



# TEST REPORT

**Test Report No. :** UL-RPT-RP77508JD01A V3.0

**Manufacturer** : Paxton Ltd  
**Model No.** : Proximity Mullion Reader / z99-mu10  
**FCC ID** : USEZ99MU10  
**Technology** : RFID – 125 kHz  
**Test Standard(s)** : FCC Parts 15.207, 15.209 and 15.215

1. This test report shall not be reproduced in full or partial, without the written approval of UL VS LTD.
2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 3.0 supersedes Test Report Serial Number RFI-RPT-RP77508JD01A\_V2.0. The original test report was issued under the previous company name of RFI Global Services Ltd.

**Date of Issue:** 15 JULY 2015

**Checked by:**

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Senior Engineer, Radio Laboratory

**Issued by :**

pp

John Newell  
Quality Manager,  
UL VS LTD



This laboratory is accredited by UKAS.  
The tests reported herein have been  
performed in accordance with its terms  
of accreditation.

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**1. Customer Information**







<b>Company Name:</b>	Paxton Ltd
<b>Address:</b>	Paxton House Home Farm Brighton Sussex BN1 9HU

## **2. Summary of Testing**

### **2.1. General Information**

<b>Specification Reference:</b>	47CFR15.207, 47CFR15.209 & 47CFR15.215
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart B (Radio Frequency Devices ) - Sections 15.207, 15.209 & 15.215
<b>Site Registration:</b>	FCC: 209735
<b>Location of Testing:</b>	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
<b>Test Dates:</b>	05 May 2010

### **2.2. Summary of Test Results**

<b>FCC Reference (47CFR)</b>	<b>Measurement</b>	<b>Result</b>
Part 15.207	Transmitter AC Conducted Spurious Emissions	
Part 15.209	Transmitter Radiated Spurious Emissions (Fundamental)	
Part 15.209	Transmitter Radiated Spurious Emissions	
Part 15.215(c)	Transmitter 20 dB Bandwidth	
<b>Key to Results</b>		
 = Complied  = Did not comply		

### **2.3. Methods and Procedures**

<b>Reference:</b>	ANSI C63.4 (2009)
<b>Title:</b>	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
<b>Reference:</b>	ANSI C63.10 (2009)
<b>Title:</b>	American National Standard for Testing Unlicensed Wireless Devices

### **2.4. Deviations from the Test Specification**

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

### **3. Equipment Under Test (EUT)**

#### **3.1. Identification of Equipment Under Test (EUT)**

<b>Brand Name:</b>	Proximity Mullion Reader UL
<b>Model Name/Number:</b>	Proximity mullion reader / z99-mu10
<b>Serial Number:</b>	None stated
<b>Hardware Version:</b>	z-5muu Rev. 2, ppc-5mu Rev. A
<b>Software Version:</b>	None
<b>FCC ID Number:</b>	USEZ99MU10

#### **3.2. Description of EUT**

The equipment under test was a proximity reader for access control. It has functionality for reading tokens with 125 kHz carrier frequencies.

#### **3.3. Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

#### **3.4. Additional Information Related to Testing**

<b>Tested Technology:</b>	RFID
<b>Modulation Type:</b>	Amplitude Modulation
<b>Transmit / Receive Frequency:</b>	125 kHz

#### **3.5. Support Equipment**

The following support equipment was used to exercise the EUT during testing:

<b>Description:</b>	Net2 1 door ACU with 2A PSU in metal cabinet
<b>Brand Name:</b>	Paxton Access Ltd
<b>Model Name or Number:</b>	411-381
<b>Serial Number:</b>	Not marked or stated

## **4. Operation and Monitoring of the EUT during Testing**

### **4.1. Operating Modes**

The EUT was tested in the following operating mode(s):

- Transceive mode
- The reader has only one mode of operation as it is constantly transmitting and receiving when in operation. It does not have a dedicated 'receive only' mode.

### **4.2. Configuration and Peripherals**

The EUT was tested in the following configuration(s):

- Connected to a Paxton Access Net2 1 door ACU with 2A PSU in metal cabinet. This provided power and data connection to the EUT.
- AC conducted emissions were performed with the EUT connected to the ACU and the ACU connected to a 120 VAC 60 Hz supply through a LISN.

## **5. Measurements, Examinations and Derived Results**

### **5.1. General Comments**

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6 Measurement Uncertainty* for details.



## 5.2. Test Results

### 5.2.1. Transmitter AC Conducted Spurious Emissions

#### Test Summary:

FCC Part:	15.207
Test Method Used:	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

#### Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	31

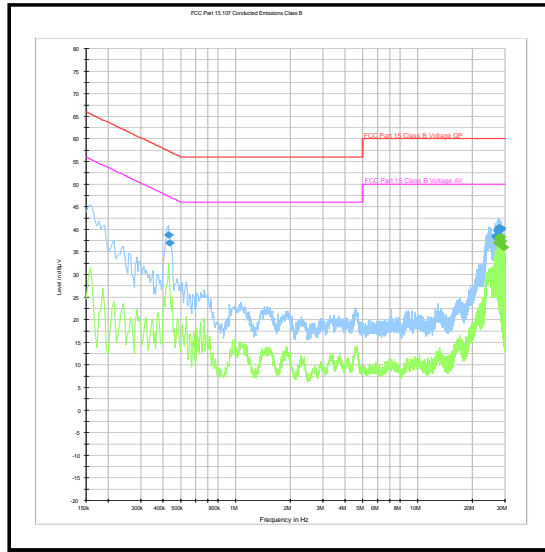
#### Results: Quasi Peak Detector Measurements

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.424500	Neutral	38.7	57.4	18.7	Complied
0.433500	Neutral	36.9	57.2	20.3	Complied
26.754000	Neutral	38.5	60.0	21.5	Complied
27.006000	Live	38.2	60.0	21.8	Complied
27.253500	Live	39.7	60.0	20.3	Complied
27.505500	Live	39.7	60.0	20.3	Complied
27.753000	Live	40.2	60.0	19.8	Complied
28.005000	Live	40.4	60.0	19.6	Complied
28.252500	Live	39.9	60.0	20.1	Complied
28.504500	Live	40.3	60.0	19.7	Complied

#### Results: Average Detector Measurements

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
27.253500	Live	37.0	50.0	13.0	Complied
27.505500	Live	37.2	50.0	12.8	Complied
27.753000	Live	37.9	50.0	12.1	Complied
28.005000	Live	38.3	50.0	11.7	Complied
28.252500	Live	37.8	50.0	12.2	Complied
28.504500	Live	38.3	50.0	11.7	Complied
28.756500	Live	36.4	50.0	13.6	Complied
29.004000	Live	37.3	50.0	12.7	Complied
29.256000	Live	36.1	50.0	13.9	Complied
29.755500	Live	36.0	50.0	14.0	Complied

**Transmitter AC Conducted Spurious Emissions (continued)**



*Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.*

**5.2.2. Transmitter Fundamental Field Strength****Test Summary:**

<b>FCC Part:</b>	15.209(a)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.4 referencing ANSI C63.4

**Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	31

**Results:**

<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Q-P Level (dBμV/m)</b>	<b>Limit (dBμV/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
0.125	45° to EUT	6.9	19.2 (at 300m)	12.3	Complied

**Note(s):**

- Limits below 30 MHz are specified at a test distance of 30 metres, whilst below 0.49 MHz they are specified at a test distance of 300 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by making the measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.
- A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to the required test distance.

*Note: An additional 20 dB has been added to attain the final value shown in the table; this is to account for a transducer factor that was not included during the original measurement.*

$$i.e.: -13.1 \text{ dB}\mu\text{V/m} + 20 \text{ dB} = 6.9 \text{ dB}\mu\text{V/m}$$

**5.2.3. Transmitter Radiated Spurious Emissions****Test Summary:**

<b>FCC Part:</b>	15.209 (a)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3, 6.4 and 6.5 referencing ANSI C63.4
<b>Frequency Range:</b>	9 kHz to 1000 MHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	31

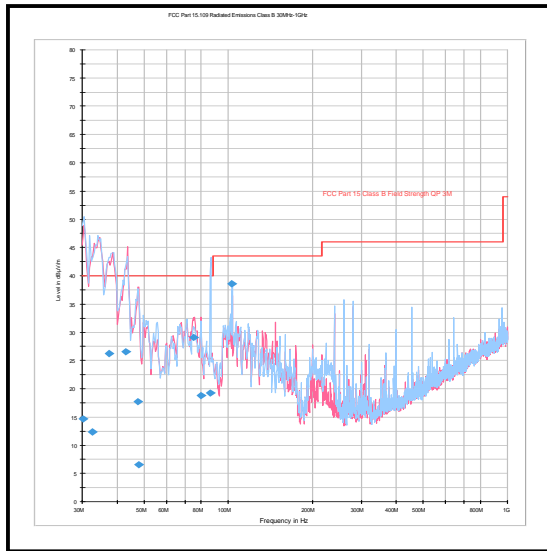
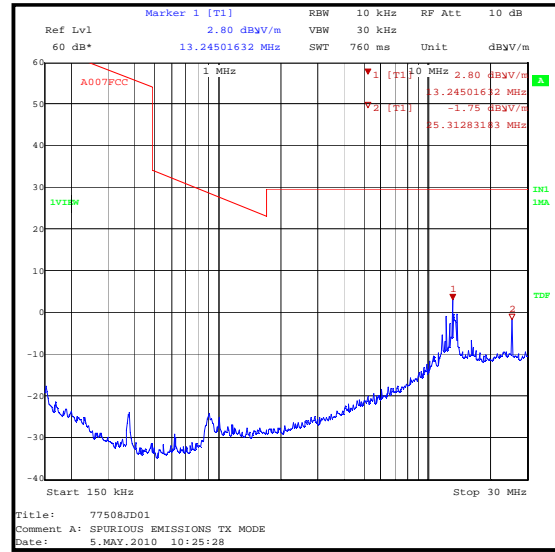
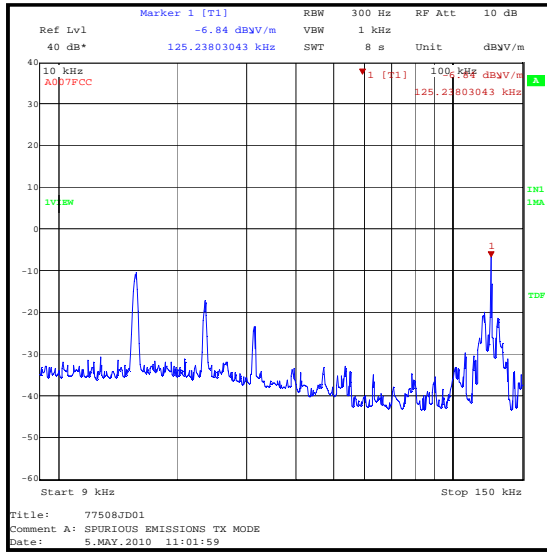
**Results: Electric Field Strength Measurements**

Frequency (MHz)	Antenna Polarity	Quasi-Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
13.425	45° to EUT	6.4	29.5	23.1	Complied
25.055	90° to EUT	12.1	29.5	17.4	Complied
30.290	Horizontal	14.6	40.0	25.4	Complied

**Note(s):**

1. Limits below 30 MHz are specified at a test distance of 30 metres, whilst below 0.49 MHz they are specified at a test distance of 300 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by making the measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.
2. Below 30 MHz a transducer factor on the measuring instrument was used to extrapolate the test results performed at 3 metres to the required test distance.
3. The carrier is shown on the 9 kHz to 150 kHz pre-scan plot at approximately 125 kHz.
4. All other emissions on the 9 kHz to 150 kHz plot were investigated and were found to radiate from the test site turntable motor and therefore ambient.
5. All emissions on the 30 MHz to 1 GHz scan (other than that recorded in the table above) were at least 20 dB below the appropriate specification limit.
6. All emissions on the 9 kHz – 30 MHz pre-scans are low by a factor of 20 dB, due to the absence of a transducer factor at the time of measurement. An additional 20 dB was subsequently added to any emissions observed during these pre-scans for comparisons with the limit, when determining the necessity for final measurements.

### Transmitter Radiated Spurious Emissions (continued)



Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

**5.2.4. Transmitter 20 dB Bandwidth**

**Test Summary:**

<b>FCC Part:</b>	15.215(c)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.9.1 (see note below)

**Environmental Conditions:**

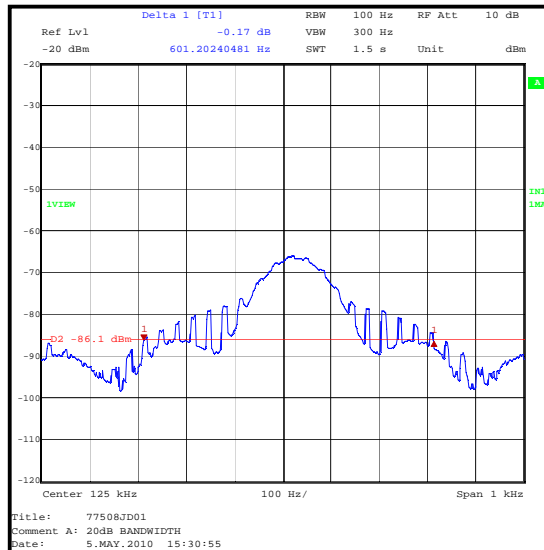
<b>Temperature (°C):</b>	22
<b>Relative Humidity (%):</b>	32

**Results:**

<b>Transmitter 20 dB Bandwidth (Hz)</b>
601

**Note(s):**

1. It was not possible to measure the 20 dB bandwidth (OBW) using a 3 dB RBW of 1% to 5% of the OBW together with a span of between two and five times the OBW because the test receiver returned an 'Uncalibrated' error message on its display. The settings chosen were those closest to those proscribed in ANSI C63.10 Section 6.9.1(b) that returned a calibrated measurement.



## **6. Measurement Uncertainty**

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measured (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
AC Conducted Spurious Emissions	150 kHz to 30 MHz	95%	±3.25 dB
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	±3.53 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±2.94 dB
20 dB Bandwidth	9 kHz to 150 kHz	95%	±0.92 ppm

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

## **7. Report Revision History**

<b>Version Number</b>	<b>Revision Details</b>		
	<b>Page No(s)</b>	<b>Clause</b>	<b>Details</b>
2.0	-	-	Previous Version
3.0	11 & 12	-	Corrected previously reported emissions levels at frequencies < 30 MHz by +20 dB



**Appendix 1. Test Equipment Used**

UL No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A1829	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100671	25 Oct 2009	12
A553	Antenna	Chase	CBL6111A	1593	16 Mar 2010	12
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	16 Mar 2010	12
G0543	Amplifier	Sonoma Instrument	310N	230801	04 Jun 2009	12
K0001	5m Semi-Anechoic Chamber	Rainford EMC	N/A	N/A	25 Apr 2010	12
L1001	Test Receiver	Rhode & Schwarz	ESU26	100239	28 Jan 2010	12
M1273	Test Receiver	Rhode & Schwarz	ESIB 26	100275	08 Apr 2010	12
M1568	Magnetic Loop	Rohde & Schwarz	HFH2-Z2	879284/2	14 Jan 2010	12

**NB** In accordance with UKAS requirements all the measurement equipment is on a calibration schedule.

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