FCC SAR TEST REPORT

Report No.:	SET2018-10930
Product:	Feature Phone
Brand Name:	ZTE
Model No.:	R570, ZTE R570
FCC ID:	SRQ-ZTER570
Applicant:	ZTE Corporation
Address:	ZTE Plaza, Keji Road South, Shenzhen, China
Issued by:	CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.
Lab Location:	Building 28/29, East of Shigu Xili Industrial Zone, Nanshan District Shenzhen, Guangdong 518055, China
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Test Report

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Applicant Address…….: ZTE Plaza, Keji Road South, Shenzhen, China
Manufacturer…………: ZTE Corporation
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Test Standards……….: **47CFR § 2.1093-** Radiofrequency Radiation Exposure Evaluation: Portable Devices;

ANSI C95.1–1992: Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.(IEEE Std C95.1-1991)

IEEE 1528–2013: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques

Test Result……………: Pass

Test Date………………: 2018-08-28~2018-08-29

Tested by …………..: Mei Chun 2018-08-30

Chun Mei, Test Engineer

Reviewed by…………: Chris You 2018-08-30

You Xingjin, Senior Egineer

Approved by……………: Zhu Qi 2018-08-30

Zhu Qi , Manager

Contents

1. Administrative Data

1.1 Testing Laboratory

Test Site:	CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd
Address:	Electronic Testing Building, No. 43 Shahe Road, Xili Jiedao, Nanshan District, Shenzhen, Guangdong, China
CNAS Lab Code:	CCIC-SET is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659.
NVLAP Lab Code:	CCIC-SET is a third party testing organization accredited by NVLAP according to ISO/IEC 17025. The accreditation certificate number is 201008-0.
FCC Registration:	CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN5031, valid time is until December 31, 2018.
ISED Registration:	CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until Aug. 03, 2019.
Test Environment Condition:	Temperature (℃): 21℃ Relative Humidity (%): 60% Atmospheric Pressure (kPa): 86KPa-106KPa

2. Equipment Under Test (EUT)

Identification of the Equipment under Test

Device Type:	Portable	
Exposure Category:	Population/Uncontrolled	
Sample Name:	Feature Phone	
Brand Name:	ZTE	
Model Name:	R570, ZTE R570	
General description:	Support Band	GSM850/1900, BT,FM
	Test Band	GSM850/1900
	IMEI No.	861369039992893
	Device Class	Class B
	Multi Class	GPRS: Class 12
	Development Stage	Identical Prototype
	Accessories	Power Supply
	Hotspot	Not Support
	Operation mode	GSM
	Modulation mode	GSM(GMSK)
	DTM mode	Not support
	Battery	Model No.: Li3708T42P3h533456 Rated capacity: 800mAh Nominal Voltage: ⎓ +3.7V Charge Voltage: ⎓ +4.2V
	Max. RF Power	31.6dBm
	Max. SAR Value	Head:0.71 0W/kg Body: 1.211W/kg(Limit:1.6W/Kg, 15mm distance)

NOTE:

a. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

3. SAR Summary

Highest Standalone SAR Summary

Exposure Position	Frequency Band	Scaled 1g-SAR(W/kg)	Highest Scaled 1g-SAR(W/kg)
Head	GSM850	0.710	0.710
	GSM1900	0.500	
Body-worn Accessory (15mm Gap)	GPRS850	1.211	1.211
	GPRS1900	0.125	

4. Specific Absorption Rate (SAR)

4.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

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

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

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

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

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

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

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

where σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the rms electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

4.2 Applicable Standards and Limits

4.2.1 Applicable Standards

47CFR §2.1093	Radiofrequency Radiation Exposure Evaluation: Portable Devices
ANSI C95.1–1992	Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.(IEEE Std C95.1-1991)
IEEE 1528–2013	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
KDB 447498 D01	v06 General RF Exposure Guidance
KDB 648474 D04	v01r03 Handset SAR
KDB 865664 D01	v01r04 SAR Measurement 100MHz to 6GHz
KDB 865664 D02	v01r02 SAR Exposure Reporting

4.2.2 RF exposure Limits

Human Exposure	Uncontrolled Environment General Population
Spatial Peak SAR* (Brain/Body)	**1.60 mW/g**
Spatial Average SAR** (Whole Body)	0.08 mW/g
Spatial Peak SAR*** (Limbs)	4.00 mW/g

The limit applied in this test report is shown in bold letters.

Notes:

* The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time

** The Spatial Average value of the SAR averaged over the whole body.

*** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

4.3 Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SATIMO. The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6mm).

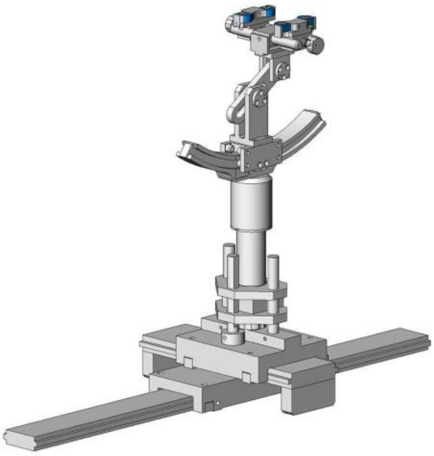
System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

SAM Twin Phantom

4.4 Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SATIMO as an integral part of the COMOSAR test system.

The device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.



Device holder

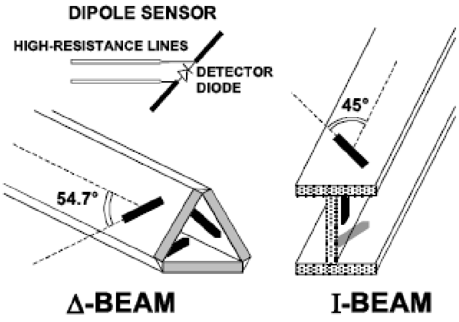
4.5 Probe Specification

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	700 MHz to 3 GHz; Linearity: ± 0.5 dB (700 MHz to 3 GHz)
Directivity	± 0.25 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	1.5 µW/g to 100 mW/g; Linearity: ± 0.5 dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 5 mm Distance from probe tip to dipole centers: <2.7 mm
Application	General dosimetry up to 3 GHz Dosimetry in strong gradient fields Compliance tests of R570 LTE USB Modems
Compatibility	COMOSAR

Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



5. Tissue check and recommend Dielectric Parameters

5.1 Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness Power drifts in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

Table 1: Recommended Dielectric Performance of Tissue

Ingredients (% by weight)	Frequency (MHz)											
	450		835		915		1900		2450		2600	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.46	52.4	41.05	56.0	54.9	40.4	62.7	73.2	55.24	64.49
Salt (Nacl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04	0.5	0.024
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0	0.0	0.0
Triton x-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0	44.45	32.25
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.2	52.5	39.0	52.5
Conductivity (s/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.80	1.78	1.96	2.16

MSL/HSL750 (Body and Head liquid for 650 – 850 MHz)

Item	Head Tissue Simulation Liquid HSL750 Muscle(body)Tissue Simulation Liquid MSL750			
H2O	Water, 35 – 58%			
Sucrese	Sugar, white, refined, 40-60%			
NaCl	Sodium Chloride, 0-6%			
Hydroxyethel-cellulsoe	Medium Viscosity (CAS# 9004-62-0), <0.3%			
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyyl-3(2H)-isothiazolone, 0.1-0.7%			
Frequency (MHz)	Head εr	Head σ(S/m)	Body εr	Bodyσ(S/m)
750	41.9	0.89	55.2	0.97

Note: The liquid of 700MHz&2600MHz typical liquid composition is provided by SATIMO.

Table 2 Recommended Tissue Dielectric Parameters

Frequency (MHz)	Head Tissue		Body Tissue	
	ε_r	σ(S/m)	ε_r	σ(S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

5.2 Simulate liquid

Liquid check results:

Table 3: Dielectric Performance of Head Tissue Simulating Liquid

Temperature: 23.2°C; Humidity: 64%;			
/	Frequency	Permittivity ε	Conductivity σ (S/m)
Target value	850MHz	41.5±5%	0.90±5%
Validation value (2018-08-28)	850MHz	41.61	0.89
Target value	1900MHz	40.0±5%	1.40±5%
Validation value (2018-08-29)	1900MHz	41.15	1.38

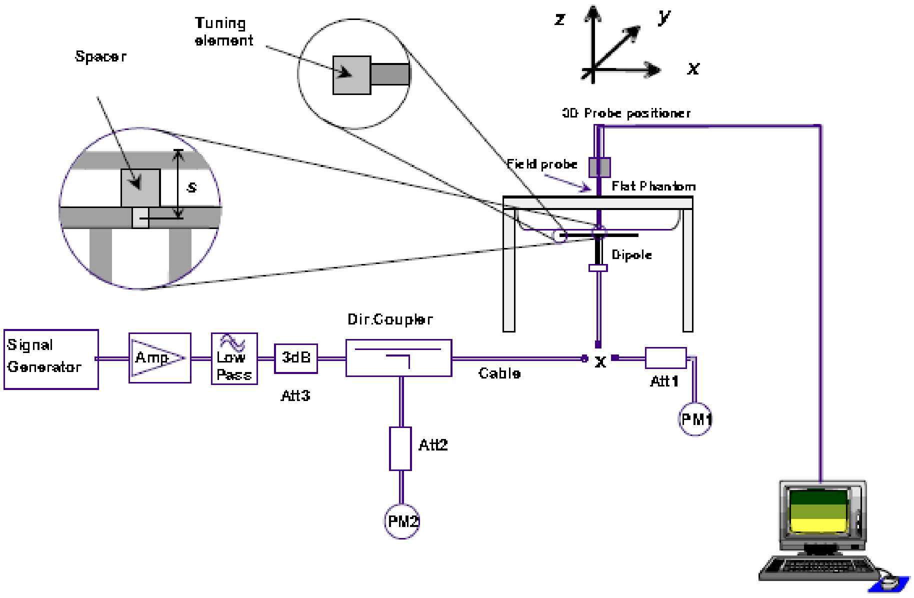
Table 4: Dielectric Performance of Body Tissue Simulating Liquid

Temperature: 23.2°C; Humidity: 64%;			
/	Frequency	Permittivity ε	Conductivity σ (S/m)
Target value	850MHz	55.2±5%	0.97±5%
Validation value (2018-08-28)	850MHz	55.35	0.91
Target value	1900MHz	53.3±5%	1.52±5%
Validation value (2018-08-29)	1900MHz	53.94	1.53

6. SAR System validation

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ±10%. The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

The following procedure, recommended for performing validation tests using box phantoms is based on the procedures described in the IEEE standard P1528. Setup according to the setup diagram below:



With the SG and Amp and with directional coupler in place, set up the source signal at the relevant frequency and use a power meter to measure the power at the end of the SMA cable that you intend to connect to the balanced dipole. Adjust the SG to make this, say, 0.01W (10 dBm). If this level is too high to read directly with the power meter sensor, insert a calibrated attenuator (e.g. 10 or 20 dB) and make a suitable correction to the power meter reading.

Note 1: In this method, the directional coupler is used for monitoring rather than setting the exact feed power level. If, however, the directional coupler is used for power measurement, you should check the frequency range and power rating of the coupler and measure the coupling factor (referred to output) at the test frequency using a VNA.

Note 2: Remember that the use of a 3dB attenuator (as shown in Figure 8.1 of P1528) means that you need an RF amplifier of 2 times greater power for the same feed power. The other issue is the cable length. You might get up to 1dB of loss per meter of cable, so the cable length after the coupler needs to be quite short.

Note 3: For the validation testing done using CW signals, most power meters are suitable. However, if you are measuring the output of a modulated signal from either a signal generator or a handset, you must ensure that the power meter correctly reads the modulated signals.

The measured 1-gram averaged SAR values of the device against the phantom are provided in Tables 5 and Table 6. The humidity and ambient temperature of test facility were 64% and 23.2°C respectively. The body phantom were full of the body tissue simulating liquid. The EUT was supplied with full-charged battery for each measurement.

The distance between the back of the EUT and the bottom of the flat phantom is 10 mm (taking into account of the IEEE 1528 and the place of the antenna).

Table 5: Head SAR system validation (1g)

Frequency	Duty cycle	Target value （W/kg）	Test value (W/kg)	
			10 mW	1W
835MHz(2018-08-28)	1:1	9.61±10%	0.094	9.40
1900MHz(2018-08-29)	1:1	39.35±10%	0.370	37.00

Table 6: Body SAR system validation (1g)

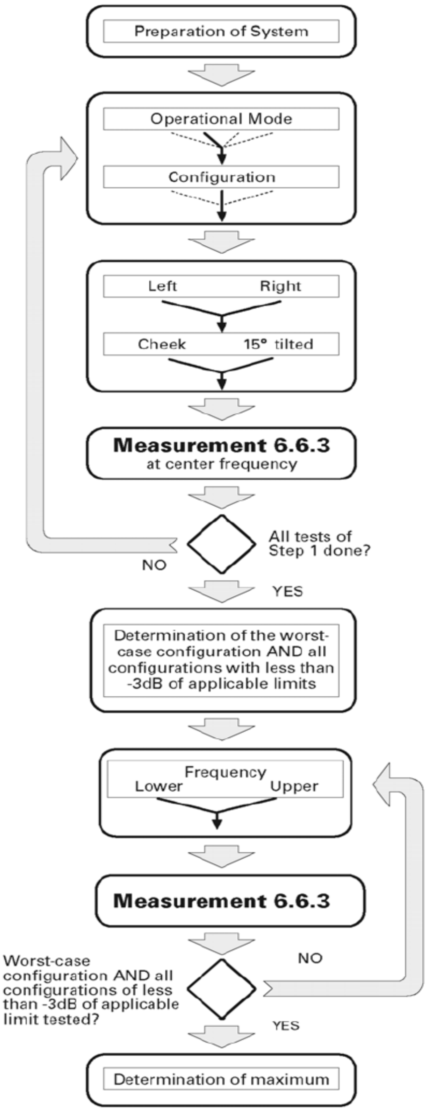
Frequency	Duty cycle	Target value （W/kg）	Test value (W/kg)	
			10 mW	1W
835MHz(2018-08-28)	1:1	9.88±10%	0.098	9.80
1900MHz(2018-08-29)	1:1	38.84±10%	0.368	36.80

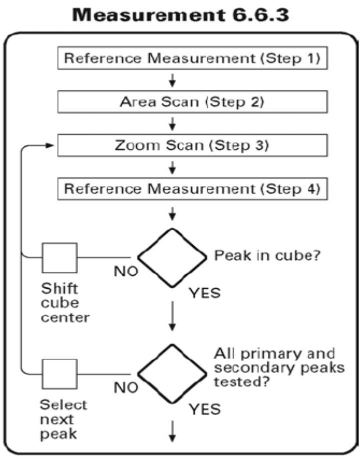
* Note: Target value was referring to the measured value in the calibration certificate of reference dipole.

Note: All SAR values are normalized to 1W forward power.

7. SAR measurement procedure

The SAR test against the head phantom was carried out as follow:





Establish a call with the maximum output power with a base station simulator, the connection between the EUT and the base station simulator is established via air interface.

After an area scan has been done at a fixed distance of 2mm from the surface of the phantom on the source side, a 3D scan is set up around the location of the maximum spot SAR. First, a point within the scan area is visited by the probe and a SAR reading taken at the start of testing. At the end of testing, the probe is returned to the same point and a second reading is taken. Comparison between these start and end readings enables the power drift during measurement to be assessed.

Above is the scanning procedure flow chart and table from the IEEEp1528 standard. This is the procedure for which all compliant testing should be carried out to ensure that all variations of the device position and transmission behavior are tested.

8. Conducted RF Output Power

8.1 GSM Conducted Power

GSM850		Burst-Averaged output Power (dBm)			Division Factors	Frame-Averaged output Power (dBm)		
		128CH	190CH	251CH		28CH	190CH	251CH
GSM (CS)		31.40	31.50	31.60	-9.19	22.21	22.31	22.41
GPRS (GMSK)	1 Tx Slot	29.40	29.10	29.30	-9.19	20.21	19.91	20.11
	2 Tx Slots	26.52	26.55	26.44	-6.13	20.39	20.42	20.31
	3 Tx Slots	25.11	25.07	25.19	-4.42	20.69	20.65	20.77
	4 Tx Slots	24.26	24.38	24.31	-3.18	21.08	21.20	21.13
GSM1900		Burst-Averaged output Power (dBm)			Division Factors	Frame-Averaged output Power (dBm)		
		512CH	661CH	810CH		512CH	661CH	810CH
GSM (CS)		29.00	29.60	28.40	-9.19	19.81	20.41	19.21
GPRS (GMSK)	1 Tx Slot	28.90	28.70	28.30	-9.19	19.71	19.51	19.11
	2 Tx Slots	26.19	26.21	26.10	-6.13	20.06	20.08	19.97
	3 Tx Slots	24.83	24.76	24.86	-4.42	20.41	20.34	20.44
	4 Tx Slots	23.73	23.60	23.30	-3.18	20.55	20.42	20.13

Note: Per KDB 447498 D01 v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.

For hotspot SAR, EUT was performed at GPRS Class 12 multi-slots(4TX) mode

For Head and Body-worn SAR testing, EUT was set in GSM Voice mode for both GSM850 and GSM1900

Timeslot consignations

No. Of Slots	Slot 1	Slot 2	Slot 3	Slot 4
Slot Consignation	1Up4Down	2UpDown	3UpDown	4Up1Down
Duty Cycle	1:8	1:4	1:2.67	1:2
Crest Factor	-9.03dB	-6.02dB	-4.26dB	-3.01dB

8.2 Bluetooth Output Power

Channel	Frequency (MHz)	BT3.0 Output Power(dBm)Peak		
		GFSK	π /4-DQPSK	8-DPSK
CH 0	2402	7.51	6.88	7.15
CH 39	2441	8.15	7.54	7.61
CH 78	2480	8.59	8.09	8.25

Channel	Frequency (MHz)	BT3.0 Output Power(dBm)Average		
		GFSK	π /4-DQPSK	8-DPSK
CH 0	2402	5.51	4.88	5.15
CH 39	2441	6.15	5.54	5.61
CH 78	2480	6.59	6.09	6.25

9. SAR test Exclusion and estimate SAR calculation:

Note:

1. Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100MHz to 6GHz at test separation distances ≤ 50mm are determined by:[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] • [$\sqrt{f}$ (GHz)] ≤3.0 for 1-g SAR and ≤7.5 for 10-g extremity SAR
   (1) f(GHz) is the RF channel transmit frequency in GHz
   (2) Power and distance are round to the nearest mW and mm before calculation
   (3) The result is rounded to one decimal place for comparison
   (4) If the test separation distance(antenna-user) is < 5mm, 5mm is used for excluded SAR calculation
   (5)

BT3.0 Max Power (dBm)	mW	Test Distance (mm)	Frequency(GHz)	Exclusion Thresholds
7	5.012	5	2.45	1.569

Per KDB 447498 D01v06 exclusion thresholds is 1.569<3, RF exposure evaluation is not required.

BT estimated SAR value=Exclusion Thresholds/7.5=1.569/7.5=**0.209W/Kg**

BT3.0 Max Power (dBm)	mW	Test Distance (mm)	Frequency(GHz)	Exclusion Thresholds
7	5.012	15	2.45	0.523

Per KDB 447498 D01v06 exclusion thresholds is 0.523<3, RF exposure evaluation is not required.
BT estimated SAR value=Exclusion Thresholds/7.5=0.523/7.5=**0.070W/Kg**

10.Scaling Factor calculation

Operation Mode	Channel	Output Power(dBm)	Tune up Power in tolerance(dBm)	Scaling Factor
GSM850	128	31.4	31.0 ± 1.0	1.148
	190	31.5	31.0 ± 1.0	1.122
	251	31.6	31.0 ± 1.0	1.096
GPRS850(4Tx)	512	24.26	23.5 ± 1.0	1.057
	661	24.38	23.5 ± 1.0	1.028
	810	24.31	23.5 ± 1.0	1.045
GSM1900	128	29.0	29.0 ± 1.0	1.259
	190	29.6	29.0 ± 1.0	1.096
	251	28.4	29.0 ± 1.0	1.445
GPRS1900 (4Tx)	512	23.73	23.0 ± 1.0	1.064
	661	23.60	23.0 ± 1.0	1.096
	810	23.30	23.0 ± 1.0	1.175
BT	78	6.59	6.0 ± 1.0	1.099

11. Test Results

Table 1: SAR Values of GSM 850MHz Band

Temperature: 23.0~23.5°C, humidity: 62~64%.								
Test Positions			Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)				Plot No.
				SAR (W/Kg),1g	Scaled Factor	Scaled SAR (W/Kg),1g	Power drift (%)	
Right Side of Head	Cheek		128/824.2	0.615	1.148	0.706	2.12	--
			190/836.6	**0.633**	1.122	**0.710**	-0.68	**1**
			251/848.8	0.601	1.096	0.659	1.21	--
	Tilt 15 degrees		190/836.6	0.578	1.122	0.649	3.45	--
Left Side of Head	Cheek		190/836.6	0.552	1.122	0.619	4.65	--
	Tilt 15 degrees		190/836.6	0.474	1.122	0.532	1.56	--
Body-worn (15mm Separation)	GPRS (4Tx)	Face Upward	190/836.6	0.469	1.028	0.481	-2.77	--
		Back Upward	128/824.2	0.933	1.057	0.986	-1.63	--
			190/836.6	**1.178**	1.028	**1.211**	0.90	**2**
			251/848.8	0.891	1.045	0.931	1.25	--
			128/824.2 Repeated	0.915	1.057	0.967	2.22	--
			190/836.6 Repeated	1.064	1.028	1.094	-1.31	--
			251/848.8 Repeated	0.874	1.045	0.913	2.85	--

Table 2: SAR Values of GSM1900 MHz Band

Temperature: 23.0~23.5°C, humidity: 62~64%.								
Test Positions			Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)				Plot No.
				SAR (W/Kg), 1g	Scaled Factor	Scaled SAR (W/Kg),1g	Power drift (%)	
Right Side of Head	Cheek		661/1880.0	**0.456**	1.096	**0.500**	2.12	**3**
	Tilt 15 degrees		661/1880.0	0.156	1.096	0.171	-0.03	--
Left Side of Head	Cheek		661/1880.0	0.305	1.096	0.334	1.97	--
	Tilt 15 degrees		661/1880.0	0.080	1.096	0.088	-1.26	--
Body-worn (15mm Separation)	GPRS (4Tx)	Face Upward	661/1880.0	0.062	1.096	0.068	-0.55	--
		Back Upward	661/1880.0	**0.114**	1.096	**0.125**	0.16	**4**

Note:
When the 1-g SAR for the mid-band channel or the channel with the highest output power satisfy the following conditions, testing of the other channels in the band is not required. (Per KDB 447498 D01 General RF Exposure Guidance v06)
• ≤ 0.8 W/kg, when the transmission band is ≤ 100 MHz
• ≤ 0.6 W/kg, when the transmission band is between 100 MHz and 200 MHz
• ≤ 0.4 W/kg, when the transmission band is ≥ 200 MHz

12.Simultaneous Transmissions Analysis

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 6 of this report. Maximum localized SAR is **below** exposure limits specified in the relevant standards.

Simultaneous SAR

No.	Transmitter Combinations	Scenario Supported or not	Supported for Mobile Hotspot or not
1	GSM+BT	Yes	No

Test Position		Right Cheek	Right Title	Left Cheek	Left Tilt
Head MAX 1-g SAR(W/Kg)	GSM850	0.710	0.649	0.619	0.532
	GSM1900	0.500	0.171	0.334	0.088
	BT	*0.209	*0.209	*0.209	*0.209
BT Simultaneous ∑1-g SAR(W/Kg)		0.919	0.858	0.828	0.741

Simultaneous Tx Combination of GSM and BT (Head).

Test Position		Face	Back	Edge A	Edge B	Edge C	Edge D
Body-worn 15mm separation MAX 1-g SAR(W/Kg)	GSMS850	0.481	1.211	--	--	--	--
	GSM1900	0.068	0.125	--	--	--	--
	BT	*0.070	*0.070	--	--	--	--
BT Simultaneous ∑1-g SAR(W/Kg)		0.551	1.281	--	--	--	--

Simultaneous Tx Combination of GSM and BT (Body).

The estimated SAR value with * Signal

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required

13.Measurement Uncertainty

No.	Uncertainty Component	Type	Uncertainty Value (%)	Probability Distribution	k	ci	Standard Uncertainty (%) ui(%)	Degree of freedom Veff or vi
	Measurement System							
1	—Probe Calibration	B	5.8	N	1	1	5.8	∞
2	—Axial isotropy	B	3.5	R	$\sqrt{3}$	0.5	1.43	∞
3	—Hemispherical Isotropy	B	5.9	R	$\sqrt{3}$	0.5	2.41	∞
4	—Boundary Effect	B	1	R	$\sqrt{3}$	1	0.58	∞
5	—Linearity	B	4.7	R	$\sqrt{3}$	1	2.71	∞
6	—System Detection Limits	B	1.0	R	$\sqrt{3}$	1	0.58	∞
7	Modulation response	B	3	N	1	1	3.00	
8	—Readout Electronics	B	0.5	N	1	1	0.50	∞
9	—Response Time	B	1.4	R	$\sqrt{3}$	1	0.81	∞
10	—Integration Time	B	3.0	R	$\sqrt{3}$	1	1.73	∞
11	—RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1.73	∞
12	—Probe Position Mechanical tolerance	B	1.4	R	$\sqrt{3}$	1	0.81	∞
13	—Probe Position with respect to Phantom Shell	B	1.4	R	$\sqrt{3}$	1	0.81	∞
14	—Extrapolation, Interpolation and Integration Algorithms for Max. SAR evaluation	B	2.3	R	$\sqrt{3}$	1	1.33	∞

	Uncertainties of the DUT							
15	—Position of the DUT	A	2.6	N	$\sqrt{3}$	1	2.6	5
16	—Holder of the DUT	A	3	N	$\sqrt{3}$	1	3.0	5
17	—Output Power Variation –SAR drift measurement	B	5.0	R	$\sqrt{3}$	1	2.89	∞
Phantom and Tissue Parameters								
18	—Phantom Uncertainty(shape and thickness tolerances)	B	4	R	$\sqrt{3}$	1	2.31	∞
19	Uncertainty in SAR correction for deviation(in permittivity and conductivity)	B	2	N	1	1	2.00	
20	—Liquid Conductivity Target –tolerance	B	2.5	R	$\sqrt{3}$	0.6	1.95	∞
21	—Liquid Conductivity –measurement Uncertainty)	B	4	N	$\sqrt{3}$	1	0.92	9
22	—Liquid Permittivity Target tolerance	B	2.5	R	$\sqrt{3}$	0.6	1.95	∞
23	—Liquid Permittivity –measurement uncertainty	B	5	N	$\sqrt{3}$	1	1.15	∞
Combined Standard Uncertainty				RSS			10.63	
Expanded uncertainty (Confidence interval of 95 %)				K=2			21.26	

System Check Uncertainty

No.	Uncertainty Component	Type	Uncertainty Value (%)	Probability Distribution	k	ci	Standard Uncertainty (%) ui(%)	Degree of freedom Veff or vi
	Measurement System							
1	—Probe Calibration	B	5.8	N	1	1	5.8	∞

2	—Axial isotropy	B	3.5	R	$\sqrt{3}$	0.5	1.43	∞
3	—Hemispherical Isotropy	B	5.9	R	$\sqrt{3}$	0.5	2.41	∞
4	—Boundary Effect	B	1	R	$\sqrt{3}$	1	0.58	∞
5	—Linearity	B	4.7	R	$\sqrt{3}$	1	2.71	∞
6	—System Detection Limits	B	1	R	$\sqrt{3}$	1	0.58	∞
7	Modulation response	B	0	N	1	1	0.00	
8	—Readout Electronics	B	0.5	N	1	1	0.50	∞
9	—Response Time	B	0.00	R	$\sqrt{3}$	1	0.00	∞
10	—Integration Time	B	1.4	R	$\sqrt{3}$	1	0.81	∞
11	—RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1.73	∞
12	—Probe Position Mechanical tolerance	B	1.4	R	$\sqrt{3}$	1	0.81	∞
13	—Probe Position with respect to Phantom Shell	B	1.4	R	$\sqrt{3}$	1	0.81	∞
14	—Extrapolation, Interpolation and Integration Algorithms for Max. SAR evaluation	B	2.3	R	$\sqrt{3}$	1	1.33	∞
	Uncertainties of the DUT							
15	Deviation of experimental source from numberical source	A	4	N	1	1	4.00	5
16	Input Power and SAR drift measurement	A	5	R	$\sqrt{3}$	1	2.89	5
17	Dipole Axis to Liquid Distance	B	2	R	$\sqrt{3}$	1	1.2	∞

Phantom and Tissue Parameters								
18	—Phantom Uncertainty(shape and thickness tolerances)	B	4	R	$\sqrt{3}$	1	2.31	∞
19	Uncertainty in SAR correction for deviation(in permittivity and conductivity)	B	2	N	1	1	2.00	
20	—Liquid Conductivity Target –tolerance	B	2.5	R	$\sqrt{3}$	0.6	1.95	∞
21	—Liquid Conductivity –measurement Uncertainty)	B	4	N	$\sqrt{3}$	1	0.92	9
22	—Liquid Permittivity Target tolerance	B	2.5	R	$\sqrt{3}$	0.6	1.95	∞
23	—Liquid Permittivity –measurement uncertainty	B	5	N	$\sqrt{3}$	1	1.15	∞
Combined Standard Uncertainty				RSS			10.15	
Expanded uncertainty (Confidence interval of 95 %)				K=2			20.29	

14.Equipment List

This table is a complete overview of the SAR measurement equipment. Devices used during the test described are marked ☒.

	EQUIPMENT	Model	Serial number	Calibration Date	Due Date
☒	SAR Probe	SSE5	SN 43/15 EP276	2017/11/27	2018/11/26
☐	Dipole	SID750	SN 23/15 DIP0G750-378	2017/11/27	2018/11/26
☒	Dipole	SID850	SN 09/13 DIP0G835-217	2017/11/27	2018/11/26
☐	Dipole	SID900	SN 09/13 DIP0G900-215	2017/11/27	2018/11/26
☐	Dipole	SID1800	SN 09/13 DIP1G800-216	2017/11/27	2018/11/26
☒	Dipole	SID1900	SN 09/13 DIP1G900-218	2017/11/27	2018/11/26
☐	Dipole	SID2000	SN 09/13 DIP2G000-219	2017/11/27	2018/11/26
☐	Dipole	SID2450	SN_09/13_DIP2G450-220	2017/11/27	2018/11/26
☐	Dipole	SID2600	SN 32/14_DIP2G600-338	2017/11/27	2018/11/26
☐	SAR Probe	SSE2	SN27/15 EPGO261	2017/11/27	2018/11/26
☐	Dipole	SWG5500	SN15/15 WGA39	2017/11/27	2018/11/26
☒	Multimeter	Keithley-2000	4085310	2017/09/08	2018/09/07
☒	System Simulator(R&S)	CMU200	A0304212	2017/11/08	2018/11/07
☒	System Simulator(Agilent 8960)	E5515C	GB 47200710	2017/11/08	2018/11/07
☒	System Simulator(R&S)	CMW500	130805	2017/08/29	2018/08/28
☒	Vector Network Analyzer(R&S)	ZVB8	A0802530	2018/05/09	2019/05/08
☒	PC 3.5 Fixed Match Calibration Kit	ZV-Z32	100571	2017/11/29	2018/11/28
☒	Dielectric Probe Kit	SCLMP	SN 09/13 OCPG51	2017/11/27	2018/11/26
☒	Signal Generator	SMU200A	A140801889	2018/05/09	2019/05/08
☒	Amplifier	Nucletudes	143060	2018/03/27	2019/03/28
☒	Directional Coupler	DC6180A	305827	2018/03/27	2019/03/28
☒	Power Meter	NRP2	A140401673	2018/03/27	2019/03/28
☒	Power Sensor	NPR-Z11	1138.3004.02-114072-nq	2018/03/27	2019/03/28
☒	Power Meter	NRVS	A0802531	2018/03/27	2019/03/28
☒	Power Sensor	NRV-Z4	100069	2018/03/27	2019/03/28

ANNEX A: Appendix A: SAR System performance Check Plots

(Please See Appendix A)

ANNEX B: Appendix B: SAR Measurement results Plots

(Please See Appendix B)

ANNEX C: Appendix C: Calibration reports

(Please See Appendix C)

ANNEX D: Appendix D: SAR Test Setup

(Please See Appendix D)

—End of the Report—