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Hearing Aid Compatibility （HAC） RF Emissions TEST REPORT

Report No: STS1605016H01

Issued for

ZTE Corporation

ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R. China

Product Name:	LTE Mutil-Mode Digital Mobile Phone
Brand Name:	ZTE
Model No.:	Z861BL
Series Model:	N/A
FCC ID:	SRQ-Z861BL
Test Standard:	ANSI C63.19:2011
Test Result:	Pass

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APPROVAL

Shenzhen STS Test Services Co., Ltd.
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Fuyong Street, Bao'an District, Shenzhen, Guangdong, China
TEL: +86-755 3688 6288 FAX: +86-755 3688 6277 E-mail:sts@stsapp.com

Test Report Certification

Applicant's name ....: ZTE Corporation

Address ....: ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R. China

Manufacture's Name.............: ZTE Corporation

Address ....: ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R. China

Product description

Product name ....: LTE Mutil-Mode Digital Mobile Phone

Trademark ....: ZTE

Model and/or type reference .: Z861BL

Serial Model : N/A

Standards ....: ANSI C63.19:2011

The device was tested by Shenzhen STS Test Services Co., Ltd. in accordance with the measurement methods and procedures specified in KDB 865664 The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of Test ....:

Date (s) of performance of tests ....: 11 May 2016

Date of Issue..: 18 May 2016

Test Result...: **Pass**

Testing Engineer : Allen Chen

(Allen Chen)

Technical Manager : John Zou

(John Zou)

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Authorized Signatory : Bovey Yang

(Bovey Yang)

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1. General Information

1.1 EUT Description

Equipment	LTE Mutil-Mode Digital Mobile Phone
Brand Name	ZTE
Model No.	Z861BL
Serial Model	N/A
FCC ID	SRQ-Z861BL
Model Difference	N/A
Hardware Version	Z861BLHWV1.0
Software Version	Z861BLV0.0.0B02
Frequency Range	GSM 850: 824.2 ~ 848.8 MHz; PCS1900: 1850.2 ~ 1909.8 MHz WCDMA II: 1852.4~1907.6 MHz; WCDMA V: 826.4~846.6 MHz LTE Band 2: 1840-1910 MHz; LTE Band 4: 1710-1755 MHz LTE Band 5: 824-849 MHz; LTE Band 12: 699-716 MHz; Bluetooth: 2402~2480 MHz
Antenna Type:	GSM/WCDMA/LTE/BT: PIFA Antenna
Hotspot Mode:	Support
DTM Mode:	Not Support
M category	M4
Test Result	Pass

1.2 Test Environment

Ambient conditions in the SAR laboratory:

Items	Required	Actual
Temperature (℃)	15-30	21~23
Humidity (%RH)	30-70	55~65

1.3 Test Facility

Shenzhen STS Test Services Co., Ltd.
Add. : 1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong, China
CNAS Registration No.: L7649
FCC Registration No.: 842334;
IC Registration No.: 12108A-1

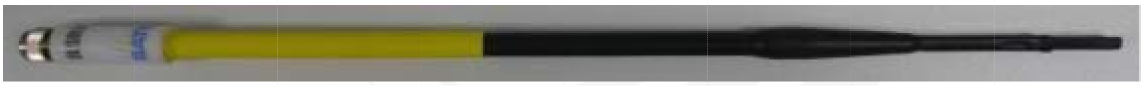
2. System components

2.1 SATIMO System Description

SATIMO is fully compliant with the technical and scientific requirements of IEEE 1528, IEC 62209, CENELEC, ARIB, ACA, and the Federal Communications Commission. The system comprises of a six axes articulated robot which utilizes a dedicated controller.
SATIMO uses the latest methodologies and FDTD order to provide a platform which is repeatable with minimum uncertainty.

2.2 E-Field Probe Specification

Device Under Test	
Device Type	COMOHAC E FIELD PROBE
Manufacturer	Satimo
Model	SCE
Serial Number	SN 06/14 EPH42
Product Condition (new / used)	new
Frequency Range of Probe	0.7GHz-2.5GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.214 MΩ Dipole 2: R2=0.213 MΩ Dipole 3: R3=0.204 MΩ



2.3 H-Field Probe Specification

Device Under Test	
Device Type	COMOHAC H FIELD PROBE
Manufacturer	Satimo
Model	SCH
Serial Number	SN 06/14 HPH51
Product Condition (new / used)	New
Frequency Range of Probe	0.7GHz-2.5GHz
Resistance of Three Loops at Connector	Loop 1: R1=0.280 MΩ Loop 2: R2=0.309 MΩ Loop 3: R3=0.297 MΩ

2.4 Axis Articulated Robot

SATIMO utilizes a six articulated robot, which is controlled using a Pentium based real-time movement controller. The movement kinematics engine utilizes proprietary (Thermo CRS) interpolation and extrapolation algorithms, which allow full freedom of movement for each of the six joints within the working envelop. Utilization of joint 6 allows for full probe rotation with a tolerance better than 0.05mm around the central axis.

Robot /Controller Manufacturer	KUKA
Number of Axis	Six independently controlled axis
Positioning Repeatability	＜±0.03mm
Controller Type	KR C4 compact
Robot Reach	901mm
Communication	RS232 and LAN compatible

2.5 Universal Device Positioner

The universal device positioner allows complete freedom of movement of the EUT. Developed to hold a EUT in a free-space scenario any additional loading attributable to the material used in the construction of the positioner has been eliminated. Repeatability has been enhanced through the linear scales which form the design used to indicate positioning for any given test scenario in all major axes.

2.6 Test Equipment List

Instrument	Manufacturer	Model	S/N	Cal. Date	Cal. Due Date
E-Field Probe	SATIMO	SCE	SN 06/14 EPH42	2015.09.01	2016.08.31
Reference Validation Dipole 850MHz	SATIMO	SID835	SN 13/14 DHA55	2015.09.01	2016.08.31
Reference Validation Dipole 1900MHz	SATIMO	SIDB1900	SN 13/14 DHB59	2015.09.01	2016.08.31
Dielectric Probe Kit	SATIMO	SCLMP	SN 32/14 OCPG52	2015.09.01	2016.08.31
Device Holder	SATIMO	SCLMP	SN 32/14 TABH37	2015.09.01	2016.08.31
Waveguide	SATIMO	SWG5500	SN 13/14 WGA32	2015.09.01	2016.08.31
COMHAC Test Bench	SATIMO	Version 2	NA	N.C.R.	N.C.R.
HAC positioning ruler	SATIMO	TABH12 SN 42/09	NA	N.C.R.	N.C.R.
Temperature/Humidity sensor	Mieo	HH660	STS-H025	2015.10.27	2016.10.26
Multi Meter	Keithley	Multi Meter 2000	4050073	2015.11.20	2016.11.19
Amplifier	Mini-Circuit	ZHL-42	22374	2015.10.24	2016.10.23
Signal Generator	Agilent	F2182A	MY50140530	2015.11.18	2016.11.17
Power Meter	R&S	NRP	100510	2015.10.25	2016.10.24
Power Sensor	R&S	NRP-Z11	101919	2015.10.24	2016.10.23
Network Analyzer	Agilent	5071C	EMY46103472	2015.12.12	2016.12.11

Note: All equipment upon which need to be calibrated are with calibration period of 1 year.

2.7 Measurement Uncertainty

UNCERTAINTY EVALUATION FOR RF HAC MEASUREMENT					
Uncertainty Component	Tol. (± dB)	Prob. Dist.	Div.	Uncertainty (dB)	Uncertainty (%)
Measurement System					
RF reflections	0.1	R	√3	0.06	
Field probe conv. Factor	0.4	R	√3	0.23	
Field probe anisotropy	0.25	R	√3	0.14	
Positioning accuracy	0.2	R	√3	0.12	
Probe cable placement	0.1	R	√3	0.06	
System repeatability	0.2	R	√3	0.12	
EUT repeatability	0.4	N	1	0.40	
Combined Standard Uncertainty		N	1	0.52	
Expanded Uncertainty (95% CONFIDENCE INTERVAL)		N	k=2	1.03	12.65
REPORTED Expanded uncertainty (confidence level of 95%, k = 2)		N	k=2	1.00	13.00

UNCERTAINTY EVALUATION FOR AUDIO HAC MEASUREMENT					
Uncertainty Component	Tol. (± dB)	Prob. Dist.	Div.	Uncertainty (dB)	Uncertainty (%)
Measurement System					
RF reflections	0.1	R	√3	0.06	
Acoustic noise	0.1	R	√3	0.06	
Probe coil sensitivity	0.49	R	√3	0.28	
Reference signal level	0.25	R	√3	0.14	
Positioning accuracy	0.4	R	√3	0.23	
Cable loss	0.1	N	2	0.05	
Frequency analyzer	0.15	R	√3	0.09	
System repeatability	0.2	N	1	0.20	
Repeatability of the WD	0.4	N	1	0.40	
Combined Standard Uncertainty		N	1	0.61	
Expanded uncertainty (confidence level of 95%, k = 2)		N	k=2	1.22	15.05
REPORTED Expanded uncertainty (confidence level of 95%, k = 2)		N	k=2	1.20	15.00

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3. HAC RF Emission Measurement Evaluation

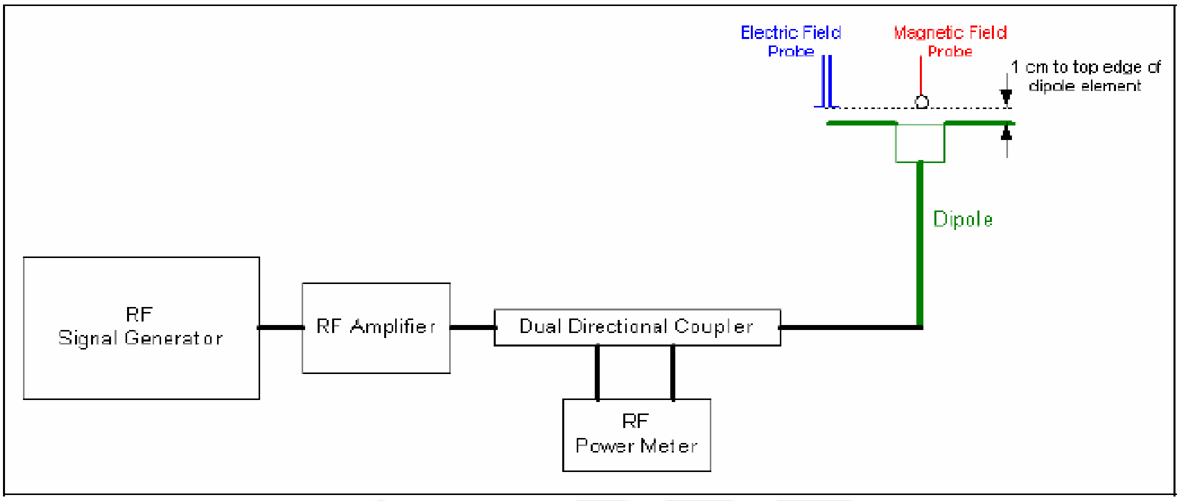
3.1 System Check

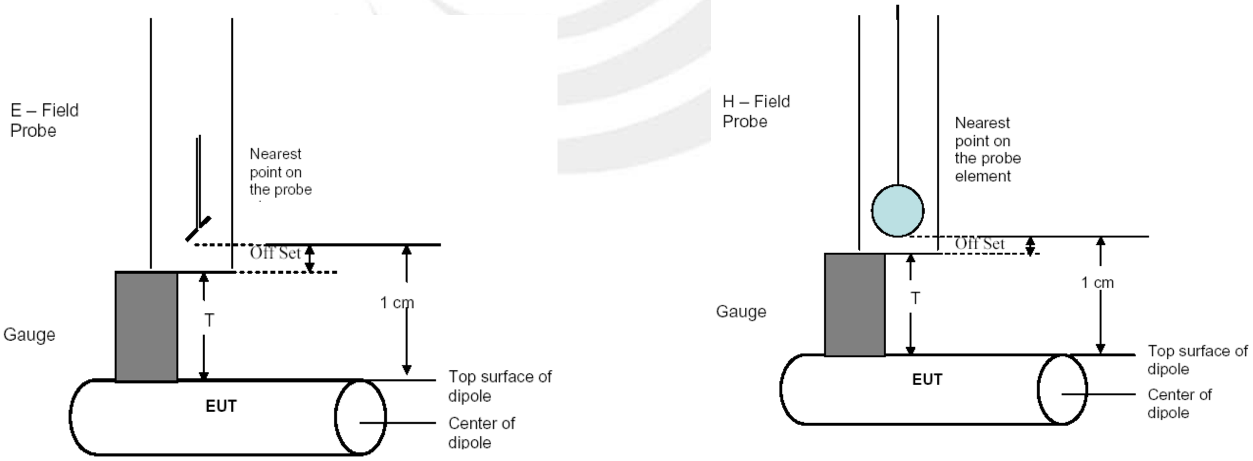
The test setup should be validated when first configured and verified periodically thereafter to ensure proper function. The procedure consists of two parts: dipole validation and determination of probe modulation factor

3.2 Dipole validation

The HAC validation dipole antenna serves as a known source for an electrical and magnetic RF output. Figure 2 shows the setup used for the dipole validation.
1. The dipole antenna was placed in the position normally occupied by the WD.
2. The dipole was energized with a 20 dBm un-modulated continuous-wave signal.
3. The length of the dipole was scanned with both E-field and H-field probes and the maximum value for each scan was recorded.
4. The readings were compared with the values provided by the probe manufacturer and were found to agree within the allowed tolerance of 10%.

Figure 2: Dipole Validation Procedure





The probe is positioned over the illuminated dipole at 10 mm distance from the nearest point on the probe sensor element to the top surface (edge) of the dipole element.

3.3 System Validation Results

Lab Temperature: 21℃, Lab Humidity: 45%.

Date	Calibration Dipole	Frequency (MHz)	Input Power (dBm)	Target Value(V/m)	Measured (V/m)	Deviation(%)
2016/5/11	SN 06/14 EPH42 E-field	850	20	220.4	225.31	2.23
2016/5/11		1900	20	153.4	154.68	0.83

Note: Deviation=((Measured Result)-(Target Value))/(Target Value)*100%

4. Device Under Test

Mobile model：	Z861BL
Normal operation：	Held to head
Accessory：	Standard cover

List of air interfaces/bands & operating modes for model Z861BL

air interfaces	Bands (MHz)	Type	C63.19/ Tested	Simultaneous Transmissions Note: Not to be tested	OTT	Reduced power 20.19(c)(1)
GSM	850	VO	Yes	Bluetooth	N/A	N/A
	1900		Yes			
	GPRS/ FDGE	DT	N/A	Bluetooth	N/A	No
WCDMA	850	VO	No	Bluetooth	N/A	N/A
	1900					
	HSPA	DT	N/A	Bluetooth	N/A	N/A
Bluetooth	2450	DT	N/A	GSM,WCDMA	N/A	N/A

VO: Voice CMRS/PTSN Service Only

V/D: Voice CMRS/PTSN and Data Service

DT: Digital Transport

5. Modulation interference Factor (MIF)

For any specific fixed and repeatable modulated signal, a modulation interference factor (MIF, expressed in dB) may be developed that relates its interference potential to its steady-state rms signal level or average power level. This factor is a function only of the audio-frequency amplitude modulation characteristics of the signal and is the same for field-strength and conducted power measurements. It is important to emphasize that the MIF is valid only for a specific repeatable audio-frequency amplitude modulation characteristic. Anychange in modulation characteristic requires determination and application of a new MIF.

The MIF may be determined using a radiated RF field, a conducted RF signal, or in a preliminary stage, a mathematical analysis of a modeled RF signal:

a) Verify the slope accuracy and dynamic range capability over the desired operating frequency band of a fast probe or sensor, square-law detector, as specified in D.3, and weighting system as specified in D.4 and D.5. For the probe and instrumentation included in the measurement of MIF, additional calibration and application of calibration factors are not required.
b) Using RF illumination or conducted coupling, apply the specific modulated signal in question to the measurement system at a level within its confirmed operating dynamic range.
c) Measure the steady-state rms level at the output of the fast probe or sensor.
d) Measure the steady-state average level at the weighting output.
e) Without changing the square-law detector or weighting system, and using RF illumination or conducted coupling, substitute for the specific modulated signal a 1 kHz, 80% amplitude-modulated carrier at the same frequency and adjust its strength until the level at the weighting output equals the step d) measurement.
f) Without changing the carrier level from step e), remove the 1 kHz modulation and again measure the steady-state rms level indicated at the output of the fast probe or sensor.
g) The MIF for the specific modulation characteristic is provided by the ratio of the step f)measurementtothestepc)measurement,expressedindB(20×log(stepf))/stepc)).

In practice, step e) and step f) need not be repeated for each MIF determination if the relationship between the two measurements has been preestablished for the measurement system over the operating frequency and dynamic ranges.
As a check on the procedure, the MIF for the specific modulation consisting of a 1 kHz, 80% AM signal is–1.2 dB, which is the ratio in dB of the average power of the unmodulated carrier to the average power of themodulated carrier (10 × log(Punmod/Pmod), or equivalently the ratio in dB of the rms level of the unmodulated carrier to the rms level of the modulated carrier (20 × log(Lunmod /Lmod). The MIF for a1/8 duty cycle, 217 Hz pulse-modulated signal (similar to basic GSM) is +3.3 dB. (Actual GSM WDmeasurements could vary due to differences in implementation or network protocol.)
MIF results for a given amplitude modulation characteristic should remain consistent at any signal level within the operating dynamic range of the test system. Caution should be used when measuring modulations that have large-magnitude MIF measurements as these place greater requirements on the test system dynamic range
Typical MIF levels are presented in Table D.1. The results shown may be considered representative for the specified protocols, but they are not intended to substitute for measurements of actual devices under test and their respective operating modes.

Transmission protocol	Modulation interference factor (dB)
GSM; full-rate version 2; speech codec/handset low	+3.63
WCDMA; speech; speech codec low; AMR 12.2 kb/s	-27.23
LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16QAM)	-9.76
LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16QAM)	-9.76
LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16QAM)	-9.76

Table D.1—Sample MIF values for sine-wave modulations

6. HAC TEST PROCEDURES

The following illustrate a typical RF emissions test scan over a wireless communications device:

1. Proper operation of the field probe, probe measurement system, other instrumentation, and the positioning system was confirmed.
2. EUT is positioned in its intended test position, acoustic output point of the device perpendicular to the field probe.
3. The EUT operation for maximum rated RF output power was configured and confirmed with the base station simulator, at the test channel and other normal operating parameters as intended for the test. The battery was ensured to be fully charged before each test.
4. The center sub-grid was centered over the center of the acoustic output (also audio band magnetic output, if applicable). The EUT audio output was positioned tangent (as physically possible) to the measurement plane.
5. A surface calibration was performed before each setup change to ensure repeatable spacing and proper maintenance of the measurement plane using the test Arch.
6. The measurement system measured the field strength at the reference location.
7. Measurements at 5 mm increments in the 5 x 5 cm region were performed and recorded. A 360° rotation about the azimuth axis at the maximum interpolated position was measured. For the worst-case condition, the peak reading from this rotation was used in re-evaluating the HAC category.
8. The system performed a drift evaluation by measuring the field at the reference location.
9. Steps 1 ~ 8 were done for both the E and H-Field measurements.

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7. Test flowchart Per ANSI-PC63.19 2011

Test Instructions

- Confirm proper operation of probes and instrumentation
- Position WD
- Configure WD Tx Operation

(Step a-c)

- Initialize field probe and take first reading
- Scan Area

(Step d-f)

- Identify exclusion area
- Rescan or reanalyze open area todetermine maximum
- Indirect method: Add the MIF to the maximum steady state rms field strength and record RF Audio Interference Level, in dB (V/m)

(Step g-i)

Identify & Record Category

(Step j)

8. Average Antenna Input Power & Evaluation for Low-power Exemption

Air-Interface	Average Antenna Input Power(dBm)	MIF(dB)	Input Power plus its MIF(dBm)	HAC Tested
GSM 850	33.07	3.63	36.70	Yes
GSM 1900	31.85	3.63	35.48	Yes
WCDMA 850	23.88	-27.23	-3.35	No
WCDMA 1700	23.47	-27.23	-3.76	No
WCDMA 1900	23.54	-27.23	-3.69	No
LTE Band 2	22.56	-9.76	12.80	No
LTE Band 4	21.89	-9.76	12.13	No
LTE Band 5	21.95	-9.76	12.19	No
LTE Band 12	22.29	-9.76	12.53	No

9. RF EMISSIONS

The ANSI Standard presents performance requirements for acceptable interoperability of hearing aids with wireless communications devices. When these parameters are met, a hearing aid operates acceptably in close proximity to a wireless communications device.

Emission Categories	E-field emissions	
	< 960 MHz	> 960 MHz
Category M1	50 to 55 dB (V/m)	40 to 45 dB (V/m)
Category M2	45 to 50 dB (V/m)	35 to 40 dB (V/m)
Category M3	40 to 45 dB (V/m)	30 to 35 dB (V/m)
Category M4	<40 dB (V/m)	<30 dB (V/m)

10 HAC RF Emission Test Results

10.1 Test Result

Band	GSM 850			GSM 1900		
Channel	128	190	251	512	661	810
Frequency(MHz)	824.2	836.6	848.8	1850.2	1880.0	1909.8
RF Output power(dBm)	31.69	31.70	31.66	29.70	30.03	30.45
Result(dB V/m)	9.10	7.59	6.50	0.64	-0.65	1.07
M-Rating	M4	M4	M4	M4	M4	M4

Band	WCDMA & LTE
Result	Refer to Section 8 Evaluation for Low-power Exemption. RF Emission testing for this device is required only for GSM voice modes. WCDMA and LTE are exempt from testing in accordance with C63.19-2011 Clause 4.4 and are rated M4.
M-Rating	M4

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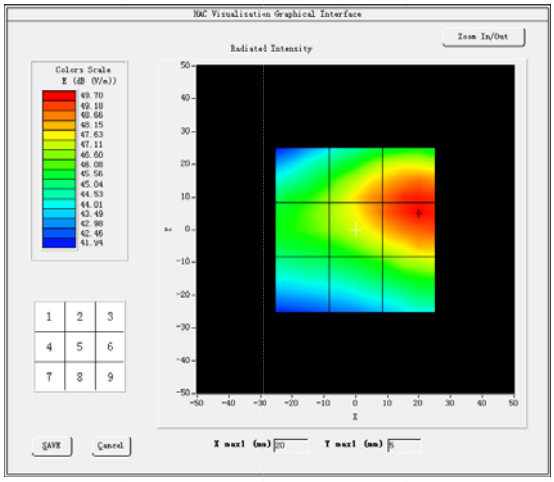
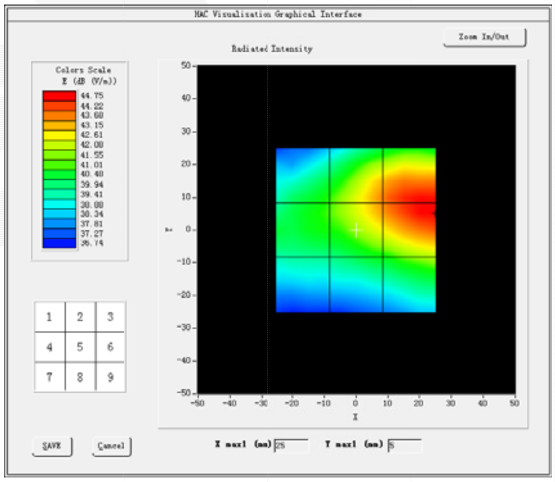
10.2 E-Field Emission for GSM:

Grid 1: 6.86	**Grid 2: 8.96**	**Grid 3: 9.64**
Grid 4: 7.03	**Grid 5: 9.10**	**Grid 6: 9.89**
Grid 7: 5.73	Grid 8: 6.80	Grid 9: 7.78



Operation mode	MIF(dB)	Channel	f(MHz)	Maximum value of total field (dB V/m)	M-Rating
GSM 850	3.63	128	824.2	9.10	M4

Grid 1: 4.94	**Grid 2: 7.60**	**Grid 3: 8.48**
Grid 4: 5.09	**Grid 5: 7.59**	**Grid 6: 8.65**
Grid 7: 3.61	Grid 8: 4.71	Grid 9: 5.83



Operation mode	MIF(dB)	Channel	f(MHz)	Maximum value of total field (dB V/m)	M-Rating
GSM 850	3.63	189	836.4	7.59	M4

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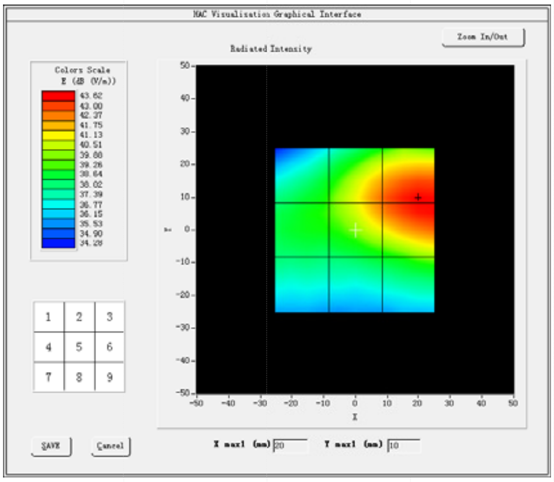
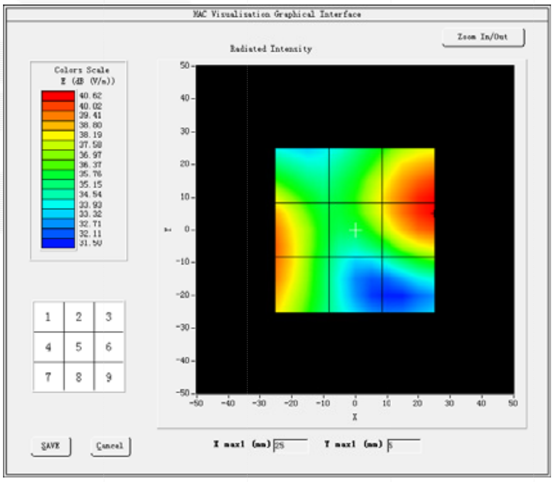
Grid 1: 3.27	**Grid 2: 6.50**	**Grid 3: 7.42**
Grid 4: 3.36	**Grid 5: 6.50**	**Grid 6: 7.46**
Grid 7: 1.93	Grid 8: 2.79	Grid 9: 3.93



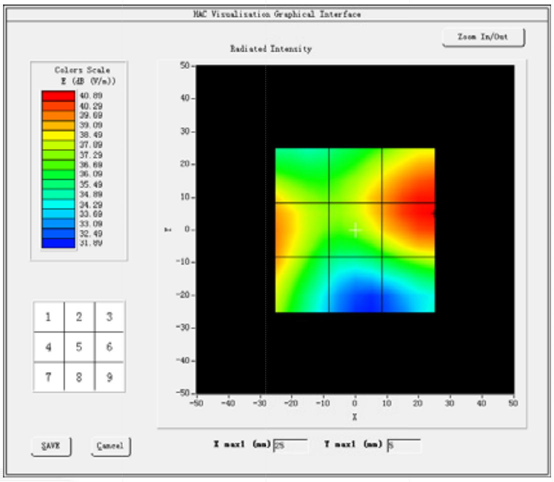
Operation mode	MIF(dB)	Channel	f(MHz)	Maximum value of total field (dB V/m)	M-Rating
GSM 850	3.63	250	848.6	6.50	M4

Grid 1: -2.23	**Grid 2: -1.61**	**Grid 3: 0.56**
Grid 4: -0.31	Grid 5: -1.60	**Grid 6: 0.64**
Grid 7: -0.40	Grid 8: -5.20	Grid 9: -2.83



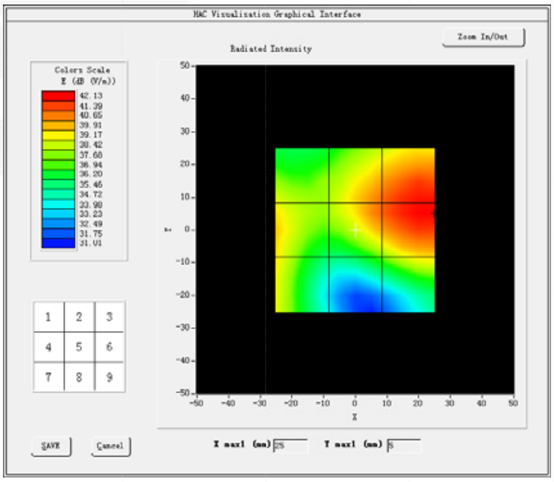
Operation mode	MIF(dB)	Channel	f(MHz)	Maximum value of total field (dB V/m)	M-Rating
GSM 1900	3.63	513	1850.4	0.64	M4

Grid 1: -1.28	**Grid 2: -0.65**	**Grid 3: 0.70**
Grid 4: -0.38	Grid 5: -0.57	**Grid 6: 0.85**
Grid 7: -0.57	Grid 8: -3.57	Grid 9: -1.86



Operation mode	MIF(dB)	Channel	f(MHz)	Maximum value of total field (dB V/m)	M-Rating
GSM 1900	3.63	661	1880.0	-0.65	M4

Grid 1: -1.40	**Grid 2: 0.90**	**Grid 3: 1.88**
Grid 4: -0.32	**Grid 5: 1.07**	**Grid 6: 2.12**
Grid 7: -0.67	Grid 8: -2.21	Grid 9: -0.45



Operation mode	MIF(dB)	Channel	f(MHz)	Maximum value of total field (dB V/m)	M-Rating
GSM 1900	3.63	809	1909.6	1.07	M4

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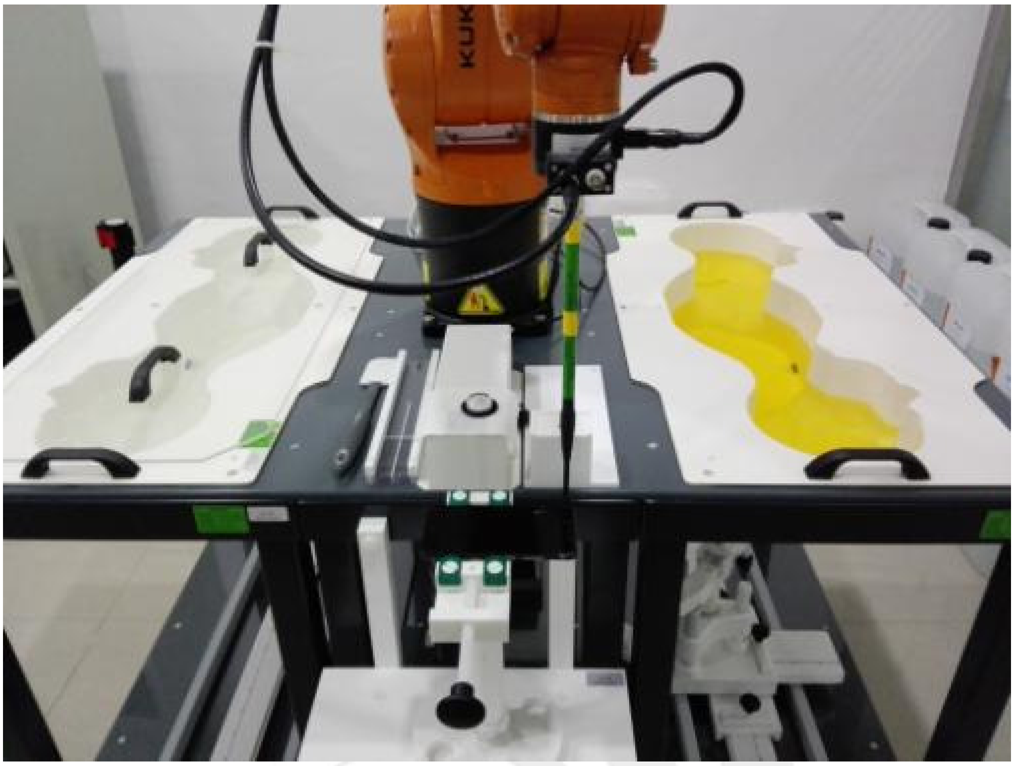
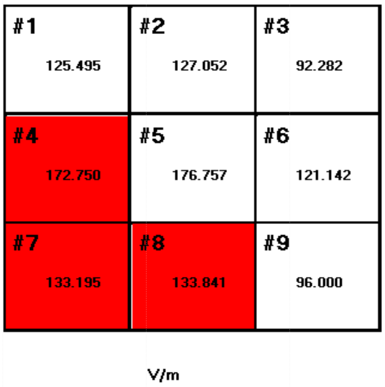
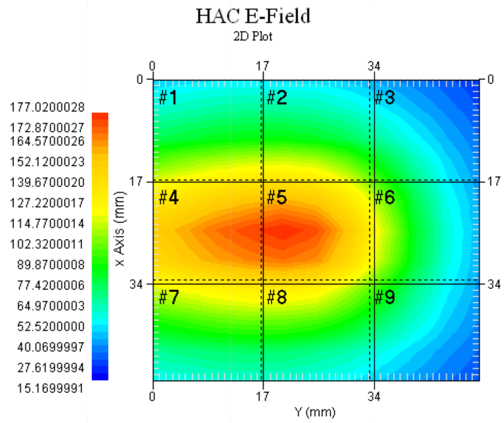
11. HAC Test Photographs



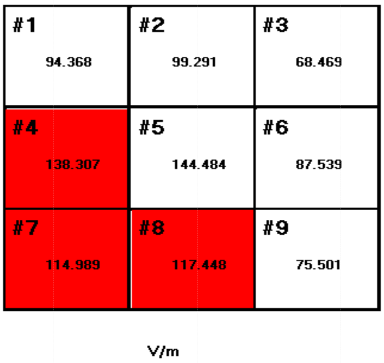
E-field

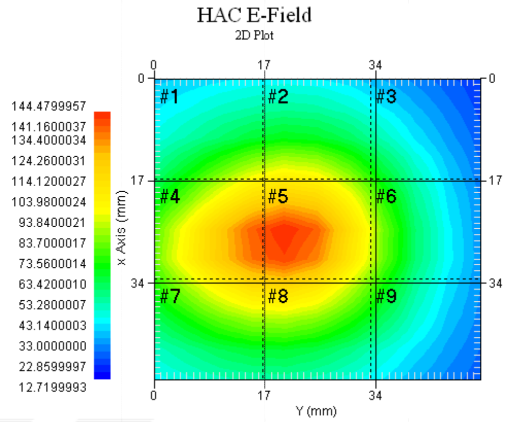
12. System VALIDATION RESULTS





Frequency(MHz)	Input power (dBm)	Target Value (dB V/m)	E-Field (dB V/m)	Deviation(%)	data
835	20	220.4	225.31	2.23	May.11.2015





Frequency(MHz)	Input power (dBm)	Target Value (dB V/m)	E-Field (dB V/m)	Deviation(%)	data
1880	20	153.4	154.68	0.83	May.11.2015

Appendix C. Probe Calibration And Dipole Calibration Report

Refer the appendix Calibration Report.

※※※※※END OF THE REPORT※※※※※