



element[®]

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.

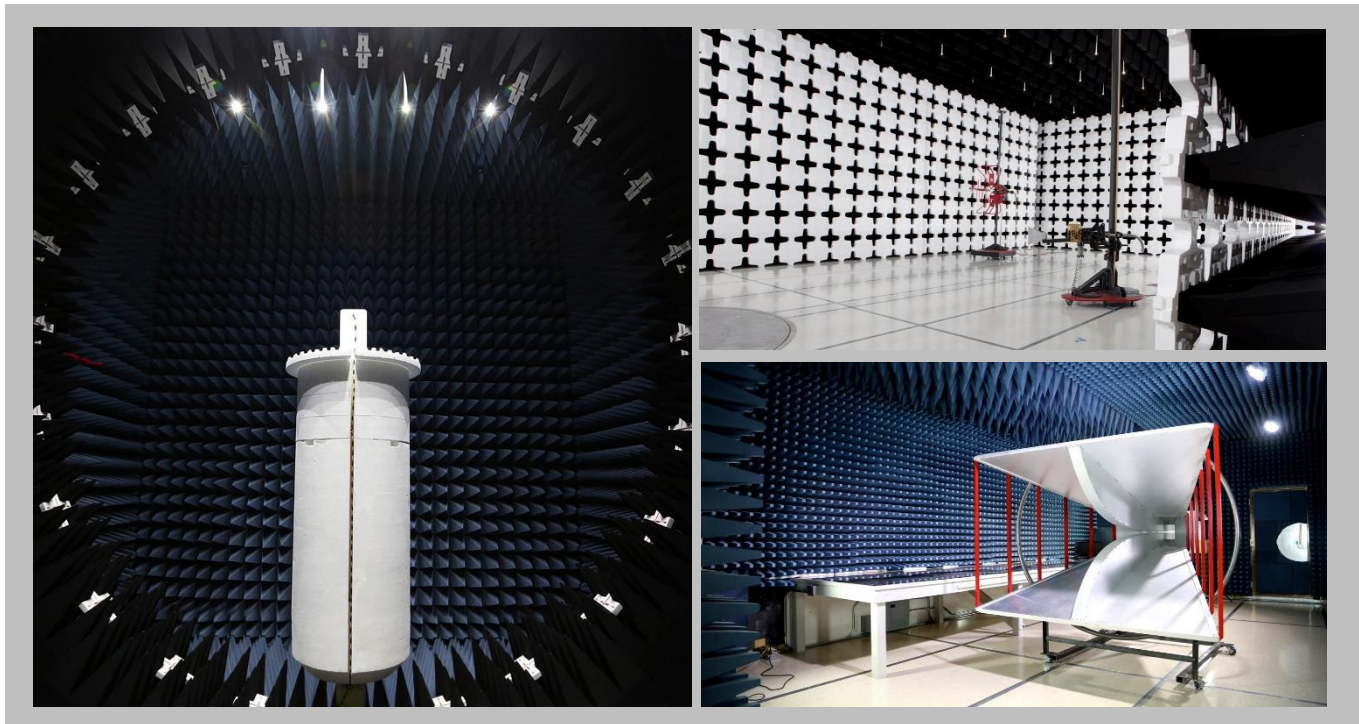
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

Test	+ MU	- MU
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 Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
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

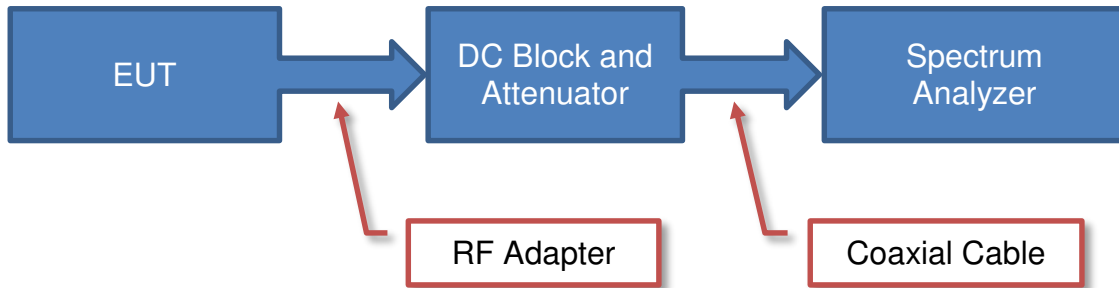


Test Setup Block Diagrams

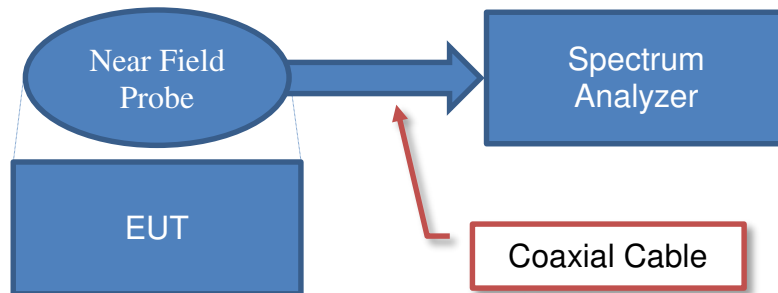


2017.1.25

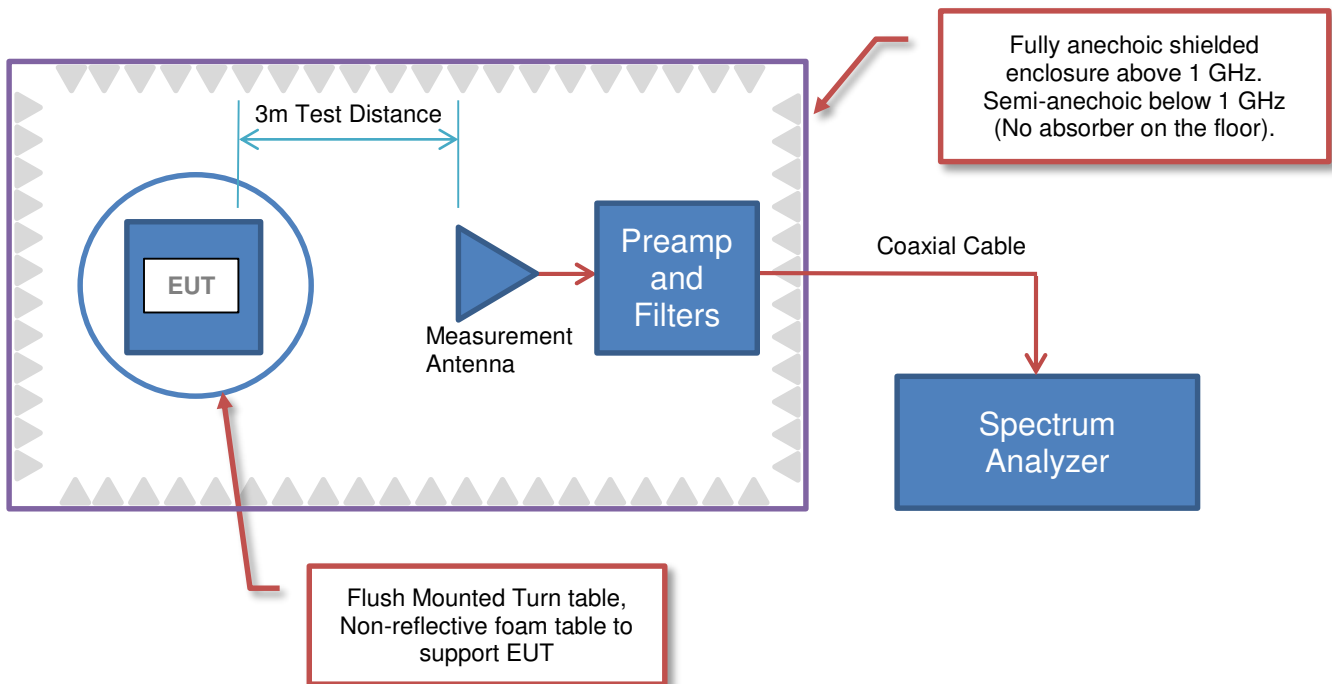
Antenna Port Conducted Measurements



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
Equipment Condition:	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	
Description	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	
Description	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
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



2017-1-25

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

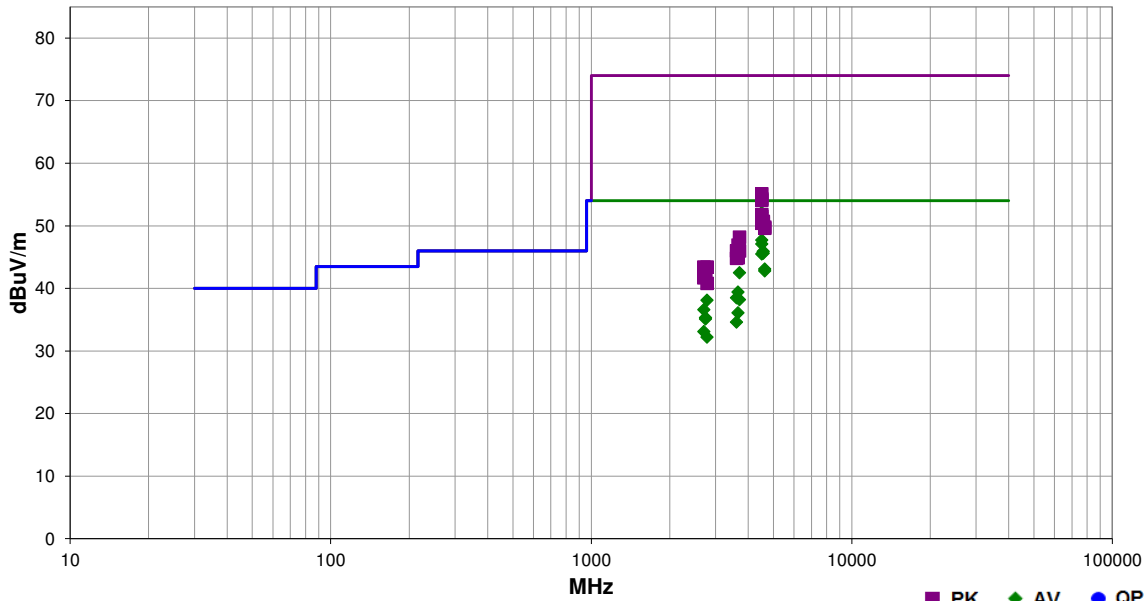


EmiRS 2017.09.18.2 PSA-ESCI 2017.09.18

Work Order:	POLR0007	Date:	23-Jan-2018	
Project:	None	Temperature:	21.9 °C	
Job Site:	EV01	Humidity:	37.1% RH	
Serial Number:	1	Barometric Pres.:	1021 mbar	
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 orientation.			

Test Specifications	Test Method
FCC 15.247:2018	ANSI C63.10:2013

Run #	12	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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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
4512.505	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
4512.345	47.0	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
4512.430	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
4512.550	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
4512.435	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
4574.925	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
4574.842	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
4512.485	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
4637.417	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
4637.433	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
3709.975	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
3660.025	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
3610.025	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
3709.958	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
2782.442	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
2707.408	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
3659.992	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
2745.033	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
2745.058	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
4512.325	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
3609.942	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
4512.750	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

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

DUTY CYCLE



XMI 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 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.

DUTY CYCLE



TbTx 2017.12.14 XMI 2017.12.13

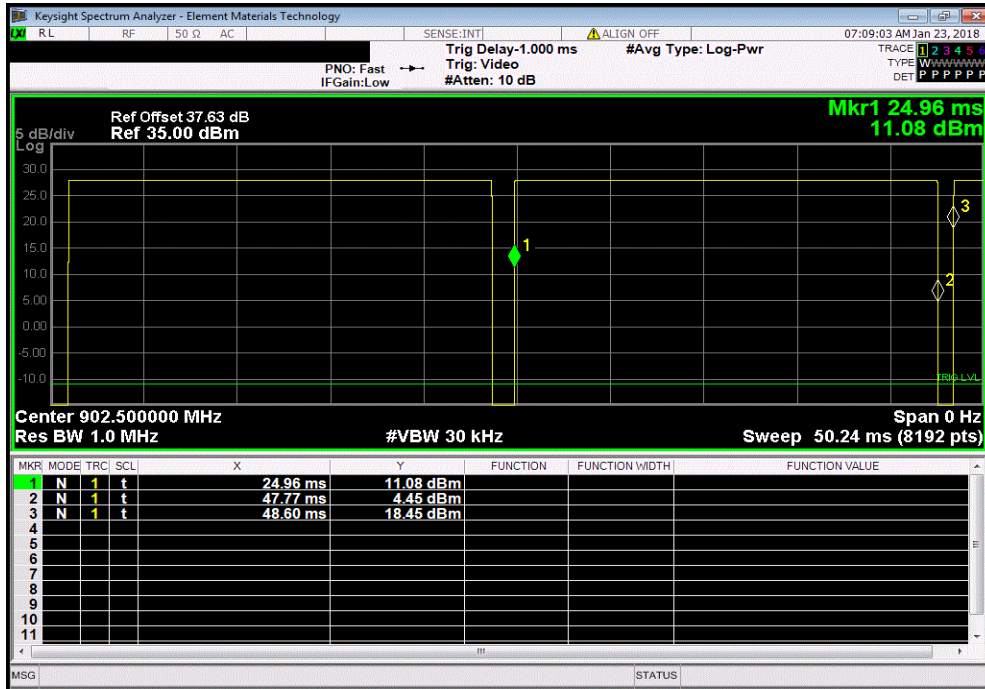
EUT: Voyager Pro		Work Order: POLR0007					
Serial Number: 1		Date: 22-Jan-18					
Customer: Polaris Industries, Inc.		Temperature: 22.3 °C					
Attendees: Stephen Reid and Ed Vaynberg		Humidity: 38.1% RH					
Project: None		Barometric Pres.: 1029 mbar					
Tested by: Jeff Alcoke	Power: 14.0 VDC	Job Site: EV06					
TEST SPECIFICATIONS		Test Method					
FCC 15.247:2018		ANSI C63.10:2013					
COMMENTS							
None							
DEVIATIONS FROM TEST STANDARD							
None							
Configuration #	1	Signature 					
		Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
FSK, Single Channel							
	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

DUTY CYCLE

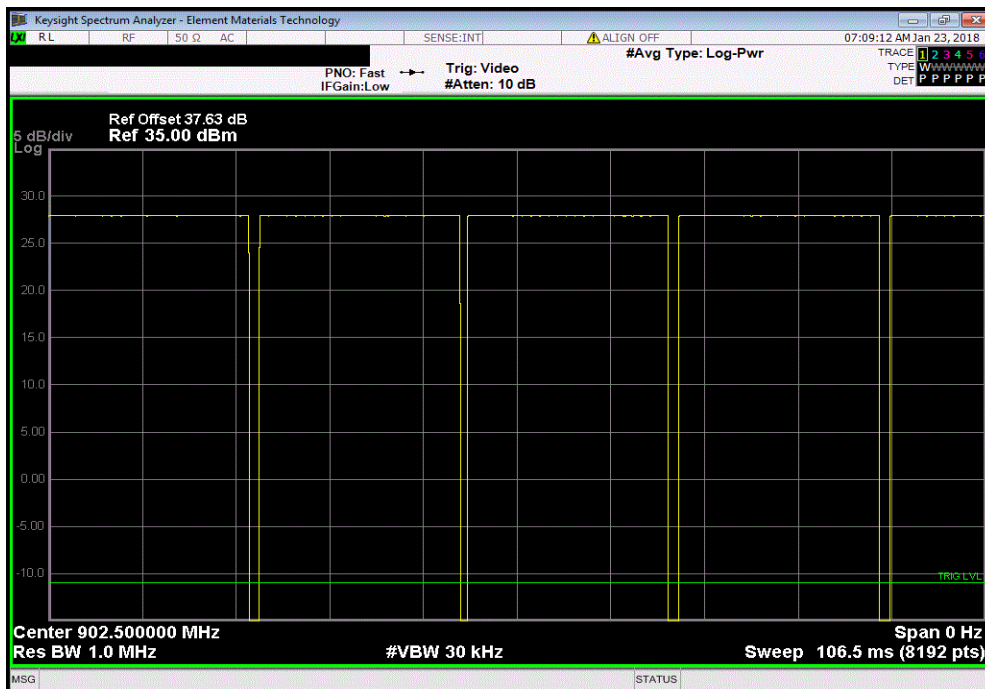


TMTx 2017.12.14 XMI 2017.12.13

FSK, Single Channel, Low Channel, 902.5 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
22.818 ms	23.647 ms	1	96.5	N/A	N/A	



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

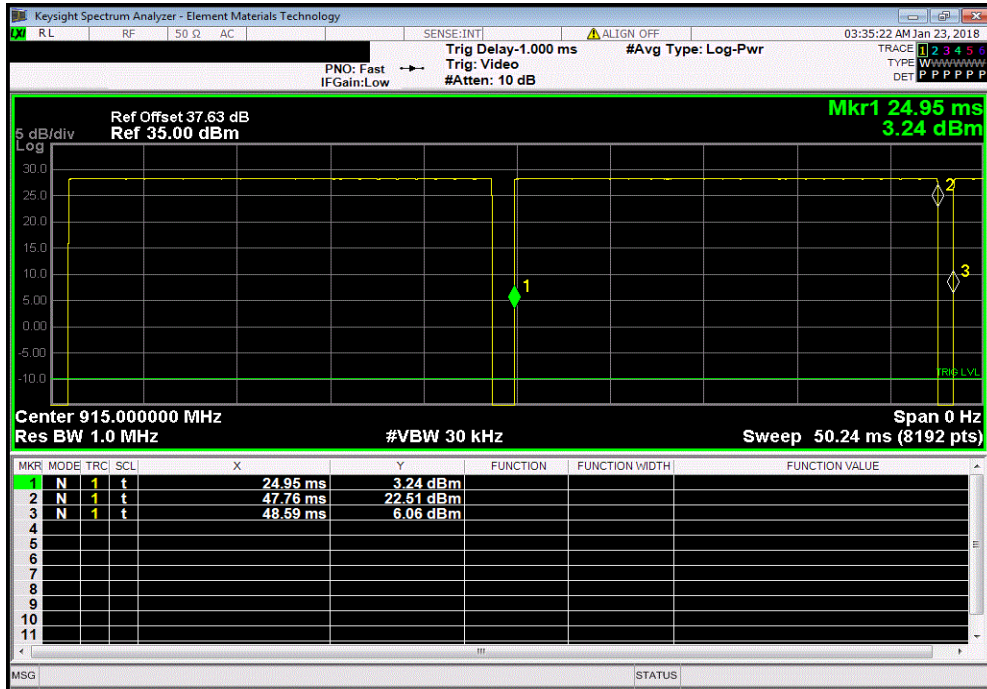


DUTY CYCLE

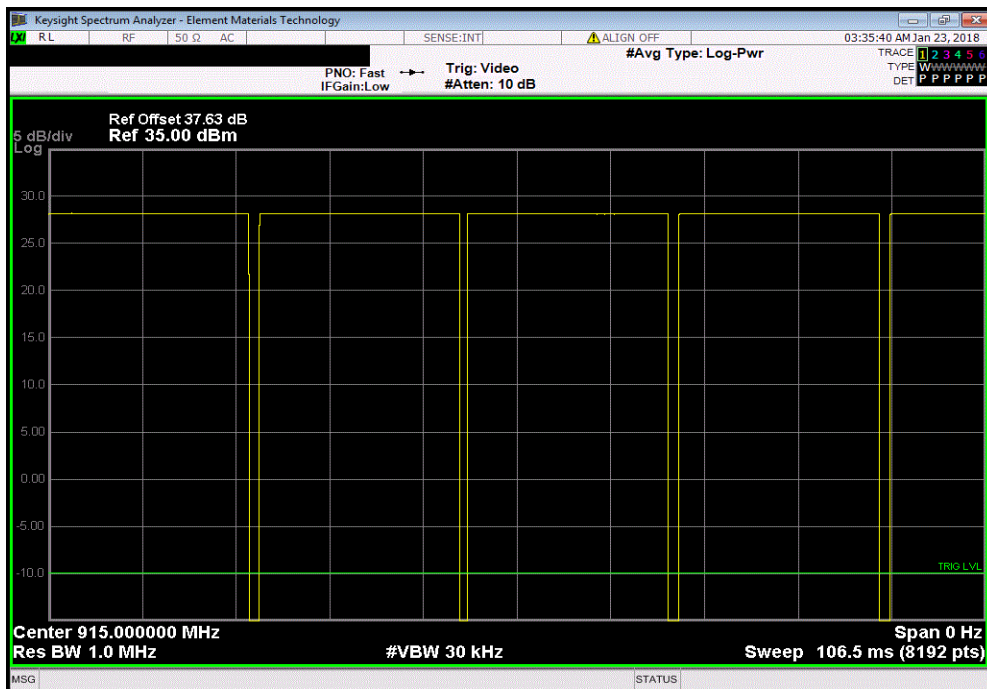


TMTx 2017.12.14 XMI 2017.12.13

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



FSK, Single Channel, Mid Channel, 915 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

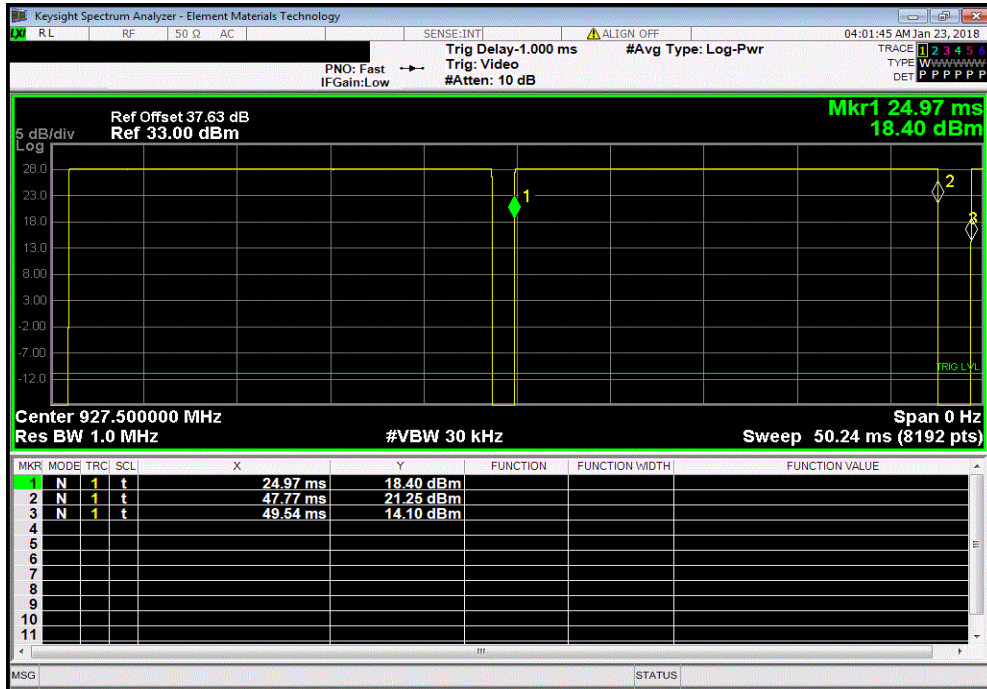


DUTY CYCLE

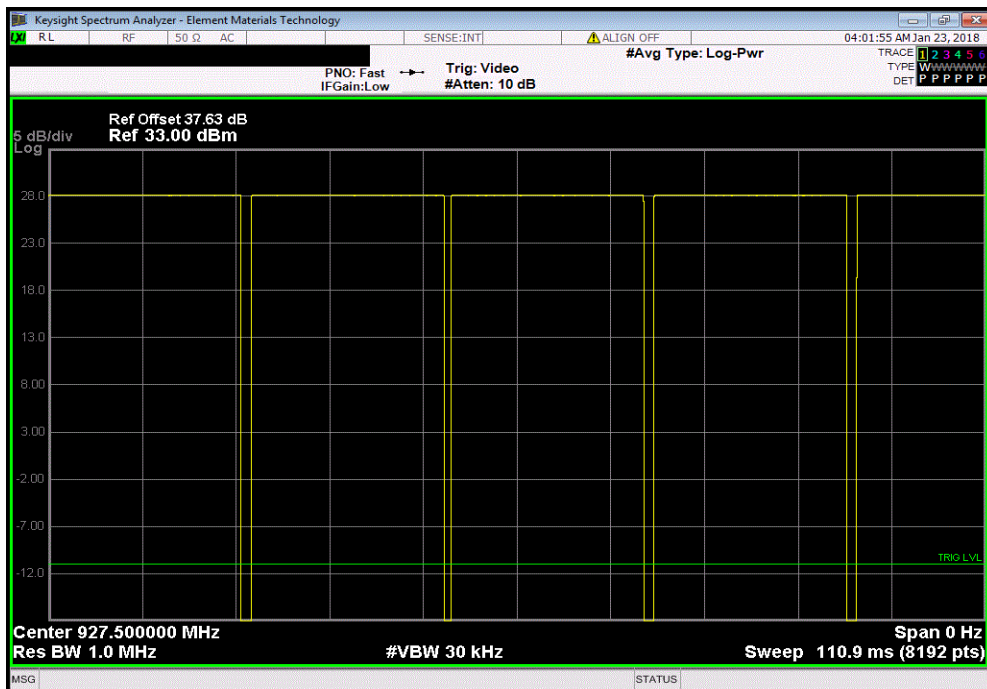


TMTx 2017.12.14 XMI 2017.12.13

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



FSK, Single Channel, High Channel, 927.5 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	



CARRIER FREQUENCY SEPARATION



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 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



TbTx 2017.12.14 XMt 2017.12.13

EUT: Voyager Pro		Work Order: POLR0007	
Serial Number: 1		Date: 22-Jan-18	
Customer: Polaris Industries, Inc.		Temperature: 22.4 °C	
Attendees: Stephen Reid and Ed Vaynberg		Humidity: 37.6% RH	
Project: None		Barometric Pres.: 1029 mbar	
Tested by: Jeff Alcoke	Power: 14.0 VDC	Job Site: EV06	
TEST SPECIFICATIONS			
FCC 15.247:2018		Test Method	
		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Jeff Alcoke</i>	
		Value	Limit (±) Results
FSK, Hopping	Mid Channel, 915 MHz	0.2 MHz	146 kHz Pass

NUMBER OF HOPPING FREQUENCIES



XMI 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 number of hopping frequencies was measured across the authorized band. The hopping function of the EUT was enabled.

NUMBER OF HOPPING FREQUENCIES



TbTx 2017.12.14 XMI 2017.12.13

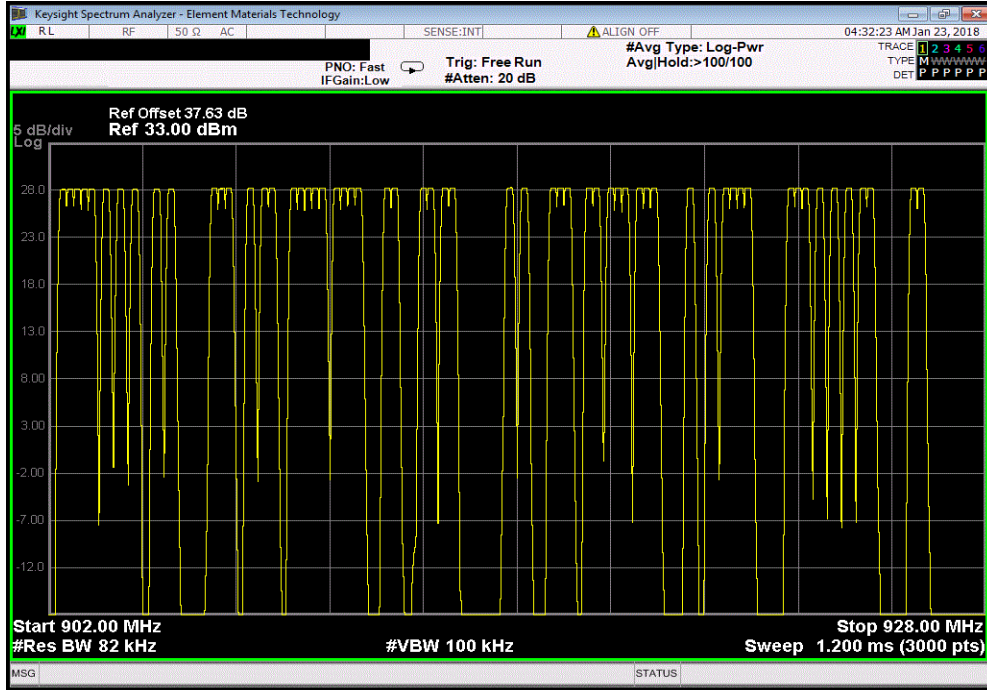
EUT: Voyager Pro		Work Order: POLR0007	
Serial Number: 1		Date: 22-Jan-18	
Customer: Polaris Industries, Inc.		Temperature: 22.4 °C	
Attendees: Stephen Reid and Ed Vaynberg		Humidity: 37.5% RH	
Project: None		Barometric Pres.: 1029 mbar	
Tested by: Jeff Alcoke	Power: 14.0 VDC	Job Site: EV06	
TEST SPECIFICATIONS			
FCC 15.247:2018		Test Method	
		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Number of Channels	Limit (≥) Results
FSK, Hopping	Mid Channel, 915 MHz	60	50 Pass

NUMBER OF HOPPING FREQUENCIES



TMTx 2017.12.14 XMI 2017.12.13

FSK, Hopping, Mid Channel, 915 MHz						
				Number of Channels	Limit (≥)	Results
				60	50	Pass



DWELL TIME



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.

DWELL TIME



XMM 2017.12.13

EUT: Voyager Pro		Work Order: POLR0007	
Serial Number: 1		Date: 14-Feb-18	
Customer: Polaris Industries, Inc.		Temperature: 21.9 °C	
Attendees: None		Humidity: 34% RH	
Project: None		Barometric Pres.: 1023 mbar	
Tested by: Jeff Alcoke		Power: 14.0 VDC	
Job Site: EV06			
TEST SPECIFICATIONS			
FCC 15.247:2018		Test Method	
		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	

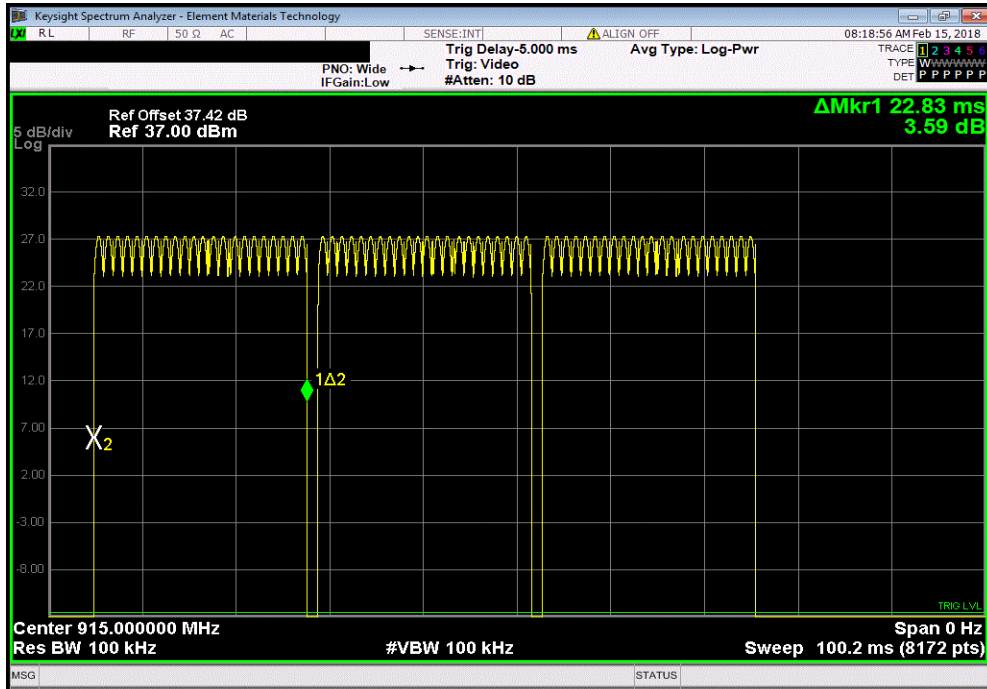
	Duration (ms)	Count Pulse 1	Count Pulse 2	Dwell Time (ms) 20 sec period	Avg Dwell Time (ms)	Limit (ms)	Result
FSK, Hopping							
Mid Channel, 915 MHz							
Pulse 1	22.83	-	-	-	-	-	-
Pulse 2	361.2	-	-	-	-	-	-
20 sec Duration 1	-	9	0	205.47	-	-	-
20 sec Duration 2	-	3	1	449.69	-	-	-
20 sec Duration 3	-	0	2	762.40	-	-	-
20 sec Duration 4	-	6	0	136.98	-	-	-
20 sec Duration 5	-	6	0	136.98	-	-	-
20 sec Duration 6	-	3	1	449.69	-	-	-
20 sec Duration 7	-	6	1	518.18	-	-	-
20 sec Duration 8	-	9	0	205.47	-	-	-
20 sec Duration 9	-	9	0	205.47	-	-	-
20 sec Duration 10	-	6	1	518.18	-	-	-
20 sec Duration 11	-	3	1	449.69	-	-	-
20 sec Duration 12	-	9	0	205.47	-	-	-
20 sec Duration 13	-	6	0	136.98	-	-	-
20 sec Duration 14	-	6	1	518.18	-	-	-
20 sec Duration 15	-	9	0	205.47	-	-	-
20 sec Duration 16	-	6	0	136.98	-	-	-
20 sec Duration 17	-	3	0	68.49	-	-	-
20 sec Duration 18	-	6	0	136.98	-	-	-
20 sec Duration 19	-	9	0	205.47	-	-	-
20 sec Duration 20	-	6	0	136.98	-	-	-
Calculation	-	-	-	-	289.46	≤ 400	Pass

DWELL TIME

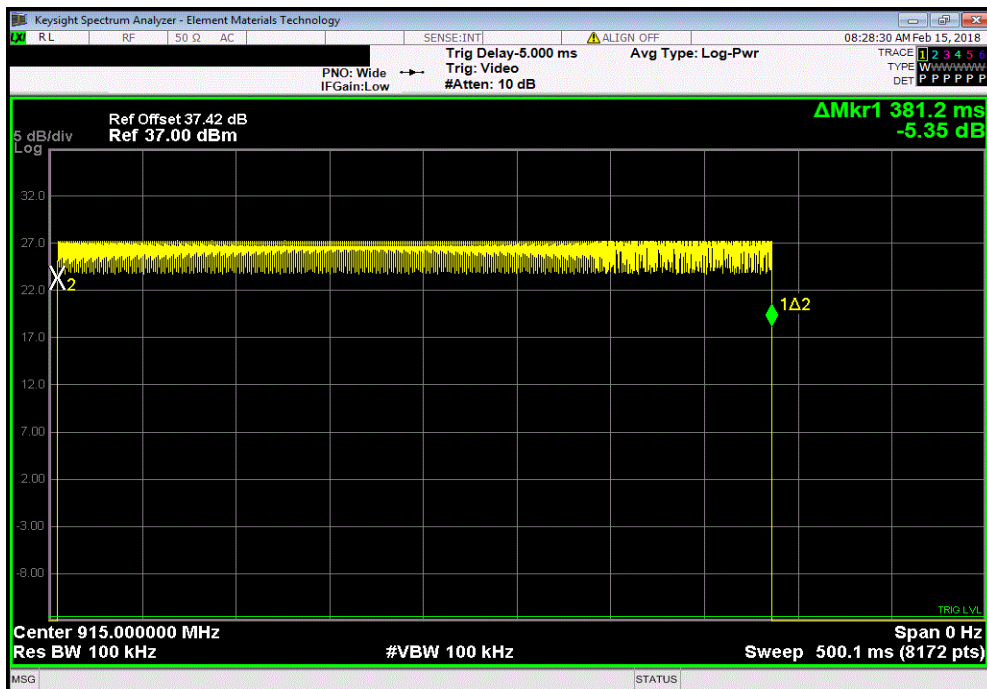


XMI 2017.12.13

FSK, Hopping, Mid Channel, 915 MHz, Pulse 1						
Duration (ms)	Count Pulse 1	Count Pulse 2	Dwell Time (ms) 20 sec period	Avg Dwell Time (ms)	Limit (ms)	Result
22.83	-	-	-	-	-	-



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

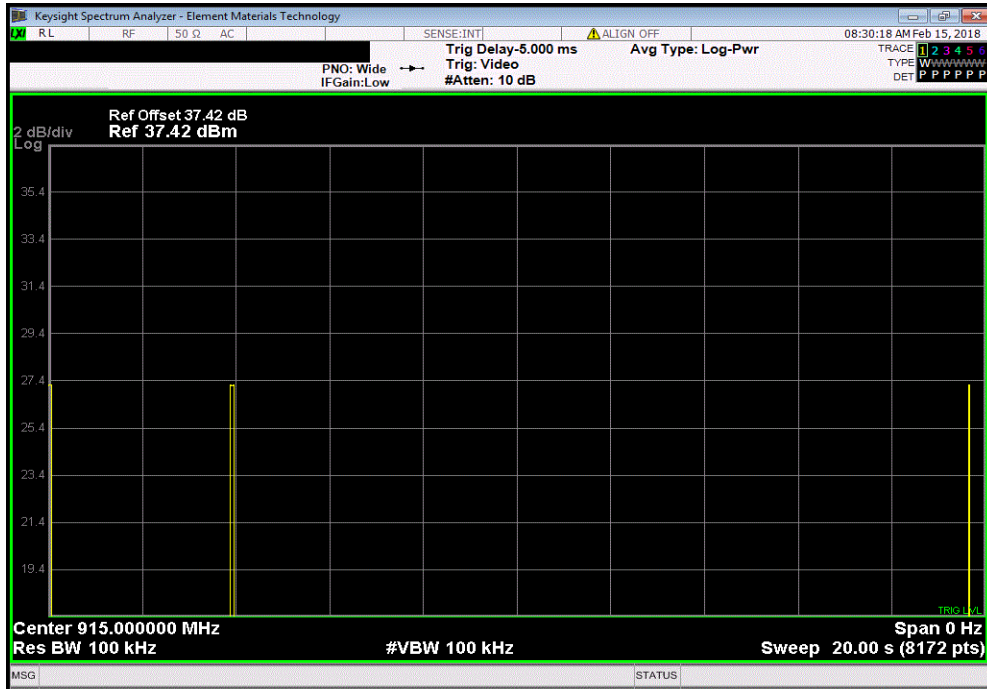


DWELL TIME

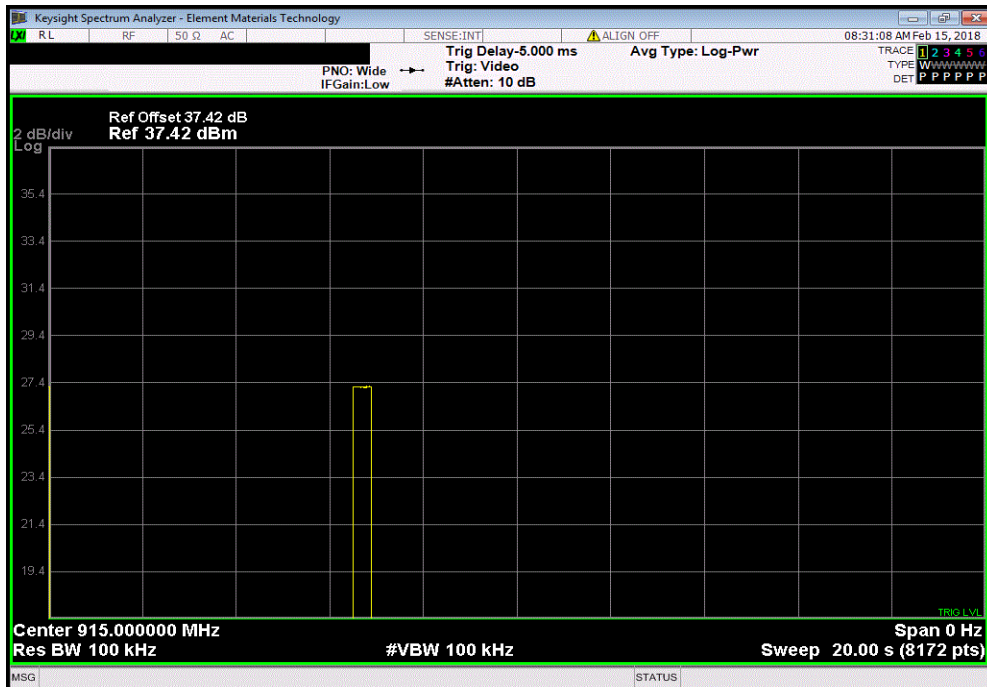


XMI 2017.12.13

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



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

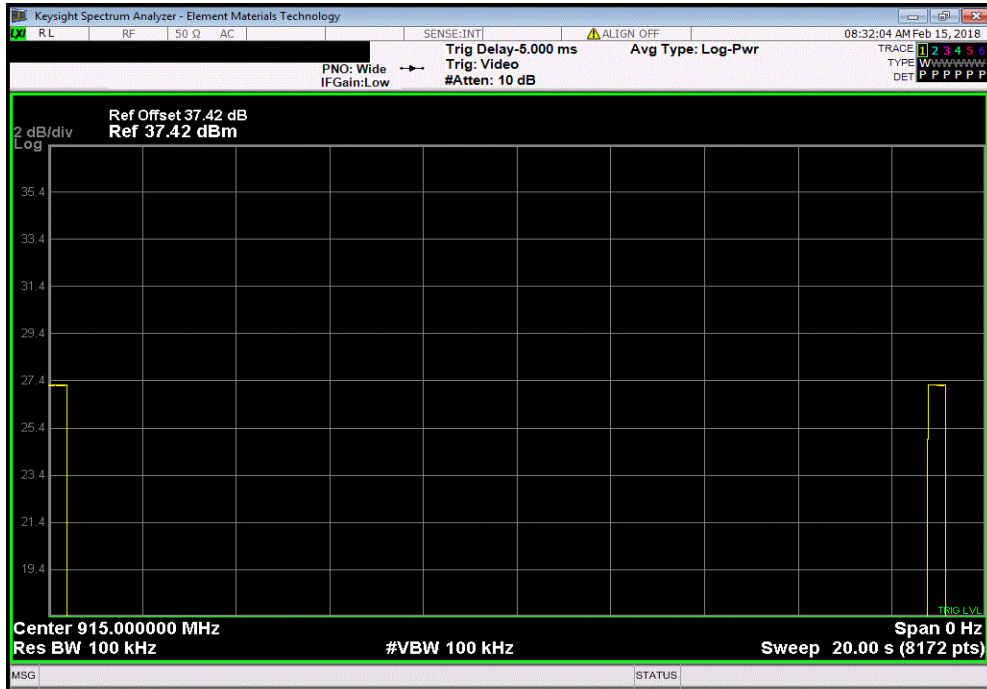


DWELL TIME

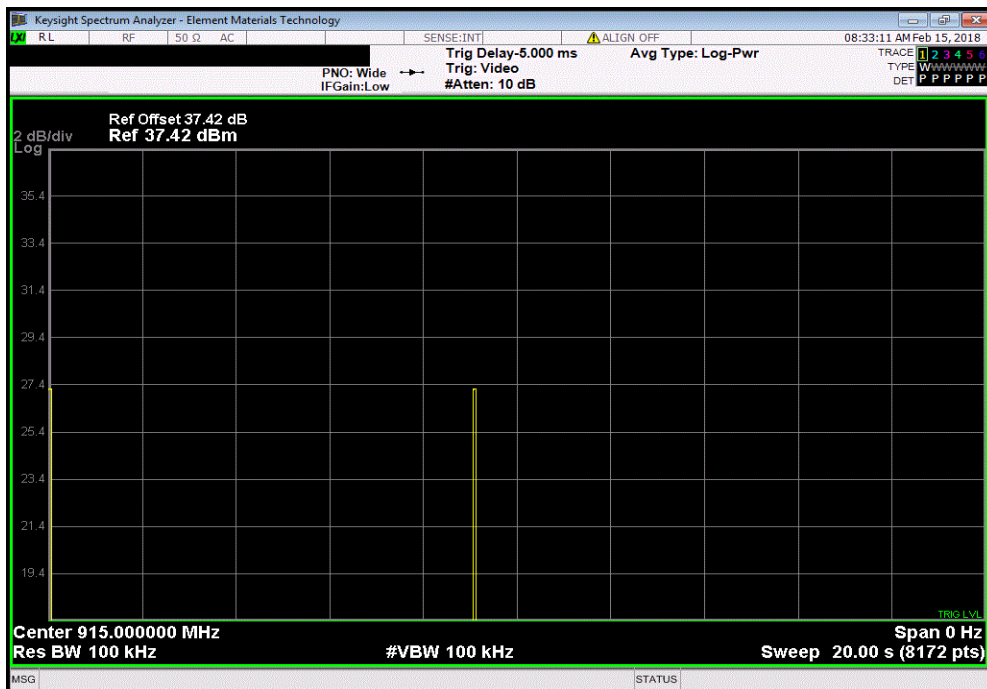


XMI 2017.12.13

FSK, Hopping, Mid Channel, 915 MHz, 20 sec Duration 3						
Duration (ms)	Count Pulse 1	Count Pulse 2	Dwell Time (ms) 20 sec period	Avg Dwell Time (ms)	Limit (ms)	Result
-	0	2	762.4	-	-	-



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

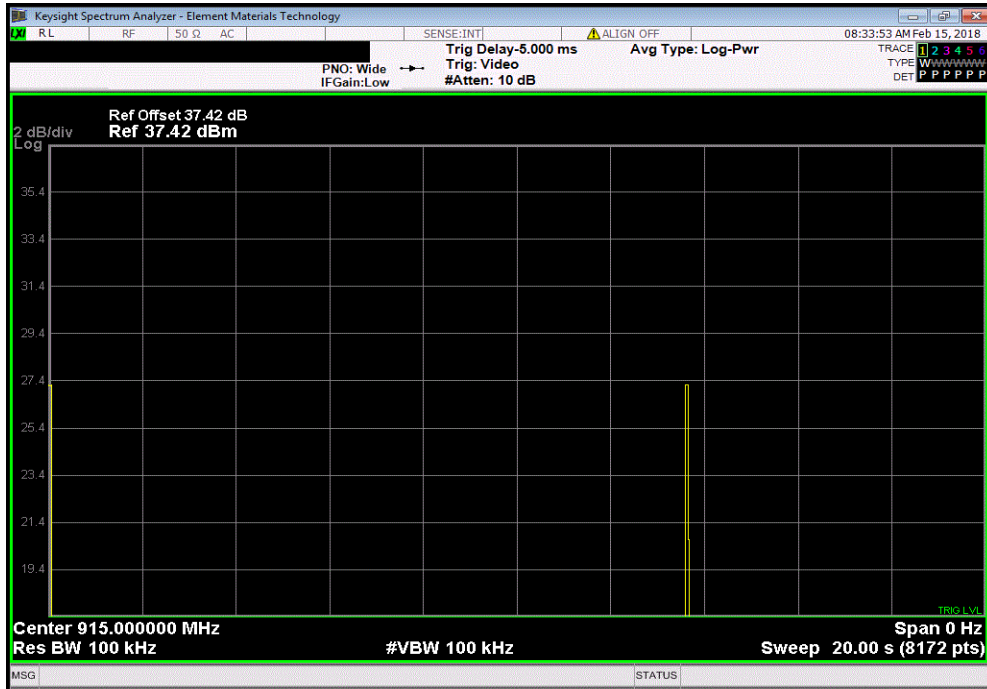


DWELL TIME

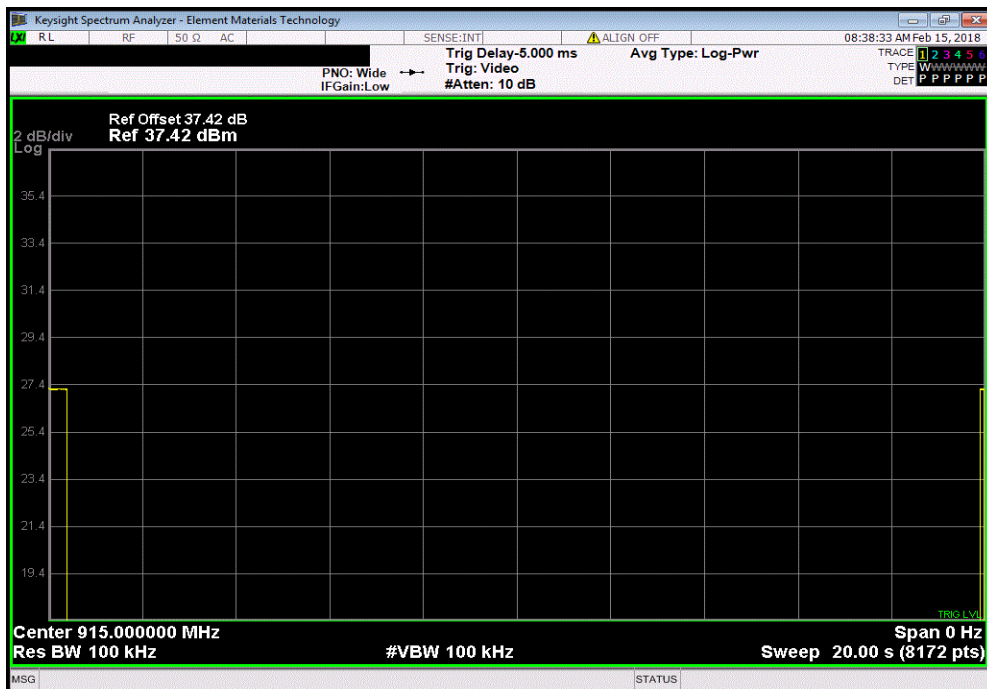


XMI 2017.12.13

FSK, Hopping, Mid Channel, 915 MHz, 20 sec Duration 5						
Duration (ms)	Count Pulse 1	Count Pulse 2	Dwell Time (ms) 20 sec period	Avg Dwell Time (ms)	Limit (ms)	Result
-	6	0	136.98	-	-	-



FSK, Hopping, Mid Channel, 915 MHz, 20 sec Duration 6						
Duration (ms)	Count Pulse 1	Count Pulse 2	Dwell Time (ms) 20 sec period	Avg Dwell Time (ms)	Limit (ms)	Result
-	3	1	449.69	-	-	-

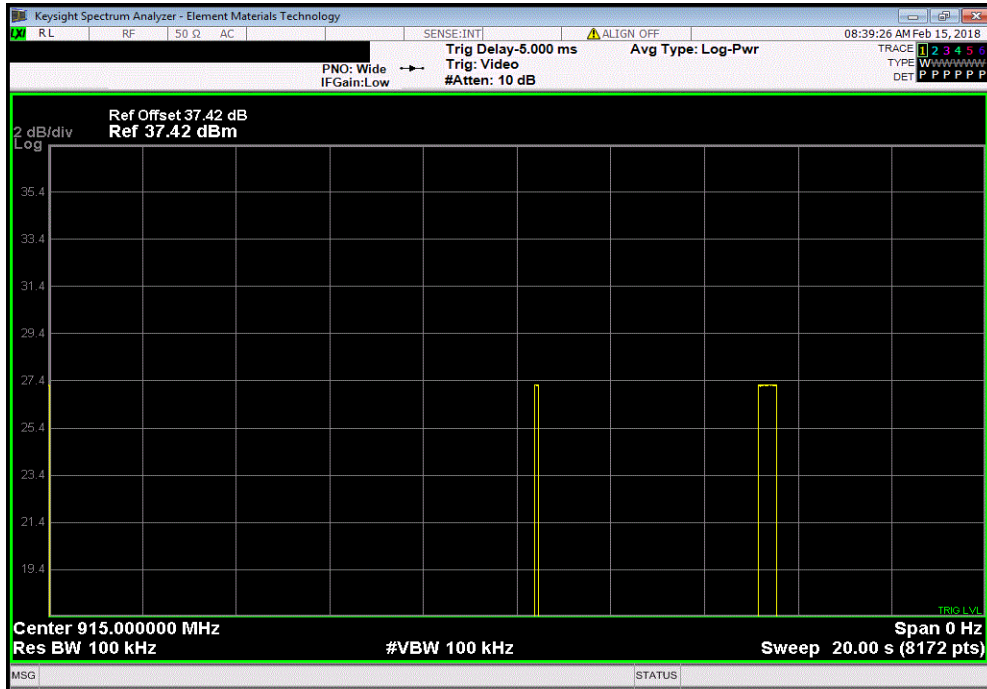


DWELL TIME

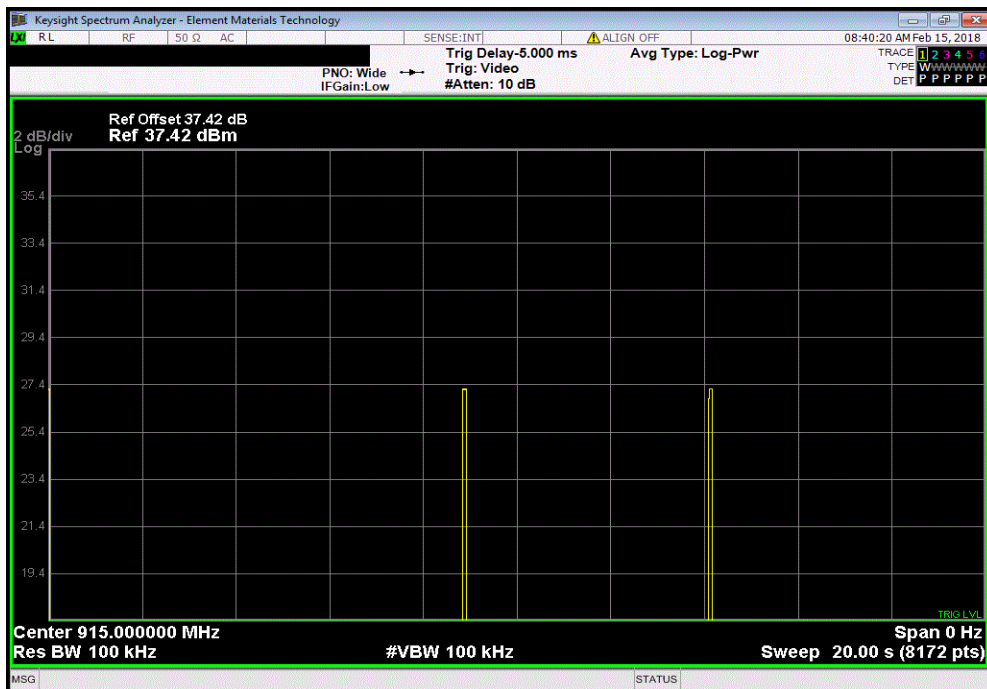


XMI 2017.12.13

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



FSK, Hopping, Mid Channel, 915 MHz, 20 sec Duration 8						
Duration (ms)	Count Pulse 1	Count Pulse 2	Dwell Time (ms) 20 sec period	Avg Dwell Time (ms)	Limit (ms)	Result
-	9	0	205.47	-	-	-

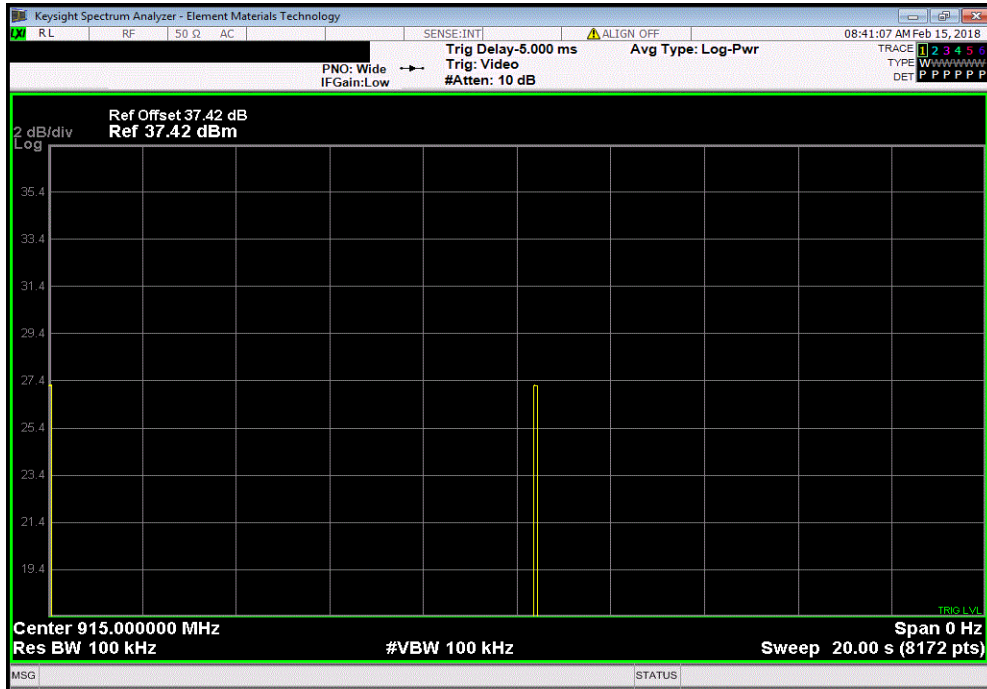


DWELL TIME

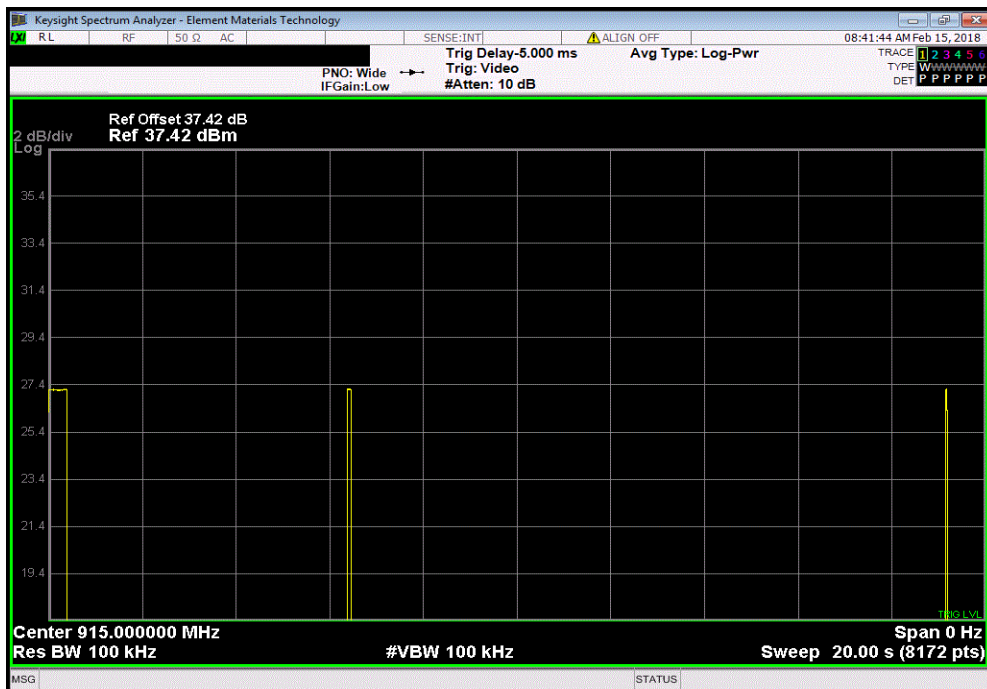


XMI 2017.12.13

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



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

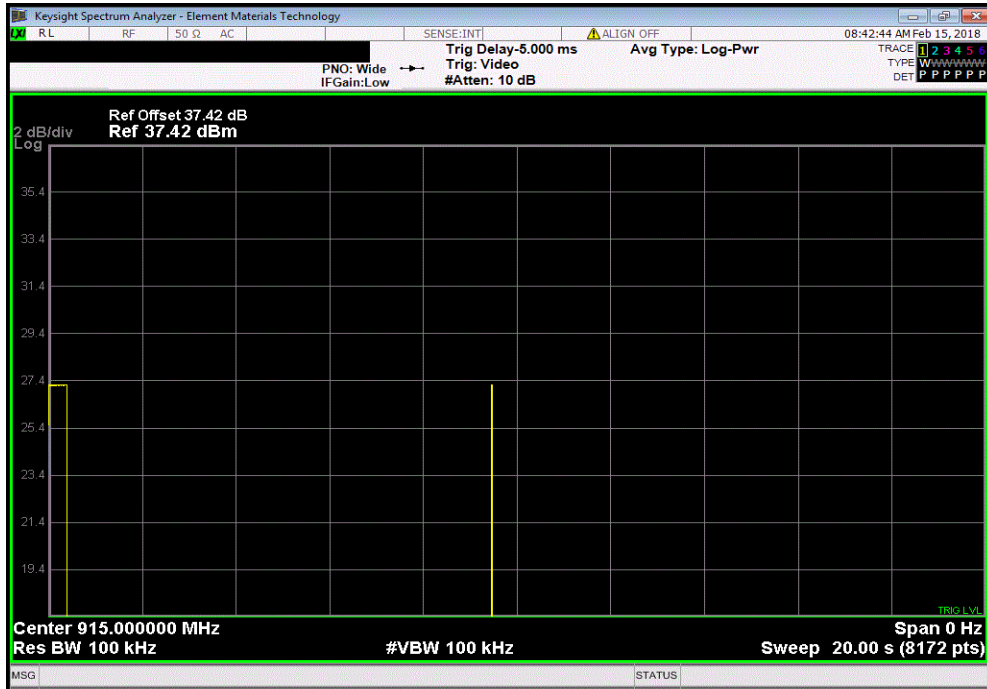


DWELL TIME

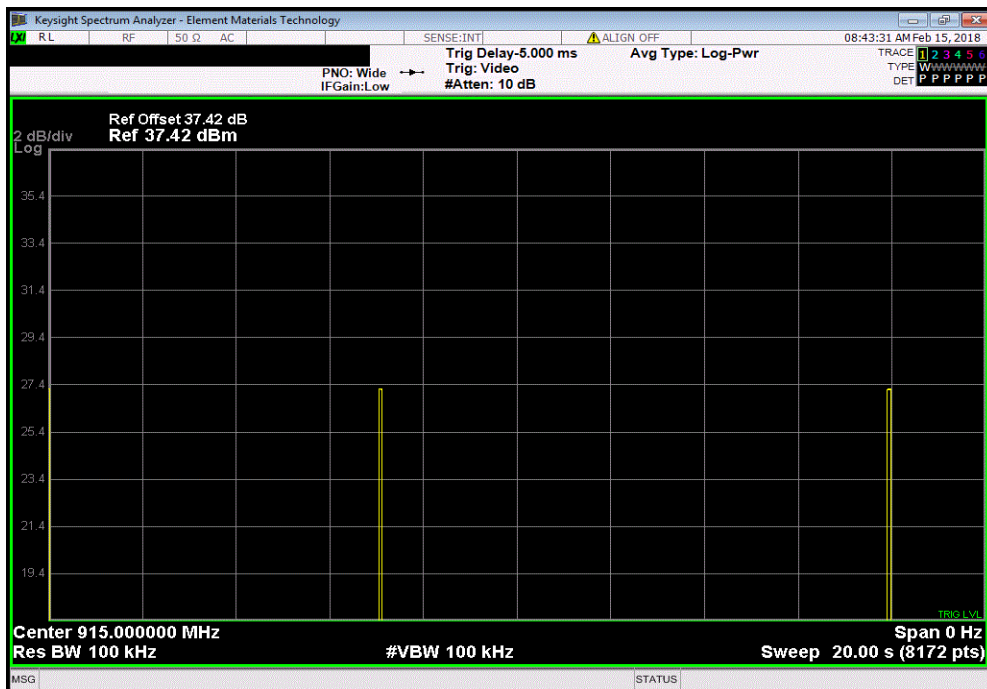


XMI 2017.12.13

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



FSK, Hopping, Mid Channel, 915 MHz, 20 sec Duration 12						
Duration (ms)	Count Pulse 1	Count Pulse 2	Dwell Time (ms) 20 sec period	Avg Dwell Time (ms)	Limit (ms)	Result
-	9	0	205.47	-	-	-

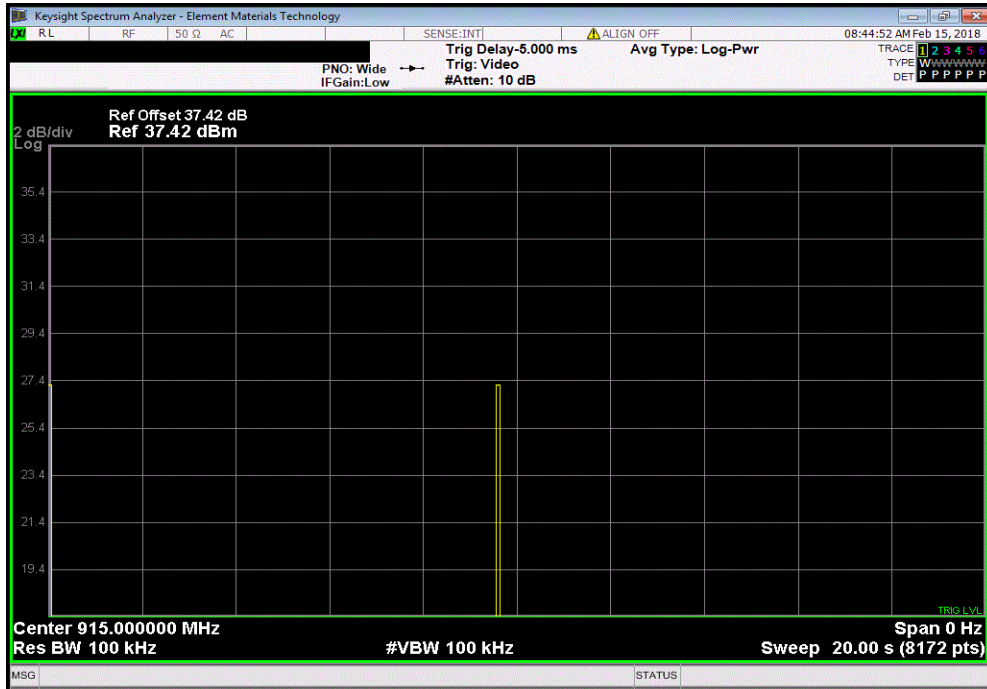


DWELL TIME

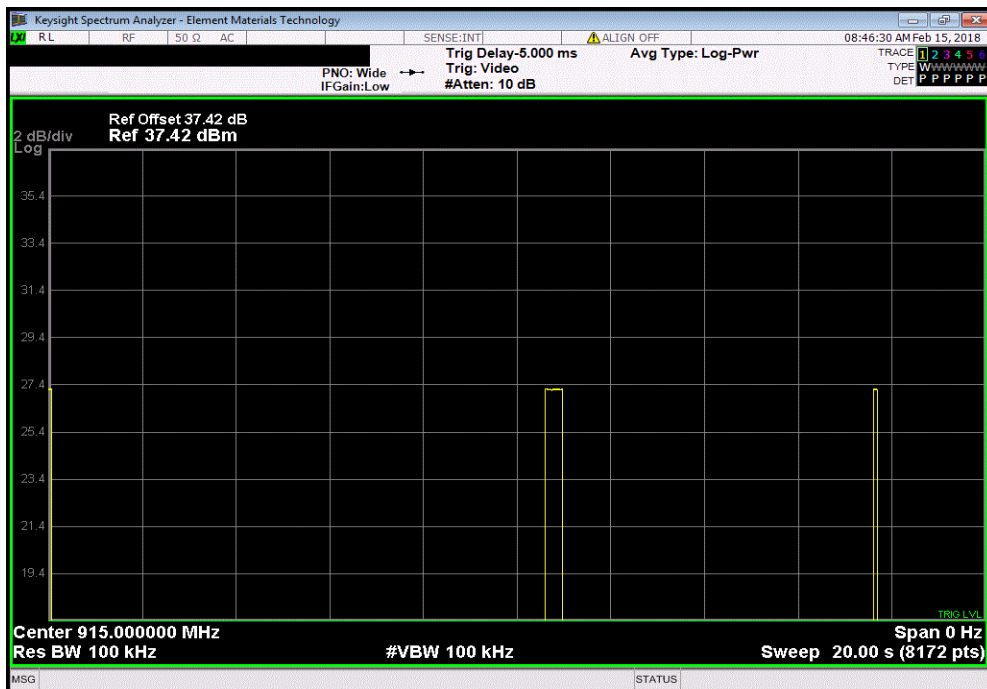


XMI 2017.12.13

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



FSK, Hopping, Mid Channel, 915 MHz, 20 sec Duration 14						
Duration (ms)	Count Pulse 1	Count Pulse 2	Dwell Time (ms) 20 sec period	Avg Dwell Time (ms)	Limit (ms)	Result
-	6	1	518.18	-	-	-

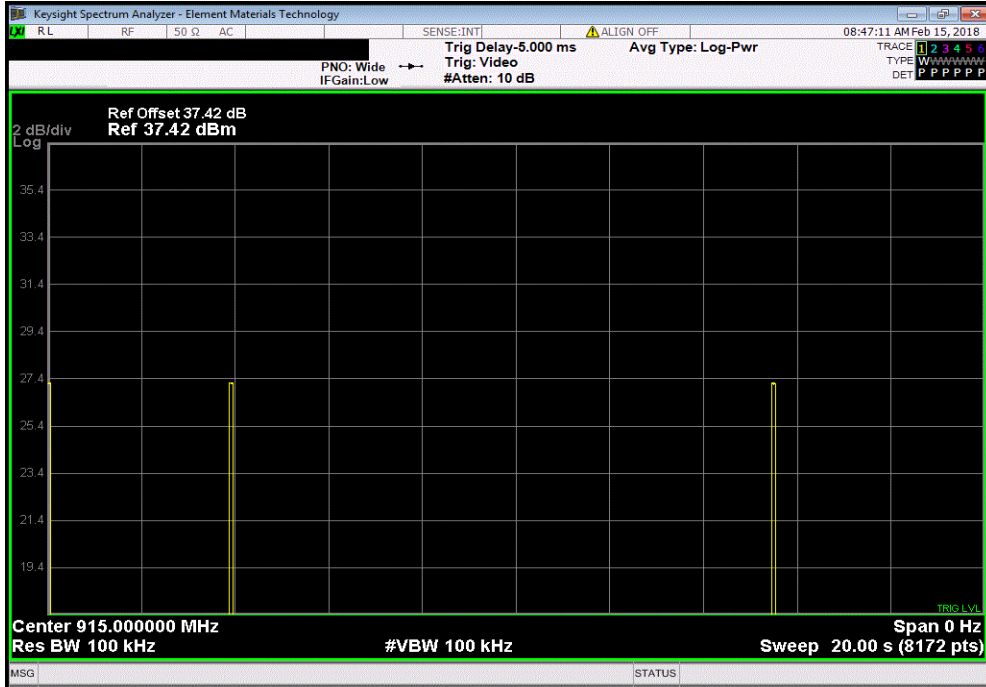


DWELL TIME

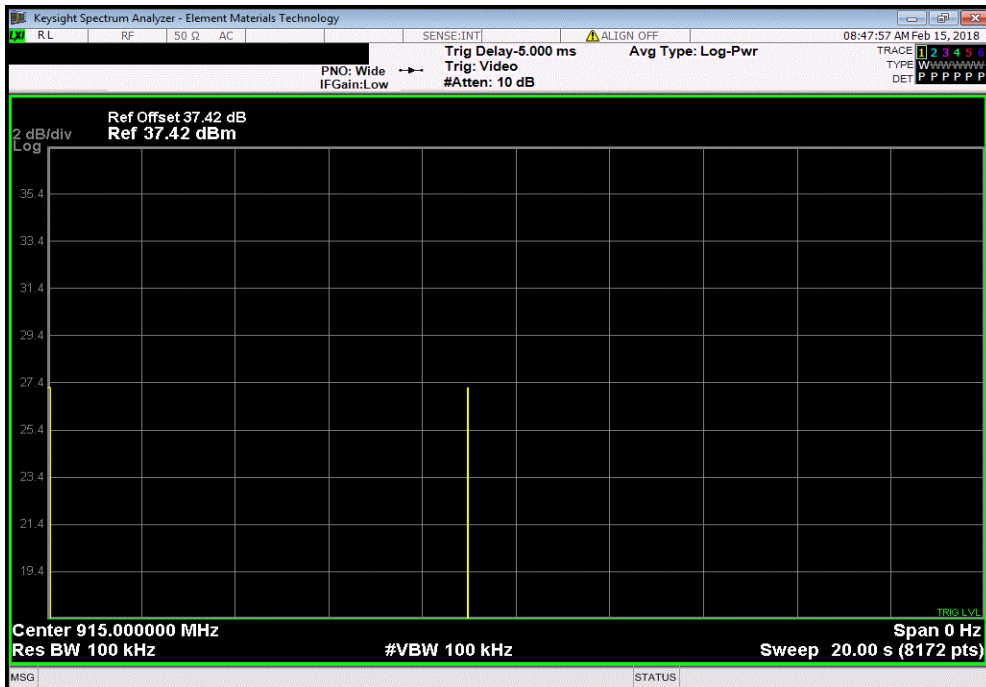


XMI 2017.12.13

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



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

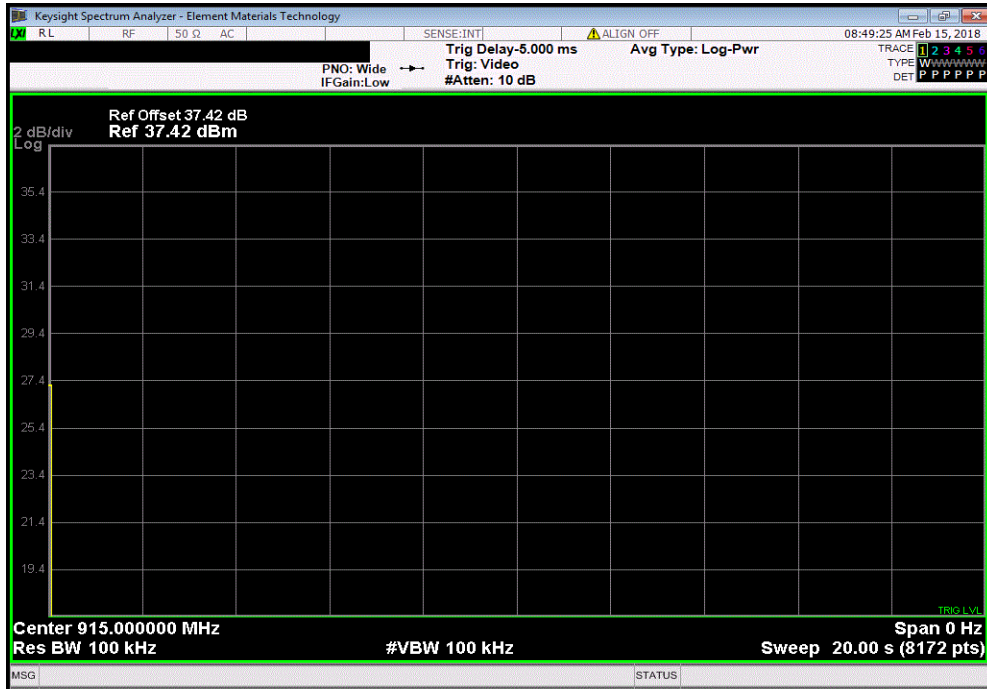


DWELL TIME

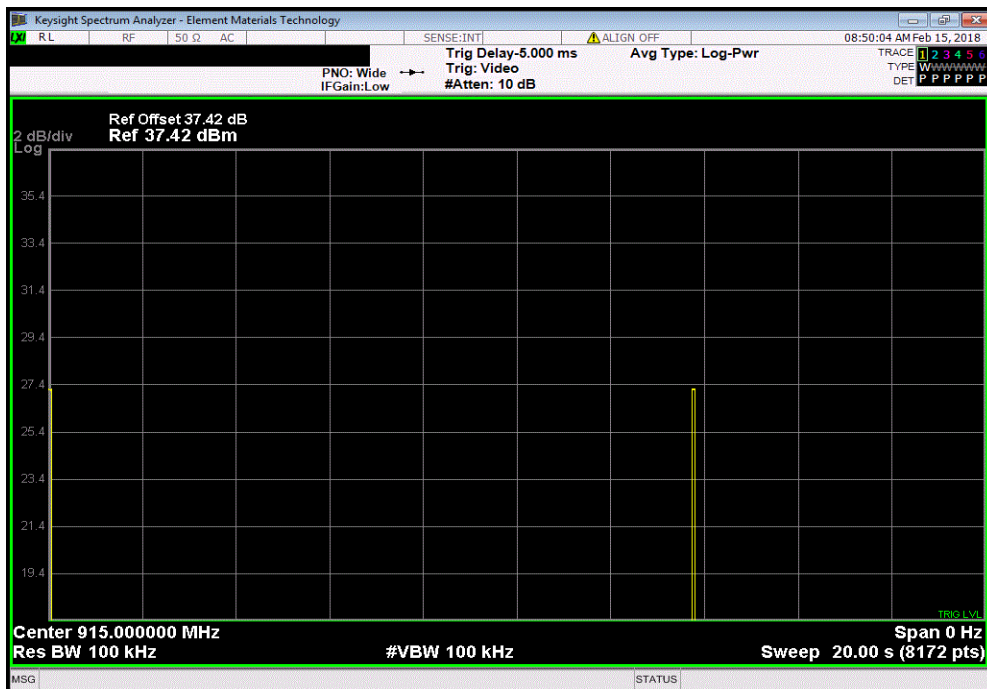


XMI 2017.12.13

FSK, Hopping, Mid Channel, 915 MHz, 20 sec Duration 17						
Duration (ms)	Count Pulse 1	Count Pulse 2	Dwell Time (ms) 20 sec period	Avg Dwell Time (ms)	Limit (ms)	Result
-	3	0	68.49	-	-	-



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

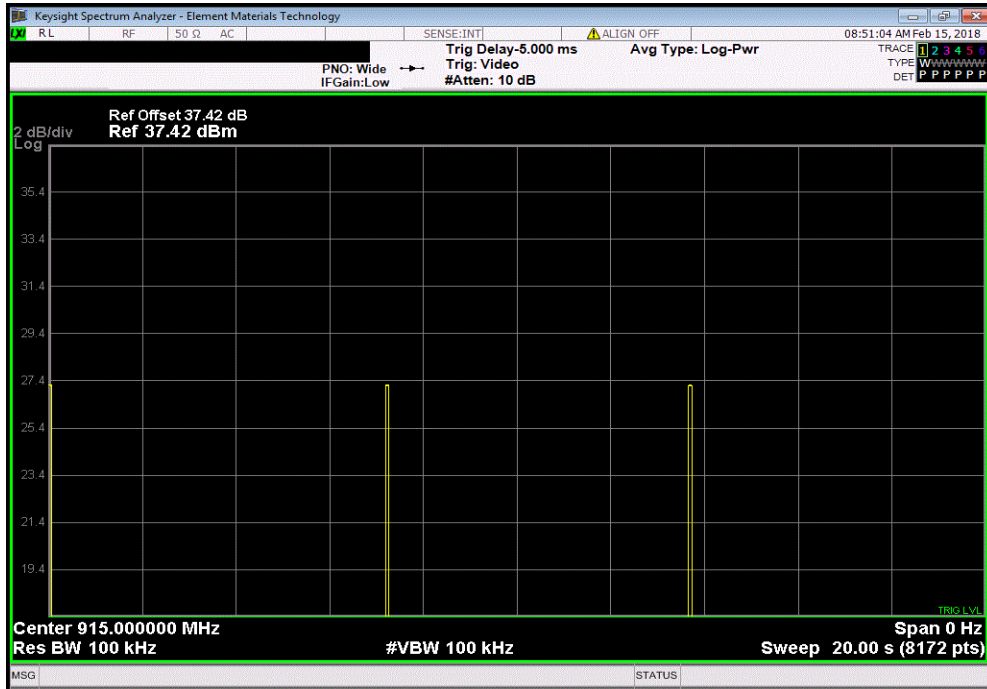


DWELL TIME

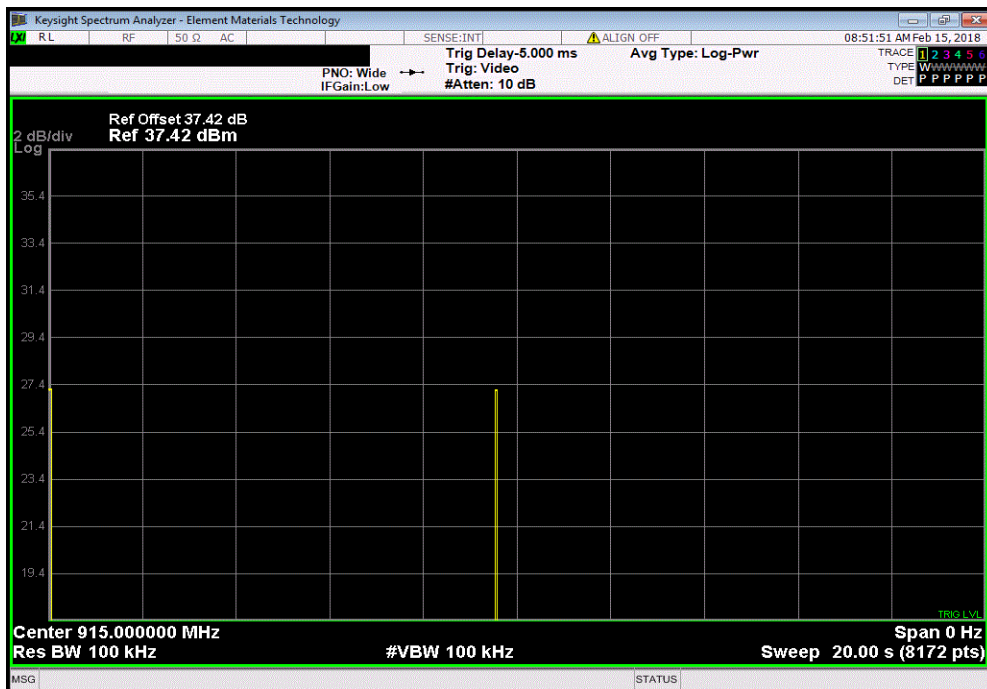


XMI 2017.12.13

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



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



OUTPUT POWER



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.

OUTPUT POWER



TbTx 2017.12.14 XMI 2017.12.13

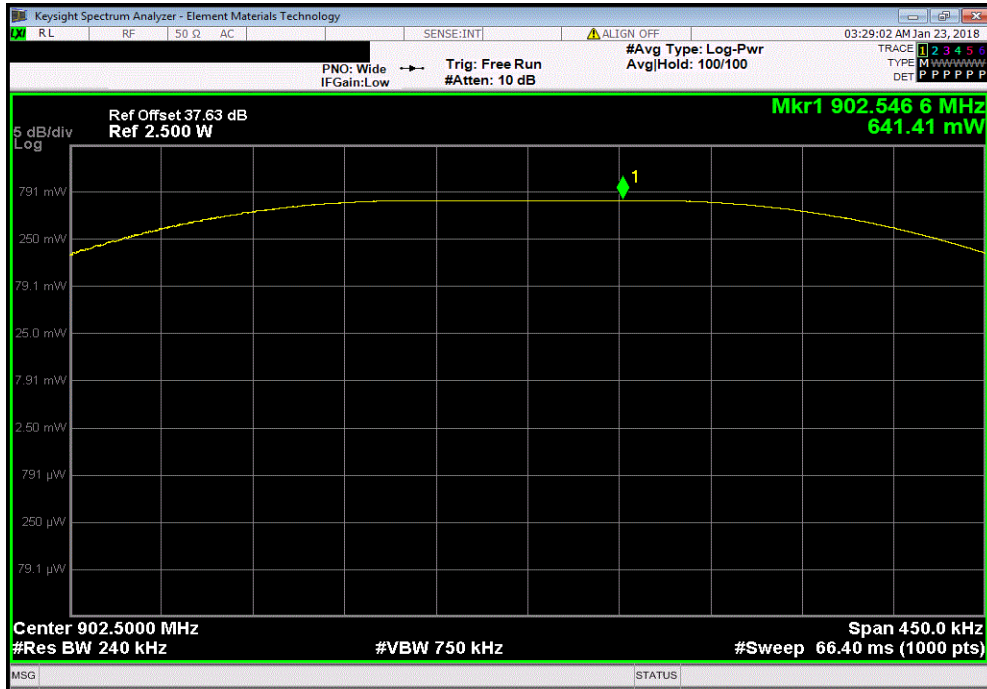
EUT: Voyager Pro		Work Order: POLR0007	
Serial Number: 1		Date: 22-Jan-18	
Customer: Polaris Industries, Inc.		Temperature: 22.4 °C	
Attendees: Stephen Reid and Ed Vaynberg		Humidity: 37.8% RH	
Project: None		Barometric Pres.: 1030 mbar	
Tested by: Jeff Alcoke	Power: 14.0 VDC	Job Site: EV06	
TEST SPECIFICATIONS			
FCC 15.247:2018		Test Method	
		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature	
		Value	Limit (-) 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

OUTPUT POWER

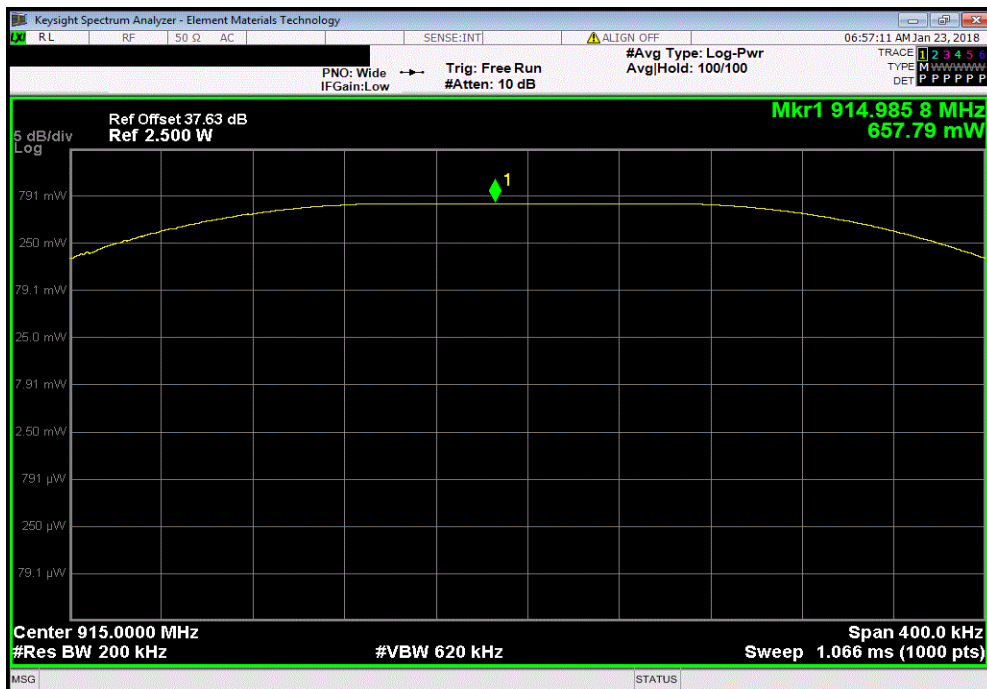


TMTx 2017.12.14 XMI 2017.12.13

FSK, Single Channel, Low Channel, 902.5 MHz						
				Value	Limit (<)	Result
				641.41 mW	1 W	Pass



FSK, Single Channel, Mid Channel, 915 MHz						
				Value	Limit (<)	Result
				657.79 mW	1 W	Pass

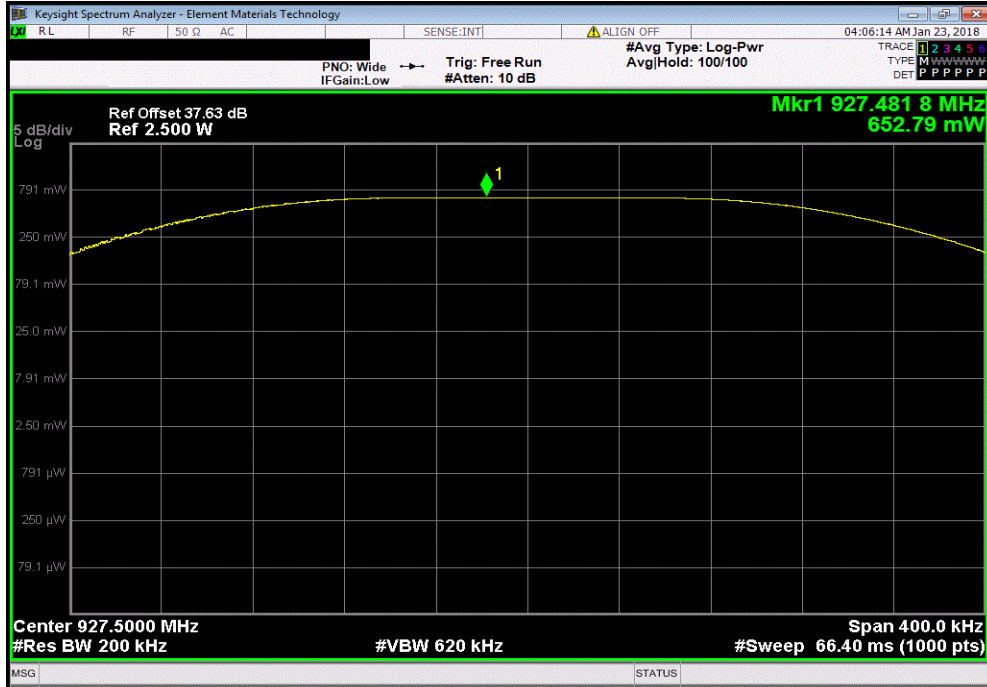


OUTPUT POWER



TbTx 2017.12.14 XMI 2017.12.13

FSK, Single Channel, High Channel, 927.5 MHz						
	Value	Limit		Value	Limit	Result
	652.79 mW	1 W				Pass



BAND EDGE COMPLIANCE



XMI 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



TbTx 2017.12.14 XMI 2017.12.13

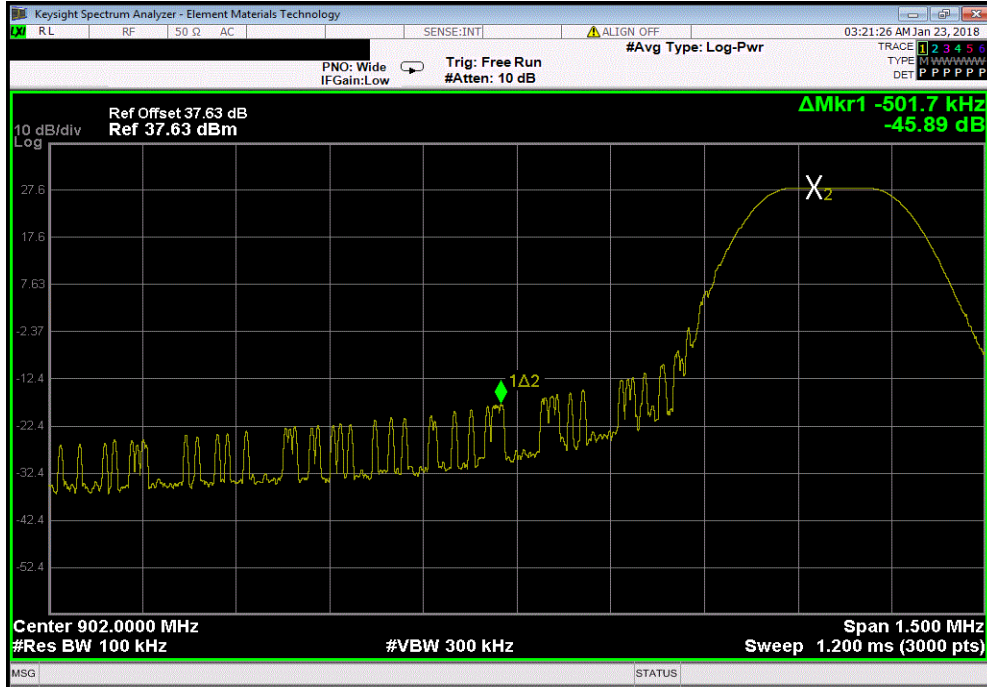
EUT: Voyager Pro		Work Order: POLR0007	
Serial Number: 1		Date: 22-Jan-18	
Customer: Polaris Industries, Inc.		Temperature: 22.1 °C	
Attendees: Stephen Reid and Ed Vaynberg		Humidity: 37.6% RH	
Project: None		Barometric Pres.: 1029 mbar	
Tested by: Jeff Alcoke	Power: 14.0 VDC	Job Site: EV06	
TEST SPECIFICATIONS		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

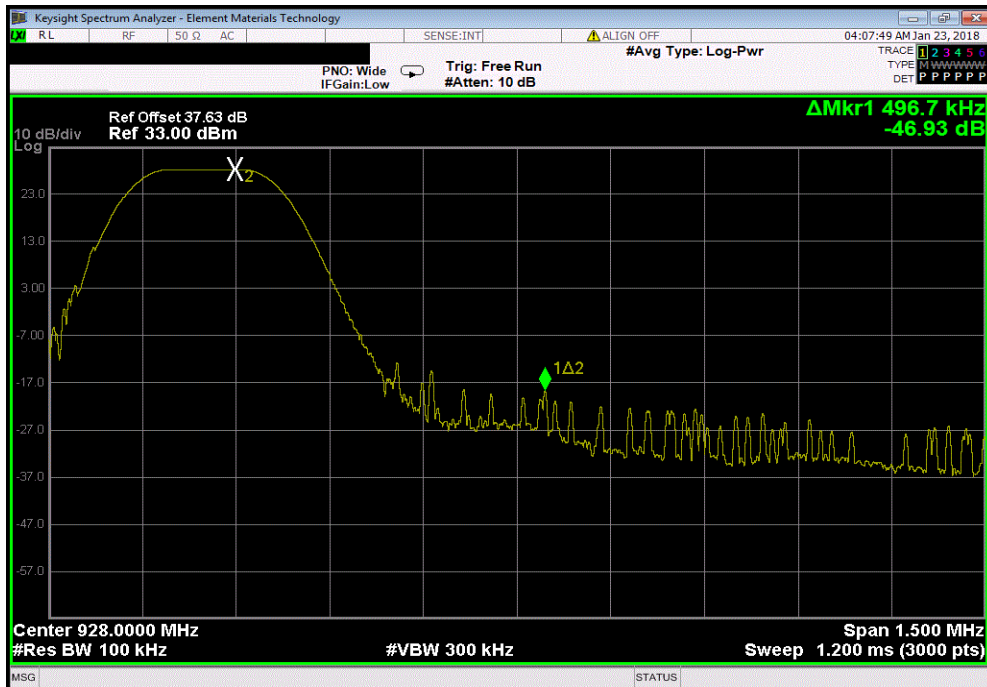


TMTX 2017.12.14 XMI 2017.12.13

FSK, Single Channel, Low Channel, 902.5 MHz						
			Value (dBc)	Limit ≤ (dBc)	Result	
			-45.89	-20	Pass	



FSK, Single Channel, High Channel, 927.5 MHz						
			Value (dBc)	Limit ≤ (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



TbTx 2017.12.14 XMI 2017.12.13

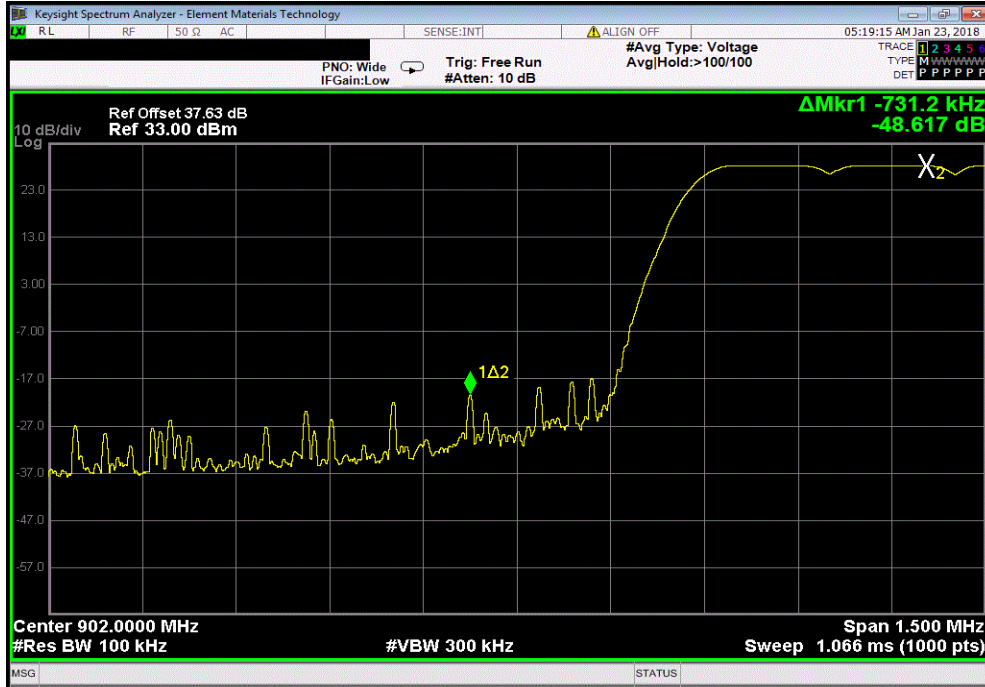
EUT: Voyager Pro		Work Order: POLR0007	
Serial Number: 1		Date: 22-Jan-18	
Customer: Polaris Industries, Inc.		Temperature: 22.2 °C	
Attendees: Stephen Reid and Ed Vaynberg		Humidity: 37.6% RH	
Project: None		Barometric Pres.: 1029 mbar	
Tested by: Jeff Alcoke	Power: 14.0 VDC	Job Site: EV06	
TEST SPECIFICATIONS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

BAND EDGE COMPLIANCE - HOPPING MODE

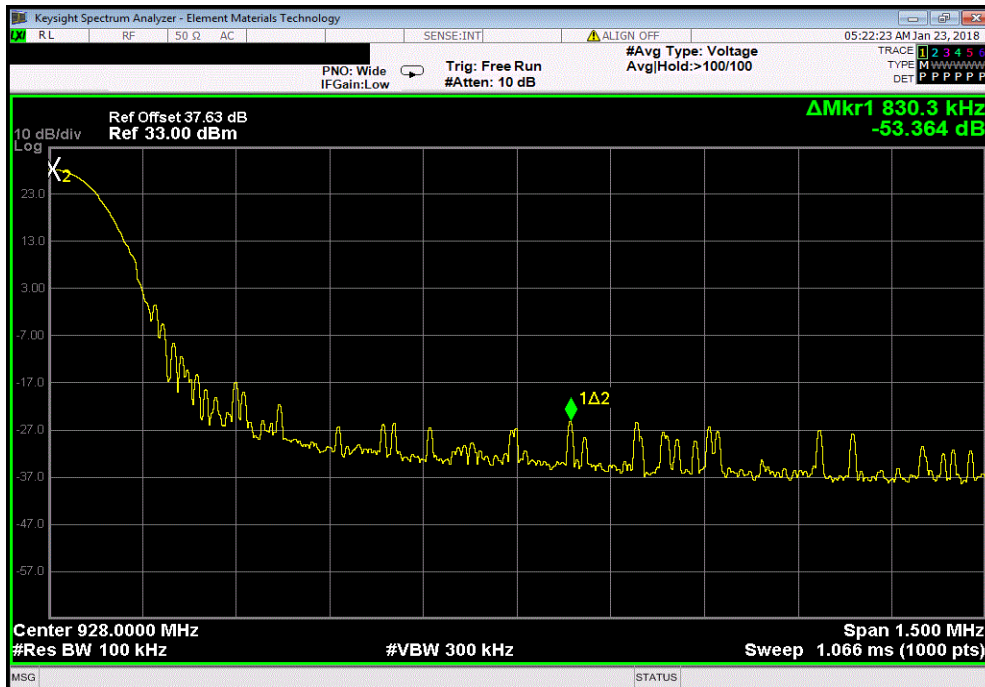


TMTx 2017.12.14 XMI 2017.12.13

FSK, Hopping, Low Channel, 902.5 MHz						
	Value	Limit				
	(dBc)	≤ (dBc)				Result
	-48.62	-20				Pass



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



OCCUPIED BANDWIDTH



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 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.

OCCUPIED BANDWIDTH



TbTx 2017.12.14 XMI 2017.12.13

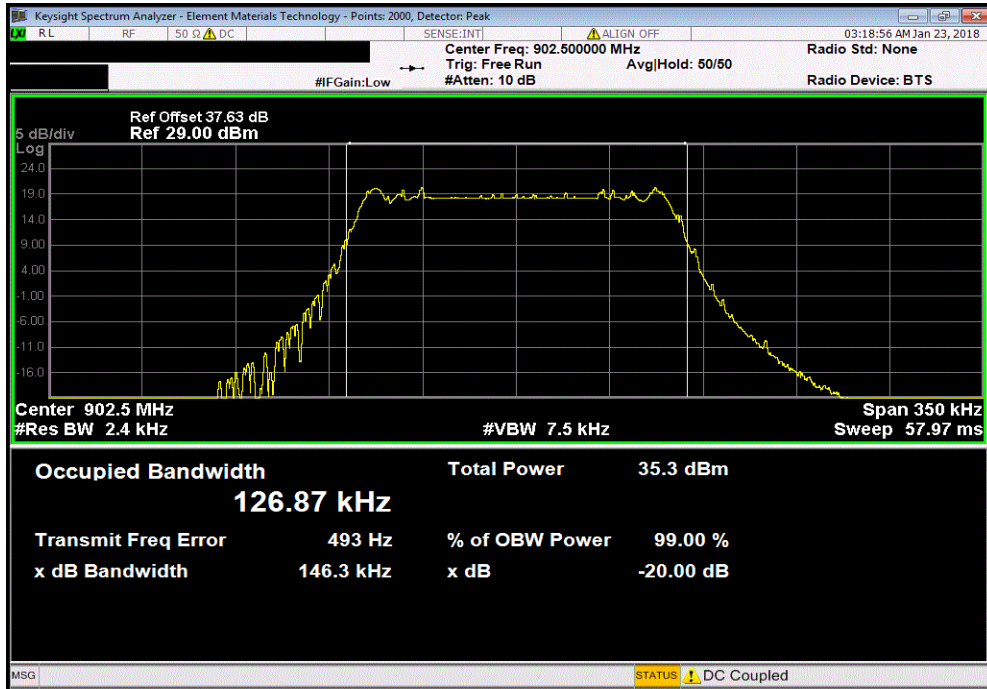
EUT: Voyager Pro		Work Order: POLR0007	
Serial Number: 1		Date: 22-Jan-18	
Customer: Polaris Industries, Inc.		Temperature: 22.4 °C	
Attendees: Stephen Reid and Ed Vaynberg		Humidity: 37.6% RH	
Project: None		Barometric Pres.: 1029 mbar	
Tested by: Jeff Alcoke		Power: 14.0 VDC	
Job Site: EV06		Test Method	
TEST SPECIFICATIONS		FCC 15.247:2018	
ANSI C63.10:2013			
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value	Limit (S) Result
FSK, Single Channel			
	Low Channel, 902.5 MHz	146.315 kHz	500 kHz Pass
	Mid Channel, 915 MHz	137.141 kHz	500 kHz Pass
	High Channel, 927.5 MHz	140.196 kHz	500 kHz Pass

OCCUPIED BANDWIDTH

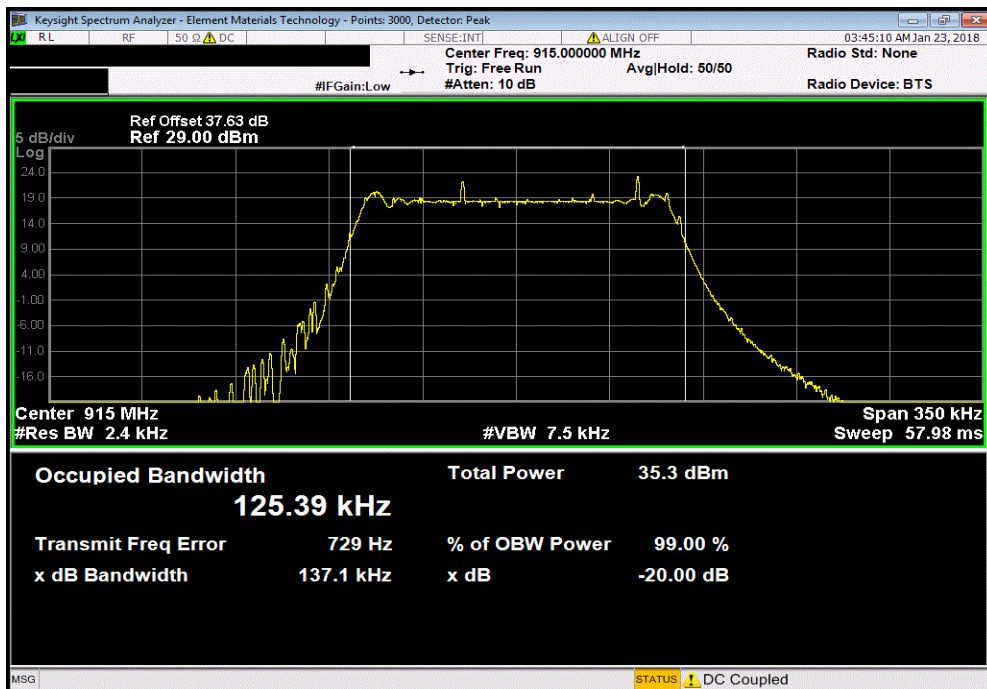


TMTx 2017.12.14 XMI 2017.12.13

FSK, Single Channel, Low Channel, 902.5 MHz						
				Value	Limit (S)	Result
				146.315 kHz	500 kHz	Pass



FSK, Single Channel, Mid Channel, 915 MHz						
				Value	Limit (S)	Result
				137.141 kHz	500 kHz	Pass

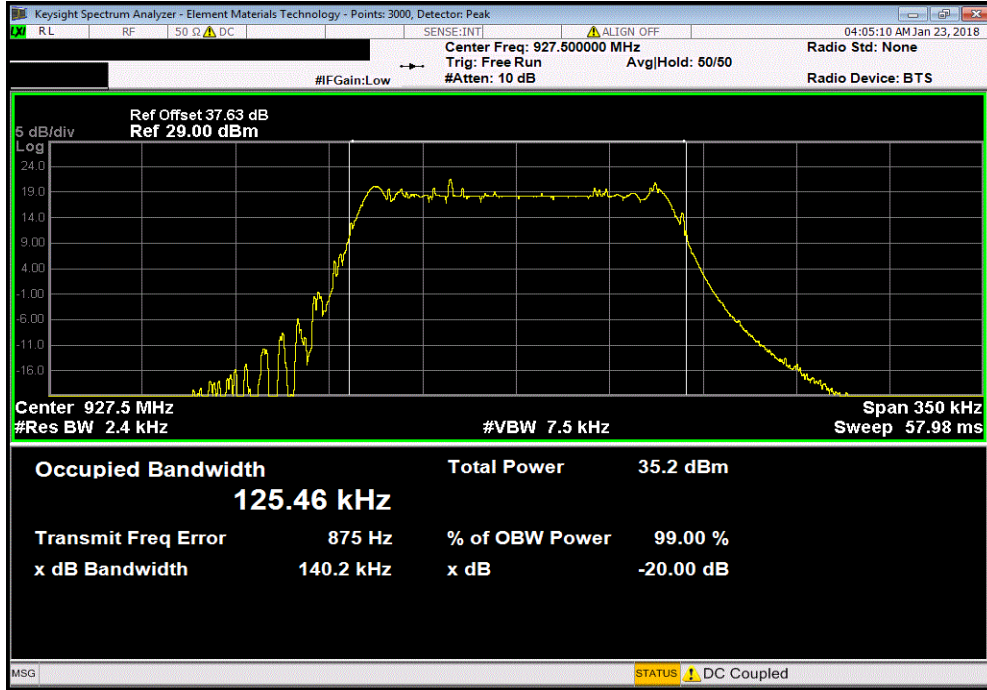


OCCUPIED BANDWIDTH



TMTx 2017.12.14 XMI 2017.12.13

FSK, Single Channel, High Channel, 927.5 MHz						
				Value	Limit	Result
				(S)		
				140.196 kHz	500 kHz	Pass



SPURIOUS CONDUCTED EMISSIONS



XMI 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.

SPURIOUS CONDUCTED EMISSIONS



TbTx 2017.12.14 XMt 2017.12.13

EUT: Voyager Pro		Work Order: POLR0007	
Serial Number: 1		Date: 22-Jan-18	
Customer: Polaris Industries, Inc.		Temperature: 22.4 °C	
Attendees: Stephen Reid and Ed Vaynberg		Humidity: 37.9% RH	
Project: None		Barometric Pres.: 1030 mbar	
Tested by: Jeff Alcock		Power: 14.0 VDC	
Job Site: EV06			
TEST SPECIFICATIONS			
FCC 15.247:2018		Test Method	
		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	

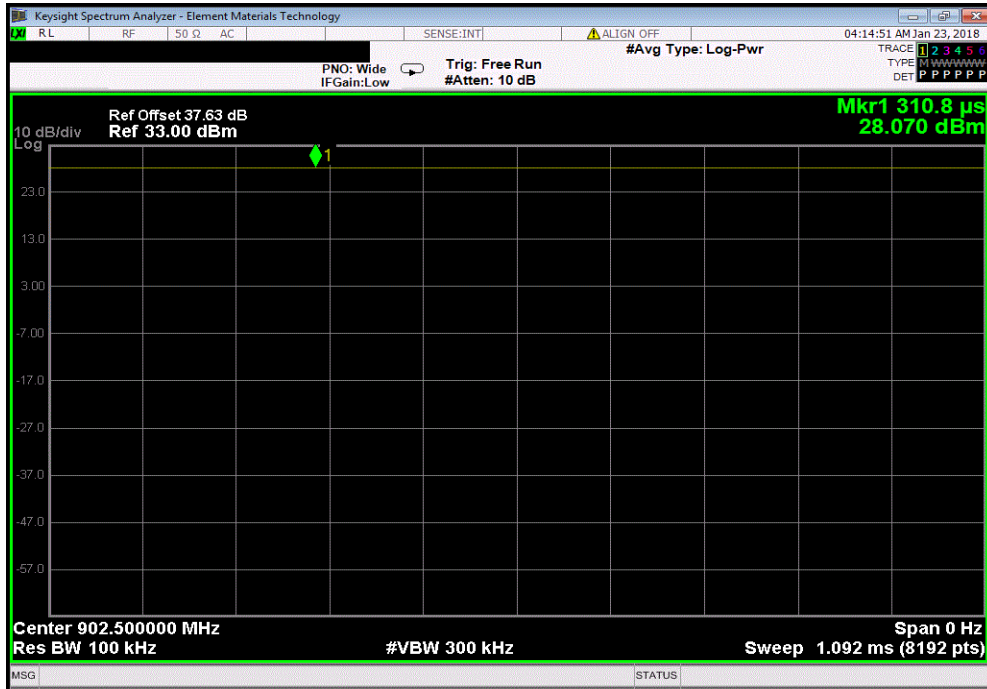
	Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result
FSK, Single Channel				
Low Channel, 902.5 MHz	Fundamental	N/A	N/A	N/A
Low Channel, 902.5 MHz	30 MHz - 12 GHz	-54.74	-20	Pass
Low Channel, 902.5 MHz	12 GHz - 25 GHz	-50.89	-20	Pass
Mid Channel, 915 MHz	Fundamental	N/A	N/A	N/A
Mid Channel, 915 MHz	30 MHz - 12 GHz	-58.15	-20	Pass
Mid Channel, 915 MHz	12 GHz - 25 GHz	-50.09	-20	Pass
High Channel, 927.5 MHz	Fundamental	N/A	N/A	N/A
High Channel, 927.5 MHz	30 MHz - 12 GHz	-56.77	-20	Pass
High Channel, 927.5 MHz	12 GHz - 25 GHz	-50.56	-20	Pass

SPURIOUS CONDUCTED EMISSIONS

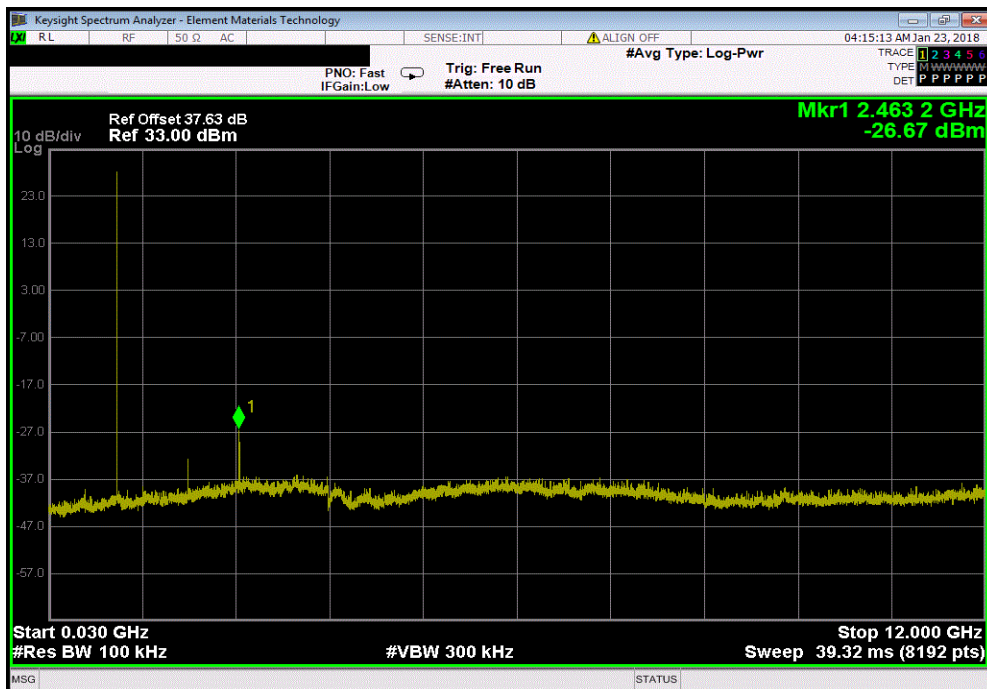


TMTx 2017.12.14 XMI 2017.12.13

FSK, Single Channel, Low Channel, 902.5 MHz						
Frequency Range		Max Value (dBc)	Limit \leq (dBc)	Result		
Fundamental		N/A	N/A	N/A		



FSK, Single Channel, Low Channel, 902.5 MHz						
Frequency Range		Max Value (dBc)	Limit \leq (dBc)	Result		
30 MHz - 12 GHz		-54.74	-20	Pass		

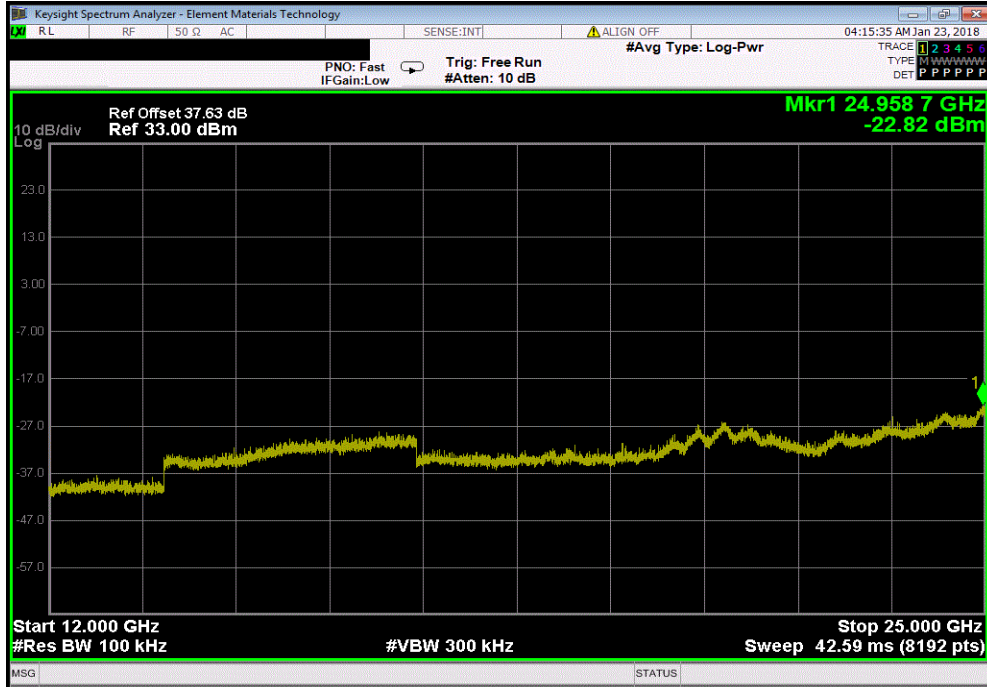


SPURIOUS CONDUCTED EMISSIONS

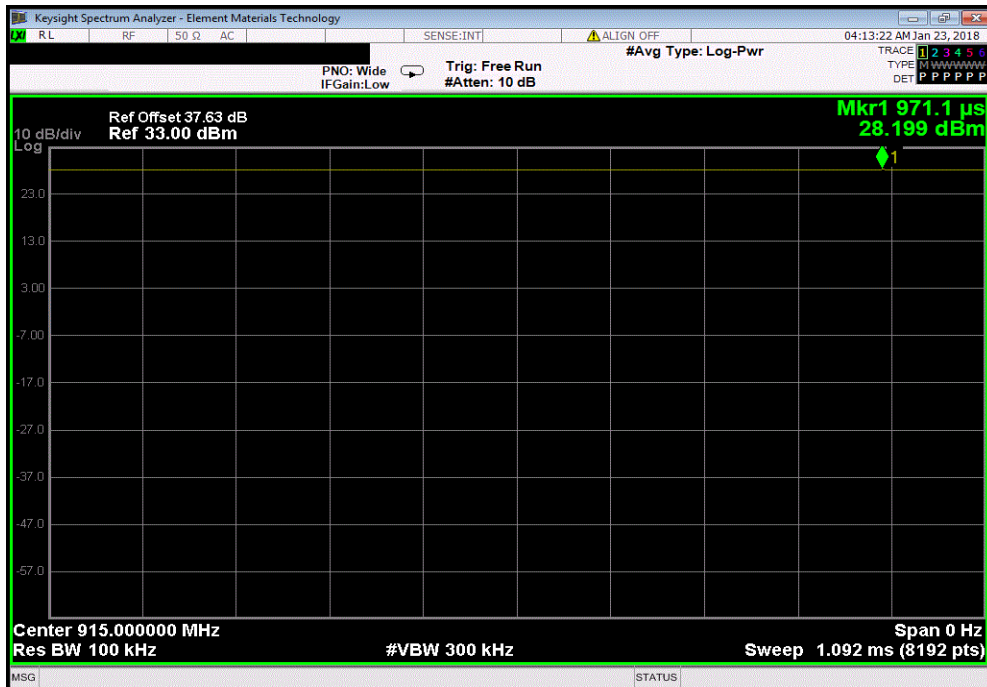


TMTx 2017.12.14 XMI 2017.12.13

FSK, Single Channel, Low Channel, 902.5 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12 GHz - 25 GHz	-50.89	-20	Pass	



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

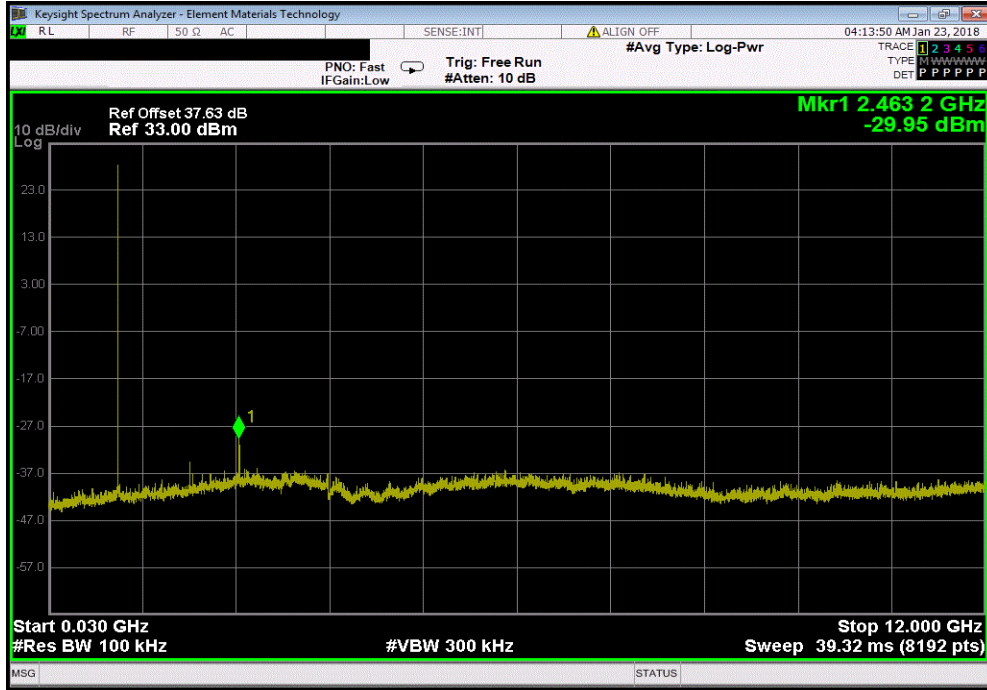


SPURIOUS CONDUCTED EMISSIONS

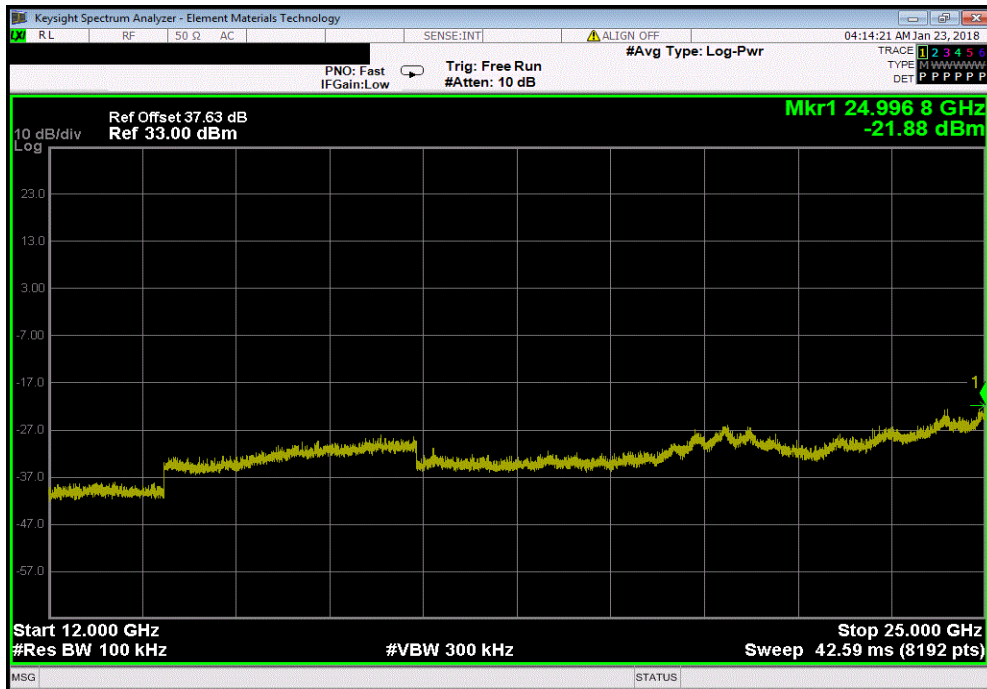


TMTx 2017.12.14 XMI 2017.12.13

FSK, Single Channel, Mid Channel, 915 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12 GHz	-58.15	-20	Pass	



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

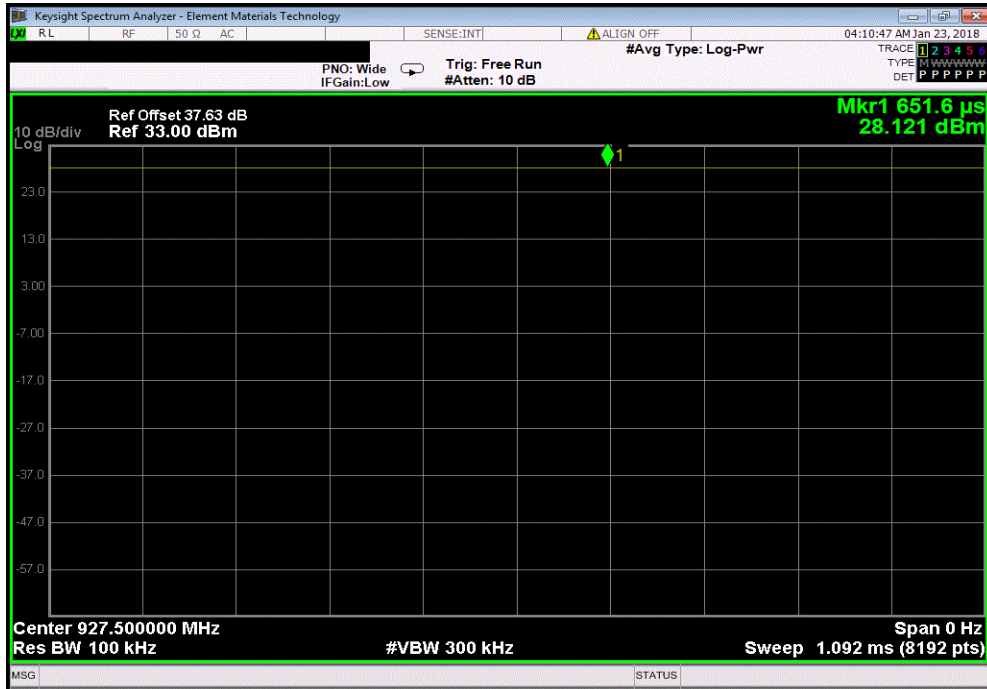


SPURIOUS CONDUCTED EMISSIONS

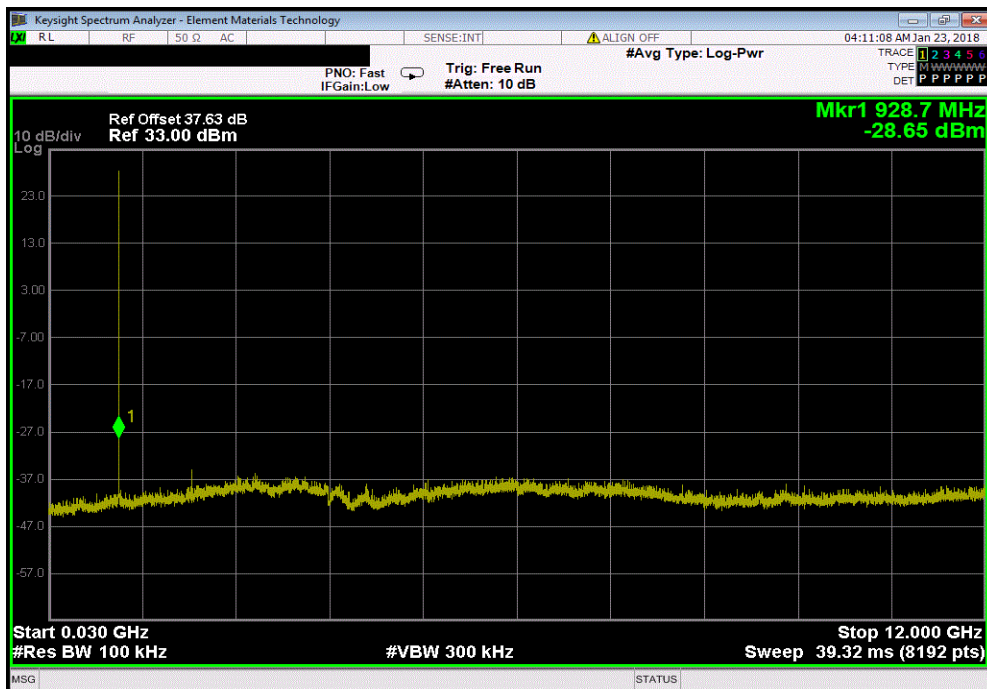


TMTx 2017.12.14 XMI 2017.12.13

FSK, Single Channel, High Channel, 927.5 MHz						
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental		N/A	N/A	N/A		



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



SPURIOUS CONDUCTED EMISSIONS



TbTx 2017.12.14 XMI 2017.12.13

FSK, Single Channel, High Channel, 927.5 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12 GHz - 25 GHz	-50.56	-20	Pass	

