FCC HAC (RF) Compliance Test Report

Product Name: Smart Phone

Model: HUAWEI H892L, H892L, HUAWEI CHE-A1, CHE-A1

Report No.: SYBH(Z-SAR)004112014-H1

FCC ID: QISH892L

	APPROVED (Lab Manager)	PREPARED (Test Engineer)
BY	Wei Huanbin	Qin Guohui
DATE	2014-11-27	2014-11-27

Reliability Laboratory of Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Tel: +86 755 28780808 Fax: +86 755 89652518

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※ ※ Modified History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	2014-11-27	Qin Guohui

1 General Information

1.1 Statement of Compliance

The M-rating of Hearing-Aid Compatibility (HAC) found during testing for HUAWEI H892L, H892L, HUAWEI CHE-A1, CHE-A1 are as below Table 1. So the M-rating of H892L, H892L, HUAWEI CHE-A1, CHE-A1 is **M4**.

Band	HAC RF Emission Test result*		M-rating
CDMA BC0	E-Field dB(V/m)	N/A	M4
CDMA BC1	E-Field dB(V/m)	N/A	M4

Table 1: Summary of test result

Note:

1) This portable wireless equipment has been shown to be hearing-aid compatible under the above rated category, specified in ANSI/IEEE Std.C63.19-2011 and had been tested in accordance with the specified measurement procedures, Hear-Aid Compatibility is based on the assumption that all production units will be designed electrically identical to the device tested in this report. Test results reported herein relate only to the item(s) tested and are for North American Bands only.

2) *- HAC RF Emission Test for CDMA bands are exempted according to ANSI C63.19-2011 and HAC RF Emission rating is M4 (Refer to Section 6.2 for details)..

1.2 ANSI C63.19-2011 limits

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)

Table 2: Telephone near-field categories in linear units

1.3 EUT Description

<table>
<tr><td colspan="4">Device Information:</td></tr>
<tr><td>DUT Name:</td><td colspan="3">Smart Phone</td></tr>
<tr><td>Type Identification:</td><td colspan="3">HUAWEI H892L, H892L, HUAWEI CHE-A1, CHE-A1</td></tr>
<tr><td>FCC ID :</td><td colspan="3">QISH892L</td></tr>
<tr><td>MEID DEC:</td><td colspan="3">2254505986000059866</td></tr>
<tr><td>SN No.:</td><td colspan="3">Z7Q0114A23000693</td></tr>
<tr><td>Device Type :</td><td colspan="3">Portable device</td></tr>
<tr><td>Exposure Category:</td><td colspan="3">Uncontrolled environment / general population</td></tr>
<tr><td>Device Phase:</td><td colspan="3">Identical Prototype</td></tr>
<tr><td>Hardware Version :</td><td colspan="3">HL1H892LM</td></tr>
<tr><td>Software Version :</td><td colspan="3">H892LV100R001C378B246</td></tr>
<tr><td>Antenna Type :</td><td colspan="3">Internal</td></tr>
<tr><td>Others Accessories</td><td colspan="3">Headset</td></tr>
<tr><td colspan="4">Device Operating Configurations:</td></tr>
<tr><td>Supporting Mode(s)</td><td colspan="3">CDMA BC0/BC1(Tested);
LTE Band IV/XIII,WiFi 2.4G, Bluetooth(Untested)</td></tr>
<tr><td>Test Modulation</td><td colspan="3">CDMA(QPSK)</td></tr>
<tr><td rowspan="7">Operating Frequency Range(s)</td><td>Band(MHz)</td><td>Tx (MHz)</td><td>Rx (MHz)</td></tr>
<tr><td>CDMA BC0</td><td>824-849</td><td>869-894</td></tr>
<tr><td>CDMA BC1</td><td>1850-1910</td><td>1930-1990</td></tr>
<tr><td>LTE Band IV</td><td>1710 -1755</td><td>2110-2155</td></tr>
<tr><td>LTE Band XIII</td><td>777-787</td><td>746-756</td></tr>
<tr><td>WiFi 2450</td><td colspan="2">2400-2483.5</td></tr>
<tr><td>BT</td><td colspan="2">2400-2483.5</td></tr>
<tr><td rowspan="2">Power Class :</td><td colspan="3">Tested with power control “All up” (CDMA BC0)</td></tr>
<tr><td colspan="3">Tested with power control “All up” (CDMA BC1)</td></tr>
<tr><td rowspan="2">Test Channels (low-mid-high) :</td><td colspan="3">1013-384-777(CDMA BC0)</td></tr>
<tr><td colspan="3">25-600-1175(CDMA BC1)</td></tr>
</table>

Table 3: Device information and operating configuration

1.3.1 General Description

cdma2000 Digital Mobile Phone HUAWEI H892L, H892L, HUAWEI CHE-A1, CHE-A1 is subscriber equipment in the CDMA/EVDO/LTE system. The frequency band is US Cellular and N. American PCS The LTE frequency band is B4 and B13, Their band test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, CDMA2000 1x and 1XEV-DO protocol processing, voice, MMS service, GPS, AGPS and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service). It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

Battery Information:

Name	Manufacture	Serials number	Description
Rechargeable Li-ion	Huawei Technologies Co., Ltd.	N/A	Battery Model: HB4242B4EBW Rated capacity: 3020mAh Nominal Voltage: ⎓ 3.8V Charging Voltage: ⎓ 4.35V

1.3.2 List of air interfaces/frequency bands

Air-Interface	Bands (MHz)	Type	C63.19 HAC tested	Simultaneous but not tested	OTT	Concurrent HAC Tested	Additional GSM power reduction
CDMA	BC0(850)	VO	Yes**	Yes-WiFi/BT	N/A	Not tested*	N/A
	BC1(1900)		Yes**	Yes-WiFi/BT	N/A	Not tested*	N/A
	EVDO	DT	No	Yes-WiFi/BT	Yes	N/A	N/A
LTE	Band IV	DT	No	Yes-CDMA,WiFi/BT	Yes	N/A	N/A
	Band XIII	DT	No	Yes-CDMA,WiFi/BT	Yes	N/A	N/A
WiFi	2450	DT	No	Yes-CDMA	Yes	N/A	N/A
BT	2450	DT	No	Yes-CDMA	N/A	N/A	N/A

Type Transport:
VO = CMRS Voice Service
DT = Digital Transport
VD = CMRS IP Voice Service and Digital Transport

Note:
1) *- No concurent mode was found to be the worst case mode.
2) **- Evaluated for MIF and low-power exemption according to ANSI C63.19-2011.
3) The device does not support VoIP over Wi-Fi for CMRS Service.

1.4 Test specification(s)

ANSI C63.19-2011	American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids
KDB 285076 D01	HAC Guidance v04

1.5 Testing laboratory

Test Site	Reliability Laboratory of Huawei Technologies Co., Ltd.
Test Location	Zone K3,Huawei Industrial Base, Bantian Industry Area, Longgang District, Shenzhen, Guangdong, China
Telephone	+86-755-28785513
Fax	+86-755-36834474
State of accreditation	The Test laboratory (area of testing) is accredited according to ISO/IEC 17025. CNAS Registration number: L0310 A2LA TESTING CERT #2174.01

1.6 Applicant and Manufacturer

Company Name	HUAWEI TECHNOLOGIES CO., LTD
Address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.7 Application details

Start Date of test	2014-11-19
End Date of test	2014-11-19

1.8 Ambient Condition

Ambient temperature	20°C – 24°C
Relative Humidity	30% – 70%

2 HAC RF Measurement System

2.1 HAC RF Measurement Set-up

These measurements are performed using the DASY5 NEO automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Stäubli), robot controller, Lenovo Intel Core i5 3.1 GHz computer, near-field probe, probe alignment sensor. The robot is a six-axis industrial robot performing precise movements. A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of the Lenovo Intel Core i5 3.1 GHz computer with Windows 7 system and HAC Measurement Software DASY5 NEO, A/D interface card, monitor, mouse, and keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

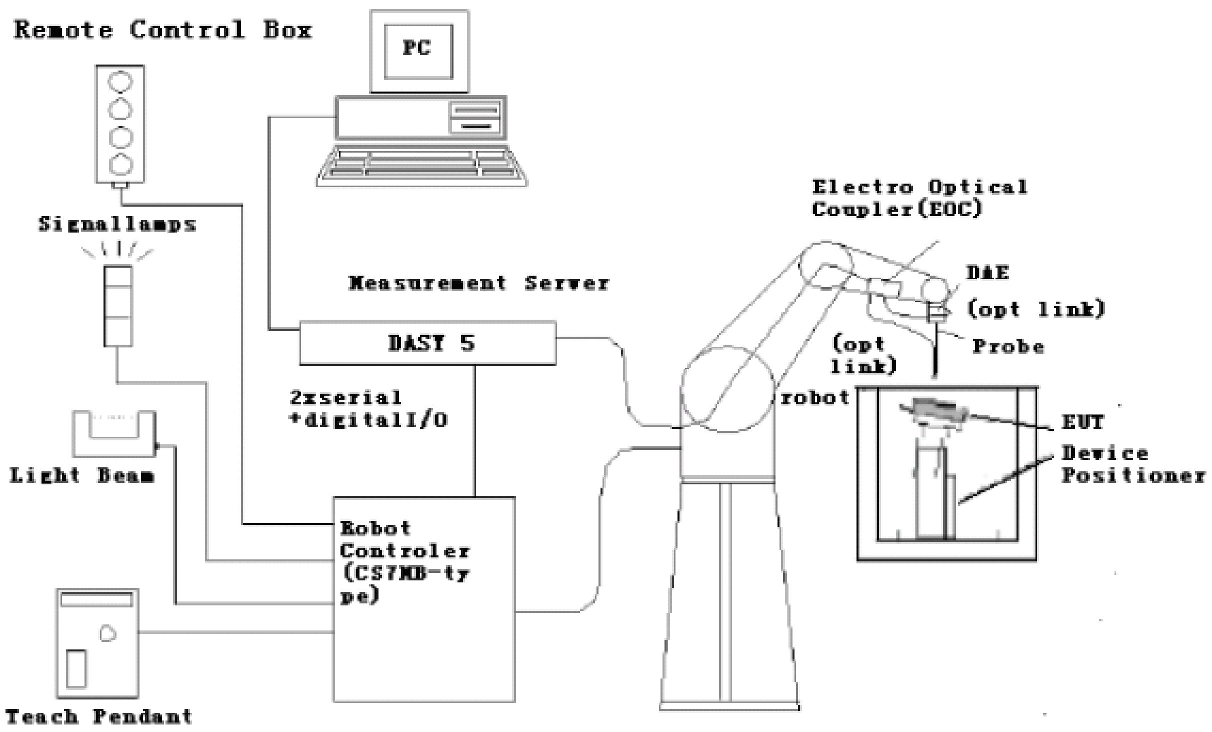
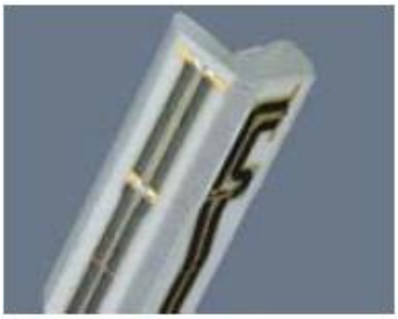


Fig. 1 HAC Test Measurement Set-up

The DAE4 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 PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

2.2 Probe description

E-Field Probe Description

Construction	One dipole parallel, two dipoles normal to probe axis Built-in shielding against static charges PEEK enclosure material	 [ER3DV6]
Calibration	In air from 100 MHz to 3.0 GHz (absolute accuracy ±6.0%,k=2)	
Frequency	40 MHz to > 6 GHz (can be extended to < 20 MHz) Linearity: ± 0.2 dB (100 MHz to 3 GHz)	
Directivity	± 0.2 dB in air (rotation around probe axis) ± 0.4 dB in air (rotation normal to probe axis)	
Dynamic range	2 V/m to > 1000 V/m; Linearity: ± 0.2 dB	
Dimensions	Overall length: 330 mm (Tip: 16 mm) Tip diameter: 8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.5 mm The closest part of the sensor element is 1.1mm closer to the tip	
Application	General near-field measurements up to 6 GHz Field component measurements Fast automatic scanning in phantoms	

2.3 Test Arch Phantom & Phone Positioner

The Test Arch phantom should be positioned horizontally on a stable surface. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. It enables easy and well defined positioning of the phone and validation dipoles as well as simple teaching of the robot (Dimensions: 370 x 370 x 370 mm).

The Phone Positioner supports accurate and reliable positioning of any phone with effect on near field <±0.5 dB.

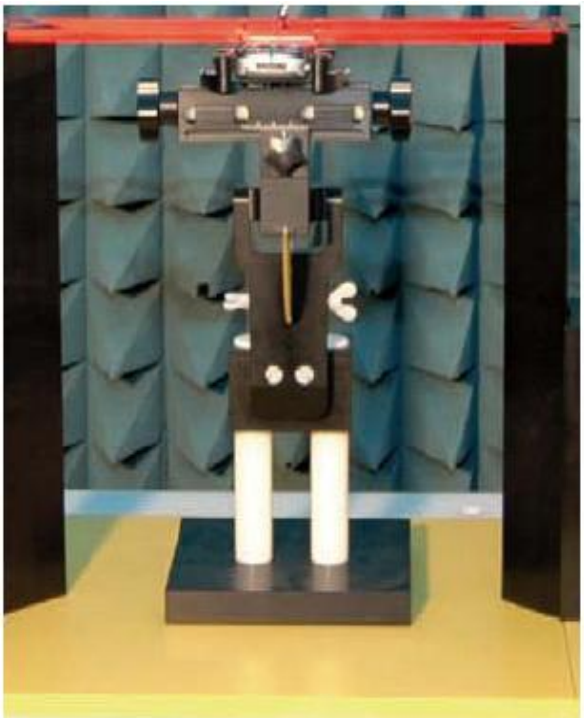


Fig. 2 HAC Phantom & Device Holder

2.4 WD RF Emission Measurements Reference and Plane

Figure 3 illustrates the references and reference plane that shall be used in the WD emissions measurement.

• The grid is 5 cm by 5 cm area that is divided into 9 evenly sized blocks or sub-grids.
• The grid is centered on the audio frequency output transducer of the WD (speaker or T-coil).
• The grid is located by reference to a reference plane. This reference plane is the planar area that contains the highest point in the area of the WD that normally rests against the user's ear
• The measurement plane is located parallel to the reference plane and 15 mm from it, out from the phone. The grid is located in the measurement plane.

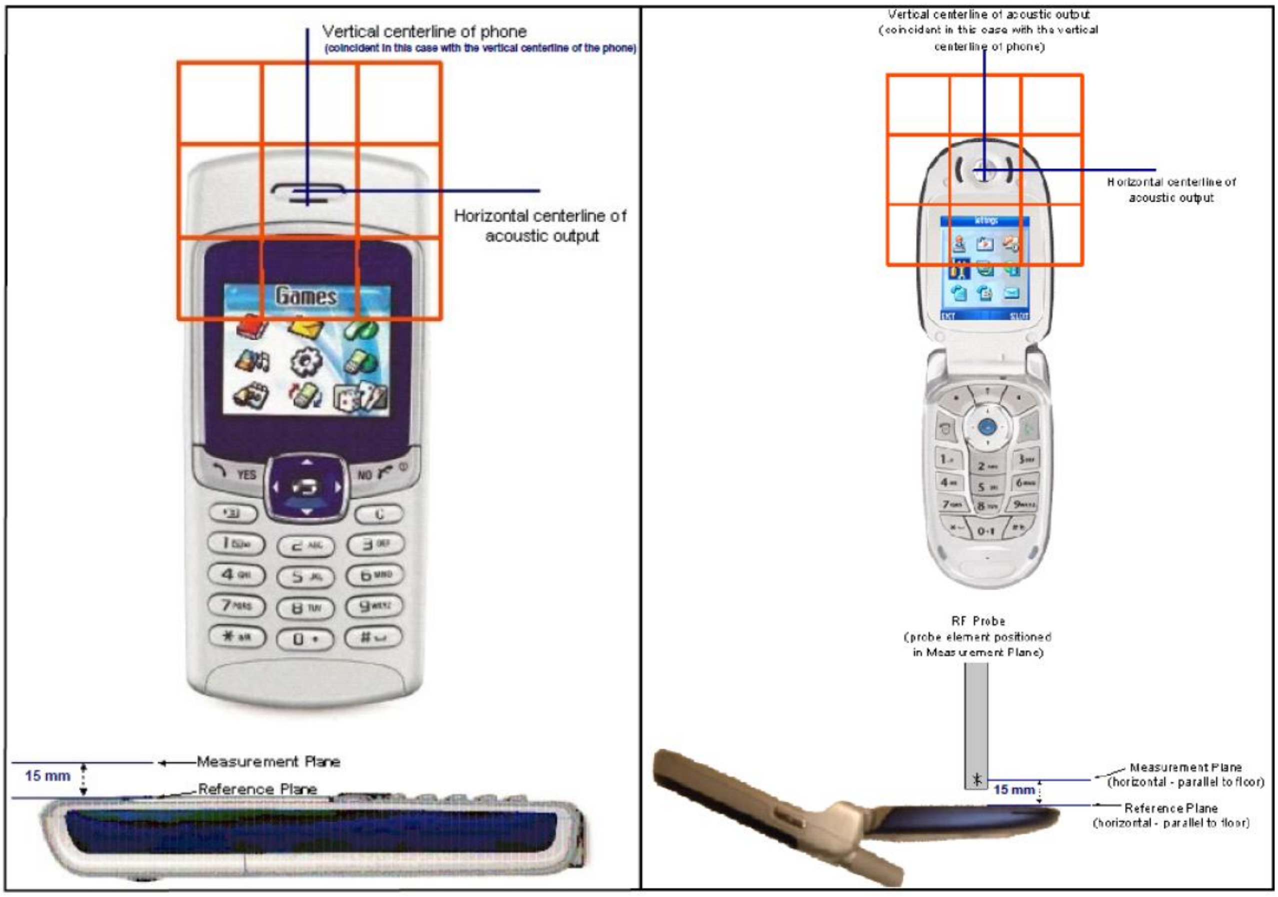


Fig. 3 WD reference and plane for RF emission measurements

2.5 Test Equipment List

This table gives a complete overview of the HAC measurement equipment
Devices used during the test described are marked ☒

	Manufacturer	Device	Type	Serial number	Date of last calibration	Valid period
☒	SPEAG	Dosimetric E-Field Probe	ER3DV6	2344	2014-06-20	One year
☒	SPEAG	835 MHz Dipole	CD835V3	1030	2014-06-16	One year
☒	SPEAG	1880 MHz Dipole	CD1880V3	1023	2014-06-16	One year
☒	SPEAG	Data acquisition electronics	DAE4	851	2014-07-24	One year
☒	SPEAG	HAC Test Arch	N/A	1102	NCR	NCR
☒	SPEAG	Software	DASY 5	N/A	NCR	NCR
☒	Agilent	Signal Generator	N5181A	MY47420989	2014-01-18	One year
☒	MINI-CIRCUITS	Amplifier	ZHL-42W	QA0746001	NCR	NCR
☒	Agilent	Power Meter	E4417A	MY45101339	2014-01-18	One year
☒	Agilent	Power Meter Sensor	E9321A	MY44420359	2014-01-18	One year
☒	AR	Directional Coupler	DC7144M1	0423264	2014-04-02	One year
☒	R & S	Power Meter	NRP	100740	2014-07-11	One year
☒	R & S	Power Meter Sensor	NRP-Z11	106288	2014-07-11	One year
☒	R & S	Universal Radio Communication Tester	CMU200	111379	2014-07-11	One year

2.6 Measurement Uncertainty Evaluation

Uncertainty Component	Uncertainty Value	Probability Distribution	Divisor	ci (E)	Standard Uncertainty (E)
Measurement System					
Probe calibration	± 5.1%	Normal	1	1	± 5.1%
Axial isotropy	± 4.7%	Rectangular	√3	1	± 2.7%
Sensor Displacement	± 16.5%	Rectangular	√3	1	± 9.5%
Test Arch	± 7.2%	Rectangular	√3	1	± 4.1%
Linearity	± 4.7%	Rectangular	√3	1	± 2.7%
Scaling to Peak Envelope Power	± 0.0%	Rectangular	√3	1	± 0.0%
System Detection Limit	± 1.0%	Rectangular	√3	1	± 0.6%
Readout Electronics	± 0.3%	Normal	1	1	± 0.3%
Response Time	± 0.8%	Rectangular	√3	1	± 0.5%
Integration Time	± 2.6%	Rectangular	√3	1	± 1.5%
RF Ambient Conditions	±3.0%	Rectangular	√3	1	± 1.7%
RF Reflections	±12.0%	Rectangular	√3	1	± 6.9%
Probe positioner	± 1.2%	Rectangular	√3	1	± 0.7%
Probe positioning	± 4.7%	Rectangular	√3	1	± 2.7%
Extrap. and Interpolation	± 1.0%	Rectangular	√3	1	± 0.6%
Test Sample Related					
Device Positioning Vertical	± 4.7%	Rectangular	√3	1	± 2.7%
Device Positioning Lateral	± 1.0%	Rectangular	1	1	± 0.6%
Device Holder and Phantom	± 2.4%	Rectangular	√3	1	± 1.4%
Power Drift	± 5.0%	Rectangular	√3	1	± 2.9%
Phantom and Set-up					
Phantom Thickness	± 2.4%	Rectangular	√3	1	± 1.4%
Combined Std. Uncertainty					**± 15.2%**
Expanded Std. Uncertainty on Power					**± 30.4%**
Expanded Std. Uncertainty on Field					**± 15.2%**

Table 4: Measurement uncertainties

Note: Worst-Case uncertainty budget for HAC free field assessment according to ANSI C63.19. The budget represents a worst case analysis. For specific tests and configurations, the uncertainty could be considerably smaller.

3 System Verification Procedure

3.1 System Check

Place a dipole antenna meeting the requirements given in ANSI C63.19-2011 in the position normally occupied by the WD. The dipole antenna serves as a known source for an electrical and magnetic output. Position the E-field probe so that the following occurs:

• The probes and their cables are parallel to the coaxial feed of the dipole antenna

• The probe cables and the coaxial feed of the dipole antenna approach the measurement area from opposite directions

• The center point of the probe element(s) are 15 mm from the closest surface of the dipole elements.

Scan the length of the dipole with the E-field probe and record the two maximum values found near the dipole ends. Average the two readings and compare the reading to the expected value in the calibration certificate or the expected value in this standard.

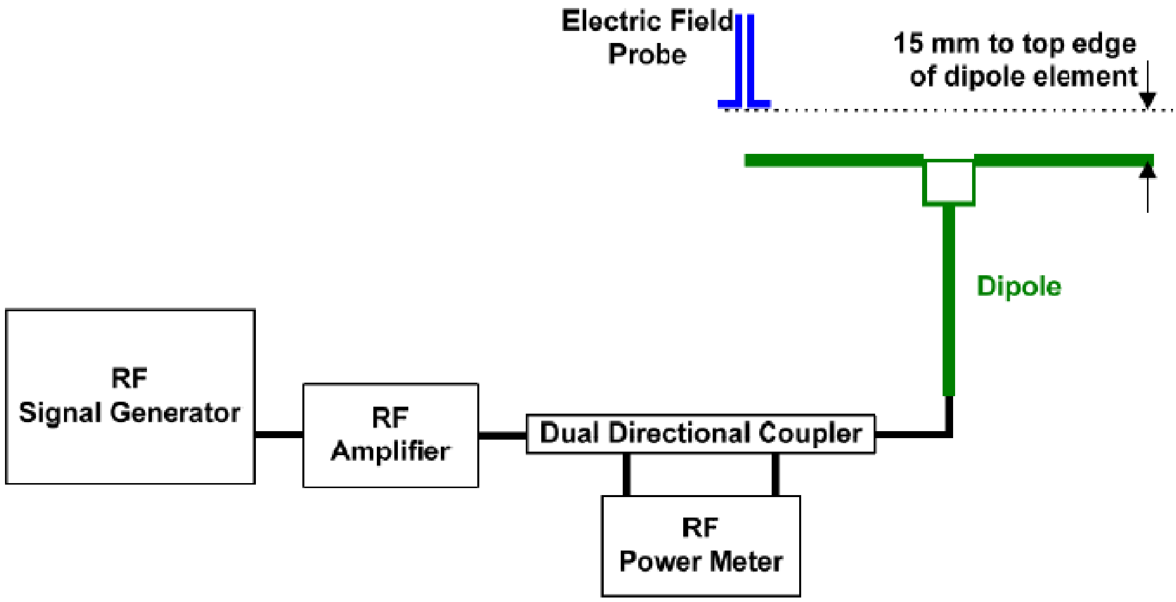


Fig. 4 Dipole Validation Setup

3.2 Validation Result

Frequency (MHz)	Input Power (mW)	E-Field Value 1 (V/m)	E-Field Value 2 (V/m)	Averaged Measured[1] Value(V/m)	Target[2] Value (V/m)	Deviation[3] (%)	Limit[4] (%)	Test Date
835	100	108.7	87.02	97.86	102.8	-4.81%	±25%	2014-11-19
1880	100	92.11	89.92	91.02	88.5	2.81%	±25%	2014-11-19

[1] Please refer to the attachment for detailed measurement data and plot.

[2] Target value is provided by SPEAD in the calibration certificate of specific dipoles.

[3] Deviation (%) = 100 * (Measured value minus Target value) divided by Target value.

[4] ANSI C63.19 requires values within ± 25% are acceptable, of which 12% is deviation and 13% is measurement uncertainty. Values independently validated for the dipole actually used in the measurements should be used, when available.

3.3 Modulation Interference Factor

The HAC Standard ANSI C63.19-2011 defines a new scaling using the Modulation Inerference Factor(MIF) which replaces the need for the Articlulation Weighting Factor(AWF) during the evaluation and is applicable to any modulation scheme.

The Modulation Interference Factor(MIF, in dB) is added to the measured average E-field (in dB V/m) and converts it to the RF Audio Interference level(in dB V/m). This level considers the audible amplitude modulation components in the RF E-field. CW fields without amplitude modulation are assumed to not enerfere with the hearing aid electronics.Modulations without time slots and low fluctuations at low frequencies have low MIF values.TDMA modulations with narrow transmission and repetition rates of few 100 Hz have high MIF values and give similar classifications as ANSI C63.19-2007.

ER3D E-Fied probes have a bandwidth <10 kHz and can therefore not evaluate the RF envelope in the full audio band. DASY52 is therefore using the “indirect” measurement method according to ANSI C63.19-2011 which is the primary method. Thest near field probes read the averaged E-field measurement. Especially for the new high peak-to-average(PAR) signal types, the probes shall be linearized by probe modulation response(PMR) calibration in order to not overestimate the field reading.

The evaluation method or the MIF is defined in ANSI C63.19-2011 section D.7. An RMS demodulated RF signal is fed to a spectral filter(similar to an A weighting filter) and forwarded to a temporal filter acting as a quasi-peak detector. The averaged output of these filtering is called to a 1 kHz 80% AM signal as reference. MIF measurement requires additional instrumentation and is not well suited for evaluation by the end user with reasonable uncertainty.It may alternatively be determined through analysis and simulation, because it is constraint and characteristic for a communication signal. DASY52 uses well defined signals for PMR calibration. The MIF of these signals has been determined by simulation and is automatically applied.

MIF values appied in this test report were probided by the HAC equipment provider, SPEAG, and the values are listed below:

UID	Communication System Name	MIF(dB)
10081-CAB	CDMA2000 (1xRTT, RC3)	-19.71

The MIF measurement uncertainty is estimated as follows, declared by the HAC equipment provider, SPEAG, for modulation frequencies from slotted waveforms with fundamental frequency and at least 2 harmonics within 10 kHz:

i) 0.2 dB for MIF: -7 to +5 dB

ii) 0.5 dB for MIF: -13 to +11 dB

iii) 1 dB for MIF: > -20 dB

4 HAC Measurement Procedure

The evaluation was performed with the following procedure:

a) Confirm the proper operation of the field probe, probe measurement system, and other instrumentation and the positioning system.

b) Position the WD in its intended test position.

c) Set the WD to transmit a fixed and repeatable combination of signal power and modulation characteristic that is representative of the worst case (highest interference potential) encountered in normal use. Transiently occurring start-up, changeover, or termination conditions, or other operations likely to occur less than 1% of the time during normal operation, may be excluded from consideration.

d) The center subgrid shall be centered on the T-Coil mode perpendicular measurement point or the acoustic output, as appropriate. Locate the field probe at the initial test position in the 50 mm by 50 mm grid, which is contained in the measurement plane, refer to illustrated in Figure 3. If the field alignment method is used, align the probe for maximum field reception.

e) Record the reading at the output of the measurement system.

f) Scan the entire 50 mm by 50 mm region in equally spaced increments and record the reading at each measurement point. The distance between measurement points shall be sufficient to assure the identification of the maximum reading.

g) Identify the five contiguous subgrids around the center subgrid whose maximum reading is the lowest of all available choices. This eliminates the three subgrids with the maximum readings. Thus, the six areas to be used to determine the WD's highest emissions are identified.

h) Identify the maximum reading within the nonexcluded subgrids identified in step g).

i) Convert the maximum reading identified in step h) to RF audio interference level, in, V/m, by taking the square root of the reading and then dividing it by the measurement system transfer function, established in 5.5.1.1. Convert the result to dB(V/m) by taking the base-10 logarithmand multiplying it by 20.

Indirect measurement method

Replacing step i) of 5.5.1.2, the RF audio interference level in dB(V/m) is obtained by adding the MIF (in dB) to the maximum steady-state rms field-strength reading, in dB(V/m), from step h). Use this result to determine the category rating.

j) Compare this RF audio interference level with the categories in Clause 8 and record the resulting WD category rating.

k) For the T-Coil mode M-rating assessment, determine whether the chosen perpendicular measurement point is contained in an included subgrid of the first scan. If so, then a second scan is not necessary. The first scan and resultant category rating may be used for the T-Coil mode M rating.

Otherwise, repeat step a) through step i), with the grid shifted so that it is centered on the perpendicular measurement point. Record the WD category rating.

5 HAC Test Configuration

5.1 General Description

The phone was tested in all normal configurations for the ear use. The EUT is mounted in the device holder equivalent as for classic dosimeter measurements. The acoustic output of the EUT shall coincide with the center point of the area formed by the dielectric wire and the middle bar of the arch's top frame. The EUT shall be moved vertically upwards until it touches the frame. The fine adjustment is possible by sliding the complete. The EUT holder is on the yellow base plate of the Test Arch phantom. These test configurations are tested at the high,middle and low frequency channels of each applicable operating mode; for example,GSM,WCDMA(UMTS),CDMA and TDMA.

5.2 CDMA Test Configuration

HAC tests for CDMA BC0 and BC1, a communication link is set up with a base station by air link. We established the radio link through call processing. The Absolute Radio Frequency Channel Number(ARFCN) are allocated to 1013, 384, 777 respectively in the case of CDMA BC0, allocated to 25, 600, 1175 respectively in the case of CDMA BC1. RF configurations is measured in RC3 with the EUT configured to transmit at full rate using Loopback Service Option SO55, at the same time the EUT shall be operated at its maximum RF output power setting.

6 HAC RF Measurement Results

6.1 Conducted power measurements

CDMA BC0	Test Mode	Conducted Power (dBm)			Tune-up limit(dBm)
		1013CH	384CH	777CH	
	RC3 SO55	23.75	23.89	23.98	24.7
CDMA BC1	Test Mode	Conducted Power (dBm)			Tune-up limit(dBm)
		25CH	600CH	1175CH	
	RC3 SO55	22.60	22.43	22.24	24.2

Table 5: Test Results of Conducted power

6.2 Low-power Exemption Conclusions

According to ANSI C63.19-2011, a RF air interface technology of a device is exempt from testing when its average antenna input power plus its MIF is ≤17 dBm for any of its operation modes.

Air Interface	Maxium Average Power(dBm)	MIF(dB)	Total (Power + MIF,dB)	C63.19 HAC RF testing required
CDMA BC0	24.7	-19.71	4.99	No
CDMA BC1	24.2	-19.71	4.49	No

Table 6: Low-power Exemption calculation

Per ANSI C63.19-2011, CDMA bands are exempted and HAC RF Emission rating is M4.

6.3 E-Field Emission Results

Not applicable. CDMA bands are exempted and HAC RF Emission rating is M4. The HAC RF measurement plots are not required, too.

Appendix A. System Check Plots

(Please See Appendix A)

Appendix B. Calibration Certificate

(Please See Appendix B）

Appendix C. MIF Specification documentation

(Please See Appendix C)

END