EMISSIONS TEST REPORT

(FULL COMPLIANCE)

Report Number: 102940158BOX-001b
Project Number: G102940158

Report Issue Date: 04/25/2017

Model(s) Tested: RTU5 (Wide Band and Narrow Band)
Model(s) Partially Tested: None
Model(s) Not Tested but declared equivalent by the client: None

Standards: FCC Part 90:2017, " Private Land Mobile Radio Services"

Tested by:
Intertek Testing Services NA, Inc.
70 Codman Hill Road
Boxborough, MA 01719
USA

Client:
LoJack Corporation
40 Pequot Way
Canton, MA 02021
USA

Report prepared by

Kouma Sinn / Staff Engineer, EMC

Report reviewed by

Norman Shpilsher/Sr. Staff Engineer, EMC

Table of Contents

1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
3	Client Information	--
4	Description of Equipment Under Test and Variant Models	--
5	System Setup and Method	--
6	Transmitter Output Power (FCC 2.1046, 90.20(e)(6))	Pass
7	Transmitter Occupied Bandwidth (FCC 2.1049, 90.20(e)(6))	Pass
8	Transmitter Frequency Stability (FCC 2.1055, 90.213)	Pass
9	Transient Frequency Behavior (FCC 2.1055, 90.214)	Pass
10	Transmitter Emissions Mask (FCC 90.210(d))	Pass
11	Transmitter Spurious Emissions (Antenna Port Conducted) (FCC 2.1051, 90.210(d))	Pass
12	Band Edge Emissions (FCC 2.1053, 90.210(d))	Pass
13	Receiver Spurious Emissions (Antenna Port Conducted) (FCC 2.1053, 90.210(d))	Pass
14	Transmitter Out-of-Band Unwanted Emissions, Radiated (FCC 2.1053, 90.210(d))	Pass
15	Receiver Radiated Emissions (FCC 2.1053, 90.210(d))	Pass
16	AC Mains Conducted Emissions	Pass
17	Revision History	--

3 Client Information

This EUT was tested at the request of:

Client: LoJack Corporation
40 Pequot Way
Canton, MA 02021
USA

Contact: Vincent Ricci
Telephone: (781) 302-4332
Fax: None
Email: vricci@lojack.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: LoJack Corporation
40 Pequot Way
Canton, MA 02021
USA

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Remote Tower Unit (Wide Band)	LoJack Corporation	RTU5	E0001A
Remote Tower Unit (Narrow Band)	LoJack Corporation	RTU5	E0001B

Receive Date:	03/23/2017
Received Condition:	Good
Type:	Production
Test Dates(s):	03/24/2017,03/27/2017-03/29/2017, 04/01/2017-04/02/2017, 04/06/2017, 04/09/2017

Description of Equipment Under Test (provided by client)
The EUT is Remote Tower Unit with wide band and narrow bands.

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
110/115 VAC	15 A	50/60 Hz	1

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Transmit mode
2	Receive mode

Software used by the EUT:

No.	Descriptions of EUT Exercising
1	None

Radio/Receiver Characteristics	
Frequency Band(s)	173.075 MHz
Modulation Type(s)	MSK
Maximum Output Power	53.39 dBm (Wide Band) 54.90 dBm (Narrow Band)
Test Channels	1
Occupied Bandwidth	13.126 kHz (26 dB, Wide Band), 12.024 kHz (Occupied Bandwidth, Wide Band), 7.377 kHz (26 dB, Narrow Band), 7.045 kHz (Occupied Bandwidth, Narrow Band)
Frequency Hopper: Number of Hopping Channels	N/A
Frequency Hopper: Channel Dwell Time	N/A
Frequency Hopper: Max interval between two instances of use of the same channel	N/A
MIMO Information (# of Transmit and Receive antenna ports)	N/A
Equipment Type	Standalone
ETSI LBT/Adaptivity	N/A
ETSI Adaptivity Type	N/A
ETSI Temperature Category (I, II, III)	N/A
ETSI Receiver Category (1, 2, 3)	N/A
Antenna Type and Gain	6 dBi

Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

5 System Setup and Method

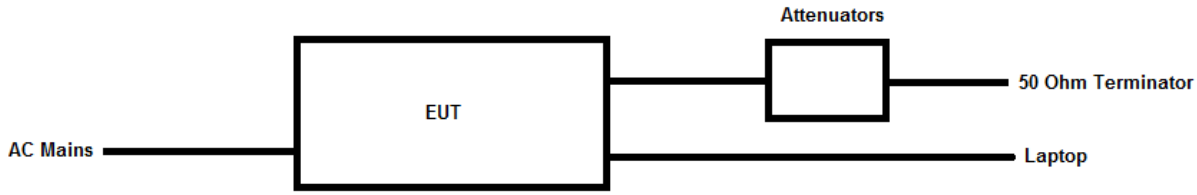
Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
1	AC cable	1	None	None	AC mains

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Laptop	Dell	LATITUDE D600	None

5.1 Method:

Configuration as required by FCC Part 90:2017, ANSI C63.10:2013, ANSI C63.26-2015, and KDB 971168 D01 Power Meas License Digital Systems v02r02.

5.2 EUT Block Diagram:



6 Output Power

6.1 Method

Tests are performed in accordance with FCC 2.1046, 90.20(e)(6).

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

6.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV002'	Weather Station	Davis Instruments	7400	PE80519A93	06/01/2016	06/01/2017
WEI18'	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017
WEI16'	Attenuator, 30dB	Weinschel Corp	47-30-34	BD4327	05/02/2016	05/02/2017
ROS001'	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	06/09/2016	06/09/2017
147058'	Signal Generator 10 MHz to 20 GHz	Hewlett Packard	83620B	3722A00552	04/19/2016	04/19/2017
CBLSHF202'	Cable, SMA - SMA, 9kHz-40GHz	Sucoflex (Huber Suhn	104PE	CBLSHF202	08/29/2016	08/29/2017
CBLSHF205'	Cable, SMA-SMA, 9kHz-40GHz, (Cable Kit5)	Huber + Suhner	Sucoflex 102EA	234715001	08/27/2016	08/27/2017
--	30 dB Attenuator, 1000 Watts	Bird	1000-A-FFN-30	1710	VBU	VBU

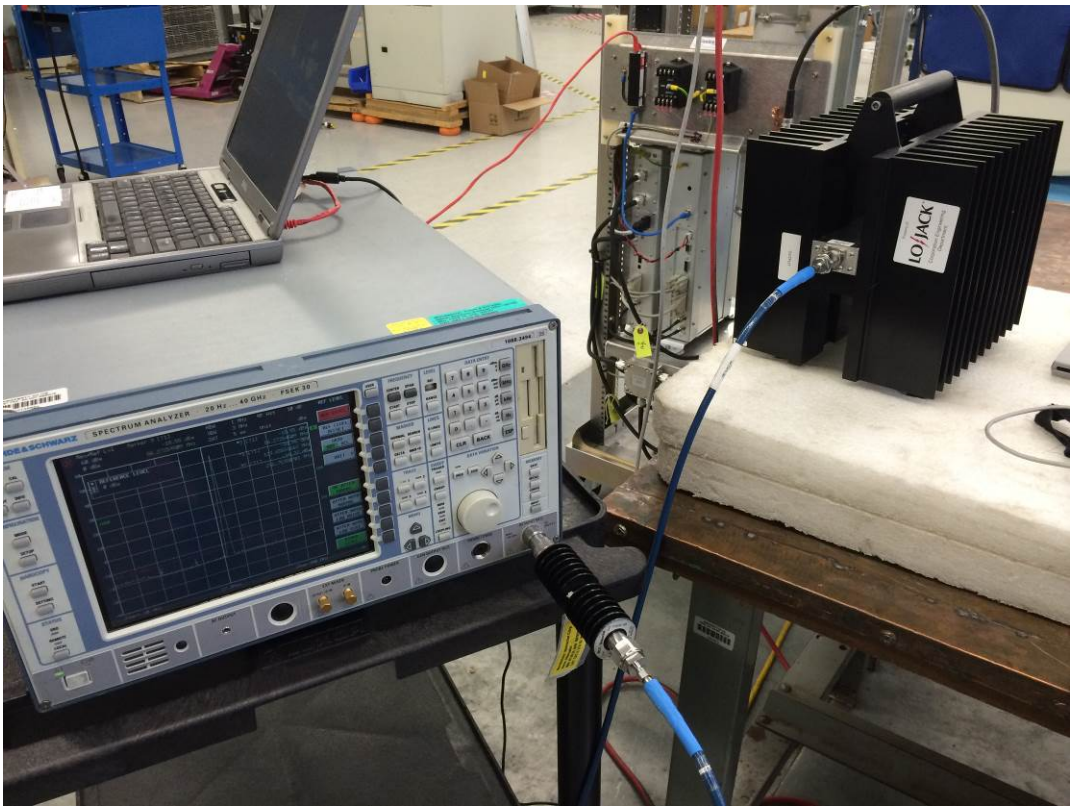
Software Utilized:

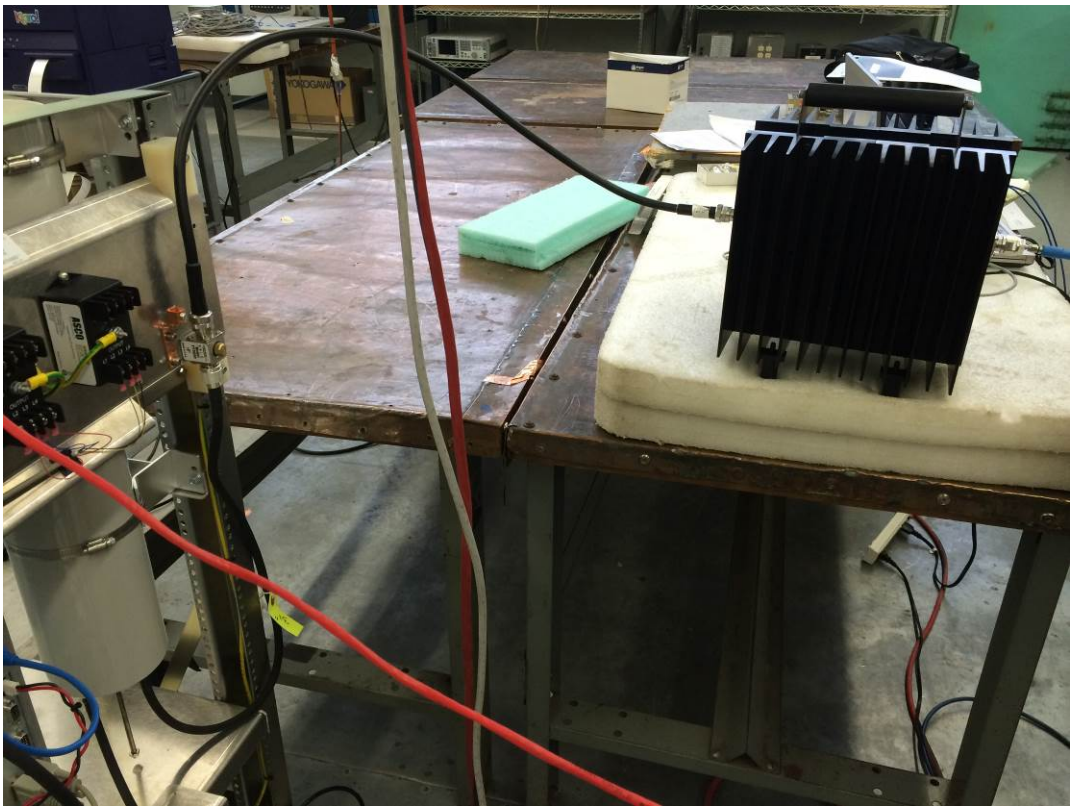
Name	Manufacturer	Version
None		

6.3 Results:

The sample tested was found to Comply.

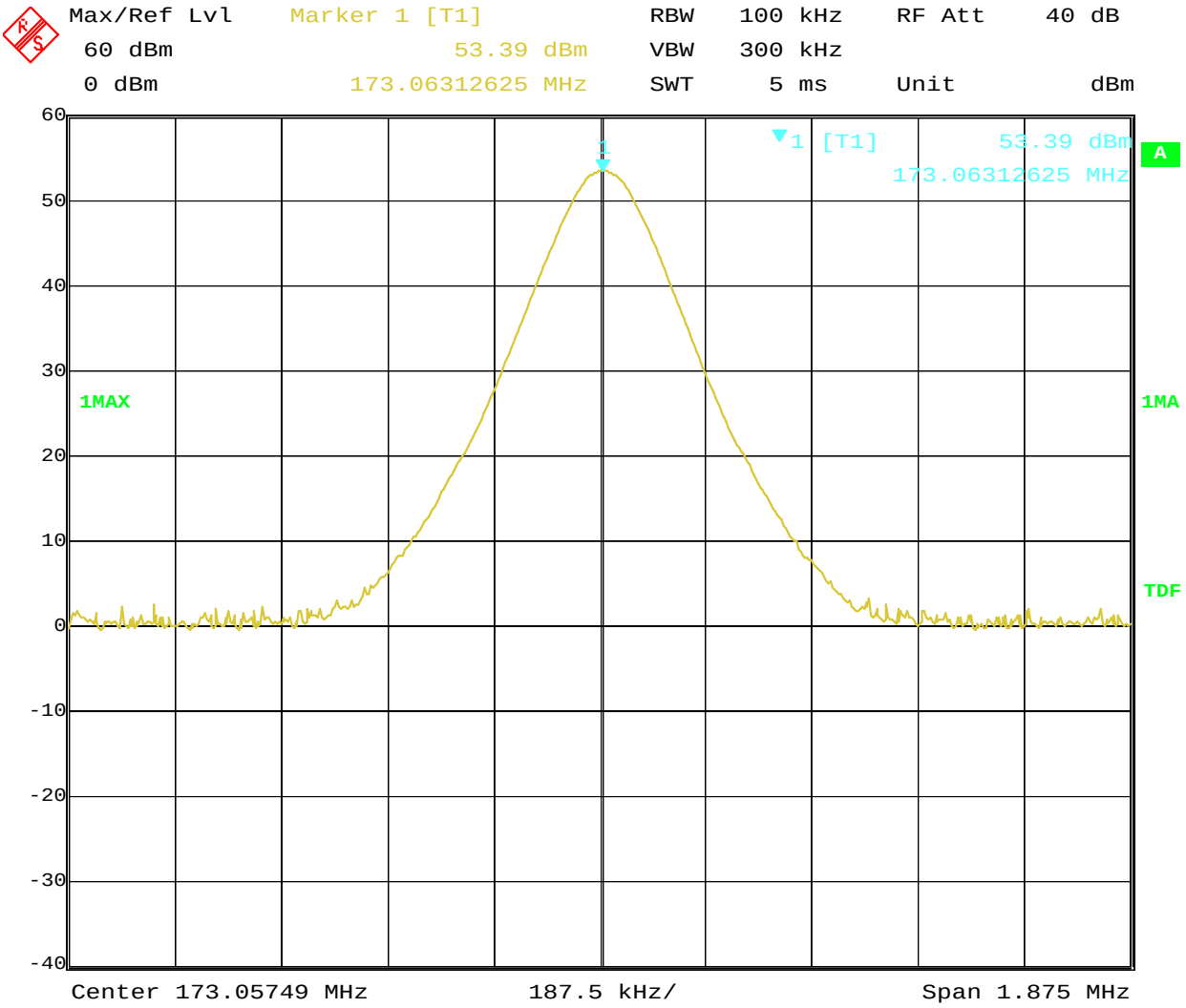
6.4 Setup Photographs:



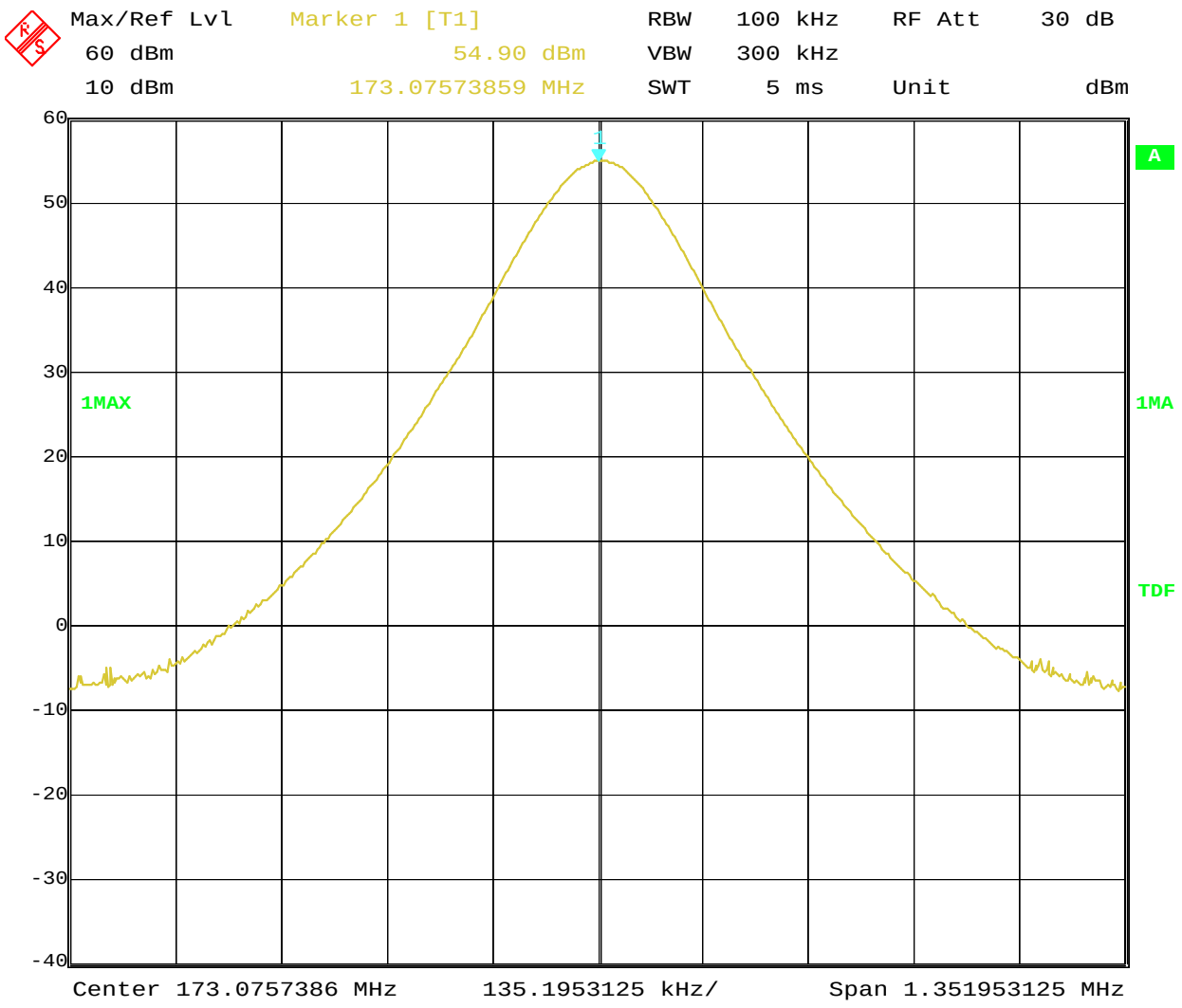


6.5 Plots/Data:

Output Power, 53.39 dBm, (Wide Band)



Output Power, 54.90 dBm, (Narrow band)



Output Power (ERP)

	Measured	Ant. Gain	Cable Loss	ERP	ERP	ERP Limit	Verdict
	Power	dBi	dB	dBm	W	W	Pass/Fail
Narrow Band	54.90	6.00	5.00	55.90	389.05	500.00	Pass
Wide Band	53.40	6.00	5.00	54.40	275.42	500.00	Pass

Test Personnel:	Kouma Sinn KPS	Test Date:	03/24/2017 (1st shift)
	Vathana Ven VSV		03/24/2017 (2nd shift)
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 90	Limit Applied:	Per standard
Input Voltage:	120VAC 60Hz	Ambient Temperature:	23 ºC
Pretest Verification w/ Ambient Signals or BB Source:	**N/A**	Relative Humidity:	10 %
		Atmospheric Pressure:	1018 mbars

Deviations, Additions, or Exclusions: None

7 Transmitter Occupied Bandwidth

7.1 Method

Tests are performed in accordance with (FCC 2.1049, 90.20(e)(6)).

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

7.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV002'	Weather Station	Davis Instruments	7400	PE80519A93	06/01/2016	06/01/2017
WEI18'	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017
WEI16'	Attenuator, 30dB	Weinschel Corp	47-30-34	BD4327	05/02/2016	05/02/2017
ROS001'	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	06/09/2016	06/09/2017
147058'	Signal Generator 10 MHz to 20 GHz	Hewlett Packard	83620B	3722A00552	04/19/2016	04/19/2017
CBLSHF202'	Cable, SMA - SMA, 9kHz-40GHz	Sucoflex (Huber Suhn	104PE	CBLSHF202	08/29/2016	08/29/2017
CBLSHF205'	Cable, SMA-SMA, 9kHz-40GHz, (Cable Kit5)	Huber + Suhner	Sucoflex 102EA	234715001	08/27/2016	08/27/2017
--	30 dB Attenuator, 1000 Watts	Bird	1000-A-FFN-30	1710	VBU	VBU

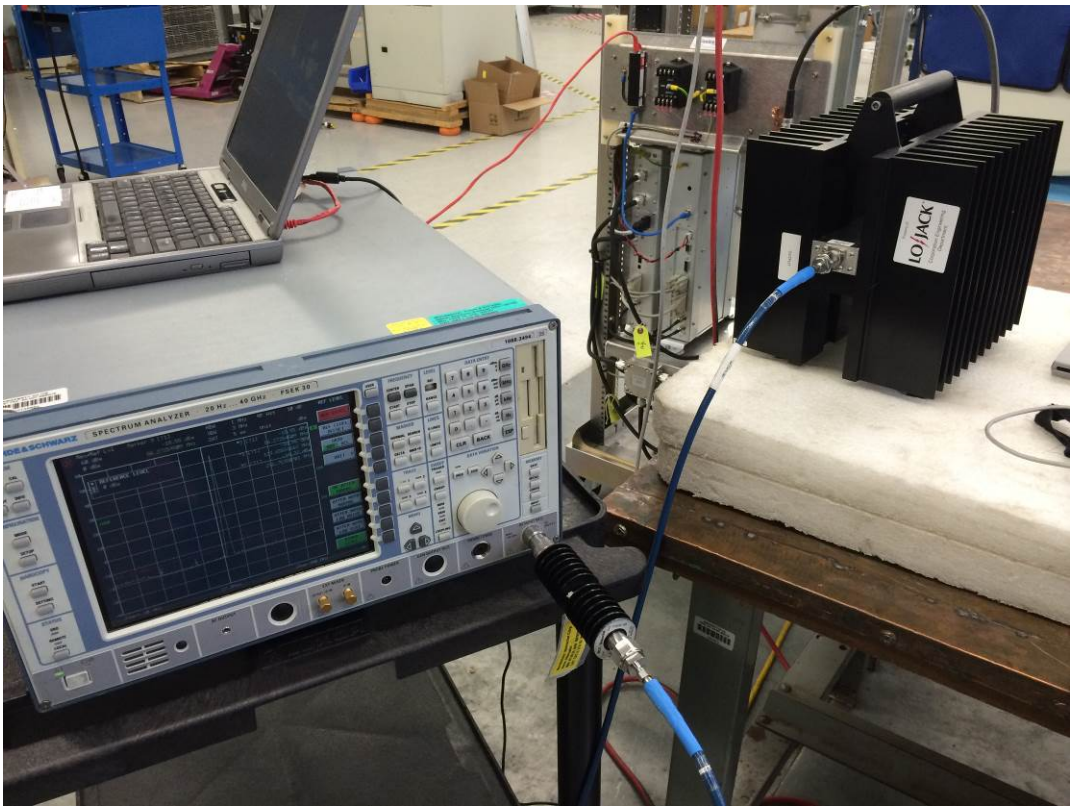
Software Utilized:

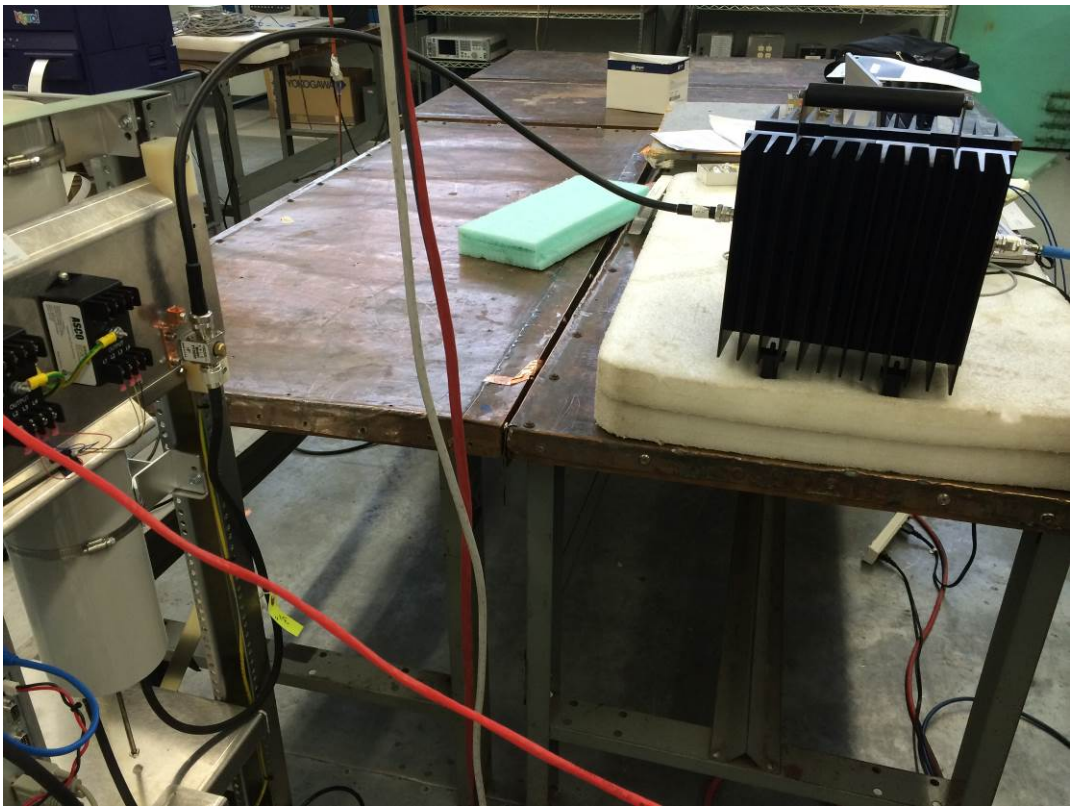
Name	Manufacturer	Version
None		

7.3 Results:

The sample tested was found to Comply.

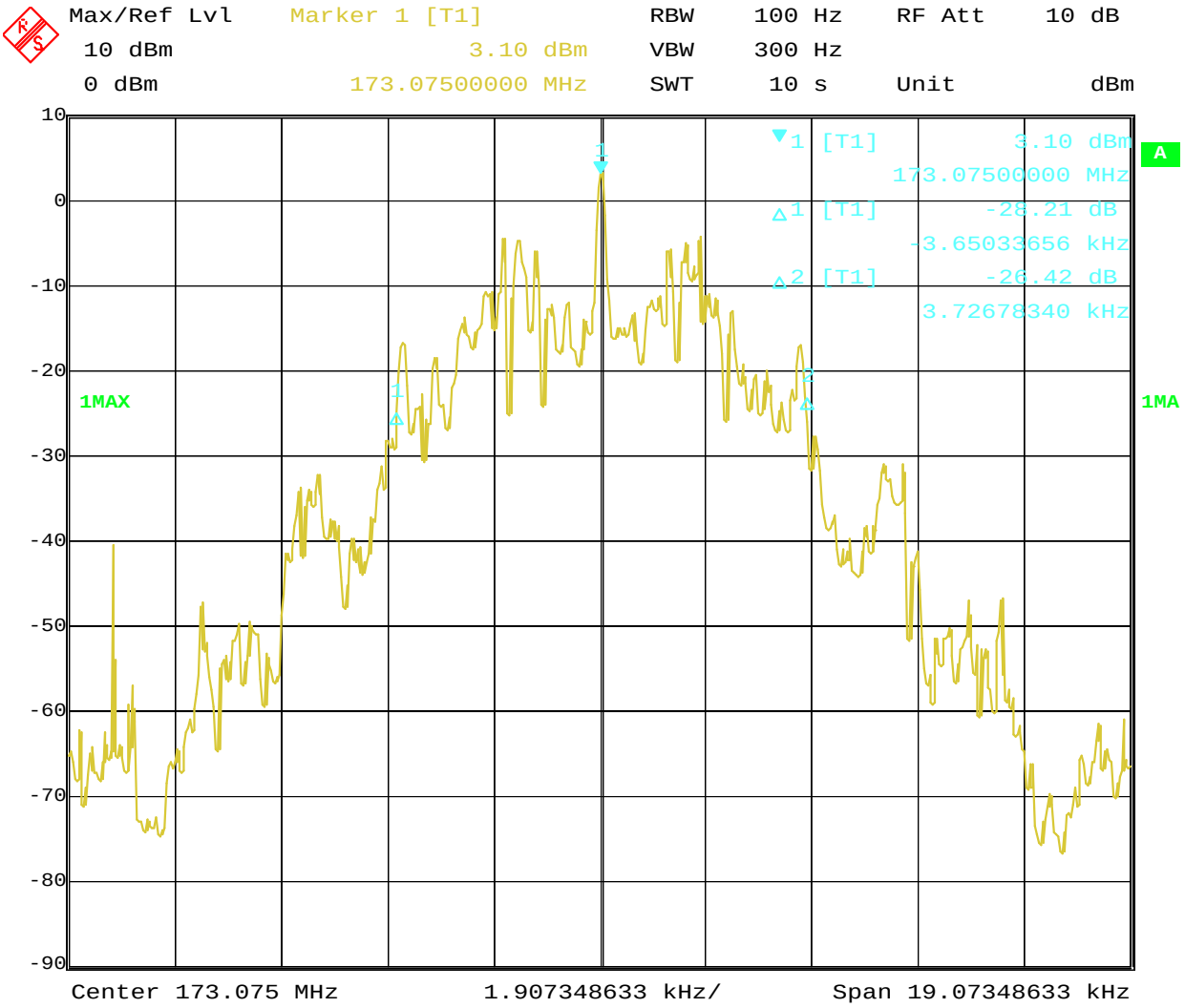
7.4 Setup Photographs:



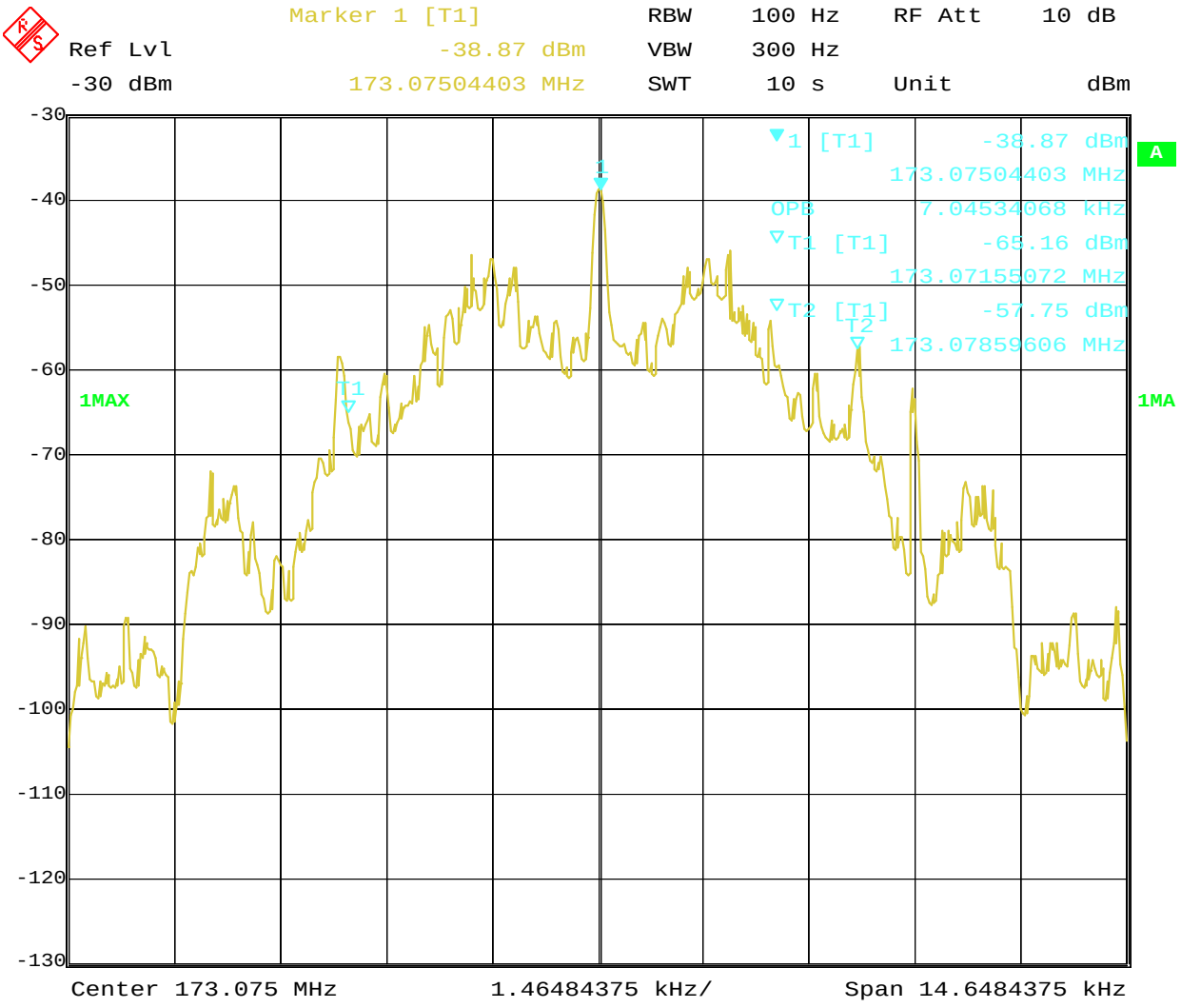


7.5 Plots/Data:

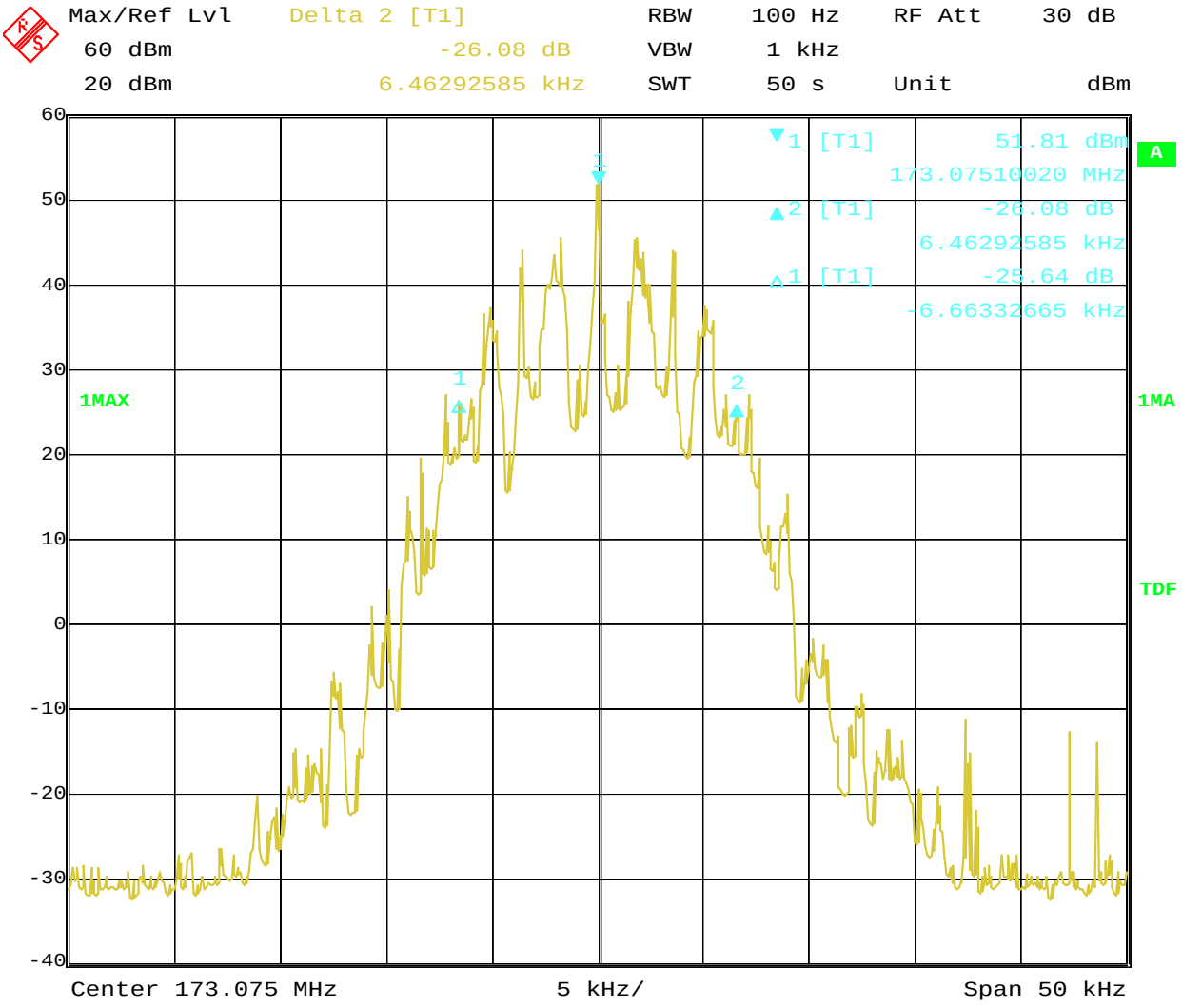
7.38 kHz (26 dB Bandwidth, Narrow Band)



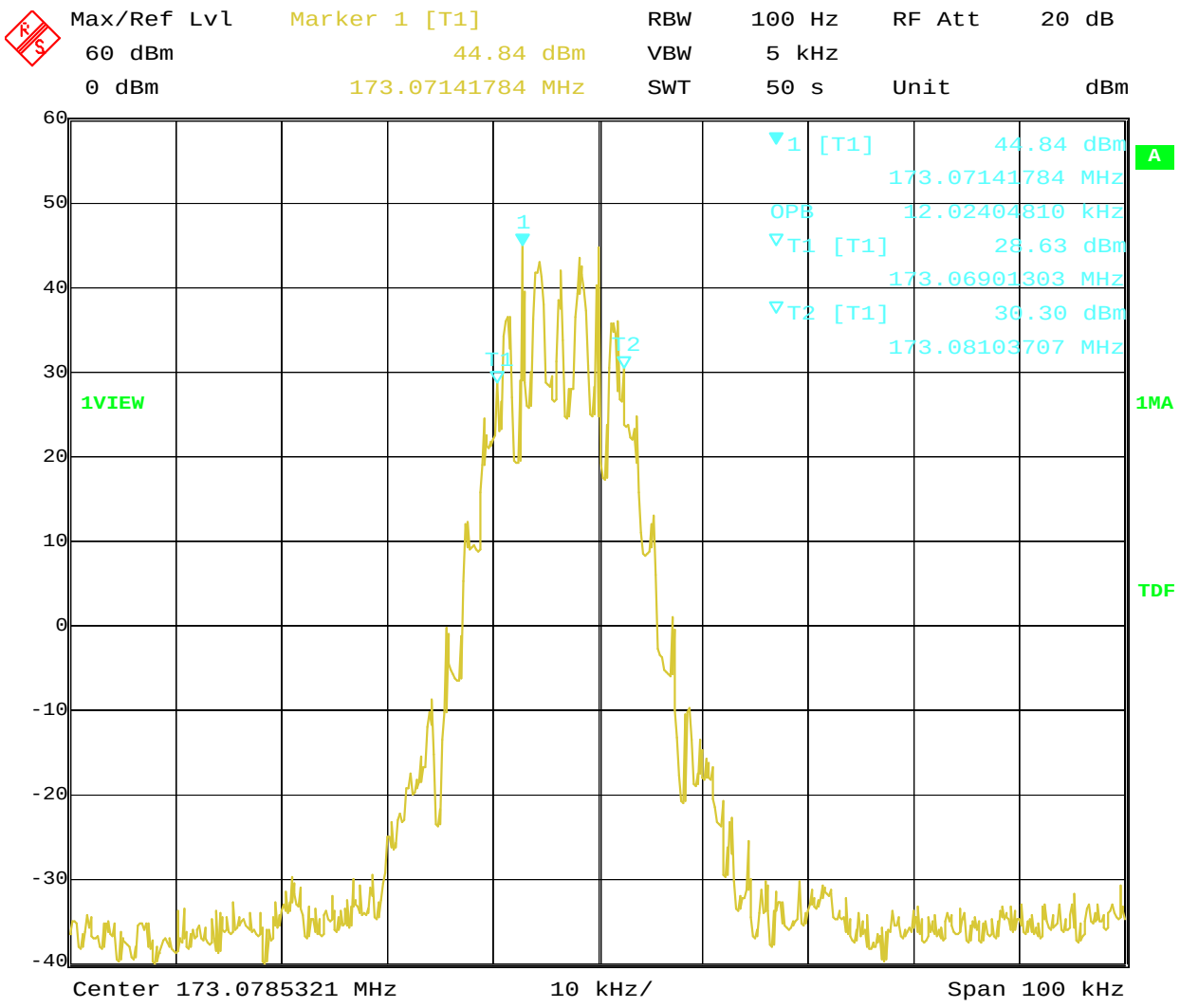
7.05 kHz (Occupied Bandwidth, Narrow Band)



13.13 kHz (26 dB Bandwidth, Wide Band)



12.02 kHz (26 dB Bandwidth, Wide Band)



Notes: The bandwidths are within the limits of 12.5 kHz and 20 kHz per FCC Part 90.20(e)(6)(ii).

Test Personnel:	Vathana Ven VJV	Test Date:	03/24/2017
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 90	Limit Applied:	Per standard
Input Voltage:	120VAC 60Hz	Ambient Temperature:	23 ºC
Pretest Verification w/ Ambient Signals or BB Source:	N/A	Relative Humidity:	10 %
		Atmospheric Pressure:	1018 mbars

Deviations, Additions, or Exclusions: None

8 Transmitter Frequency Stability

8.1 Method

Tests are performed in accordance with FCC 2.1055, 90.213.

TEST SITE: Safety Lab

The Safety Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

8.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
WEI16'	Attenuator, 30dB	Weinschel Corp	47-30-34	BD4327	05/02/2016	05/02/2017
ROS001'	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	06/09/2016	06/09/2017
147058'	Signal Generator 10 MHz to 20 GHz	Hewlett Packard	83620B	3722A00552	04/19/2016	04/19/2017
CBLSHF202'	Cable, SMA - SMA, 9kHz-40GHz	Sucoflex (Huber Suhn	104PE	CBLSHF202	08/29/2016	08/29/2017
CBLSHF205'	Cable, SMA-SMA, 9kHz-40GHz, (Cable Kit5)	Huber + Suhner	Sucoflex 102EA	234715001	08/27/2016	08/27/2017
--	30 dB Attenuator, 1000 Watts	Bird	1000-A-FFN-30	1710	VBU	VBU
SAF881'	Walk-In Humidity Chamber/Controller	Associated Env. Sys.	WR-601	8769	02/15/2017	02/15/2018
SAF764'	Low-Medium Power Thermal Sensor	OPHIR Optronics	30(150)A-SV-17	596271	01/20/2017	01/20/2018

Software Utilized:

Name	Manufacturer	Version
None		

8.3 Results:

The sample tested was found to Comply.

8.4 Setup Photographs:

8.5 Test Data:

Frequency Stability

Company: LoJack Corporation
Model #: Remote Tower Unit
Serial #: E0001A
Engineer(s): Kouma Sinn
Project #: G102940158
Standard: FCC Part 90

Date(s): 04/02/17
Location: Safety

Limit: 5 PPM
Nominal freq: 173.075 MHz

Test Equipment Used:

ROS001	SAF881	CBLSHF205
WEI18	30 dB att	
SAF764	FLU12	

Voltage: 120 VAC

%	Voltage Volts	Frequency MHz	Deviation kHz	Limit kHz
-15%	102	173.075094	0	0.87
+0%	120	173.075094	0	0.87
+15%	138	173.075094	0	0.87

Temp Celsius	Frequency MHz	Deviation kHz	Limit kHz
-30	173.075219	0.12525	0.87
-20	173.075219	0.12525	0.87
-10	173.075219	0.12525	0.87
0	173.075282	0.18787	0.87
10	173.075157	0.06262	0.87
20	173.075094	0	0.87
30	173.075157	0.06262	0.87
40	173.075157	0.06262	0.87
50	173.075219	0.12525	0.87

Test Personnel: Kouma Sinn KPS
Supervising/Reviewing Engineer: (Where Applicable) N/A
Product Standard: FCC Part 90
Input Voltage: 120VAC 60Hz
Pretest Verification w/ Ambient Signals or BB Source: **N/A**

Test Date: 04/02/2017
Limit Applied: Per standard
Ambient Temperature: N/A
Relative Humidity: N/A
Atmospheric Pressure: N/A

Deviations, Additions, or Exclusions: None

9 Transient Frequency

9.1 Method

Tests are performed in accordance with FCC 2.1055, 90.214.

TEST SITE: 5m Chamber

The 5m Chamber 5m Chamber is a fact 5 - 3m quiet zone type of chamber. This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 meters away at the other end of the chamber on the adjustable Antenna Mast. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room.

9.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV002'	Weather Station	Davis Instruments	7400	PE80519A93	06/01/2016	06/01/2017
WEI16'	Attenuator, 30dB	Weinschel Corp	47-30-34	BD4327	05/02/2016	05/02/2017
ROS001'	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	06/09/2016	06/09/2017
147058'	Signal Generator 10 MHz to 20 GHz	Hewlett Packard	83620B	3722A00552	04/19/2016	04/19/2017
CBLSHF202'	Cable, SMA - SMA, 9kHz-40GHz	Sucoflex (Huber Suhn	104PE	CBLSHF202	08/29/2016	08/29/2017
CBLSHF205'	Cable, SMA-SMA, 9kHz-40GHz, (Cable Kit5)	Huber + Suhner	Sucoflex 102EA	234715001	08/27/2016	08/27/2017
--	30 dB Attenuator, 1000 Watts	Bird	1000-A-FFN-30	1710	VBU	VBU
HEW65'	Measuring Receiver	Hewlett Packard	8902A	3749A04397	01/21/2016	01/21/2018
AGL002'	1GHz 4CH O'Scope	Agilent	DSO6104A	MY44008115	08/11/2016	08/11/2017
HEW63'	Generator, Signal	Hewlett Packard	8648C	3847A05291	02/16/2017	02/16/2018
MIN005'	Splitter/Combiner 2-Way 10-2000 MHz	Mini Circuits	ZESC-2-11	none	12/02/2003	Verified

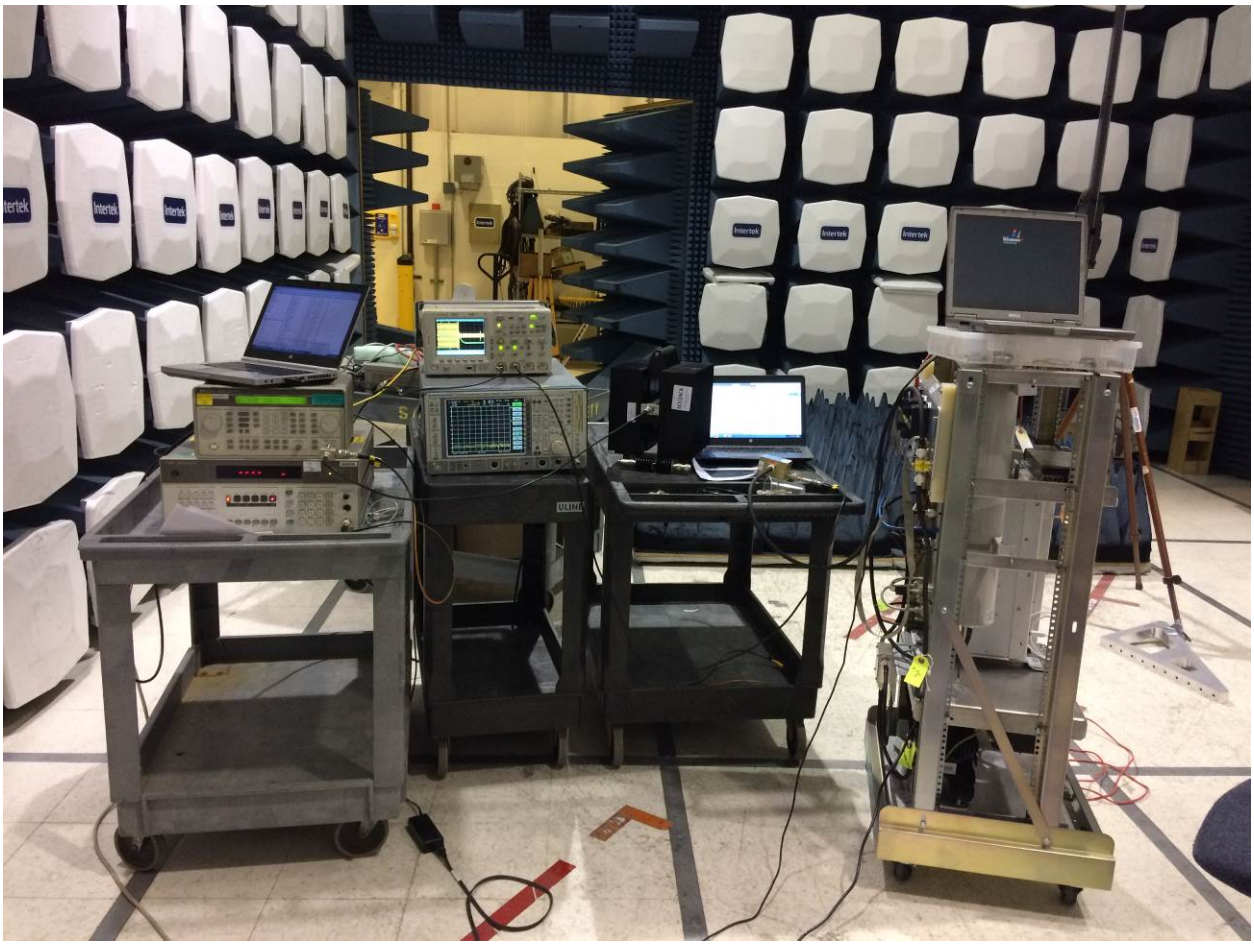
Software Utilized:

Name	Manufacturer	Version
None		

9.3 Results:

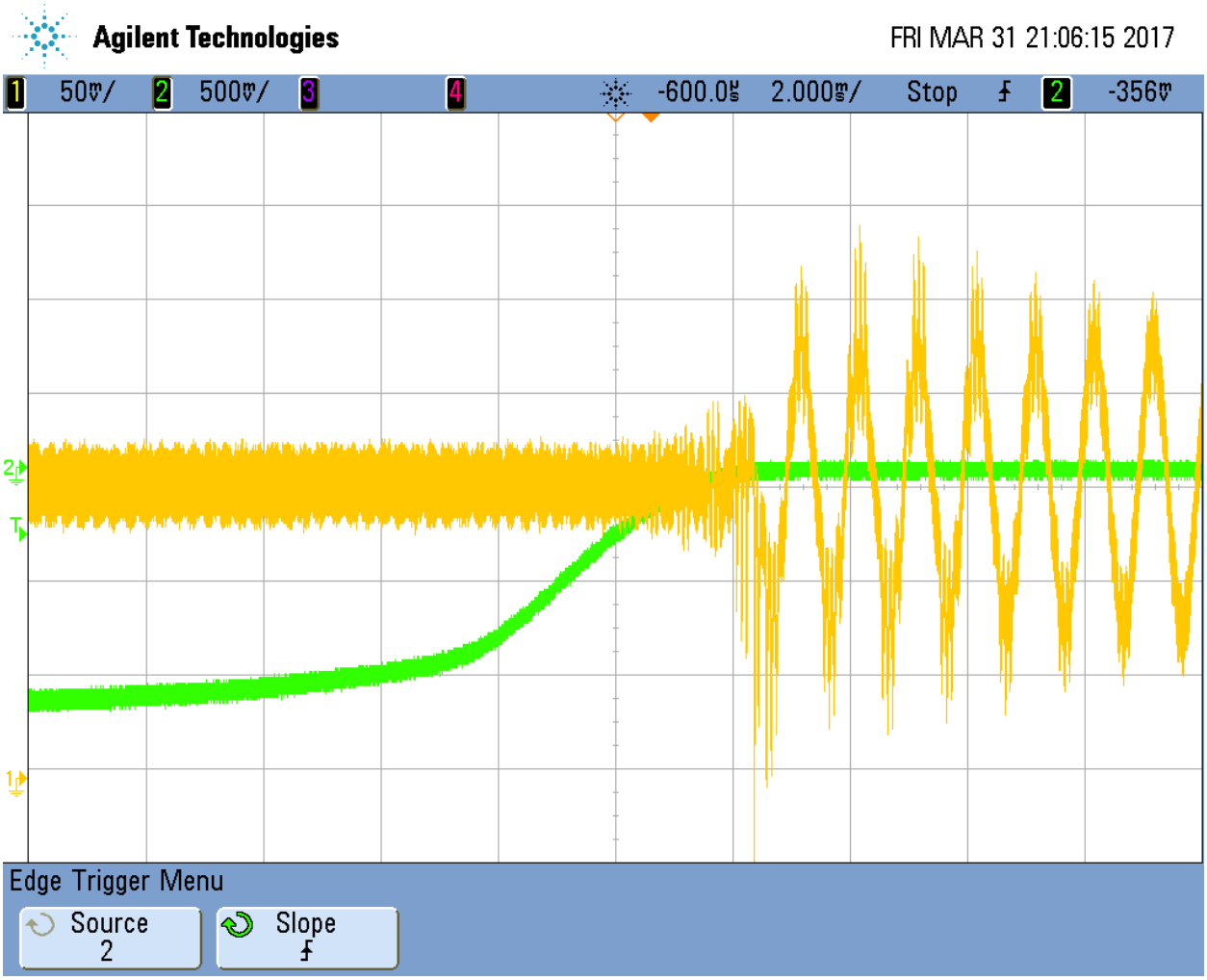
The sample tested was found to Comply.

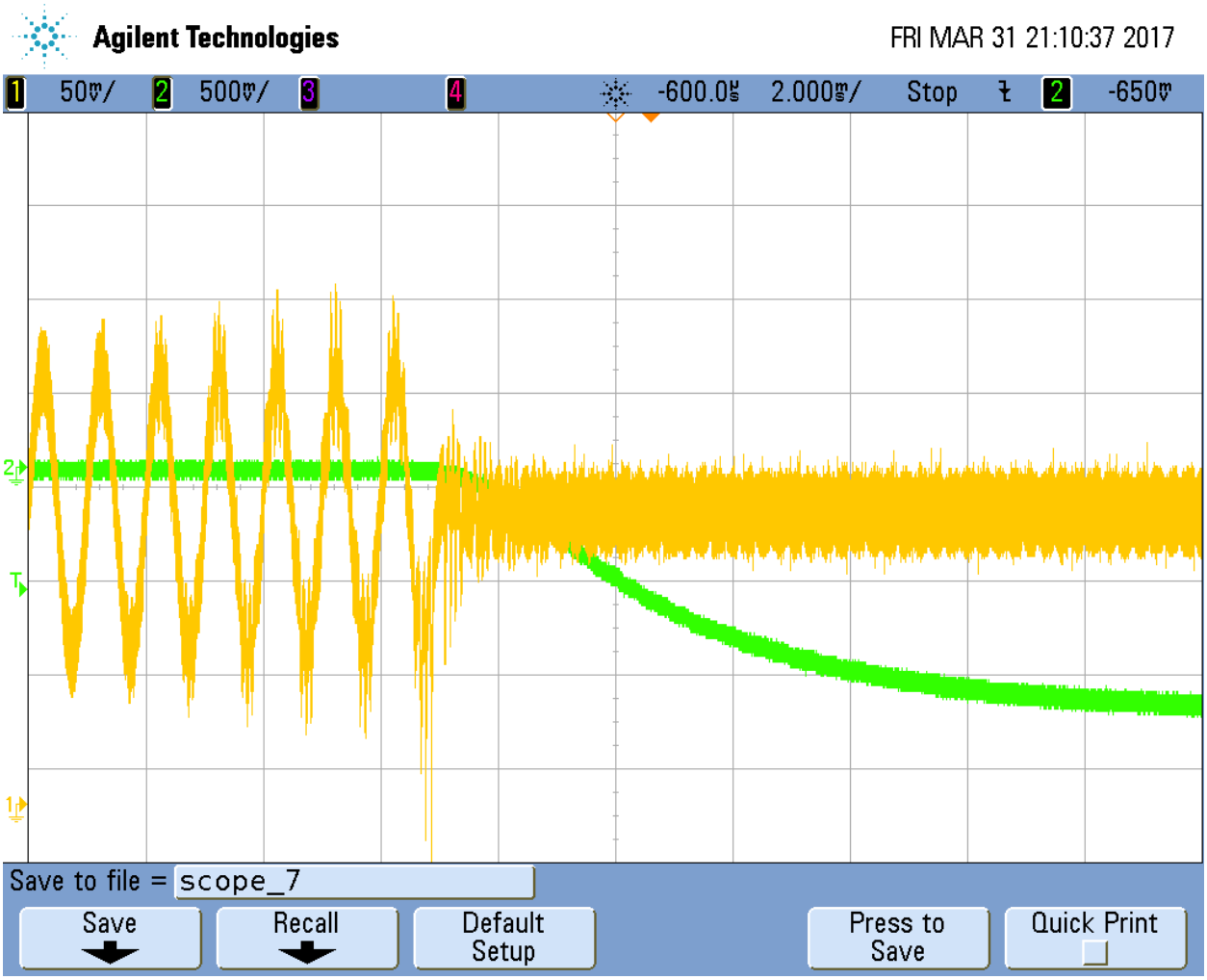
9.4 Setup Photograph:



9.5 Plots/Data:

Narrow Band




Agilent Technologies
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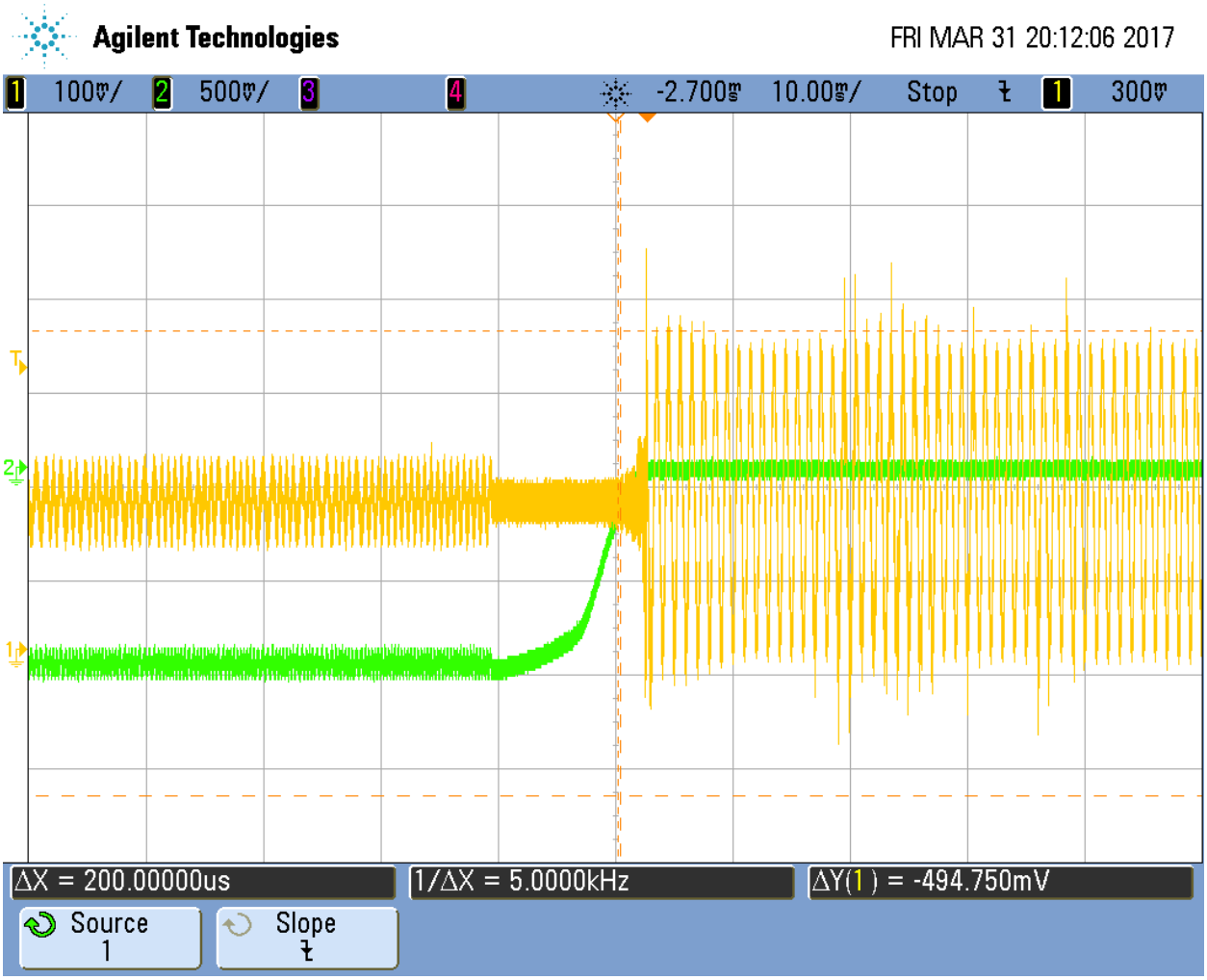
1 50mV/ 2 500mV/ 3 4 -600.0ns 2.000ms/ Stop 2 -650mV
Save to file = scope_7
Save
Recall
Default Setup
Press to Save
Quick Print

Wide Band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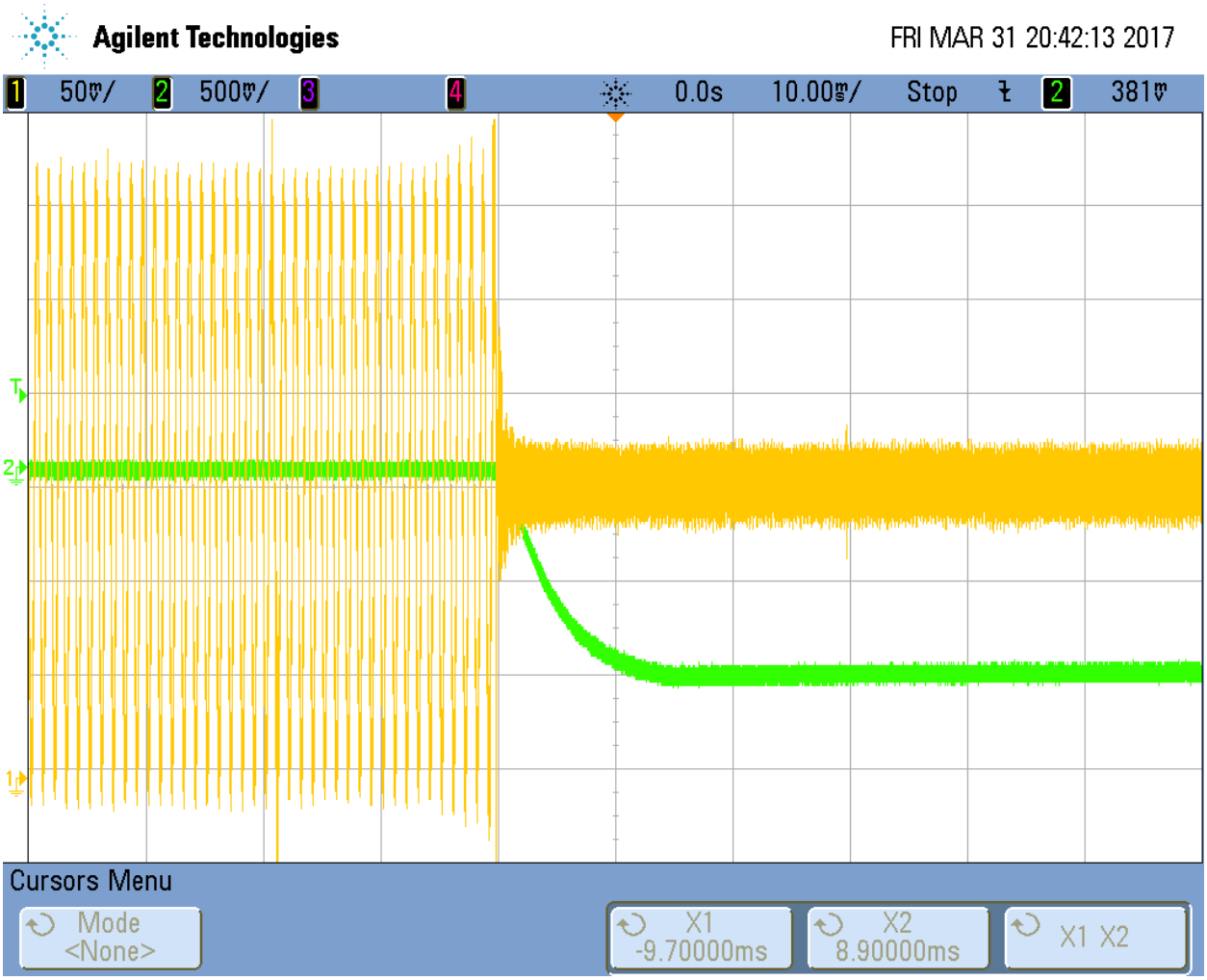
ΔY(1) = -494.750mV
Source 1
Slope



Test Personnel:	Vathana Ven VFV	Test Date:	04/01/2017
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 90	Limit Applied:	Per standard
Input Voltage:	120VAC 60Hz	Ambient Temperature:	22 C
Pretest Verification w/ Ambient Signals or BB Source:	**N/A**	Relative Humidity:	34 %
		Atmospheric Pressure:	1008 mbar

Deviations, Additions, or Exclusions: None

10 Emission masks

10.1 Method

Tests are performed in accordance with FCC Part 90, 90.210.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

10.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV002'	Weather Station	Davis Instruments	7400	PE80519A93	06/01/2016	06/01/2017
WEI16'	Attenuator, 30dB	Weinschel Corp	47-30-34	BD4327	05/02/2016	05/02/2017
ROS001'	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	06/09/2016	06/09/2017
147058'	Signal Generator 10 MHz to 20 GHz	Hewlett Packard	83620B	3722A00552	04/19/2016	04/19/2017
CBLSHF202'	Cable, SMA - SMA, 9kHz-40GHz	Sucoflex (Huber Suhn	104PE	CBLSHF202	08/29/2016	08/29/2017
CBLSHF205'	Cable, SMA-SMA, 9kHz-40GHz, (Cable Kit5)	Huber + Suhner	Sucoflex 102EA	234715001	08/27/2016	08/27/2017
--	30 dB Attenuator, 1000 Watts	Bird	1000-A-FFN-30	1710	VBU	VBU

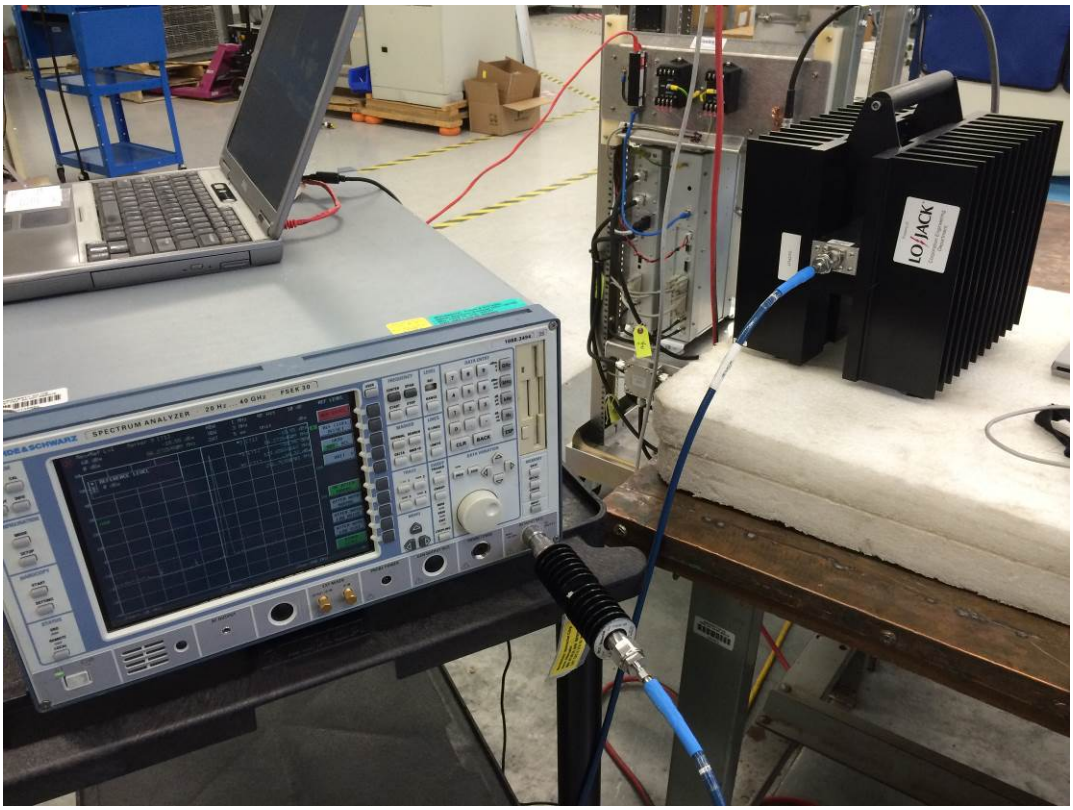
Software Utilized:

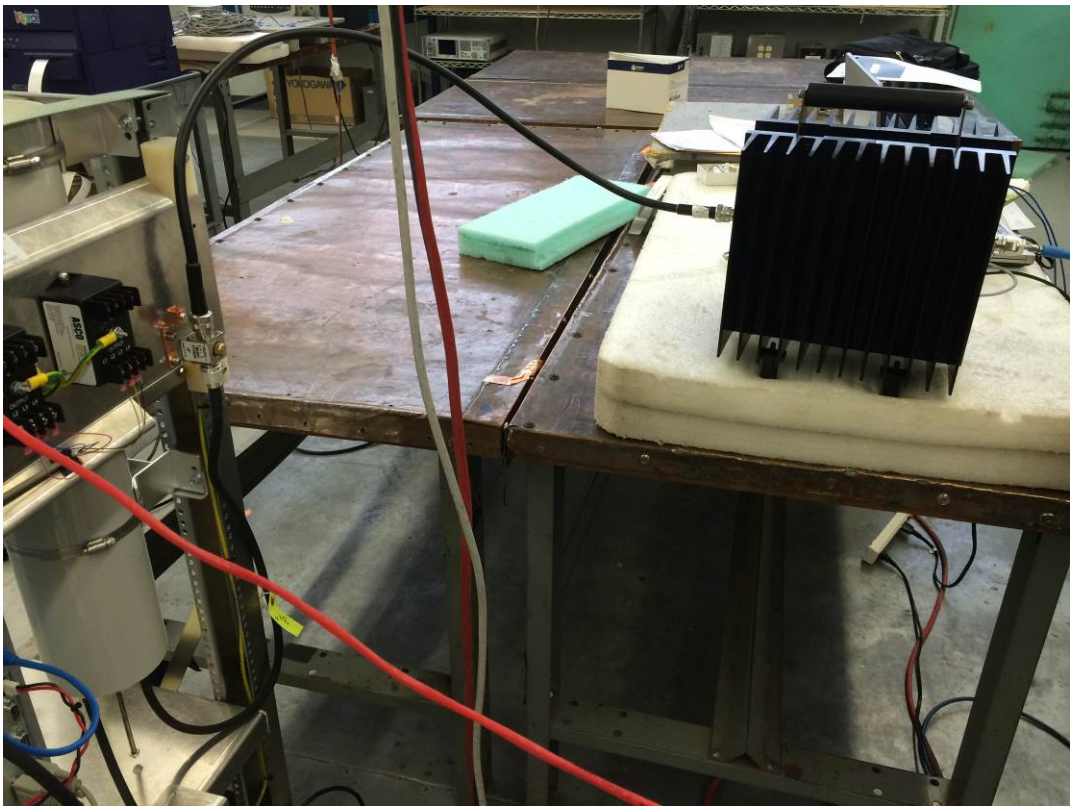
Name	Manufacturer	Version
None		

10.3 Results:

The sample tested was found to Comply.

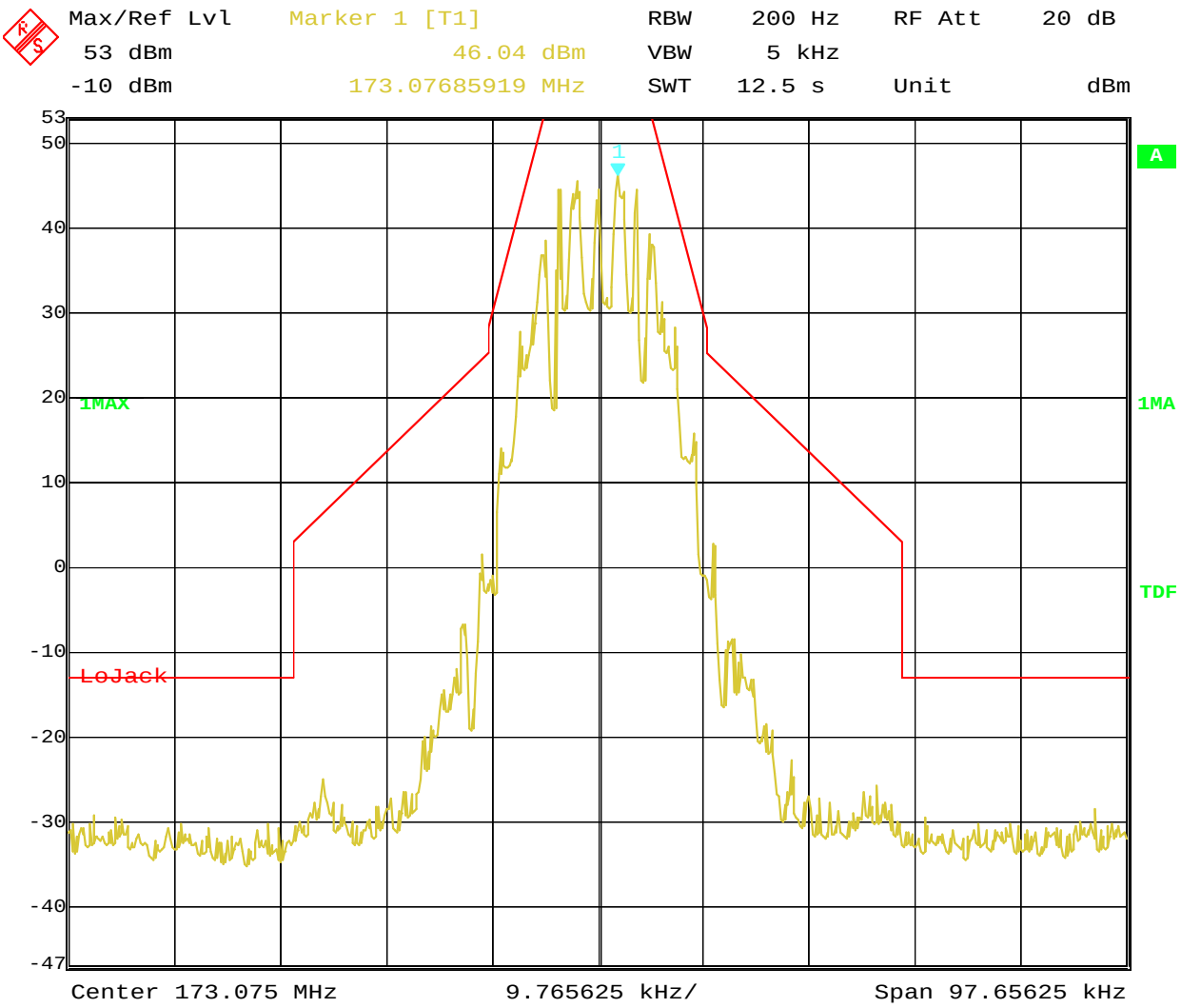
10.4 Setup Photographs:



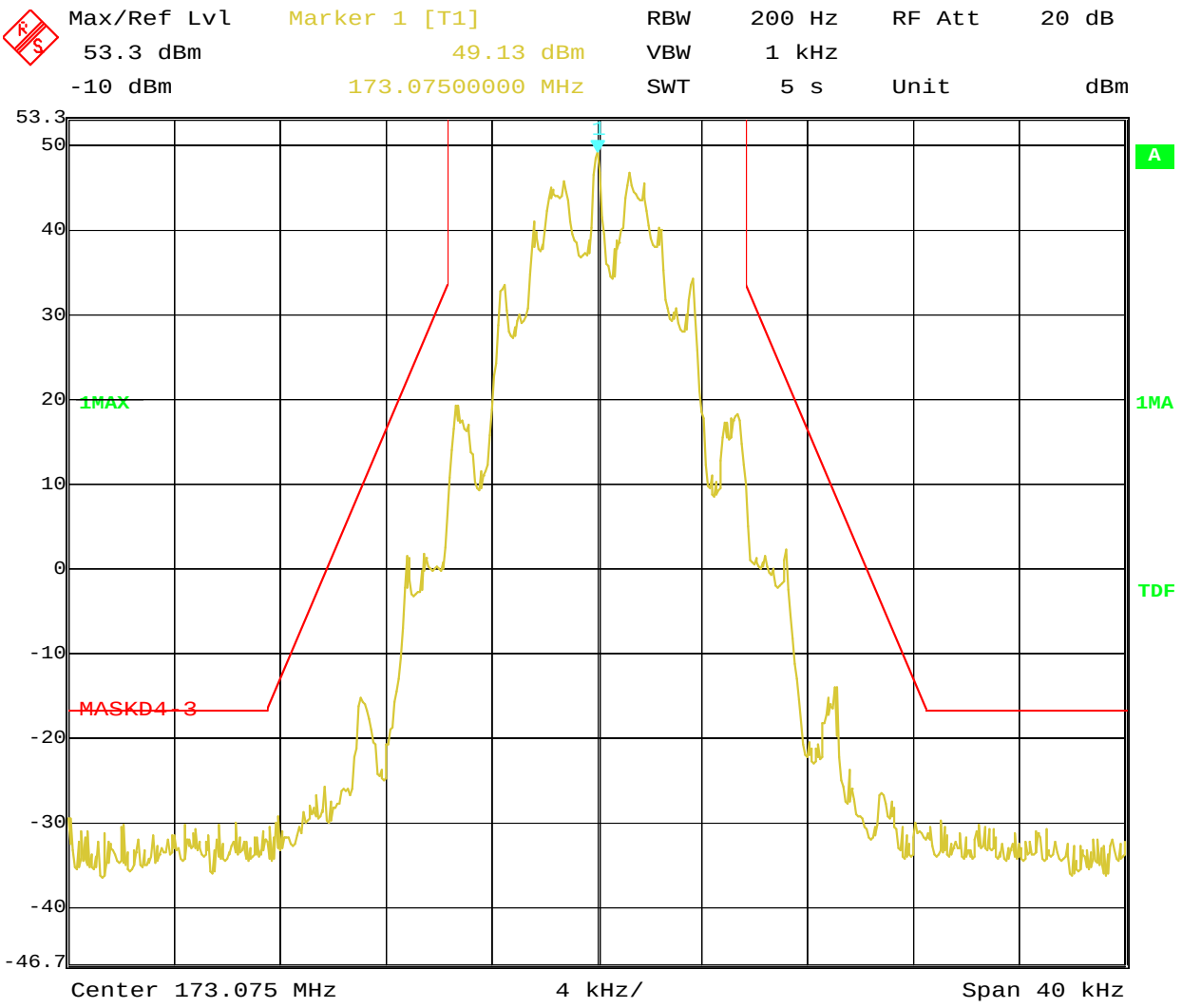


10.5 Plots/Data:

Emissions Mask C (Wide Band)



Emissions Mask D (Narrow Band)



Test Personnel:	Kouma Sinn KPS	Test Date:	03/27/2017, 04/06/2017
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 90	Limit Applied:	Per standard
Input Voltage:	120VAC 60Hz	Ambient Temperature:	23, 22 ºC
Pretest Verification w/ Ambient Signals or BB Source:	**N/A**	Relative Humidity:	10, 27 %
		Atmospheric Pressure:	1018, 1002 mbars

Deviations, Additions, or Exclusions: None

11 Transmitter Spurious Emissions (Antenna Port Conducted)

11.1 Method

Tests are performed in accordance with FCC 2.1051, 90.210(d).

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

11.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV002'	Weather Station	Davis Instruments	7400	PE80519A93	06/01/2016	06/01/2017
WEI18'	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017
ROS001'	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	06/09/2016	06/09/2017
147058'	Signal Generator 10 MHz to 20 GHz	Hewlett Packard	83620B	3722A00552	04/19/2016	04/19/2017
CBLSHF202'	Cable, SMA - SMA, 9kHz-40GHz	Sucoflex (Huber Suhn	104PE	CBLSHF202	08/29/2016	08/29/2017
CBLSHF205'	Cable, SMA-SMA, 9kHz-40GHz, (Cable Kit5)	Huber + Suhner	Sucoflex 102EA	234715001	08/27/2016	08/27/2017
--	30 dB Attenuator, 1000 Watts	Bird	1000-A-FFN-30	1710	VBU	VBU
--	High Pass Filter	Mini-Circuits	NHP-300+	15542	02/02/2017	02/02/2018

Software Utilized:

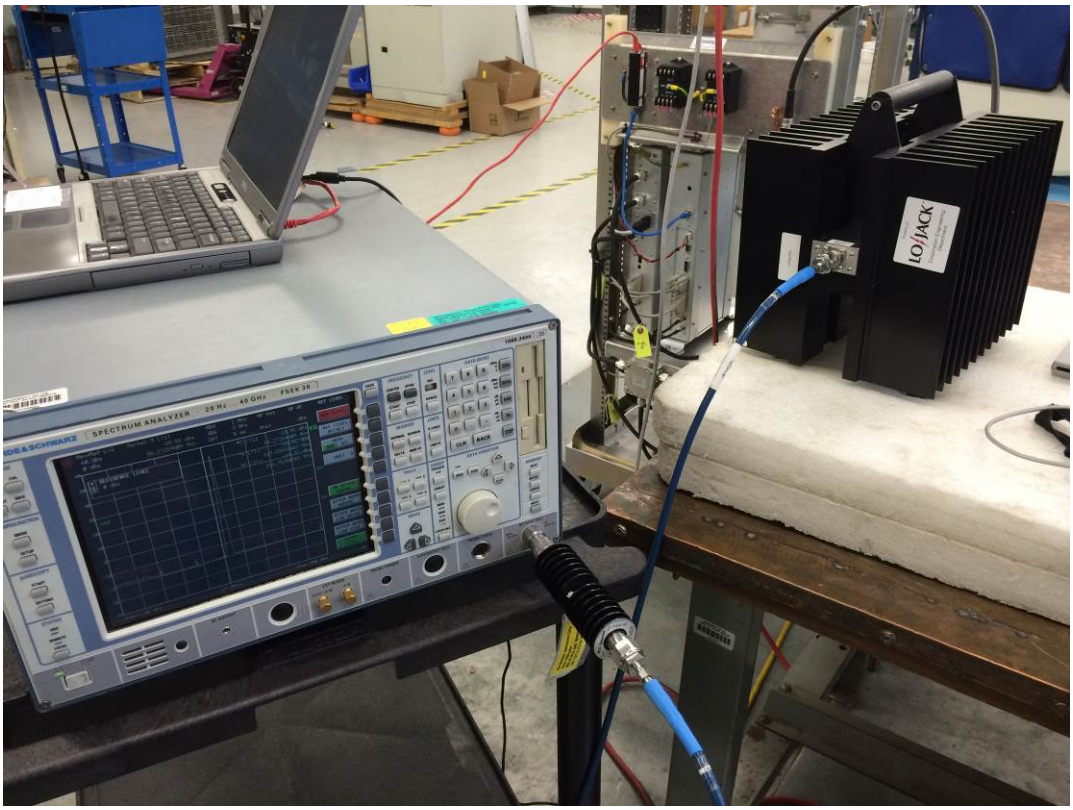
Name	Manufacturer	Version
None		

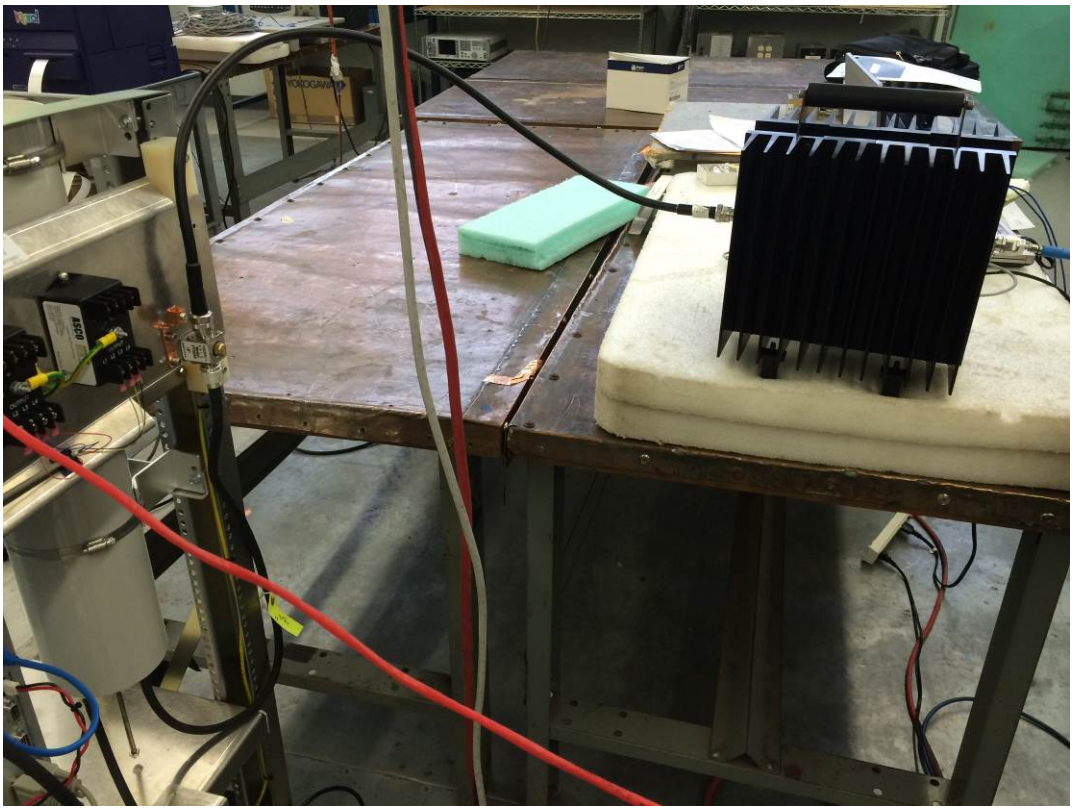
11.3 Results:

The sample tested was found to Comply.

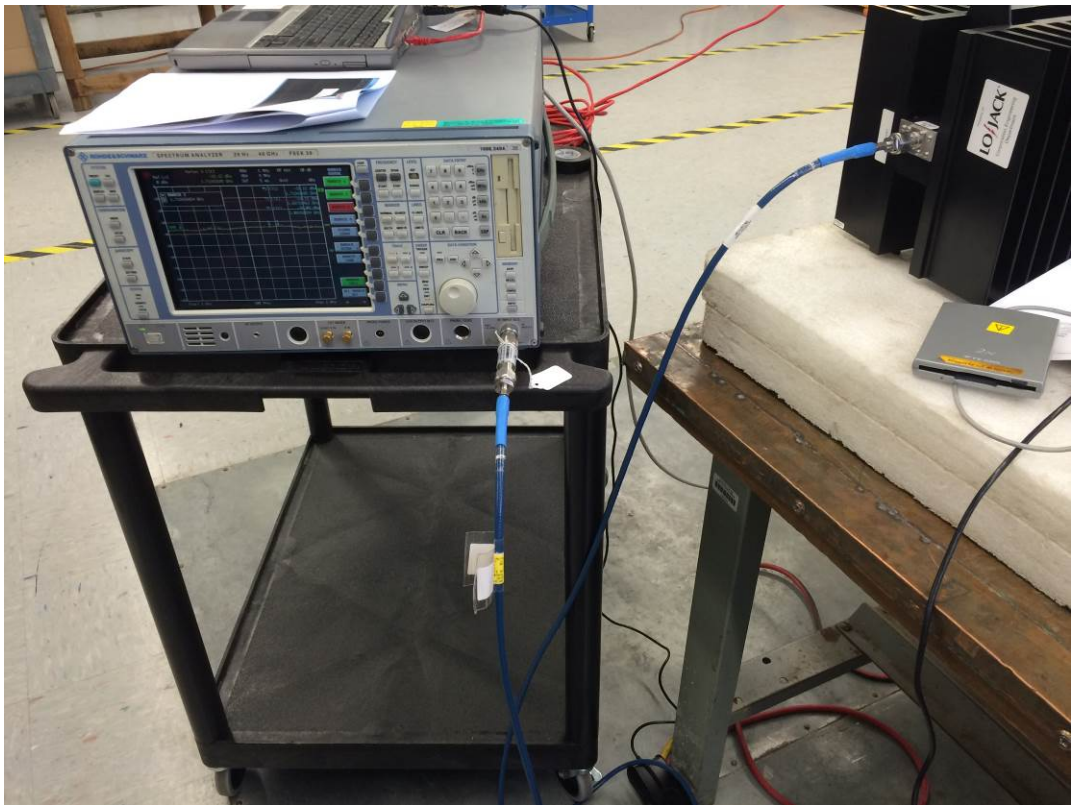
11.4 Setup Photographs:

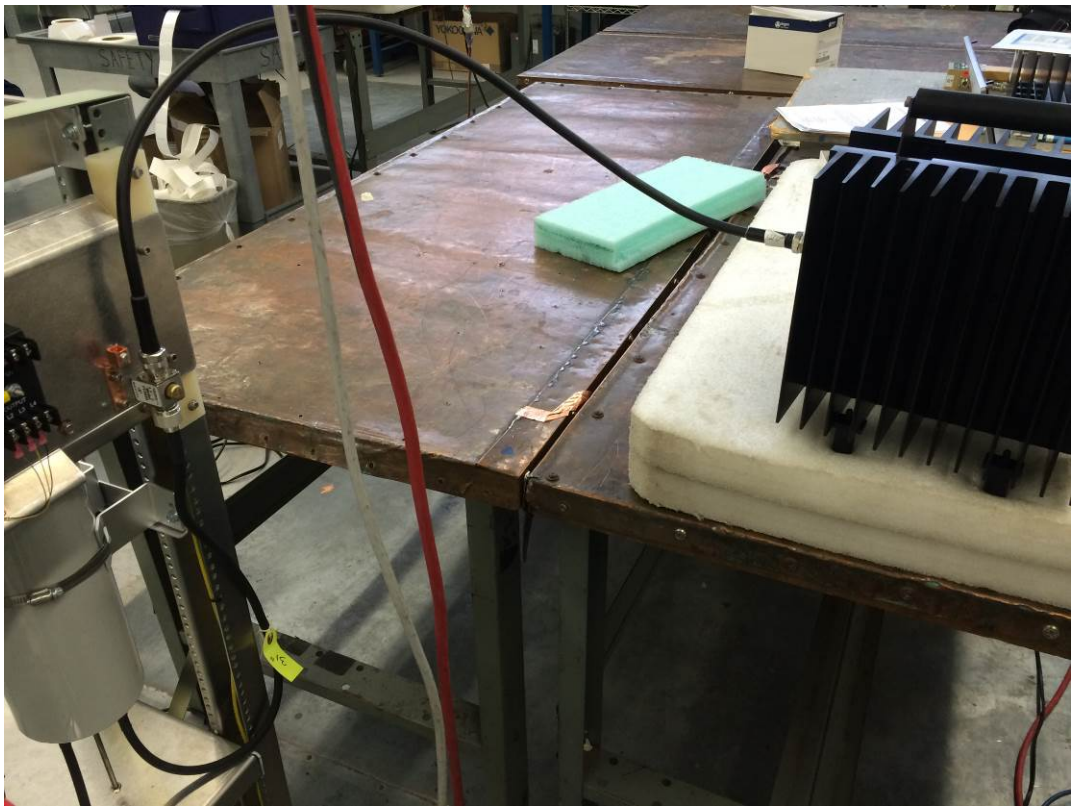
30-300 MHz





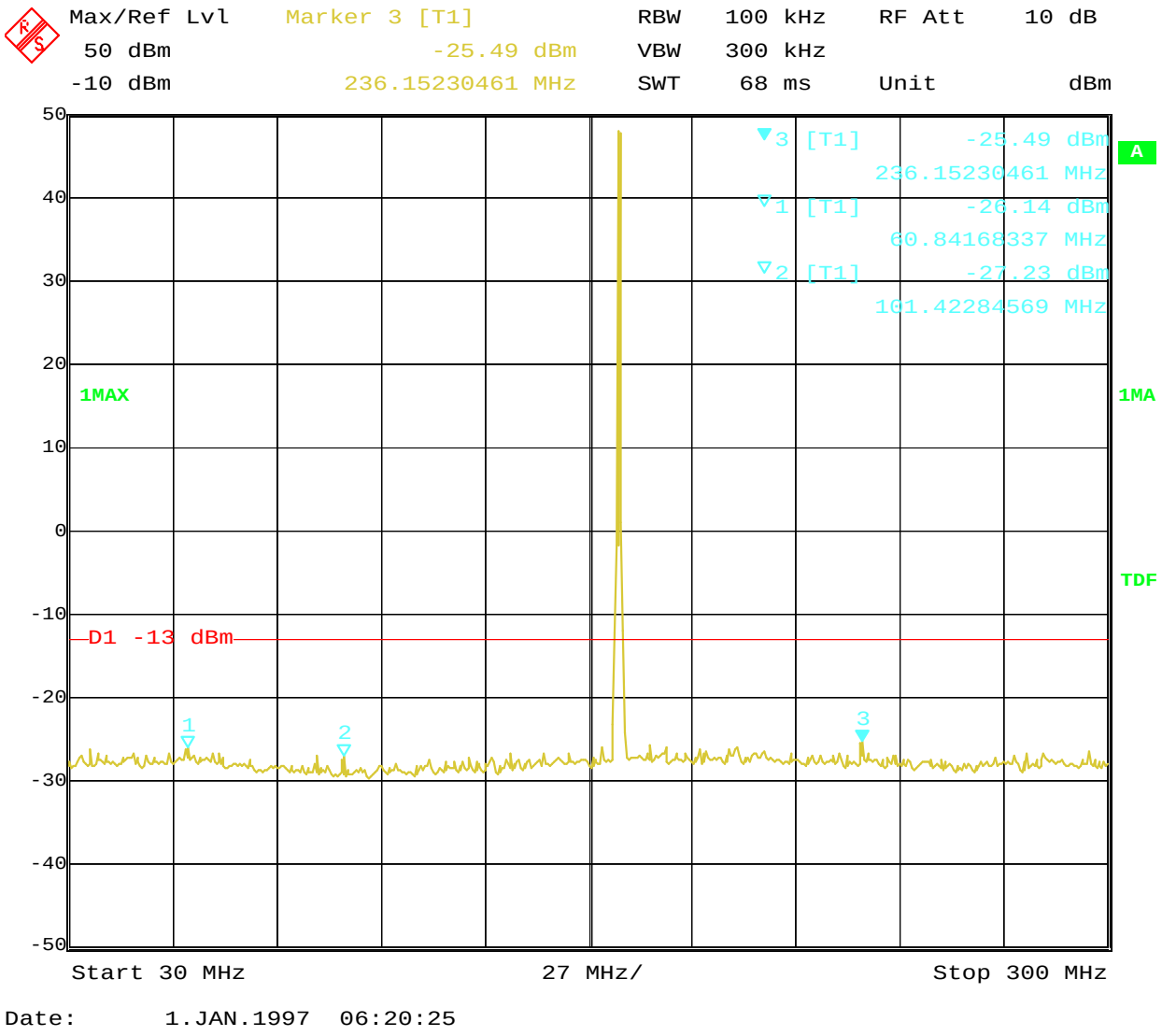
300-2000 MHz



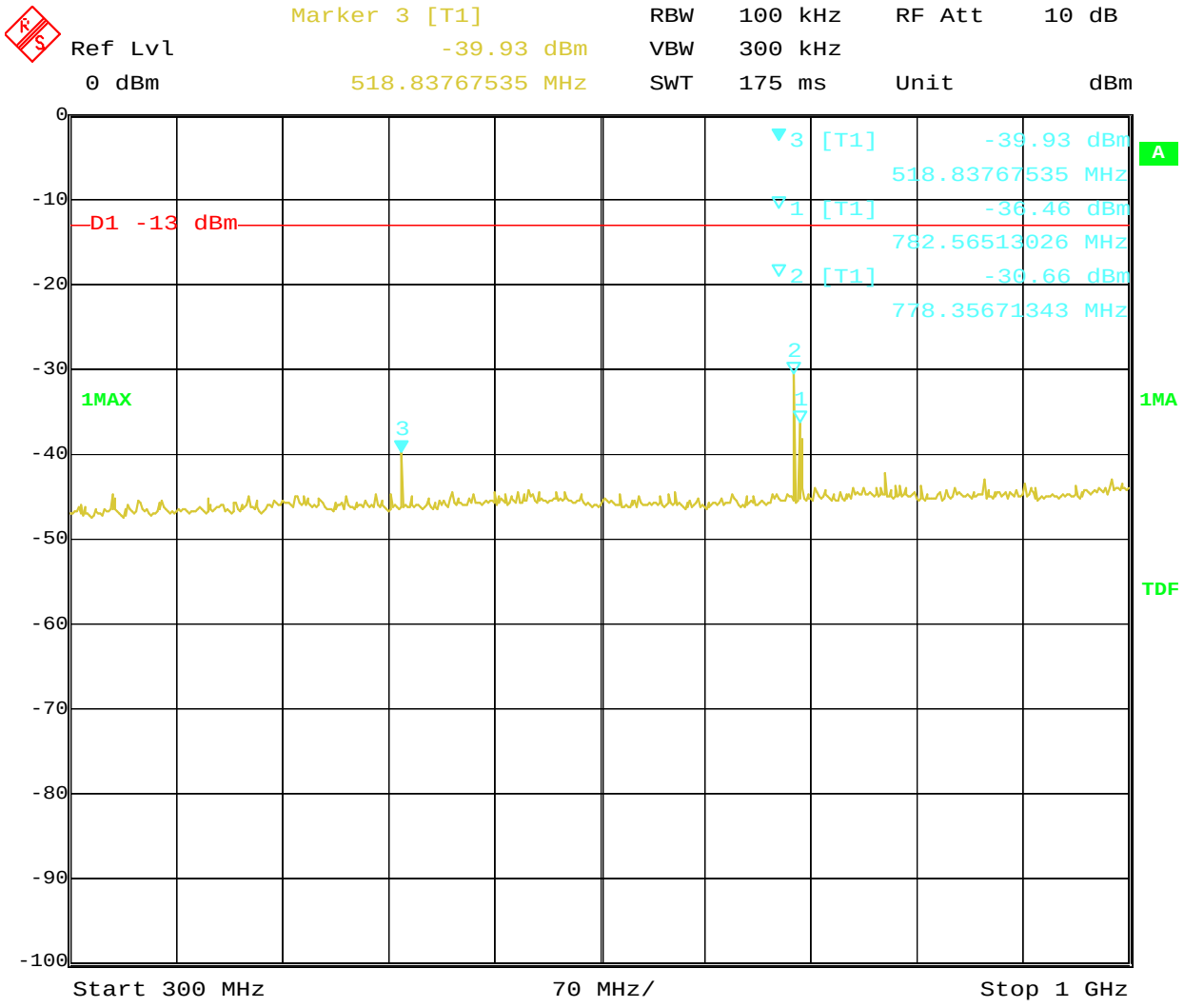


11.5 Plots/Data:

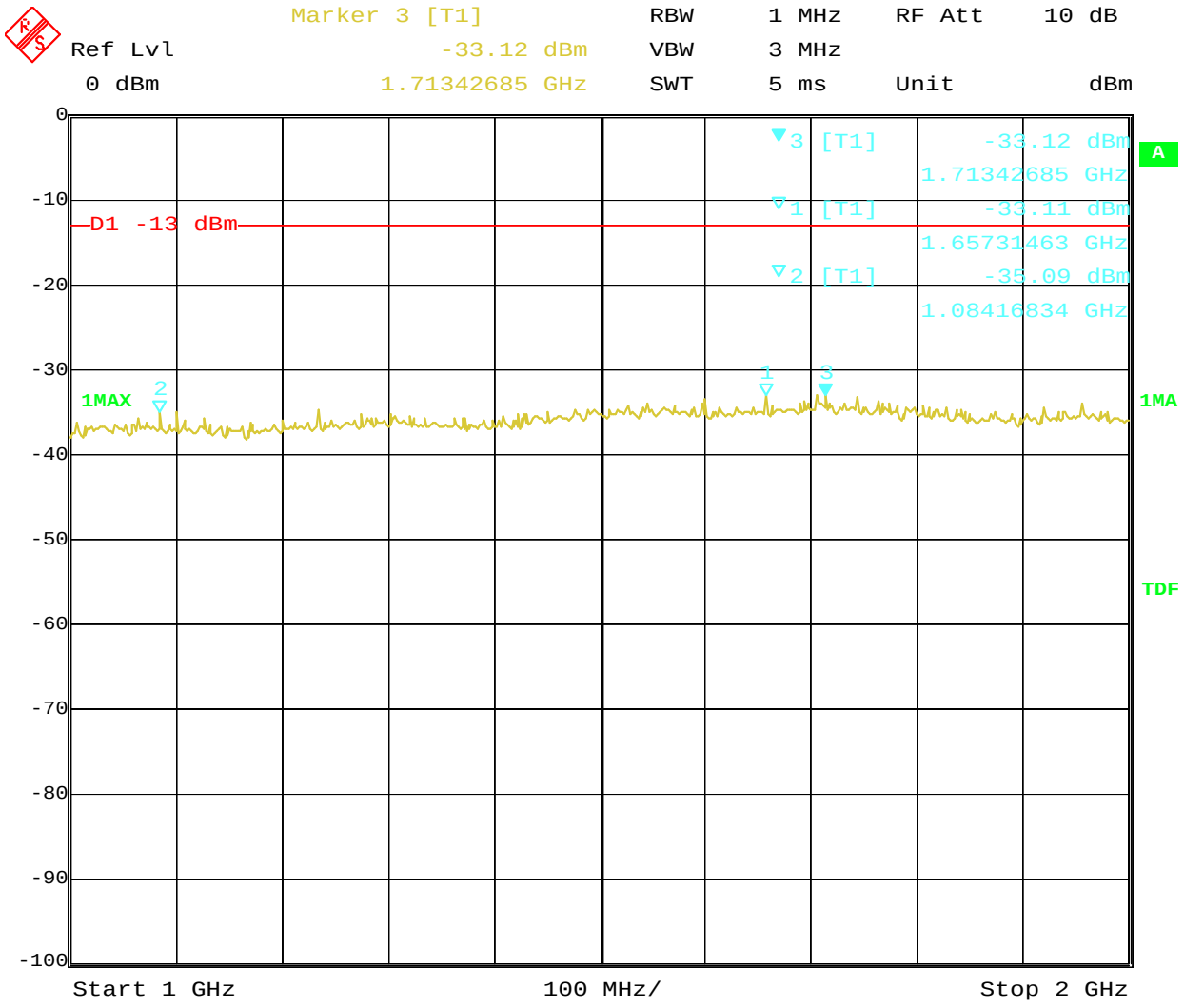
Transmitter Port Conducted Spurious Emissions, 30-300 MHz, (Wide Band)



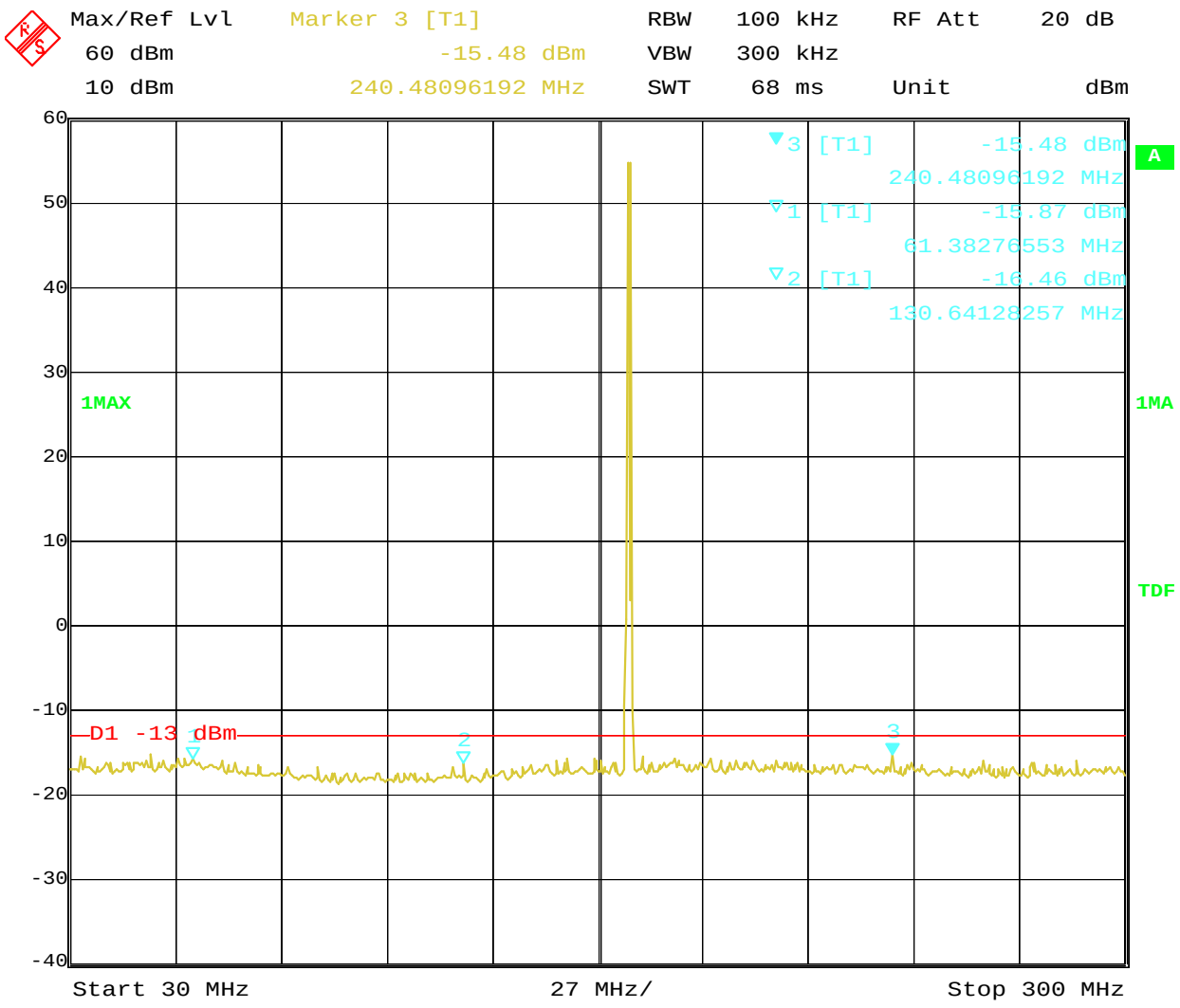
Transmitter Port Conducted Spurious Emissions, 300-1000 MHz, (Wide Band)



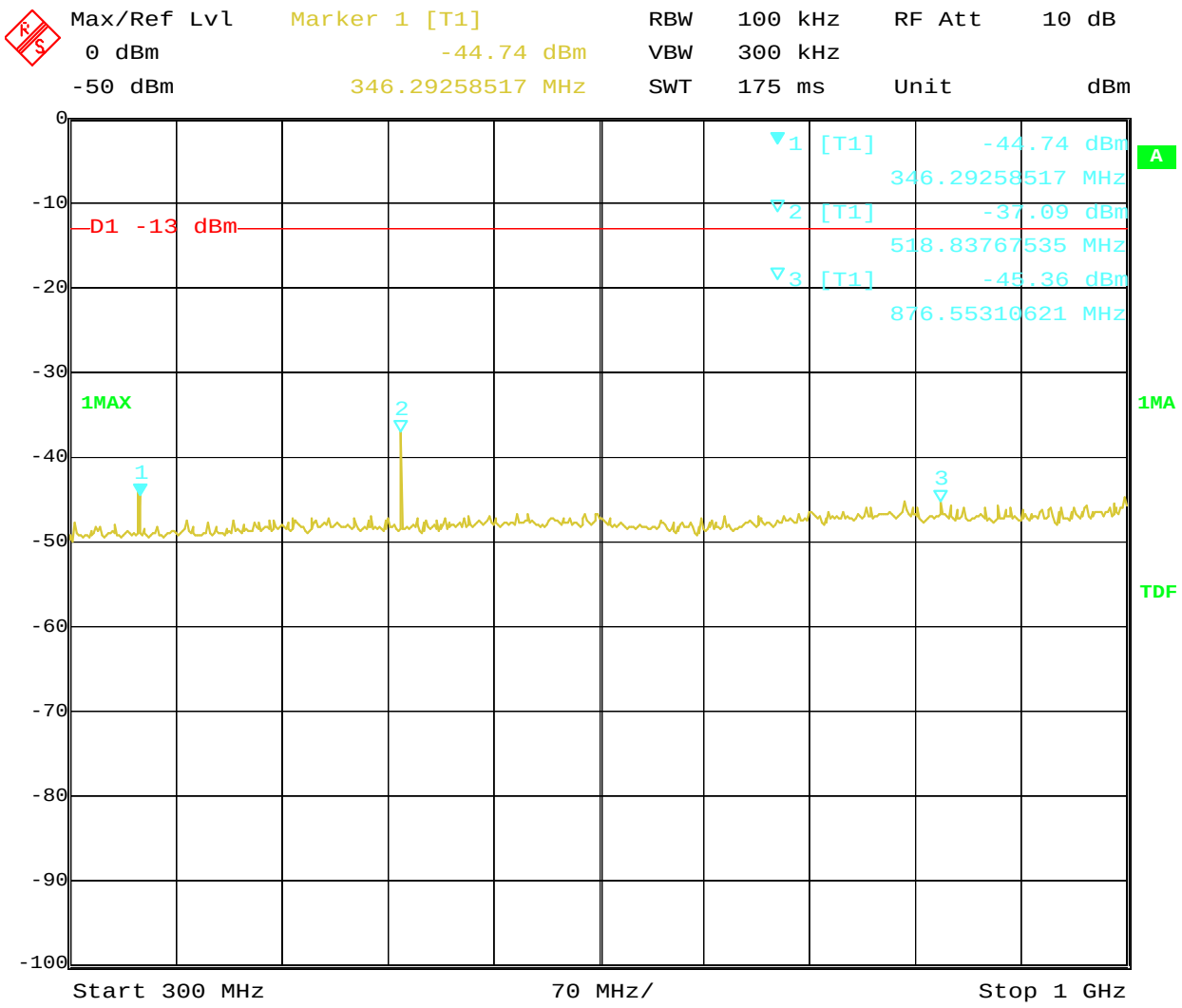
Transmitter Port Conducted Spurious Emissions, 1-2 GHz, (Wide Band)



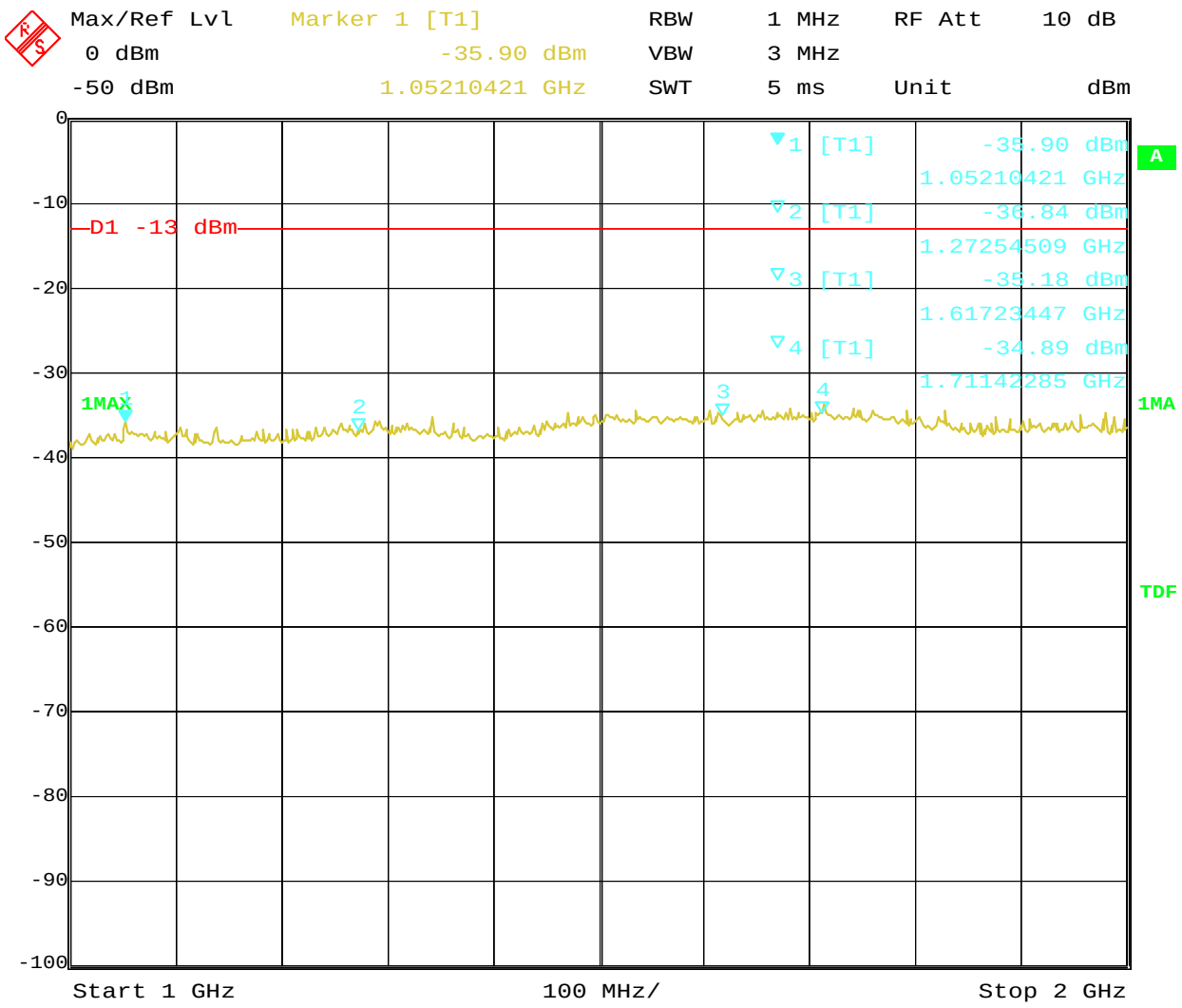
Transmitter Port Conducted Spurious Emissions, 30-300 MHz, (Narrow Band)



Transmitter Port Conducted Spurious Emissions, 300-1000 MHz, (Narrow Band)



Transmitter Port Conducted Spurious Emissions, 1-2 GHz, (Narrow Band)



Test Personnel:	Kouma Sinn KPS	Test Date:	03/24/2017 (1st shift)
	Vathana Ven VSV		03/24/2017 (2nd shift)
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 90	Limit Applied:	Per standard
Input Voltage:	120VAC 60Hz	Ambient Temperature:	23 ºC
Pretest Verification w/ Ambient Signals or BB Source:	**N/A**	Relative Humidity:	10 %
		Atmospheric Pressure:	1018 mbars

Deviations, Additions, or Exclusions: None

12 Band Edge Emissions

12.1 Method

Tests are performed in accordance with FCC 2.1051, 90.210(d).

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

12.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV002'	Weather Station	Davis Instruments	7400	PE80519A93	06/01/2016	06/01/2017
WEI18'	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017
ROS001'	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	06/09/2016	06/09/2017
147058'	Signal Generator 10 MHz to 20 GHz	Hewlett Packard	83620B	3722A00552	04/19/2016	04/19/2017
CBLSHF202'	Cable, SMA - SMA, 9kHz-40GHz	Sucoflex (Huber Suhn	104PE	CBLSHF202	08/29/2016	08/29/2017
CBLSHF205'	Cable, SMA-SMA, 9kHz-40GHz, (Cable Kit5)	Huber + Suhner	Sucoflex 102EA	234715001	08/27/2016	08/27/2017
--	30 dB Attenuator, 1000 Watts	Bird	1000-A-FFN-30	1710	VBU	VBU

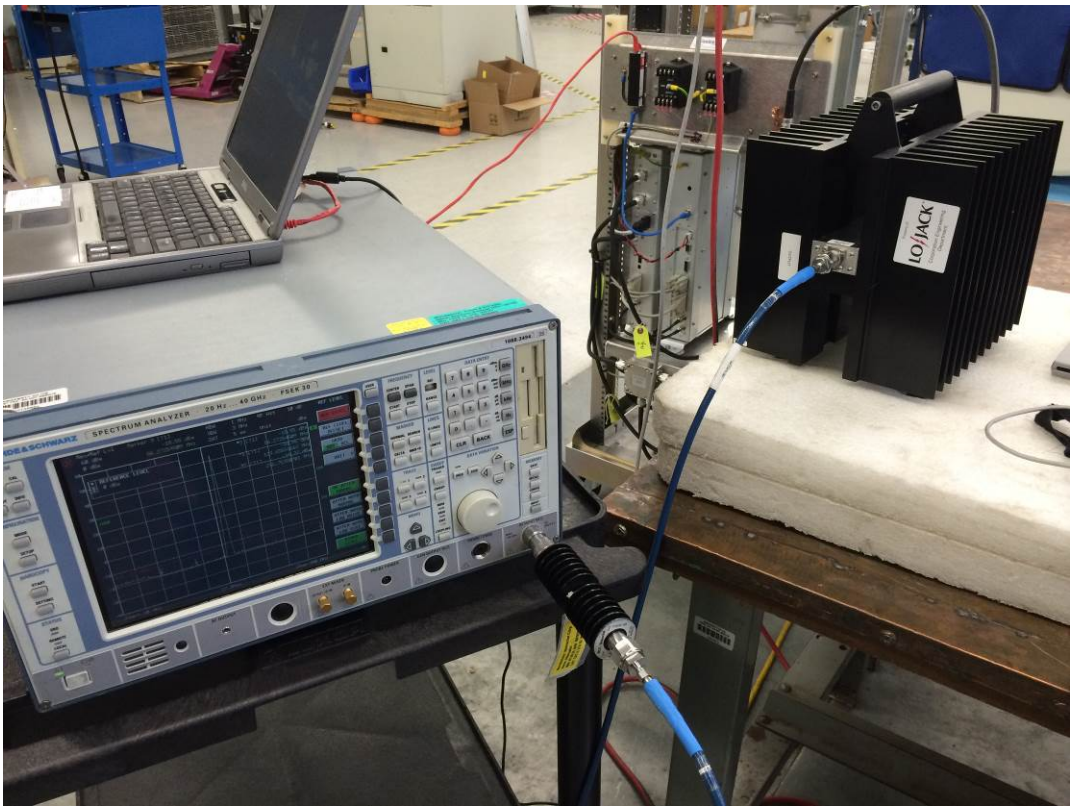
Software Utilized:

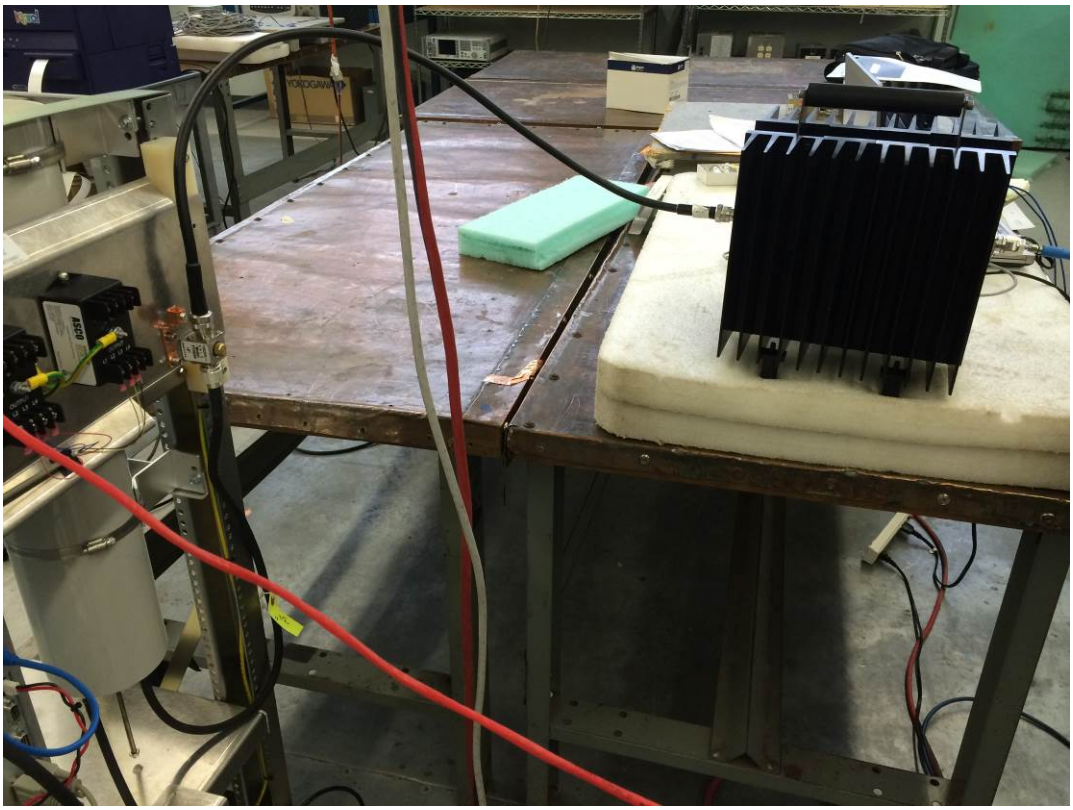
Name	Manufacturer	Version
None		

12.3 Results:

The sample tested was found to Comply.

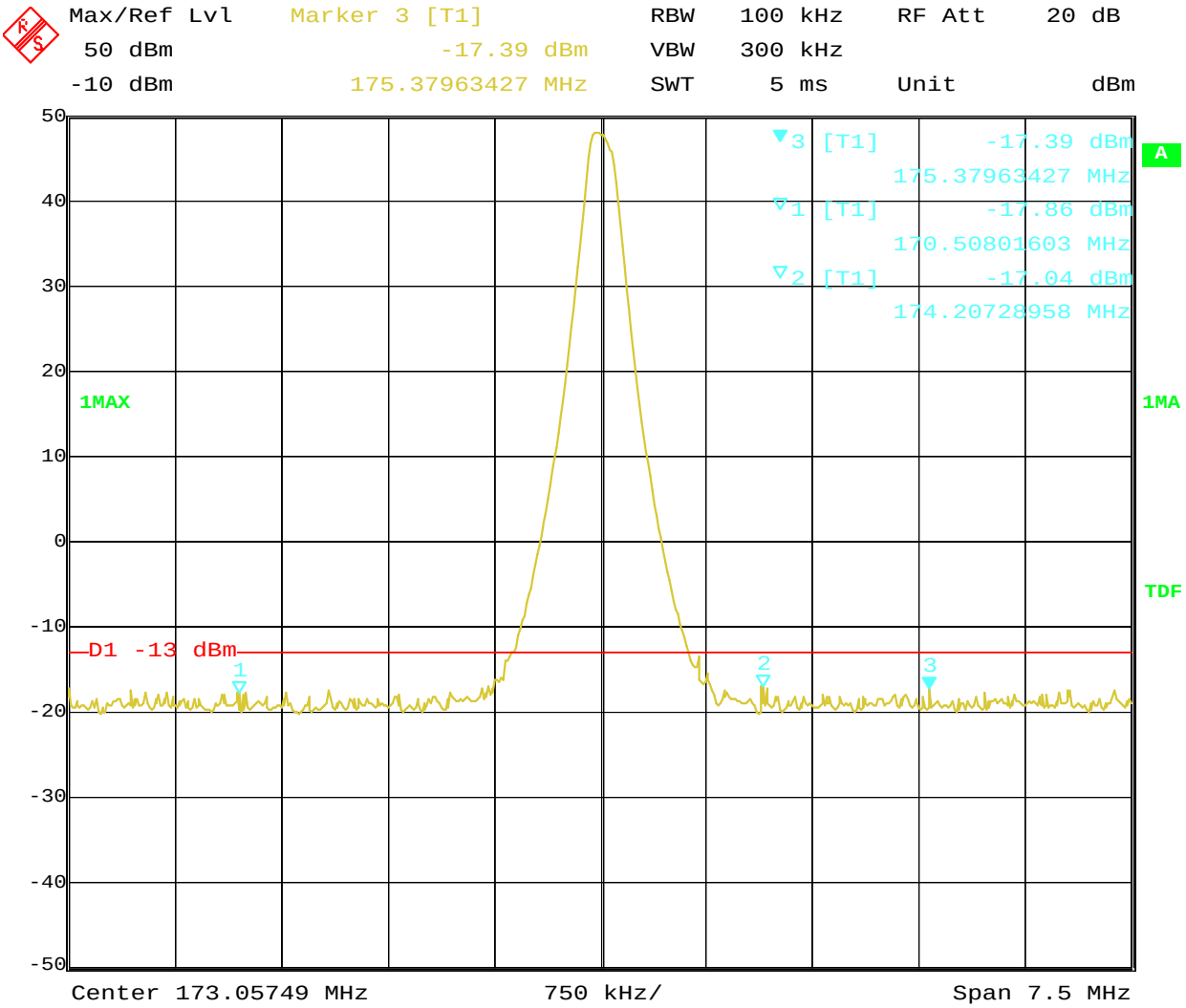
12.4 Setup Photographs:



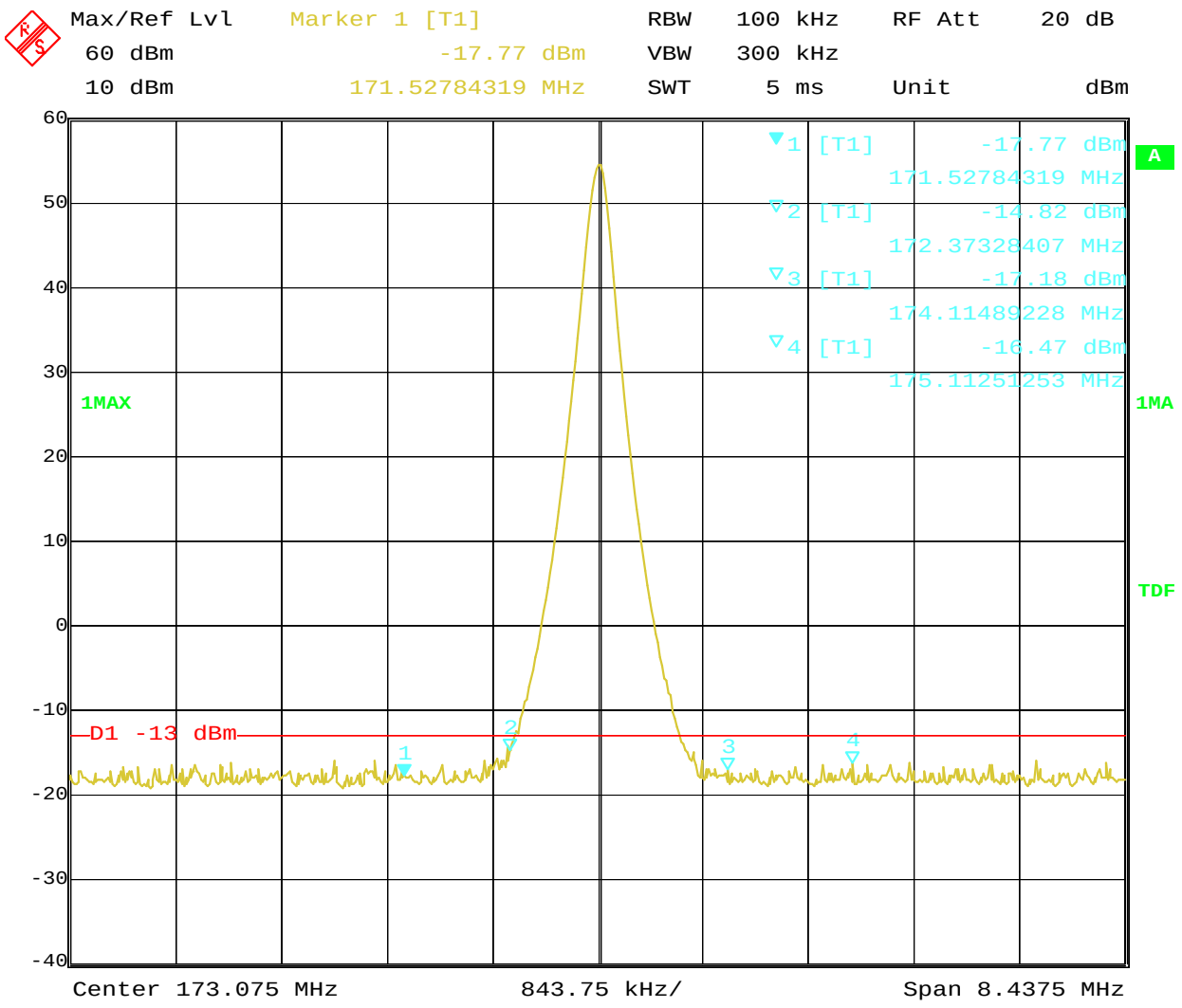


12.5 Plots/Data:

Band Edge Emissions, 30-300 MHz, (Wide Band)



Band Edge Emissions, 30-300 MHz, (Narrow Band)



Test Personnel:	Kouma Sinn KPS	Test Date:	03/24/2017 (1st shift)
	Vathana Ven VSV		03/24/2017 (2nd shift)
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 90	Limit Applied:	Per standard
Input Voltage:	120VAC 60Hz	Ambient Temperature:	23 ºC
Pretest Verification w/ Ambient Signals or BB Source:	**N/A**	Relative Humidity:	10 %
		Atmospheric Pressure:	1018 mbars

Deviations, Additions, or Exclusions: None

13 Receiver Spurious Emissions (Antenna Port Conducted)

13.1 Method

Tests are performed in accordance with FCC 2.1051, 90.210(d).

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

13.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV002'	Weather Station	Davis Instruments	7400	PE80519A93	06/01/2016	06/01/2017
ROS001'	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	06/09/2016	06/09/2017
CBLSHF205'	Cable, SMA-SMA, 9kHz-40GHz, (Cable Kit5)	Huber + Suhner	Sucoflex 102EA	234715001	08/27/2016	08/27/2017

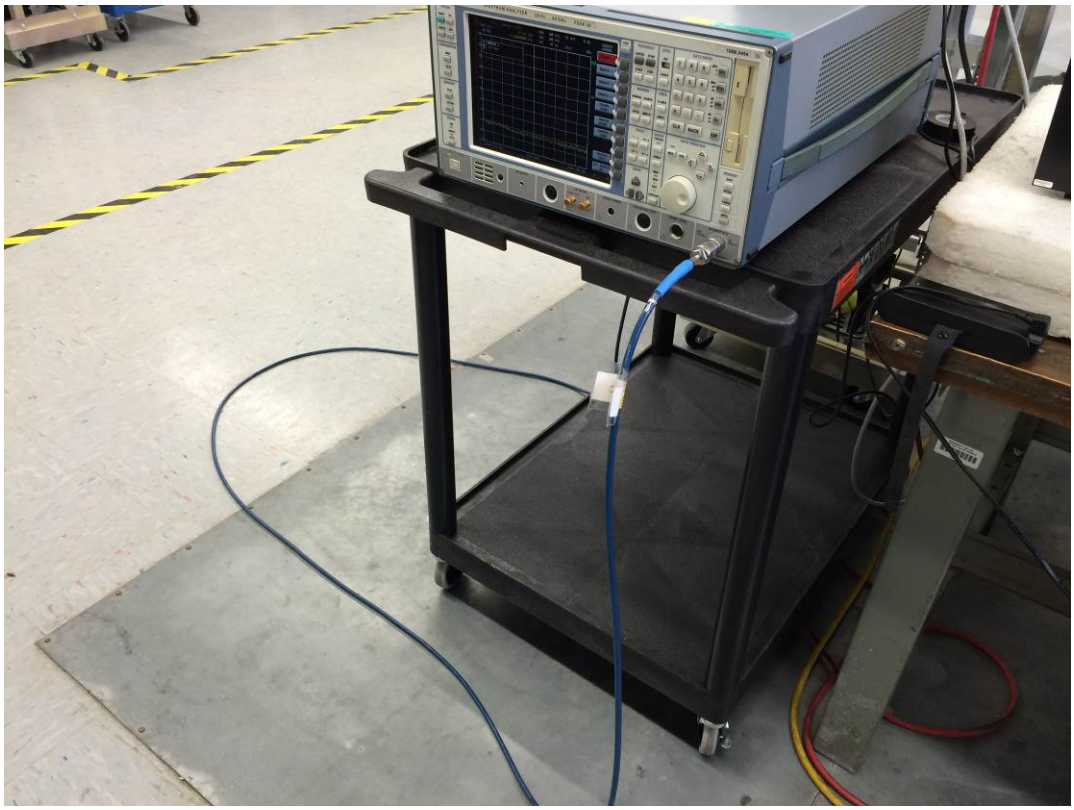
Software Utilized:

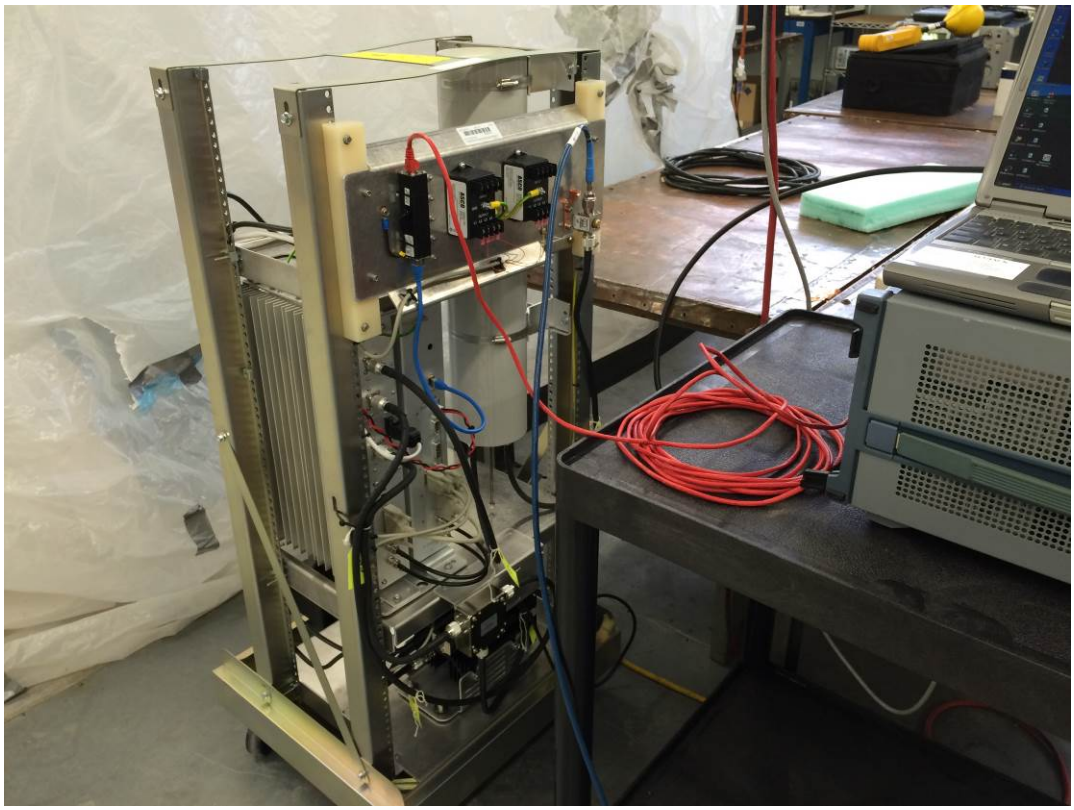
Name	Manufacturer	Version
None		

13.3 Results:

The sample tested was found to Comply.

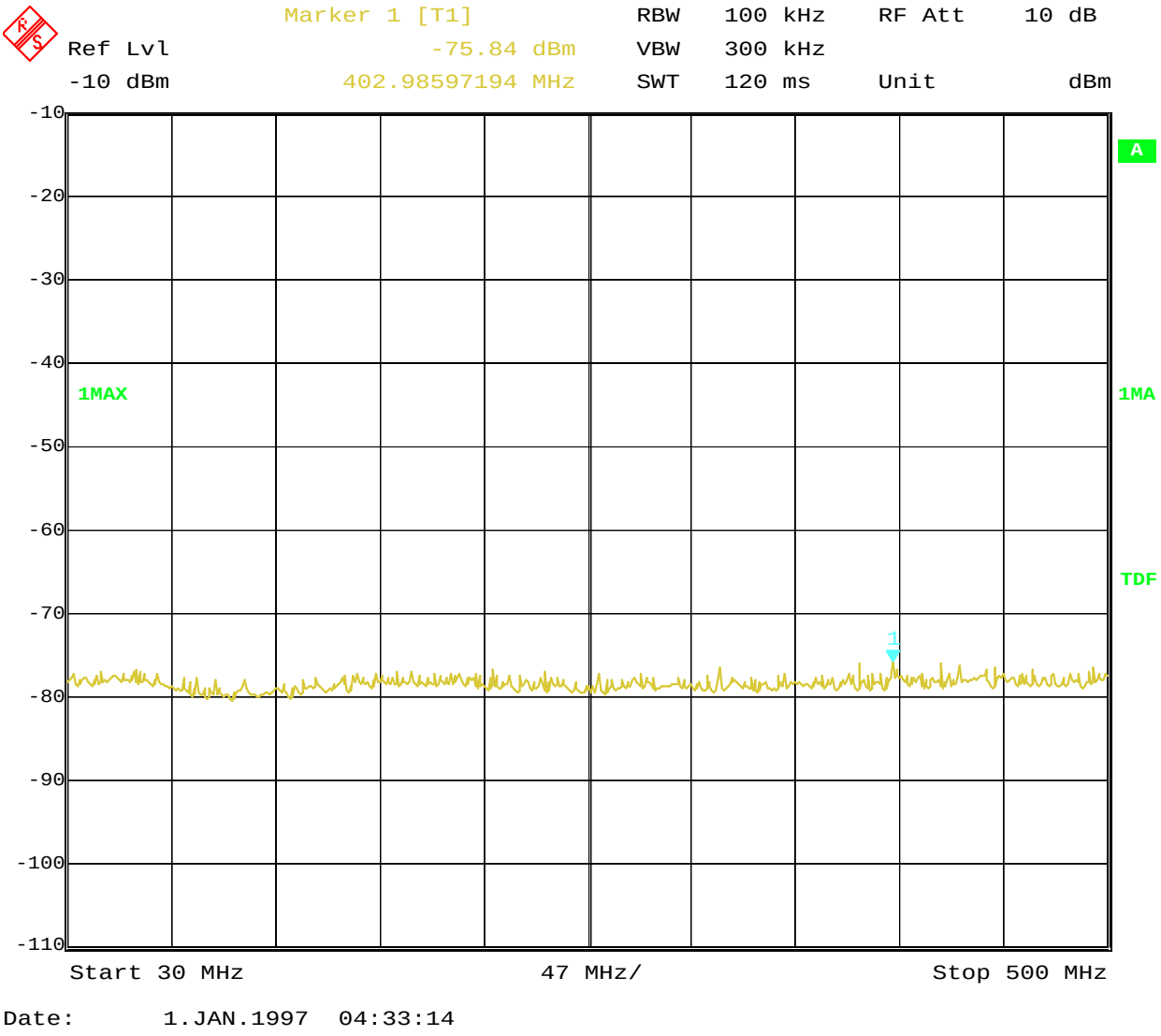
13.4 Setup Photographs:



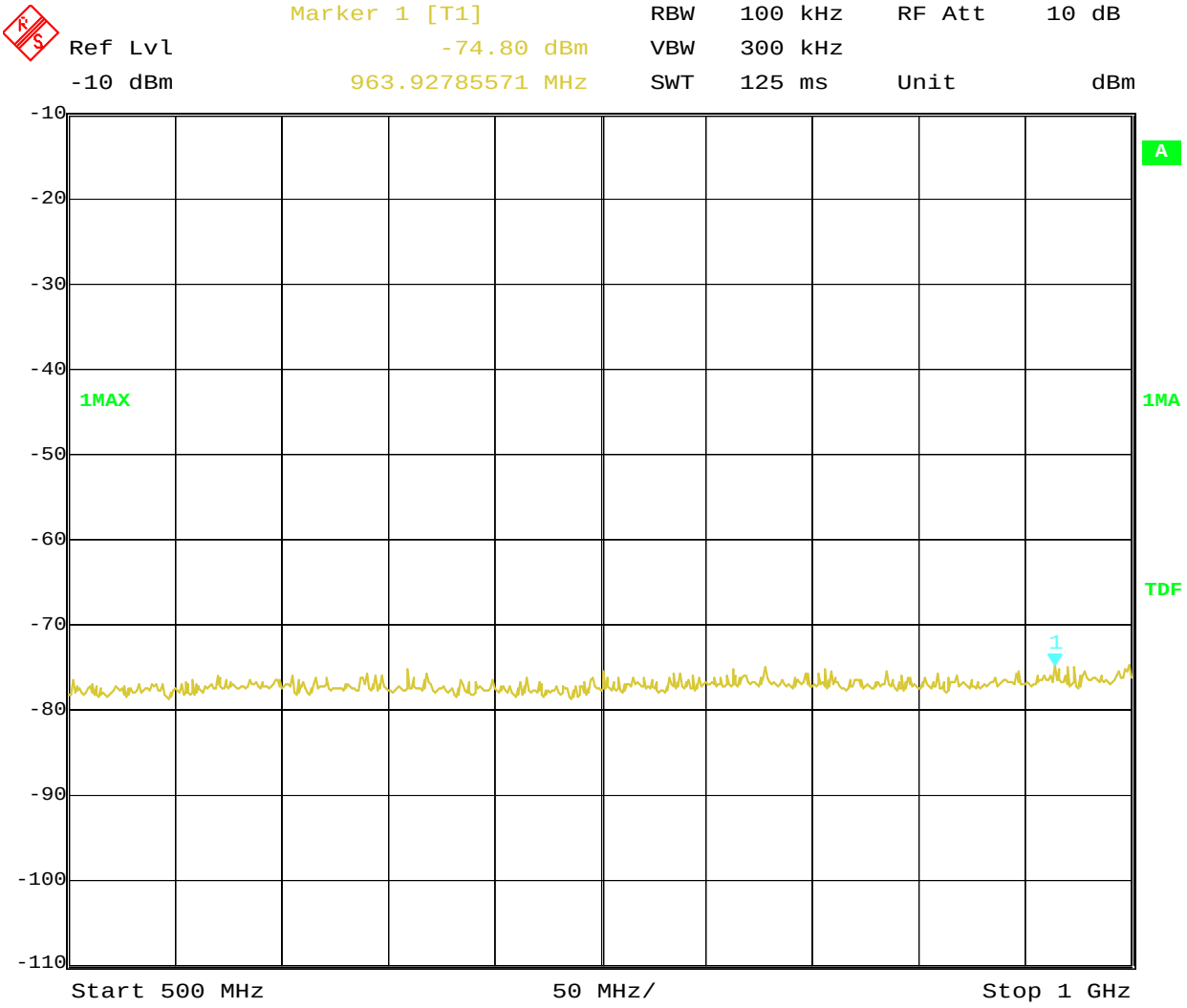


13.5 Plots/Data:

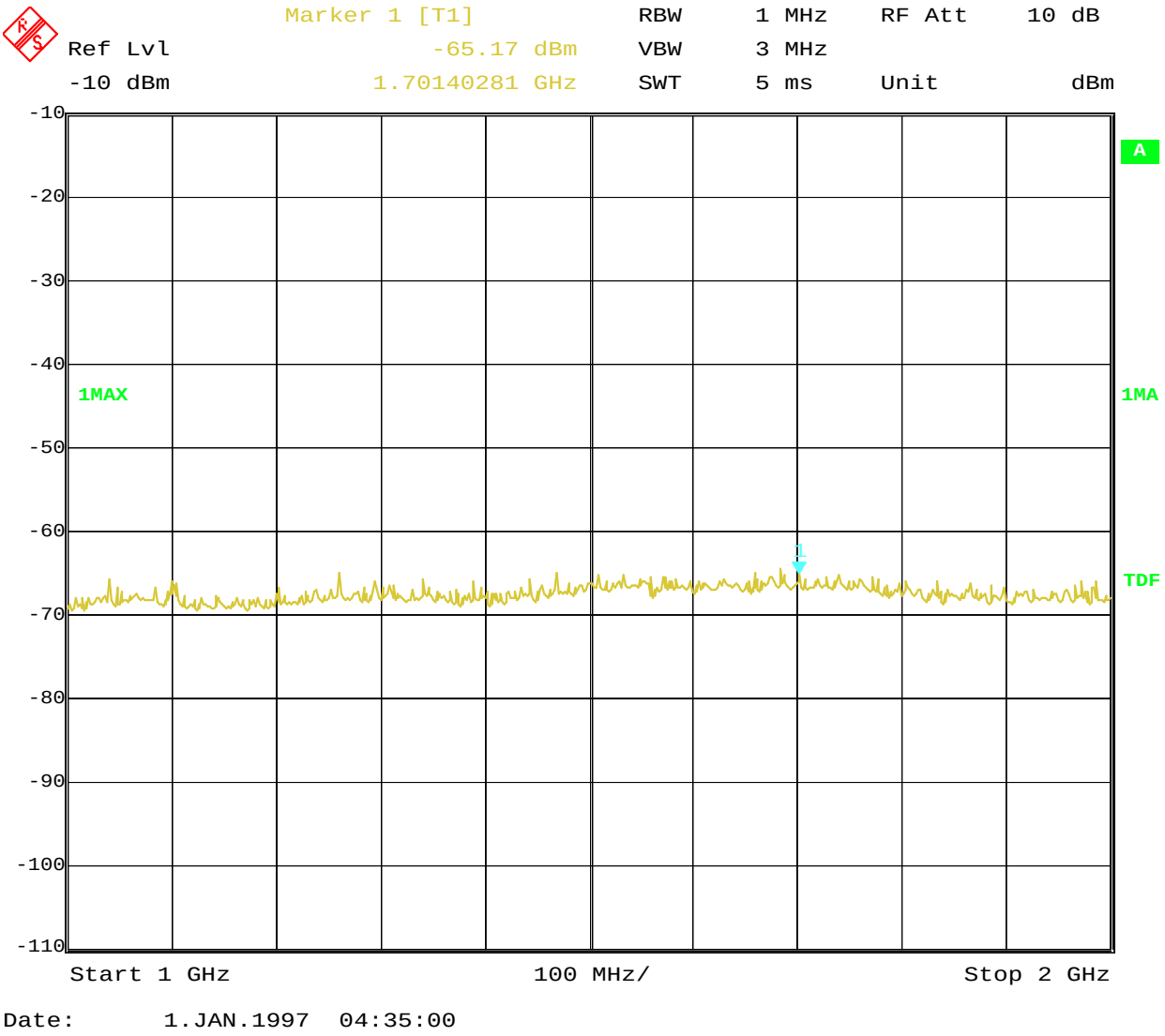
Receiver Port Conducted Emissions, 30-500 MHz, (Wide Band)



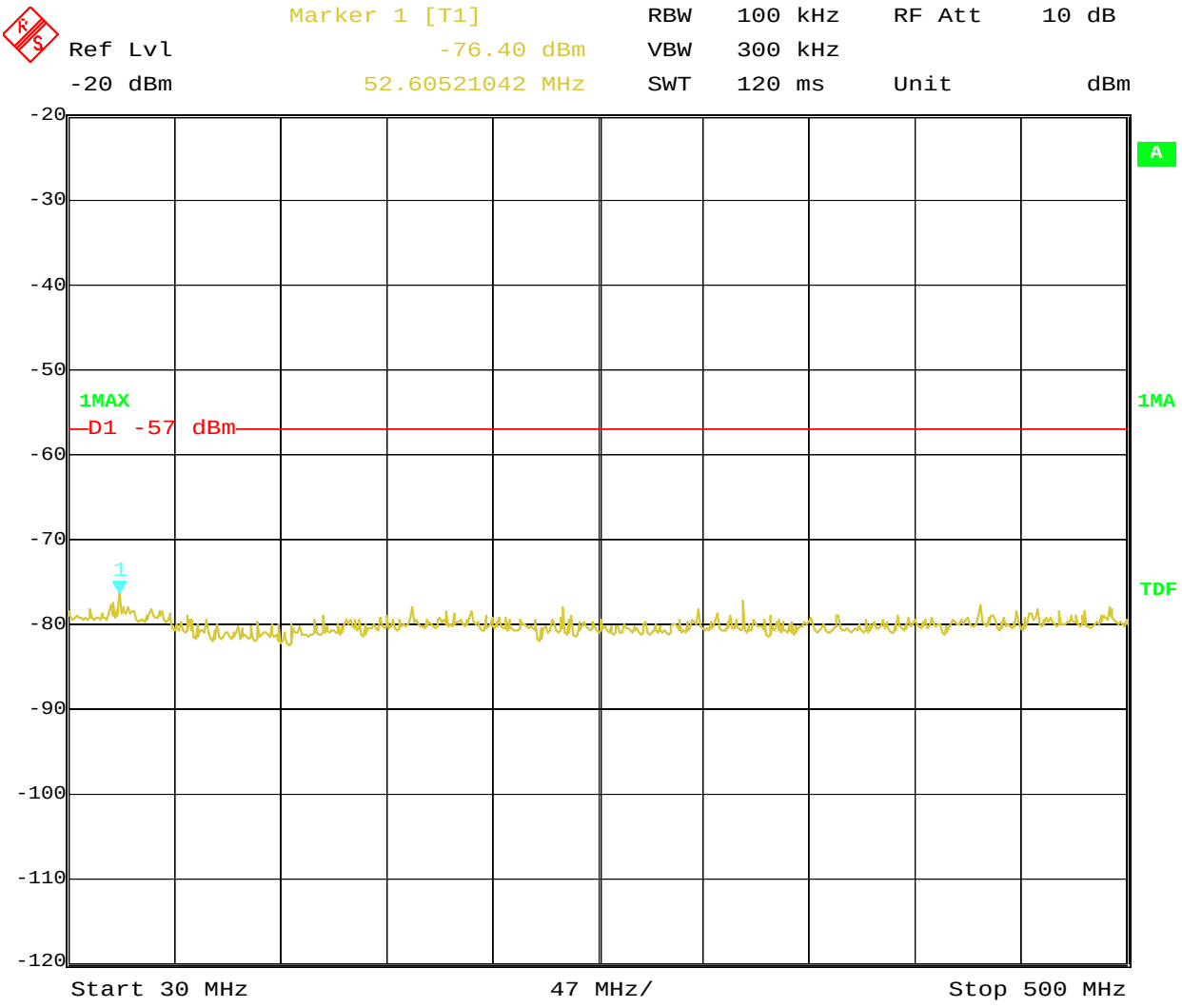
Receiver Port Conducted Emissions, 500-1000 MHz, (Wide Band)



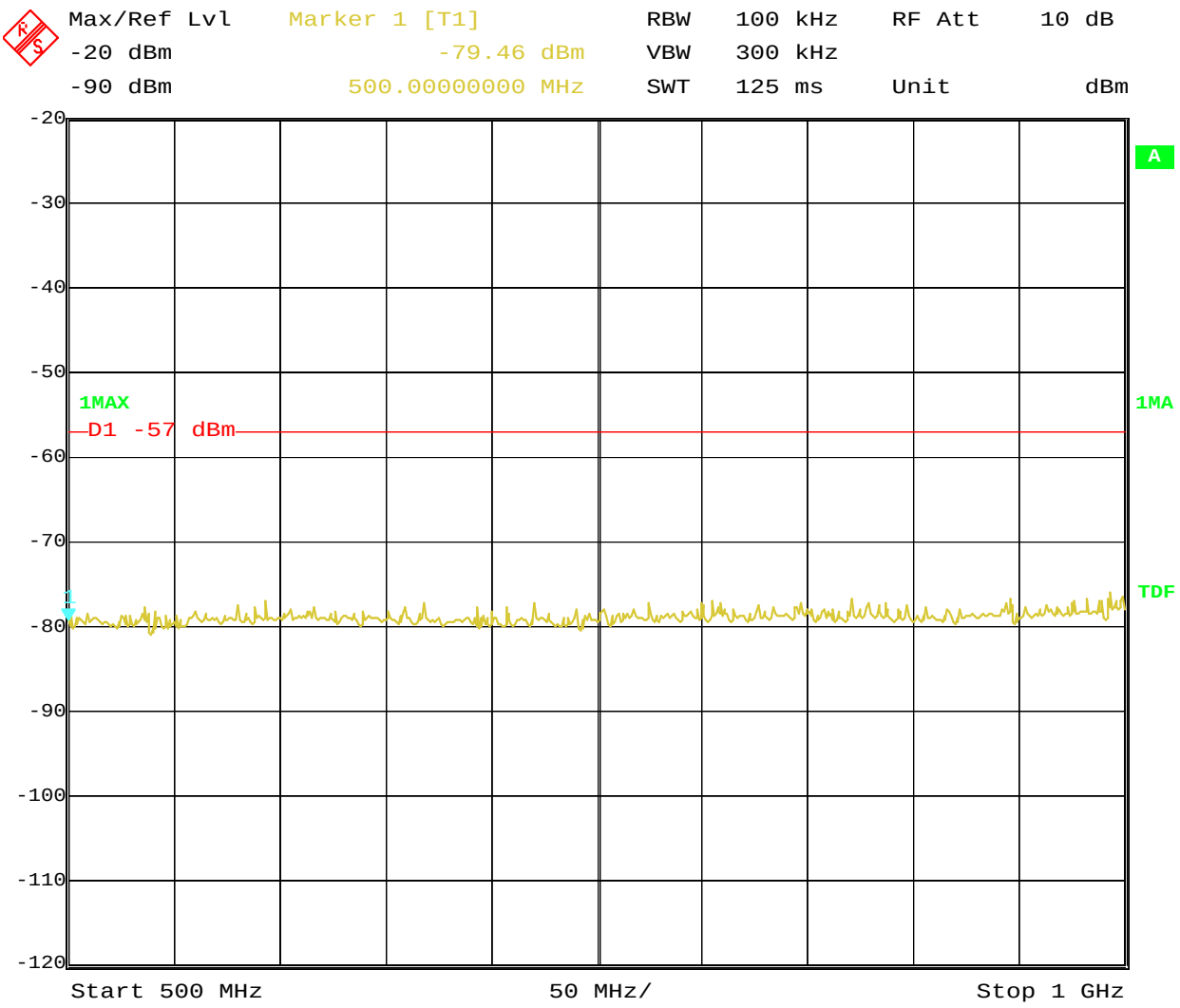
Receiver Port Conducted Emissions, 1-2 GHz, (Wide Band)



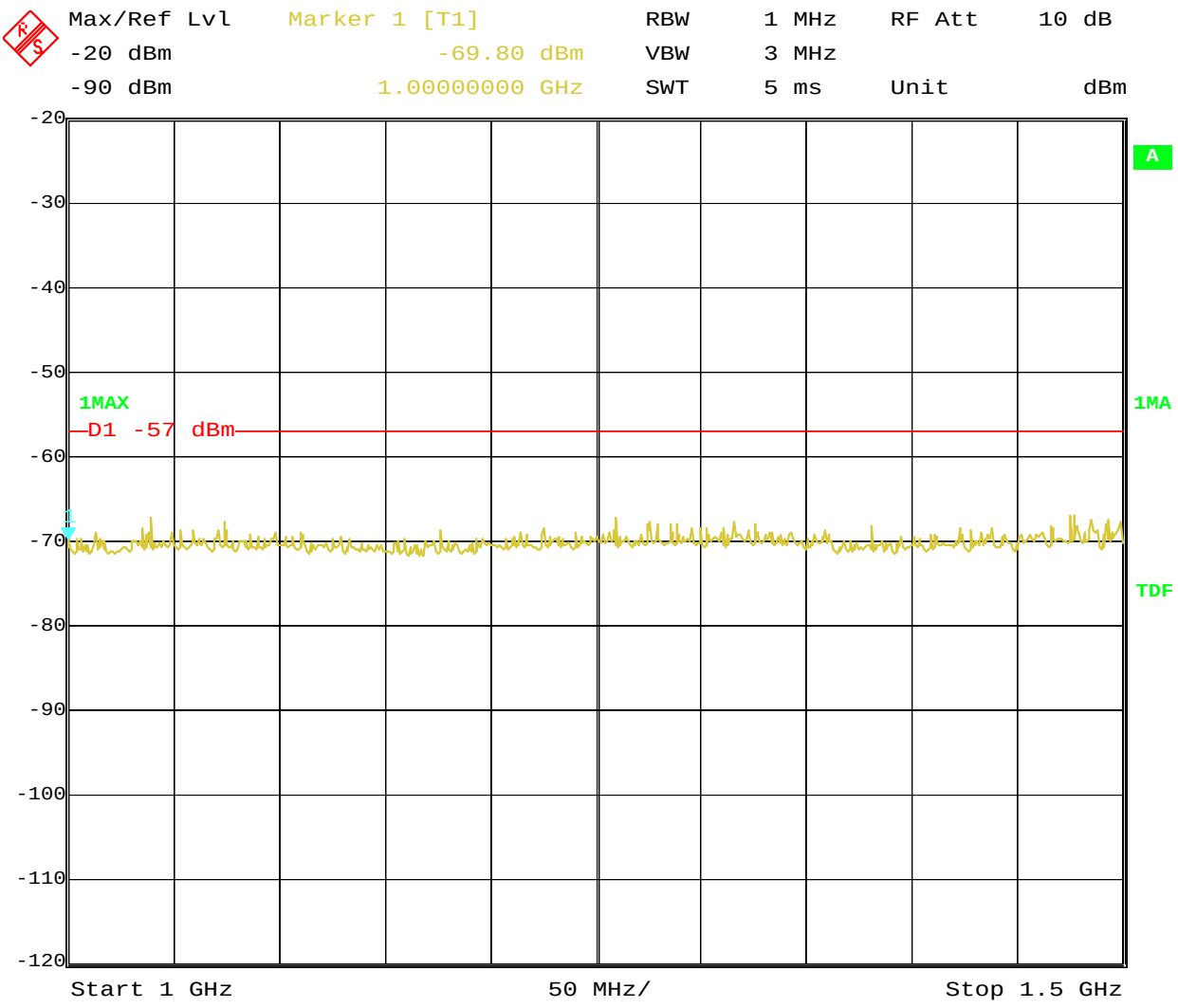
Receiver Port Conducted Emissions, 30-500 MHz, (Narrow Band)



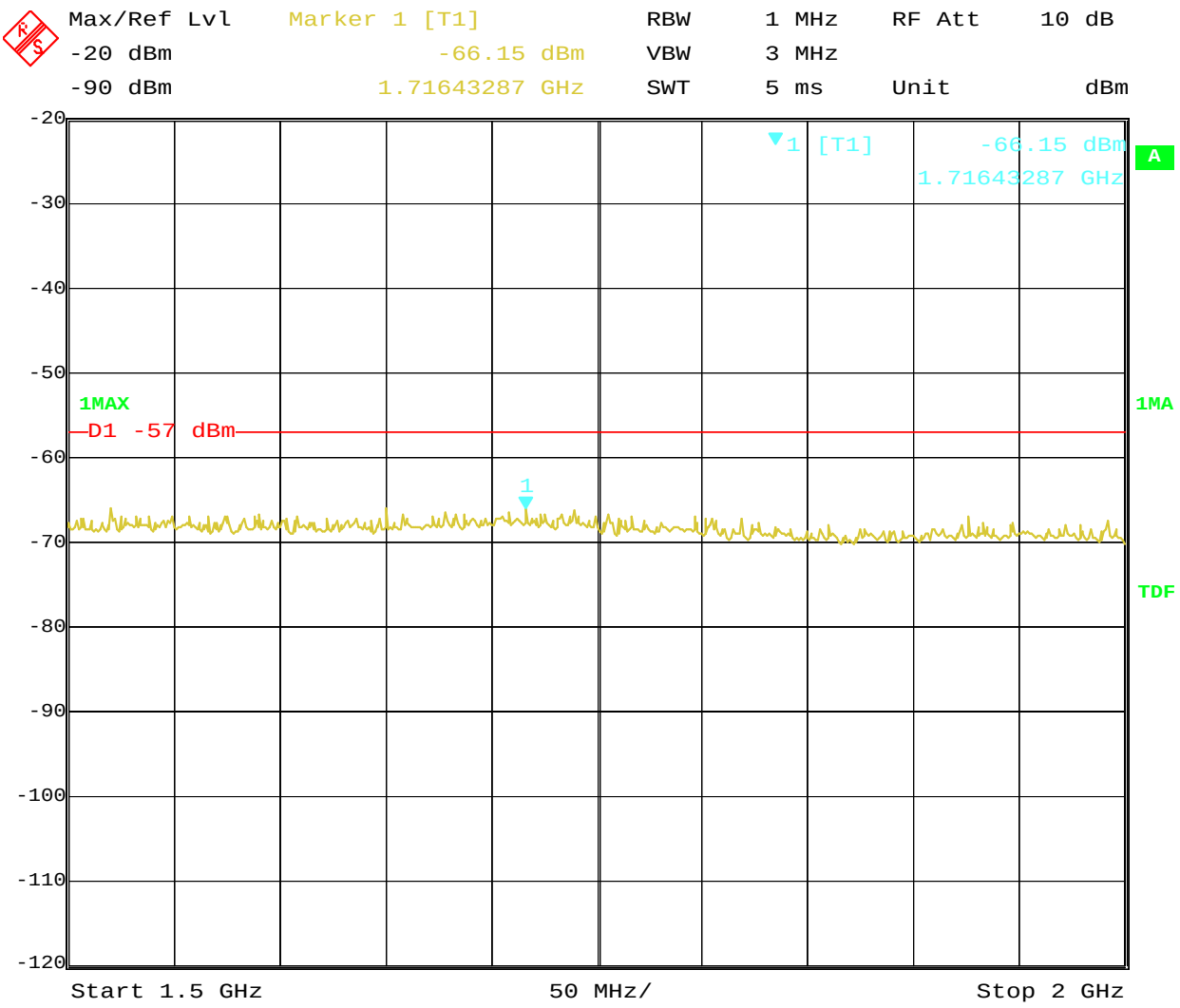
Receiver Port Conducted Emissions, 500-1000 MHz, (Narrow Band)



Receiver Port Conducted Emissions, 1-1.5 GHz, (Narrow Band)



Receiver Port Conducted Emissions, 1.5-2 GHz, (Narrow Band)



Test Personnel:	Kouma Sinn KPS	Test Date:	03/24/2017 (1st shift)
	Vathana Ven VSV		03/24/2017 (2nd shift)
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 90	Limit Applied:	Per standard
Input Voltage:	120VAC 60Hz	Ambient Temperature:	23 ºC
Pretest Verification w/ Ambient Signals or BB Source:	**N/A**	Relative Humidity:	10 %
		Atmospheric Pressure:	1018 mbars

Deviations, Additions, or Exclusions: None

14 Transmitter Out-of-Band Unwanted Emissions, Radiated

14.1 Method

Tests are performed in accordance with FCC 2.1053, 90.210(d).

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.6dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	5.3 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.5 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.2 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	5.0 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	5.0 dB	5.5 dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG
Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:

FS = RA + AF + CF – AG = 52.0 + 7.4 + 1.6 – 29.0 = 32.0
$UF = 10^{(32\ dB\mu V / 20)}$ = 39.8 μV/m

Alternately, when C5 Software is used, the “Level” includes all losses and gains and is compared directly in the “Margin” column to the “Limit”. “AF” is the Antenna Factor; “PA+CL” are Preamp and Cable Loss. These are already accounted for in the “Level” column.

14.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV004'	Weather Station	Davis Instruments	7400	PE80529A61A	05/02/2016	05/02/2017
145128'	EMI Receiver (20 Hz - 40 Ghz)	Rohde & Schwarz	ESIB 40	839283/001	03/15/2017	03/15/2018
ROS001'	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	06/09/2016	06/09/2017
REA003'	1GHz High Pass Filter	Reactel, Inc	7HS-1G/10G-S11	06-1	02/17/2017	02/17/2018
REA006'	18GHz High Pass Filter	Reactel, Inc	7HS-18G/40G K11	(06)1	02/17/2017	02/17/2018
145-416'	Cables 145-420 145-423 145-424 145-408	Huber + Suhner	3m Track B cables	multiple	07/30/2016	07/30/2017
CBLHF2012-2M-2'	2m 9kHz-40GHz Coaxial Cable - SET2	Huber & Suhner	SF102	252675002	02/08/2017	02/08/2018
CBLHF2012-5M-2'	5m 9kHz-40GHz Coaxial Cable - SET2	Huber & Suhner	SF102	252676002	02/08/2017	02/08/2018
PRE10'	30-1000MHz pre-amp	ITS	PRE10	PRE10	12/16/2016	12/16/2017
HEW46'	METER, POWER	Hewlett Packard	436A/022	2604A23768	04/29/2016	04/29/2017
ETS001'	1-18GHz DRG Horn Antenna	ETS-Lindgren	3117	00143259	02/13/2017	02/13/2018
EMC04'	ANTENNA, RIDGED GUIDE, 18-40 GHZ	EMCO	3116	2090	04/07/2015	04/07/2016

Software Utilized:

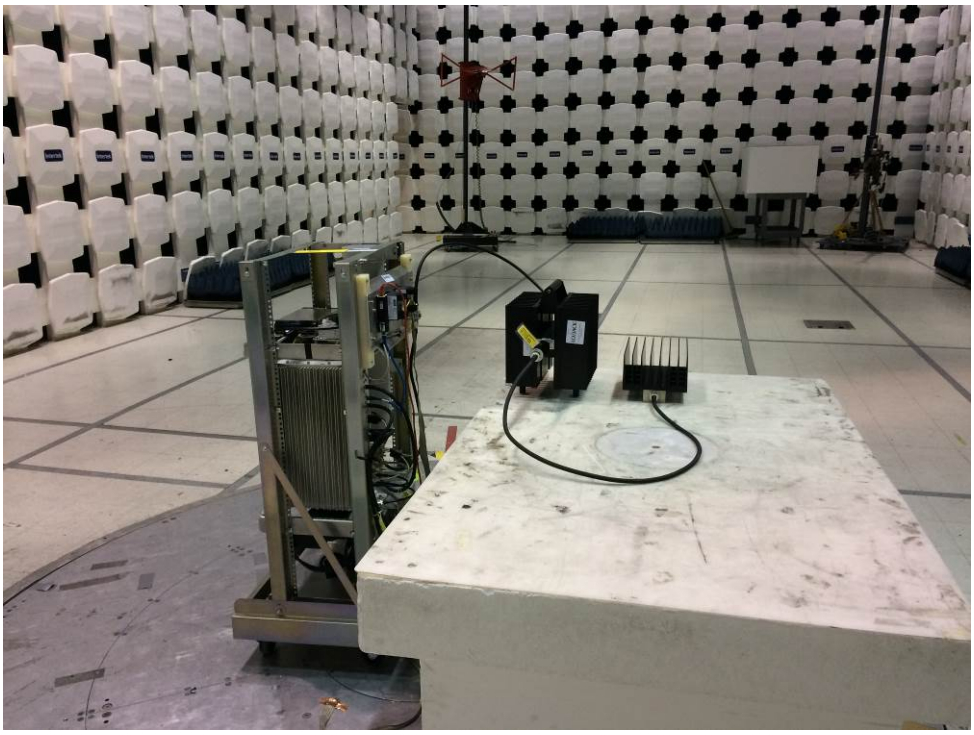
Name	Manufacturer	Version

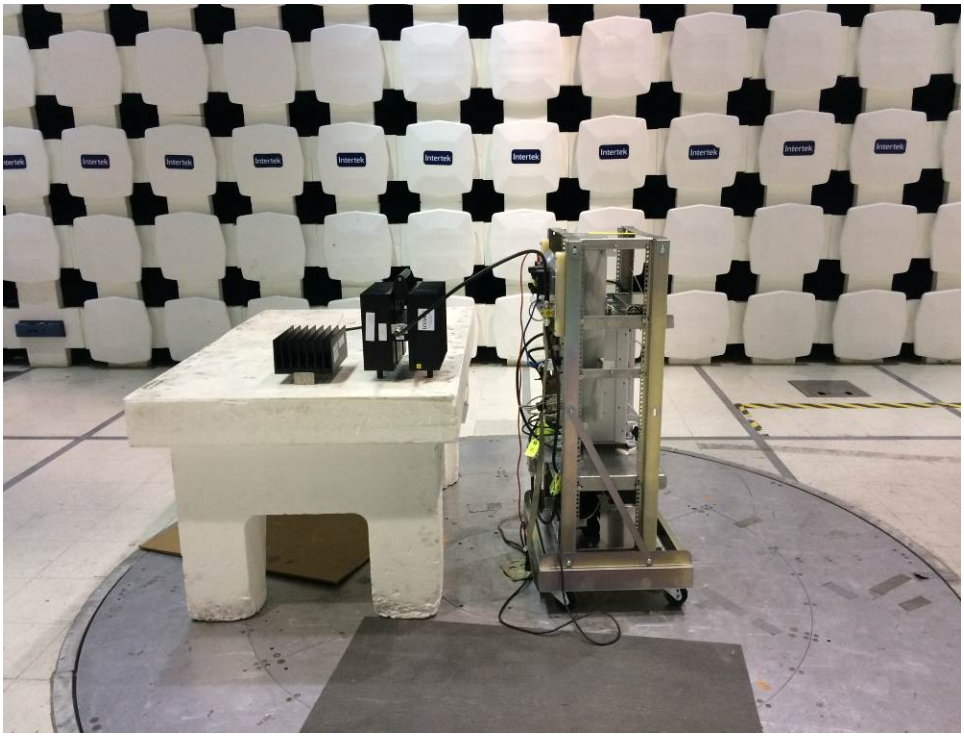
14.3 Results:

The sample tested was found to Comply.

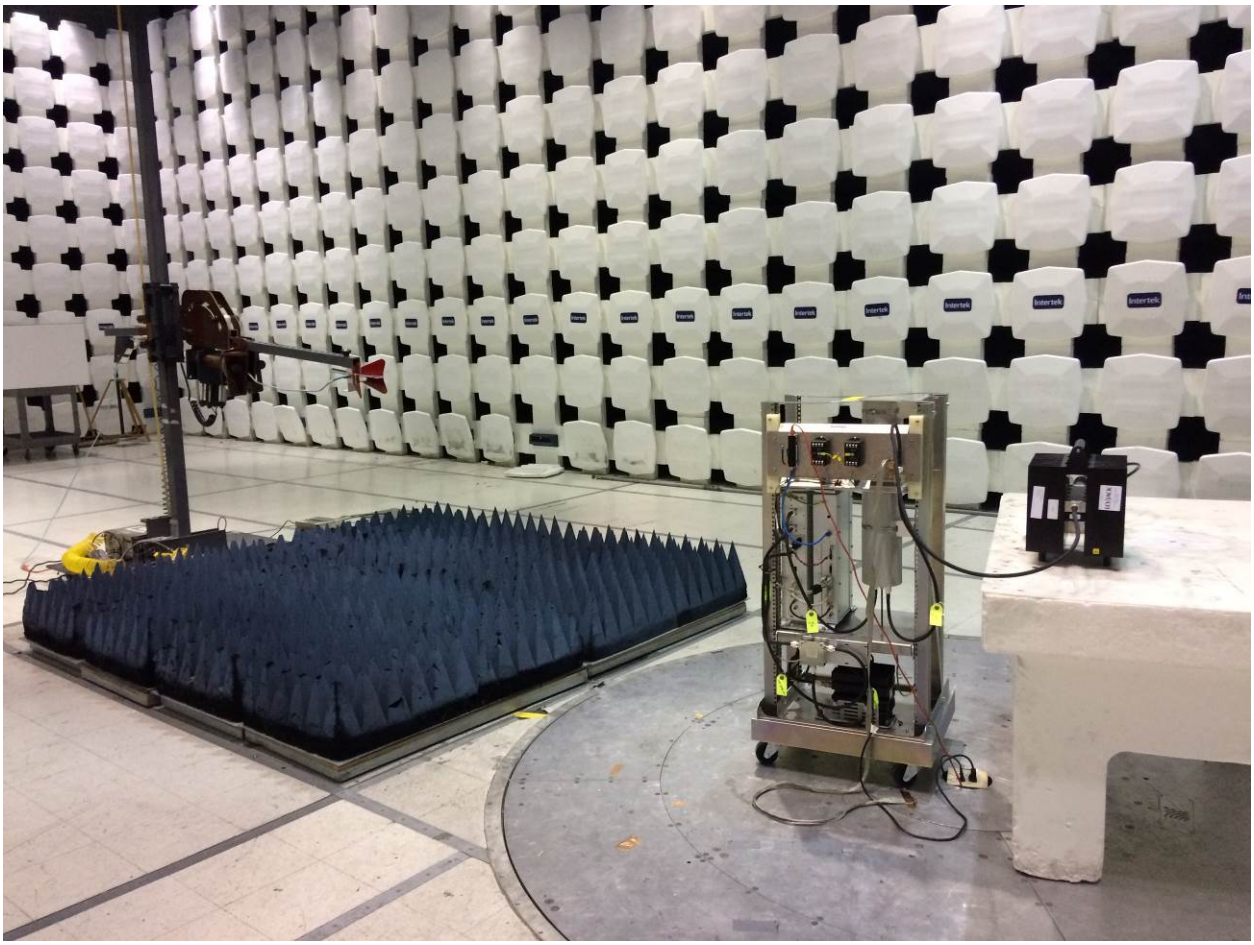
14.4 Setup Photographs:

30-1000 MHz





1-2 GHz



14.5 Plots/Data:

Narrow Band, 30 MHz-2 GHz

Radiated Emissions, Substitution

Company: LoJACK Corporation
Model #: RTU5
Serial #: E001B
Engineer(s): Vathana Ven
Project #: Qu-00755931
Standard: FCC Part 15/Cispr22 Class B
Barometer: DAV004 Temp/Humidity/Pressure: 20 deg C 33% 1003mB
Location: 10M
Date(s): 03/28/17
Rx Antenna: 145-106 ETS001
Rx Cable(s): 145-410 145-416 REA003
Rx Preamp: 145-014 Receiver: 145-128
Tx Antenna: 145154 ANT6C ANTB
Tx Cable(s): CBLSHF205
Tx Signal Generator: HEW62
ERP or EIRP?: ERP
Test Distance (m): 10 Voltage/Frequency: 120VAC 60Hz Frequency Range: 30 MHz - 2 GHz
Net = Generator Level (0.00 dBm) + (EUT reading - Generator reading) - Cable Loss + Antenna Gain (dBi or dBd)
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	EUT Reading dB(uV)	Generator Reading dB(uV)	Transmit Cable Loss dB	Transmit Antenna dBi	Generator Level dBm	Net dBm	Limit dBm	Margin dB	Bandwidth	
PK	V	93.367	30.78	51.36	0.64	-0.40	-20.00	-43.77	-13.00	-30.77	120/300 kHz	No Pre-amp
PK	H	346.123	48.99	46.69	1.22	-0.70	-20.00	-21.77	-13.00	-8.77	120/300 kHz	No Pre-amp
PK	H	519.225	29.37	44.02	1.38	1.00	-20.00	-37.18	-13.00	-24.18	120/300 kHz	No Pre-amp
PK	H	865.375	29.70	41.61	1.86	0.60	-20.00	-35.32	-13.00	-22.32	120/300 kHz	No Pre-amp
PK	H	1038.450	70.94	84.04	1.92	6.90	-20.00	-30.27	-13.00	-17.27	1/3 MHz	
PK	H	1211.525	46.37	81.09	1.92	6.99	-20.00	-51.80	-13.00	-38.80	1/3 MHz	
PK	H	1384.600	61.12	81.61	1.92	7.18	-20.00	-37.38	-13.00	-24.38	1/3 MHz	
PK	H	1557.675	44.01	82.77	2.71	8.51	-20.00	-55.11	-13.00	-42.11	1/3 MHz	
PK	H	1730.750	47.20	80.83	2.71	9.18	-20.00	-49.31	-13.00	-36.31	1/3 MHz	

Wide Band, 30 MHz-2 GHz

Radiated Emissions, Substitution

Company: LoJACK Corporation
Model #: RTU5
Serial #: E0001A
Engineer(s): Vathana Ven
Project #: Qu-00755931
Standard: FCC Part 15/Cispr22 Class B
Barometer: DAV004 Temp/Humidity/Pressure: 21 deg C 30% 1008mB
Location: 10M
Date(s): 03/29/17
Rx Antenna: 145-106 ETS001
Rx Cable(s): 145-410 145-416 REA003
Rx Preamp: 145-014 Receiver: 145-128
Tx Antenna: 145154 ANT6C ANTB
Tx Cable(s): CBLSHF205
Tx Signal Generator: HEW62
ERP or EIRP?: ERP
Test Distance (m): 3 & 10 Voltage/Frequency: 120VAC 60Hz Frequency Range: 30 MHz - 2 GHz
Net = Generator Level (0.00 dBm) + (EUT reading - Generator reading) - Cable Loss + Antenna Gain (dBi or dBd)
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	EUT Reading dB(uV)	Generator Reading dB(uV)	Transmit Cable Loss dB	Transmit Antenna dBi	Generator Level dBm	Net dBm	Limit dBm	Margin dB	Bandwidth	
PK	V	92.425	29.70	51.36	0.64	-0.40	-20.00	-44.85	-13.00	-31.85	120/300 kHz	No Pre-amp
PK	H	346.123	39.46	46.69	1.22	-0.70	-20.00	-31.30	-13.00	-18.30	120/300 kHz	No Pre-amp
PK	H	519.225	29.39	44.02	1.38	1.00	-20.00	-37.16	-13.00	-24.16	120/300 kHz	No Pre-amp
PK	H	865.375	26.50	41.61	1.86	0.60	-20.00	-38.52	-13.00	-25.52	120/300 kHz	No Pre-amp
PK	H	1038.450	68.90	82.88	1.92	6.90	-20.00	-31.15	-13.00	-18.15	1/3 MHz	
PK	H	1211.525	49.89	79.92	1.92	6.99	-20.00	-47.11	-13.00	-34.11	1/3 MHz	
PK	H	1384.600	48.05	81.59	1.92	7.18	-20.00	-50.43	-13.00	-37.43	1/3 MHz	
PK	H	1557.675	40.48	81.98	2.71	8.51	-20.00	-57.85	-13.00	-44.85	1/3 MHz	
PK	H	1730.750	49.46	80.31	2.71	9.18	-20.00	-46.53	-13.00	-33.53	1/3 MHz	

Test Personnel:	Vathana Ven VSV	Test Date:	03/28/2017
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 90	Limit Applied:	Per standard
Input Voltage:	120VAC 60Hz	Ambient Temperature:	21 ºC
Pretest Verification w/ Ambient Signals or BB Source:	**BB Source**	Relative Humidity:	30 %
		Atmospheric Pressure:	1008 mbars

Deviations, Additions, or Exclusions: None

15 Receiver Radiated Emissions

15.1 Method

Tests are performed in accordance with (FCC 2.1053, 90.210(d))

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.6dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	5.3 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.5 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.2 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	5.0 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	5.0 dB	5.5 dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG
Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:

FS = RA + AF + CF – AG = 52.0 + 7.4 + 1.6 – 29.0 = 32.0
$UF = 10^{(32\ dB\mu V / 20)}$ = 39.8 μV/m

Alternately, when BAT-EMC Emission Software is used, the “Level” includes all losses and gains and is compared directly in the “Margin” column to the “Limit”. The “Correction” includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the “Level” column.

15.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV004	Weather Station	Davis Instruments	7400	PE80529A61A	05/02/2016	05/02/2017
145106	Bilog Antenna (30MHz - 5GHz)	Sunol Sciences	JB5	A111003	05/03/2016	05/03/2017
PRE10	30-1000MHz pre-amp	ITS	PRE10	PRE10	12/16/2016	12/16/2017
145-410	Cables 145-420 145-421 145-422 145-406	Huber + Suhner	10m Track A Cables	multiple	07/30/2016	07/30/2017
145-418						
ETS002	1-18GHz DRG Horn Antenna	ETS Lindgren	3117	00143260	05/13/2016	05/13/2017
145014	Preamplifier (1 GHz to 26.5 GHz)	Hewlett Packard	8449B	3008A00232	05/27/2016	05/27/2017
145128	EMI Receiver (20 Hz - 40 Ghz)	Rohde & Schwarz	ESIB 40	839283/001	03/15/2017	03/15/2018

Software Utilized:

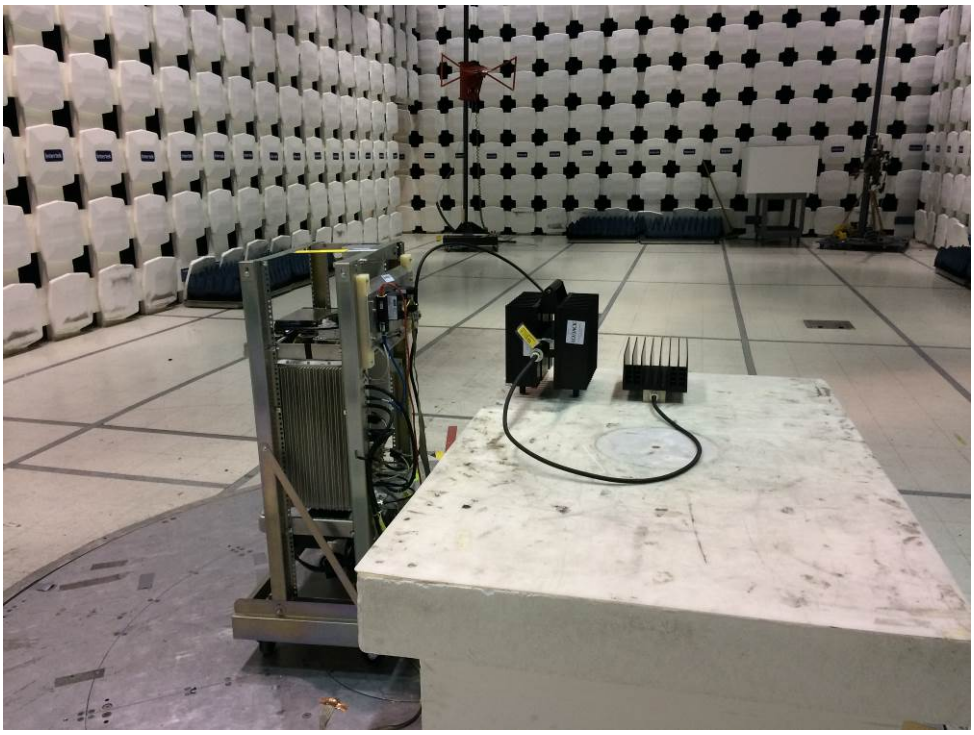
Name	Manufacturer	Version
BAT-EMC Emissions	Nexio	3.16.0.69

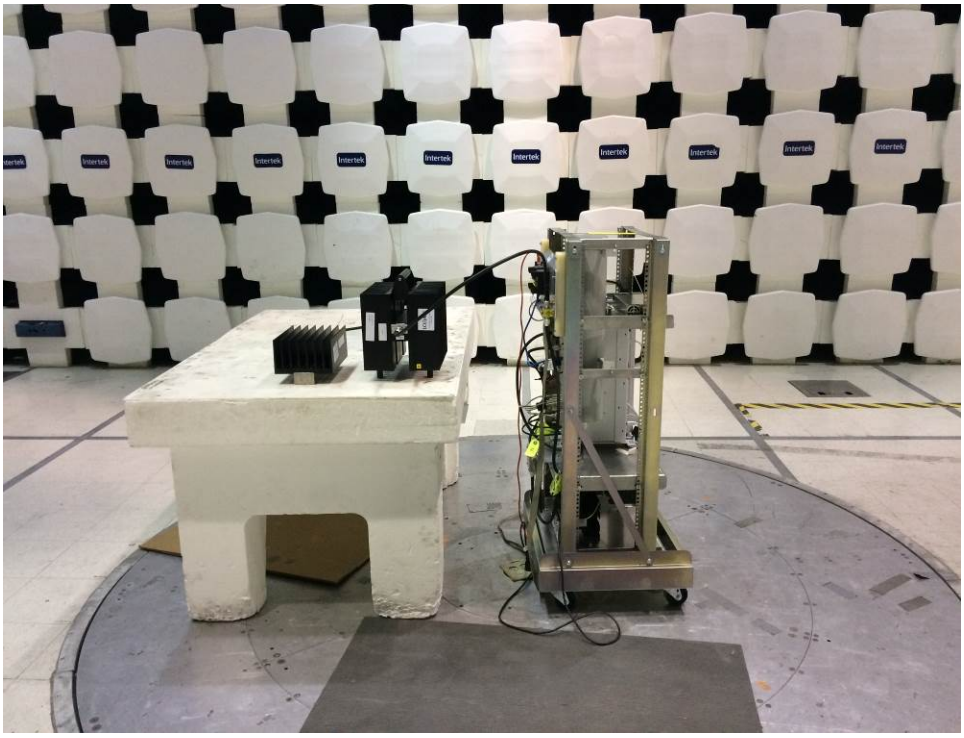
15.3 Results:

The sample tested was found to Comply.

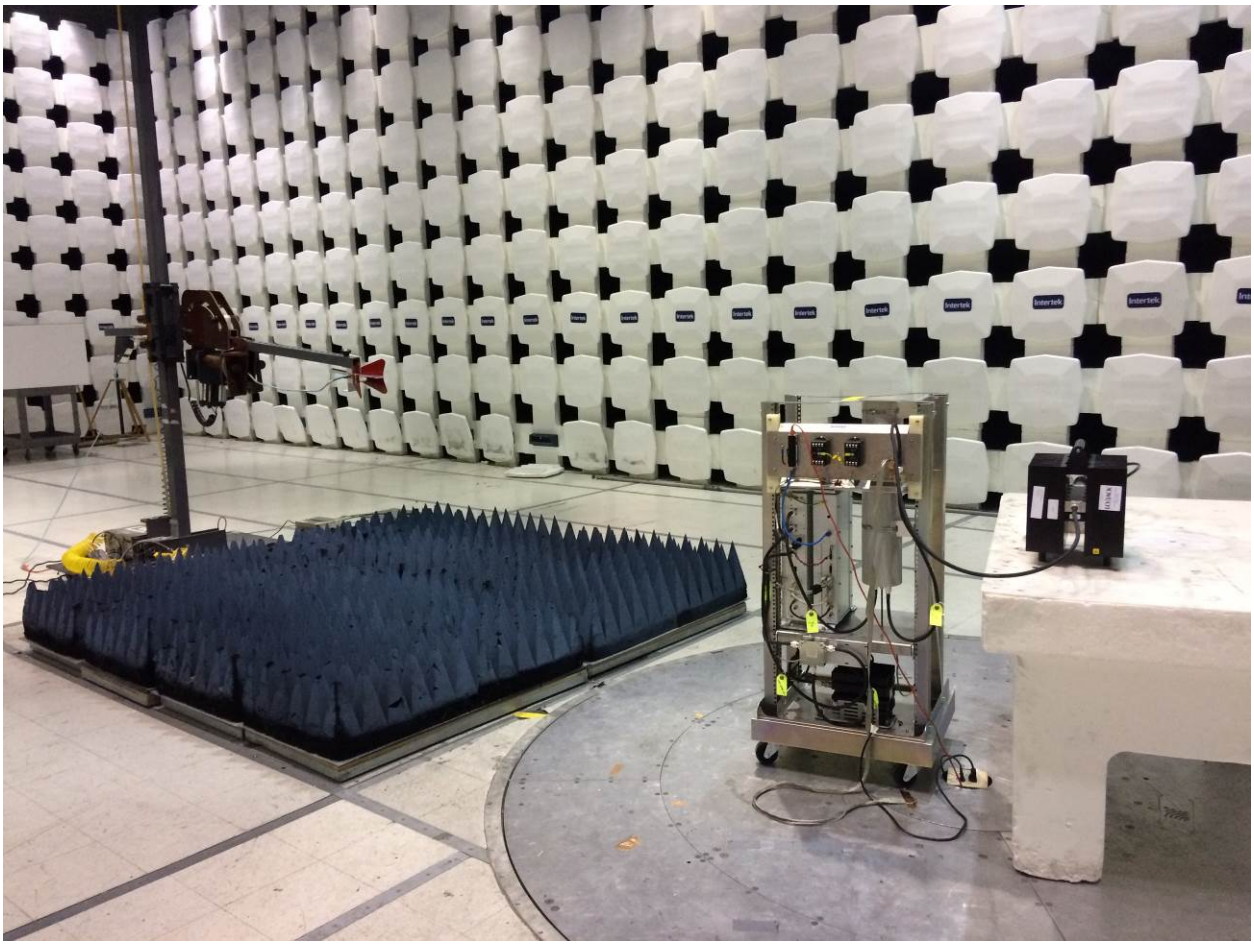
15.4 Setup Photographs:

30-1000 MHz

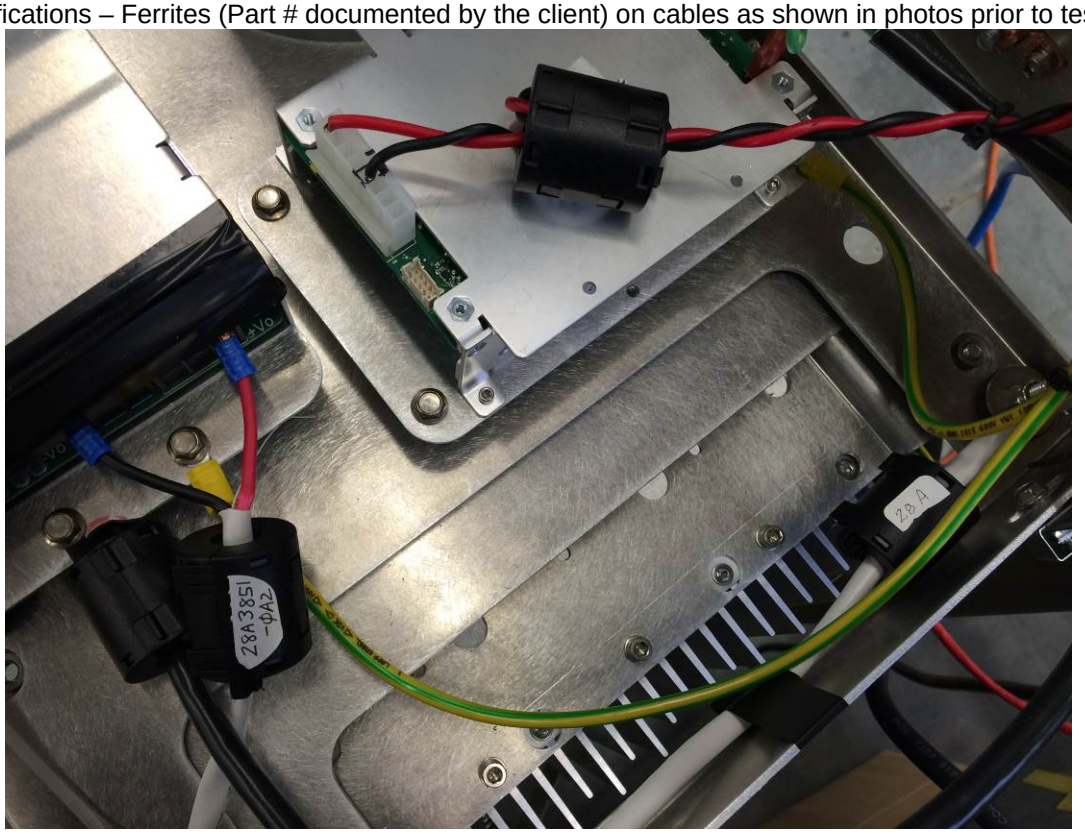


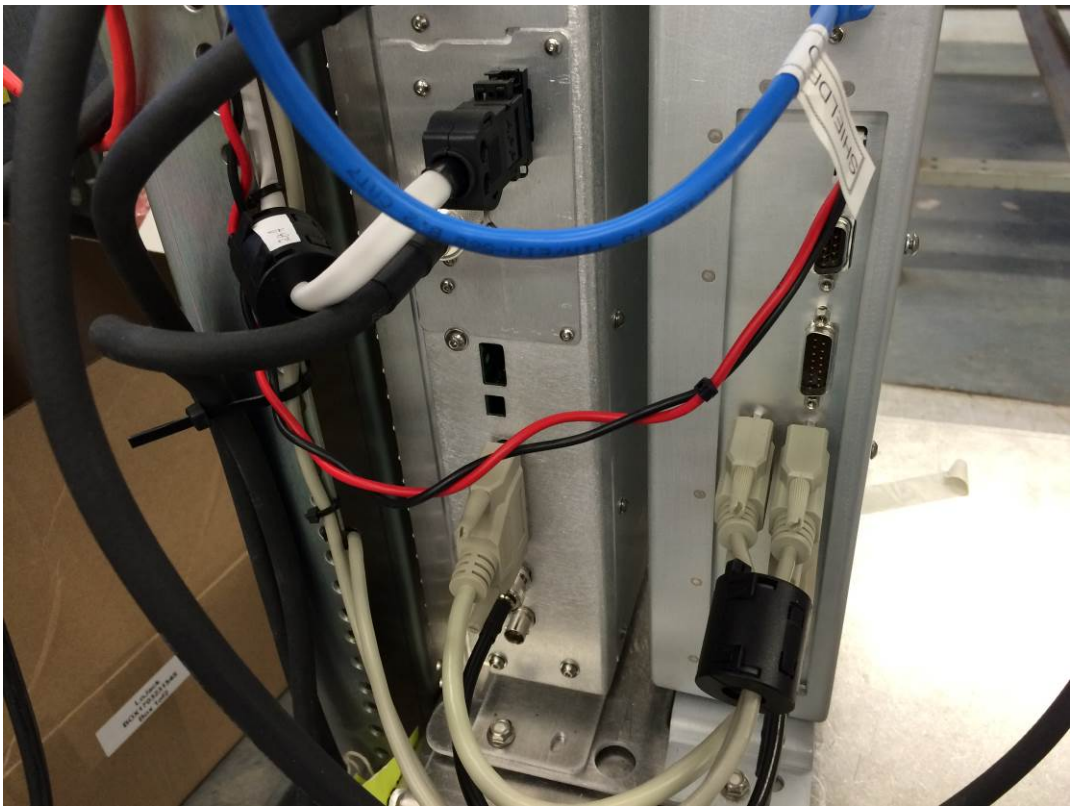


1-2 GHz

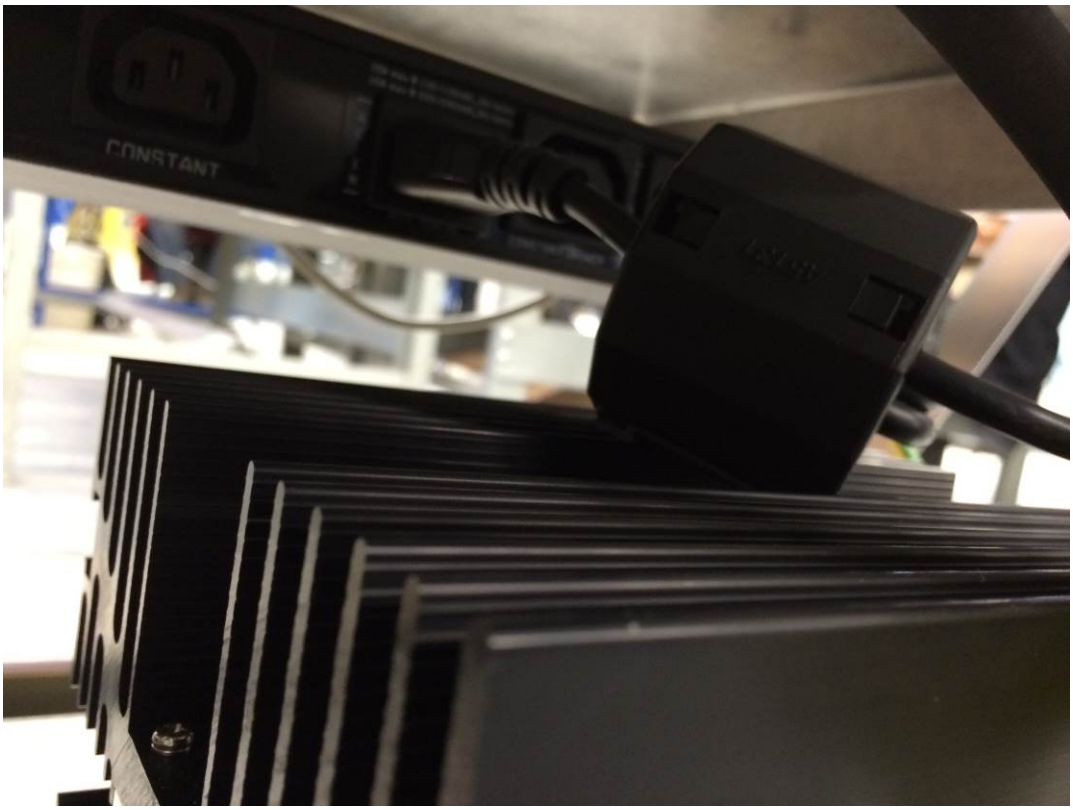


Modifications – Ferrites (Part # documented by the client) on cables as shown in photos prior to testing





Modifications – Ferrites (Part # documented by the client) on cables as shown in photos prior to testing



15.5 Plots/Data:

Narrow Band, Receive Mode, with modifications as shown in photos, 30-1000 MHz

Test Information:

Date and Time	3/28/2017
Client and Project Number	LoJack - Qu-00755931
Engineer	Kouma Sinn
Temperature	19C
Humidity	31%
Atmospheric Pressure	1006mbar
Comments	Remote Tower Unit, NB, Rx, 120VAC 60Hz

Graph: not available

Results:

Quasi-Peak

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
85.68	34.96	39.08	-4.12	266.00	2.00	Vertical	0.10	-24.82
130.74	36.87	43.52	-6.65	278.00	1.00	Vertical	0.10	-17.63
139.62	40.92	43.52	-2.6	120.00	3.98	Horizontal	0.10	-18.46
173.52	40.72	43.52	-2.8	210.00	3.93	Horizontal	0.10	-20.00
199.98	38.57	43.52	-4.95	176.00	3.50	Horizontal	0.10	-18.73
212.76	35.81	43.52	-7.71	209.00	3.95	Horizontal	0.10	-20.60
256.14	28.55	46.33	-17.78	0.00	2.50	Horizontal	0.10	-19.39
619.32	35.98	46.33	-10.35	334.00	1.75	Horizontal	0.10	-10.58
796.26	37.36	46.33	-8.97	225.00	3.77	Horizontal	0.10	-7.23

Peak

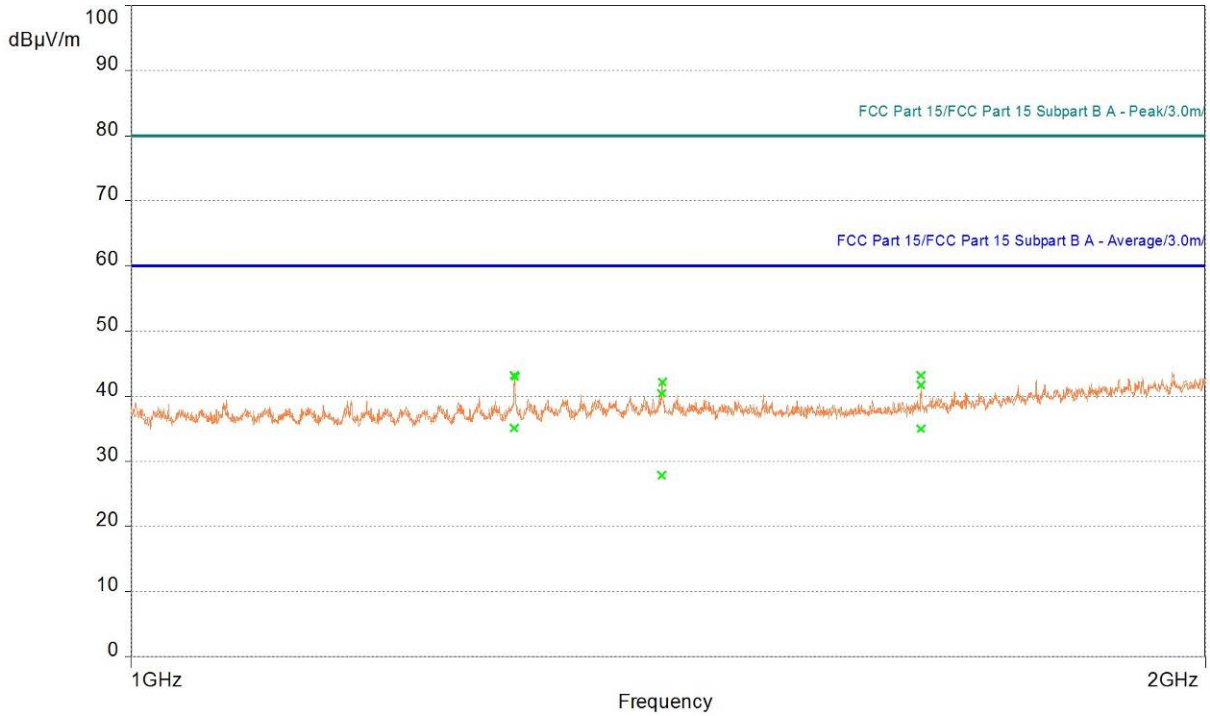
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
85.68	40.61	No limit	No limit	266.00	2.00	Vertical	0.10	-24.82
130.74	42.11	No limit	No limit	278.00	1.00	Vertical	0.10	-17.63
139.62	45.15	No limit	No limit	120.00	3.98	Horizontal	0.10	-18.46
173.52	46.43	No limit	No limit	210.00	3.93	Horizontal	0.10	-20.00
199.98	44.69	No limit	No limit	176.00	3.50	Horizontal	0.10	-18.73
212.76	39.62	No limit	No limit	209.00	3.95	Horizontal	0.10	-20.60
619.32	37.46	No limit	No limit	334.00	1.75	Horizontal	0.10	-10.58
796.26	38.74	No limit	No limit	225.00	3.77	Horizontal	0.10	-7.23
256.14	31.87	No limit	No limit	0.00	2.50	Horizontal	0.10	-19.39

Narrow Band, Receive Mode, with modifications as shown in photos, 1-2 GHz

Test Information:

Date and Time	4/9/17
Client and Project Number	LoJack_Rx, NB
Engineer	Kouma Sinn
Temperature	21C
Humidity	23%
Atmospheric Pressure	1006mbar
Comments	Rx, NB

Graph:



Results:

Avg

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1280.5	35.12	60.00	-24.88	240.00	1.25	Horizontal	0.10	-1.05
1408.5	27.87	60.00	-32.13	184.00	1.74	Horizontal	0.10	-0.70
1665	35.01	60.00	-24.99	83.00	2.76	Horizontal	0.10	-0.20

Peak

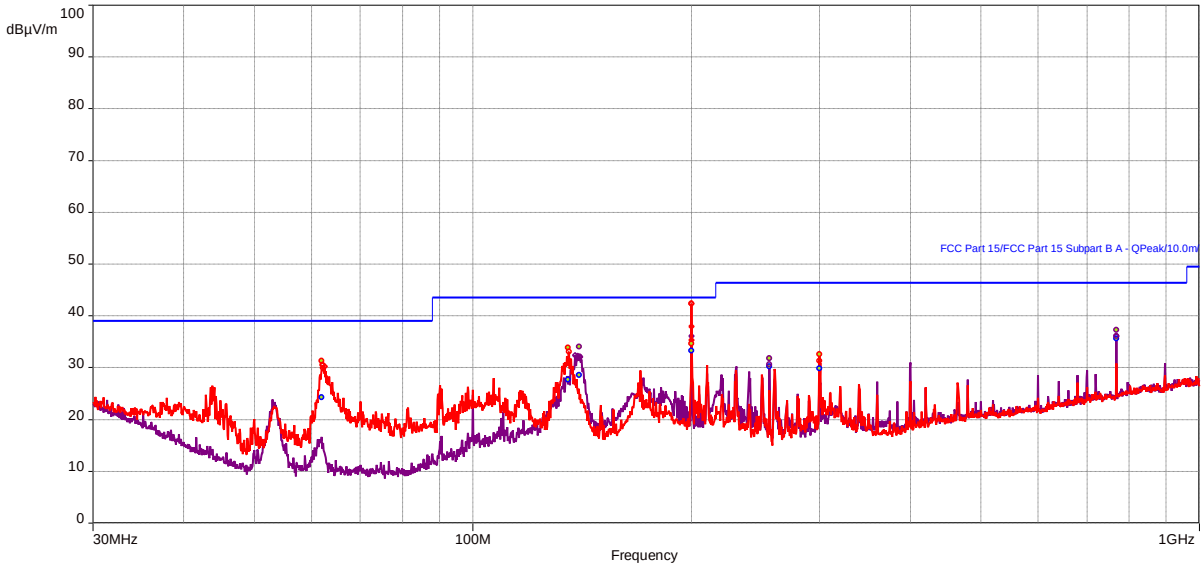
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1280.5	43.14	80.00	-36.86	240.00	1.25	Horizontal	0.10	-1.05
1408.5	40.38	80.00	-39.62	184.00	1.74	Horizontal	0.10	-0.70
1665	43.19	80.00	-36.81	83.00	2.76	Horizontal	0.10	-0.20

Wide Band, Receive Mode, with modifications as shown in photos, 30-1000 MHz

Test Information:

Date and Time	03/29/2017
Client and Project Number	LoJack_Qu-00755931_03-29-2017
Engineer	Vathana Ven
Temperature	21 deg C
Humidity	30%
Atmospheric Pressure	1008 mB
Comments	120VAC 60Hz WB Rx mode

Graph:



Results:

Quasi-Peak

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
61.92	24.23	39.00	-14.77	355.00	1.36	Vertical	0.10	-24.92
135.3	27.65	43.50	-15.85	8.00	1.34	Vertical	0.10	-18.06
199.98	33.25	43.50	-10.25	266.00	1.36	Vertical	0.10	-18.73
300	29.84	46.40	-16.56	0.00	1.36	Vertical	0.10	-17.42
139.98	28.57	43.50	-14.93	199.00	3.97	Horizontal	0.10	-18.49
256.14	30.26	46.40	-16.14	86.00	3.35	Horizontal	0.10	-19.39
768.42	35.57	46.40	-10.83	209.00	1.50	Horizontal	0.10	-7.85

Peak

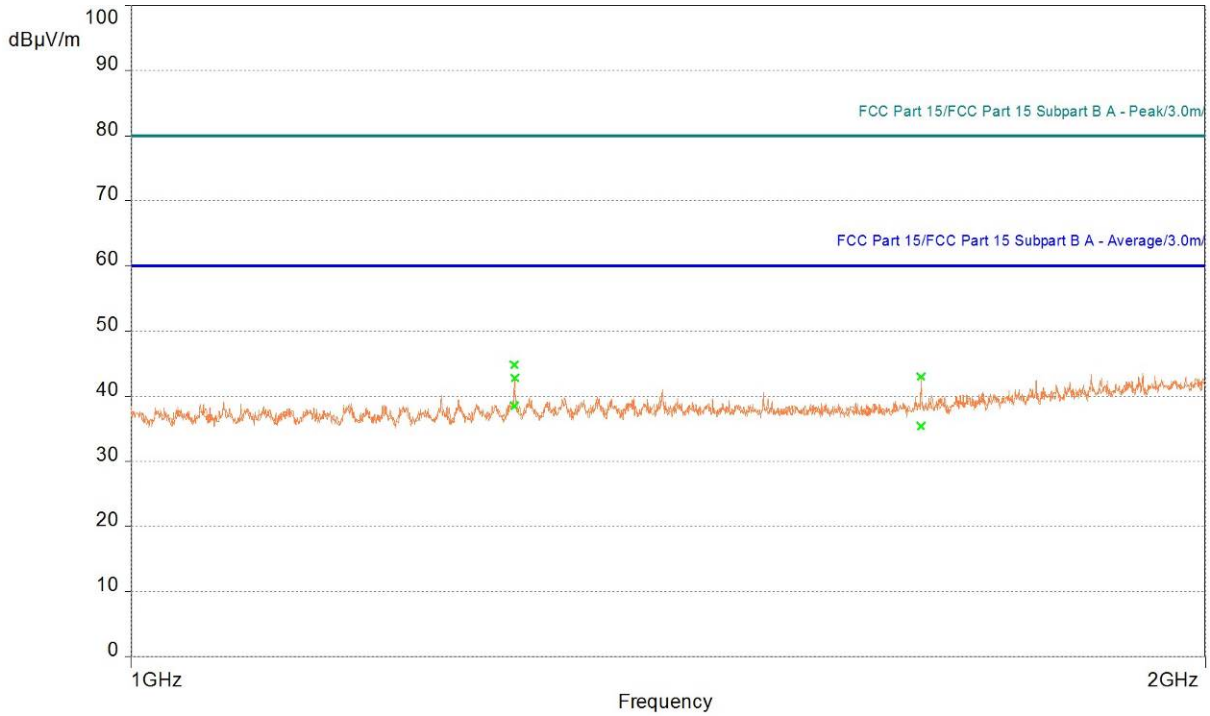
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
61.92	31.27	39.00	-7.73	355.00	1.36	Vertical	0.10	-24.92
135.3	33.90	43.50	-9.60	8.00	1.34	Vertical	0.10	-18.06
199.98	34.65	43.50	-8.85	266.00	1.36	Vertical	0.10	-18.73
300	32.63	46.40	-13.77	0.00	1.36	Vertical	0.10	-17.42
139.98	34.01	43.50	-9.49	199.00	3.97	Horizontal	0.10	-18.49
256.14	31.81	46.40	-14.59	86.00	3.35	Horizontal	0.10	-19.39
768.42	37.25	46.40	-9.15	209.00	1.50	Horizontal	0.10	-7.85

Wide Band, Receive Mode, with modifications as shown in photos, 1-2 GHz

Test Information:

Date and Time	4/9/17
Client and Project Number	LoJack_Rx, NB
Engineer	Kouma Sinn
Temperature	21C
Humidity	23%
Atmospheric Pressure	1006mbar
Comments	Wide Band, Receive Mode

Graph:



Results:

Avg

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1280.5	38.47	60.00	-21.53	320.00	2.87	Horizontal	0.10	-1.05
1665	35.38	60.00	-24.62	148.00	3.86	Horizontal	0.10	-0.20

Peak

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1280.5	44.75	80.00	-35.25	320.00	2.87	Horizontal	0.10	-1.05
1665	42.93	80.00	-37.07	148.00	3.86	Horizontal	0.10	-0.20

Test Personnel:	Kouma Sinn KPS	Test Date:	03/28/2017, 04/09/2017
	Vathana Ven VSV		03/29/2017
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 90	Limit Applied:	Per standard
Input Voltage:	120VAC 60Hz	Ambient Temperature:	19, 21, 21 ºC
Pretest Verification w/ Ambient Signals or BB Source:	**BB Source**	Relative Humidity:	31, 30, 23 %
		Atmospheric Pressure:	1006, 1008, 1006 mbars

Deviations, Additions, or Exclusions: None

16 AC Mains Conducted Emissions

16.1 Method

Tests are performed in accordance with FCC Part 15B, 15.107.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
AC Line Conducted Emissions	150 kHz - 30 MHz	2.8dB	3.4dB
Telco Port Emissions	150 kHz - 30 MHz	3.2dB	5.0dB

As shown in the table above our conducted emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculations

The following is how net line-conducted readings were determined:

NF = RF + LF + CF + AF
Where NF = Net Reading in dBμV
RF = Reading from receiver in dBμV
LF = LISN or ISN Correction Factor in dB
CF = Cable Correction Factor in dB
AF = Attenuator Loss Factor in dB

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:

NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 dBμV
$UF = 10^{(49.1\ dB\mu V / 20)}$ = 285.1 μV/m

Alternately, when C5 Software is used, the “Level” includes all losses and gains and is compared directly in the “Margin” column to the “Limit”. “TF” is the Transducer Factor; in this case LISN or ISN loss.

16.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV002'	Weather Station	Davis Instruments	7400	PE80519A93	06/01/2016	06/01/2017
LISN34'	LISN - CISPR16 Compliant 9kHz-30MHz	Com-Power	LI-215A	191956	06/27/2016	06/27/2017
ROS002'	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	07/29/2016	07/29/2017
CBLBNC7'	30 ft 50 ohm coax, BNC - BNC	ITT Pomona	RG 58 C/U	CBLBNC7	01/10/2017	01/10/2018
DS22'	Attenuator, 20dB	Mini Circuits	20dB, 50 ohm	DS22	09/08/2016	09/08/2017

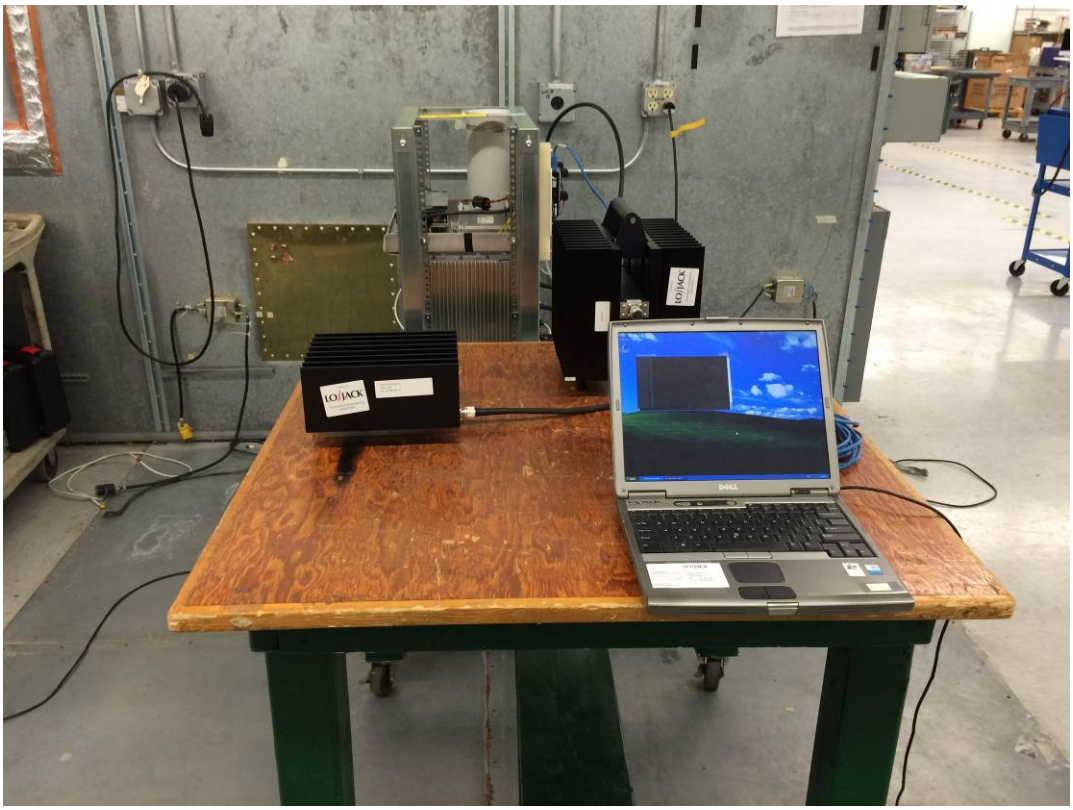
Software Utilized:

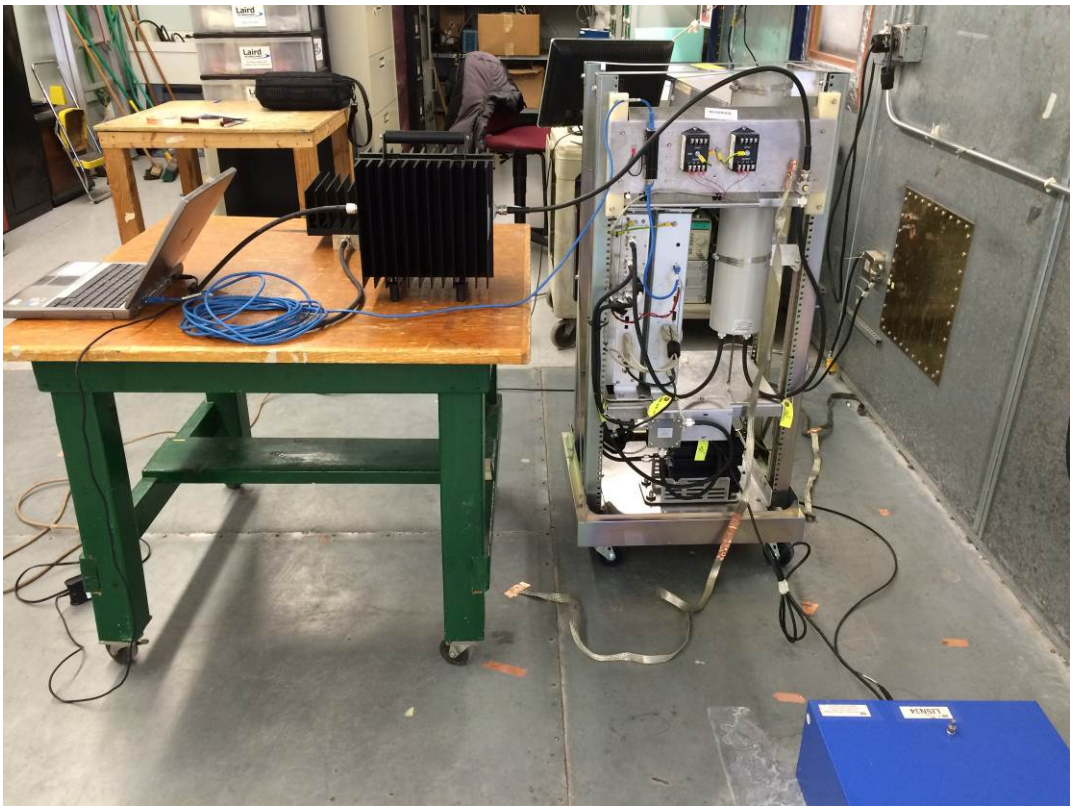
Name	Manufacturer	Version
Compliance 5	Teseq	5.26.46.46

16.3 Results:

The sample tested was found to Comply.

16.4 Setup Photographs:





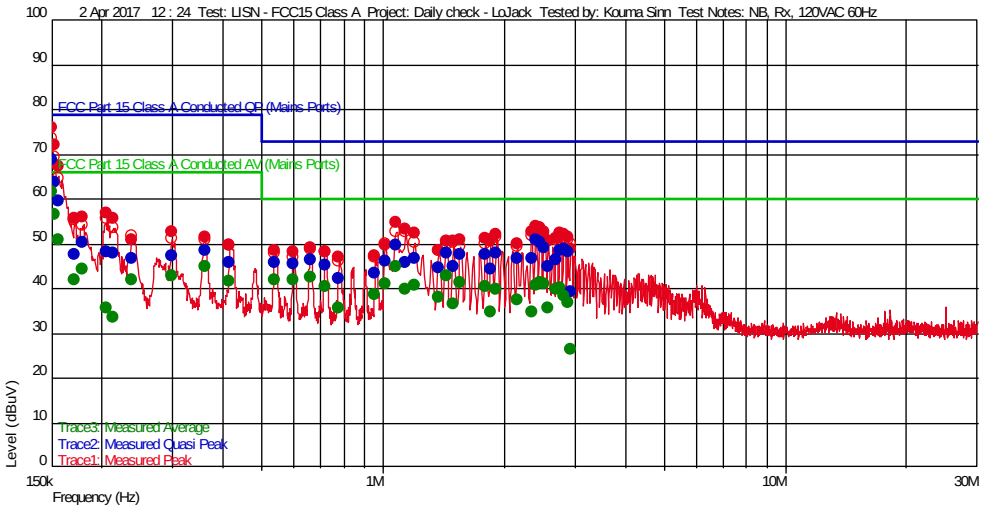
16.5 Plots/Data:

Narrow Band, Receive Mode

Test Information

Test Details	User Entry	Additional Information
Test:	LISN - FCC15 Class A	
Project:	Daily check - LoJack	
Test Notes:	NB, Rx, 120VAC 60Hz	
Temperature:	22C	
Humidity:	22%, 1008mbar	
Tested by:	Kouma Sinn	
Test Started:	2 Apr 2017 12 : 24	

Prescan Emission Graph



- Measured Peak Value
- Measured Quasi Peak Value
- Measured Average Value
- Maximum Value of Mast and Turntable

- Swept Peak Data
- Swept Quasi Peak Data
- Swept Average Data

Emissions Test Data

Trace2: Measured Quasi Peak

Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
2.926 M	39.20	0.020	20.576	73.000	-33.80	9 k		L1
416.9 k	45.87	0.026	20.578	79.000	-33.13	9 k		N
237.55 k	46.71	0.036	20.589	79.000	-32.29	9 k		L1
298.75 k	47.18	0.030	20.586	79.000	-31.82	9 k		N
171.25 k	47.46	0.063	20.593	79.000	-31.54	9 k		N
213.75 k	47.96	0.039	20.591	79.000	-31.04	9 k		N
776.45 k	42.24	0.020	20.557	73.000	-30.76	9 k		L1
206.1 k	48.27	0.039	20.591	79.000	-30.73	9 k		L1
362.5 k	48.60	0.028	20.582	79.000	-30.40	9 k		N
958.35 k	43.48	0.020	20.545	73.000	-29.52	9 k		L1
178.9 k	50.35	0.057	20.593	79.000	-28.65	9 k		L1
1.855 M	44.42	0.020	20.558	73.000	-28.58	9 k		L1
1.378 M	44.77	0.020	20.550	73.000	-28.23	9 k		N
2.575 M	44.78	0.020	20.570	73.000	-28.22	9 k		L1
1.495 M	44.99	0.020	20.552	73.000	-28.01	9 k		L1
717.8 k	45.20	0.020	20.560	73.000	-27.80	9 k		N
600.5 k	45.49	0.020	20.567	73.000	-27.51	9 k		L1
539.3 k	45.68	0.022	20.571	73.000	-27.32	9 k		L1
1.135 M	45.91	0.020	20.545	73.000	-27.09	9 k		L1
1.018 M	46.13	0.020	20.543	73.000	-26.87	9 k		L1
2.701 M	46.50	0.020	20.572	73.000	-26.50	9 k		L1
662.55 k	46.53	0.020	20.564	73.000	-26.47	9 k		L1
2.161 M	46.64	0.020	20.563	73.000	-26.36	9 k		N
1.198 M	46.75	0.020	20.546	73.000	-26.25	9 k		N
2.35 M	46.85	0.020	20.566	73.000	-26.15	9 k		N
1.558 M	47.57	0.020	20.553	73.000	-25.43	9 k		N
1.801 M	47.73	0.020	20.557	73.000	-25.27	9 k		N
1.918 M	47.87	0.020	20.559	73.000	-25.13	9 k		L1
1.441 M	47.99	0.020	20.551	73.000	-25.01	9 k		L1
2.881 M	48.07	0.020	20.575	73.000	-24.93	9 k		L1
2.764 M	48.36	0.020	20.573	73.000	-24.64	9 k		N
2.827 M	48.81	0.020	20.575	73.000	-24.19	9 k		N
2.521 M	49.19	0.020	20.569	73.000	-23.81	9 k		N
1.081 M	49.68	0.020	20.544	73.000	-23.32	9 k		N
2.467 M	50.16	0.020	20.568	73.000	-22.84	9 k		L1
2.404 M	50.82	0.020	20.567	73.000	-22.18	9 k		N
156.8 k	59.41	0.075	20.594	79.000	-19.59	9 k		N
152.55 k	63.86	0.078	20.594	79.000	-15.14	9 k		L1
150.0 k	68.91	0.080	20.594	79.000	-10.09	9 k		L1

Trace3: Measured Average

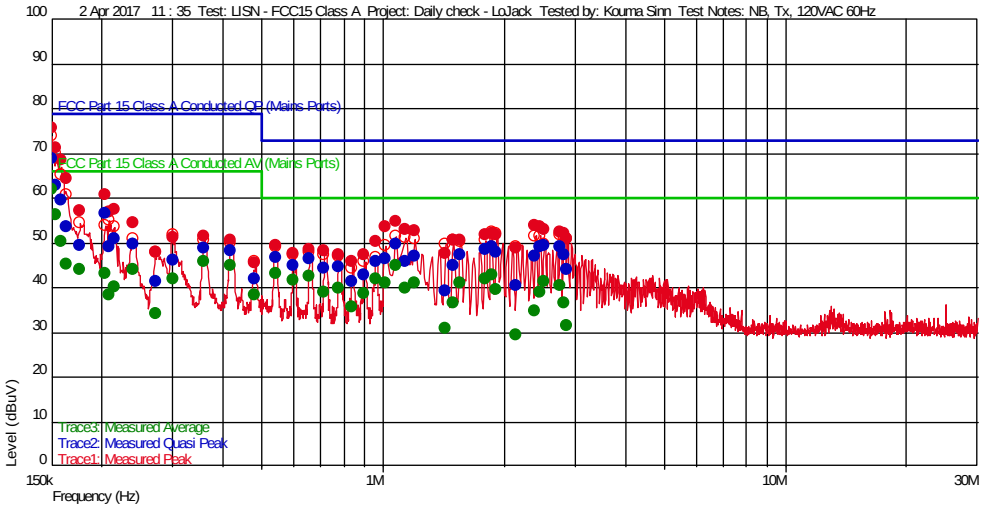
Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
2.926 M	26.42	0.020	20.576	60.000	-33.58	9 k		L1
213.75 k	33.48	0.039	20.591	66.000	-32.52	9 k		N
206.1 k	35.79	0.039	20.591	66.000	-30.21	9 k		L1
1.855 M	34.65	0.020	20.558	60.000	-25.35	9 k		L1
2.35 M	34.68	0.020	20.566	60.000	-25.32	9 k		N
416.9 k	41.64	0.026	20.578	66.000	-24.36	9 k		N
2.575 M	35.72	0.020	20.570	60.000	-24.28	9 k		L1
776.45 k	35.79	0.020	20.557	60.000	-24.21	9 k		L1
237.55 k	41.87	0.036	20.589	66.000	-24.13	9 k		L1
171.25 k	42.06	0.063	20.593	66.000	-23.94	9 k		N
1.495 M	36.52	0.020	20.552	60.000	-23.48	9 k		L1
298.75 k	42.84	0.030	20.586	66.000	-23.16	9 k		N
2.881 M	36.87	0.020	20.575	60.000	-23.13	9 k		L1
2.161 M	37.42	0.020	20.563	60.000	-22.58	9 k		N
1.378 M	38.14	0.020	20.550	60.000	-21.86	9 k		N
178.9 k	44.28	0.057	20.593	66.000	-21.72	9 k		L1
2.827 M	38.38	0.020	20.575	60.000	-21.62	9 k		N
958.35 k	38.58	0.020	20.545	60.000	-21.42	9 k		L1
362.5 k	45.01	0.028	20.582	66.000	-20.99	9 k		N
2.701 M	39.80	0.020	20.572	60.000	-20.20	9 k		L1
1.135 M	39.86	0.020	20.545	60.000	-20.14	9 k		L1
1.918 M	39.90	0.020	20.559	60.000	-20.10	9 k		L1
2.764 M	40.16	0.020	20.573	60.000	-19.84	9 k		N
717.8 k	40.34	0.020	20.560	60.000	-19.66	9 k		N
1.801 M	40.56	0.020	20.557	60.000	-19.44	9 k		N
1.198 M	40.71	0.020	20.546	60.000	-19.29	9 k		N
2.404 M	40.82	0.020	20.567	60.000	-19.18	9 k		N
1.018 M	41.10	0.020	20.543	60.000	-18.90	9 k		L1
2.521 M	41.15	0.020	20.569	60.000	-18.85	9 k		N
1.558 M	41.22	0.020	20.553	60.000	-18.78	9 k		N
2.467 M	41.22	0.020	20.568	60.000	-18.78	9 k		L1
600.5 k	41.98	0.020	20.567	60.000	-18.02	9 k		L1
539.3 k	42.05	0.022	20.571	60.000	-17.95	9 k		L1
662.55 k	42.67	0.020	20.564	60.000	-17.33	9 k		L1
1.441 M	42.98	0.020	20.551	60.000	-17.02	9 k		L1
156.8 k	50.88	0.075	20.594	66.000	-15.12	9 k		N
1.081 M	44.90	0.020	20.544	60.000	-15.10	9 k		N
152.55 k	56.68	0.078	20.594	66.000	-9.32	9 k		L1
150.0 k	61.70	0.080	20.594	66.000	-4.30	9 k		L1

Narrow Band, Transmit Mode

Test Information

Test Details	User Entry	Additional Information
Test:	LISN - FCC15 Class A	
Project:	Daily check - LoJack	
Test Notes:	NB, Tx, 120VAC 60Hz	
Temperature:	22C	
Humidity:	22%, 1008mbar	
Tested by:	Kouma Sinn	
Test Started:	2 Apr 2017 11 : 35	

Prescan Emission Graph



- Measured Peak Value
- Measured Quasi Peak Value
- Measured Average Value
- Maximum Value of Mast and Turntable

- Swept Peak Data
- Swept Quasi Peak Data
- Swept Average Data

Emissions Test Data

Trace2: Measured Quasi Peak

Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
273.25 k	41.46	0.033	20.587	79.000	-37.54	9 k		N
479.8 k	41.94	0.024	20.574	79.000	-37.06	9 k		L1
1.432 M	39.14	0.020	20.550	73.000	-33.86	9 k		L1
302.15 k	46.15	0.030	20.585	79.000	-32.85	9 k		L1
2.152 M	40.32	0.020	20.563	73.000	-32.68	9 k		L1
838.5 k	41.38	0.020	20.553	73.000	-31.62	9 k		L1
419.45 k	48.29	0.026	20.578	79.000	-30.71	9 k		L1
359.1 k	48.95	0.028	20.582	79.000	-30.05	9 k		N
901.4 k	42.96	0.020	20.549	73.000	-30.04	9 k		N
208.65 k	49.09	0.039	20.591	79.000	-29.91	9 k		N
177.2 k	49.34	0.058	20.593	79.000	-29.66	9 k		L1
239.25 k	49.65	0.036	20.589	79.000	-29.35	9 k		L1
2.872 M	44.15	0.020	20.575	73.000	-28.85	9 k		L1
716.95 k	44.45	0.020	20.560	73.000	-28.55	9 k		L1
779.85 k	44.49	0.020	20.556	73.000	-28.51	9 k		L1
215.45 k	51.01	0.038	20.590	79.000	-27.99	9 k		L1
1.495 M	45.04	0.020	20.552	73.000	-27.96	9 k		N
599.65 k	45.07	0.020	20.567	73.000	-27.93	9 k		N
1.135 M	45.75	0.020	20.545	73.000	-27.25	9 k		N
960.9 k	45.95	0.020	20.545	73.000	-27.05	9 k		L1
659.15 k	46.32	0.020	20.564	73.000	-26.68	9 k		L1
1.018 M	46.45	0.020	20.543	73.000	-26.55	9 k		N
541.0 k	46.73	0.022	20.571	73.000	-26.27	9 k		L1
2.395 M	46.96	0.020	20.567	73.000	-26.04	9 k		N
1.198 M	47.10	0.020	20.546	73.000	-25.90	9 k		N
1.558 M	47.33	0.020	20.553	73.000	-25.67	9 k		L1
2.818 M	47.39	0.020	20.574	73.000	-25.61	9 k		N
163.6 k	53.47	0.069	20.593	79.000	-25.53	9 k		N
1.918 M	47.80	0.020	20.559	73.000	-25.20	9 k		L1
1.801 M	48.38	0.020	20.557	73.000	-24.62	9 k		L1
2.764 M	49.02	0.020	20.573	73.000	-23.98	9 k		N
2.458 M	49.08	0.020	20.568	73.000	-23.92	9 k		N
1.864 M	49.18	0.020	20.558	73.000	-23.82	9 k		N
2.521 M	49.28	0.020	20.569	73.000	-23.72	9 k		N
1.081 M	49.66	0.020	20.544	73.000	-23.34	9 k		N
204.4 k	56.60	0.040	20.591	79.000	-22.40	9 k		L1
159.35 k	59.56	0.073	20.594	79.000	-19.44	9 k		L1
154.25 k	62.92	0.077	20.594	79.000	-16.08	9 k		L1
150.0 k	68.76	0.080	20.594	79.000	-10.24	9 k		L1

Trace3: Measured Average

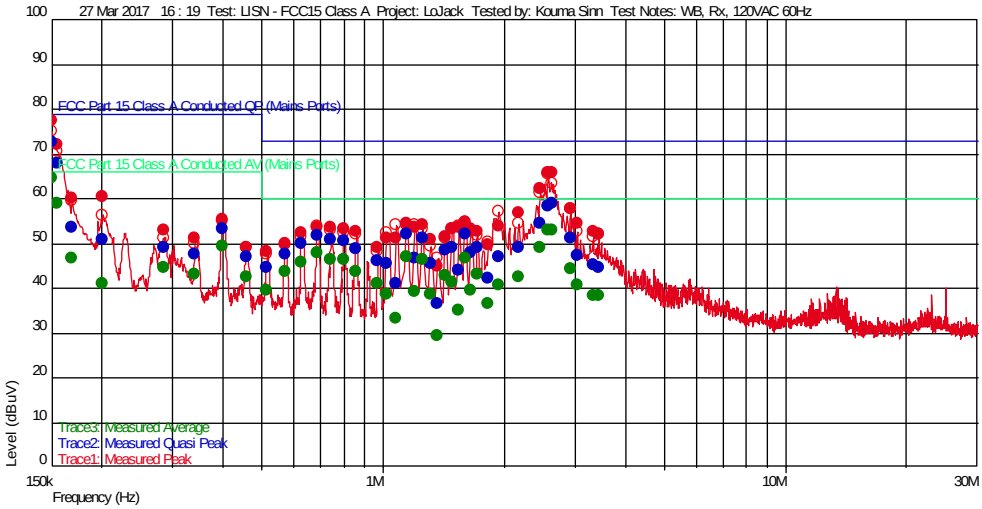
Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
273.25 k	34.07	0.033	20.587	66.000	-31.93	9 k		N
2.152 M	29.29	0.020	20.563	60.000	-30.71	9 k		L1
1.432 M	30.75	0.020	20.550	60.000	-29.25	9 k		L1
2.872 M	31.55	0.020	20.575	60.000	-28.45	9 k		L1
479.8 k	38.31	0.024	20.574	66.000	-27.69	9 k		L1
208.65 k	38.44	0.039	20.591	66.000	-27.56	9 k		N
215.45 k	40.20	0.038	20.590	66.000	-25.80	9 k		L1
2.395 M	34.75	0.020	20.567	60.000	-25.25	9 k		N
838.5 k	35.78	0.020	20.553	60.000	-24.22	9 k		L1
302.15 k	41.86	0.030	20.585	66.000	-24.14	9 k		L1
1.495 M	36.43	0.020	20.552	60.000	-23.57	9 k		N
2.818 M	36.53	0.020	20.574	60.000	-23.47	9 k		N
204.4 k	43.27	0.040	20.591	66.000	-22.73	9 k		L1
177.2 k	44.01	0.058	20.593	66.000	-21.99	9 k		L1
239.25 k	44.11	0.036	20.589	66.000	-21.89	9 k		L1
901.4 k	38.51	0.020	20.549	60.000	-21.49	9 k		N
419.45 k	44.95	0.026	20.578	66.000	-21.05	9 k		L1
716.95 k	39.06	0.020	20.560	60.000	-20.94	9 k		L1
2.458 M	39.08	0.020	20.568	60.000	-20.92	9 k		N
163.6 k	45.09	0.069	20.593	66.000	-20.91	9 k		N
1.918 M	39.50	0.020	20.559	60.000	-20.50	9 k		L1
359.1 k	45.70	0.028	20.582	66.000	-20.30	9 k		N
1.135 M	39.77	0.020	20.545	60.000	-20.23	9 k		N
779.85 k	39.80	0.020	20.556	60.000	-20.20	9 k		L1
2.764 M	40.39	0.020	20.573	60.000	-19.61	9 k		N
1.558 M	40.91	0.020	20.553	60.000	-19.09	9 k		L1
1.198 M	40.94	0.020	20.546	60.000	-19.06	9 k		N
1.018 M	41.07	0.020	20.543	60.000	-18.93	9 k		N
2.521 M	41.20	0.020	20.569	60.000	-18.80	9 k		N
599.65 k	41.51	0.020	20.567	60.000	-18.49	9 k		N
1.801 M	41.81	0.020	20.557	60.000	-18.19	9 k		L1
960.9 k	41.92	0.020	20.545	60.000	-18.08	9 k		L1
659.15 k	42.62	0.020	20.564	60.000	-17.38	9 k		L1
1.864 M	42.80	0.020	20.558	60.000	-17.20	9 k		N
541.0 k	43.14	0.022	20.571	60.000	-16.86	9 k		L1
159.35 k	50.33	0.073	20.594	66.000	-15.67	9 k		L1
1.081 M	44.85	0.020	20.544	60.000	-15.15	9 k		N
154.25 k	56.13	0.077	20.594	66.000	-9.87	9 k		L1
150.0 k	61.80	0.080	20.594	66.000	-4.20	9 k		L1

Wide Band, Receive Mode, 120VAC 60Hz

Test Information

Test Details	User Entry	Additional Information
Test:	LISN - FCC15 Class A	
Project:	LoJack	
Test Notes:	WB, Rx, 120VAC 60Hz	
Temperature:	22C	
Humidity:	27%, 1007mbar	
Tested by:	Kouma Sinn	
Test Started:	27 Mar 2017 16 : 19	

Prescan Emission Graph



- Measured Peak Value
- Measured Quasi Peak Value
- Measured Average Value
- Maximum Value of Mast and Turntable

- Swept Peak Data
- Swept Quasi Peak Data
- Swept Average Data

Emissions Test Data

Trace2: Measured Quasi Peak

Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
1.369 M	36.48	0.020	20.549	73	-36.52	9 k		L1
1.081 M	41.01	0.020	20.544	73	-31.99	9 k		L1
1.828 M	42.35	0.020	20.557	73	-30.65	9 k		N
201.0 k	50.98	0.040	20.591	79	-28.02	9 k		L1
1.54 M	44.14	0.020	20.552	73	-28.86	9 k		N
285.15 k	49.11	0.031	20.586	79	-29.89	9 k		N
342.1 k	47.66	0.029	20.583	79	-31.34	9 k		N
514.65 k	44.66	0.023	20.572	73	-28.34	9 k		N
168.7 k	53.69	0.065	20.593	79	-25.31	9 k		L1
3.439 M	44.77	0.020	20.585	73	-28.23	9 k		L1
3.331 M	45.10	0.020	20.583	73	-27.9	9 k		L1
1.027 M	45.59	0.020	20.543	73	-27.41	9 k		N
1.315 M	45.64	0.020	20.548	73	-27.36	9 k		N
973.65 k	46.20	0.020	20.545	73	-26.8	9 k		N
459.4 k	46.92	0.025	20.576	79	-32.08	9 k		L1
1.198 M	46.63	0.020	20.546	73	-26.37	9 k		L1
1.936 M	47.13	0.020	20.559	73	-25.87	9 k		L1
3.043 M	47.43	0.020	20.578	73	-25.57	9 k		N
574.15 k	47.69	0.021	20.569	73	-25.31	9 k		L1
1.657 M	47.81	0.020	20.554	73	-25.19	9 k		N
1.432 M	48.51	0.020	20.550	73	-24.49	9 k		N
859.75 k	48.94	0.020	20.551	73	-24.06	9 k		L1
1.72 M	48.98	0.020	20.555	73	-24.02	9 k		N
1.486 M	49.03	0.020	20.551	73	-23.97	9 k		N
2.179 M	49.20	0.020	20.563	73	-23.8	9 k		L1
629.4 k	49.86	0.020	20.565	73	-23.14	9 k		N
801.95 k	50.71	0.020	20.555	73	-22.29	9 k		L1
743.3 k	50.88	0.020	20.559	73	-22.12	9 k		L1
1.261 M	51.21	0.020	20.548	73	-21.79	9 k		L1
2.926 M	51.26	0.020	20.576	73	-21.74	9 k		L1
399.9 k	53.17	0.027	20.579	79	-25.83	9 k		L1
686.35 k	51.78	0.020	20.562	73	-21.22	9 k		N
1.144 M	52.04	0.020	20.545	73	-20.96	9 k		L1
1.603 M	52.14	0.020	20.553	73	-20.86	9 k		N
2.458 M	54.49	0.020	20.568	73	-18.51	9 k		L1
155.1 k	68.00	0.076	20.594	79	-11.00	9 k		N
2.575 M	58.45	0.020	20.570	73	-14.55	9 k		L1
2.638 M	58.97	0.020	20.571	73	-14.03	9 k		L1
150.0 k	72.57	0.080	20.594	79	-6.43	9 k		N

Trace3: Measured Average

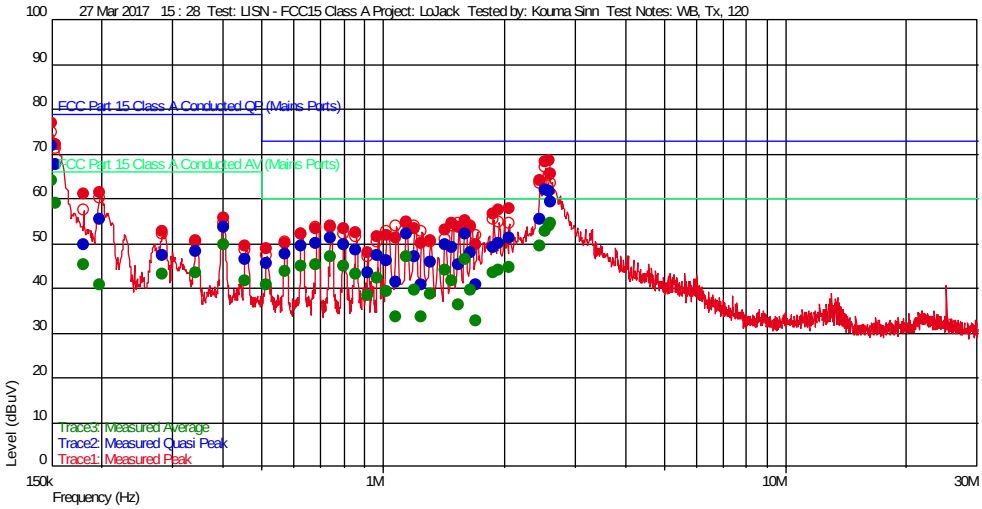
Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
1.369 M	29.39	0.020	20.549	60	-30.61	9 k		L1
1.081 M	33.31	0.020	20.544	60	-26.69	9 k		L1
201.0 k	41.10	0.040	20.591	66	-24.9	9 k		L1
1.54 M	35.22	0.020	20.552	60	-24.78	9 k		N
1.828 M	36.54	0.020	20.557	60	-23.46	9 k		N
168.7 k	46.70	0.065	20.593	66	-19.3	9 k		L1
3.331 M	38.24	0.020	20.583	60	-21.76	9 k		L1
3.439 M	38.39	0.020	20.585	60	-21.61	9 k		L1
1.027 M	38.59	0.020	20.543	60	-21.41	9 k		N
1.315 M	38.66	0.020	20.548	60	-21.34	9 k		N
1.198 M	39.28	0.020	20.546	60	-20.72	9 k		L1
1.657 M	39.60	0.020	20.554	60	-20.4	9 k		N
514.65 k	39.60	0.023	20.572	66	-26.4	9 k		N
285.15 k	44.64	0.031	20.586	66	-21.36	9 k		N
342.1 k	43.19	0.029	20.583	66	-22.81	9 k		N
1.936 M	40.64	0.020	20.559	60	-19.36	9 k		L1
3.043 M	40.70	0.020	20.578	60	-19.3	9 k		N
973.65 k	40.98	0.020	20.545	66	-25.02	9 k		N
1.486 M	41.44	0.020	20.551	60	-18.56	9 k		N
459.4 k	42.44	0.025	20.576	66	-23.56	9 k		L1
2.179 M	42.49	0.020	20.563	60	-17.51	9 k		L1
1.432 M	42.70	0.020	20.550	60	-17.3	9 k		N
1.72 M	43.16	0.020	20.555	60	-16.84	9 k		N
574.15 k	43.61	0.021	20.569	66	-22.39	9 k		L1
859.75 k	43.79	0.020	20.551	66	-22.21	9 k		L1
2.926 M	44.42	0.020	20.576	60	-15.58	9 k		L1
629.4 k	45.79	0.020	20.565	66	-20.21	9 k		N
801.95 k	46.34	0.020	20.555	66	-19.66	9 k		L1
1.261 M	46.37	0.020	20.548	60	-13.63	9 k		L1
743.3 k	46.38	0.020	20.559	66	-19.62	9 k		L1
1.603 M	46.69	0.020	20.553	60	-13.31	9 k		N
1.144 M	47.01	0.020	20.545	60	-12.99	9 k		L1
399.9 k	49.32	0.027	20.579	66	-16.68	9 k		L1
686.35 k	47.77	0.020	20.562	66	-18.23	9 k		N
2.458 M	49.04	0.020	20.568	60	-10.96	9 k		L1
155.1 k	58.97	0.076	20.594	66	-7.03	9 k		N
2.575 M	52.99	0.020	20.570	60	-7.01	9 k		L1
2.638 M	53.02	0.020	20.571	60	-6.98	9 k		L1
150.0 k	64.76	0.080	20.594	66	-1.24	9 k		N

Wide Band, Transmit, 120VAC 60Hz

Test Information

Test Details	User Entry	Additional Information
Test:	LISN - FCC15 Class A	
Project:	LoJack	
Test Notes:	WB, Tx, 120VAC 60Hz	
Temperature:	22C	
Humidity:	27%, 1007mbar	
Tested by:	Kouma Sinn	
Test Started:	27 Mar 2017 15 : 28	

Prescan Emission Graph



- Measured Peak Value
- Measured Quasi Peak Value
- Measured Average Value
- Maximum Value of Mast and Turntable

- Swept Peak Data
- Swept Quasi Peak Data
- Swept Average Data

Emissions Test Data

Trace2: Measured Quasi Peak

Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
1.252 M	40.66	0.020	20.547	73	-32.34	9 k		N
1.711 M	40.70	0.020	20.555	73	-32.3	9 k		L1
180.6 k	49.66	0.056	20.592	79	-29.34	9 k		L1
1.081 M	41.34	0.020	20.544	73	-31.66	9 k		L1
284.3 k	47.25	0.032	20.586	79	-31.75	9 k		L1
916.7 k	43.33	0.020	20.548	79	-35.67	9 k		L1
342.95 k	48.17	0.029	20.583	79	-30.83	9 k		L1
1.54 M	45.23	0.020	20.552	73	-27.77	9 k		L1
456.85 k	46.31	0.025	20.576	79	-32.69	9 k		N
515.5 k	45.63	0.023	20.572	79	-33.37	9 k		N
1.315 M	45.80	0.020	20.548	73	-27.2	9 k		N
1.027 M	46.04	0.020	20.543	73	-26.96	9 k		L1
1.198 M	47.03	0.020	20.546	73	-25.97	9 k		L1
973.65 k	47.44	0.020	20.545	79	-31.56	9 k		N
197.6 k	55.29	0.042	20.591	79	-23.71	9 k		N
572.45 k	47.68	0.021	20.569	79	-31.32	9 k		L1
1.657 M	47.78	0.020	20.554	73	-25.22	9 k		N
858.9 k	48.54	0.020	20.551	79	-30.46	9 k		L1
1.882 M	49.19	0.020	20.558	73	-23.81	9 k		L1
1.486 M	49.22	0.020	20.551	73	-23.78	9 k		L1
628.55 k	49.35	0.020	20.566	79	-29.65	9 k		L1
1.432 M	49.62	0.020	20.550	73	-23.38	9 k		N
800.25 k	49.77	0.020	20.555	79	-29.23	9 k		N
1.936 M	50.14	0.020	20.559	73	-22.86	9 k		L1
684.65 k	50.14	0.020	20.562	79	-28.86	9 k		L1
2.062 M	51.10	0.020	20.561	73	-21.9	9 k		L1
743.3 k	51.29	0.020	20.559	79	-27.71	9 k		N
402.45 k	53.60	0.027	20.579	79	-25.4	9 k		N
1.603 M	52.07	0.020	20.553	73	-20.93	9 k		L1
1.144 M	52.12	0.020	20.545	73	-20.88	9 k		L1
2.458 M	55.26	0.020	20.568	73	-17.74	9 k		L1
154.25 k	67.57	0.077	20.594	79	-11.43	9 k		N
2.611 M	59.37	0.020	20.571	73	-13.63	9 k		L1
2.593 M	61.58	0.020	20.570	73	-11.42	9 k		L1
150.0 k	71.78	0.080	20.594	79	-7.22	9 k		N
2.539 M	62.06	0.020	20.570	73	-10.94	9 k		L1

Trace3: Measured Average

Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
1.711 M	32.74	0.020	20.555	60	-27.26	9 k		L1
197.6 k	40.84	0.042	20.591	66	-25.16	9 k		N
1.081 M	33.49	0.020	20.544	60	-26.51	9 k		L1
1.252 M	33.55	0.020	20.547	60	-26.45	9 k		N
1.54 M	36.28	0.020	20.552	60	-23.72	9 k		L1
180.6 k	45.12	0.056	20.592	66	-20.88	9 k		L1
916.7 k	38.32	0.020	20.548	66	-27.68	9 k		L1
284.3 k	43.11	0.032	20.586	66	-22.89	9 k		L1
1.315 M	38.78	0.020	20.548	60	-21.22	9 k		N
1.027 M	39.15	0.020	20.543	60	-20.85	9 k		L1
1.198 M	39.55	0.020	20.546	60	-20.45	9 k		L1
1.657 M	39.58	0.020	20.554	60	-20.42	9 k		N
342.95 k	43.53	0.029	20.583	66	-22.47	9 k		L1
456.85 k	41.59	0.025	20.576	66	-24.41	9 k		N
515.5 k	40.86	0.023	20.572	66	-25.14	9 k		N
1.486 M	41.75	0.020	20.551	60	-18.25	9 k		L1
973.65 k	42.38	0.020	20.545	66	-23.62	9 k		N
858.9 k	43.14	0.020	20.551	66	-22.86	9 k		L1
1.882 M	43.46	0.020	20.558	60	-16.54	9 k		L1
572.45 k	43.71	0.021	20.569	66	-22.29	9 k		L1
1.936 M	43.92	0.020	20.559	60	-16.08	9 k		L1
1.432 M	43.98	0.020	20.550	60	-16.02	9 k		N
2.062 M	44.67	0.020	20.561	60	-15.33	9 k		L1
800.25 k	44.95	0.020	20.555	66	-21.05	9 k		N
628.55 k	45.06	0.020	20.566	66	-20.94	9 k		L1
684.65 k	45.27	0.020	20.562	66	-20.73	9 k		L1
1.603 M	46.55	0.020	20.553	60	-13.45	9 k		L1
743.3 k	46.93	0.020	20.559	66	-19.07	9 k		N
1.144 M	47.02	0.020	20.545	60	-12.98	9 k		L1
402.45 k	49.67	0.027	20.579	66	-16.33	9 k		N
154.25 k	59.06	0.077	20.594	66	-6.94	9 k		N
2.458 M	49.45	0.020	20.568	60	-10.55	9 k		L1
2.539 M	52.69	0.020	20.570	60	-7.31	9 k		L1
2.593 M	53.91	0.020	20.570	60	-6.09	9 k		L1
150.0 k	64.03	0.080	20.594	66	-1.97	9 k		N
2.611 M	54.46	0.020	20.571	60	-5.54	9 k		L1

Test Personnel:	Kouma Sinn KPS	Test Date:	03/27/2017, 04/02/2017
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 90	Limit Applied:	FCC Part 15 Subpart B Class A
Input Voltage:	120VAC 60Hz	Ambient Temperature:	22, 22 ºC
Pretest Verification w/ Ambient Signals or BB Source:	**BB Source**	Relative Humidity:	27, 22 %
		Atmospheric Pressure:	1007,1008 mbars

Deviations, Additions, or Exclusions: None

17 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	04/10/2017	102940158BOX-001	KPS	MFM	Original Issue
1	04/25/2017	102940158BOX-001b	KPS	NS	Corrected the product from Mini Base station to Remote Tower Unit on page 4, 19, and 66