313 West 12800 South, Suite 311

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(801) 260-4040

Test Report

Certification

FCC ID	2ANAC-ER002
Equipment Under Test	IRXP-OE
Test Report Serial No	V048672_02
Dates of Test	July 25 and 30, 2019 and August 1, 2019
Report Issue Date	August 6, 2019

Test Specifications:	Applicant:
FCC Part 15, Subpart C	Essex Electronics 1130 Mark Street Carpinteria, CA 93013 U.S.A.

NVLAP Testing
NVLAP Lab Code 100272-0

Certification of Engineering Report

This report has been prepared by VPI Laboratories, 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 of this report may only be made with the written consent of the laboratory. The results in this report apply only to the sample tested.

Applicant	Essex Electronics
Manufacturer	Essex Electronics
Brand Name	Essex
Model Number	IRXP-OE
FCC ID	2ANAC-ER002

On this 6th day of August 2019, I, individually and for VPI Laboratories, 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 accredited the VPI Laboratories, Inc. EMC testing facilities, this report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

VPI Laboratories, Inc.

Tested by: Norman P. Hansen

Reviewed by: Benjamin N. Antczak

Revision History		
Revision	**Description**	**Date**
01	Original Report Release	August 6, 2019
02	Change FCC ID to match label and 731 form	August 27, 2019

Table of Contents

1 Client Information

1.1 Applicant

Company Name	Essex Electronics 1130 Mark Street Carpinteria, CA 93013 U.S.A.
Contact Name	Steve Petree
Title	Engineering Technician

1.2 Manufacturer

Company Name	Essex Electronics 1130 Mark Street Carpinteria, CA 93013 U.S.A.
Contact Name	Steve Petree
Title	Engineering Technician

2 Equipment Under Test (EUT)

2.1 Identification of EUT

Brand Name	Essex
Model Number	IRXP-OE
Serial Number	None
Dimensions (cm)	7.0 x 9.0 x 1.3

2.2 Description of EUT

The IRXP-OE is an interface board used in access control systems using RFID/NFC readers and a BLE transceiver. The board is powered by a host system but for testing purposes, was powered by a Phihong PSA05A-050 power supply providing 5 VDC to the system. The IRXP-OE contains a 125 MHz transmitter, a 13.56 MHz transmitter, and a BLE transceiver operating in the 2400 MHz to 2483.5 MHz ISM frequency band.

The 13.56 MHz transmitter is used with passive tags. The tags were used to modulate the emission when required in testing. The 13.56 MHz transmitter uses an Essex Electronics RPC210 printed circuit board coil antenna.

This report covers the transmitter circuitry of the devices subject to FCC Part 15, Subpart C, §15.225. The circuitry of the device subject to FCC Subpart B was found to be compliant and is covered in VPI Laboratories, Inc. report V048670. The Bluetooth LE transceiver and 125 kHz transmitter are covered in separate testing and reports.

2.3 EUT and Support Equipment

The EUT and support equipment used during the test are listed below.

Brand Name **Model Number** **Serial Number**	**Description**	**Name of Interface Ports / Interface Cables**
BN: Essex MN: IRXP-OE (Note 1) SN: None	Access control board	See Section 2.4
BN: Phihong MN: PSA05A-050 SN: None	Power supply	DC out/2 conductors
BN: Essex MN: Power/data interface card SN: None	Interface card/Host simulator	Card Interface/4 conductors (Note 2) Serial/DB9 connector with serial cable Power/2 Conductors
BN: Dell MN: Vostro SN: None	Computer	USB/USB cable with header interface and USB to serial adapter cable

Notes: (1) EUT

(2) Interface port connected to EUT (See Section 2.4)

The support equipment listed above was not modified in order to achieve compliance with this standard.

2.4 Interface Ports on EUT

Name of Ports	No. of Ports Fitted to EUT	Cable Description/Length
Power/data	1	4 conductors/12 cm

2.5 Modification Incorporated/Special Accessories on EUT

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

2.6 Deviation from Test Standard

There were no deviations from the test specification.

3 Test Specification, Methods and Procedures

3.1 Test Specification

Title	FCC PART 15, Subpart C (47 CFR 15) 15.203, 15.207, and 15.225
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 as shown in paragraphs (b) and (c) of this section, for an intentional radiator 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 boundary between the frequency ranges.

Frequency range (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15 to 0.50*	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency.

Table 1: Limits for conducted emissions at mains ports of Class B ITE.

3.2.3 §15.225 Operation Within the Band 13.110 – 14.010

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 band shall not exceed the general radiated emission limits in § 15.209.

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.

f) In the case of radio frequency powered tags designed to operate with a device authorized under this section, the tag may be approved with the device or be considered as a separate device subject to its own authorization. Powered tags approved with a device under a single application shall be labeled with the same identification number as the device.

3.3 Test Procedure

VPI Laboratories, Inc. is accredited by National Voluntary Laboratory Accreditation Program (NVLAP); NVLAP Lab Code: 100272-0, which is effective until September 30, 2019. VPI Laboratories, Inc. carries FCC Accreditation Designation Number US5263. VPI Laboratories main office is located at 313 W 12800 S, Suite 311, Draper, UT 84020. The testing was performed according to the procedures in ANSI C63.10-2013, and 47 CFR Part 15 at the VPI Laboratories, Inc. Wanship Upper Open Area Test Site, located at 29145 Old Lincoln Highway, Wanship, UT. This location is listed on NVLAP scope under the lines for C63.4 and C63.10.

4 Operation of EUT During Testing

4.1 Operating Environment

Power Supply	120 VAC/60 Hz to power supply that provided 5 VDC to the EUT

4.2 Operating Modes

The transmitter was tested on 3 orthogonal axes while in a constant transmit mode. The other transmitters in the device were active transmitting in the 2400 – 2483.5 MHz band and 125 kHz. The voltage to the EUT was varied as required by §15.31(e) with no change seen in the transmitter characteristics.

4.3 EUT Exercise Software

Internal firmware was used to activate the 13.56 MHz and 125 kHz transmitters. HID Global test software was used to exercise the Bluetooth LE module.

5 Summary of Test Results

5.1 FCC Part 15, Subpart C

5.1.1 Summary of Tests

Part 15, Subpart C Reference	Test Performed	Frequency Range (MHz)	Result
15.203	Antenna Requirement	N/A	Complied
15.207	Conducted Disturbance at Mains Ports	0.15 to 30	Complied
15.225(a)	Field Strength	13.553 – 13.567	Complied
15.225(b)	Field Strength	13.410 -13.553 13.567 – 13.710	Complied
15.225(c)	Field Strength	13.110 – 13.410 13.710 – 14.010	Complied
15.225(d)	Field Strength	0.009 – 13.110 14.010 - 12400	Complied
15.225(e)	Frequency Stability	13.110 – 14.010	Complied
---	Emission Bandwidth	13.56	Reported

5.2 Result

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

6 Measurements, Examinations and Derived 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 Section 7 of this report.

6.2 Test Results

6.2.1 §15.203 Antenna Requirements

The 13.56 MHz transmitter antenna is a printed circuit board with a printed coil. The antenna feed lines are soldered to the card reader module.

Result

The EUT complied with the specification

6.2.2 §15.207 Conducted Emissions at the AC Mains

Frequency (MHz)	AC Mains Lead	Detector	Measured Level (dBμV)	Limit (dBμV)	Margin (dB)
0.75	Hot Lead	Peak (Note 1)	32.3	46.0	-13.7
0.85	Hot Lead	Peak (Note 1)	34.0	46.0	-12.0
0.96	Hot Lead	Peak (Note 1)	33.5	46.0	-12.5
18.25	Hot Lead	Peak (Note 1)	36.6	50.0	-13.4
18.98	Hot Lead	Peak (Note 1)	36.8	50.0	-13.2
19.75	Hot Lead	Peak (Note 1)	36.2	50.0	-13.8
0.33	Neutral Lead	Peak (Note 1)	35.8	49.6	-13.8
0.75	Neutral Lead	Peak (Note 1)	33.2	46.0	-12.8
0.85	Neutral Lead	Peak (Note 1)	33.9	46.0	-12.1
4.54	Neutral Lead	Peak (Note 1)	32.0	46.0	-14.0
18.38	Neutral Lead	Peak (Note 1)	37.3	50.0	-12.7
19.10	Neutral Lead	Peak (Note 1)	37.1	50.0	-12.9

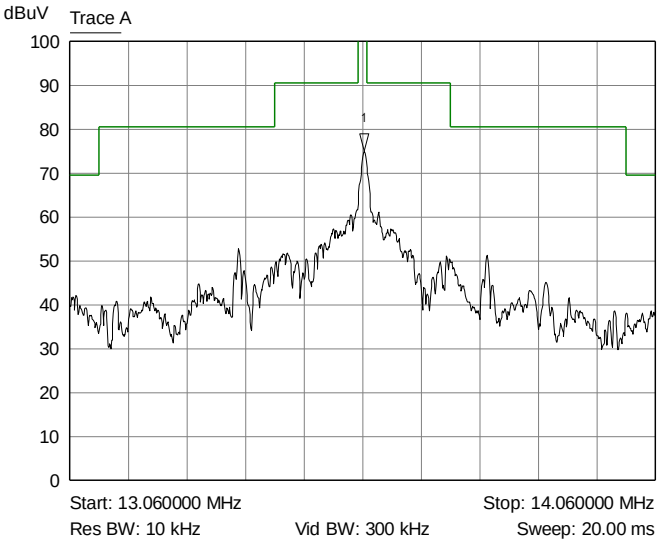
Note 1: The reference detector used for the measurements was Quasi-Peak or Peak and the data was compared to the average limit; therefore, the EUT was deemed to meet both the average and quasi-peak limits.
Note 2: The reference detector used for the measurements was quasi-peak and average and the data was compared to the respective limits.

Result

The EUT complied with the specification limit by a margin of 12.0 dB.

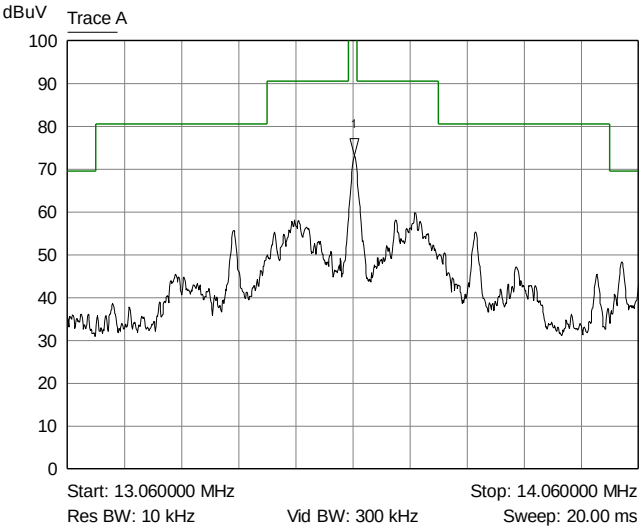
6.2.3 §15.225 (a) – (c) Radiated Disturbance Data (13.110 – 14.010 MHz)

The plots below show the fundamental frequency compared to the limits of FCC §15.225 (a) – (c).



Mkr	X-Axis	Value	Notes
1 ▽	13.562000 MHz	75.0000 dBuV	

Graph 1: Plot of Fundamental Frequency – no tag



Mkr	X-Axis	Value	Notes
1 ▽	13.562000 MHz	73.1000 dBuV	

Graph 2: Plot of Fundamental Frequency – with tag

Result

The EUT complied with the specification for emissions in the band 13.110 to 14.010 MHz.

6.2.4 §15.225 (d) Radiated Disturbance Data (0.009 – 1000 MHz, excluding the range 13.110 – 14.010 MHz)

The transmitter was tested for spurious emissions from 0.009 – 12400 MHz using the limits of §15.209. The worst-case emission test data is shown in the table below. The EUT was also tested for emissions from the digital circuitry of the device using the limits of §15.209 and was found to be compliant. The results of this testing is shown in VPI Laboratories, Inc. report V048670.

Vertical Polarity

Frequency (MHz)	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
27.12	Peak (Note 1 and 2)	3.3 (Note 3)	11.3	17.6	29.5	-11.9
40.76	Peak (Note 1)	8.0	18.2	26.2	40.0	-13.8
54.32	Peak (Note 1)	12.3	14.7	27.0	40.0	-13.0
67.88	Peak (Note 1)	11.2	14.8	26.0	40.0	-14.0
122.12	Peak (Note 1)	9.8	15.8	25.6	40.0	-14.4
149.24	Peak (Note 1)	7.8	17.6	25.4	43.5	-18.1
230.52	Peak (Note 1)	20.7	20.5	41.2	46.0	-4.8
406.80	Peak (Note 1)	11.3	28.0	39.3	46.0	-6.7

Note 1: The reference detector used for the measurements was peak or quasi-peak and the data was compared to the quasi-peak limit.

Note 2: Active Loop antenna was used for these measurements

Note 3: At frequencies below 30 MHz, prescans were made at 10 meters and 20 meters. In order to have the emission well above the noise floor, a measurement distance was 3 meters was used and the measurement adjusted accordingly using an inverse proportionality factor of 40 dB per decade. At frequencies above 30 MHz, the measurement distance was 3 meters.

Horizontal Polarity

Frequency (MHz)	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
54.24	Peak (Note 1)	6.8	14.6	21.4	40.0	-18.6
230.52	Peak (Note 1)	16.9	20.7	37.6	46.0	-8.4
393.24	Peak (Note 1)	14.4	27.6	42.0	46.0	-4.0
406.80	Peak (Note 1)	14.5	28.0	42.5	46.0	-3.5
420.36	Peak (Note 1)	13.6	28.0	41.6	46.0	-4.4
433.92	Peak (Note 1)	12.1	28.1	40.2	46.0	-5.8

Frequency (MHz)	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Note 1: The reference detector used for the measurements was peak or quasi-peak and the data was compared to the quasi-peak limit. Note 2: Active Loop antenna was used for these measurements Note 3: At frequencies below 30 MHz, prescans were made at 10 meters and 20 meters. In order to have the emission well above the noise floor, a measurement distance was 3 meters was used and the measurement adjusted accordingly using an inverse proportionality factor of 40 dB per decade. At frequencies above 30 MHz, the measurement distance was 3 meters.						

Result

The EUT complied with the specification for emissions outside the band 13.110 to 14.010 MHz by 3.5 dB.

6.2.5 §15.225(e) Frequency Stability

The EUT was tested for frequency stability as specified in §15.225(e). The transmitter transmits at 13.559417 Hz. The transmitter is allowed a deviation of 0.01% or 1355.9 Hz.

(ºC)	Frequency (Hz) over Time (Minutes)				Deviation (Hz)			
	Startup	2	5	10 min	Min Freq	Deviation	Max Freq	Deviation
50	13559351	13559351	13559351	13559351	13559351	-66	13559351	-66
40	13559371	13559373	13559373	13559373	13559371	-46	13559373	-44
30	13559397	13559397	13559396	13559395	13559395	-23	13559397	-20
20	13559423	13559421	13556417	13559417	13559417	0	13559423	5
10	13559440	13559436	13559436	13559438	13559436	19	13559440	23
0	13559452	13559452	13559450	13559450	13559450	33	13559452	35
-10	13559445	13559445	13559450	13559446	13559445	28	13559450	33
-20	13559398	13559405	13559405	13559409	13559398	-19	13559409	-8

Table 2: Frequency vs Temperature Stability

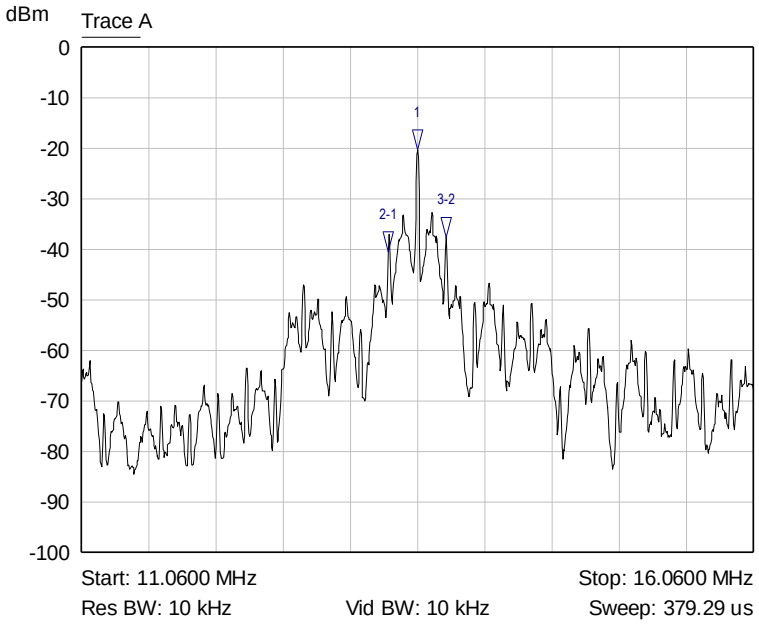
The 13.56 MHz module has its own voltage regulation. Varying the voltage ±15% does not change the transmitter fundamental frequency. The EUT transmits at 13,559,417 Hz.

Result

The EUT complied with the specification as the fundamental frequency was maintained with ± 0.01% of the operating frequency through the tests.

6.2.6 Emission 20 dB Bandwidth

The 20 dB bandwidth of the emission when modulated is reported as 435 kHz. See the plot below.



Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	13.5600 MHz	-20.32 dBm	
2-1 ▽	Trace A	-220.0000 kHz	-20.18 dB	
3-2 ▽	Trace A	435.0000 kHz	2.79 dB	

6.3 Sample Field Strength Calculation

The field strength is calculated by adding the *Correction Factor* (*Antenna Factor* + *Cable Factor*), to the measured level from the receiver. The receiver amplitude reading is compensated for any amplifier gain. The basic equation with a sample calculation is shown below:

$$Receiver\ Amplitude\ Reading = Receiver\ Reading - Amplifier\ Gain$$

$$Correction\ Factor = Antenna\ Factor + Cable\ Factor$$

$$Field\ Strength = Receiver\ Amplitude\ Reading + Correction\ Factor + Averaging\ Factor$$

Example

Assuming a *Receiver Reading* of 42.5 dBµV is obtained from the receiver, the *Amplifier Gain* is 26.5 dB the *Antenna Factor* is 4.5 dB, the *Cable Factor* is 4.0 dB, and the *Averaging Factor* is -6.0. The *Field Strength* is calculated by subtracting the *Amplifier Gain* and adding the *Correction Factor* and *Averaging Factor*, giving a *Field Strength* of 18.5 dBµV/m.

$$Receiver\ Amplitude\ Reading = 42.5 - 26.5 = 16.0\ \text{dBµV/m}$$

$$Correction\ Factor = 4.5 + 4.0 = 8.5\ \text{dB}$$

$$Averaging\ Factor = -6.0$$

$$Field\ Strength = 16.0 + 8.5 + (-6.0) = 18.5\ \text{dBµV/m}$$

7 Test Procedures and Test Equipment

7.1 Conducted Emissions at Mains Ports

The conducted emissions at mains and telecommunications ports from the EUT were measured using a spectrum analyzer with a quasi-peak adapter for peak, quasi-peak and average readings. The quasi-peak adapter uses a bandwidth of 9 kHz, with the spectrum analyzer's resolution bandwidth set at 100 kHz, for readings in the 150 kHz to 30 MHz frequency ranges.

The conducted emissions at mains ports measurements are performed in a screen room using a (50 Ω/50 µH) Line Impedance Stabilization Network (LISN).

Where mains flexible power cords are longer than 1 m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4 m in length.

Where the EUT is a collection of devices with each device having its own power cord, the point of connection for the LISN is determined from the following rules:

- Each power cord, which is terminated in a mains supply plug, shall be tested separately.
- Power cords, which are not specified by the manufacturer to be connected via a host unit, shall be tested separately.
- Power cords which are specified by the manufacturer to be connected via a host unit or other power supplying equipment shall be connected to that host unit and the power cords of that host unit connected to the LISN and tested.
- Where a special connection is specified, the necessary hardware to effect the connection is supplied by the manufacturer for the testing purpose.
- When testing equipment with multiple mains cords, those cords not under test are connected to an artificial mains network (AMN) different than the AMN used for the mains cord under test.

For testing, desktop EUT are placed on a non-conducting table at least 0.8 meters from the metallic floor and placed 40 cm from the vertical coupling plane (copper plating in the wall behind EUT table). Floor standing equipment is placed directly on the earth grounded floor.

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
Spectrum Analyzer	Hewlett Packard	8566B	V048078	05/26/2019	05/26/2020
Quasi-Peak Detector	Hewlett Packard	85650A	V039474	05/02/2018	05/02/2020
LISN	Teseq	NNB 51	V045406	07/13/2018	07/13/2020
Conductance Cable Wanship Upper Site	VPI Labs	Cable J	V034832	01/08/2019	01/08/2020
Filter	VPI Labs	47038	V047038	01/03/2019	01/03/2020
Test Software (AC)	VPI Labs	Revision 01	V035674	N/A	N/A

Table 3: List of equipment used for conducted emissions testing at mains ports.

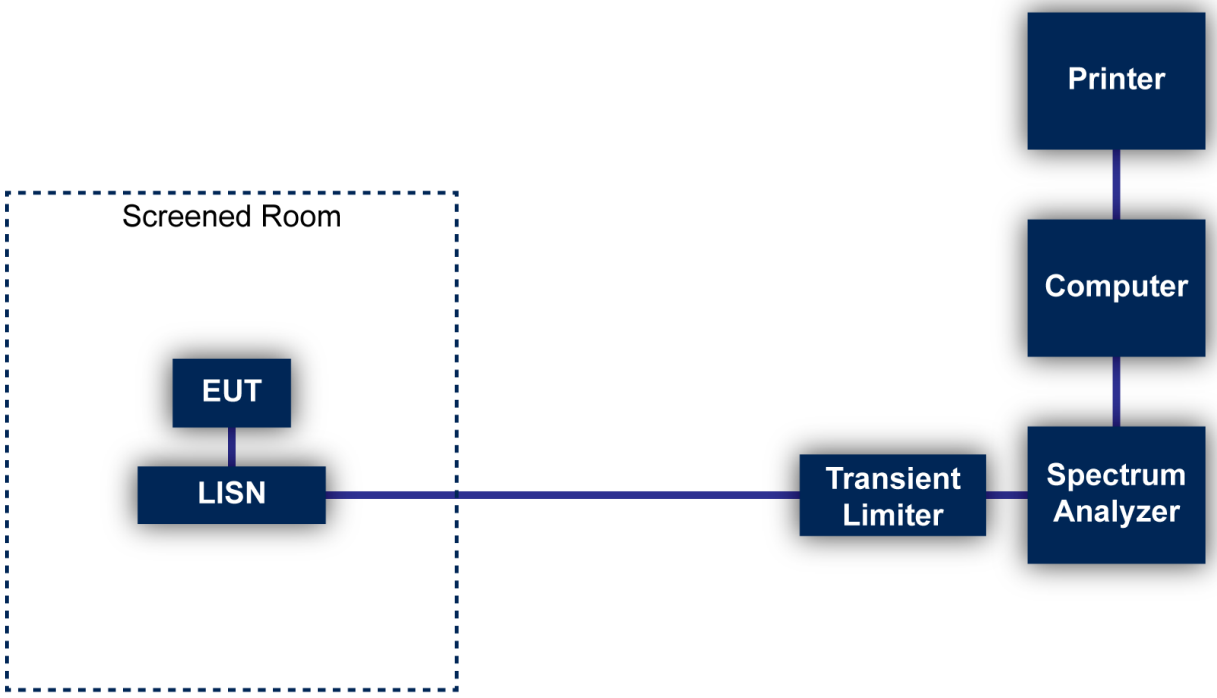


Figure 1: Conducted Emissions Test

7.2 Radiated Emissions

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

A preamplifier with a fixed gain of 51 dB was 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 frequencies below 30 MHz, a 9 kHz resolution bandwidth was used. For frequencies above 1000 MHz, a 1 MHz resolution bandwidth was used.

A loop antenna was used to measure frequencies below 30 MHz. A biconilog antenna was used to measure the frequency range of 30 to 1000 MHz, at a distance of 3 meters from the EUT. The readings obtained by these antennas are correlated to the levels obtained with a tuned dipole antenna by adding antenna factors. A double-ridged guide antenna was used to measure the emissions at frequencies above 1000 MHz at a distance of 3 meters from the EUT.

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 emissions. 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. For frequencies above 1000 MHz, the EUT is placed on a table 1.5 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 emissions testing 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	Asset Number	Date of Last Calibration	Due Date of Calibration
Spectrum Analyzer/Receiver	Rohde & Schwarz	FSV40	V044352	04/01/2019	04/01/2020
Spectrum Analyzer	Hewlett Packard	8566B	V048078	05/26/2019	05/26/2020
Quasi-Peak Detector	Hewlett Packard	85650A	V039474	05/02/2018	05/02/2020
Loop Antenna	EMCO	6502	V034216	02/11/2019	02/11/2021
Biconilog Antenna	EMCO	3142E-PA	V035736	07/05/2018	07/05/2020
Double Ridged Guide Antenna	EMCO	3115	V033469	04/13/2018	04/13/2020
High Frequency Amplifier	Miteq	AFS4-001018000-35-10P-4	V033997	01/08/2019	01/08/2020
6’ High Frequency Cable	Microcoax	UFB197C-0-0720-000000	V033638	01/08/2019	01/08/2020
20’ High Frequency Cable	Microcoax	UFB197C-1-3120-000000	V033979	01/08/2019	01/08/2020
3 Meter Radiated Emissions Cable Wanship Upper Site	Microcoax	UFB205A-0-4700-000000	V033639	01/08/2019	01/08/2020
Test Software (FCC)	VPI Labs	Revision 01	V035673	N/A	N/A

Table 4: List of equipment used for radiated emissions testing.

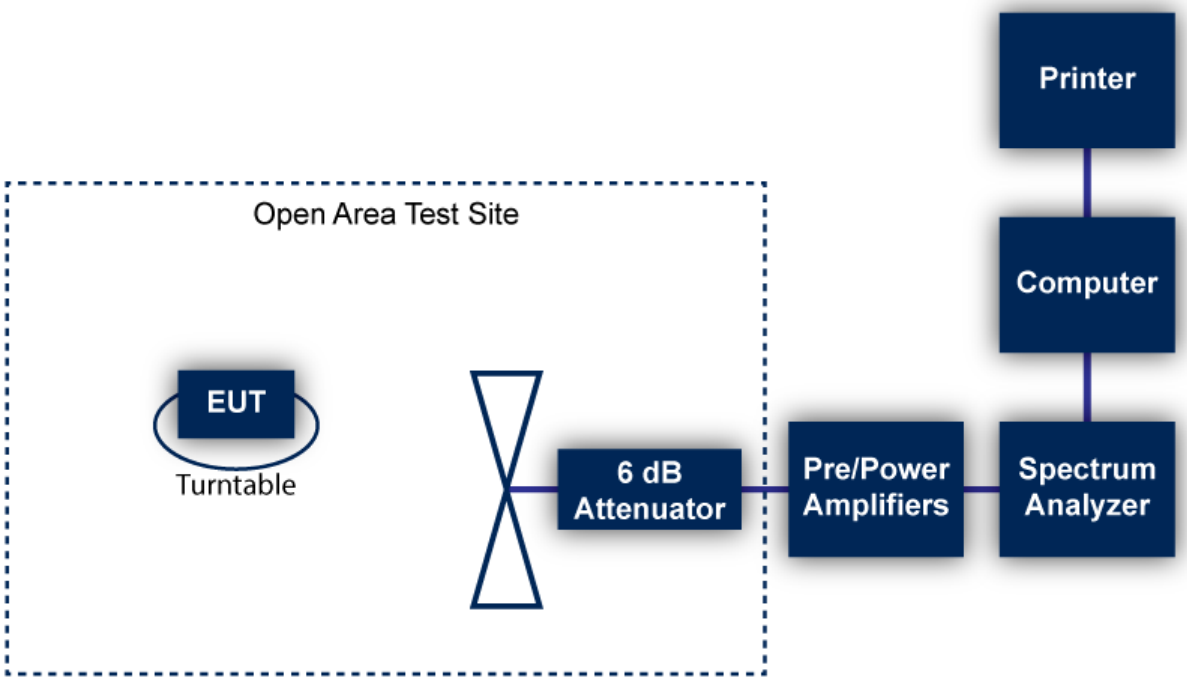


Figure 2: Radiated Emissions Test

7.3 Frequency Stability with Temperature and Voltage

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
Spectrum Analyzer/Receiver	Rohde & Schwarz	FSV40	V044352	04/01/2019	04/01/2020
Datalogger	Keysight	34972A	V041813	10/10/2017	10/10/2019

7.4 Equipment Calibration

All applicable equipment is calibrated using either an independent calibration laboratory or VPI Laboratories, Inc. personnel at intervals defined in ANSI C63.4:2014 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.

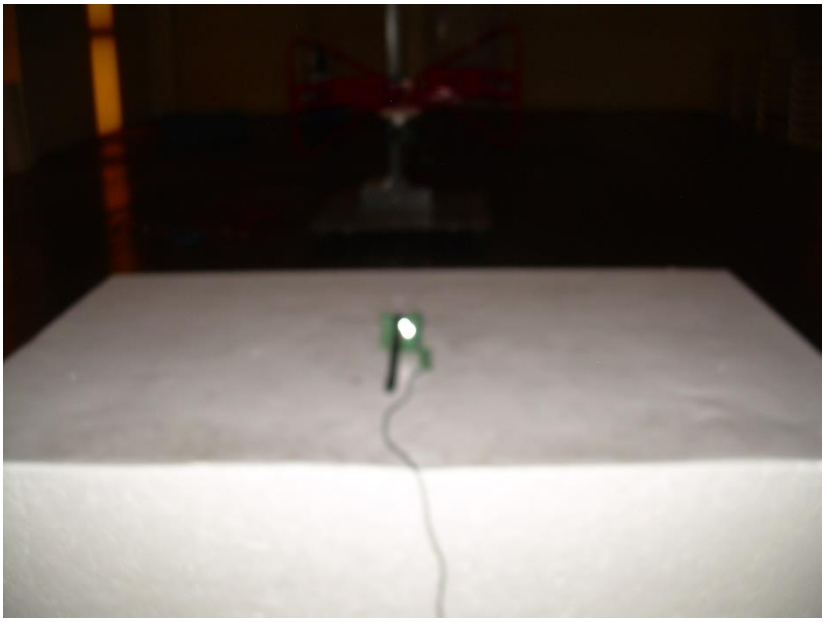
7.5 Measurement Uncertainty

Test	Uncertainty (±dB)	Confidence (%)
Conducted Emissions	2.8	95
Radiated Emission (9 kHz to 30 MHz)	3.3	95
Radiated Emissions (30 MHz to 1 GHz)	3.4	95
Radiated Emissions (1 GHz to 18 GHz)	5.0	95

8 Photographs

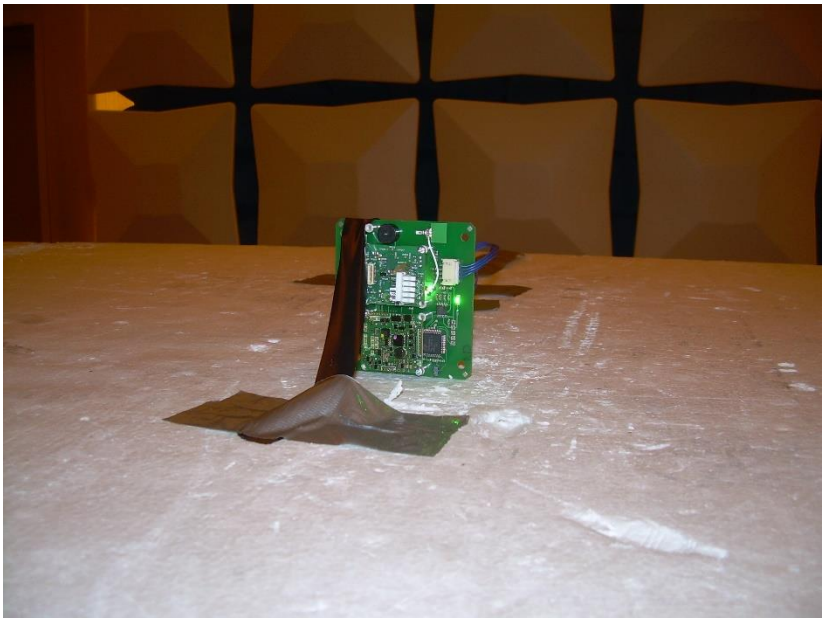
Photograph 1: Front View Radiated Emissions Configuration – Below 30 MHz

Photograph 2: Front View Radiated Emissions Configuration - 30 MHz – 1000 MHz

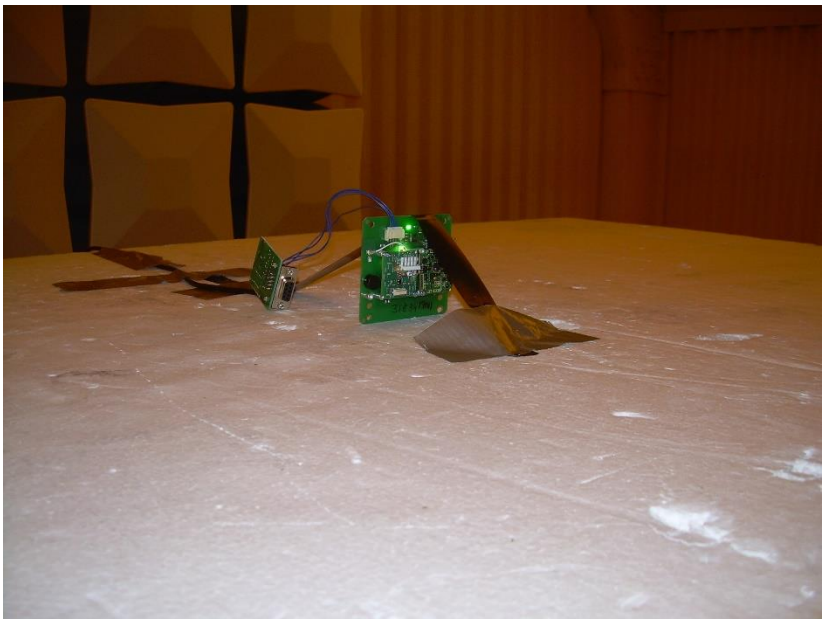


Photograph 3 – Back View Radiated Emissions Configuration - 30 MHz – 1000 MHz

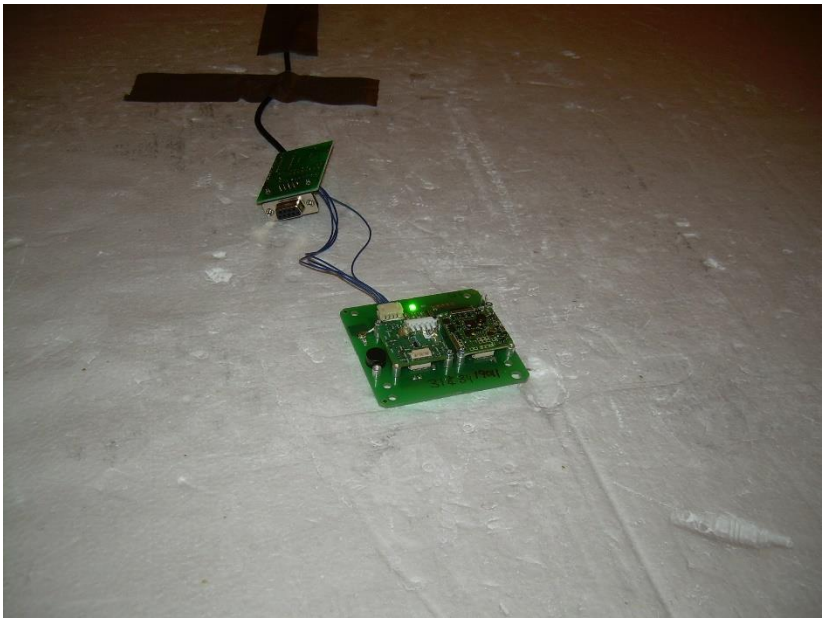
Photograph 4 – Front View Radiated Emissions Configuration – Above 1000 MHz



Photograph 5 – On Edge Configuration

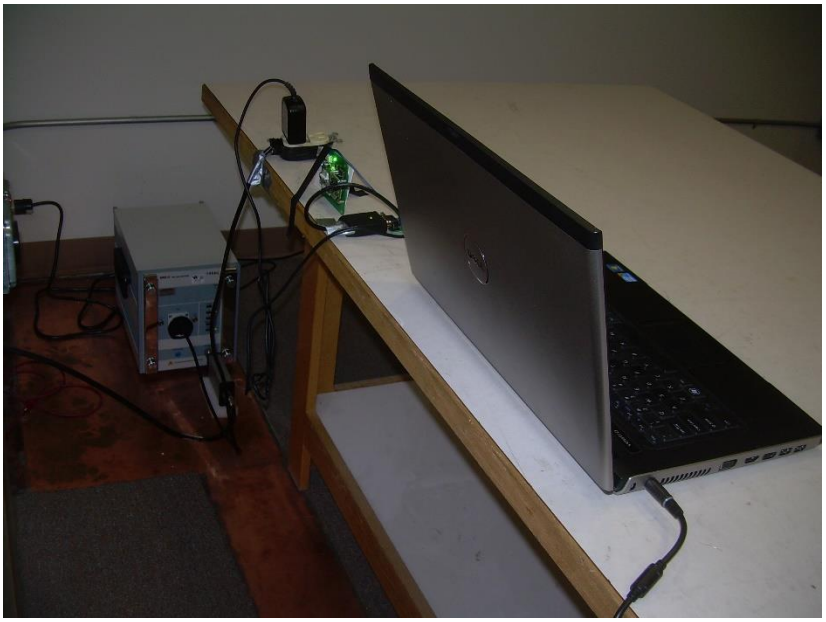


Photograph 6 – Vertical Configuration

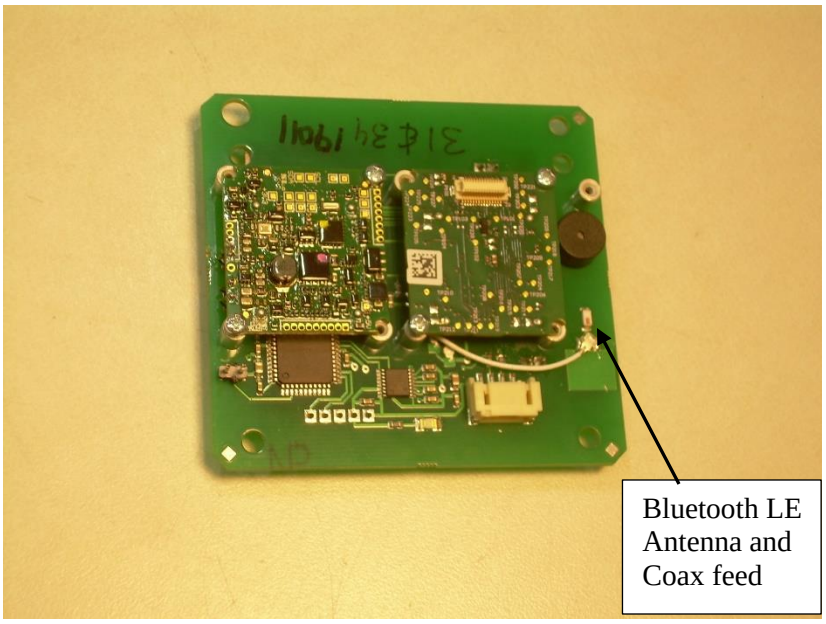


Photograph 7 – Flat Configuration

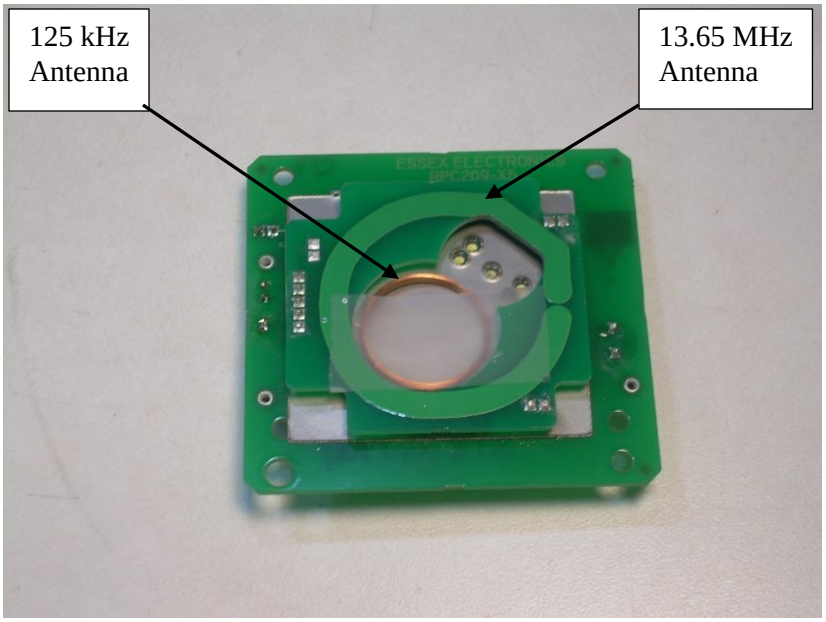
Photograph 8 – Front View Conducted Emission Configuration



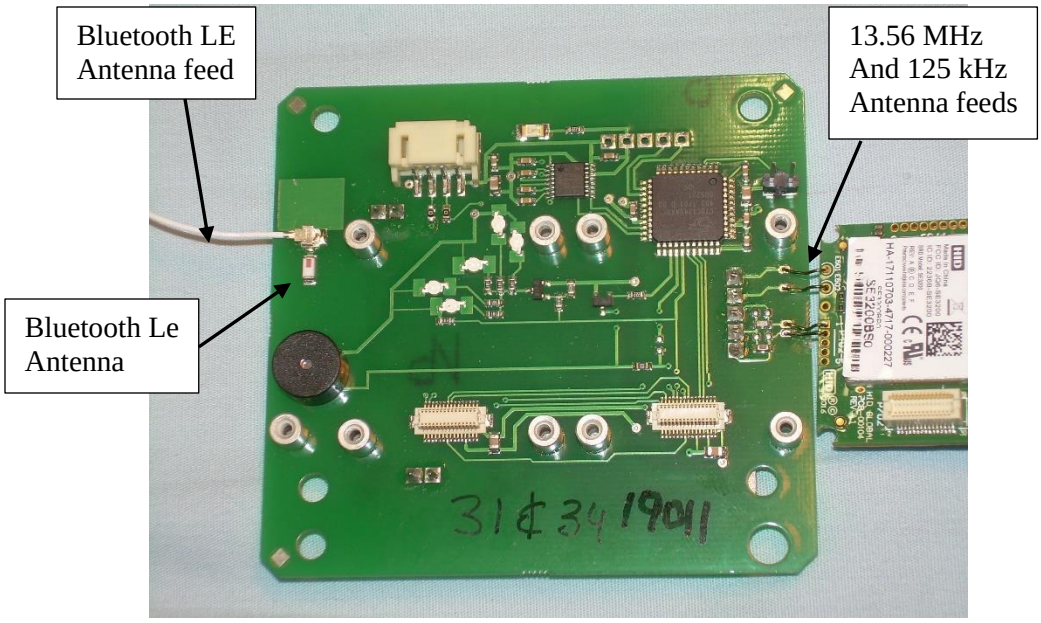
Photograph 9 – Back View Conducted Emissions Configuration



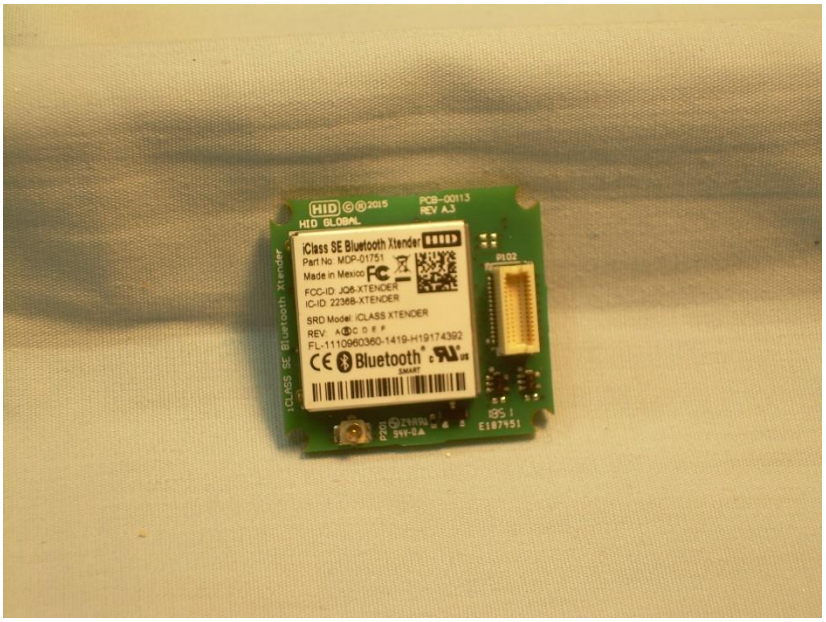
Photograph 10 – Front View of the EUT



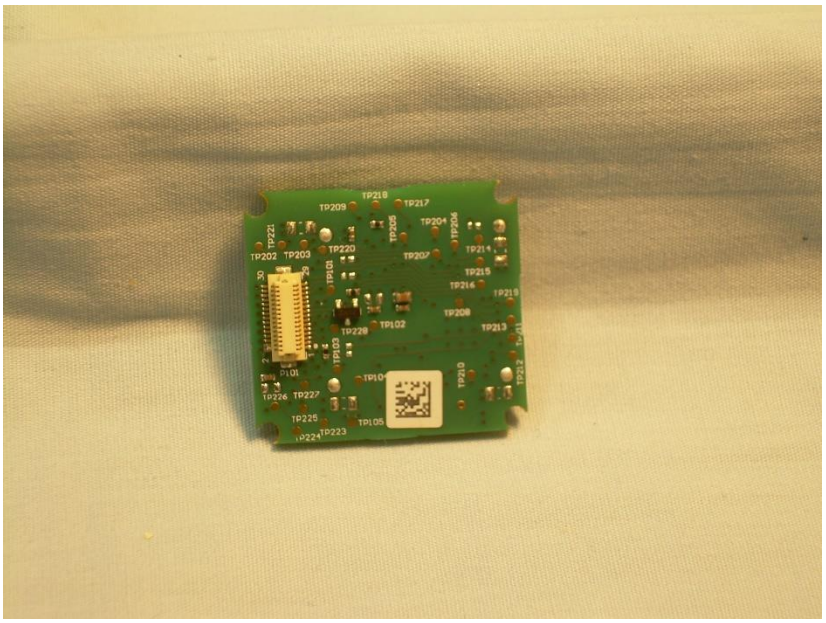
Photograph 11 – Back View of the EUT



Photograph 12 – Front View of the EUT With the Bluetooth LE and RFID/NFC Modules Removed

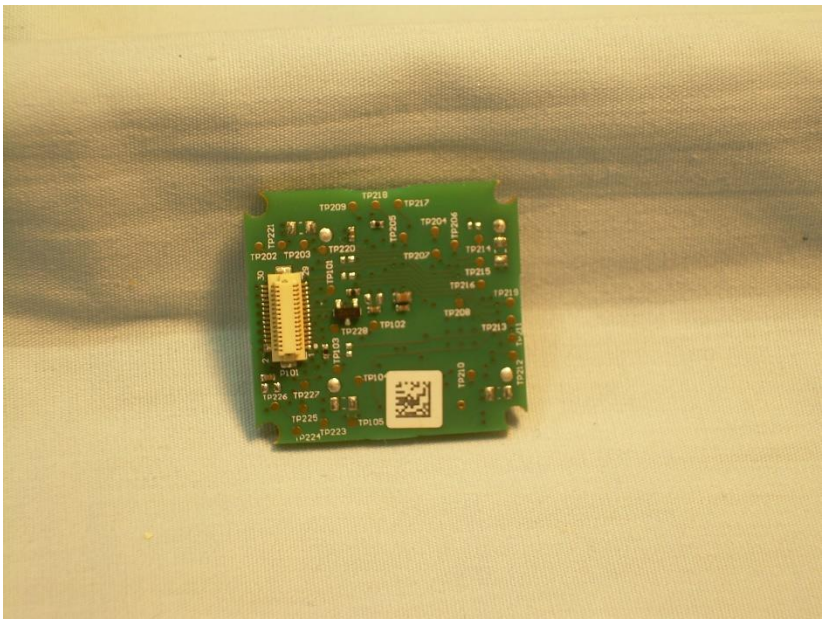


Photograph 13 – Front View of the Bluetooth LE Module



Photograph 14 – Back View of the Bluetooth LE Module

Photograph 15 – Front View of the RFID/NFC Module



Photograph 16 – Back View of the RFID/NFC Module

--- End of Report ---