



<b>Test specification: Section 2.1049, Occupied bandwidth</b>			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict: 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>			

### 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

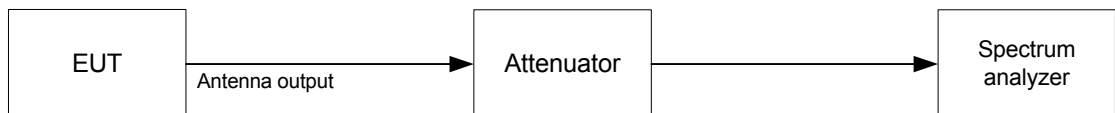
7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

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





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<b>Test mode:</b> Compliance		<b>Verdict: PASS</b>	
<b>Date(s):</b> 5-Dec-21			
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<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.

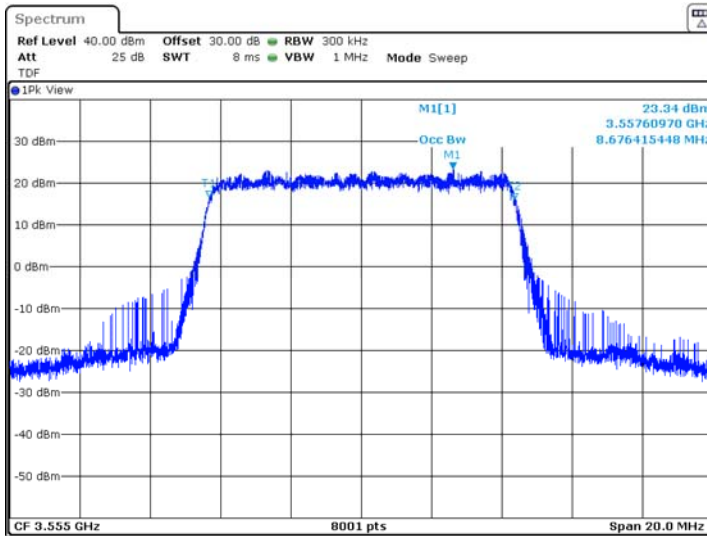


HERMON LABORATORIES

<b>Test specification: Section 2.1049, 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>			

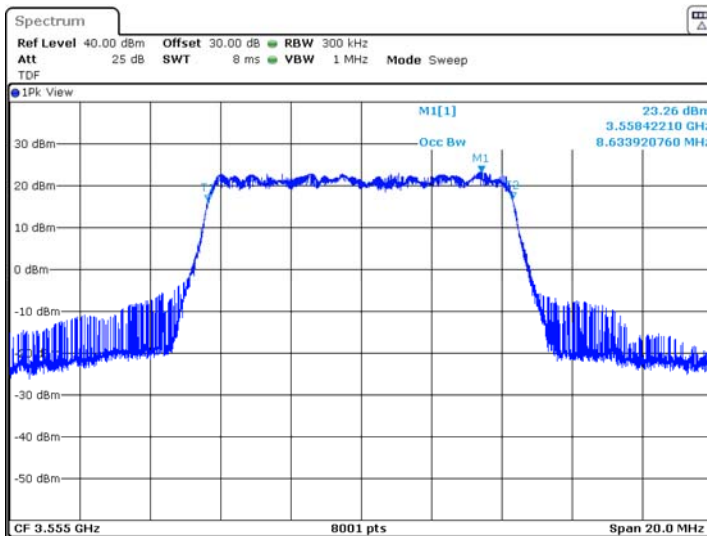
Plot 7.3.1 Occupied bandwidth test result at low frequency

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



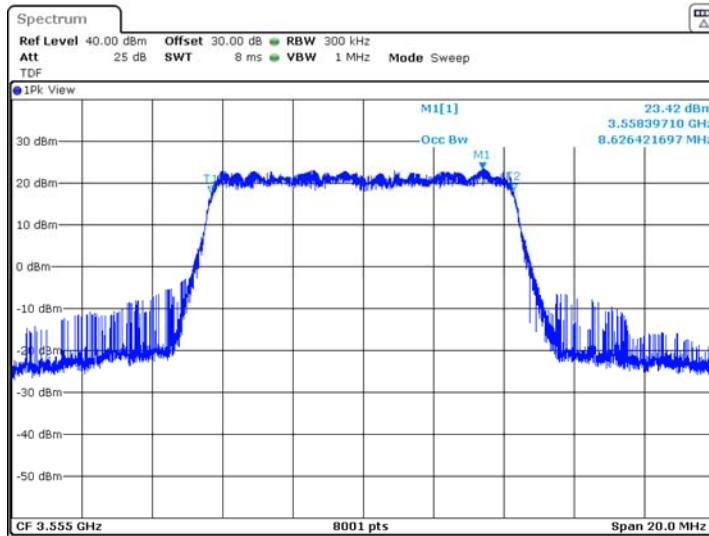


HERMON LABORATORIES

<b>Test specification: Section 2.1049, Occupied bandwidth</b>			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict: 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>			

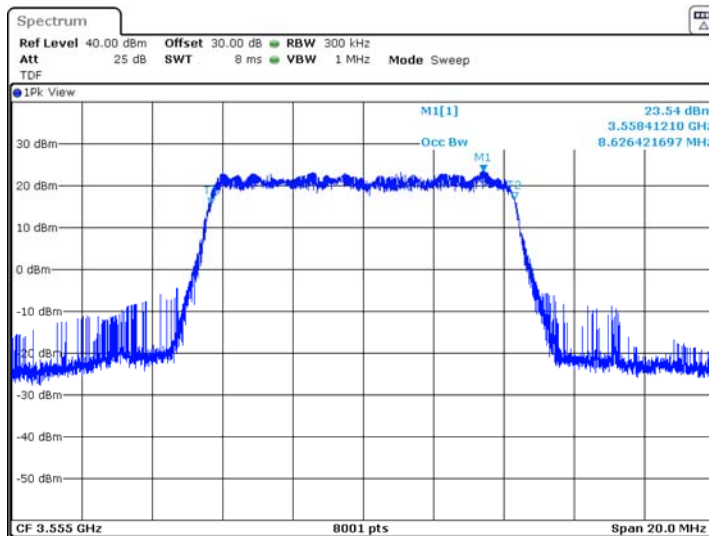
Plot 7.3.3 Occupied bandwidth test result at low frequency

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



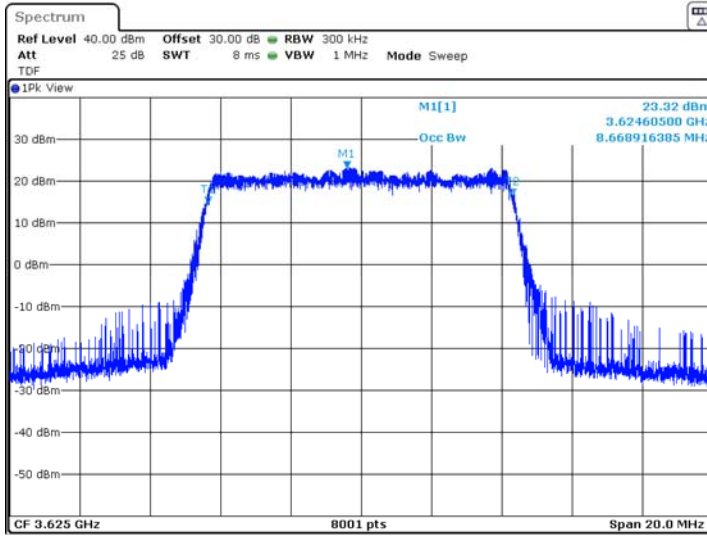


HERMON LABORATORIES

<b>Test specification: Section 2.1049, 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>			

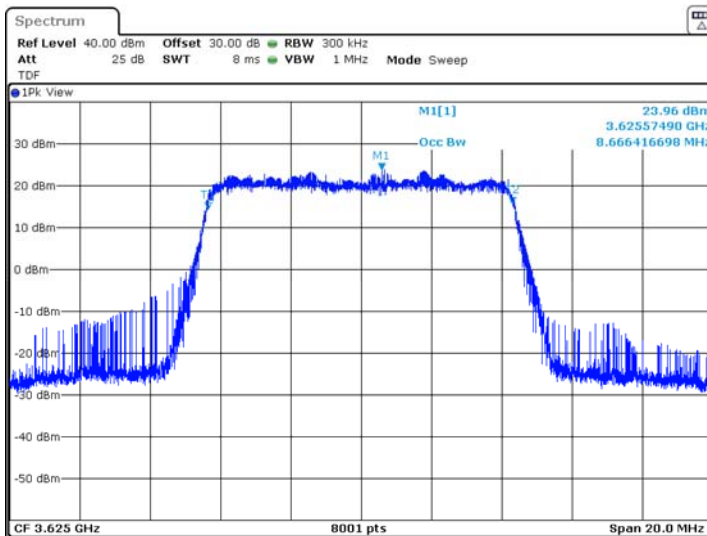
Plot 7.3.5 Occupied bandwidth test result at mid frequency

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



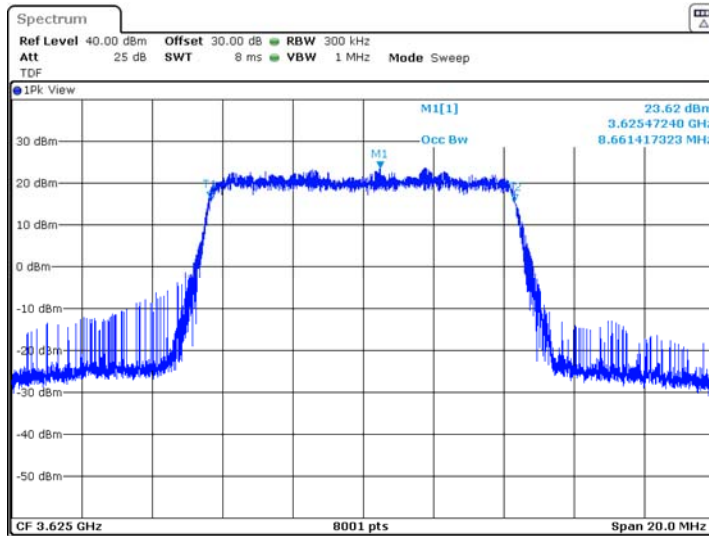


HERMON LABORATORIES

<b>Test specification: Section 2.1049, 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>			

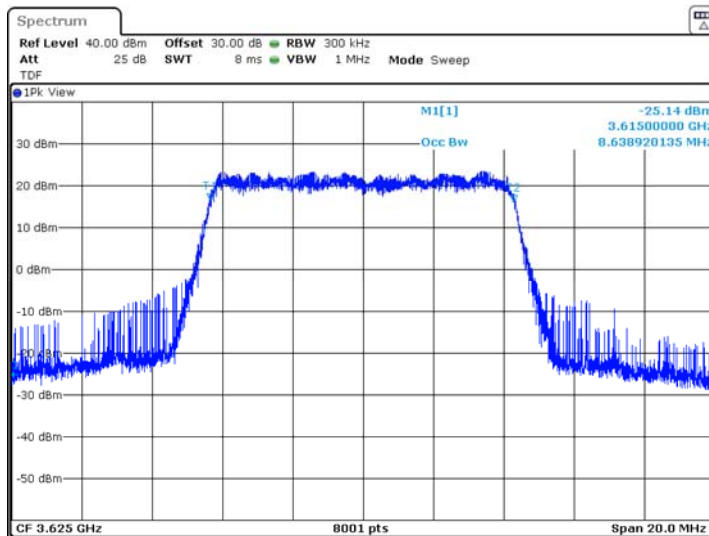
Plot 7.3.7 Occupied bandwidth test result at mid frequency

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



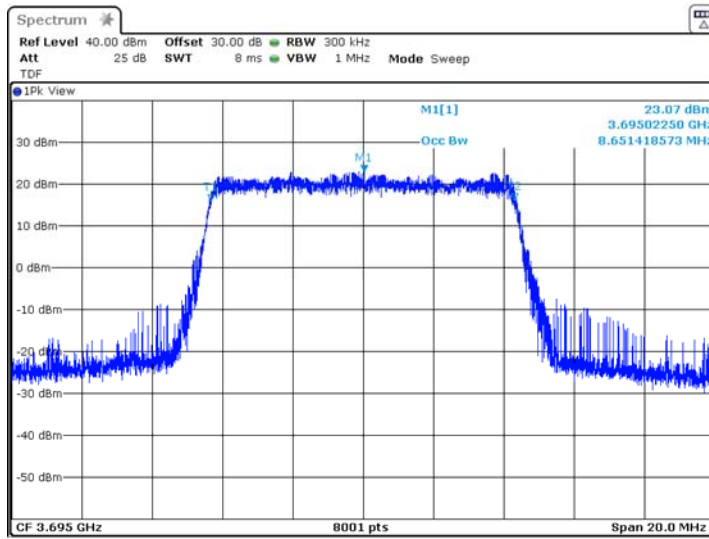


HERMON LABORATORIES

<b>Test specification: Section 2.1049, 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>			

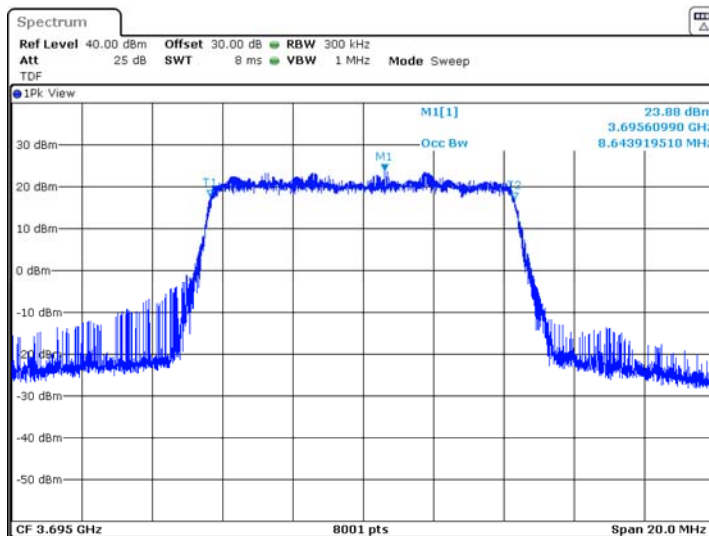
Plot 7.3.9 Occupied bandwidth test result at high frequency

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



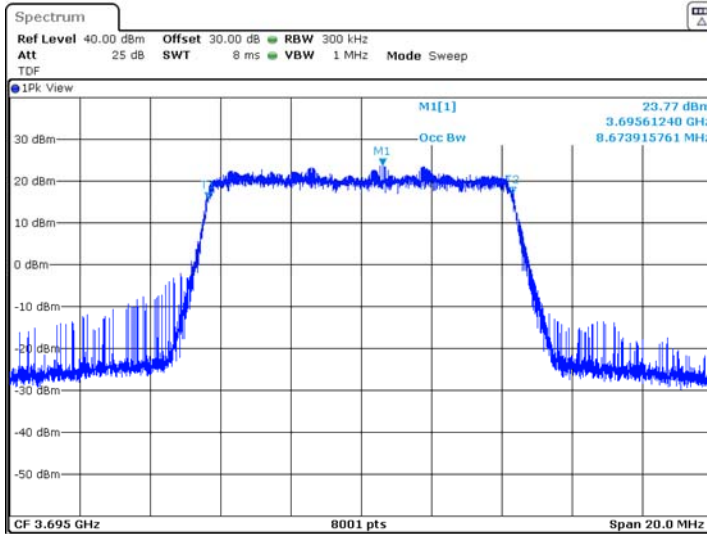


HERMON LABORATORIES

<b>Test specification: Section 2.1049, 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>			

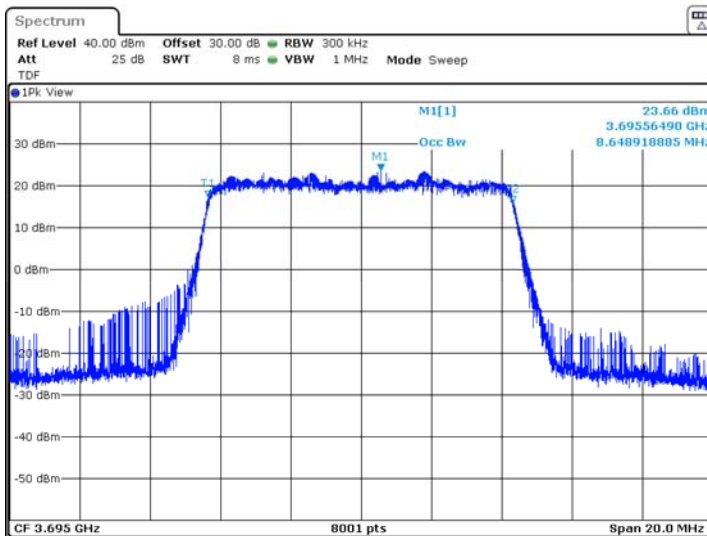
Plot 7.3.11 Occupied bandwidth test result at high frequency

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





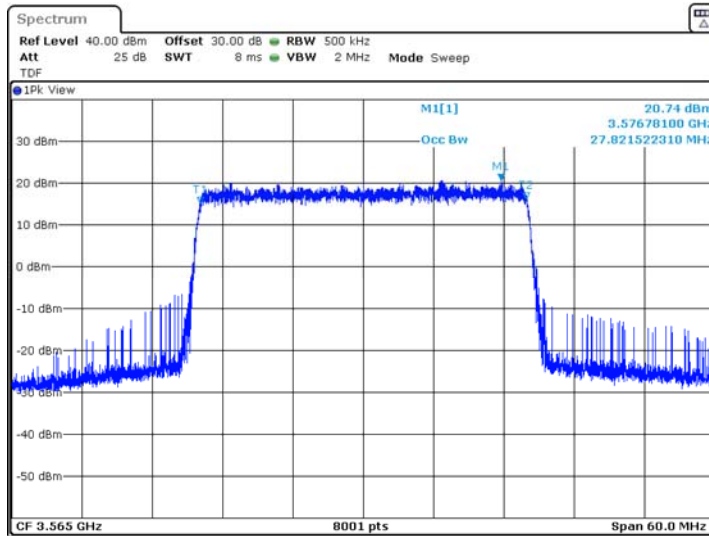


HERMON LABORATORIES

<b>Test specification: Section 2.1049, Occupied bandwidth</b>			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict: 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>			

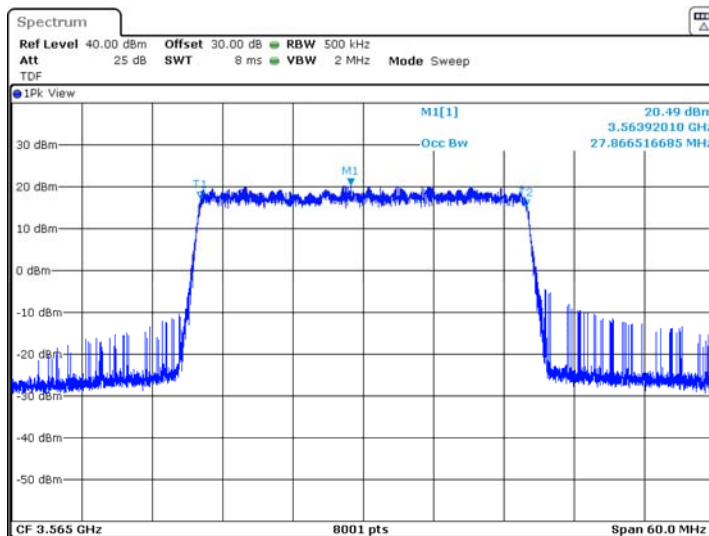
Plot 7.3.13 Occupied bandwidth test result at low frequency

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



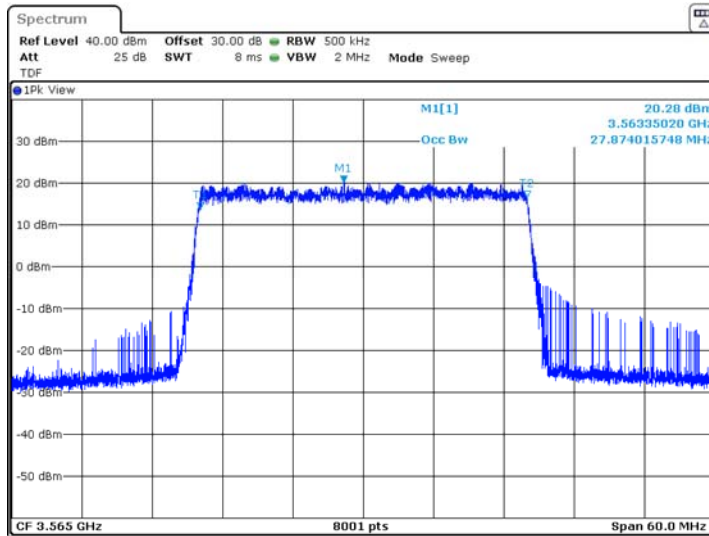


HERMON LABORATORIES

<b>Test specification: Section 2.1049, 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>			

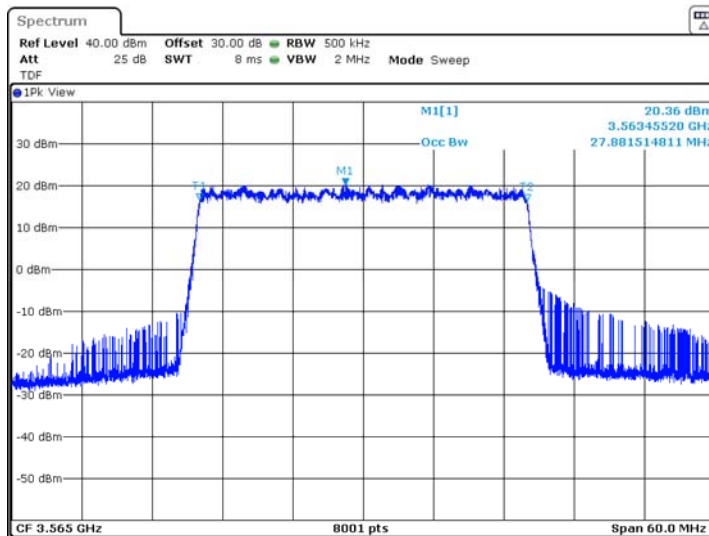
Plot 7.3.15 Occupied bandwidth test result at low frequency

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



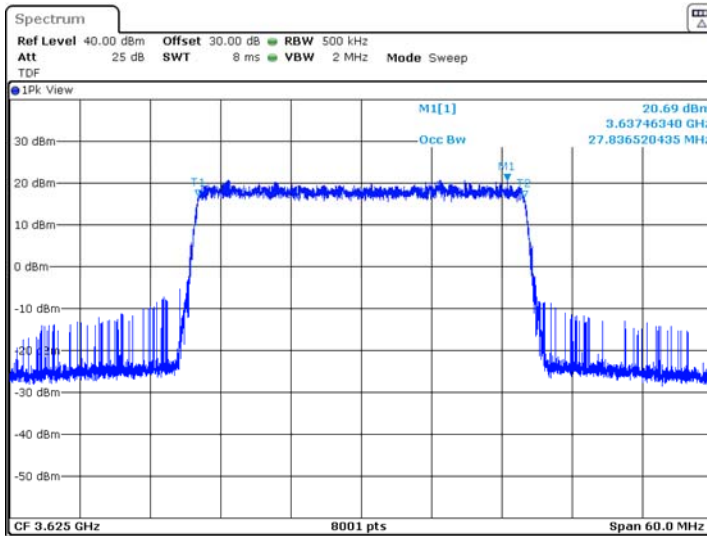


HERMON LABORATORIES

<b>Test specification: Section 2.1049, Occupied bandwidth</b>			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict: 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>			

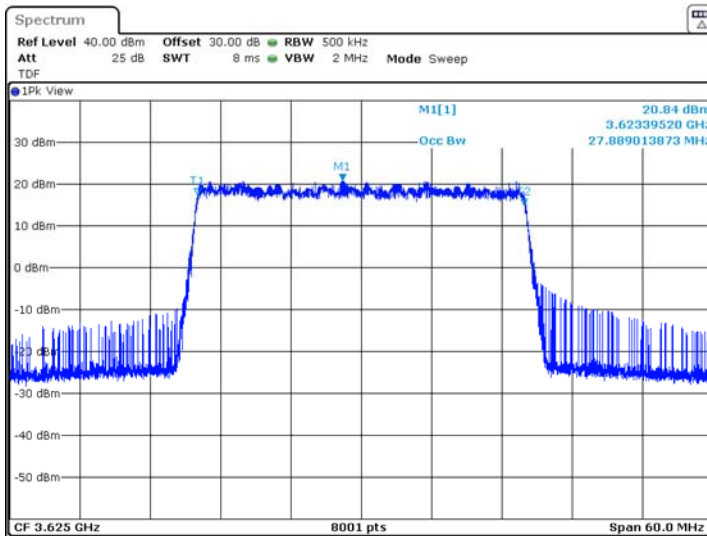
Plot 7.3.17 Occupied bandwidth test result at mid frequency

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



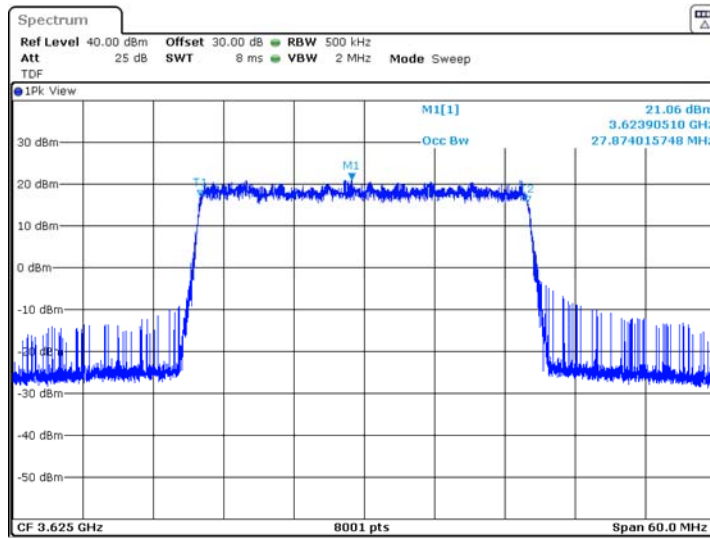


HERMON LABORATORIES

<b>Test specification: Section 2.1049, 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>			

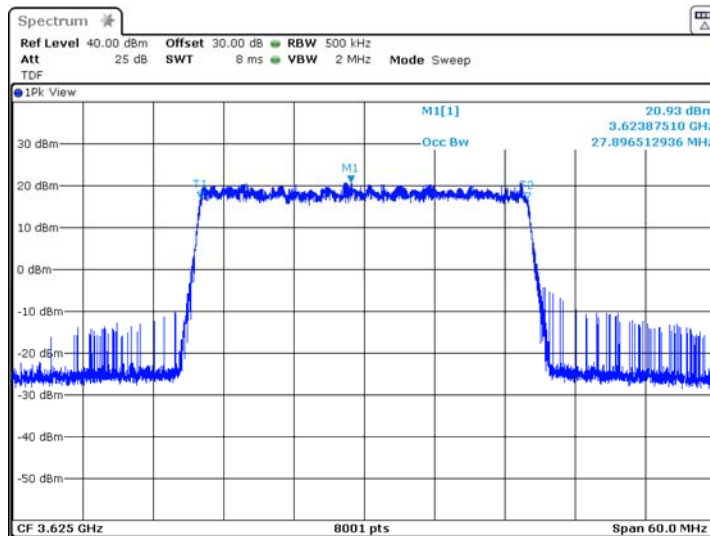
Plot 7.3.19 Occupied bandwidth test result at mid frequency

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



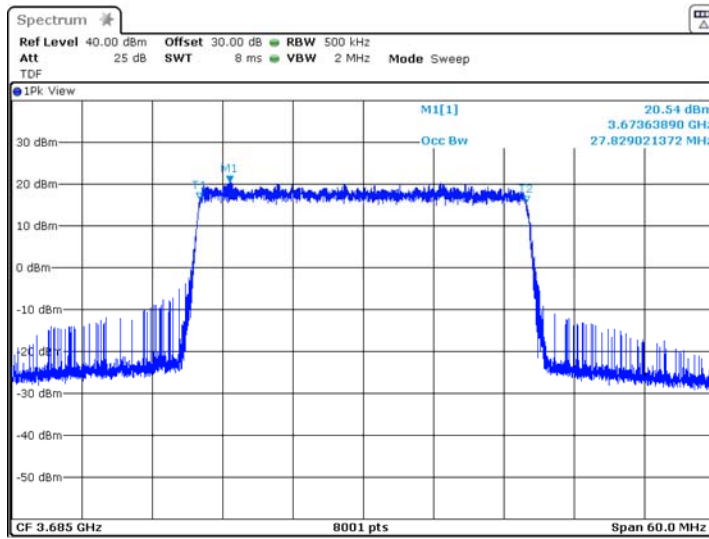


HERMON LABORATORIES

<b>Test specification: Section 2.1049, 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>			

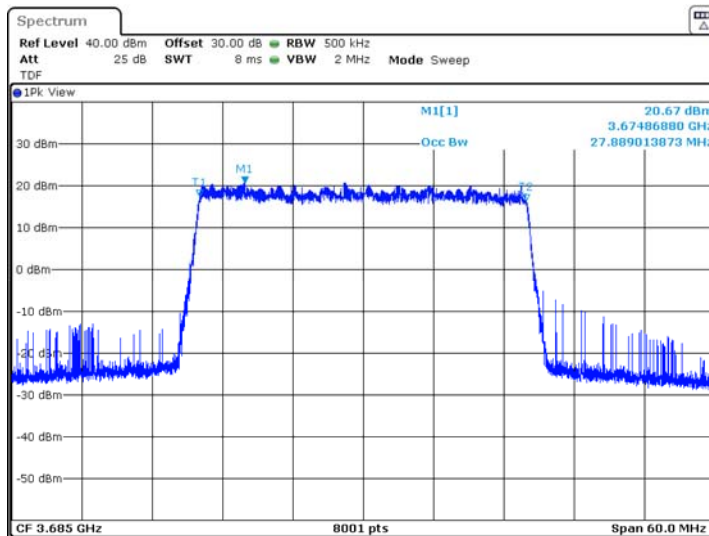
Plot 7.3.21 Occupied bandwidth test result at high frequency

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



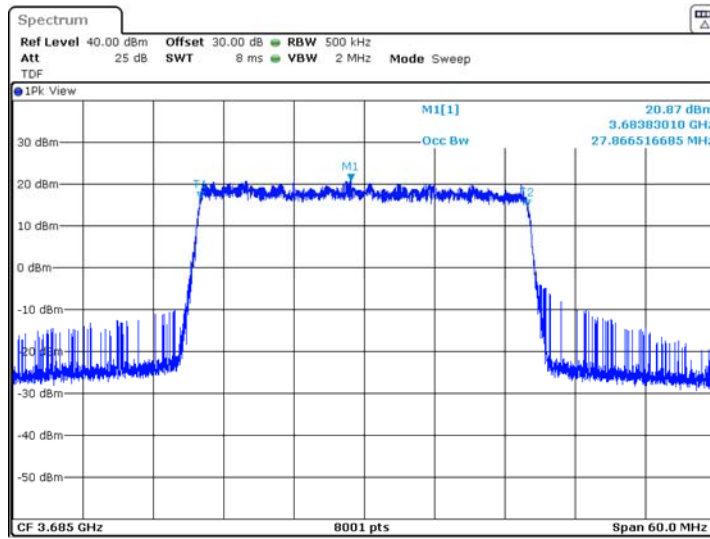


HERMON LABORATORIES

<b>Test specification: Section 2.1049, Occupied bandwidth</b>			
<b>Test procedure:</b> 47 CFR, Section 2.1049			
<b>Test mode:</b> Compliance		<b>Verdict: 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

