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FCC PART 15.247

CLASS II PERMISSIVE CHANGE

2.4 GHz DTS TEST REPORT

Applicant	**ETECTRX, INC.**
Address	**107 SW 140th TERRACE**
	SUITE 1
	NEWBERRY FL 32669
FCC ID	**2AL2U-BRCM1078**
Model Number	etectRX Reader 2.05
Product Description	etectRX Reader 2.05
Date Sample Received	5/15/2017
Final Test Date	5/15/2017
Tested By	Tim Royer
Approved By	Sid Sanders

Report Number	Version Number	Description	Issue Date
814BUT17TestReport	Rev1	Initial Issue	5/15/2017
	Rev2	Revised Report	10/19/2017
	Rev3	Updated FCC ID	6/13/2018

TIMCO ENGINEERING, Inc.

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GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

Summary

The device under test does:

☒ Fulfill the general approval requirements as identified in this test report and was selected by the customer.

☐ Not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669

Tested by:
Name and Title: Tim Royer, Project Manager/Testing Engineer

Sr. EMC Engineer
EMC-003838-NE

Date: 5/19/2017

Reviewed and approved by: _____
Name and Title: Sid Sanders, Engineer

Date: 10/9/2017

GENERAL INFORMATION

EUT Specification

Regulatory Standards	FCC Title 47 CFR Part 15.247		
FCC ID	**2AL2U-BRCM1078**		
Model	etectRX Reader 2.05		
EUT Description	etectRX Reader 2.05		
Modulation Type	Bluetooth LE (GFSK 1 Mbps)		
Operating Frequency	TX: 2400 MHz	RX: 2400 MHz	
EUT Power Source	☐ 110–120Vac/50– 60Hz		
	☐ DC Power		
	☒ Battery Operated Exclusively		
Test Item	☐ Prototype	☒ Pre-Production	☐ Production
Type of Equipment	☐ Fixed	☐ Mobile	☒ Portable
Antenna Connector	Integrated		
Antenna	Integrated		
Test Facility	**Timco Engineering Inc. located at 849 NW State Road 45 Newberry, FL 32669 USA.**		
Test Conditions	Temperature: 24-26ºC Relative humidity: 50-65%		
Measurement Standard	ANSI C63.10-2013 (Measurement Procedures) ANSI C63.4-2014 (Radiated Site Validation)		
Test Exercise	The EUT was operating nomally		

Test Supporting Equipment

Device	Manufacturer	Model	S/N	Supplied By	Used For
N/A					

RESULTS SUMMARY

FCC Rule Part No.	IC Standard Ref.	Requirement	Test Item	Result
15.247(b)	RSS-247 § 5.4	Transmitter Output Power and Equivalent Isotropically Radiated Power	Peak Power Output (ERP)	Pass
			Antenna Gain (EIRP)	Pass
15.247(d)	RSS-247 § 5.5	Unwanted Emissions	Bandedge	Pass
			Radiated Spurious	Pass

Notes:

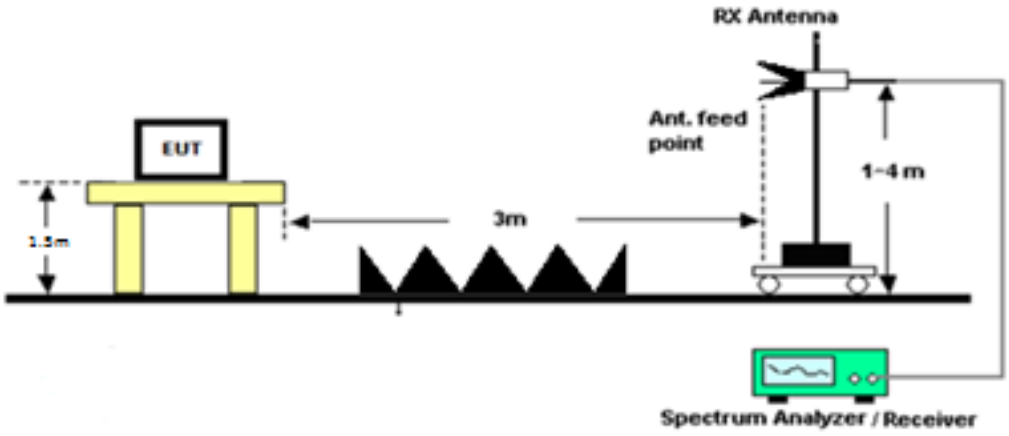
PEAK POWER OUTPUT

Rules Part No.: FCC 15.247(b) (3) (4), IC RSS 247 § 5.4.4

Requirements: Maximum Conducted Peak Power Output shall not exceed 1 Watt
Also the Peak Power Output shall not exceed 4 Watts EIRP

Test Method: ANSI C63.10 § 11.2 Power Limits, definitions, and device configuration
ANSI C63.10 § 11.9.1.1 Fundamental Output Power RBW ≥ DTS Bandwidth
ANSI C63.10 § 6.3 Radiated Emissions testing- Common
ANSI C63.10 § Annex G Relationship among Field Strength and ERP/EIRP

Setup:



PEAK POWER OUTPUT

Field Strength Conversion Formula: eirp = $(E \times d)^2/30$

E = electric field strength in V/m,
d = measurement distance in meters (m).

EIRP to ERP Conversion Formula: erp = eirp/1.64

Test Data: **Peak Power Output Measurement Table**

Peak Power Output EIRP			
Tuned Frequency (MHz)	3M Field Strength (dBuV/M)	EIRP (W)	Margin (W)
2480	84.31	0.00008	3.999919

Peak Power Output ERP		
Tuned Frequency (MHz)	ERP (W)	Margin (W)
2480	0.00005	0.99995

RESULTS: Meets Requirements

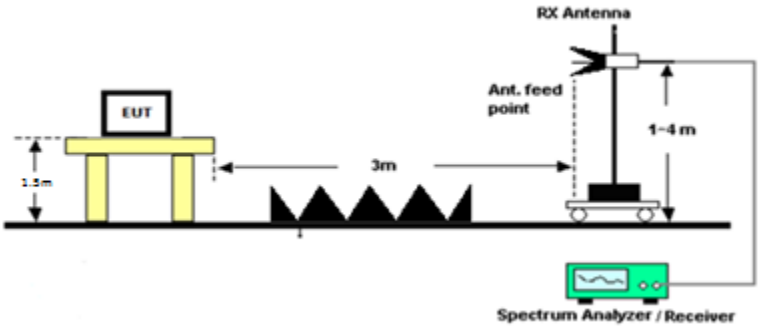
BANDEDGE

Rule Part No.: FCC 15.247(d), IC RSS 247 § 5.5

Requirements: Emissions must be at least 20dB down from the highest emission level Within the authorized band as measured with a 100 kHz RBW.

Test Method: ANSI C63.10 § 6.10.4 Authorized band-edge relative method (non-restricted
NSI C63.10 § 6.10.6 Marker Delta Method (restricted band edge)
ANSI C63.10 § 6.3 Radiated Emissions testing- Common

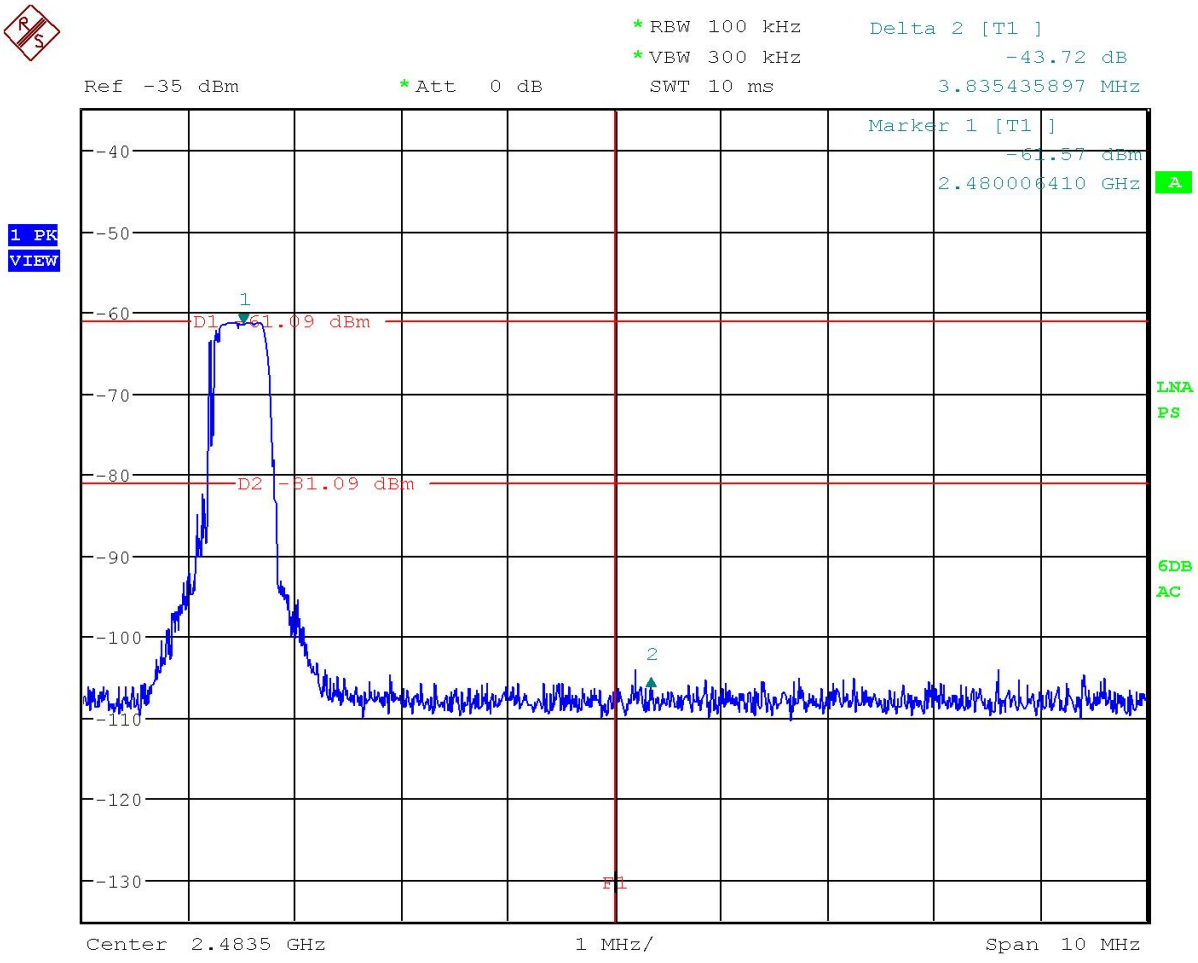
Setup:



BANDEDGE

Test Data: **Upper Band Edge Plot Marker Delta Method**

Field Strength of Carrier (dBuV/m)	Emission Level Below Carrier (dB)	Field Strength of Emission (dBuV/m)	Emission Limit (dBuV/m)	Margin (dB)
84.31	43.72	40.59	74	33.41
75.17	43.72	31.45	54	22.55

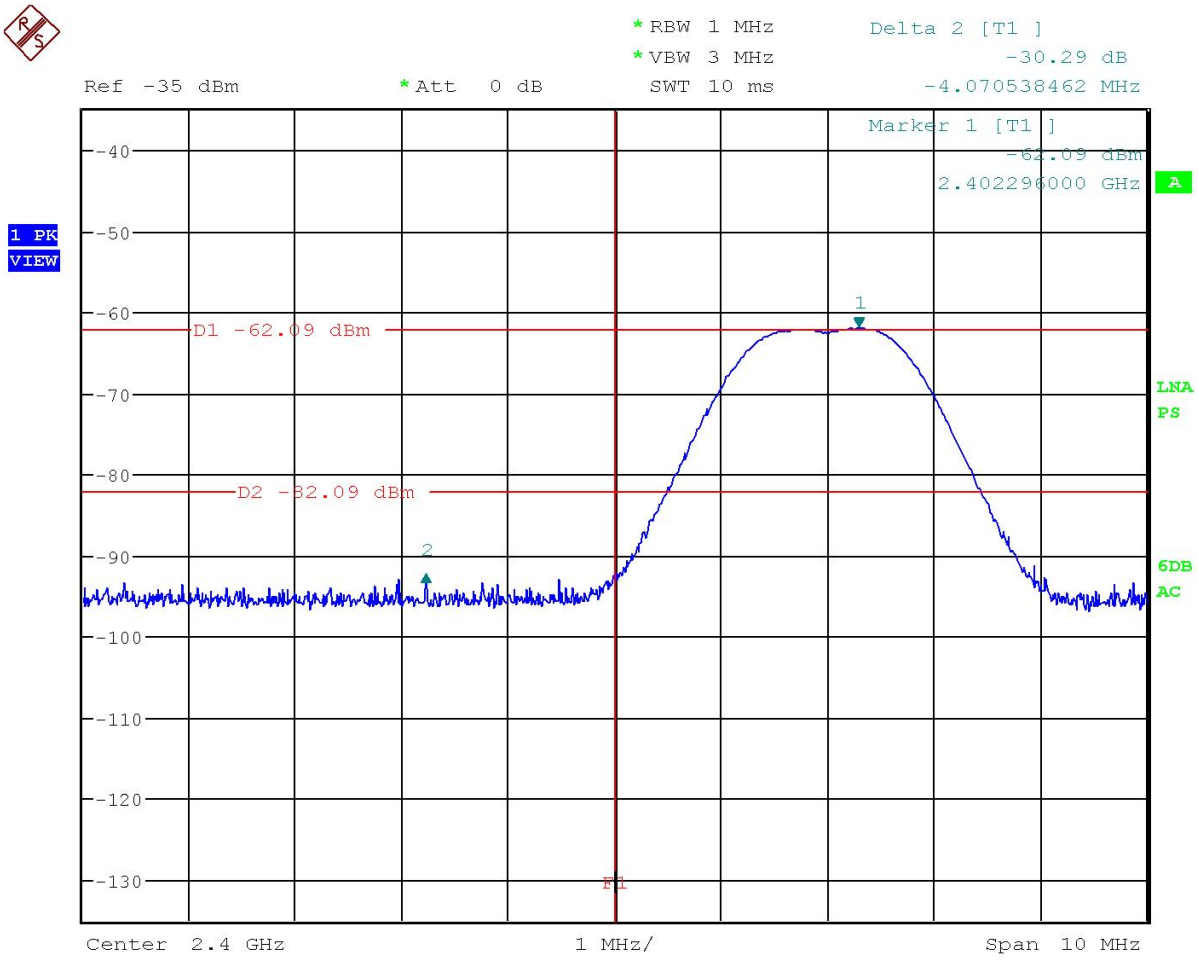


Date: 16.MAY.2017 10:05:20

RESULTS: Meets Requirements

BANDEDGE

Test Data: **Lower Band Edge Plot**



Date: 16.MAY.2017 09:18:04

RESULTS: Meets Requirements

RADIATED SPURIOUS EMISSIONS

Rules Part No.: FCC part 15.247 (d) & 15.209, IC RSS 247 § 5.5 & RSS GEN § 8.9

Requirements: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below

In addition, Emissions found in restricted bands the levels must comply with the general limits found in FCC part 15.209

Frequency	Limits
FCC Part 15.209, IC RSS-GEN 8.9	
9 to 490 kHz	2400/F (kHz) µV/m @ 300 meters
490 to 1705 kHz	24000/F (kHz) µV/m @ 30 meters
1705 kHz to 30 MHz	29.54 dBµV/m @ 30 meters
30 – 88	40.0 dBµV/m @ 3 meters
80 – 216	43.5 dBµV/m @ 3 meters
216 – 960	46.0 dBµV/m @ 3 meters
Above 960	54.0 dBµV/m @ 3 meters

Test Method: ANSI C63.4 § Annex D Validation of radiated emissions standard test sites
ANSI C63.10 § 6.3 Common requirements radiated emissions
ANSI C63.10 § 6.4 Emissions below 30 MHz
ANSI C63.10 § 6.5 Emissions between 30 & 1000 MHz
ANSI C63.10 § 6.6 Emissions above 1 GHz

Field Strength Calculation:

The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBµV) to the antenna correction factor supplied by the antenna manufacturer plus the coax loss. The antenna correction factors are stated in terms of dB. The gain of the preselector was accounted for in the spectrum analyzer meter reading.

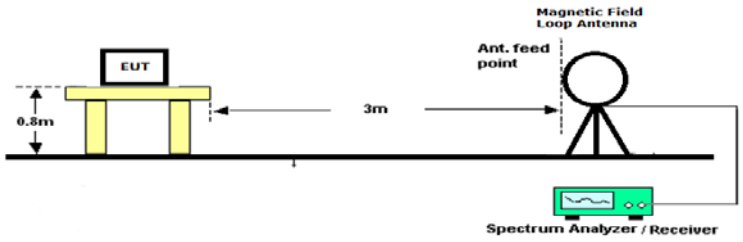
Example:

Freq (MHz)	Meter Reading	+ ACF	+ CL = FS
33	20 dBµV	+ 10.36 dB	+ 0.5 = 30.86 dBµV/m @ 3m

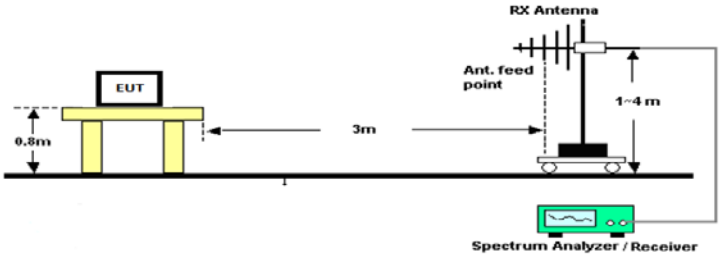
RADIATED SPURIOUS EMISSIONS

Setup:

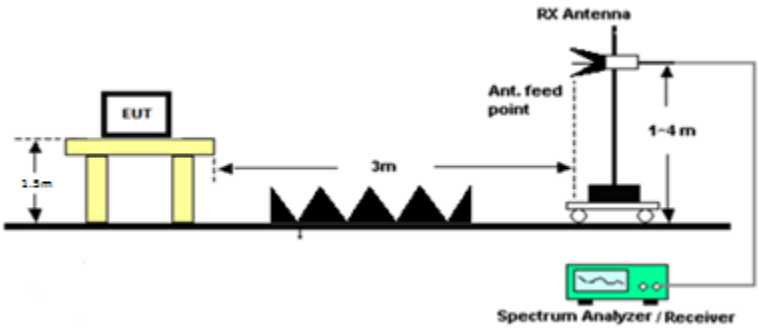
Emissions below 30 MHz



Emissions 30 – 1000 MHz



Emissions above 1 GHz



RADIATED SPURIOUS EMISSIONS

Notes: The EUT was checked in three orthogonal planes as required, a setup photo is provided to show the orientation of the worst case position.

Only the worst case data rate and Output Power which produced emissions within 20dB of the limit are reported.

The spectrum was measured from 9 KHz to 25 GHz

Test Data: Field Strength table (2402MHz)

Emission Frequency MHz	Detector	Meter Reading dBu V	Antenna Polarity	Field Strength dBu V/M	Limit dBuV/m	Margin (dB)
4804	PK	10.8	V	53.0	54.0	1.0
4804	AV	-3.8	V	38.4	54.0	15.6
7206	PK	9.2	V	54.8	74.0	19.2
7206	AV	-4.8	V	40.8	54.0	13.2
9608	PK	8.1	V	56.5	74.0	17.5
9608	AV	-13.7	V	34.7	54.0	19.3
12010	PK	6.8	H	58.9	74.0	15.1
12010	AV	-16.0	H	36.1	54.0	17.9
14412	PK	4.7	V	58.4	74.0	15.6
14412	AV	-17.3	V	36.4	54.0	17.6
16814	PK	5.4	H	62.1	74.0	11.9
16814	AV	-18.2	H	38.5	54.0	15.5

Results Meet Requirements

RADIATED SPURIOUS EMISSIONS

Test Data: Field Strength table (2440 MHz)

Emission Frequency MHz	Detector	Meter Reading dBu V	Antenna Polarity	Field Strength dBu V/M	Limit dBuV/m	Margin dB
88.84	PK	1.2	H	12.8	43.0	30.2
104.91	PK	2.2	V	14.1	43.0	28.9
109.27	PK	-0.1	H	11.6	43.0	31.4
122.77	PK	0.9	H	13.5	43.0	29.5
191.28	PK	1.3	V	17.2	43.0	25.8
579.48	PK	2.1	V	23.0	46.0	23.0
584.61	PK	0.9	H	22.3	46.0	23.7
735.89	PK	1.5	V	24.9	46.0	21.1
860.25	PK	0.0	H	26.2	54.0	27.8
860.25	PK	0.0	H	26.2	54.0	27.8
4880.00	PK	11.1	H	53.2	74.0	20.8
4880.00	AV	-7.6	H	34.5	54.0	19.5
4880.00	PK	8.8	V	50.9	74.0	23.1
4880.00	AV	-10.6	V	31.5	54.0	22.5
7320.00	PK	11.1	V	56.8	74.0	17.2

Results Meet Requirements

RADIATED SPURIOUS EMISSIONS

Test Data: Field Strength table (2480 MHz)

Emission Frequency MHz	Detector	Meter Reading dBu V	Antenna Polarity	Field Strength dBu V/M	Limit dBuV/m	Margin
9920	AV	-13.9	V	35.2	54.0	18.8
12400	PK	5.4	V	57.9	54.0	16.1
12400	AV	-15.7	V	36.8	74.0	17.2
14880	PK	3.8	V	58.2	54.0	15.8
14880	AV	-18.1	V	36.3	74.0	17.7
17360	PK	3.4	H	59.6	54.0	14.4
17360	AV	-19.2	H	37.0	74.0	17.0

Results Meet Requirements

TEST EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Antenna: Biconical 1096	Eaton	94455-1	1096	08/01/17	08/01/19
Antenna: Log-Periodic 1122	Electro-Metrics	LPA-25	1122	07/26/17	07/26/19
CHAMBER	Panashield	3M	N/A	04/25/16	12/31/17
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren	3117	00041534	03/01/17	03/01/19
Software: Field Strength Program	Timco	N/A	Version 4.10.7.0	N/A	N/A
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	04/01/16	04/01/18
Coaxial Cable - Chamber 3 cable set (Primary)	Micro-Coax	Chamber 3 cable set (Primary)	KMKM-0244-01; KMKM-0670-00; KFKF-0198-01	08/09/16	08/09/18
Band Reject Filter 2.4 GHz	Micro-Tronics	BRM50702-02	-G042	09/27/16	09/27/18

***EMI RECEIVER SOFTWARE VERSION**

The receiver firmware used was version 4.43 Service Pack 3

END OF TEST REPORT