

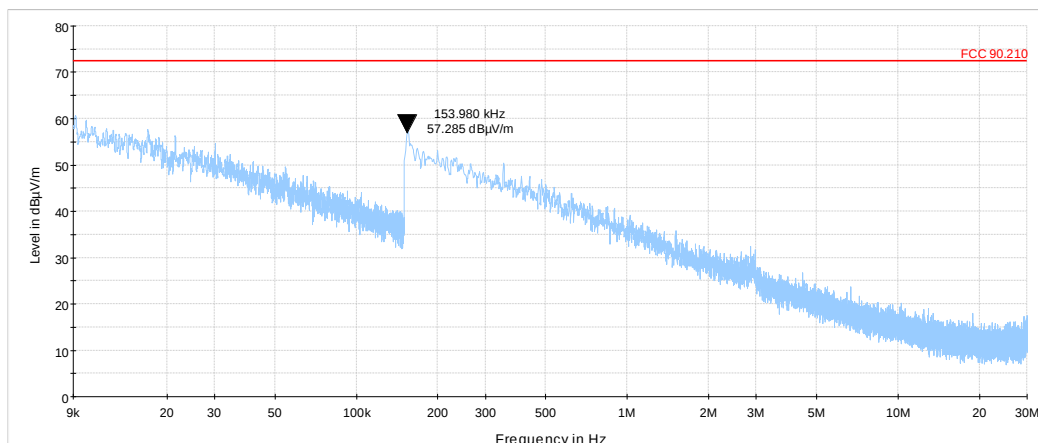


HERMON LABORATORIES

Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12			
Test mode: Compliance		Verdict: PASS	
Date(s): 04-Jan-24			
Temperature: 24 °C	Relative Humidity: 47 %	Air Pressure: 1018 hPa	Power: 48 VDC
Remarks:			

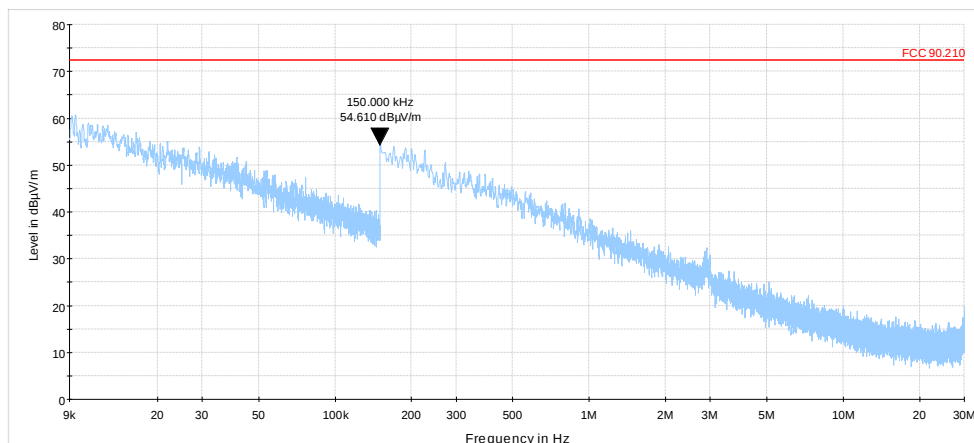
Plot 7.4.1 Radiated emission measurements in 9 kHz - 30 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low
TEST DISTANCE: 3 m



Plot 7.4.2 Radiated emission measurements in 9 kHz - 30 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Mid
TEST DISTANCE: 3 m



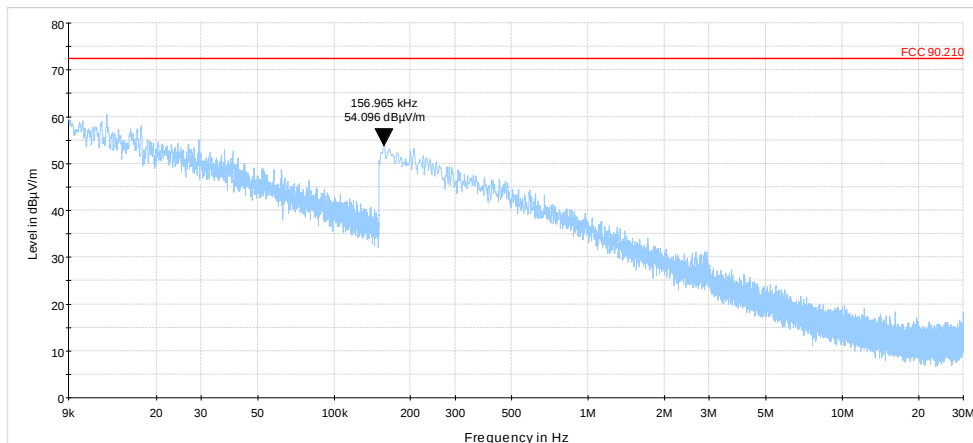


HERMON LABORATORIES

Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12			
Test mode: Compliance		Verdict: PASS	
Date(s): 04-Jan-24			
Temperature: 24 °C	Relative Humidity: 47 %	Air Pressure: 1018 hPa	Power: 48 VDC
Remarks:			

Plot 7.4.3 Radiated emission measurements in 9 kHz - 30 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
TEST DISTANCE:	3 m



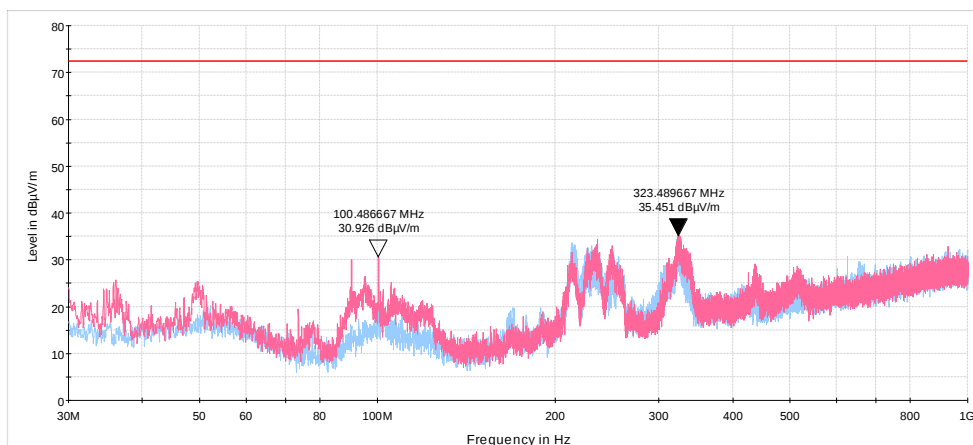


HERMON LABORATORIES

Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12			
Test mode: Compliance		Verdict: PASS	
Date(s): 04-Jan-24			
Temperature: 24 °C	Relative Humidity: 47 %	Air Pressure: 1018 hPa	Power: 48 VDC
Remarks:			

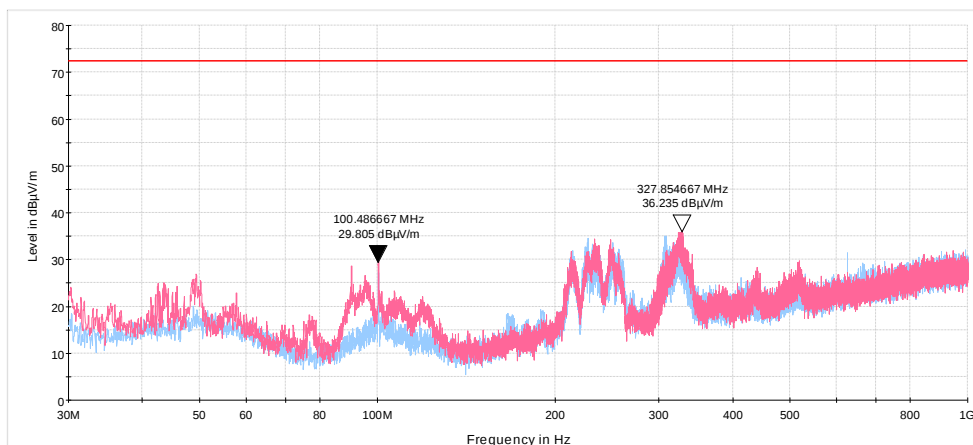
Plot 7.4.4 Radiated emission measurements in 30 - 1000 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Plot 7.4.5 Radiated emission measurements in 30 - 1000 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



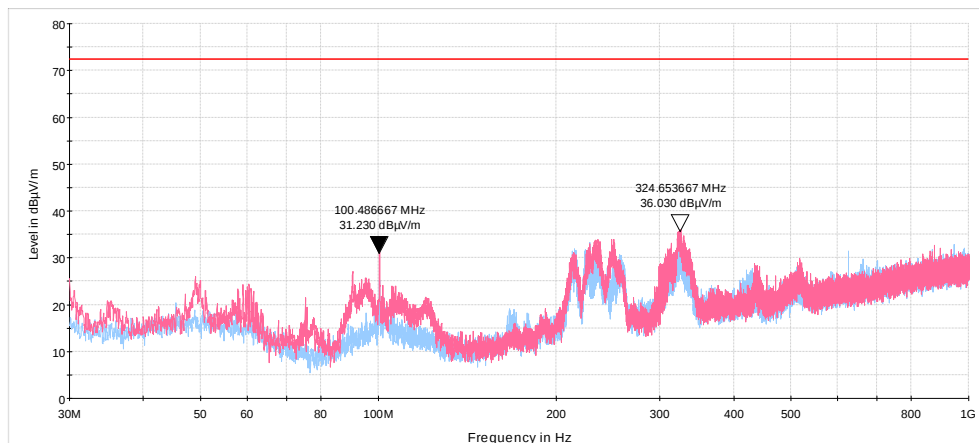


HERMON LABORATORIES

Test specification:		Section 90.210, Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12	
Test mode:		Verdict: PASS	
Date(s):			
04-Jan-24			
Temperature: 24 °C	Relative Humidity: 47 %	Air Pressure: 1018 hPa	Power: 48 VDC
Remarks:			

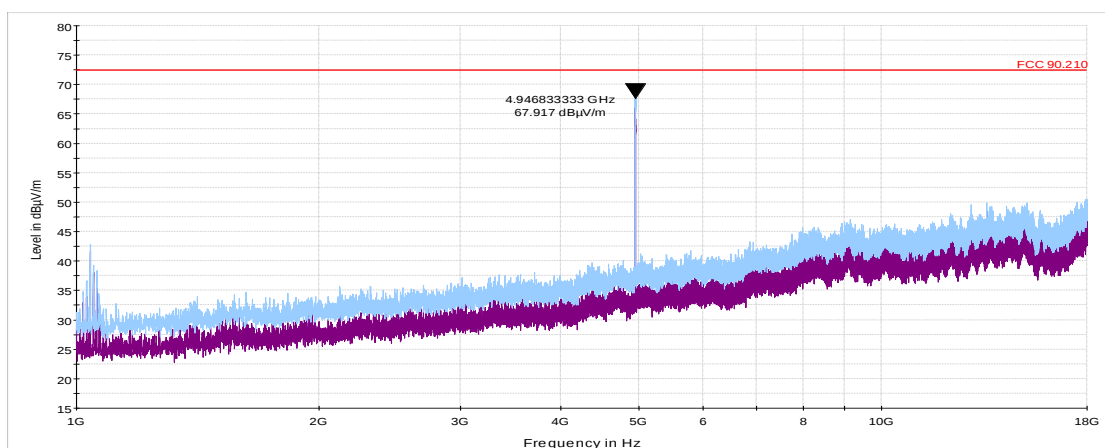
Plot 7.4.6 Radiated emission measurements in 30 - 1000 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Plot 7.4.7 Radiated emission measurements in 1000 – 18000 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

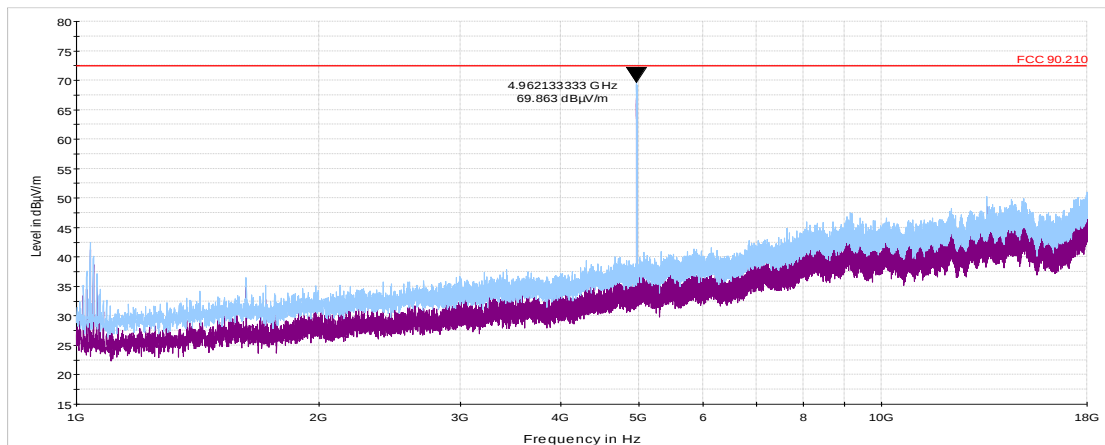




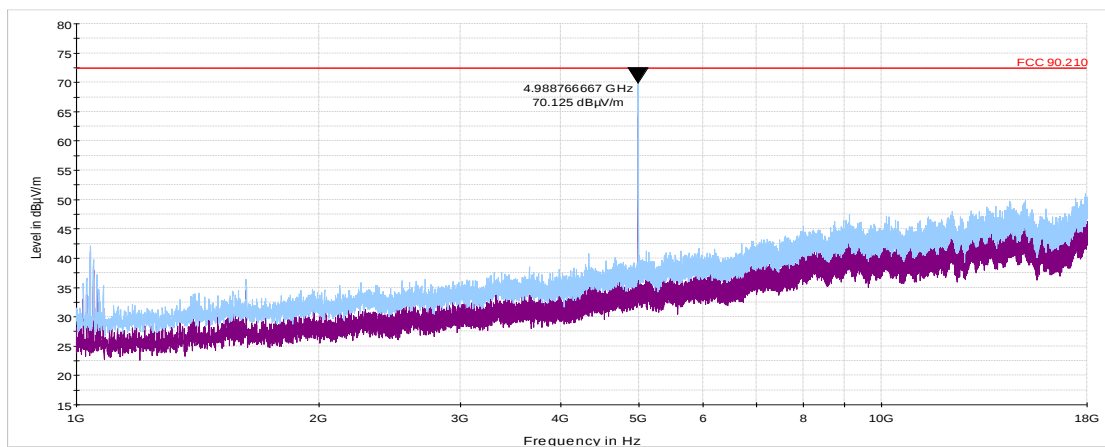
Test specification:		Section 90.210, Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12	
Test mode:		Verdict: PASS	
Date(s):			
04-Jan-24			
Temperature: 24 °C	Relative Humidity: 47 %	Air Pressure: 1018 hPa	Power: 48 VDC
Remarks:			

Plot 7.4.8 Radiated emission measurements in 1000 – 18000 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

**Plot 7.4.9 Radiated emission measurements in 1000 – 18000 MHz range**

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



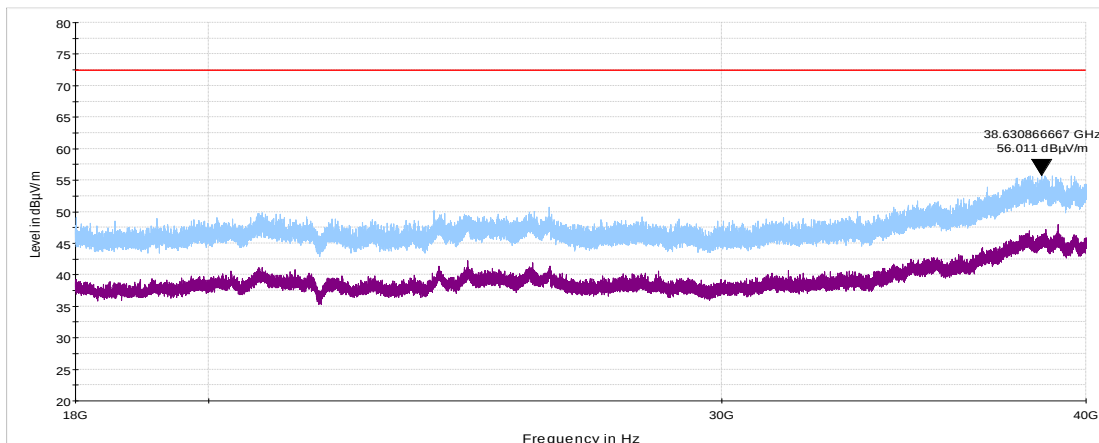


HERMON LABORATORIES

Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12			
Test mode: Compliance		Verdict: PASS	
Date(s): 04-Jan-24			
Temperature: 24 °C	Relative Humidity: 47 %	Air Pressure: 1018 hPa	Power: 48 VDC
Remarks:			

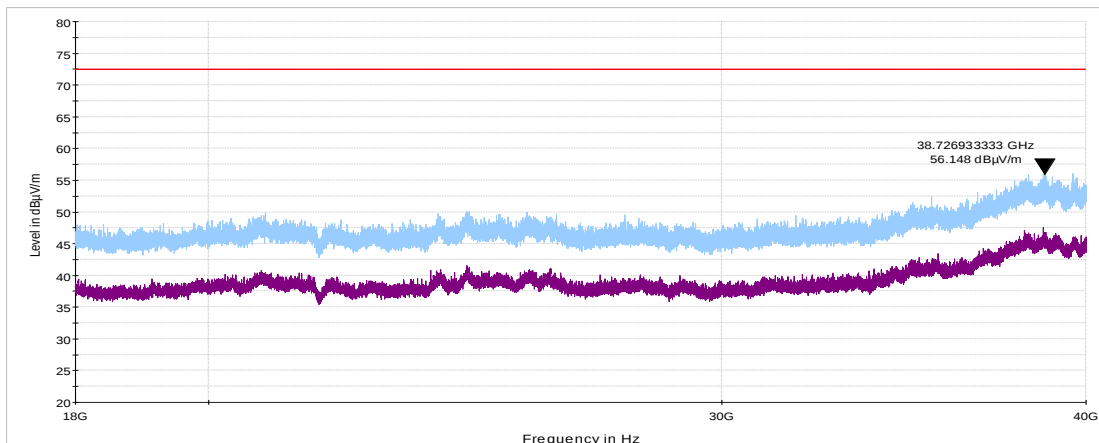
Plot 7.4.10 Radiated emission measurements in 18000 – 40000 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Plot 7.4.11 Radiated emission measurements in 18000 – 40000 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



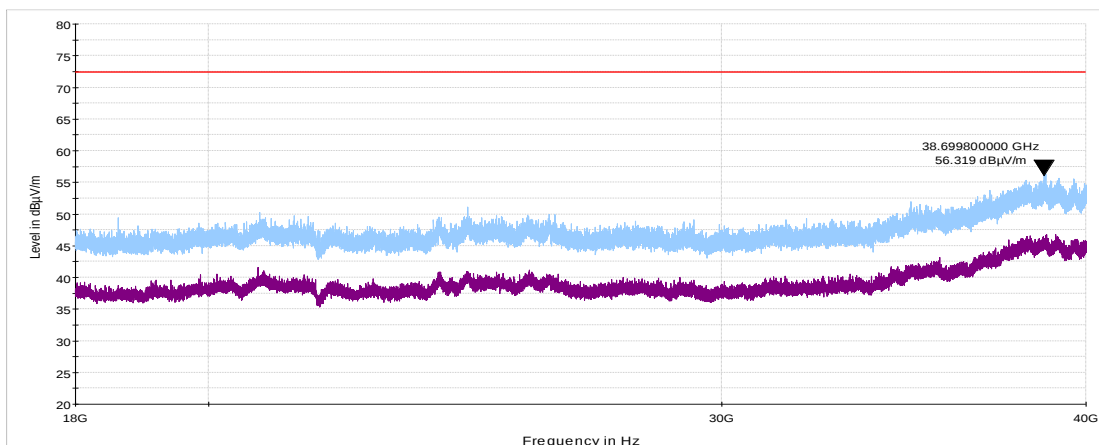


HERMON LABORATORIES

Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12			
Test mode: Compliance		Verdict: PASS	
Date(s): 04-Jan-24			
Temperature: 24 °C	Relative Humidity: 47 %	Air Pressure: 1018 hPa	Power: 48 VDC
Remarks:			

Plot 7.4.12 Radiated emission measurements in 18000 – 40000 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m





Test specification: Section 90.210, Conducted spurious emissions			
Test procedure: 47 CFR, Sections 2.1051 and 90.210(m)			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Jan-24			
Temperature: 23 °C	Relative Humidity: 44 %	Air Pressure: 1016 hPa	Power: 48 VDC
Remarks:			

7.5 Spurious emissions at RF antenna connector test

7.5.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Spurious emission limits

Frequency, MHz	Spurious emission, dBm
0.009 – 10th harmonic*	-25

* - spurious emission limits do not apply to the in band emission within ± 150 % of the authorized bandwidth from the carrier; investigated in course of emission mask testing. The high frequency is the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower

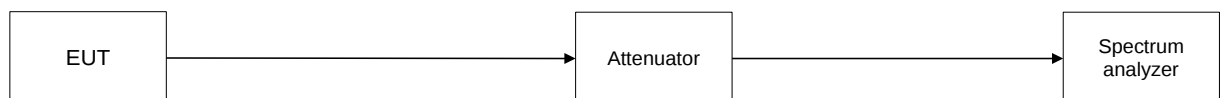
7.5.2 Test procedure

7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and its proper operation was checked.

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

7.5.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.5.2, Table 7.5.3 and Table 7.5.4 and the associated plots.

Figure 7.5.1 Spurious emission test setup





Test specification:		Section 90.210, Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051 and 90.210(m)	
Test mode:		Verdict: PASS	
Date(s):			
03-Jan-24			
Temperature: 23 °C	Relative Humidity: 44 %	Air Pressure: 1016 hPa	Power: 48 VDC
Remarks:			

Table 7.5.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 4940.0 – 4990.0 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 40000 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATION: QPSK (worst case variant)
 MODULATING SIGNAL: PRBS
 CHANNEL SPACING: 10 MHz
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission*, dBm	Total Spurious emission**, dBm	Limit, dBm	Margin, dB***	Verdict
Low carrier frequency									
4904.0	-31.63	Included	Included	1000	-31.63	-28.63	-25.0	-3.63	Pass
5008.0	-30.15	Included	Included	1000	-30.15	-27.15	-25.0	-2.15	Pass
Mid carrier frequency									
4888.6	-32.05	Included	Included	1000	-32.05	-29.05	-25.0	-4.05	Pass
4892.4	-33.13	Included	Included	1000	-33.13	-30.15	-25.0	-5.15	Pass
29156.5	-39.55	Included	Included	1000	-39.55	-36.55	-25.0	-11.55	Pass
High carrier frequency									
2884.7	-33.05	Included	Included	1000	-33.05	-30.05	-25.0	-5.05	Pass
5034.0	-30.29	Included	Included	1000	-30.29	-27.29	-25.0	-3.29	Pass
26083.5	-39.24	Included	Included	1000	-39.24	-36.24	-25.0	-11.24	Pass
31714.0	-39.84	Included	Included	1000	-39.84	-36.84	-25.0	-11.84	Pass

* - SA Reading over 1 chain = Max SA reading (Chains #1 or chains #2)

** - Total emission = Maximum emission per chain + 10*log(N)

*** - Margin = Spurious emission – specification limit.



Test specification:		Section 90.210, Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051 and 90.210(m)	
Test mode:		Verdict: PASS	
Date(s):			
03-Jan-24			
Temperature: 23 °C	Relative Humidity: 44 %	Air Pressure: 1016 hPa	Power: 48 VDC
Remarks:			

Table 7.5.3 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 4942.5 – 4987.5 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 40000 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATION: QPSK (worst case variant)
 MODULATING SIGNAL: PRBS
 CHANNEL SPACING: 25 MHz
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission*, dBm	Total Spurious emission**, dBm	Limit, dBm	Margin, dB***	Verdict
Low carrier frequency									
4927.5	-30.07	Included	Included	1000	-30.07	-27.07	-25.0	-2.07	Pass
27083.0	-39.60	Included	Included	1000	-39.60	-36.60	-25.0	-11.60	Pass
Mid carrier frequency									
4927.5	-30.62	Included	Included	1000	-30.62	-27.62	-25.0	-2.62	Pass
High carrier frequency									
4927.5	-31.45	Included	Included	1000	-31.45	-28.45	-25.0	-3.45	Pass
26.151.5	-39.69	Included	Included	1000	-39.69	-36.69	-25.0	-11.69	Pass

* - SA Reading over 1 chain = Max SA reading (Chains #1 or chains #2)

** - Total emission = Maximum emission per chain + 10*log(N)

*** - Margin = Spurious emission – specification limit.



Test specification: Section 90.210, Conducted spurious emissions			
Test procedure: 47 CFR, Sections 2.1051 and 90.210(m)			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Jan-24			
Temperature: 23 °C	Relative Humidity: 44 %	Air Pressure: 1016 hPa	Power: 48 VDC
Remarks:			

Table 7.5.4 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 4942.5 – 4987.5 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 40000 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATION: QPSK (worst case variant)
 MODULATING SIGNAL: PRBS
 CHANNEL SPACING: 50 MHz
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission*, dBm	Total Spurious emission**, dBm	Limit, dBm	Margin, dB***	Verdict
Low carrier frequency									
No spurious emissions were found									
Mid carrier frequency									
4455.4	-36.68	Included	Included	1000	-36.73	-33.73	-25.0	-8.73	Pass
4474.5	-37.10	Included	Included	1000	-37.10	-34.10	-25.0	-9.10	Pass
4583.7	-38.35	Included	Included	1000	-38.35	-36.35	-25.0	-11.35	Pass
4915.0	-32.65	Included	Included	1000	-32.65	-29.65	-25.0	-4.65	Pass
5015.0	-34.76	Included	Included	1000	-34.76	-31.76	-25.0	-6.76	Pass
31576.5	-39.37	Included	Included	1000	-39.37	-36.37	-25.0	-11.37	Pass
High carrier frequency									
No spurious emissions were found									

* - SA Reading over 1 chain = Max SA reading (Chains #1 or chains #2)

** - Total emission = Maximum emission per chain + 10*log(N)

*** - Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

HL 3357	HL 5376	HL 5596	HL 5636	HL 3818	HL 5626		
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Full description is given in Appendix A.



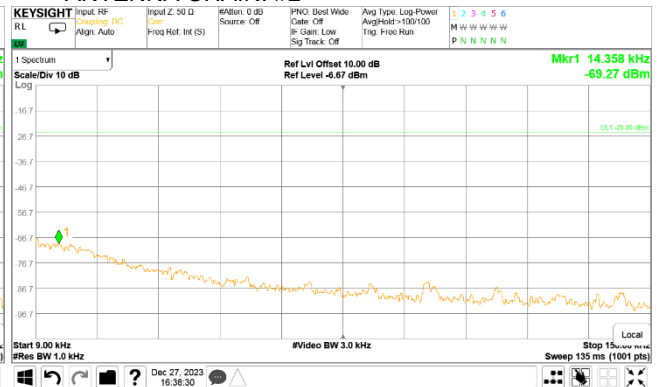
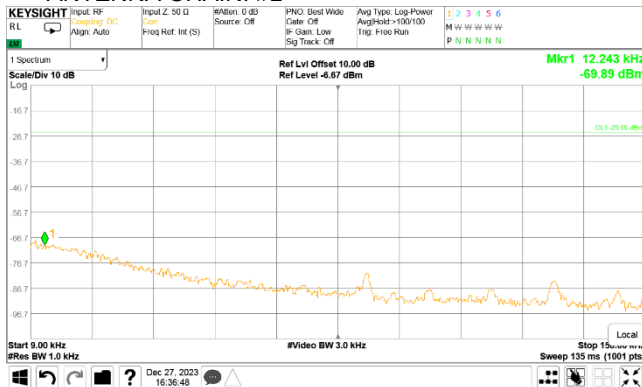
HERMON LABORATORIES

Test specification: Section 90.210, Conducted spurious emissions			
Test procedure: 47 CFR, Sections 2.1051 and 90.210(m)			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Jan-24			
Temperature: 23 °C	Relative Humidity: 44 %	Air Pressure: 1016 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

MODULATION:
CHANNEL SPACING:
ANTENNA CHAIN: #1

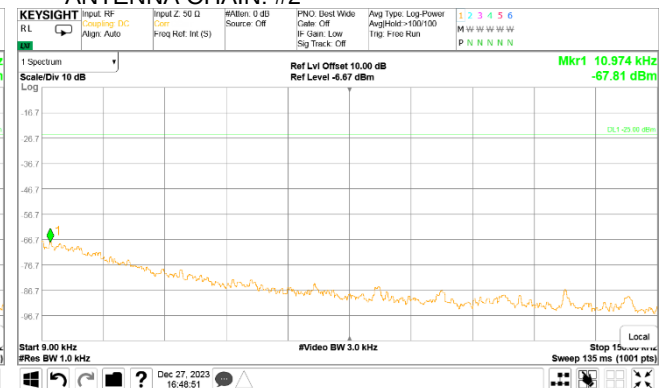
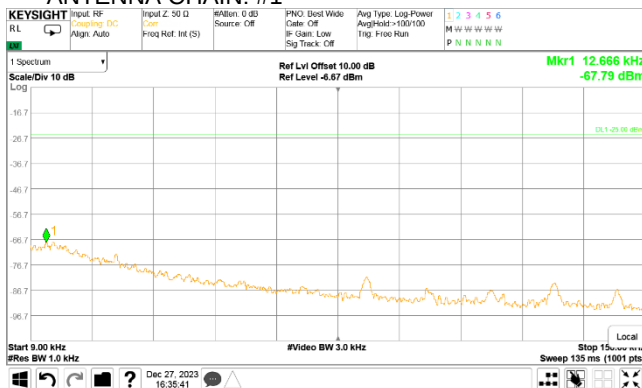
QPSK (worst case variant)
10 MHz
ANTENNA CHAIN: #2



Plot 7.5.2 Spurious emission measurements in 9 kHz - 150 kHz range at mid carrier frequency

MODULATION:
CHANNEL SPACING:
ANTENNA CHAIN: #1

QPSK (worst case variant)
10 MHz
ANTENNA CHAIN: #2



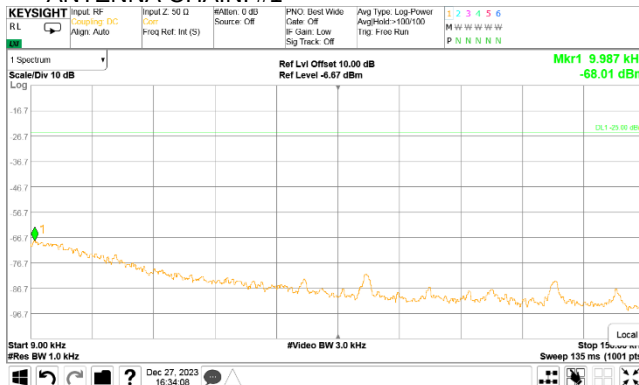


HERMON LABORATORIES

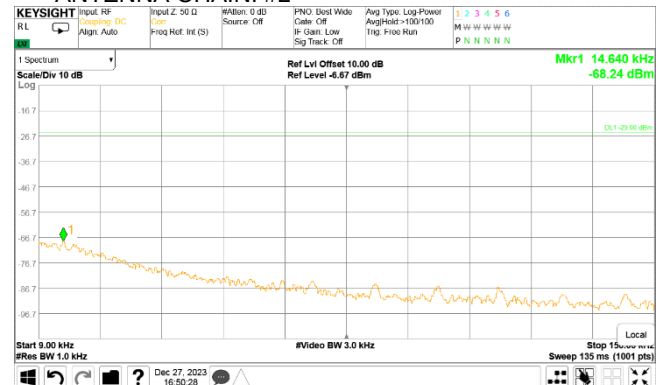
Test specification: Section 90.210, Conducted spurious emissions			
Test procedure: 47 CFR, Sections 2.1051 and 90.210(m)			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Jan-24			
Temperature: 23 °C	Relative Humidity: 44 %	Air Pressure: 1016 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.3 Spurious emission measurements in 9 kHz - 150 kHz range at high carrier frequency

MODULATION:
CHANNEL SPACING:
ANTENNA CHAIN: #1

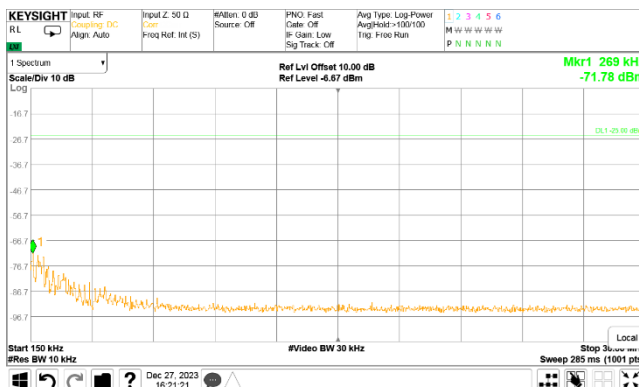


QPSK (worst case variant)
10 MHz
ANTENNA CHAIN: #2

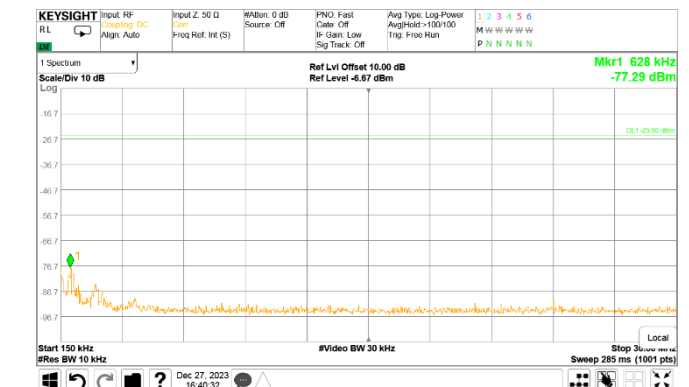


Plot 7.5.4 Spurious emission measurements in 150 kHz – 30 MHz range at low carrier frequency

MODULATION:
CHANNEL SPACING:
ANTENNA CHAIN: #1



QPSK (worst case variant)
10 MHz
ANTENNA CHAIN: #2





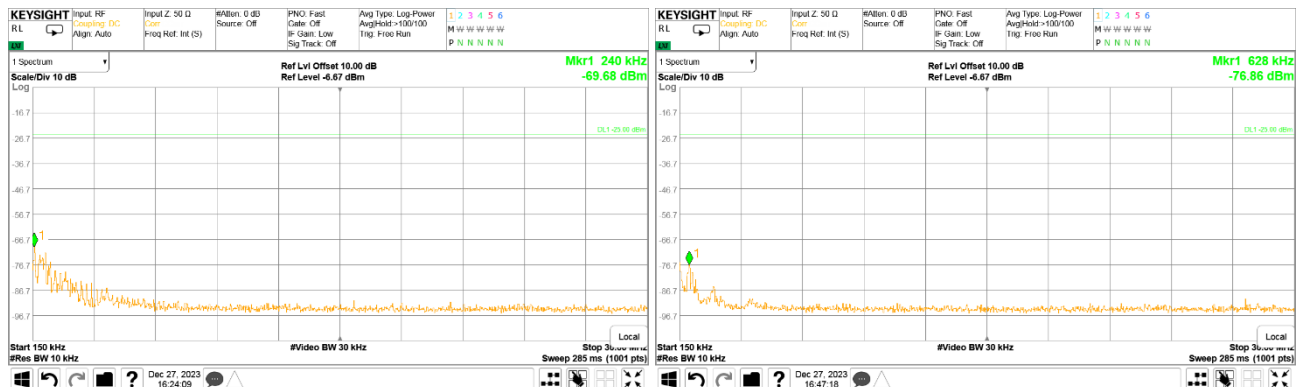
HERMON LABORATORIES

Test specification: Section 90.210, Conducted spurious emissions			
Test procedure: 47 CFR, Sections 2.1051 and 90.210(m)			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Jan-24			
Temperature: 23 °C	Relative Humidity: 44 %	Air Pressure: 1016 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.5 Spurious emission measurements in 150 kHz – 30 MHz range at mid carrier frequency

MODULATION:
CHANNEL SPACING:
ANTENNA CHAIN: #1

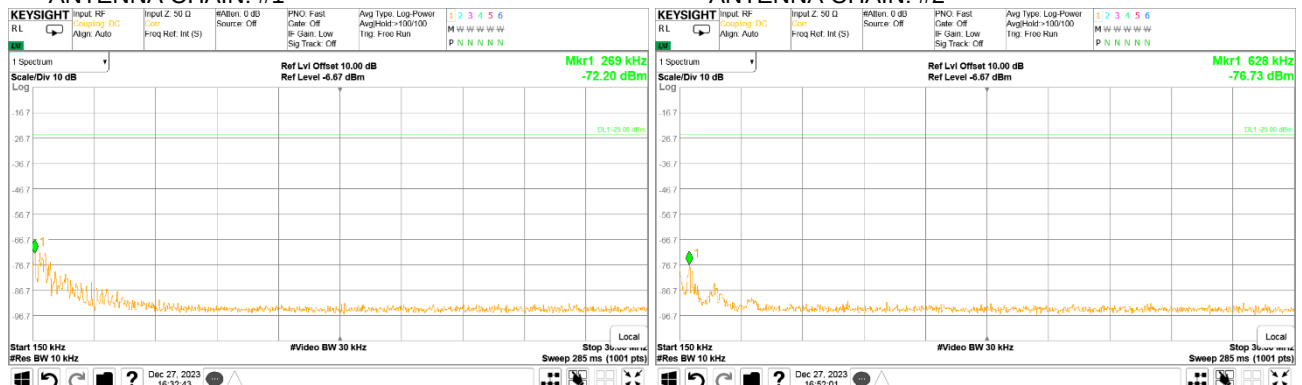
QPSK (worst case variant)
10 MHz
ANTENNA CHAIN: #2



Plot 7.5.6 Spurious emission measurements in 150 kHz – 30 MHz range at high carrier frequency

MODULATION:
CHANNEL SPACING:
ANTENNA CHAIN: #1

QPSK (worst case variant)
10 MHz
ANTENNA CHAIN: #2

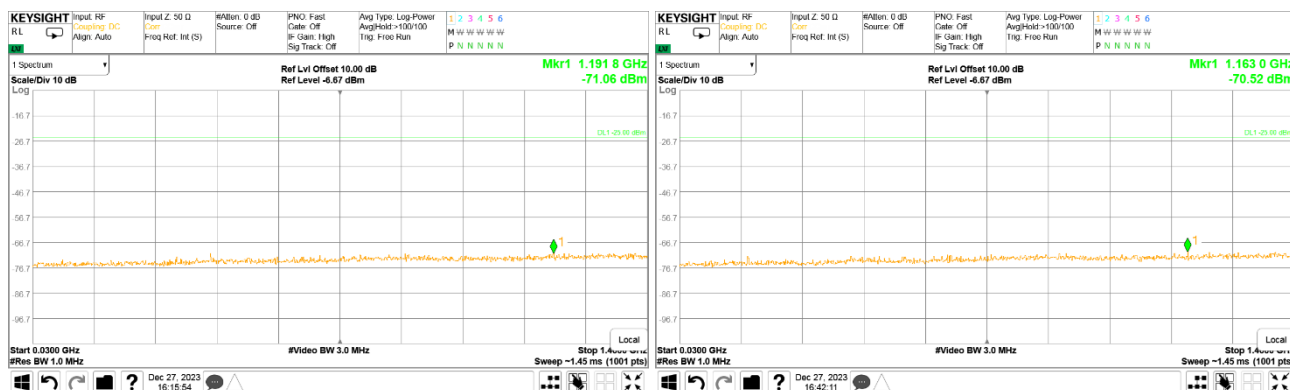


Test specification:		Section 90.210, Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051 and 90.210(m)	
Test mode:		Compliance	Verdict: PASS
Date(s):		03-Jan-24	
Temperature: 23 °C	Relative Humidity: 44 %	Air Pressure: 1016 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.7 Spurious emission measurements in 30 - 1400 MHz range at low carrier frequency

MODULATION:
CHANNEL SPACING:
ANTENNA CHAIN: #1

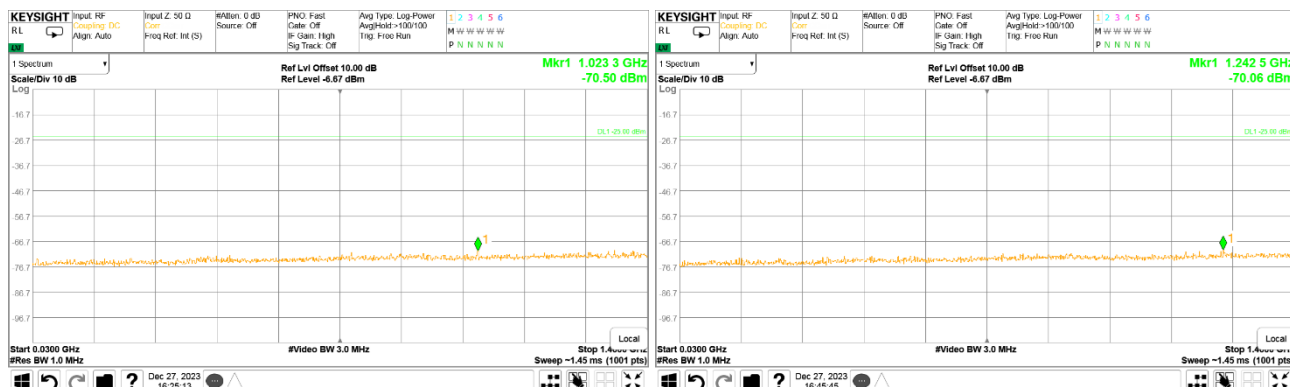
QPSK (worst case variant)
10 MHz
ANTENNA CHAIN: #2



Plot 7.5.8 Spurious emission measurements in 30 - 1400 MHz range at mid carrier frequency

MODULATION:
CHANNEL SPACING:
ANTENNA CHAIN: #1

QPSK (worst case variant)
10 MHz
ANTENNA CHAIN: #2





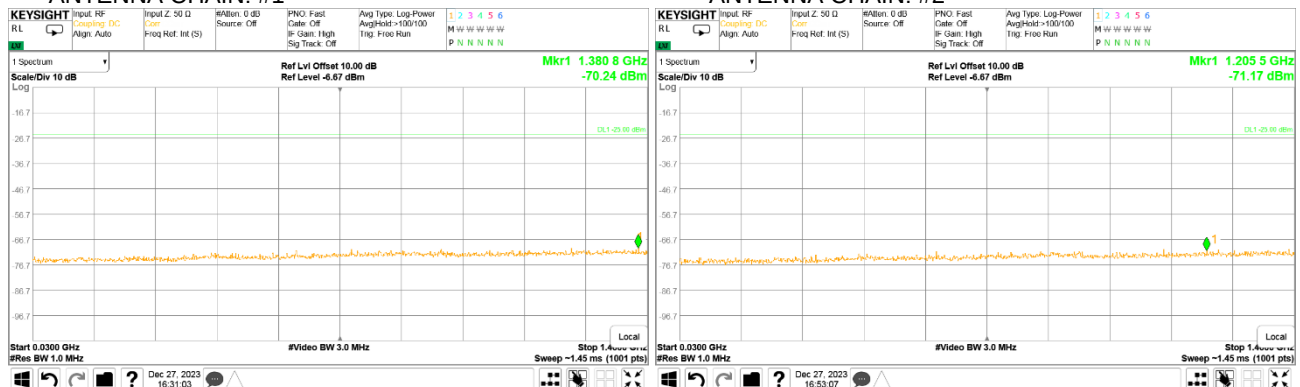
HERMON LABORATORIES

Test specification: Section 90.210, Conducted spurious emissions			
Test procedure: 47 CFR, Sections 2.1051 and 90.210(m)			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Jan-24			
Temperature: 23 °C	Relative Humidity: 44 %	Air Pressure: 1016 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.9 Spurious emission measurements in 30 - 1400 MHz range at high carrier frequency

MODULATION:
CHANNEL SPACING:
ANTENNA CHAIN: #1

QPSK (worst case variant)
10 MHz
ANTENNA CHAIN: #2



Plot 7.5.10 Spurious emission measurements in 1400 - 3000 MHz range at low carrier frequency

MODULATION:
CHANNEL SPACING:
ANTENNA CHAIN: #1

QPSK (worst case variant)
10 MHz
ANTENNA CHAIN: #2

