

## Polaris Industries, Inc.

Voyager Pro FCC 15.247:2018 902 – 928 MHz Transceiver

#### Report # POLR0007







NVLAP Lab Code: 200630-0

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More: https://www.bis.doc.gov/index.php/forms-documents/regulations-docs/14-commerce-country-chart/fileT

## **CERTIFICATE OF TEST**



Last Date of Test: February 1, 2018
Polaris Industries, Inc.
Model: Voyager Pro

## **Radio Equipment Testing**

#### **Standards**

Specification	Method
FCC 15.247:2018	ANSI C63.10:2013

#### **Results**

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	No	N/A	Not required, EUT is DC powered from a vehicle.
6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
7.5	Duty Cycle	Yes	Pass	
7.8.2	Carrier Frequency Separation	Yes	Pass	
7.8.3	Number of Hopping Frequencies	Yes	Pass	
7.8.4	Dwell Time	Yes	Pass	
7.8.5	Output Power	Yes	Pass	
7.8.6	Band Edge Compliance	Yes	Pass	
7.8.6	Band Edge Compliance - Hopping Mode	Yes	Pass	
7.8.7	Occupied Bandwidth	Yes	Pass	
7.8.8	Spurious Conducted Emissions	Yes	Pass	
11.10.2	Power Spectral Density	No	N/A	Not required for FHSS devices.

#### **Deviations From Test Standards**

None

Approved By:

Kyle Holgate, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information.

## **REVISION HISTORY**



Revision Number	Description	Date	Page Number
00	None		

# ACCREDITATIONS AND AUTHORIZATIONS



#### **United States**

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

**A2LA** - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

#### Canada

**ISED** - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

#### **European Union**

European Commission - Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

#### Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

#### Korea

MSIP / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

#### Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

#### **Taiwan**

BSMI - Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

#### **Singapore**

**IDA** – Recognized by IDA as a CAB for the acceptance of test data.

#### Israel

**MOC** – Recognized by MOC as a CAB for the acceptance of test data.

#### **Hong Kong**

**OFCA** – Recognized by OFCA as a CAB for the acceptance of test data.

#### **Vietnam**

**MIC** – Recognized by MIC as a CAB for the acceptance of test data.

## SCOPE

For details on the Scopes of our Accreditations, please visit:

http://portlandcustomer.element.com/ts/scope/scope.htm http://gsi.nist.gov/global/docs/cabs/designations.html

## MEASUREMENT UNCERTAINTY



### **Measurement Uncertainty**

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

Test	+ MU	<u>- MU</u>
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

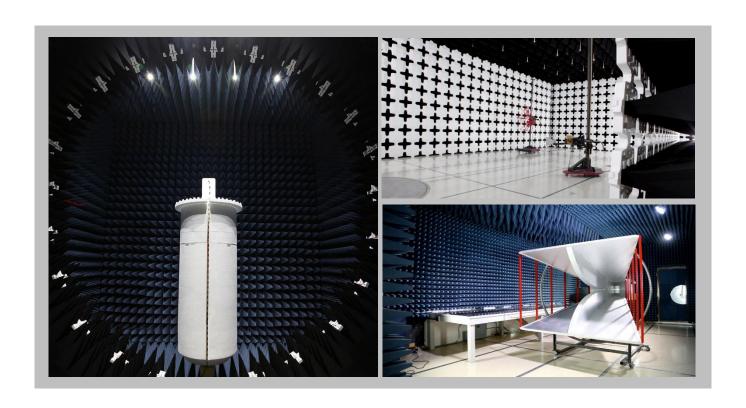
## **FACILITIES**







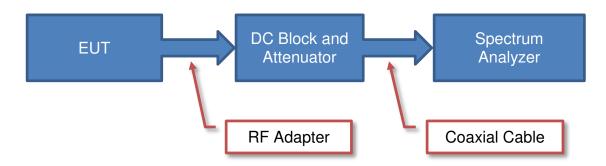
California	Minnesota	New York	Oregon	Texas	Washington		
Labs OC01-17	Labs MN01-10	Labs NY01-04	Labs EV01-12	Labs TX01-09	Labs NC01-05		
41 Tesla	9349 W Broadway Ave.	4939 Jordan Rd.	6775 NE Evergreen Pkwy #400	3801 E Plano Pkwy	19201 120 <sup>th</sup> Ave NE		
Irvine, CA 92618	Brooklyn Park, MN 55445	Elbridge, NY 13060	Hillsboro, OR 97124	Plano, TX 75074	Bothell, WA 98011		
(949) 861-8918	(612)-638-5136	(315) 554-8214	(503) 844-4066	(469) 304-5255	(425)984-6600		
		NV	LAP				
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0		
	Innovation, Science and Economic Development Canada						
2834B-1, 2834B-3	2834E-1, 2834E-3	N/A	2834D-1, 2834D-2	2834G-1	2834F-1		
BSMI							
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R		
VCCI							
A-0029	A-0109	N/A	A-0108	A-0201	A-0110		
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA							
US0158	US0175	N/A	US0017	US0191	US0157		



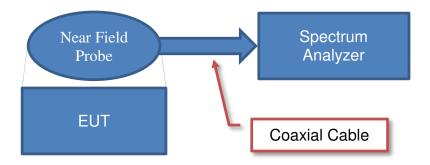
## **Test Setup Block Diagrams**



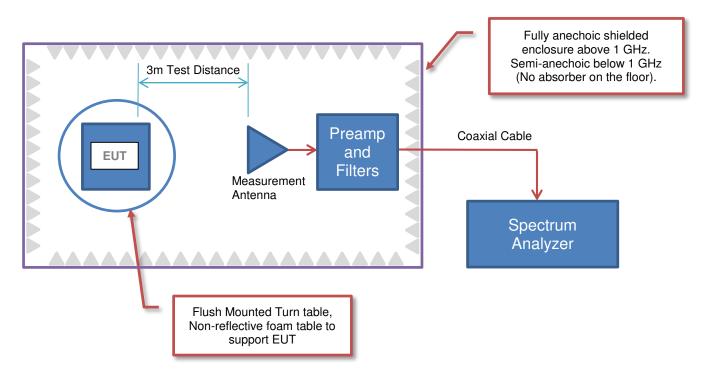
#### **Antenna Port Conducted Measurements**



### **Near Field Test Fixture Measurements**



### **Spurious Radiated Emissions**



## PRODUCT DESCRIPTION



### **Client and Equipment Under Test (EUT) Information**

Company Name:	Polaris Industries, Inc.
Address:	1600 SE 18th Ave.
City, State, Zip:	Battle Ground, WA 98604
Test Requested By:	Alex Baltes
Model:	Voyager Pro
First Date of Test:	January 22, 2018
Last Date of Test:	February 1, 2018
Receipt Date of Samples:	January 22, 2018
Equipment Design Stage:	Production
<b>Equipment Condition:</b>	No Damage
Purchase Authorization:	Verified

### Information Provided by the Party Requesting the Test

#### Functional Description of the EUT:

Display for use on vehicles which includes a 915 MHz FHSS radio.

#### Testing Objective:

Seeking to demonstrate compliance of the FHSS radio under FCC 15.247:2018 for operation in the 902 - 928 MHz Band.

## **CONFIGURATIONS**



## **Configuration POLR0007-1**

Software/Firmware Running during test				
<b>Description</b> Version				
TeraTerm	4.96			
Engineering Node Web Server	Unknown			

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Vehicle Display Unit	Polaris Industries, Inc.	Voyager Pro	15

Peripherals in test setup boundary					
Description	Manufacturer	Model/Part Number	Serial Number		
Linear DC Power Supply	TOPWARD ELECTRIC INSTRUMENTS CO. LTD.	TPS-2000	None		

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power Cable	No	0.1 m	No	Vehicle Display Unit	DC Leads
DC Leads	No	0.8 m	No	DC Power Cable	Linear DC Power Supply

## **CONFIGURATIONS**



## **Configuration POLR0007-2**

Software/Firmware Running during test				
<b>Description</b> Version				
TeraTerm	4.96			
Engineering Node Web Server	Unknown			

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Vehicle Display Unit	Polaris Industries, Inc.	Voyager Pro	15

Peripherals in test setup l	boundary		
Description	Manufacturer	Model/Part Number	Serial Number
Linear DC Power Supply	TOPWARD ELECTRIC INSTRUMENTS CO. LTD.	TPS-2000	None
Automotive Whip Antenna	Laird	Unknown	None
GPS antenna	Trail Tech	Unknown	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power Cable	No	0.1 m	No	Vehicle Display Unit	DC Leads
DC Leads	No	0.8 m	No	DC Power Cable	Linear DC Power Supply
Coax (Whip Antenna)	Yes	3.5 m	No	Automotive Whip Antenna	Vehicle Display Unit
Coax (GPS)	Yes	1.6 m	No	GPS Antenna	Vehicle Display Unit
I/O Cables (x3)	No	1.1 m	No	Unterminated	Vehicle Display Unit

## **MODIFICATIONS**



## **Equipment Modifications**

Item	Date	Test	Modification	Note	Disposition of EUT
1	1/22/2018	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	1/22/2018	Carrier Frequency Separation	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	1/22/2018	Number of Hopping Frequencies	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	1/22/2018	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	1/22/2018	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	1/22/2018	Band Edge Compliance - Hopping Mode	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	1/22/2018	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
8	1/22/2018	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
9	1/23/2018	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
10	2/1/2018	Dwell Time	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

## SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2017.09.18

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

#### **MODES OF OPERATION**

LoRa Continuous Tx, Low Ch. 902.5, Mid Ch. 915 MHz, High Ch. 927.5 MHz. Default max power.

#### **POWER SETTINGS INVESTIGATED**

14.0 VDC

#### **CONFIGURATIONS INVESTIGATED**

POLR0007 - 2

#### FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz Stop Frequency 12.4 GHz

#### SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

#### **TEST EQUIPMENT**

Description	Manufacturer	Model	ID	Last Cal.	Interval
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	13-Apr-2017	12 mo
Cable	None	Standard Gain Horns Cable	EVF	30-Nov-2017	12 mo
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-08001200-30-10P	PAO	30-Nov-2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	0 mo
Filter - High Pass	Micro-Tronics	HPM50108	HFV	6-Feb-2017	12 mo
Filter - Low Pass	Micro-Tronics	LPM50003	LFB	19-Apr-2017	12 mo
Filter - Band Pass/Notch	K&L Microwave	3TNF-500/1000-N/N	HFT	12-Dec-2017	12 mo
Attenuator	Coaxicom	3910-10	AWX	19-Apr-2017	12 mo
Attenuator	Coaxicom	3910-20	AXZ	19-Apr-2017	12 mo
Cable	N/A	Double Ridge Horn Cables	EVB	29-Nov-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	29-Nov-2017	12 mo
Antenna - Double Ridge	EMCO	3115	AHC	23-Jun-2016	24 mo
Cable	N/A	Bilog Cables	EVA	30-Nov-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	30-Nov-2017	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AXR	30-Jun-2016	24 mo

#### **TEST DESCRIPTION**

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These "pre-scans" are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector

PK = Peak Detector

AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

## **SPURIOUS RADIATED EMISSIONS**

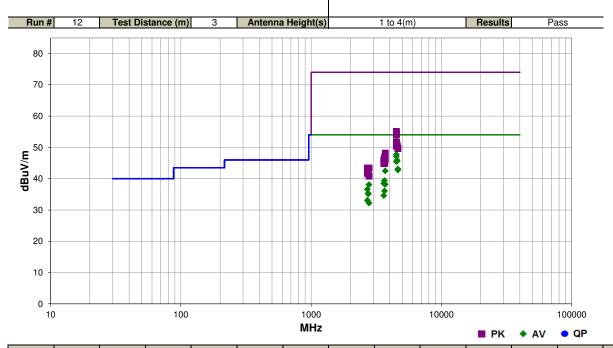


				EmiR5 2017.09.18.2 PSA-ESCI 2017.09.18
Work Order:	POLR0007	Date:	23-Jan-2018	- // //
Project:	None	Temperature:	21.9 °C	19/4///
Job Site:	EV01	Humidity:	37.1% RH	UCAT 1/182
Serial Number:	1	Barometric Pres.:	1021 mbar	Tested by: Jody House and Jeff Alcoke
EUT:	Voyager Pro			
Configuration:	2			
Customer:	Polaris Industries, Inc.			
Attendees:	Stephen Reid and Ed	Vaynberg		
EUT Power:	14.0 VDC			
Operating Mode:	LoRa Continuous Tx,	Low Ch. 902.5, Mid Ch.	915 MHz, High Ch.	927.5 MHz. Default max power.
Deviations:	None			
Comments:	See comments below	for Channel and EUT or	rientation.	
Test Specifications			Test Met	thod

Test Specifications

FCC 15.247:2018

ANSI C63.10:2013



	eq Hz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4510	2.505	47.9	4.2	2.7	286.0	3.0	0.0	Horz	AV	0.0	52.1	54.0	-1.9	Low Channel, EUT Vertical
	2.345	47.9	4.2	2.6	219.0	3.0	0.0	Horz	AV	0.0	51.2	54.0	-2.8	Low Channel, EUT on Side
	2.430	46.8	4.2	1.0	268.0	3.0	0.0	Vert	AV	0.0	51.0	54.0	-3.0	Low Channel, EUT Horizontal
	2.550	43.5	4.2	1.0	58.0	3.0	0.0	Vert	AV	0.0	47.7	54.0	-6.3	Low Channel, EUT Vertical
	2.435	42.9	4.2	1.0	275.0	3.0	0.0	Horz	AV	0.0	47.1	54.0	-6.9	Low Channel, EUT Vertical
	1.925	41.6	4.3	1.0	256.0	3.0	0.0	Vert	AV	0.0	45.9	54.0	-8.1	Mid Channel, EUT Horizontal
	1.842	41.3	4.3	2.7	309.0	3.0	0.0	Horz	AV	0.0	45.6	54.0	-8.4	Mid Channel, EUT Vertical
	2.485	41.3	4.2	1.6	197.0	3.0	0.0	Vert	AV	0.0	45.5	54.0	-8.5	Low Channel, EUT on Side
4637	7.417	38.7	4.4	2.7	299.0	3.0	0.0	Horz	AV	0.0	43.1	54.0	-10.9	High Channel, EUT Vertical
4637	7.433	38.4	4.4	1.0	282.0	3.0	0.0	Vert	AV	0.0	42.8	54.0	-11.2	High Channel, EUT Horizontal
3709	9.975	40.0	2.5	1.0	262.0	3.0	0.0	Vert	AV	0.0	42.5	54.0	-11.5	High Channel, EUT Horizontal
3660	0.025	37.3	2.1	3.2	235.0	3.0	0.0	Vert	AV	0.0	39.4	54.0	-14.6	Mid Channel, EUT Horizontal
3610	0.025	36.6	1.9	1.0	178.0	3.0	0.0	Vert	AV	0.0	38.5	54.0	-15.5	Low Channel, EUT Horizontal
3709	9.958	35.7	2.5	1.1	44.0	3.0	0.0	Horz	AV	0.0	38.2	54.0	-15.8	High Channel, EUT Vertical
2782	2.442	40.9	-2.8	1.1	329.0	3.0	0.0	Horz	AV	0.0	38.1	54.0	-15.9	High Channel, EUT Vertical
2707	7.408	39.8	-3.2	1.0	189.0	3.0	0.0	Vert	AV	0.0	36.6	54.0	-17.4	Low Channel, EUT Horizontal
3659	9.992	34.0	2.1	3.4	278.0	3.0	0.0	Horz	AV	0.0	36.1	54.0	-17.9	Mid Channel, EUT Vertical
	5.033	38.3	-3.0	1.2	106.0	3.0	0.0	Horz	AV	0.0	35.3	54.0	-18.7	Mid Channel, EUT Vertical
	5.058	38.1	-3.0	1.0	194.0	3.0	0.0	Vert	AV	0.0	35.1	54.0	-18.9	Mid Channel, EUT Horizontal
	2.325	50.9	4.2	2.7	286.0	3.0	0.0	Horz	PK	0.0	55.1	74.0	-18.9	Low Channel, EUT Vertical
	9.942	32.7	1.9	1.1	52.0	3.0	0.0	Horz	AV	0.0	34.6	54.0	-19.4	Low Channel, EUT Vertical
	2.750	50.1	4.2	1.0	268.0	3.0	0.0	Vert	PK	0.0	54.3	74.0	-19.7	Low Channel, EUT Horizontal
	50					2.0	0	. 5		2.0	- 1.0			,

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4512.435	49.9	4.2	2.6	219.0	3.0	0.0	Horz	PK	0.0	54.1	74.0	-19.9	Low Channel, EUT on Side
2707.492	36.3	-3.2	1.2	226.0	3.0	0.0	Horz	AV	0.0	33.1	54.0	-20.9	Low Channel, EUT Vertical
2782.417	35.0	-2.8	1.0	286.0	3.0	0.0	Vert	AV	0.0	32.2	54.0	-21.8	High Channel, EUT Horizontal
4512.815	47.6	4.2	1.0	58.0	3.0	0.0	Vert	PK	0.0	51.8	74.0	-22.2	Low Channel, EUT Vertical
4512.280	47.3	4.2	1.0	275.0	3.0	0.0	Horz	PK	0.0	51.5	74.0	-22.5	Low Channel, EUT Horizontal
4574.900	46.4	4.3	1.0	256.0	3.0	0.0	Vert	PK	0.0	50.7	74.0	-23.3	Mid Channel, EUT Horizontal
4575.142	46.1	4.4	2.7	309.0	3.0	0.0	Horz	PK	0.0	50.5	74.0	-23.5	Mid Channel, EUT Vertical
4512.325	46.2	4.2	1.6	197.0	3.0	0.0	Vert	PK	0.0	50.4	74.0	-23.6	Low Channel, EUT on Side
4637.550	45.4	4.4	2.7	299.0	3.0	0.0	Horz	PK	0.0	49.8	74.0	-24.2	High Channel, EUT Vertical
4637.292	45.2	4.4	1.0	282.0	3.0	0.0	Vert	PK	0.0	49.6	74.0	-24.4	High Channel, EUT Horizontal
3709.633	45.7	2.5	1.0	262.0	3.0	0.0	Vert	PK	0.0	48.2	74.0	-25.8	High Channel, EUT Horizontal
3660.183	44.8	2.1	3.2	235.0	3.0	0.0	Vert	PK	0.0	46.9	74.0	-27.1	Mid Channel, EUT Horizontal
3709.675	43.5	2.5	1.1	44.0	3.0	0.0	Horz	PK	0.0	46.0	74.0	-28.0	High Channel, EUT Vertical
3609.792	44.1	1.9	1.0	178.0	3.0	0.0	Vert	PK	0.0	46.0	74.0	-28.0	Low Channel, EUT Horizontal
3660.025	42.8	2.1	3.4	278.0	3.0	0.0	Horz	PK	0.0	44.9	74.0	-29.1	Mid Channel, EUT Vertical
3610.008	42.9	1.9	1.1	52.0	3.0	0.0	Horz	PK	0.0	44.8	74.0	-29.2	Low Channel, EUT Vertical
2782.650	46.2	-2.8	1.1	329.0	3.0	0.0	Horz	PK	0.0	43.4	74.0	-30.6	High Channel, EUT Vertical
2707.650	46.6	-3.2	1.0	189.0	3.0	0.0	Vert	PK	0.0	43.4	74.0	-30.6	Low Channel, EUT Horizontal
2745.192	45.6	-3.0	1.0	194.0	3.0	0.0	Vert	PK	0.0	42.6	74.0	-31.4	Mid Channel, EUT Horizontal
2744.933	45.2	-3.0	1.2	106.0	3.0	0.0	Horz	PK	0.0	42.2	74.0	-31.8	Mid Channel, EUT Vertical
2707.983	44.9	-3.2	1.2	226.0	3.0	0.0	Horz	PK	0.0	41.7	74.0	-32.3	Low Channel, EUT Vertical
2782.075	43.6	-2.8	1.0	286.0	3.0	0.0	Vert	PK	0.0	40.8	74.0	-33.2	High Channel, EUT Horizontal



XMit 2017.12.13

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#### **TEST EQUIPMENT**

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	27-Oct-15	27-Oct-18
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	30-May-17	30-May-18
Attenuator	S.M. Electronics	SA26B-10	AWR	24-Oct-17	24-Oct-18
Attenuator	Fairview Microwave	18B5W-26	RFZ	6-Sep-17	6-Sep-18
Block - DC	Fairview Microwave	SD3379	AMW	5-Jun-17	5-Jun-18
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	14-Aug-17	14-Aug-18

#### **TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes

There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum.

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.

If the transmit duty cycle < 98 percent, burst gating may have been used during some of the other tests in this report to only take the measurement during the burst duration.



								TbtTx 2017.12.14	XMit 2017.12.13
EUT	Voyager Pro						Work Order:	POLR0007	
Serial Number	1							22-Jan-18	
Customer	Polaris Industries, Inc.						Temperature:		
Attendees	Stephen Reid and Ed Vay	nberg						38.1% RH	
Project							<b>Barometric Pres.:</b>	1029 mbar	
	Jeff Alcoke		Power:	14.0 VDC			Job Site:	EV06	
TEST SPECIFICAT	IONS			Test Method					
FCC 15.247:2018				ANSI C63.10:2013					
	<u> </u>								
COMMENTS									
None									
<b>DEVIATIONS FRO</b>	M TEST STANDARD								
None									
	1		/	1/2					
Configuration #	1 1	Signature	Jett.	1/2					
		Signature			2	Number of	Value	Limit	
				Pulse Width	Period	Pulses	(%)	(%)	Results
FSK, Single Channe				1 4100 1114111		. 4.000	(/0)	(/0)	11000110
r ort, origio oriarin	Low Channel, 902.5 MHz			22.818 ms	23.647 ms	1	96.5	N/A	N/A
	Low Channel, 902.5 MHz			N/A	N/A	5	N/A	N/A	N/A
	Mid Channel, 915 MHz			22.812 ms	23.64 ms	1	96.5	N/A	N/A
	Mid Channel, 915 MHz			N/A	N/A	5	N/A	N/A	N/A
	High Channel, 927.5 MHz			22.807 ms	24.579 ms	1	92.8	N/A	N/A
	High Channel, 927.5 MHz			N/A	N/A	5	N/A	N/A	N/A
	g., 0			// (	// (	3	// (	. 4// (	// (

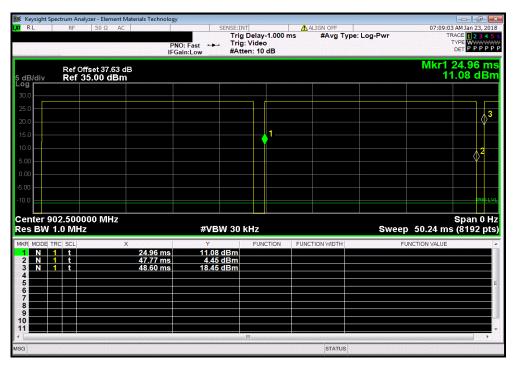


FSK, Single Channel, Low Channel, 902.5 MHz

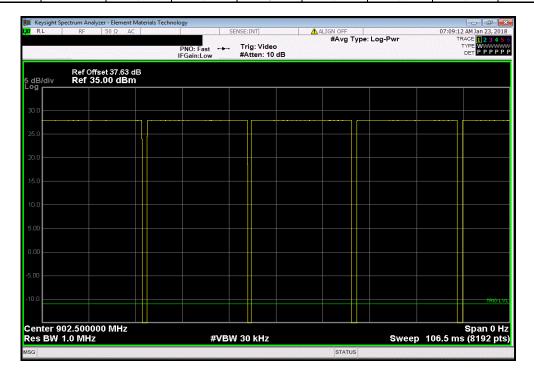
Number of Value Limit

Pulse Width Period Pulses (%) (%) Results

22.818 ms 23.647 ms 1 96.5 N/A N/A



		FSK, Single Ch	annel, Low Chan	nel, 902.5 MHz		
			Number of	Value	Limit	
	Pulse Width	Period	Pulses	(%)	(%)	Results
	N/A	N/A	5	N/A	N/A	N/A

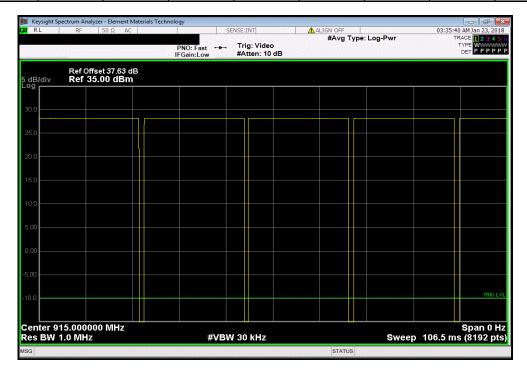




		FSK, Single C	hannel, Mid Char	nnel, 915 MHz			
			Number of	Value	Limit		
	Pulse Width	Period	Pulses	(%)	(%)	Results	
	22.812 ms	23.64 ms	1	96.5	N/A	N/A	

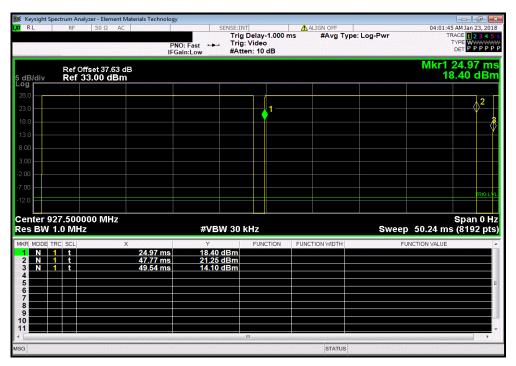


		FSK, Single C	hannel, Mid Char	nnel, 915 MHz		
			Number of	Value	Limit	
	 Pulse Width	Period	Pulses	(%)	(%)	Results
i	N/A	N/A	5	N/A	N/A	N/A

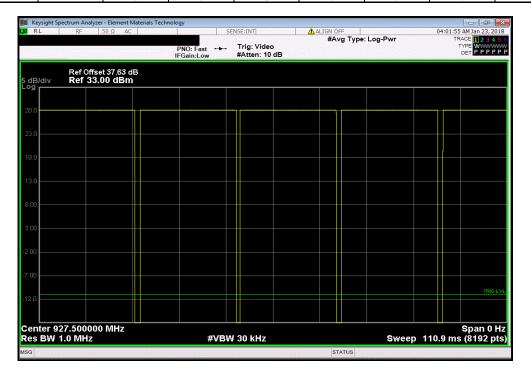




		FSK, Single Ch	annel, High Chan	nel, 927.5 MHz			
			Number of	Value	Limit		
	Pulse Width	Period	Pulses	(%)	(%)	Results	
	22.807 ms	24.579 ms	1	92.8	N/A	N/A	



		FSK, Single Ch	annel, High Chan	nel, 927.5 MHz		
			Number of	Value	Limit	
	 Pulse Width	Period	Pulses	(%)	(%)	Results
i	N/A	N/A	5	N/A	N/A	N/A



## **CARRIER FREQUENCY SEPARATION**



XMit 2017.12.1

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

#### **TEST EQUIPMENT**

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	27-Oct-15	27-Oct-18
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	30-May-17	30-May-18
Attenuator	S.M. Electronics	SA26B-10	AWR	24-Oct-17	24-Oct-18
Attenuator	Fairview Microwave	18B5W-26	RFZ	6-Sep-17	6-Sep-18
Block - DC	Fairview Microwave	SD3379	AMW	5-Jun-17	5-Jun-18
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	14-Aug-17	14-Aug-18

#### **TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The channel carrier frequencies in the 902 - 928 MHz band must be separated by 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Or, if the output power is less than 125 mW, the channel separation can be 25 kHz or 2/3 of the 20dB bandwidth. The EUT was operated in pseudorandom hopping mode. The spectrum was scanned across two adjacent peaks. The separation between the peaks of these channels was measured.

## **CARRIER FREQUENCY SEPARATION**



						TbtTx 2017.12.14	XMit 2017.12.13
EUT	: Voyager Pro				Work Order:	POLR0007	
Serial Number	: 1					22-Jan-18	•
Customer	: Polaris Industries, Inc.				Temperature:		•
Attendees	: Stephen Reid and Ed Va	ynberg				37.6% RH	
Project					Barometric Pres.:		•
	: Jeff Alcoke		Power:	14.0 VDC	Job Site:	EV06	
TEST SPECIFICAT	TIONS			Test Method			
FCC 15.247:2018				ANSI C63.10:2013			
COMMENTS							
None							
<b>DEVIATIONS FRO</b>	M TEST STANDARD						
None							
Configuration #	1	Signature	JAF				,
					Value	Limit (≥)	Results
FSK, Hopping							
	Mid Channel, 915 MHz				0.2 MHz	146 kHz	Pass

## **CARRIER FREQUENCY SEPARATION**



FSK, Hopping, Mid Channel, 915 MHz

Limit

Value (2) Results

0.2 MHz 146 kHz Pass



## **NUMBER OF HOPPING FREQUENCIES**



XMit 2017 12 13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

#### **TEST EQUIPMENT**

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	27-Oct-15	27-Oct-18
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	30-May-17	30-May-18
Attenuator	S.M. Electronics	SA26B-10	AWR	24-Oct-17	24-Oct-18
Attenuator	Fairview Microwave	18B5W-26	RFZ	6-Sep-17	6-Sep-18
Block - DC	Fairview Microwave	SD3379	AMW	5-Jun-17	5-Jun-18
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	14-Aug-17	14-Aug-18

#### **TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The number of hopping frequencies was measured across the authorized band. The hopping function of the EUT was enabled.

## **NUMBER OF HOPPING FREQUENCIES**



							TbtTx 2017.12.14	XMit 2017.12.13
EUT	: Voyager Pro					Work Order	POLR0007	
Serial Number	r: 1					Date	22-Jan-18	
Customer	: Polaris Industries, Inc.					Temperature	22.4 °C	
Attendees	Stephen Reid and Ed Vay	ynberg					37.5% RH	
Project	: None					Barometric Pres.	1029 mbar	
	/: Jeff Alcoke			Power:	14.0 VDC	Job Site	EV06	
TEST SPECIFICAT	TIONS				Test Method			
FCC 15.247:2018					ANSI C63.10:2013			
COMMENTS								
None								
<b>DEVIATIONS FRO</b>	M TEST STANDARD							
None								
Configuration #	1	Signature	J	leff,				
		•				Number of	Limit	
						Channels	(≥)	Results
FSK, Hopping								
	Mid Channel, 915 MHz					60	50	Pass

## **NUMBER OF HOPPING FREQUENCIES**



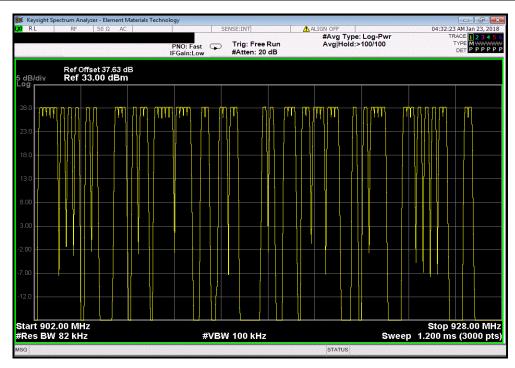
TbtTx 2017.12.14

FSK, Hopping, Mid Channel, 915 MHz

Number of Limit

Channels (2) Results

60 50 Pass





XMit 2017 12 13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

#### **TEST EQUIPMENT**

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TID	25-Apr-17	25-Apr-19
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	30-May-17	30-May-18
Attenuator	Fairview Microwave	18B5W-26	RFZ	6-Sep-17	6-Sep-18
Attenuator	Fairview Microwave	SA26B-10	TWH	15-Apr-17	15-Apr-18
Block - DC	Fairview Microwave	SD3379	AMW	5-Jun-17	5-Jun-18
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	14-Aug-17	14-Aug-18

#### **TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The average dwell time per hopping channel was measured at one hopping channel in the middle of the authorized band. The hopping function of the EUT was enabled.

The average Dwell Time of any frequency shall not be greater than 0.4 seconds within a 20 second period.



EUT: Voyager Pro
Serial Number: 1
Customer: Polaris Industries, Inc. Work Order: POLR0007
Date: 14-Feb-18
Temperature: 21.9 °C Humidity: 34% RH Barometric Pres.: 1023 mbar Project: None
Tested by: Jeff Alcoke
TEST SPECIFICATIONS Power: 14.0 VDC
Test Method Job Site: EV06 FCC 15.247:2018 COMMENTS DEVIATIONS FROM TEST STANDARD Configuration # Signature Count Pulse 1 Count Pulse 2 Avg Dwell Time (ms) Result 20 sec period (ms) (ms) FSK, Hopping Mid Channel, 915 MHz Pulse 1 Pulse 2 22.83 381.2 20 sec Duration 1 205.47 0 20 sec Duration 2 20 sec Duration 3 449.69 762.40 20 sec Duration 4 20 sec Duration 5 136.98 136.98 0 20 sec Duration 6 20 sec Duration 7 449.69 518.18 20 sec Duration 8 20 sec Duration 9 205.47 205.47 0 0 20 sec Duration 10 518.18 20 sec Duration 11 449.69 20 sec Duration 12 20 sec Duration 13 205.47 0 0 136.98 20 sec Duration 14 20 sec Duration 15 518.18 205.47 20 sec Duration 16 20 sec Duration 17 0 136.98 136.98 205.47 20 sec Duration 18 0 20 sec Duration 19 6 20 sec Duration 20 0 136.98 Calculation 289.46 ≤ 400 Pass



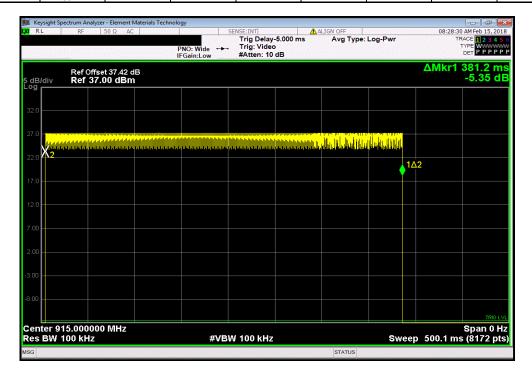
FSK, Hopping, Mid Channel, 915 MHz, Pulse 1

Duration Count Dwell Time (ms) Avg Dwell Limit

(ms) Pulse 1 Pulse 2 20 sec period Time (ms) (ms) Result



		FSK, Hopping	j, Mid Channel, 915	MHz, Pulse 2		
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
381.2	-	-	-	-	-	-





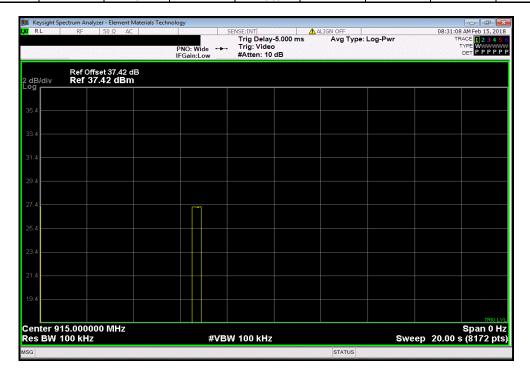
XMit 2017.12.1

30/60

	FS	K, Hopping, Mid	Channel, 915 MH	z, 20 sec Duratio	n 1	
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	9	0	205.47		-	-



	FS	K, Hopping, Mid	Channel, 915 MH	z, 20 sec Duratio	n 2	
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	3	1	449.69	-	-	-



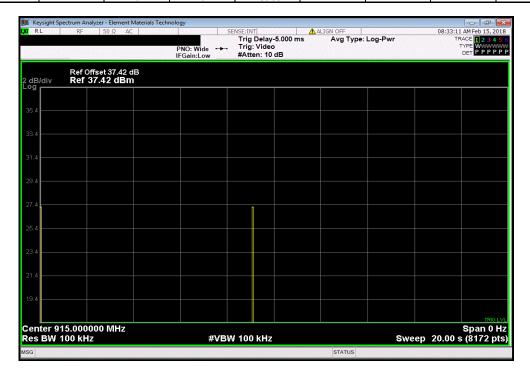


YMit 2017 12 1

	FS	K, Hopping, Mid	Channel, 915 MH	z, 20 sec Duratio	n 3	
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	0	2	762.4	-	-	-



	FS	K, Hopping, Mid	Channel, 915 MHz	z, 20 sec Duratio	n 4	
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	6	0	136.98	-	-	-





YMR 2017 12 1

		FS	K, Hopping, Mid	Channel, 915 MH	z, 20 sec Duration	n 5	
Dι	Duration Count Count Dwell Time (ms) Avg Dwell Limit						
	(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
	-	6	0	136.98		-	-



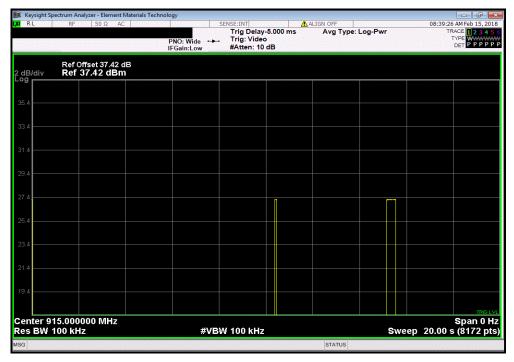
	(ms) Pulse 1 Pulse 2 20 sec period Time (ms)					
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	3	1	449.69	-	-	-



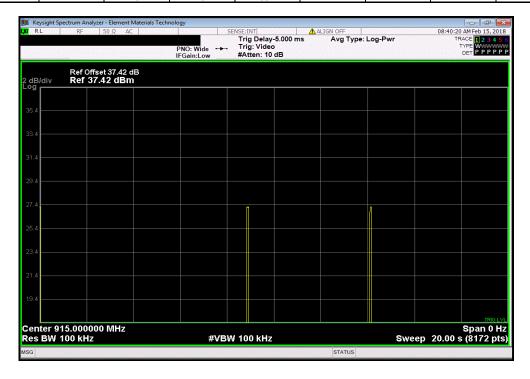


VMR 2017 12 1

FSK, Hopping, Mid Channel, 915 MHz, 20 sec Duration 7  Duration Count Dwell Time (ms) Avg Dwell L						
Duration Count Count Dwell Time (ms) Avg Dwell Limit						
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	6	1	518.18	-	-	-



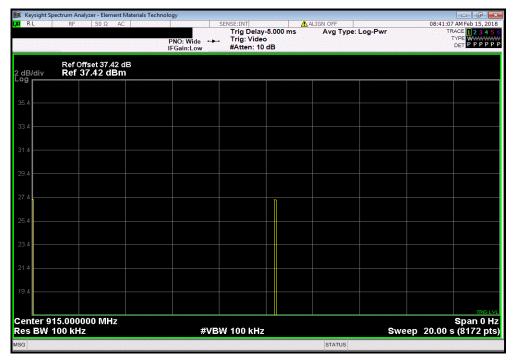
	(ms) Pulse 1 Pulse 2 20 sec period Time (m				n 8	
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	9	0	205.47	-	-	-



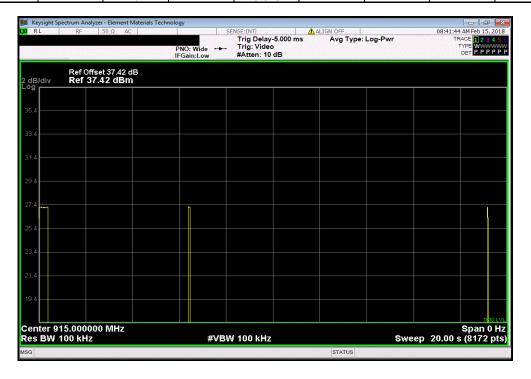


VMR 2017 12 1

	FS	K, Hopping, Mid	Channel, 915 MH:	z, 20 sec Duratio	n 9	
Duration Count Count Dwell Time (ms) Avg Dwell Limit						
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	9	0	205.47	-	-	-



	FSI	K, Hopping, Mid	Channel, 915 MHz	, 20 sec Duration	n 10	
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	6	1	518.18	-	-	-

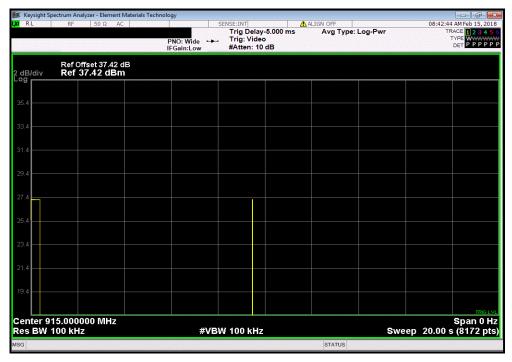




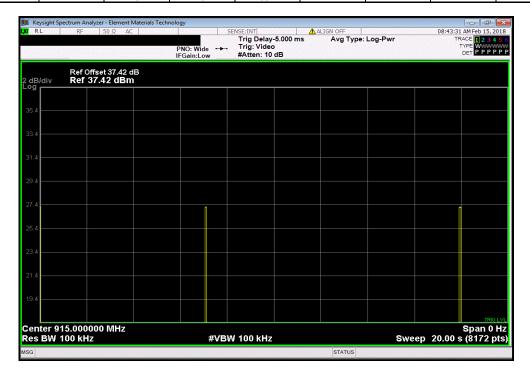
XMit 2017.12.1

35/60

	FSI	K, Hopping, Mid	Channel, 915 MHz	, 20 sec Duration	า 11	
Duration Count Count Dwell Time (ms) Avg Dwell Limit						
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	3	1	449.69	-	-	-



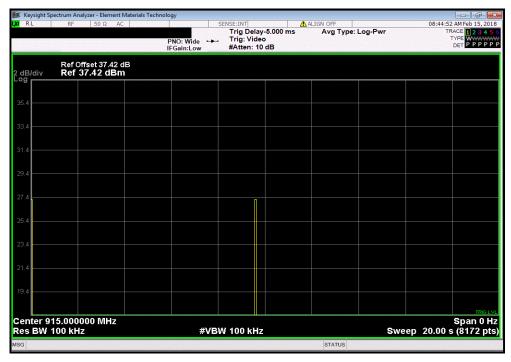
	(ms) Pulse 1 Pulse 2 20 sec period Tir			, 20 sec Duration	า 12	
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	9	0	205.47	-	-	-



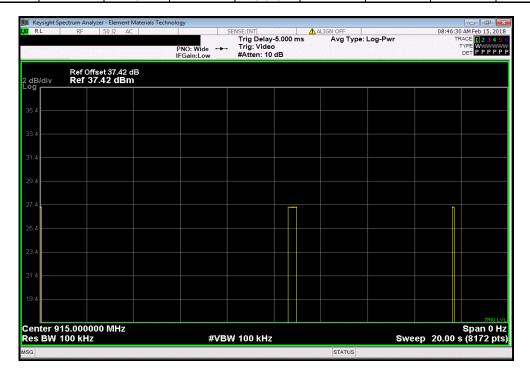


XMit 2017.12.1

	FSI	K, Hopping, Mid	Channel, 915 MHz	, 20 sec Duration	n 13	
Duration Count Count Dwell Time (ms) Avg Dwell Limit						
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	6	0	136.98		-	-



	(ms) Pulse 1 Pulse 2 20 sec period Time				า 14	
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	6	1	518.18	-	-	-



## **DWELL TIME**



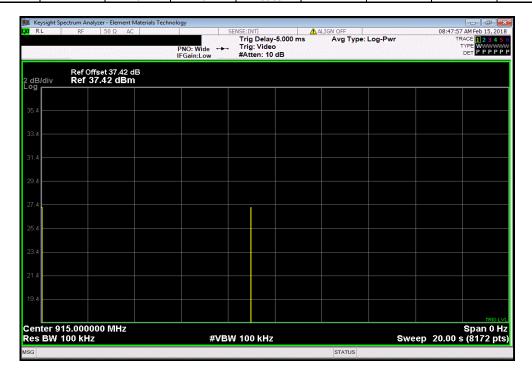
XMit 2017.12.1

37/60

	FSI	K, Hopping, Mid	Channel, 915 MHz	, 20 sec Duration	า 15	
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	9	0	205.47	-	-	-



	FSI	K, Hopping, Mid	Channel, 915 MHz	, 20 sec Duration	า 16	
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	6	0	136.98	-	-	-



### **DWELL TIME**

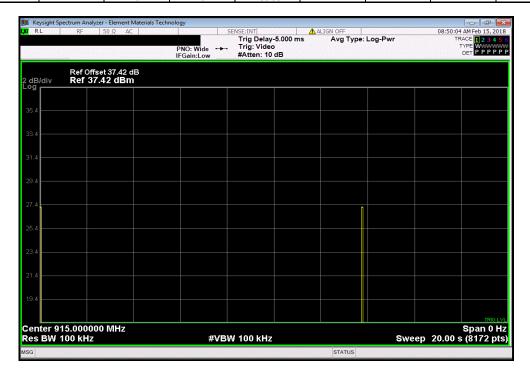


XMit 2017.12.1

		FSK, Hopping,	Mid Channel, 915 MF	Iz, 20 sec Duratio	n 17	
Dur	ation Cou	nt Coun	Dwell Time (ms	s) Avg Dwell	Limit	
(r	ıs) Puls	e 1 Pulse	2 20 sec period	Time (ms)	(ms)	Result
	- 3	0	68.49	-	-	-



	FSI	K, Hopping, Mid	Channel, 915 MHz	, 20 sec Duration	า 18	
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	6	0	136.98	-	-	-



## **DWELL TIME**

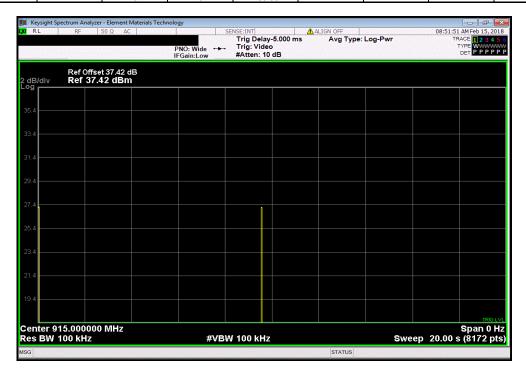


XMit 2017.12.1

	FSI	K, Hopping, Mid	Channel, 915 MHz	, 20 sec Duration	า 19	
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	9	0	205.47		-	-



	FSI	K, Hopping, Mid	Channel, 915 MHz	, 20 sec Duration	า 20	
Duration	Count	Count	Dwell Time (ms)	Avg Dwell	Limit	
(ms)	Pulse 1	Pulse 2	20 sec period	Time (ms)	(ms)	Result
-	6	0	136.98	-	-	-





XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

#### **TEST EQUIPMENT**

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	27-Oct-15	27-Oct-18
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	30-May-17	30-May-18
Attenuator	S.M. Electronics	SA26B-10	AWR	24-Oct-17	24-Oct-18
Attenuator	Fairview Microwave	18B5W-26	RFZ	6-Sep-17	6-Sep-18
Block - DC	Fairview Microwave	SD3379	AMW	5-Jun-17	5-Jun-18
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	14-Aug-17	14-Aug-18

#### **TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The peak output power was measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting in a no hop mode at the data rate(s) listed in the datasheet.

The method found in ANSI C63.10:2013 Section 7.8.5 was used for a FHSS radio.

De Facto EIRP Limit: The EUT meets the de facto EIRP limit of +36 dBm.



	TbtTx 2017.12.14	XMit 2017.12.13
EUT: Voyager Pro Work Orde	r: POLR0007	
Serial Number: 1 Date	e: 22-Jan-18	
Customer: Polaris Industries, Inc. Temperature	22.4 °C	
Attendees: Stephen Reid and Ed Vaynberg Humidity	y: 37.8% RH	
Project: None Barometric Pres	.: 1030 mbar	
Tested by: Jeff Alcoke Power: 14.0 VDC Job Site	e: EV06	
TEST SPECIFICATIONS Test Method		
FCC 15.247:2018 ANSI C63.10:2013		
COMMENTS		
None		
DEVIATIONS FROM TEST STANDARD		
None		
——————————————————————————————————————		
Configuration # 1		
Signature		
	Limit	
Value	(<)	Result
FSK, Single Channel		
Low Channel, 902.5 MHz 641.41 mW	1 W	Pass
Mid Channel, 915 MHz 657.79 mW	1 W	Pass
High Channel, 927.5 MHz 652.79 mW	1 W	Pass

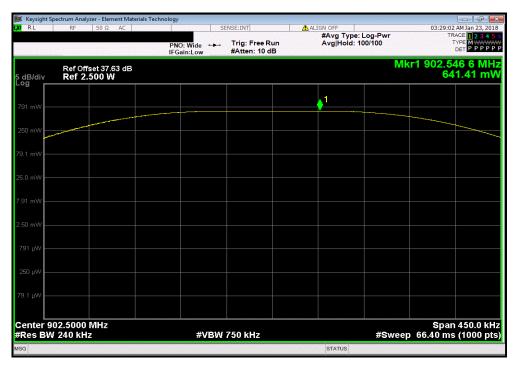


FSK, Single Channel, Low Channel, 902.5 MHz

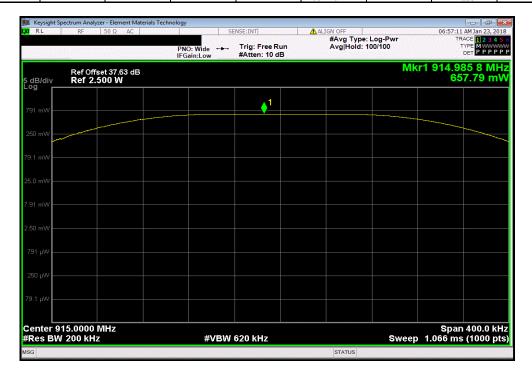
Limit

Value (<) Result

641.41 mW 1 W Pass



	FSK, Single C	hannel, Mid Char	nnel, 915 MHz		
				Limit	
			Value	(<)	Result
			657.79 mW	1 W	Pass





FSK, Single Channel, High Channel, 927.5 MHz

Limit

Value (<) Result

652.79 mW 1 W Pass



## **BAND EDGE COMPLIANCE**



XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

#### **TEST EQUIPMENT**

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	27-Oct-15	27-Oct-18
Attenuator	Fairview Microwave	18B5W-26	RFZ	6-Sep-17	6-Sep-18
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	30-May-17	30-May-18
Attenuator	S.M. Electronics	SA26B-10	AWR	24-Oct-17	24-Oct-18
Block - DC	Fairview Microwave	SD3379	AMW	5-Jun-17	5-Jun-18
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	14-Aug-17	14-Aug-18

#### **TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet in a no hop mode. The channels closest to the band edges were selected.

The spectrum was scanned below the lower band edge and above the higher band edge.

# **BAND EDGE COMPLIANCE**



		TbtTx 2017.12.14	XMit 2017.12.13
EUT: Voyager Pro	Work Order:	POLR0007	
Serial Number: 1	Date:	22-Jan-18	•
Customer: Polaris Industries, Inc.	Temperature:	22.1 °C	•
Attendees: Stephen Reid and Ed Vaynberg	Humidity:	37.6% RH	
Project: None	Barometric Pres.:		•
Tested by: Jeff Alcoke Power: 14.0 VDC	Job Site:	EV06	,
TEST SPECIFICATIONS Test Method			
FCC 15.247:2018 ANSI C63.10:2013			
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			•
Configuration # 1 Signature			
	Value (dBc)	Limit ≤ (dBc)	Result
FSK, Single Channel		·	
Low Channel, 902.5 MHz	-45.89	-20	Pass
High Channel, 927.5 MHz	-46.93	-20	Pass

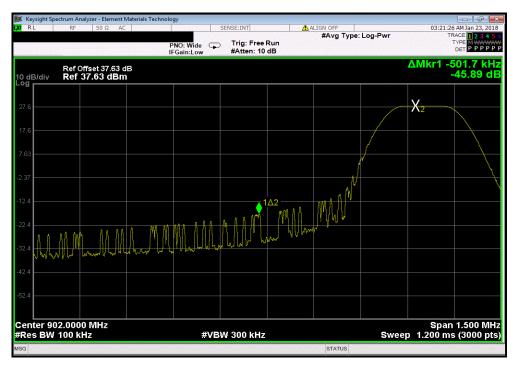
### **BAND EDGE COMPLIANCE**



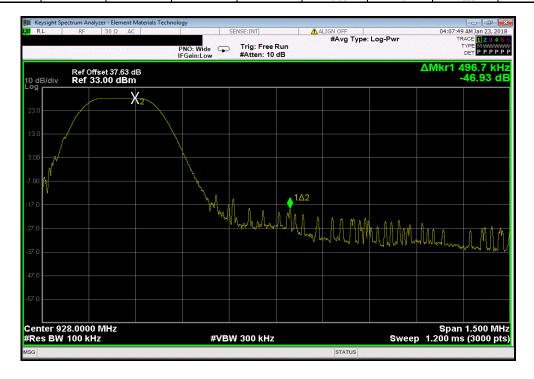
FSK, Single Channel, Low Channel, 902.5 MHz

Value Limit
(dBc) ≤ (dBc) Result

-45.89 -20 Pass



	FSK, Single Ch	annel, High Chan	nel, 927.5 MHz		
			Value	Limit	
			(dBc)	≤ (dBc)	Result
			-46.93	-20	Pass



# **BAND EDGE COMPLIANCE - HOPPING MODE**



XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

#### **TEST EQUIPMENT**

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	27-Oct-15	27-Oct-18
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	30-May-17	30-May-18
Attenuator	S.M. Electronics	SA26B-10	AWR	24-Oct-17	24-Oct-18
Attenuator	Fairview Microwave	18B5W-26	RFZ	6-Sep-17	6-Sep-18
Block - DC	Fairview Microwave	SD3379	AMW	5-Jun-17	5-Jun-18
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	14-Aug-17	14-Aug-18

#### **TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to its normal pseudo-random hopping sequence. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

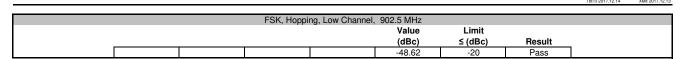
# **BAND EDGE COMPLIANCE - HOPPING MODE**

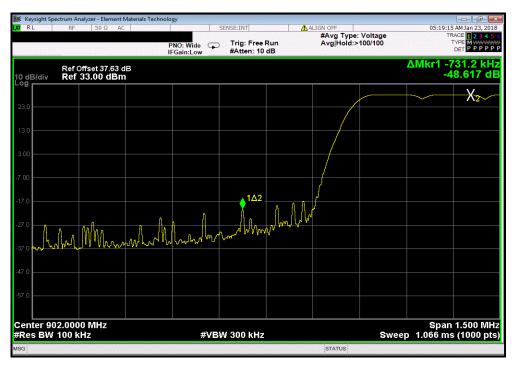


						TbtTx 2017.12.14	XMit 2017.12.13
EUT: Voyager	Pro				Work Order:	POLR0007	
Serial Number: 1					Date:	22-Jan-18	
Customer: Polaris II	ndustries, Inc.				Temperature:	22.2 °C	
Attendees: Stephen	Reid and Ed Vaynberg				Humidity:	37.6% RH	
Project: None					Barometric Pres.:	1029 mbar	
Tested by: Jeff Alco	ke		Power:	14.0 VDC	Job Site:	EV06	
TEST SPECIFICATIONS				Test Method			
FCC 15.247:2018				ANSI C63.10:2013			
COMMENTS							
None							
<b>DEVIATIONS FROM TEST ST</b>	TANDARD						
None							
Configuration #	1	Signature	leff,				
					Value (dBc)	Limit ≤ (dBc)	Result
FSK, Hopping							
	nnel, 902.5 MHz				-48.62	-20	Pass
High Cha	innel, 927.5 MHz				-53.36	-20	Pass

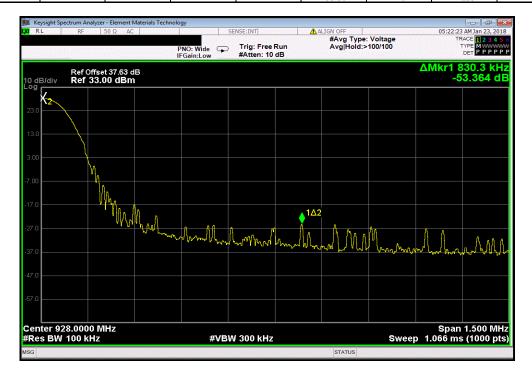
### **BAND EDGE COMPLIANCE - HOPPING MODE**







		FSK, Hoppii	ng, High Channel	927.5 MHz		
Value				Value	Limit	
				(dBc)	≤ (dBc)	Result
				-53.36	-20	Pass





XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

#### **TEST EQUIPMENT**

Description	Manufacturer	Model	D	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	27-Oct-15	27-Oct-18
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	30-May-17	30-May-18
Attenuator	S.M. Electronics	SA26B-10	AWR	24-Oct-17	24-Oct-18
Attenuator	Fairview Microwave	18B5W-26	RFZ	6-Sep-17	6-Sep-18
Block - DC	Fairview Microwave	SD3379	AMW	5-Jun-17	5-Jun-18
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	14-Aug-17	14-Aug-18

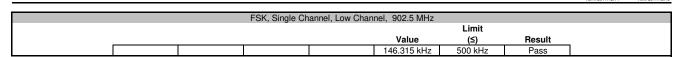
#### **TEST DESCRIPTION**

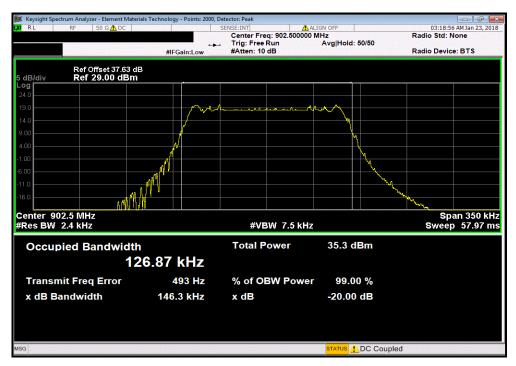
The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The 20 dB occupied bandwidth was measured with the EUT set to low, medium and high transmit frequencies in the band. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode.

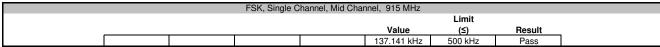


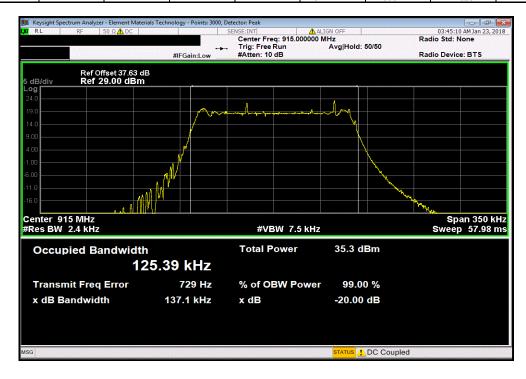
						TbtTx 2017.12	2.14 XMit 2017.12.13
EUT	T: Voyager Pro				Work O	der: POLR0007	
Serial Number	r: 1					ate: 22-Jan-18	
Custome	r: Polaris Industries, Inc.				Tempera	ure: 22.4 °C	
Attendees	s: Stephen Reid and Ed Vay	nberg			Humi	dity: 37.6% RH	
Projec	t: None				Barometric P	res.: 1029 mbar	
Tested by	y: Jeff Alcoke		Powe	r: 14.0 VDC	Job	Site: EV06	
TEST SPECIFICAT	TIONS			Test Method			
FCC 15.247:2018				ANSI C63.10:2013			
COMMENTS				•			
None							
<b>DEVIATIONS FRO</b>	OM TEST STANDARD						
None							
				-/ 1/4			
Configuration #	1		1-1-				
		Signature	Car,	9/100			
		-				Limit	
					Value	(≤)	Result
FSK, Single Chann	nel						
	Low Channel, 902.5 MHz				146.315 kF	lz 500 kHz	Pass
	Mid Channel, 915 MHz				137.141 kF	lz 500 kHz	Pass
	High Channel, 927.5 MHz				140.196 kF	lz 500 kHz	Pass











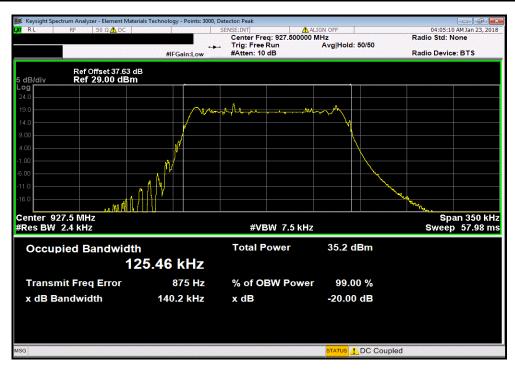


FSK, Single Channel, High Channel, 927.5 MHz

Limit

Value (≤) Result

140.196 kHz 500 kHz Pass





XMit 2017 12 13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

#### **TEST EQUIPMENT**

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	27-Oct-15	27-Oct-18
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	30-May-17	30-May-18
Attenuator	S.M. Electronics	SA26B-10	AWR	24-Oct-17	24-Oct-18
Attenuator	Fairview Microwave	18B5W-26	RFZ	6-Sep-17	6-Sep-18
Block - DC	Fairview Microwave	SD3379	AMW	5-Jun-17	5-Jun-18
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	14-Aug-17	14-Aug-18

#### **TEST DESCRIPTION**

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

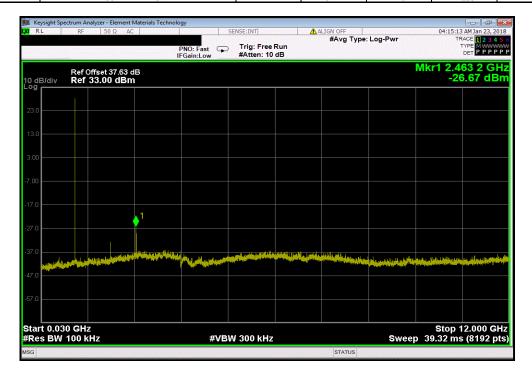


			TbtTx 2017.12.14	XMit 2017.12.1
EUT: Voyager Pro		Work Order:		
Serial Number: 1			22-Jan-18	
Customer: Polaris Industries, Inc.		Temperature:		
Attendees: Stephen Reid and Ed Vaynberg			37.9% RH	
Project: None		Barometric Pres.:		
Tested by: Jeff Alcoke	Power: 14.0 VDC	Job Site:	EV06	
TEST SPECIFICATIONS	Test Method			
FCC 15.247:2018	ANSI C63.10:2013			
		-		
COMMENTS				
None		_		
DEVIATIONS FROM TEST STANDARD				
None				
	Signature Jeff			
	Frequency	Max Value	Limit	
Configuration # 1		Max Value (dBc)	Limit ≤ (dBc)	Result
Configuration # 1 FSK, Single Channel	Frequency Range	(dBc)	≤ (dBc)	
Configuration # 1  =SK, Single Channel Low Channel, 902.5 MHz	Frequency Range Fundamental	(dBc)	≤ (dBc)	N/A
Configuration # 1  FSK, Single Channel  Low Channel, 902.5 MHz  Low Channel, 902.5 MHz	Frequency Range Fundamental 30 MHz - 12 GHz	(dBc) N/A -54.74	≤ (dBc) N/A -20	N/A Pass
Configuration # 1  FSK, Single Channel  Low Channel, 902.5 MHz  Low Channel, 902.5 MHz  Low Channel, 902.5 MHz	Frequency Range Fundamental 30 MHz - 12 GHz 12 GHz - 25 GHz	(dBc) N/A -54.74 -50.89	≤ (dBc)  N/A -20 -20	N/A Pass Pass
FSK, Single Channel  Low Channel, 902.5 MHz Low Channel, 902.5 MHz Low Channel, 902.5 MHz Mid Channel, 915 MHz	Frequency Range Fundamental 30 MHz - 12 GHz 12 GHz - 25 GHz Fundamental	(dBc) N/A -54.74 -50.89 N/A	S (dBc)  N/A -20 -20 N/A	N/A Pass Pass N/A
Configuration # 1  ESK, Single Channel  Low Channel, 902.5 MHz  Low Channel, 902.5 MHz  Low Channel, 915 MHz  Mid Channel, 915 MHz  Mid Channel, 915 MHz	Frequency Range Fundamental 30 MHz - 12 GHz 12 GHz - 25 GHz Fundamental 30 MHz - 12 GHz	(dBc)  N/A -54.74 -50.89 N/A -58.15	≤ (dBc)  N/A -20 -20	N/A Pass Pass N/A Pass
ESK, Single Channel  Low Channel, 902.5 MHz  Low Channel, 902.5 MHz  Low Channel, 902.5 MHz  Mid Channel, 915 MHz	Frequency Range Fundamental 30 MHz - 12 GHz 12 GHz - 25 GHz Fundamental	(dBc) N/A -54.74 -50.89 N/A	S (dBc)  N/A -20 -20 N/A	N/A Pass Pass N/A
Configuration # 1  ESK, Single Channel  Low Channel, 902.5 MHz  Low Channel, 902.5 MHz  Low Channel, 902.5 MHz  Mid Channel, 915 MHz	Frequency Range  Fundamental 30 MHz - 12 GHz 12 GHz - 25 GHz Fundamental 30 MHz - 12 GHz 12 GHz - 25 GHz Fundamental	(dBc)  N/A -54.74 -50.89 N/A -58.15 -50.09 N/A	N/A -20 -20 N/A -20	N/A Pass Pass N/A Pass
FSK, Single Channel  Low Channel, 902.5 MHz Low Channel, 902.5 MHz Low Channel, 902.5 MHz Mid Channel, 915 MHz Mid Channel, 915 MHz Mid Channel, 915 MHz	Frequency Range  Fundamental 30 MHz - 12 GHz 12 GHz - 25 GHz Fundamental 30 MHz - 12 GHz 12 GHz - 25 GHz	(dBc)  N/A -54.74 -50.89 N/A -58.15 -50.09	≤ (dBc)  N/A -20 -20 N/A -20 -20 -20	N/A Pass Pass N/A Pass Pass

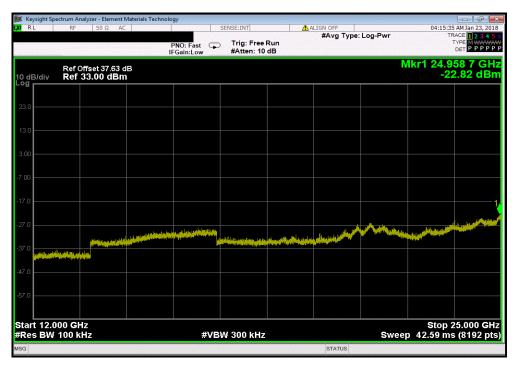




	FSK, Single (	hannel, Low Chan	nel, 902.5 MHz		
	Frequency		Max Value	Limit	
	Range		(dBc)	≤ (dBc)	Result
l l	30 MHz - 12 GHz		-54.74	-20	Pass







	FSK, Single Channel, Mid Channel, 915 MHz				
	Frequency Max Value			Limit	
_	Range		(dBc)	≤ (dBc)	Result
	Fundamental		N/A	N/A	N/A





TbtTx 2017.12.14

FSK, Single Channel, Mid Channel, 915 MHz

Frequency

Range

(dBc)

30 MHz - 12 GHz

FSK, Single Channel, Mid Channel, 915 MHz

Max Value

Limit

(dBc)

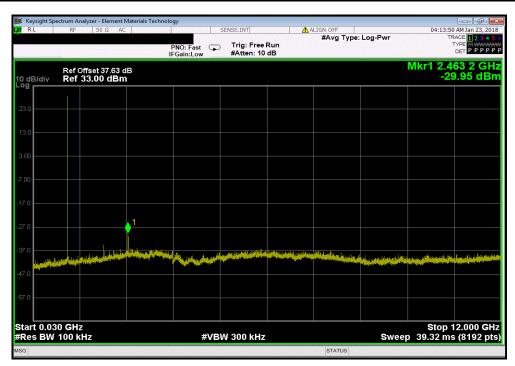
≤ (dBc)

Result

-58.15

-20

Pass



	FSK, Single Channel, Mid Channel, 915 MHz				
	Frequency Max Value			Limit	
	Range		(dBc)	≤ (dBc)	Result
,	12 GHz - 25 GHz		-50.09	-20	Pass





FSK, Single Channel, High Channel, 927.5 MHz

Frequency
Range
(dBc)
Fundamental

Fundamental

N/A
N/A
N/A
N/A
N/A

Fundamental

Row Max Value
Limit
(dBc)
Fesult
N/A
N/A
N/A
N/A



FSK, Single (	hannel, High Char	nel, 927.5 MHz		
Frequency		Max Value	Limit	
Range		(dBc)	≤ (dBc)	Result
30 MHz - 12 GHz		-56.77	-20	Pass

