



Hermon Laboratories Ltd.
P.O. Box 23, Binyamina 3055001, Israel
Tel. +972 4628 8001
Fax. +972 4628 8277
E-mail: mail@hermonlabs.com

TEST REPORT

ACCORDING TO: TO: FCC 47CFR part 96

FOR:

Airspan Networks Inc.

LTE Base Station Radio

Model: AirHarmony 4200 3550-3700MHz (B48)

FCC ID:PIDAH4200

This report is in conformity with ISO/IEC 17025. The "A2LA Accredited" symbol endorsement applies only to the tests and calibrations that are listed in the scope of Hermon Laboratories accreditation. The test results relate only to the items tested. This test report shall not be reproduced in any form except in full with the written approval of Hermon Laboratories Ltd.

Table of contents

1	Applicant information	3
2	Equipment under test attributes	3
3	Manufacturer information	3
4	Test details	3
5	Tests summary	4
6	EUT description	5
6.1	General information	5
6.2	Ports and lines	5
6.3	Support and test equipment	5
6.4	Changes made in the EUT	5
6.5	Test configuration	6
6.6	Transmitter characteristics	7
7	Transmitter tests according to 47CFR part 96	8
7.1	Maximum EIRP and maximum power spectral density	8
7.2	Peak-to-average power ratio (PAPR) test	36
7.3	Occupied bandwidth test	44
7.4	Emission outside the fundamental test	56
7.5	Radiated spurious emission measurements	68
7.6	Spurious emissions at RF antenna connector test	79
7.7	Frequency stability test	96
8	APPENDIX A Test equipment and ancillaries used for tests	98
9	APPENDIX B Measurement uncertainties	100
10	APPENDIX C Test facility description	101
11	APPENDIX D Specification references	101
12	APPENDIX E Test equipment correction factors	102
13	APPENDIX F Abbreviations and acronyms	110

1 Applicant information

Client name: Airspan Networks Inc.
Address: 777 Yamato, Road Suite 310 Boca Raton, FL 33431, USA
Telephone: +1 561 893 8670
Fax: +1 561 893 8671
E-mail: zlevi@airspan.com
Contact name: Mr. Zion Levi

2 Equipment under test attributes

Product name: LTE Base Station Radio
Product type: Transceiver
Model(s): AirHarmony 4200 3550-3700MHz (B48)
Serial number: D5EF25CED5BC
Hardware version: C2
Software release: SR 16.00
Receipt date: 16-Dec-18

3 Manufacturer information

Manufacturer name: Airspan Networks Inc.
Address: 777 Yamato, Road Suite 310 Boca Raton, FL 33431, USA
Telephone: +1 561 893 8670
Fax: +1 561 893 8671
E-Mail: zlevi@airspan.com
Contact name: Mr. Zion Levi

4 Test details

Project ID: 31875
Location: Hermon Laboratories Ltd. P.O. Box 23, Binyamina 3055001, Israel
Test started: 16-Dec-18
Test completed: 01-Feb-19
Test specification(s): FCC 47CFR part 96




5 Tests summary

Test	Status
Transmitter characteristics	
Section 96.41(b), Maximum EIRP and maximum power spectral density	Pass
Section 96.41(g), Peak-to- average power ratio	Pass
Section 2.1049, Occupied bandwidth	Pass
Section 96.41(e), Emission mask	Pass
Section 96.41(e)(2), Radiated spurious emissions	Pass
Section 96.41(e)(3), Conducted spurious emissions	Pass
Section 2.1055, Frequency stability	Pass

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.

The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

This test report supersedes the previously issued test report identified by Doc ID:AIRRAD_FCC.31875_rev1.

	Name and Title	Date	Signature
Tested by:	Mr. S. Samokha, test engineer Mrs. E. Pitt, test engineer Mr. A. Morozov, test engineer	February 1, 2019	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	March 6 , 2019	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	April 15, 2019	



6 EUT description

6.1 General information

The EUT, Mobile Digital station, AirHarmony 4200 3550-3700MHz (B48), is part of a LTE broadband fixed cellular wireless access system. The system provides a radio link between an end-user (a subscriber) and a network to give high-speed data access. The AirHarmony's transceiver/receiver (Up to 64 QAM modulation, data rate up to 95 Mbps) equipped with a 9.5 dBi external antenna. Advanced Antenna Techniques 2x2 MIMO are supported. The maximum RF output power (not including antenna gain) is 36.9 dBm for 9.5 dBi and it can be reduced by software. The AirHarmony is installed outdoors. The Subscriber transmits and receives traffic to and from the base station respectively. The transceiver provides subscribers with "always-on" Internet, high speed data only, or data and voice (VoIP) services and is configured with a unique base station reference number, preventing the LTE UE from relocating to another subscriber premises without authorization.

Note: The AH4200 equipment defined as Category B CBSD (Citizens Broadband Radio Service Device). The transmitter output signal are completely uncorrelated, antennas 1/2 is one sector and antennas 3/4 is another sector. The sectors are not working on the same frequency, each sector has the different frequency.

6.2 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length, m
Power	DC power	EUT	AC/DC adapter	1	Unshielded	20
Signal	Ethernet	EUT	Laptop	1	Shielded	20
Signal*	Serial*	Not connected	Not connected	1	NA	NA

*for maintenance only

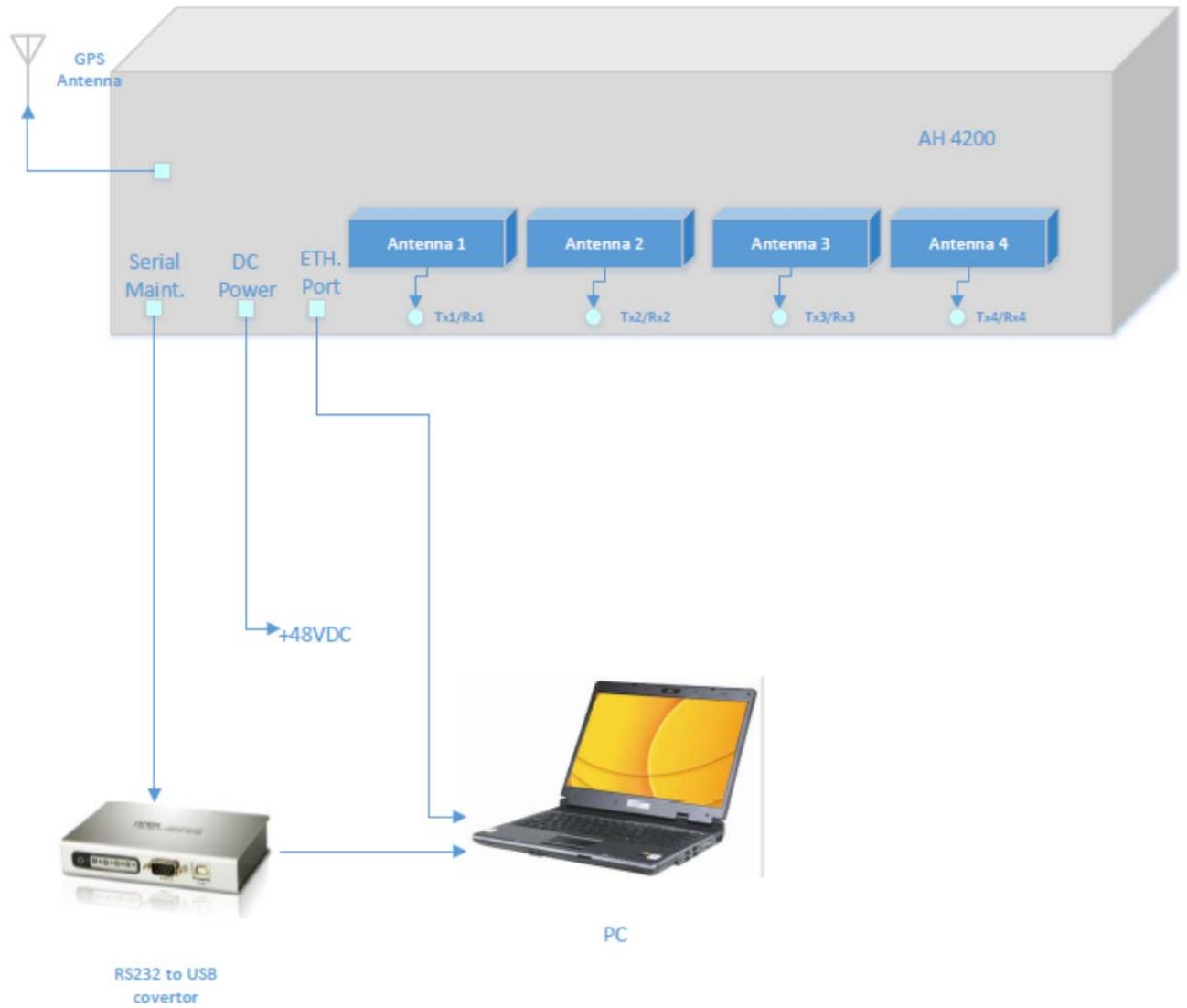
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop	Dell	E7450	8TYRP32
USB to RS-232 convertor	ATEN	UC2324	NA
AC/DC adapter	DVE	DSA-96PFB-12 1 120750	P/N DSA-96PFB-12 1 120750-W25

6.4 Changes made in the EUT

No changes were implemented in the EUT during testing.

6.5 Test configuration





6.6 Transmitter characteristics

Type of equipment									
<input checked="" type="checkbox"/>	Stand-alone (Equipment with or without its own control provisions)								
<input type="checkbox"/>	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)								
<input type="checkbox"/>	Plug-in card (Equipment intended for a variety of host systems)								
Intended use		Condition of use							
<input checked="" type="checkbox"/>	fixed	Always at a distance more than 2 m from all people							
<input type="checkbox"/>	mobile	Always at a distance more than 20 cm from all people							
<input type="checkbox"/>	portable	May operate at a distance closer than 20 cm to human body							
Assigned frequency range		3550.0 – 3700.0 MHz							
Operating frequency (full bands)		3555.0 – 3695.0 MHz							
RF channel spacing		10 MHz, 20 MHz							
Maximum rated output power		At transmitter 50 Ω RF output connector (per port)	36.9 dBm						
Is transmitter output power variable?		No							
		continuous variable							
		<input checked="" type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	stepped variable with step size	0.25 dB			
		minimum RF power		-30 dBm					
		maximum RF power at antenna connector		dBm					
Antenna connection									
<input type="checkbox"/>	unique coupling	<input checked="" type="checkbox"/>	standard connector	<input type="checkbox"/>	Integral	<input checked="" type="checkbox"/>	with temporary RF connector	<input type="checkbox"/>	without temporary RF connector
Antenna/s technical characteristics									
Type	Manufacturer	Model number	Gain						
External	ALPHA Wireless Ltd.	AW3089	9.5 dBi						
Transmitter aggregate data rate/s, Mbps									
Transmitter 26dBc power bandwidth		Type of modulation							
		QPSK	16QAM	64QAM					
10 MHz		10.7	22.7	47.3					
20 MHz		23.4	45.4	95					
Type of multiplexing		TDD							
Modulating test signal (baseband)		PRBS							
Maximum transmitter duty cycle in normal use		0.74							
Transmitter power source									
<input checked="" type="checkbox"/>	DC	Nominal rated voltage	48 VDC	Battery type					
<input type="checkbox"/>	AC mains	Nominal rated voltage		Frequency					
Common power source for transmitter and receiver		<input checked="" type="checkbox"/>	yes	<input type="checkbox"/>	no				



Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

7 Transmitter tests according to 47CFR part 96

7.1 Maximum EIRP and maximum power spectral density

7.1.1 General

This test was performed to measure the maximum EIRP and maximum spectral power density at the transmitter RF antenna connector. Specification test limits are given in Table 7.1.1, Table 7.1.2.

Table 7.1.1 Peak output power limits

Assigned frequency range, MHz	EIRP	
	W/10 MHz	dBm/10 MHz
3550 - 3700	17.0	47.0

Table 7.1.2 Peak spectral power density limits

Assigned frequency range, MHz	Measurement bandwidth, MHz	Peak spectral power density, dBm
3550 - 3700	1.0	37.0

7.1.2 Test procedure

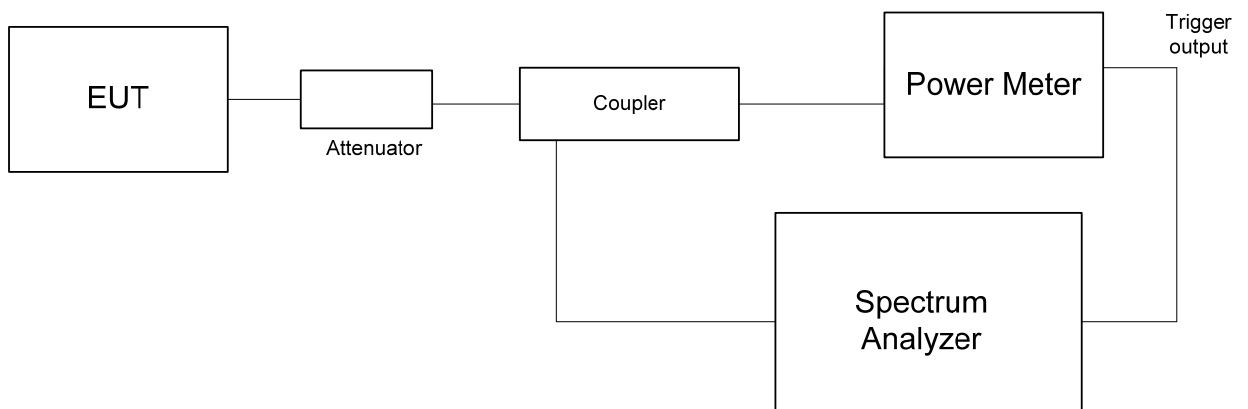
7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.

7.1.2.2 The EUT was adjusted to produce maximum available to end user RF output power.

7.1.2.3 The peak output power was measured with power meter as provided in Table 7.1.3.

7.1.2.4 Spectrum analyzer was set in average mode, sufficient number of sweeps was allowed for trace stabilization and peak spectral power density was measured as provided in Table 7.1.4 and the associated plots.

Figure 7.1.1 Peak output power and spectral power density test setup





Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Table 7.1.3 Maximum EIRP test results

ASSIGNED FREQUENCY RANGE: 3550.0 – 3700.0 MHz
DETECTOR USED: Average (gated)

CHANNEL SPACING: 10 MHz

Frequency, MHz	RF Output power				Antenna gain, dBi	EIRP*, dBm/10 MHz	Limit, dBm/10 MHz	Margin, dB**	Verdict
	Chain RF#1, dBm	Chain RF#2, dBm	Chain RF#3, dBm	Chain RF#4, dBm					
Modulation QPSK									
3555.0	36.5	35.8	36.9	36.5	9.5	46.4	47.0	-0.6	Pass
3625.0	35.9	36.9	35.2	35.9	9.5	46.4	47.0	-0.6	Pass
3695.0	36.1	35.4	35.0	35.3	9.5	45.6	47.0	-1.4	Pass
Modulation 16QAM									
3555.0	36.4	35.6	36.8	36.9	9.5	46.4	47.0	-0.6	Pass
3625.0	36.0	36.8	35.1	35.8	9.5	46.3	47.0	-0.7	Pass
3695.0	36.1	35.4	35.0	36.3	9.5	45.8	47.0	-1.2	Pass
Modulation 64QAM									
3555.0	36.4	35.7	36.7	36.8	9.5	46.3	47.0	-0.7	Pass
3625.0	36.0	36.7	35.3	35.7	9.5	46.2	47.0	-0.8	Pass
3695.0	36.0	35.4	35.0	36.5	9.5	46.0	47.0	-1.0	Pass

CHANNEL SPACING: 20 MHz

Frequency, MHz	RF Output power				Antenna gain, dBi	EIRP*, dBm/10 MHz	Limit, dBm/10 MHz	Margin, dB**	Verdict
	Chain RF#1, dBm	Chain RF#2, dBm	Chain RF#3, dBm	Chain RF#4, dBm					
Modulation QPSK									
3560.0	37.52	37.33	36.67	37.10	9.5	44.02	47.0	-2.98	Pass
3625.0	37.23	37.08	36.32	37.30	9.5	43.80	47.0	-3.20	Pass
3690.0	37.12	37.21	36.34	36.26	9.5	43.71	47.0	-3.29	Pass
Modulation 16QAM									
3560.0	37.46	37.12	37.30	37.20	9.5	43.96	47.0	-3.04	Pass
3625.0	37.05	36.77	37.48	36.62	9.5	43.98	47.0	-3.02	Pass
3690.0	37.12	36.98	36.52	36.36	9.5	43.62	47.0	-3.38	Pass
Modulation 64QAM									
3560.0	37.00	36.88	36.90	36.90	9.5	43.50	47.0	-3.50	Pass
3625.0	36.86	36.70	36.93	36.45	9.5	43.43	47.0	-3.57	Pass
3690.0	36.37	36.68	37.00	36.86	9.5	43.50	47.0	-3.50	Pass

Note: Offset 51 dB included: coupling loss 16 dB, attenuator 30 dB, cables loss 5.04 dB

* - EIRP = Max SA reading (Chains #1&2and #3&4) + 10*log[10 MHz/OBW(MHz)] + Antenna gain =
= Max SA reading - 3 dB + Antenna gain

** - Margin = EIRP, dBm – specification limit.



Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Table 7.1.4 Full EIRP test results

ASSIGNED FREQUENCY RANGE: 3550.0 – 3700.0 MHz
DETECTOR USED: Average (gated)

CHANNEL SPACING: 10 MHz

Frequency, MHz	EIRP, dBm/10 MHz	Full EIRP, dBm	Limit, dBm/10 MHz	Margin, dB**	Verdict
Modulation QPSK					
3555.0	46.4	46.4	47.0	-0.6	Pass
3625.0	46.4	46.4	47.0	-0.6	Pass
3695.0	45.6	45.6	47.0	-1.4	Pass
Modulation 16QAM					
3555.0	46.4	46.4	47.0	-0.6	Pass
3625.0	46.3	46.3	47.0	-0.7	Pass
3695.0	45.8	45.8	47.0	-1.2	Pass
Modulation 64QAM					
3555.0	46.3	46.3	47.0	-0.7	Pass
3625.0	46.2	46.2	47.0	-0.8	Pass
3695.0	46.0	46.0	47.0	-1.0	Pass

CHANNEL SPACING: 20 MHz

Frequency, MHz	EIRP, dBm/10 MHz	OBW factor*, dB	Full EIRP**, dBm	Limit, dBm/10 MHz	Margin, dB**	Verdict
Modulation QPSK						
3560.0	44.02	2.45	46.47	47.0	-0.53	Pass
3625.0	43.80	2.45	46.25	47.0	-0.75	Pass
3690.0	43.71	2.45	46.16	47.0	-0.84	Pass
Modulation 16QAM						
3560.0	43.96	2.45	46.41	47.0	-0.59	Pass
3625.0	43.98	2.45	46.43	47.0	-0.57	Pass
3690.0	43.62	2.45	46.07	47.0	-0.93	Pass
Modulation 64QAM						
3560.0	43.50	2.45	45.95	47.0	-1.05	Pass
3625.0	43.43	2.45	45.88	47.0	-1.12	Pass
3690.0	43.50	2.45	45.95	47.0	-1.05	Pass

*OBW factor, dB= 10*log OBW(MHz)/10 MHz, e.g. 10*log 17.57 MHz/10 MHz = 2.45 dB

** - Full EIRP, dBm = EIRP, dBm/10 MHz + OBW factor, dB

*** - Margin = EIRP, dBm – specification limit.



Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Table 7.1.5 Peak spectral power density test results

ASSIGNED FREQUENCY RANGE: 3550.0 – 3700.0 MHz
 DETECTOR USED: Average (gated)
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 NUMBER OF CHAINS: 2

Frequency, MHz	RF Output power				Total PSD*, dBm	Limit, dBm/10 MHz	Margin, dB	Verdict
	Chain RF#1, dBm	Chain RF#2, dBm	Chain RF#3, dBm	Chain RF#4, dBm				
Channel Spacing 10 MHz								
Modulation QPSK								
3555.0	27.87	27.43	28.29	27.10	31.29	37.0	-5.71	Pass
3625.0	27.36	27.56	28.15	26.98	31.15	37.0	-5.85	Pass
3695.0	27.71	27.31	27.57	27.65	30.57	37.0	-6.43	Pass
Modulation 16QAM								
3555.0	27.83	27.37	28.57	27.51	31.57	37.0	-5.43	Pass
3625.0	27.48	27.40	28.03	27.32	31.03	37.0	-5.97	Pass
3695.0	27.61	27.28	27.45	27.79	30.45	37.0	-6.55	Pass
Modulation 64QAM								
3555.0	27.89	27.45	28.15	27.79	31.15	37.0	-5.85	Pass
3625.0	27.52	27.57	28.13	26.59	31.13	37.0	-5.87	Pass
3695.0	27.70	27.58	27.98	26.81	30.98	37.0	-6.02	Pass
Channel Spacing 20 MHz								
Modulation QPSK								
3560.0	26.24	25.47	25.68	25.09	28.68	37.0	-8.32	Pass
3625.0	25.91	24.94	24.68	24.29	27.68	37.0	-9.32	Pass
3690.0	25.79	25.75	24.14	24.42	27.14	37.0	-9.86	Pass
Modulation 16QAM								
3560.0	26.25	25.46	25.59	25.67	28.59	37.0	-8.41	Pass
3625.0	25.44	25.85	25.87	25.47	28.87	37.0	-8.13	Pass
3690.0	25.88	25.74	24.99	25.71	27.99	37.0	-9.01	Pass
Modulation 64QAM								
3560.0	25.79	25.39	26.16	25.63	29.16	37.0	-7.84	Pass
3625.0	25.37	25.69	25.87	25.72	28.87	37.0	-8.13	Pass
3690.0	25.22	25.58	24.88	25.43	27.88	37.0	-9.12	Pass

Note: Offset 48 dB included: coupling loss 16 dB, attenuator 30 dB, cables loss 2.0 dB
 * - Total PSD = Max SA reading (Chains #1&2 or chains #3&4) + 10*log(N) = Max SA reading +3 dB
 ** - Margin = Total PSD, dBm – specification limit.

Reference numbers of test equipment used

HL 3301	HL 3302	HL 3434	HL 3433	HL 2909	HL 4355	HL 5112	HL 4071
---------	---------	---------	---------	---------	---------	---------	---------

Full description is given in Appendix A.

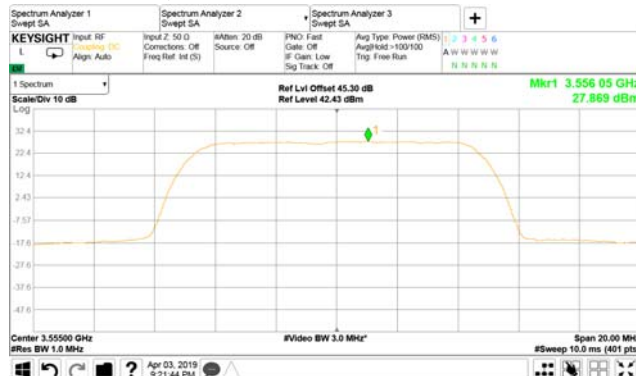


HERMON LABORATORIES

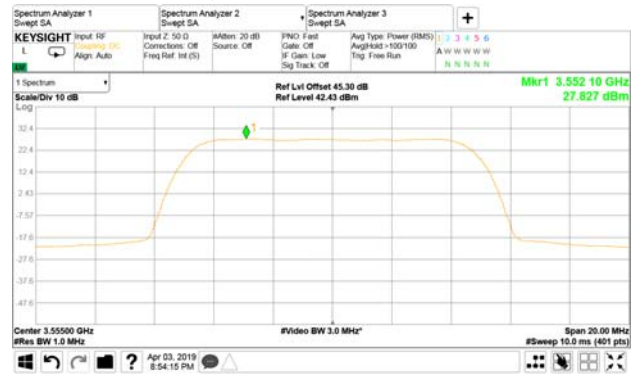
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.1 Peak spectral power density at low frequency

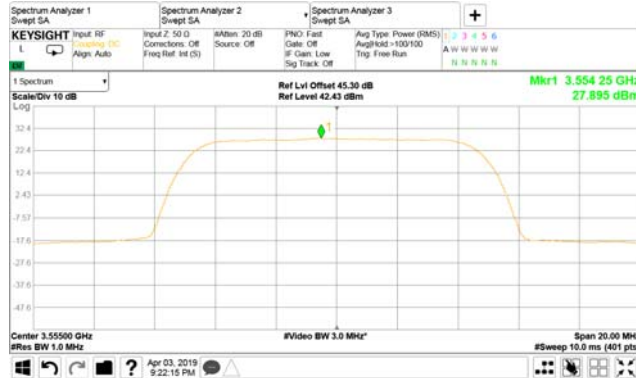
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



10 MHz
1
Modulation: 16QAM



Modulation: 64QAM



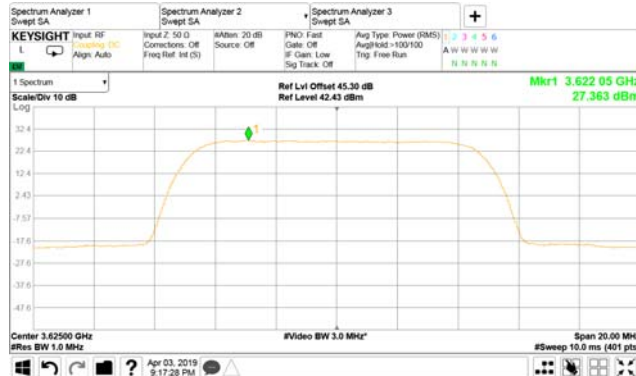


HERMON LABORATORIES

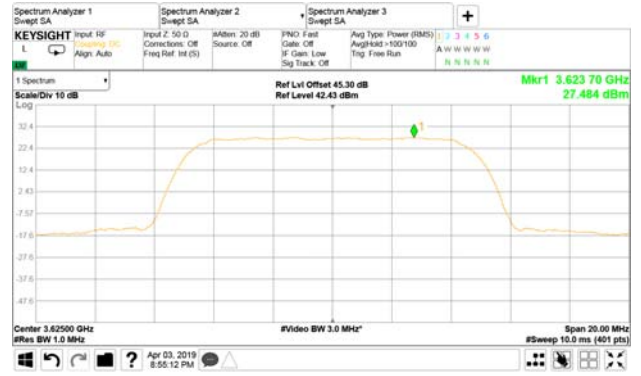
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.2 Peak spectral power density at mid frequency

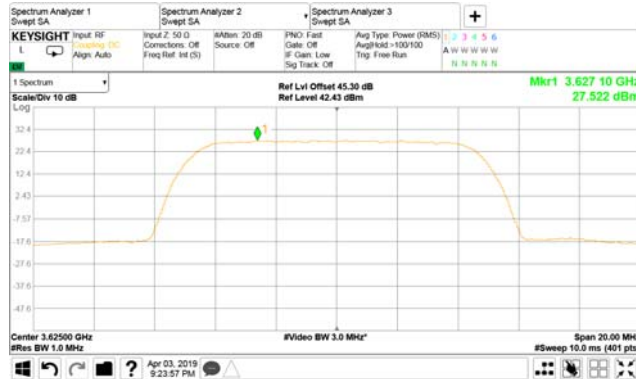
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



10 MHz
1
Modulation: 16QAM



Modulation: 64QAM





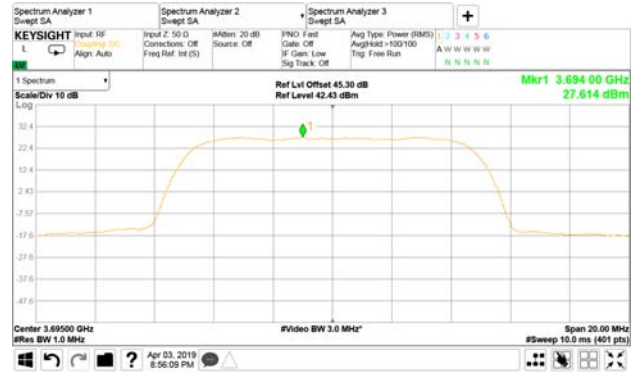
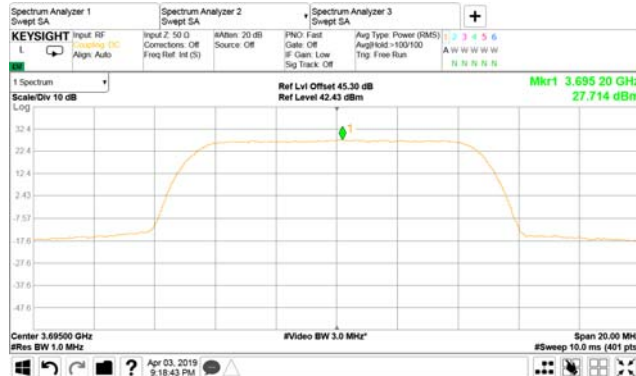
HERMON LABORATORIES

Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

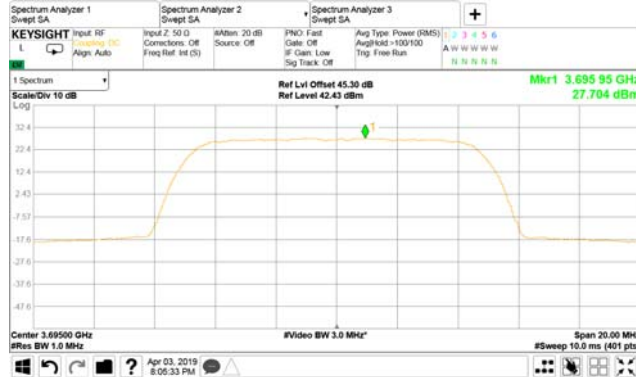
Plot 7.1.3 Peak spectral power density at high frequency

HANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK

10 MHz
1
Modulation: 16QAM



Modulation: 64QAM



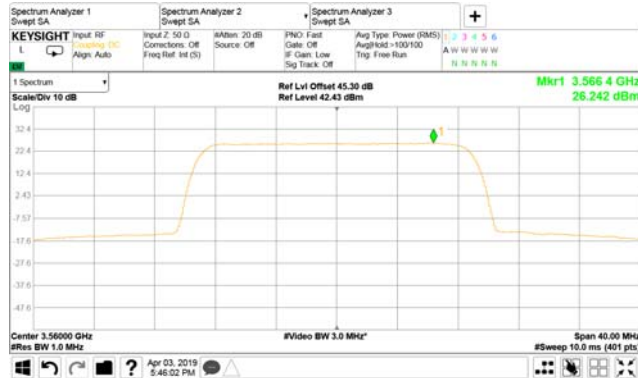


HERMON LABORATORIES

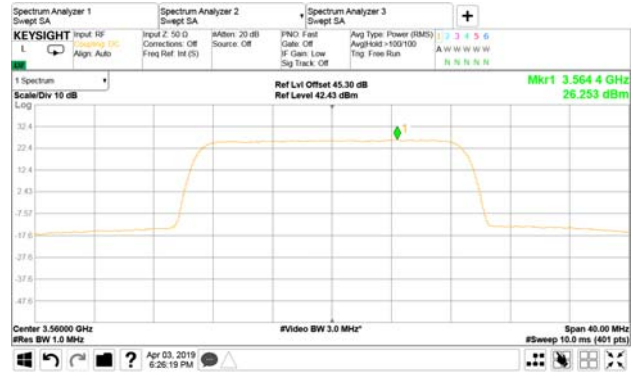
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.4 Peak spectral power density at low frequency

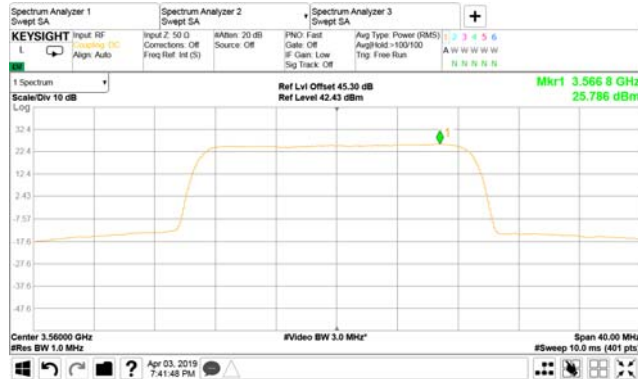
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



20 MHz
1
Modulation: 16QAM



Modulation: 64QAM



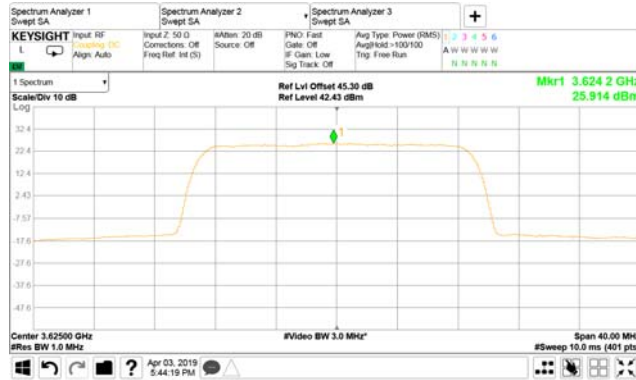


HERMON LABORATORIES

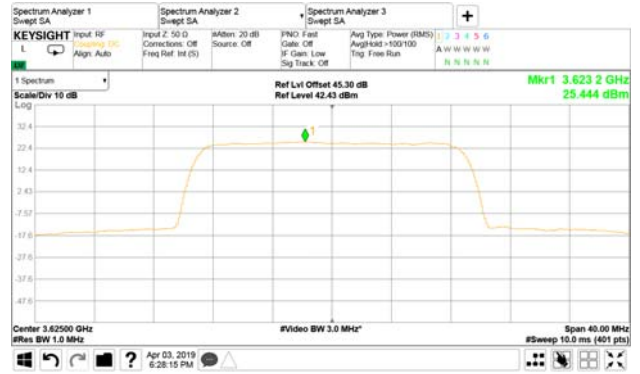
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.5 Peak spectral power density at mid frequency

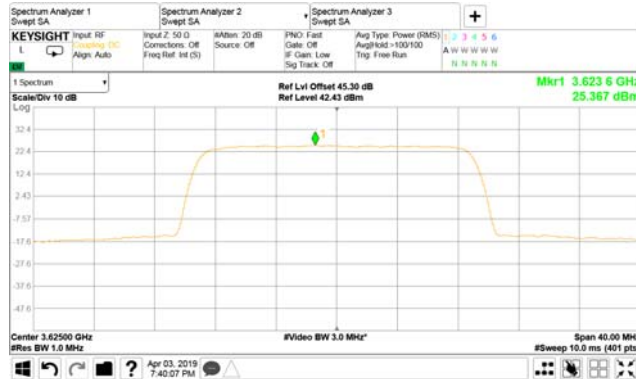
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



20 MHz
1
Modulation: 16QAM



Modulation: 64QAM



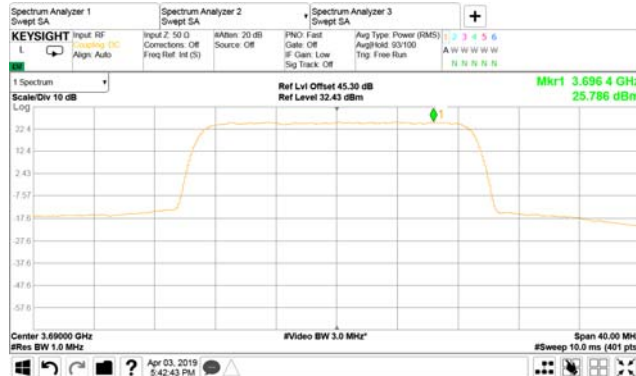


HERMON LABORATORIES

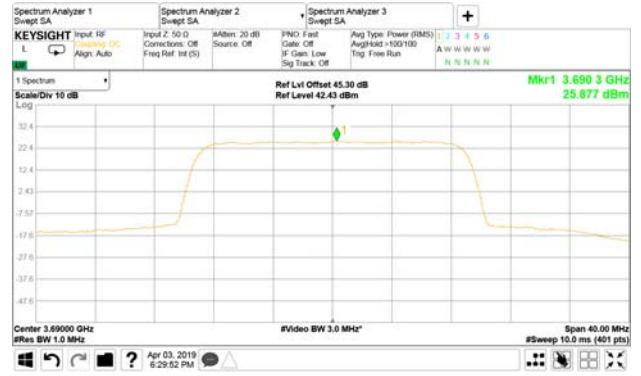
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.6 Peak spectral power density at high frequency

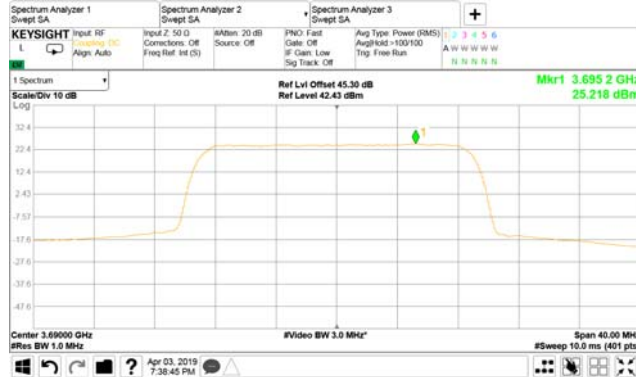
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



20 MHz
1
Modulation: 16QAM



Modulation: 64QAM





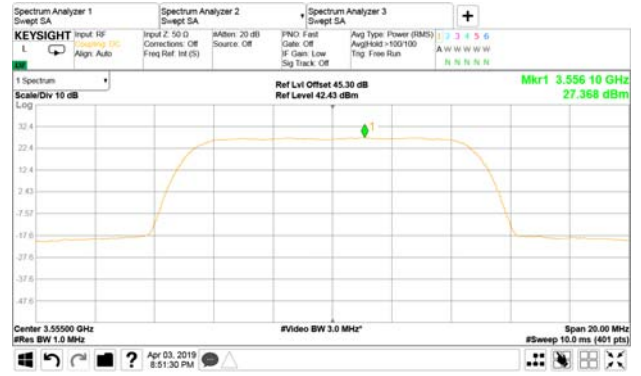
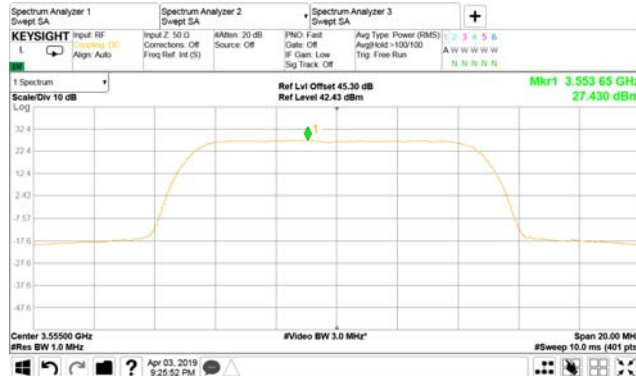
HERMON LABORATORIES

Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.7 Peak spectral power density at low frequency

CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK

10 MHz
2
Modulation: 16QAM



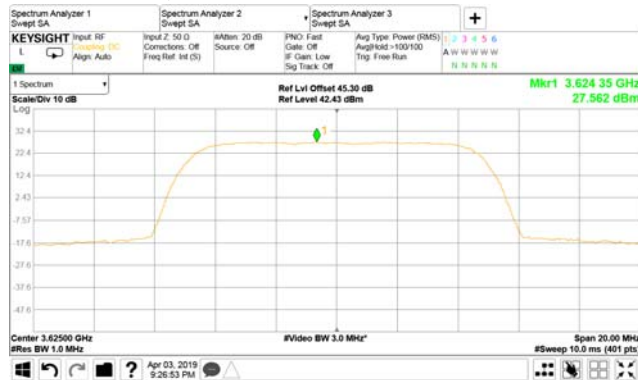


HERMON LABORATORIES

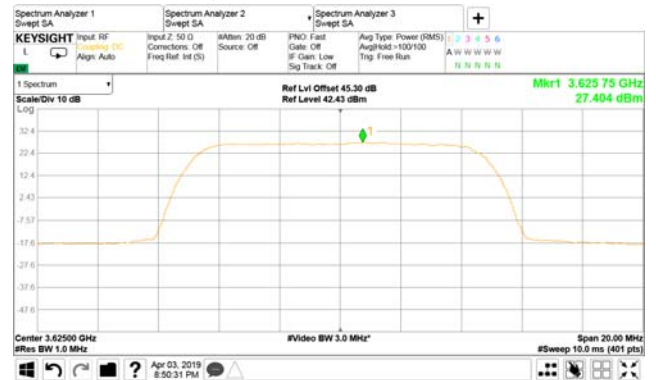
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.8 Peak spectral power density at mid frequency

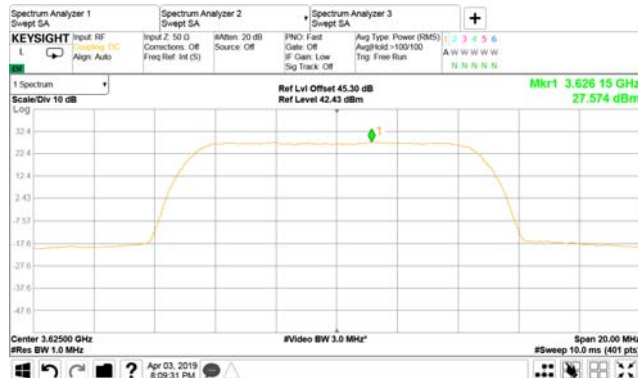
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



10 MHz
2
Modulation: 16QAM



Modulation: 64QAM





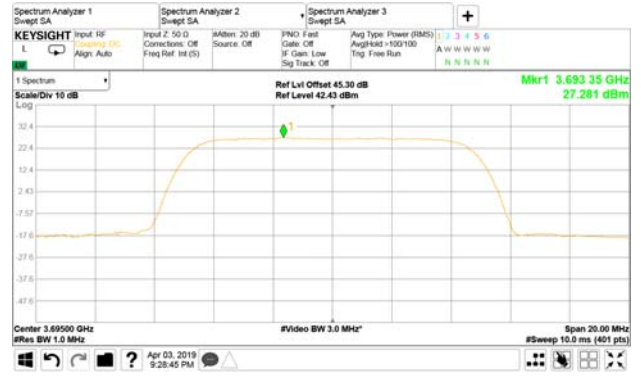
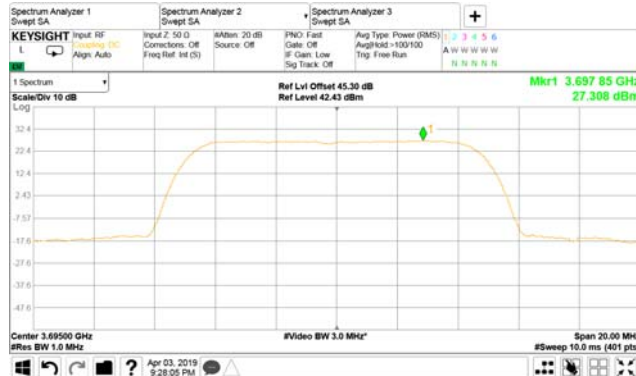
HERMON LABORATORIES

Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

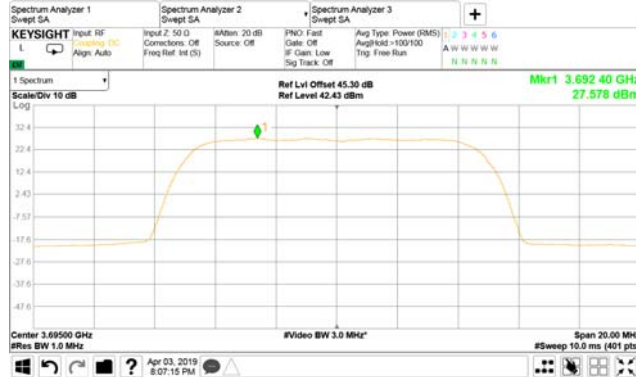
Plot 7.1.9 Peak spectral power density at high frequency

HANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK

10 MHz
2
Modulation: 16QAM



Modulation: 64QAM



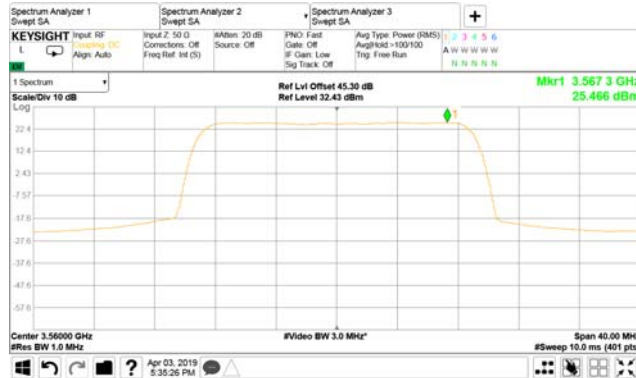


HERMON LABORATORIES

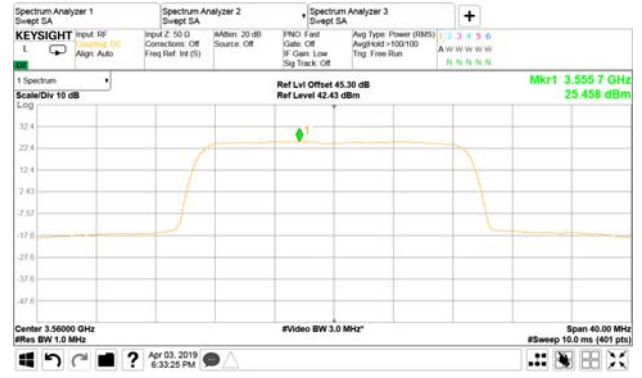
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.10 Peak spectral power density at low frequency

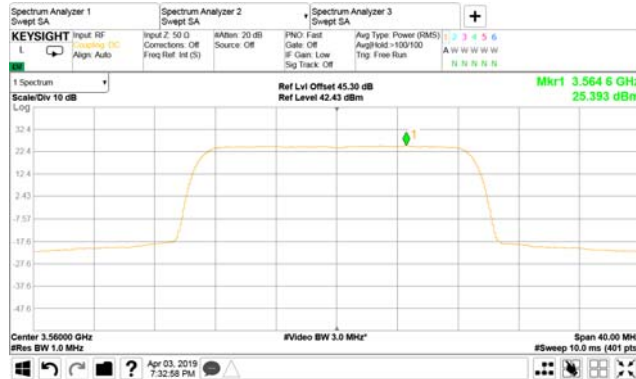
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



20 MHz
2
Modulation: 16QAM



Modulation: 64QAM



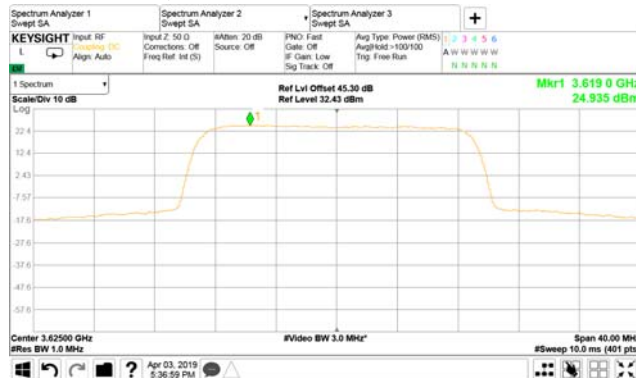


HERMON LABORATORIES

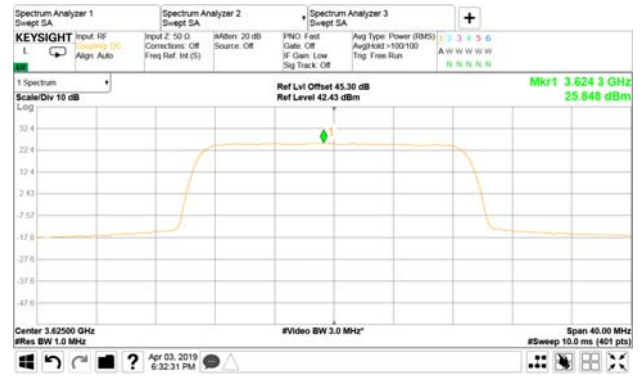
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.11 Peak spectral power density at mid frequency

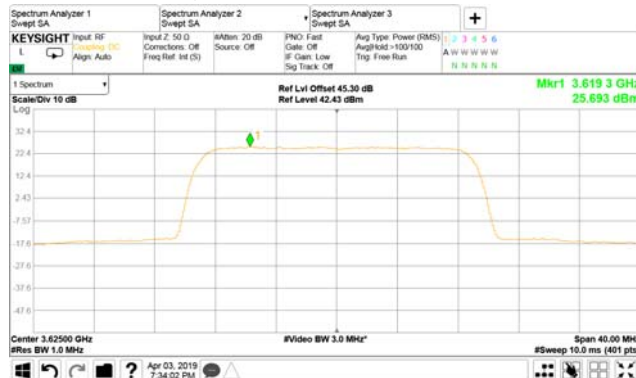
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



20 MHz
2
Modulation: 16QAM



Modulation: 64QAM



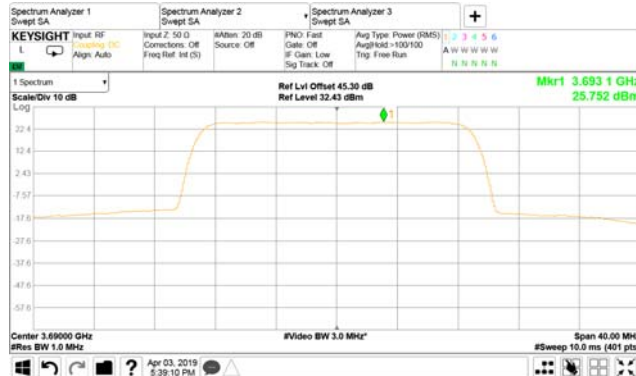


HERMON LABORATORIES

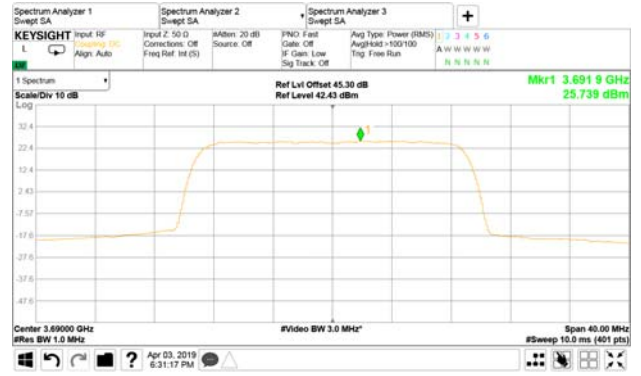
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.12 Peak spectral power density at high frequency

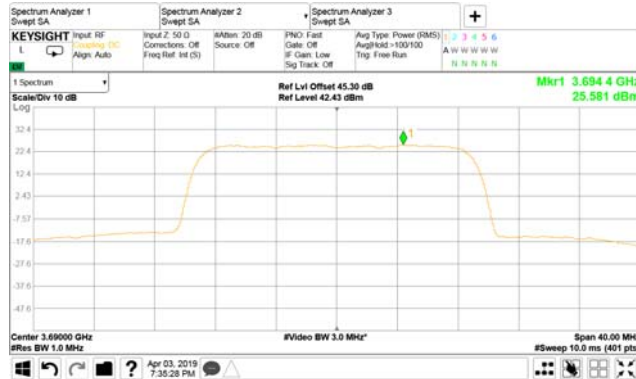
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



20 MHz
2
Modulation: 16QAM



Modulation: 64QAM



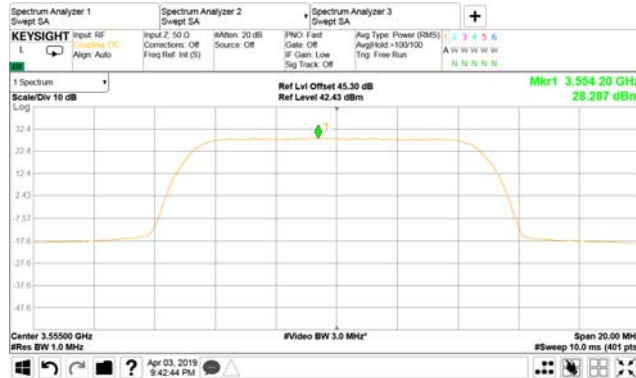


HERMON LABORATORIES

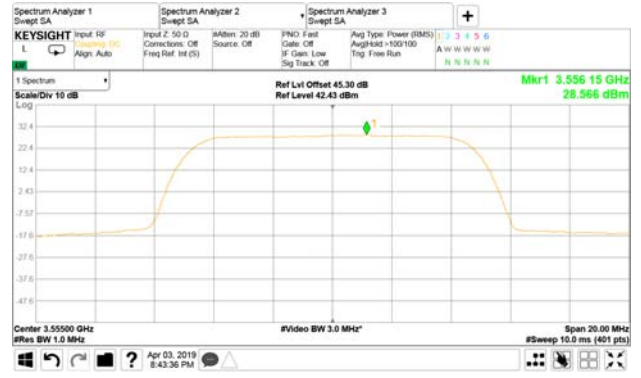
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.13 Peak spectral power density at low frequency

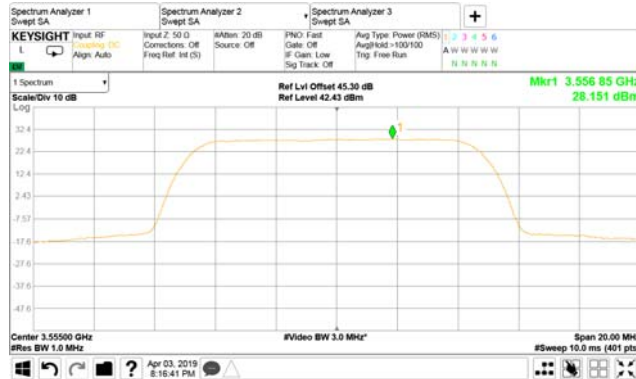
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



10 MHz
3
Modulation: 16QAM



Modulation: 64QAM





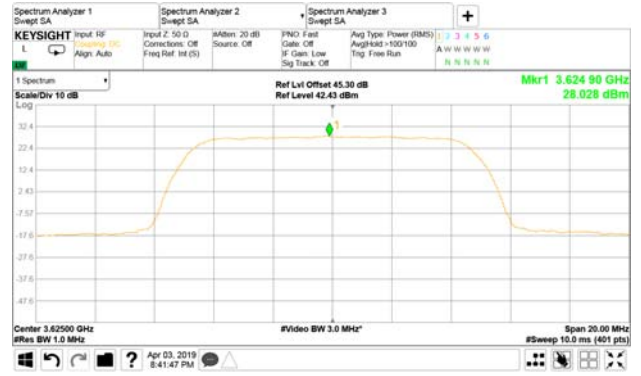
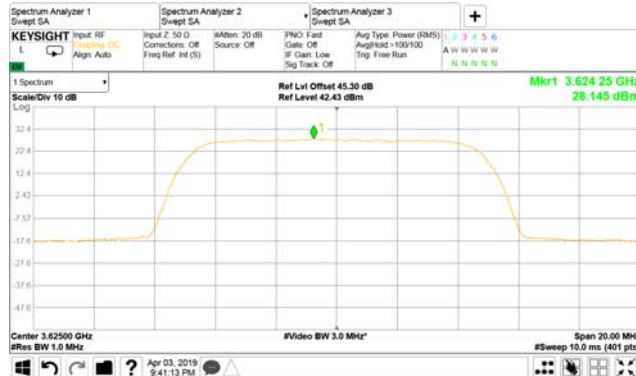
HERMON LABORATORIES

Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

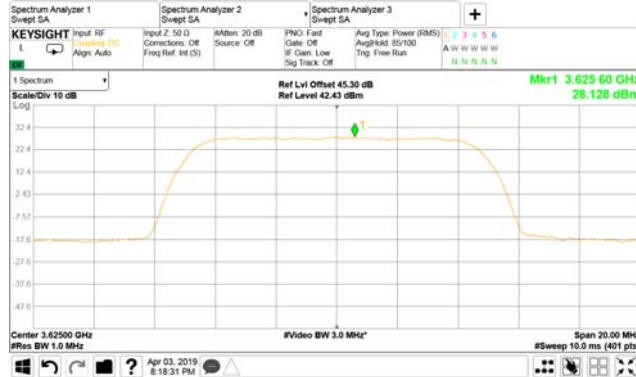
Plot 7.1.14 Peak spectral power density at mid frequency

CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK

10 MHz
3
Modulation: 16QAM



Modulation: 64QAM



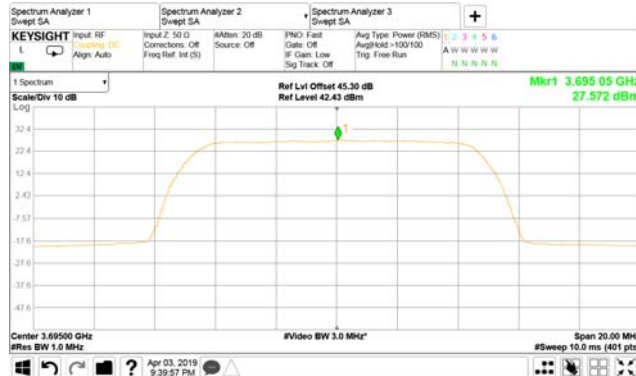


HERMON LABORATORIES

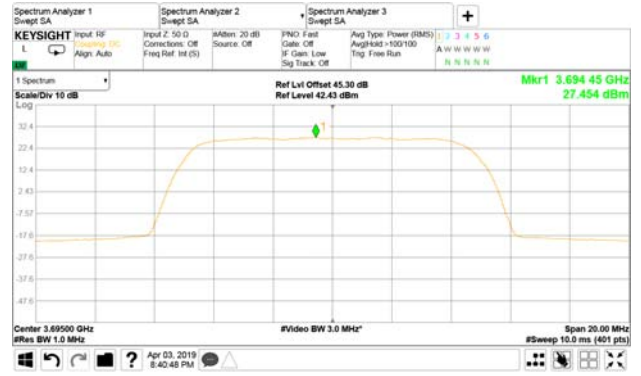
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.15 Peak spectral power density at high frequency

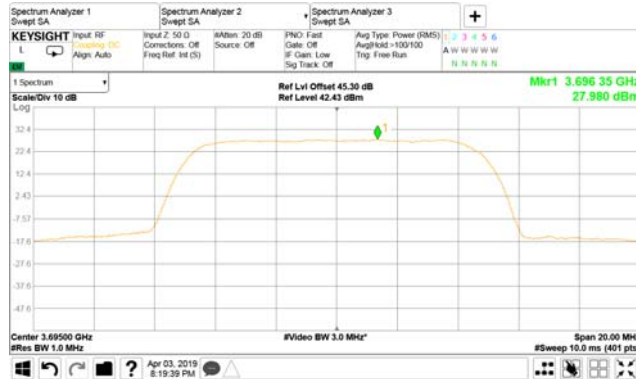
HANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



10 MHz
3
Modulation: 16QAM



Modulation: 64QAM



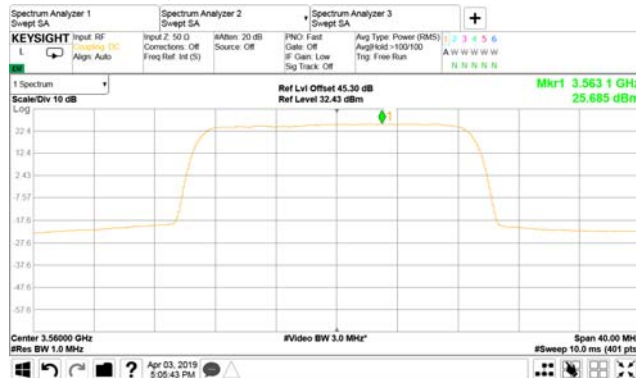


HERMON LABORATORIES

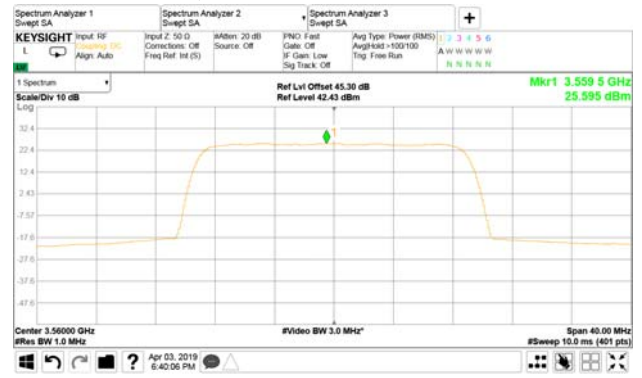
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.16 Peak spectral power density at low frequency

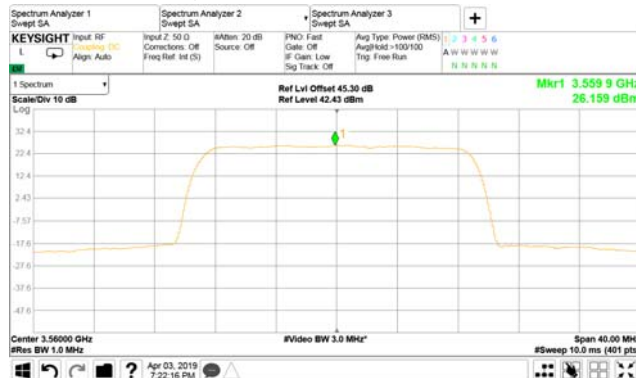
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



20 MHz
3
Modulation: 16QAM



Modulation: 64QAM





HERMON LABORATORIES

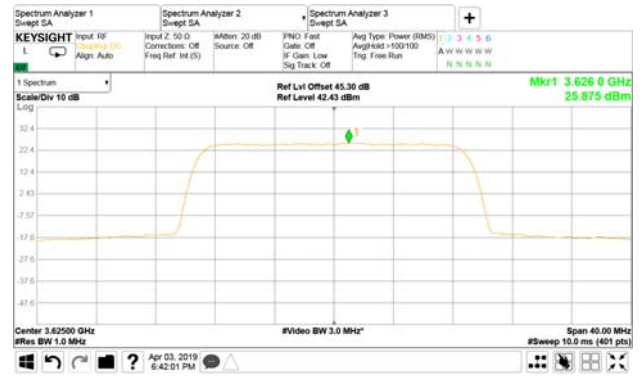
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.17 Peak spectral power density at mid frequency

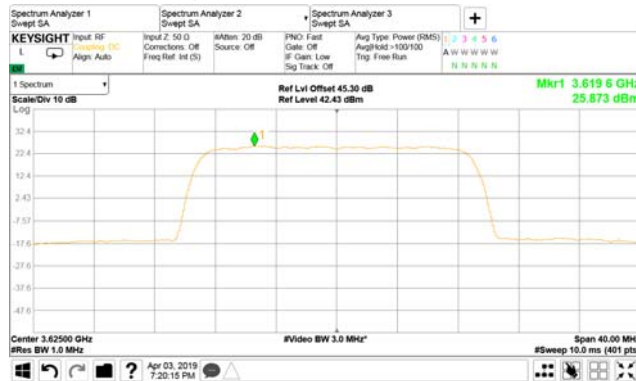
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



20 MHz
3
Modulation: 16QAM



Modulation: 64QAM



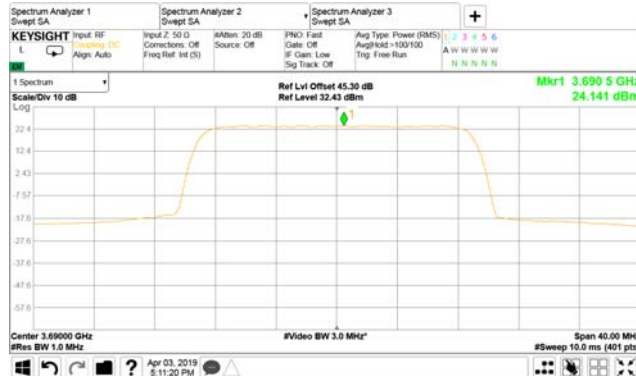


HERMON LABORATORIES

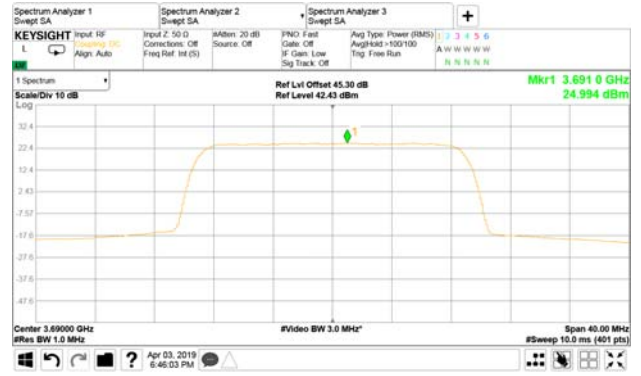
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.18 Peak spectral power density at high frequency

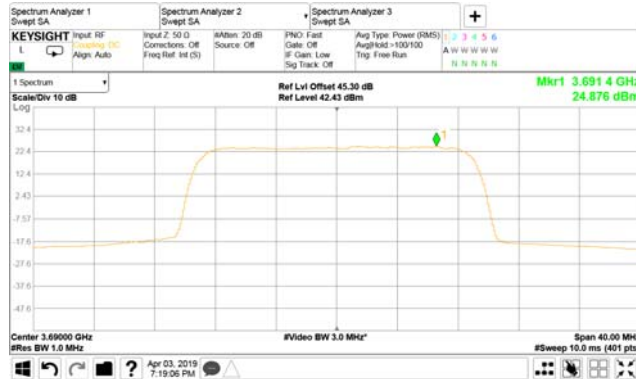
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



20 MHz
3
Modulation: 16QAM



Modulation: 64QAM



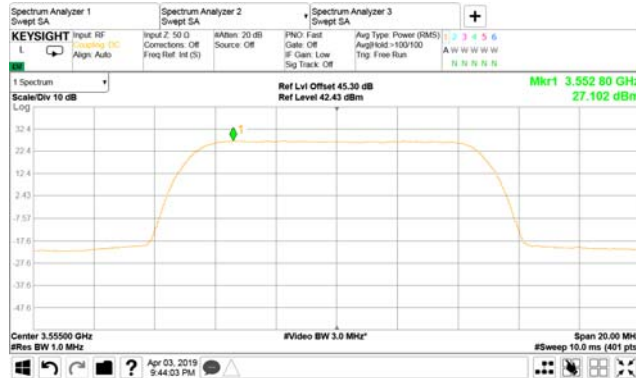


HERMON LABORATORIES

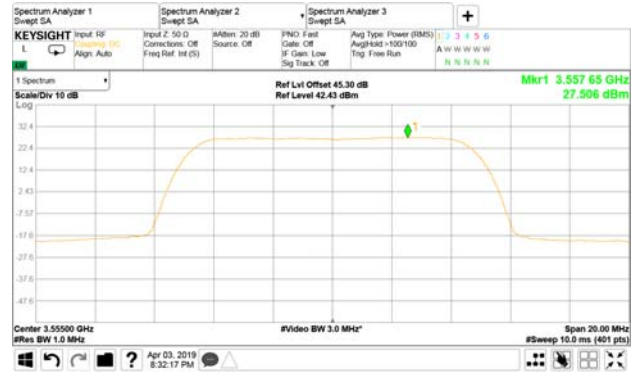
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.19 Peak spectral power density at low frequency

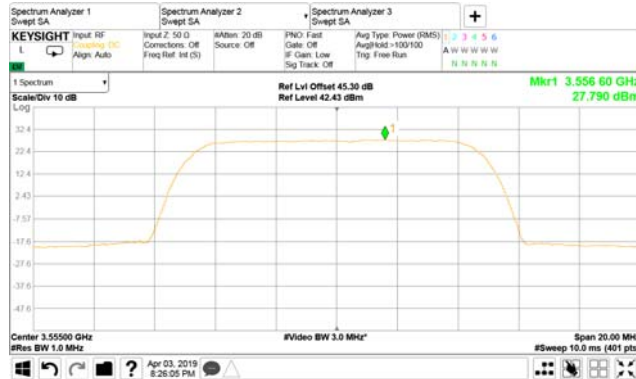
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



10 MHz
4
Modulation: 16QAM



Modulation: 64QAM



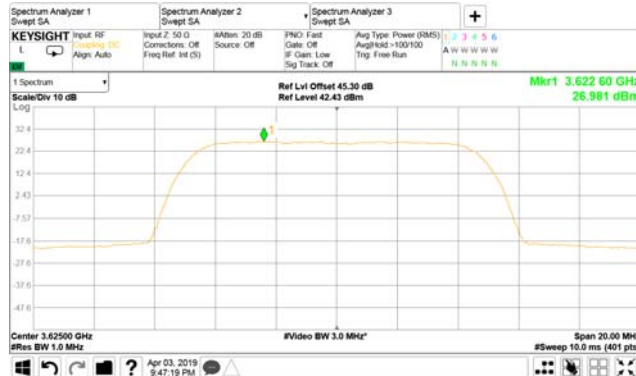


HERMON LABORATORIES

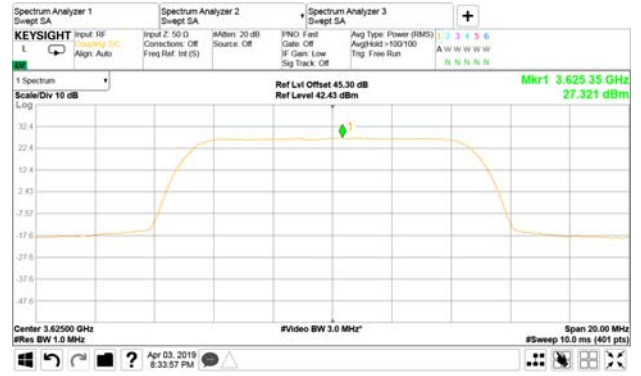
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.20 Peak spectral power density at mid frequency

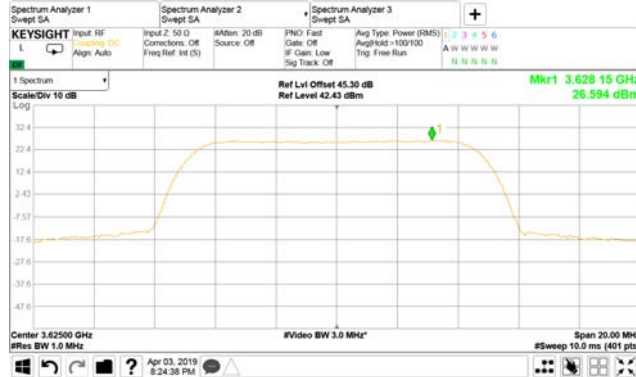
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



10 MHz
4
Modulation: 16QAM



Modulation: 64QAM





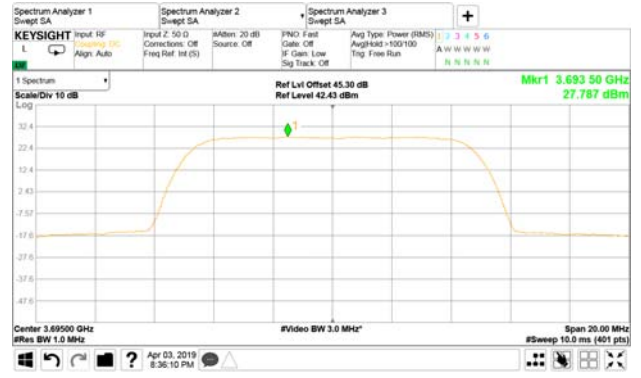
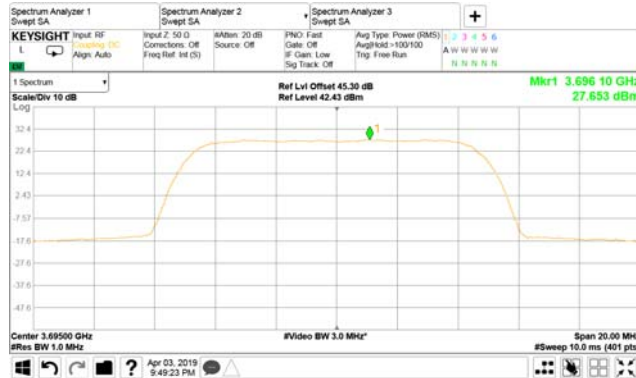
HERMON LABORATORIES

Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

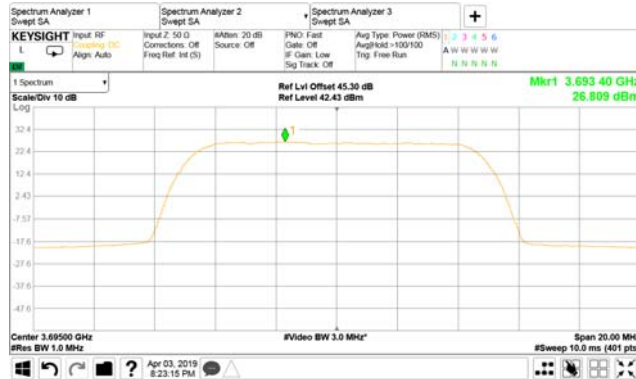
Plot 7.1.21 Peak spectral power density at high frequency

HANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK

10 MHz
4
Modulation: 16QAM



Modulation: 64QAM





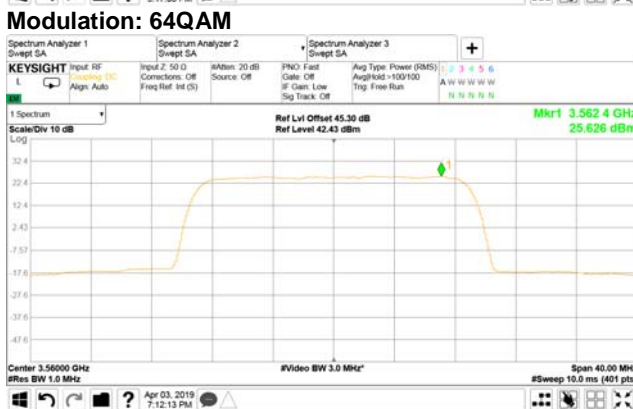
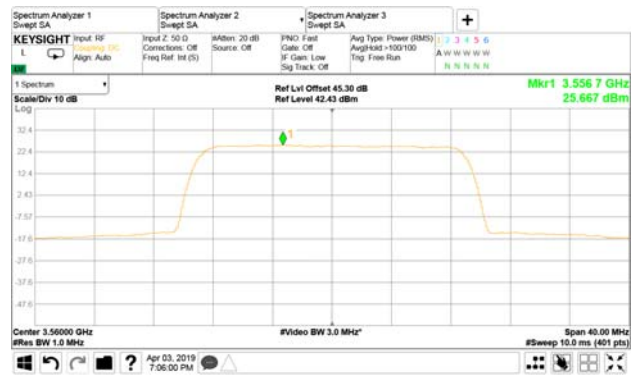
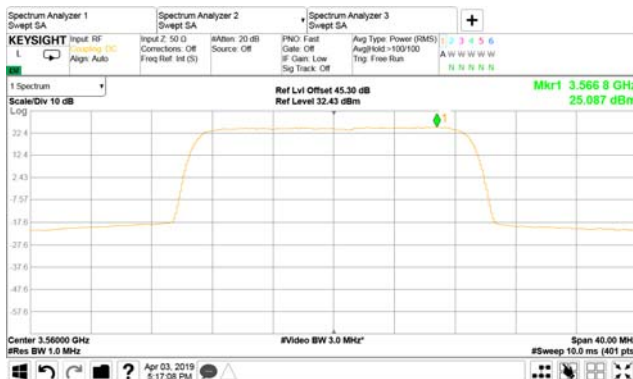
HERMON LABORATORIES

Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.22 Peak spectral power density at low frequency

CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK

20 MHz
4
Modulation: 16QAM



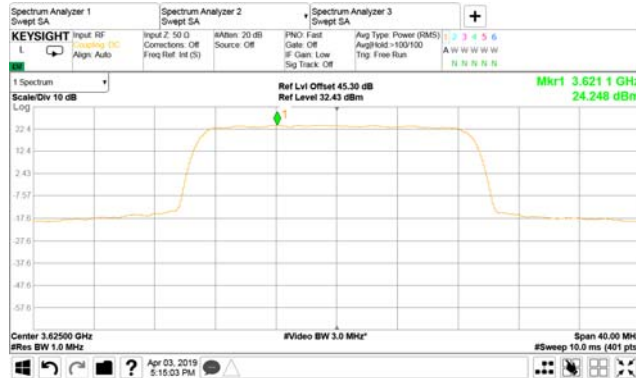


HERMON LABORATORIES

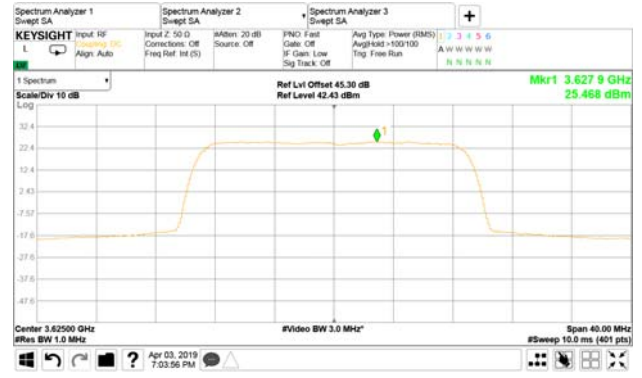
Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.23 Peak spectral power density at mid frequency

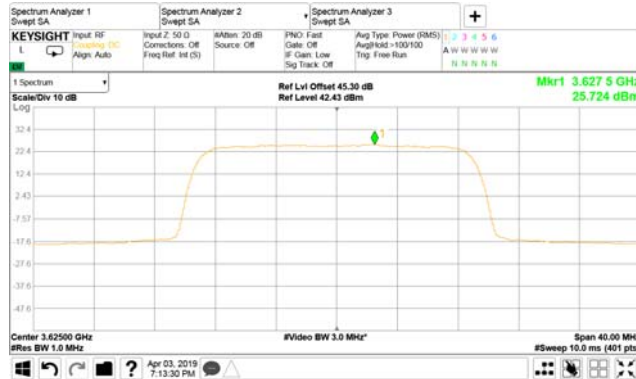
CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK



20 MHz
4
Modulation: 16QAM



Modulation: 64QAM





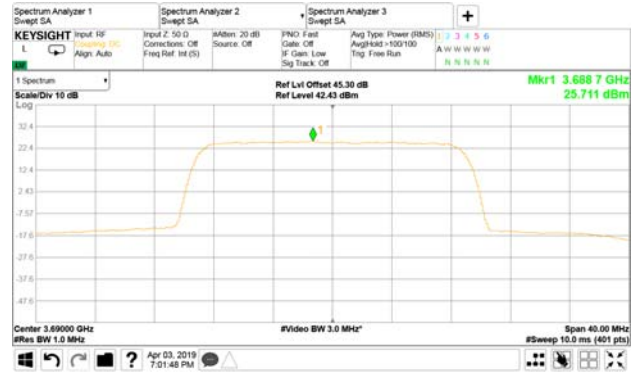
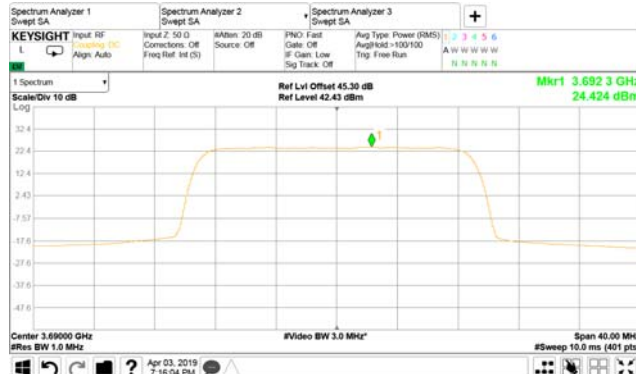
HERMON LABORATORIES

Test specification: Section 96.41(b), Maximum EIRP and maximum power spectral density			
Test procedure: Section 96.41(e)(3)			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-18 - 17-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

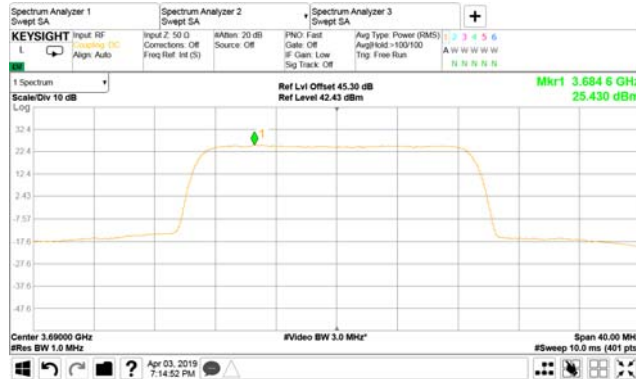
Plot 7.1.24 Peak spectral power density at high frequency

CHANNEL SPACING:
ANTENNA CHAIN:
Modulation: QPSK

20 MHz
4
Modulation: 16QAM



Modulation: 64QAM





Test specification: Section 96.41(g), Peak-to- average power ratio			
Test procedure: Section 96.41(g)			
Test mode: Compliance		Verdict: PASS	
Date(s): 23-Dec-18			
Temperature: 24.3 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

7.2 Peak-to-average power ratio (PAPR) test

7.2.1 General

This test was performed to measure the peak to average power ratio at RF antenna connector. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Peak-to-average power ratio limits

Assigned frequency range, MHz	Peak to average power ratio limit	
	Probability, %	dB
3550.0 – 3700.0	0.1	13.0

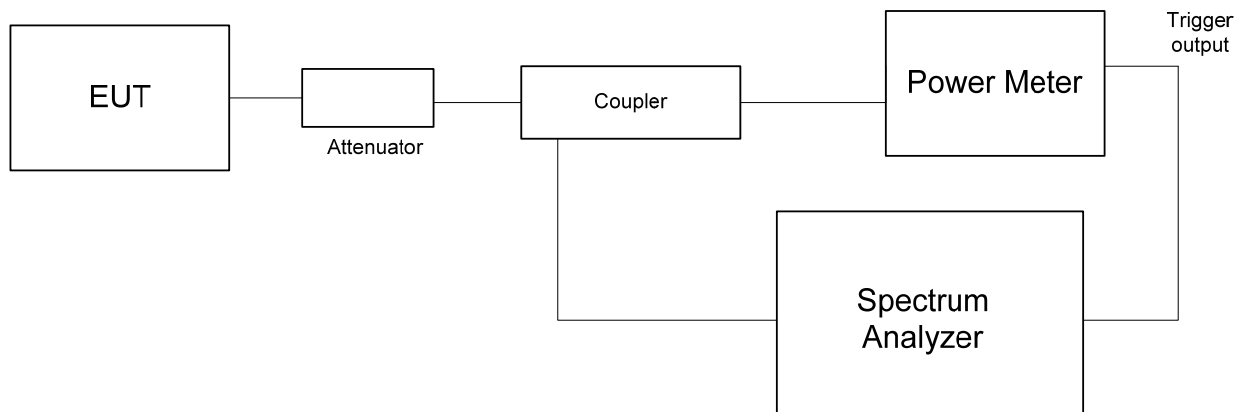
7.2.2 Test procedure

7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.

7.2.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.

7.2.2.3 The peak to average power ratio was measured with power meter as provided in Table 7.2.2 and associated plots.

Figure 7.2.1 Peak-to-average power test setup





Test specification: Section 96.41(g), Peak-to- average power ratio			
Test procedure: Section 96.41(g)			
Test mode: Compliance		Verdict: PASS	
Date(s): 23-Dec-18			
Temperature: 24.3 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Table 7.2.2 Peak-to-average power test results

OPERATING FREQUENCY RANGE: 3550 – 3700 MHz
 DETECTOR USED: Peak/Average
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Carrier frequency, MHz	Peak to average ratio, dB	Limit, dBm	Margin, dB	Verdict
Channel Spacing 10 MHz				
Modulation QPSK				
3555.0	7.83	13.0	-5.17	Pass
3625.0	7.80	13.0	-5.20	Pass
3695.0	7.77	13.0	-5.23	Pass
Modulation 16QAM				
3555.0	7.88	13.0	-5.12	Pass
3625.0	7.86	13.0	-5.14	Pass
3695.0	7.86	13.0	-5.14	Pass
Modulation 64QAM				
3555.0	7.80	13.0	-5.20	Pass
3625.0	7.80	13.0	-5.20	Pass
3695.0	7.77	13.0	-5.23	Pass
Channel Spacing 20 MHz				
Modulation QPSK				
3560.0	11.40	13.0	-1.60	Pass
3625.0	11.62	13.0	-1.38	Pass
3690.0	11.22	13.0	-1.78	Pass
Modulation 16QAM				
3560.0	11.31	13.0	-1.69	Pass
3625.0	11.51	13.0	-1.49	Pass
3690.0	11.55	13.0	-1.45	Pass
Modulation 64QAM				
3560.0	11.43	13.0	-1.57	Pass
3625.0	11.71	13.0	-1.29	Pass
3690.0	11.50	13.0	-1.50	Pass

Note: Offset 42.93 dB included: coupling loss 10 dB, attenuator 30 dB, cables loss 2.93 dB

Reference numbers of test equipment used

HL 3301	HL 3302	HL 3434	HL 4355		
---------	---------	---------	---------	--	--

Full description is given in Appendix A.



HERMON LABORATORIES

Test specification: Section 96.41(g), Peak-to- average power ratio			
Test procedure: Section 96.41(g)			
Test mode: Compliance		Verdict: PASS	
Date(s): 23-Dec-18			
Temperature: 24.3 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.1 Peak-to-average power ratio test results at low frequency

CHANNEL SPACING:

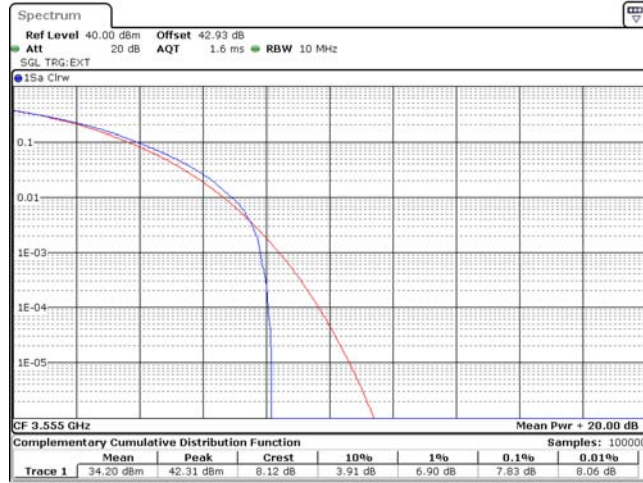
10 MHz

ANTENNA PORT:

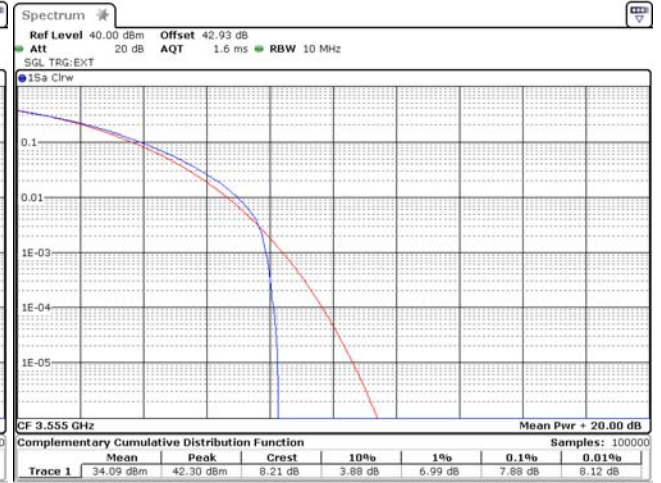
1

Modulation: QPSK

Modulation: 16QAM

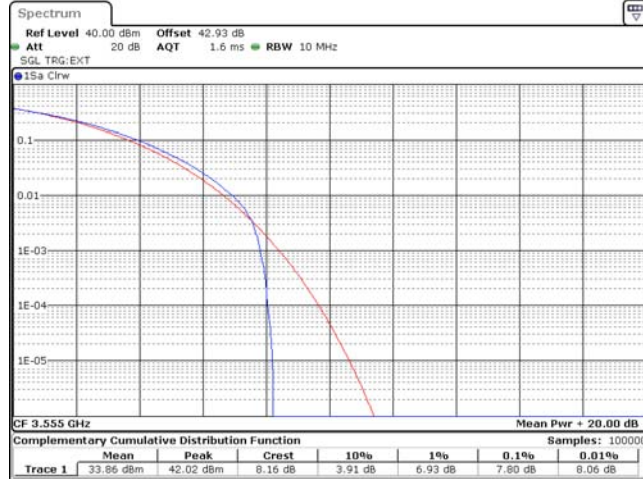


Date: 23.DEC.2018 10:23:01



Date: 1.JAN.2003 01:11:05

Modulation: 64QAM



Date: 1.JAN.2003 00:59:17



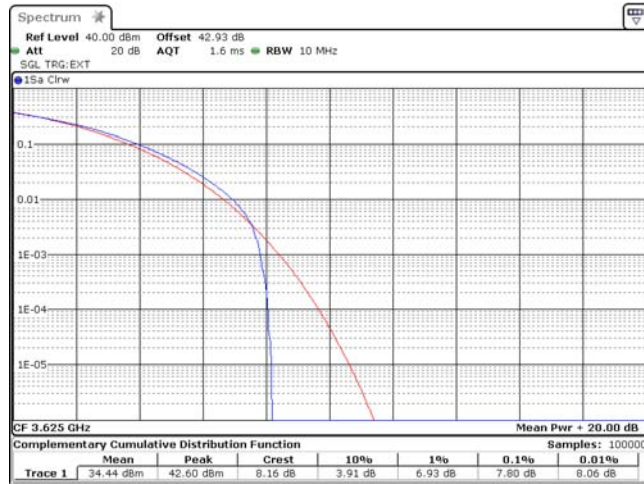
HERMON LABORATORIES

Test specification: Section 96.41(g), Peak-to- average power ratio			
Test procedure: Section 96.41(g)			
Test mode: Compliance		Verdict: PASS	
Date(s): 23-Dec-18			
Temperature: 24.3 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

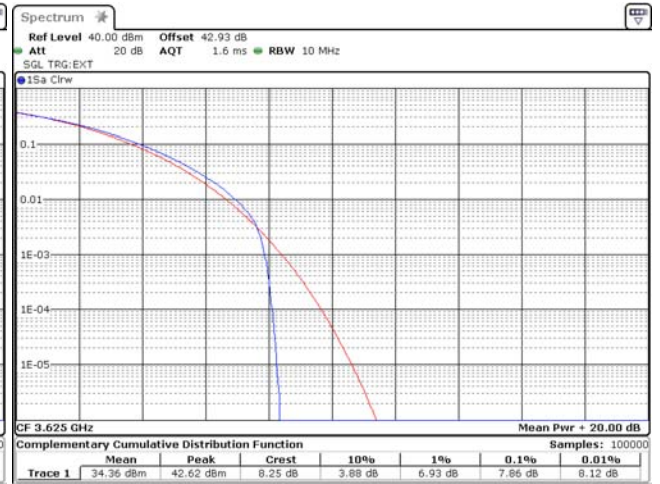
Plot 7.2.2 Peak-to-average power ratio test results at mid frequency

CHANNEL SPACING:
ANTENNA PORT:
Modulation: QPSK

10 MHz
1
Modulation: 16QAM



Date: 23.DEC.2018 10:23:45



Date: 1.JAN.2003 01:10:30

Modulation: 64QAM



Date: 1.JAN.2003 01:01:15



HERMON LABORATORIES

Test specification: Section 96.41(g), Peak-to- average power ratio			
Test procedure: Section 96.41(g)			
Test mode: Compliance		Verdict: PASS	
Date(s): 23-Dec-18			
Temperature: 24.3 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

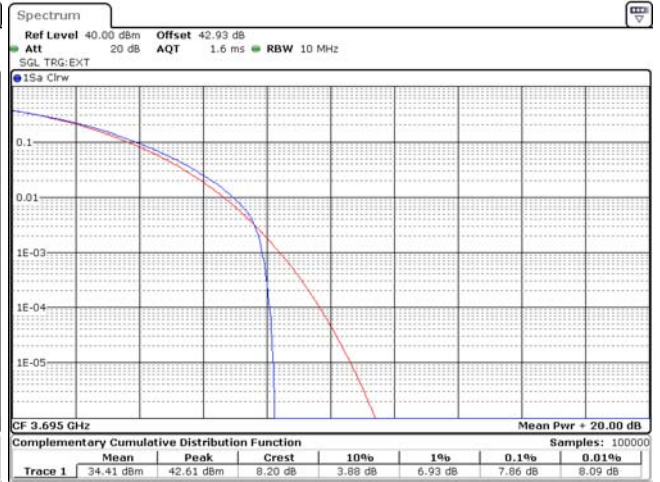
Plot 7.2.3 Peak-to-average power ratio test results at high frequency

CHANNEL SPACING:
ANTENNA PORT:
Modulation: QPSK

10 MHz
1
Modulation: 16QAM

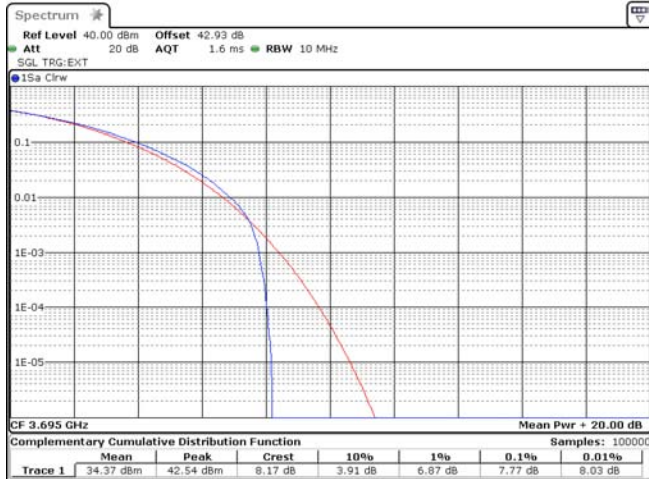


Date: 23.DEC.2018 10:24:28



Date: 1.JAN.2003 01:09:30

Modulation: 64QAM



Date: 1.JAN.2003 01:04:22



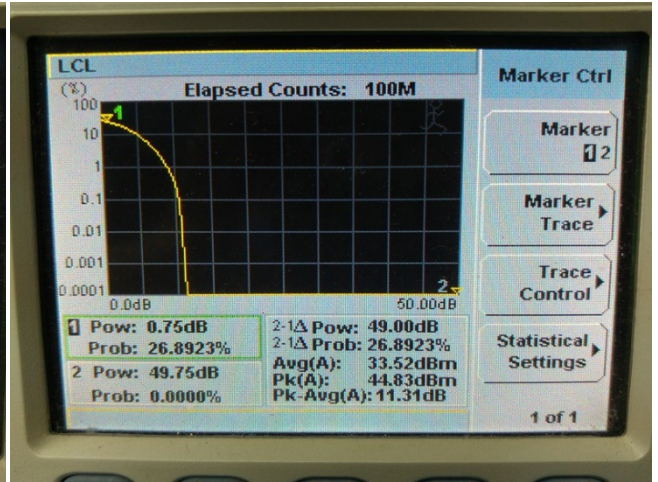
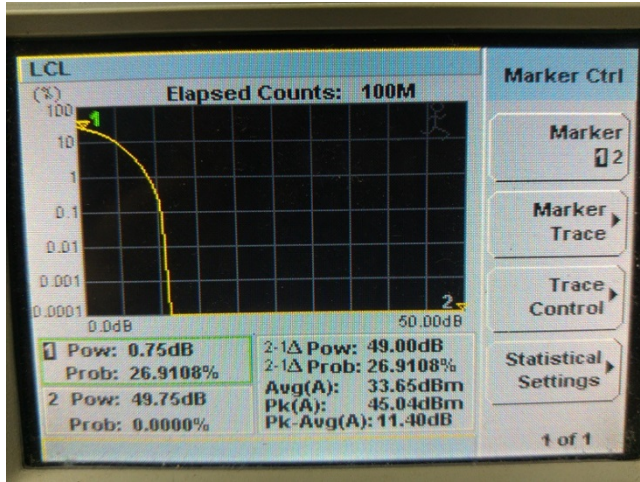
HERMON LABORATORIES

Test specification: Section 96.41(g), Peak-to- average power ratio	
Test procedure: Section 96.41(g)	
Test mode: Compliance	Verdict: PASS
Date(s): 23-Dec-18	
Temperature: 24.3 °C	Relative Humidity: 48 %
Remarks:	

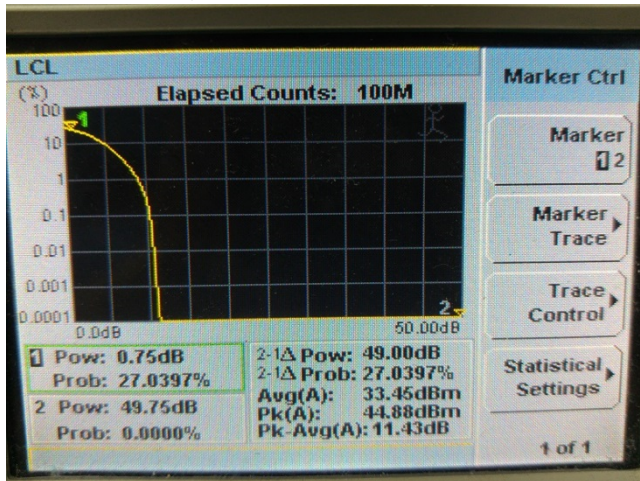
Plot 7.2.4 Peak-to-average power ratio test results at low frequency

CHANNEL SPACING:
ANTENNA PORT:
Modulation: QPSK

20 MHz
1
Modulation: 16QAM



Modulation: 64QAM





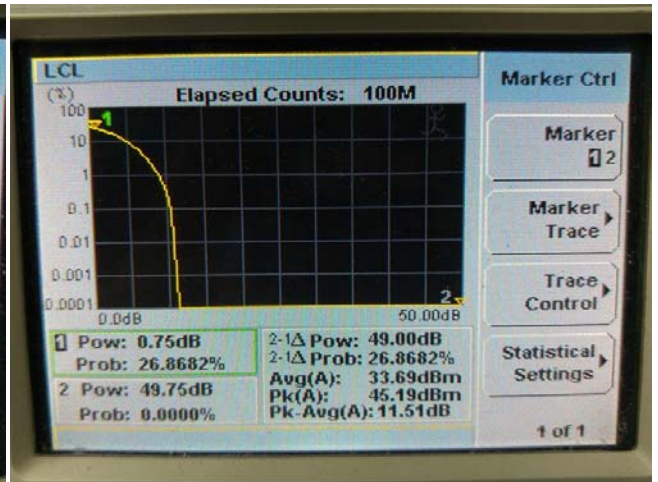
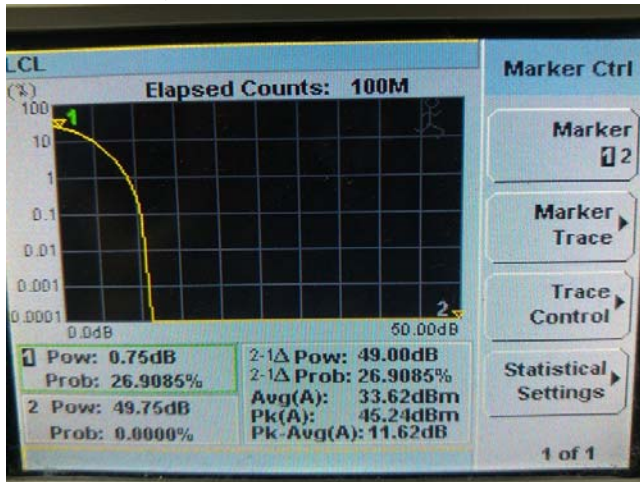
HERMON LABORATORIES

Test specification: Section 96.41(g), Peak-to- average power ratio			
Test procedure: Section 96.41(g)			
Test mode: Compliance		Verdict: PASS	
Date(s): 23-Dec-18			
Temperature: 24.3 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

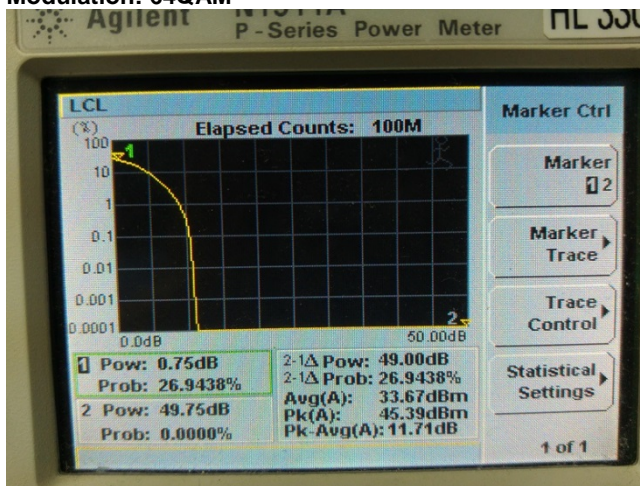
Plot 7.2.5 Peak-to-average power ratio test results at mid frequency

CHANNEL SPACING:
ANTENNA PORT:
Modulation: QPSK

20 MHz
1
Modulation: 16QAM



Modulation: 64QAM





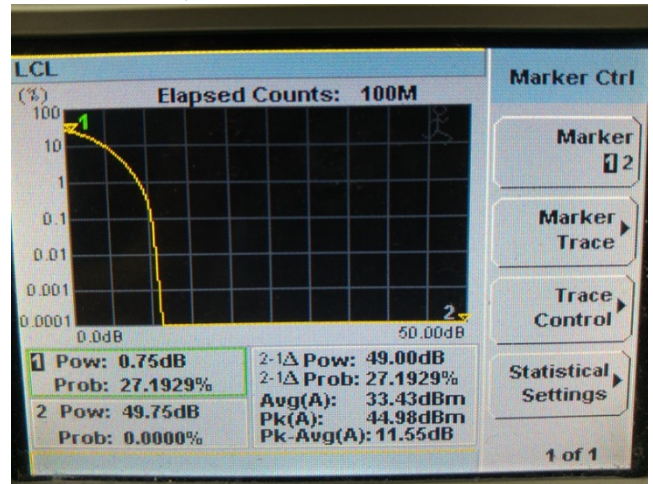
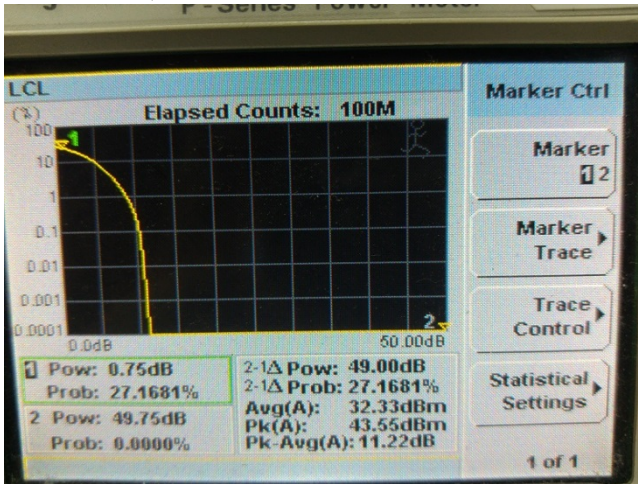
HERMON LABORATORIES

Test specification: Section 96.41(g), Peak-to- average power ratio			
Test procedure: Section 96.41(g)			
Test mode: Compliance		Verdict: PASS	
Date(s): 23-Dec-18			
Temperature: 24.3 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

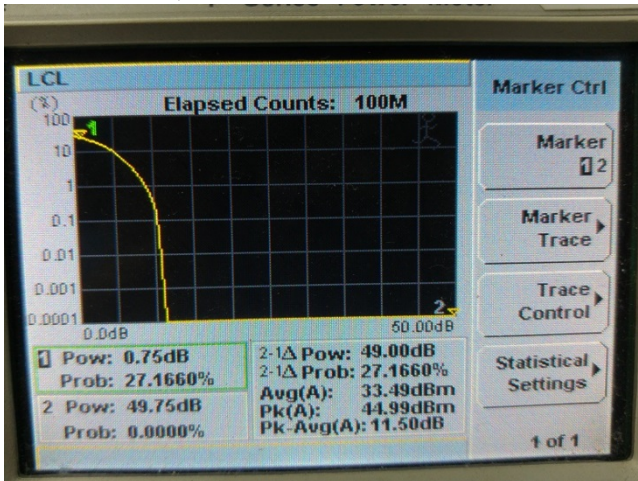
Plot 7.2.6 Peak-to-average power ratio test results at high frequency

CHANNEL SPACING:
ANTENNA PORT:
Modulation: QPSK

20 MHz
1
Modulation: 16QAM



Modulation: 64QAM





Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date(s): 21-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1008 hPa	Power: 48 VDC
Remarks:			

7.3 Occupied bandwidth test

7.3.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, %	Maximum allowed bandwidth, MHz
3550-3700	99	10 / 20 MHz

* - Modulation envelope reference points are provided in terms of attenuation below the unmodulated carrier.

7.3.2 Test procedure

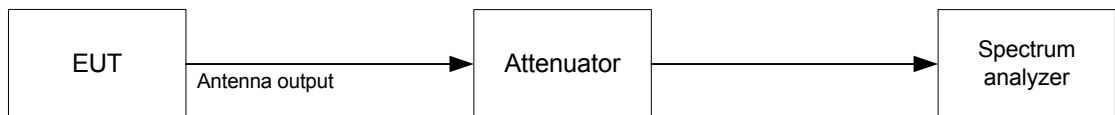
7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

7.3.2.2 The EUT was set to transmit the unmodulated carrier and the reference peak power level was measured.

7.3.2.3 The EUT was set to transmit the normally modulated carrier.

7.3.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.3.2 and the associated plots.

Figure 7.3.1 Occupied bandwidth test setup





Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date(s): 21-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1008 hPa	Power: 48 VDC
Remarks:			

Table 7.3.2 Occupied bandwidth test results

DETECTOR USED: AVR
 RESOLUTION BANDWIDTH: 300 kHz
 VIDEO BANDWIDTH: 3 MHz
 MODULATION ENVELOPE REFERENCE POINTS: 99%

CS=10 MHz

Modulation	Carrier frequency, MHz	Occupied bandwidth, MHz	Limit, MHz	Margin, MHz	Verdict
QPSK	3555	9.0279	10	-0.0721	Pass
	3625	9.0160	10	-0.9840	Pass
	3695	9.0066	10	-0.9934	Pass
16 QAM	3555	9.0135	10	-0.9865	Pass
	3625	9.0007	10	-0.9993	Pass
	3695	9.0040	10	-0.9960	Pass
64 QAM	3555	9.0257	10	-0.9743	Pass
	3625	9.0134	10	-0.9866	Pass
	3695	8.9717	10	-1.0283	Pass

CS=20 MHz

Modulation	Carrier frequency, MHz	Occupied bandwidth, MHz	Limit, MHz	Margin, kHz	Verdict
QPSK	3560	17.5700	20	-2.4300	Pass
	3625	17.5747	20	-2.4253	Pass
	3690	17.5779	20	-2.4221	Pass
16 QAM	3560	17.6201	20	-2.3799	Pass
	3625	17.5749	20	-2.4251	Pass
	3690	17.5821	20	-2.4179	Pass
64 QAM	3560	17.5841	20	-2.4159	Pass
	3625	17.5610	20	-2.4390	Pass
	3690	17.5826	20	-2.4174	Pass

Note: Offset 48 dB included: coupling loss 16 dB, attenuator 30 dB, cables loss 2.0 dB

Reference numbers of test equipment used

HL 3818						
---------	--	--	--	--	--	--

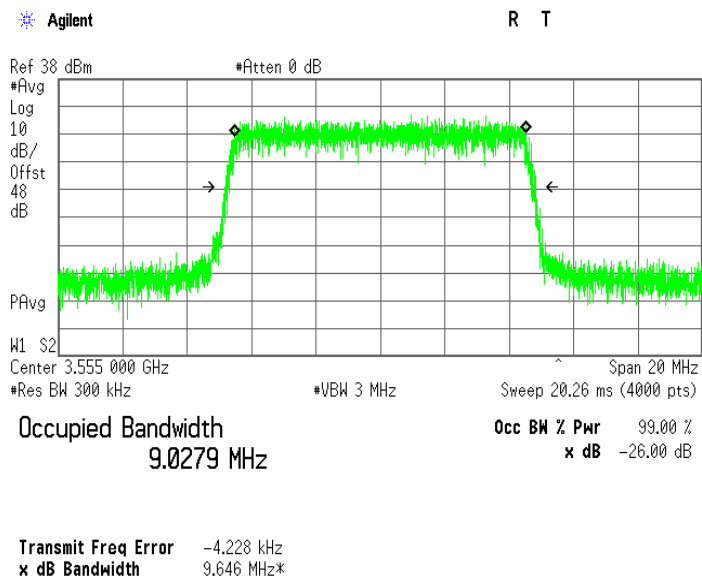
Full description is given in Appendix A.



Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date(s): 21-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1008 hPa	Power: 48 VDC
Remarks:			

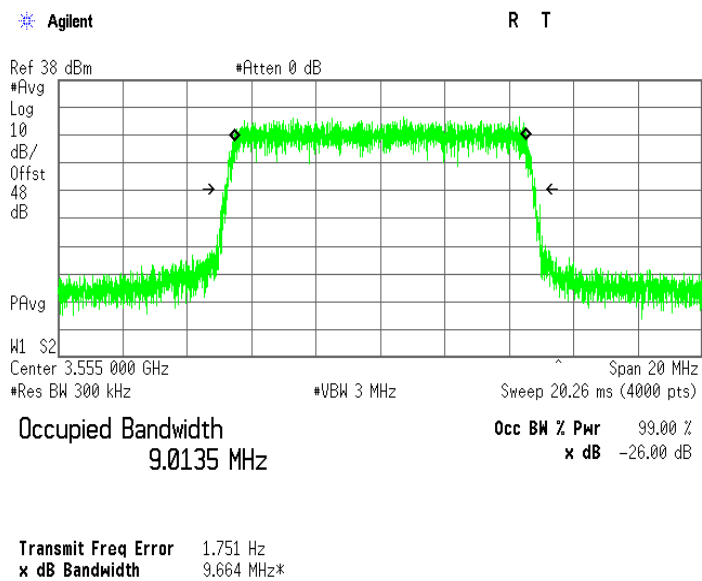
Plot 7.3.1 Occupied bandwidth test result at low frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz



Plot 7.3.2 Occupied bandwidth test result at low frequency

MODULATION: 16QAM
CHANNEL SPACING: 10 MHz



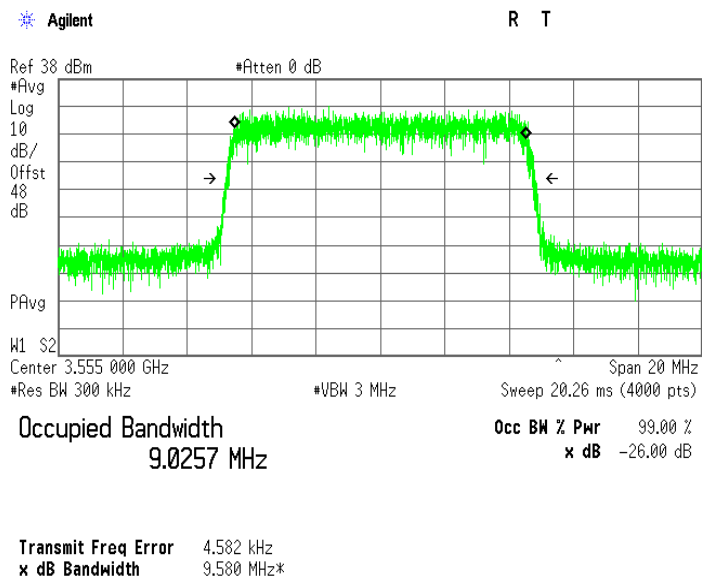


HERMON LABORATORIES

Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date(s): 21-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1008 hPa	Power: 48 VDC
Remarks:			

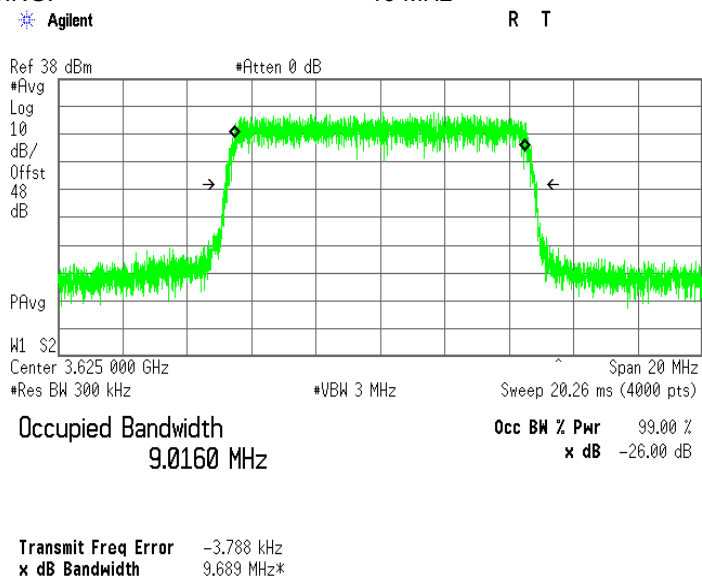
Plot 7.3.3 Occupied bandwidth test result at low frequency

MODULATION: 64QAM
CHANNEL SPACING: 10 MHz



Plot 7.3.4 Occupied bandwidth test result at mid frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz

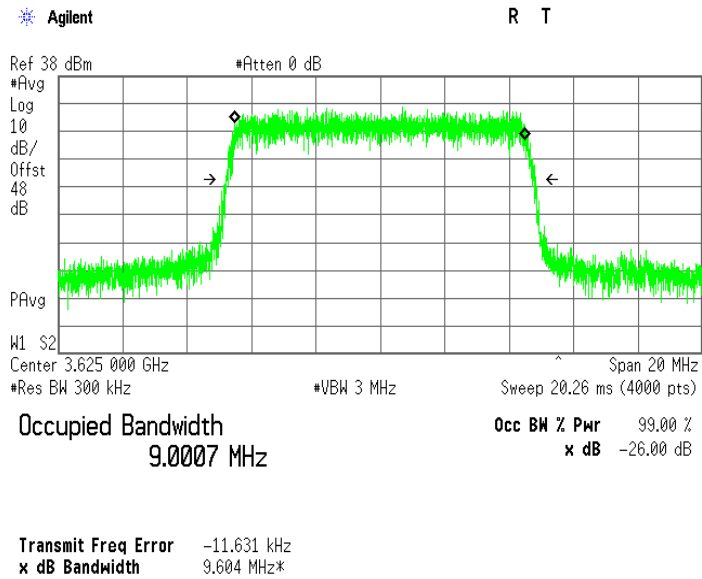




Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date(s): 21-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1008 hPa	Power: 48 VDC
Remarks:			

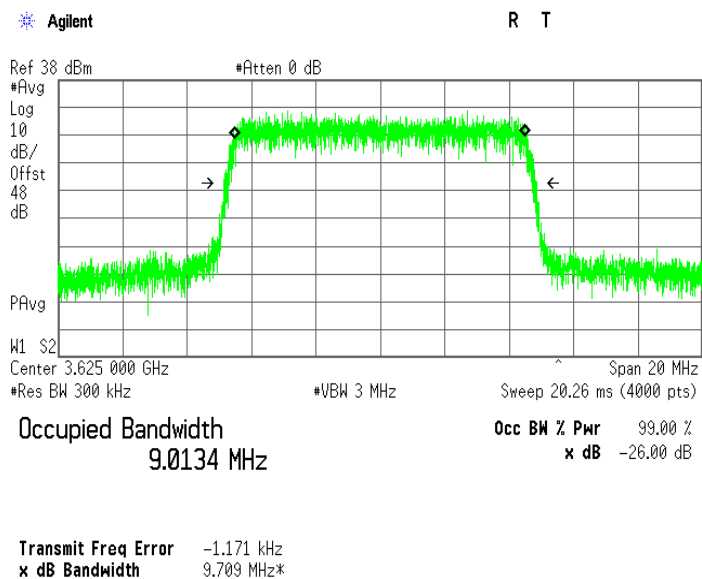
Plot 7.3.5 Occupied bandwidth test result at mid frequency

MODULATION: 16QAM
CHANNEL SPACING: 10 MHz



Plot 7.3.6 Occupied bandwidth test result at mid frequency

MODULATION: 64QAM
CHANNEL SPACING: 10 MHz



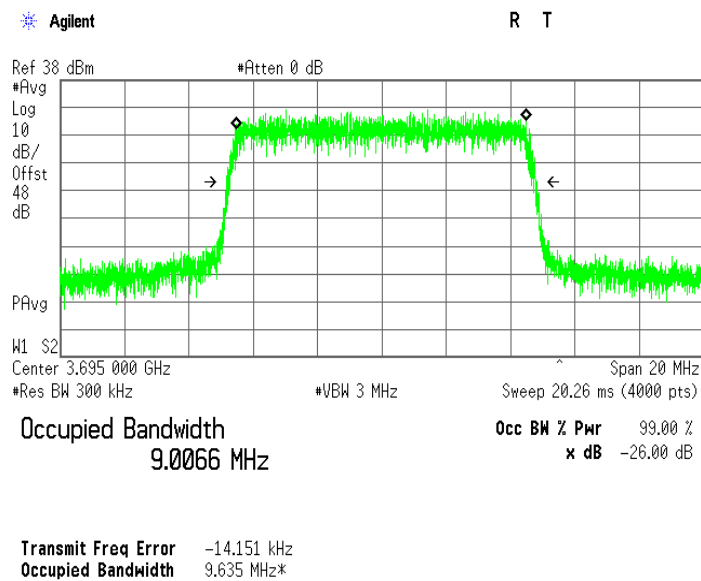


HERMON LABORATORIES

Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date(s): 21-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1008 hPa	Power: 48 VDC
Remarks:			

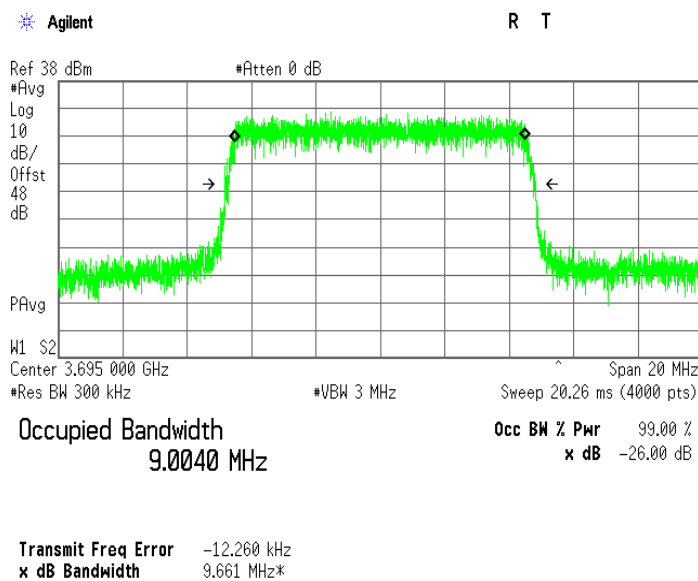
Plot 7.3.7 Occupied bandwidth test result at high frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz



Plot 7.3.8 Occupied bandwidth test result at high frequency

MODULATION: 16QAM
CHANNEL SPACING: 10 MHz





HERMON LABORATORIES

Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date(s): 21-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1008 hPa	Power: 48 VDC
Remarks:			

Plot 7.3.9 Occupied bandwidth test result at high frequency

MODULATION: 64QAM
CHANNEL SPACING: 10 MHz
Agilent R T



Occupied Bandwidth 8.9717 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB

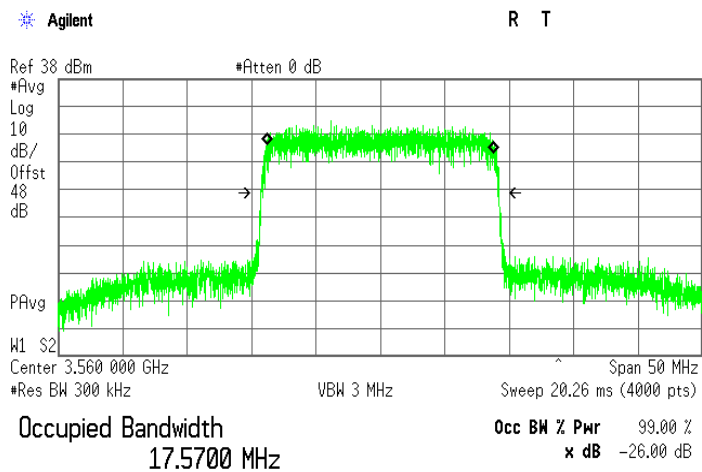
Transmit Freq Error -5.855 kHz
x dB Bandwidth 9.619 MHz*



Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date(s): 21-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1008 hPa	Power: 48 VDC
Remarks:			

Plot 7.3.10 Occupied bandwidth test result at low frequency

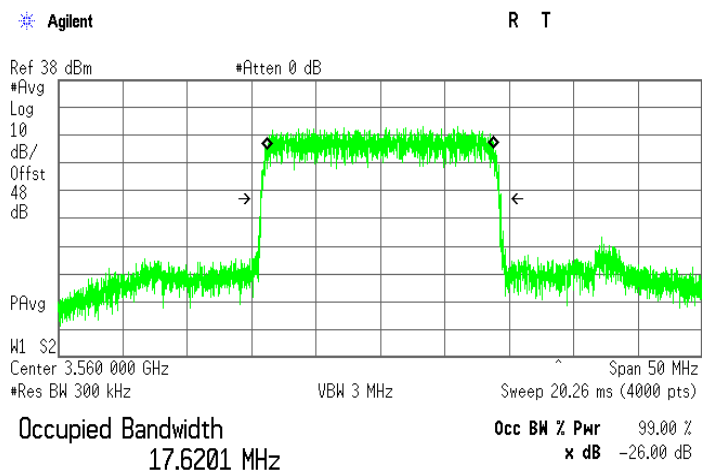
MODULATION: QPSK
CHANNEL SPACING: 20 MHz



Transmit Freq Error 21.170 kHz
x dB Bandwidth 18.465 MHz*

Plot 7.3.11 Occupied bandwidth test result at low frequency

MODULATION: 16QAM
CHANNEL SPACING: 20 MHz



Transmit Freq Error -12.200 kHz
x dB Bandwidth 18.633 MHz*

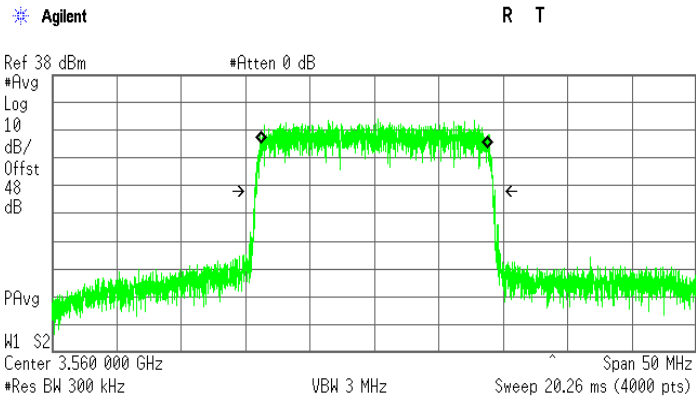


HERMON LABORATORIES

Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date(s): 21-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1008 hPa	Power: 48 VDC
Remarks:			

Plot 7.3.12 Occupied bandwidth test result at low frequency

MODULATION: 64QAM
CHANNEL SPACING: 20 MHz



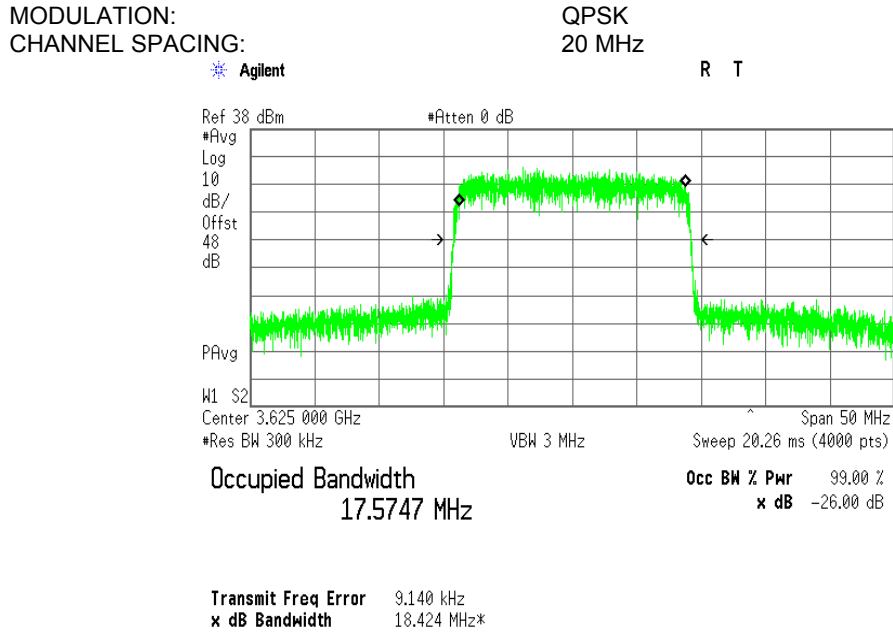
Occupied Bandwidth 17.5841 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 25.484 kHz
x dB Bandwidth 18.609 MHz*

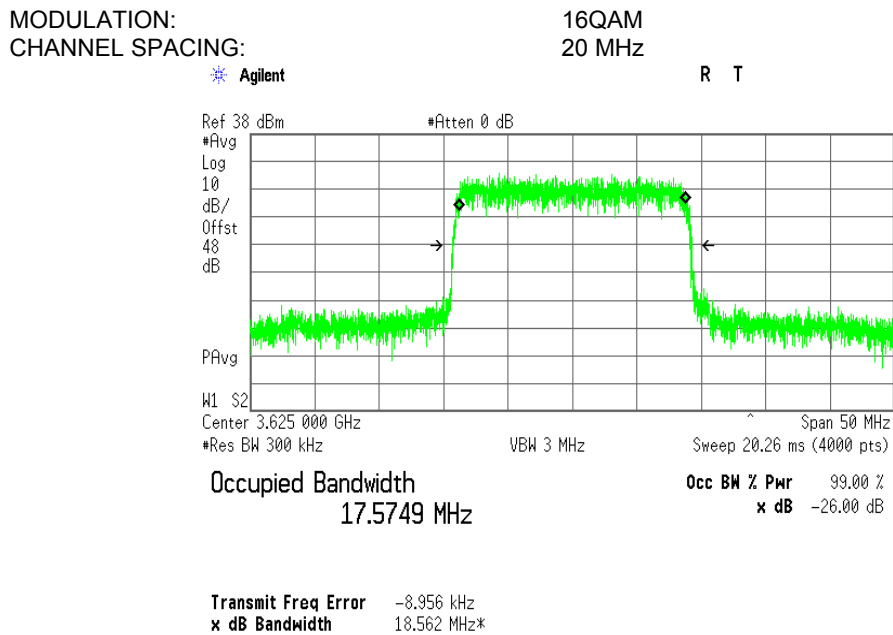


Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date(s): 21-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1008 hPa	Power: 48 VDC
Remarks:			

Plot 7.3.13 Occupied bandwidth test result at mid frequency



Plot 7.3.14 Occupied bandwidth test result at mid frequency



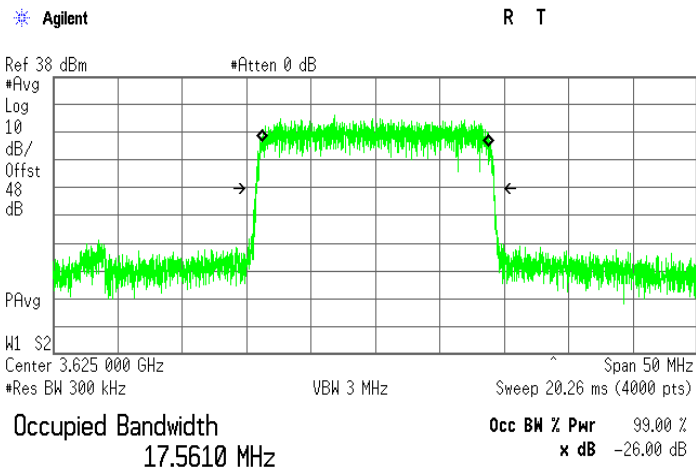


HERMON LABORATORIES

Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date(s): 21-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1008 hPa	Power: 48 VDC
Remarks:			

Plot 7.3.15 Occupied bandwidth test result at mid frequency

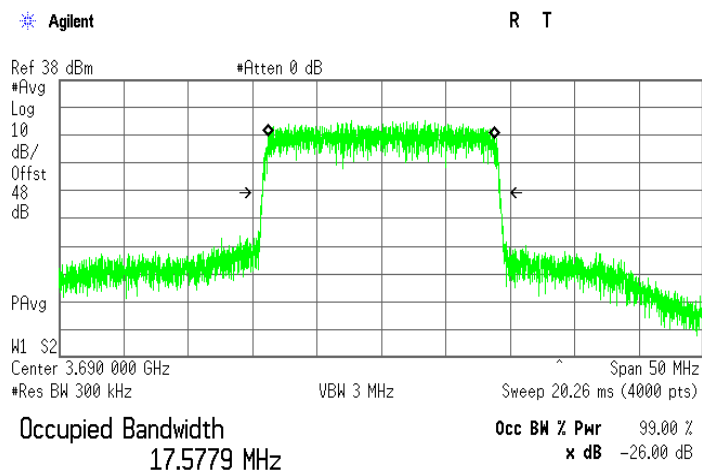
MODULATION: 64QAM
CHANNEL SPACING: 20 MHz



Transmit Freq Error -11.733 kHz
x dB Bandwidth 18.499 MHz*

Plot 7.3.16 Occupied bandwidth test result at high frequency

MODULATION: QPSK
CHANNEL SPACING: 20 MHz



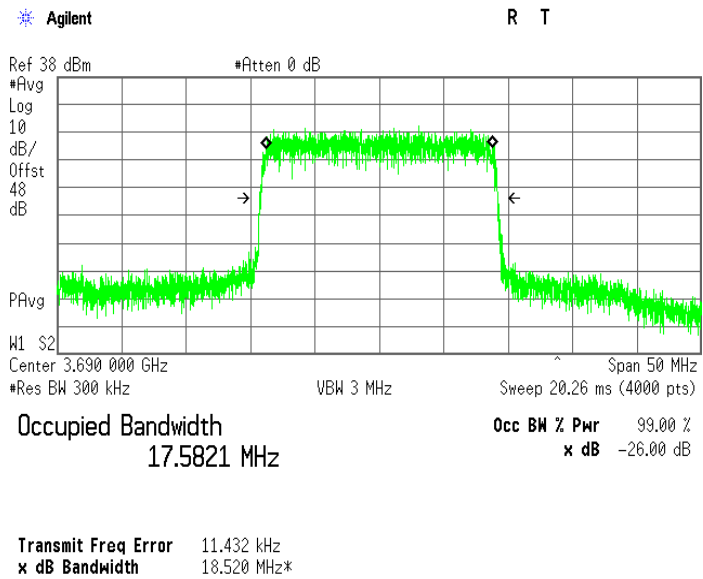
Transmit Freq Error -3.472 kHz
x dB Bandwidth 18.474 MHz*



Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date(s): 21-Dec-18			
Temperature: 23 °C	Relative Humidity: 55 %	Air Pressure: 1008 hPa	Power: 48 VDC
Remarks:			

Plot 7.3.17 Occupied bandwidth test result at high frequency

MODULATION: 16QAM
CHANNEL SPACING: 20 MHz



Plot 7.3.18 Occupied bandwidth test result at high frequency

MODULATION: 64QAM
CHANNEL SPACING: 20 MHz

