FCC PART 15 Subpart C

EMI MEASUREMENT AND TEST REPORT

For

Lionda Technology Co., Ltd

Block 2 Laodong 2nd Industrial Area, Xixian, Baoan, Shenzhen, China

FCC ID:O63GH5815HALD04

2004-04-15

This Report Concerns:	**Equipment Type:**
☒ Original Report	5.8GHz Analog Cordless Phone

Test Engineer:	Hang Tan /
Report No.:	R0401192(Handset)
Test Date:	2004-02-10
Reviewed By:	Ling Zhang /
Prepared By:	Bay Area Compliance Laboratory Corporation 230 Commercial Street Sunnyvale, CA 94085 Tel (408) 732-9162 Fax (408) 732-9164

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *LIONDA TECHNOLOGY CO LTD*'s product, model name: GH5815 or the "EUT" as referred to in this report is a Handset, 5.8GHz Cordless Phone. The EUT was composed of two parts, one is a Base, and the other is a Handset. This report is for Handset which measures approximately 6.5"L x 2.0"W x 1.5"H

** The test data gathered are from production sample, serial number: GH5815001, provided by the manufacturer.*

Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 - 2001.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.205, 15.207, 15.203, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 - 2001, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules and Article 8 of the VCCI regulations. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2001.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, CISPR 22:1997 and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing according to ANSI C63.4-2001.

Handset being tested: The Handset unit was placed on the wooden table and tested in three orthogonal axis. The handset was connected to the headset via its headset port. The Low, middle, and high channels were tested. The handset was transmitting to and receiving from the Base unit. The EUT was investigated for emissions while off hook. The radiated data was taken in this mode of operation. All initial and final investigations were performed with the EMI receiver in manual mode scanning the frequency range continuously. The cables were bundled and routed as shown in the Test Setup Block Diagram.

Equipment Modifications

No modifications were made to the EUT.

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Teltone	Line Simulator	TLS-3B-01	80071	N/A
Southern Telecom	Phone	N/A	N/A	N/A

External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Phone Line	1.0	Line 1 Port / Line Simulator	Phone
Phone Line	1.0	Line 2 Port / Line Simulator	EUT

Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number	FCC ID
Bell South	AC Adapter	U090030D12	0230	N/A

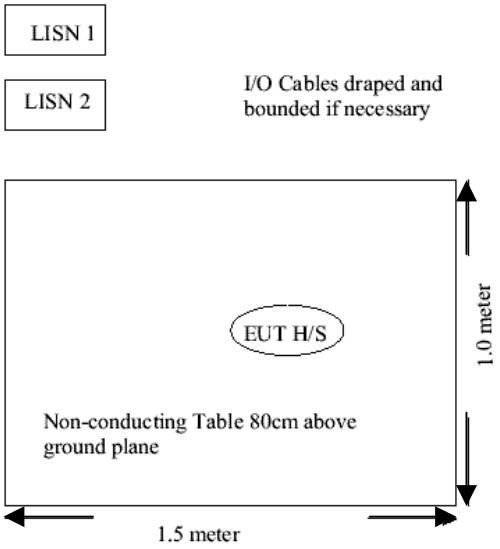
Configuration of Test System

Radiated Setup for Handset

Handset

Test Setup Block Diagram

Radiated Setup for Handset



SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.207 (a)	Conducted Emission	Compliant
§15.249	Radiated Emission	Compliant
§15.249 (c)	Band Edge Testing	Compliant
§15.203	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§15.214	Cordless Telephone	Compliant

§ 15.249 (c) - CONDUCTED EMISSIONS TEST DATA

Measurement Uncertainty

All measurements involve certain levels of uncertainties. These uncertainties are attributed to: Spectrum analyzer, Cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the estimated uncertainty of any conducted emission measurement at BACL is $\pm$2.4 dB.

EUT Setup

The measurement was performed in the shielded room, using the same setup per ANSI C63.4-2001 measurement procedure. The specification used was FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle as required.

The host PC system was connected with 120Vac/60Hz power source.

Spectrum Analyzer Setup

The spectrum analyzer was set to investigate the spectrum from 150 kHz to 30Mhz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Artificial LISN	ESH2-Z5	871884/039	2003-03-28
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2003-05-06
Fluke	Calibrated Voltmeter	189	18485-38	2003-07-18

*** Statement of Traceability: BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Qusi-Peak readings are distinguished with an “QP”. Average readings are distinguished with an “Ave”.

Environmental Conditions

Temperature:	17 ° C
Relative Humidity:	24%
ATM Pressure:	1024 mbar
Test Date:	2004-02-10

Summary of Test Results

According to the recorded data in following table, the EUT complies with the FCC Conducted limit for a Class B device, with the *worst* margin reading of:

-32.0dB at **13.3 MHz** in the **Line** mode

Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBµV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBµV	Margin dB
13.300	14.0	Ave	Line	46	-32.0
17.900	13.5	Ave	Line	50	-36.5
13.300	13.1	Ave	Neutral	50	-36.9
13.300	15.4	Qp	Line	56	-40.6
17.900	17.7	Qp	Line	60	-42.3
0.580	14.8	Qp	Neutral	60	-45.2
0.620	20.6	Qp	Line	66	-45.4
13.300	12.9	Qp	Neutral	60	-47.1
0.580	2.3	Ave	Neutral	50	-47.7
0.150	3.8	Ave	Neutral	56	-52.2
0.150	13.5	Qp	Neutral	66	-52.5
0.620	2.8	Ave	Line	56	-53.2

Plot of Conducted Emissions Test Data

Plot of Conducted Emissions test data was presented hereinafter as reference.

Bay Area Compliance Laboratory Corp 10. Feb 04 11:24

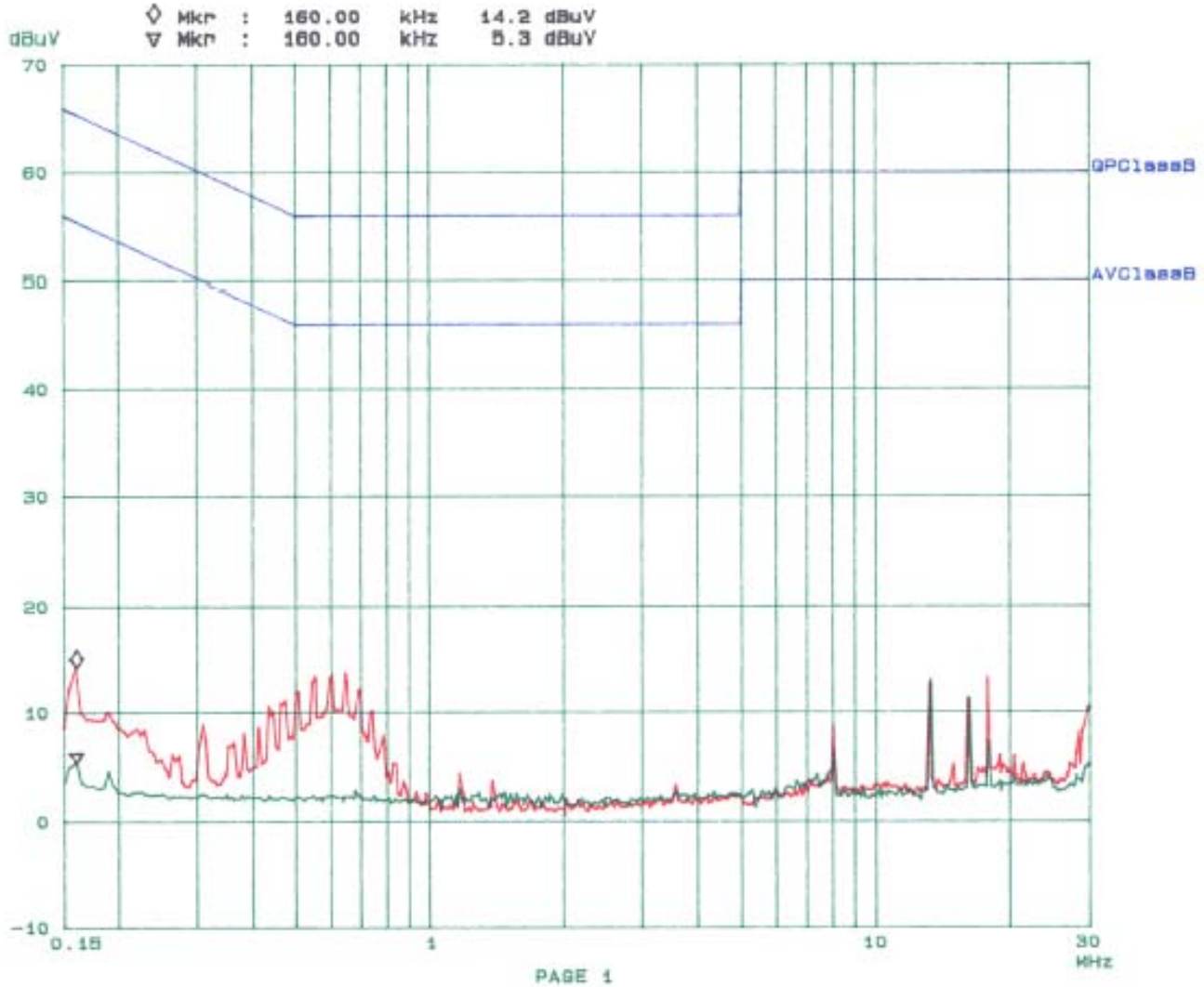
Class B

EUT: GH5815
Manuf: Lionda Technology
Op Cond: Normal
Operator: HANG
Comment: N

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



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Bay Area Compliance Laboratory Corp 10. Feb 04 11:58

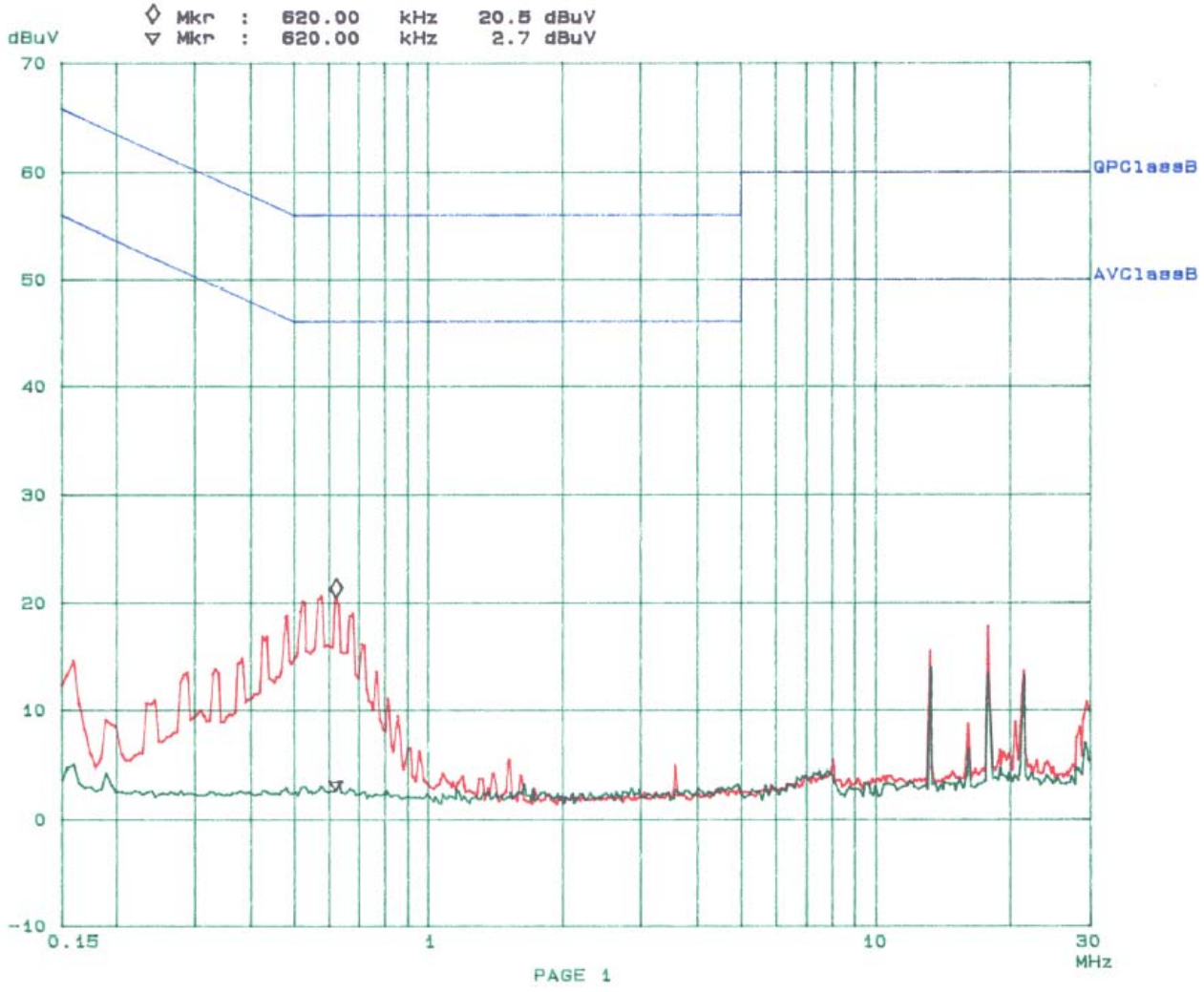
Class B

EUT: GH5815
Manuf: Lionda Technology
Op Cond: Normal
Operator: HANG
Comment: L

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



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§15.209(a) - RADIATED EMISSION DATA

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ±4.0 dB.

EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with ANSI C63.4-2001. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle as required.

The host PC system was connected with 120Vac/60Hz power source.

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR 15.33 (a) (1), the system was tested to 25 GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	***RBW***	***Video B/W***
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Amplifier, Microwave	8449B	3147A00400	2003-03-14
HP	Amplifier, Pre	8447E	1937A01046	2003-08-02
HP	Analyzer, Spectrum	8565EC	3946A00131	2003-06-30
ETS	Antenna, Biconical	3110B	9603-2315	2003-10-11
A.R.A.	Antenna, Horn, DRG	DRG-118/A	1132	2003-09-30
ETS	Antenna, logperiodic	3148	0004-1155	2003-10-11
EMI	Antenna, Horn, std	PTC-28KF-01	10555-02	N/A
EMI	Antenna, Horn, std	PTC-42-KF-01	10555-01	N/A

*** Statement of Traceability: BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	14 ° C
Relative Humidity:	42%
ATM Pressure:	1019 mbar
Test Date:	2004-02-11

Test Procedure

For the radiated emissions test, the power cord of the host system and all support equipment were connected to the AC floor outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within –4 dB of specification limits), and are distinguished with a "**Qp**" in the data table.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor – Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of –7dB means the emission is 7dB below the maximum limit for applicable limits. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Applicable Limit

Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207, and 15.249 after tested to 10^{th} harmonics as required by FCC and had the worst margin of:

Handset, 1 – 25GHz, 3 Meters

-10.0 dB at 822.67 MHz in the Vertical polarization at Low Frequency

-10.3 dB at 824.67 MHz in the Vertical polarization at Mid Frequency

-11.3 dB at 826.57 MHz in the Vertical polarization at High Frequency

-3.7 dB at 74.99 MHz in the Horizontal polarization at Unintentional Emission, 30-1000 MHz

Radiated Emissions Test Result Data

Handset Unit, 1 to 25GHz, 3 meters

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 Subpart C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
Low Frequency (Handset)											
822.67	43.33	Local Oscillator / Ave	45	1.4	V	22.6	6.5	28.4	44.0	54	-10.0
822.67	40.33	Local Oscillator / Ave	60	1.7	H	22.6	6.5	28.4	41.0	54	-13.0
7404.00	33.67	AVG	120	1.4	V	36.3	4.3	35.7	38.6	54	-15.4
7404.00	33.67	AVG	180	1.5	H	36.3	4.3	35.7	38.6	54	-15.4
4936.00	34.83	AVG	150	1.4	V	32.5	3.1	34.8	35.7	54	-18.3
4936.00	32.00	AVG	180	1.5	H	32.5	3.1	34.8	32.9	54	-21.2
822.67	51.50	Local Oscillator / Peak	45	1.4	V	22.6	6.5	28.4	52.2	74	-21.8
7404.00	45.67	Peak	120	1.4	V	36.3	4.3	35.7	50.6	74	-23.4
822.67	49.83	Local Oscillator / Peak	60	1.7	H	22.6	6.5	28.4	50.5	74	-23.5
7404.00	45.33	Peak	180	1.5	H	36.3	4.3	35.7	50.2	74	-23.8
2468.00	75.67	FUND / Ave.	150	1.8	H	28.1	2.0	35.7	70.1	94	-23.9
2468.00	75.50	FUND / Ave.	110	1.5	V	28.1	2.0	35.7	69.9	94	-24.1
4936.00	44.17	Peak	150	1.4	V	32.5	3.1	34.8	45.0	74	-29.0
4936.00	44.00	Peak	180	1.5	H	32.5	3.1	34.8	44.9	74	-29.2
2468.00	76.50	FUND / Peak.	110	1.5	V	28.1	2.0	35.7	70.9	114	-43.1
2468.00	76.50	FUND / Peak.	150	1.8	H	28.1	2.0	35.7	70.9	114	-43.1

Ave.: Average
FUND: Fundamental

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 Subpart C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
Mid Frequency (Handset)											
824.67	43.00	Local Oscillator / Ave	60	1.4	V	22.6	6.5	28.4	43.7	54	-10.3
824.67	39.33	Local Oscillator / Ave	90	1.2	H	22.6	6.5	28.4	40.0	54	-14.0
7422.00	33.83	AVG	0	1.4	V	36.3	4.3	35.7	38.7	54	-15.3
7422.00	33.67	AVG	15	1.3	H	36.3	4.3	35.7	38.6	54	-15.4
4948.00	36.50	AVG	315	1.3	V	32.5	3.1	34.8	37.4	54	-16.7
4948.00	33.17	AVG	0	1.4	H	32.5	3.1	34.8	34.0	54	-20.0
7422.00	46.83	Peak	0	1.4	V	36.3	4.3	35.7	51.7	74	-22.3
824.67	50.83	Local Oscillator / Peak	60	1.4	V	22.6	6.5	28.4	51.5	74	-22.5
2474.00	76.83	FUND / Ave.	45	1.3	V	28.1	2.0	35.7	71.3	94	-22.7
7422.00	45.50	Peak	15	1.3	H	36.3	4.3	35.7	50.4	74	-23.6
2474.00	74.83	FUND / Ave.	15	1.8	H	28.1	2.0	35.7	69.3	94	-24.7
824.67	48.33	Local Oscillator / Peak	90	1.2	H	22.6	6.5	28.4	49.0	74	-25.0
4948.00	46.00	Peak	315	1.3	V	32.5	3.1	34.8	46.9	74	-27.2
4948.00	44.33	Peak	0	1.4	H	32.5	3.1	34.8	45.2	74	-28.8
2474.00	77.33	FUND / Peak.	45	1.3	V	28.1	2.0	35.7	71.8	114	-42.2
2474.00	75.33	FUND / Peak.	15	1.8	H	28.1	2.0	35.7	69.8	114	-44.2

Ave.: Average
FUND: Fundamental

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 Subpart C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
High Frequency (Handset)											
826.57	42.00	Local Oscillator / Ave	0	1.4	V	22.6	6.5	28.4	42.7	54	-11.3
826.57	38.50	Local Oscillator / Ave	150	1.1	H	22.6	6.5	28.4	39.2	54	-14.8
7439.10	33.83	AVG	15	1.6	H	36.3	4.3	35.7	38.7	54	-15.3
7439.10	33.67	AVG	90	1.6	V	36.3	4.3	35.7	38.6	54	-15.4
4959.40	33.33	AVG	120	1.9	V	32.5	3.1	34.8	34.2	54	-19.8
4959.40	33.17	AVG	345	1.7	H	32.5	3.1	34.8	34.0	54	-20.0
7439.10	46.33	Peak	90	1.6	V	36.3	4.3	35.7	51.2	74	-22.8
7439.10	45.67	Peak	15	1.6	H	36.3	4.3	35.7	50.6	74	-23.4
826.57	49.67	Local Oscillator / Peak	0	1.4	V	22.6	6.5	28.4	50.4	74	-23.6
826.57	48.67	Local Oscillator / Peak	150	1.1	H	22.6	6.5	28.4	49.4	74	-24.6
2479.70	73.50	FUND / Ave.	270	1.8	V	28.1	2.0	35.7	67.9	94	-26.1
2479.70	72.67	FUND / Ave.	0	1.7	H	28.1	2.0	35.7	67.1	94	-26.9
4959.40	44.67	Peak	120	1.9	V	32.5	3.1	34.8	45.5	74	-28.5
4959.40	44.50	Peak	345	1.7	H	32.5	3.1	34.8	45.4	74	-28.7
2479.70	74.17	FUND / Peak.	270	1.8	V	28.1	2.0	35.7	68.6	114	-45.4
2479.70	73.83	FUND / Peak.	0	1.7	H	28.1	2.0	35.7	68.3	114	-45.7

Ave.: Average
FUND: Fundamental

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 Subpart C	
Frequency MHz	Ampl. dBμV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
Unintentional Emission (Handset) 30-1000MHz										
74.99	53.50	60	1.5	H	9.6	1.8	28.6	36.3	40	-3.7
74.97	52.67	45	1.3	V	9.6	1.8	28.6	35.5	40	-4.5
55.27	51.17	0	1.8	V	10.3	1.6	28.6	34.5	40	-5.5
41.64	49.30	30	1.4	V	12.1	1.4	28.7	34.1	40	-5.9
55.29	50.83	270	1.7	H	10.3	1.6	28.6	34.1	40	-5.9
41.64	46.00	60	1.6	H	12.1	1.4	28.7	30.8	40	-9.2
174.54	45.40	30	1.5	V	13.3	2.8	27.9	33.6	43.5	-9.9
111.61	47.60	90	1.3	H	11.7	2.2	28.5	33.0	43.5	-10.5
174.53	44.50	90	1.7	H	13.3	2.8	27.9	32.7	43.5	-10.8
111.62	45.33	0	1.5	V	11.7	2.2	28.5	30.7	43.5	-12.8
158.04	41.83	315	1.5	V	13.0	2.5	28.1	29.2	43.5	-14.3
130.02	41.50	45	1.3	H	12.6	2.4	28.2	28.3	43.5	-15.2
130.01	41.33	15	1.2	V	12.6	2.4	28.2	28.1	43.5	-15.4
158.05	40.56	30	1.6	H	13.0	2.5	28.1	28.0	43.5	-15.5

Ave.: Average
FUND: Fundamental

Note: This test was performed by placing the handset on 3 orthogonal axis.

§15.249(c) - BAND EDGES TESTING

Standard Applicable

Requirements: FCC 15.249 (c), the emission power at the START and STOP frequencies shall be at least 50 dB below the level of the fundamental or to the general radiated emission limits in FCC 15.209, whichever is the lesser attenuation.

Test Procedure

With the EUT's antenna attached, the EUT's radiated emission power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8565EC	3946A00131	2003-05-03

*** Statement of Traceability: BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Environmental Conditions

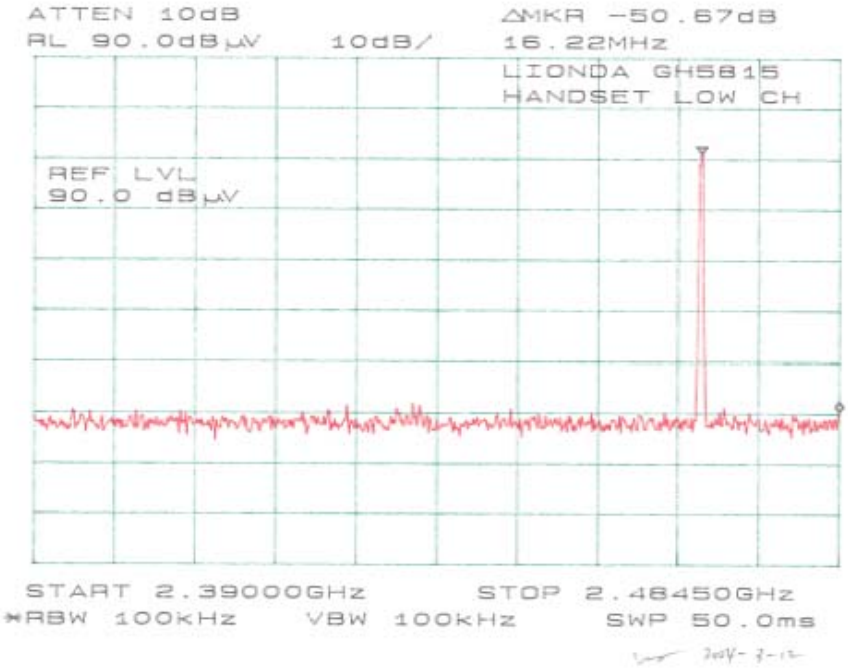
Temperature:	13 ° C
Relative Humidity:	50%
ATM Pressure:	1027 mbar

Test Results

Refer to the attached plots.

Handset - Low Frequency

Handset – High Frequency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RL 90.0dBμV
10dB/
ΔMKR -50.67dB
16.22MHz
LIONDA GH5815
HANDSET LOW CH
REF LVL
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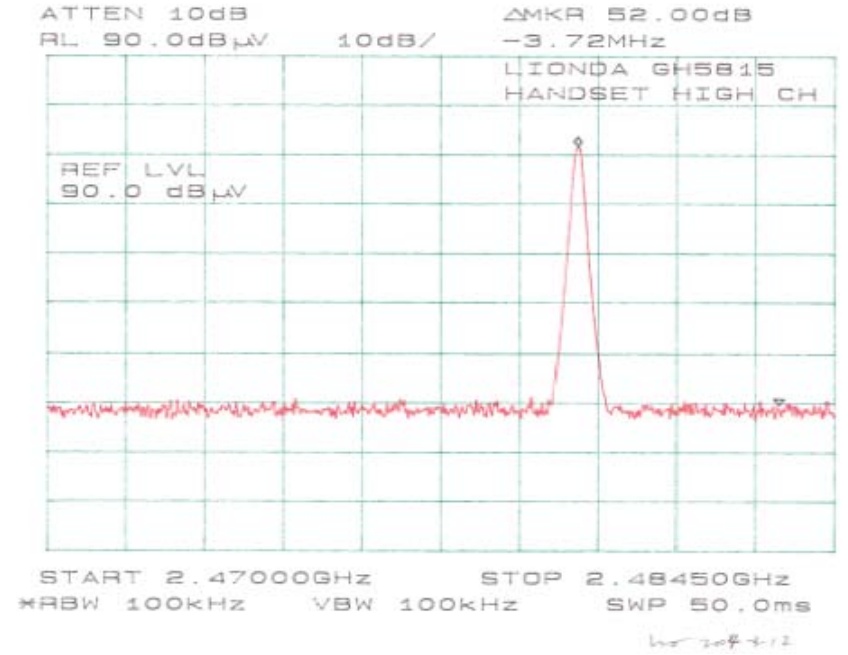
VBW 100kHz
SWP 50.0ms


ATTEN 10dB
RL 90.0dBμV
10dB/
ΔMKR 52.00dB
-3.72MHz
LIONDA GH5815
HANDSET HIGH CH
REF LVL
90.0 dBμV
START 2.47000GHz
STOP 2.48450GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms