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Electromagnetic Emissions Test Report and Application for Grant of Equipment Authorization pursuant to FCC Part 15, Subpart C and Industry Canada RSS 210 Issue 5 on the Far Touch, Inc. Models: USB-RF-TX01 and RF-MSC-RX01

FCC ID:	QS2-USB-RF-TX01
GRANTEE:	Far Touch, Inc. 855 Mango Avenue Sunnyvale, CA 94087
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	April 16, 2003
FINAL TEST DATE:	December 23 and 24, 2003
AUTHORIZED SIGNATORY:	Mark Briggs Director of Engineering

DECLARATIONS OF COMPLIANCE

Equipment Name and Model:

Control Transmitter USB-RF-TX01, Receiver RF-MSC-RX01

Manufacturer:

Far Touch, Inc.
855 Mango Avenue
Sunnyvale, CA 94087

Tested to applicable standards:

RSS-210, Issue 5, November 2001 (Low Power License-Exempt Radiocommunication Devices)
FCC Part 15 Subpart C

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC2845 **SV3** Dated July 30, 2001

I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above mentioned departmental standards (through the use of ANSI C63.4 as detailed in section 5.3 of RSS-210, Issue 5); and that the equipment performed in accordance with the data submitted in this report.

Signature	
Name	Mark Briggs
Title	Director of Engineering
Company	Elliott Laboratories Inc.
Address	684 W. Maude Ave Sunnyvale, CA 94086 USA
Date:	April 16, 2003

Maintenance of compliance with the above standards is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

TABLE OF CONTENTS

SCOPE

An electromagnetic emissions test has been performed on the Far Touch, Inc. model USB-RF-TX01 and pursuant to Subpart C of Part 15 of FCC Rules for intentional radiators and on the models USB-RF-TX01 and RF-MSC-RX01 in accordance with RSS-210 Issue 5 for licence-exempt devices. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4-1992 as outlined in Elliott Laboratories test procedures.

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the Far Touch, Inc. model USB-RF-TX01 and RX-MSC-RX01 and therefore apply only to the tested samples. The sample was selected and prepared by Steve Decker of Far Touch, Inc.

OBJECTIVE

The primary objective of the manufacturer is compliance with Subpart C of Part 15 of FCC Rules and Industry Canada RSS-210 for the radiated and conducted emissions of intentional radiators. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules and RSS-210.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC and the IC. The FCC and IC issue a grant of equipment authorization upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units that are subsequently manufactured.

SUMMARY OF RESULTS

USB-RF-TX01 (Transmitter)

FCC Part 15 Section	RSS 210 Section	Description	Comments	Result
15.249(a)	6.2.2(m2)(1)	Fundamental Field Strength	85.2 dBµV/m @ 916.823 MHz	COMPLIES
15.249(e)	6.2.2(m2)(3)	Spurious Emissions Field Strength	43.8 dBµV/m @ 4584.12 MHz	COMPLIES
15.207	6.6	AC Conducted Emissions	38.3 dBµV @ 15.0 MHz	COMPLIES

RX-MSC-RX01 (Receiver)

RSS 210 Section	Description	Comments	Result
7.3	Spurious Emissions Field Strength	38.6 dBµV/m @ 931.182 MHz	COMPLIES
7.4	AC Conducted Emissions	30.63 dBµV @ 0.810 MHz	COMPLIES

MEASUREMENT UNCERTAINTIES

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	30 to 1000	± 3.6

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Far Touch, Inc. model USB-RF-TX01 is a USB to RF converter that transmits at 916.5 MHz that is designed to control remote electromechanical devices. Model RF-MSC-RX01 receives the signal and controls the remote device. Normally, the EUT would be placed on a tabletop during operation. The EUT was, therefore, treated as tabletop equipment during testing to simulate the end user environment.

The sample was received on December 23, 2003 and tested on December 23 and 24, 2003. The EUT consisted of the following component(s):

Manufacturer/Model/Description	Serial Number	Proposed FCC ID #
Far Touch USB-RF-TX01 Transmitter	-	QS2-USB-RF-TX01
Far Touch RF-MSC-RX01 Receiver	-	None

ENCLOSURE

The transmitter and receiver enclosures are primarily constructed of molded plastic.

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with the emission specifications.

SUPPORT EQUIPMENT

The following equipment was used as local support equipment for emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
HP	Kayak XM600	PC	MSD551001473	DoC
Microsoft	Intellimouse 1.1 a	mouse	1621891-50000	C3KKMP5
Sony	GDM-17SE1	Monitor	7131518	DoC
HP	5187-0341	Keyboard	BD20433506	DoC

No equipment was used as remote support equipment for emissions testing:

EUT INTERFACE PORTS

The I/O cabling configuration during emissions testing was as follows:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length (m)
PC port	Transmitter unit	USB	Shielded	3
PC port	Monitor	Serial	Unshielded	2
PC port	Mouse	Serial	Unshielded	1.5
PC port	Keyboard	Serial	Unshielded	1.5

Note: The printer port was not connected as this is not required per ANSI 63.4/1992 configuration for testing transmitters. The receiver was connected to an indicator board with an unshielded 0.2 m cable during the receiver tests.

EUT OPERATION DURING TESTING

The transmitter was sending packets (Transmitting) continuously to the receiver.

ANTENNA REQUIREMENTS

The antenna for the device is an integral antenna constructed as a PC board trace. It is not accessible to the user.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on December 23 and 24, 2003 at the Elliott Laboratories Open Area Test Site #3 located at 684 West Maude Avenue, Sunnyvale, California. The test site contains separate areas for radiated and conducted emissions testing. Pursuant to section 2.948 of the Rules, construction, calibration, and equipment data has been filed with the Federal Communications Commission. In accordance with Industry Canada rules detailed in RSS 210 Issue 5 and RSS-212, construction, calibration, and equipment data for the test sites have been filed with the Federal Communications Commission.

The FCC recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent FCC requirements.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4-1992. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

POWER METER

Either a spectrum analyzer or a power meter and thermister mount are used for all direct output power measurements from transmitters.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the entire 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

ANSI C63.4 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

EUT AND CABLE PLACEMENT

The FCC requires that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4, and the worst case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

RADIATED EMISSIONS

Radiated emissions measurements are performed in two phases as well. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from 30 MHz up to the frequency required by the regulation specified on page 1. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360˚, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit.

A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth which results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions which have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements are performed with the antenna port of the EUT connected to either the power meter or spectrum analyzer via a suitable attenuator and/or filter. These are used to ensure that the front end of the measurement instrument is not overloaded by the fundamental transmission.

Measurement bandwidths (video and resolution) are set in accordance with FCC procedures for the type of radio being tested.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions from the AC power port are given in units of microvolts, the limits for radiated electric field emissions are given in units of microvolts per meter at a specified test distance and the output power limits are given in temrs of Watts, milliwatts or dBm. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp) the following formula is used to determine the field strength limit in terms of microvolts per meter at a distance of 3m from the equipment under test:

$$E = \frac{1000000 \quad 30\,P}{3} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

For reference, converting the voltage and electric field strength specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. Conversion of power specification limits from linear units (in milliwatts) to decibel form (in dBm) is accomplished by taking the base ten logarithm, then multiplying by 10.

FCC 15.249 (a) and RSS-210 6.2.2(m2)(1) FUNDAMENTAL FIELD STRENGTH LIMITS

The maximum field strength for the fundamental in the 902-928 MHz band is 50 millivolts/meter.

FCC 15.249 (a) and RSS-210 6.2.2(m2)(1) SPURIOUS FIELD STRENGTH LIMITS

The table below shows the limits for unwanted (spurious) emissions

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

AC POWER PORT CONDUCTED EMISSIONS LIMITS

The table below shows the limits for emissions on the AC power line as detailed in FCC Part 15.207 in effect prior to September 2002 and Industry Canada RSS-210 section 6.6.

Frequency Range (MHz)	Limit (uV)	Limit (dBuV)
0.450 to 30.000	250	48

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - B = C$$

and

$$C - S = M$$

where:

R_r = Receiver Reading in dBuV

B = Broadband Correction Factor*

C = Corrected Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

* Broadband Level - Per ANSI C63.4, 13 dB may be subtracted from the quasi-peak level if it is determined that the emission is broadband in nature. If the signal level in the average mode is six dB or more below the signal level in the peak mode, the emission is classified as broadband.

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements. A distance factor, when used for electric field measurements, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

EXHIBIT 1: Test Equipment Calibration Data

1 Page

Fundamental Measurement, 23-Dec-02
Engineer: jmartinez

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	1347	12	10/30/2002	10/30/2003
Rohde & Schwarz	Test Receiver, 20-1300MHz	ESVP	273	12	2/6/2002	2/6/2003

Radiated Emissions, 1 - 9.2 GHz, 23-Dec-02
Engineer: jmartinez

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	12	3/2/2002	3/2/2003
Filtek	High Pass Filter, 1GHz	HP12/1000-5BA	957	12	3/25/2002	3/25/2003
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	12	1/15/2002	1/15/2003
Hewlett Packard	Spectrum Analyzer, 9KHz - 22GHz	8593EM	1319	12	11/19/2002	11/19/2003

Conducted and Radiated Emissions, 24-Dec-02
Engineer: mfaustino

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Com-Power Corp.	Comp generator, 20MHz	CG-520	1095	6	1/22/2002	1/22/2003
Elliott Laboratories	Biconical Antenna, 30-300 MHz	EL30.300	54	12	1/4/2002	1/4/2003
Elliott Laboratories	LISN 2 x (Solar 8028 LISN + 6512 Ca	LISN-5,Support	379	12	8/20/2002	8/20/2003
EMCO	Log Periodic Antenna, 0.3-1 GHz	3146A	364	12	9/12/2002	9/12/2003
Rohde& Schwarz	Pulse Limiter	ESH3 Z2	1398	12	2/7/2002	2/7/2003
Rohde & Schwarz	Test Receiver, 0.009-30 MHz	ESH3	1316	12	12/6/2002	12/6/2003
Rohde & Schwarz	Test Receiver, 20-1300MHz	ESVP	213	12	7/22/2002	7/22/2003
Solar Electronics Co	LISN	8028-50-TS-24-B	904	12	6/19/2002	6/19/2003

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T49759 14 Pages

Elliott

EMC Test Data

Client:	Far Touch, Inc.	Job Number:	J49732
Model:	USB-RF-TX01 & RF-MSC-RX01	T-Log Number:	T49759
		Proj Eng:	Mark Briggs
Contact:	Steve Decker		
Emissions Spec:	FCC 15.249/15.207	Class:	-
Immunity Spec:	N/A	Environment:	-

EMC Test Data

For The

Far Touch, Inc.

Model

USB-RF-TX01 & RF-MSC-RX01

Client:	Far Touch, Inc.	Job Number:	J49732
Model:	USB-RF-TX01 & RF-MSC-RX01	T-Log Number:	T49759
		Proj Eng:	Mark Briggs
Contact:	Steve Decker		
Emissions Spec:	FCC 15.249/15.207	Class:	-
Immunity Spec:	N/A	Environment:	-

EUT INFORMATION

General Description

The EUT is a USB to RF converter that transmits at 916 MHz which is designed to control remote mechanical devices. Normally, the EUT would be placed on a table top during operation. The EUT was, therefore, treated as table-top equipment during testing to simulate the end user environment. The transmitter receives power from the USB port of the host computer. The receiver receives power from either batteries or an AC adapter.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Far Touch	USB-RF-TX01	Transmitter	-	QS2-USB-RF-TX01
Far Touch	RF-MSC-RX01	Receiver	-	none

EUT Enclosure

The transmitter enclosure is primarily constructed of molded plastic.

Modification History

Mod. #	Test	Date	Modification
1	-	-	None

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.

Client:	Far Touch, Inc.	Job Number:	J49732
Model:	USB-RF-TX01 & RF-MSC-RX01	T-Log Number:	T49759
		Proj Eng:	Mark Briggs
Contact:	Steve Decker		
Emissions Spec:	FCC 15.249/15.207	Class:	-
Immunity Spec:	N/A	Environment:	-

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
HP	Kayak XM600	PC	MSD551001473	DoC
Microsoft	Intellimouse 1.1 a	mouse	1621891-50000	C3KKMP5
Sony	GDM-17SE1	Monitor	7131518	DoC
HP	5187-0341	Keyboard	BD20433506	DoC

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

Interface Cabling and Ports

		Cable(s)		
Port	Connected To	Description	Shielded or Unshielded	Length(m)
PC port	Transmitter unit	USB	Shielded	3
PC port	Monitor	Serial	Unshielded	2
PC port	Mouse	Serial	Unshielded	1.5
PC port	Keyboard	Serial	Unshielded	1.5
Receiver	Indicator board	3 wire	Unshielded	0.2

Note: The printer port was not connected as this is not required per ANSI 63.4/1992 configuration for testing transmitters.

EUT Operation During Emissions

The Transmitter was sending packets (Transmitting) continuously to the receiver.

Client:	Far Touch, Inc.	Job Number:	J49732
Model:	USB-RF-TX01 & RF-MSC-RX01	T-Log Number:	T49759
		Proj Eng:	Mark Briggs
Contact:	Steve Decker		
Spec:	FCC 15.249/15.207	Class:	N/A

Radiated Emissions

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 12/23/2002
Test Engineer: jmartinez
Test Location: SVOATS #3

Config. Used: 1
Config Change: None
Host Unit Voltage

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Unless stated otherwise the EUT was operating such that it constantly hopped on either the low, center or high channels.

Ambient Conditions:

Temperature: 7.2°C
Rel. Humidity: 62%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, Emissions	FCC Part 15.249 (a)	Pass	-8.8 dB @ 916.823 MHz
2	RE, 1000 - 9600 MHz - Spurious Emissions	FCC Part 15.209 / 15.249	Pass	-10.2dB @ 4584.0MHz
3	Bandedge	15.249(d)	Pass	Refer to plot

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Elliott

EMC Test Data

Client:	Far Touch, Inc.	Job Number:	J49732
Model:	USB-RF-TX01 & RF-MSC-RX01	T-Log Number:	T49759
		Proj Eng:	Mark Briggs
Contact:	Steve Decker		
Spec:	FCC 15.249/15.207	Class:	N/A

Run #1: Radiated Emissions, Fundamental

Frequency	Level	Pol	15.209 / 15.249		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
916.823	76.6	v	94.0	-17.4	QP	249	1.0	
916.823	85.2	h	94.0	-8.8	QP	334	1.0	

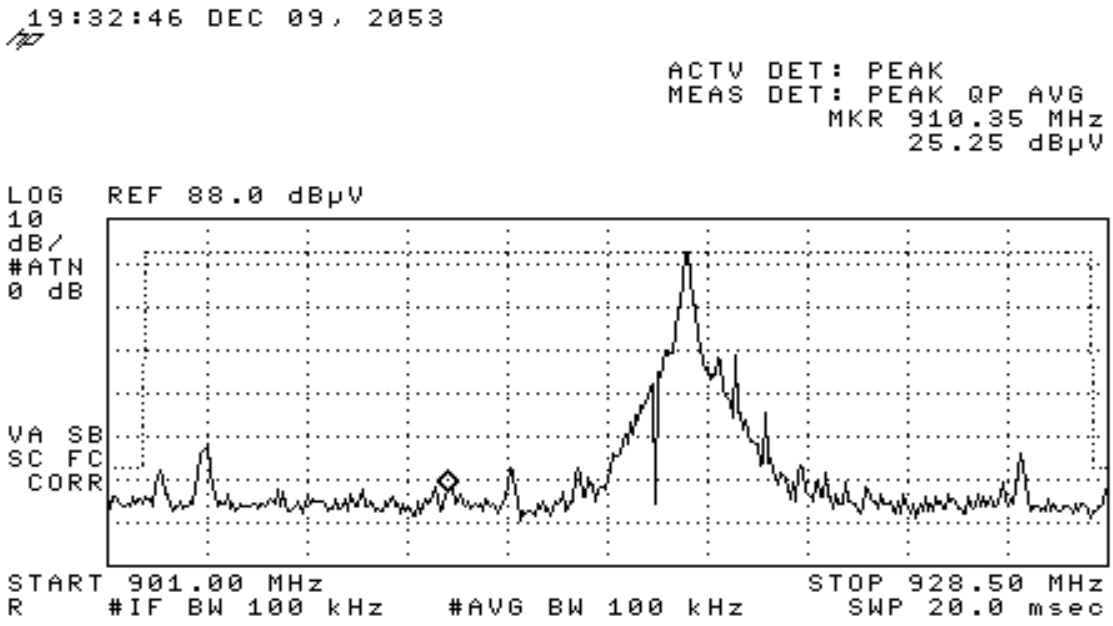
Run #2: Radiated Spurious Emissions, 1,000-9,200 MHz. 916.823 MHz

Frequency	Level	Pol	15.209 / 15.249		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4584.115	43.8	v	54.0	-10.2	Avg	249	1.0	Noise Floor
3667.292	42.7	v	54.0	-11.3	Avg	250	1.0	Noise Floor
1833.646	42.0	v	54.0	-12.0	Avg	82	1.0	
1833.646	39.5	h	54.0	-14.5	Avg	65	1.0	
2750.469	38.5	v	54.0	-15.5	Avg	261	1.0	Noise Floor
2750.469	38.4	h	54.0	-15.6	Avg	0	1.0	Noise Floor
1833.646	57.2	h	74.0	-16.8	Pk	65	1.0	
4584.115	56.5	v	74.0	-17.5	Pk	249	1.0	Noise Floor
3667.292	56.0	v	74.0	-18.0	Pk	250	1.0	Noise Floor
1833.646	55.0	v	74.0	-19.0	Pk	82	1.0	
2750.469	51.9	h	74.0	-22.1	Pk	0	1.0	Noise Floor
2750.469	51.5	v	74.0	-22.5	Pk	261	1.0	Noise Floor

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.
Note 2:	No emission detected after the 2nd harmonics. Scan was made to the 10th harmonic, emission were 20-dB below the limit.

Client:	Far Touch, Inc.	Job Number:	J49732
Model:	USB-RF-TX01 & RF-MSC-RX01	T-Log Number:	T49759
		Proj Eng:	Mark Briggs
Contact:	Steve Decker		
Spec:	FCC 15.249/15.207	Class:	N/A

Run #2: Bandedge



Note 1:	Add note here
Note 2:	

Client:	Far Touch, Inc.	Job Number:	J49732
Model:	USB-RF-TX01 & RF-MSC-RX01	T-Log Number:	T49759
		Proj Eng:	Mark Briggs
Contact:	Steve Decker		
Spec:	FCC 15.249/15.207	Class:	-

Radiated Emissions

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 12/24/2002
Test Engineer: Marissa Faustino
Test Location: SVOATS #1

Config. Used: 1
Config Change: None
EUT Voltage 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated emissions testing.
On the OATS, the measurement antenna was located 3m from the EUT for the frequency range 30 - 1000 MHz.
Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 8°C
Rel. Humidity: 70%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	RE, 30 - 1000MHz -Radiated Spurious Emissions(Receiver)	FCC B	Pass	-7.4dB @ 931.182MHz

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Far Touch, Inc.	Job Number:	J49732
Model:	USB-RF-TX01 & RF-MSC-RX01	T-Log Number:	T49759
		Proj Eng:	Mark Briggs
Contact:	Steve Decker		
Spec:	FCC 15.249/15.207	Class:	-

Run #1: Radiated Spurious Emissions, receiver 30-1000 MHz
receiver powered from AC adapter

Frequency	Level	Pol	FCC B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
931.182	38.2	v	46.0	-7.8	QP	0	1.0	
902.464	34.2	v	46.0	-11.8	QP	0	1.0	
223.630	31.3	h	46.0	-14.7	QP	0	1.0	
902.464	30.2	h	46.0	-15.8	QP	0	1.0	
43.082	23.2	v	40.0	-16.8	QP	0	1.0	
57.441	21.9	v	40.0	-18.1	QP	0	1.0	
931.182	27.4	h	46.0	-18.6	QP	0	1.0	
43.082	19.7	h	40.0	-20.3	QP	0	1.0	
114.797	21.9	h	43.5	-21.6	QP	0	1.0	
129.238	21.9	h	43.5	-21.6	QP	0	1.0	
86.078	17.8	h	40.0	-22.2	QP	0	1.0	

Run #2: Radiated Spurious Emissions, receiver 30-1000 MHz
receiver powered from batteries

Frequency	Level	Pol	FCC B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
931.182	38.6	v	46.0	-7.4	QP	0	1.0	
223.630	30.3	h	46.0	-15.7	QP	80	1.0	
902.464	28.6	h	46.0	-17.4	QP	0	1.0	
902.464	25.9	v	46.0	-20.1	QP	0	1.0	
931.182	24.7	h	46.0	-21.3	QP	0	1.0	
43.082	17.4	v	40.0	-22.6	QP	0	1.0	
57.441	16.9	v	40.0	-23.1	QP	0	1.0	
86.078	11.8	h	40.0	-28.2	QP	0	1.0	
114.797	13.9	h	43.5	-29.6	QP	0	1.0	
43.082	10.2	h	40.0	-29.8	QP	0	1.0	
129.238	13.1	h	43.5	-30.4	QP	0	1.0	

Client:	Far Touch, Inc.	Job Number:	J49732
Model:	USB-RF-TX01 & RF-MSC-RX01	T-Log Number:	T49759
		Account Manager:	Mark Briggs
Contact:	Steve Decker		
Spec:	FCC 15.249/15.207	Class:	-

Conducted Emissions - Power Ports

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 12/24/2002 Config. Used: 1
Test Engineer: Marissa Faustino Config Change: -
Test Location: SVOATS #1 EUT and Host Voltage: 120V/60Hz

General Test Configuration

For tabletop equipment, the EUT was located on a wooden table, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment.

Ambient Conditions:

Temperature: 8°C
Rel. Humidity: 70%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power 120V/60Hz (transmitter host)	FCC B	Pass	-9.7dB @ 15.000MHz
2	CE, AC Power 120V/60Hz(receiver)	FCC B	Pass	-17.4dB @ 0.810MHz

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Elliott

EMC Test Data

Client:	Far Touch, Inc.	Job Number:	J49732
Model:	USB-RF-TX01 & RF-MSC-RX01	T-Log Number:	T49759
		Account Manager:	Mark Briggs
Contact:	Steve Decker		
Spec:	FCC 15.249/15.207	Class:	-

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz
Host PC of the transmitter

Frequency	Level	AC	FCC B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
15.0000	38.3	Neutral	48.0	-9.7	QP	
26.3276	35.0	Neutral	48.0	-13.0	QP	
25.3733	34.2	Line 1	48.0	-13.8	QP	
15.0000	29.3	Line 1	48.0	-18.7	QP	
15.5910	28.6	Neutral	48.0	-19.4	QP	
9.7263	27.9	Line 1	48.0	-20.1	QP	

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz
Receiver

Frequency	Level	AC	FCC B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.8100	30.6	Neutral	48.0	-17.4	QP	
0.8099	28.6	Line 1	48.0	-19.4	QP	
1.1699	23.9	Neutral	48.0	-24.1	QP	
0.6800	21.8	Line 1	48.0	-26.2	QP	
0.5513	16.5	Line 1	48.0	-31.5	QP	
2.0409	8.4	Neutral	48.0	-39.6	QP	

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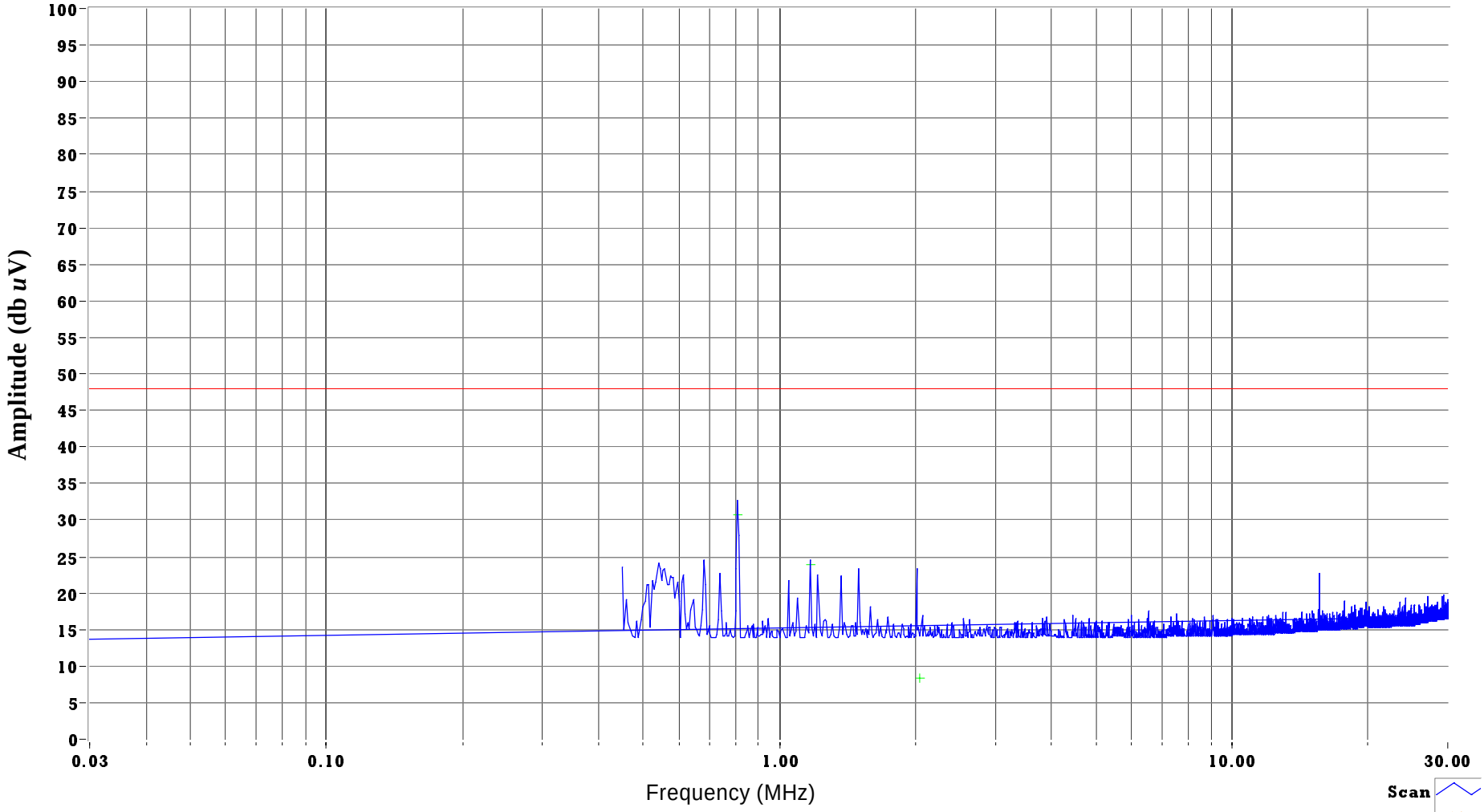
SVOATS#1: Far Touch , Inc Receiver Run 2

J49732/T49743

Spec: FCC-B

Mains Lead Neutral



Scan
Peak
Quasi-peak
Average
QuasiPeak Limit
QuasiPeak Limit

12/24/02

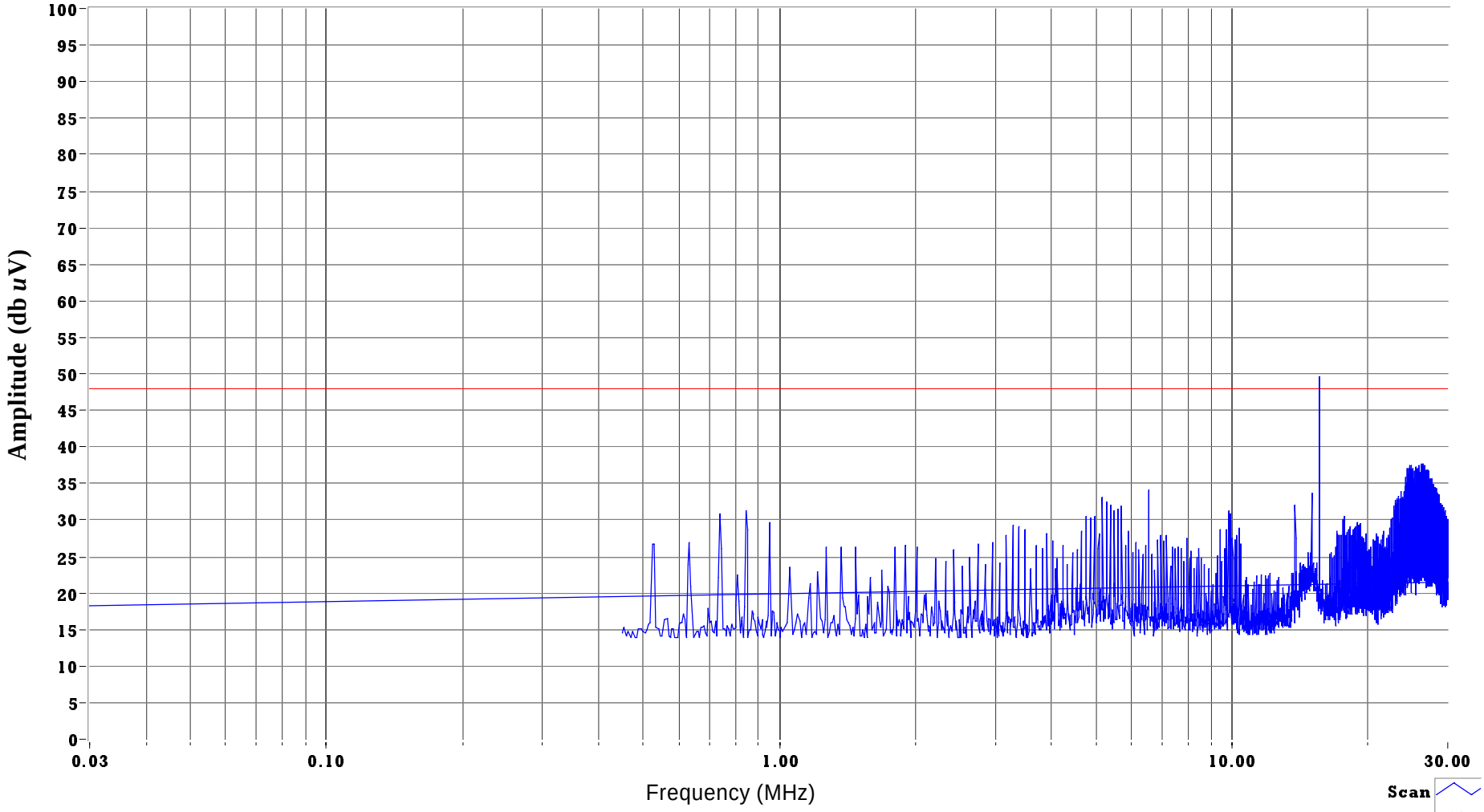
Marissa Faustino

SVOATS#1: Far Touch , Inc Transmitter Run 1

J49732/T49743

Spec: FCC-B

Mains Lead Neutral



Scan
Peak
Quasi-peak
Average
QuasiPeak Limit
QuasiPeak Limit

12/24/02

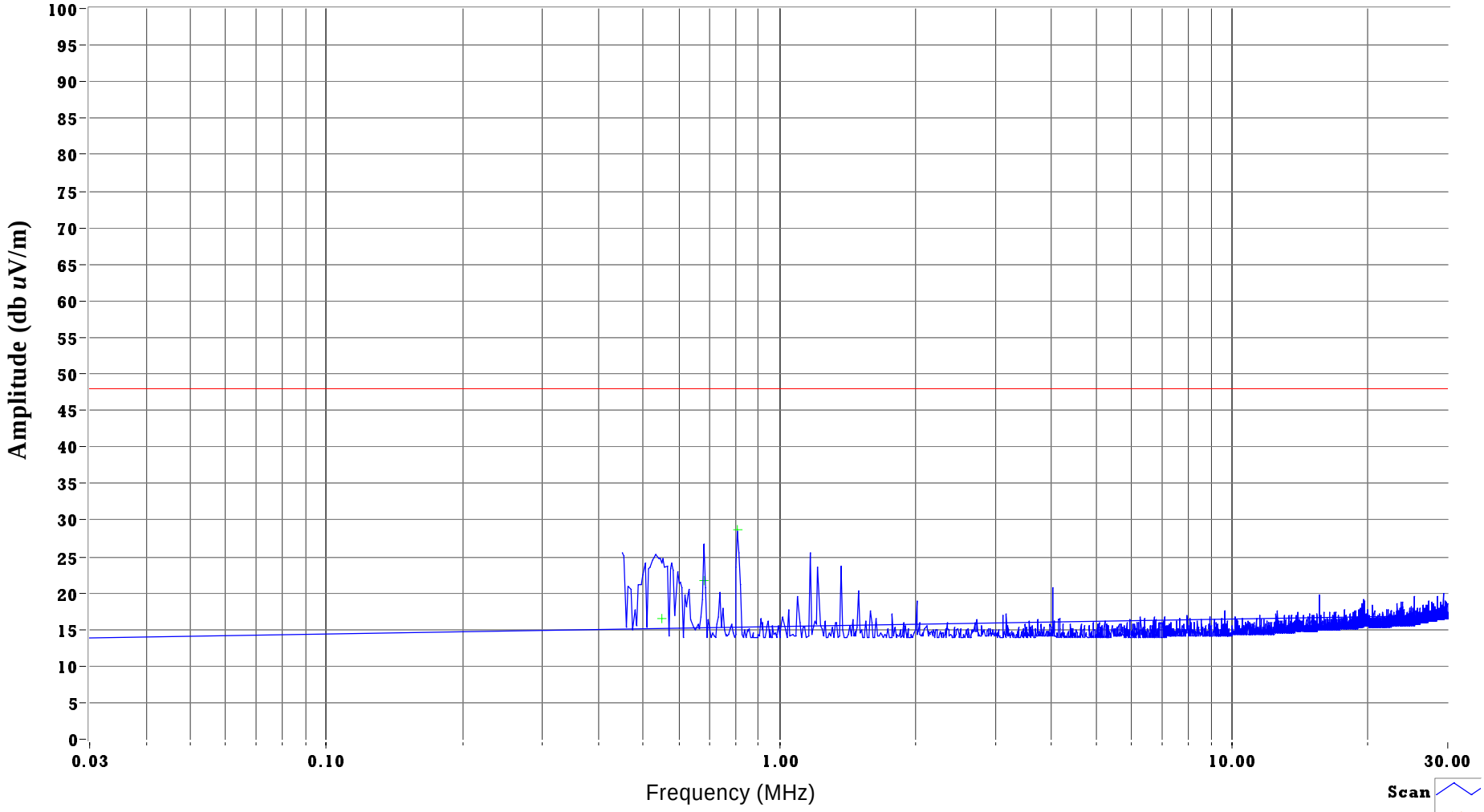
Marissa Faustino

T49743: Far Touch, Inc. Receiver

Spec: FCC-B

Mains Lead Line 1

J49732



Scan
Peak
Quasi-peak
Average
QuasiPeak Limit
QuasiPeak Limit

12/24/02

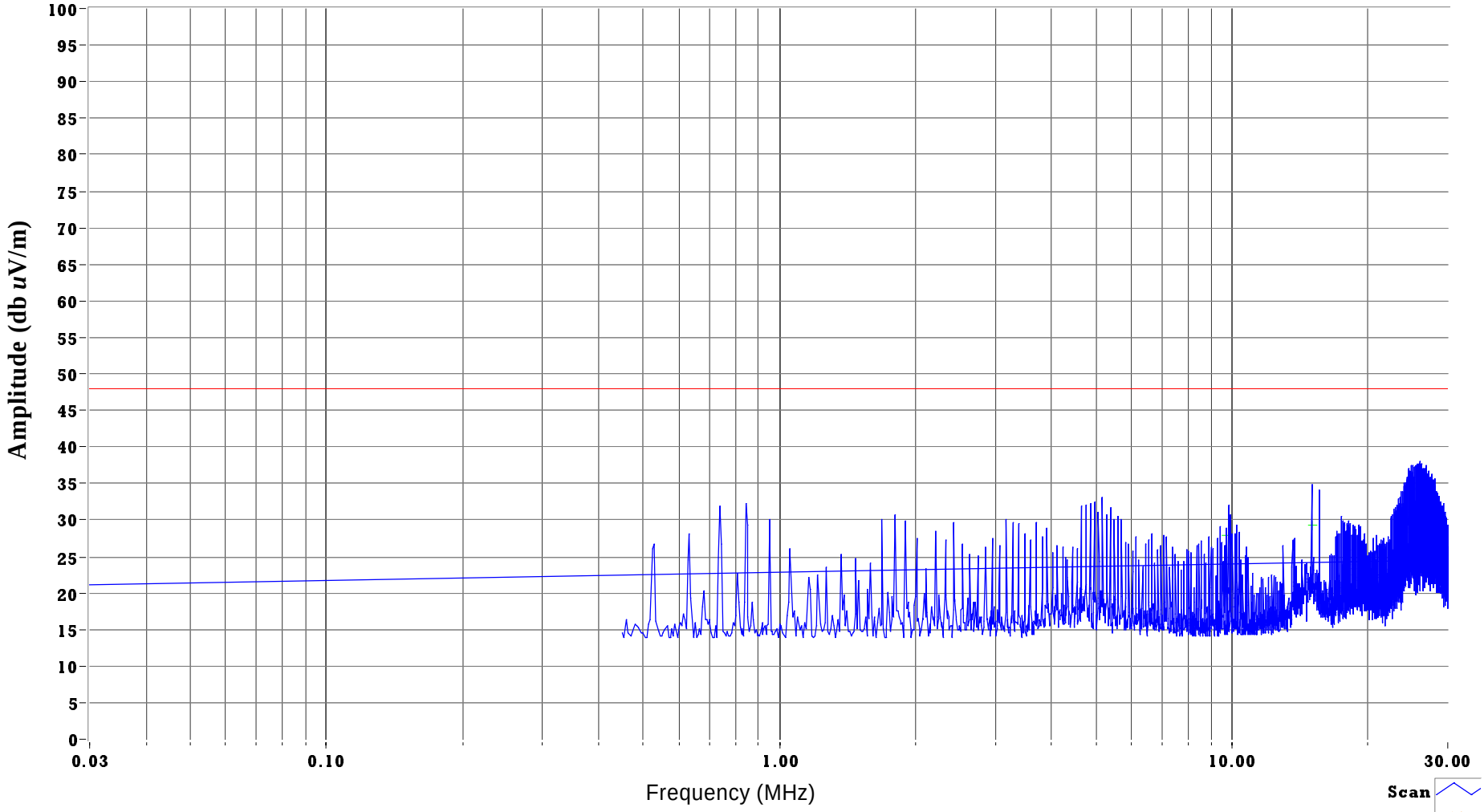
Marissa Faustino

SVOATS#1: Far Touch , Inc Transmitter Run 1

J49732/T49743

Spec: FCC-B

Mains Lead Line 1



Scan
Peak
Quasi-peak
Average
QuasiPeak Limit
QuasiPeak Limit

12/24/02

Marissa Faustino