Engineering Test Report No. 2101580-01		
Report Date	June 25, 2021	
Manufacturer Name	Astronics	
Manufacturer Address	One Corporate Drive, Suite 110 Lake Zurich, IL 60047	
Model No.	Resideo Thermostat, Model No. Focus Pro	
Date Received	June 1, 2021	
Test Dates	June 1, 2021 – June 7, 2021	
Specifications	FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 FCC “Code of Federal Regulations” Title 47, Part15, Subpart 15B Innovation, Science, and Economic Development Canada, RSS-247 Innovation, Science, and Economic Development Canada, RSS-GEN	
Test Facility	Elite Electronic Engineering, Inc. 1516 Centre Circle, Downers Grove, IL 60515	FCC Reg. Number: 269750 IC Reg. Number: 2987A CAB Identifier: US0107
Signature	Mark E. Longinotti	
Tested by	Mark E. Longinotti	
Signature	Raymond J. Klouda	
Approved by	Raymond J. Klouda, Registered Professional Engineer of Illinois – 44894	
PO Number	44842	

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247 and RSS-GEN test specifications. The data presented in this test report pertains to the EUT on the test dates specified. Any electrical or mechanical modifications made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification. This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the Federal Government.

Table of Contents

1. Report Revision History

Revision	Date	Description
–	25 JUN 2021	Initial Release of Engineering Test Report No. 2101580-01

2. Introduction

2.1. Scope of Tests

This document presents the results of a series of RF emissions tests that were performed on the Astronics Resideo Thermostat (hereinafter referred to as the Equipment Under Test (EUT)). The EUT was manufactured and submitted for testing by Astronics, located in Lake Zurich, IL.

2.2. Purpose

The test series was performed to determine if the EUT meets the RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part15, Subpart 15B, Section 15.107 and 15.109 for Receivers and Part 15, Subpart C, Sections 15.247 for a Digital Modulation intentional radiator operating within the 2400-2483.5MHz band.

The test series was also performed to determine if the EUT meets the RF emission requirements of the Innovation, Science, and Economic Development Canada Radio Standards Specification RSS-Gen and Innovation, Science, and Economic Development Canada Radio Standards Specification RSS-247 for a Digital Modulation intentional radiator operating within the 2400-2483.5MHz band.

Testing was performed in accordance with ANSI C63.10-2013.

2.3. Identification of the EUT

The EUT was identified as follows:

EUT Identification	
Product Description	Resideo Thermostat
Model/Part No.	Focus Pro
Serial No.	1378317 (Used for EIRP, high band edge, and spurious radiated emissions tests) 1378290 (Used for antenna conducted tests only)
Device Type	Digitally Modulated Transmission Device
Band of Operation	2412 – 2462MHz
Software/Firmware Version	XTR_CFPro_1.1
Conducted Output Power	22.47dBm (176.6mW)
Antenna Type	Pulse Larsen Antennas, M/N: W3300, Chip Antenna
Manufacturer Supplied* Antenna Gain (dBi)	1.3dBi
6dB Bandwidth	17.72MHz
Occupied Bandwidth (99% CBW)	17.67MHz
Size of EUT	3 9/16" x 5 13/16" x 1 ½"

*- Antenna gain is supplied by the manufacturer and Elite is not responsible for the accuracy of the antenna gain.

3. Power Input

The EUT obtained 24V, 60Hz via a 2 wire output power cord from a Hammond Manufacturing Power Supply, M/N: BPE2G. The Hammond Manufacturing Power Supply, M/N: BPE2G was powered with 115V 60Hz.

4. Grounding

The EUT was not connected to ground.

5. Support Equipment

The EUT was submitted for testing with no support equipment.

6. Interconnect Leads

No interconnect leads were used during the tests.

7. Modifications Made to the EUT

No modifications were made to the EUT during the testing.

8. Modes of Operation

The EUT and all peripheral equipment were energized. The unit was programmed to transmit in one of the following modes. The following frequencies were used for testing each mode:

- 2412MHz
- 2437MHz
- 2462MHz

Mode	Description
802.11b	The following data rates were used during testing: 2412MHz (channel 1) - 1Mbps, power setting = 107 - 2Mbps, power setting = 107 - 5.5Mbps, power setting = 107 - 11Mbps, power setting = 107 2437MHz (channel 6) - 1Mbps, power setting = 107 - 2Mbps, power setting = 107 - 5.5Mbps, power setting = 107 - 11Mbps, power setting = 107 2462MHz (channel 11) - 1Mbps, power setting = 107 - 2Mbps, power setting = 107 - 5.5Mbps, power setting = 107 - 11Mbps, power setting = 107
802.11g	The following data rates were used during testing: 2412MHz (channel 1) - 6Mbps, power setting = 75 - 9Mbps, power setting = 75 - 12Mbps, power setting = 75 - 18Mbps, power setting = 75 - 24Mbps, power setting = 75 - 36Mbps, power setting = 75 - 48Mbps, power setting = 75 - 54Mbps, power setting = 60 2437MHz (channel 6) - 6Mbps, power setting = 75 - 9Mbps, power setting = 75 - 12Mbps, power setting = 75 - 18Mbps, power setting = 75 - 24Mbps, power setting = 75 - 36Mbps, power setting = 75 - 48Mbps, power setting = 75 - 54Mbps, power setting = 60 2462MHz (channel 11) - 6Mbps, power setting = 75 - 9Mbps, power setting = 75 - 12Mbps, power setting = 75 - 18Mbps, power setting = 75 - 24Mbps, power setting = 75

	- 36Mbps, power setting = 75 - 48Mbps, power setting = 75 - 54Mbps, power setting = 60
802.11n	The following data rates were used during testing: 2412MHz (channel 1) - MCS0, power setting = 68 - MCS1, power setting = 68 - MCS2, power setting = 68 - MCS3, power setting = 68 - MCS4, power setting = 68 - MCS5, power setting = 68 - MCS6, power setting = 57 - MCS7, power setting = 57 2437MHz (channel 6) - MCS0, power setting = 68 - MCS1, power setting = 68 - MCS2, power setting = 68 - MCS3, power setting = 68 - MCS4, power setting = 68 - MCS5, power setting = 68 - MCS6, power setting = 57 - MCS7, power setting = 57 2462MHz (channel 11) - MCS0, power setting = 68 - MCS1, power setting = 68 - MCS2, power setting = 68 - MCS3, power setting = 68 - MCS4, power setting = 68 - MCS5, power setting = 68 - MCS6, power setting = 57 - MCS7, power setting = 57 -

9. Test Specifications

The tests were performed to selected portions of, and in accordance with the following test specifications:

- Federal Communications Commission “Code of Federal Regulations”, Title 47, Part 15, Subpart C
- Federal Communications Commission “Code of Federal Regulations”, Title 47, Part 15, Subpart B
- ANSI C63.4-2014, “American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz”
- ANSI C63.10-2013, “American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices”
- Federal Communications Commission Office of Engineering and Technology Laboratory Division, Guidance For Compliance Measurements On Digital Transmission Systems, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 April 2, 2019 KDB 558074 D01v05r02
- RSS-247 Issue 2, February 2017, “Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices”
- RSS-Gen Issue 5, March 2019, Amendment 1 March 2019, Amendment 2 February 2021, Innovation, Science, and Economic Development Canada, “Spectrum Management and Telecommunications,

Radio Standards Specification, General Requirements for Compliance of Radio Apparatus”

10. Test Plan

No test plan was provided. Instructions were provided by personnel from Astronics and used in conjunction with the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247, and ANSI C63.4-2014 specifications.

11. Deviations, Additions, or Exclusions from Test Specifications

There were no deviations, additions to, or exclusions from the test specifications during this test series.

12. Laboratory Conditions

Ambient Parameters	Value
Temperature	23°C
Relative Humidity	23%
Atmospheric Pressure	1017mb

13. Summary

The following EMC tests were performed, and the results are shown below:

Test Description	Requirements	Test Methods	S/N	Results
Digital Device Conducted Emissions	FCC 15B 15.107 ISED RSS-GEN	ANSI C63.4:2014	1378317	Conforms
Digital Device Radiated Emission	FCC 15B 15.107 ISED RSS-GEN	ANSI C63.4:2014	1378317	Conforms
Transmitter Conducted Emissions	FCC 15B 15.207 ISED RSS-GEN	ANSI C63.10:2013	1378317	Conforms
6dB Bandwidth	FCC 15C 15.247 ISED RSS-247	ANSI C63.10:2013	1378290	Conforms
Occupied Bandwidth (99%)	FCC 15C 15.247 ISED RSS-247	ANSI C63.10:2013	1378290	Conforms
Maximum Peak Conducted Output Power	FCC 15C 15.247 ISED RSS-247	ANSI C63.10:2013	1378290	Conforms
Effective Isotropic Radiated Power (EIRP)	FCC 15C 15.247 ISED RSS-247	ANSI C63.10:2013	1378317	Conforms
Duty Cycle Factor Measurements	FCC 15C 15.247 ISED RSS-247	ANSI C63.10:2013	1378290	—
Case Spurious Radiated Emissions	FCC 15C 15.247 ISED RSS-247	ANSI C63.10:2013	1378317	Conforms
Band-Edge Compliance	FCC 15C 15.247 ISED RSS-247	ANSI C63.10:2013	1378317, 1378290	Conforms
Power Spectral Density	FCC 15C 15.247 ISED RSS-247	ANSI C63.10:2013	1378290	Conforms

14. Sample Calculations

For Powerline Conducted Emissions:

The resultant voltage level (VL) is a summation in decibels (dB) of the receiver meter reading (MTR) and the cable loss factor (CF).

Formula 1: VL (dBuV) = MTR (dBuV) + CF (dB).

For Radiated Emissions:

The resultant field strength (FS) is a summation in decibels (dB) of the receiver meter reading (MTR), the antenna correction factor (AF), and the cable loss factor (CF). If an external preamplifier is used, the total is reduced by its gain (-PA). If a distance correction (DC) is required, it is added to the total.

Formula 1: FS (dBuV/m) = MTR (dBuV) + AF (dB/m) + CF (dB) + (- PA (dB)) + DC (dB)

To convert the Field Strength dBuV/m term to uV/m, the dBuV/m is first divided by 20. The Base 10 AntiLog is taken of this quotient. The result is the Field Strength value in uV/m terms.

Formula 2: FS (uV/m) = AntiLog [(FS (dBuV/m))/20]

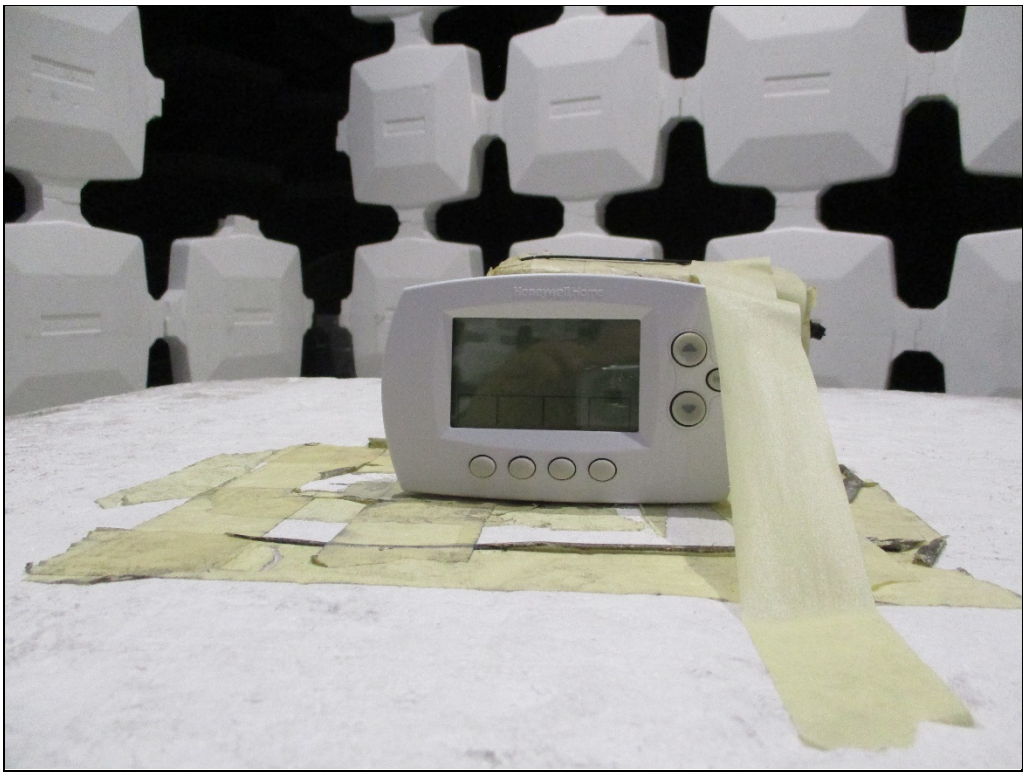
15. Statement of Conformity

The Astronics Resideo Thermostat, Model No. Focus Pro, did fully conform to the selected requirements of FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247.

16. Certification

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247 test specifications. The data presented in this test report pertains to the EUT on the test date specified. Any electrical or mechanical modifications made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification.

17. Photograph of EUT

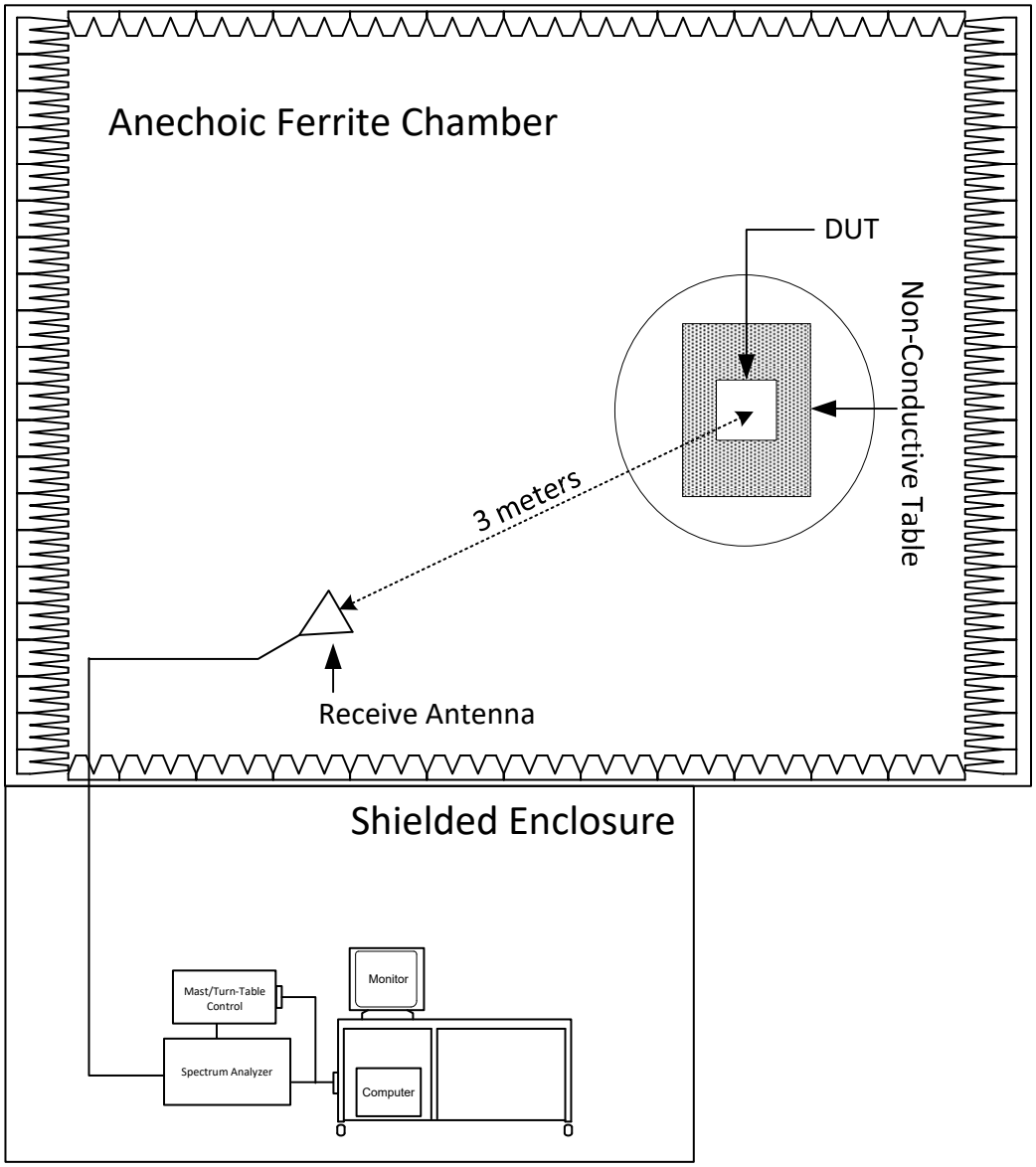


18. Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW0	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-30-20G20R6G	PL2926/0646	20GHZ-26.5GHZ	9/24/2020	9/24/2021
APW14	PREAMPLIFIER	PLANAR	PE2-35-120-5R0-10-12-SFF	PL22671	1-20GHz	9/24/2020	9/24/2021
CDZ3	LAB WORKSTATION	ELITE	LWS-10		WINDOWS 10	CNR	
NHG0	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NWQ2	DOUBLE RIDGED WAVEGUIDE ANTENNA	ETS LINDGREN	3117	66659	1GHZ-18GHZ	4/7/2020	4/7/2022
PLF1	CISPR16 50UH LISN	ELITE	CISPR16/70A	001	.15-30MHz	4/8/2021	4/8/2022
PLF3	CISPR16 50UH LISN	ELITE	CISPR16/70A	003	.15-30MHz	4/8/2021	4/8/2022
RBG3	EMI ANALYZER	ROHDE & SCHWARZ	ESW44	101592	2HZ-44GHZ	5/27/2021	5/27/2022
SES0	24VDC POWER SUPPLY	P-TRANS	FS-32024-1M	001	18-27VDC	NOTE 1	
T1N2	10DB 20W ATTENUATOR	NARDA	766-10	---	DC-4GHZ	4/2/2020	4/2/2022
T2D5	20DB, 25W ATTENUATOR	WEINSCHEL	46-20-43	AY9244	DC-18GHZ	1/9/2020	1/9/2022
T2S7	20DB 25W ATTENUATOR	WEINSCHEL	46-20-34	BU8139	DC-18GHZ	3/10/2020	3/10/2022
VBR8	CISPR EN FCC CE VOLTAGE.exe					N/A	
VBV2	CISPR EN FCC ICES RE.EXE	ELITE	CISPR EN FCC ICES RE.EXE	---	---	N/A	
WKA1	SOFTWARE, UNIVERSAL RCV EMI	ELITE	UNIV_RCV_EMI	1	---	I/O	
XOB2	ADAPTER	HEWLETT PACKARD	K281C,012	09407	18-26.5GHZ	NOTE 1	
XPR0	HIGH PASS FILTER	K&L MICROWAVE	11SH10-4800/X20000	001	4.8-20GHZ	9/6/2019	9/6/2021

N/A: Not Applicable I/O: Initial Only CNR: Calibration Not Required
NOTE 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

19. Block Diagram of Test Setup



Radiated Measurements Test Setup

20. Digital Device Conducted Emissions

EUT Information	
Manufacturer	Astronics
Product	Resideo Thermostat
Model No.	Focus Pro
Serial No.	1378317
Mode	Transmitter in Standby

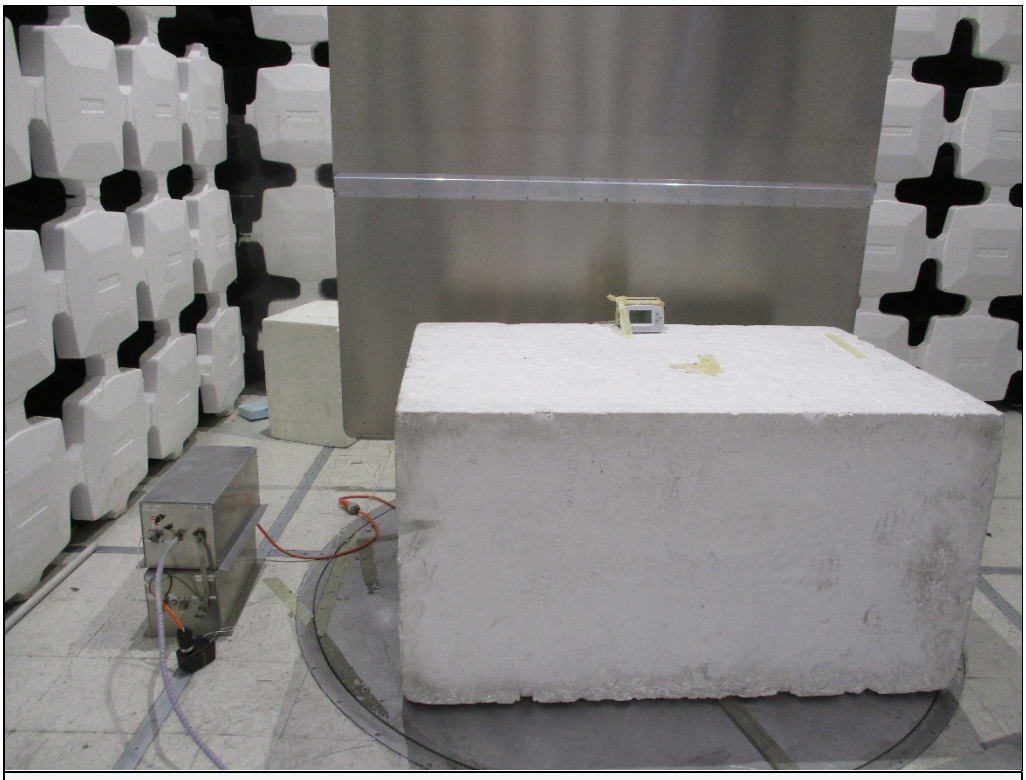
Test Setup Details	
Setup Format	Tabletop
Type of Test Site	Semi-Anechoic Chamber or Shielded Enclosure
Test Site Used	Room 29
Note	N/A

Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Conducted disturbance (mains port) (150 kHz – 30 MHz)	2.7

Requirements
All radio frequency voltages on the power lines for any frequency or frequencies of an unintentional radiator shall not exceed the limits in the following table.

FCC Part 15 Subpart B Conducted Emissions Class B Limits		
Frequency of Emission (MHz)	Conducted Limits (dBµV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56-46*
0.5 – 5	56	46
5 – 30	60	50
*Decreases with the logarithm of the frequency		

Procedure
The interference on each power lead of the EUT was measured by connecting the measuring equipment to the appropriate meter terminal of the Line Impedance Stabilization Network (LISN). The meter terminal of the LISN not under test was terminated with 50 ohms. 1) The EUT was operated in the transmitter in standby mode. 2) Measurements were first made on the 120VAC high line of the Hammond Manufacturing BPE2G Power Supply which provided 24VAC to the EUT. 3) The frequency range from 150 kHz to 30 MHz was broken up into smaller frequency sub-bands. 4) Conducted emissions measurements were taken on the first frequency sub-band using a peak detector. 5) The data thus obtained was then searched by the computer for the highest levels. Any emissions levels that were within 4dB of the average limit were then measured again using both a quasi-peak detector and an average detector. (If no peak readings were within 4dB of the average limit, quasi-peak and average readings were taken on the highest emissions levels measured during the peak detector scan.) 6) Steps (4) and (5) were repeated for the remainder of the frequency sub-bands until the entire frequency range from 150kHz to 30MHz was investigated. The peak trace was automatically plotted. The plot also shows quasi-peak and average readings that were taken on discrete frequencies. A table showing the quasi-peak and average readings was also generated. This tabular data compares the quasi-peak and average conducted emissions to the applicable conducted emissions limits. 7) Steps (3) through (6) were repeated on the 120VAC return line of the Hammond Manufacturing BPE2G Power Supply which provided 24VAC to the EUT.



Test Setup for RF Conducted Emissions (AC Mains)

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 05/14/2020

Manufacturer	:	Astronics
Model	:	Focus Pro
DUT Revision	:	
Serial Number	:	1378317
DUT Mode	:	Transmitter in standby
Line Tested	:	120V, 60Hz High
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-4
Notes	:	Tested with a Hammond Manufacturing BPE2G Power Supply (24VAC Output)
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Jun 07, 2021 03:07:27 PM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 4 dB margin below limit

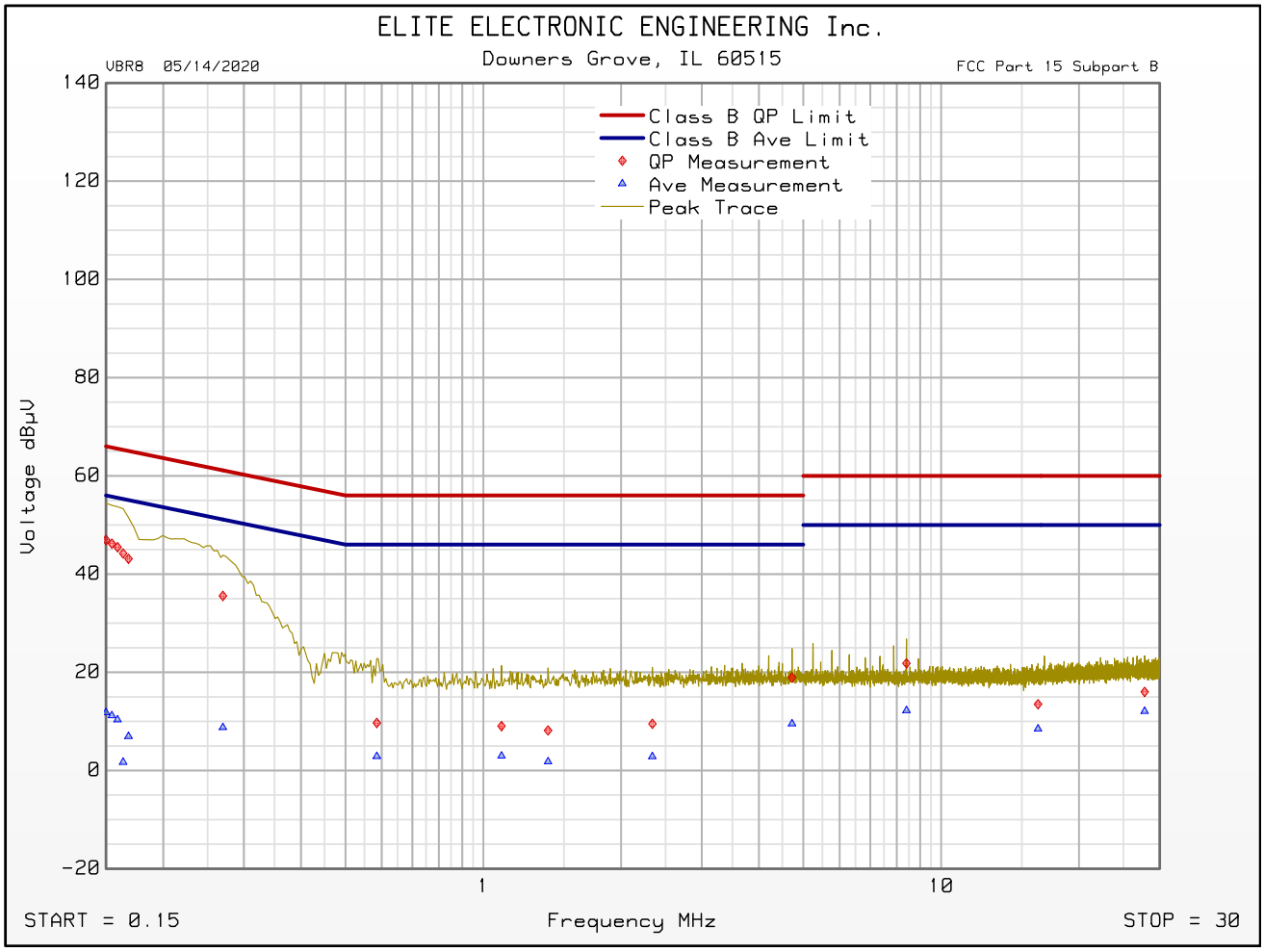
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.150	46.9	66.0		11.8	56.0	
0.270	35.6	61.1		8.8	51.1	
0.586	9.7	56.0		2.9	46.0	
1.096	9.0	56.0		3.0	46.0	
1.385	8.2	56.0		1.8	46.0	
2.340	9.5	56.0		2.8	46.0	
4.724	18.9	56.0		9.5	46.0	
8.398	21.8	60.0		12.2	50.0	
16.272	13.5	60.0		8.5	50.0	
27.815	16.0	60.0		12.1	50.0	

FCC Part 15 Subpart B Conducted Emissions Test

Cumulative Data

VBR8 05/14/2020

Manufacturer	:	Astronics
Model	:	FocusPro
DUT Revision	:	
Serial Number	:	
DUT Mode	:	Transmitter in standby
Line Tested	:	120V, 60Hz High
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-4
Notes	:	Tested with a Hammond Manufacturing BPE2G Power Supply (24VAC Output)
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Jun 07, 2021 03:07:27 PM



Emissions Meet QP Limit
Emissions Meet Ave Limit

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 05/14/2020

Manufacturer	:	Astronics
Model	:	Focus Pro
DUT Revision	:	
Serial Number	:	1378317
DUT Mode	:	Transmitter in standby
Line Tested	:	120V, 60Hz Return
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-4
Notes	:	Tested with a Hammond Manufacturing BPE2G Power Supply (24VAC Output)
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Jun 07, 2021 03:01:41 PM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 4 dB margin below limit

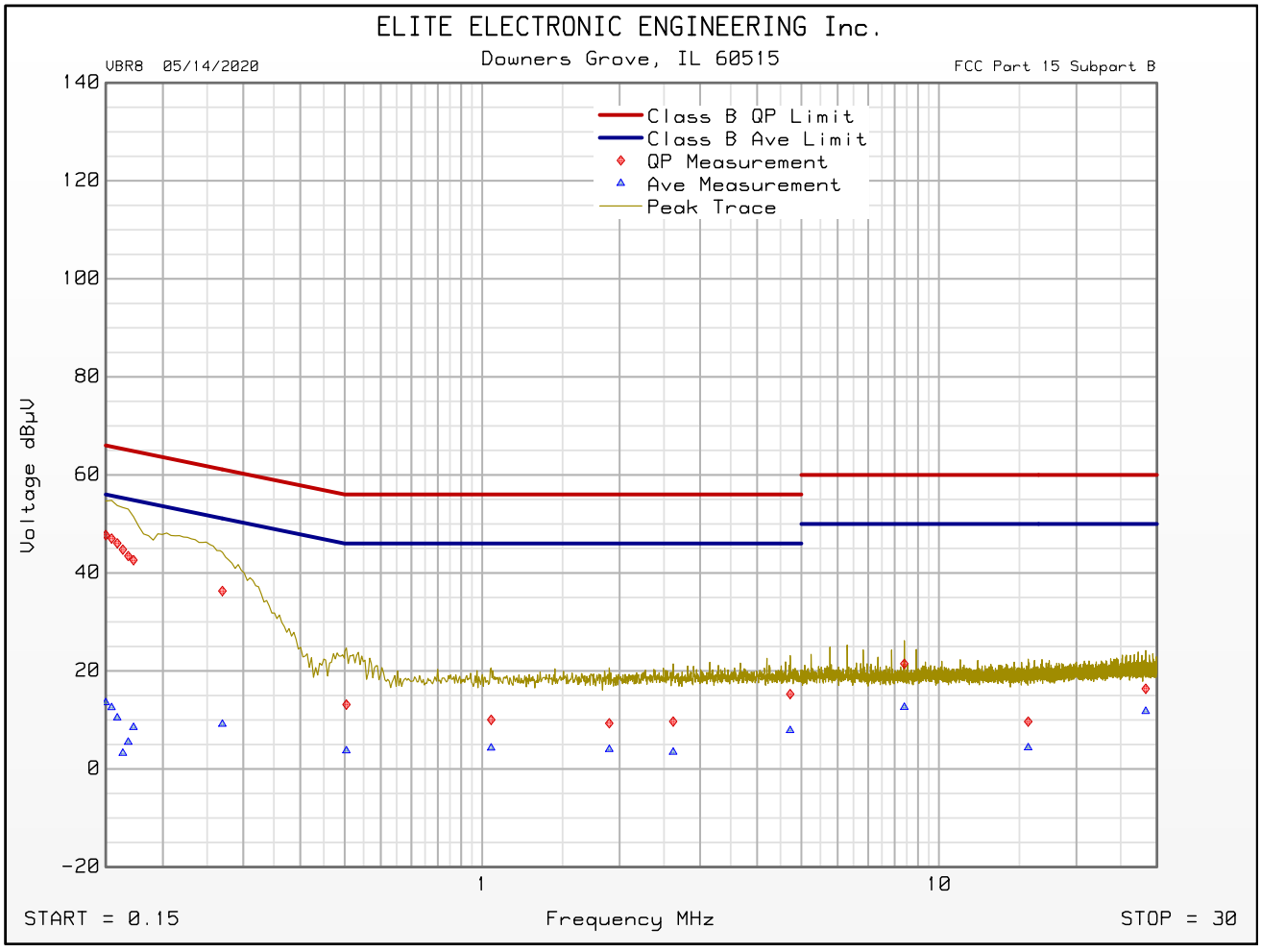
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.150	47.7	66.0		13.6	56.0	
0.270	36.3	61.1		9.2	51.1	
0.505	13.1	56.0		3.7	46.0	
1.047	10.0	56.0		4.3	46.0	
1.898	9.3	56.0		4.0	46.0	
2.619	9.7	56.0		3.4	46.0	
4.724	15.3	56.0		7.9	46.0	
8.398	21.5	60.0		12.6	50.0	
15.678	9.7	60.0		4.3	50.0	
28.346	16.4	60.0		11.8	50.0	

FCC Part 15 Subpart B Conducted Emissions Test

Cumulative Data

VBR8 05/14/2020

Manufacturer	:	Astronics
Model	:	Focus Pro
DUT Revision	:	
Serial Number	:	1378317
DUT Mode	:	Transmitter in standby
Line Tested	:	120V, 60Hz Return
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-4
Notes	:	
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Jun 07, 2021 03:01:41 PM



Emissions Meet QP Limit
Emissions Meet Ave Limit

21. Digital Device Radiated Emissions

EUT Information	
Manufacturer	Astronics
Product	Resideo Thermostat
Model No.	Focus Pro
Serial No.	1378317
Mode	Transmitter Standby

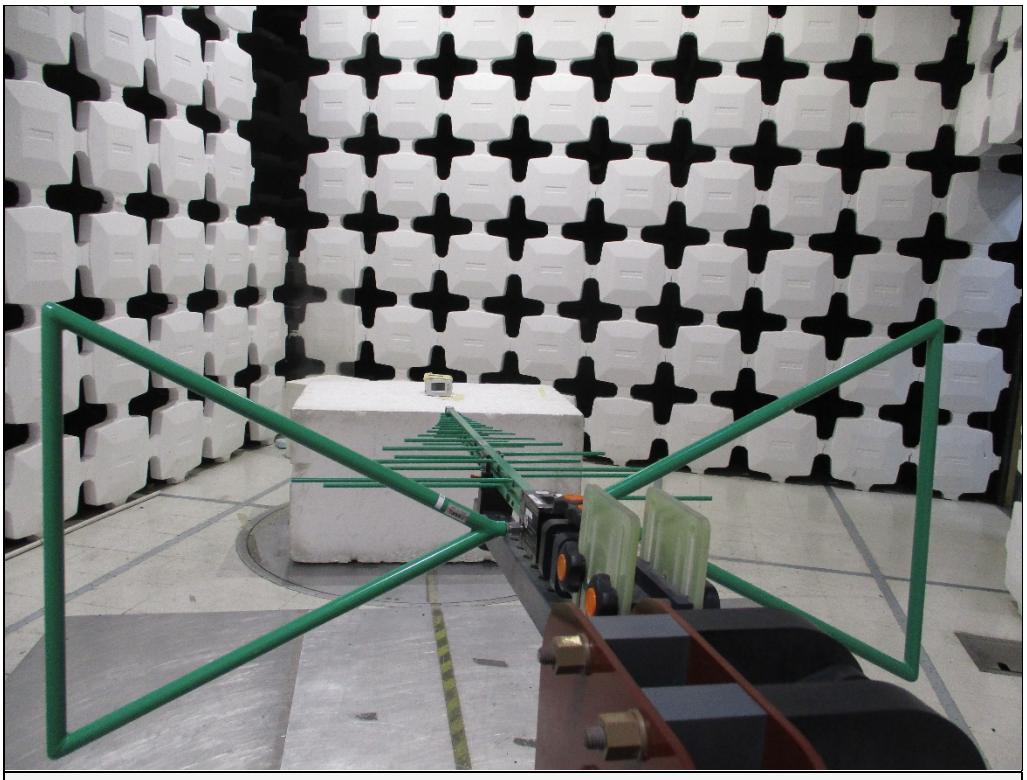
Test Setup Details	
Setup Format	Tabletop
Type of Test Site	Semi-Anechoic Chamber
Test Site Used	Room 29
Type of Antennas Used	Below 1GHz: Bilog (or equivalent) Above 1GHz: Double-ridged waveguide (or equivalent)
Highest Internal Frequency of the EUT	2.4GHz
Highest Measurement Frequency	13GHz
Notes	The cables were manually maximized during the preliminary emissions sweeps. The cable arrangement which resulted in the worst-case emissions was utilized.

Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz)	4.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz)	3.1
Radiated disturbance (electric field strength on an open area test site or alternative test site) (6 GHz – 18 GHz)	3.2
Radiated disturbance (electric field strength on an open area test site or alternative test site) (18 GHz – 26.5 GHz)	3.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (26.5 GHz – 40 GHz)	3.4

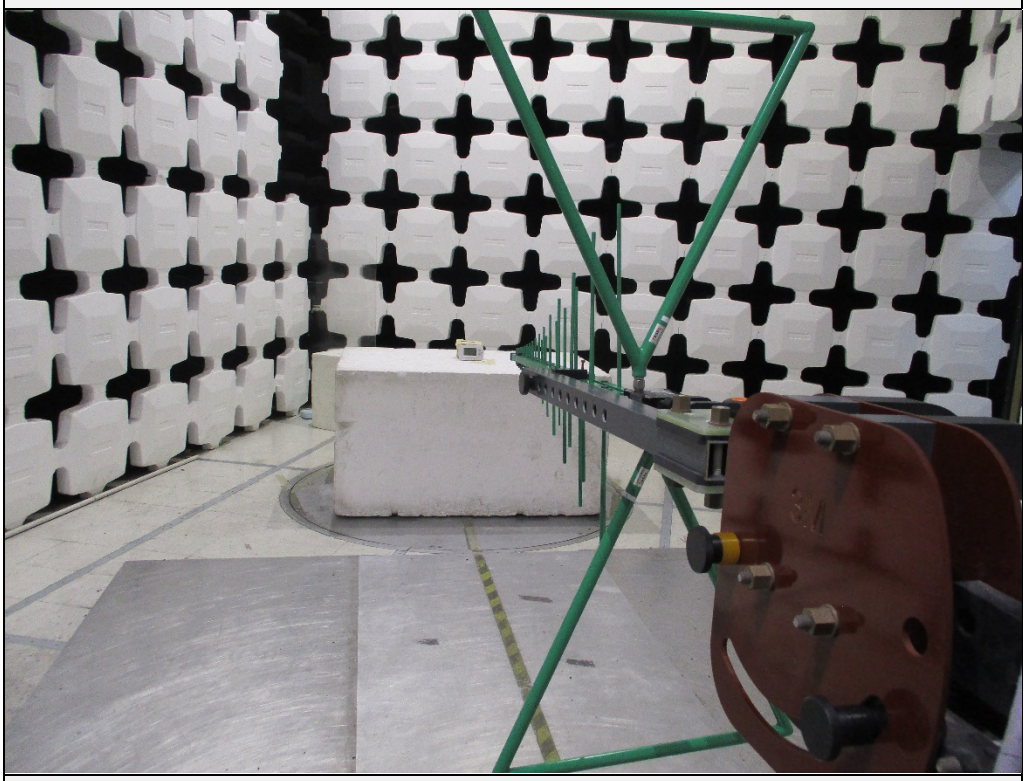
Requirements
The field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values.

Requirements	
Frequency of Emission (MHz)	Field Strength (µV/m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

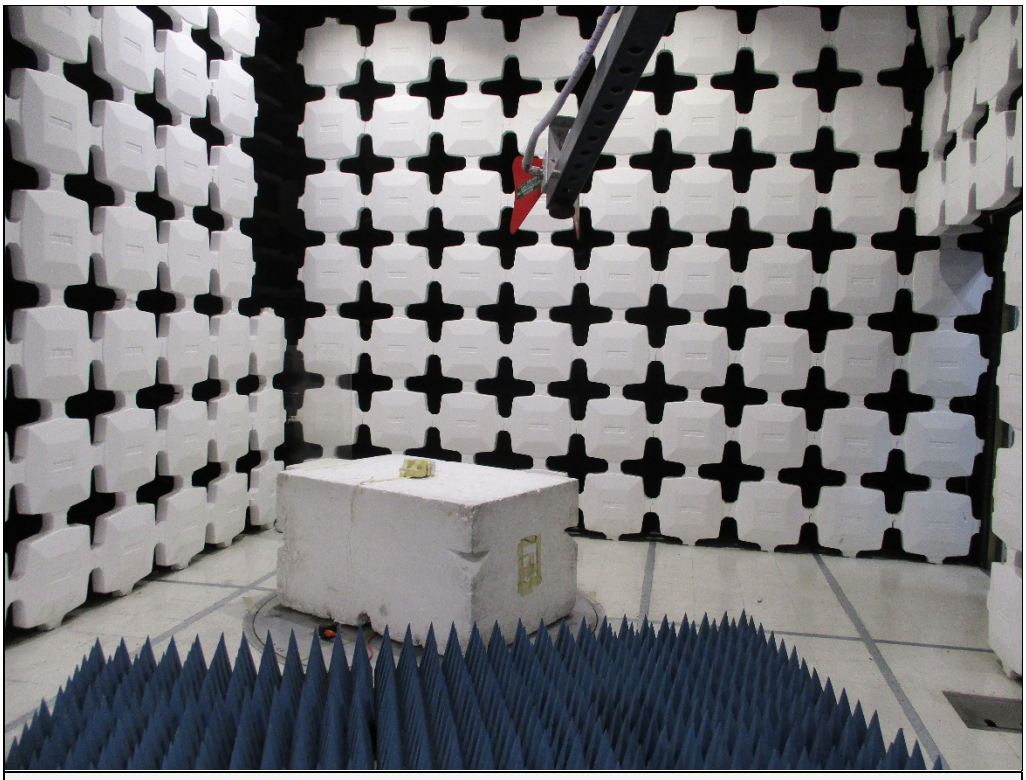
Procedures
Since a quasi-peak detector and an average detector requires a long integration times, it is not practical to automatically sweep through the quasi-peak and average levels. Therefore, radiated emissions from the EUT were first scanned using a peak detector and automatically plotted. The frequencies where significant emission levels were noted were then remeasured using the quasi-peak detector or average detector. The EUT was placed on an 80cm high non-conductive stand. The broadband measuring antenna was positioned at a 3 meter distance from the EUT. The frequency range from 30MHz to 1GHz was investigated using a peak detector function with the bilog antenna at several heights, horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The frequency range from 1GHz to 13GHz was investigated using a peak detector function with the double ridged waveguide antenna at several heights, horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The maximum levels for each antenna polarization were plotted. Final radiated emissions were performed on all significant broadband and narrowband emissions found in the exploratory sweeps using the following methods: 1) Measurements from 30MHz to 1GHz were made using a quasi-peak detector and a broadband bilog antenna. Measurements above 1GHz were made using an average detector and a broadband double ridged waveguide antenna. 2) To ensure that maximum or worst case, emission levels were measured, the following steps were taken: a) The EUT was rotated so that all sides were exposed to the receiving antenna. b) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured. c) The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.



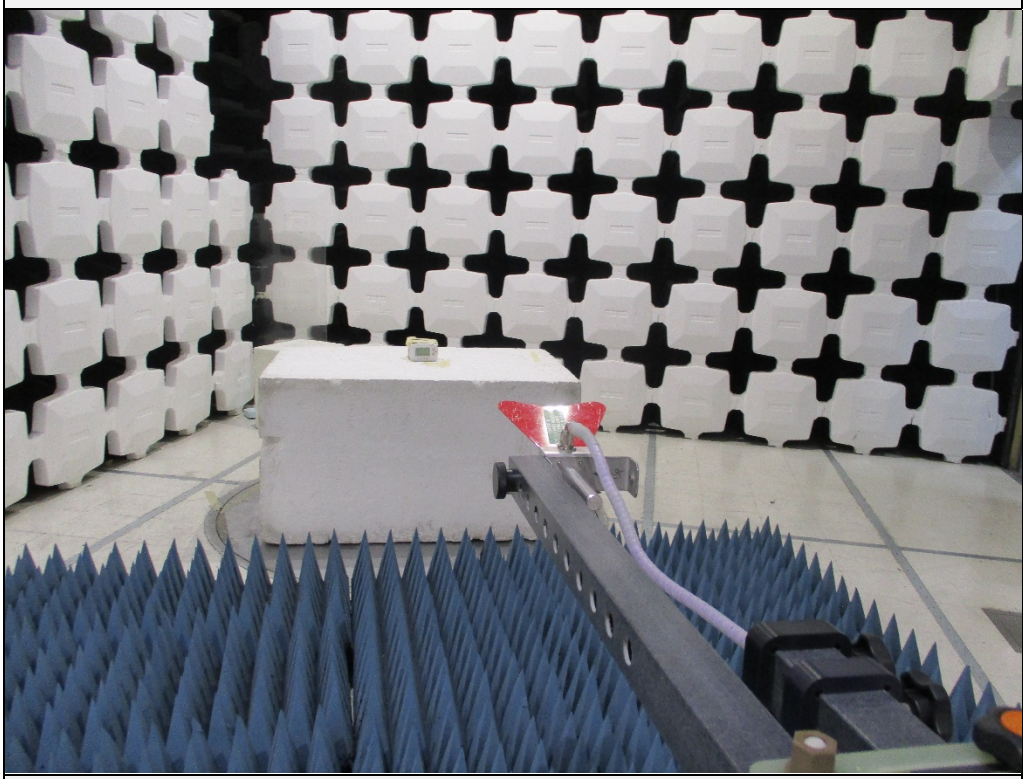
Test Setup for Radiated Emissions: 30MHz to 1GHz, Horizontal Polarization



Test Setup for Radiated Emissions: 30MHz to 1GHz, Vertical Polarization



Test Setup for Radiated Emissions: 1GHz to 13GHz, Horizontal Polarization

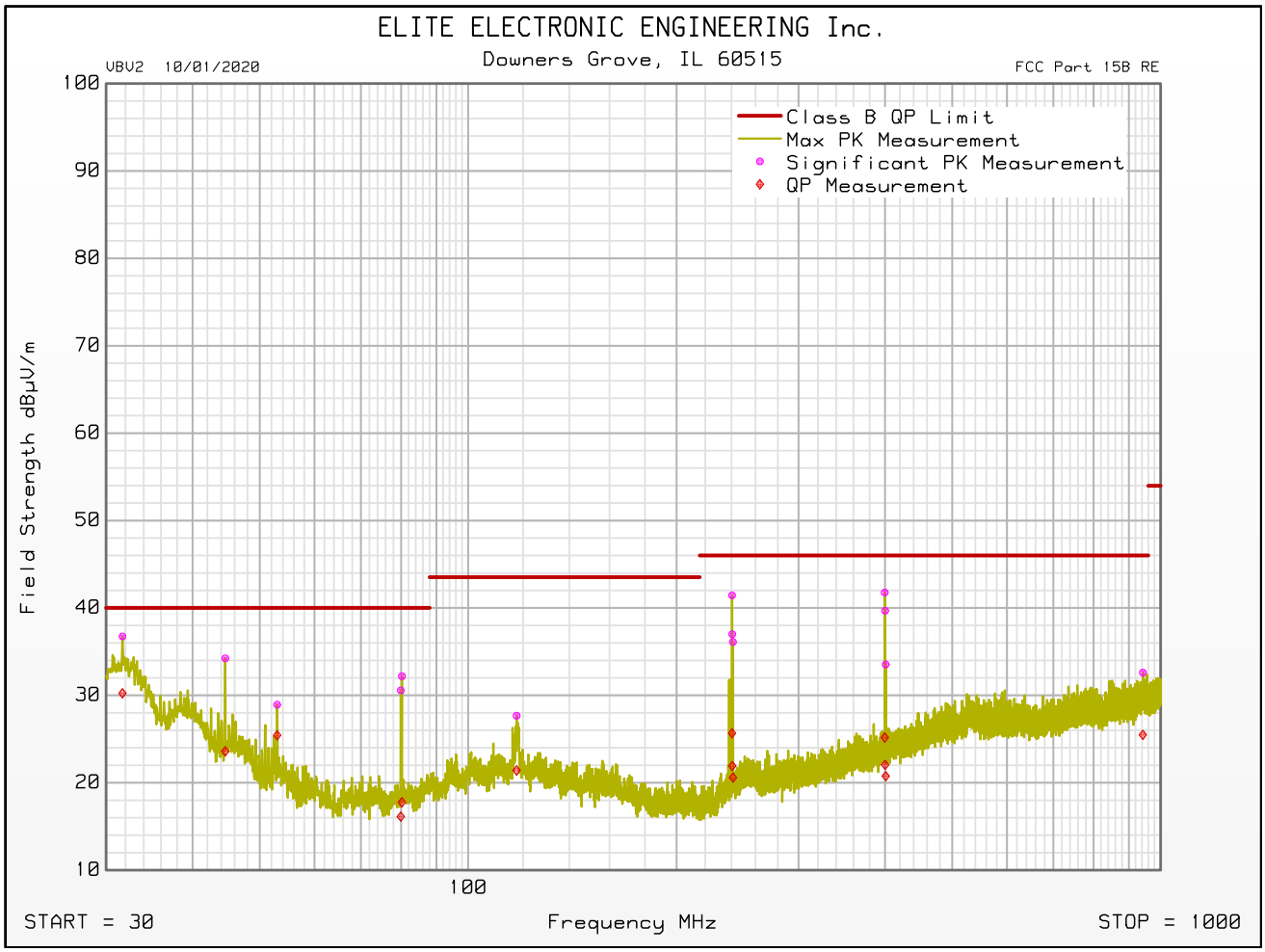


Test Setup for Radiated Emissions: 1GHz to 13GHz, Vertical Polarization

FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 10/01/2020

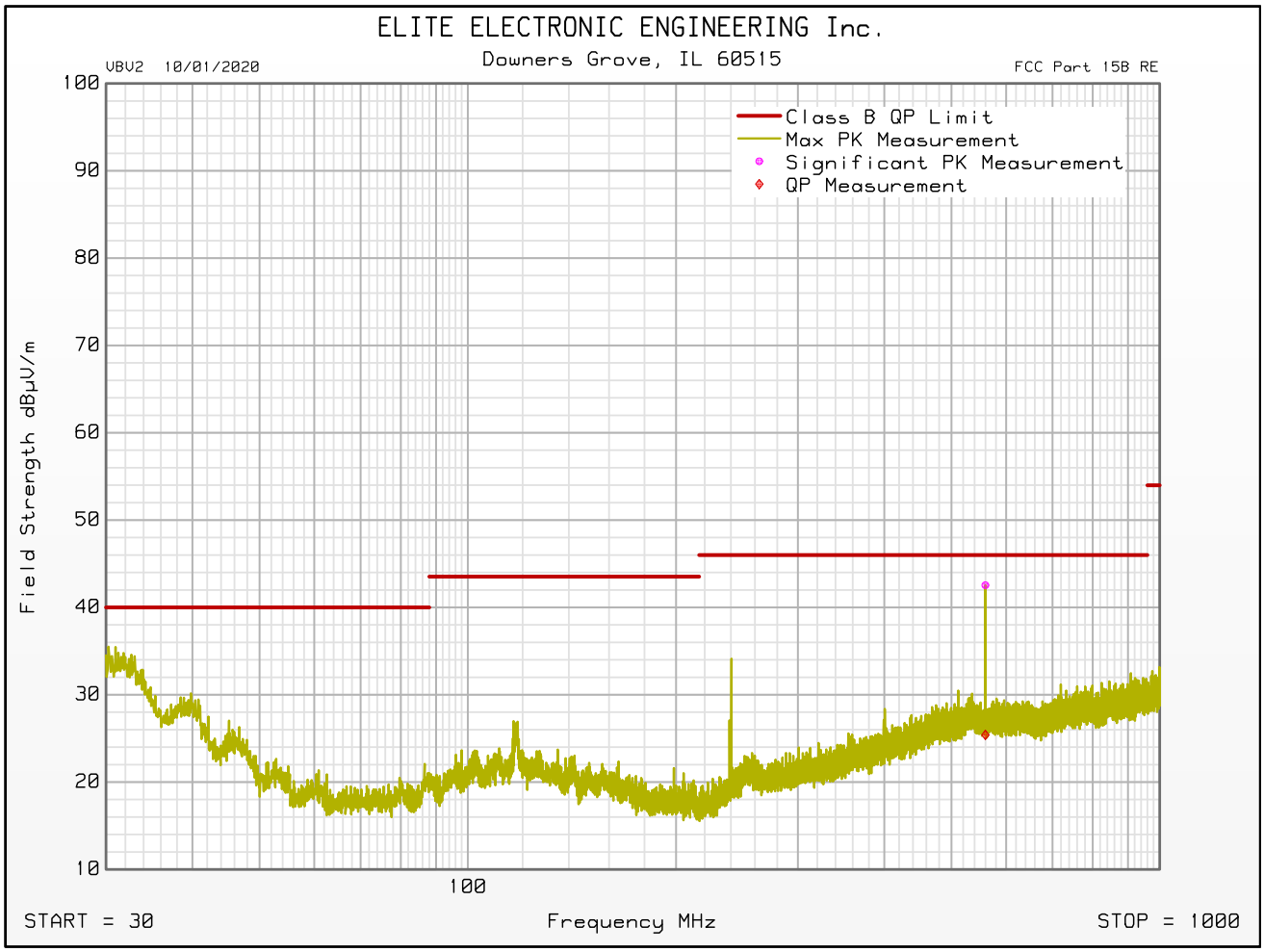
Manufacturer	:	Astronics
Model	:	Focus Pro
Serial Number	:	1378317
DUT Mode	:	Transmitter in standby
Antenna Polarization	:	Vertical
Scan Type	:	Stepped Scan
Test RBW	:	120 kHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	
Test Engineer	:	M. Longinotti
Test Date	:	Jun 07, 2021 12:44:15 PM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 10/01/2020

Manufacturer	:	Astronics
Model	:	Focus Pro
Serial Number	:	1378317
DUT Mode	:	Transmitter in Standby
Antenna Polarization	:	Horizontal
Scan Type	:	Stepped Scan
Test RBW	:	120 kHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	
Test Engineer	:	M. Longinotti
Test Date	:	Jun 07, 2021 12:44:15 PM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 10/01/2020

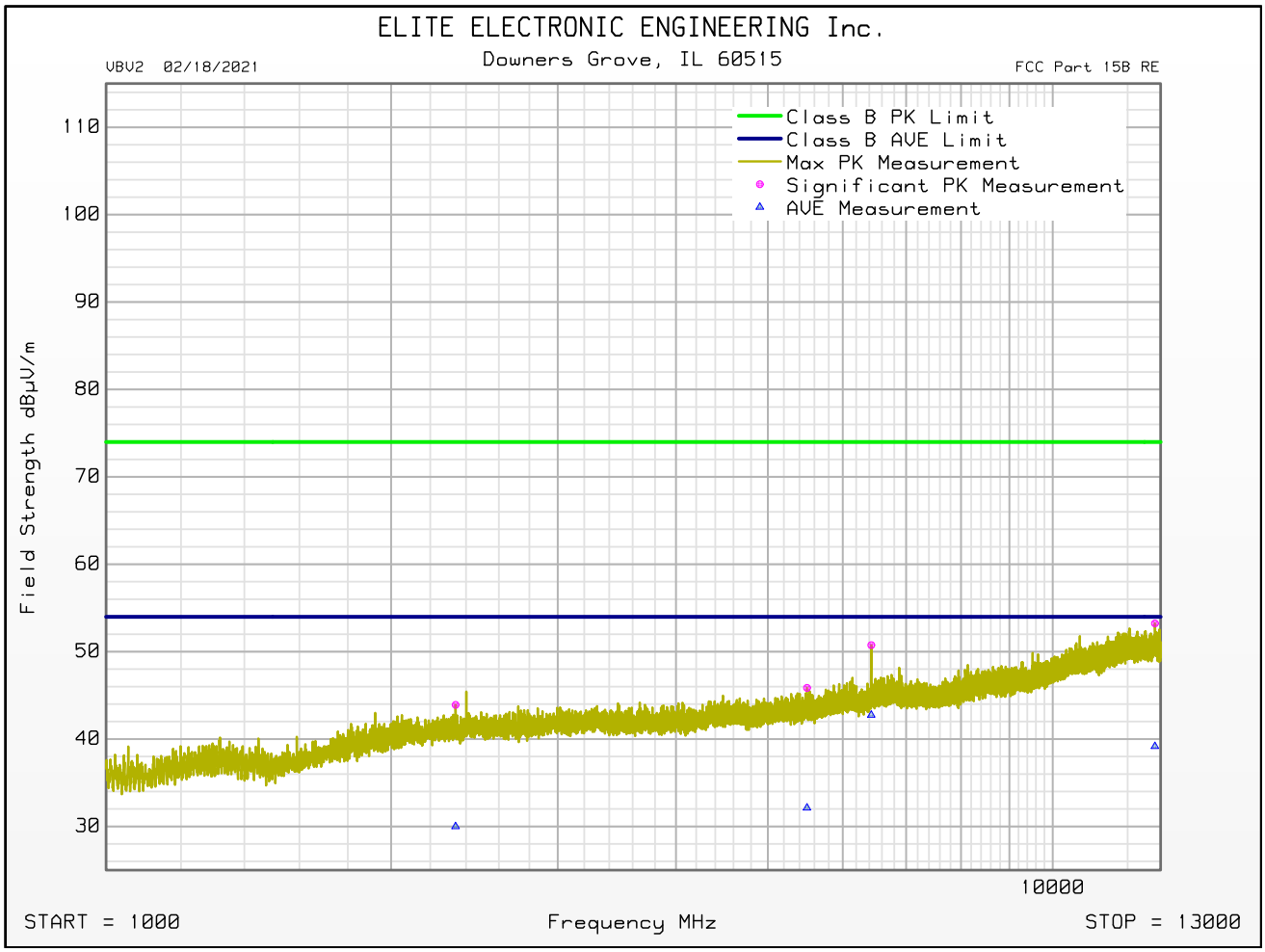
Manufacturer	:	Astronics
Model	:	FocusPro
Serial Number	:	1378317
DUT Mode	:	Transmitter in Standby
Scan Type	:	Stepped Scan
Test RBW	:	120 kHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	
Test Engineer	:	M. Longinotti
Test Date	:	Jun 07, 2021 12:44:15 PM

Freq MHz	Peak Mtr Rdg dBuV	QP Mtr Rdg dBuV	Ant Fac dB/m	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBµV/m	QP Total dBµV/m	QP Limit dBµV/m	QP Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °	Excessive QP Level
31.680	12.4	5.9	23.9	0.0	0.4	0.0	36.7	30.2	40.0	-9.8	V	340	0	
44.580	16.6	6.0	17.2	0.0	0.4	0.0	34.2	23.6	40.0	-16.4	V	200	135	
52.980	14.6	11.1	13.9	0.0	0.4	0.0	28.9	25.4	40.0	-14.6	V	120	90	
79.920	16.9	2.5	13.3	0.0	0.4	0.0	30.6	16.1	40.0	-23.9	V	120	45	
80.220	18.5	4.1	13.3	0.0	0.4	0.0	32.2	17.8	40.0	-22.2	V	120	180	
117.460	9.1	2.8	18.1	0.0	0.5	0.0	27.7	21.4	43.5	-22.1	V	200	270	
240.480	23.3	7.5	17.4	0.0	0.8	0.0	41.4	25.7	46.0	-20.3	V	340	225	
240.660	18.9	3.8	17.4	0.0	0.8	0.0	37.0	21.9	46.0	-24.1	V	340	180	
241.200	17.9	2.4	17.4	0.0	0.8	0.0	36.1	20.6	46.0	-25.4	V	200	180	
399.540	18.8	2.2	21.8	0.0	1.1	0.0	41.8	25.2	46.0	-20.8	V	120	180	
400.080	16.7	-0.9	21.9	0.0	1.1	0.0	39.7	22.0	46.0	-24.0	V	120	315	
400.860	10.5	-2.3	21.9	0.0	1.1	0.0	33.5	20.8	46.0	-25.2	V	340	180	
559.860	16.7	-0.4	24.7	0.0	1.1	0.0	42.5	25.4	46.0	-20.6	H	120	180	
942.720	4.1	-3.0	27.0	0.0	1.5	0.0	32.6	25.5	46.0	-20.5	V	120	315	

FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 02/18/2021

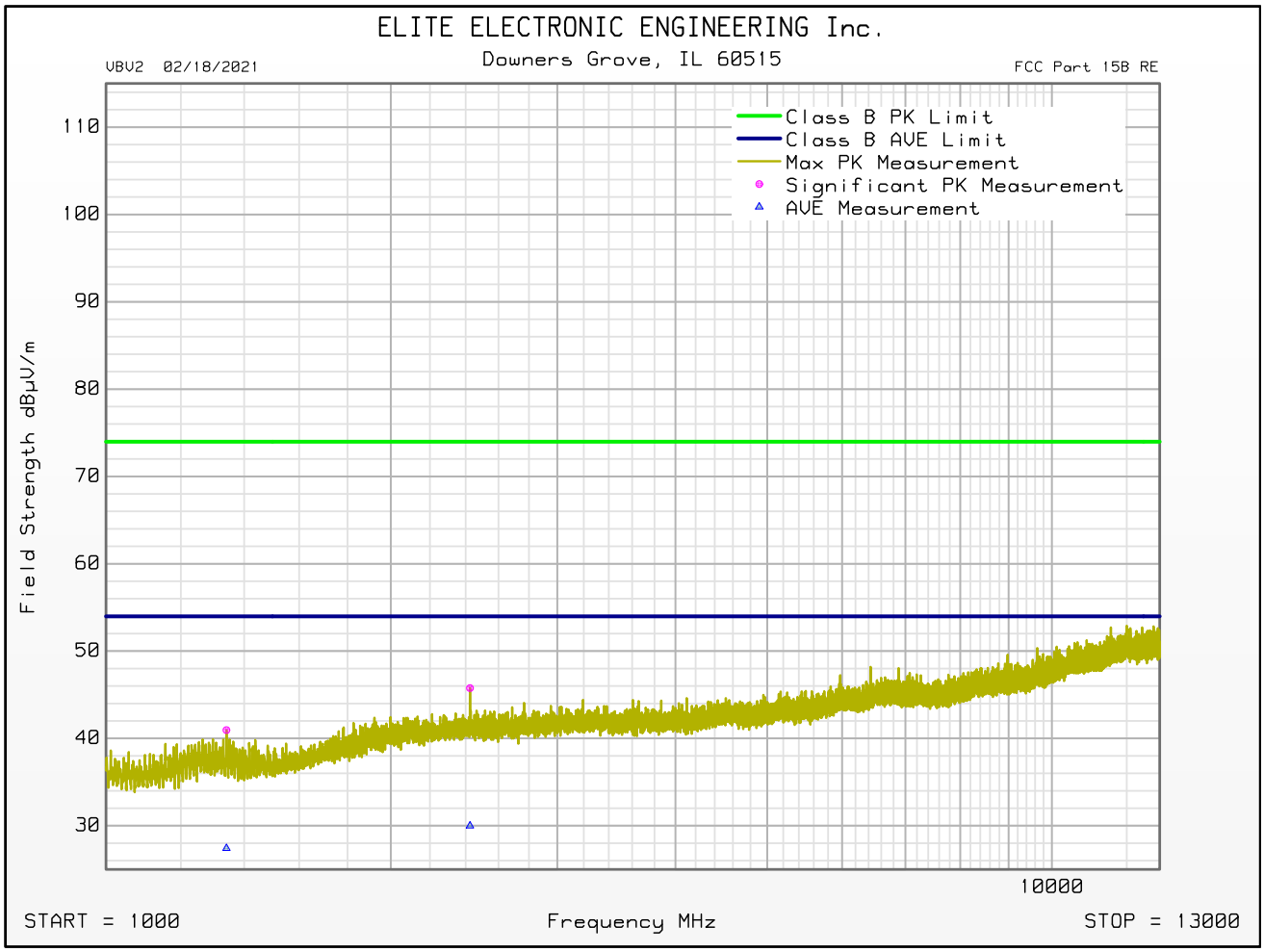
Manufacturer	:	Astronics
Model	:	Focus Pro
Serial Number	:	1378317
DUT Mode	:	Transmitter in standby
Antenna Polarization	:	Horizontal
Scan Type	:	Stepped Scan
Test RBW	:	1 MHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	
Test Engineer	:	M. Longinotti
Test Date	:	Jun 07, 2021 10:14:32 AM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 02/18/2021

Manufacturer	:	Astronics
Model	:	Focus Pro
Serial Number	:	1378317
DUT Mode	:	Transmitter in standby
Antenna Polarization	:	Vertical
Scan Type	:	Stepped Scan
Test RBW	:	1 MHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	
Test Engineer	:	M. Longinotti
Test Date	:	Jun 07, 2021 10:14:32 AM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 02/18/2021

Manufacturer	:	Astronics
Model	:	Focus Pro
Serial Number	:	1378317
DUT Mode	:	Transmitter in standby
Scan Type	:	Stepped Scan
Test RBW	:	1 MHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	
Test Engineer	:	M. Longinotti
Test Date	:	Jun 07, 2021 10:14:32 AM

Freq MHz	Peak Mtr Rdg dBuV	Ant Fac dB/m	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBµV/m	Peak Limit dBµV/m	Peak Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °	Excessive Peak Level
1340.500	51.0	29.0	-40.9	1.8	0.0	41.0	74.0	-33.0	V	340	135	
2340.000	49.9	32.0	-40.5	2.5	0.0	43.9	74.0	-30.1	H	200	45	
2425.500	51.4	32.2	-40.5	2.6	0.0	45.8	74.0	-28.2	V	200	0	
5500.500	47.4	34.7	-40.3	4.0	0.0	45.9	74.0	-28.1	H	200	225	
6432.000	51.0	35.8	-40.4	4.4	0.0	50.7	74.0	-23.2	H	120	225	
12820.500	47.9	38.8	-39.5	6.1	0.0	53.2	74.0	-20.7	H	200	45	

Freq MHz	Average Mtr Rdg dBuV	Ant Fac dB/m	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Average Total dBµV/m	Average Limit dBµV/m	Average Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °	Excessive Average Level
1340.500	37.5	29.0	-40.9	1.8	0.0	27.4	54.0	-26.6	V	340	135	
2340.000	36.0	32.0	-40.5	2.5	0.0	30.0	54.0	-24.0	H	200	45	
2425.500	35.7	32.2	-40.5	2.6	0.0	30.0	54.0	-24.0	V	200	0	
5500.500	33.7	34.7	-40.3	4.0	0.0	32.1	54.0	-21.8	H	200	225	
6432.000	43.0	35.8	-40.4	4.4	0.0	42.7	54.0	-11.2	H	120	225	
12820.500	33.8	38.8	-39.5	6.1	0.0	39.2	54.0	-14.8	H	200	45	

22. Transmitter Conducted Emissions

EUT Information	
Manufacturer	Astronics
Product	Resideo Thermostat
Model No.	Focus Pro
Serial No.	1378317
Mode	Transmit at 2437MHz, 802.11b, 11MBPS

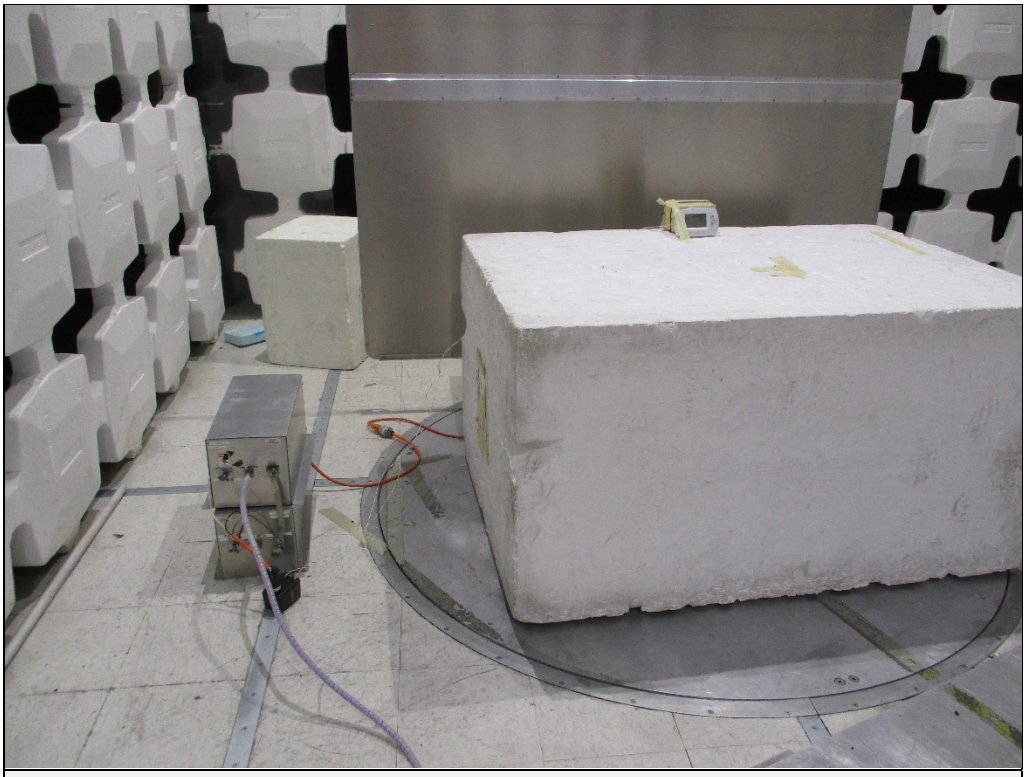
Test Setup Details	
Setup Format	Tabletop
Type of Test Site	Semi-Anechoic Chamber
Test Site Used	Room 29
Note	None

Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Conducted disturbance (mains port) (150 kHz – 30 MHz)	2.7

Requirements
All radio frequency voltages on the power lines for any frequency or frequencies of an intentional radiator shall not exceed the limits in the following table.

FCC Part 15 Subpart B Conducted Emissions Class B Limits		
Frequency of Emission (MHz)	Conducted Limits (dBµV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56-46*
0.5 – 5	56	46
5 – 30	60	50
*Decreases with the logarithm of the frequency		

Procedures
The interference on each power lead of the EUT was measured by connecting the measuring equipment to the appropriate meter terminal of the Line Impedance Stabilization Network (LISN). The meter terminal of the LISN not under test was terminated with 50 ohms. 1) The EUT was operated in the Transmit at 2437MHz, 802.11b, 11MBPS mode. 2) Measurements were first made on the 120VAC high line of the Hammond Manufacturing BPE2G Power Supply which provided 24VAC to the EUT. 3) The frequency range from 150 kHz to 30 MHz was broken up into smaller frequency sub-bands. 4) Conducted emissions measurements were taken on the first frequency sub-band using a peak detector. 5) The data thus obtained was then searched by the computer for the highest levels. Any emissions levels that were within 4dB of the average limit were then measured again using both a quasi-peak detector and an average detector. (If no peak readings were within 4dB of the average limit, quasi-peak and average readings were taken on the highest emissions levels measured during the peak detector scan.) 6) Steps (4) and (5) were repeated for the remainder of the frequency sub-bands until the entire frequency range from 150kHz to 30MHz was investigated. The peak trace was automatically plotted. The plot also shows quasi-peak and average readings that were taken on discrete frequencies. A table showing the quasi-peak and average readings was also generated. This tabular data compares the quasi-peak and average conducted emissions to the applicable conducted emissions limits. 7) Steps (3) through (6) were repeated on the 120VAC return line of the Hammond Manufacturing BPE2G Power Supply which provided 24VAC to the EUT.



Test Setup for RF Conducted Emissions (AC Mains)

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 05/14/2020

Manufacturer	:	Astronics
Model	:	Focus Pro
DUT Revision	:	
Serial Number	:	1378317
DUT Mode	:	Transmit at 2437MHz, 802.11b, 11MBPS
Line Tested	:	120V, 60Hz High
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-4
Notes	:	Tested with a Hammond Manufacturing BPE2G Power Supply (24VAC Output)
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Jun 07, 2021 03:13:35 PM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 4 dB margin below limit

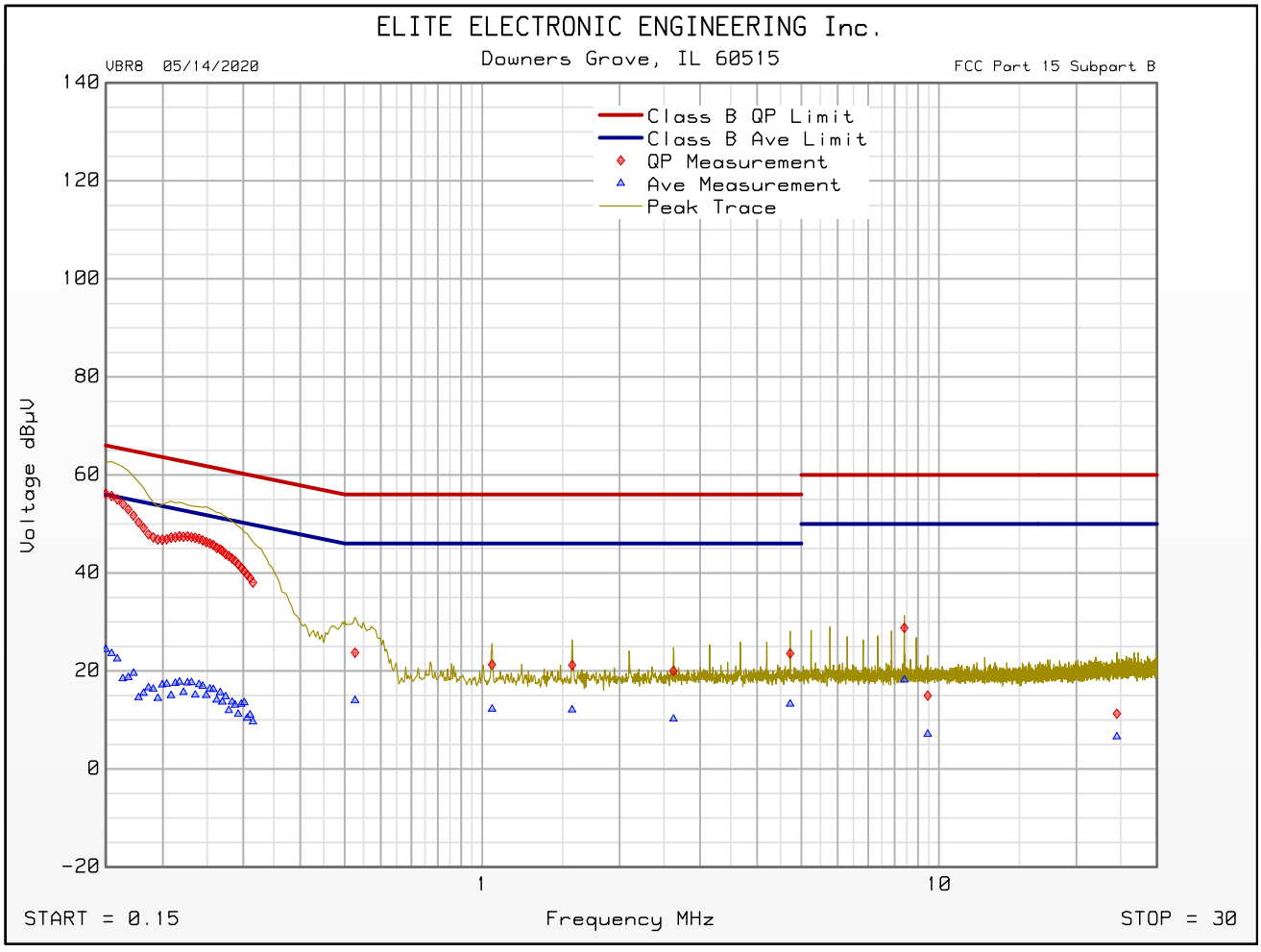
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.150	56.2	66.0		24.4	56.0	
0.270	44.5	61.1		13.7	51.1	
0.527	23.7	56.0		14.0	46.0	
1.051	21.3	56.0		12.2	46.0	
1.574	21.2	56.0		12.1	46.0	
2.624	20.0	56.0		10.2	46.0	
4.724	23.6	56.0		13.3	46.0	
8.398	28.8	60.0		18.2	50.0	
9.450	15.0	60.0		7.1	50.0	
24.517	11.3	60.0		6.6	50.0	

FCC Part 15 Subpart B Conducted Emissions Test

Cumulative Data

VBR8 05/14/2020

Manufacturer	:	Astronics
Model	:	Focus Pro
DUT Revision	:	
Serial Number	:	1378317
DUT Mode	:	Transmit at 2437MHz, 802.11b, 11MBPS
Line Tested	:	120V, 60Hz High
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-4
Notes	:	Tested with a Hammond Manufacturing BPE2G Power Supply (24VAC Output)
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Jun 07, 2021 03:13:35 PM



Emissions Meet QP Limit
Emissions Meet Ave Limit

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 05/14/2020

Manufacturer	:	Astronics
Model	:	Focus Pro
DUT Revision	:	
Serial Number	:	1378317
DUT Mode	:	Transmit at 2437MHz, 802.11b, 11MBPS
Line Tested	:	120V, 60Hz Return
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-4
Notes	:	Tested with a Hammond Manufacturing BPE2G Power Supply (24VAC Output)
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Jun 07, 2021 03:19:57 PM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 4 dB margin below limit

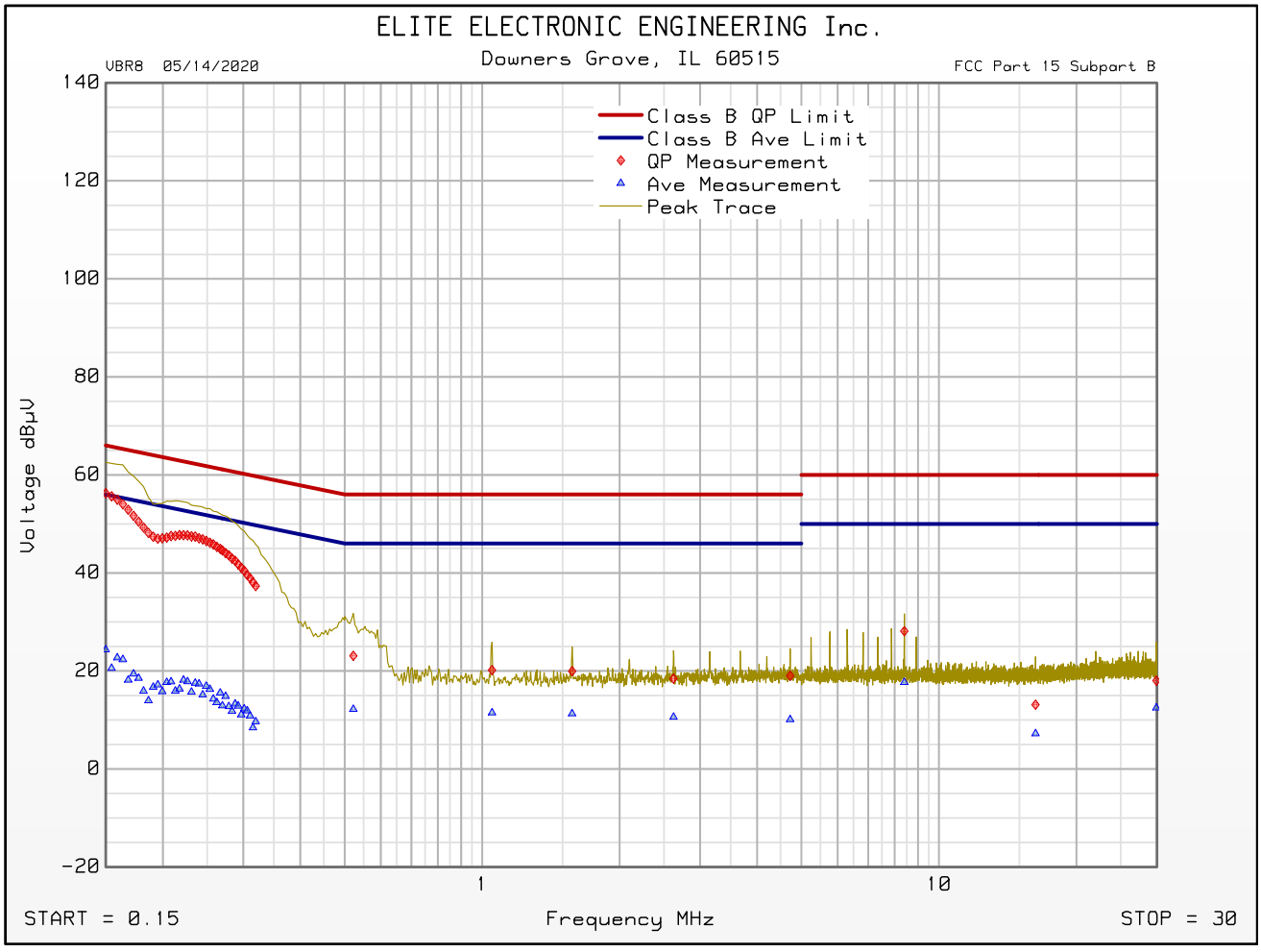
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.150	56.3	66.0		24.3	56.0	
0.270	44.6	61.1		12.9	51.1	
0.523	23.1	56.0		12.2	46.0	
1.051	20.2	56.0		11.5	46.0	
1.574	20.0	56.0		11.3	46.0	
2.624	18.4	56.0		10.6	46.0	
4.724	19.0	56.0		10.1	46.0	
8.398	28.1	60.0		17.7	50.0	
16.268	13.1	60.0		7.2	50.0	
29.912	18.0	60.0		12.5	50.0	

FCC Part 15 Subpart B Conducted Emissions Test

Cumulative Data

VBR8 05/14/2020

Manufacturer	:	Astronics
Model	:	Focus Pro
DUT Revision	:	
Serial Number	:	1378317
DUT Mode	:	Transmit at 2437MHz, 802.11b, 11MBPS
Line Tested	:	120V, 60Hz Return
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-4
Notes	:	Tested with a Hammond Manufacturing BPE2G Power Supply (24VAC Output)
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Jun 07, 2021 03:19:57 PM



Emissions Meet QP Limit
Emissions Meet Ave Limit

23. 6dB Bandwidth

EUT Information	
Manufacturer	Astronics
Product	Resideo Thermostat
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11b, 802.11g, 802.11n

Test Setup Details	
Setup Format	Tabletop
Measurement Method	Antenna Conducted
Notes	N/A

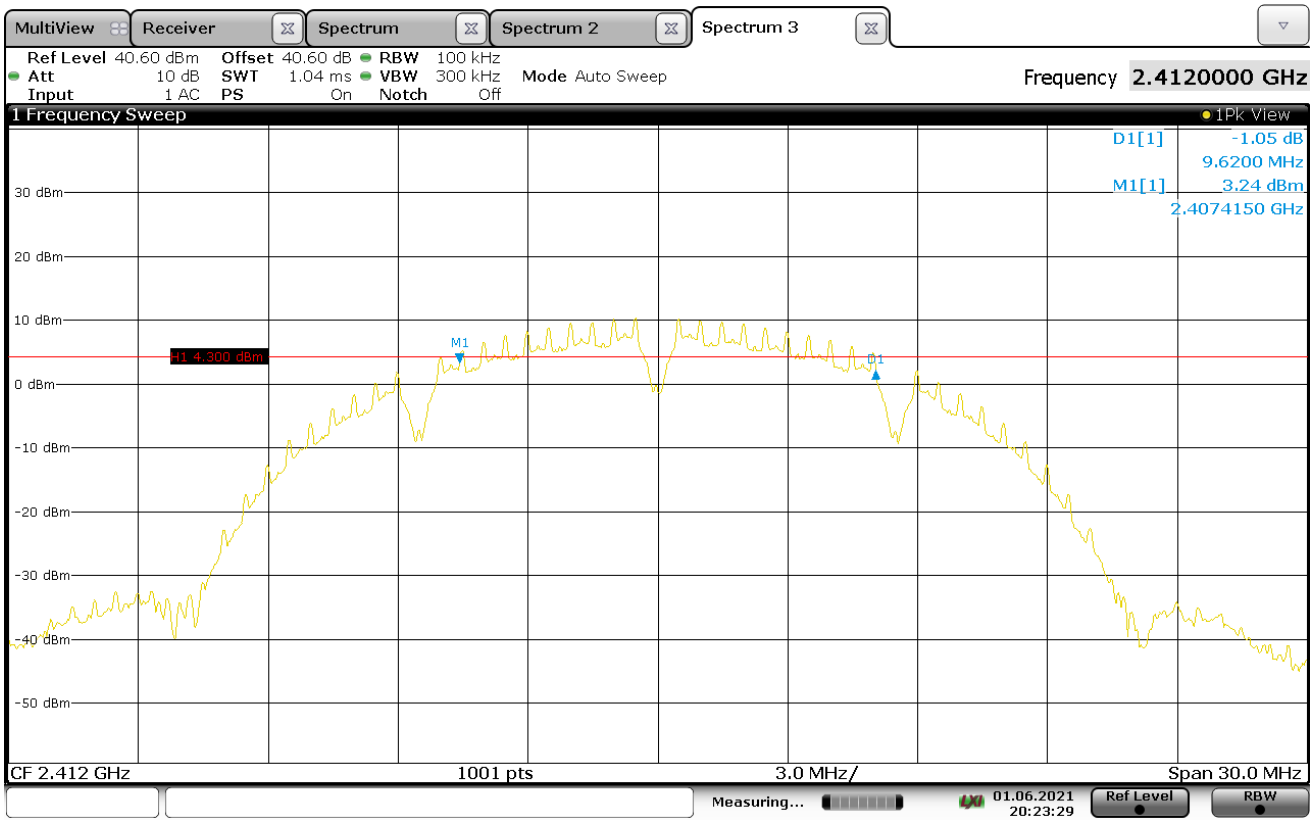
Requirements
Systems using digital modulation techniques shall have a minimum 6dB bandwidth of 500kHz.

Procedures
The antenna port of the EUT was connected to the spectrum analyzer through 40dB of attenuation. The EUT was allowed to transmit continuously. The transmit channel was set separately to low, middle, and high channels. The resolution bandwidth (RBW) was set to 100kHz, the video bandwidth (VBW) was set to the same as or 3 times greater than the RBW, and the span was set to 3 times the RBW. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer's display was plotted using a 'screen dump' utility.

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11b
Parameters	6dB BW
Notes	N/A

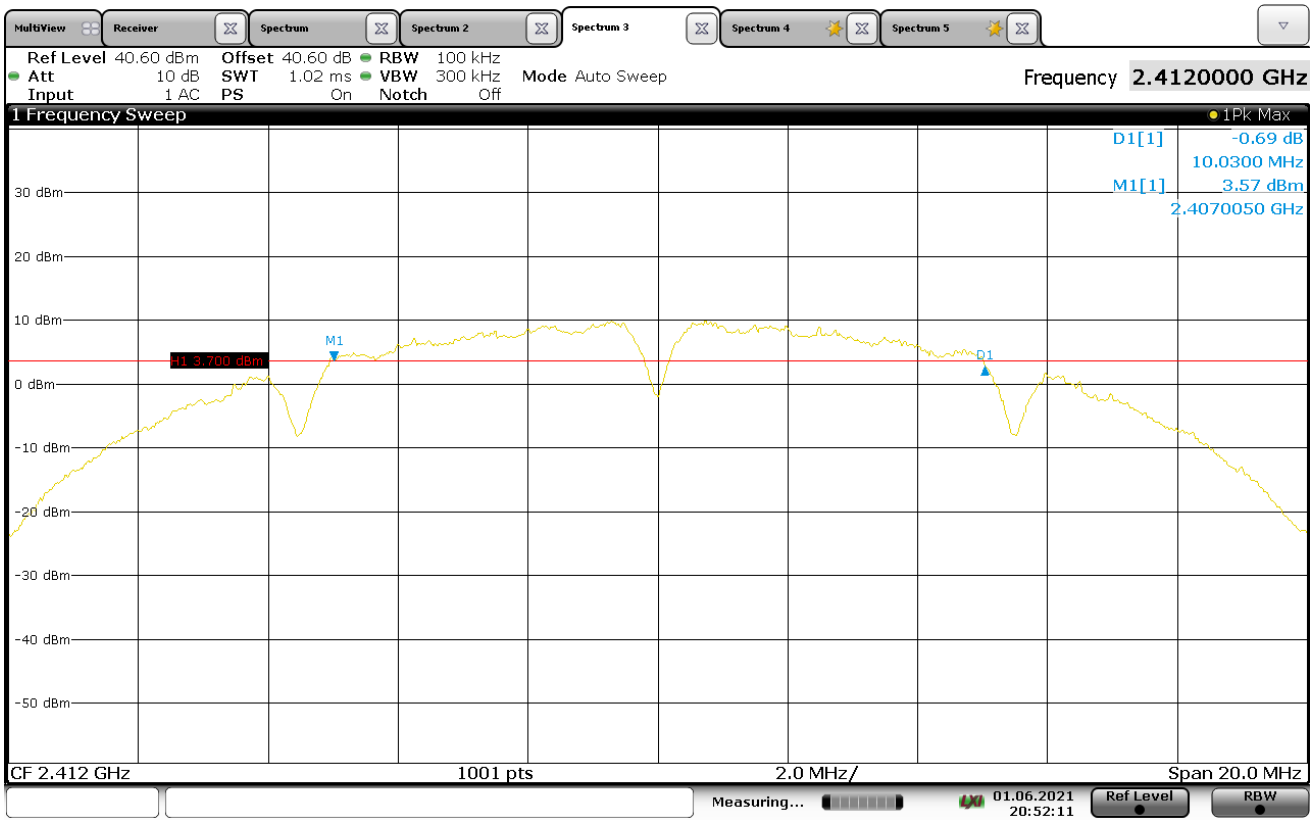
Protocol	Freq (MHz)	Data Rate (Mbps)	6dB BW (MHZ)
802.11b	2412	1	9.62
	2437		10.09
	2462		10.07
	2412	2	10.03
	2437		9.79
	2462		9.95
	2412	5.5	10.21
	2437		9.37
	2462		9.66
	2412	11	9.81
	2437		10.33
	2462		9.33

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11b – 1Mbps
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 9.62MHz



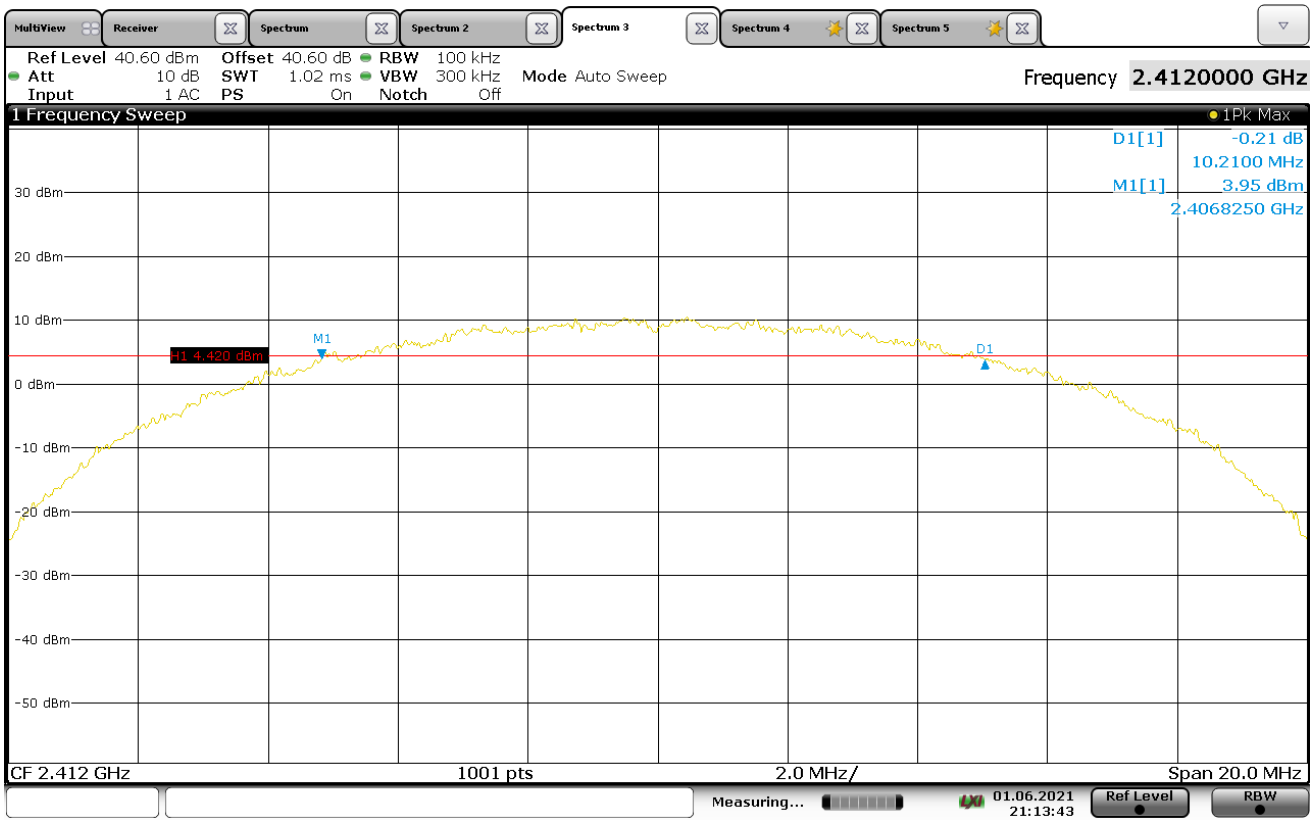
20:23:29 01.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11b – 2Mbps
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 10.03MHz



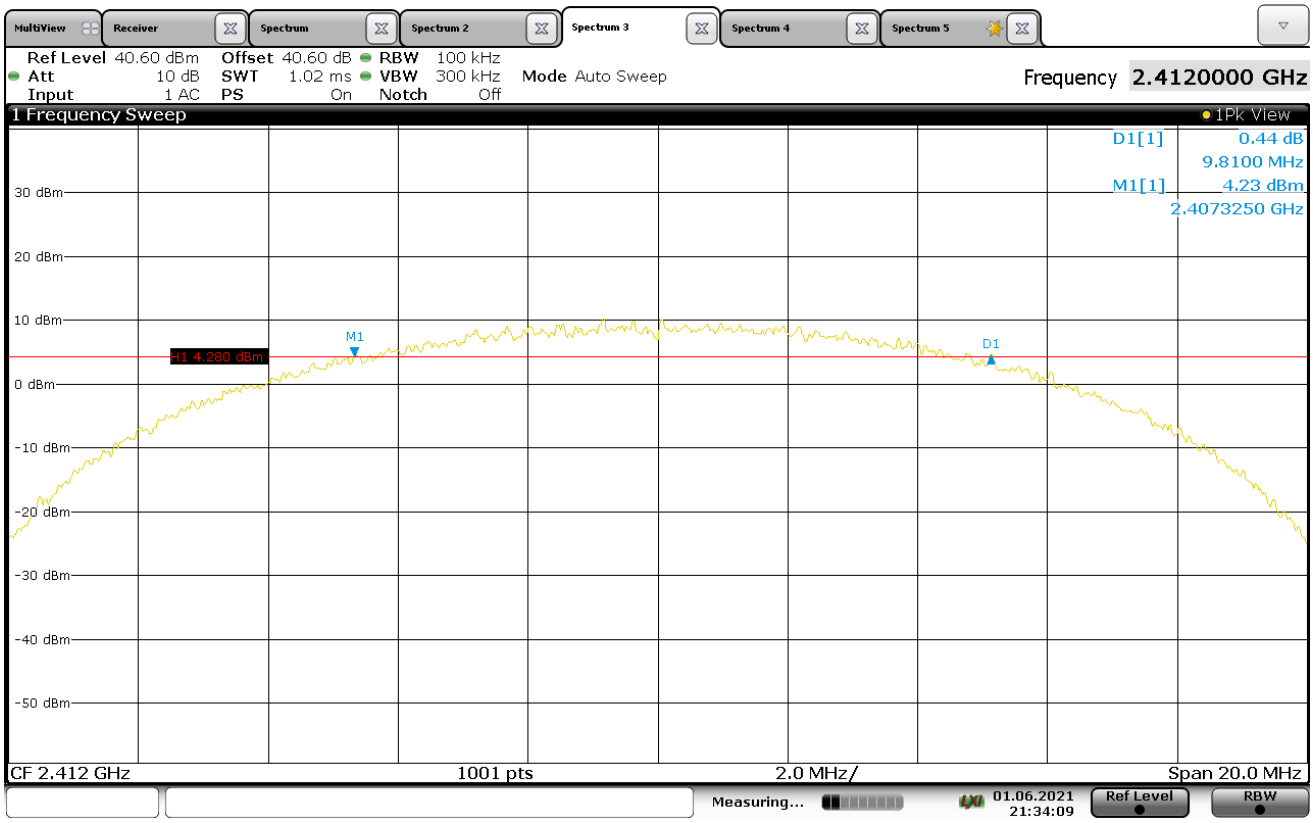
20:52:11 01.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11b – 5.5Mbps
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 10.21MHz



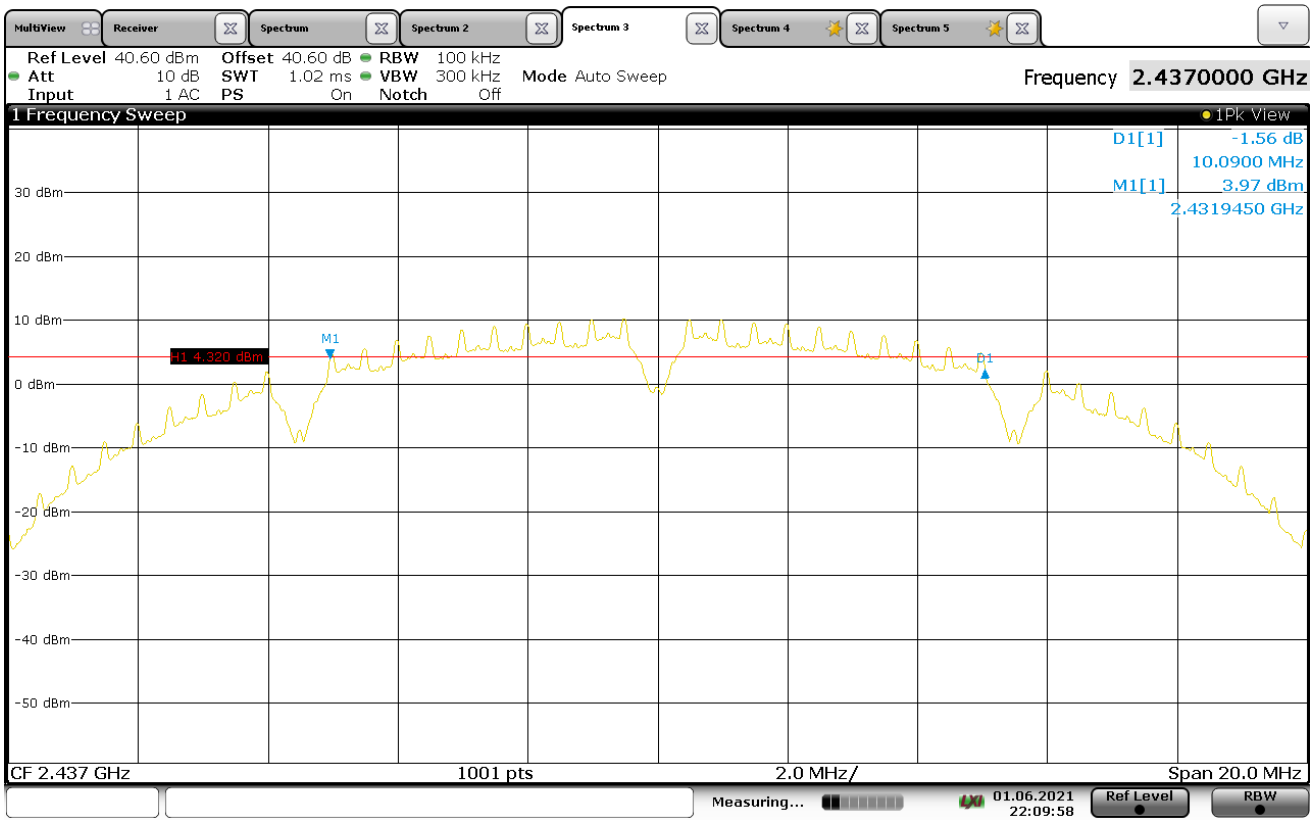
21:13:43 01.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11b – 11Mbps
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 9.81MHz



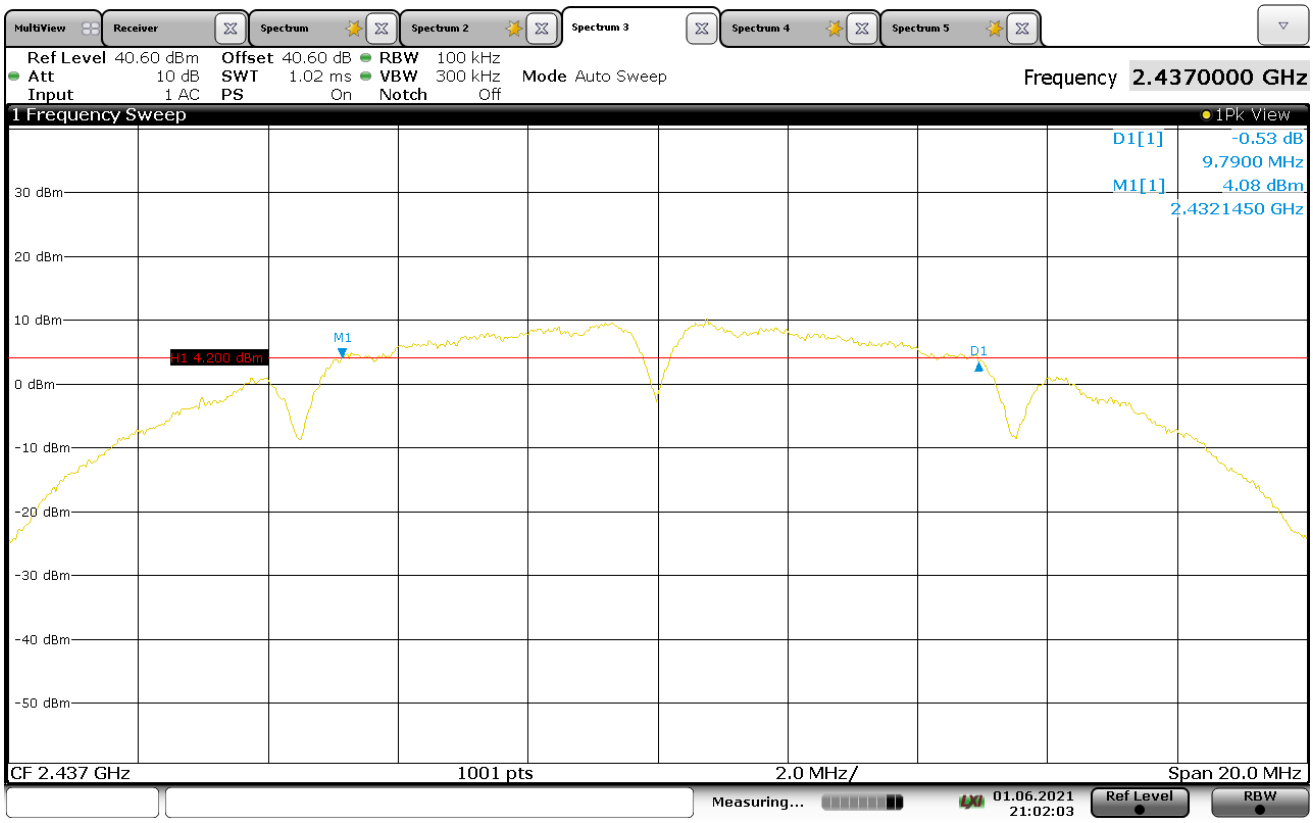
21:34:09 01.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11b – 1Mbps
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 10.09MHz



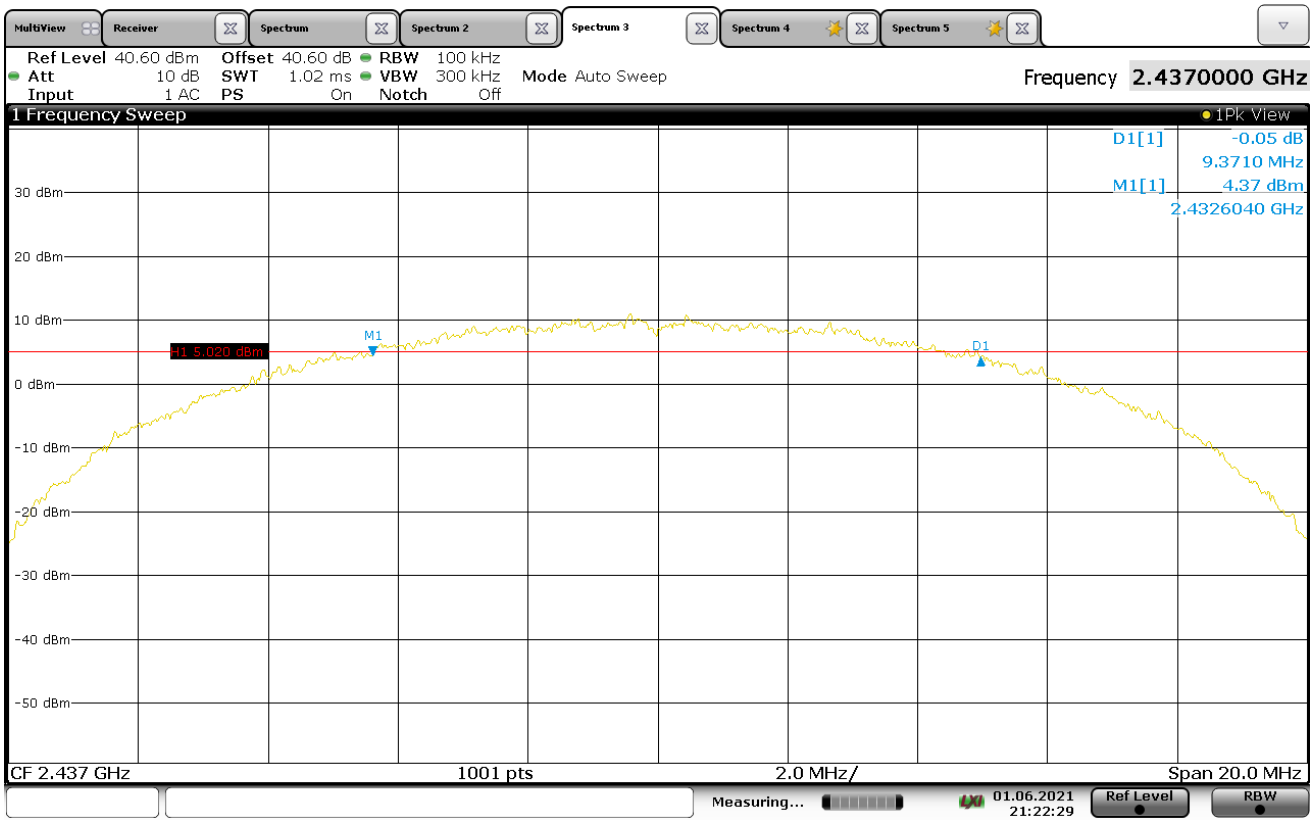
22:09:58 01.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11b – 2Mbps
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 9.79MHz



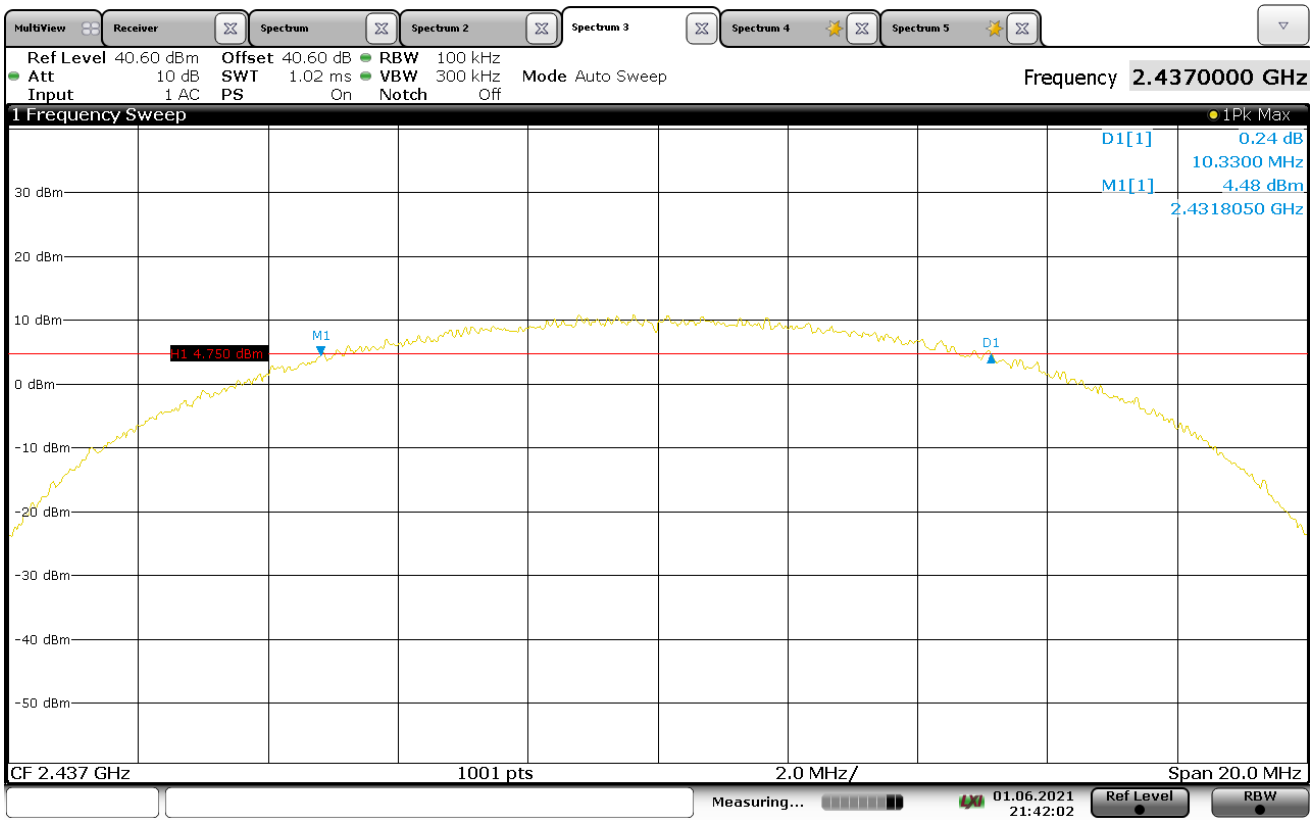
21:02:03 01.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11b – 5.5Mbps
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 9.37MHz



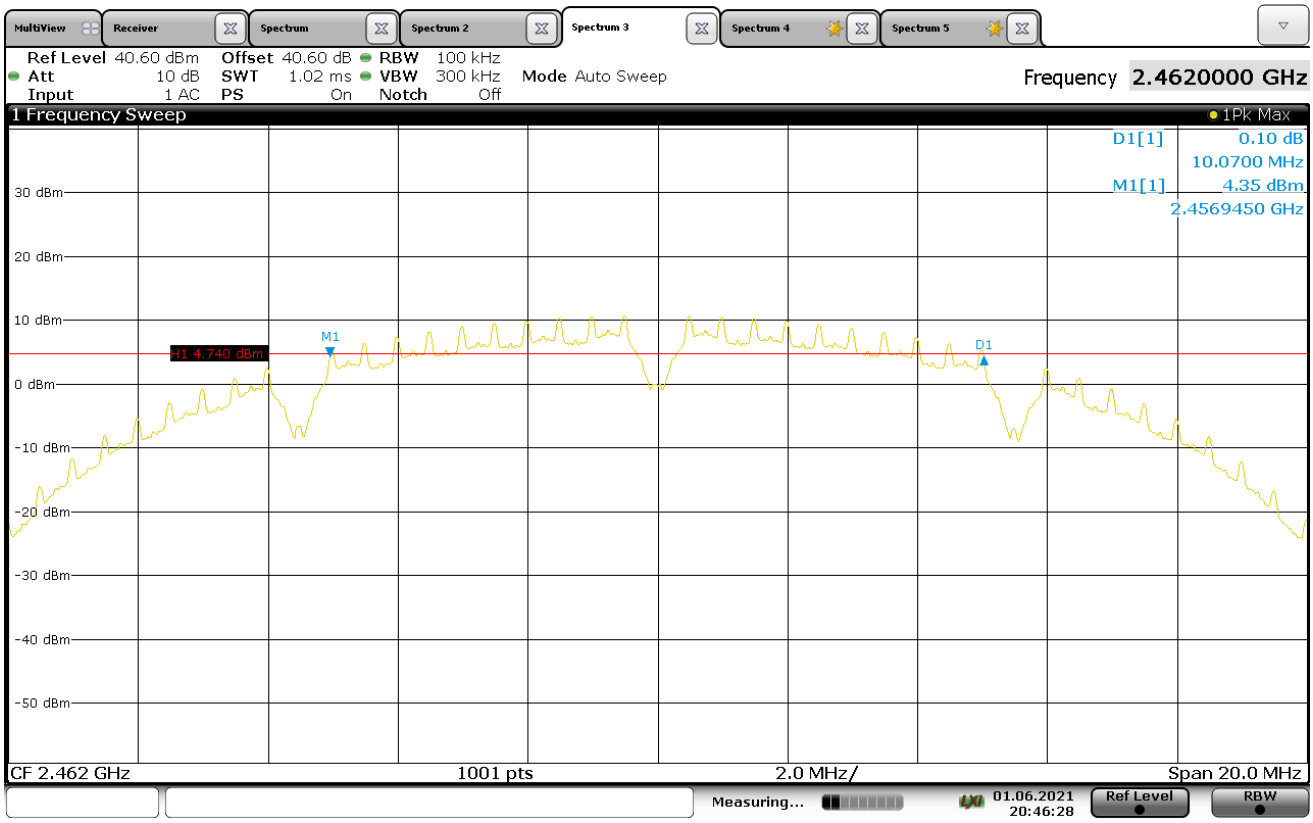
21:22:29 01.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11b – 11Mbps
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 10.33MHz



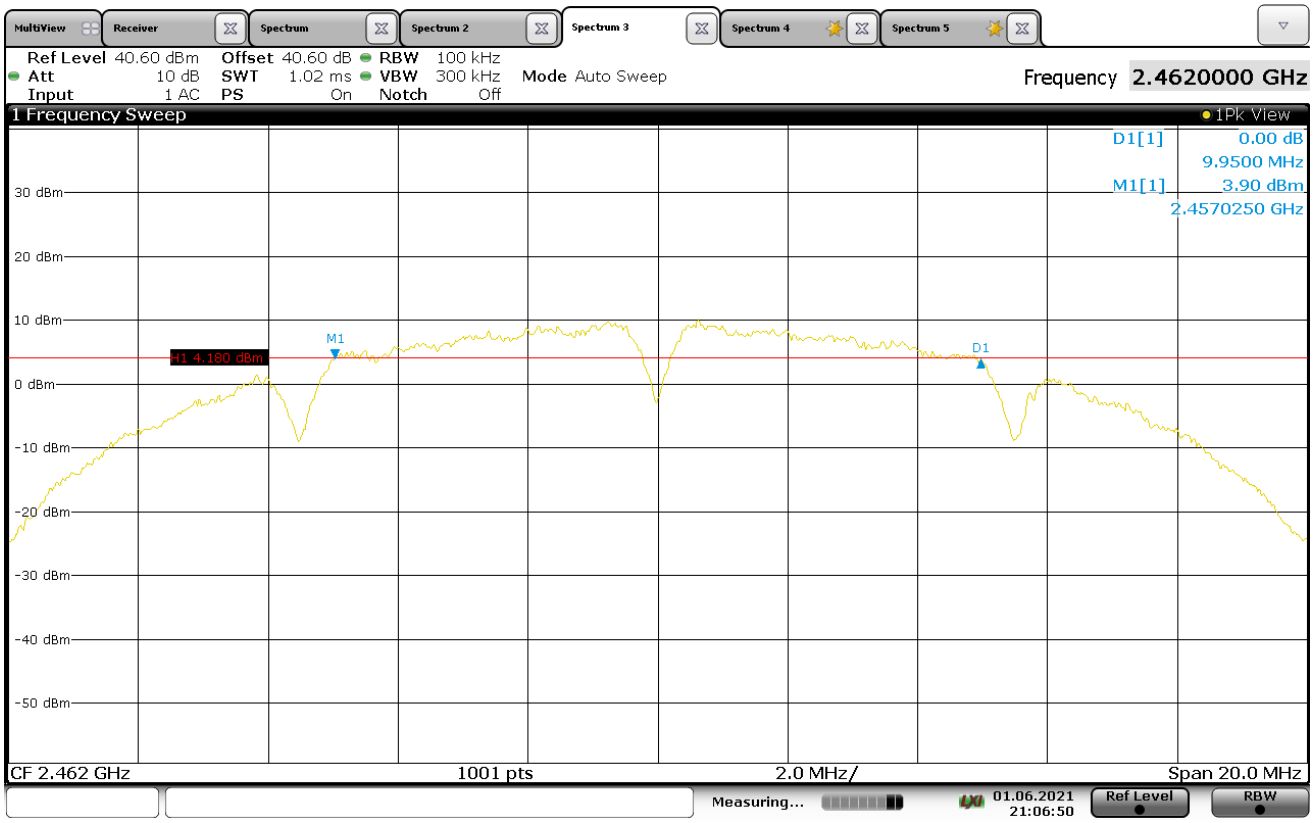
21:42:03 01.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11b – 1Mbps
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 10.07MHz



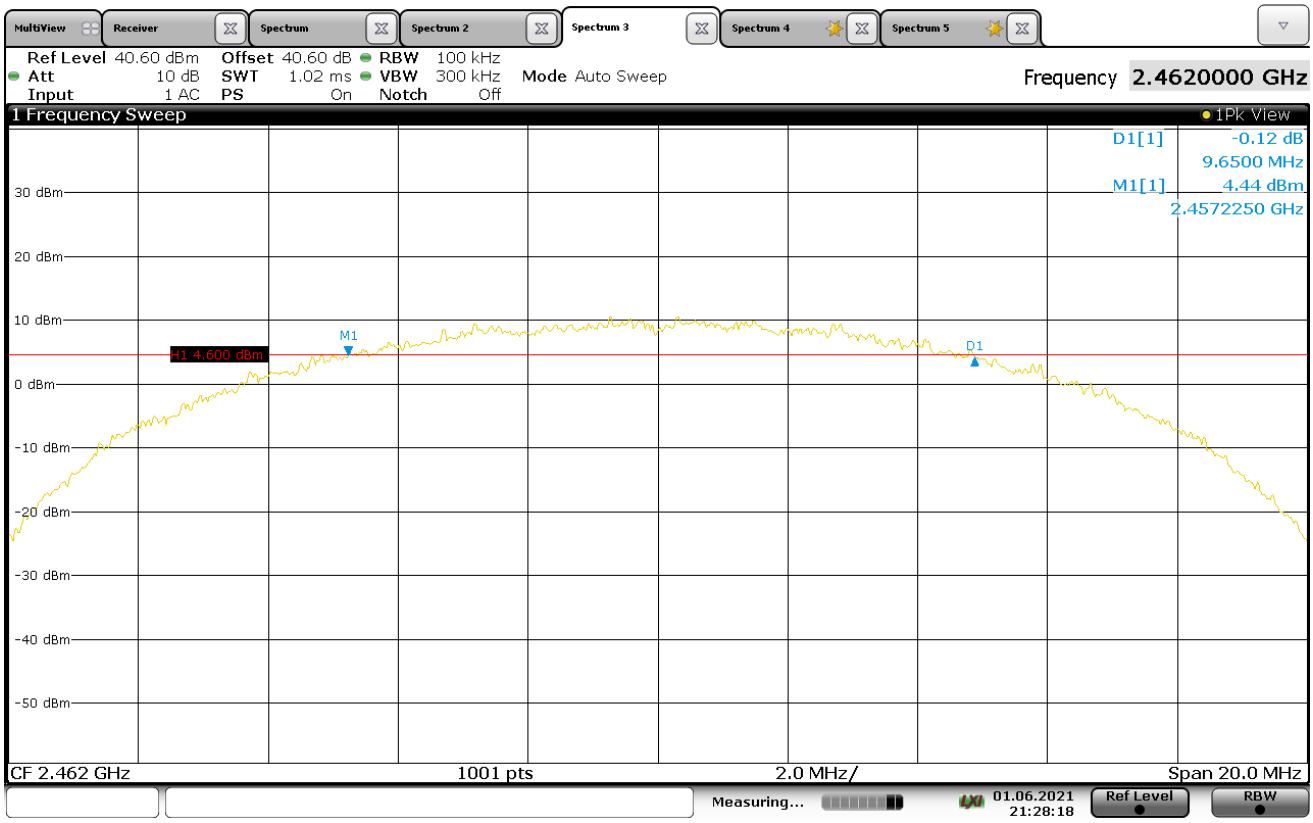
20:46:28 01.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11b – 2Mbps
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 9.95MHz



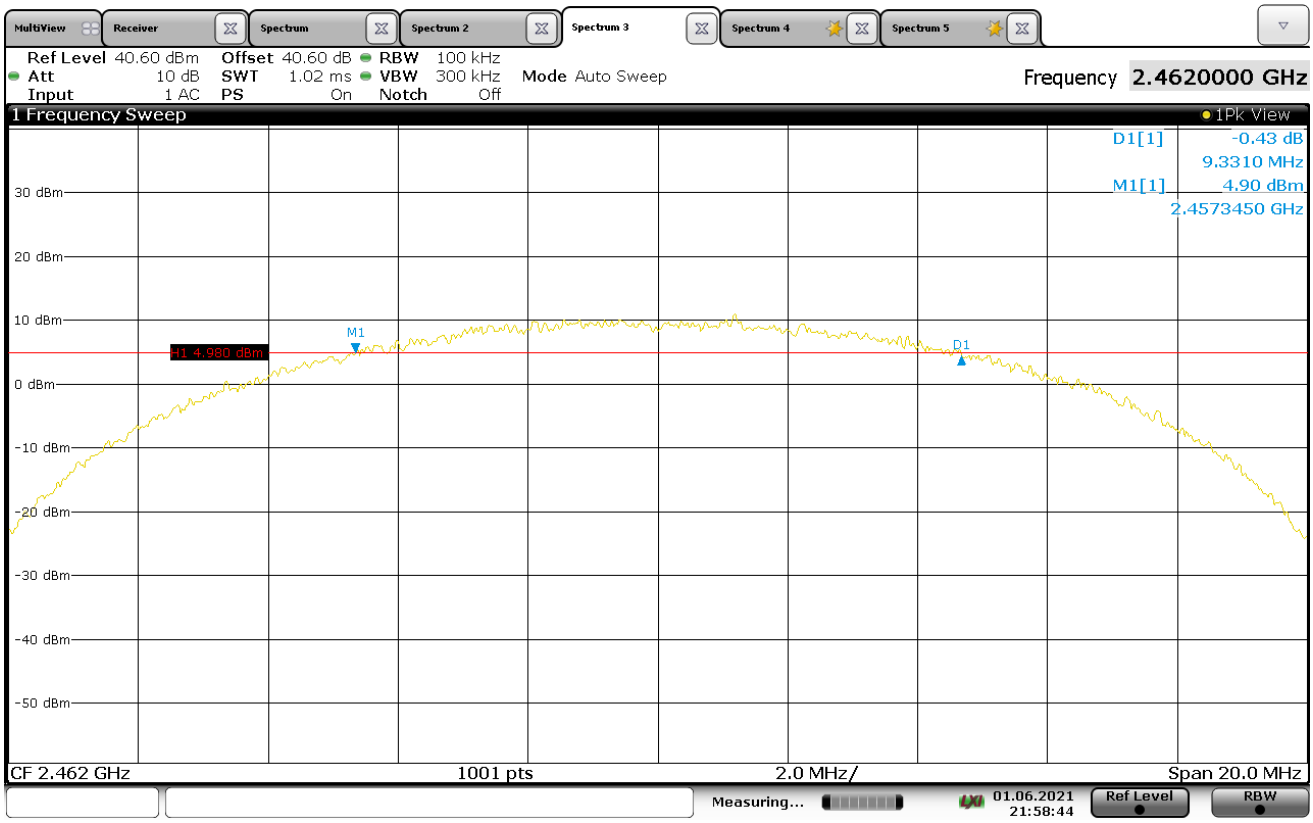
21:06:51 01.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11b – 5.5Mbps
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 9.65MHz



21:28:19 01.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11b – 11Mbps
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 9.33MHz

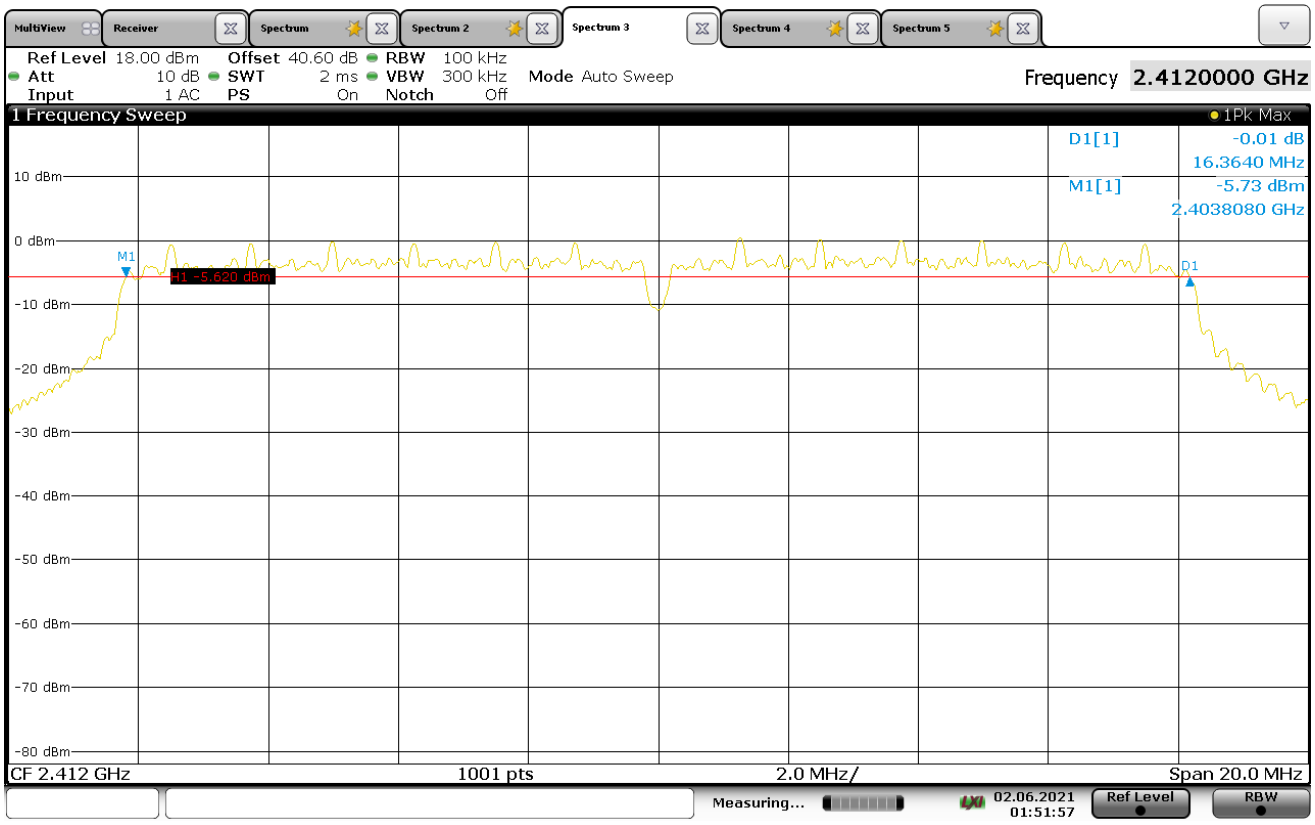


21:58:45 01.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g
Parameters	6dB BW
Notes	N/A

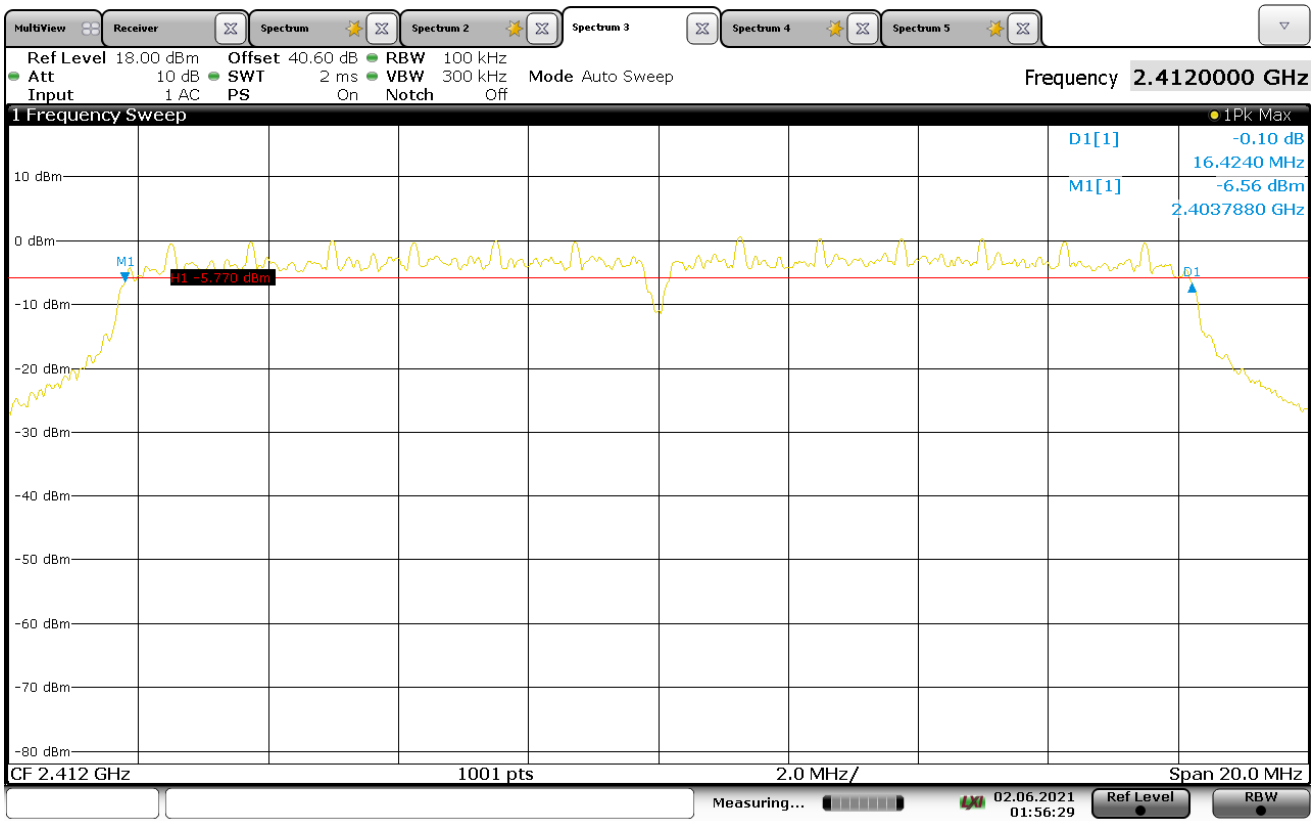
Protocol	Freq (MHz)	Data Rate (Mbps)	6dB BW (MHZ)
802.11g	2412	6	16.36
	2437		16.4
	2462		16.36
	2412	9	16.42
	2437		16.38
	2462		16.4
	2412	12	16.44
	2437		16.46
	2462		16.44
	2412	18	16.44
	2437		16.42
	2462		16.42
	2412	24	16.46
	2437		16.46
	2462		16.5
	2412	36	16.42
	2437		16.5
	2462		16.48
	2412	48	16.44
	2437		16.46
	2462		16.5
	2412	54	16.4
	2437		16.46
	2462		16.38

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 6Mbps
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 16.36MHz



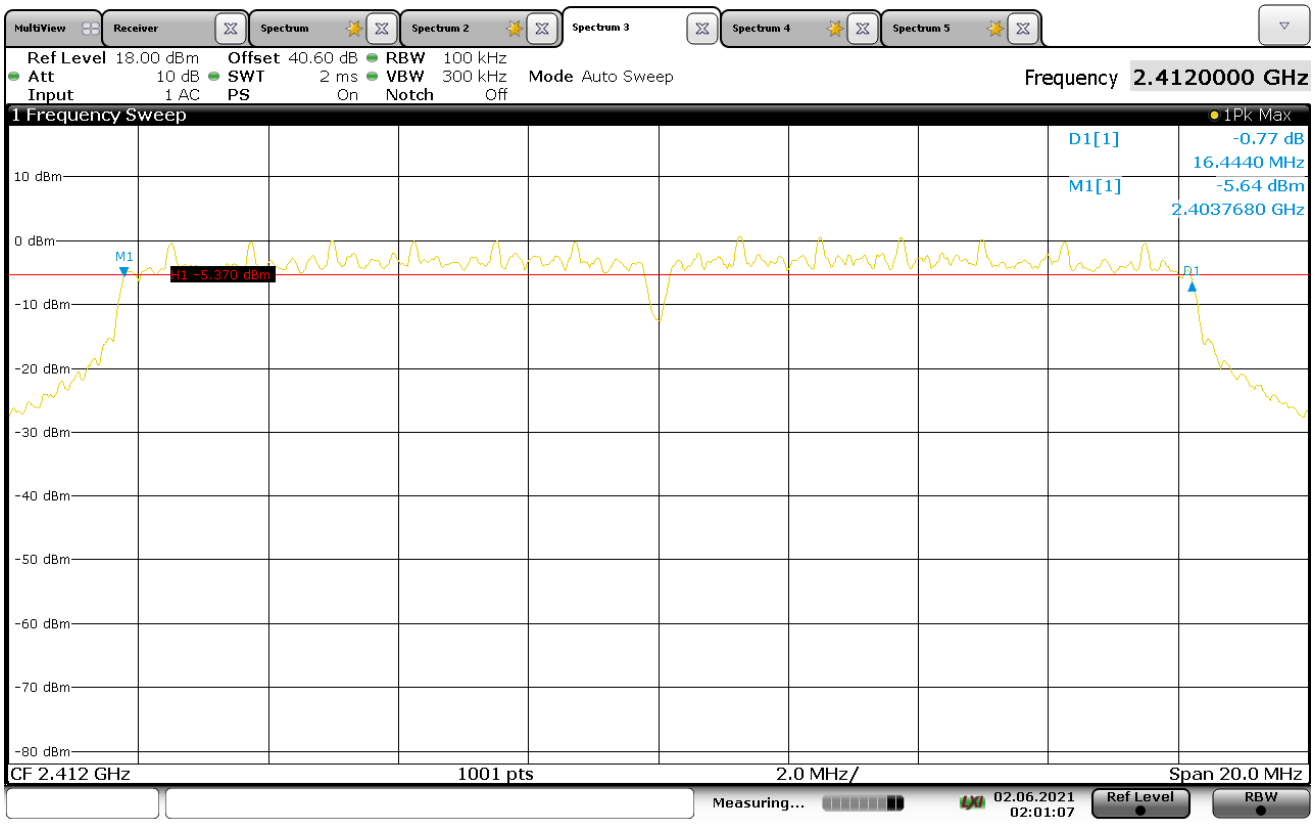
01:51:58 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 9Mbps
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 16.42MHz



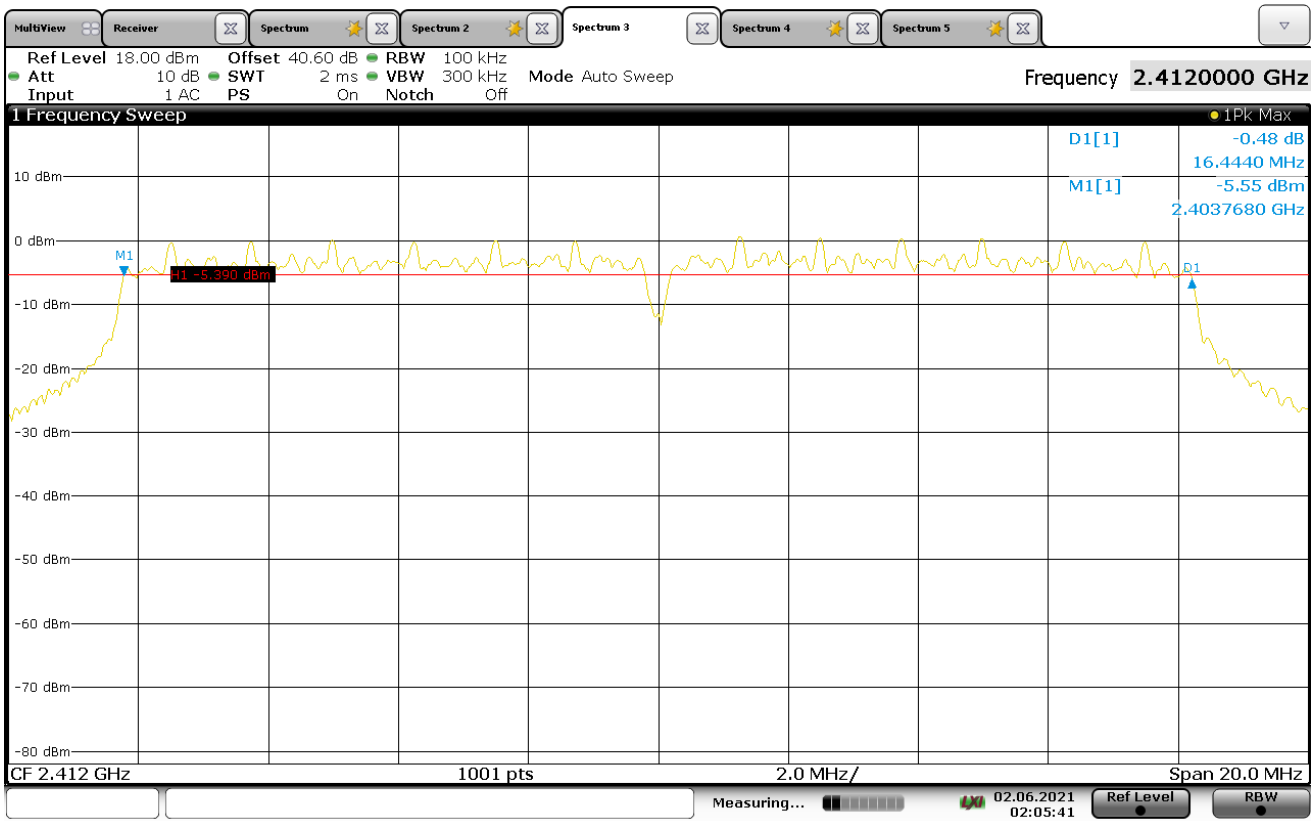
01:56:29 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 12Mbps
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 16.44MHz



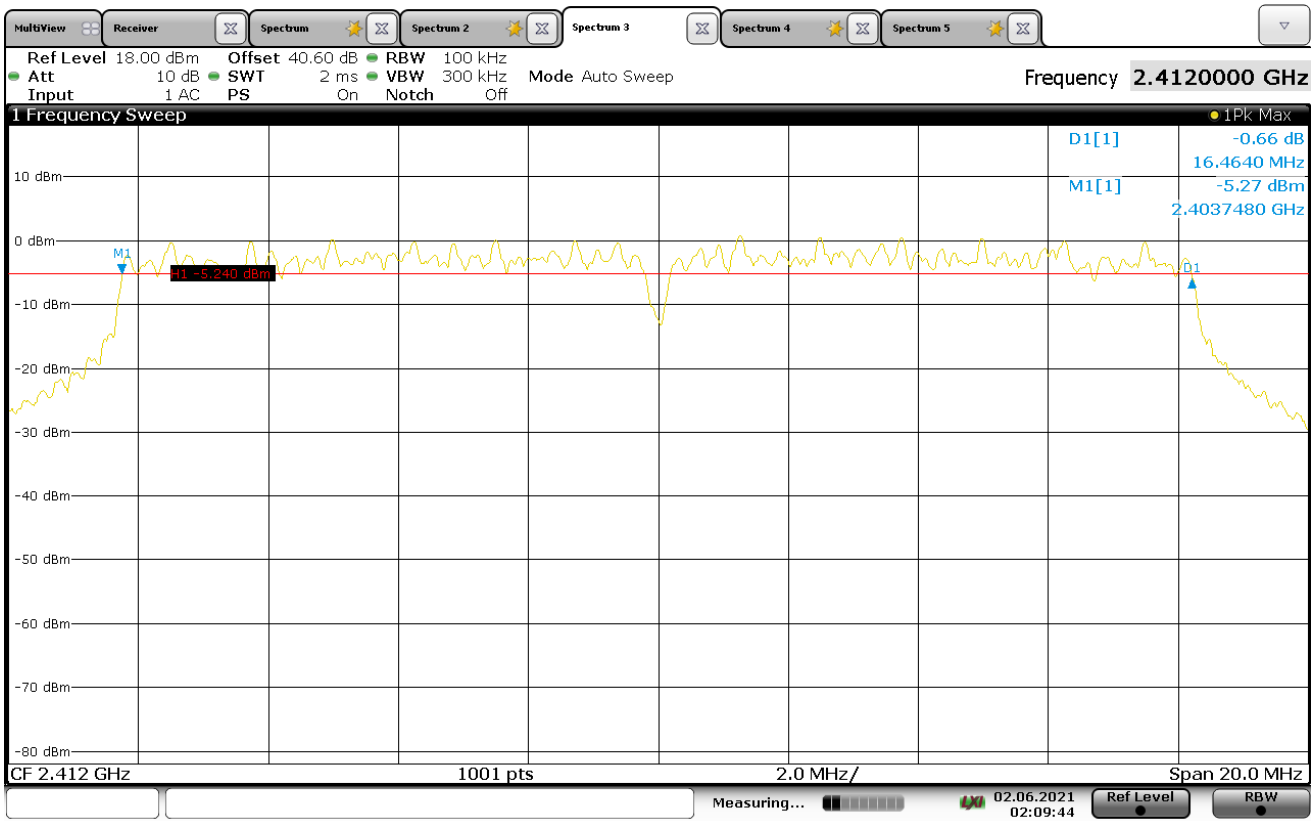
02:01:08 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 18Mbps
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 16.44MHz



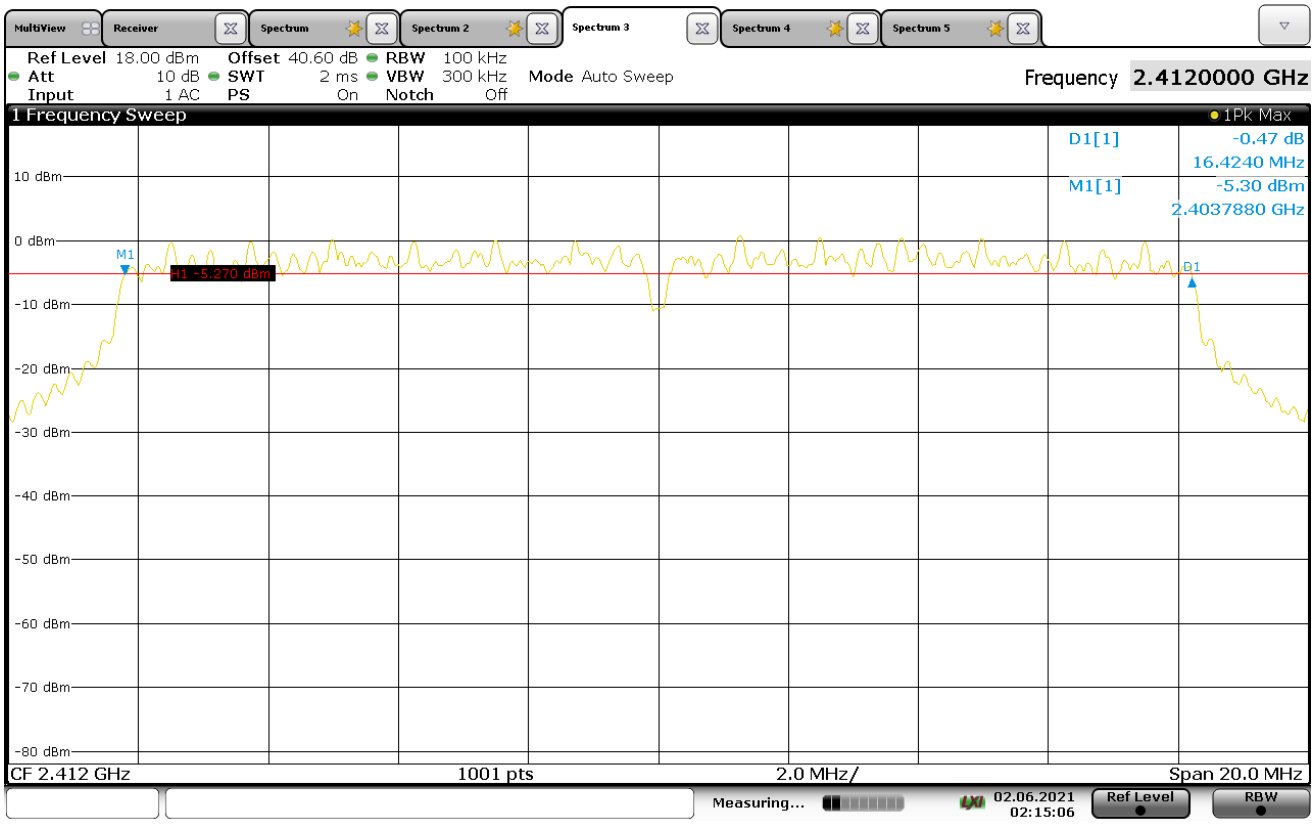
02:05:41 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 24Mbps
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 16.46MHz



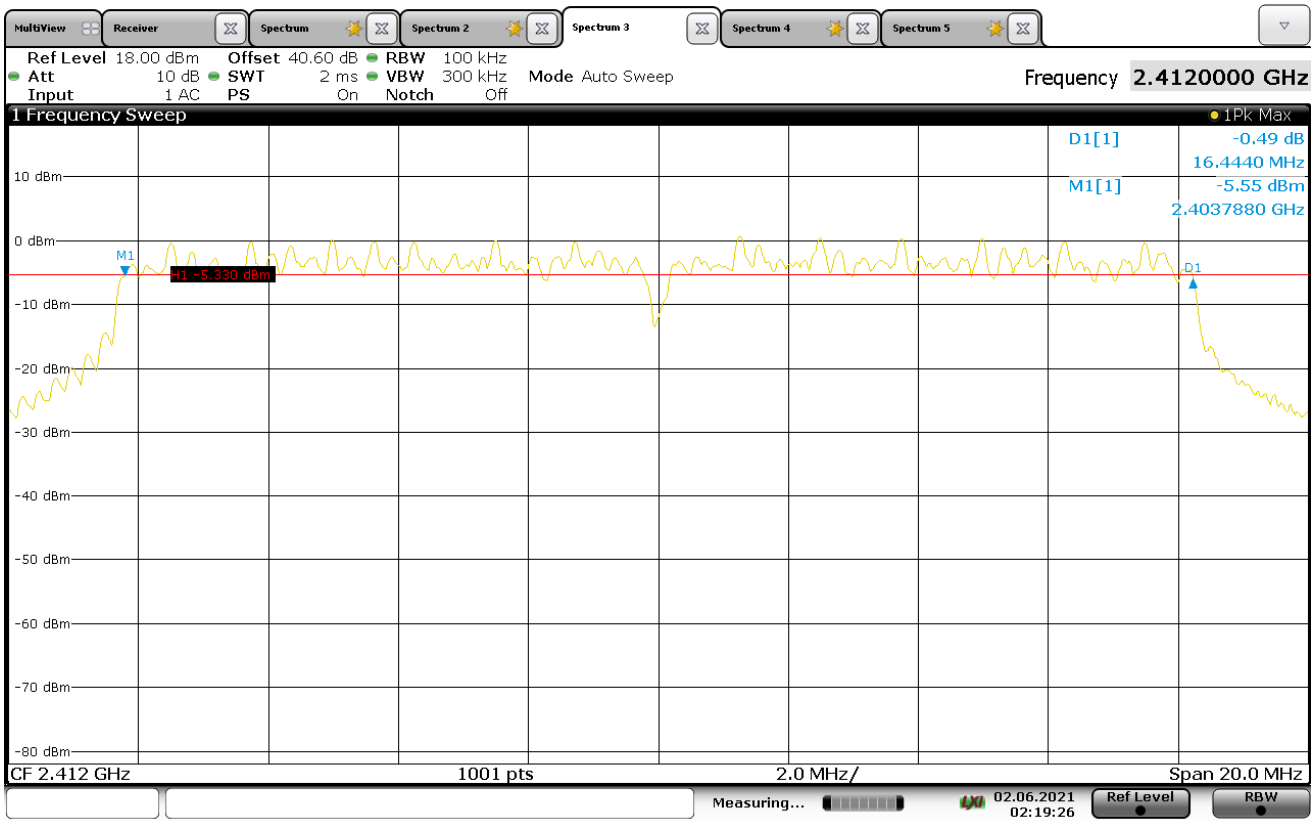
02:09:45 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 36Mbps
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 16.42MHz



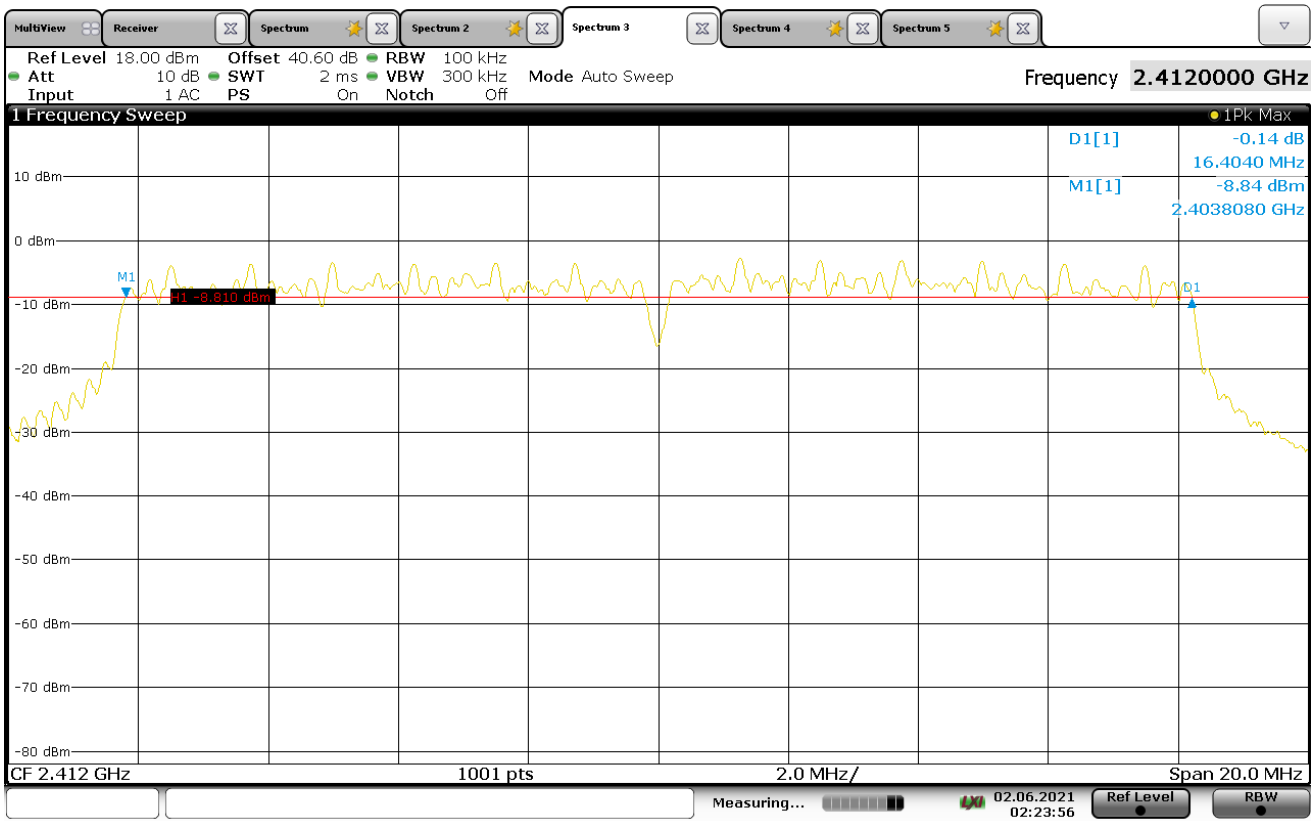
02:15:07 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 48Mbps
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 16.44MHz



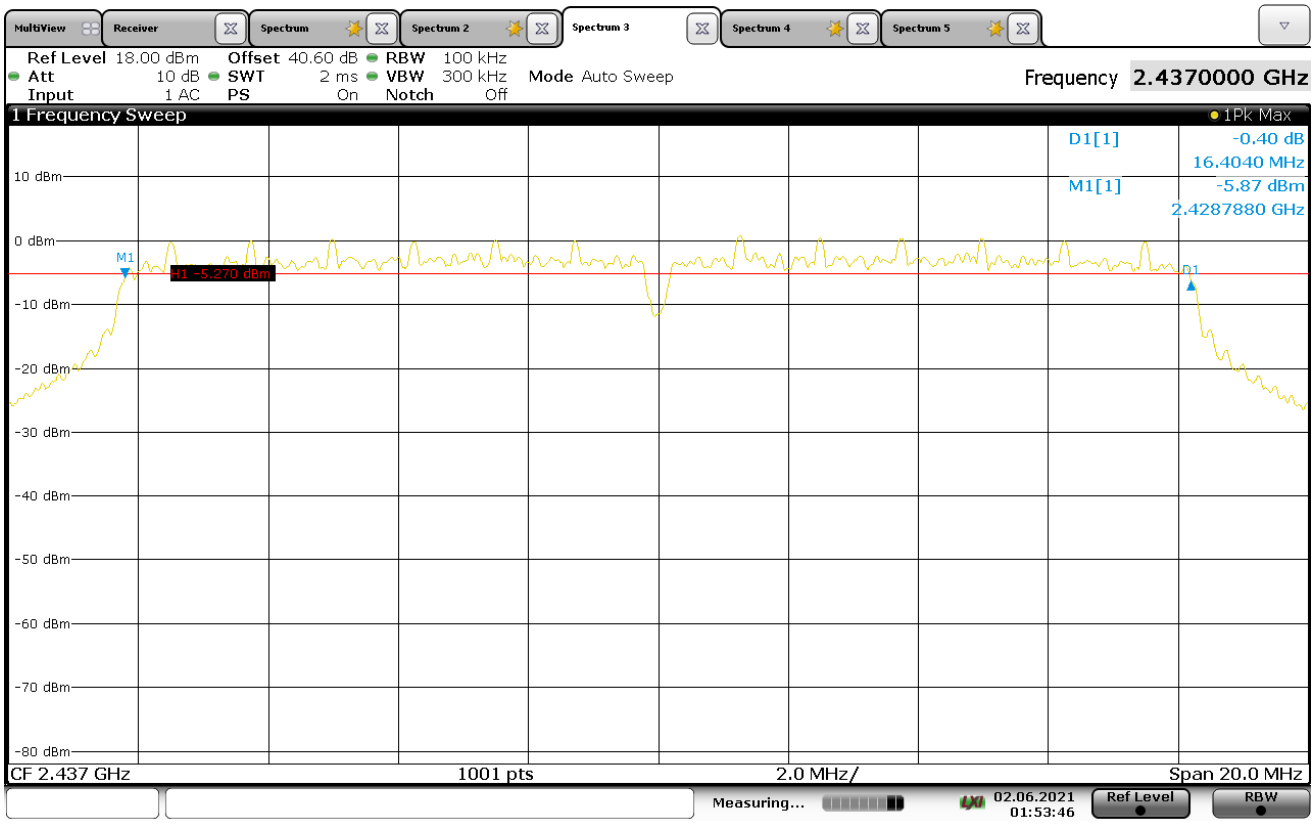
02:19:27 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 54Mbps
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 16.40MHz



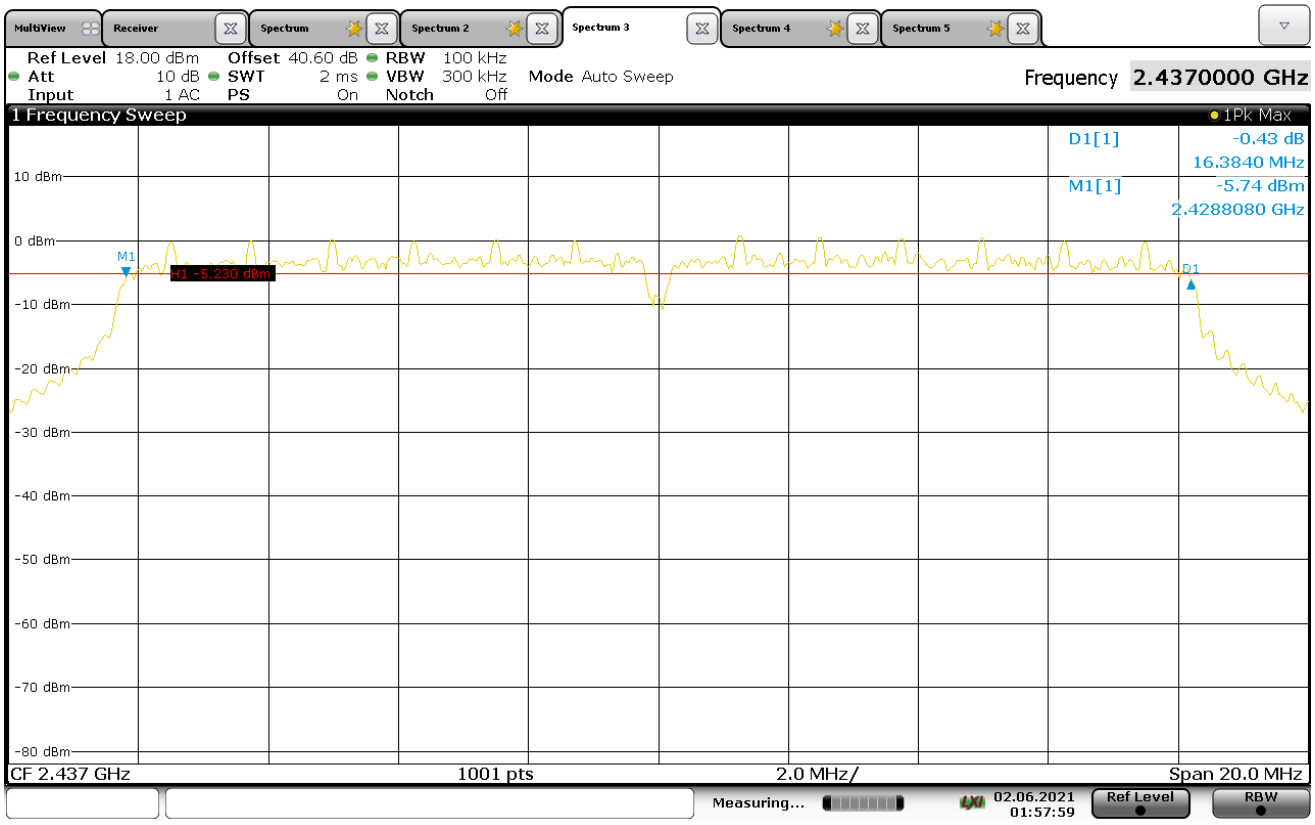
02:23:57 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 6Mbps
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 16.40MHz



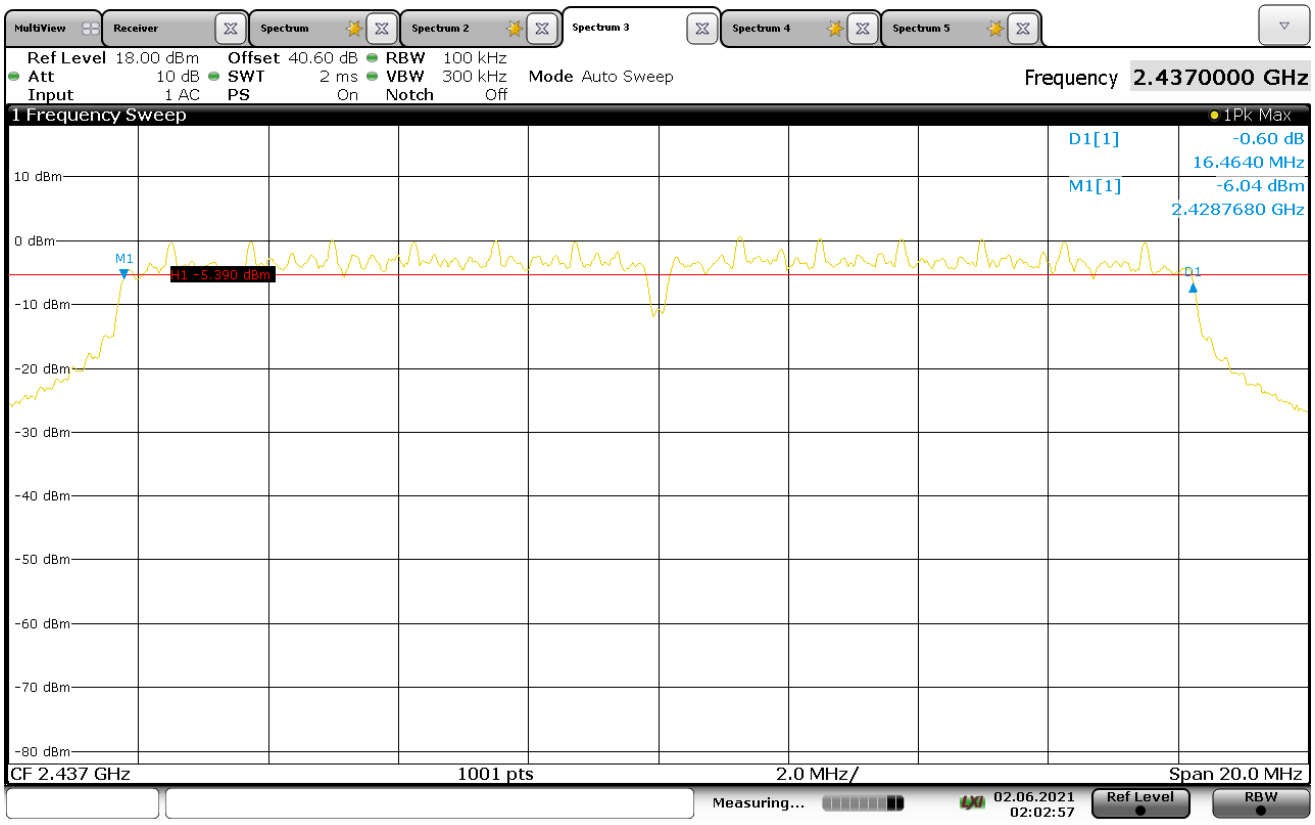
01:53:46 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 9Mbps
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 16.38MHz



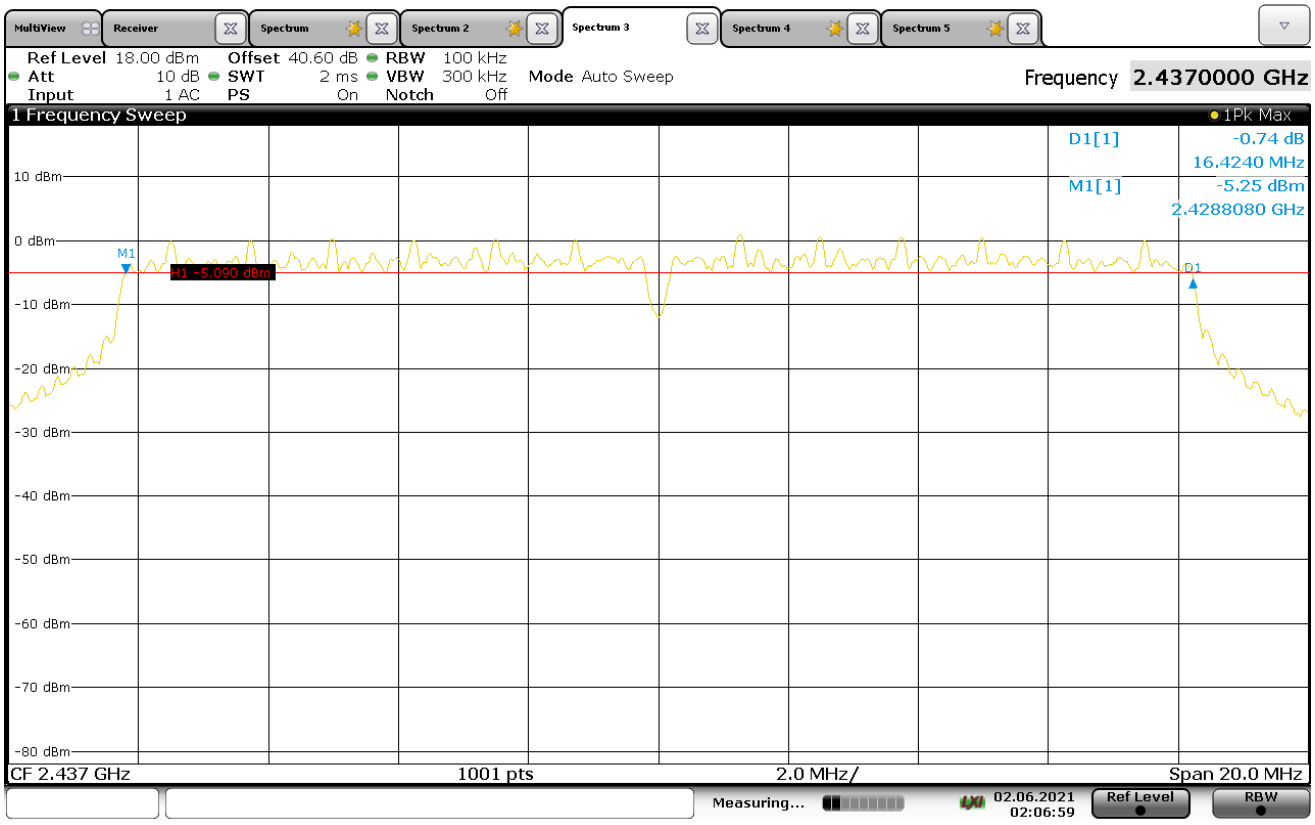
01:58:00 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 12Mbps
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 16.46MHz



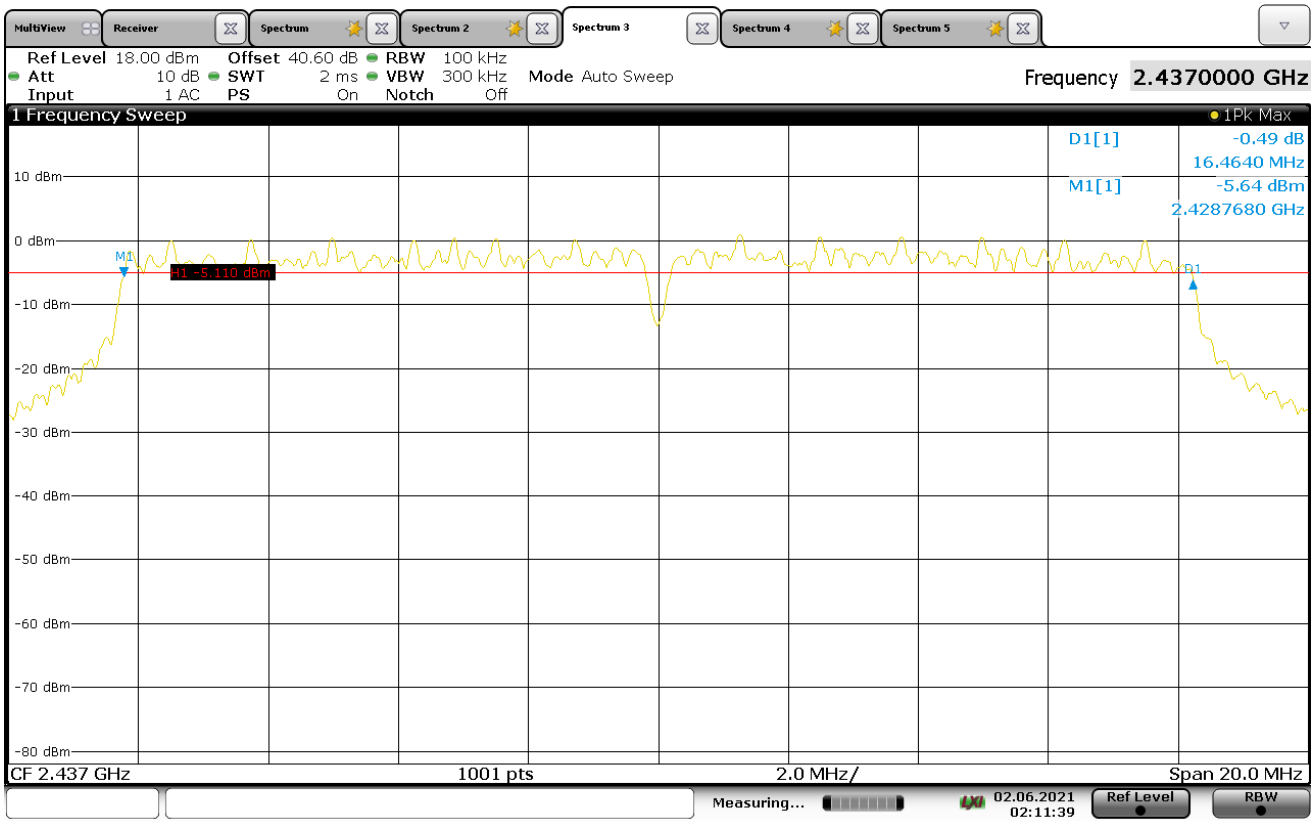
02:02:58 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 18Mbps
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 16.42MHz



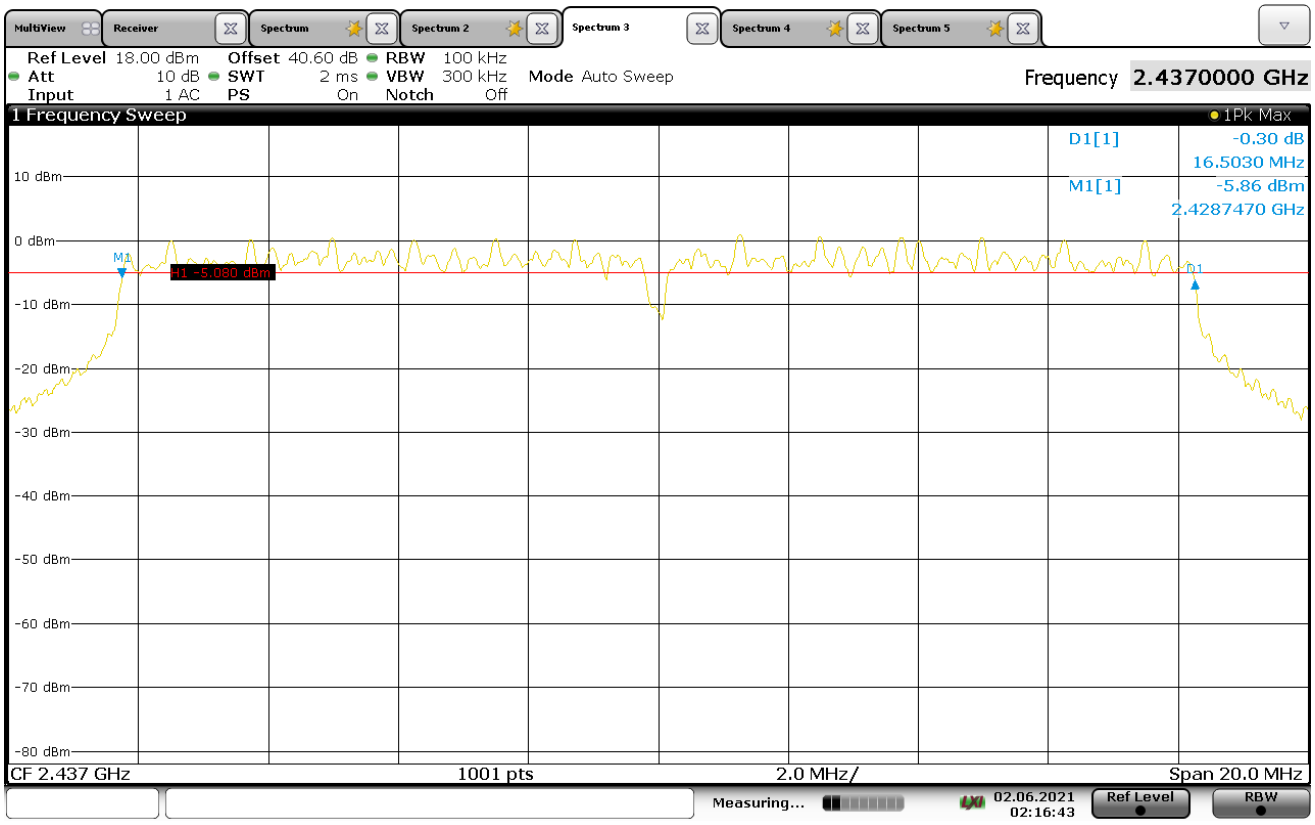
02:06:59 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 24Mbps
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 16.46MHz



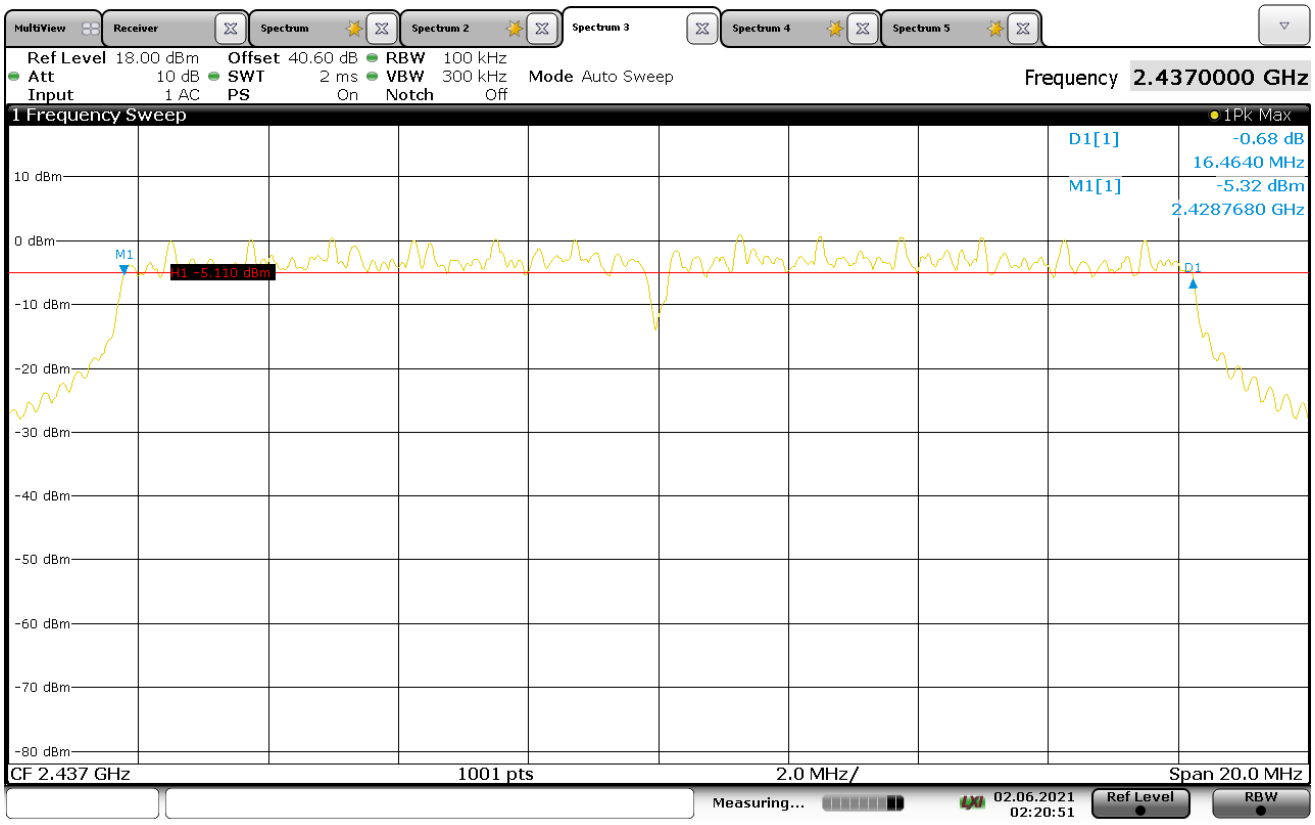
02:11:39 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 36Mbps
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 16.50MHz



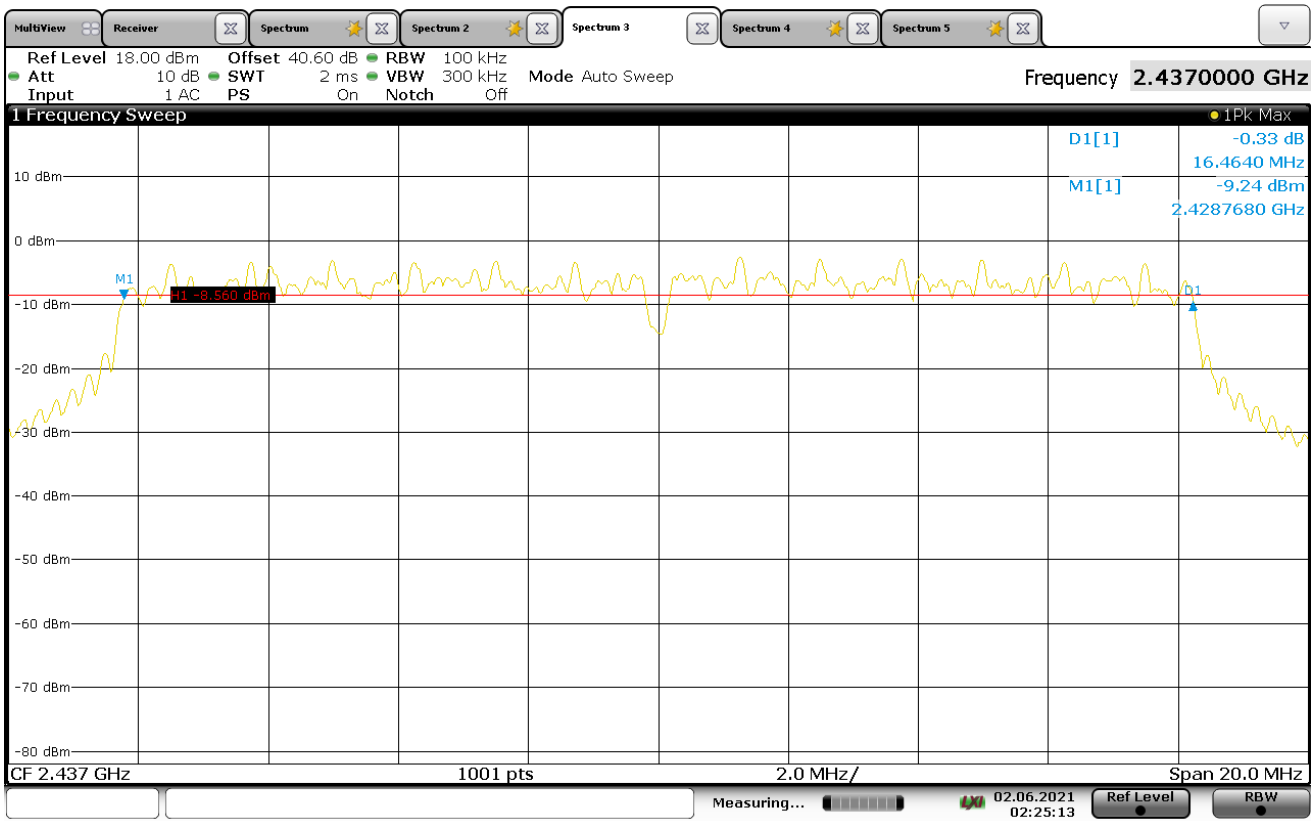
02:16:44 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 48Mbps
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 16.46MHz



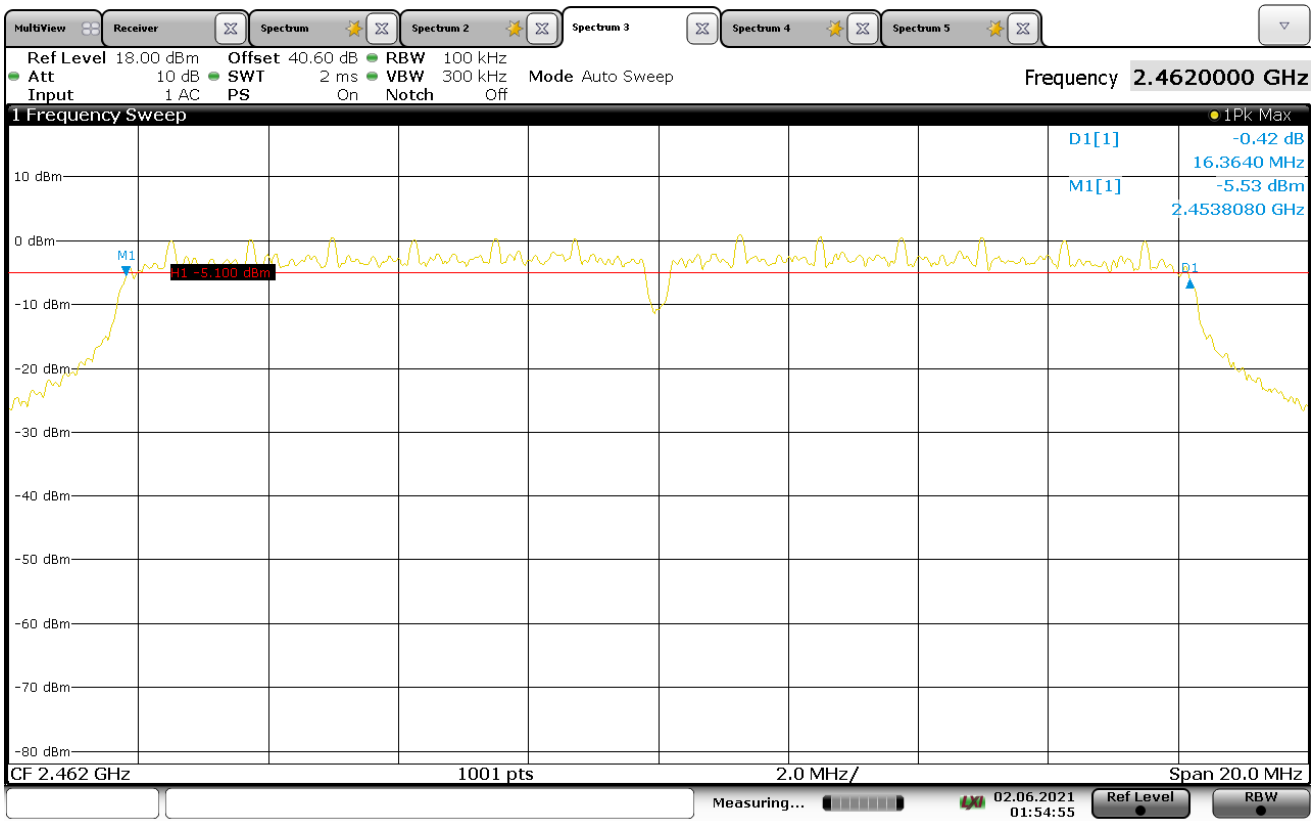
02:20:52 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 54Mbps
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 16.46MHz



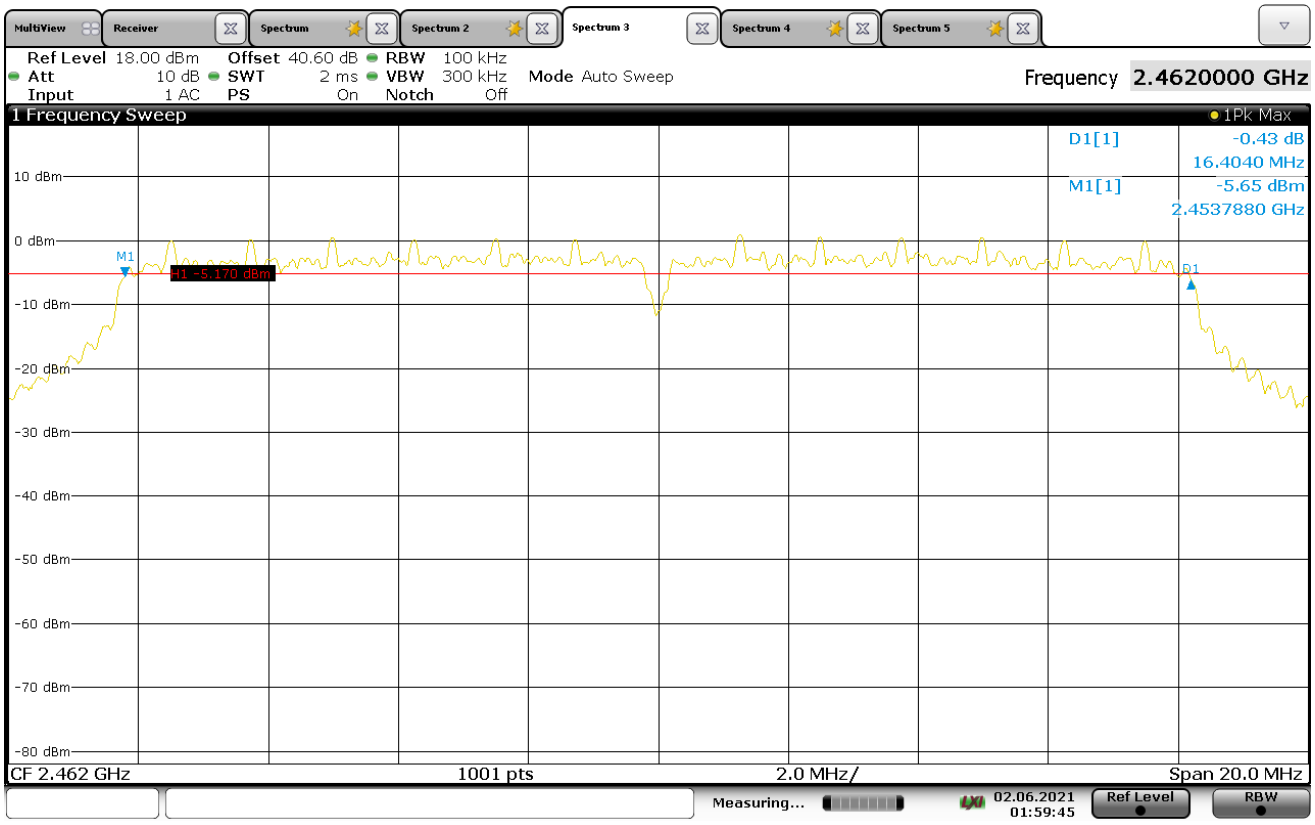
02:25:14 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 6Mbps
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 16.36MHz



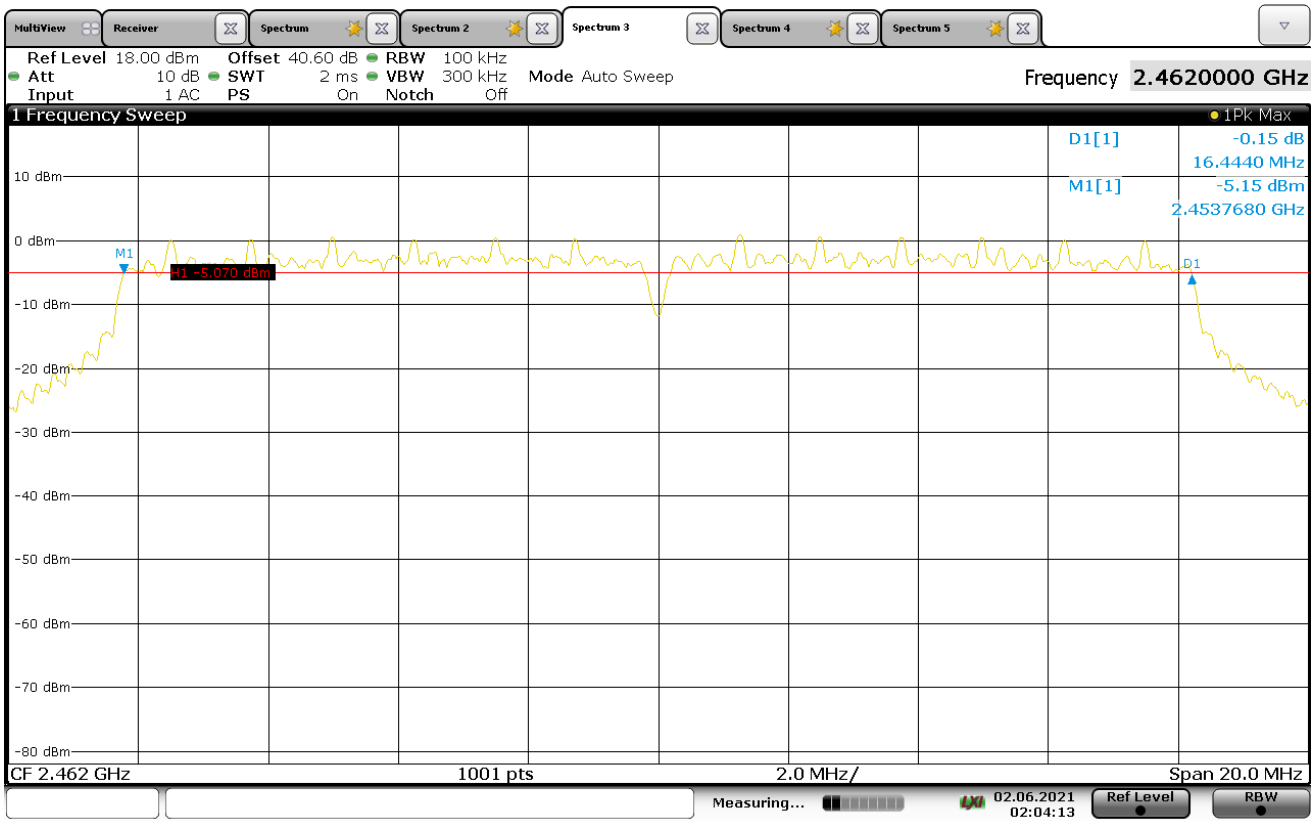
01:54:55 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 9Mbps
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 16.46MHz



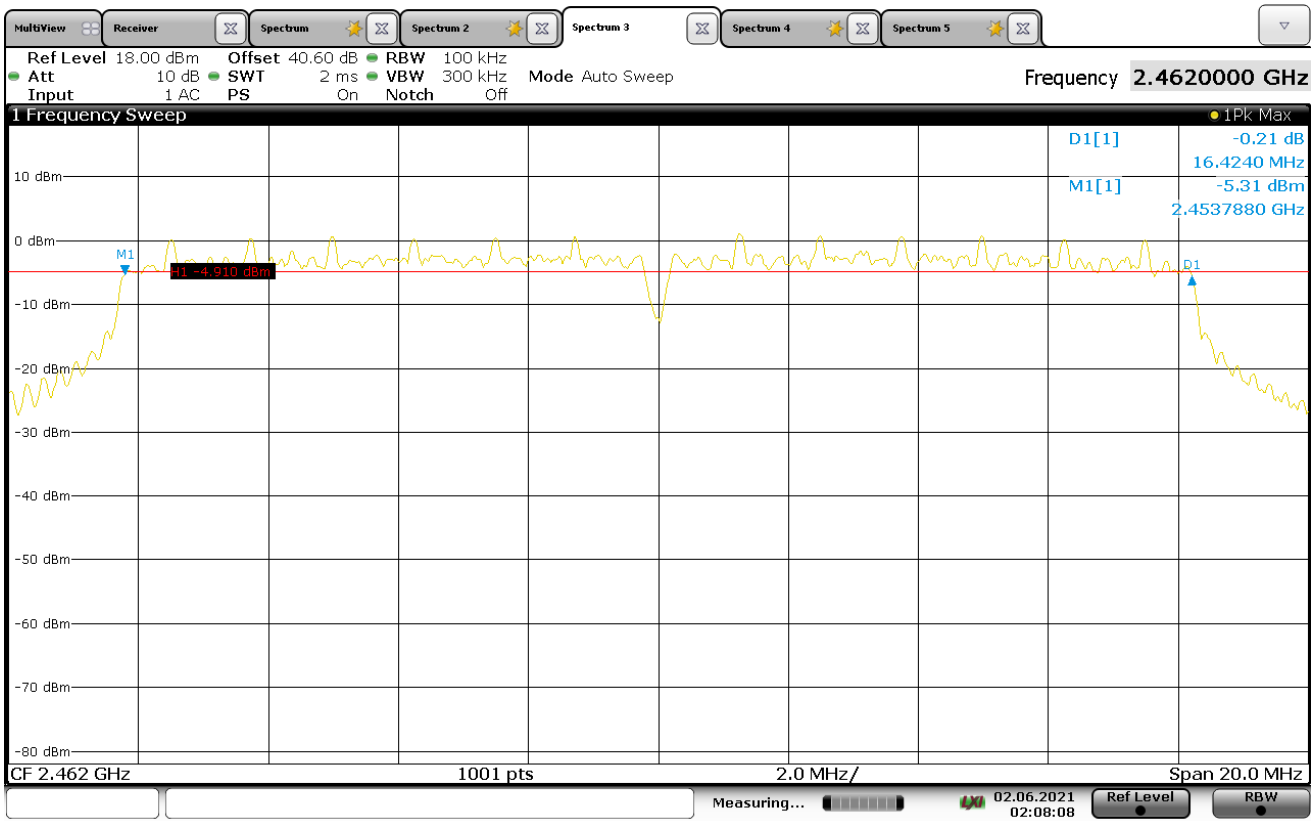
01:59:46 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 12Mbps
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 16.44MHz



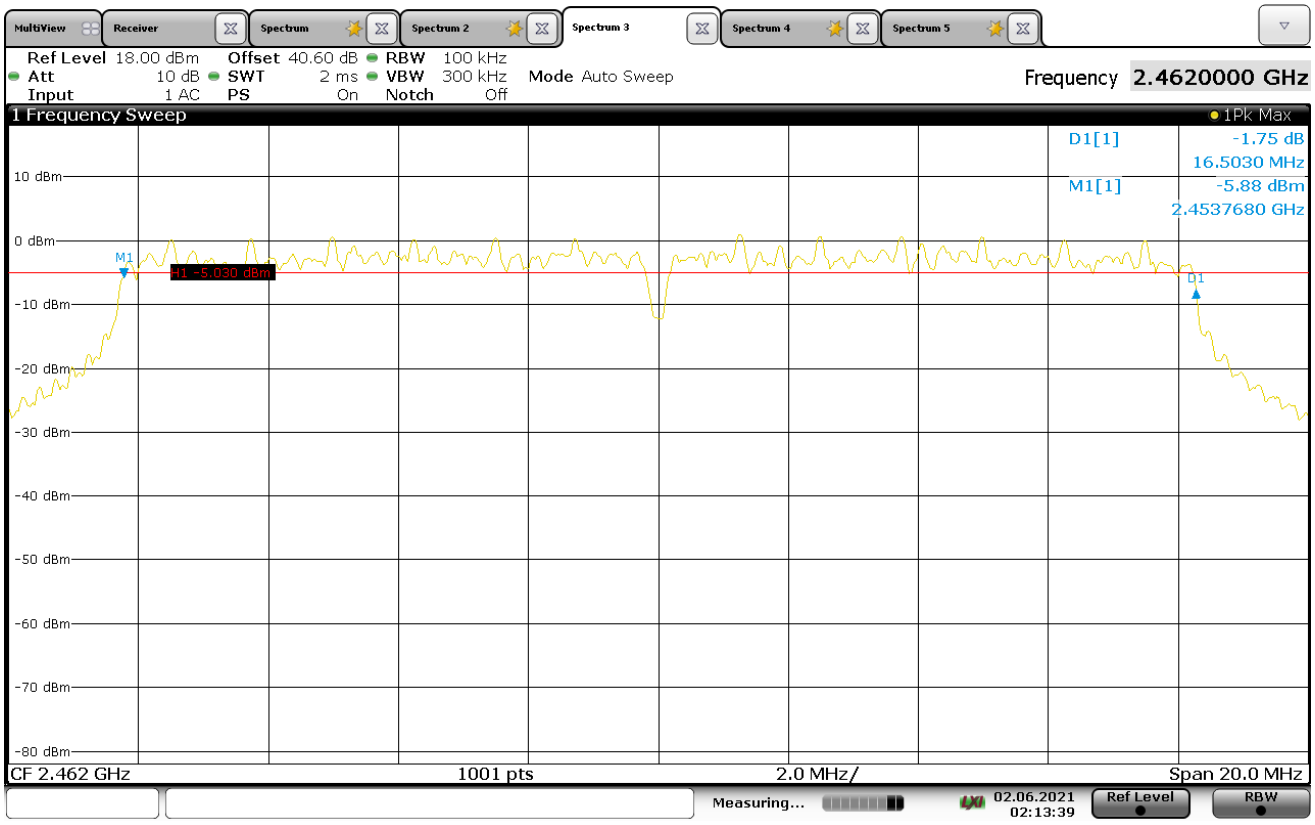
02:04:14 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 18Mbps
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 16.42MHz



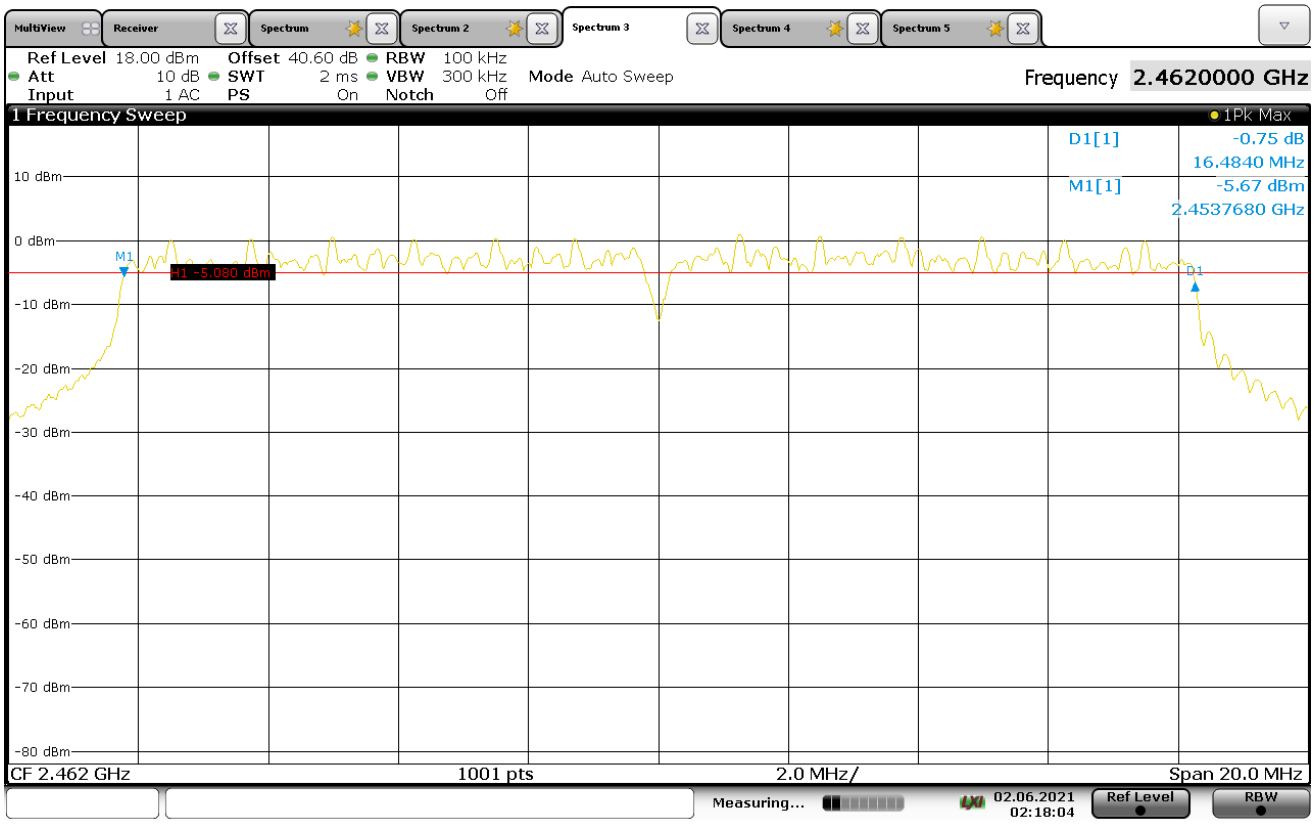
02:08:08 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 24Mbps
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 16.50MHz



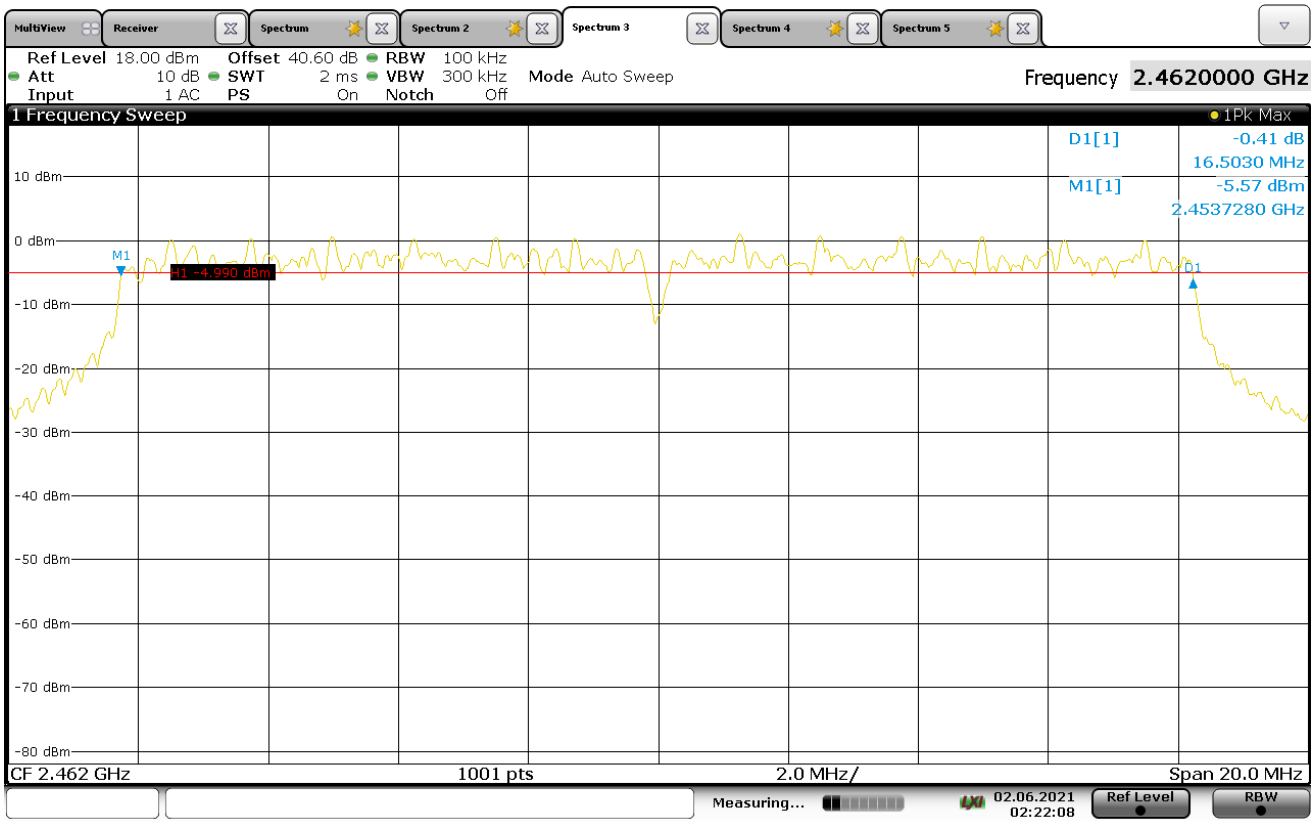
02:13:40 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 36Mbps
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 16.48MHz



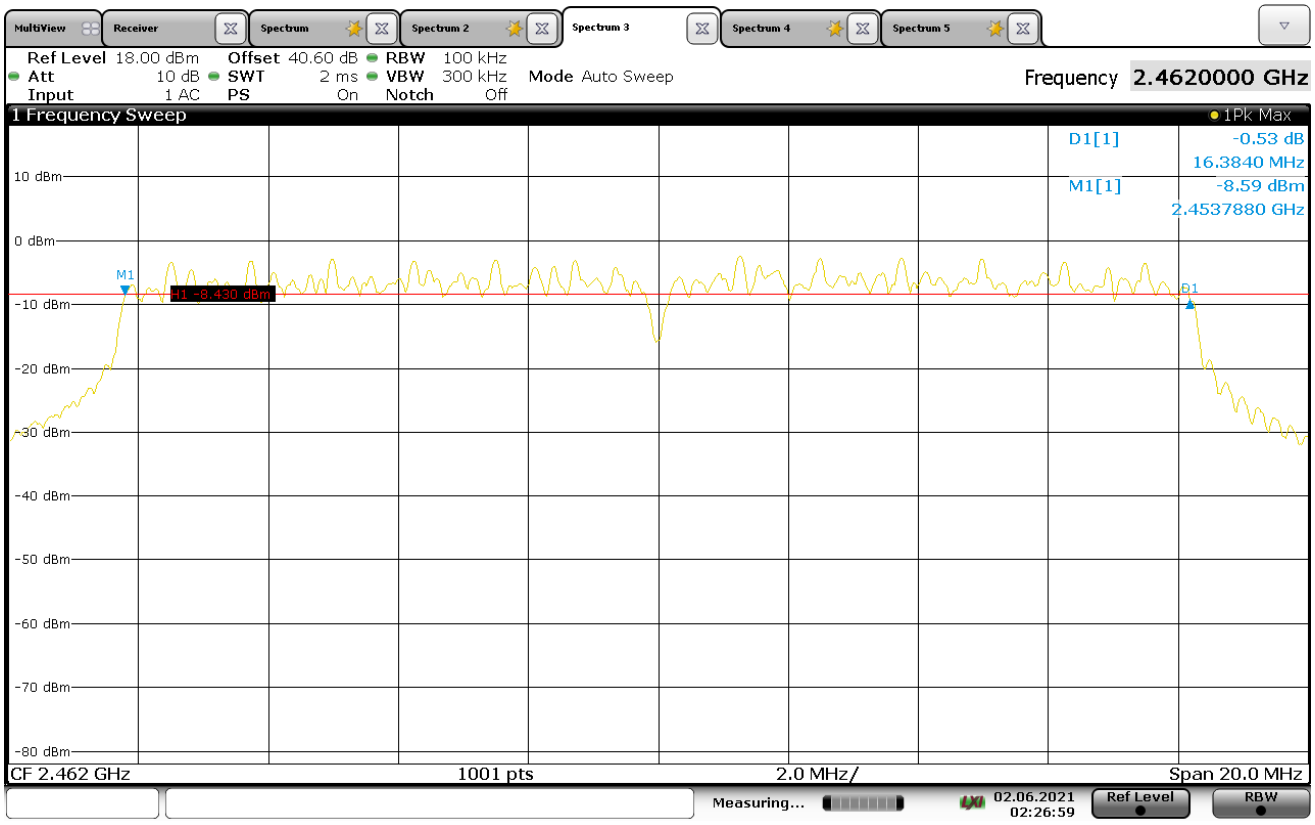
02:18:04 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 48Mbps
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 16.50MHz



02:22:09 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11g – 54Mbps
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 16.38MHz

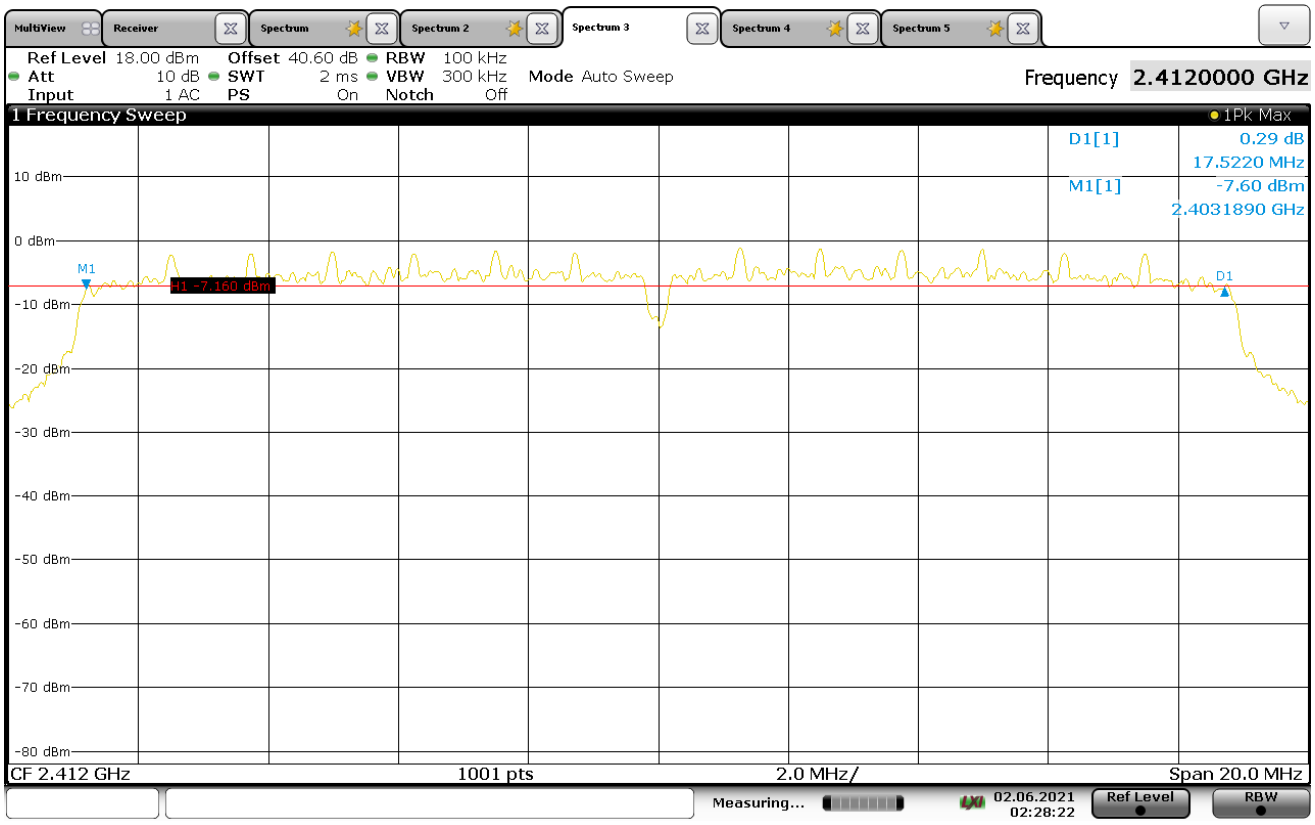


02:26:59 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n
Parameters	6dB BW
Notes	N/A

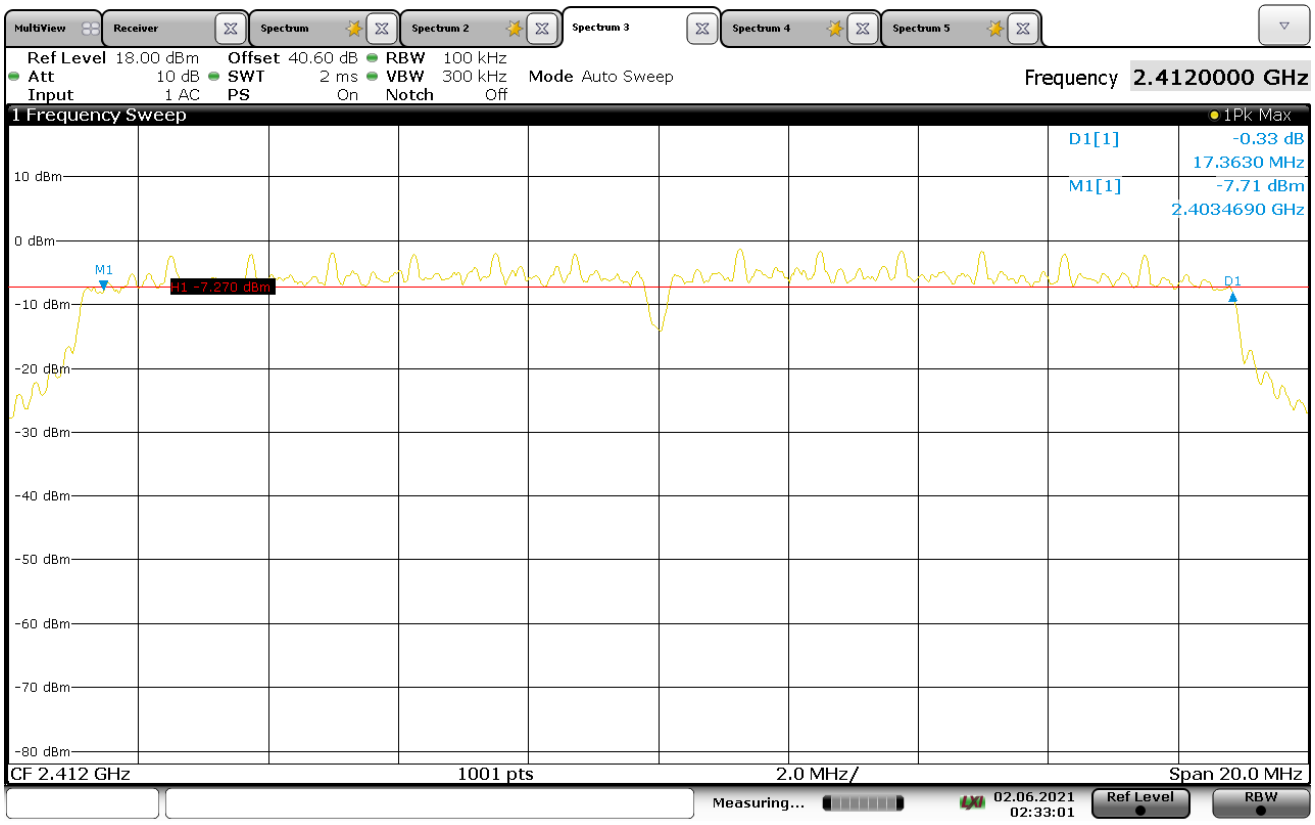
Protocol	Freq (MHz)	Data Rate (Mbps)	6dB BW (MHZ)
802.11n	2412	MCS0	17.6
	2437		17.58
	2462		17.6
	2412	MCS1	17.36
	2437		17.52
	2462		17.56
	2412	MCS2	17.5
	2437		17.28
	2462		17.56
	2412	MCS3	17.72
	2437		17.66
	2462		17.68
	2412	MCS4	17.6
	2437		17.68
	2462		17.68
	2412	MCS5	17.34
	2437		17.56
	2462		17.58
	2412	MCS6	17.58
	2437		17.66
	2462		17.2
	2412	MCS7	17.42
	2437		17.5
	2462		17.54

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS0
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 17.52MHz



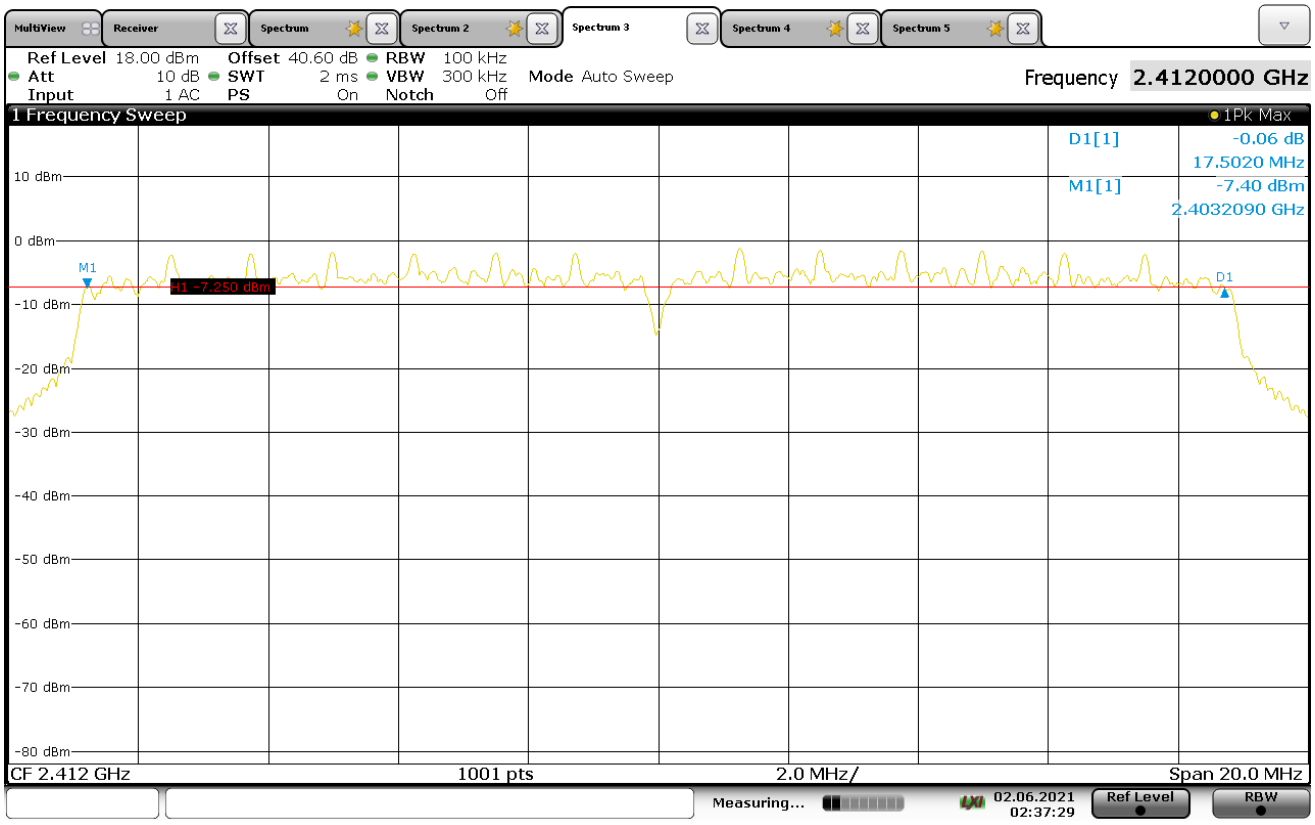
02:28:23 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS1
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 17.36MHz



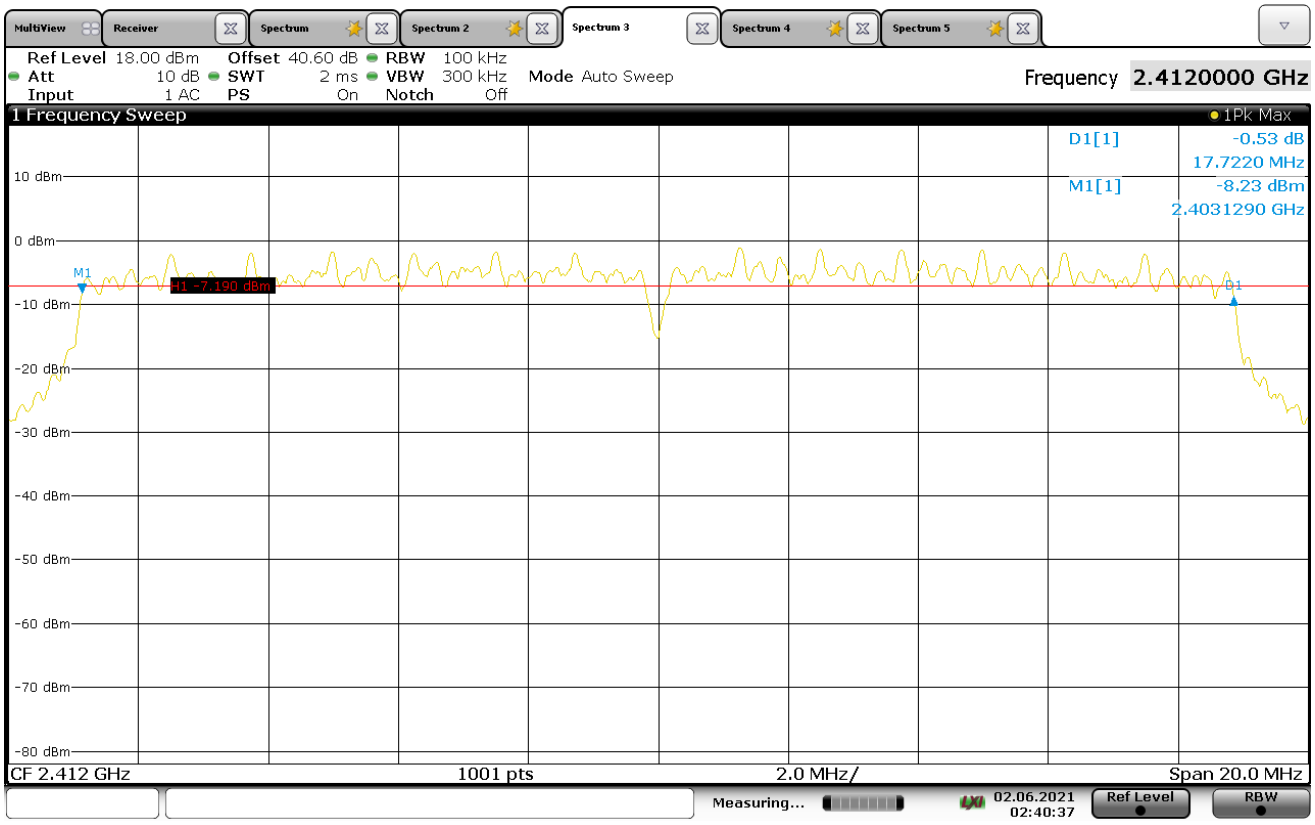
02:33:02 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS2
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 17.50MHz



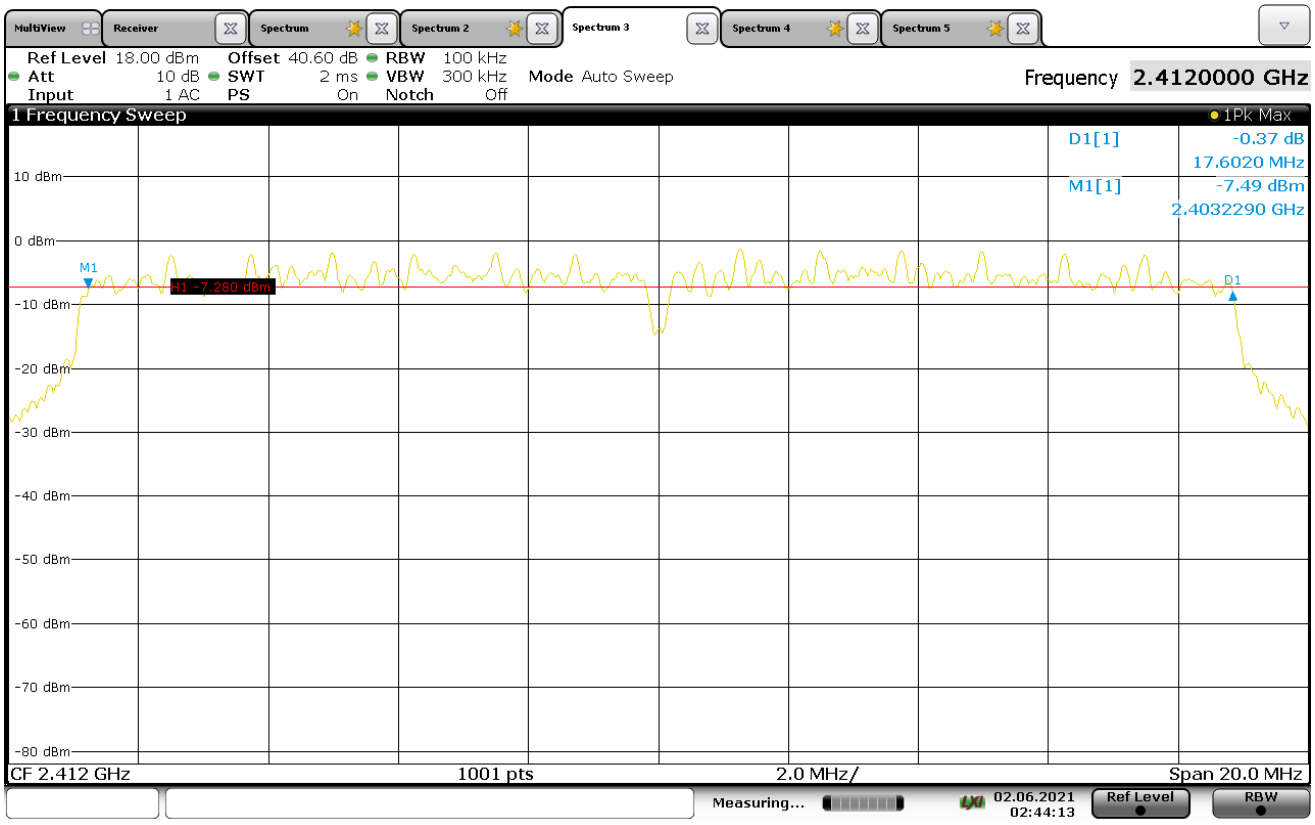
02:37:30 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS3
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 17.72MHz



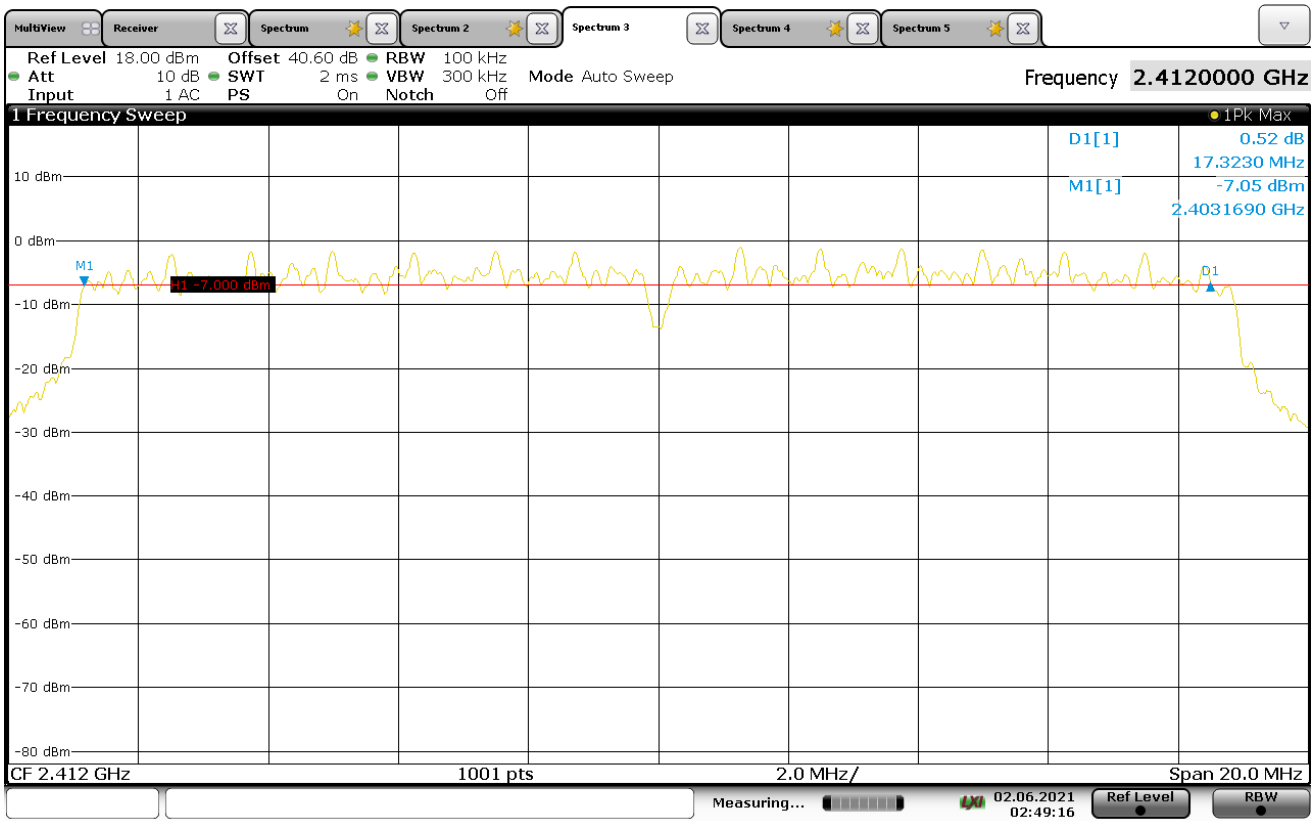
02:40:37 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS4
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 17.52MHz



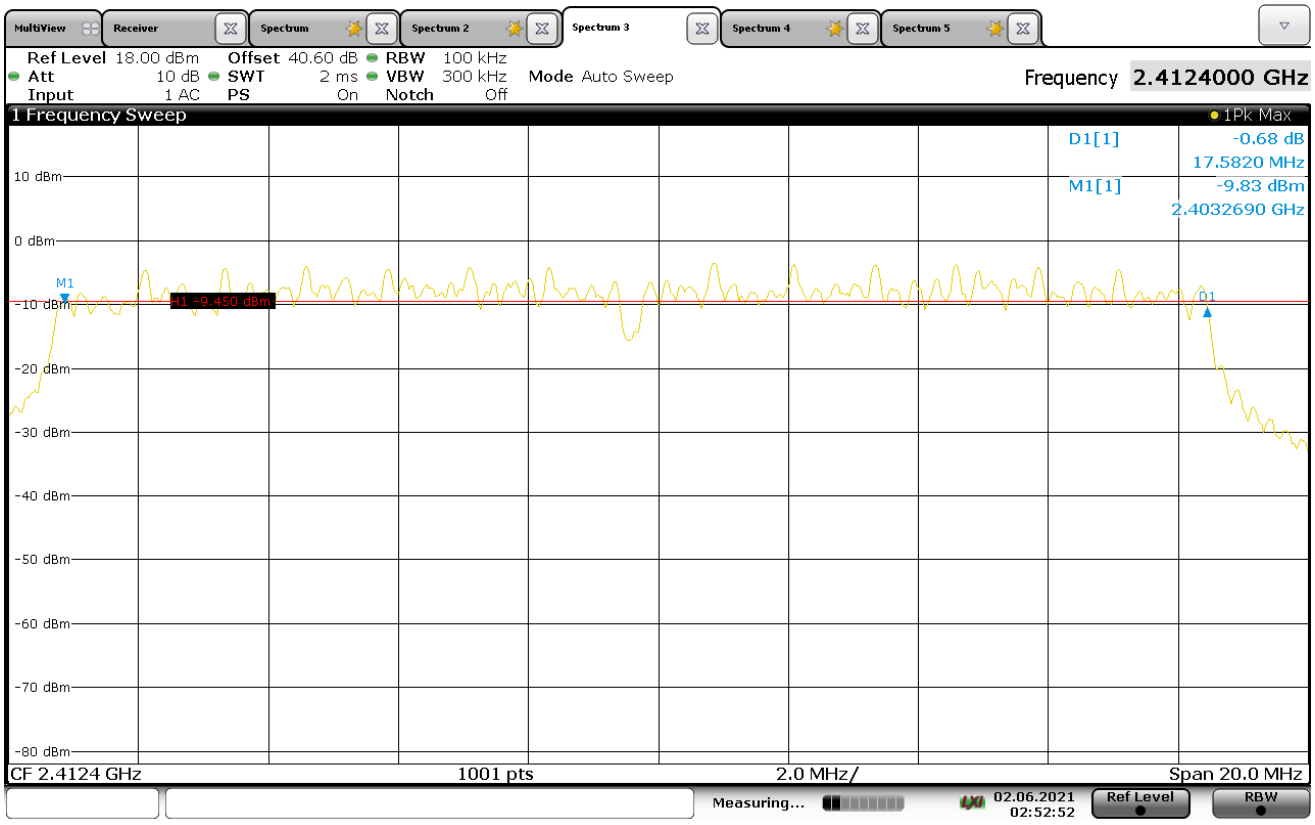
02:44:13 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS5
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 17.32MHz



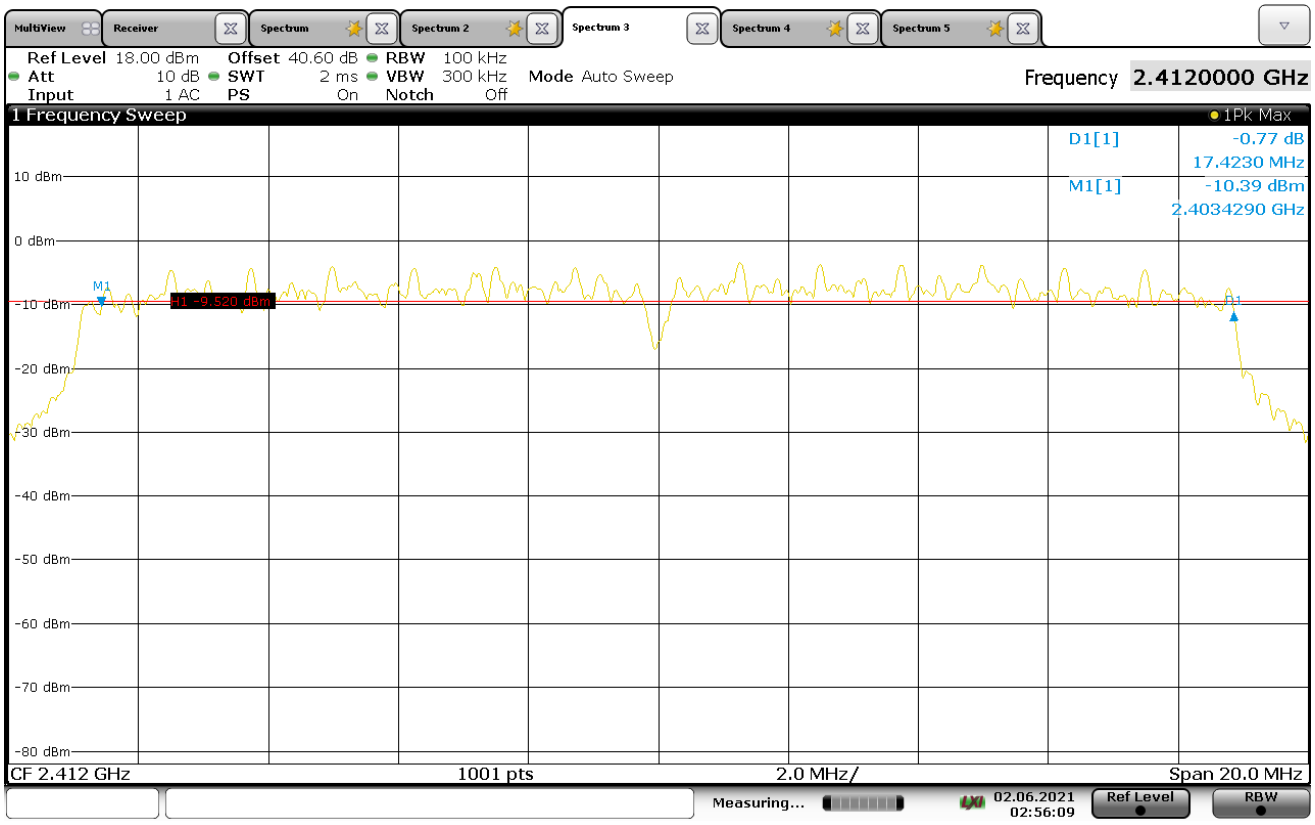
02:49:16 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS6
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 17.58MHz



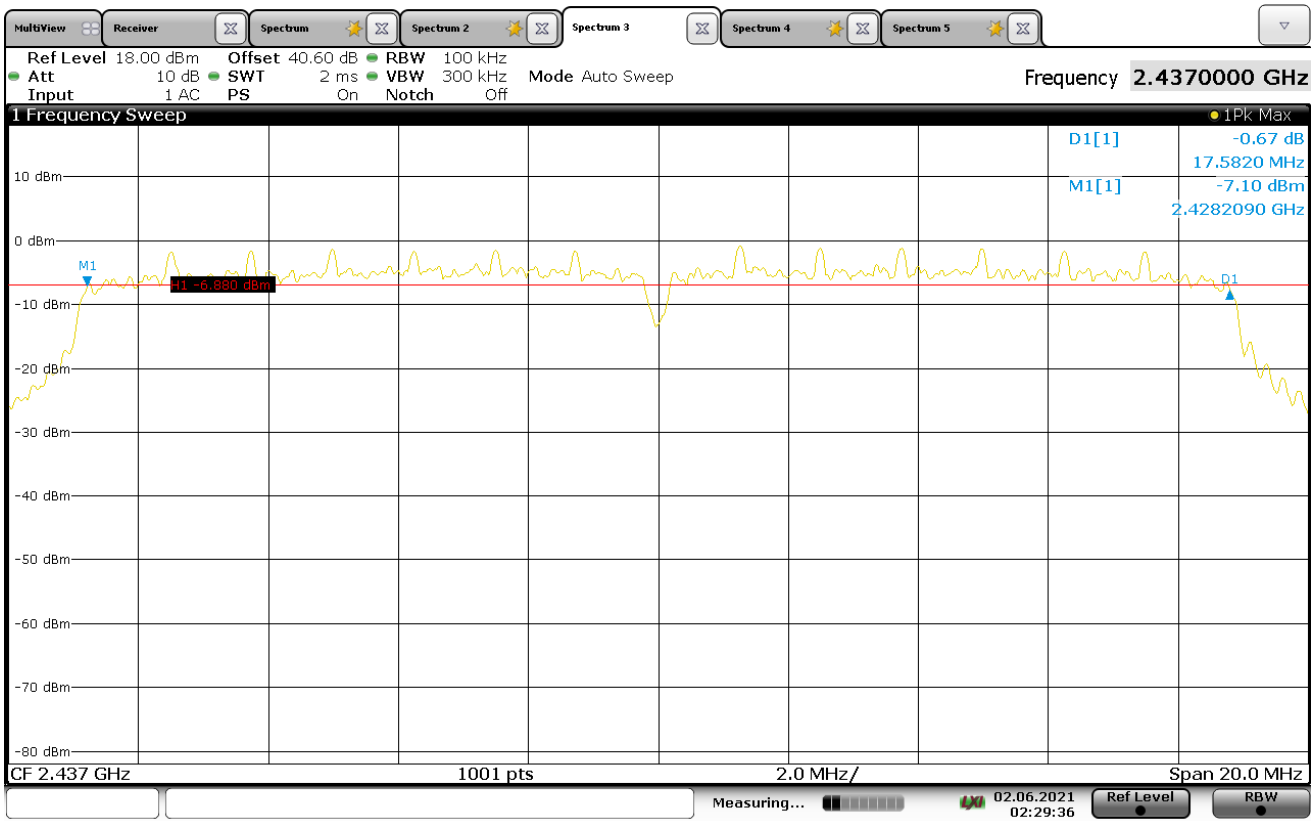
02:52:52 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS7
Carrier Frequency	2412MHz
Parameters	6dB BW
Notes	6dB BW = 17.42MHz



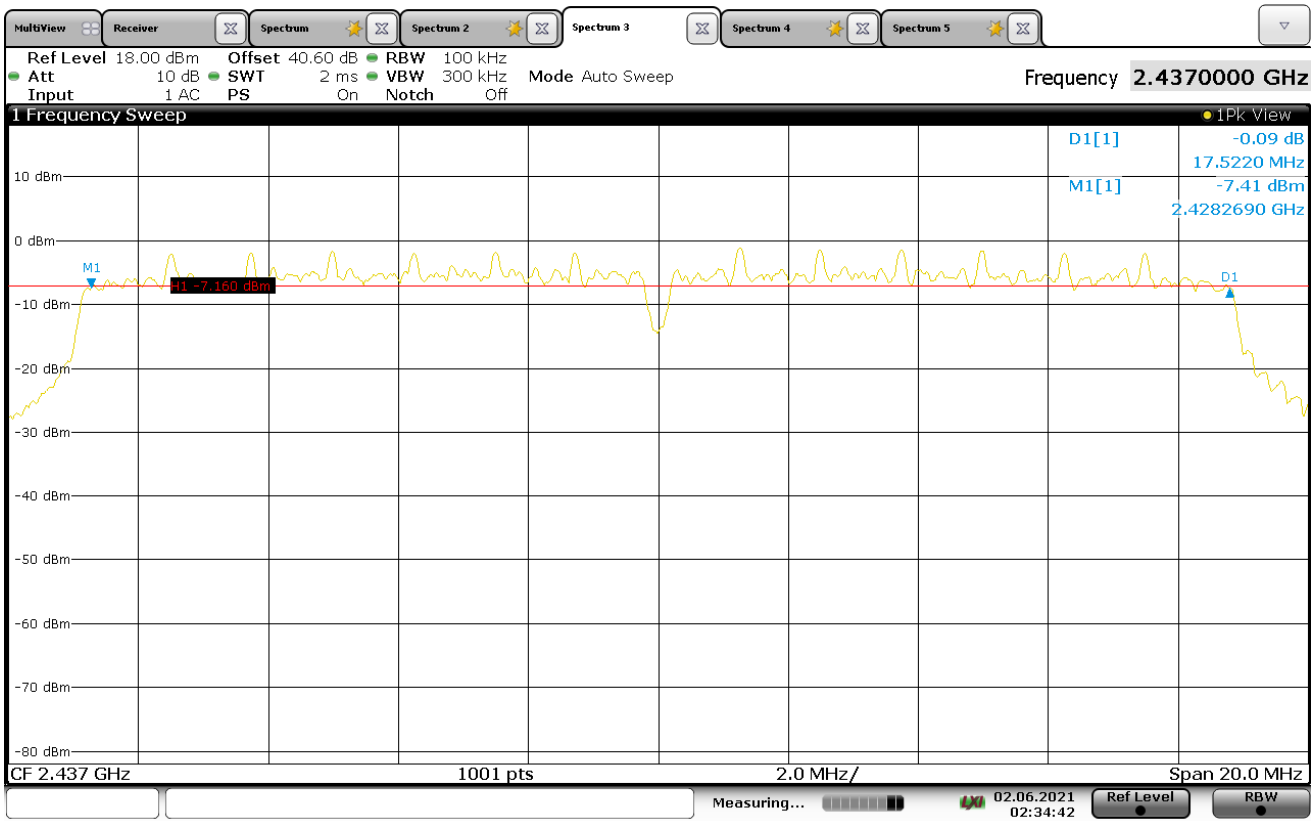
02:56:09 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS0
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 17.58MHz



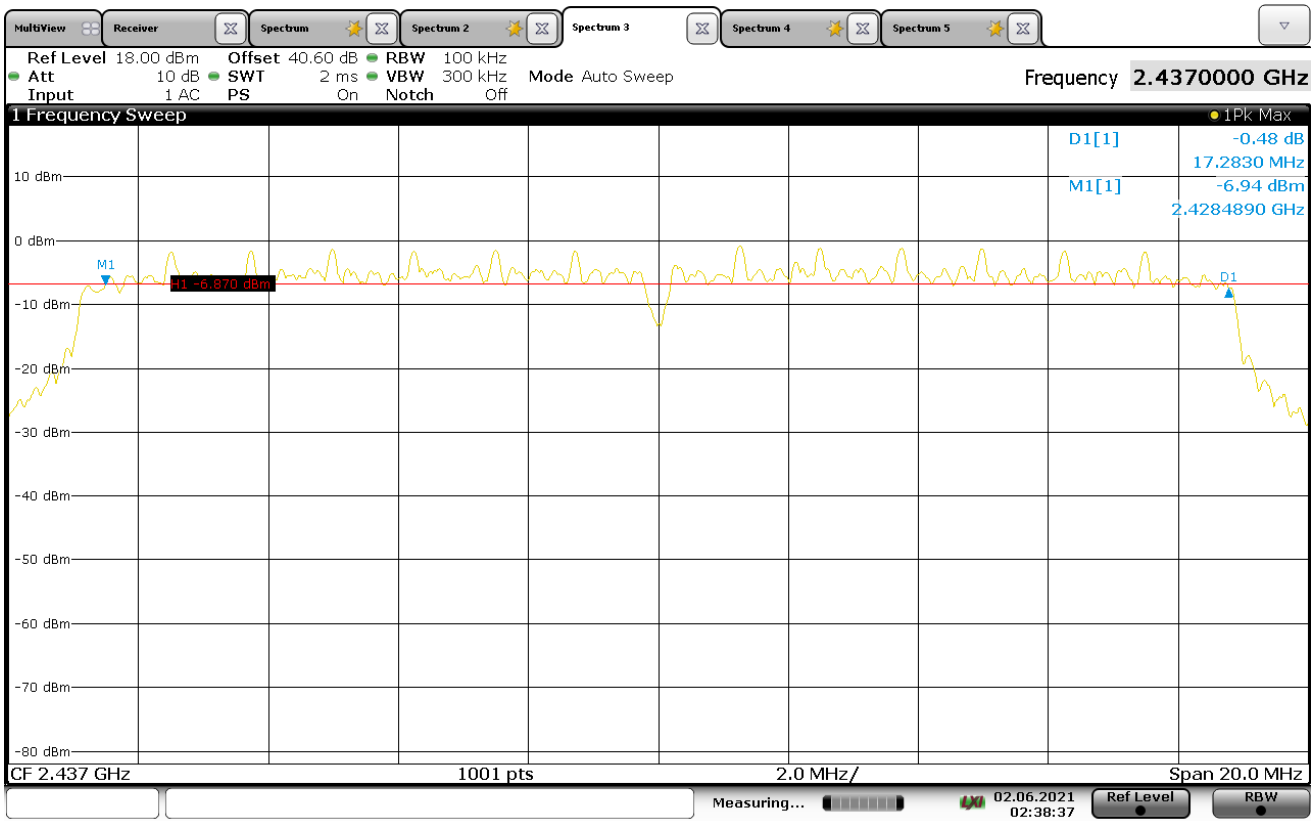
02:29:36 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS1
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 17.52MHz



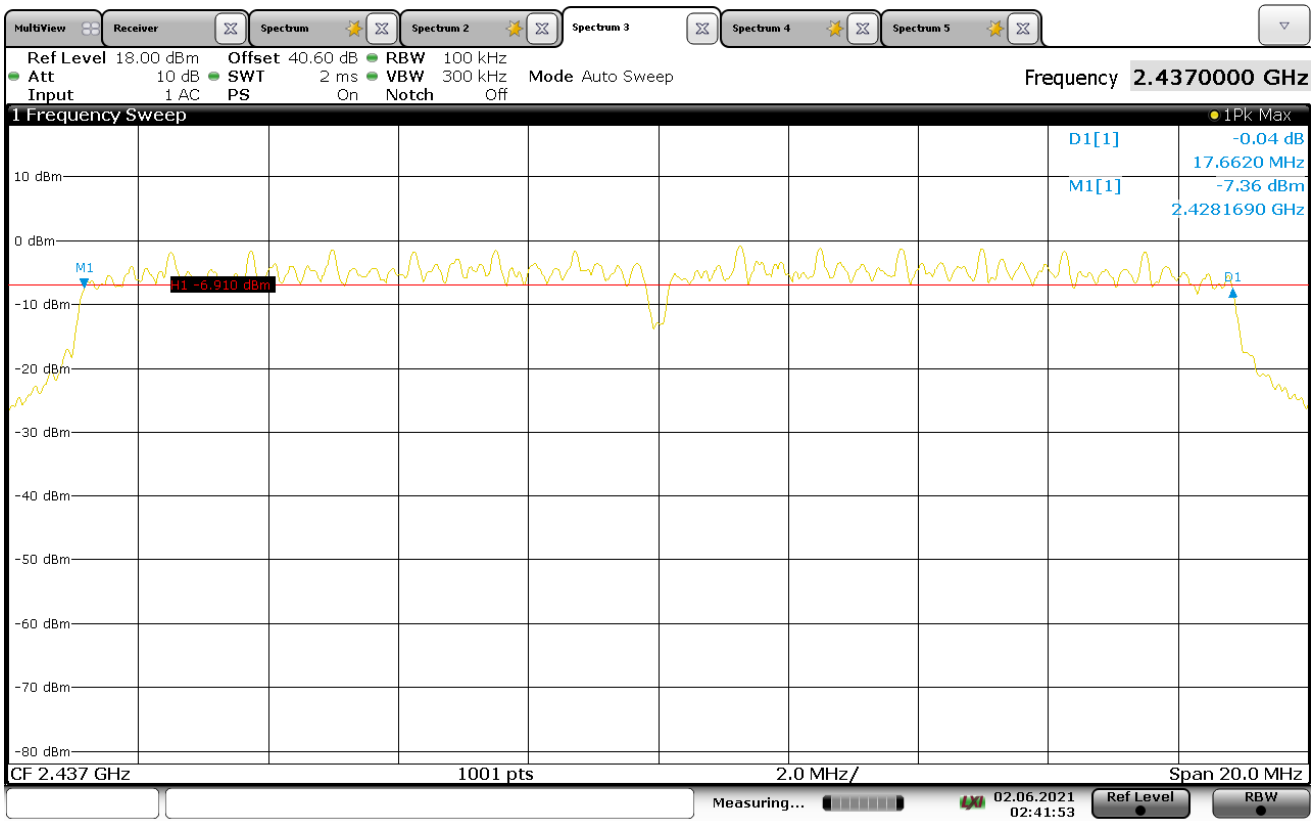
02:34:43 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS2
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 17.28MHz



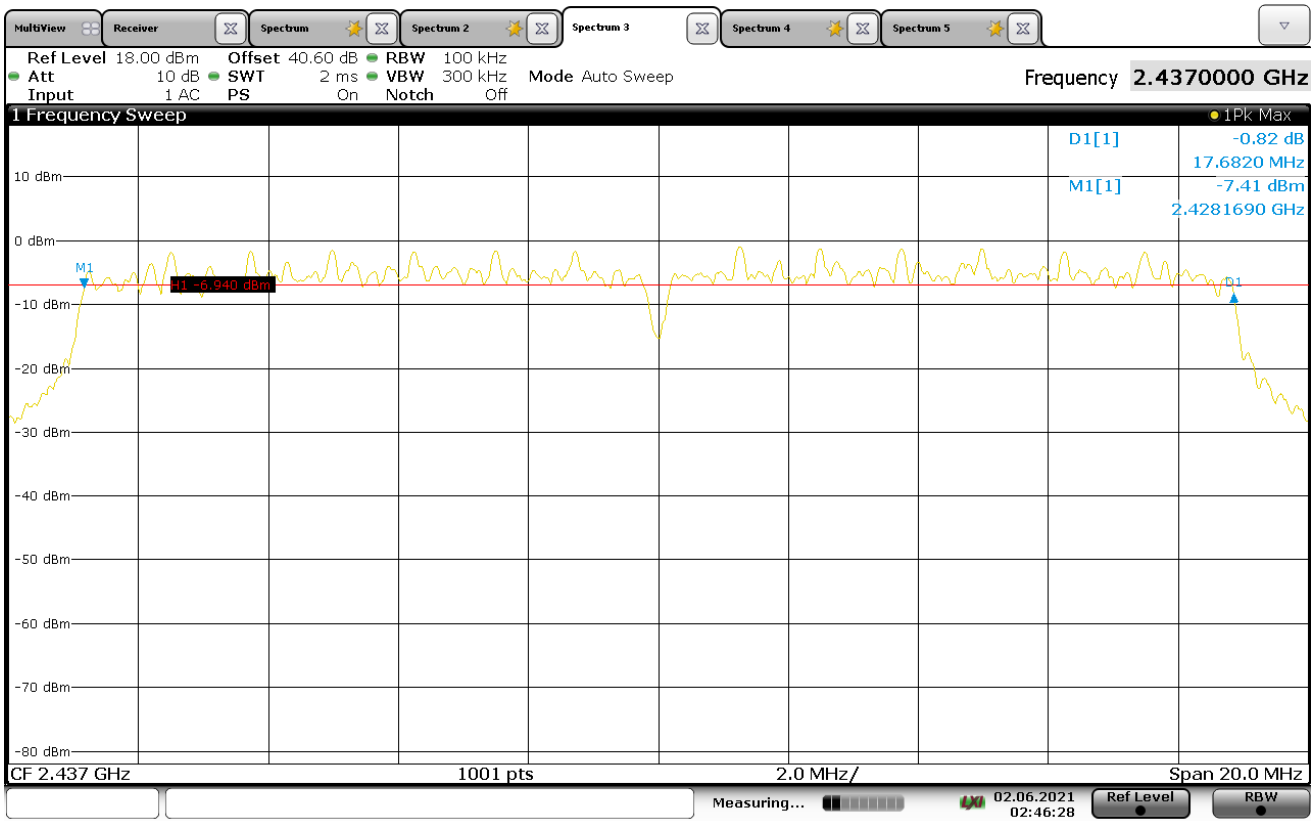
02:38:37 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS3
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 17.66MHz



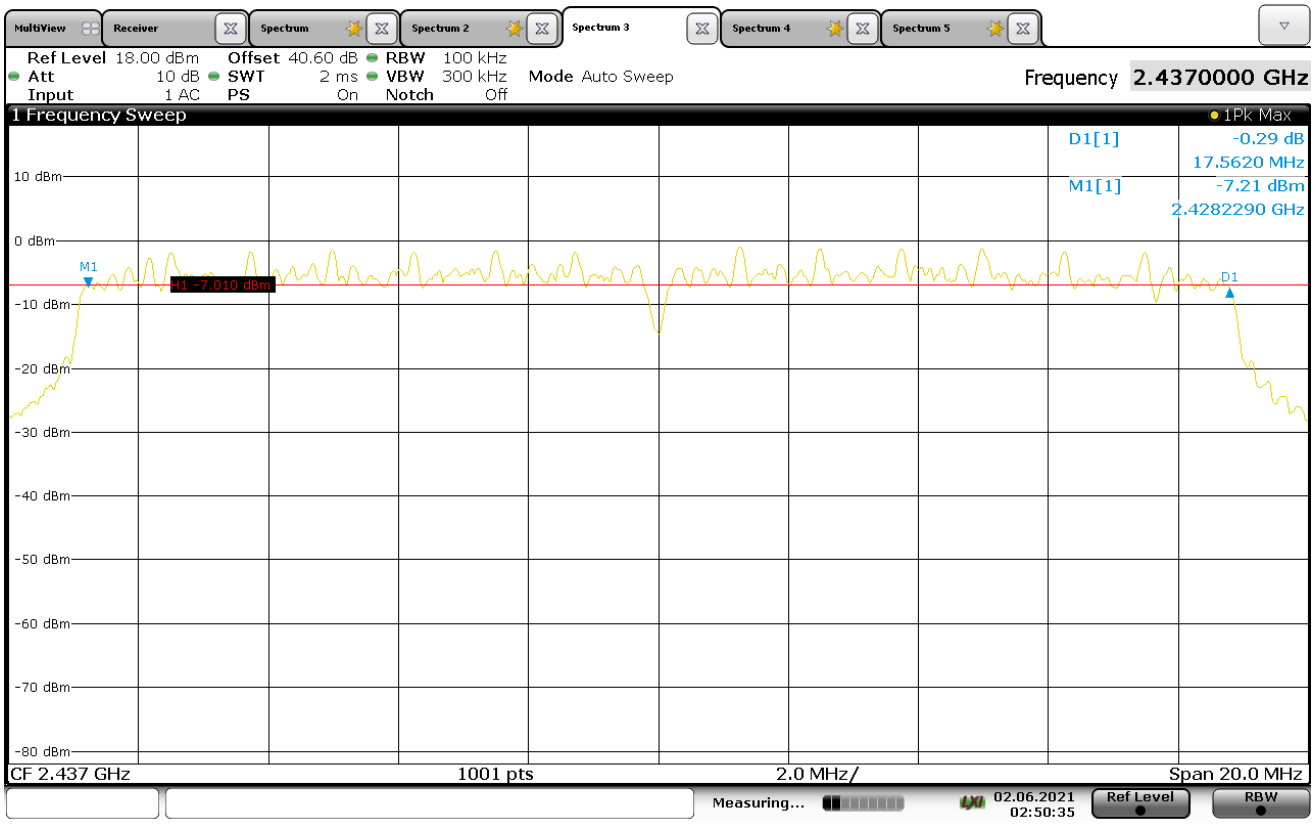
02:41:54 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS4
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 17.68MHz



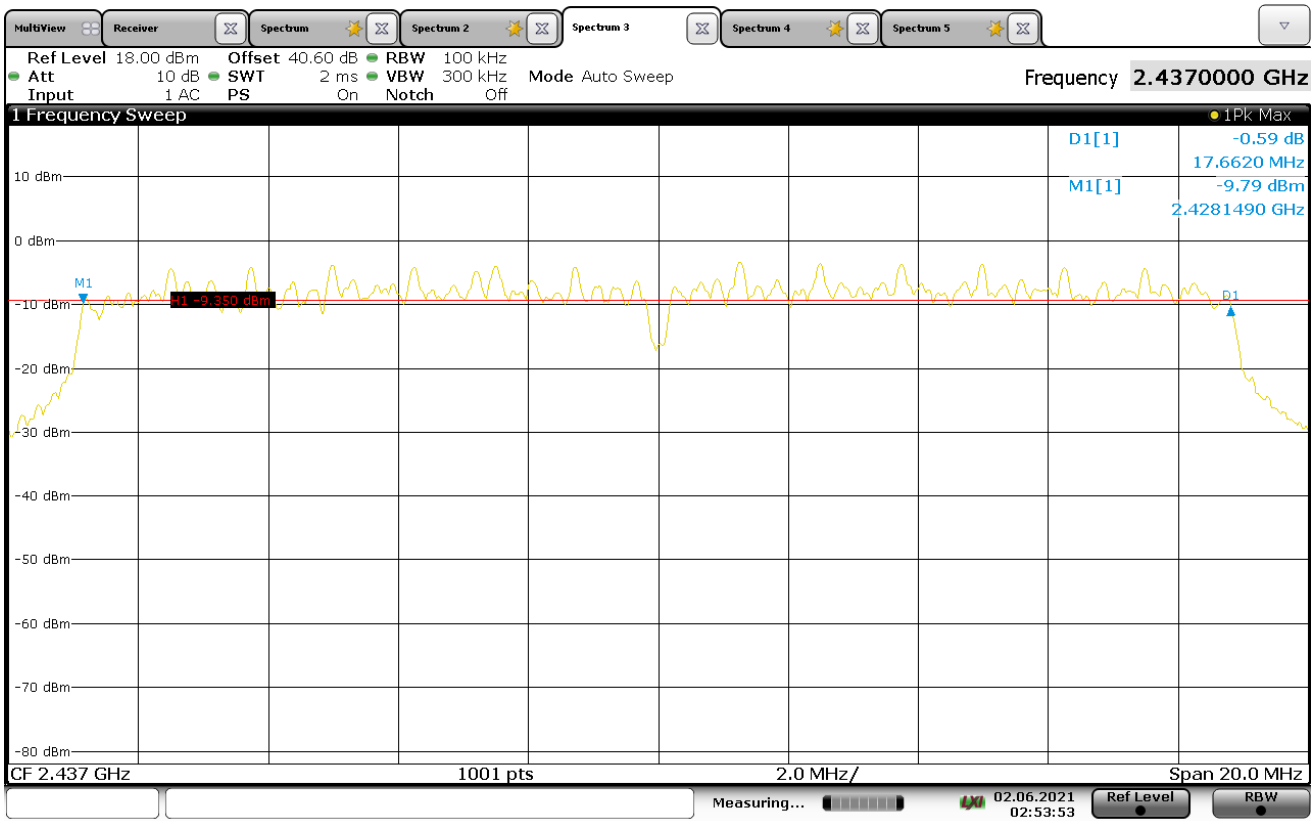
02:46:29 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS5
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 17.56MHz



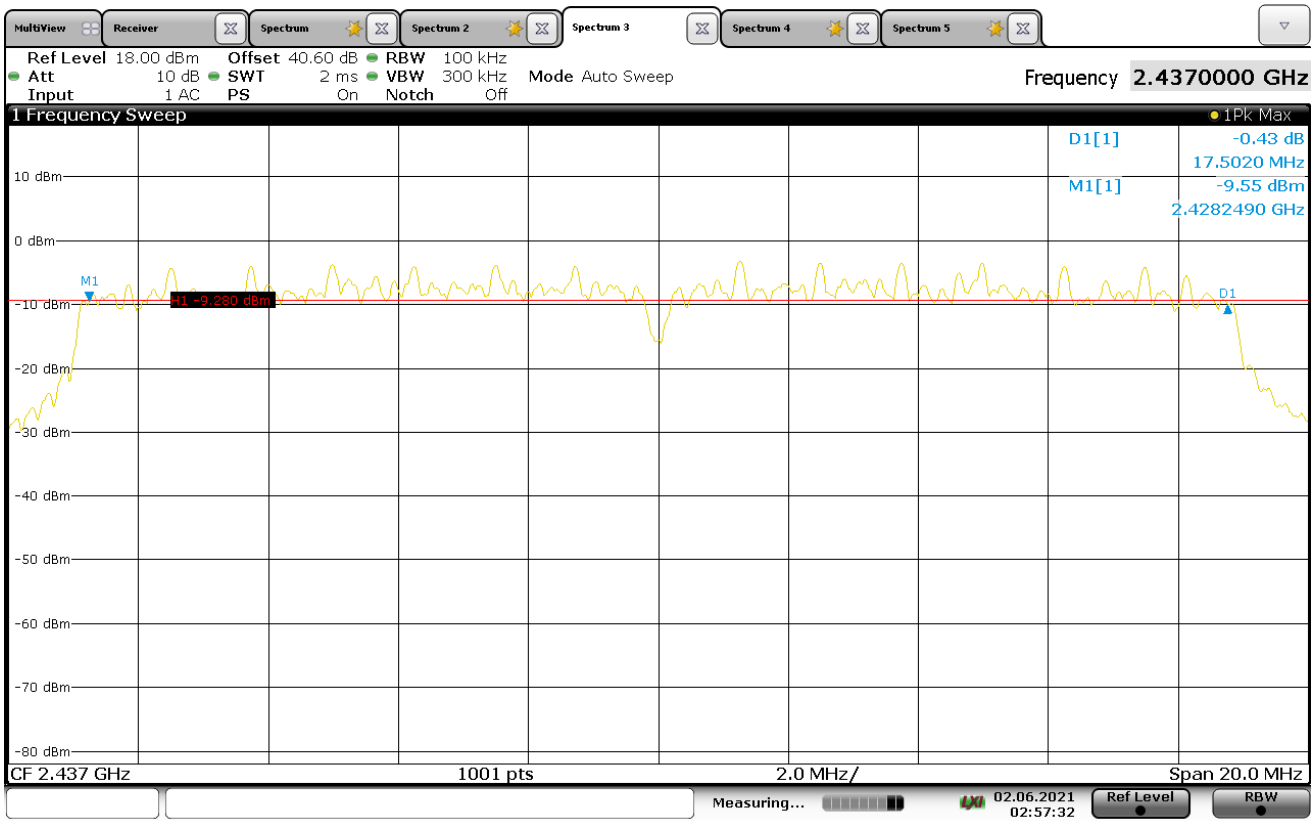
02:50:35 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS6
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 17.66MHz



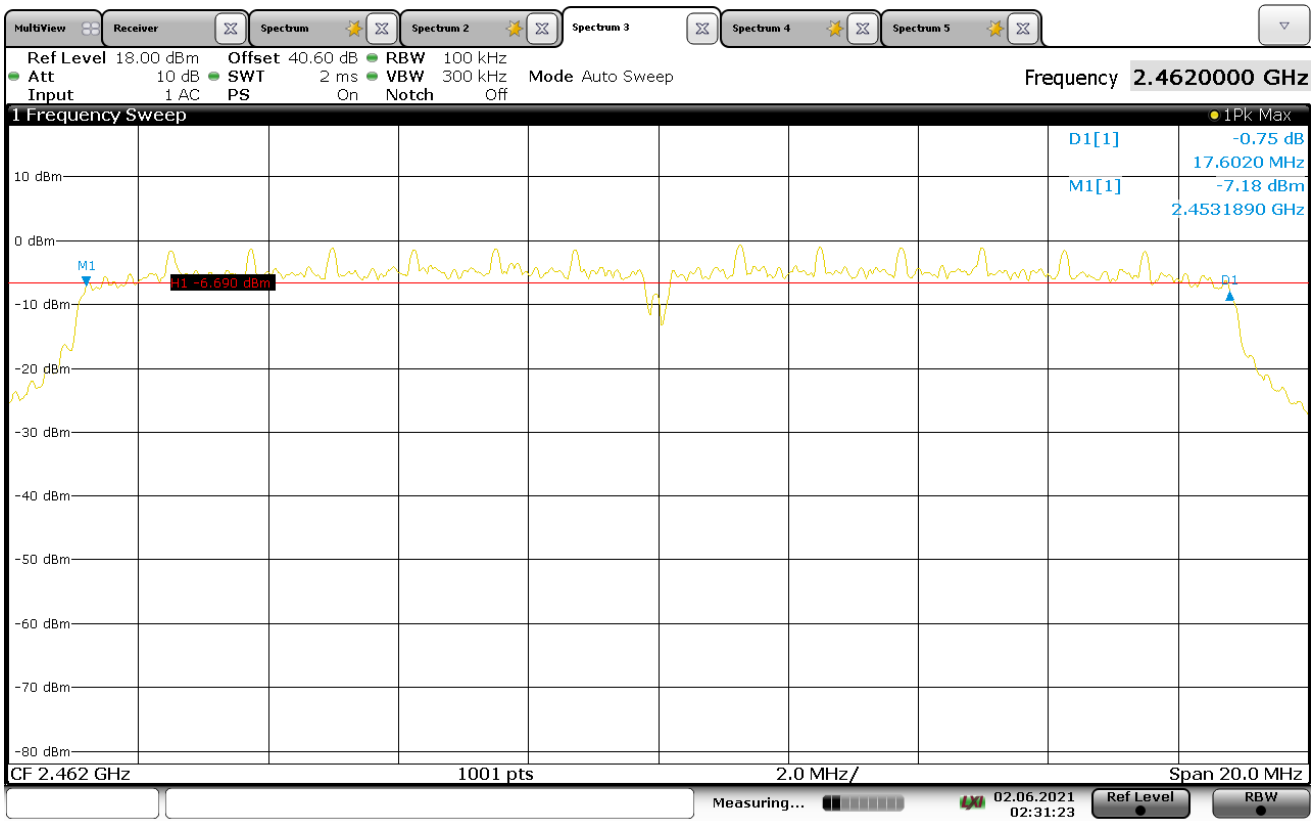
02:53:53 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS7
Carrier Frequency	2437MHz
Parameters	6dB BW
Notes	6dB BW = 17.50MHz



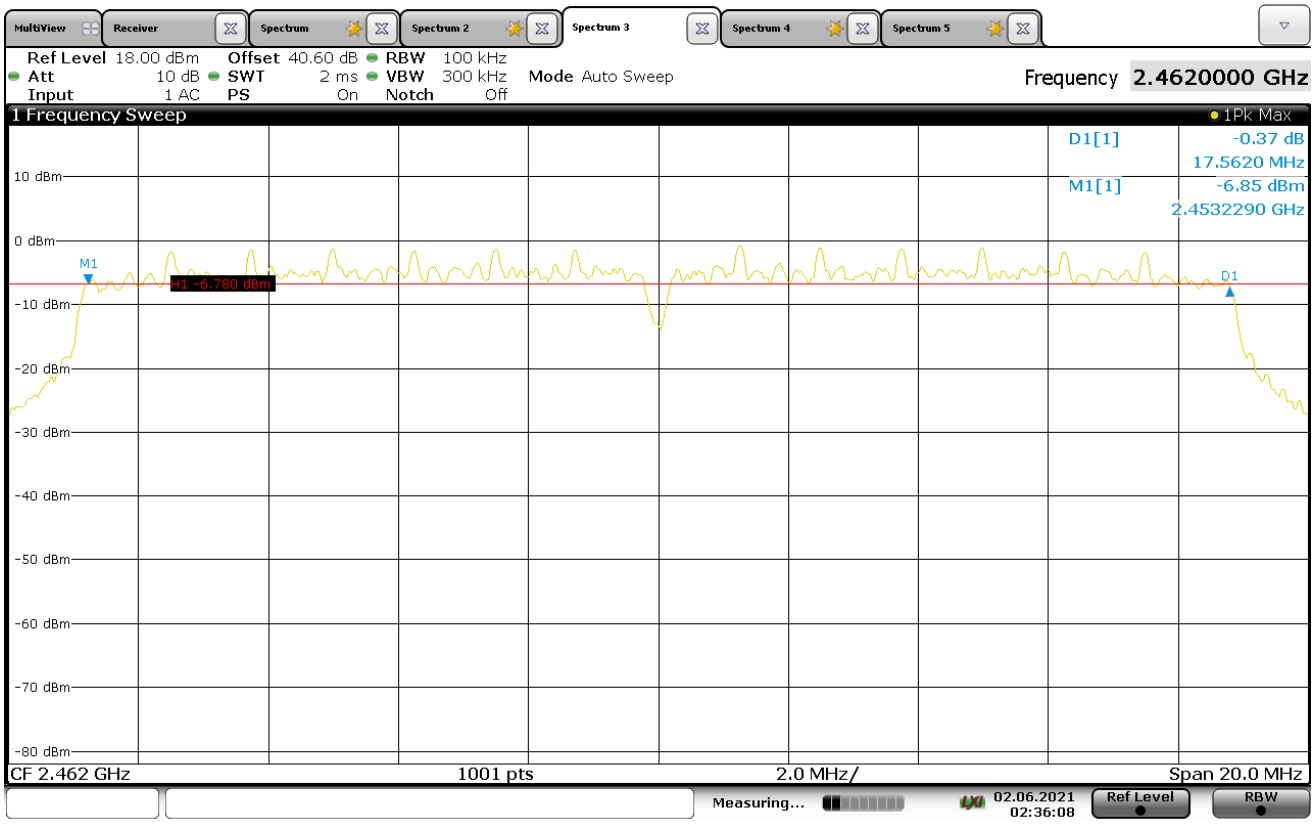
02:57:32 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS0
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 17.60MHz



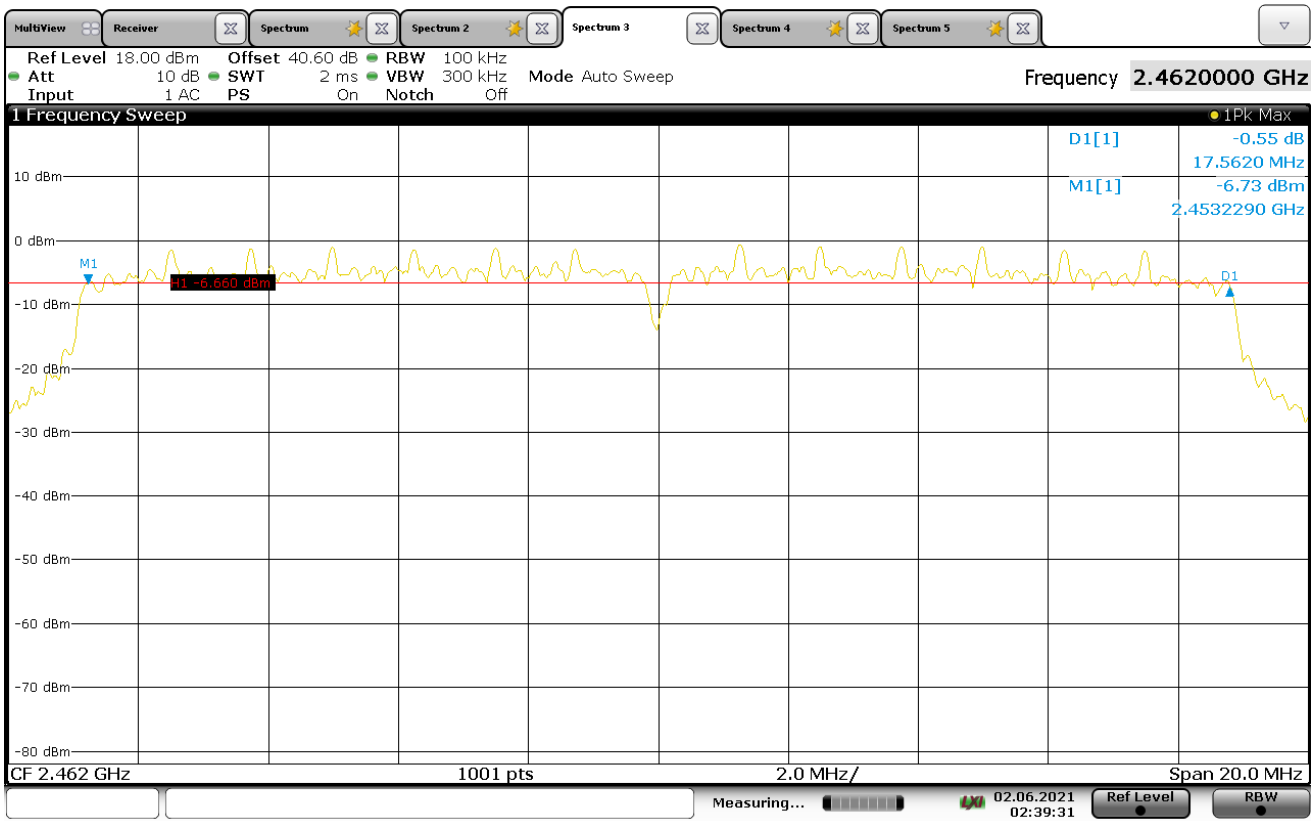
02:31:23 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS1
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 17.56MHz



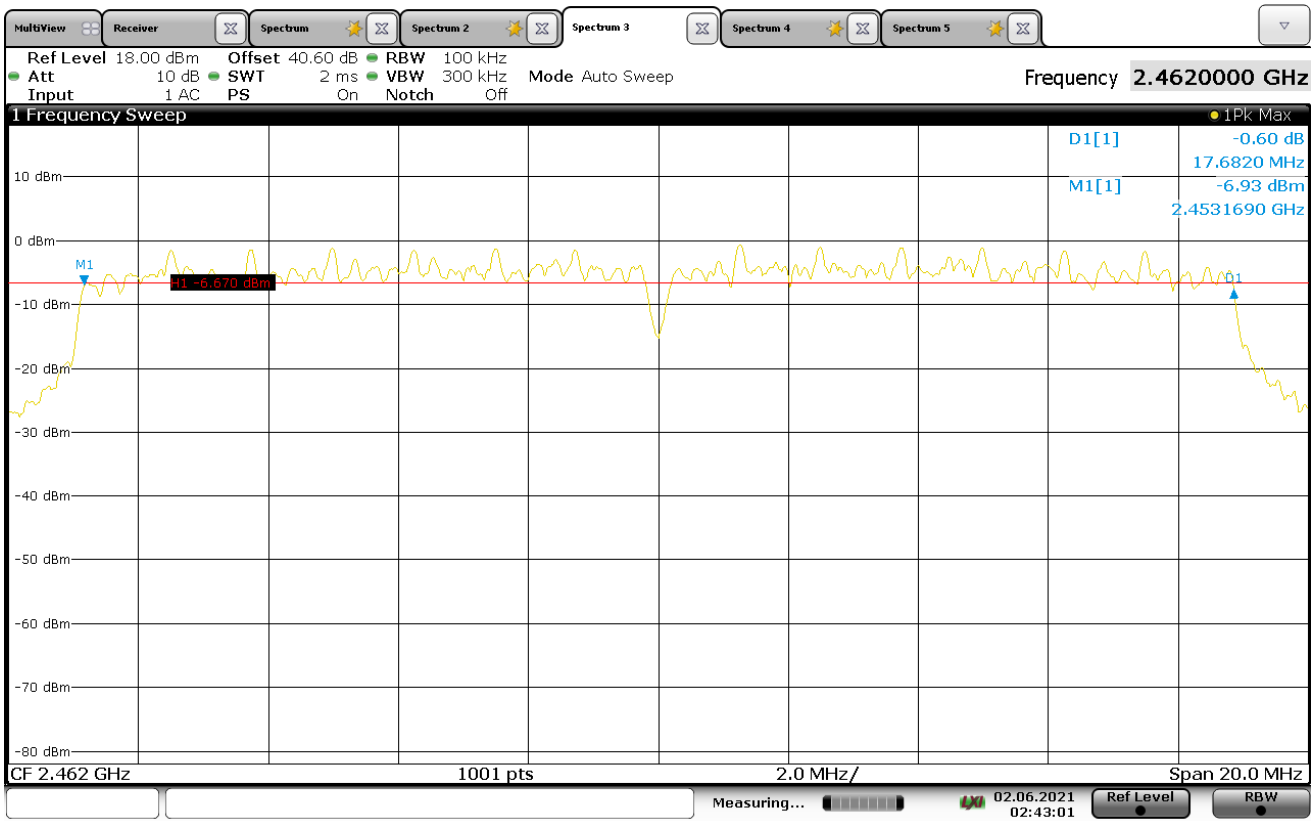
02:36:09 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS2
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 17.56MHz



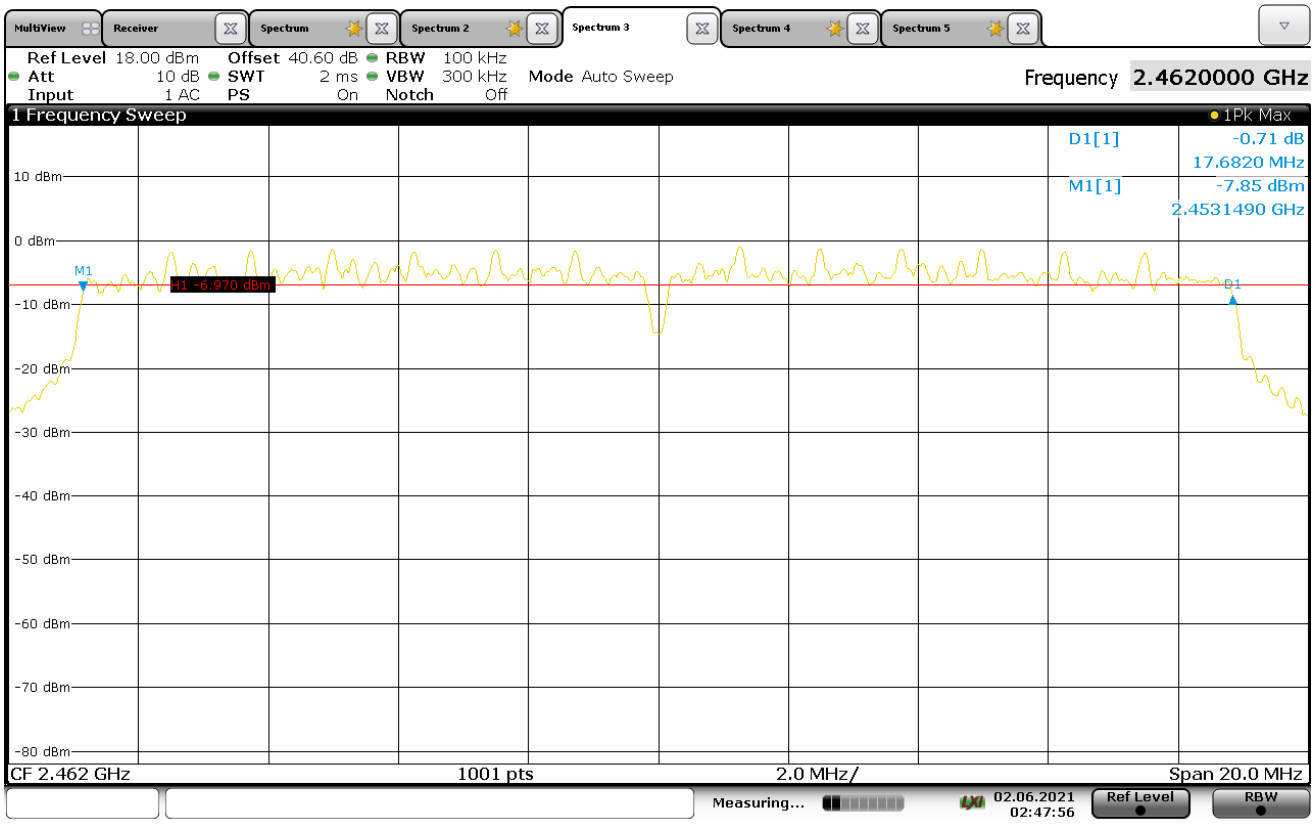
02:39:31 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS3
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 17.68MHz



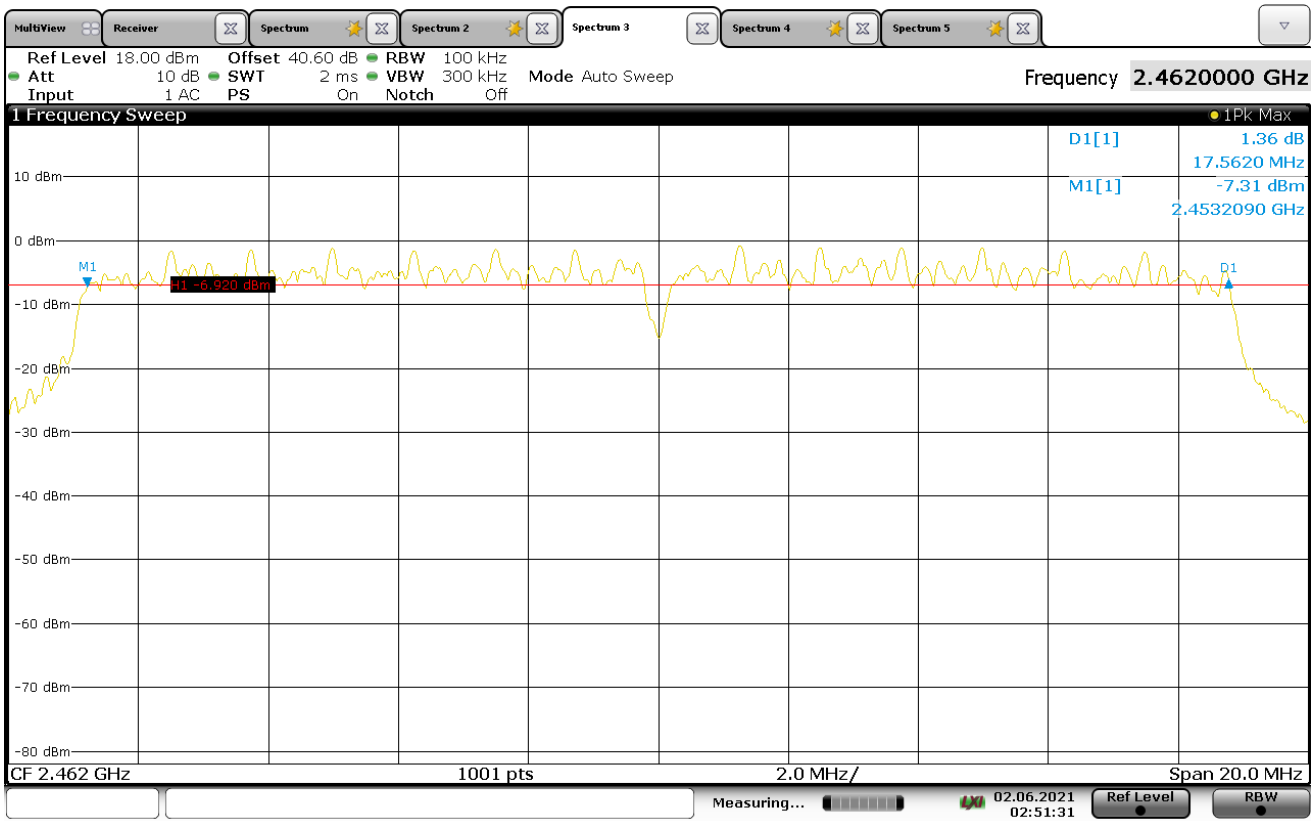
02:43:02 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS4
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 17.68MHz



02:47:56 02.06.2021

Test Details	
Manufacturer	Astronics
Model No.	Focus Pro
Serial No.	1378290
Mode	802.11n – MCS5
Carrier Frequency	2462MHz
Parameters	6dB BW
Notes	6dB BW = 17.56MHz



02:51:31 02.06.2021