

TEST REPORT

ACCORDING TO: FCC 47CFR part 27

FOR:

**Airspan Networks Inc.
LTE Base Station**

Model:

**AirHarmony 4000, 2.5 GHz (B41), Int filter
FCC ID:PIDH4K25**

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Table of contents

1	Applicant information	3
2	Equipment under test attributes	3
3	Manufacturer information	3
4	Test details	3
5	Tests summary	4
6	EUT description	5
6.1	General information	5
6.2	Ports and lines	5
6.3	Support and test equipment	5
6.4	Changes made in the EUT	5
6.5	Test configuration	6
6.6	Transmitter characteristics	7
7	Transmitter tests according to 47CFR part 27	8
7.1	Peak output power test	8
7.2	Spurious emissions at RF antenna connector test	47
7.3	Radiated spurious emission measurements	64
8	APPENDIX A Test equipment and ancillaries used for tests	76
9	APPENDIX B Measurement uncertainties	77
10	APPENDIX C Test facility description	78
11	APPENDIX D Specification references	78
12	APPENDIX E Test equipment correction factors	79
13	APPENDIX F Abbreviations and acronyms	90

1 Applicant information

Client name: Airspan Networks Inc.
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E-mail: zlevi@airspan.com
Contact name: Mr. Zion Levi

2 Equipment under test attributes

Product name: LTE Base Station
Product type: Transceiver
Model(s): AirHarmony 4000, 2.5 GHz (B41), Int filter
Serial number: D00F07CD0000
Hardware version: B0
Software release: 14-15-00-119
Receipt date 25-Dec-16

3 Manufacturer information

Manufacturer name: Airspan Networks Inc.
Address: 777 Yamato, Road Suite 310 Boca Raton, FL 33431, USA
Telephone: +1 561 893 8670
Fax: +1 561 893 8671
E-Mail: zlevi@airspan.com
Contact name: Mr. Zion Levi

4 Test details

Project ID: 29092
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 25-Dec-16
Test completed: 26-Dec-16
Test specification(s): FCC 47CFR part 27

5 Tests summary

Test	Status
Transmitter characteristics	
Section 27.50(h), Peak output power at RF antenna connector	Pass
Section 27.50(h)(4), Spectral power density	Pass
Section 27.53(m)(2), Spurious emissions at RF antenna connector	Pass
Section 27.53(m)(2), Radiated spurious emissions	Pass

The product was approved under FCC ID: PIDH4K25 for operation in 2496.0 – 2690.0 MHz band with 5 MHz, 10 MHz, 20 MHz and 40 MHz channel bandwidth and external Cavity filters. The relevant tests to support operation with internal passive filters and submit Application for Class II permissive changes certification were done. The change is software controlled, no hardware change was made except internal filters use instead of external ones.

The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

	Name and Title	Date	Signature
Tested by:	Mr. K. Zushchuk, test engineer	December 26, 2016	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	January 18, 2017	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	February 15, 2017	

6 EUT description

6.1 General information

The EUT, Base station radio, AirHarmony 4000, 2.5 GHz (B41), is part of a LTE broadband fixed cellular wireless access system. The system provides a radio link between an end-user (a subscriber) and a network to give high-speed data access. The AirHarmony's transceiver/receiver (Up to 64 QAM modulation, data rate up to 190 Mbps) uses OFDM and operating in TDD mode, equipped with a 18 dBi external antenna. Advanced Antenna Techniques 2x2 MIMO are supported (the detailed description provided in the Operational description exhibit in Application for certification). The maximum total RF output power (not including antenna gain) is 46.19 dBm for 18 dBi antenna and it can be reduced by software.

The AirHarmony is installed outdoors and typically is mounted on a pole. The Subscriber transmits and receives traffic to and from the base station respectively. The transceiver provides subscribers with "always-on" Internet, high speed data only, or data and voice (VoIP) services and is configured with a unique base station reference number, preventing the LTE UE from relocating to another subscriber premises without authorization.

The EUT, AirHarmony 4000 2.5GHz (B41), comes in range of three frequency band variants that can be installed with different internal filters. Frequency band is 2496 – 2690 MHz. The internal filters are designed specifically for AirHarmony 4000 deployments. The installation and replacement of the internal filters can be performed by licensed installer only according installation procedure.

6.2 Ports and lines

Port Type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length, m
Power	DC power	EUT	DC mains	1	Unshielded	3
Signal	GPS	EUT	GPS external antenna	1	Coax	3
Signal	Eth. POE	EUT	Laptop	1	FTP	3
Signal	Eth. POE	EUT	Open circuit	1	FTP	3
Signal	Eth.	EUT	Open circuit	2	FTP	3
RF	RF Link (Tx/Rx)	EUT	Antenna	2	Coax	0.5
Signal*	Serial*	Not connected	Not connected	1	NA	NA

*for maintenance only

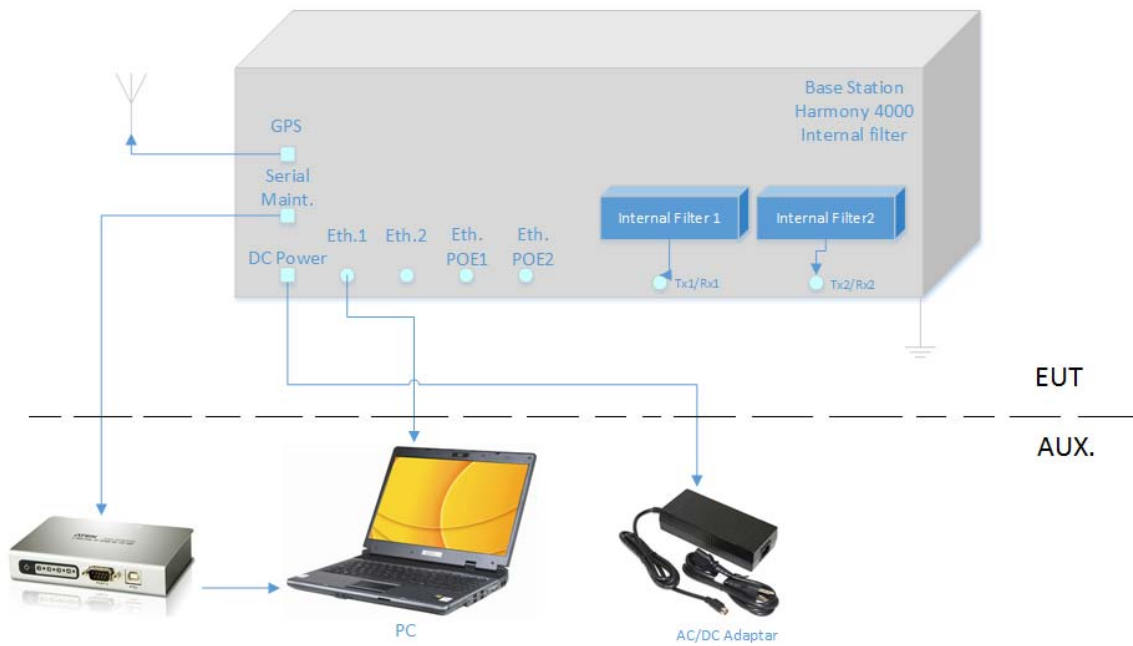
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
DC power supply	Mean Well	PSP-600-48	RB29063683
GPS antenna	Tallysman Wireless	32-3030-0	20110606
Laptop	DELL	E7440	R41000418
4 Port USB to RS-232 hub	ATEN INTERNATIONAL	UC2324	Z3E2216AB0098

6.4 Changes made in the EUT

No changes were implemented in the EUT during testing.

6.5 Test configuration



6.6 Transmitter characteristics

Type of equipment					
☒	Stand-alone (Equipment with or without its own control provisions)				
☐	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)				
☐	Plug-in card (Equipment intended for a variety of host systems)				
Intended use		Condition of use			
☒	fixed	Always at a distance more than 2 m from all people			
☐	mobile	Always at a distance more than 20 cm from all people			
☐	portable	May operate at a distance closer than 20 cm to human body			
Assigned frequency range		2496.0 – 2690.0 MHz			
Operating frequency (full bands)		2498.5 – 2687.5 MHz for 5 MHz OBW 2501.0 – 2685.0 MHz for 10 MHz OBW 2506.0 – 2680.0 MHz for 20 MHz OBW 2516.0 – 2670.0 MHz for 40 MHz OBW			
RF channel spacing		5 MHz; 10 MHz, 20 MHz, 40 MHz			
Maximum rated output power		At transmitter 50 Ω RF output connector (aggregate power of both RF chains)		46.00 dBm	
Is transmitter output power variable?		☐ No			
		☒	Yes	☐ continuous variable	
				☒ stepped variable with step size	0.25 dB
				minimum RF power	-30 dBm
				maximum RF power at antenna connector	46.00 dBm
Antenna connection					
unique coupling	☒	standard connector	Integral	☒ with temporary RF connector without temporary RF connector	
Antenna/s technical characteristics					
Type	Manufacturer	Model number	Gain		
External	ALPHA Wireless Ltd	AW3007	18 dBi		
External	ALPHA Wireless Ltd	AW3008	17 dBi		
External sector	Cobham Antenna Systems	SA12-2.5-DS/1915	11 dBi		
Transmitter aggregate data rate/s, MBps					
Transmitter 26dBc power bandwidth		Type of modulation			
		QPSK	16QAM	64QAM	
5 MHz		5.3 MBps	10.7 MBps	23.0 MBps	
10 MHz		10.7 MBps	22.7 MBps	47.3 MBps	
20 MHz		23.4 MBps	45.4 MBps	95.0 MBps	
40 MHz		46.8 MBps	90.8 MBps	190 MBps	
Type of multiplexing		TDD			
Modulating test signal (baseband)		PRBS			
Maximum transmitter duty cycle in normal use		75%			
Transmitter power source					
☒		Nominal rated voltage	Battery type		
	DC	Nominal rated voltage	48 VDC via AC/DC adapter		
	AC mains	Nominal rated voltage	Frequency		
Common power source for transmitter and receiver		☒	yes	no	

Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

7 Transmitter tests according to 47CFR part 27

7.1 Peak output power test

7.1.1 General

This test was performed to measure the peak output power at RF antenna connector. Specification test limits are given in Table 7.1.1.

Table 7.1.1 Peak output power limits

Transmitter type	Assigned frequency range, MHz	Maximum peak output power dBm
Main, booster and base stations	2496 – 2690	$63 + 10\log(X/Y) + 10\log(360/\text{beamwidth})$
		Maximum peak power density dBm/100 kHz
		$\text{EIRP} + 10\log(0.1/Y)$

X is the actual channel width in MHz (occupied bandwidth)

Y is either Frequency assignment for the BRS/EBS band

Beamwidth is the total horizontal plane beam width of the individual transmitting antenna for the station or any sector measured at the half-power points.

7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.

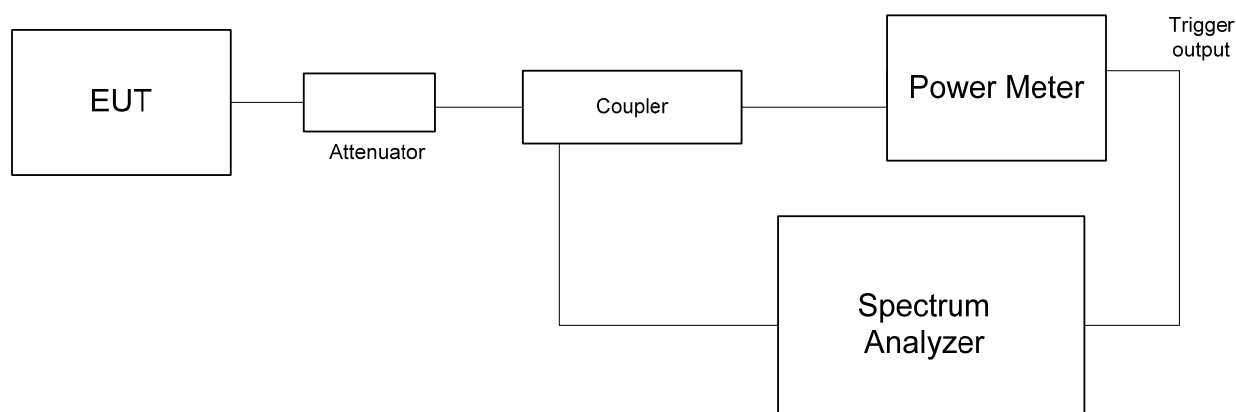
7.1.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.

7.1.2.3 The average output power was measured with power meter as provided in Table 7.1.2, to Table 7.1.5.

7.1.2.4 The power spectral density was measured with spectrum analyzer as provided in Table 7.1.6 to Table 7.1.9 and the associated plots..

7.1.2.5 The test results are provided in the tables below and associated plots.

Figure 7.1.1 Peak output power test setup





Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.1.2 Peak output power test results

DETECTOR USED:

Average within Tx burst

DUTY CYCLE:

75%

EBW:

5 MHz

Carrier frequency, MHz	Power Meter reading RF#1, dBm	Power Meter reading RF#2, dBm	Total RF power**, dBm	Antenna gain, dBi	Total EIRP*, dBm	Limit***, dBm	Margin, dB	Verdict
QPSK								
2498.5	42.80	42.76	45.80	18.00	63.80	69.34	-5.54	Pass
2593.0	42.75	42.81	45.81	18.00	63.81	69.34	-5.53	Pass
2687.5	42.65	42.73	45.73	18.00	63.73	69.76	-6.03	Pass
64QAM								
2498.5	42.81	42.82	45.82	18.00	63.82	69.34	-5.52	Pass
2593.0	42.78	42.80	45.80	18.00	63.80	69.35	-5.55	Pass
2687.5	42.68	42.70	45.70	18.00	63.70	69.70	-6.00	Pass
QPSK								
2498.5	42.80	42.76	45.80	17.00	62.80	67.93	-5.13	Pass
2593.0	42.75	42.81	45.81	17.00	62.81	67.93	-5.12	Pass
2687.5	42.65	42.73	45.73	17.00	62.73	68.34	-5.61	Pass
64QAM								
2498.5	42.81	42.82	45.82	17.00	62.82	67.93	-5.11	Pass
2593.0	42.78	42.80	45.80	17.00	62.80	67.93	-5.13	Pass
2687.5	42.68	42.70	45.70	17.00	62.70	68.29	-5.59	Pass

* - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi

** - Total RF power, dBm = P(dBm, RF#) + 3 dB

*** - See Table 7.1.11



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Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.1.3 Peak output power test results

DETECTOR USED:

Average within Tx burst

DUTY CYCLE:

75%

EBW:

10 MHz

Carrier frequency, MHz	Power Meter reading RF#1, dBm	Power Meter reading RF#2, dBm	Total RF power**, dBm	Antenna gain, dBi	Total EIRP*, dBm	Limit***, dBm	Margin, dB	Verdict
QPSK								
2501	42.91	42.86	45.91	18.00	63.91	69.55	-5.64	Pass
2596	42.85	42.82	45.85	18.00	63.85	69.37	-5.52	Pass
2685	42.80	42.78	45.80	18.00	63.80	69.73	-5.93	Pass
64QAM								
2501	42.78	42.90	45.90	18.00	63.90	69.54	-5.64	Pass
2596	42.75	42.81	45.81	18.00	63.81	69.37	-5.56	Pass
2685	42.81	42.76	45.81	18.00	63.81	69.75	-5.94	Pass
QPSK								
2501	42.91	42.86	45.91	17.00	62.91	68.13	-5.22	Pass
2596	42.85	42.82	45.85	17.00	62.85	67.96	-5.11	Pass
2685	42.80	42.78	45.80	17.00	62.80	68.31	-5.51	Pass
64QAM								
2501	42.78	42.90	45.90	17.00	62.90	68.13	-5.23	Pass
2596	42.75	42.81	45.81	17.00	62.81	67.96	-5.15	Pass
2685	42.81	42.76	45.81	17.00	62.81	68.34	-5.53	Pass

* - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi

** - Total RF power, dBm = P(dBm, RF#) + 3 dB

*** - See Table 7.1.11



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Report ID: AIRRAD_FCC.29092.docx

Date of Issue: 15-Feb-17

Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.1.4 Peak output power test results

DETECTOR USED:

Average within Tx burst

DUTY CYCLE:

75%

EBW:

20 MHz

Carrier frequency, MHz	Power Meter reading RF#1, dBm	Power Meter reading RF#2, dBm	Total RF power**, dBm	Antenna gain, dBi	Total EIRP*, dBm	Limit***, dBm	Margin, dB	Verdict
QPSK								
2506	42.85	42.88	45.88	18.00	63.88	69.57	-5.69	Pass
2596	42.93	42.91	45.93	18.00	63.93	69.29	-5.36	Pass
2680	42.45	42.38	45.45	18.00	63.45	69.67	-6.22	Pass
64QAM								
2506	42.91	42.93	45.93	18.00	63.93	69.55	-5.62	Pass
2596	42.90	42.85	45.90	18.00	63.90	69.31	-5.41	Pass
2680	42.20	42.30	45.30	18.00	63.30	69.67	-6.37	Pass
QPSK								
2506	42.85	42.88	45.88	17.00	62.88	68.15	-5.27	Pass
2596	42.93	42.91	45.93	17.00	62.93	67.87	-4.94	Pass
2680	42.45	42.38	45.45	17.00	62.45	68.25	-5.80	Pass
64QAM								
2506	42.91	42.93	45.93	17.00	62.93	68.13	-5.20	Pass
2596	42.90	42.85	45.90	17.00	62.90	67.90	-5.00	Pass
2680	42.20	42.30	45.30	17.00	62.30	68.25	-5.95	Pass

* - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi

** - Total RF power, dBm = P(dBm, RF#) + 3 dB

*** - See Table 7.1.11



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Report ID: AIRRAD_FCC.29092.docx

Date of Issue: 15-Feb-17

Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.1.5 Peak output power test results

DETECTOR USED:

Average within Tx burst

DUTY CYCLE:

75%

EBW:

40 MHz

Carrier frequency, MHz	Power Meter reading RF#1, dBm	Power Meter reading RF#2, dBm	Total RF power**, dBm	Antenna gain, dBi	Total EIRP*, dBm	Limit***, dBm	Margin, dB	Verdict
QPSK								
2516	42.62	42.70	45.70	18.00	63.70	69.83	-6.13	Pass
2594	42.89	42.93	45.93	18.00	63.93	70.08	-6.15	Pass
2670	42.85	42.77	45.85	18.00	63.85	69.88	-6.03	Pass
64QAM								
2516	42.68	42.62	45.68	18.00	63.68	69.82	-6.14	Pass
2594	42.88	42.81	45.88	18.00	63.88	70.08	-6.20	Pass
2670	42.75	42.85	45.85	18.00	63.85	69.88	-6.03	Pass
QPSK								
2516	42.62	42.70	45.70	17.00	62.70	68.42	-5.72	Pass
2594	42.89	42.93	45.93	17.00	62.93	68.67	-5.74	Pass
2670	42.85	42.77	45.85	17.00	62.85	68.47	-5.62	Pass
64QAM								
2516	42.68	42.62	45.68	17.00	62.68	68.41	-5.73	Pass
2594	42.88	42.81	45.88	17.00	62.88	68.67	-5.79	Pass
2670	42.75	42.85	45.85	17.00	62.85	68.47	-5.62	Pass

* - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi

** - Total RF power, dBm = P(dBm, RF#) + 3 dB

*** - See Table 7.1.11

Reference numbers of test equipment used

HL 2214	HL 3301	HL 3302	HL 3818	HL 3322	HL 3901		
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Full description is given in Appendix A.



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Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.1.6 Power spectral density test results

DETECTOR USED: Average gated
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 300 kHz
 CHANNEL BANDWIDTH: 5 MHz
 DUTY CYCLE: 75%

Carrier frequency, MHz	SA reading, RF #1 dBm/100kHz	SA reading, RF #2 dBm/100kHz	Antenna gain, dBi	Total PSD*, dBm/100kHz	Limit**, dBm	Margin, dB	Verdict
QPSK							
2498.5	27.47	27.49	18.00	48.49	51.56	-3.07	Pass
2593.0	27.26	27.29	18.00	48.29	51.56	-3.27	Pass
2687.5	27.42	27.39	18.00	48.42	52.35	-3.93	Pass
64 QAM							
2498.5	27.35	27.33	18.00	48.35	51.56	-3.21	Pass
2593.0	27.27	27.36	18.00	48.36	51.56	-3.20	Pass
2687.5	27.41	27.39	18.00	48.41	52.30	-3.89	Pass
QPSK							
2498.5	27.47	27.49	17.00	47.49	50.15	-2.66	Pass
2593.0	27.26	27.29	17.00	47.29	50.15	-2.86	Pass
2687.5	27.42	27.39	17.00	47.42	50.94	-3.52	Pass
64 QAM							
2498.5	27.35	27.33	17.00	47.35	50.15	-2.80	Pass
2593.0	27.27	27.36	17.00	47.36	50.15	-2.79	Pass
2687.5	27.41	27.39	17.00	47.41	50.89	-3.48	Pass

* Total PSD, dBm/100kHz = PSD(dBm/100kHz,RF#)+ 3 dB + Antenna Gain, dBi

** See Table 7.1.12



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Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.1.7 Power spectral density test results

DETECTOR USED: Average gated
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 300 kHz
 CHANNEL BANDWIDTH: 10 MHz
 DUTY CYCLE: 75%

Carrier frequency, MHz	SA reading, RF #1 dBm/100kHz	SA reading, RF #2 dBm/100kHz	Antenna gain, dBi	Total PSD*, dBm/100kHz	Limit**, dBm	Margin, dB	Verdict
QPSK							
2501	25.42	25.51	18.00	46.51	48.94	-2.43	Pass
2596	25.73	25.50	18.00	46.73	48.58	-1.85	Pass
2685	25.80	25.91	18.00	46.91	49.31	-2.40	Pass
64QAM							
2501	25.43	25.56	18.00	46.56	48.94	-2.38	Pass
2596	25.58	25.70	18.00	46.70	48.58	-1.88	Pass
2685	25.65	25.67	18.00	46.67	49.34	-2.67	Pass
QPSK							
2501	25.42	25.51	17.00	45.51	47.53	-2.02	Pass
2596	25.73	25.50	17.00	45.73	47.17	-1.44	Pass
2685	25.80	25.91	17.00	45.91	47.90	-1.99	Pass
64QAM							
2501	25.43	25.56	17.00	45.56	47.52	-1.96	Pass
2596	25.58	25.70	17.00	45.70	47.16	-1.46	Pass
2685	25.65	25.67	17.00	45.67	47.92	-2.25	Pass

* Total PSD, dBm/100kHz = PSD(dBm/100kHz,RF#)+ 3 dB + Antenna Gain, dBi

** See Table 7.1.12



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Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.1.8 Power spectral density test results

DETECTOR USED: Average gated
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 300 kHz
 CHANNEL BANDWIDTH: 20 MHz
 DUTY CYCLE: 75%

Carrier frequency, MHz	SA reading, RF #1 dBm/100kHz	SA reading, RF #2 dBm/100kHz	Antenna gain, dBi	Total PSD*, dBm/100kHz	Limit**, dBm	Margin, dB	Verdict
QPSK							
2506	23.26	23.06	18.00	44.26	46.04	-1.78	Pass
2596	22.82	22.83	18.00	43.83	45.48	-1.65	Pass
2680	23.02	22.94	18.00	44.02	46.24	-2.22	Pass
64QAM							
2506	22.95	22.97	18.00	43.97	46.03	-2.06	Pass
2596	22.89	22.90	18.00	43.90	45.51	-1.61	Pass
2680	23.07	23.00	18.00	44.07	46.24	-2.17	Pass
QPSK							
2506	23.26	23.06	17.00	43.26	44.63	-1.37	Pass
2596	22.82	22.83	17.00	42.83	44.07	-1.24	Pass
2680	23.02	22.94	17.00	43.02	44.83	-1.81	Pass
64QAM							
2506	22.95	22.97	17.00	42.97	44.61	-1.64	Pass
2596	22.89	22.90	17.00	42.90	44.09	-1.19	Pass
2680	23.07	23.00	17.00	43.07	44.83	-1.76	Pass

* Total PSD, dBm/100kHz = PSD(dBm/100kHz,RF#)+ 3 dB + Antenna Gain, dBi

** See Table 7.1.12



Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.1.9 Power spectral density test results

DETECTOR USED: Average gated
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 300 kHz
 CHANNEL BANDWIDTH: 40 MHz
 DUTY CYCLE: 75%

Carrier frequency, MHz	SA reading, RF #1, dBm/100kHz	SA reading, RF #2, dBm/100kHz	Antenna gain, dBi	Total PSD*, dBm/100kHz	Limit**, dBm	Margin, dB	Verdict
QPSK							
2516	19.06	18.89	18.00	40.06	43.35	-3.29	Pass
2594	18.85	18.70	18.00	39.85	43.85	-4.00	Pass
2670	19.48	19.15	18.00	40.48	43.44	-2.96	Pass
64QAM							
2516	19.13	19.19	18.00	40.19	43.34	-3.15	Pass
2594	19.36	19.31	18.00	40.36	43.85	-3.49	Pass
2670	19.05	19.13	18.00	40.13	43.45	-3.32	Pass
QPSK							
2516	19.06	18.89	17.00	39.06	41.94	-2.88	Pass
2594	18.85	18.70	17.00	38.85	42.44	-3.59	Pass
2670	19.48	19.15	17.00	39.48	42.03	-2.55	Pass
64QAM							
2516	19.13	19.19	17.00	39.19	41.93	-2.74	Pass
2594	19.36	19.31	17.00	39.36	42.43	-3.07	Pass
2670	19.05	19.13	17.00	39.13	42.04	-2.91	Pass

* Total PSD, dBm/100kHz = PSD(dBm/100kHz,RF#)+ 3 dB + Antenna Gain, dBi

** See Table 7.1.12

Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.1.10 Pre - transition frequency channels assignment

Channel	OBW, MHz	Peak power limit, dBm	Power density limit, dBm/100kHz
5 MHz Dual Channel QPSK 5.3 Mbps			
2498.5 MHz BRS Ch.1	4.667	$63+10\log(\text{OBW}/6.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/6.0)$
2593.0 MHz EBS Ch.D4	4.665	$63+10\log(\text{OBW}/6.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/6.0)$
2687.5 MHz EBS Ch.G3	4.707	$63+10\log(\text{OBW}/5.5)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/5.5)$
5 MHz Dual Channel 64QAM 23 Mbps			
2498.5 MHz BRS Ch.1	4.669	$63+10\log(\text{OBW}/6.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/6.0)$
2593.0 MHz EBS Ch.D4	4.670	$63+10\log(\text{OBW}/6.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/6.0)$
2687.5 MHz EBS Ch.G3	4.650	$63+10\log(\text{OBW}/5.5)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/5.5)$
10 MHz Dual Channel QPSK 10.7 Mbps			
2501.0 MHz BRS Ch.1 + EBS Ch. A1	9.377	$63+10\log(\text{OBW}/11.5)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/11.5)$
2596.0 MHz EBS Ch.D4+G4	9.398	$63+10\log(\text{OBW}/12.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/12.0)$
2685.0 MHz EBS Ch.G2 + G3	9.349	$63+10\log(\text{OBW}/11.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/11.0)$
10 MHz Dual Channel 64QAM 47.3 Mbps			
2501.0 MHz BRS Ch.1 + EBS Ch. A1	9.365	$63+10\log(\text{OBW}/11.5)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/11.5)$
2596.0 MHz EBS Ch.D4+G4	9.390	$63+10\log(\text{OBW}/12.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/12.0)$
2685.0 MHz EBS Ch.G2 + G3	9.395	$63+10\log(\text{OBW}/11.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/11.0)$
20 MHz 4 Channels QPSK 23.4 Mbps			
2506.0 MHz BRS Ch.1+ EBS Ch.A1+A2+A3	18.427	$63+10\log(\text{OBW}/22.5)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/22.5)$
2596.0 MHz EBS Ch.C4+D4+G4+F4	18.428	$63+10\log(\text{OBW}/24.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/24.0)$
2680.0 MHz BRS CH.H3+ EBS Ch.G1+G2+G3	18.433	$63+10\log(\text{OBW}/22.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/22.0)$
20 MHz 4 Channels 64QAM 95 Mbps			
2506.0 MHz BRS Ch.1+ EBS Ch.A1+A2+A3	18.347	$63+10\log(\text{OBW}/22.5)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/22.5)$
2596.0 MHz EBS Ch.C4+D4+G4+F4	18.527	$63+10\log(\text{OBW}/24.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/24.0)$
2680.0 MHz BRS CH.H3+ EBS Ch.G1+G2+G3	18.437	$63+10\log(\text{OBW}/22.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/22.0)$

Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.1.10 Pre - transition frequency channels assignment (continued)

Channel	OBW, MHz	Peak power limit, dBm	Power density limit, dBm/100kHz
40 MHz 4 Channels QPSK 46.8 Mbps			
2516.0 MHz (BRS Ch.1 + EBS Ch.A1+A2+A3+B1+B2+B3+C1)	38.760	$63+10\log(\text{OBW}/44.5)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/44.5)$
2594.0 MHz (EBS Ch.A4+B4+C4+D4+G4+F4+E4)	38.750	$63+10\log(\text{OBW}/42.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/42.0)$
2670.0 MHz (BRS Ch.F2+F3 H1+H2+H3 + EBS Ch.G1+G2+G3)	38.720	$63+10\log(\text{OBW}/44.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/44.0)$
40 MHz 4 Channels 64QAM 190 Mbps			
2516.0 MHz (BRS Ch.1 + EBS Ch.A1+A2+A3+B1+B2+B3+C1)	38.660	$63+10\log(\text{OBW}/44.5)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/44.5)$
2594.0 MHz (EBS Ch.A4+B4+C4+D4+G4+F4+E4)	38.720	$63+10\log(\text{OBW}/42.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/42.0)$
2670.0 MHz (BRS Ch.F2+F3 H1+H2+H3 + EBS Ch.G1+G2+G3)	38.770	$63+10\log(\text{OBW}/44.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/44.0)$



HERMON LABORATORIES

Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode:	Compliance	Verdict:	PASS
Date(s):	25-Dec-16		
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.1.11 EIRP limits

Channel	Channel BW, MHz	Peak power limit, dBm	
		17 dBi, 90° beamwidth	18 dBi, 65°beamwidth
5 MHz Dual Channel QPSK			
2498.5 MHz BRS Ch.1	6.0	67.93	69.34
2593.0 MHz EBS Ch.D4	6.0	67.93	69.34
2687.5 MHz EBS Ch.G3	5.5	68.34	69.76
10 MHz Dual Channel QPSK			
2501.0 MHz BRS Ch.1 + EBS Ch. A1	11.5	68.13	69.55
2596.0 MHz EBS Ch.D4+G4	12.0	67.96	69.37
2685.0 MHz EBS Ch.G2 + G3	11.0	68.31	69.73
20 MHz Dual Channel QPSK			
2506.0 MHz BRS Ch.1+ EBS Ch.A1+A2+A3	22.5	68.15	69.57
2596.0 MHz EBS Ch.C4+D4+G4+F4	24.0	67.87	69.29
2680.0 MHz BRS CH.H3+ EBS Ch.G1+G2+G3	22.0	68.25	69.67
5 MHz Dual Channel 64 QAM			
2498.5 MHz BRS Ch.1	6.0	67.93	69.34
2593.0 MHz EBS Ch.D4	6.0	67.93	69.35
2687.5 MHz EBS Ch.G3	5.5	68.29	69.70
10 MHz Dual Channel 64 QAM			
2501.0 MHz BRS Ch.1 + EBS Ch. A1	11.5	68.13	69.54
2596.0 MHz EBS Ch.D4+G4	12.0	67.96	69.37
2685.0 MHz EBS Ch.G2 + G3	11.0	68.34	69.75
20 MHz Dual Channel 64 QAM			
2506.0 MHz BRS Ch.1+ EBS Ch.A1+A2+A3	22.5	68.13	69.55
2596.0 MHz EBS Ch.C4+D4+G4+F4	24.0	67.90	69.31
2680.0 MHz BRS CH.H3+ EBS Ch.G1+G2+G3	22.0	68.25	69.67



Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.1.11 EIRP limits (continued)

Channel	Channel BW, MHz	Peak power limit, dBm	
		17 dBi, 90° beamwidth	18 dBi, 65°beamwidth
40 MHz Dual Channel QPSK			
2516.0 MHz (BRS Ch.1 + EBS Ch.A1+A2+A3+B1+B2+B3+C1)	44.5	68.42	69.83
2594.0 MHz (EBS Ch.A4+B4+C4+D4+G4+F4+E4)	42.0	68.67	70.08
2670.0 MHz (BRS Ch.F2+F3 H1+H2+H3 + EBS Ch.G1+G2+G3)	44.0	68.47	69.88
40 MHz Dual Channel 64 QAM			
2516.0 MHz (BRS Ch.1 + EBS Ch.A1+A2+A3+B1+B2+B3+C1)	44.5	68.41	69.82
2594.0 MHz (EBS Ch.A4+B4+C4+D4+G4+F4+E4)	42.0	68.67	70.08
2670.0 MHz (BRS Ch.F2+F3 H1+H2+H3 + EBS Ch.G1+G2+G3)	44.0	68.47	69.88



Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode:	Compliance	Verdict:	PASS
Date(s):	25-Dec-16		
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.1.12 Peak power density limits

Channel	Channel BW, MHz	Peak power density, dBm/100kHz	
		17 dBi, 90° beamwidth	18 dBi, 65°beamwidth
5 MHz Dual Channel QPSK			
2498.5 MHz BRS Ch.1	6.0	50.15	51.56
2593.0 MHz EBS Ch.D4	6.0	50.15	51.56
2687.5 MHz EBS Ch.G3	5.5	50.94	52.35
10 MHz Dual Channel QPSK			
2501.0 MHz BRS Ch.1 + EBS Ch. A1	11.5	47.53	48.94
2596.0 MHz EBS Ch.D4+G4	12.0	47.17	48.58
2685.0 MHz EBS Ch.G2 + G3	11.0	47.90	49.31
20 MHz Dual Channel QPSK			
2506.0 MHz BRS Ch.1+ EBS Ch.A1+A2+A3	22.5	44.63	46.04
2596.0 MHz EBS Ch.C4+D4+G4+F4	24.0	44.07	45.48
2680.0 MHz BRS CH.H3+ EBS Ch.G1+G2+G3	22.0	44.83	46.24
5 MHz Dual Channel 64 QAM			
2498.5 MHz BRS Ch.1	6.0	50.15	51.56
2593.0 MHz EBS Ch.D4	6.0	50.15	51.56
2687.5 MHz EBS Ch.G3	5.5	50.89	52.30
10 MHz Dual Channel 64 QAM			
2501.0 MHz BRS Ch.1 + EBS Ch. A1	11.5	47.52	48.94
2596.0 MHz EBS Ch.D4+G4	12.0	47.16	48.58
2685.0 MHz EBS Ch.G2 + G3	11.0	47.92	49.34
20 MHz Dual Channel 64 QAM			
2506.0 MHz BRS Ch.1+ EBS Ch.A1+A2+A3	22.5	44.61	46.03
2596.0 MHz EBS Ch.C4+D4+G4+F4	24.0	44.09	45.51
2680.0 MHz BRS CH.H3+ EBS Ch.G1+G2+G3	22.0	44.83	46.24



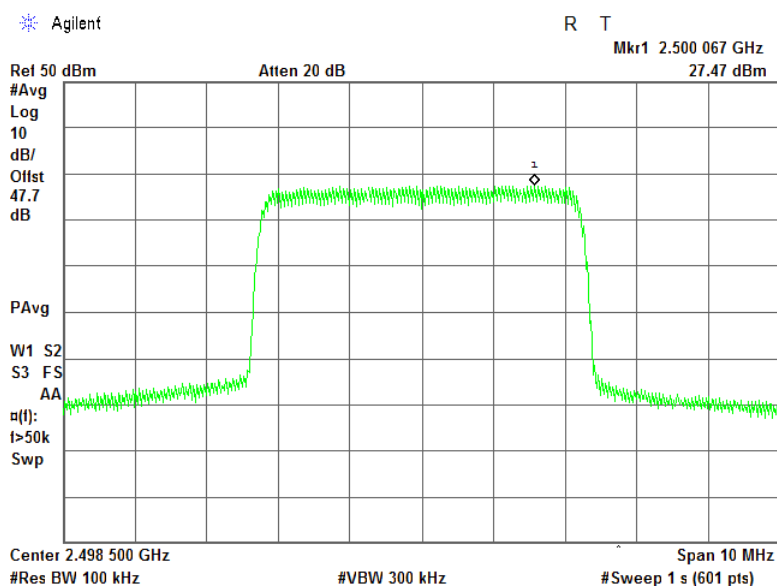
Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.1.12 Peak power density limits (continued)

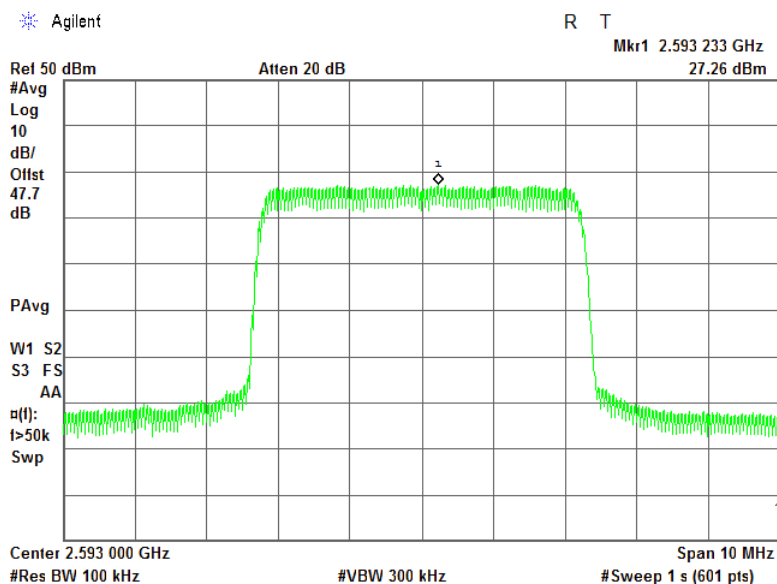
Channel	Channel BW, MHz	Peak power density, dBm/100kHz	
		17 dBi, 90° beamwidth	18 dBi, 65°beamwidth
40 MHz Dual Channel QPSK			
2516.0 MHz (BRS Ch.1 + EBS Ch.A1+A2+A3+B1+B2+B3+C1)	44.5	41.94	43.35
2594.0 MHz (EBS Ch.A4+B4+C4+D4+G4+F4+E4)	42.0	42.44	43.85
2670.0 MHz (BRS Ch.F2+F3 H1+H2+H3 + EBS Ch.G1+G2+G3)	44.0	42.03	43.44
40 MHz Dual Channel 64 QAM			
2516.0 MHz (BRS Ch.1 + EBS Ch.A1+A2+A3+B1+B2+B3+C1)	44.5	41.93	43.34
2594.0 MHz (EBS Ch.A4+B4+C4+D4+G4+F4+E4)	42.0	42.43	43.85
2670.0 MHz (BRS Ch.F2+F3 H1+H2+H3 + EBS Ch.G1+G2+G3)	44.0	42.04	43.45

Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.1 Power spectral density test results at low frequency, QPSK, 5 MHz EBW RF # 1

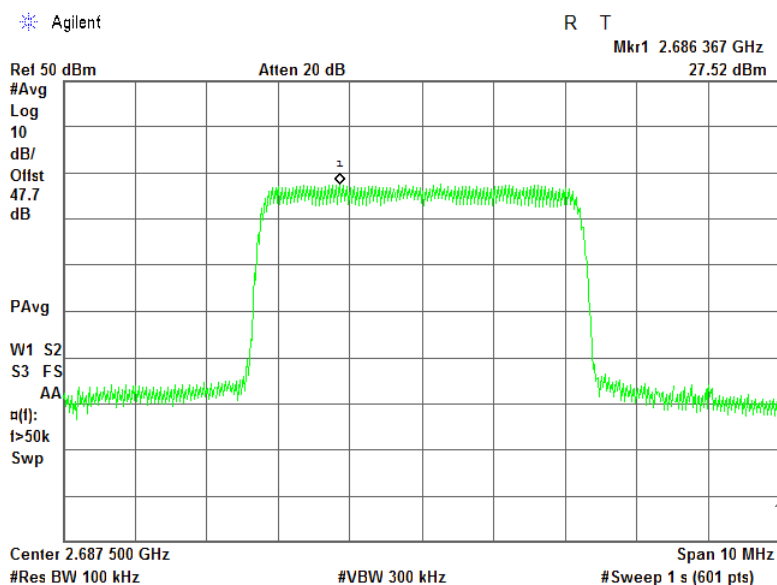


Plot 7.1.2 Power spectral density test results at mid frequency, QPSK, 5 MHz EBW RF # 1

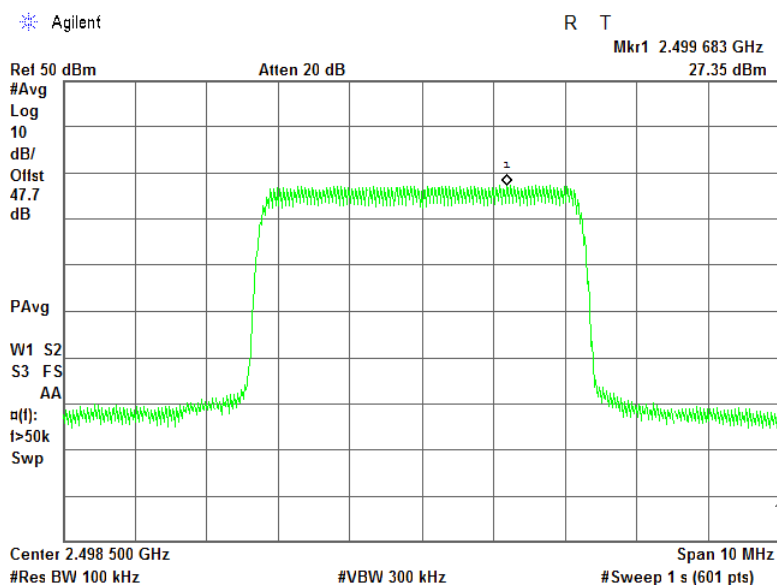


Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.3 Power spectral density test results at high frequency, QPSK, 5 MHz EBW RF # 1

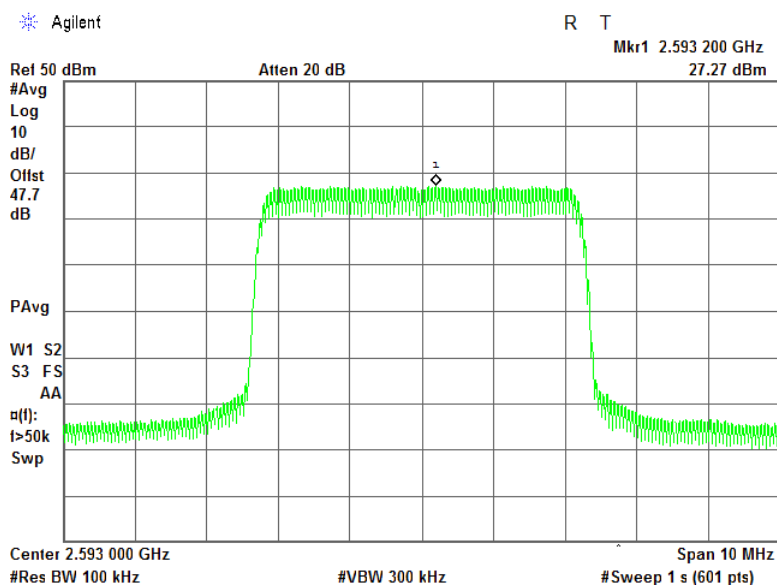


Plot 7.1.4 Power spectral density test results at low frequency, 64QAM, 5 MHz EBW RF # 1

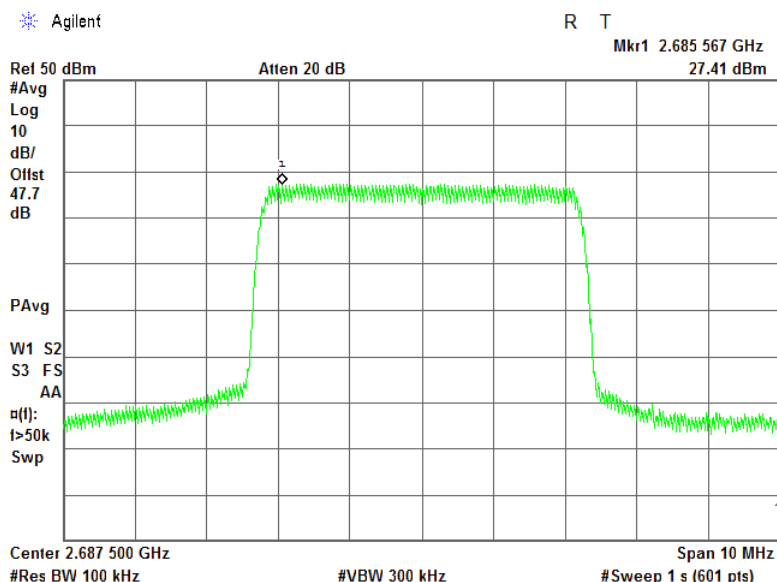


Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.5 Power spectral density test results at mid frequency, 64QAM, 5 MHz EBW RF # 1

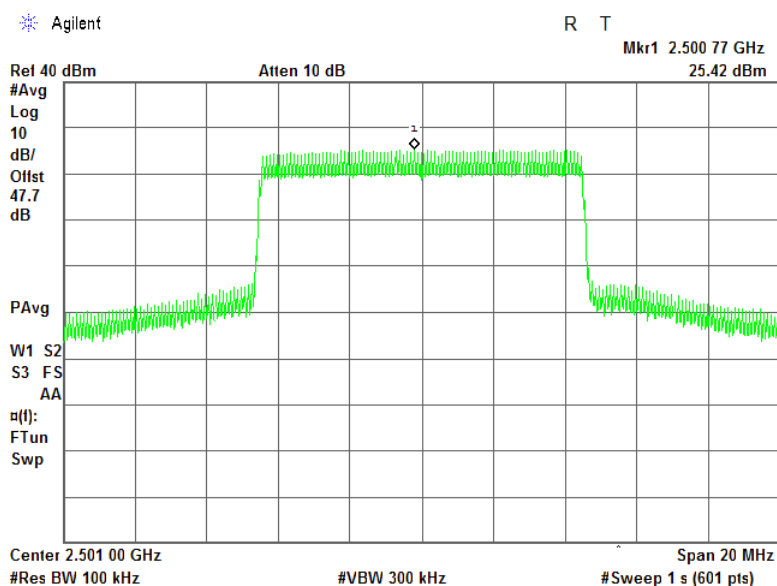


Plot 7.1.6 Power spectral density test results at high frequency, 64QAM, 5 MHz EBW RF # 1

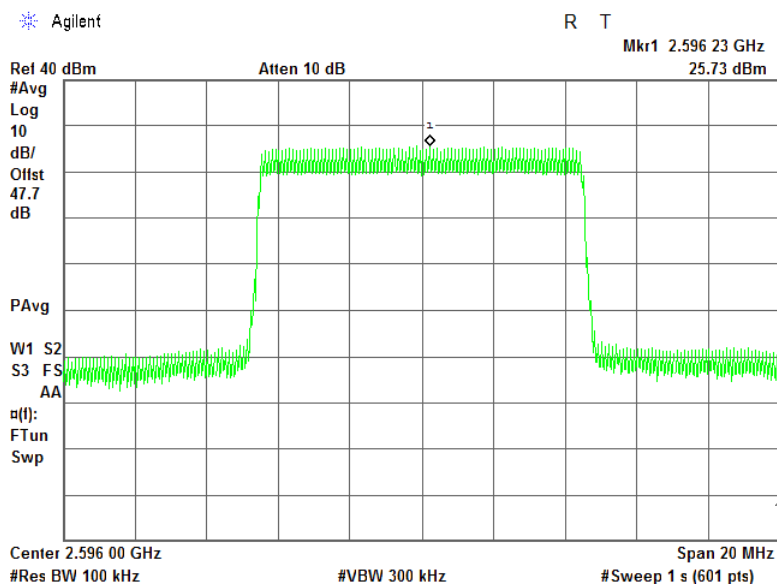


Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.7 Power spectral density test results at low frequency, QPSK, 10 MHz EBW RF # 1

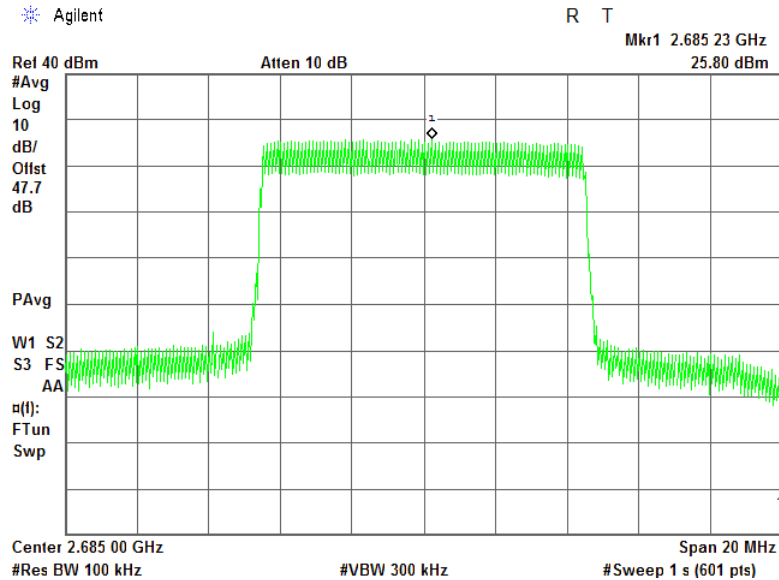


Plot 7.1.8 Power spectral density test results at mid frequency, QPSK, 10 MHz EBW RF # 1

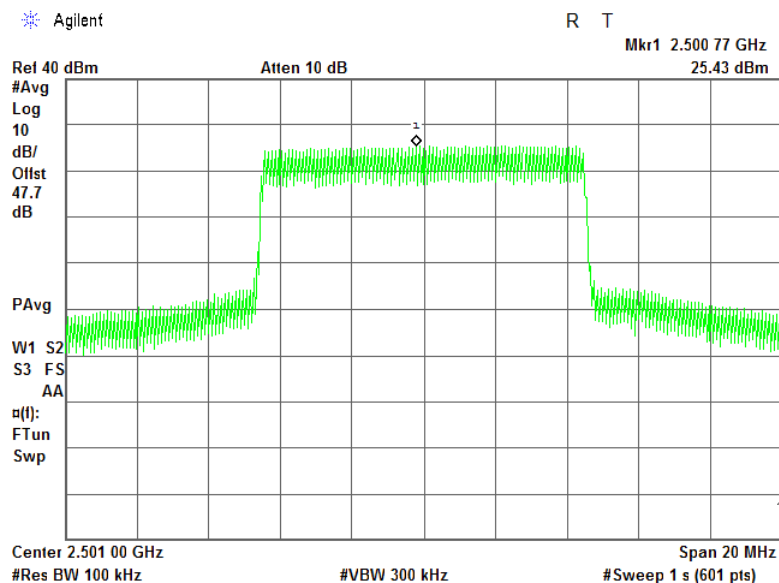


Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.9 Power spectral density test results at high frequency, QPSK, 10 MHz EBW RF # 1

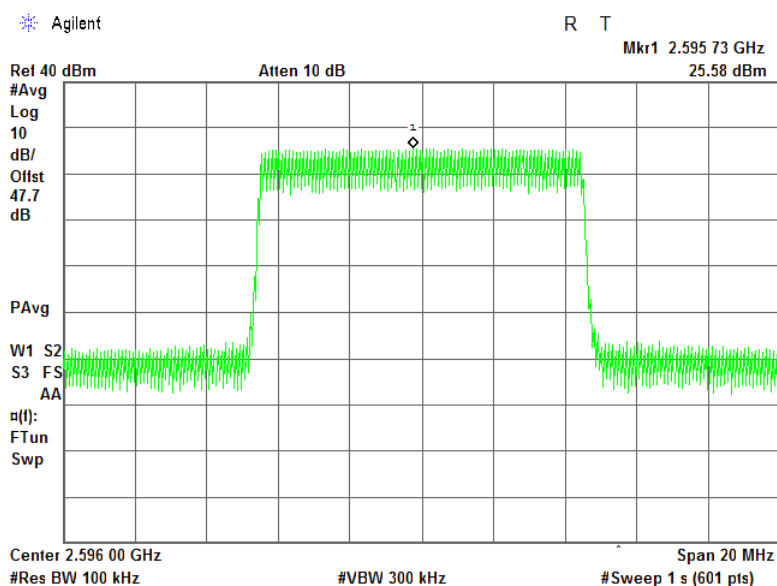


Plot 7.1.10 Power spectral density test results at low frequency, 64QAM, 10 MHz EBW RF # 1

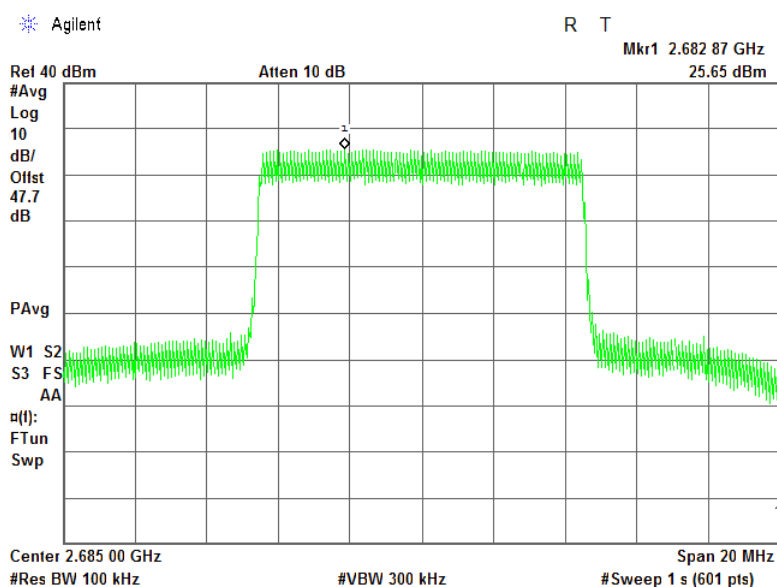


Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.11 Power spectral density test results at mid frequency, 64QAM, 10 MHz EBW RF # 1

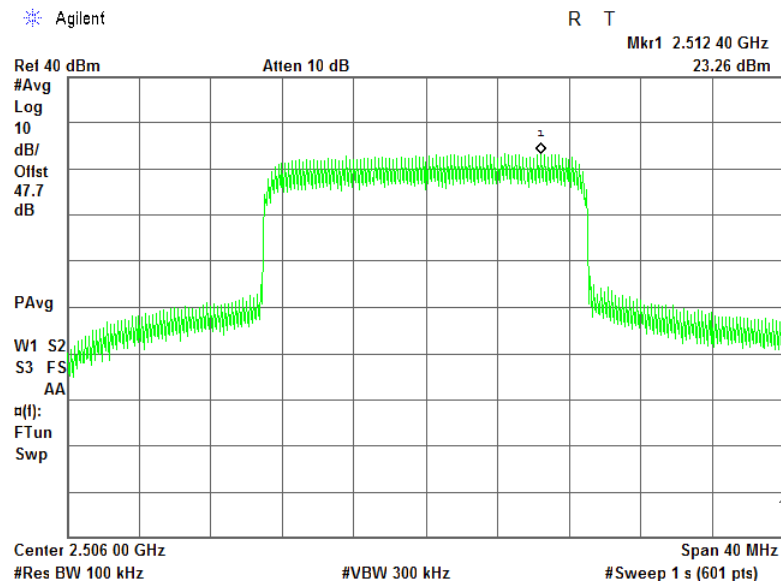


Plot 7.1.12 Power spectral density test results at high frequency, 64QAM, 10 MHz EBW RF # 1

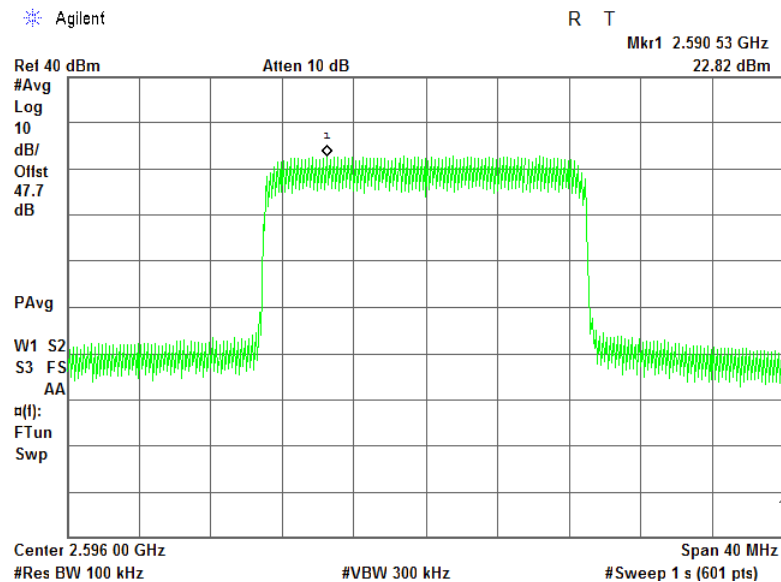


Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.13 Power spectral density test results at low frequency, QPSK, 20 MHz EBW RF # 1

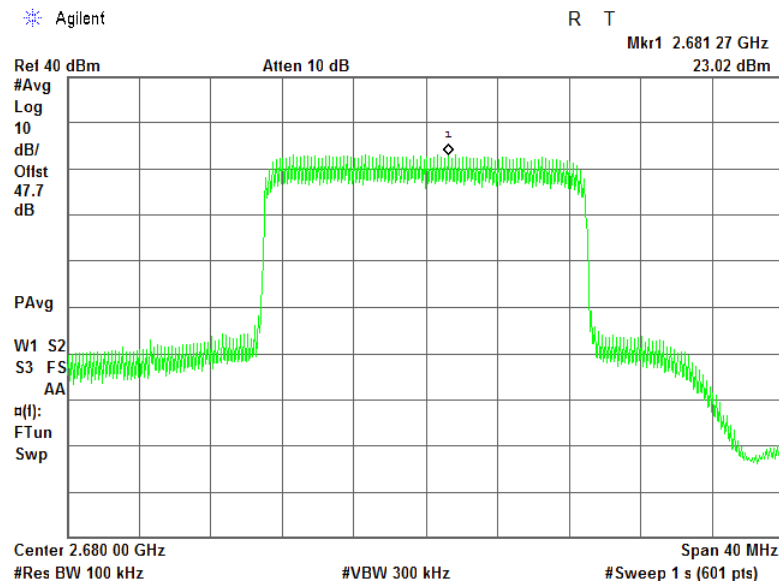


Plot 7.1.14 Power spectral density test results at mid frequency, QPSK, 20 MHz EBW RF # 1

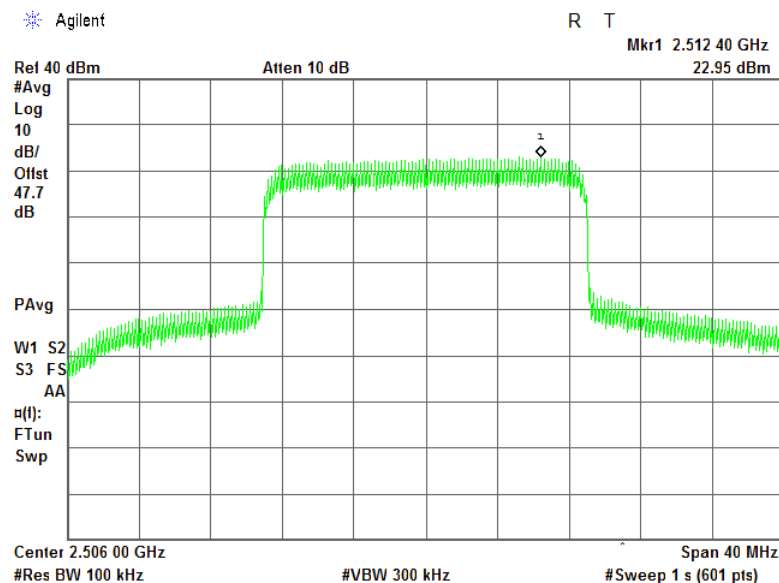


Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.15 Power spectral density test results at high frequency, QPSK, 20 MHz EBW RF # 1

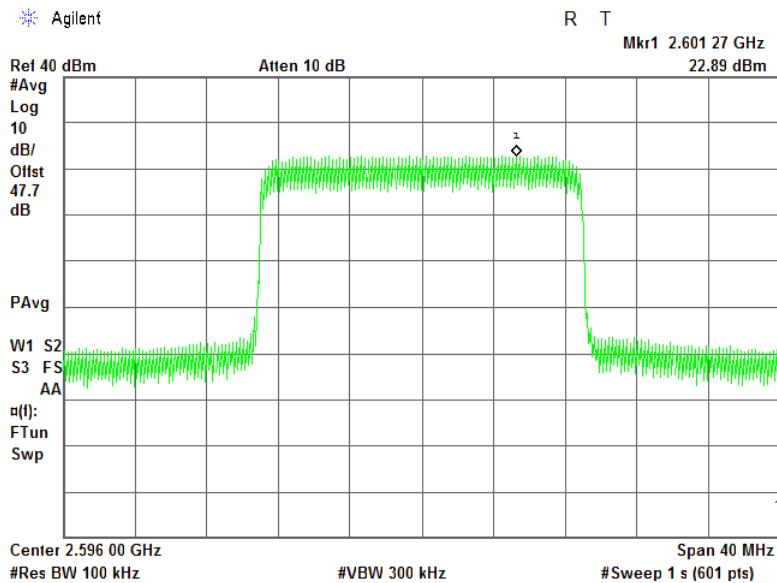


Plot 7.1.16 Power spectral density test results at low frequency, 64QAM, 20 MHz EBW RF # 1

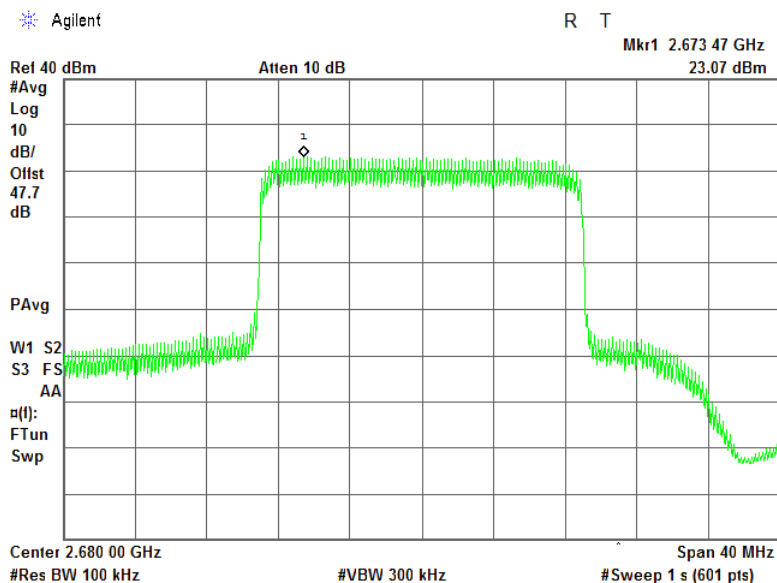


Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.17 Power spectral density test results at mid frequency, 64QAM, 20 MHz EBW RF # 1

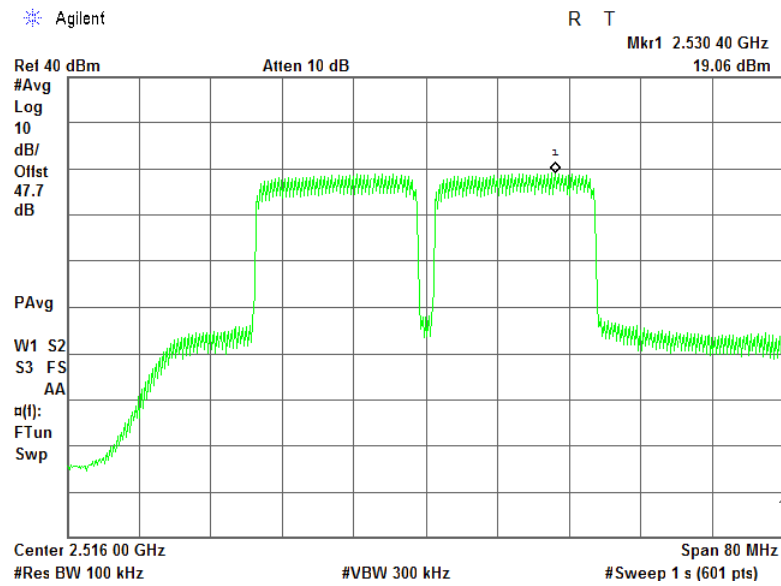


Plot 7.1.18 Power spectral density test results at high frequency, 64QAM, 20 MHz EBW RF # 1

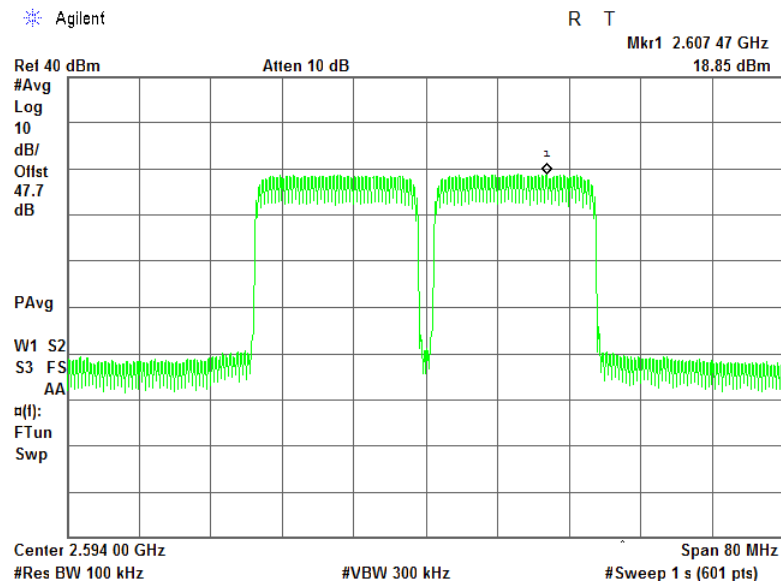


Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.19 Power spectral density test results at low frequency, QPSK, 40 MHz EBW RF # 1

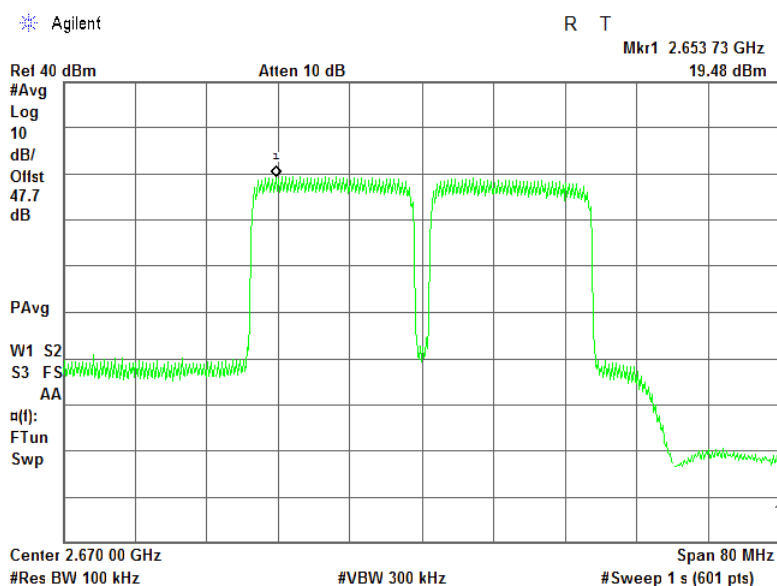


Plot 7.1.20 Power spectral density test results at mid frequency, QPSK, 40 MHz EBW RF # 1

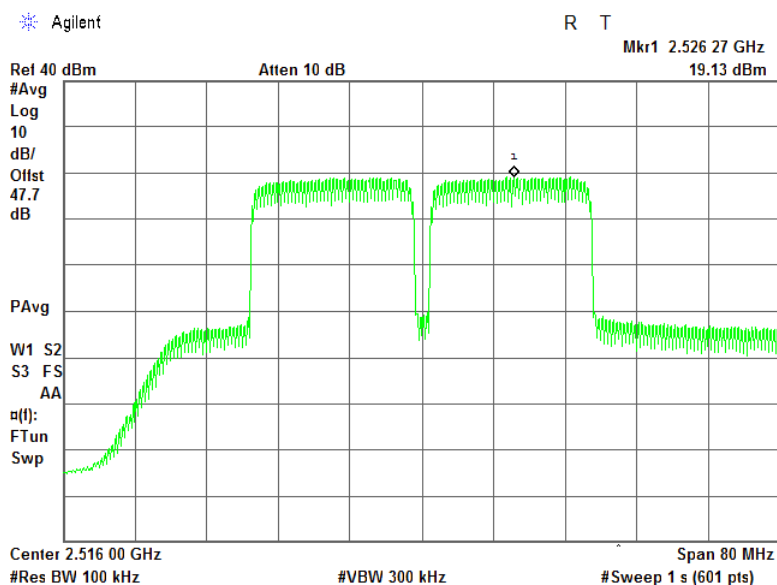


Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.21 Power spectral density test results at high frequency, QPSK, 40 MHz EBW RF # 1

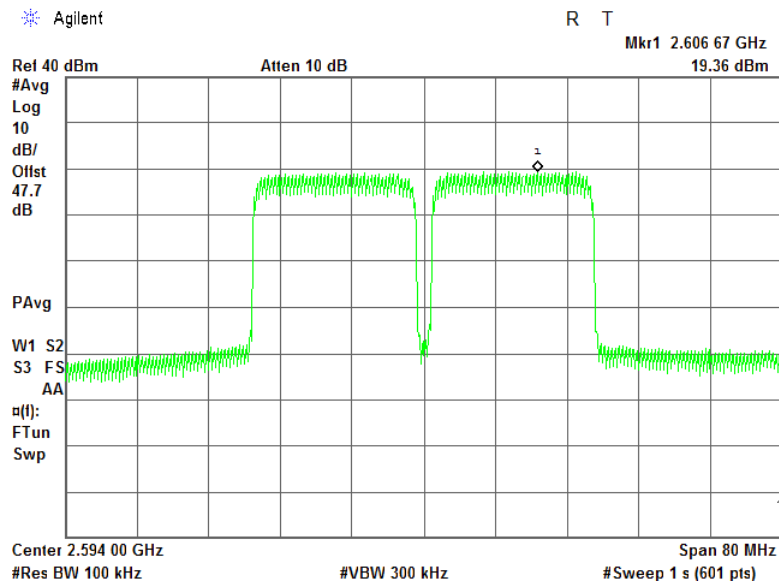


Plot 7.1.22 Power spectral density test results at low frequency, 64QAM, 40 MHz EBW RF # 1

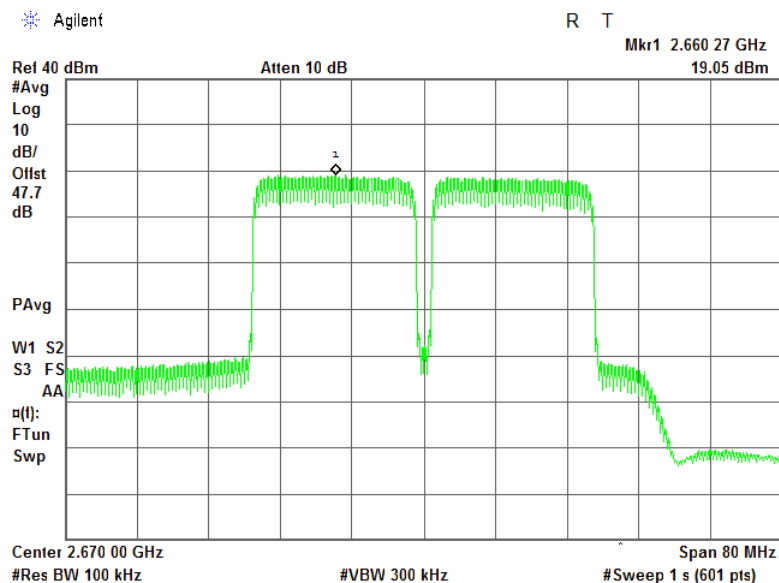


Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.23 Power spectral density test results at mid frequency, 64QAM, 40 MHz EBW RF # 1

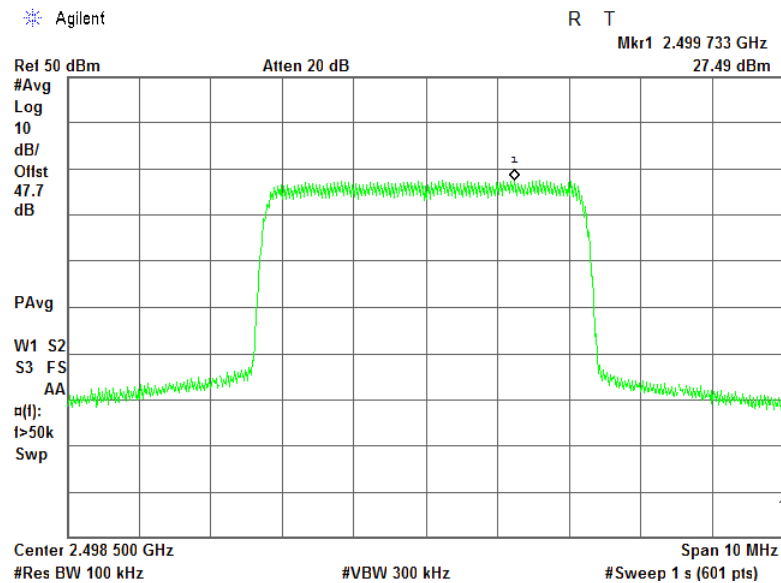


Plot 7.1.24 Power spectral density test results at high frequency, 64QAM, 40 MHz EBW RF # 1

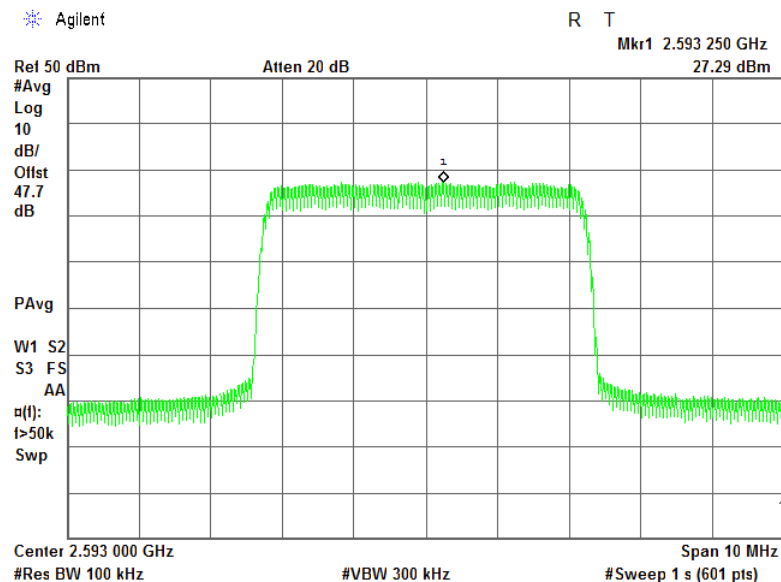


Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.25 Power spectral density test results at low frequency, QPSK, 5 MHz EBW RF # 2

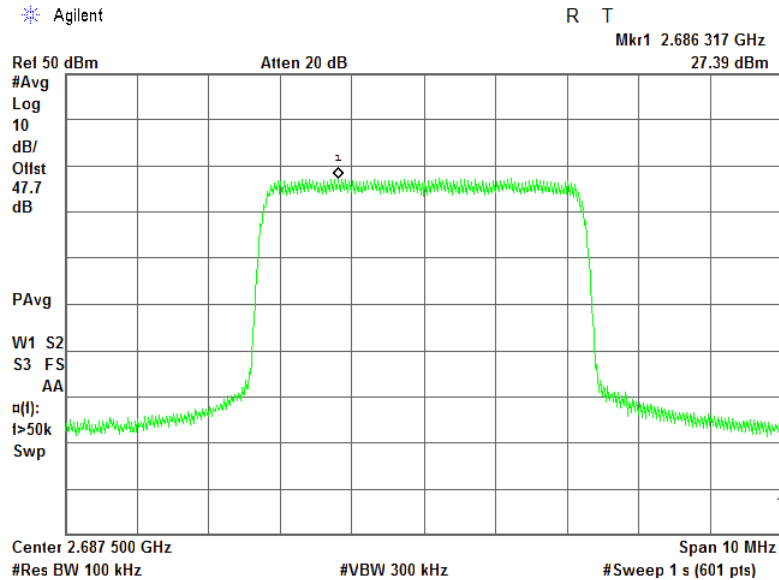


Plot 7.1.26 Power spectral density test results at mid frequency, QPSK, 5 MHz EBW RF # 2

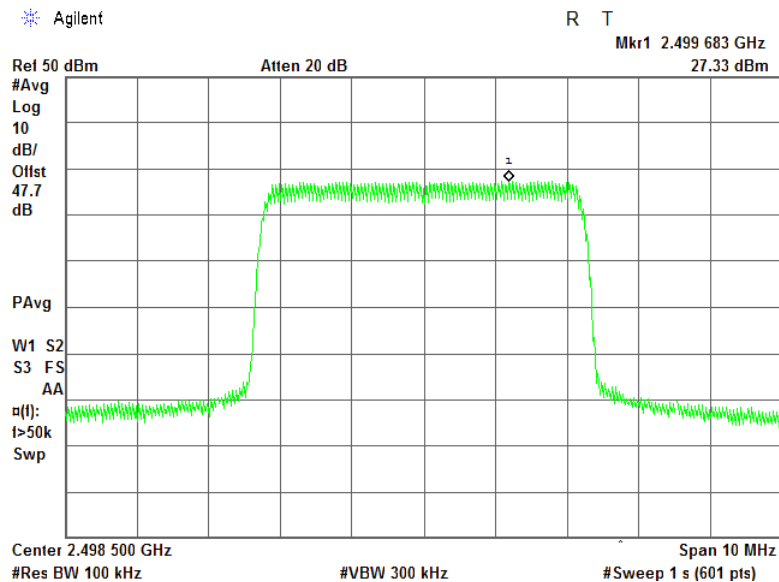


Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.27 Power spectral density test results at high frequency, QPSK, 5 MHz EBW RF # 2

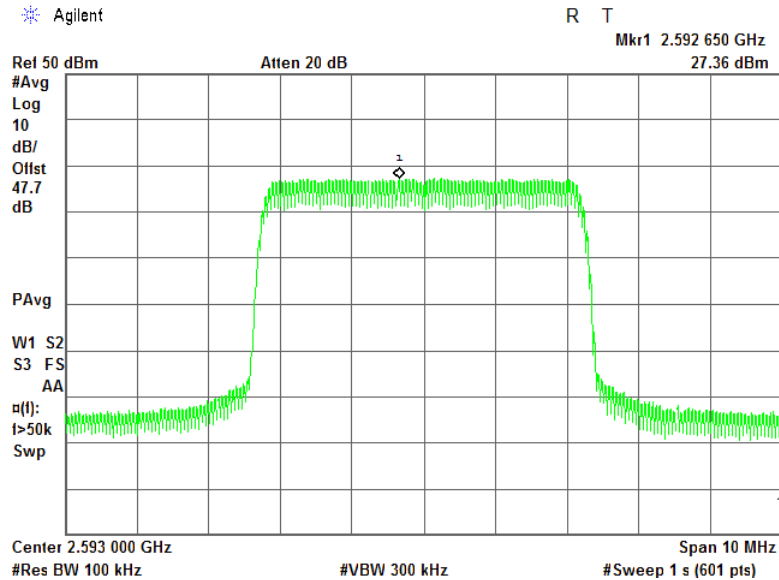


Plot 7.1.28 Power spectral density test results at low frequency, 64QAM, 5 MHz EBW RF # 2

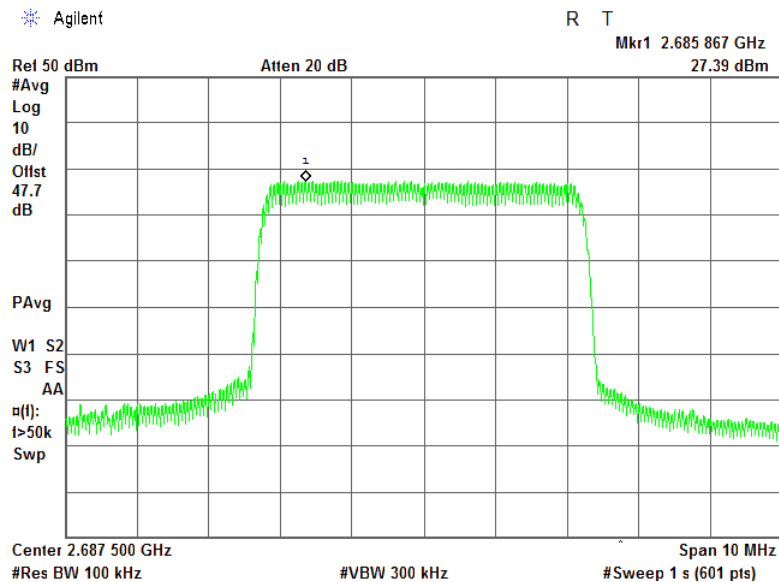


Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.29 Power spectral density test results at mid frequency, 64QAM, 5 MHz EBW RF # 2

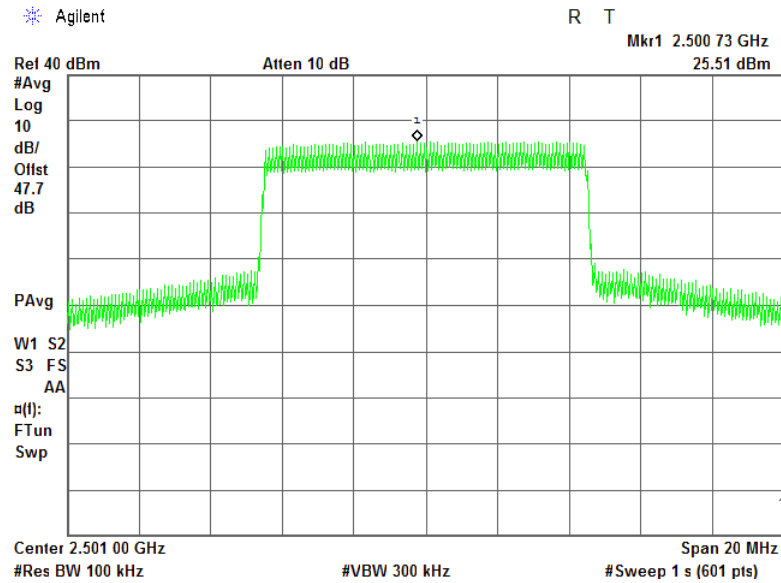


Plot 7.1.30 Power spectral density test results at high frequency, 64QAM, 5 MHz EBW RF # 2

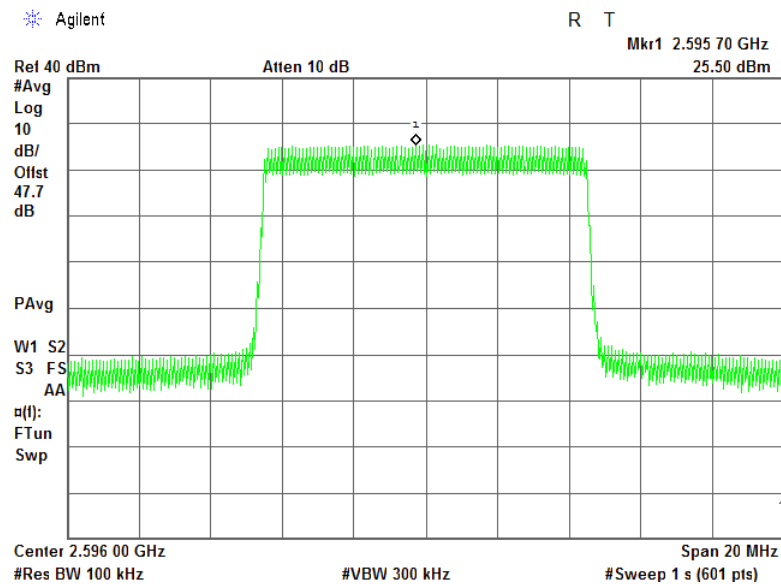


Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.31 Power spectral density test results at low frequency, QPSK, 10 MHz EBW RF # 2

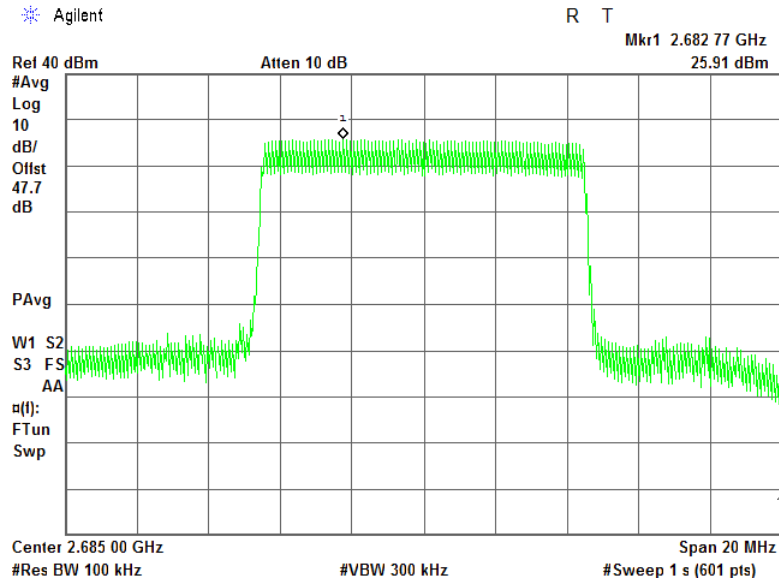


Plot 7.1.32 Power spectral density test results at mid frequency, QPSK, 10 MHz EBW RF # 2

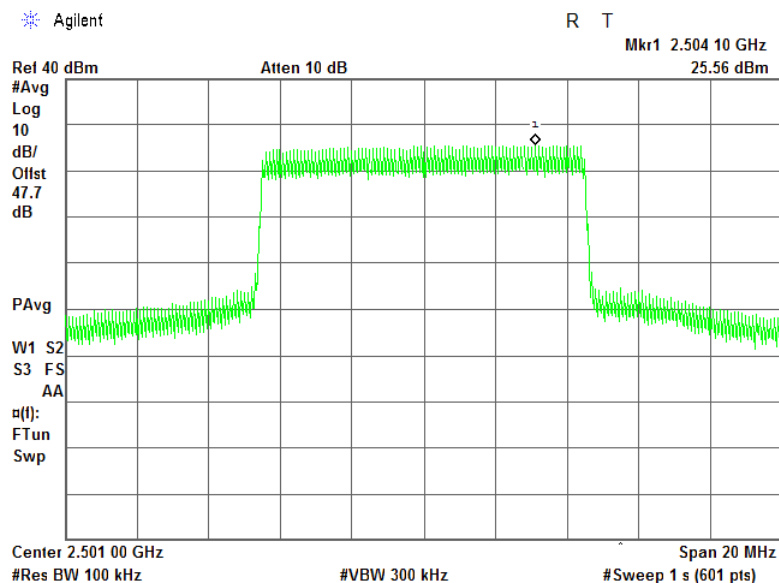


Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.33 Power spectral density test results at high frequency, QPSK, 10 MHz EBW RF # 2

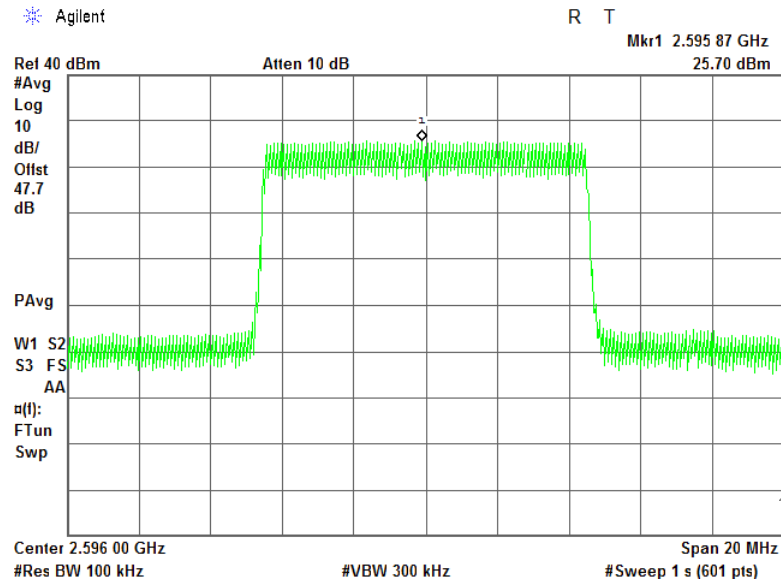


Plot 7.1.34 Power spectral density test results at low frequency, 64QAM, 10 MHz EBW RF # 2

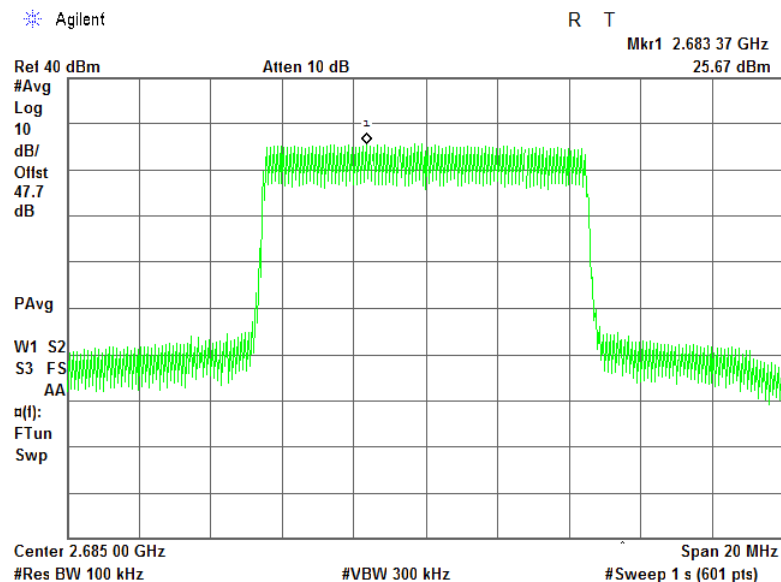


Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.35 Power spectral density test results at mid frequency, 64QAM, 10 MHz EBW RF # 2

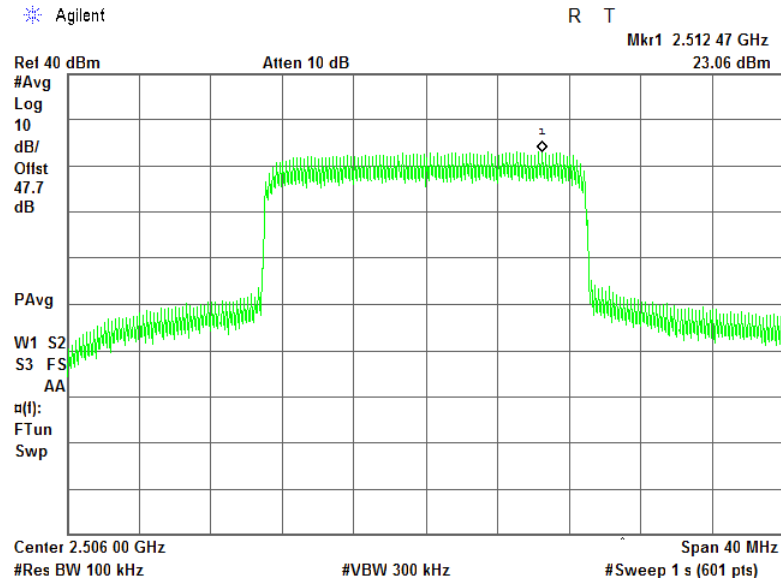


Plot 7.1.36 Power spectral density test results at high frequency, 64QAM, 10 MHz EBW RF # 2

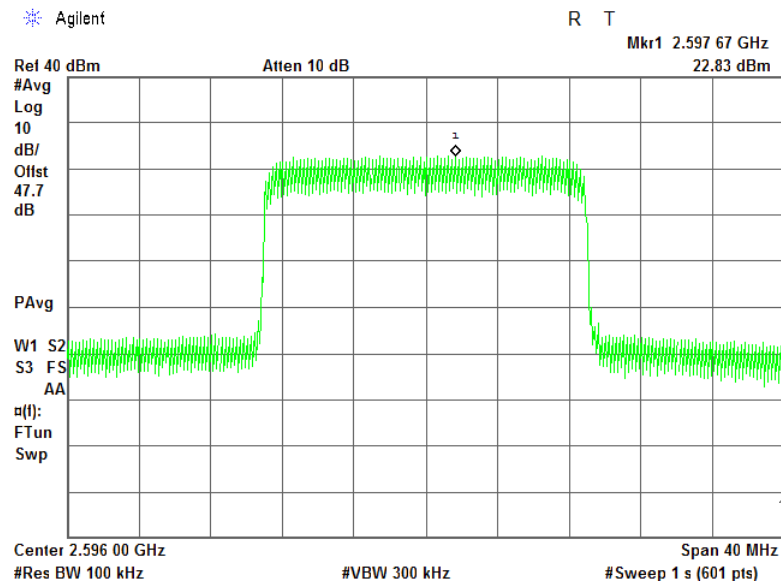


Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.37 Power spectral density test results at low frequency, QPSK, 20 MHz EBW RF # 2

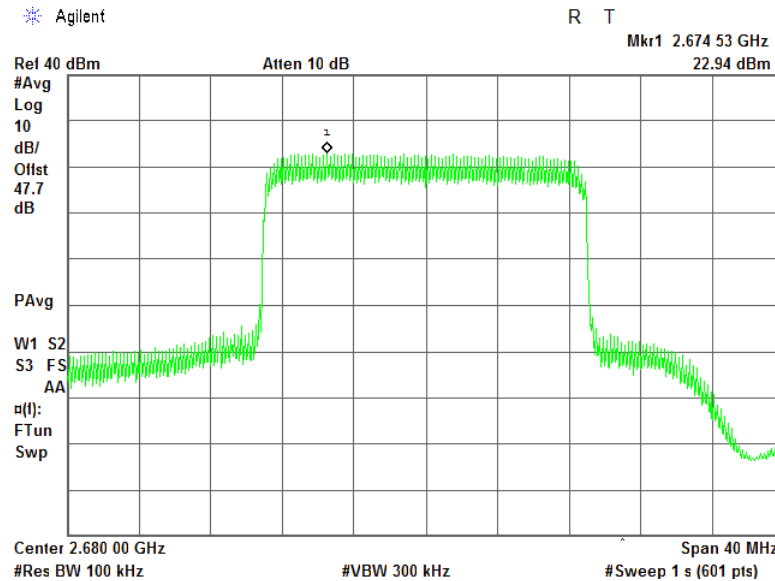


Plot 7.1.38 Power spectral density test results at mid frequency, QPSK, 20 MHz EBW RF # 2

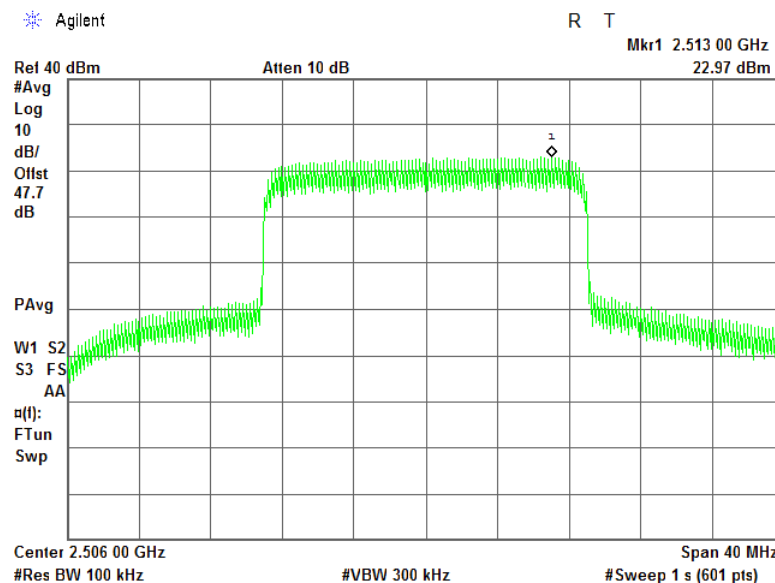


Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.39 Power spectral density test results at high frequency, QPSK, 20 MHz EBW RF # 2

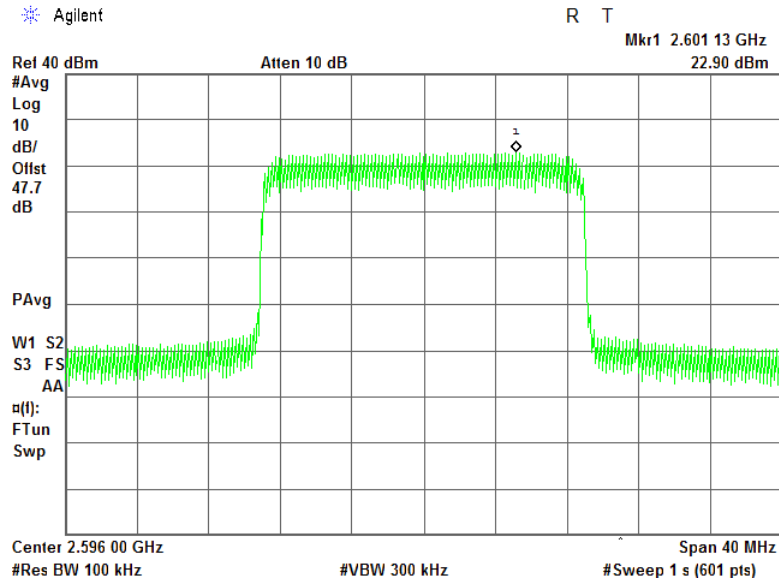


Plot 7.1.40 Power spectral density test results at low frequency, 64QAM, 20 MHz EBW RF # 2

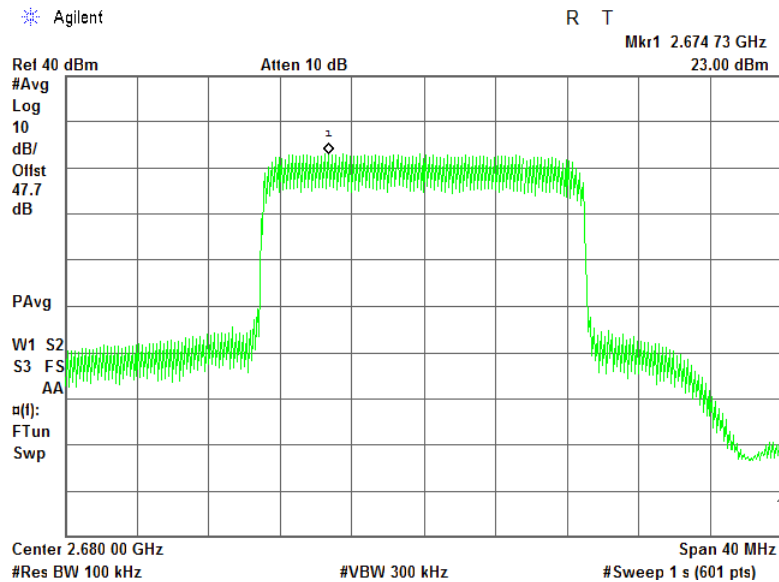


Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.41 Power spectral density test results at mid frequency, 64QAM, 20 MHz EBW RF # 2

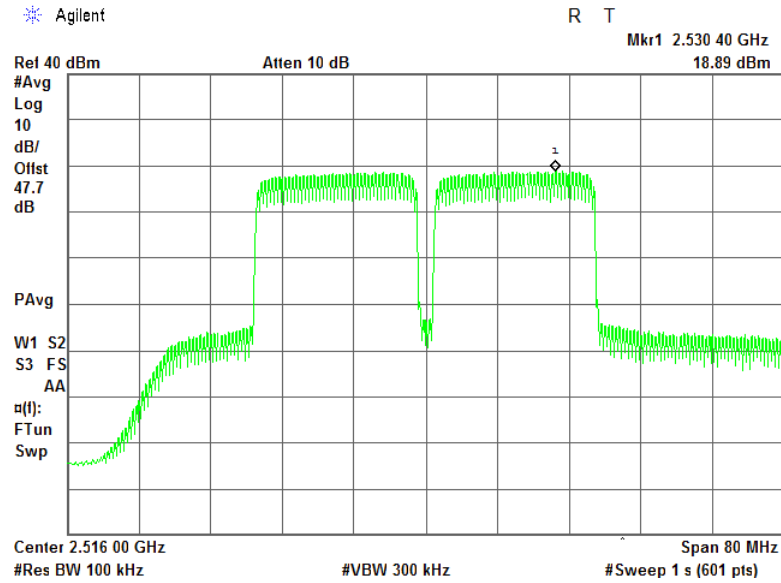


Plot 7.1.42 Power spectral density test results at high frequency, 64QAM, 20 MHz EBW RF # 2

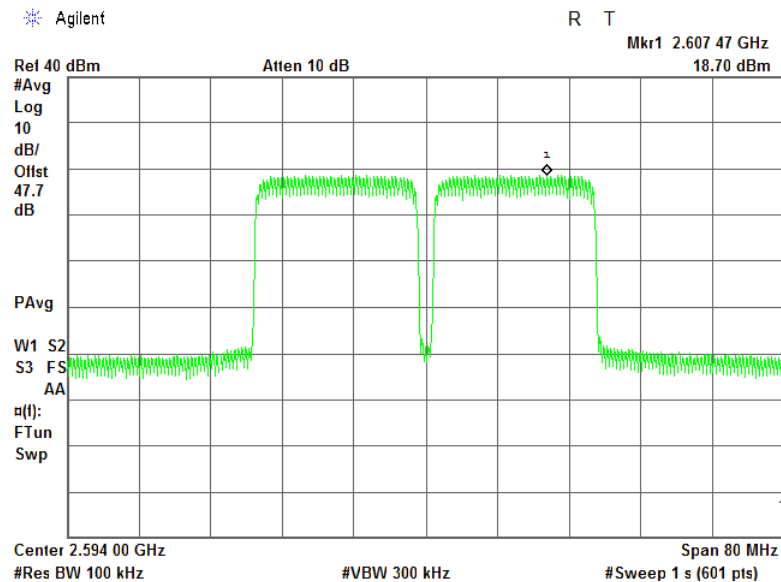


Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.43 Power spectral density test results at low frequency, QPSK, 40 MHz EBW RF # 2

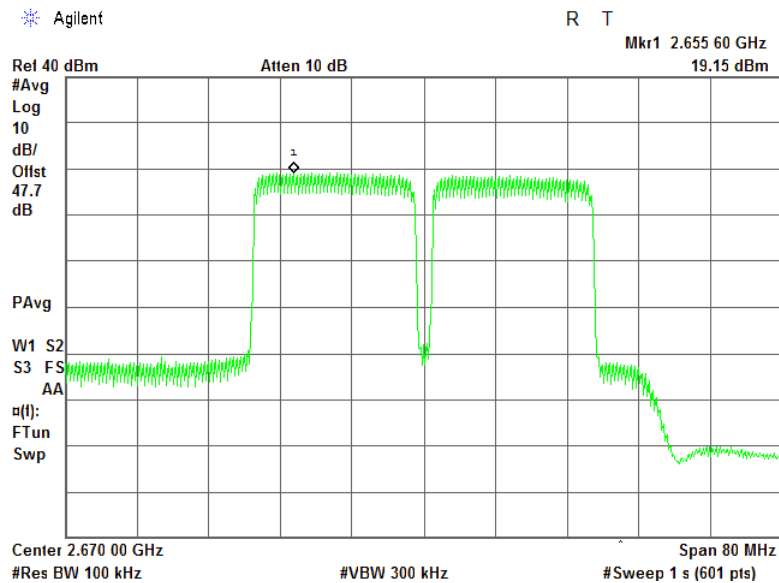


Plot 7.1.44 Power spectral density test results at mid frequency, QPSK, 40 MHz EBW RF # 2

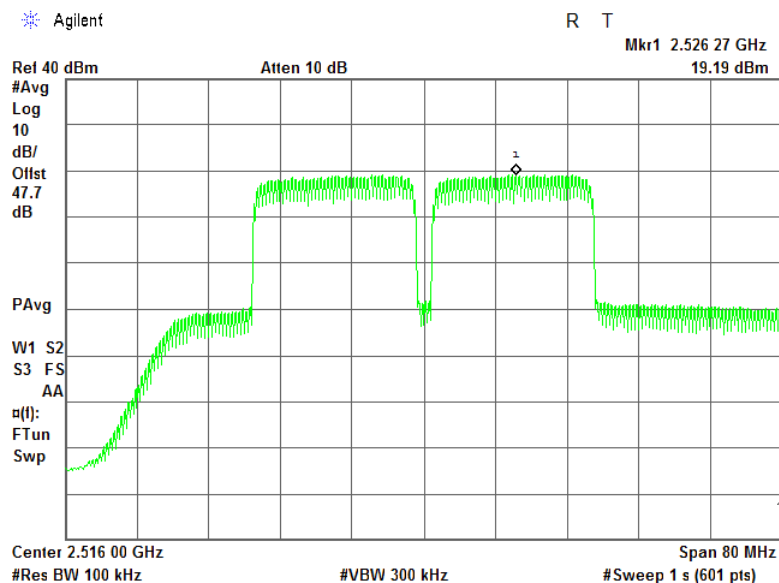


Test specification:		Section 27.50, Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.45 Power spectral density test results at high frequency, QPSK, 40 MHz EBW RF # 2

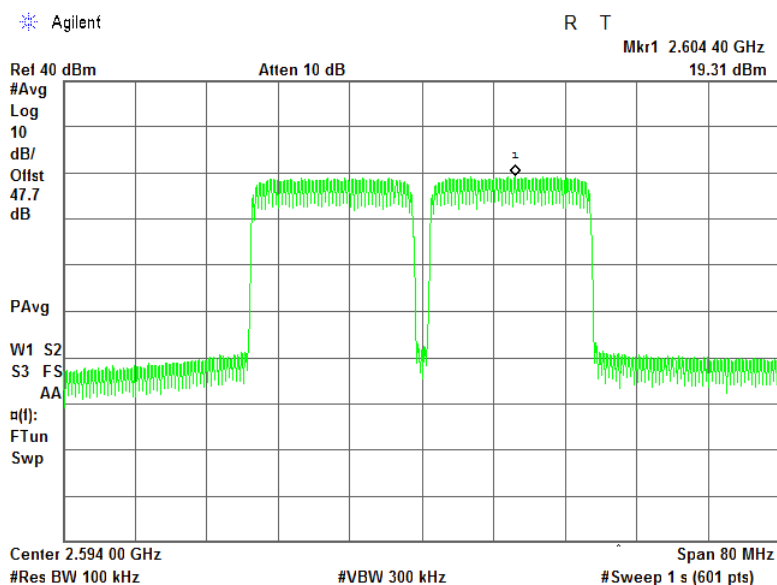


Plot 7.1.46 Power spectral density test results at low frequency, 64QAM, 40 MHz EBW RF # 2

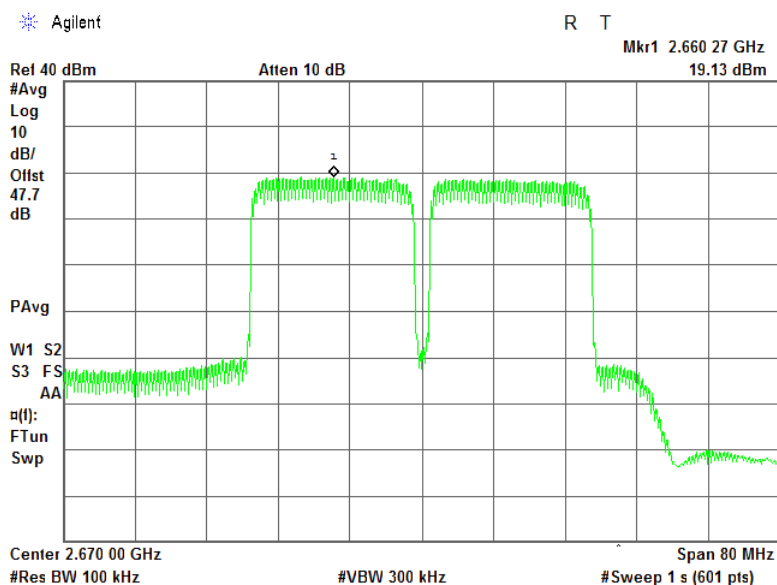


Test specification: Section 27.50, Peak output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-D, Section 2.2.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.1.47 Power spectral density test results at mid frequency, 64QAM, 40 MHz EBW RF # 2



Plot 7.1.48 Power spectral density test results at high frequency, 64QAM, 40 MHz EBW RF # 2



Test specification: Section 27.53, Spurious emissions at RF antenna connector			
Test procedure: 47 CFR, Sections 2.1051, 27.53			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

7.2 Spurious emissions at RF antenna connector test

7.2.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Spurious emission limits

Frequency, MHz	Attenuation below carrier, dBc	Spurious emissions, dBm
Base and fixed user stations		
0.009 – 10th harmonic	$43+10\log P(W)^{**}$	-13.0

* - spurious emission limits do not apply to the channel edge emission investigated in course of band edge emission testing

** - P is transmitter output power in watts

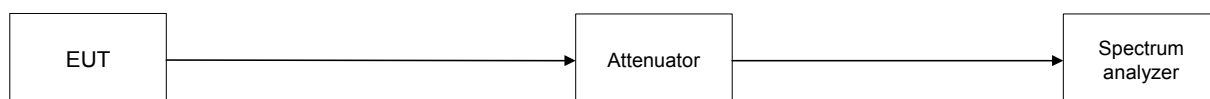
7.2.2 Test procedure

7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.

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

7.2.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.2.2 and associated plots.

Figure 7.2.1 Spurious emission test setup, single output





Test specification: Section 27.53, Spurious emissions at RF antenna connector			
Test procedure: 47 CFR, Sections 2.1051, 27.53			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Table 7.2.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 2496 - 2690 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 –27000 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATION: 64 QAM
 EMISSION BANDWIDTH: 5 MHz

Frequency, MHz	SA reading, dBm	Attenuation, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency 2498.5 MHz								
2489.99	-20.42	included	included	1000	-20.42	-13.00	-7.42	Pass
2507.14	-20.66	included	included	1000	-20.66	-13.00	-7.66	Pass
Mid carrier frequency 2593 MHz								
2584.89	-14.57	included	included	1000	-14.57	-13.00	-1.57	Pass
2601.15	-14.74	included	included	1000	-14.74	-13.00	-1.74	Pass
High carrier frequency 2687.5 MHz								
2679.00	-15.42	included	included	1000	-15.42	-13.00	-2.42	Pass
2696.00	-29.57	included	included	1000	-29.57	-13.00	-16.57	Pass

*- Margin = Spurious emission – specification limit.

Note: The offsets shown in the plots include the antenna chains integration $10 \times \log 2 = 3$ dB.

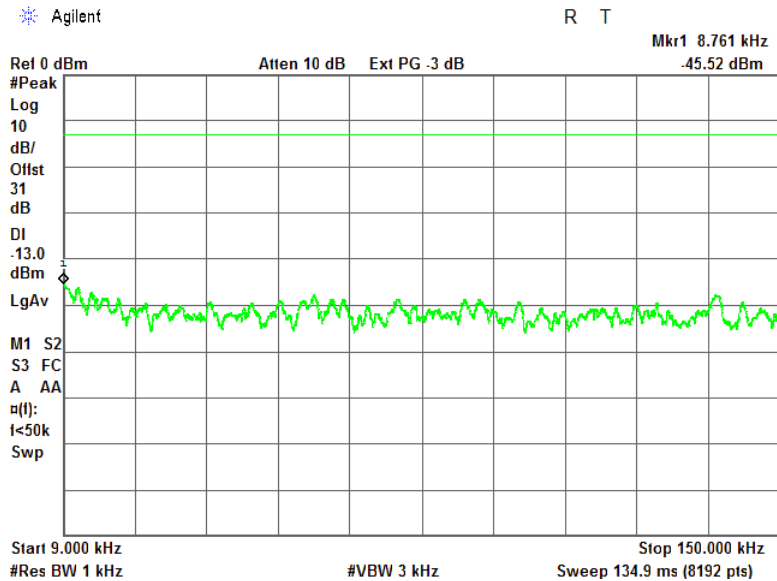
Reference numbers of test equipment used

HL 3322	HL 3818	HL 3901	HL 3903				
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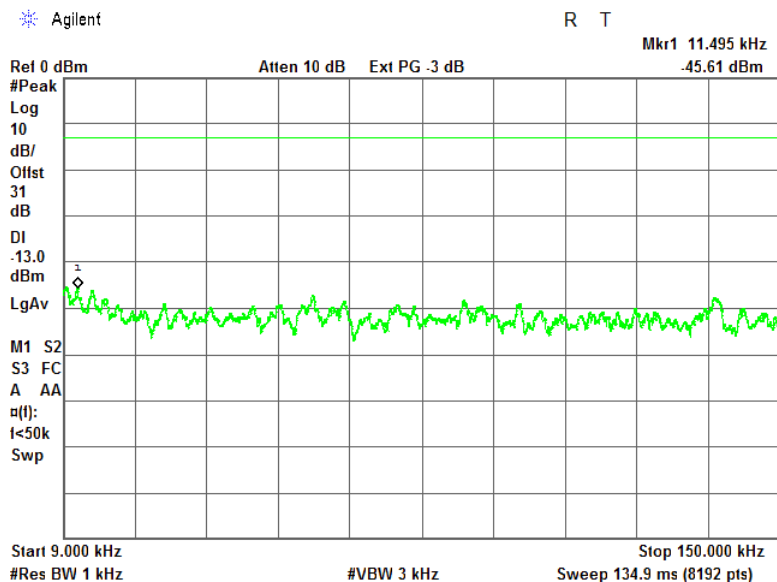
Full description is given in Appendix A.

Test specification: Section 27.53, Spurious emissions at RF antenna connector			
Test procedure: 47 CFR, Sections 2.1051, 27.53			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

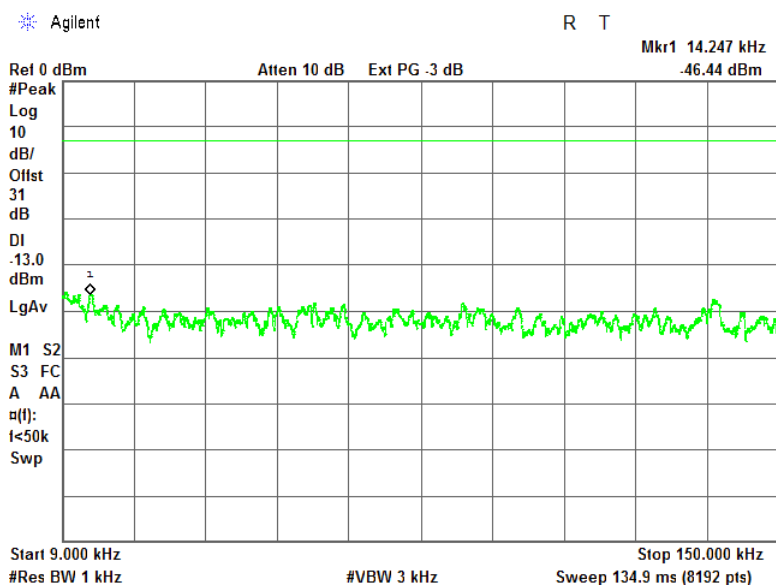


Plot 7.2.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

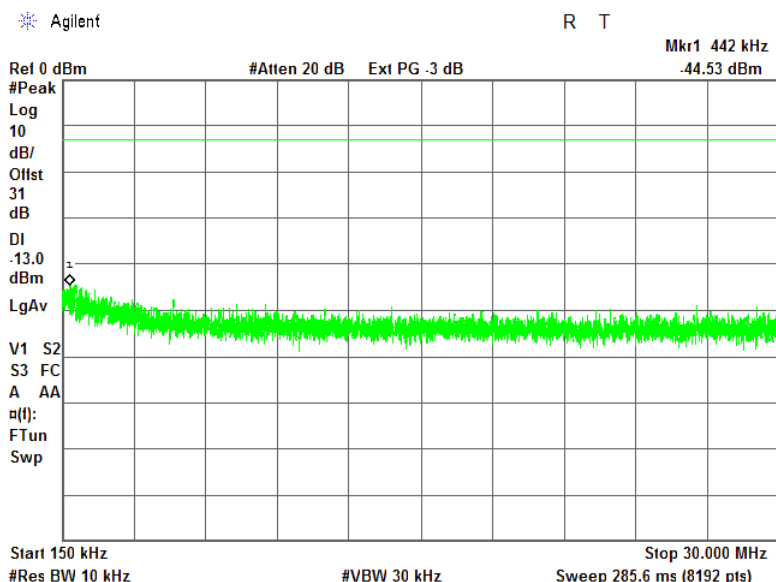


Test specification: Section 27.53, Spurious emissions at RF antenna connector			
Test procedure: 47 CFR, Sections 2.1051, 27.53			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

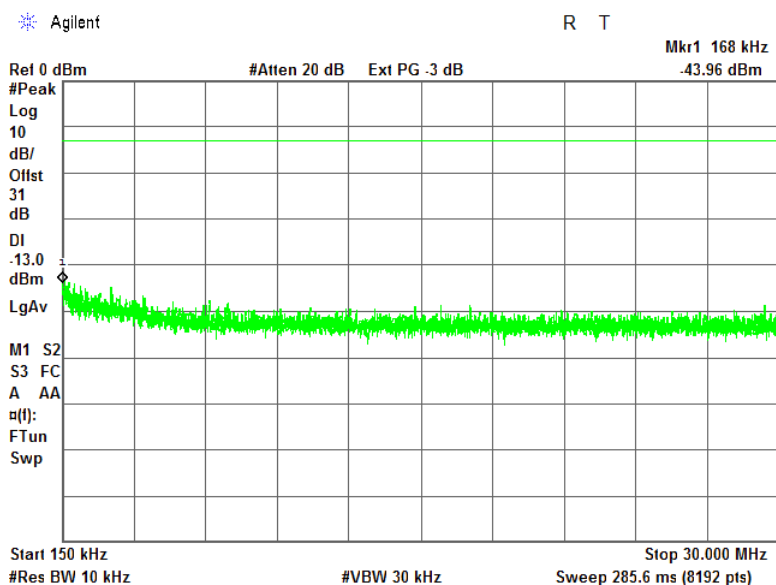


Plot 7.2.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

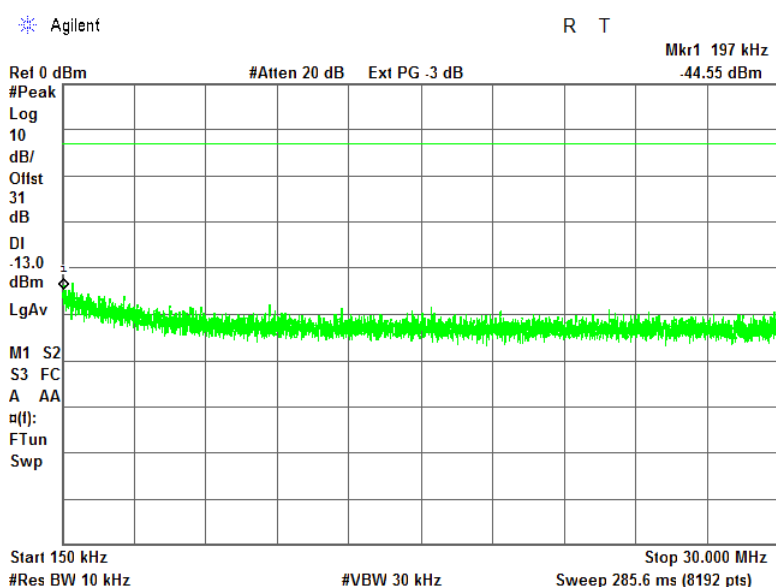


Test specification: Section 27.53, Spurious emissions at RF antenna connector			
Test procedure: 47 CFR, Sections 2.1051, 27.53			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency

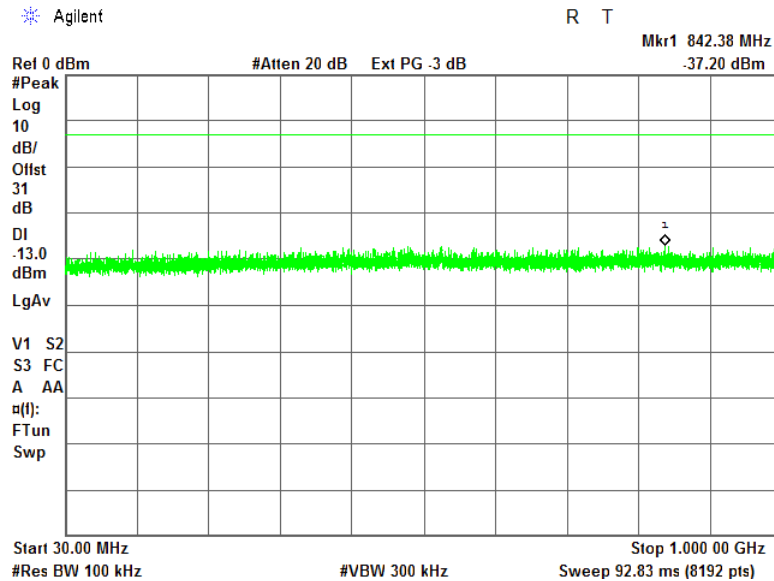


Plot 7.2.6 Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency

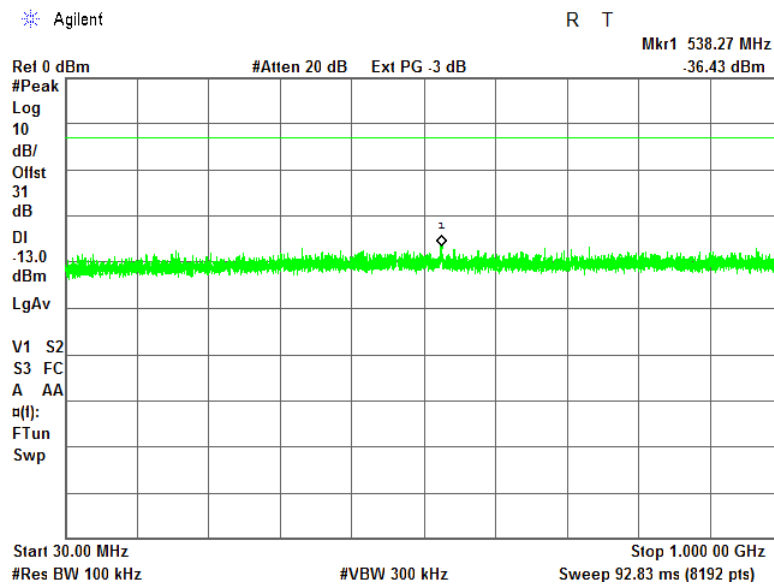


Test specification: Section 27.53, Spurious emissions at RF antenna connector			
Test procedure: 47 CFR, Sections 2.1051, 27.53			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.7 Spurious emission measurements in 30 - 1000 MHz range at low carrier frequency

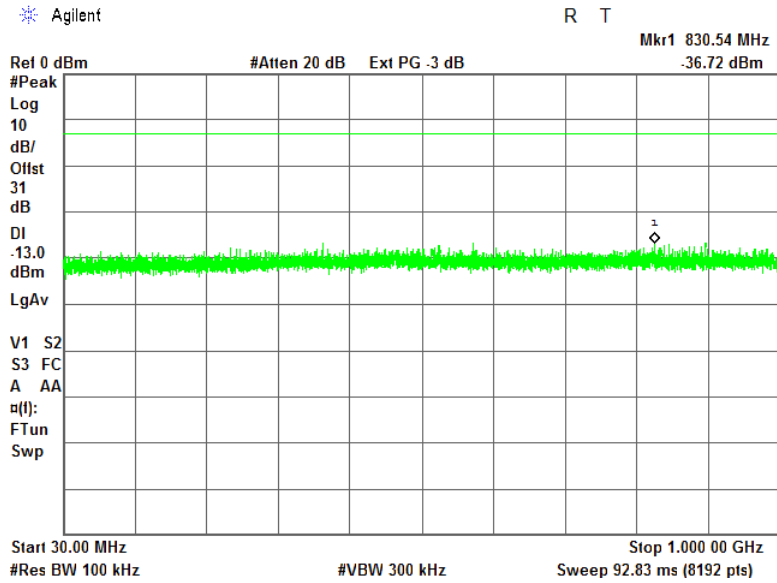


Plot 7.2.8 Spurious emission measurements in 30 - 1000 MHz range at mid carrier frequency



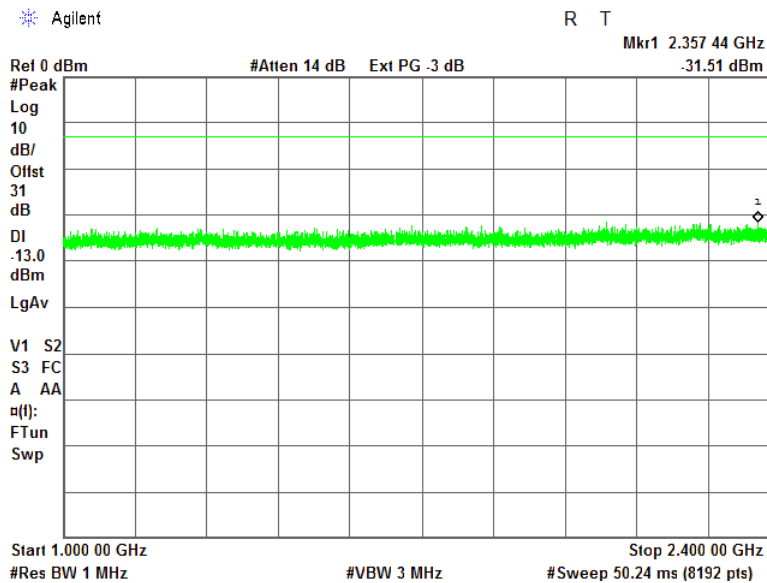
Test specification:		Section 27.53, Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.9 Spurious emission measurements in 30 - 1000 MHz range at high carrier frequency

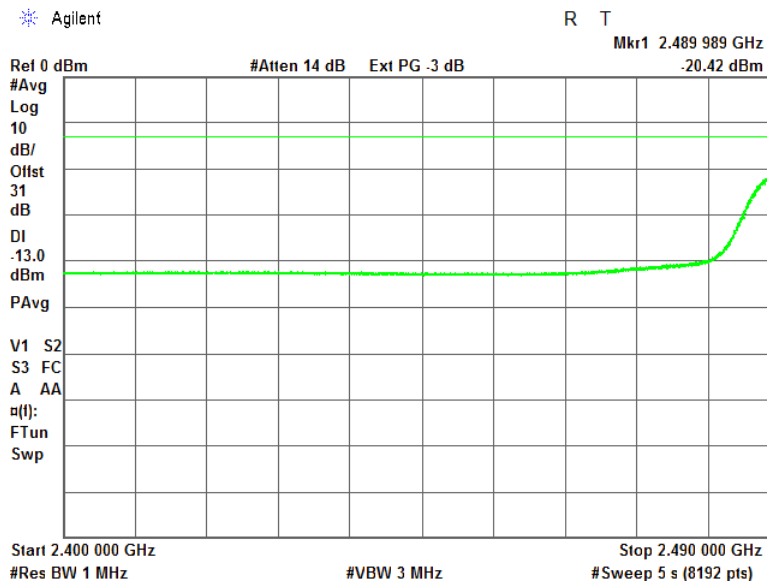


Test specification:		Section 27.53, Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.10 Spurious emission measurements in 1000 - 2400 MHz range at low carrier frequency



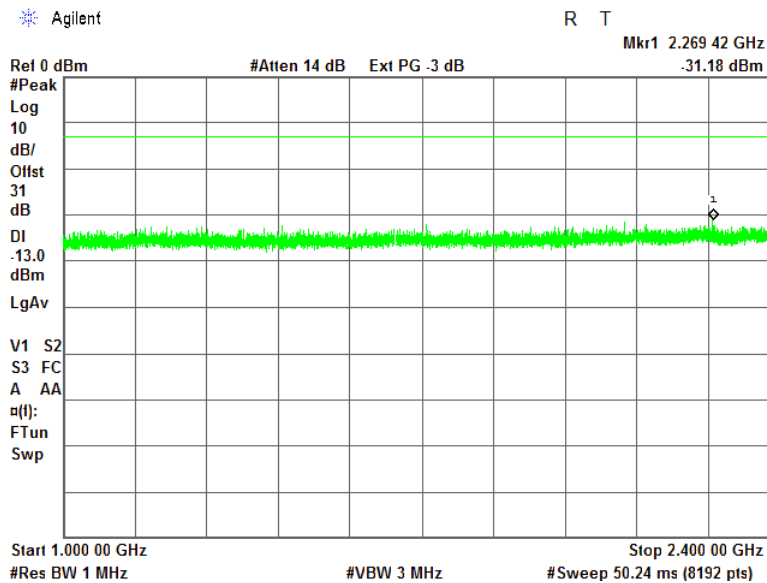
Plot 7.2.11 Spurious emission measurements in 2400 – 2490 MHz range at low carrier frequency



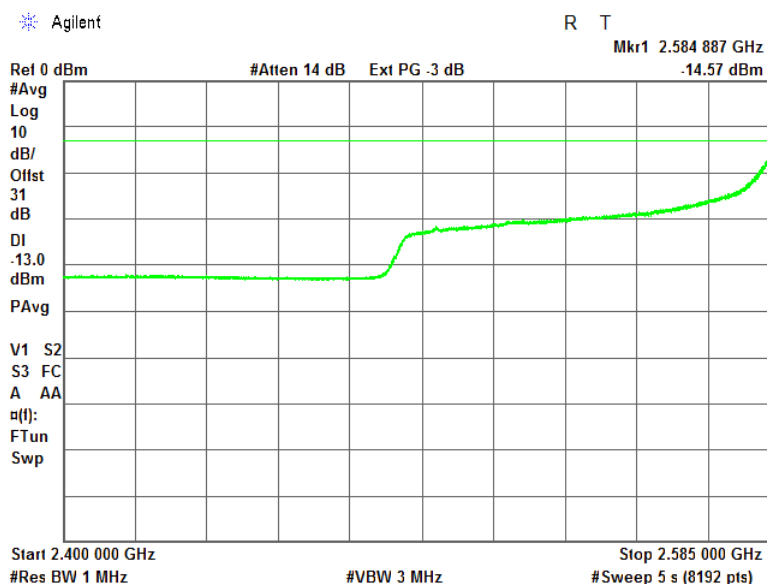
NOTE: Average Detector and Max Hold were used

Test specification:		Section 27.53, Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.12 Spurious emission measurements in 1000 - 2400 MHz range at mid carrier frequency



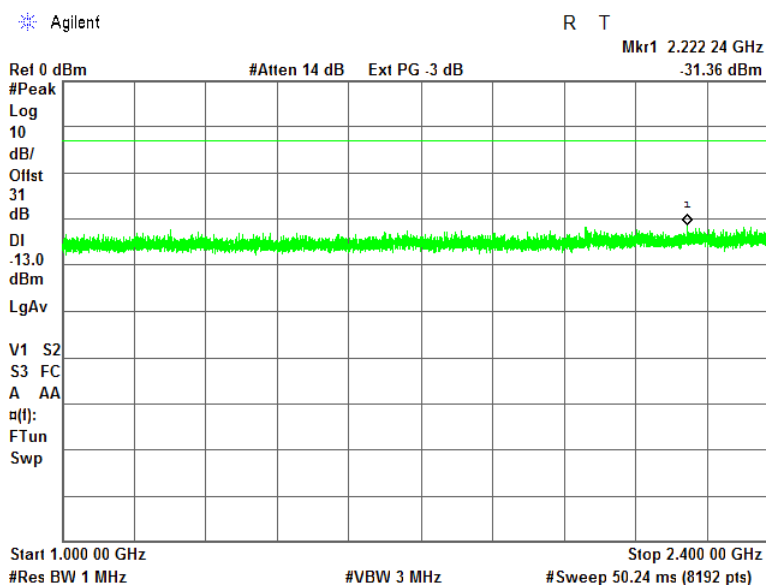
Plot 7.2.13 Spurious emission measurements in 2400 - 2585 MHz range at mid carrier frequency



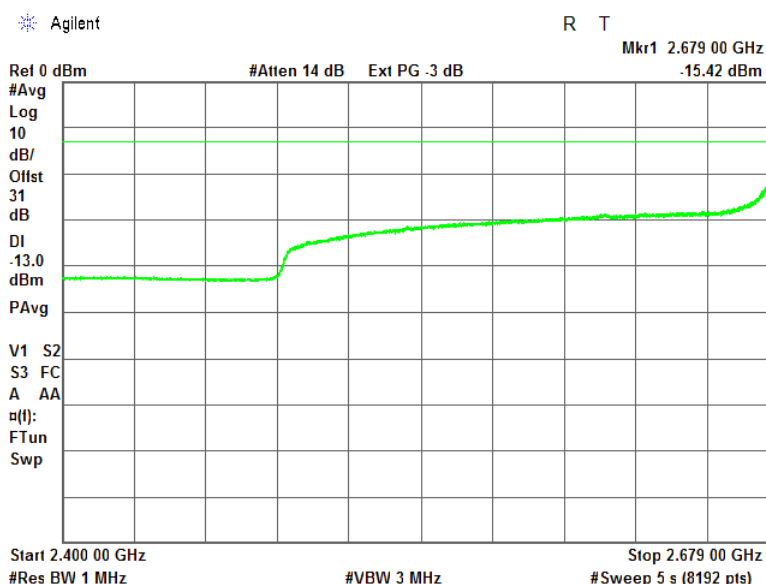
NOTE: Average Detector and Max Hold were used

Test specification: Section 27.53, Spurious emissions at RF antenna connector			
Test procedure: 47 CFR, Sections 2.1051, 27.53			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.14 Spurious emission measurements in 1000 - 2400 MHz range at high carrier frequency



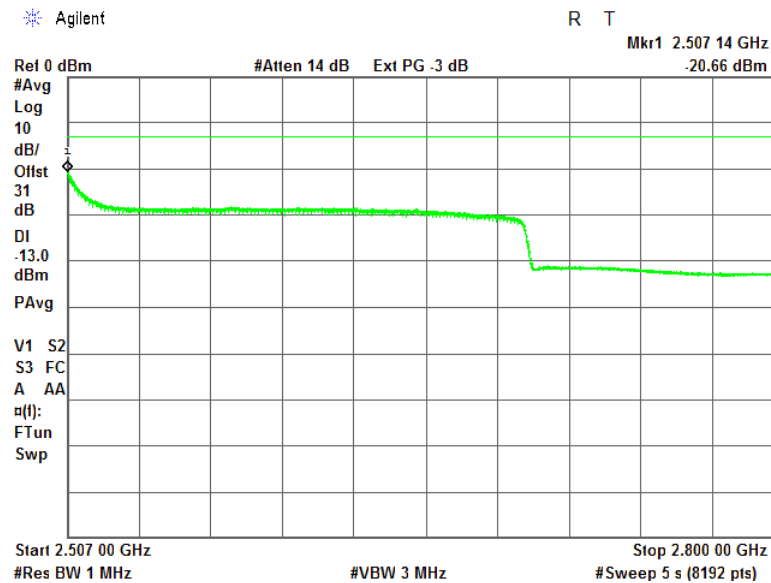
Plot 7.2.15 Spurious emission measurements in 2400 -2679 MHz range at high carrier



NOTE: Average Detector and Max Hold were used

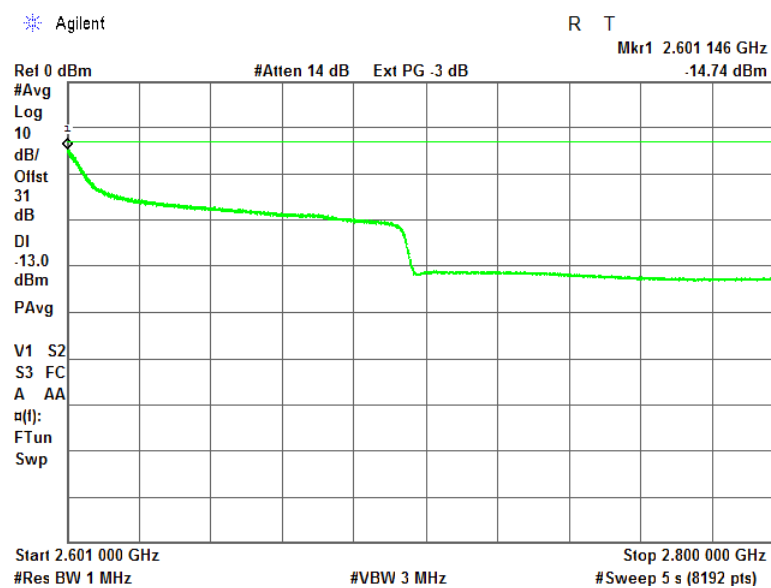
Test specification:		Section 27.53, Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		25-Dec-16	
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.16 Spurious emission measurements in 2507 - 2800 MHz range at low carrier frequency



NOTE: Average Detector and Max Hold were used

Plot 7.2.17 Spurious emission measurements in 2601 - 2800 MHz range at mid carrier frequency



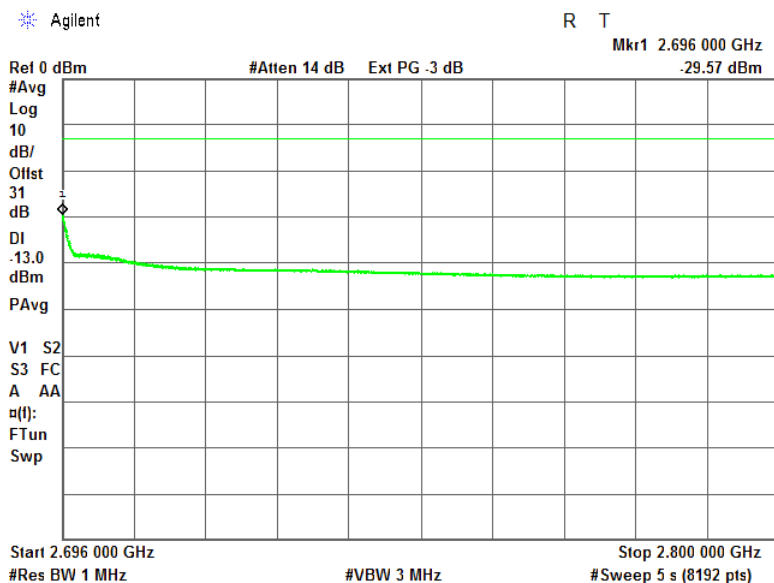
NOTE: Average Detector and Max Hold were used



HERMON LABORATORIES

Test specification: Section 27.53, Spurious emissions at RF antenna connector			
Test procedure: 47 CFR, Sections 2.1051, 27.53			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

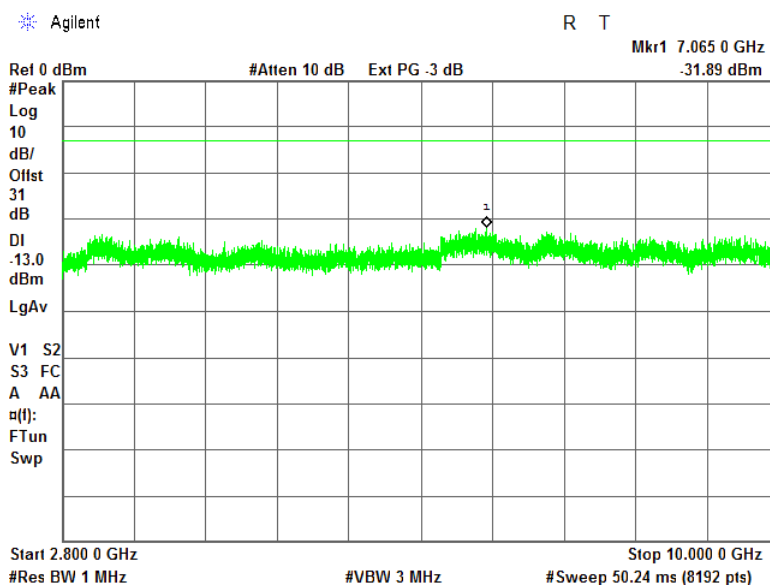
Plot 7.2.18 Spurious emission measurements in 2696 - 2800 MHz range at high carrier frequency



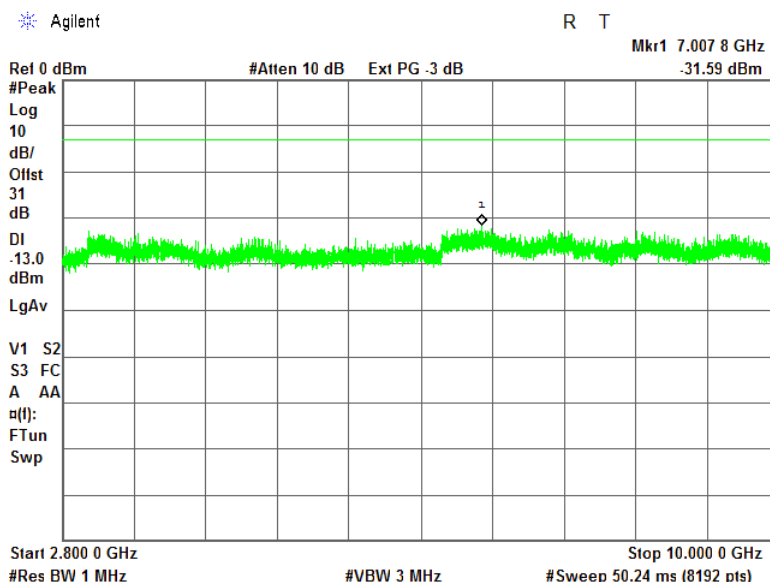
NOTE: Average Detector and Max Hold were used

Test specification: Section 27.53, Spurious emissions at RF antenna connector			
Test procedure: 47 CFR, Sections 2.1051, 27.53			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.19 Spurious emission measurements in 2800-10000 MHz range at low carrier frequency

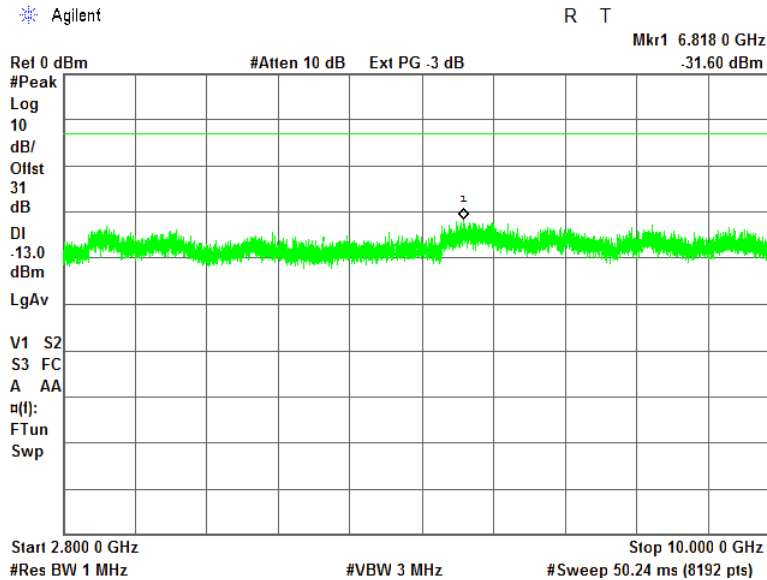


Plot 7.2.20 Spurious emission measurements in 2800 - 10000 MHz range at mid carrier frequency

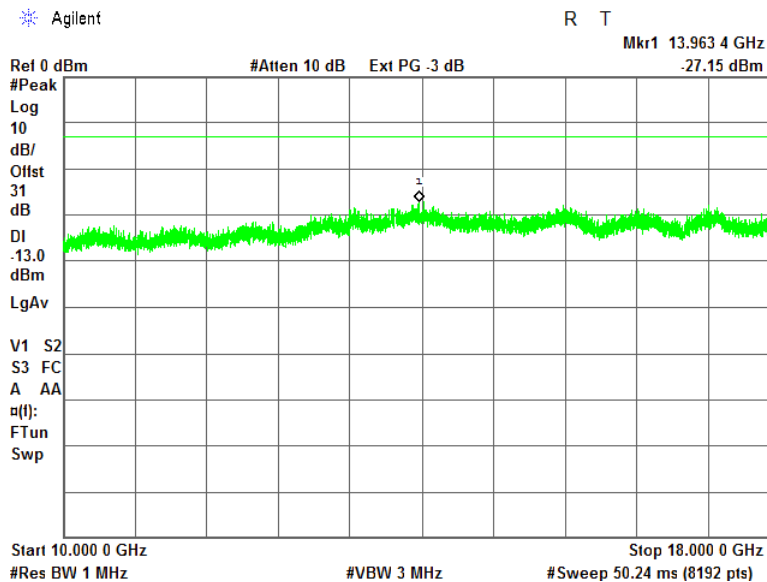


Test specification:		Section 27.53, Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Verdict: PASS	
Date(s):			
25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.21 Spurious emission measurements in 2800 - 10000 MHz range at high carrier frequency

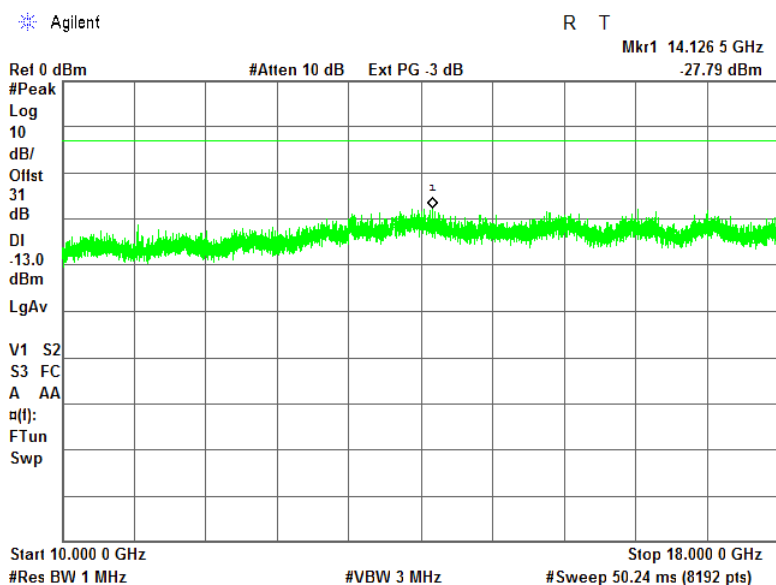


Plot 7.2.22 Spurious emission measurements in 10000-18000 MHz range at low carrier frequency

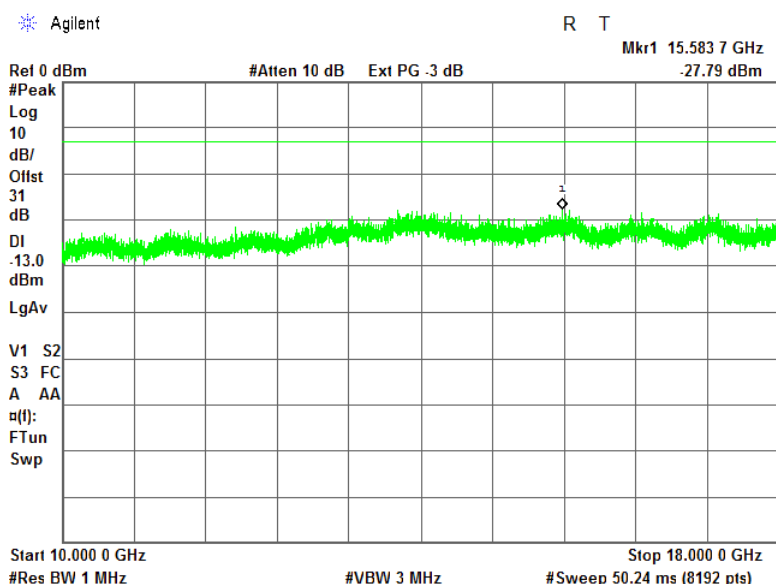


Test specification: Section 27.53, Spurious emissions at RF antenna connector			
Test procedure: 47 CFR, Sections 2.1051, 27.53			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.23 Spurious emission measurements in 10000 - 18000 MHz range at mid carrier frequency

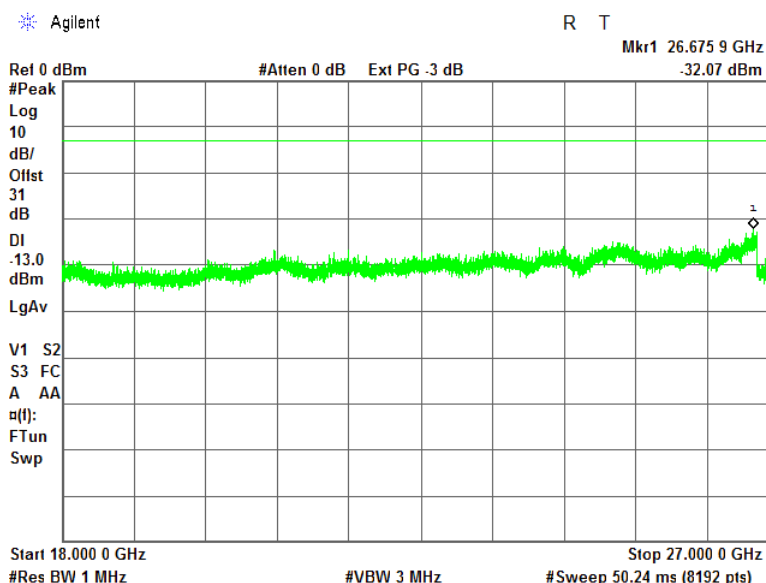


Plot 7.2.24 Spurious emission measurements in 10000 - 18000 MHz range at high carrier frequency

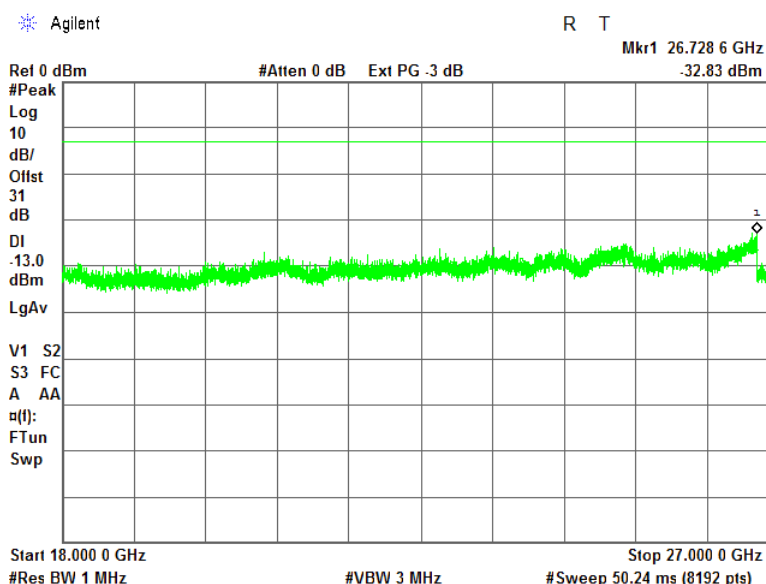


Test specification: Section 27.53, Spurious emissions at RF antenna connector			
Test procedure: 47 CFR, Sections 2.1051, 27.53			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.25 Spurious emission measurements in 18000 - 27000 MHz range at low carrier frequency

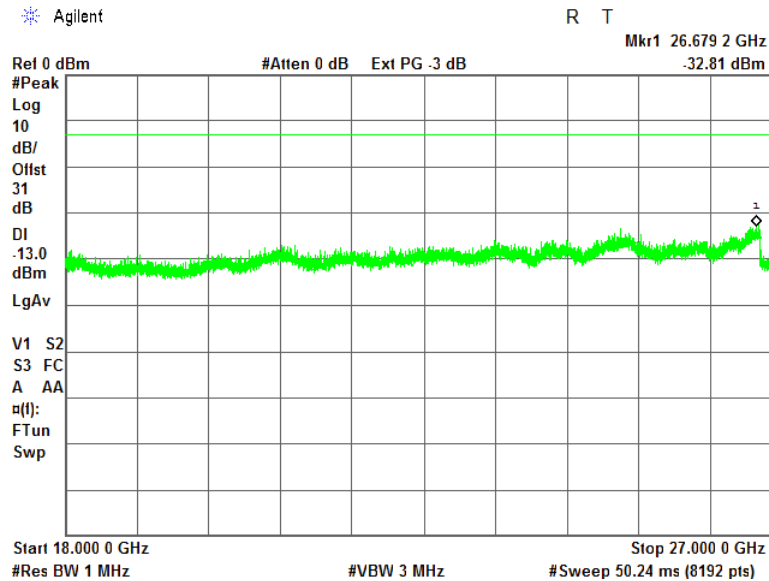


Plot 7.2.26 Spurious emission measurements in 18000 - 27000 MHz range at mid carrier frequency



Test specification: Section 27.53, Spurious emissions at RF antenna connector			
Test procedure: 47 CFR, Sections 2.1051, 27.53			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Dec-16			
Temperature: 25 °C	Relative Humidity: 44 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.27 Spurious emission measurements in 18000 - 27000 MHz range at high carrier frequency





Test specification: Section 27.53, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053; TIA/EIA-603-D, Section 2.2.12			
Test mode: Compliance		Verdict: PASS	
Date(s): 26-Dec-16			
Temperature: 23 °C	Relative Humidity: 42 %	Air Pressure: 1019 hPa	Power: 48 VDC
Remarks:			

7.3 Radiated spurious emission measurements

7.3.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Radiated spurious emission test limits

Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm	Equivalent field strength limit @ 3m, dB(μV/m)***
0.009 – 10 th harmonic*	43+10logP** fixed	-13	84.4

* - Excluding the band emission

** - P is transmitter output power in Watts

*** - Equivalent field strength limit was calculated from maximum allowed ERP of spurious as follows:
 $E = \sqrt{30 \times P \times 1.64} / r$, where P is ERP in Watts, 1.64 is numeric gain of ideal dipole and r is antenna to EUT distance in meters

7.3.2 Test procedure for spurious emission field strength measurements in 9 kHz to 30 MHz band

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and the performance check was conducted.

7.3.2.2 The specified frequency range was investigated with antenna connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated around its vertical axis.

7.3.2.3 The worst test results (the lowest margins) were recorded in Table 7.3.2 and shown in the associated plots.

7.3.3 Test procedure for spurious emission field strength measurements above 30 MHz

7.3.3.1 The EUT was set up as shown in Figure 7.3.2, energized and the performance check was conducted.

7.3.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360° and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal, polarizations.

7.3.3.3 The worst test results (the lowest margins) were recorded in Table 7.3.2 and shown in the associated plots.

Test specification: Section 27.53, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053; TIA/EIA-603-D, Section 2.2.12			
Test mode: Compliance		Verdict: PASS	
Date(s): 26-Dec-16			
Temperature: 23 °C	Relative Humidity: 42 %	Air Pressure: 1019 hPa	Power: 48 VDC
Remarks:			

Figure 7.3.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band

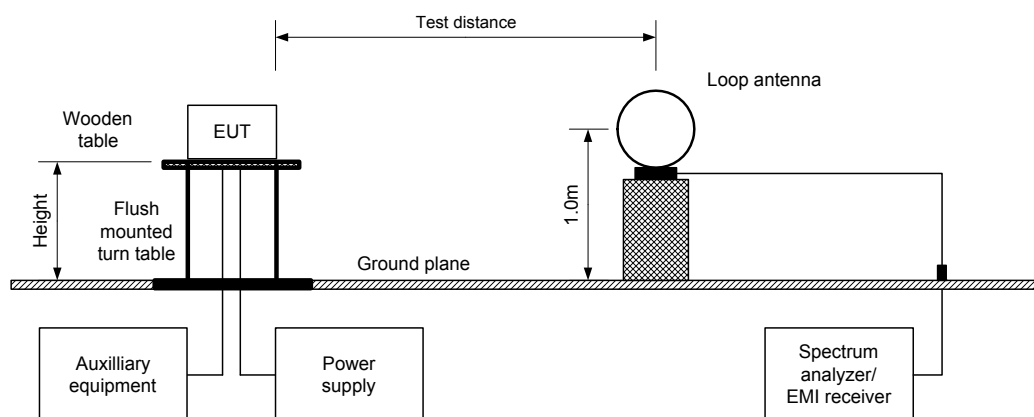
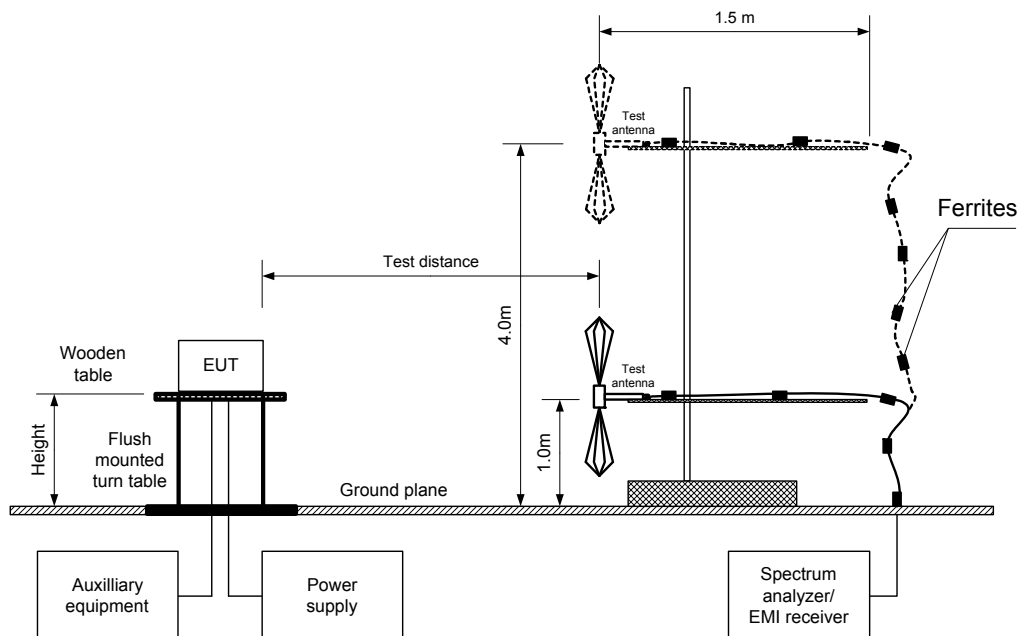


Figure 7.3.2 Setup for spurious emission field strength measurements above 30 MHz





Test specification: Section 27.53, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053; TIA/EIA-603-D, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date(s): 26-Dec-16			
Temperature: 23 °C	Relative Humidity: 42 %	Air Pressure: 1019 hPa	Power: 48 VDC
Remarks:			

Table 7.3.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 2496-2690 MHz
 TEST DISTANCE: 3 m
 TEST SITE: Anechoic chamber
 EUT HEIGHT: 0.8 m
 INVESTIGATED FREQUENCY RANGE: 0.009 – 26900 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: > Resolution bandwidth
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Biconilog (30 MHz – 1000 MHz)
 Double ridged guide (above 1000 MHz)
 MODULATION: 64QAM***
 BANDWIDTH: 5MHz***

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Low carrier frequency							
No emissions were found							
Mid carrier frequency							
No emissions were found							
High carrier frequency							
No emissions were found							

Verdict: Pass

*- Margin = Field strength of spurious – calculated field strength limit.

**- EUT front panel refers to 0 degrees position of turntable.

***- Maximum Power Density

Reference numbers of test equipment used

HL 0446	HL 0521	HL 0604	HL 3818	HL 4011	HL 4353	HL 4933	HL 4956
HL 5101	HL 5107	HL 5110	HL 5111				

Full description is given in Appendix A.

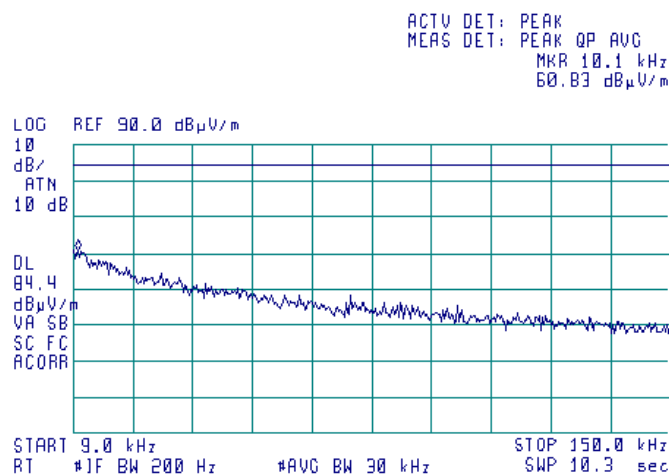


HERMON LABORATORIES

Test specification: Section 27.53, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053; TIA/EIA-603-D, Section 2.2.12			
Test mode: Compliance		Verdict: PASS	
Date(s): 26-Dec-16			
Temperature: 23 °C	Relative Humidity: 42 %	Air Pressure: 1019 hPa	Power: 48 VDC
Remarks:			

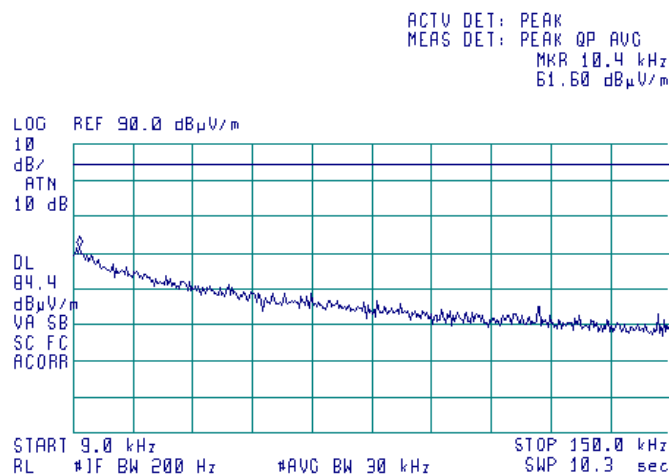
Plot 7.3.1 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.3.2 Radiated emission measurements in 9 - 150 kHz range

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



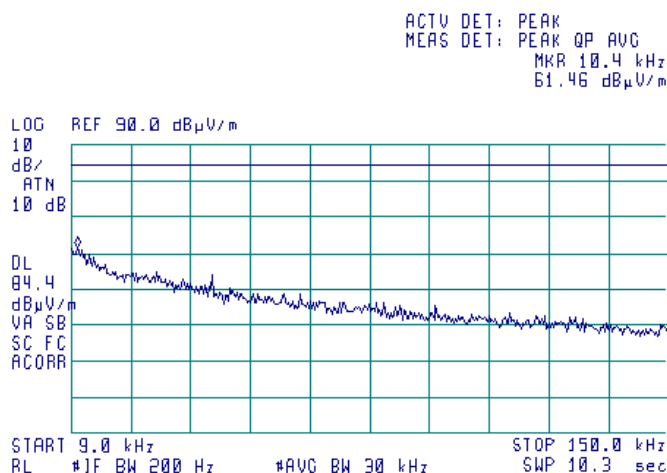


HERMON LABORATORIES

Test specification: Section 27.53, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053; TIA/EIA-603-D, Section 2.2.12			
Test mode: Compliance		Verdict: PASS	
Date(s): 26-Dec-16			
Temperature: 23 °C	Relative Humidity: 42 %	Air Pressure: 1019 hPa	Power: 48 VDC
Remarks:			

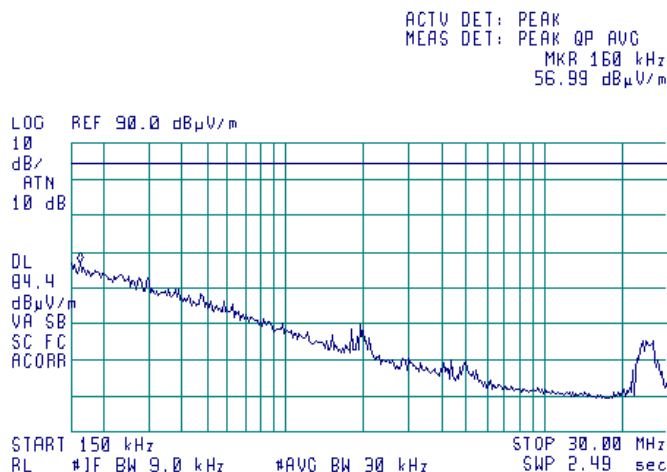
Plot 7.3.3 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.3.4 Radiated emission measurements in 0.15 - 30 MHz range

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



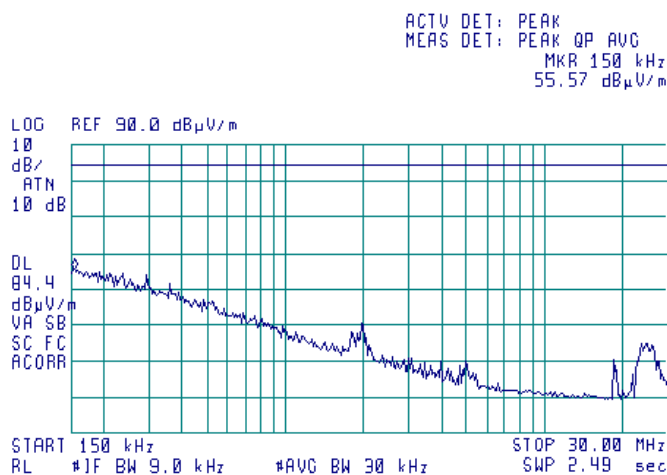


HERMON LABORATORIES

Test specification: Section 27.53, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053; TIA/EIA-603-D, Section 2.2.12			
Test mode: Compliance		Verdict: PASS	
Date(s): 26-Dec-16			
Temperature: 23 °C	Relative Humidity: 42 %	Air Pressure: 1019 hPa	Power: 48 VDC
Remarks:			

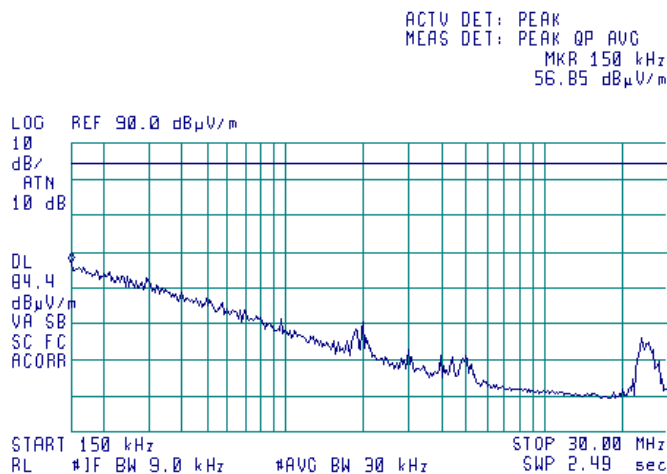
Plot 7.3.5 Radiated emission measurements in 0.15 - 30 MHz range

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



Plot 7.3.6 Radiated emission measurements in 0.15 - 30 MHz range

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



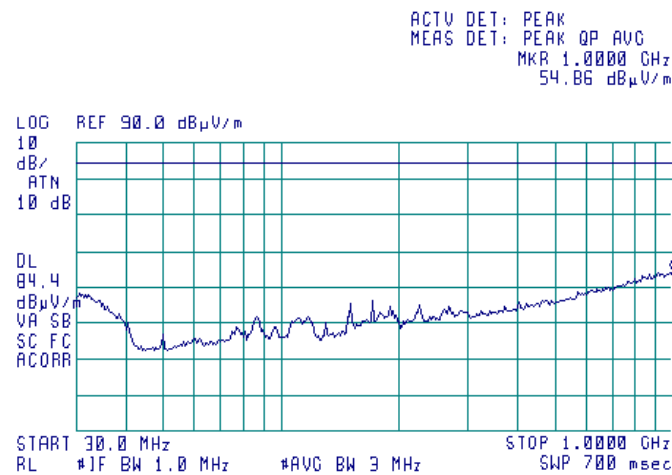


HERMON LABORATORIES

Test specification:		Section 27.53, Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053; TIA/EIA-603-D, Section 2.2.12	
Test mode:		Verdict: PASS	
Date(s):			
26-Dec-16			
Temperature: 23 °C	Relative Humidity: 42 %	Air Pressure: 1019 hPa	Power: 48 VDC
Remarks:			

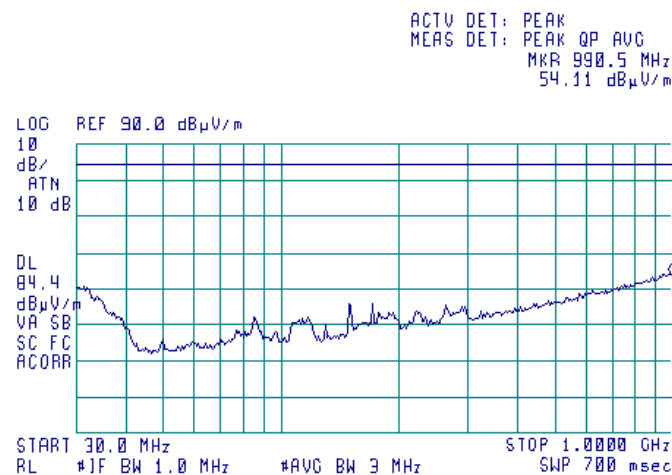
Plot 7.3.7 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.3.8 Radiated emission measurements in 30 - 1000 MHz range

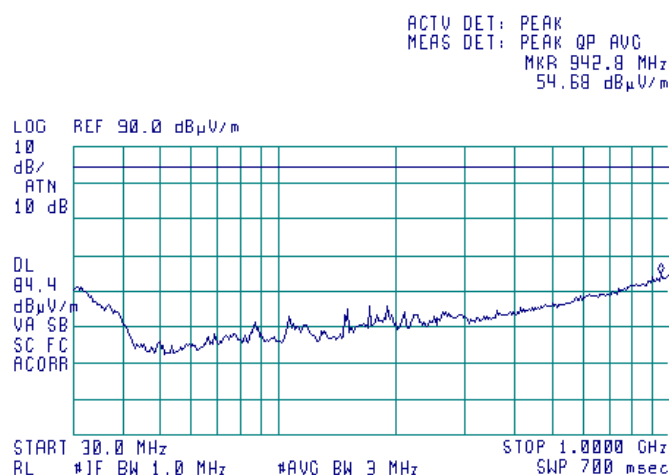
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification: Section 27.53, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053; TIA/EIA-603-D, Section 2.2.12			
Test mode: Compliance		Verdict: PASS	
Date(s): 26-Dec-16			
Temperature: 23 °C	Relative Humidity: 42 %	Air Pressure: 1019 hPa	Power: 48 VDC
Remarks:			

Plot 7.3.9 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

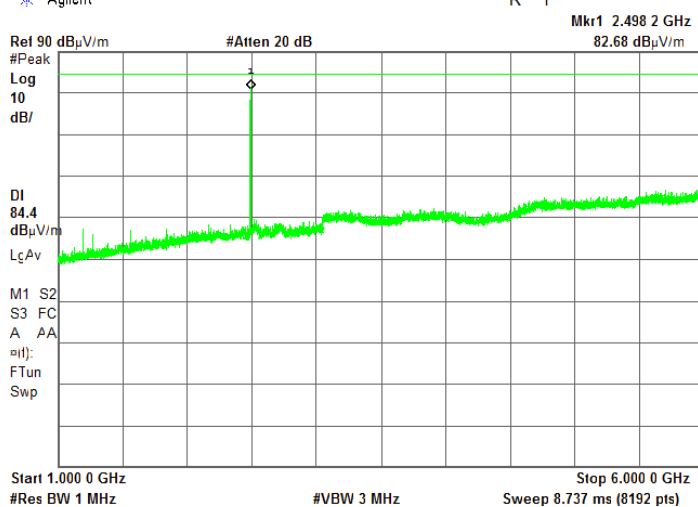


Plot 7.3.10 Radiated emission measurements in 1000 – 6000 MHz range

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

* Agilent

R T

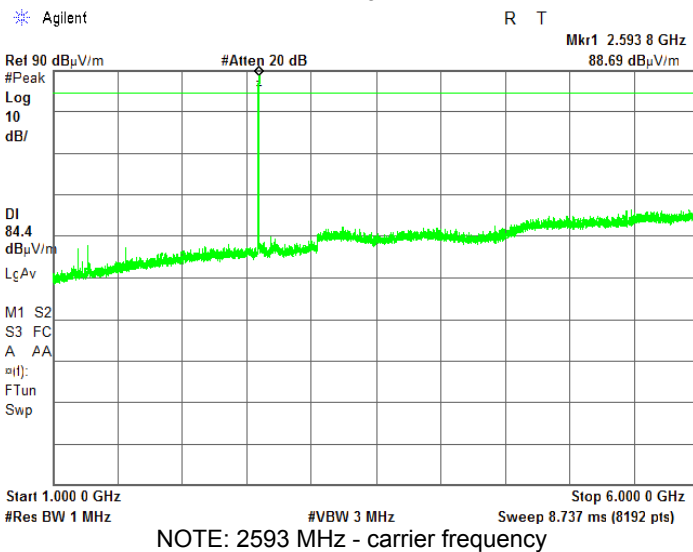


NOTE: 2498.5 MHz - carrier frequency

Test specification:		Section 27.53, Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053; TIA/EIA-603-D, Section 2.2.12	
Test mode:		Verdict: PASS	
Date(s):			
26-Dec-16			
Temperature: 23 °C	Relative Humidity: 42 %	Air Pressure: 1019 hPa	Power: 48 VDC
Remarks:			

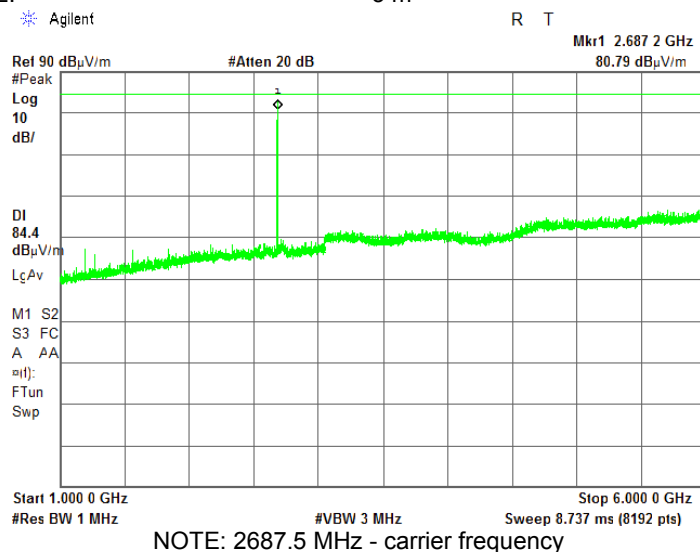
Plot 7.3.11 Radiated emission measurements in 1000 – 6000 MHz range

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



Plot 7.3.12 Radiated emission measurements in 1000 –6000 MHz range

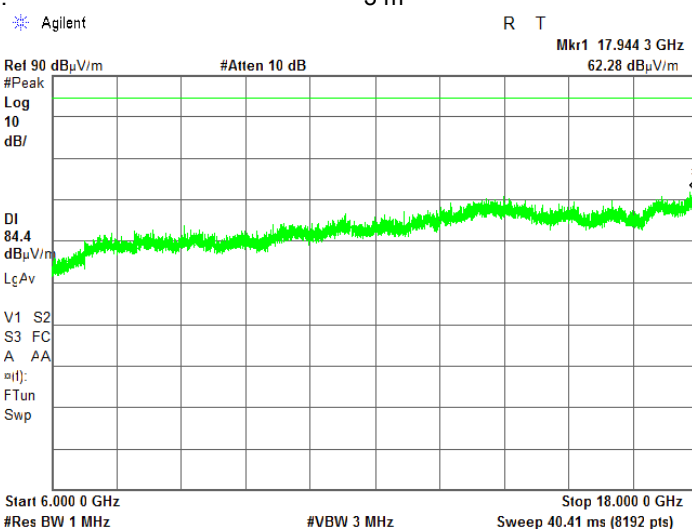
TEST SITE: Fully anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification: Section 27.53, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053; TIA/EIA-603-D, Section 2.2.12			
Test mode: Compliance		Verdict: PASS	
Date(s): 26-Dec-16			
Temperature: 23 °C	Relative Humidity: 42 %	Air Pressure: 1019 hPa	Power: 48 VDC
Remarks:			

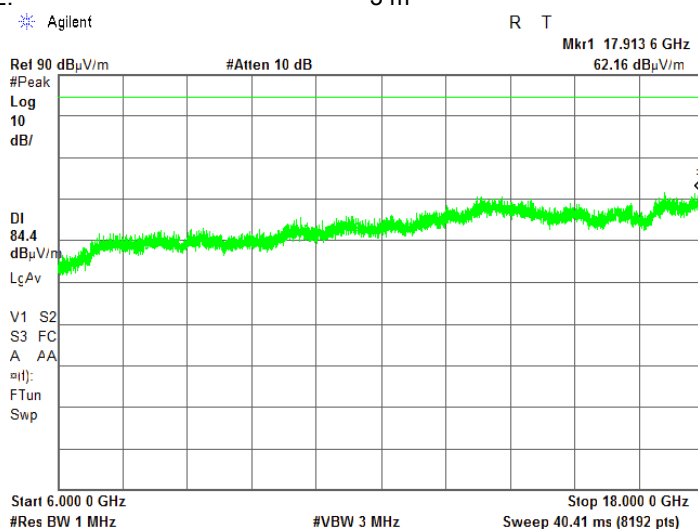
Plot 7.3.13 Radiated emission measurements in 6000 – 18000 MHz range

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



Plot 7.3.14 Radiated emission measurements in 6000 – 18000 MHz range

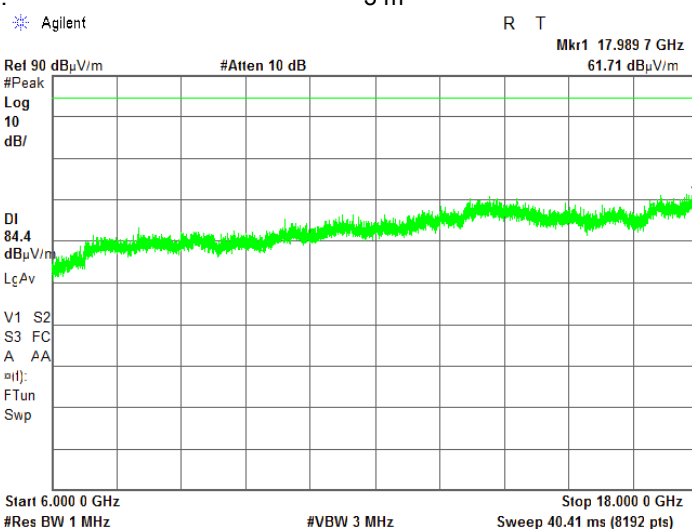
TEST SITE: Fully anechoic chamber
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification: Section 27.53, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053; TIA/EIA-603-D, Section 2.2.12			
Test mode: Compliance		Verdict: PASS	
Date(s): 26-Dec-16			
Temperature: 23 °C	Relative Humidity: 42 %	Air Pressure: 1019 hPa	Power: 48 VDC
Remarks:			

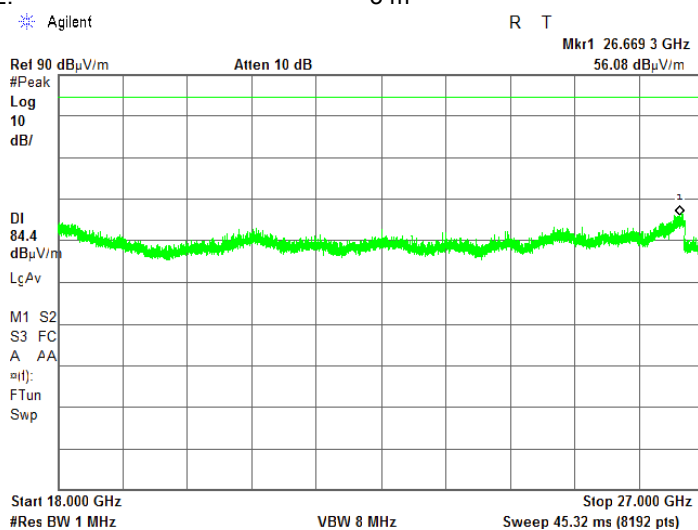
Plot 7.3.15 Radiated emission measurements in 6000 – 18000 MHz range

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



Plot 7.3.16 Radiated emission measurements in 18000 – 27000 MHz range

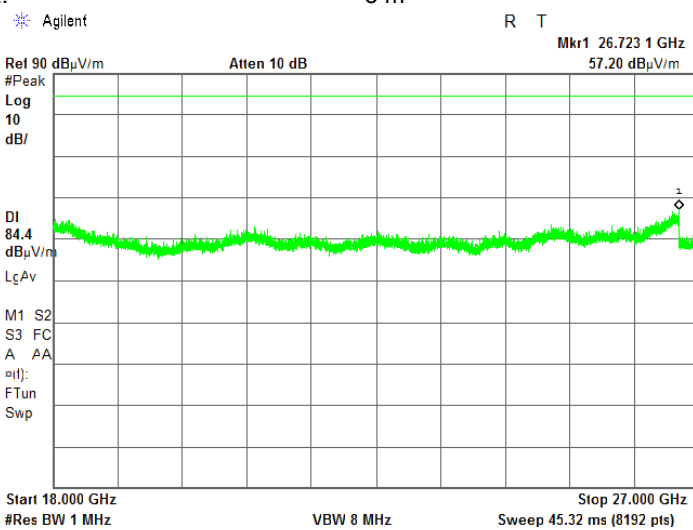
TEST SITE: Fully anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:		Section 27.53, Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053; TIA/EIA-603-D, Section 2.2.12	
Test mode:		Verdict: PASS	
Date(s):			
26-Dec-16			
Temperature: 23 °C	Relative Humidity: 42 %	Air Pressure: 1019 hPa	Power: 48 VDC
Remarks:			

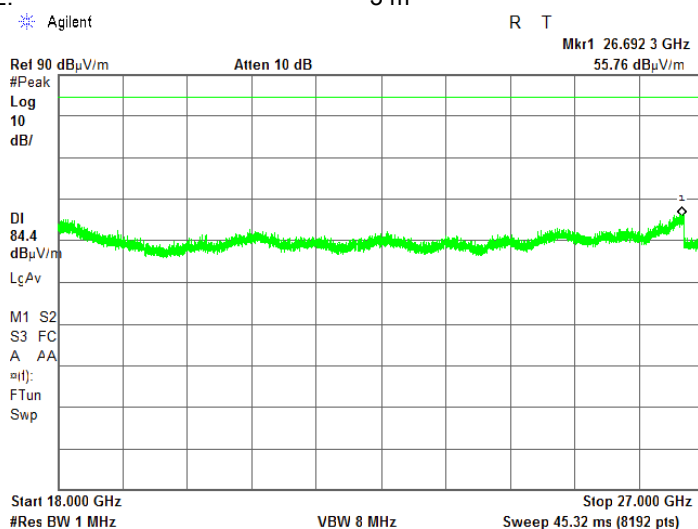
Plot 7.3.17 Radiated emission measurements in 18000 – 26500 MHz range

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



Plot 7.3.18 Radiated emission measurements in 18000 – 27000 MHz range

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



8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	18-Jan-16	18-Jan-17
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	27-Oct-16	27-Oct-17
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	10-May-16	10-May-17
2214	Directional Coupler 1.7-26.5 GHz	Krytar	2616	31354	16-Sep-15	16-Sep-17
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY451010 57	26-Apr-16	26-Jul-17
3302	Power sensor, P-Series, 50 MHz to 40 GHz, -35/30 to 20 dBm	Agilent Technologies	N1922A	MY452405 86	30-Jan-16	30-Apr-17
3322	Attenuator DC to 22 GHz, 30 dB, 50 W	Aeroflex / Weinschel	86-30-12	448	25-Sep-16	25-Sep-17
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY482502 88	03-May-16	03-May-17
3901	Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA	Huber-Suhner	SUCOFLE X 102A	1225/2A	15-Feb-16	15-Feb-17
3903	Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA	Huber-Suhner	SUCOFLE X 102A	1226/2A	10-Feb-16	10-Feb-17
4011	Temp. & Humidity Meter, (-50 - +70) deg, (20 - 99)% RH	Mad Electronics	HTC-1	NA	20-Sep-16	20-Sep-17
4353	Low Loss Armored Test Cable, DC - 18 GHz, 6.2 m, N type-M/N type-M	MegaPhase	NC29- N1N1-244	12025101 003	15-Mar-16	15-Mar-17
4933	Active Horn Antenna, 1 GHz to 18 GHz	Com-Power Corporation	AHA-118	701046	14-Oct-16	14-Oct-17
4956	Active horn antenna, 18 to 40 GHz	Com-Power Corporation	AHA-840	105004	09-Nov-15	09-Nov-16
5101	RF cable, 18 GHz, 6 m, N-type	Huber-Suhner	SF106A/1 1N/11N/6 000MM	500847/6A	26-Jul-16	26-Jul-17
5107	RF cable, 18 GHz, 4.5 m, N-type	Huber-Suhner	SF106A/1 1N/11N/4 500MM	500845/6A	26-Jul-16	26-Jul-17
5110	RF cable, 18 GHz, 3 m, N-type	Huber-Suhner	ST18A/N m/Nm/300 0	600818/18 A	26-Jul-16	26-Jul-17
5111	RF cable, 40 GHz, 5.5 m, K-type	Huber-Suhner	SF102EA/ 11SK/11S K/5500M M	502493/2E A	26-Jul-16	26-Jul-17

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	$\pm 8\%$
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 $\pm 13.9\%$
Duty cycle, timing (Tx ON / OFF) and average factor measurements	$\pm 1.0\%$

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 facility description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility.

Hermon Laboratories is recognized and accredited by the Federal Communications Commission (USA) for 1, 2, 15, 18 parts of Code of Federal Regulations 47 (CFR 47), Test Firm Registration Number is 927748, Designation Number is IL1001; registered by Industry Canada for electromagnetic emissions, file number IC 2186A-1 for OATS, certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-869 for RE measurements above 1 GHz, C-845 for conducted emissions site, T-1606 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 and environmental simulation (for exact scope please refer to Certificate No. 839.01).

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11 APPENDIX D Specification references

47CFR part 27: 2015	Private land mobile radio services
47CFR part 1: 2015	Practice and procedure
47CFR part 2: 2015	Frequency allocations and radio treaty matters; general rules and regulations
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI/TIA/EIA-603-D:2010	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

12 APPENDIX E Test equipment correction factors

Antenna factor
Active loop antenna
Model 6502, S/N 2857, HL 0446

Frequency, MHz	Magnetic antenna factor, dB	Electric antenna factor, dB
0.009	-32.8	18.7
0.010	-33.8	17.7
0.020	-38.3	13.2
0.050	-41.1	10.4
0.075	-41.3	10.2
0.100	-41.6	9.9
0.150	-41.7	9.8
0.250	-41.6	9.9
0.500	-41.8	9.8
0.750	-41.9	9.7
1.000	-41.4	10.1
2.000	-41.5	10.0
3.000	-41.4	10.2
4.000	-41.4	10.1
5.000	-41.5	10.1
10.000	-41.9	9.6
15.000	-41.9	9.6
20.000	-42.2	9.3
25.000	-42.8	8.7
30.000	-44.0	7.5

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field strength in dB(μ V/m).

Antenna factor
Biconilog antenna EMCO Model 3141
Ser.No.1011, HL 0604

Frequency, MHz	Antenna factor, dB(1/m)	Frequency, MHz	Antenna factor, dB(1/m)	Frequency, MHz	Antenna factor, dB(1/m)
26	7.8	580	20.6	1320	27.8
28	7.8	600	21.3	1340	28.3
30	7.8	620	21.5	1360	28.2
40	7.2	640	21.2	1380	27.9
60	7.1	660	21.4	1400	27.9
70	8.5	680	21.9	1420	27.9
80	9.4	700	22.2	1440	27.8
90	9.8	720	22.2	1460	27.8
100	9.7	740	22.1	1480	28.0
110	9.3	760	22.3	1500	28.5
120	8.8	780	22.6	1520	28.9
130	8.7	800	22.7	1540	29.6
140	9.2	820	22.9	1560	29.8
150	9.8	840	23.1	1580	29.6
160	10.2	860	23.4	1600	29.5
170	10.4	880	23.8	1620	29.3
180	10.4	900	24.1	1640	29.2
190	10.3	920	24.1	1660	29.4
200	10.6	940	24.0	1680	29.6
220	11.6	960	24.1	1700	29.8
240	12.4	980	24.5	1720	30.3
260	12.8	1000	24.9	1740	30.8
280	13.7	1020	25.0	1760	31.1
300	14.7	1040	25.2	1780	31.0
320	15.2	1060	25.4	1800	30.9
340	15.4	1080	25.6	1820	30.7
360	16.1	1100	25.7	1840	30.6
380	16.4	1120	26.0	1860	30.6
400	16.6	1140	26.4	1880	30.6
420	16.7	1160	27.0	1900	30.6
440	17.0	1180	27.0	1920	30.7
460	17.7	1200	26.7	1940	30.9
480	18.1	1220	26.5	1960	31.2
500	18.5	1240	26.5	1980	31.6
520	19.1	1260	26.5	2000	32.0
540	19.5	1280	26.6		
560	19.8	1300	27.0		

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field strength in dB(μ V/m).



HERMON LABORATORIES

Antenna factor, HL 4933

**Active Horn Antenna Factor Calibration**

1 GHz to 18 GHz

Equipment:			ACTIVE HORN ANTENNA		
Model:			AHA-118		
Serial Number:			701046		
Calibration Distance:			3 Meter		
Polarization:			Horizontal		
Calibration Date:			11/12/2014		
Frequency (GHz)	Preamplifier Gain (dB)	Antenna Factor with pre-amp (dB/m)	Frequency (GHz)	Preamplifier Gain (dB)	Antenna Factor with pre-amp (dB/m)
1	40.96	-16.47	10	40.94	-1.97
1.5	41.21	-14.53	10.5	40.63	-1.06
2	41.44	-13.30	11	40.74	-1.50
2.5	41.71	-12.87	11.5	40.65	-0.52
3	41.96	-12.26	12	40.76	-0.15
3.5	42.14	-11.77	12.5	41.03	-0.85
4	42.13	-10.91	13	41.37	-0.81
4.5	41.79	-9.41	13.5	41.18	0.05
5	41.44	-7.54	14	40.98	0.36
5.5	40.91	-6.47	14.5	40.81	1.26
6	40.69	-5.48	15	40.65	0.25
6.5	40.64	-5.53	15.5	40.93	-1.05
7	40.76	-4.12	16	41.31	-1.44
7.5	40.94	-3.12	16.5	40.96	-0.80
8	40.68	-1.69	17	40.64	-0.02
8.5	40.08	-1.71	17.5	40.57	1.81
9	40.41	-1.86	18	40.08	3.63
9.5	41.21	-2.73			
Calibration according to ARP 958					
Antenna Factor to be added to receiver reading: Meter Reading (dBuV) + Antenna Factor (dB/m) = Corrected Reading (dBuV/m)					



HERMON LABORATORIES

Antenna factor, HL 4956

**Active Horn Antenna Factor Calibration**

18 GHz to 40 GHz

Equipment:			ACTIVE HORN ANTENNA		
Model:			AHA-840		
Serial Number:			105004		
Calibration Distance:			3 meter		
Polarization:			Horizontal		
Calibration Date:			1/26/2015		
Frequency (GHz)	Preamplifier Gain (dB)	Antenna Factor with pre-amp (dB/m)	Frequency (GHz)	Preamplifier Gain (dB)	Antenna Factor with pre-amp (dB/m)
18	38.83	-1.06	29.5	42.47	-5.33
18.5	39.34	-2.65	30	41.91	-4.86
19	39.71	-3.88	30.5	41.60	-4.64
19.5	39.87	-4.35	31	41.52	-4.60
20	39.98	-3.97	31.5	41.56	-4.79
20.5	40.42	-3.68	32	41.80	-5.21
21	41.12	-4.06	32.5	42.29	-5.54
21.5	41.74	-5.46	33	42.79	-5.63
22	42.14	-6.22	33.5	42.88	-5.38
22.5	42.35	-6.42	34	42.62	-4.76
23	42.50	-6.59	34.5	42.63	-4.84
23.5	42.65	-6.82	35	43.15	-5.13
24	42.81	-7.01	35.5	43.91	-5.83
24.5	42.86	-7.37	36	44.59	-6.39
25	42.73	-7.53	36.5	45.04	-6.64
25.5	42.77	-7.45	37	45.08	-6.40
26	42.85	-7.21	37.5	44.82	-5.75
26.5	42.98	-7.17	38	44.16	-4.58
27	43.14	-7.22	38.5	42.90	-2.66
27.5	43.18	-7.32	39	42.39	-1.71
28	43.04	-7.10	39.5	43.76	-2.49
28.5	43.01	-6.73	40	45.98	-5.21
Calibration per ANSI C63.5: 2006 Standard Site Method, Equations 1-6 (3-antenna) Corrected Reading (dBμV/m) = Meter Reading (dBμV) + AFE(dB/m)					

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
Microwave Cable Assembly, Huber-Suhner, 40 GHz, 1.5 m, SMA-SMA, S/N 1226/2A
HL 3903

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	-0.02	9500	1.84	21000	2.98
100	0.15	10000	1.86	22000	3.07
500	0.38	10500	1.93	23000	3.13
1000	0.56	11000	1.99	24000	3.21
1500	0.69	11500	2.04	25000	3.26
2000	0.82	12000	2.10	26000	3.48
2500	0.90	12500	2.15	27000	3.44
3000	0.98	13000	2.21	28000	3.53
3500	1.06	13500	2.25	29000	3.59
4000	1.11	14000	2.29	30000	3.66
4500	1.17	14500	2.34	31000	3.70
5000	1.24	15000	2.36	32000	3.79
5500	1.32	15500	2.40	33000	3.88
6000	1.40	16000	2.45	34000	3.94
6500	1.50	16500	2.48	35000	3.91
7000	1.56	17000	2.56	36000	4.05
7500	1.62	17500	2.58	37000	4.22
8000	1.68	18000	2.60	38000	4.25
8500	1.74	19000	2.84	39000	4.27
9000	1.78	20000	2.88	40000	4.33

Cable loss
Low Loss Armored Test Cable, MegaPhase, 18 GHz, 6.2 m, N type-M/N type-M,
NC29-N1N1-244S/N 12025101 003,
HL 4353

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
50	0.20	9000	2.71
100	0.27	9500	2.81
300	0.47	10000	2.90
500	0.61	10500	2.97
1000	0.87	11000	3.06
1500	1.07	11500	3.13
2000	1.24	12000	3.20
2500	1.39	12500	3.26
3000	1.53	13000	3.34
3500	1.65	13500	3.39
4000	1.77	14000	3.47
4500	1.89	14500	3.54
5000	1.99	15000	3.62
5500	2.07	15500	3.69
6000	2.20	16000	3.76
6500	2.30	16500	3.83
7000	2.39	17000	3.86
7500	2.51	17500	3.94
8000	2.58	18000	4.02
8500	2.65		

Cable loss
RF Cable, Huber-Suhner, 18 GHz, 6 m, N- type,
SF106A/11N/11N/6000MM, S/N 500847/6A
HL 5101

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
0.1	0.01	5500	2.42
50	0.22	6000	2.53
100	0.31	6500	2.65
200	0.43	7000	2.76
300	0.53	7500	2.86
400	0.62	8000	2.96
500	0.69	8500	3.06
600	0.76	9000	3.16
700	0.82	9500	3.26
800	0.87	10000	3.35
900	0.93	10500	3.44
1000	0.98	11000	3.54
1100	1.03	11500	3.62
1200	1.08	12000	3.70
1300	1.12	12500	3.80
1400	1.17	13000	3.88
1500	1.21	13500	3.97
1600	1.25	14000	4.04
1700	1.29	14500	4.13
1800	1.33	15000	4.22
1900	1.37	15500	4.31
2000	1.41	16000	4.39
2500	1.59	16500	4.47
3000	1.75	17000	4.54
3500	1.90	17500	4.61
4000	2.04	18000	4.68
4500	2.17		
5000	2.30		

Cable loss
RF Cable, Huber-Suhner, 18 GHz, 6 m, N- type,
SF106A/11N/11N/4500MM, S/N 500845/6A
HL 5107

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
0.1	0.01	5500	1.75
50	0.16	6000	1.84
100	0.22	6500	1.92
200	0.31	7000	2.00
300	0.38	7500	2.07
400	0.44	8000	2.15
500	0.49	8500	2.23
600	0.54	9000	2.29
700	0.58	9500	2.38
800	0.63	10000	2.43
900	0.67	10500	2.50
1000	0.71	11000	2.57
1100	0.74	11500	2.63
1200	0.77	12000	2.69
1300	0.81	12500	2.76
1400	0.84	13000	2.82
1500	0.87	13500	2.87
1600	0.91	14000	2.93
1700	0.93	14500	3.00
1800	0.96	15000	3.06
1900	0.99	15500	3.12
2000	1.01	16000	3.18
2500	1.14	16500	3.22
3000	1.26	17000	3.28
3500	1.37	17500	3.36
4000	1.47	18000	3.43
4500	1.57		
5000	1.66		

Cable loss
RF Cable, Huber-Suhner, 18 GHz, 3 m, N- type,
ST18A/Nm/Nm/3000, S/N 600818/18A
HL 5110

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
0.1	0.01	5500	1.99
50	0.17	6000	2.10
100	0.24	6500	2.20
200	0.34	7000	2.29
300	0.42	7500	2.38
400	0.48	8000	2.47
500	0.54	8500	2.57
600	0.59	9000	2.65
700	0.64	9500	2.74
800	0.69	10000	2.83
900	0.73	10500	2.91
1000	0.77	11000	2.99
1100	0.82	11500	3.07
1200	0.86	12000	3.14
1300	0.89	12500	3.22
1400	0.93	13000	3.29
1500	0.96	13500	3.37
1600	1.00	14000	3.45
1700	1.03	14500	3.52
1800	1.06	15000	3.59
1900	1.10	15500	3.66
2000	1.13	16000	3.74
2500	1.28	16500	3.80
3000	1.41	17000	3.88
3500	1.54	17500	4.00
4000	1.66	18000	4.02
4500	1.78		
5000	1.89		

Cable loss
RF Cable, Huber-Suhner, 40 GHz, 5.5 m, K type,
SF102EA/11SK/11SK/5500MM, S/N 502493/2EA
HL 5111

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
100	0.68	20500	10.17
200	0.97	21000	10.30
300	1.18	21500	10.43
500	1.52	22000	10.58
1000	2.14	22500	10.73
1500	2.62	23000	10.85
2000	3.03	23500	10.98
2500	3.39	24000	11.11
3000	3.72	24500	11.20
3500	4.03	25000	11.32
4000	4.32	25500	11.47
4500	4.59	26000	11.59
5000	4.84	26500	11.72
5500	5.09	27000	11.83
6000	5.32	27500	11.94
6500	5.55	28000	12.04
7000	5.77	28500	12.16
7500	5.99	29000	12.28
8000	6.19	29500	12.40
8500	6.40	30000	12.50
9000	6.60	30500	12.59
9500	6.79	31000	12.68
10000	6.98	31500	12.80
10500	7.16	32000	12.94
11000	7.34	32500	13.09
11500	7.51	33000	13.23
12000	7.68	33500	13.32
12500	7.84	34000	13.44
13000	8.00	34500	13.54
13500	8.15	35000	13.68
14000	8.31	35500	13.81
14500	8.46	36000	13.90
15000	8.62	36500	13.99
15500	8.76	37000	14.12
16000	8.91	37500	14.22
16500	9.06	38000	14.33
17000	9.21	38500	14.47
17500	9.35	39000	14.54
18000	9.49	39500	14.62
18500	9.62	40000	14.75
19000	9.76		
19500	9.90		
20000	10.05		

13 APPENDIX F 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(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
dB(μ A)	decibel referred to one microampere
dB Ω	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
μ s	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