FCC PART 15.225
EMI MEASUREMENT AND TEST REPORT

For

VeriFone Inc

3755 Atherton Road
Rocklin, CA 95765-3701

FCC ID: B32MX870RFID

This Report Concerns:	Equipment Type:
☒ Original Report	Credit Card Verification System

Test Engineer:	Jerry Wang
Report No.:	R0506092
Report Date:	2005-06-20
Reviewed By:	Richard Lee
Prepared By:	Bay Area Compliance Laboratory Corporation (BACL) 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 *VeriFone Inc.* product, FCC ID: *B32MX870RFID* or the "EUT" as referred to in this report is a Credit Card Verification System. The EUT measures approximately 23.0cm (L) x 21.0cm (W) x 6.5cm (H).

** The test data gathered is from production samples, serial number: PROTO 517000003, provided by the manufacturer.*

Objective

This Type approval report is prepared on behalf of *VeriFone Inc.* in accordance with Part 2, Subpart J, and Part 15 Subpart C of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC rules, Part 15, sec 15.35, sec 15.203, sec 15.205, sec 15.207, sec 15.209 and sec 15.225.

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 test methods and procedures 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.

EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components.

Special Accessories

As shown in the following test setup block diagram, all interface cables used for compliance testing are un-shielded.

Schematics and Block Diagram

Please refer to Appendix D.

Equipment Modifications

No modifications were made to the EUT

Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number	FCC ID
VeriFone	AC/DC Adapter	481210RO3CT	04250-01	None

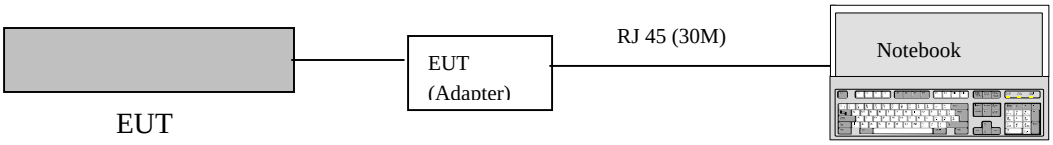
Remote Support Equipment

Manufacturer	Description	Model	Serial Number
Dell	Notebook	PP05L	CN-0G5152-48643-48F-0708

Printed Circuit Boards in EUT

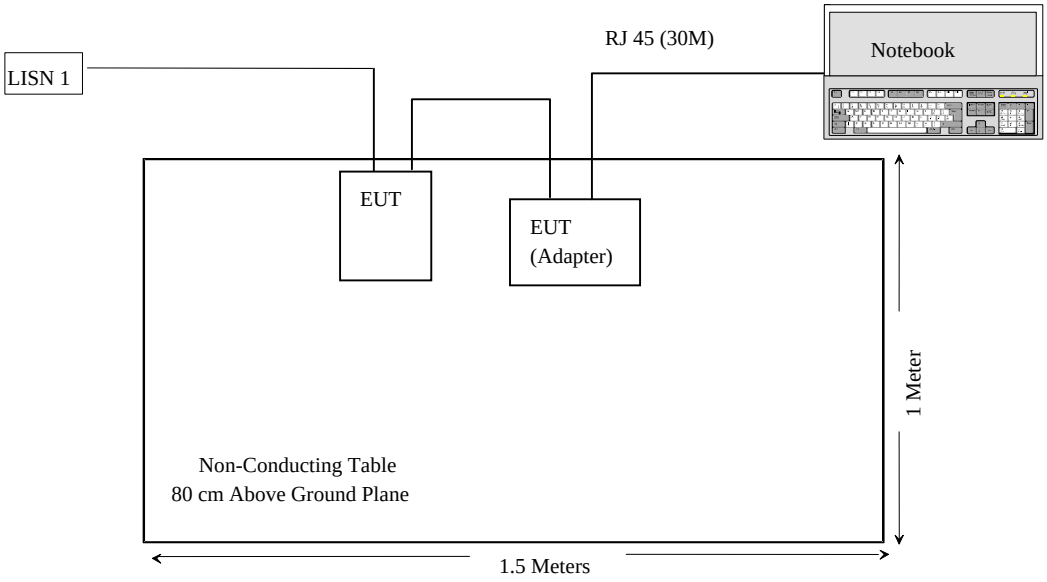
Manufacturer/Description	Rev.	# of Layers	Crystals (MHz)
Vivotech	B	4	13.56

Test Setup Configuration

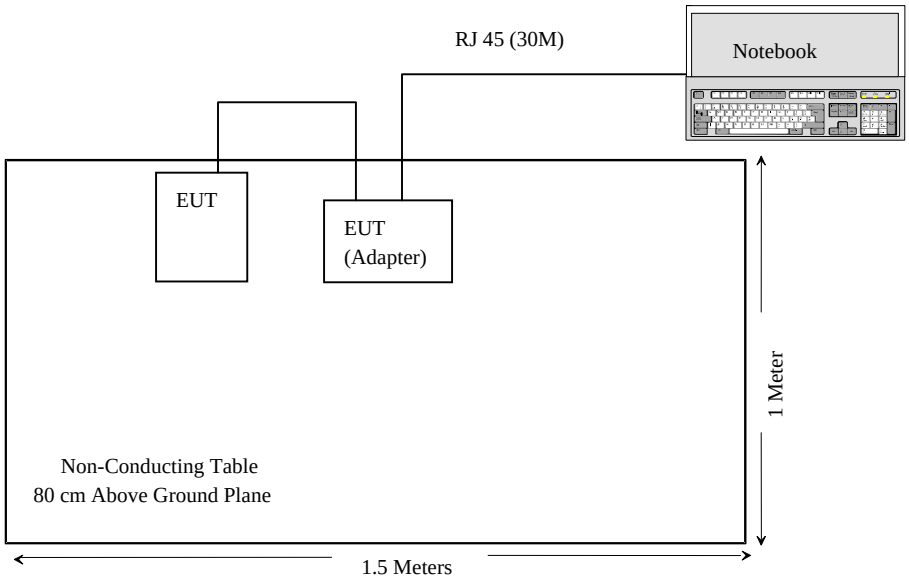


Test Setup Block Diagram

Conducted Emission



Radiated Emission



SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§ 15.35 § 15.205 § 15.209 § 15.225	Radiated Emission	Within the Measurement of Uncertainty *
§ 15.207	Conducted Emission	Compliant
§15.225(e)	Frequency Stability	Compliant

* The EUT measured –1.5(QP) dB and –2.12(QP) dB for unintentional within the measurement uncertainty of ±4.0 dB.

§ 15.35, § 15.205, § 15.209, § 15.225 - RADIATED EMISSION TEST

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 accordance with the ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

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

The EUT was placed on the center of the back edge on the test table, connected to 120Vac/60Hz power source.

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR 15.33, the EUT was tested to 1 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
Agilent	Amplifier, Pre	8447D	2944A10187	2004-08-25
ETS	Antenna, Loop, H-Field, Passive	6512	34167	2005-05-09
Sunol Sciences	Antenna	JB1	A013105-3	2005-02-11
Sunol Sciences	System Controller	SC99V	122303-1	N/R
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2004-09-29

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

Test Procedure

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

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

The EUT was operating at normal to represent worst case during final qualification test. Therefore, this configuration was used for final test data recorded in the following table of this report.

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 Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Limit

Summary of Test Results

According to the data in section 10.7, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.225. The EUT measured –1.5(QP) dB and –2.12(QP) dB for unintentional within the measurement uncertainty of ±4.0 dB, and had the worst margin reading of:

-1.5(QP) dB at **212.52 MHz** in the **Horizontal** polarization

-2.12(QP) dB at **340.04 MHz** in the **Horizontal** polarization for Unintentional Emission

Environmental Conditions

Temperature:	22.4° C
Relative Humidity:	49%
ATM Pressure:	1021 mbar

Testing was performed by Jerry Wang on 2005-06-10.

Radiated Emissions Test Result Data @ 3M

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR				FCC 15.225	
Freq	Reading	Angle	Height	Polar	Antenna	Cable	Amp.	Correction Factor	Limit	Margin
MHz	dBμV	Degree	Meter	H/ V	dB	dB	dB	dBμV/m	dBμV/m	dB
212.52	56.30	200	1.2	H	10.4	3.0	27.7	42.00	43.5	-1.50QP
340.04	53.58	300	1.0	H	14.0	4.0	27.7	43.88	46.0	-2.12QP
300.00	53.89	330	1.2	H	13.6	3.6	27.4	43.69	46.0	-2.31QP
300.00	52.10	200	1.2	V	13.6	3.6	27.4	41.90	46.0	-4.10
81.36	54.20	300	2.5	H	8.1	1.9	28.4	35.80	40.0	-4.20
150.00	52.20	90	1.2	V	12.6	2.5	28.0	39.30	43.5	-4.20
381.26	49.88	180	1.0	H	15.3	4.3	28.0	41.48	46.0	-4.52
350.00	49.80	180	1.2	H	14.5	4.2	27.7	40.80	46.0	-5.20QP
400.00	48.50	200	1.2	V	15.4	4.6	28.1	40.40	46.0	-5.60
350.00	49.40	180	1.2	V	14.5	4.2	27.7	40.40	46.0	-5.60
447.52	46.70	30	1.0	V	17.1	4.6	28.3	40.10	46.0	-5.90
225.00	53.30	180	1.2	H	10.9	3.1	27.6	39.70	46.0	-6.30
150.00	49.20	180	1.2	H	12.6	2.5	28.0	36.30	43.5	-7.20
420.40	45.90	180	1.2	V	16.3	4.7	28.1	38.80	46.0	-7.20
383.35	47.20	180	1.2	H	15.3	4.3	28.0	38.80	46.0	-7.20
250.00	50.90	200	1.2	H	11.9	3.4	27.4	38.80	46.0	-7.20
162.70	49.30	200	1.5	H	12.2	2.5	28.0	36.00	43.5	-7.50
316.70	48.20	180	1.2	V	13.8	3.8	27.5	38.30	46.0	-7.70
257.66	50.40	200	1.2	H	11.9	3.4	27.4	38.30	46.0	-7.70
772.98	39.20	180	1.2	V	21.1	5.9	28.0	38.20	46.0	-7.80
447.50	44.54	200	1.5	H	17.1	4.6	28.3	37.94	46.0	-8.06
268.74	48.50	200	1.2	H	13.0	3.5	27.4	37.60	46.0	-8.40
582.98	42.30	180	1.2	V	18.8	5.3	28.8	37.60	46.0	-8.40
216.68	51.44	330	1.2	V	10.6	3.1	27.6	37.54	46.0	-8.46
203.41	47.54	180	1.5	H	12.2	3.0	27.7	35.04	43.5	-8.46
325.03	46.90	200	1.2	H	14.1	3.8	27.5	37.30	46.0	-8.70
433.95	44.60	200	1.2	H	16.5	4.4	28.2	37.30	46.0	-8.70
230.52	50.59	200	1.2	H	11.0	3.3	27.6	37.29	46.0	-8.71
400.00	45.30	200	1.2	H	15.4	4.6	28.1	37.20	46.0	-8.80
515.31	42.30	200	1.2	H	18.1	5.0	28.5	36.90	46.0	-9.10
450.03	43.72	200	1.2	H	16.9	4.6	28.4	36.82	46.0	-9.18
542.50	41.30	200	1.2	V	18.8	5.2	28.5	36.80	46.0	-9.20
460.97	43.20	180	1.2	H	17.2	4.7	28.5	36.60	46.0	-9.40
420.38	43.70	180	1.2	H	16.3	4.7	28.1	36.60	46.0	-9.40
231.26	49.81	180	1.2	H	11.0	3.3	27.6	36.51	46.0	-9.49
433.96	43.80	200	1.0	V	16.5	4.4	28.2	36.50	46.0	-9.50
293.77	46.50	300	1.2	H	13.5	3.6	27.4	36.20	46.0	-9.80

Radiated Emissions Test Result Data @ 3M (Cont.)

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR				FCC 15.225	
Freq	Reading	Angle	Height	Polar	Antenna	Cable	Amp.	Correction Factor	Limit	Margin
MHz	dBμV	Degree	Meter	H/ V	dB	dB	dB	dBμV/m	dBμV/m	dB
283.34	46.14	200	1.2	V	13.5	3.5	27.4	35.74	46.0	-10.26
199.98	46.30	120	1.2	V	11.6	2.9	27.7	33.10	43.5	-10.40
125.00	44.89	180	1.2	V	14.1	2.3	28.2	33.09	43.5	-10.41
81.36	47.90	300	1.5	V	8.1	1.9	28.4	29.50	40.0	-10.50
375.00	43.80	180	1.2	H	15.5	4.1	27.9	35.50	46.0	-10.50
244.33	48.00	180	1.2	H	11.5	3.3	27.5	35.30	46.0	-10.70
456.26	42.10	180	1.2	V	16.9	4.6	28.4	35.20	46.0	-10.80
600.00	39.80	180	1.2	H	18.6	5.4	28.6	35.20	46.0	-10.80
375.00	43.40	200	1.2	V	15.5	4.1	27.9	35.10	46.0	-10.90
264.00	46.70	180	1.2	H	12.3	3.4	27.4	35.00	46.0	-11.00
225.00	48.60	90	1.2	V	10.9	3.1	27.6	35.00	46.0	-11.00
337.52	44.36	180	1.2	H	14.2	3.9	27.5	34.96	46.0	-11.04
281.26	45.30	180	1.2	H	13.5	3.5	27.4	34.90	46.0	-11.10
468.75	41.30	200	1.2	V	17.2	4.7	28.5	34.70	46.0	-11.30
166.66	45.30	200	1.2	V	12.1	2.7	27.9	32.20	43.5	-11.30
331.29	43.89	200	1.2	V	14.2	3.9	27.5	34.49	46.0	-11.51
488.19	40.60	200	1.2	V	17.6	4.8	28.6	34.40	46.0	-11.60
515.30	39.70	30	1.2	V	18.1	5.0	28.5	34.30	46.0	-11.70
528.88	39.80	45	1.2	V	18.0	5.0	28.5	34.30	46.0	-11.70
216.97	48.11	30	1.5	H	10.6	3.1	27.6	34.21	46.0	-11.79
406.82	42.10	200	1.2	V	15.4	4.6	28.1	34.00	46.0	-12.00
133.34	43.20	180	1.2	V	14.1	2.4	28.3	31.40	43.5	-12.10
250.00	45.90	120	1.2	V	11.9	3.4	27.4	33.80	46.0	-12.20
325.00	43.20	100	1.2	V	14.1	3.8	27.5	33.60	46.0	-12.40
75.00	45.90	200	1.0	V	8.2	1.8	28.4	27.50	40.0	-12.50
183.33	44.39	120	1.2	V	11.6	2.8	27.8	30.99	43.5	-12.51
311.13	43.20	200	1.2	H	13.8	3.8	27.5	33.30	46.0	-12.70
393.26	41.87	200	1.0	H	15.2	4.3	28.1	33.27	46.0	-12.73
108.50	45.61	200	3.0	H	11.0	2.1	28.2	30.51	43.5	-12.99
450.01	39.90	200	1.2	V	16.9	4.6	28.4	33.00	46.0	-13.00
135.61	42.30	180	1.5	H	13.8	2.4	28.1	30.40	43.5	-13.10
312.00	42.10	200	1.2	V	13.8	3.8	27.5	32.20	46.0	-13.80
339.00	41.53	180	1.2	V	14.2	3.9	27.5	32.13	46.0	-13.87
13.76	43.60	200	1.2	H	15.8	0.3	27.3	32.40	60.5	-28.10Peak
13.56	76.99	200	1.2	H	15.8	0.3	27.3	65.79	104.0	-38.21Fund-Peak
13.12	42.30	200	1.2	H	15.8	0.3	27.3	31.10	60.5	-29.40Peak
13.74	42.10	180	1.2	V	15.8	0.3	27.3	30.90	60.5	-29.60 Peak
13.12	41.60	200	1.2	V	15.8	0.3	27.3	30.40	60.5	-30.10 Peak
13.56	71.68	180	1.3	V	15.8	0.3	27.3	60.48	104.0	-43.52Fund-Peak

Unintentional Emission

Indicated			Table	Antenna		Correction Factor			FCC 15.225	
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBμV	Degree	Meter	H/V	dB	dB	dB	dBμV/m	dBμV/m	dB
340.04	53.58	300	1.0	H	14.0	4.0	27.7	43.88	46.0	-2.12QP
300.00	53.89	330	1.2	H	13.6	3.6	27.4	43.69	46.0	-2.31QP
300.00	52.10	200	1.2	V	13.6	3.6	27.4	41.90	46.0	-4.10
150.00	52.20	90	1.2	V	12.6	2.5	28.0	39.30	43.5	-4.20
350.00	49.80	180	1.2	H	14.5	4.2	27.7	40.80	46.0	-5.20QP
400.00	48.50	200	1.2	V	15.4	4.6	28.1	40.40	46.0	-5.60
350.00	49.40	180	1.2	V	14.5	4.2	27.7	40.40	46.0	-5.60
225.00	53.30	180	1.2	H	10.9	3.1	27.6	39.70	46.0	-6.30
150.00	49.20	180	1.2	H	12.6	2.5	28.0	36.30	43.5	-7.20
250.00	50.90	200	1.2	H	11.9	3.4	27.4	38.80	46.0	-7.20
400.00	45.30	200	1.2	H	15.4	4.6	28.1	37.20	46.0	-8.80
125.00	44.89	180	1.2	V	14.1	2.3	28.2	33.09	43.5	-10.41
375.00	43.80	180	1.2	H	15.5	4.1	27.9	35.50	46.0	-10.50
600.00	39.80	180	1.2	H	18.6	5.4	28.6	35.20	46.0	-10.80
375.00	43.40	200	1.2	V	15.5	4.1	27.9	35.10	46.0	-10.90
264.00	46.70	180	1.2	H	12.3	3.4	27.4	35.00	46.0	-11.00
225.00	48.60	90	1.2	V	10.9	3.1	27.6	35.00	46.0	-11.00
250.00	45.90	120	1.2	V	11.9	3.4	27.4	33.80	46.0	-12.20
325.00	43.20	100	1.2	V	14.1	3.8	27.5	33.60	46.0	-12.40
75.00	45.90	200	1.0	V	8.2	1.8	28.4	27.50	40.0	-12.50
450.01	39.90	200	1.2	V	16.9	4.6	28.4	33.00	46.0	-13.00
312.00	42.10	200	1.2	V	13.8	3.8	27.5	32.20	46.0	-13.80

§ 15.203 – ANTENNA REQUIEMENT

Standard Applicable

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

This device has an integral antenna; it is a permanently attached antenna.

§ 15.207 – CONDUCTED EMISSIONS TEST

Measurement Uncertainty

All measurements involve certain levels of uncertainties. 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.

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 Class B limits.

The EUT was placed on the test table and connected to the power supply.

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

Spectrum Analyzer Setup

The EMI test receiver was set to investigate the spectrum from 150 KHz to 30 MHz.

Test Equipment

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Artificial-Mains Network	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 Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Procedure

During the conducted emission test, the power cord of the host system was connected to the mains outlet of the LISN-1.

Maximizing procedure was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with 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 limits). Quasi-peak readings are distinguished with a "**Qp**".

Summary of Test Results

According to the data in the following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.225. Conducted margin for a Class B device, and these test results is deemed as satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations, with the worst margin reading of:

-7.90 dB at **0.15 MHz** in the **Line** conductor

Environmental Conditions

Temperature:	24° C
Relative Humidity:	53%
ATM Pressure:	1020 mbar

Testing was performed by Jerry Wang on 2005-06-09.

Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC 15.207	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
0.15	58.1	QP	Line	66.00	-7.90
0.15	57.4	QP	Neutral	66.00	-8.60
25.00	27.7	Ave	Line	50.00	-22.30
13.50	37.0	QP	Neutral	60.00	-23.00
13.50	36.4	QP	Line	60.00	-23.60
25.00	24.3	Ave	Neutral	50.00	-25.70
0.15	26.4	Ave	Line	56.00	-29.60
25.00	29.6	QP	Line	60.00	-30.40
0.15	25.6	Ave	Neutral	56.00	-30.40
25.00	27.6	QP	Neutral	60.00	-32.40
13.50	8.8	Ave	Line	50.00	-41.20
13.50	8.2	Ave	Neutral	50.00	-41.80

Plot of Conducted Emissions Test Data

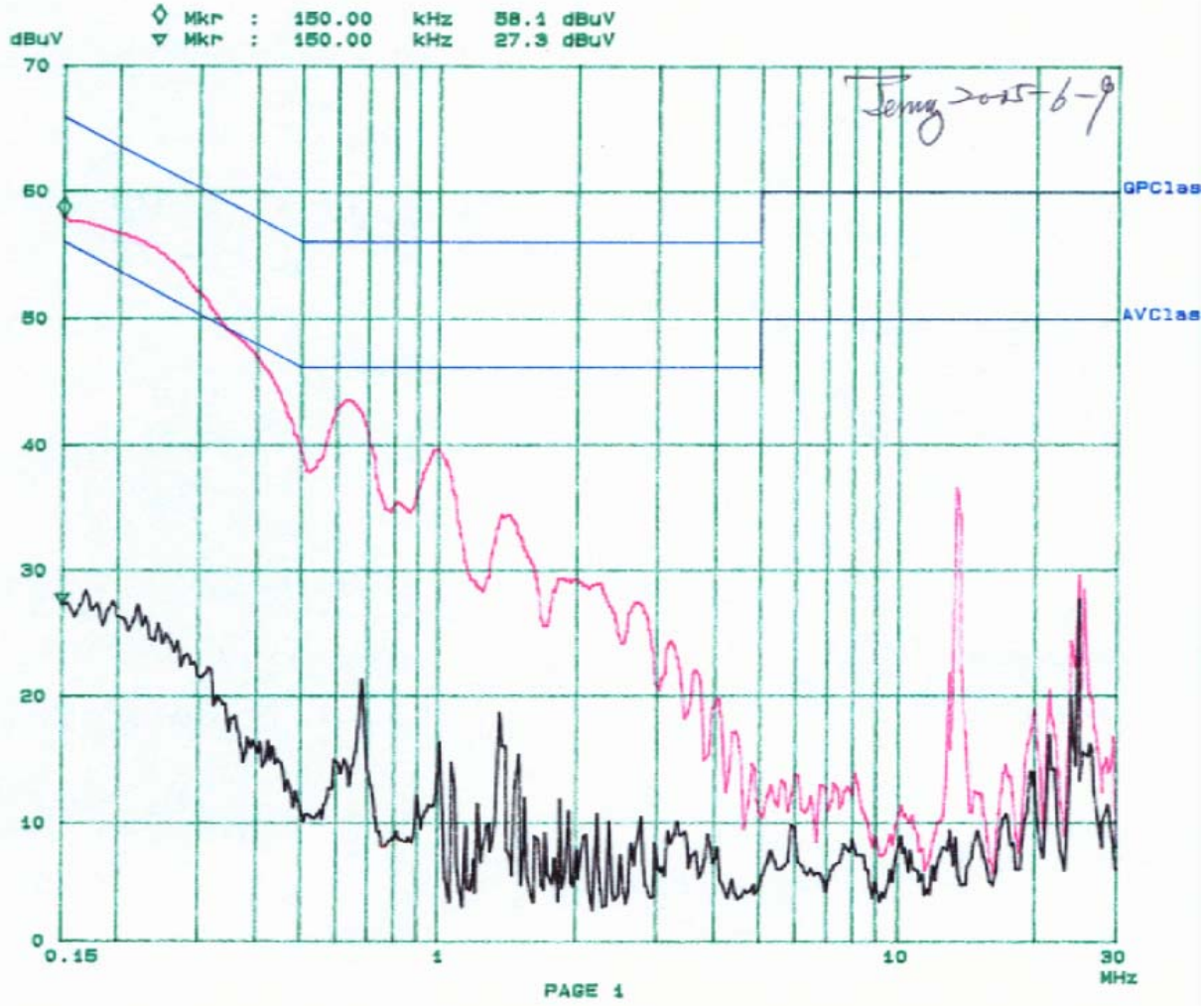
Plot(s) of Conducted Emissions Test Data is presented hereinafter as reference.

Bay Area Compliance Laboratory Corp 09. Jun 05 12:28
Class B

EUT: Verifone 2
Manuf: Vivotech
Op Cond: Normal
Operator: Jerry
Comment: L
120VAC

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



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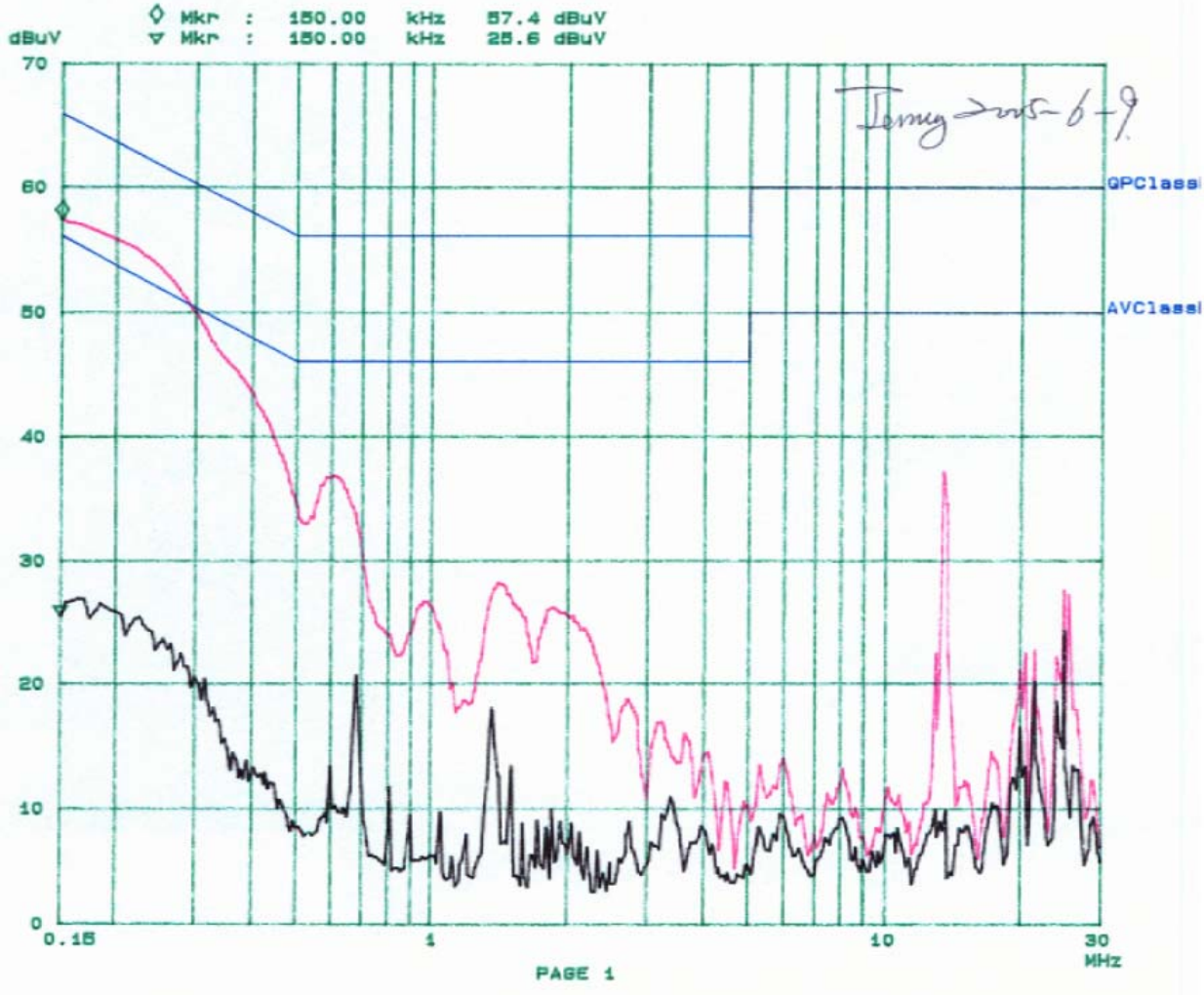
Bay Area Compliance Laboratory Corp 09. Jun 05 12:49
Class B

EUT: Verifone 2
Manuf: Vivotech
Op Cond: Normal
Operator: Jerry
Comment: N
120VAC

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



§ 15.225(e) - FREQUENCY STABILITY MEASUREMENT

Standard Applicable

According to FCC §15.225(e), the frequency tolerance of the carrier signal shall be maintained within ± 0.01% of the operating frequency over a temperature variation of –20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Procedure

Frequency stability versus environmental temperature

The equipment under test was connected to an external AC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.

Frequency Stability versus Input Voltage

At room temperature (25±5°C), an external variable AC power supply was connected to the EUT (AC/DC adapter). The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage.

Test Equipment List and Details

Manufacturer	Description	Model	Serial No.	Calibration Date
HP	Spectrum Analyzer	8568B	2408A00105	2004-08-19
Tenny	Temperature Chamber	Versa Tenna	N/A	2005-04-23
HP	Quasi Peak Adapter	85650A	2521A00718	2004-08-19
HP	Spectrum Analyzer Display	85662A	2403A06544	2004-08-19

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

Environmental Conditions

Temperature:	24° C
Relative Humidity:	53.1%
ATM Pressure:	1021 mbar

Testing was performed by Jerry Wang on 2005-06-09.

Test Results

Reference Frequency: 13.5600 MHz, Limit = 100 PPM			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF (MHz)	PPM Error
50	110V	13.5604	29.50
40	110V	13.5603	22.12
30	110V	13.5602	14.75
20	110V	13.5602	14.75
10	110V	13.5604	29.50
0	110V	13.5604	29.50
-10	110V	13.5605	36.87
-20	110V	13.5606	44.25

Frequency Stability Versus Battery Voltage

Reference Frequency: 13.5600 MHz, Limit = 100 PPM						
Power Supplied (VAC)	Frequency Measure with Time Elapsed					
	2 Minutes		5 Minutes		10 Minutes	
	MHz	PPM	MHz	PPM	MHz	PPM
126.5V	13.5602	14.70	13.5604	29.40	13.5605	36.87
110V	13.5603	22.12	13.5603	22.12	13.5604	29.50
93.5V	13.5604	36.80	13.5605	36.80	13.5605	36.57

Conclusion: The EUT complied with the applicable Frequency Stability Limits.