HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

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TEST REPORT

ACCORDING TO: FCC 47CFR part 27

FOR:

Airspan Networks Inc.
LTE Base Station
Model: AirHarmony 4400, 2.5GHz (B41)
FCC ID:PIDH4K425

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1 Applicant information

Client 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

2 Equipment under test attributes

Product name:	LTE Base Station
Product type:	Transceiver
Model(s):	AirHarmony 4400, 2.5 GHz (B41)
Serial number:	D3EF0BCE3180
Hardware version:	B3
Software release:	14_15_00_175
Receipt date	07-Nov-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:	28936
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	07-Nov-16
Test completed:	14-Nov-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 2.1091, 27.52, RF safety	Pass, exhibit provided in Application for certification
Section 27.53(m)(2), Spurious emissions at RF antenna connector	Pass
Section 27.53(m)(2), Band edge emissions at RF antenna connector	Pass
Section 27.53(m)(2), Radiated spurious emissions	Pass
Section 27.54, Frequency stability	Pass
Section 2.1049, Occupied bandwidth	Pass

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.
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. Zushchyk, test engineer	November 14, 2016	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	December 7, 2016	
Approved by:	Mr. M. Nikishin, EMC and radio group leader	December 13, 2016	

6 EUT description

6.1 General information

The EUT, Base station radio, AirHarmony 4400 2.5GHz (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 95 Mbps) uses OFDM and operating in TDD mode, equipped with 18 dBi external antenna. Advanced Antenna Techniques 2x4 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 46.2 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 4400 2.5GHz (B41), comes in range of three frequency band variants that can be installed with different external Cavity filters. Frequency bands are 2496 – 2690 MHz, 2618 – 2690 MHz and 2496 – 2568 MHz. The external Cavity filters are designed specifically for AirHarmony 4400 deployments. The installation and replacement of the external 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	AC power	EUT	AC 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 (via filter)	4	Coax	1
Signal*	Serial*	Not connected	Not connected	1	NA	NA

*for maintenance only

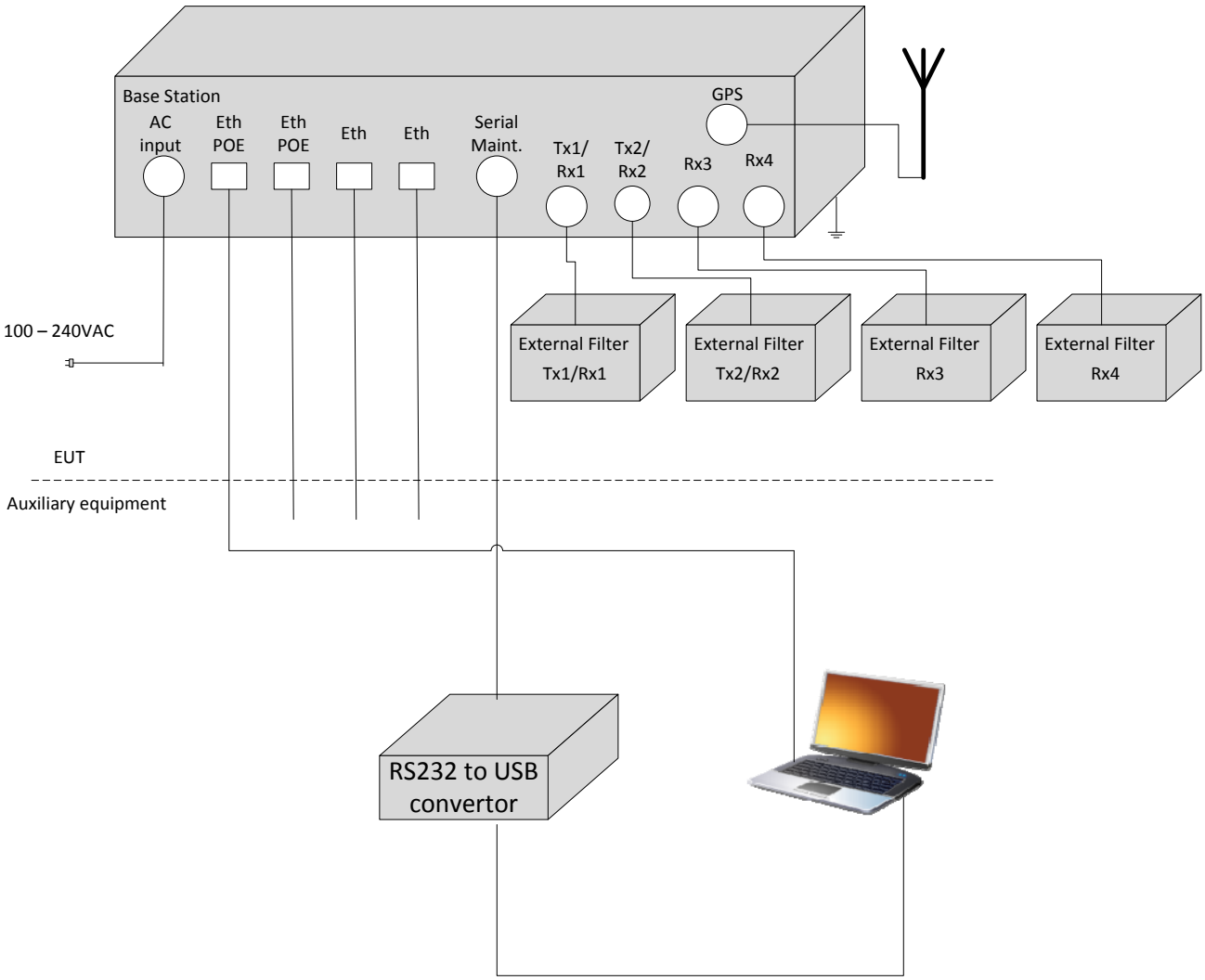
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop	Dell	E7450	8TYRP32

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	
V	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**
V	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 (full band)
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
RF channel spacing	5 MHz; 10 MHz, 20 MHz
Maximum rated output power	At transmitter 50 Ω RF output connector (aggregate power of both RF chains): 46.20 dBm

Is transmitter output power variable?				
	No			
V	Yes		continuous variable	
		V	stepped variable with step size	0.25 dB
		minimum RF power		-30 dBm
		maximum RF power at antenna connector		46.20 dBm

Antenna connection					
unique coupling	**V**	standard connector	Integral	**V**	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	10.7	23.0
10 MHz	10.7	22.7	47.3
20 MHz	23.4	45.4	95.0

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**			
V	AC mains	**Nominal rated voltage**	120 VAC	Frequency	

Common power source for transmitter and receiver	**V**	yes	no

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

7 Transmitter tests according to 47CFR part 27

7.1 Occupied bandwidth test in 2498.5 – 2687.5 MHz band

7.1.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.1.1.

Table 7.1.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, kHz
2496.0 – 2690.0 MHz	26	NA

* - Modulation envelope reference points are provided in terms of attenuation below the unmodulated carrier.

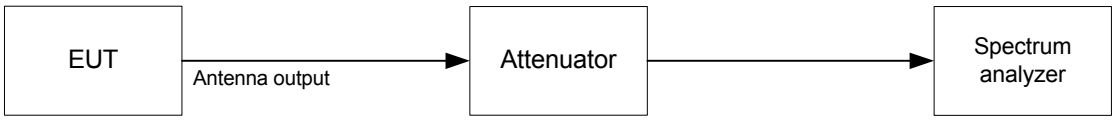
7.1.2 Test procedure

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 set to transmit the normal modulated signal and actual channel width was measured at the 26 dBc modulation envelope reference points.

7.1.2.3 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.1.2 and the associated plots.

Figure 7.1.1 Occupied bandwidth test setup



Test specification:	**Section 2.1049, Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.1.2 Occupied bandwidth test results

DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 51 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
EBW: 5 MHz

Carrier frequency, MHz	OBW 26 dBc, kHz	OBW 99%. kHz	Limit, kHz	Verdict
QPSK				
2498.5	4666.0	4394.7	NA	Pass
2593.0	4663.0	4391.7	NA	Pass
2687.5	4674.0	4390.4	NA	Pass
64QAM				
2498.5	4654.0	4390.2	NA	Pass
2593.0	4658.0	4395.0	NA	Pass
2687.5	4657.0	4393.9	NA	Pass

DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 100 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
EBW: 10 MHz

Carrier frequency, MHz	OBW 26 dBc, kHz	OBW 99%. kHz	Limit, kHz	Verdict
QPSK				
2501	9435.0	8904.3	NA	Pass
2596	9430.0	8914.7	NA	Pass
2685	9482.0	8924.5	NA	Pass
64QAM				
2501	9453.0	8932.6	NA	Pass
2596	9451.0	8930.4	NA	Pass
2685	9458.0	8926.6	NA	Pass

DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 200 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
EBW: 20 MHz

Carrier frequency, MHz	OBW 26 dBc, kHz	OBW 99%. kHz	Limit, kHz	Verdict
QPSK				
2506	18539.0	17542.4	NA	Pass
2596	18558.0	17521.0	NA	Pass
2680	18650.0	17561.3	NA	Pass
64QAM				
2506	18556.0	17544.2	NA	Pass
2596	18566.0	17548.3	NA	Pass
2680	18548.0	17539.3	NA	Pass

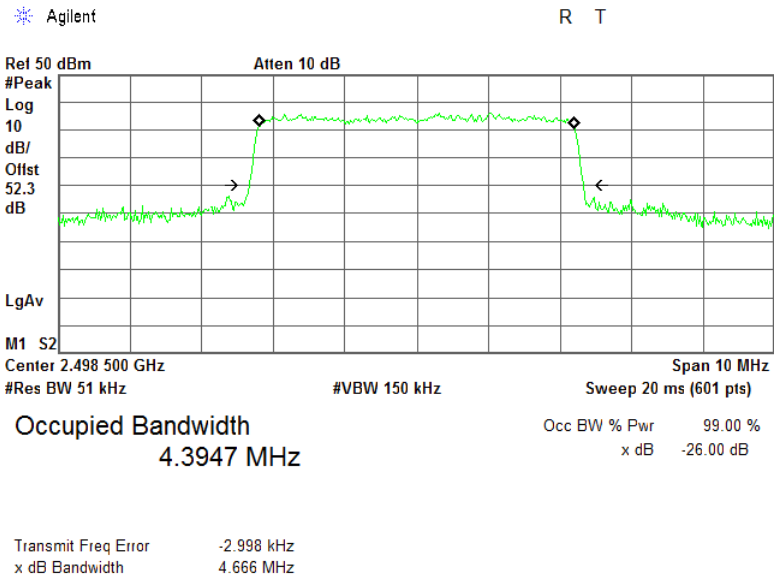
Reference numbers of test equipment used

HL 2214	HL 3301	HL 3302	HL 3818	HL 4756			

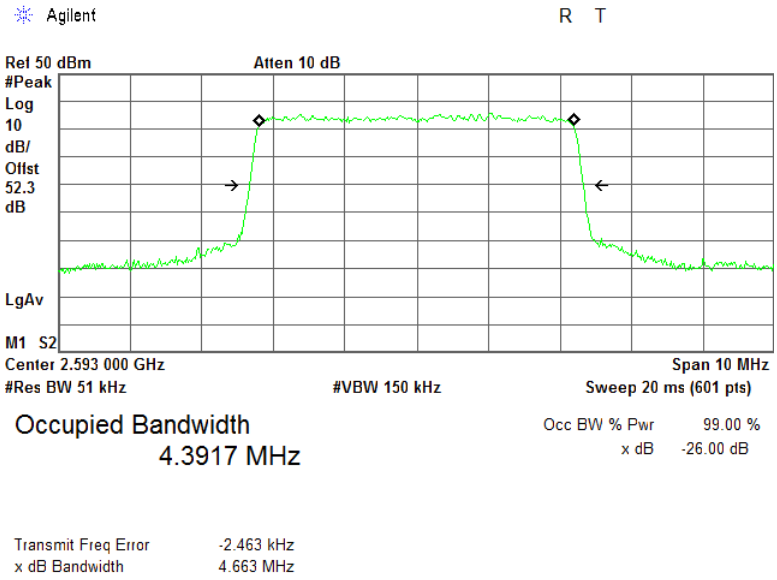
Full description is given in Appendix A.

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.1.1 Occupied bandwidth test results at low frequency, 5 MHz EBW, QPSK

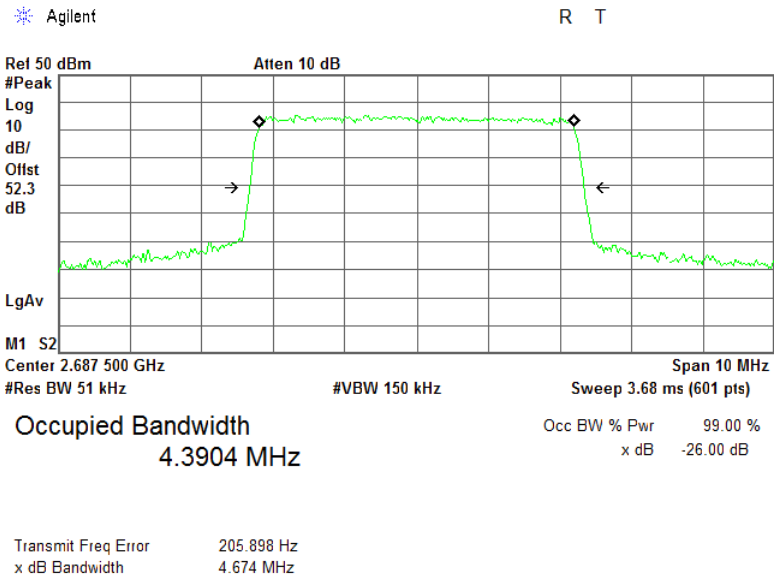


Plot 7.1.2 Occupied bandwidth test results at mid frequency, 5 MHz EBW, QPSK

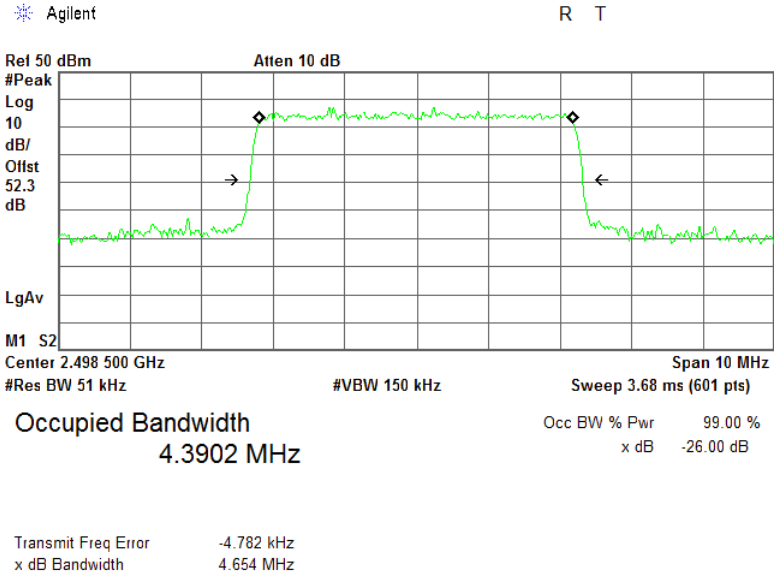


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.1.3 Occupied bandwidth test results at high frequency, 5 MHz EBW, QPSK

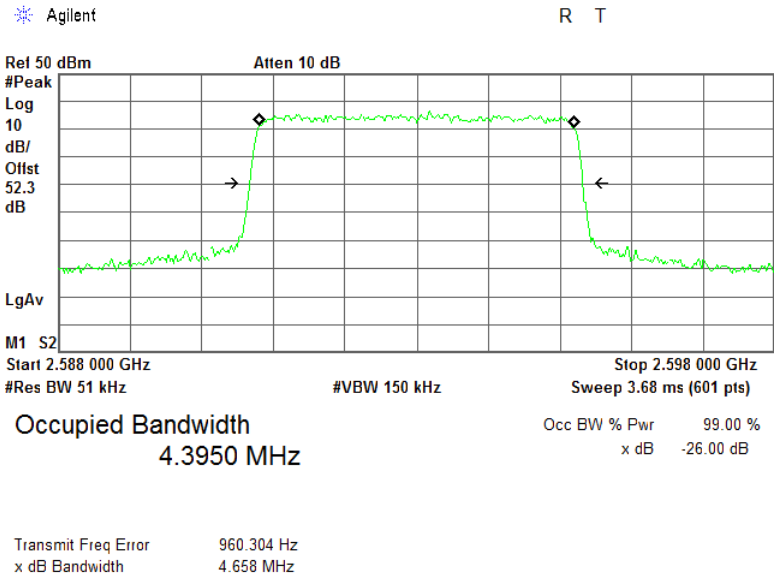


Plot 7.1.4 Occupied bandwidth test results at low frequency, 5 MHz EBW, 64QAM

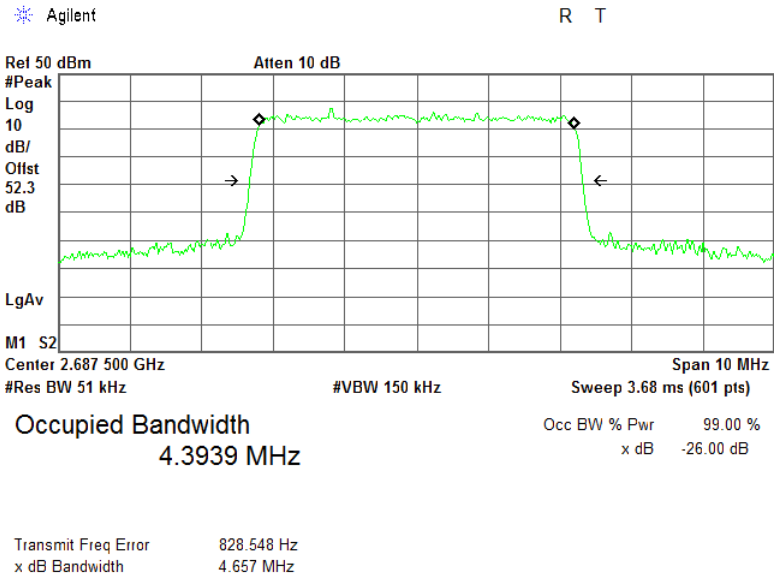


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.1.5 Occupied bandwidth test results at mid frequency, 5 MHz EBW, 64QAM

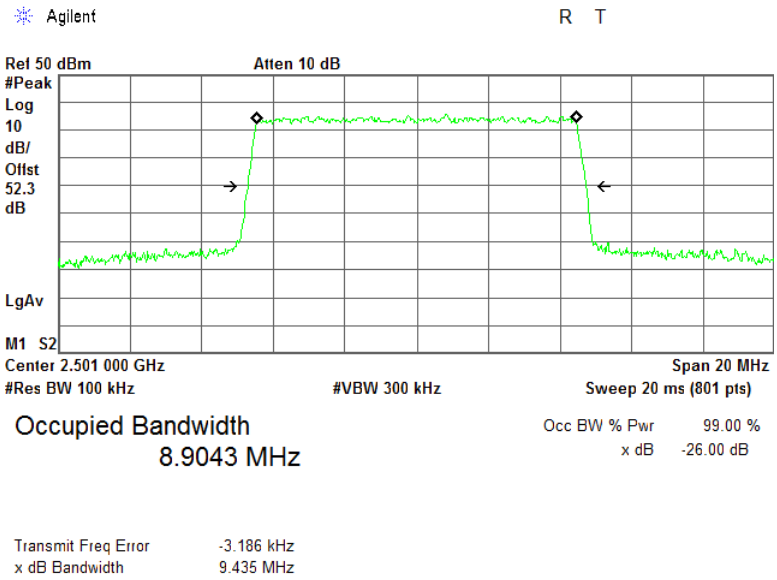


Plot 7.1.6 Occupied bandwidth test results at high frequency, 5 MHz EBW, 64QAM

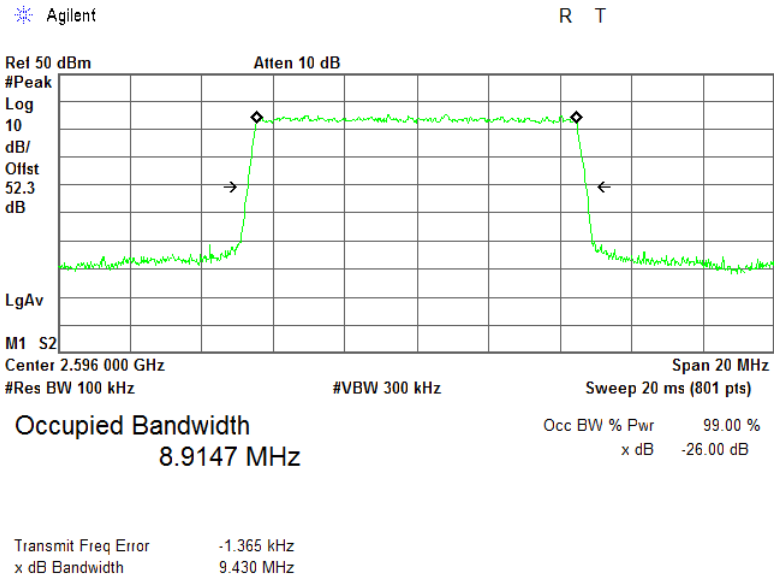


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.1.7 Occupied bandwidth test results at low frequency, 10 MHz EBW, QPSK

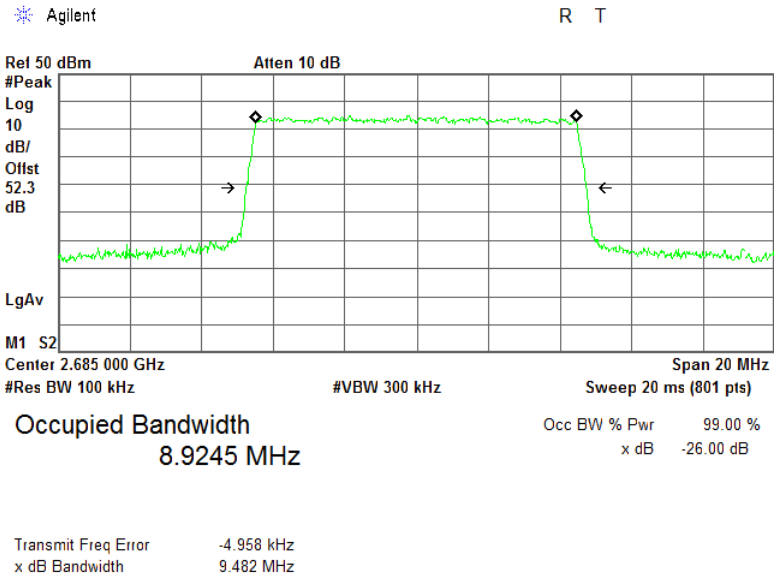


Plot 7.1.8 Occupied bandwidth test results at mid frequency, 10 MHz EBW, QPSK

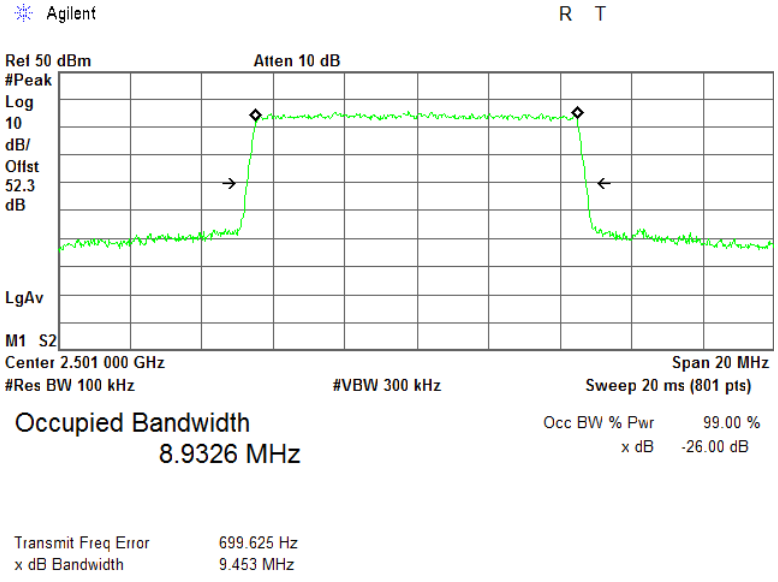


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.1.9 Occupied bandwidth test results at high frequency, 10 MHz EBW, QPSK

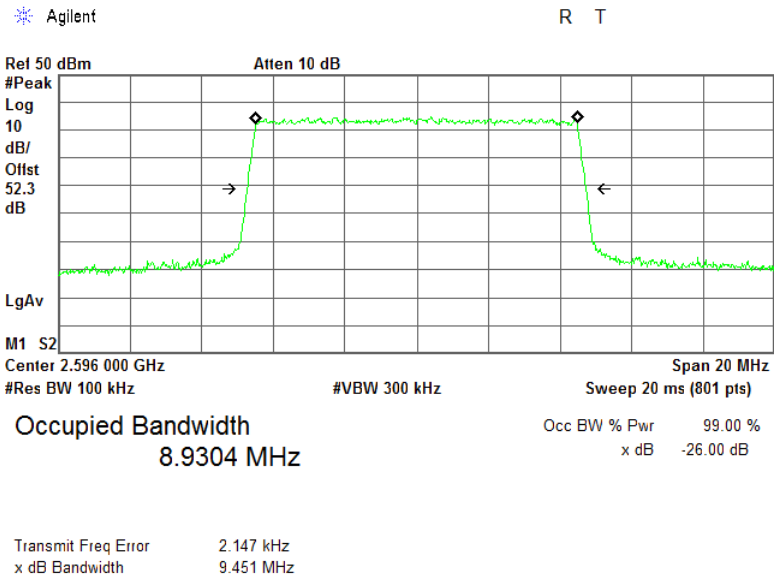


Plot 7.1.10 Occupied bandwidth test results at low frequency, 10 MHz EBW, 64QAM

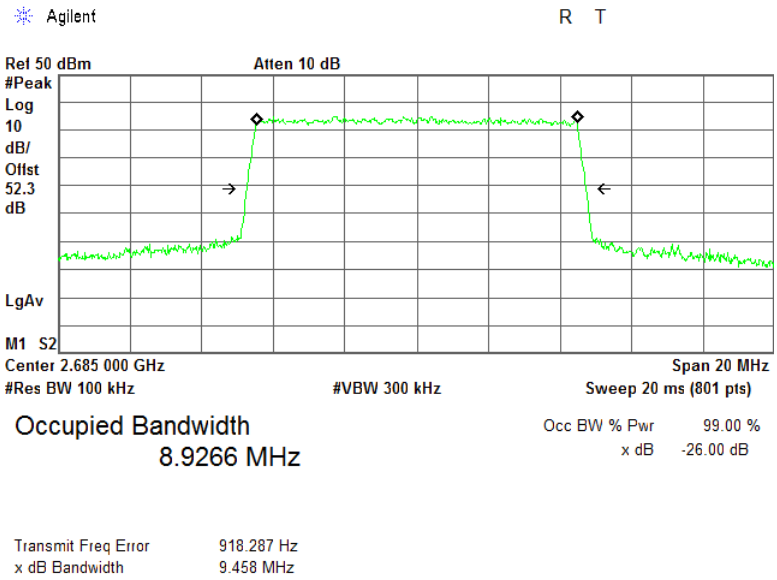


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.1.11 Occupied bandwidth test results at mid frequency, 10 MHz EBW, 64QAM

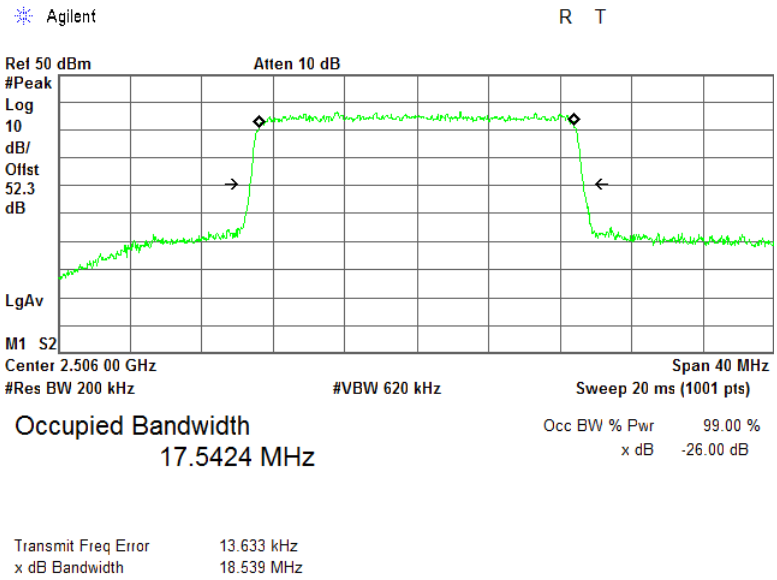


Plot 7.1.12 Occupied bandwidth test results at high frequency, 10 MHz EBW, 64QAM

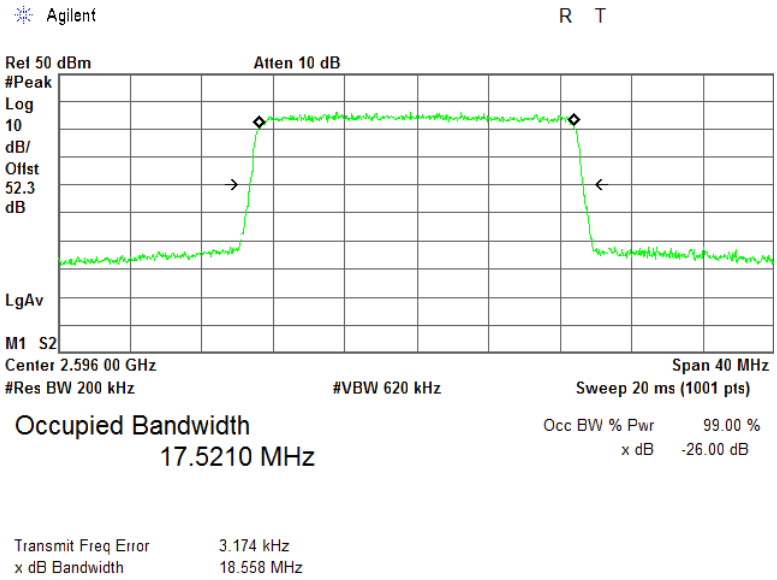


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.1.13 Occupied bandwidth test results at low frequency, 20 MHz EBW, QPSK

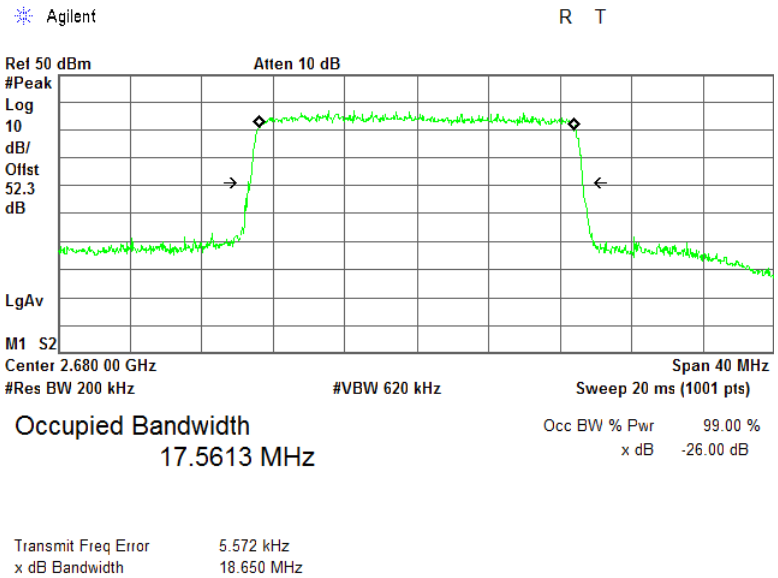


Plot 7.1.14 Occupied bandwidth test results at mid frequency, 20 MHz EBW, QPSK

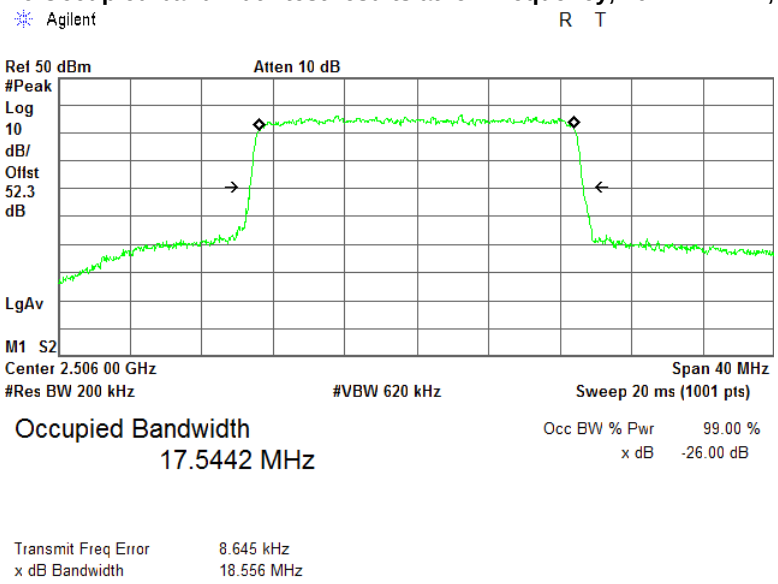


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.1.15 Occupied bandwidth test results at high frequency, 20 MHz EBW, QPSK

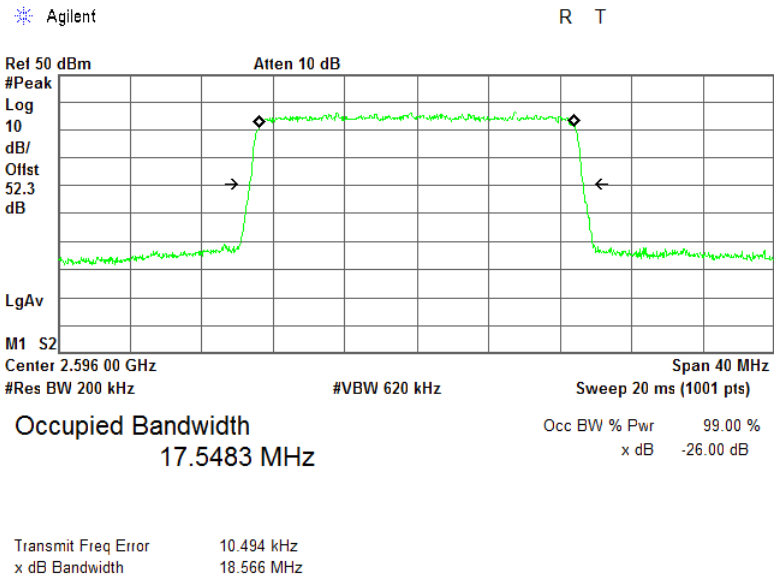


Plot 7.1.16 Occupied bandwidth test results at low frequency, 20 MHz EBW, 64QAM

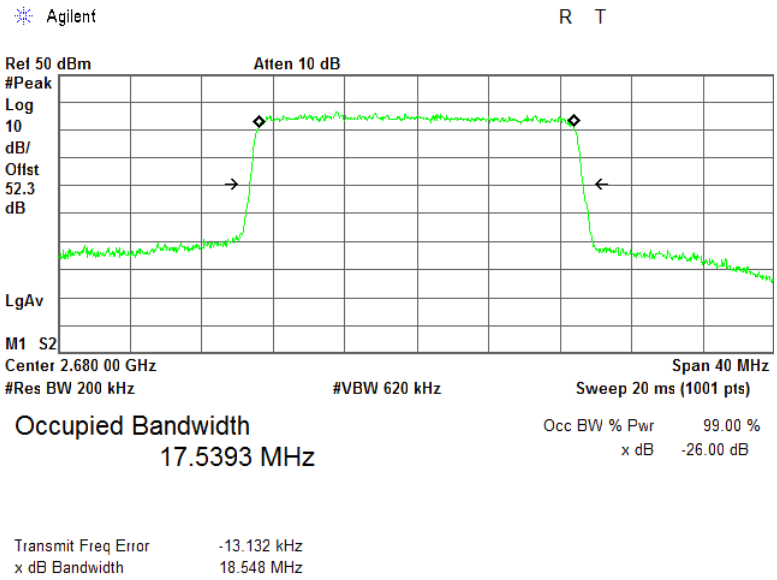


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.1.17 Occupied bandwidth test results at mid frequency, 20 MHz EBW, 64QAM



Plot 7.1.18 Occupied bandwidth test results at high frequency, 20 MHz EBW, 64QAM



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

7.2 Occupied bandwidth test in 2498.5 – 2565.5 MHz band

7.2.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, kHz
2496.0 – 2572.0 MHz	26	NA

* - Modulation envelope reference points are provided in terms of attenuation below the unmodulated carrier.

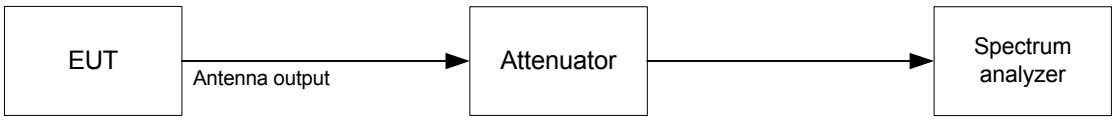
7.2.2 Test procedure

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 set to transmit the normal modulated signal and actual channel width was measured at the 26 dBc modulation envelope reference points.

7.2.2.3 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.2.2 and the associated plots.

Figure 7.2.1 Occupied bandwidth test setup



Test specification:	**Section 2.1049, Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Table 7.2.2 Occupied bandwidth test results

DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 51 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
EBW: 5 MHz

Carrier frequency, MHz	OBW 26 dBc, kHz	OBW 99%. kHz	Limit, kHz	Verdict
QPSK				
2498.5	4666.0	4394.7	NA	Pass
2532.0	4683.0	4395.4	NA	Pass
2565.5	4670.0	4396.3	NA	Pass
64QAM				
2498.5	4654.0	4392.3	NA	Pass
2532.0	4673.0	4390.6	NA	Pass
2565.5	4668.0	4395.8	NA	Pass

DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 100 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
EBW: 10 MHz

Carrier frequency, MHz	OBW 26 dBc, kHz	OBW 99%. kHz	Limit, kHz	Verdict
QPSK				
2501.0	9456.0	8919.6	NA	Pass
2535.0	9468.0	8914.4	NA	Pass
2563.0	9468.0	8934.3	NA	Pass
64QAM				
2501.0	9476.0	8938.3	NA	Pass
2535.0	9463.0	8920.6	NA	Pass
2563.0	9457.0	8931.1	NA	Pass

DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 200 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
EBW: 20 MHz

Carrier frequency, MHz	OBW 26 dBc, kHz	OBW 99%. kHz	Limit, kHz	Verdict
QPSK				
2506.0	18553.0	17582.8	NA	Pass
2532.0	18542.0	17579.8	NA	Pass
2558.0	18615.0	17573.4	NA	Pass
64QAM				
2506.0	18490.0	17589.4	NA	Pass
2532.0	18496.0	17581.7	NA	Pass
2558.0	18614.0	17540.4	NA	Pass

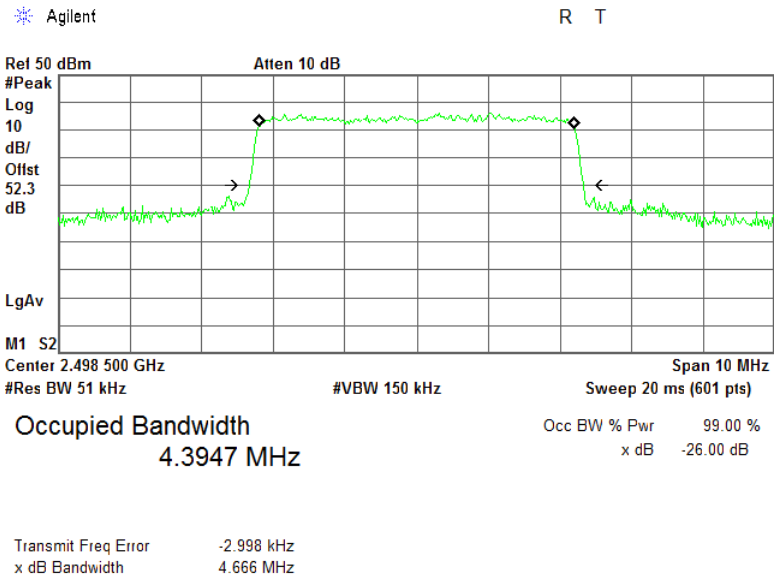
Reference numbers of test equipment used

HL 2214	HL 3301	HL 3302	HL 3818	HL 4756			

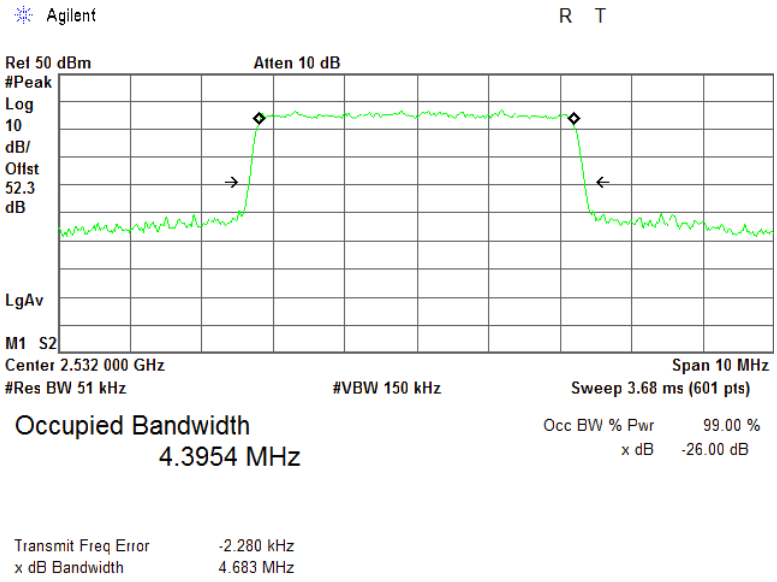
Full description is given in Appendix A.

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.2.1 Occupied bandwidth test results at low frequency, 5 MHz EBW, QPSK

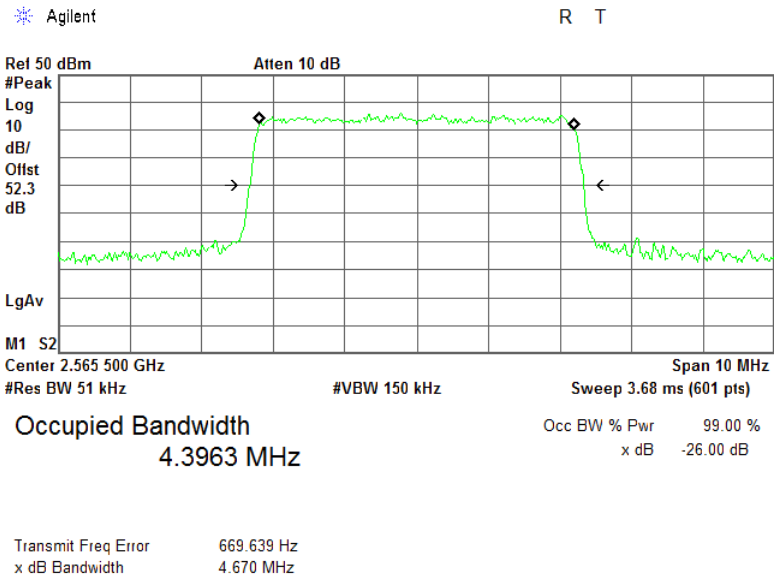


Plot 7.2.2 Occupied bandwidth test results at mid frequency, 5 MHz EBW, QPSK

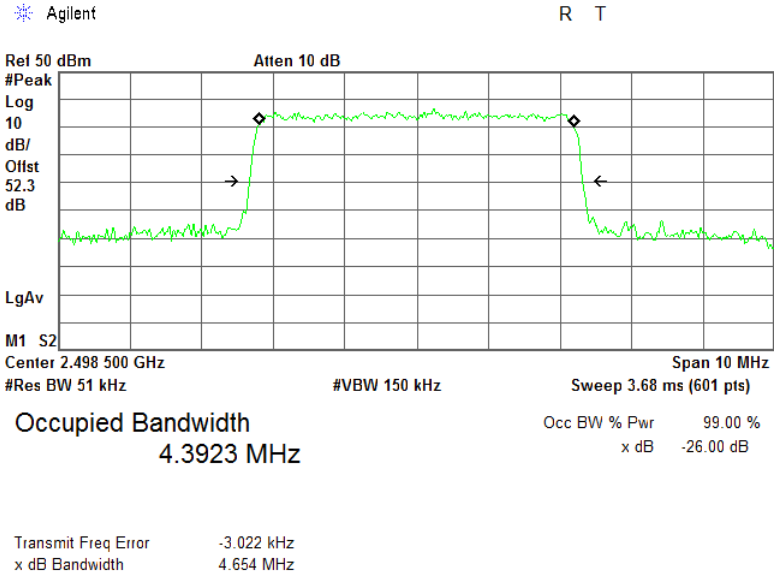


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.2.3 Occupied bandwidth test results at high frequency, 5 MHz EBW, QPSK

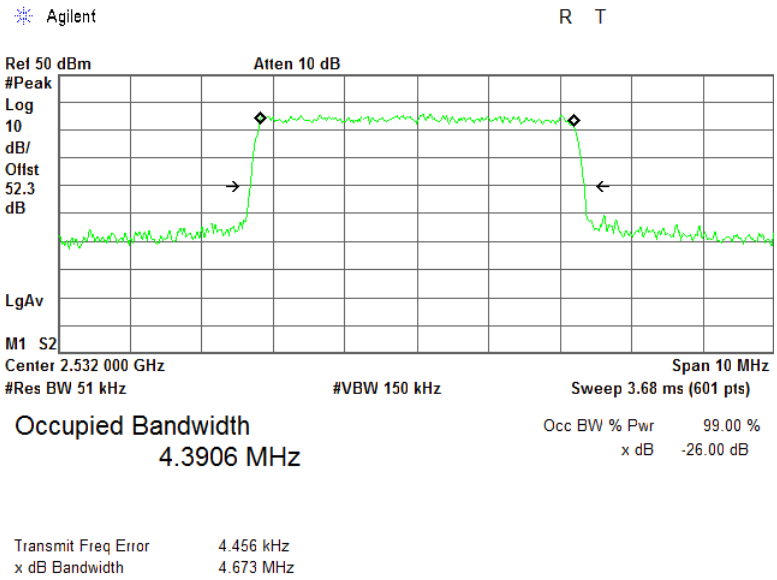


Plot 7.2.4 Occupied bandwidth test results at low frequency, 5 MHz EBW, 64QAM

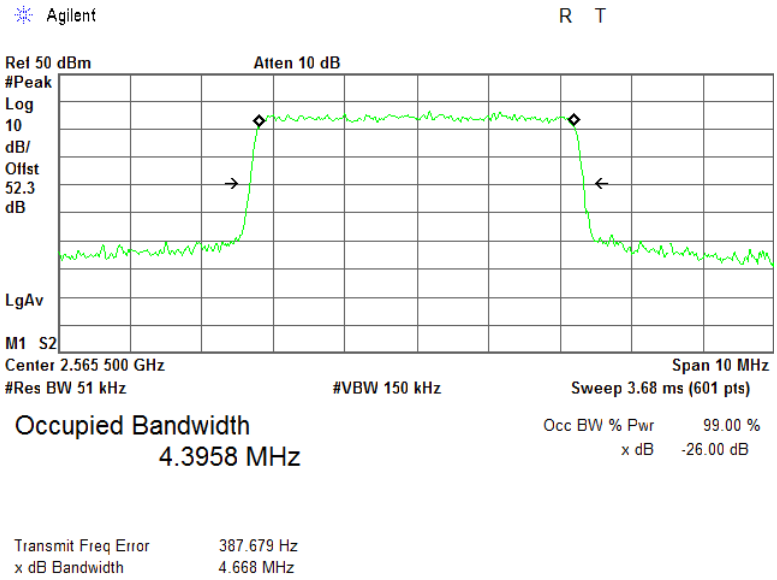


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.2.5 Occupied bandwidth test results at mid frequency, 5 MHz EBW, 64QAM

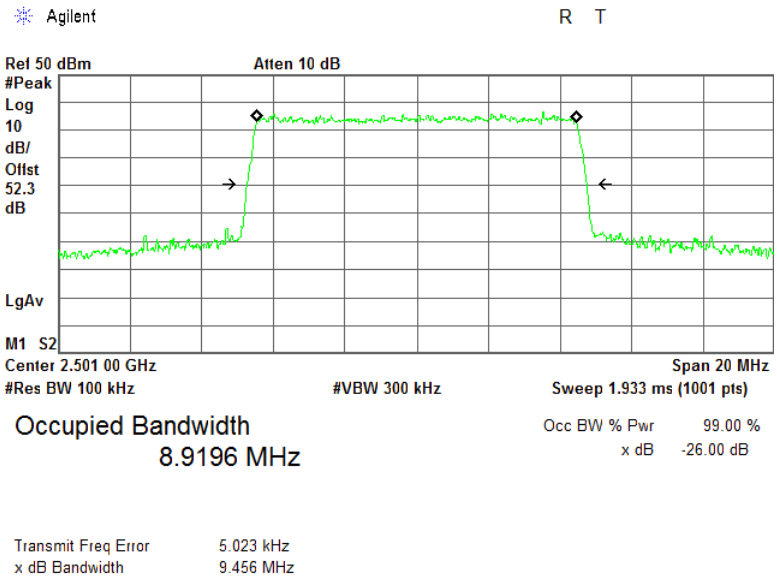


Plot 7.2.6 Occupied bandwidth test results at high frequency, 5 MHz EBW, 64QAM

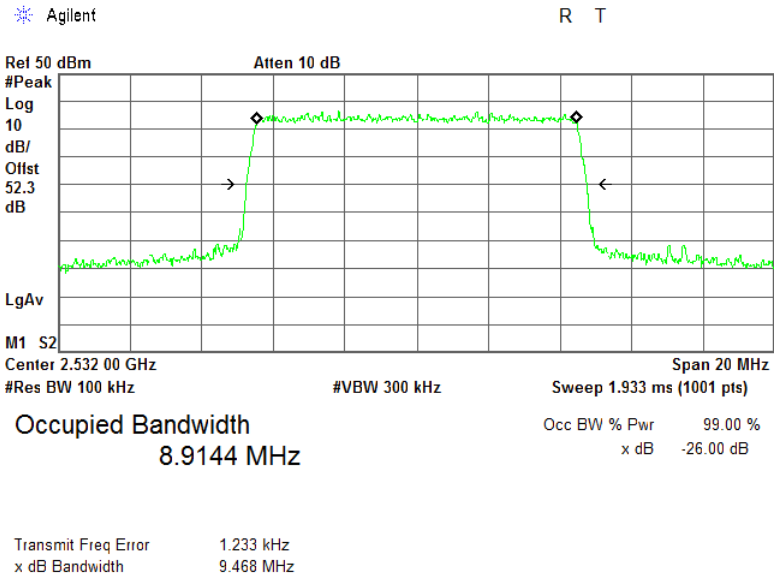


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.2.7 Occupied bandwidth test results at low frequency, 10 MHz EBW, QPSK

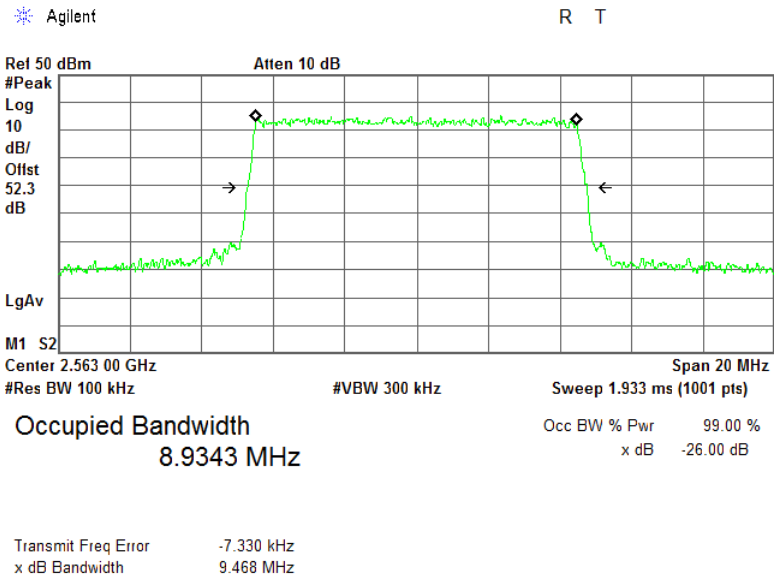


Plot 7.2.8 Occupied bandwidth test results at mid frequency, 10 MHz EBW, QPSK

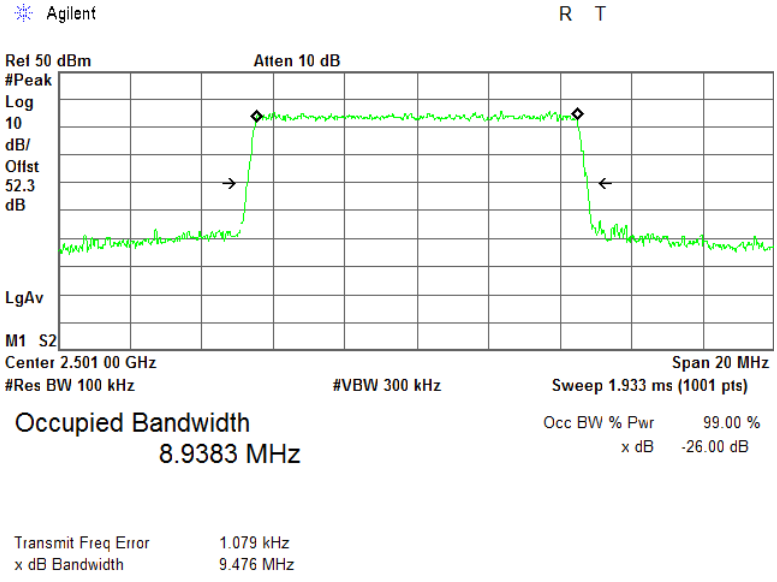


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.2.9 Occupied bandwidth test results at high frequency, 10 MHz EBW, QPSK

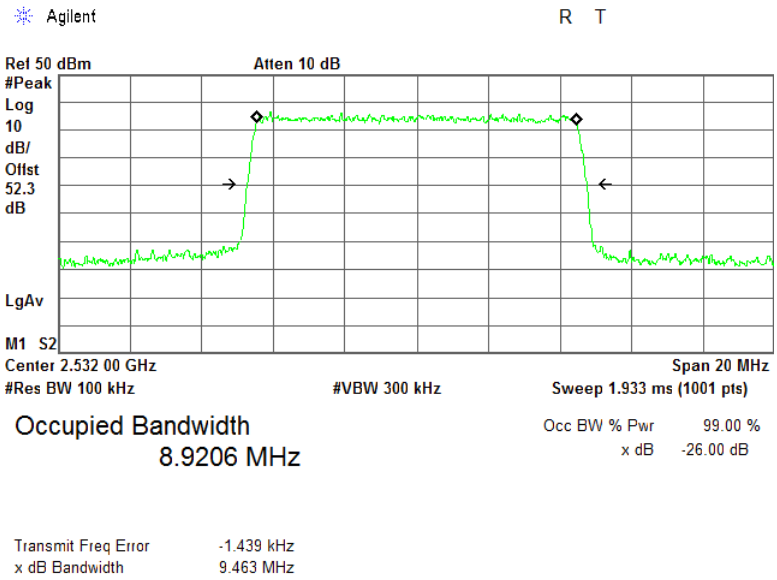


Plot 7.2.10 Occupied bandwidth test results at low frequency, 10 MHz EBW, 64QAM

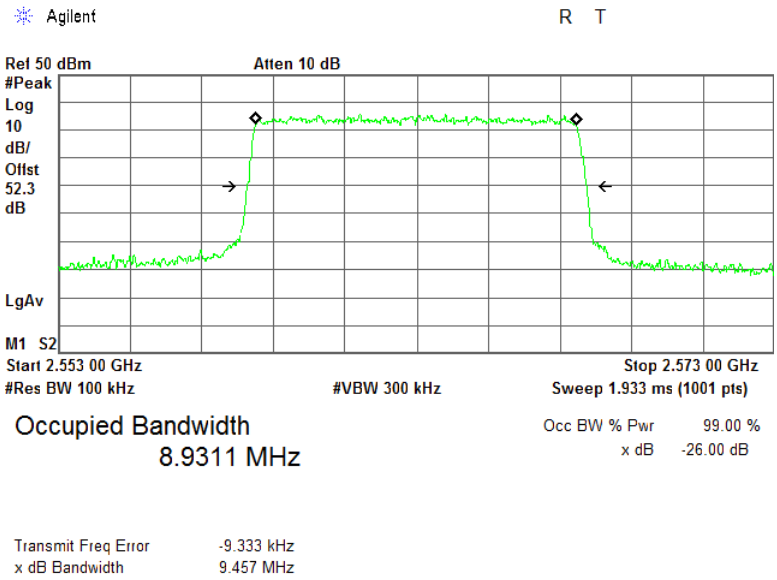


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.2.11 Occupied bandwidth test results at mid frequency, 10 MHz EBW, 64QAM

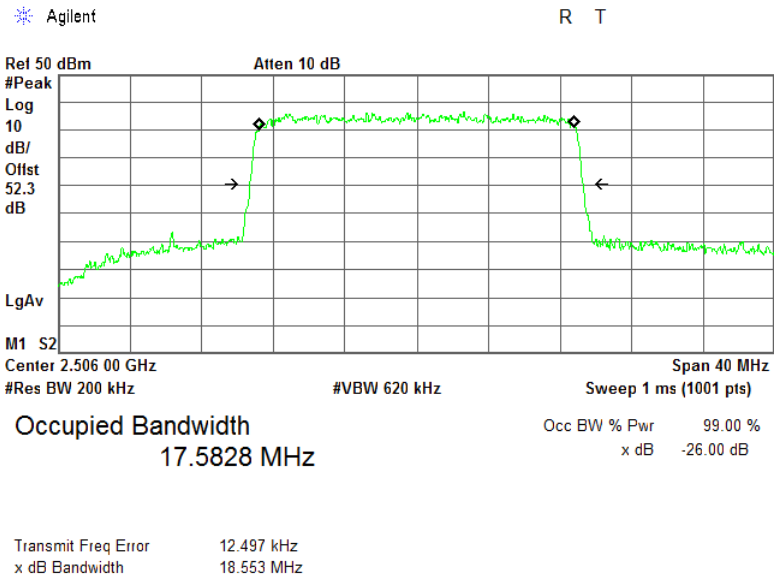


Plot 7.2.12 Occupied bandwidth test results at high frequency, 10 MHz EBW, 64QAM

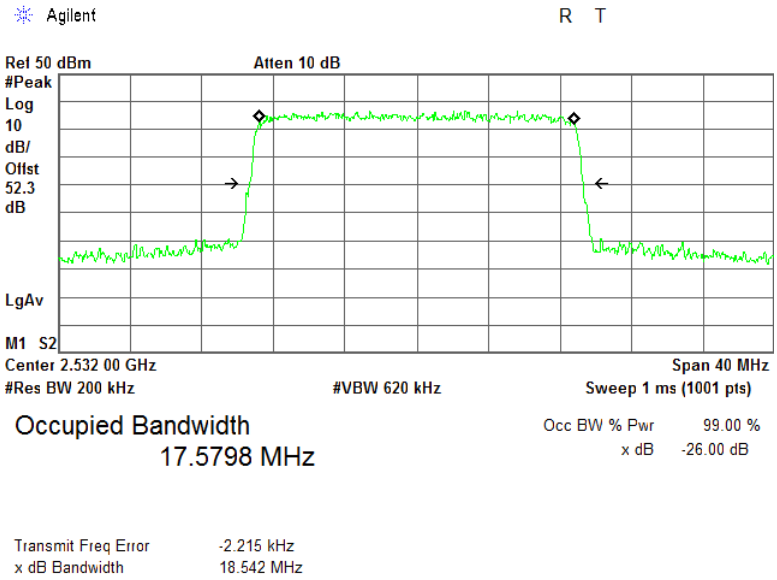


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.2.13 Occupied bandwidth test results at low frequency, 20 MHz EBW, QPSK

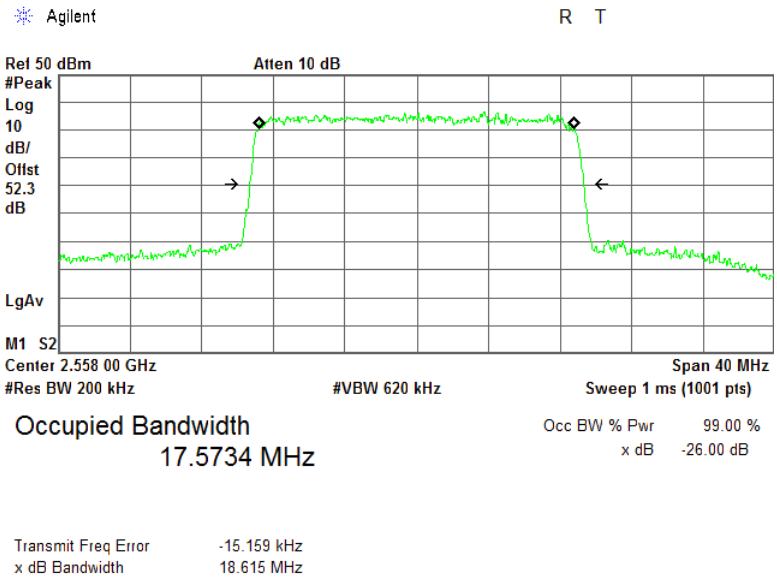


Plot 7.2.14 Occupied bandwidth test results at mid frequency, 20 MHz EBW, QPSK

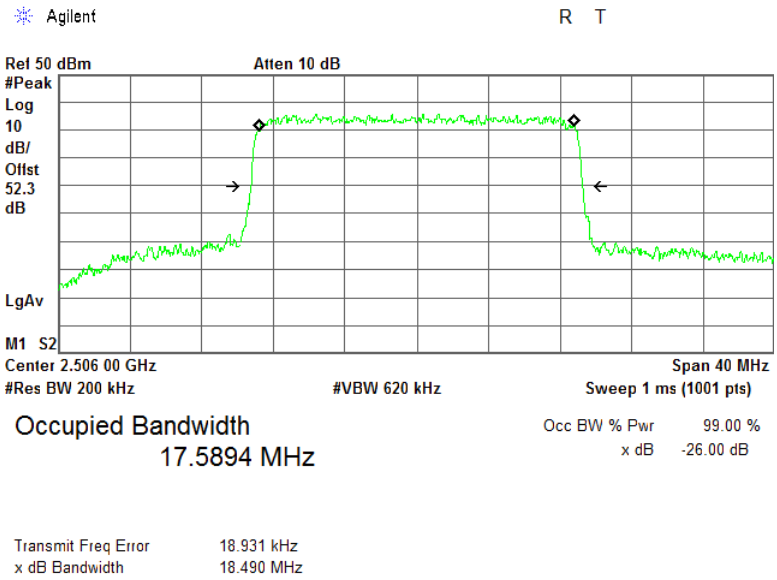


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.2.15 Occupied bandwidth test results at high frequency, 20 MHz EBW, QPSK

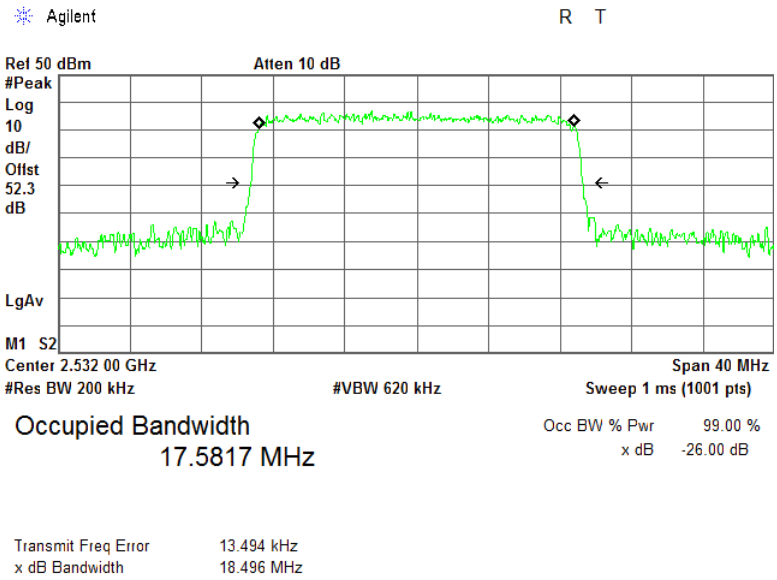


Plot 7.2.16 Occupied bandwidth test results at low frequency, 20 MHz EBW, 64QAM

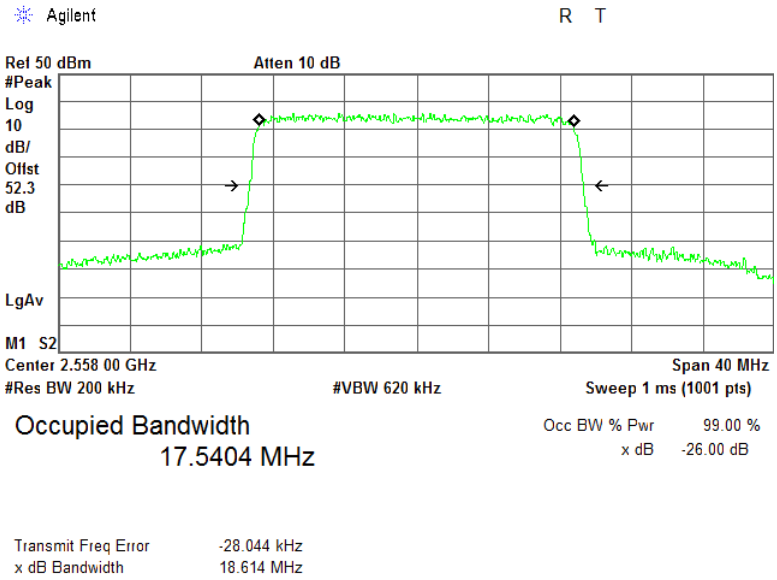


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.2.17 Occupied bandwidth test results at mid frequency, 20 MHz EBW, 64QAM



Plot 7.2.18 Occupied bandwidth test results at high frequency, 20 MHz EBW, 64QAM



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

7.3 Occupied bandwidth test in 2620.5 – 2687.5 MHz band

7.3.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, kHz
2614.0 – 2690.0 MHz	26	NA

* - Modulation envelope reference points are provided in terms of attenuation below the unmodulated carrier.

7.3.2 Test procedure

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

7.3.2.2 The EUT was set to transmit the normal modulated signal and actual channel width was measured at the 26 dBc modulation envelope reference points.

7.3.2.3 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.3.2 and the associated plots.

Figure 7.3.1 Occupied bandwidth test setup

Test specification:	**Section 2.1049, Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Table 7.3.2 Occupied bandwidth test results

DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 51 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
EBW: 5 MHz

Carrier frequency, MHz	OBW 26 dBc, kHz	OBW 99%. kHz	Limit, kHz	Verdict
QPSK				
2620.5	4652.0	4399.7	NA	Pass
2654.0	4657.0	4392.1	NA	Pass
2687.5	4664.0	4386.5	NA	Pass
64QAM				
2620.5	4665.0	4389.9	NA	Pass
2654.0	4661.0	4399.1	NA	Pass
2687.5	4663.0	4389.3	NA	Pass

DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 100 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
EBW: 10 MHz

Carrier frequency, MHz	OBW 26 dBc, kHz	OBW 99%. kHz	Limit, kHz	Verdict
QPSK				
2623.0	9458.0	8927.1	NA	Pass
2657.0	9466.0	8933.1	NA	Pass
2685.0	9457.0	8921.7	NA	Pass
64QAM				
2623.0	9446.0	8913.9	NA	Pass
2657.0	9427.0	8946.0	NA	Pass
2685.0	9440.0	8944.2	NA	Pass

DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 200 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
EBW: 20 MHz

Carrier frequency, MHz	OBW 26 dBc, kHz	OBW 99%. kHz	Limit, kHz	Verdict
QPSK				
2628.0	18553.0	17575.7	NA	Pass
2657.0	18476.0	17590.3	NA	Pass
2680.0	18531.0	17556.1	NA	Pass
64QAM				
2628.0	18509.0	17560.3	NA	Pass
2657.0	18580.0	17522.5	NA	Pass
2680.0	18598.0	17545.0	NA	Pass

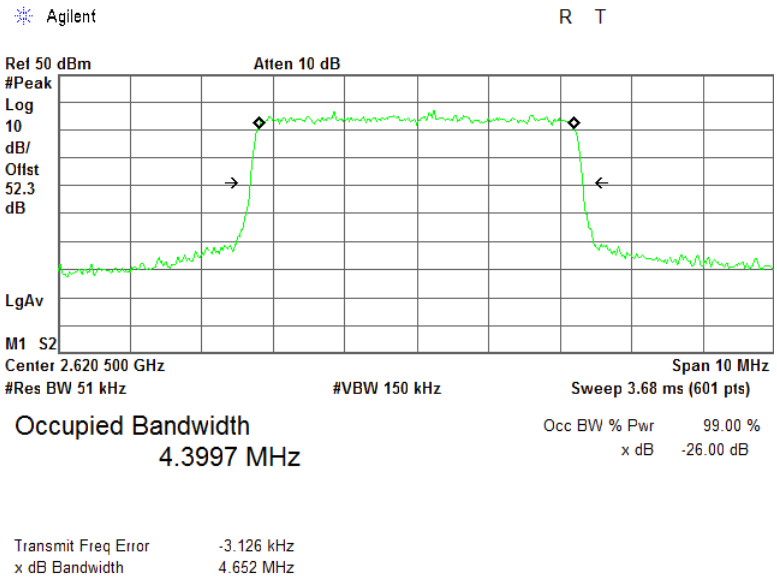
Reference numbers of test equipment used

HL 2214	HL 3301	HL 3302	HL 3818	HL 4756			

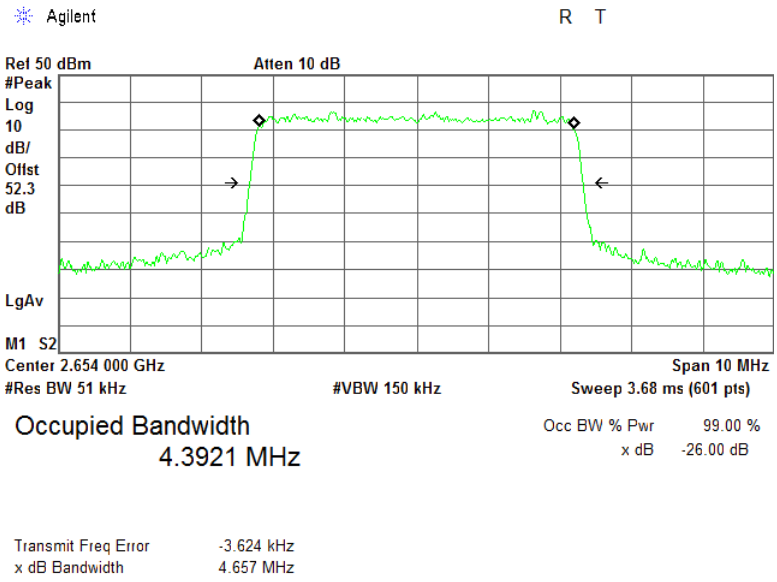
Full description is given in Appendix A.

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.3.1 Occupied bandwidth test results at low frequency, 5 MHz EBW, QPSK

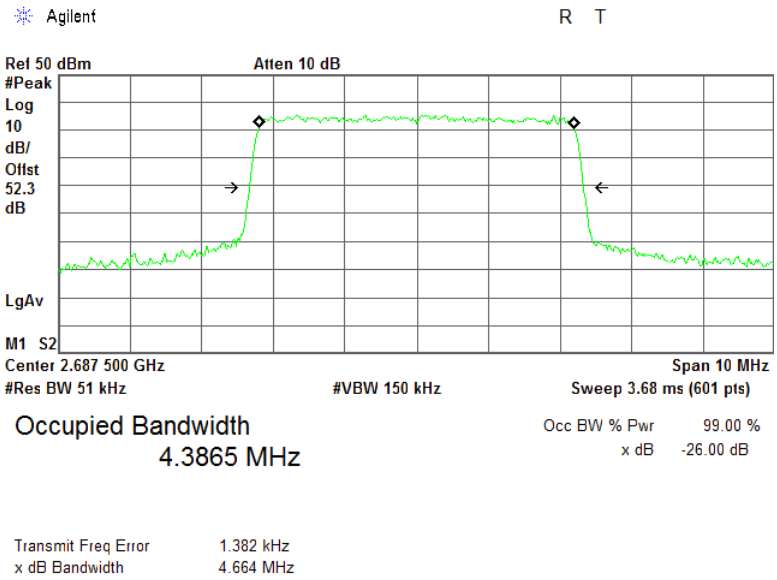


Plot 7.3.2 Occupied bandwidth test results at mid frequency, 5 MHz EBW, QPSK

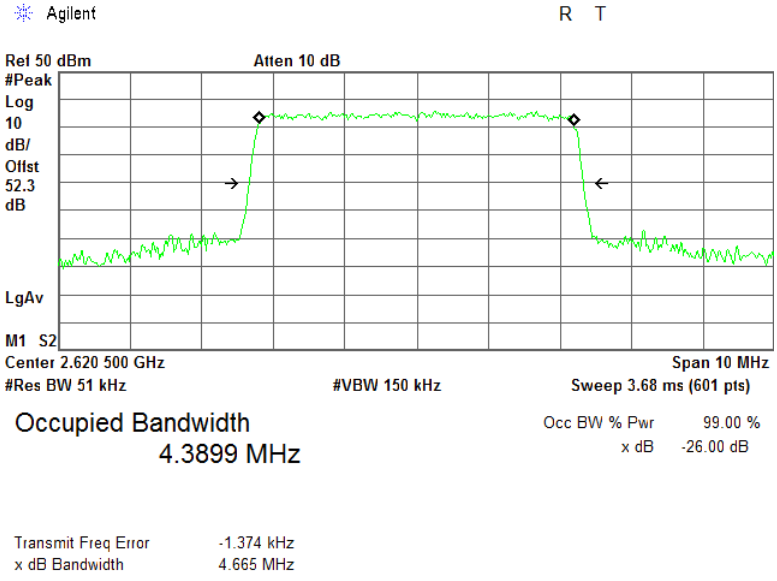


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.3.3 Occupied bandwidth test results at high frequency, 5 MHz EBW, QPSK

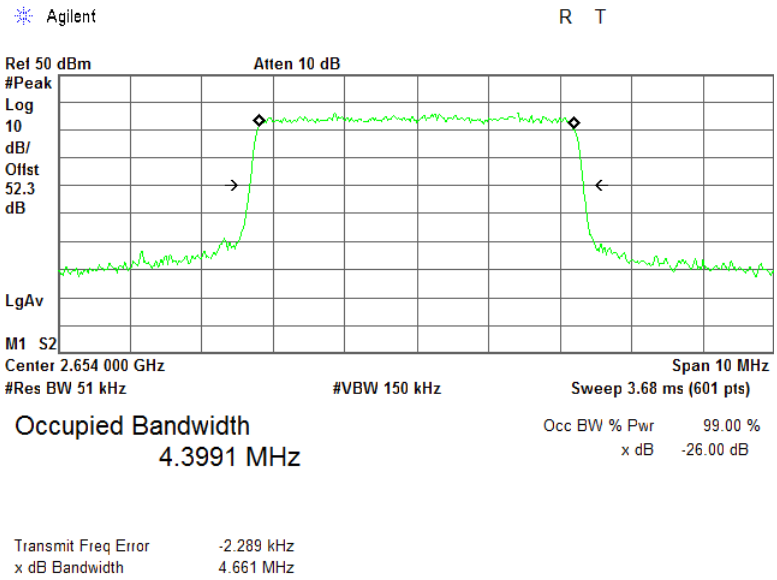


Plot 7.3.4 Occupied bandwidth test results at low frequency, 5 MHz EBW, 64QAM

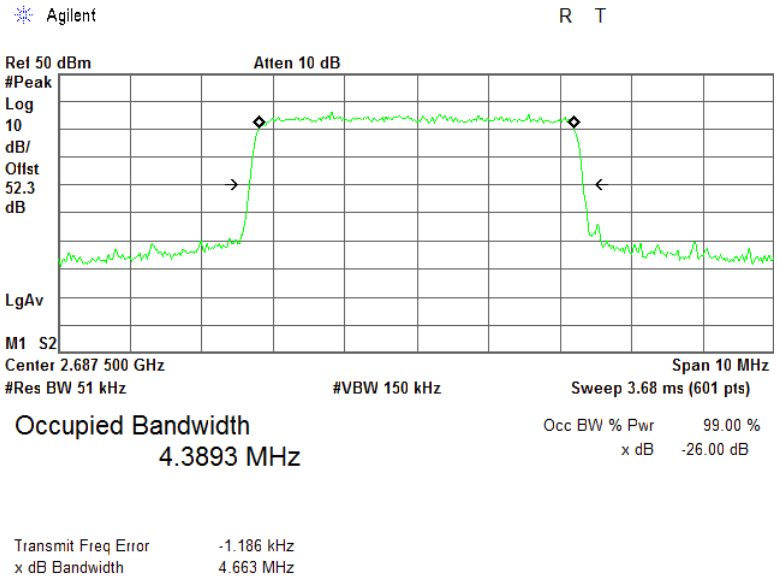


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.3.5 Occupied bandwidth test results at mid frequency, 5 MHz EBW, 64QAM

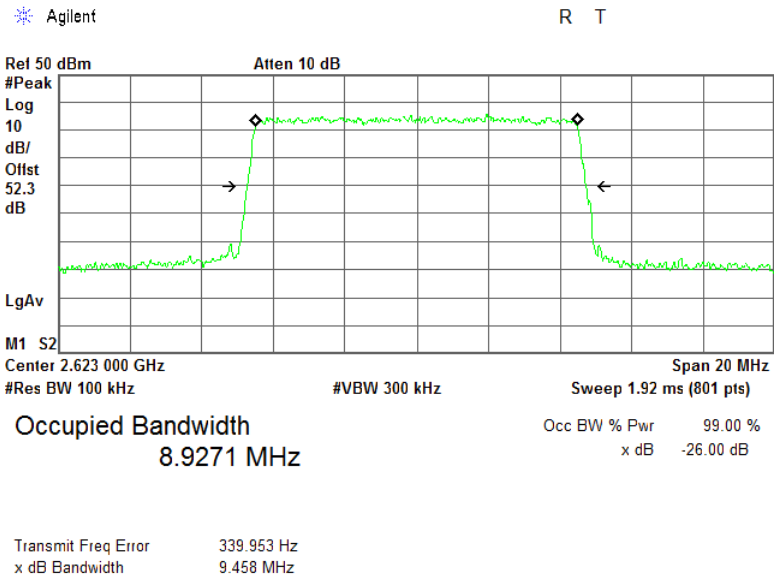


Plot 7.3.6 Occupied bandwidth test results at high frequency, 5 MHz EBW, 64QAM

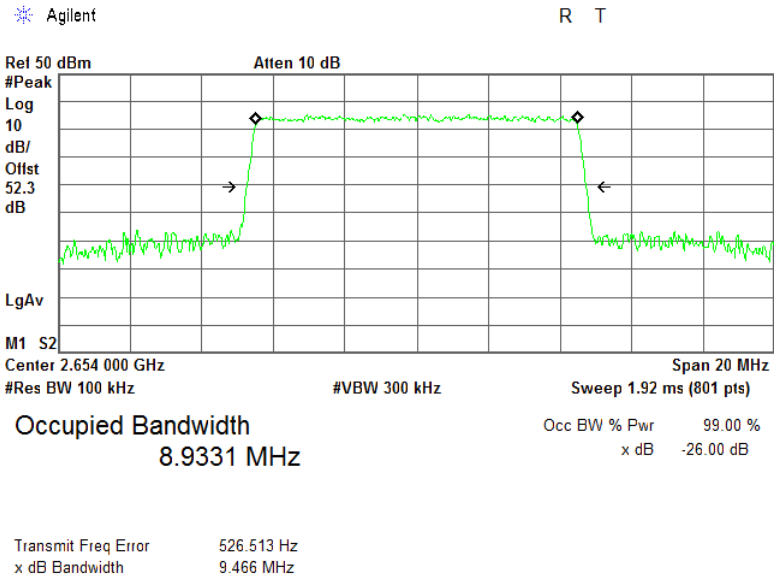


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.3.7 Occupied bandwidth test results at low frequency, 10 MHz EBW, QPSK

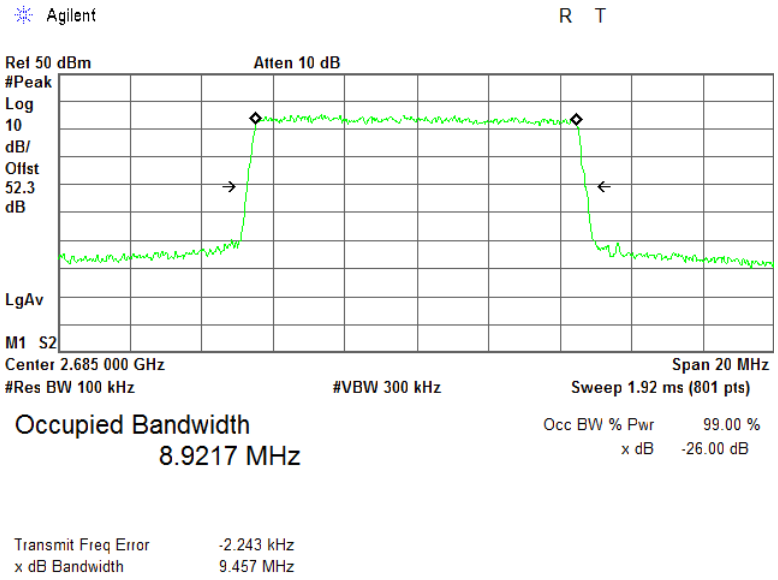


Plot 7.3.8 Occupied bandwidth test results at mid frequency, 10 MHz EBW, QPSK

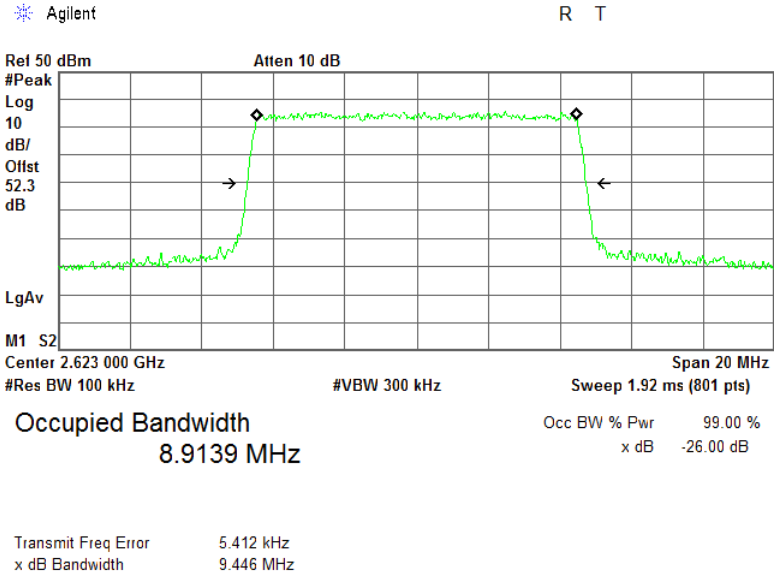


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.3.9 Occupied bandwidth test results at high frequency, 10 MHz EBW, QPSK

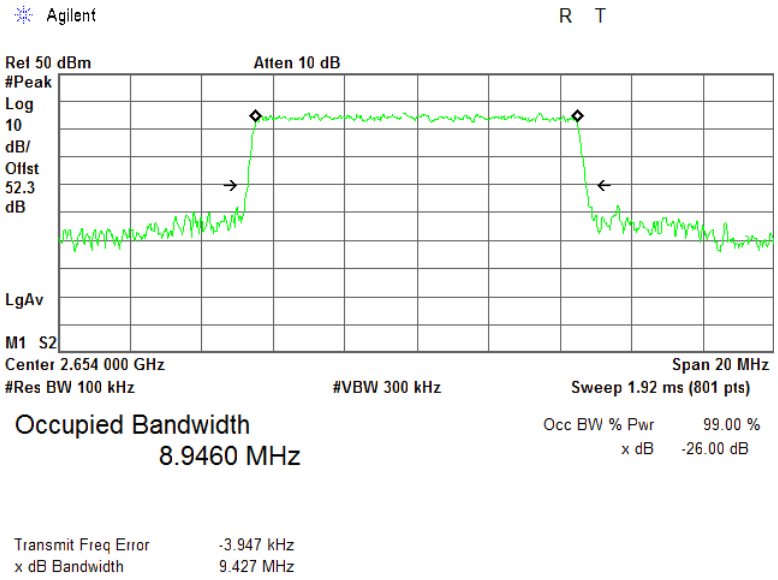


Plot 7.3.10 Occupied bandwidth test results at low frequency, 10 MHz EBW, 64QAM

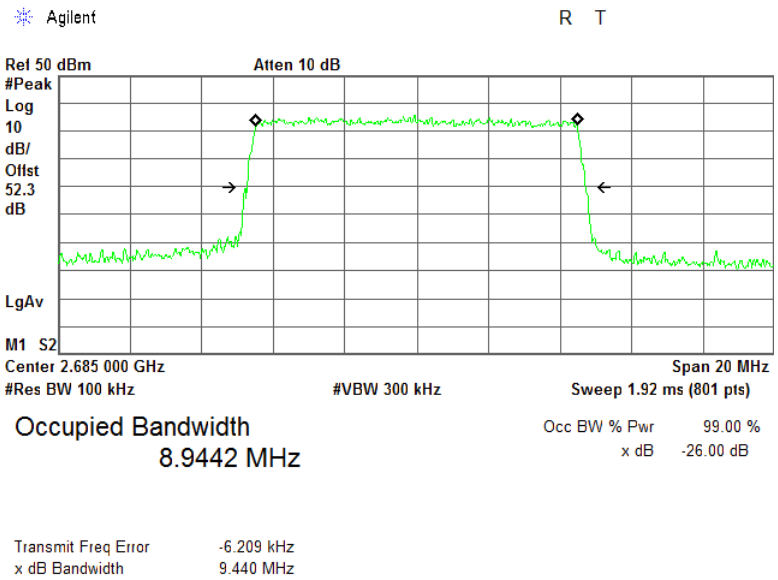


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.3.11 Occupied bandwidth test results at mid frequency, 10 MHz EBW, 64QAM

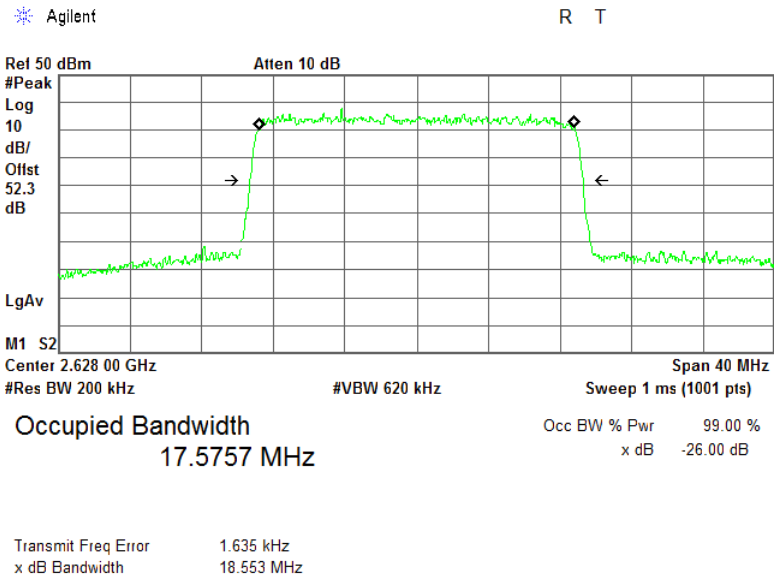


Plot 7.3.12 Occupied bandwidth test results at high frequency, 10 MHz EBW, 64QAM

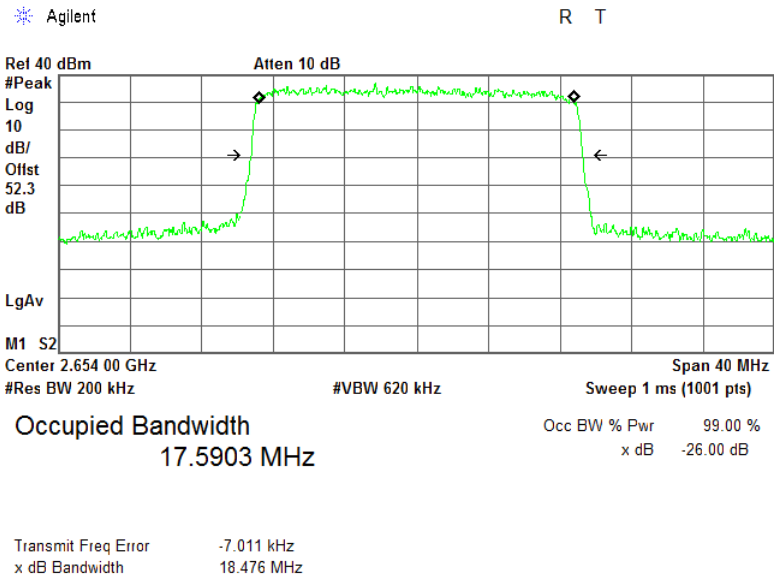


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.3.13 Occupied bandwidth test results at low frequency, 20 MHz EBW, QPSK

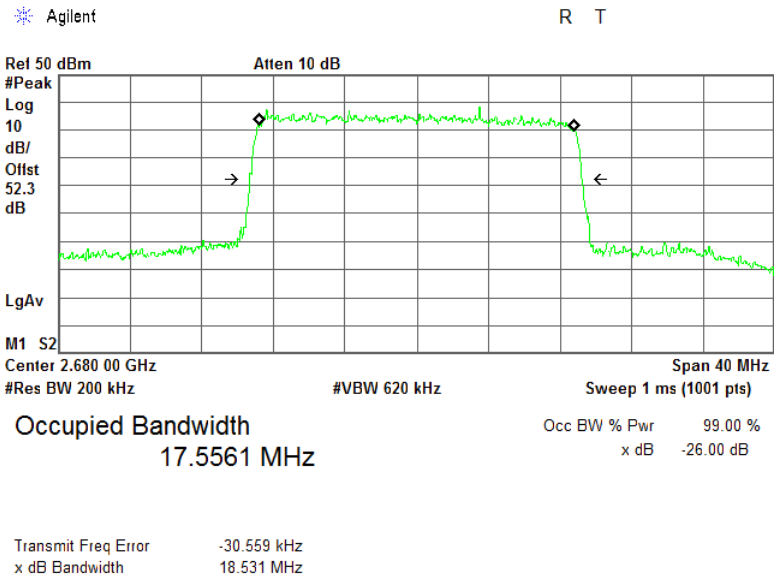


Plot 7.3.14 Occupied bandwidth test results at mid frequency, 20 MHz EBW, QPSK

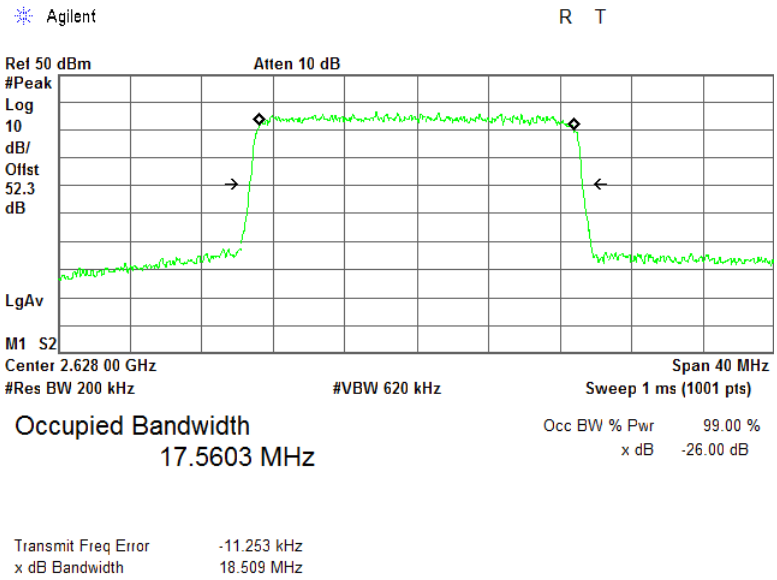


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.3.15 Occupied bandwidth test results at high frequency, 20 MHz EBW, QPSK

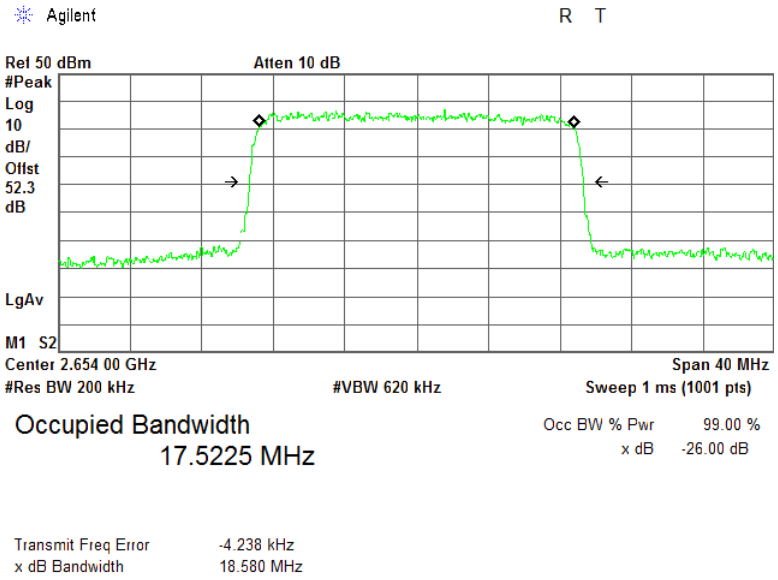


Plot 7.3.16 Occupied bandwidth test results at low frequency, 20 MHz EBW, 64QAM

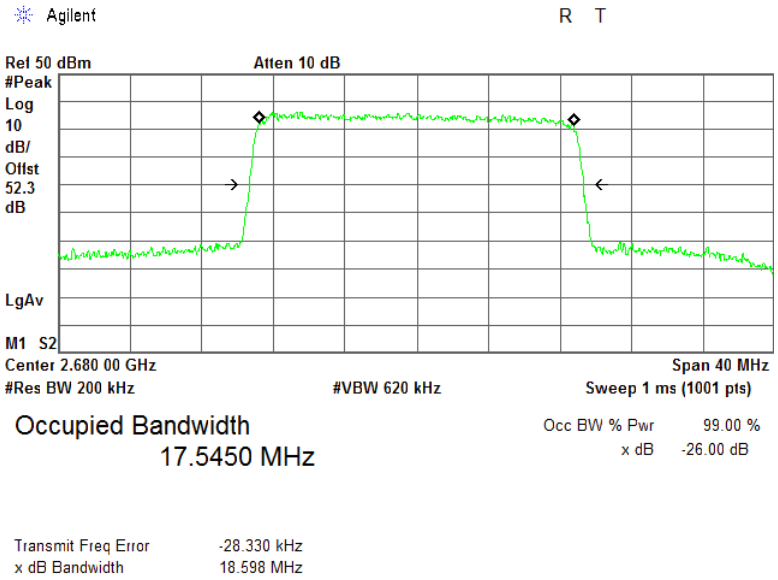


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.3.17 Occupied bandwidth test results at mid frequency, 20 MHz EBW, 64QAM



Plot 7.3.18 Occupied bandwidth test results at high frequency, 20 MHz EBW, 64QAM



Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

7.4 Peak output power test in 2498.5 – 2687.5 MHz band

7.4.1 General

This test was performed to measure the peak output power at RF antenna connector. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Peak output power limits

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

7.4.2 Test procedure

7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized and its proper operation was checked.

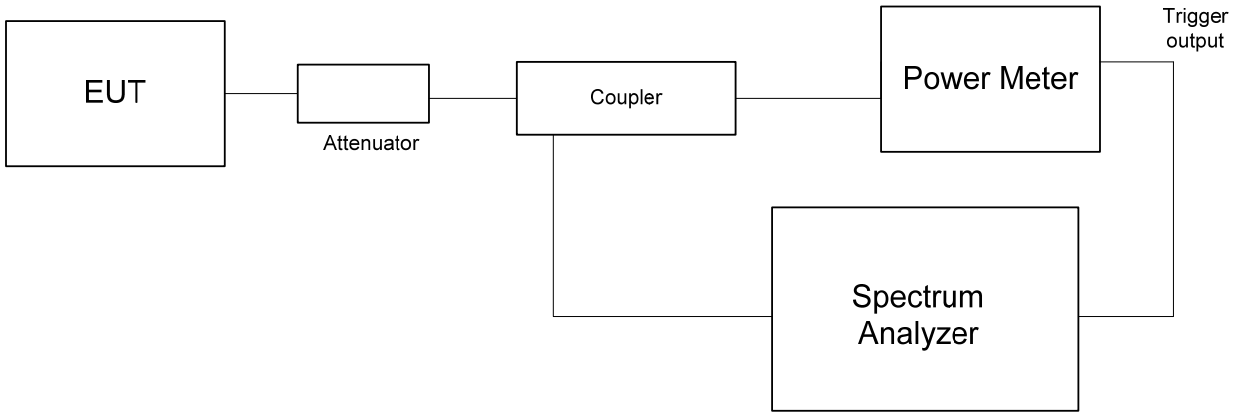
7.4.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.

7.4.2.3 The average output power was measured with power meter as provided in Table 7.4.2 to Table 7.4.4.

7.4.2.4 The power spectral density was measured with spectrum analyzer as provided in Table 7.4.5 to Table 7.4.7 and the associated plots..

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

Figure 7.4.1 Peak output power test setup



Test specification:	**Section 27.50, Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.4.2 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	41.60	41.65	44.65	18.00	62.65	69.34	-6.69	Pass
2593.0	43.17	43.12	46.17	18.00	64.17	69.34	-5.17	Pass
2687.5	43.12	43.15	46.15	18.00	64.15	69.73	-5.58	Pass
64QAM								
2498.5	42.12	42.13	45.13	18.00	63.13	69.33	-6.20	Pass
2593.0	43.12	43.17	46.17	18.00	64.17	69.33	-5.16	Pass
2687.5	43.18	43.16	46.18	18.00	64.18	69.71	-5.53	Pass
QPSK								
2498.5	41.60	41.65	44.65	17.00	61.65	67.93	-6.28	Pass
2593.0	43.17	43.12	46.17	17.00	63.17	67.93	-4.76	Pass
2687.5	43.12	43.15	46.15	17.00	63.15	68.31	-5.16	Pass
64QAM								
2498.5	42.12	42.13	45.13	17.00	62.13	67.92	-5.79	Pass
2593.0	43.12	43.17	46.17	17.00	63.17	67.92	-4.75	Pass
2687.5	43.18	43.16	46.18	17.00	63.18	68.30	-5.12	Pass
QPSK								
2498.5	41.60	41.65	44.65	11.00	55.65	69.34	-13.69	Pass
2593.0	43.17	43.12	46.17	11.00	57.17	69.34	-12.17	Pass
2687.5	43.12	43.15	46.15	11.00	57.15	69.73	-12.58	Pass
64QAM								
2498.5	42.12	42.13	45.13	11.00	56.13	69.33	-13.20	Pass
2593.0	43.12	43.17	46.17	11.00	57.17	69.33	-12.16	Pass
2687.5	43.18	43.16	46.18	11.00	57.18	69.71	-12.53	Pass

* - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi
** - Total RF power , dBm = 10*log[10^(Power RF#1 /10) + 10^(Power RF#2 /10)
*** - See Table 7.4.9.

Test specification:	**Section 27.50, Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.4.3 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	43.16	43.17	46.17	18.00	64.17	69.57	-5.40	Pass
2596	43.20	43.15	46.20	18.00	64.20	69.39	-5.19	Pass
2685	43.12	43.17	46.17	18.00	64.17	69.79	-5.62	Pass
64QAM								
2501	43.13	43.16	46.16	18.00	64.16	69.58	-5.42	Pass
2596	43.15	43.14	46.15	18.00	64.15	69.40	-5.25	Pass
2685	43.18	43.20	46.20	18.00	64.20	69.78	-5.58	Pass
QPSK								
2501	43.16	43.17	46.17	17.00	63.17	68.16	-4.99	Pass
2596	43.20	43.15	46.20	17.00	63.20	67.97	-4.77	Pass
2685	43.12	43.17	46.17	17.00	63.17	68.38	-5.21	Pass
64QAM								
2501	43.13	43.16	46.16	17.00	63.16	68.17	-5.01	Pass
2596	43.15	43.14	46.15	17.00	63.15	67.98	-4.83	Pass
2685	43.18	43.20	46.20	17.00	63.20	68.36	-5.16	Pass
QPSK								
2501	43.16	43.17	46.17	11.00	57.17	69.57	-12.40	Pass
2596	43.20	43.15	46.20	11.00	57.20	69.39	-12.19	Pass
2685	43.12	43.17	46.17	11.00	57.17	69.57	-12.40	Pass
64QAM								
2501	43.13	43.16	46.16	11.00	57.16	69.58	-12.42	Pass
2596	43.15	43.14	46.15	11.00	57.15	69.40	-12.25	Pass
2685	43.18	43.20	46.20	11.00	57.20	69.78	-12.58	Pass

* - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi
** - Total RF power , dBm = 10*log[10^(Power RF#1 /10) + 10^(Power RF#2 /10)
*** - See Table 7.4.9.

Test specification:	**Section 27.50, Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.4.4 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	43.10	43.13	46.13	18.00	64.13	69.59	-5.46	Pass
2596	43.14	43.12	46.14	18.00	64.14	69.32	-5.18	Pass
2680	43.13	43.17	46.17	18.00	64.17	69.72	-5.55	Pass
64QAM								
2506	43.15	43.20	46.20	18.00	64.20	69.60	-5.40	Pass
2596	43.16	43.12	46.16	18.00	64.16	69.32	-5.16	Pass
2680	43.13	43.17	46.17	18.00	64.17	69.69	-5.52	Pass
QPSK								
2506	43.10	43.13	46.13	17.00	63.13	68.18	-5.05	Pass
2596	43.14	43.12	46.14	17.00	63.14	67.90	-4.76	Pass
2680	43.13	43.17	46.17	17.00	63.17	68.30	-5.13	Pass
64QAM								
2506	43.15	43.20	46.20	17.00	63.20	68.18	-4.98	Pass
2596	43.16	43.12	46.16	17.00	63.16	67.91	-4.75	Pass
2680	43.13	43.17	46.17	17.00	63.17	68.28	-5.11	Pass
QPSK								
2506	43.10	43.13	46.13	11.00	57.13	69.59	-12.46	Pass
2596	43.14	43.12	46.14	11.00	57.14	69.32	-12.18	Pass
2680	43.13	43.17	46.17	11.00	57.17	69.72	-12.55	Pass
64QAM								
2506	43.15	43.20	46.20	11.00	57.20	69.60	-12.40	Pass
2596	43.16	43.12	46.16	11.00	57.16	69.32	-12.16	Pass
2680	43.13	43.17	46.17	11.00	57.17	69.69	-12.52	Pass

* - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi
** - Total RF power , dBm = 10*log[10^(Power RF#1 /10) + 10^(Power RF#2 /10)
*** - See Table 7.4.9.

Reference numbers of test equipment used

HL 2214	HL 3301	HL 3302	HL 3818	HL 4756			

Full description is given in Appendix A.

Test specification:	**Section 27.50, Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.4.5 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	29.16	28.91	18.00	50.16	51.56	-1.40	Pass
2593.0	29.92	29.85	18.00	50.92	51.56	-0.64	Pass
2687.5	29.76	29.79	18.00	50.79	52.32	-1.53	Pass
64 QAM							
2498.5	28.95	29.20	18.00	50.20	51.55	-1.35	Pass
2593.0	29.87	30.02	18.00	51.02	51.55	-0.53	Pass
2687.5	29.99	29.48	18.00	50.99	52.31	-1.32	Pass
QPSK							
2498.5	29.16	28.91	17.00	49.16	50.15	-0.99	Pass
2593.0	29.92	29.85	17.00	49.92	50.14	-0.22	Pass
2687.5	29.76	29.79	17.00	49.79	50.91	-1.12	Pass
64 QAM							
2498.5	28.95	29.20	17.00	49.20	50.14	-0.94	Pass
2593.0	29.87	30.02	17.00	50.02	50.14	-0.12	Pass
2687.5	29.99	29.48	17.00	49.99	50.89	-0.90	Pass
QPSK							
2498.5	29.16	28.91	11.00	43.16	51.56	-8.40	Pass
2593.0	29.92	29.85	11.00	43.92	51.56	-7.64	Pass
2687.5	29.76	29.79	11.00	43.79	52.32	-8.53	Pass
64 QAM							
2498.5	28.95	29.20	11.00	43.20	51.55	-8.35	Pass
2593.0	29.87	30.02	11.00	44.02	51.55	-7.53	Pass
2687.5	29.99	29.48	11.00	43.99	52.31	-8.32	Pass

* SA reading, including attenuation, cable loss and Duty Cycle correction factor
** Total PSD, dBm/100kHz = PSD(dBm/100kHz,RF#1)+ 3 dB + Antenna Gain, dBi
*** See Table 7.4.10

Test specification:	**Section 27.50, Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.4.6 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	25.60	25.53	18.00	46.60	48.97	-2.37	Pass
2596	25.43	25.42	18.00	46.43	48.60	-2.17	Pass
2685	25.62	25.28	18.00	46.62	49.38	-2.76	Pass
64QAM							
2501	25.94	25.74	18.00	46.94	48.98	-2.04	Pass
2596	25.47	25.47	18.00	46.47	48.61	-2.14	Pass
2685	25.43	25.41	18.00	46.43	49.36	-2.93	Pass
QPSK							
2501	25.60	25.53	17.00	45.60	47.55	-1.95	Pass
2596	25.43	25.42	17.00	45.43	47.18	-1.75	Pass
2685	25.62	25.28	17.00	45.62	47.96	-2.34	Pass
64QAM							
2501	25.94	25.74	17.00	45.94	47.56	-1.62	Pass
2596	25.47	25.47	17.00	45.47	47.19	-1.72	Pass
2685	25.43	25.41	17.00	45.43	47.95	-2.52	Pass
QPSK							
2501	25.60	25.53	11.00	39.60	48.97	-9.37	Pass
2596	25.43	25.42	11.00	39.43	48.60	-9.17	Pass
2685	25.62	25.28	11.00	39.62	49.38	-9.76	Pass
64QAM							
2501	25.94	25.74	11.00	39.94	48.98	-9.04	Pass
2596	25.47	25.47	11.00	39.47	48.61	-9.14	Pass
2685	25.43	25.41	11.00	39.43	49.36	-9.93	Pass

* SA reading, including attenuation, cable loss and Duty Cycle correction factor
** Total PSD, dBm/100kHz = PSD(dBm/100kHz,RF#1)+ 3 dB + Antenna Gain, dBi
*** See Table 7.4.10.

Test specification:	**Section 27.50, Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.4.7 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	23.28	23.38	18.00	44.38	46.07	-1.69	Pass
2596	23.03	22.90	18.00	44.03	45.51	-1.48	Pass
2680	22.90	22.94	18.00	43.94	46.29	-2.35	Pass
64QAM							
2506	23.25	23.10	18.00	44.25	46.08	-1.83	Pass
2596	23.07	23.12	18.00	44.12	45.52	-1.40	Pass
2680	23.41	23.24	18.00	44.41	46.27	-1.86	Pass
QPSK							
2506	23.28	23.38	17.00	43.38	44.66	-1.28	Pass
2596	23.03	22.90	17.00	43.03	44.10	-1.07	Pass
2680	22.90	22.94	17.00	42.94	44.88	-1.94	Pass
64QAM							
2506	23.25	23.10	17.00	43.25	44.66	-1.41	Pass
2596	23.07	23.12	17.00	43.12	44.10	-0.98	Pass
2680	23.41	23.24	17.00	43.41	44.86	-1.45	Pass
QPSK							
2506	23.28	23.38	11.00	37.38	46.07	-8.69	Pass
2596	23.03	22.90	11.00	37.03	45.51	-8.48	Pass
2680	22.90	22.94	11.00	36.94	46.29	-9.35	Pass
64QAM							
2506	23.25	23.10	11.00	37.25	46.08	-8.83	Pass
2596	23.07	23.12	11.00	37.12	45.52	-8.40	Pass
2680	23.41	23.24	11.00	37.41	46.27	-8.86	Pass

* SA reading, including attenuation, cable loss and Duty Cycle correction factor
** Total PSD, dBm/100kHz = PSD(dBm/100kHz,RF#1)+ 3 dB + Antenna Gain, dBi
*** See Table 7.4.10.

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.4.8 Post- 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	4.666	63+10log(OBW/6.0)+10log(360/beamwidth)	EIRP+10log(0.1/6.0)
2593.0 MHz EBS Ch.D4	4.663	63+10log(OBW/6.0)+10log(360/beamwidth)	EIRP+10log(0.1/6.0)
2687.5 MHz EBS Ch.G3	4.674	63+10log(OBW/5.5)+10log(360/beamwidth)	EIRP+10log(0.1/5.5)
5 MHz Dual Channel 64QAM 23 Mbps			
2498.5 MHz BRS Ch.1	4.654	63+10log(OBW/6.0)+10log(360/beamwidth)	EIRP+10log(0.1/6.0)
2593.0 MHz EBS Ch.D4	4.658	63+10log(OBW/6.0)+10log(360/beamwidth)	EIRP+10log(0.1/6.0)
2687.5 MHz EBS Ch.G3	4.657	63+10log(OBW/5.5)+10log(360/beamwidth)	EIRP+10log(0.1/5.5)
10 MHz Dual Channel QPSK 10.7 Mbps			
2501.0 MHz BRS Ch.1 + EBS Ch. A1	9.435	63+10log(OBW/11.5)+10log(360/beamwidth)	EIRP+10log(0.1/11.5)
2596.0 MHz EBS Ch.D4+G4	9.430	63+10log(OBW/12.0)+10log(360/beamwidth)	EIRP+10log(0.1/12.0)
2685.0 MHz EBS Ch.G2 + G3	9.482	63+10log(OBW/11.0)+10log(360/beamwidth)	EIRP+10log(0.1/11.0)
10 MHz Dual Channel 64QAM 47.3 Mbps			
2501.0 MHz BRS Ch.1 + EBS Ch. A1	9.453	63+10log(OBW/11.5)+10log(360/beamwidth)	EIRP+10log(0.1/11.5)
2596.0 MHz EBS Ch.D4+G4	9.451	63+10log(OBW/12.0)+10log(360/beamwidth)	EIRP+10log(0.1/12.0)
2685.0 MHz EBS Ch.G2 + G3	9.458	63+10log(OBW/11.0)+10log(360/beamwidth)	EIRP+10log(0.1/11.0)
20 MHz 4 Channels QPSK 23.4 Mbps			
2506.0 MHz BRS Ch.1+ EBS Ch.A1+A2+A3	18.539	63+10log(OBW/22.5)+10log(360/beamwidth)	EIRP+10log(0.1/22.5)
2596.0 MHz EBS Ch.C4+D4+G4+F4	18.558	63+10log(OBW/24.0)+10log(360/beamwidth)	EIRP+10log(0.1/24.0)
2680.0 MHz BRS CH.H3+ EBS Ch.G1+G2+G3	18.650	63+10log(OBW/22.0)+10log(360/beamwidth)	EIRP+10log(0.1/22.0)
20 MHz 4 Channels 64QAM 95 Mbps			
2506.0 MHz BRS Ch.1+ EBS Ch.A1+A2+A3	18.556	63+10log(OBW/22.5)+10log(360/beamwidth)	EIRP+10log(0.1/22.5)
2596.0 MHz EBS Ch.C4+D4+G4+F4	18.566	63+10log(OBW/24.0)+10log(360/beamwidth)	EIRP+10log(0.1/24.0)
2680.0 MHz BRS CH.H3+ EBS Ch.G1+G2+G3	18.548	63+10log(OBW/22.0)+10log(360/beamwidth)	EIRP+10log(0.1/22.0)

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.4.9 EIRP limits

Channel	Channel BW, MHz	Peak power limit, dBm	
		17 dBi, 90º beamwidth	18 dBi, 65ºbeamwidth 11 dBi, 65ºbeamwidth
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	68.31	69.73
10 MHz Dual Channel QPSK			
2501.0 MHz BRS Ch.1 + EBS Ch. A1	11.5	68.16	69.57
2596.0 MHz EBS Ch.D4+G4	12.0	67.97	69.39
2685.0 MHz EBS Ch.G2 + G3	11.0	68.38	69.79
20 MHz Dual Channel QPSK			
2506.0 MHz BRS Ch.1+ EBS Ch.A1+A2+A3	22.5	68.18	69.59
2596.0 MHz EBS Ch.C4+D4+G4+F4	24.0	67.90	69.32
2680.0 MHz BRS CH.H3+ EBS Ch.G1+G2+G3	22.0	68.30	69.72
5 MHz Dual Channel 64 QAM			
2498.5 MHz BRS Ch.1	6.0	67.92	69.33
2593.0 MHz EBS Ch.D4	6.0	67.92	69.33
2687.5 MHz EBS Ch.G3	5.5	68.30	69.71
10 MHz Dual Channel 64 QAM			
2501.0 MHz BRS Ch.1 + EBS Ch. A1	11.5	68.17	69.58
2596.0 MHz EBS Ch.D4+G4	12.0	67.98	69.40
2685.0 MHz EBS Ch.G2 + G3	11.0	68.36	69.78
20 MHz Dual Channel 64 QAM			
2506.0 MHz BRS Ch.1+ EBS Ch.A1+A2+A3	22.5	68.18	69.60
2596.0 MHz EBS Ch.C4+D4+G4+F4	24.0	67.91	69.32
2680.0 MHz BRS CH.H3+ EBS Ch.G1+G2+G3	22.0	68.28	69.69

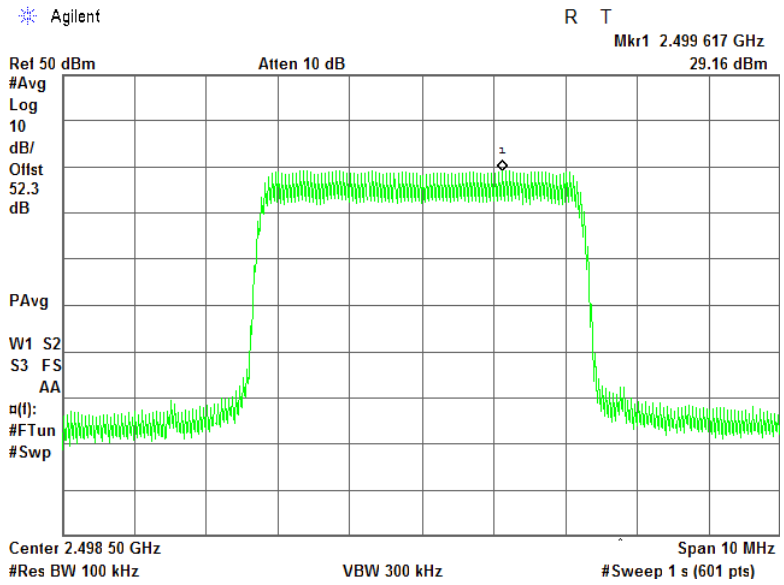
Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.4.10 Peak power density limits

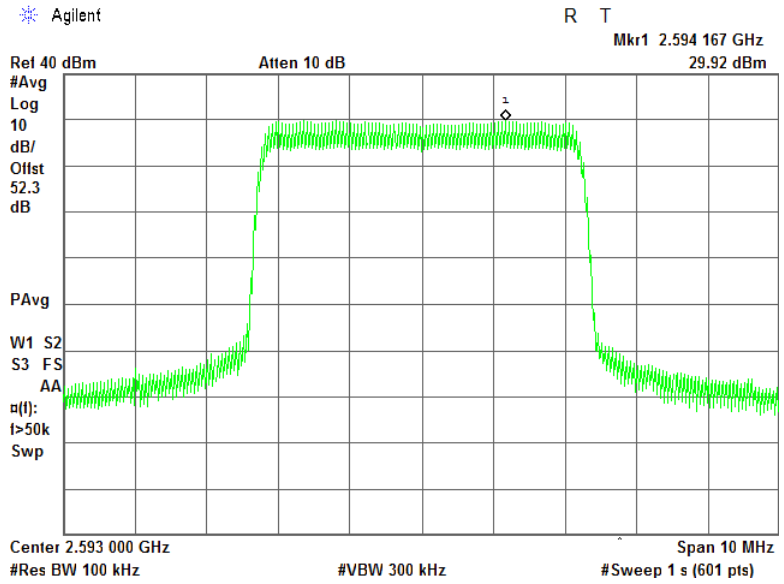
Channel	Channel BW, MHz	Peak power density, dBm/100kHz	
		17 dBi, 90º beamwidth	18 dBi, 65ºbeamwidth 11 dBi, 65ºbeamwidth
5 MHz Dual Channel QPSK			
2498.5 MHz BRS Ch.1	6.0	50.15	51.56
2593.0 MHz EBS Ch.D4	6.0	50.14	51.56
2687.5 MHz EBS Ch.G3	5.5	50.91	52.32
10 MHz Dual Channel QPSK			
2501.0 MHz BRS Ch.1 + EBS Ch. A1	11.5	47.55	48.97
2596.0 MHz EBS Ch.D4+G4	12.0	47.18	48.60
2685.0 MHz EBS Ch.G2 + G3	11.0	47.96	49.38
20 MHz Dual Channel QPSK			
2506.0 MHz BRS Ch.1+ EBS Ch.A1+A2+A3	22.5	44.66	46.07
2596.0 MHz EBS Ch.C4+D4+G4+F4	24.0	44.10	45.51
2680.0 MHz BRS CH.H3+ EBS Ch.G1+G2+G3	22.0	44.88	46.29
5 MHz Dual Channel 64 QAM			
2498.5 MHz BRS Ch.1	6.0	50.14	51.55
2593.0 MHz EBS Ch.D4	6.0	50.14	51.55
2687.5 MHz EBS Ch.G3	5.5	50.89	52.31
10 MHz Dual Channel 64 QAM			
2501.0 MHz BRS Ch.1 + EBS Ch. A1	11.5	47.56	48.98
2596.0 MHz EBS Ch.D4+G4	12.0	47.19	48.61
2685.0 MHz EBS Ch.G2 + G3	11.0	47.95	49.36
20 MHz Dual Channel 64 QAM			
2506.0 MHz BRS Ch.1+ EBS Ch.A1+A2+A3	22.5	44.66	46.08
2596.0 MHz EBS Ch.C4+D4+G4+F4	24.0	44.10	45.52
2680.0 MHz BRS CH.H3+ EBS Ch.G1+G2+G3	22.0	44.86	46.27

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.1 Power spectral density test results at low frequency, QPSK, 5 MHz EBW, RF # 1

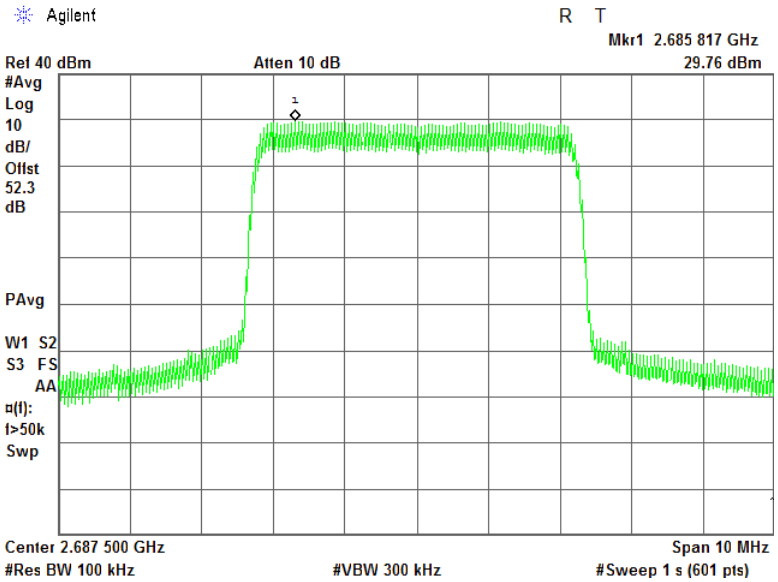


Plot 7.4.2 Power spectral density test results at mid frequency, QPSK, 5 MHz EBW, RF # 1

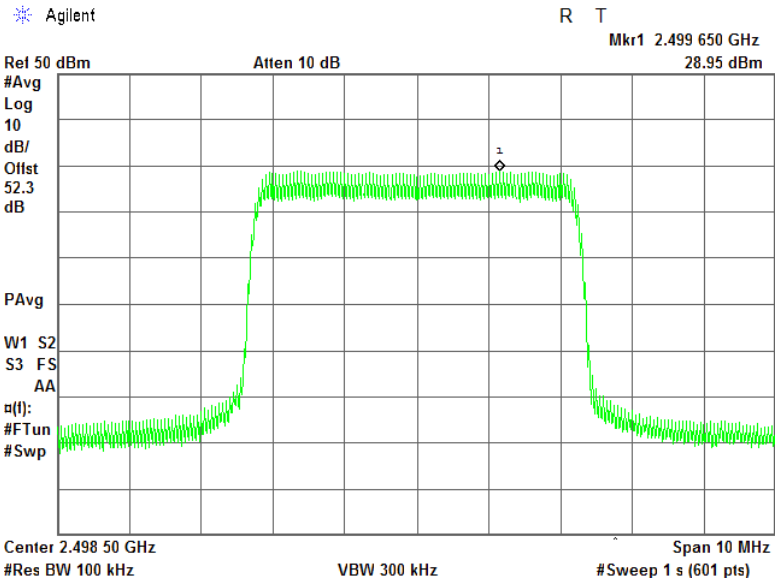


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.3 Power spectral density test results at high frequency, QPSK, 5 MHz EBW, RF # 1

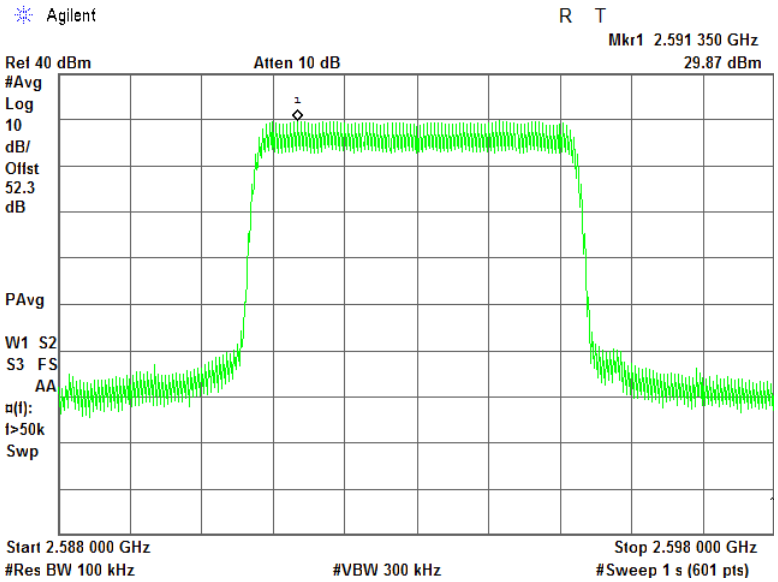


Plot 7.4.4 Power spectral density test results at low frequency, 64QAM, 5 MHz EBW, RF # 1

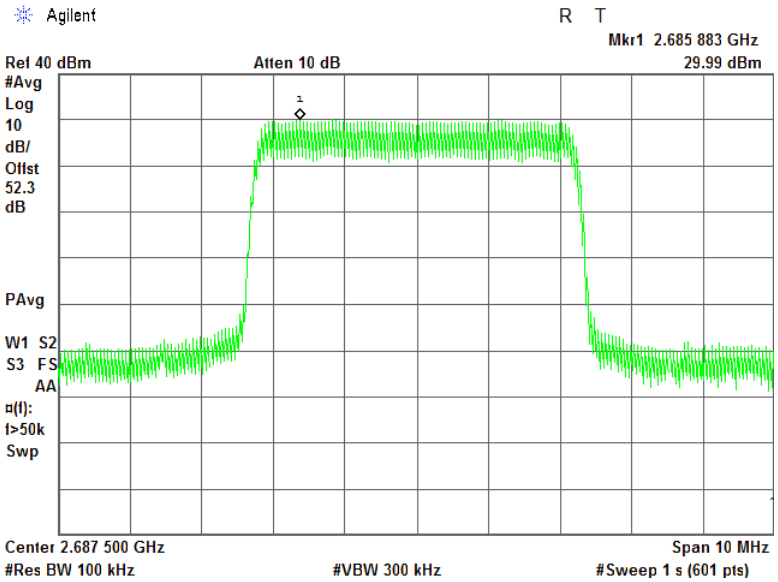


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.5 Power spectral density test results at mid frequency, 64QAM, 5 MHz EBW, RF # 1

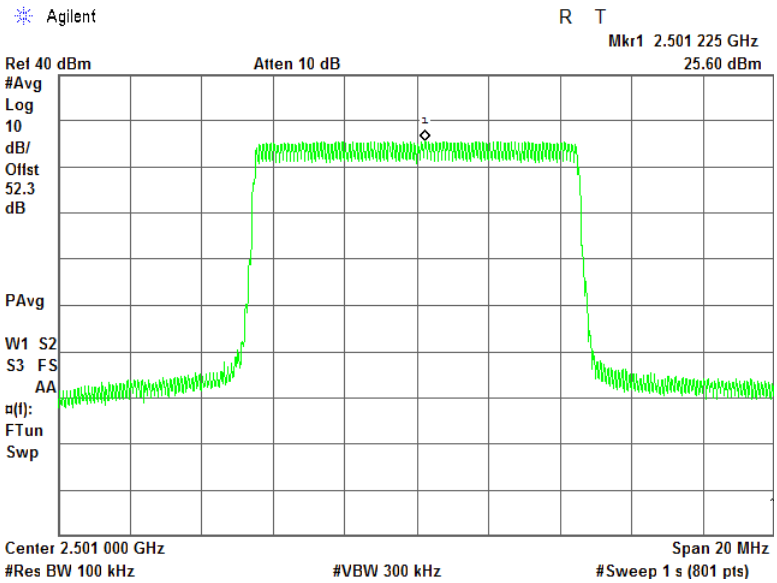


Plot 7.4.6 Power spectral density test results at high frequency, 64QAM, 5 MHz EBW, RF # 1

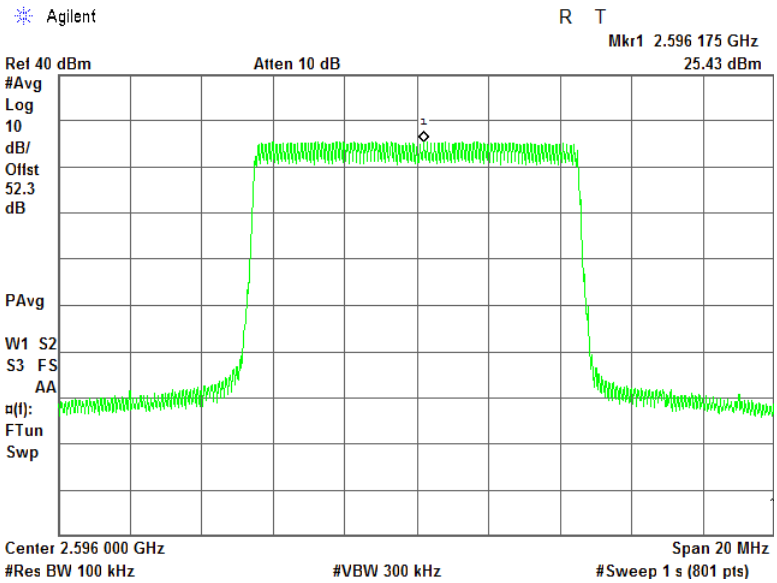


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.7 Power spectral density test results at low frequency, QPSK, 10 MHz EBW, RF # 1

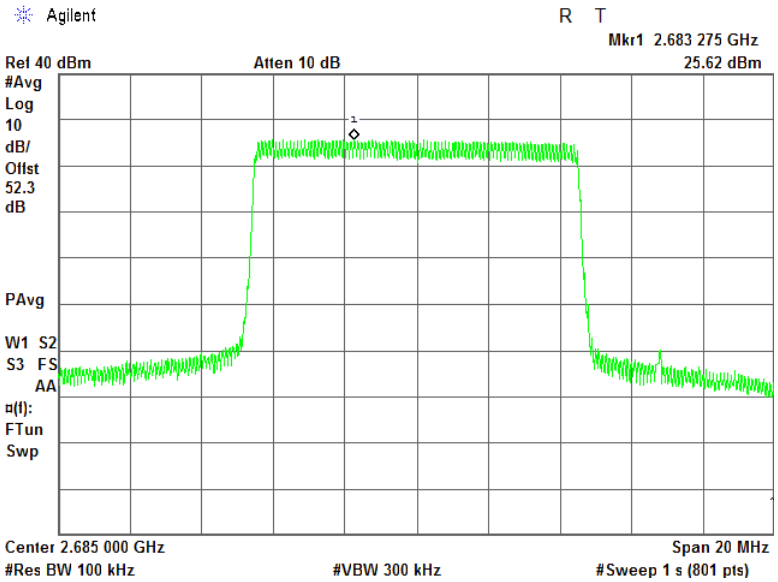


Plot 7.4.8 Power spectral density test results at mid frequency, QPSK, 10 MHz EBW, RF # 1

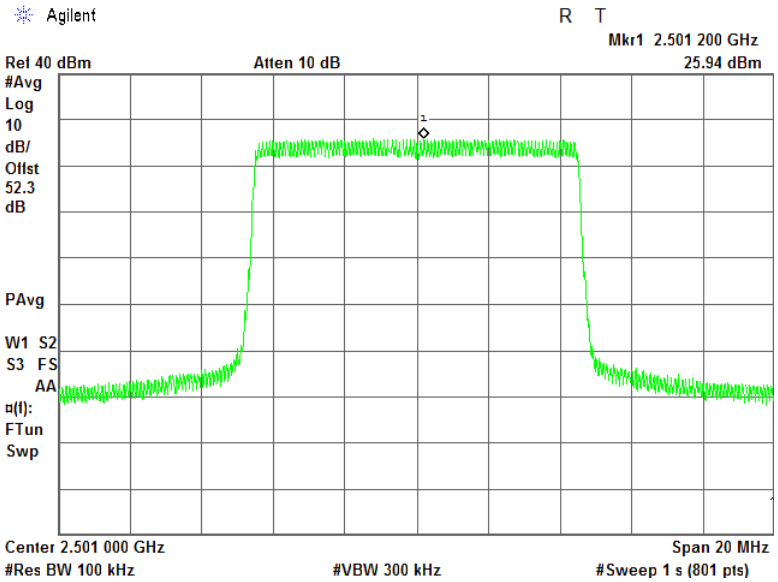


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.9 Power spectral density test results at high frequency, QPSK, 10 MHz EBW, RF # 1

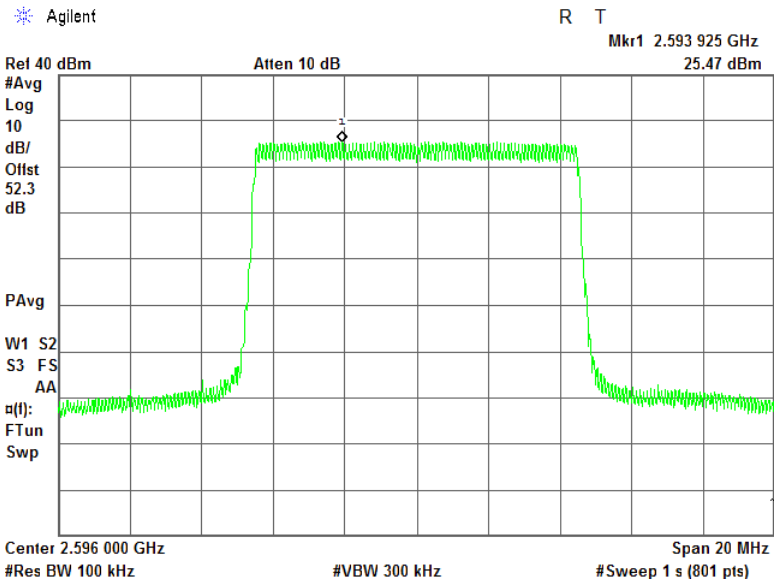


Plot 7.4.10 Power spectral density test results at low frequency, 64QAM, 10 MHz EBW, RF # 1

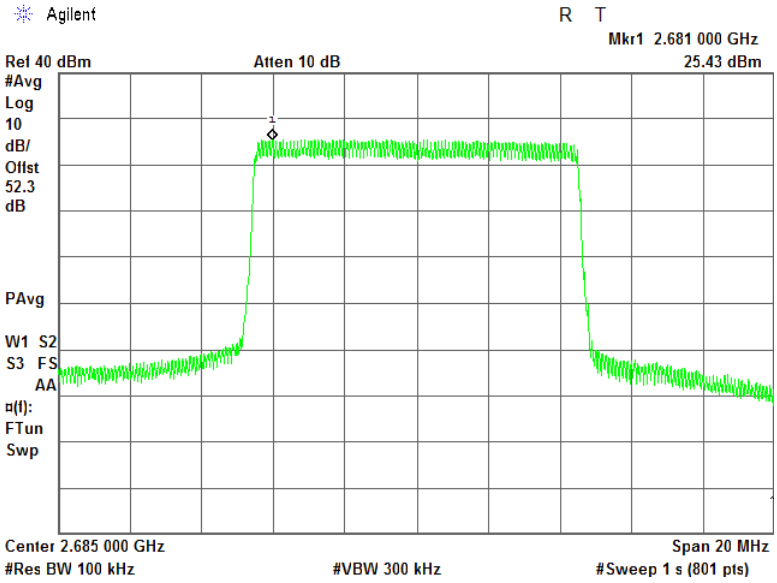


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.11 Power spectral density test results at mid frequency, 64QAM, 10 MHz EBW, RF # 1

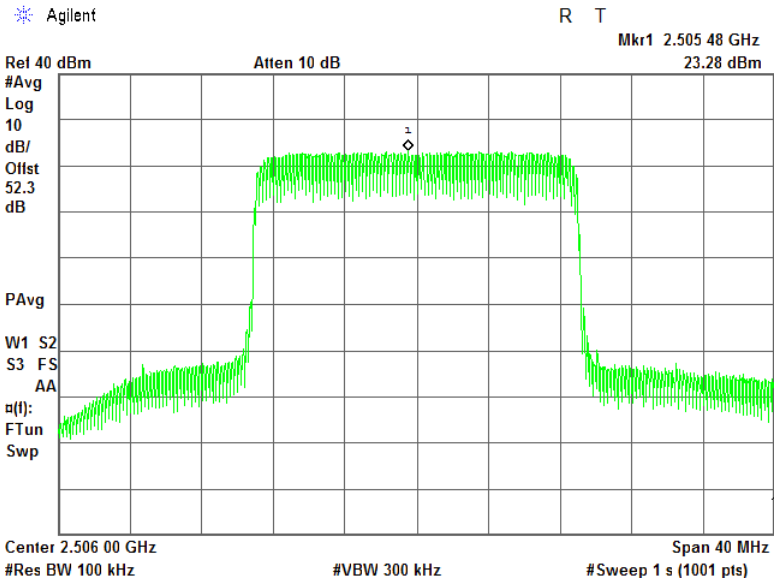


Plot 7.4.12 Power spectral density test results at high frequency, 64QAM, 10 MHz EBW, RF # 1

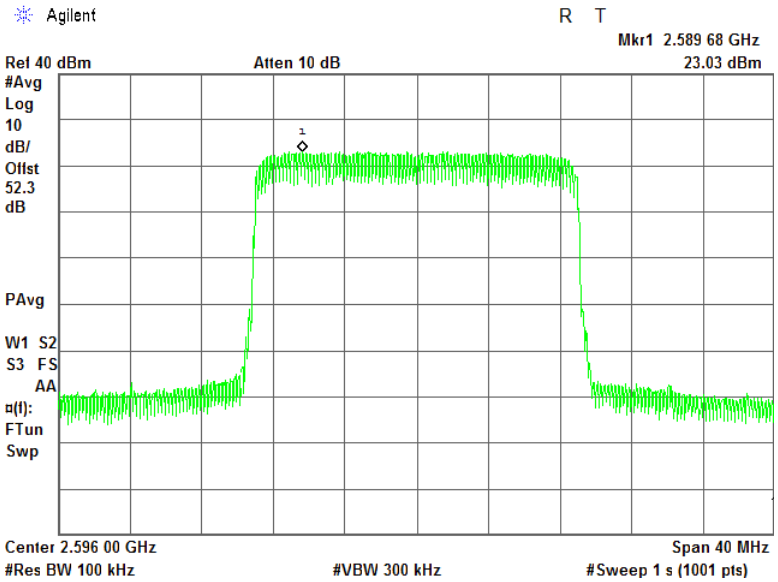


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.13 Power spectral density test results at low frequency, QPSK, 20 MHz EBW, RF # 1

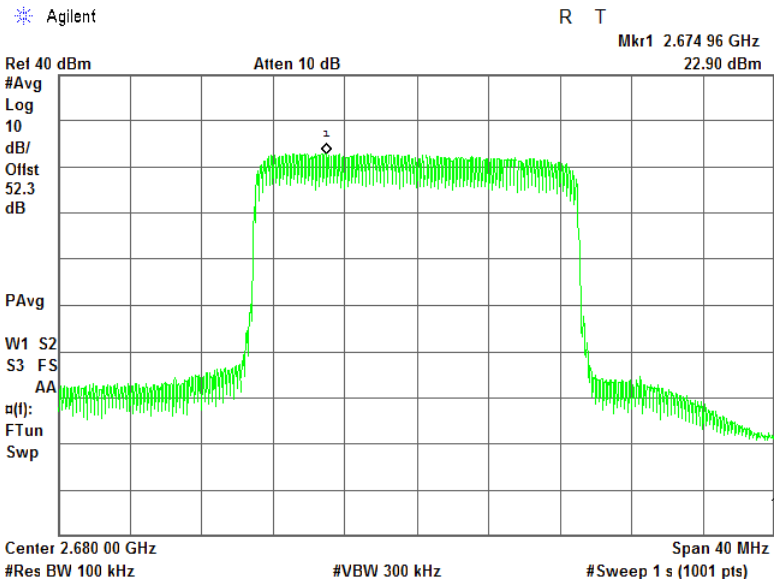


Plot 7.4.14 Power spectral density test results at mid frequency, QPSK, 20 MHz EBW, RF # 1

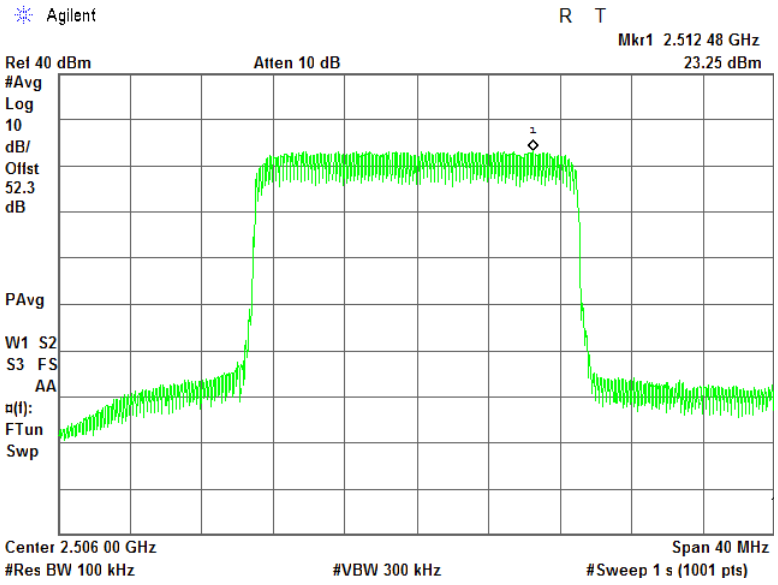


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.15 Power spectral density test results at high frequency, QPSK, 20 MHz EBW, RF # 1

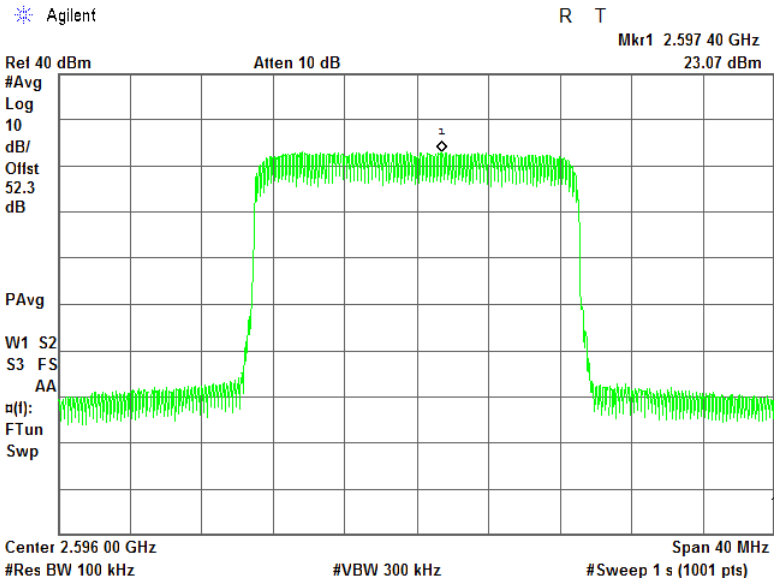


Plot 7.4.16 Power spectral density test results at low frequency, 64QAM, 20 MHz EBW, RF # 1

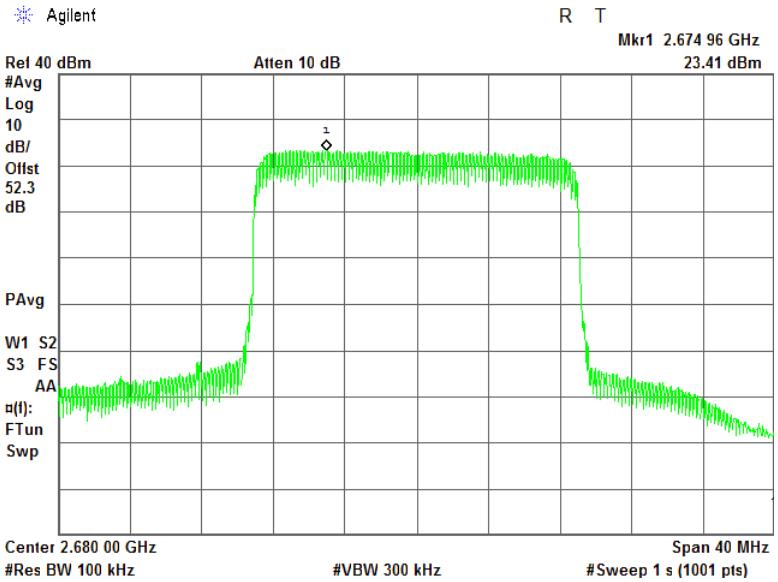


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.17 Power spectral density test results at mid frequency, 64QAM, 20 MHz EBW, RF # 1

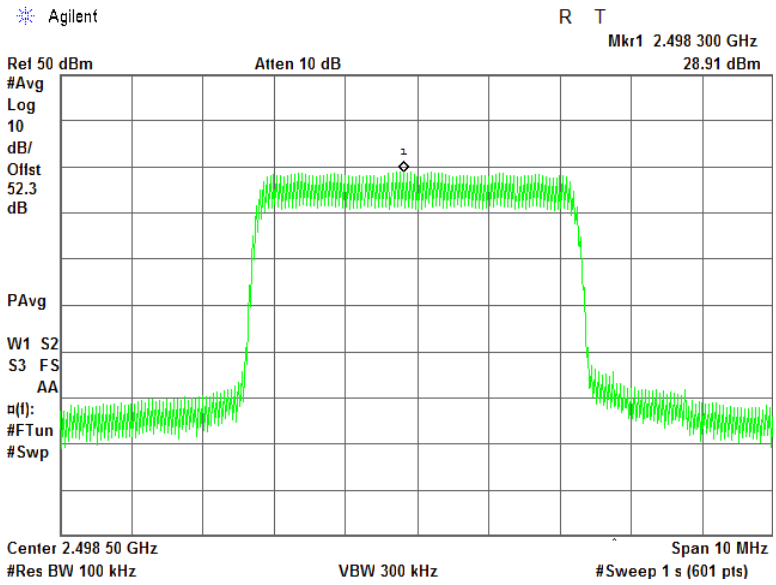


Plot 7.4.18 Power spectral density test results at high frequency, 64QAM, 20 MHz EBW, RF # 1

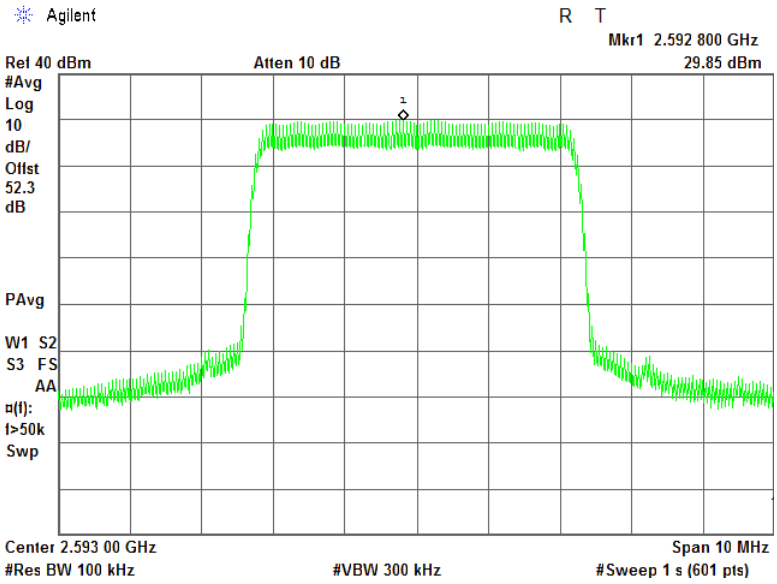


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.19 Power spectral density test results at low frequency, QPSK, 5 MHz EBW, RF # 2

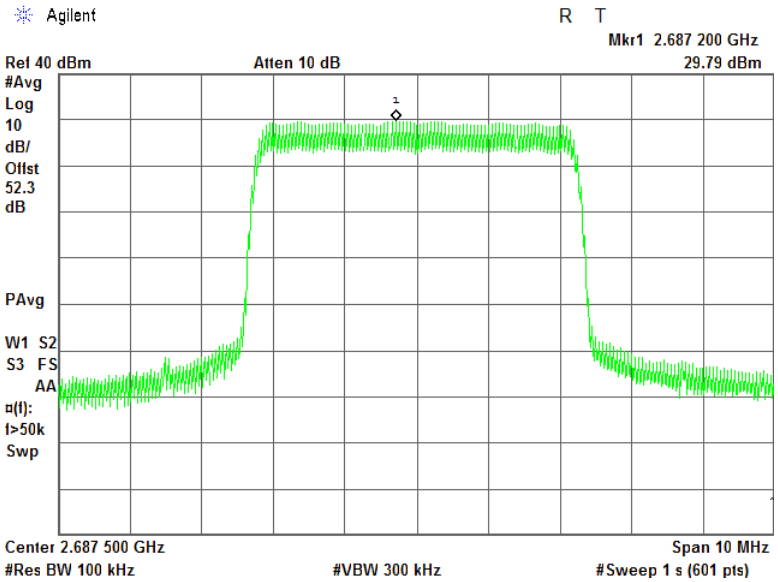


Plot 7.4.20 Power spectral density test results at mid frequency, QPSK, 5 MHz EBW, RF # 2

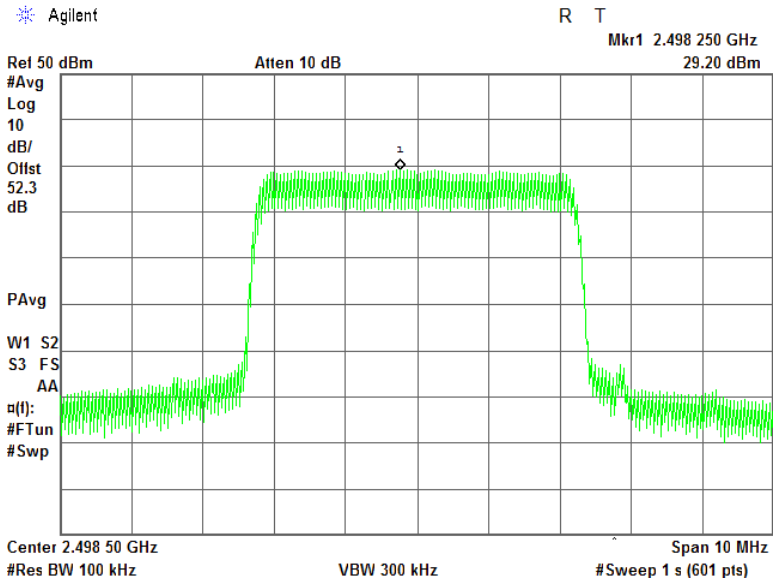


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.21 Power spectral density test results at high frequency, QPSK, 5 MHz EBW, RF # 2

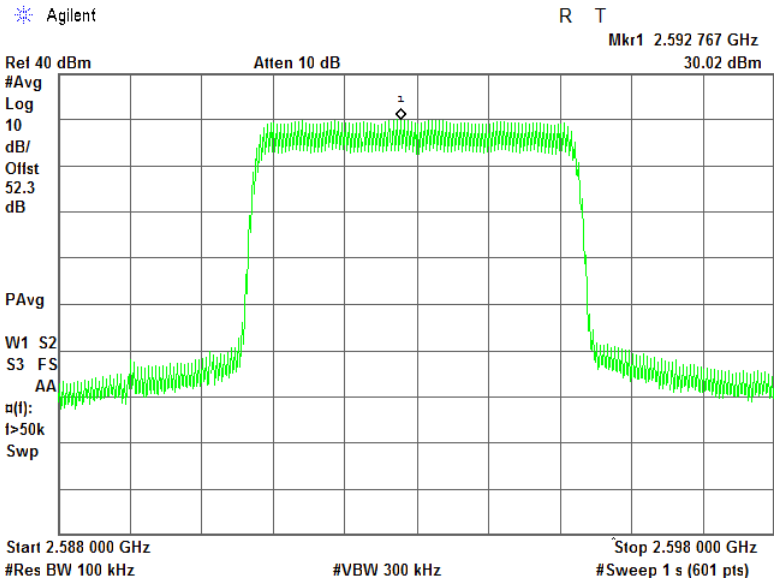


Plot 7.4.22 Power spectral density test results at low frequency, 64QAM, 5 MHz EBW, RF # 2

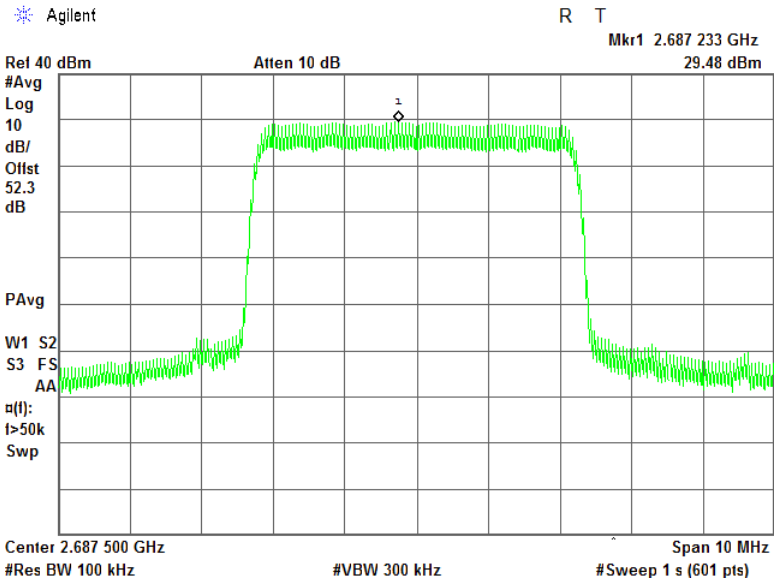


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.23 Power spectral density test results at mid frequency, 64QAM, 5 MHz EBW, RF # 2

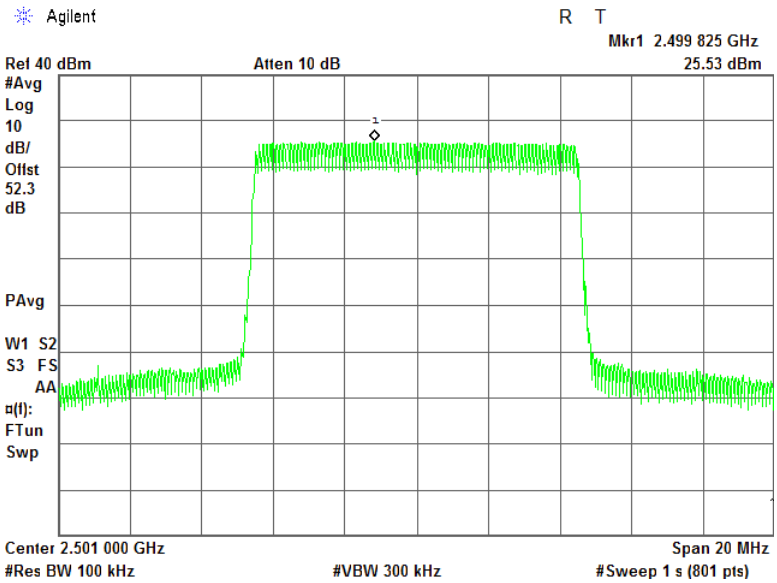


Plot 7.4.24 Power spectral density test results at high frequency, 64QAM, 5 MHz EBW, RF # 2

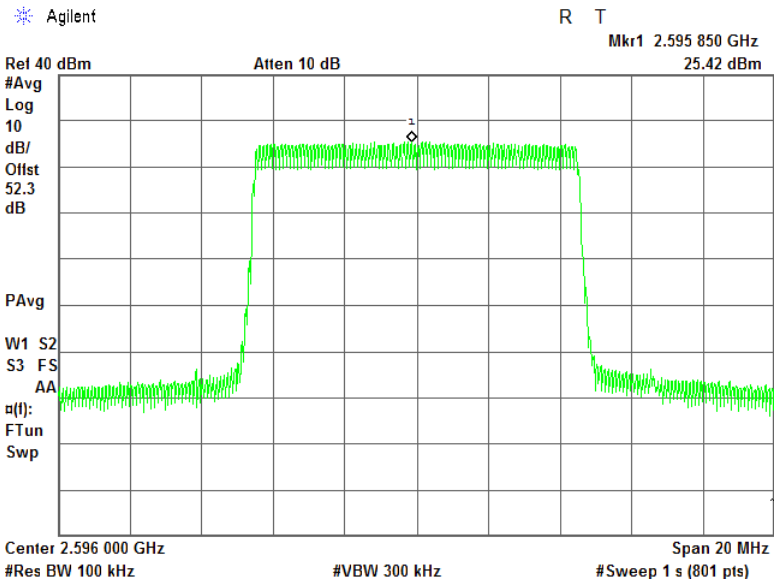


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.25 Power spectral density test results at low frequency, QPSK, 10 MHz EBW, RF # 2

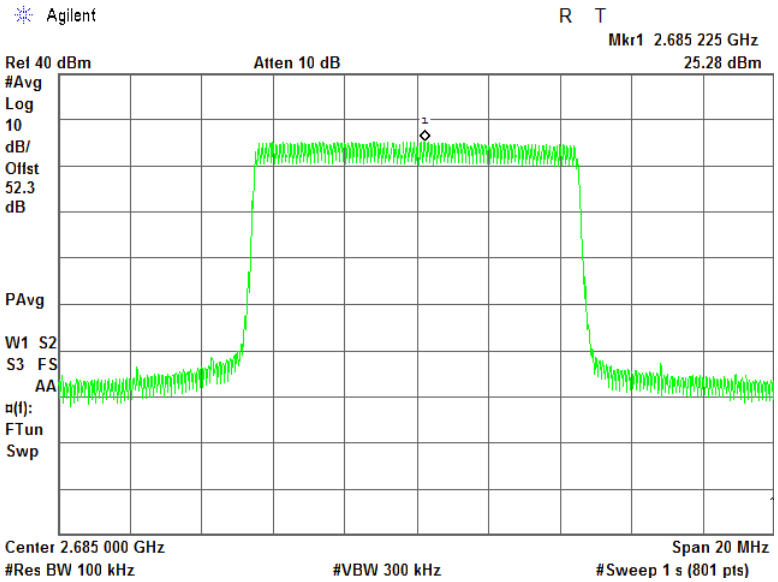


Plot 7.4.26 Power spectral density test results at mid frequency, QPSK, 10 MHz EBW, RF # 2

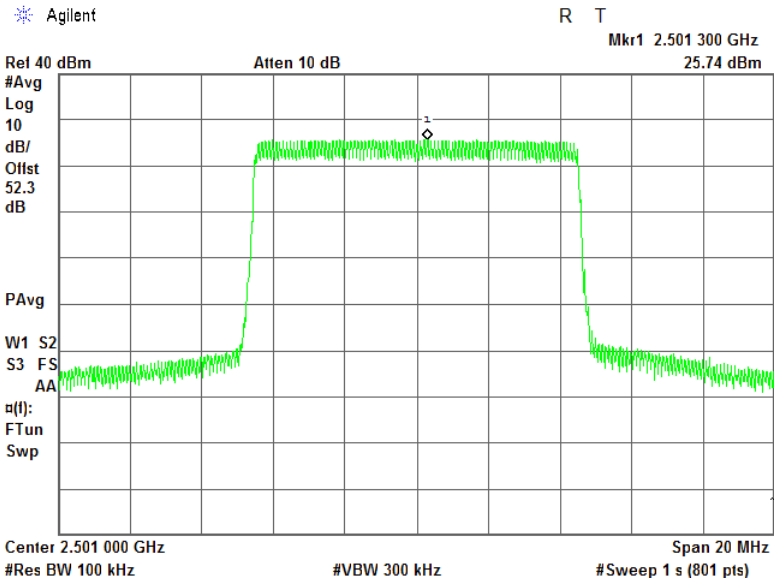


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.27 Power spectral density test results at high frequency, QPSK, 10 MHz EBW, RF # 2

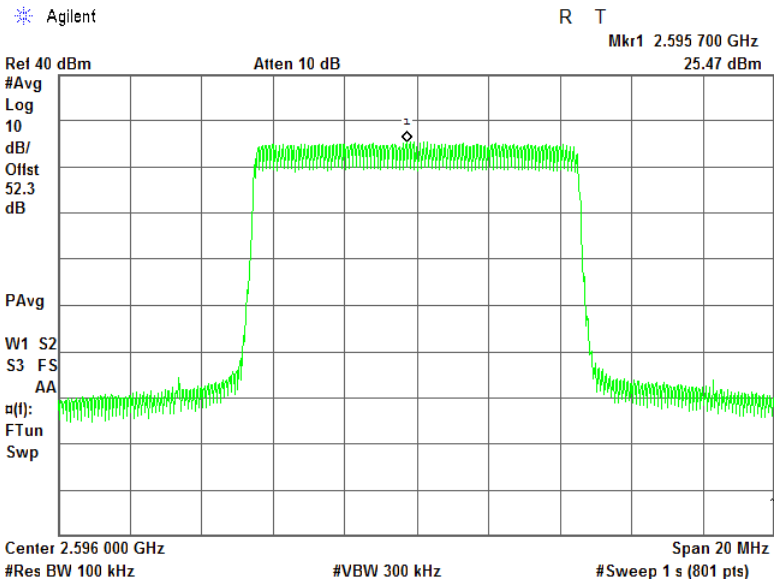


Plot 7.4.28 Power spectral density test results at low frequency, 64QAM, 10 MHz EBW, RF # 2

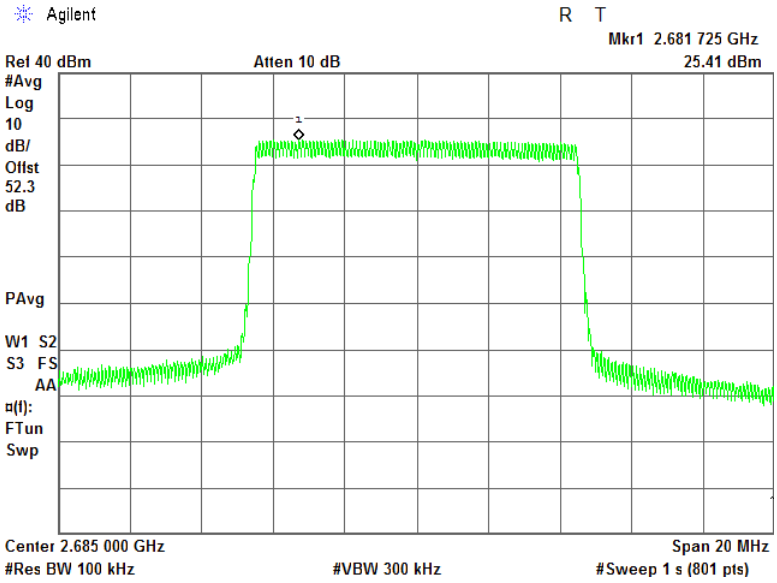


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.29 Power spectral density test results at mid frequency, 64QAM, 10 MHz EBW, RF # 2

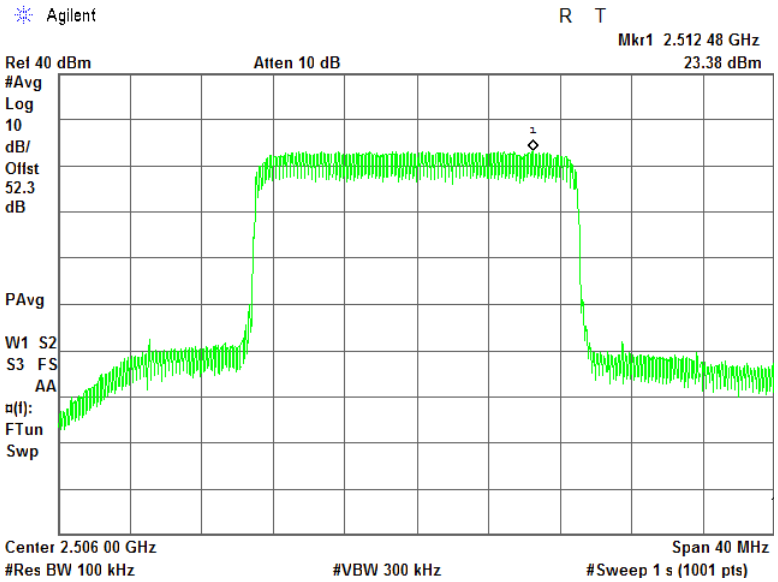


Plot 7.4.30 Power spectral density test results at high frequency, 64QAM, 10 MHz EBW, RF # 2

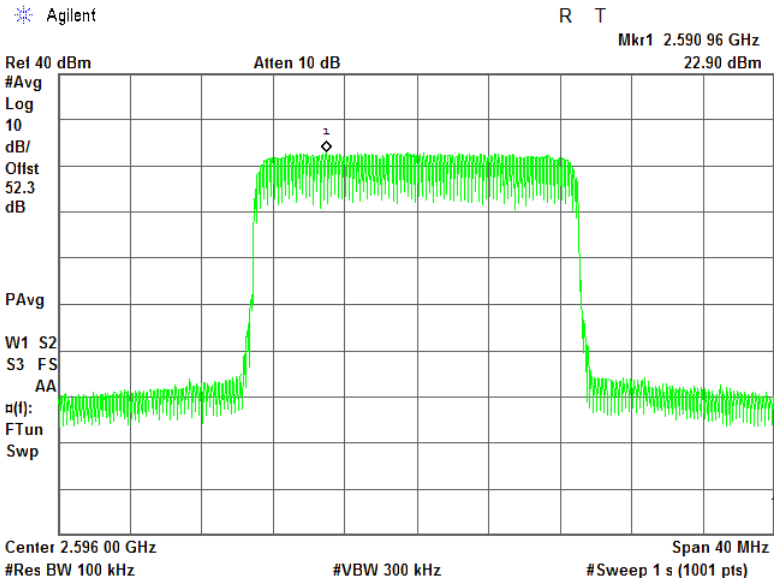


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.31 Power spectral density test results at low frequency, QPSK, 20 MHz EBW, RF # 2

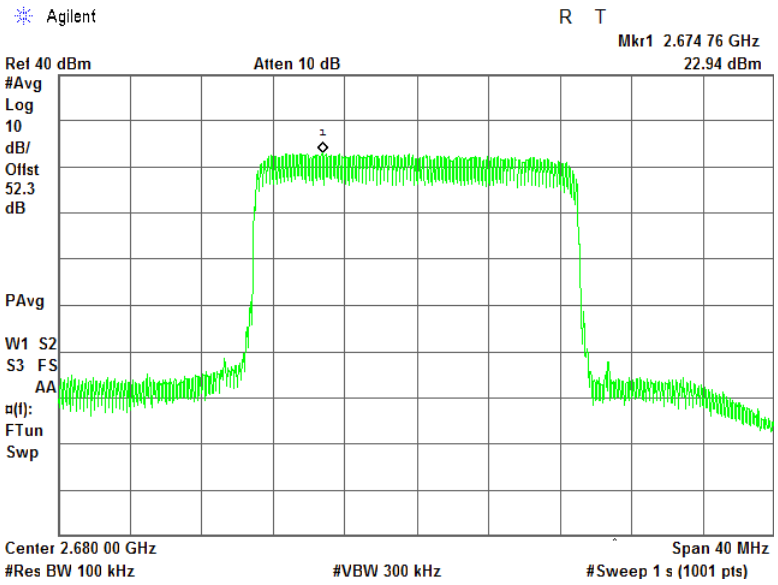


Plot 7.4.32 Power spectral density test results at mid frequency, QPSK, 20 MHz EBW, RF # 2

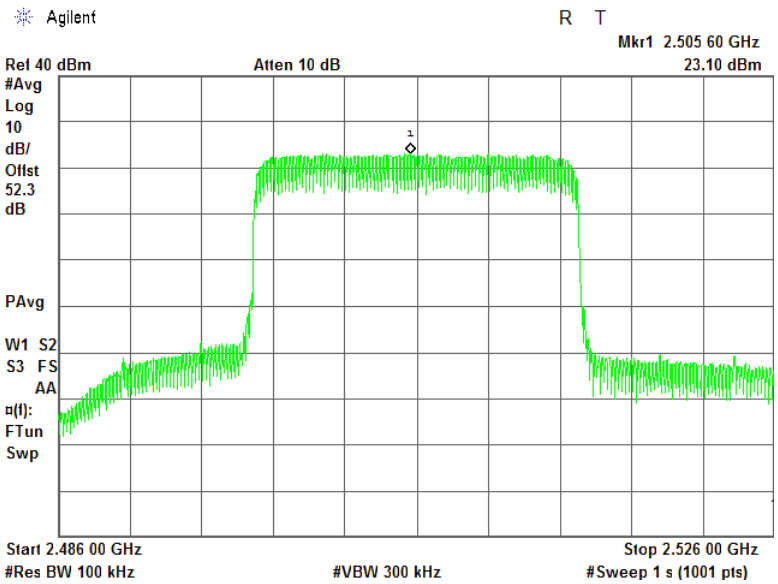


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.33 Power spectral density test results at high frequency, QPSK, 20 MHz EBW, RF # 2

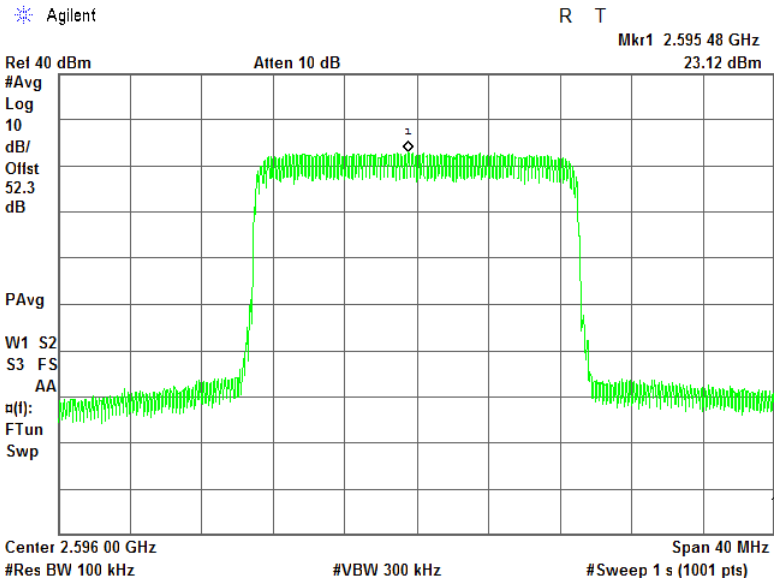


Plot 7.4.34 Power spectral density test results at low frequency, 64QAM, 20 MHz EBW, RF # 2

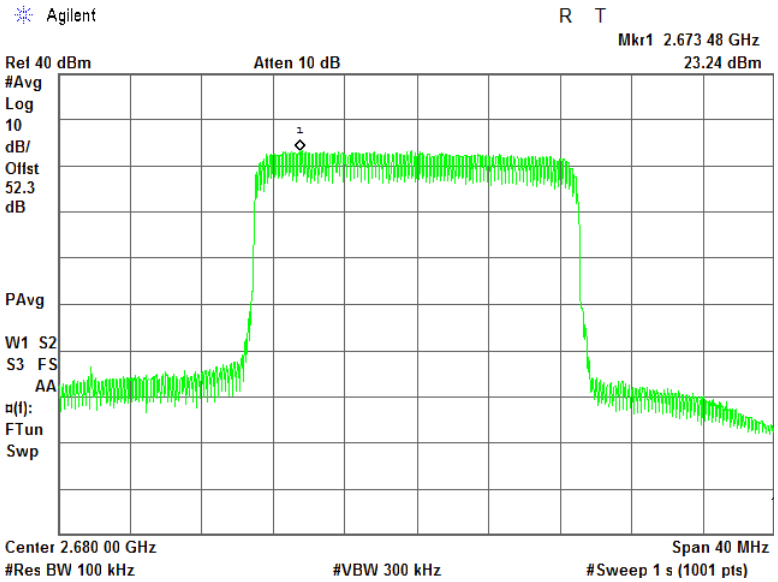


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.4.35 Power spectral density test results at mid frequency, 64QAM, 20 MHz EBW, RF # 2



Plot 7.4.36 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-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

7.5 Peak output power test in 2498.5 – 2565.5 MHz band

7.5.1 General

This test was performed to measure the peak output power at RF antenna connector. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Peak output power limits

Transmitter type	Assigned frequency range, MHz	Maximum peak output power dBm
Main, booster and base stations	2496 – 2572	63+10log(X/Y)+10log(360/beamwidth)
		Maximum peak power density dBm/100 kHz
		EIRP+10log(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.

7.5.2 Test procedure

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

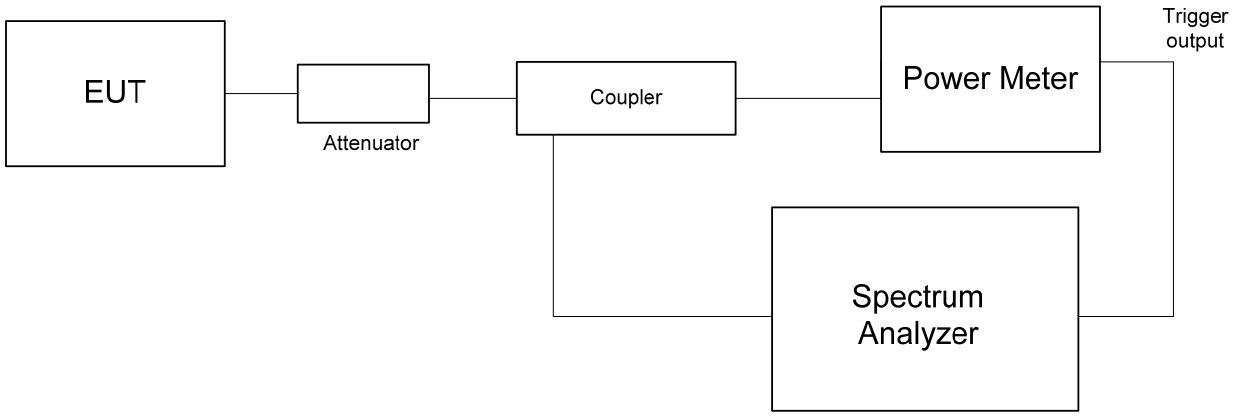
7.5.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.

7.5.2.3 The average output power was measured with power meter as provided in Table 7.5.2 to Table 7.5.4.

7.5.2.4 The power spectral density was measured with spectrum analyzer as provided in Table 7.5.5 to Table 7.5.7 and the associated plots.

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

Figure 7.5.1 Peak output power test setup



Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Table 7.5.2 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	41.60	41.60	44.60	18.00	62.60	69.34	-6.74	Pass
2532.0	43.17	43.18	46.18	18.00	64.18	69.74	-5.56	Pass
2565.5	43.12	43.11	46.12	18.00	64.12	69.72	-5.60	Pass
64QAM								
2498.5	42.00	42.05	45.05	18.00	63.05	69.33	-6.28	Pass
2532.0	43.15	43.14	46.15	18.00	64.15	69.73	-5.58	Pass
2565.5	43.14	43.16	46.16	18.00	64.16	69.72	-5.56	Pass
QPSK								
2498.5	41.60	41.60	44.60	17.00	61.60	67.93	-6.33	Pass
2532.0	43.17	43.18	46.18	17.00	63.18	68.32	-5.14	Pass
2565.5	43.12	43.11	46.12	17.00	63.12	68.31	-5.19	Pass
64QAM								
2498.5	42.00	42.05	45.05	17.00	62.05	67.92	-5.87	Pass
2532.0	43.15	43.14	46.15	17.00	63.15	68.31	-5.16	Pass
2565.5	43.14	43.16	46.16	17.00	63.16	68.31	-5.15	Pass
QPSK								
2498.5	41.60	41.60	44.60	11.00	55.60	69.34	-13.74	Pass
2532.0	43.17	43.18	46.18	11.00	57.18	69.74	-12.56	Pass
2565.5	43.12	43.11	46.12	11.00	57.12	69.72	-12.60	Pass
64QAM								
2498.5	42.00	42.05	45.05	11.00	56.05	69.33	-13.28	Pass
2532.0	43.15	43.14	46.15	11.00	57.15	69.73	-12.58	Pass
2565.5	43.14	43.16	46.16	11.00	57.16	69.72	-12.56	Pass

* - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi
** - Total RF power , dBm = 10*log[10^(Power RF#1 /10) + 10^(Power RF#2 /10)
*** - See Table 7.5.9.

Test specification:	**Section 27.50, Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Table 7.5.3 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	43.15	43.16	46.16	18.00	64.16	69.58	-5.42	Pass
2535	43.12	43.20	46.20	18.00	64.20	68.02	-3.82	Pass
2563	43.19	43.18	46.19	18.00	64.19	69.78	-5.59	Pass
64QAM								
2501	43.12	43.11	46.12	18.00	64.12	69.59	-5.47	Pass
2535	43.15	43.15	46.15	18.00	64.15	69.78	-5.63	Pass
2563	43.16	43.18	46.18	18.00	64.18	69.78	-5.60	Pass
QPSK								
2501	43.15	43.16	46.16	17.00	63.16	68.17	-5.01	Pass
2535	43.12	43.20	46.20	17.00	63.20	66.61	-3.41	Pass
2563	43.19	43.18	46.19	17.00	63.19	68.37	-5.18	Pass
64QAM								
2501	43.12	43.11	46.12	17.00	63.12	68.18	-5.06	Pass
2535	43.15	43.15	46.15	17.00	63.15	68.37	-5.22	Pass
2563	43.16	43.18	46.18	17.00	63.18	68.36	-5.18	Pass
QPSK								
2501	43.15	43.16	46.16	11.00	57.16	69.58	-12.42	Pass
2535	43.12	43.20	46.20	11.00	57.20	69.78	-12.58	Pass
2563	43.19	43.18	46.19	11.00	57.19	69.78	-12.59	Pass
64QAM								
2501	43.12	43.11	46.12	11.00	57.12	69.59	-12.47	Pass
2535	43.15	43.15	46.15	11.00	57.15	69.78	-12.63	Pass
2563	43.16	43.18	46.18	11.00	57.18	69.78	-12.60	Pass

* - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi
** - Total RF power , dBm = 10*log[10^(Power RF#1 /10) + 10^(Power RF#2 /10)
*** - See Table 7.5.9

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Table 7.5.4 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	43.12	43.15	46.15	18.00	64.15	69.60	-5.45	Pass
2535	43.14	43.15	46.15	18.00	64.15	69.69	-5.54	Pass
2558	43.16	43.18	46.18	18.00	64.18	69.71	-5.53	Pass
64QAM								
2506	43.18	43.17	46.18	18.00	64.18	69.58	-5.40	Pass
2535	43.11	43.13	46.13	18.00	64.13	69.68	-5.55	Pass
2558	43.12	43.15	46.15	18.00	64.15	69.71	-5.56	Pass
QPSK								
2506	43.12	43.15	46.15	17.00	63.15	68.18	-5.03	Pass
2535	43.14	43.15	46.15	17.00	63.15	68.28	-5.13	Pass
2558	43.16	43.18	46.18	17.00	63.18	68.30	-5.12	Pass
64QAM								
2506	43.18	43.17	46.18	17.00	63.18	68.17	-4.99	Pass
2535	43.11	43.13	46.13	17.00	63.13	68.27	-5.14	Pass
2558	43.12	43.15	46.15	17.00	63.15	68.29	-5.14	Pass
QPSK								
2506	43.12	43.15	46.15	11.00	57.15	69.60	-12.45	Pass
2535	43.14	43.15	46.15	11.00	57.15	69.69	-12.54	Pass
2558	43.16	43.18	46.18	11.00	57.18	69.71	-12.53	Pass
64QAM								
2506	43.18	43.17	46.18	11.00	57.18	69.58	-12.40	Pass
2535	43.11	43.13	46.13	11.00	57.13	69.68	-12.55	Pass
2558	43.12	43.15	46.15	11.00	57.15	69.71	-12.56	Pass

* - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi
** - Total RF power , dBm = 10*log[10^(Power RF#1 /10) + 10^(Power RF#2 /10)
*** - See Table 7.5.9.

Reference numbers of test equipment used

HL 2214	HL 3301	HL 3302	HL 3818	HL 4756			

Full description is given in Appendix A.

Test specification:	**Section 27.50, Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Table 7.5.5 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	29.07	29.20	18.00	50.20	51.56	-1.36	Pass
2532.0	30.16	30.16	18.00	51.16	52.33	-1.17	Pass
2565.5	30.12	29.97	18.00	51.12	52.32	-1.20	Pass
64 QAM							
2498.5	29.06	29.16	18.00	50.16	51.55	-1.39	Pass
2532.0	30.07	30.11	18.00	51.11	52.32	-1.21	Pass
2565.5	29.96	30.06	18.00	51.06	52.32	-1.26	Pass
QPSK							
2498.5	29.07	29.20	17.00	49.20	50.15	-0.95	Pass
2532.0	30.16	30.16	17.00	50.16	50.92	-0.76	Pass
2565.5	30.12	29.97	17.00	50.12	50.91	-0.79	Pass
64 QAM							
2498.5	29.06	29.16	17.00	49.16	50.14	-0.98	Pass
2532.0	30.07	30.11	17.00	50.11	50.91	-0.80	Pass
2565.5	29.96	30.06	17.00	50.06	50.90	-0.84	Pass
QPSK							
2498.5	29.07	29.20	11.00	43.20	51.56	-8.36	Pass
2532.0	30.16	30.16	11.00	44.16	52.33	-8.17	Pass
2565.5	30.12	29.97	11.00	44.12	52.32	-8.20	Pass
64 QAM							
2498.5	29.06	29.16	11.00	43.16	51.55	-8.39	Pass
2532.0	30.07	30.11	11.00	44.11	52.32	-8.21	Pass
2565.5	29.96	30.06	11.00	44.06	52.32	-8.26	Pass

* SA reading including attenuation, cable loss and DC correction factor
** Total PSD, dBm/100kHz = PSD(dBm/100kHz,RF#1)+ 3 dB + Antenna Gain, dBi
*** See Table 7.5.10.

Test specification:	**Section 27.50, Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Table 7.5.6 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	25.96	26.28	18.00	47.28	48.98	-1.70	Pass
2535	25.94	26.08	18.00	47.08	49.37	-2.29	Pass
2563	25.65	26.07	18.00	47.07	49.37	-2.30	Pass
64QAM							
2501	25.92	26.18	18.00	47.18	48.99	-1.81	Pass
2535	26.03	26.29	18.00	47.29	49.37	-2.08	Pass
2563	25.56	26.08	18.00	47.08	49.36	-2.28	Pass
QPSK							
2501	25.96	26.28	17.00	46.28	47.56	-1.28	Pass
2535	25.94	26.08	17.00	46.08	47.96	-1.88	Pass
2563	25.65	26.07	17.00	46.07	47.96	-1.89	Pass
64QAM							
2501	25.92	26.18	17.00	46.18	47.57	-1.39	Pass
2535	26.03	26.29	17.00	46.29	47.95	-1.66	Pass
2563	25.56	26.08	17.00	46.08	47.95	-1.87	Pass
QPSK							
2501	25.96	26.28	11.00	40.28	48.98	-8.70	Pass
2535	25.94	26.08	11.00	40.08	49.37	-9.29	Pass
2563	25.65	26.07	11.00	40.07	49.37	-9.30	Pass
64QAM							
2501	25.92	26.18	11.00	40.18	48.99	-8.81	Pass
2535	26.03	26.29	11.00	40.29	49.37	-9.08	Pass
2563	25.56	26.08	11.00	40.08	49.36	-9.28	Pass

* SA reading including attenuation, cable loss and DC correction factor
** Total PSD, dBm/100kHz = PSD(dBm/100kHz,RF#1)+ 3 dB + Antenna Gain, dBi
*** See Table 7.5.10.

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Table 7.5.7 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	23.16	23.25	18.00	44.25	46.07	-1.82	Pass
2535	23.10	23.23	18.00	44.23	46.27	-2.04	Pass
2558	23.29	23.33	18.00	44.33	46.28	-1.95	Pass
64QAM							
2506	23.51	23.35	18.00	44.51	46.06	-1.55	Pass
2535	23.38	23.56	18.00	44.56	46.26	-1.70	Pass
2558	23.03	23.42	18.00	44.42	46.28	-1.86	Pass
QPSK							
2506	23.16	23.25	17.00	43.25	44.66	-1.41	Pass
2535	23.10	23.23	17.00	43.23	44.85	-1.62	Pass
2558	23.29	23.33	17.00	43.33	44.87	-1.54	Pass
64QAM							
2506	23.51	23.35	17.00	43.51	44.65	-1.14	Pass
2535	23.38	23.56	17.00	43.56	44.84	-1.28	Pass
2558	23.03	23.42	17.00	43.42	44.87	-1.45	Pass
QPSK							
2506	23.16	23.25	11.00	37.25	46.07	-8.82	Pass
2535	23.10	23.23	11.00	37.23	46.27	-9.04	Pass
2558	23.29	23.33	11.00	37.33	46.28	-8.95	Pass
64QAM							
2506	23.51	23.35	11.00	37.51	46.06	-8.55	Pass
2535	23.38	23.56	11.00	37.56	46.26	-8.70	Pass
2558	23.03	23.42	11.00	37.42	46.28	-8.86	Pass

* SA reading including attenuation, cable loss and DC correction factor
** Total PSD, dBm/100kHz = PSD(dBm/100kHz,RF#1)+ 3 dB + Antenna Gain, dBi
*** See Table 7.5.10.

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Table 7.5.8 Post - 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	4.666	63+10log(OBW/6.0)+10log(360/beamwidth)	EIRP+10log(0.1/6.0)
2532.0 MHz EBS Ch. B3	4.683	63+10log(OBW/5.5)+10log(360/beamwidth)	EIRP+10log(0.1/5.5)
2565.5 MHz EBS Ch. D3	4.670	63+10log(OBW/5.5)+10log(360/beamwidth)	EIRP+10log(0.1/5.5)
5 MHz Dual Channel 64QAM 23 Mbps			
2498.5 MHz BRS Ch.1	4.654	63+10log(OBW/6.0)+10log(360/beamwidth)	EIRP+10log(0.1/6.0)
2532.0 MHz EBS Ch. B3	4.673	63+10log(OBW/5.5)+10log(360/beamwidth)	EIRP+10log(0.1/5.5)
2565.5 MHz EBS Ch. D3	4.668	63+10log(OBW/5.5)+10log(360/beamwidth)	EIRP+10log(0.1/5.5)
10 MHz Dual Channel QPSK 10.7 Mbps			
2501.0 MHz BRS Ch. 1+EBS Ch. A1	9.456	63+10log(OBW/11.5)+10log(360/beamwidth)	EIRP+10log(0.1/11.5)
2535.0 MHz EBS Ch. B3+C1	9.468	63+10log(OBW/11.0)+10log(360/beamwidth)	EIRP+10log(0.1/11.0)
2563.0 MHz EBS Ch. D2 + D3	9.468	63+10log(OBW/11.0)+10log(360/beamwidth)	EIRP+10log(0.1/11.0)
10 MHz Dual Channel 64QAM 47.3 Mbps			
2501.0 MHz BRS Ch. 1+EBS Ch. A1	9.476	63+10log(OBW/11.5)+10log(360/beamwidth)	EIRP+10log(0.1/11.5)
2535.0 MHz EBS Ch. B3+C1	9.463	63+10log(OBW/11.0)+10log(360/beamwidth)	EIRP+10log(0.1/11.0)
2563.0 MHz EBS Ch. D2 + D3	9.457	63+10log(OBW/11.0)+10log(360/beamwidth)	EIRP+10log(0.1/11.0)
20 MHz 4 Channels QPSK 23.4 Mbps			
2506.0 MHz BRS Ch.1+ EBS Ch. A1 +A2+A3	18.553	63+10log(OBW/22.5)+10log(360/beamwidth)	EIRP+10log(0.1/22.5)
2535.0 MHz EBS Ch.B2+B3+C1+C2	18.542	63+10log(OBW/22.0)+10log(360/beamwidth)	EIRP+10log(0.1/22.0)
2558.0 MHz EBS CH.C3+D1+D2+D3	18.615	63+10log(OBW/22.0)+10log(360/beamwidth)	EIRP+10log(0.1/22.0)
20 MHz 4 Channels 64QAM 95 Mbps			
2506.0 MHz BRS Ch.1+ EBS Ch. A1 +A2+A3	18.490	63+10log(OBW/22.5)+10log(360/beamwidth)	EIRP+10log(0.1/22.5)
2535.0 MHz EBS Ch.B2+B3+C1+C2	18.496	63+10log(OBW/22.0)+10log(360/beamwidth)	EIRP+10log(0.1/22.0)
2558.0 MHz EBS CH.C3+D1+D2+D3	18.614	63+10log(OBW/22.0)+10log(360/beamwidth)	EIRP+10log(0.1/22.0)

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Table 7.5.9 EIRP limits

Channel	Channel BW, MHz	Peak power limit, dBm	
		17 dBi, 90º beamwidth	18 dBi, 65ºbeamwidth 11 dBi, 65ºbeamwidth
5 MHz Dual Channel QPSK			
2498.5 MHz BRS Ch.1	6.0	67.93	69.34
2532.0 MHz EBS Ch. B3	5.5	68.32	69.74
2565.5 MHz EBS Ch. D3	5.5	68.31	69.72
10 MHz Dual Channel QPSK			
2501.0 MHz BRS Ch. 1+EBS Ch. A1	11.5	68.17	69.58
2535.0 MHz EBS Ch. B3+C1	11.0	66.61	68.02
2563.0 MHz EBS Ch. D2 + D3	11.0	68.37	69.78
20 MHz Dual Channel QPSK			
2506.0 MHz BRS Ch.1+ EBS Ch. A1 +A2+A3	22.5	68.18	69.60
2535.0 MHz EBS Ch.B2+B3+C1+C2	22.0	68.28	69.69
2558.0 MHz EBS CH.C3+D1+D2+D3	22.0	68.30	69.71
5 MHz Dual Channel 64 QAM			
2498.5 MHz BRS Ch.1	6.0	67.92	69.33
2532.0 MHz EBS Ch. B3	5.5	68.31	69.73
2565.5 MHz EBS Ch. D3	5.5	68.31	69.72
10 MHz Dual Channel 64 QAM			
2501.0 MHz BRS Ch. 1+EBS Ch. A1	11.5	68.18	69.59
2535.0 MHz EBS Ch. B3+C1	11.0	68.37	69.78
2563.0 MHz EBS Ch. D2 + D3	11.0	68.36	69.78
20 MHz Dual Channel 64 QAM			
2506.0 MHz BRS Ch.1+ EBS Ch. A1 +A2+A3	22.5	68.17	69.58
2535.0 MHz EBS Ch.B2+B3+C1+C2	22.0	68.27	69.68
2558.0 MHz EBS CH.C3+D1+D2+D3	22.0	68.29	69.71

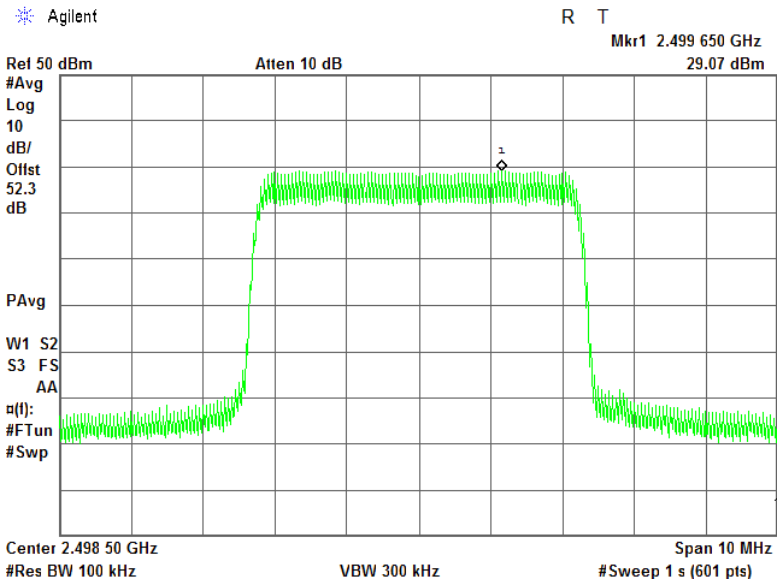
Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Table 7.5.10 Peak power density limits

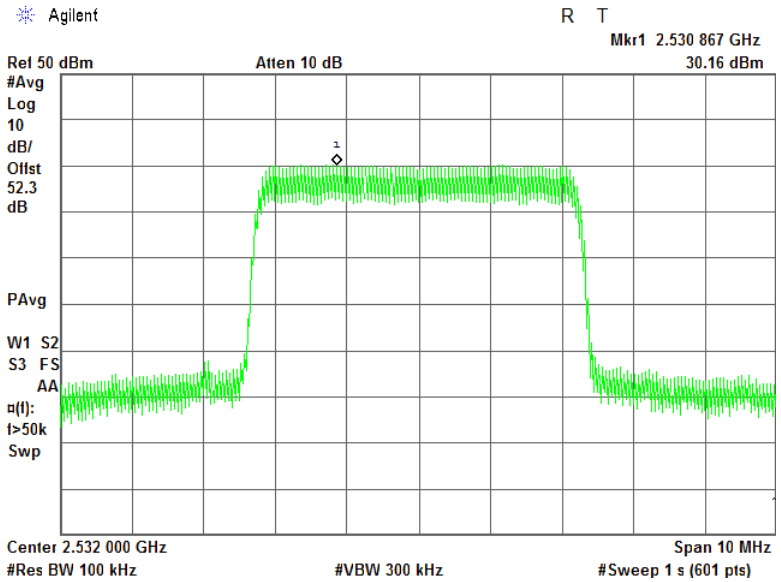
Channel	Channel BW, MHz	Peak power density, dBm/100kHz	
		17 dBi, 90º beamwidth	18 dBi, 65ºbeamwidth 11 dBi, 65ºbeamwidth
5 MHz Dual Channel QPSK			
2498.5 MHz BRS Ch.1	6.0	50.14	51.55
2532.0 MHz EBS Ch. B3	5.5	50.91	52.32
2565.5 MHz EBS Ch. D3	5.5	50.90	52.32
10 MHz Dual Channel QPSK			
2501.0 MHz BRS Ch. 1+EBS Ch. A1	11.5	47.56	48.98
2532.0 MHz EBS Ch. B2+B3+C1	11.0	47.96	49.37
2563.0 MHz EBS Ch. D2 + D3	11.0	47.96	49.37
20 MHz Dual Channel QPSK			
2506.0 MHz BRS Ch.1+ EBS Ch. A1 +A2+A3	22.5	44.66	46.07
2535.0 MHz EBS Ch.B2+B3+C1+C2	22.0	44.85	46.27
2558.0 MHz EBS CH.C3+D1+D2+D3	22.0	44.87	46.28
5 MHz Dual Channel 64 QAM			
2498.5 MHz BRS Ch.1	6.0	50.14	51.55
2532.0 MHz EBS Ch. B3	5.5	50.91	52.32
2565.5 MHz EBS Ch. D3	5.5	50.90	52.32
10 MHz Dual Channel 64 QAM			
2501.0 MHz BRS Ch. 1+EBS Ch. A1	11.5	47.57	48.99
2535.0 MHz EBS Ch. B3+C1	11.0	47.95	49.37
2563.0 MHz EBS Ch. D2 + D3	11.0	47.95	49.36
20 MHz Dual Channel 64 QAM			
2506.0 MHz BRS Ch.1+ EBS Ch. A1 +A2+A3	22.5	46.06	44.65
2535.0 MHz EBS Ch.B2+B3+C1+C2	22.0	46.26	44.84
2558.0 MHz EBS CH.C3+D1+D2+D3	22.0	46.28	44.87

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.1 Power spectral density test results at low frequency, QPSK, 5 MHz EBW, RF # 1

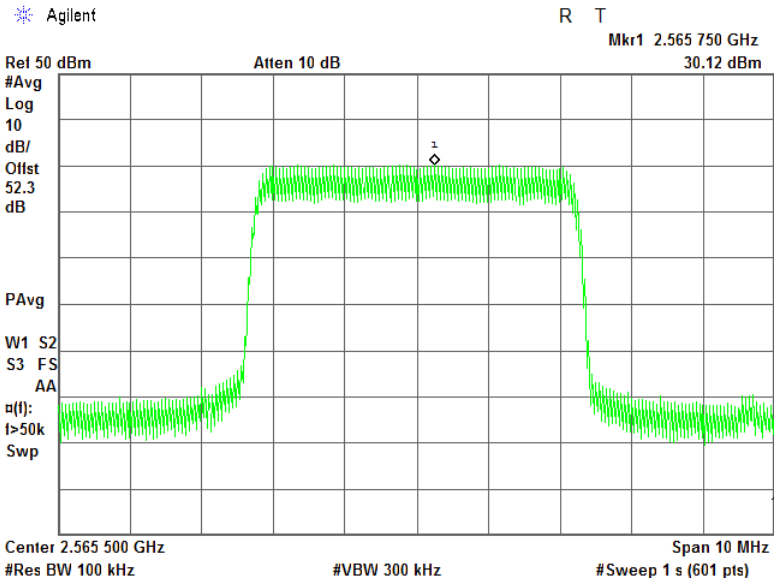


Plot 7.5.2 Power spectral density test results at mid frequency, QPSK, 5 MHz EBW, RF # 1

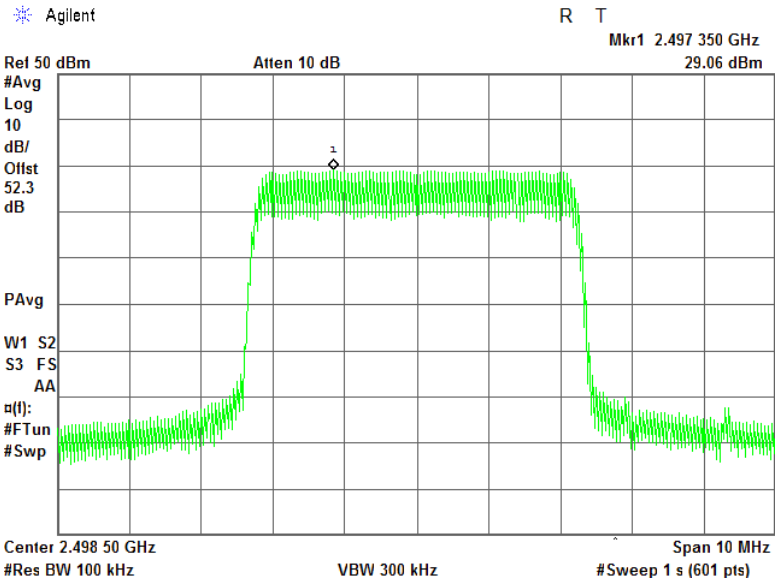


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.3 Power spectral density test results at high frequency, QPSK, 5 MHz EBW, RF # 1

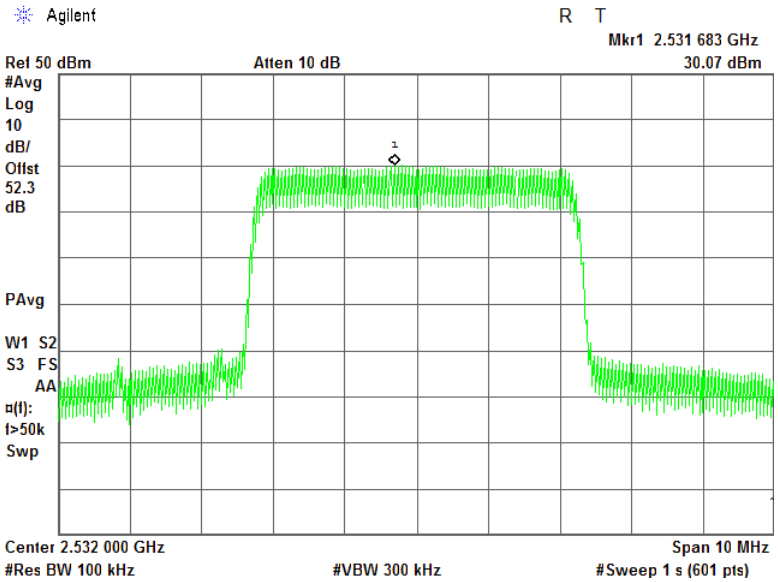


Plot 7.5.4 Power spectral density test results at low frequency, 64QAM, 5 MHz EBW, RF # 1

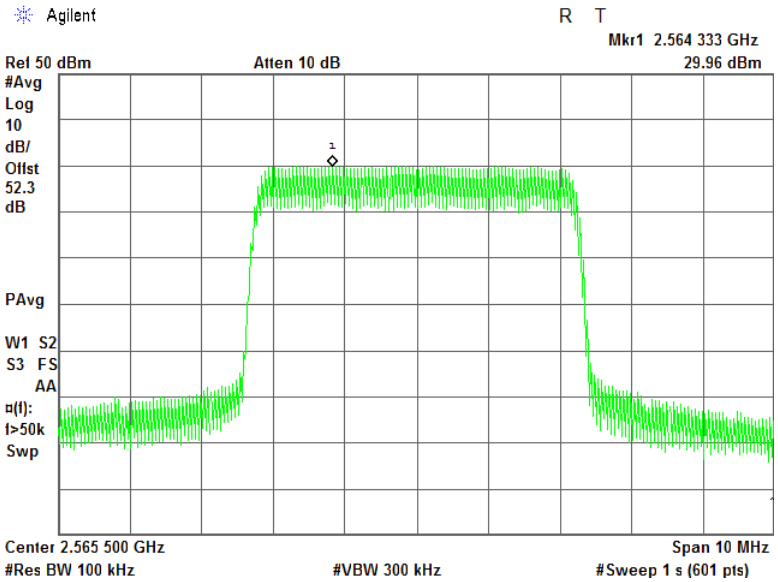


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.5 Power spectral density test results at mid frequency, 64QAM, 5 MHz EBW, RF # 1

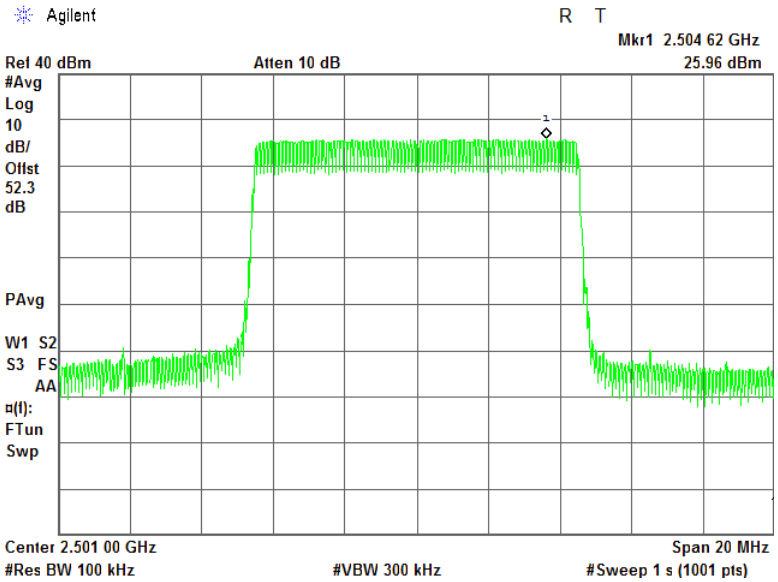


Plot 7.5.6 Power spectral density test results at high frequency, 64QAM, 5 MHz EBW, RF # 1

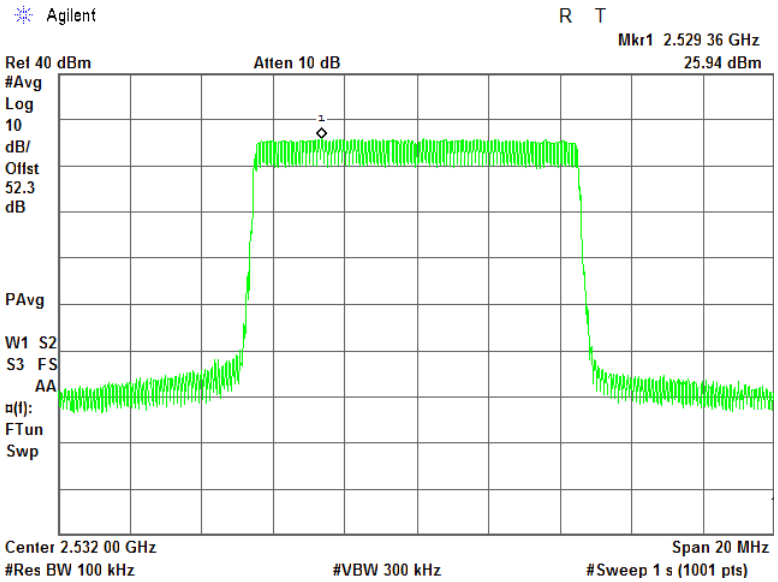


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.7 Power spectral density test results at low frequency, QPSK, 10 MHz EBW, RF # 1

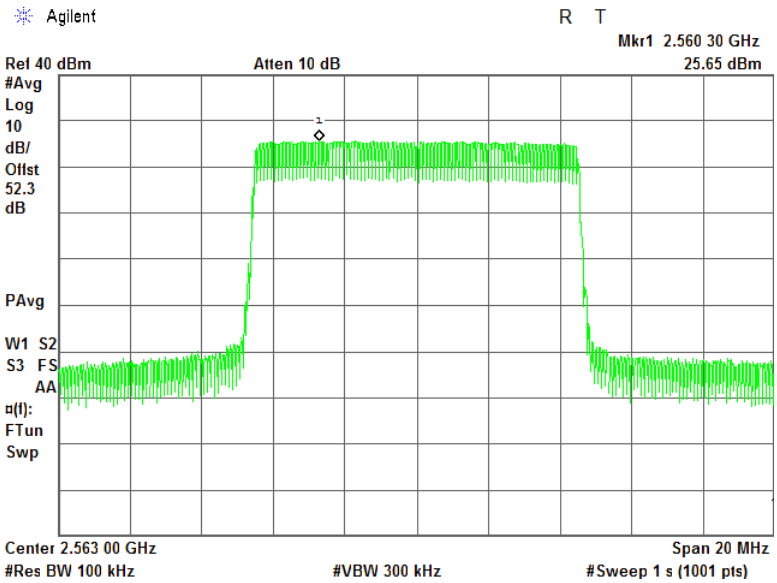


Plot 7.5.8 Power spectral density test results at mid frequency, QPSK, 10 MHz EBW, RF # 1

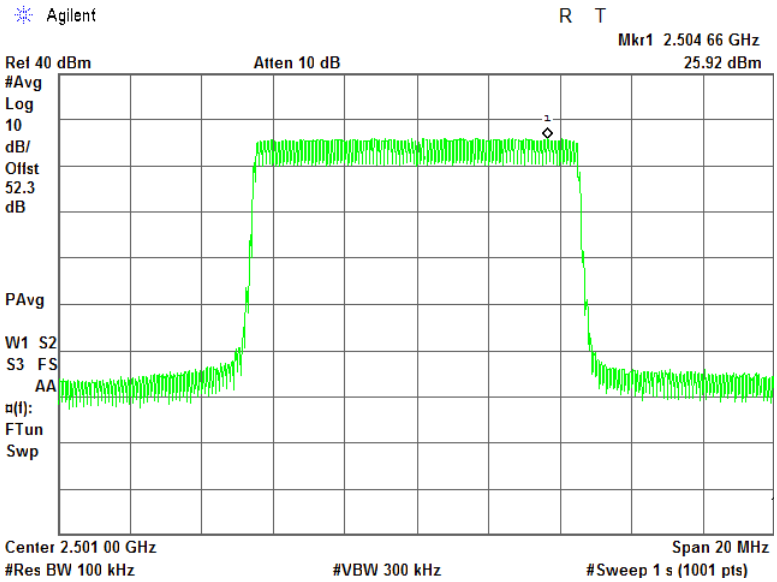


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.9 Power spectral density test results at high frequency, QPSK, 10 MHz EBW, RF # 1

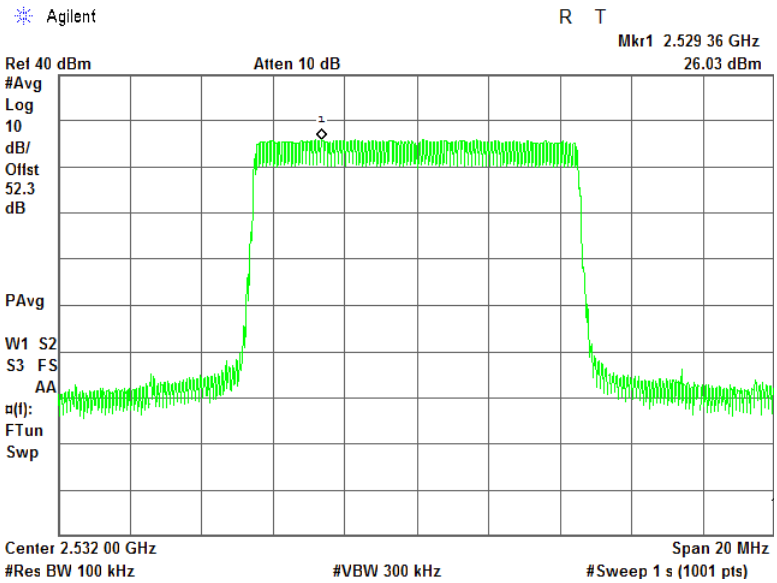


Plot 7.5.10 Power spectral density test results at low frequency, 64QAM, 10 MHz EBW, RF # 1

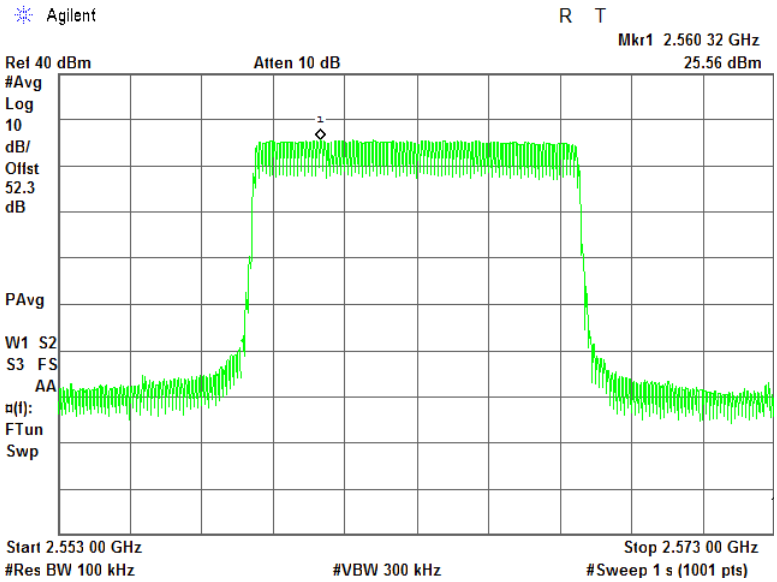


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.11 Power spectral density test results at mid frequency, 64QAM, 10 MHz EBW, RF # 1

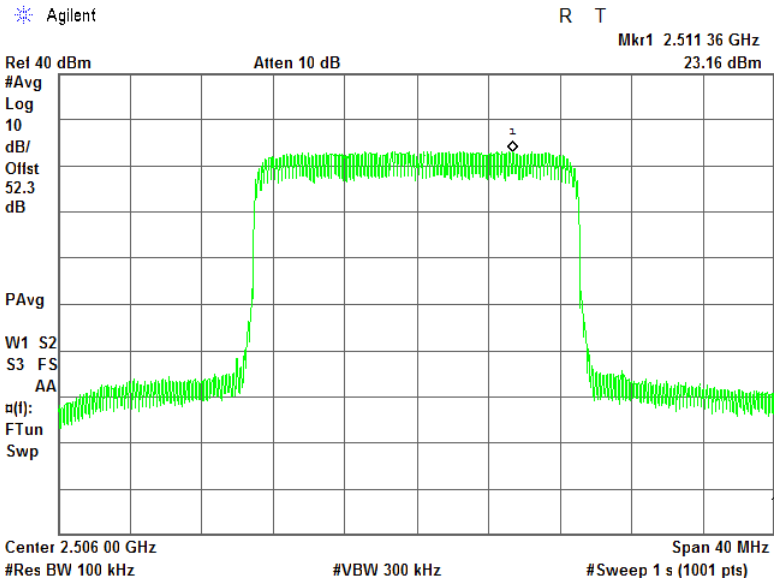


Plot 7.5.12 Power spectral density test results at high frequency, 64QAM, 10 MHz EBW, RF # 1

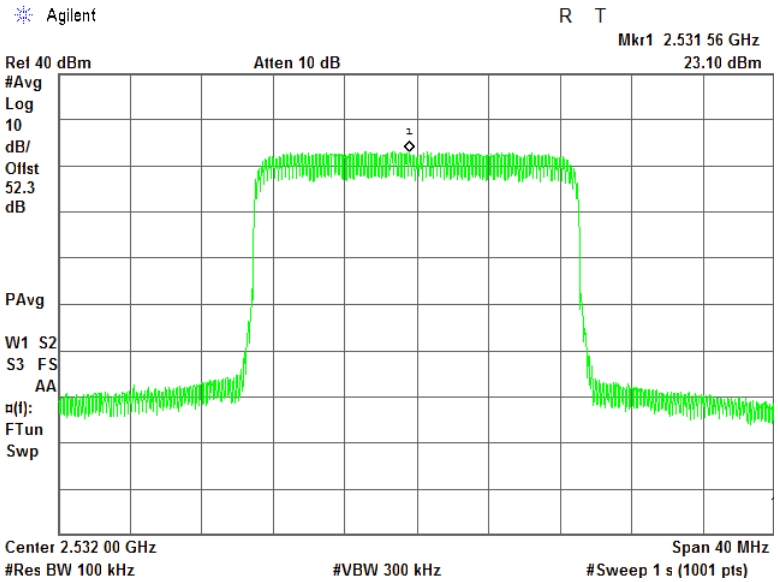


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.13 Power spectral density test results at low frequency, QPSK, 20 MHz EBW, RF # 1

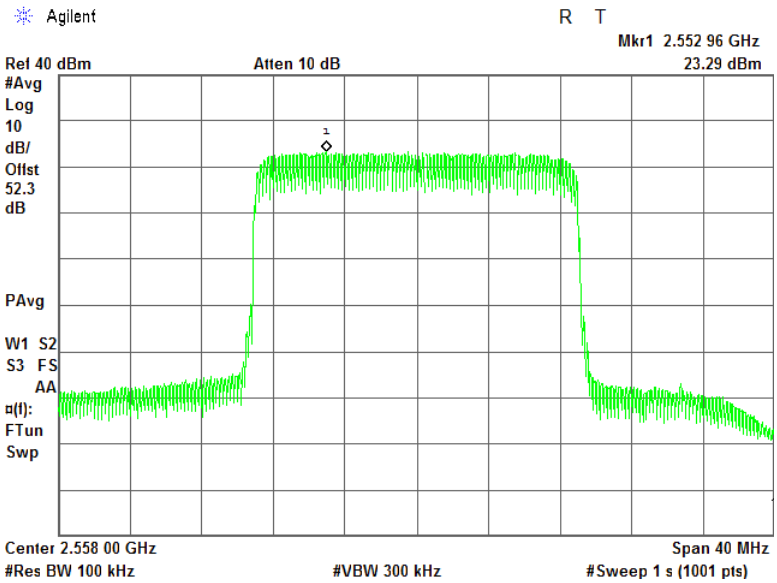


Plot 7.5.14 Power spectral density test results at mid frequency, QPSK, 20 MHz EBW, RF # 1

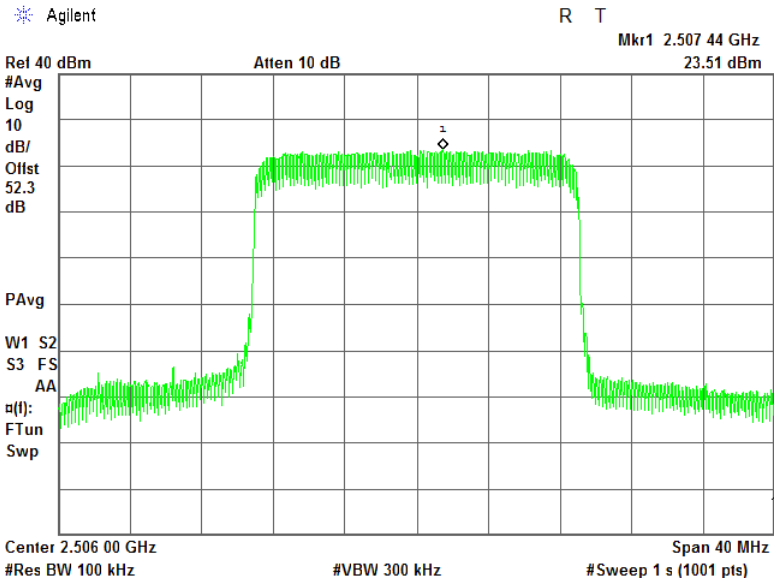


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.15 Power spectral density test results at high frequency, QPSK, 20 MHz EBW, RF # 1

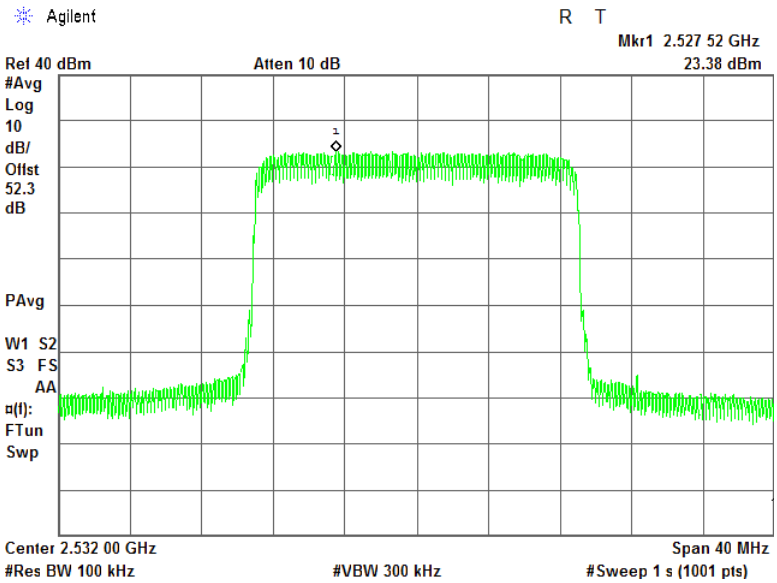


Plot 7.5.16 Power spectral density test results at low frequency, 64QAM, 20 MHz EBW, RF # 1

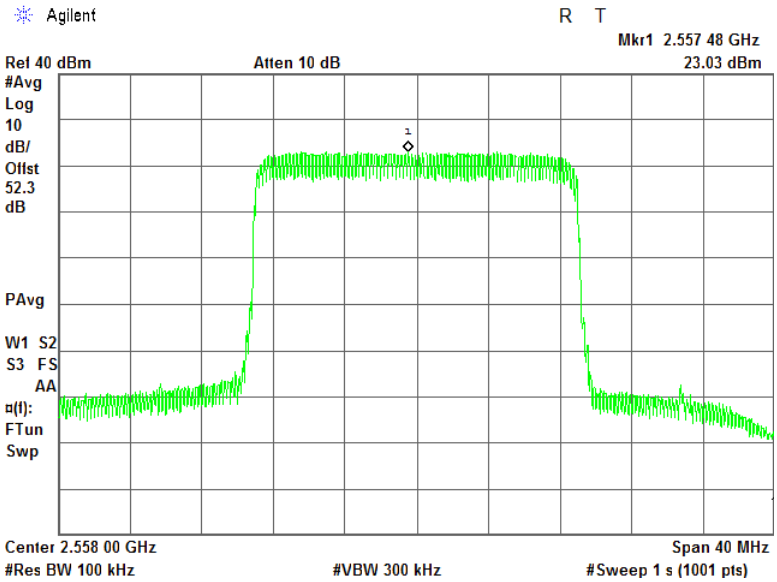


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.17 Power spectral density test results at mid frequency, 64QAM, 20 MHz EBW, RF # 1

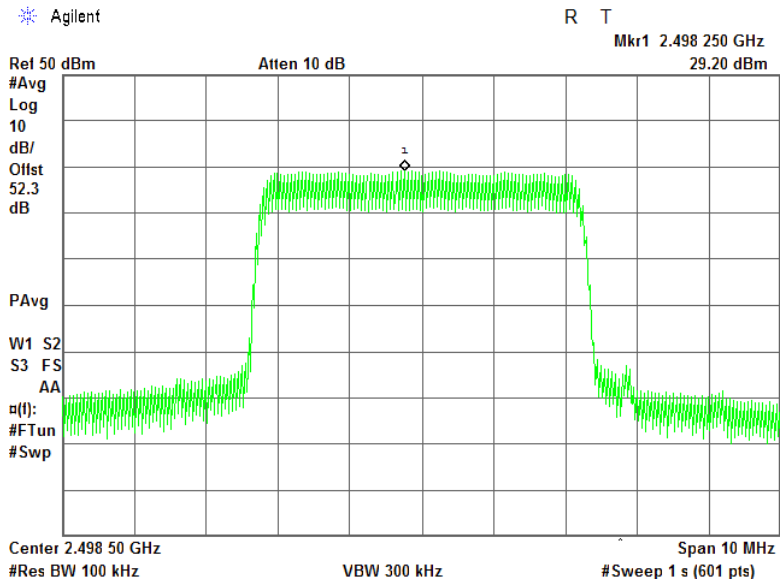


Plot 7.5.18 Power spectral density test results at high frequency, 64QAM, 20 MHz EBW, RF # 1

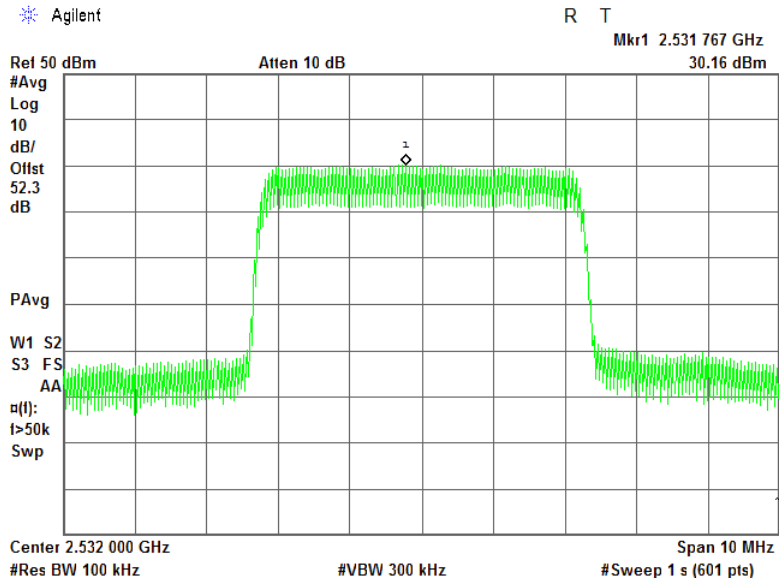


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.19 Power spectral density test results at low frequency, QPSK, 5 MHz EBW, RF # 2

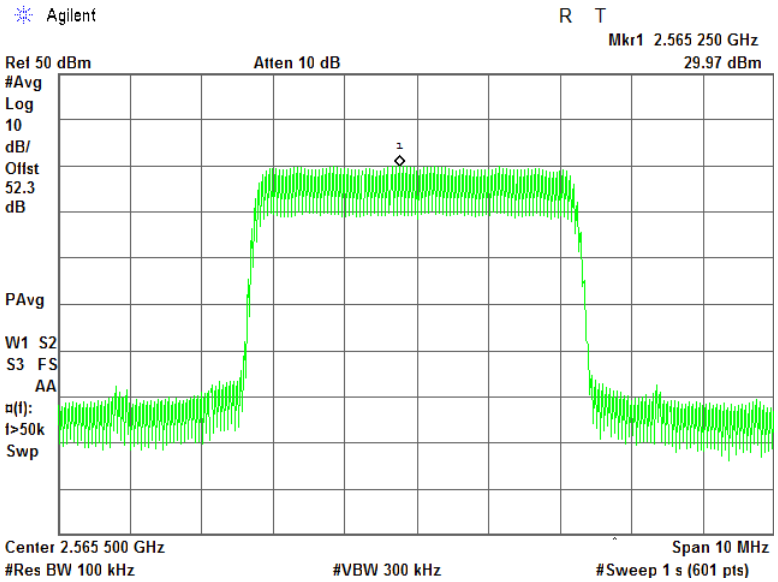


Plot 7.5.20 Power spectral density test results at mid frequency, QPSK, 5 MHz EBW, RF # 2

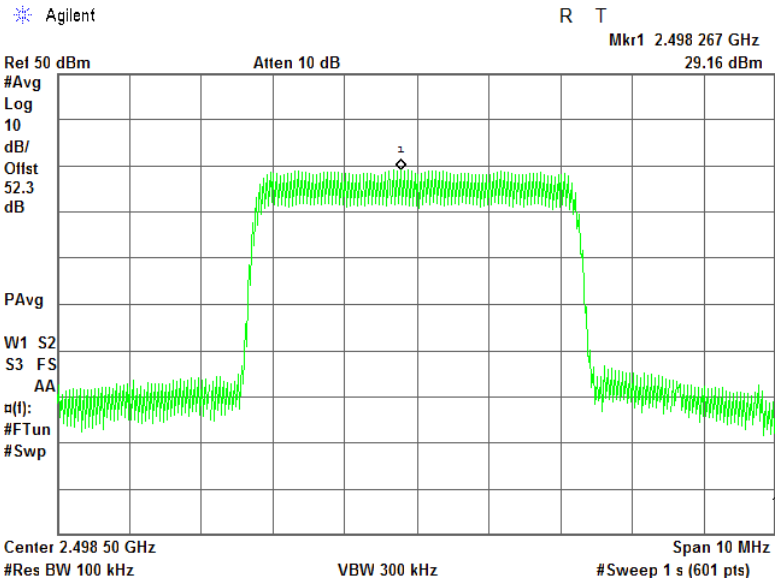


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.21 Power spectral density test results at high frequency, QPSK, 5 MHz EBW, RF # 2

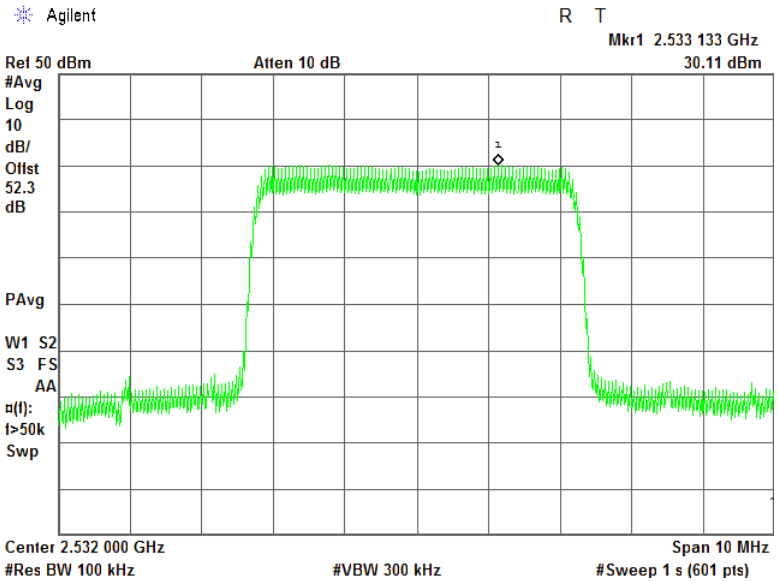


Plot 7.5.22 Power spectral density test results at low frequency, 64QAM, 5 MHz EBW, RF # 2

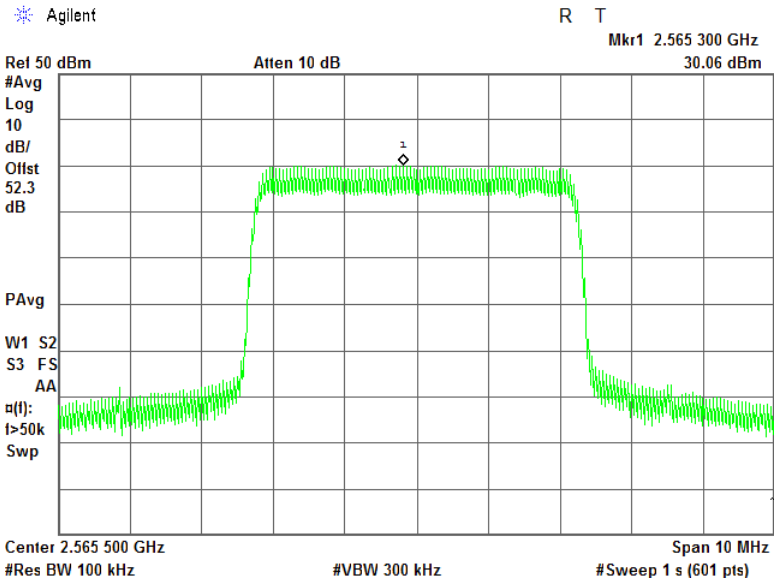


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.23 Power spectral density test results at mid frequency, 64QAM, 5 MHz EBW, RF # 2

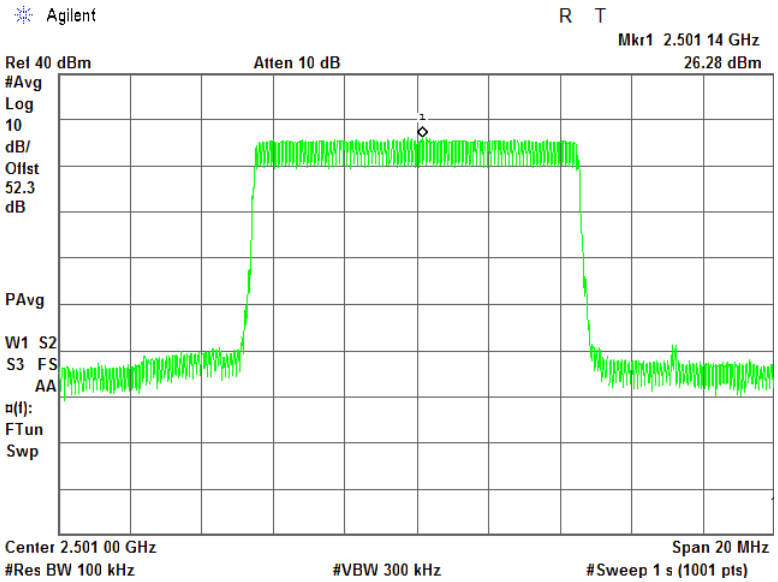


Plot 7.5.24 Power spectral density test results at high frequency, 64QAM, 5 MHz EBW, RF # 2

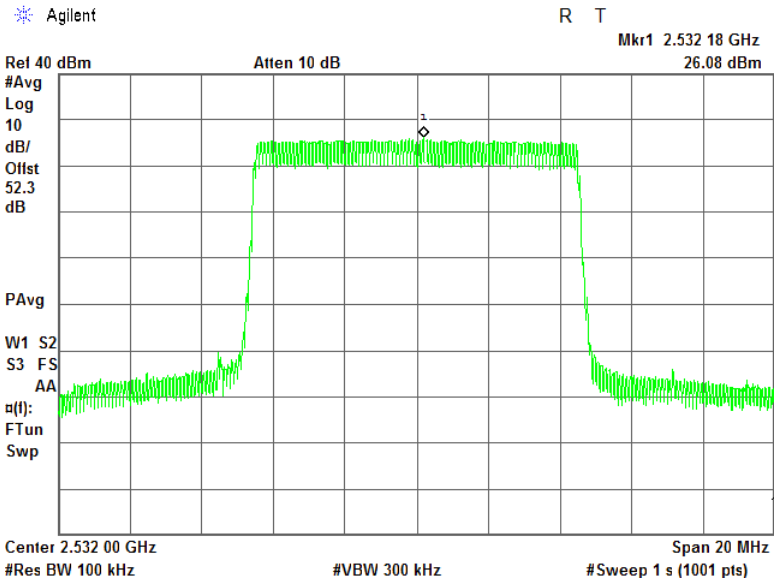


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.25 Power spectral density test results at low frequency, QPSK, 10 MHz EBW, RF # 2

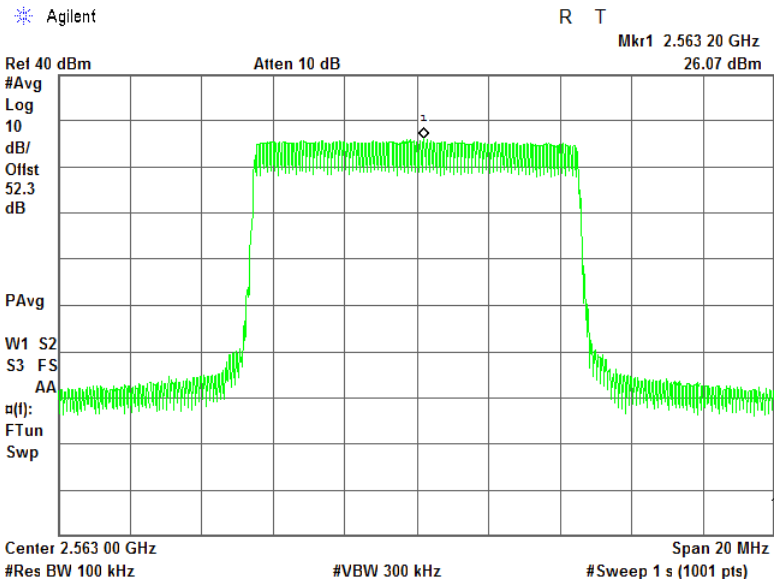


Plot 7.5.26 Power spectral density test results at mid frequency, QPSK, 10 MHz EBW, RF # 2

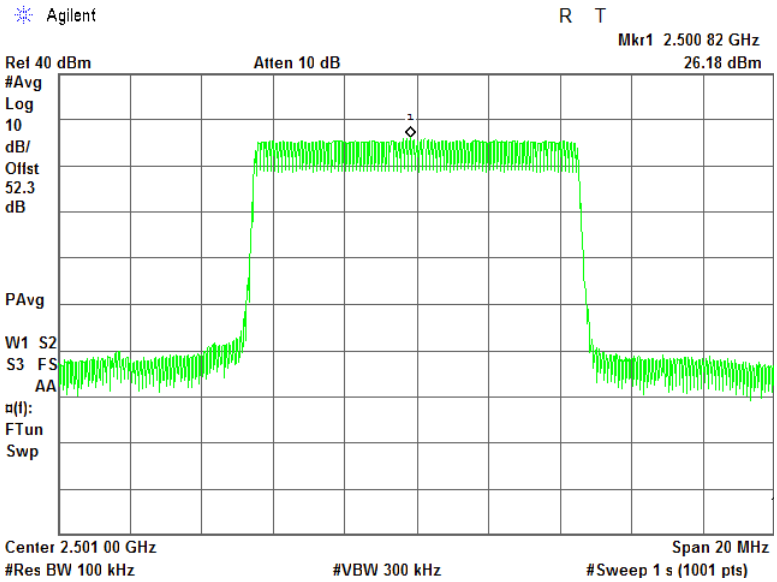


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.27 Power spectral density test results at high frequency, QPSK, 10 MHz EBW, RF # 2

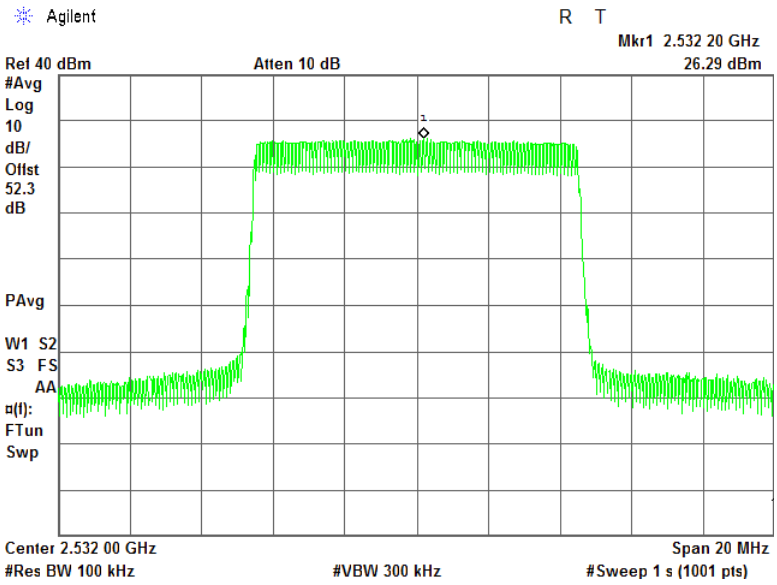


Plot 7.5.28 Power spectral density test results at low frequency, 64QAM, 10 MHz EBW, RF # 2

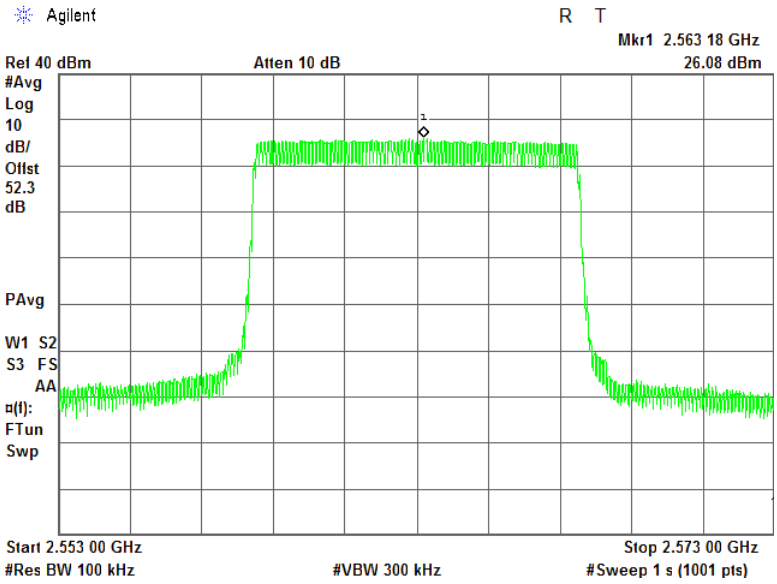


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.29 Power spectral density test results at mid frequency, 64QAM, 10 MHz EBW, RF # 2

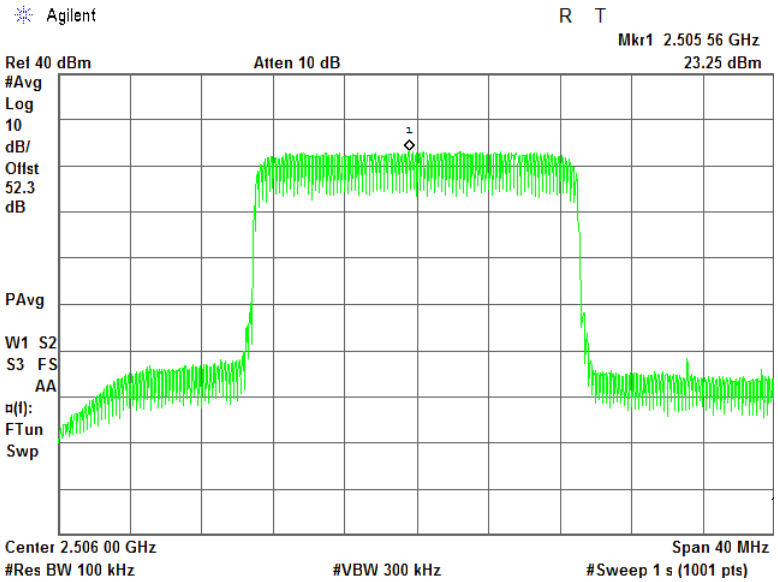


Plot 7.5.30 Power spectral density test results at high frequency, 64QAM, 10 MHz EBW, RF # 2

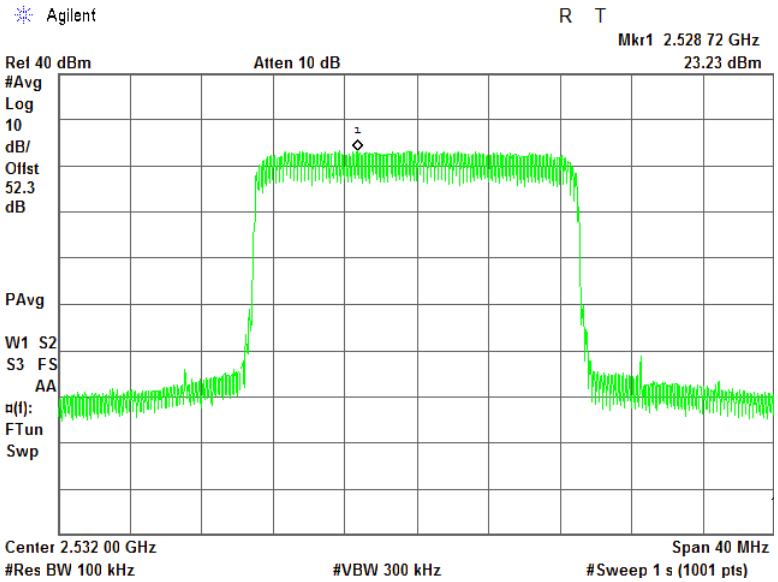


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.31 Power spectral density test results at low frequency, QPSK, 20 MHz EBW, RF # 2

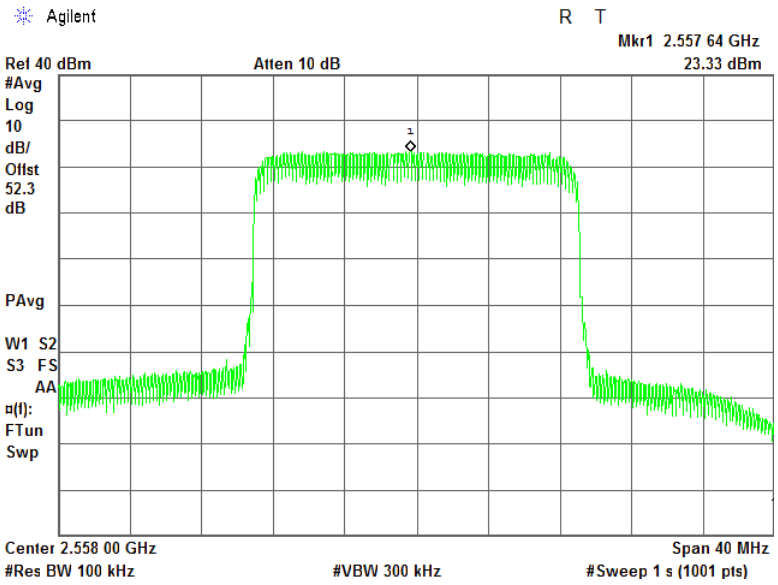


Plot 7.5.32 Power spectral density test results at mid frequency, QPSK, 20 MHz EBW, RF # 2

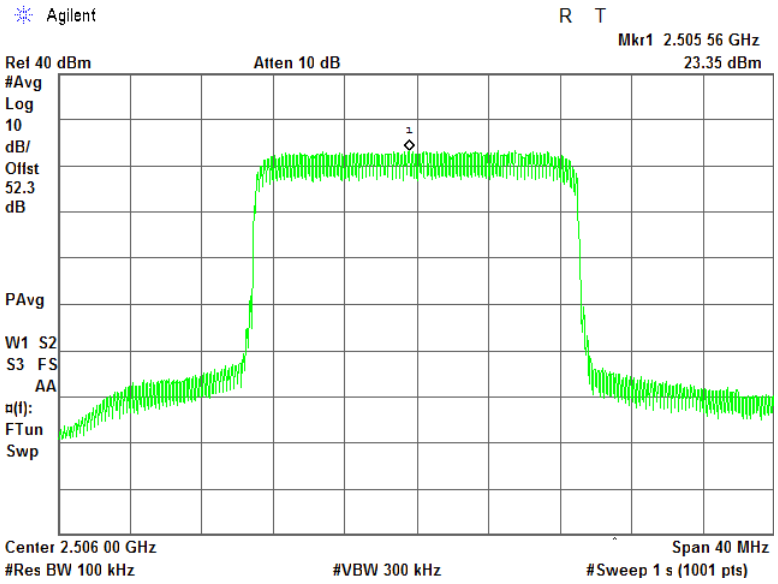


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.33 Power spectral density test results at high frequency, QPSK, 20 MHz EBW, RF # 2

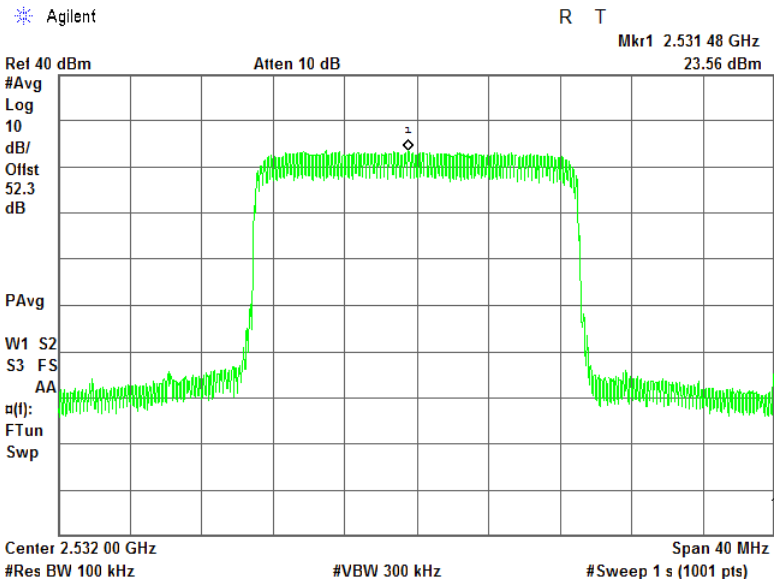


Plot 7.5.34 Power spectral density test results at low frequency, 64QAM, 20 MHz EBW, RF # 2

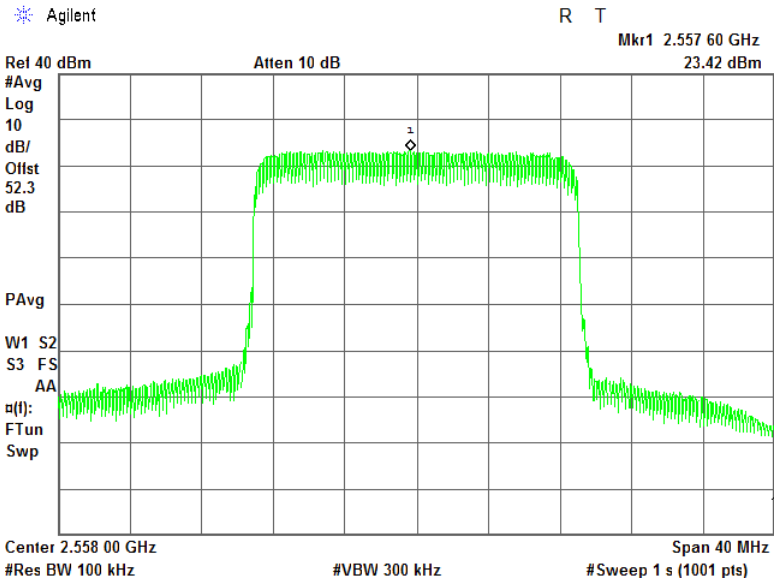


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.5.35 Power spectral density test results at mid frequency, 64QAM, 20 MHz EBW, RF # 2



Plot 7.5.36 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-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

7.6 Peak output power test in 2620.5 – 2687.5 MHz band

7.6.1 General

This test was performed to measure the peak output power at RF antenna connector. Specification test limits are given in Table 7.6.1.

Table 7.6.1 Peak output power limits

Transmitter type	Assigned frequency range, MHz	Maximum peak output power dBm
Main, booster and base stations	2614 – 2690	63+10log(X/Y)+10log(360/beamwidth)
		Maximum peak power density dBm/100 kHz
		EIRP+10log(0.1/Y)

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

Y is frequency assignments 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.

7.6.2 Test procedure

7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized and its proper operation was checked.

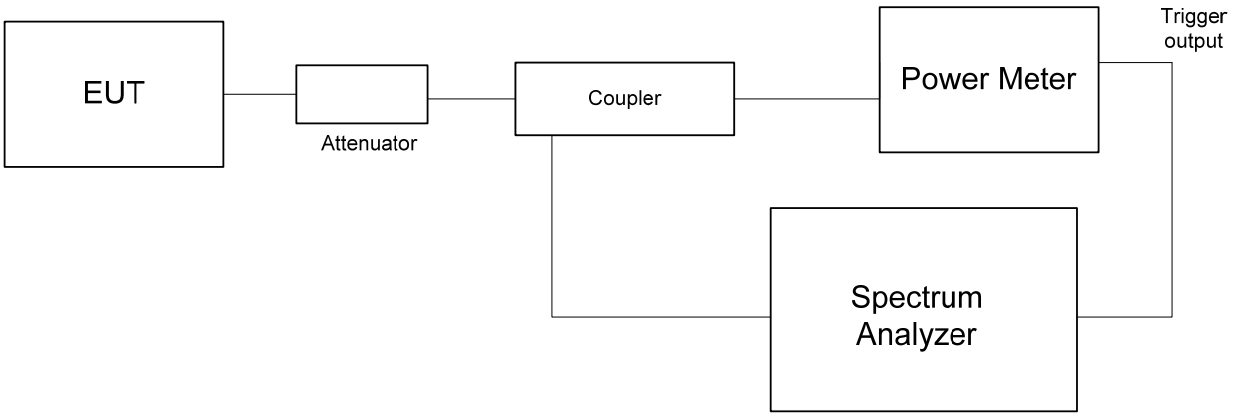
7.6.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.

7.6.2.3 The average output power was measured with power meter as provided in Table 7.6.2 to Table 7.6.4.

7.6.2.4 The power spectral density was measured with spectrum analyzer as provided in Table 7.6.5 to Table 7.6.7 and the associated plots..

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

Figure 7.6.1 Peak output power test setup



Test specification:	**Section 27.50, Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Table 7.6.2 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								
2620.5	43.12	43.11	46.18	18.00	64.18	69.35	-5.17	Pass
2654.0	43.15	43.17	46.12	18.00	64.12	69.72	-5.60	Pass
2687.5	43.16	43.19	46.16	18.00	64.16	69.75	-5.59	Pass
64QAM								
2620.5	43.13	43.10	46.13	18.00	64.13	69.38	-5.25	Pass
2654.0	43.20	43.19	46.20	18.00	64.20	69.72	-5.52	Pass
2687.5	43.15	43.16	46.16	18.00	64.16	69.73	-5.57	Pass
QPSK								
2620.5	43.12	43.11	46.18	17.00	63.18	67.94	-4.76	Pass
2654.0	43.15	43.17	46.12	17.00	63.12	68.31	-5.19	Pass
2687.5	43.16	43.19	46.16	17.00	63.16	68.34	-5.18	Pass
64QAM								
2620.5	43.13	43.10	46.13	17.00	63.13	67.96	-4.83	Pass
2654.0	43.20	43.19	46.20	17.00	63.20	68.31	-5.11	Pass
2687.5	43.15	43.16	46.16	17.00	63.16	68.32	-5.16	Pass
QPSK								
2620.5	43.12	43.11	46.18	11.00	57.18	69.35	-12.17	Pass
2654.0	43.15	43.17	46.12	11.00	57.12	69.72	-12.60	Pass
2687.5	43.16	43.19	46.16	11.00	57.16	69.75	-12.59	Pass
64QAM								
2620.5	43.13	43.10	46.13	11.00	57.13	69.38	-12.25	Pass
2654.0	43.20	43.19	46.20	11.00	57.20	69.72	-12.52	Pass
2687.5	43.15	43.16	46.16	11.00	57.16	69.73	-12.57	Pass

* - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi
** - Total RF power , dBm = 10*log[10^(Power RF#1 /10) + 10^(Power RF#2 /10)
*** - See Table 7.6.9.

Test specification:	**Section 27.50, Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Table 7.6.3 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								
2623	43.18	43.15	46.18	18.00	64.18	69.52	-5.34	Pass
2657	43.12	43.11	46.12	18.00	64.12	69.71	-5.59	Pass
2685	43.15	43.16	46.16	18.00	64.16	69.72	-5.56	Pass
64QAM								
2623	43.12	43.13	46.13	18.00	64.13	69.55	-5.42	Pass
2657	43.14	43.17	46.17	18.00	64.17	69.74	-5.57	Pass
2685	43.15	43.16	46.16	18.00	64.16	69.73	-5.57	Pass
QPSK								
2623	43.18	43.15	46.18	17.00	63.18	68.11	-4.93	Pass
2657	43.12	43.11	46.12	17.00	63.12	68.30	-5.18	Pass
2685	43.15	43.16	46.16	17.00	63.16	68.31	-5.15	Pass
64QAM								
2623	43.12	43.13	46.13	17.00	63.13	68.13	-5.00	Pass
2657	43.14	43.17	46.17	17.00	63.17	68.32	-5.15	Pass
2685	43.15	43.16	46.16	17.00	63.16	68.32	-5.16	Pass
QPSK								
2623	43.18	43.15	46.18	11.00	57.18	69.52	-12.34	Pass
2657	43.12	43.11	46.12	11.00	57.12	69.33	-12.21	Pass
2685	43.15	43.16	46.16	11.00	57.16	69.72	-12.56	Pass
64QAM								
2623	43.12	43.13	46.13	11.00	57.13	69.55	-12.42	Pass
2657	43.14	43.17	46.17	11.00	57.17	69.36	-12.19	Pass
2685	43.15	43.16	46.16	11.00	57.16	69.73	-12.57	Pass

* - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi
** - Total RF power , dBm = 10*log[10^(Power RF#1 /10) + 10^(Power RF#2 /10)
*** - See Table 7.6.9.

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Table 7.6.4 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								
2628	43.15	43.16	46.16	18.00	64.16	69.58	-5.42	Pass
2657	43.16	43.17	46.17	18.00	64.17	69.67	-5.50	Pass
2680	43.12	43.13	46.13	18.00	64.13	69.68	-5.55	Pass
64QAM								
2628	43.11	43.12	46.12	18.00	64.12	69.57	-5.45	Pass
2657	43.20	43.19	46.20	18.00	64.20	69.66	-5.46	Pass
2680	43.18	43.17	46.18	18.00	64.18	69.65	-5.47	Pass
QPSK								
2628	43.15	43.16	46.16	17.00	63.16	68.17	-5.01	Pass
2657	43.16	43.17	46.17	17.00	63.17	68.26	-5.09	Pass
2680	43.12	43.13	46.13	17.00	63.13	68.26	-5.13	Pass
64QAM								
2628	43.11	43.12	46.12	17.00	63.12	68.16	-5.04	Pass
2657	43.20	43.19	46.20	17.00	63.20	68.25	-5.05	Pass
2680	43.18	43.17	46.18	17.00	63.18	68.24	-5.06	Pass
QPSK								
2628	43.15	43.16	46.16	11.00	57.16	69.58	-12.42	Pass
2657	43.16	43.17	46.17	11.00	57.17	69.67	-12.50	Pass
2680	43.12	43.13	46.13	11.00	57.13	69.68	-12.55	Pass
64QAM								
2628	43.11	43.12	46.12	11.00	57.12	69.57	-12.45	Pass
2657	43.20	43.19	46.20	11.00	57.20	69.66	-12.46	Pass
2680	43.18	43.17	46.18	11.00	57.18	69.65	-12.47	Pass

* - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi
** - Total RF power , dBm = 10*log[10^(Power RF#1 /10) + 10^(Power RF#2 /10)
*** - See Table 7.6.9.

Reference numbers of test equipment used

HL 2214	HL 3301	HL 3302	HL 3818	HL 4756			

Full description is given in Appendix A.

Test specification:	**Section 27.50, Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Table 7.6.5 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							
2620.5	29.66	29.98	18.00	50.98	51.57	-0.59	Pass
2654.0	29.88	29.94	18.00	50.94	52.32	-1.38	Pass
2687.5	29.89	29.74	18.00	50.89	52.34	-1.45	Pass
64 QAM							
2620.5	29.85	30.06	18.00	51.06	51.59	-0.53	Pass
2654.0	29.84	29.82	18.00	50.84	52.32	-1.48	Pass
2687.5	29.85	29.66	18.00	50.85	52.33	-1.48	Pass
QPSK							
2620.5	29.66	29.98	17.00	49.98	50.15	-0.17	Pass
2654.0	29.88	29.94	17.00	49.94	50.91	-0.97	Pass
2687.5	29.89	29.74	17.00	49.89	50.93	-1.04	Pass
64 QAM							
2620.5	29.85	30.06	17.00	50.06	50.18	-0.12	Pass
2654.0	29.84	29.82	17.00	49.84	50.91	-1.07	Pass
2687.5	29.85	29.66	17.00	49.85	50.91	-1.06	Pass
QPSK							
2620.5	29.66	29.98	11.00	43.98	51.57	-7.59	Pass
2654.0	29.88	29.94	11.00	43.94	52.32	-8.38	Pass
2687.5	29.89	29.74	11.00	43.89	52.34	-8.45	Pass
64 QAM							
2620.5	29.85	30.06	11.00	44.06	51.59	-7.53	Pass
2654.0	29.84	29.82	11.00	43.84	52.32	-8.48	Pass
2687.5	29.85	29.66	11.00	43.85	52.33	-8.48	Pass

* SA reading including attenuation, cable loss and DC correction factor
** Total PSD, dBm/100kHz = PSD(dBm/100kHz,RF#1)+ 3 dB + Antenna Gain, dBi
*** See Table 7.6.10.

Test specification:	**Section 27.50, Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Table 7.6.6 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							
2623	25.53	25.60	18.00	46.60	48.91	-2.31	Pass
2657	25.66	25.76	18.00	46.76	49.30	-2.54	Pass
2685	25.59	25.53	18.00	46.59	49.31	-2.72	Pass
64QAM							
2623	26.04	25.88	18.00	47.04	48.94	-1.90	Pass
2657	25.67	25.44	18.00	46.67	49.32	-2.65	Pass
2685	25.59	25.33	18.00	46.59	49.32	-2.73	Pass
QPSK							
2623	25.53	25.60	17.00	45.60	47.50	-1.90	Pass
2657	25.66	25.76	17.00	45.76	47.88	-2.12	Pass
2685	25.59	25.53	17.00	45.59	47.89	-2.30	Pass
64QAM							
2623	26.04	25.88	17.00	46.04	47.52	-1.48	Pass
2657	25.67	25.44	17.00	45.67	47.91	-2.24	Pass
2685	25.59	25.33	17.00	45.59	47.90	-2.31	Pass
QPSK							
2623	25.53	25.60	11.00	39.60	48.91	-9.31	Pass
2657	25.66	25.76	11.00	39.76	48.54	-8.78	Pass
2685	25.59	25.53	11.00	39.59	49.31	-9.72	Pass
64QAM							
2623	26.04	25.88	11.00	40.04	48.94	-8.90	Pass
2657	25.67	25.44	11.00	39.67	48.57	-8.90	Pass
2685	25.59	25.33	11.00	39.59	49.32	-9.73	Pass

* SA reading including attenuation, cable loss and DC correction factor
** Total PSD, dBm/100kHz = PSD(dBm/100kHz,RF#1)+ 3 dB + Antenna Gain, dBi
*** See Table 7.6.10.

Test specification:	**Section 27.50, Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1021 hPa	**Power:** 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Table 7.6.7 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							
2628	23.30	23.01	18.00	44.30	46.06	-1.76	Pass
2657	22.96	23.08	18.00	44.08	46.25	-2.17	Pass
2680	22.93	23.18	18.00	44.18	46.25	-2.07	Pass
64QAM							
2628	23.11	23.03	18.00	44.11	46.05	-1.94	Pass
2657	23.01	23.13	18.00	44.13	46.24	-2.11	Pass
2680	23.10	23.22	18.00	44.22	46.22	-2.00	Pass
QPSK							
2628	23.30	23.01	17.00	43.30	44.65	-1.35	Pass
2657	22.96	23.08	17.00	43.08	44.83	-1.75	Pass
2680	22.93	23.18	17.00	43.18	44.84	-1.66	Pass
64QAM							
2628	23.11	23.03	17.00	43.11	44.64	-1.53	Pass
2657	23.01	23.13	17.00	43.13	44.82	-1.69	Pass
2680	23.10	23.22	17.00	43.22	44.81	-1.59	Pass
QPSK							
2628	23.30	23.01	11.00	37.30	46.06	-8.76	Pass
2657	22.96	23.08	11.00	37.08	46.25	-9.17	Pass
2680	22.93	23.18	11.00	37.18	46.25	-9.07	Pass
64QAM							
2628	23.11	23.03	11.00	37.11	46.05	-8.94	Pass
2657	23.01	23.13	11.00	37.13	46.24	-9.11	Pass
2680	23.10	23.22	11.00	37.22	46.22	-9.00	Pass

* SA reading including attenuation, cable loss and DC correction factor
** Total PSD, dBm/100kHz = PSD(dBm/100kHz,RF#1)+ 3 dB + Antenna Gain, dBi
*** See Table 7.6.10.

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Table 7.6.8 Post - transition frequency channels assignment

Channel	OBW, MHz	Peak power limit, dBm	Power density limit, dBm/100kHz
5 MHz Dual Channel QPSK 5.3 Mbps			
2620.5 MHz BRS Ch.2	4.674	63+10log(OBW/6.0)+10log(360/beamwidth)	EIRP+10log(0.1/6.0)
2654.0 MHz BRS Ch.F3	4.670	63+10log(OBW/5.5)+10log(360/beamwidth)	EIRP+10log(0.1/5.5)
2687.5 MHz EBS Ch.G3	4.697	63+10log(OBW/5.5)+10log(360/beamwidth)	EIRP+10log(0.1/5.5)
5 MHz Dual Channel 64QAM 23 Mbps			
2620.5 MHz BRS Ch.2	4.703	63+10log(OBW/6.0)+10log(360/beamwidth)	EIRP+10log(0.1/6.0)
2654.0 MHz BRS Ch.F3	4.670	63+10log(OBW/5.5)+10log(360/beamwidth)	EIRP+10log(0.1/5.5)
2687.5 MHz EBS Ch.G3	4.676	63+10log(OBW/5.5)+10log(360/beamwidth)	EIRP+10log(0.1/5.5)
10 MHz Dual Channel QPSK 10.7 Mbps			
2623.0 MHz BRS Ch.2 + E1	9.316	63+10log(OBW/11.5)+10log(360/beamwidth)	EIRP+10log(0.1/11.5)
2657.0 MHz BRS Ch.F3 + H1	9.313	63+10log(OBW/11.0)+10log(360/beamwidth)	EIRP+10log(0.1/11.0)
2685.0 MHz EBS Ch.G2 + G3	9.333	63+10log(OBW/11.0)+10log(360/beamwidth)	EIRP+10log(0.1/11.0)
10 MHz Dual Channel 64QAM 47.3 Mbps			
2623.0 MHz BRS Ch.2 + E1	9.372	63+10log(OBW/11.5)+10log(360/beamwidth)	EIRP+10log(0.1/11.5)
2657.0 MHz BRS Ch.F3 + H1	9.371	63+10log(OBW/11.0)+10log(360/beamwidth)	EIRP+10log(0.1/11.0)
2685.0 MHz EBS Ch.G2 + G3	9.354	63+10log(OBW/11.0)+10log(360/beamwidth)	EIRP+10log(0.1/11.0)
20 MHz 4 Channels QPSK 23.4 Mbps			
2628.0 MHz BRS Ch.2 + E1 +E2 + E3	18.487	63+10log(OBW/22.5)+10log(360/beamwidth)	EIRP+10log(0.1/22.5)
2657.0 MHz BRS Ch.F2 + F3 + H1 +H2	18.452	63+10log(OBW/22.0)+10log(360/beamwidth)	EIRP+10log(0.1/22.0)
2680.0 MHz EBS Ch.H3 + G1 + G2 + G3	18.486	63+10log(OBW/22.0)+10log(360/beamwidth)	EIRP+10log(0.1/22.0)
20 MHz 4 Channels 64QAM 95 Mbps			
2628.0 MHz BRS Ch.2 + E1 +E2 + E3	18.448	63+10log(OBW/22.5)+10log(360/beamwidth)	EIRP+10log(0.1/22.5)
2657.0 MHz BRS Ch.F2 + F3 + H1 +H2	18.407	63+10log(OBW/22.0)+10log(360/beamwidth)	EIRP+10log(0.1/22.0)
2680.0 MHz EBS Ch.H3 + G1 + G2 + G3	18.361	63+10log(OBW/22.0)+10log(360/beamwidth)	EIRP+10log(0.1/22.0)

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Table 7.6.9 EIRP limits

Channel	Channel BW, MHz	Peak power limit, dBm	
		17 dBi, 90º beamwidth	18 dBi, 65ºbeamwidth 11 dBi, 65ºbeamwidth
5 MHz Dual Channel QPSK			
2620.5 MHz BRS Ch.2	6.0	67.94	69.35
2654.0 MHz BRS Ch.F3	5.5	68.31	69.72
2687.5 MHz EBS Ch.G3	5.5	68.34	69.75
10 MHz Dual Channel QPSK			
2623.0 MHz BRS Ch.2 + E1	11.5	68.11	69.52
2657.0 MHz BRS Ch.F3 + H1	11.0	68.30	69.71
2685.0 MHz EBS Ch.G2 + G3	11.0	68.31	69.72
20 MHz Dual Channel QPSK			
2628.0 MHz BRS Ch.2 + E1 +E2 + E3	22.5	68.17	69.58
2657.0 MHz BRS Ch.F2 + F3 + H1 +H2	22.0	68.26	69.67
2680.0 MHz EBS Ch.H3 + G1 + G2 + G3	22.0	68.26	69.68
5 MHz Dual Channel 64 QAM			
2620.5 MHz BRS Ch.2	6.0	67.96	69.38
2654.0 MHz BRS Ch.F3	5.5	68.31	69.72
2687.5 MHz EBS Ch.G3	5.5	68.32	69.73
10 MHz Dual Channel 64 QAM			
2623.0 MHz BRS Ch.2 + E1	11.5	68.13	69.55
2657.0 MHz BRS Ch.F3 + H1	11.0	68.32	69.36
2685.0 MHz EBS Ch.G2 + G3	11.0	68.32	69.73
20 MHz Dual Channel 64 QAM			
2628.0 MHz BRS Ch.2 + E1 +E2 + E3	22.5	68.16	69.57
2657.0 MHz BRS Ch.F2 + F3 + H1 +H2	22.0	68.25	69.66
2680.0 MHz EBS Ch.H3 + G1 + G2 + G3	22.0	68.24	69.65

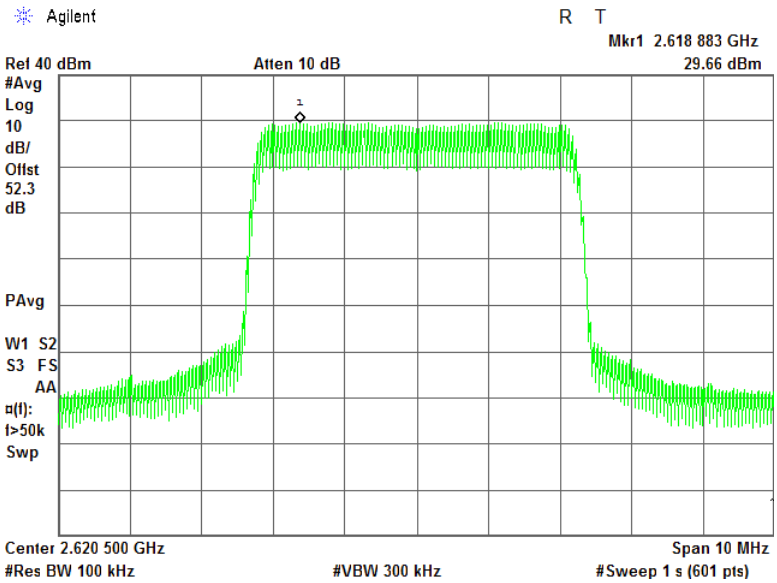
Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Table 7.6.10 Peak power density limits

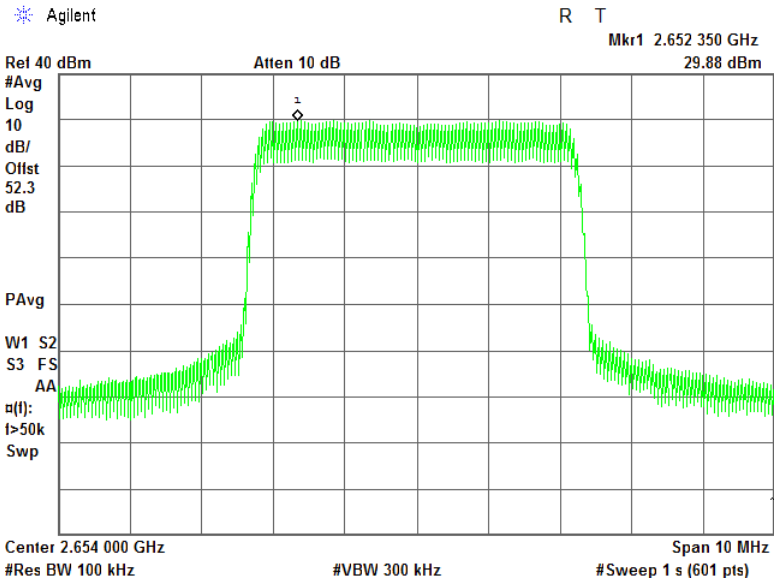
Channel	Channel BW, MHz	Peak power density, dBm/100kHz	
		17 dBi, 90º beamwidth	18 dBi, 65ºbeamwidth 11 dBi, 65ºbeamwidth
5 MHz Dual Channel QPSK			
2620.5 MHz BRS Ch.2	6.0	50.15	51.57
2654.0 MHz BRS Ch.F3	5.5	50.91	52.32
2687.5 MHz EBS Ch.G3	5.5	50.93	52.34
10 MHz Dual Channel QPSK			
2623.0 MHz BRS Ch.2 + E1	11.5	47.50	48.91
2657.0 MHz BRS Ch.F3 + H1	11.0	47.88	49.30
2685.0 MHz EBS Ch.G2 + G3	11.0	47.89	49.31
20 MHz Dual Channel QPSK			
2628.0 MHz BRS Ch.2 + E1 +E2 + E3	22.5	44.65	46.06
2657.0 MHz BRS Ch.F2 + F3 + H1 +H2	22.0	44.83	46.25
2680.0 MHz EBS Ch.H3 + G1 + G2 + G3	22.0	44.84	46.25
5 MHz Dual Channel 64 QAM			
2620.5 MHz BRS Ch.2	6.0	50.18	51.59
2654.0 MHz BRS Ch.F3	5.5	50.91	52.32
2687.5 MHz EBS Ch.G3	5.5	50.91	52.33
10 MHz Dual Channel 64 QAM			
2623.0 MHz BRS Ch.2 + E1	11.5	47.52	48.94
2657.0 MHz BRS Ch.F3 + H1	11.0	47.91	48.57
2685.0 MHz EBS Ch.G2 + G3	11.0	47.90	49.32
20 MHz Dual Channel 64 QAM			
2628.0 MHz BRS Ch.2 + E1 +E2 + E3	22.5	44.64	46.05
2657.0 MHz BRS Ch.F2 + F3 + H1 +H2	22.0	44.82	46.24
2680.0 MHz EBS Ch.H3 + G1 + G2 + G3	22.0	44.81	46.22

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.1 Power spectral density test results at low frequency, QPSK, 5 MHz EBW, RF # 1

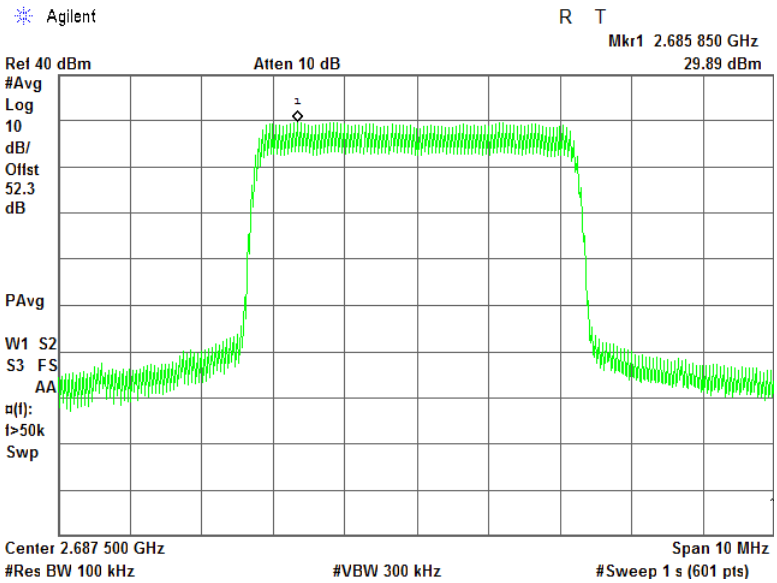


Plot 7.6.2 Power spectral density test results at mid frequency, QPSK, 5 MHz EBW, RF # 1

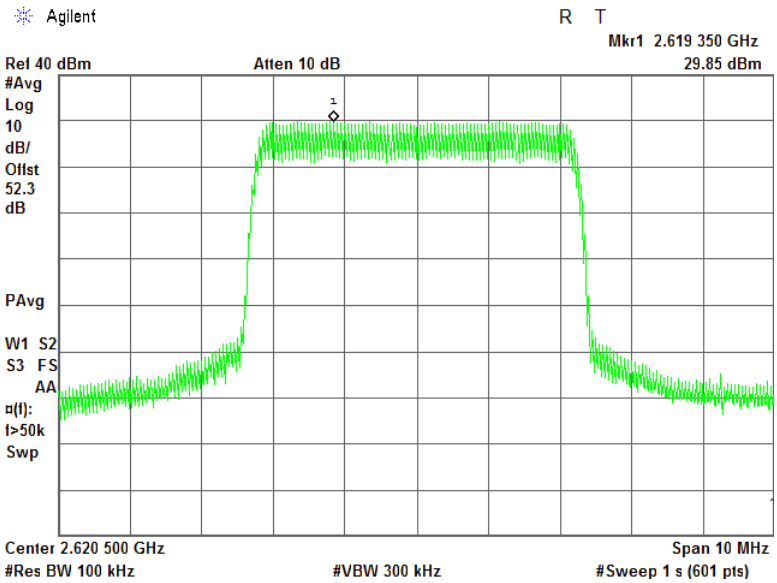


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.3 Power spectral density test results at high frequency, QPSK, 5 MHz EBW, RF # 1

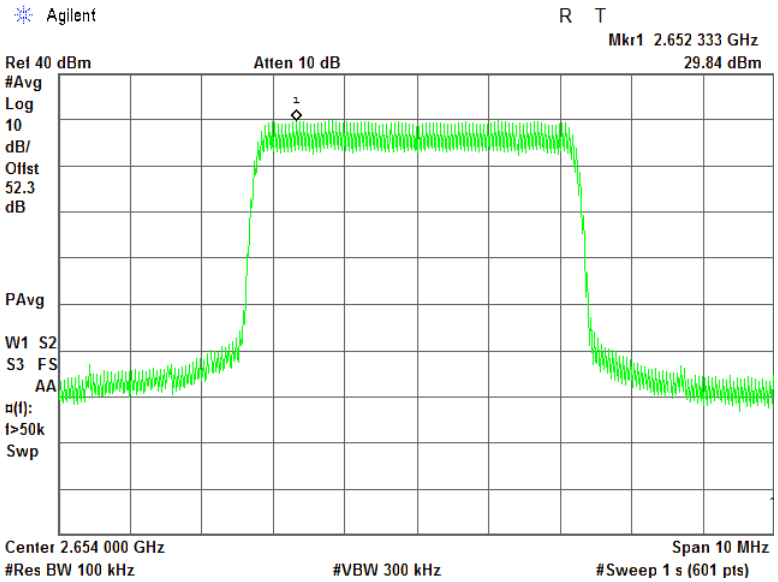


Plot 7.6.4 Power spectral density test results at low frequency, 64QAM, 5 MHz EBW, RF # 1

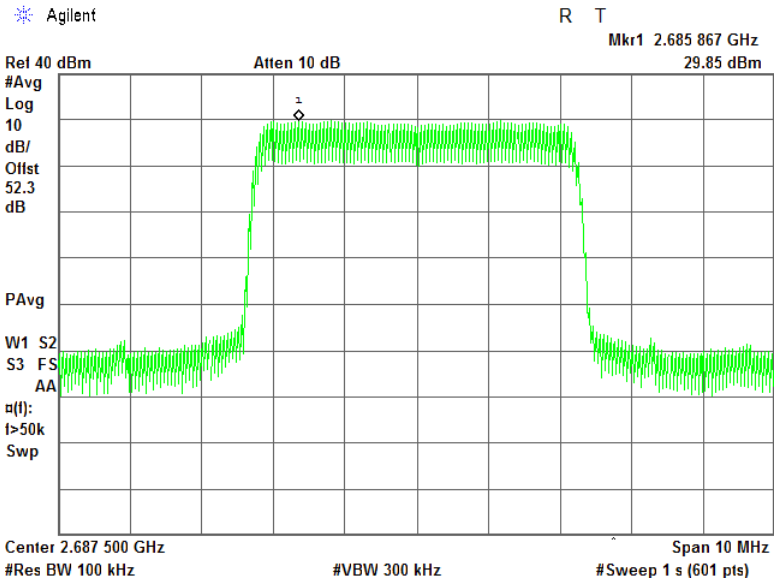


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.5 Power spectral density test results at mid frequency, 64QAM, 5 MHz EBW, RF # 1

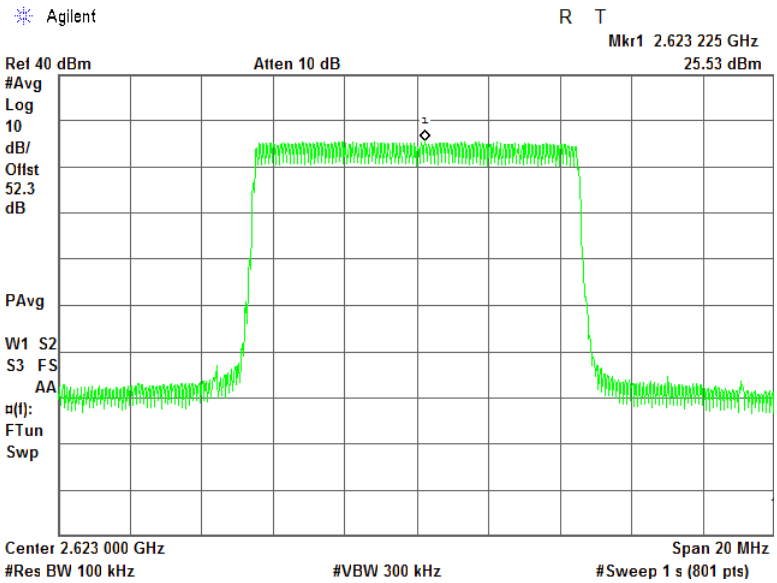


Plot 7.6.6 Power spectral density test results at high frequency, 64QAM, 5 MHz EBW, RF # 1

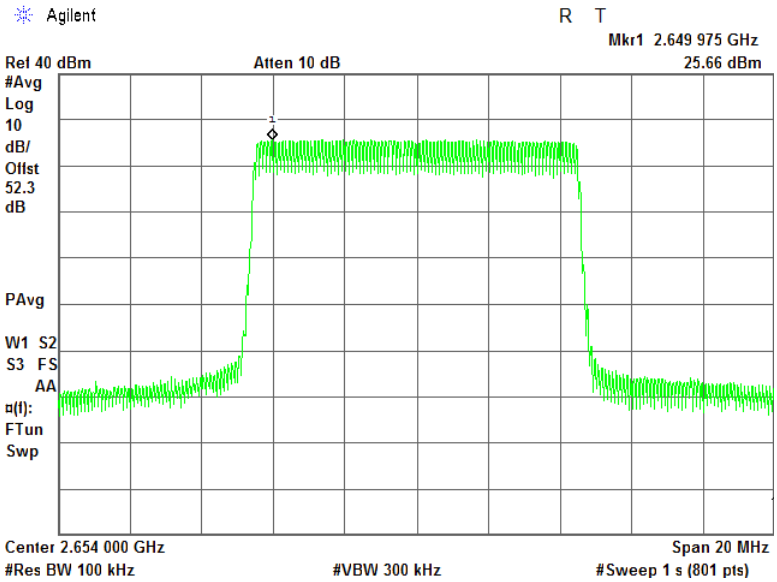


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.7 Power spectral density test results at low frequency, QPSK, 10 MHz EBW, RF # 1

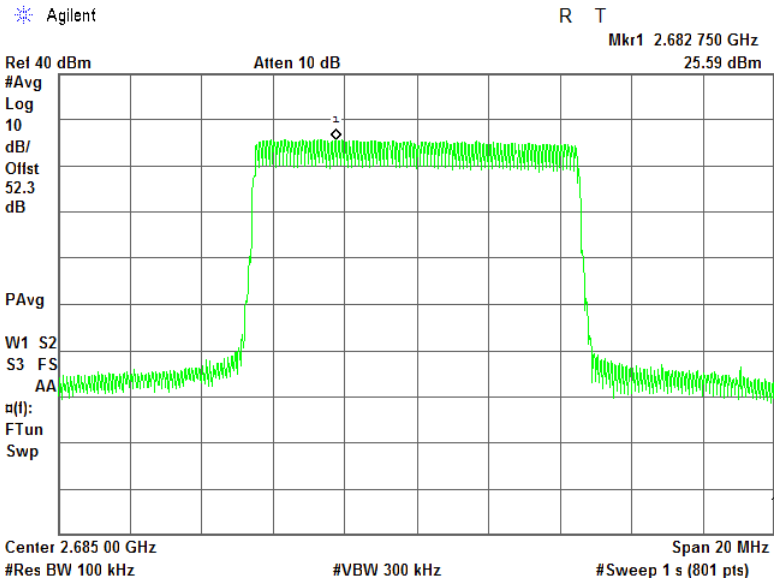


Plot 7.6.8 Power spectral density test results at mid frequency, QPSK, 10 MHz EBW, RF # 1

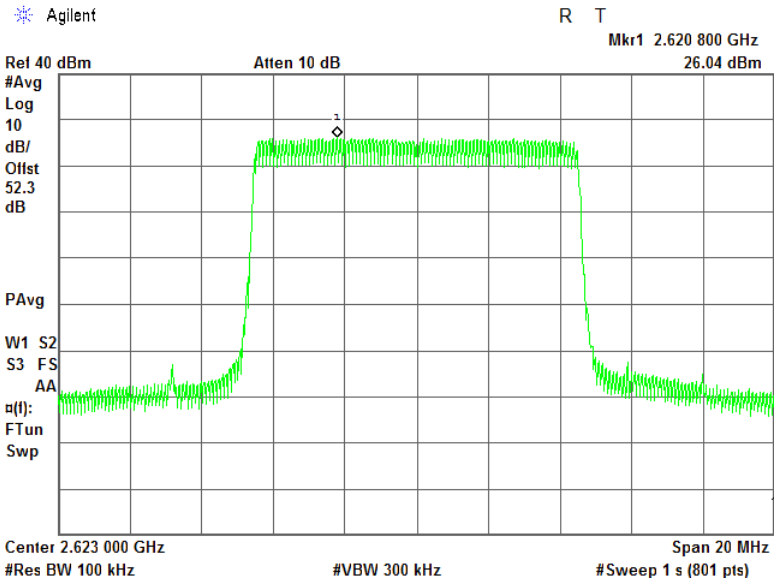


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.9 Power spectral density test results at high frequency, QPSK, 10 MHz EBW, RF # 1

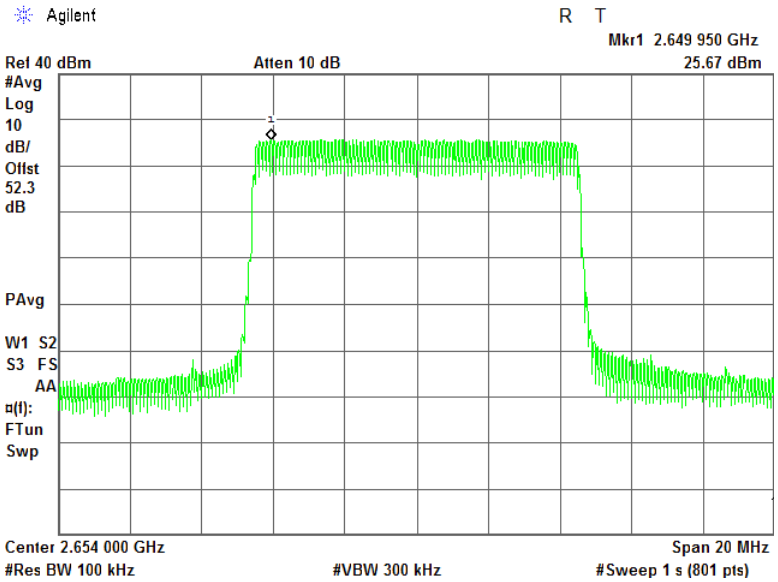


Plot 7.6.10 Power spectral density test results at low frequency, 64QAM, 10 MHz EBW, RF # 1

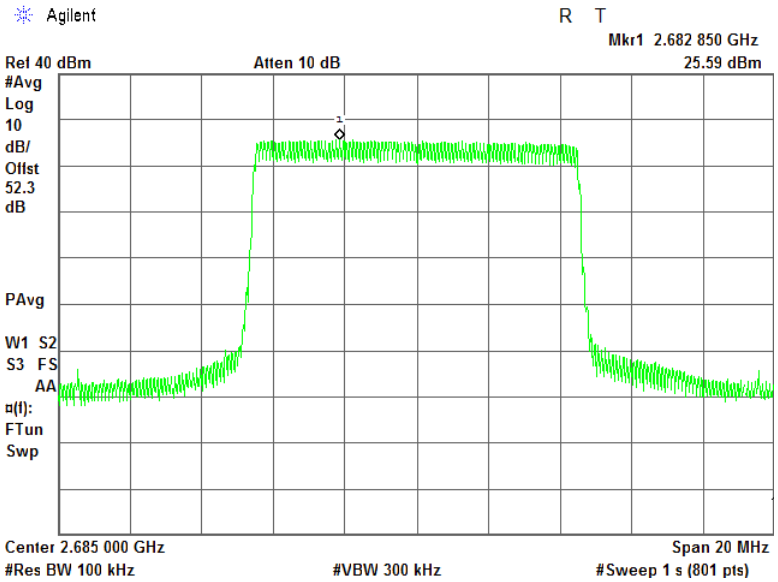


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.11 Power spectral density test results at mid frequency, 64QAM, 10 MHz EBW, RF # 1

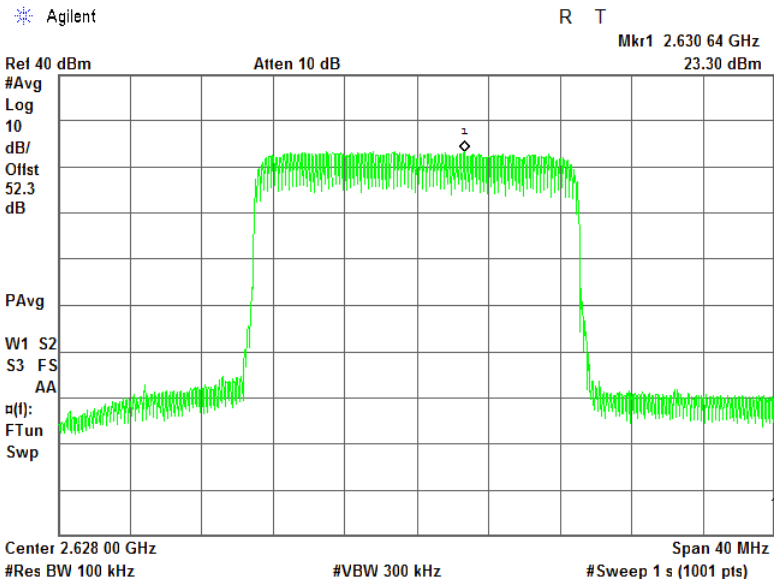


Plot 7.6.12 Power spectral density test results at high frequency, 64QAM, 10 MHz EBW, RF # 1

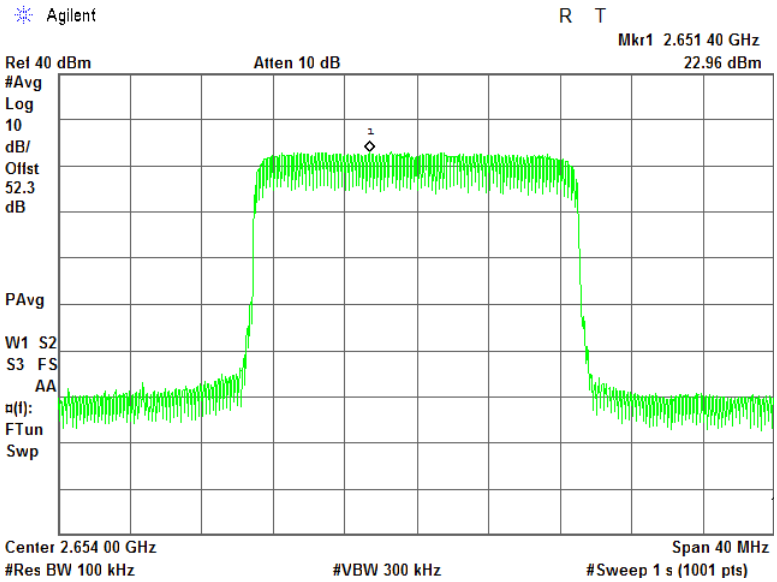


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.13 Power spectral density test results at low frequency, QPSK, 20 MHz EBW, RF # 1

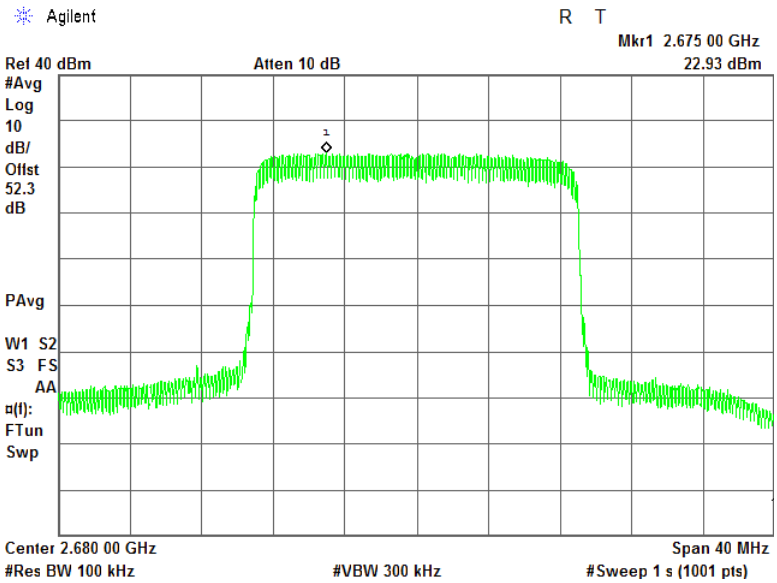


Plot 7.6.14 Power spectral density test results at mid frequency, QPSK, 20 MHz EBW, RF # 1

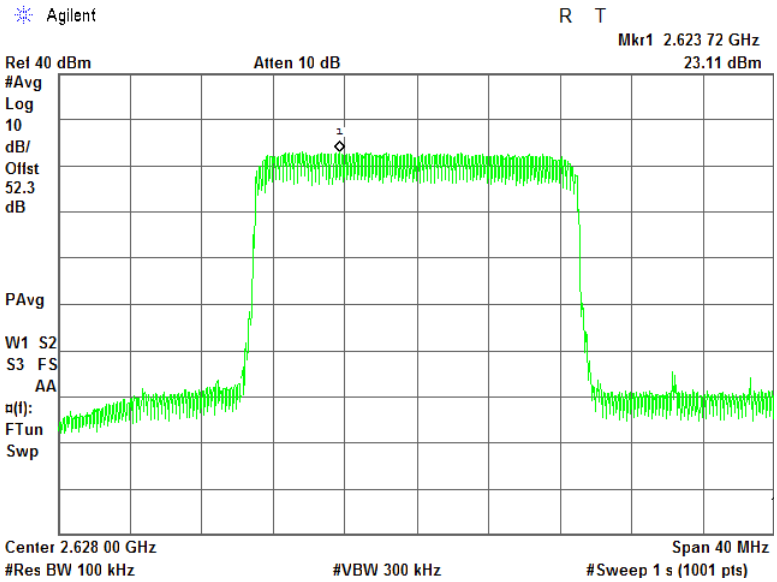


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.15 Power spectral density test results at high frequency, QPSK, 20 MHz EBW, RF # 1

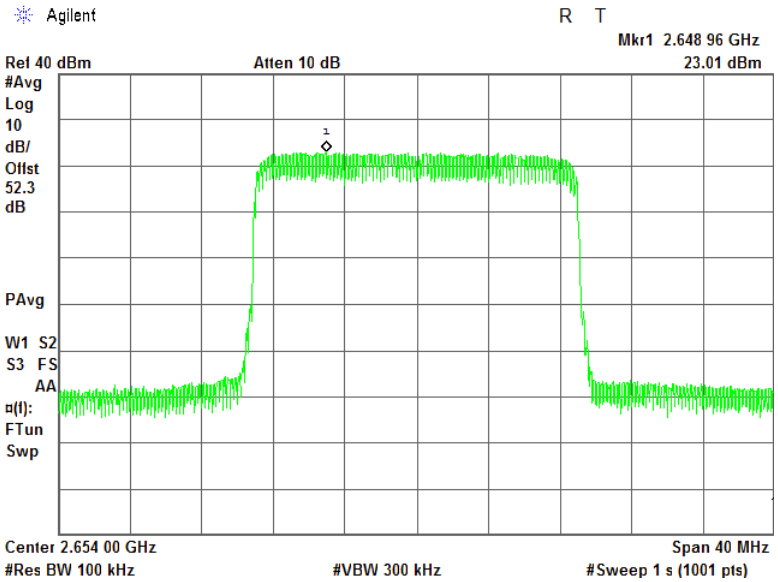


Plot 7.6.16 Power spectral density test results at low frequency, 64QAM, 20 MHz EBW, RF # 1

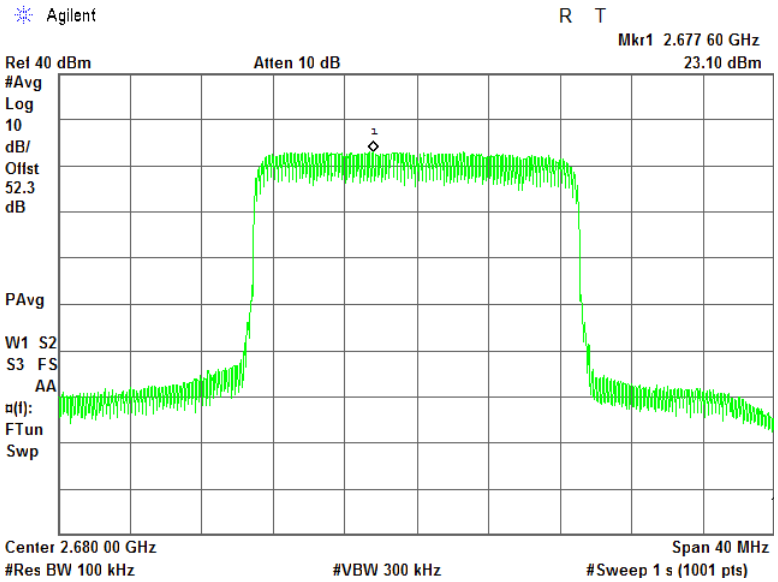


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.17 Power spectral density test results at mid frequency, 64QAM, 20 MHz EBW, RF # 1

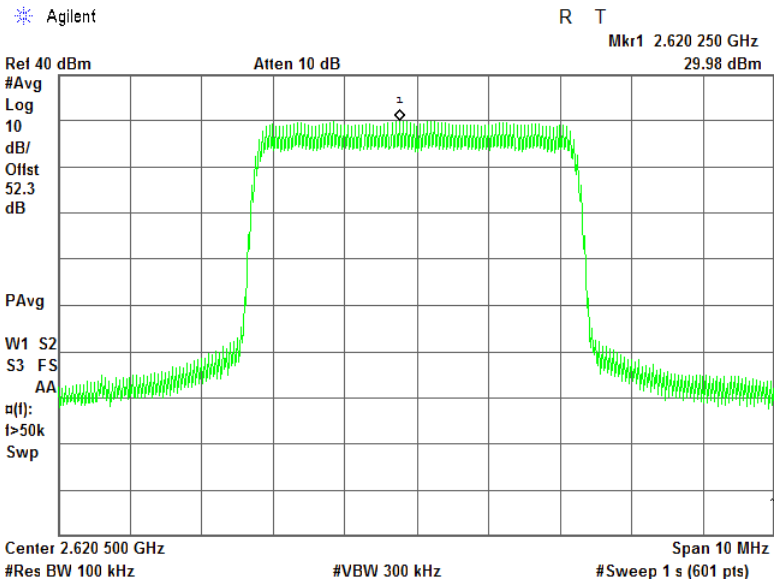


Plot 7.6.18 Power spectral density test results at high frequency, 64QAM, 20 MHz EBW, RF # 1

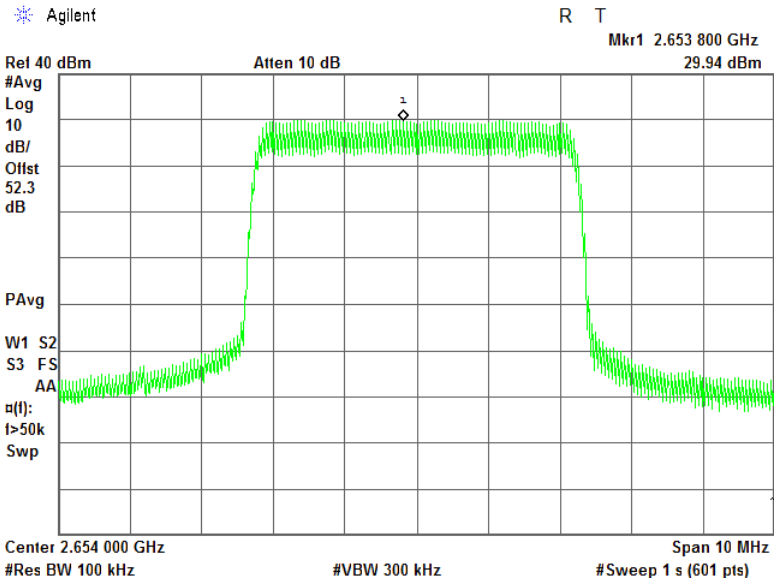


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.19 Power spectral density test results at low frequency, QPSK, 5 MHz EBW, RF # 2

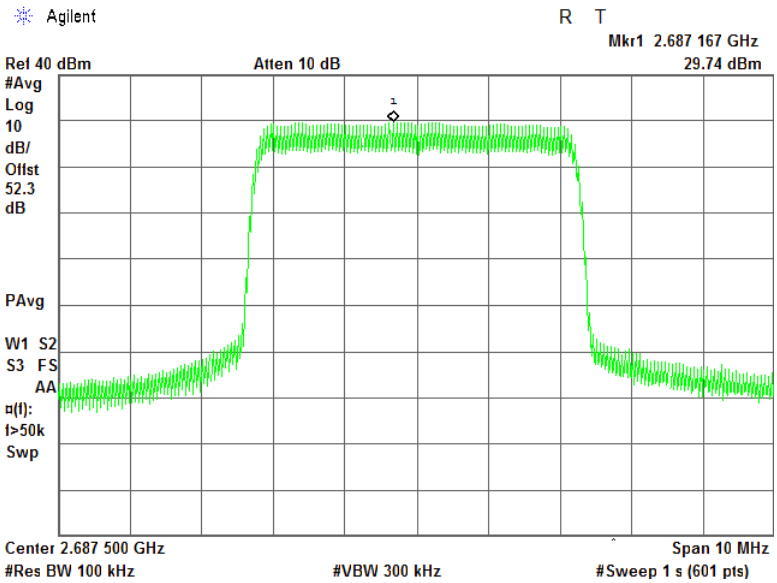


Plot 7.6.20 Power spectral density test results at mid frequency, QPSK, 5 MHz EBW, RF # 2

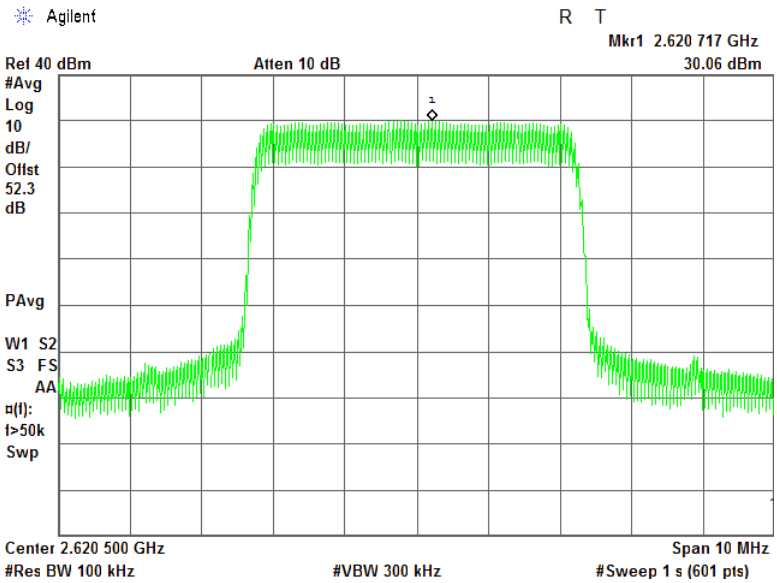


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.21 Power spectral density test results at high frequency, QPSK, 5 MHz EBW, RF # 2

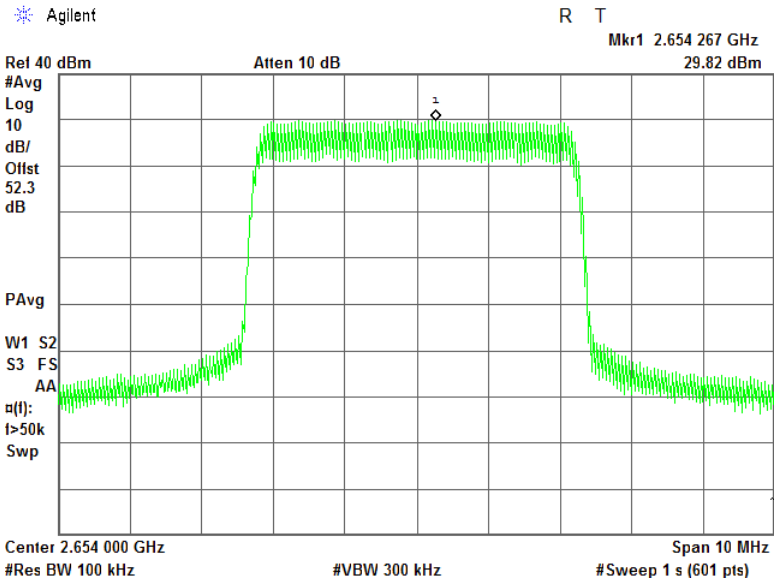


Plot 7.6.22 Power spectral density test results at low frequency, 64QAM, 5 MHz EBW, RF # 2

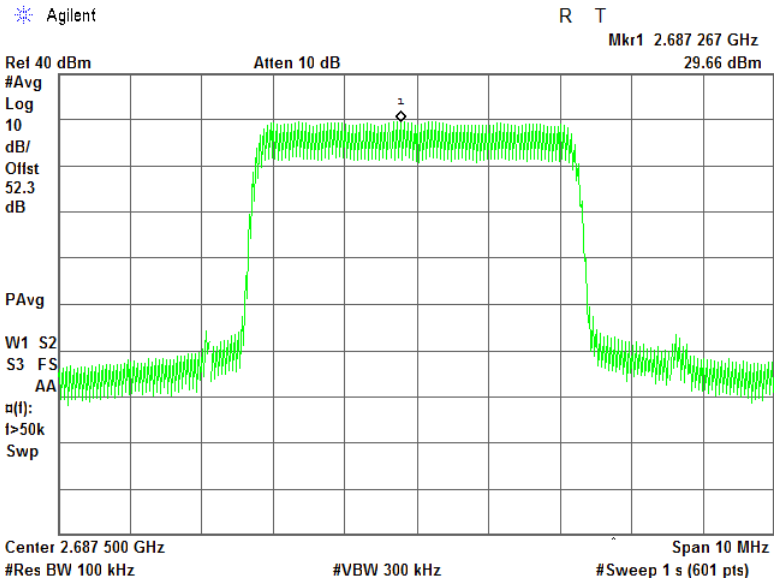


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.23 Power spectral density test results at mid frequency, 64QAM, 5 MHz EBW, RF # 2

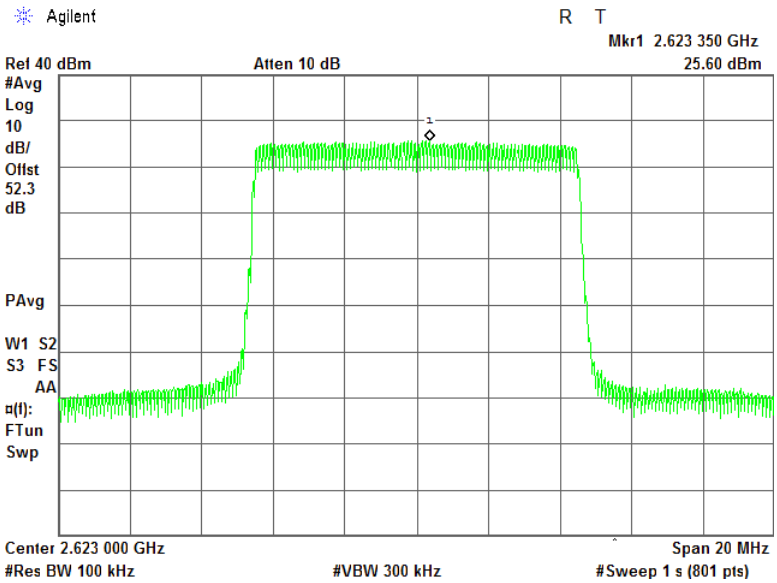


Plot 7.6.24 Power spectral density test results at high frequency, 64QAM, 5 MHz EBW, RF # 2

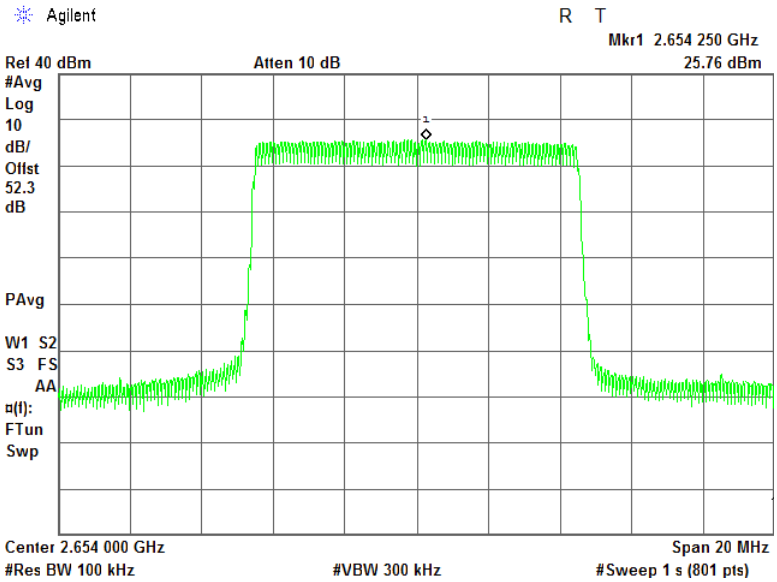


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.25 Power spectral density test results at low frequency, QPSK, 10 MHz EBW, RF # 2

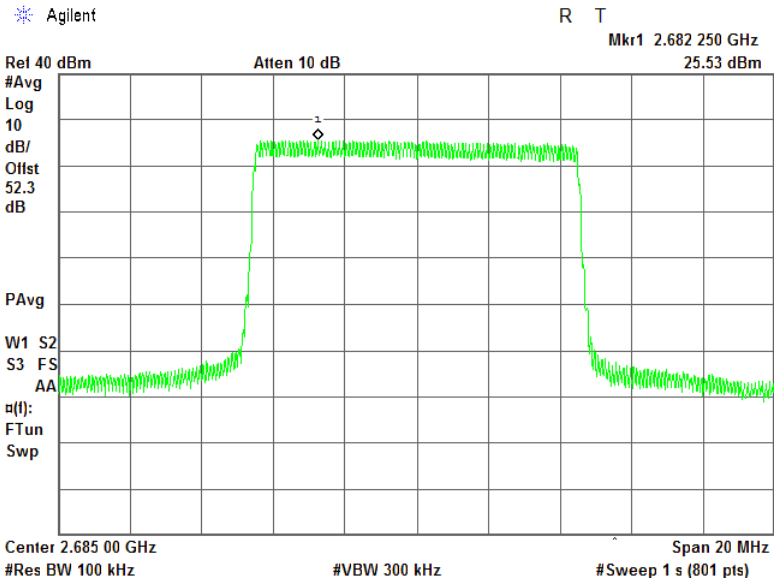


Plot 7.6.26 Power spectral density test results at mid frequency, QPSK, 10 MHz EBW, RF # 2

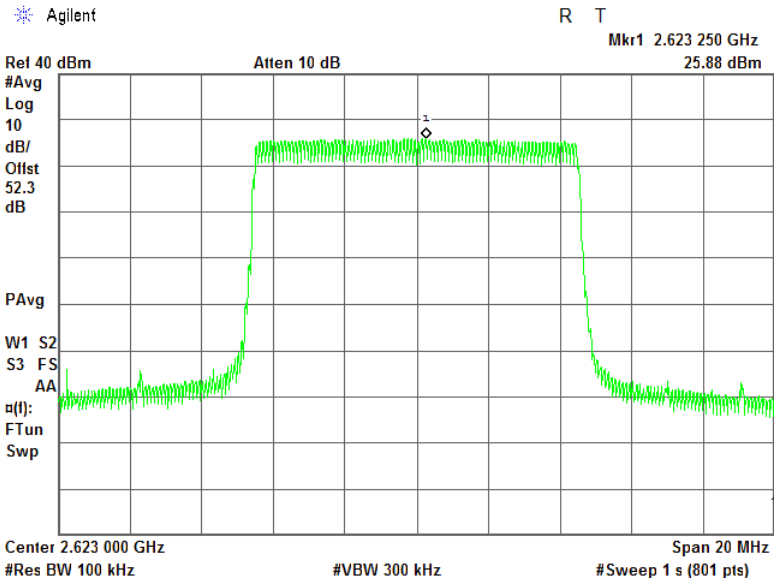


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.27 Power spectral density test results at high frequency, QPSK, 10 MHz EBW, RF # 2

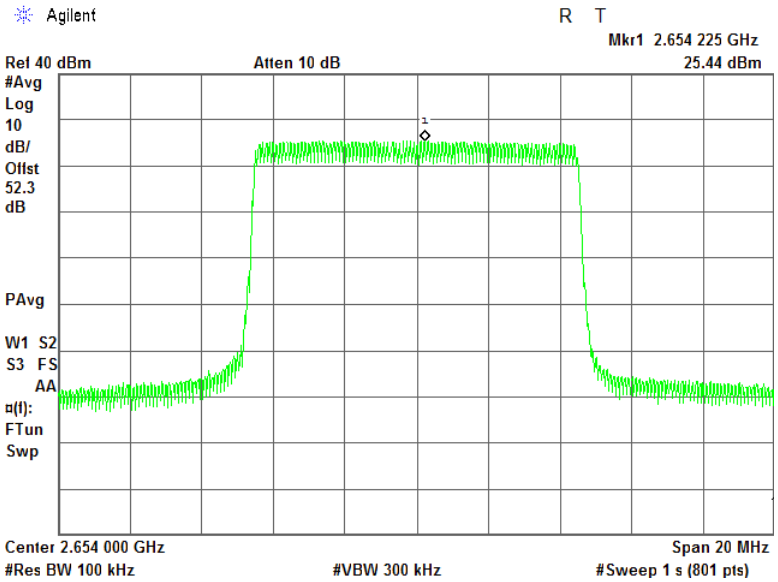


Plot 7.6.28 Power spectral density test results at low frequency, 64QAM, 10 MHz EBW, RF # 2

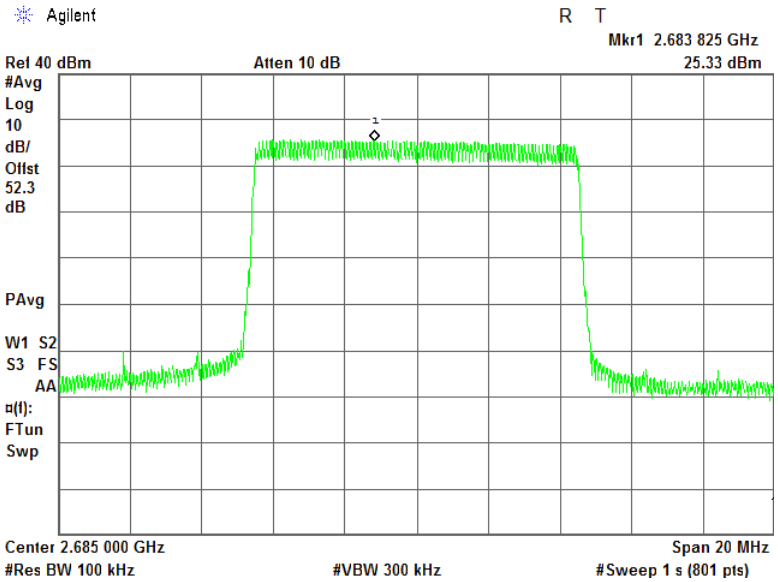


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.29 Power spectral density test results at mid frequency, 64QAM, 10 MHz EBW, RF # 2

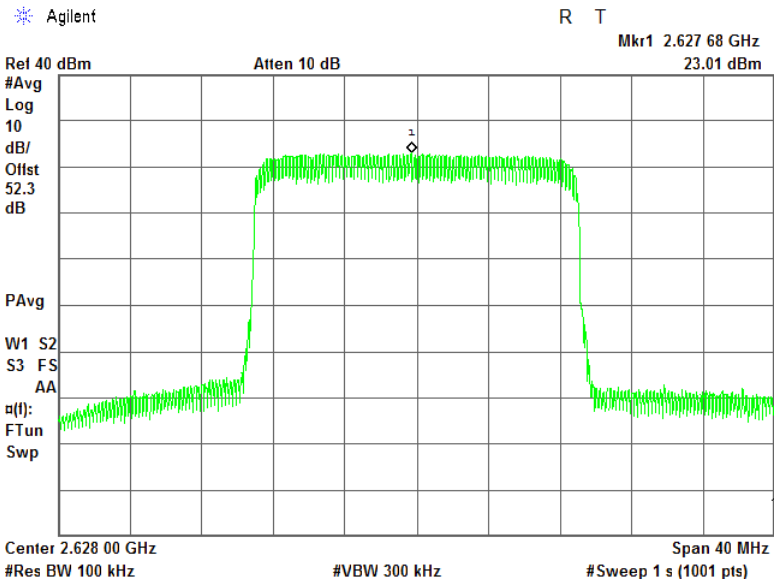


Plot 7.6.30 Power spectral density test results at high frequency, 64QAM, 10 MHz EBW, RF # 2

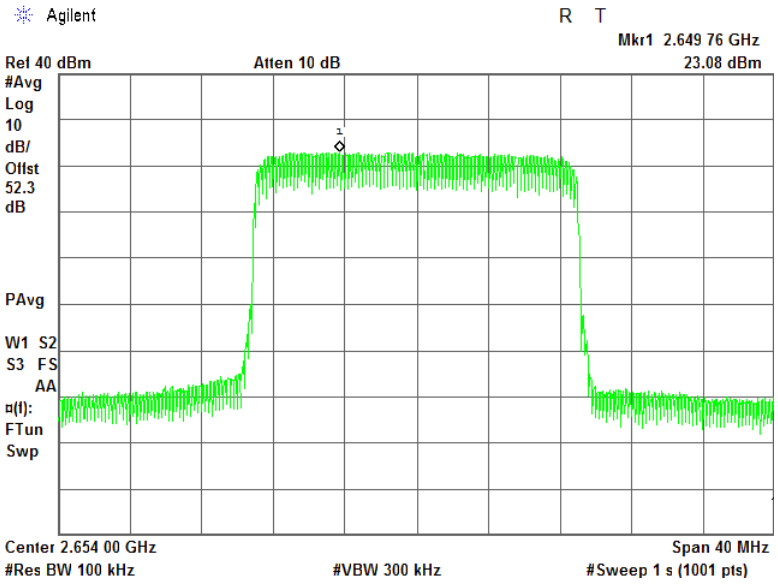


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.31 Power spectral density test results at low frequency, QPSK, 20 MHz EBW, RF # 2

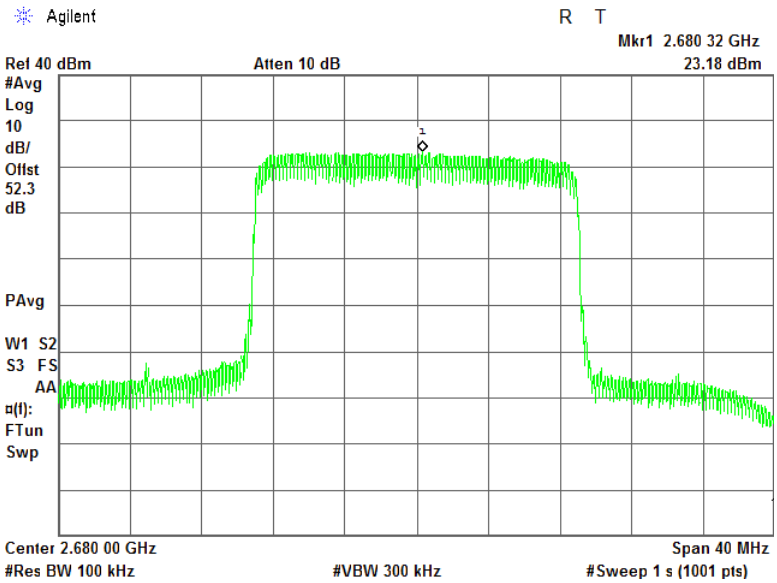


Plot 7.6.32 Power spectral density test results at mid frequency, QPSK, 20 MHz EBW, RF # 2

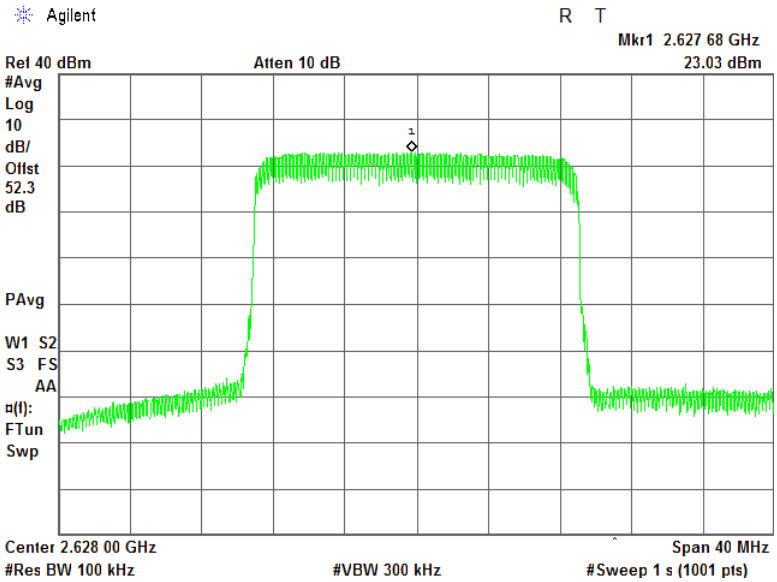


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.33 Power spectral density test results at high frequency, QPSK, 20 MHz EBW, RF # 2

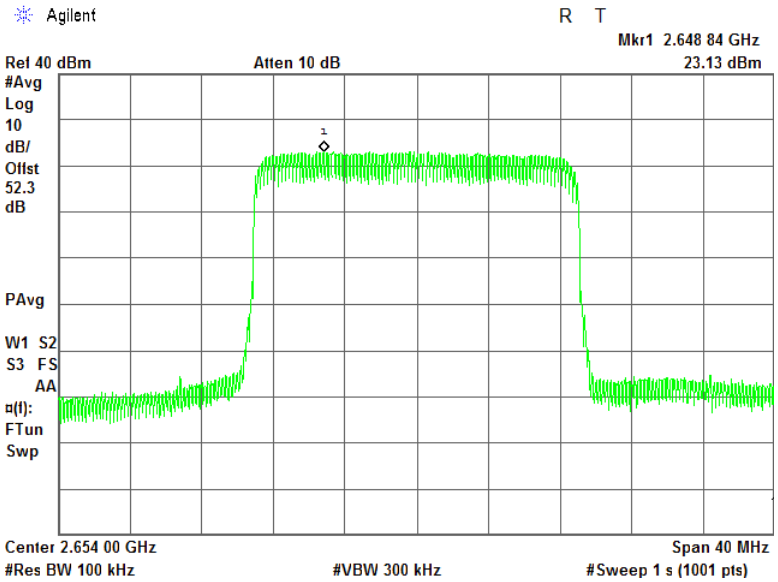


Plot 7.6.34 Power spectral density test results at low frequency, 64QAM, 20 MHz EBW, RF # 2

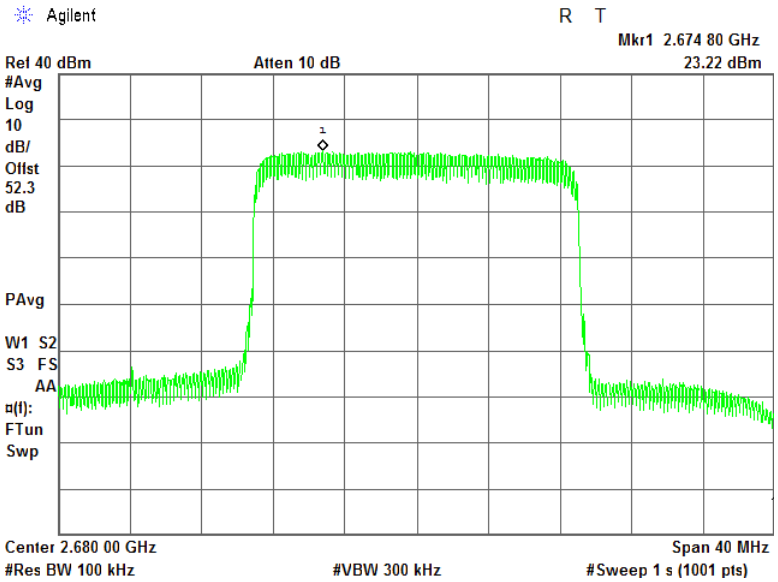


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	07-Nov-16		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1021 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.6.35 Power spectral density test results at mid frequency, 64QAM, 20 MHz EBW, RF # 2



Plot 7.6.36 Power spectral density test results at high frequency, 64QAM, 20 MHz EBW, RF # 2



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

7.7 Band edge emissions at RF connector test in 2498.5 – 2687.5 MHz band

7.7.1 General

This test was performed to measure spurious emissions at the channel edge at the RF antenna connector. Specification test limits are given in Table 7.7.1.

Table 7.7.1 Spurious emission limits at band edges

Channel	Frequency range	Attenuation below carrier, dBc	Limit, dBm
Channel bandwidth 5 MHz			
2498.5	2496.0 - 2502.0	43+ 10*Log (P*)	-13.0
2593.0	2590.0 - 2596.0	43+ 10*Log (P*)	-13.0
2687.5	2684.5 - 2690.0	43+ 10*Log (P*)	-13.0
Channel bandwidth 10 MHz			
2501	2496.0 - 2502.0 2502.0 - 2507.5	43+ 10*Log (P*)	-13.0
2596	2590.0 - 2596.0 2596.0 - 2602.0	43+ 10*Log (P*)	-13.0
2685	2679.0 - 2684.5 2684.5 - 2690.0	43+ 10*Log (P*)	-13.0
Channel bandwidth 20 MHz			
2506	2496.0 - 2502.0 2502.0 - 2507.5 2507.5 - 2513.0 2513.0 - 2518.5	43+ 10*Log (P*)	-13.0
2596	2584.0 - 2590.0 2590.0 - 2596.0 2596.0 - 2602.0 2602.0 - 2608.0	43+ 10*Log (P*)	-13.0
2680	2668.0 - 2673.5 2673.5 - 2679.0 2679.0 - 2684.5 2684.5 - 2690.0	43+ 10*Log (P*)	-13.0

* - P is transmitter output power in Watts

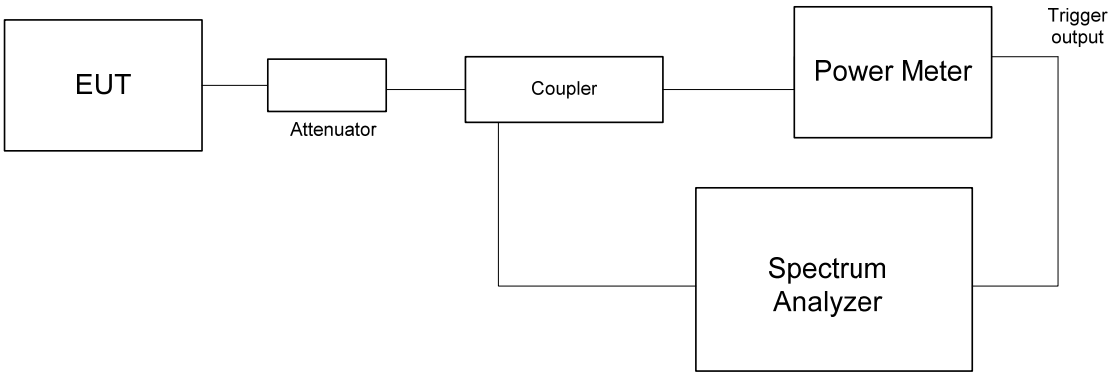
7.7.2 Test procedure

7.7.2.1 The EUT was set up as shown in Figure 7.7.1, energized and its proper operation was checked.

7.7.2.2 The spurious emission was measured with spectrum analyzer as provided in Table 7.7.2 to Table 7.7.7 and the associated plots.

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Figure 7.7.1 Spurious emission test setup for single output



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.7.2 Spurious emission at the low band edge test results

DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 5 MHz

Frequency MHz	Frequency offset, ± MHz	Low band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2498.5	3.0	-13.53	51	NA	-13.0	Pass
	4.0	-15.53	51	1000	-13.0	
2593.0	3.0	-14.28	51	NA	-13.0	Pass
	4.0	-16.40	51	1000	-13.0	
2687.5	3.0	-13.51	51	NA	-13.0	Pass
	4.0	-13.26	51	1000	-13.0	
64QAM						
2498.5	3.0	-14.90	51	NA	-13.0	Pass
	4.0	-13.59	51	1000	-13.0	
2593.0	3.0	-13.13	51	NA	-13.0	Pass
	4.0	-16.19	51	1000	-13.0	
2687.5	3.0	-14.82	51	NA	-13.0	Pass
	4.0	-13.87	51	1000	-13.0	

Table 7.7.3 Spurious emission at the high band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 5 MHz

Frequency MHz	Frequency offset, ± MHz	High band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2498.5	3.0	-13.34	51	NA	-13.0	Pass
	4.0	-15.22	51	1000	-13.0	
2593.0	3.0	-14.04	51	NA	-13.0	Pass
	4.0	-16.14	51	1000	-13.0	
2687.5	3.0	-13.05	51	NA	-13.0	Pass
	4.0	-13.27	51	1000	-13.0	
64QAM						
2498.5	3.0	-13.19	51	NA	-13.0	Pass
	4.0	-14.16	51	1000	-13.0	
2593.0	3.0	-13.01	51	NA	-13.0	Pass
	4.0	-16.35	51	1000	-13.0	
2687.5	3.0	-14.16	51	NA	-13.0	Pass
	4.0	-13.66	51	1000	-13.0	

Test specification:	**Section 27.53, Band edge emissions**		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1018 hPa	**Power:** 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.7.4 Spurious emission at the low band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 10 MHz

Frequency MHz	Frequency offset, ± MHz	Low band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2501	5.5	-15.29	100	NA	-13.0	Pass
	6.5	-14.90	100	1000	-13.0	
2596	5.5	-13.60	100	NA	-13.0	Pass
	6.5	-15.23	100	1000	-13.0	
2685	5.5	-14.18	100	NA	-13.0	Pass
	6.5	-13.17	100	1000	-13.0	
64QAM						
2501	5.5	-13.85	100	NA	-13.0	Pass
	6.5	-14.15	100	1000	-13.0	
2596	5.5	-14.56	100	NA	-13.0	Pass
	6.5	-17.05	100	1000	-13.0	
2685	5.5	-15.21	100	NA	-13.0	Pass
	6.5	-13.34	100	1000	-13.0	

Table 7.7.5 Spurious emission at the high band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 10MHz

Frequency MHz	Frequency offset, ± MHz	High band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2501	5.5	-15.29	100	NA	-13.0	Pass
	6.5	-15.32	100	1000	-13.0	
2596	5.5	-13.12	100	NA	-13.0	Pass
	6.5	-15.29	100	1000	-13.0	
2685	5.5	-14.49	100	NA	-13.0	Pass
	6.5	-14.11	100	1000	-13.0	
64QAM						
2501	5.5	-13.85	100	NA	-13.0	Pass
	6.5	-13.93	100	1000	-13.0	
2596	5.5	-13.53	100	NA	-13.0	Pass
	6.5	-16.95	100	1000	-13.0	
2685	5.5	-15.34	100	NA	-13.0	Pass
	6.5	-14.49	100	1000	-13.0	

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.7.6 Spurious emission at the low band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 20 MHz

Frequency MHz	Frequency offset, ± MHz	Low band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2506	10.5	-14.26	200	NA	-13.0	Pass
	11.5	-15.92	200	1000	-13.0	
2596	10.5	-14.53	200	NA	-13.0	Pass
	11.5	-16.67	200	1000	-13.0	
2680	10.5	-13.64	200	NA	-13.0	Pass
	11.5	-15.25	200	1000	-13.0	
64QAM						
2506	10.5	-13.95	200	NA	-13.0	Pass
	11.5	-16.20	200	1000	-13.0	
2596	10.5	-13.28	200	NA	-13.0	Pass
	11.5	-16.44	200	1000	-13.0	
2680	10.5	-14.14	200	NA	-13.0	Pass
	11.5	-14.47	200	1000	-13.0	

Table 7.7.7 Spurious emission at the high band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 20MHz

Frequency MHz	Frequency offset, ± MHz	High band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2506	10.5	-15.62	200	NA	-13.0	Pass
	11.5	-16.68	200	1000	-13.0	
2596	10.5	-13.17	200	NA	-13.0	Pass
	11.5	-17.74	200	1000	-13.0	
2680	10.5	-13.99	200	NA	-13.0	Pass
	11.5	-16.26	200	1000	-13.0	
64QAM						
2506	10.5	-13.33	200	NA	-13.0	Pass
	11.5	-16.30	200	1000	-13.0	
2596	10.5	-13.46	200	NA	-13.0	Pass
	11.5	-15.53	200	1000	-13.0	
2680	10.5	-13.39	200	NA	-13.0	Pass
	11.5	-16.22	200	1000	-13.0	

Reference numbers of test equipment used

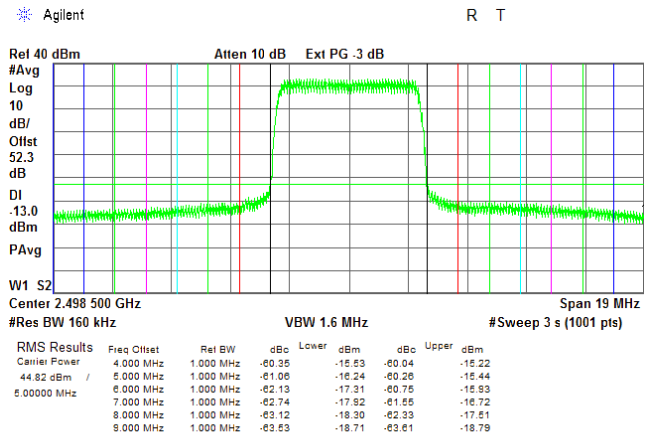
HL 2214	HL 3301	HL 3302	HL 3818	HL 4756			

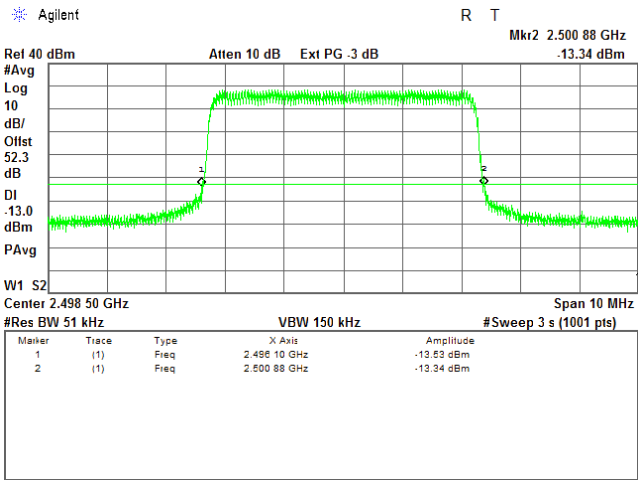
Full description is given in Appendix A.

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.7.1 Spurious emission at band edges test results at low carrier frequency, 5 MHz EBW

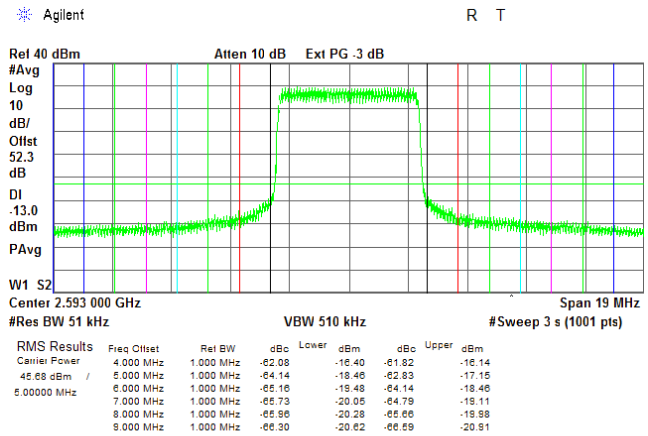
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 5.3 Mbps

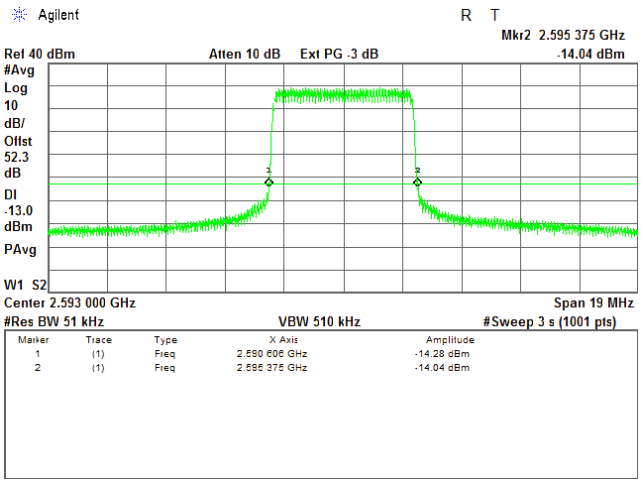




Plot 7.7.2 Spurious emission at band edges test results at mid carrier frequency, 5 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 5.3 Mbps

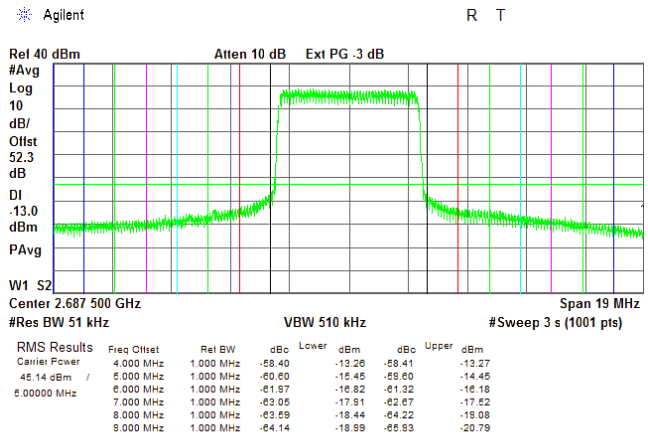


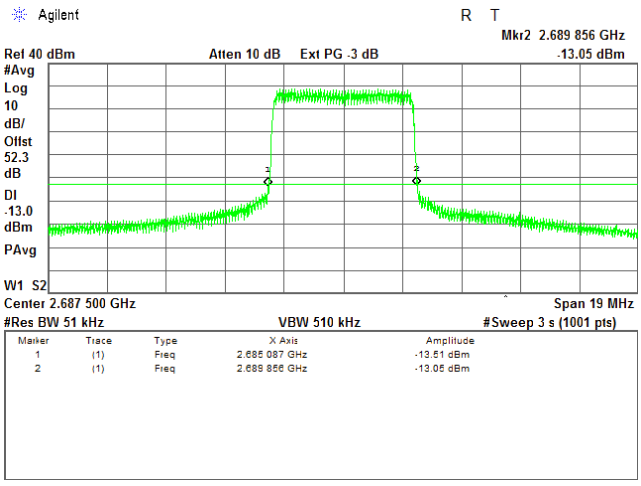


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.7.3 Spurious emission at band edges test results at high carrier frequency, 5 MHz EBW

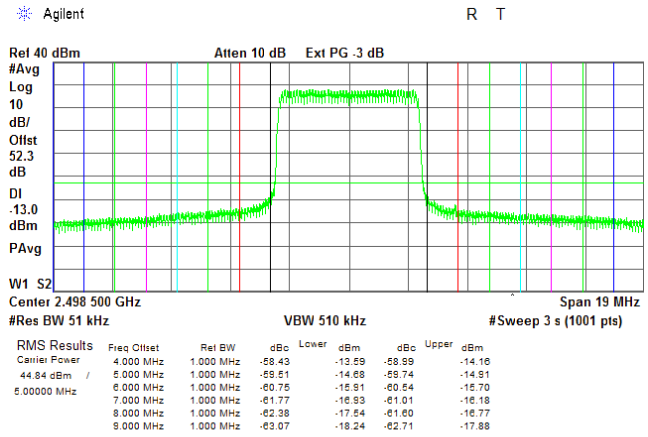
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 5.3 Mbps

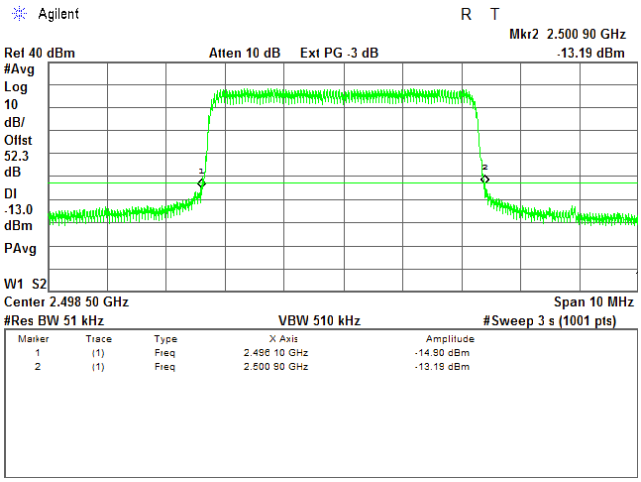




Plot 7.7.4 Spurious emission at band edges test results at low carrier frequency, 5 MHz EBW

DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 23 Mbps

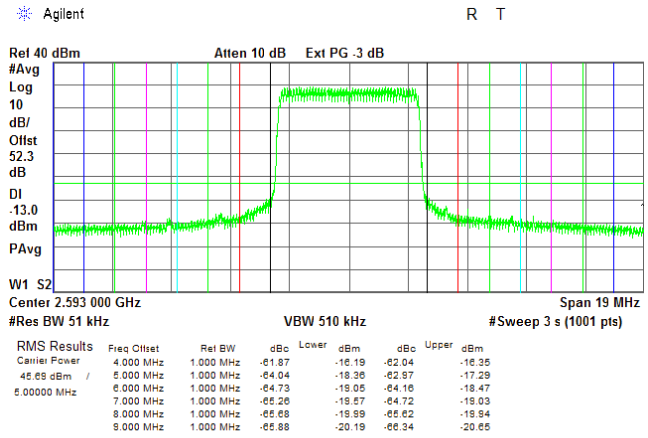


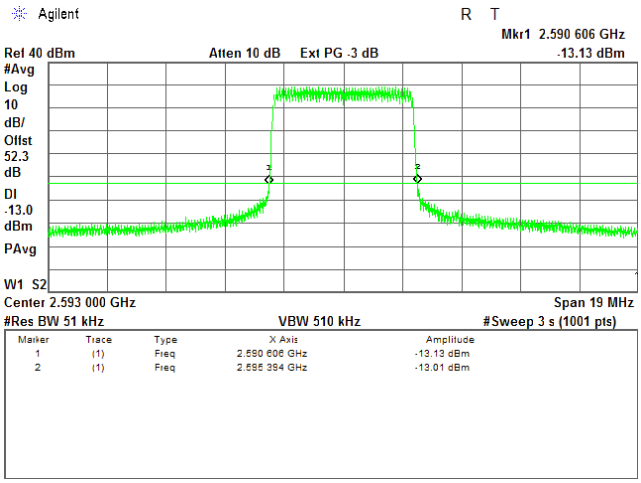


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.7.5 Spurious emission at band edges test results at mid carrier frequency, 5 MHz EBW

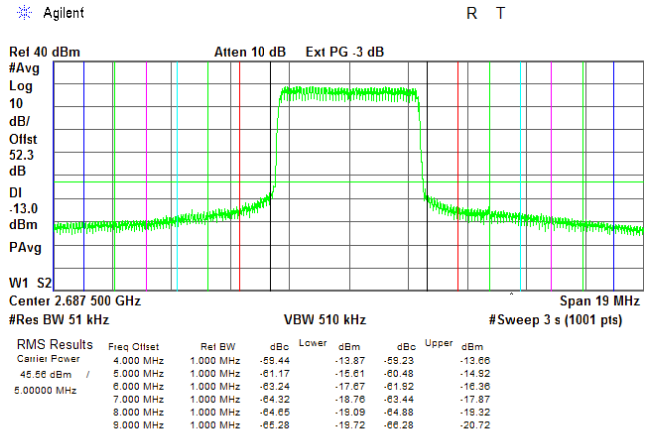
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 23 Mbps

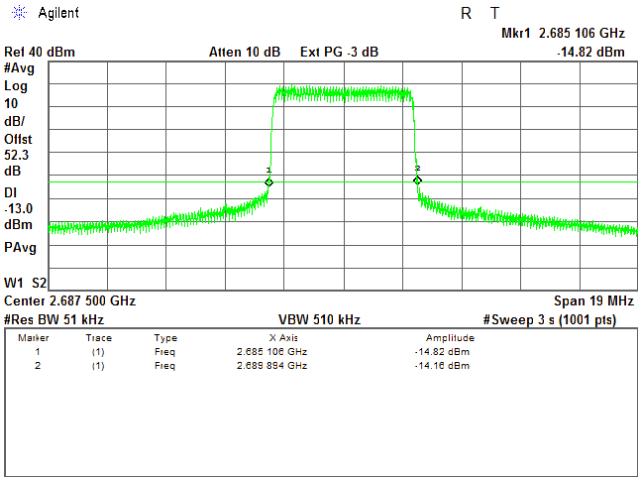




Plot 7.7.6 Spurious emission at band edges test results at high carrier frequency, 5 MHz EBW

DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 23 Mbps

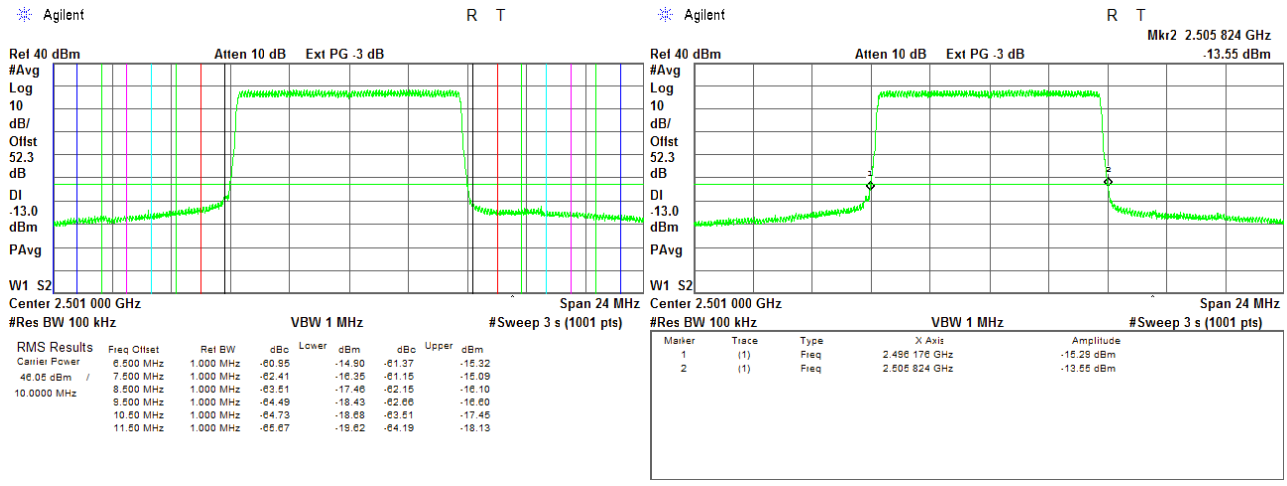




Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

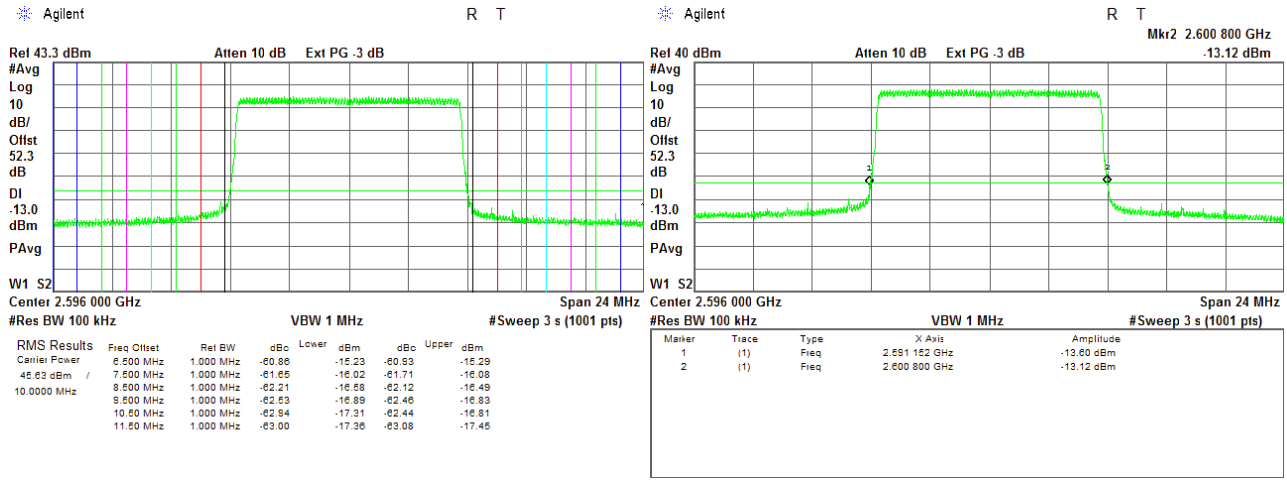
Plot 7.7.7 Spurious emission at band edges test results at low carrier frequency, 10 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 10.7 Mbps



Plot 7.7.8 Spurious emission at band edges test results at mid carrier frequency, 10 MHz EBW

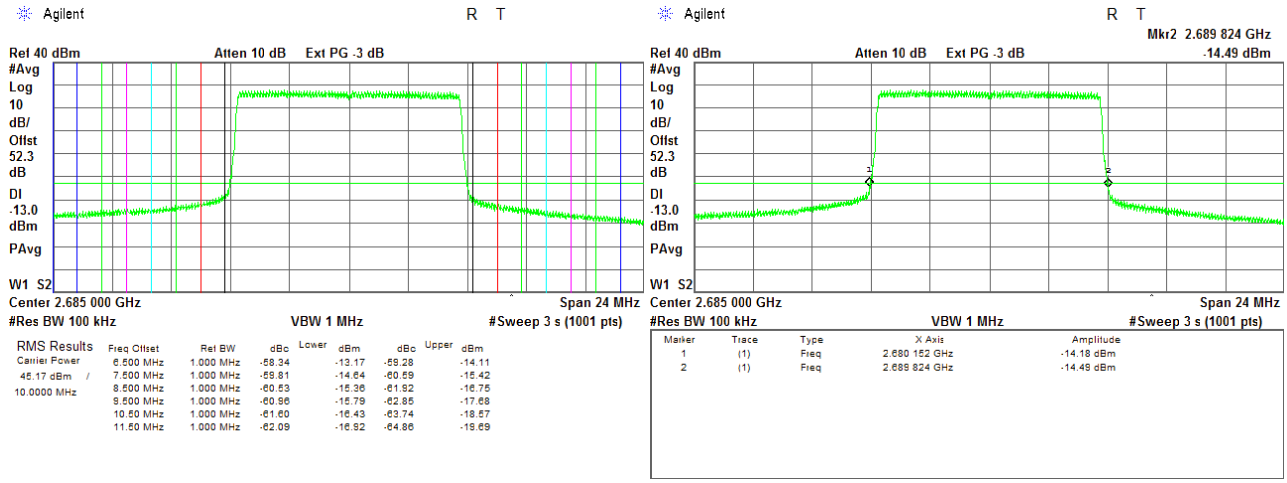
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 10.7 Mbps



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

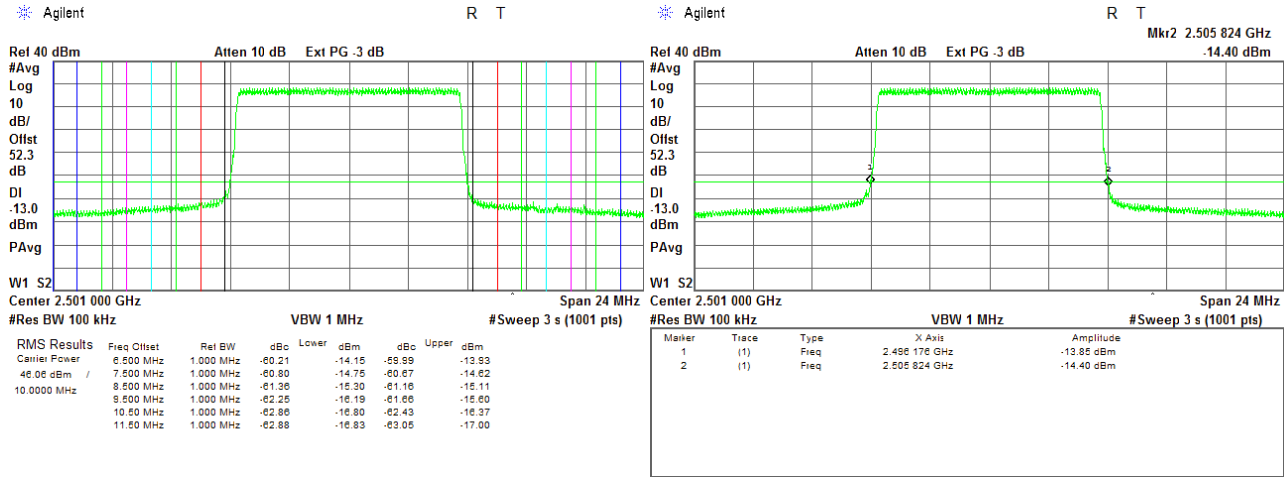
Plot 7.7.9 Spurious emission at band edges test results at high carrier frequency, 10 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 10.7 Mbps



Plot 7.7.10 Spurious emission at band edges test results at low carrier frequency, 10 MHz EBW

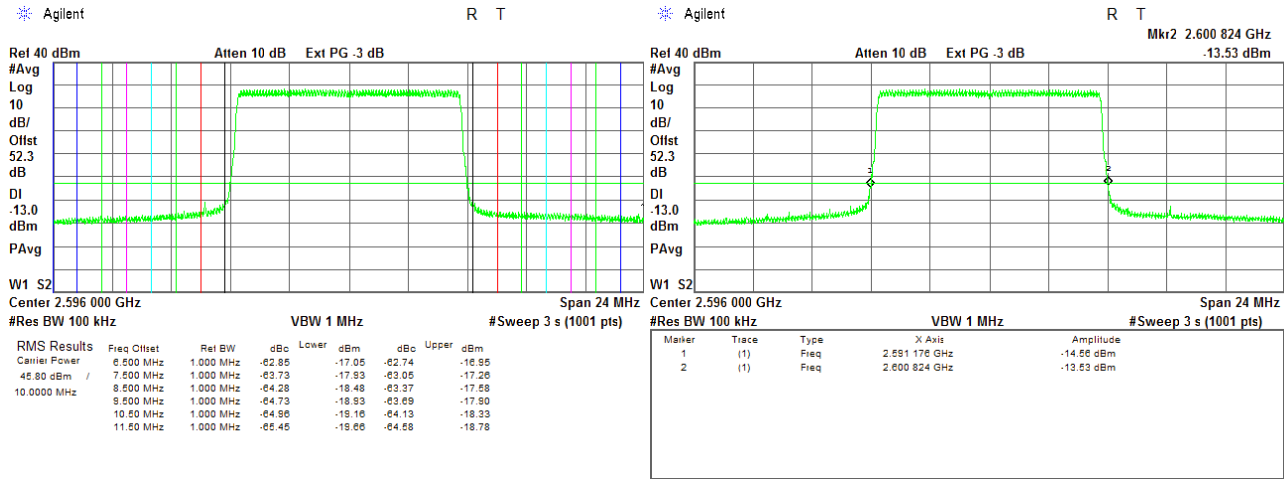
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 47.3 Mbps



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

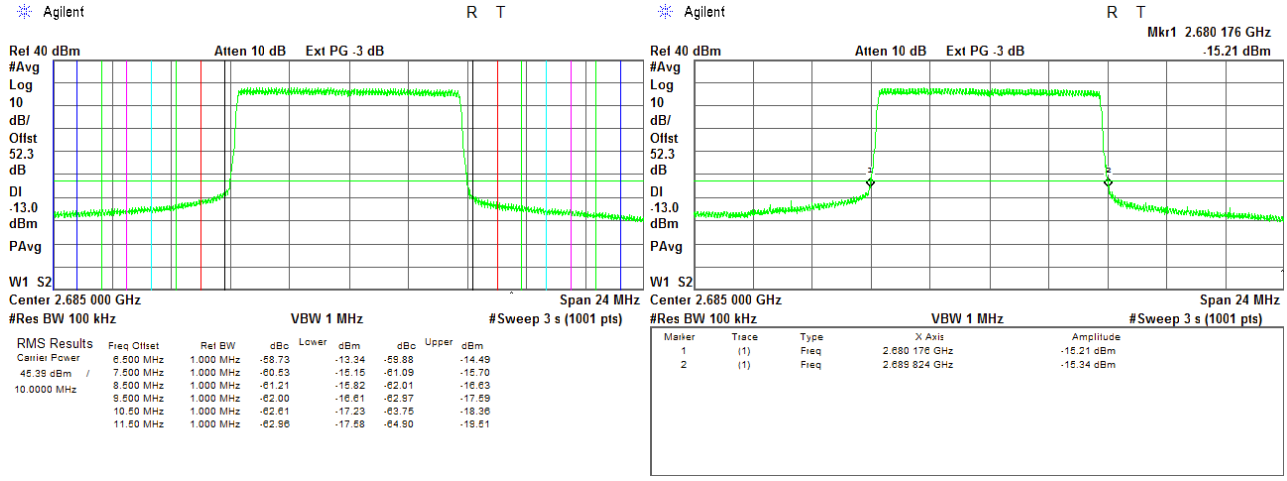
Plot 7.7.11 Spurious emission at band edges test results at mid carrier frequency, 10 MHz EBW

DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 47.3 Mbps



Plot 7.7.12 Spurious emission at band edges test results at high carrier frequency, 10 MHz EBW

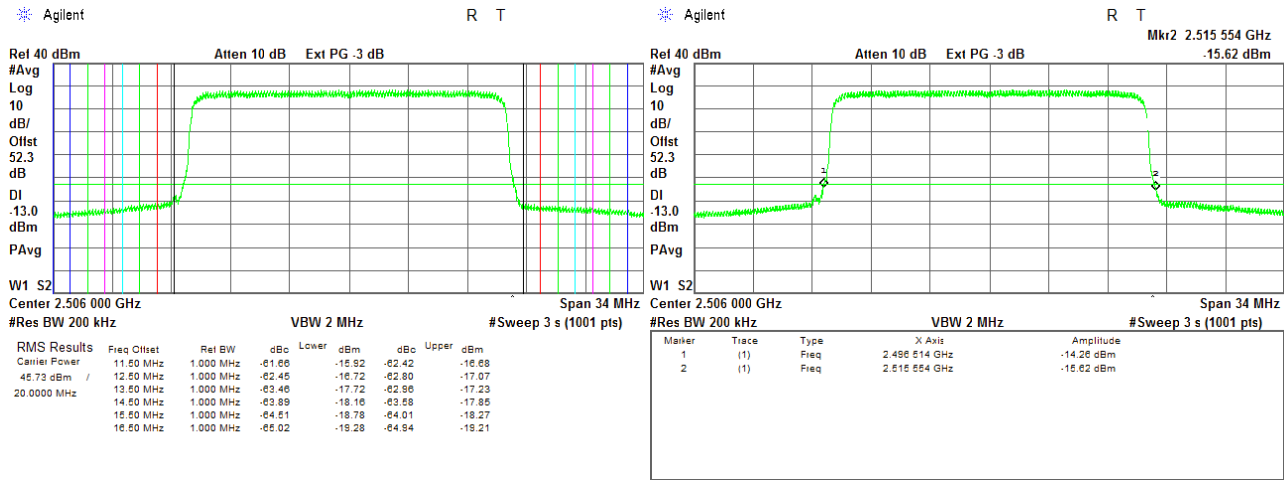
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 47.3 Mbps



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

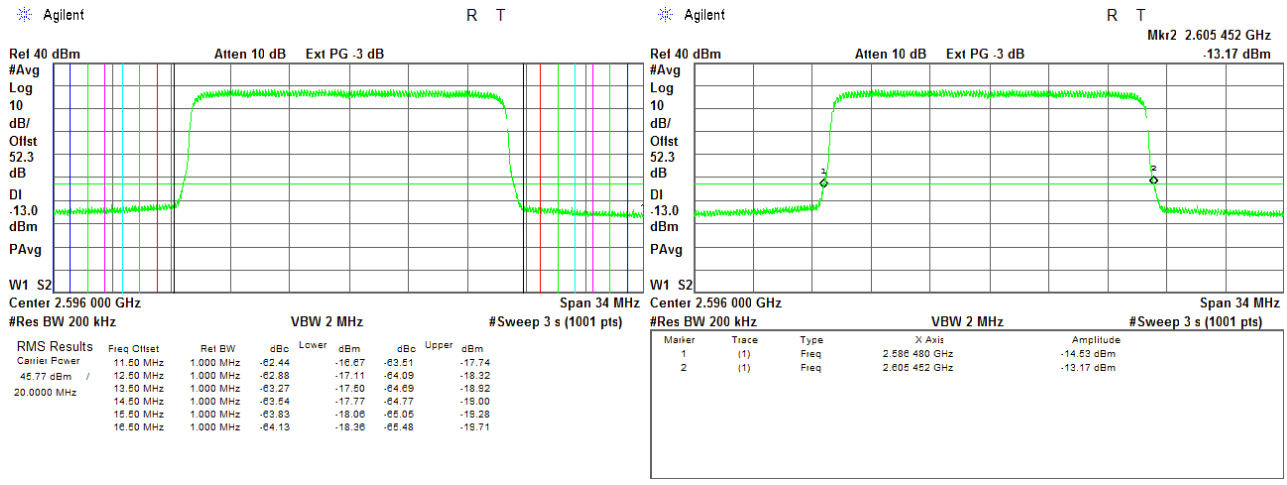
Plot 7.7.13 Spurious emission at band edges test results at low carrier frequency, 20 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 23.4 Mbps



Plot 7.7.14 Spurious emission at band edges test results at mid carrier frequency, 20 MHz EBW

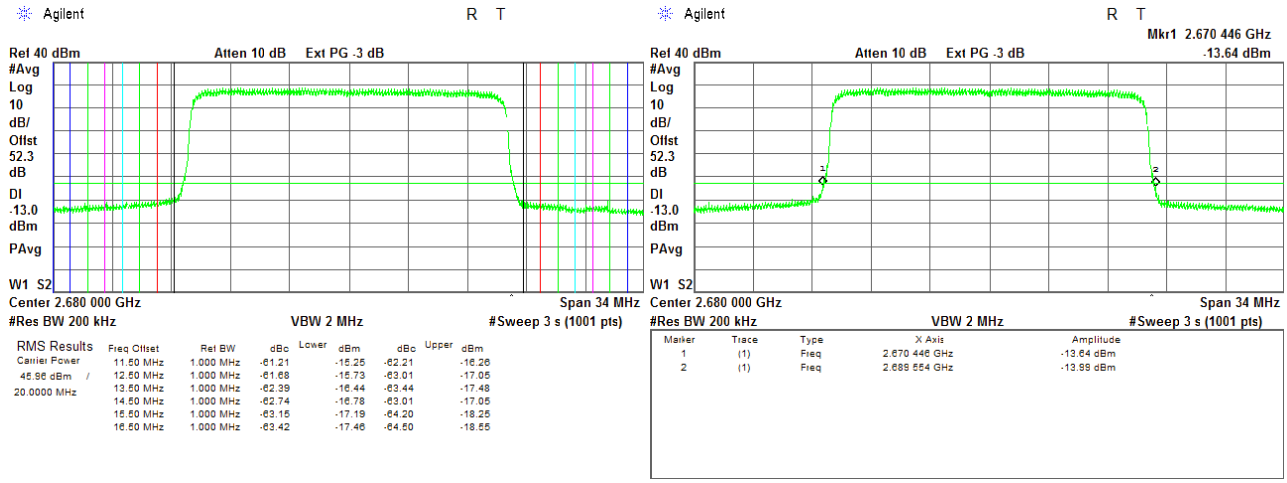
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 23.4 Mbps



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

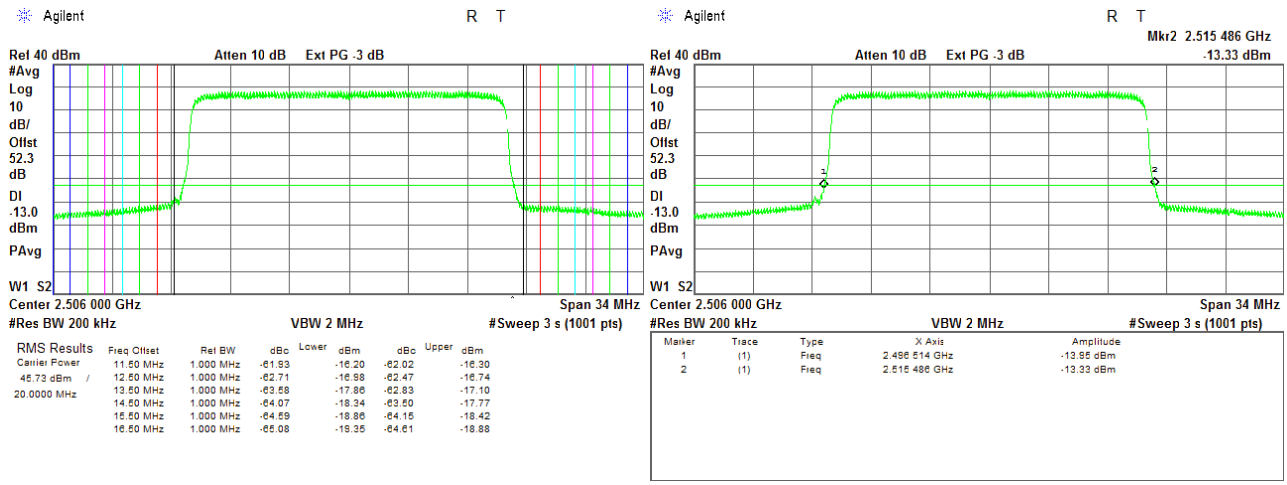
Plot 7.7.15 Spurious emission at band edges test results at high carrier frequency, 20 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 23.4 Mbps



Plot 7.7.16 Spurious emission at band edges test results at low carrier frequency, 20 MHz EBW

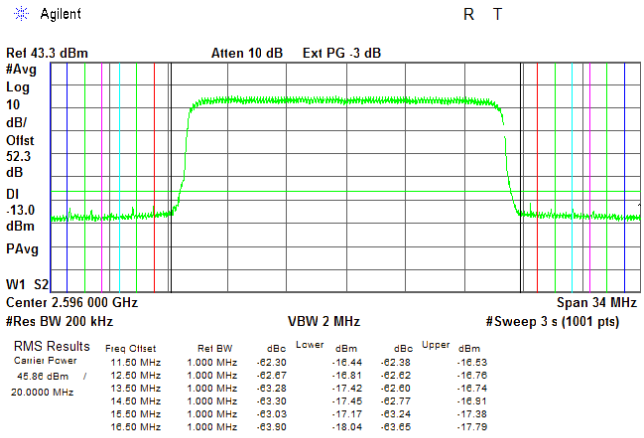
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 95 Mbps

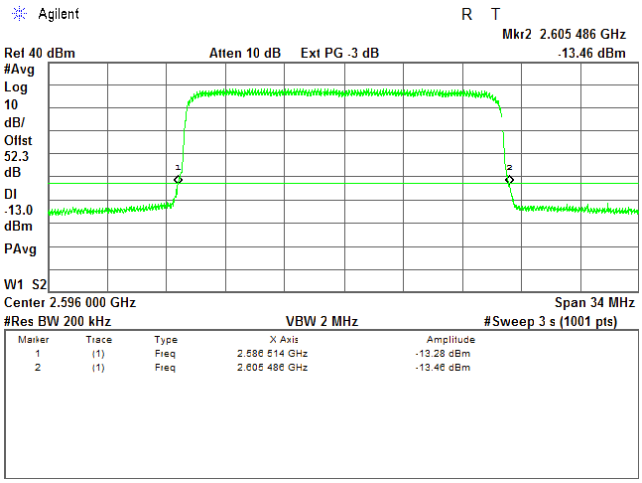


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.7.17 Spurious emission at band edges test results at mid carrier frequency, 20 MHz EBW

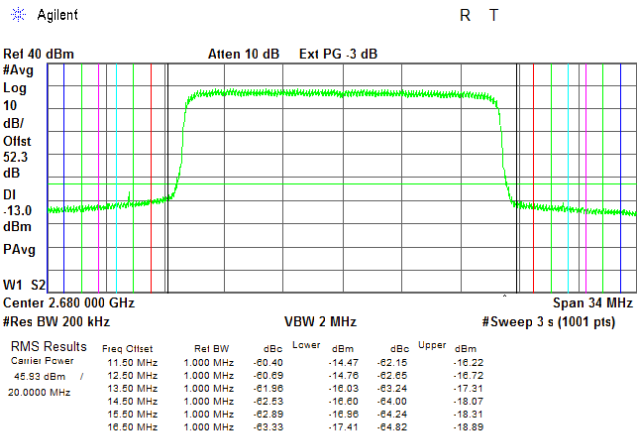
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 95 Mbps

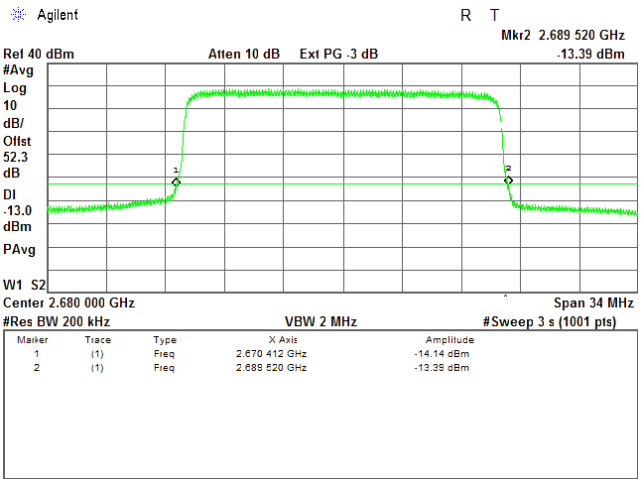




Plot 7.7.18 Spurious emission at band edges test results at high carrier frequency, 20 MHz EBW

DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 95 Mbps





Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

7.8 Band edge emissions at RF connector test in 2498.5 – 2565.5 MHz band

7.8.1 General

This test was performed to measure spurious emissions at the channel edge at the RF antenna connector. Specification test limits are given in Table 7.8.1.

Table 7.8.1 Spurious emission limits at band edges

Channel	Frequency range	Attenuation below carrier, dBc	Limit, dBm
Channel bandwidth 5 MHz			
2498.5	2496.0 - 2502.0	43+ 10*Log (P*)	-13.0
2532.0	2529.5 – 2535.0	43+ 10*Log (P*)	-13.0
2565.5	2562.5 - 2568.0	43+ 10*Log (P*)	-13.0
Channel bandwidth 10 MHz			
2501	2496.0 - 2502.0 2502.0 - 2507.5	43+ 10*Log (P*)	-13.0
2535	2529.5 – 2535.0 2535.0 - 2540.5	43+ 10*Log (P*)	-13.0
2563	2557.0 - 2562.5 2562.5 - 2568.0	43+ 10*Log (P*)	-13.0
Channel bandwidth 20 MHz			
2506	2496.0 - 2502.0 2502.0 - 2507.5 2507.5 – 2513.0 2513.0 – 2518.5	43+ 10*Log (P*)	-13.0
2535	2524.0 – 2529.5 2529.5 – 2535.0 2535.0 - 2540.5 2540.5 - 2546.0	43+ 10*Log (P*)	-13.0
2558	2546.0 - 2551.5 2551.5 – 2557.0 2557.0 - 2562.5 2562.5 - 2568.0	43+ 10*Log (P*)	-13.0

* - P is transmitter output power in Watts

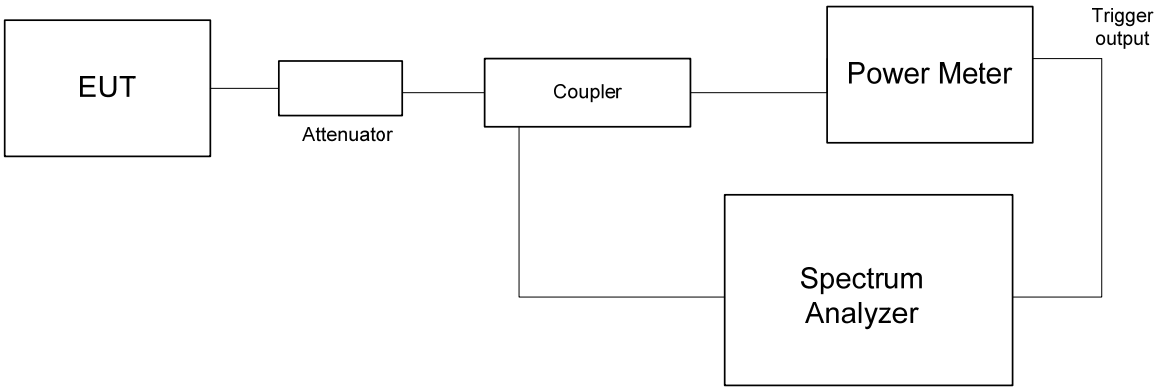
7.8.2 Test procedure

7.8.2.1 The EUT was set up as shown in Figure 7.8.1, energized and its proper operation was checked.

7.8.2.2 The spurious emission was measured with spectrum analyzer as provided in Table 7.8.2 to Table 7.8.7 and the associated plots.

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Figure 7.8.1 Spurious emission test setup for single output



Test specification:	**Section 27.53, Band edge emissions**		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1018 hPa	**Power:** 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Table 7.8.2 Spurious emission at the low band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 5 MHz

Frequency MHz	Frequency offset, ± MHz	Low band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2498.5	3.0	-13.59	51	NA	-13.0	Pass
	4.0	-14.16	51	1000	-13.0	
2532.0	3.0	-13.95	51	NA	-13.0	Pass
	4.0	-14.91	51	1000	-13.0	
2565.5	3.0	-13.58	51	NA	-13.0	Pass
	4.0	-15.44	51	1000	-13.0	
64QAM						
2498.5	3.0	-14.50	51	NA	-13.0	Pass
	4.0	-14.09	51	1000	-13.0	
2532.0	3.0	-14.81	51	NA	-13.0	Pass
	4.0	-13.68	51	1000	-13.0	
2565.5	3.0	-14.32	51	NA	-13.0	Pass
	4.0	-14.42	51	1000	-13.0	

Table 7.8.3 Spurious emission at the high band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 5 MHz

Frequency MHz	Frequency offset, ± MHz	High band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2498.5	3.0	-13.06	51	NA	-13.0	Pass
	4.0	-14.49	51	1000	-13.0	
2532.0	3.0	-13.09	51	NA	-13.0	Pass
	4.0	-14.56	51	1000	-13.0	
2565.5	3.0	-14.61	51	NA	-13.0	Pass
	4.0	-15.03	51	1000	-13.0	
64QAM						
2498.5	3.0	-13.09	51	NA	-13.0	Pass
	4.0	-14.23	51	1000	-13.0	
2532.0	3.0	-16.54	51	NA	-13.0	Pass
	4.0	-15.37	51	1000	-13.0	
2565.5	3.0	-14.42	51	NA	-13.0	Pass
	4.0	-14.65	51	1000	-13.0	

Test specification:	**Section 27.53, Band edge emissions**		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1018 hPa	**Power:** 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Table 7.8.4 Spurious emission at the low band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 10 MHz

Frequency MHz	Frequency offset, ± MHz	Low band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2501	5.5	-13.52	100	NA	-13.0	Pass
	6.5	-15.04	100	1000	-13.0	
2535	5.5	-13.69	100	NA	-13.0	Pass
	6.5	-15.07	100	1000	-13.0	
2563	5.5	-15.02	100	NA	-13.0	Pass
	6.5	-15.95	100	1000	-13.0	
64QAM						
2501	5.5	-14.26	100	NA	-13.0	Pass
	6.5	-13.68	100	1000	-13.0	
2535	5.5	-13.68	100	NA	-13.0	Pass
	6.5	-14.65	100	1000	-13.0	
2563	5.5	-14.87	100	NA	-13.0	Pass
	6.5	-15.69	100	1000	-13.0	

Table 7.8.5 Spurious emission at the high band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 10MHz

Frequency MHz	Frequency offset, ± MHz	High band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2501	5.5	-13.96	100	NA	-13.0	Pass
	6.5	-15.29	100	1000	-13.0	
2535	5.5	-13.29	100	NA	-13.0	Pass
	6.5	-14.85	100	1000	-13.0	
2563	5.5	-14.25	100	NA	-13.0	Pass
	6.5	-16.48	100	1000	-13.0	
64QAM						
2501	5.5	-14.99	100	NA	-13.0	Pass
	6.5	-13.81	100	1000	-13.0	
2535	5.5	-13.03	100	NA	-13.0	Pass
	6.5	-14.51	100	1000	-13.0	
2563	5.5	-14.59	100	NA	-13.0	Pass
	6.5	-15.63	100	1000	-13.0	

Test specification:	**Section 27.53, Band edge emissions**		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1018 hPa	**Power:** 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Table 7.8.6 Spurious emission at the low band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 20 MHz

Frequency MHz	Frequency offset, ± MHz	Low band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2506	10.5	-13.42	200	NA	-13.0	Pass
	11.5	-15.86	200	1000	-13.0	
2535	10.5	-13.24	200	NA	-13.0	Pass
	11.5	-15.52	200	1000	-13.0	
2558	10.5	-13.37	200	NA	-13.0	Pass
	11.5	-15.57	200	1000	-13.0	
64QAM						
2506	10.5	-14.20	200	NA	-13.0	Pass
	11.5	-15.99	200	1000	-13.0	
2535	10.5	-14.34	200	NA	-13.0	Pass
	11.5	-15.30	200	1000	-13.0	
2558	10.5	-14.10	200	NA	-13.0	Pass
	11.5	-15.60	200	1000	-13.0	

Table 7.8.7 Spurious emission at the high band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 20 MHz

Frequency MHz	Frequency offset, ± MHz	High band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2506	10.5	-15.61	200	NA	-13.0	Pass
	11.5	-16.66	200	1000	-13.0	
2535	10.5	-14.98	200	NA	-13.0	Pass
	11.5	-16.57	200	1000	-13.0	
2558	10.5	-15.51	200	NA	-13.0	Pass
	11.5	-16.47	200	1000	-13.0	
64QAM						
2506	10.5	-13.18	200	NA	-13.0	Pass
	11.5	-16.42	200	1000	-13.0	
2535	10.5	-13.48	200	NA	-13.0	Pass
	11.5	-15.50	200	1000	-13.0	
2558	10.5	-13.13	200	NA	-13.0	Pass
	11.5	-16.17	200	1000	-13.0	

Reference numbers of test equipment used

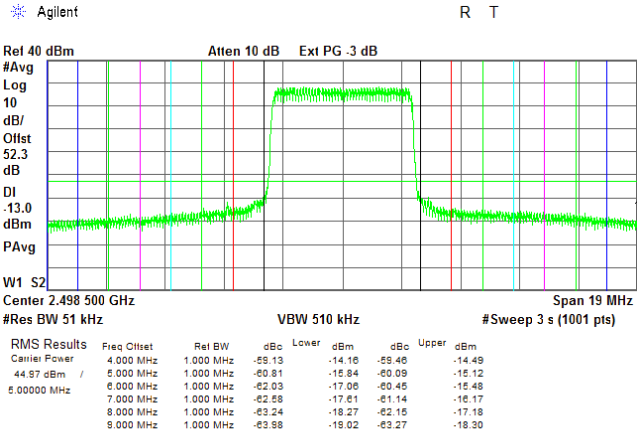
HL 2214	HL 3301	HL 3302	HL 3818	HL 4756			

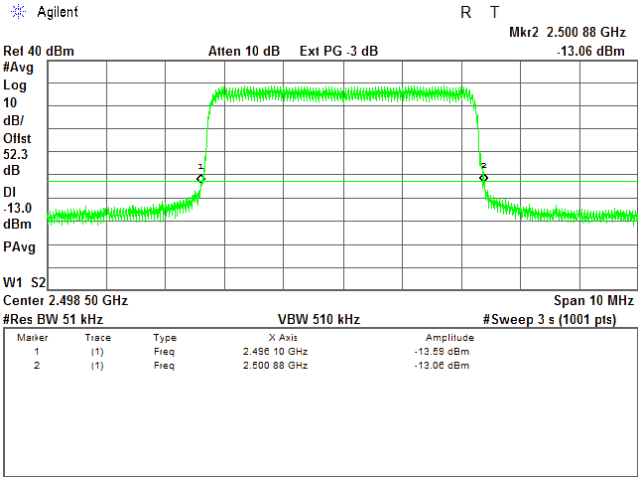
Full description is given in Appendix A.

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.8.1 Spurious emission at band edges test results at low carrier frequency, 5 MHz EBW

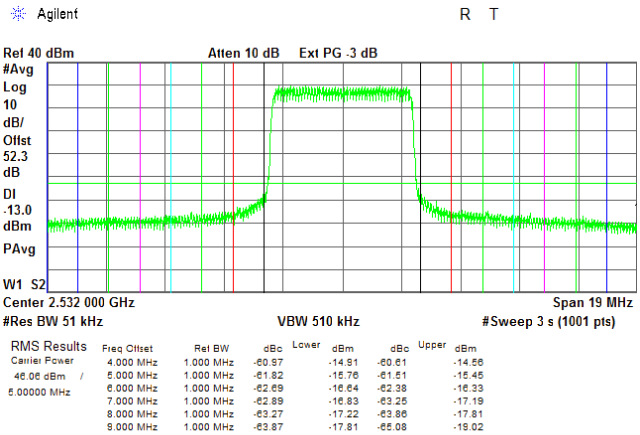
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 5.3 Mbps

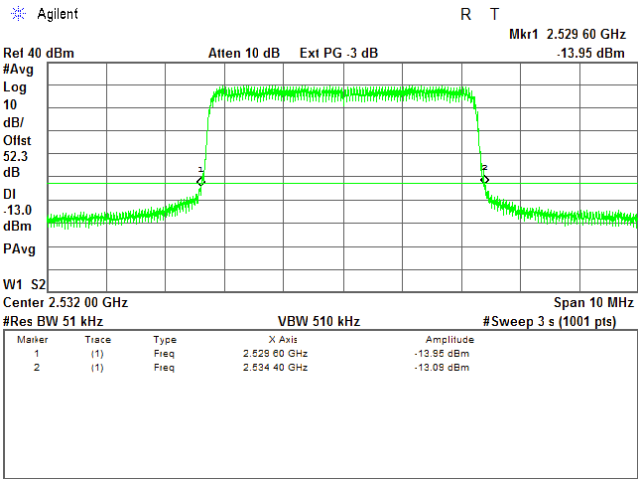




Plot 7.8.2 Spurious emission at band edges test results at mid carrier frequency, 5 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 5.3 Mbps

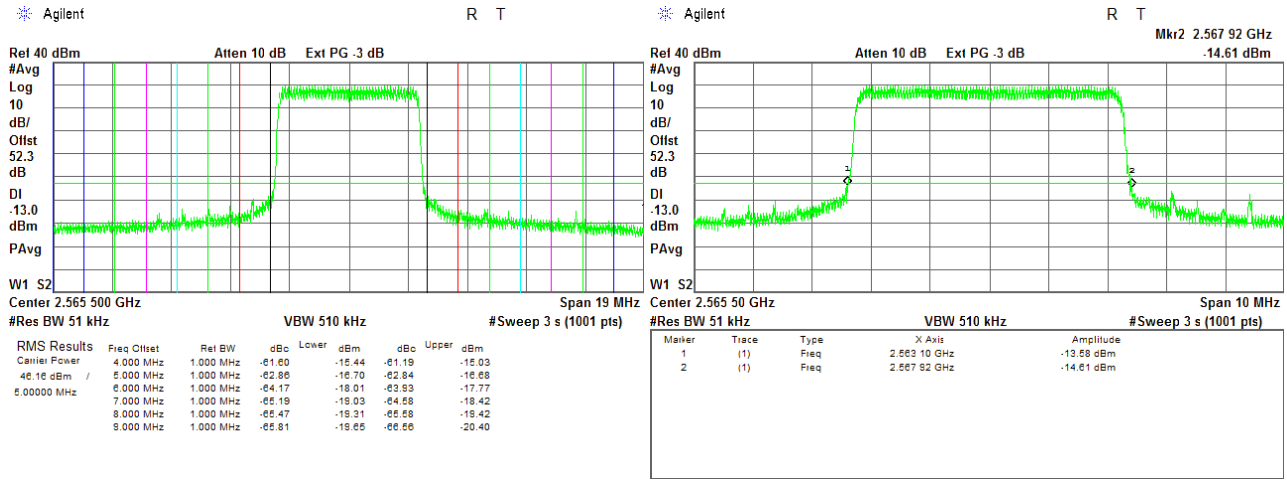




Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

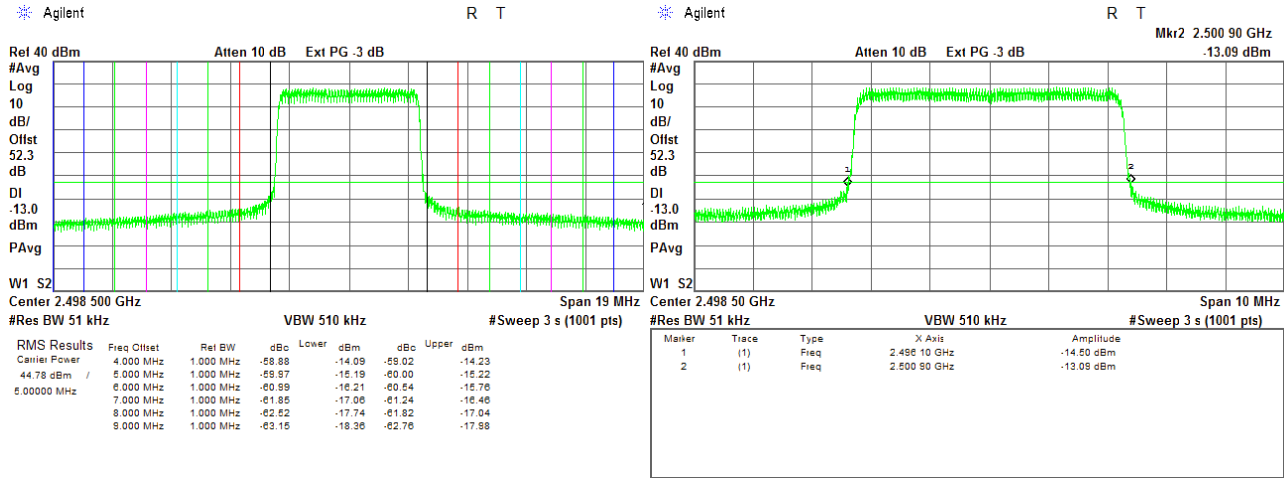
Plot 7.8.3 Spurious emission at band edges test results at high carrier frequency, 5 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 5.3 Mbps



Plot 7.8.4 Spurious emission at band edges test results at low carrier frequency, 5 MHz EBW

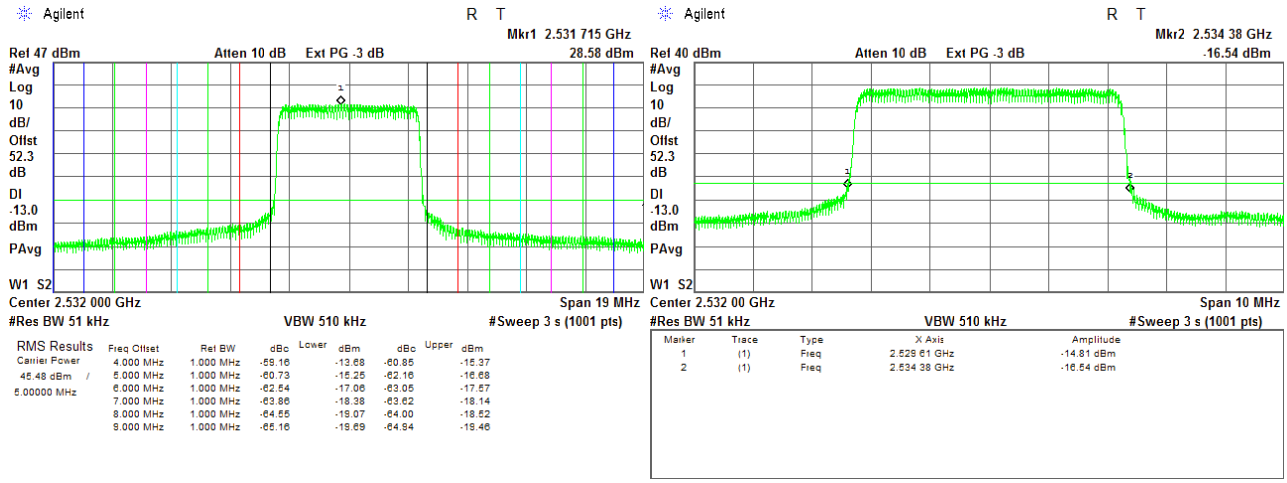
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 23 Mbps
41.62 dBm



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

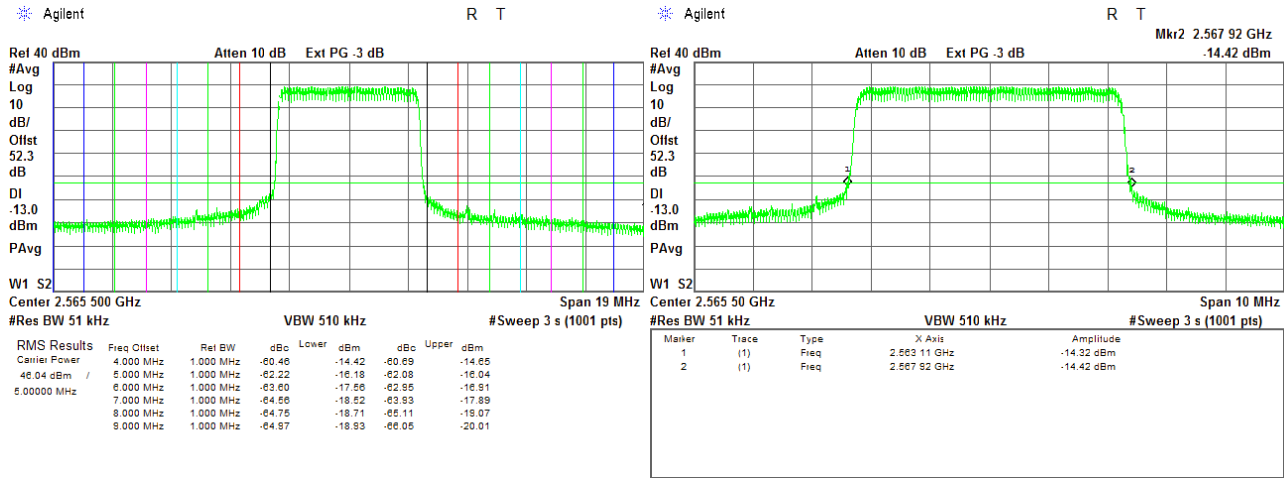
Plot 7.8.5 Spurious emission at band edges test results at mid carrier frequency, 5 MHz EBW

DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 23 Mbps
42.48 dBm



Plot 7.8.6 Spurious emission at band edges test results at high carrier frequency, 5 MHz EBW

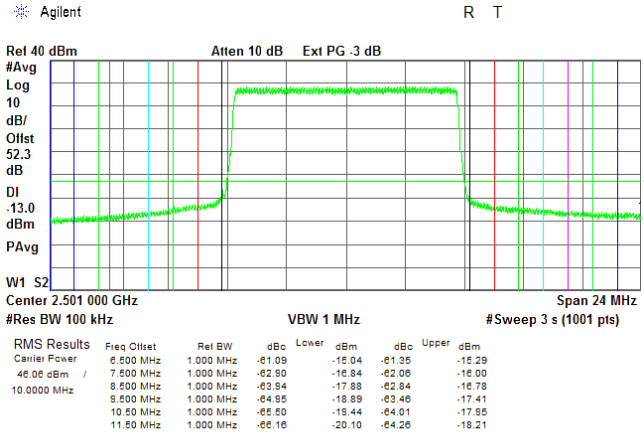
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 23 Mbps

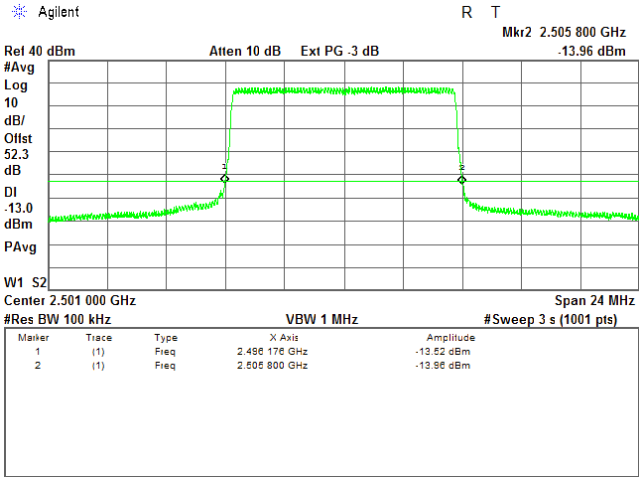


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.8.7 Spurious emission at band edges test results at low carrier frequency, 10 MHz EBW

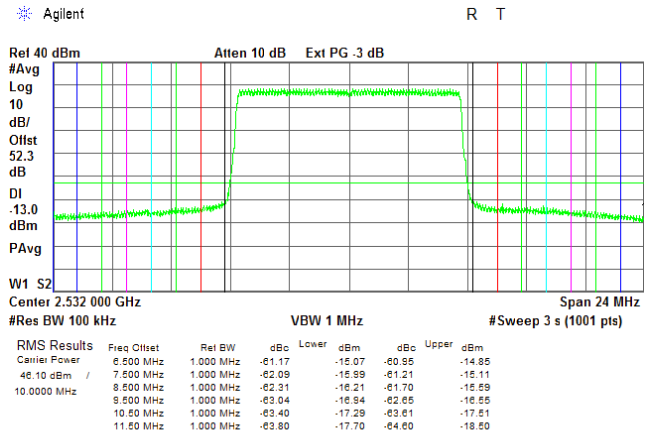
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 10.7 Mbps

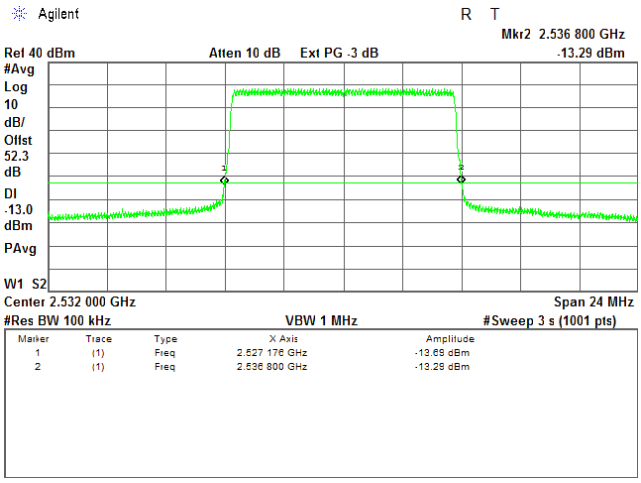




Plot 7.8.8 Spurious emission at band edges test results at mid carrier frequency, 10 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 10.7 Mbps

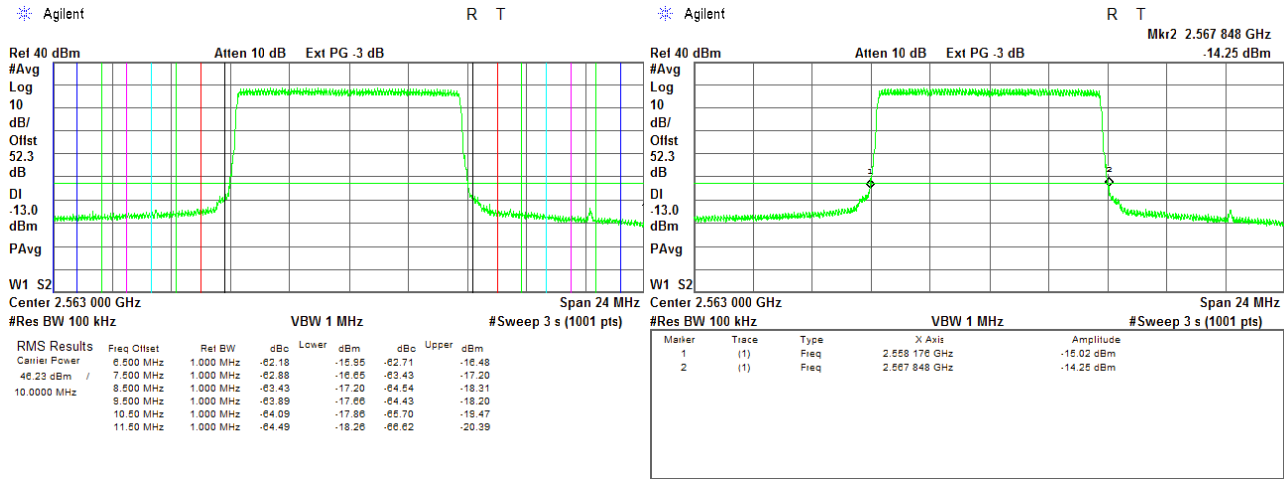




Test specification:	**Section 27.53, Band edge emissions**		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1018 hPa	**Power:** 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

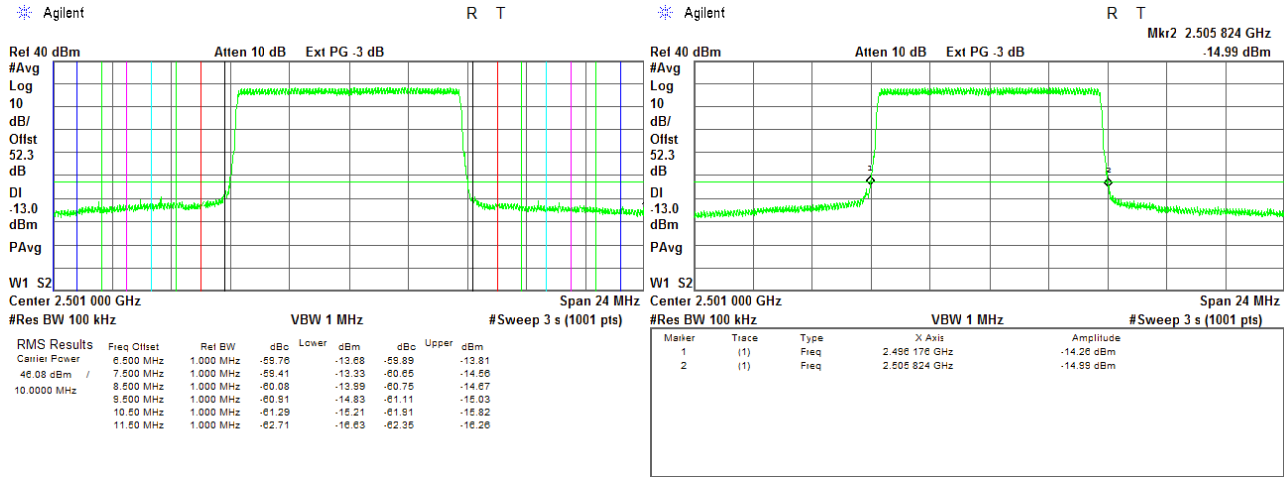
Plot 7.8.9 Spurious emission at band edges test results at high carrier frequency, 10 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 10.7 Mbps



Plot 7.8.10 Spurious emission at band edges test results at low carrier frequency, 10 MHz EBW

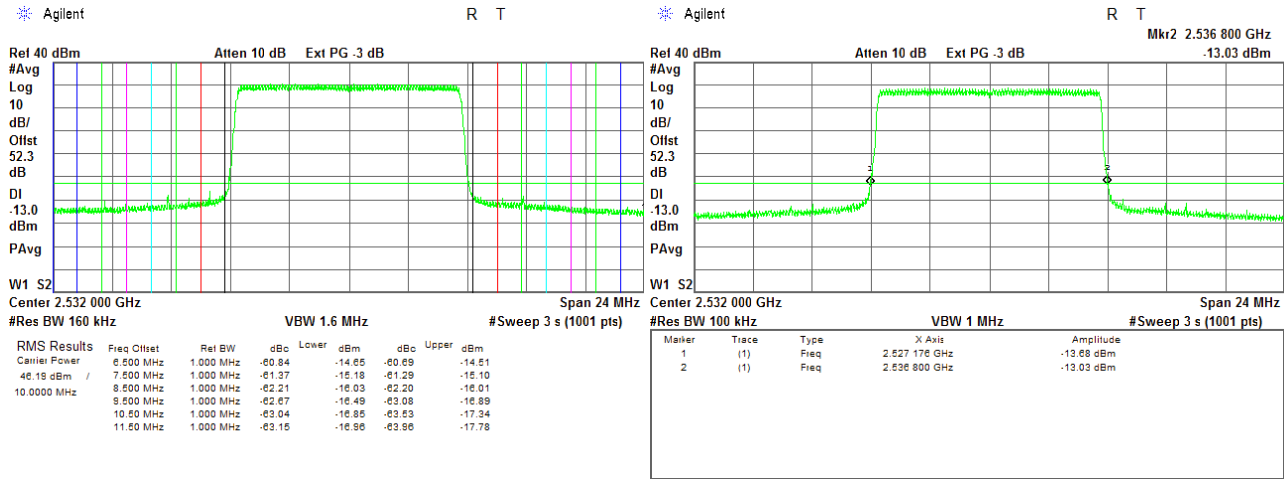
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 47.3 Mbps



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

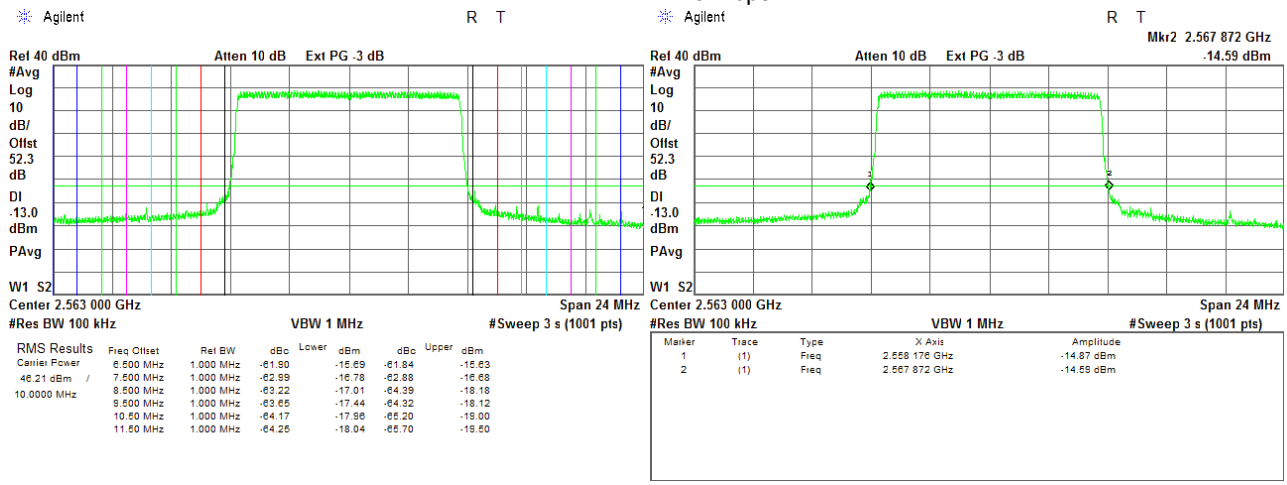
Plot 7.8.11 Spurious emission at band edges test results at mid carrier frequency, 10 MHz EBW

DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 47.3 Mbps



Plot 7.8.12 Spurious emission at band edges test results at high carrier frequency, 10 MHz EBW

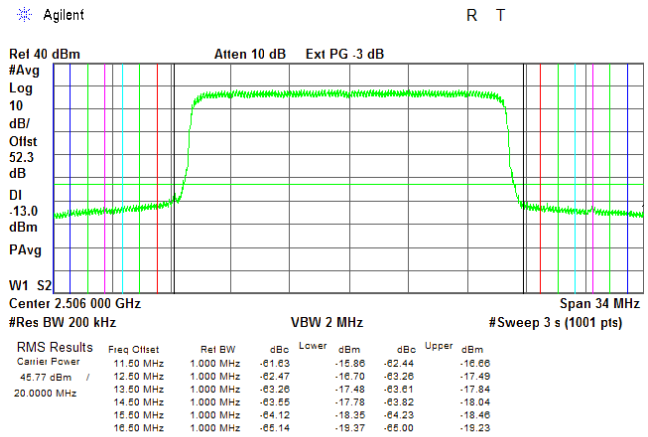
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 47.3 Mbps

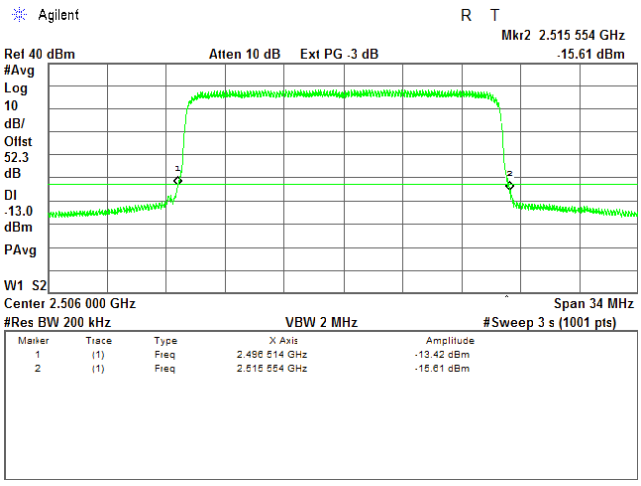


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.8.13 Spurious emission at band edges test results at low carrier frequency, 20 MHz EBW

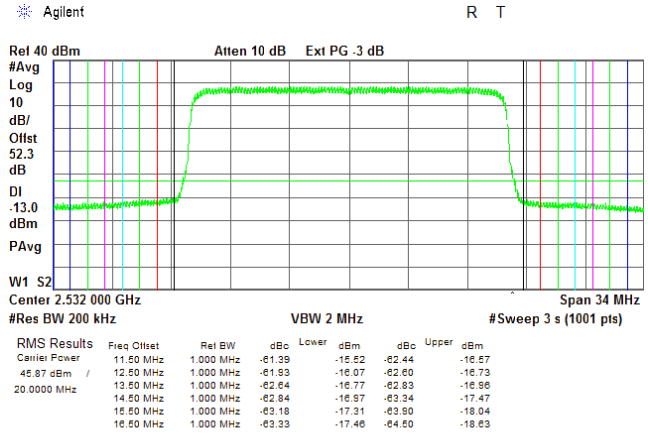
DETECTOR USED:	Average
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	23.4 Mbps

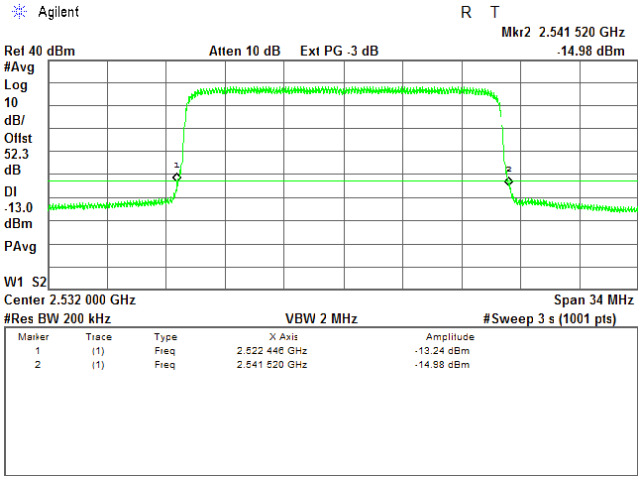




Plot 7.8.14 Spurious emission at band edges test results at mid carrier frequency, 20 MHz EBW

DETECTOR USED:	Average
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	23.4 Mbps

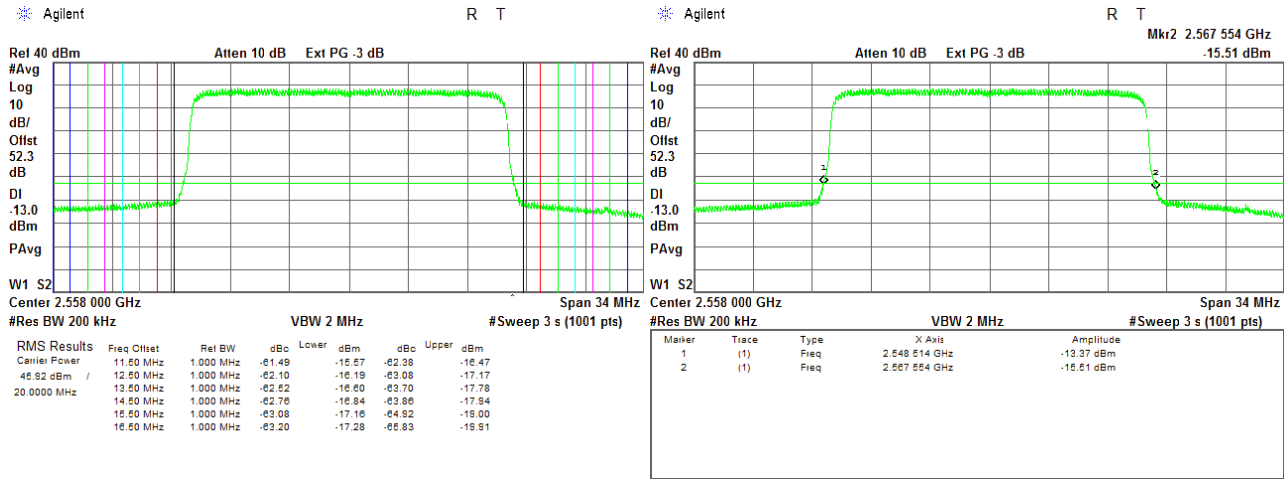




Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

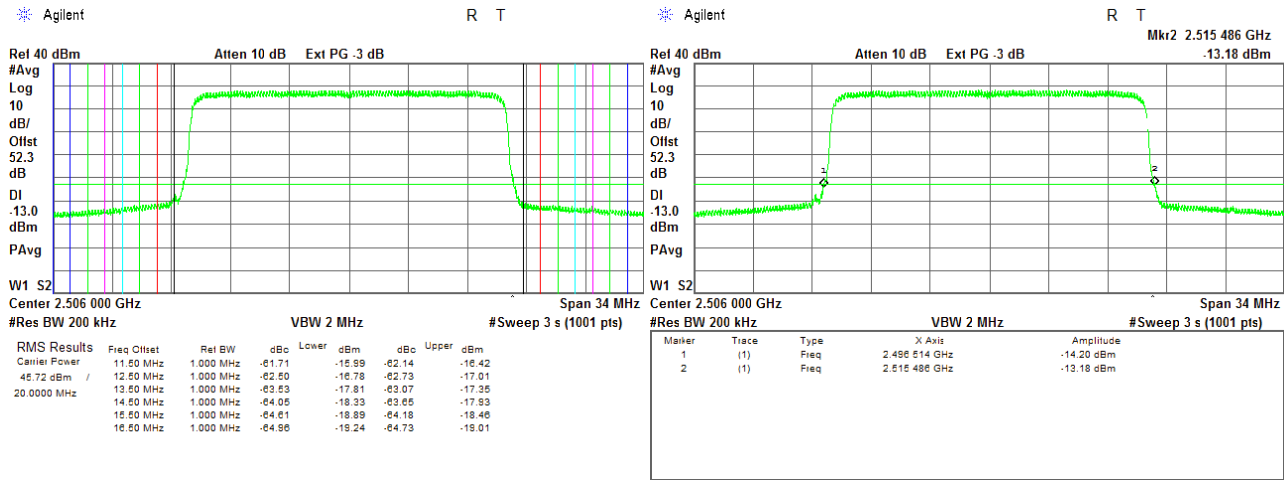
Plot 7.8.15 Spurious emission at band edges test results at high carrier frequency, 20 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 23.4 Mbps



Plot 7.8.16 Spurious emission at band edges test results at low carrier frequency, 20 MHz EBW

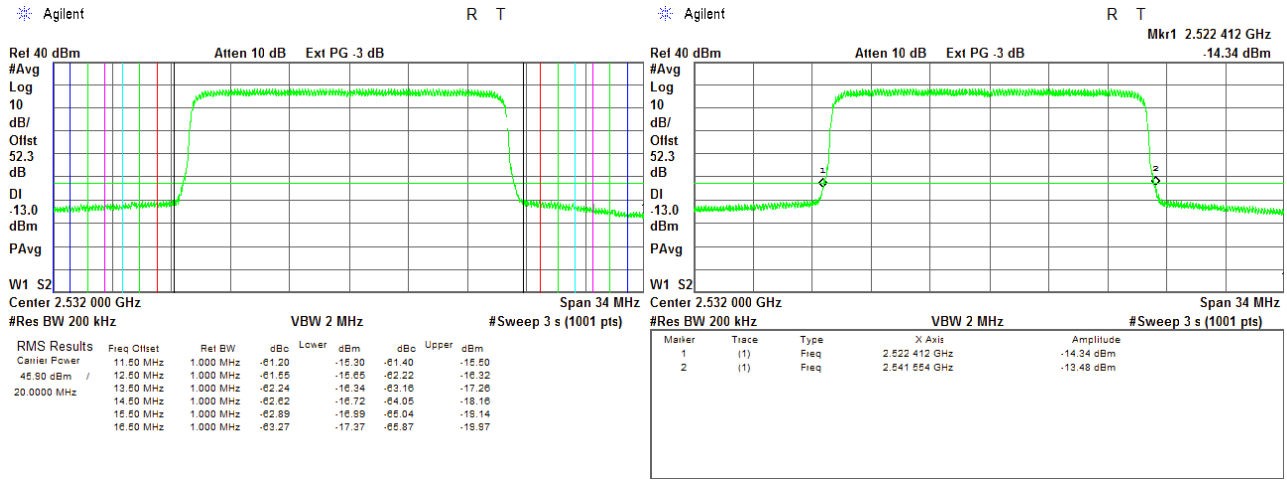
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 95 Mbps



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

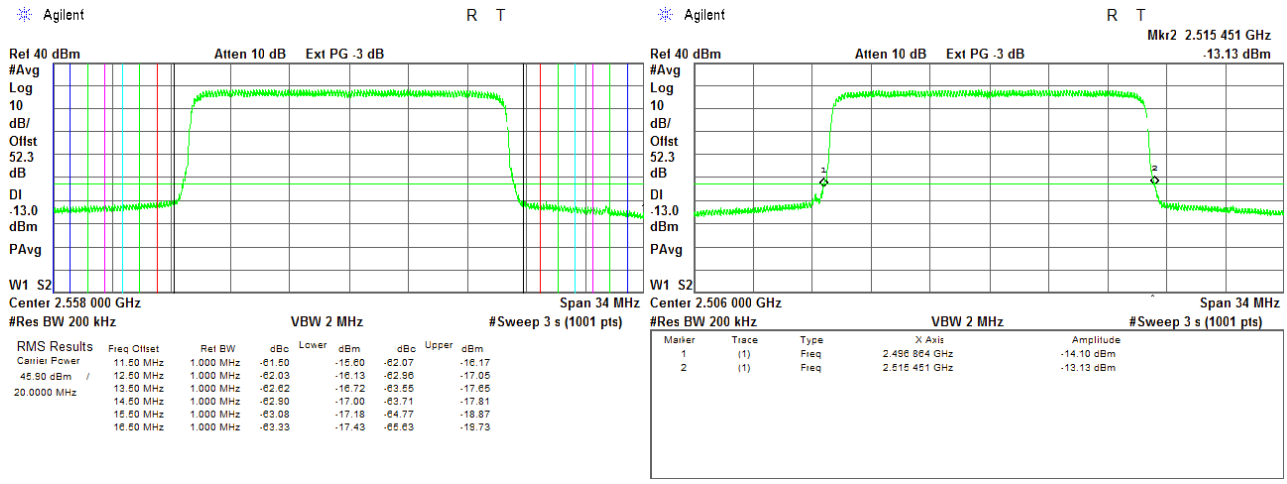
Plot 7.8.17 Spurious emission at band edges test results at mid carrier frequency, 20 MHz EBW

DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 95 Mbps



Plot 7.8.18 Spurious emission at band edges test results at high carrier frequency, 20 MHz EBW

DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 95 Mbps



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

7.9 Band edge emissions at RF connector test in 2620.5 – 2687.5 MHz bandg

7.9.1 General

This test was performed to measure spurious emissions at the channel edge at the RF antenna connector. Specification test limits are given in Table 7.9.1.

Table 7.9.1 Spurious emission limits at band edges

Channel	Frequency range	Attenuation below carrier, dBc	Limit, dBm
Channel bandwidth 5 MHz			
2620.5	2618.0 - 2624.0	43+ 10*Log (P*)	-13.0
2654.0	2651.5 – 2657.0	43+ 10*Log (P*)	-13.0
2687.5	2684.5 - 2690.0	43+ 10*Log (P*)	-13.0
Channel bandwidth 10 MHz			
2623.0	2618.0 - 2624.0 2624.0 - 2629.5	43+ 10*Log (P*)	-13.0
2657.0	2651.5 - 2657.0 2657.0 - 2662.5	43+ 10*Log (P*)	-13.0
2685.0	2679.0 - 2684.5 2684.5 - 2690.0	43+ 10*Log (P*)	-13.0
Channel bandwidth 20 MHz			
2628.0	2618.0 - 2624.0 2624.0 - 2629.5 2629.5 - 2635.0 2635.0 - 2640.5	43+ 10*Log (P*)	-13.0
2657.0	2646.0 - 2651.5 2651.5 - 2657.0 2657.0 - 2662.5 2662.5 – 2668.0	43+ 10*Log (P*)	-13.0
2680.0	2668.0 - 2673.5 2673.5 - 2679.0 2679.0 - 2684.5 2684.5 - 2690.0	43+ 10*Log (P*)	-13.0

* - P is transmitter output power in Watts

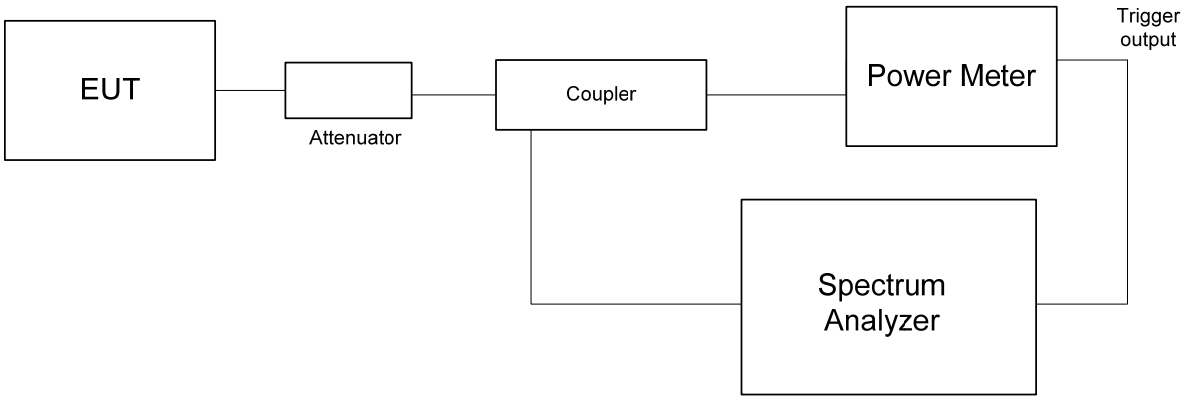
7.9.2 Test procedure

7.9.2.1 The EUT was set up as shown in Figure 7.9.1, energized and its proper operation was checked.

7.9.2.2 The spurious emission was measured with spectrum analyzer as provided in Table 7.9.2 to Table 7.9.7 and the associated plots.

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Figure 7.9.1 Spurious emission test setup for single output



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Table 7.9.2 Spurious emission at the low band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 5 MHz

Frequency MHz	Frequency offset, ± MHz	Low band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2620.5	3.0	-14.05	51	NA	-13.0	Pass
	4.0	-13.92	51	1000	-13.0	
2654.0	3.0	-14.89	51	NA	-13.0	Pass
	4.0	-15.57	51	1000	-13.0	
2687.5	3.0	-14.19	51	NA	-13.0	Pass
	4.0	-13.37	51	1000	-13.0	
64QAM						
2620.5	3.0	-14.05	51	NA	-13.0	Pass
	4.0	-16.58	51	1000	-13.0	
2654.0	3.0	-13.26	51	NA	-13.0	Pass
	4.0	-13.98	51	1000	-13.0	
2687.5	3.0	-13.22	51	NA	-13.0	Pass
	4.0	-14.04	51	1000	-13.0	

Table 7.9.3 Spurious emission at the high band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 5 MHz

Frequency MHz	Frequency offset, ± MHz	High band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2620.5	3.0	-14.10	51	NA	-13.0	Pass
	4.0	-14.33	51	1000	-13.0	
2654.0	3.0	-14.23	51	NA	-13.0	Pass
	4.0	-14.96	51	1000	-13.0	
2687.5	3.0	-14.42	51	NA	-13.0	Pass
	4.0	-13.20	51	1000	-13.0	
64QAM						
2620.5	3.0	-14.13	51	NA	-13.0	Pass
	4.0	-16.21	51	1000	-13.0	
2654.0	3.0	-13.33	51	NA	-13.0	Pass
	4.0	-14.75	51	1000	-13.0	
2687.5	3.0	-13.88	51	NA	-13.0	Pass
	4.0	-13.55	51	1000	-13.0	

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Table 7.9.4 Spurious emission at the low band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 10 MHz

Frequency MHz	Frequency offset, ± MHz	Low band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2623.0	5.5	-13.24	100	NA	-13.0	Pass
	6.5	-16.11	100	1000	-13.0	
2657.0	5.5	-14.87	100	NA	-13.0	Pass
	6.5	-15.44	100	1000	-13.0	
2685.0	5.5	-13.72	100	NA	-13.0	Pass
	6.5	-13.18	100	1000	-13.0	
64QAM						
2623.0	5.5	-13.97	100	NA	-13.0	Pass
	6.5	-16.13	100	1000	-13.0	
2657.0	5.5	-14.26	100	NA	-13.0	Pass
	6.5	-14.86	100	1000	-13.0	
2685.0	5.5	-14.93	100	NA	-13.0	Pass
	6.5	-13.25	100	1000	-13.0	

Table 7.9.5 Spurious emission at the high band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 10MHz

Frequency MHz	Frequency offset, ± MHz	High band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2623.0	5.5	-14.52	100	NA	-13.0	Pass
	6.5	-17.72	100	1000	-13.0	
2657.0	5.5	-14.55	100	NA	-13.0	Pass
	6.5	-15.11	100	1000	-13.0	
2685.0	5.5	-14.11	100	NA	-13.0	Pass
	6.5	-13.92	100	1000	-13.0	
64QAM						
2623.0	5.5	-13.38	100	NA	-13.0	Pass
	6.5	-16.42	100	1000	-13.0	
2657.0	5.5	-14.01	100	NA	-13.0	Pass
	6.5	-15.65	100	1000	-13.0	
2685.0	5.5	-14.31	100	NA	-13.0	Pass
	6.5	-14.80	100	1000	-13.0	

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Table 7.9.6 Spurious emission at the low band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 20 MHz

Frequency MHz	Frequency offset, ± MHz	Low band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2628.0	10.5	-14.59	200	NA	-13.0	Pass
	11.5	-16.90	200	1000	-13.0	
2657.0	10.5	-13.27	200	NA	-13.0	Pass
	11.5	-16.78	200	1000	-13.0	
2680.0	10.5	-13.37	200	NA	-13.0	Pass
	11.5	-14.86	200	1000	-13.0	
64QAM						
2628.0	10.5	-14.06	200	NA	-13.0	Pass
	11.5	-16.97	200	1000	-13.0	
2657.0	10.5	-13.49	200	NA	-13.0	Pass
	11.5	-16.23	200	1000	-13.0	
2680.0	10.5	-13.77	200	NA	-13.0	Pass
	11.5	-14.79	200	1000	-13.0	

Table 7.9.7 Spurious emission at the high band edge test results

DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 20 MHz

Frequency MHz	Frequency offset, ± MHz	High band edge dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK						
2628.0	10.5	-14.29	200	NA	-13.0	Pass
	11.5	-17.44	200	1000	-13.0	
2657.0	10.5	-14.99	200	NA	-13.0	Pass
	11.5	-17.59	200	1000	-13.0	
2680.0	10.5	-14.50	200	NA	-13.0	Pass
	11.5	-16.13	200	1000	-13.0	
64QAM						
2628.0	10.5	-13.62	200	NA	-13.0	Pass
	11.5	-17.82	200	1000	-13.0	
2657.0	10.5	-14.90	200	NA	-13.0	Pass
	11.5	-18.28	200	1000	-13.0	
2680.0	10.5	-14.48	200	NA	-13.0	Pass
	11.5	-15.99	200	1000	-13.0	

Reference numbers of test equipment used

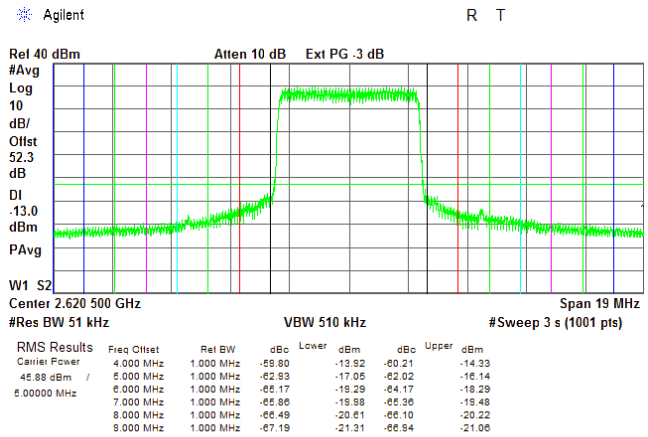
HL 2214	HL 3301	HL 3302	HL 3818	HL 4756			

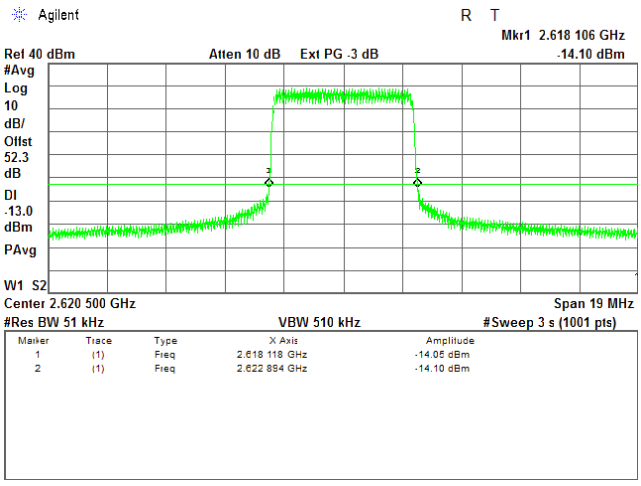
Full description is given in Appendix A.

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.9.1 Spurious emission at band edges test results at low carrier frequency, 5 MHz EBW

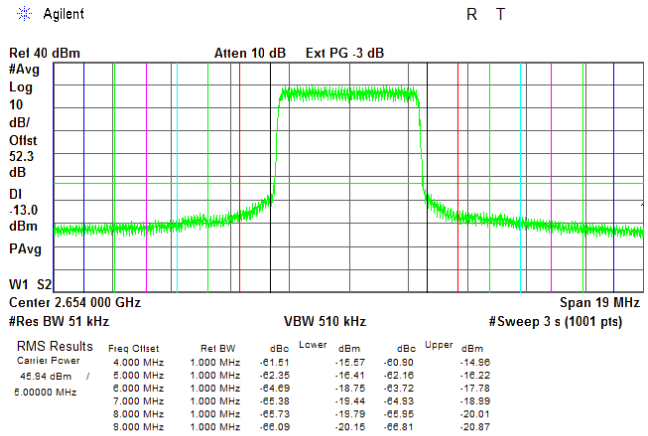
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 5.3 Mbps

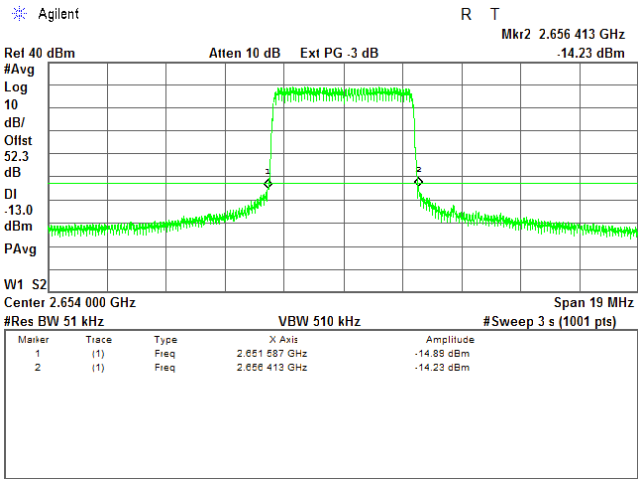




Plot 7.9.2 Spurious emission at band edges test results at mid carrier frequency, 5 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 5.3 Mbps

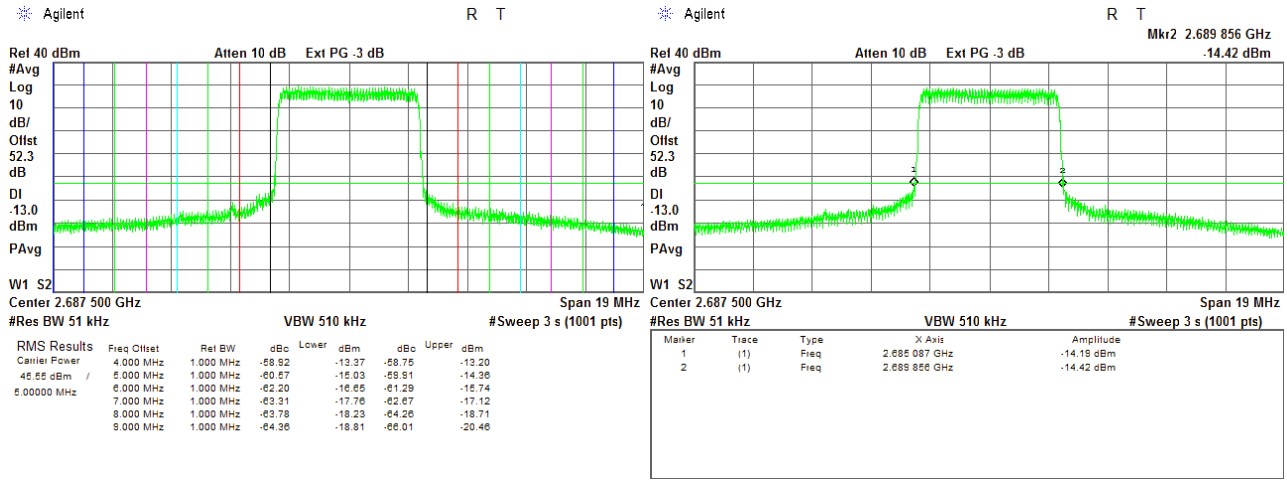




Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

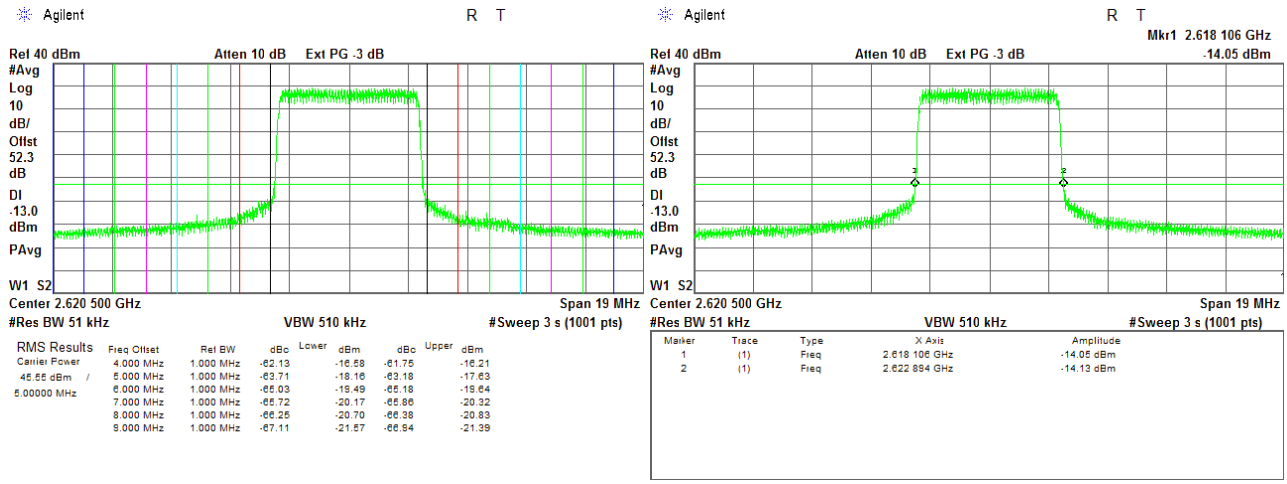
Plot 7.9.3 Spurious emission at band edges test results at high carrier frequency, 5 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 5.3 Mbps



Plot 7.9.4 Spurious emission at band edges test results at low carrier frequency, 5 MHz EBW

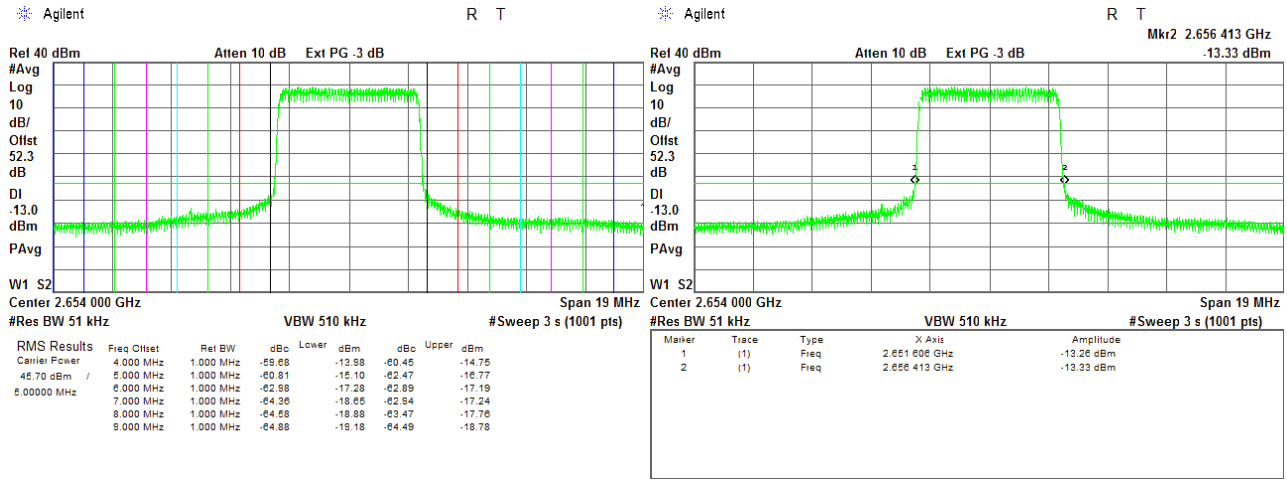
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 23 Mbps



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

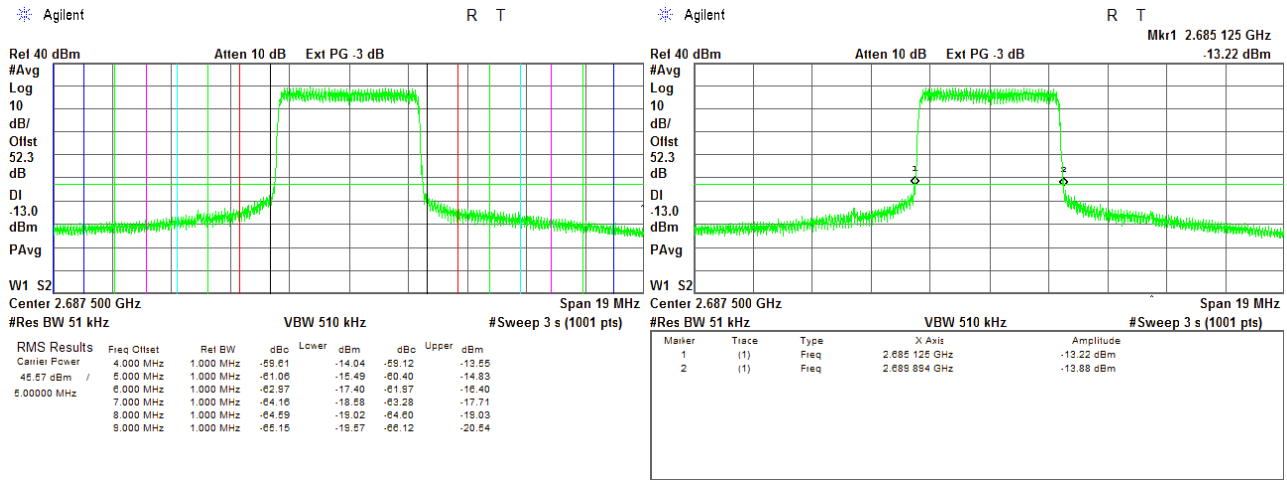
Plot 7.9.5 Spurious emission at band edges test results at mid carrier frequency, 5 MHz EBW

DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 23 Mbps



Plot 7.9.6 Spurious emission at band edges test results at high carrier frequency, 5 MHz EBW

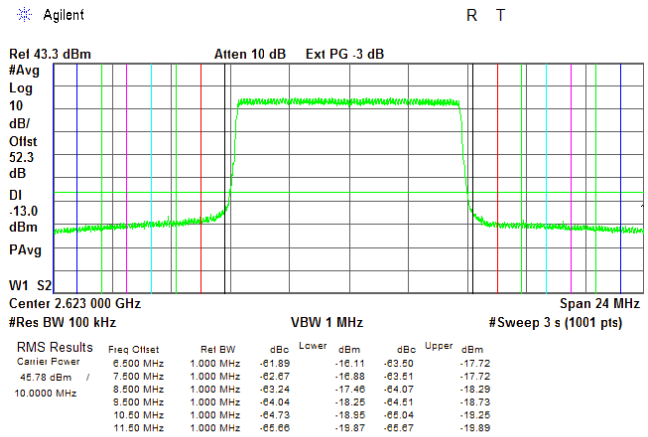
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 23 Mbps

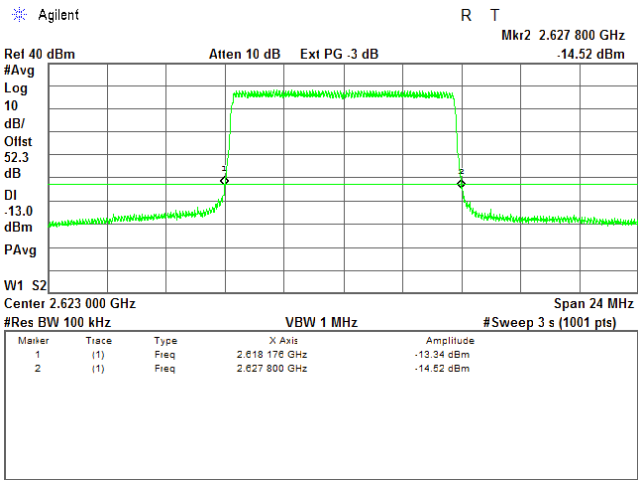


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.9.7 Spurious emission at band edges test results at low carrier frequency, 10 MHz EBW

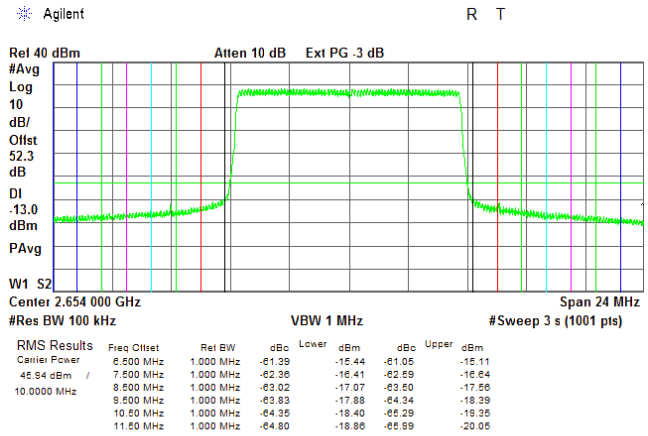
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 10.7 Mbps

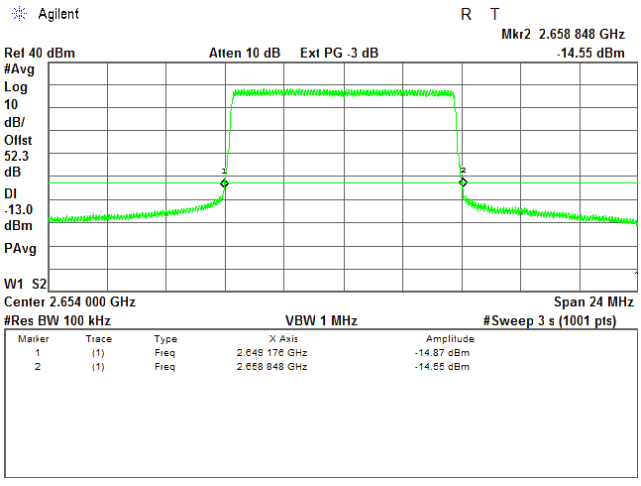




Plot 7.9.8 Spurious emission at band edges test results at mid carrier frequency, 10 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 10.7 Mbps

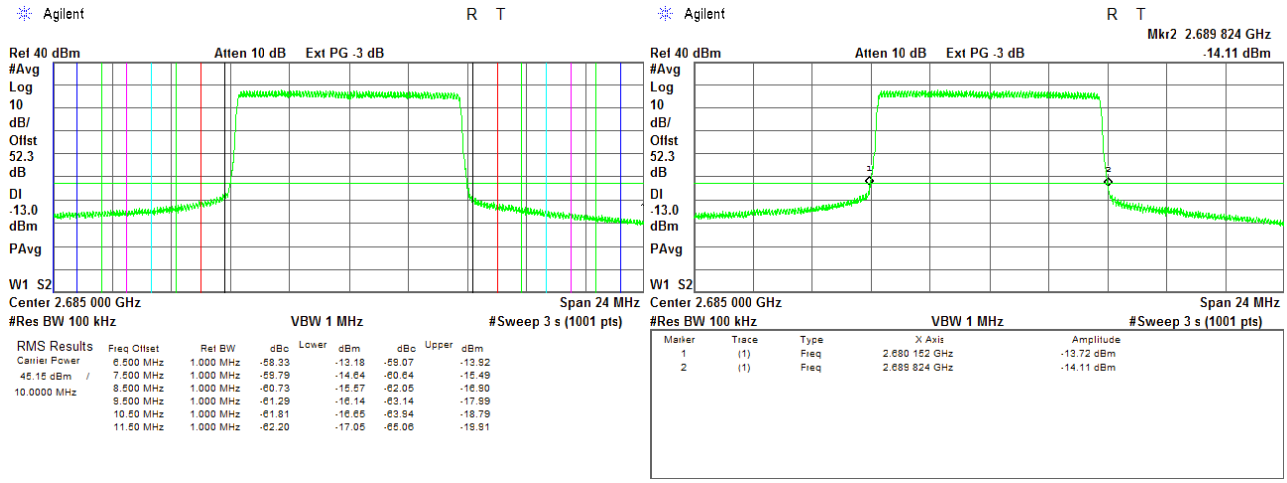




Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

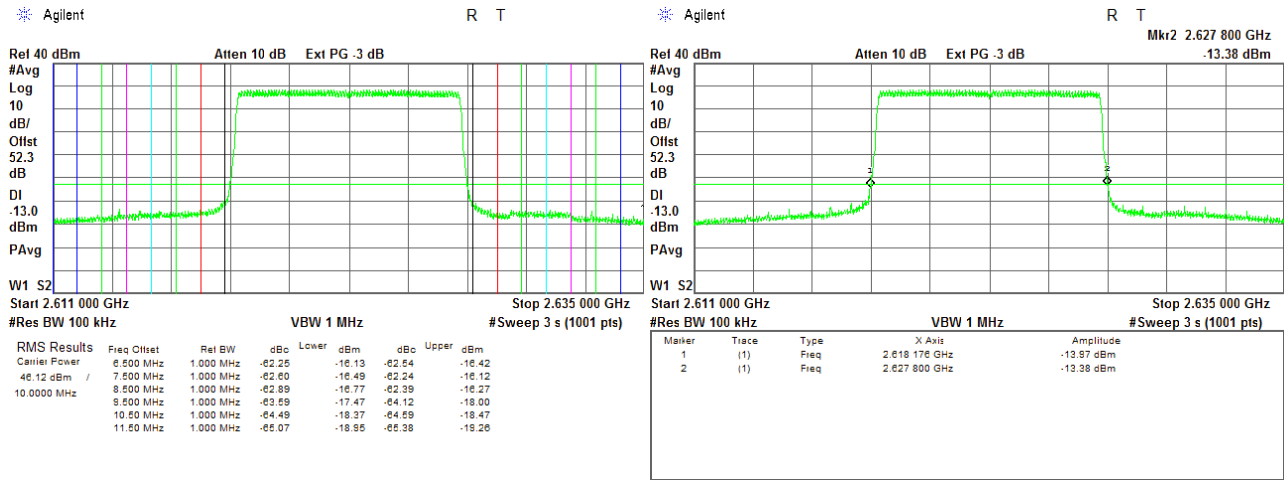
Plot 7.9.9 Spurious emission at band edges test results at high carrier frequency, 10 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 10.7 Mbps



Plot 7.9.10 Spurious emission at band edges test results at low carrier frequency, 10 MHz EBW

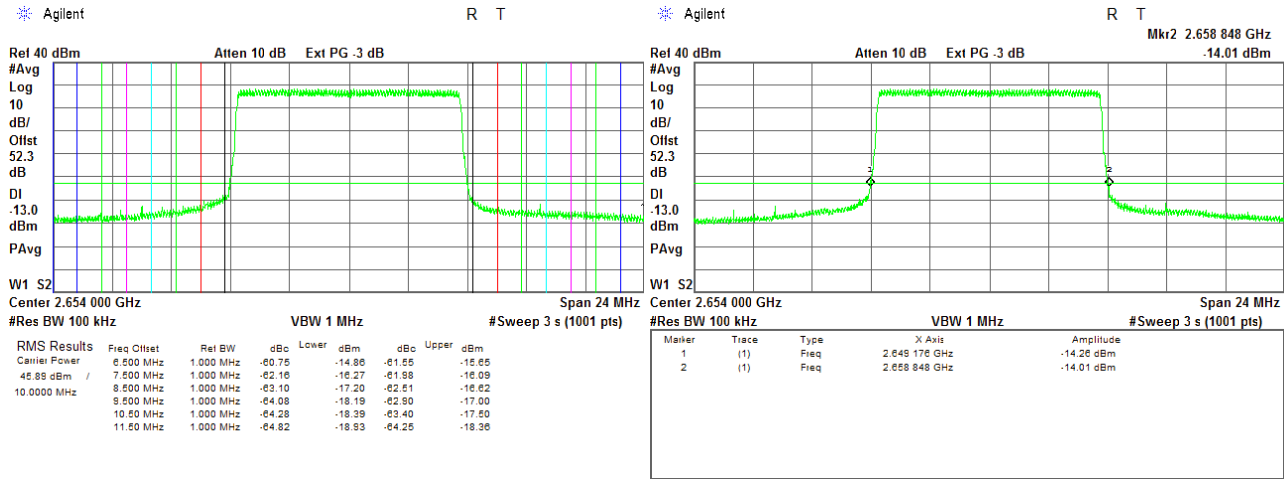
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 47.3 Mbps



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

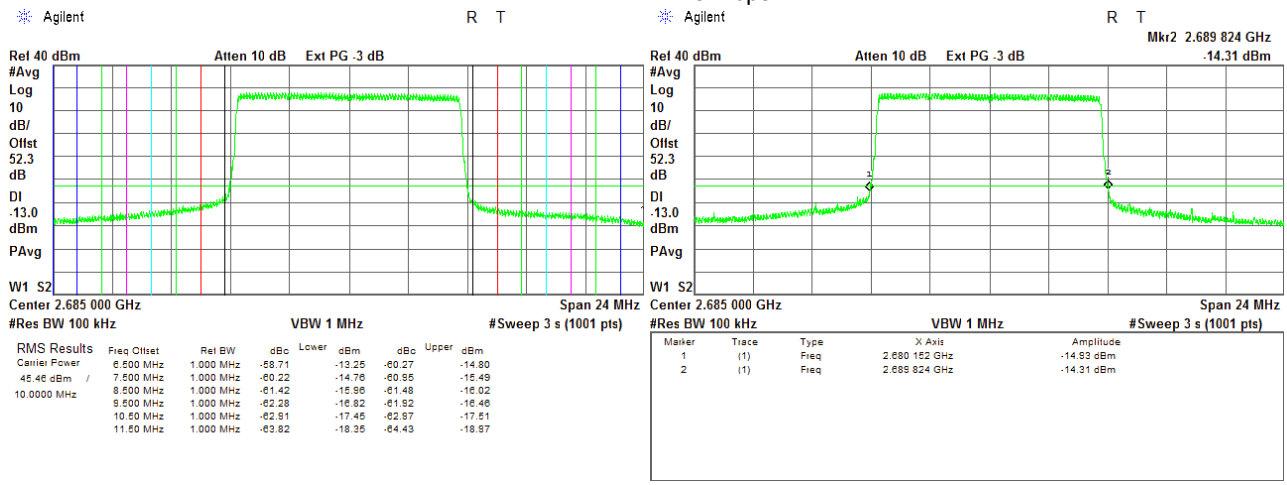
Plot 7.9.11 Spurious emission at band edges test results at mid carrier frequency, 10 MHz EBW

DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 47.3 Mbps



Plot 7.9.12 Spurious emission at band edges test results at high carrier frequency, 10 MHz EBW

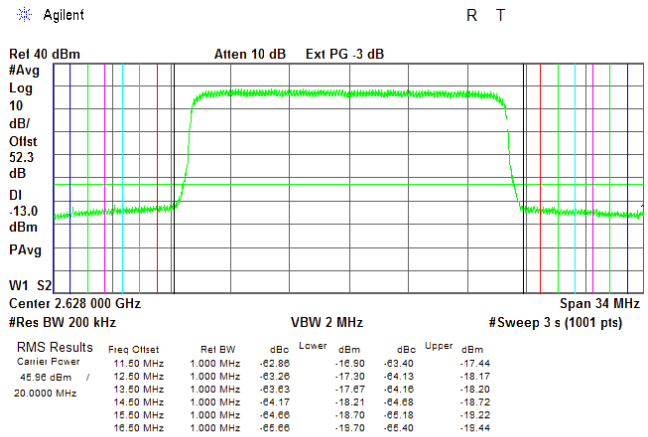
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 47.3 Mbps

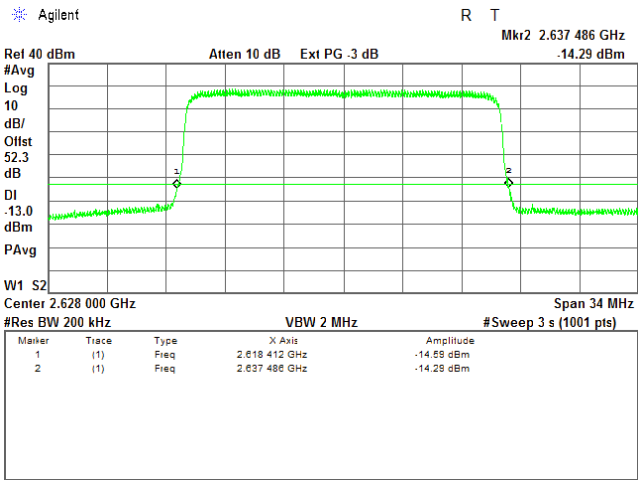


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.9.13 Spurious emission at band edges test results at low carrier frequency, 20 MHz EBW

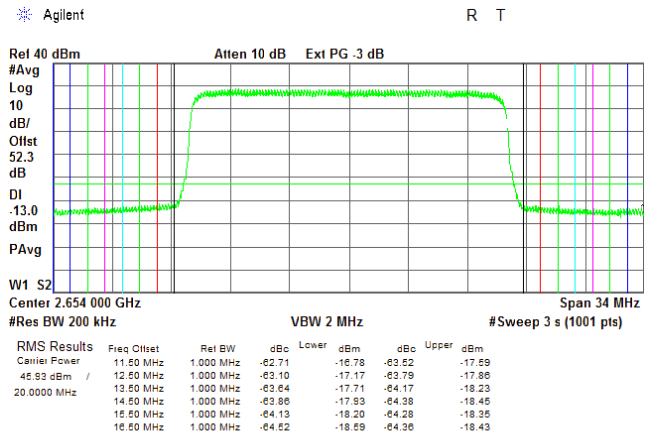
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 23.4 Mbps

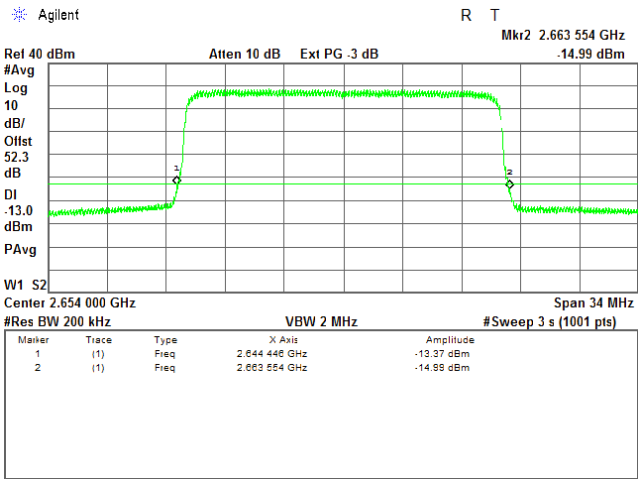




Plot 7.9.14 Spurious emission at band edges test results at mid carrier frequency, 20 MHz EBW

DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 23.4 Mbps

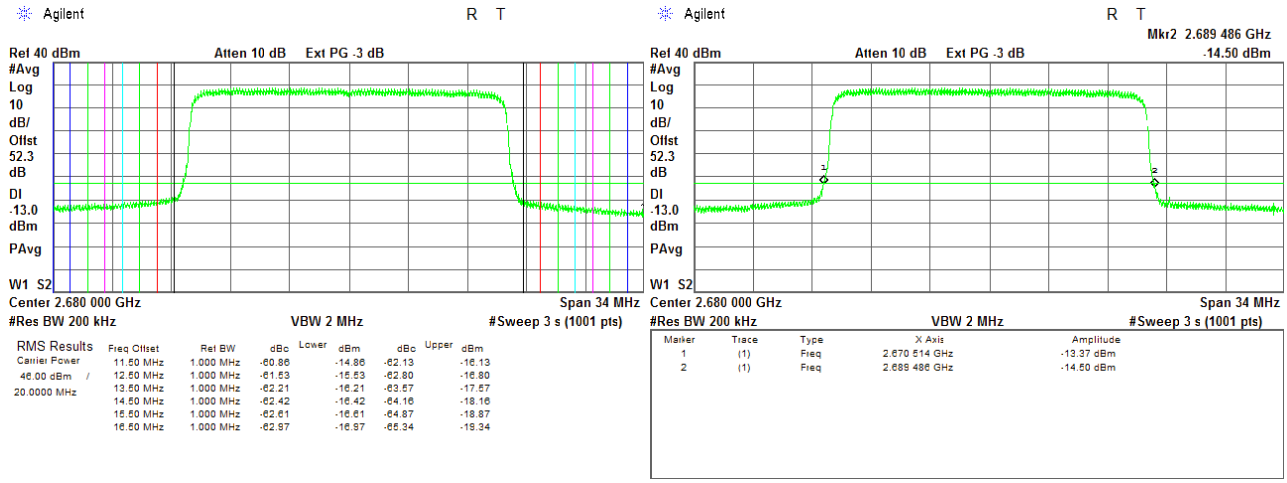




Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

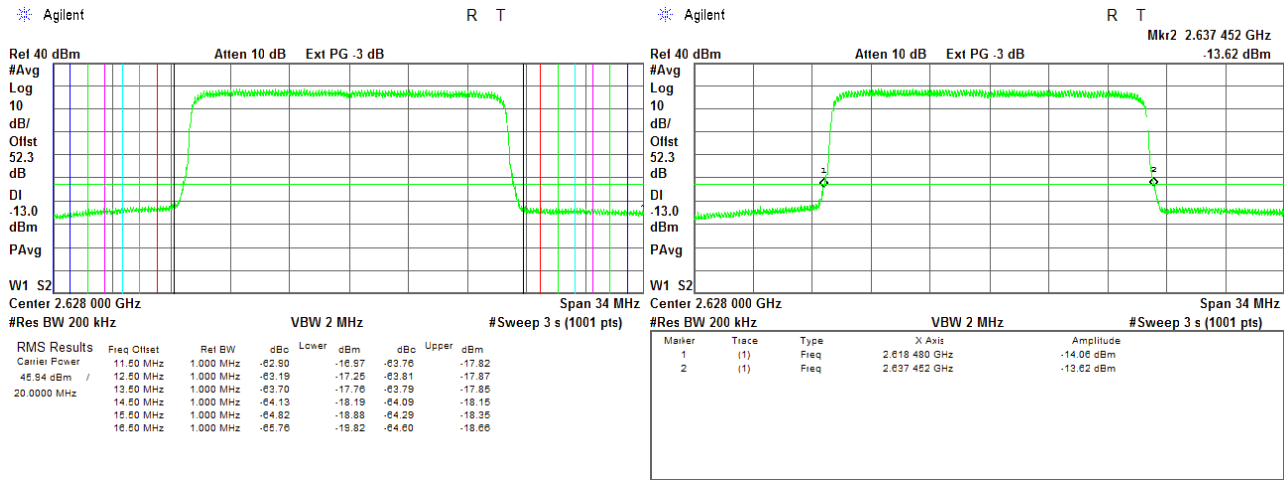
Plot 7.9.15 Spurious emission at band edges test results at high carrier frequency, 20 MHz EBW

DETECTOR USED:	Average
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	23.4 Mbps



Plot 7.9.16 Spurious emission at band edges test results at low carrier frequency, 20 MHz EBW

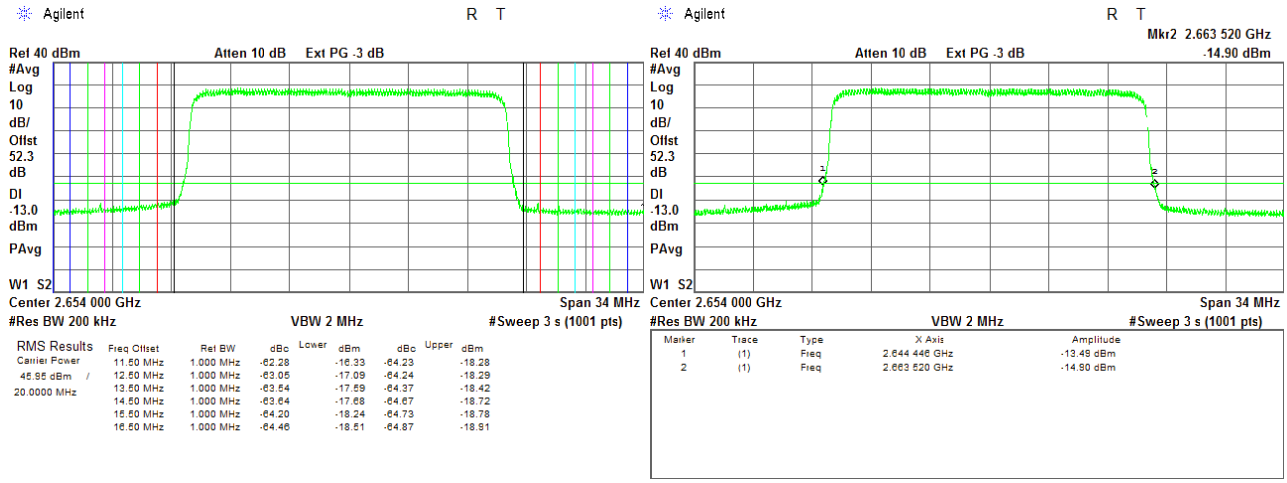
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	95 Mbps



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	09-Nov-16		
Temperature: 24 ºC	Relative Humidity: 39 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

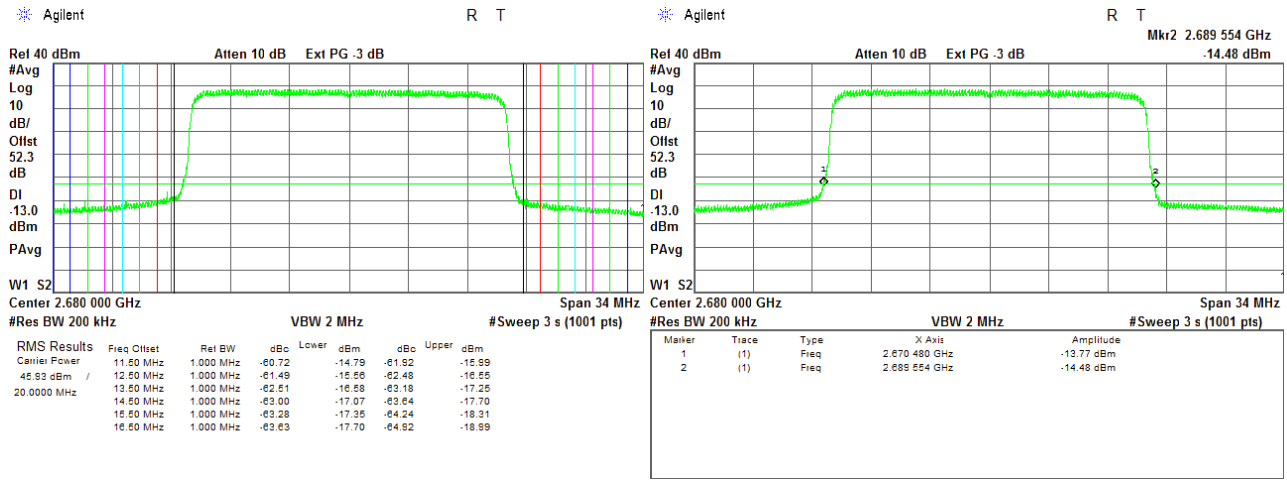
Plot 7.9.17 Spurious emission at band edges test results at mid carrier frequency, 20 MHz EBW

DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 95 Mbps



Plot 7.9.18 Spurious emission at band edges test results at high carrier frequency, 20 MHz EBW

DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 95 Mbps



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):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

7.10 Spurious emissions at RF antenna connector test

7.10.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.10.1.

Table 7.10.1 Spurious emission limits

Frequency, MHz	Attenuation below carrier, dBc	Spurious emissions, dBm
Base and fixed user stations		
0.009 – 10th harmonic	43+10logP(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

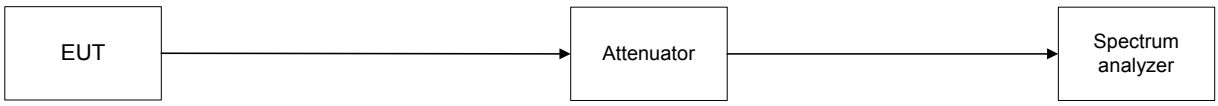
7.10.2 Test procedure

7.10.2.1 The EUT was set up as shown in Figure 7.10.1, energized and its proper operation was checked.

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

7.10.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.10.2 and associated plots.

Figure 7.10.1 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):	10-Nov-16		
Temperature: 26 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1016 hPa	**Power:** 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.10.2 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								
2489.00	-28.52	included	included	1000	-28.52	-13.00	-15.52	Pass
2508.11	-24.04	included	included	1000	-24.04	-13.00	-11.04	Pass
Mid carrier frequency 2593.0 MHz								
2582.90	-22.20	included	included	1000	-22.20	-13.00	-9.2	Pass
2602.50	-22.52	included	included	1000	-22.52	-13.00	-9.52	Pass
High carrier frequency 2687.5 MHz								
2677.49	-21.25	included	included	1000	-21.25	-13.00	-8.25	Pass
2697.05	-26.69	included	included	1000	-26.69	-13.00	-13.69	Pass

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

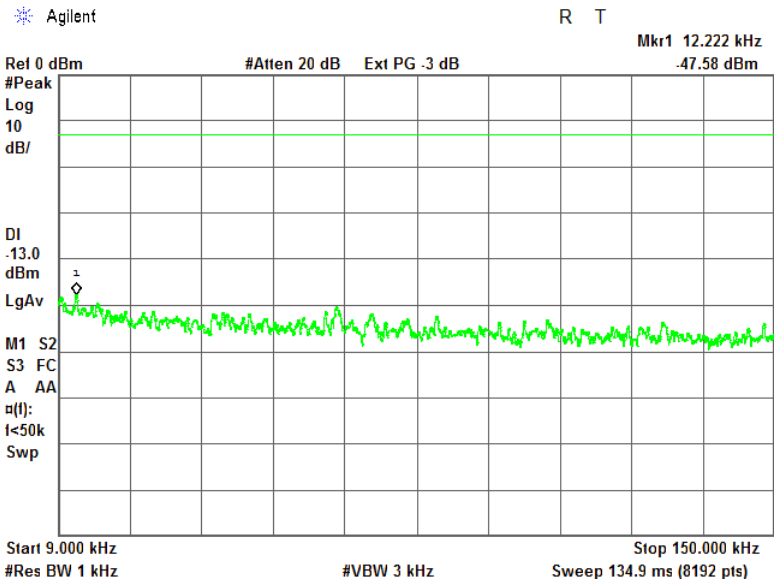
Reference numbers of test equipment used

HL 3322	HL 3818	HL 3903	HL 3901	HL 4756			

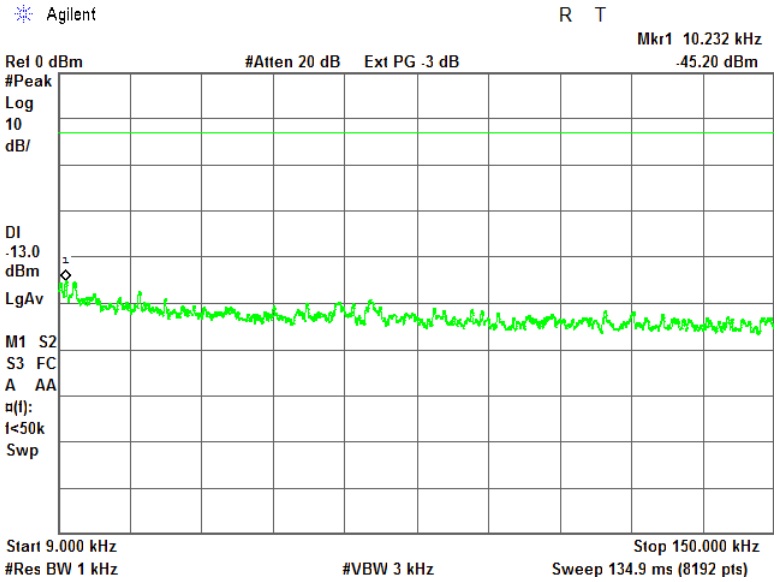
Full description is given in Appendix A.

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):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.10.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

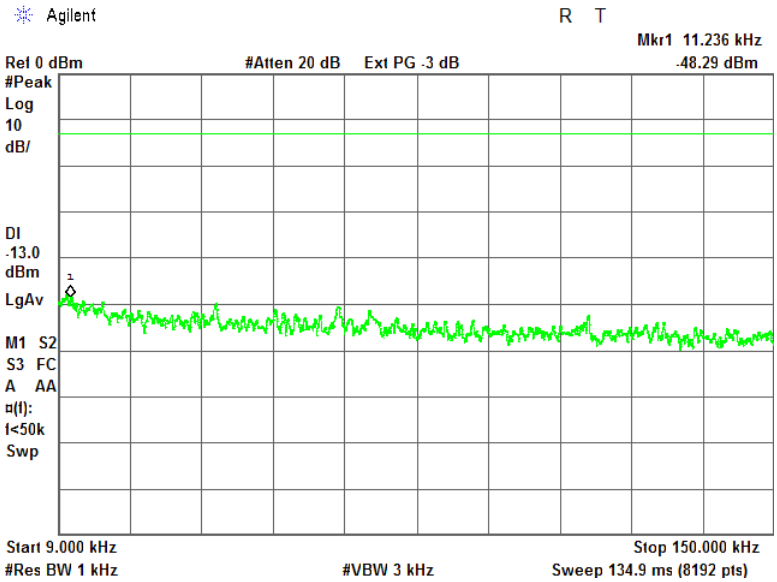


Plot 7.10.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

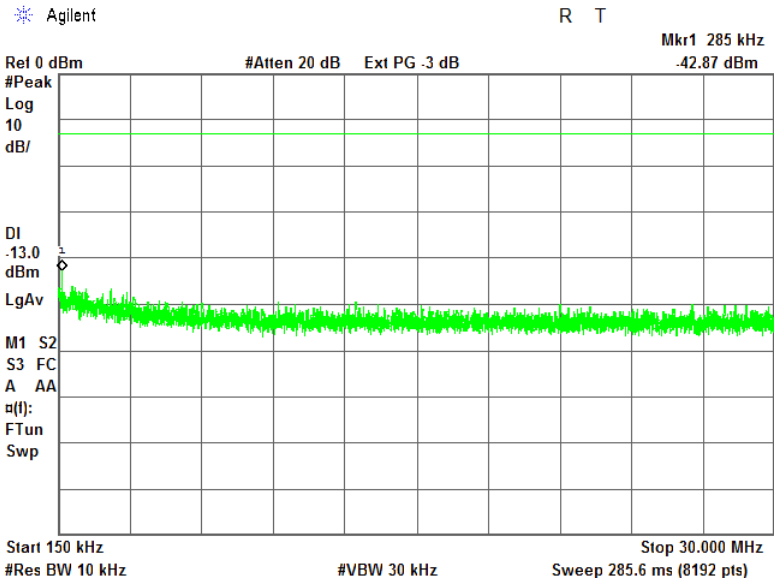


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.10.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

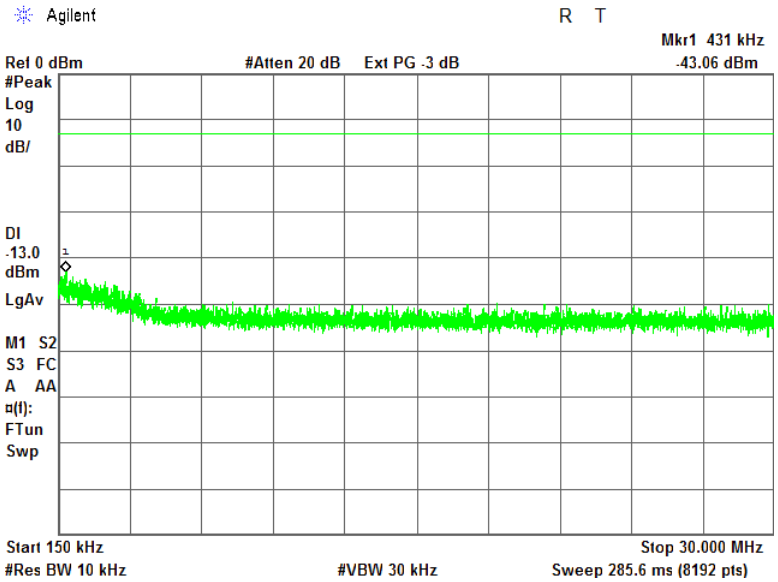


Plot 7.10.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

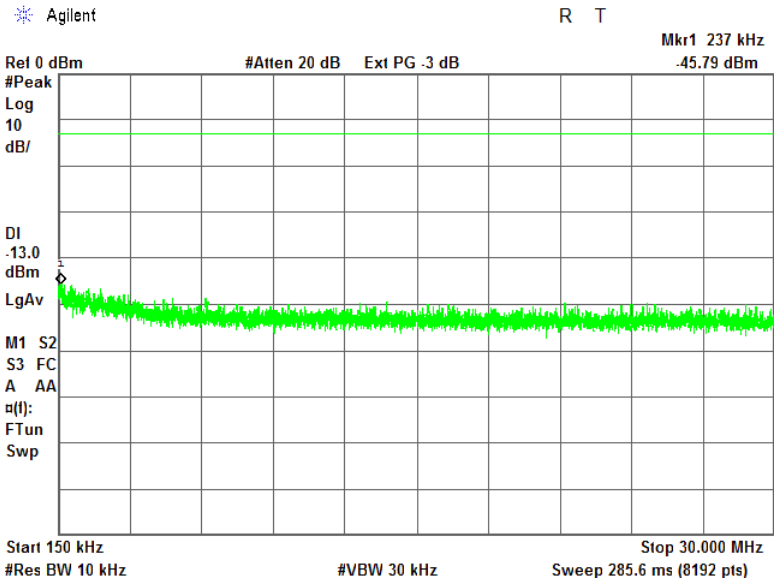


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.10.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency

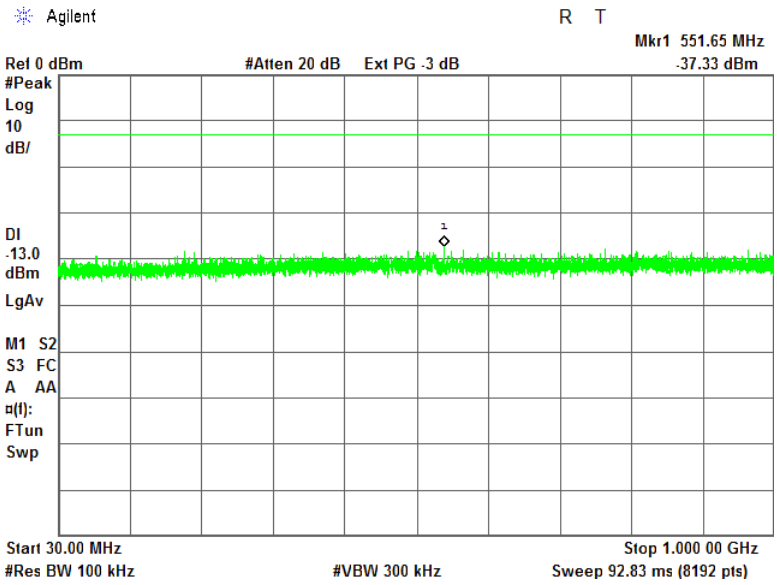


Plot 7.10.6 Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency

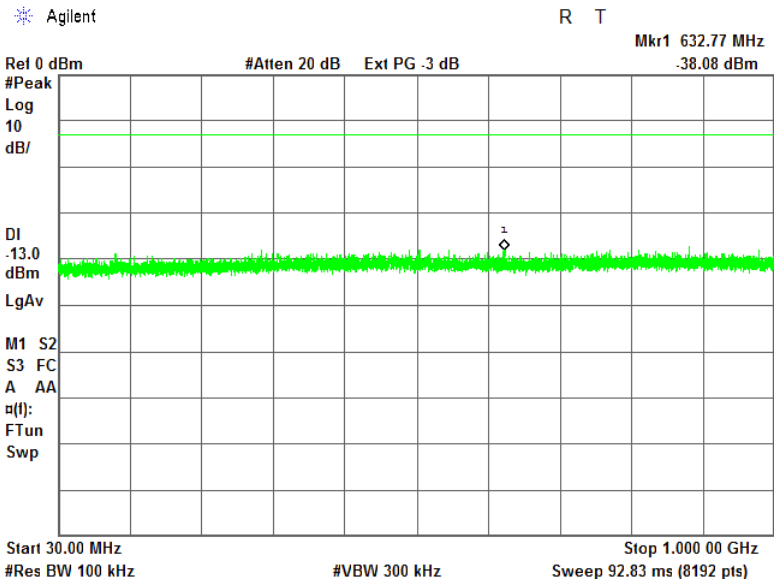


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.10.7 Spurious emission measurements in 30 - 1000 MHz range at low carrier frequency

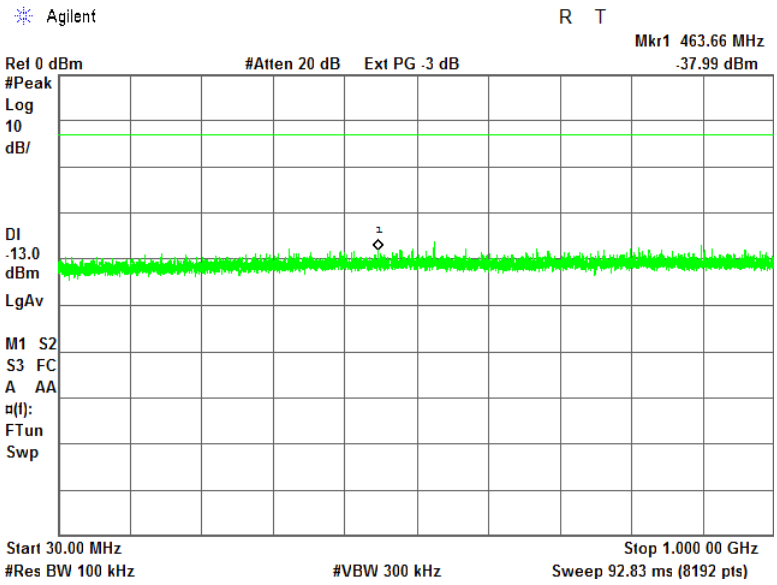


Plot 7.10.8 Spurious emission measurements in 30 - 1000 MHz range at mid carrier frequency

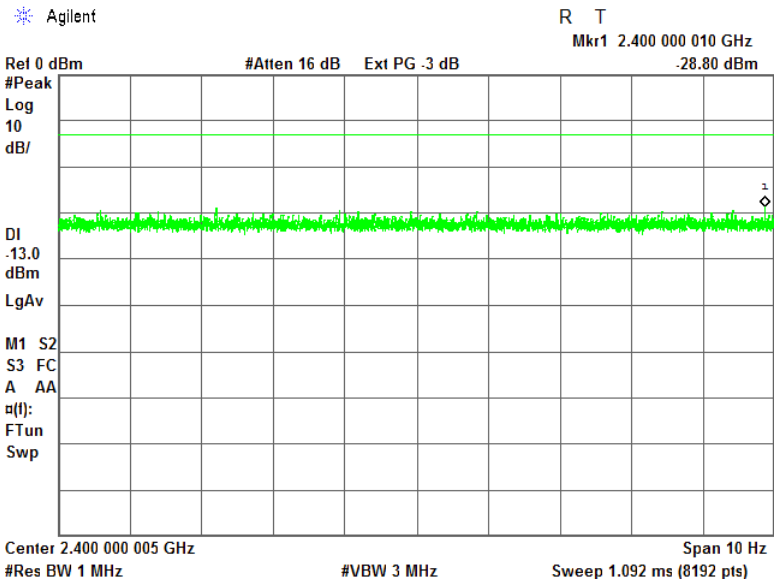


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.10.9 Spurious emission measurements in 30 - 1000 MHz range at high carrier frequency

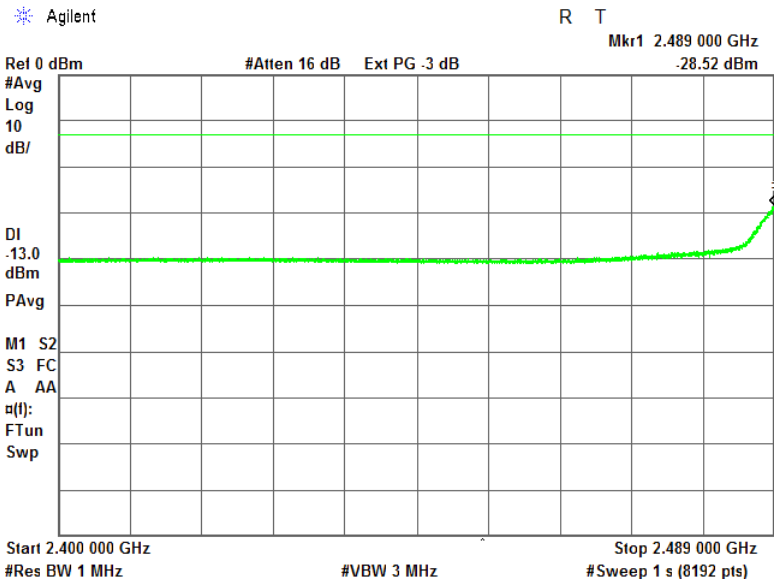


Plot 7.10.10 Spurious emission measurements in 1000 - 2400 MHz range at low carrier frequency



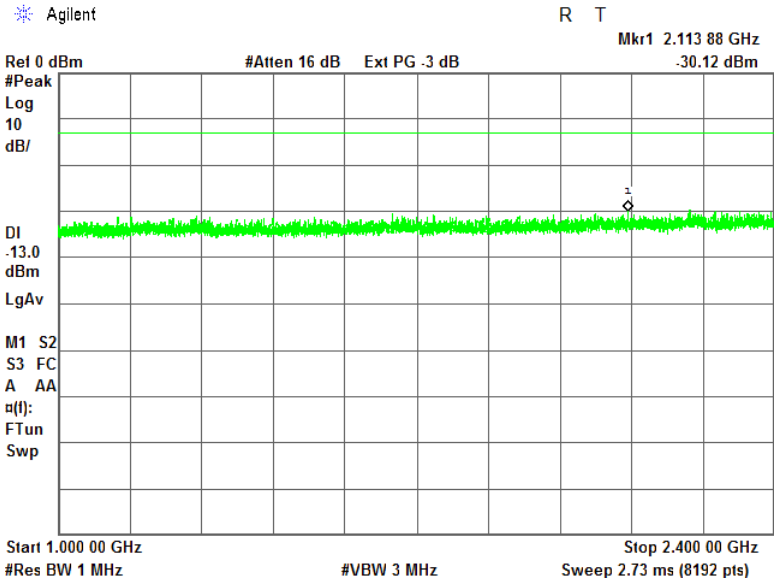
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.10.11 Spurious emission measurements in 2400 – 2489 MHz range at low carrier frequency



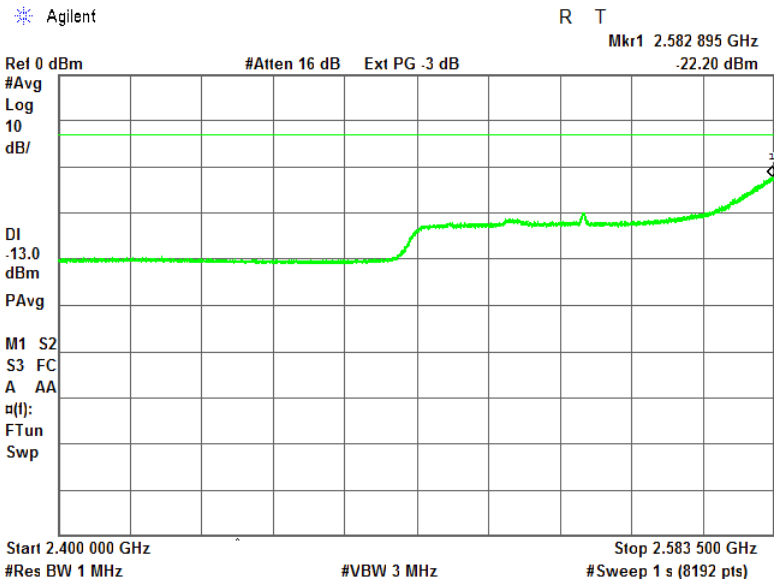
NOTE: Average Detector and Max Hold were used

Plot 7.10.12 Spurious emission measurements in 1000 - 2400 MHz at mid carrier frequency



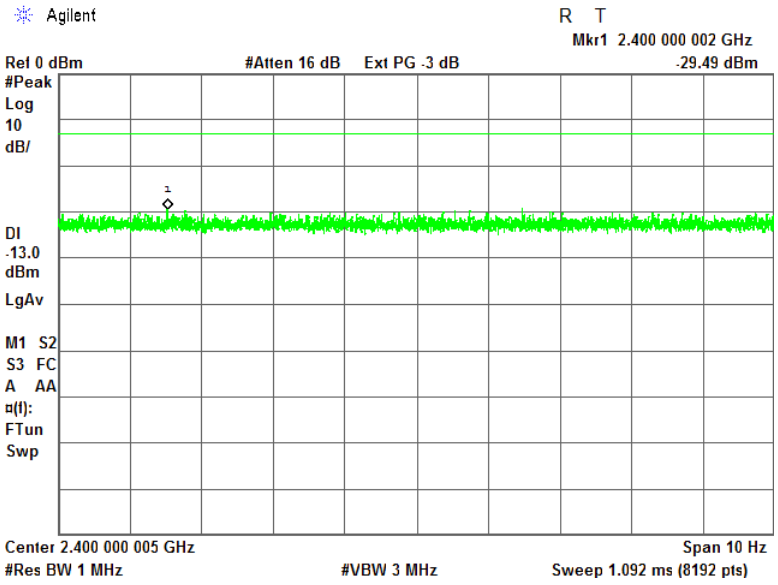
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.10.13 Spurious emission measurements in 2400 – 2583.5 MHz at mid carrier frequency



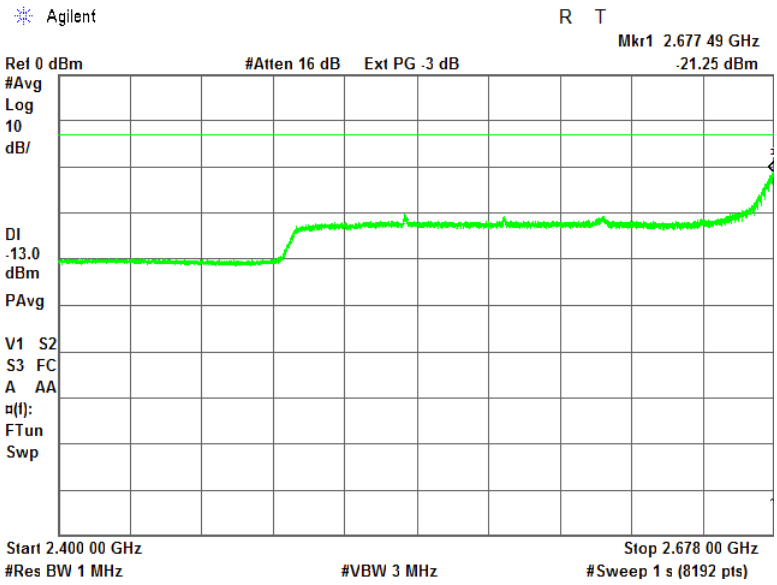
NOTE: Average Detector and Max Hold were used

Plot 7.10.14 Spurious emission measurements in 1000 - 2400 MHz at high carrier frequency



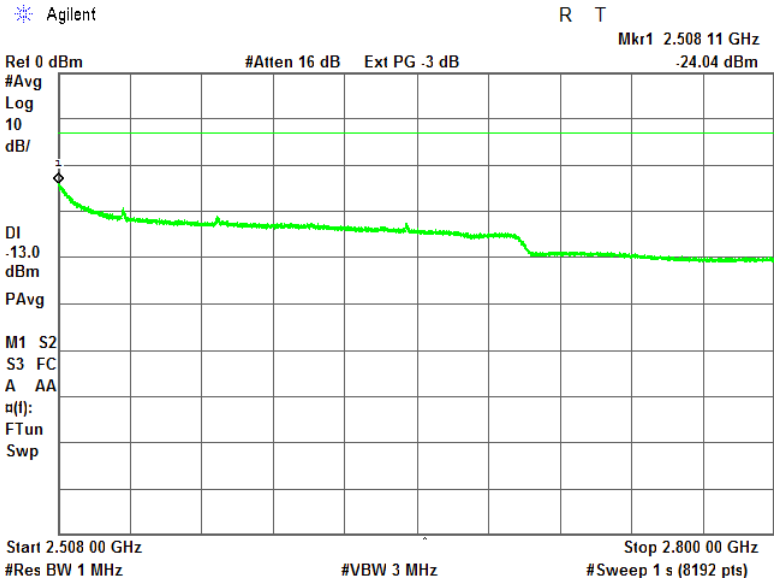
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.10.15 Spurious emission measurements in 2400 -2678 MHz at high carrier



NOTE: Average Detector and Max Hold were used

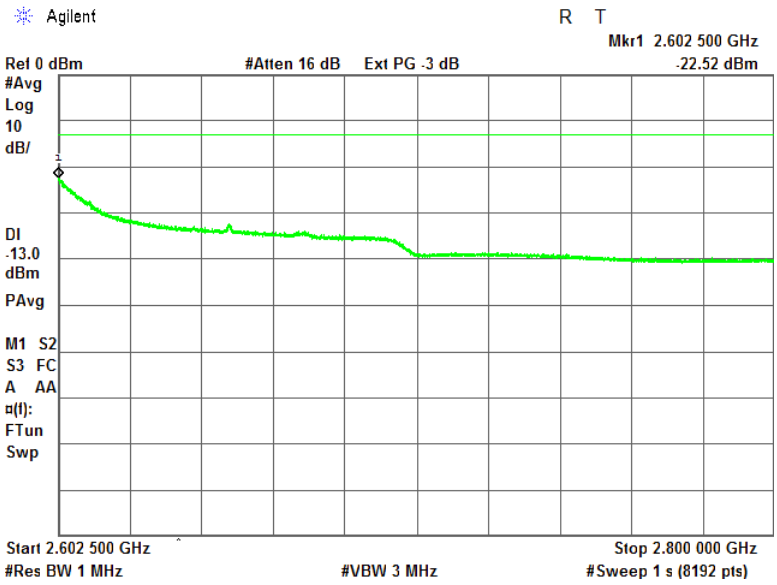
Plot 7.10.16 Spurious emission measurements in 2508 - 2800 MHz range at low carrier frequency



NOTE: Average Detector and Max Hold were used

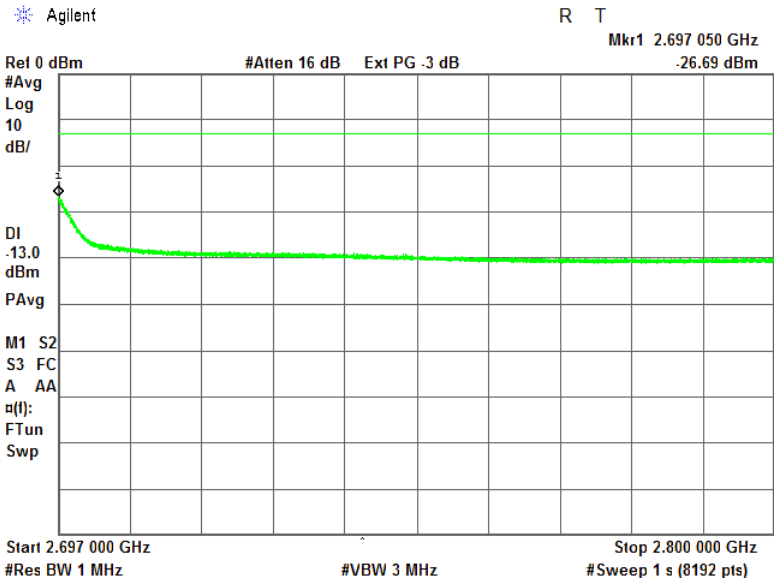
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.10.17 Spurious emission measurements in 2602.5 - 2800 MHz at mid carrier frequency



NOTE: Average Detector and Max Hold were used

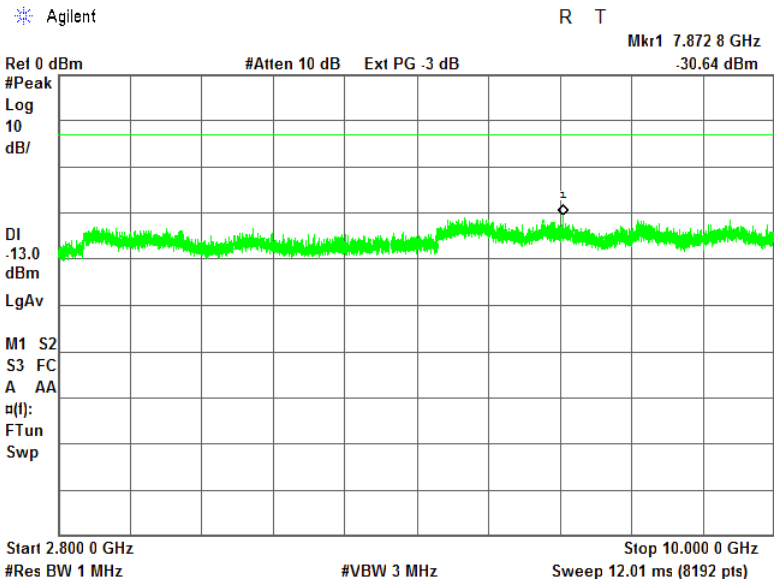
Plot 7.10.18 Spurious emission measurements in 2697 - 2800 MHz at high carrier frequency



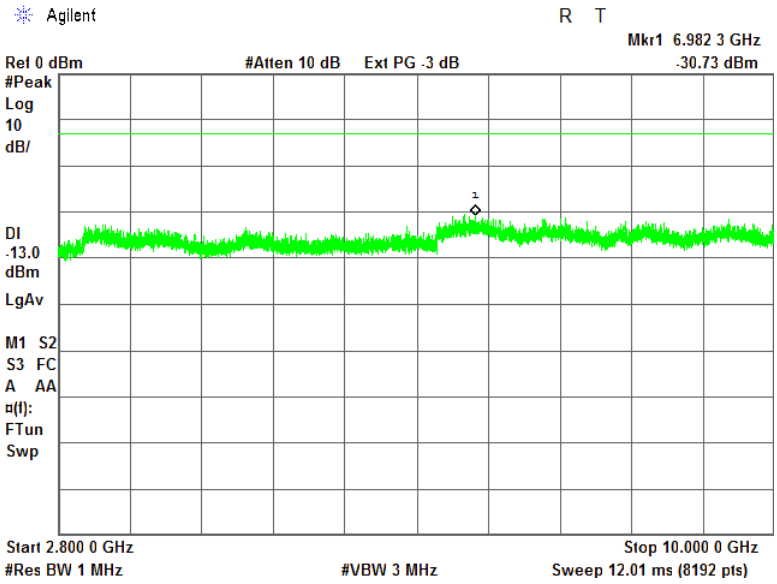
NOTE: Average Detector and Max Hold were used

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):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.10.19 Spurious emission measurements in 2800-10000 MHz range at low carrier frequency

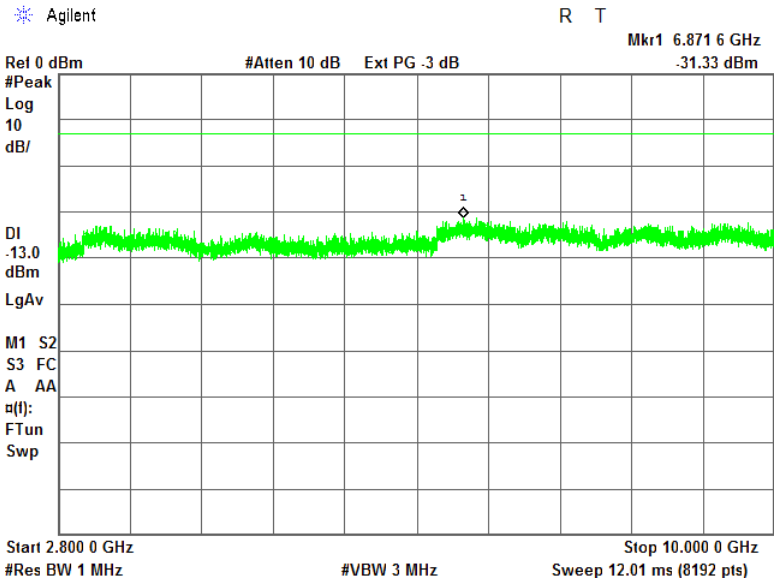


Plot 7.10.20 Spurious emission measurements in 2800 - 10000 MHz at mid carrier frequency

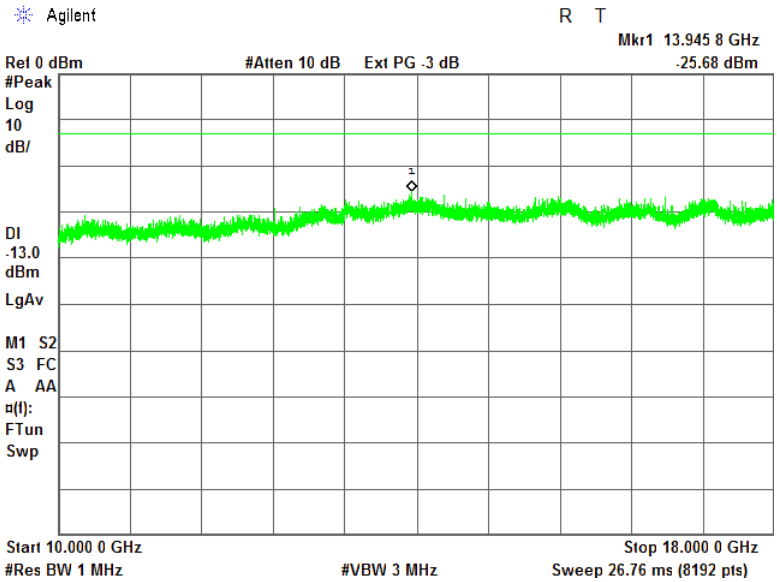


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.10.21 Spurious emission measurements in 2800 - 10000 MHz at high carrier frequency

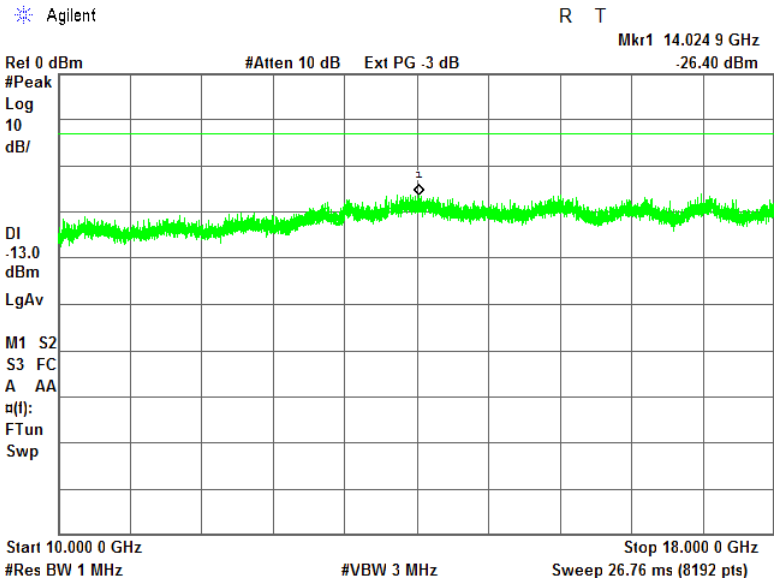


Plot 7.10.22 Spurious emission measurements in 10000-18000 MHz range at low carrier frequency

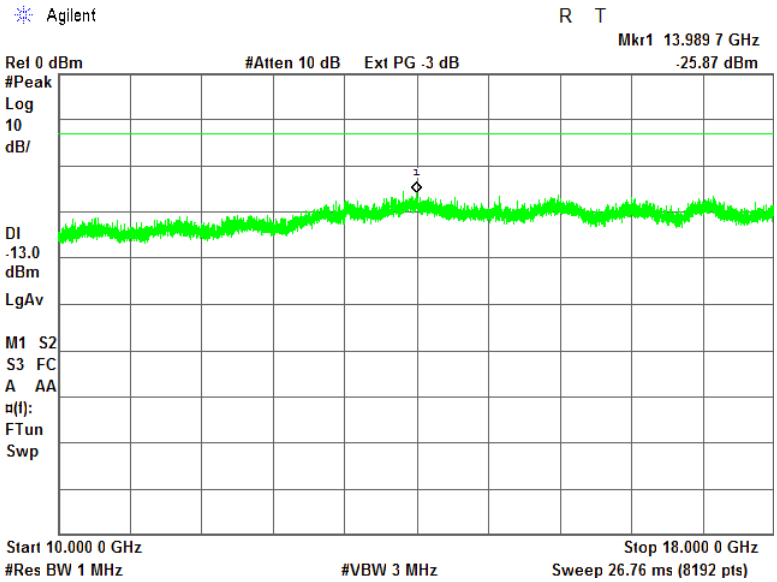


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.10.23 Spurious emission measurements in 10000 - 18000 MHz at mid carrier frequency

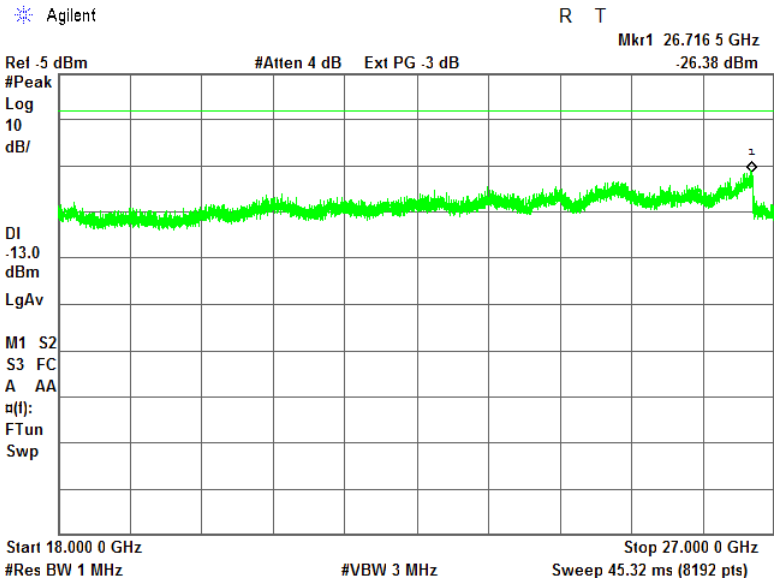


Plot 7.10.24 Spurious emission measurements in 10000 - 18000 MHz at high carrier frequency

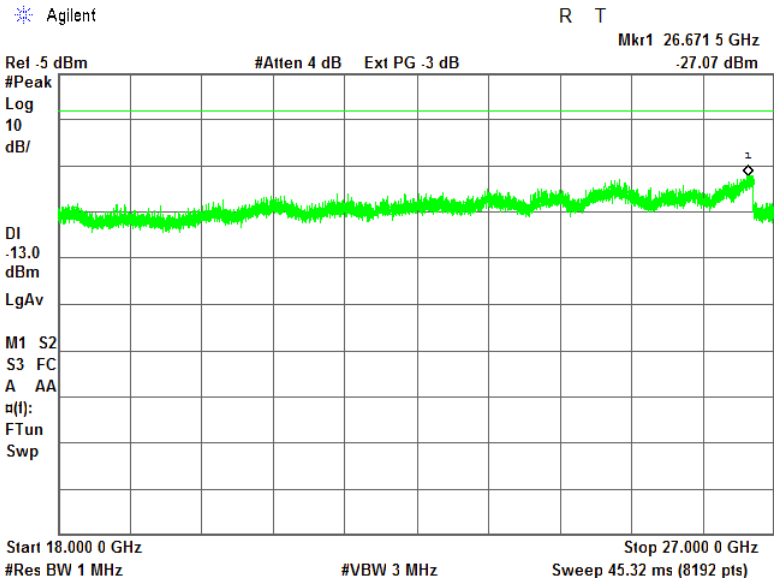


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.10.25 Spurious emission measurements in 18000-27000 MHz range at low carrier frequency

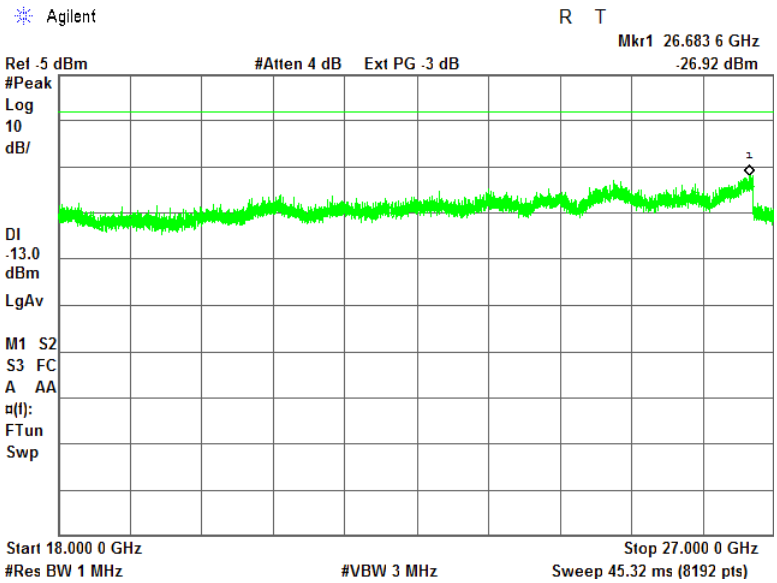


Plot 7.10.26 Spurious emission measurements in 18000 - 27000 MHz at mid carrier frequency



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):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.10.27 Spurious emission measurements in 18000 - 27000 MHz 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):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

7.11 Spurious emissions at RF antenna connector test

7.11.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.11.1.

Table 7.11.1 Spurious emission limits

Frequency, MHz	Attenuation below carrier, dBc	Spurious emissions, dBm
Base and fixed user stations		
0.009 – 10th harmonic	43+10logP(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

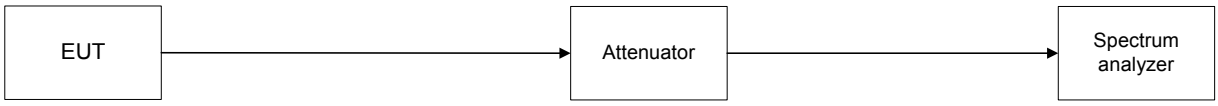
7.11.2 Test procedure

7.11.2.1 The EUT was set up as shown in Figure 7.11.1, energized and its proper operation was checked.

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

7.11.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.11.2 and associated plots.

Figure 7.11.1 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):	10-Nov-16		
Temperature: 26 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1016 hPa	**Power:** 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Table 7.11.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 2496-2572 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 –26000 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								
2488.98	-25.11	included	included	1000	-25.11	-13.00	-12.11	Pass
2508.00	-23.97	included	included	1000	-23.97	-13.00	-10.97	Pass
Mid carrier frequency 2532 MHz								
2520.77	-22.89	included	included	1000	-22.89	-13.00	-9.89	Pass
2541.53	-23.97	included	included	1000	-23.97	-13.00	-10.97	Pass
High carrier frequency 2565.5 MHz								
2555.09	-23.86	included	included	1000	-23.86	-13.00	-10.86	Pass
2575.11	-26.10	included	included	1000	-26.10	-13.00	-13.10	Pass

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

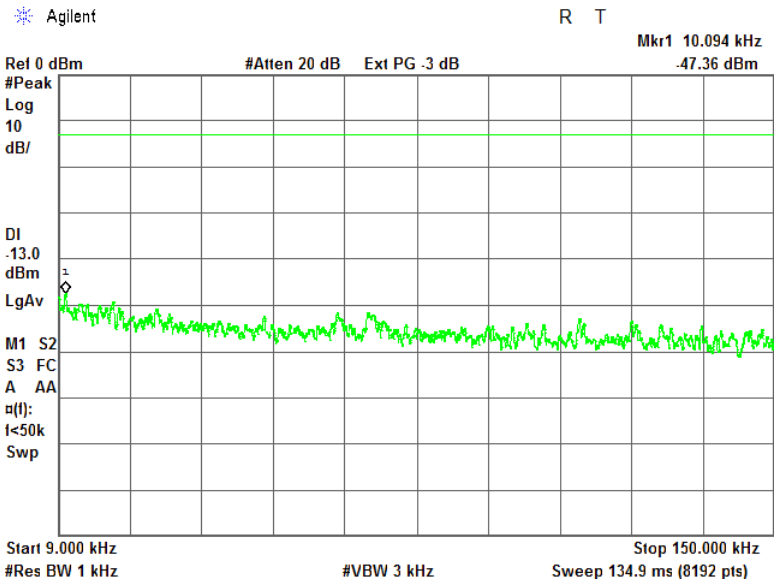
Reference numbers of test equipment used

HL 3322	HL 3818	HL 3903	HL 3901	HL 4756			

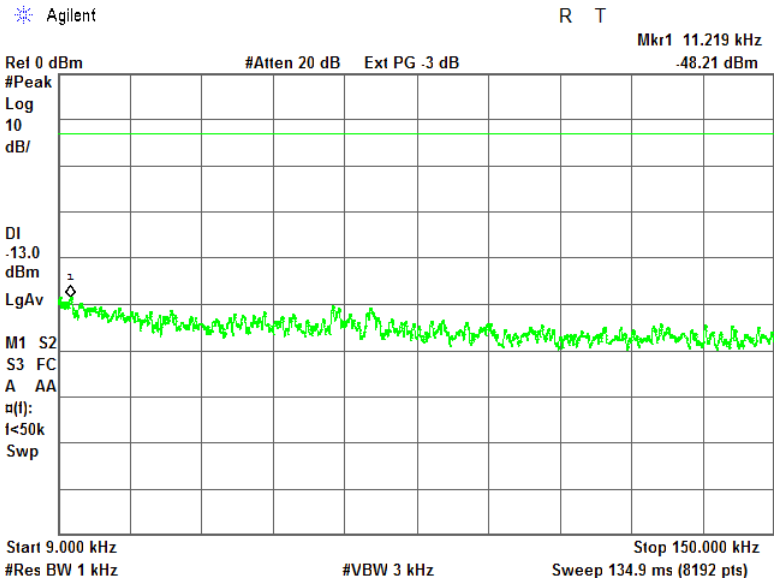
Full description is given in Appendix A.

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):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.11.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

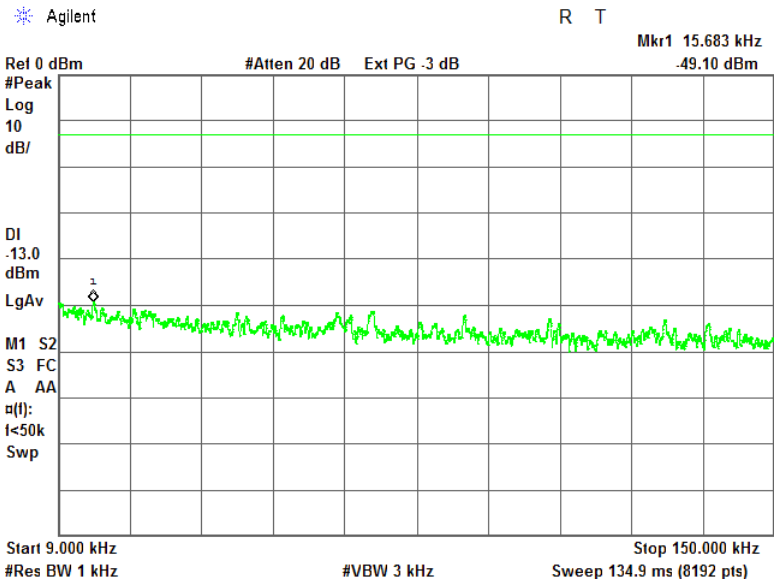


Plot 7.11.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

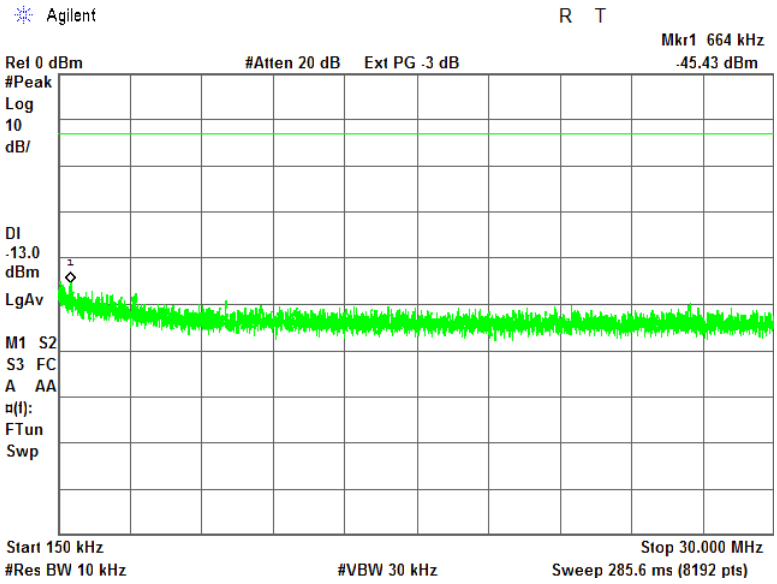


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.11.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

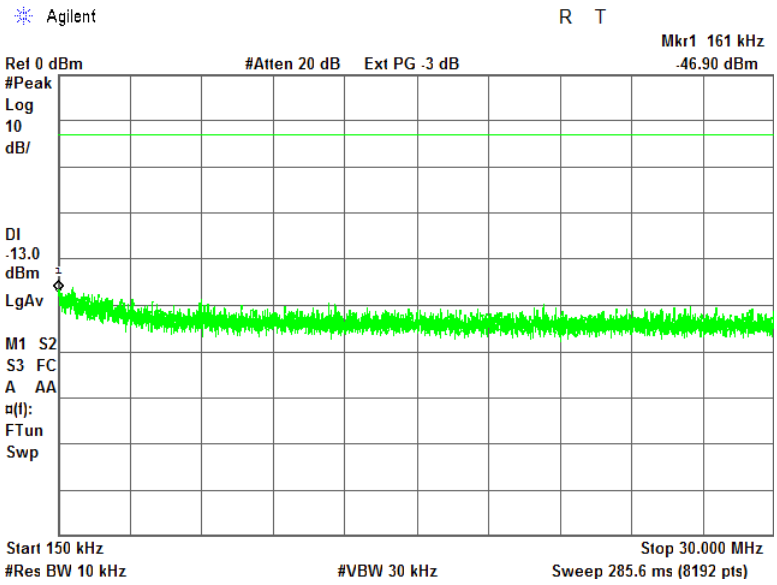


Plot 7.11.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

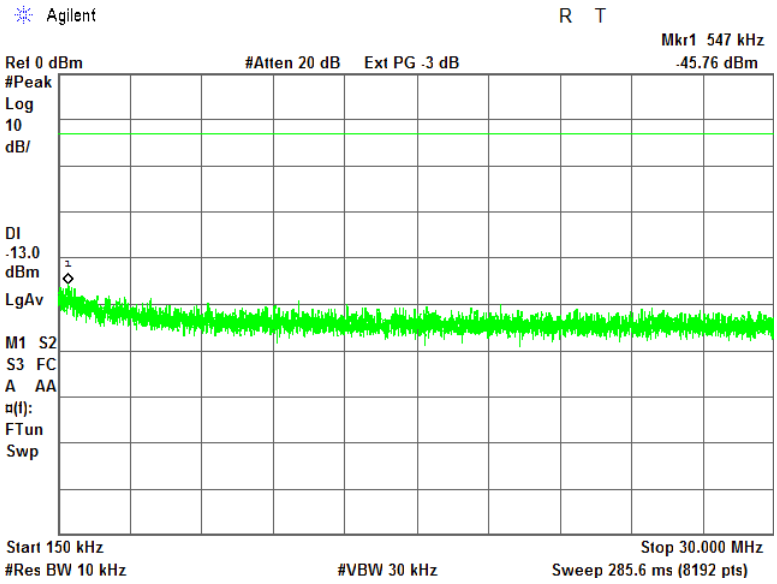


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.11.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency

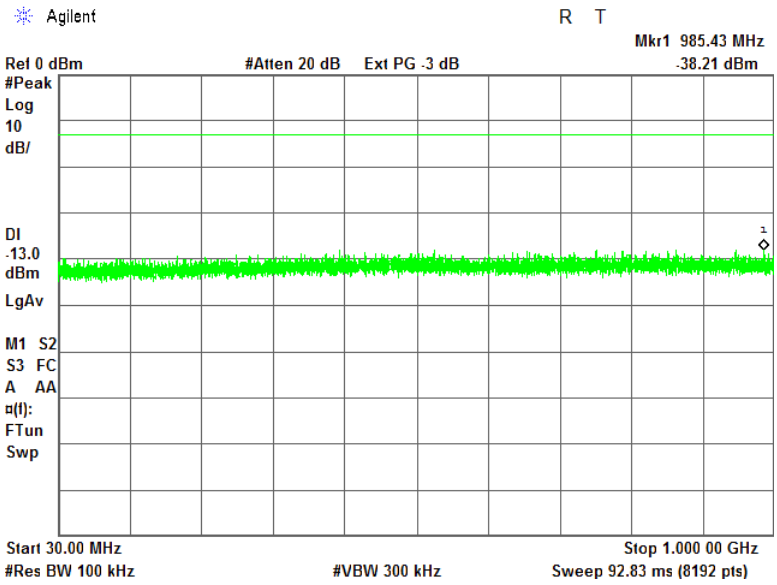


Plot 7.11.6 Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency

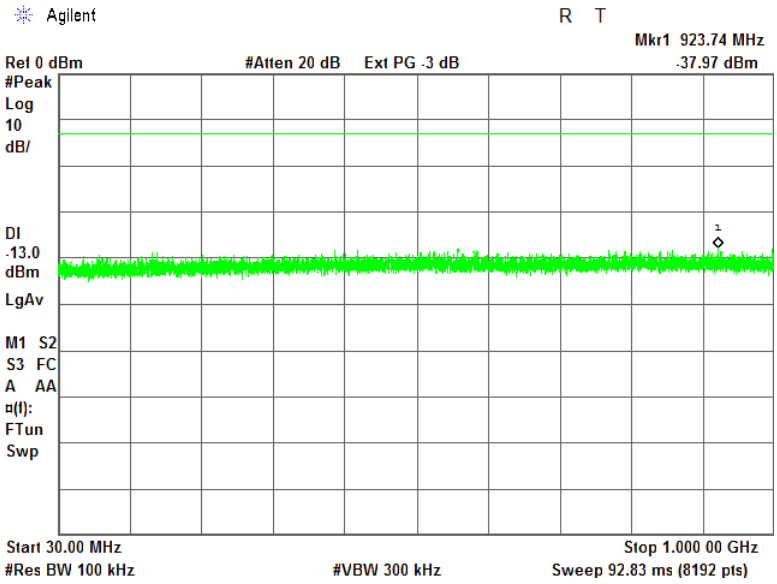


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.11.7 Spurious emission measurements in 30 - 1000 MHz range at low carrier frequency

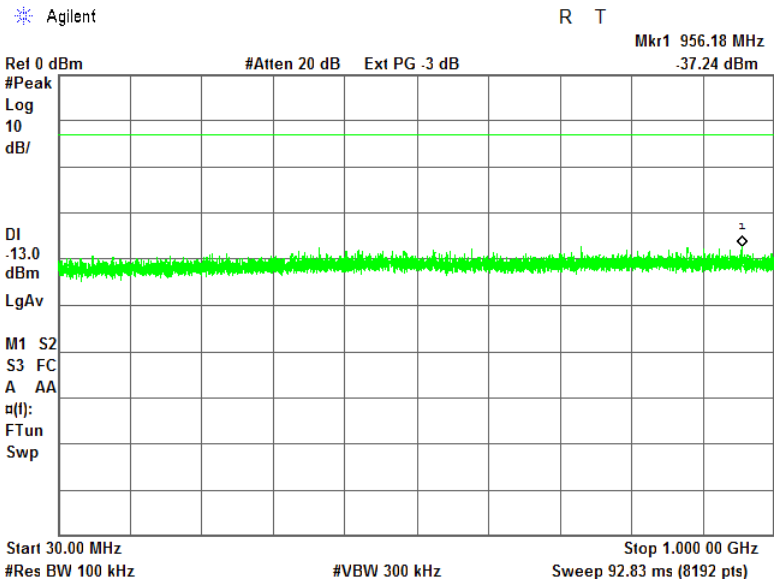


Plot 7.11.8 Spurious emission measurements in 30 - 1000 MHz range at mid carrier frequency

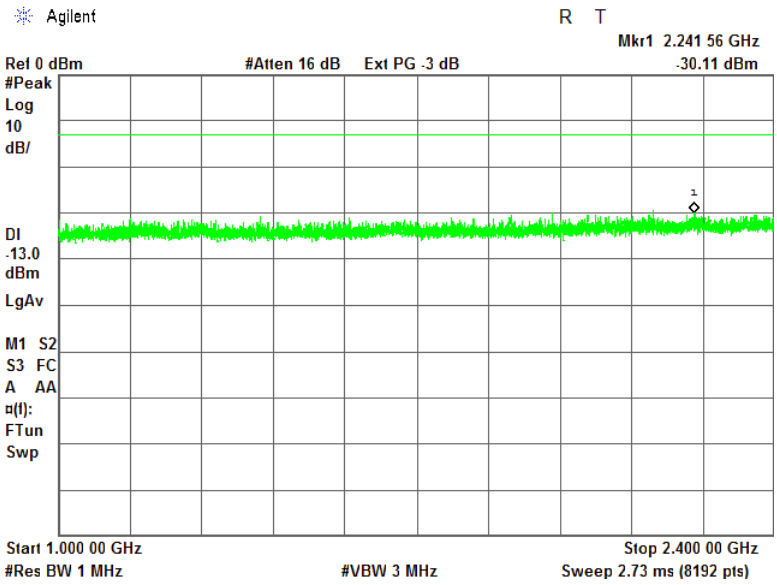


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.11.9 Spurious emission measurements in 30 - 1000 MHz range at high carrier frequency

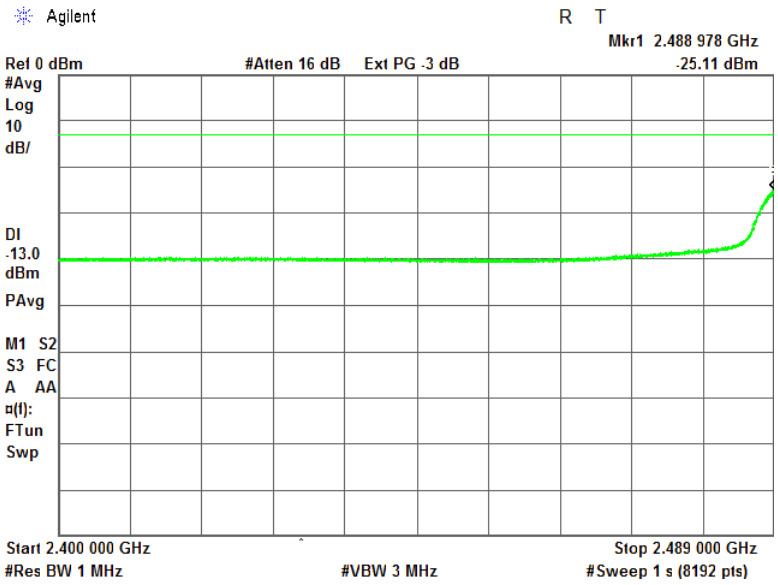


Plot 7.11.10 Spurious emission measurements in 1000 - 2400 MHz range at low carrier frequency



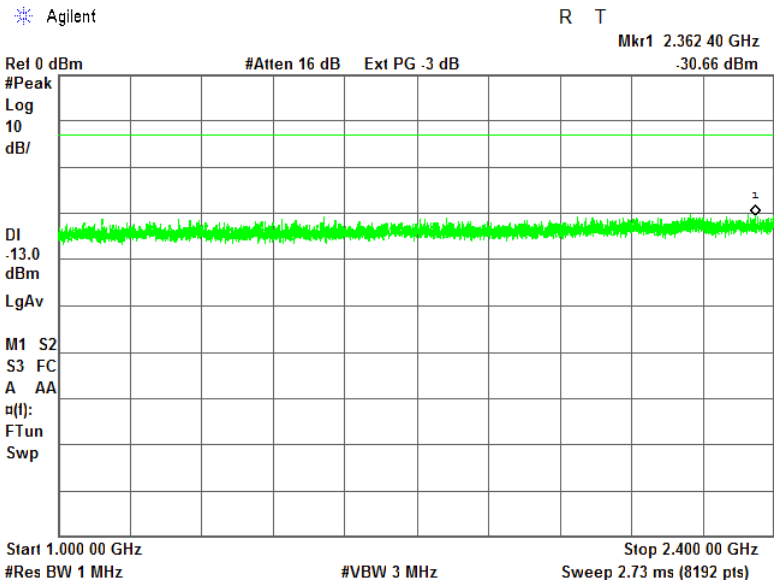
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.11.11 Spurious emission measurements in 2400 - 2489 MHz range at low carrier frequency



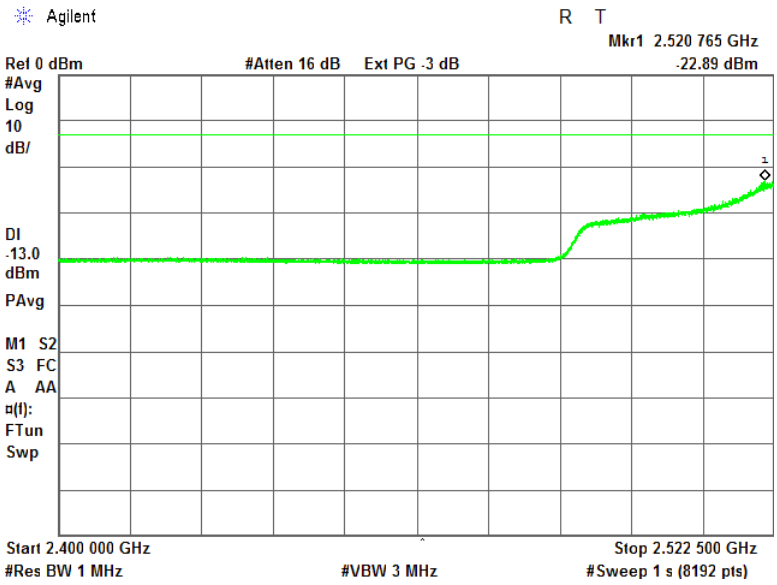
NOTE: Average Detector and Max Hold were used

Plot 7.11.12 Spurious emission measurements in 1000 - 2400 MHz at mid carrier frequency



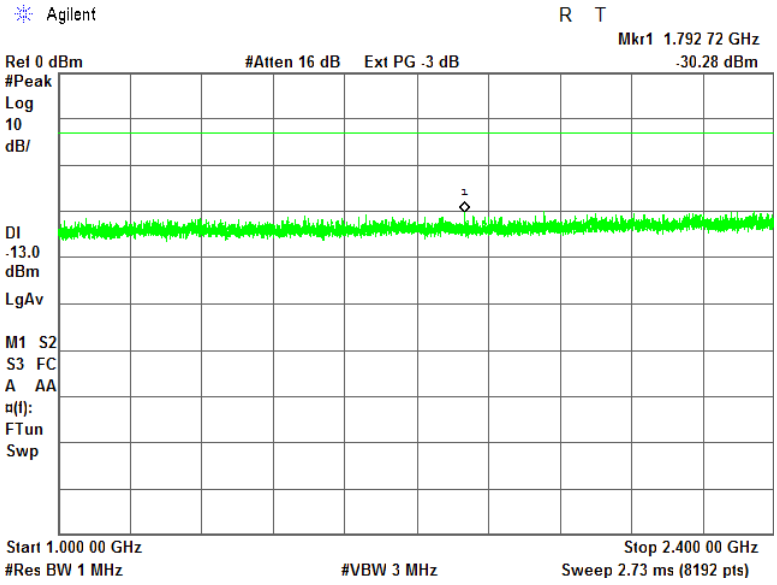
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.11.13 Spurious emission measurements in 2400 – 2522.5 MHz at mid carrier frequency



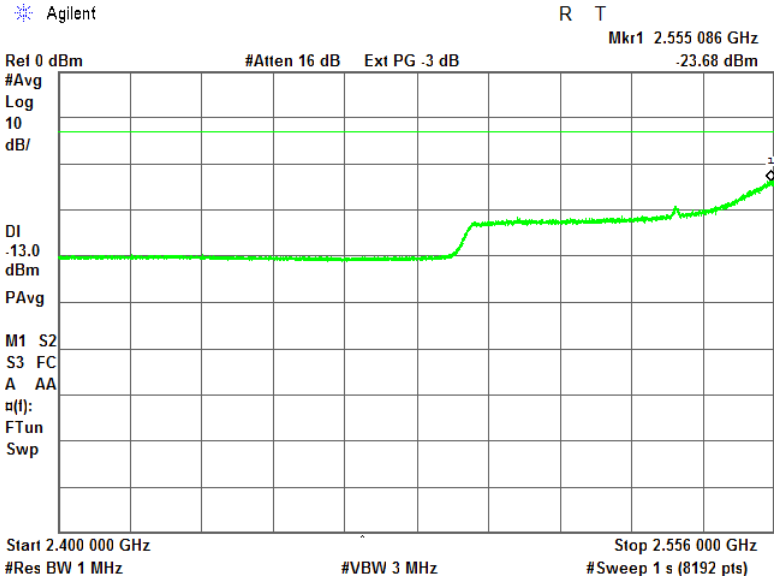
NOTE: Average Detector and Max Hold were used

Plot 7.11.14 Spurious emission measurements in 1000 - 2400 MHz at high carrier frequency



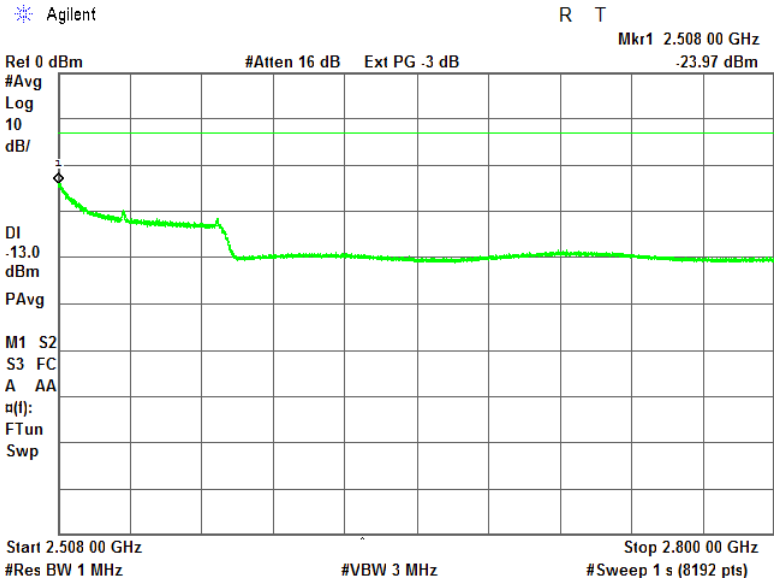
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.11.15 Spurious emission measurements in 2400 - 2556 MHz at high carrier frequency



NOTE: Average Detector and Max Hold were used

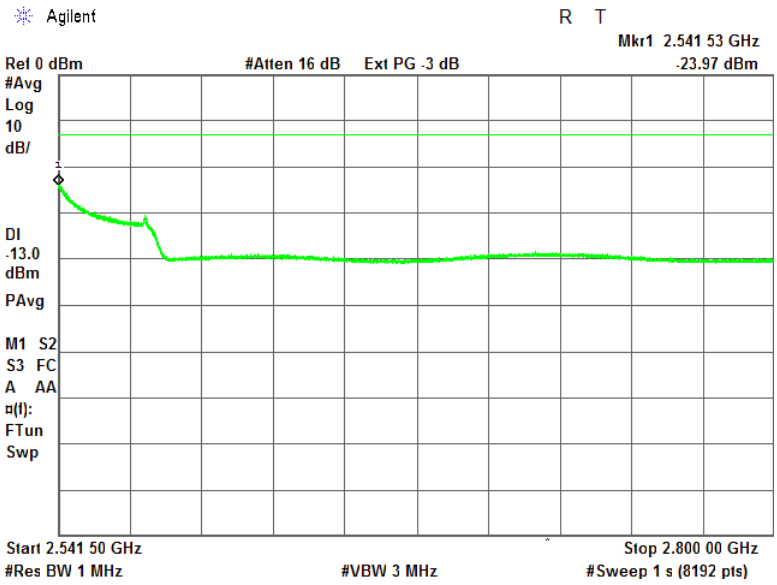
Plot 7.11.16 Spurious emission measurements in 2508 - 2800 MHz range at low carrier frequency



NOTE: Average Detector and Max Hold were used

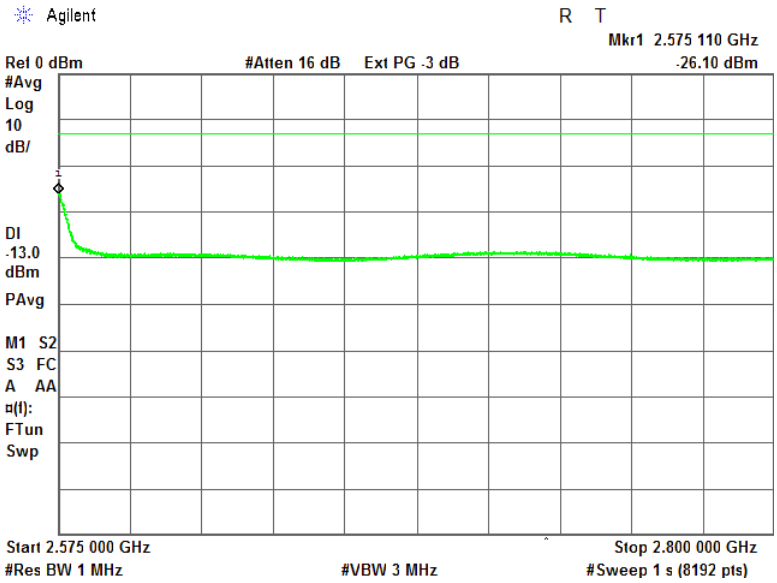
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.11.17 Spurious emission measurements in 2541 - 2800 MHz at mid carrier frequency



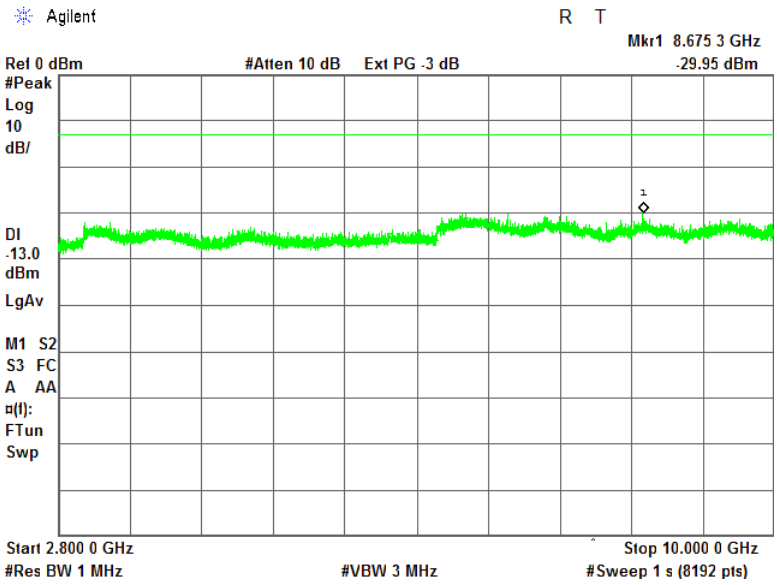
NOTE: Average Detector and Max Hold were used

Plot 7.11.18 Spurious emission measurements in 2575 - 2800 MHz at high carrier frequency

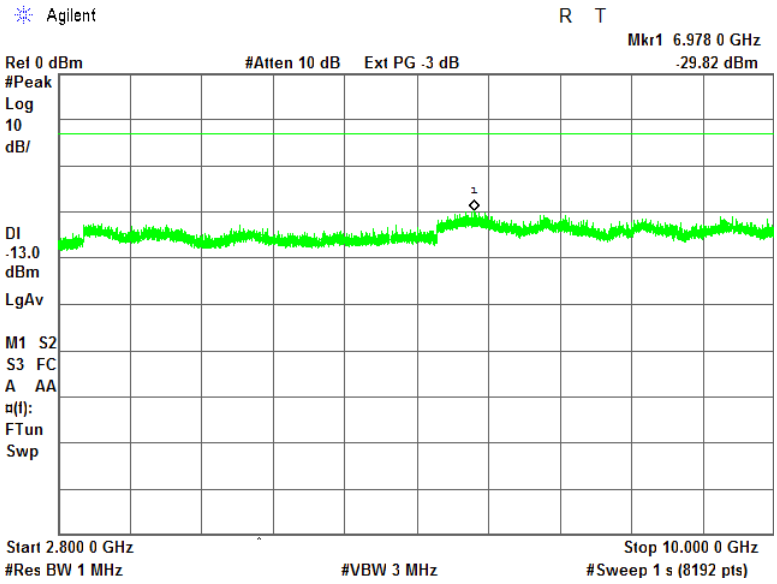


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.11.19 Spurious emission measurements in 2800-10000 MHz range at low carrier frequency

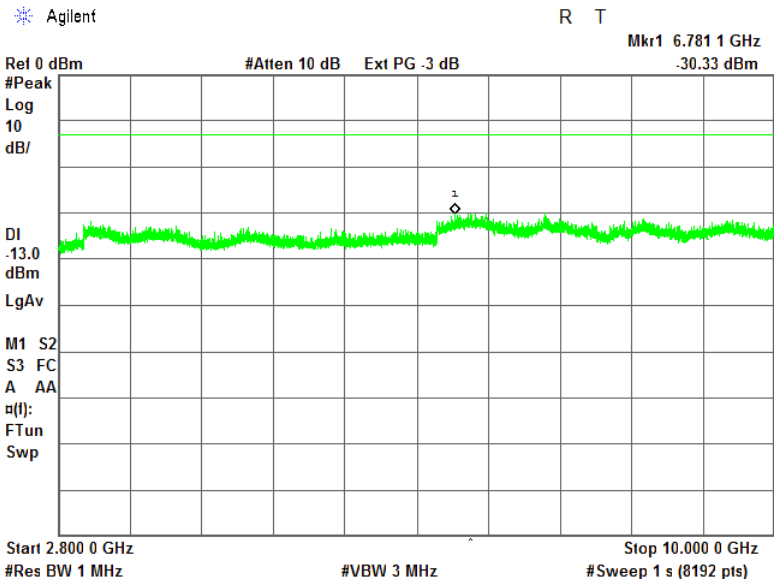


Plot 7.11.20 Spurious emission measurements in 2800 - 10000 MHz at mid carrier frequency

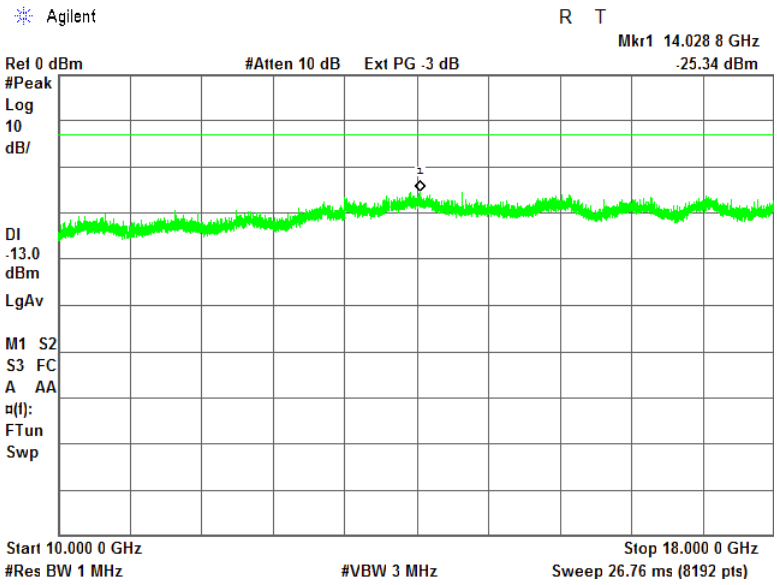


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.11.21 Spurious emission measurements in 2800 - 10000 MHz at high carrier frequency

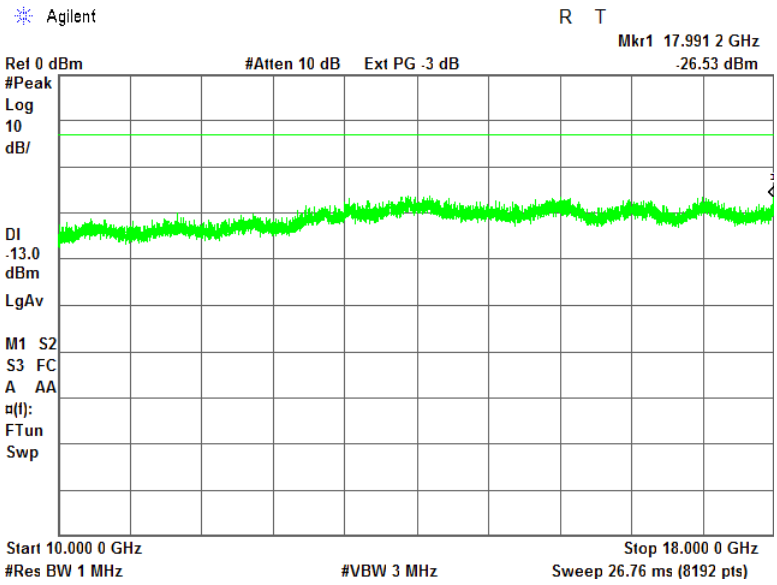


Plot 7.11.22 Spurious emission measurements in 10000-18000 MHz range at low carrier frequency

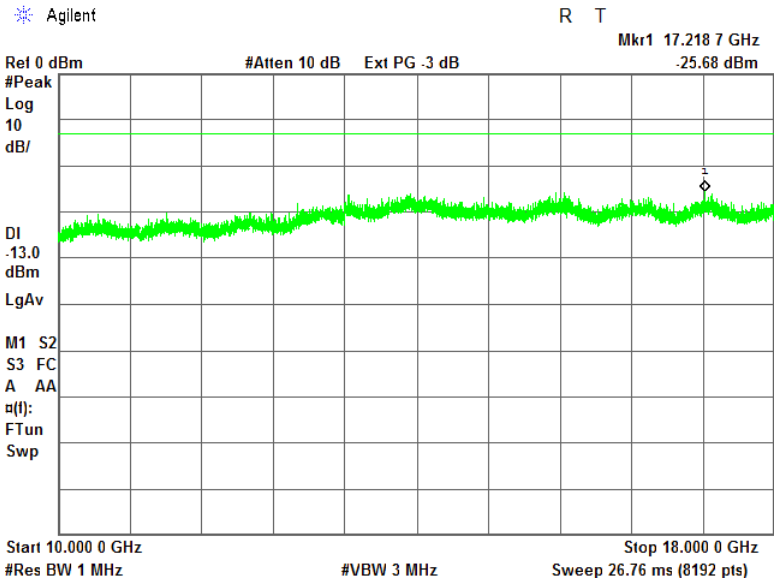


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.11.23 Spurious emission measurements in 10000 - 18000 MHz at mid carrier frequency

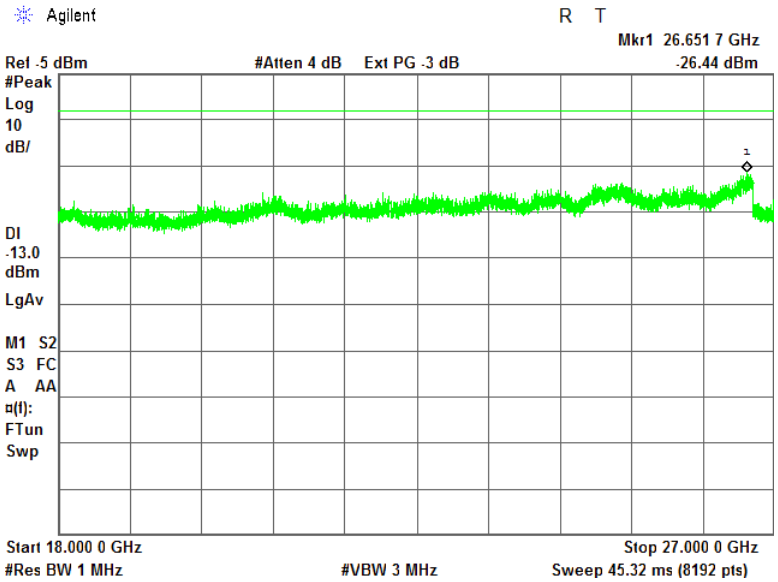


Plot 7.11.24 Spurious emission measurements in 10000 - 18000 MHz at high carrier frequency

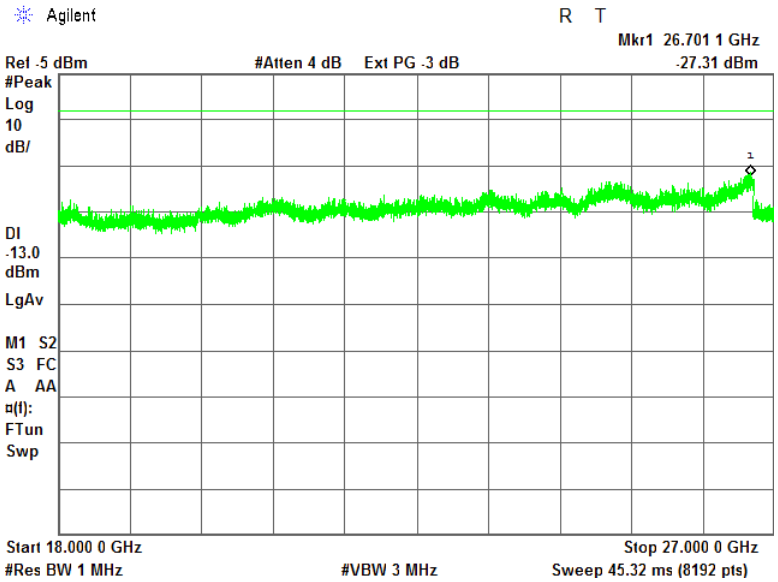


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.11.25 Spurious emission measurements in 18000-26000 MHz range at low carrier frequency

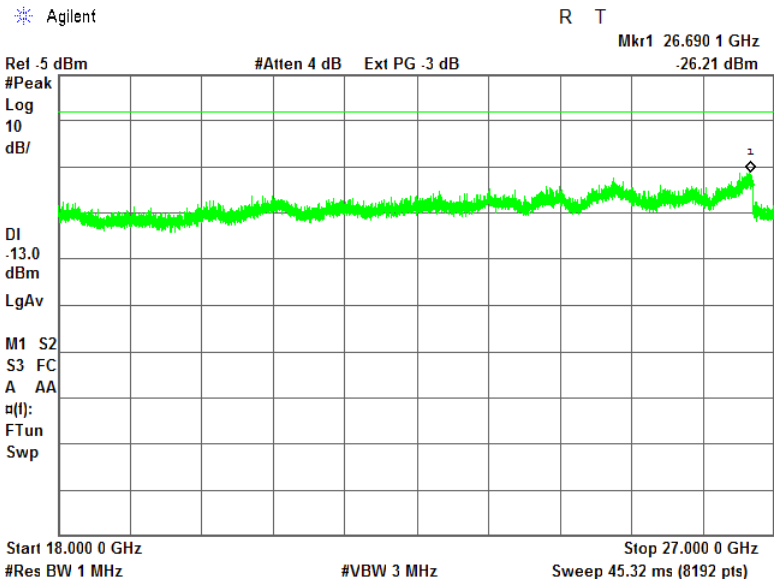


Plot 7.11.26 Spurious emission measurements in 18000 - 26000 MHz at mid carrier frequency



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):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in low band 2498.5 – 2565.5 MHz			

Plot 7.11.27 Spurious emission measurements in 18000 - 26000 MHz 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):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

7.12 Spurious emissions at RF antenna connector test

7.12.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.12.1.

Table 7.12.1 Spurious emission limits

Frequency, MHz	Attenuation below carrier, dBc	Spurious emissions, dBm
Base and fixed user stations		
0.009 – 10th harmonic	43+10logP(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

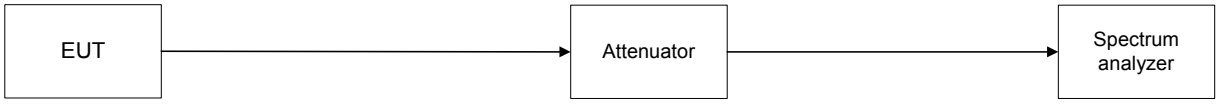
7.12.2 Test procedure

7.12.2.1 The EUT was set up as shown in Figure 7.12.1, energized and its proper operation was checked.

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

7.12.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.12.2 and associated plots.

Figure 7.12.1 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):	10-Nov-16		
Temperature: 26 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1016 hPa	**Power:** 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Table 7.12.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 2614 - 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 2620.5 MHz								
2610.85	-26.06	included	included	1000	-26.06	-13.00	-13.06	Pass
2630.00	-25.02	included	included	1000	-25.02	-13.00	-12.02	Pass
Mid carrier frequency 2654.0 MHz								
2644.23	-22.03	included	included	1000	-22.03	-13.00	-9.03	Pass
2663.73	-23.31	included	included	1000	-23.31	-13.00	-10.31	Pass
High carrier frequency 2687.5 MHz								
2677.42	-20.98	included	included	1000	-20.98	-13.00	-7.98	Pass
2697.10	-23.78	included	included	1000	-23.78	-13.00	-10.78	Pass

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

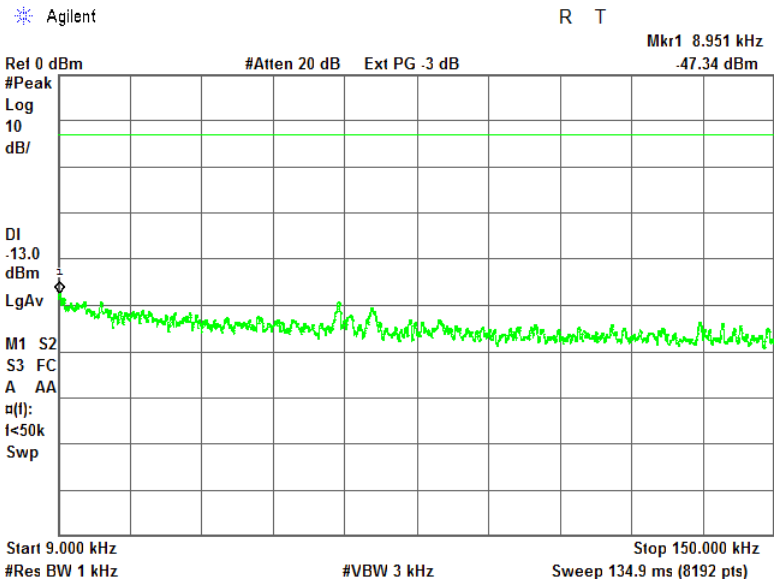
Reference numbers of test equipment used

HL 3322	HL 3818	HL 3903	HL 3901	HL 4756			

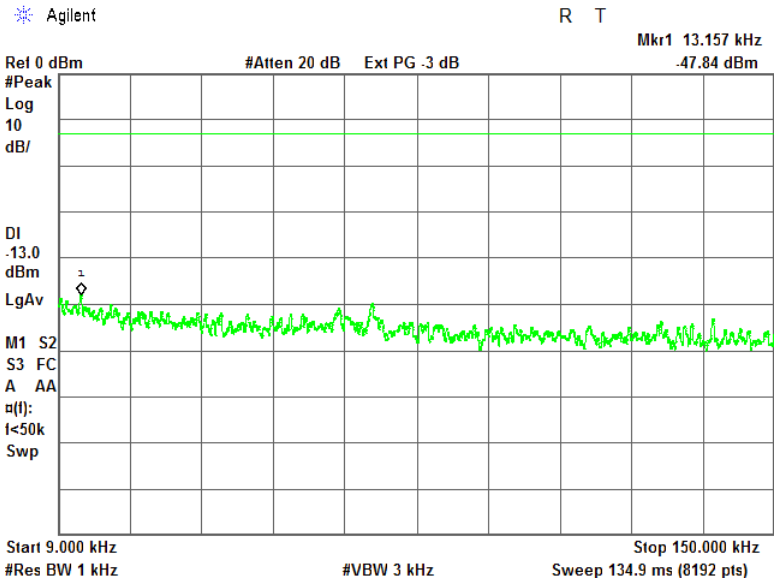
Full description is given in Appendix A.

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):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.12.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

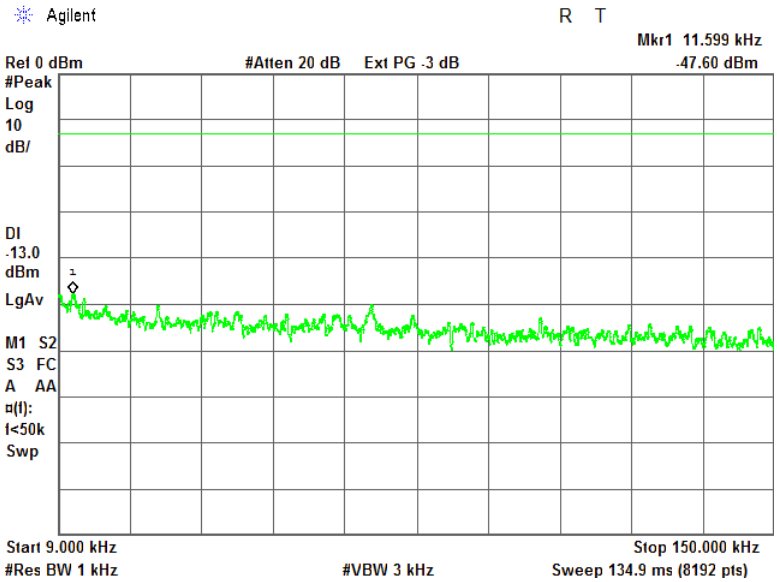


Plot 7.12.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

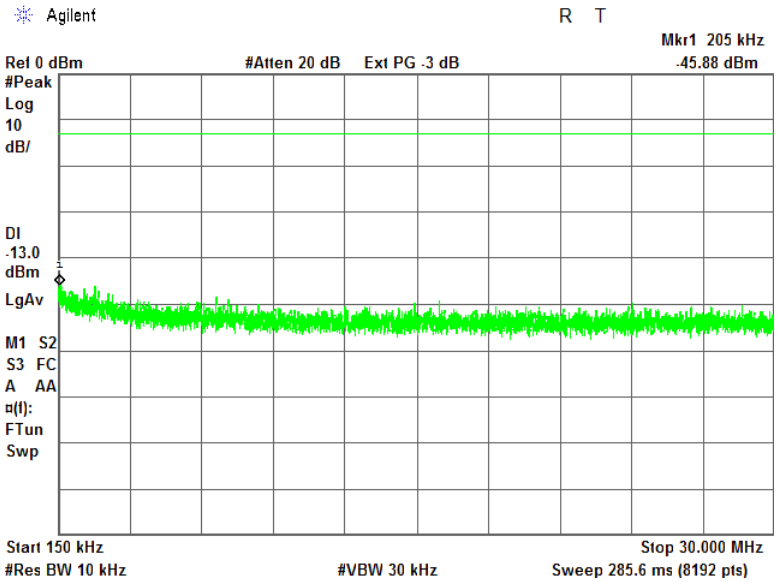


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.12.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

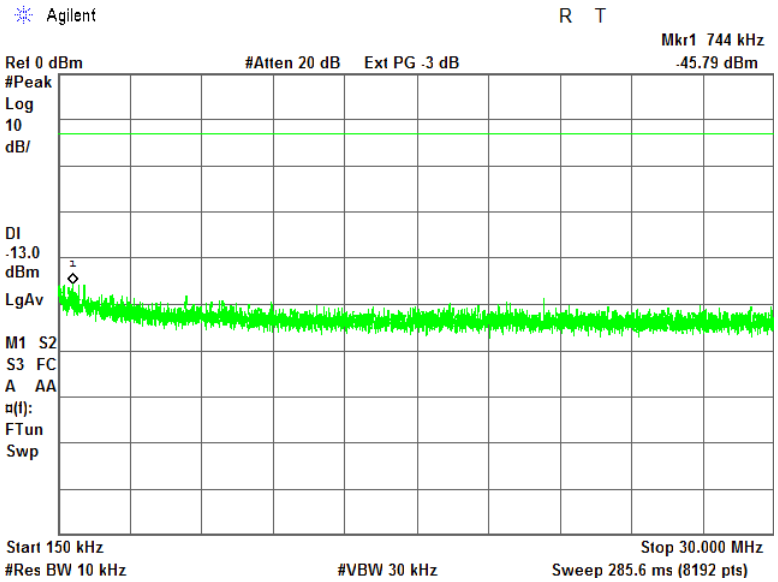


Plot 7.12.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

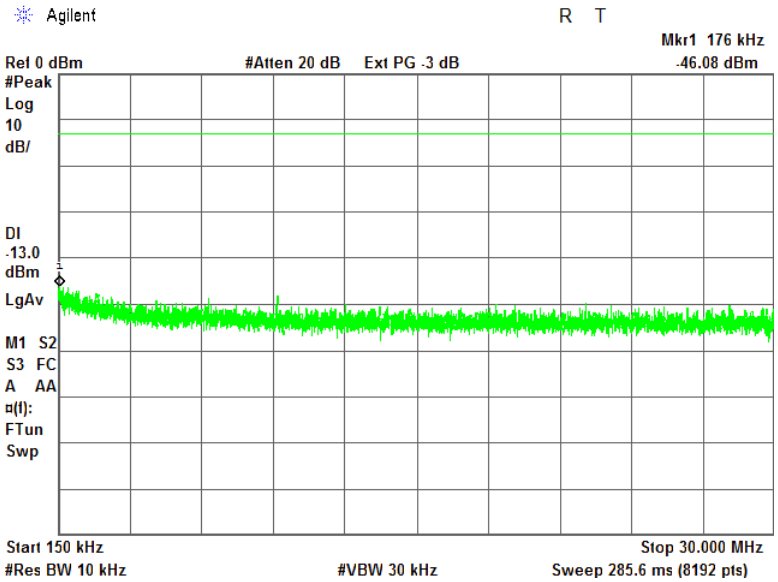


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.12.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency

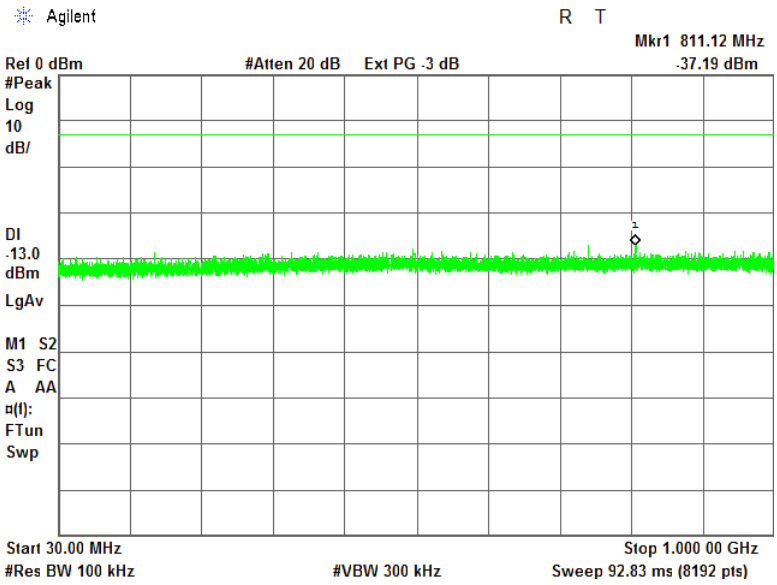


Plot 7.12.6 Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency

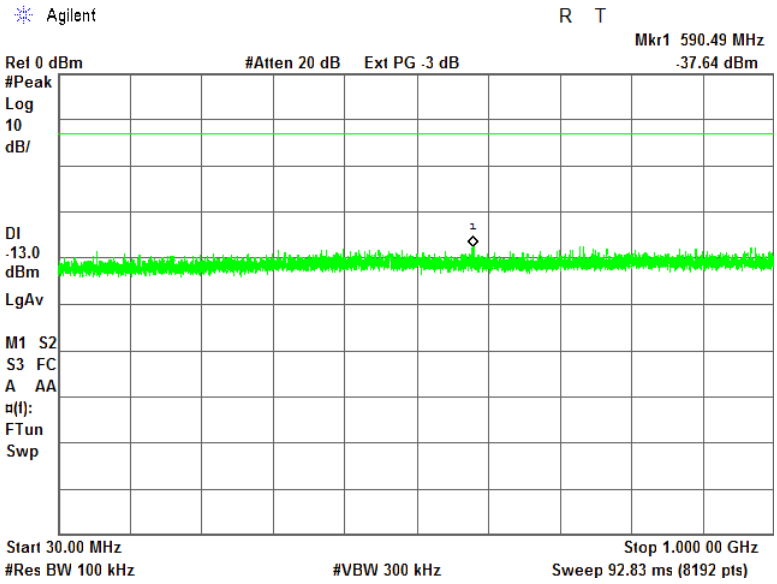


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.12.7 Spurious emission measurements in 30 - 1000 MHz range at low carrier frequency

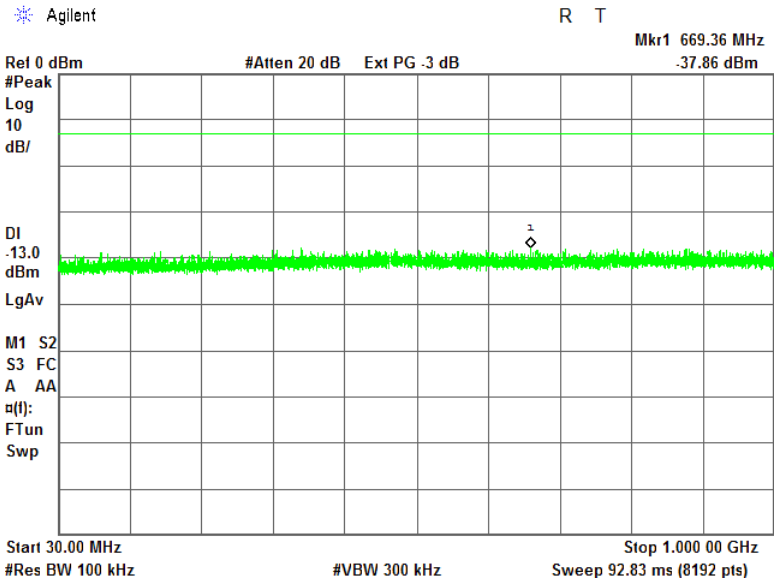


Plot 7.12.8 Spurious emission measurements in 30 - 1000 MHz range at mid carrier frequency

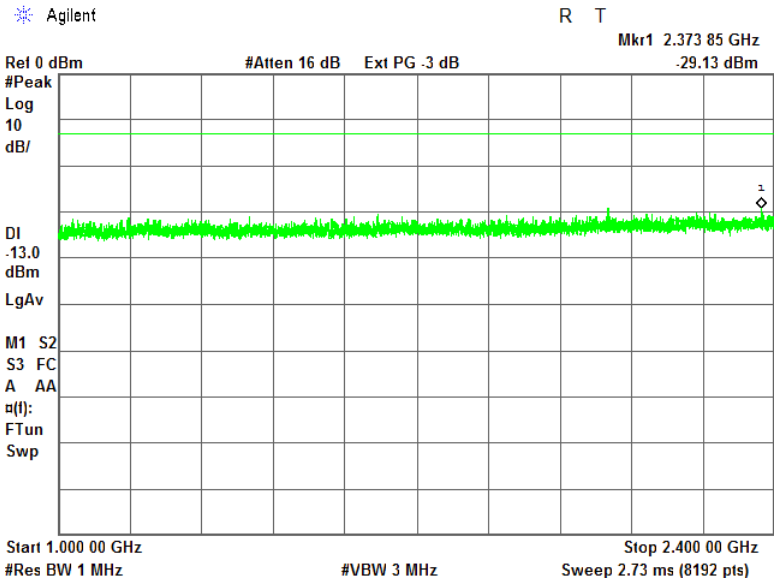


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.12.9 Spurious emission measurements in 30 - 1000 MHz range at high carrier frequency

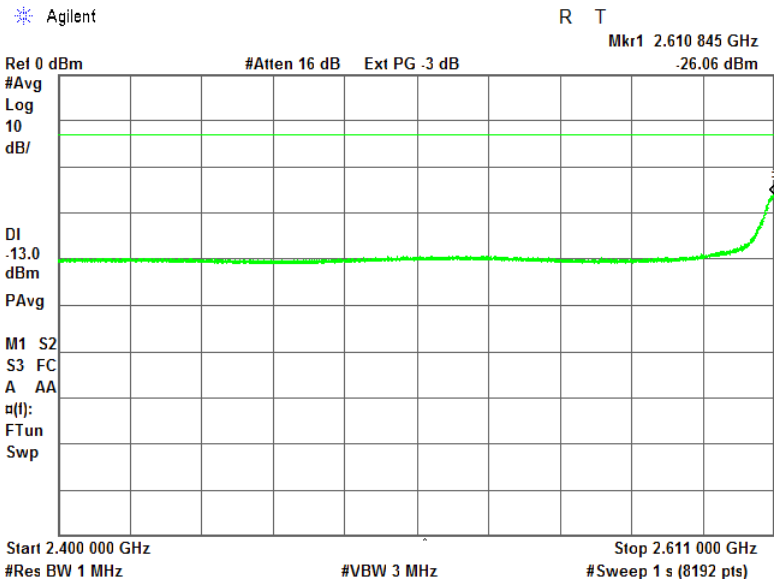


Plot 7.12.10 Spurious emission measurements in 1000 - 2400 MHz range at low carrier frequency



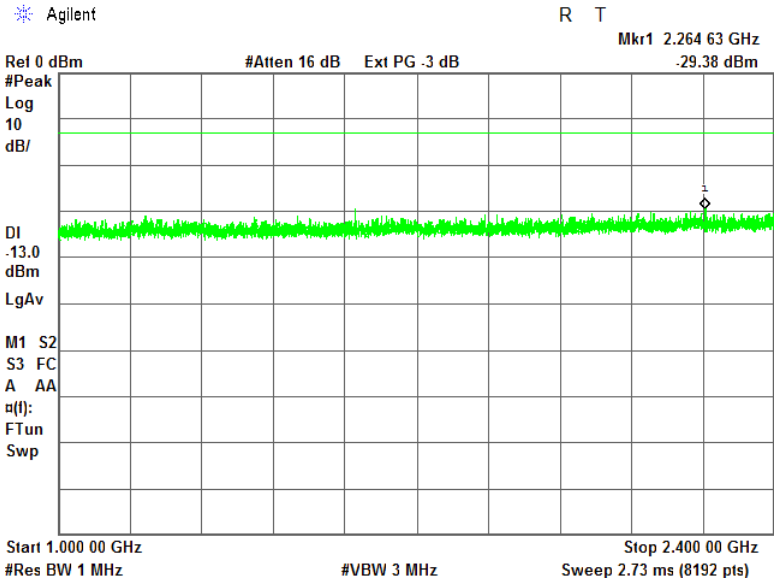
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.12.11 Spurious emission measurements in 2400 – 2611 MHz range at low carrier frequency



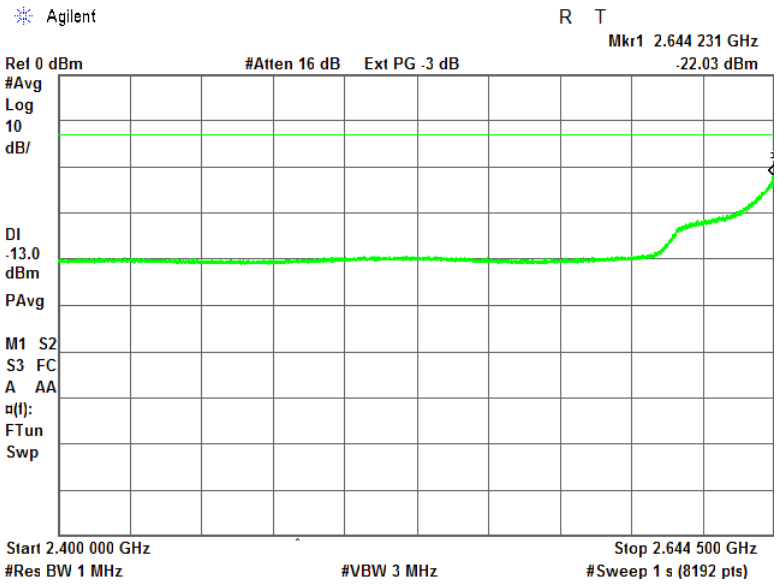
NOTE: Average Detector and Max Hold were used

Plot 7.12.12 Spurious emission measurements in 1000 - 2400 MHz at mid carrier frequency



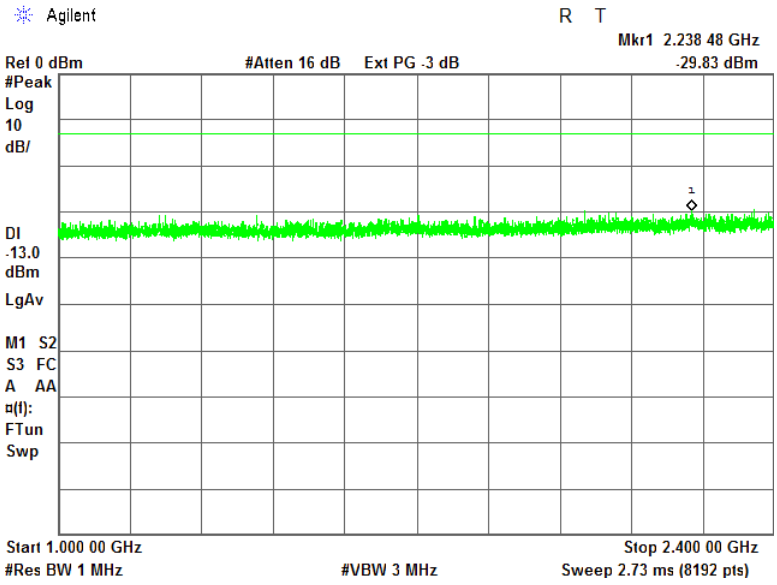
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.12.13 Spurious emission measurements in 2400 – 2644.5 MHz at mid carrier frequency



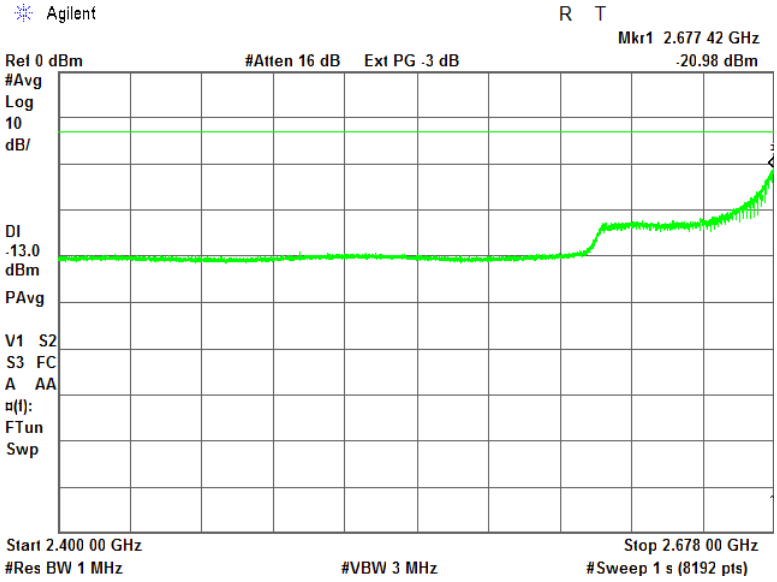
NOTE: Average Detector and Max Hold were used

Plot 7.12.14 Spurious emission measurements in 1000 - 2400 MHz at high carrier frequency



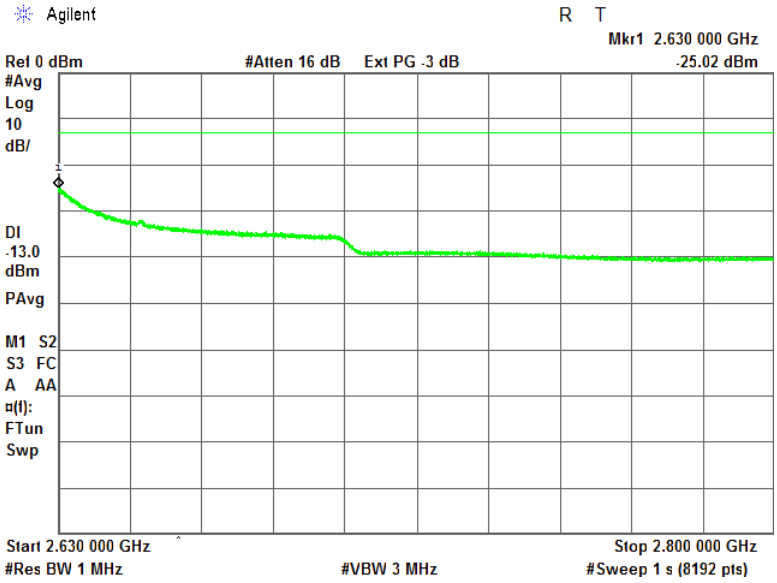
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.12.15 Spurious emission measurements in 2400 -2678 MHz at high carrier



NOTE: Average Detector and Max Hold were used

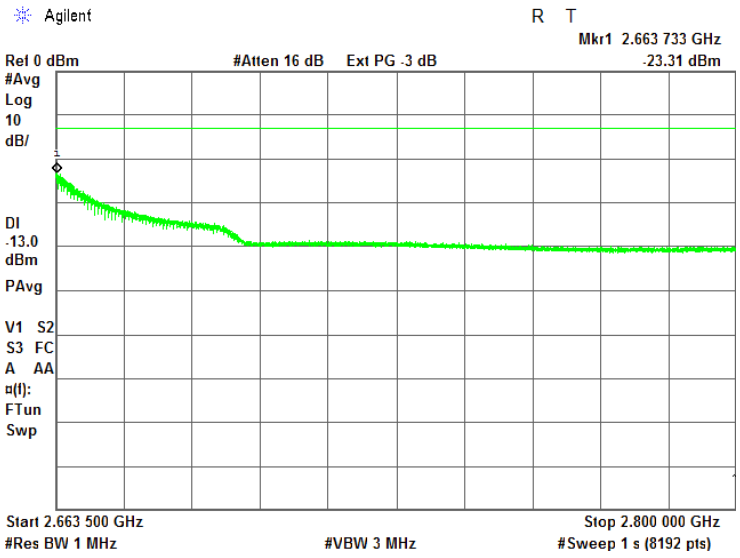
Plot 7.12.16 Spurious emission measurements in 2630 - 2800 MHz range at low carrier frequency



NOTE: Average Detector and Max Hold were used

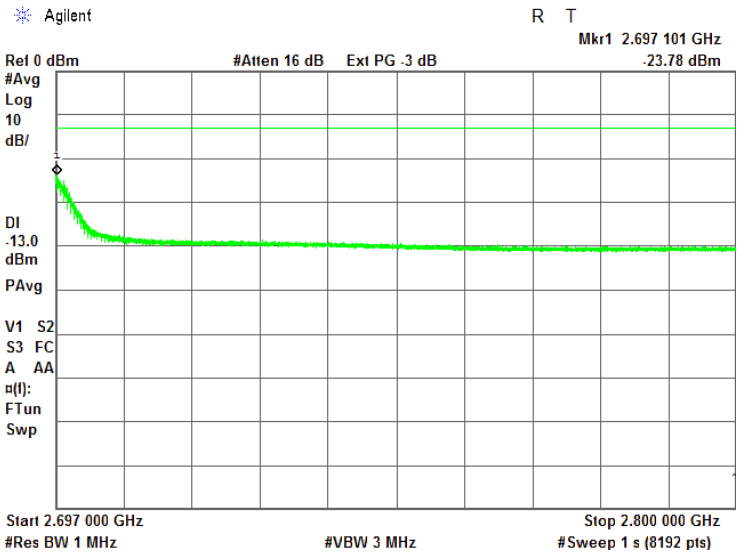
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.12.17 Spurious emission measurements in 2663.5 - 2800 MHz at mid carrier frequency



NOTE: Average Detector and Max Hold were used

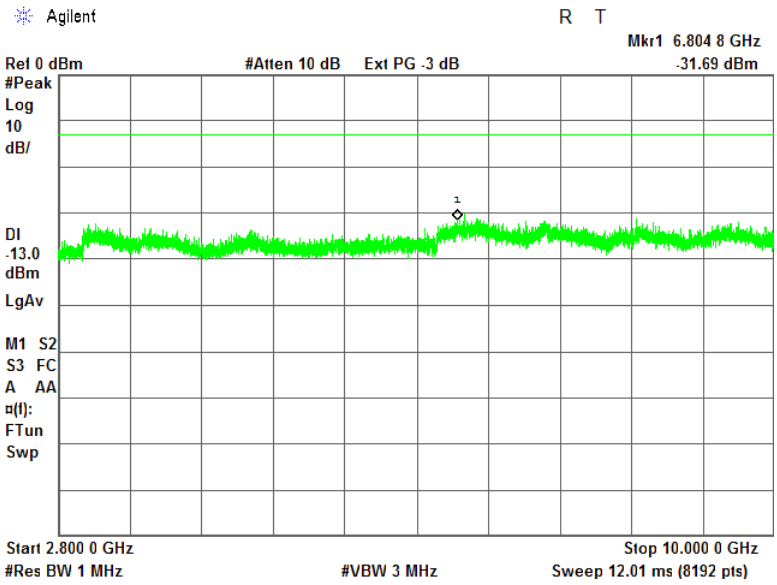
Plot 7.12.18 Spurious emission measurements in 2697 - 2800 MHz at high carrier frequency



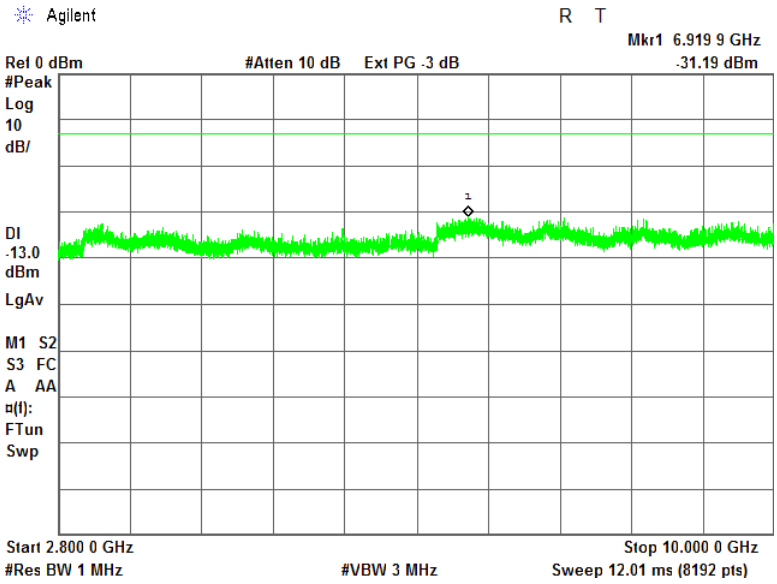
NOTE: Average Detector and Max Hold were used

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):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.12.19 Spurious emission measurements in 2800-10000 MHz range at low carrier frequency

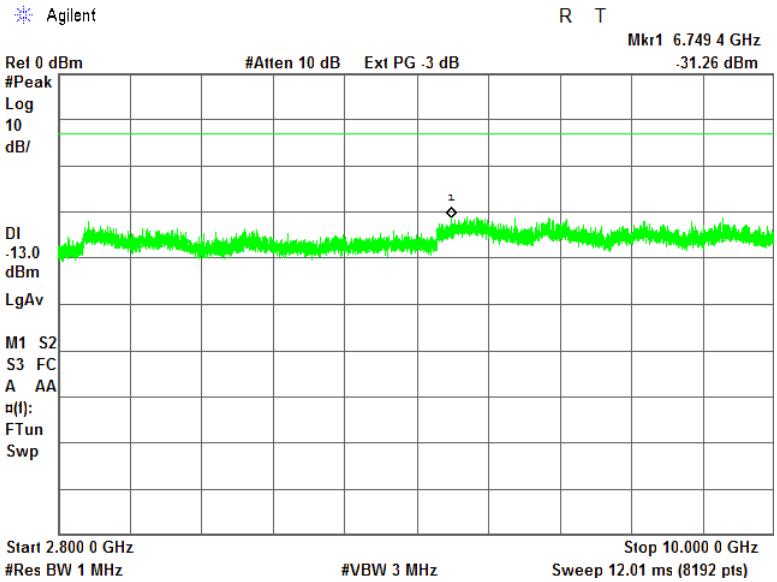


Plot 7.12.20 Spurious emission measurements in 2800 - 10000 MHz at mid carrier frequency

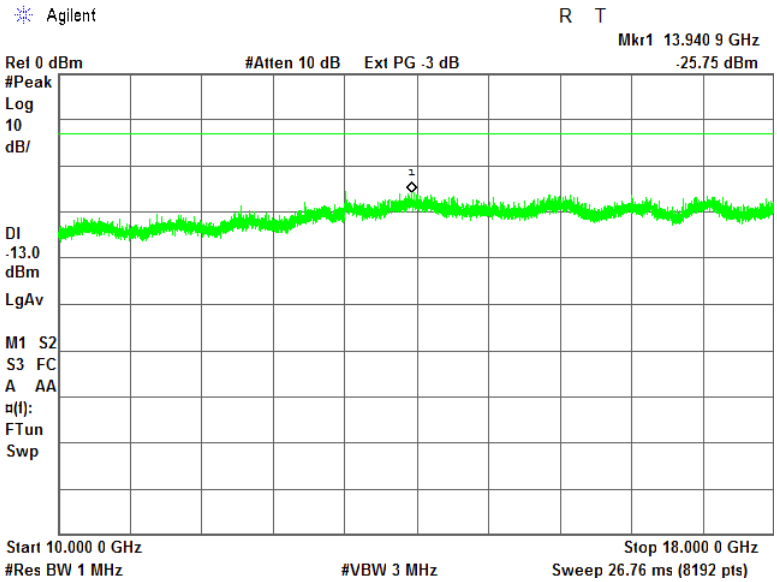


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.12.21 Spurious emission measurements in 2800 - 10000 MHz at high carrier frequency

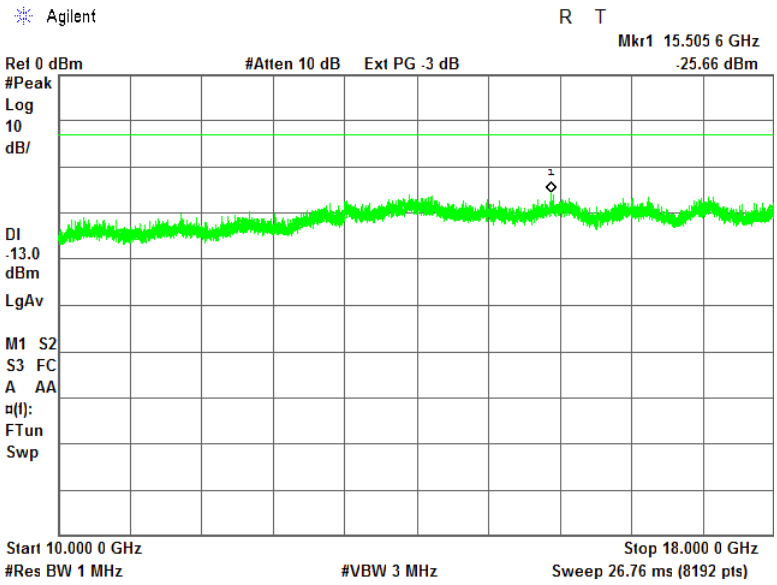


Plot 7.12.22 Spurious emission measurements in 10000-18000 MHz range at low carrier frequency

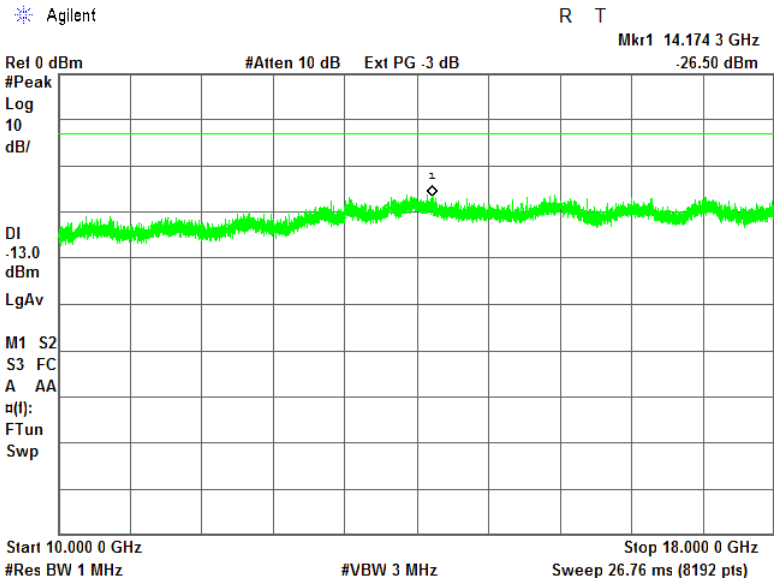


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.12.23 Spurious emission measurements in 10000 - 18000 MHz at mid carrier frequency

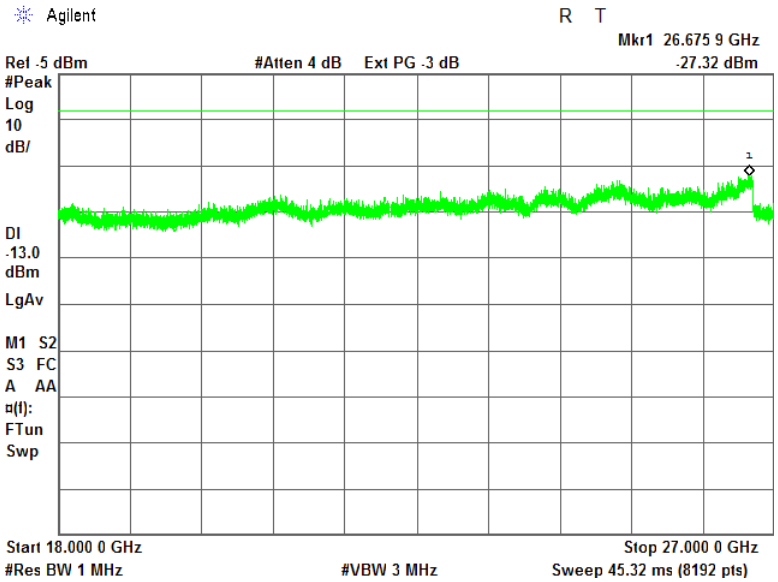


Plot 7.12.24 Spurious emission measurements in 10000 - 18000 MHz at high carrier frequency

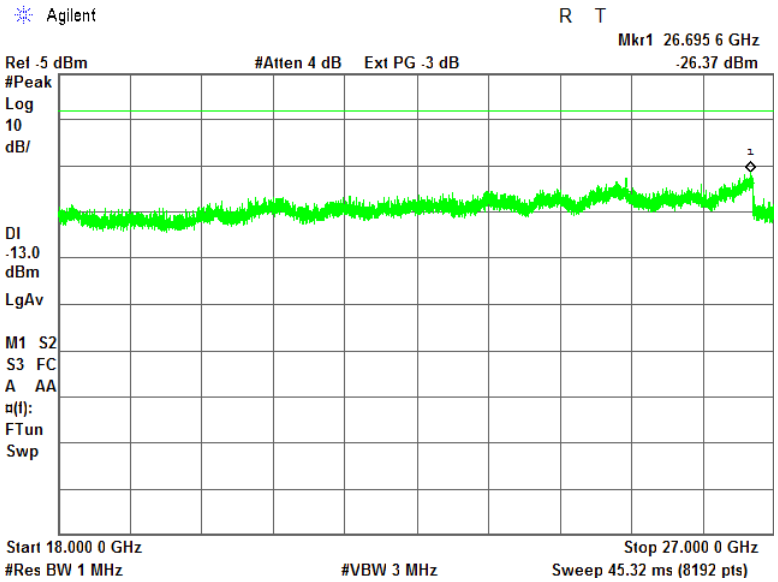


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.12.25 Spurious emission measurements in 18000-27000 MHz range at low carrier frequency

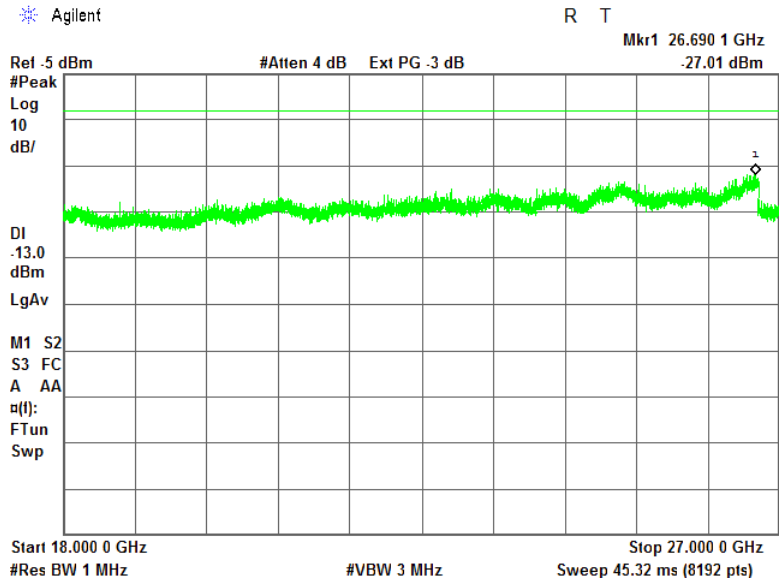


Plot 7.12.26 Spurious emission measurements in 18000 - 27000 MHz at mid carrier frequency



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):	10-Nov-16		
Temperature: 26 ºC	Relative Humidity: 42 %	Air Pressure: 1016 hPa	Power: 120 VAC
Remarks: Operation in high band 2620.5 – 2687.5 MHz			

Plot 7.12.27 Spurious emission measurements in 18000 - 27000 MHz at high carrier frequency



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Nov-16		
Temperature: 25 ºC	Relative Humidity: 41 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

7.13 Radiated spurious emission measurements

7.13.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 7.13.1.

Table 7.13.1 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 – 10th 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×P×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

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

7.13.2.1 The EUT was set up as shown in Figure 7.13.1, energized and the performance check was conducted.

7.13.2.2 The specified frequency range was investigated with antenna connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna was rotated around its vertical axis.

7.13.2.3 The worst test results (the lowest margins) were recorded in Table 7.13.2 and shown in the associated plots.

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

7.13.3.1 The EUT was set up as shown in Figure 7.13.2, energized and the performance check was conducted.

7.13.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal, polarizations.

7.13.3.3 The worst test results (the lowest margins) were recorded in Table 7.13.2 and shown in the associated plots.

Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Nov-16		
Temperature: 25 ºC	Relative Humidity: 41 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Figure 7.13.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band

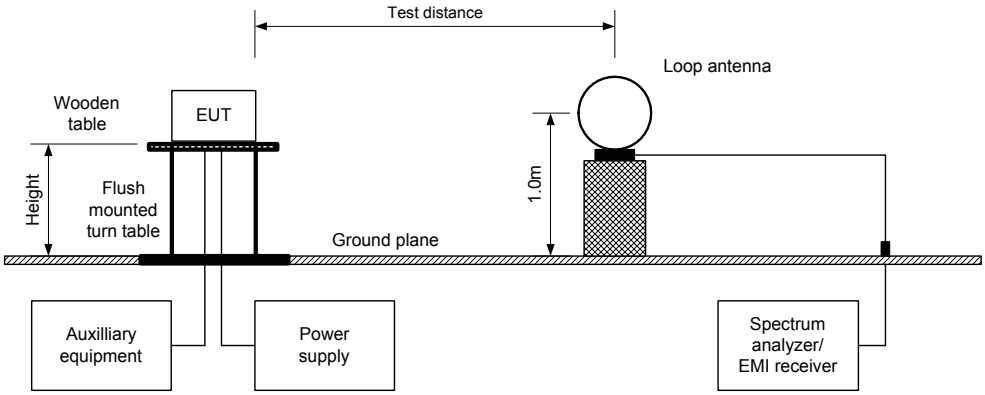
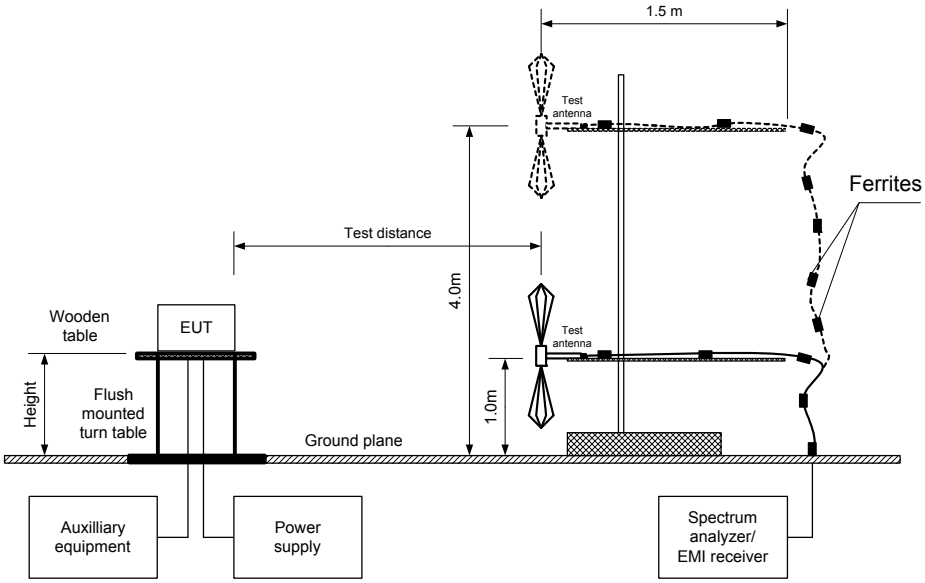


Figure 7.13.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	**Section 27.53, Radiated spurious emissions**		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	14-Nov-16		
Temperature: 25 ºC	**Relative Humidity:** 41 %	**Air Pressure:** 1018 hPa	**Power:** 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.13.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE:	2496-2690 MHz
TEST DISTANCE:	3 m
TEST SITE:	Semi 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

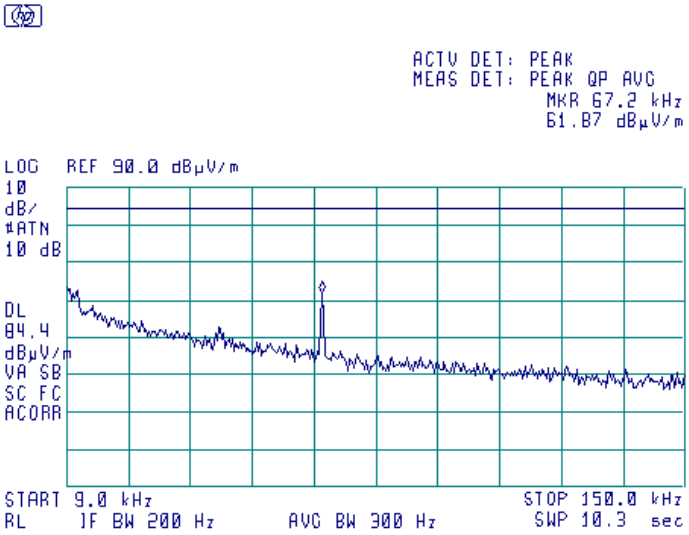
HL 0446	HL 0521	HL 0604	HL 1984	HL 3818	HL 4353	HL 4932	HL 4956
HL 5107	HL 5111	HL 5112					

Full description is given in Appendix A.

Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Nov-16		
Temperature: 25 ºC	Relative Humidity: 41 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

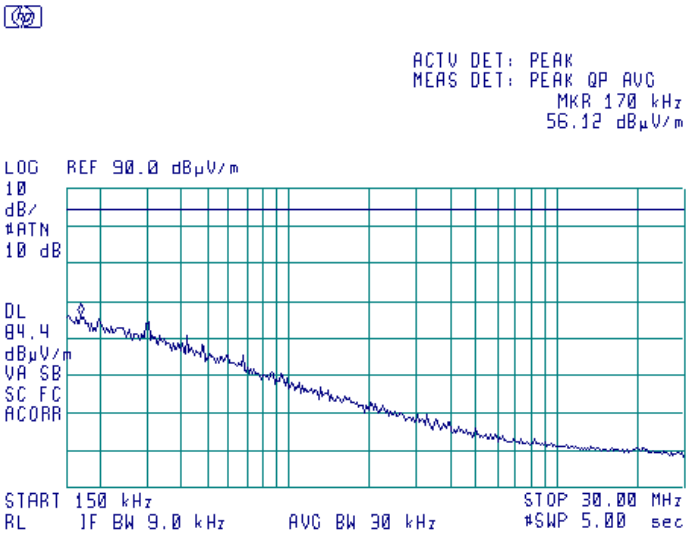
Plot 7.13.1 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.13.2 Radiated emission measurements in 0.15 - 30 MHz range

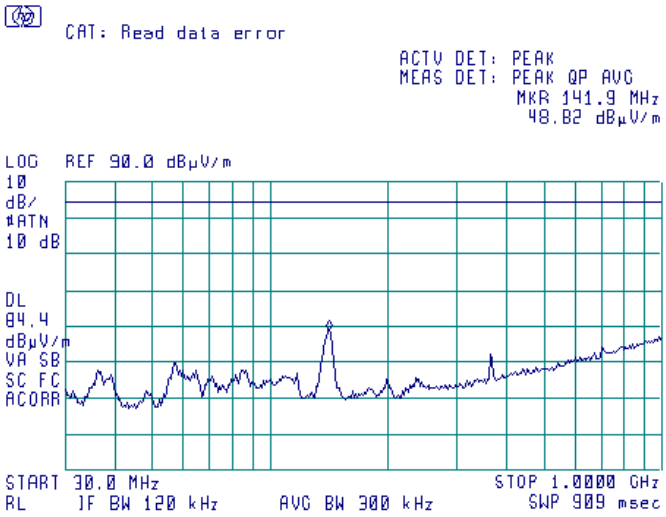
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low, Mid, High
TEST DISTANCE: 3 m



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Nov-16		
Temperature: 25 ºC	Relative Humidity: 41 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

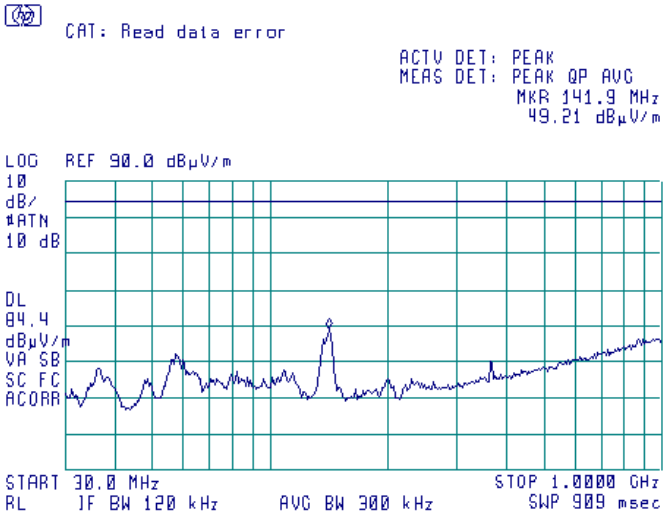
Plot 7.13.3 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.13.4 Radiated emission measurements in 30 - 1000 MHz range

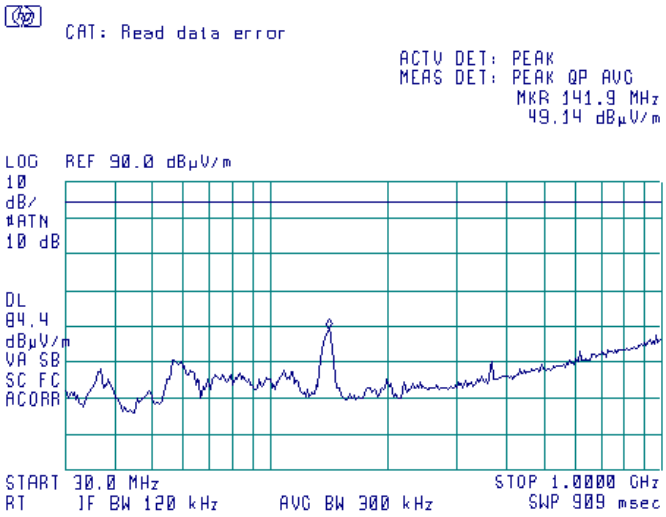
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Nov-16		
Temperature: 25 ºC	Relative Humidity: 41 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

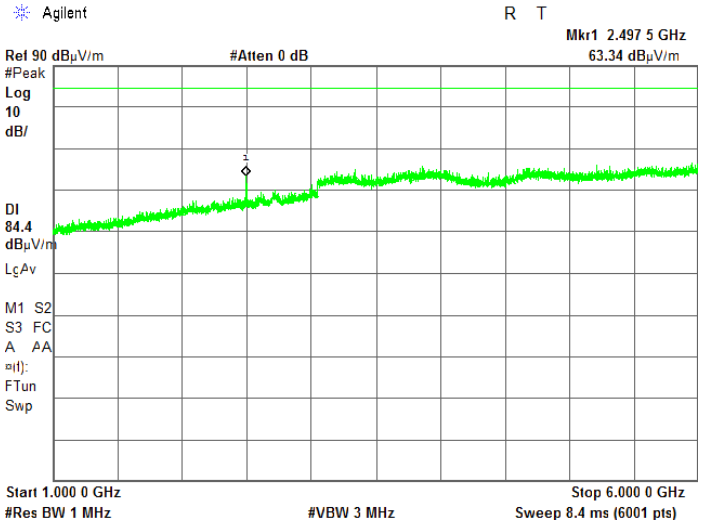
Plot 7.13.5 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.13.6 Radiated emission measurements in 1000 – 6000 MHz range

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

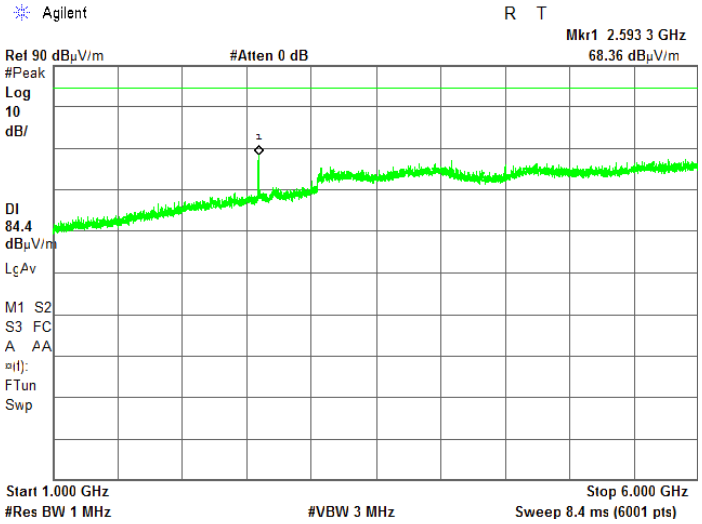


NOTE: 2498.5 MHz - carrier frequency

Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Nov-16		
Temperature: 25 ºC	Relative Humidity: 41 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.13.7 Radiated emission measurements in 1000 – 6000 MHz range

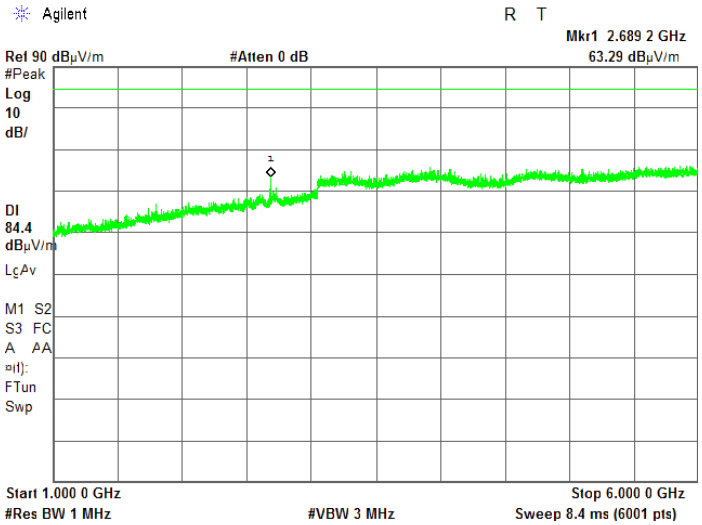
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



NOTE: 2593 MHz - carrier frequency

Plot 7.13.8 Radiated emission measurements in 1000 – 6000 MHz range

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

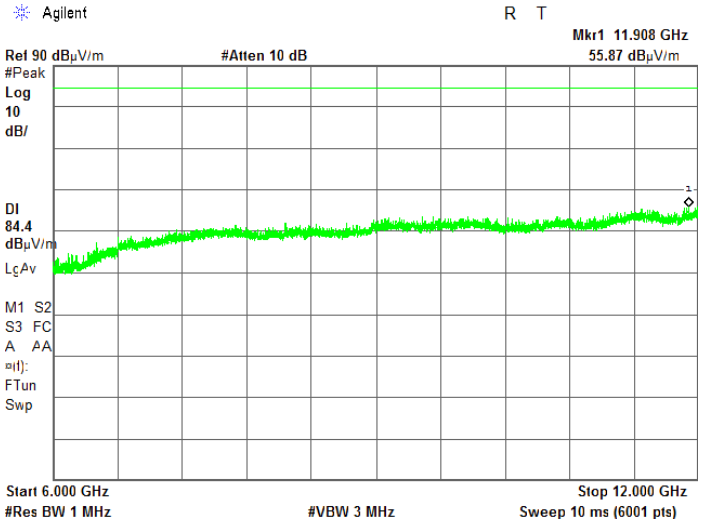


NOTE: 2687.5 MHz - carrier frequency

Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Nov-16		
Temperature: 25 ºC	Relative Humidity: 41 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Plot 7.13.9 Radiated emission measurements in 6000 – 12000 MHz range

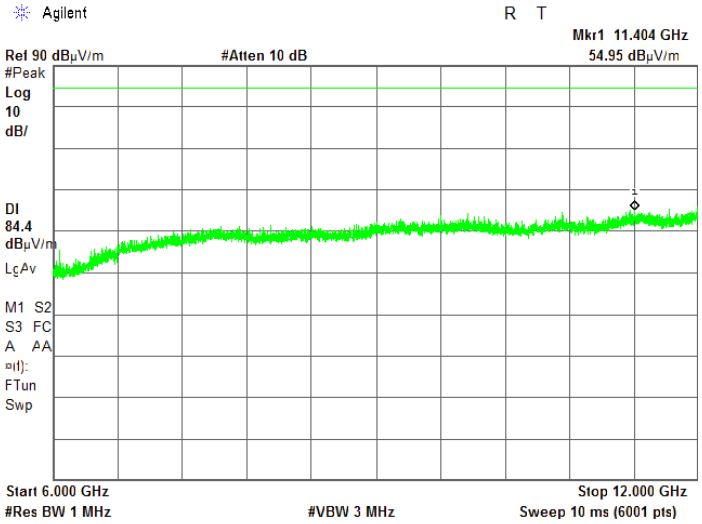
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Nov-16		
Temperature: 25 ºC	Relative Humidity: 41 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

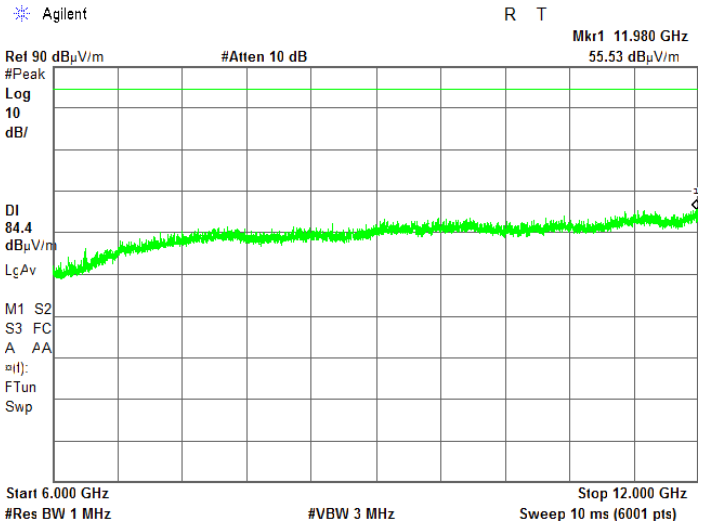
Plot 7.13.10 Radiated emission measurements in 6000 – 12000 MHz range

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



Plot 7.13.11 Radiated emission measurements in 6000 – 12000 MHz range

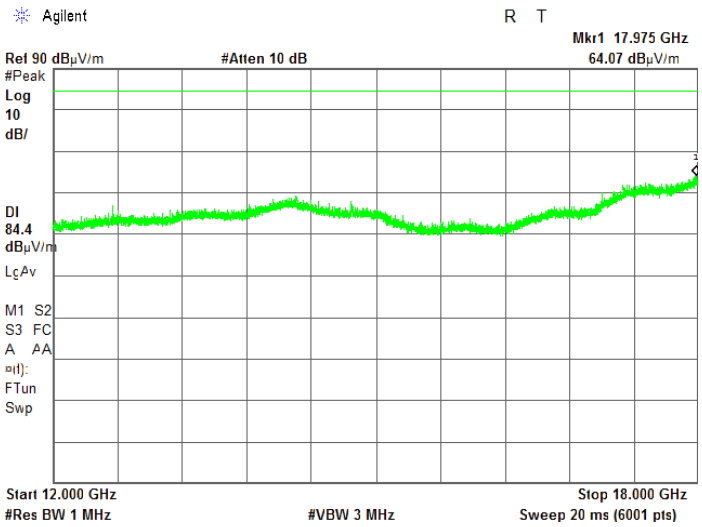
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Nov-16		
Temperature: 25 ºC	Relative Humidity: 41 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

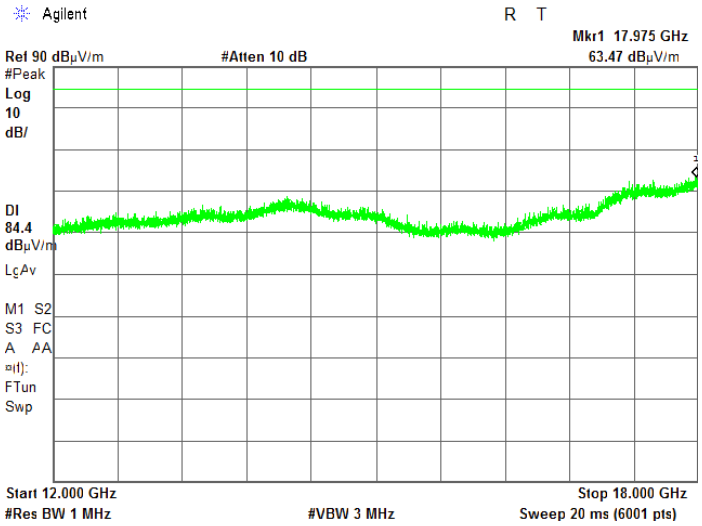
Plot 7.13.12 Radiated emission measurements in 12000 – 18000 MHz range

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



Plot 7.13.13 Radiated emission measurements in 12000 – 18000 MHz range

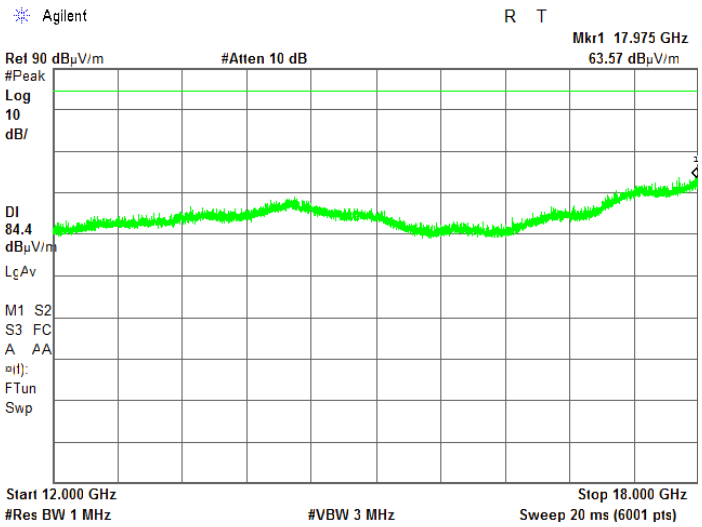
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Nov-16		
Temperature: 25 ºC	Relative Humidity: 41 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

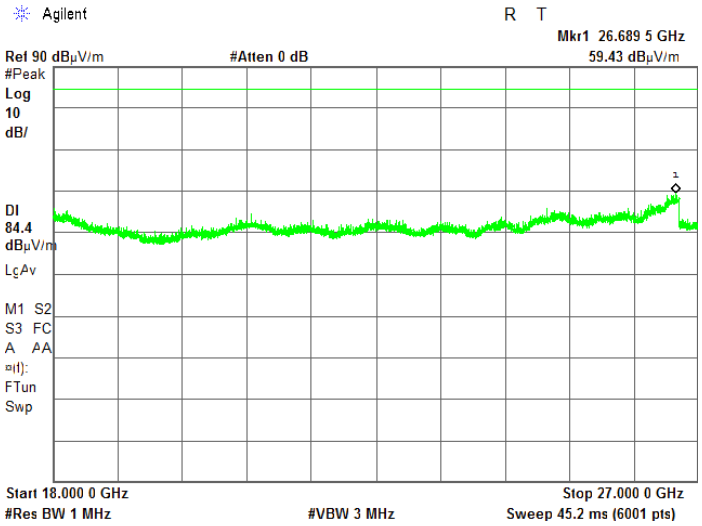
Plot 7.13.14 Radiated emission measurements in 12000 – 18000 MHz range

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



Plot 7.13.15 Radiated emission measurements in 18000 – 27000 MHz range

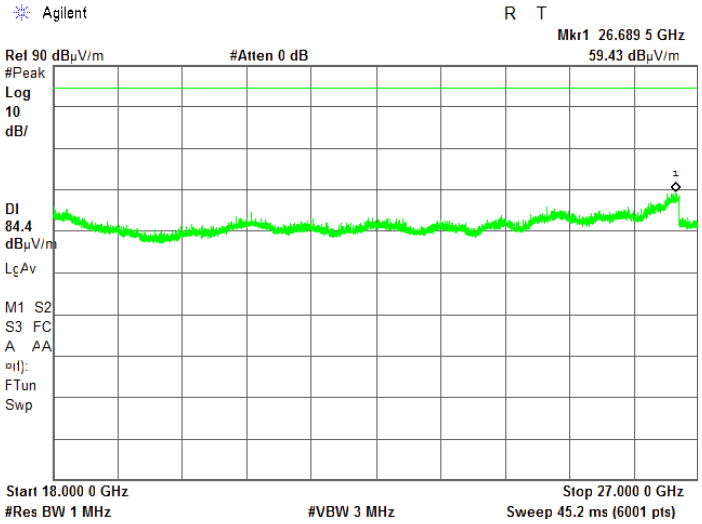
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Nov-16		
Temperature: 25 ºC	Relative Humidity: 41 %	Air Pressure: 1018 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

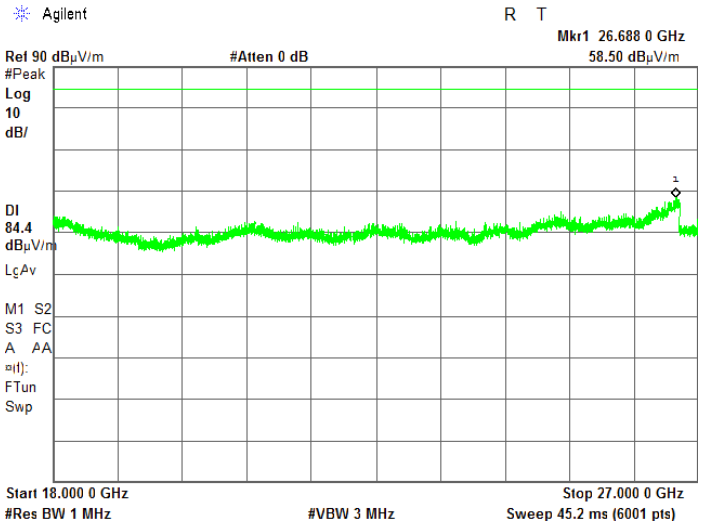
Plot 7.13.16 Radiated emission measurements in 18000 – 27000 MHz range

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



Plot 7.13.17 Radiated emission measurements in 18000 – 27000 MHz range

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



Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	13-Nov-16		
Temperature: 24 ºC	Relative Humidity: 45 %	Air Pressure: 1013 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

7.14 Frequency stability test in 2498.5 – 2687.5 MHz band

7.14.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.14.1.

Table 7.14.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement
2496.0 – 2690.0	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

7.14.2 Test procedure

7.14.2.1 The EUT was set up as shown in Figure 7.14.1, energized and its proper operation was checked.

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

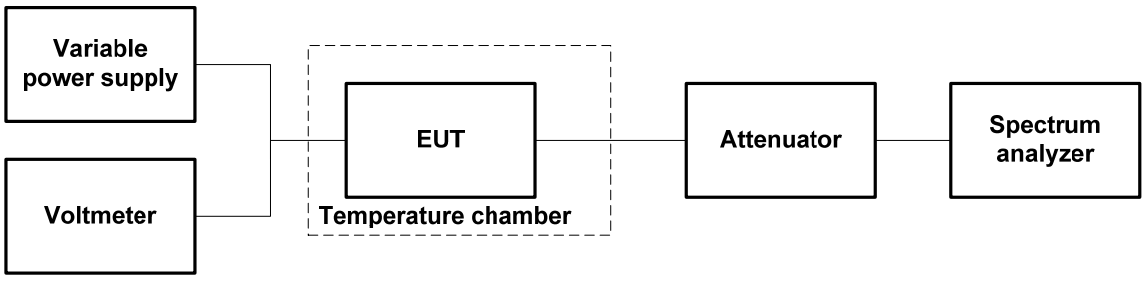
7.14.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

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

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

7.14.2.6 Frequency displacement was calculated and provided in Table 7.14.2.

Figure 7.14.1 Frequency stability test setup



Test specification:	**Section 27.54, Frequency stability**		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	13-Nov-16		
Temperature: 24 ºC	**Relative Humidity:** 45 %	**Air Pressure:** 1013 hPa	**Power:** 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.14.2 Frequency stability test results

OPERATING FREQUENCY: 2496.0 – 2690.0 MHz
NOMINAL POWER VOLTAGE: 120VAC
TEMPERATURE STABILIZATION PERIOD: 20 min
POWER DURING TEMPERATURE TRANSITION: Off
SPECTRUM ANALYZER MODE: Max Hold
RESOLUTION BANDWIDTH: 1 kHz
VIDEO BANDWIDTH: 3 kHz
MODULATION: Unmodulated

T, ºC	Voltage, V	Frequency, MHz							Max frequency drift, Hz	
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative
Low carrier frequency 2498.5 MHz										
-30	120	2498.500025	2498.500025	2498.500000	2498.500025	2498.500100	2498.500025	2498.500050	100	0
-20	120	2498.499975	NA	NA	NA	NA	NA	2498.499950	0	50
-10	120	2498.500000	NA	NA	NA	NA	NA	2498.500000	0	0
0	120	2498.499975	2498.500000	2498.500075	2498.500025	2498.499950	2498.500000	2498.499975	75	50
10	120	2498.499975	NA	NA	NA	NA	NA	2498.500000	0	25
20	138	2498.500025	NA	NA	NA	NA	NA	2498.500025	25	0
20	120	2498.500000	NA	NA	NA	NA	NA	2498.500000	0	0
20	102	2498.499950	NA	NA	NA	NA	NA	2498.499975	0	50
30	120	2498.500025	2498.499950	2498.499975	2498.500025	2498.499975	2498.500000	2498.499950	25	50
40	120	2498.499950	NA	NA	NA	NA	NA	2498.499950	0	50
50	120	2498.499975	NA	NA	NA	NA	NA	2498.500000	0	25
Mid carrier frequency 2593.0 MHz										
-30	120	2593.000000	2593.000075	2593.000000	2593.000025	2592.999975	2593.000000	2593.000000	75	25
-20	120	2593.000025	NA	NA	NA	NA	NA	2593.000075	75	0
-10	120	2593.000050	NA	NA	NA	NA	NA	2592.999975	50	25
0	120	2593.000025	2593.000000	2593.000000	2593.000025	2593.000000	2593.000100	2593.000000	100	0
10	120	2593.000050	NA	NA	NA	NA	NA	2592.999975	50	25
20	138	2593.000050	NA	NA	NA	NA	NA	2593.000050	50	0
20	120	2593.000000	NA	NA	NA	NA	NA	2592.999975	0	25
20	102	2593.000050	NA	NA	NA	NA	NA	2593.000050	50	0
30	120	2593.000025	2593.000075	2593.000075	2593.000050	2593.000050	2593.000050	2593.000000	75	0
40	120	2592.999975	NA	NA	NA	NA	NA	2593.000025	25	25
50	120	2593.000050	NA	NA	NA	NA	NA	2593.000025	50	0
High carrier frequency 2687.5 MHz										
-30	120	2687.500500	2687.500475	2687.500475	2687.500350	2687.500375	2687.500425	2687.500450	100	50
-20	120	2687.500500	NA	NA	NA	NA	NA	2687.500500	100	0
-10	120	2687.500450	NA	NA	NA	NA	NA	2687.500475	75	0
0	120	2687.500525	2687.500450	2687.500400	2687.500450	2687.500450	2687.500475	2687.500500	125	0
10	120	2687.500425	NA	NA	NA	NA	NA	2687.500450	50	0
20	138	2687.500425	NA	NA	NA	NA	NA	2687.500400	25	0
20	120	2687.500400	NA	NA	NA	NA	NA	2687.500475	75	0
20	102	2687.500500	NA	NA	NA	NA	NA	2687.500400	100	0
30	120	2687.500425	2687.500325	2687.500475	2687.500475	2687.500400	2687.500475	2687.500375	75	75
40	120	2687.500425	NA	NA	NA	NA	NA	2687.500325	25	75
50	120	2687.500325	NA	NA	NA	NA	NA	2687.500475	75	75

* - Reference frequency

Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	13-Nov-16		
Temperature: 24 ºC	Relative Humidity: 45 %	Air Pressure: 1013 hPa	Power: 120 VAC
Remarks: Operation in full band 2498.5-2687.5 MHz			

Table 7.14.3 Maximum frequency displacement

Channel	Maximum frequency displacement			
	ppm		Hz	
	Negative	Positive	Negative	Positive
Low (2498.5 MHz)	0.02	0.04	50	100
Mid (2593.0 MHz)	0.01	0.04	25	100
High (2687.5 MHz)	0.03	0.05	75	125

Table 7.14.4 Transmission occupied bandwidth with frequency drift test results

64 QAM

Lower measured* band edge, MHz	Upper measured* band edge, MHz	Lower calculated** band edge, MHz	Upper calculated** band edge, MHz	Lower specified band edge, MHz	Upper specified band edge, MHz	Lower margin***, MHz	Upper margin***, MHz	Verdict
5 MHz BW								
2496.100000	2500.900000	2496.099950	2500.900100	2496.000000	2502.000000	0.099950	-1.099900	Pass
2590.606000	2595.394000	2590.605975	2595.394100	2590.000000	2596.000000	0.605975	-0.605900	Pass
2685.106000	2689.894000	2685.105925	2689.894125	2684.500000	2690.000000	0.605925	-0.105875	Pass
10 MHz BW								
2496.176000	2505.824000	2496.175950	2505.823900	2496.000000	2507.500000	0.175950	-1.676100	Pass
2591.176000	2600.824000	2591.175975	2600.823900	2590.000000	2602.000000	1.175975	-1.176100	Pass
2680.176000	2689.824000	2680.175925	2689.823875	2679.000000	2690.000000	1.175925	-0.176125	Pass
20 MHz BW								
2496.514000	2515.486000	2496.513950	2515.485900	2496.000000	2518.500000	0.513950	-3.014100	Pass
2586.514000	2605.486000	2586.513975	2605.485900	2584.000000	2608.000000	2.513975	-2.514100	Pass
2670.412000	2689.520000	2670.411925	2689.519875	2668.000000	2690.000000	2.411925	-0.480125	Pass

QPSK

Lower measured* band edge, MHz	Upper measured* band edge, MHz	Lower calculated** band edge, MHz	Upper calculated** band edge, MHz	Lower specified band edge, MHz	Upper specified band edge, MHz	Lower margin***, MHz	Upper margin***, MHz	Verdict
5 MHz BW								
2496.100000	2500.880000	2496.099950	2500.880100	2496.000000	2502.000000	0.099950	-1.119900	Pass
2590.606000	2595.375000	2590.605975	2595.375100	2590.000000	2596.000000	0.605975	-0.624900	Pass
2685.087000	2689.856000	2685.086925	2689.856125	2684.500000	2690.000000	0.586925	-0.143875	Pass
10 MHz BW								
2496.176000	2505.824000	2496.175950	2505.823900	2496.000000	2507.500000	0.175950	-1.676100	Pass
2591.152000	2600.800000	2591.151975	2600.799900	2590.000000	2602.000000	1.151975	-1.200100	Pass
2680.152000	2689.824000	2680.151925	2689.823875	2679.000000	2690.000000	1.151925	-0.176125	Pass
20 MHz BW								
2496.514000	2515.554000	2496.513950	2515.553900	2496.000000	2518.500000	0.513950	-2.946100	Pass
2586.480000	2605.452000	2586.479975	2605.451900	2584.000000	2608.000000	2.479975	-2.548100	Pass
2670.446000	2689.554000	2670.445925	2689.553875	2668.000000	2690.000000	2.445925	-0.446125	Pass

* - Measured under normal test conditions
** - Measured band edge with proper drift addition
*** - Margin = Calculated band edge – specified band edge

Reference numbers of test equipment used

HL 2909	HL 3322	HL 3286	HL 4756				

Full description is given in Appendix A.

8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
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
1984	Antenna, Double-Ridged Waveguide Horn, 1 to 18 GHz, 300 W	EMC Test Systems	3115	9911-5964	28-Mar-16	28-Mar-17
2214	Directional Coupler 1.7-26.5 GHz	Krytar	2616	31354	16-Sep-15	16-Sep-17
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	21-Feb-16	21-Feb-17
3286	Temperature Chamber, (-50 to +170) °C	Thermotron	EL-8-CH-1-1-CO2	21-9048	06-Oct-16	06-Oct-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	SUCOFLEX 102A	1225/2A	15-Feb-16	15-Feb-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
4756	Digital Hygrometer / Thermometer, (0 to +50) deg., (20 to 99) %RH	WESTERN Humidor Corporation	Caliber 4	NA	06-Nov-16	06-Nov-17
4932	Microwave preamplifier, 500 MHz to 18 GHz, 40 dB Gain	Com-Power Corporation	PAM-118A	551029	01-Sep-16	01-Sep-17
4956	Active horn antenna, 18 to 40 GHz	Com-Power Corporation	AHA-840	105004	09-Nov-16	09-Nov-17
5107	RF cable, 18 GHz, 4.5 m, N-type	Huber-Suhner	SF106A/11N/11N/4500MM	500845/6A	26-Jul-16	26-Jul-17
5111	RF cable, 40 GHz, 5.5 m, K-type	Huber-Suhner	SF102EA/11SK/11SK/5500MM	502493/2EA	26-Jul-16	26-Jul-17
5112	RF cable, 40 GHz, 5.5 m, K-type	Huber-Suhner	SF102EA/11SK/11SK/5500MM	502494/2EA	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	±8%
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Spurious emissions radiated 30 MHz – 40 GHz (substitution method)	± 4.5 dB
Frequency error	30 – 300 MHz: ± 50.5 Hz (1.68 ppm) 300 – 1000 MHz: ± 168 Hz (0.56 ppm)
Transient frequency behaviour	187 Hz ± 13.9 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %

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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Person for contact: Mr. Alex Usoskin, CEO.

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(μV) to convert it into field strength in dB(μV/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(μV) to convert it into field strength in dB(μV/m).

Antenna factor
Double-ridged wave guide horn antenna
Model 3115, S/N 9911-5964, HL1984

Frequency, MHz	Antenna factor, dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.6
2500.0	28.9
3000.0	31.2
3500.0	32.0
4000.0	32.5
4500.0	32.7
5000.0	33.6
5500.0	35.1
6000.0	35.4
6500.0	34.9
7000.0	36.1
7500.0	37.8
8000.0	38.0
8500.0	38.1
9000.0	39.1
9500.0	38.3
10000.0	38.6
10500.0	38.2
11000.0	38.7
11500.0	39.5
12000.0	40.0
12500.0	40.4
13000.0	40.5
13500.0	41.1
14000.0	41.6
14500.0	41.7
15000.0	38.7
15500.0	38.2
16000.0	38.8
16500.0	40.5
17000.0	42.5
17500.0	45.9
18000.0	49.4

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

Antenna factor, HL 4956

COM-POWER CORPORATION

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
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/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, 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		

Cable loss
RF Cable, Huber-Suhner, 40 GHz, 5.5 m, K type,
SF102EA/11SK/11SK/5500MM, S/N 502494/2EA
HL 5112

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
100	0.69	20500	10.18
200	0.97	21000	10.32
300	1.18	21500	10.47
500	1.52	22000	10.60
1000	2.14	22500	10.75
1500	2.62	23000	10.87
2000	3.03	23500	11.00
2500	3.40	24000	11.12
3000	3.73	24500	11.23
3500	4.04	25000	11.35
4000	4.33	25500	11.52
4500	4.60	26000	11.64
5000	4.86	26500	11.73
5500	5.10	27000	11.84
6000	5.34	27500	11.93
6500	5.57	28000	12.05
7000	5.79	28500	12.19
7500	6.00	29000	12.33
8000	6.21	29500	12.44
8500	6.43	30000	12.53
9000	6.62	30500	12.58
9500	6.82	31000	12.71
10000	7.01	31500	12.86
10500	7.17	32000	13.00
11000	7.34	32500	13.11
11500	7.51	33000	13.24
12000	7.68	33500	13.33
12500	7.84	34000	13.44
13000	8.00	34500	13.58
13500	8.16	35000	13.69
14000	8.32	35500	13.81
14500	8.48	36000	13.93
15000	8.63	36500	14.05
15500	8.77	37000	14.24
16000	8.92	37500	14.28
16500	9.08	38000	14.38
17000	9.23	38500	14.50
17500	9.37	39000	14.61
18000	9.51	39500	14.70
18500	9.66	40000	14.83
19000	9.78		
19500	9.92		
20000	10.07		

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

END OF DOCUMENT