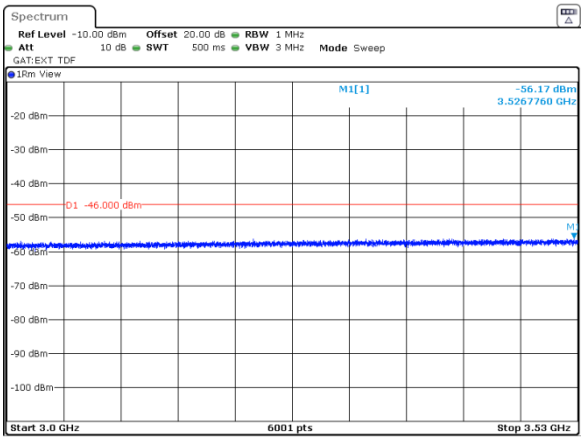
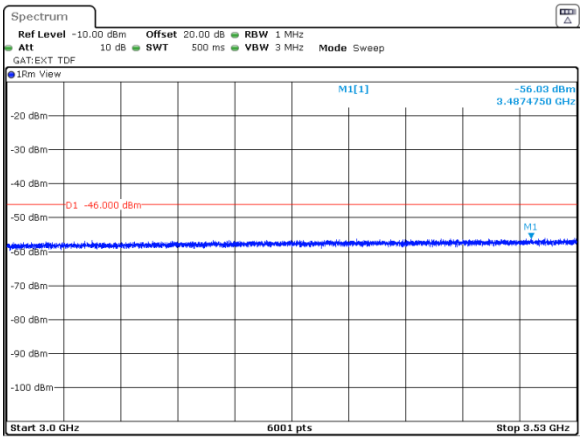
Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.41 Spurious emission measurements in 3000 - 3530 MHz range at mid carrier frequency

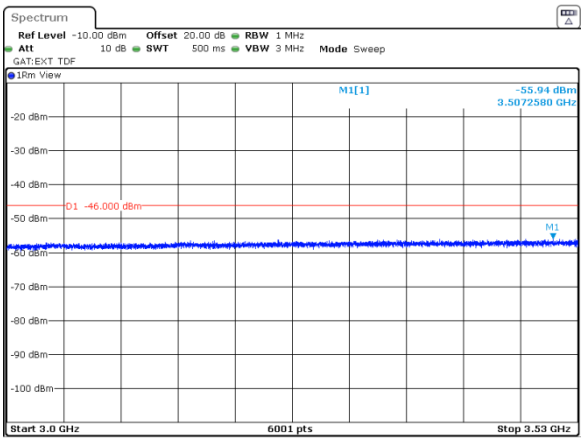
MODULATION: QPSK
CHANNEL SPACING: 30 MHz
ANTENNA CHAIN: #1



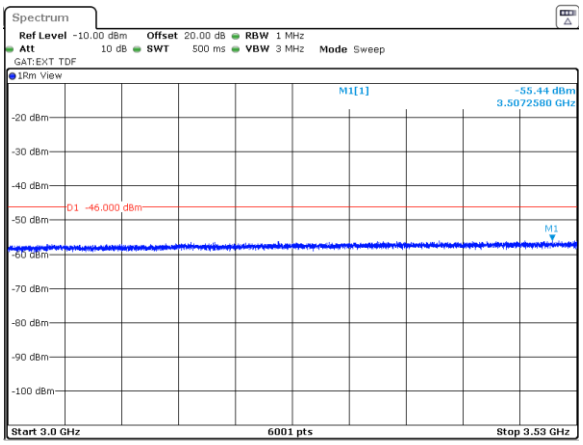
ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



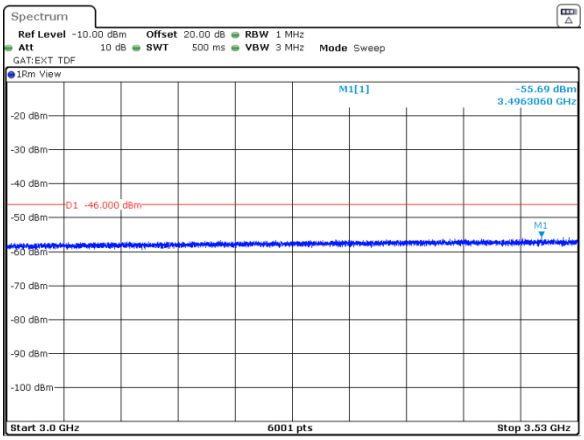
ANTENNA CHAIN: #4



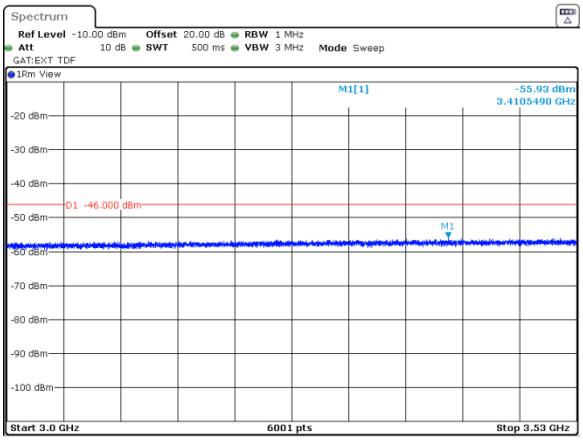
Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.42 Spurious emission measurements in 3000 - 3530 MHz range at high carrier frequency

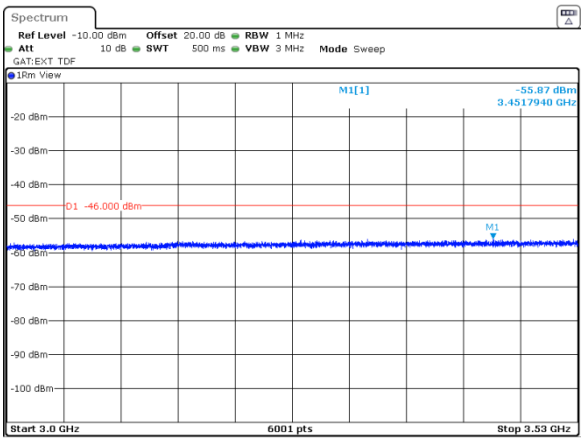
MODULATION: QPSK
CHANNEL SPACING: 30 MHz
ANTENNA CHAIN: #1



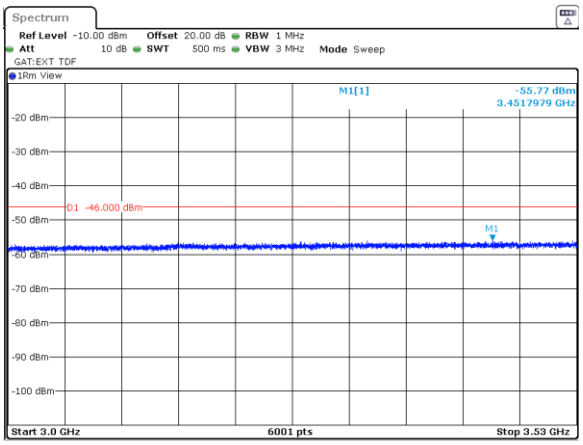
ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



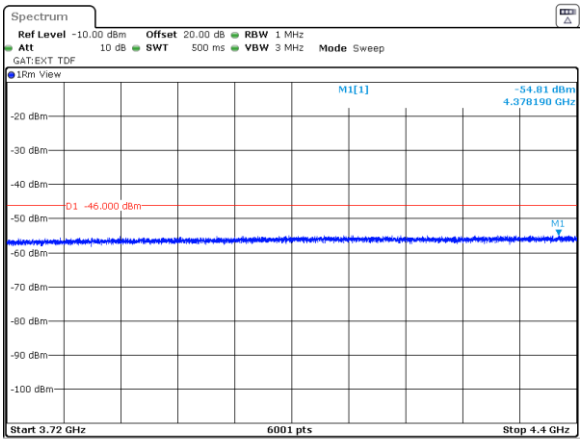
ANTENNA CHAIN: #4



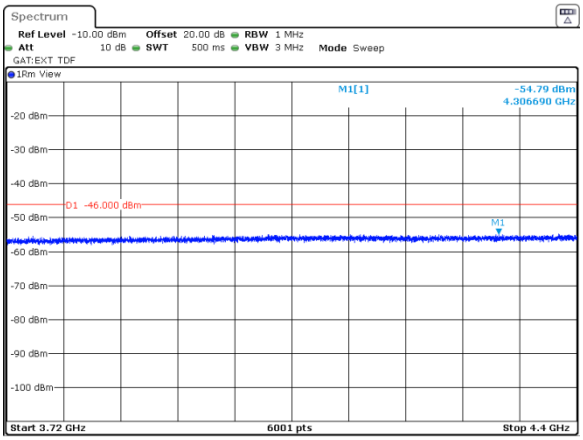
Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.43 Spurious emission measurements in 3720 - 4400 MHz range at low carrier frequency

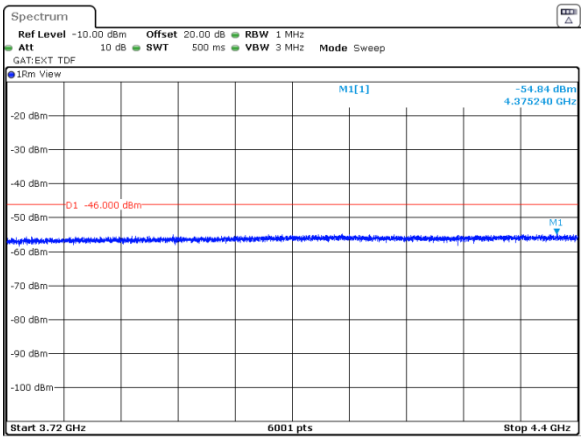
MODULATION: QPSK
CHANNEL SPACING: 30 MHz
ANTENNA CHAIN: #1



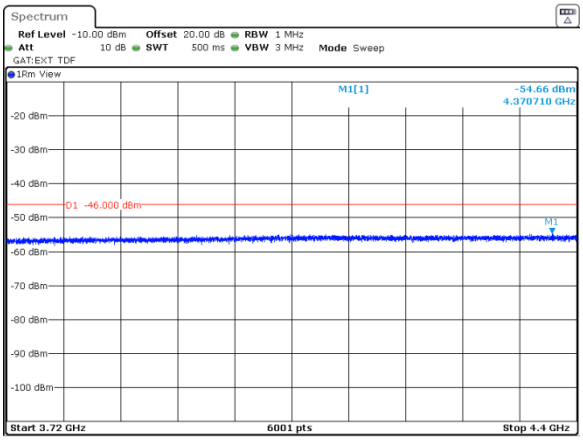
ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



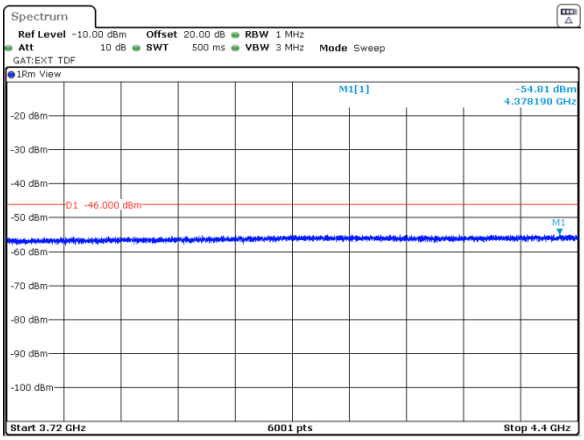
ANTENNA CHAIN: #4



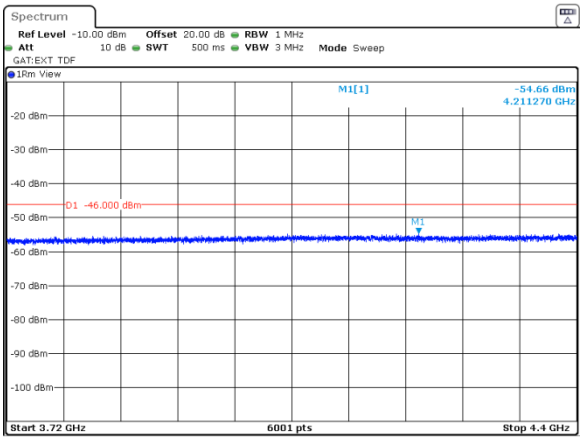
Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.44 Spurious emission measurements in 3720 - 4400 MHz range at mid carrier frequency

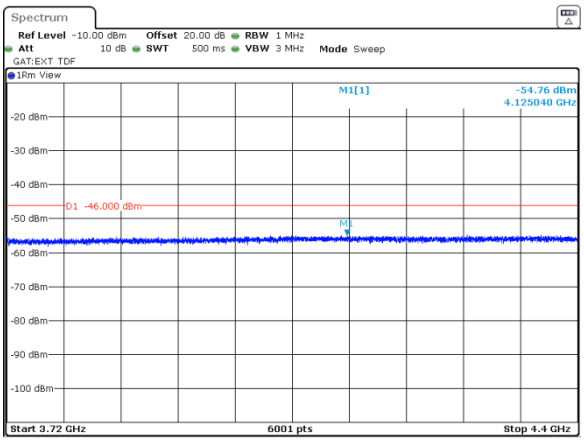
MODULATION: QPSK
CHANNEL SPACING: 30 MHz
ANTENNA CHAIN: #1



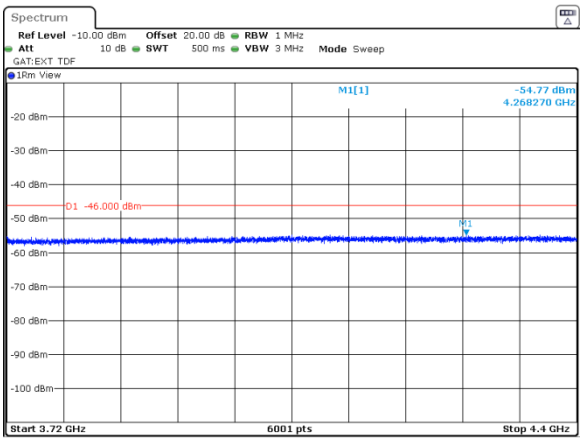
ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



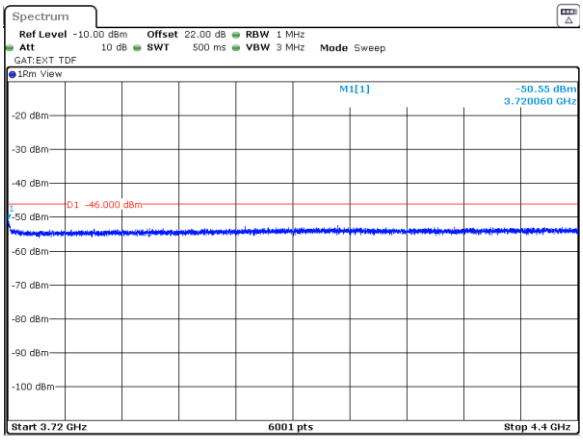
ANTENNA CHAIN: #4



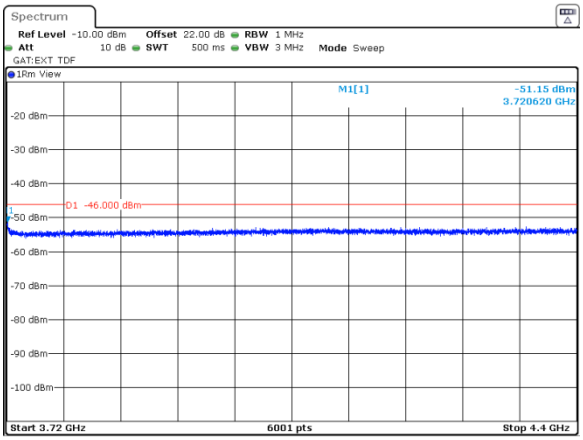
Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.45 Spurious emission measurements in 3720 - 4400 MHz range at high carrier frequency

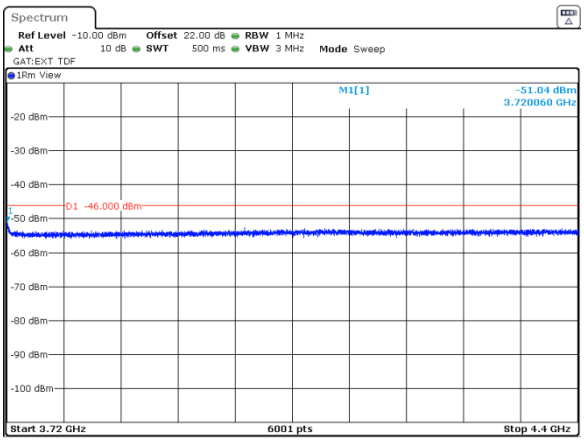
MODULATION: QPSK
CHANNEL SPACING: 30 MHz
ANTENNA CHAIN: #1



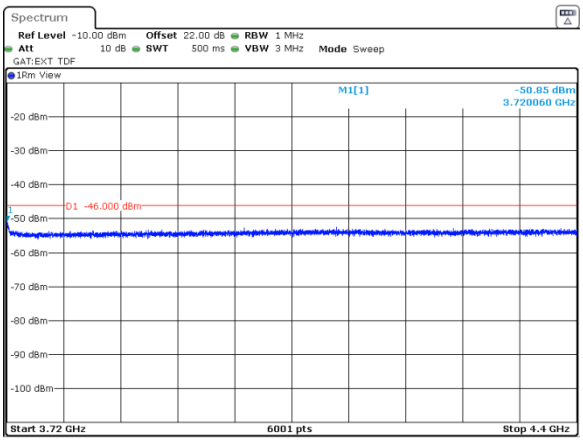
ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



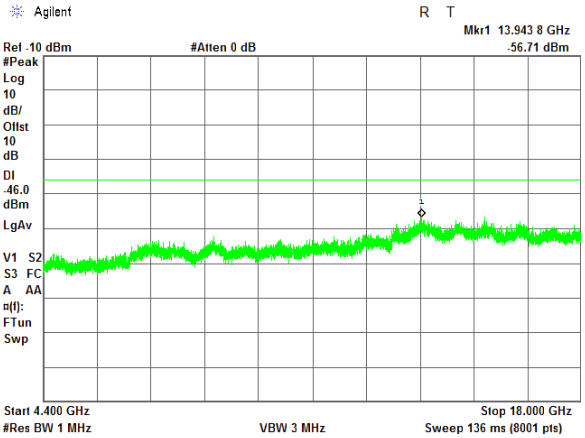
ANTENNA CHAIN: #4



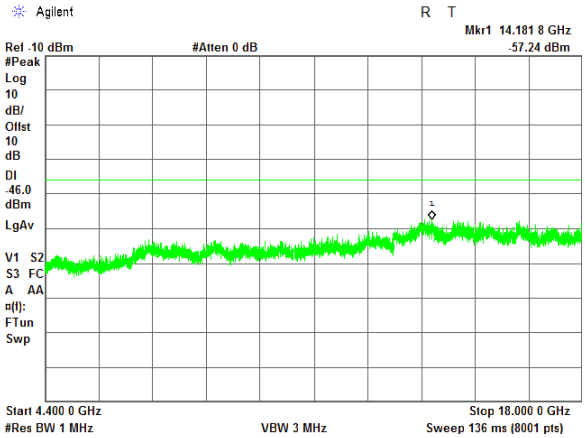
Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.46 Spurious emission measurements in 4400 - 18000 MHz range at low carrier frequency

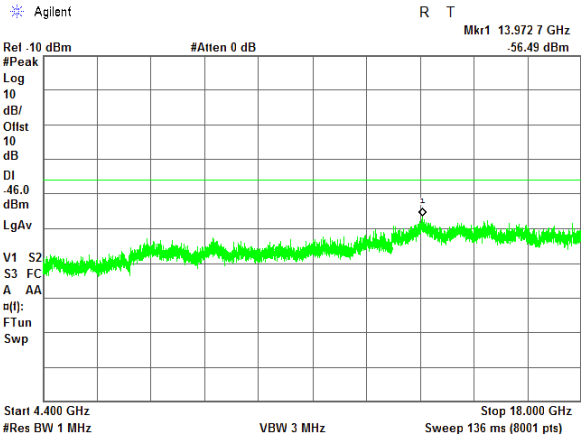
MODULATION: QPSK
CHANNEL SPACING: 30 MHz
ANTENNA CHAIN: #1



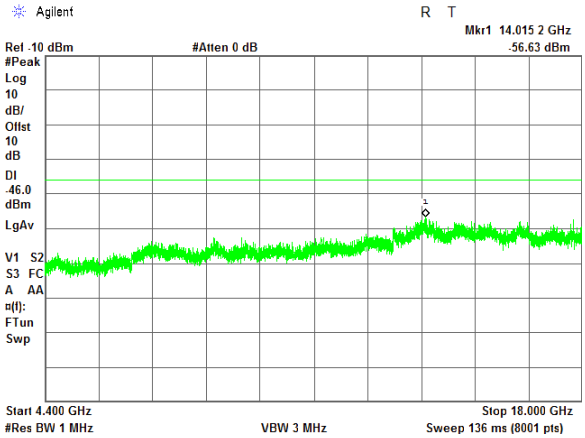
ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



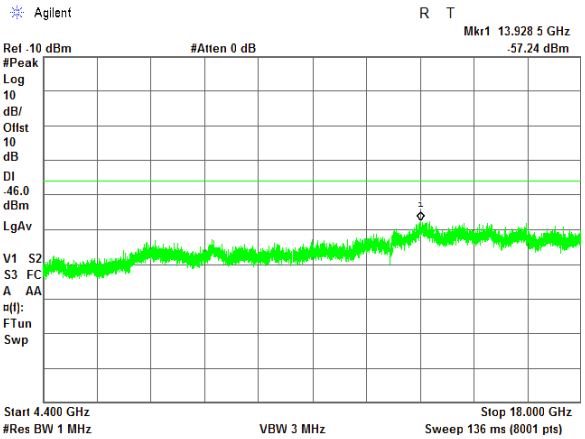
ANTENNA CHAIN: #4



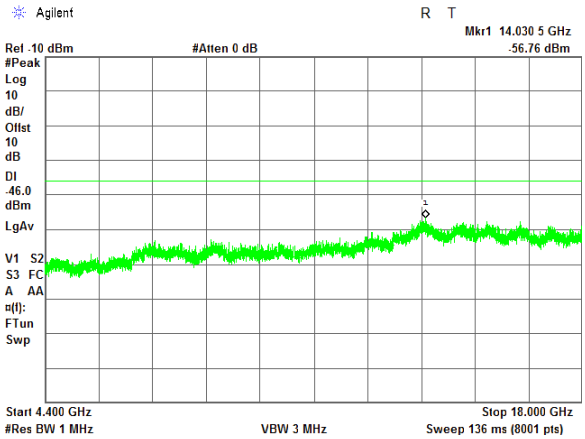
Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.47 Spurious emission measurements in 4400 - 18000 MHz range at mid carrier frequency

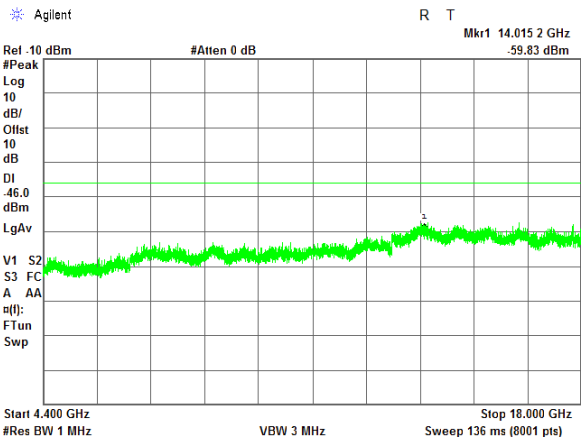
MODULATION: QPSK
CHANNEL SPACING: 30 MHz
ANTENNA CHAIN: #1



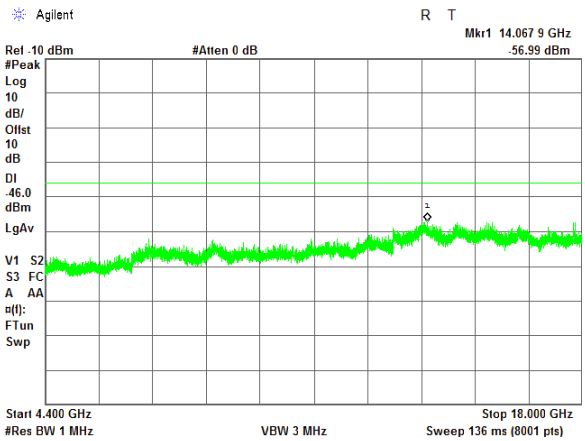
ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



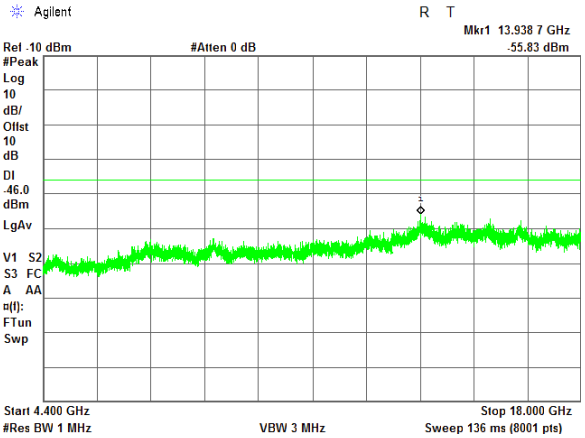
ANTENNA CHAIN: #4



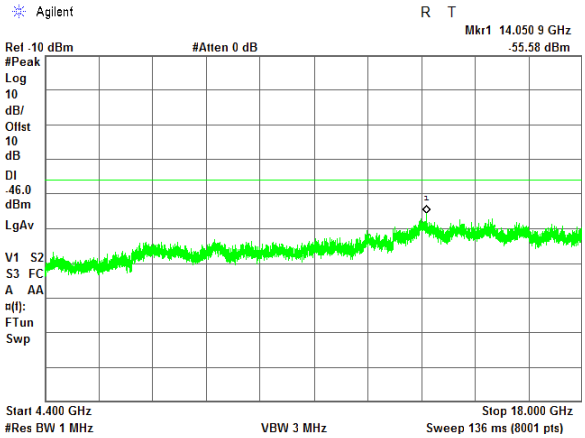
Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.48 Spurious emission measurements in 4400 - 18000 MHz range at high carrier frequency

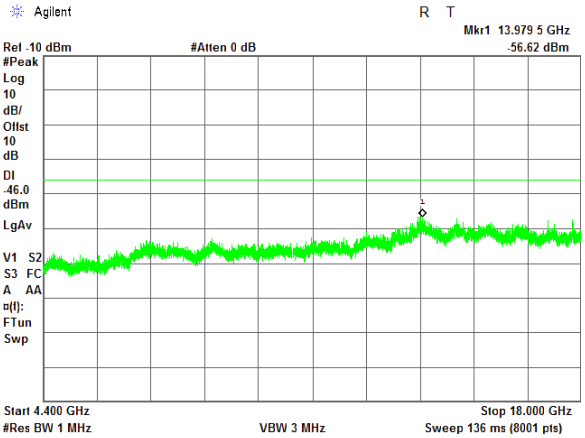
MODULATION: QPSK
CHANNEL SPACING: 30 MHz
ANTENNA CHAIN: #1



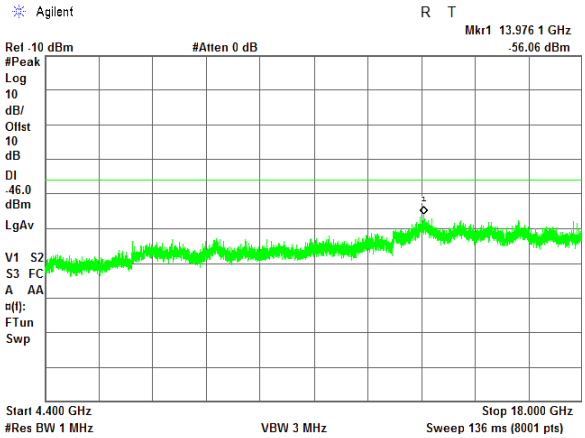
ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



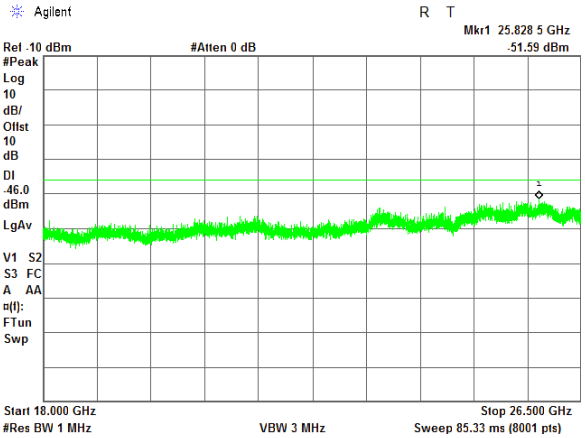
ANTENNA CHAIN: #4



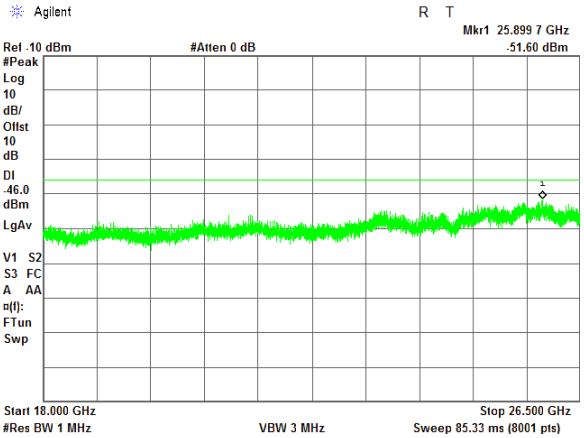
Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.49 Spurious emission measurements in 18000 - 26500 MHz range at low carrier frequency

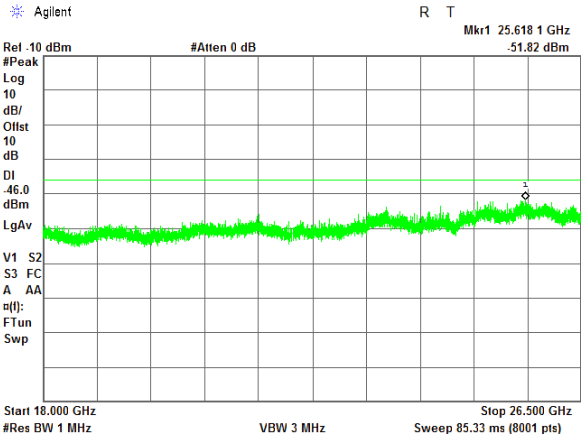
MODULATION: QPSK
CHANNEL SPACING: 30 MHz
ANTENNA CHAIN: #1



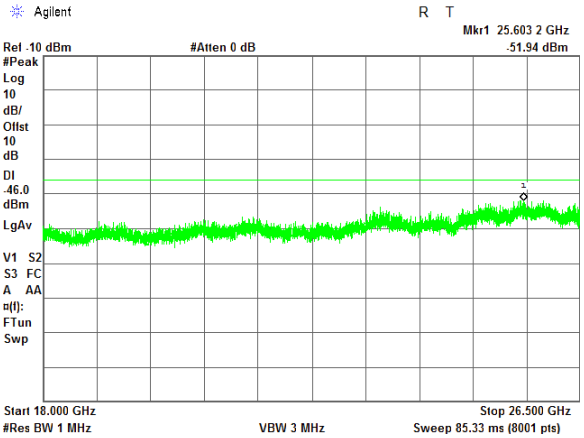
ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



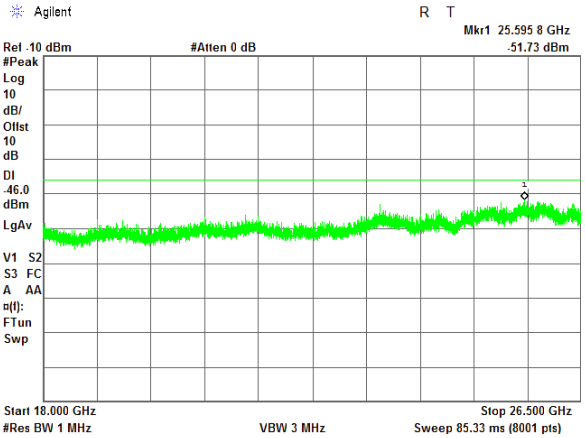
ANTENNA CHAIN: #4



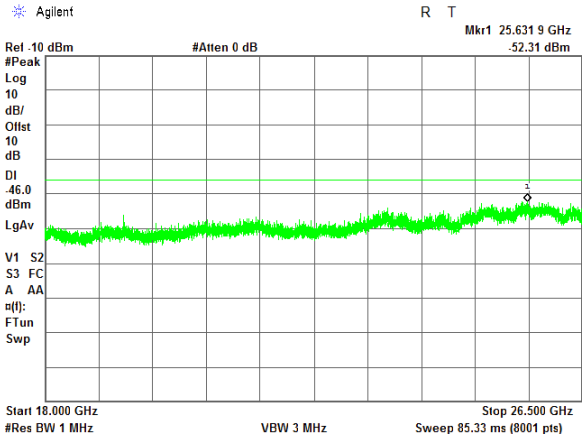
Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.50 Spurious emission measurements in 18000 - 26500 MHz range at mid carrier frequency

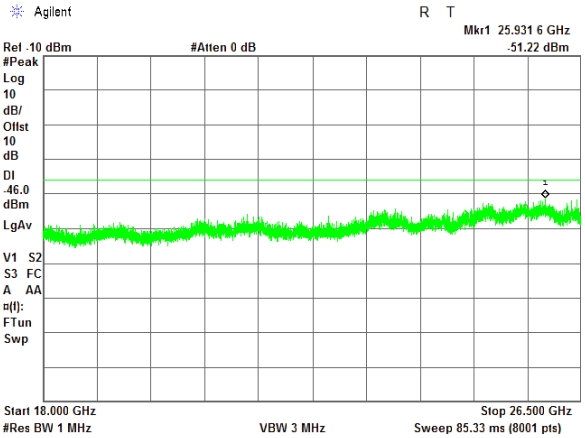
MODULATION: QPSK
CHANNEL SPACING: 30 MHz
ANTENNA CHAIN: #1



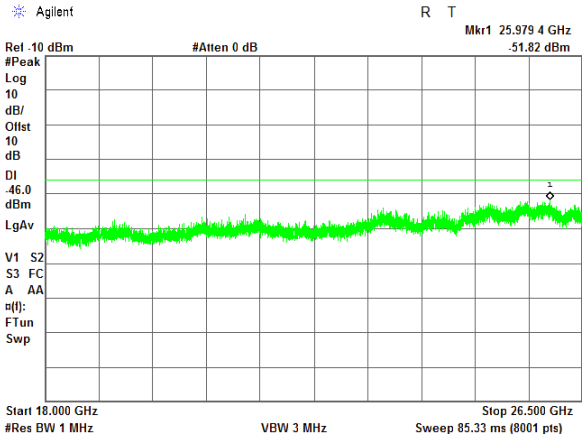
ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



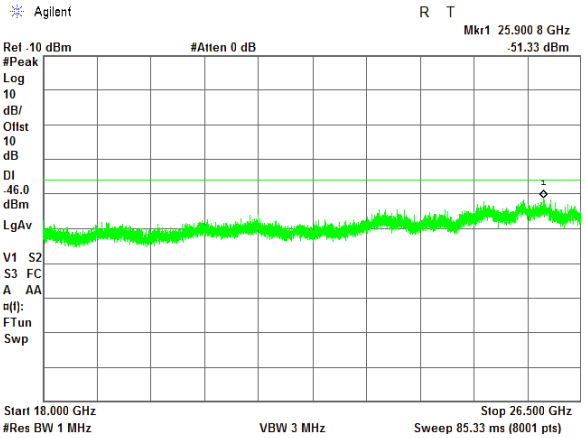
ANTENNA CHAIN: #4



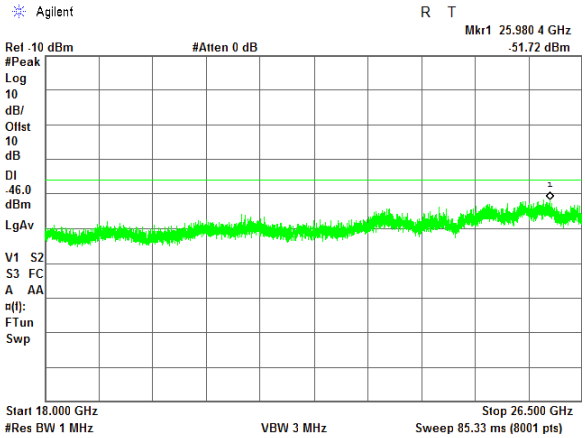
Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.51 Spurious emission measurements in 18000 - 26500 MHz range at high carrier frequency

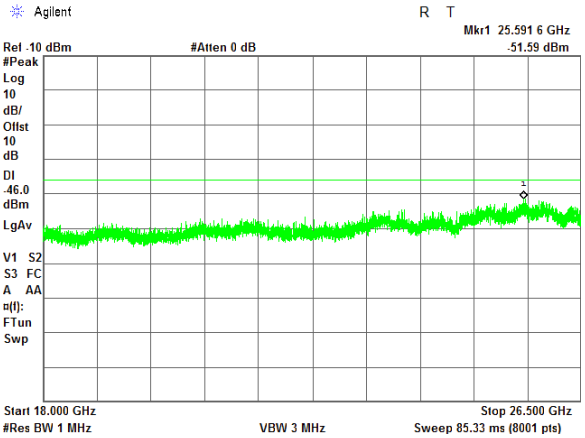
MODULATION: QPSK
CHANNEL SPACING: 30 MHz
ANTENNA CHAIN: #1



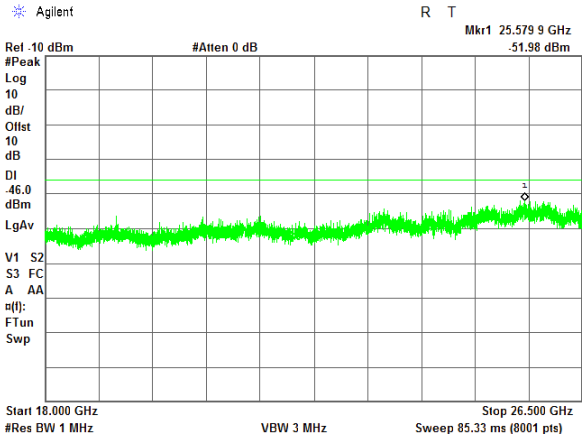
ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



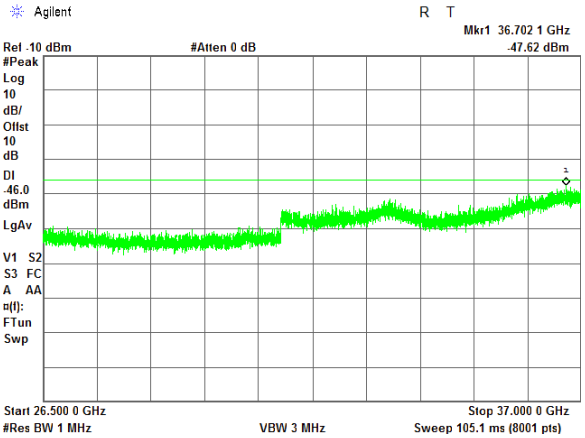
ANTENNA CHAIN: #4



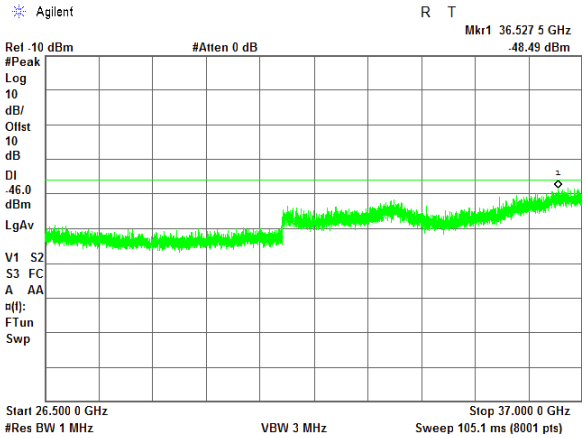
Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.52 Spurious emission measurements in 26500 - 37000 MHz range at low carrier frequency

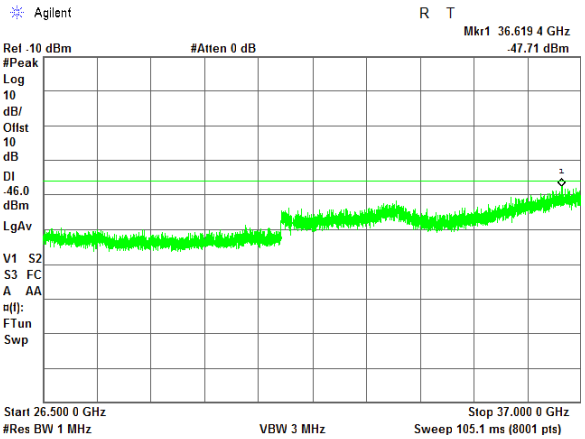
MODULATION: QPSK
CHANNEL SPACING: 30 MHz
ANTENNA CHAIN: #1



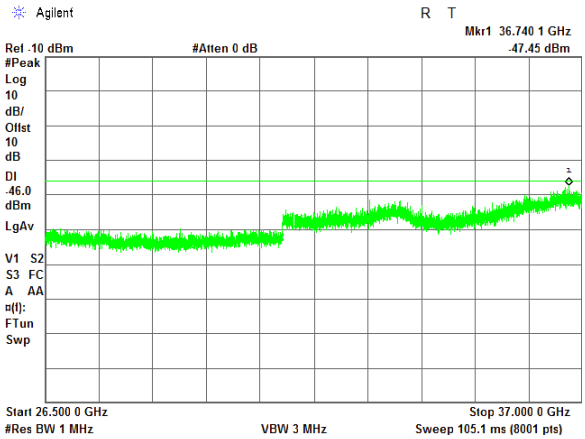
ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



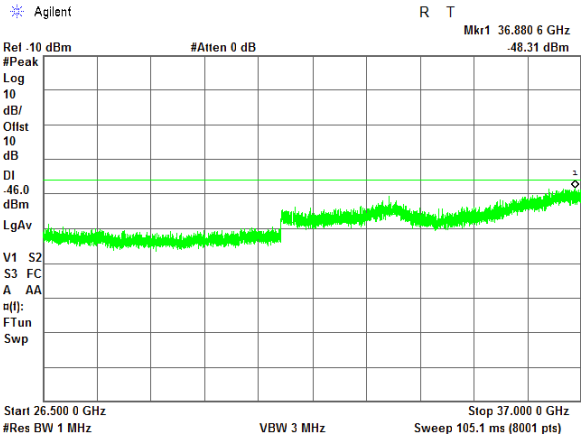
ANTENNA CHAIN: #4



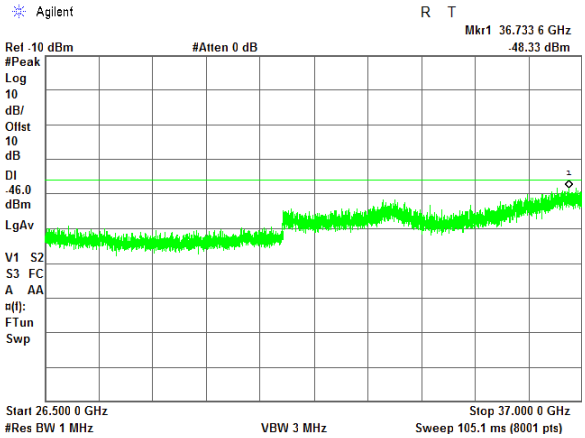
Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.53 Spurious emission measurements in 26500 - 37000 MHz range at mid carrier frequency

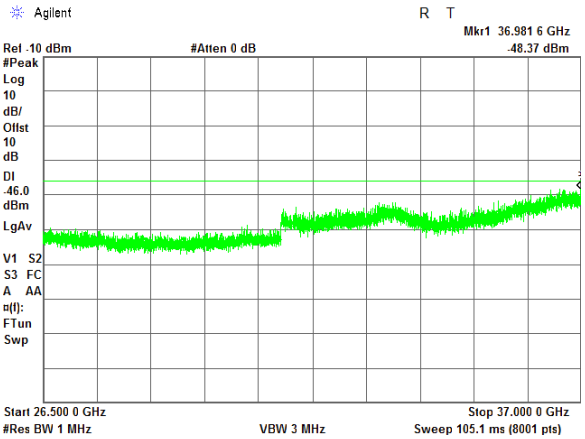
MODULATION: QPSK
CHANNEL SPACING: 30 MHz
ANTENNA CHAIN: #1



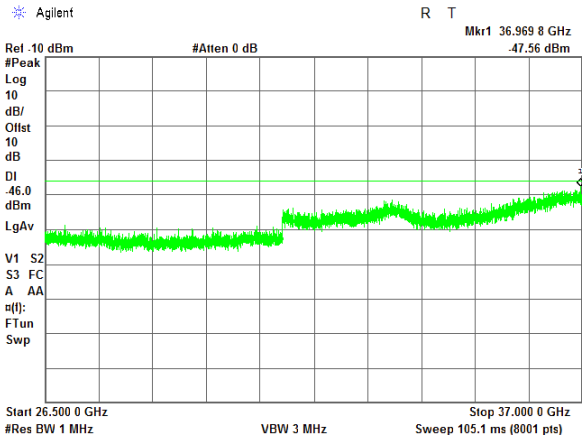
ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



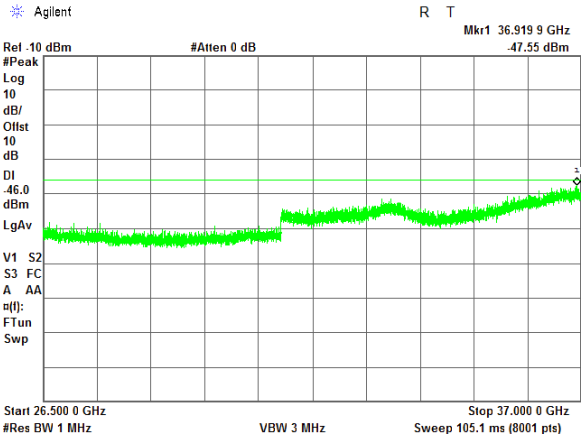
ANTENNA CHAIN: #4



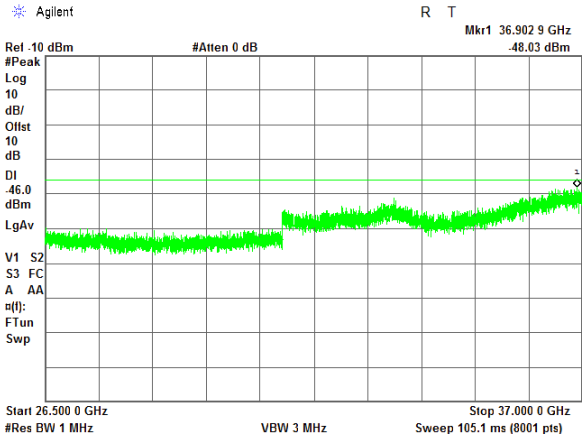
Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

Plot 7.5.54 Spurious emission measurements in 26500 - 37000 MHz range at high carrier frequency

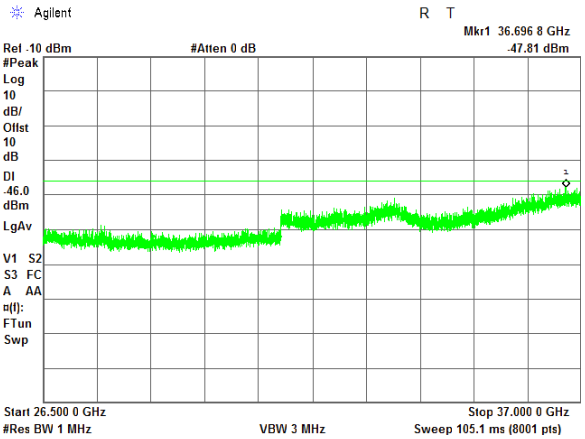
MODULATION: QPSK
CHANNEL SPACING: 30 MHz
ANTENNA CHAIN: #1



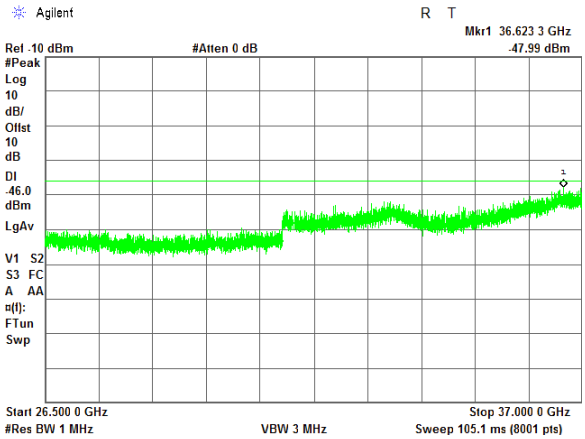
ANTENNA CHAIN: #2



ANTENNA CHAIN: #3



ANTENNA CHAIN: #4



Test specification:	Section 2.1055, Frequency stability		
Test procedure:	47 CFR, Section 2.1055		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	Relative Humidity: 53 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

7.6 Frequency stability test

7.6.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.6.1.

Table 7.6.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement	
	ppm	Hz
3555.0	NA	NA
3625.0		NA
3695.0		NA

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 power was turned off. Temperature within test chamber was set to +30˚C and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.

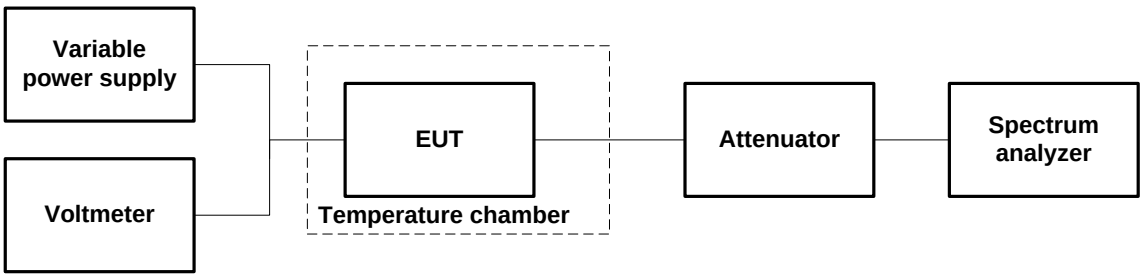
7.6.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

7.6.2.4 The above procedure was repeated at 0˚C and at the lowest test temperature.

7.6.2.5 The EUT was powered on and carrier frequency was measured at start up moment and at the end of stabilization period at the rest of test temperatures and voltages. The EUT was powered off.

7.6.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 7.6.2.

Figure 7.6.1 Frequency stability test setup



Test specification:	**Section 2.1055, Frequency stability**		
Test procedure:	47 CFR, Section 2.1055		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	14-Dec-21		
Temperature: 24 ºC	**Relative Humidity:** 53 %	**Air Pressure:** 1010 hPa	**Power:** 48 VDC
Remarks:			

Table 7.6.2 Frequency stability test results

OPERATING FREQUENCY: 3550 – 3700 MHz
NOMINAL POWER VOLTAGE: 48 VDC
TEMPERATURE STABILIZATION PERIOD: 20 min
POWER DURING TEMPERATURE TRANSITION: Off
SPECTRUM ANALYZER MODE: Counter
RESOLUTION BANDWIDTH: 100 Hz
VIDEO BANDWIDTH: 1 kHz
MODULATION: Unmodulated

T, ºC	Voltage, V	Frequency, MHz							Max frequency drift, Hz		Verdict
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative	
Low frequency 3555.0 MHz											
-30	nominal	3555.000175	3555.000175	3555.000175	3555.000176	3555.000176	3555.000176	3555.001756	6	0	Pass
-20	nominal	3555.000174	NA	NA	NA	NA	NA	3555.000174	6	0	Pass
-10	nominal	3555.000173	NA	NA	NA	NA	NA	3555.000173	5	0	Pass
0	nominal	3555.000171	3555.000171	3555.000171	3555.000171	3555.000171	3555.000171	3555.000171	3	0	Pass
10	nominal	3555.000169	NA	NA	NA	NA	NA	3555.000170	1	0	Pass
20	15%	3555.000170	NA	NA	NA	NA	NA	3555.000170	2	0	Pass
20	nominal	3555.000169	NA	NA	NA	NA	NA	3555.000168	1	0	Pass
20	-15%	3555.000170	NA	NA	NA	NA	NA	3555.000170	2	0	Pass
30	nominal	3555.000170	3555.000170	3555.000170	3555.000170	3555.000170	3555.000170	3555.000170	2	0	Pass
40	nominal	3555.000170	NA	NA	NA	NA	NA	3555.000170	2	0	Pass
50	nominal	3555.000172	NA	NA	NA	NA	NA	3555.000172	4	0	Pass
Mid frequency 3625.0 MHz											
-30	nominal	3625.000168	3625.000168	3625.000168	3625.000168	3625.000168	3625.000168	3625.000168	6	0	Pass
-20	nominal	3625.000165	NA	NA	NA	NA	NA	3625.000167	5	0	Pass
-10	nominal	3625.000165	NA	NA	NA	NA	NA	3625.000165	4	0	Pass
0	nominal	3625.000164	3625.000164	3625.000164	3625.000164	3625.000164	3625.000164	3625.000164	3	0	Pass
10	nominal	3625.000161	NA	NA	NA	NA	NA	3625.000161	0	0	Pass
20	15%	3625.000163	NA	NA	NA	NA	NA	3625.000162	1	0	Pass
20	nominal	3625.000162	NA	NA	NA	NA	NA	3625.000162	0	0	Pass
20	-15%	3625.000163	NA	NA	NA	NA	NA	3625.000163	1	0	Pass
30	nominal	3625.000163	3625.000163	3625.000163	3625.000163	3625.000163	3625.000163	3625.000163	1	0	Pass
40	nominal	3625.000163	NA	NA	NA	NA	NA	3625.000163	1	0	Pass
50	nominal	3625.000164	NA	NA	NA	NA	NA	3625.000164	3	0	Pass
High frequency 3695.0 MHz											
-30	nominal	3695.000174	3695.000174	3695.000174	3695.000174	3695.000175	3695.000175	3695.000175	6	0	Pass
-20	nominal	3695.000174	NA	NA	NA	NA	NA	3695.000174	5	0	Pass
-10	nominal	3695.000172	NA	NA	NA	NA	NA	3695.000172	4	0	Pass
0	nominal	3695.000171	3695.000171	3695.000171	3695.000171	3695.000171	3695.000171	3695.000171	2	0	Pass
10	nominal	3695.000169	NA	NA	NA	NA	NA	3695.000169	0	0	Pass
20	15%	3695.000169	NA	NA	NA	NA	NA	3695.000169	0	0	Pass
20	nominal	3695.000169	NA	NA	NA	NA	NA	3695.000169	0	0	Pass
20	-15%	3695.000170	NA	NA	NA	NA	NA	3695.000170	1	0	Pass
30	nominal	3695.000170	3695.000170	3695.000170	3695.000170	3695.000170	3695.000170	3695.000170	1	0	Pass
40	nominal	3695.000169	NA	NA	NA	NA	NA	3695.000169	1	0	Pass
50	nominal	3695.000171	NA	NA	NA	NA	NA	3695.000171	3	0	Pass

* - Reference frequency

Reference numbers of test equipment used

HL 3286	HL 3818						

Full description is given in Appendix A.

8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
1294	Adapter 35WR42Kf, 18 - 26.5 GHz	Getronics	35WR42KF	1294	09-Nov-21	09-Nov-23
1295	Adapter 35WR28Kf, 26.5-40 GHz	Wiltron	35WR28KF	1295	14-Sep-20	14-Sep-23
3286	Temperature Chamber, (-50 to +170) °C	Thermotron	EL-8-CH-1-1-CO2	21-9048	10-Dec-21	10-Dec-22
3287	Low pass filter, DC-3.0 GHz	Unknown	NA	3287	15-Jun-21	15-Jun-23
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY45101057	18-May-21	18-Jun-22
3355	Low Pass Filter, 50 Ohm, DC to 1450 MHz	Mini-Circuits	VLF-1450+	NA	15-Jun-21	15-Jun-23
3437	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	13-Sep-21	13-Sep-22
3781	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	13-Sep-21	13-Sep-22
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY48250288	02-Aug-21	02-Aug-22
3901	Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1225/2A	06-Apr-21	06-Apr-22
4355	Signal and Spectrum Analyzer, 9 kHz to 7 GHz	Rohde & Schwarz	FSV 7	101630	20-Sep-21	20-Sep-22
4366	Directional coupler, 1 GHz to 18 GHz, 10 dB, SMA Female	Tiger Micro-Electronics Institute	TGD-A1101-10	01e-JSDE805-007	03-Jun-20	03-Jun-22
4425	Switch Matrices, DC up to 18 GHz	Mini-Circuits	USB-4SPDT-A18	11206140027	15-Jul-21	15-Jul-22
5232	WR42 to coaxial Right Angle Adapter. Freq. Range: 18.0 - 26.5 GHz	AINFO(HK)LIMITED	42WCA3_Cu	J504063308	24-Jan-21	24-Jan-22
5233	WR28 to coaxial Right Angle Adapter. Freq. Range: 26.5.0 - 40.0 GHz	AINFO(HK)LIMITED	28WCAK_Cu	J504063051	24-Jan-21	24-Jan-23
5286	Band Pass Filter, 50 Ohm, 4.4 to 18 GHz, SMA/M-SMA/F	A-INFOMW	WBLB-T-HP-4.4-18-S	J10800000305	15-Jun-21	15-Jun-23
5372	MXE EMI receiver, 3 Hz to 44 GHz	Keysight Technologies	N9038A	MY57290155	15-Mar-21	15-Mar-22
5409	RF cable, 40 GHz, SMA-SMA, 2 m	Huber-Suhner	SF102EA/11SK/11SK/2000MM	503973/2EA	10-Aug-21	10-Aug-22
5636	Cable, 50 Ohm, DC to 18 GHz, 1.8 m, SMA/SMA	Mini Circuits	CBL-6FT-SMSM+	NA	01-Nov-21	01-Nov-22
5637	Cable, 50 Ohm, DC to 18 GHz, 1.8 m, SMA/SMA	Mini Circuits	CBL-6FT-SMSM+	NA	08-Aug-21	08-Aug-22
5642	Cable, 50 Ohm, DC to 18 GHz, 1.8 m, SMA/SMA	Mini Circuits	CBL-6FT-SMSM+	NA	08-Aug-21	08-Aug-22
5643	Cable, 50 Ohm, DC to 18 GHz, 1.8 m, SMA/SMA	Mini Circuits	CBL-6FT-SMSM+	NA	01-Nov-21	01-Nov-22
5644	Cable, 50 Ohm, DC to 18 GHz, 1.8 m, SMA/SMA	Mini Circuits	CBL-6FT-SMSM+	NA	01-Nov-21	01-Nov-22
5686	Thermal Power Sensor, DC to 18 GHz	Rohde & Schwarz	NRP18T	101944	30-Nov-20	30-Dec-21

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Transmitter tests	
Carrier power conducted at antenna connector	± 1.7 dB
Carrier power radiated (substitution method)	± 4.5 dB
Occupied bandwidth	±8%
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Spurious emissions radiated 30 MHz – 40 GHz (substitution method)	± 4.5 dB
Frequency error	30 – 300 MHz: ± 50.5 Hz (1.68 ppm) 300 – 1000 MHz: ± 168 Hz (0.56 ppm)
Transient frequency behaviour	187 Hz ± 13.9 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Unintentional radiator tests	
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	 Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.

Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.

In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.

10 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, Radio, Safety, Environmental and Telecommunication testing facility.
Hermon Laboratories is recognized and accredited by the Federal Communications Commission (USA) for relevant parts of Code of Federal Regulations 47 (CFR 47), Test Firm Registration Number is 927748, Designation Number is IL1001; Recognized by Innovation, Science and Economic Development Canada for wireless and terminal testing (ISED), ISED #2186A, CAB identifier is IL1001; Certified by VCCI, Japan (the registration numbers for OATS are R-10808 for RE measurements below 1 GHz, G-20112 for RE measurements above 1 GHz, R-11082 for anechoic chamber for RE measurements below 1 GHz, G-10869 for RE measurements above 1 GHz, C-10845 for conducted emissions site and T-11606 for conducted emissions at telecommunication ports).
The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing, environmental simulation and calibration (for exact scope please refer to Certificate No. 839.01, 839.03 and 839.04).

Address: P.O. Box 23, Binyamina 3055001, Israel.
Telephone: +972 4628 8001
Fax: +972 4628 8277
e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Michael Nikishin, EMC&Radio group manager

11 APPENDIX D Specification references

FCC 47CFR part 96: 2020	Citizens Broaband Radio Service
FCC 47CFR part 1: 2020	Practice and procedure
FCC 47CFR part 2: 2020	Frequency allocations and radio treaty matters; general rules and regulations

12 APPENDIX E Test equipment correction factors

Cable loss
Microwave Cable Assembly, Huber-Suhner, 40 GHz, 3.5 m, SMA-SMA, S/N 1225/2A
HL 3901

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.09	9500	4.29	21000	6.67
100	0.41	10000	4.40	22000	6.92
500	0.93	10500	4.52	23000	7.00
1000	1.33	11000	4.64	24000	7.18
1500	1.63	11500	4.76	25000	7.29
2000	1.90	12000	4.87	26000	7.55
2500	2.12	12500	4.99	27000	7.70
3000	2.33	13000	5.11	28000	7.88
3500	2.50	13500	5.20	29000	8.02
4000	2.67	14000	5.31	30000	8.15
4500	2.82	14500	5.42	31000	8.35
5000	2.99	15000	5.51	32000	8.40
5500	3.16	15500	5.58	33000	8.62
6000	3.32	16000	5.68	34000	8.73
6500	3.51	16500	5.78	35000	8.78
7000	3.65	17000	5.91	36000	8.94
7500	3.79	17500	5.99	37000	9.21
8000	3.92	18000	6.07	38000	9.37
8500	4.04	19000	6.36	39000	9.45
9000	4.18	20000	6.49	40000	9.52

Cable loss
RF Cable, Huber-Suhner, 40 GHz, 2 m, ,
SF102EA/11SK/11SK/2000MM, S/N 503973/2EA
HL 5409

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
100	0.26	20500	3.75
200	0.36	21000	3.80
300	0.45	21500	3.85
500	0.58	22000	3.90
1000	0.82	22500	3.95
1500	0.99	23000	4.00
2000	1.15	23500	4.04
2500	1.28	24000	4.09
3000	1.40	24500	4.13
3500	1.51	25000	4.19
4000	1.61	25500	4.25
4500	1.71	26000	4.30
5000	1.80	26500	4.37
5500	1.89	27000	4.45
6000	1.98	27500	4.47
6500	2.06	28000	4.45
7000	2.14	28500	4.49
7500	2.22	29000	4.57
8000	2.29	29500	4.60
8500	2.36	30000	4.59
9000	2.43	30500	4.63
9500	2.50	31000	4.68
10000	2.58	31500	4.74
10500	2.63	32000	4.81
11000	2.70	32500	4.89
11500	2.76	33000	4.89
12000	2.82	33500	4.92
12500	2.87	34000	4.94
13000	2.94	34500	4.99
13500	3.00	35000	5.07
14000	3.06	35500	5.12
14500	3.11	36000	5.14
15000	3.17	36500	5.22
15500	3.23	37000	5.28
16000	3.29	37500	5.30
16500	3.35	38000	5.39
17000	3.41	38500	5.48
17500	3.47	39000	5.44
18000	3.51	39500	5.45
18500	3.56	40000	5.51
19000	3.60		
19500	3.66		
20000	3.71		

Cable loss
RF Cable, Mini Circuits, DC to 18 GHz, 1.8 m,
CBL-6FT-SMSM+, HL 5636

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
0.1	0.01	8750	2.32
10	0.04	9000	2.36
30	0.09	9250	2.40
50	0.15	9500	2.45
100	0.22	9750	2.49
250	0.35	10000	2.56
500	0.50	10250	2.58
750	0.61	10500	2.63
1000	0.71	10750	2.70
1250	0.80	11000	2.70
1500	0.88	11250	2.79
1750	0.95	11500	2.80
2000	1.03	11750	2.83
2250	1.09	12000	2.89
2500	1.15	12250	2.89
2750	1.21	12500	2.95
3000	1.27	12750	2.97
3250	1.33	13000	2.99
3500	1.38	13250	3.08
3750	1.44	13500	3.04
4000	1.49	13750	3.13
4250	1.54	14000	3.14
4500	1.59	14250	3.15
4750	1.64	14500	3.20
5000	1.69	14750	3.21
5250	1.73	15000	3.24
5500	1.79	15250	3.26
5750	1.83	15500	3.30
6000	1.88	15750	3.32
6250	1.93	16000	3.33
6500	1.95	16250	3.38
6750	2.02	16500	3.39
7000	2.05	16750	3.42
7250	2.10	17000	3.46
7500	2.13	17250	3.48
7750	2.16	17500	3.53
8000	2.21	17750	3.54
8250	2.24	18000	3.59
8500	2.29		

Cable loss
RF Cable, Mini Circuits, DC to 18 GHz, 1.8 m,
CBL-6FT-SMSM+, HL 5637

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
0.1	0.02	8750	2.34
10	0.83	9000	2.35
30	0.49	9250	2.37
50	0.15	9500	2.40
100	0.21	9750	2.40
250	0.33	10000	2.43
500	0.48	10250	2.44
750	0.59	10500	2.45
1000	0.68	10750	2.48
1250	0.77	11000	2.51
1500	0.85	11250	2.55
1750	0.92	11500	2.60
2000	0.99	11750	2.64
2250	1.06	12000	2.68
2500	1.12	12250	2.73
2750	1.19	12500	2.76
3000	1.25	12750	2.80
3250	1.30	13000	2.86
3500	1.36	13250	2.88
3750	1.41	13500	2.92
4000	1.46	13750	2.96
4250	1.52	14000	2.99
4500	1.57	14250	3.03
4750	1.61	14500	3.06
5000	1.65	14750	3.07
5250	1.68	15000	3.14
5500	1.73	15250	3.16
5750	1.77	15500	3.21
6000	1.81	15750	3.26
6250	1.87	16000	3.29
6500	1.92	16250	3.34
6750	1.96	16500	3.36
7000	2.00	16750	3.37
7250	2.07	17000	3.42
7500	2.11	17250	3.42
7750	2.14	17500	3.43
8000	2.21	17750	3.42
8250	2.26	18000	3.43
8500	2.29		

Cable loss
RF Cable, Mini Circuits, DC to 18 GHz, 1.8 m,
CBL-6FT-SMSM+, HL 5642

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
0.1	1.00	8750	2.23
10	0.83	9000	2.27
30	0.49	9250	2.30
50	0.14	9500	2.35
100	0.21	9750	2.37
250	0.33	10000	2.42
500	0.48	10250	2.45
750	0.59	10500	2.48
1000	0.68	10750	2.52
1250	0.77	11000	2.55
1500	0.85	11250	2.60
1750	0.93	11500	2.64
2000	1.00	11750	2.68
2250	1.07	12000	2.71
2500	1.12	12250	2.75
2750	1.20	12500	2.79
3000	1.25	12750	2.83
3250	1.30	13000	2.87
3500	1.37	13250	2.91
3750	1.42	13500	2.94
4000	1.46	13750	2.98
4250	1.54	14000	3.00
4500	1.56	14250	3.06
4750	1.61	14500	3.07
5000	1.65	14750	3.11
5250	1.68	15000	3.18
5500	1.73	15250	3.18
5750	1.75	15500	3.26
6000	1.80	15750	3.30
6250	1.85	16000	3.34
6500	1.89	16250	3.41
6750	1.93	16500	3.42
7000	1.99	16750	3.45
7250	2.01	17000	3.48
7500	2.06	17250	3.49
7750	2.09	17500	3.51
8000	2.13	17750	3.47
8250	2.17	18000	3.47
8500	2.20		

Cable loss
RF Cable, Mini Circuits, DC to 18 GHz, 1.8 m,
CBL-6FT-SMSM+, HL 5643

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
0.1	0.01	8750	2.33
10	0.04	9000	2.38
30	0.10	9250	2.41
50	0.15	9500	2.46
100	0.22	9750	2.49
250	0.35	10000	2.55
500	0.51	10250	2.59
750	0.62	10500	2.63
1000	0.71	10750	2.69
1250	0.81	11000	2.70
1500	0.89	11250	2.77
1750	0.96	11500	2.79
2000	1.04	11750	2.82
2250	1.10	12000	2.88
2500	1.16	12250	2.90
2750	1.23	12500	2.94
3000	1.28	12750	2.98
3250	1.34	13000	3.00
3500	1.40	13250	3.06
3750	1.45	13500	3.06
4000	1.50	13750	3.10
4250	1.56	14000	3.14
4500	1.61	14250	3.15
4750	1.66	14500	3.18
5000	1.71	14750	3.20
5250	1.75	15000	3.24
5500	1.81	15250	3.26
5750	1.86	15500	3.30
6000	1.90	15750	3.32
6250	1.95	16000	3.35
6500	1.97	16250	3.38
6750	2.03	16500	3.41
7000	2.07	16750	3.43
7250	2.10	17000	3.47
7500	2.14	17250	3.49
7750	2.17	17500	3.54
8000	2.21	17750	3.54
8250	2.26	18000	3.60
8500	2.29		

Cable loss
RF Cable, Mini Circuits, DC to 18 GHz, 1.8 m,
CBL-6FT-SMSM+, HL 5644

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
0.1	-0.02	8750	2.46
10	0.00	9000	2.49
30	0.06	9250	2.53
50	0.11	9500	2.58
100	0.19	9750	2.62
250	0.32	10000	2.65
500	0.49	10250	2.71
750	0.60	10500	2.72
1000	0.71	10750	2.78
1250	0.80	11000	2.80
1500	0.89	11250	2.83
1750	0.96	11500	2.88
2000	1.04	11750	2.89
2250	1.11	12000	2.95
2500	1.18	12250	2.98
2750	1.25	12500	3.00
3000	1.31	12750	3.06
3250	1.37	13000	3.09
3500	1.43	13250	3.12
3750	1.49	13500	3.18
4000	1.54	13750	3.19
4250	1.60	14000	3.24
4500	1.65	14250	3.24
4750	1.70	14500	3.27
5000	1.77	14750	3.30
5250	1.81	15000	3.33
5500	1.88	15250	3.35
5750	1.94	15500	3.38
6000	1.97	15750	3.43
6250	2.05	16000	3.45
6500	2.06	16250	3.49
6750	2.12	16500	3.53
7000	2.16	16750	3.55
7250	2.19	17000	3.60
7500	2.23	17250	3.63
7750	2.28	17500	3.66
8000	2.33	17750	3.69
8250	2.38	18000	3.74
8500	2.41		

13 APPENDIX F Manufacturer's declaration of additional to be used antennas

Additional antennas for Part 96 operations with the FCC Hardware Certified Part 96 CBSD radio device.

Model Number: AirSpeed 2900, 5G, 3.55-3.7GHz (n48)
Radio FCC ID: PIDAS2900

The Original Equipment Manufacturer (OEM) vendor of the radio states that the use of the following listed external antennas meets all requirements for Part 96 operations, including all OOBE requirements, due to the radio dynamic range and allowed power setting.
Note: use of an external cable introduces additional losses that may be compensated appropriately by increasing the radio's power level (reducing the attenuator setting). This cable compensation may be achieved during radio setup.

The following specific external antennas may be used in conjunction with this model radio at the appropriate listed power settings.

Antenna configuration	Antenna Vendor	Antenna Model Number	Antenna Peak Gain (dB)	Signal Bandwidth (MHz)	Maximum Conducted Power (dBm)	EIRP (dBm/10MHz)	EIRP per Bandwidth (dBm)	Operational Category
1	ALPHA	AN1003-R2	17	10.0	29.99	46.99	46.99	B
				20.0	32.23	46.63	49.23	
				30.0	33.34	45.87	50.34	
				40.0	33.00	44.23	50.00	
2	ALPHA	AW3014	18.0	10.0	28.99	46.99	46.99	B
				20.0	31.23	46.63	49.23	
				30.0	32.34	45.87	50.34	
				40.0	32.00	44.23	50.00	
3	ALPHA	AW3170	20.5	10.0	26.49	46.99	46.99	B
				20.0	28.73	46.63	49.23	
				30.0	29.84	45.87	50.34	
				40.0	29.50	44.23	50.00	

14 APPENDIX G Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
BB	broad band
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
dB(μA)	decibel referred to one microampere
dBΩ	decibel referred to one Ohm
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
ITE	information technology equipment
k	kilo
kHz	kilohertz
LISN	line impedance stabilization network
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μs	microsecond
NA	not applicable
NB	narrow band
NT	not tested
OATS	open area test site
Ω	Ohm
QP	quasi-peak
PM	pulse modulation
PS	power supply
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
VA	volt-ampere

END OF DOCUMENT