

FCC PART 15.249
EMI MEASUREMENT AND TEST REPORT

For

VTech Telecommunications Ltd.

23/F Tai Ping Industrial Center Block 1
57 Ting Kok Road, Tai Po NT, Hong Kong

FCC ID: EW780-5587-00

This Report Concerns: <input checked="" type="checkbox"/> Class II Permissive Change	Equipment Type: Transceiver, Cordless Telephone Base
Test Engineer: Snell Leong 	
Report No.: R0501315-Base	
Report Date: 2005-02-22	
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TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY	3
TEST FACILITY	4
SYSTEM TEST CONFIGURATION.....	5
DESCRIPTION OF TEST CONFIGURATION	5
EQUIPMENT MODIFICATIONS	5
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS	5
EXTERNAL I/O CABLING LIST AND DETAILS	5
POWER SUPPLY AND LINE FILTERS	5
CONFIGURATION OF TEST SYSTEM	6
TEST SETUP BLOCK DIAGRAM	6
SUMMARY OF TEST RESULTS	7
§ 15.249 (C) - CONDUCTED EMISSIONS TEST DATA	8
MEASUREMENT UNCERTAINTY	8
EUT SETUP.....	8
SPECTRUM ANALYZER SETUP	8
TEST EQUIPMENT LIST AND DETAILS.....	8
TEST PROCEDURE	8
ENVIRONMENTAL CONDITIONS	9
SUMMARY OF TEST RESULTS	9
CONDUCTED EMISSIONS TEST DATA	9
PLOT OF CONDUCTED EMISSIONS TEST DATA	10
§15.209(A) - RADIATED EMISSION DATA	15
MEASUREMENT UNCERTAINTY	15
EUT SETUP.....	15
SPECTRUM ANALYZER SETUP	15
TEST EQUIPMENT LIST AND DETAILS.....	15
ENVIRONMENTAL CONDITIONS	16
TEST PROCEDURE	16
CORRECTED AMPLITUDE & MARGIN CALCULATION	16
SUMMARY OF TEST RESULTS	16
RADIATED EMISSIONS TEST RESULT DATA, 3M	17

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *VTech Telecommunications Ltd.*'s product, FCC ID: EW780-5587-00, Model: 5851 & 5829 or the "EUT" as referred to in this report is the base of a cordless phone. The EUT operates at frequency 912.75-917.10 MHz. The EUT measures approximately 180mmL x 135mmW x 60mmH (model: 5851) and 150mmL x 115mmW x 55mmH (model: 5829).

** The test data gathered are from production sample, serial number: BS001 (For model: 5851) & BS002 (For model: 5829), 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 15.205, 15.207, and 15.249, 15.203, 15.209 rules.

This is the C2PC application of the device. The difference between the original device and the current one is as follows:

Original configuration	New configuration
"Package" version RF Combo IC	"Diebond" version RF Combo IC
Separate base antennas - Dipole(5.8GHz RX), L-antenna (900MHz TX)	Single Dual band Antenna
Not used	Duplexer (discrete version) for 900MHz and 5.8GHz operation
2.4GHz BPF (Murata)	2.4GHz low cost BPF (discrete version)
--	Minor PCB layout to accommodate the above changes

For the changes made to the device, conducted emission and radiated emission testing was performed.

Related Submittal(s)/Grant(s)

This is a C2PC application. The original application was granted on 2004-12-14.

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. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Open Area Test site used by BACL 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 BACL 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

Description of Test Configuration

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

The final qualification test was performed with the EUT operating at normal mode

Equipment Modifications

No modifications were made to the EUT.

Local Support Equipment List and Details

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

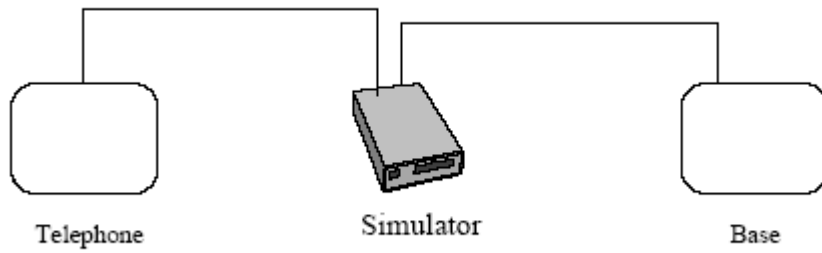
External I/O Cabling List and Details

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

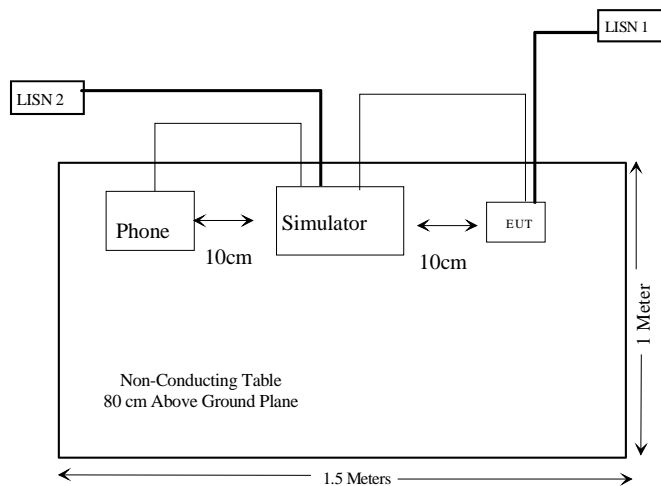
Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number	FCC ID
Component Telephone Power Supply Class 2	AC Adapter	U060030D12 (for 5829) U090050D (for 5851)	N/A	N/A

Configuration of Test System



Test Setup Block Diagram



SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Unchanged
§15.205	Restricted Bands of Operation	Unchanged
§15.207 (a)	Conducted Emission	Compliant
§15.209 (a), §15.249 (a)	Radiated Emission	Compliant
§15.249 (c)	Band Edge Testing	Unchanged

§ 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 ± 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 as required.

The EUT adapter 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	LISN	ESH2-Z5	871884/039	2004-08-16
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2004-09-15
Fluke	Calibrated Voltmeter	189	18485-38	2004-07-18

* **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 power cord of the adapter 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 quasi-peak and average detection mode. Quasi-Peak readings are distinguished with an "QP". Average readings are distinguished with an "Ave".

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	38%
ATM Pressure:	1015mbar

Testing was performed by Snell Leong on 2005-02-01.

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:

-26.0 dB at 0.150 MHz in the Neutral conductor, Model 5851

-23.0 dB at 24.000MHz in the Line conductor, Model 5829

Conducted Emissions Test Data

Model: 5851

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
0.150	40.0	QP	Neutral	66.00	-26.0
0.150	39.1	QP	LINE	66.00	-26.9
17.900	17.3	Ave	LINE	50.00	-32.7
17.900	15.5	Ave	Neutral	50.00	-34.5
17.900	25.0	QP	LINE	60.00	-35.0
13.300	24.7	QP	LINE	60.00	-35.3
17.900	22.5	QP	Neutral	60.00	-37.5
13.300	22.4	QP	Neutral	60.00	-37.6
13.300	9.2	Ave	Neutral	50.00	-40.8
13.300	4.0	Ave	LINE	50.00	-46.0
0.150	12.7	Ave	Neutral	56.00	-53.3
0.150	12.3	Ave	LINE	56.00	-53.7

Model: 5829

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
24.000	27.0	Ave	LINE	50.00	-23.0
13.300	25.0	Ave	LINE	50.00	-25.0
18.500	23.0	Ave	Neutral	50.00	-27.0
0.150	38.9	QP	Neutral	66.00	-27.1
0.150	37.4	QP	LINE	66.00	-28.6
24.700	19.4	Ave	Neutral	50.00	-30.6
13.300	26.8	QP	LINE	60.00	-33.2
24.000	26.2	QP	LINE	60.00	-33.8
18.500	23.1	QP	Neutral	60.00	-36.9
24.700	22.6	QP	Neutral	60.00	-37.4
0.150	11.8	Ave	Neutral	56.00	-44.2
0.150	11.2	Ave	LINE	56.00	-54.8

Plot of Conducted Emissions Test Data

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

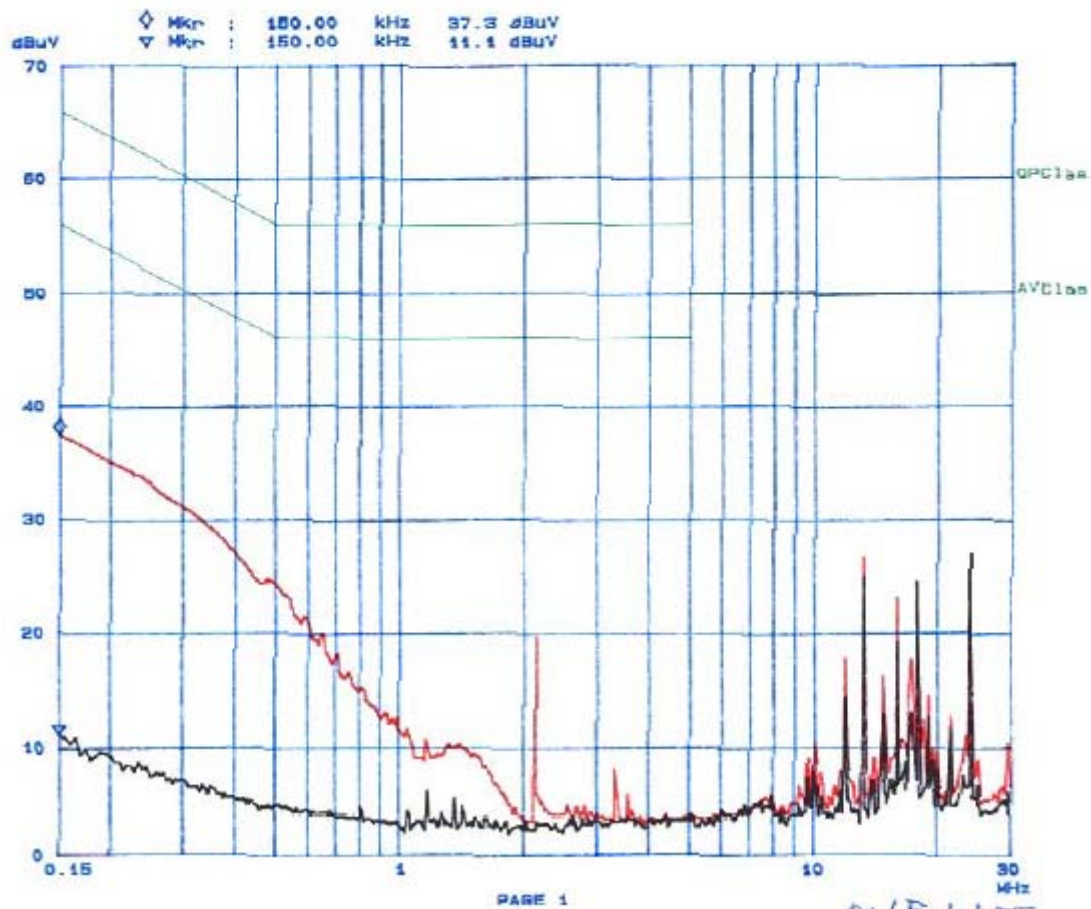
Bay Area Compliance Laboratory Corp
Class B

01. Feb 08 12:44

EUT: IA5929
Manuf: V Tech
Op Cond: Normal
Operator: Snell
Comment: .L
120V AC

Scan Settings (3 Ranges)

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

01/Feb/05
Snell

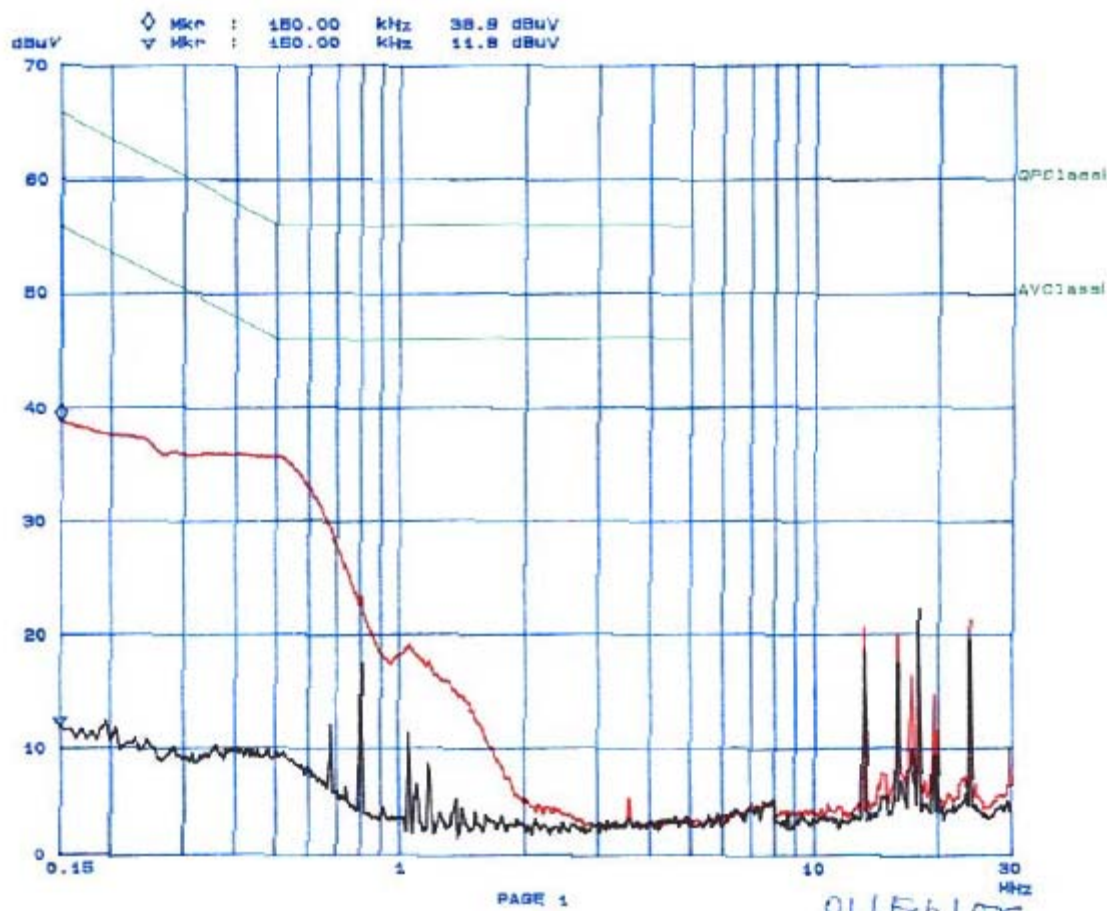
Bay Area Compliance Laboratory Corp
Class B

01. Feb 05 11:35

EUT: 1A5828
Manuf: V Tech
Op Cond: Normal
Operator: Shell
Comment: N
120V AC

Scan Settings (3 Ranges)

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



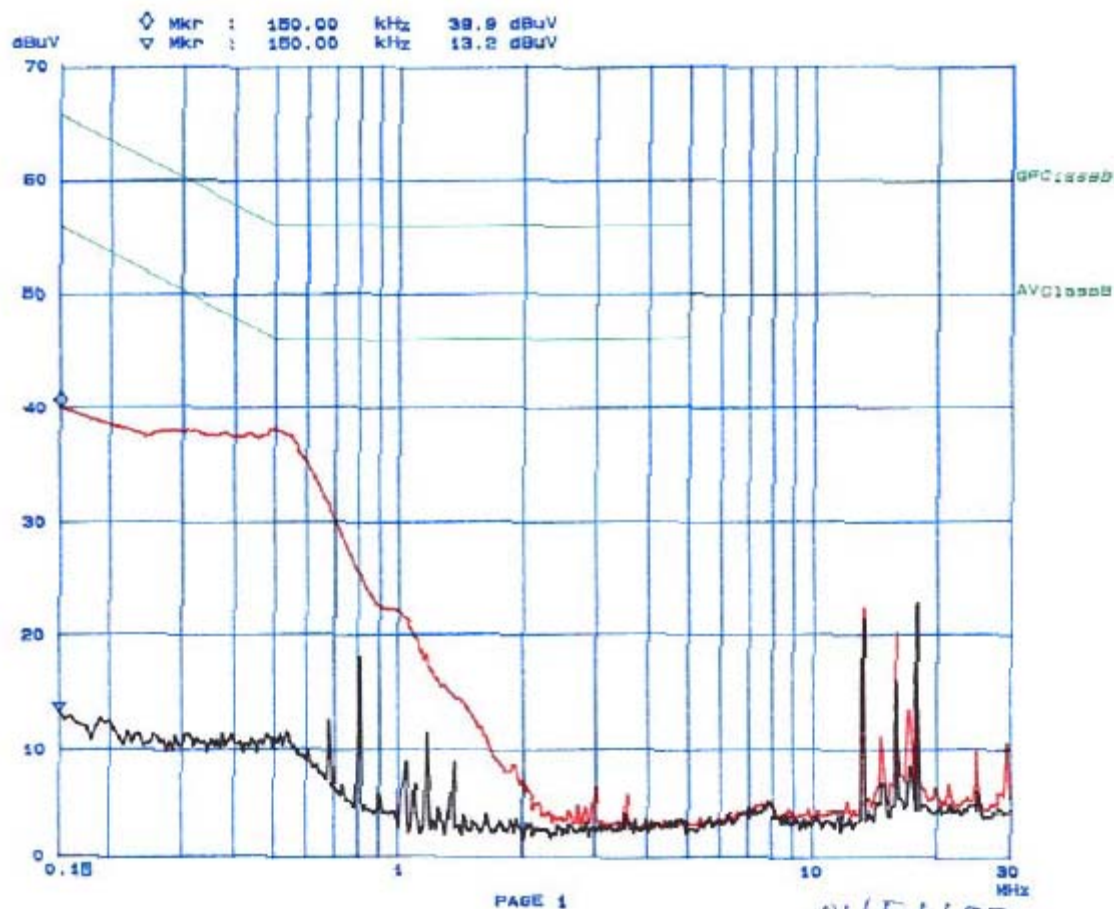
Bay Area Compliance Laboratory Corp
Class B

01. Feb 05 11:12

EUT: IA5851
Manuf: V Tech
Op Cond: Normal
Operator: Snell
Comment: N
120V AC

Scan Settings (3 Ranges)

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

01 Feb 05
Snell

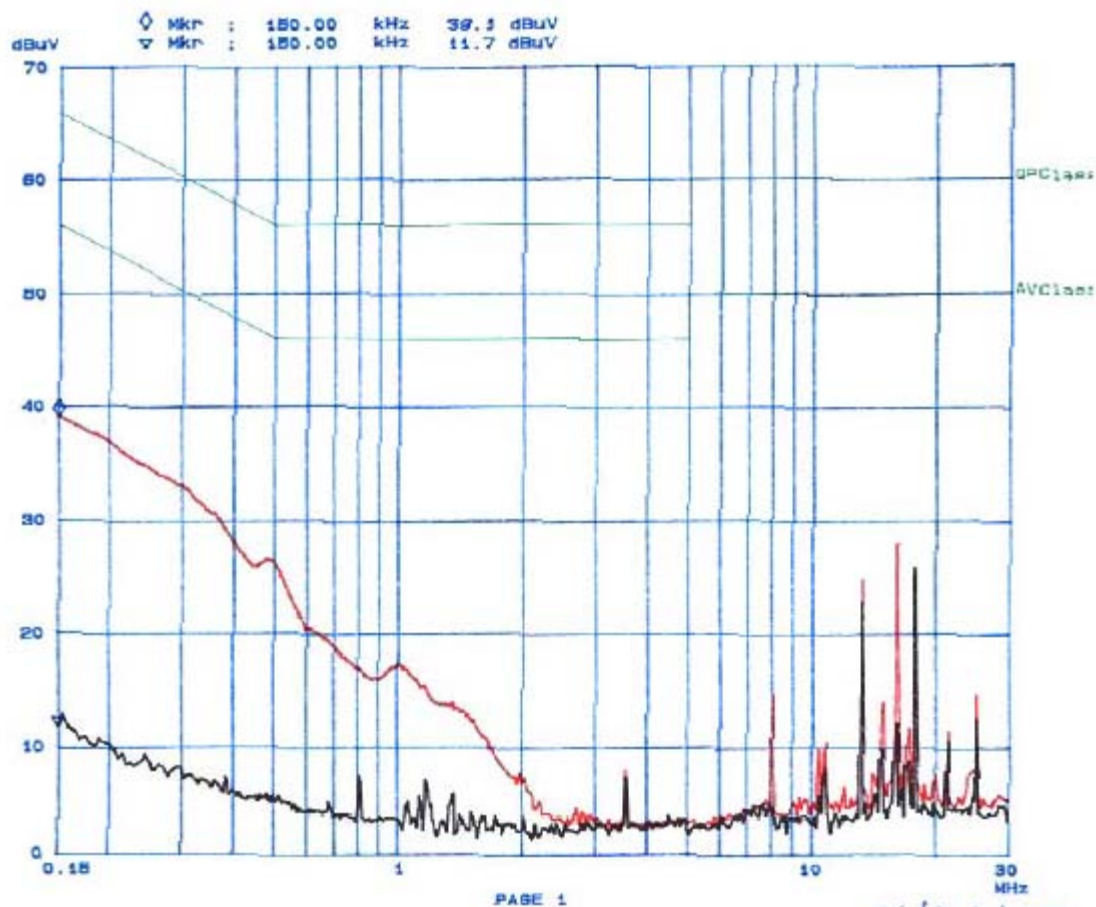
Bay Area Compliance Laboratory Corp
Class B

01. Feb 05 10:34

EUT: IAS851
Manuf: V Tech
Op Cond: Normal
Operator: Shell
Comment: L
120V AC

Scan Settings (3 Ranges)

Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	8k	QP+AV	20ms	15dB LN	OFF
1M	5M	10k	8k	QP+AV	1ms	15dB LN	OFF
5M	30M	100k	8k	QP+AV	1ms	15dB LN	OFF



§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 C63.4-2003. 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 as required.

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:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
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, microwave	8449B	3147A00400	2004-03-14
HP	Amplifier, Pre	8447E	1937A01057	2004-08-04
Agilent	Analyzer, Spectrum	E4446	US44300386	2004-11-10
ETS	Antenna, Biconical	3110B	9603-2315	2004-12-14
A.R.A.	Antenna, Horn, DRG	DRG-118/A	1132	2004-09-30
ETS	Antenna, logperiodic	3148	0004-1155	2004-10-11

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

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	38%
ATM Pressure:	1015mbar

Testing was performed by Snell Leong on 2005-02-05.

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 dBμV 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 -7dBμV means the emission is 7dBμV 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 complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207, and 15.249 after tested to 10th harmonics as required by FCC and had the worst margin of:

Model: 5851

-4.7 dB at 912.7500 MHz in the Vertical polarization at Low Channel

-5.8 dB at 1592.6700 MHz in the Horizontal polarization at High Channel

Model: 5829

-6.1 dB at 1588.000 MHz in the Horizontal polarization at Low Channel

-5.3 dB at 1592.670 MHz in the Horizontal polarization at High Emission

Radiated Emissions Test Result Data, 3M

Model: 5851

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 dB	Cable dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
900MHz – 10GHz, Low Channel											
912.7500	87.8	Fund/Peak	90	1.4	v	23.2	3.9	28.4	86.6	94	-7.4
912.7500	87.4	Fund/Peak	180	3.2	h	23.2	3.9	28.4	86.2	94	-7.8
1588.0000	53.2	Ave	340	2.6	h	25.3	1.9	36.3	44.1	54	-10.0
1825.5000	47.0	Ave	45	3.0	h	25.3	1.9	36.3	37.9	54	-16.2
1588.0000	46.5	Ave	180	1.5	v	25.3	1.9	36.3	37.4	54	-16.7
1825.5000	44.4	Ave	90	3.0	v	25.3	1.9	36.3	35.3	54	-18.8
1588.0000	60.4	Peak	340	2.6	h	25.3	1.9	36.3	51.3	74	-22.8
1588.0000	55.2	Peak	180	1.5	v	25.3	1.9	36.3	46.1	74	-28.0
1825.5000	51.4	Peak	90	3.0	v	25.3	1.9	36.3	42.3	74	-31.8
1825.5000	50.0	Peak	45	3.0	h	25.3	1.9	36.3	40.9	74	-33.2
900MHz – 10GHz, High Channel											
1592.6700	57.4	Ave	30	3.0	h	25.3	1.9	36.3	48.3	54	-5.8
917.1000	88.1	Fund/Peak	90	1.0	h	23.2	3.9	28.4	86.9	94	-7.1
917.1000	87.6	Fund/Peak	45	2.5	v	23.2	3.9	28.4	86.4	94	-7.6
1834.2000	47.1	Ave	90	1.5	h	25.3	1.9	36.3	38.0	54	-16.1
1592.6700	46.5	Ave	20	4.0	v	25.3	1.9	36.3	37.4	54	-16.7
1592.6700	63.7	Peak	30	3.0	h	25.3	1.9	36.3	54.6	74	-19.5
1834.2000	43.0	Ave	0	3.0	v	25.3	1.9	36.3	33.9	54	-20.2
1592.6700	55.6	Peak	20	4.0	v	25.3	1.9	36.3	46.5	74	-27.6
1834.2000	51.8	Peak	90	1.5	h	25.3	1.9	36.3	42.7	74	-31.4
1834.2000	49.5	Peak	0	3.0	v	25.3	1.9	36.3	40.4	74	-33.7

Model: 5829

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 dB	Cable dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
900MHz – 10GHz, Low Channel											
1588.0000	57.0	Ave	340	2.6	h	25.3	1.9	36.3	47.9	54	-6.1
912.7500	86.5	Fund/Peak	180	3.2	h	23.2	3.9	28.4	85.3	94	-8.7
912.7500	86.0	Fund/Peak	90	1.4	v	23.2	3.9	28.4	84.8	94	-9.2
1825.5000	52.6	Ave	45	3.0	h	25.3	1.9	36.3	43.5	54	-10.5
1588.0000	48.8	Ave	180	1.5	v	25.3	1.9	36.3	39.7	54	-14.3
1588.0000	63.0	Peak	340	2.6	h	25.3	1.9	36.3	53.9	74	-20.2
1825.5000	39.5	Ave	90	3.0	v	25.3	1.9	36.3	30.4	54	-23.7
1588.0000	55.0	Peak	180	1.5	v	25.3	1.9	36.3	45.9	74	-28.1
1825.5000	54.2	Peak	45	3.0	h	25.3	1.9	36.3	45.1	74	-28.9
1825.5000	47.5	Peak	90	3.0	v	25.3	1.9	36.3	38.4	74	-35.6
900MHz – 10GHz, High Channel											
1592.6700	57.8	Ave	30	3.0	h	25.3	1.9	36.3	48.7	54	-5.3
1834.2000	54.3	Ave	90	1.5	h	25.3	1.9	36.3	45.2	54	-8.8
917.1000	85.7	Fund/Peak	45	2.5	v	23.2	3.9	28.4	84.5	94	-9.5
917.1000	85.3	Fund/Peak	90	1.0	h	23.2	3.9	28.4	84.1	94	-9.9
1834.2000	48.6	Ave	0	3.0	v	25.3	1.9	36.3	39.4	54	-14.6
1592.6700	65.1	Peak	30	3.0	h	25.3	1.9	36.3	56.0	74	-18.1
1592.6700	45.0	Ave	20	4.0	v	25.3	1.9	36.3	35.8	54	-18.2
1834.2000	56.5	Peak	90	1.5	h	25.3	1.9	36.3	47.4	74	-26.7
1834.2000	52.2	Peak	0	3.0	v	25.3	1.9	36.3	43.1	74	-30.9
1592.6700	52.0	Peak	20	4.0	v	25.3	1.9	36.3	42.8	74	-31.2