

# FCC SAR TEST REPORT

**APPLICANT** : Zhejiang Lingzhu Technology Co., Ltd.  
**EQUIPMENT** : 4G Locator  
**MODEL NAME** : TYST-20-US  
**FCC ID** : 2BEWXTYST20  
**STANDARD** : FCC 47 CFR PART 2 (2.1093)

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.



Approved by: Si Zhang



***Sporton International Inc. (Kunshan)***

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People's Republic of China***



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## History of this test report

Report No.	Version	Description	Issued Date
FA4N2502	Rev. 01	Initial issue of report	Jan. 24, 2025

## 1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Zhejiang Lingzhu Technology Co., Ltd., 4G Locator, TYST-20-US, are as follows.

Highest Standalone 1g SAR Summary			
Equipment Class	Frequency Band		Body (Separation 5mm)
			1g SAR (W/kg)
Licensed	LTE	LTE Band 2	0.53
		LTE Band 5	0.15
		LTE Band 12	0.23
		LTE Band 13	0.39
		LTE Band 66/4	0.14
		LTE Band 71	0.55
Date of Testing:		2024/12/20 ~ 2024/12/23	
Remark: This device supports LTE B4 and B66. Since the supported frequency span for LTE B4 falls completely within the support's frequency span for LTE B66, both LTE bands have the same target power, and both LTE bands share the same transmission path; therefore, SAR was only assessed for LTE B66.			

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.



## **2. Administration Data**

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory			
Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR02-KS	CN1257	314309

Applicant	
Company Name	Zhejiang Lingzhu Technology Co., Ltd.
Address	Room 302, No 1 Building Huace Center, Xihu District, Hangzhou City, Zhejiang Province, China

Manufacturer	
Company Name	Zhejiang Lingzhu Technology Co., Ltd.
Address	Room 302, No 1 Building Huace Center, Xihu District, Hangzhou City, Zhejiang Province, China

## **3. Guidance Applied**

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 941225 D05 SAR for LTE Devices v02r05



#### **4. Equipment Under Test (EUT) Information**

##### **4.1 General Information**

Product Feature & Specification	
Equipment Name	4G Locator
Model Name	TYST-20-US
FCC ID	2BEWXTYST20
Wireless Technology and Frequency Range	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz
Mode	LTE: QPSK, 16QAM
HW Version	V1.0.3
SW Version	V1.0.10
EUT Stage	Identical Prototype
<b>Remark:</b> 1. This device has no voice function. 2. This device has one Silicone case that does not contain metal components and any electronic circuitry, it has no effect on RF exposure and does not require evaluation for SAR.	

## 4.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05																																																																							
FCC ID	2BEWXTYST20																																																																						
Equipment Name	4G Locator																																																																						
Operating Frequency Range of each LTE transmission band	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz																																																																						
Channel Bandwidth	LTE Band 2:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 4:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 12:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 13: 5MHz, 10MHz LTE Band 66:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 71: 5MHz, 10MHz, 15MHz, 20MHz																																																																						
uplink modulations used	QPSK / 16QAM																																																																						
LTE Voice / Data requirements	Data only																																																																						
LTE release	R14																																																																						
CA support	Not Supported																																																																						
LTE MPR permanently built-in by design	<table><tr><th colspan="8">Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3</th></tr><tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (<math>N_{RB}</math>)</th><th rowspan="2">MPR (dB)</th></tr><tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr><tr><td>QPSK</td><td>&gt; 5</td><td>&gt; 4</td><td>&gt; 8</td><td>&gt; 12</td><td>&gt; 16</td><td>&gt; 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>&gt; 5</td><td>&gt; 4</td><td>&gt; 8</td><td>&gt; 12</td><td>&gt; 16</td><td>&gt; 18</td><td>≤ 2</td></tr><tr><td>64 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 2</td></tr><tr><td>64 QAM</td><td>&gt; 5</td><td>&gt; 4</td><td>&gt; 8</td><td>&gt; 12</td><td>&gt; 16</td><td>&gt; 18</td><td>≤ 3</td></tr><tr><td>256 QAM</td><td colspan="6">≥ 1</td><td>≤ 5</td></tr></table>	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3								Modulation	Channel bandwidth / Transmission bandwidth ( $N_{RB}$ )						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	64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2	64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3	256 QAM	≥ 1						≤ 5
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64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3																																																																
256 QAM	≥ 1						≤ 5																																																																
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)																																																																						
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.																																																																						

Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 2												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900
LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745
LTE Band 5												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829	20450	829	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844	20600	844	20600	844

LTE Band 12												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	23017	699.7	23025	700.5	23035	701.5	23060	704				
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5				
H	23173	715.3	23165	714.5	23155	713.5	23130	711				
LTE Band 13												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Freq.(MHz)		Channel #		Freq.(MHz)					
L	23205		779.5		23230		782					
M	23230		782									
H	23255		784.5									
LTE Band 66												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	131979	1710.7	131987	1711.5	131997	1712.5	132022	1715	132047	1717.5	132072	1720
M	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745
H	132665	1779.3	132657	1778.5	132647	1777.5	132622	1775	132597	1772.5	132572	1770
LTE Band 71												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	133147	665.5	133172	668	133197	670.5	133222	673				
M	133247	675.5	133272	678	133297	680.5	133322	683				
H	133447	695.5	133422	693	133397	690.5	133372	688				

**<For LTE Overlap Bands Description>**

1) LTE Bands BW

Band	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
LTE Band 4	Yes	Yes	Yes	Yes	Yes	Yes
LTE Band 66	Yes	Yes	Yes	Yes	Yes	Yes

2) LTE Bands tune up:

Band	Default
	Tune-up Limit
LTE Band 66(4)	24



## **5. RF Exposure Limits**

### **5.1 Uncontrolled Environment**

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

### **5.2 Controlled Environment**

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

**Limits for Occupational/Controlled Exposure (W/kg)**

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

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

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

Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

## **6. Specific Absorption Rate (SAR)**

### **6.1 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.

### **6.2 SAR Definition**

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

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

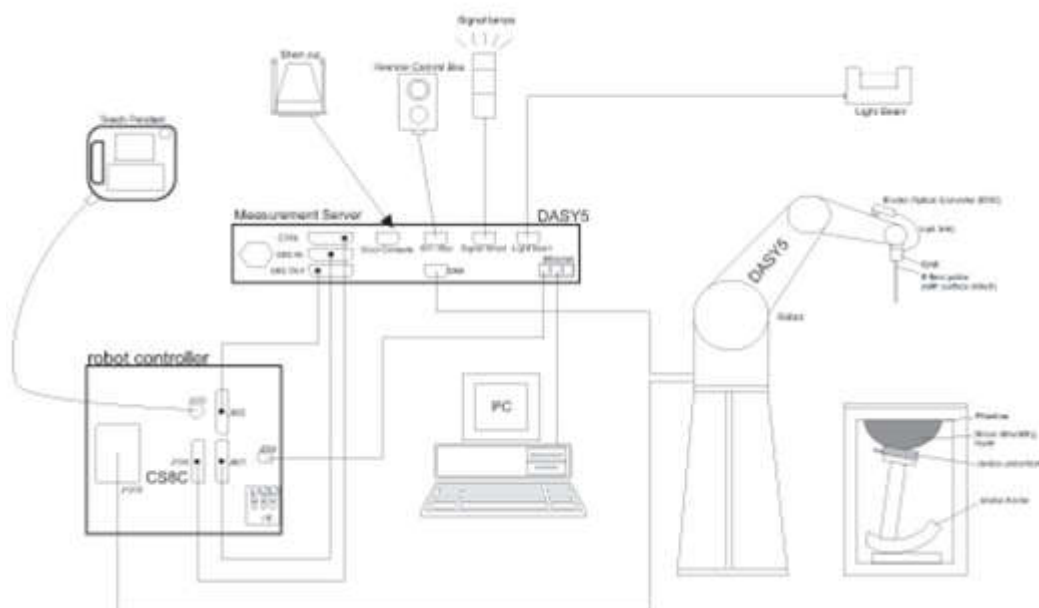
SAR is expressed in units of Watts per kilogram (W/kg)

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

## 7. System Description and Setup

The DASY system used for performing compliance tests consists of the following items:




- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- 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 from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- 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.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

## 7.1 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG). The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

### <EX3DV4 Probe>

<b>Construction</b>	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
<b>Frequency</b>	4 MHz – 10 GHz Linearity: $\pm 0.2$ dB (30 MHz – 10 GHz)	
<b>Directivity</b>	$\pm 0.3$ dB in TSL (rotation around probe axis) $\pm 0.5$ dB in TSL (rotation normal to probe axis)	
<b>Dynamic Range</b>	10 $\mu$ W/g – >100 mW/g Linearity: $\pm 0.2$ dB (noise: typically <1 $\mu$ W/g)	
<b>Dimensions</b>	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	

## 7.2 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.


The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.



**Fig 5.1 Photo of DAE**


### 7.3 Phantom

#### <SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
Measurement Areas	Left Hand, Right Hand, Flat Phantom	

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

#### <ELI Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)	
Filling Volume	Approx. 30 liters	
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm	

The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices or for evaluating transmitters operating at low frequencies. ELI is fully compatible with standard and all known tissue simulating liquids.

## 7.4 Device Holder

### <Mounting Device for Hand-Held Transmitter>

In combination with the Twin SAM V5.0/V5.0c or ELI phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat). And upgrade kit to Mounting Device to enable easy mounting of wider devices like big smart-phones, e-books, small tablets, etc. It holds devices with width up to 140 mm.



Mounting Device for Hand-Held Transmitters



Mounting Device Adaptor for Wide-Phones

### <Mounting Device for Laptops and other Body-Worn Transmitters>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.



Mounting Device for Laptops

## 8. Measurement Procedures

The measurement procedures are as follows:

### <Conducted power measurement>

- (a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
- (b) Read the WWAN RF power level from the base station simulator.
- (c) For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band
- (d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/BT output power

### <SAR measurement>

- (a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
- (b) Place the EUT in the positions as Appendix D demonstrates.
- (c) Set scan area, grid size and other setting on the DASY software.
- (d) Measure SAR results for the highest power channel on each testing position.
- (e) Find out the largest SAR result on these testing positions of each band
- (f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- (a) Power reference measurement
- (b) Area scan
- (c) Zoom scan
- (d) Power drift measurement

### 8.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- (a) Extraction of the measured data (grid and values) from the Zoom Scan
- (b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
- (c) Generation of a high-resolution mesh within the measured volume
- (d) Interpolation of all measured values from the measurement grid to the high-resolution grid
- (e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- (f) Calculation of the averaged SAR within masses of 1g and 10g

## 8.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

## 8.3 Area Scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB0) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

	$\leq 3$ GHz	$> 3$ GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	$5 \pm 1$ mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{Area}$ , $\Delta y_{Area}$	$\leq 2$ GHz: $\leq 15$ mm 2 – 3 GHz: $\leq 12$ mm	3 – 4 GHz: $\leq 12$ mm 4 – 6 GHz: $\leq 10$ 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 $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	



## 8.4 Zoom Scan

Zoom scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the zoom scan evaluates the averaged SAR for 1 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

			$\leq 3 \text{ GHz}$	$> 3 \text{ GHz}$
Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$			$\leq 2 \text{ GHz}: \leq 8 \text{ mm}$ $2 - 3 \text{ GHz}: \leq 5 \text{ mm}^*$	$3 - 4 \text{ GHz}: \leq 5 \text{ mm}^*$ $4 - 6 \text{ GHz}: \leq 4 \text{ mm}^*$
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{\text{Zoom}}(n)$		$\leq 5 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 4 \text{ mm}$ $4 - 5 \text{ GHz}: \leq 3 \text{ mm}$ $5 - 6 \text{ GHz}: \leq 2 \text{ mm}$
	graded grid	$\Delta z_{\text{Zoom}}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	$\leq 4 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 3 \text{ mm}$ $4 - 5 \text{ GHz}: \leq 2.5 \text{ mm}$ $5 - 6 \text{ GHz}: \leq 2 \text{ mm}$
		$\Delta z_{\text{Zoom}}(n>1)$ : between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$	
Minimum zoom scan volume	x, y, z		$\geq 30 \text{ mm}$	$3 - 4 \text{ GHz}: \geq 28 \text{ mm}$ $4 - 5 \text{ GHz}: \geq 25 \text{ mm}$ $5 - 6 \text{ GHz}: \geq 22 \text{ mm}$
Note: $\delta$ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.				
* When zoom scan is required and the <u>reported</u> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is $\leq 1.4 \text{ W/kg}$ , $\leq 8 \text{ mm}$ , $\leq 7 \text{ mm}$ and $\leq 5 \text{ mm}$ zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

## 8.5 Volume Scan Procedures

The volume scan is used to assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

## 8.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASy measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

## 9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1087	2022/2/24	2025/2/22
SPEAG	835MHz System Validation Kit	D835V2	4d298	2024/1/26	2025/1/25
SPEAG	1750MHz System Validation Kit	D1750V2	1090	2022/2/24	2025/2/22
SPEAG	1900MHz System Validation Kit	D1900V2	5d118	2022/3/30	2025/3/28
SPEAG	Data Acquisition Electronics	DAE4	1279	2024/8/20	2025/8/19
SPEAG	Dosimetric E-Field Probe	EX3DV4	3857	2024/1/22	2025/1/21
SPEAG	SAM Twin Phantom	SAM Twin	TP-1842	NCR	NCR
CHIGO	Thermo-Hygrometer	HTC-1	55009	2024/1/4	2025/1/3
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio Communication Analyzer	MT8821C	6262306175	2024/7/4	2025/7/3
Agilent	ENA Series Network Analyzer	E5071C	MY46112129	2024/7/4	2025/7/3
SPEAG	Dielectric Probe Kit	DAK-3.5	1071	2024/2/19	2025/2/18
Anritsu	Vector Signal Generator	MG3710A	6201682672	2024/1/2	2025/1/1
Rohde & Schwarz	Power Meter	NRVD	102081	2024/7/4	2025/7/3
Rohde & Schwarz	Power Sensor	NRV-Z5	100538	2024/7/4	2025/7/3
Rohde & Schwarz	Spectrum Analyzer	FSV7	101631	2024/10/11	2025/10/10
TES	DIGITAC THERMOMETER	TYPE-K	220305411	2024/1/4	2025/1/3
ARRA	Power Divider	A3200-2	N/A	Note 1	
MCL	Attenuation1	BW-S10W5+	N/A	Note 1	
MCL	Attenuation2	BW-S10W5+	N/A	Note 1	
MCL	Attenuation3	BW-S10W5+	N/A	Note 1	
BONN	POWER AMPLIFIER	BLMA 0830-3	087193A	Note 1	
BONN	POWER AMPLIFIER	BLMA 2060-2	087193B	Note 1	
Agilent	Dual Directional Coupler	778D	20500	Note 1	
Agilent	Dual Directional Coupler	11691D	MY48151020	Note 1	

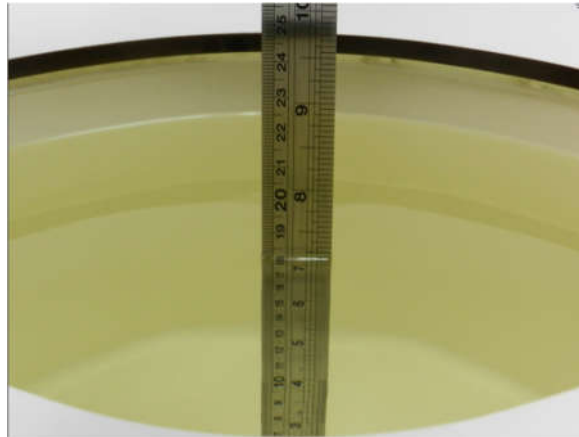
**Note:**

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.
2. The dipole calibration interval can be extended to 3 years with justification according to KDB 865664 D01. The dipoles are also not physically damaged, or repaired during the interval. The justification data in appendix C can be found which the return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration for each dipole.

## **10. System Verification**

### **10.1 Tissue Simulating Liquids**

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 11.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 11.2.



**Fig 11.2 Photo of Liquid Height for Body SAR**

## 10.2 Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity ( $\sigma$ )	Permittivity ( $\epsilon_r$ )
For Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0

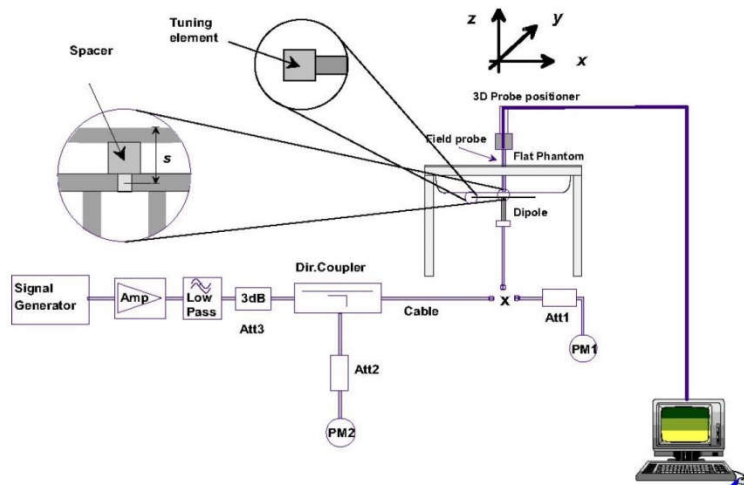
### <Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. ( $^{\circ}\text{C}$ )	Conductivity ( $\sigma$ )	Permittivity ( $\epsilon_r$ )	Conductivity Target ( $\sigma$ )	Permittivity Target ( $\epsilon_r$ )	Delta ( $\sigma$ ) (%)	Delta ( $\epsilon_r$ ) (%)	Limit (%)	Date
750	Head	22.6	0.900	41.192	0.89	41.90	1.12	-1.69	$\pm 5$	2024/12/20
835	Head	22.8	0.902	41.240	0.90	41.50	0.22	-0.63	$\pm 5$	2024/12/21
1750	Head	22.9	1.409	40.669	1.37	40.10	2.85	1.42	$\pm 5$	2024/12/22
1900	Head	22.6	1.397	39.035	1.40	40.00	-0.21	-2.41	$\pm 5$	2024/12/23

## 10.3 System Performance Check Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2024/12/20	750	Head	50	1087	3857	1279	0.436	8.58	8.72	1.63
2024/12/21	835	Head	50	4d298	3857	1279	0.461	9.89	9.22	-6.77
2024/12/22	1750	Head	50	1090	3857	1279	1.980	37.00	39.6	7.03
2024/12/23	1900	Head	50	5d118	3857	1279	2.020	39.30	40.4	2.80



**Fig 8.3.1 System Performance Check Setup**



**Fig 8.3.2 Setup Photo**



## **11. RF Exposure Positions**

### **11.1 Wireless Router**

### **11.2 SAR Testing for 4G Locator**

#### **<For Body>**

- (a) To position the device parallel to the phantom surface with all surfaces of the device.
- (b) To adjust the device parallel to the flat phantom.
- (c) To adjust the distance between the device surface and the flat phantom to 5mm.

#### **<EUT Setup Photos>**

Please refer to Appendix D for the test setup photos.

## **12. Conducted RF Output Power (Unit: dBm)**

The detailed conducted power table can refer to Appendix E.

### **<LTE Conducted Power>**

#### **General Note:**

1. Anritsu MT8821C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, 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.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are  $\leq 0.8$  W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is  $> 1.45$  W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is  $>$  not  $\frac{1}{2}$  dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is  $\leq 1.45$  W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is  $>$  not  $\frac{1}{2}$  dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is  $\leq 1.45$  W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4/B5/B12 /B71 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
9. LTE band 4 SAR test was covered by Band 66; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
  - a. the maximum output power, including tolerance, for the smaller band is  $\leq$  the larger band to qualify for the SAR test exclusion
  - b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band



### **13. Antenna Location**

The detailed antenna location information can refer to SAR Test Setup Photos.

## 14. SAR Test Results

### General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
  - a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
  - b. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)\*Tune-up Scaling Factor
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
  - $\leq 0.8$  W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\leq 100$  MHz
  - $\leq 0.6$  W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
  - $\leq 0.4$  W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\geq 200$  MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is  $\geq 0.8$ W/kg.

### LTE Note:

1. Per KDB 941225 D05v02r05, 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.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, for QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are  $\leq 0.8$  W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is  $> 1.45$  W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is  $>$  not  $\frac{1}{2}$  dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is  $\leq 1.45$  W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, smaller bandwidth output power for each RB allocation configuration is  $>$  not  $\frac{1}{2}$  dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is  $\leq 1.45$  W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B4/B5/B12 /B71 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
7. LTE band 4 SAR test was covered by Band 66; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
  - the maximum output power, including tolerance, for the smaller band is  $\leq$  the larger band to qualify for the SAR test exclusion
  - the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band





## 14.1 Body SAR

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
750MHz															
01	LTE Band 71	20M	QPSK	1	49	Front	5mm	133322	683	24.01	24.50	1.119	0.08	0.309	0.346
	LTE Band 71	20M	QPSK	50	50	Front	5mm	133322	683	22.90	24.50	1.445	0.01	0.184	0.266
	LTE Band 71	20M	QPSK	1	49	Back	5mm	133322	683	24.01	24.50	1.119	0.03	0.300	0.336
	LTE Band 71	20M	QPSK	50	50	Back	5mm	133322	683	22.90	24.50	1.445	-0.08	0.209	0.302
	LTE Band 71	20M	QPSK	1	49	Left Side	5mm	133322	683	24.01	24.50	1.119	-0.08	0.071	0.079
	LTE Band 71	20M	QPSK	50	50	Left Side	5mm	133322	683	22.90	24.50	1.445	0.1	0.000	0.000
	LTE Band 71	20M	QPSK	1	49	Right Side	5mm	133322	683	24.01	24.50	1.119	0.07	0.490	0.549
	LTE Band 71	20M	QPSK	50	50	Right Side	5mm	133322	683	22.90	24.50	1.445	-0.18	0.363	0.525
	LTE Band 71	20M	QPSK	1	49	Top Side	5mm	133322	683	24.01	24.50	1.119	0.1	0.081	0.091
	LTE Band 71	20M	QPSK	50	50	Top Side	5mm	133322	683	22.90	24.50	1.445	0.12	0.040	0.058
	LTE Band 71	20M	QPSK	1	49	Bottom Side	5mm	133322	683	24.01	24.50	1.119	0.08	0.326	0.365
	LTE Band 71	20M	QPSK	50	50	Bottom Side	5mm	133322	683	22.90	24.50	1.445	-0.17	0.216	0.312
02	LTE Band 12	10M	QPSK	1	25	Front	5mm	23095	707.5	23.36	24.50	1.300	-0.03	0.082	0.107
	LTE Band 12	10M	QPSK	25	0	Front	5mm	23095	707.5	22.77	24.50	1.489	0.14	0.080	0.119
	LTE Band 12	10M	QPSK	1	25	Back	5mm	23095	707.5	23.36	24.50	1.300	0.11	0.096	0.125
	LTE Band 12	10M	QPSK	25	0	Back	5mm	23095	707.5	22.77	24.50	1.489	-0.05	0.093	0.139
	LTE Band 12	10M	QPSK	1	25	Left Side	5mm	23095	707.5	23.36	24.50	1.300	0.18	0.000	0.000
	LTE Band 12	10M	QPSK	25	0	Left Side	5mm	23095	707.5	22.77	24.50	1.489	0.14	0.000	0.000
	LTE Band 12	10M	QPSK	1	25	Right Side	5mm	23095	707.5	23.36	24.50	1.300	-0.06	0.179	0.233
	LTE Band 12	10M	QPSK	25	0	Right Side	5mm	23095	707.5	22.77	24.50	1.489	-0.17	0.129	0.192
	LTE Band 12	10M	QPSK	1	25	Top Side	5mm	23095	707.5	23.36	24.50	1.300	0.17	0.026	0.034
	LTE Band 12	10M	QPSK	25	0	Top Side	5mm	23095	707.5	22.77	24.50	1.489	-0.05	0.022	0.033
	LTE Band 12	10M	QPSK	1	25	Bottom Side	5mm	23095	707.5	23.36	24.50	1.300	0.01	0.096	0.125
	LTE Band 12	10M	QPSK	25	0	Bottom Side	5mm	23095	707.5	22.77	24.50	1.489	0.1	0.091	0.136
03	LTE Band 13	10M	QPSK	1	25	Front	5mm	23230	782	23.18	24.50	1.355	-0.01	0.291	0.394
	LTE Band 13	10M	QPSK	25	25	Front	5mm	23230	782	22.92	24.50	1.439	-0.17	0.188	0.270
	LTE Band 13	10M	QPSK	1	25	Back	5mm	23230	782	23.18	24.50	1.355	0.04	0.119	0.161
	LTE Band 13	10M	QPSK	25	25	Back	5mm	23230	782	22.92	24.50	1.439	-0.01	0.198	0.285
	LTE Band 13	10M	QPSK	1	25	Left Side	5mm	23230	782	23.18	24.50	1.355	-0.08	0.061	0.083
	LTE Band 13	10M	QPSK	25	25	Left Side	5mm	23230	782	22.92	24.50	1.439	0.05	0.000	0.000
	LTE Band 13	10M	QPSK	1	25	Right Side	5mm	23230	782	23.18	24.50	1.355	0.06	0.221	0.299
	LTE Band 13	10M	QPSK	25	25	Right Side	5mm	23230	782	22.92	24.50	1.439	-0.09	0.233	0.335
	LTE Band 13	10M	QPSK	1	25	Top Side	5mm	23230	782	23.18	24.50	1.355	-0.08	0.056	0.076
	LTE Band 13	10M	QPSK	25	25	Top Side	5mm	23230	782	22.92	24.50	1.439	0.13	0.099	0.142
	LTE Band 13	10M	QPSK	1	25	Bottom Side	5mm	23230	782	23.18	24.50	1.355	0.12	0.130	0.176
	LTE Band 13	10M	QPSK	25	25	Bottom Side	5mm	23230	782	22.92	24.50	1.439	0.03	0.139	0.200
835MHz															
04	LTE Band 5	10M	QPSK	1	25	Front	5mm	20525	836.5	23.41	24.50	1.285	-0.03	0.113	0.145
	LTE Band 5	10M	QPSK	25	25	Front	5mm	20525	836.5	22.70	23.50	1.202	0.18	0.074	0.089
	LTE Band 5	10M	QPSK	1	25	Back	5mm	20525	836.5	23.41	24.50	1.285	0.16	0.060	0.077
	LTE Band 5	10M	QPSK	25	25	Back	5mm	20525	836.5	22.70	23.50	1.202	-0.1	0.048	0.058
	LTE Band 5	10M	QPSK	1	25	Left Side	5mm	20525	836.5	23.41	24.50	1.285	0.07	0.000	0.000
	LTE Band 5	10M	QPSK	25	25	Left Side	5mm	20525	836.5	22.70	23.50	1.202	0.18	0.000	0.000
	LTE Band 5	10M	QPSK	1	25	Right Side	5mm	20525	836.5	23.41	24.50	1.285	-0.1	0.094	0.121
	LTE Band 5	10M	QPSK	25	25	Right Side	5mm	20525	836.5	22.70	23.50	1.202	0.01	0.091	0.109
	LTE Band 5	10M	QPSK	1	25	Top Side	5mm	20525	836.5	23.41	24.50	1.285	-0.15	0.031	0.040
	LTE Band 5	10M	QPSK	25	25	Top Side	5mm	20525	836.5	22.70	23.50	1.202	0.19	0.047	0.057
	LTE Band 5	10M	QPSK	1	25	Bottom Side	5mm	20525	836.5	23.41	24.50	1.285	0.07	0.078	0.100
	LTE Band 5	10M	QPSK	25	25	Bottom Side	5mm	20525	836.5	22.70	23.50	1.202	-0.18	0.068	0.082
1750MHz															
	LTE Band 66	20M	QPSK	1	49	Front	5mm	132322	1745	23.48	24.00	1.127	0.03	0.060	0.068



	LTE Band 66	20M	QPSK	50	0	Front	5mm	132322	1745	22.71	23.00	1.069	-0.15	0.045	0.048
	LTE Band 66	20M	QPSK	1	49	Back	5mm	132322	1745	23.48	24.00	1.127	-0.15	0.055	0.062
	LTE Band 66	20M	QPSK	50	0	Back	5mm	132322	1745	22.71	23.00	1.069	0.11	0.042	0.045
	LTE Band 66	20M	QPSK	1	49	Left Side	5mm	132322	1745	23.48	24.00	1.127	-0.08	0.015	0.017
	LTE Band 66	20M	QPSK	50	0	Left Side	5mm	132322	1745	22.71	23.00	1.069	-0.17	0.017	0.018
05	LTE Band 66	20M	QPSK	1	49	Right Side	5mm	132322	1745	23.48	24.00	1.127	-0.06	0.126	0.142
	LTE Band 66	20M	QPSK	50	0	Right Side	5mm	132322	1745	22.71	23.00	1.069	-0.08	0.072	0.077
	LTE Band 66	20M	QPSK	1	49	Top Side	5mm	132322	1745	23.48	24.00	1.127	-0.04	0.043	0.048
	LTE Band 66	20M	QPSK	50	0	Top Side	5mm	132322	1745	22.71	23.00	1.069	-0.08	0.027	0.029
	LTE Band 66	20M	QPSK	1	49	Bottom Side	5mm	132322	1745	23.48	24.00	1.127	0.17	0.024	0.027
	LTE Band 66	20M	QPSK	50	0	Bottom Side	5mm	132322	1745	22.71	23.00	1.069	0.18	0.022	0.024
<b>1900MHz</b>															
	LTE Band 2	20M	QPSK	1	49	Front	5mm	18900	1880	22.91	24.00	1.285	-0.04	0.225	0.289
	LTE Band 2	20M	QPSK	50	0	Front	5mm	18900	1880	21.76	23.00	1.330	-0.08	0.172	0.229
	LTE Band 2	20M	QPSK	1	49	Back	5mm	18900	1880	22.91	24.00	1.285	-0.13	0.219	0.281
	LTE Band 2	20M	QPSK	50	0	Back	5mm	18900	1880	21.76	23.00	1.330	-0.13	0.232	0.309
	LTE Band 2	20M	QPSK	1	49	Left Side	5mm	18900	1880	22.91	24.00	1.285	0.06	0.053	0.068
	LTE Band 2	20M	QPSK	50	0	Left Side	5mm	18900	1880	21.76	23.00	1.330	0.06	0.033	0.044
06	LTE Band 2	20M	QPSK	1	49	Right Side	5mm	18900	1880	22.91	24.00	1.285	0.08	0.415	0.533
	LTE Band 2	20M	QPSK	50	0	Right Side	5mm	18900	1880	21.76	23.00	1.330	0.08	0.235	0.313
	LTE Band 2	20M	QPSK	1	49	Top Side	5mm	18900	1880	22.91	24.00	1.285	-0.03	0.088	0.113
	LTE Band 2	20M	QPSK	50	0	Top Side	5mm	18900	1880	21.76	23.00	1.330	-0.03	0.077	0.102
	LTE Band 2	20M	QPSK	1	49	Bottom Side	5mm	18900	1880	22.91	24.00	1.285	0.08	0.109	0.140
	LTE Band 2	20M	QPSK	50	0	Bottom Side	5mm	18900	1880	21.76	23.00	1.330	-0.07	0.128	0.170

## 15. Simultaneous Transmission Analysis

No.	Simultaneous Transmission Configurations
1.	None

**Test Engineer :** Martin Li, Varus Wang, Light Wang



## **16. Uncertainty Assessment**

Per KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is  $< 1.5$  W/kg. The expanded SAR measurement uncertainty must be  $\leq 30\%$ , for a confidence interval of  $k = 2$ . If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. For this device, the highest measured 1-g SAR is less 1.5W/kg. Therefore, the measurement uncertainty table is not required in this report.

## **17. References**

- [1] FCC 47 CFR Part 2 "Frequency Allocations and Radio Treaty Matters; General Rules and Regulations"
- [2] ANSI/IEEE Std. C95.1-1992, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", September 1992
- [3] IEEE Std. 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", Sep 2013
- [4] SPEAG DASY System Handbook
- [5] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [6] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.
- [7] FCC KDB 447498 D01 v06, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Oct 2015
- [8] FCC KDB 941225 D05 v02r05, "SAR Evaluation Considerations for LTE Devices", Dec 2015

## **Appendixes**

Please refer to separated files for the following appendixes

### **Appendix A. Plots of System Performance Check**

### **Appendix B. Plots of High SAR Measurement**

### **Appendix C. DASY Calibration Certificate**

### **Appendix D. Test Setup Photos**

### **Appendix E. Conducted RF Output Power Table**

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