Report ID: AIRRAD_FCC.44746_Rev1 Date of Issue: 24-Nov-21



Test specification:	Section 96.41(e)(2), Radiated spurious emissions			
Test procedure:	Section 96.41(e)(3)			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	04-Nov-21	verdict:	PASS	
Temperature: 25 °C	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 48 VDC	
Remarks:				

Table 7.5.3 Field strength of spurious emissions above 1 GHz

ASSIGNED FREQUENCY RANGE: 3550 - 3700 MHz

TEST DISTANCE: 3 m

TEST SITE: Semi anechoic chamber

DETECTOR USED: Peak

VIDEO BANDWIDTH: > Resolution bandwidth

TEST ANTENNA TYPE: Double ridged guide (above 1000 MHz)

MODULATION: QPSK
CHANNEL BANDWIDTH: 40 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

IKANSIVII	LIER OUT	201 PO	WER SEI	HINGS.	I\	/laximum				
F	Anten	na	A =:	Peak field s	trength(VB	W=3 MHz)	Average fie	eld strength(VBW=1	10 Hz)	
Frequency, MHz	Polarization	Height, m	Azimuth, degrees*	Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB***	Verdict
Low carrier	frequency 3	570 MHz								
1040.175	Vertical	1.0	-136	35.58	75.2	-39.62	35.58	55.2	-19.62	Pass
1267.227	Horizontal	1.0	-54	42.48	75.2	-32.72	42.48	55.2	-12.72	Pass
13379.415	Horizontal	1.0	-29	49.80	75.2	-25.40	49.80	55.2	-5.40	Pass
13500.098	Vertical	1.0	-136	50.50	75.2	-24.70	50.50	55.2	-4.70	Pass
Mid carrier t	frequency 30	625 MHz								
1267.227	Horizontal	1.0	-53	42.26	75.2	-32.94	42.26	55.2	-12.94	Pass
1536.112	Vertical	1.0	-121	36.52	75.2	-38.68	36.52	55.2	-18.68	Pass
4266.610	Vertical	1.0	114	42.16	75.2	-33.04	42.16	55.2	-13.04	Pass
High carrier frequency 3680 MHz										
1267.227	Horizontal	1.0	-52	39.68	75.2	-35.52	39.68	55.2	-15.52	Pass
3071.939	Horizontal	1.0	-164	38.13	75.2	-37.07	38.13	55.2	-17.07	Pass
13286.598	Vertical	1.0	-168	48.29	75.2	-26.91	48.29	55.2	-6.91	Pass

Reference numbers of test equipment used

HL 0446	HL 3903	HL 4280	HL 4360	HL 4933	HL 4956	HL 5112	HL 5288
HL 5902							

Full description is given in Appendix A.

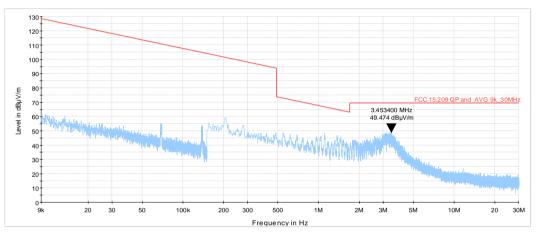


Test specification:	Section 96.41(e)(2), Radiated spurious emissions			
Test procedure:	Section 96.41(e)(3)			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	04-Nov-21	verdict.	PASS	
Temperature: 25 °C	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 48 VDC	
Remarks:				

Plot 7.5.1 Radiated emission measurements in 9 kHz - 30 MHz range

TEST SITE: Semi anechoic chamber

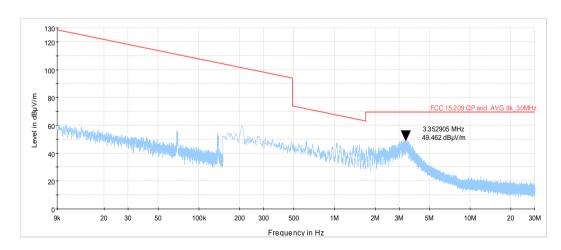
CARRIER FREQUENCY: Low TEST DISTANCE: 3 m



Plot 7.5.2 Radiated emission measurements in 9 kHz - 30 MHz range

TEST SITE: Semi anechoic chamber

CARRIER FREQUENCY: Mid TEST DISTANCE: 3 m





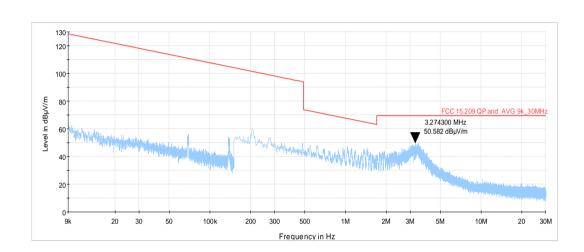


Test specification:	Section 96.41(e)(2), Radiated spurious emissions			
Test procedure:	Section 96.41(e)(3)			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	04-Nov-21	verdict.	PASS	
Temperature: 25 °C	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 48 VDC	
Remarks:				

Plot 7.5.3 Radiated emission measurements in 9 kHz - 30 MHz range

TEST SITE: Semi anechoic chamber

CARRIER FREQUENCY: High TEST DISTANCE: 3 m





Test specification:	Section 96.41(e)(2), Radiated spurious emissions			
Test procedure:	Section 96.41(e)(3)			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	04-Nov-21	verdict:	PASS	
Temperature: 25 °C	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 48 VDC	
Remarks:	-			

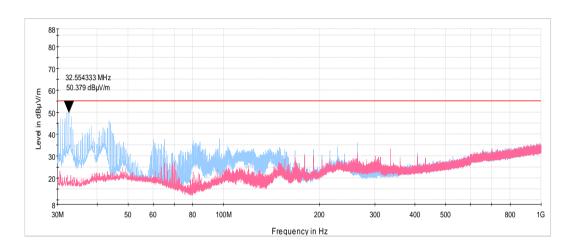
Plot 7.5.4 Radiated emission measurements in 30 - 1000 MHz range

TEST SITE: Semi anechoic chamber CARRIER FREQUENCY: Low

ANTENNA POLARIZATION:

Vertical and Horizontal

TEST DISTANCE: 3 m

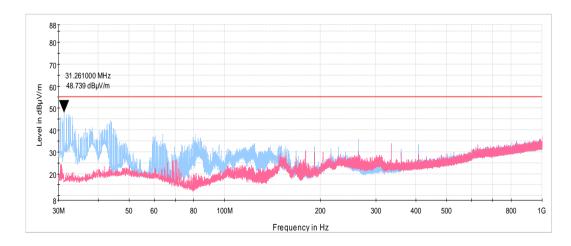


Plot 7.5.5 Radiated emission measurements in 30 - 1000 MHz range

TEST SITE: Semi anechoic chamber CARRIER FREQUENCY: Mid

ANTENNA POLARIZATION: Vertical and Horizontal

TEST DISTANCE: 3 m







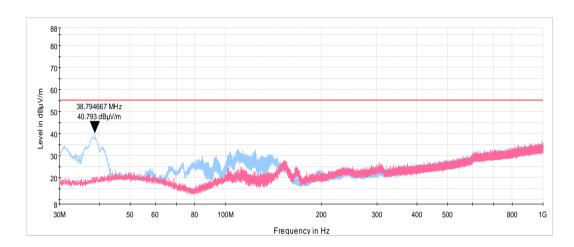
Test specification:	Section 96.41(e)(2), Radiated spurious emissions			
Test procedure:	Section 96.41(e)(3)			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	04-Nov-21	verdict.	PASS	
Temperature: 25 °C	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 48 VDC	
Remarks:				

Plot 7.5.6 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





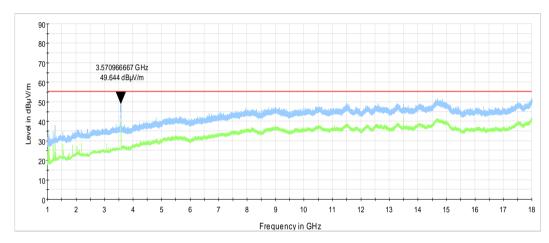
Test specification:	Section 96.41(e)(2), Radiated spurious emissions			
Test procedure:	Section 96.41(e)(3)			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	04-Nov-21	verdict:	PASS	
Temperature: 25 °C	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 48 VDC	
Remarks:				

Plot 7.5.7 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



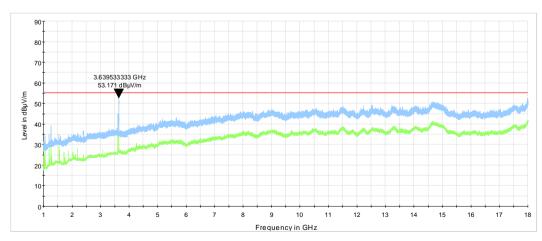
Note: 3570.9 MHz - low fundamental frequency

Plot 7.5.8 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



Note: 3639.5 MHz - mid fundamental frequency



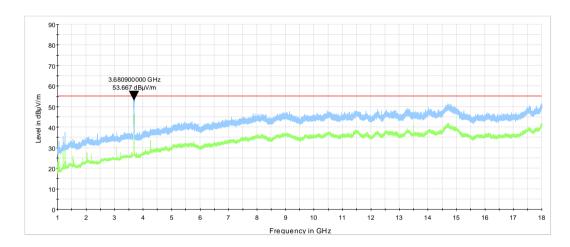
Test specification:	Section 96.41(e)(2), Radiated spurious emissions			
Test procedure:	Section 96.41(e)(3)			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	04-Nov-21	verdict.	PASS	
Temperature: 25 °C	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 48 VDC	
Remarks:				

Plot 7.5.9 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



Note: 3680.9 MHz - high fundamental frequency



Test specification:	Section 96.41(e)(2), Radiated spurious emissions			
Test procedure:	Section 96.41(e)(3)			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	04-Nov-21	verdict:	PASS	
Temperature: 25 °C	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 48 VDC	
Remarks:				

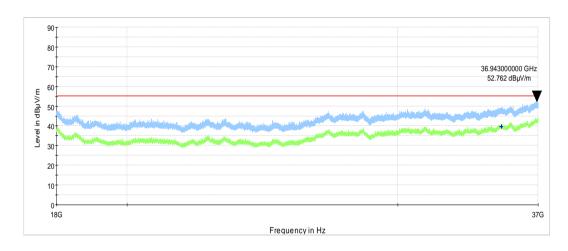
Plot 7.5.10 Radiated emission measurements in 18000 -37000 MHz range

TEST SITE: Semi anechoic chamber

CARRIER FREQUENCY: Low

ANTENNA POLARIZATION: Vertical and Horizontal

TEST DISTANCE: 3 m



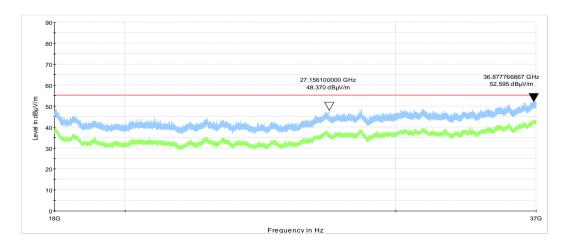
Plot 7.5.11 Radiated emission measurements in 18000 -37000 MHz range

TEST SITE: Semi anechoic chamber

CARRIER FREQUENCY: M

ANTENNA POLARIZATION: Vertical and Horizontal

TEST DISTANCE: 3 m







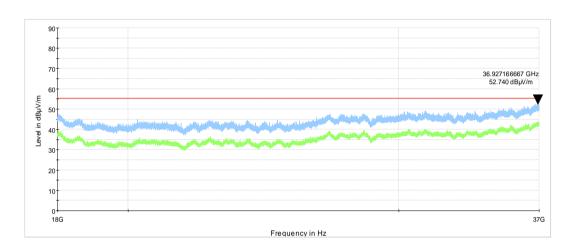
Test specification:	Section 96.41(e)(2), Radiated spurious emissions			
Test procedure:	Section 96.41(e)(3)			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	04-Nov-21	verdict:	PASS	
Temperature: 25 °C	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 48 VDC	
Remarks:				

Plot 7.5.12 Radiated emission measurements in 18000 -37000 MHz range

TEST SITE: Semi anechoic chamber CARRIER FREQUENCY: High

ANTENNA POLARIZATION: Vertical and Horizontal

TEST DISTANCE: 3 m





Test specification:	Section 96.41(e)(3), Conducted spurious emissions			
Test procedure:	Section 96.41(e)(3)			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	16-Nov-21	verdict:	PASS	
Temperature: 24 °C	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC	
Remarks:				

7.6 Spurious emissions at RF antenna connector test

7.6.1 General

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

Table 7.6.1 Spurious emission limits

Frequency, MHz	Conducted power of spurious, dBm/MHz	
0.009 - below 3530.0	-40.0	
3720.0 – 10th harmonic*	-40.0	

7.6.2 Test procedure

- **7.6.2.1** The EUT was set up as shown in Figure 7.6.1, energized and its proper operation was checked.
- **7.6.2.2** The EUT was adjusted to produce maximum available for end user RF output power.
- 7.6.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.6.2 and associated plots.

Figure 7.6.1 Spurious emission test setup



Report ID: AIRRAD_FCC.44746_Rev1 Date of Issue: 24-Nov-21



Test specification:	Section 96.41(e)(3), Conducted spurious emissions				
Test procedure:	Section 96.41(e)(3)				
Test mode:	Compliance	Verdict:	PASS		
Date(s):	16-Nov-21	verdict:	PASS		
Temperature: 24 °C	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC		
Remarks:					

Table 7.6.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 3550 - 3700 MHz INVESTIGATED FREQUENCY RANGE: 0.009 - 37000 MHz

DETECTOR USED: Peak

VIDEO BANDWIDTH: ≥ Resolution bandwidth

 $\begin{array}{ll} \text{MODULATION:} & \text{QPSK} \\ \text{TRANSMITTER OUTPUT POWER SETTINGS:} & \text{Maximum} \\ \text{NUMBER ANTENNA PORTS:} & \text{N} = 4 \\ \end{array}$

NUMBER ANTEN						
_						
Frequency, MHz	Maximun emission per chain, dBm**	Total emission, dBm***	Limit, dBm	Margin, dB*	Verdict	
Channel bandwidth 20 MHz						
Low carrier frequency 3560 MHz						
3058.87	-47.41	-41.41	-40.00	-1.41	Pass	
Mid carrier frequency 3625 MHz						
3073.32	-47.33	-41.33	-40.00	-1.33	Pass	
High carrier frequency 3690 MHz						
3099.05	-48.08	-42.08	-40.00	-2.08	Pass	
Channel bandwidth 40 MHz						
Low carrier frequency 3570 MHz						
3067.03	-51.50	-45.5	-40.00	-5.50	Pass	
Mid carrier frequency 3625 MHz						
3024.91	-52.08	-46.08	-40.00	-6.08	Pass	
High carrier frequency 3680 MHz						
3730.08	-51.08	-45.08	-40.00	-5.08	Pass	

^{*-} Margin = Total spurious emission - specification limit.

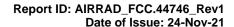
Reference numbers of test equipment used

HL 3287	HL 3301	HL 3302	HL 5642	HL 3356	HL 3433	HL 3434	HL 3435
HL 3818	HL 4355	HL 5637	HL 5174	HL 5286	HL 5409	HL 5611	

Full description is given in Appendix A.

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

^{** -} SA Reading over 1 chain = Max SA reading (Chains #1&2 or chains #3&4)

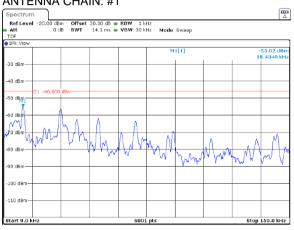




Test specification:	specification: Section 96.41(e)(3), Conducted spurious emissions				
Test procedure:	Section 96.41(e)(3)				
Test mode:	Compliance	Verdict:	PASS		
Date(s):	16-Nov-21	verdict.	PASS		
Temperature: 24 °C	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC		
Remarks:					

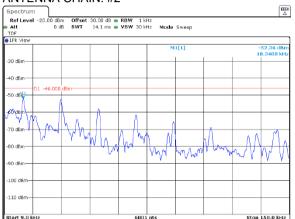
Plot 7.6.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency



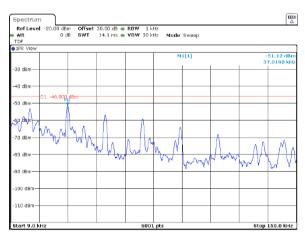


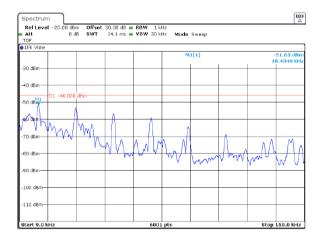
QPSK 20 MHz

ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



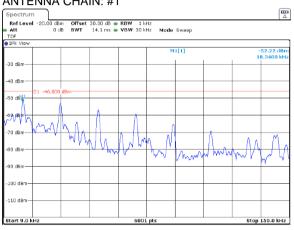






Plot 7.6.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency



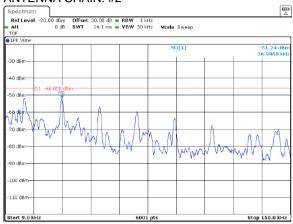


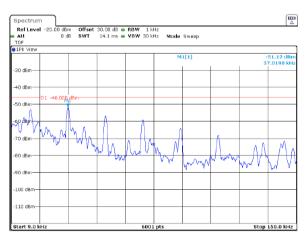
ANTENNA CHAIN: #3



QPSK 20 MHz





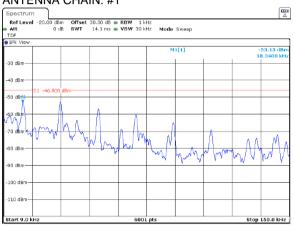




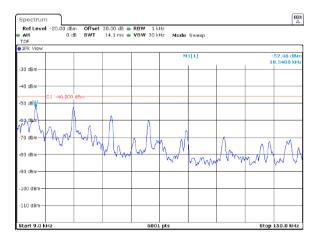


Plot 7.6.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency



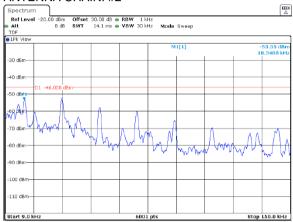


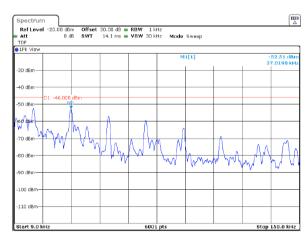
ANTENNA CHAIN: #3



QPSK 20 MHz





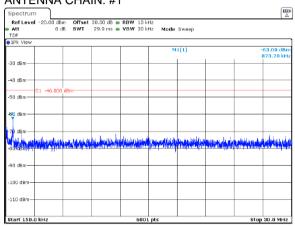




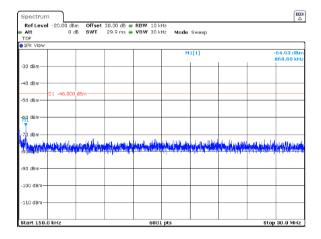


Plot 7.6.4 Spurious emission measurements in 150 kHz - 30 MHz range at low carrier frequency

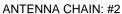
MODULATION: CHANNEL SPACING: ANTENNA CHAIN: #1

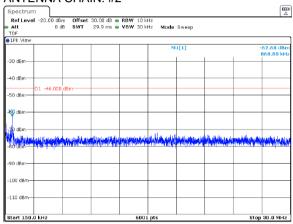


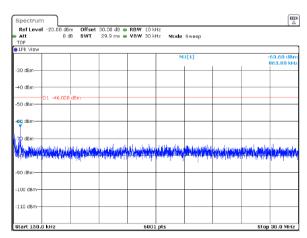
ANTENNA CHAIN: #3



QPSK 20 MHz







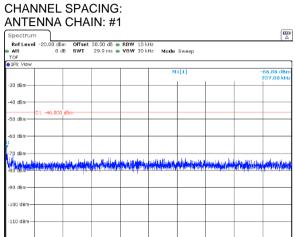


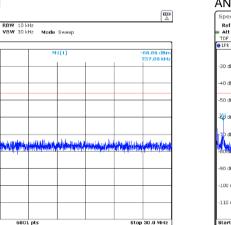


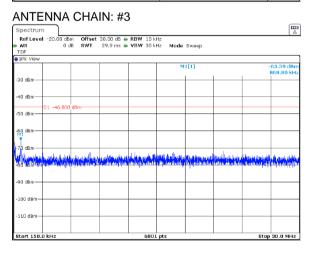
MODULATION:

Test specification: Section 96.41(e)(3), Conducted spurious emissions Section 96.41(e)(3) Test procedure: Test mode: Compliance Verdict: **PASS** Date(s): 16-Nov-21 Temperature: 24 °C Relative Humidity: 53 % Air Pressure: 1010 hPa Power: 48 VDC Remarks:

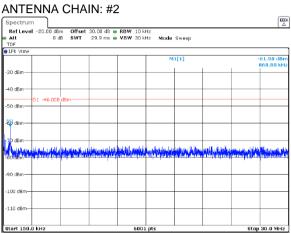
Plot 7.6.5 Spurious emission measurements in 150 kHz - 30 MHz range at mid carrier frequency

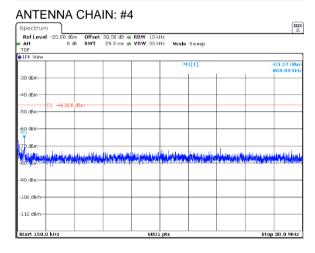








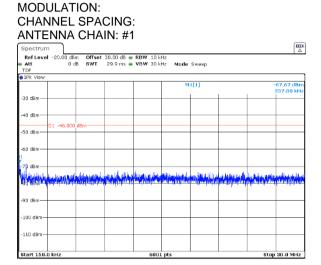


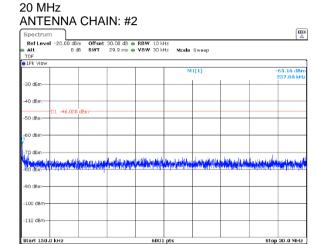


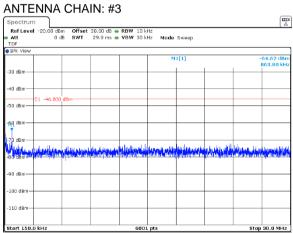


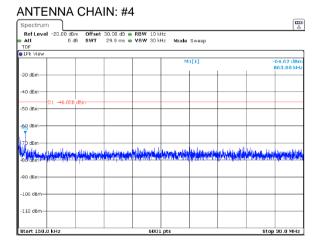


Plot 7.6.6 Spurious emission measurements in 150 kHz - 30 MHz range at high carrier frequency







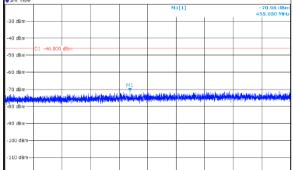


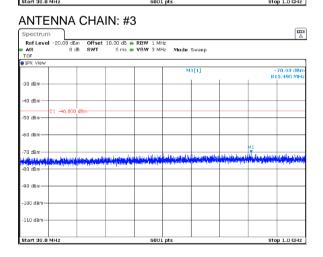




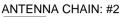
Plot 7.6.7 Spurious emission measurements in 30 - 1000 MHz range at low carrier frequency

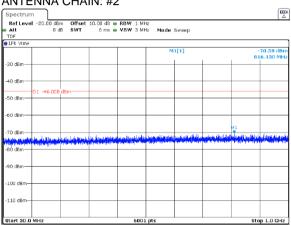


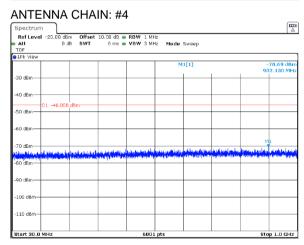










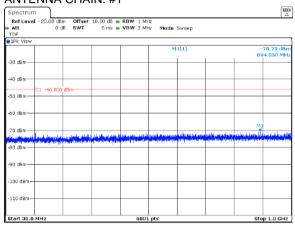




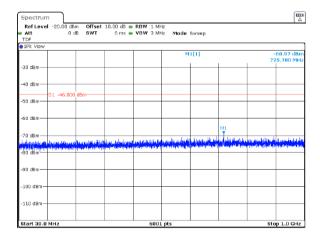


Plot 7.6.8 Spurious emission measurements in 30 - 1000 MHz range at mid carrier frequency

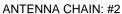
MODULATION: CHANNEL SPACING: ANTENNA CHAIN: #1

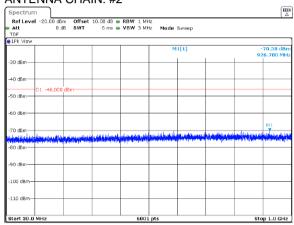


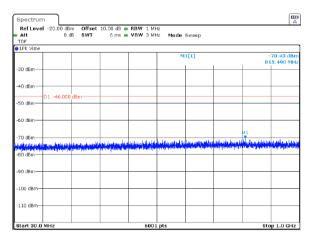
ANTENNA CHAIN: #3



QPSK 20 MHz



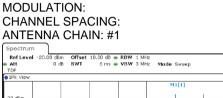


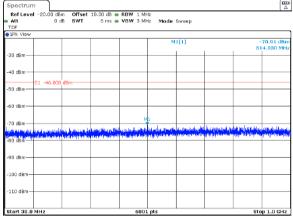


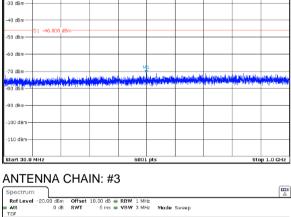


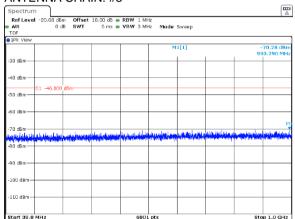


Plot 7.6.9 Spurious emission measurements in 30 - 1000 MHz range at high carrier frequency



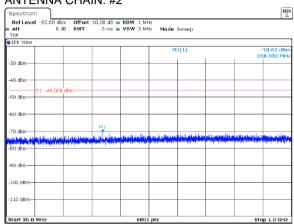


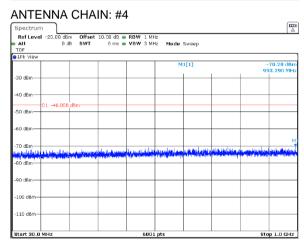




20 MHz





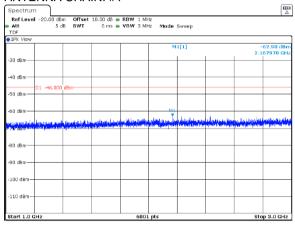




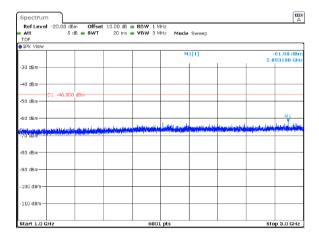


Plot 7.6.10 Spurious emission measurements in 1000 - 3000 MHz range at low carrier frequency

MODULATION: CHANNEL SPACING: ANTENNA CHAIN: #1

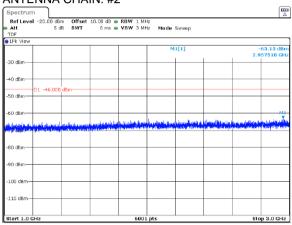


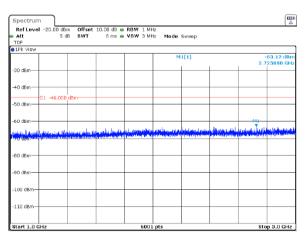
ANTENNA CHAIN: #3



QPSK 20 MHz







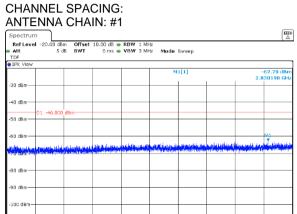


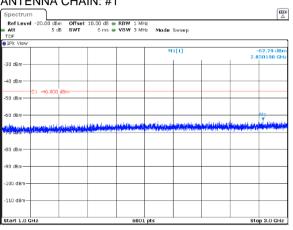


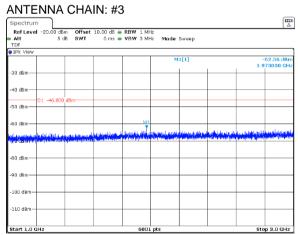
MODULATION:

Test specification: Section 96.41(e)(3), Conducted spurious emissions Section 96.41(e)(3) Test procedure: Test mode: Compliance Verdict: **PASS** Date(s): 16-Nov-21 Temperature: 24 °C Relative Humidity: 53 % Air Pressure: 1010 hPa Power: 48 VDC Remarks:

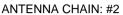
Plot 7.6.11 Spurious emission measurements in 1000 - 3000 MHz range at mid carrier frequency

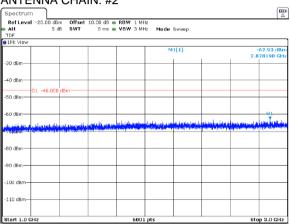




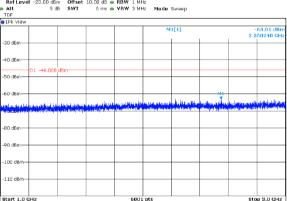








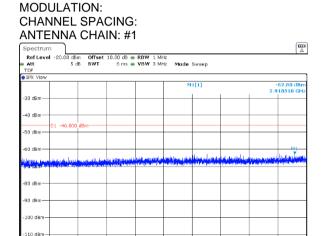


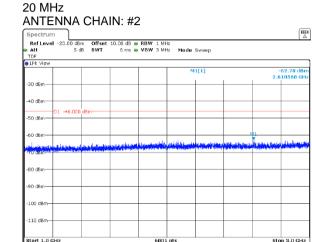


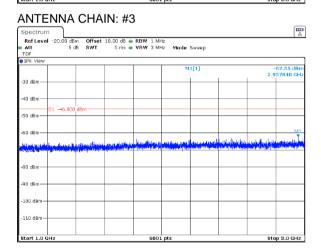


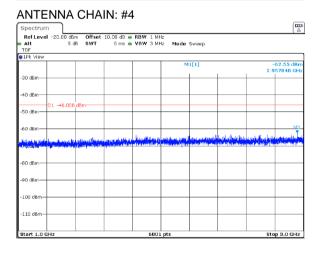


Plot 7.6.12 Spurious emission measurements in 1000 - 3000 MHz range at high carrier frequency









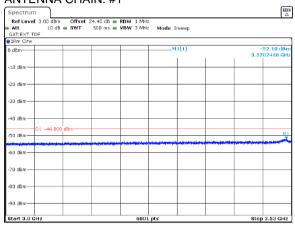




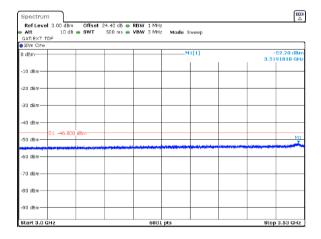
Test specification: Section 96.41(e)(3), Conducted spurious emissions Section 96.41(e)(3) Test procedure: Test mode: Compliance Verdict: **PASS** Date(s): 16-Nov-21 Temperature: 24 °C Relative Humidity: 53 % Air Pressure: 1010 hPa Power: 48 VDC Remarks:

Plot 7.6.13 Spurious emission measurements in 3000 - 3530 MHz range at low carrier frequency

MODULATION: CHANNEL SPACING: ANTENNA CHAIN: #1

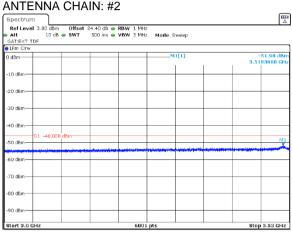


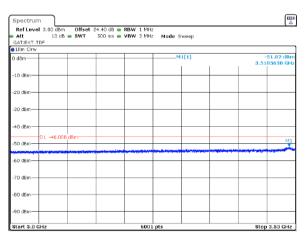
ANTENNA CHAIN: #3



20 MHz







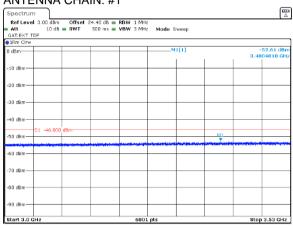




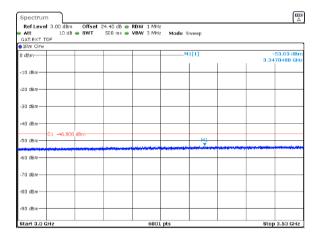
Test specification: Section 96.41(e)(3), Conducted spurious emissions Section 96.41(e)(3) Test procedure: Test mode: Compliance Verdict: **PASS** Date(s): 16-Nov-21 Temperature: 24 °C Relative Humidity: 53 % Air Pressure: 1010 hPa Power: 48 VDC Remarks:

Plot 7.6.14 Spurious emission measurements in 3000 - 3530 MHz range at mid carrier frequency

MODULATION: CHANNEL SPACING: ANTENNA CHAIN: #1

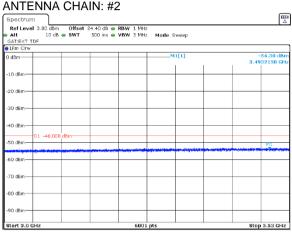


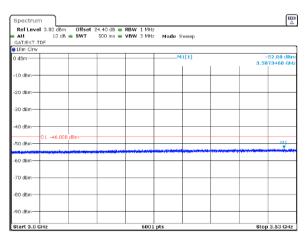
ANTENNA CHAIN: #3



20 MHz







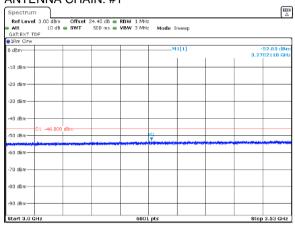




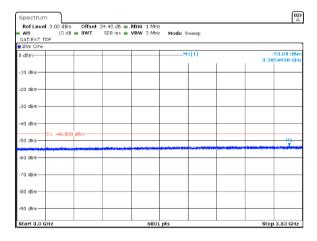
Test specification: Section 96.41(e)(3), Conducted spurious emissions Section 96.41(e)(3) Test procedure: Test mode: Compliance Verdict: **PASS** Date(s): 16-Nov-21 Temperature: 24 °C Relative Humidity: 53 % Air Pressure: 1010 hPa Power: 48 VDC Remarks:

Plot 7.6.15 Spurious emission measurements in 3000 - 3530 MHz range at high carrier frequency

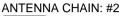
MODULATION: CHANNEL SPACING: ANTENNA CHAIN: #1

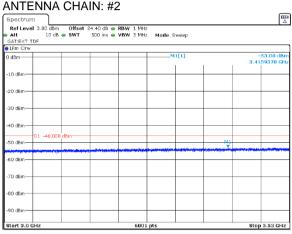


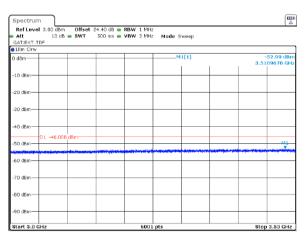
ANTENNA CHAIN: #3



20 MHz





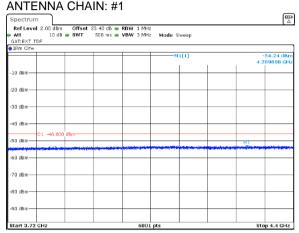




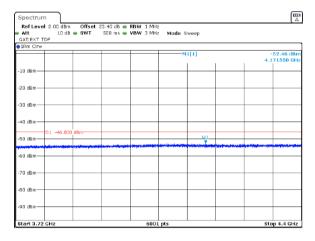


Plot 7.6.16 Spurious emission measurements in 3720 - 4400 MHz range at low carrier frequency

MODULATION: CHANNEL SPACING: ANTENNA CHAIN: #1



ANTENNA CHAIN: #3



QPSK 20 MHz



