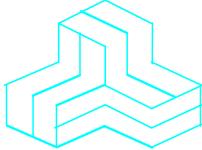


ENGINEERING TEST REPORT



**Multilane POS Terminal
Model: L5300
FCC ID: NVA00010**

Applicant:

Equinox Payments LLC
8901 East Raintree Drive, Suite 400
Scottsdale, AZ 85260
USA

In Accordance With

**Federal Communications Commission (FCC)
Part 15, Subpart C
Unlicensed Low Power Transmitter Operating in the Band 13.110-14.010 MHz**

UltraTech's File No.: MIS-107F15C225

This Test report is Issued under the Authority of
Tri M. Luu
Vice President of Engineering
UltraTech Group of Labs

Date: September 3, 2014

Report Prepared by: Dan Huynh

Tested by: Wei Wu

Issued Date: September 3, 2014

Test Dates: July 8, 30 & September 3, 2014

- The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.*
- This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government.*

UltraTech

3000 Bristol Circle, Oakville, Ontario, Canada, L6H 6G4

Tel.: (905) 829-1570 Fax.: (905) 829-8050

Website: www.ultratech-labs.com, Email: vic@ultratech-labs.com, Email: tri@ultratech-labs.com



91038



1309



46390-2049



NVLAP LAB
CODE 200093-0



SL2-IN-E-
1119R



CA2049



TL363_B



TPTDP
DA1300

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart C, Section 15.225 - Operation within the band 13.110 - 14.010 MHz.
Title:	Code of Federal Regulations (CFR), Title 47 Telecommunication, Part 15, Subpart C - Intentional Radiators
Purpose of Test:	Equipment Certification for Devices in Section 15.225 - Operation within the Band 13.110 - 14.010 MHz.
Test Procedures:	American National Standards Institute ANSI C63.4 - American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 KHz to 40 GHz
Environmental Classification:	Commercial, industrial or business environment

1.2. RELATED SUBMITTAL(S)/GRANT(S)

None.

1.3. NORMATIVE REFERENCES

Publication	Year	Title
47 CFR Parts 0-19	2014	Code of Federal Regulations (CFR), Title 47 – Telecommunication
ANSI C63.4	2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 KHz to 40 GHz
ANSI C63.10	2009	American National Standard for Testing Unlicensed Wireless Devices
CISPR 22 & EN 55022	2008-09, Edition 6.0 2006	Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement
CISPR 16-1-1 +A1 +A2	2006 2006 2007	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus
CISPR 16-1-2 +A1 +A2	2003 2004 2006	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-2: Conducted disturbances

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT	
Name:	Equinox Payments LLC
Address:	8901 East Raintree Drive, Suite 400 Scottsdale, AZ 85260 USA
Contact Person:	Clint Woodworth Phone #: 480-551-7803 Fax #: N/A Email Address: cwoodworth@equinoxpayments.com

MANUFACTURER	
Name:	Technocom Systems Sdn. Bhd.
Address:	PLO 121 Jalan Firma 1/3 Tebrau Industrial Estate 1 Johor Bahru 81100 Malaysia
Contact Person:	Thomas Lee Phone #: +6-017-724-1250 Fax #: N/A Email Address: Thomas.Lee@venture.com.sg

2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

Brand Name:	Equinox Payments LLC
Product Name:	Multilane POS Terminal
Model Name or Number:	L5300
Serial Number:	Test sample
Type of Equipment:	Low Power Communication Device Transmitter
Input Power Supply Type:	12 VDC / PoE from AC/DC adapter
Primary User Functions of EUT:	Point of Sale credit/debit financial transactions

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4

Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: MIS-107F15C225

September 3, 2014

2.3. EUT'S TECHNICAL SPECIFICATIONS

Transmitter	
Equipment Type:	Mobile
Intended Operating Environment:	Commercial, light industry & heavy industry
Power Supply Requirement:	12V/2.5A / PoE
Field Strength:	55.02 dB μ V/m at 10 m
Operating Frequency Range:	13.56 MHz
RF Output Impedance:	50 Ω
20 dB Bandwidth:	41.6 kHz
Modulation Type:	ASK
Oscillator Frequencies:	27.12 MHz
Antenna Connector Type:	Integral

2.4. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Shielded/Non-shielded)
1	RS232	1	RJ45	1.8m, Non-shielded
2	Ethernet	2	RJ45	2.0m, Non-shielded
3	PUSB	1	PUSB Remote Side Connector	3m, Shielded
4	Tailgate	1	RJ11	3.6m, Non-shielded
5	USB Host	1	USB Type A	1.8m, Shielded
6	Power Port	1	Power Jack	Non-shielded
7	Touch Screen Stylus	1	4-pin Custom	0.75m, Shielded
8	Audio Out	1	2.5mm Jack	1m, Non-shielded

2.5. ANCILLARY EQUIPMENT

The EUT was tested while connected to the following representative configuration of ancillary equipment necessary to exercise the ports during tests:

Ancillary Equipment # 1	
Description:	ITE Power Supply AC Adapter
Brand name:	Equinox
Model Name or Number:	NU40-E120250-13
Connected to EUT's Port:	DC Port

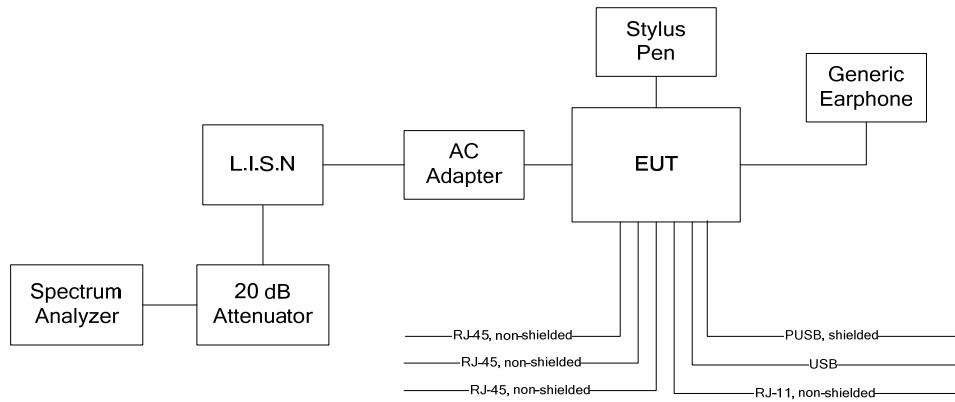
Ancillary Equipment # 2	
Description:	ITE Power Supply AC Adapter
Brand name:	Hypercom
Model Name or Number:	NU40-8120250-I3
Connected to EUT's Port:	PUSB and USB Ports

Ancillary Equipment # 3	
Description:	Stylus Pen
Brand name:	Equinox
Model Name or Number:	P/N 040367-001E
Connected to EUT's Port:	Touch Screen Stylus Port

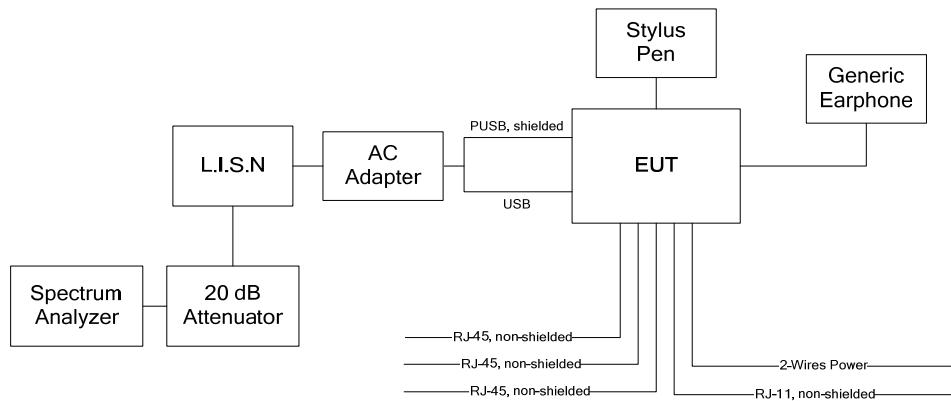
Ancillary Equipment # 4	
Description:	Earphone
Brand name:	Generic
Model Name or Number:	N/A
Connected to EUT's Port:	Audio Out Port

2.6. TEST SETUP

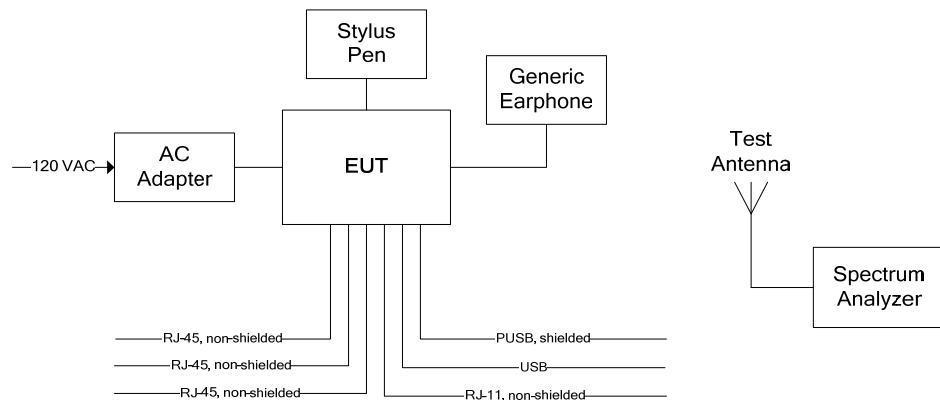
Power Line Conducted Emission (Power Port)



Power Line Conducted Emission (Power over Ethernet and USB)



Radiated Emission



Frequency Stability

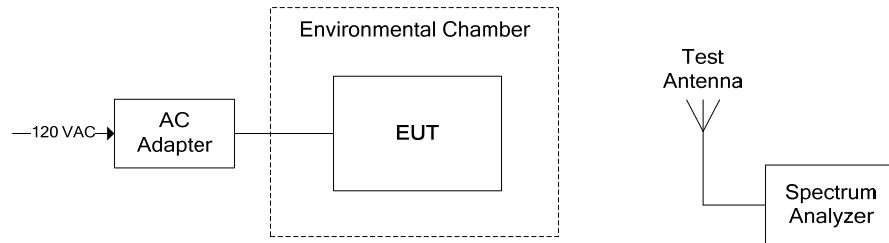


EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21 to 23 °C
Humidity:	45 to 58%
Pressure:	102 kPa
Power Input Source:	12 VDC / PoE from AC adapter

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	The EUT was configured for continuous transmission for the duration of testing.
Special Test Software:	N/A
Special Hardware Used:	N/A
Transmitter Test Antenna:	The EUT was tested with the antenna fitted in a manner typical of normal intended use as integral antenna equipment.

Transmitter Test Signals:	
Frequency:	13.56 MHz
Transmitter Wanted Output Test Signals:	
▪ RF Power Output (measured maximum output power):	55.02 dB μ V/m at 10 m
▪ Normal Test Modulation:	ASK
▪ Modulating signal source:	Internal

EXHIBIT 4. SUMMARY OF TEST RESULTS

4.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

- AC Power Line Conducted Emissions were performed in UltraTech's shielded room, 24'(L) by 16'(W) by 8'(H).
- Radiated Emissions were performed at the Ultratech's 3-10 TDK Semi-Anechoic Chamber situated in the Town of Oakville, province of Ontario. This test site been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville 3-10 TDK Semi-Anechoic Chamber has been filed with FCC office (FCC File No.: 91038) and Industry Canada office (Industry Canada File No.: 2049A-3). Expiry Date: 2017-04-02.

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC Regulations	Test Requirements	Compliance (Yes/No)
15.203 & 15.204	The transmitter shall use a transmitting antenna that is an integral part of the device	Yes
15.215(c)	Emission Bandwidth	Yes
15.225(a) – (d)	Field Strength of Emissions Inside and Outside the Permitted Band 13.110 - 14.010 MHz	Yes
15.225(e)	Frequency Stability	Yes
15.107 & 15.207	Class B - Power Line Conducted Emissions	Yes

4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

- 1) DC input power cable looped twice around Steward Ferrite Part number 28A2025-OAO.



ULTRATECH GROUP OF LABS

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File #: MIS-107F15C225

September 3, 2014

EXHIBIT 5. TEST DATA

5.1. EMISSION BANDWIDTH [§15.215(c)]

5.1.1. Limits

The 20 dB bandwidth of the emission shall be contained within the band 13.110–14.010 MHz.

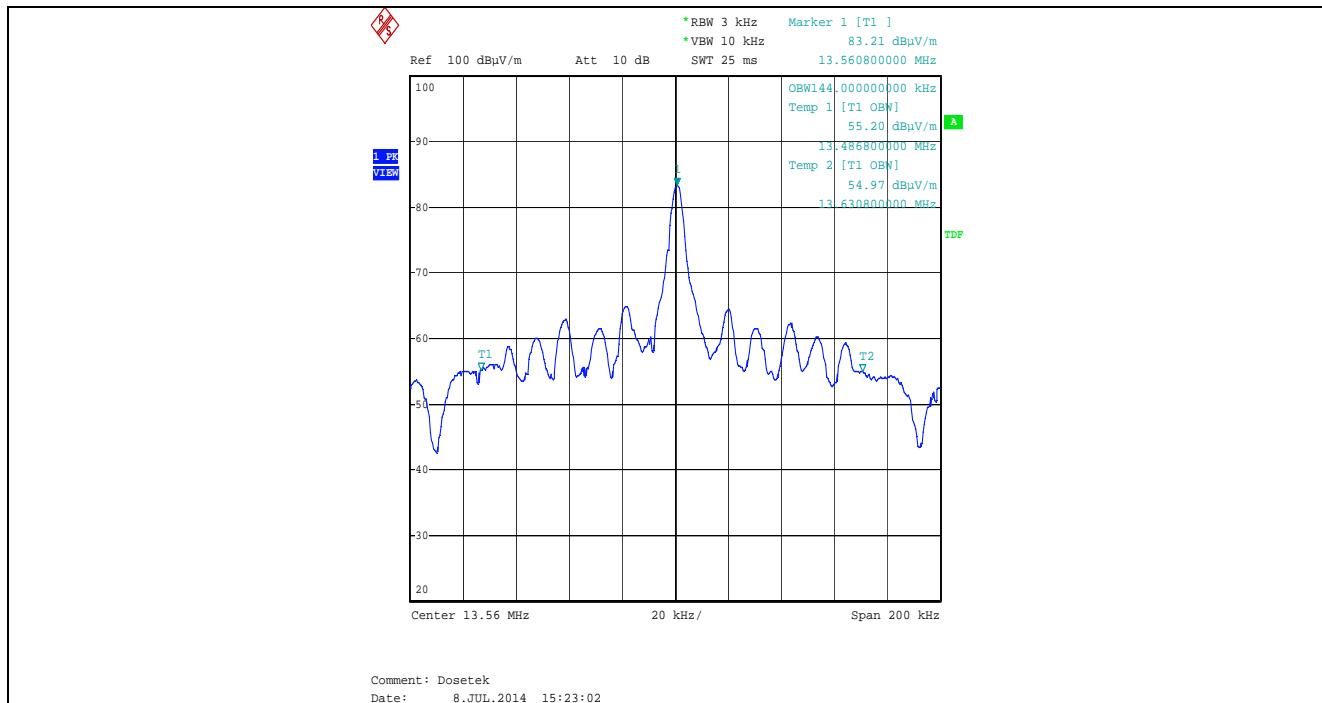
5.1.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001 and ANSI C63.4 for measurement methods

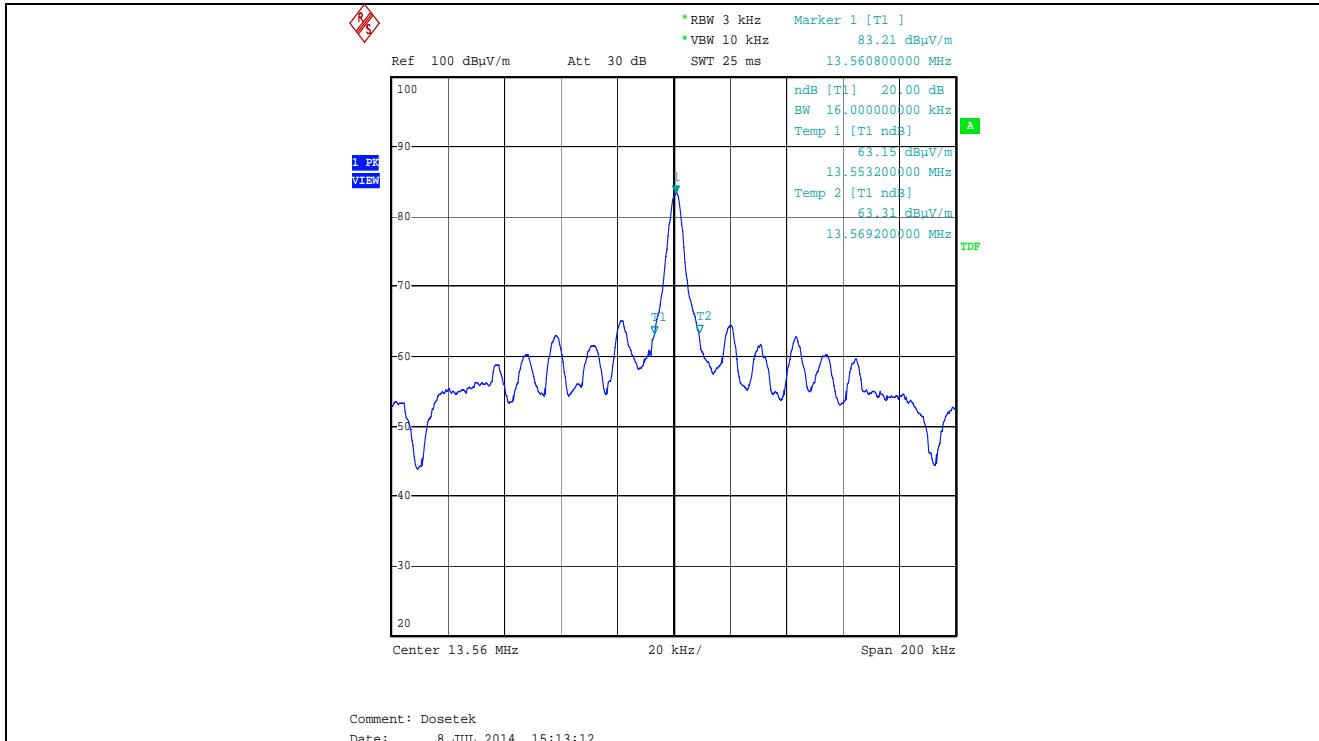
5.1.3. Test Data

Test Frequency (MHz)	Occupied Bandwidth (kHz)	
	20 dB BW	99 % BW
13.56	41.6	144.0

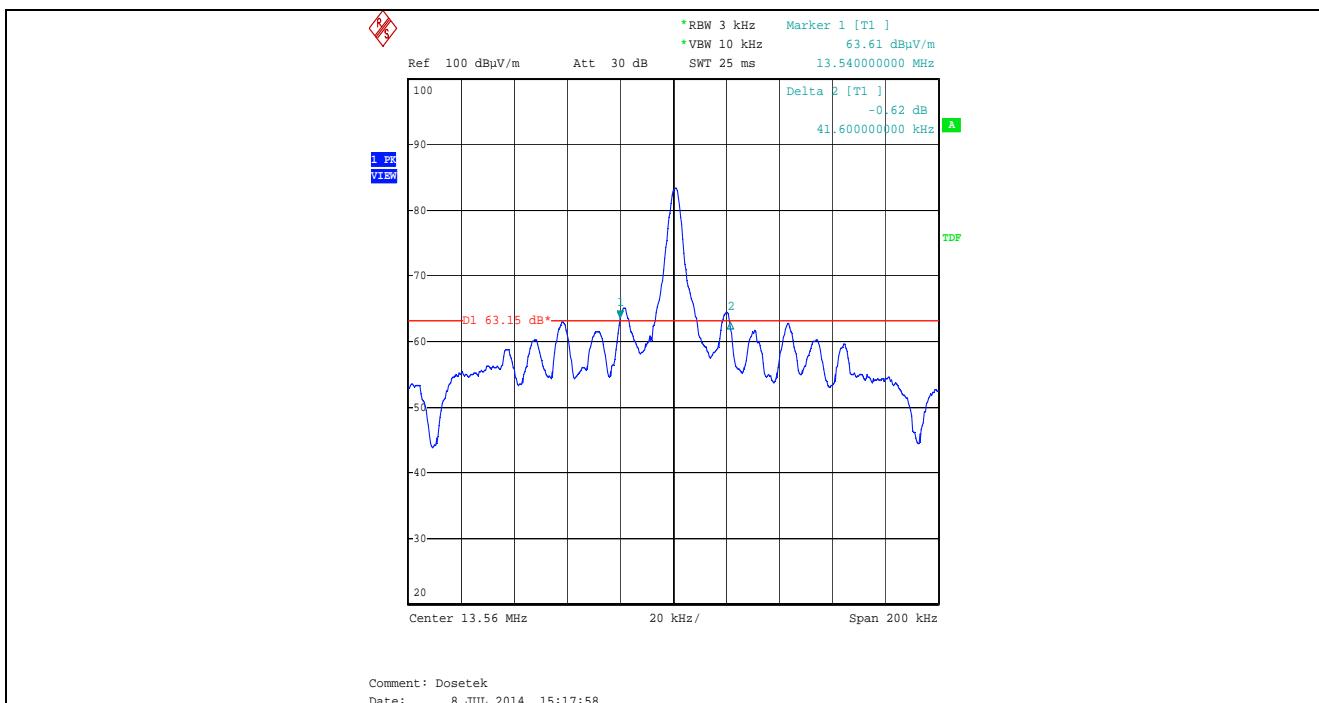
Plot 5.1.3.1. 99% Occupied Bandwidth, 13.56 MHz



Plot 5.1.3.2. 20 dB Emission Bandwidth, 13.56 MHz,



Plot 5.1.3.3. 20 dB Emission Bandwidth, 13.56 MHz



**5.2. FIELD STRENGTH OF EMISSIONS WITHIN & OUTSIDE THE PERMITTED BAND 13.110-14.010 MHz
[47 CFR 15.225 (a) to (d)]**

5.2.1. Limits

- (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110 – 14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

47 CFR 15.209(a) – Radiated Emission Limits; general requirements

Frequency (MHz)	Field Strength Limits (microvolts/m)	Distance (Meters)
0.009 - 0.490	2,400 / F (KHz)	300
0.490 - 1.705	24,000 / F (KHz)	30
1.705 - 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

5.2.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001 and ANSI C63.4 for measurement methods

5.2.3. Test Data

Remarks:

- Radiated spurious emissions measurements were performed at a measuring distance of 10 m (for frequencies below 30 MHz) and 3 m (for frequencies at or above 30 MHz), from 10 kHz – 10th harmonic of the fundamental or the range applicable to the digital device, whichever is the higher frequency range and all spurious emissions that are in excess of 20 dB below the specified limit shall be recorded.
- For frequencies below 30 MHz, the results measured at 10 m distance shall be extrapolated to the specified distance using an extrapolation factor of 40 dB/decade for determining compliance.

5.2.3.1. Field Strength of Emissions Within the Permitted Band at 10 m

Frequency (MHz)	Measured Field Strength @ 10 m (dB μ V/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	Field Strength Extrapolated Value (dB μ V/m)	§ 15.225 Field Strength Limits (dB μ V/m)	Margin (dB)
13.56	55.02	Peak	V	35.9	84.0	-48.1
13.56	49.27	Peak	H	30.2	84.0	-53.8

5.2.3.2. Field Strength of Emissions Outside the Permitted Band Below 30 MHz at 10 m

Frequency (MHz)	Measured Field Strength @ 10 m (dB μ V/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	Field Strength Extrapolated Value (dB μ V/m)	§ 15.209 Field Strength Limits (dB μ V/m)	Margin (dB)
All spurious emissions are more than 20 dB below the specified limit.						

5.2.3.3. Field Strength of Emissions Outside the Permitted Band at or Above 30 MHz at 3 m

Frequency (MHz)	Measured Field Strength @ 3 m (dB μ V/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	§ 15.209 Field Strength Limits (dB μ V/m)	Margin (dB)
40.68	34.64	Peak	V	40.0	-5.4
81.36	29.21	Peak	V	40.0	-10.8
94.92	34.79	Peak	V	43.5	-8.7
108.48	36.86	Peak	V	43.5	-6.6
108.48	27.93	Peak	H	43.5	-15.6
122.04	36.03	Peak	V	43.5	-7.5
122.04	28.05	Peak	H	43.5	-15.5
135.60	36.71	Peak	V	43.5	-6.8
135.60	30.07	Peak	H	43.5	-13.4

5.3. FREQUENCY STABILITY [47 CFR 15.225(e)]

5.3.1. Limits

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

5.3.2. Method of Measurements

ANSI C63.4.

5.3.3. Test Data

Frequency Band:	13.56 MHz
Center Frequency:	13.56 MHz
Frequency Tolerance Limit:	$\pm 0.01\% (\pm 1356 \text{ Hz})$
Max. Frequency Tolerance Measured:	-60 Hz
Input Voltage Rating:	120 VAC

Ambient Temperature (°C)	Frequency Drift (Hz)		
	Supply Voltage 120 VAC	Supply Voltage 138 VAC	Supply Voltage 102 VAC
-20	-20	N/A	N/A
-10	+20	N/A	N/A
0	+40	N/A	N/A
10	+20	N/A	N/A
20	0	+20	-20
30	0	N/A	N/A
40	-60	N/A	N/A
50	-60	N/A	N/A

5.4. POWER LINE CONDUCTED EMISSIONS [47 CFR 15.107(a) & 15.207]

5.4.1. Limits

The equipment shall meet the limits of the following table:

Frequency of emission (MHz)	Class B Conducted Limits (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

* Decreases linearly with logarithm of the frequency

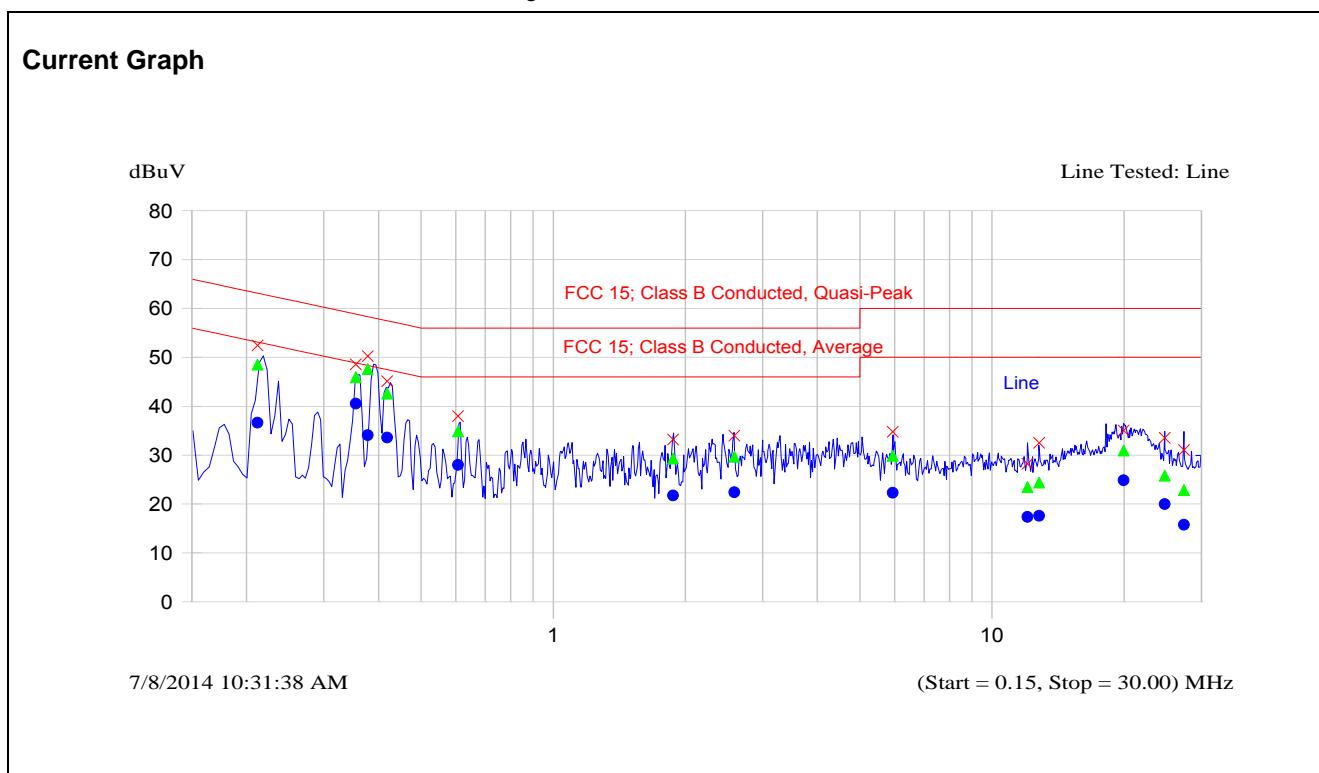
5.4.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001 and ANSI C63.4 for measurement methods

5.4.3. Test Data

Plot 5.4.3.1. Power Line Conducted Emissions

Test Configuration 1: Power Port via Equinox ITE Power Supply AC Adapter
Voltage: 120 VAC, Line Tested: Line



Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.212	52.4	48.5	-15.7	36.6	-17.6	Line
0.355	48.6	45.9	-14.1	40.5	-9.6	Line
0.378	50.2	47.6	-11.8	34.1	-15.3	Line
0.418	45.1	42.6	-15.7	33.6	-14.7	Line
0.607	38.0	34.9	-21.1	28.0	-18.0	Line
1.875	33.2	29.3	-26.7	21.8	-24.2	Line
2.586	34.0	29.7	-26.3	22.4	-23.6	Line
5.945	34.8	29.9	-30.1	22.3	-27.7	Line
12.044	28.2	23.5	-36.5	17.4	-32.6	Line
12.797	32.5	24.4	-35.6	17.6	-32.4	Line
19.951	35.0	31.0	-29.0	24.9	-25.1	Line
24.749	33.5	25.8	-34.2	20.0	-30.0	Line
27.393	31.0	22.9	-37.1	15.8	-34.2	Line

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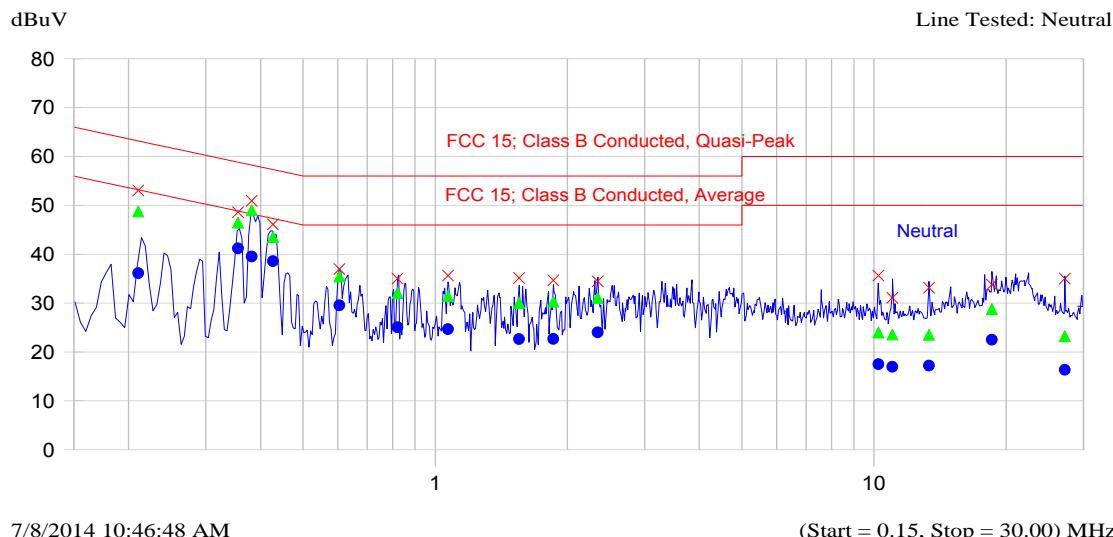
File #: MIS-107F15C225

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Plot 5.4.3.2. Power Line Conducted Emissions

Test Configuration 1: Power Port via Equinox ITE Power Supply AC Adapter
 Voltage: 120 VAC, Line Tested: Neutral

Current Graph

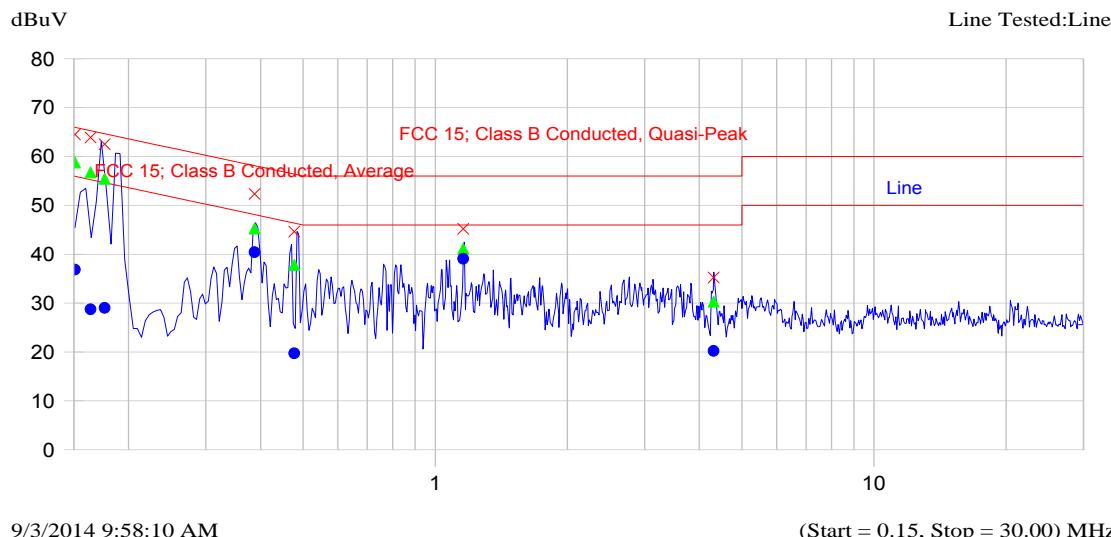


Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.210	53.0	48.8	-15.5	36.1	-18.1	Neutral
0.355	48.6	46.4	-13.6	41.2	-8.8	Neutral
0.381	50.9	49.0	-10.3	39.5	-9.8	Neutral
0.427	46.1	43.5	-14.5	38.6	-9.5	Neutral
0.605	37.0	35.4	-20.6	29.6	-16.4	Neutral
0.820	35.0	32.0	-24.0	25.1	-20.9	Neutral
1.069	35.6	31.4	-24.6	24.7	-21.3	Neutral
1.552	35.1	30.0	-26.0	22.6	-23.4	Neutral
1.857	34.6	30.3	-25.7	22.7	-23.3	Neutral
2.346	34.5	31.1	-24.9	24.0	-22.0	Neutral
10.231	35.6	24.0	-36.0	17.5	-32.5	Neutral
11.004	31.1	23.6	-36.4	17.0	-33.0	Neutral
13.340	33.1	23.5	-36.5	17.2	-32.8	Neutral
18.570	33.8	28.8	-31.2	22.5	-27.5	Neutral
27.230	35.0	23.2	-36.8	16.4	-33.6	Neutral

Plot 5.4.3.3. Power Line Conducted Emissions
Test Configuration 2: Power over Ethernet (PoE) + USB via Hypercom ITE Power Supply and Cable Adapter
Voltage: 120 VAC, Line Tested: Line

Current Graph



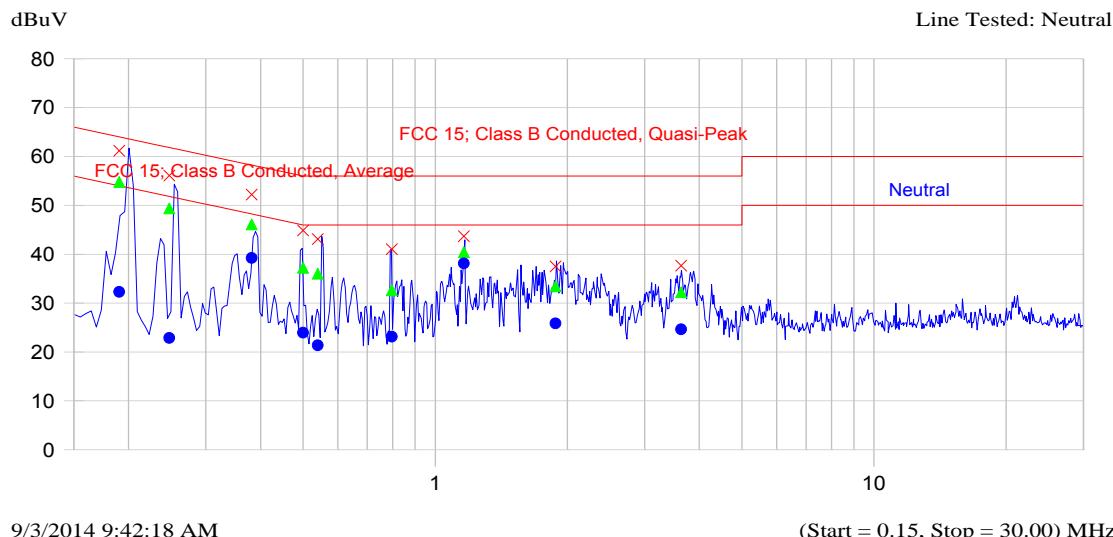
Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.151	64.5	58.8	-7.2	36.9	-19.1	Line
0.164	63.9	56.7	-8.8	28.7	-26.9	Line
0.176	62.5	55.5	-9.8	29.0	-26.2	Line
0.388	52.3	45.3	-13.9	40.4	-8.7	Line
0.477	44.6	37.8	-18.8	19.7	-26.9	Line
1.158	45.2	41.2	-14.8	39.1	-6.9	Line
4.311	35.2	30.3	-25.7	20.2	-25.8	Line

Plot 5.4.3.4. Power Line Conducted Emissions

Test Configuration 2: Power over Ethernet (PoE) + USB via Hypercom ITE Power Supply and Cable Adapter
 Voltage: 120 VAC, Line Tested: Neutral

Current Graph



Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.190	61.2	54.8	-10.0	32.3	-22.5	Neutral
0.248	56.1	49.4	-13.8	22.9	-30.3	Neutral
0.382	52.2	46.1	-13.2	39.2	-10.1	Neutral
0.500	44.9	37.2	-18.8	23.9	-22.1	Neutral
0.540	43.1	36.0	-20.0	21.4	-24.6	Neutral
0.796	41.0	32.6	-23.4	23.1	-22.9	Neutral
1.163	43.7	40.4	-15.6	38.1	-7.9	Neutral
1.879	37.5	33.5	-22.5	25.9	-20.1	Neutral
3.634	37.7	32.3	-23.7	24.6	-21.4	Neutral

EXHIBIT 6. TEST EQUIPMENT LIST

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Cal. Due Date
Spectrum Analyzer	Rohde & Schwarz	FSP7	100646	9 kHz – 7 GHz	25 Sep 2014
Loop Antenna	EMCO	6502	9104-2611	10 kHz – 30 MHz	27 Aug 2015
EMC Analyzer	Agilent	E7401A	US40240432	9 kHz - 1.5 GHz	14 Mar 2015
Spectrum Analyzer	Rohde & Schwarz	ESU40	100037	20 Hz – 40 GHz	05 Apr 2015
Biconi-Log Antenna	EMCO	3142C	00026873	26 – 3000 MHz	14 Apr 2015
Transient Limiter	Pasternack	PE7010-20	N/A	DC - 2 GHz	02 Jan 2015
LISN	Schwarzbeck	NSLK 8127	8127276	10 kHz – 30 MHz	25 Mar 2015
LISN	EMCO	3825/2R	1165	10 kHz – 30 MHz	05 Nov 2014
Spectrum Analyzer	Rohde & Schwarz	FSEK	834157/005	9 kHz – 40 GHz	03 Jan 2015
Environmental Chamber	Envirotronics	SSH32C	11994847-S-11059	-60 to 177 °C	16 Apr 2015
Antenna	EMCO	6502	2611	10 kHz – 30 MHz	27 Aug 2015

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EXHIBIT 7. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of CISPR 16-4-2 @ IEC:2003 and JCGM 100:2008 (GUM 1995) – Guide to the Expression of Uncertainty in Measurement.

7.1. LINE CONDUCTED EMISSION MEASUREMENT UNCERTAINTY

	Line Conducted Emission Measurement Uncertainty (9 kHz – 30 MHz):	Measured	Limit
u_c	Combined standard uncertainty: $u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$	± 1.44	± 1.8
U	Expanded uncertainty U: $U = 2u_c(y)$	± 2.89	± 3.6

7.2. RADIATED EMISSION MEASUREMENT UNCERTAINTY

	Radiated Emission Measurement Uncertainty @ 3m, Horizontal (30-1000 MHz):	Measured (dB)	Limit (dB)
u_c	Combined standard uncertainty: $u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$	± 2.39	± 2.6
U	Expanded uncertainty U: $U = 2u_c(y)$	± 4.79	± 5.2

	Radiated Emission Measurement Uncertainty @ 3m, Vertical (30-1000 MHz):	Measured (dB)	Limit (dB)
u_c	Combined standard uncertainty: $u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$	± 2.39	± 2.6
U	Expanded uncertainty U: $U = 2u_c(y)$	± 4.78	± 5.2

	Radiated Emission Measurement Uncertainty @ 3 m, Horizontal & Vertical (1 – 18 GHz):	Measured (dB)	Limit (dB)
u_c	Combined standard uncertainty: $u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$	± 1.87	Under consideration
U	Expanded uncertainty U: $U = 2u_c(y)$	± 3.75	Under consideration