Report on the FCC and IC Testing of:

**PervasID** UHF RFID Distributed Antenna System, Model: Space/Portal Ranger 9200

# In accordance with FCC 47 CFR Part 15B. ICES-003 and Industry Canada RSS-GEN

Prepared for: PervasID St John's Inovation Centre Cowley Road, Cambridge CB4 OWS UNITED KINGDOM

FCC ID: 2AQQW9200 IC: 24482-9200

# COMMERCIAL-IN-CONFIDENCE

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#### SIGNATURE 1sell NAME JOB TITLE **RESPONSIBLE FOR ISSUE DATE** Matthew Russell RF Team Leader Authorised Signatory 06 November 2018

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 15, ICES-003 and Industry Canada RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

SIGNATURE								
Gt. Nawler .								
NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE					
Graeme Lawler	Test Engineer	Testing	06 November 2018					
FCC Accreditation 90987 Octagon House, Fa	Industry Canad reham Test Laboratory IC2932B-1 Oc	da Accreditation tagon House, Fareham Te	est Laboratory					
EXECUTIVE SUMMARY A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15B: 2017, ICES-003: 2016 and Industry Canada RSS-GEN Issue 05 (2018-04) for the tests detailed in section 1.3.								
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# **TÜV SÜD Product Service**







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# 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	06 November 2018

Applicant	PervasID
Manufacturer	PervasID
Model Number(s)	Space/Portal Ranger 9200
Serial Number(s)	0280420101-0001
Hardware Version(s)	5.2 FCC
Software Version(s)	2.6.8
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15B: 2017 ICES-003: 2016 Industry Canada RSS-GEN: Issue 05 (2018-04)
Order Number Date	PO-0028 15-June-2018
Date of Receipt of EUT	31-July-2018
Start of Test	31-July-2018
Finish of Test	01-August-2018
Name of Engineer(s)	Graeme Lawler
Related Document(s)	ANSI C63.4: 2014

Table 1

# 1.2 Introduction



#### 1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15B, ICES-003 and Industry Canada RSS-GEN is shown below.

Section	Specification Clause		iuse	Test Description	Result	Comments/Base Standard
	Part 15B	ICES-003	RSS-GEN			
Configuration and Mode: Idle						
2.1	15.107	6.1	8.8	Conducted Disturbance at Mains Terminals	Pass	ANSI C63.4: 2014
2.2	15.109	6.2	7.3	Radiated Disturbance	Pass	ANSI C63.4: 2014

Table 2



#### 1.4 Application Form

MAIN EUT					
MANUFACTURING DESCRIPTION	UHF RFID Distributed Antenna System				
MANUFACTURER	PervasID				
MODEL NAME/NUMBER	Space/Portal Ranger 9200				
PART NUMBER	RFID DAS 9200 R				
SERIAL NUMBER	0280420101-0001				
HARDWARE VERSION	v5.2 FCC				
SOFTWARE VERSION	268				
PSU VOLTAGE/FREQUENCY/CURRENT	24V DC 3A				
HIGHEST INTERNALLY GENERATED /					
USED FREQUENCY	928MHz				
ECC ID (if applicable)	2AQQW9200				
INDUSTRY CANADA ID (if applicable)	24482-9200				
(a brief description of the intended use and	UHF RFID Distributed Antenna System - intended use				
operation)	detection and monitoring of UHF RFID tags				
COUNTRY OF ORIGIN	UK				
RF CHAR	ACTERISTICS (if applicable)				
TRANSMITTER FREQUENCY					
OPERATING RANGE (MHz)	902-928 MHz				
RECEIVER EREQUENCY OPERATING					
RANGE (MHz)	902 - 928 MHz				
INTERMEDIATE FREQUENCIES	Direct conversion				
EMISSION DESIGNATOR(S)					
(i.e. G1D GXW)					
(i.e. GMSK, QPSK)	PR-ASK				
OUTPUT POWER (W or dBm)	34dBm				
SEPARATE BATT	ERY/POWER SUPPLY (if applicable)				
	XP Power				
	90-204 VAC, 47-03HZ, 1.3A				
	DULES (if applicable)				
MANUFACTURING DESCRIPTION					
POWER					
FCC ID					
INDUSTRY CANADA ID					
EMISSION DESIGNATOR					
DHSS/FHSS/COMBINED OR OTHER					
COUNTRY OF ORIGIN					
ANC	ILLARIES (if applicable)				
MANUFACTURING DESCRIPTION					
MANUFACTURER					
ТҮРЕ					
PART NUMBER					
SERIAL NUMBER					
COUNTRY OF ORIGIN					
L	· · · ·				

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

Name: Sabesan Sithamparanathan

Position held: CEO

Date: 25/06/2018



#### 1.5 **Product Information**

#### 1.5.1 Technical Description

UHF RFID Distributed Antenna System - intended use detection and monitoring of UHF RFID tags.

#### **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: 0280420101-0001							
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: Idle					
Conducted Disturbance at Mains Terminals	Graeme Lawler	UKAS			
Radiated Disturbance	Graeme Lawler	UKAS			

#### Table 4

Office Address:

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



## 2 Test Details

#### 2.1 Conducted Disturbance at Mains Terminals

#### 2.1.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.107 ICES-003, Clause 6.1 Industry Canada RSS-GEN, Clause 8.8

#### 2.1.2 Equipment Under Test and Modification State

Space/Portal Ranger 9200, S/N: 0280420101-0001 - Modification State 0

#### 2.1.3 Date of Test

01-August-2018

#### 2.1.4 Test Method

This test was performed in accordance with ANSI C63.4, clause 7.

The EUT was placed on a non-conductive table 0.8m above a reference ground plane and 0.4m away from a vertical coupling plane.

All power was connected to the EUT through an Artificial Mains Network (AMN). Conducted disturbance voltage measurements on mains lines were made at the output of the AMN. The AMN was placed 0.8m from the boundary of the EUT and bonded to the reference ground plane.

#### 2.1.5 Environmental Conditions

Ambient Temperature	20.1 °C
Relative Humidity	56.8 %



### 2.1.6 Test Results

#### **Results for Configuration and Mode : Idle.**

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.



Figure 1 - Graphical Results - AC Mains Neutral

Frequency (MHz)	QP Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Level (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)
0.150	34.8	79.0	-44.2	22.0	66.0	-44.0
0.521	34.3	73.0	-38.7	28.9	60.0	-31.1
1.755	31.5	73.0	-41.5	21.1	60.0	-38.9
11.894	38.4	73.0	-34.6	35.0	60.0	-25.0
17.695	40.4	73.0	-32.6	36.3	60.0	-23.7
20.014	32.5	73.0	-40.5	28.8	60.0	-31.2

Table 5





## Figure 2 - Graphical Results - AC Mains Live

Frequency (MHz)	QP Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Level (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)
0.169	39.7	79.0	-39.3	31.4	66.0	-34.6
0.525	34.4	73.0	-38.6	29.3	60.0	-30.7
1.761	31.3	73.0	-41.7	23.5	60.0	-36.5
13.604	35.3	73.0	-37.7	31.3	60.0	-28.7
17.694	41.3	73.0	-31.7	37.2	60.0	-22.8
19.894	33.3	73.0	-39.7	30.1	60.0	-29.9

Table 6



## 2.1.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Screened Room (5)	Rainford	Rainford	1545	36	23-Jan-2021
Single Phase LISN	Rohde & Schwarz	ESH3-Z5	1674	12	04-Apr-2019
Transient Limiter	Hewlett Packard	11947A	2377	12	23-Feb-2019
Multimeter	lso-tech	IDM101	2419	12	23-Nov-2018
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Nov-2018
Cable (Rx, Nm-Nm, 7m)	Scott Cables	SLU18-NMNM- 07.00M	4498	-	O/P Mon
Hygrometer	Rotronic	HP21	4989	12	26-Apr-2019

#### Table 7

O/P Mon - Output Monitored using calibrated equipment



#### 2.2 Radiated Disturbance

#### 2.2.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.109 ICES-003, Clause 6.2 Industry Canada RSS-GEN, Clause 7.3

#### 2.2.2 Equipment Under Test and Modification State

Space/Portal Ranger 9200, S/N: 0280420101-0001 - Modification State 0

#### 2.2.3 Date of Test

31-July-2018

#### 2.2.4 Test Method

This test was performed in accordance with ANSI C63.4, clause 8.

The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable and placed on a non-conductive table 0.8m above a reference ground plane.

A pre-scan of the EUT emissions profile was made while varying the antenna-to-EUT azimuth and antenna-to-EUT polarisation using a peak detector; measurements were taken at a 3m distance. Using the pre-scan list of the highest emissions detected, their bearing and associated antenna polarisation, the EUT was then formally measured using a Quasi-Peak, Peak, Average detector as appropriate. The readings were maximised by adjusting the antenna height, polarisation and turntable azimuth, in accordance with the specification.

In a typical installation the manufacturer declared that the EUT could either be installed two orientations (X and Y) therefore the EUT was tested in both of these orientations.

#### 2.2.5 Environmental Conditions

Ambient Temperature	20.2 °C
Relative Humidity	56.8 %



#### 2.2.6 Test Results

#### **Results for Configuration and Mode : Idle.**

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Highest frequency generated or used within the EUT:928 MHzWhich necessitates an upper frequency test limit of:5 GHz



Figure 3 - Graphical Results – 30 MHz to 1 GHz, Vertical Polarity - EUT Orientation: X





Figure 4 - Graphical Results – 30 MHz to 1 GHz, Horizontal Polarity - EUT Orientation: X



Figure 5 - Graphical Results – 30 MHz to 1 GHz, Vertical Polarity - EUT Orientation: Y





#### Figure 6 - Graphical Results – 30 MHz to 1 GHz, Horizontal Polarity - EUT Orientation: Y - Peak



Figure 7 - Graphical Results - 1 GHz to 5 GHz Vertical Polarity - EUT Orientation: X - Peak





#### Figure 8 - Graphical Results - 1 GHz to 5 GHz Horizontal Polarity - EUT Orientation: X - Peak



Figure 9 - Graphical Results - 1 GHz to 5 GHz Vertical Polarity - EUT Orientation: X - Average





#### Figure 10 - Graphical Results - 1 GHz to 5 GHz Horizontal Polarity - EUT Orientation: X - Average



Figure 11 - Graphical Results - 1 GHz to 5 GHz Vertical Polarity - EUT Orientation: Y - Peak





### Figure 12 - Graphical Results - 1 GHz to 5 GHz Horizontal Polarity - EUT Orientation: Y - Peak



Figure 13 - Graphical Results - 1 GHz to 5 GHz Vertical Polarity - EUT Orientation: Y - Average





#### Figure 14 - Graphical Results - 1 GHZ to 5 GHz Horizontal Polarity - EUT Orientation: Y - Average

No emissions were detected within 10 dB of the limit.



## 2.2.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Screened Room (5)	Rainford	Rainford	1545	36	23-Jan-2021
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Multimeter	lso-tech	IDM101	2419	12	23-Nov-2018
Antenna (Bilog)	Chase	CBL6143	2904	24	08-Aug-2019
Comb Generator	Schaffner	RSG1000	3034	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Nov-2018
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	18-Oct-2018
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000- KPS	4526	6	31-Aug-2018
Cable (Rx, SMAm-SMAm 0.5m)	Scott Cables	SLSLL18-SMSM- 00.50M	4528	6	15-Aug-2018
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	01-Mar-2019
Mast Controller	Maturo Gmbh	NCD	4810	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	4811	-	TU
9m N type RF cable	Rosenberger	2303-0 9.0m PNm PNm	4827	6	04-Jan-2019
4dB Attenuator	Pasternack	PE7047-4	4935	12	28-Nov-2018

Table 8

TU – Traceability Unscheduled



# 3 Measurement Uncertainty

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

Test Name	Measurement Uncertainty	
Conducted Disturbance at Mains Terminals	150 kHz to 30 MHz, LISN, ±3.7 dB	
Radiated Disturbance	30 MHz to 1 GHz, Bilog Antenna, ±5.2 dB	
	1 GHz to 40 GHz, Horn Antenna, ±6.3 dB	

Table 9