FCC SAR TEST REPORT

Application No.:	SZCR2307002165AT
Applicant:	Shenzhen Jimi IoT Co., Ltd.
Address of Applicant:	3-4/F,Block A,Building#7,Shenzhen International Innovation Valley, Dashi 1st Road, Nanshan District ShenZhen China
Manufacturer:	Shenzhen Jimi IoT Co., Ltd.
Address of Manufacturer:	3-4/F,Block A,Building#7,Shenzhen International Innovation Valley, Dashi 1st Road, Nanshan District ShenZhen China
Factory:	Huizhou Newthinking Electronics Co., Ltd.
Address of Factory:	The third&sixth floor, 1&2 Factory Buildings, Jimi Industrial Park, No.101 Jinfu Road, Xiaojinkou street, Huicheng District, Huizhou
Product Name:	LTEM Mini GPS Tracker
Model No.(EUT):	Qbit M, PL600, PL601, PL602, GT601, GT602, P6400, LCT1, LCT2, LCT3, LCT4, LCT5, LCT6, LCT7, LCT8, LCT9, LCT10, LCT11, LCT12, LCT13, LCT14, LCT15, LCT16, LCT17, LCT18, LCT19, LCT20, A41 ♣
♣	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade Mark:	Jimi
FCC ID:	2AMLF-PL600
Standards:	FCC 47CFR §2.1093
Date of Receipt:	2023-10-19
Date of Test:	2023-10-20 to 2023-11-30
Date of Issue:	2023-12-05
Test conclusion:	**PASS ***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Keny Xu
EMC Laboratory Manager

REVISION HISTORY

Version	Chapter	Date	Modifier	Remark
01		2023-12-05		Original

Authorized for issue by:				
		Roman Pan **Roman Pan/Project Engineer**		
		Eric Fu **Eric Fu/Reviewer**		

TEST SUMMARY

Frequency Band	Maximum Reported SAR(W/kg)
	Body-worn
LTE Band 5	0.36
LTE Band 12	0.19
LTE Band 13	0.21
LTE Band 25/2	1.24
LTE Band 26	0.36
LTE Band 66/4	**1.32**
WI-FI (2.4GHz)	<0.10
BT	0.28
SAR Limited(W/kg)	1.6
Maximum Simultaneous Transmission SAR (W/kg)	
Scenario	Body-worn
Sum SAR	1.585
SPLSR	/
SPLSR Limited	0.04

According to TCB workshop (Overlapping LTE Bands): SAR in LTE band 2 (frequency range: 1850-1910 MHz) is covered by LTE band 25 (frequency range: 1850-1915 MHz). The SAR in LTE band 4 (frequency range: 1710-1755 MHz) is covered by LTE band 66 (frequency range: 1710-1780 MHz). Because the frequency range is similar, the maximum tuning limit is the same, and the channel bandwidth and other operating parameters for the smaller band is fully supported by the larger band.

Declaration of EUT Family Grouping:

Model No.: Qbit M, PL600, PL601, PL602, GT601, GT602, P6400, LCT1, LCT2, LCT3, LCT4, LCT5, LCT6, LCT7, LCT8, LCT9, LCT10, LCT11, LCT12, LCT13, LCT14, LCT15, LCT16, LCT17, LCT18, LCT19, LCT20, A41

Only the model Qbit M was tested, since according to the declaration from the applicant, the electrical circuit design, PCB layout, components used and internal wiring and functions were identical for the above models, with only difference on model No..

This EUT include LTE module which has got certified, FCC ID of LTE module is 2ANPO00NRF9160.

CONTENTS

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国·广东·深圳市南山区科技园中区M-10栋1号厂房 邮编:518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国·广东·深圳市南山区科技园中区M-10栋1号厂房 邮编:518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

1 General Information

1.1 General Description of EUT

Device Type :	portable device		
Exposure Category:	uncontrolled environment / general population		
Product Name:	LTEM Mini GPS Tracker		
Model No.(EUT):	Qbit M, PL600, PL601, PL602, GT601, GT602, P6400, LCT1, LCT2, LCT3, LCT4, LCT5, LCT6, LCT7, LCT8, LCT9, LCT10, LCT11, LCT12, LCT13, LCT14, LCT15, LCT16, LCT17, LCT18, LCT19, LCT20, A41		
FCC ID:	2AMLF-NRF9160		
Trade Mark:	Jimi		
Product Phase:	Identical Prototype		
Hardware Version:	P6400_WFBJ_V1.0.4_20230908.1530		
Software Version:	P6400_MB_V1.1		
S/N:	351358812130463		
HVIN:	PL600		
FVIN:	P6400_MB_V1.1		
Antenna Type:	PIFA antenna		
Antenna Gain:	BLE: 1.35dBi 2.4G Wi-Fi: 1.35dBi LTE Band2: 1.3dBi; LTE Band4: -0.31dBi; LTE Band5: -5.8dBi LTE Band12: -3.31dBi; LTE Band13: -5.53dBi; LTE Band25: 1.3dBi; LTE Band26: -5.58dBi; LTE Band66: -0.67dBi		
Device Operating Configurations:			
Modulation Mode:	**LTE**: For Cat M1: QPSK,16QAM, For Cat NB: QPSK, BPSK **Wi-Fi**: DSSS **BLE**: GFSK		
Device Class:	B		
GPRS Multi-slots Class:	12	EGPRS Multi-slots Class:	12
HSDPA UE Category:	14	HSUPA UE Category:	6
DC-HSDPA UE Category:			
Frequency Bands:	Band	Tx (MHz)	Rx (MHz)
	LTE Band 2	1850-1910	1930-1990
	LTE Band 4	1710-1755	2110-2155
	LTE Band 5	824-849	869-894
	LTE Band 12	699-716	729-746
	LTE Band 13	777-787	746-756
	LTE Band 25	1850-1915	1930-1995
	LTE Band 26	814-849	859-894
	LTE Band 66	1710-1780	2110-2200
	Bluetooth	2402-2480	2402-2480
	Wi-Fi(2.4GHz)	2412~2462	2412~2462
Battery Information:	Model:	HT543232	
	Normal Voltage:	3.7Vdc	

	Rated capacity:	650mAh, 2.41Wh
	Battery Type:	Rechargeable Li-ion Battery
	Manufacturer	Huizhou Everpower Technology CO.,LTD

Note: *Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information, SGS is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.
Remark:
As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.
CAT-M1 And NB-IOT Frequency Bands consistent.

1.2 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

1.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI (Member No. 1937)

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC –Designation Number: CN1336

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

• Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

1.4 Test Specification

Identity	Document Title
FCC 47CFR §2.1093	Radiofrequency Radiation Exposure Evaluation: Portable Devices
ANSI/IEEE C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.
IEEE 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
KDB 447498 D01	General RF Exposure Guidance v06
KDB 941225 D05	SAR for LTE Devices v02r05
KDB 941225 D05A	LTE Rel.10 KDB Inquiry Sheet v01r02
KDB 865664 D01	SAR Measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02	RF Exposure Reporting v01r02
KDB 248227 D01	SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS

1.5 RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain*Trunk)	1.60 mW/g	8.00 mW/g
Spatial Average SAR** (Whole Body)	0.08 mW/g	0.40 mW/g
Spatial Peak SAR*** (Hands/Feet/Ankle/Wrist)	4.00 mW/g	20.00 mW/g

Notes:

* The Spatial Peak value of the SAR averaged over any 1 gram 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.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation.)

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国・广东・深圳市南山区科技园中区M-10栋1号厂房 邮编:518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

2 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

Table 1： The Ambient Conditions

3 SAR Measurements System Configuration

3.1 The SAR Measurement System

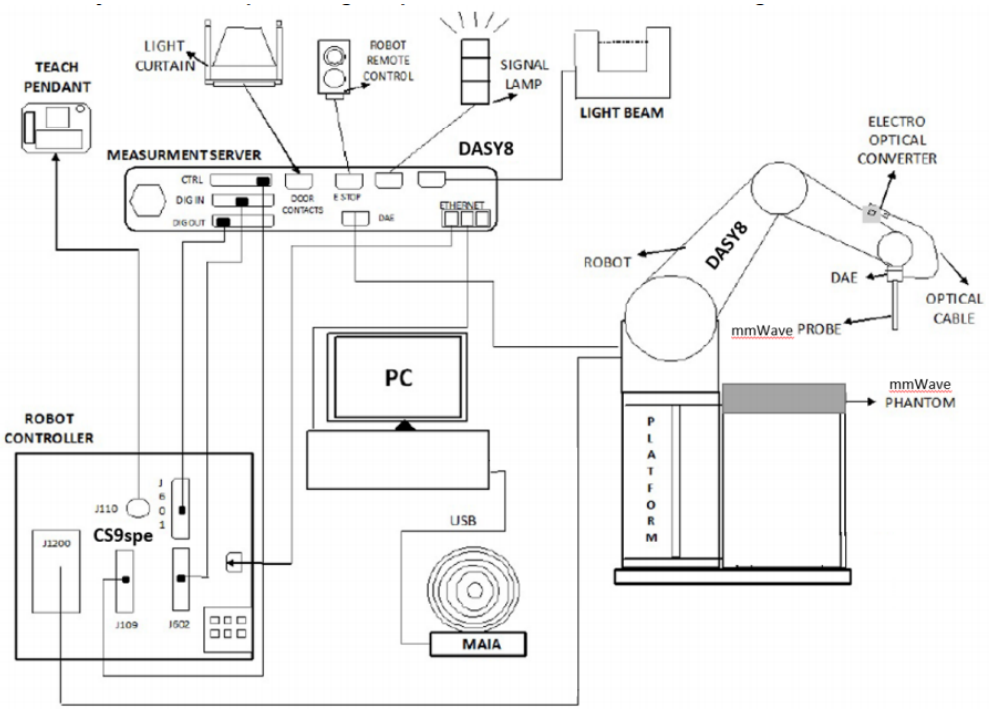
This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ (|Ei|2)/ ρ where σ and ρ are the conductivity and mass density of the tissue-Simulate.

The DASY system for performing compliance tests consists of the following items:
A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software .An arm extension for accommodation the data acquisition electronics (DAE).

A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.



F-1. SAR Measurement System Configuration

- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows system.
- DASY software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand, right-hand and Body Worn usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to be validating the proper functioning of the system.

3.2 Isotropic E-field Probe EX3DV4

	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

3.3 Data Acquisition Electronics (DAE)

Model	DAE
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detectors for mechanical surface detection and emergency robot stop.
Measurement Range	-100 to +300 mV (16-bit resolution and two range settings: 4mV,400mV)
Input Offset Voltage	< 5µV (with auto zero)
Input Bias Current	< 50 f A
Dimensions	60 x 60 x 68 mm

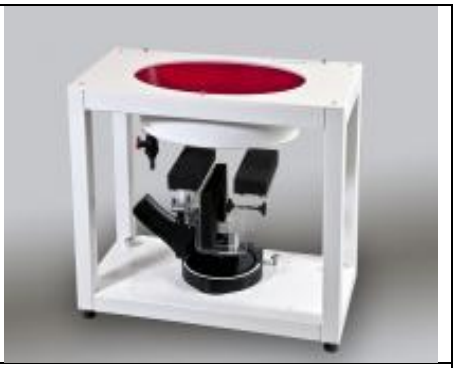
3.4 SAM Twin Phantom

Material	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions (incl. Wooden Support)	Length: 1000 mm Width: 500 mm Height: adjustable feet
Filling Volume	approx. 25 liters
Wooden Support	SPEAG standard phantom table

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left- and right-hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0 but has reinforced top structure.

3.5 ELI Phantom

Material	Vinylester, glass fiber reinforced (VE-GF)	
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)	
Shell Thickness	2.0 ± 0.2 mm (bottom plate)	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	
Filling Volume	approx. 30 liters	
Wooden Support	SPEAG standard phantom table	

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEEE 1528 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.

ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4 but has reinforced top structure.

3.6 Device Holder for Transmitters

F-2. **Device Holder for Transmitters**

- The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centres for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.
- The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity ε=3 and loss tangent δ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

3.7 Measurement procedure

3.7.1 Scanning procedure

Step 1: Power reference measurement

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure.

Step 2: *Area scan*

The SAR distribution at the exposed side of the head was measured at a distance of 4mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm*15mm or 12mm*12mm or 10mm*10mm.Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

Step 3: *Zoom scan*

Around this point, a volume of 32mm*32mm*30mm (f≤2GHz), 30mm*30mm*30mm (f for 2-3GHz) and 24mm*24mm*22mm (f for 5-6GHz) was assessed by measuring 5x5x7 points (f≤2GHz), 7x7x7 points (f for 2-3GHz) and 7x7x12 points (f for 5-6GHz). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

The data at the surface was extrapolated, since the centre of the dipoles is 2.0mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. (This can be variable. Refer to the probe specification).The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The volume was integrated with the trapezoidal algorithm. One thousand points were interpolated to calculate the average. All neighbouring volumes were evaluated until no neighboring volume with a higher average value was found.

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std. 1528-2013.

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

Step 4: Power reference measurement (drift)

The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The indicated drift is mainly the variation of the DUT's output power and should vary max. ± 5 %

3.7.2 Data Storage

The DASY software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DAE". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated. The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [m W/g], [m W/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

3.7.3 Data Evaluation by SEMCAD

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

Probe parameters:	- Sensitivity	Normi, ai0, ai1, ai2
	- Conversion factor	ConvFi
	- Diode compression point	Dcpi
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	ε
	- Density	ρ

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

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf / dcp_i$$

With Vi = compensated signal of channel i (i = x, y, z)
Ui = input signal of channel i (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)
dcp i = diode compression point (DASY parameter)

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

E-field probes:

$$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$

H-field probes:

$$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$$

With Vi = compensated signal of channel i (i = x, y, z)
Normi = sensor sensitivity of channel I (i = x, y, z)
[mV/(V/m)2] for E-field Probes
ConvF = sensitivity enhancement in solution
aij = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
Ei = electric field strength of channel i in V/m
Hi = magnetic field strength of channel i in A/m

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

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

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

$$SAR = (Etot^2 \cdot \sigma) / (\varepsilon \cdot 1000)$$

with SAR = local specific absorption rate in mW/g
Etot = total field strength in V/m
σ= conductivity in [mho/m] or [Siemens/m]
ε= equivalent tissue density in g/cm3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}{}^2{}_2 / 3770 \text{ or } \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with Ppwe = equivalent power density of a plane wave in mW/cm2
Etot = total electric field strength in V/m
Htot = total magnetic field strength in A/m

4 SAR measurement variability and uncertainty

4.1 SAR measurement variability

Per KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

2) When the original highest measured SAR is ⩾ 0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ⩾ 1.45 W/kg (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ⩾1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

4.2 SAR measurement uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

5 Description of Test Position

5.1 Body-worn accessory exposure condition

According to KDB 447498 D01 devices that are designed to operate on the body of users using lanyards and straps or without requiring additional body-worn accessories must be tested for SAR compliance using a conservative minimum test separation distance ≤ 5 mm to support compliance. In this report, we use a testing distance of 5 mm.

6 SAR System Verification Procedure

6.1 Tissue Simulate Liquid

6.1.1 Recipes for Tissue Simulate Liquid

The bellowing tables give the recipes for tissue simulating liquids to be used in different frequency bands：

Ingredients (% by weight)	Frequency (MHz)				
	450	700-900	1750-2000	2300-2500	2500-2700
Water	38.56	40.30	55.24	55.00	54.92
Salt (NaCl)	3.95	1.38	0.31	0.2	0.23
Sucrose	56.32	57.90	0	0	0
HEC	0.98	0.24	0	0	0
Bactericide	0.19	0.18	0	0	0
Tween	0	0	44.45	44.80	44.85
Salt: 99⁺% Pure Sodium Chloride Water: De-ionized, 16 MΩ⁺ resistivity Tween: Polyoxyethylene (20) sorbitan monolaurate			Sucrose: 98⁺% Pure Sucrose HEC: Hydroxyethyl Cellulose		
HSL5GHz is composed of the following ingredients：(Manufactured by SPEAG) Water：50-65% Mineral oil：10-30% Emulsifiers：8-25% Sodium salt：0-1.5%					

Table 2： Recipe of Tissue Simulate Liquid

6.1.2 Measurement for Tissue Simulate Liquid

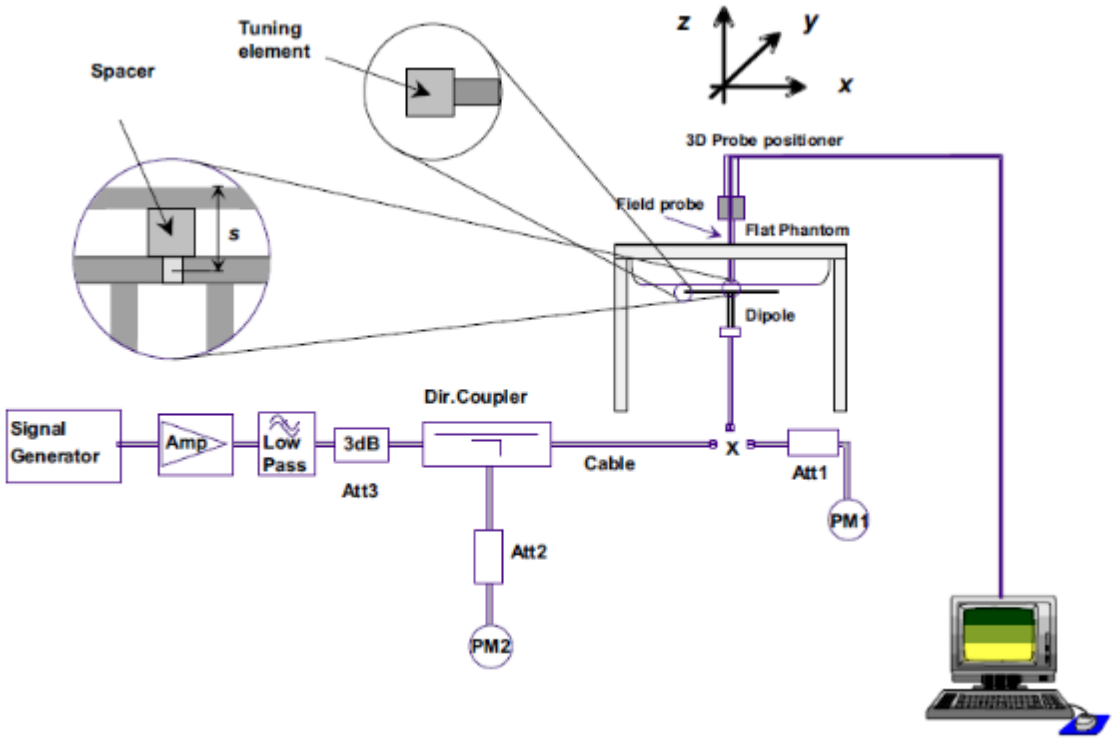
The Conductivity (σ) and Permittivity (ε_r) are listed in bellow table. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was 22±2°C.

Measurement for Tissue Simulate Liquid									
Tissue Type	Measured Frequency（MHz）	Measured Tissue		Target Tissue (±5%)		Deviation (Within ±5%)		Liquid Temp. (℃)	Test Date
		ε_r	σ(S/m)	ε_r	σ(S/m)	ε_r	σ(S/m)		
750 Head	750	43.900	0.882	41.90	0.89	4.77%	-0.90%	22.0	2023/10/23
835 Head	835	43.400	0.927	41.50	0.90	4.58%	3.00%	22.1	2023/10/22
1750 Head	1750	40.500	1.350	40.10	1.37	1.00%	-1.46%	21.9	2023/10/20
1950 Head	1950	40.100	1.390	40.00	1.40	0.25%	-0.71%	22.2	2023/10/21
2450 Head	2450	40.500	1.800	39.20	1.80	3.32%	0.00%	22.1	2023/10/24

Table 3： Measurement result of Tissue electric parameters

6.2 SAR System Check

The microwave circuit arrangement for system Check is sketched in F-3. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the following table (A power level of 250mW (below 3GHz) or 100mW (3-6GHz) was input to the dipole antenna). During the tests, the ambient temperature of the laboratory was in the range 22±2°C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15±0.5 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



F-3. the microwave circuit arrangement used for SAR system check

6.2.1 Justification for Extended SAR Dipole Calibrations

1) Referring to KDB 865664 D01 requirements for dipole calibration, instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.
a) There is no physical damage on the dipole.
b) System check with specific dipole is within 10% of calibrated value.
c) Return-loss is within 10% of calibrated measurement.
d) Impedance is within 5Ω from the previous measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

6.2.2 Summary System Check Result(s)

SAR System Validation Result(s)											
Validation Kit		Measured SAR 250mW	Measured SAR 250mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W)	Target SAR (normalized to 1W)	Deviation (Within ±10%)		Liquid Temp. (℃)	Test Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)	1-g(W/kg)	10-g(W/kg)		
D750V3	Head	2.05	1.35	8.20	5.40	8.37	5.53	-2.03%	-2.35%	22.0	2023/10/23
D835V2	Head	2.46	1.63	9.84	6.52	9.53	6.29	3.25%	3.66%	22.1	2023/10/22
D1750V2	Head	8.89	4.82	35.56	19.28	36.60	19.30	-2.84%	-0.10%	21.9	2023/10/20
D1950V3	Head	10.40	5.35	41.60	21.40	40.50	20.80	2.72%	2.88%	22.2	2023/10/21
D2450V2	Head	14.20	6.59	56.80	26.36	52.20	24.30	8.81%	8.48%	22.1	2023/10/24

Table 4： SAR System Check Result

6.2.3 Detailed System Check Results

Please see the Appendix A

7 Test results and Measurement Data

7.1 Operation Configurations

7.1.1 LTE NB-IoT Test Configuration

Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The Radio Communication Analyzer was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration.

A) Spectrum Plots for RB Configurations

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

B) MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.521-1 Section 6.2.3F.3 under Table 6.2.3F.3-1.

Modulation	QPSK		
Tone positions for 3 Tones allocation	0-2	3-5 and 6-8	9-11
MPR	≤ 0.5 dB	0 dB	≤ 0.5 dB
Tone positions for 6 Tones allocation	0-5 and 6-11		
MPR	≤ 1 dB	≤ 1 dB	
Tone positions for 12 Tones allocation	0-11		
MPR	≤ 2 dB		

7.1.2 LTE CAT-M1 Test Configuration

Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The Radio Communication Analyzer was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration.

B) Spectrum Plots for RB Configurations

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

B) MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.521-1 Section 6.2.3EA under Table 6.2.3EA-2.

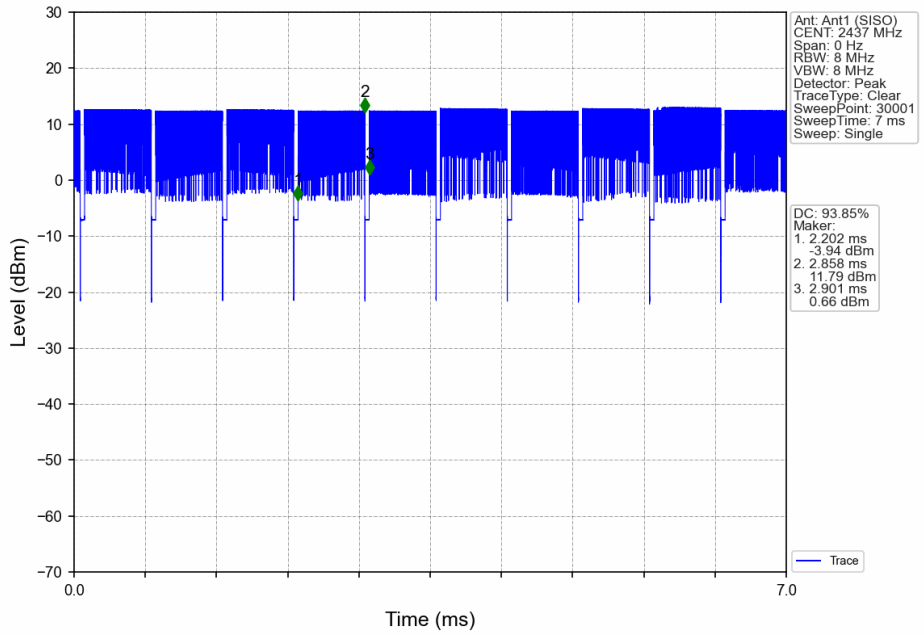
Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	>2	>2	>3	>5	-	-	≤ 1
QPSK	>5	>5	-	-	-	-	≤ 2
16 QAM	≤ 2	≤ 2	>3	>5	-	-	≤ 1
16QAM	>2	>2	>5	-	-	-	≤ 2

7.1.1 Wi-Fi Test Configuration

A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement.

7.1.1.1 Duty cycle

2.4G Wi-Fi duty cycle: 93.85%

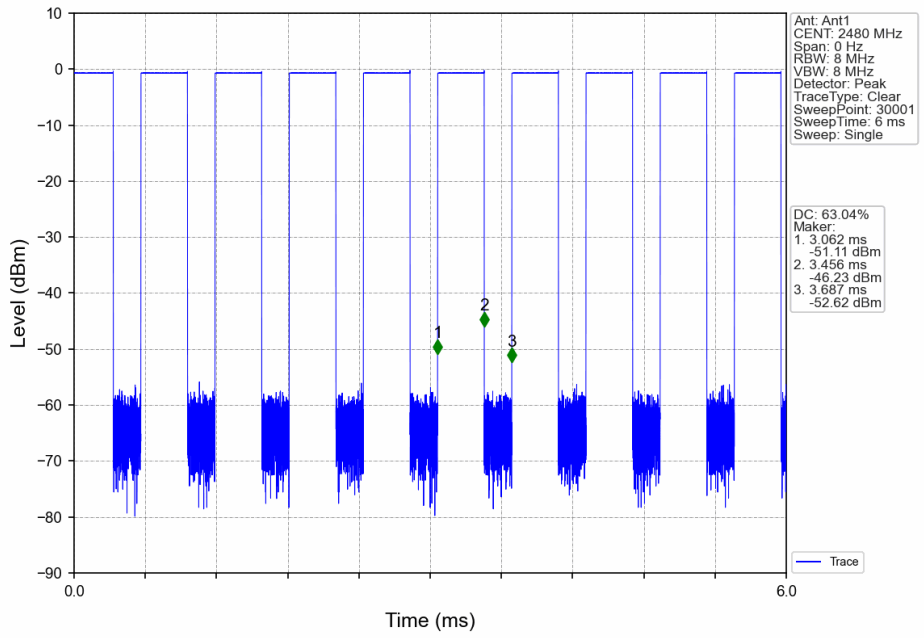


7.1.2 BluetoothTest Configuration

For the Bluetooth SAR tests, a communication link is set up with the test mode software for BT mode test. Bluetooth USES frequency hopping technology to divide the transmitted data into packets and transmit the packets respectively through 79 designated Bluetooth channels, 1MHz Bandwidth, frequency hops at 1600 hops/second per the Bluetooth standard. The Radio Frequency Channel Number (RFCN) is allocated to 0, 39 and 78 respectively in the case of 2402~2480 MHz during the test at each test frequency channel, the EUT is operated at the RF continuous emission mode.

7.1.2.1 Duty cycle

Bluetooth duty cycle: 63.04%



7.1.3 DUT Antenna Locations

Please Refer to Appendix D

8 Test Result

8.1 Measurement of RF conducted Power

8.1.1 SAR Result of 2.4G Wifi

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Average Power (dBm) Main Ant	Tune up
802.11b	1	2412	1	11.38	12
	6	2437		11.33	12
	11	2462		11.15	12

8.1.2 SAR Result of Bluetooth

BLE_1Mbps			Average Conducted Power (dBm)	Tune up
Modulation	Channel	Frequency(MHz)		
GFSK	0	2402	0.02	1
	19	2440	0.21	1
	39	2480	-0.52	1

8.1.3 Conducted Power of LTE CAT-M1

LTE Band 2				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel 18607	Channel 18900	Channel 19193	Tune up
1.4MHz	QPSK	1	0	22.87	22.93	22.88	23.00
		6	0	20.64	20.9	21.08	22.00
	16QAM	1	0	21.38	21.97	21.77	22.00
		5	0	20.91	19.87	20.92	21.50
Bandwidth	Modulation	RB size	RB offset	Channel 18615	Channel 18900	Channel 19185	Tune up
3MHz	QPSK	1	0	22.65	22.78	22.87	23.00
		6	0	20.72	20.94	21.17	22.00
	16QAM	1	0	21.33	21.89	21.87	22.00
		5	0	20.82	20.09	20.96	21.50
Bandwidth	Modulation	RB size	RB offset	Channel 18625	Channel 18900	Channel 19175	Tune up
5MHz	QPSK	1	0	22.75	22.99	22.79	23.00
		6	0	20.9	20.97	21.07	22.00
	16QAM	1	0	21.43	21.88	21.95	22.00
		5	0	20.83	19.93	21.07	21.50
Bandwidth	Modulation	RB size	RB offset	Channel 18650	Channel 18900	Channel 19150	Tune up
10MHz	QPSK	1	0	22.57	22.92	22.71	23.00
		6	0	20.81	21	21.27	22.00
	16QAM	1	0	21.45	21.76	21.89	22.00
		5	0	20.66	19.88	21.1	21.50
Bandwidth	Modulation	RB size	RB offset	Channel 18675	Channel 18900	Channel 19125	Tune up
15MHz	QPSK	1	0	22.57	22.8	22.85	23.00
		6	0	20.65	20.91	21.03	22.00
	16QAM	1	0	21.44	21.97	21.77	22.00
		5	0	20.89	20.02	21.02	21.50
Bandwidth	Modulation	RB size	RB offset	Channel 18700	Channel 18900	Channel 19100	Tune up
20MHz	QPSK	1	0	22.77	22.83	22.89	23.00
		6	0	20.64	21.15	21.24	22.00
	16QAM	1	0	21.4	21.79	21.71	22.00
		5	0	20.81	20.05	21.17	21.50

LTE Band 4				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel 19957	Channel 20175	Channel 20393	Tune up
1.4MHz	QPSK	1	0	22.96	22.74	22.98	23.00
		6	0	20.58	20.99	21	22.00
	16QAM	1	0	21.59	21.67	21.72	22.00
		5	0	20.95	20.79	20.21	21.00
Bandwidth	Modulation	RB size	RB offset	Channel 19965	Channel 20175	Channel 20385	Tune up
3MHz	QPSK	1	0	22.69	22.86	22.83	23.00
		6	0	20.5	20.9	20.82	22.00
	16QAM	1	0	21.84	21.67	21.43	22.00
		5	0	20.81	20.97	20.12	21.00
Bandwidth	Modulation	RB size	RB offset	Channel 19975	Channel 20175	Channel 20375	Tune up
5MHz	QPSK	1	0	22.81	22.81	22.91	23.00
		6	0	20.56	20.82	21.09	22.00
	16QAM	1	0	21.61	21.56	21.55	22.00
		5	0	20.91	20.99	20.08	21.00
Bandwidth	Modulation	RB size	RB offset	Channel 20000	Channel 20175	Channel 20350	Tune up
10MHz	QPSK	1	0	22.77	22.75	22.97	23.00
		6	0	20.54	20.92	20.79	22.00
	16QAM	1	0	21.86	21.79	21.74	22.00
		5	0	20.94	20.71	20.21	21.00
Bandwidth	Modulation	RB size	RB offset	Channel 20025	Channel 20175	Channel 20325	Tune up
15MHz	QPSK	1	0	22.79	22.94	22.98	23.00
		6	0	20.68	20.84	20.95	22.00
	16QAM	1	0	21.59	21.79	21.48	22.00
		5	0	20.96	20.99	20.32	21.00
Bandwidth	Modulation	RB size	RB offset	Channel 20050	Channel 20175	Channel 20300	Tune up
20MHz	QPSK	1	0	22.88	22.9	22.85	23.00
		6	0	20.63	20.98	20.93	22.00
	16QAM	1	0	21.76	21.67	21.52	22.00
		5	0	20.98	20.95	20.32	21.00

LTE Band 5				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel 20407	Channel 20525	Channel 20643	Tune up
1.4MHz	QPSK	1	0	22.93	22.84	22.8	24.00
		6	0	20.56	20.86	21.05	23.00
	16QAM	1	0	21.7	21.62	21.69	23.00
		5	0	20.93	20.75	20.16	22.00
Bandwidth	Modulation	RB size	RB offset	Channel 20415	Channel 20525	Channel 20635	Tune up
3MHz	QPSK	1	0	22.97	22.99	22.99	24.00
		6	0	20.75	21.07	21.08	23.00
	16QAM	1	0	21.89	21.86	21.73	23.00
		5	0	21.08	20.99	20.33	22.00
Bandwidth	Modulation	RB size	RB offset	Channel 20425	Channel 20525	Channel 20625	Tune up
5MHz	QPSK	1	0	22.94	22.71	22.84	24.00
		6	0	20.6	20.92	20.92	23.00
	16QAM	1	0	21.68	21.6	21.49	23.00
		5	0	20.9	20.8	20.07	22.00
Bandwidth	Modulation	RB size	RB offset	Channel 20450	Channel 20525	Channel 20600	Tune up
10MHz	QPSK	1	0	22.92	22.84	22.93	24.00
		6	0	20.49	21	20.96	23.00
	16QAM	1	0	21.67	21.8	21.69	23.00
		5	0	20.91	20.97	20.05	22.00

LTE FDD Band 12				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel 23017	Channel 23095	Channel 23173	Tune up
1.4MHz	QPSK	1	0	22.51	22.74	22.44	24.00
		6	0	21.42	21.55	21.57	23.00
	16QAM	1	0	21.37	21.51	21.4	23.00
		5	0	21.38	21.67	21.51	23.00
Bandwidth	Modulation	RB size	RB offset	Channel 23025	Channel 23095	Channel 23165	Tune up
3MHz	QPSK	1	0	22.48	22.5	22.52	24.00
		6	0	21.45	21.45	21.48	23.00
	16QAM	1	0	21.33	21.62	21.5	23.00
		5	0	21.58	21.65	21.42	23.00

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23035	23095	23155	
5MHz	QPSK	1	0	22.35	22.75	22.53	24.00
		6	0	21.52	21.45	21.47	23.00
	16QAM	1	0	21.55	21.32	21.55	23.00
		5	0	21.67	21.53	21.48	23.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23060	23095	23130	
10MHz	QPSK	1	0	22.65	22.74	22.7	24.00
		6	0	21.65	21.73	21.71	23.00
	16QAM	1	0	21.58	21.62	21.67	23.00
		5	0	21.67	21.68	21.71	23.00

LTE FDD Band 13				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23205	23230	23255	
5MHz	QPSK	1	0	22.81	22.9	22.8	24.00
		6	0	20.53	20.99	21.05	23.00
	16QAM	1	0	21.67	21.76	21.7	23.00
		5	0	20.87	20.85	20.18	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				NA	23230	NA	
10MHz	QPSK	1	0	/	22.83	/	24.00
		6	0	/	20.93	/	23.00
	16QAM	1	0	/	21.82	/	23.00
		5	0	/	20.70	/	22.00

LTE Band 25				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26047	26365	26683	
1.4MHz	QPSK	1	0	22.79	22.87	22.89	23.00
		6	0	20.77	20.92	21.00	22.00
	16QAM	1	0	21.35	21.77	21.72	22.00
		5	0	20.72	19.79	21.07	21.50
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26055	26365	26675	
3MHz	QPSK	1	0	22.86	22.99	22.98	23.00
		6	0	20.91	21.14	21.28	22.00
	16QAM	1	0	21.52	21.99	21.94	22.00
		5	0	20.91	20.08	21.22	21.50

Bandwidth	Modulation	RB size	RB offset	Channel 26065	Channel 26365	Channel 26665	Tune up
5MHz	QPSK	1	0	22.81	22.69	22.77	23.00
		6	0	20.79	20.88	21.18	22.00
	16QAM	1	0	21.26	21.77	21.90	22.00
		5	0	20.86	20.00	20.97	21.50
Bandwidth	Modulation	RB size	RB offset	Channel 26090	Channel 26365	Channel 26640	Tune up
10MHz	QPSK	1	0	22.78	22.69	22.88	23.00
		6	0	20.89	21.05	21.28	22.00
	16QAM	1	0	21.22	21.85	21.78	22.00
		5	0	20.74	19.83	21.12	21.50
Bandwidth	Modulation	RB size	RB offset	Channel 26115	Channel 26365	Channel 26615	Tune up
15MHz	QPSK	1	0	22.8	22.84	22.76	23.00
		6	0	20.78	20.91	21.22	22.00
	16QAM	1	0	21.51	21.81	21.9	22.00
		5	0	20.76	19.79	20.98	21.50
Bandwidth	Modulation	RB size	RB offset	Channel 26140	Channel 26365	Channel 26590	Tune up
20MHz	QPSK	1	0	22.85	22.85	22.89	23.00
		6	0	20.84	21.01	20.98	22.00
	16QAM	1	0	21.37	21.9	21.76	22.00
		5	0	20.88	19.97	21.21	21.50

LTE FDD Band 26				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel 26697	Channel 26865	Channel 27033	Tune up
1.4MHz	QPSK	1	0	22.8	23	22.9	24.00
		6	0	20.56	20.98	21.06	23.00
	16QAM	1	0	21.82	21.63	21.62	23.00
		5	0	20.9	20.84	20.23	22.00
Bandwidth	Modulation	RB size	RB offset	Channel 26705	Channel 26865	Channel 27025	Tune up
3MHz	QPSK	1	0	22.68	22.74	22.87	24.00
		6	0	20.69	20.99	21.02	23.00
	16QAM	1	0	21.65	21.83	21.72	23.00
		5	0	20.78	20.76	20.16	22.00
Bandwidth	Modulation	RB size	RB offset	Channel 26715	Channel 26865	Channel 27015	Tune up
5MHz	QPSK	1	0	22.69	22.8	22.76	24.00
		6	0	20.49	20.78	20.97	23.00

	16QAM	1	0	21.65	21.8	21.49	23.00
		5	0	20.87	21	20.24	22.00
Bandwidth	Modulation	RB size	RB offset	Channel 26740	Channel 26865	Channel 26990	Tune up
10MHz	QPSK	1	0	22.92	22.98	22.81	24.00
		6	0	20.61	20.9	21.05	23.00
	16QAM	1	0	21.85	21.71	21.43	23.00
		5	0	20.9	20.77	20.34	22.00
Bandwidth	Modulation	RB size	RB offset	Channel 26765	Channel 26865	Channel 26965	Tune up
15MHz	QPSK	1	0	22.73	22.73	22.93	24.00
		6	0	20.49	20.81	20.79	23.00
	16QAM	1	0	21.76	21.58	21.48	23.00
		5	0	20.98	20.99	20.04	22.00

LTE Band 66				**Conducted Power(dBm)**			
Bandwidth	Modulation	RB size	RB offset	Channel 131979	Channel 132322	Channel 132665	Tune up
1.4MHz	QPSK	1	0	22.68	22.81	22.68	23.00
		6	0	21.68	21.79	21.77	22.00
	16QAM	1	0	21.38	21.69	21.77	22.00
		5	0	20.62	20.61	20.78	21.00
Bandwidth	Modulation	RB size	RB offset	Channel 131987	Channel 132322	Channel 132657	Tune up
3MHz	QPSK	1	0	22.67	22.62	22.86	23.00
		6	0	21.8	21.73	21.6	22.00
	16QAM	1	0	21.47	21.67	21.47	22.00
		5	0	20.54	20.68	20.54	21.00
Bandwidth	Modulation	RB size	RB offset	Channel 131997	Channel 132322	Channel 132647	Tune up
5MHz	QPSK	1	0	22.77	22.88	22.88	23.00
		6	0	21.79	21.93	21.82	22.00
	16QAM	1	0	21.68	21.83	21.77	22.00
		5	0	20.72	20.87	20.83	21.00
Bandwidth	Modulation	RB size	RB offset	Channel 132022	Channel 132322	Channel 132622	Tune up
10MHz	QPSK	1	0	22.72	22.87	22.8	23.00
		6	0	21.61	21.91	21.82	22.00
	16QAM	1	0	21.56	21.58	21.6	22.00
		5	0	20.63	20.77	20.82	21.00
Bandwidth	Modulation	RB size	RB offset	Channel 132047	Channel 132322	Channel 132597	Tune up

15MHz	QPSK	1	0	22.63	22.69	22.85	23.00
		6	0	21.51	21.75	21.65	22.00
	16QAM	1	0	21.38	21.69	21.5	22.00
		5	0	20.65	20.77	20.67	21.00
Bandwidth	Modulation	RB size	RB offset	Channel 132072	Channel 132322	Channel 132572	Tune up
20MHz	QPSK	1	0	22.5	22.84	22.84	23.00
		6	0	21.51	21.85	21.54	22.00
	16QAM	1	0	21.46	21.72	21.7	22.00
		5	0	20.68	20.64	20.79	21.00

Table 5： Conducted Power of LTE CAT-M1

8.1.4 Conducted Power of NB-IOT

LTE Band 2							
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
18602	**1850.2**	BPSK	3.75	1	0	22.83	24.0
				1	47	22.92	24.0
			15	1	0	22.92	24.0
				1	11	22.86	24.0
		QPSK	3.75	1	0	22.98	24.0
				1	47	22.88	24.0
			15	1	0	22.88	24.0
				1	11	22.92	24.0
				3	0	22.88	24.0
				3	6	23.12	24.0
				6	0	22.06	23.0
				6	6	22.15	23.0
				12	0	21.20	22.0
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
18900	**1880**	BPSK	3.75	1	0	22.38	24.0
				1	47	22.46	24.0
			15	1	0	22.37	24.0
				1	11	22.23	24.0
		QPSK	3.75	1	0	22.32	24.0
				1	47	22.31	24.0
			15	1	0	22.29	24.0
				1	11	22.23	24.0
				3	0	21.28	24.0
				3	6	21.30	24.0
				6	0	21.23	23.0
				6	6	19.80	21.0
				12	0	19.81	21.0
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
19198	**1909.8**	BPSK	3.75	1	0	23.19	24.0
				1	47	23.18	24.0
			15	1	0	23.24	24.0
				1	11	23.17	24.0
		QPSK	3.75	1	0	23.21	24.0
				1	47	23.20	24.0

			15	1	0	23.21	24.0
				1	11	23.28	24.0
				3	0	23.07	24.0
				3	6	23.78	24.0
				6	0	22.37	23.0
				6	6	22.58	23.0
				12	0	21.46	22.0

LTE Band 4							
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
19952	**1710.2**	BPSK	3.75	1	0	22.82	24.0
				1	47	22.75	24.0
			15	1	0	22.95	24.0
				1	11	22.93	24.0
		QPSK	3.75	1	0	23.00	24.0
				1	47	22.83	24.0
			15	1	0	22.98	24.0
				1	11	22.95	24.0
				3	0	22.70	24.0
				3	6	23.17	24.0
				6	0	22.09	23.5
				6	6	22.17	23.5
				12	0	21.20	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
20175	**1732.5**	BPSK	3.75	1	0	22.72	24.0
				1	47	22.52	24.0
			15	1	0	22.69	24.0
				1	11	22.70	24.0
		QPSK	3.75	1	0	22.59	24.0
				1	47	22.48	24.0
			15	1	0	22.69	24.0
				1	11	22.69	24.0
				3	0	22.32	24.0
				3	6	22.36	24.0
				6	0	21.56	23.5
				6	6	21.35	23.5
				12	0	20.54	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
20398	**1754.8**	BPSK	3.75	1	0	23.08	24.0

				1	47	23.01	24.0
			15	1	0	23.00	24.0
				1	11	23.00	24.0
		QPSK	3.75	1	0	22.97	24.0
				1	47	22.98	24.0
			15	1	0	23.10	24.0
				1	11	22.93	24.0
				3	0	22.96	24.0
				3	6	23.21	24.0
				6	0	22.17	23.5
				6	6	22.38	23.5
				12	0	21.18	22.5

LTE Band 5							
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
20402	**824.2**	BPSK	3.75	1	0	23.12	24.0
				1	47	23.04	24.0
			15	1	0	23.12	24.0
				1	11	23.11	24.0
		QPSK	3.75	1	0	23.14	24.0
				1	47	23.07	24.0
			15	1	0	23.17	24.0
				1	11	23.16	24.0
				3	0	22.99	24.0
				3	6	23.31	24.0
				6	0	22.31	23.5
				6	6	22.38	23.5
				12	0	21.37	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
20525	**836.5**	BPSK	3.75	1	0	23.05	24.0
				1	47	22.98	24.0
			15	1	0	23.04	24.0
				1	11	23.00	24.0
		QPSK	3.75	1	0	23.04	24.0
				1	47	22.96	24.0
			15	1	0	23.03	24.0
				1	11	22.99	24.0
				3	0	22.71	24.0
				3	6	23.16	24.0
				6	0	21.80	23.5

				6	6	21.81	23.5
				12	0	20.78	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
20648	**848.8**	BPSK	3.75	1	0	23.01	24.0
				1	47	23.04	24.0
			15	1	0	23.15	24.0
				1	11	23.10	24.0
		QPSK	3.75	1	0	23.00	24.0
				1	47	23.03	24.0
			15	1	0	23.18	24.0
				1	11	23.10	24.0
				3	0	22.98	24.0
				3	6	23.34	24.0
				6	0	22.23	23.5
				6	6	22.31	23.5
				12	0	21.27	22.5

LTE Band 12							
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
23012	**699.2**	BPSK	3.75	1	0	22.84	24.0
				1	47	22.79	24.0
			15	1	0	22.95	24.0
				1	11	22.95	24.0
		QPSK	3.75	1	0	22.90	24.0
				1	47	22.81	24.0
			15	1	0	22.86	24.0
				1	11	22.94	24.0
				3	0	22.83	24.0
				3	6	23.19	24.0
				6	0	22.03	23.5
				6	6	22.13	23.5
				12	0	21.14	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
23095	**707.5**	BPSK	3.75	1	0	23.01	24.0
				1	47	23.11	24.0
			15	1	0	23.16	24.0
				1	11	23.13	24.0
		QPSK	3.75	1	0	23.01	24.0
				1	47	23.09	24.0

			15	1	0	23.15	24.0
				1	11	23.10	24.0
				3	0	22.97	24.0
				3	6	23.17	24.0
				6	0	21.97	23.5
				6	6	21.98	23.5
				12	0	20.95	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
23178	**715.8**	BPSK	3.75	1	0	22.85	24.0
				1	47	22.86	24.0
			15	1	0	22.83	24.0
				1	11	22.82	24.0
		QPSK	3.75	1	0	22.81	24.0
				1	47	22.85	24.0
			15	1	0	22.90	24.0
				1	11	22.86	24.0
				3	0	22.71	24.0
				3	6	23.16	24.0
				6	0	22.03	23.5
				6	6	22.09	23.5
				12	0	21.18	22.5

LTE Band 13							
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
23182	**777.2**	BPSK	3.75	1	0	22.97	24.0
				1	47	22.95	24.0
			15	1	0	22.96	24.0
				1	11	22.95	24.0
		QPSK	3.75	1	0	23.04	24.0
				1	47	22.95	24.0
			15	1	0	23.14	24.0
				1	11	23.12	24.0
				3	0	22.76	24.0
				3	6	23.22	24.0
				6	0	22.13	23.5
				6	6	22.21	23.5
				12	0	21.22	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
23230	**782**	BPSK	3.75	1	0	22.97	24.0

				1	47	22.85	24.0
			15	1	0	22.92	24.0
				1	11	22.89	24.0
		QPSK	3.75	1	0	22.93	24.0
				1	47	22.87	24.0
			15	1	0	22.91	24.0
				1	11	22.89	24.0
				3	0	22.66	24.0
				3	6	23.01	24.0
				6	0	21.72	23.5
				6	6	21.70	23.5
				12	0	20.74	22.5

Channel	Frequency (MHz)	Modulation	Bandwidth (kHz)	RB size	RB offset	Average Power (dBm)	Tune up
23278	786.8	BPSK	3.75	1	0	23.10	24.0
				1	47	23.03	24.0
			15	1	0	23.07	24.0
				1	11	23.05	24.0
		QPSK	3.75	1	0	23.13	24.0
				1	47	23.03	24.0
			15	1	0	23.05	24.0
				1	11	23.13	24.0
				3	0	22.90	24.0
				3	6	23.26	24.0
				6	0	22.18	23.5
				6	6	22.26	23.5
				12	0	21.29	22.5

LTE Band 25							
Channel	Frequency (MHz)	Modulation	Bandwidth (kHz)	RB size	RB offset	Average Power (dBm)	Tune up
26042	1850.2	BPSK	3.75	1	0	23.02	24.0
				1	47	22.96	24.0
			15	1	0	22.97	24.0
				1	11	22.95	24.0
		QPSK	3.75	1	0	22.98	24.0
				1	47	22.91	24.0
			15	1	0	23.05	24.0
				1	11	22.96	24.0
				3	0	22.96	24.0
				3	6	23.31	24.0
				6	0	22.18	23.5

				6	6	22.31	23.5
				12	0	21.28	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
26365	**1882.5**	BPSK	3.75	1	0	22.48	24.0
				1	47	22.45	24.0
			15	1	0	22.42	24.0
				1	11	22.36	24.0
		QPSK	3.75	1	0	22.45	24.0
				1	47	22.44	24.0
			15	1	0	22.40	24.0
				1	11	22.25	24.0
				3	0	21.30	24.0
				3	6	21.29	24.0
				6	0	21.37	23.5
				6	6	19.91	23.5
				12	0	19.91	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
26688	**1914.8**	BPSK	3.75	1	0	23.28	24.0
				1	47	23.32	24.0
			15	1	0	23.30	24.0
				1	11	23.30	24.0
		QPSK	3.75	1	0	23.29	24.0
				1	47	23.34	24.0
			15	1	0	23.40	24.0
				1	11	23.33	24.0
				3	0	23.25	24.0
				3	6	23.89	24.0
				6	0	22.49	23.5
				6	6	22.61	23.5
				12	0	21.51	22.5

LTE Band 26							
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
26792	**824.2**	BPSK	3.75	1	0	23.12	24.0
				1	47	23.04	24.0
			15	1	0	23.12	24.0
				1	11	23.11	24.0
		QPSK	3.75	1	0	23.14	24.0
				1	47	23.07	24.0

			15	1	0	23.17	24.0
				1	11	23.16	24.0
				3	0	22.99	24.0
				3	6	23.31	24.0
				6	0	22.31	23.5
				6	6	22.38	23.5
				12	0	21.37	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
26915	**836.5**	BPSK	3.75	1	0	23.05	24.0
				1	47	22.98	24.0
			15	1	0	23.04	24.0
				1	11	23.00	24.0
		QPSK	3.75	1	0	23.04	24.0
				1	47	22.96	24.0
			15	1	0	23.03	24.0
				1	11	22.99	24.0
				3	0	22.71	24.0
				3	6	23.16	24.0
				6	0	21.80	23.5
				6	6	21.81	23.5
				12	0	20.78	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
27038	**848.8**	BPSK	3.75	1	0	23.01	24.0
				1	47	23.04	24.0
			15	1	0	23.15	24.0
				1	11	23.10	24.0
		QPSK	3.75	1	0	23.00	24.0
				1	47	23.03	24.0
			15	1	0	23.18	24.0
				1	11	23.10	24.0
				3	0	22.98	24.0
				3	6	23.34	24.0
				6	0	22.23	23.5
				6	6	22.31	23.5
				12	0	21.27	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
26692	**814.2**	BPSK	3.75	1	0	23.02	24.0
				1	47	22.96	24.0
			15	1	0	22.99	24.0
				1	11	23.01	24.0

		QPSK	3.75	1	0	22.95	24.0
				1	47	22.93	24.0
			15	1	0	22.98	24.0
				1	11	22.96	24.0
				3	0	22.88	24.0
				3	6	22.86	24.0
				6	0	22.20	23.5
				6	6	22.24	23.5
				12	0	21.21	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
26788	**823.8**	BPSK	3.75	1	0	23.01	24.0
				1	47	22.69	24.0
			15	1	0	22.78	24.0
				1	11	22.79	24.0
		QPSK	3.75	1	0	22.75	24.0
				1	47	22.69	24.0
			15	1	0	22.80	24.0
				1	11	22.96	24.0
				3	0	21.96	24.0
				3	6	22.01	24.0
				6	0	21.01	23.5
				6	6	20.91	23.5
				12	0	21.21	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
26790	**824**	BPSK	3.75	1	0	23.14	24.0
				1	47	23.12	24.0
			15	1	0	23.14	24.0
				1	11	23.11	24.0
		QPSK	3.75	1	0	23.12	24.0
				1	47	23.15	24.0
			15	1	0	23.16	24.0
				1	11	23.17	24.0
				3	0	22.64	24.0
				3	6	23.16	24.0
				6	0	21.94	23.5
				6	6	21.97	23.5
				12	0	21.04	22.5

LTE Band 66							
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
131974	**1710.2**	BPSK	3.75	1	0	22.96	24.0
				1	47	22.92	24.0
			15	1	0	22.98	24.0
				1	11	22.96	24.0
		QPSK	3.75	1	0	22.99	24.0
				1	47	22.90	24.0
			15	1	0	22.99	24.0
				1	11	22.96	24.0
				3	0	22.83	24.0
				3	6	23.31	24.0
				6	0	22.20	23.5
				6	6	22.29	23.5
				12	0	21.19	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
132322	**1745**	BPSK	3.75	1	0	22.75	24.0
				1	47	22.69	24.0
			15	1	0	22.75	24.0
				1	11	22.73	24.0
		QPSK	3.75	1	0	22.74	24.0
				1	47	22.66	24.0
			15	1	0	22.73	24.0
				1	11	22.72	24.0
				3	0	22.40	24.0
				3	6	22.46	24.0
				6	0	21.55	23.5
				6	6	21.54	23.5
				12	0	20.54	22.5
Channel	**Frequency (MHz)**	**Modulation**	**Bandwidth (kHz)**	**RB size**	**RB offset**	**Average Power (dBm)**	**Tune up**
132670	**1779.8**	BPSK	3.75	1	0	23.11	24.0
				1	47	23.03	24.0
			15	1	0	23.12	24.0
				1	11	23.16	24.0
		QPSK	3.75	1	0	23.12	24.0
				1	47	23.10	24.0
			15	1	0	23.13	24.0
				1	11	23.10	24.0
				3	0	22.98	24.0

				3	6	23.39	24.0
				6	0	22.21	23.5
				6	6	22.38	23.5
				12	0	21.26	22.5

Table 6： Conducted Power of NB-IOT

8.2 Measurement of SAR Data

8.2.1 SAR Result of 2.4G Wifi

Wi-Fi 2.4G SAR Test Record											
Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(℃)
Body Test data (Separate 5mm)											
Front side	802.11b	1/2412	93.71%	1.067	0.063	0.03	11.38	12.00	1.153	0.078	22.1
Back side	802.11b	1/2412	93.71%	1.067	0.067	-0.19	11.38	12.00	1.153	**0.082**	22.1
Left side	802.11b	1/2412	93.71%	1.067	0.007	0.01	11.38	12.00	1.153	0.009	22.1
Right side	802.11b	1/2412	93.71%	1.067	0.048	-0.17	11.38	12.00	1.153	0.059	22.1
Bottom side	802.11b	1/2412	93.71%	1.067	0.012	0.05	11.38	12.00	1.153	0.015	22.1
Top side	802.11b	1/2412	93.71%	1.067	0.004	0.01	11.38	12.00	1.153	0.005	22.1

8.2.2 SAR Result of Bluetooth

Bluetooth SAR Test Record											
Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(℃)
Body Test data (Separate 5mm)											
Front side	BLE	19/2440	62.88%	1.590	0.140	0.12	0.21	1.00	1.199	0.267	22.1
Back side	BLE	19/2440	62.88%	1.590	0.148	0.05	0.21	1.00	1.199	**0.282**	22.1
Left side	BLE	19/2440	62.88%	1.590	0.015	0.08	0.21	1.00	1.199	0.029	22.1
Right side	BLE	19/2440	62.88%	1.590	0.117	0.02	0.21	1.00	1.199	0.223	22.1
Bottom side	BLE	19/2440	62.88%	1.590	0.027	0.05	0.21	1.00	1.199	0.052	22.1
Top side	BLE	19/2440	62.88%	1.590	0.015	-0.04	0.21	1.00	1.199	0.029	22.1

8.2.3 SAR Result of LTE CAT-M1 and NB IOT

LTE Band 5 SAR Test Record											
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(℃)
Body Test data (Separate 5mm) CAT M1											
Front side	10 MHz	QPSK 1_0	20600/844	1:1	0.283	-0.05	22.93	24.00	1.279	**0.362**	22
Back side	10 MHz	QPSK 1_0	20600/844	1:1	0.153	0.02	22.93	24.00	1.279	0.196	22
Left side	10 MHz	QPSK 1_0	20600/844	1:1	0.129	0.01	22.93	24.00	1.279	0.165	22.1
Right side	10 MHz	QPSK 1_0	20600/844	1:1	0.019	0.03	22.93	24.00	1.279	0.024	22.1
Bottom side	10 MHz	QPSK 1_0	20600/844	1:1	0.098	0.01	22.93	24.00	1.279	0.125	22.1
Top side	10 MHz	QPSK 1_0	20600/844	1:1	0.128	0.05	22.93	24.00	1.279	0.164	22.1
Body Test data (Separate 5mm) NB IOT											
Front side	15 kHz	QPSK 3_6	20648/848.8	1:1	0.222	-0.06	23.34	24.50	1.306	0.258	21.7
Back side	15 kHz	QPSK 3_6	20648/848.8	1:1	0.115	-0.02	23.34	24.50	1.306	0.134	21.7
Left side	15 kHz	QPSK 3_6	20648/848.8	1:1	0.002	-0.04	23.34	24.50	1.306	0.002	21.3
Right side	15 kHz	QPSK 3_6	20648/848.8	1:1	0.001	0.00	23.34	24.50	1.306	0.001	21.3
Bottom side	15 kHz	QPSK 3_6	20648/848.8	1:1	0.007	-0.13	23.34	24.50	1.306	0.008	21.3
Top side	15 kHz	QPSK 3_6	20648/848.8	1:1	0.003	0.13	23.34	24.50	1.306	0.003	21.3

LTE Band 12 SAR Test Record											
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(℃)
Body Test data (Separate 5mm) CAT M1											
Front side	10 MHz	QPSK 1_0	23095/707.5	1:1	0.139	-0.13	22.74	24.00	1.337	**0.186**	22.0
Back side	10 MHz	QPSK 1_0	23095/707.5	1:1	0.070	0.01	22.74	24.00	1.337	0.094	22.0
Left side	10 MHz	QPSK 1_0	23095/707.5	1:1	0.085	0.02	22.74	24.00	1.337	0.114	22.0
Right side	10 MHz	QPSK 1_0	23095/707.5	1:1	0.018	0.01	22.74	24.00	1.337	0.024	22.0
Bottom side	10 MHz	QPSK 1_0	23095/707.5	1:1	0.049	0.02	22.74	24.00	1.337	0.065	22.0
Top side	10 MHz	QPSK 1_0	23095/707.5	1:1	0.095	0.01	22.74	24.00	1.337	0.127	22.0
Body Test data (Separate 5mm) NB IOT											
Front side	15 kHz	QPSK 3_6	23012/699.2	1:1	0.021	-0.14	23.19	24.50	1.352	0.025	21.7
Back side	15 kHz	QPSK 3_6	23012/699.2	1:1	0.016	0.08	23.19	24.50	1.352	0.019	21.7
Left side	15 kHz	QPSK 3_6	23012/699.2	1:1	0.002	-0.02	23.19	24.50	1.352	0.002	21.7
Right side	15 kHz	QPSK 3_6	23012/699.2	1:1	0.005	0.02	23.19	24.50	1.352	0.006	21.7
Bottom side	15 kHz	QPSK 3_6	23012/699.2	1:1	0.005	-0.04	23.19	24.50	1.352	0.006	21.7
Top side	15 kHz	QPSK 3_6	23012/699.2	1:1	0.003	0.02	23.19	24.50	1.352	0.004	21.7

LTE Band 13 SAR Test Record											
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(℃)
Body Test data (Separate 5mm) CAT M1											
Front side	10 MHz	QPSK 1_0	23230/782	1:1	0.157	-0.17	22.83	24.00	1.309	**0.206**	22.0
Back side	10 MHz	QPSK 1_0	23230/782	1:1	0.081	0.02	22.83	24.00	1.309	0.106	22.0
Left side	10 MHz	QPSK 1_0	23230/782	1:1	0.094	0.15	22.83	24.00	1.309	0.123	22.0
Right side	10 MHz	QPSK 1_0	23230/782	1:1	0.013	0.05	22.83	24.00	1.309	0.017	22.0
Bottom side	10 MHz	QPSK 1_0	23230/782	1:1	0.048	0.01	22.83	24.00	1.309	0.063	22.0
Top side	10 MHz	QPSK 1_0	23230/782	1:1	0.093	0.02	22.83	24.00	1.309	0.122	22.0
Body Test data (Separate 5mm) NB IOT											
Front side	15 kHz	QPSK 3_6	23278/786.8	1:1	0.041	-0.10	23.26	24.50	1.330	0.049	21.7
Back side	15 kHz	QPSK 3_6	23278/786.8	1:1	0.018	-0.07	23.26	24.50	1.330	0.021	21.7
Left side	15 kHz	QPSK 3_6	23278/786.8	1:1	0.002	0.09	23.26	24.50	1.330	0.002	21.7
Right side	15 kHz	QPSK 3_6	23278/786.8	1:1	0.001	-0.09	23.26	24.50	1.330	0.001	21.7
Bottom side	15 kHz	QPSK 3_6	23278/786.8	1:1	0.005	-0.06	23.26	24.50	1.330	0.006	21.7
Top side	15 kHz	QPSK 3_6	23278/786.8	1:1	0.003	-0.02	23.26	24.50	1.330	0.004	21.7

LTE Band 25 SAR Test Record											
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(℃)
Body Test data (Separate 5mm) CAT M1											
Front side	20 MHz	QPSK 1_0	26590/1905	1:1	0.991	0.03	22.89	23.00	1.026	1.016	21.9
Back side	20 MHz	QPSK 1_0	26590/1905	1:1	0.657	0.08	22.89	23.00	1.026	0.674	22.2
Left side	20 MHz	QPSK 1_0	26590/1905	1:1	0.346	0.08	22.89	23.00	1.026	0.355	22.2
Right side	20 MHz	QPSK 1_0	26590/1905	1:1	0.094	0.08	22.89	23.00	1.026	0.096	22.2
Top side	20 MHz	QPSK 1_0	26590/1905	1:1	0.355	0.02	22.89	23.00	1.026	0.364	22.2
Bottom side	20 MHz	QPSK 1_0	26590/1905	1:1	0.092	0.01	22.89	23.00	1.026	0.094	22.2
Front side	20 MHz	QPSK 1_0	26140/1860	1:1	1.120	-0.02	22.85	23.00	1.035	**1.159**	21.9
Front side Repeated	20 MHz	QPSK 1_0	26140/1860	1:1	1.090	-0.06	22.85	23.00	1.035	1.128	21.9
Front side	20 MHz	QPSK 1_0	26365/1882.5	1:1	1.020	0.08	22.85	23.00	1.035	1.056	21.9
Back side	20 MHz	QPSK 1_0	26140/1860	1:1	0.713	0.02	22.85	23.00	1.035	0.738	22.2
Back side	20 MHz	QPSK 1_0	26365/1882.5	1:1	0.664	0.08	22.85	23.00	1.035	0.687	22.2
Test data (Separate 5mm) NB IOT											
Front side	15 kHz	QPSK 3_6	26688/1914.8	1:1	0.184	-0.05	23.89	24.50	1.151	0.189	21.7
Back side	15 kHz	QPSK 3_6	26688/1914.8	1:1	0.095	-0.01	23.89	24.50	1.151	0.097	21.7
Left side	15 kHz	QPSK 3_6	26688/1914.8	1:1	0.048	0.07	23.89	24.50	1.151	0.049	21.7
Right side	15 kHz	QPSK 3_6	26688/1914.8	1:1	0.003	-0.05	23.89	24.50	1.151	0.003	21.7
Bottom side	15 kHz	QPSK 3_6	26688/1914.8	1:1	0.047	0.10	23.89	24.50	1.151	0.048	21.7
Top side	15 kHz	QPSK 3_6	26688/1914.8	1:1	0.035	0.01	23.89	24.50	1.151	0.036	21.7

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
Front side	26140/1860	1.12	1.09	1.028	N/A	N/A
Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.						
2) A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).						
3) A third repeated measurement was preformed only if the original, first or second repeated measurement was ⩾ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.						
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg						
5) The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds. The repeated measurement results must be clearly identified in the SAR report.						

LTE Band 26 SAR Test Record											
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(℃)
Body Test data (Separate 5mm) CAT M1											
Front side	15 MHz	QPSK 1_0	26965/841.5	1:1	0.282	0.00	22.93	24.00	1.279	**0.361**	22.2
Back side	15 MHz	QPSK 1_0	26965/841.5	1:1	0.155	0.01	22.93	24.00	1.279	0.198	22.2
Left side	15 MHz	QPSK 1_0	26965/841.5	1:1	0.155	0.02	22.93	24.00	1.279	0.198	22.2
Right side	15 MHz	QPSK 1_0	26965/841.5	1:1	0.022	-0.06	22.93	24.00	1.279	0.028	22.2
Bottom side	15 MHz	QPSK 1_0	26965/841.5	1:1	0.096	0.01	22.93	24.00	1.279	0.123	22.2
Top side	15 MHz	QPSK 1_0	26965/841.5	1:1	0.097	0.09	22.93	24.00	1.279	0.124	22.2
Body Test data (Separate 5mm) NB IOT											
Front side	15 kHz	QPSK 3_6	27038/848.8	1:1	0.222	-0.11	23.34	24.50	1.306	0.258	21.7
Back side	15 kHz	QPSK 3_6	27038/848.8	1:1	0.114	0.00	23.34	24.50	1.306	0.133	21.7
Left side	15 kHz	QPSK 3_6	27038/848.8	1:1	0.003	0.06	23.34	24.50	1.306	0.003	21.7
Right side	15 kHz	QPSK 3_6	27038/848.8	1:1	0.001	-0.02	23.34	24.50	1.306	0.001	21.7
Bottom side	15 kHz	QPSK 3_6	27038/848.8	1:1	0.007	-0.01	23.34	24.50	1.306	0.008	21.7
Top side	15 kHz	QPSK 3_6	27038/848.8	1:1	0.004	-0.06	23.34	24.50	1.306	0.005	21.7

LTE Band 66 SAR Test Record											
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(℃)
Body Test data (Separate 5mm) CAT M1											
Front side	20 MHz	QPSK 1_0	132322/1745	1:1	1.140	0.00	22.84	23.00	1.038	1.183	21.9
Back side	20 MHz	QPSK 1_0	132322/1745	1:1	1.020	-0.09	22.84	23.00	1.038	1.058	22
Left side	20 MHz	QPSK 1_0	132322/1745	1:1	0.384	0.01	22.84	23.00	1.038	0.398	22
Right side	20 MHz	QPSK 1_0	132322/1745	1:1	0.073	0.02	22.84	23.00	1.038	0.076	22
Top side	20 MHz	QPSK 1_0	132322/1745	1:1	0.240	0.01	22.84	23.00	1.038	0.249	22
Front side	20 MHz	QPSK 1_0	132072/1720	1:1	1.030	-0.01	22.50	23.00	1.122	1.156	21.9
Front side	20 MHz	QPSK 1_0	132572/1770	1:1	1.270	0.02	22.84	23.00	1.038	**1.318**	21.9
Front side Repeated	20 MHz	QPSK 1_0	132572/1770	1:1	1.140	0.02	22.84	23.00	1.038	1.183	21.9
Back side	20 MHz	QPSK 1_0	132072/1720	1:1	0.877	-0.05	22.50	23.00	1.122	0.984	21.9
Back side	20 MHz	QPSK 1_0	132572/1770	1:1	1.010	0.02	22.84	23.00	1.038	1.048	21.9
Body Test data (Separate 5mm) NB IOT											
Front side	15 kHz	QPSK 3_6	132670/1779.8	1:1	0.291	0.02	23.39	24.50	1.291	0.335	21.7
Back side	15 kHz	QPSK 3_6	132670/1779.8	1:1	0.315	0.00	23.39	24.50	1.291	0.363	21.7
Left side	15 kHz	QPSK 3_6	132670/1779.8	1:1	0.267	-0.04	23.39	24.50	1.291	0.307	21.7
Right side	15 kHz	QPSK 3_6	132670/1779.8	1:1	0.011	0.11	23.39	24.50	1.291	0.013	21.7
Bottom side	15 kHz	QPSK 3_6	132670/1779.8	1:1	0.428	-0.02	23.39	24.50	1.291	0.493	21.7
Top side	15 kHz	QPSK 3_6	132670/1779.8	1:1	0.033	0.03	23.39	24.50	1.291	0.038	21.7

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
Front side	132572/1770	1.27	1.14	1.114	N/A	N/A
Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.						
2) A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).						
3) A third repeated measurement was preformed only if the original, first or second repeated measurement was ⩾ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.						
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg						
5) The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds. The repeated measurement results must be clearly identified in the SAR report.						

Table 7： SAR of LTE CAT-M1 and NB IOT

Note: Please refer to Appendix D for testing positions.

8.3 Multiple Transmitter Evaluation

8.3.1 Simultaneous SAR SAR test evaluation

Simultaneous Transmission

NO.	Simultaneous Transmission Configuration	Extremity
1	WWAN + WIFI 2.4GHz	Yes
2	WWAN + BT	Yes

Simultaneous Transmission SAR Summation Scenario for Body_Worn

Test position		SARmax (W/kg)			Summed SAR	
		Main Ant	WiFi 2.4G	BT		
		1	2	3	1+2	1+3
LTE B5	Front side	0.362	0.078	0.267	0.440	0.629
	Back side	0.196	0.082	0.282	0.278	0.478
	Left side	0.165	0.009	0.029	0.174	0.194
	Right side	0.024	0.059	0.223	0.083	0.247
	Top side	0.164	0.005	0.029	0.169	0.193
	Bottom side	0.125	0.015	0.052	0.140	0.177
LTE B12	Front side	0.186	0.078	0.267	0.264	0.453
	Back side	0.094	0.082	0.282	0.176	0.376
	Left side	0.114	0.009	0.029	0.123	0.143
	Right side	0.024	0.059	0.223	0.083	0.247
	Top side	0.127	0.005	0.029	0.132	0.156
	Bottom side	0.065	0.015	0.052	0.080	0.117
LTE B13	Front side	0.206	0.078	0.267	0.284	0.473
	Back side	0.106	0.082	0.282	0.188	0.388
	Left side	0.123	0.009	0.029	0.132	0.152
	Right side	0.017	0.059	0.223	0.076	0.240
	Top side	0.122	0.005	0.029	0.127	0.151
	Bottom side	0.063	0.015	0.052	0.078	0.115
LTE B25	Front side	1.159	0.078	0.267	1.237	1.426
	Back side	0.738	0.082	0.282	0.82	1.02
	Left side	0.355	0.009	0.029	0.364	0.384
	Right side	0.096	0.059	0.223	0.155	0.319
	Top side	0.364	0.005	0.029	0.369	0.393
	Bottom side	0.048	0.015	0.052	0.063	0.1
LTE B26	Front side	0.361	0.078	0.267	0.439	0.628
	Back side	0.198	0.082	0.282	0.280	0.480
	Left side	0.198	0.009	0.029	0.207	0.227
	Right side	0.028	0.059	0.223	0.087	0.251
	Top side	0.124	0.005	0.029	0.129	0.153

	Bottom side	0.123	0.015	0.052	0.138	0.175
LTE B66	Front side	1.318	0.078	0.267	1.396	1.585
	Back side	1.058	0.082	0.282	1.140	1.340
	Left side	0.398	0.009	0.029	0.407	0.427
	Right side	0.076	0.059	0.223	0.135	0.299
	Top side	0.249	0.005	0.029	0.254	0.278
	Bottom side	0.493	0.015	0.052	0.508	0.545

9 Equipment list

Test Platform		SPEAG DASY Professional				
Description		SAR Test System (Frequency range 300MHz-6GHz)				
Software Reference		DASY8 V16.2.4.2524				
Hardware Reference						
Equipment		Manufacturer	Model	Serial Number	Calibration Date	Due date of calibration
☒	Twin Phantom	SPEAG	SAM 8	2146	NCR	NCR
☒	DAE	SPEAG	DAE4ip	1803	2023/07/14	2024/07/13
☒	E-Field Probe	SPEAG	EX3DV4	7636	2023/06/05	2024/06/04
☒	Validation Kits	SPEAG	D750V3	1160	2022/06/06	2025/06/05
☒	Validation Kits	SPEAG	D835V2	4d105	2022/11/02	2025/11/01
☒	Validation Kits	SPEAG	D1750V2	1149	2022/06/17	2025/06/16
☒	Validation Kits	SPEAG	D1950V3	1138	2022/10/31	2025/10/30
☒	Validation Kits	SPEAG	D2450V2	733	2022/11/2	2025/11/1
☒	Dielectric parameter probes	SPEAG	DAKS-3.5	0005	2023/6/15	2024/6/14
☒	Vector Network Analyzer and Vector Reflectometer	SPEAG	DAKS_VNA R140	0140913	2023/6/7	2024/6/6
☒	RF Bi-Directional Coupler	Agilent	86205-60001	MY31400031	NCR	NCR
☒	Signal Generator	Agilent	N5171B	MY53050736	2023/02/16	2024/02/15
☒	Preamplifier	Compliance Directions Systems Inc.	AMP28-3W	073501433	NCR	NCR
☒	Power Meter	Agilent	E4416A	GB41292095	2023/02/16	2024/02/15
☒	Power Sensor	Agilent	8481H	MY41091234	2023/02/16	2024/02/15
☒	Power Sensor	R&S	NRP-Z92	100025	2023/02/16	2024/02/15
☒	Attenuator	SHX	TS2-3dB	30704	NCR	NCR
☒	Speed reading thermometer	MingGao	T809	NA	2023/05/26	2024/05/25
☒	Humidity and Temperature Indicator	CHIGAO	HTC-1	ZGL2020120550471	2023/05/26	2024/05/25

Note: All the equipments are within the valid period when the tests are performed.

10 Calibration certificate

Please see the Appendix C

11 Photographs

Please see the Appendix D

Appendix A: Detailed System Check Results

Appendix B: Detailed Test Results

Appendix C: Calibration certificate

Appendix D: Photographs

---END---

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国・广东・深圳市南山区科技园中区M-10栋1号厂房 邮编:518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com