

FCC PART 15.249
EMI MEASUREMENT AND TEST REPORT
For
CCT R&D LIMITED

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Fo Tan, Shatin, N.T. Hong Kong

FCC ID: NC8CT4250

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: 2.4GHz/900 MHz Dual Band Cordless Phone – Base
Test Engineer: Snell Leong/ 	
Report No.: R0507113(B)	
Report Date: 2005-07-29	
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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The CCT R&D LIMITED's product, FCC ID: NC8CT4250H, or the "EUT" as referred to in this report is a 2.4GHz/900 MHz Dual Band Cordless Phone, base portion. The base operates at frequency 924.00-926.00MHz and measures approximately 175mmL x 155mmW x 125mmH.

** The test data gathered are from production sample, serial number: CT4250001, 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 - 2003.

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

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 - 2003, 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.

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 C63.4-2003.

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, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2003.

Schematics and Block Diagram

Please refer to Appendix A.

Equipment Modifications

No modifications were made to the EUT.

Power Supply

Manufacturer	Description	Model	Serial Number	FCC ID
Market Direct	AC Adaptor	DU28090020C	None	None (BS)

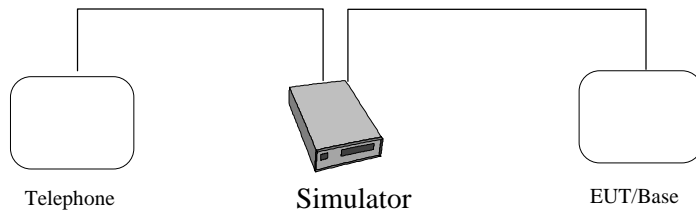
Local Support Equipment

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

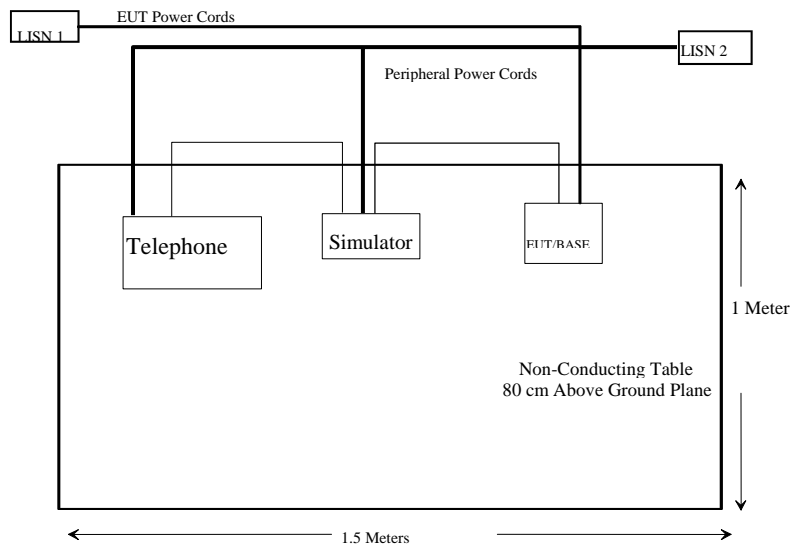
Interface Ports and Cabling

Cable Description	Length (M)	From	To
None-Shielded RJ-11 Cable	1.5	RJ-11 Port/EUT	Simulator RJ11Port
None-Shielded RJ-11 Cable	1.5	Support telephone	Simulator RJ11Port

Configuration of Test System



Test Setup Block Diagram



SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.205	Restricted Band	Compliant
§15.207(a)	Conducted Emission	Compliant
§15.209 (a), §15.249 (a)	Radiated Emission	Compliant*
15.249 (d)	Band Edge Testing	Compliant

*: Test data is within the measurement uncertainty of $\pm 4.0\text{dB}$ at unintentional emission.

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Connected Construction

The antenna connector is designed with permanent attachment and no consideration of replacement.

Antenna gain is 0 dBi, single port wire antenna.

§ 15.207 (a) - CONDUCTED EMISSIONS TEST DATA

Measurement Uncertainty

All measurements involve certain levels of uncertainties. These uncertainties are attributed to: Receiver, 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 ± 2.4 dB.

EUT Setup

The measurement was performed in the shielded room, using the same setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC 15 Subpart C limits.

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

The EUT was connected to an adapter, which connected to 120Vac/60Hz power source.

Receiver Setup

The receiver was set to investigate the frequency 150 kHz to 30MHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Receiver, EMI Test	ESCS30	100176	9/15/2004
Rohde & Schwarz	LISN, Artificial Mains	ESH2-Z5	871884/039	8/16/2004

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Procedure

During the conducted emission test, the adapter of EUT was connected to the main outlet of the LISN-1.

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. Quasi-Peak readings are distinguished with an "QP". Average readings are distinguished with an "Ave".

Environmental Conditions

Temperature:	26°C
Relative Humidity:	78%
ATM Pressure:	1023mbar

*Testing was performed by Snell Leong on 2005-07-26.

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:

-23.2 dB at 17.050 MHz in the Line mode

Conducted Emissions Test Data

Frequency MHz	LINE CONDUCTED EMISSIONS			FCC CLASS B	
	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
17.050	26.8	Ave	Line	50.00	-23.2
0.810	22.7	Ave	Neutral	46.00	-23.3
17.050	34.1	QP	Line	60.00	-25.9
0.810	19.6	Ave	Line	46.00	-26.4
21.530	21.5	Ave	Neutral	50.00	-28.5
17.050	19.4	Ave	Neutral	50.00	-30.6
0.810	25.2	QP	Neutral	56.00	-30.8
25.000	27.6	QP	Line	60.00	-32.4
17.050	27.1	QP	Neutral	60.00	-32.9
0.810	22.1	QP	Line	56.00	-33.9
25.000	16.1	Ave	Line	50.00	-33.9
21.530	21.3	QP	Neutral	60.00	-38.7

Plot of Conducted Emissions Test Data

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

Bay Area Compliance Laboratory Corp#
Class B

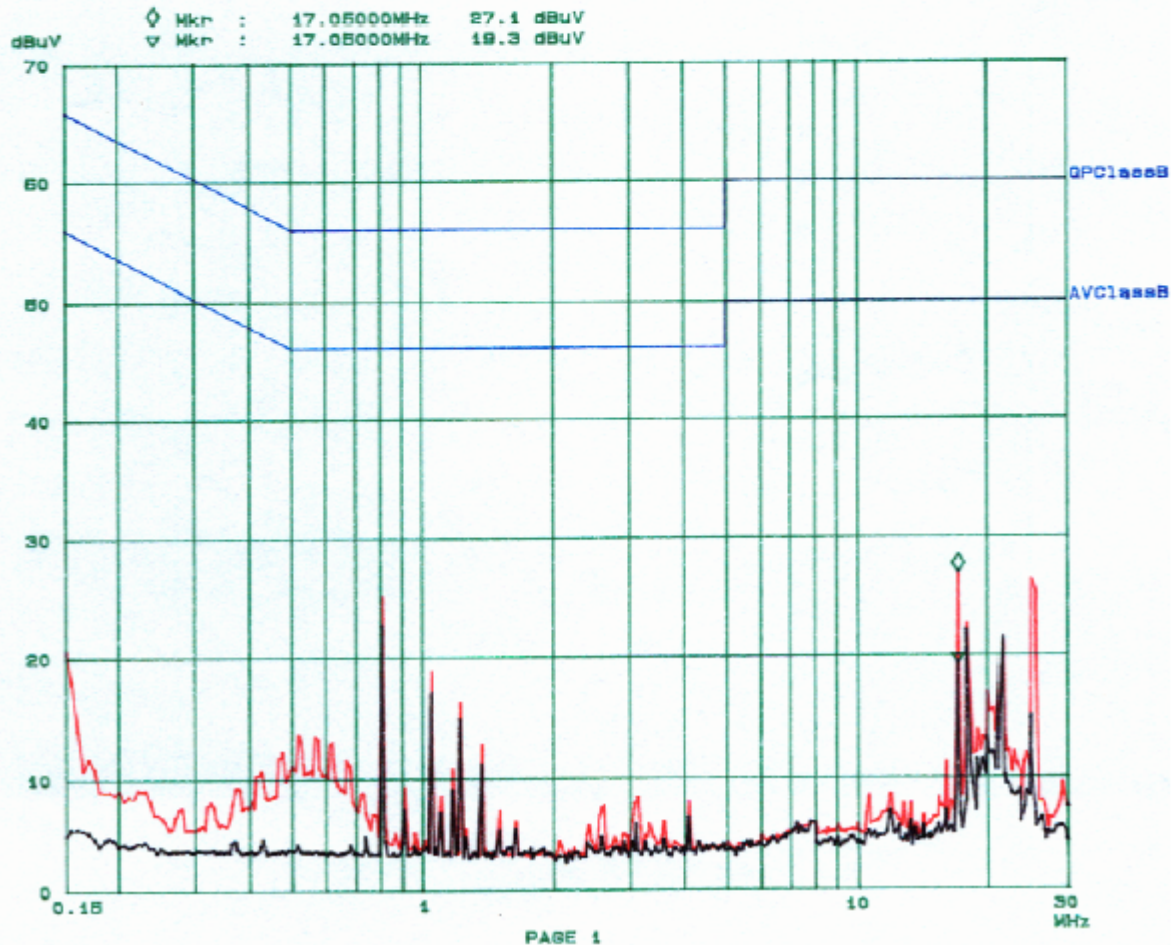
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Snell

EUT: 800/2400 MHz cordless phone
Manuf: CCT
Op Cond: Normal
Operator: SNELL
Comment: N
120 VAC

Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preampl	
150k	1M	5k	9k	QP+AV	20ms	15dB LN	OFF	
1M	5M	10k	9k	QP+AV	1ms	15dB LN	OFF	
5M	30M	50k	9k	QP+AV	1ms	15dB LN	OFF	



Bay Area Compliance Laboratory Corp#
Class B

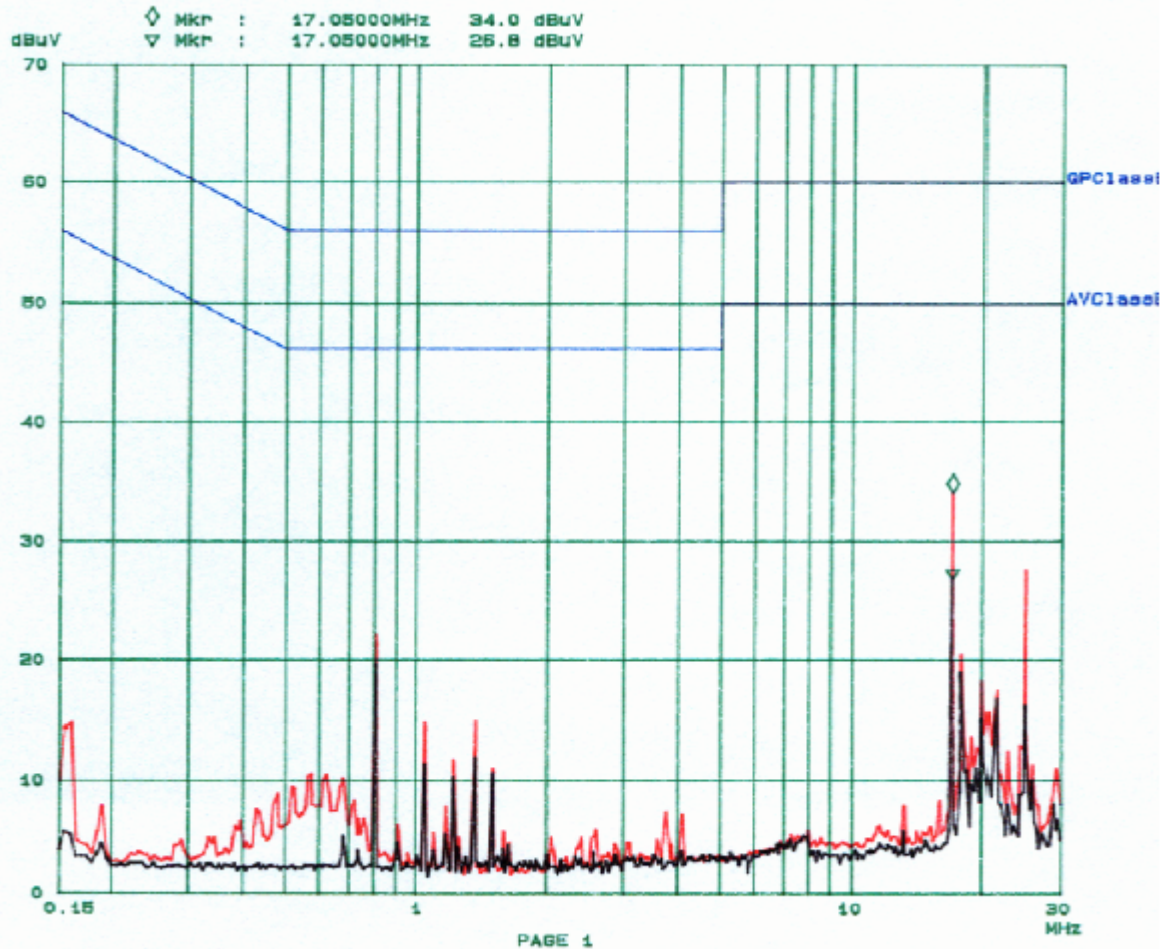
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26 July 05
Snell

EUT: 900/2400 MHz cordless phone
Manuf: CCT
Op Cond: Normal
Operator: SNELL
Comment: L
120 VAC

Scan Settings (3 Ranges)

Frequencies			Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten Presamp
150k	1M	5k	9k	QP+AV	20ms	15dB LN OFF
1M	5M	10k	9k	QP+AV	1ms	15dB LN OFF
5M	30M	50k	9k	QP+AV	1ms	15dB LN OFF



§15.205, §15.209 (a), §15.249 (a) - RADIATED EMISSION DATA

Applicable Standard

According to §15.249 (a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of (millivolts/ meter)	Field strength of fundamental harmonics (microvolts/ meter)
902-928 MHz.....	50	500
2400-2483.5 MHz.....	50	500
5725-5875 MHz.....	50	500
24.0-24.25 GHz.....	250	2500

According to §15.249 (d), emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

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 C63.4-2003. 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 when necessary.

The EUT was connected to the power adapter, which is connected with 120Vac/60Hz power source

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR 15.33 (a) (1), the system was tested to 10GHz.

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

<u>Frequency Range</u>	<u>RBW</u>	<u>Video B/W</u>
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, Pre (.1 ~ 1300MHz)	8447D	2944A10198	8/20/2004
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004
HP	Pre, Amplifier (1 ~ 26.5 GHz)	8449B	3147A00400	05/10/2005
Sunol Science	30Mhz ~ 2 GHz Antenna	JB1	A03105-3	02/11/2005
Sunol Sciences	Antenna, Horn, Std	DRH-118	A052704	6/2/2004

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Environmental Conditions

Temperature:	26°C
Relative Humidity:	78%
ATM Pressure:	1023mbar

*Testing was performed by Snell Leong on 2005-07-26.

Test Procedure

For the radiated emissions test, the power cord of the EUT was 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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Applicable Limit}$$

Summary of Test Results

According to the recorded data in following table, the EUT measured test data within the measurement uncertainty of ± 4.0 , and had the worst margin of:

- 11.5 dB at 924.00 MHz in the Horizontal polarization at Low Channel
- 11.2 dB at 925.00 MHz in the Horizontal polarization at Mid Channel
- 11.7 dB at 926 MHz in the Vertical polarization at High Channel
- 1.6 dB at 890.33 MHz in the Horizontal polarization at Unintentional Emission*

*: Test data is within the measurement uncertainty of ± 4.0 dB at unintentional emission.

Radiated Emissions Test Result Data - Base, 3Meter

Low Channel

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction Factor	FCC	FCC	Comments
MHz	dBuV/m	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB	
924.0000	80.8	240	3.1	H	22.1	6.9	27.3	82.5	94	-11.5	Peak
924.0000	79.8	330	3.0	V	22.1	6.9	27.3	81.5	94	-12.5	Peak
2772.0000	31.3	180	2.0	v	28.9	2.4	35.5	27.1	54	-26.9	Ave
2772.0000	30.8	90	2.0	h	28.9	2.4	35.5	26.6	54	-27.4	Ave
1848.0000	33.6	270	2.4	v	24.8	1.9	36.3	23.9	54	-30.1	Ave
1848.0000	31.8	180	2.3	h	24.8	1.9	36.3	22.1	54	-31.9	Ave
2772.0000	44.1	90	2.0	v	28.9	2.4	35.5	39.9	74	-34.1	Peak
2772.0000	41.5	180	2.0	h	28.9	2.4	35.5	37.3	74	-36.7	Peak
1848.0000	46.1	270	2.4	v	24.8	1.9	36.3	36.4	74	-37.6	Peak
1848.0000	44.5	180	2.3	h	24.8	1.9	36.3	34.8	74	-39.2	Peak

Mid Channel

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction Factor	FCC	FCC	Comments
MHz	dBuV/m	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB	
925.0000	81.1	240	3.1	H	22.1	6.9	27.3	82.8	94	-11.2	Peak
925.0000	79.8	330	3.0	V	22.1	6.9	27.3	81.5	94	-12.5	Peak
2775.0000	32.3	270	2.4	v	28.9	2.4	35.5	28.1	54	-25.9	Ave
2775.0000	31.8	180	2.1	h	28.9	2.4	35.5	27.6	54	-26.4	Ave
1850.0000	34.5	270	2.4	v	24.8	1.9	36.3	24.8	54	-29.2	Ave
1850.0000	32.1	180	2.2	h	24.8	1.9	36.3	22.4	54	-31.6	Ave
2775.0000	44.7	180	2.3	h	28.9	2.4	35.5	40.5	74	-33.5	Peak
2775.0000	44.4	270	2.4	v	28.9	2.4	35.5	40.2	74	-33.8	Peak
1850.0000	49.2	270	2.4	v	24.8	1.9	36.3	39.5	74	-34.5	Peak
1850.0000	44.7	180	2.2	h	24.8	1.9	36.3	35.0	74	-39.0	Peak

High Channel

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction Factor	FCC	FCC	Comments
MHz	dBuV/m	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB	
926.0000	80.6	240	3.1	H	22.1	6.9	27.3	82.3	94	-11.7	Peak
926.0000	79.9	330	3.0	V	22.1	6.9	27.3	81.6	94	-12.4	Peak
2778.0000	31.9	90	2.1	h	28.9	2.4	35.5	27.7	54	-26.3	Ave
2778.0000	31.8	270	2.4	v	28.9	2.4	35.5	27.6	54	-26.4	Ave
1852.0000	35.4	270	2.4	v	24.8	1.9	36.3	25.7	54	-28.3	Ave
1852.0000	35.1	90	2.1	h	24.8	1.9	36.3	25.4	54	-28.6	Ave
1852.0000	50.7	270	2.4	v	24.8	1.9	36.3	41.0	74	-33.0	Peak
2778.0000	44.3	90	2.1	h	28.9	2.4	35.5	40.1	74	-33.9	Peak
2778.0000	44.2	270	2.4	v	28.9	2.4	35.5	40.0	74	-34.0	Peak
1852.0000	49.1	90	2.1	h	24.8	1.9	36.3	39.4	74	-34.6	Peak

Unintentional Emission

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction Factor	FCC	FCC
MHz	dBuV/m	Degree	Meter	H/V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB
890.33	42.7	280	2.8	H	22.3	7.0	27.6	44.4	46	-1.6
890.33	40.2	250	1.0	V	22.3	7.0	27.6	41.9	46	-4.1
187.68	41.5	330	1.2	V	11.5	2.8	27.8	28.0	43.5	-15.5
187.68	40.2	270	2.1	H	11.5	2.8	27.8	26.7	43.5	-16.8
162.03	36.3	75	1.8	V	12.2	2.5	28.0	23.0	43.5	-20.5
162.03	35.4	270	3.2	H	12.2	2.5	28.0	22.1	43.5	-21.4

§15.249 (d) – BAND-EDGE 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. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Environmental Conditions

Temperature:	26°C
Relative Humidity:	78%
ATM Pressure:	1023mbar

**Testing was performed by Snell Leong on 2005-07-26.*

Test Results

Refer to the attached plots.

