

<b>Test specification: Section2.1049, Occupied bandwidth</b>			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 5-Dec-21			
<b>Temperature:</b> 25 °C	<b>Relative Humidity:</b> 54 %	<b>Air Pressure:</b> 1010 hPa	<b>Power:</b> 48 VDC
<b>Remarks:</b>			

## 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 / 30 MHz

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

### 7.3.2 Test procedure

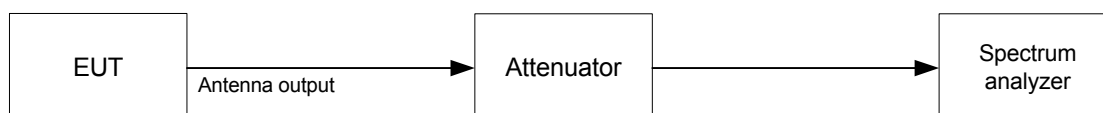
**7.3.2.1** The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

**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**





<b>Test specification:</b> <b>Section2.1049, Occupied bandwidth</b>			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict:</b> <b>PASS</b>	
<b>Date(s):</b> 5-Dec-21			
<b>Temperature:</b> 25 °C	<b>Relative Humidity:</b> 54 %	<b>Air Pressure:</b> 1010 hPa	<b>Power:</b> 48 VDC
<b>Remarks:</b>			

Table 7.3.2 Occupied bandwidth test results

DETECTOR USED: Peak hold  
 RESOLUTION BANDWIDTH: 1 – 5% of the OBW  
 VIDEO BANDWIDTH: > RBW  
 MODULATION ENVELOPE REFERENCE POINTS: 99%

Carrier frequency, MHz	Occupied bandwidth, MHz	Limit, MHz	Margin, MHz	Verdict
<b>Channel spacing 10 MHz</b>				
<b>Modulation QPSK</b>				
3555.0	8.6764	10.0	-1.3236	Pass
3625.0	8.6689	10.0	-1.3311	Pass
3695.0	8.6514	10.0	-1.3486	Pass
<b>Modulation 16QAM</b>				
3555.0	8.6339	10.0	-1.3661	Pass
3625.0	8.6664	10.0	-1.3336	Pass
3695.0	8.6439	10.0	-1.3561	Pass
<b>Modulation 64QAM</b>				
3555.0	8.6264	10.0	-1.3736	Pass
3625.0	8.6614	10.0	-1.3386	Pass
3680.0	8.6739	10.0	-1.3261	Pass
<b>Modulation 256QAM</b>				
3555.0	8.6264	10.0	-1.3736	Pass
3625.0	8.6389	10.0	-1.3611	Pass
3695.0	8.6489	10.0	-1.3511	Pass
<b>Channel spacing 30 MHz</b>				
<b>Modulation QPSK</b>				
3.565	27.8215	30.0	-2.1785	Pass
3.625	27.8365	30.0	-2.1635	Pass
3.685	27.8290	30.0	-2.1710	Pass
<b>Modulation 16QAM</b>				
3.565	27.8665	30.0	-2.1335	Pass
3.625	27.8890	30.0	-2.1110	Pass
3.685	27.8890	30.0	-2.1110	Pass
<b>Modulation 64QAM</b>				
3.565	27.8740	30.0	-2.1260	Pass
3.625	27.8740	30.0	-2.1260	Pass
3.685	27.8665	30.0	-2.1335	Pass
<b>Modulation 256QAM</b>				
3.565	27.8815	30.0	-2.1185	Pass
3.625	27.8965	30.0	-2.1035	Pass
3.685	27.8515	30.0	-2.1485	Pass

## Reference numbers of test equipment used

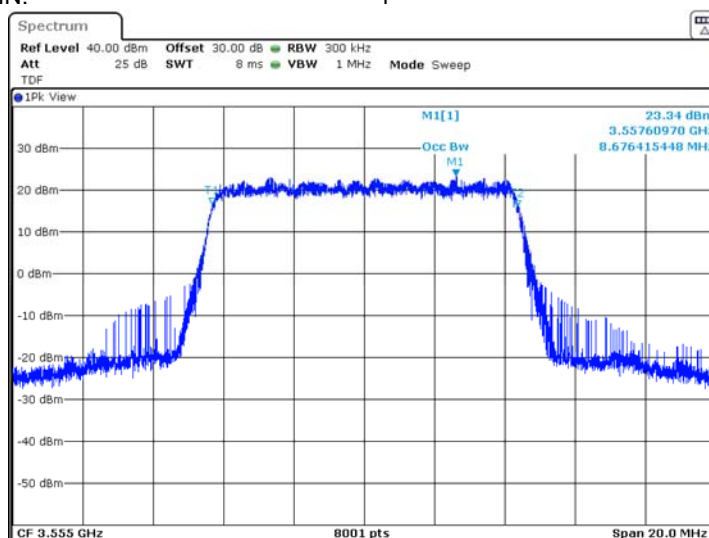
HL 3301	HL 4355	HL 5409	HL 4425				
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Full description is given in Appendix A.

<b>Test specification:</b> Section2.1049, Occupied bandwidth			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 5-Dec-21			
<b>Temperature:</b> 25 °C	<b>Relative Humidity:</b> 54 %	<b>Air Pressure:</b> 1010 hPa	<b>Power:</b> 48 VDC
<b>Remarks:</b>			

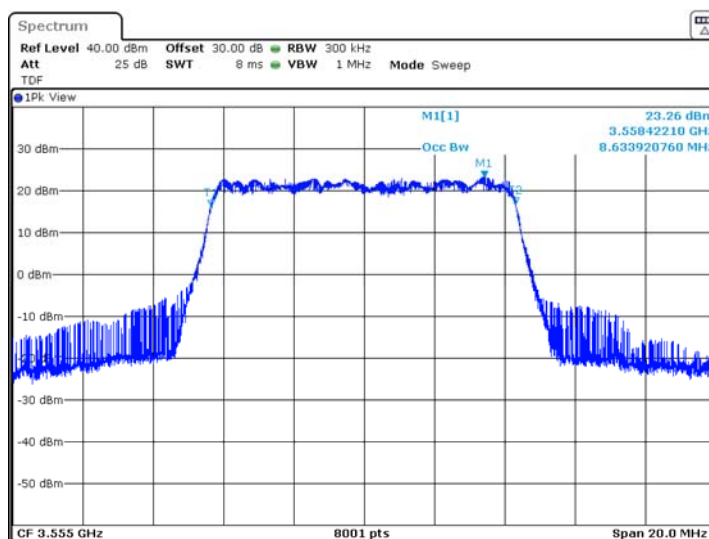
**Plot 7.3.1 Occupied bandwidth test result at low frequency**

MODULATION: QPSK  
CHANNEL SPACING: 10 MHz  
ANTENNA CHAIN: 1



**Plot 7.3.2 Occupied bandwidth test result at low frequency**

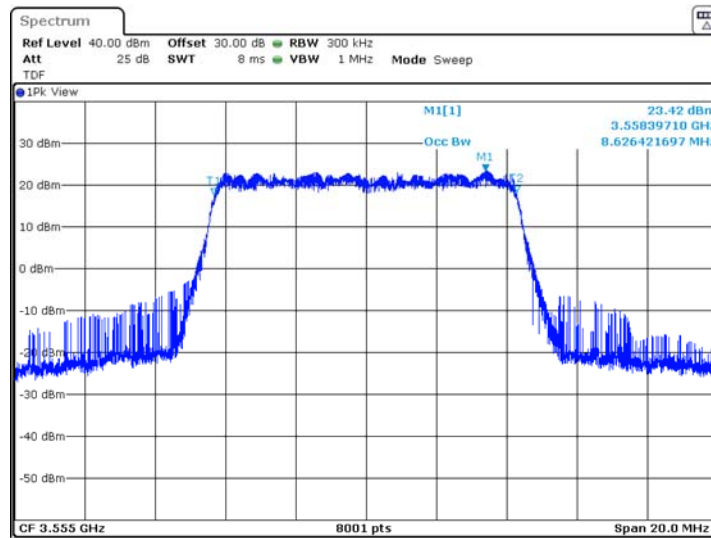
MODULATION: 16QAM  
CHANNEL SPACING: 10 MHz  
ANTENNA CHAIN: 1



Test specification:		Section2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Verdict: PASS	
Date(s):			
5-Dec-21			
Temperature: 25 °C	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

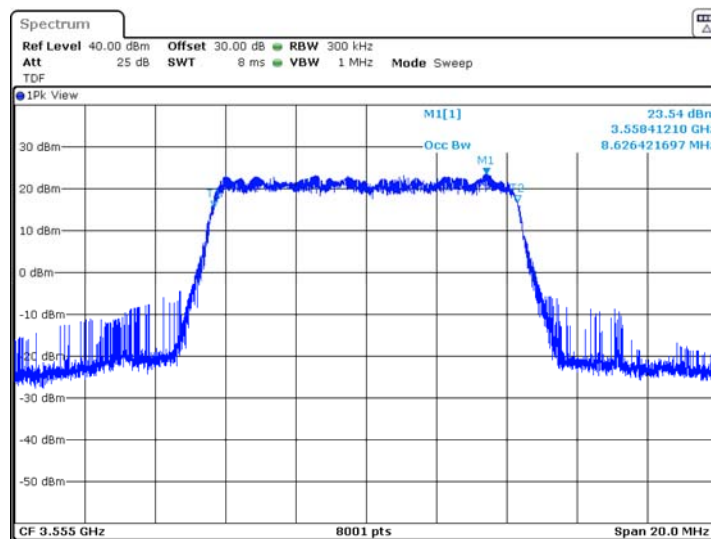
**Plot 7.3.3 Occupied bandwidth test result at low frequency**

MODULATION: 64QAM  
CHANNEL SPACING: 10 MHz  
ANTENNA CHAIN: 1



**Plot 7.3.4 Occupied bandwidth test result at low frequency**

MODULATION: 256QAM  
CHANNEL SPACING: 10 MHz  
ANTENNA CHAIN: 1



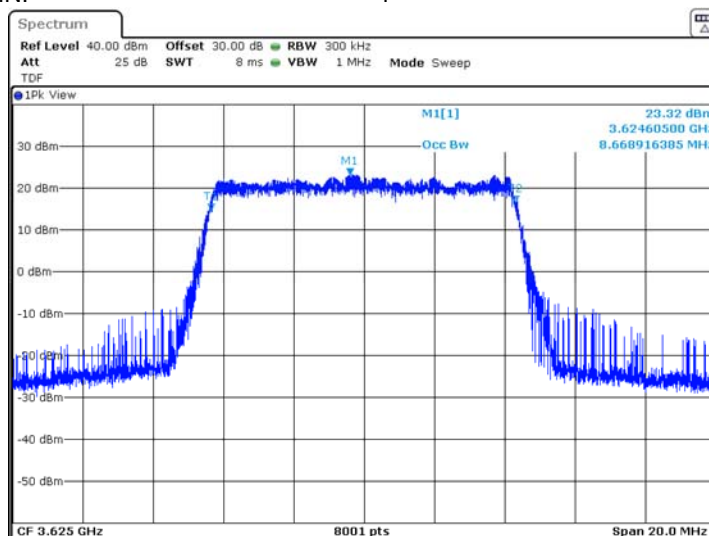


HERMON LABORATORIES

<b>Test specification:</b> <b>Section2.1049, Occupied bandwidth</b>			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict:</b> <b>PASS</b>	
<b>Date(s):</b> 5-Dec-21			
<b>Temperature:</b> 25 °C	<b>Relative Humidity:</b> 54 %	<b>Air Pressure:</b> 1010 hPa	<b>Power:</b> 48 VDC
<b>Remarks:</b>			

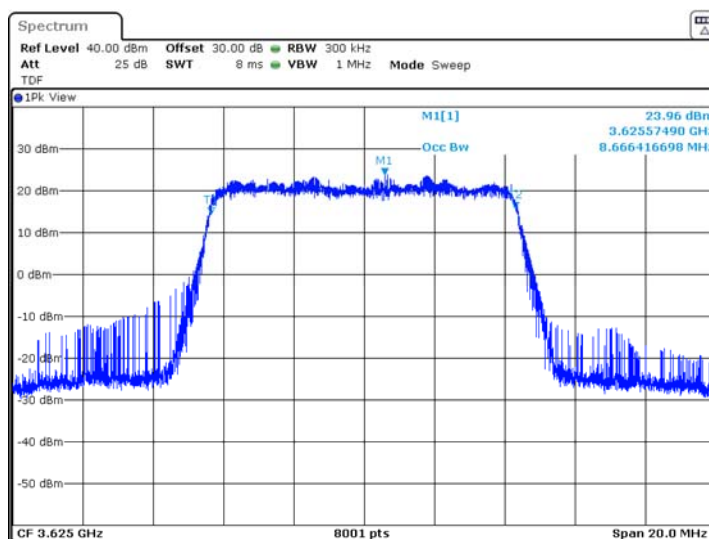
Plot 7.3.5 Occupied bandwidth test result at mid frequency

MODULATION: QPSK  
CHANNEL SPACING: 10 MHz  
ANTENNA CHAIN: 1



Plot 7.3.6 Occupied bandwidth test result at mid frequency

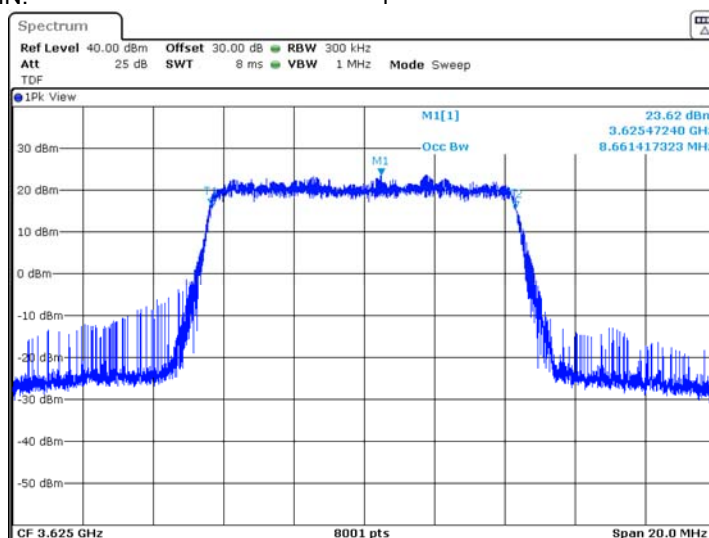
MODULATION: 16QAM  
CHANNEL SPACING: 10 MHz  
ANTENNA CHAIN: 1



Test specification: Section2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date(s): 5-Dec-21			
Temperature: 25 °C	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

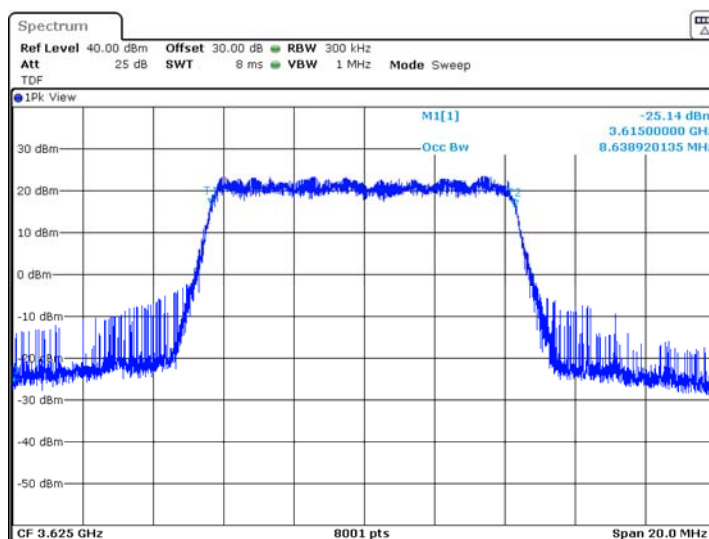
**Plot 7.3.7 Occupied bandwidth test result at mid frequency**

MODULATION: 64QAM  
CHANNEL SPACING: 10 MHz  
ANTENNA CHAIN: 1



**Plot 7.3.8 Occupied bandwidth test result at mid frequency**

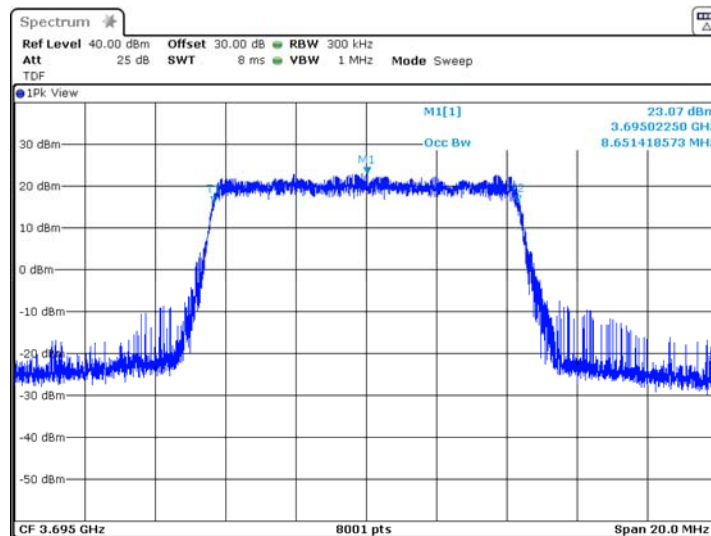
MODULATION: 256QAM  
CHANNEL SPACING: 10 MHz  
ANTENNA CHAIN: 1



<b>Test specification:</b> Section2.1049, Occupied bandwidth			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 5-Dec-21			
<b>Temperature:</b> 25 °C	<b>Relative Humidity:</b> 54 %	<b>Air Pressure:</b> 1010 hPa	<b>Power:</b> 48 VDC
<b>Remarks:</b>			

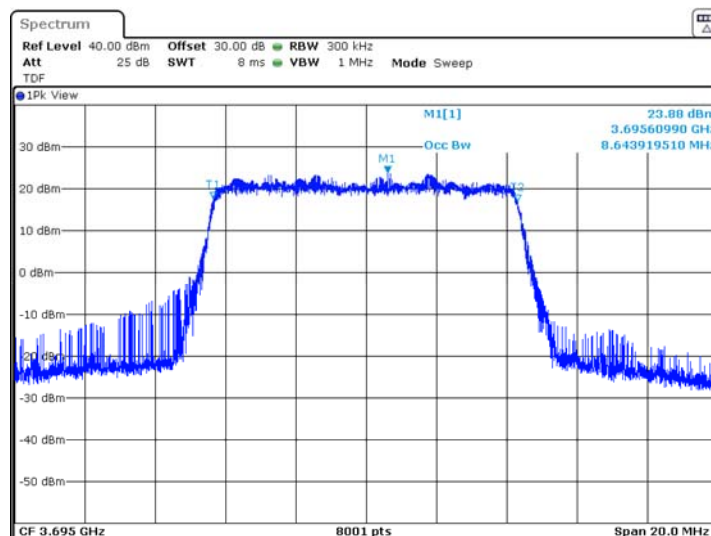
**Plot 7.3.9 Occupied bandwidth test result at high frequency**

MODULATION: QPSK  
CHANNEL SPACING: 10 MHz  
ANTENNA CHAIN: 1



**Plot 7.3.10 Occupied bandwidth test result at high frequency**

MODULATION: 16QAM  
CHANNEL SPACING: 10 MHz  
ANTENNA CHAIN: 1



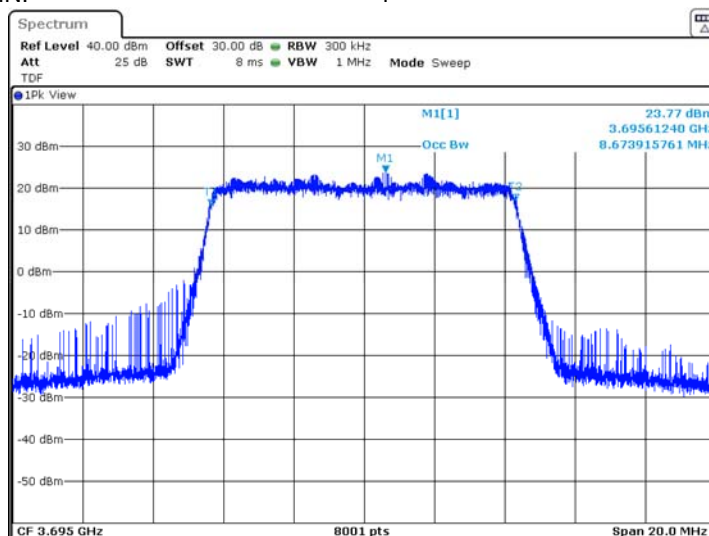


HERMON LABORATORIES

Test specification: Section2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date(s): 5-Dec-21			
Temperature: 25 °C	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

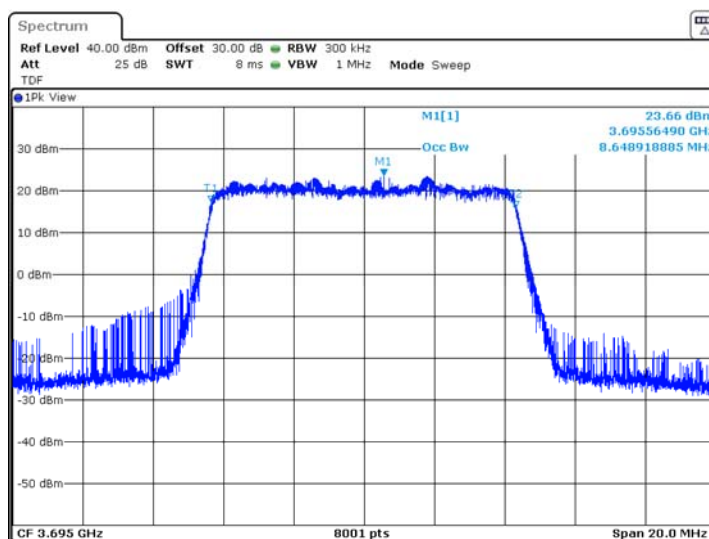
Plot 7.3.11 Occupied bandwidth test result at high frequency

MODULATION: 64QAM  
CHANNEL SPACING: 10 MHz  
ANTENNA CHAIN: 1



Plot 7.3.12 Occupied bandwidth test result at high frequency

MODULATION: 256QAM  
CHANNEL SPACING: 10 MHz  
ANTENNA CHAIN: 1

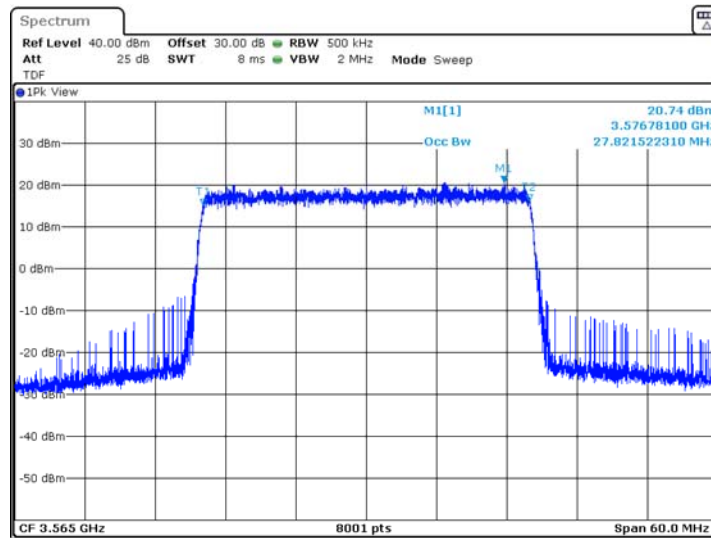




Test specification:		Section2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Verdict: PASS	
Date(s):			
5-Dec-21			
Temperature: 25 °C	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

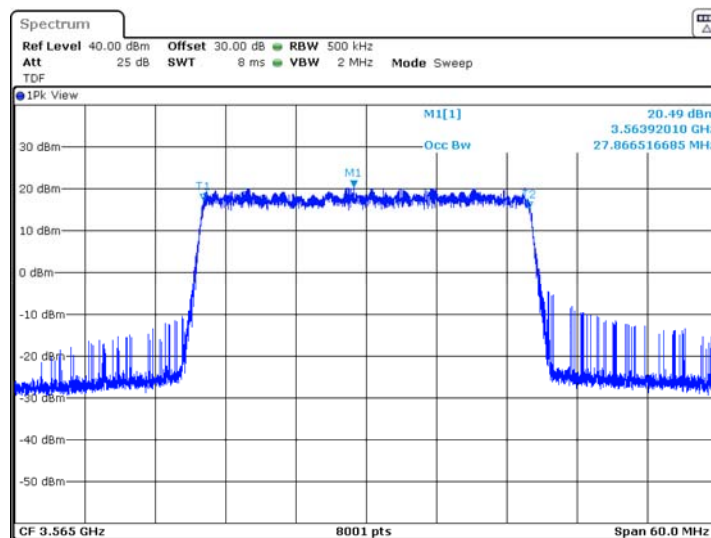
Plot 7.3.13 Occupied bandwidth test result at low frequency

MODULATION: QPSK  
CHANNEL SPACING: 30 MHz  
ANTENNA CHAIN: 1



Plot 7.3.14 Occupied bandwidth test result at low frequency

MODULATION: 16QAM  
CHANNEL SPACING: 30 MHz  
ANTENNA CHAIN: 1



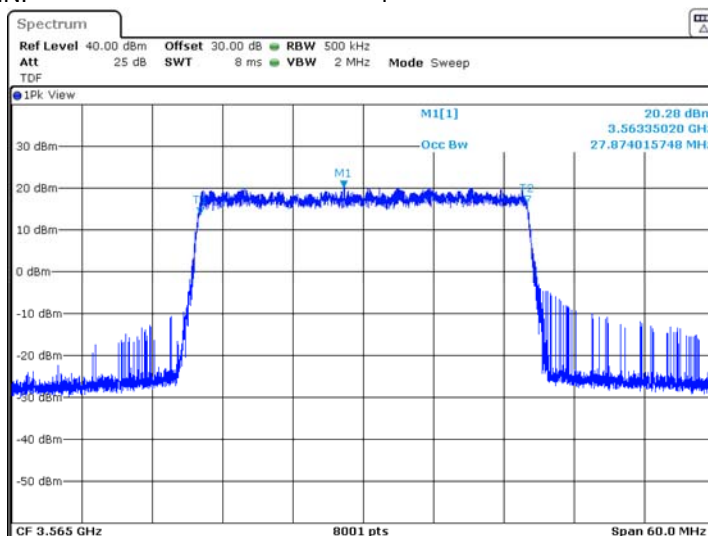


HERMON LABORATORIES

<b>Test specification:</b> <b>Section2.1049, Occupied bandwidth</b>			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict:</b> <b>PASS</b>	
<b>Date(s):</b> 5-Dec-21			
<b>Temperature:</b> 25 °C	<b>Relative Humidity:</b> 54 %	<b>Air Pressure:</b> 1010 hPa	<b>Power:</b> 48 VDC
<b>Remarks:</b>			

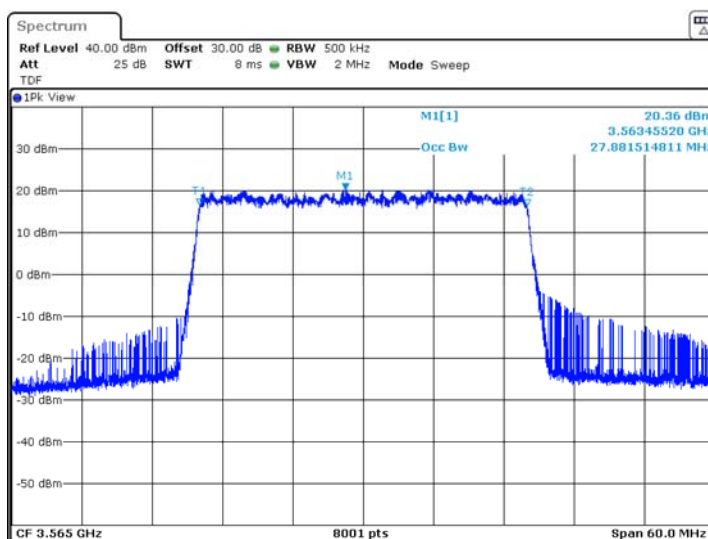
Plot 7.3.15 Occupied bandwidth test result at low frequency

MODULATION: 64QAM  
CHANNEL SPACING: 30 MHz  
ANTENNA CHAIN: 1



Plot 7.3.16 Occupied bandwidth test result at low frequency

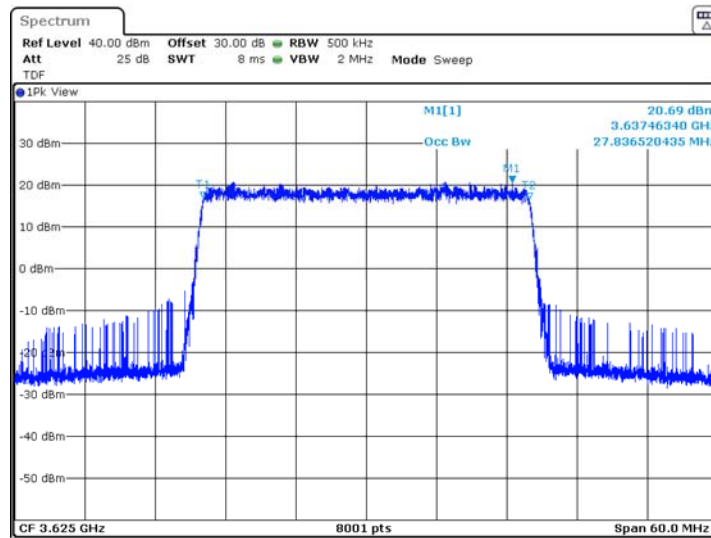
MODULATION: 256QAM  
CHANNEL SPACING: 30 MHz  
ANTENNA CHAIN: 1



<b>Test specification:</b> Section2.1049, Occupied bandwidth			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 5-Dec-21			
<b>Temperature:</b> 25 °C	<b>Relative Humidity:</b> 54 %	<b>Air Pressure:</b> 1010 hPa	<b>Power:</b> 48 VDC
<b>Remarks:</b>			

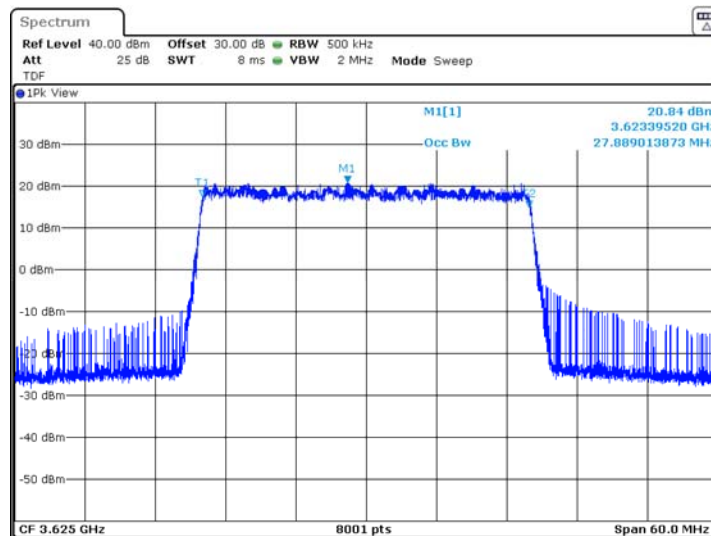
**Plot 7.3.17 Occupied bandwidth test result at mid frequency**

MODULATION: QPSK  
CHANNEL SPACING: 30 MHz  
ANTENNA CHAIN: 1



**Plot 7.3.18 Occupied bandwidth test result at mid frequency**

MODULATION: 16QAM  
CHANNEL SPACING: 30 MHz  
ANTENNA CHAIN: 1



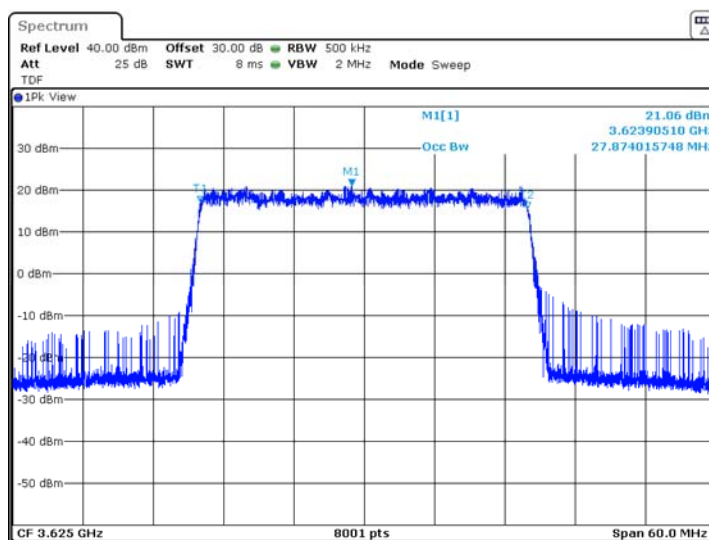


HERMON LABORATORIES

<b>Test specification:</b> <b>Section2.1049, Occupied bandwidth</b>			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict:</b> <b>PASS</b>	
<b>Date(s):</b> 5-Dec-21			
<b>Temperature:</b> 25 °C	<b>Relative Humidity:</b> 54 %	<b>Air Pressure:</b> 1010 hPa	<b>Power:</b> 48 VDC
<b>Remarks:</b>			

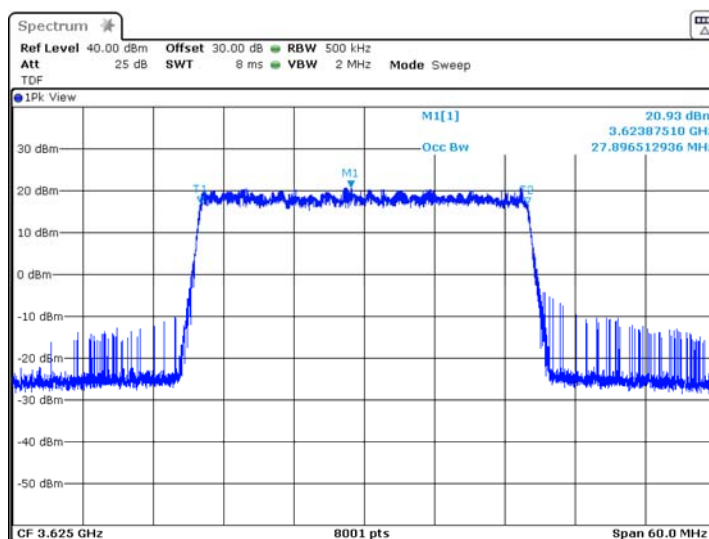
Plot 7.3.19 Occupied bandwidth test result at mid frequency

MODULATION: 64QAM  
CHANNEL SPACING: 30 MHz  
ANTENNA CHAIN: 1



Plot 7.3.20 Occupied bandwidth test result at mid frequency

MODULATION: 256QAM  
CHANNEL SPACING: 30 MHz  
ANTENNA CHAIN: 1



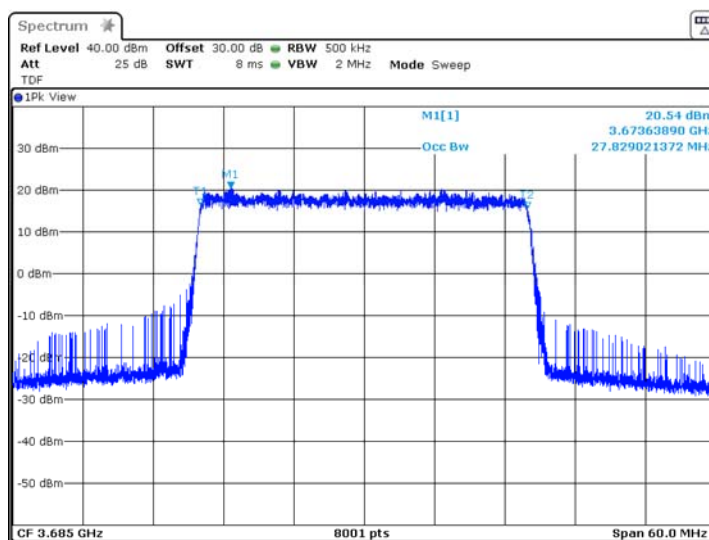


HERMON LABORATORIES

<b>Test specification:</b> <b>Section2.1049, Occupied bandwidth</b>			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict:</b> <b>PASS</b>	
<b>Date(s):</b> 5-Dec-21			
<b>Temperature:</b> 25 °C	<b>Relative Humidity:</b> 54 %	<b>Air Pressure:</b> 1010 hPa	<b>Power:</b> 48 VDC
<b>Remarks:</b>			

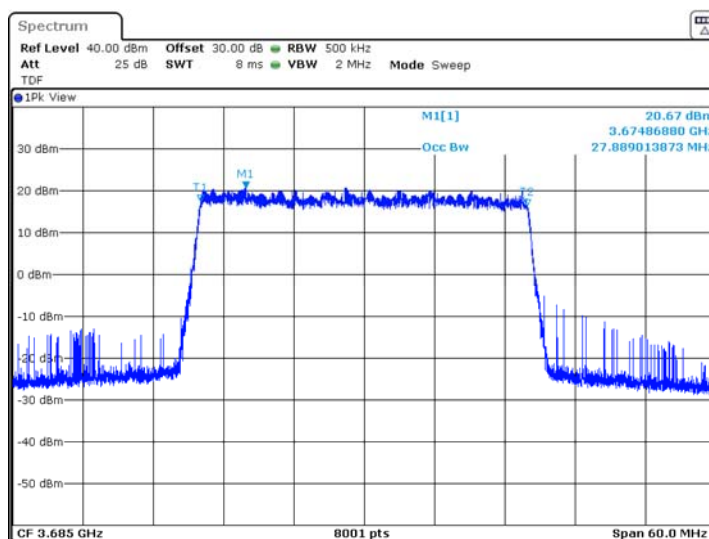
Plot 7.3.21 Occupied bandwidth test result at high frequency

MODULATION: QPSK  
CHANNEL SPACING: 30 MHz  
ANTENNA CHAIN: 1



Plot 7.3.22 Occupied bandwidth test result at high frequency

MODULATION: 16QAM  
CHANNEL SPACING: 30 MHz  
ANTENNA CHAIN: 1



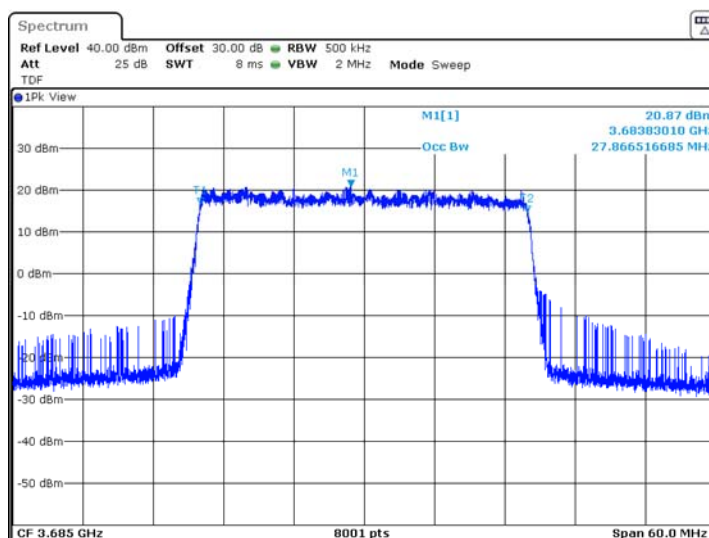


HERMON LABORATORIES

<b>Test specification:</b> <b>Section2.1049, Occupied bandwidth</b>			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict:</b> <b>PASS</b>	
<b>Date(s):</b> 5-Dec-21			
<b>Temperature:</b> 25 °C	<b>Relative Humidity:</b> 54 %	<b>Air Pressure:</b> 1010 hPa	<b>Power:</b> 48 VDC
<b>Remarks:</b>			

Plot 7.3.23 Occupied bandwidth test result at high frequency

MODULATION: 64QAM  
CHANNEL SPACING: 30 MHz  
ANTENNA CHAIN: 1



Plot 7.3.24 Occupied bandwidth test result at high frequency

MODULATION: 256QAM  
CHANNEL SPACING: 30 MHz  
ANTENNA CHAIN: 1

