



**xFCC 47 CFR PART 15 SUBPART B & C
INDUSTRY CANADA RSS-210 ISSUE 8**

CERTIFICATION TEST REPORT

Platform Transceiver

MODEL NUMBER: Platform

FCC ID: 2AE4KBUD001

IC: 20769-BUD001

REPORT NUMBER: 10667825B

ISSUE DATE: October 29, 2015

Prepared for
Five Element Robotics
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Wall, NJ 07753
US

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NVLAP Lab code: 100414-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	2015- 10-29	Initial Issue	BM

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Five Element Robotics
1333 Compus Parkway
Wall, NJ 07753
US

EUT DESCRIPTION: Robot Platform radio board

MODEL: Platform

SERIAL NUMBER: Non-Serialized

DATE TESTED: August 2015 – September 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart B & C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL LLC By:



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EMC Engineer
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Tested By:



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UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4 and RSS-210 Issue 8, ICES-003 Issue 5.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 333 Pfingsten Road, Northbrook, IL 60062 USA.

UL NBK is accredited by NVLAP, Laboratory Code 100414-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/>

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Sample Calculations

Radiated Field Strength and Conducted Emissions data contained within this report is calculated on the following basis:

Field Strength (dBuV/m) = Meter Reading (dBuV) + AF (dB/m) - Gain (dB) + Cable Loss (dB)

Conducted Voltage (dBuV) = Meter Reading (dBuV) + Cable Loss (dB) + LISN IL (dB)

Conducted Current (dBuA) = Meter Reading (dBuV) + Cable Loss (dB) - Transducer Factor (dBohms)

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test	Range	Equipment	Uncertainty k=2
Radiated Emissions	30-200MHz	Bicon 10m Horz	4.27dB
Radiated Emissions	30-200MHz	Bicon 10m Vert	4.28dB
Radiated Emissions	200-1000MHz	LogP 10m Horz	3.33dB
Radiated Emissions	200-1000MHz	LogP 10m Vert	3.39dB
Radiated Emissions	1-6GHz	Horn	5.02dB
Radiated Emissions	6-18GHz	Horn	5.34dB
Radiated Emissions	18-26GHz	Horn	6.60dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a consumer robotic device that implements a 2.4GHz 802.15.4 transceiver via the Atmel ATMEGA256RFR2 microcontroller. The EUT pairs with a portable transmitter to achieve a follow behavior.

5.2. MAXIMUM OUTPUT E-FIELD STRENGTH

The transmitter has a maximum output peak E-field as follows:

Frequency Range (MHz)	Mode	Output AV E-field Strength (dBuV/m) @ 3m
2405-2480	GFSK	88.48

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Part Number: Ceramic Chip Antenna by Johanson Technology 2450AT18D0100E

Antenna Peak Gain: 1.5dBi

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT (transmitter) during testing was version 1.0.

The firmware installed in the EUT (platform) during testing was version 0.9.17.

The test utility software used during testing was FCCTest revision 1.0.

5.5. WORST-CASE CONFIGURATION AND MODE

The transmitter will be positioned in single orientation during normal use.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
*Battery	Generic	Generic	-	-
**Power Supply	TRIAD	WSU180-2000	-	
* used as temprary soruce to power the trasmitter board				
** only used to recharge the product, device is not trasmitting while charging.				

I/O CABLES

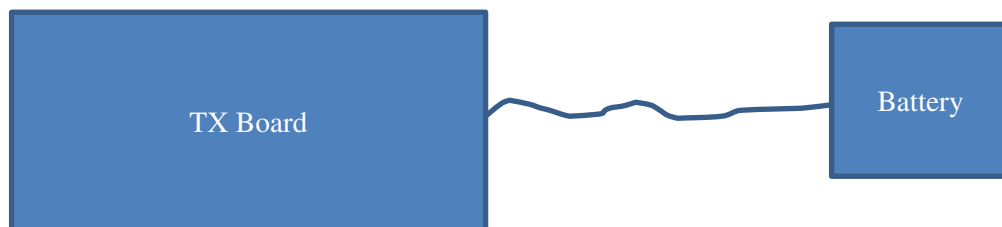
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	round	2-wire	1m	cable between supply and the EUT

TEST SETUP

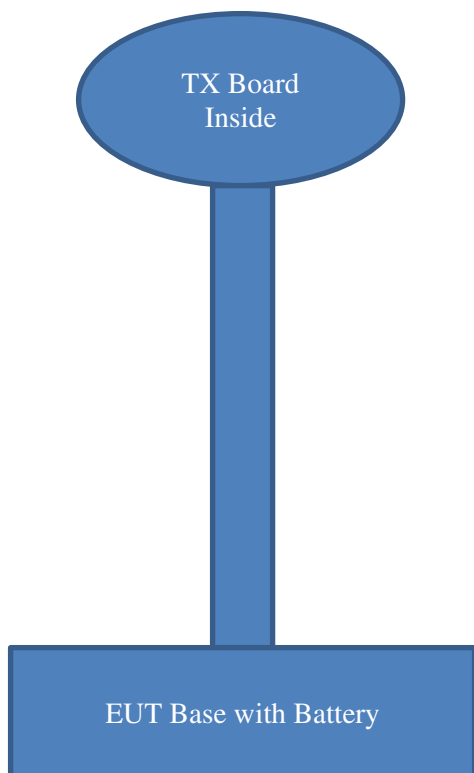
The board was tested as stand alone component. Some testing was repeated when installed in the host.

SETUP DIAGRAM FOR TESTS

Setup of device for stand alone testing.



Setup for device when inside intended host



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List					
Description	Manufacturer	Model	EMC No.	Cal Date	Cal Due
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014		
Conducted Software	UL	UL EMC	Ver 9.5, May 17 2012		
EMI Test Receiver	Rohde & Schwarz	ESU	EMC4323	20141216	20151231
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	20141830	20151231
Bicon Antenna	Electro-Metrics	EM6912A	EMC4070	20141014	20151031
Log-P Antenna	Chase	UPA6109	EMC4313	20141119	20151130
Loop Antenna	EMCO	6502/1	EMC4026	20150420	20160430
Antenna Array	UL	BOMS	EMC4276	20141201	20151231
Spectrum Analyzer	Agilent	N9030A (PXA)	EMC4360	20141219	20151219
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESR	EMC4377	20150423	20160423
Transient Limiter	Electro-Metrics	EM7600-2	EMC4224	N/A	N/A
HighPass Filter	Solar Electronics	2803-150	885551	N/A	N/A
Attenuator	HP	8494B	2831A00838	N/A	N/A
LISN - L1	Solar	8602-50-TS-50-N	EMC4052	20150109	20160110
LISN - L2	Solar	8602-50-TS-50-N	EMC4064	20150109	20160110

7. TEST RESULTS

7.1.1. 99% and 20dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

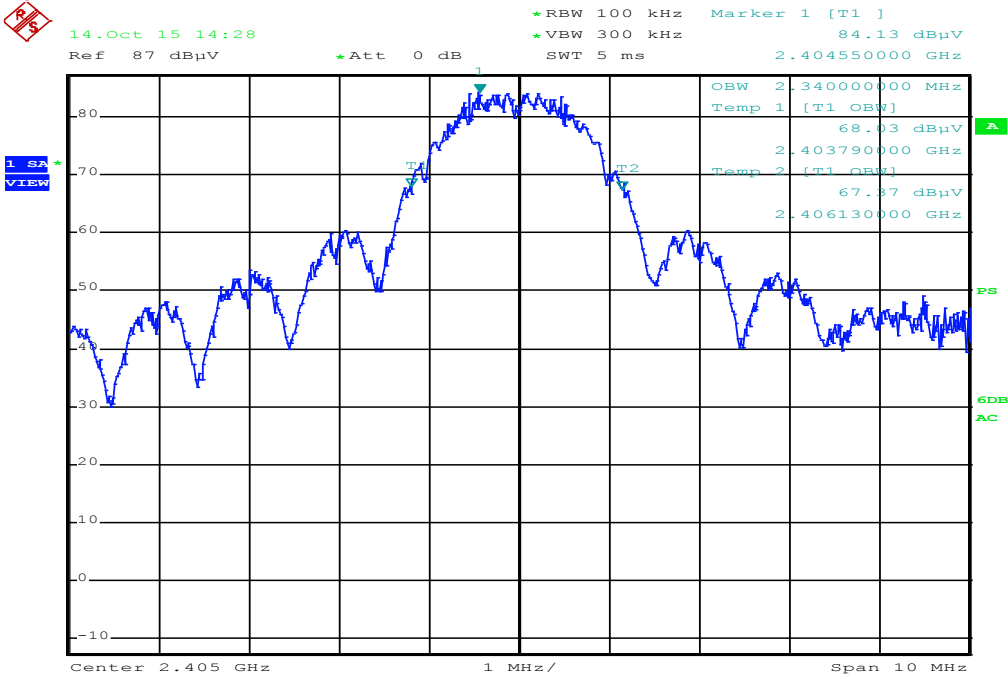
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

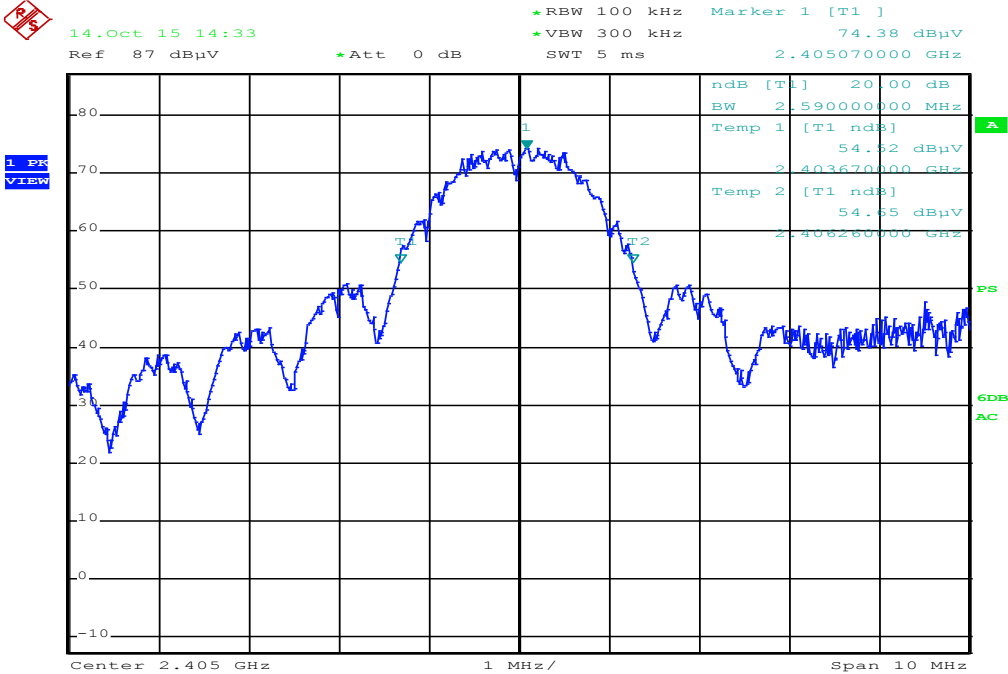
Channel	Frequency (MHz)	99% Bandwidth (MHz)	20dB Bandwidth (MHz)
Low	2405	2.34	2.59
Middle	2445	2.41	2.6
High	2480	2.49	2.62

Low Channel

99% Bandwidth

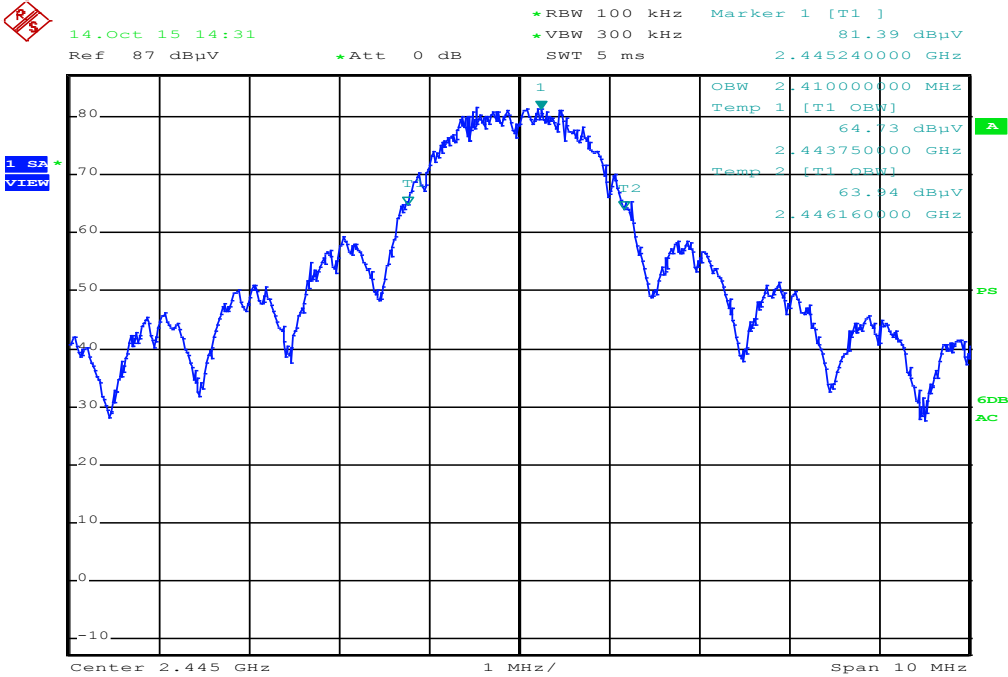


20dB Bandwidth

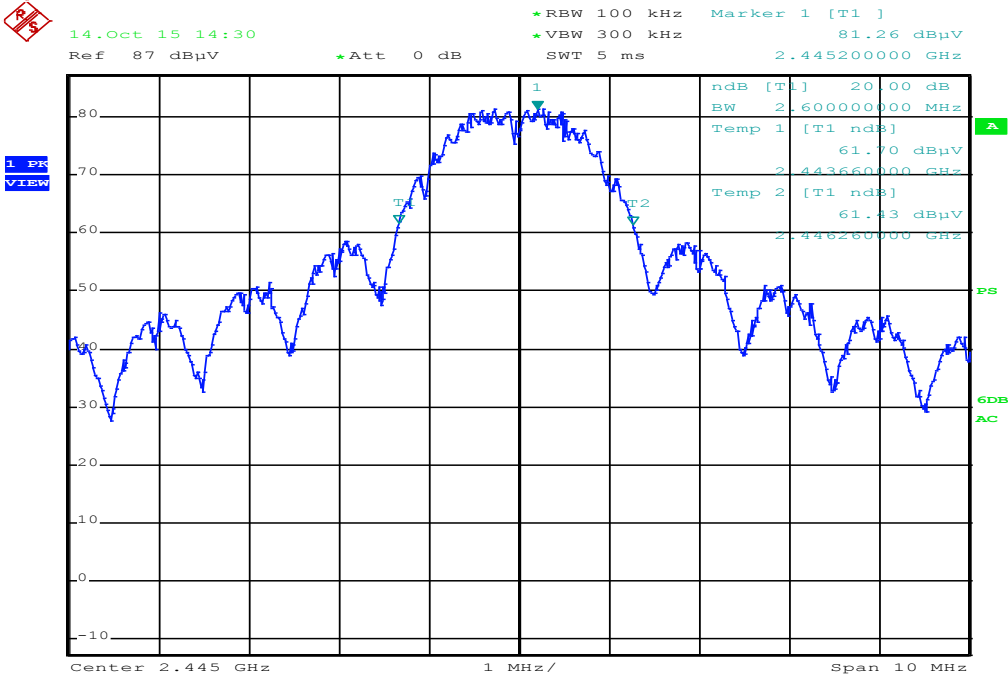


Middle Channel

99% Bandwidth

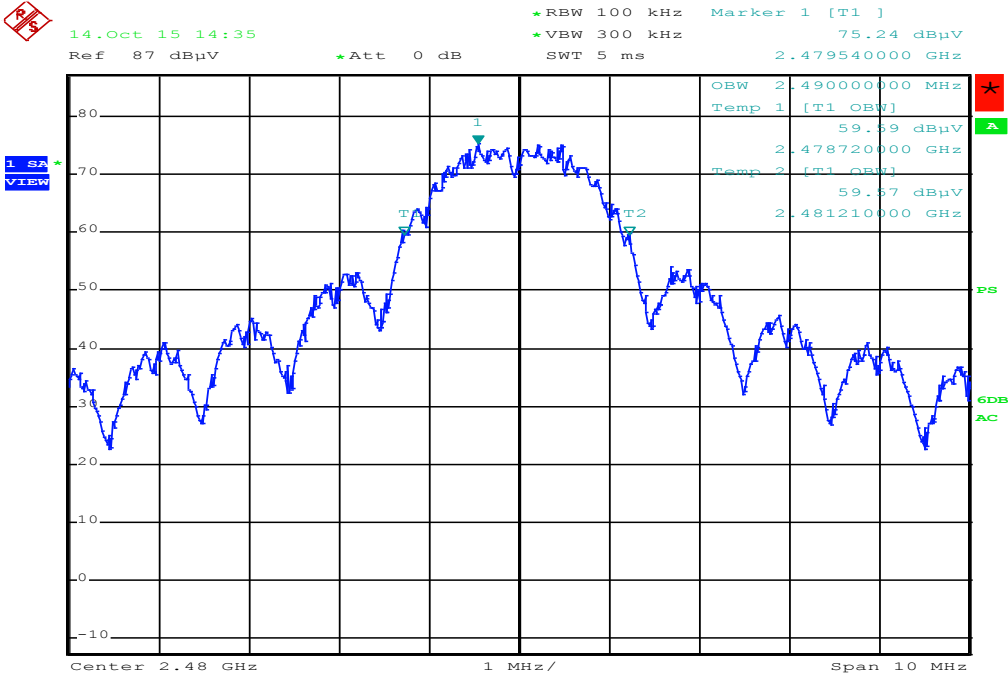


20dB Bandwidth

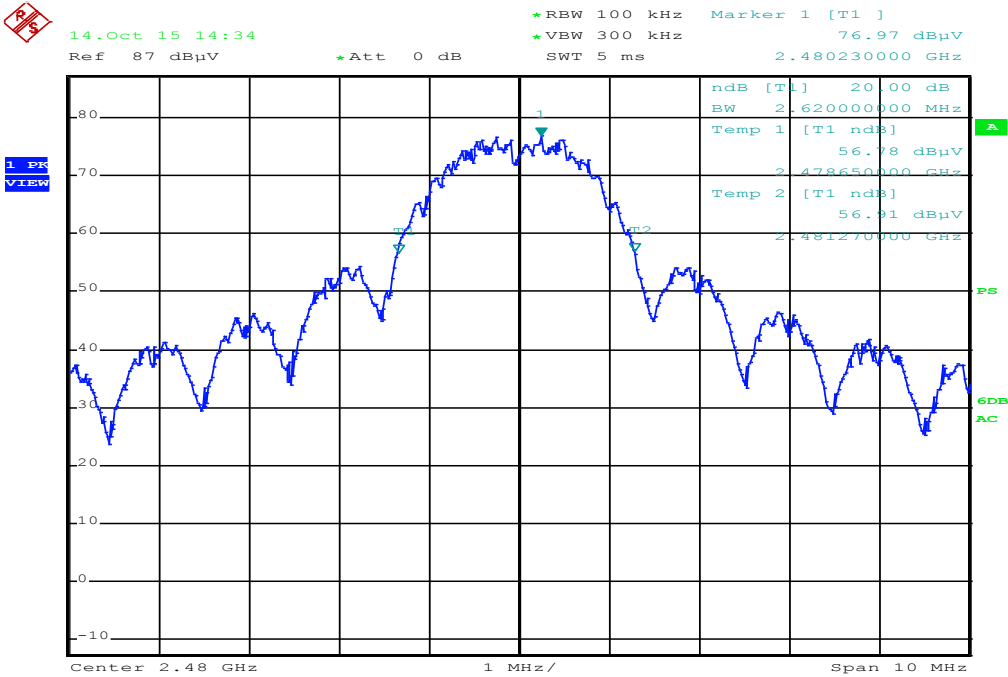


High Channel

99% Bandwidth



20dB Bandwidth



7.2. RADIATED EMISSIONS

LIMIT

IC RSS-210, A2.9
FCC 15.249

Operation within the bands 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHz, and 24.0–24.25 GHz.

(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

(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.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100 **	3
88–216	150 **	3
216–960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

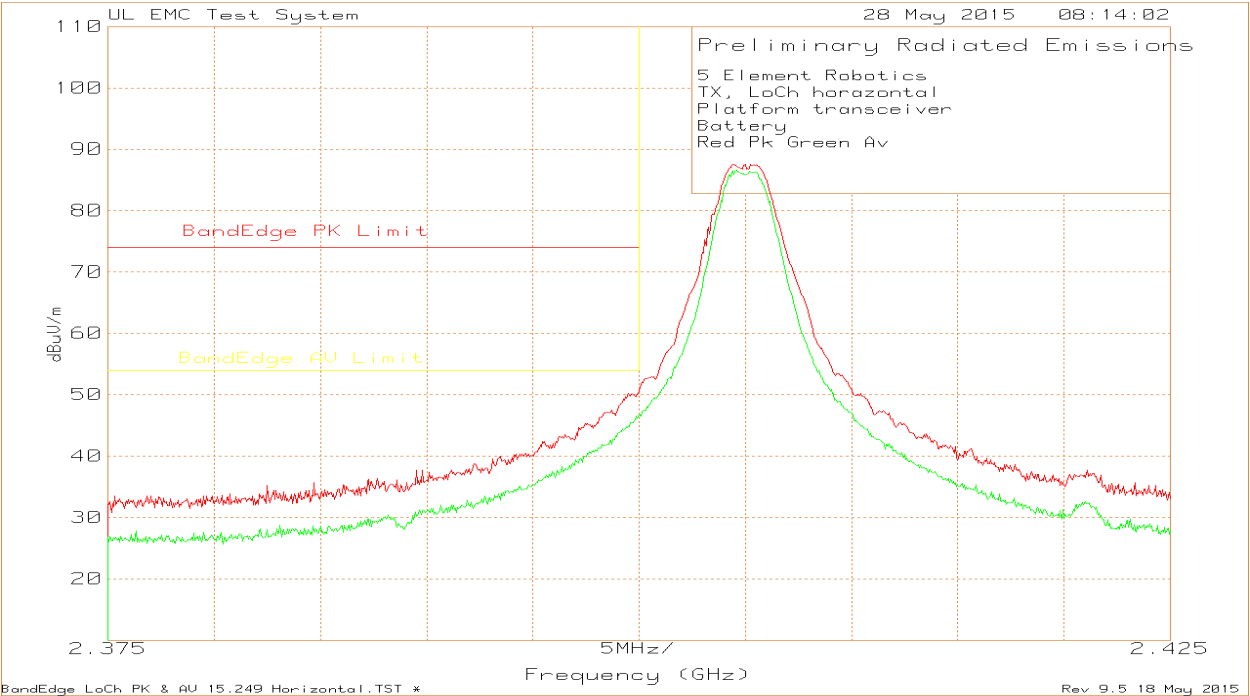
RESULTS

7.2.1. FUNDAMENTAL FREQUENCY RADIATED EMISSION

5 Element Robotics										
Platform transceiver										
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Limit FCC 15.249 dBuV/m @ 3m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
2.405	117.8	Pk	21.8	-51.81	87.79	114	-26.21	147	100	H
2.4045	117.27	RMS AV	21.8	-51.83	87.24	94	-6.76	147	100	H
2.405	116.03	Pk	21.8	-51.81	86.02	114	-27.98	91	106	V
2.4044	115.67	RMS AV	21.8	-51.83	85.64	94	-8.36	91	106	V
2.445	116.08	Pk	21.9	-51.28	86.7	114	-27.3	212	193	H
2.4444	115.69	RMS AV	21.9	-51.28	86.31	94	-7.69	212	193	H
2.4449	113.42	Pk	21.9	-51.28	84.04	114	-29.96	262	100	V
2.4444	113.05	RMS AV	21.9	-51.28	83.67	94	-10.33	262	100	V
2.4803	118.16	Pk	22	-51.68	88.48	114	-25.52	213	213	H
2.4795	117.35	RMS AV	22	-51.66	87.69	94	-6.31	213	213	H
2.4802	116.39	Pk	22	-51.68	86.71	114	-27.29	262	103	V
2.4795	116.02	RMS AV	22	-51.67	86.35	94	-7.65	262	103	V

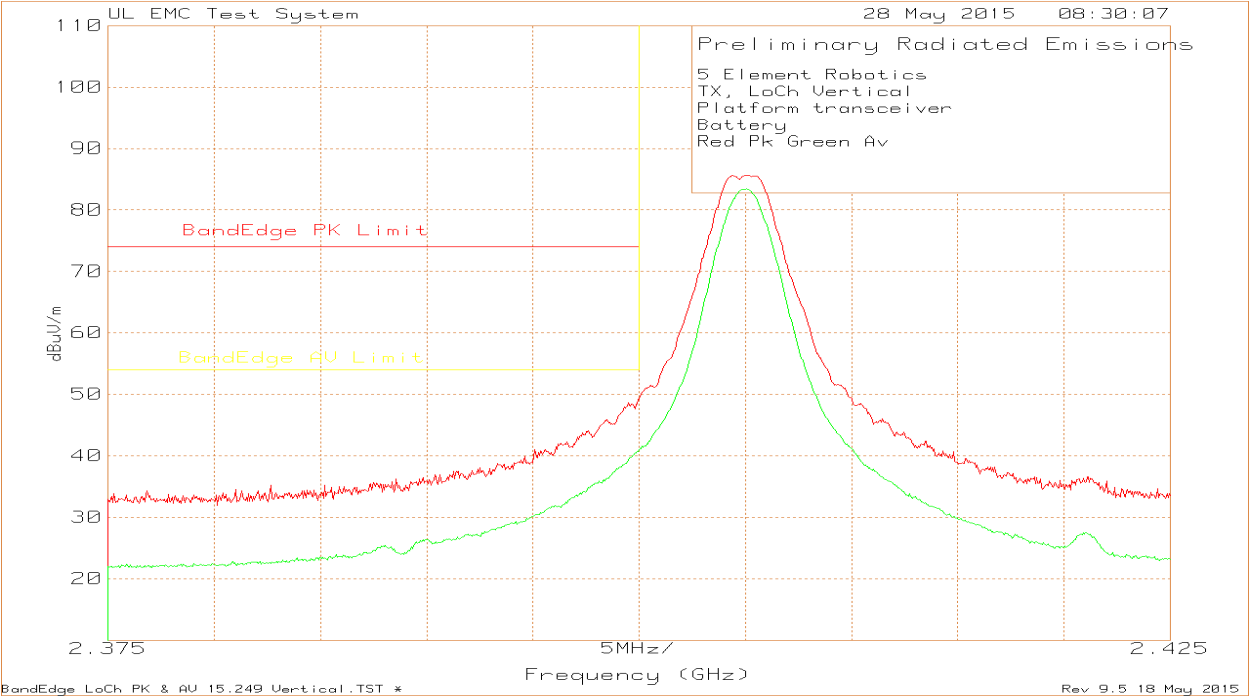
7.2.2. TRANSMITTER RESTRICTED BAND EDGES

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



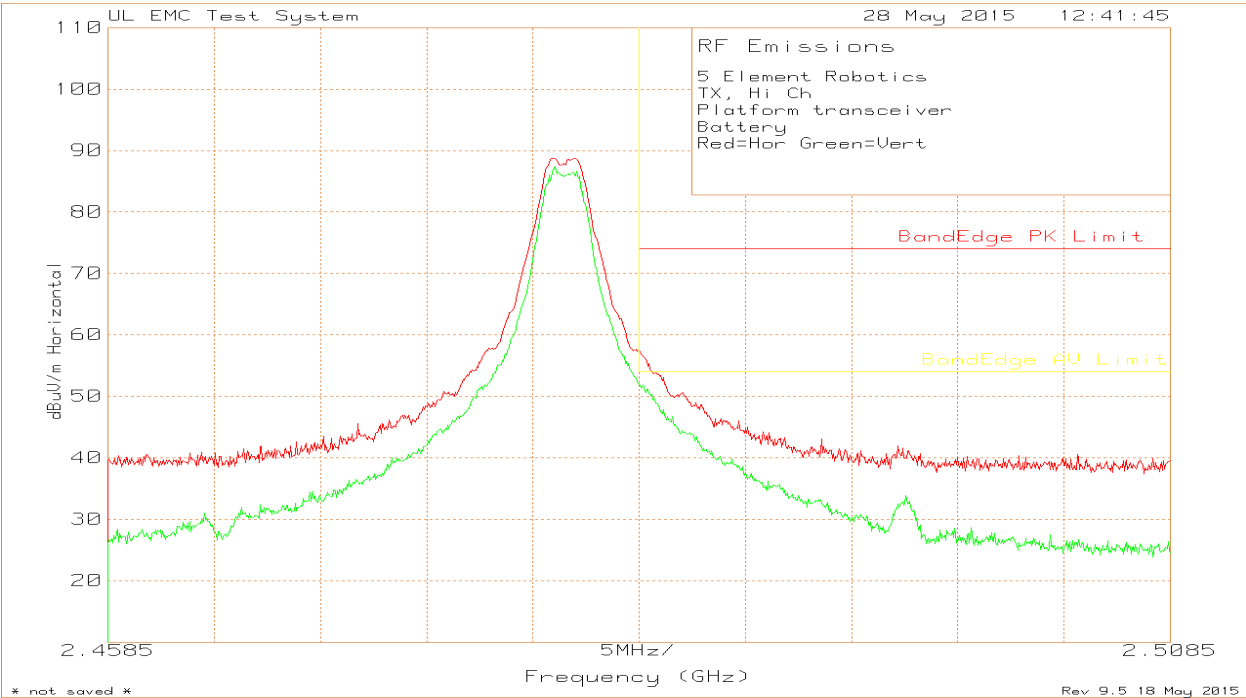
5 Element Robotics													
TX, LoCh horizontal													
Platform transceiver													
Battery													
Red Pk Green Av													
Trace Markers													
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Facotr dB/m	Path Factor dB	Level dBuV/m	Peak Limit dBuVm	Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth [Deps]	Height [cm]	Polarity
Peak													
1	2.405	117.6	Pk	21.8	-51.81	87.59	-	-	-	-	147	100	H
6	2.4	80.85	Pk	21.8	-51.93	50.72	74	-23.28	54	-3.28	147	100	H
7	2.4	80.28	Pk	21.8	-51.93	50.15	74	-23.85	54	-3.85	147	100	H
8	2.4001	81.28	Pk	21.8	-51.93	51.15	-	-	-	-	147	100	H
Average													
2	2.4052	116.39	AV	21.8	-51.8	86.39	-	-	-	-	147	100	H
3	2.4	76.88	AV	21.8	-51.93	46.75	74	-27.25	54	-7.25	147	100	H
4	2.4	76.65	AV	21.8	-51.93	46.52	74	-27.48	54	-7.48	147	100	H
5	2.4001	76.83	AV	21.8	-51.93	46.7	-	-	-	-	147	100	H
PK - Peak Detector													
AV - Average Detector													

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



5 Element Robotics													
TX, LoCh Vertical													
Platform transceiver													
Battery													
Red Pk Green Av													
Trace Markers													
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Facotr dB/m	Path Factor dB	Level dBuV/m	Peak Limit dBuVm	Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
Peak													
1	2.405	115.67	Pk	21.8	-51.81	85.66	-	-	-	-	91	106	V
6	2.4	79.38	Pk	21.8	-51.93	49.25	74	-24.75	54	-4.75	91	106	V
7	2.4	79.36	Pk	21.8	-51.93	49.23	74	-24.77	54	-4.77	91	106	V
8	2.4001	79.8	Pk	21.8	-51.93	49.67	-	-	-	-	91	106	V
Average													
2	2.4051	113.42	AV	21.8	-51.81	83.41	-	-	-	-	91	106	V
3	2.4	70.98	AV	21.8	-51.93	40.85	74	-33.15	54	-13.15	91	106	V
4	2.4	70.85	AV	21.8	-51.93	40.72	74	-33.28	54	-13.28	91	106	V
5	2.4001	71.21	AV	21.8	-51.93	41.08	-	-	-	-	91	106	V
PK - Peak Detector													
AV - Average Detector													

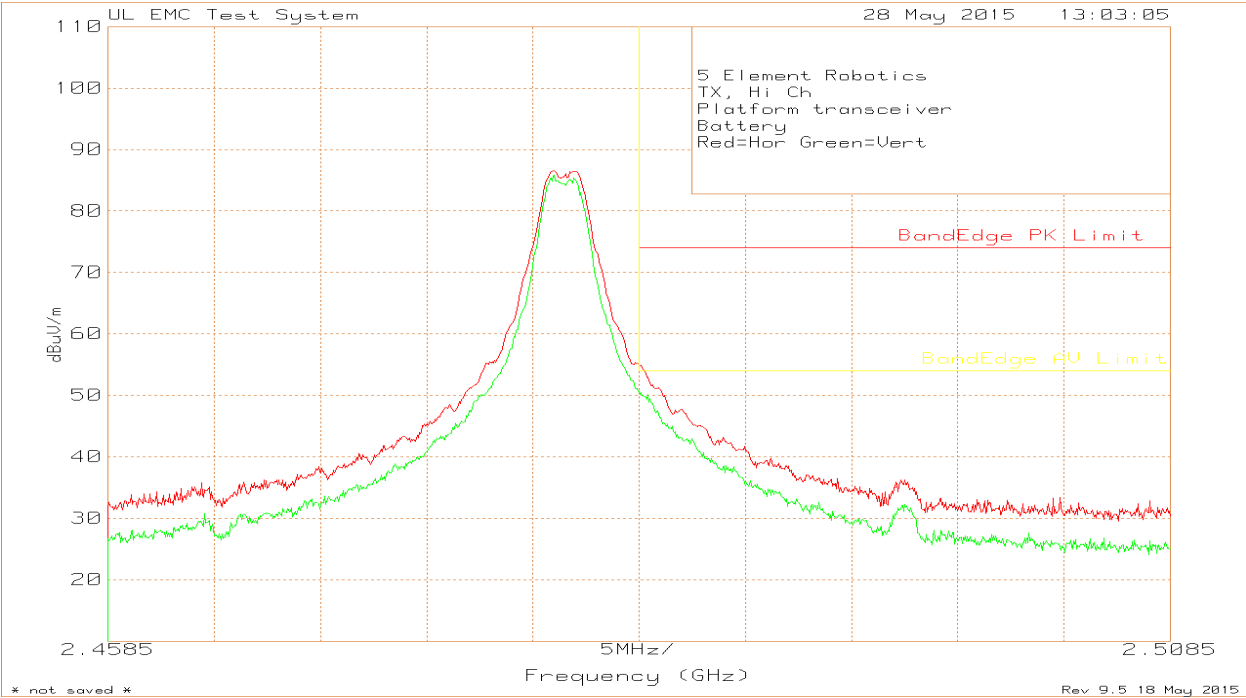
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



* label in plot shows Red=Hor Green=Vert, this is incorrect and it should be RED: PK GRN: Av

5 Element Robotics													
TX, Hi Ch													
Platform transceiver													
Battery													
Red=Hor Green=Vert													
Trace Markers													
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Facotr dB/m	Path Factor dB	Level dBuV/m	Peak Limit dBuVm	Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth [Deps]	Height [cm]	Polarity
Peak													
2	2.4795	110.05	Pk	22	-43.3	88.72	-	-	-	-	213	213	H
3	2.4835	78.8	Pk	22.1	-43.4	57.49	74	-16.51	-	-	213	213	H
4	2.4835	78.79	Pk	22.1	-43.4	57.48	-	-	-	-	213	213	H
5	2.4836	78.58	Pk	22.1	-43.4	57.27	74	-16.73	-	-	213	213	H
Average													
1	2.4796	117.1	AV	22	-51.7	87.43	-	-	-	-	213	213	H
6	2.4835	81.83	AV	22.1	-51.7	52.19	-	-	54	-1.81	213	213	H
7	2.4835	81.58	AV	22.1	-51.7	51.94	74	-22.06	54	-2.06	213	213	H
8	2.4836	81.41	AV	22.1	-51.7	51.77	74	-22.23	54	-2.23	213	213	H
PK - Peak Detector													

RESTRICTED BANDEDGE (HIGH CHANNEL, Vertical)

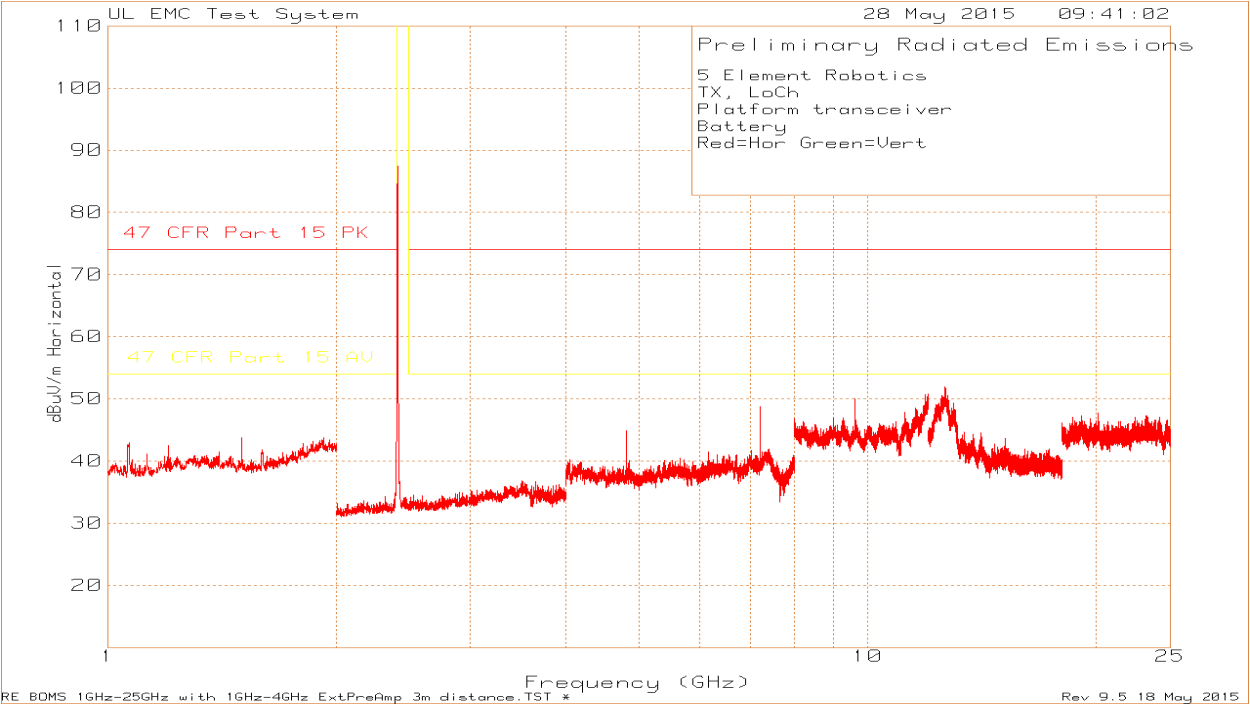
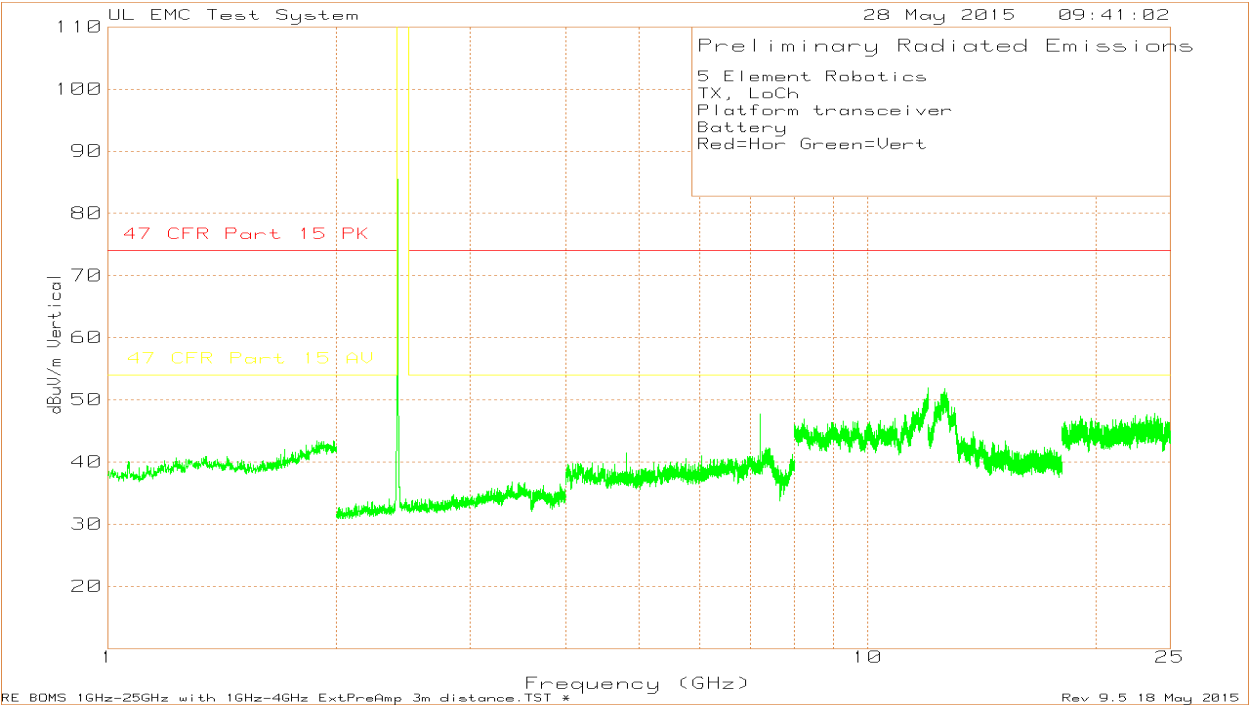


* label in plot shows Red=Hor Green=Vert, this is incorrect and it should be RED: PK GRN: Av

5 Element Robotics													
TX, Hi Ch													
Platform transceiver													
Battery													
Red=Hor Green=Vert													
Trace Markers													
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Facotr dB/m	Path Factor dB	Level dBuV/m	Peak Limit dBuVm	Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
Peak													
1	2.4795	116.15	Pk	22	-51.66	86.49	-	-	-	-	262	103	V
6	2.4835	84.71	Pk	22.1	-51.74	55.07	-	-	-	-	262	103	V
7	2.4835	84.66	Pk	22.1	-51.74	55.02	74	-18.98	-	-	262	103	V
8	2.4836	84.46	Pk	22.1	-51.74	54.82	74	-19.18	-	-	262	103	V
Average													
2	2.4795	115.47	AV	22	-51.67	85.8	-	-	-	-	262	103	V
3	2.4835	80.38	AV	22.1	-51.74	50.74	74	-23.26	54	-3.26	262	103	V
4	2.4835	80.38	AV	22.1	-51.74	50.74	-	-	54	-3.26	262	103	V
5	2.4836	79.81	AV	22.1	-51.74	50.17	74	-23.83	54	-3.83	262	103	V
PK - Peak Detector													
AV - Average Detector													

7.2.3. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz

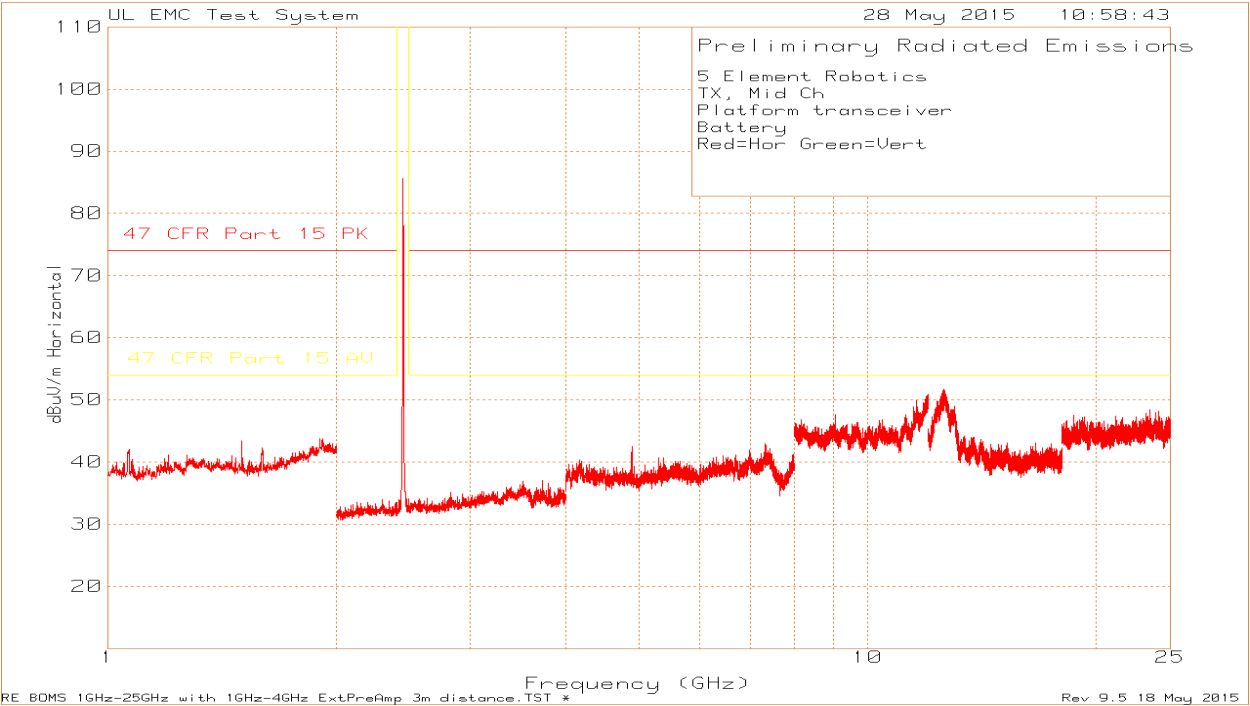
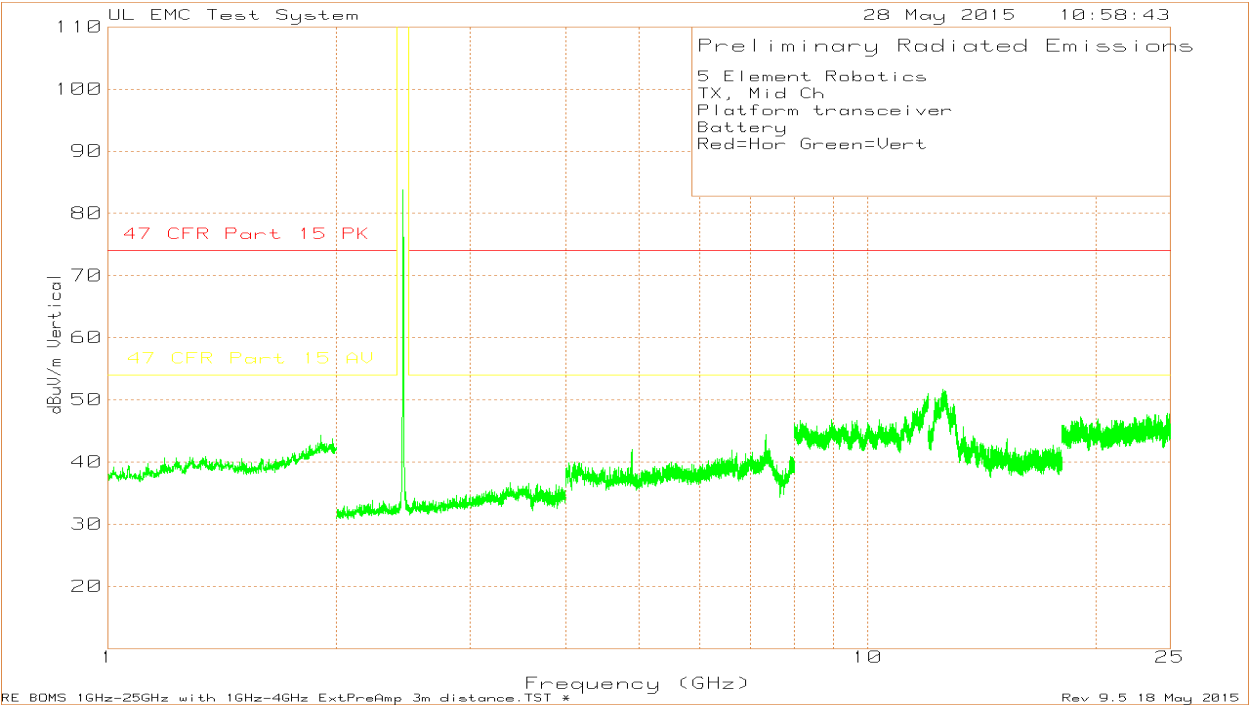
Low Channel, board alone, scan



Low Channel, board alone, data

5 Element Robotics													
TX, LoCh													
Platform transceiver													
Battery													
Red=Hor Green=Vert													
Trace Markers													
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Facotr dB/m	Path Factor dB	Level dBuV/m	Peak Limit dBuVm	Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.404	117.46	Pk	21.8	-51.84	87.42	-	-	-	-	0-360	150	H
3	4.811	67.71	Pk	27.7	-50.55	44.86	74	-29.14	54	-9.14	0-360	149	H
4	7.214	65.7	Pk	29.8	-46.73	48.77	74	-25.23	54	-5.23	0-360	149	H
5	9.618	62.04	Pk	36.4	-48.38	50.06	74	-23.94	54	-3.94	0-360	150	H
2	2.404	115.59	Pk	21.8	-51.84	85.55	-	-	-	-	0-360	100	V
6	4.809	64.38	Pk	27.7	-50.57	41.51	74	-32.49	54	-12.49	0-360	100	V
7	7.214	64.62	Pk	29.8	-46.73	47.69	74	-26.31	54	-6.31	0-360	150	V
Pk - Peak detector													
Radiated Emission Data													
	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Facotr dB/m	Path Factor dB	Level dBuV/m	Peak Limit dBuVm	Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	7.2135	68.29	Pk	29.8	-46.73	51.36	74	-22.64	-	-	216	158	H
	7.2134	65.79	RMS AV	29.8	-46.72	48.87	-	-	54	-5.13	216	158	H
	7.2133	66.63	Pk	29.8	-46.72	49.71	74	-24.29	-	-	172	100	V
	7.2133	63.82	RMS AV	29.8	-46.72	46.9	-	-	54	-7.1	172	100	V
	9.618	66.8	Pk	36.4	-48.38	54.82	74	-19.18	-	-	236	161	H
	9.6177	63.32	RMS AV	36.4	-48.38	51.34	-	-	54	-2.66	236	161	H
	9.6179	64.45	Pk	36.4	-48.38	52.47	74	-21.53	-	-	318	165	V
	9.6179	59.23	RMS AV	36.4	-48.38	47.25	-	-	54	-6.75	318	165	V
Pk - Peak detector													
RMS AV - AVerage Detector													

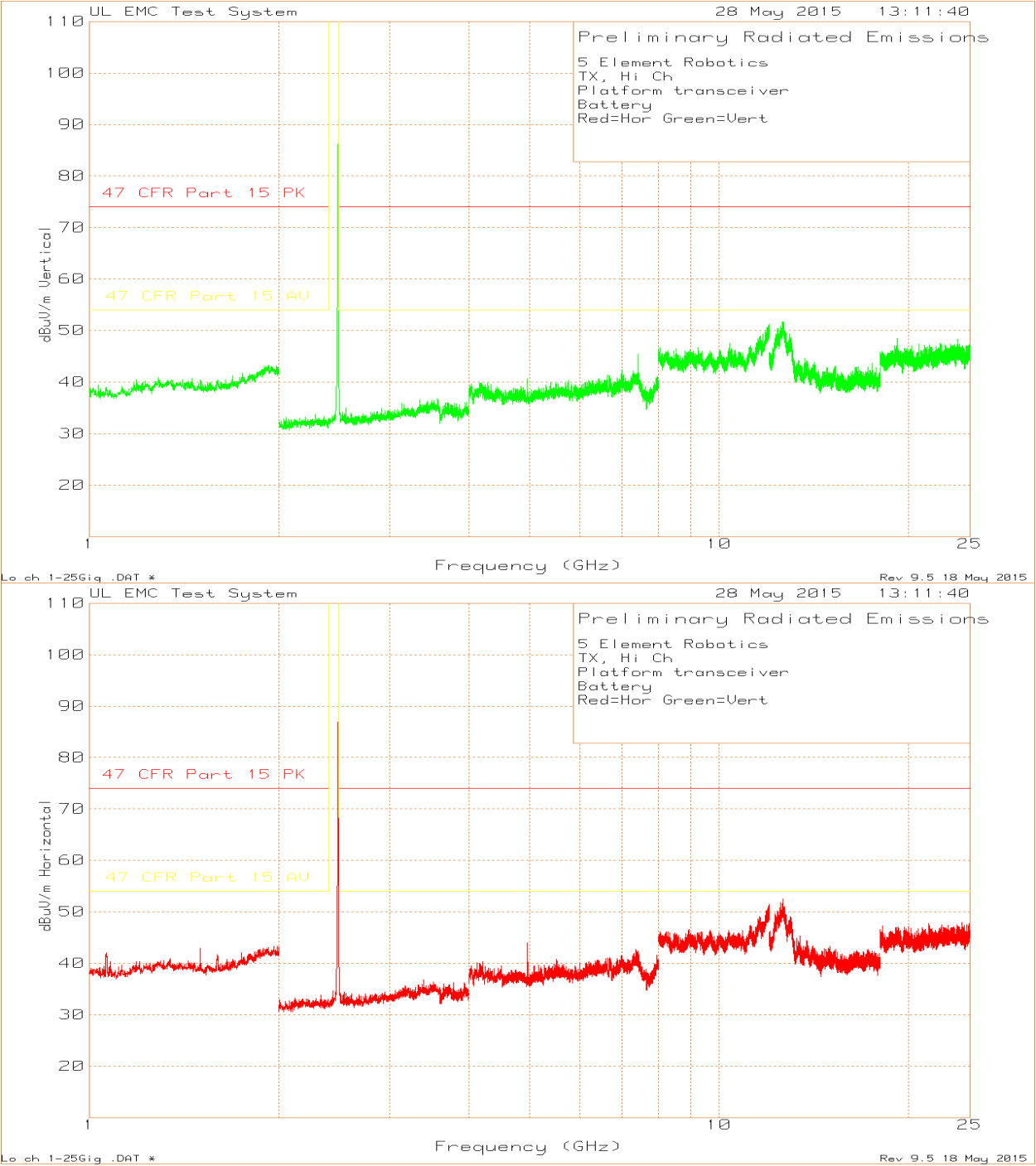
Middle Channel, board alone, scan



Middle Channel, board alone, data

5 Element Robotics													
TX, Mid Ch													
Platform transceiver													
Battery													
Red=Hor Green=Vert													
Trace Markers													
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Facotr dB/m	Path Factor dB	Level dBuV/m	Peak Limit dBuVm	Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.444	115.04	Pk	21.9	-51.28	85.66	-	-	-	-	0-360	150	H
2	4.891	65.22	Pk	27.7	-50.42	42.5	74	-31.5	54	-11.5	0-360	149	H
6	7.334	58.2	Pk	30.7	-45.91	42.99	74	-31.01	54	-11.01	0-360	149	H
3	2.444	113.21	Pk	21.9	-51.28	83.83	-	-	-	-	0-360	100	V
4	4.891	64.72	Pk	27.7	-50.42	42	74	-32	54	-12	0-360	150	V
5	7.337	59.61	Pk	30.7	-45.9	44.41	74	-29.59	54	-9.59	0-360	150	V
Radiated Emission Data													
	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Facotr dB/m	Path Factor dB	Level dBuV/m	Peak Limit dBuVm	Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	7.3363	62.86	Pk	30.7	-45.9	47.66	74	-26.34	-	-	184	100	V
	7.3363	58.9	RMS AV	30.7	-45.9	43.7	-	-	54	-10.3	184	100	V
	7.3363	63.15	Pk	30.7	-45.9	47.95	74	-26.05	-	-	236	209	H
	7.3363	58.63	RMS AV	30.7	-45.9	43.43	-	-	54	-10.57	236	209	H
Pk - Peak detector													
RMS AV - AVerage Detector													

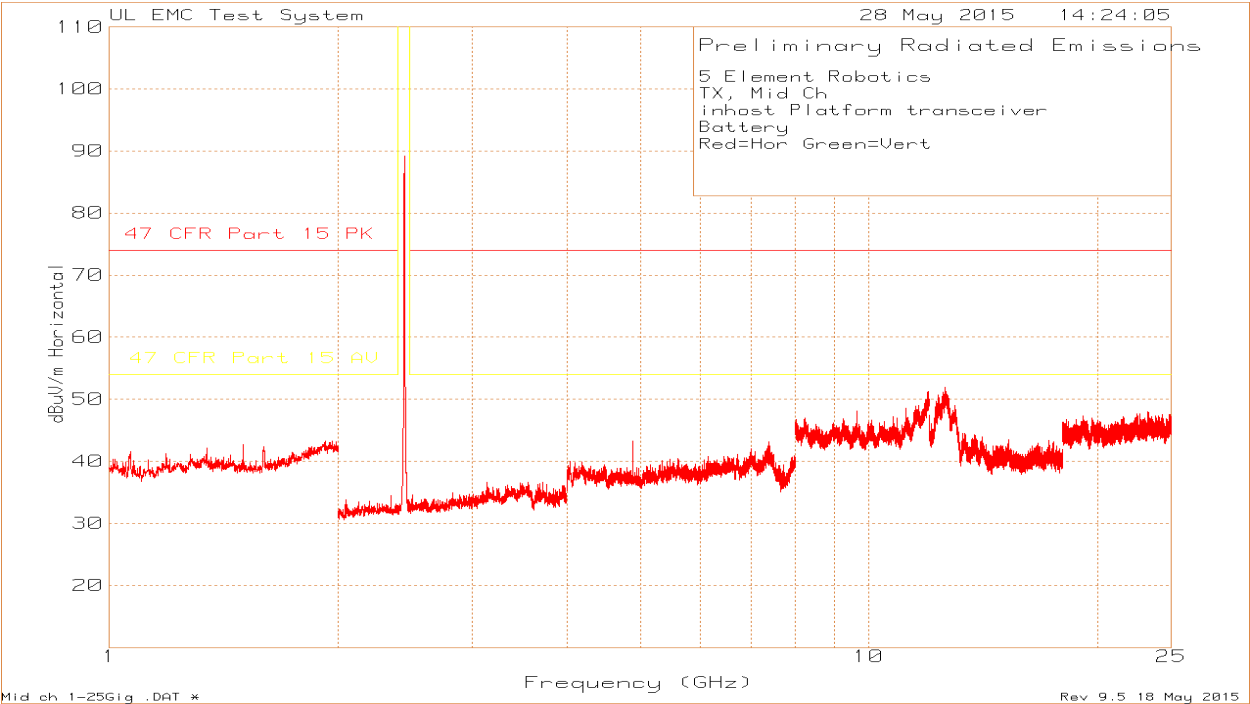
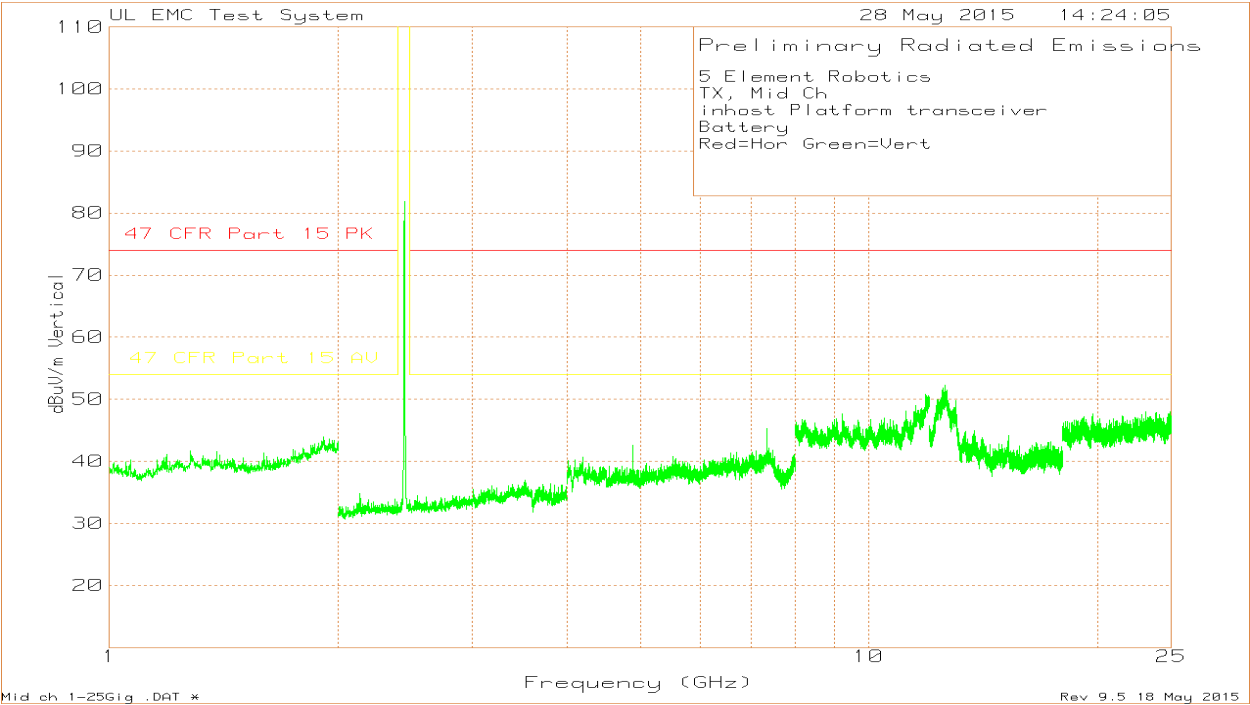
High Channel, board alone, scan



High Channel, board alone, data

5 Element Robotics													
TX, Hi Ch													
Platform transceiver													
Battery													
Red=Hor Green=Vert													
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Facotr dB/m	Path Factor dB	Level dBuV/m	Peak Limit dBuVm	Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth [Dega]	Height [cm]	Polarity
1	2.48	116.54	Pk	22	-51.67	86.87	-	-	-	-	0-360	150	H
2	4.961	66.62	Pk	27.8	-50.74	43.68	74	-30.32	54	-10.32	0-360	149	H
5	2.479	115.84	Pk	22	-51.66	86.18	-	-	-	-	0-360	100	V
3	4.961	63.66	Pk	27.8	-50.74	40.72	74	-33.28	54	-13.28	0-360	150	V
4	7.439	61.61	Pk	30.6	-46.79	45.42	74	-28.58	54	-8.58	0-360	100	V
Pk - Peak detector													
Radiated Emission Data													
	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Facotr dB/m	Path Factor dB	Level dBuV/m	Peak Limit dBuVm	Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth [Dega]	Height [cm]	Polarity
	7.4381	63.78	Pk	30.6	-46.76	47.62	74	-26.38	-	-	184	100	V
	7.4383	60.42	RMS AV	30.6	-46.77	44.25	-	-	54	-9.75	184	100	V
	7.4381	63.02	Pk	30.6	-46.76	46.86	74	-27.14	-	-	224	230	H
	7.4385	58.43	RMS AV	30.6	-46.77	42.26	-	-	54	-11.74	224	230	H
Pk - Peak detector													
RMS AV - Average Detector													

Middle Channel, board installed in host, scan

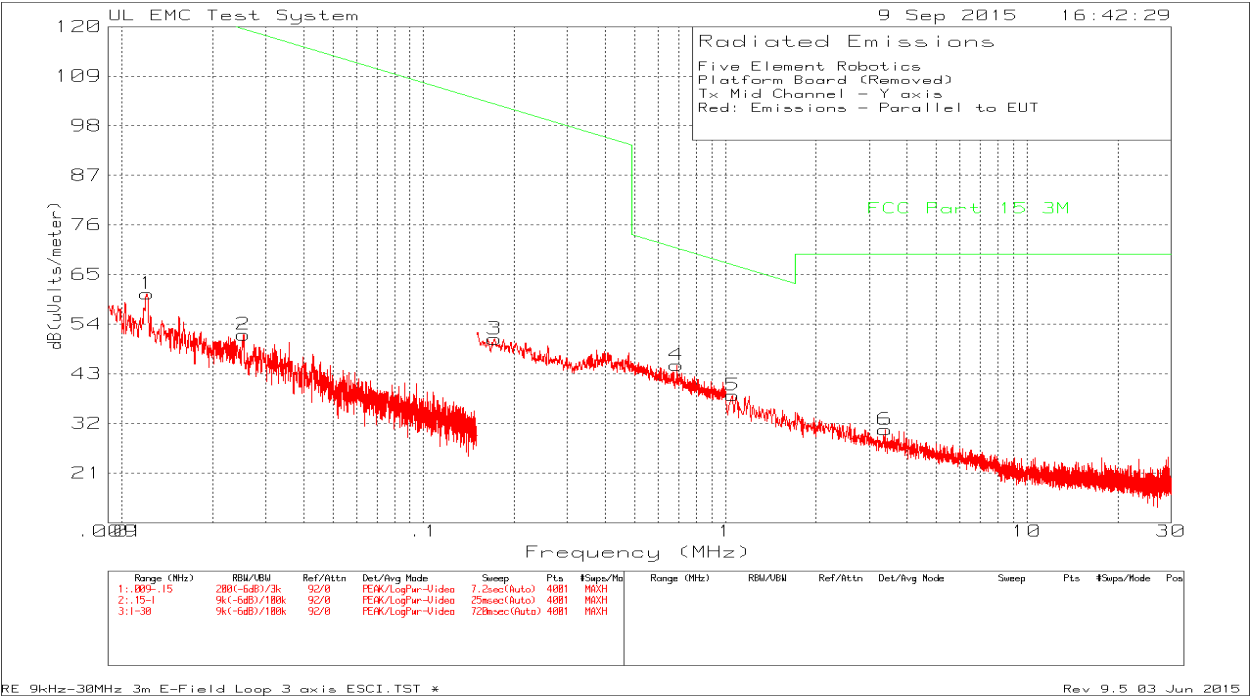


Middle Channel, board installed in host, data

5 Element Robotics													
TX, Mid Ch													
inhost Platform transceiver													
Battery													
Red=Hor Green=Vert													
Trace Markers													
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Facotr dB/m	Path Factor dB	Level dBuV/m	Peak Limit dBuVm	Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.444	118.52	Pk	21.9	-51.28	89.14	-	-	-	-	0-360	100	H
3	4.889	66.02	Pk	27.7	-50.42	43.3	74	-30.7	54	-10.7	0-360	101	H
2	2.445	111.21	Pk	21.9	-51.28	81.83	-	-	-	-	0-360	100	V
4	4.891	65.28	Pk	27.7	-50.42	42.56	74	-31.44	54	-11.44	0-360	150	V
5	7.334	60.55	Pk	30.7	-45.91	45.34	74	-28.66	54	-8.66	0-360	150	V
Pk - Peak detector													

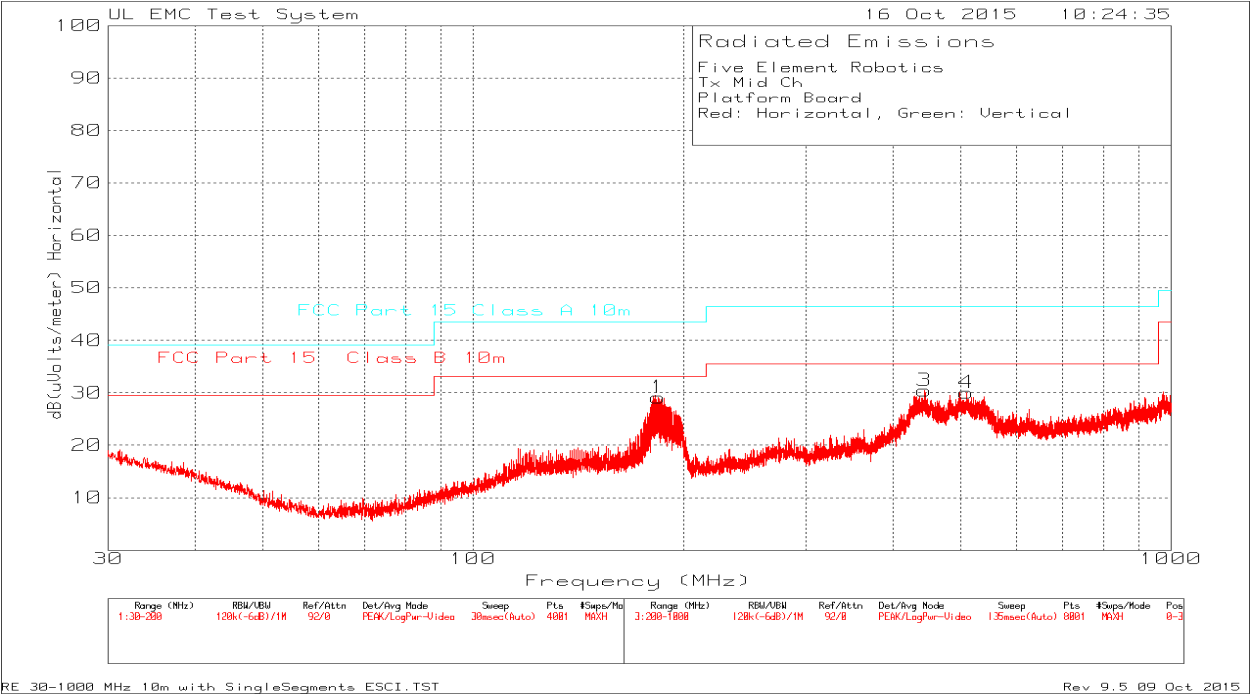
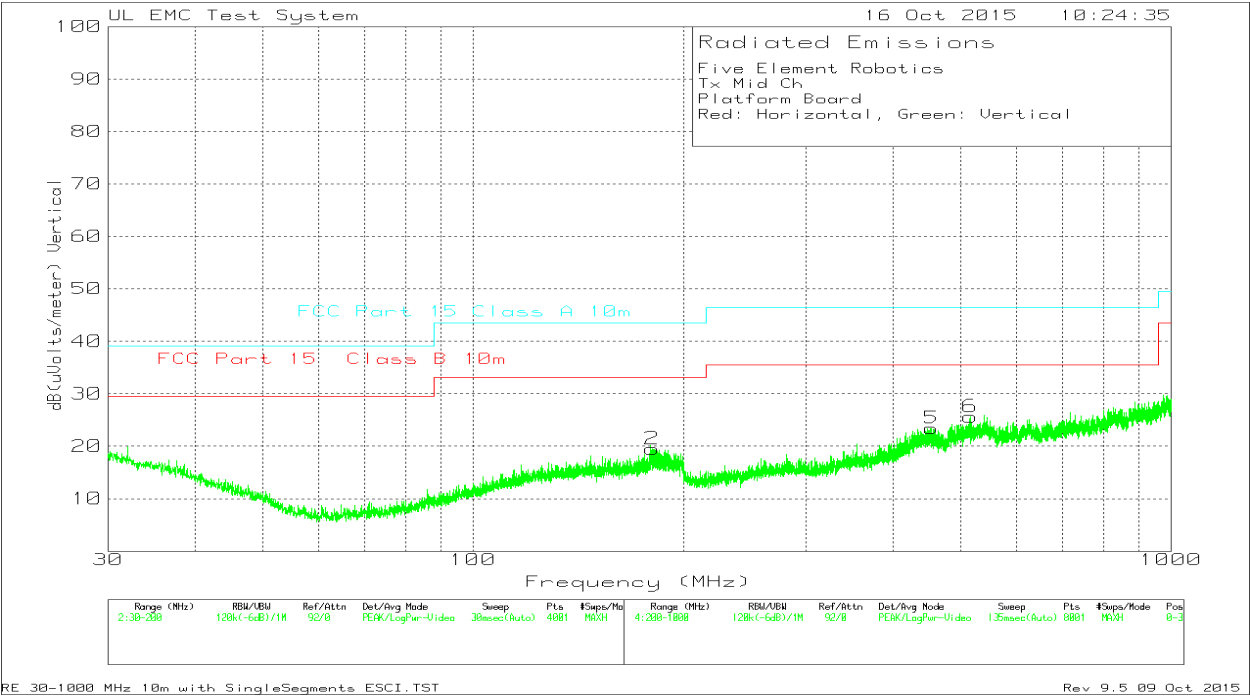
7.2.4. WORST-CASE BELOW 1 GHz

9kHz – 30MHz



Five Element Robotics									
Platform Board (Removed)									
Tx Mid Channel - Y axis									
Red: Emissions - Parallel to EUT									
Trace Markers									
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	FCC Part 15.3M Limit dBuV/m	Margin (dB)	Azimuth [Degs]
1	0.012115	40.54	Pk	20.2	0	60.74	125.92	-65.18	0-360
2	0.02531	35.38	Pk	16.3	0	51.68	119.52	-67.84	0-360
3	0.17215	38.61	Pk	12.1	0	50.71	102.88	-52.17	0-360
4	0.69102	32.9	Pk	12	0	44.9	70.81	-25.91	0-360
5	1.058	25.52	Pk	12.6	0.1	38.22	67.11	-28.89	0-360
6	3.38525	18.5	Pk	12	0.1	30.6	69.54	-38.94	0-360
Pk - Peak detector									

30MHz – 1GHz



Five Element Robotics											
Tx Mid Ch											
Platform Board											
Red: Horizontal, Green: Vertical											
Trace Markers											
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Limit FCC Part 15 Class B 10m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	184.1475	42.18	Pk	16.1	-29.2	29.08	33.07	-3.99	0-360	398	H
2	180.62	32.89	Pk	15.9	-29.3	19.49	33.07	-13.58	0-360	399	V
3	443.3	41.02	Pk	16.9	-27.5	30.42	35.57	-5.15	0-360	199	H
4	509.3	39.12	Pk	17.9	-27	30.02	35.57	-5.55	0-360	199	H
5	453.7	33.73	Pk	17.1	-27.4	23.43	35.57	-12.14	0-360	199	V
6	516.1	34.83	Pk	18.1	-27.3	25.63	35.57	-9.94	0-360	103	V
Pk - Peak detector											
Radiated Emission Data											
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Limit FCC Part 15 Class B 10m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	182.2655	41.87	Qp	16	-29.3	28.57	33.07	-4.5	66	342	H
	443.08216	37.54	Qp	16.9	-27.5	26.94	35.57	-8.63	37	218	H
	507.37863	36.87	Qp	17.7	-27.2	27.37	35.57	-8.2	342	171	H
Qp - Quasi-Peak detector											