FCC PART 15 Subpart C

EMI MEASUREMENT AND TEST REPORT

For

Shenzhen Baoan Hantong Electronics Factory

Block 11 & 12, Jinbi Industrial Area
Hwangtian, Baoan, Shenzhen, China

FCC ID: OK8TT3880HT02

July 18, 2002

This Report Concerns:	**Equipment Type:**
☒ Original Report	2.4GHz 50-Channel Analog Cordless Telephone

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Report No.:	R0206122
Test Date:	June 25, 2002
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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *Shenzhen Baoan Hantong Electronics Factory's* product, model name: PMP-3880XX or "EUT" as referred to in this report is a 2.4 GHz 50-Cahnnel Analog Cordless Telephone with digital answering machine and Caller ID and Call Waiting on handset.

** The test data was good for test sample only. It may have deviation for other product samples.*

1.2 Objective

This document is a qualification 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 C63.4-2002.

The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined by FCC Title 47, Part 15, Subpart C, section 15.205, 15.207, and 15.249.

1.3 Related Submittal(s)/Grant(s)

No related submittal(s)/grant(s).

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2000, 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.

1.5 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 on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2000.

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, IEC/CISPR 22: 1998, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8564E	08303	12/6/2002
HP	Spectrum Analyzer	8593B	2919A00242	12/20/2002
HP	Amplifier	8349B	2644A02662	12/20/2002
HP	Quasi-Peak Adapter	85650A	917059	12/6/2002
HP	Amplifier	8447E	1937A01046	12/6/2002
A.H. System	Horn Antenna	SAS0200/571	261	12/27/2002
Com-Power	Log Periodic Antenna	AL-100	16005	11/2/2002
Com-Power	Biconical Antenna	AB-100	14012	11/2/2002
Solar Electronics	LISN	8012-50-R-24-BNC	968447	12/28/2002
Com-Power	LISN	LI-200	12208	12/20/2002
Com-Power	LISN	LI-200	12005	12/20/2002
BACL	Data Entry Software	DES1	0001	12/20/2002

***Statement of Traceability: Bay Area Compliance Laboratory Corp.** Certifies that all calibration has been performed using suitable standards traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY.

1.8 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
South Telecom	Telephone	None	None	None
Teltone Corp.	Simulator	TLS-3B-01	80071	None

1.9 External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Unshielded RJ-11 Cable	1.8	RJ-11 Port / EUT	Simulator RJ-11 Port 1
Unshielded RJ-11 Cable	1.8	Southern Telephone	Simulator RJ-11 Port 2

2 - SYSTEM TEST CONFIGURATION

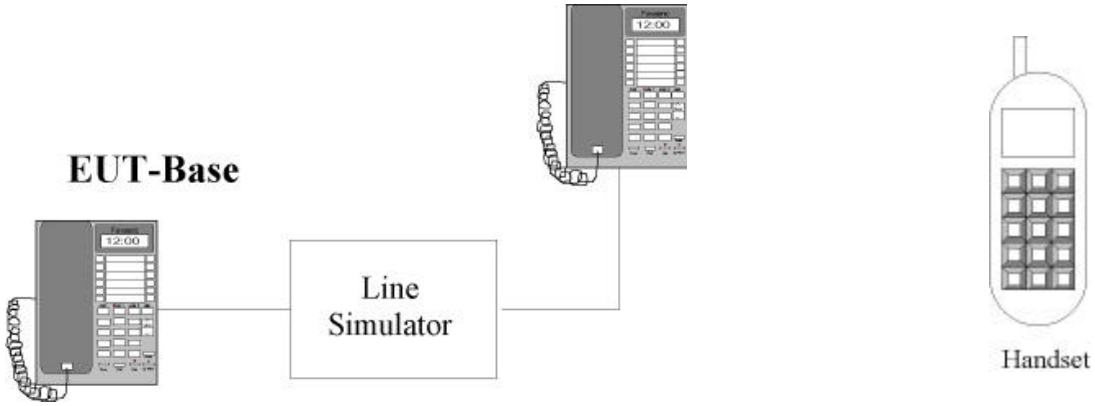
2.1 Description of Test Configuration

The EUT was configured for testing in a typical fashion (as normally used by a typical user).

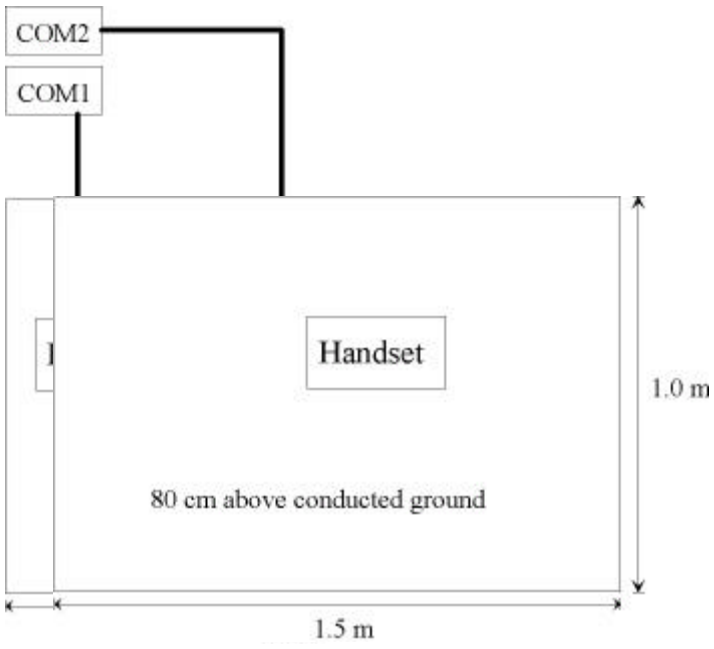
2.2 Equipment Modifications

No modification(s) to the EUT were made by BACL to comply with the applicable limits.

2.3 Configuration of Test System



2.4 Test Setup Block Diagram



3 - CONDUCTED EMISSION

3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ±2.4 dB.

3.2 EUT Setup

The measurement was performed at the **O**pen **A**rea **T**est **S**ite, using the same setup per ANSI C63.4-2000 measurement procedure. Specification used was with the FCC Class B limits.

The base unit was set up on a table with another telephone set and simulator. The handset was setup in a separate location on a table by itself. It was powered by it's own battery pack.

The spacing between the peripherals was 10 centimeters.

3.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the conducted emission test:

Start Frequency	450 kHz
Stop Frequency	30 MHz
Sweep Speed	Auto
IF Bandwidth	10 kHz
Video Bandwidth	10 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode	Normal

3.4 Test Procedure

During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first LISN with all support equipment power cords connected to the second.

The EUT was tested to represent worst-case results for the final qualification test. Therefore, these results were used for final test data recorded in the table listed under section 3.6 of this report.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination. All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within -4 dB of specification limit). Quasi-peak readings are distinguished with a "**Qp**".

3.5 Summary of Test Results

According to the data in section 3.6, the EUT complied with the FCC Conducted margin for a Class B device and these test results is deemed satisfactory evidence of compliance with RSS-210 of the Canadian Interference-Causing Equipment Regulations, with the *worst* margin reading of:

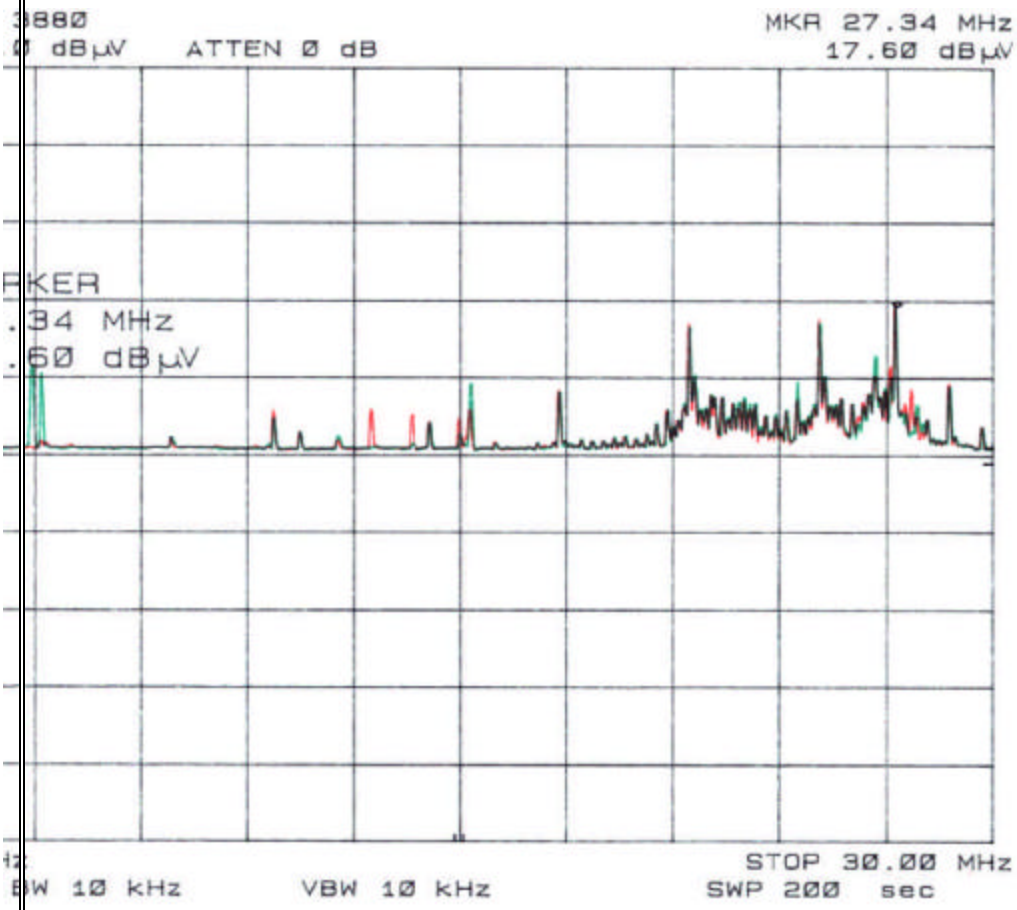
-28.5 dBµV at 0.80 MHz in the Neutral mode.

3.6 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
0.80	19.5	Peak	Neutral	48	-28.5
0.80	18.0	Peak	Line	48	-30.0
27.34	17.6	Peak	Line	48	-30.4
27.34	17.3	Peak	Neutral	48	-30.7
1.22	16.6	Peak	Line	48	-31.4
1.22	16.4	Peak	Neutral	48	-31.6

3.7 Plot of Conducted Emissions Test Data

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



4 - RADIATED EMISSION

4.1 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.

4.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4-2000. The specification used was the FCC 15 Subpart C limits.

The base unit was set up on a table with another telephone set and simulator. The handset was setup in a separate location on a table by itself. It was powered by it's own battery pack.

The spacing between the peripherals was 10 centimeters.

4.3 Spectrum Analyzer Setup

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

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

Start Frequency	30MHz
Stop Frequency	25GHz
Sweep Speed	Auto
IF Bandwidth	1 MHz
Video Bandwidth	1 MHz
Quasi-Peak Adapter Bandwidth	120 kHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	1MHz

4.4 Test Procedure

For the radiated emissions test, both the EUT and all support equipment power cords were connected to the AC floor outlet since the power supply used in the EUT did not provide an accessory power outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is 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 limit), and are distinguished with a "**Qp**" in the data table.

4.5 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 -7dBµV means the emission is 7dBµV below the maximum limit for applicable limits. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Applicable Limit

4.6 Summary of Test Results

According to the data in section 4.7, 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, 30MHz to 25GHz, 3 Meters

-0.9 dBµV (Fund./Ave.) at 2472.21 MHz in the Vertical polarization at Low Channel
-0.7 dBµV (Fund./Ave.) at 2474.55 MHz in the Horizontal polarization at Middle Channel
-1.1 dBµV (Fund.) at 2476.94 MHz in the Horizontal polarization at High Channel
-8.7 dBµV at 32.55 MHz in the Vertical polarization at Unwanted Emission

Base, 30MHz to 25GHz, 3 Meters

-0.7 dBµV (Fund./Ave.) at 2400.59 MHz in the Vertical polarization at Low Channel
-5.0 dBµV (Fund./Ave.) at 2402.89 MHz in the Vertical polarization at Middle Channel
-4.8 dBµV (Fund./Ave.) at 2405.31 MHz in the Horizontal polarization at High Channel
-7.3 dBµV at 32.22 MHz in the Vertical polarization at Unwanted Emission

4.7 Radiated Emissions Test Result Data

Handset Unit, 30 MHz to 25GHz, 3 meters

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBµV/m	Degree	Meter	H/V	dBµV/m	dBµV/m	dB	dBµV/m	dBµV/m	dB	
Low Channel											
2472.21	91.6	180	1.6	V	28.1	3.4	30.0	93.1	94	-0.9	FUND / Ave.
2472.21	91.1	270	1.5	H	28.1	3.4	30.0	92.6	94	-1.4	FUND / Ave.
7416.72	31.7	180	1.6	V	35.1	5.6	30.0	42.4	54	-11.6	AVG
7416.72	30.5	270	1.5	H	35.1	5.6	30.0	41.2	54	-12.8	AVG
4944.48	33.4	180	1.6	V	32.5	4.9	30.0	40.8	54	-13.2	AVG
4944.48	30.7	270	1.5	H	32.5	4.9	30.0	38.1	54	-15.9	AVG
2472.21	92.8	180	1.6	V	28.1	3.4	30.0	94.3	114	-19.7	FUND / Peak.
2472.21	92.3	270	1.5	H	28.1	3.4	30.0	93.8	114	-20.2	FUND / Peak.
7416.72	35.8	180	1.6	V	35.1	5.6	30.0	46.5	74	-27.5	pk
7416.72	34.9	270	1.5	H	35.1	5.6	30.0	45.6	74	-28.4	pk
4944.48	37.6	180	1.6	V	32.5	4.9	30.0	45.0	74	-29.0	pk
4944.48	35.2	270	1.5	H	32.5	4.9	30.0	42.6	74	-31.4	pk
Middle Channel											
2474.55	91.8	135	1.6	H	28.1	3.4	30.0	93.3	94	-0.7	FUND / Ave.
2474.55	91.1	45	1.5	V	28.1	3.4	30.0	92.6	94	-1.4	FUND / Ave.
4949.10	38.7	45	1.5	V	32.5	4.9	30.0	46.1	54	-7.9	AVG
4949.10	35.5	45	1.8	H	32.5	4.9	30.0	42.9	54	-11.1	AVG
7423.65	31.9	45	1.5	V	35.1	5.6	30.0	42.6	54	-11.4	AVG
7423.65	30.8	135	1.6	H	35.1	5.6	30.0	41.5	54	-12.5	AVG
2474.55	92.9	135	1.6	H	28.1	3.4	30.0	94.4	114	-19.7	FUND / Peak.
2474.55	92.3	45	1.5	V	28.1	3.4	30.0	93.8	114	-20.2	FUND / Peak.
4949.10	42.1	45	1.5	V	32.5	4.9	31.0	48.5	74	-25.5	pk
4949.10	39.6	45	1.8	H	32.5	4.9	32.0	45.0	74	-29.0	pk
7423.65	35.5	45	1.5	V	35.1	5.6	33.0	43.2	74	-30.8	pk
7423.65	34.7	135	1.6	H	35.1	5.6	34.0	41.4	74	-32.6	pk
High Channel											
2476.94	91.4	180	1.8	H	28.1	3.4	30.0	92.9	94	-1.1	FUND / Ave.
2476.94	91.2	270	1.7	V	28.1	3.4	30.0	92.7	94	-1.3	FUND / Ave.
4953.92	36.7	360	1.8	H	32.5	4.9	30.0	44.1	54	-9.9	AVG
7430.88	32.3	180	1.8	H	35.1	5.6	30.0	43.0	54	-11.0	AVG
4953.92	34.2	270	1.7	V	32.5	4.9	30.0	41.6	54	-12.4	AVG
7430.88	30.7	270	1.8	V	35.1	5.6	30.0	41.4	54	-12.6	AVG
2476.94	92.6	180	1.8	H	28.1	3.4	30.0	94.1	114	-19.9	FUND / Peak.
2476.94	92.3	270	1.7	V	28.1	3.4	30.0	93.8	114	-20.3	FUND / Peak.
4953.92	40.1	360	1.8	H	32.5	4.9	31.0	46.5	74	-27.5	pk
7430.88	37.5	180	1.8	H	35.1	5.6	32.0	46.2	74	-27.8	pk
4953.92	39.3	270	1.7	V	32.5	4.9	33.0	43.7	74	-30.3	pk
7430.88	34.6	270	1.8	V	35.1	5.6	34.0	41.3	74	-32.7	pk

Unwanted Emission											
32.55	40.7	160	1.8	V	15.3	0.3	25.0	31.3	40	-8.7	/
54.20	42.6	120	1.5	V	10.5	1.0	25.0	29.1	40	-10.9	/
85.82	39.2	180	1.2	V	9.7	2.2	25.0	26.1	40	-13.9	/
110.63	40.8	90	1.2	H	11.7	1.3	25.0	28.8	43.5	-14.7	/
283.54	32.4	230	1.5	H	14.6	5.8	25.0	27.8	46	-18.2	/

Base Unit, 30 MHz to 25GHz, 3 meters

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency MHz	Ampl. dBµV/m	Direction Degree	Height Meter	Polar H/V	Antenna dBµV/m	Cable Loss dBµV/m	Amp. dB	Corr. Ampl. dBµV/m	Limit dBµV/m	Margin dB	Mode
Low Channel											
2400.59	91.8	45	1.5	V	28.1	3.4	30.0	93.3	94	-0.7	FUND / Ave.
2400.59	83.3	225	1.2	H	28.1	3.4	30.0	84.8	94	-9.2	FUND / Ave.
4801.18	36.9	225	1.0	V	32.5	4.9	30.0	44.3	54	-9.7	AVG
7201.77	31.8	180	1.5	H	35.1	5.6	30.0	42.5	54	-11.5	AVG
7201.77	30.4	225	1.0	V	35.1	5.6	30.0	41.1	54	-12.9	AVG
4801.18	33.5	180	1.5	H	32.5	4.9	30.0	40.9	54	-13.1	AVG
2400.59	92.9	225	1.0	V	28.1	3.4	30.0	94.4	114	-19.6	FUND / Peak.
4801.18	41.2	225	1.0	V	32.5	4.9	30.0	48.6	74	-25.4	pk
7201.77	35.9	180	1.5	H	35.1	5.6	30.0	46.6	74	-27.4	pk
2400.59	84.5	225	1.2	H	28.1	3.4	30.0	86.0	114	-28.0	FUND / Peak.
7201.77	34.5	225	1.0	V	35.1	5.6	30.0	45.2	74	-28.8	pk
4801.18	37.6	180	1.5	H	32.5	4.9	30.0	45.0	74	-29.0	pk
Middle Channel											
2402.89	87.5	45	1.5	V	28.1	3.4	30.0	89.0	94	-5.0	FUND / Ave.
2402.89	82.3	270	1.2	H	28.1	3.4	30.0	83.8	94	-10.2	FUND / Ave.
4805.78	35.9	45	1.0	V	32.5	4.9	30.0	43.3	54	-10.7	AVG
7208.67	30.6	45	1.0	V	35.1	5.6	30.0	41.3	54	-12.7	AVG
4805.78	33.7	270	1.2	H	32.5	4.9	30.0	41.1	54	-12.9	AVG
7208.67	30.1	270	1.2	H	35.1	5.6	30.0	40.8	54	-13.2	AVG
2402.89	88.4	45	1.5	V	28.1	3.4	30.0	89.9	114	-24.1	FUND / Peak.
4805.78	39.8	45	1.0	V	32.5	4.9	30.0	47.2	74	-26.8	pk
7208.67	34.7	45	1.0	V	35.1	5.6	30.0	45.4	74	-28.6	pk
4805.78	37.9	270	1.2	H	32.5	4.9	30.0	45.3	74	-28.7	pk
7208.67	34.5	270	1.2	H	35.1	5.6	30.0	45.2	74	-28.8	pk
2402.89	83.6	270	1.2	H	28.1	3.4	30.0	85.1	114	-28.9	FUND / Peak.
High Channel											
2405.31	87.7	135	1.1	H	28.1	3.4	30.0	89.2	94	-4.8	FUND / Ave.
2405.31	81.9	270	1.2	V	28.1	3.4	30.0	83.4	94	-10.6	FUND / Ave.
4810.60	35.5	135	1.1	H	32.5	4.9	30.0	42.9	54	-11.1	AVG
7215.90	31.6	45	1.0	V	35.1	5.6	30.0	42.3	54	-11.7	AVG
4810.60	33.8	45	1.0	V	32.5	4.9	30.0	41.2	54	-12.8	AVG
7215.90	30.4	135	1.1	H	35.1	5.6	30.0	41.1	54	-12.9	AVG
2405.31	88.6	135	1.1	H	28.1	3.4	30.0	90.1	114	-24.0	FUND / Peak.
4810.60	39.2	135	1.1	H	32.5	4.9	30.0	46.6	74	-27.4	Pk
7215.90	35.8	45	1.0	V	35.1	5.6	30.0	46.5	74	-27.5	Pk
7215.90	34.6	135	1.1	H	35.1	5.6	30.0	45.3	74	-28.7	Pk
2405.31	83.1	270	1.2	V	28.1	3.4	30.0	84.6	114	-29.4	FUND / Peak.
4810.60	35.1	45	1.0	V	32.5	4.9	30.0	42.5	74	-31.5	Pk

Unwanted Emission											
32.22	42.1	180	2.0	V	15.3	0.3	25.0	32.7	40	-7.3	/
53.70	42.5	135	1.2	V	10.5	1.0	25.0	29.0	40	-11.0	/
85.82	39.1	180	1.0	V	9.7	2.2	25.0	26.0	40	-14.0	/
663.25	32.2	45	1.8	H	20.8	3.6	25.0	31.6	46	-14.4	/
112.78	40.6	180	1.2	V	11.7	1.3	25.0	28.6	43.5	-14.9	/
299.52	32.5	90	1.0	H	14.9	5.1	25.0	27.5	46	-18.5	/
486.26	27.9	0	1.0	H	18.7	2.5	25.0	24.1	46	-21.9	/
149.80	30.3	225	1.0	V	13.4	1.6	25.0	20.3	43.5	-23.2	/

Fund. : Fundamental
Avg.: Average
Pk: Peak

Note: The EUT was tested in 3 orthogonal planes.

5 - BAND EDGES TESTING

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.

5.1 Test Procedure

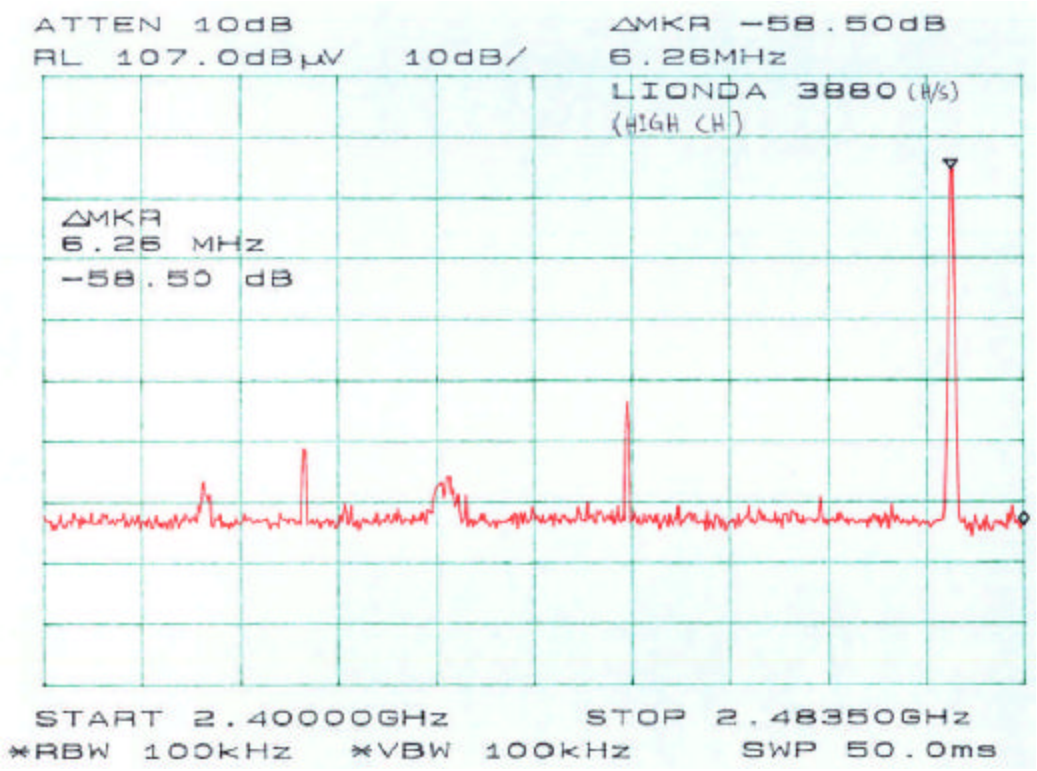
With the EUT's antenna attached, the EUT's radiated emission power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

5.2 Test Equipment

HP 8566B Spectrum Analyzer
HP 7470A Plotter

5.3 Test Results

Handset – High Channel



Base – Low Channel