FCC SAR TEST REPORT

APPLICANT	:	Smart Meter Corporation
EQUIPMENT	:	Blood Glucose Monitoring System
Brand Name	:	iGlucose
Model Name	:	GM291-W
FCC ID	:	2AHYZGM291SMIK-1
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.

Si Zhang

Approved by: Si Zhang

ilac-MRA
a2la ACCREDITED Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FA381601	01	Initial issue of report	Nov. 09, 2023

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Smart Meter Corporation, Blood Glucose Monitoring System, GM291-W,** are as follows.

Highest Standalone 10g SAR Summary			
Equipment Class	Frequency Band		Extremity 10g SAR (W/kg) (Separation 0mm)
Licensed	LTE	LTE Band 5/26	0.79
		LTE Band 12/17	0.91
		LTE Band 13	0.23
		LTE Band 25/ 2	**3.09**
		LTE Band 66/ 4	2.61
Date of Testing:		2023/8/29 ~ 2023/10/13	

Remark:
This device supports LTE B2 / B4 / B5 / B17 and B25 / B66 / B26 / B12. Since the supported frequency span for LTE B2 / B4 / B5 / B17 falls completely within the supports frequency span for LTE B25 / B66 / B26 / B12, both LTE bands have the same target power, and both LTE bands share the same transmission path; therefore, SAR was only assessed for LTE B25 / B66 / B26 / B12.

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (4.0 W/kg for Extremity 10g 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.
	SAR01-KS	CN1257	314309

Applicant	
Company Name	Smart Meter Corporation
Address	5501 W. Waters Ave. Suite 401 Tampa, FL 33634, United States

Manufacturer	
Company Name	Bionime Corporation
Address	No. 100, Sec 2, Daqing St., South Dist., Taichung City40242, Taiwan.

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	Blood Glucose Monitoring System
Brand Name	iGlucose
Model Name	GM291-W
FCC ID	2AHYZGM291SMIK-1
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 25 : 1850 MHz ~ 1915 MHz LTE Band 26 : 814 MHz ~ 849 MHz LTE Band 66 : 1710 MHz ~ 1780 MHz NB-IOT Band 2 : 1850 MHz ~ 1910 MHz NB-IOT Band 4 : 1710 MHz ~ 1755 MHz NB-IOT Band 5 : 824 MHz ~ 849 MHz NB-IOT Band 12: 699 MHz ~ 716 MHz NB-IOT Band 13: 777 MHz ~ 787 MHz NB-IOT Band 17: 704 MHz ~ 716 MHz NB-IOT Band 25: 1850 MHz ~ 1915 MHz NB-IOT Band 66 : 1710 MHz ~ 1780 MHz
Mode	LTE: QPSK, 16QAM NB-IOT: BPSK, QPSK
HW Version	2.6
SW Version	2.5.6
EUT Stage	Identical Prototype
Remark: 1. This device has no voice function.	

4.2 General LTE SAR Test and Reporting Considerations

<table>
<tr><th colspan="2">Summarized necessary items addressed in KDB 941225 D05 v02r05</th></tr>
<tr><td>FCC ID</td><td>2AHYZGM291SMIK-1</td></tr>
<tr><td>Equipment Name</td><td>Blood Glucose Monitoring System</td></tr>
<tr><td>Operating Frequency Range of each LTE transmission band</td><td>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 25 : 1850 MHz ~ 1915 MHz
LTE Band 26 : 814 MHz ~ 849 MHz
LTE Band 66 : 1710 MHz ~ 1780 MHz
NB-IOT Band 2 : 1850 MHz ~ 1910 MHz
NB-IOT Band 4 : 1710 MHz ~ 1755 MHz
NB-IOT Band 5 : 824 MHz ~ 849 MHz
NB-IOT Band 12: 699 MHz ~ 716 MHz
NB-IOT Band 13: 777 MHz ~ 787 MHz
NB-IOT Band 17: 704 MHz ~ 716 MHz
NB-IOT Band 25: 1850 MHz ~ 1915 MHz
NB-IOT Band 66: 1710 MHz ~ 1780 MHz</td></tr>
<tr><td>Channel Bandwidth</td><td>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 25:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 26:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz
LTE Band 66:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz</td></tr>
<tr><td>uplink modulations used</td><td>BPSK / QPSK / 16QAM</td></tr>
<tr><td>LTE release</td><td>R14, Cat M1 and NB1</td></tr>
<tr><td>CA support</td><td>Not Supported</td></tr>
<tr><td>LTE Voice / Data requirements</td><td>Data only</td></tr>
<tr><td>LTE MPR permanently built-in by design</td><td>For Cat M1:

Table 6.2.3E-1: Maximum Power Reduction (MPR) for Power Class 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (N_{RB})</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>>2</td><td>>2</td><td>>1</td><td>>4</td><td>-</td><td>-</td><td>≤ 1</td></tr>
<tr><td>QPSK</td><td>>5</td><td>>5</td><td>-</td><td>-</td><td>-</td><td>-</td><td>≤ 2</td></tr>
<tr><td>16 QAM</td><td>≤ 2</td><td>≤ 2</td><td>>1</td><td>>3</td><td>-</td><td>-</td><td>≤ 1</td></tr>
<tr><td>16QAM</td><td>>2</td><td>>2</td><td>>3</td><td>>5</td><td>-</td><td>-</td><td>≤ 2</td></tr>
</table>
For NB:
<table>
<tr><th>Modulation</th><th colspan="3">QPSK</th></tr>
<tr><td>Tone positions for 3 Tones allocation</td><td>0-2</td><td>3-5 and 6-8</td><td>9-11</td></tr>
<tr><td>MPR</td><td>≤ 0.5 dB</td><td>0 dB</td><td>≤ 0.5 dB</td></tr>
<tr><td>Tone positions for 6 Tones allocation</td><td colspan="3">0-5 and 6-11</td></tr>
<tr><td>MPR</td><td>≤ 1 dB</td><td colspan="2">≤ 1 dB</td></tr>
<tr><td>Tone positions for 12 Tones allocation</td><td colspan="3">0-11</td></tr>
<tr><td>MPR</td><td colspan="3">≤ 2 dB</td></tr>
</table></td></tr>
<tr><td>LTE A-MPR</td><td>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)</td></tr>
<tr><td>Spectrum plots for RB configuration</td><td>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.</td></tr>
</table>

NB-IOT

Transmission (H, M, L) channel numbers and frequencies in each LTE band

	LTE Band 2		LTE Band 4		LTE Band 5		LTE Band 12		LTE Band 13		LTE Band 17	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18601	1850.1	19951	1710.1	20401	824.1	23011	699.1	23181	777.1	23731	704.1
M	18900	1880	20175	1732.5	20525	836.5	23095	707.5	23230	782	23790	710
H	19199	1909.9	20399	1754.9	20649	848.9	23179	715.9	23279	786.9	23849	715.9

	LTE Band 25		LTE Band 66	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26041	1850.1	131973	1710.1
M	26365	1882.5	132322	1745
H	26689	1914.9	132671	1779.9

CAT M1

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	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	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		
M	23230	782	23230	782
H	23255	784.5		

LTE Band 25

	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	26047	1850.7	26055	1851.5	26065	1852.5	26090	1855	26115	1857.5	26140	1860
M	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880
H	26683	1914.3	26675	1913.5	26665	1912.5	26640	1910	26615	1907.5	26590	1905

LTE Band 26										
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26697	814.7	26705	815.5	26715	816.5	26740	819	26765	821.5
M	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5
H	27033	848.3	27025	847.5	27015	846.5	26990	844	26965	841.5

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

<For LTE Overlap Bands Description>

NB-IOT

1) LTE Bands tune up:

Band	Default Tune-up Limit
LTE Band 2	24
LTE Band 25	24
LTE Band 4	24
LTE Band 66	24
LTE Band 12	24
LTE Band 17	24
LTE Band 5	24
LTE Band 26	24

CATM1

2) LTE Bands BW

Band	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
LTE Band 2	Yes	Yes	Yes	Yes	Yes	Yes
LTE Band 25	Yes	Yes	Yes	Yes	Yes	Yes
LTE Band 4	Yes	Yes	Yes	Yes	Yes	Yes
LTE Band 66	Yes	Yes	Yes	Yes	Yes	Yes
LTE Band 5	Yes	Yes	Yes	Yes		
LTE Band 26	Yes	Yes	Yes	Yes	Yes	

3) LTE Bands tune up:

Band	Default Tune-up Limit
LTE Band 2	24
LTE Band 25	24
LTE Band 4	24
LTE Band 66	24
LTE Band 5	24
LTE Band 26	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:

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

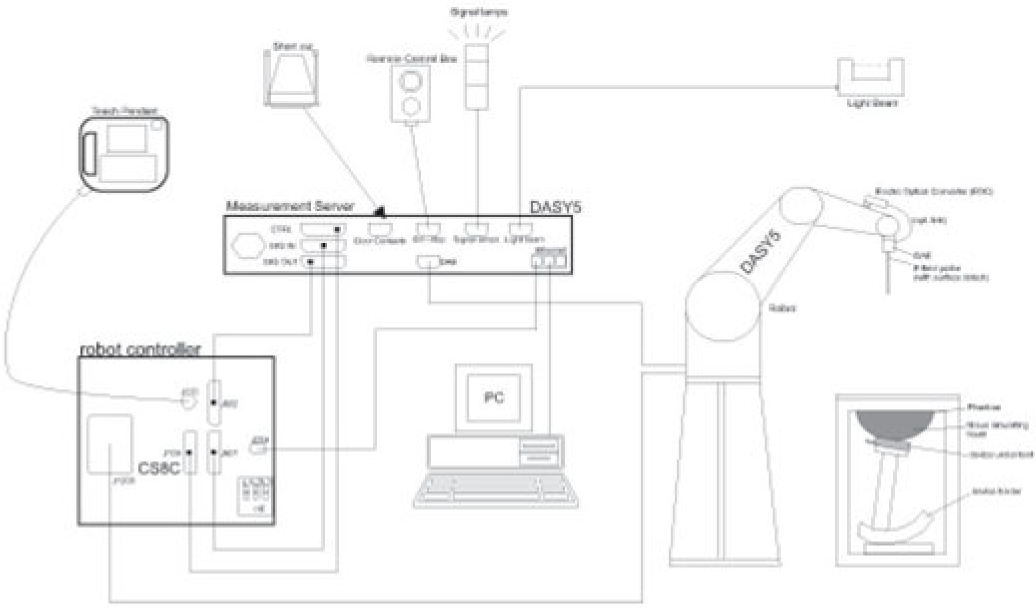
SAR is expressed in units of Watts per kilogram (W/kg)

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

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.

<ES3DV3 Probe>

Construction	Symmetric design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – 4 GHz; Linearity: ±0.2 dB (30 MHz – 4 GHz)	
Directivity	±0.2 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	5 μW/g – >100 mW/g; Linearity: ±0.2 dB	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 3.9 mm (body: 12 mm) Distance from probe tip to dipole centers: 3.0 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.

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

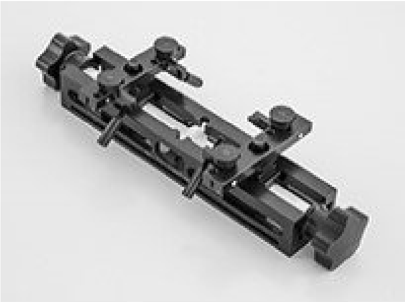
The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices or for evaluating transmitters operating at low frequencies. ELI is fully compatible with standard and all known tissue simulating liquids.

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 form 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.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 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° ± 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.	

8.4 Zoom Scan

Zoom scans are used 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 shoes 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.

<table>
<tr><th colspan="3"></th><th>$\leq$ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>$\leq$ 2 GHz: $\leq$ 8 mm
2 – 3 GHz: $\leq$ 5 mm*</td><td>3 – 4 GHz: $\leq$ 5 mm*
4 – 6 GHz: $\leq$ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>$\leq$ 5 mm</td><td>3 – 4 GHz: $\leq$ 4 mm
4 – 5 GHz: $\leq$ 3 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>$\leq$ 4 mm</td><td>3 – 4 GHz: $\leq$ 3 mm
4 – 5 GHz: $\leq$ 2.5 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>$\geq$ 30 mm</td><td>3 – 4 GHz: $\geq$ 28 mm
4 – 5 GHz: $\geq$ 25 mm
5 – 6 GHz: $\geq$ 22 mm</td></tr>
<tr><td colspan="5">Note: δ 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 reported SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is $\leq$ 1.4 W/kg, $\leq$ 8 mm, $\leq$ 7 mm and $\leq$ 5 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.</td></tr>
</table>

8.5 Volume Scan Procedures

The volume scan is used for 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	2025/2/23
SPEAG	835MHz System Validation Kit	D835V2	4d091	2022/8/19	2025/8/18
SPEAG	1750MHz System Validation Kit	D1750V2	1090	2022/2/24	2025/2/23
SPEAG	1900MHz System Validation Kit	D1900V2	5d118	2022/3/30	2025/3/29
SPEAG	Data Acquisition Electronics	DAE4	690	2023/6/20	2024/6/19
SPEAG	Dosimetric E-Field Probe	ES3DV3	3293	2022/11/22	2023/11/21
SPEAG	SAM Twin Phantom	SAM Twin	TP-1754	NCR	NCR
CHIGO	Thermo-Hygrometer	HTC-1	55011	2023/1/8	2024/1/7
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio Communication Analyzer	MT8821C	6262306175	2023/7/5	2024/7/4
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	2023/7/5	2024/7/4
SPEAG	Dielectric Probe Kit	DAK-3.5	1071	2023/2/20	2024/2/19
Anritsu	Vector Signal Generator	MG3710A	6201682672	2023/1/5	2024/1/4
Rohde & Schwarz	Power Meter	NRVD	102081	2023/7/5	2024/7/4
Rohde & Schwarz	Power Sensor	NRV-Z5	100538	2023/7/5	2024/7/4
Rohde & Schwarz	Power Sensor	NRV-Z5	100539	2023/7/5	2024/7/4
Rohde & Schwarz	Spectrum Analyzer	FSV7	101631	2022/10/12	2023/10/11
Rohde & Schwarz	Spectrum Analyzer	FSV7	101631	2023/10/11	2024/10/10
TES	DIGITAC THERMOMETER	1310	220305411	2023/1/8	2024/1/7
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	
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	

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 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. 10.1.

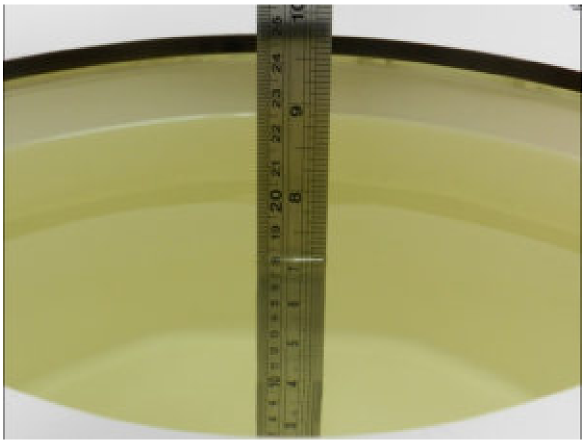


Fig 10.1 Photo of Liquid Height for Body SAR

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 (σ)	Permittivity (εr)
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. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
750	Head	22.7	0.900	41.192	0.89	41.90	1.12	-1.69	±5	2023/10/11
835	Head	22.7	0.902	41.240	0.90	41.50	0.22	-0.63	±5	2023/10/11
1750	Head	22.8	1.409	40.669	1.37	40.10	2.85	1.42	±5	2023/10/12
1900	Head	22.8	1.452	40.674	1.40	40.00	3.71	1.69	±5	2023/10/13
750	Head	22.7	0.889	42.281	0.89	41.90	-0.11	0.91	±5	2023/8/29
835	Head	22.7	0.912	41.950	0.90	41.50	1.33	1.08	±5	2023/8/29
1750	Head	22.8	1.317	40.224	1.37	40.10	-3.87	0.31	±5	2023/8/30
1900	Head	22.8	1.407	40.213	1.40	40.00	0.50	0.53	±5	2023/8/30

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 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
2023/10/11	750	Head	50	1087	3293	690	0.280	5.65	5.6	-0.88
2023/10/11	835	Head	50	4d091	3293	690	0.331	6.22	6.62	6.43
2023/10/12	1750	Head	50	1090	3293	690	0.985	19.50	19.7	1.03
2023/10/13	1900	Head	50	5d118	3293	690	1.080	20.40	21.6	5.88
2023/8/29	750	Head	50	1087	3293	690	0.266	5.65	5.32	-5.84
2023/8/29	835	Head	50	4d091	3293	690	0.311	6.22	6.22	0.00
2023/8/30	1750	Head	50	1090	3293	690	0.929	19.50	18.58	-4.72
2023/8/30	1900	Head	50	5d118	3293	690	1.040	20.40	20.8	1.96

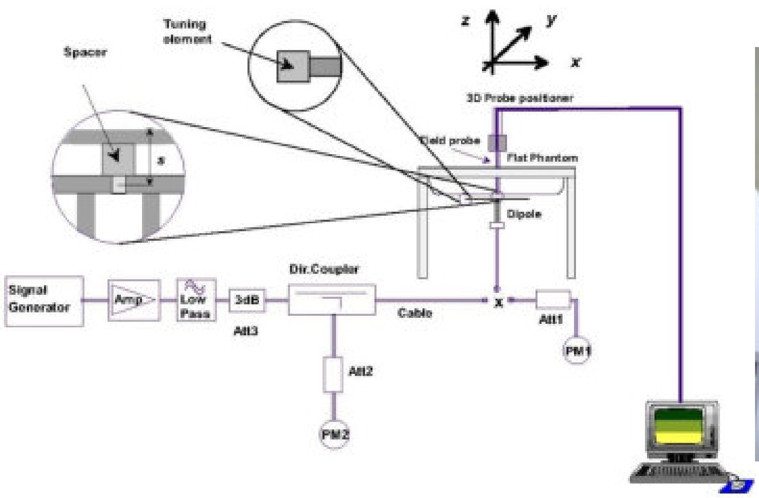


Fig 10.3.1 System Performance Check Setup

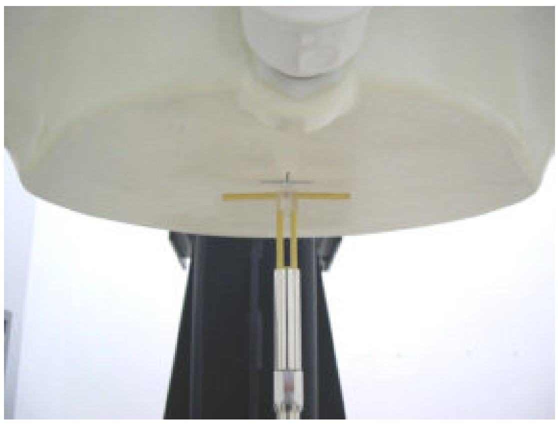


Fig 10.3.2 Setup Photo

11. RF Exposure Positions

11.1 Extremity Exposure

Devices that are designed or intended for use on extremities, or mainly operated in extremity only exposure conditions, i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When extremity SAR testing is required, a flat phantom must be used if the exposure condition is more conservative than the actual use conditions.

<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 ≤ 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 ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 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 ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4 / B5 / B12 / B17 / B26 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 B2 / B4 /B5 / B17 SAR test was covered by B25 / B66 / B26 / B12; 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 ≤ 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:
   · ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   · ≤ 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
   · ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, if the extremity repeated SAR is necessary, 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.

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 ≤ 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 ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 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 ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B4 / B5 / B12 / B17 / B26 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 B2 / B4 /B5 / B17 SAR test was covered by B25 / B66 / B26 / B12; 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 ≤ 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

14.1 Extremity SAR

NB-IOT

Plot No.	Band	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
01	LTE Band 5	BPSK	1	0	NB-IOT	Front	0mm	20525	836.5	23.05	24.00	1.245	0.01	0.637	**0.793**
	LTE Band 5	BPSK	1	11	NB-IOT	Front	0mm	20525	836.5	23.01	24.00	1.256	0.18	0.613	0.770
	LTE Band 5	BPSK	1	0	NB-IOT	Back	0mm	20525	836.5	23.05	24.00	1.245	-0.1	0.194	0.241
	LTE Band 5	BPSK	1	11	NB-IOT	Back	0mm	20525	836.5	23.01	24.00	1.256	0.08	0.149	0.187
	LTE Band 5	BPSK	1	0	NB-IOT	Left Side	0mm	20525	836.5	23.05	24.00	1.245	0.05	0.330	0.411
	LTE Band 5	BPSK	1	11	NB-IOT	Left Side	0mm	20525	836.5	23.01	24.00	1.256	-0.02	0.377	0.474
	LTE Band 5	BPSK	1	0	NB-IOT	Right Side	0mm	20525	836.5	23.05	24.00	1.245	0.07	0.463	0.576
	LTE Band 5	BPSK	1	11	NB-IOT	Right Side	0mm	20525	836.5	23.01	24.00	1.256	0.03	0.405	0.509
	LTE Band 5	BPSK	1	0	NB-IOT	Bottom Side	0mm	20525	836.5	23.05	24.00	1.245	0.09	0.089	0.111
	LTE Band 5	BPSK	1	11	NB-IOT	Bottom Side	0mm	20525	836.5	23.01	24.00	1.256	0.12	0.082	0.103
	LTE Band 12	BPSK	1	0	NB-IOT	Front	0mm	23095	707.5	23.09	24.00	1.233	0.08	0.493	0.608
	LTE Band 12	BPSK	1	11	NB-IOT	Front	0mm	23095	707.5	23.03	24.00	1.250	0.09	0.636	0.795
02	LTE Band 12	BPSK	1	0	NB-IOT	Back	0mm	23095	707.5	23.09	24.00	1.233	-0.02	0.740	**0.912**
	LTE Band 12	BPSK	1	11	NB-IOT	Back	0mm	23095	707.5	23.03	24.00	1.250	-0.18	0.654	0.818
	LTE Band 12	BPSK	1	0	NB-IOT	Left Side	0mm	23095	707.5	23.09	24.00	1.233	0.06	0.262	0.323
	LTE Band 12	BPSK	1	11	NB-IOT	Left Side	0mm	23095	707.5	23.03	24.00	1.250	0.06	0.355	0.444
	LTE Band 12	BPSK	1	0	NB-IOT	Right Side	0mm	23095	707.5	23.09	24.00	1.233	0.15	0.497	0.613
	LTE Band 12	BPSK	1	11	NB-IOT	Right Side	0mm	23095	707.5	23.03	24.00	1.250	-0.1	0.597	0.746
	LTE Band 12	BPSK	1	0	NB-IOT	Bottom Side	0mm	23095	707.5	23.09	24.00	1.233	0.11	0.064	0.079
	LTE Band 12	BPSK	1	11	NB-IOT	Bottom Side	0mm	23095	707.5	23.03	24.00	1.250	0.1	0.057	0.071
	LTE Band 13	BPSK	1	0	NB-IOT	Front	0mm	23230	782	23.19	24.00	1.205	0.07	0.155	0.187
03	LTE Band 13	BPSK	1	11	NB-IOT	Front	0mm	23230	782	23.08	24.00	1.236	0.13	0.182	**0.225**
	LTE Band 13	BPSK	1	0	NB-IOT	Back	0mm	23230	782	23.19	24.00	1.205	0.09	0.135	0.163
	LTE Band 13	BPSK	1	11	NB-IOT	Back	0mm	23230	782	23.08	24.00	1.236	0.01	0.100	0.124
	LTE Band 13	BPSK	1	0	NB-IOT	Left Side	0mm	23230	782	23.19	24.00	1.205	-0.17	0.105	0.127
	LTE Band 13	BPSK	1	11	NB-IOT	Left Side	0mm	23230	782	23.08	24.00	1.236	0.03	0.091	0.112
	LTE Band 13	BPSK	1	0	NB-IOT	Right Side	0mm	23230	782	23.19	24.00	1.205	0.05	0.128	0.154
	LTE Band 13	BPSK	1	11	NB-IOT	Right Side	0mm	23230	782	23.08	24.00	1.236	0.04	0.155	0.192
	LTE Band 13	BPSK	1	0	NB-IOT	Bottom Side	0mm	23230	782	23.19	24.00	1.205	-0.11	0.044	0.053
	LTE Band 13	BPSK	1	11	NB-IOT	Bottom Side	0mm	23230	782	23.08	24.00	1.236	0.06	0.043	0.053
	LTE Band 25	BPSK	1	0	NB-IOT	Front	0mm	26365	1882.5	22.45	24.00	1.429	-0.14	1.250	1.786
	LTE Band 25	BPSK	1	11	NB-IOT	Front	0mm	26365	1882.5	22.41	24.00	1.442	0.18	1.130	1.630
04	LTE Band 25	BPSK	1	0	NB-IOT	Back	0mm	26365	1882.5	22.45	24.00	1.429	0.02	2.160	**3.086**
	LTE Band 25	BPSK	1	0	NB-IOT	Back	0mm	26041	1850.1	22.37	24.00	1.455	0.06	2.060	2.998
	LTE Band 25	BPSK	1	0	NB-IOT	Back	0mm	26689	1914.9	22.44	24.00	1.432	0.09	2.010	2.879
	LTE Band 25	BPSK	1	11	NB-IOT	Back	0mm	26365	1882.5	22.41	24.00	1.442	-0.17	2.020	2.913
	LTE Band 25	BPSK	1	11	NB-IOT	Back	0mm	26041	1850.1	22.38	24.00	1.452	0.02	1.950	2.832
	LTE Band 25	BPSK	1	11	NB-IOT	Back	0mm	26689	1914.9	22.37	24.00	1.455	0.01	1.960	2.853
	LTE Band 25	QPSK	12	0	NB-IOT	Back	0mm	26365	1882.5	20.35	22.00	1.462	0.01	1.560	2.281
	LTE Band 25	BPSK	1	0	NB-IOT	Left Side	0mm	26365	1882.5	22.45	24.00	1.429	0.13	0.169	0.241
	LTE Band 25	BPSK	1	11	NB-IOT	Left Side	0mm	26365	1882.5	22.41	24.00	1.442	0.15	0.152	0.219
	LTE Band 25	BPSK	1	0	NB-IOT	Right Side	0mm	26365	1882.5	22.45	24.00	1.429	0.09	0.676	0.966
	LTE Band 25	BPSK	1	11	NB-IOT	Right Side	0mm	26365	1882.5	22.41	24.00	1.442	0.06	0.683	0.985
	LTE Band 25	BPSK	1	0	NB-IOT	Bottom Side	0mm	26365	1882.5	22.45	24.00	1.429	0.09	1.880	2.686
	LTE Band 25	BPSK	1	0	NB-IOT	Bottom Side	0mm	26041	1850.1	22.37	24.00	1.455	-0.03	1.710	2.489
	LTE Band 25	BPSK	1	0	NB-IOT	Bottom Side	0mm	26689	1914.9	22.44	24.00	1.432	0.02	1.690	2.420
	LTE Band 25	BPSK	1	11	NB-IOT	Bottom Side	0mm	26365	1882.5	22.41	24.00	1.442	0.01	1.780	2.567
	LTE Band 25	BPSK	1	11	NB-IOT	Bottom Side	0mm	26041	1850.1	22.38	24.00	1.452	0.02	1.750	2.541
	LTE Band 25	BPSK	1	11	NB-IOT	Bottom Side	0mm	26689	1914.9	22.37	24.00	1.455	0.03	1.650	2.402
	LTE Band 25	QPSK	12	0	NB-IOT	Bottom Side	0mm	26365	1882.5	20.35	22.00	1.462	0.01	1.210	1.769
	LTE Band 66	BPSK	1	0	NB-IOT	Front	0mm	132322	1745	22.89	24.00	1.291	0.04	1.040	1.343

	LTE Band 66	BPSK	1	11	NB-IOT	Front	0mm	132322	1745	22.82	24.00	1.312	0.08	1.010	1.325
05	LTE Band 66	BPSK	1	0	NB-IOT	Back	0mm	132322	1745	22.89	24.00	1.291	-0.03	2.020	2.608
	LTE Band 66	BPSK	1	0	NB-IOT	Back	0mm	131973	1710.1	22.82	24.00	1.312	0.02	1.950	2.559
	LTE Band 66	BPSK	1	0	NB-IOT	Back	0mm	132671	1779.9	22.88	24.00	1.294	0.01	1.960	2.537
	LTE Band 66	BPSK	1	11	NB-IOT	Back	0mm	132322	1745	22.82	24.00	1.312	0.06	1.940	2.546
	LTE Band 66	BPSK	1	11	NB-IOT	Back	0mm	131973	1710.1	22.82	24.00	1.312	0.03	1.850	2.428
	LTE Band 66	BPSK	1	11	NB-IOT	Back	0mm	132671	1779.9	22.82	24.00	1.312	0.01	1.790	2.349
	LTE Band 66	QPSK	12	0	NB-IOT	Back	0mm	132322	1745	20.97	22.00	1.268	0.01	1.150	1.458
	LTE Band 66	BPSK	1	0	NB-IOT	Left Side	0mm	132322	1745	22.89	24.00	1.291	0.05	0.205	0.265
	LTE Band 66	BPSK	1	11	NB-IOT	Left Side	0mm	132322	1745	22.82	24.00	1.312	-0.09	0.208	0.273
	LTE Band 66	BPSK	1	0	NB-IOT	Right Side	0mm	132322	1745	22.89	24.00	1.291	0.06	0.507	0.655
	LTE Band 66	BPSK	1	11	NB-IOT	Right Side	0mm	132322	1745	22.82	24.00	1.312	0.16	0.456	0.598
	LTE Band 66	BPSK	1	0	NB-IOT	Bottom Side	0mm	132322	1745	22.89	24.00	1.291	0.11	1.250	1.614
	LTE Band 66	BPSK	1	11	NB-IOT	Bottom Side	0mm	132322	1745	22.82	24.00	1.312	0.04	1.080	1.417

Cat M1

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
06	LTE Band 12	10M	QPSK	1	0	Cat M1	Front	0mm	23095	707.5	22.08	24.00	1.556	-0.01	0.187	0.291
	LTE Band 12	10M	QPSK	3	0	Cat M1	Front	0mm	23095	707.5	22.94	24.00	1.276	0.01	0.185	0.236
	LTE Band 12	10M	QPSK	1	0	Cat M1	Back	0mm	23095	707.5	22.08	24.00	1.556	0.03	0.120	0.187
	LTE Band 12	10M	QPSK	3	0	Cat M1	Back	0mm	23095	707.5	22.94	24.00	1.276	-0.08	0.122	0.156
	LTE Band 12	10M	QPSK	1	0	Cat M1	Left Side	0mm	23095	707.5	22.08	24.00	1.556	-0.08	0.101	0.157
	LTE Band 12	10M	QPSK	3	0	Cat M1	Left Side	0mm	23095	707.5	22.94	24.00	1.276	0.1	0.108	0.138
	LTE Band 12	10M	QPSK	1	0	Cat M1	Right Side	0mm	23095	707.5	22.08	24.00	1.556	-0.18	0.159	0.247
	LTE Band 12	10M	QPSK	3	0	Cat M1	Right Side	0mm	23095	707.5	22.94	24.00	1.276	0.1	0.160	0.204
	LTE Band 12	10M	QPSK	1	0	Cat M1	Bottom Side	0mm	23095	707.5	22.08	24.00	1.556	0.12	0.045	0.070
	LTE Band 12	10M	QPSK	3	0	Cat M1	Bottom Side	0mm	23095	707.5	22.94	24.00	1.276	0.08	0.050	0.064
	LTE Band 13	10M	QPSK	1	0	Cat M1	Front	0mm	23230	782	22.68	24.00	1.355	-0.17	0.141	0.191
07	LTE Band 13	10M	QPSK	3	0	Cat M1	Front	0mm	23230	782	22.65	24.00	1.365	-0.03	0.149	0.203
	LTE Band 13	10M	QPSK	1	0	Cat M1	Back	0mm	23230	782	22.68	24.00	1.355	0.14	0.114	0.154
	LTE Band 13	10M	QPSK	3	0	Cat M1	Back	0mm	23230	782	22.65	24.00	1.365	0.11	0.114	0.156
	LTE Band 13	10M	QPSK	1	0	Cat M1	Left Side	0mm	23230	782	22.68	24.00	1.355	-0.05	0.077	0.104
	LTE Band 13	10M	QPSK	3	0	Cat M1	Left Side	0mm	23230	782	22.65	24.00	1.365	0.18	0.082	0.112
	LTE Band 13	10M	QPSK	1	0	Cat M1	Right Side	0mm	23230	782	22.68	24.00	1.355	0.14	0.125	0.169
	LTE Band 13	10M	QPSK	3	0	Cat M1	Right Side	0mm	23230	782	22.65	24.00	1.365	-0.17	0.121	0.165
	LTE Band 13	10M	QPSK	1	0	Cat M1	Bottom Side	0mm	23230	782	22.68	24.00	1.355	0.17	0.036	0.049
	LTE Band 13	10M	QPSK	3	0	Cat M1	Bottom Side	0mm	23230	782	22.65	24.00	1.365	-0.05	0.047	0.064
	LTE Band 26	15M	QPSK	1	0	Cat M1	Front	0mm	26865	831.5	22.83	24.00	1.309	0.01	0.217	0.284
	LTE Band 26	15M	QPSK	3	0	Cat M1	Front	0mm	26865	831.5	23.63	24.00	1.089	0.1	0.220	0.240
	LTE Band 26	15M	QPSK	1	0	Cat M1	Back	0mm	26865	831.5	22.83	24.00	1.309	-0.17	0.092	0.120
	LTE Band 26	15M	QPSK	3	0	Cat M1	Back	0mm	26865	831.5	23.63	24.00	1.089	0.04	0.089	0.097
	LTE Band 26	15M	QPSK	1	0	Cat M1	Left Side	0mm	26865	831.5	22.83	24.00	1.309	-0.01	0.213	0.279
	LTE Band 26	15M	QPSK	3	0	Cat M1	Left Side	0mm	26865	831.5	23.63	24.00	1.089	-0.08	0.226	0.246
08	LTE Band 26	15M	QPSK	1	0	Cat M1	Right Side	0mm	26865	831.5	22.83	24.00	1.309	0.03	0.295	0.386
	LTE Band 26	15M	QPSK	3	0	Cat M1	Right Side	0mm	26865	831.5	23.63	24.00	1.089	0.06	0.297	0.323
	LTE Band 26	15M	QPSK	1	0	Cat M1	Bottom Side	0mm	26865	831.5	22.83	24.00	1.309	-0.09	0.042	0.055
	LTE Band 26	15M	QPSK	3	0	Cat M1	Bottom Side	0mm	26865	831.5	23.63	24.00	1.089	-0.08	0.048	0.052
	LTE Band 66	20M	QPSK	1	0	Cat M1	Front	0mm	132322	1745	22.59	24.00	1.384	-0.01	0.537	0.743
	LTE Band 66	20M	QPSK	3	0	Cat M1	Front	0mm	132322	1745	22.56	24.00	1.393	-0.08	0.523	0.729
	LTE Band 66	20M	QPSK	1	0	Cat M1	Back	0mm	132322	1745	22.59	24.00	1.384	0.03	0.797	1.103
	LTE Band 66	20M	QPSK	3	0	Cat M1	Back	0mm	132322	1745	22.56	24.00	1.393	0.03	0.768	1.070
	LTE Band 66	20M	QPSK	1	0	Cat M1	Left Side	0mm	132322	1745	22.59	24.00	1.384	0.03	0.091	0.126
	LTE Band 66	20M	QPSK	3	0	Cat M1	Left Side	0mm	132322	1745	22.56	24.00	1.393	0.06	0.058	0.081

	LTE Band 66	20M	QPSK	1	0	Cat M1	Right Side	0mm	132322	1745	22.59	24.00	1.384	-0.09	0.205	0.284
	LTE Band 66	20M	QPSK	3	0	Cat M1	Right Side	0mm	132322	1745	22.56	24.00	1.393	0.02	0.195	0.272
09	LTE Band 66	20M	QPSK	1	0	Cat M1	Bottom Side	0mm	132322	1745	22.59	24.00	1.384	0.07	0.879	1.216
	LTE Band 66	20M	QPSK	3	0	Cat M1	Bottom Side	0mm	132322	1745	22.56	24.00	1.393	0.01	0.813	1.133
	LTE Band 25	20M	QPSK	1	0	Cat M1	Front	0mm	26365	1882.5	22.36	24.00	1.459	0.13	0.472	0.689
	LTE Band 25	20M	QPSK	3	0	Cat M1	Front	0mm	26365	1882.5	22.35	24.00	1.462	0.12	0.502	0.734
	LTE Band 25	20M	QPSK	1	0	Cat M1	Back	0mm	26365	1882.5	22.36	24.00	1.459	0.03	0.903	1.317
10	LTE Band 25	20M	QPSK	3	0	Cat M1	Back	0mm	26365	1882.5	22.35	24.00	1.462	0.03	1.020	1.491
	LTE Band 25	20M	QPSK	1	0	Cat M1	Left Side	0mm	26365	1882.5	22.36	24.00	1.459	0.16	0.080	0.117
	LTE Band 25	20M	QPSK	3	0	Cat M1	Left Side	0mm	26365	1882.5	22.35	24.00	1.462	-0.1	0.083	0.121
	LTE Band 25	20M	QPSK	1	0	Cat M1	Right Side	0mm	26365	1882.5	22.36	24.00	1.459	0.07	0.382	0.557
	LTE Band 25	20M	QPSK	3	0	Cat M1	Right Side	0mm	26365	1882.5	22.35	24.00	1.462	0.18	0.443	0.648
	LTE Band 25	20M	QPSK	1	0	Cat M1	Bottom Side	0mm	26365	1882.5	22.36	24.00	1.459	-0.1	0.629	0.918
	LTE Band 25	20M	QPSK	3	0	Cat M1	Bottom Side	0mm	26365	1882.5	22.35	24.00	1.462	0.01	0.691	1.010

14.2 Repeated SAR Measurement

Plot No.	Band	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Ratio	Reported 10g SAR (W/kg)
1st	LTE Band 25	BPSK	1	0	NB-IOT	Back	0mm	26365	1882.5	22.45	24.00	1.429	0.02	2.160	1	3.086
2nd	LTE Band 25	BPSK	1	0	NB-IOT	Back	0mm	26365	1882.5	22.45	24.00	1.429	0.01	2.010	1.075	2.872
1st	LTE Band 66	BPSK	1	0	NB-IOT	Back	0mm	132322	1745	22.89	24.00	1.291	-0.03	2.020	2	2.608
2nd	LTE Band 66	BPSK	1	0	NB-IOT	Back	0mm	132322	1745	22.89	24.00	1.291	0.01	1.950	1.036	2.518

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
2. Per KDB 865664 D01v01r04, if the extremity repeated SAR is necessary, 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 ratio is the difference in percentage between original and repeated *measured SAR*.
3. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

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15. 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 and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 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 10-g SAR is less 3.75W/kg. Therefore, the measurement uncertainty table is not required in this report.

16. 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