849 NW State Road 45
Newberry, FL 32669 USA
Ph: 888.472.2424 or 352.472.5500
Fax: 352.472.2030
Email: info@timcoengr.com
Website: www.timcoengr.com

FCC PART 15.249 & IC RSS-210 (i8) ANNEX A2.9

UNLICENSED INTENTIONAL RADIATOR

COMBINED TEST REPORT

APPLICANT	**HITEC RCD INC.**
ADDRESS	**12115 PAINE STREET POWAY CALIFORNIA 92064 USA**
FCC ID	IFHRX5MLINK
IC	3420A-RX5MLINK
MODELS	RX-5 light, RX-5 M-Link ID, RX-4/9 Flexx
PRODUCT DESCRIPTION	RX5 M-LINK 2.4 GHZ TRANSCEIVER
DATE SAMPLE RECEIVED	9/23/2014
DATE TESTED	12/2/2014
TESTED BY	Cory Leverett
APPROVED BY	Sid Sanders
REPORT ISSUE DATE	12/10/2014
TIMCO REPORT NO.	1718AUT14TestReport.docx
TEST RESULTS	☒ PASS ☐ FAIL

Table of Contents

GENERAL REMARKS 3
GENERAL INFORMATION 4
TEST RESULTS SUMMARY 4
TEST PROCEDURES 5
RADIATION INTERFERENCE 6
BANDEDGE 8
BANDEDGE 9
SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND 10
POWER LINE CONDUCTED INTERFERENCE 12
EMC EQUIPMENT LIST 13

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
☐ 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: 2005 requirements.

I attest that the necessary measurements were made, under my supervision, at:

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

Authorized Signatory Name:

Cory Leverett
Project Manager
Date: 12/10/2014

Table of Contents

GENERAL INFORMATION

EUT Specification

The test results relate only to the items tested.			
Applicable Standards	FCC Part 15.249 & IC RSS-210 (i8), RSS-GEN (i4)		
EUT Description	2.4 GHz transciever		
FCC ID	IFHRX5MLINK		
IC Certification Number	3420A-RX5MLINK		
Model Number	RX-5 light, RX-5 M-Link ID, RX-4/9 Flexx		
Operating Frequency	TX: 2402 MHz	RX: FHSS 2402-2479 MHz	
No. of Channels	39	**Modulations**	TX: CQPSK (bind only) RX: FHSS
EUT Power Source	☐ 110–120Vac/50– 60Hz when Charging		
	☐ DC Power		
	☒ Battery Operated Exclusively		
Test Item	☐ Prototype	☐ Pre-Production	☒ Production
Type of Equipment	☐ Fixed	☐ Mobile	☒ Portable
Antenna Connector	FCC Rules require that the antenna connector be unique. There is no antenna connector, it has an integrated PCB antenna		
Test Facility	Timco Engineering Inc. located at 849 NW State Road 45 Newberry, FL 32669 USA.		
Conditions in the Test laboratory	Temperature: 24-26ºC Relative humidity: 50-65%		
Test Exercise	For transmitter test a sample was programmed to transmit a modulated signal at 100% duty cycle. This was done at the only channel in the band		
Revision History of EUT	None		

TEST RESULTS SUMMARY

FCC Rules Part No.	Industry Canada Rules	RESULTS – Pass/Fail/NA
15.249 Fundamental Emission	RSS-210 (i8) ANNEX A2.9, RSS-GEN (i4)	Pass
15.249 & 15.209 Harmonics & Spurious	RSS-210 (i8) ANNEX A2.9, RSS-GEN (i4)	Pass
15.205 & 2.202 Occupied Bandwidth	RSS-GEN (i4), 4.6	Pass
15.249 & 15.205 Bandedge Compliance	RSS-GEN (i4), 4.6	Pass
15.207 Power Line Emissions	RSS-GEN (i4), 7.2.4	NA

Table of Contents

TEST PROCEDURES

Radiation Interference: ANSI C63.4-2003 using a spectrum analyzer, a preselector, a quasi-peak adapter, and an appropriate antenna. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz with an appropriate sweep speed and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3 MHz above 1 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worst case emissions were reported. The spectrum was searched to at least the tenth (10) harmonic of the fundamental. Emissions were scanned from 30MHz to the tenth harmonic of the fundamental frequency at three places in the band. All emissions greater than 20 dB from the limit are not reported.

Formula Of Conversion Factors: The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. 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 dBuV	+ 10.36 dB	+ 0.5 = 30.86 dBuV/m @ 3m

Power Line Conducted Interference: The procedure used was ANSI C63.4-2003 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The spectrum was scanned from 0.15 to 30 MHz.

Occupied Bandwidth: A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was printed. The vertical scale is set to -10 dBm per division.

ANSI C63.4-2003 10.1 Measurement Procedures: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes. Emissions attenuated more than 20 dB below the permissible value are not reported.

Table of Contents

RADIATION INTERFERENCE

Rules Part No.: FCC 15.249, 15.209 & IC RSS-210 (i8) ANNEX A2.9, RSS-GEN (i4)

Requirements:

Frequency	Limits
Part 15.209 & RSS-GEN (i4)	
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
Part 15.249 & RSS-210 (i8) ANNEX A.2.9	
Fundamental 902 – 928 MHz	94.0 dBµV/m @ 3 meters
Fundamental 2.4 – 2.4835 GHz	94.0 dBµV/m @ 3 meters
Harmonics	54.0 dBµV/m @ 3 meters

Test Data: Peak Detector Used for all Measurement's. Only emissions less than 20 dB from the limit are reported.

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Pol	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	Margin dB
2,402.0	2,402.00	53.7	V	3.18	32.15	88.98	5.02
2,402.0	2,402.00	57.9	H	3.18	32.15	93.22	.88
2,402.0	4,804.00	9.8	V	4.90	34.13	48.85	5.15
2,402.0	4,804.00	11.9	H	4.90	34.13	50.90	3.10
2,440.0	2,440.00	53.6	V	3.21	32.22	89.06	4.94
2,440.0	2,440.00	58.0	H	3.21	32.22	93.39	.61
2,440.0	4,880.00	9.2	V	4.94	34.14	48.23	5.77
2,440.0	4,880.00	11.0	H	4.94	34.14	50.05	3.95
2,479.0	2,479.00	53.4	V	3.24	32.30	88.98	5.02
2,479.0	2,479.00	57.1	H	3.24	32.30	92.65	1.35
2,479.0	4,958.00	9.6	V	4.98	34.16	48.77	5.23
2,479.0	4,958.00	11.1	H	4.98	34.16	50.25	3.75

Table of Contents

20 dB BANDWIDTH

Test Data:

Measured 20 dB OCC BW = 1.13 MHz

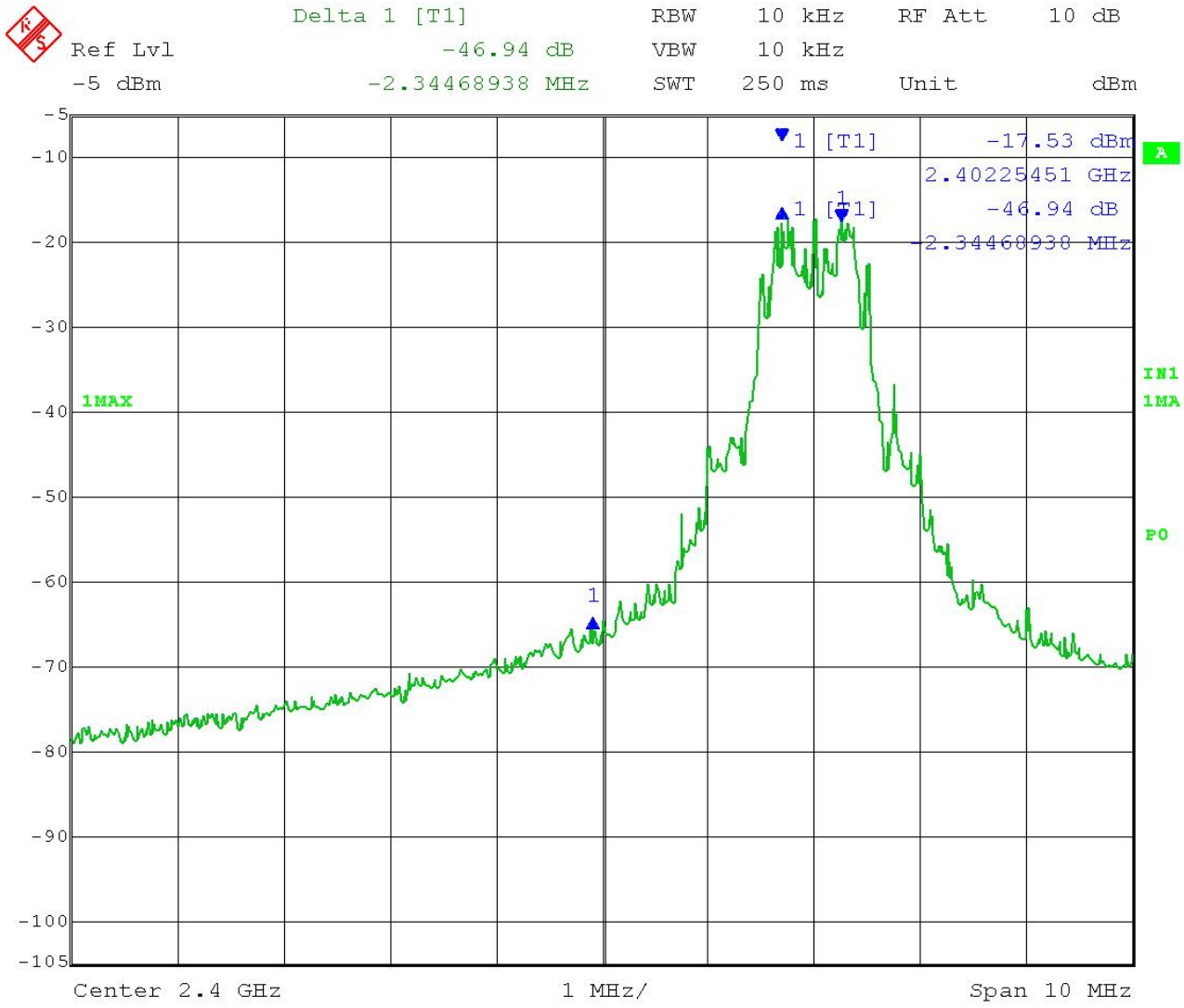
Date: 2.DEC.2014 08:59:16

BANDEDGE

Rules Part No.: 15.249 (d) & RSS-GEN (i4), 4.6

Requirements: The field strength of any emissions appearing outside the bandedges and up to 10 kHz above and below the band edges shall be attenuated at least 50 dB below the level of the carrier or to the general limits of 15.249.

Test Data: Lower Band Edge



Date: 2.DEC.2014 09:21:48

FS @ 2402 = 93.22 dBuV

93.22 dBuV – 46.94(delta on plot) = **46.28 dBuV at band edge which meets the 15.109 emission requirements**, this is the lesser attenuation.

Table of Contents

BANDEDGE

Test Data: Upper Band Edge

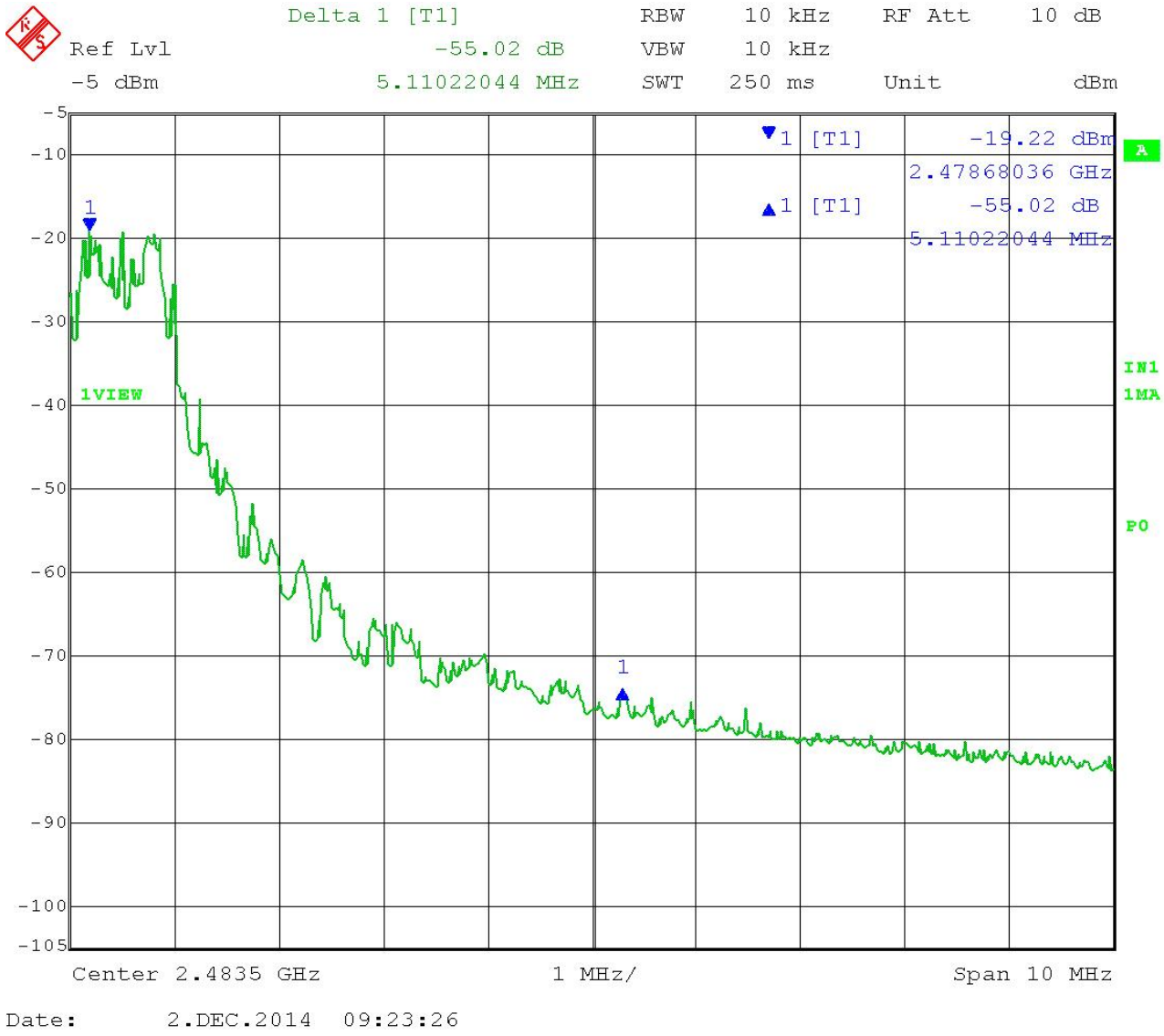


Table of Contents

Spurious Emissions into restricted band at 2390MHz

Rule Part: 15.205

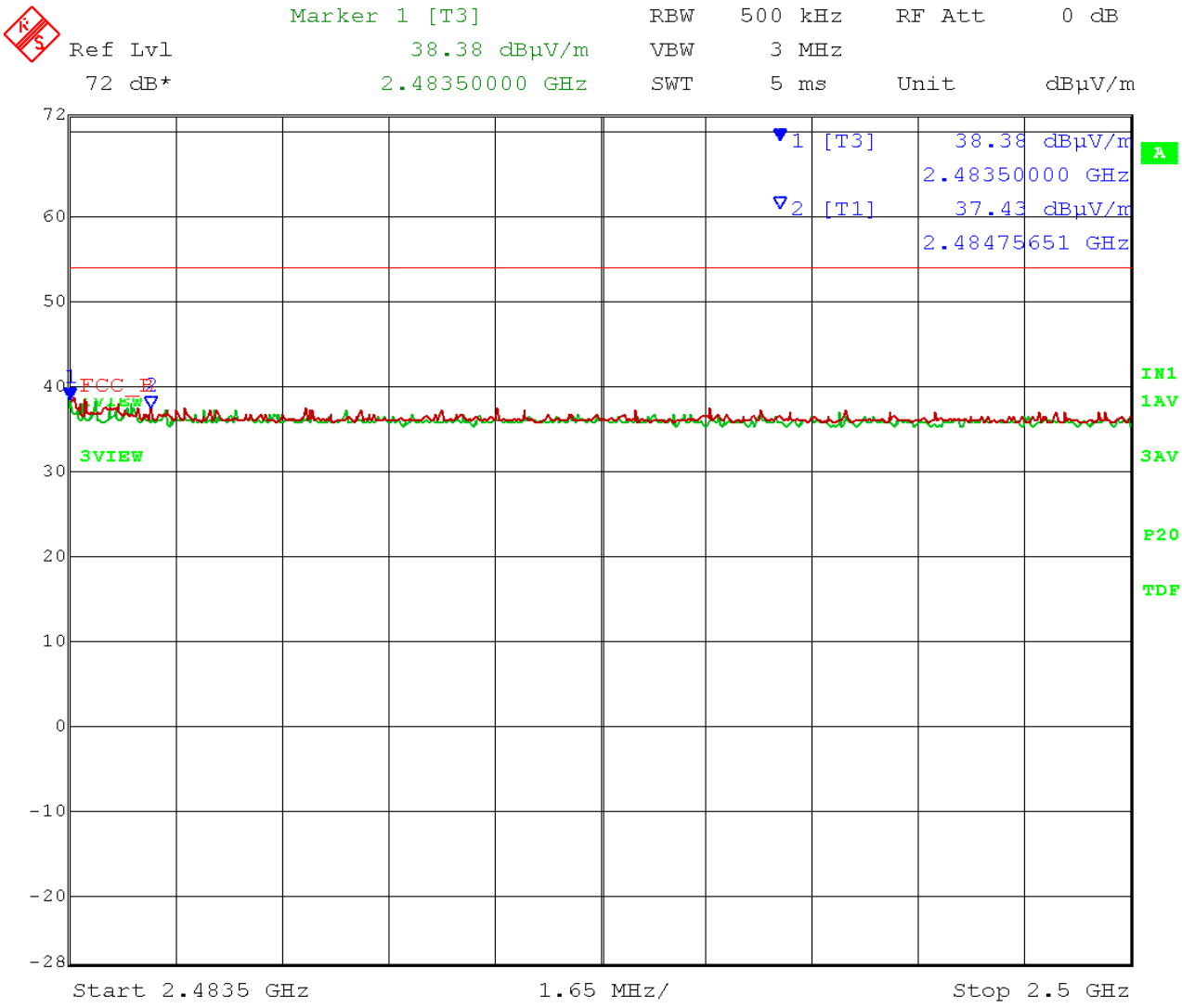
Test Data: Plot of lower restricted band

Date: 28.NOV.2014 15:30:08

SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

Rule Part: 15.205

Test Data: Plot of upper restricted band



Date: 28.NOV.2014 15:23:24

POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: 15.207, & RSS-GEN (i4), 7.2.4

Requirements:

Frequency (MHz)	Quasi Peak Limits (dBuv)	Average Limits (dBuV)
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5.0	56	46
5.0 – 30	60	50

Test Data: Not Applicable

Table of Contents

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Antenna: Biconnical Chamber	Eaton Chamber	94455-1	1057	06/14/13	06/14/15
Antenna: Log-Periodic Chamber	Eaton	96005	1243	05/31/13	05/31/15
LISN	Electro-Metrics	ANS-25/2	2604	01/07/14	01/07/16
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/13	12/31/15
Antenna: Double-Ridged Horn/ETS Horn 1	ETS-Lindgren Chamber	3117	00035923	06/13/14	06/13/16
EMI Test Receiver R & S ESIB 40	Rohde & Schwarz	ESIB 40	100274	08/12/14	08/12/16

*EMI RECEIVER SOFTWARE VERSION

*EMI Test Receiver Firmware Version: 4.73 Service Pack 1

Table of Contents