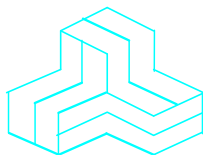


ENGINEERING TEST REPORT



Multilane POS Terminal
Model: L5200
FCC ID: NVA00011

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.: 15MIS109_FCC15.225

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

Date: January 14, 2015

Report Prepared by: Dharmajit Solanki

Tested by: Hung Trinh

Issued Date: January 14, 2015

Test Dates: Nov. 11, 2014 to Jan. 09, 2015

- 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

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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	2009	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:	L5200
Serial Number:	Test sample
Type of Equipment:	Low Power Communication Device Transmitter
Input Power Supply Type:	12 VDC from AC/DC adapter or PoE/USB/RS232 Powered
Primary User Functions of EUT:	Point of Sale credit/debit financial transactions

2.3. EUT'S TECHNICAL SPECIFICATIONS

Transmitter	
Equipment Type:	Base Station
Intended Operating Environment:	Commercial, Industrial or Business
Power Supply Requirement:	12V/2.5A / PoE/USB/RS232
Field Strength:	55.92 dB μ V/m at 10 m
Operating Frequency Range:	13.56 MHz
RF Output Impedance:	50 Ω
20 dB Bandwidth:	1.5 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:

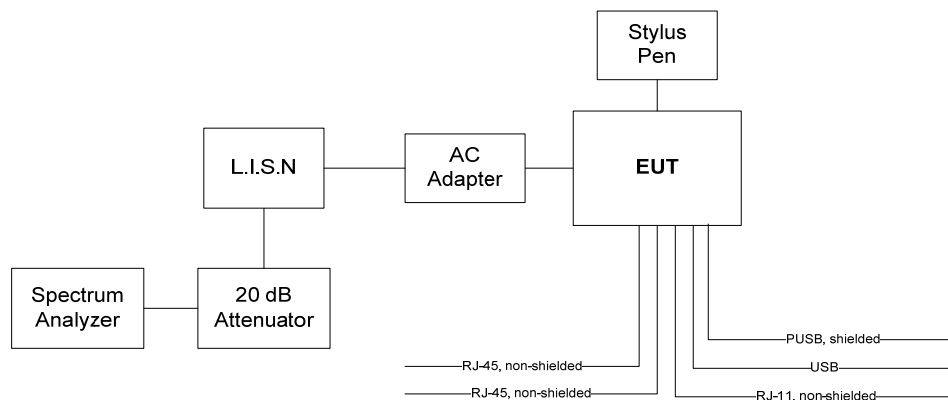
Ancillary Equipment # 1	
Description:	ITE Power Supply AC Adapter
Brand name:	Equinox
Model Name or Number:	NU40-E120250-13
Connected to EUT's Port:	DC Port

Ancillary Equipment # 2	
Description:	Stylus Pen
Brand name:	Equinox
Model Name or Number:	P/N 040367-001E
Connected to EUT's Port:	Touch Screen Stylus Port

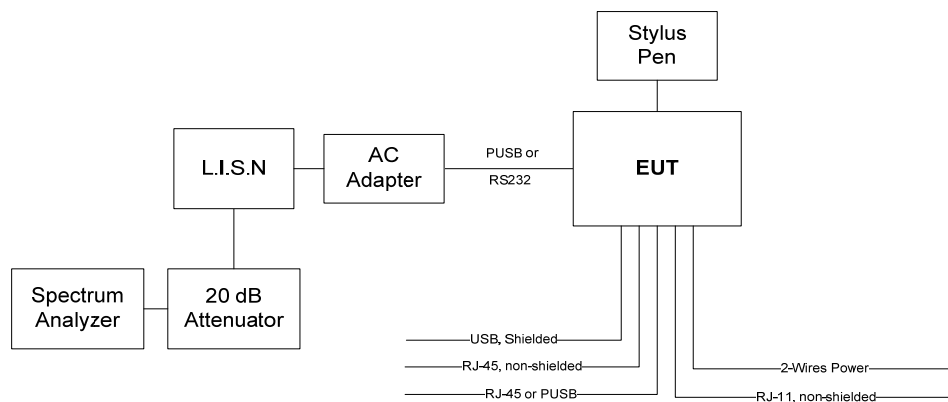
Ancillary Equipment # 3	
Description:	PoE Adaptor
Brand name:	PowerDsine 3001
Model Name or Number:	PD 3001 AC
Connected to EUT's Port:	RJ-45

2.6. TEST SETUP

Power Line Conducted Emission (Power Port)



Power Line Conducted Emission (RS-232 Or PUSB Port)



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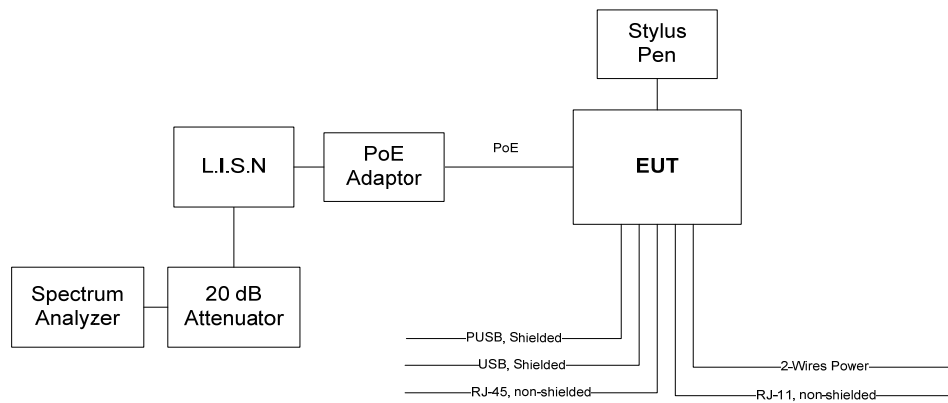
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 15MIS109_FCC15.225

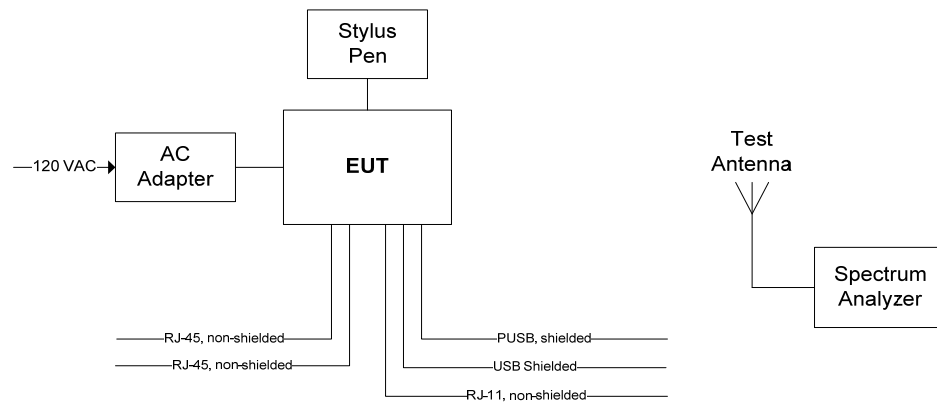
January 14, 2015

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Power Line Conducted Emission (PoE Port)



Radiated Emission



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File #: 15MIS109_FCC15.225

January 14, 2015

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

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 from AC/DC adapter or PoE/USB/RS232 powered

3.2. OPEPERATIONAL 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):	55.92 dBμV/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) USB power cable looped once around Steward Ferrite Part number 28A2025-OAO.



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File #: 15MIS109_FCC15.225

January 14, 2015

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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.

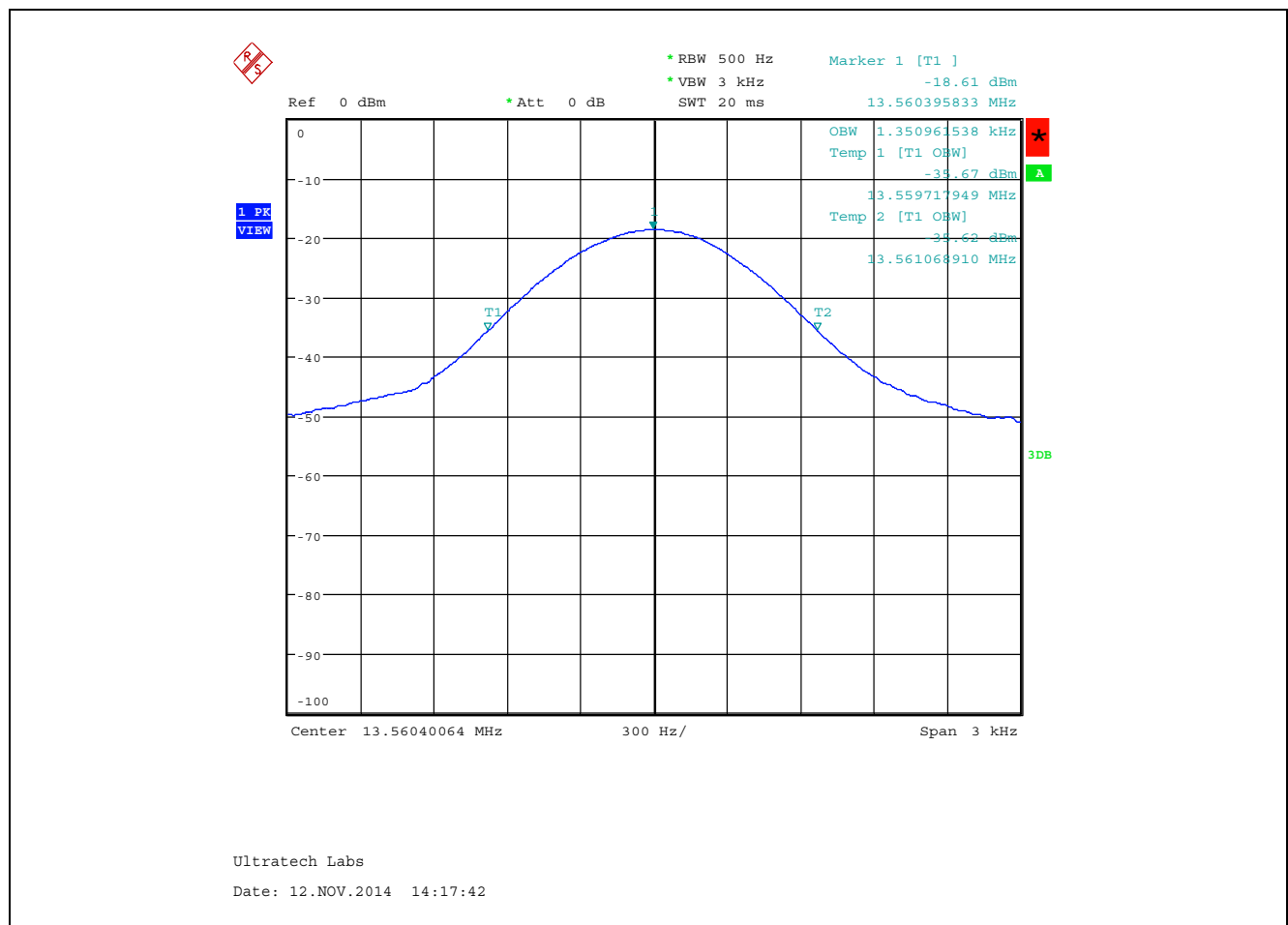
5.1.2. Method of Measurements

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	1.50	1.35

Plot 5.1.3.1. 99% Occupied Bandwidth, 13.56 MHz



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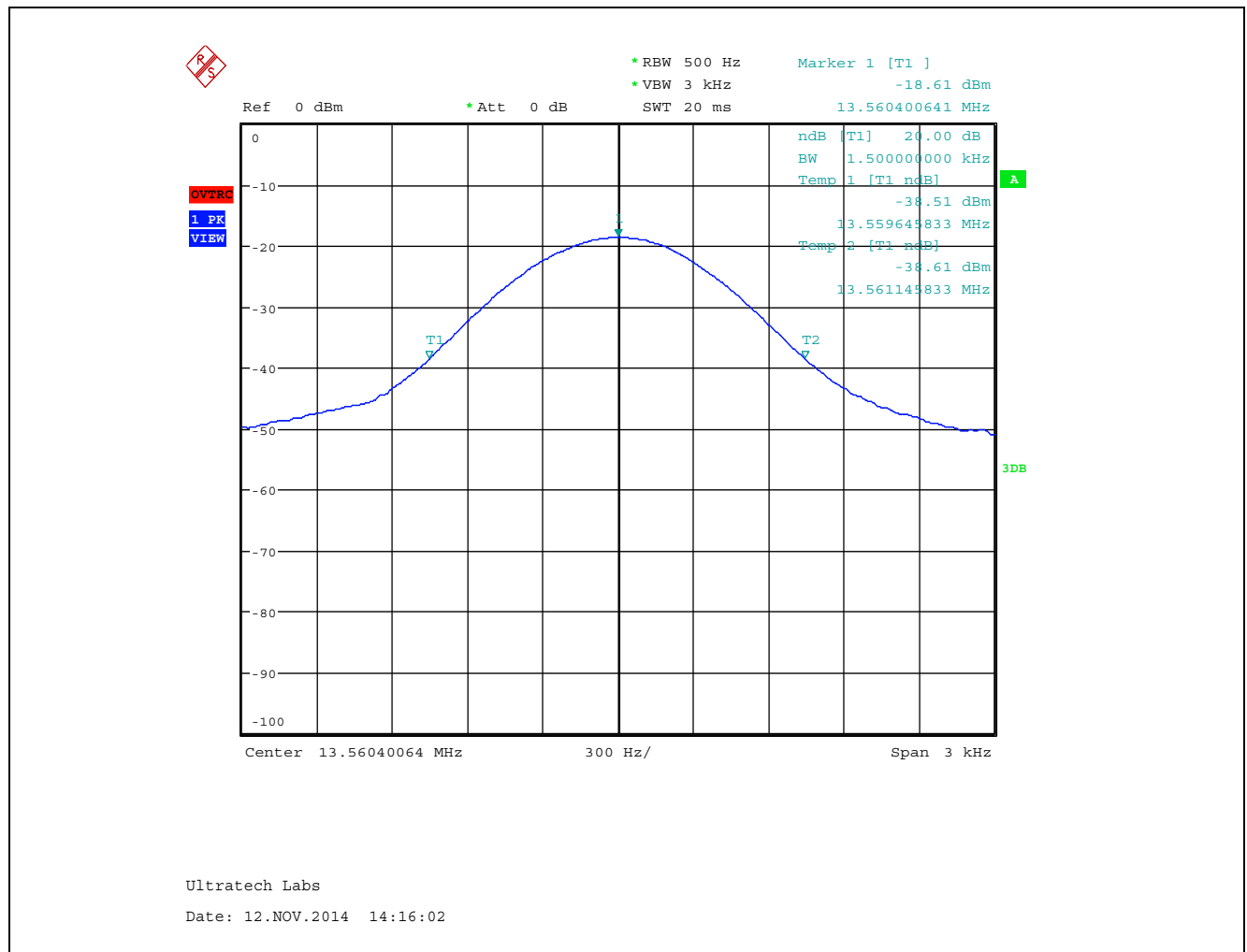
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 15MIS109_FCC15.225

January 14, 2015

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Plot 5.1.3.2. 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 (dBµV/m)	Detector Used (Peak/QP)	Antenna Plane	Field Strength Extrapolated Value (dBµV/m)	§ 15.225 Field Strength Limits (dBµV/m)	Margin (dB)
13.56	54.32	Peak	0°	35.2	84.0	-48.8
13.56	55.92	Peak	90°	36.8	84.0	-47.2

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 (dBµV/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	Field Strength Extrapolated Value (dBµV/m)	§ 15.209 Field Strength Limits (dBµV/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 (dBµV/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	§ 15.209 Field Strength Limits (dBµV/m)	Margin (dB)
67.80	35.50	Peak	V	40.0	-4.5
67.80	34.40	Peak	H	40.0	-5.6
94.92	38.81	Peak	V	43.5	-4.7
108.48	37.73	Peak	V	43.5	-5.8
108.48	27.80	Peak	H	43.5	-15.7

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

The following test data is from the original FCC report submission for the same model L5200 tested in 2011 as confirmed by the applicant.



FCC ID: NVA00007
IC: 1204B-00007

Report No: ER/2011/70015
Issue Date: July 28, 2011
Page: 24 of 25

A. Temperature Variation

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
Vac	Temperature (°C)	(MHz)		
120	-20	13.560833	-16.00	+/- 1.356
120	-10	13.560821	-4.00	+/- 1.356
120	0	13.560825	-8.00	+/- 1.356
120	10	13.560803	14.00	+/- 1.356
120	20	13.560817	0.00	+/- 1.356
120	30	13.560845	-28.00	+/- 1.356
120	40	13.560851	-34.00	+/- 1.356
120	50	13.560895	-78.00	+/- 1.356

B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
Vac	Temperature (°C)	(MHz)		
138	20	13.560833	-16.00	+/- 1.356
120	20	13.560817	0.00	+/- 1.356
102	20	13.560825	-8.00	+/- 1.356

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File #: 15MIS109_FCC15.225
January 14, 2015

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

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 (dBμV)	
	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

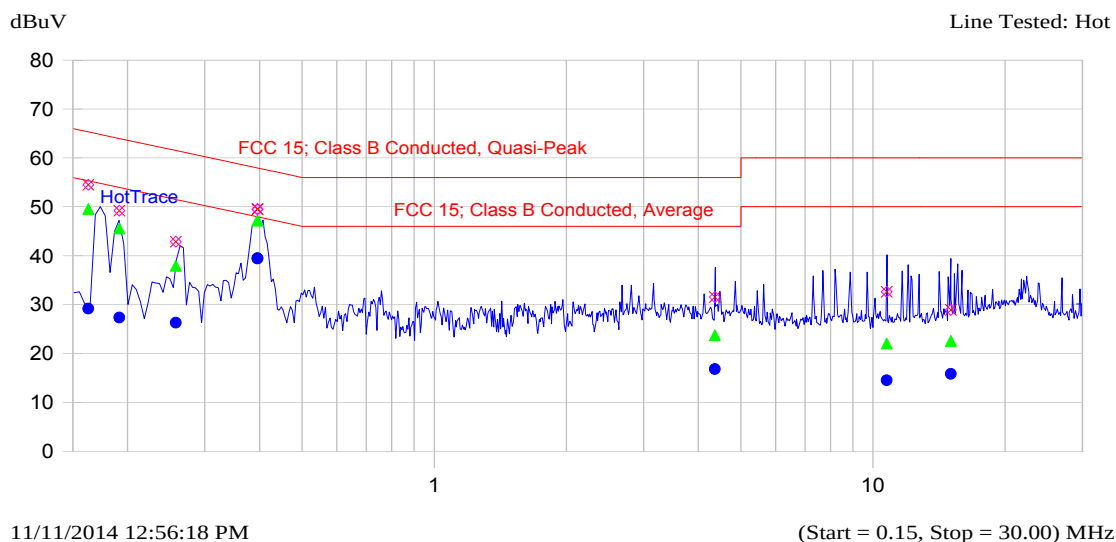
5.4.3. Test Data

Please review the following plots for details of measurements.

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

Description: Supply Voltage:120Vac
Setup Name: FCC 15 Class B
EUT Name: Payment Terminal with RFID reader (13.56 MHz)
Date Created: 11/11/2014 11:49:40 AM

Current Graph



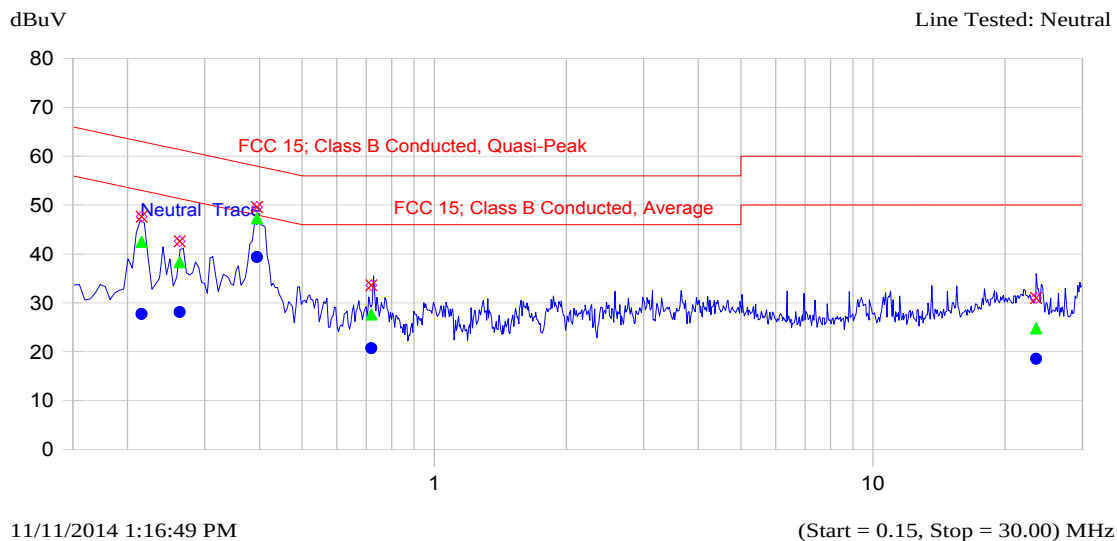
Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.163	54.5	49.6	-16.0	29.2	-26.4	HotTrace
0.191	49.2	45.6	-19.2	27.4	-27.4	HotTrace
0.258	42.8	37.9	-24.9	26.3	-26.6	HotTrace
0.395	49.5	47.2	-11.7	39.4	-9.5	HotTrace
0.396	49.6	47.2	-11.7	39.5	-9.4	HotTrace
4.363	31.5	23.7	-32.3	16.8	-29.2	HotTrace
10.751	32.6	22.0	-38.0	14.5	-35.5	HotTrace
15.050	28.9	22.6	-37.4	15.8	-34.2	HotTrace

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

Description: Supply Voltage:120Vac
Setup Name: FCC 15 Class B
EUT Name: Payment Terminal with RFID reader (13.56 MHz)
Date Created: 11/11/2014 11:49:40 AM

Current Graph



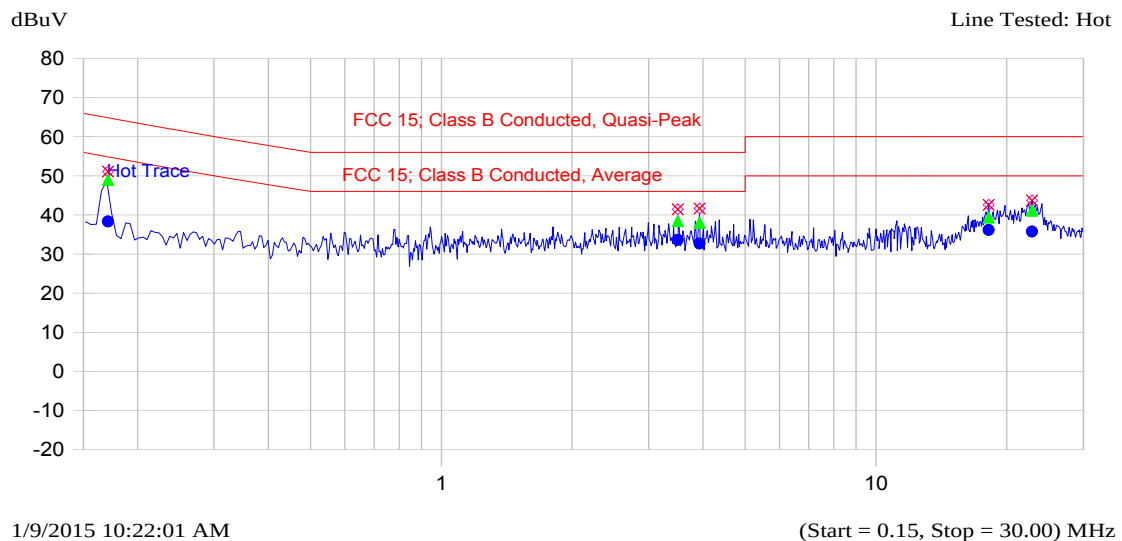
Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.215	47.6	42.5	-21.6	27.7	-26.4	Neutral Trace
0.263	42.6	38.3	-24.4	28.1	-24.6	Neutral Trace
0.394	49.6	47.3	-11.6	39.4	-9.6	Neutral Trace
0.719	33.6	27.6	-28.4	20.8	-25.2	Neutral Trace
23.541	31.0	24.8	-35.2	18.6	-31.4	Neutral Trace

Plot 5.4.3.3. Power Line Conducted Emissions
Test Configuration 2: Power over Ethernet (PoE)
Voltage: 120 VAC, Line Tested: Line

Description: Line Voltage: 120Vac
Setup Name: PoE Powered
EUT Name: Payment Terminal with RFID Reader
Date Created: 1/9/2015 10:18:43 AM

Current Graph



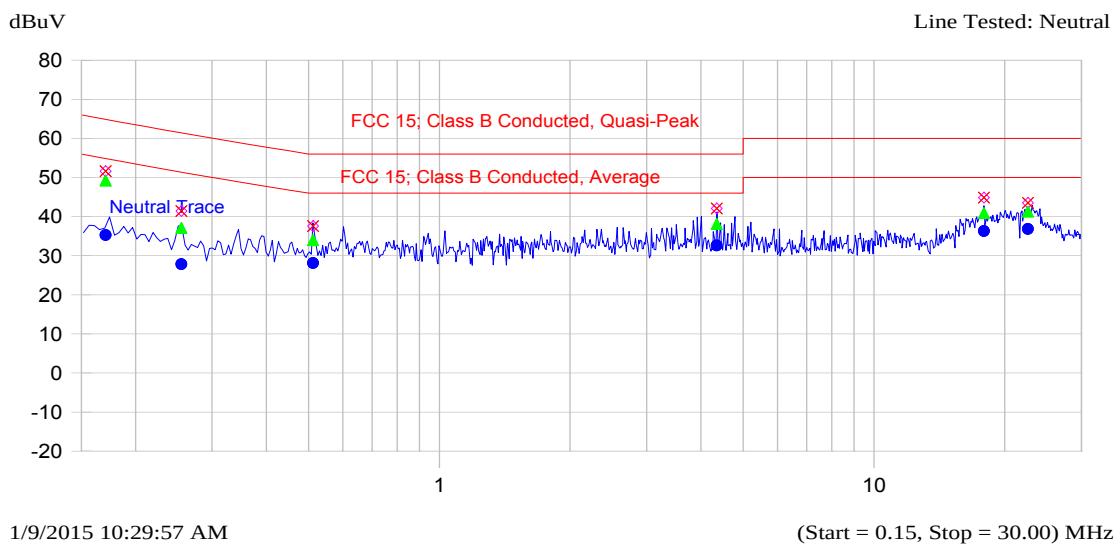
Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.171	51.1	48.9	-16.0	38.3	-16.6	Hot Trace
3.498	41.4	38.4	-17.6	33.6	-12.4	Hot Trace
3.925	41.6	38.0	-18.0	32.7	-13.3	Hot Trace
18.164	42.6	39.3	-20.7	36.2	-13.8	Hot Trace
22.856	43.7	41.1	-18.9	35.8	-14.2	Hot Trace

Plot 5.4.3.4. Power Line Conducted Emissions
Test Configuration 2: Power over Ethernet (PoE)
Voltage: 120 VAC, Line Tested: Neutral

Description: Lin Voltage: 120Vac
Setup Name: PoE Powered
EUT Name: Payment Terminal with RFID Reader
Date Created: 1/9/2015 10:18:43 AM

Current Graph



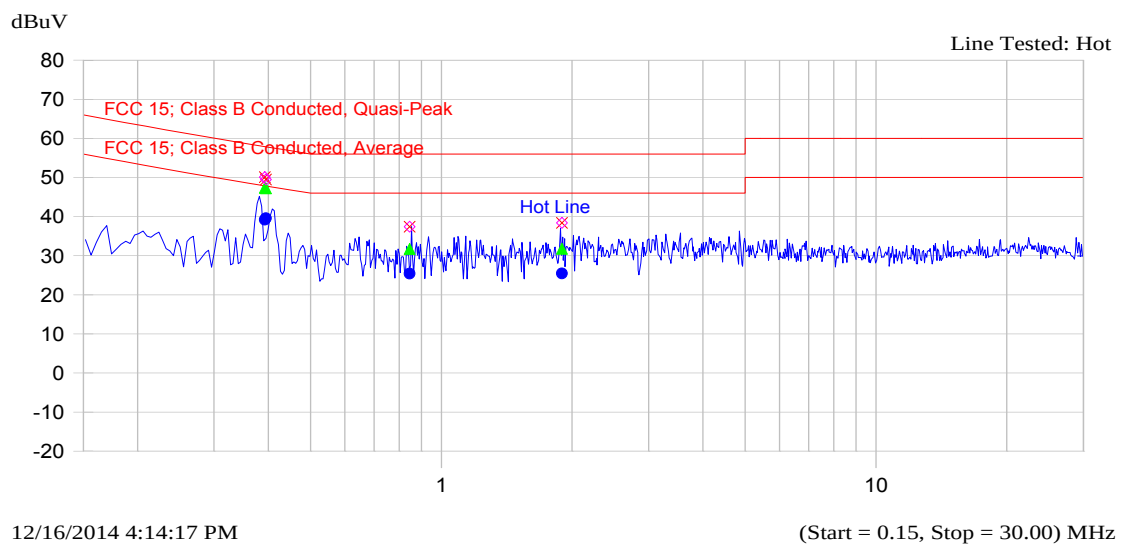
Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP dB	Limit	Avg dBuV	Delta Avg-Avg dB	Limit	Trace Name
0.171	51.6	49.2	-15.7		35.3	-19.7		Neutral Trace
0.255	41.4	37.1	-24.5		27.8	-23.8		Neutral Trace
0.512	37.6	33.9	-22.1		28.1	-17.9		Neutral Trace
4.347	42.1	38.1	-17.9		32.6	-13.4		Neutral Trace
17.903	44.9	40.8	-19.2		36.3	-13.7		Neutral Trace
22.594	43.5	41.3	-18.7		36.8	-13.2		Neutral Trace

Plot 5.4.3.5. Power Line Conducted Emissions
Test Configuration 3: PUSB via Equinox ITE Power Supply and Cable Adapter
Voltage: 120 VAC, Line Tested: Line

Description: Power Input: 120 Vac
Configuration: Powered from PUSB
EUT Name: Payment Terminal with RFID reader
Date Created: 12/16/2014 2:22:44 PM

Current Graph



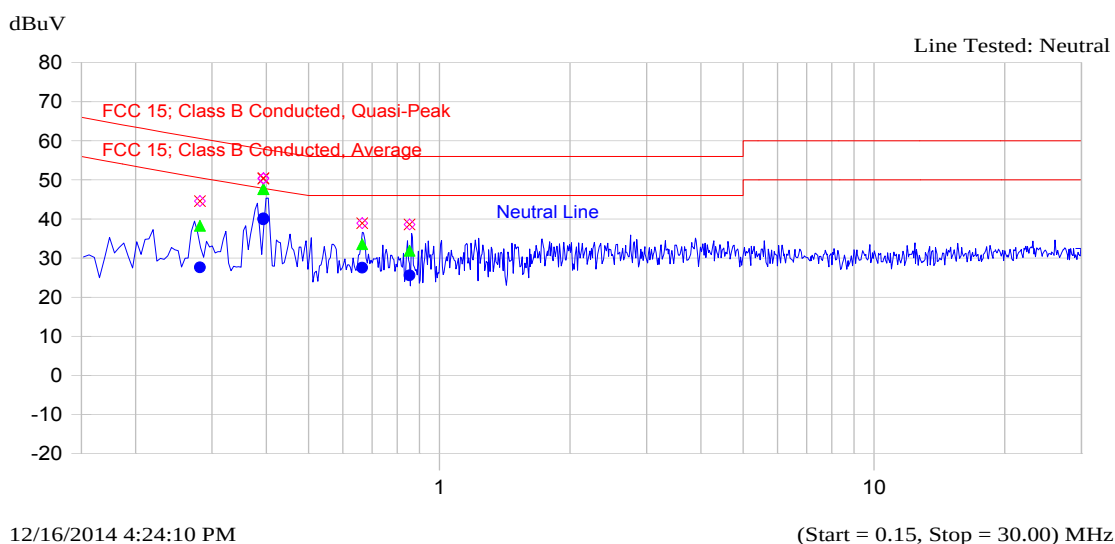
Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta Qp_Qp dB	Limit	Avg dBuV	Delta Avg_Avg dB	Limit	Trace Name
0.393	50.1	47.3	-10.7		39.2	-8.8		Hot Line
0.395	49.5	47.2	-10.8		39.6	-8.4		Hot Line
0.846	37.4	31.7	-24.3		25.4	-20.6		Hot Line
1.894	38.4	31.7	-24.3		25.4	-20.6		Hot Line

Plot 5.4.3.6. Power Line Conducted Emissions
Test Configuration 3: PUSB via Equinox ITE Power Supply and Cable Adapter
Voltage: 120 VAC, Line Tested: Neutral

Description: Power Input: 120 Vac
Configuration: Powered from PUSB
EUT Name: Payment Terminal with RFID reader
Date Created: 12/16/2014 2:22:44 PM

Current Graph



Current List

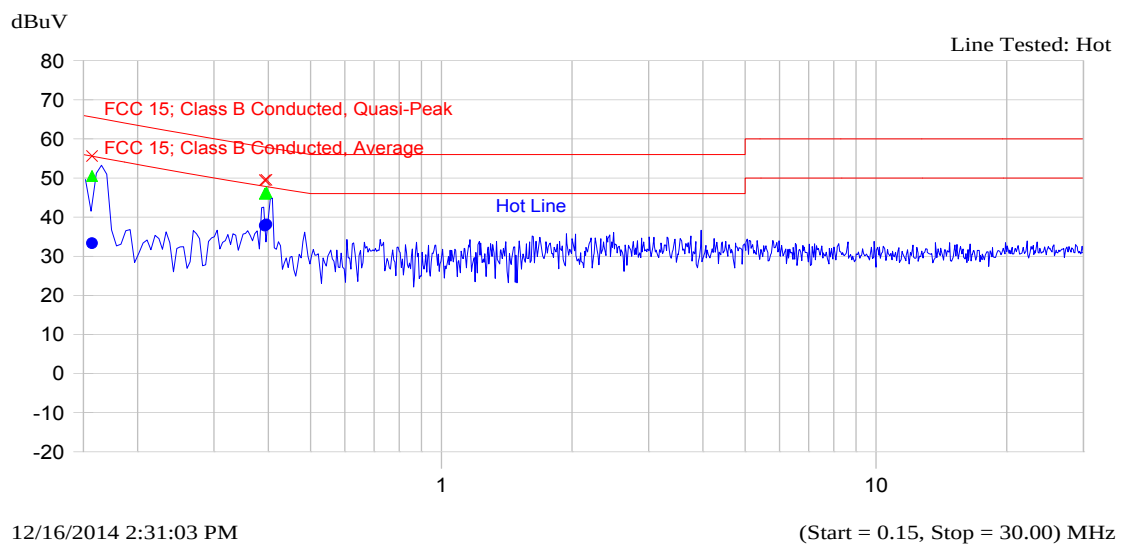
Frequency MHz	Peak dBuV	QP dBuV	Delta Qp_Qp dB	Limit	Avg dBuV	Delta Avg_Avg dB	Limit	Trace Name
0.281	44.5	38.2	-22.5		27.6	-23.2		Neutral Line
0.394	50.3	47.6	-10.4		39.9	-8.1		Neutral Line
0.394	50.4	47.6	-10.4		40.1	-7.9		Neutral Line
0.664	38.9	33.5	-22.5		27.6	-18.4		Neutral Line
0.854	38.6	31.9	-24.1		25.6	-20.4		Neutral Line

Plot 5.4.3.7. Power Line Conducted Emissions

Test Configuration 4: RS232 via Equinox ITE ITE Power Supply and Cable Adapter
Voltage: 120 VAC, Line Tested: Line

Description: Power Input: 120 Vac
Configuration: Powered from RS232
EUT Name: Payment Terminal with RFID reader
Date Created: 12/16/2014 2:22:44 PM

Current Graph



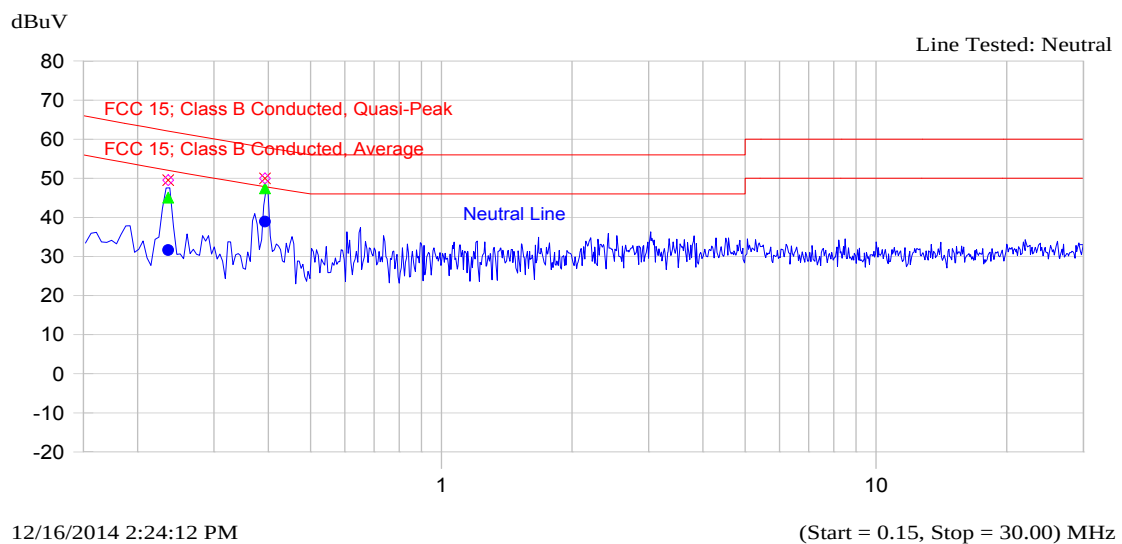
Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta Qp_Qp dB	Limit	Avg dBuV	Delta Avg_Avg dB	Limit	Trace Name
0.157	55.6	50.5	-15.1		33.3	-22.3		Hot Line
0.392	49.4	46.0	-12.0		37.8	-10.2		Hot Line
0.396	49.5	46.3	-11.6		38.1	-9.8		Hot Line

Plot 5.4.3.8. Power Line Conducted Emissions
Test Configuration 4: RS232 via Equinox ITE ITE Power Supply and Cable Adapter
Voltage: 120 VAC, Line Tested: Neutral

Description: Power Input: 120 Vac
Configuration: Powered from RS232
EUT Name: Payment Terminal with RFID reader
Date Created: 12/16/2014 2:22:44 PM

Current Graph



Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta dB	Qp_Qp Limit	Avg dBuV	Delta dB	Avg_Avg Limit	Trace Name
0.235	49.5	45.0	-17.2		31.6	-20.6		Neutral Line
0.393	50.0	47.4	-10.6		38.9	-9.1		Neutral Line

EXHIBIT 6. TEST EQUIPMENT LIST

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Cal. Due Date
Spectrum Analyzer	Rohde & Schwarz	FSU26	200946	20 Hz – 26.5 GHz	14 Jul 2015
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	06 Jan 2016
LISN	Schwarzbeck	NSLK 8127	8127276	10 kHz – 30 MHz	25 Mar 2015
LISN	EMCO	3825/2	8907-1531	10 kHz – 30 MHz	03 Sep 2015

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File #: 15MIS109_FCC15.225

January 14, 2015

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

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