

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT**

OF

Hardwire FIA

MODEL No.: Hardwire FIA

FCC ID: 2AKAM2288

Trademark: N/A

REPORT NO: ES161129051E

ISSUE DATE: December 20, 2016

Prepared for

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Prepared by
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VERIFICATION OF COMPLIANCE

Applicant:	Roseman Engineering Ltd. Kiryat Atidim. St. Dvora Nevia, Bld.3, floor 5., Tel Aviv, Israel
Manufacturer:	Roseman Engineering Ltd. Kiryat Atidim. St. Dvora Nevia, Bld.3, floor 5., Tel Aviv, Israel
Product product:	Hardwire FIA
Model Number:	Hardwire FIA
Trademark:	N/A
File Number:	ES161129051E
Date of Test:	December 5, 2016 to December 20, 2016

We hereby certify that:

The above equipment was tested by EMTEK (SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15C.

The test results of this report relate only to the tested sample identified in this report.

Date of Test : December 5, 2016 to December 20, 2016

Prepared by : Joanna Jiao
Joanna Jiao/Editor

Reviewer : Joe Xia
Joe Xia/Supervisor

Approve & Authorized Signer : Lisa Wang
Lisa Wang/Manager



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1 General Information

1.1 Product Description

Characteristics	Description
Product	Hardwire FIA
Model Number	Hardwire FIA
Power Supply	DC12V from fleet journal
Operation Frequency	10 KHz
Modulation	AM
Antenna Type	Loop Antenna
Antenna Gain	0 dBi

1.2 Related Submittal(s) / Grant(s)

This submittal(s) (test report) is intended for FCC ID: 2AKAM2288 filing to comply with FCC Part 15, Subpart C Rules.

1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

1.6 Test Facility

Site Description

EMC Lab. : Accredited by CNAS, 2016.10.24
The certificate is valid until 2022.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005)
The Certificate Registration Number is L2291.

Accredited by TUV Rheinland Shenzhen 2015.4
The Laboratory has been assessed according to the requirements ISO/IEC 17025.

Accredited by FCC, April 17, 2013
The Certificate Registration Number is 709623.

Accredited by FCC, July 13, 2016
The Certificate Registration Number is 406365.

Accredited by Industry Canada, November 24, 2015
The Certificate Registration Number is 4480A.

Name of Firm

: EMTEK (SHENZHEN) CO., LTD.

Site Location

: Bldg 69, Majialong Industry Zone,
Nanshan District, Shenzhen, Guangdong, China

2 System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

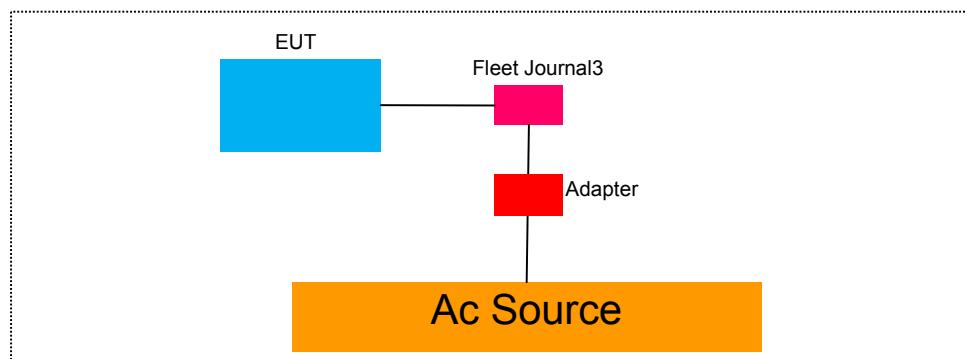


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	Car Dara Logger	N/A	Fleet Journal3	JAKFG3E		
2.	Adapter	MASS POWER	NBS12E120100 UV-1	N/A		

Note:

- (1) Unless otherwise denoted as EUT in 『Remark』 column, device(s) used in tested system is a support equipment.

3 Summary of Test Results

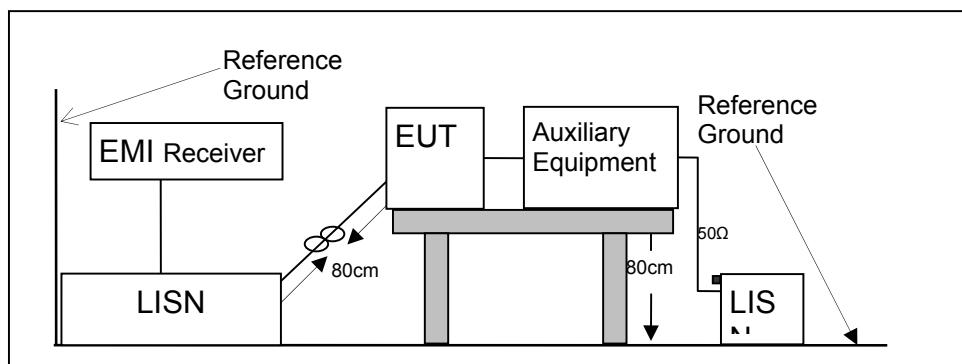
FCC Rules	Description Of Test	Result
§15.207	AC Power Conducted Emission	Pass
§15.209	Radiated Emission	Pass

4 Conducted Emissions Test

4.1 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

4.2 Test SET-UP (Block Diagram of Configuration)



4.3 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2016	05/29/2017
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	05/28/2016	05/28/2017
50Ω Coaxial Switch	Anritsu	MP59B	M20531	05/29/2016	05/29/2017
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	05/28/2016	05/28/2017
Voltage Probe	Rohde & Schwarz	TK9416	N/A	05/28/2016	05/28/2017
I.S.N	Rohde & Schwarz	ENY22	1109.9508.02	05/28/2016	05/28/2017

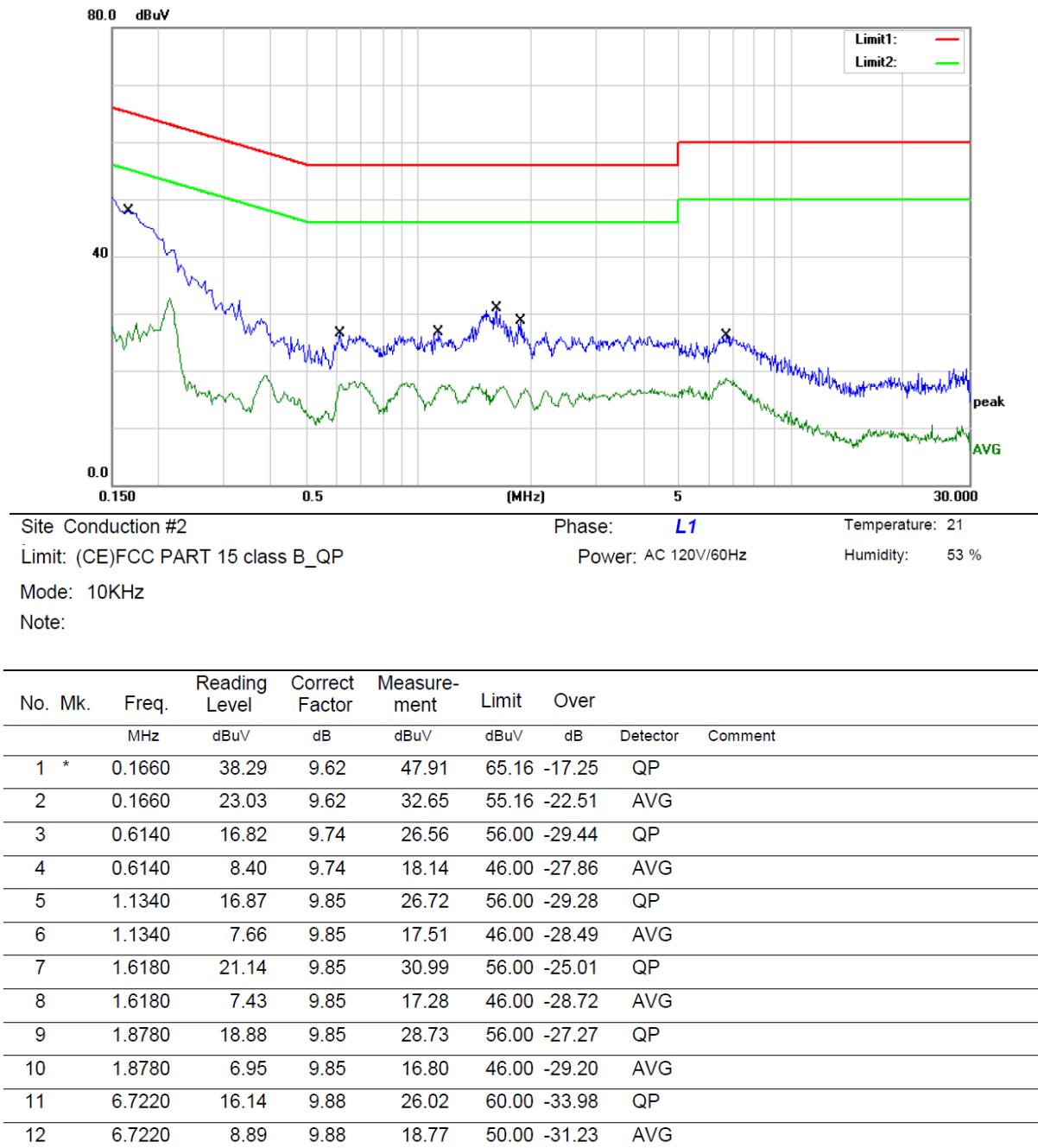
4.4 Conducted Emission Limit

Conducted Emission Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

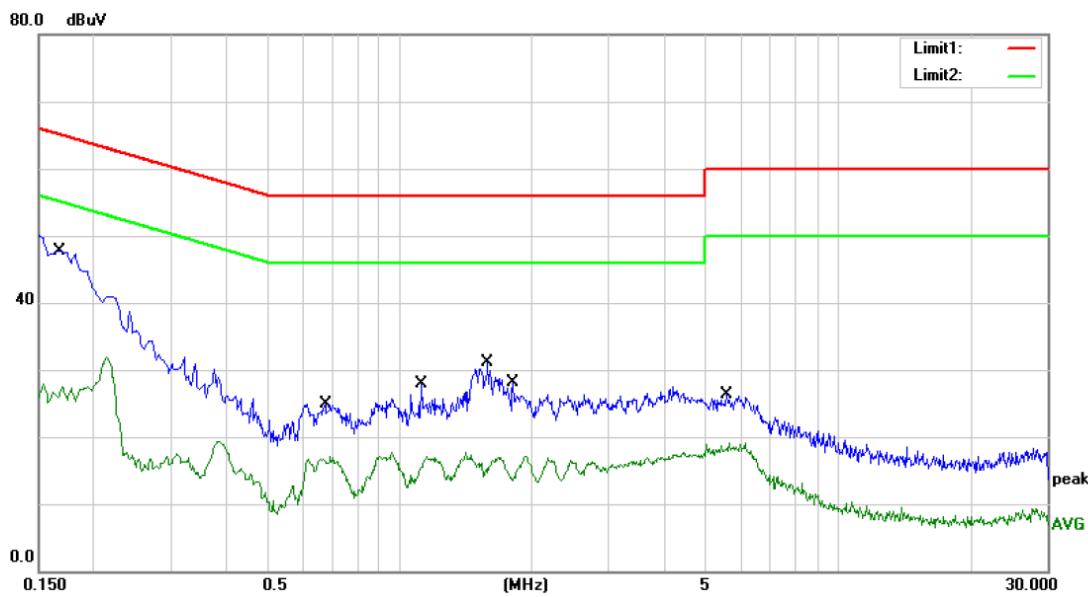
Note: 1. The lower limit shall apply at the transition frequencies
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.5 Measurement Result

We test the EUT at 120V and 240V, and show the worst result as bellow.



*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator:



Site Conduction #2

Phase: **N**

Temperature: 21

Limit: (CE)FCC PART 15 class B_QP

Power: AC 120V/60Hz

Humidity: 53 %

Mode: 10KHz

Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Detector	Comment
			Level	Factor	ment				
1	*	0.1685	37.99	9.62	47.61	65.03	-17.42	QP	
2		0.1685	22.29	9.62	31.91	55.03	-23.12	AVG	
3		0.6780	15.13	9.76	24.89	56.00	-31.11	QP	
4		0.6780	6.99	9.76	16.75	46.00	-29.25	AVG	
5		1.1180	18.04	9.85	27.89	56.00	-28.11	QP	
6		1.1180	7.22	9.85	17.07	46.00	-28.93	AVG	
7		1.5860	21.25	9.85	31.10	56.00	-24.90	QP	
8		1.5860	7.13	9.85	16.98	46.00	-29.02	AVG	
9		1.8180	18.20	9.85	28.05	56.00	-27.95	QP	
10		1.8180	7.32	9.85	17.17	46.00	-28.83	AVG	
11		5.5740	16.39	9.87	26.26	60.00	-33.74	QP	
12		5.5740	9.20	9.87	19.07	50.00	-30.93	AVG	

*:Maximum data

x:Over limit

!:over margin

Comment: Factor build in receiver.

Operator:

4.6 Conducted Measurement Photo



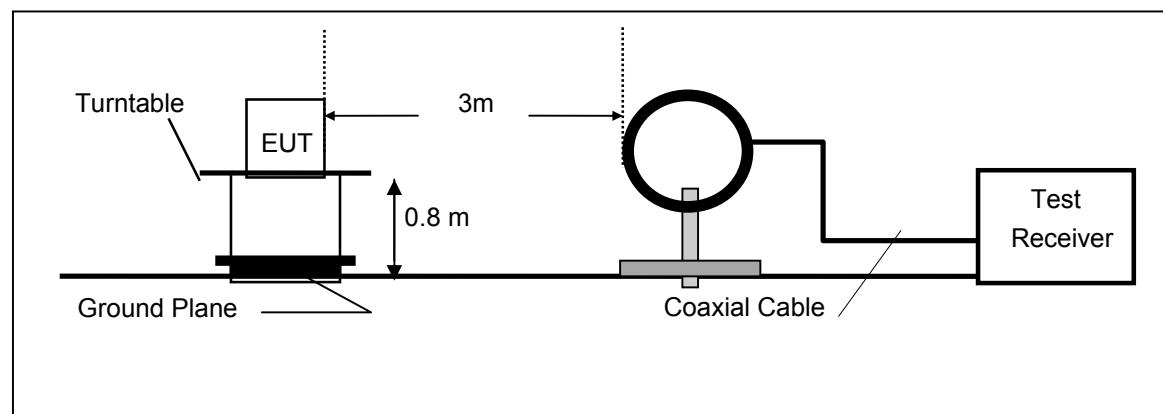
5 Radiated Emission Test

5.1 Measurement Procedure

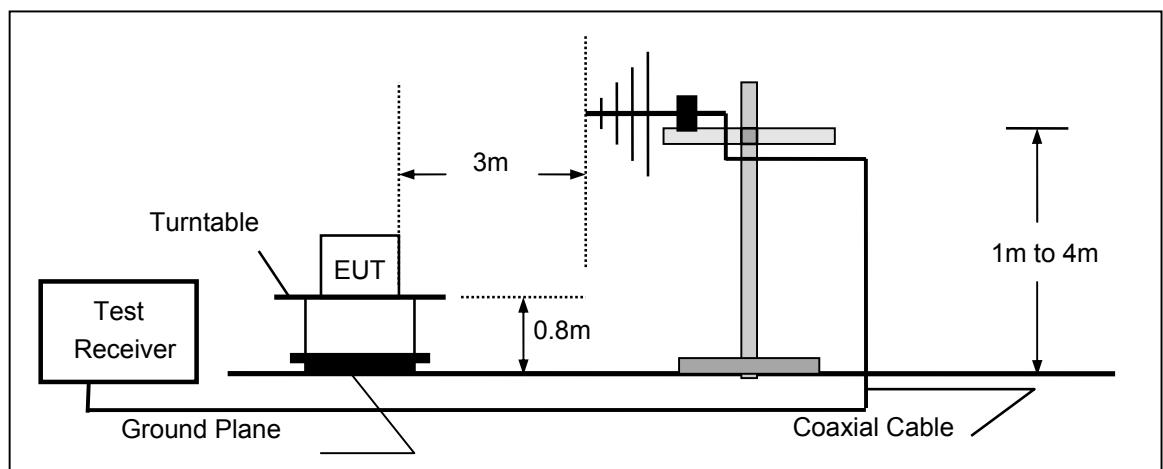
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.
5. Use the following receiver/spectrum analyzer settings:
 Span = wide enough to fully capture the emission being measured
 RBW=200Hz for 9KHz to 150KHz,
 RBW=9kHz for 150KHz to 30MHz,
 RBW=120KHz for 30MHz to 1GHz
 $VBW \geq 3 \times RBW$
 Sweep = auto
 Detector function = QP
 Trace = max hold

5.2 Test SET-UP (Block Diagram of Configuration)

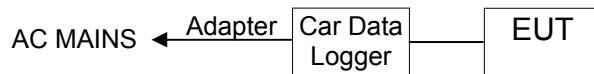
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Block Diagram of EUT System



(EUT: Hardwire FIA)

5.3 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/29/2016	05/29/2017
Pre-Amplifier	HP	8447D	2944A07999	05/28/2016	05/28/2017
Bilog Antenna	Schwarzbeck	VULB9163	142	05/28/2016	05/28/2017
Loop Antenna	ARA	PLA-1030/B	1029	05/28/2016	05/28/2017
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/28/2016	05/28/2017
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/28/2016	05/16/2016
Cable	Schwarzbeck	AK9513	ACRX1	05/29/2016	05/29/2017
Cable	Rosenberger	N/A	FP2RX2	05/29/2016	05/29/2017
Cable	Schwarzbeck	AK9513	CRPX1	05/29/2016	05/29/2017
Cable	Schwarzbeck	AK9513	CRRX2	05/29/2016	05/29/2017

5.4 Radiated Emission Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

FCC Part 15.209				
Frequency (MHz)	Field Strength Limitation		Field Strength Limitation Frequency at 3m Measurement Dist	
	(uV/m)	Dist	(uV/m)	(dBuV/m)
0.009 – 0.490	2400 / F(KHz)	300m	10000 * 2400/F(KHz)	20log 2400/F(KHz) + 80
0.490 – 1.705	24000 / F(KHz)	30m	100 * 24000/F(KHz)	20log 24000/F(KHz) + 40
1.705 – 30.00	30	30m	100* 30	20log 30 + 40
30.0 – 88.0	100	3m	100	20log 100
88.0 – 216.0	150	3m	150	20log 150
216.0 – 960.0	200	3m	200	20log 200
Above 960.0	500	3m	500	20log 500

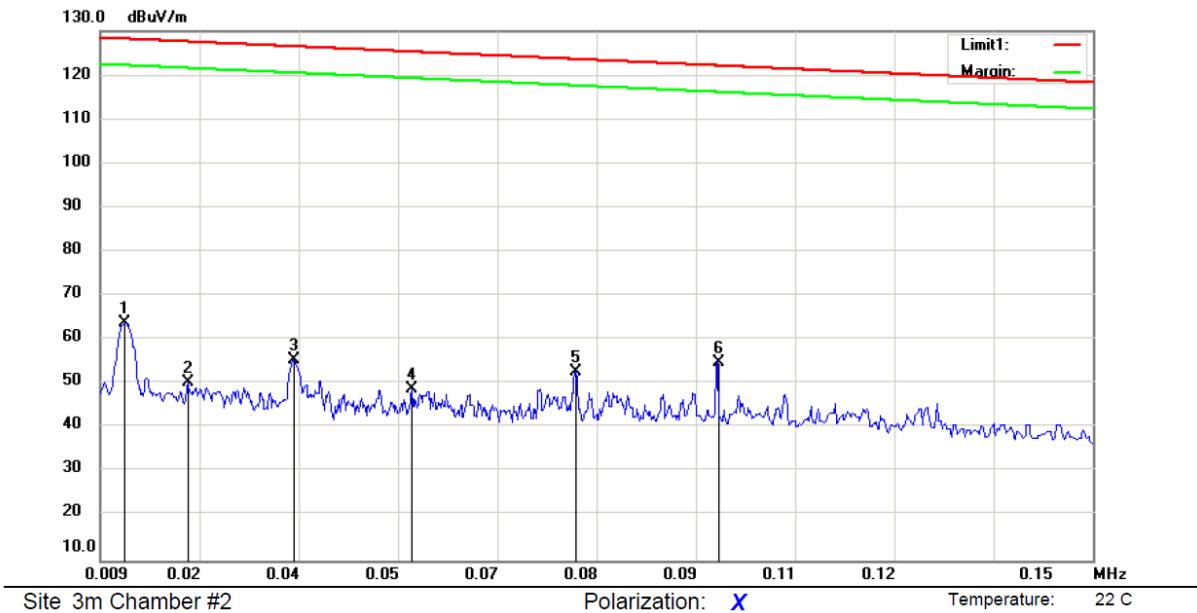
15.205 Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

Remark:

1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

5.5 Measurement Result



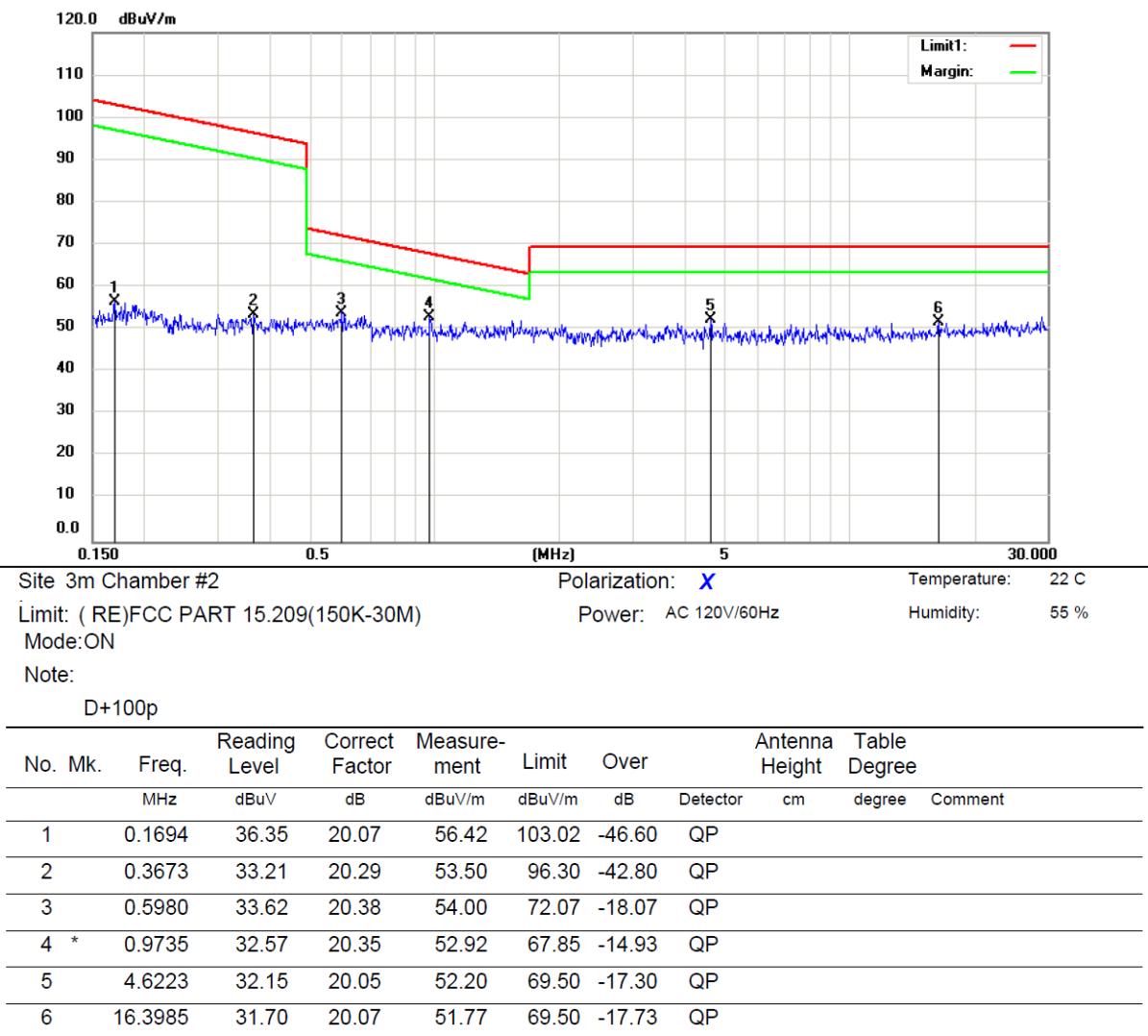
Note:

D+100p

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table		
			Level	Factor	ment				Height	Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	0.0126	44.48	19.35	63.83	128.24	-64.41	QP			
2		0.0214	30.71	19.53	50.24	127.61	-77.37	QP			
3		0.0365	35.75	19.83	55.58	126.52	-70.94	QP			
4		0.0533	28.82	20.08	48.90	125.30	-76.40	QP			
5		0.0765	32.83	19.94	52.77	123.63	-70.86	QP			
6		0.0967	34.92	19.87	54.79	122.17	-67.38	QP			

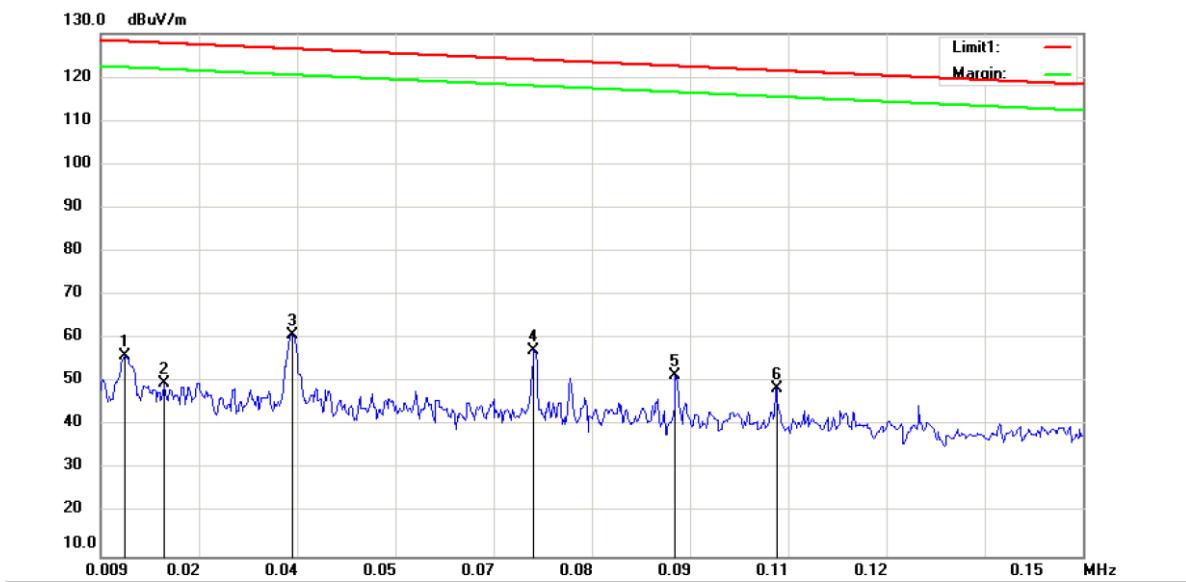
*:Maximum data x:Over limit !:over margin

Operator: Ricky



*:Maximum data x:Over limit !:over margin

Operator: Ricky



Site: 3m Chamber #2 Polarization: **Y** Temperature: 22 C

Limit: (RE)FCC PART 15.209(9K-150K) Power: AC 120V/60Hz Humidity: 55 %

Mode: ON

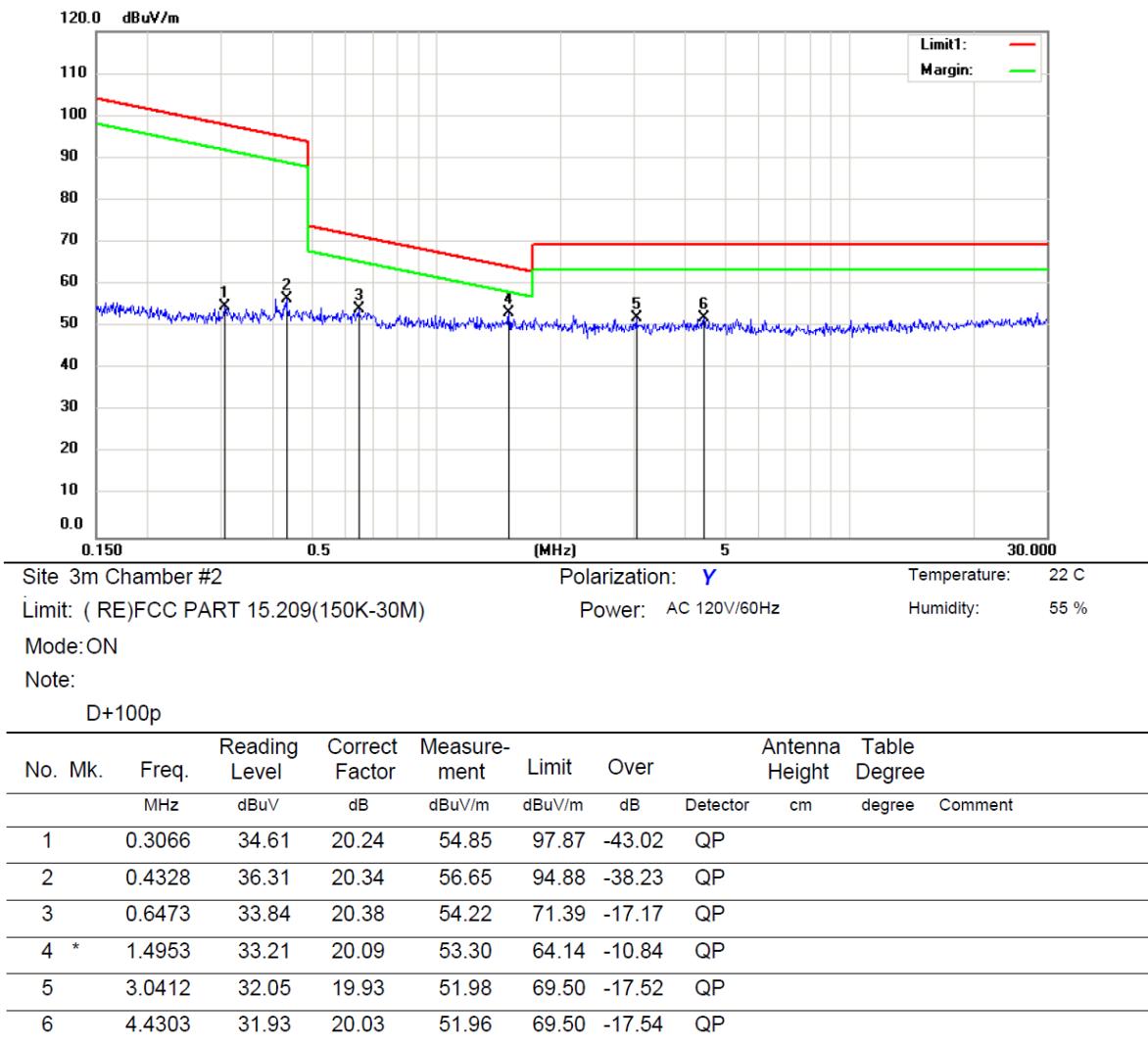
Note:

D+100p

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table	
			Level	Factor	ment					
		MHz	dBuV	dB	dBuV/m	dB	Detector	cm	degree	Comment
1		0.0126	36.70	19.35	56.05	128.24	-72.19	QP		
2		0.0183	30.24	19.47	49.71	127.83	-78.12	QP		
3	*	0.0366	41.12	19.83	60.95	126.51	-65.56	QP		
4		0.0713	37.42	19.97	57.39	124.01	-66.62	QP		
5		0.0916	31.58	19.90	51.48	122.54	-71.06	QP		
6		0.1061	28.67	19.87	48.54	121.50	-72.96	QP		

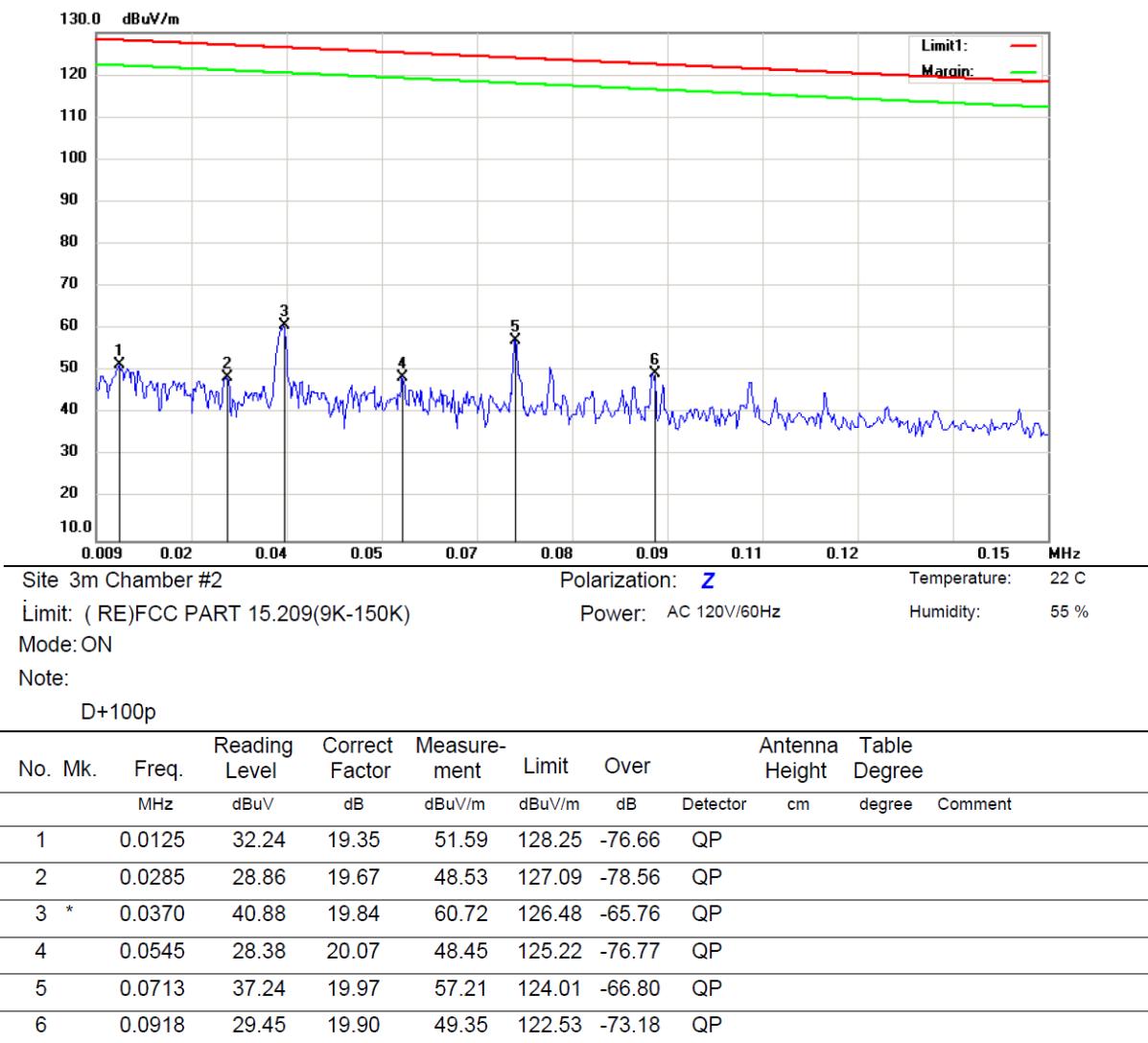
*:Maximum data x:Over limit !:over margin

Operator: Ricky



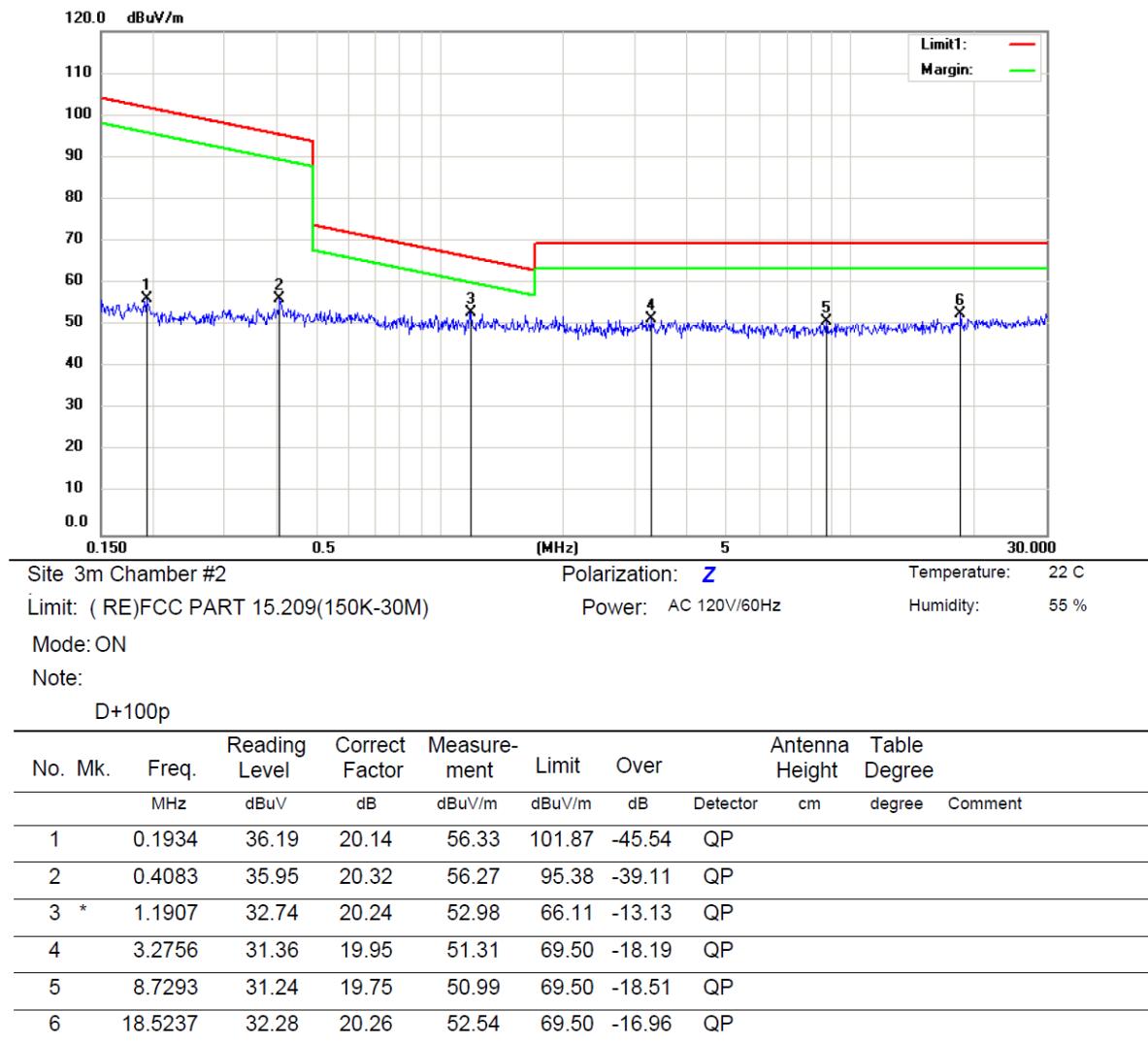
*:Maximum data x:Over limit !:over margin

Operator: Ricky



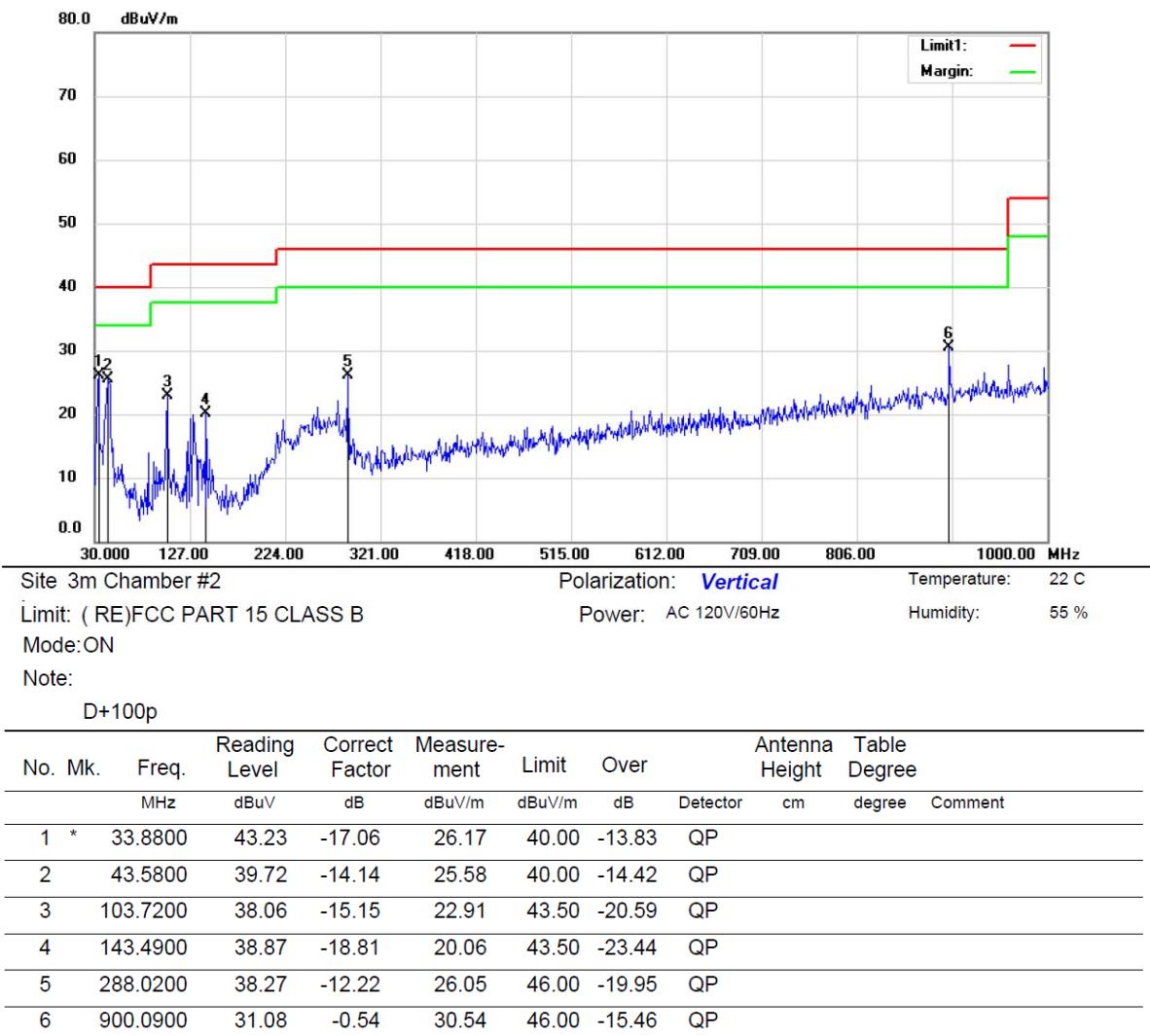
*:Maximum data x:Over limit !:over margin

Operator: Ricky



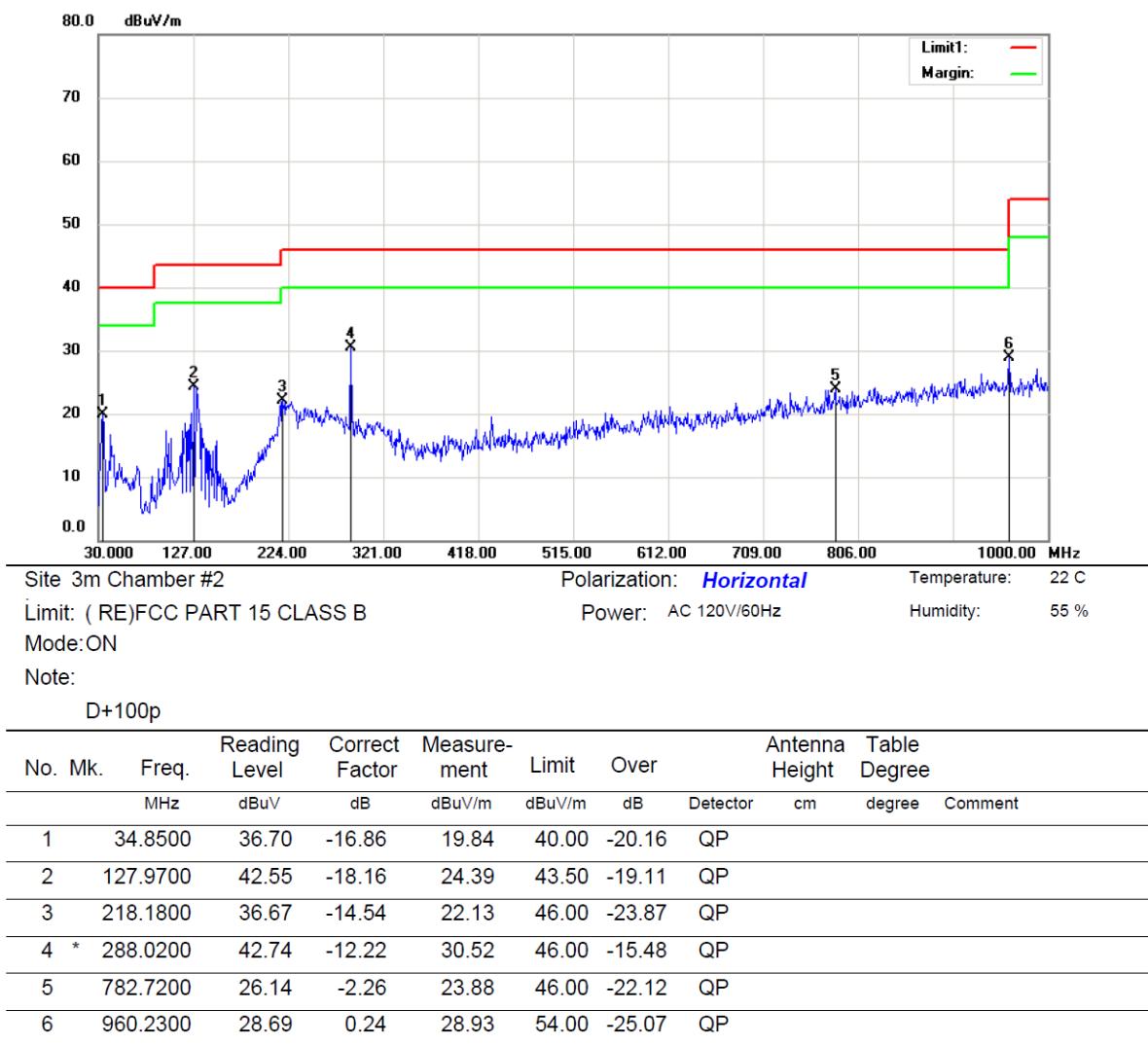
*:Maximum data x:Over limit !:over margin

Operator: Ricky



*:Maximum data x:Over limit !:over margin

Operator: Ricky



*:Maximum data x:Over limit !:over margin

Operator: Ricky

5.6 Radiated Measurement Photos

