ENGINEERING TEST REPORT

Model No.: Luxe 6200m
FCC ID: COL-LUXE6200M

Applicant:

NBS Payment Solutions Inc.
703 Evans Avenue, Suite 400
Toronto, Ontario
Canada M9C 5E9

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.: 18MIS-122F15C225

This Test report is Issued under the Authority of Tri M. Luu Vice President of Engineering UltraTech Group of Labs Date: April 16, 2018	
Report Prepared by: Santhosh Fernandez Issued Date: April 16, 2018	Tested by: Nimisha Desai and Hien Luu Test Dates: February 28 – March 7, 2018

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart C, Sec. 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:	To gain FCC Equipment Certification for FCC Part 15C.
Test Procedures:	ANSI C63.4 and ANSI C63.10
Environmental Classification:	Commercial, industrial or business environment

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

None.

1.3. NORMATIVE REFERENCES

Publication	Year	Title
FCC CFR Parts 0-19, 80-End	2018	Code of Federal Regulations (CFR), Title 47 – Telecommunication, Part 15 Radio Frequency Devices
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	2013	American National Standard for Testing Unlicensed Wireless Devices
CISPR 22 &	2008-09, Edition 6.0	Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement
CISPR 16-1-1	2010	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:	NBS Payment Solutions Inc.
Address:	703 Evans Avenue, Suite 400 Toronto, Ontario Canada M9C 5E9
Contact Person:	Eric Babbitt Phone #: 416 621 7410 x567 Fax #: 416 621 2450 Email Address: ebabbitt@nbsps.com

Manufacturer	
Name:	NBS Payment Solutions Inc.
Address:	703 Evans Avenue, Suite 400 Toronto, Ontario Canada M9C 5E9
Contact Person:	Eric Babbitt Phone #:416 621 7410 x 567 Fax #: 416 621 2450 Email Address: ebabbitt@nbsps.com

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:	NBS Payment Solutions Inc.
Product Name:	Luxe 6200m
Model Name or Number:	Luxe 6200m
Serial Number:	Test sample
Type of Equipment:	Low Power Communication Device Transmitter
Input Power Supply Type:	4.2V DC from external power supply through Power module Luxe 60m12
Primary User Functions of EUT:	Point of Sale Terminal

2.3. EUT'S TECHNICAL SPECIFICATIONS

Transmitter	
Equipment Type:	Mobile
Intended Operating Environment:	Residential, Commercial, light industry & heavy industry
Power Supply Requirement:	4.2V DC from external power supply through Power module Luxe 60m12
Field Strength:	56.29 dBµV/m at 10 m
Operating Frequency Range:	13.56 MHz
RF Output Impedance:	175 Ω
20 dB Bandwidth:	288.5 kHz
Modulation Type:	ASK
Oscillator Frequencies:	13.56 MHz
Antenna Connector Type:	Integral

Antenna Description	
Manufacturer:	NBS Payment Solutions Inc.
Type:	Loop
Model:	100864-004E
Frequency Range:	13.56MHz

2.4. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Specify minimum length and shielded/non-shielded)
1	Interface Port	1	PCB Pads	N/A

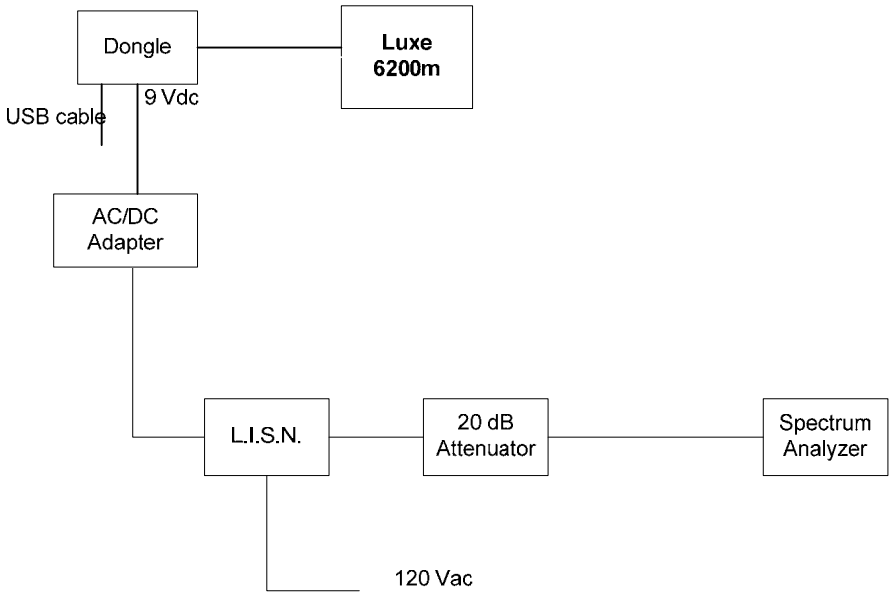
2.5. ANCILLARY EQUIPMENT

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

Ancillary Equipment # 1	
Equipment Make and Name:	Fixed Wired Attachable Power Module
ModelNo.:	Luxe 60m1x (using AC/DC Adaptor ENG SMPS Model: 6A-161WU09)
Connected to EUT's Port #: *(See above table 2.4)*	1. Interface Port

2.6. GENERAL TEST SETUP

2.6.1. Power Line Conducted Emission Test Setup



2.6.2. Radiated Emission Test Setup

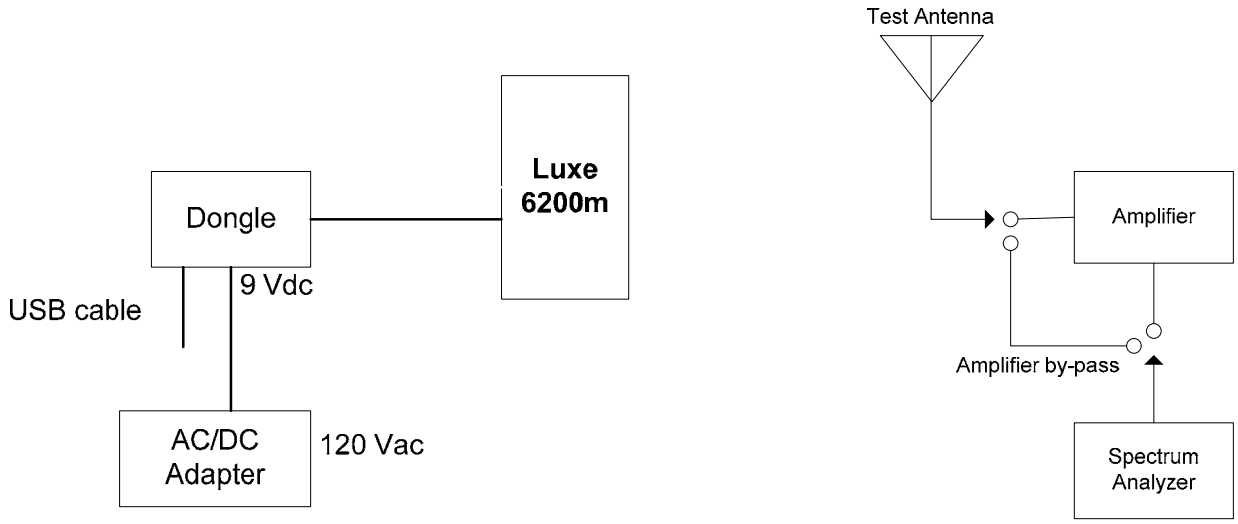


EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21°C
Humidity:	23%
Pressure:	102 kPa
Power input source:	4.2V DC for the EUT supplied by a Power module Luxe 60m12 with 9V DC input

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 Band(s):	13.56 MHz
Test Frequency(ies):	13.56 MHz
Transmitter Wanted Output Test Signals:	
▪ RF Power Output (measured maximum output power):	56.29 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.

- 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 ANAB File No.: AT-1945.

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*
15.107 & 15.207	Class B - Power Line Conducted Emissions	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

* The EUT complies with the requirement; it employs integral antenna.

4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

The following modifications were made for compliance:

1. Power Supply was replaced to meet unintentional radiations

EXHIBIT 5. TEST DATA

5.1. POWERLINE CONDUCTED EMISSION [47 CFR 15.207(a)]

5.1.1. Limit(s)

The equipment shall meet the limits of the following table:

Frequency of emission (MHz)	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

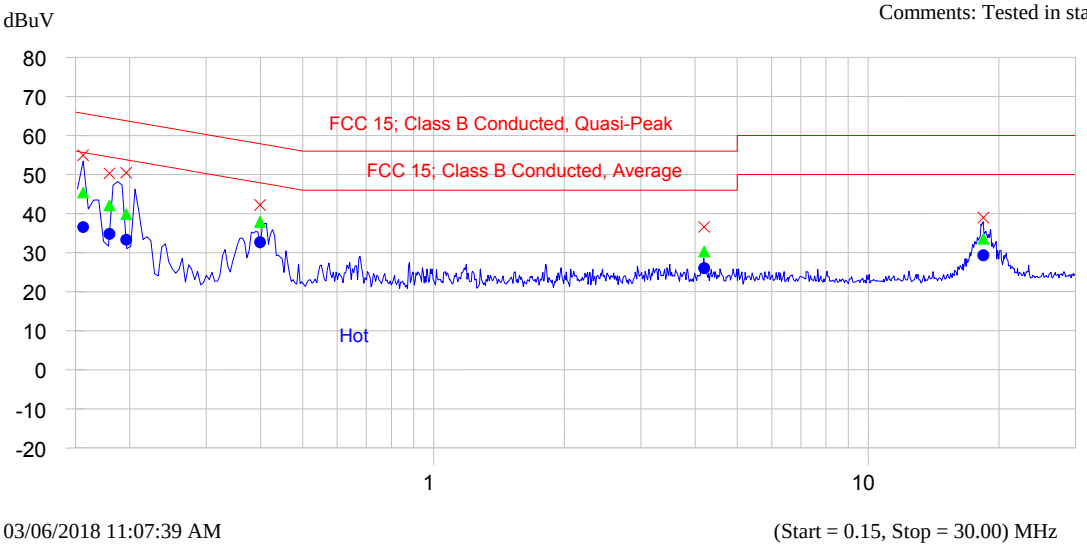
*Decreases linearly with the logarithm of the frequency

5.1.2. Method of Measurements

Refer to ANSI C63.4.

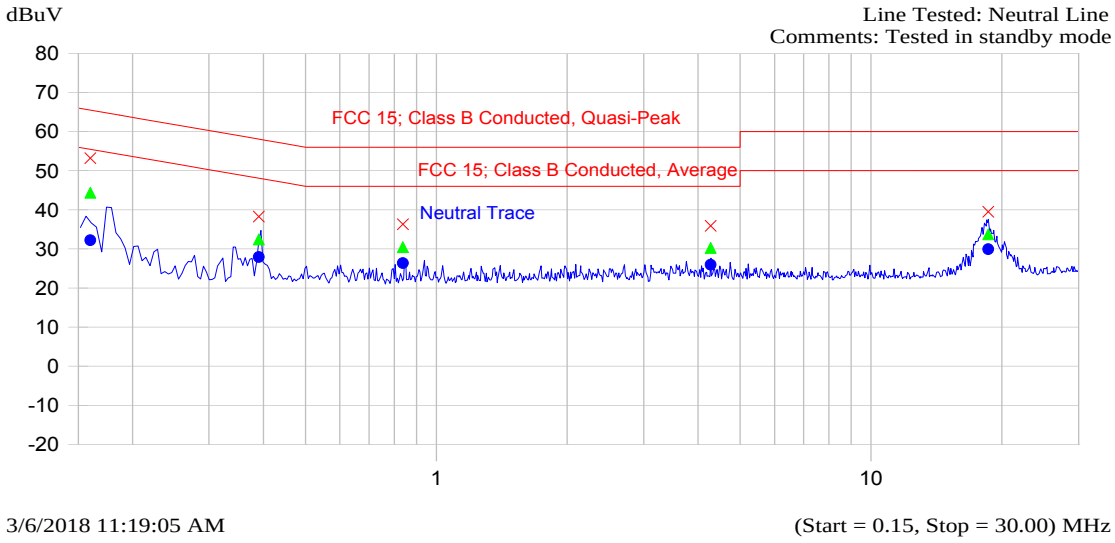
5.1.3. Test Data

Plot 5.1.3.1. Power Line Conducted Emissions –Standby Mode
Line Voltage: 120 Vac; Line Tested: Hot



Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.156	54.9	45.4	-20.3	36.5	-19.1	Hot Trace
0.180	50.3	42.1	-22.4	34.8	-19.7	Hot Trace
0.399	42.2	37.8	-20.0	32.6	-15.2	Hot Trace
4.195	36.6	30.2	-25.8	26.0	-20.0	Hot Trace
18.413	38.9	33.5	-26.5	29.3	-20.7	Hot Trace

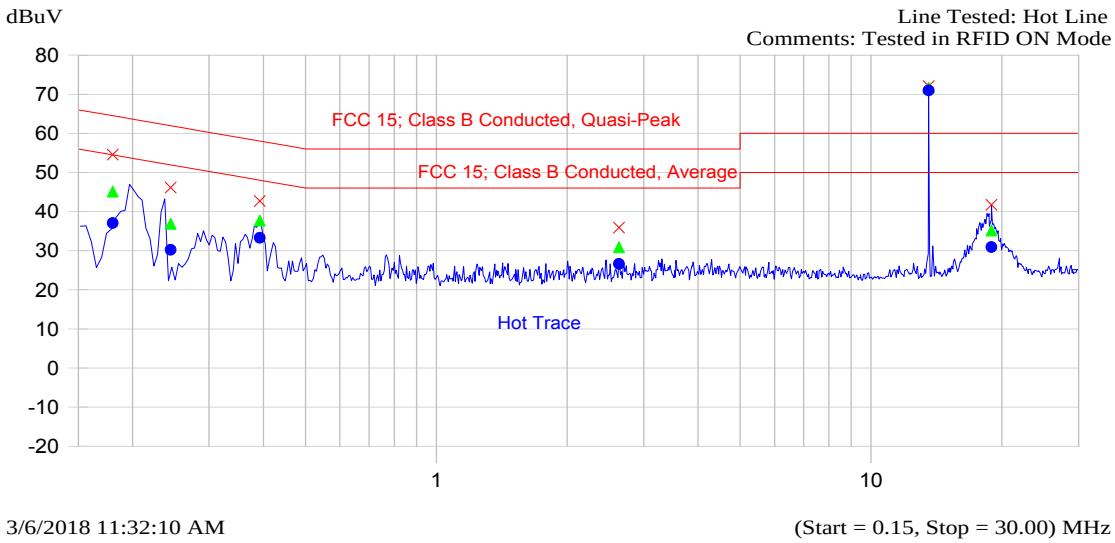
Plot 5.1.3.2. Power Line Conducted Emissions –Standby Mode
Line Voltage: 120 Vac; Line Tested:-Neutral



Current List

Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.160	53.2	44.3	-21.1	32.2	-23.3	Neutral Trace
0.391	38.3	32.4	-25.6	27.9	-20.1	Neutral Trace
0.838	36.3	30.4	-25.6	26.4	-19.6	Neutral Trace
4.276	35.9	30.2	-25.8	26.0	-20.0	Neutral Trace
18.612	39.5	33.7	-26.3	29.9	-20.1	Neutral Trace

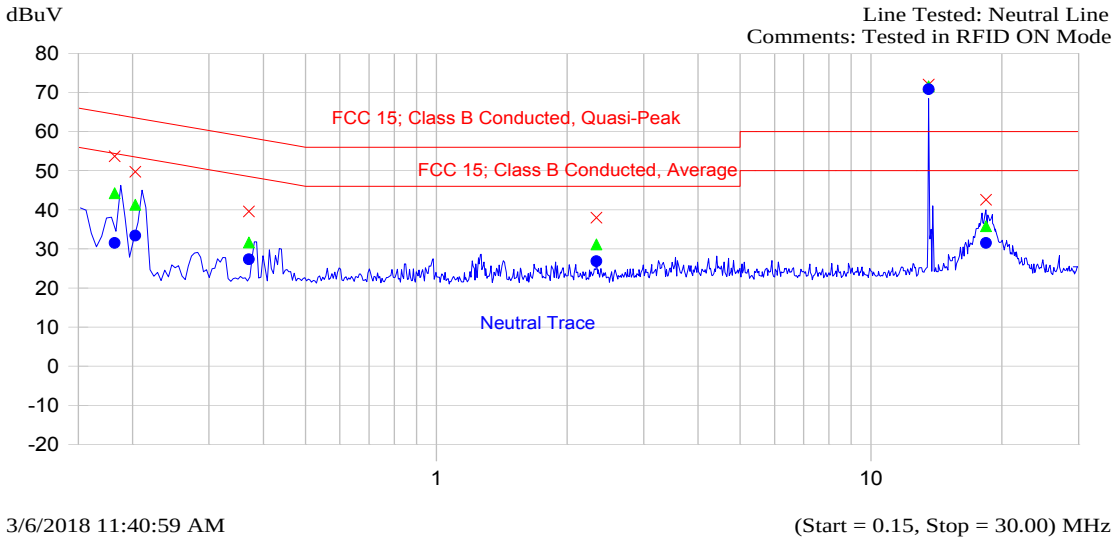
Plot 5.1.3.3. Power Line Conducted Emissions –RFID on without termination
Line Voltage: 120 Vac; Line Tested: Hot



Current List

Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.180	54.6	45.1	-19.4	37.0	-17.4	Hot Trace
0.245	46.1	36.9	-25.0	30.2	-21.7	Hot Trace
0.392	42.7	37.7	-20.3	33.3	-14.7	Hot Trace
2.631	35.9	30.8	-25.2	26.6	-19.4	Hot Trace
13.561	72.1	71.6	11.6	70.9	20.9	Hot Trace
18.917	41.7	35.1	-24.9	30.9	-19.1	Hot Trace

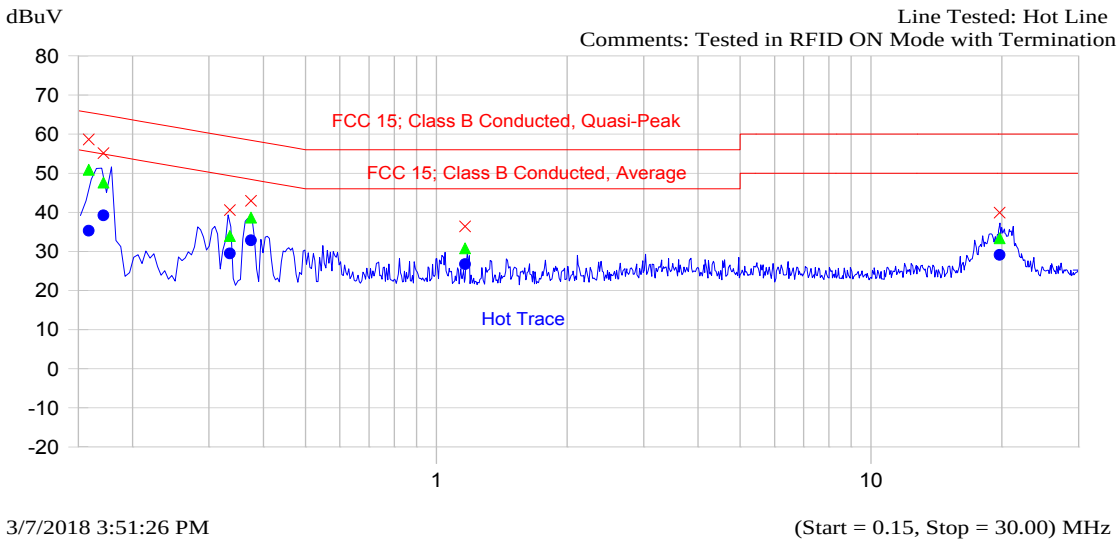
Plot 5.1.3.4. Power Line Conducted Emissions –RFID on without termination
Line Voltage: 120 Vac; Line Tested:-Neutral



Current List

Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.182	53.7	44.2	-20.2	31.5	-22.9	Neutral Trace
0.203	49.7	41.3	-22.2	33.4	-20.1	Neutral Trace
0.370	39.5	31.6	-26.9	27.3	-21.2	Neutral Trace
2.334	38.0	31.1	-24.9	26.9	-19.1	Neutral Trace
13.561	72.0	71.6	11.6	70.8	20.8	Neutral Trace
18.380	42.6	35.8	-24.2	31.5	-18.5	Neutral Trace

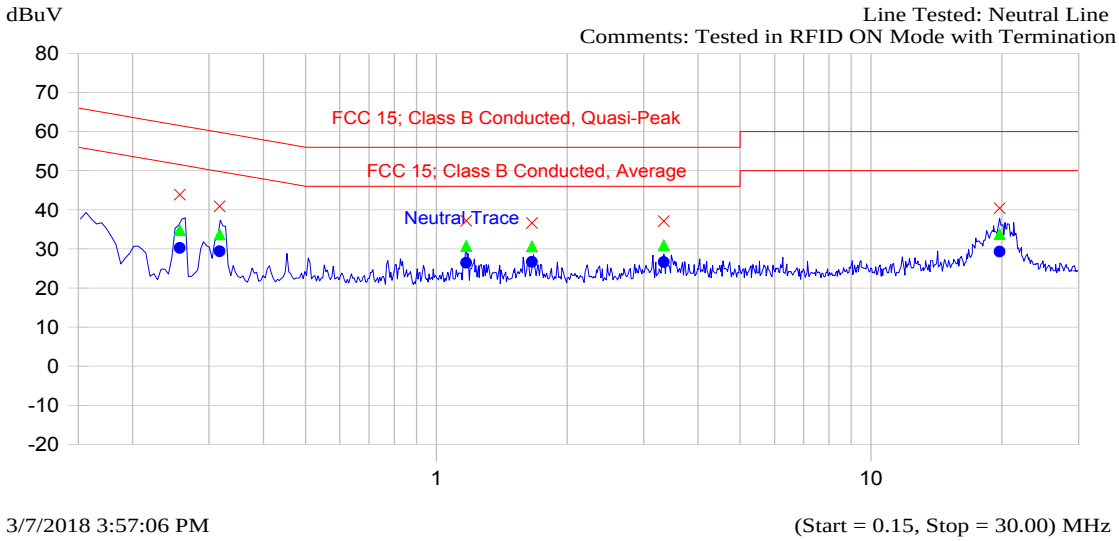
Plot 5.1.3.5. Power Line Conducted Emissions –RFID on with Antenna termination
Line Voltage: 120 Vac; Line Tested: Hot



Current List

Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.159	58.6	50.9	-14.7	35.3	-20.2	Hot Trace
0.172	55.1	47.6	-17.3	39.2	-15.7	Hot Trace
0.335	40.6	34.0	-25.4	29.4	-19.9	Hot Trace
0.374	43.0	38.6	-19.8	32.8	-15.6	Hot Trace
1.165	36.4	30.8	-25.2	26.7	-19.3	Hot Trace
19.768	39.9	33.4	-26.6	29.1	-20.9	Hot Trace

Plot 5.1.3.6. Power Line Conducted Emissions –RFID on with Antenna termination
Line Voltage: 120 Vac; Line Tested:Neutral



Current List

Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.257	43.9	34.8	-26.7	30.2	-21.3	Neutral Trace
0.317	40.9	33.7	-26.1	29.4	-20.4	Neutral Trace
1.171	37.2	30.7	-25.3	26.4	-19.6	Neutral Trace
1.658	36.6	30.6	-25.4	26.7	-19.3	Neutral Trace
3.334	37.1	30.9	-25.1	26.7	-19.3	Neutral Trace
19.766	40.4	33.8	-26.2	29.3	-20.7	Neutral Trace

5.2. EMISSION BANDWIDTH

5.2.1. Limit(s)

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

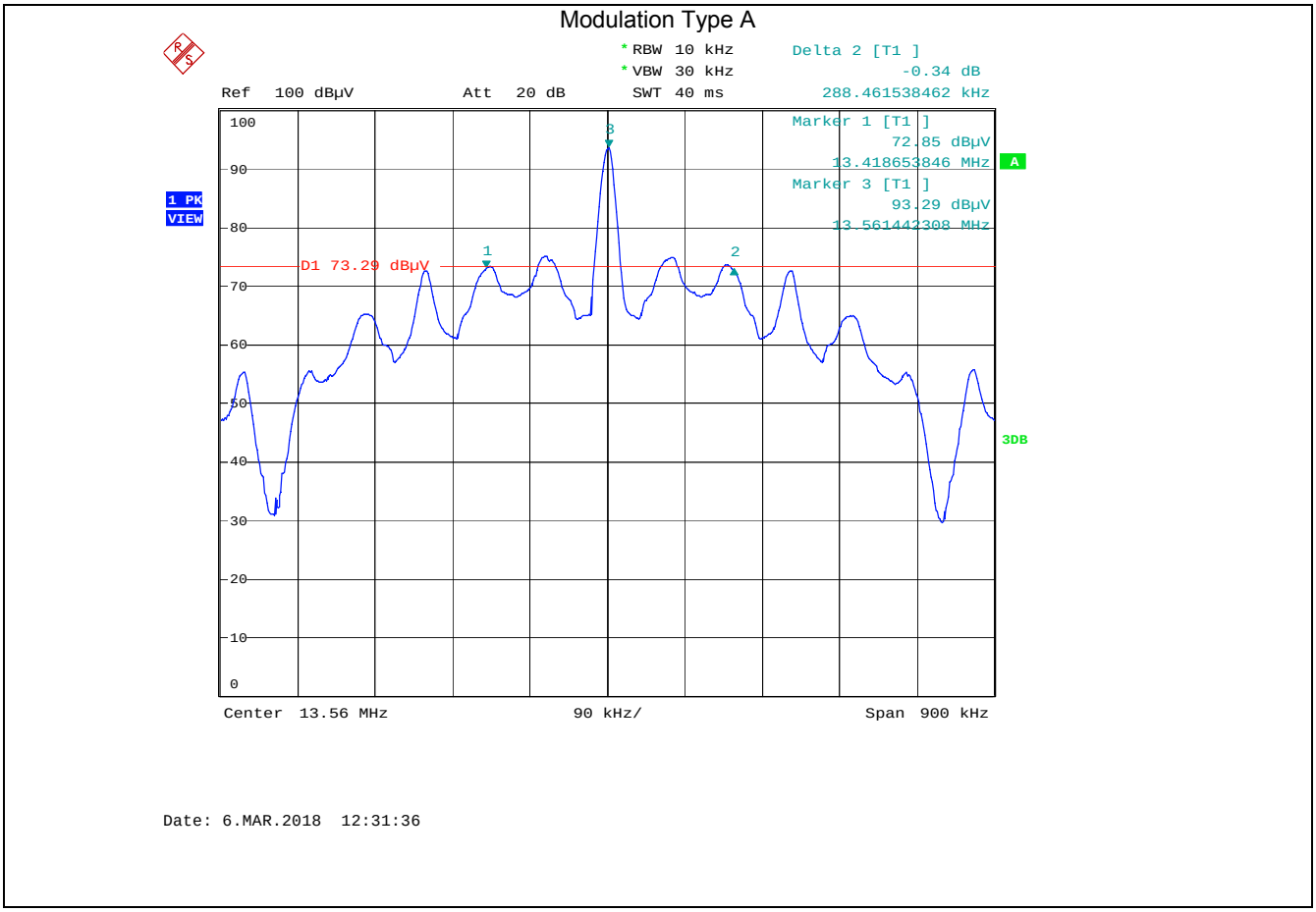
5.2.2. Method of Measurements

The measurements were performed in accordance with Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4.

5.2.3. Test Data

Test Frequency (MHz)	Occupied Bandwidth (kHz)	
	20 dB BW	99 % BW
13.56	288.46	445.67

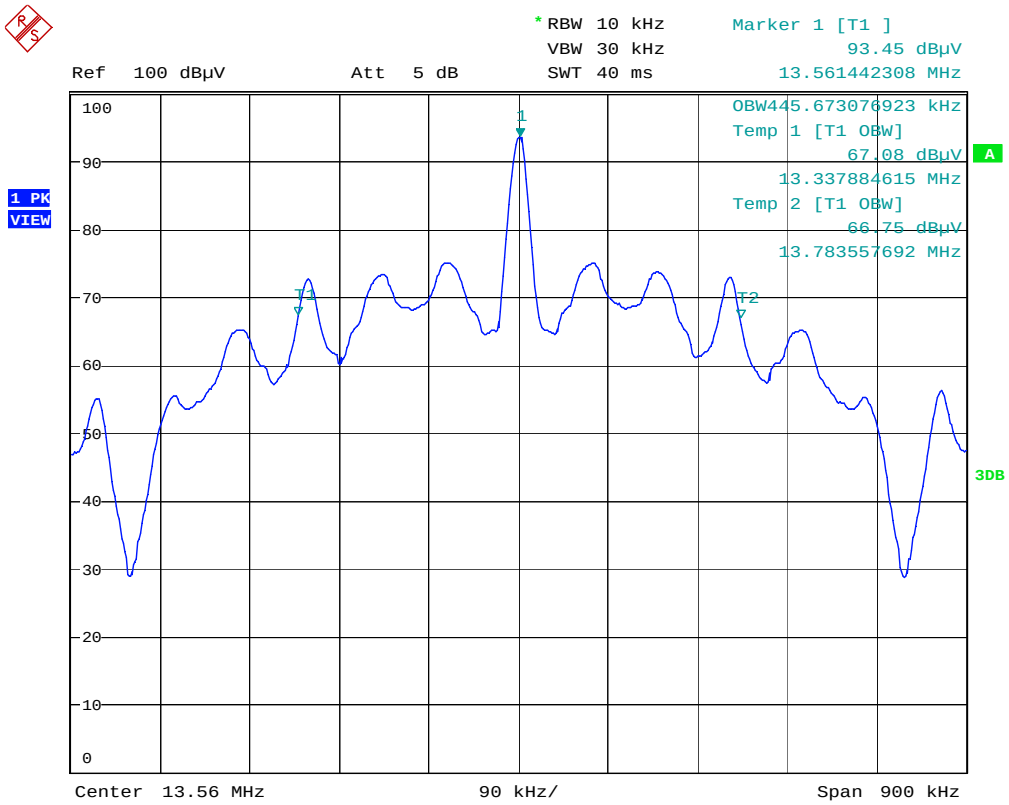
Plot 5.2.3.1. 20 dB Bandwidth, Fc: 13.56 MHz



Plot 5.2.3.2. 20 dB Bandwidth, Fc: 13.56 MHz

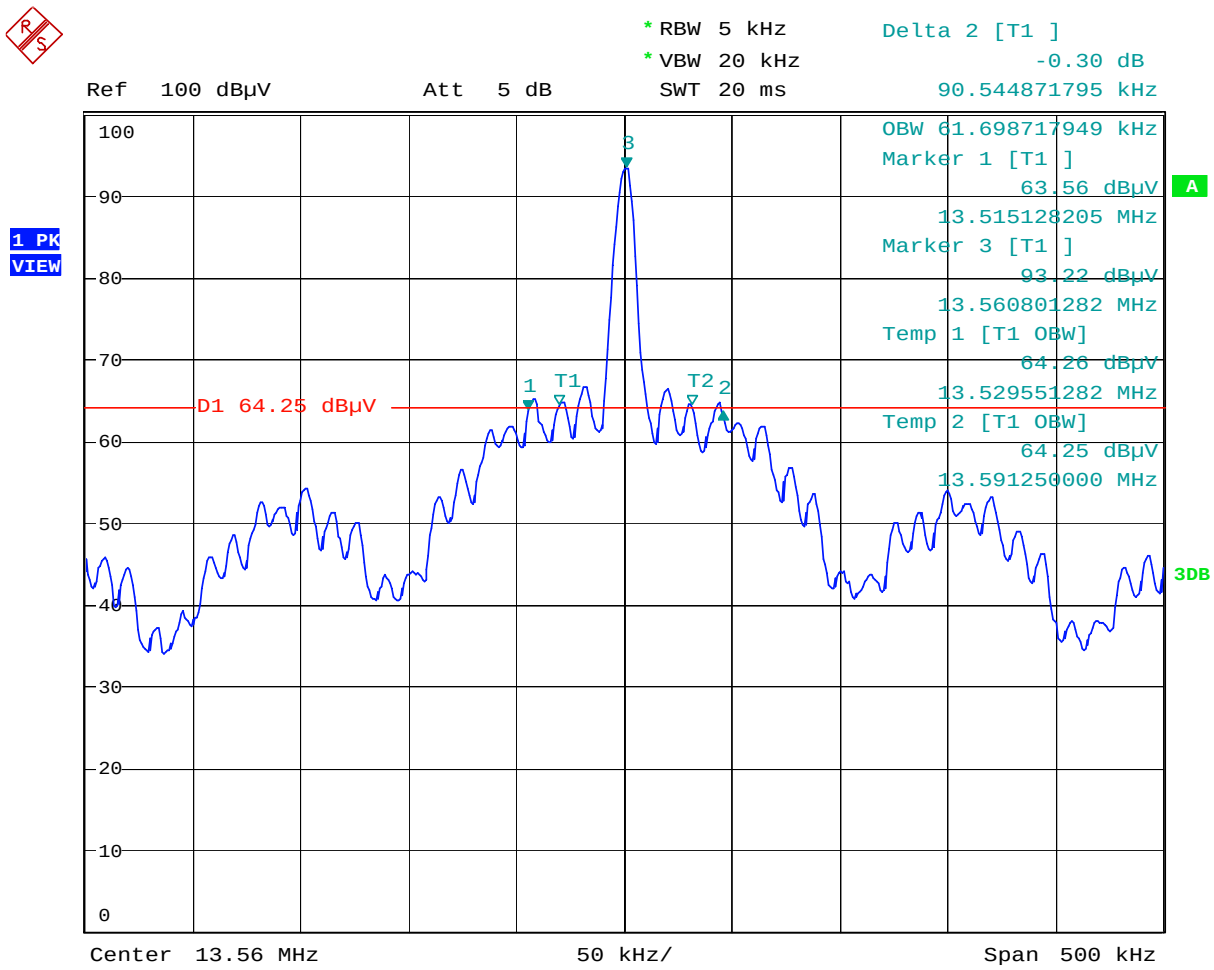
Plot 5.2.3.3. 99% Occupied Bandwidth, Fc: 13.56 MHz

Modulation Type A



Plot 5.2.3.4. 99% Occupied Bandwidth, Fc: 13.56 MHz

Modulation Type B



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

5.3.1. 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 Limts; 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

5.3.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4 for measurement methods

5.3.3. Test Data

Remarks:

- Radiated spurious emissions measurements were performed at a measuring distance of 10 m, from 10 kHz – 10th harmonic of the fundamental 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.
- Three orientations were pre-scanned and the worst case readings are shown below using Type A modulation operaion.

5.3.3.1. 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 30m Value (dBµV/m)	§ 15.225 Field Strength Limits (dBµV/m)	Margin (dB)
13.56	42.6	PEAK	flat	23.52	84.0	-60.48
13.56	56.29	PEAK	0 degree	37.21	84.0	-46.79
13.56	55.89	PEAK	90degree	36.81	84.0	-47.19

5.3.3.2. 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	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.						

5.3.3.3. 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)
40.68	28.69	PEAK	V	40	-11.31
40.68	21.65	PEAK	H	40	-18.35
54.24	27.58	PEAK	V	40	-12.42
54.24	17.6	PEAK	H	40	-22.4
67.8	24.69	PEAK	V	40	-15.31
67.8	19.35	PEAK	H	40	-20.65
71.36	21.81	PEAK	V	40	-18.19
71.36	16.16	PEAK	H	40	-23.84
94.92	21.85	PEAK	V	43.5	-21.65
94.92	21.48	PEAK	H	43.5	-22.02
108.48	29.55	PEAK	V	43.5	-13.95
108.48	18.41	PEAK	H	43.5	-25.09
122.04	30.67	PEAK	V	43.5	-12.83
122.04	20.7	PEAK	H	43.5	-22.8
135.6	26.88	PEAK	V	43.5	-16.62
135.6	19.38	PEAK	H	43.5	-24.12
162.13	28.5	PEAK	V	43.5	-15
162.13	21.7	PEAK	H	43.5	-21.8
297.37	37.49	PEAK	V	46	-8.51
297.37	31.88	PEAK	H	46	-14.12
311.36	35.45	PEAK	V	46	-10.55
311.36	27.15	PEAK	H	46	-18.85
325.35	39.64	PEAK	V	46	-6.36
325.35	36.14	PEAK	H	46	-9.86
351.77	35	PEAK	V	46	-11
351.77	29.02	PEAK	H	46	-16.98
583.39	35.46	PEAK	V	46	-10.54
583.39	30.76	PEAK	H	46	-15.24

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

5.4.1. Limit(s)

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.

5.4.2. Method of Measurements

ANSI C63.4-2014.

5.4.3. Test Data

Full power at 56.29 dBuV/m @ 10m

Frequency Band:	13.56 MHz
Center Frequency:	13.56 MHz
Frequency Tolerance Limit:	± 0.01% (±1356 Hz)
Max. Frequency Tolerance Measured:	641 Hz
Input Voltage Rating:	9 VDC on DC input of Power module

Ambient Temperature (°C)	**Frequency Drift (Hz)**		
	Supply Voltage (Nominal) 9 VDC	**Supply Voltage (85 % of Nominal) 7.65 VDC**	**Supply Voltage (115% of Nominal) 10.35 VDC**
-30	-321	N/A	N/A
-20	641	N/A	N/A
-10	481	N/A	N/A
0	-321	N/A	N/A
10	160	N/A	N/A
20	0	0	0
30	160	N/A	N/A
40	481	N/A	N/A
50	160	N/A	N/A

EXHIBIT 6. TEST EQUIPMENT LIST

6.1. Emission Bandwidth, Field Strength of Emissions Inside and Outside the Permitted Band, Frequency Stability

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Cal. Due Date
Spectrum Analyzer	Rohde & Schwarz	FSU	200946	20 Hz – 26.5 GHz	21 Jul 2018
Environmental Chamber	Envirotronics	SSH32C	11994847-S-11059	-60 to 177 degree C	01 Jun 2018
Loop Antenna	Emco	6502	9104-2611	10 kHz – 30 MHz	15 Dec 2019
Spectrum Analyzer	Rohde & Schwarz	ESU40	100037	20 Hz – 40 GHz	9 May 2018
RF Amplifier	Com-Power	PAM-0118A	551052	500 MHz – 18 GHz	17 Jul 2018
Biconi-Log Antenna	ETS Lindgren	3142	9601-1005	26 – 2000 MHz	12 May 2018

Test Dates: Feb 28 and March 6, 2018

6.2. Power Line Conducted Emissions

Spectrum Analyzer	Agilent	E7405A	US39440181	9 kHz–26.5 GHz	11 May, 2018
Attenuator	Pasternack	PE7010-20	7	DC–2 GHz	13 Mar 2018
L.I.S.N	EMCO	3825/2	8907-1531	10kHz -100 MHz	20 Feb 2019

Test Dates: March 6, 2018

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. CONDUCTED EMISSION MEASUREMENT UNCERTAINTY

	Line Conducted Emission Measurement Uncertainty (9 KHz – 30 MHz):	Measured	Limit
u_c	Combined standard uncertainty: $u_c(y) = \sqrt{\sum_{i=1}^{m} u_i^2(y)}$	± 1.31	± 1.8
U	Expanded uncertainty U: $U = 2u_c(y)$	± 2.62	± 3.6

7.2. RADIATED EMISSION MEASUREMENT UNCERTAINTY

	Radiated Emission Measurement Uncertainty (10 KHz – 30 MHz):	Measured	Limit
u_c	Combined standard uncertainty: $u_c(y) = \sqrt{\sum_{i=1}^{m} u_i^2(y)}$	± 1.30	± 2.6
U	Expanded uncertainty U: $U = 2u_c(y)$	± 2.60	± 5.2

	Radiated Emission Measurement Uncertainty @ 3m, Horizontal (30-1000 MHz):	Measured (dB)	Limit (dB)
u_c	Combined standard uncertainty: $u_c(y) = \sqrt{\sum_{i=1}^{m} u_i^2(y)}$	± 2.15	± 2.6
U	Expanded uncertainty U: $U = 2u_c(y)$	± 4.30	± 5.2

	Radiated Emission Measurement Uncertainty @ 3m, Vertical (30-1000 MHz):	Measured (dB)	Limit (dB)
u_c	Combined standard uncertainty: $u_c(y) = \sqrt{\sum_{i=1}^{m} u_i^2(y)}$	± 2.14	± 2.6
U	Expanded uncertainty U: $U = 2u_c(y)$	± 4.29	± 5.2

	Radiated Emission Measurement Uncertainty @ 3 m, Horizontal & Vertical (1 – 18 GHz):	Measured (dB)	Limit (dB)
u_c	Combined standard uncertainty: $u_c(y) = \sqrt{\sum_{i=1}^{m} u_i^2(y)}$	± 1.52	Under consideration
U	Expanded uncertainty U: $U = 2u_c(y)$	± 3.04	Under consideration