Nemko-CCL, Inc.
1940 West Alexander Street
Salt Lake City, UT 84119
801-972-6146

Test Report

Certification

Test Of: XTMR 103

FCC ID: 2ADQ5-103

Test Specifications:

FCC PART 15, Subpart C

Test Report Serial No: 273691-4.2

Applicant:
PGS Medical Research & Electronic Design, LLC
55 Cove Road North
Southampton, NY 11968
U.S.A

Dates of Test: November 12-13, and 24, 2014

Report Issue Date: December 16, 2014

Accredited Testing Laboratory By:

NVLAP Lab Code 100272-0

CERTIFICATION OF ENGINEERING REPORT

This report has been prepared by Nemko-CCL, Inc. to document compliance of the device described below with the requirements of Federal Communications Commission (FCC) Part 15, Subpart C. This report may be reproduced in full, partial reproduction may only be made with the written consent of the laboratory. The results in this report apply only to the sample tested.

- Applicant: PGS Medical Research & Electronic Design, LLC
- Manufacturer: PGS Medical Research & Electronic Design, LLC
- Brand Name: TrackViewsID
- Model Number: XTMR103
- FCC ID: 2ADQ5-103

On this 16th day of December 2014, I, individually and for Nemko-CCL, Inc., certify that the statements made in this engineering report are true, complete, and correct to the best of my knowledge, and are made in good faith.

Although NVLAP has recognized that the Nemko-CCL, Inc. EMC testing facilities are in good standing, this report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Nemko-CCL, Inc.

Tested by: Norman P. Hansen
Test Technician

Reviewed by: Thomas C. Jackson
Certification Manager

TABLE OF CONTENTS

PAGE

SECTION 1.0 CLIENT INFORMATION

1.1 Applicant:

Company Name: PGS Medical Research & Electronic Design, LLC
55 Cove Road North
Southampton, NY 11968
U.S.A

Contact Name: Michael Sciarra
Title: President

1.2 Manufacturer:

Company Name: PGS Medical Research & Electronic Design, LLC
55 Cove Road North
Southampton, NY 11968
U.S.A

Contact Name: Michael Sciarra
Title: President

SECTION 2.0 EQUIPMENT UNDER TEST (EUT)

2.1 Identification of EUT:

Brand Name:	TrackViewsID
Model Number:	XTMR103
Serial Number:	None
Dimensions:	Ankle Band Flex: 15.25 cm x 2.25 cm Main Housing: 6.67 cm x 5.0 cm x 1.6 cm

2.2 Description of EUT:

The XTMR103 is an ankle bracelet transmitter used in a system with a REC 103 receiver in correctional institutions for monitoring inmates. The XTMR103 transmits OOK modulated at 916.5 MHz. The XTMR103 has a trace antenna and is powered by a CR2477 lithium, 3V at 1000 mA/hr battery.

This report covers the transmitter circuitry of the device subject to FCC Part 15, Subpart C. The circuitry of the device, subject to FCC Part 15, Subpart B is covered in Nemko-CCL, Inc. report 273961-3.

2.3 EUT and Support Equipment:

The FCC ID numbers for all the EUT and support equipment used during the test are listed below:

Brand Name Model Number Serial Number	FCC ID Number or Compliance	Description	Name of Interface Ports / Interface Cables
BN: TrackViewsID MN: XTMR103 (Note 1) SN: None	2ADQ5-103	Transmitter	See Section 2.4

Note: (1) EUT

2.4 Interface Ports on EUT:

There are no interface ports on the EUT. All interfacing is via the transmitter.

2.5 Modification Incorporated/Special Accessories on EUT:

There were no modifications or special accessories required to comply with the specification.

SECTION 3.0 TEST SPECIFICATION, METHODS & PROCEDURES

3.1 Test Specification:

Title:	FCC PART 15, Subpart C (47 CFR 15) 15.203, 15.207, and 15.249 Limits and methods of measurement of radio interference characteristics of radio frequency devices
Purpose of Test:	The tests were performed to demonstrate initial compliance

3.2 Methods & Procedures:

3.2.1 §15.203 Antenna Requirement

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

3.2.2 §15.207 Conducted Limits

(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHZ to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15 – 0.5*	66 to 56*	56 to 46*
0.5 – 5	56	46
5 - 30	60	50

*Decreases with the logarithm of the frequency.

3.2.3 §15.249 Operation within the bands 902 – 928 MHz, 2400 – 2483.5 MHz, and 5725 – 5850 MHz

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of 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

(b) Fixed, point-to-point operation as referred to in this paragraph shall be limited to systems employing a fixed transmitter transmitting to a fixed remote location. Point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information are not allowed. Fixed, point-to-point operation is permitted in the 24.05-24.25 GHz band subject to the following conditions:

(1) The field strength of emissions in this band shall not exceed 2500 millivolts/meter.

(2) The frequency tolerance of the carrier signal shall be maintained within ±0.001% 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.

(3) Antenna gain must be at least 33 dBi. Alternatively, the main lobe beamwidth must not exceed 3.5 degrees. The beamwidth limit shall apply to both the azimuth and elevation planes. At antenna gains over 33 dBi or beamwidths narrower than 3.5 degrees, power must be reduced to ensure that the field strength does not exceed 2500 millivolts/meter.

(c) Field strength limits are specified at a distance of 3 meters.

(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.

(e) As shown in § 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

3.3 Test Procedure

The testing was performed according to the procedures in ANSI C63.4: 2003. Testing was performed at the Nemko-CCL, Inc. Wanship open area test site #2, located at 29145 Old Lincoln Highway, Wanship, UT. This site has been registered with the FCC, and was renewed February 15, 2012 (90504). This registration is valid for three years.

Nemko-CCL, Inc. is accredited by National Voluntary Laboratory Accreditation Program (NVLAP); NVLAP Lab Code: 100272-0, which is effective until September 30, 2015.

SECTION 4.0 OPERATION OF EUT DURING TESTING

4.1 Operating Environment:

Power Supply: 3 Vdc from CR2477 battery

4.2 Operating Modes:

The EUT was in a continuous transmit state and was tested on 3 axes. A new battery was used in testing.

4.3 EUT Exercise Software:

Internal firmware was used to exercise the EUT.

SECTION 5.0 SUMMARY OF TEST RESULTS

5.1 FCC Part 15, Subpart C

5.1.1 Summary of Tests:

Section	Environmental Phenomena	Frequency Range (MHz)	Result
15.203	Antenna Requirements	Structural requirement	Complied
15.207	Conducted Disturbance at Mains Ports	0.15 to 30	Not Applicable
15.249(a)	Field Strength of the Fundamental Frequency	916.5	Complied
15.249(a)	Field Strength of the Harmonics	916.5 – 9165	Complied
15.249(d)	Field Strength of Spurious Emissions	0.03 – 9165	Complied

5.2 Result

In the configuration tested, the EUT complied with the requirements of the specification.

SECTION 6.0 MEASUREMENTS AND RESULTS

6.1 General Comments:

This section contains the test results only. Details of the test methods used and a list of the test equipment used during the measurements can be found in Appendix 1 of this report.

6.2 Test Results:

6.2.1 §15.203 Antenna Requirements

A trace in the flexible ankle band is the antenna and it is not replaceable.

RESULT

The EUT complied with the specification.

6.2.2 §15.207 Conducted Disturbance at the AC Mains Ports

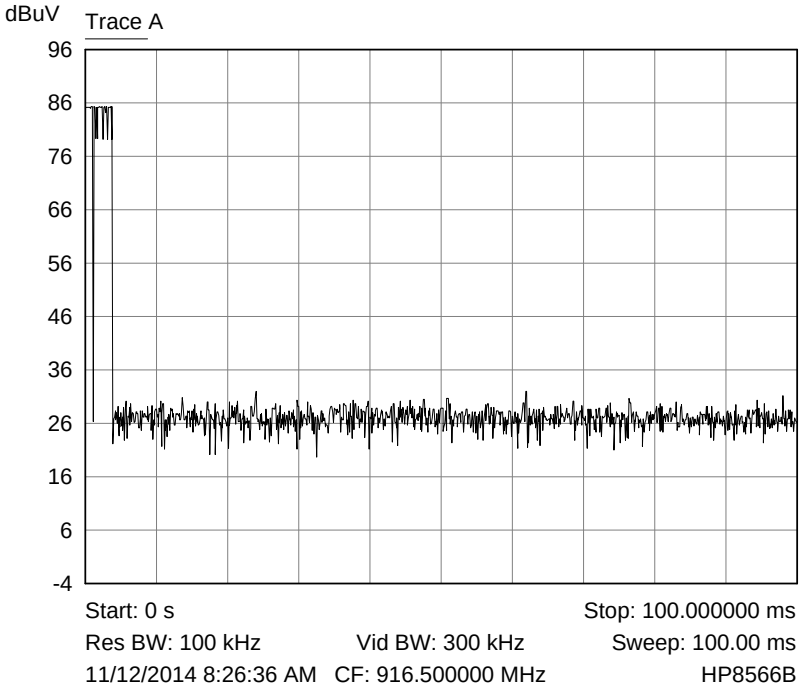
The EUT is battery powered and has no provision for connection to a device that connects to the AC mains.

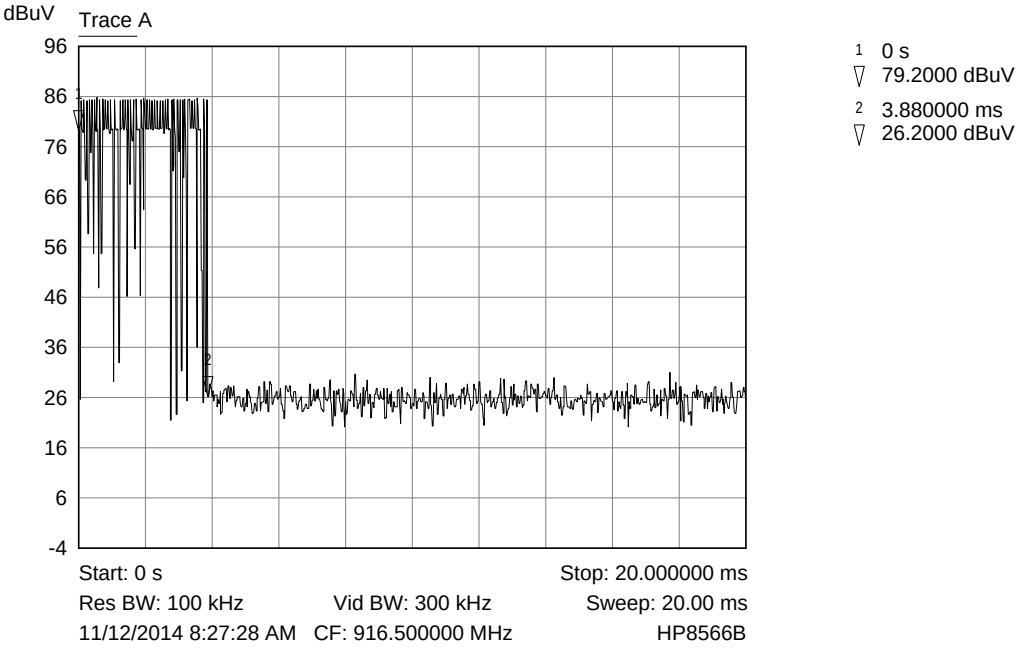
RESULT

This test is not applicable.

6.2.3 §15.35(c) Pulsed Emission Averaging Factor

The XTMR103 transmitter is a pulsed emission device using OOK; therefore, the method of §15.35 for averaging a pulsed emission may be used. A plot of the pulse train, and the average factor calculations are shown below:


dBuV
Trace A
96
86
76
66
56
46
36
26
16
6
-4
Start: 0 s
Stop: 100.000000 ms
Res BW: 100 kHz
Vid BW: 300 kHz
Sweep: 100.00 ms
11/12/2014 8:26:36 AM
CF: 916.500000 MHz
HP8566B


dBuV
Trace A
96
86
76
66
56
46
36
26
16
6
-4
1
2
Start: 0 s
Stop: 20.000000 ms
Res BW: 100 kHz
Vid BW: 300 kHz
Sweep: 20.00 ms
11/12/2014 8:27:28 AM
CF: 916.500000 MHz
HP8566B
1 0 s
79.2000 dBuV
2 3.880000 ms
26.2000 dBuV

Average factor calculation

From the plots, the pulsed emission is on 3.88 ms out of a 100 ms period. The Average Factor will be calculated using 100 ms as specified in FCC §15.35(c).

The Average Factor is calculated by the equation:

Average Factor = 20 log (on time/pulse train time)

Pulse train time = 100 ms

On time = 3.88 ms

Average Factor = 20 log (3.88 / 100)
= -28.22 dB

§15.35(b) specifies a 20 dB maximum between the peak and average measurements; therefore, a -20.0 dB averaging factor is allowed and will be used for harmonic emissions above 1000 MHz.

6.2.4 §15.249(a) Fundamental Field Strength

The table below shows the fundamental emission, measured at 3 meters using quasi-peak detection.

Frequency (MHz)	Detector	Receiver Reading (dBµV)	Correction Factor (dB/m)	Field Strength (dBµV/m)	3 m Limit (dBµV/m)	Margin (dB)	Polarity
916.5	Quasi-Peak	56.3	31.0	87.3	94.0	-6.7	Vertical
916.5	Quasi-Peak	58.1	31.0	89.1	94.0	-4.9	Horizontal

RESULT

The EUT complied with the specification.

6.2.5 §15.249(a) and §15.249(d) Field Strength of Harmonics and Spurious Emissions

The spurious emissions and harmonic emissions were measured from 0.03 MHz to 9165 MHz. The table below shows the emissions from the transmitter. Emissions from the digital circuitry of the EUT are shown in Nemko-CCL, Inc. report 273691-3.

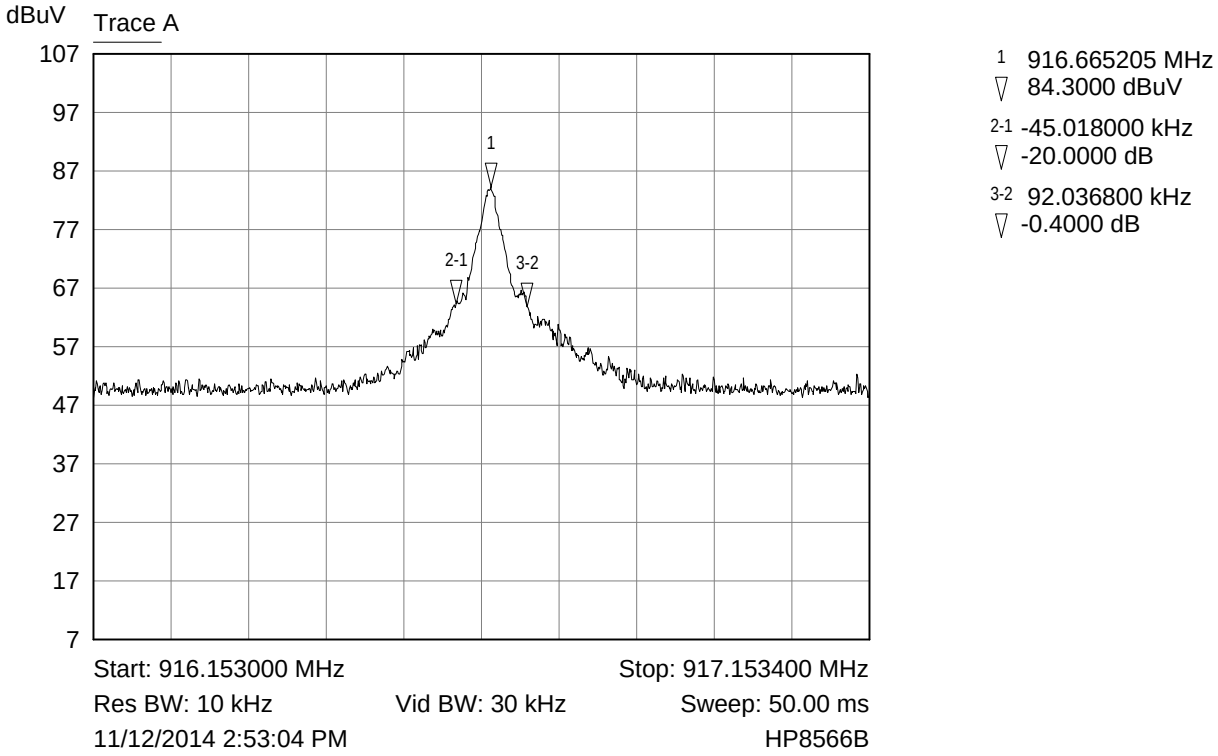
Frequency (MHz)	Detection Mode	Antenna Polarity	Receiver Reading (dBµV)	Correction Factor (dB)	Average Factor (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1833.0	Peak	Vertical	43.3	30.1	-20.0	53.4	54.0	-0.6
1833.0	Peak	Horizontal	42.9	30.0	-20.0	52.9	54.0	-1.1
2749.5	Peak	Vertical	38.5	33.8	-20.0	52.3	54.0	-1.7
2749.5	Peak	Horizontal	40.0	33.8	-20.0	53.8	54.0	-0.2
3666.0	Peak	Vertical	20.1	36.9	-20.0	37.0	54.0	-17.0
3666.0	Peak	Horizontal	19.9	36.9	-20.0	36.8	54.0	-17.2
4582.5	Peak	Vertical	14.2	38.6	-20.0	32.8	54.0	-21.2
4582.5	Peak	Horizontal	15.0	38.6	-20.0	33.6	54.0	-20.4
5499.0	Peak	Vertical	13.2	40.8	-20.0	34.0	54.0	-20.0
5499.0	Peak	Horizontal	12.0	40.8	-20.0	32.8	54.0	-21.2
6415.5	Peak	Vertical	12.2	41.6	-20.0	33.8	54.0	-20.2
6415.5	Peak	Horizontal	11.5	41.6	-20.0	33.1	54.0	-20.9
7332.0	Peak	Vertical	5.2	44.1	-20.0	29.3	54.0	-24.7
7332.0	Peak	Horizontal	6.7	44.1	-20.0	30.8	54.0	-23.2
8248.5	Peak	Vertical	3.3	45.5	-20.0	28.8	54.0	-25.2
8248.5	Peak	Horizontal	2.3	45.5	-20.0	27.8	54.0	-26.2
9165.0	Peak	Vertical	2.0	46.6	-20.0	28.6	54.0	-25.4
9165.0	Peak	Horizontal	2.8	46.6	-20.0	29.4	54.0	-24.6

RESULT

The EUT complied with the specification.

6.2.6 Channel Bandwidth

The 20 dB bandwidth of the channel is shown in the plot below. This plot shows the fundamental emission has a 20 dB band width of 92 kHz which is contained totally within the 902 – 928 MHz frequency band.



APPENDIX 1 TEST PROCEDURES AND TEST EQUIPMENT

A1.1 Radiated Spurious Emissions in the Restricted Bands

The radiated emissions from the intentional radiator were measured using a spectrum analyzer with a quasi-peak adapter for peak and quasi-peak readings.

A loop antenna was used to measure emissions below 30 MHz. Emission readings more than 20 dB below the limit at any frequency may not be listed in the reported data. For frequencies between 9 kHz and 30 MHz, or the lowest frequency generated or used in the device greater than 9 kHz, and less than 30 MHz, the spectrum analyzer resolution bandwidth was set to 9 kHz and the video bandwidth was set to 30 kHz. For average measurements, the spectrum analyzer average detector was used.

For frequencies above 30 MHz, an amplifier and preamplifier were used to increase the sensitivity of the measuring instrumentation. The quasi-peak adapter uses a bandwidth of 120 kHz, with the spectrum analyzer's resolution bandwidth set at 1 MHz, for readings in the 30 to 1000 MHz frequency ranges. For peak emissions above 1000 MHz the spectrum analyzer's resolution bandwidth was set to 1 MHz and the video bandwidth was set to 3 MHz. For average measurements above 1000 MHz the spectrum analyzer's resolution bandwidth was set to 1 MHz and the average detector of the analyzer was used.

A biconilog antenna was used to measure the frequency range of 30 to 1000 MHz and a Double Ridge Guide Horn antenna was used to measure the frequency range of 1 GHz to 18 GHz, and a Pyramidal Horn antenna was used to measure the frequency range of 18 GHz to 25 GHz, at a distance of 3 meters and/or 1 meter from the EUT. The readings obtained by the antenna are correlated to the levels obtained with a tuned dipole antenna by adding antenna factors.

The configuration of the EUT was varied to find the maximum radiated emission. The EUT was connected to the peripherals listed in Section 2.3 via the interconnecting cables listed in Section 2.4. A technician manually manipulated these interconnecting cables to obtain worst-case radiated disturbance. The EUT was rotated 360 degrees, and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission. Where there were multiple interface ports all of the same type, cables are either placed on all of the ports or cables added to these ports until the emissions do not increase by more than 2 dB.

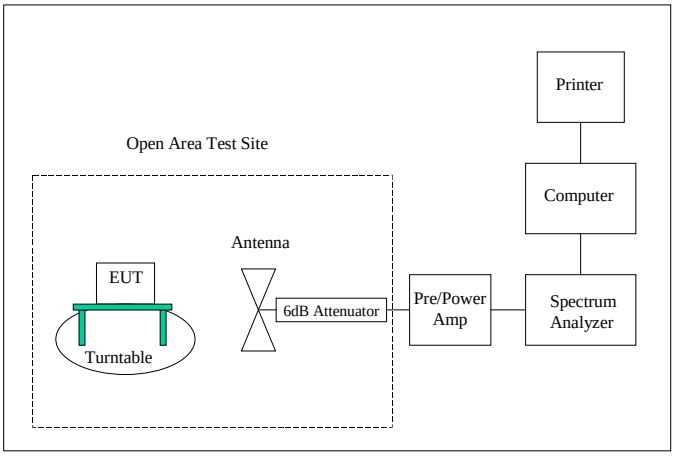
Desktop EUT are measured on a non-conducting table 0.8 meters above the ground plane. The table is placed on a turntable, which is level with the ground plane. For equipment normally placed on floors, the equipment shall be placed directly on the turntable.

For radiated emission testing at 30 MHz or above that is performed at distances closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

Type of Equipment	Manufacturer	Model Number	Barcode Number	Date of Last Calibration	Due Date of Calibration
Wanship Open Area Test Site #2	Nemko	N/A	830	12/10/2013	12/10/2014
Test Software	Nemko	Radiated Emissions	Revision 1.3	N/A	N/A
Spectrum Analyzer/Receiver	Rohde & Schwarz	ESU40	1229	04/08/2014	04/08/2015
Spectrum Analyzer	Hewlett Packard	8566B	644	02/25/2014	02/25/2015
Quasi-Peak Detector	Hewlett Packard	85650A	572	03/10/2014	03/10/2015
Loop Antenna	EMCO	6502	176	03/04/2013	03/04/2015
Biconilog Antenna	EMCO	3142	714	04/25/2013	04/25/2015
Double Ridged Guide Antenna	EMCO	3115	735	03/07/2013	03/07/2015
High Frequency Amplifier	Miteq	AFS4-00102650-35-10P-4	1299	05/08/2014	05/08/2015
20’ High Frequency Cable	Microcoax	UFB197C-1-3120-000000	1297	05/08/2014	05/08/2015
3 Meter Radiated Emissions Cable Wanship Site #2	Microcoax	UFB205A-0-4700-000000	1295	05/08/2014	05/08/2015
Pre/Power-Amplifier	Hewlett Packard	8447F	762	09/05/2014	09/05/2015
6 dB Attenuator	Hewlett Packard	8491A	1103	12/23/2013	12/23/2014

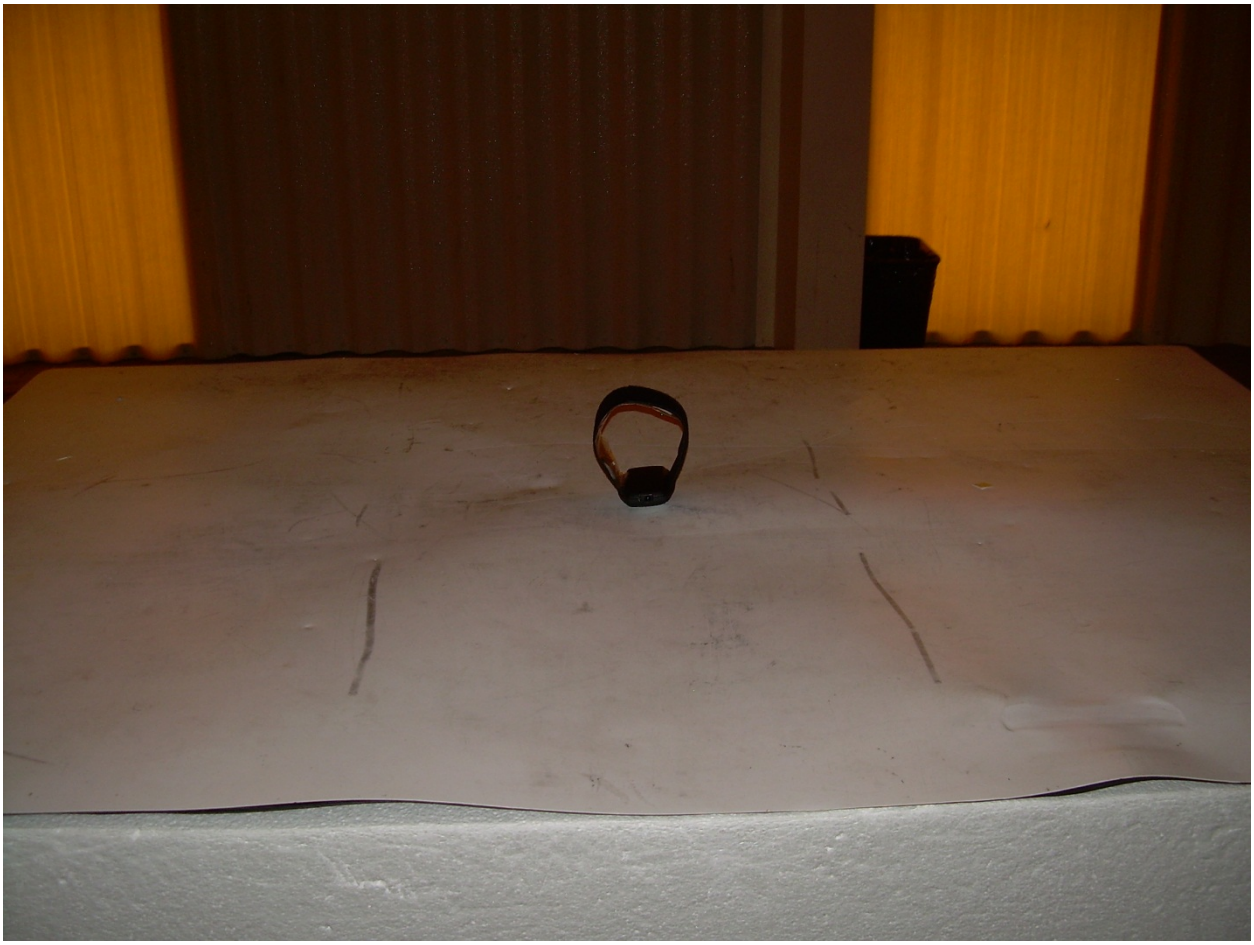
An independent calibration laboratory or Nemko-CCL, Inc. personnel calibrates all the equipment listed above at intervals defined in ANSI C63.4:2003 Section 4.4 following outlined calibration procedures. All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to tractability is on file and is available for examination upon request.

Radiated Emissions Test Setup

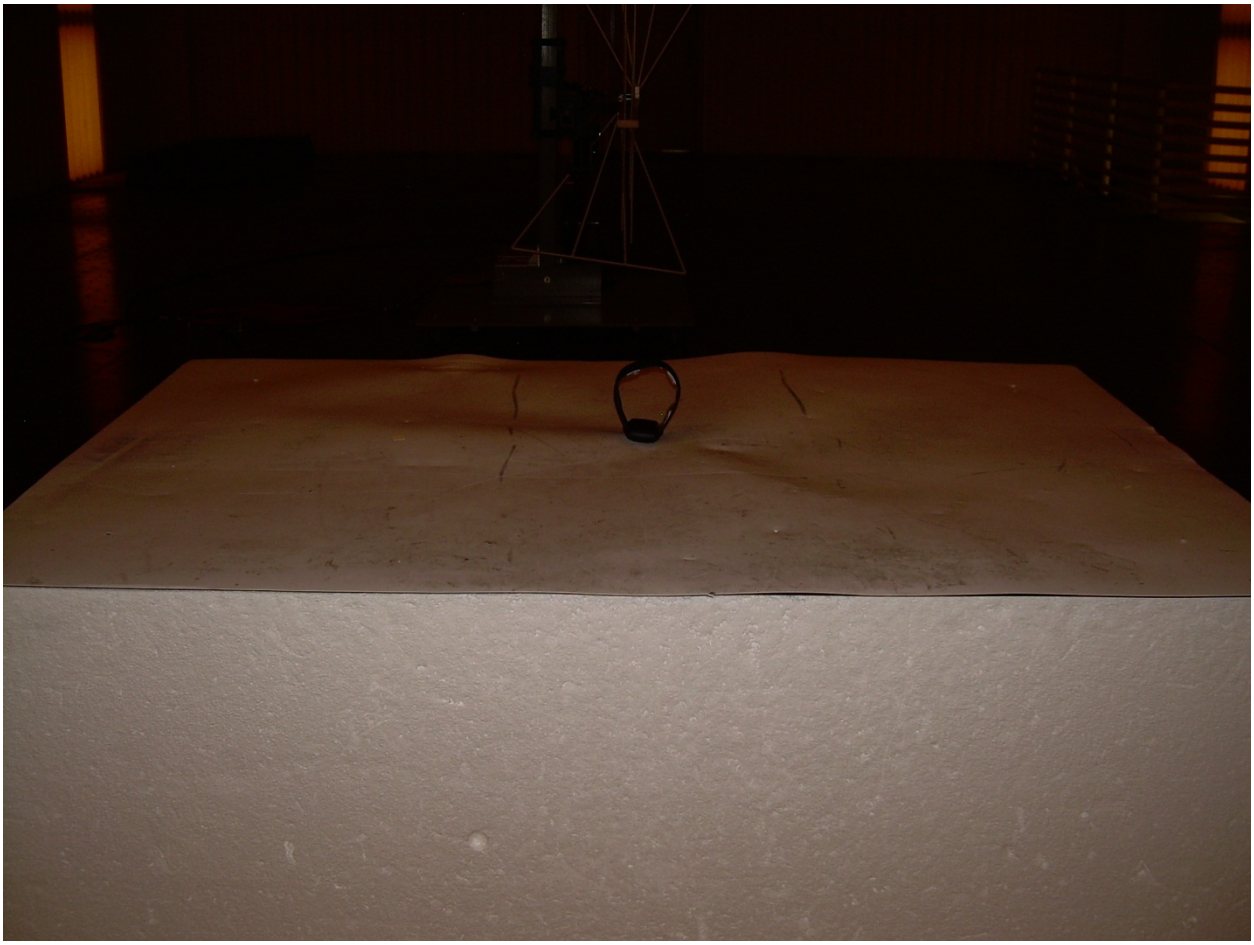


APPENDIX 2 PHOTOGRAPHS

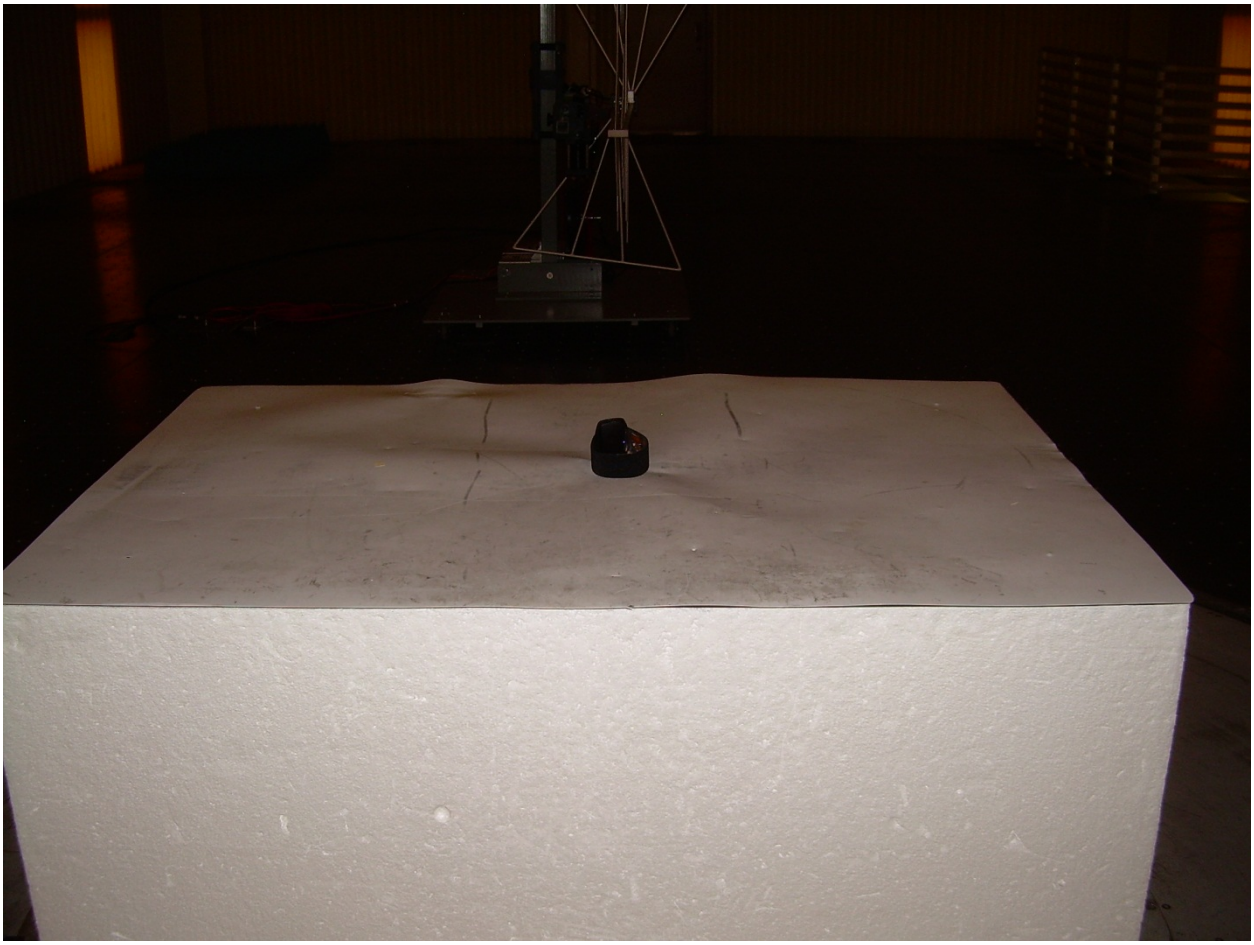
Photograph 1 – Front View Radiated Disturbance Worst Case Configuration – Flat



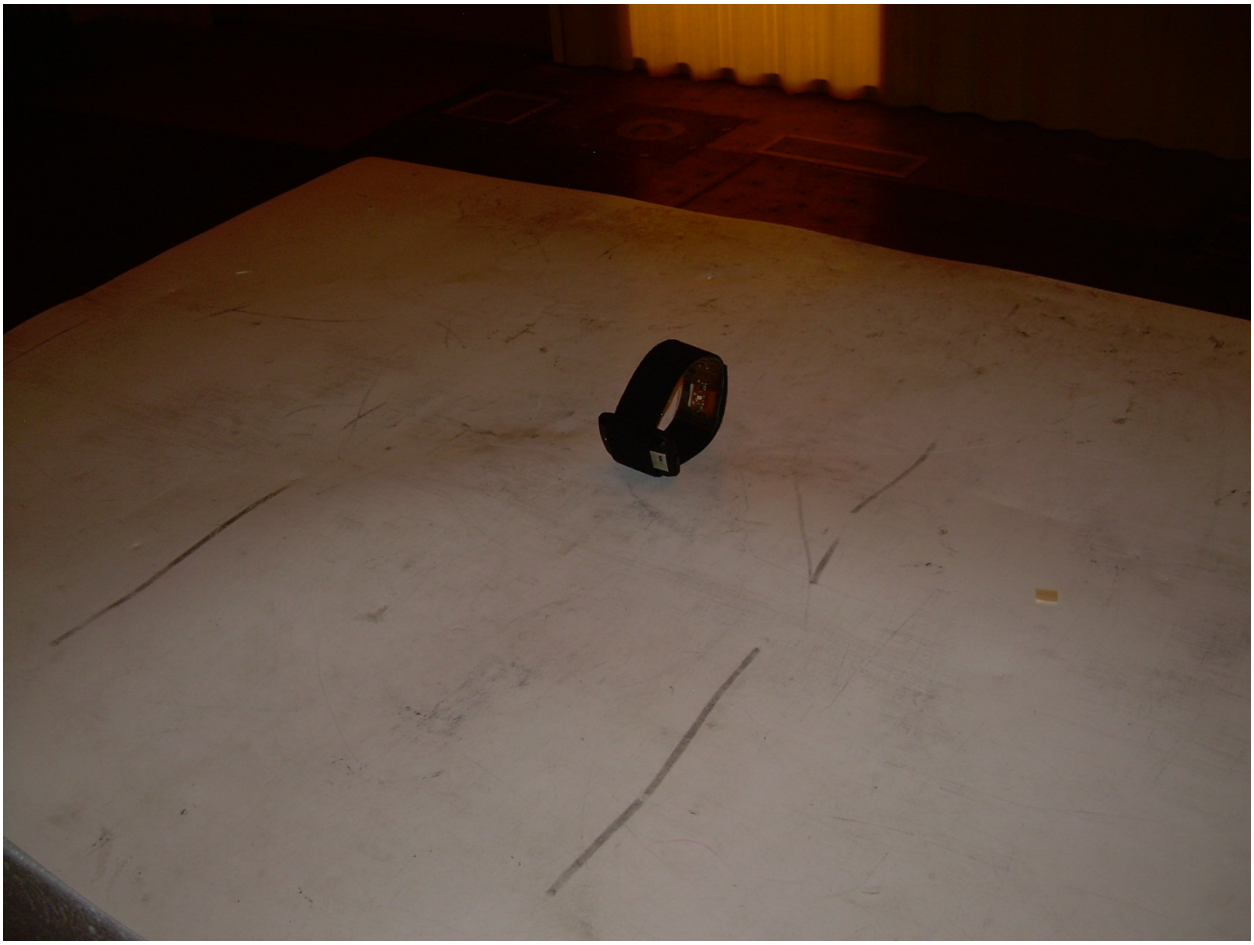
Photograph 2 – Back View Radiated Disturbance Worst Case Configuration – Flat



Photograph 3 – Back View Radiated Disturbance Configuration – Vertical



Photograph 4 – Front View Radiated Disturbance Configuration – On Edge

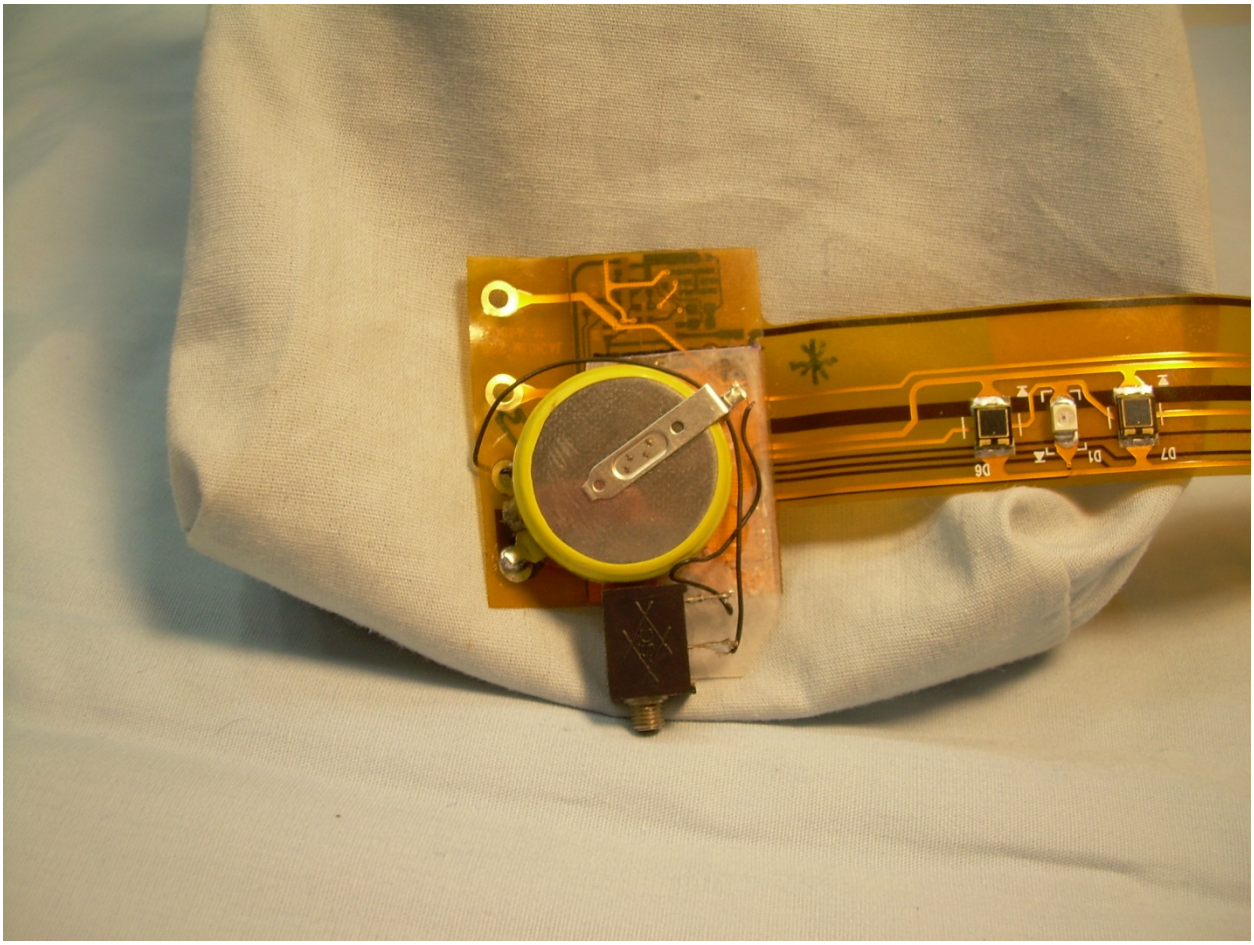


Photograph 5 – Top View of the XTMR103

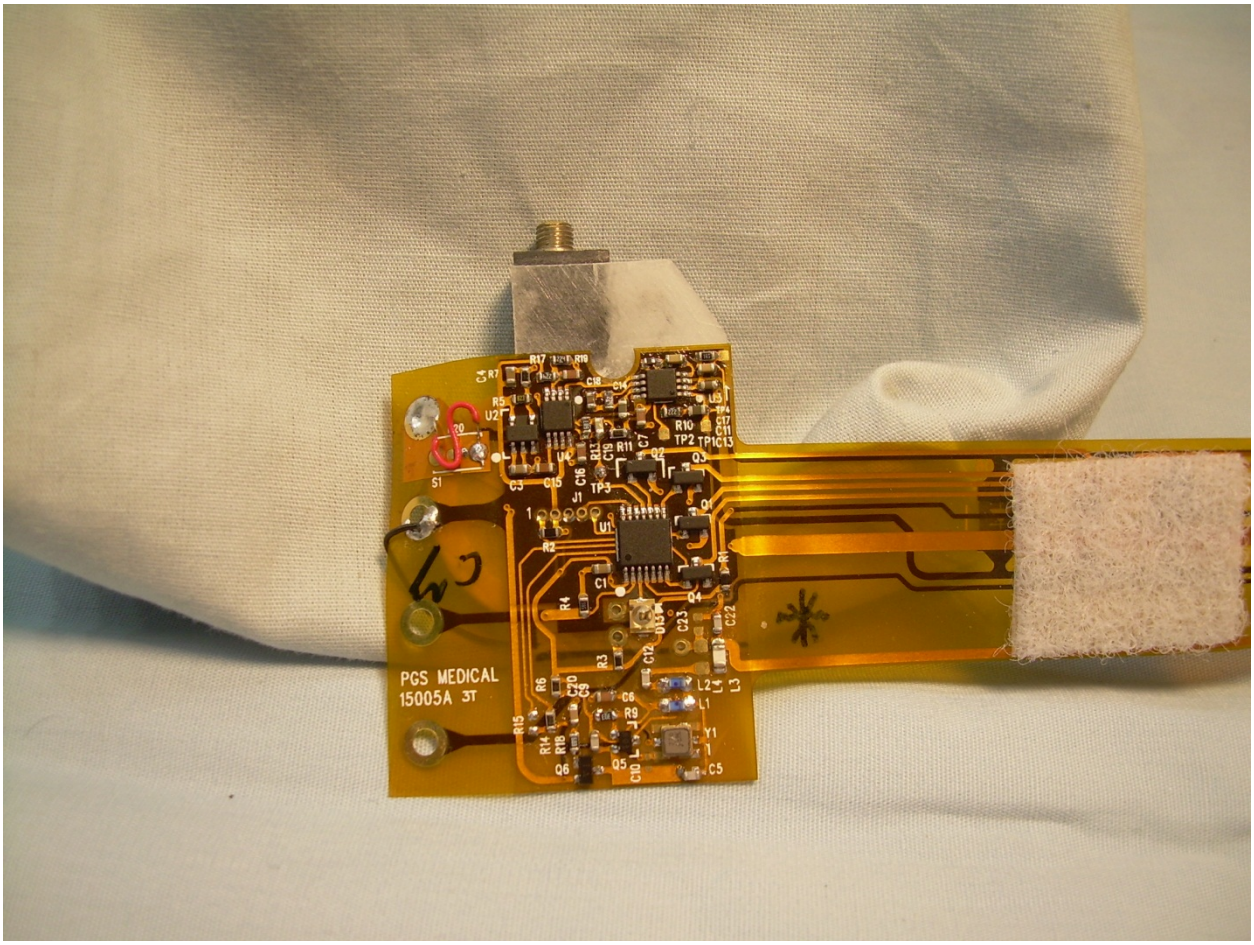
Photograph 6 – Back View of the XTMR103

Photograph 7 – View with the XTMR 103 Housing Opened

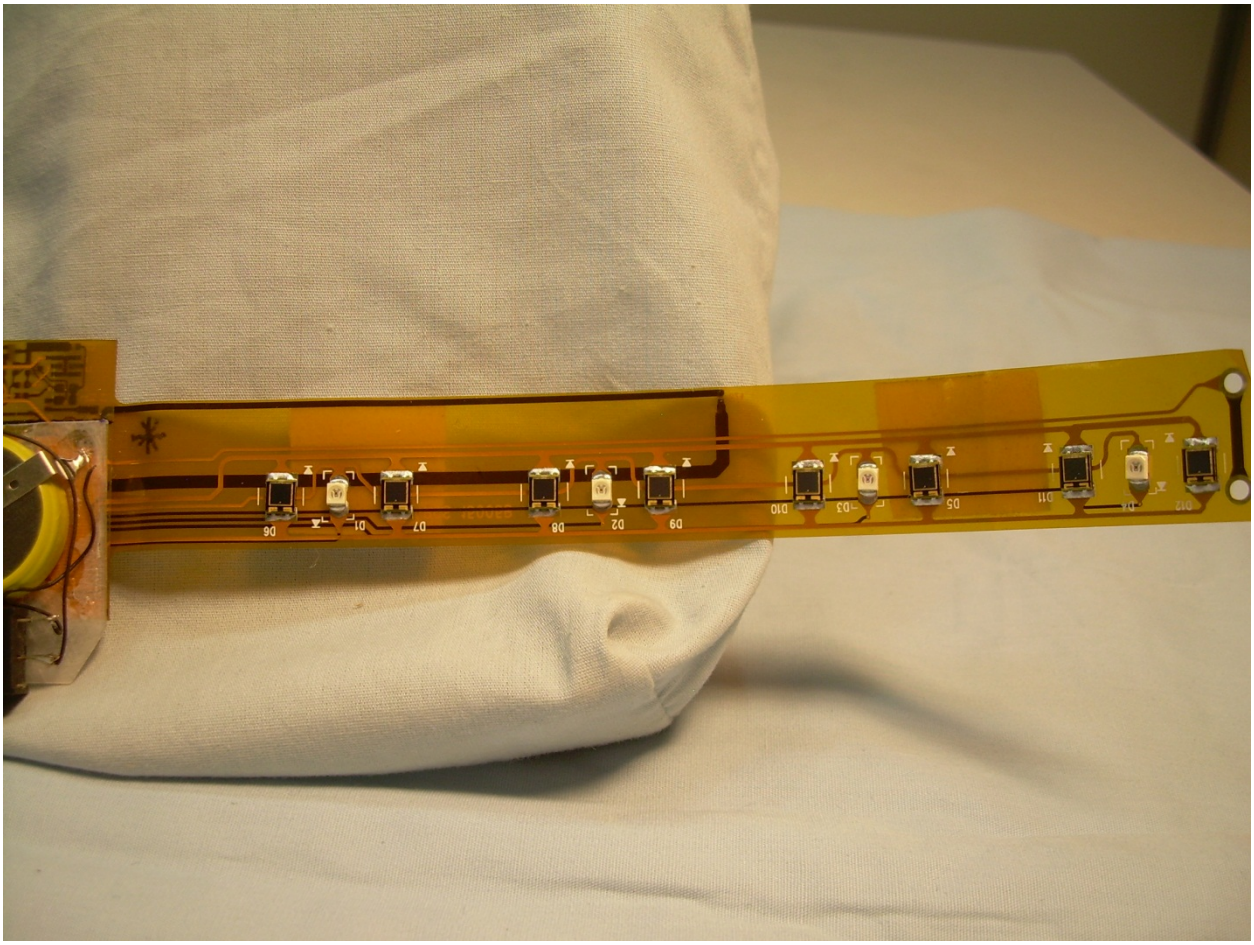
Photograph 8 – View of the Battery Side



Photograph 9 – View of the Component Side



Photograph 10 – View of the Inner Side of the Flex Band



Photograph 11 – View of the Outer Side of the Flex Band and Antenna