



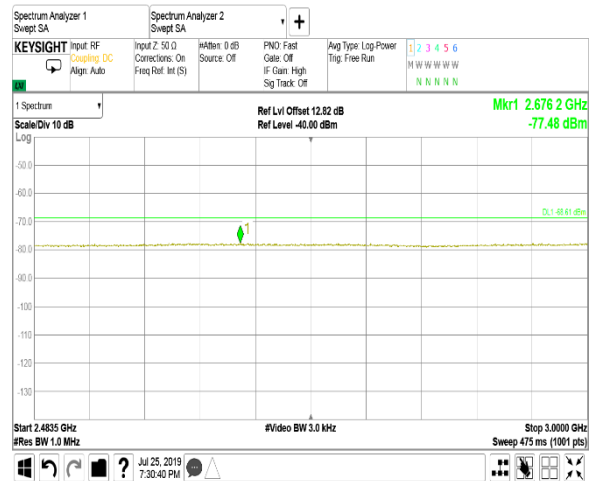
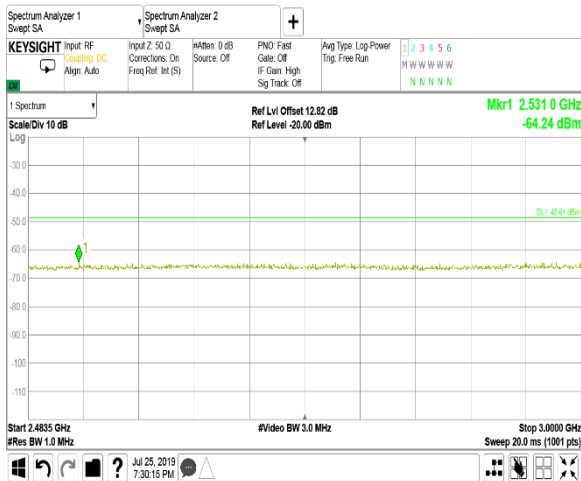
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Plot 7.6.51 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 6, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

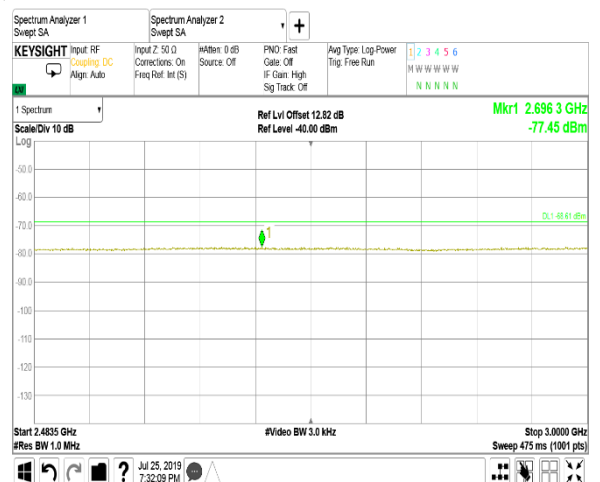
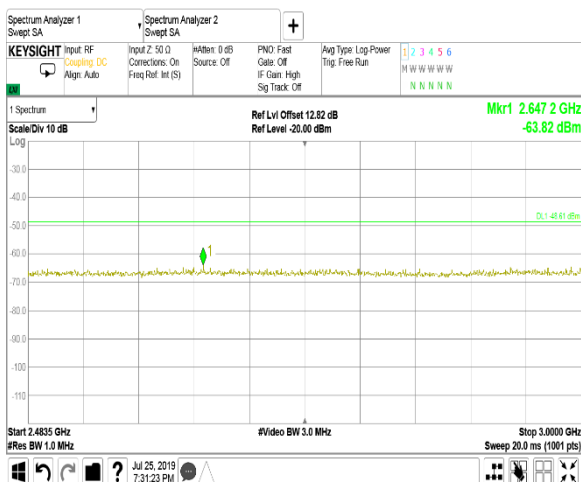
5 MHz
1beam
QPSK



Plot 7.6.52 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 6, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

5 MHz
1beam
64 QAM





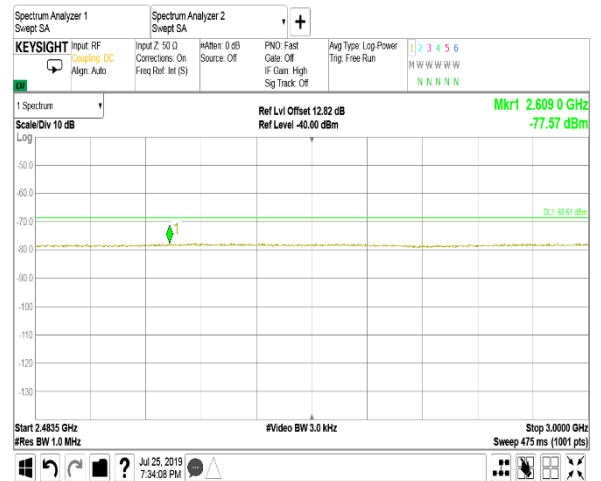
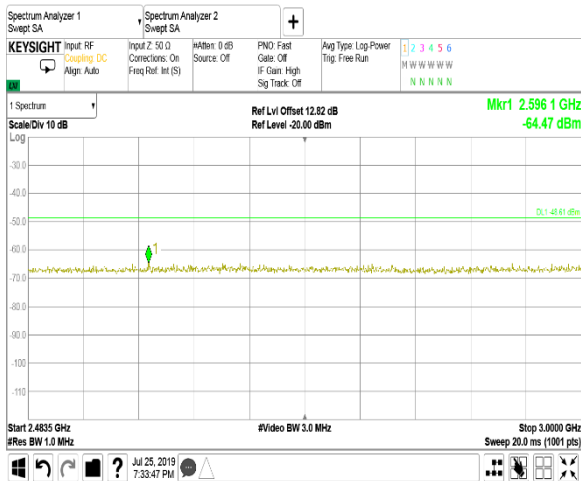
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Plot 7.6.53 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 7, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

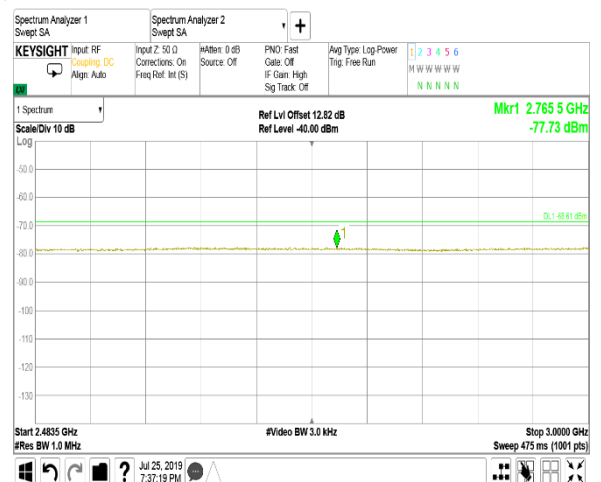
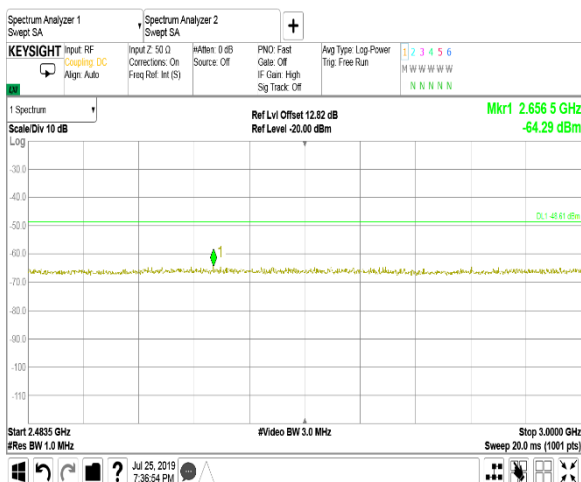
5 MHz
1beam
QPSK



Plot 7.6.54 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 7, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

5 MHz
1beam
64 QAM





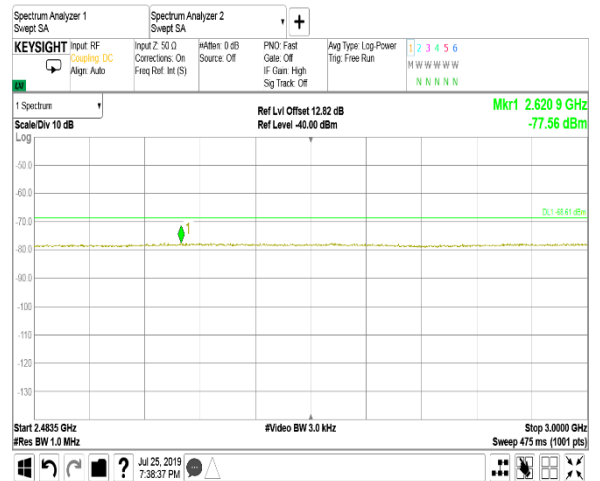
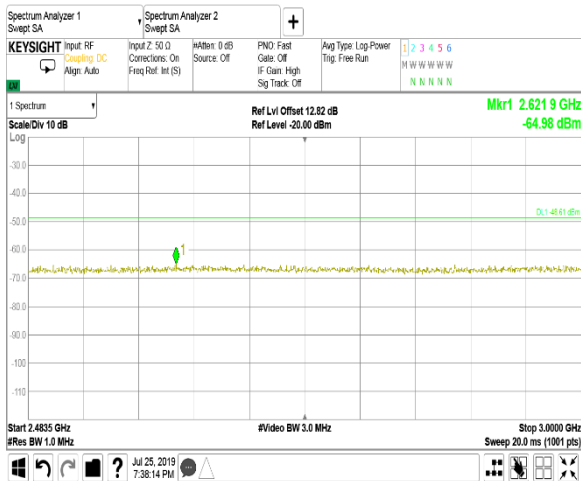
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Plot 7.6.55 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 8, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

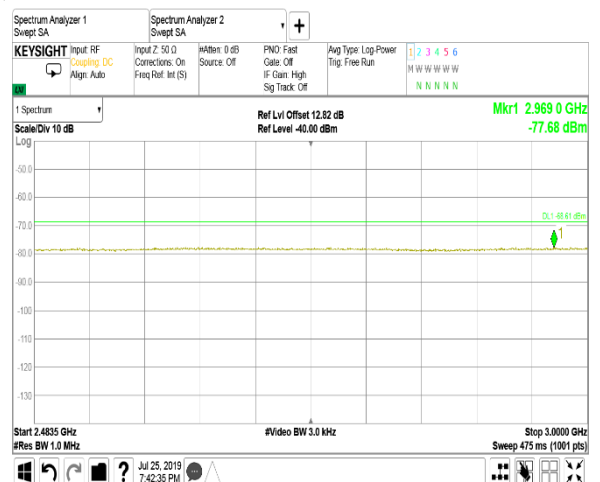
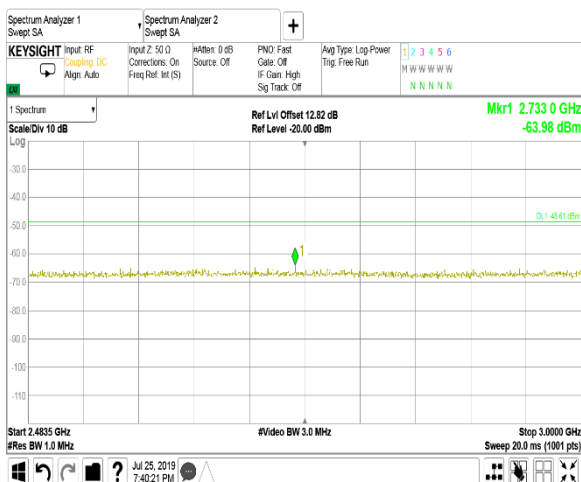
5 MHz
1beam
QPSK



Plot 7.6.56 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 8, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

5 MHz
1beam
64 QAM





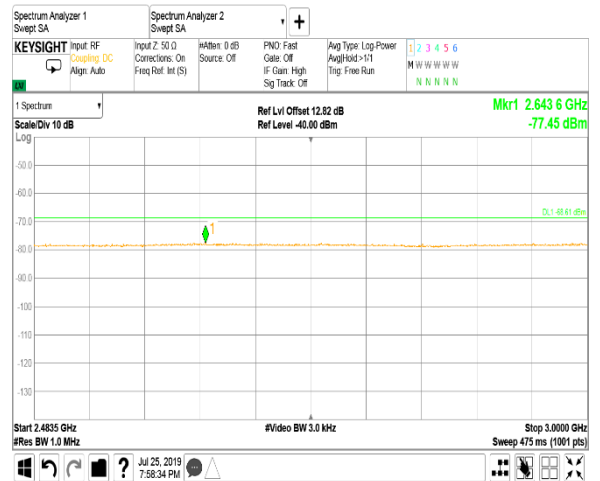
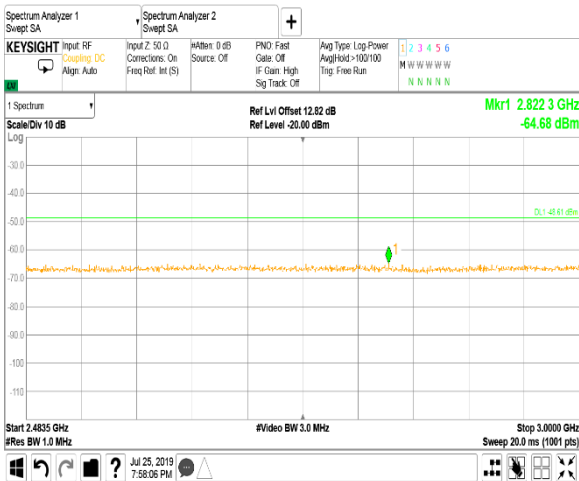
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Plot 7.6.57 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 1, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

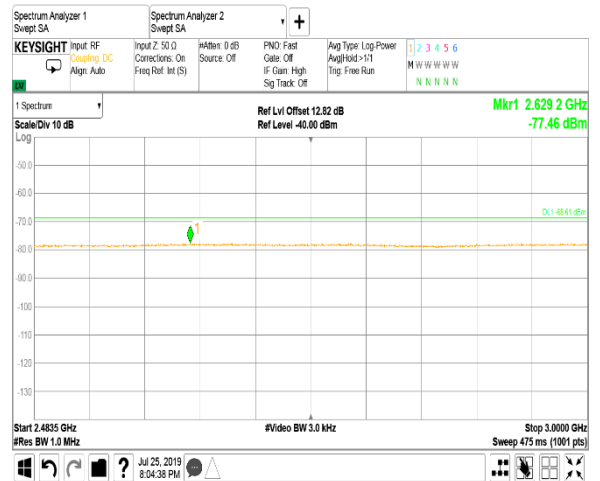
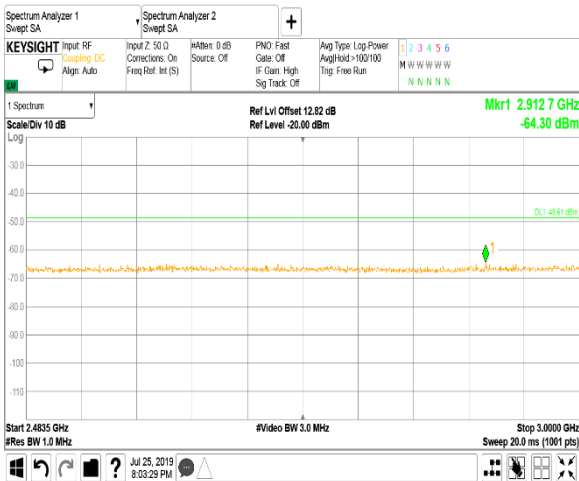
10 MHz
1beam
QPSK



Plot 7.6.58 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 1, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

10 MHz
1beam
64 QAM





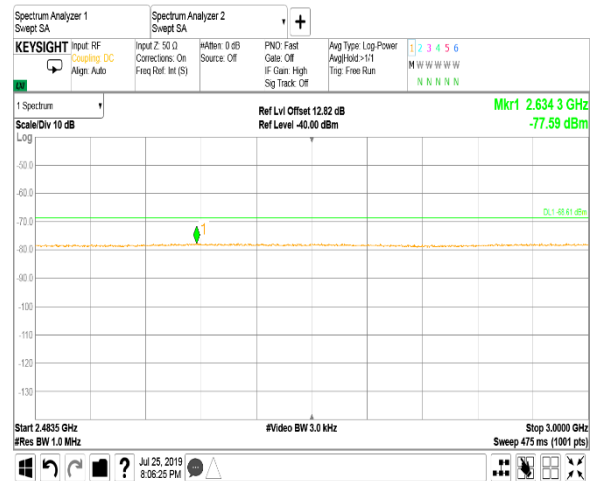
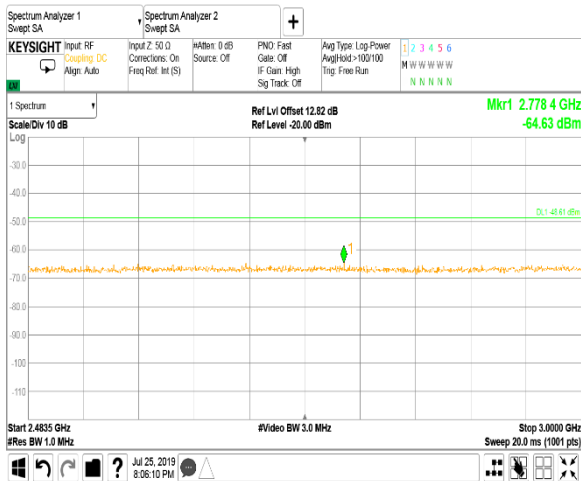
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Plot 7.6.59 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 2, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

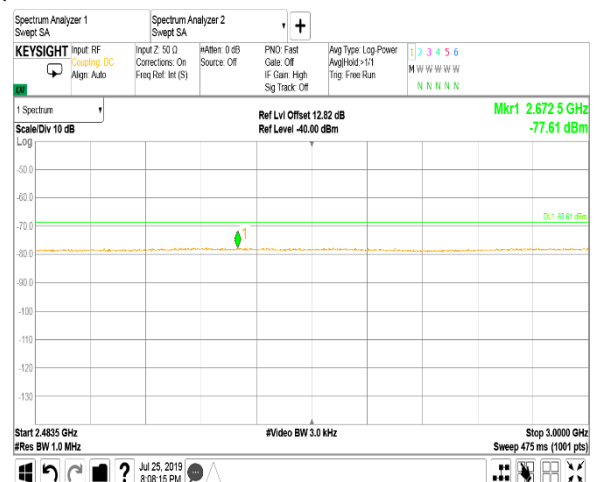
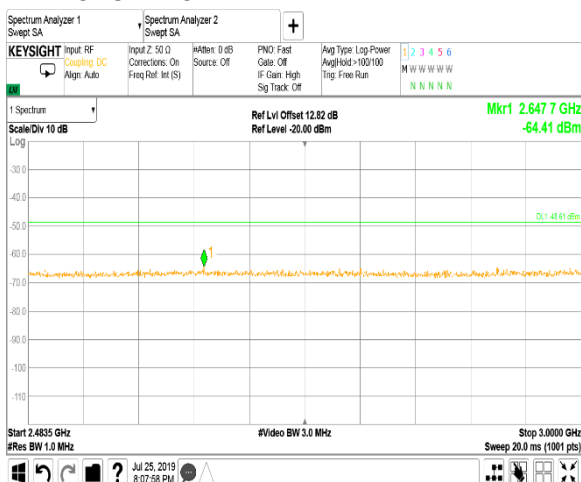
10 MHz
1beam
QPSK



Plot 7.6.60 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 2, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

10 MHz
1beam
64 QAM





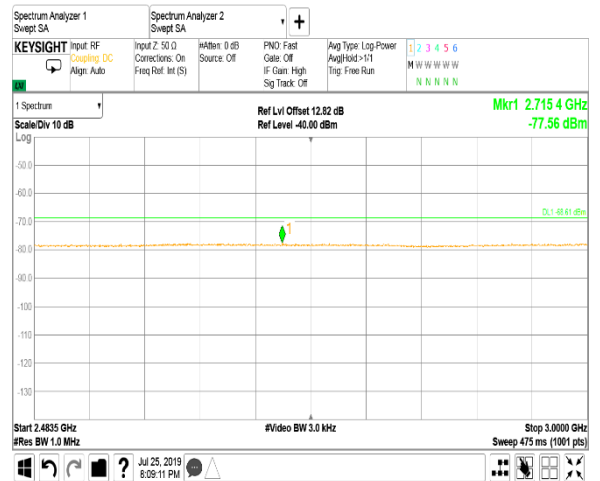
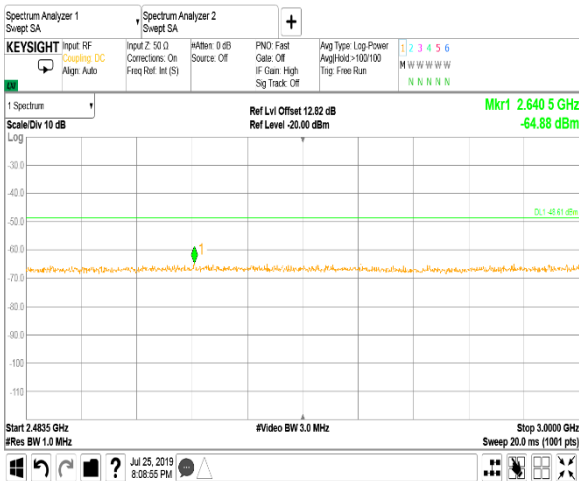
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Plot 7.6.61 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 3, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

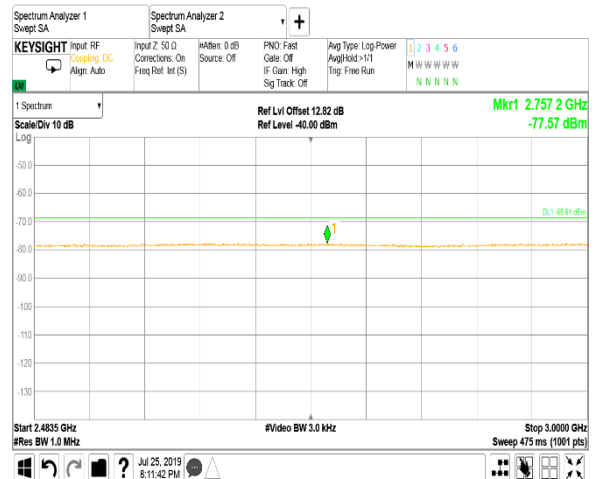
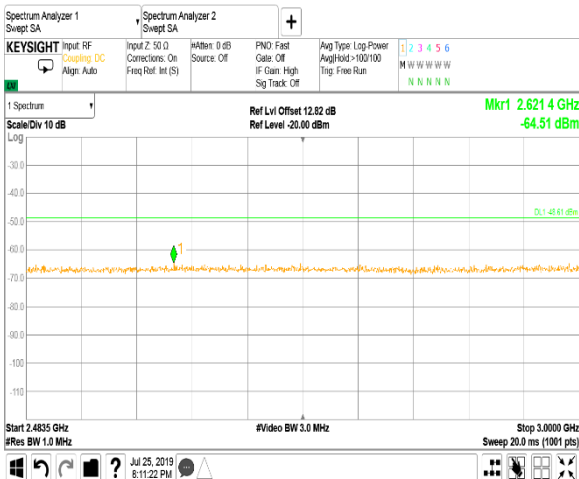
10 MHz
1beam
QPSK



Plot 7.6.62 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 3, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

10 MHz
1beam
64 QAM





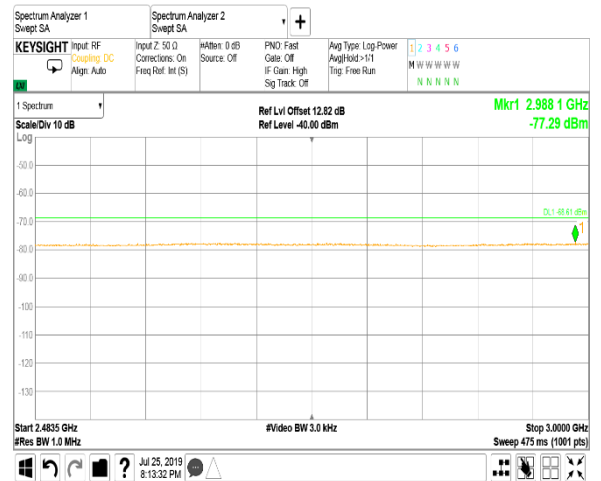
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Plot 7.6.63 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 4, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

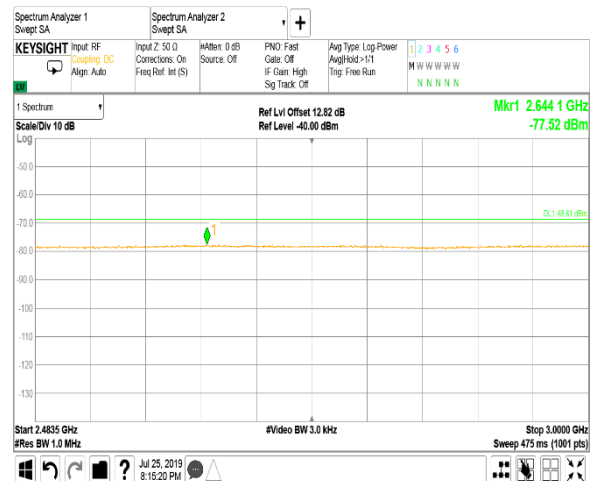
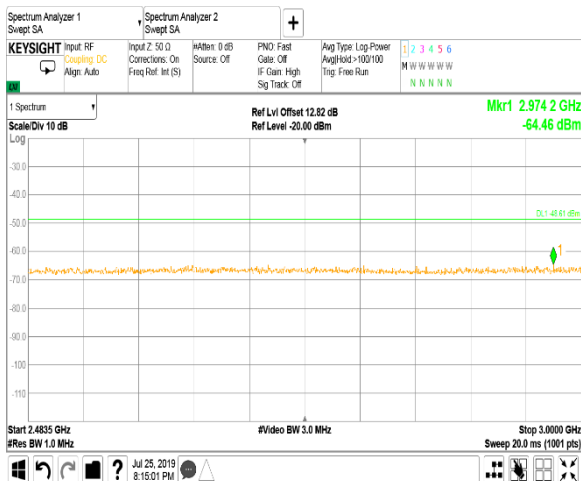
10 MHz
1beam
QPSK



Plot 7.6.64 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 4, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

10 MHz
1beam
64 QAM





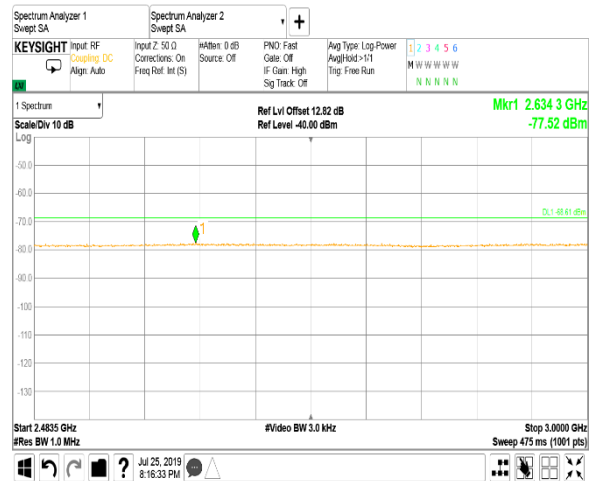
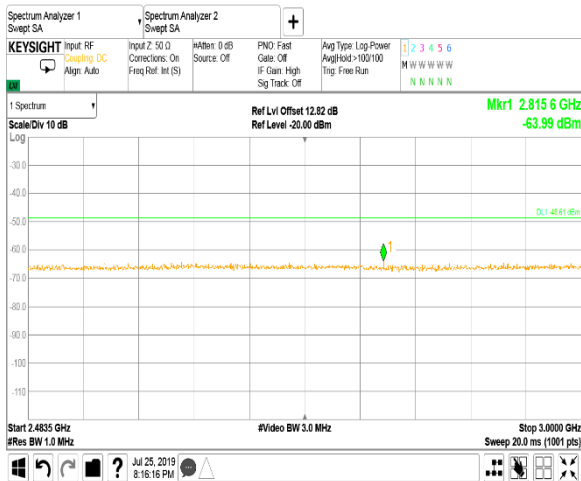
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Plot 7.6.65 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 5, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

10 MHz
1beam
QPSK

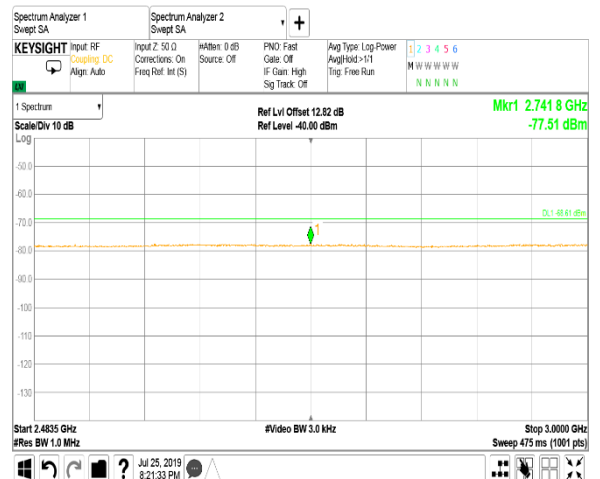
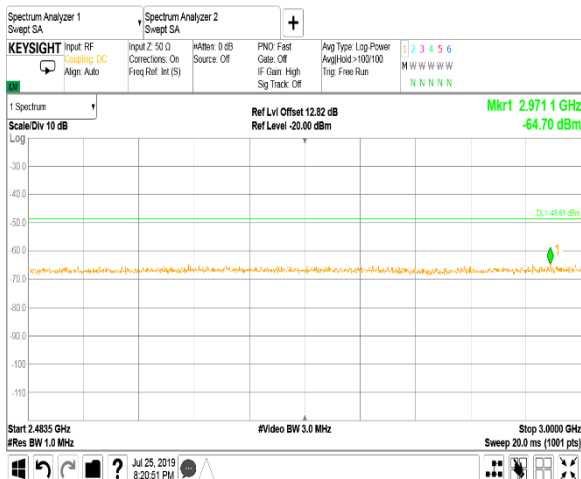


n

Plot 7.6.66 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 5, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

10 MHz
1beam
64 QAM





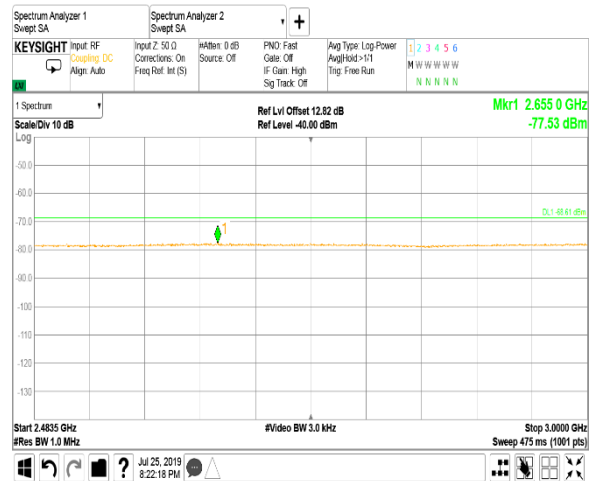
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Plot 7.6.67 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 6, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

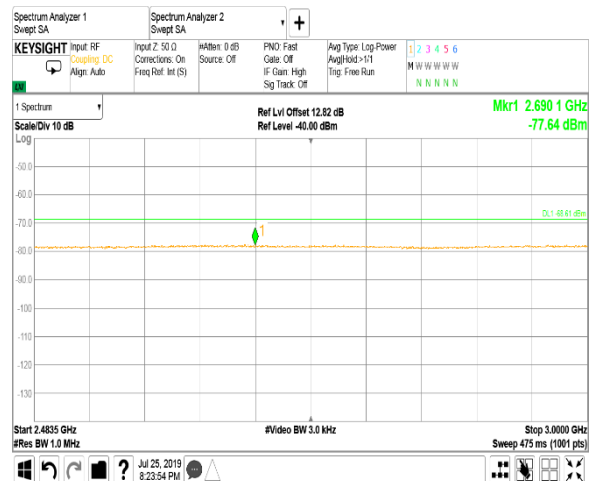
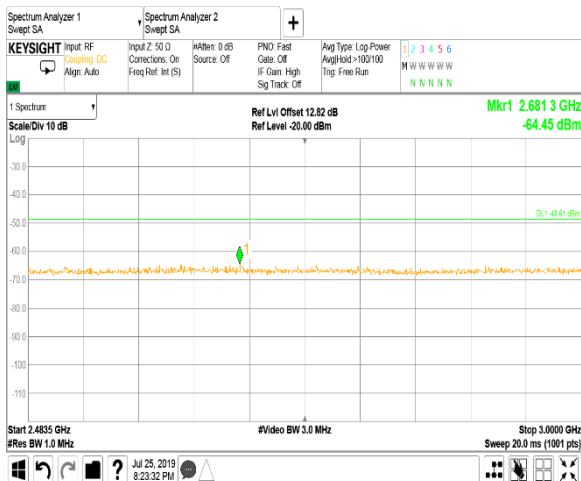
10 MHz
1beam
QPSK



Plot 7.6.68 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 6, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

10 MHz
1beam
64 QAM





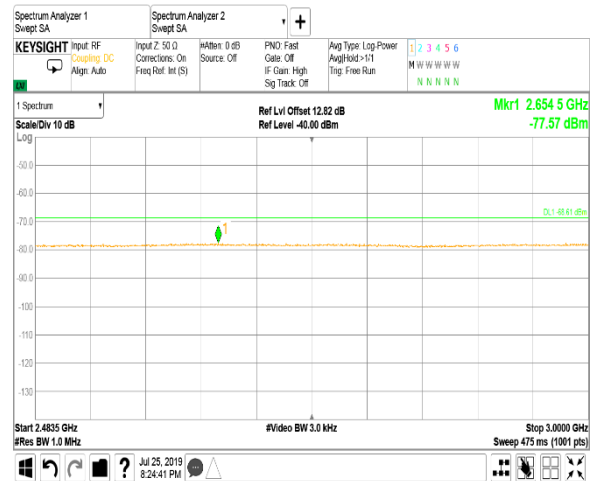
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Plot 7.6.69 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 7, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

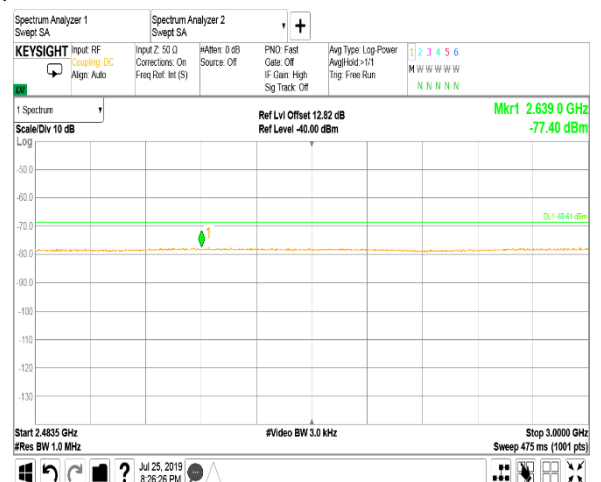
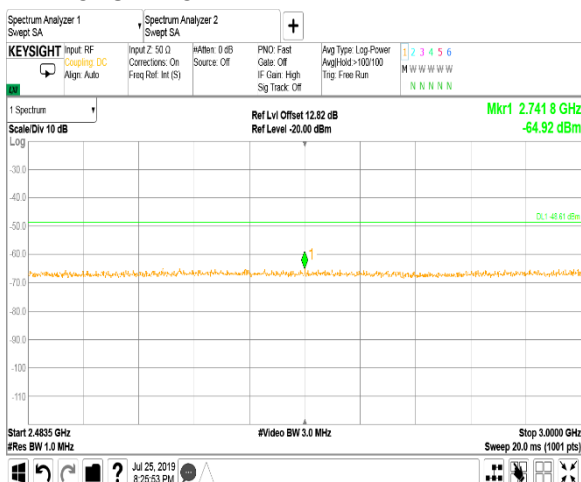
10 MHz
1beam
QPSK



Plot 7.6.70 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 7, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

10 MHz
1beam
64 QAM





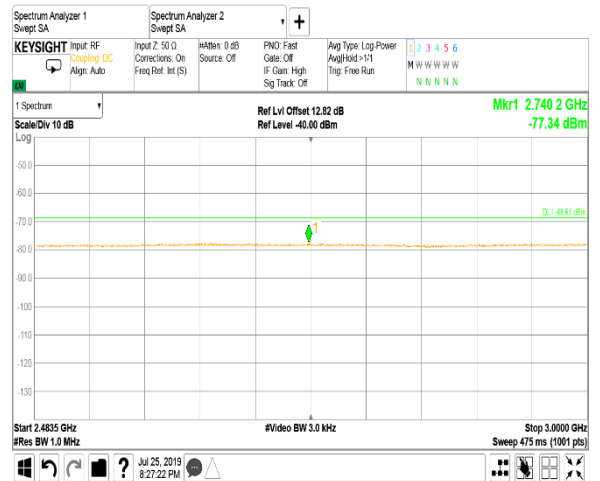
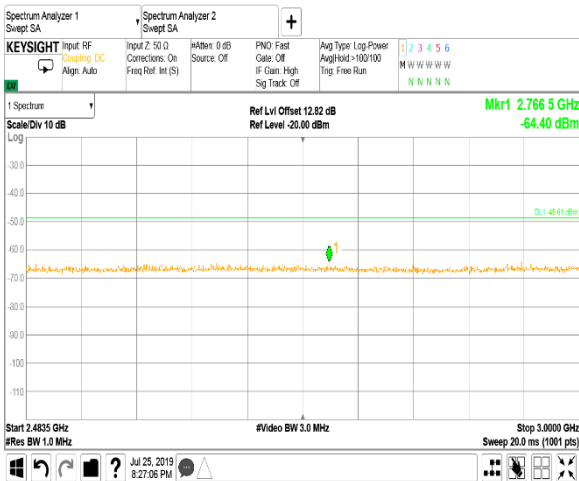
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Plot 7.6.71 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 8, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

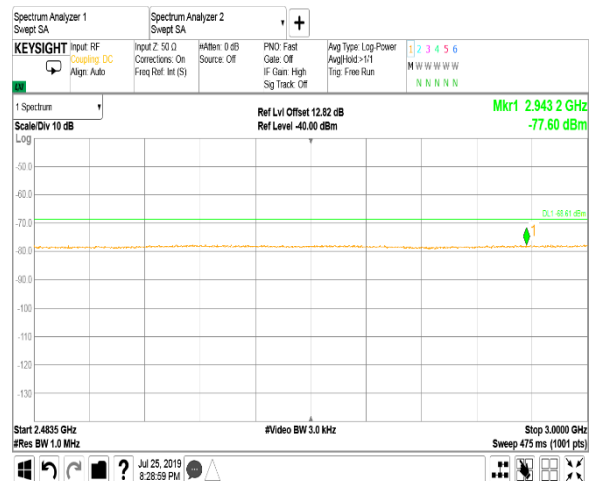
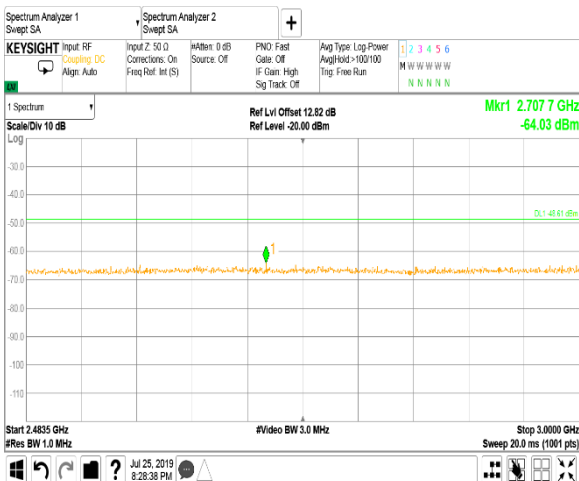
10 MHz
1beam
QPSK



Plot 7.6.72 Band edge emission measurements in 2483.5 - 3000 MHz range at antenna chain # 8, high carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

10 MHz
1beam
64 QAM





Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

7.7 Band edge emissions at RF antenna connector for 4 non overlapping beam configuration

7.7.1 General

This test was performed to measure band edge emissions at RF antenna connector. Specification test limits are given in Table 7.6.1.

Table 7.7.1 Band edge emission limits

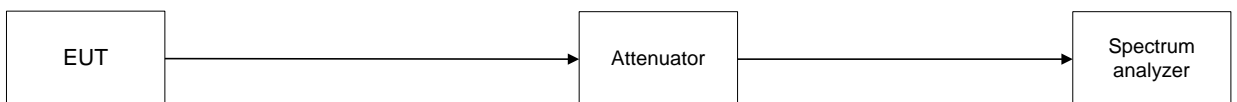
Output power	Assigned frequency, MHz	Attenuation below carrier*, dBc
Peak	902.0 – 928.0	20.0
	2400.0 – 2483.5	
	5725.0 – 5850.0	
Averaged over a time interval	902.0 – 928.0	30.0
	2400.0 – 2483.5	
	5725.0 – 5850.0	

* - Band edge emission limit is provided in terms of attenuation below the peak of modulated carrier measured with the same resolution bandwidth.

7.7.2 Test procedure

- 7.7.2.1 The EUT was set up as shown in Figure 7.6.1, energized normally modulated at the maximum data rate and its proper operation was checked.
- 7.7.2.2 The EUT was adjusted to produce maximum available to end user RF output power at the lowest carrier frequency.
- 7.7.2.3 The spectrum analyzer span was set to capture the carrier frequency and associated modulation products. The resolution bandwidth was set wider than 1 % of the frequency span.
- 7.7.2.4 The spectrum analyzer was set in max hold mode and allowed trace to stabilize. The highest emission level within the authorized band was measured.
- 7.7.2.5 The maximum band edge emission and modulation product outside of the band were measured as provided in Table 7.6.2 and associated plots and referenced to the highest emission level measured within the authorized band.
- 7.7.2.6 The above procedure was repeated with the EUT adjusted to produce maximum RF output power at the highest carrier frequency.

Figure 7.7.1 Band edge emission test setup





Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Table 7.7.2 Band edge emission outside restricted band test results

ASSIGNED FREQUENCY RANGE: 2400 - 2483.5 MHz
 DETECTOR USED: Peak
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: ≥ RBW
 CONFIGURATION: 4 non-overlapping beams
 CHANNEL SPACING: 5 MHz

Antenna port	Frequency, MHz	Band edge emission, dBm	Emission at carrier, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Modulation QPSK							
Chain #1							Pass
Chain #2							
Chain #3							
Chain #4							
Chain #5			No emissions were found				
Chain #6							
Chain #7							
Chain #8							
Modulation 64QAM							
Chain #1							Pass
Chain #2							
Chain #3							
Chain #4							
Chain #5			No emissions were found				
Chain #6							
Chain #7							
Chain #8							

*- Margin = Attenuation below carrier – specification limit.



HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

CHANNEL SPACING: 10 MHz

Antenna port	Frequency, MHz	Band edge emission, dBm	Emission at carrier, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Modulation QPSK							
Chain #1	No emissions were found						Pass
Chain #2							
Chain #3							
Chain #4							
Chain #5							
Chain #6							
Chain #7							
Chain #8							
Modulation 64QAM							
Chain #1	No emissions were found						Pass
Chain #2							
Chain #3							
Chain #4							
Chain #5							
Chain #6							
Chain #7							
Chain #8							

*- Margin = Attenuation below carrier – specification limit.



Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Table 7.7.3 Low band edge emission within restricted band test results

ASSIGNED FREQUENCY RANGE: 2400 - 2483.5 MHz
 DETECTOR USED: Peak / Average
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 RESOLUTION BANDWIDTH: 1 MHz
 VIDEO BANDWIDTH: ≥ RBW
 CONFIGURATION: 4 non-overlapping beams
 CHANNEL SPACING: 5 MHz

Modulation	Band edge	SA Reading, dBm								Sum , dBm
		Chain #1	Chain #2	Chain #3	Chain #4	Chain #5	Chain #6	Chain #7	Chain #8	
Detector Peak										
QPSK	2390.0	-72.08	-72.57	-72.86	-72.79	-71.48	-72.23	-72.63	-72.96	-63.42
64QAM	2390.0	-72.70	-72.08	-72.33	-73.09	-71.76	-70.89	-72.71	-73.00	-63.26
Detector Average										
QPSK	2390.0	-82.14	-82.58	-82.54	-82.31	-82.38	-82.23	-82.72	-82.58	-73.43
64QAM	2390.0	-82.55	-82.46	-82.80	-82.60	-82.49	-82.39	-82.18	-82.50	-73.49

CHANNEL SPACING: 10 MHz

Detector Peak										
QPSK	2390.0	-71.42	-72.61	-72.03	-72.72	-72.79	-72.69	-72.01	-72.57	-63.33
64QAM	2390.0	-72.97	-73.03	-72.97	-72.70	-72.25	-72.70	-72.58	-72.41	-63.69
Detector Average										
QPSK	2390.0	-82.32	-82.58	-82.47	-82.74	-82.39	-82.70	-81.91	-82.64	-73.46
64QAM	2390.0	-82.57	-82.85	-82.43	-82.65	-82.12	-82.78	-82.56	-82.30	-73.53

CHANNEL SPACING: 5 MHz

Frequency, MHz	Detector peak, dBm			Limit, dBm	Margin, dB*	Detector average, dBm,		Limit, dBm	Margin, dB*	Verdict
	Emission	Cable loss, dB	Band edge result			Emission	Band edge result			
Modulation QPSK										
2390.0	-63.42	1.23	-64.65	-39.58	-25.07	-73.43	-74.66	-59.58	-15.08	Pass
Modulation 64QAM										
2390.0	-63.26	1.23	-64.49	-39.58	-24.91	-73.49	-74.72	-59.58	-15.14	Pass

CHANNEL SPACING: 10 MHz

Modulation QPSK										
2390.0	-63.33	1.23	-64.53	-39.58	-24.95	-73.46	-74.69	-59.58	-15.11	Pass
Modulation 64QAM										
2390.0	-63.69	1.23	-64.92	-39.58	-25.34	-73.53	-74.76	-59.58	-15.18	Pass



Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Table 7.7.4 High band edge emission within restricted band test results

ASSIGNED FREQUENCY RANGE: 2400 - 2483.5 MHz
 DETECTOR USED: Peak / Average
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 RESOLUTION BANDWIDTH: 1 MHz
 VIDEO BANDWIDTH: ≥ RBW
 CONFIGURATION: 4 non-overlapping beams
 CHANNEL SPACING: 5 MHz

Modulation	Band edge	SA Reading, dBm								Sum , dBm
		Chain #1	Chain #2	Chain #3	Chain #4	Chain #5	Chain #6	Chain #7	Chain #8	
Detector Peak										
QPSK	2483.5	-70.39	-69.71	-70.40	-71.11	-71.01	-70.86	-70.85	-70.64	-61.60
64QAM	2483.5	-71.00	-70.85	-70.83	-70.43	-70.65	-70.90	-70.01	-70.88	-61.68
Detector Average										
QPSK	2483.5	-80.87	-80.82	-80.31	-80.41	-80.86	-80.88	-80.70	-80.85	-71.71
64QAM	2483.5	-80.67	-80.55	-80.60	-80.46	-80.70	-80.86	-80.96	-80.34	-71.64

CHANNEL SPACING: 10 MHz

Detector Peak										
QPSK	2483.5	-69.56	-67.93	-69.40	-69.85	-69.38	-69.52	-69.75	-70.31	-60.41
64QAM	2483.5	-69.81	-69.42	-70.28	-69.75	-69.62	-69.03	-69.70	-69.33	-60.60
Detector Average										
QPSK	2483.5	-79.21	-79.60	-79.32	-79.67	-79.61	-79.45	-79.79	-79.46	-70.51
64QAM	2483.5	-79.84	-79.86	-79.83	-79.65	-79.55	-79.63	-79.33	-79.67	-70.67

CHANNEL SPACING: 5 MHz

Frequency, MHz	Detector peak, dBm			Limit, dBm	Margin, dB*	Detector average, dBm,		Limit, dBm	Margin, dB*	Verdict
	Emission	Cable loss, dB	Band edge result			Emission	Band edge result			
High band edge										
Modulation QPSK										
2483.5	-61.60	1.23	-62.83	-39.58	-23.25	-71.71	-72.94	-59.58	-13.36	Pass
Modulation 64QAM										
2483.5	-61.68	1.23	-62.91	-39.58	-23.33	-71.64	-72.87	-59.58	-13.29	Pass

CHANNEL SPACING: 10 MHz

Modulation QPSK										
2483.5	-60.41	1.23	-61.64	-39.58	-22.06	-70.51	-71.74	-59.58	-12.16	Pass
Modulation 64QAM										
2483.5	-60.60	1.23	-61.83	-39.58	-22.25	-70.67	-71.90	-59.58	-12.32	Pass

Reference numbers of test equipment used

HL 3901	HL 4070	HL 4366	HL 5376	HL	HL	HL	HL
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Full description is given in Appendix A.



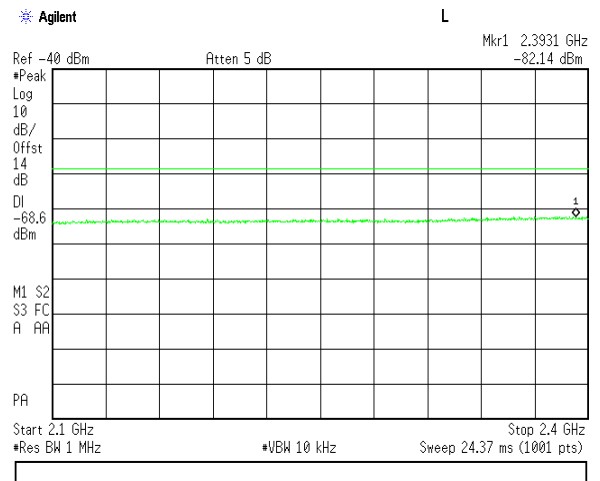
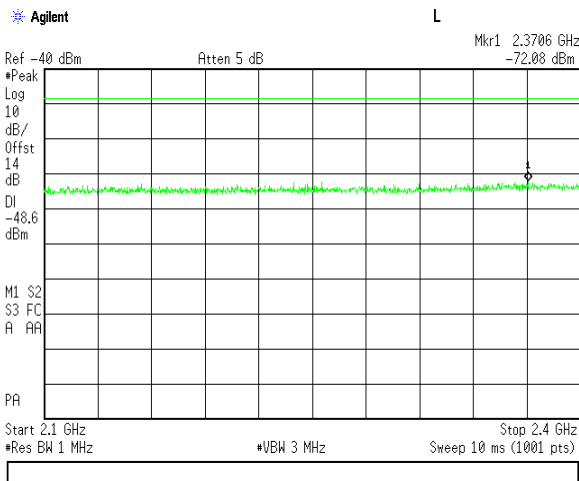
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Plot 7.7.1 Spurious emission measurements in 2100 - 2400 MHz range at antenna chain # 1, low carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

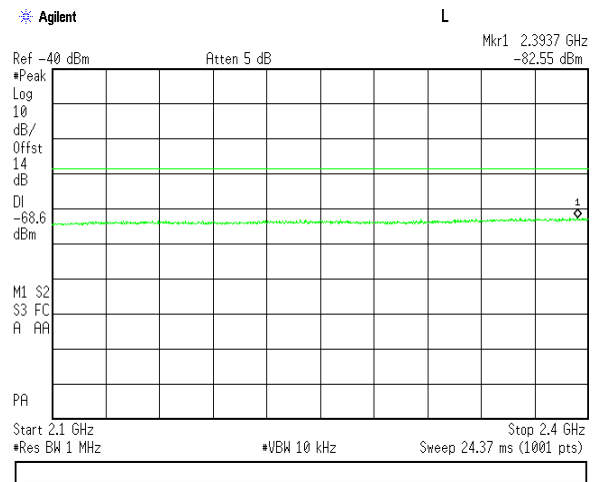
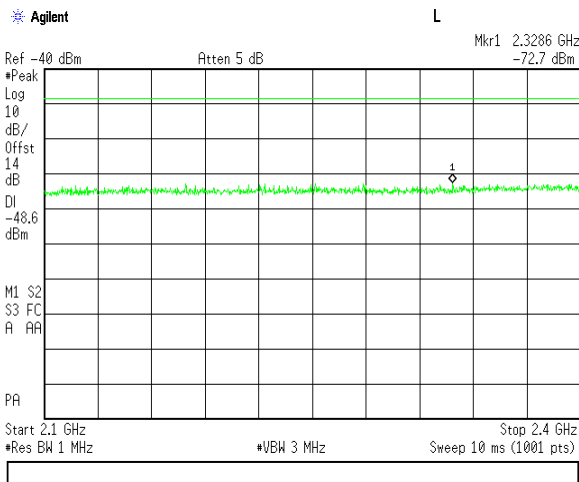
5 MHz
4 non-overlapping beams
QPSK



Plot 7.7.2 Spurious emission measurements in 2100 - 2400 MHz range at antenna chain # 1, low carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

5 MHz
4 non-overlapping beams
64 QAM





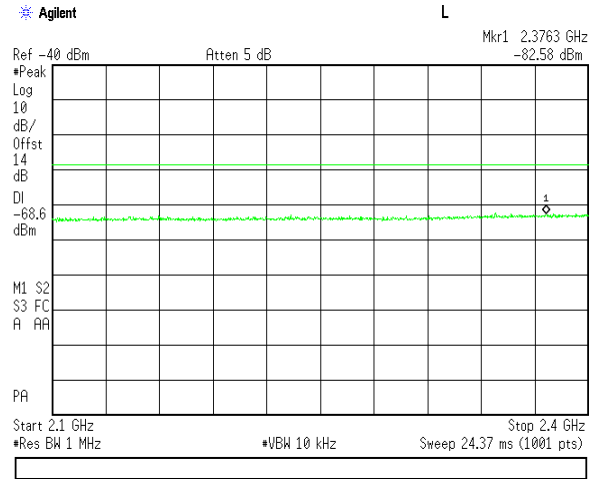
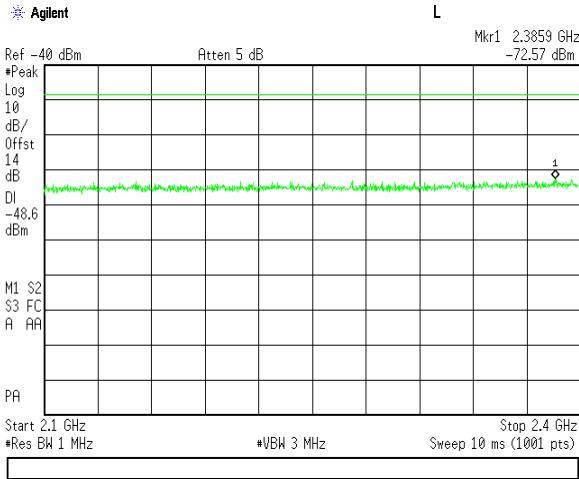
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 28-Jul-19			
Temperature: 24 °C	Relative Humidity: 44 %	Air Pressure: 1004 hPa	Power: 48 VDC
Remarks:			

Plot 7.7.3 Spurious emission measurements in 2100 - 2400 MHz range at antenna chain # 2, low carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

5 MHz
4 non-overlapping beams
QPSK



Plot 7.7.4 Spurious emission measurements in 2100 - 2400 MHz range at antenna chain # 2, low carrier frequency

CHANNEL BANDWIDTH:
CONFIGURATION:
MODULATION:

5 MHz
4 non-overlapping beams
64 QAM

