FCC CFR47 PART 15 SUBPART C
CERTIFICATION TEST REPORT

FOR

LOW POWER TRANSMITTER WIRELESS CARD READER

MODEL NUMBER: VIVOPAY DINE

FCC ID: Q55VIVOPAYDINE

REPORT NUMBER: 06U10696-1B

ISSUE DATE: JANUARY 02, 2007

Prepared for
VIVOTECH
451 EL CAMINO REAL
SANTA CLARA, CA 95050, USA

Prepared by
COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD
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LAB CODE:200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
---	11/21/06	Initial Issue	T.C.
B	01/02/07	Converted to Corrected Unit Limit on Section 7.2.1	T.C.

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	VIVOTECH 451 EL CAMINO REAL SANTA CLARA, CA 95050, USA
EUT DESCRIPTION:	LOW POWER TRANSMITTER WIRELESS CARD READER
MODEL:	VIVOPAY DINE
SERIAL NUMBER:	01818
DATE TESTED:	NOVEMBER 02 to NOVEMBER 04, 2006

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

THANH NGUYEN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT is a low power transmitter wireless card Payment for Point of Sale (P.O.S) terminal and its fundamental frequency is 13.56MHz.

GENERAL INFORMATION

CHASSIS/ ENCLOSURE MATERIAL	PLASTIC
POWER REQUIREMENTS	12 VDC
POWERLINE FILTER MANUFACTURER AND MODEL	N/A
LIST OF ALL OSCILLATOR FREQUENCIES GREATER THAN OR EQUAL TO 9 kHz	13.56MHz, 10MHz, 32.768MHz, 27.120MHz, 3.6864MHz, 3.5712MHz

5.2. TEST CONFIGURATION

The following configuration was investigated during testing:

EUT Configuration	Description
Typical Configuration	EUT alone.

5.3. MODE(S) OF OPERATION

Mode	Description
Normal Mode	Transmit Continuously

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5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was EC3U6D2Y22091.

5.5. MODIFICATIONS

No modifications were made during the test.

5.6. DETAILS OF TESTED SYSTEM

SUPPORT EQUIPMENT

No support equipment was used for the operation of the EUT.

I/O CABLES

N/A

TEST SETUP

EUT is standalone unit with battery operated and transmits continuously during testing.
The worst position is determined as Z position (the unit is laid down on the edge).

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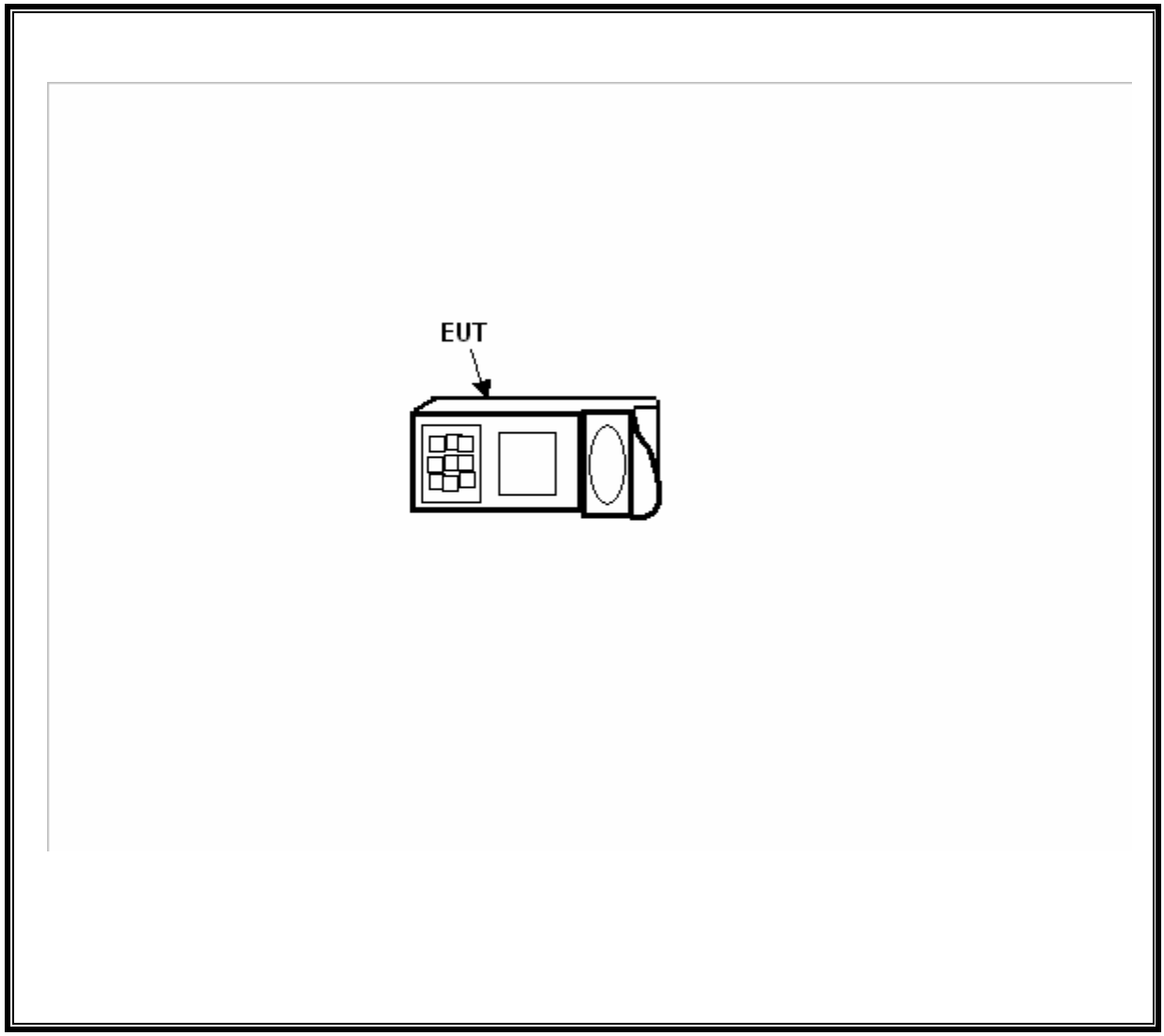
TEST SETUP DIAGRAM



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
EMI Receiver, 9 kHz ~ 2.9 GHz	Agilent / HP	8542E	3942A00286	2/4/2007
RF Filter Section	Agilent / HP	85420E	3705A00256	2/4/07
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	9/3/07
Antenna, Loop 9 kHz ~ 30 MHz	EMCO	6502	9202-2722	9/7/07
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	29800	6/12/07
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	US42070220	7/29/07
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/07
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	8/30/07
EMI Test Receiver	R & S	ESHS 20	827129/006	1/3/08

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7. LIMITS AND RESULTS

7.1. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

No non-compliance noted:

99% Bandwidth

Frequency (MHz)	99% Bandwidth (KHz)
13.56	6.486

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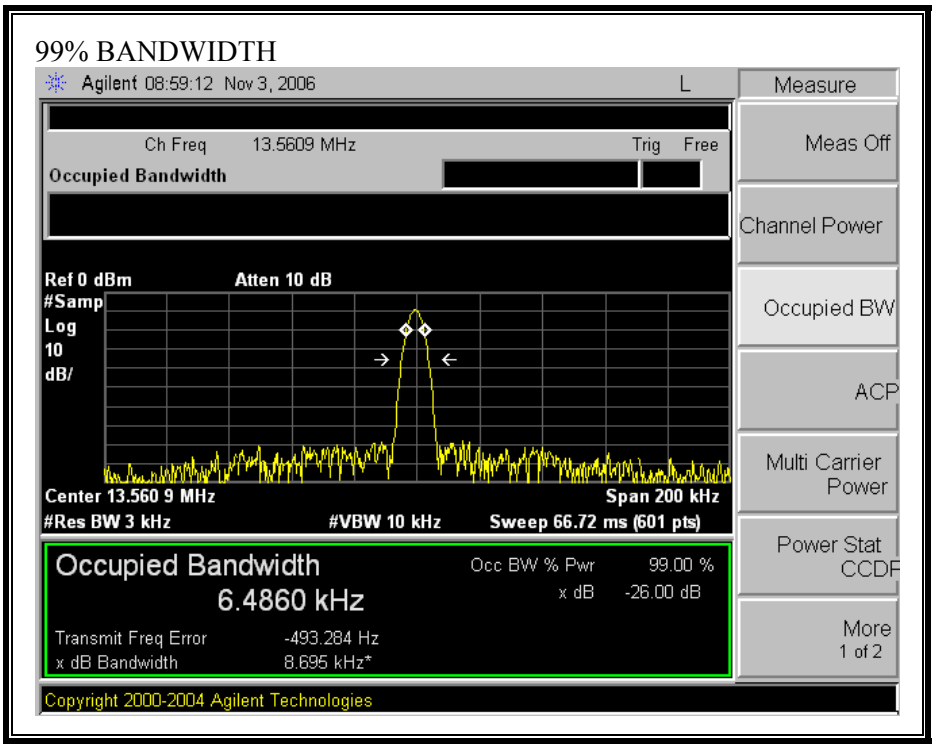
99% BANDWIDTH



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7.2. RADIATED EMISSIONS

7.2.1. OPERATION WITHIN THE BAND 13.110 – 14.010 MHz

TEST PROCEDURE

ANSI C63.4

LIMIT

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.
(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209.

TRANSCEIVER SPURIOUS EMISSIONS BELOW 30MHz

FCC Part 15, Subpart B & C **10 Meter Distance Measurement At Open Field**

Company: Vivotech
Project #: 06U10696
EUT Description: **13.56MHz**, Wireless Card Reader
Model #: VP-Dine
Tester: **Thanh Nguyen**
Date: November 2nd, 2006

Frequency (MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	AF dB/m	Distance Correction (dB)	PK Corrected Reading (dBuV/m)	AV Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	PK Margin (dB)	AV Margin (dB)	Notes
Loop Antenna Face On:												
13.56	52.7			10.56	-19.08	44.17		84.00		-39.8		10m distance
27.12	27.13			9.046	-19.08	17.09		29.54		-12.4		10m distance
Loop Antenna Face Off:												
13.56	34.6			10.56	-19.08	26.07		84.00		-57.9		10m distance
27.12	28.1			9.046	-19.08	18.06		29.54		-11.5		10m distance

Rev. 5.1.6

* No more emissions were found up to 30MHz

Note: The emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 10000Mhz. Radiated emission limits in these three bands are based on measurements employing an average detector.

P.K. = Peak
Q.P. = Quasi Peak Readings
A.F. = Antenna factor

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7.2.2. TRANSMITTER RADIATED SPURIOUS EMISSIONS

TEST PROCEDURE

ANSI C63.4

The highest clock frequency generated or used in the EUT is 13.56 MHz; therefore the frequency range was investigated from 9 kHz to 1000 MHz.

LIMIT

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (μV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

In addition:

§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

RESULTS

No non-compliance noted:

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SPURIOUS EMISSIONS 30 TO 140 MHz (UP TO 10TH HARMONIC) (TX WORST-CASE CONFIGURATION, HORIZONTAL)

```
Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Thanh Nguyen
Company:       : VIVOTECH
Project #:     : 06U10696
Configuration:: EUT Stand Alone
Mode of Oper.:: Tx Worst Case
Target:        : FCC Part 15.225 (13.553-13.567MHz)
```

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	40.890	25.27	14.24	39.51	40.00	-0.49	Peak
2	67.840	24.42	9.19	33.61	40.00	-6.39	Peak
3	121.740	16.90	15.18	32.08	43.50	-11.42	Peak

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SPURIOUS EMISSIONS 30 TO 140 MHz (UP TO 10TH HARMONIC) (TX WORST-CASE CONFIGURATION, VERTICAL)

```
Condition: FCC CLASS-B VERTICAL
Test Operator:: Thanh Nguyen
Company:      : VIVOTECH
Project #:    : 06U10696
Configuration:: EUT Stand Alone
Mode of Oper.:: Tx Worst Case
Target:       : FCC Part 15.225 (13.553-13.567MHz)
* Note: 40.89MHz Tested w/ dipole antenna ETS 312C-DB1, S/N 1594
```

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	*40.890	37.30	0.25	37.55	40.00	-2.45	Peak
2	67.840	30.66	9.19	39.85	40.00	-0.15	Peak
3	121.740	19.30	15.18	34.48	43.50	-9.02	Peak

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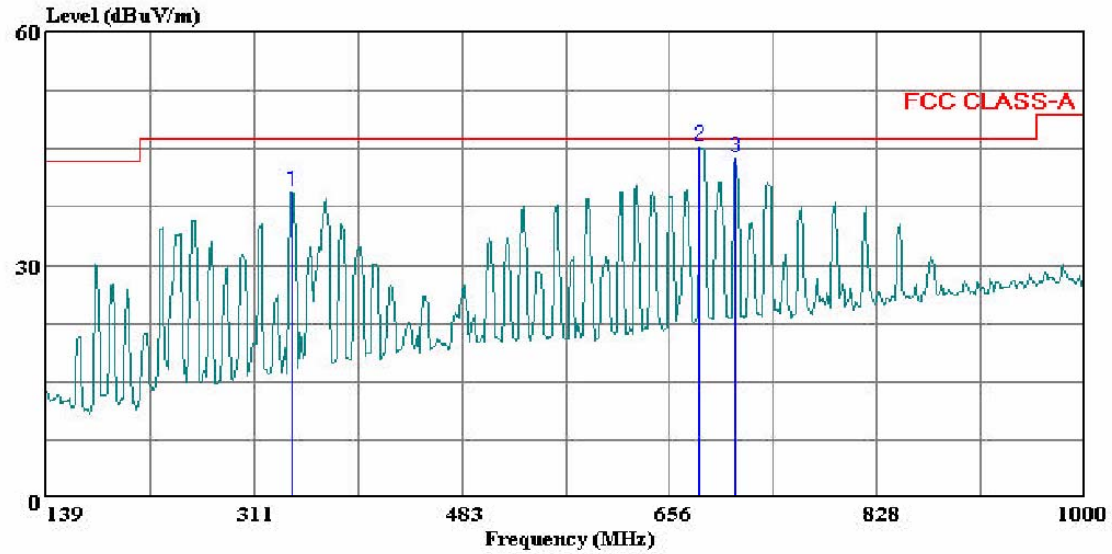
SPURIOUS EMISSIONS 140 TO 1000 MHz (DIGITAL WORST-CASE CONFIGURATION, HORIZONTAL)

561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 22 File#: 696EMI.EMI Date: 11-02-2006 Time: 17:45:59



(Audix ATC)

Trace: 21 Ref Trace:

Condition: FCC CLASS-A HORIZONTAL
Test Operator:: Thanh Nguyen
Company: : VIVOTECH
Project #: : 06U10696
Configuration:: EUT Stand Alone
Mode of Oper. : NORMAL
Target: : FCC Class A

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	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	343.057	22.75	16.74	39.49	46.40	-6.91	Peak
2	680.569	22.32	22.85	45.17	46.40	-1.24	Peak
3	710.704	20.48	23.26	43.74	46.40	-2.66	Peak

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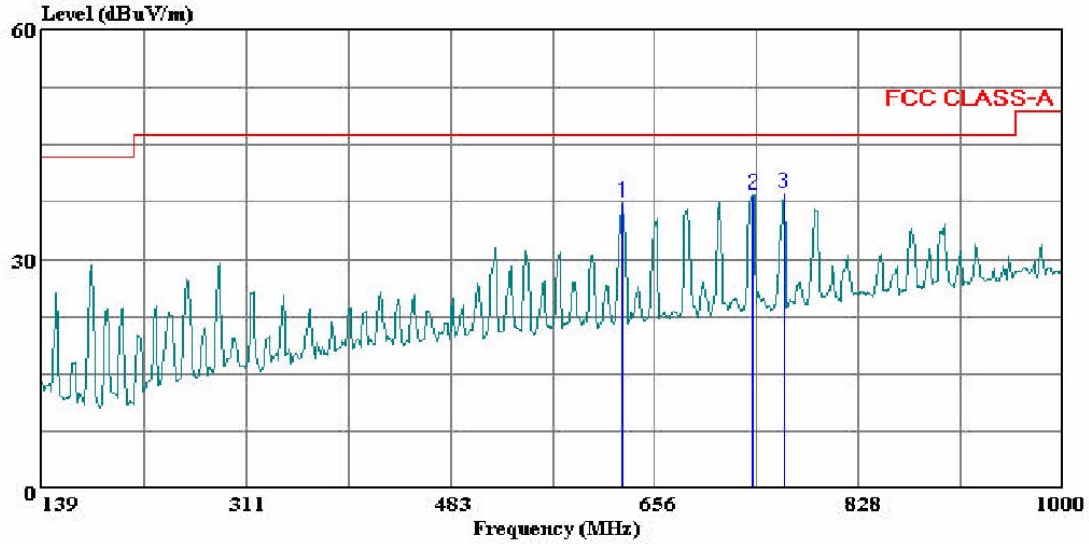
SPURIOUS EMISSIONS 140 TO 1000 MHz (DIGITAL WORST-CASE CONFIGURATION, VERTICAL)

561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 30 File#: 696EMI.EMI Date: 11-02-2006 Time: 18:10:56



(Audix ATC)

Trace: 29 Ref Trace:

Condition: FCC CLASS-A VERTICAL
Test Operator:: Thanh Nguyen
Company: : VIVOTECH
Project #: : 06U10696
Configuration:: EUT Stand Alone
Mode of Oper.:: NORMAL
Target: : FCC CLASS A

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	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	628.909	15.30	21.99	37.29	46.40	-9.11	Peak
2	738.256	14.66	23.68	38.35	46.40	-8.05	Peak
3	764.947	14.62	24.09	38.71	46.40	-7.69	Peak

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7.3. FREQUENCY STABILITY

LIMIT

15.225 (e) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% 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.

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 2.3.1 and 2.3.2

RESULTS

No non-compliance noted.

Reference Frequency: EUT Channel 13.56MHz @ 20*C Limit: ± 100 ppm = 135.603 KHz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
12.00	50	13.5603105	0.005	± 100
12.00	40	13.5603184	-0.001	± 100
12.00	30	13.5603369	-0.015	± 100
12.00	***20***	***13.5603172***	***0.000***	***± 100***
12.00	10	13.5603931	-0.056	± 100
12.00	0	13.5604218	-0.077	± 100
12.00	-10	13.5604255	-0.080	± 100
12.00	-20	13.5604158	-0.073	± 100
10.20	25	13.5603347	-0.013	± 100
13.8	25	13.5603354	-0.013	± 100

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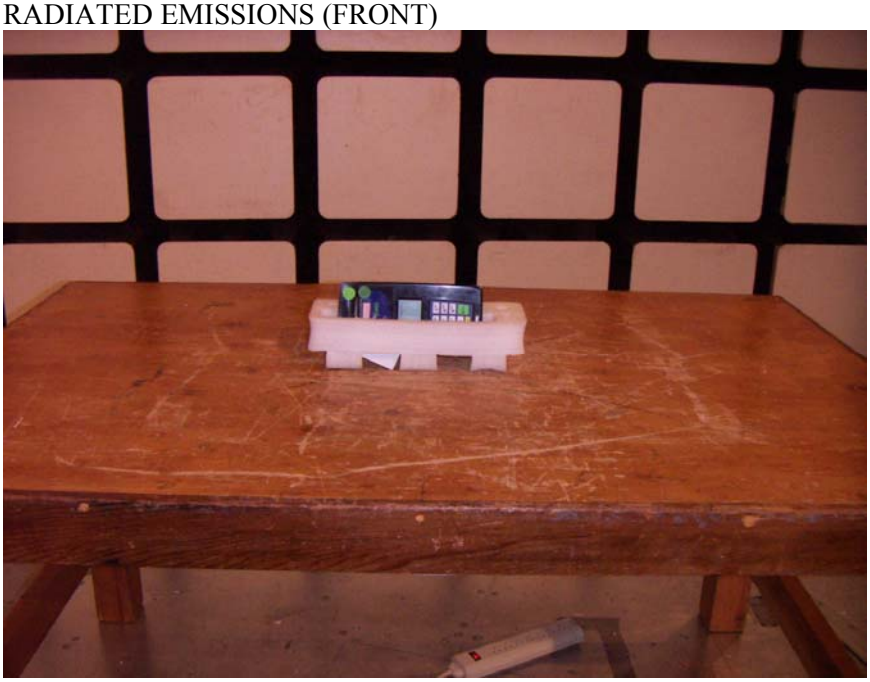
8. SETUP PHOTOS

RADIATED EMISSION (30-1000 MHz)

RADIATED EMISSIONS (FRONT)



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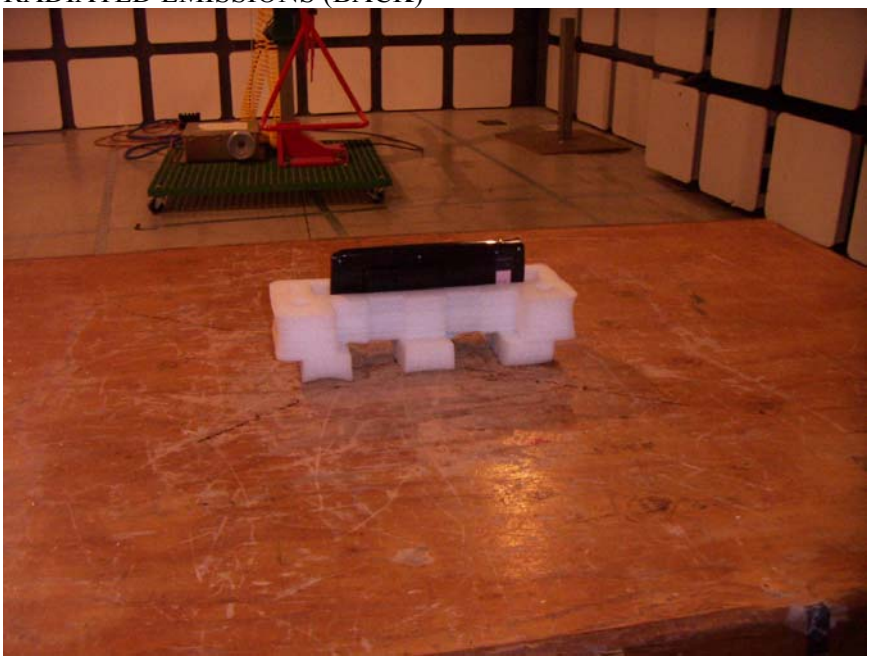
RADIATED EMISSIONS (BACK)



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RADIATED RF MEASUREMENT SETUP FOR PORTABLE CONFIGURATION

X-AXIS FRONT PHOTO

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Y-AXIS FRONT PHOTO

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Z-AXIS FRONT PHOTO

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RADIATED EMISSIONS (0.009-30 MHz)

RADIATED EMISSIONS (Below 30 MHz)

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FREQUENCY STABILITY

TEMPERATURE CHAMBER

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