FCC and Industry Canada Testing of the Domino UK Limited RFiD QMM Module, Model: EPT038882 In accordance with FCC 47 CFR Part 15C, Industry Canada RSS-210 and Industry Canada RSS-GEN

Product Service

Choose certainty.
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Prepared for: Domino UK Limited
PO Box 538
Bar Hill
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CB23 8TU

FCC ID: 2AHFK-EPT038882
IC: 21200-EPT038882

COMMERCIAL-IN-CONFIDENCE

Date: November 2017
Document Number: 75939628-07 | Issue: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Jennifer Harris	20 December 2017	
Authorised Signatory	Matt Russell	20 December 2017	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

ENGINEERING STATEMENT
The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C, Industry Canada RSS-210 and Industry Canada RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Mehadi Choudhury	20 December 2017	
Testing	Graeme Lawler	20 December 2017	
Testing	Jack Tuckwell	20 December 2017	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
IC2932B-1 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15C: 2016, Industry Canada RSS-210: Issue 09 (08-2016) and Industry Canada RSS-GEN: Issue 04 (11-2014).

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Product Service

Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	20 December 2017

Table 1

1.2 Introduction

Applicant	Domino UK Limited
Manufacturer	Domino UK Limited
Model Number(s)	EPT038882
Serial Number(s)	Not Serialised (75939628-TSR0014)
Hardware Version(s)	R02
Software Version(s)	5.2
Number of Samples Tested	3
Test Specification/Issue/Date	FCC 47 CFR Part 15C: 2016 Industry Canada RSS-210: Issue 09 (08-2016) Industry Canada RSS-GEN: Issue 04 (11-2014)
Order Number Date	PO292767 03-July-2017
Date of Receipt of EUT	15-September-2017
Start of Test	20-September-2017
Finish of Test	27-September-2017
Name of Engineer(s)	Mehadi Choudhury, Graeme Lawler and Jack Tuckwell
Related Document(s)	ANSI C63.10 (2013)

Product Service

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C, Industry Canada RSS-210 and Industry Canada RSS-GEN is shown below.

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 15C	RSS-210	RSS-GEN			
Configuration and Mode: DC Powered - RFiD Active						
2.1	15.215 (c)	-	6.6	20 dB Bandwidth	Pass	ANSI C63.10
2.2	15.225 (a)(b)(c)(d)	B.6	6.13	Field Strength of any Emission	Pass	ANSI C63.10
2.3	15.225 (e)	B.6	6.11	Frequency Tolerance Under Temperature Variations	Pass	ANSI C63.10

Table 2

Product Service

1.4 Application Form

EQUIPMENT DESCRIPTION	
Model Name/Number	Quality Management Module Wireless
Part Number	EPT038882
Hardware Version	R02
Software Version	5.2
Technical Description (Please provide a brief description of the intended use of the equipment)	Dual RFID Tranceiver for Consumable Management

TRANSMITTER TECHNICAL CHARACTERISTICS		
FREQUENCY CHARACTERISTICS		
Transmitter channel switching frequency range:	13.553 to 13.567	MHz)
Transmitter frequency alignment range:	to	MHz
Please confirm that the OFDM system shall have one or more carriers per 1MHz Bandwidth	☐Yes	☐No

TRANSMITTER POWER CHARACTERSITICS				
Maximum Effective Rated Power (rated as stated by the manufacturer):	1.3µ	W		
Is transmitter intended for :				
Continuous Operation	☐	Yes	☒	No
Intermittent Operation	☒	Yes	☐	No
If intermittent state DUTY CYCLE:				
38% OR Transmitter ON seconds Transmitter OFF minutes				
Is transmitter output power variable:				
	☐	Yes	☒	No
☐ Continuously variable	☐ Stepped			
dB per step				
Maximum RF output power (Watts)	Minimum RF output power (Watts)			

TRANSMITTER - MODULATION			
☐ Frequency		☐ Phase	
☒ Others	Detail	**Amplitude Modulation**	

RECEIVER TECHNICAL CHARACTERISTICS		
RECEIVER - FREQUENCY		
RECEIVER CHANNEL SWITCHING FREQUENCY RANGE	to	MHz
RECEIVER FREQUENCY ALIGNMENT RANGE	to	MHz

Product Service

TRANSMITTER AND RECEIVER CHARACTERISTICS	
Channel Separation:	kHz
State the maximum number of channels over which the equipment can operate:	Device Is Single Channel - n/a

AUTOMATIC EQUIPMENT SWITCH OFF
If the equipment is designed to automatically switch off at a predetermined voltage level which is higher or lower in value than the battery minimum and minimum calculated values this shall be clearly stated.
☐ Applies V cut-off voltage
☒ Does not apply

POWER SOURCE				
☐ AC mains		State voltage		
AC supply frequency	(Hz)	VAC		Max Current
☐ Single phase		☐ Three phase		
And / Or				
☒ External DC supply				
Nominal voltage	24V	Max Current	0.5	A
Extreme upper voltage		Extreme lower voltage		
Battery				
☐ Nickel Cadmium				
☐ Lead acid (Vehicle regulated)				
☐ Alkaline				
☐ Leclanche				
☐ Lithium				
☐ Other Details :	no battery fitted			
Volts nominal.				
End point voltage as quoted by equipment manufacturer		V		

Antenna Information	
Frequency	13.56 MHz
Gain	
Calculated Equivalent Isotropic Radiated Power	

I hereby declare that the information supplied is correct and complete.

Name: Matt Smith Position held: Group Compliance Engineer

Date: 2nd October 2017

1.5 Product Information

1.5.1 Technical Description

RFiD based device used to check the correct consumables are used with a Domino printer (i.e. tells customer they have put the wrong ink in the printer).

1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Serial Number: Not Serialised (75939628-TSR0014)			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

1.8 Test Location

TÜV SÜD Product Service conducted the following tests at our Fareham Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: DC Powered - RFiD Active		
20 dB Bandwidth	Mehadi Choudhury	UKAS
Field Strength of any Emission	Graeme Lawler and Jack Tuckwell	UKAS
Frequency Tolerance Under Temperature Variations	Mehadi Choudhury	UKAS

Table 4

Office Address:

Octagon House
Concorde Way
Segensworth North
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Test Details

2.1 20 dB Bandwidth

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.215 (c),
Industry Canada RSS-GEN, Clause 6.6

2.1.2 Equipment Under Test and Modification State

EPT038882, S/N: Not Serialised (75939628-TSR0014) - Modification State 0

2.1.3 Date of Test

25-September-2017

2.1.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.9.1.

2.1.5 Environmental Conditions

Ambient Temperature	21.2 °C
Relative Humidity	67.1 %

2.1.6 Test Results

DC Powered - RFiD Active

Frequency (MHz)	20 dB Bandwidth (Hz)	99% Occupied Bandwidth (Hz)	F_{LOWER} (MHz)	F_{UPPER} (MHz)
13.56	202	688	13.559645	13.560333

Table 5

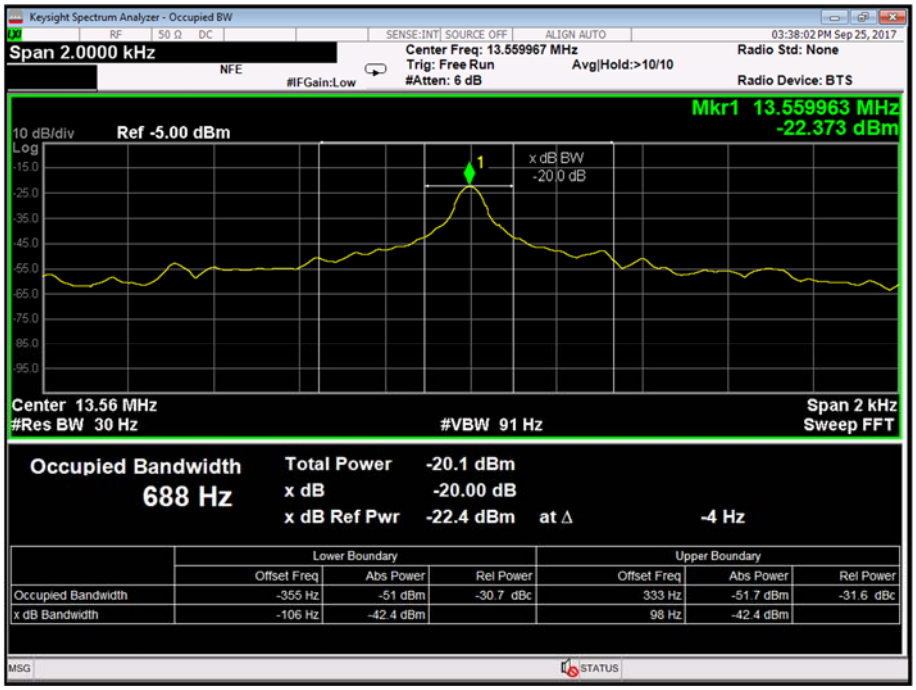

Figure 1 - 20 dB Bandwidth and 99% Occupied Bandwidth

FCC 47 CFR Part 15, Limit Clause 15.215 (c)

The 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Industry Canada RSS 210 and Industry Canada RSS GEN, Limit Clause

None specified.

2.1.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
RF Coupler	TUV SUD Product Service	RFC1	414	TU	-
Multimeter	Iso-tech	IDM-101	466	12	02-Oct-2017
Hygrometer	Rotronic	I-1000	3220	12	30-Aug-2018
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	12-Mar-2018
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	12-Jan-2018
4 Channel PSU	Rohde & Schwarz	HMP4040	4736	-	O/P Mon
1 metre K type Cable	IW Microwave	KPS-1501LC-394-KPS-R	4830	12	24-Jan-2018

Table 6

TU – Traceability Unscheduled.
O/P Mon – Output Monitored using calibrated equipment

2.2 Field Strength of any Emission

2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.225 (a)(b)(c)(d)
Industry Canada RSS-210, Clause B.6
Industry Canada RSS-GEN, Clause 6.13

2.2.2 Equipment Under Test and Modification State

EPT038882, S/N: Not Serialised (75939628-TSR0014) - Modification State 0

2.2.3 Date of Test

20-September-2017

2.2.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.3, 6.4 and 6.5.

Pre-scan measurements were made at a distance of 3 m as shown by the plots below using a peak detector. Final emission measurements were then made using a Quasi-Peak detector and recorded in the tables below. The limit lines shown on the plot were extrapolated from either 300 m or 30 m to the measurement distance of 3 m in accordance with ANSI C63.10 Clause 6.4.4.2.

2.2.5 Environmental Conditions

Ambient Temperature	18.1 - 19.0 °C
Relative Humidity	48.0 - 57.0 %

2.2.6 Test Results

DC Powered - RFiD Active, Carrier Results

Frequency (MHz)	Quasi-Peak Level (dBµV/m) at 3m	Quasi-Peak Level (dBµV/m) at 30m	Quasi-Peak Level (µV/m) at 3m	Quasi-Peak Level (µV/m) at 30m
13.56	68.61	47.22	2694.64	229.61

Table 7

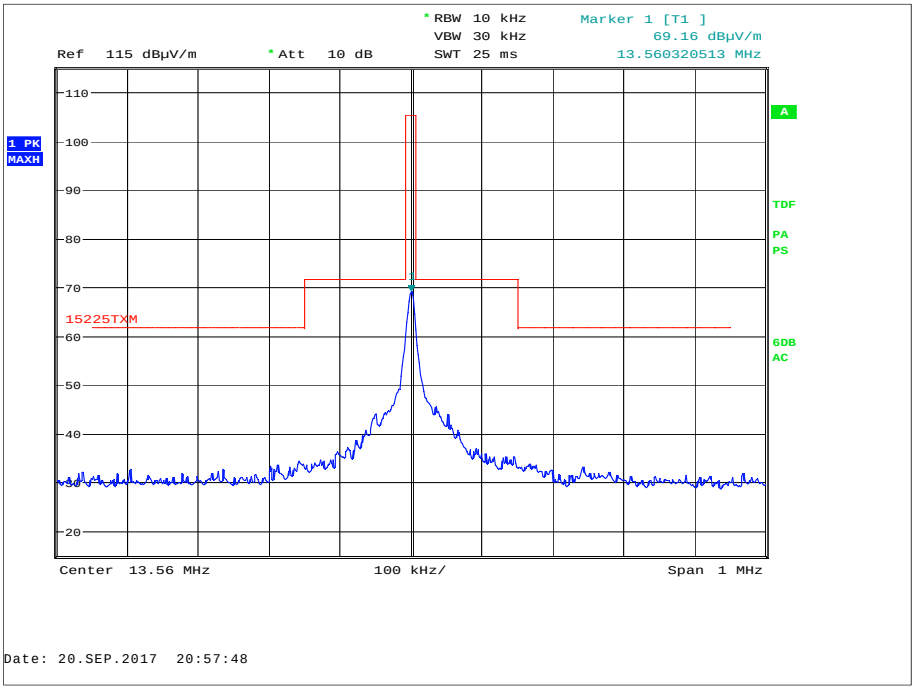

Figure 2 - Plot of the Fundamental (13.56 MHz)

DC Powered - RFiD Active, Field Strength of any Emission Results, 9 kHz to 30 MHz

Frequency MHz	Quasi-Peak Level (dBµV/m) at 3 m	Quasi-Peak Level (dBµV/m) at 30 m	Quasi-Peak Level (µV/m) at 3 m	Quasi-Peak Level (µV/m) at 30 m
27.120	42.28	22.28	130.02	13.00

Table 8

No other emissions were detected within 10 dB of the limit.

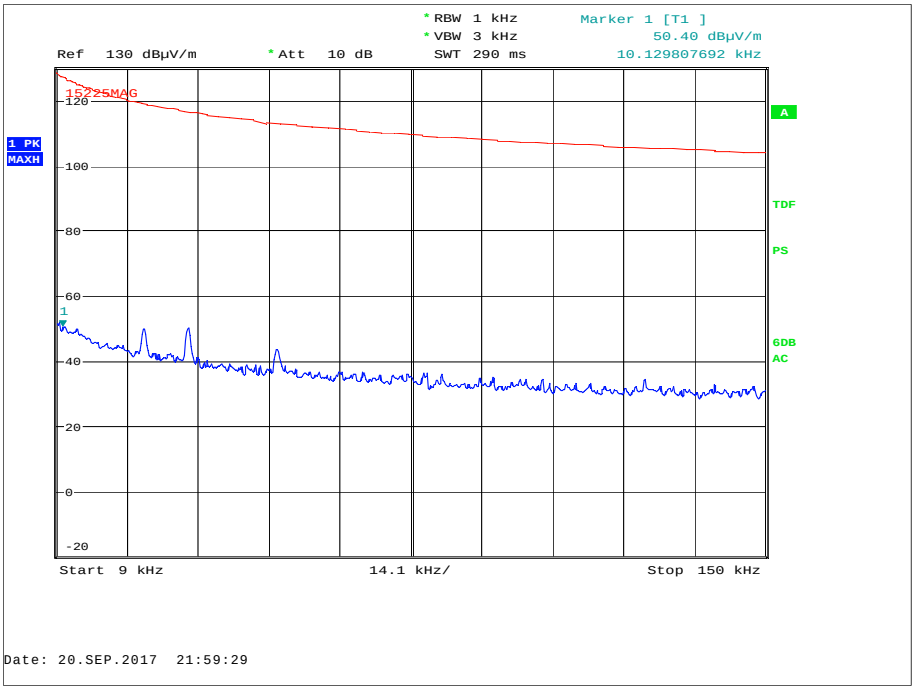

Figure 3 - 9 kHz to 150 kHz

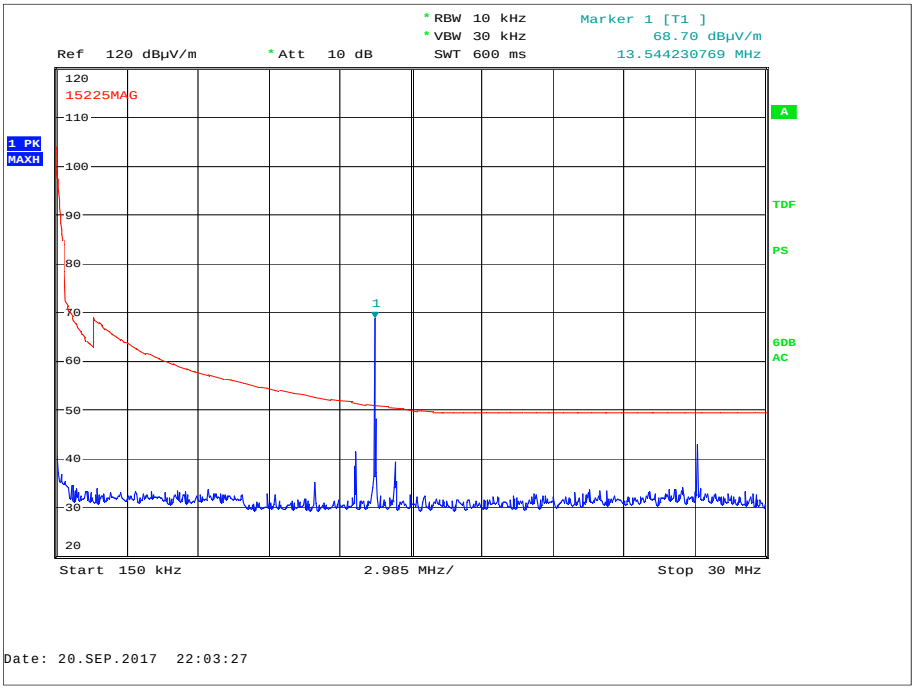

Figure 4 - 150 kHz to 30 MHz

DC Powered - RFiD Active, Field Strength of any Emission Results, 30 MHz to 1 GHz

Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
31.776	34.7	40.0	-5.3	360	3.24	Horizontal
40.670	35.7	40.0	-4.3	143	1.68	Horizontal
96.432	29.7	43.5	-13.8	30	2.41	Horizontal
122.042	40.6	43.5	-2.9	187	2.48	Horizontal
199.986	30.0	43.5	-13.5	95	1.77	Horizontal
605.018	31.2	46.0	-14.8	243	1.17	Horizontal

Table 9

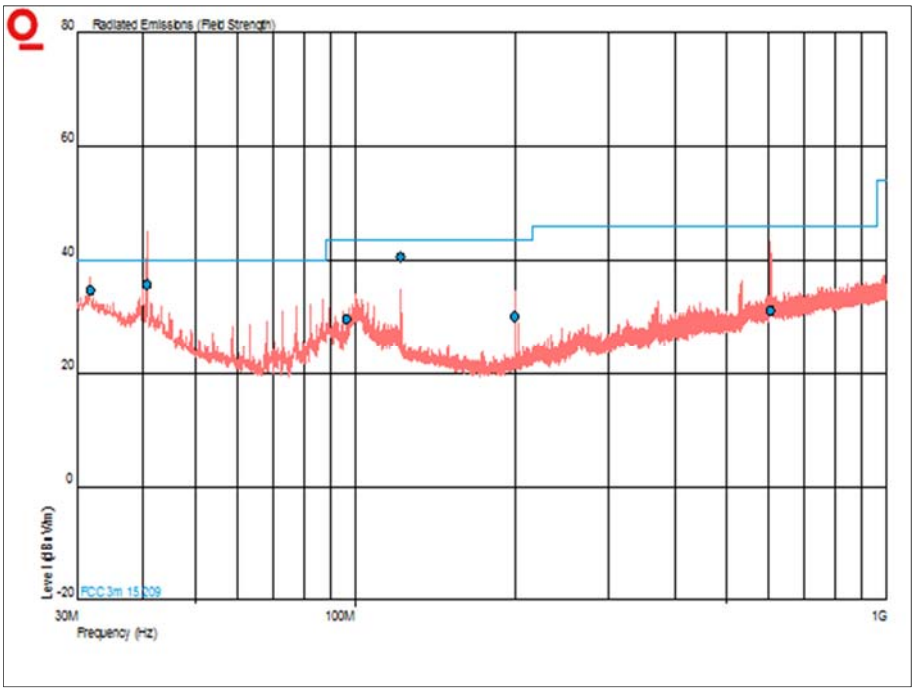

Figure 5 - Polarity: Horizontal and Vertical

FCC 47 CFR Part 15, Limit Clause 15.225 (a)(b)(c)(d)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 m.

(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 m.

(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 m.

(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.

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30
30 to 88	100**	3
88 to 216	150**	3
216 to 960	200**	3
Above 960	500	5

Table 10 - FCC Radiated Emission Limit

Industry Canada RSS-210, Limit Clause B.6

The field strength of any emission shall not exceed the following limits:

(a) 15.848 mW/m (84 dBµV/m) at 30 m, within the band 13.553 – 13.567 MHz.

(b) 334 µV/m (50.5 dBµV/m) at 30 m, withing the bands 13.410 – 13.553 MHz and 13.567 – 13.710 MHz.

(c) 106 µV/m (40.5 dBµV/m) at 30 m, within the bands 13.110 – 13.410 MHz and 13.710 – 14.010 MHz.

(d) RSS-GEN general field strength limits for frequencies outside the band 13.110 – 14.010 MHz.

Industry Canada RSS-GEN, Limit Clause

Frequency	Electric Field Strength (µV/m)	Magnetic Field Strength (H-Field) (µA/m)	Measurement Distance (m)
9 - 490 kHz	2,400/F (F in kHz)	2,400/377F (F in kHz)	300
490 - 1,705 kHz	24,000/F (F in kHz)	24,000/377F (F in kHz)	30
1,705 kHz - 30 MHz	30	N/A	30

Table 11 - Industry Canada Radiated Emission Limit - Less than 30 MHz

Frequency (MHz)	Field Strength (µV/m at 3 m)
30 - 88	100
88 - 216	150
216 - 960	200
> 960	500

Table 12 - Industry Canada Radiated Emission Limit - 30 MHz to 1 GHz

2.2.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Antenna (Bilog)	Schaffner	CBL6143	287	24	18-Apr-2018
Antenna (Active Loop, 9kHz-30MHz)	Rohde & Schwarz	HFH2-Z2	333	24	09-Dec-2018
Antenna (Dish/Tripod/Adaptor, 1GHz-18GHz)	Rohde & Schwarz	AC-008	334	-	TU
Multimeter	Iso-tech	IDM-101	466	12	02-Oct-2017
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Comb Generator	Schaffner	RSG1000	3034	-	TU
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	12	02-May-2018
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	12-Nov-2017
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Digital thermo Hygrometer	Radio Spares	1260	4300	12	30-Aug-2018
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	6	04-Nov-2017
4 Channel PSU	Rohde & Schwarz	HMP4040	4736	-	O/P Mon

Table 13

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment

2.3 Frequency Tolerance Under Temperature Variations

2.3.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.225 (e)
Industry Canada RSS-210, Clause B.6
Industry Canada RSS-GEN, Clause 6.11

2.3.2 Equipment Under Test and Modification State

EPT038882, S/N: Not Serialised (75939628-TSR0014) - Modification State 0

2.3.3 Date of Test

26-September-2017 to 02-November-2017

2.3.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.8.

2.3.5 Environmental Conditions

Ambient Temperature	21.9 - 24.6 °C
Relative Humidity	61.6 - 67.1 %

2.3.6 Test Results

DC Powered - RFiD Active

Temperature	Voltage	Measured Frequency (MHz)	Frequency Deviation (%)	Frequency Error (ppm)
-30.0 °C	24 V DC	13.560	-0.004	-3.664
-20.0 °C	24 V DC	13.560	0.006	5.909
-10.0 °C	24 V DC	13.560	0.001	0.946
0.0 °C	24 V DC	13.560	0.001	1.064
10.0 °C	24 V DC	13.560	0.000	0.355
20.0 °C	20.4 V DC	13.560	-0.000	-2.364
20.0 °C	27.6 V DC	13.560	-0.000	-1.773
30.0 °C	24 V DC	13.560	-0.003	-3.073
40.0 °C	24 V DC	13.560	-0.003	-3.191
50.0 °C	24 V DC	13.560	-0.003	-2.955

Table 14

FCC 47 CFR Part 15, Limit Clause 15.225 (e)

The frequency tolerance of the carrier signal shall be maintained within ± 0.01 % of the operating frequency.

Industry Canada RSS-210, Limit Clause B.6

Carrier frequency stability shall be maintained to ±0.01% (±100 ppm).

2.3.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Climatic Chamber	Votsch	VT4002	161	-	O/P Mon
RF Coupler	TUV SUD Product Service	RFC1	414	TU	-
Multimeter	Iso-tech	IDM-101	466	12	02-Oct-2017
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Digital Temperature Indicator	Fluke	51	2267	12	05-Jul-2018
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	02-Feb-2018
Hygrometer	Rotronic	I-1000	3220	12	30-Aug-2018
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	12-Mar-2018
2 metre N-Type Cable	Florida Labs	NMS-235SP-78.8-NMS	4508	12	2-Mar-2018
4 Channel PSU	Rohde & Schwarz	HMP4040	4736	-	O/P Mon
1 metre K type Cable	IW Microwave	KPS-1501LC-394-KPS-R	4830	12	24-Jan-2018

Table 15

TU – Traceability Unscheduled.
O/P Mon – Output Monitored using calibrated equipment

3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
20 dB Bandwidth	± 0.02 kHz
Field Strength of any Emission	9 kHz to 30 MHz: ± 3.4 dB 30 MHz to 1 GHz: ± 5.1 dB
Frequency Tolerance Under Temperature Variations	0.013 kHz

Table 16