

RADIO REPORT FCC 47 CFR Part 25C Satellite communications	
Report Reference No	G0M-2107-9891-TFC25CSAT-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	  DAKKS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	ASTROCAST SA
Address	Chemin des Ramiers 20 1022 Chavannes-près-Renens SWITZERLAND
Test Specification	47 CFR Part 25C
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	L-band radio transceiver satellite communication module
Model(s)	Astronode S (mounted on Astronode S+ as testing carrier board)
Additional Model(s)	None
Brand Name(s)	None
Hardware Version(s)	Astronode S+: v00 / Astronode S: v02
Software Version(s)	2.7.0
FCC ID	2A269-01001
Test Result	PASSED

Possible test case verdicts:		
Required by standard but not tested	N/T	
Not required by standard	N/R	
Not applicable to EUT	N/A	
Test object does meet the requirement	P(PASS)	
Test object does not meet the requirement	F(FAIL)	
Testing:		
Test Lab Temperature	20 °C - 30 °C	
Test Lab Humidity	25 % - 55 %	
Date of receipt of test item	2021-10-28	
Report:		
Compiled by	Toralf Jahn	
Tested by (+ signature) (Responsible for Test)	Toralf Jahn	
Tested by (+ signature) (Responsible for Test)	Florian Voigt	
Approved by (+ signature) (Test Lab Engineer)	Wilfried Treffke	
Date of Issue	2022-02-01	
Total number of pages	78	
General Remarks:		
The test results presented in this report relate only to the object tested. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.		
Additional Comments:		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2022-02-01	Initial Release	

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
RBW	Resolution bandwidth
RMS	Root mean square
VBW	Video bandwidth
EIRP	Effective isotropic radiated power
QPSK	Quadrature phase shift keying
V _{NOM}	Nominal supply voltage
V _{MIN}	Minimum supply voltage
V _{MAX}	Maximum supply voltage
T _{NOM}	Nominal temperature
T _{MIN}	Minimum temperature
T _{MAX}	Maximum temperature

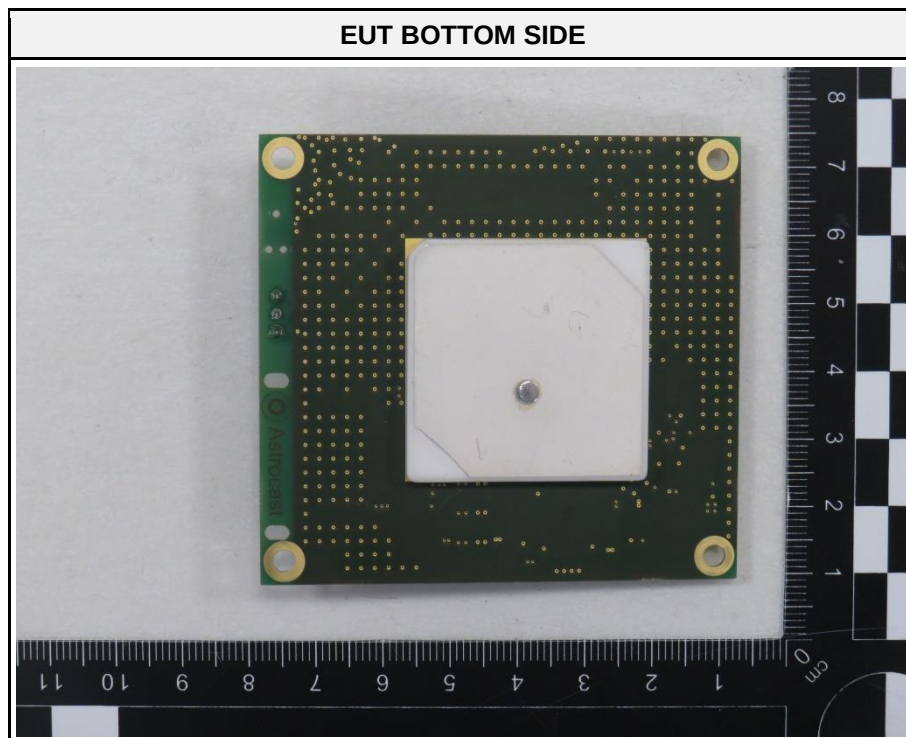
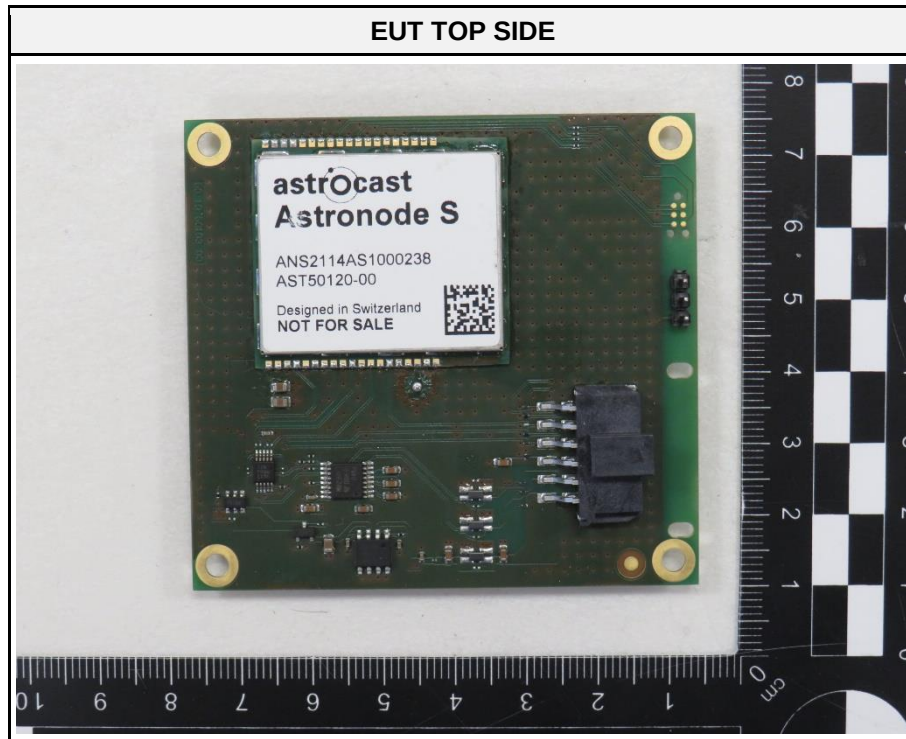
REPORT INDEX

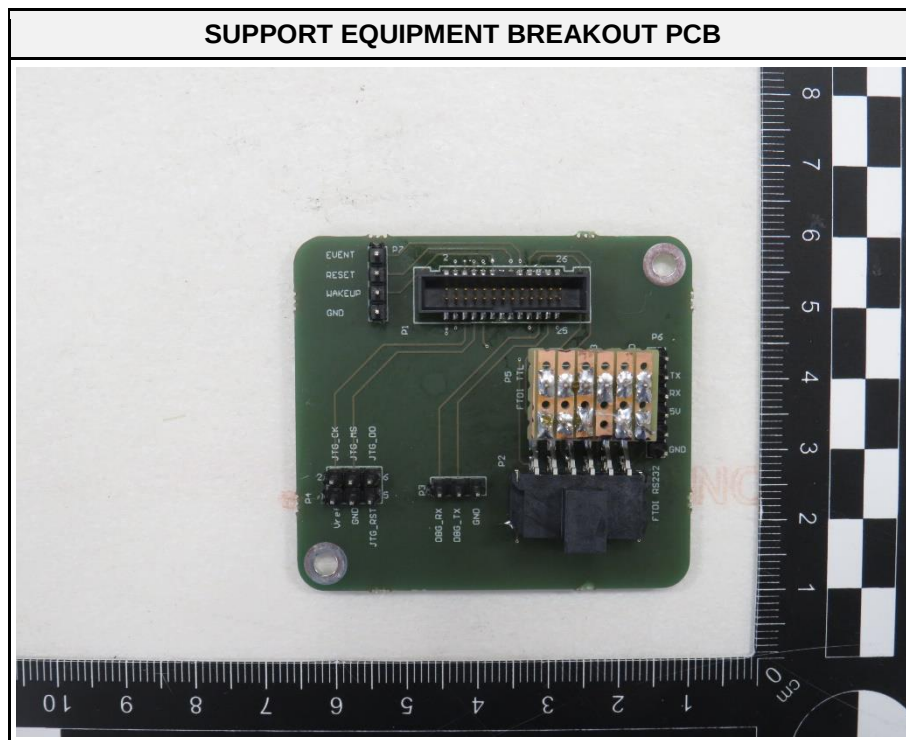
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1 Equipment (Test Item) Under Test

Description	L-band radio transceiver satellite communication module	
Model	Astronode S (mounted on Astronode S+ as testing carrier board)	
Additional Model(s)	None	
Brand Name(s)	None	
Serial Number(s)	Conducted: ANS2114AS1000239 Radiated: ANS2114AS1000240	
Hardware Version(s)	Astronode S+: v00 / Astronode S: v02	
Software Version(s)	2.7.0	
FCC ID	2A269-01001	
Equipment type	Radio Module	
Radio type	Transceiver for mobile earth station	
Assigned frequency bands	Transmit (Earth to space) 1626.5 – 1660.5 MHz Receive (Space to earth) 1525.0 – 1559.0 MHz	
Nominated / Authorized / Allocated Bandwidth	150 kHz	
Modulation	QPSK	
Number of antenna ports	1	
Antenna	Type	Integrated
	Model	AST50127-00
	Manufacturer	Astrocast
	Gain	3 dBi
Supply Voltage	V _{NOM}	3.30 VDC
	V _{MIN}	3.14 VDC
	V _{MAX}	3.47 VDC
Operating Temperature	T _{NOM}	25 °C
	T _{MIN}	-20 °C
	T _{MAX}	70 °C
AC/DC-Adaptor	None	
Manufacturer	ASTROCAST SA Chemin des Ramiers 20 1022 Chavannes-près-Renens SWITZERLAND	

1.1 Photos – Equipment External



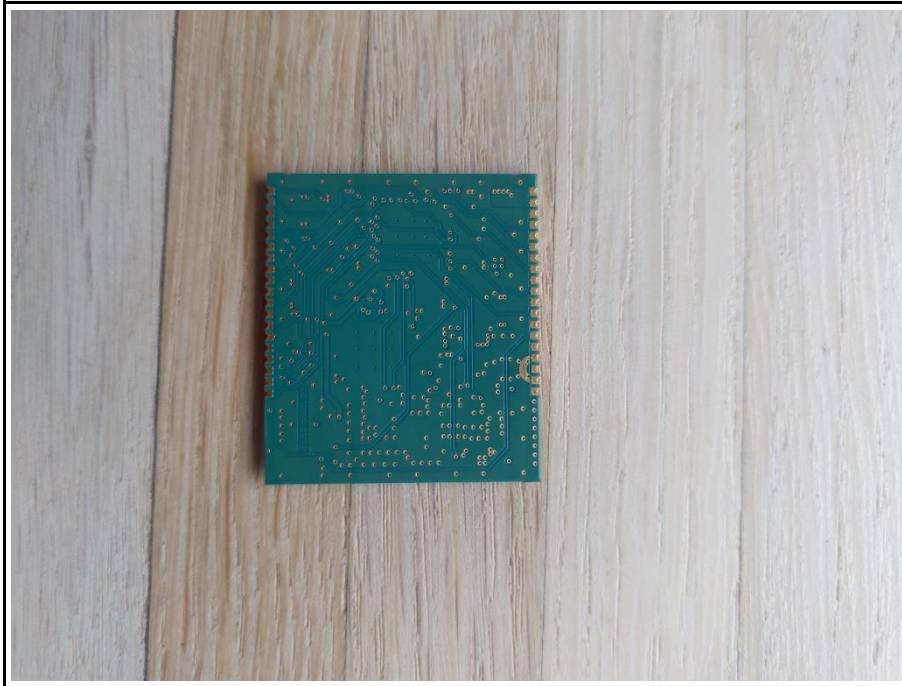


1.2 Photos – Equipment Internal

Astronode_S_top



Astronode_S_bottom



1.3 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
CBL	USB to UART	FTDI	TTL-232RG-VREG3V3-Astrocast	To enable test modes
AE	breakout PCB for connector	Astrocast	breakout_AS_plus	To enable test modes
AE	Laptop	Lenovo	E580	To enable test modes
AE	Laptop power supply	Lite-On Technology	ADLX65YLC3D	
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
SFT Note: The Equipment Under Test used an operating system with a test firmware. The driver for the tested technology was running in a manufacturer mode.				
Comment:				

1.4 Test Modes

Mode	Description
Tx	Test Mode = Single Frequency Transmit Mode Modulation = QPSK Duty cycle = 100%
Idle	Carrier is off
Comment:	

1.5 Test Frequencies

Designator	Mode	Calculation	Frequency [MHz]
F1	Tx	1627.543 MHz - 43 kHz	1627.500
F2	Tx	1627.543 MHz + 0 kHz	1627.543
F3	Tx	1627.543 MHz + 43 kHz	1627.586
F4	Tx	1643.500 MHz - 43 kHz	1643.457
F5	Tx	1643.500 MHz + 0 kHz	1643.500
F6	Tx	1643.500 MHz + 43 kHz	1643.543
F7	Tx	1659.457 MHz - 43 kHz	1659.414
F8	Tx	1659.457 MHz + 0 kHz	1659.457
F9	Tx	1659.457 MHz + 43 kHz	1659.500

1.6 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dBμV. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB/m)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dBμV/m). The FCC limits are given in units of μV/m. The following formula is used to convert the units of μV/m to dBμV/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log(\mu\text{V/m})$$

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading + AF	= Net Reading	:	Net reading - FCC limit	= Margin
+21.5 dBμV + 26 dB/m	= 47.5 dBμV/m	:	47.5 dBμV/m - 57.0 dBμV/m	= -9.5 dB

2 Result Summary

Test Summary				
Product Standard Reference	Requirement	Reference Method	Result	Remarks
FCC 25.204 FCC 2.1046	Power limits for earth stations	ANSI C63.26:2015 5.2	PASS	
FCC 2.1049	Occupied bandwidth	ANSI C63.26:2015 5.4	PASS	
FCC 25.202(f) FCC 2.1051	Spurious emissions at antenna terminal	FCC 25.202(f) ANSI C63.26:2015 5.7	PASS	
FCC 25.202(f) FCC 2.1053	Spurious emissions radiated	FCC 25.202(f) ANSI C63.26:2015 5.5	PASS	
FCC 25.202(d) FCC 2.1055	Frequency Stability	ANSI C63.26:2015 5.6	PASS	
FCC 25.216	Emission limits for protection of aeronautical radionavigation-satellite service	FCC 25.216 ANSI C63.26:2015 5.7	PASS	

Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

3 Test Conditions and Results

3.1 Test Conditions and Results - Occupied bandwidth

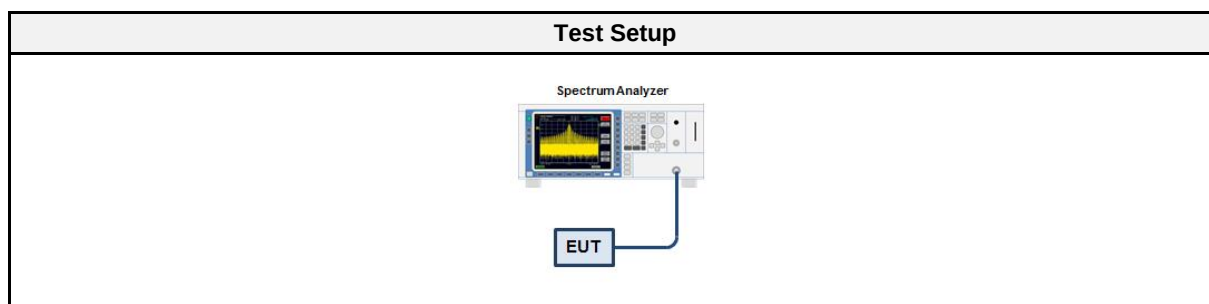
3.1.1 Information

Test Information	
Reference	47 CFR § 2.1049
Measurement Method	ANSI C63.26:2015 5.4
Measurement Uncertainty	$\pm 1.26 \%$
Test Sample ID	36867
Operator	Toralf Jahn
Date	2021-11-26

3.1.2 Limits

Limits
None (Informational only)

3.1.3 Setup



3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07

3.1.5 Procedure

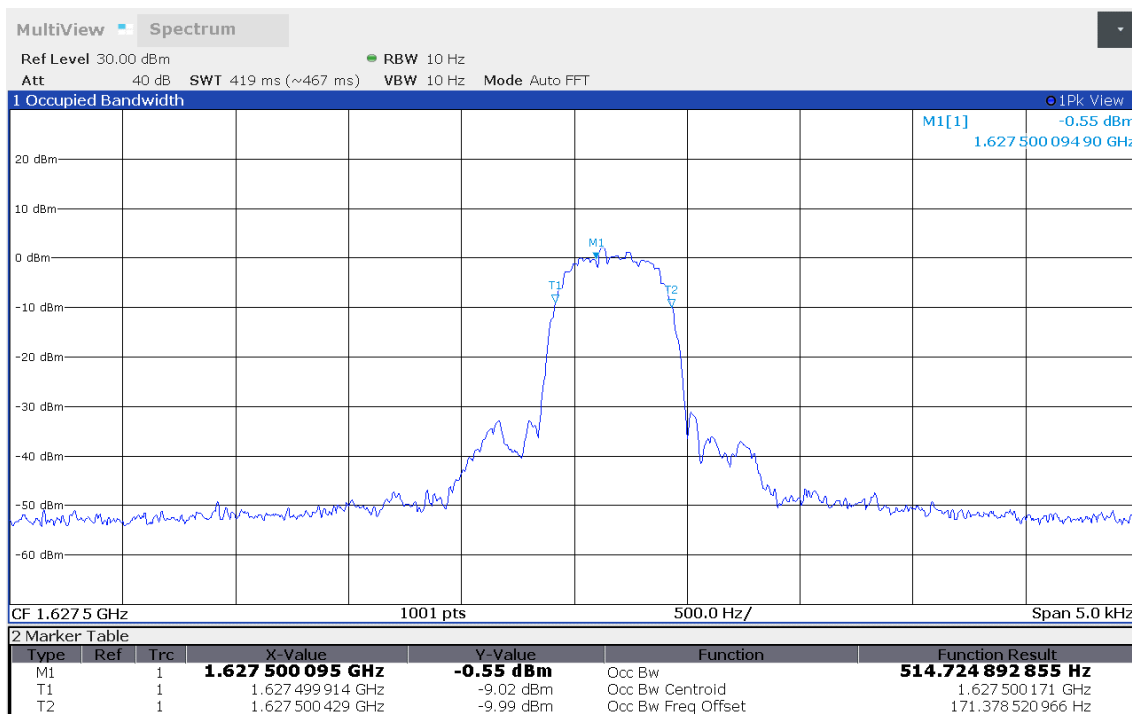
Test Procedure
1. EUT transmitter is activated in test mode under normal conditions 2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum 3. The resolution bandwidth is set to the range of 1 % to 5 % of the occupied bandwidth 4. The occupied bandwidth is measured with the build-in analyzer function

3.1.6 Results

Test Results		
Mode	Frequency	Bandwidth [Hz]
Tx	1627.500 MHz	514.7
Tx	1643.500 MHz	507.7
Tx	1659.500 MHz	507.5

Occupied Bandwidth FCC 2.1049

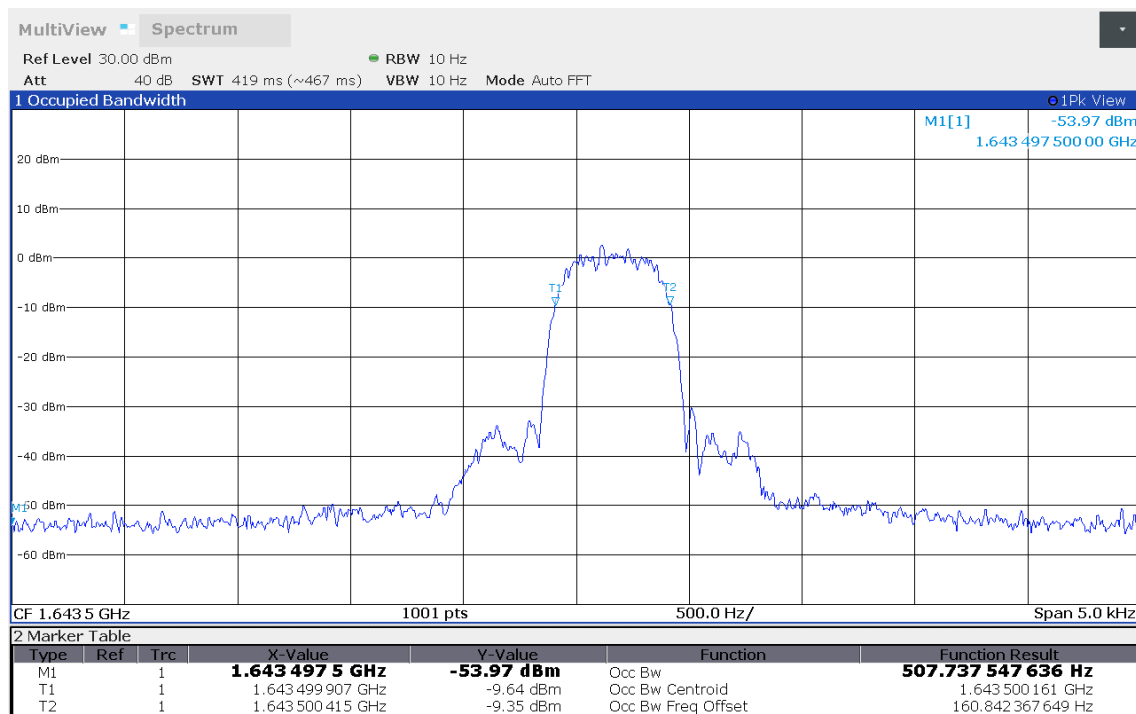
Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000239
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2021-11-26
 Operating Conditions: Tnom/Vnom
 Mode: 1627.5 MHz



10:05:51 26.11.2021

Occupied Bandwidth FCC 2.1049

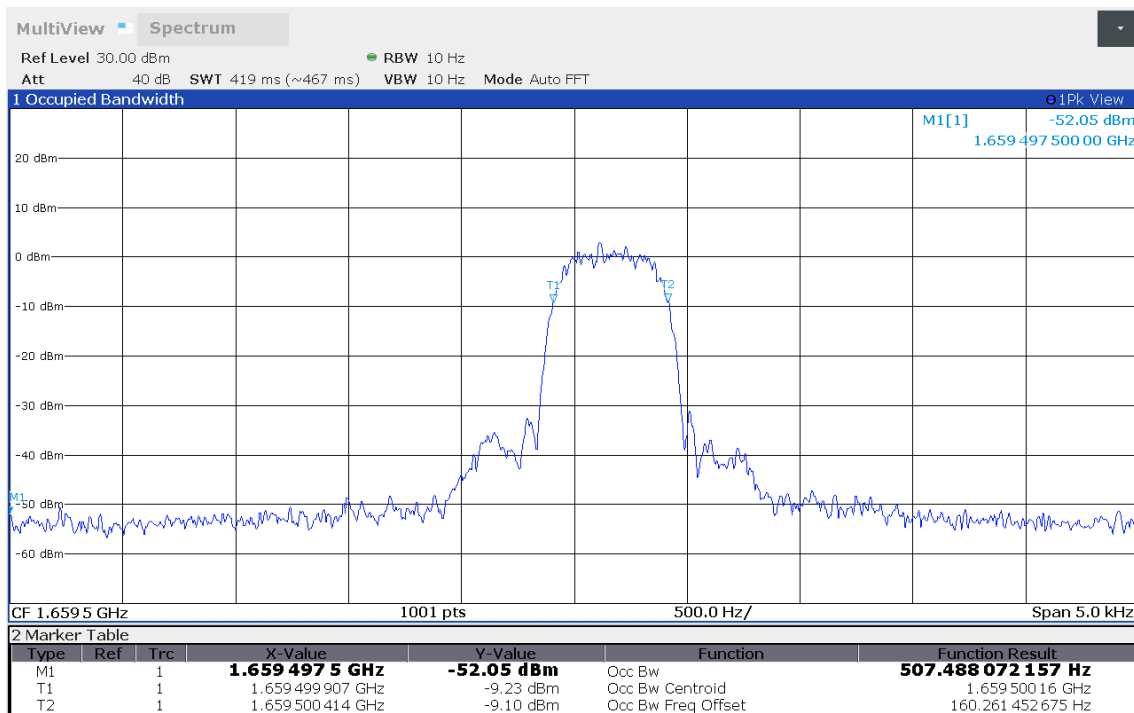
Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000239
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2021-11-26
 Operating Conditions: Tnom/Vnom
 Mode: 1643.5 MHz



10:08:23 26.11.2021

Occupied Bandwidth FCC 2.1049

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000239
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2021-11-26
 Operating Conditions: Tnom/Vnom
 Mode: 1659.5 MHz



10:09:49 26.11.2021

3.2 Test Conditions and Results - Output power

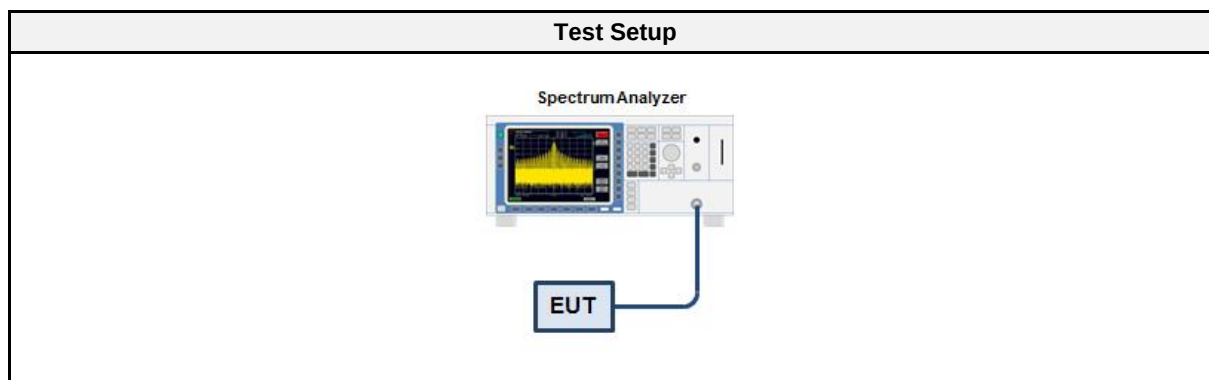
3.2.1 Information

Test Information	
Reference	47 CFR § 25.204; 47 CFR § 2.1046
Measurement Method	ANSI C63.26:2015 5.2
Measurement Uncertainty	± 2.86 dB
Operator	Toralf Jahn
Date	2022-01-13

3.2.2 Limits

Limits
40 dBW / 4 kHz

3.2.3 Setup



3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07

3.2.5 Procedure

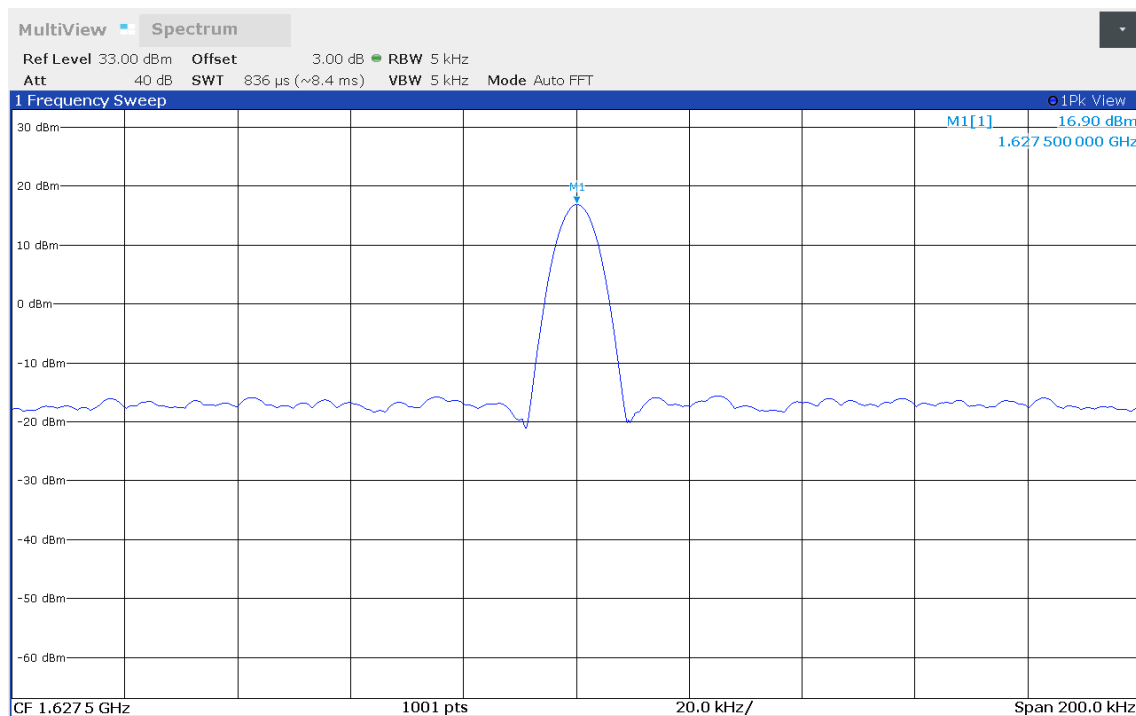
Test Procedure
1. EUT set to test mode 2. Analyzer resolution bandwidth is set to 5 kHz (lowest bandwidth supported by instrument but ≥ 4 kHz) 3. Detector set to peak and max hold 4. Sweep time is set to auto 5. After the trace has stabilized a marker is set to peak of envelope

3.2.6 Results

Test Results					
Channel [MHz]	EIRP power [dBm / 5 kHz]	Conducted power [dBm / 5 kHz]	EIRP power [dBW / 5 kHz]	Limit [dBW / 4 kHz]	Verdict
1627.5	16.90	13.90	-13.10	40	PASS
1643.5	17.49	14.49	-12.51	40	PASS
1659.5	17.75	14.75	-12.25	40	PASS
Comment: All measurement result plots are in EIRP.					

EIRP FCC 25.204

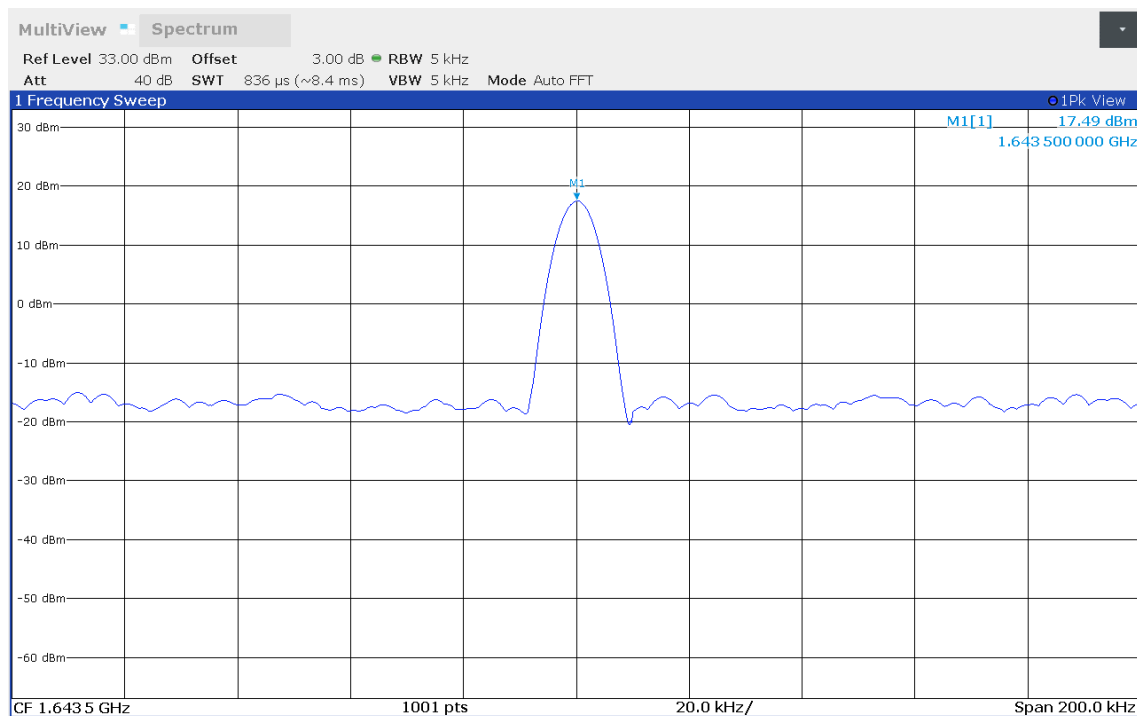
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 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000239
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-01-13
 Operating Conditions: Tnom/Vnom
 Mode: 1627.5 MHz



13:49:12 13.01.2022

EIRP FCC 25.204

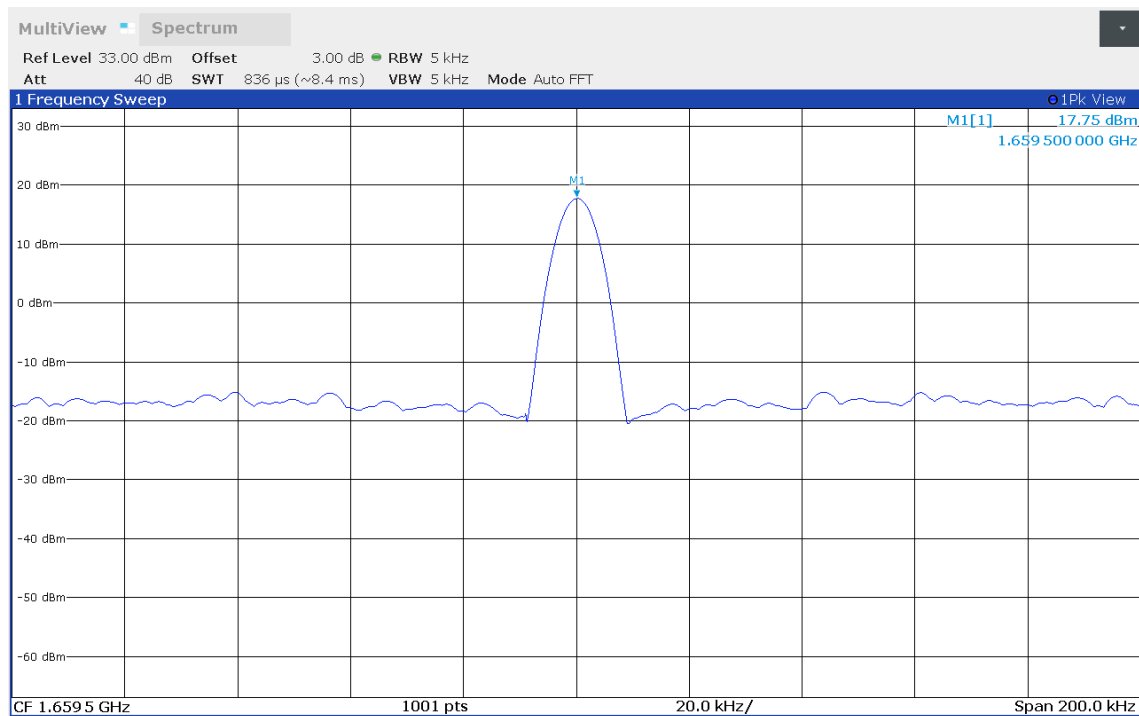
Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000239
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-01-13
 Operating Conditions: Tnom/Vnom
 Mode: 1643.5 MHz



13:52:40 13.01.2022

EIRP FCC 25.204

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000239
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-01-13
 Operating Conditions: Tnom/Vnom
 Mode: 1659.5 MHz



3.3 Test Conditions and Results - Spurious emissions at antenna terminal

3.3.1 Information

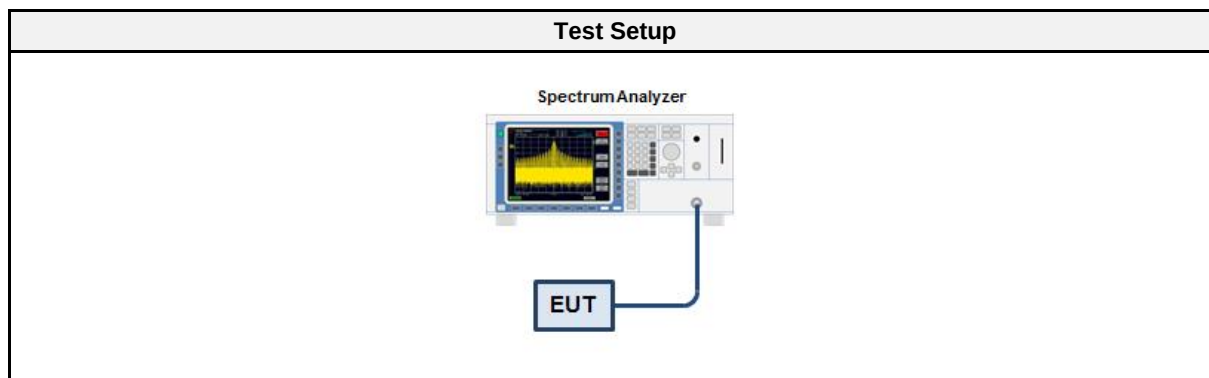
Test Information	
Reference	47 CFR § 25.202(f); 47 CFR § 25.216; 47 CFR § 2.1051
Measurement Uncertainty	± 4.25 dB
Measurement Method	ANSI C63.26:2015 5.7
Operator	Toralf Jahn, Florian Voigt
Date	2022-01-19 + 2022-01-31

3.3.2 Limits

Limits - § 25.202(f)				
Frequency range [MHz]	Detector	Bandwidth	Attenuation [dB]	Limit [dBm]
-	RMS	4 kHz	$43+10 \cdot \log_{10}(P[W])$	-13
CCF + 0.5·ABW to CCF + 1.0·ABW CCF - 0.5·ABW to CCF - 1.0·ABW	RMS	4 kHz	25	P[dBm] - 25
CCF + 1.0·ABW to CCF + 2.5·ABW CCF - 1.0·ABW to CCF - 2.5·ABW	RMS	4 kHz	35	P[dBm] - 35
CCF: Channel center frequency ABW: Authorized bandwidth P: Measured conducted transmitter output power				

Limits - § 25.216				
Frequency range [MHz]	Mode	Detector	Bandwidth	Limit [dBW EIRP]
1559 to 1605	Tx	RMS	1 MHz	-70
1605 to 1610	Tx	RMS	1 MHz	-70 to -46 linearly interpolated
1559 to 1605	Tx	RMS	700 Hz	-80
1605 to 1610	Tx	RMS	700 Hz	-80 to -56 linearly interpolated
1559 to 1610	Idle	RMS	1 MHz	-80
Comment: All measurement result plots for § 25.216 are in EIRP.				

3.3.3 Setup



3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07

3.3.5 Procedure

Test Procedure - FCC 25.202 (f)(1 and 2)
1. EUT set to test mode 2. RBW is set to 5 kHz and VBW is set to 20 kHz 3. The receiver is set to RMS detection with trace averaging over 100 traces

Test Procedure - FCC 25.202 (f)(3)
1. EUT set to test mode 2. RBW is set to 1 MHz and VBW is set to 3 MHz 3. The receiver is set to peak detection with max hold 4. All significant emissions are measured again using the procedure above for 25.202(f)(1 and 2)

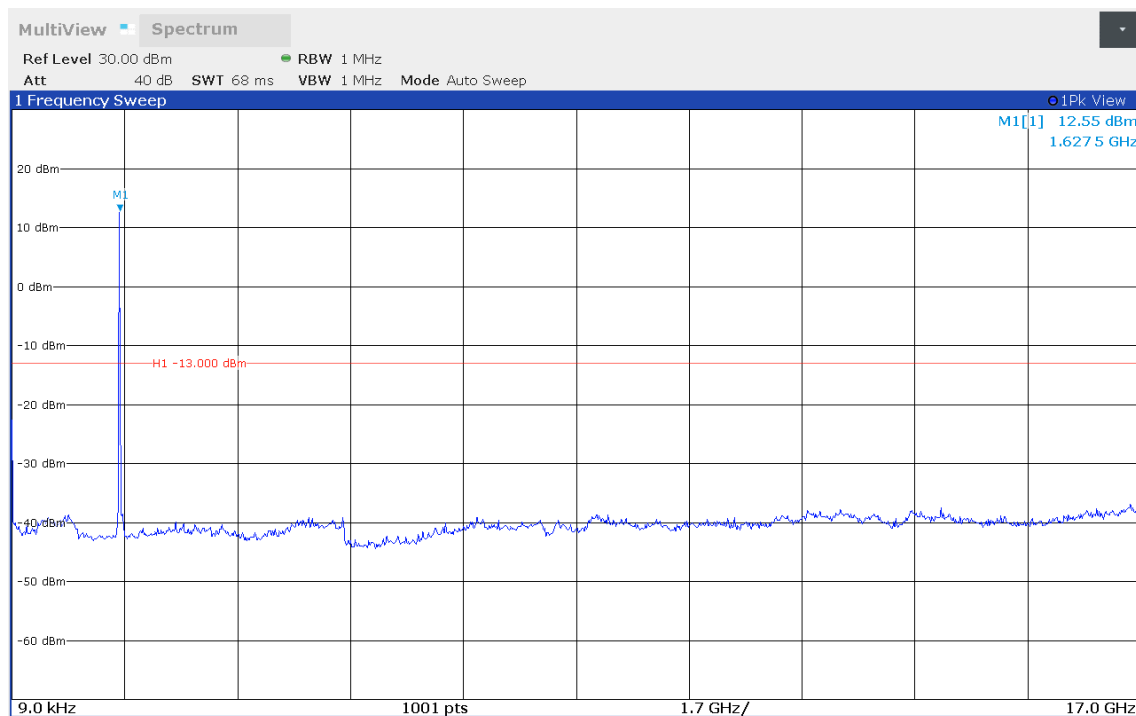
Test Procedure - FCC 25.216
1. EUT set to test mode 2. RBW is set to 1 MHz and VBW is set to 3 MHz or RBW is set to 1 kHz and VBW is set to 3 kHz 3. Sweep time is set so that a measure time of 2 ms for each bin will not be exceeded 4. The receiver is set to RMS detection with max hold

3.3.6 Results

Test Results		
Mode	Channel [MHz]	Verdict
Tx	1627.500	PASS
Tx	1627.543	PASS
Tx	1627.586	PASS
Tx	1643.457	PASS
Tx	1643.500	PASS
Tx	1643.543	PASS
Tx	1659.414	PASS
Tx	1659.457	PASS
Tx	1659.500	PASS

Spurious emissions outside of channel domain FCC 25.202 (f)

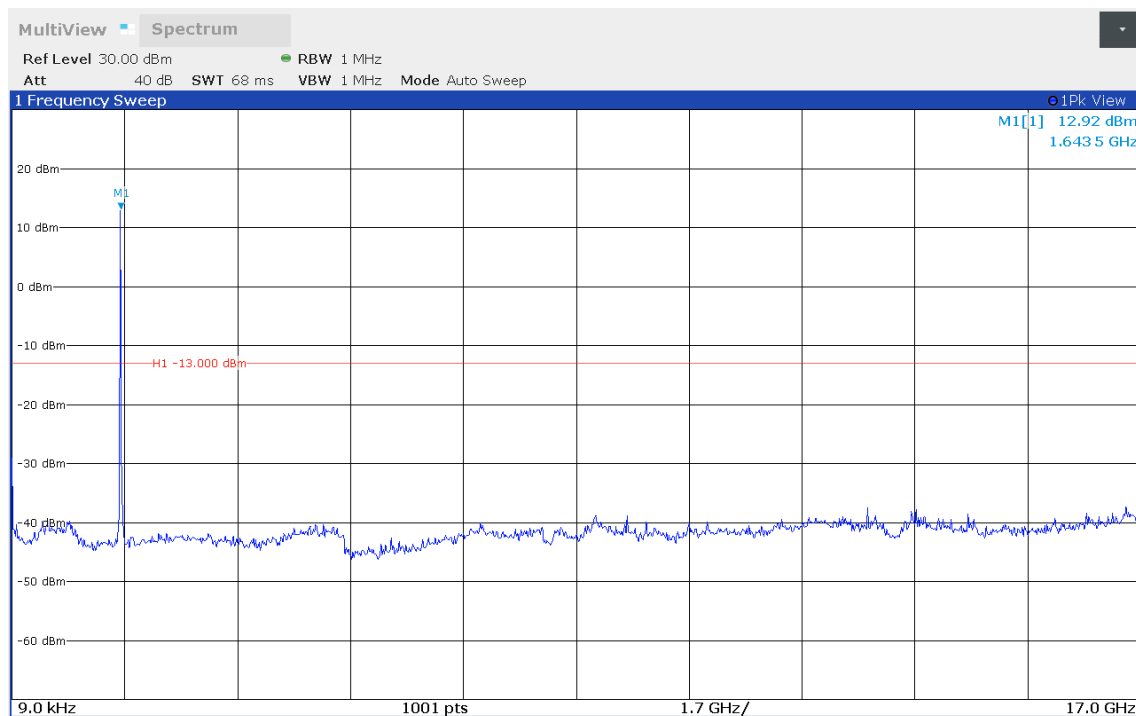
Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000239
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-01-13
 Operating Conditions: Tnom/Vnom
 Mode: 1627.5 MHz



13:29:40 13.01.2022

Spurious emissions outside of channel domain FCC 25.202 (f)

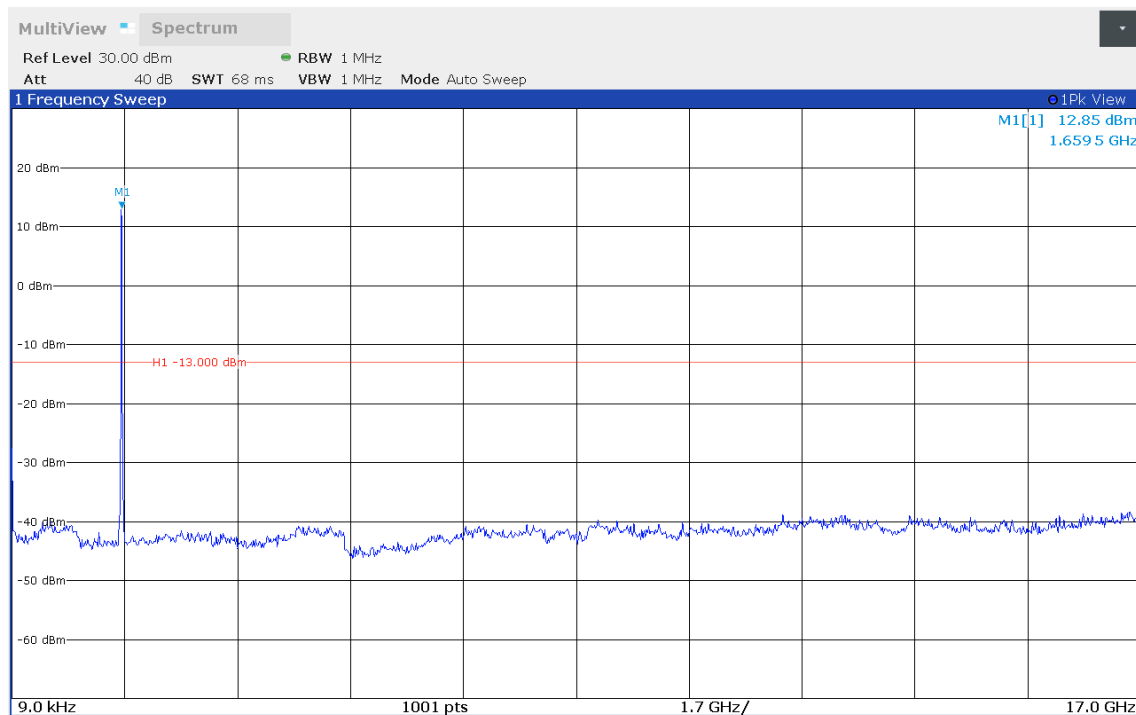
Project Number: G0M-2107-9891
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 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000239
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-01-13
 Operating Conditions: Tnom/Vnom
 Mode: 1643.5 MHz



13:31:41 13.01.2022

Spurious emissions outside of channel domain FCC 25.202 (f)

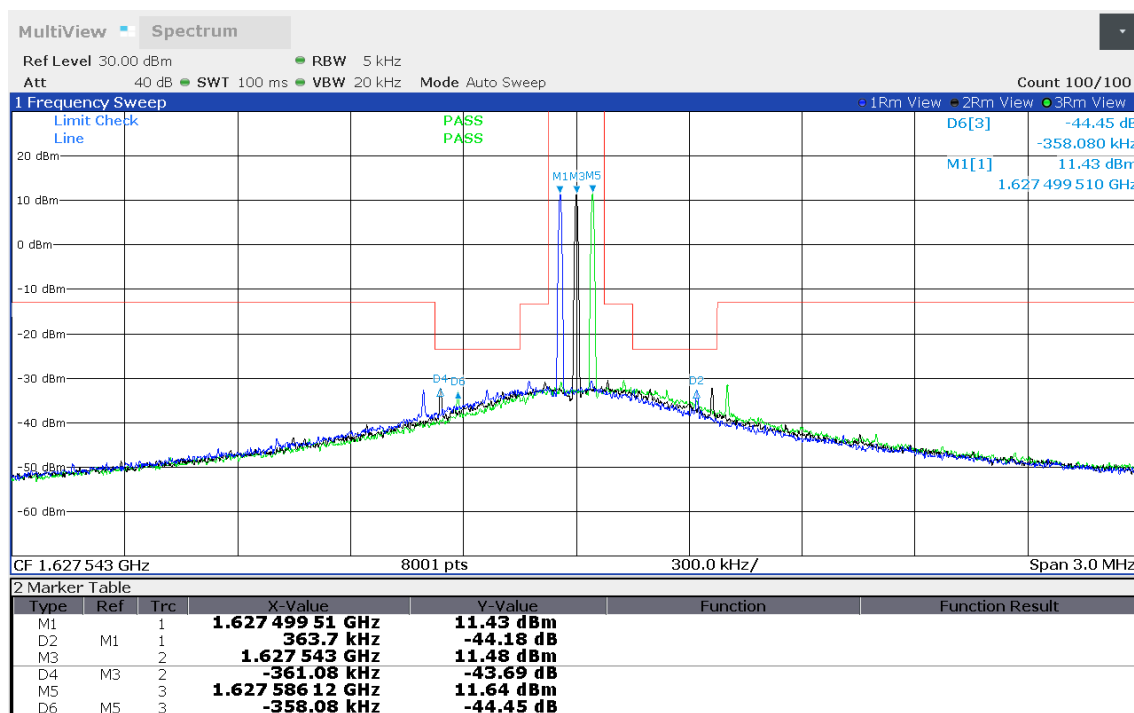
Project Number: G0M-2107-9891
Applicant: ASTROCAST SA
Model Description: L-band radio transceiver satellite communication module
Model: Astronode S+ (carrier board of the Astronode S communication module)
Test Sample ID: SerNo. ANS2114AS1000239
Operator: Toralf Jahn
Test Site: Eurofins Product Service GmbH
Test Date: 2022-01-13
Operating Conditions: Tnom/Vnom
Mode: 1659.5 MHz



13:32:43 13.01.2022

Spurious emissions at channel domain FCC 25.202 (f)

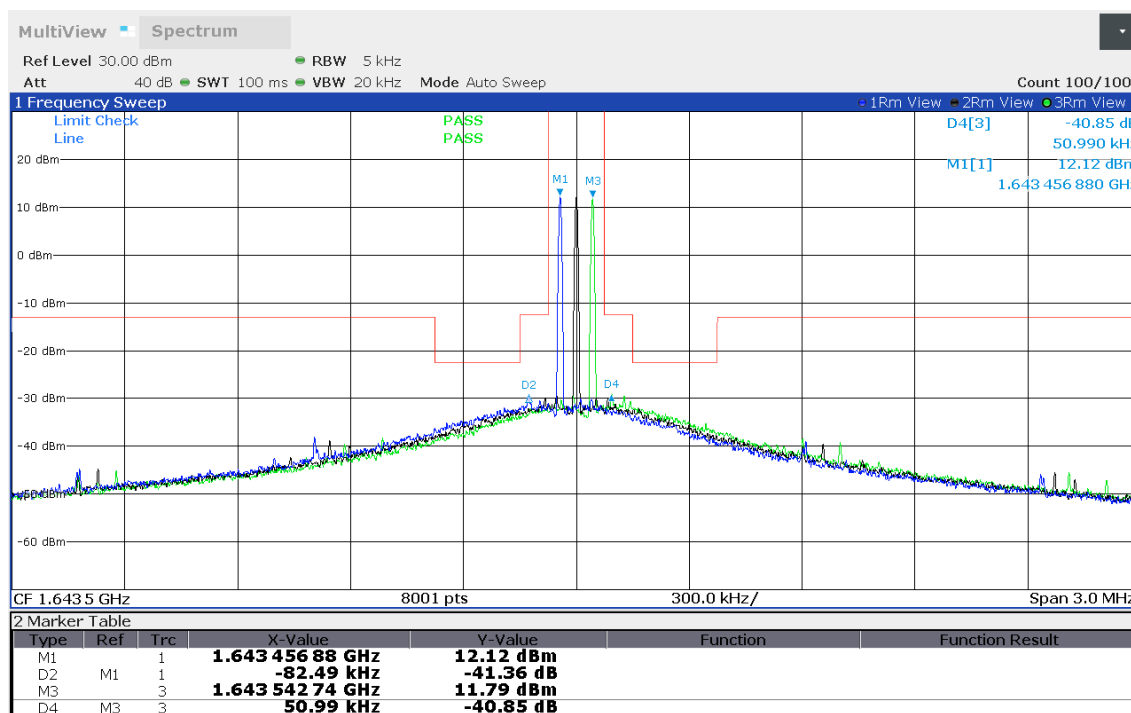
Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000239
 Operator: Florian Voigt
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-01-31
 Operating Conditions: Tnom/Vnom
 Mode: Tx; 1627.500MHz, 1627.543MHz, 1627.586MHz



20:24:11 31.01.2022

Spurious emissions at channel domain FCC 25.202 (f)

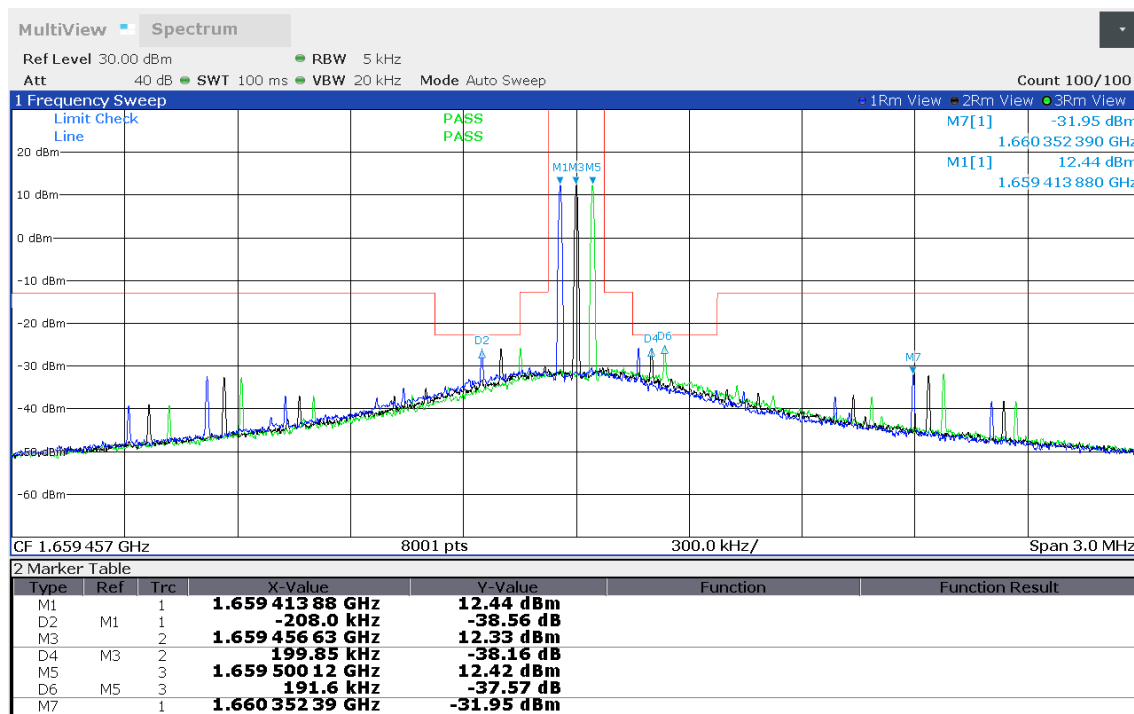
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 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000239
 Operator: Florian Voigt
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-01-31
 Operating Conditions: Tnom/Vnom
 Mode: Tx; 1643.457MHz, 1643.500MHz, 1643.543MHz



20:32:53 31.01.2022

Spurious emissions at channel domain FCC 25.202 (f)

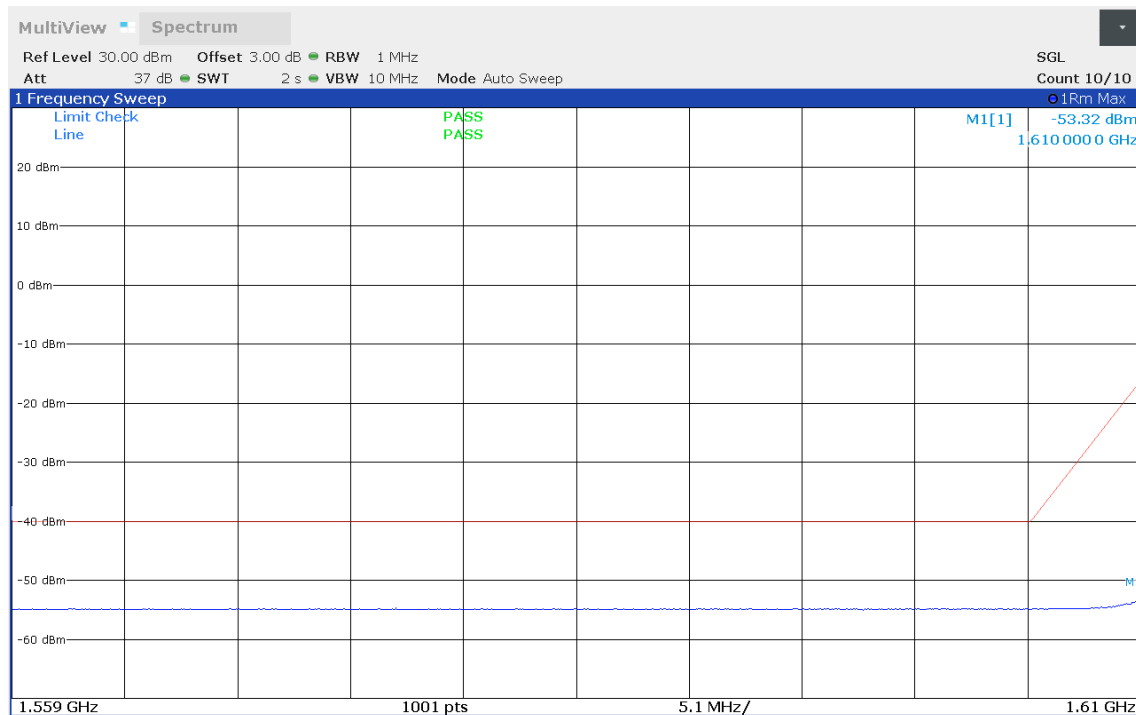
Project Number: G0M-2107-9891
Applicant: ASTROCAST SA
Model Description: L-band radio transceiver satellite communication module
Model: Astronode S+ (carrier board of the Astronode S communication module)
Test Sample ID: SerNo. ANS2114AS1000239
Operator: Florian Voigt
Test Site: Eurofins Product Service GmbH
Test Date: 2022-01-31
Operating Conditions: Tnom/Vnom
Mode: Tx; 1659.414MHz, 1659.457MHz, 1659.500MHz



20:49:22 31.01.2022

Emission limits for protection of aeronautical service

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000239
 Reference Standards: FCC Part 25.216(c)(h)
 Reference Method: FCC Part 25.216(c)(h)
 Operating Conditions: Tnom/Vnom
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-01-13
 Verdict: PASS
 Mode: 1627.5 MHz



15:42:37 13.01.2022

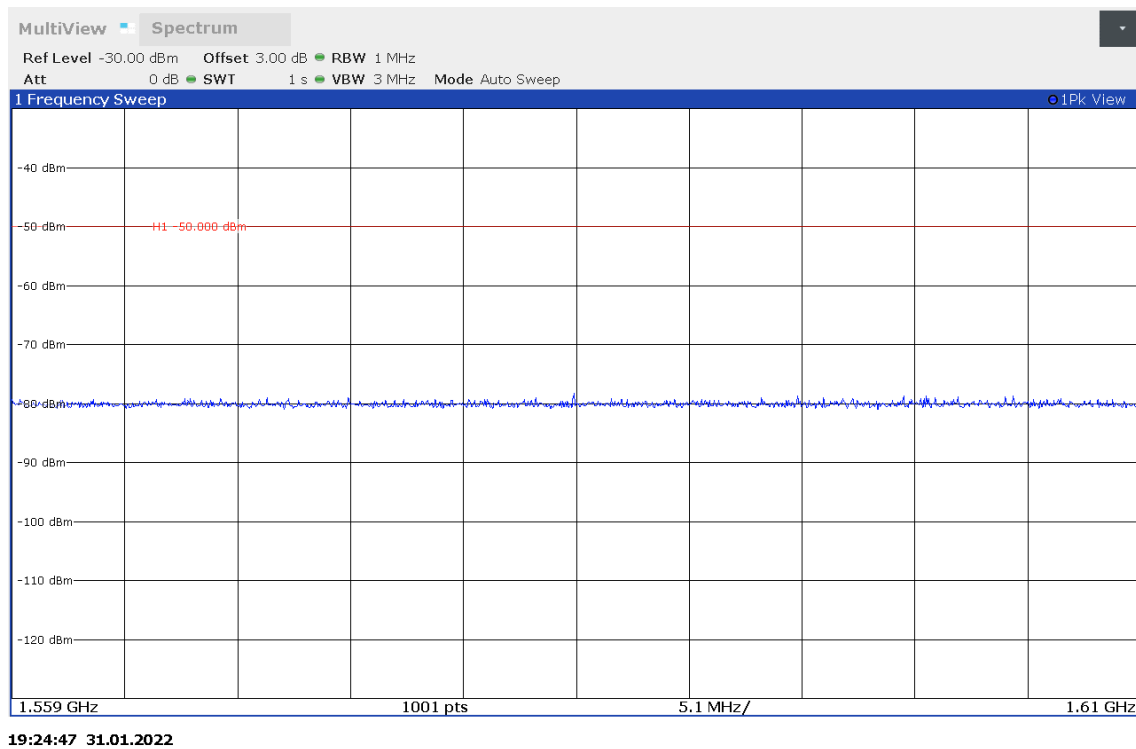
Emission limits for protection of aeronautical service

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000239
 Reference Standards: FCC Part 25.216(c)(h)
 Reference Method: FCC Part 25.216(c)(h)
 Operating Conditions: Tnom/Vnom
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-01-13
 Verdict: PASS
 Mode: 1627.5 MHz



Emission limits for protection of aeronautical service - Carrier-off state

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000239
 Operator: Florian Voigt
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-01-31
 Operating Conditions: Tnom/Vnom
 Mode: Idle



3.4 Test Conditions and Results - Spurious emissions radiated

3.4.1 Information

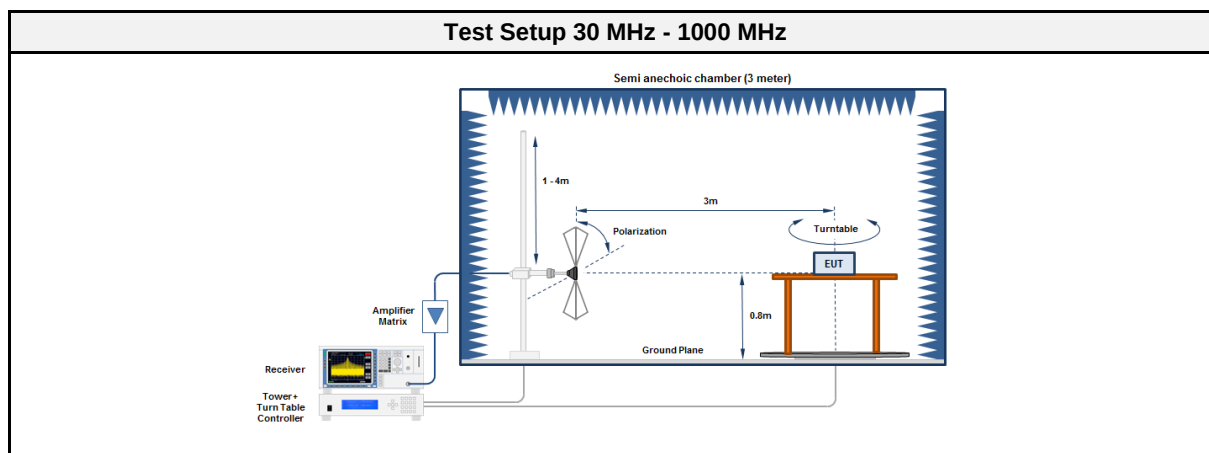
Test Information	
Reference	47 CFR § 25.202(f); 47 CFR § 25.216; 47 CFR § 2.1051;
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.26:2015 5.5
Operator	Florian Voigt
Date	2022-01-24 - 2022-01-28

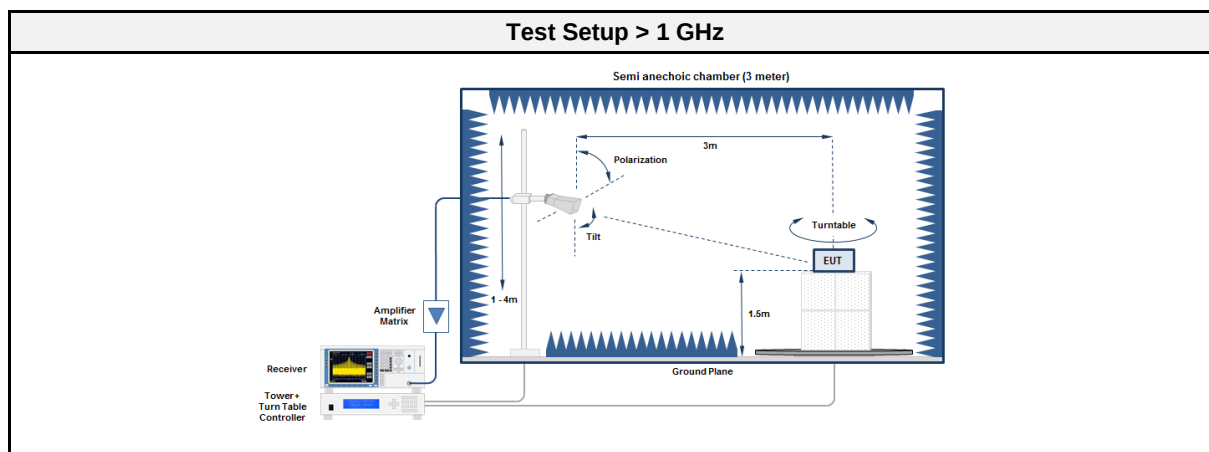
3.4.2 Limits

Limits - § 25.202(f)				
Frequency range [MHz]	Detector	Bandwidth	Attenuation [dB]	Limit [dBm]
-	RMS	4 kHz	$43+10 \cdot \log_{10}(P[W])$	-13
CCF + 0.5·ABW to CCF + 1.0·ABW CCF - 0.5·ABW to CCF - 1.0·ABW	RMS	4 kHz	25	P[dBm] - 25
CCF + 1.0·ABW to CCF + 2.5·ABW CCF - 1.0·ABW to CCF - 2.5·ABW	RMS	4 kHz	35	P[dBm] - 35
CCF: Channel center frequency ABW: Authorized bandwidth P: Measured EIRP Transmitter output power				

Limits - § 25.216				
Frequency range [MHz]	Mode	Detector	Bandwidth	Limit [dBW EIRP]
1559 to 1605	Tx	RMS	1 MHz	-70
1605 to 1610	Tx	RMS	1 MHz	-70 to -46 linearly interpolated
1559 to 1605	Tx	RMS	700 Hz	-80
1605 to 1610	Tx	RMS	700 Hz	-80 to -56 linearly interpolated
1559 to 1610	Idle	RMS	1 MHz	-80

3.4.3 Setup





3.4.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2022-07
Antenna	R&S	HK 116	EF00030	2021-05	2024-05
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2022-07
Spectrum Analyzer	R&S	FSU26	EF01709	2021-02	2022-02
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2019-10	2022-10

3.4.5 Procedure

Test Procedure 30 MHz - 1000 MHz	
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector	

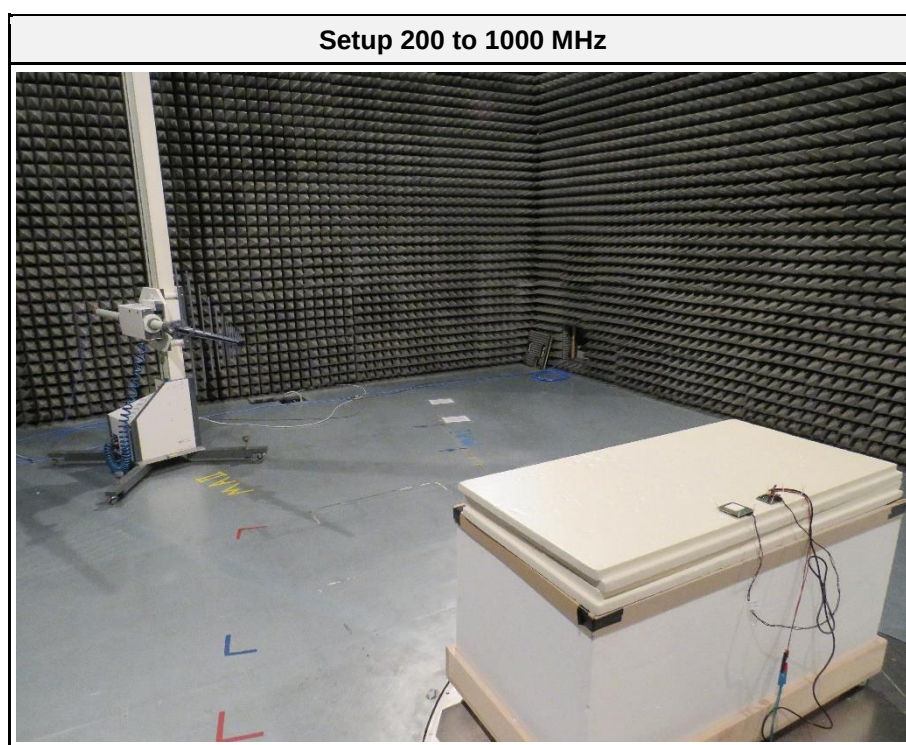
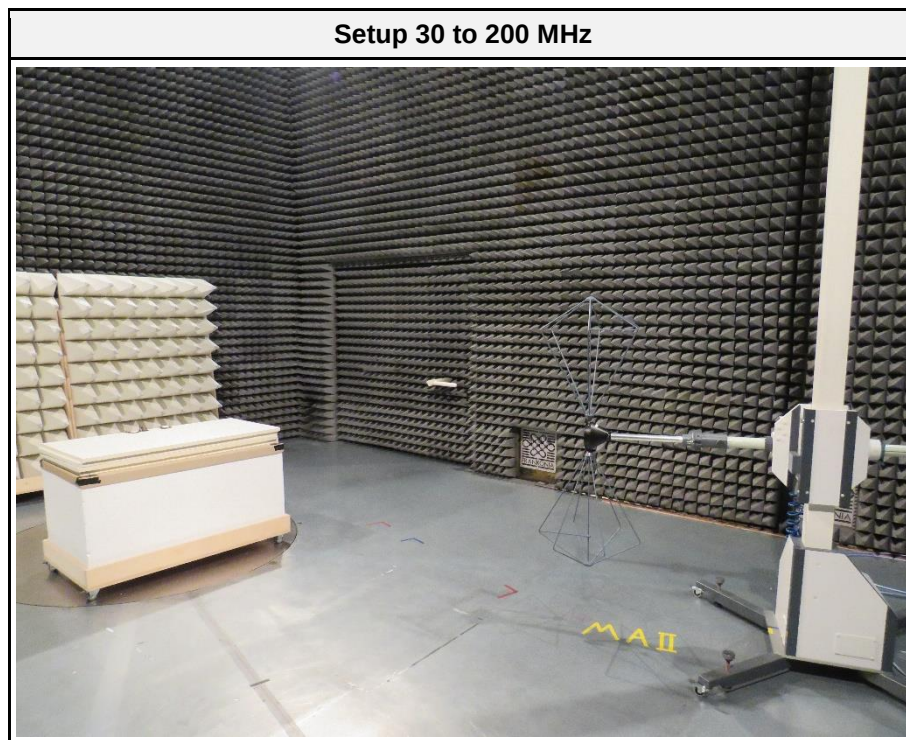
Test Procedure > 1 GHz	
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector	

3.4.6 Results

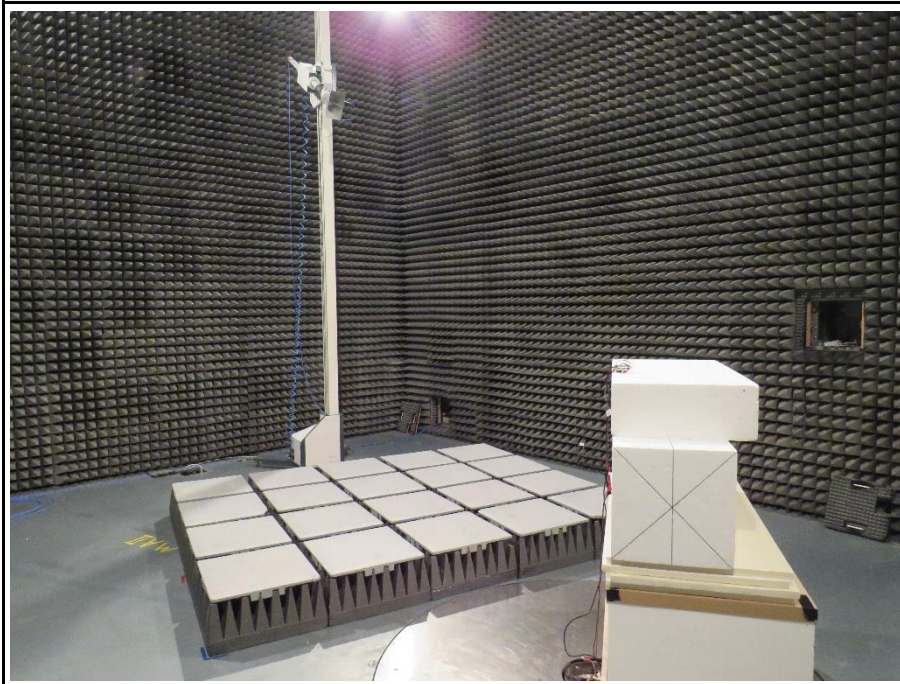
Test Results - § 25.202(f)						
Channel [MHz]	Emission [MHz]	Level [dBm EIRP]	Det.	Pol.	Limit [dBm EIRP]	Margin [dB]
1627.5	216.04	-70.6 dBm	pk	ver	-13 dBm	-57.62
1627.5	264	-71.0 dBm	pk	ver	-13 dBm	-57.97
1627.5	360.1	-68.3 dBm	pk	hor	-13 dBm	-55.33
1627.5	39.822	-48.3 dBm	pk	ver	-13 dBm	-35.32
1643.5	39.894	-49.4 dBm	pk	ver	-13 dBm	-36.38
1643.5	407.5	-69.4 dBm	pk	hor	-13 dBm	-56.39
1643.5	216.06	-70.8 dBm	pk	ver	-13 dBm	-57.81
1643.5	3287	-40.0 dBm	pk	hor	-13 dBm	-27.00
1659.5	407.98	-67.5 dBm	pk	ver	-13 dBm	-54.46
1659.5	3319	-40.5 dBm	pk	ver	-13 dBm	-27.47
1659.5	39.86	-49.3 dBm	pk	ver	-13 dBm	-36.29
1659.5	216	-70.8 dBm	pk	ver	-13 dBm	-57.84
1659.5	3319	-37.2 dBm	pk	hor	-13 dBm	-24.20
1627.543	1627.343	-24.2 dBm	RMS	hor	-20.4 dBm	-03.81
1627.500	1627.696	-24.1 dBm	RMS	hor	-20.4 dBm	-03.71
1643.543	1643.318	-22.8 dBm	RMS	hor	-19.5 dBm	-03.32
1643.457	1643.698	-24.2 dBm	RMS	hor	-19.5 dBm	-04.66
1659.414	1659.206	-21.7 dBm	RMS	hor	-19.7 dBm	-02.08
1659.414	1659.621	-21.3 dBm	RMS	hor	-19.7 dBm	-01.61
1659.500	1659.693	-21.8 dBm	RMS	hor	-19.7 dBm	-02.14

Test Results - § 25.216						
Channel [MHz]	Emission [MHz]	Level [dBW EIRP]	Det.	Pol.	Limit [dBW EIRP]	Margin [dB]
1643.5	1585	-86.9 dBW	pk	ver	-80 dBW	-06.85
1643.5	1569	-87.3 dBW	pk	ver	-80 dBW	-07.27
1659.5	1590	-87.4 dBW	pk	ver	-80 dBW	-07.35
1659.5	1596	-87.1 dBW	pk	hor	-80 dBW	-07.08
Carrier-Off	1577	-87.5 dBW	pk	hor	-80 dBW	-07.55

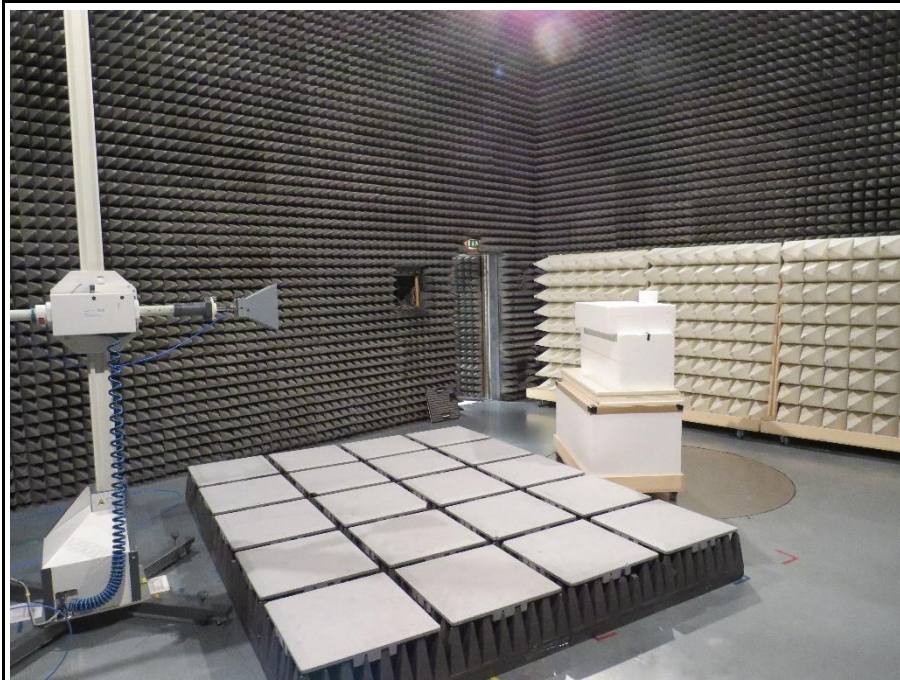
3.4.7 Setup Photos



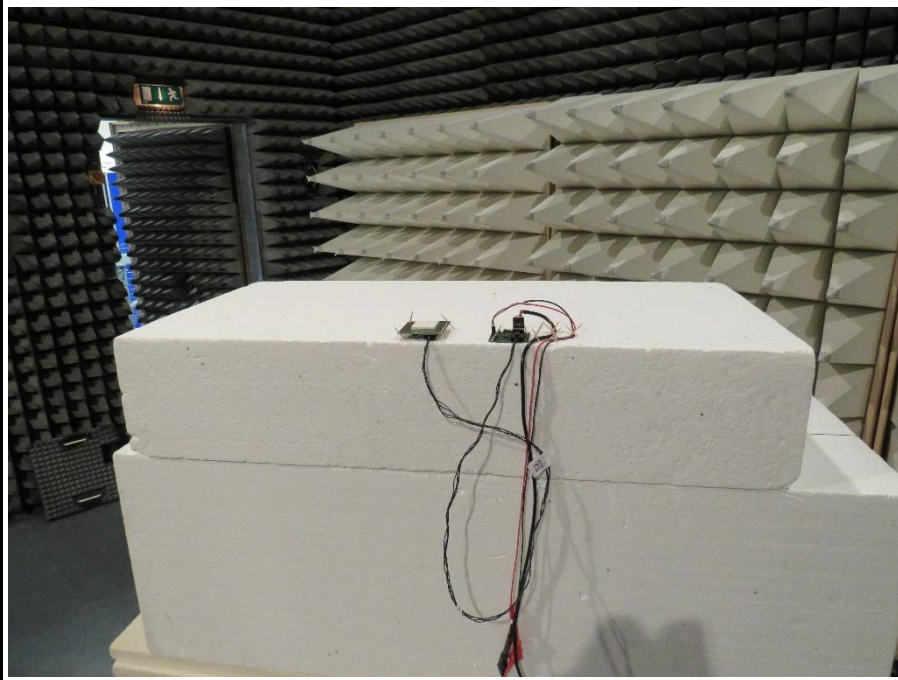
Setup 1 to 17 GHz A



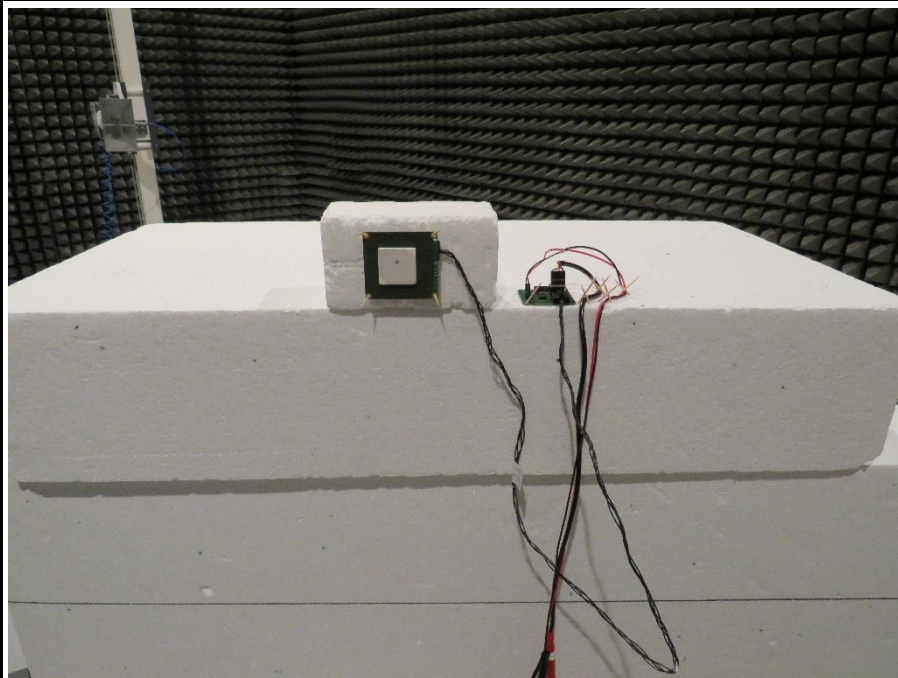
Setup 1 to 17 GHz B



Setup EUT horizontal



Setup EUT vertical



3.5 Test Conditions and Results - Frequency stability

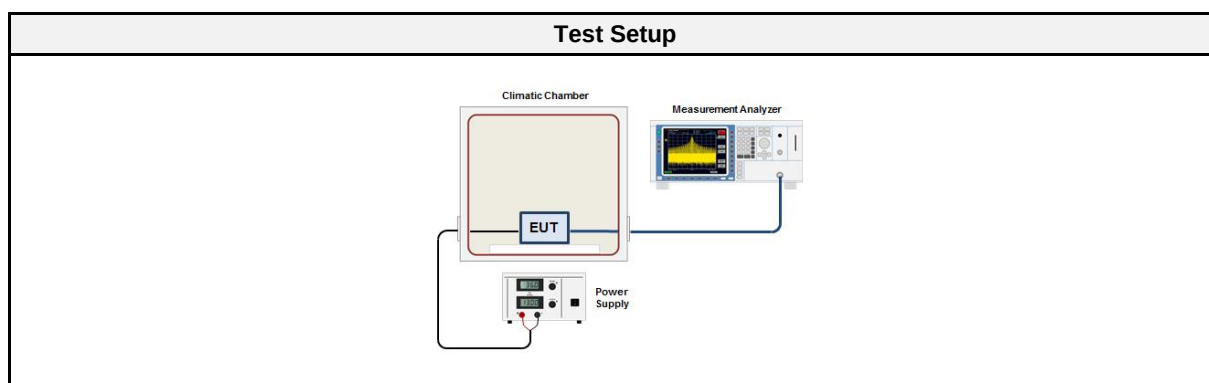
3.5.1 Information

Test Information	
Product Standard Reference	FCC 25.202(d); FCC 2.1055
Measurement Method	ANSI C63.26:2015 5.6
Measurement Uncertainty	± 0.66 PPM
Operator	Toralf Jahn
Date	2022-01-05

3.5.2 Limits

Limits
Frequency error limit
$\pm 0.01\%$ (± 100 ppm)

3.5.3 Setup



3.5.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSW 43	EF00896	2021-07	2022-07
Climatic chamber	Vötsch	VT 4010	EF00134	2021-06	2022-06

3.5.5 Procedure

Test Procedure
1. EUT set to test mode 2. The ambient temperature and supply voltage is set according to measurement conditions 3. Span is set to capture fundamental emission 4. Frequency error is measured with frequency counter measurement function

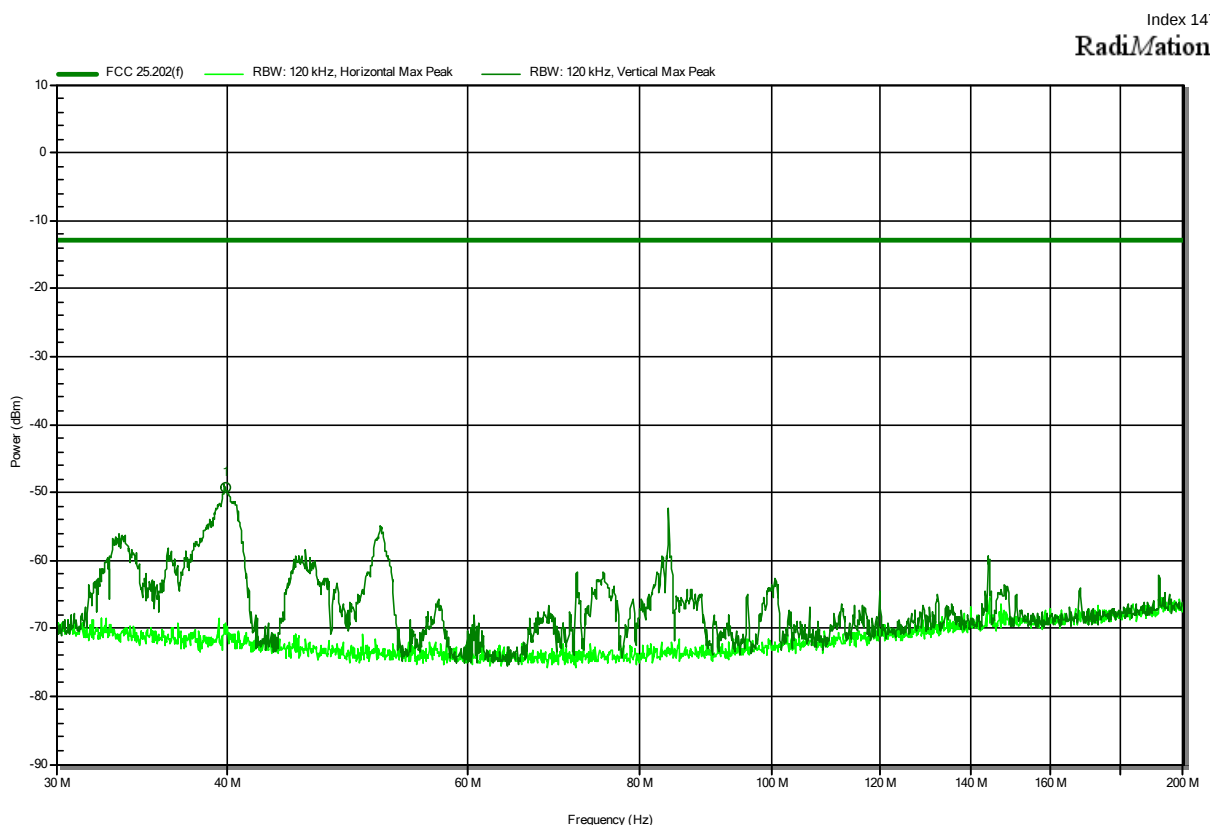
3.5.6 Results

Test Results				
Channel [MHz]	Temperatur [°C]	Voltage [V]	Measured Frequency [MHz]	Error [ppm]
1643.5	25	3.30	1643.500551	0.00
1643.5	25	3.14	1643.500481	-0.04
1643.5	25	3.47	1643.500534	-0.01
1643.5	-20	3.30	1643.499551	-0.61
1643.5	-10	3.30	1643.500293	-0.16
1643.5	0	3.30	1643.500955	0.25
1643.5	10	3.30	1643.500964	0.25
1643.5	20	3.30	1643.500551	0.00
1643.5	30	3.30	1643.500263	-0.18
1643.5	40	3.30	1643.499997	-0.34
1643.5	50	3.30	1643.500062	-0.30
1643.5	60	3.30	1643.499594	-0.58
1643.5	70	3.30	1643.499559	-0.60

ANNEX A Spurious emissions

Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Tx; 1627.5MHz, QPSK; EUT horizontal
 Test Date: 2022-01-27
 Note:



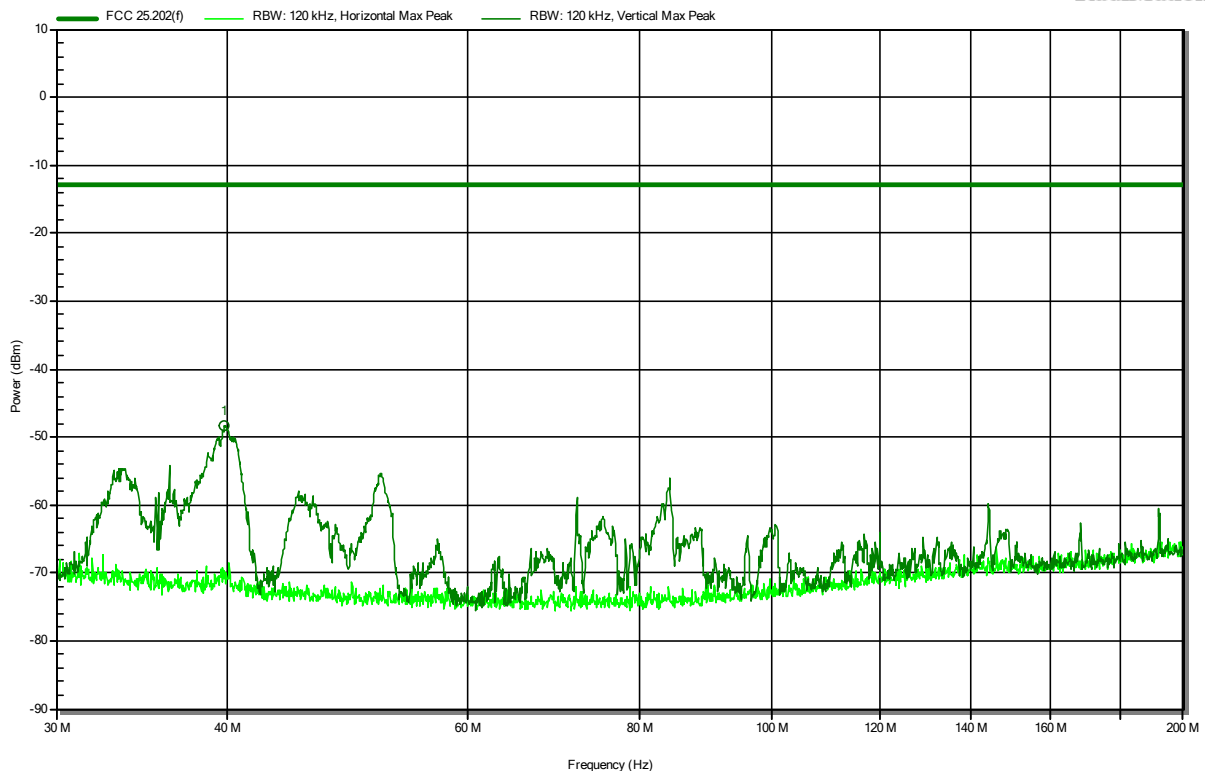
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
39.868 MHz	-49.3 dBm	-13 dBm	-36.33 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Tx; 1627.5MHz, QPSK; EUT vertical
 Test Date: 2022-01-27
 Note:

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RadiMation



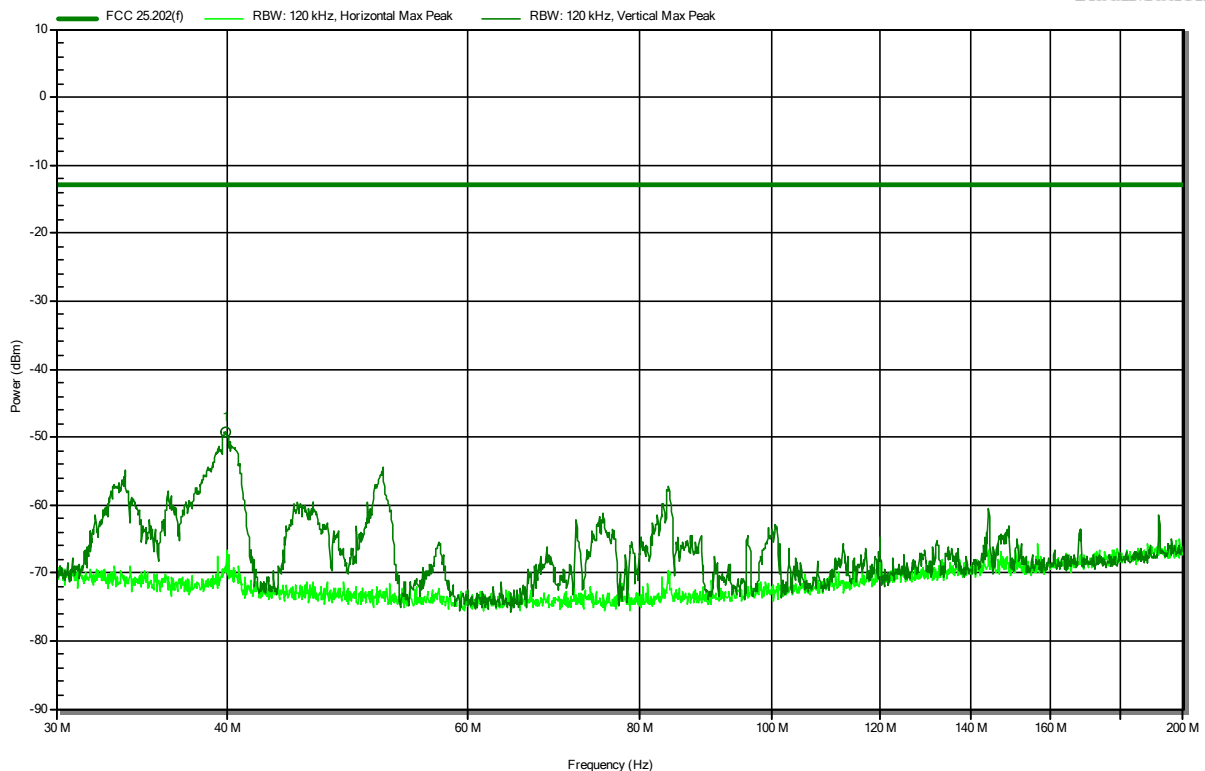
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
39.822 MHz	-48.3 dBm	-13 dBm	-35.32 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Tx; 1643.5MHz, QPSK; EUT horizontal
 Test Date: 2022-01-27
 Note:

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RadiMation



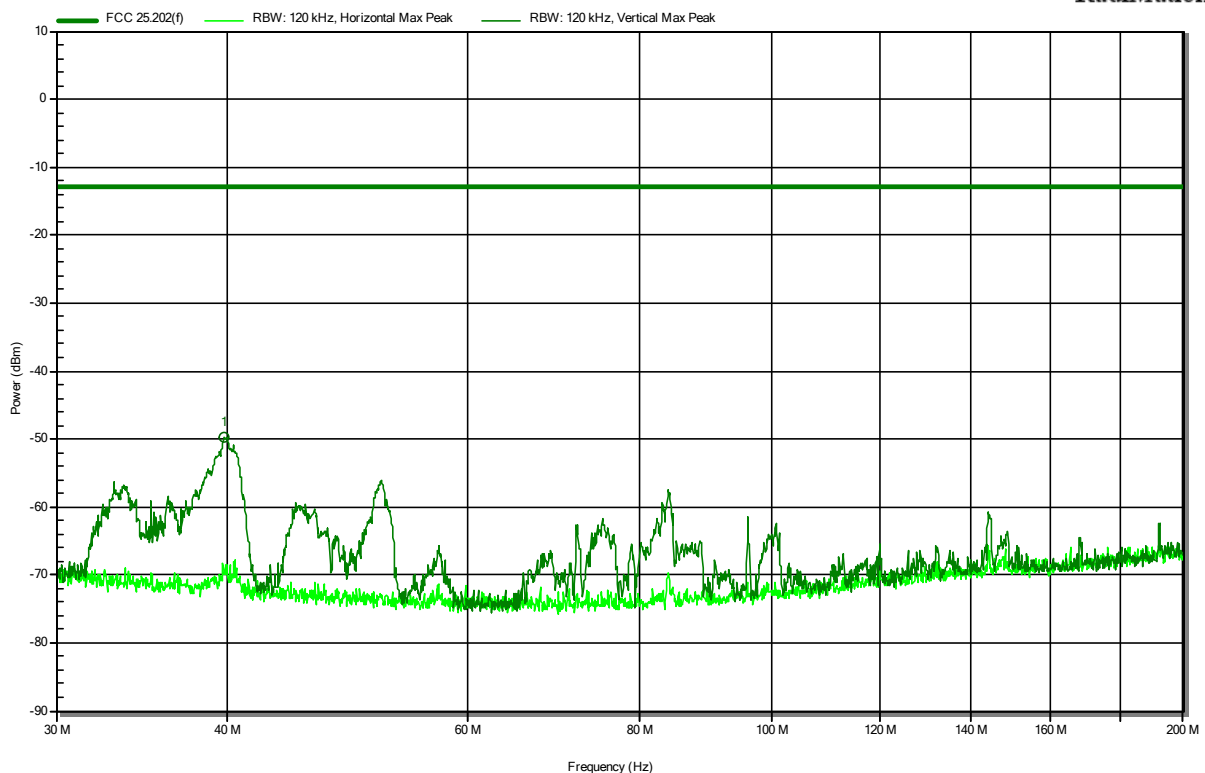
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
39.894 MHz	-49.4 dBm	-13 dBm	-36.38 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Tx; 1643.5MHz, QPSK; EUT vertical
 Test Date: 2022-01-27
 Note:

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RadiMation



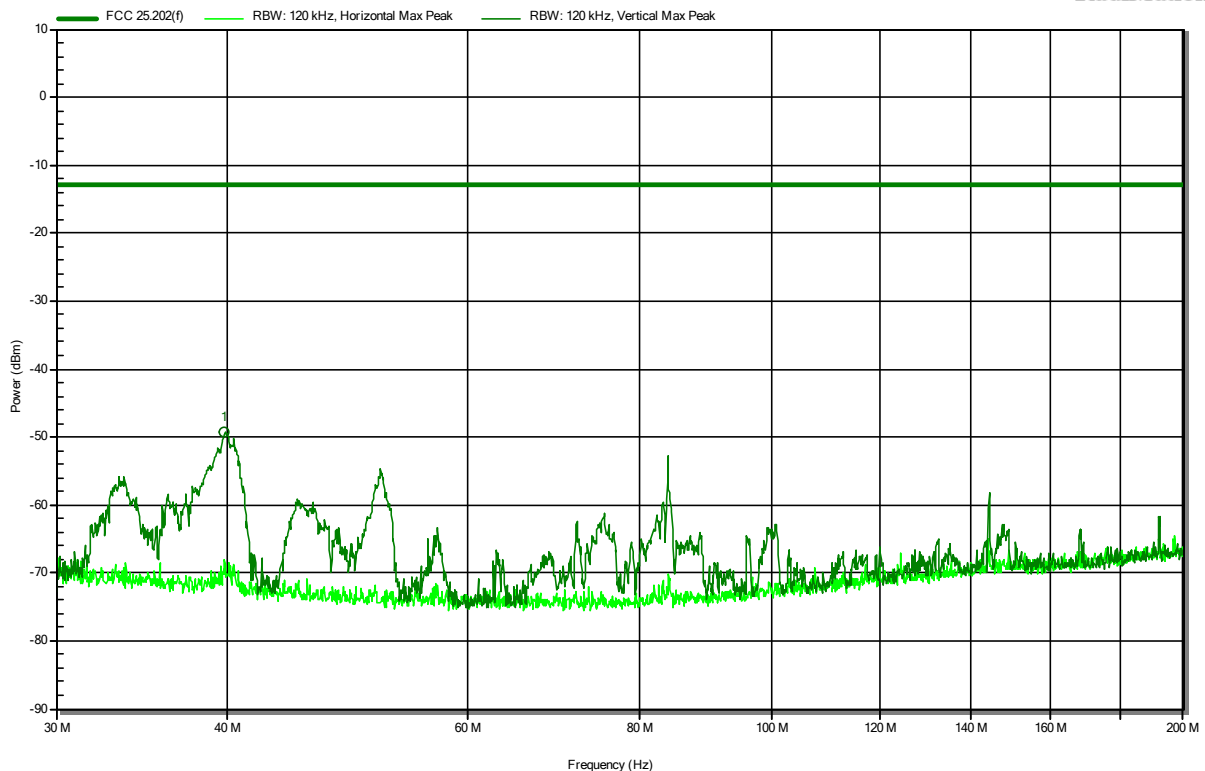
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
39.805 MHz	-49.7 dBm	-13 dBm	-36.69 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Tx; 1659.5MHz, QPSK; EUT horizontal
 Test Date: 2022-01-27
 Note:

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RadiMation



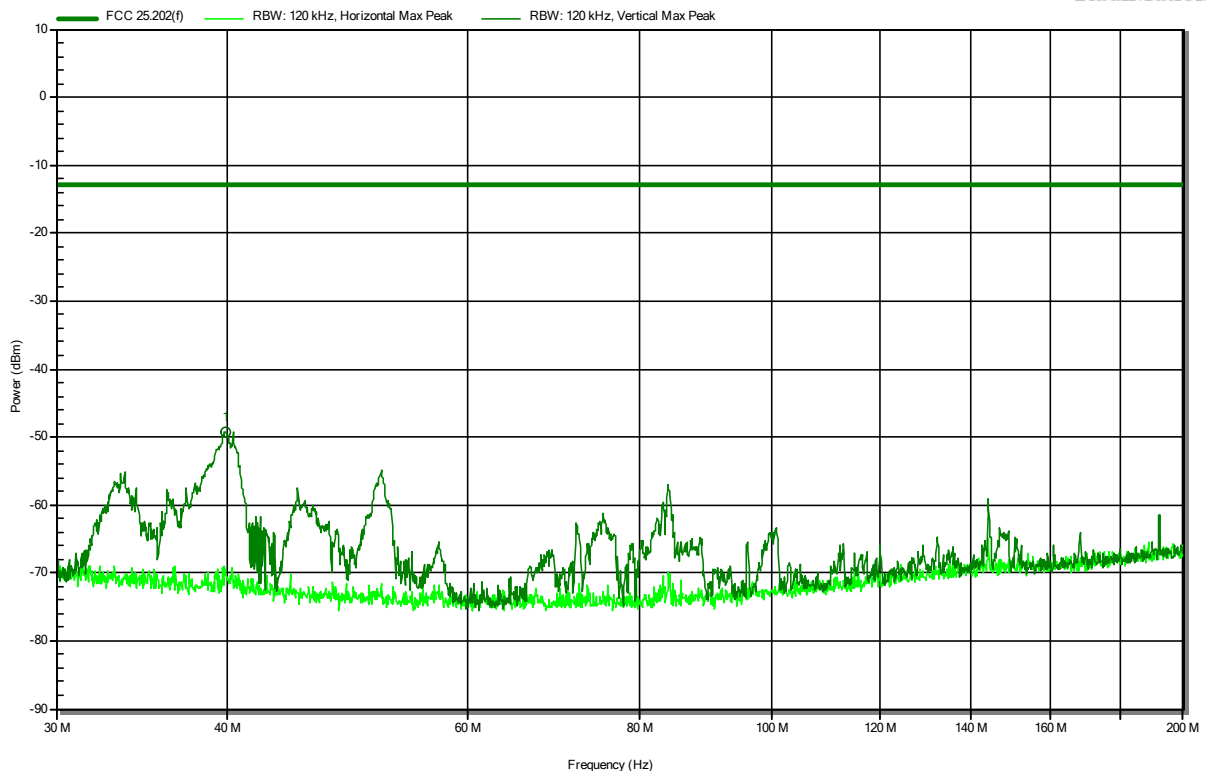
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
39.851 MHz	-49.4 dBm	-13 dBm	-36.38 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Tx; 1659.5MHz, QPSK; EUT vertical
 Test Date: 2022-01-27
 Note:

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RadiMation



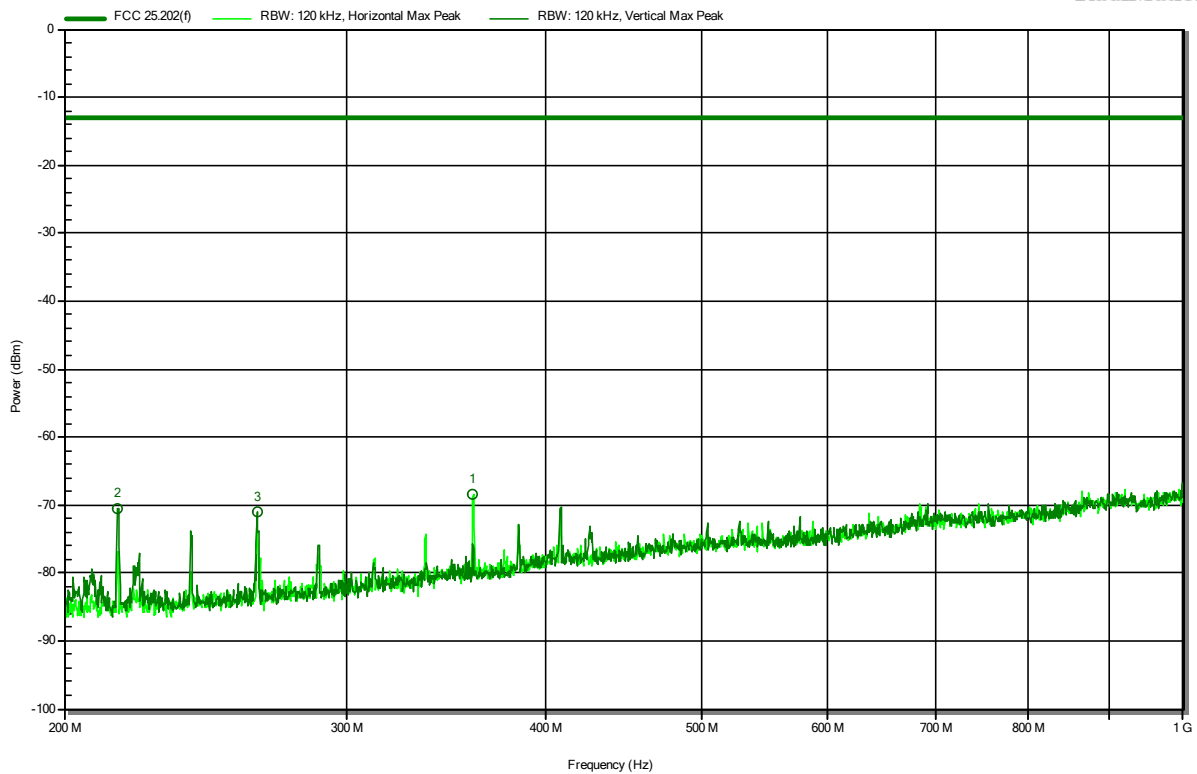
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
39.86 MHz	-49.3 dBm	-13 dBm	-36.29 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HL 223
 Measurement distance: 3 m
 Mode: Tx; 1627.5MHz, QPSK; EUT horizontal
 Test Date: 2022-01-27
 Note:

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RadiMation



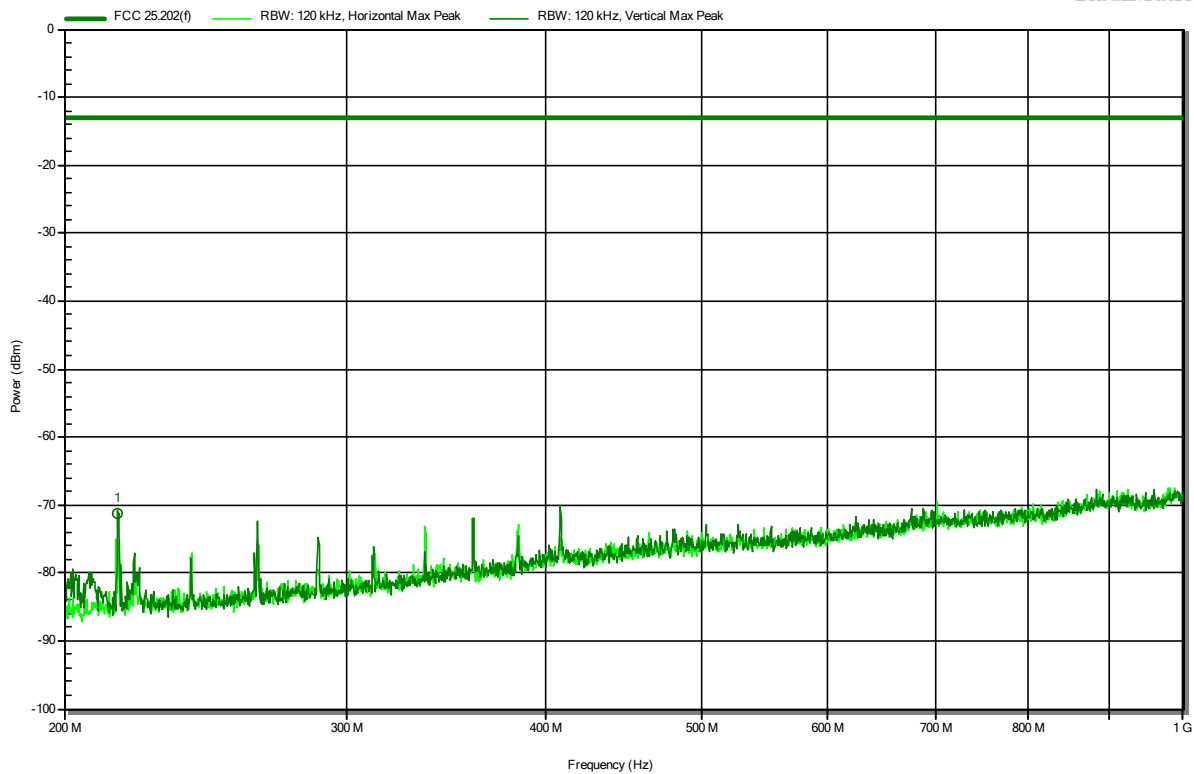
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
216.04 MHz	-70.6 dBm	-13 dBm	-57.62 dB	Pass	Vertical
264 MHz	-71 dBm	-13 dBm	-57.97 dB	Pass	Vertical
360.1 MHz	-68.3 dBm	-13 dBm	-55.33 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HL 223
 Measurement distance: 3 m
 Mode: Tx; 1627.5MHz, QPSK; EUT vertical
 Test Date: 2022-01-27
 Note:

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RadiMation



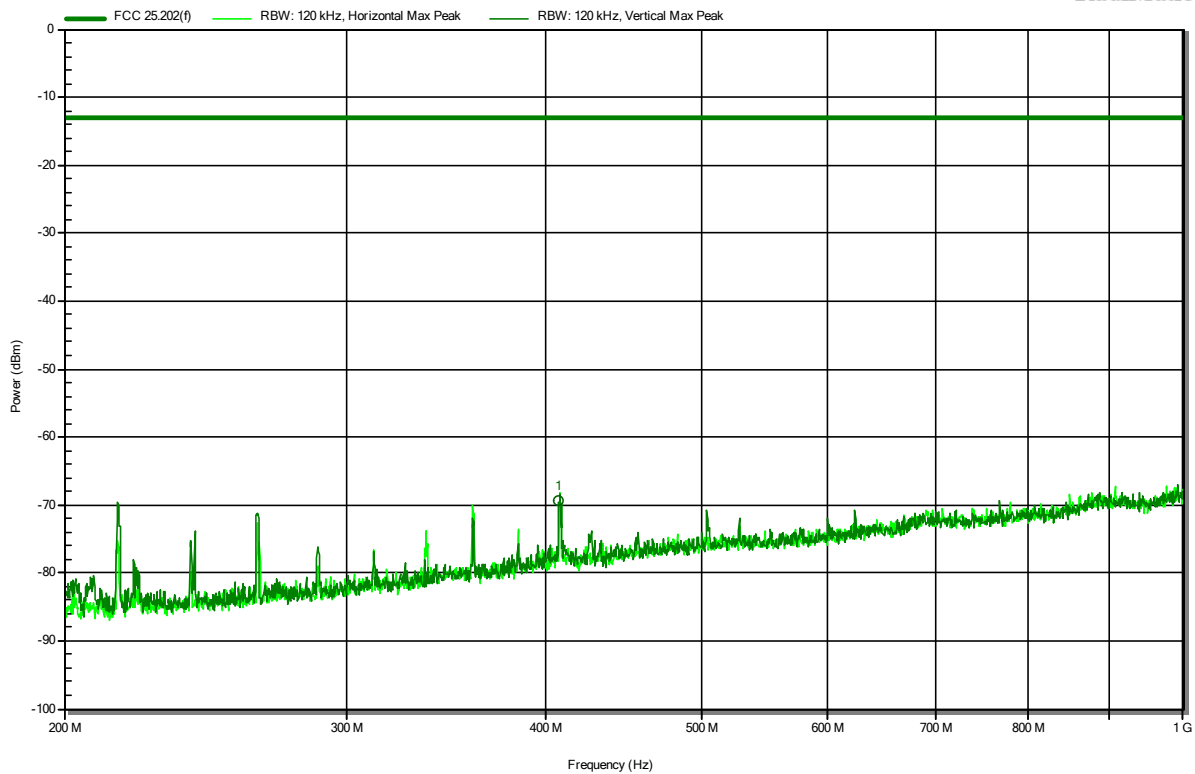
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
216 MHz	-71.1 dBm	-13 dBm	-58.14 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HL 223
 Measurement distance: 3 m
 Mode: Tx; 1643.5MHz, QPSK; EUT horizontal
 Test Date: 2022-01-27
 Note:

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RadiMation



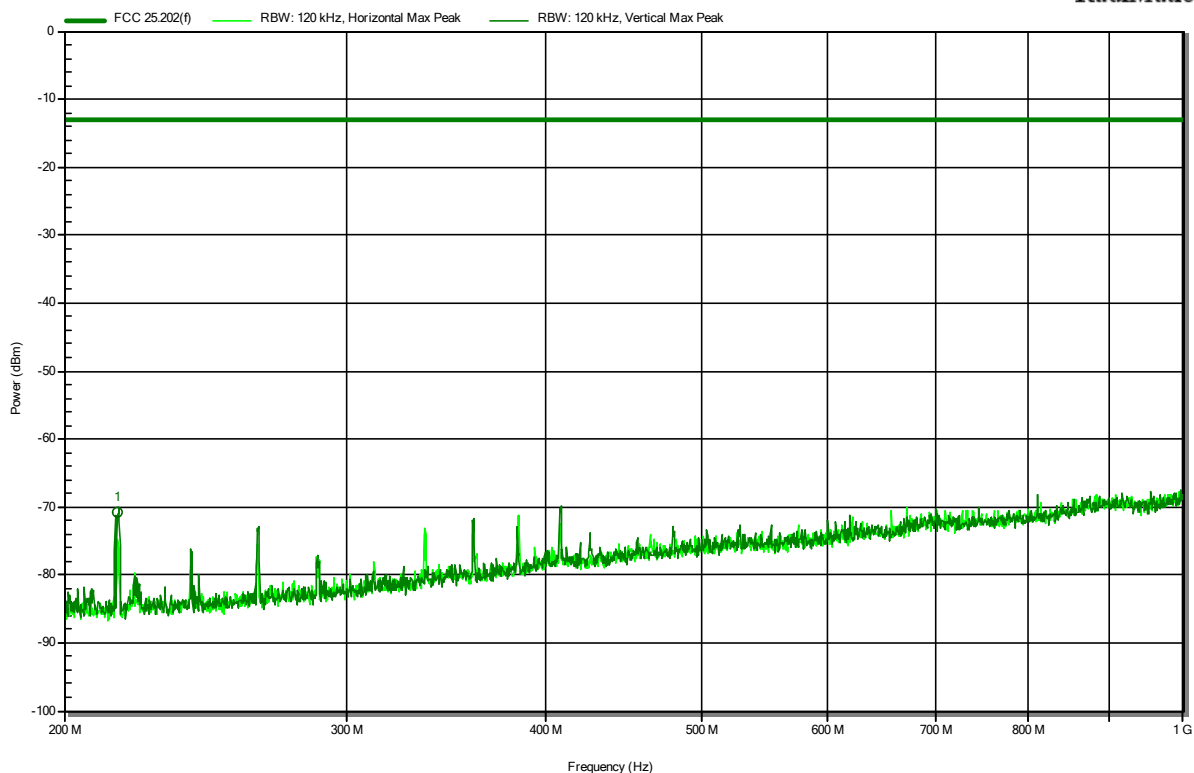
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
407.5 MHz	-69.4 dBm	-13 dBm	-56.39 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HL 223
 Measurement distance: 3 m
 Mode: Tx; 1643.5MHz, QPSK; EUT vertical
 Test Date: 2022-01-27
 Note:

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RadiMation



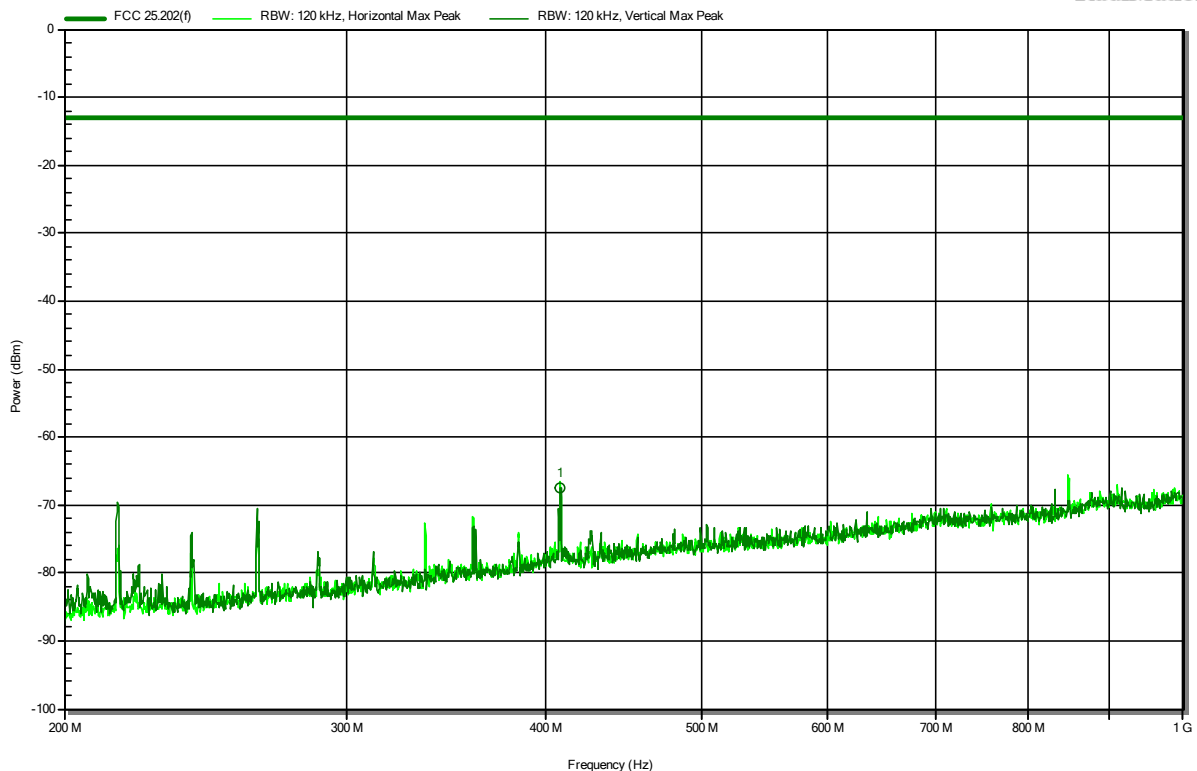
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
216.06 MHz	-70.8 dBm	-13 dBm	-57.81 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HL 223
 Measurement distance: 3 m
 Mode: Tx; 1659.5MHz, QPSK; EUT horizontal
 Test Date: 2022-01-27
 Note:

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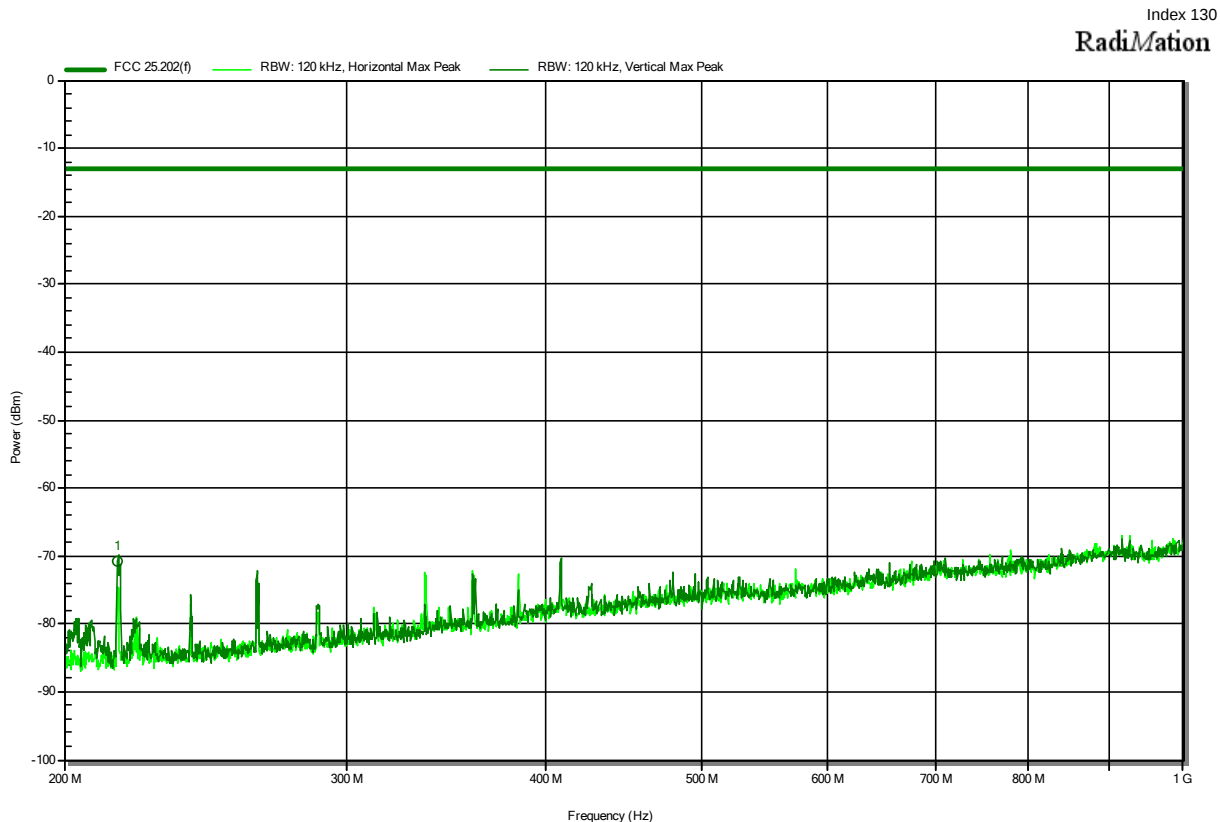
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
407.98 MHz	-67.5 dBm	-13 dBm	-54.46 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR § 25.202

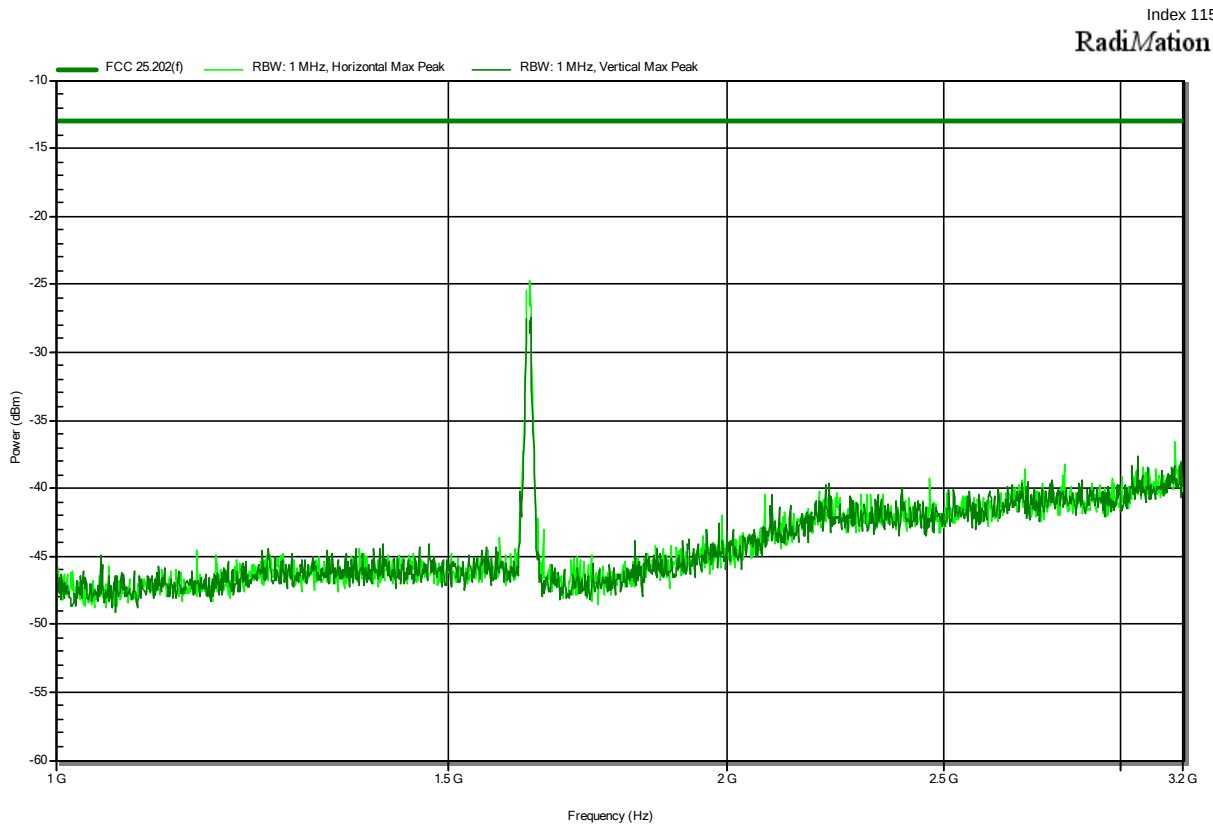
Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HL 223
 Measurement distance: 3 m
 Mode: Tx; 1659.5MHz, QPSK; EUT vertical
 Test Date: 2022-01-27
 Note:



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
216 MHz	-70.8 dBm	-13 dBm	-57.84 dB	Pass	Vertical

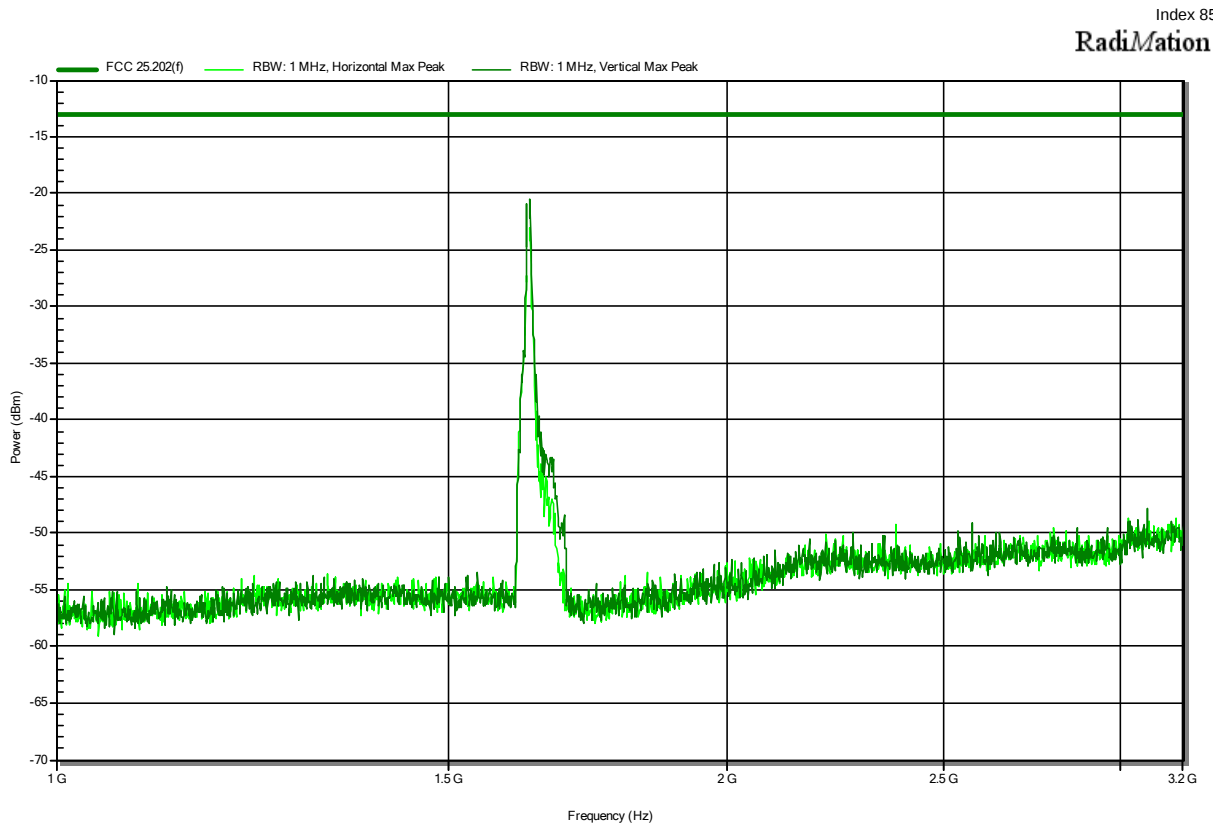
Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1627.5MHz, QPSK; EUT horizontal
 Test Date: 2022-01-26
 Note:



Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1627.5MHz, QPSK; EUT vertical
 Test Date: 2022-01-25
 Note:

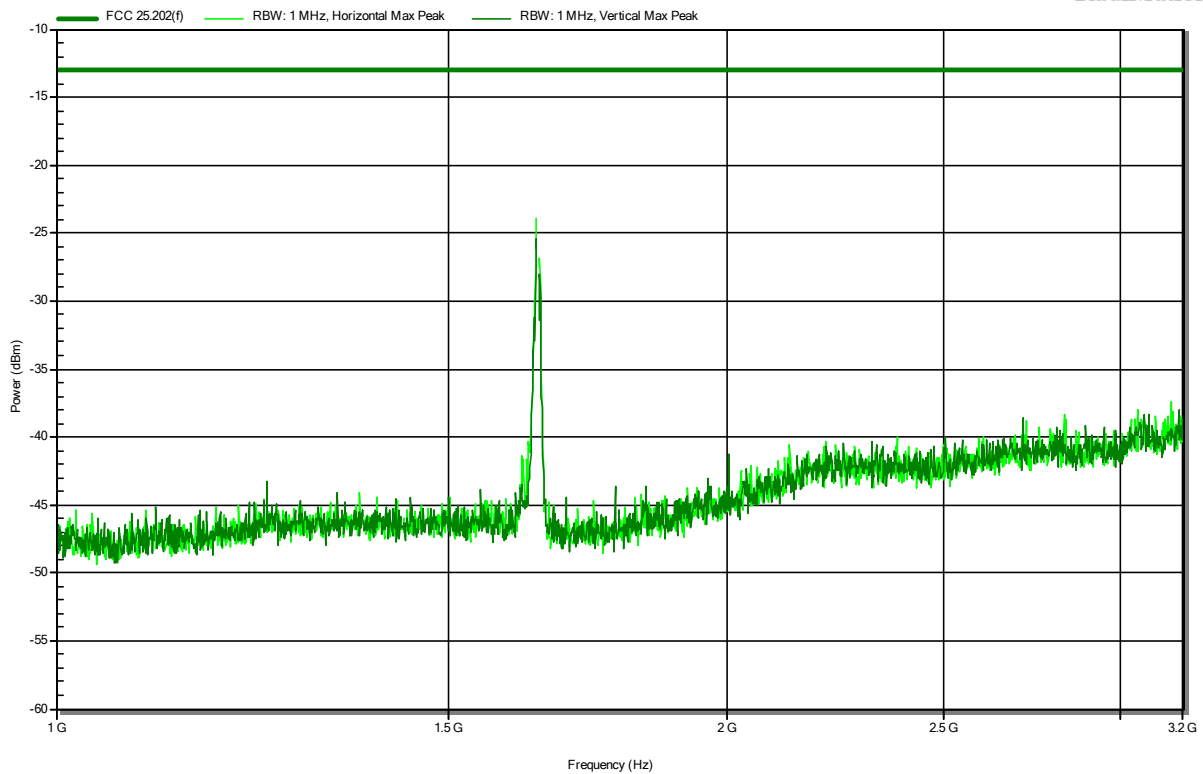


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Project Number: G0M-2107-9891
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 Model Description: L-band radio transceiver satellite communication module
 Model: Astronode S+ (carrier board of the Astronode S communication module)
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 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1643.5MHz, QPSK; EUT horizontal
 Test Date: 2022-01-26
 Note:

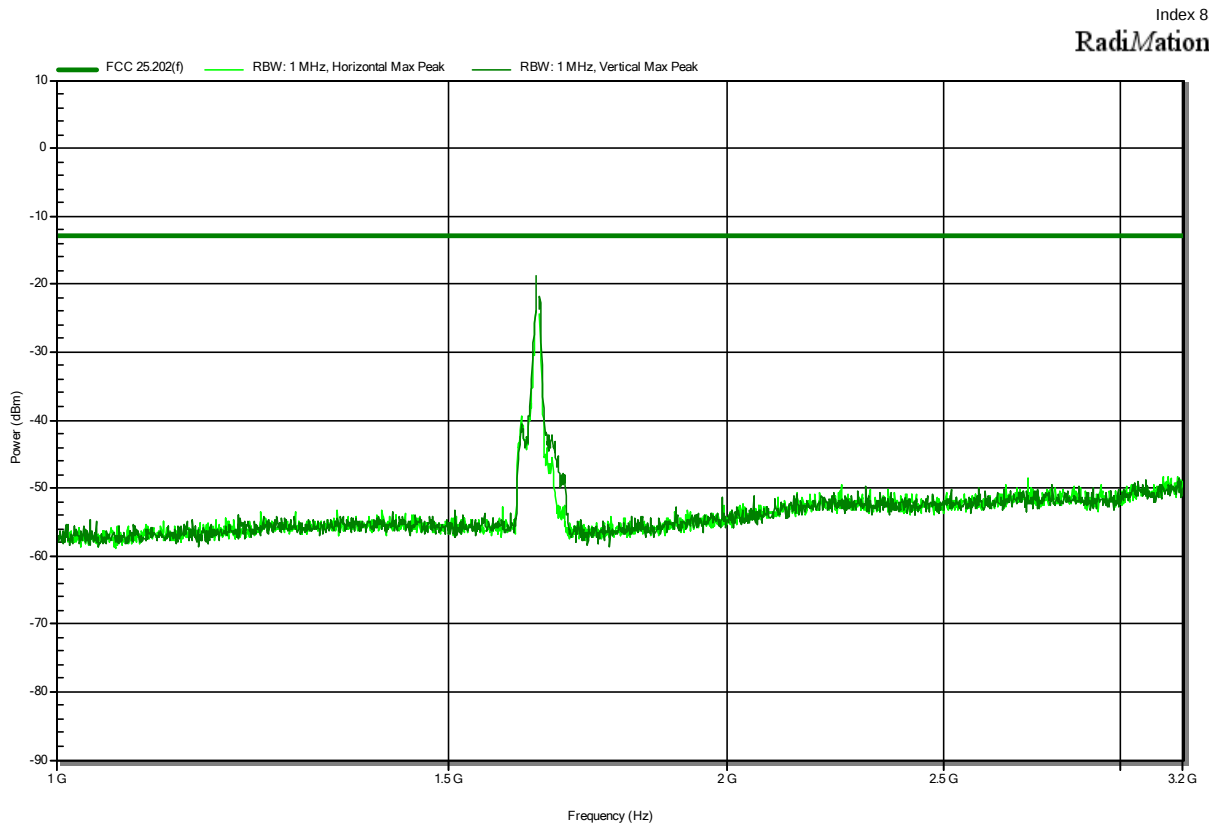
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Radiated Spurious Emissions according to 47 CFR § 25.202

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 Applicant: ASTROCAST SA
 Model Description: L-band radio transceiver satellite communication module
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 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1643.5MHz, QPSK; EUT vertical
 Test Date: 2022-01-25
 Note:

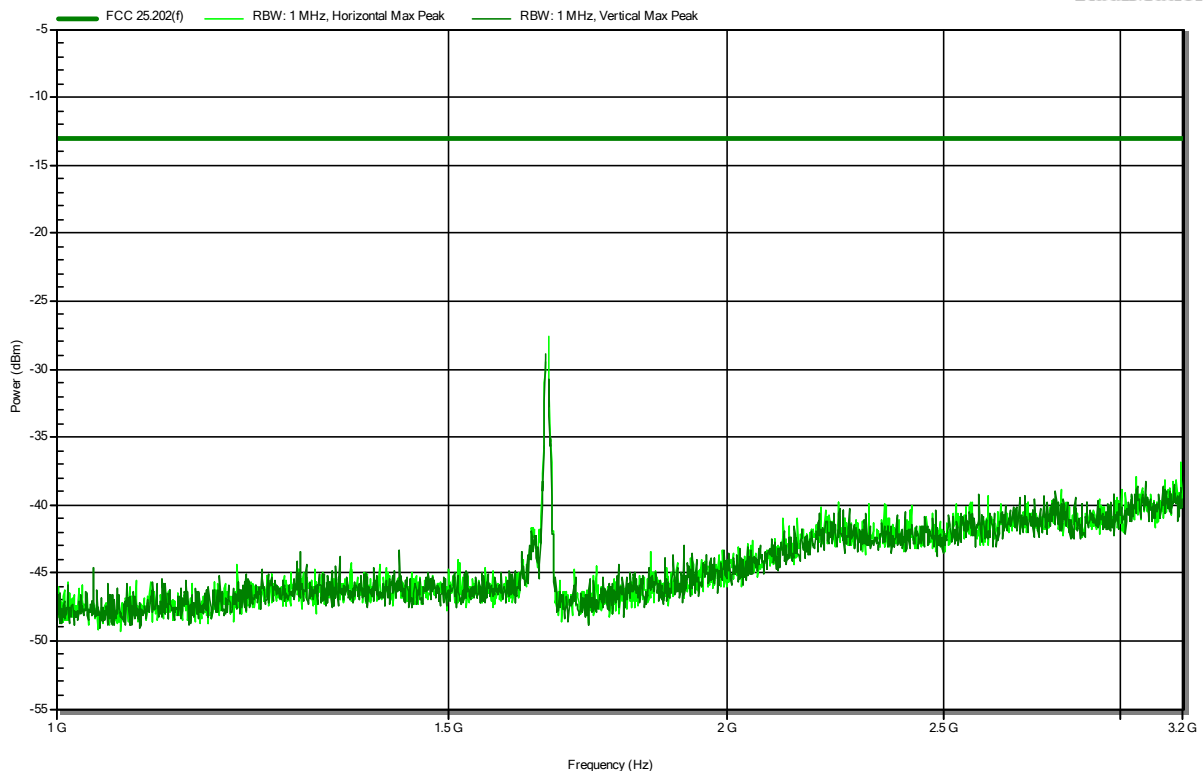


Radiated Spurious Emissions according to 47 CFR § 25.202

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 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1659.5MHz, QPSK; EUT horizontal
 Test Date: 2022-01-26
 Note:

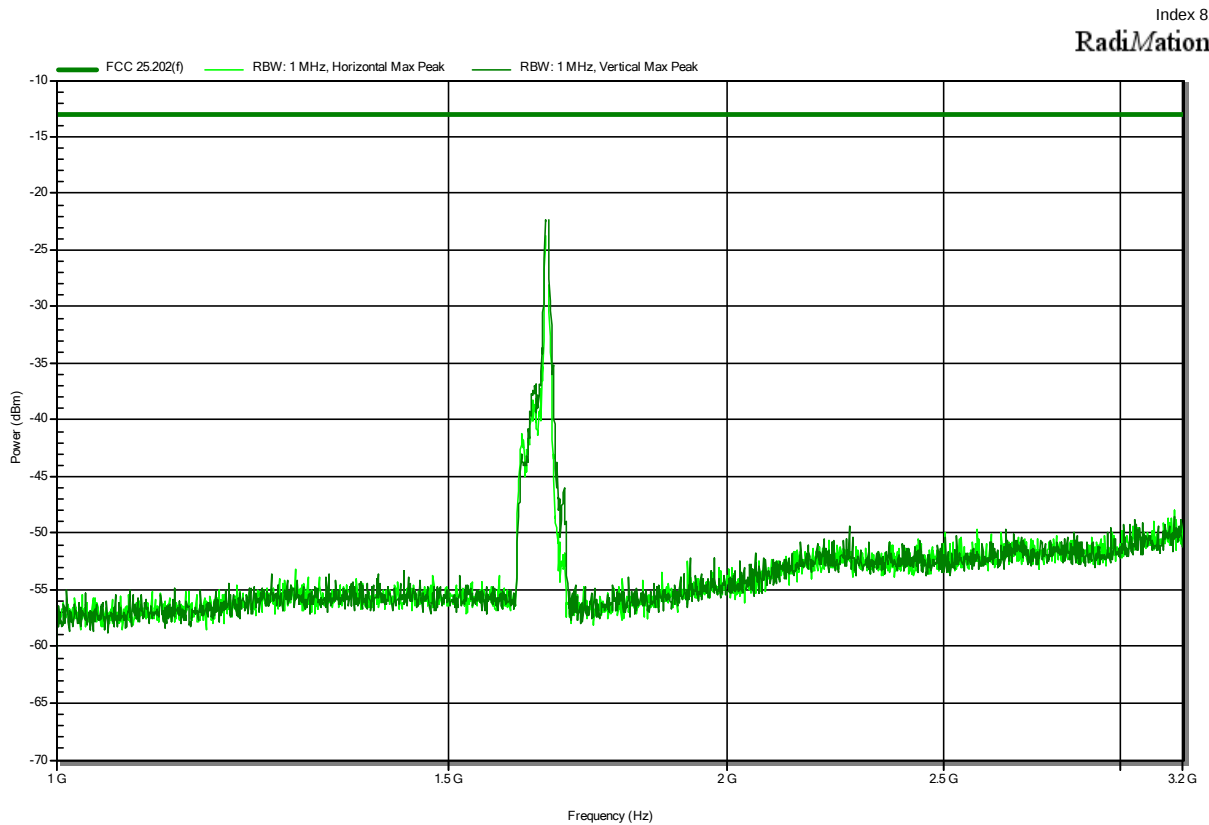
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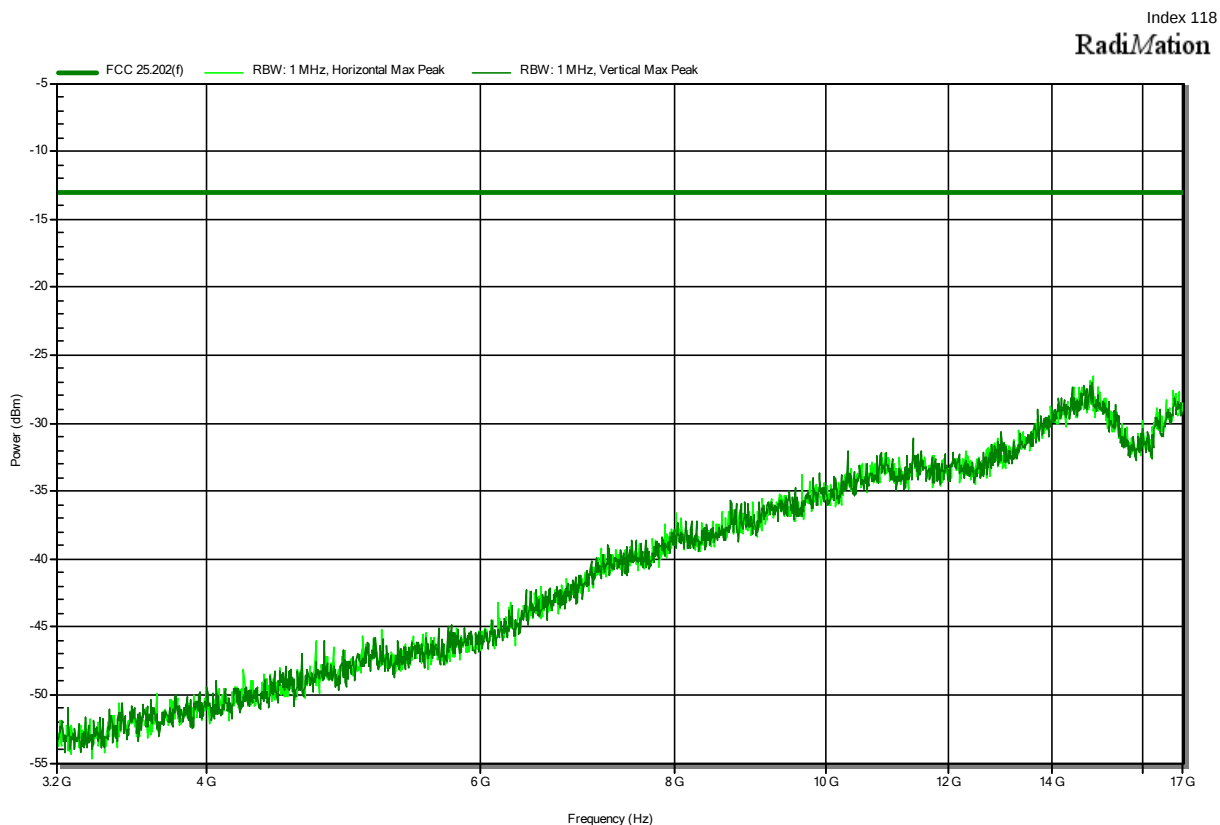
Radiated Spurious Emissions according to 47 CFR § 25.202

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 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1659.5MHz, QPSK; EUT vertical
 Test Date: 2022-01-25
 Note:



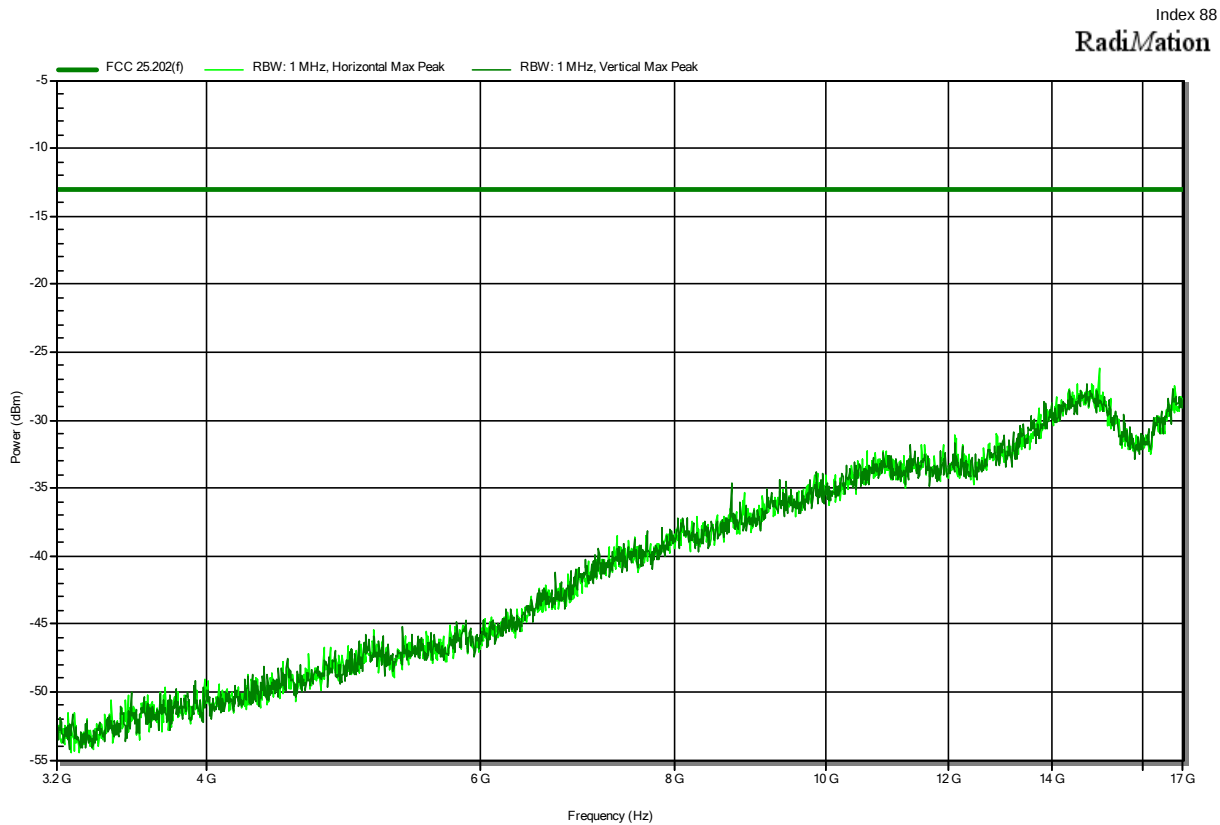
Radiated Spurious Emissions according to 47 CFR § 25.202

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 Model Description: L-band radio transceiver satellite communication module
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 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1627.5MHz, QPSK; EUT horizontal
 Test Date: 2022-01-26
 Note:



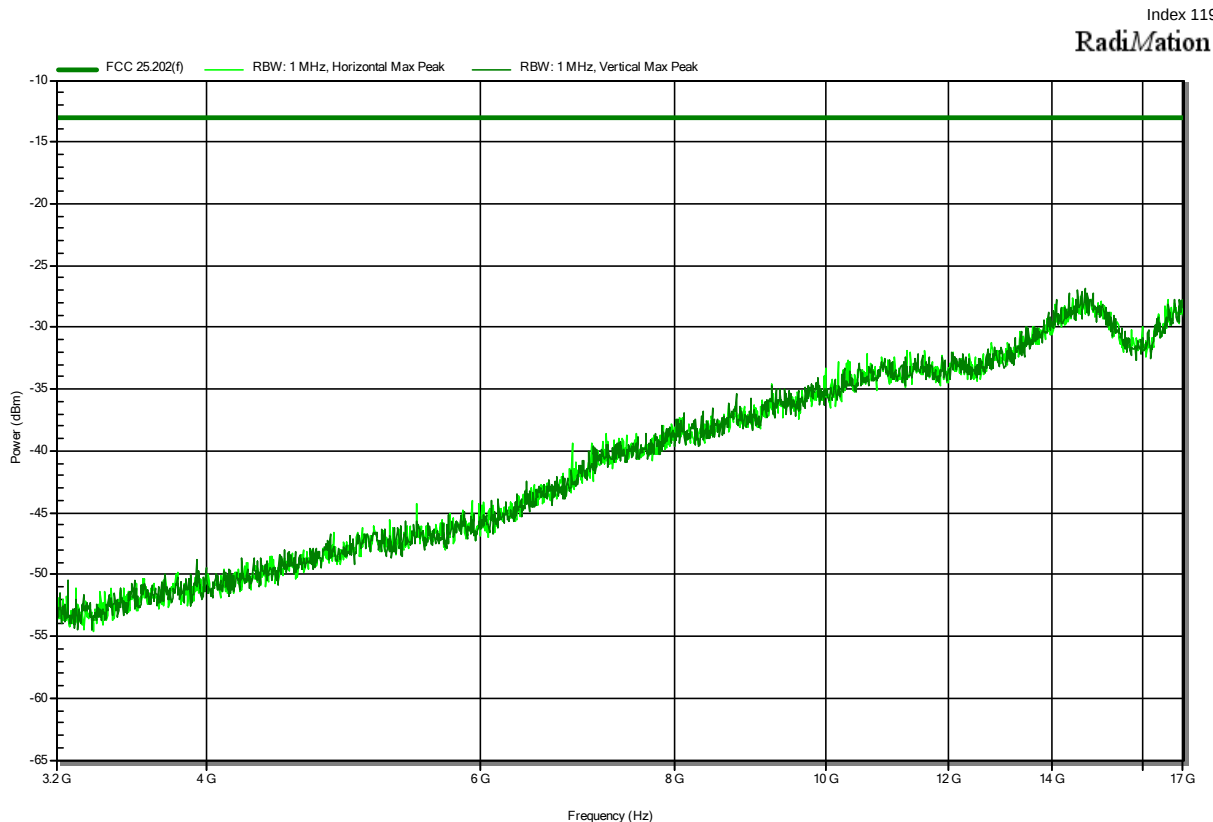
Radiated Spurious Emissions according to 47 CFR § 25.202

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 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1643.5MHz, QPSK; EUT horizontal
 Test Date: 2022-01-26
 Note:

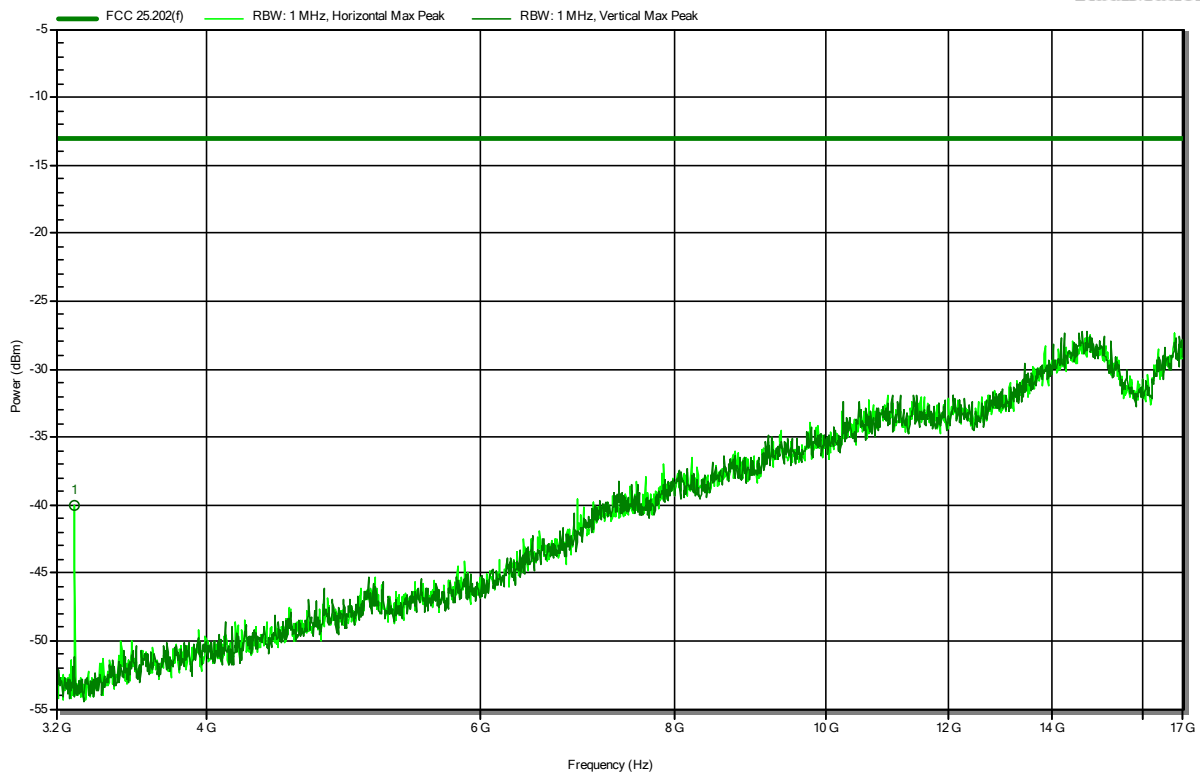


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 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1643.5MHz, QPSK; EUT vertical
 Test Date: 2022-01-25
 Note:

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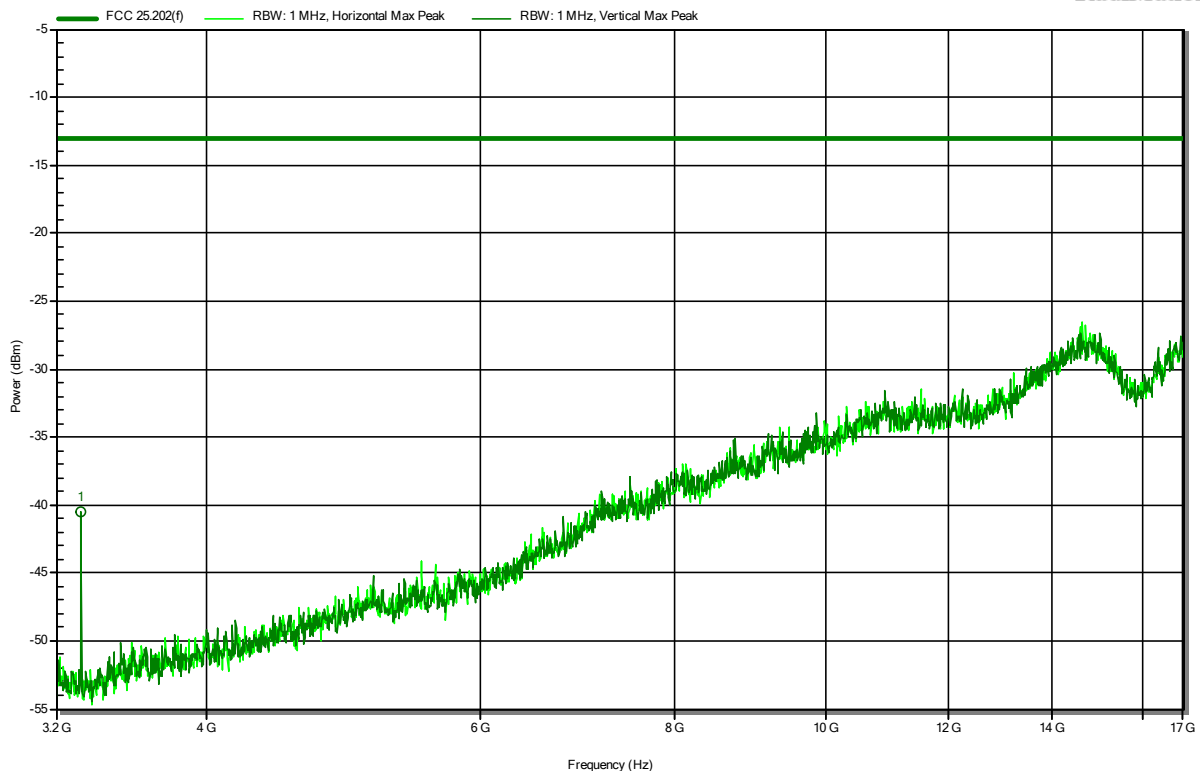
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
3.287 GHz	-40 dBm	-13 dBm	-27 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
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 Test Sample ID: SerNo. ANS2114AS1000240
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 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1659.5MHz, QPSK; EUT horizontal
 Test Date: 2022-01-26
 Note:

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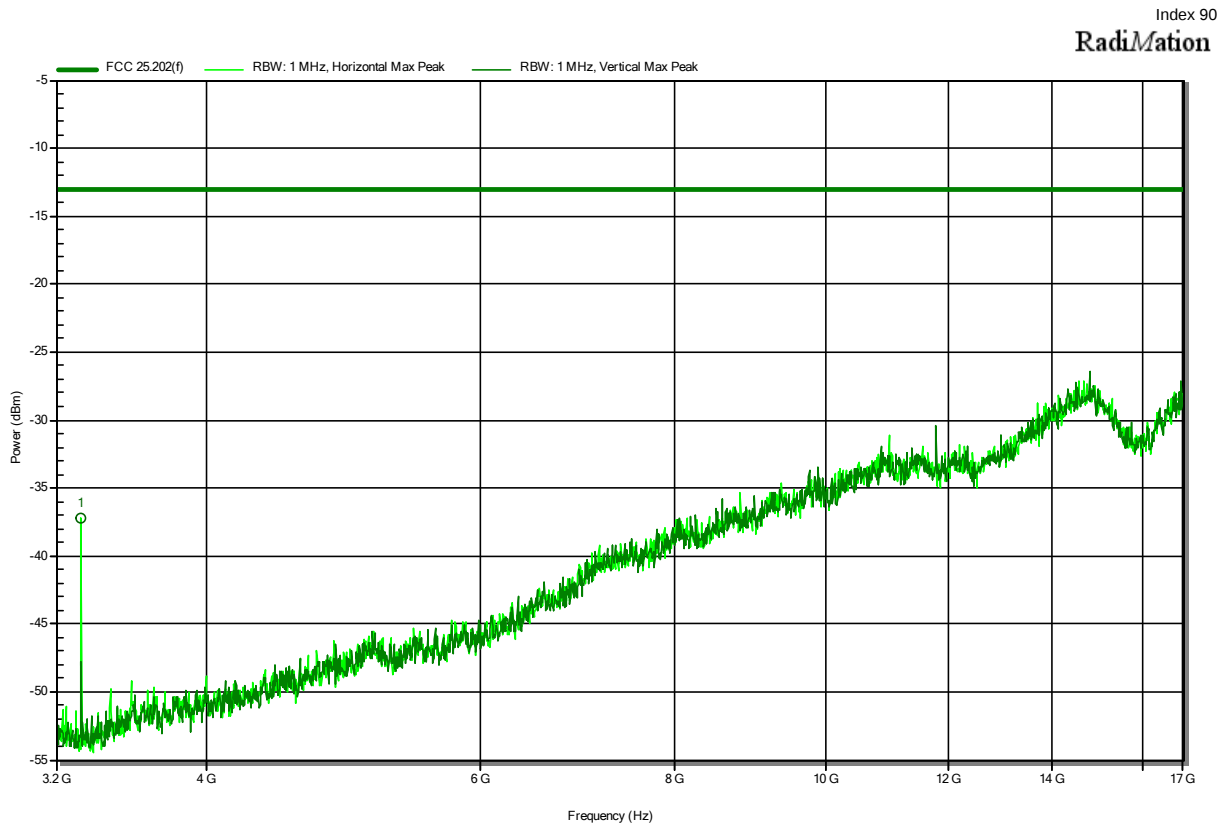
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
3.319 GHz	-40.5 dBm	-13 dBm	-27.47 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR § 25.202

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 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1659.5MHz, QPSK; EUT vertical
 Test Date: 2022-01-25
 Note:



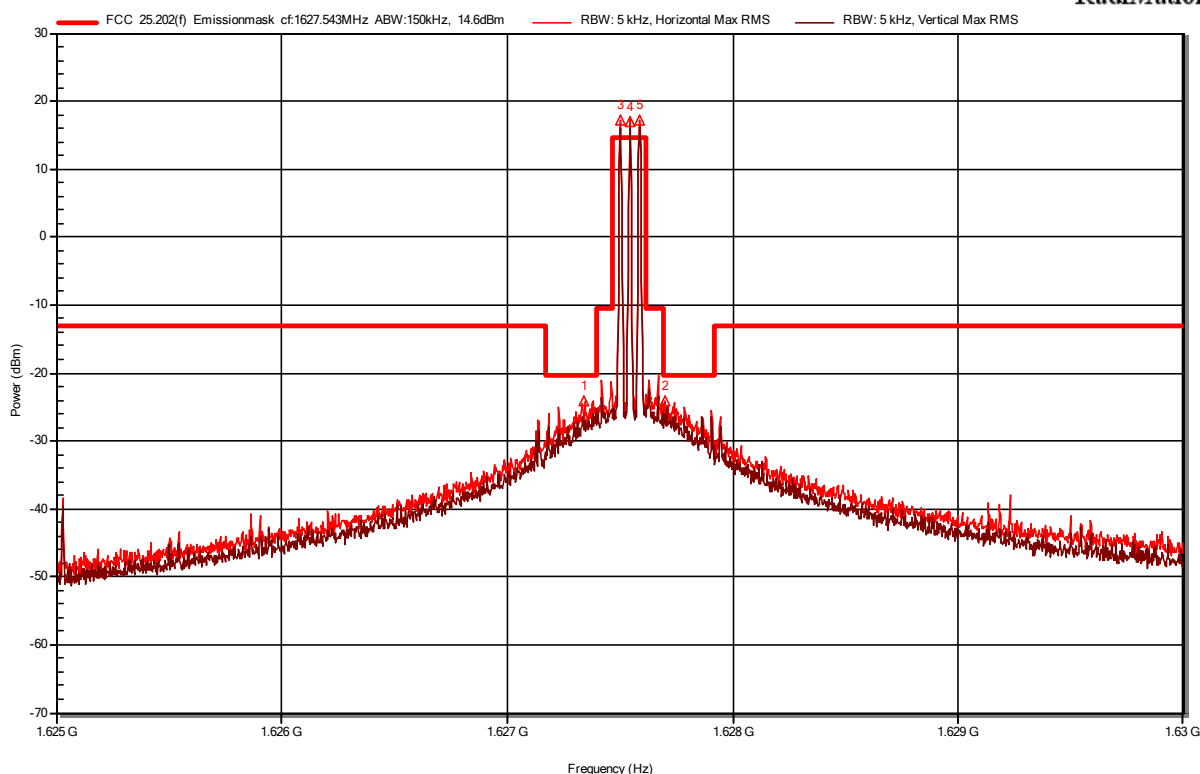
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
3.319 GHz	-37.2 dBm	-13 dBm	-24.2 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
 Applicant: ASTROCAST SA
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 Model: Astronode S+ (carrier board of the Astronode S communication module)
 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1627.500MHz, 1627.543MHz, 1627.586MHz, QPSK;
 EUT vertical (worst case orientation)
 Test Date: 2022-01-28
 Note:

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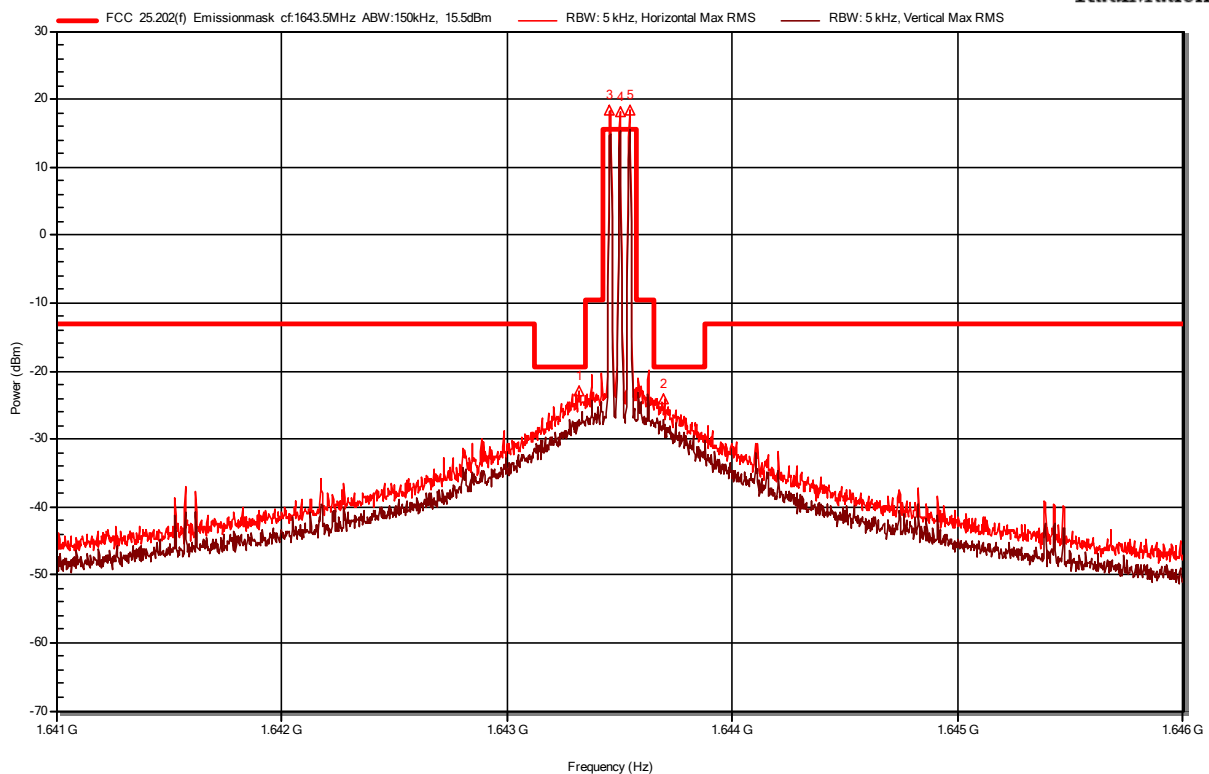
Frequency	RMS	RMS Limit	RMS Difference	RMS Status	Polarization
1.627343 GHz	-24.2 dBm	-20.4 dBm	-3.81 dB	Pass	Horizontal
1.6275 GHz	17.3 dBm	---	---	Carrier	---
1.627544 GHz	17 dBm	---	---	Carrier	---
1.627586 GHz	17.3 dBm	---	---	Carrier	---
1.627696 GHz	-24.1 dBm	-20.4 dBm	-3.71 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR § 25.202

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 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1643.457MHz, 1643.500MHz, 1643.543MHz, QPSK;
 EUT vertical (worst case orientation)
 Test Date: 2022-01-28
 Note:

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RadiMation



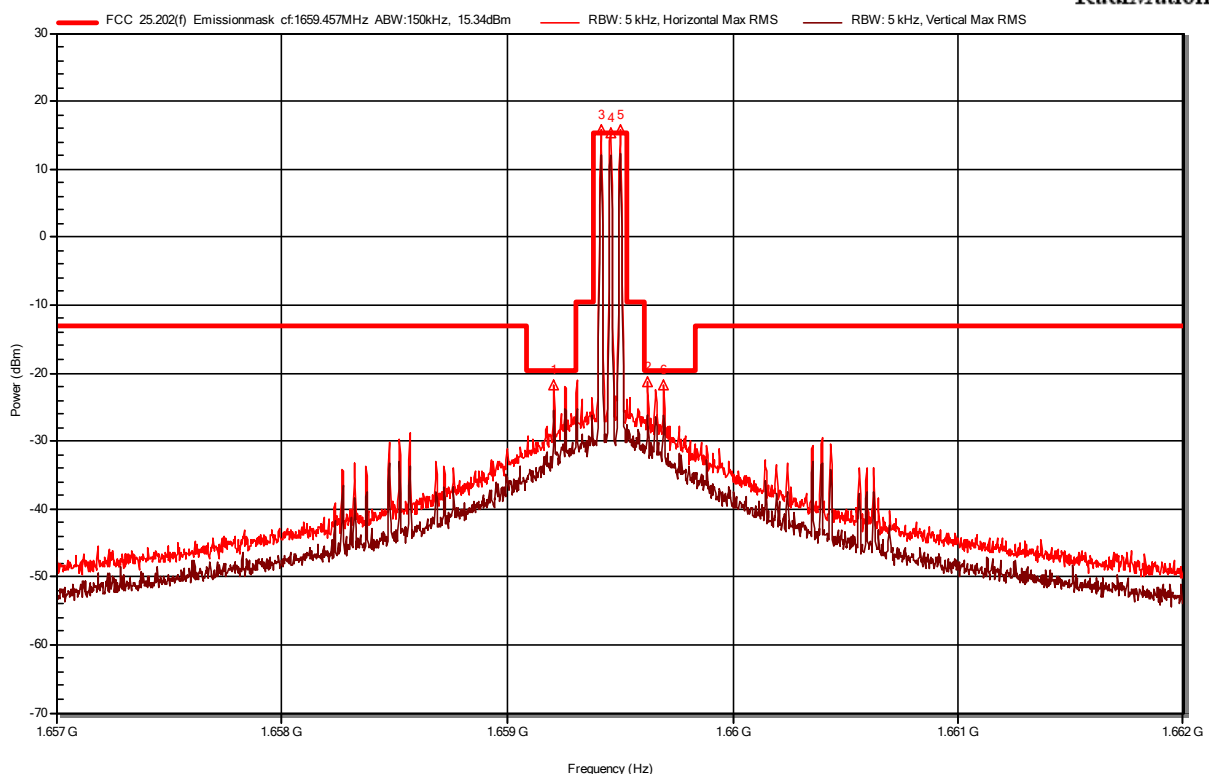
Frequency	RMS	RMS Limit	RMS Difference	RMS Status	Polarization
1.643318 GHz	-22.8 dBm	-19.5 dBm	-3.32 dB	Pass	Horizontal
1.643458 GHz	18.4 dBm	---	---	Carrier	---
1.6435 GHz	18.1 dBm	---	---	Carrier	---
1.643544 GHz	18.4 dBm	---	---	Carrier	---
1.643698 GHz	-24.2 dBm	-19.5 dBm	-4.66 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR § 25.202

Project Number: G0M-2107-9891
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 Test Sample ID: SerNo. ANS2114AS1000240
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1659.414MHz, 1659.457MHz, 1659.500MHz, QPSK;
 EUT vertical (worst case orientation)
 Test Date: 2022-01-28
 Note:

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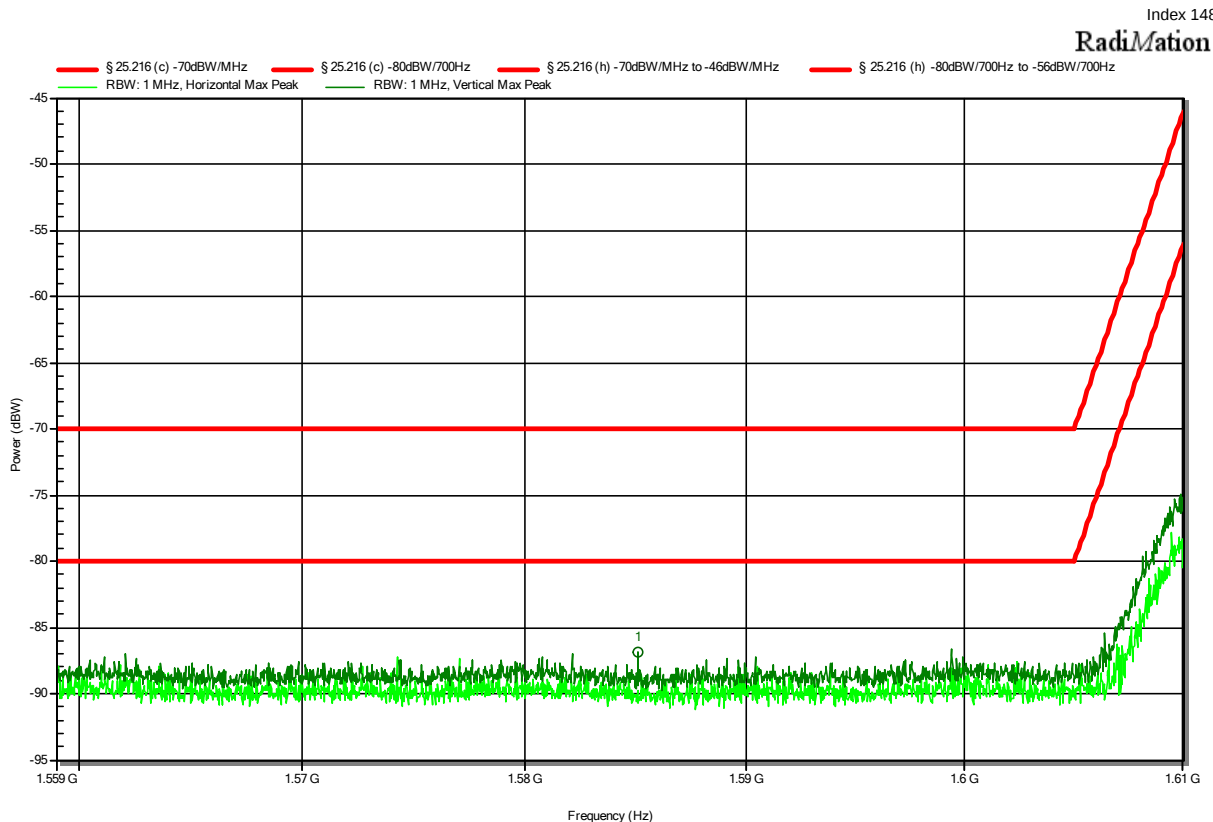
RadiMation



Frequency	RMS	RMS Limit	RMS Difference	RMS Status	Polarization
1.659206 GHz	-21.7 dBm	-19.7 dBm	-2.08 dB	Pass	Horizontal
1.659414 GHz	15.9 dBm	---	---	Carrier	---
1.659456 GHz	15.3 dBm	---	---	Carrier	---
1.6595 GHz	15.9 dBm	---	---	Carrier	---
1.659621 GHz	-21.3 dBm	-19.7 dBm	-1.61 dB	Pass	Horizontal
1.659693 GHz	-21.8 dBm	-19.7 dBm	-2.14 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR § 25.216

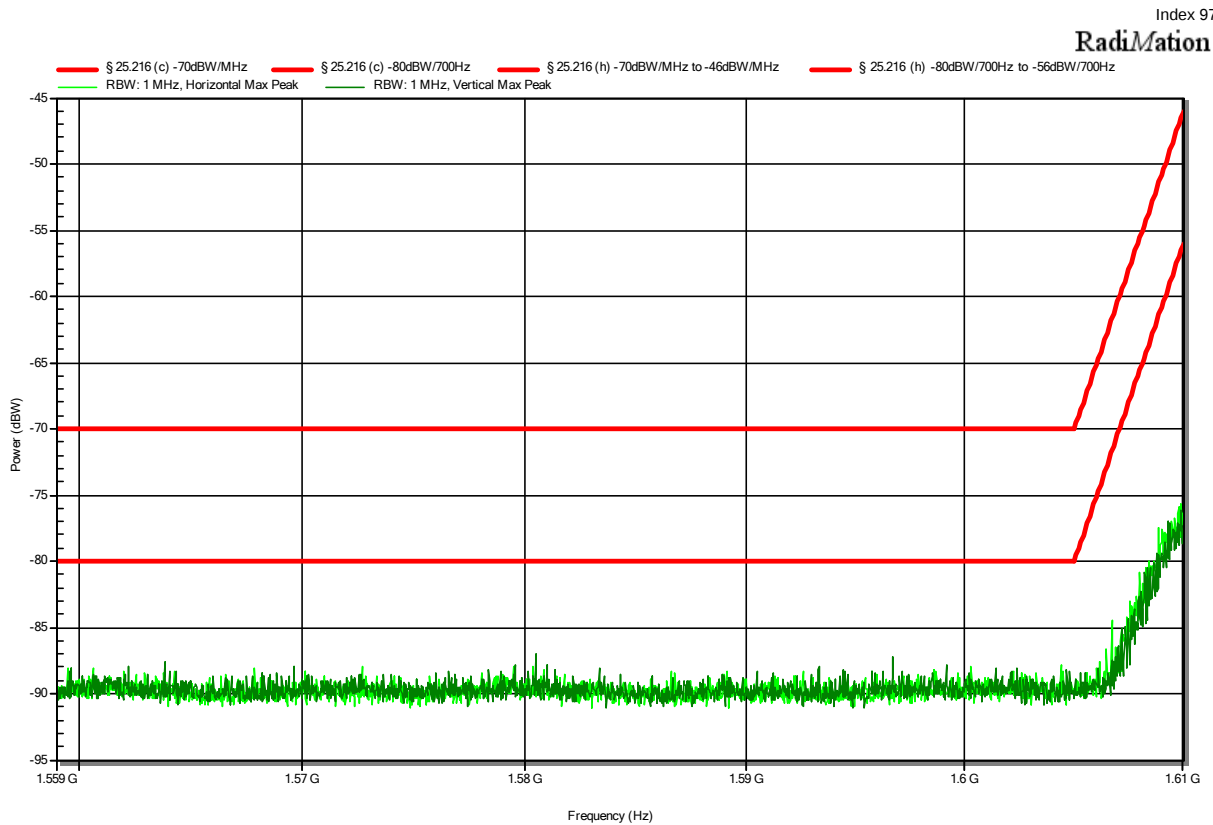
Project Number: G0M-2107-9891
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 Model Description: L-band radio transceiver satellite communication module
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 Test Sample ID: SerNo. ANS2114AS1000240
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 Operator: Mr. Voigt
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 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1627.5MHz, QPSK; EUT horizontal
 Test Date: 2022-01-28
 Note:



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
1.585 GHz	-86.9 dBW	-80 dBW	-6.85 dB	Pass	Vertical

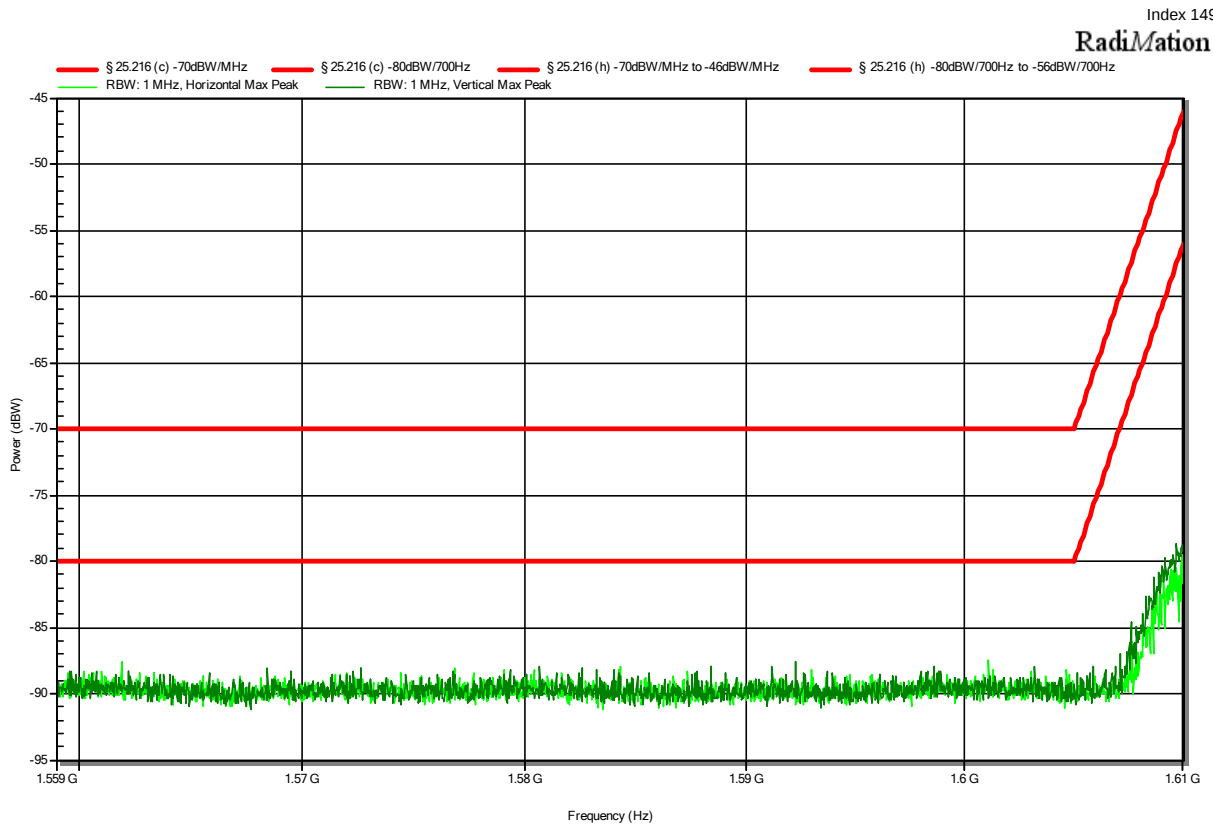
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 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Tx; 1627.5MHz, QPSK; EUT vertical
 Test Date: 2022-01-26
 Note:



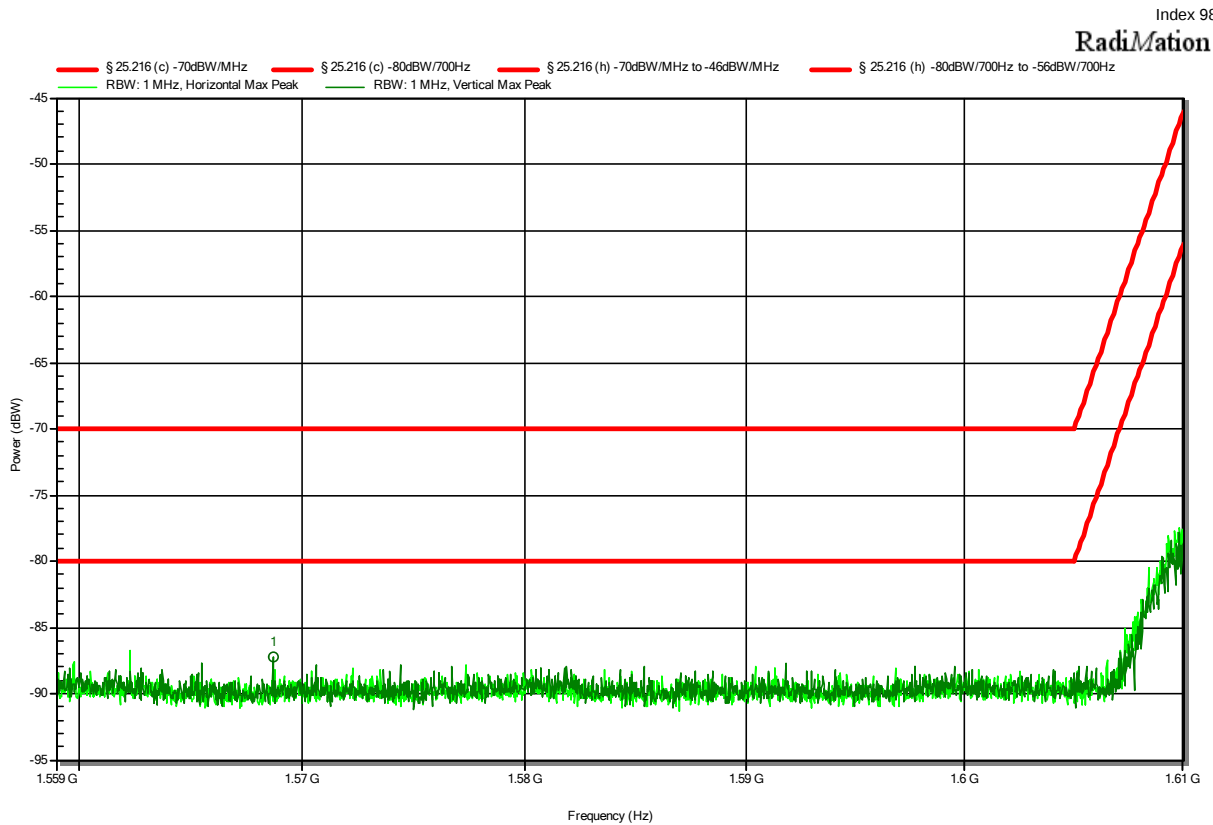
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 Mode: Tx; 1643.5MHz, QPSK; EUT horizontal
 Test Date: 2022-01-28
 Note:



Radiated Spurious Emissions according to 47 CFR § 25.216

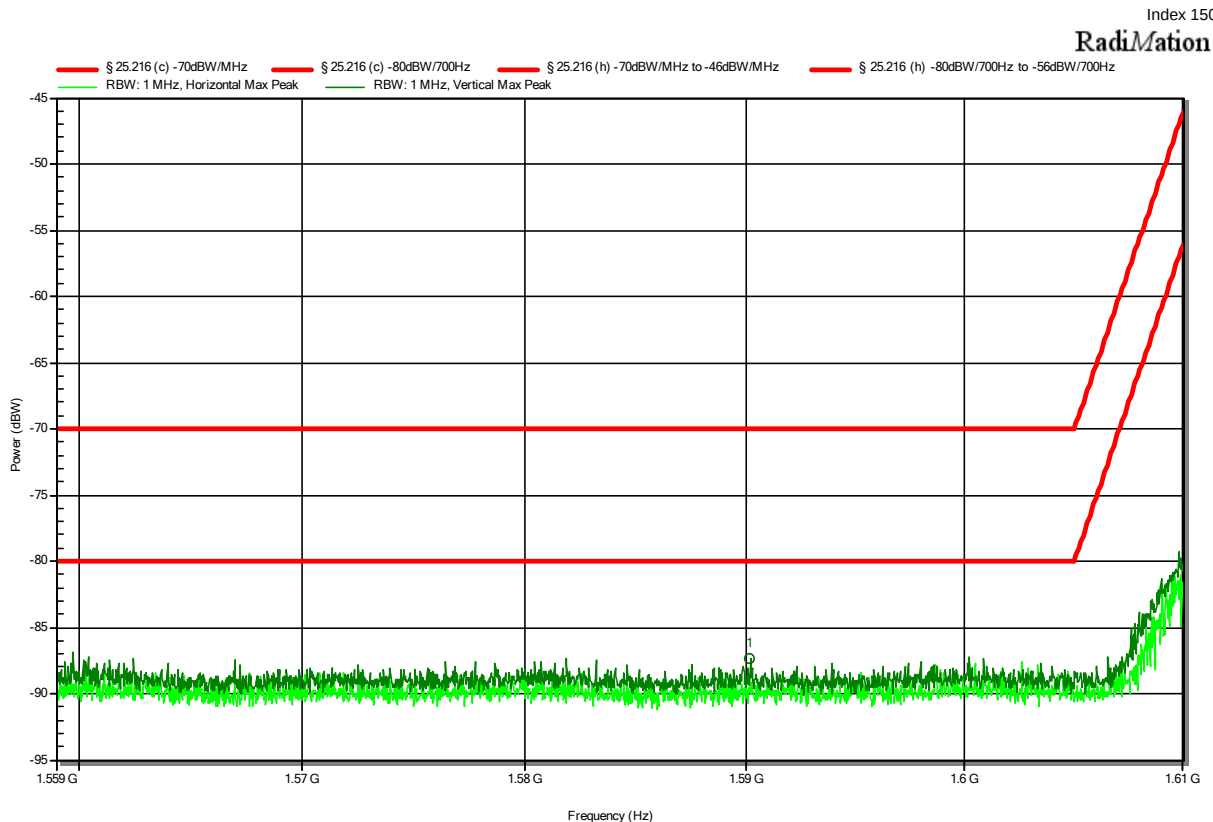
Project Number: G0M-2107-9891
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 Antenna: Schwarzbeck BBHA 9120D
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 Mode: Tx; 1643.5MHz, QPSK; EUT vertical
 Test Date: 2022-01-26
 Note:



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
1.569 GHz	-87.3 dBW	-80 dBW	-7.27 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR § 25.216

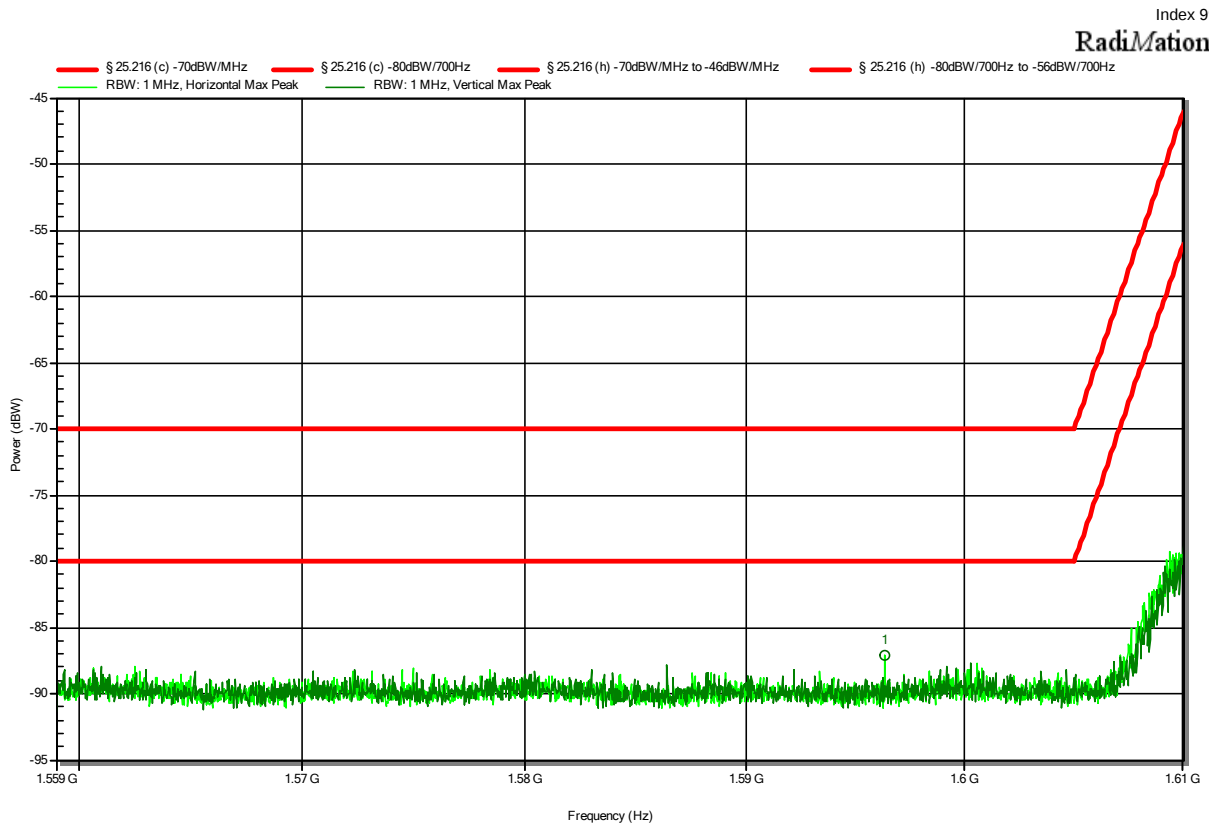
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Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
1.59 GHz	-87.4 dBW	-80 dBW	-7.35 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR § 25.216

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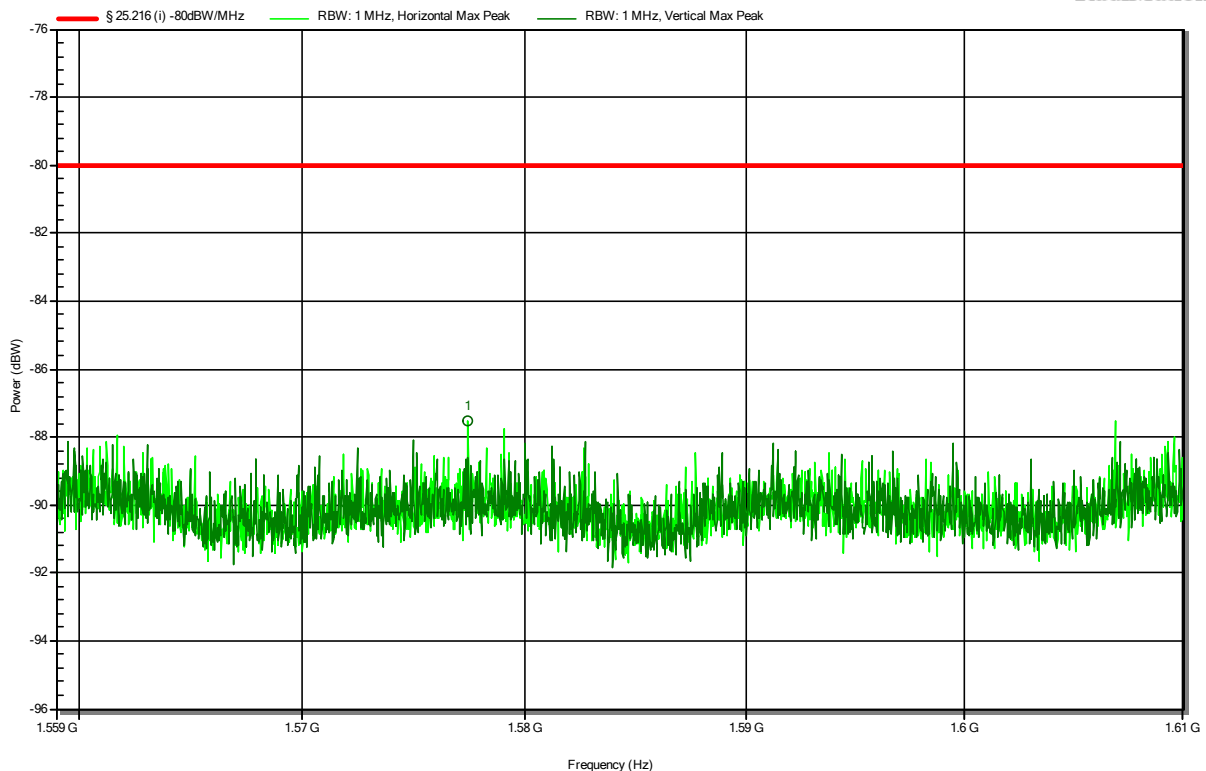
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
1.596 GHz	-87.1 dBW	-80 dBW	-7.08 dB	Pass	Horizontal

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 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Idle; EUT horizontal
 Test Date: 2022-01-28
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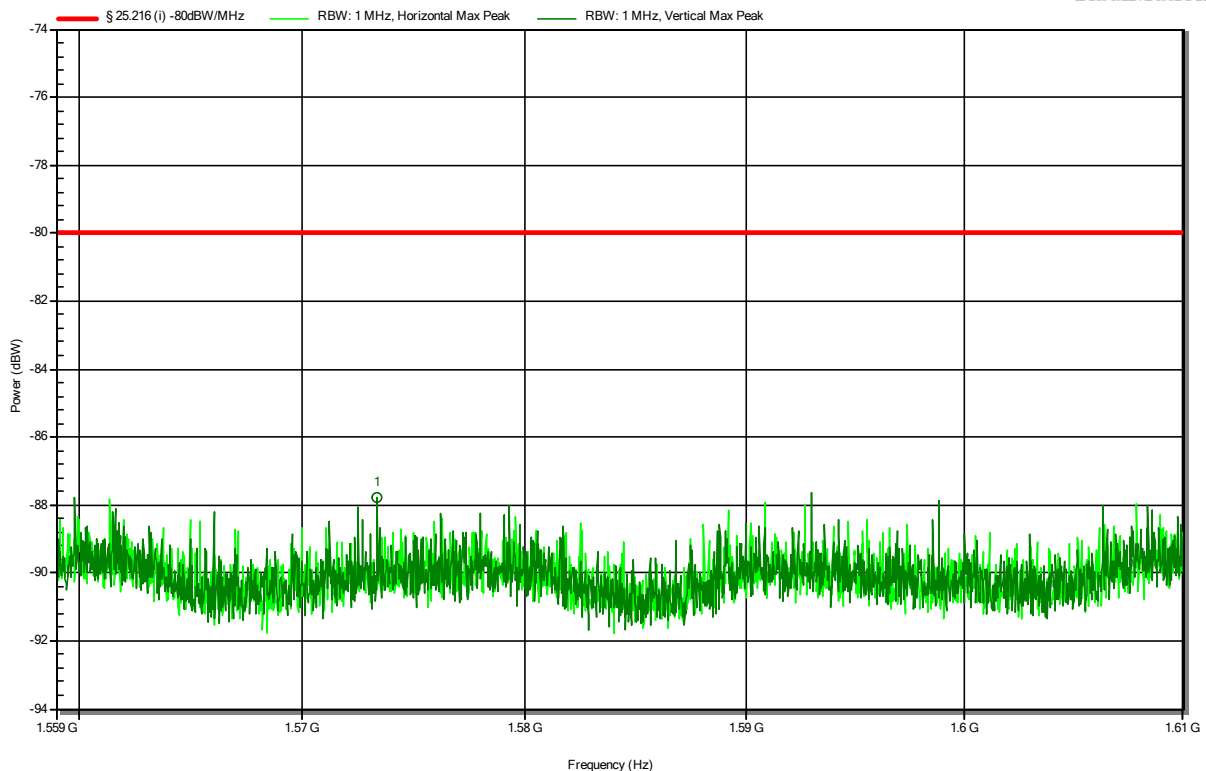
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
1.577 GHz	-87.5 dBW	-80 dBW	-7.55 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR § 25.216

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 Test Conditions: Tnom: 22 °Celsius, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Idle; EUT vertical
 Test Date: 2022-01-26
 Note:

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
1.573 GHz	-87.8 dBW	-80 dBW	-7.78 dB	Pass	Vertical

=== End of test report ===

Test Report No.: G0M-2107-9891-TFC25CSAT-V01

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany