



Nemko

Nemko USA, Inc.

11696 Sorrento Valley Rd., Suite F

San Diego, CA 92121-1024

Phone (858) 755-5525 Fax (858) 452-1810

CERTIFICATION TEST REPORT

Report Number: 2009 05127443 FCC

Project Number: 24181-1

Nex Number: 127443

Applicant: VESTA MEDICAL LLC
1555-A McGAW AVENUE
IRVINE, CA 92614

Equipment Under Test (EUT): RFID PCB IO ASSY

Model: 12-121-001

FCC ID: XC7ECOREXRFID

In Accordance With: FCC Part 15 Subpart C, 15.225

Tested By: Nemko USA Inc.
11696 Sorrento Valley Road, Suite F
San Diego, CA 92121

Authorized By: Alan Laudani, EMC/RF Test Engineer

Date: May 9, 2009

Total Number of Pages: 16



Section1: Summary of Test Results

General

All measurements are traceable to national standards

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15; Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed: RFID PCB IO Assy

Model: 12-121-001

Specification: FCC Part 15 Subpart C, 15.225

Date Received in Laboratory: April 30, 2009

Compliance Status: Complies

Exclusions: None

Non-compliances: None



1.1 Report Release History

REVISION	DATE	COMMENTS	
-	May 9, 2009	Prepared By:	Ferdinand Custodio
-	May 9, 2009	Initial Release:	Alan Laudani

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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TESTED BY:


Ferdinand Custodio, EMC Test Engineer

Date: May 9, 2009

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Section 2: Equipment Under Test

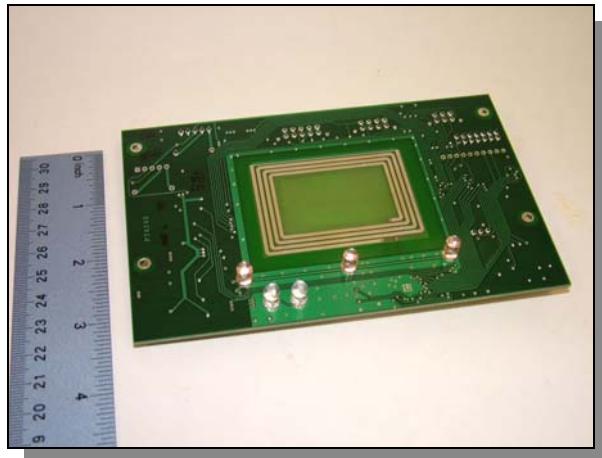
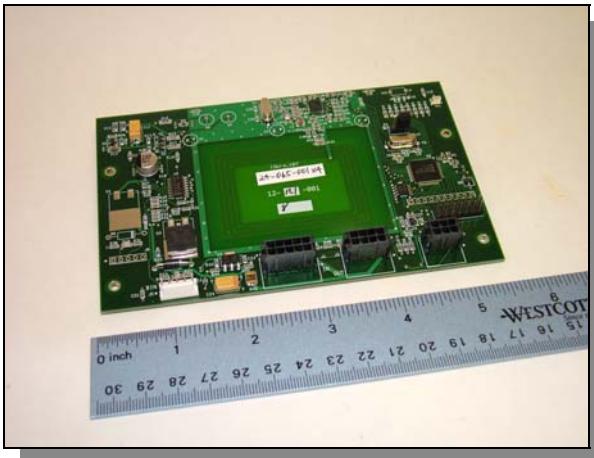
2.1 Product Identification

The Equipment Under Test was indentified as follows:

VESTA MEDICAL LLC 12-121-001 RFID PCB IO Assy

2.2 Samples Submitted for Assessment

The following sample of the apparatus with built-in antenna have been submitted for type assessment:





2.3 Theory of Operation

The 12-121-001 is a RFID PCB IO Assy. The EUT is a device that incorporates a Texas Instruments TRF7961 RFID transceiver with a fixed, built-in antenna. The purpose of the device is to power and read 13.56 MHz, ISO 15693 RFID tags that are within 1 inch of the antenna. The RFID IO boards detect and read RFID tags that are affixed to EcoRex disposable waste liners. When a waste liner is properly installed in a waste collection bay of the EcoRex system the RFID IO board can determine what type of waste liner is present by reading the data in the RFID tag.

2.4 Technical Specifications of the EUT

Manufacturer:	Vesta Medical LLC
Operating Frequency:	13.56 MHz in the 13.110–14.010 MHz Band
Number of Operating Frequencies:	1
Rated Power:	65.94dB μ V/m @ 3 meters
Modulation:	ISO 15693 Communication Protocol (ASK)
Antenna Connector:	Integral (PCB Spiral Antenna)
Power Source:	5VDC from external power supply (Nemko asset # 936).



Section 3: Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.225
Operation within the bands 13.110–14.010 MHz.

3.2 Deviations From Laboratory Test Procedures

No deviations from Laboratory Test Procedure

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15-27 °C
Humidity range	:	44-90 %
Pressure range	:	101.52-101.7 kPa
Power supply range	:	4.25 to 5.75VDC

3.4 Test Equipment

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
N149	Environmental Chamber	Cincinnati Sub-Zero	ZPHS-32-2-2-H/AC	ZP0552665	02-Jun-08	02-Jun-09
926	Microwave Frequency Counter	Anritsu	MF2412B	6200229301	30-Jan-09	30-Jan-10
841	Preamp (40dB)	Com-Power	PA-010	171007	17-Jul-08	17-Jul-09
552	Antenna, Loop	EMCO	ALR-30M	820	23-Sep-08	23-Sep-09
115	Antenna, Bicon	EMCO	3104	3020	15-Sep-08	15-Sep-10
110	Antenna, LPA	Electrometrics	LPA-25	1217	10-Jan-09	10-Feb-11
841	Preamp (40dB)	Com-Power	PA-010	171007	17-Jul-08	17-Jul-09
902	pre amp	Sonoma	310 N	185803	17-Jul-08	17-Jul-09
936	DC Power Supply 0-50V 0-10A 200W	Hewlett Packard	6002A	N/A	Verified by Asset #815	
815	Multimeter	Fluke	111	78130066	16-Jul-08	16-Jul-09
911	Spectrum Analyzer	Agilent	E4440A	US4142126 6	06-Nov-08	06-Nov-09

2040B-1 OATS



Section 4: Observations

4.1 Modifications Performed During Assessment

No modifications were performed during assessment.

4.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

4.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

4.4 Test Deleted

No Tests were deleted from this assessment.

4.5 Additional Observations

There were no additional observations made during this assessment.



Section 5: Results Summary

This section contains the following:

FCC Part 15 Subpart C: Test Results

§ 15.225 Operation within the bands 13.110–14.010 MHz.

The column headed “Required” indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No: not applicable / not relevant

Y Yes: Mandatory i.e. the apparatus shall conform to these test.

N/T Not Tested, mandatory but not assessed. (See section 4.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

5.1 Test Results

Part 15C	Test Description	Required	Result
15.225(a)	Emissions limit within the band 13.553 to 13.567 MHz.	Y	Pass
15.225(b)	Emissions limit within the band 13.410 to 13.553 MHz and 13.567 to 13.710 MHz.	N	-
15.225(c)	Emissions limit within the band 13.110 to 13.410 MHz and 13.710 to 14.010MHz.	N	-
15.225 (d)	Spurious Emissions (Radiated Emission Test)	Y	Pass
15.225 (e)	Frequency tolerance of the carrier signal.	Y	Pass
15.225(f)	Radio frequency powered tags	N*	-

* Powered tags used during evaluation are considered as a separate device subject to its own authorization



Appendix A: Test Results

Section 15.225 (a) – Emissions limit within the band 13.553 to 13.567 MHz

15.225(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.

Test Conditions:

Sample Number:	12-121-001	Temperature:	15
Date:	May 5, 2009	Humidity:	90
Modification State:		Tester:	FSCustodio

Laboratory: SOATS

Test Results:

See attached plots.

Additional Observations:

- Detectors used are peak and quasi peak. No difference between peak and QP readings.
- Limit adjusted by +40dB going from 30 meters to 3 meters ($40\log[30/3]$).
- Measurements verified at 5.0 and 5.75VDC, however no difference in readings observed. EUT will not transmit @ 4.25VDC.
- EUT has one orientation only, no X and Z verification necessary.
- Loop antenna position varied during testing. See test notes on the following page.



NEMKO USA, Inc.

Nemko**San Diego Headquarters:**

11696 Sorrento Valley Rd.

San Diego, CA 92121

Tel: (858) 755-5525

Fax: (858) 452-1810

Radiated Emissions Data

Job # : 24181-1 Date : 5/5/2009
NEX # : 127443 Time : 7AM
Staff : FSC

Client Name : Vesta Medical LLC
EUT Name : RFID IO Board
EUT Model # : 12-121-001
EUT Serial # : 24-065-001 X4
EUT Config. : Transmit @ full power

EUT Voltage : 4.25~5.75V
EUT Frequency :
Phase:
NOATS
SOATS X
Distance < 1000 MHz: 3 m
Distance > 1000 MHz: 3 m

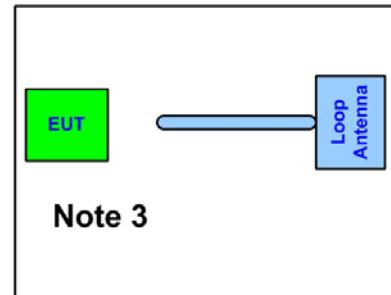
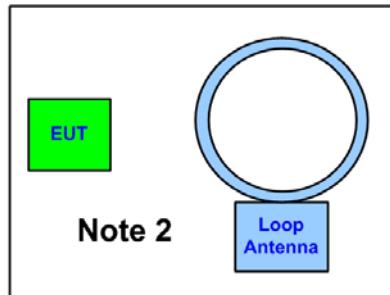
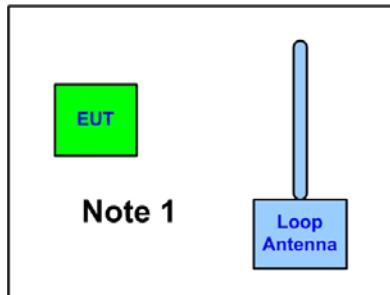
Specification : CFR47 Part 15, Subpart B, Class B
Loop Ant. #: 552
Bicon Ant.#: 115_3m Temp. (°C) : 15
Log Ant.#: 110_3m Humidity (%) : 90
DRG Ant. # NA Spec An.#: 911
Cable LF#: SOATS Spec An. Display #: 911
Cable HF#: NA QP #: 911
Preamp LF#: 841 and 902 PreSelect#: NA
Preamp HF# NA

Quasi-Peak	RBW: 120 kHz
Peak	RBW: 1 MHz
Average	RBW: 1 MHz
	Video Bandwidth 10 Hz

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.

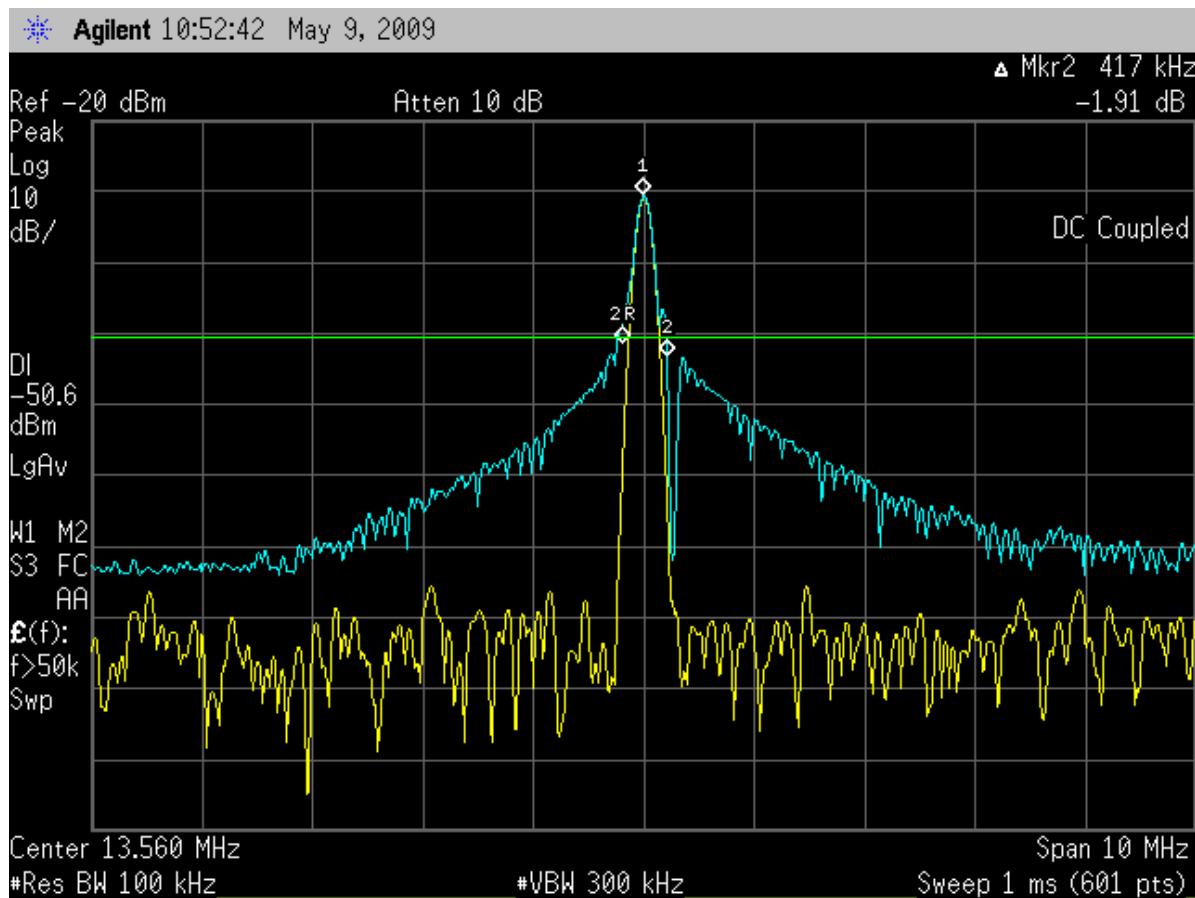
Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading	Meter Reading	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dB μ V)	Corrected Reading (dB μ V/m)	Spec. limit (dB μ V/m)	CR/SL Diff. (dB)	Pass Fail	Comment
13.6	61.5		Q		1.0	61.45	57.8	124.0	-66.3	Pass	See Note ¹
13.6	69.6		Q		1.3	69.64	65.9	124.0	-58.1	Pass	See Note ²
13.6	55.8		Q		1.0	55.82	52.1	124.0	-71.9	Pass	See Note ³



Sample Computations:

Corrected reading = 65.9 dB μ V/m
= Max reading (dB μ V/m) + Antenna factor (dB) + Cable Loss (dB) – Preamp gain (dB)
= 69.64 +35.7 + 0.6 -40
= 65.9 dB μ V/m

20dB Bandwidth (417 kHz):

**Section 15.225(d) – Spurious Emissions (Radiated Emission Test)**

15.225(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

Test Conditions:

Sample Number:	12-121-001	Temperature:	15
Date:	May 5. 2009	Humidity:	90
Modification State:		Tester:	FSCustodio

 | | **Laboratory:** | SOATS |**Test Results:**

No other emissions observed other than the fundamental.

Additional Observations:

- The spectrum was searched from 13.56 MHz up to 1GHz.
- The EUT does not have a separate receive mode.

Section 15.225(e) – Frequency tolerance of the carrier signal

(e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ 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 Conditions:

Sample Number:	12-121-001	Temperature:	27
Date:	May 4, 2009	Humidity:	44
Modification State:		Tester:	FSCustodio
		Laboratory:	Humidity Chamber

Test Results:

Primary Supply Voltage Variation @ 20°C

Voltage (VDC)	Frequency (MHz)	Difference (%)	Results
4.25	<i>ceases transmitting</i>	N/A	Pass
5.00	13.555300	<i>Reference</i>	
5.75	13.555300	0	Pass

Frequency tolerance of the carrier signal:

Temperature (°C)	Frequency (MHz)	Difference (%)	Results
-20°C	13.555100	0.0014	Pass
-10°C	13.555170	0.0009	Pass
-0°C	13.555300	0	Pass
10°C	13.555300	0	Pass
20°C	13.555300	<i>Reference</i>	
30°C	13.555300	0	Pass
40°C	13.556050	0.0055	Pass
50°C	13.556220	0.0067	Pass

Appendix C: Block Diagram of Test Setups

Test Site For Radiated Emissions

