

Proxess LLC

RF Exposure Exhibit

SCOPE OF WORK

EMC TESTING – Proxess Mullion Reader, Model Tested: PXR01-MU

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RF Exposure Exhibit (mobile devices)

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Report Issue Date: December 08, 2020

Product Designation: Proxess Mullion Reader
Model Tested: PXR01-MU
HVIN: PXR01-MU

FCC ID: 2AKUZPXR01
IC: 22335-PXR01

to

47CFR 2.1091
RSS-102 Issue 5

for

Proxess LLC

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Report No. 104444452MPK-002A	
Equipment Under Test:	Proxess Mullion Reader
Trade Name:	Proxess LLC
Model(s) Tested:	PXR01-MU
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Applicable Regulation:	47CFR 2.1091 RSS-102 Issue 5

TABLE OF CONTENTS

<i>Proxess LLC</i>	1
<i>1.0 RF Exposure Summary</i>	5
<i>2.0 RF Exposure Limits</i>	5
<i>3.0 Test Results (Mobile Configuration)</i>	7
<i>Appendix A: Power Density Calculation</i>	9
<i>4.0 Document History</i>	10

1.0 RF Exposure Summary

Test	Reference FCC	Reference Industry Canada	Result
Radio frequency Radiation Exposure Evaluation	47 CFR§2.1091	RSS-102 Issue 5	Complies

2.0 RF Exposure Limits

In this document, we evaluate the RF Exposure to human body due the intentional transmission from the transmitter (EUT). The limits for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 and RSS-102 are followed.

2.1 FCC Limits

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
(A) Limits For Occupational / Control Exposures				
0.3 – 3.0	614	1.63	*100	6
3.0 – 30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300 - 1500	...	...	F/300	6
1500 - 100,000	...	...	5	6
(B) Limits For General Population / Uncontrolled Exposure				
0.3 – 1.34	614	1.63	*100	30
1.34 – 30	824/f	2.19/f	*180/f ²	30
30 – 300	27.5	0.073	0.2	30
300 - 1500	...	...	F/1500	30
1500 - 100,000	...	...	1.0	30

F = Frequency in MHz

* = plane wave equivalent density

2.2 Industry Canada Limits

According to RSS-102, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	0.73/f	-	6**
1.1-10	87/f ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/f ^{0.25}	0.1540/f ^{0.25}	8.944/f ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 f ^{0.3417}	0.008335 f ^{0.3417}	0.02619 f ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/f ^{1.2}
150000-300000	0.158 f ^{0.5}	4.21 x 10-4 f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/f ^{1.2}

Note: f is frequency in MHz.
 * Based on nerve stimulation (NS).
 ** Based on specific absorption rate (SAR).

3.0 Test Results (Mobile Configuration)

3.1 Classification

Radio is installed inside a mobile host device. The antenna of the product, under normal use condition, is at least 20 cm away from the body of the user and accessible to the end user. Warning statement to the user for keeping at least 20 cm or more separation distance with the antenna should be included in user's manual.

3.2 EIRP calculations

The Proxess Mullion Reader, Model: PXR01-MU consists of two radios: 13.56 MHz RFID and Bluetooth. For RF exposure compliance refer reports # 104444452MPK-002.

3.3 Maximum RF Power

Frequency Range (MHz)	Peak FS @10m (dB μ V/m)	Note
13.56	39.44	FS measurement was taken from Report # 104444452MPK-002.

Frequency Range (MHz)	RF Output (dBm)	Antenna Gain ¹ (dBi)	Note
2402-2480	8.45	-0.65	Conducted power measurements were taken from FCC ID: SH6MDBT50Q.

¹As declared by the manufacturer.

3.4 RF Exposure Calculation

3.4.1 RF Exposure calculation for RFID, and Bluetooth:

Frequency (MHz)	Power (dBm)	Peak FS @10m (dB μ V/m)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	PD (mW/cm ²)	FCC PD Limits (mW/cm ²)	MPE Ratio FCC	Sum of MPE Ratios
13.56		39.44		-45.33	0.00002930	5.82905E-09	0.9789	0.00	
2402-2480	8.45		-0.65	8.45	7.00	0.00139	1	0.00139	0.00139

Note: Antenna gains below 0 are considered as 0dBi.

Frequency (MHz)	Power (dBm)	Peak FS @10m (dB μ V/m)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	PD (W/m ²)	ISED PD Limits (W/m ²)	MPE Ratio ISED	Sum of MPE Ratios
13.56		39.44		-45.33	0.00002930	5.82905E-08	2	0.00	
2402-2480	8.45		-0.65	8.45	7.00	0.0139	5.47	0.00254	0.00254

Note: Antenna gains below 0 are considered as 0dBi.

The summation of the MPE ratio is less than 1, therefore, the EUT complies for the MPE requirement of simultaneous transmission.

Appendix A: Power Density Calculation

The Power Density can be calculated using the formula

$$S = \text{EIRP} / 4\pi D^2$$

Where: S is Power Density in mW/cm²

D is the distance from the antenna in cm.

4.0 Document History

Revision/ Job Number	Writer Initials	Reviewers Initials	Date	Change
1.0/ G104444452	HH	KV	December 08, 2020	Original document