Report No.: SZ12120168H02

HAC TEST REPORT

Issued to

SHENZHEN SANGFEI CONSUMER COMMUNICATIONS CO.,LTD

For

SAF3011

Model Name	:	SAF3011
Trade Name	:	(n.a)
Brand Name	:	(n.a)
FCC ID	:	VQR-SAF3011
IC ID	:	10881A-SAF3011
Standard	:	ANSI C 63.19:2007
HAC Level	:	T-Coil: T3
Test date	:	2013-01-23
Issue date	:	2013-02-01

Shenzhen MORLAB Communication Technology Co., Ltd.

Tested by Samuel Peng	*Approved by*	*Review by* Li Lei
Date 2013.02.01	*Date* 2013.02.01	*Date* 2013.02.01

Shenzhen MORLAB Communication Technology Co., Ltd. Tel: +86 755 61281201 Fax: +86 755 86130218
FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China 518101

Contents

1.1. Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road,Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China 518101
Responsible Test Lab Manager:	Mr. Shu Luan
Telephone:	+86 755 86130268
Facsimile:	+86 755 86130218

1.2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road,Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China 518101

1.3. Accreditation Certificate

Accredited Testing Laboratory:	No. CNAS L3572

1.4. List of Test Equipments

No.	Instrument	Type	Cal. Date	Cal. Due
1	PC	Dell (Pentium IV 2.4GHz, SN:X10-23533)	(n.a)	(n.a)
2	Network Emulator	Rohde&Schwarz (CMU200, SN:105894)	2012-9-26	1year
3	Voltmeter	Keithley (2000, SN:1000572)	2012-9-26	1year
4	Signal Generator	Rohde&Schwarz (SMP_02)	2012-9-24	1year
5	Power Meter	Agilent (E4416A, SN:MY45102093)	2012-5-07	1year
6	Power Sensor	Agilent (N8482A, SN:MY41091706)	2012-5-07	1year
7	Directional coupler	Giga-tronics(SN:1829112)	2012-9-24	1year
8	Audio DAQ	NI (MonDAQ, SN:MonNumero)	2012-9-24	1year
9	T-coil Probe	SATIMO (SN:39/08 TCP11)	2012-10-06	1year
10	HAC holder	SN02_EPH02 (SN:SN_3608_SUPH16)	2012-9-24	1year

2. Technical Information

Note: the following data is based on the information by the applicant.

2.1. Identification of Applicant

Company Name:	SHENZHEN SANGFEI CONSUMER COMMUNICATIONS CO.,LTD
Address:	11 Science and Technology Road, Shenzhen Hi-tech industrial Park Nanshan District.Shenzhen,PRC

2.2. Identification of Manufacturer

Company Name:	SHENZHEN SANGFEI CONSUMER COMMUNICATIONS CO.,LTD
Address:	11 Science and Technology Road, Shenzhen Hi-tech industrial Park Nanshan District.Shenzhen,PRC

2.3. Equipment Under Test (EUT)

Model Name:	SAF3011
Trade Name:	Public Mobile or ACG
Brand Name:	Public Mobile or ACG
Hardware Version:	SAF3011_ V2.0
Software Version:	SAF3011PM_0.0.1075.0079_20121220_SHIP.bin
Frequency Bands:	CDMA 800MHz PCD1900MHz WIFI: 2412MHz-2462MHz BT: 2402MHz-2480MHz
Modulation Mode:	CDMA:CDMA WIFI802.11B: DSSS; WIFI802.11G: OFDM WIFI 802.11N: OFDM; BT: GFSK/8-DPSK
Antenna type:	Fixed Internal Antenna
Development Stage:	Identical prototype
Battery Model:	SAF3011PM
Battery specification:	2000mAh3.7V
HAC Test Configurations:	CDMA 800; channel 1013, 384, 777, BT OFF, Wifi OFF CDMA 1900; channel 25, 600, 1175, BT OFF, Wifif OFF

2.3.1. Photographs of the EUT

Please see for photographs of the EUT.

2.3.2. Identification of all used EUTs

The EUT identity consists of numerical and letter characters, the letter character indicates the test sample, and the following two numerical characters indicate the software version of the test sample.

EUT Identity	Hardware Version	Software Version
1#	SAF3011_ V2.0	SAF3011PM_0.0.1075.0079_2012 1220_SHIP.bin

2.4. Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title
1	**ANSI C 63.19:2007**	American National Standard Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids

Note： Test report, reference KDB 285076 documents.

2.5. Test Environment/Conditions

Normal Temperature (NT):	20 ... 25 °C
Relative Humidity:	30 ... 75 %
Air Pressure:	980 ... 1020 hPa
Test frequency:	CDMA 800MHz / CDMA 1900MHz;
Operation mode:	Call established
Power Level:	CDMA 800 MHz Maximum output power
	CDMA 1900 MHz Maximum output power

During HAC test, EUT is in Traffic Mode (Channel Allocated) at Normal Voltage Condition. A communication The EUT shall use its internal transmitter. The antenna(s), battery and accessories shall be those specified by the manufacturer. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output. If a wireless link is used, the antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the handset.

Air-interface	Band (MHz)	Type	C63.19-2007 Tested	Simultaneous Transmissions Scenarios invoice (Not to be tested)	Reduced power	VOIP
CDMA	800	Voice	Yes	Yes: WIFI or BT	N/A	N/A
	1900	Voice	Yes	Yes: WIFI or BT	N/A	N/A
WIFI	2450	Data	N/A	Yes GSM or WCDMA	N/A	N/A
BT	2450	Data	N/A	Yes GSM or WCDMA	N/A	N/A

The volume is at the maximum value, and the backlight of the phone is turned off. The Manufacturer doesn't design HAC mode software on the EUT

2.6. Operational Conditions During Test

2.6.1. INTRODUCTION

On July 10.2003.the Federal Communications Commission (FCC) adopted new rules requiring wireless manufacturers and service providers to provide digital wireless phones that are compatible with hearing aids. The FCC has modified the exemption for wireless phones under the Hearing Aid Compatibility Act of 1998 (HAC Act) in WT Docket 01-309 RM-8658 to extend the benefits of wireless telecommunications to individuals with hearing disabilities. These benefits encompass business, social and emergency communications, which increase the value of the wireless network for everyone. An estimated more than 10% of the population in the United States show signs of hearing impairment and of that fraction, almost 80% use hearing aids. Approximately 500 million people worldwide suffer from hearing loss.

Compatibility Tests involved:

The standard calls for wireless communications devices to be measured for:

- RF Electric-field emissions.
- RF Magnetic- field emissions.
- T-coil mode, magnetic-signal strength in the audio band.
- T-coil mode, magnetic-signal frequency response through the audio band.
- T-coil mode, magnetic-signal and noise articulation index.

The hearing aid must be measured for:

- RF immunity in microphone mode
- RF immunity in T-coil mode

In the following tests and results, this report includes the evaluation for a wireless communications device

2.6.2. ANSI/IEEE PC 63.19 PERFORMANCE CATEGORIES

4.3.2.1. T-coil

The table below provides the signal quality requirement for the intended audio magnetic signal from a wireless device. Only the RF immunity of the hearing aid is measured in T-coil mode. It is assumed that a hearing aid can have no immunity to an interference signal in the audio band, which is the intended reception band for this mode. The only criterion that can be measured is the RF immunity in T-coil mode. This is measured using the same procedure as the audio coupling mode at the same levels.

The signal quality of the axial and radial components of the magnetic field was used to determine the T-coil mode category.

Category	Telephone RF Parameter
	Wireless Device Signal Quality (Signal + Noise-to-noise ratio in dB)
T1	0 to 10 dB
T2	10 to 20 dB
T3	20 to 30 dB
T4	＞30 dB
Magnetic Coupling Parameters	

4.3.2.2. Articulation Weighing Factor (AWF)

Standard	Technology	AWF
T1/T1P1/3GPP	UMTS(WCDMA)	0
IS-95	CDMA	0
iden	GSM(22and 11Hz)	0
J-STD-007	GSM(217Hz)	-5
AWF has been developed from information presented to the committee regarding the interference potential of the various modulation types according to ANSI PC 63.19		

2.6.3. Description of Test System

4.3.3.1. COMOHAC E-FIELD PROBE

Serial Number:	SN 41/08 EPH17
Frequency:	100MHz – 3GHz
Probe length:	330mm
Length of one dipole:	3.3mm
Maximum external diameter:	8mm
Probe extremity diameter:	6mm
Distance between dipoles/probe extremity:	3mm
Resistance of the three dipole (at the connector):	Dipole 1:R1=2.1807 MΩ Dipole 2:R1=2.0612 MΩ Dipole 3:R3=2.1892 MΩ
Connector (HIROSE series SR30)	6 wire male (Hirose SR30series)

CALIBRATION TEST EQUIPMENT

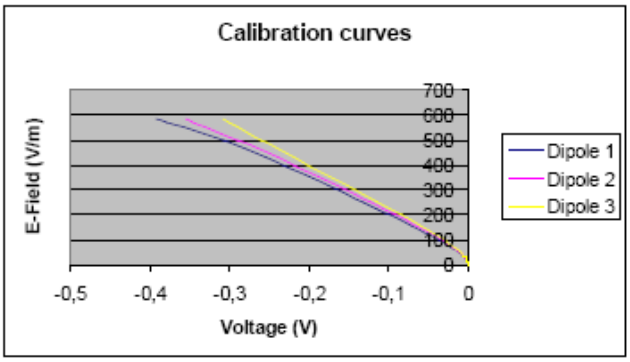
TYPE	IDENTIFICATION
Calibration bench	SATIMO AIR CALIBRATION SOFTWARE
Multimeter	Keithley 2000

MEASUREMENT PROCEDURE

Probe calibration is realized by using the waveguide method. The probe was inserted in a waveguide loading by a 50 load. By controlling the input power in the waveguide, we are able to create a know EField value in the waveguide. ,

Keithley configuration:

Rate = Medium; Filter =ON; RDGS=10; FILTER TYPE =MOVING AVERAGE; RANGE AUTO



The following tables represent the calibration curves linearization by curve segment in CW signal.

4.3.3.2. COMOHAC H-FIELD PROBE

Serial Number:	SN 41/08 HPH18
Frequency:	100MHz – 3GHz
Probe length:	330mm
Length of one dipole:	3.3mm
Maximum external diameter:	8mm
Probe extremity diameter:	6mm
Distance between dipoles/probe extremity:	3mm
Resistance of the three dipole (at the connector):	Dipole 1:R1=2.1650 MΩ Dipole 2:R1=2.2176 MΩ Dipole 3:R3=2.4084 MΩ
Connector (HIROSE series SR30)	6 wire male (Hirose SR30series)

CALIBRATION TEST EQUIPMENT

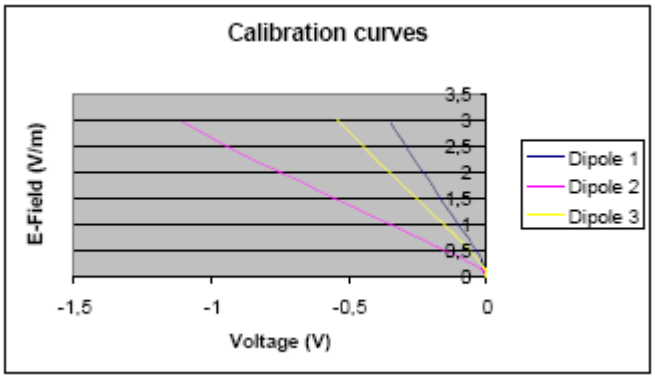
TYPE	IDENTIFICATION
Calibration bench	SATIMO AIR CALIBRATION SOFTWARE
Multimeter	Keithley 2000

MEASUREMENT PROCEDURE

Probe calibration is realized by using the waveguide method. The probe was inserted in a waveguide loading by a 50 load. By controlling the input power in the waveguide, we are able to create a know HField value in the waveguide.

Keithley configuration:

Rate = Medium; Filter =ON; RDGS=10; FILTER TYPE =MOVING AVERAGE; RANGE AUTO

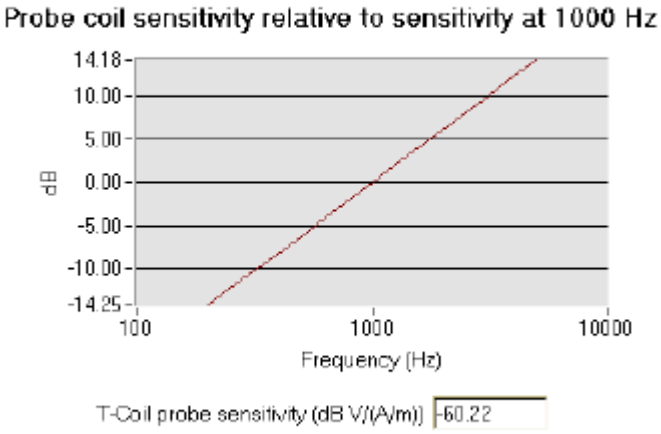


The following tables represent the calibration curves linearization by curve segment in CW signal.

4.3.3.3. COMOHAC T-COIL PROBE

Serial Number:	SN 39/08 TCP11
Dimensions:	6.55mm length*2.29mm diameter
DC resistance:	860.6Ω
Wire size:	51 AWG
Inductance:	132.1 mH at 1kHz
Sensitivity:	-60.22 dB (V/A/m) at 1kHz

SENSITIVITY



Frequency (Hz)	H (dB (V/(A/m)))
200	-73,92940009
250	-72,01119983
315	-70,06378892
400	-67,88880017
500	-66,00059991
630	-64,07318901
800	-62,00820026
1000	-60,22
1250	-58,29179974
1600	-56,20760035
2000	-54,31940009
2500	-52,36119983
3150	-50,38378892
4000	-48,50880017
5000	-46,44059991

LINEARITY

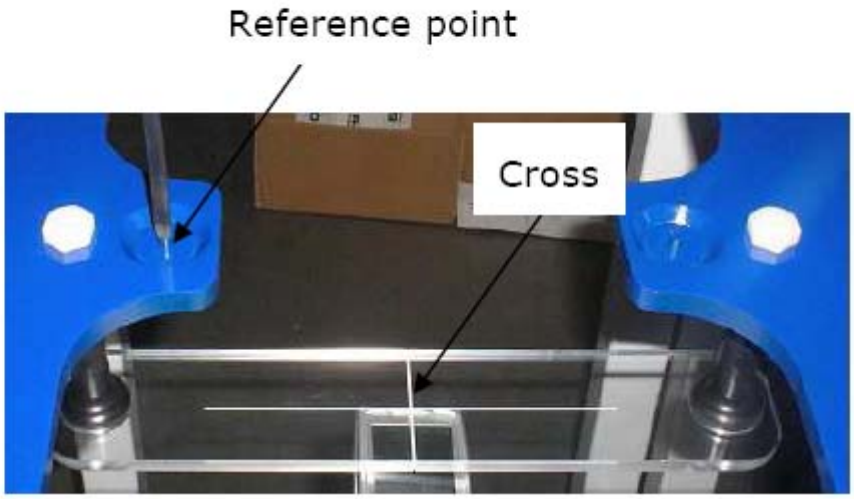
Linearity = 0.27 dB

Power (dB) relative to 1 A/m	0	-10	-20	-30	-40	-50
H (dB (V/(A/m)))	0	-9,95	-19,95	-30	-39,9	-49,73

4.3.3.4. System Hardware

The HAC positioning ruler is used to position the phone properly with the regard to the position of the probe during a measurement. The positioning system is made of a dedicated frame that can be fixed on the table. The tip of the probe is positioned on a reference point located on the top of the positioning ruler. The distance between this reference point and the cross located on the ruler being known, the speaker of the phone is positioned on this cross in order to make sure both probe and phone are positioned properly.

During the measurement, the HAC ruler has to be removed so that it does not interfere with the measurement.

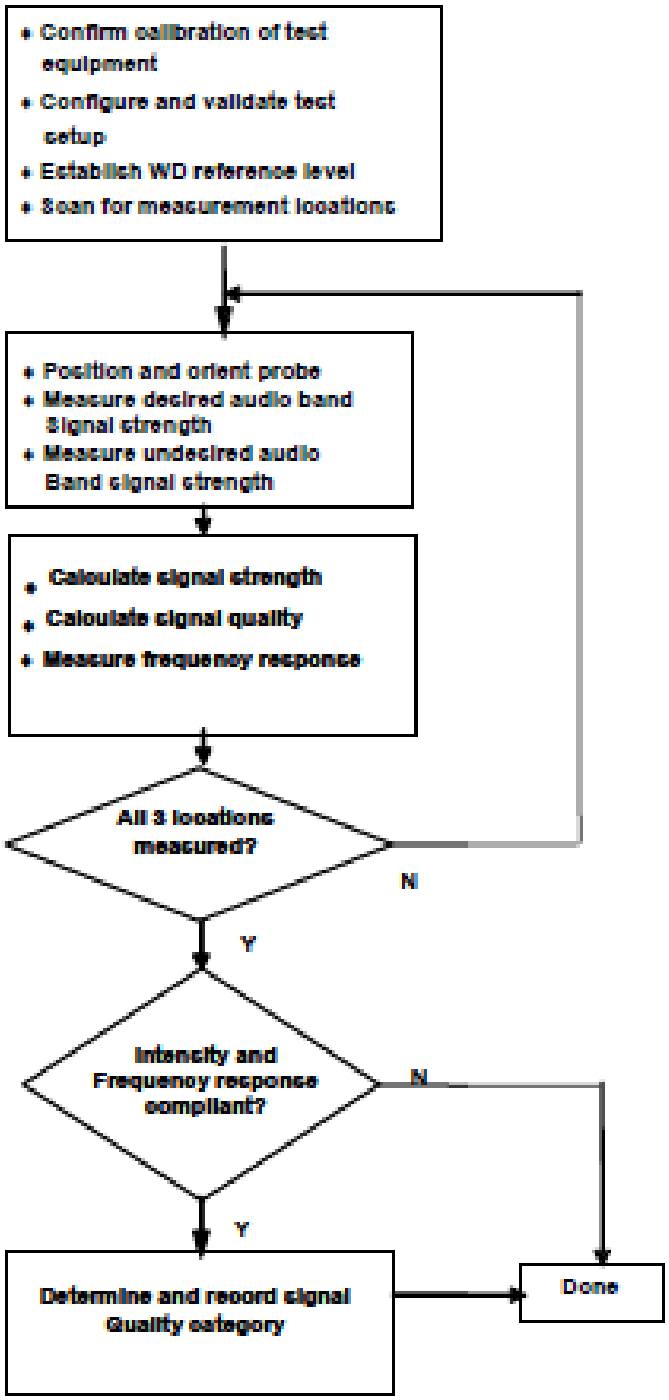


HAC positioning ruler

2.6.4. TEST PROCEDURE

4.3.4.1. T-coil Test Flow

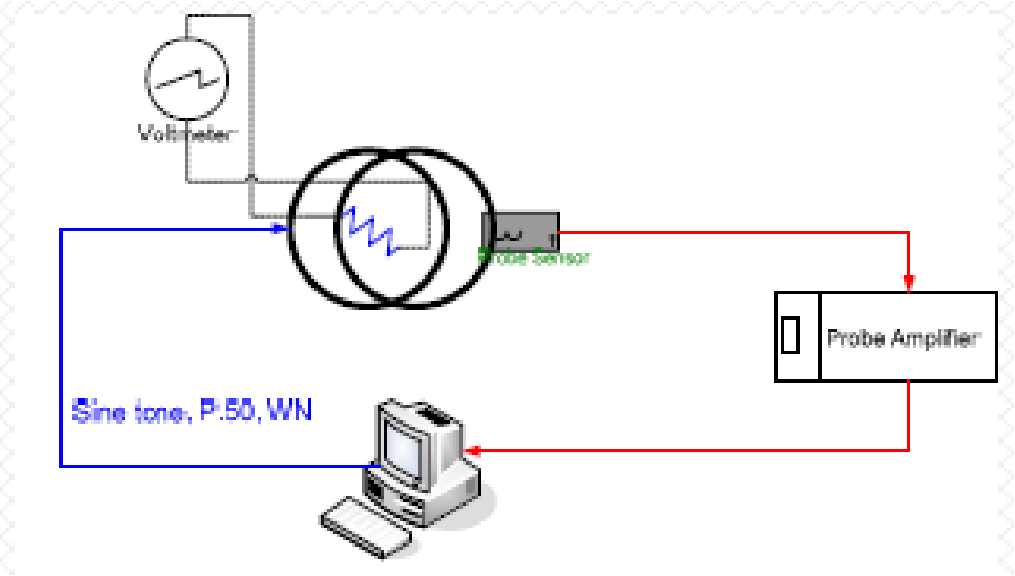
The flow diagram below was followed (From C63.19):



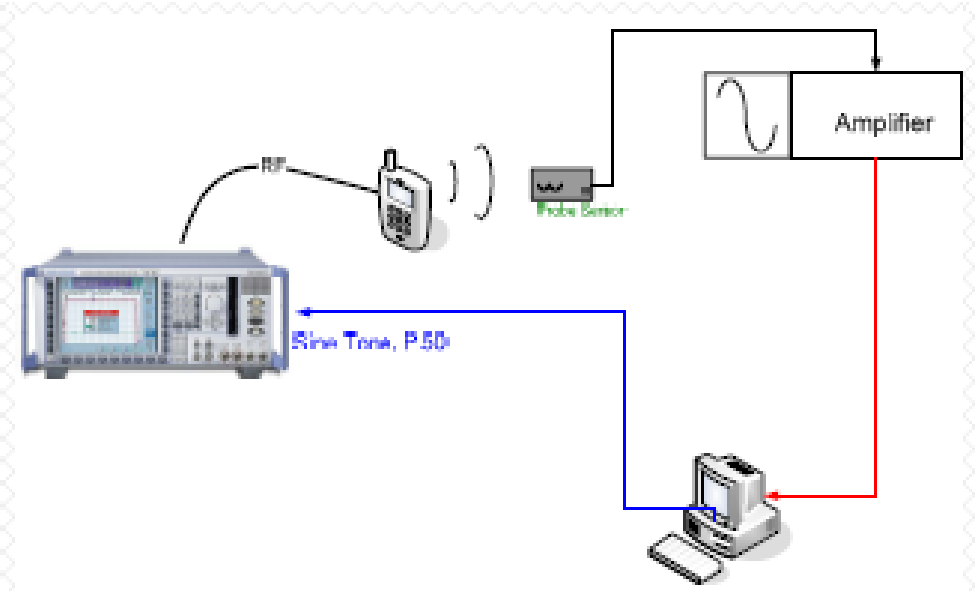
C63.19 T-Coil Signal Test Process

4.3.4.2. TEST Setup

The equipment was connected as shown in an acoustic/RF hemi-anechoic chamber:



Validation Setup with Helmholtz Coil



T-Coil Test Setup

4.3.4.3.T-coil Test Procedure

Frequency Response Validation

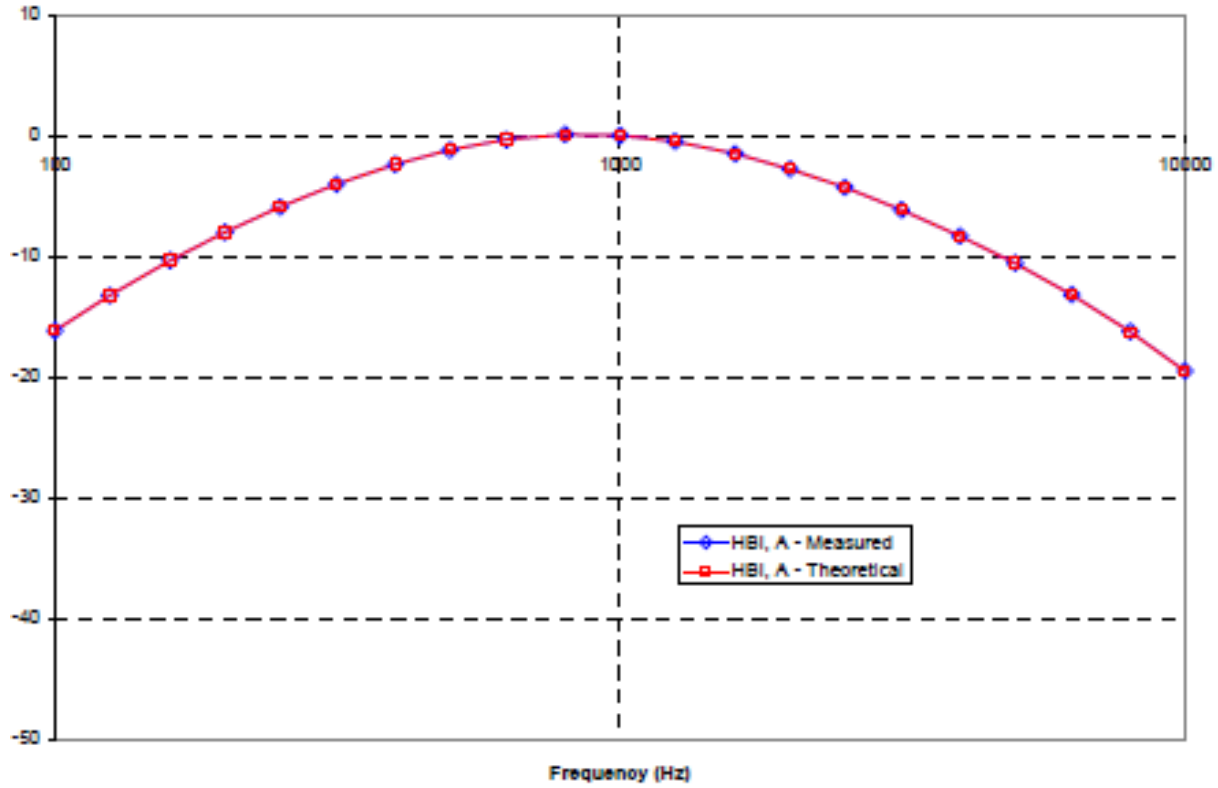
The frequency response through the Helmholtz Coil was verified to be within 0.5 dB relative to 1 kHz, between 300 – 3000 Hz using the ITU-P.50 artificial speech signal as shown below:

Frequency Response Validation

Measurement Validation

WD noise measurements are filtered with A-weighting and Half-Band Integration over a frequency range of 100Hz – 10kHz to process ABM2 measurements. Below is the verification of the system processing A-weighting and Half-Band integration between system input to output within 0.5 dB of the theoretical result:

f(Hz)	HBI, A- Measured (dB re 1kHz)	HBI, A- Theoretical (dB re 1kHz)	dB Var.
100	-16.150	-16.170	0.020
125	-13.241	-13.250	0.009
160	-10.333	-10.340	0.007
200	-8.005	-8.010	0.005
250	-5.915	-5.920	0.005
315	-4.035	-4.040	0.005
400	-2.395	-2.400	0.005
500	-1.207	-1.210	0.003
630	-0.347	-0.350	0.003
800	0.068	0.070	0.002
1000	0.001	0.000	0.001
1250	-0.501	-0.500	-0.001
1600	-1.511	-1.510	-0.001
2000	-2.783	-2.780	-0.003
2500	-4.323	-4.320	-0.003
3150	-6.175	-6.170	-0.005
4000	-8.338	-8.330	-0.008
5000	-10.599	-10.590	-0.009
6300	-13.212	-13.200	-0.012
8000	-16.284	-16.270	-0.014
10000	-19.539	-19.520	-0.019



Frequency Response Validation

2.6.5. Uncertainty Estimation Table

Error Description	Uncertainty value	Probe Dist.	Div	c AMB1	C AMB2	Std. Unc.(+-%)	
						AMB1	AMB2
Probe Sensitivity	4.00	N	1.000	1	1	4.00	4.00
Reference level	0.70	R	1.732	1	1	0.40	0.40
AMCC geometry	0.60	R	1.732	1	1	0.35	0.35
AMCC current	0.10	R	1.732	1	1	0.06	0.06
Probe positioning during calibration	0.70	R	1.732	0.01	1	0.00	0.40
Noise contribution	5.90	R	1.732	0.1	1	0.34	3.41
Frequency slope	1.00	R	1.000	1	1	0.58	0.58
Repeatability/drift	0.60	R	1.732	1	1	0.35	0.35
Linearity/Dynamic range	1.00	R	1.732	0.1	1	0.06	0.58
Acoustic noise	2.40	R	1.732	1	1	1.39	1.39
Probe angle	0.90	R	1.732	1	1	0.52	0.52
Spectral processing	0.60	N	1.732	1	5	0.60	3.00
Integration time	0.20	R	1.732	1	1	0.12	0.12
Field disturbation	0.60	R	1.000	0	1	0.00	0.35
Reference signal spectral response	2.00	R	1.000	1	1	1.15	1.15
Probe positioning	0.90	R	1.732	1	1	0.52	0.52
EUT positioning	1.90	R	1.732	1	1	1.10	1.10
RF interference	0.00	R	1.732	1	1	0.00	0.00
Test signal variation	2.00	R	1.000	1	1	1.15	1.15
Combined Std. Uncertainty (ABM field)						**4.85**	**6.66**
Expanded Std. Uncertaninty on (%)						**9.71**	**13.31**

Note for table

1. N-Nomal
2. R-Rectangular
3. Div.- Divisor used to obataion standard uncertanty

2.6.6. OVERALL MEASUREMENT SUMMARY

4.3.7.1 T-coil

Mode	Test Description	Measurement Results	T Rating
CDMA800	Axial	28.41	T3
	Radial H	26.63	T3
	Radial V	36.61	T4
CDMA1900	Axial	27.47	T3
	Radial H	25.49	T3
	Radial V	31.64	T4

2.6.7. TEST DATA

FREQUENCY	PARAMETERS
WCDMA 850	Measurement 1: T-coil on WCDMA Mode
WCDMA 1900	Measurement 2: T-coil on WCDMA Mode

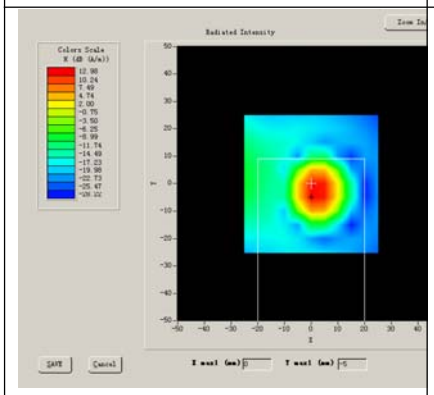
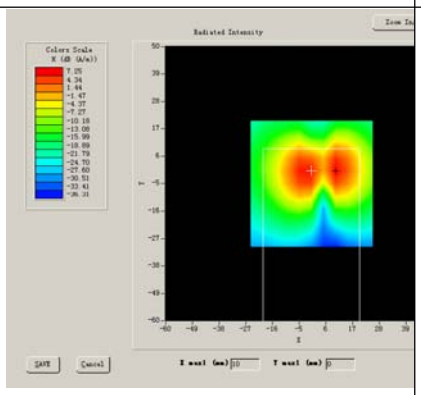
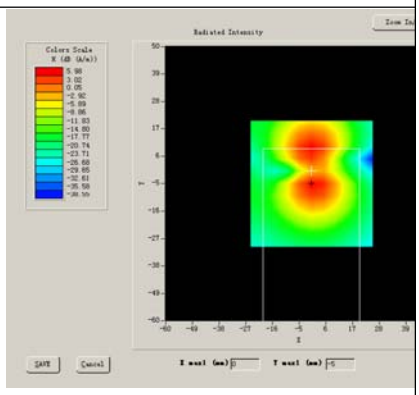
MEASUREMENT 1

A. Experimental conditions.

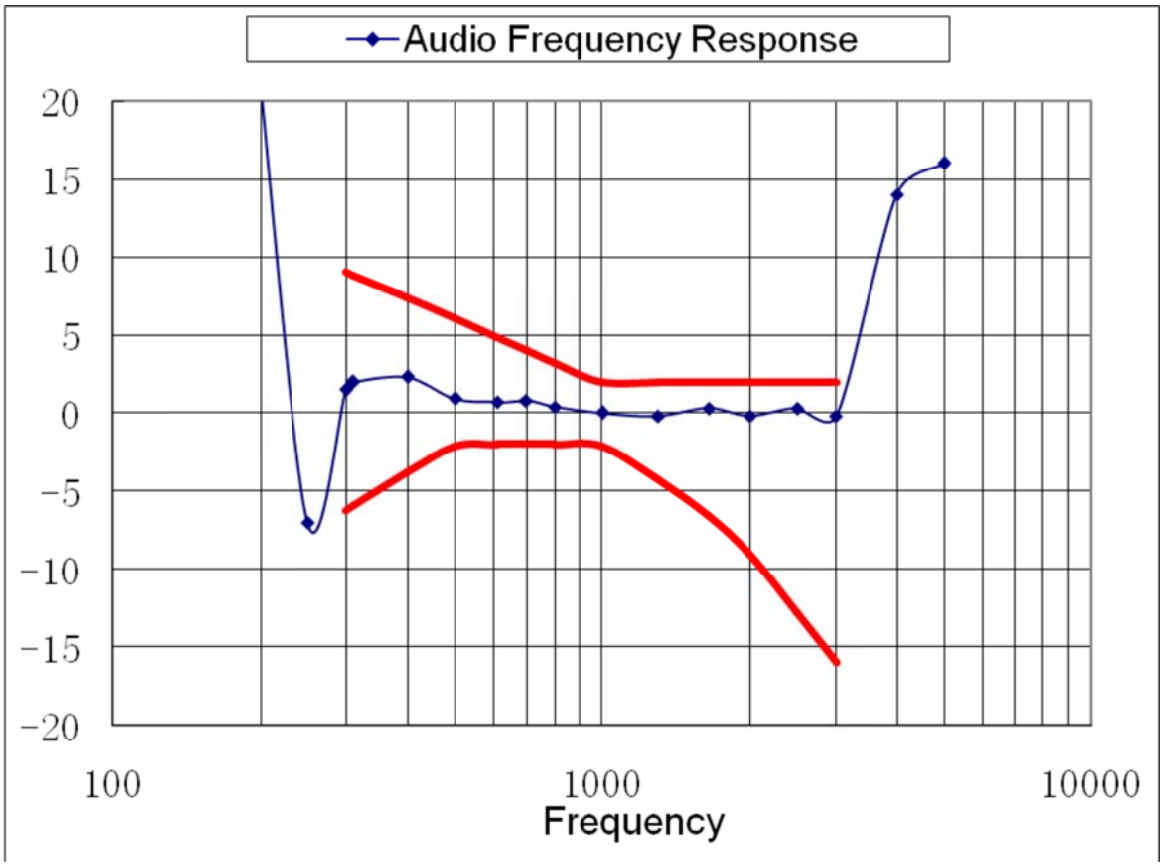
Grid size (mm x mm)	50.0, 50.0
Step (mm)	5
Scanning Height (mm)	10.0
Band	CDMA800
Date of measurement	23/1/2013

B. HAC Measurement Results

	Axial			Radial H			Radial V		
	4132	4175	4233	4132	4175	4233	4132	4175	4233
	Max	Max	Max	**Max**	Max	Max	Max	Max	Max
ABM1, dBA/m	NULL	6.87	13.15	NULL	1.03	1.03	NULL	0.68	0.68
ABM2, dBA/m	NULL	NULL	-21.58	NULL	NULL	-15.3	NULL	NULL	-29.49
Ambient noise, dBA/m	-41.00	-41.00	-41.00	-41.84	-41.84	-41.84	-39.18	-39.18	-39.18
Freq Reponse Margin (dB)		-	-	-	-	-	-	-	-
S+N/N(dB)	NULL	NULL	34.73	NULL	NULL	22.55	NULL	NULL	28.15
S+N/N per orientation (dB)	28.41			26.63			36.61		

AXIAL(Location:0, -5, 7mm)	**RADIAL H(Location:10, 0, 7mm)**	**RADIAL V(Location:0, 10, 7mm)**
		

C63.19	Mode	Band	Test Description	Minimum Limit	Location	Measured	Category	Verdict
				dBA/m	-	dBA/m	-	Pass/Fail
7.3.1.1	GSM	GSM850	Intensity, Axial	-18	Max	13.16	-	PASS
7.3.1.2			Intensity, RadialH	-18	Max	7.25	-	PASS
				-	-	-	-	-
7.3.1.2			Intensity, RadialV	-18	Max	5.87	-	PASS
				-	-	-	-	-
				dB		dB		
7.3.3			Signal to noise/noise, Axial	5	Max	28.41	T3	PASS
7.3.3			Signal to noise/noise, RadialH	5	Max	26.63	T3	PASS
				-	-	-	-	-
7.3.3			Signal to noise/noise, RadialV	5	Max	36.61	T4	PASS
				-	-	-	-	-



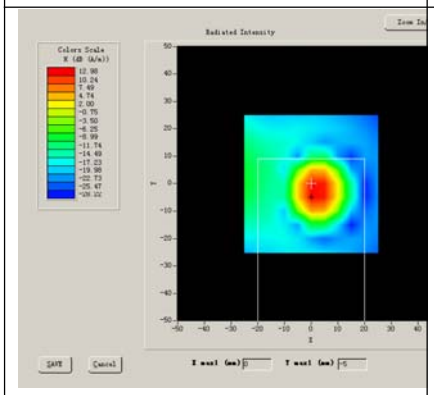
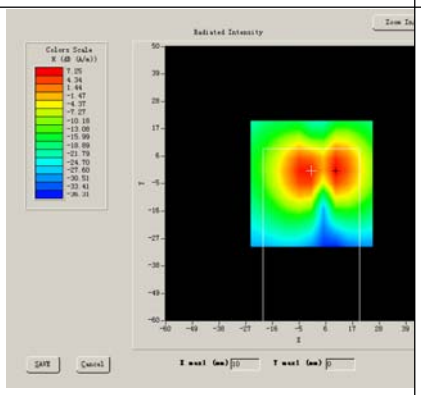
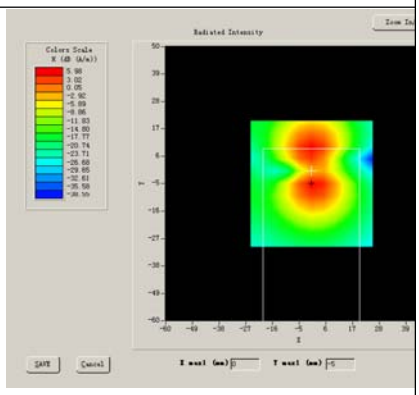
MEASUREMENT 2

A. Experimental conditions.

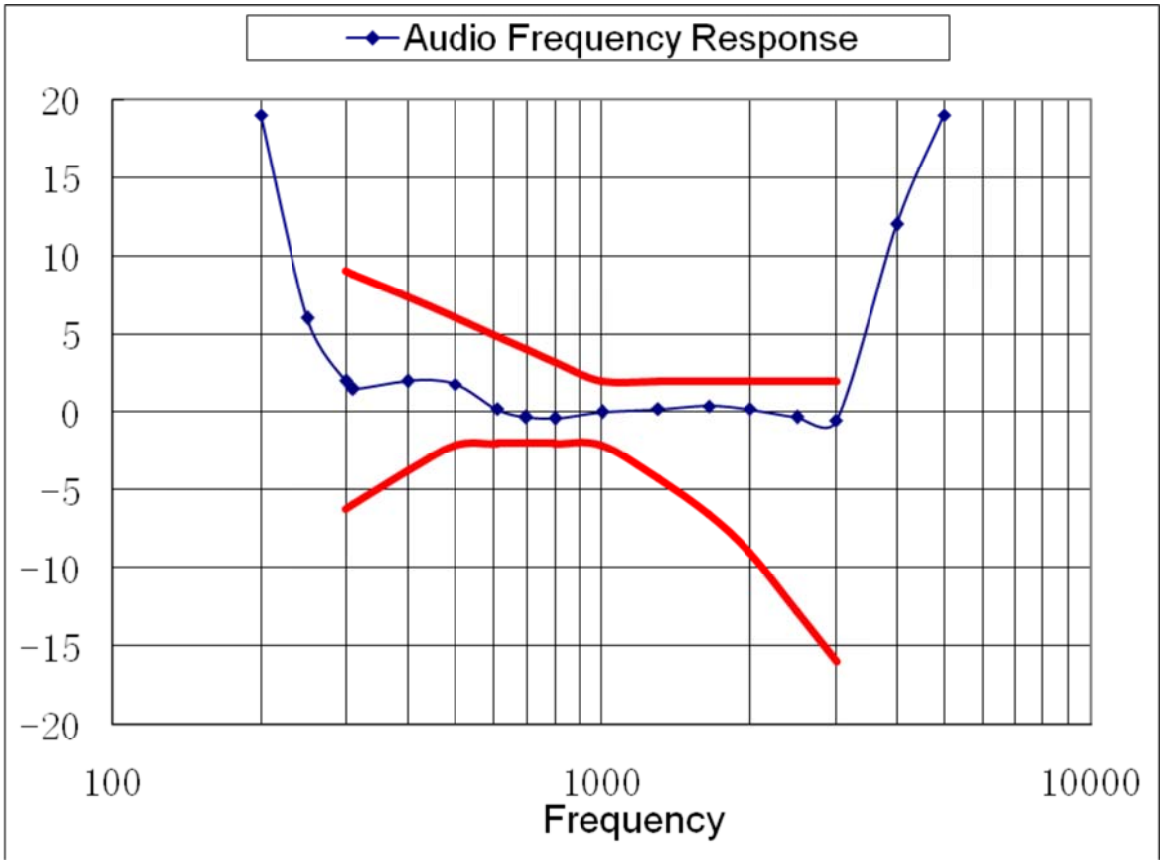
Grid size (mm x mm)	50.0, 50.0
Step (mm)	5
Scanning Height (mm)	10.0
Band	CDMA 1900
Date of measurement	23/1/2013

B. HAC Measurement Results

	Axial			Radial H			Radial V		
	9262	9400	9538	9262	9400	9538	9262	9400	9538
	Max	Max	Max	Max	Max	Max	Max	Max	Max
ABM1, dBA/m	NULL	5.77	5.77	NULL	1.63	1.63	NULL	0.84	0.84
ABM2, dBA/m	NULL	NULL	-22.32	NULL	NULL	-15.25	NULL	NULL	-29.7
Ambient noise, dBA/m	-41.50	-41.50	-41.50	-42.84	-42.84	-42.84	-40.14	-40.14	-40.14
Freq Reponse Margin (dB)		-	-	-	-	-	-	-	-
S+N/N(dB)	NULL	NULL	34.73	NULL	NULL	22.55	NULL	NULL	28.15
S+N/N per orientation (dB)	27.47			25.49			31.64		

AXIAL(Location:0, -5, 7mm)	**RADIAL H(Location:10, 0, 7mm)**	**RADIAL V(Location:0, 10, 7mm)**
		

C63.19	Mode	Band	Test Description	Minimum Limit	Location	Measured	Category	Verdict
				dBA/m	-	dBA/m	-	Pass/Fail
7.3.1.1	GSM	GSM1900	Intensity, Axial	-18	Max	13.53	-	PASS
7.3.1.2			Intensity, RadialH	-18	Max	7.63	-	PASS
				-	-	-	-	-
7.3.1.2			Intensity, RadialV	-18	Max	4.84	-	PASS
				-	-	-	-	-
				dB		dB		
7.3.3			Signal to noise/noise, Axial	5	Max	27.47	T3	PASS
7.3.3			Signal to noise/noise, RadialH	5	Max	25.49	T3	PASS
				-	-	-	-	-
7.3.3			Signal to noise/noise, RadialV	5	Max	31.64	T4	PASS
				-	-	-	-	-



Annex A Photographs of the EUT

Annex B Photographs of test setup