

TEST REPORT

ACCORDING TO: FCC 47CFR part 27

FOR:

Airspan Networks Inc.

LTE Base Station

Model: Synergy 2000 2.5 GHz (B41)

FCC ID:PIDSYN2500

This report is in conformity with ISO/ IEC 17025. The "A2LA Accredited" symbol endorsement applies only to the tests and calibrations that are listed in the scope of Hermon Laboratories accreditation. The test results relate only to the items tested.
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1 Applicant information

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E-mail: zlevi@airspan.com
Contact name: Mr. Zion Levi

2 Equipment under test attributes

Product name: LTE Base Station
Product type: Transceiver
Model(s): Synergy 2000 2.5 GHz (B41)
Serial number: 70F1E1173BD0
Hardware version: C8
Software release: 14.12.50.57
Receipt date 23-Feb-14

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: 25543
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 25-Feb-14
Test completed: 4-Mar-14
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.

This test report supersedes the previously issued test report identified by Doc ID: AIRRAD_FCC.25543.

	Name and Title	Date	Signature
Tested by:	Mr. V. Einem, test engineer	March 4, 2014	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	March 20, 2014	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	March 20, 2014	

6 EUT description

6.1 General information

A base station radio, Synergy 2000-Band 41 TDD LTE, is a part of the 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 Synergy's' transceiver/receiver (Up to 64 QAM modulation, data rate up to 150 Mbps) uses OFDM and operating in TDD mode, equipped with a 18 dBi external antenna.

The Synergy 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.

6.2 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length, m
Power	DC power	DC power supply	EUT	1	Unshielded	10
Signal	Ethernet	ETH1 port	Laptop	1	Shielded	10
Signal	Antenna	EUT	GPS external antenna	1	Coax	5
RF	Antenna	EUT	Termination 50 Ohm	2	Coax	NA
Signal*	RS-232	EUT	Laptop	1	Unshielded	2

* For maintenance only

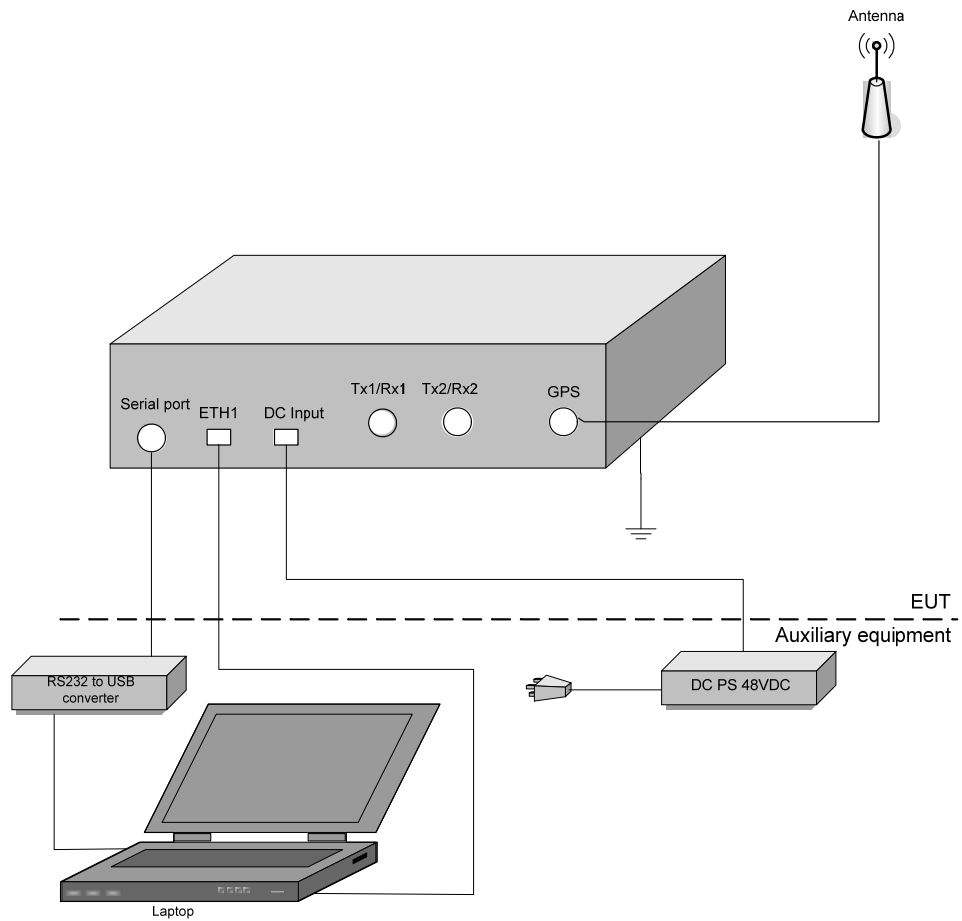
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
DC power supply	Mean Well	PSP-600-48	RB29063683
GPS antenna	Tallysman Wireless	32-3030-0	20110606
Laptop	DELL	E6410	PO1038624
4 Port USB to RS-232 hub	ATEN INTERNATIONAL	UC2324	Z3CA2180AB40199

6.4 Changes made in the EUT

No changes were implemented in the EUT during testing.

6.5 Test configuration



6.6 Transmitter characteristics

Type of equipment					
☒	Stand-alone (Equipment with or without its own control provisions)				
☐	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)				
☐	Plug-in card (Equipment intended for a variety of host systems)				
Intended use		Condition of use			
☒	fixed	Always at a distance more than 2 m from all people			
☐	mobile	Always at a distance more than 20 cm from all people			
☐	portable	May operate at a distance closer than 20 cm to human body			
Assigned frequency range		2496.0 – 2690.0 MHz			
Operating frequency		2501.0 – 2685.0 MHz for 10 MHz OBW 2506.0 – 2680.0 MHz for 20 MHz OBW			
RF channel spacing		10 MHz, 20MHz			
Maximum rated output power		At transmitter 50 Ω RF output connector (aggregate power of both RF chains)			33.65 dBm
Is transmitter output power variable?		☐ No			
		☒	Yes	☐ continuous variable	
				☒ stepped variable with stepsize	0.25 dB
				minimum RF power	-30 dBm
				maximum RF power at antenna connector	33.65 dBm
Antenna connection					
☐ unique coupling	☒	standard connector	☐ Integral	☒ with temporary RF connector ☐ without temporary RF connector	
Antenna/s technical characteristics					
Type	Manufacturer		Model number		Gain
External	ALPHA Wireless Ltd		AW3007		18 dBi
External	ALPHA Wireless Ltd		AW3008		17 dBi
External sector	Cobham Antenna Systems		SA12-2.5-DS/1915		11 dBi
Transmitter aggregate data rate/s, MBps					
Transmitter 99% power bandwidth		Type of modulation			
		QPSK	16QAM	64QAM	
10 MHz		15.5	30.5	75.0	
20 MHz		31.0	61.0	150.0	
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	48 VDC via AC/DC adaptor		
	AC mains	Nominal rated voltage	120 V	Frequency	60 Hz
Common power source for transmitter and receiver			☒	yes	☐ no

Test specification:		Section 2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date(s):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

7 Transmitter tests according to 47CFR part 27

7.1 Occupied bandwidth test

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.

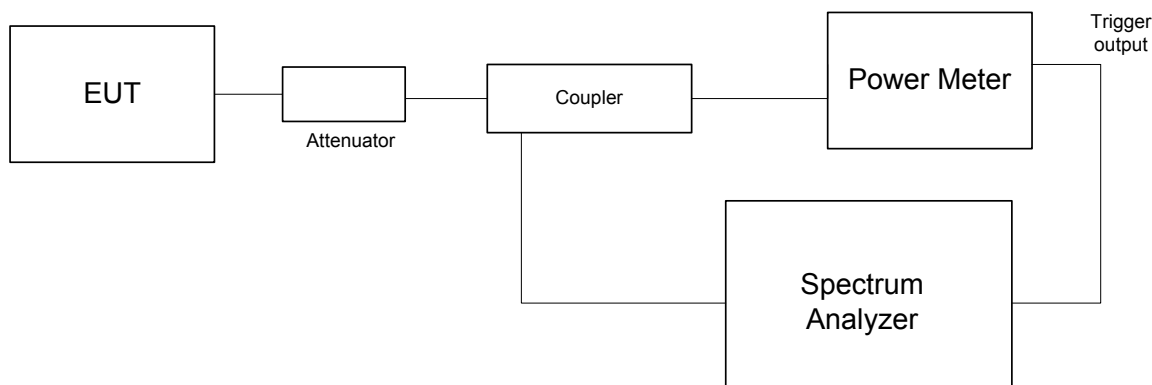
7.1.2 Test procedure

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):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Table 7.1.2 Occupied bandwidth test results

DETECTOR USED: Average
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 300 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
 MODULATING SIGNAL: PRBS
 EBW: 10 MHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
QPSK 15.1 Mbps				
2501	9711	NA	NA	Pass
2595	9728	NA	NA	Pass
2685	9696	NA	NA	Pass
64QAM 75.0 Mbps				
2501	9648	NA	NA	Pass
2595	9558	NA	NA	Pass
2685	9641	NA	NA	Pass

DETECTOR USED: Average
 RESOLUTION BANDWIDTH: 200 kHz
 VIDEO BANDWIDTH: 620 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
 MODULATING SIGNAL: PRBS
 EBW: 20 MHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
QPSK 31.0 Mbps				
2506	19484	NA	NA	Pass
2595	19463	NA	NA	Pass
2680	19467	NA	NA	Pass
64QAM 150.0 Mbps				
2506	19534	NA	NA	Pass
2595	19488	NA	NA	Pass
2680	19324	NA	NA	Pass

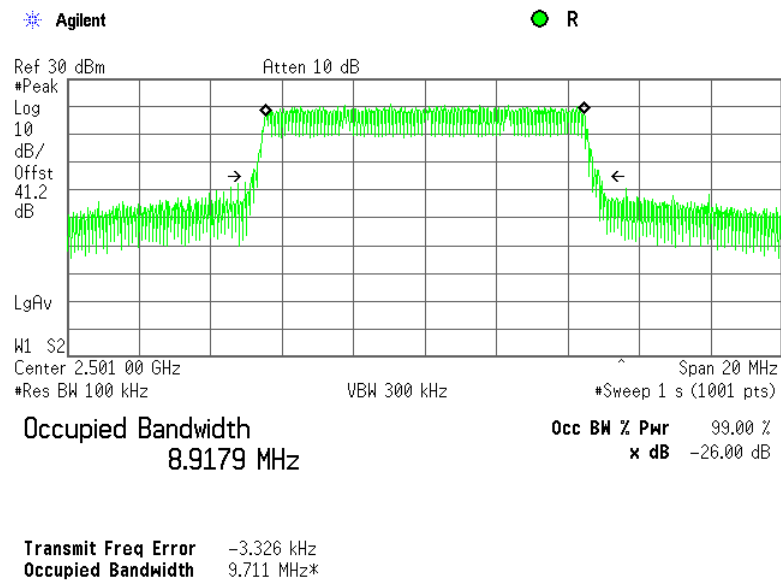
Reference numbers of test equipment used

HL 3301	HL 3302	HL 3818	HL 4229	HL 4234	HL 4273	HL 4366	
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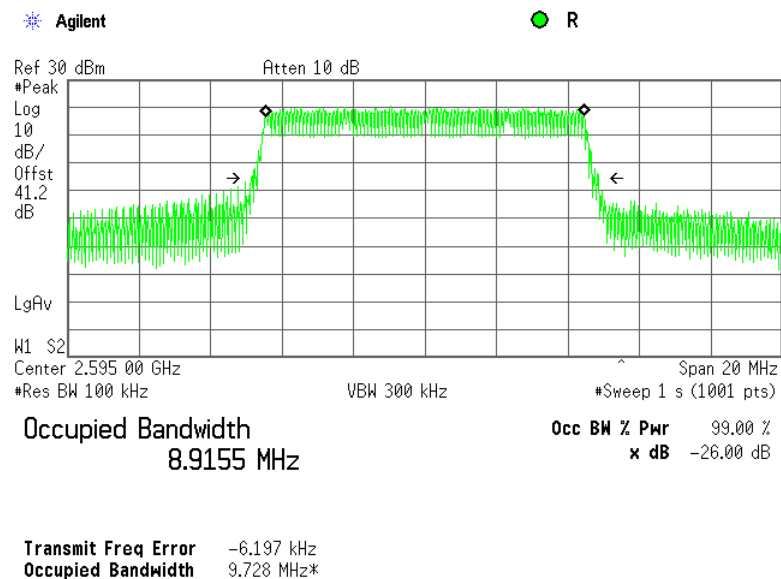
Full description is given in Appendix A.

Test specification:		Section 2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date(s):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.1 Occupied bandwidth test results at low frequency, 10 MHz EBW, QPSK, RF#2

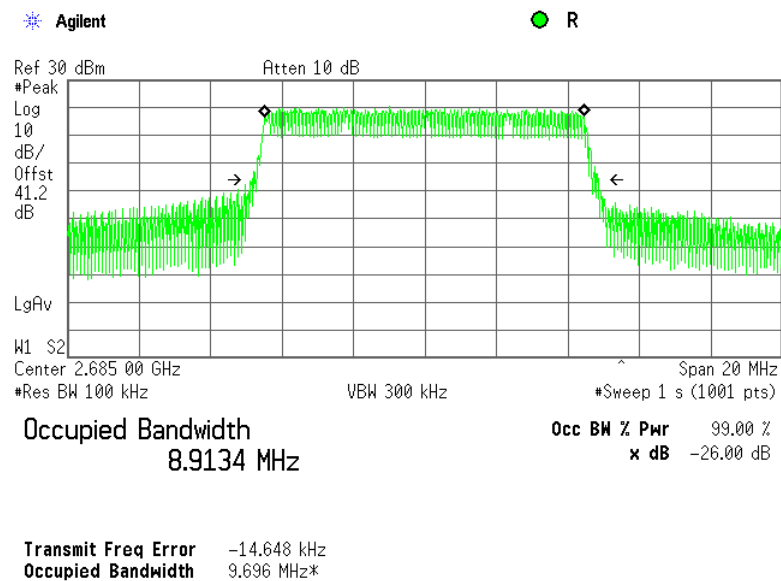


Plot 7.1.2 Occupied bandwidth test results at mid frequency, 10 MHz EBW, QPSK, RF#2

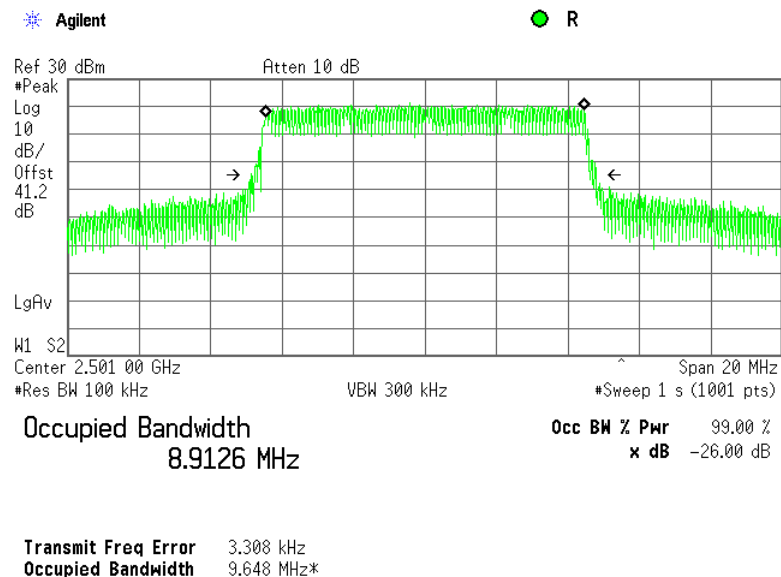


Test specification:		Section 2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date(s):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.3 Occupied bandwidth test results at high frequency, 10 MHz EBW, QPSK, RF#2



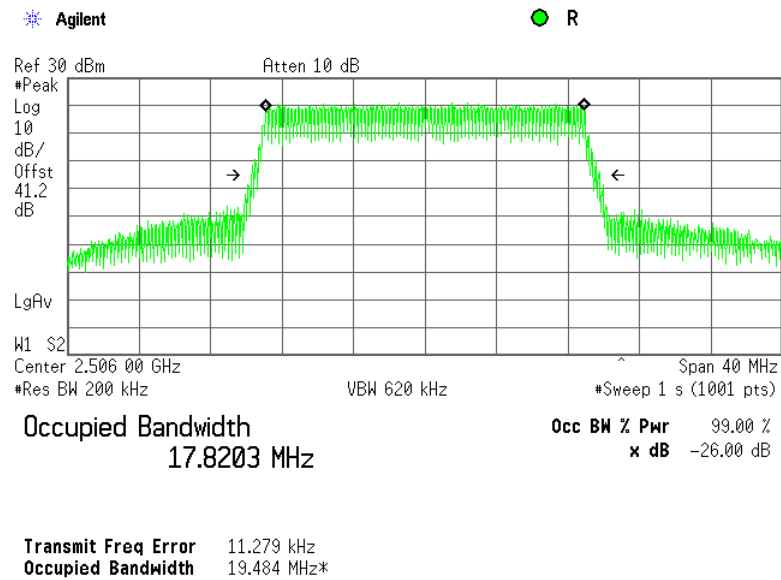
Plot 7.1.4 Occupied bandwidth test results at low frequency, 10 MHz EBW, 64QAM, RF#2



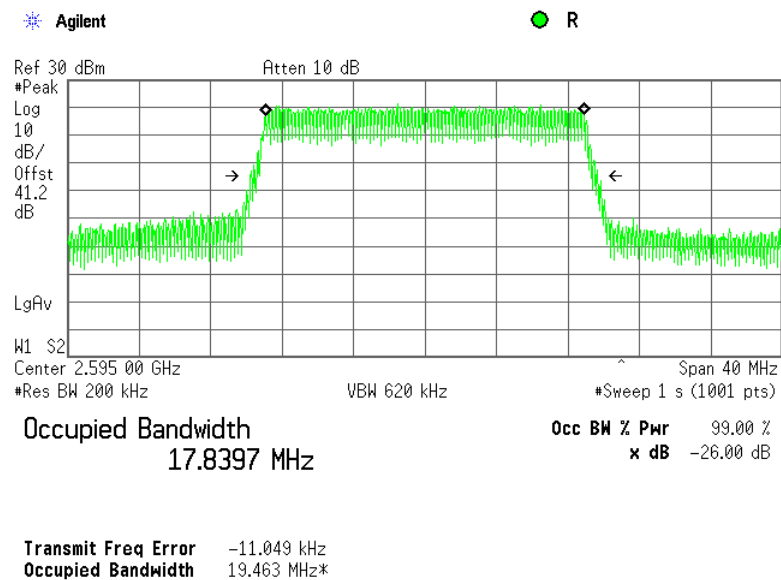


Test specification:		Section 2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date(s):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.7 Occupied bandwidth test results at low frequency, 20 MHz EBW, QPSK, RF#2

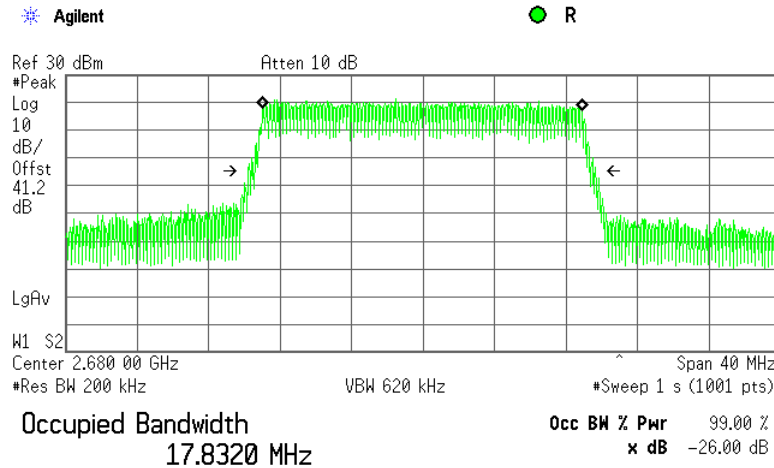


Plot 7.1.8 Occupied bandwidth test results at mid frequency, 20 MHz EBW, QPSK, RF#2



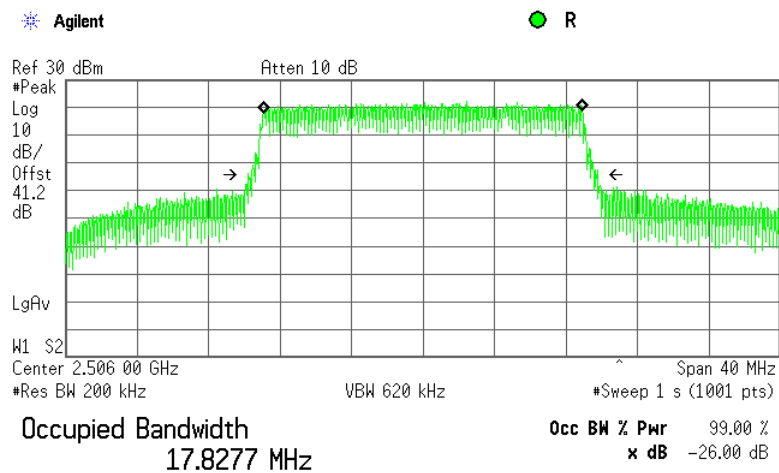
Test specification:		Section 2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date(s):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.9 Occupied bandwidth test results at high frequency, 20 MHz EBW, QPSK, RF#2



Transmit Freq Error -31.735 kHz
Occupied Bandwidth 19.467 MHz*

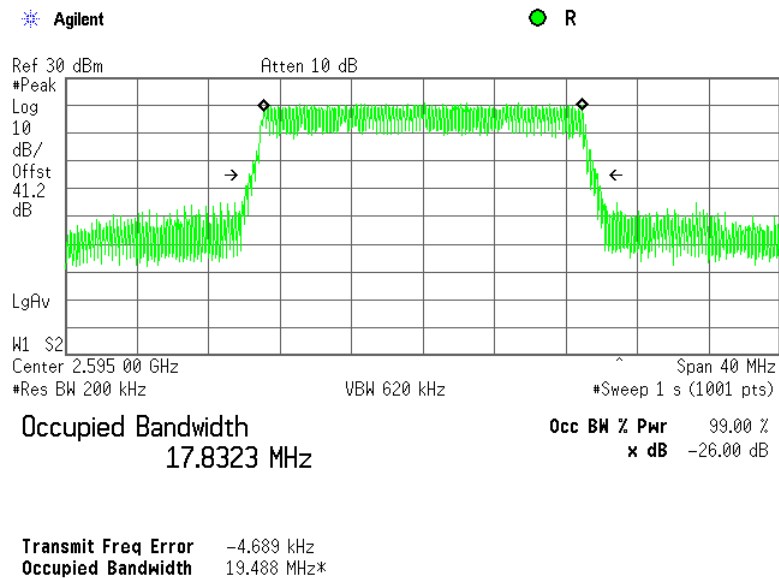
Plot 7.1.10 Occupied bandwidth test results at low frequency, 20 MHz EBW, 64QAM, RF#2



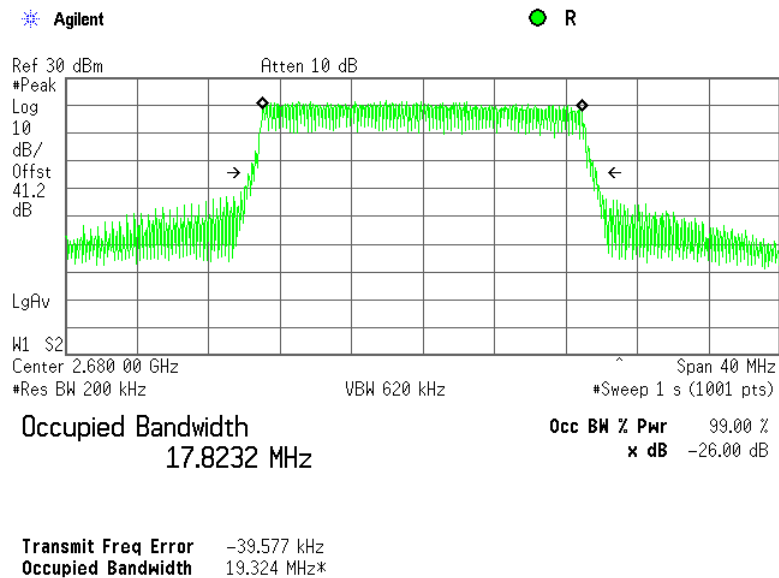
Transmit Freq Error -3.488 kHz
Occupied Bandwidth 19.534 MHz*

Test specification:		Section 2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date(s):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.11 Occupied bandwidth test results at mid frequency, 20 MHz EBW, 64QAM, RF#2



Plot 7.1.12 Occupied bandwidth test results at high frequency, 20 MHz EBW, 64QAM, RF#2



Test specification:		Section 27.50(h), 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):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

7.2 Peak output power test

7.2.1 General

This test was performed to measure the peak output power at RF antenna connector. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Peak output power limits

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

*- X is the actual channel width in MHz (occupied bandwidth), Y is either

- 1) 6 MHz if prior to transition or the station is in the MBS following transition or
- 2) 5.5 MHz if the station is in the LBS and UBS following transition, and
- 3) 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.

7.2.2 Test procedure

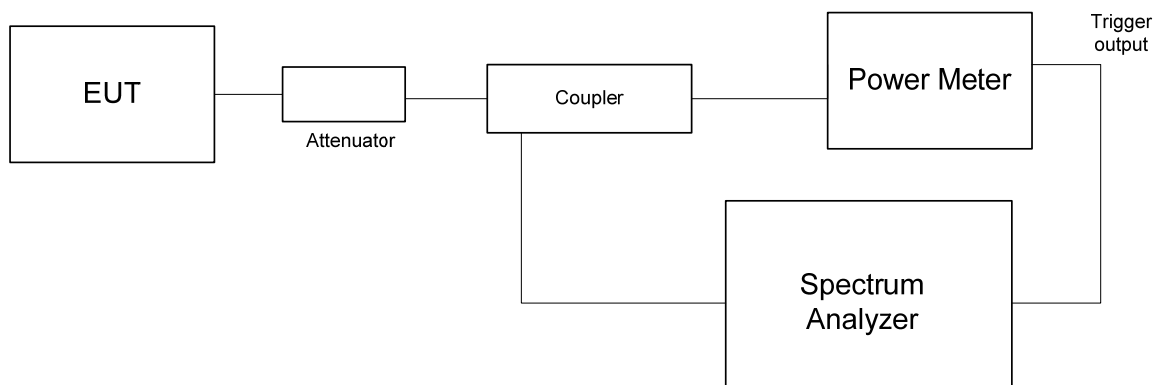
7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.

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

7.2.2.3 The average output power was measured with power meter as provided in Table 7.2.2 and Table 7.2.3.

7.2.2.4 The power spectral density was measured with spectrum analyzer as provided in Table 7.2.4 to Table 7.2.5 and the associated plots.

Figure 7.2.1 Peak output power test setup





Test specification:		Section 27.50(h), 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):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Table 7.2.2 Peak output power test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 DETECTOR USED: Average
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DUTY CYCLE: 100%
 EBW: 10 MHz
 NUMBER OF RF OUTPUTS: N = 2
 MAXIMUM ANTENNA GAIN: 18 dBi

- 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 15.5 Mbps								
2501	30.06	30.14	33.11	18.0	51.11	70.31	-19.20	Pass
2595	29.79	30.09	32.95	18.0	50.95	69.52	-18.57	Pass
2685	29.81	29.67	32.75	18.0	50.75	70.30	-19.55	Pass
64QAM 75.0 Mbps								
2501	30.53	30.52	33.54	18.0	51.54	70.28	-18.74	Pass
2595	29.77	30.10	32.95	18.0	50.95	69.45	-17.81	Pass
2685	29.78	29.75	32.78	18.0	50.78	70.28	-19.50	Pass

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

** - Total RF power, dBm = $10 \log\{10^{[P(\text{dBm}, \text{RF}\#1)/10]} + 10^{[P(\text{dBm}, \text{RF}\#2)/10]}\}$

*** - See Table 7.2.6, Table 7.2.7

Note: the calculation of total EIRP was done for the worst case, 18 dBi gain antenna; the limit is the same for 11 dBi and 18 dBi antenna

MAXIMUM ANTENNA GAIN: 17 dBi

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 15.5 Mbps								
2501	30.06	30.14	33.11	17.0	50.11	68.89	-18.78	Pass
2595	29.79	30.09	32.95	17.0	49.95	68.11	-18.16	Pass
2685	29.81	29.67	32.75	17.0	49.75	68.89	-19.14	Pass
64QAM 75.0 Mbps								
2501	30.53	30.52	33.54	17.0	50.54	68.86	-18.32	Pass
2595	29.77	30.10	32.95	17.0	50.64	68.03	-17.39	Pass
2685	29.78	29.75	32.78	17.0	49.78	68.86	-19.08	Pass

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

** - Total RF power, dBm = $10 \log\{10^{[P(\text{dBm}, \text{RF}\#1)/10]} + 10^{[P(\text{dBm}, \text{RF}\#2)/10]}\}$

*** - See Table 7.2.6, Table 7.2.7



Test specification:		Section 27.50(h), 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):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Table 7.2.3 Peak output power test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 DETECTOR USED: Average
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DUTY CYCLE: 100%
 EBW: 20 MHz
 NUMBER OF RF OUTPUTS: N = 2
 MAXIMUM ANTENNA GAIN: 18 dBi

- 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 31.0 Mbps								
2506	29.79	30.23	33.03	18.0	51.03	69.91	-18.88	Pass
2595	30.83	30.09	33.49	18.0	51.49	69.52	-18.03	Pass
2680	30.04	29.98	33.02	18.0	51.02	69.90	-18.88	Pass
64QAM 150.0 Mbps								
2506	30.54	30.74	33.65	18.0	51.65	69.92	-18.27	Pass
2595	30.12	30.15	33.15	18.0	51.15	69.53	-18.38	Pass
2680	30.03	30.51	33.29	18.0	51.29	69.87	-18.58	Pass

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

** - Total RF power, dBm = $10 \log\{10^{[P(\text{dBm}, \text{RF}\#1)/10]} + 10^{[P(\text{dBm}, \text{RF}\#2)/10]}\}$

*** - See Table 7.2.6, Table 7.2.7

Note: the calculation of total EIRP was done for the worst case, 18 dBi gain antenna; the limit is the same for 11 dBi and 18 dBi antenna

MAXIMUM ANTENNA GAIN: 17 dBi

- 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 31.0 Mbps								
2506	29.79	30.23	33.03	17.0	50.03	68.49	-18.46	Pass
2595	30.83	30.09	33.49	17.0	50.49	68.11	-17.62	Pass
2680	30.04	29.98	33.02	17.0	50.02	68.49	-18.47	Pass
64QAM 150.0 Mbps								
2506	30.54	30.74	33.65	17.0	50.65	68.50	-17.85	Pass
2595	30.12	30.15	33.15	17.0	50.15	68.12	-17.97	Pass
2680	30.03	30.51	33.29	17.0	50.29	68.46	-18.17	Pass

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

** - Total RF power, dBm = $10 \log\{10^{[P(\text{dBm}, \text{RF}\#1)/10]} + 10^{[P(\text{dBm}, \text{RF}\#2)/10]}\}$

*** - See Table 7.2.6, Table 7.2.7

Test specification: Section 27.50(h), 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):	25-Feb-14		
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Table 7.2.4 Power spectral density test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 300 kHz
MODULATING SIGNAL: PRBS
CHANNEL BANDWIDTH: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: 30 dBm
DUTY CYCLE: 100%
NUMBER OF RF OUTPUTS: N = 2
MAXIMUM ANTENNA GAIN: 18 dBi

Carrier frequency, MHz	SA reading, RF #2 dBm/100kHz	PSD result**, dBm/100kHz	Antenna gain, dBi	Total PSD*, dBm/100kHz	Limit***, dBm	Margin, dB	Verdict
QPSK 15.5 Mbps							
2501	11.76	14.76	18.0	32.76	50.31	-17.55	Pass
2595	11.44	14.44	18.0	32.44	48.73	-16.29	Pass
2685	11.18	14.18	18.0	32.18	50.30	-18.12	Pass
64QAM 75.0 Mbps							
2501	12.10	15.10	18.0	33.10	50.28	-17.18	Pass
2595	11.60	14.60	18.0	32.60	48.65	-16.05	Pass
2685	11.52	14.52	18.0	32.52	50.28	-17.76	Pass

* - Total PSD, dBm/100kHz = PSD result**, dBm/100kHz + Antenna Gain, dBi

** - PSD result, dBm/100kHz = SA reading + 10*log(N)

*** - See Table 7.2.6, Table 7.2.8

Note: the calculation of Total PSD was done for the worst case of 18 dBi gain antenna

MAXIMUM ANTENNA GAIN: 17 dBi

Carrier frequency, MHz	SA reading, RF #2 dBm/100kHz	PSD result**, dBm/100kHz	Antenna gain, dBi	Total PSD*, dBm/100kHz	Limit***, dBm	Margin, dB	Verdict
QPSK 15.5 Mbps							
2501	11.76	14.76	17.0	31.76	48.89	-17.13	Pass
2595	11.44	14.44	17.0	31.44	47.32	-15.88	Pass
2685	11.18	14.18	17.0	31.18	48.89	-17.71	Pass
64QAM 75.0 Mbps							
2501	12.10	15.10	17.0	32.10	48.86	-16.76	Pass
2595	11.60	14.60	17.0	31.60	47.24	-15.64	Pass
2685	11.52	14.52	17.0	31.52	48.86	-17.34	Pass

* - Total PSD, dBm/100kHz = PSD result**, dBm/100kHz + Antenna Gain, dBi

** - PSD result, dBm/100kHz = SA reading + 10*log(N)

*** - See Table 7.2.6, Table 7.2.8

Test specification:		Section 27.50(h), 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):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Table 7.2.5 Power spectral density test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 300 kHz
MODULATING SIGNAL: PRBS
CHANNEL BANDWIDTH: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: 30 dBm
DUTY CYCLE: 100%
NUMBER OF RF OUTPUTS: N = 2
MAXIMUM ANTENNA GAIN: 18 dBi

Carrier frequency, MHz	SA reading, RF #2 dBm/100kHz	PSD result**, dBm/100kHz	Antenna gain, dBi	Total PSD*, dBm/100kHz	Limit***, dBm	Margin, dB	Verdict
QPSK 31.0 Mbps							
2506	8.61	11.61	18.0	29.61	46.48	-16.87	Pass
2595	8.40	11.40	18.0	29.40	45.72	-16.32	Pass
2680	8.73	11.73	18.0	29.73	46.48	-16.75	Pass
64QAM 150.0 Mbps							
2506	9.69	12.69	18.0	30.69	46.49	-15.80	Pass
2595	8.99	11.99	18.0	29.99	45.73	-15.74	Pass
2680	9.46	12.46	18.0	30.46	46.45	-15.99	Pass

* - Total PSD, dBm/100kHz = PSD result**, dBm/100kHz + Antenna Gain, dBi

** - PSD result, dBm/100kHz = SA reading + 10*log(N)

*** - See Table 7.2.6, Table 7.2.8

Note: the calculation of Total PSD was done for the worst case of 18 dBi gain antenna

MAXIMUM ANTENNA GAIN: 17 dBi

Carrier frequency, MHz	SA reading, RF #2 dBm/100kHz	PSD result**, dBm/100kHz	Antenna gain, dBi	Total PSD*, dBm/100kHz	Limit***, dBm	Margin, dB	Verdict
QPSK 31.0 Mbps							
2506	8.61	11.61	17.0	28.61	45.07	-16.46	Pass
2595	8.40	11.40	17.0	28.40	44.31	-15.91	Pass
2680	8.73	11.73	17.0	28.73	45.07	-16.34	Pass
64QAM 150.0 Mbps							
2506	9.69	12.69	17.0	29.69	45.08	-15.39	Pass
2595	8.99	11.99	17.0	28.99	44.31	-15.32	Pass
2680	9.46	12.46	17.0	29.46	45.03	-15.57	Pass

* - Total PSD, dBm/100kHz = PSD result**, dBm/100kHz + Antenna Gain, dBi

** - PSD result, dBm/100kHz = SA reading + 10*log(N)

*** - See Table 7.2.6, Table 7.2.8

Reference numbers of test equipment used

HL 3301	HL 3302	HL 3818	HL 4229	HL 4234	HL 4273	HL 4366	
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Full description is given in Appendix A.



Test specification:		Section 27.50(h), 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):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Table 7.2.6 Pre - transition frequency channels assignment

Channel	Channel BW, MHz	Peak power limit, dBm	Power density limit, dBm/100kHz
10 MHz Dual Channel QPSK 15.1 Mbps			
2501.0 MHz BRS Ch.1 ERS Ch. A1	9.711	$63+10\log(\text{OBW}/10.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/10.0)$
2595.0 MHz EBS Ch.D4+ BRS Ch. E1	9.728	$63+10\log(\text{OBW}/12.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/12.0)$
2685.0 MHz EBS Ch.I+ EBS Ch.G4	9.696	$63+10\log(\text{OBW}/10.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/10.0)$
10 MHz Dual Channel 64QAM 75.0 Mbps			
2501.0 MHz BRS Ch.1 ERS Ch. A1	9.648	$63+10\log(\text{OBW}/10.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/10.0)$
2595.0 MHz EBS Ch.D4+ BRS Ch. E1	9.558	$63+10\log(\text{OBW}/12.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/12.0)$
2685.0 MHz EBS Ch.I+ EBS Ch.G4	9.641	$63+10\log(\text{OBW}/10.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/10.0)$
20 MHz 4 Channels QPSK 31.0 Mbps			
2506.0 MHz BRS Ch.1+ EBS Ch. A1+A2+B1	19.484	$63+10\log(\text{OBW}/22.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/22.0)$
2595.0 MHz EBS Ch.C4+D4+ BRS Ch.E1+F1	19.463	$63+10\log(\text{OBW}/24.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/24.0)$
2680.0 MHz EBS CH.I+G3+G4 BRS Ch.H3	19.467	$63+10\log(\text{OBW}/22.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/22.0)$
20 MHz 4 Channels 64QAM 150.0 Mbps			
2506.0 MHz BRS Ch.1+ EBS Ch. A1+A2+B1	19.534	$63+10\log(\text{OBW}/22.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/22.0)$
2595.0 MHz EBS Ch.C4+D4+ BRS Ch.E1+F1	19.488	$63+10\log(\text{OBW}/24.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/24.0)$
2680.0 MHz EBS CH.I+G3+G4 BRS Ch.H3	19.324	$63+10\log(\text{OBW}/22.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/22.0)$



Test specification:		Section 27.50(h), 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):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Table 7.2.7 EIRP limits

Channel	Channel BW, MHz	Peak power limit, dBm	
		17 dBi, 90° beamwidth	11 dBi/18 dBi, 65°beamwidth
10 MHz Dual Channel QPSK 15.1 Mbps			
2501.0 MHz BRS Ch.1 ERS Ch. A1	10.0	68.89	70.31
2595.0 MHz EBS Ch.D4+ BRS Ch. E1	12.0	68.11	69.52
2685.0 MHz EBS Ch.I+ EBS Ch.G4	10.0	68.89	70.30
10 MHz Dual Channel 64QAM 75.0 Mbps			
2501.0 MHz BRS Ch.1 ERS Ch. A1	10.0	68.86	70.28
2595.0 MHz EBS Ch.D4+ BRS Ch. E1	12.0	68.03	69.45
2685.0 MHz EBS Ch.I+ EBS Ch.G4	10.0	68.86	70.28
20 MHz 4 Channels QPSK 31.0 Mbps			
2506.0 MHz BRS Ch.1+ EBS Ch. A1+A2+B1	22.0	68.49	69.91
2595.0 MHz EBS Ch.C4+D4+ BRS Ch.E1+F1	24.0	68.11	69.52
2680.0 MHz EBS CH.I+G3+G4 BRS Ch.H3	22.0	68.49	69.90
20 MHz 4 Channels 64QAM 150.0 Mbps			
2506.0 MHz BRS Ch.1+ EBS Ch. A1+A2+B1	22.0	68.50	69.92
2595.0 MHz EBS Ch.C4+D4+ BRS Ch.E1+F1	24.0	68.12	69.53
2680.0 MHz EBS CH.I+G3+G4 BRS Ch.H3	22.0	68.46	69.87



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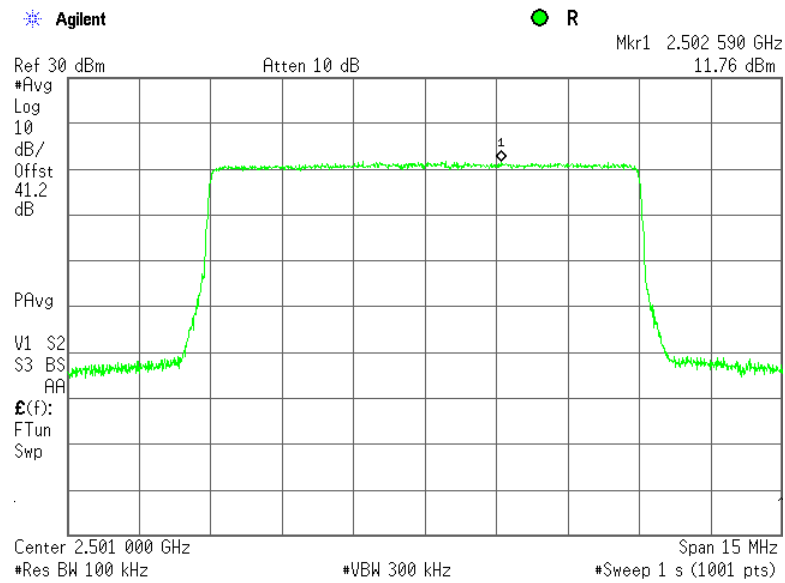
Test specification:		Section 27.50(h), Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date(s):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Table 7.2.8 Peak power density limits

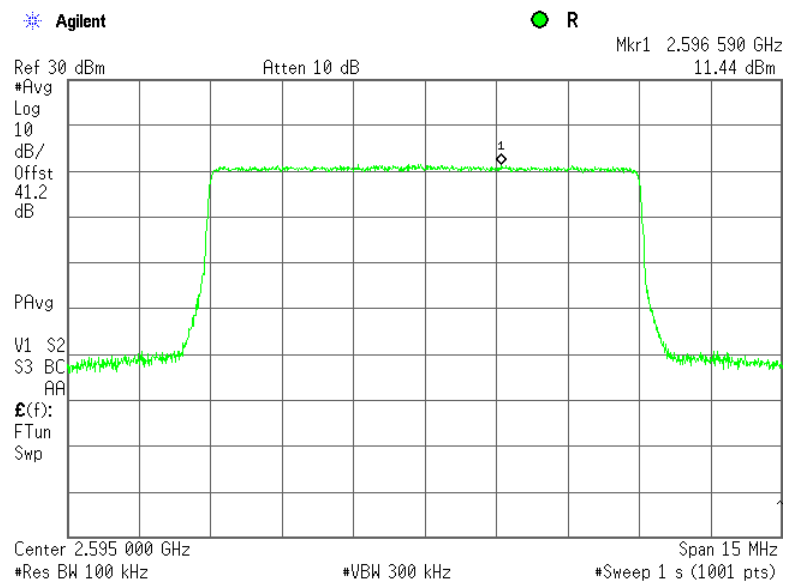
Channel	Channel BW, MHz	Peak power density, dBm/100kHz	
		17 dBi, 90° beamwidth	18 dBi, 65°beamwidth
10 MHz Dual Channel QPSK 15.1 Mbps			
2501.0 MHz BRS Ch.1 ERS Ch. A1	10.0	48.89	50.31
2595.0 MHz EBS Ch.D4+ BRS Ch. E1	12.0	47.32	48.73
2685.0 MHz EBS Ch.I+ EBS Ch.G4	10.0	48.89	50.30
10 MHz Dual Channel 64QAM 75.0 Mbps			
2501.0 MHz BRS Ch.1 ERS Ch. A1	10.0	48.86	50.28
2595.0 MHz EBS Ch.D4+ BRS Ch. E1	12.0	47.24	48.65
2685.0 MHz EBS Ch.I+ EBS Ch.G4	10.0	48.86	50.28
20 MHz 4 Channels QPSK 31.0 Mbps			
2506.0 MHz BRS Ch.1+ ERS Ch. A1+A2+A3	22.0	45.07	46.48
2595.0 MHz EBS Ch.C4+D4+ EBS Ch.G4+F4	24.0	44.31	45.72
2680.0 MHz EBS CH.G1+G2+G3 BRS Ch.H3	22.0	45.07	46.48
20 MHz 4 Channels 64QAM 150.0 Mbps			
2506.0 MHz BRS Ch.1+ ERS Ch. A1+A2+A3	22.0	45.08	46.49
2595.0 MHz EBS Ch.C4+D4+ EBS Ch.G4+F4	24.0	44.31	45.73
2680.0 MHz EBS CH.G1+G2+G3 BRS Ch.H3	22.0	45.03	46.45

Test specification:		Section 27.50(h), 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):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.1 Power spectral density test results at low frequency, QPSK, 10 MHz EBW, RF # 2

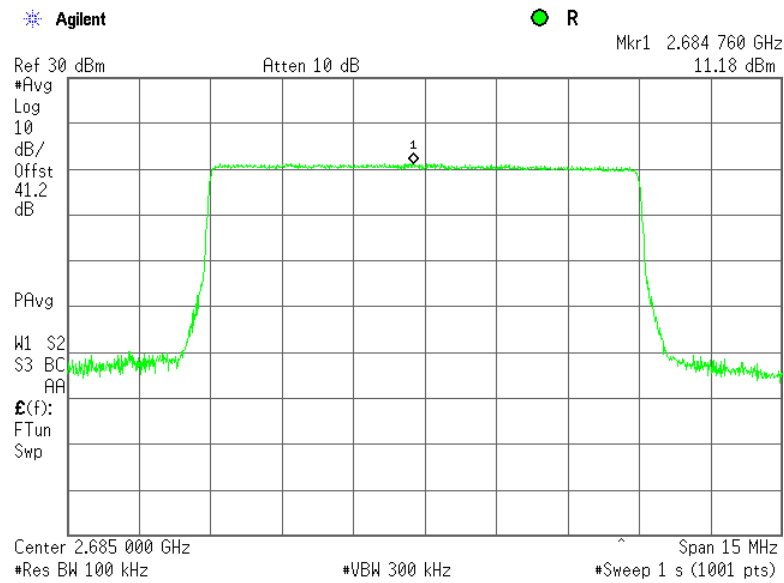


Plot 7.2.2 Power spectral density test results at mid frequency, QPSK, 10 MHz EBW, RF # 2

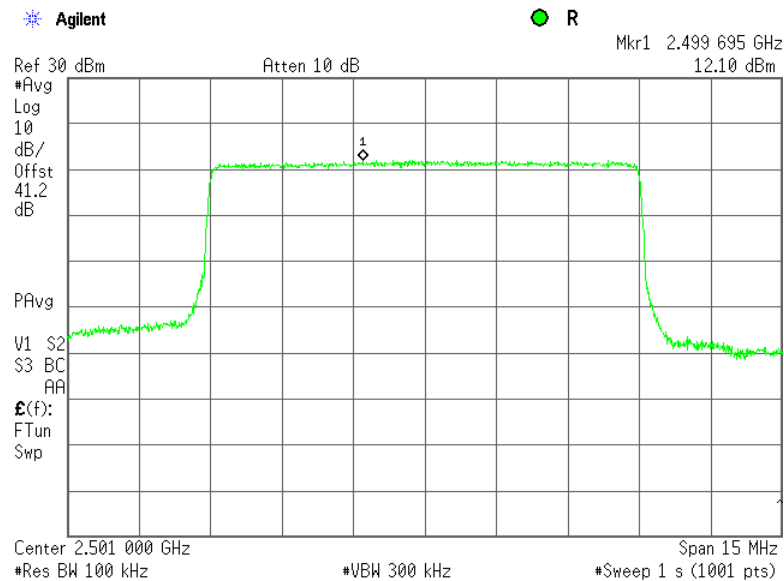


Test specification:		Section 27.50(h), Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date(s):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.3 Power spectral density test results at high frequency, QPSK, 10 MHz EBW, RF # 2

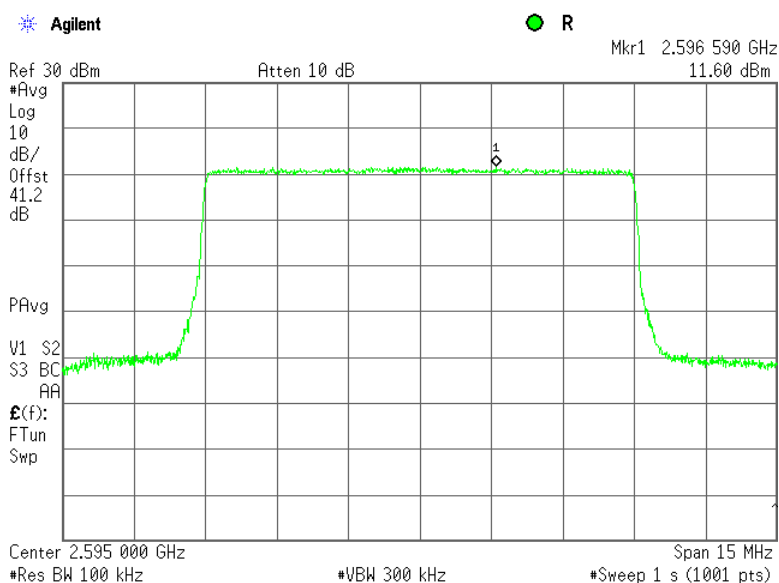


Plot 7.2.4 Power spectral density test results at low frequency, 64QAM, 10 MHz EBW, RF # 2

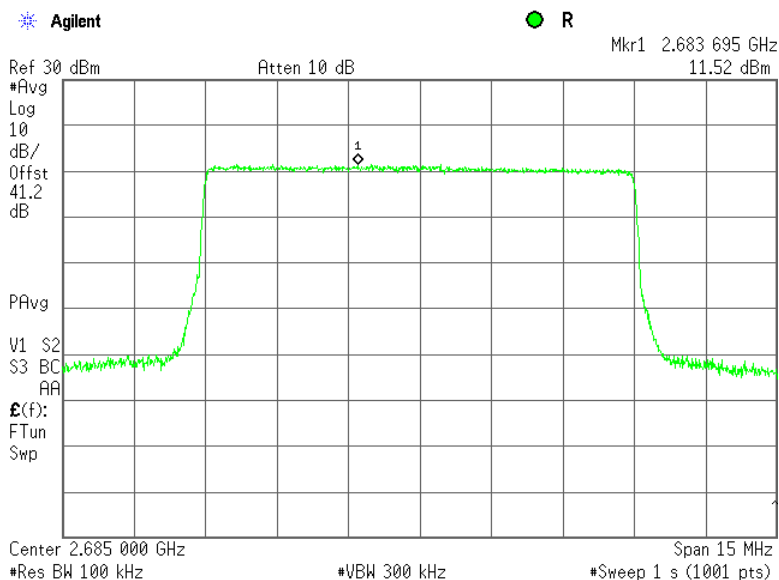


Test specification:		Section 27.50(h), Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date(s):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.5 Power spectral density test results at mid frequency, 64QAM, 10 MHz EBW, RF # 2

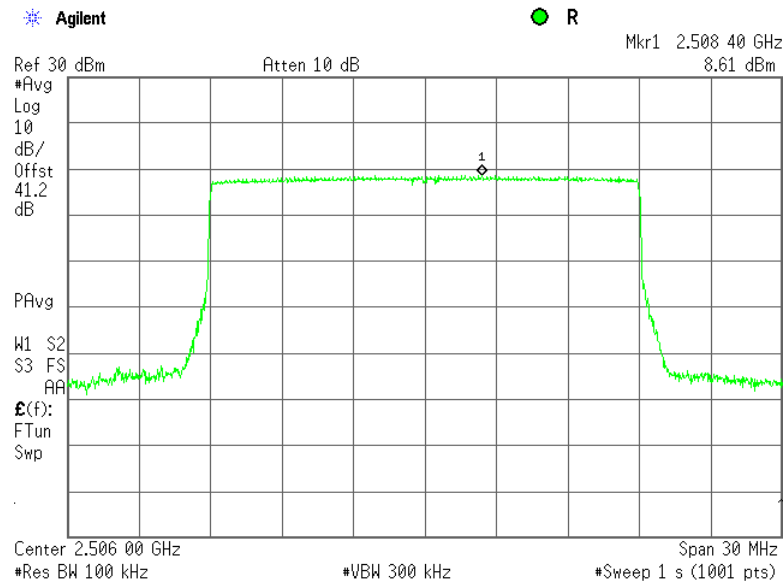


Plot 7.2.6 Power spectral density test results at high frequency, 64QAM, 10 MHz EBW, RF # 2

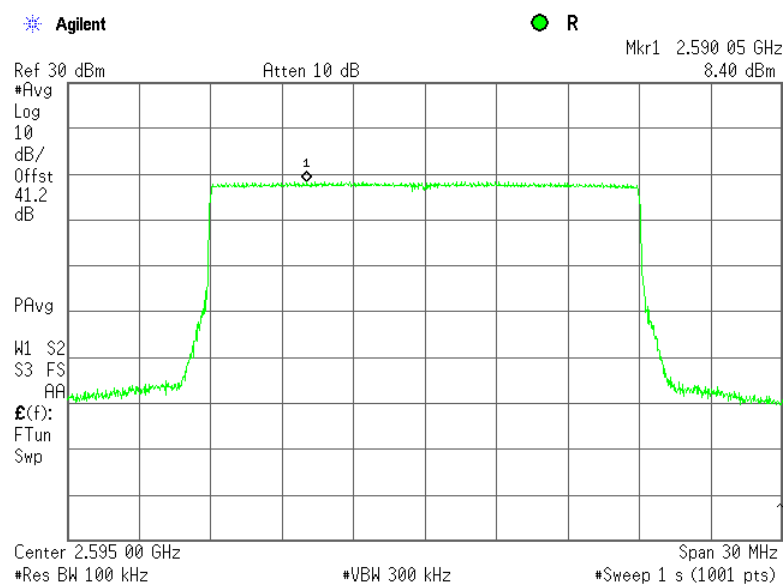


Test specification:		Section 27.50(h), Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date(s):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.7 Power spectral density test results at low frequency, QPSK, 20 MHz EBW, RF # 2

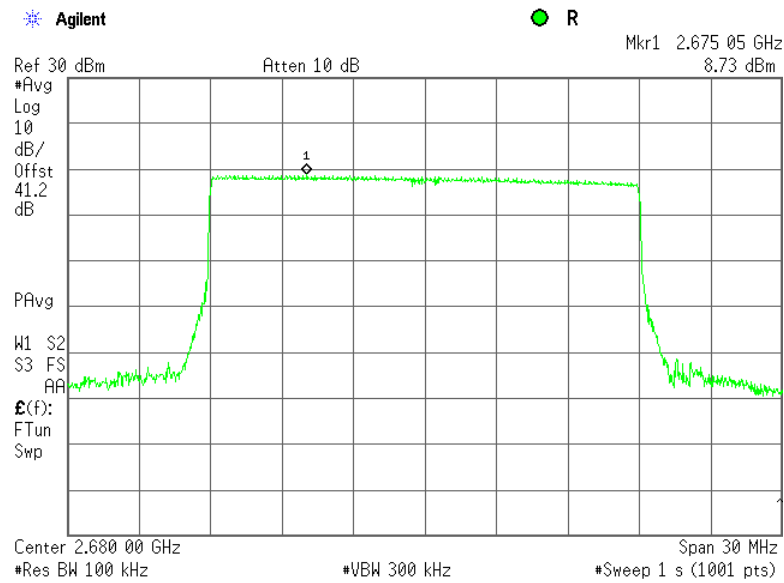


Plot 7.2.8 Power spectral density test results at mid frequency, QPSK, 20 MHz EBW, RF # 2

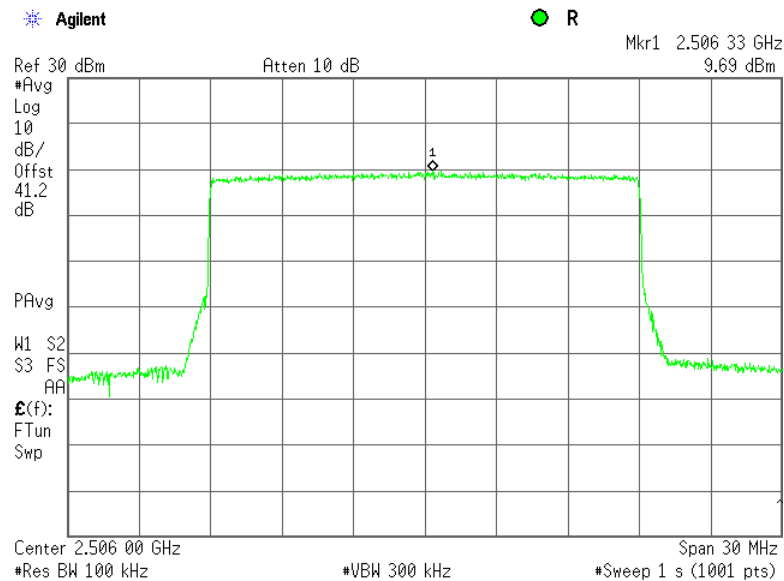


Test specification:		Section 27.50(h), Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date(s):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.9 Power spectral density test results at high frequency, QPSK, 20 MHz EBW, RF # 2

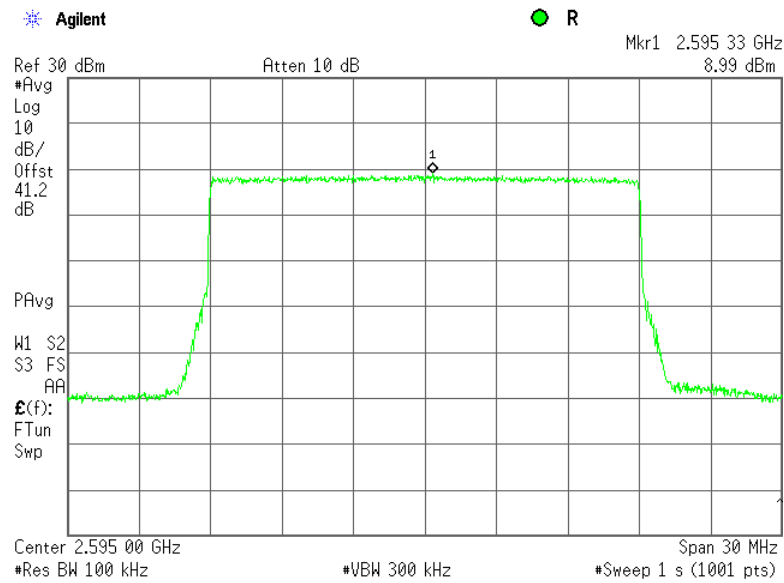


Plot 7.2.10 Power spectral density test results at low frequency, 64QAM, 20 MHz EBW, RF # 2

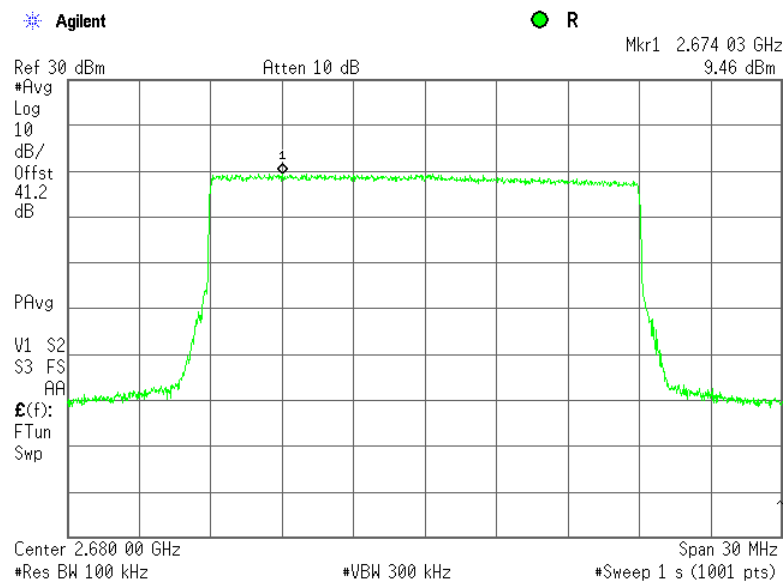


Test specification:		Section 27.50(h), Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date(s):		25-Feb-14	
Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.11 Power spectral density test results at mid frequency, 64QAM, 20 MHz EBW, RF # 2



Plot 7.2.12 Power spectral density test results at high frequency, 64QAM, 20 MHz EBW, RF # 2



Test specification:		Section 27.53(m)(2), 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):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

7.3 Band edge emissions at RF connector test

7.3.1 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 7.3.1.

Table 7.3.1 Spurious emission limits at band edges

Channel	Frequency range	Attenuation below carrier, dBc	Limit, dBm
Channel bandwidth 10 MHz			
2501	2490.0 - 2496.0 2506.0 - 2512.0	43+ 10*Log (P*)	-13.0
2595	2584.0 - 2590.0 2602.0 - 2608.0	43+ 10*Log (P*)	-13.0
2685	2674.0 - 2680.0 2690.0 - 2696.0	43+ 10*Log (P*)	-13.0
Channel bandwidth 20 MHz			
2506	2490.0 - 2496.0 2518.0 - 2524.0	43+ 10*Log (P*)	-13.0
2595	2578.0 - 2584.0 2608.0 - 2614.0	43+ 10*Log (P*)	-13.0
2680	2662.0 - 2668.0 2690.0 - 2696.0	43+ 10*Log (P*)	-13.0

* - P is transmitter output power in Watts

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 spurious emission was measured with spectrum analyzer as provided in Table 7.3.2 and the associated plots.

Figure 7.3.1 Spurious emission test setup for single output





Test specification: Section 27.53(m)(2), 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): 04-Mar-14			
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

Table 7.3.2 Spurious emission at the low band edge test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 INVESTIGATED FREQUENCY RANGE: See below
 RBW: 100 kHz
 DETECTOR USED: Average
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 MODULATION: QPSK, 64QAM
 EBW: 10 MHz
 NUMBER OF RF OUTPUTS: N = 2

Frequency offset, ± MHz	Low band edge SA reading, dBm	Low band edge result, dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
Low carrier frequency 2501.0 MHz QPSK						
5.5	-22.17	-19.17	100	1000	-13.0	Pass
6.5	-23.00	-20.00	100	1000	-13.0	
7.5	-23.44	-20.44	100	1000	-13.0	
9.5	-25.16	-22.16	100	1000	-13.0	
Low carrier frequency 2501.0 MHz 64QAM						
5.5	-21.98	-18.98	100	1000	-13.0	Pass
6.5	-23.93	-20.93	100	1000	-13.0	
7.5	-24.16	-21.16	100	1000	-13.0	
8.5	-25.91	-22.91	100	1000	-13.0	
Mid carrier frequency 2595.0 MHz QPSK						
5.5	-19.40	-16.40	100	1000	-13.0	Pass
6.5	-20.97	-17.97	100	1000	-13.0	
7.5	-22.13	-19.13	100	1000	-13.0	
9.5	-24.37	-21.37	100	1000	-13.0	
Mid carrier frequency 2595.0 MHz 64QAM						
5.5	-20.75	-17.75	100	1000	-13.0	Pass
6.5	-21.88	-18.88	100	1000	-13.0	
7.5	-22.50	-19.50	100	1000	-13.0	
9.5	-26.51	-23.51	100	1000	-13.0	
High carrier frequency 2685.0 MHz QPSK						
5.5	-21.86	-18.86	300	1000	-13.0	Pass
6.5	-23.71	-20.71	300	1000	-13.0	
7.5	-24.70	-21.70	300	1000	-13.0	
9.5	-27.27	-24.27	300	1000	-13.0	
High carrier frequency 2685.0 MHz 64QAM						
5.5	-21.01	-18.01	100	1000	-13.0	Pass
6.5	-22.62	-19.62	100	1000	-13.0	
7.5	-23.71	-20.71	100	1000	-13.0	
9.5	-26.91	-23.91	100	1000	-13.0	

* - Low band edge result = Low band edge SA Reading + 10log(N)



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Test specification: Section 27.53(m)(2), 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): 04-Mar-14			
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

Table 7.3.3 Spurious emission at the high band edge test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 INVESTIGATED FREQUENCY RANGE: See below
 RBW: 100 kHz
 DETECTOR USED: Average
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 MODULATION: QPSK, 64QAM
 EBW: 10 MHz
 NUMBER OF RF OUTPUTS: N = 2

Frequency offset, ± MHz	High band edge SA reading, dBm	High band edge result, dBm*	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
Low carrier frequency 2501.0 MHz QPSK						
5.5	-20.60	-17.60	100	1000	-13.0	Pass
6.5	-21.94	-18.94	100	1000	-13.0	
7.5	-23.70	-20.70	100	1000	-13.0	
9.5	-25.68	-22.68	100	1000	-13.0	
Low carrier frequency 2501.0 MHz 64QAM						
5.5	-21.14	-18.14	100	1000	-13.0	Pass
6.5	-22.23	-19.23	100	1000	-13.0	
7.5	-23.87	-20.87	100	1000	-13.0	
8.5	-24.68	-21.68	100	1000	-13.0	
Mid carrier frequency 2595.0 MHz QPSK						
5.5	-17.67	-14.67	100	1000	-13.0	Pass
6.5	-19.58	-16.58	100	1000	-13.0	
7.5	-19.79	-16.79	100	1000	-13.0	
9.5	-23.73	-20.73	100	1000	-13.0	
Mid carrier frequency 2595.0 MHz 64QAM						
5.5	-19.78	-16.78	100	1000	-13.0	Pass
6.5	-21.57	-18.57	100	1000	-13.0	
7.5	-23.15	-20.15	100	1000	-13.0	
9.5	-26.04	-23.04	100	1000	-13.0	
High carrier frequency 2685.0 MHz QPSK						
5.5	-22.74	-19.74	300	1000	-13.0	Pass
6.5	-23.90	-20.90	300	1000	-13.0	
7.5	-25.14	-22.14	300	1000	-13.0	
9.5	-28.96	-25.96	300	1000	-13.0	
High carrier frequency 2685.0 MHz 64QAM						
5.5	-22.39	-19.39	100	1000	-13.0	Pass
6.5	-22.78	-19.78	100	1000	-13.0	
7.5	-24.46	-21.46	100	1000	-13.0	
9.5	-28.22	-25.22	100	1000	-13.0	

* - High band edge result = High band edge SA Reading + 10log(N)



Test specification:		Section 27.53(m)(2), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Verdict: PASS	
Date(s):			
04-Mar-14			
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

Table 7.3.4 Spurious emission at the low band edge test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 INVESTIGATED FREQUENCY RANGE: See below
 RBW: 200 kHz
 DETECTOR USED: Average
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 MODULATION: QPSK, 64QAM
 EBW: 20 MHz
 NUMBER OF RF OUTPUTS: N = 2

Frequency offset, ± MHz	Low band edge SA reading, dBm	Low band edge result, dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
Low carrier frequency 2506.0 MHz QPSK						
10.5	-25.11	-22.11	200	1000	-13.0	Pass
11.5	-27.17	-24.17	200	1000	-13.0	
12.5	-28.05	-25.05	200	1000	-13.0	
13.5	-28.66	-25.66	200	1000	-13.0	
Low carrier frequency 2506.0 MHz 64QAM						
10.5	-22.18	-19.18	200	1000	-13.0	Pass
11.5	-21.93	-18.93	200	1000	-13.0	
12.5	-23.44	-20.44	200	1000	-13.0	
13.5	-23.15	-20.15	200	1000	-13.0	
Mid carrier frequency 2595.0 MHz QPSK						
10.5	-25.17	-22.17	200	1000	-13.0	Pass
11.5	-27.13	-24.13	200	1000	-13.0	
12.5	-27.23	-24.23	200	1000	-13.0	
13.5	-27.79	-24.79	200	1000	-13.0	
Mid carrier frequency 2595.0 MHz 64QAM						
10.5	-27.74	-24.74	200	1000	-13.0	Pass
11.5	-29.93	-26.93	200	1000	-13.0	
12.5	-30.76	-27.76	200	1000	-13.0	
13.5	-31.20	-28.20	200	1000	-13.0	
High carrier frequency 2680.0 MHz QPSK						
10.5	-24.63	-21.63	200	1000	-13.0	Pass
11.5	-26.25	-23.25	200	1000	-13.0	
12.5	-26.63	-23.63	200	1000	-13.0	
13.5	-27.31	-24.31	200	1000	-13.0	
High carrier frequency 2680.0 MHz 64QAM						
10.5	-25.42	-22.42	200	1000	-13.0	Pass
11.5	-27.83	-24.83	200	1000	-13.0	
12.5	-27.30	-24.30	200	1000	-13.0	
13.5	-27.83	-24.83	200	1000	-13.0	

* - Low band edge result = Low band edge SA Reading + 10log(N)



Test specification: Section 27.53(m)(2), 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): 04-Mar-14			
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

Table 7.3.5 Spurious emission at the high band edge test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 INVESTIGATED FREQUENCY RANGE: See below
 RBW: 200 kHz
 DETECTOR USED: Average
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 MODULATION: QPSK, 64QAM
 EBW: 20 MHz
 NUMBER OF RF OUTPUTS: N = 2

Frequency offset, ± MHz	High band edge SA reading, dBm	High band edge result, dBm*	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
Low carrier frequency 2506.0 MHz QPSK						
10.5	-25.90	-22.90	200	1000	-13.0	Pass
11.5	-27.53	-24.53	200	1000	-13.0	
12.5	-27.59	-24.59	200	1000	-13.0	
13.5	-28.48	-25.48	200	1000	-13.0	
Low carrier frequency 2506.0 MHz 64QAM						
10.5	-21.50	-18.50	200	1000	-13.0	Pass
11.5	-21.98	-18.98	200	1000	-13.0	
12.5	-21.25	-18.25	200	1000	-13.0	
13.5	-22.45	-19.45	200	1000	-13.0	
Mid carrier frequency 2595.0 MHz QPSK						
10.5	-27.04	-24.04	200	1000	-13.0	Pass
11.5	-28.29	-25.29	200	1000	-13.0	
12.5	-28.40	-25.40	200	1000	-13.0	
13.5	-29.93	-25.93	200	1000	-13.0	
Mid carrier frequency 2595.0 MHz 64QAM						
10.5	-27.46	-24.46	200	1000	-13.0	Pass
11.5	-29.14	-26.14	200	1000	-13.0	
12.5	-29.89	-26.89	200	1000	-13.0	
13.5	-30.66	-27.66	200	1000	-13.0	
High carrier frequency 2680.0 MHz QPSK						
10.5	-27.35	-24.35	200	1000	-13.0	Pass
11.5	-28.20	-25.20	200	1000	-13.0	
12.5	-29.10	-26.10	200	1000	-13.0	
13.5	-30.09	-27.09	200	1000	-13.0	
High carrier frequency 2680.0 MHz 64QAM						
10.5	-24.69	-21.69	200	1000	-13.0	Pass
11.5	-25.32	-22.32	200	1000	-13.0	
12.5	-26.62	-23.62	200	1000	-13.0	
13.5	-28.05	-25.05	200	1000	-13.0	

* - High band edge result = High band edge SA Reading + 10log(N)

Reference numbers of test equipment used

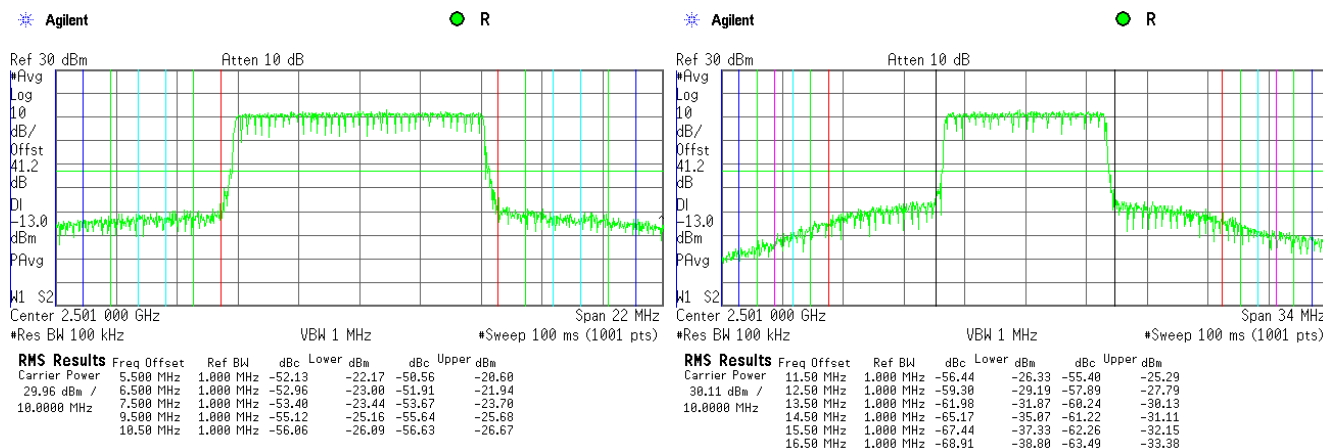
HL 3301	HL 3302	HL 3818	HL 4229	HL 4234	HL 4273	HL 4366	
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Full description is given in Appendix A.

Test specification:		Section 27.53(m)(2), 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):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

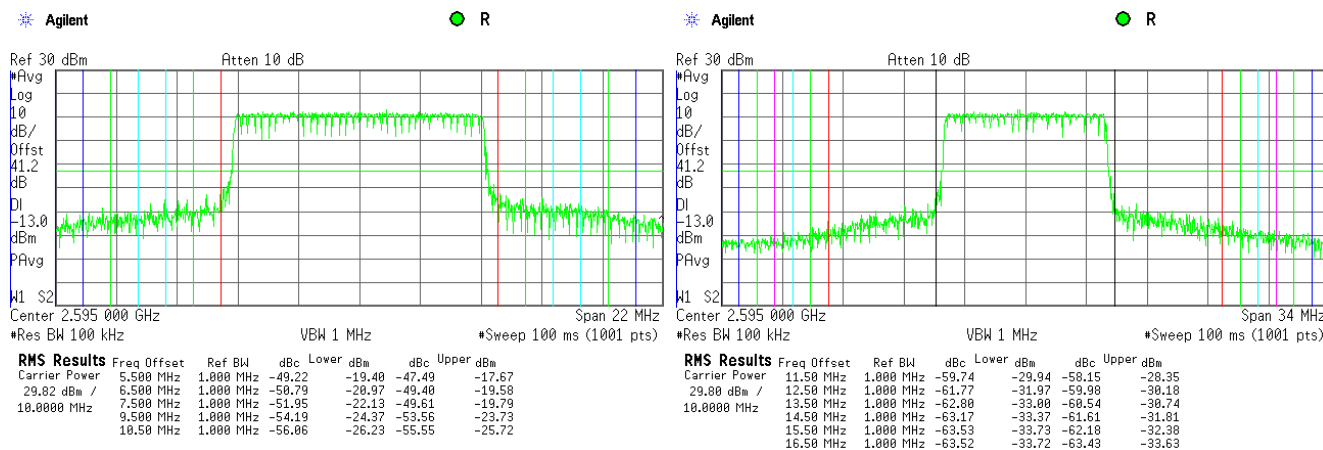
Plot 7.3.1 Spurious emission at band edges test results at low carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 15.5 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.2 Spurious emission at band edges test results at mid carrier frequency, 10 MHz EBW

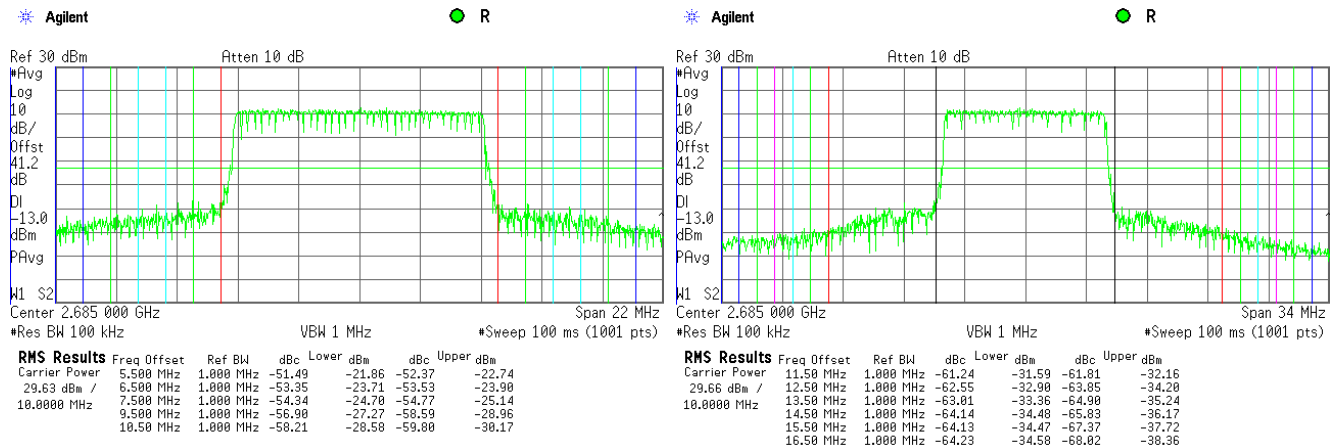
OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 15.5 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test specification:		Section 27.53(m)(2), 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):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

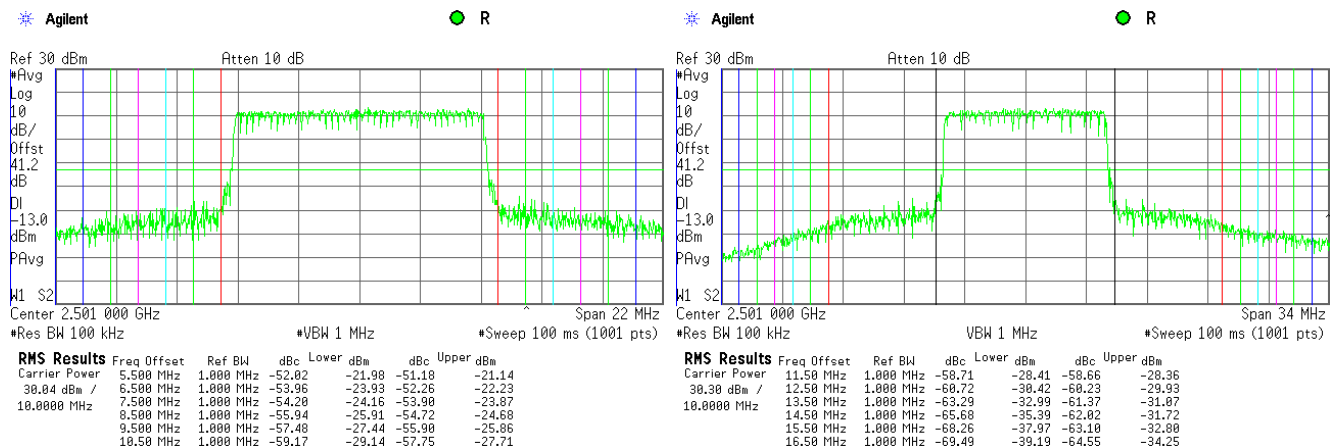
Plot 7.3.3 Spurious emission at band edges test results at high carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 15.5 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.4 Spurious emission at band edges test results at low carrier frequency, 10 MHz EBW

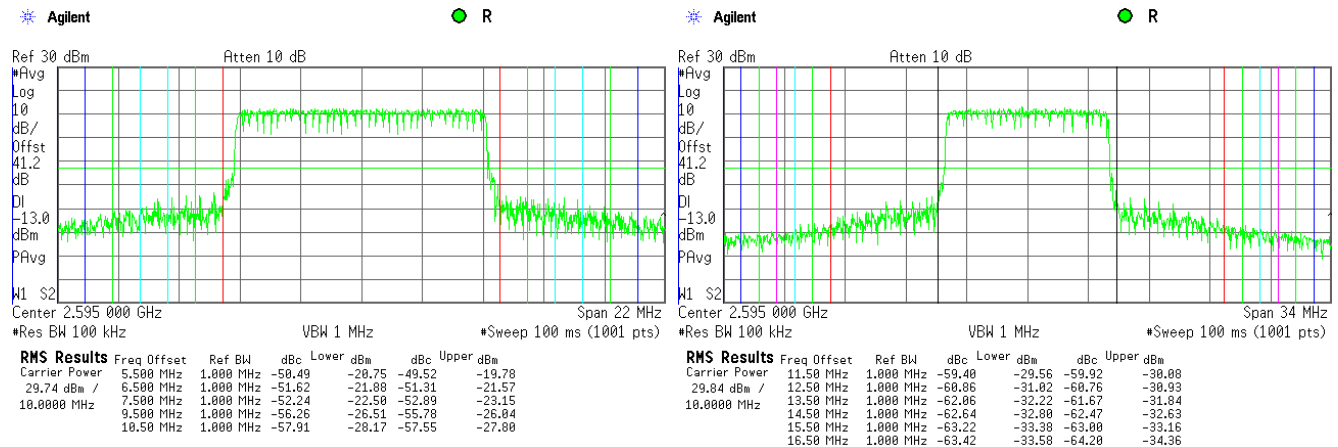
OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 75.0 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test specification:		Section 27.53(m)(2), 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):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

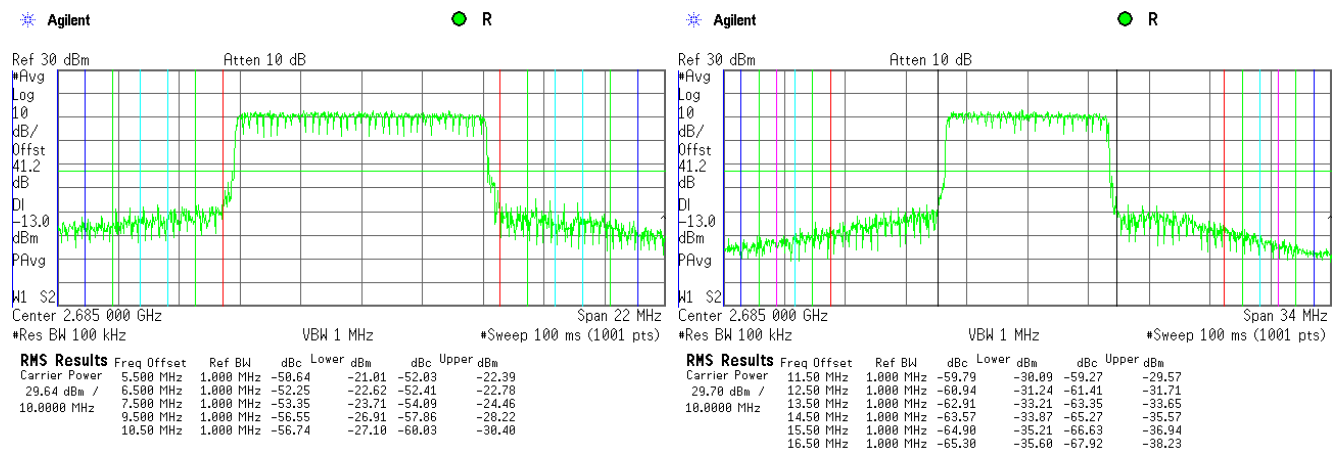
Plot 7.3.5 Spurious emission at band edges test results at mid carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 75.0 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.6 Spurious emission at band edges test results at high carrier frequency, 10 MHz EBW

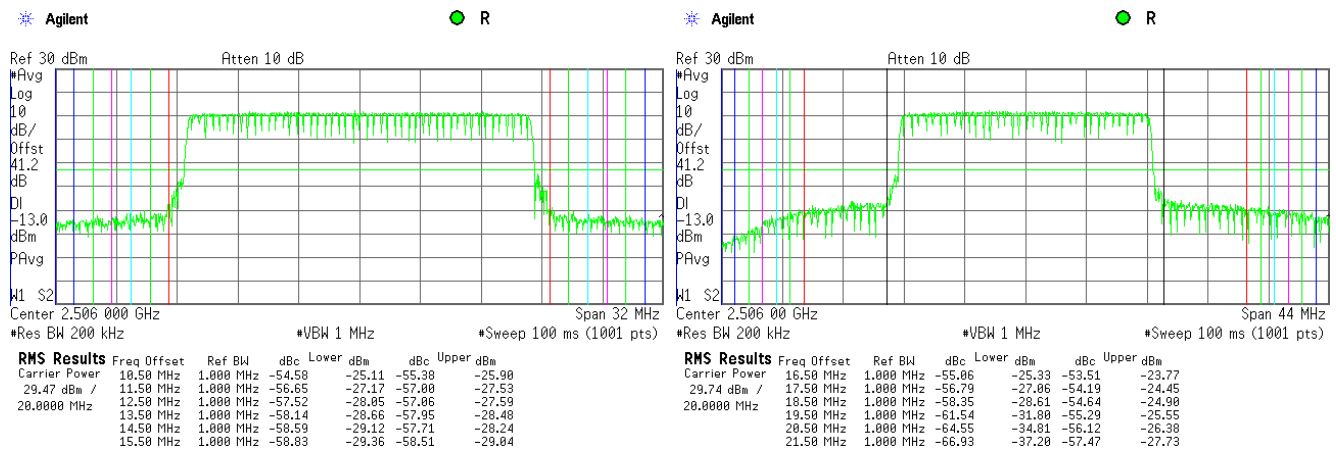
OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 75.0 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test specification:		Section 27.53(m)(2), 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):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

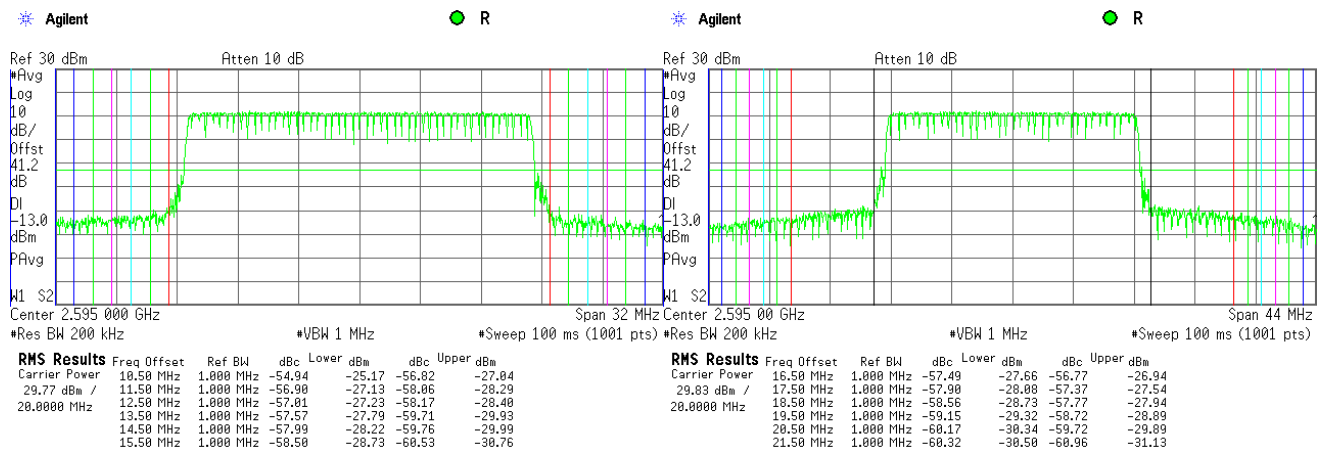
Plot 7.3.7 Spurious emission at band edges test results at low carrier frequency, 20 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 31 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.8 Spurious emission at band edges test results at mid carrier frequency, 20 MHz EBW

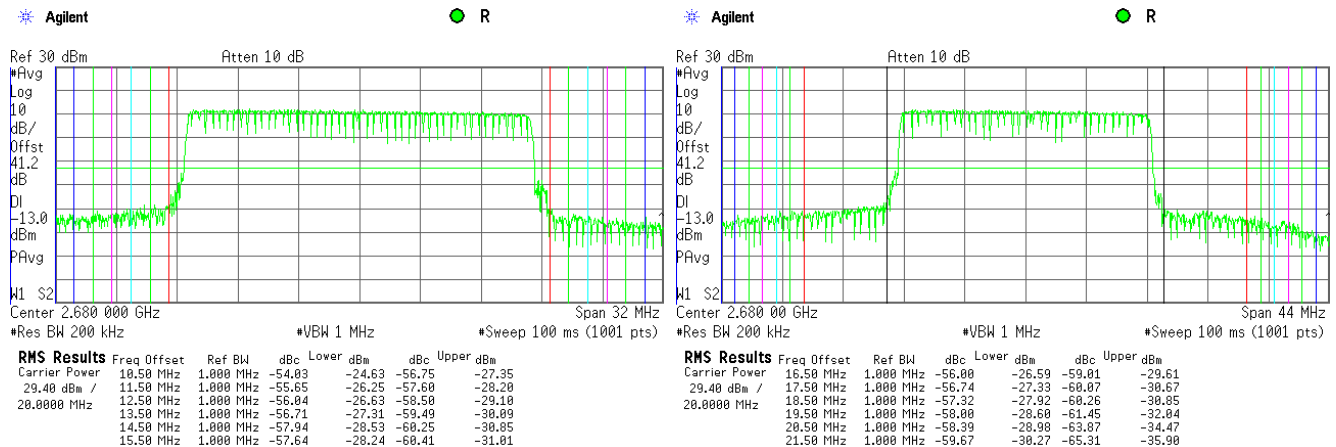
OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 31 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test specification:		Section 27.53(m)(2), 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):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

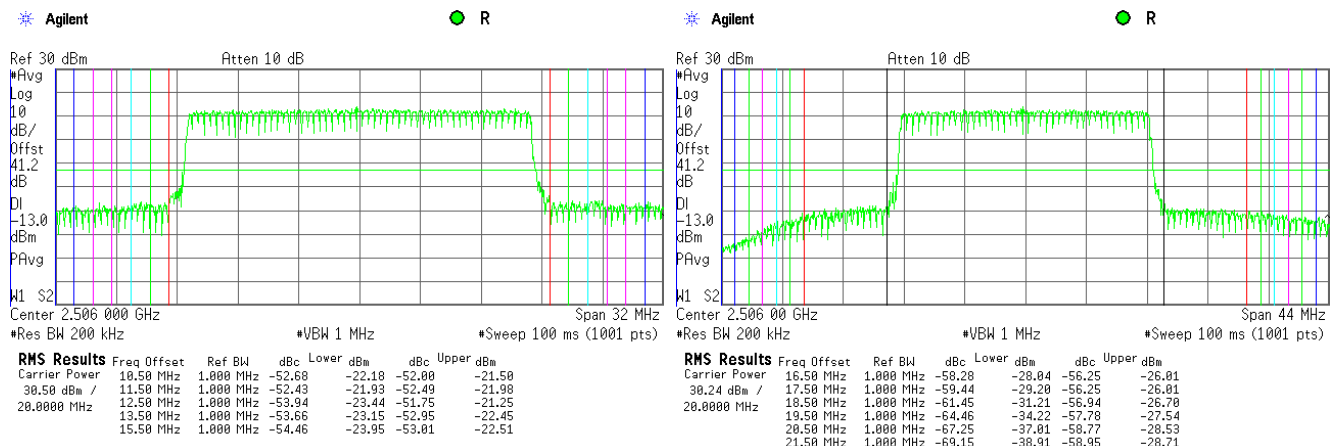
Plot 7.3.9 Spurious emission at band edges test results at high carrier frequency, 20 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 31 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.10 Spurious emission at band edges test results at low carrier frequency, 20 MHz EBW

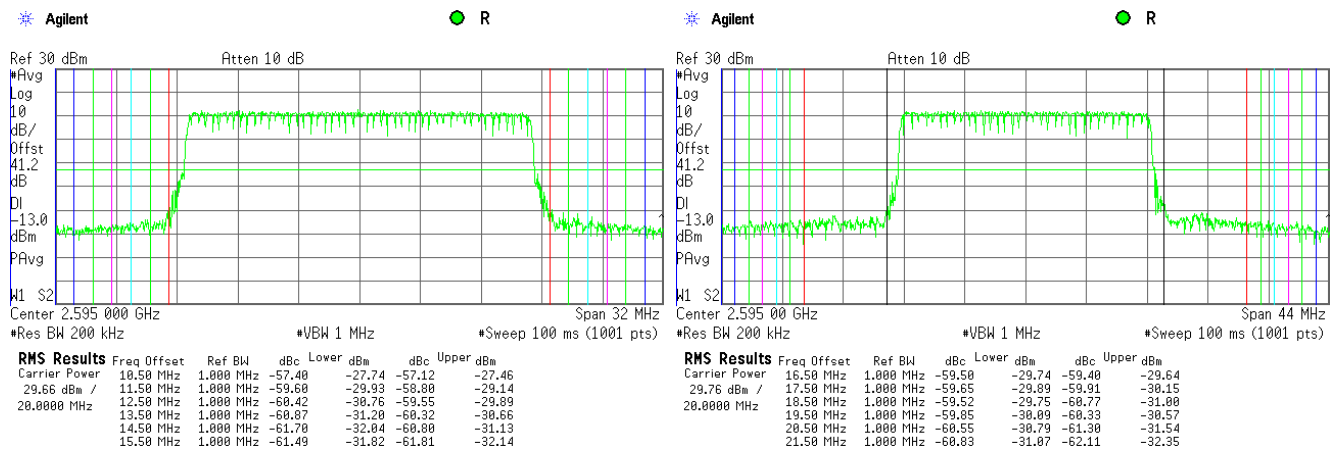
OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 150 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test specification:		Section 27.53(m)(2), 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):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

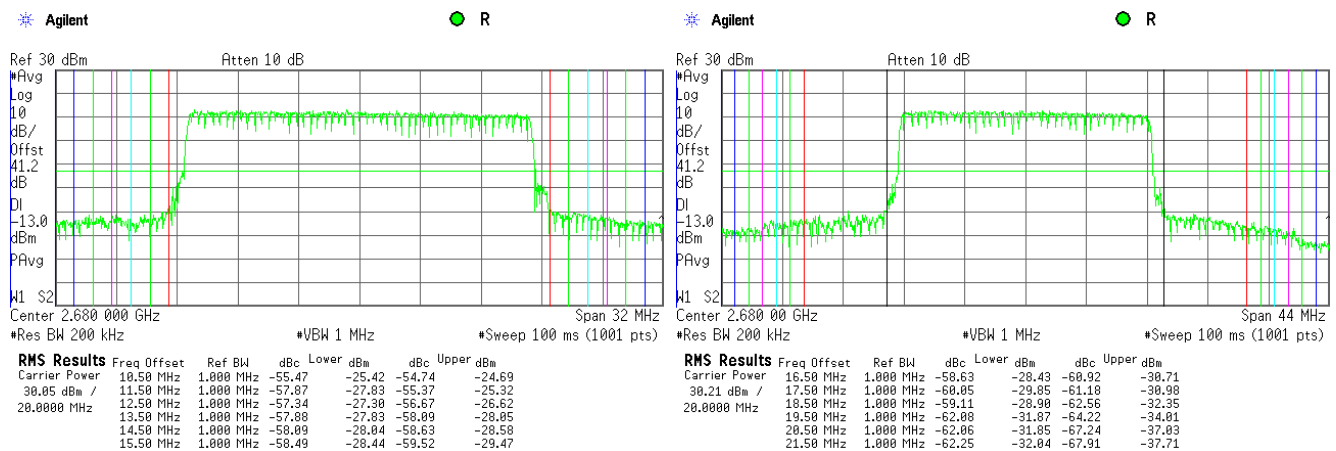
Plot 7.3.11 Spurious emission at band edges test results at mid carrier frequency, 20 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 150 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.12 Spurious emission at band edges test results at high carrier frequency, 20 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 150 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Mar-14		
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

7.4 Spurious emissions at RF antenna connector test

7.4.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.4.1.

Table 7.4.1 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

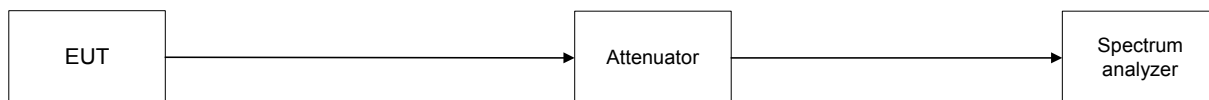
7.4.2 Test procedure

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 for end user RF output power.

7.4.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.4.2 and associated plots.

Figure 7.4.1 Spurious emission test setup, single output



Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Mar-14		
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Table 7.4.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 27000 MHz
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATION: 64QAM
 MODULATING SIGNAL: PRBS
 BIT RATE: 75.0Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TESTED RF CHAIN: RF#1

Frequency, MHz	SA reading, dBm	Attenuation, dB	Detector used	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency								
999.88	-46.98	included	Peak	100	-46.98	-13.00	-33.98	Pass
1665.00	-39.39	included	Peak	1000	-39.39	-13.00	-26.39	Pass
2479.04	-41.10	included	Average	1000	-41.10	-13.00	-28.10	Pass
2522.00	-22.59	included	Average	1000	-22.59	-13.00	-9.59	Pass
6973.00	-35.07	included	Peak	1000	-35.07	-13.00	-22.07	Pass
14125.00	-32.27	included	Peak	1000	-32.27	-13.00	-19.27	Pass
20575.40	-35.67	included	Peak	1000	-35.67	-13.00	-22.67	Pass
26710.90	-31.69	included	Peak	1000	-31.69	-13.00	-18.69	Pass
Mid carrier frequency								
776.30	-47.55	included	Peak	100	-47.55	-13.00	-34.55	Pass
1466.00	-39.23	included	Peak	1000	-39.23	-13.00	-26.23	Pass
2574.00	-19.07	included	Average	1000	-19.07	-13.00	-6.07	Pass
2616.40	-24.33	included	Average	1000	-24.33	-13.00	-11.33	Pass
6959.30	-34.79	included	Peak	1000	-34.79	-13.00	-21.79	Pass
14105.00	-31.98	included	Peak	1000	-31.98	-13.00	-18.98	Pass
22791.80	-35.96	included	Peak	1000	-35.96	-13.00	-22.96	Pass
26666.50	-32.74	included	Peak	1000	-32.74	-13.00	-19.74	Pass
High carrier frequency								
271.46	-47.76	included	Peak	100	-47.76	-13.00	-34.76	Pass
1661.00	-39.55	included	Peak	1000	-39.55	-13.00	-26.55	Pass
2664.00	-17.21	included	Average	1000	-17.21	-13.00	-4.21	Pass
2711.00	-46.46	included	Average	1000	-46.46	-13.00	-33.46	Pass
3027.30	-34.77	included	Peak	1000	-34.77	-13.00	-21.77	Pass
14139.20	-32.55	included	Peak	1000	-32.55	-13.00	-19.55	Pass
20776.20	-35.26	included	Peak	1000	-35.26	-13.00	-22.26	Pass
26775.90	-31.96	included	Peak	1000	-31.96	-13.00	-18.96	Pass



HERMON LABORATORIES

Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Mar-14		
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Table 7.4.2 Spurious emission test results (continued)

TESTED RF CHAIN:

RF#2

Frequency, MHz	SA reading, dBm	Attenuation, dB	Detector used	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency								
443.77	-47.19	included	Peak	100	-47.19	-13.00	-34.19	Pass
1703.00	-39.23	included	Peak	1000	-39.23	-13.00	-26.23	Pass
2416.85	-46.19	included	Average	1000	-46.19	-13.00	-33.19	Pass
2524.90	-31.03	included	Average	1000	-31.03	-13.00	-18.03	Pass
6854.20	-35.75	included	Peak	1000	-35.75	-13.00	-22.75	Pass
13925.30	-31.89	included	Peak	1000	-31.89	-13.00	-18.89	Pass
22399.30	-34.91	included	Peak	1000	-34.91	-13.00	-21.91	Pass
26702.60	-31.75	included	Peak	1000	-31.75	-13.00	-18.75	Pass
Mid carrier frequency								
339.91	-47.71	included	Peak	100	-47.71	-13.00	-34.71	Pass
1757.00	-39.42	included	Peak	1000	-39.42	-13.00	-26.42	Pass
2572.85	-22.67	included	Average	1000	-22.67	-13.00	-9.67	Pass
2617.90	-27.41	included	Average	1000	-27.41	-13.00	-14.41	Pass
7633.60	-35.53	included	Peak	1000	-35.53	-13.00	-22.53	Pass
13954.60	-31.22	included	Peak	1000	-31.22	-13.00	-18.22	Pass
22533.00	-36.14	included	Peak	1000	-36.14	-13.00	-23.14	Pass
26767.10	-32.61	included	Peak	1000	-32.61	-13.00	-19.61	Pass
High carrier frequency								
331.27	-47.32	included	Peak	100	-47.32	-13.00	-34.32	Pass
1408.00	-39.46	included	Peak	1000	-39.46	-13.00	-26.46	Pass
2663.70	-21.07	included	Average	1000	-21.07	-13.00	-8.07	Pass
2706.00	-46.89	included	Average	1000	-46.89	-13.00	-33.89	Pass
6822.60	-35.72	included	Peak	1000	-35.72	-13.00	-22.72	Pass
13894.00	-31.91	included	Peak	1000	-31.91	-13.00	-18.91	Pass
20740.80	-35.98	included	Peak	1000	-35.98	-13.00	-22.98	Pass
26753.90	-32.38	included	Peak	1000	-32.38	-13.00	-19.38	Pass

*- Margin = Spurious emission – specification limit.

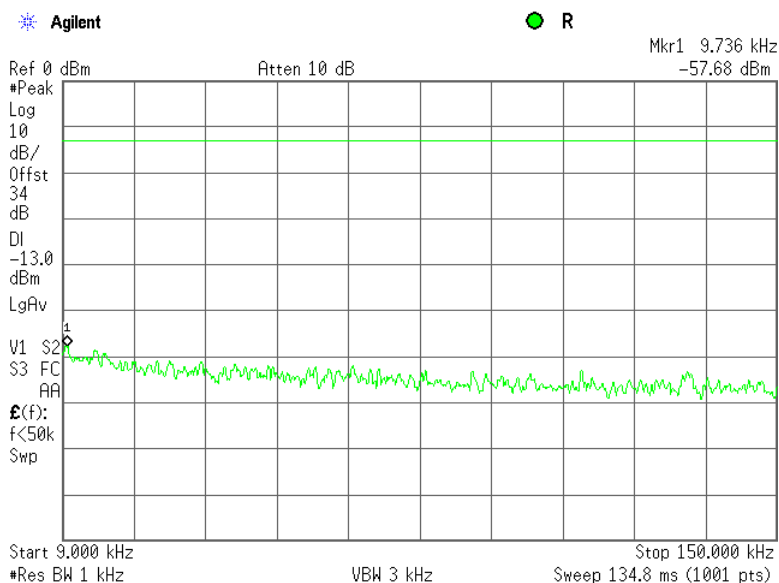
Reference numbers of test equipment used

HL 3455	HL 3818	HL 3901	HL 4229	HL 4234	HL 4273		
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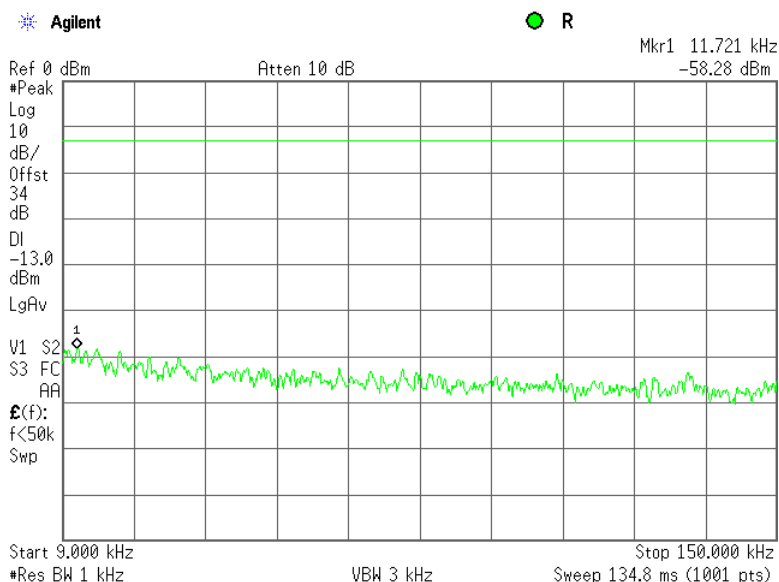
Full description is given in Appendix A.

Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency, RF#1

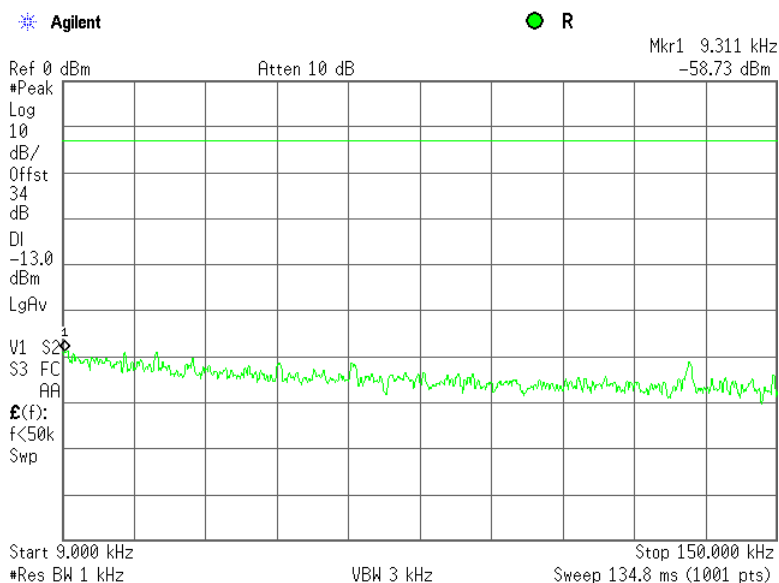


Plot 7.4.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency, RF#1

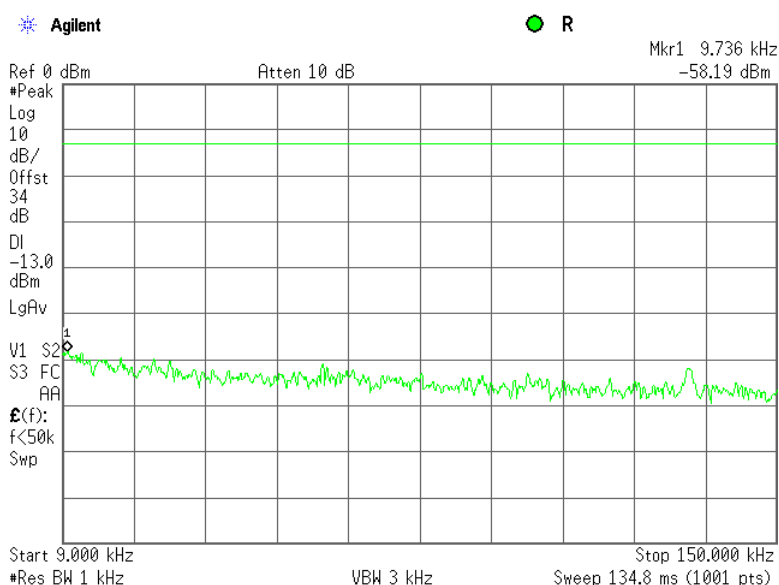


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.5 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency, RF#2

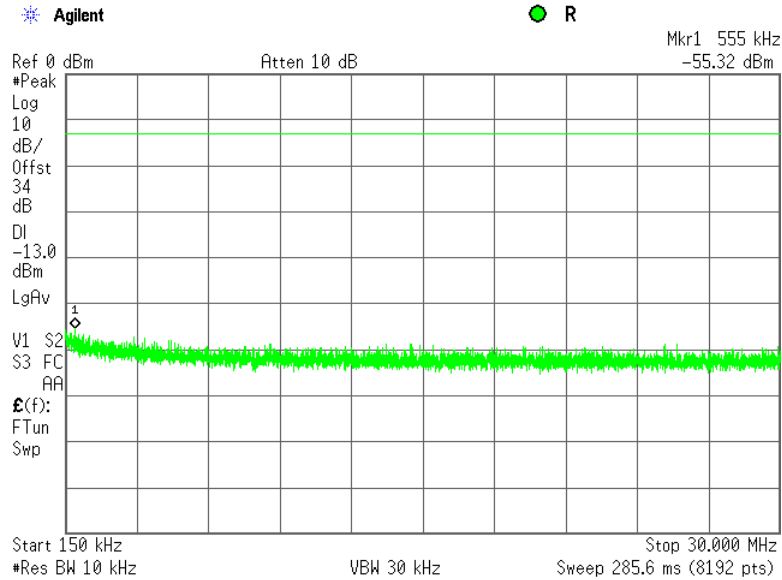


Plot 7.4.6 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency, RF#2

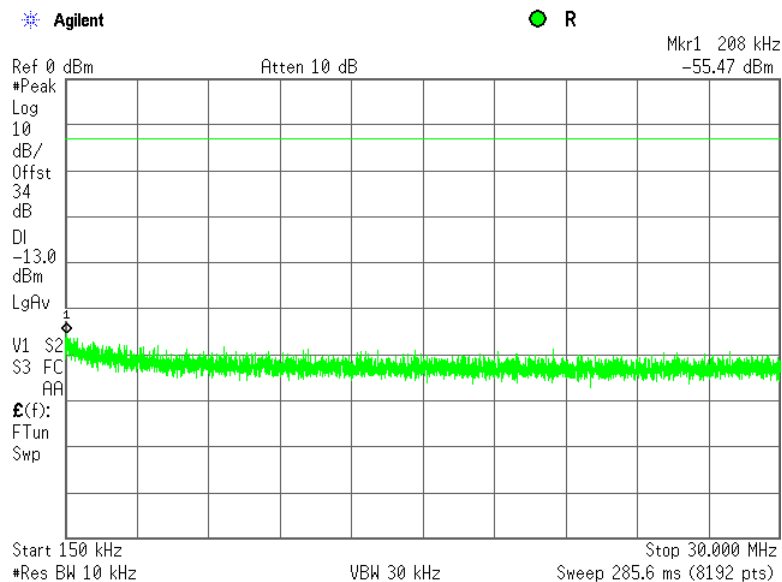


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.7 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency, #RF1



Plot 7.4.8 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency, #RF1





Agilent

Ref 0 dBm

Atten 10 dB

Mkr1 434 kHz

-55.08 dBm

Peak

Log

10

dB/

Offst

34

dB

DI

-13.0

dBm

LgAv

1

V1 S2

S3 FC

RA

$\mathcal{E}(f)$:

FTun

Swp

Start 150 kHz

Stop 30.000 MHz

#Res BW 10 kHz

VBW 30 kHz

Sweep 285.6 ms (8192 pts)

Agilent

Ref 0 dBm

Atten 10 dB

Mkr1 314 kHz

-55.26 dBm

Log

10

dB/

Offset

34

dB

DI

-13.0

dBm

LgAv

1

V1 S2

S3 FC

AR

E(f):

FTun

Swp

Start 150 kHz

Stop 30.000 MHz

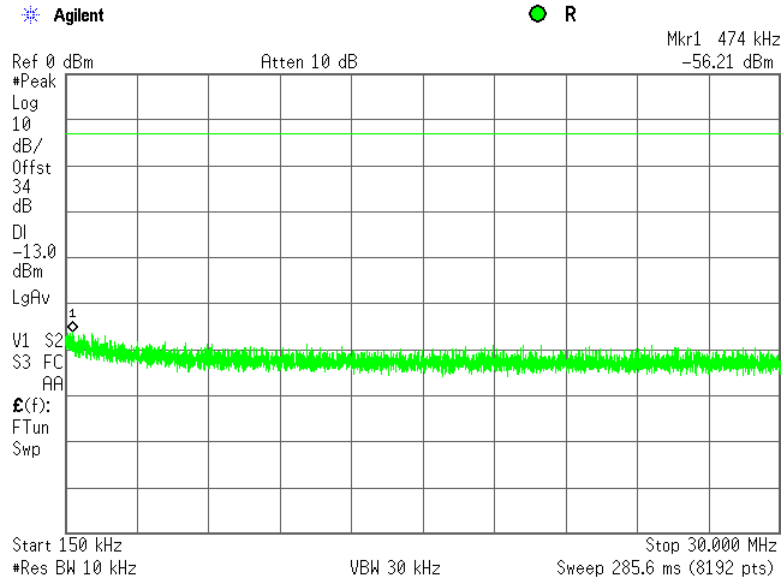
#Res BW 10 kHz

VBW 30 kHz

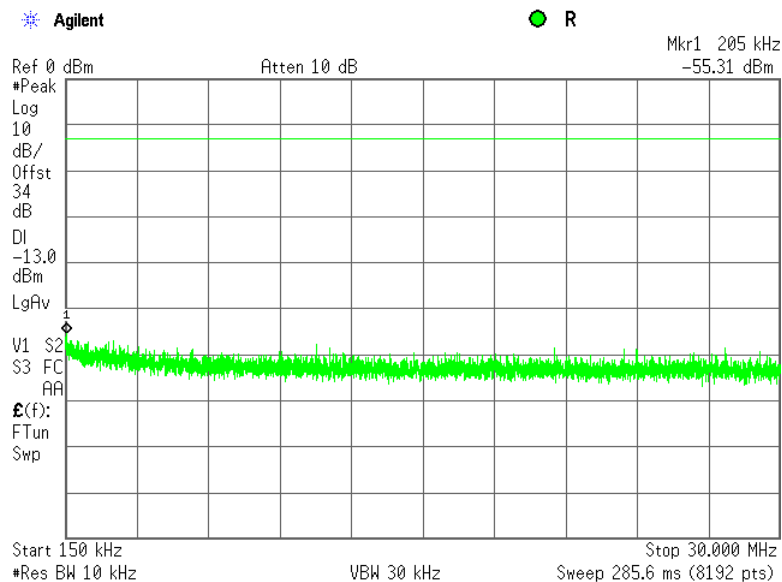
Sweep 285.6 ms (8192 pts)

Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.11 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency, #RF2

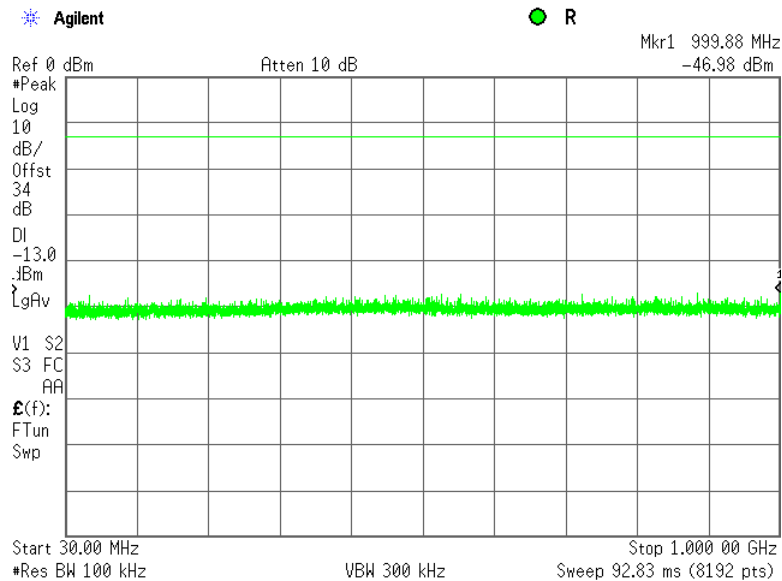


Plot 7.4.12 Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency, #RF2

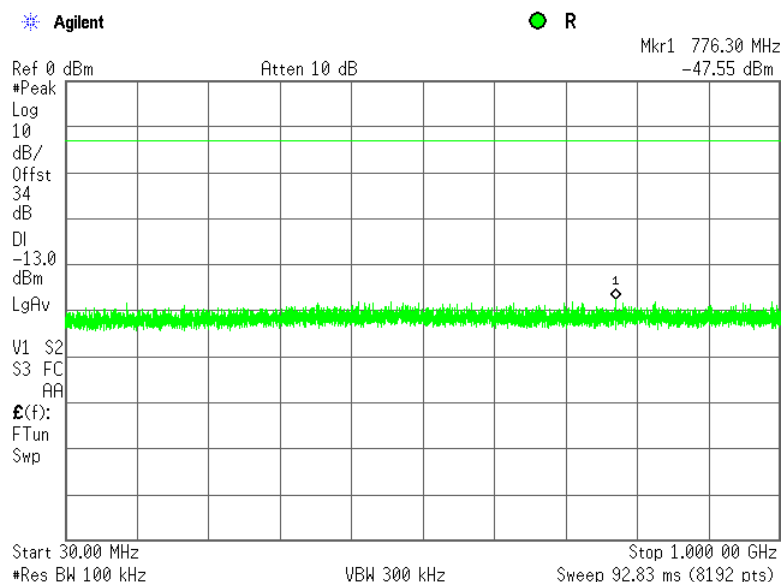


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.13 Spurious emission measurements in 30 - 1000 MHz range at low carrier frequency, #RF1

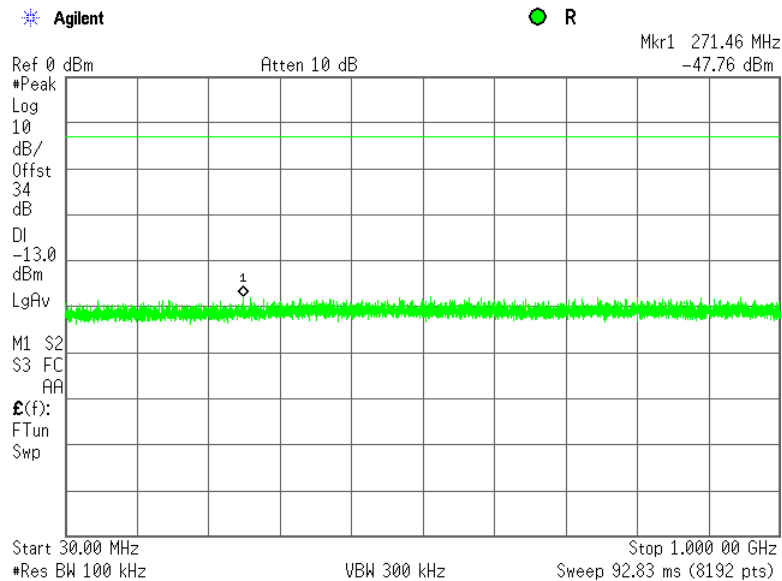


Plot 7.4.14 Spurious emission measurements in 30 - 1000 MHz range at mid carrier frequency, #RF1

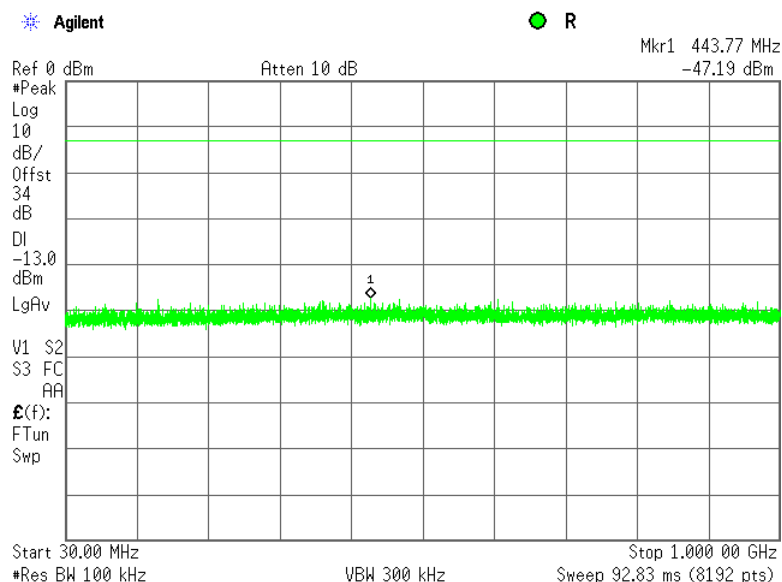


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.15 Spurious emission measurements in 30 - 1000 MHz range at high carrier frequency, #RF1

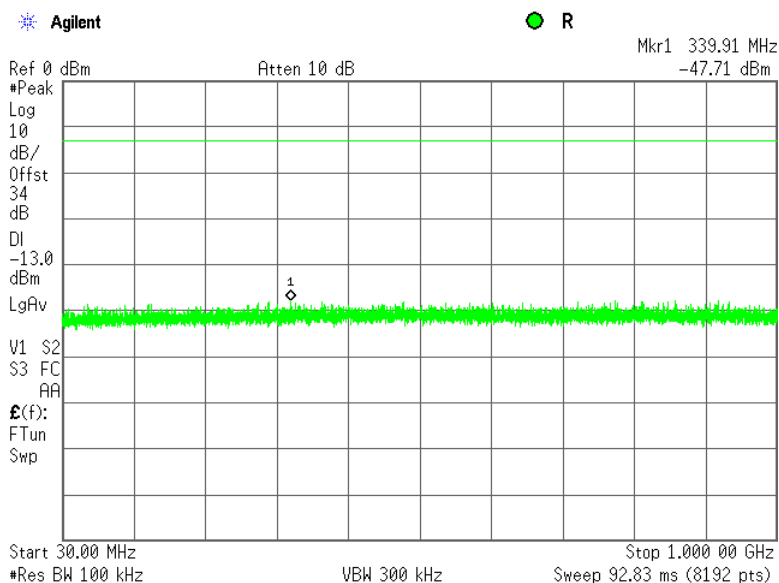


Plot 7.4.16 Spurious emission measurements in 30 - 1000 MHz range at low carrier frequency, #RF2

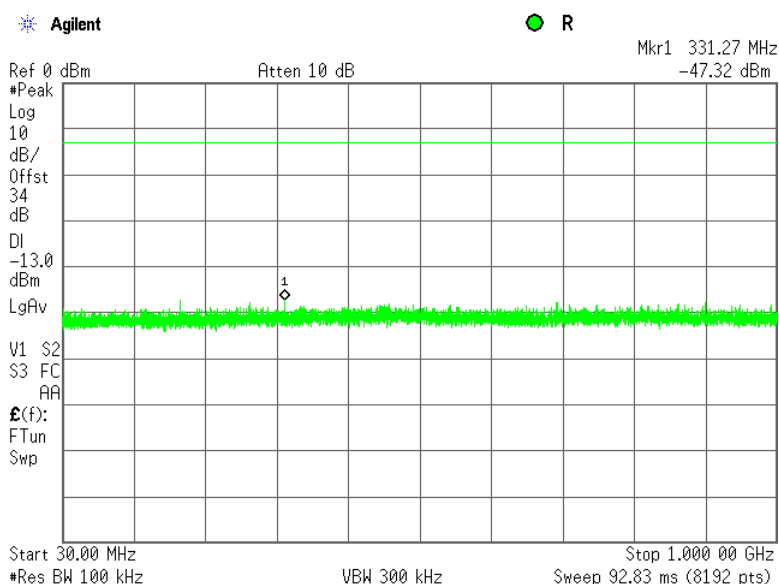


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.17 Spurious emission measurements in 30 - 1000 MHz range at mid carrier frequency, #RF2

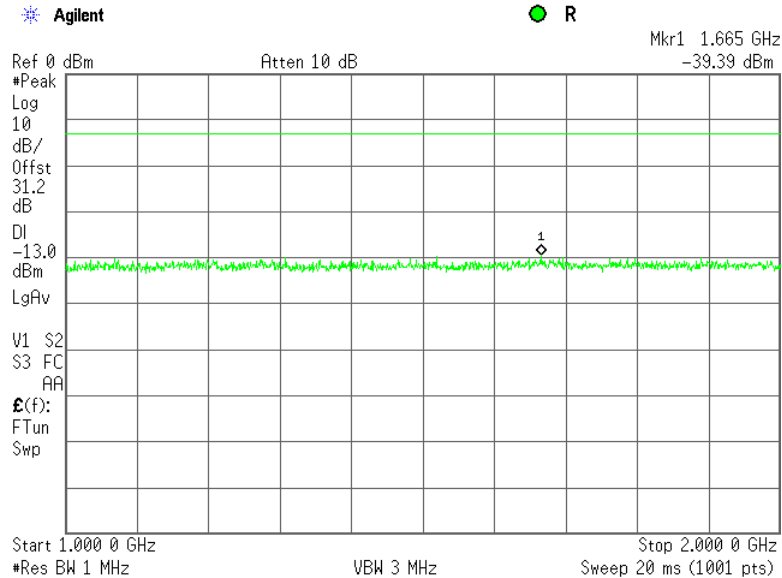


Plot 7.4.18 Spurious emission measurements in 30 - 1000 MHz range at high carrier frequency, #RF2

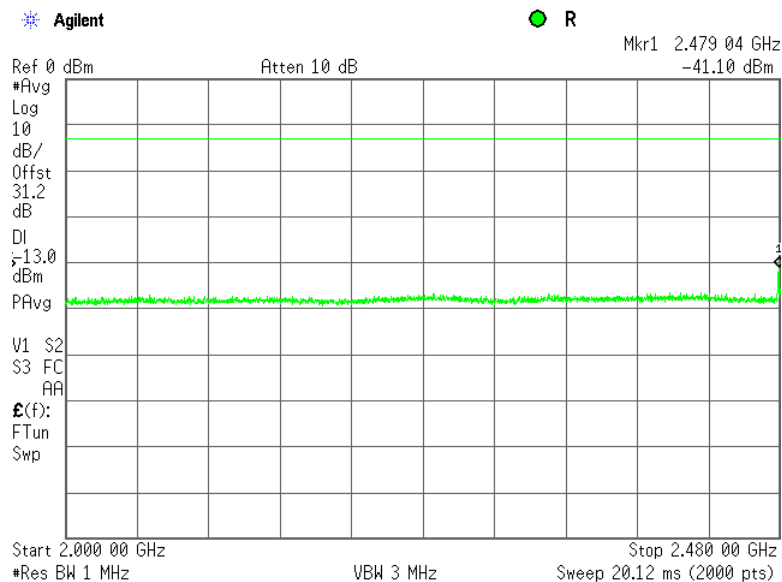


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.19 Spurious emission measurements in 1000 – 2000 MHz range at low carrier frequency, #RF1



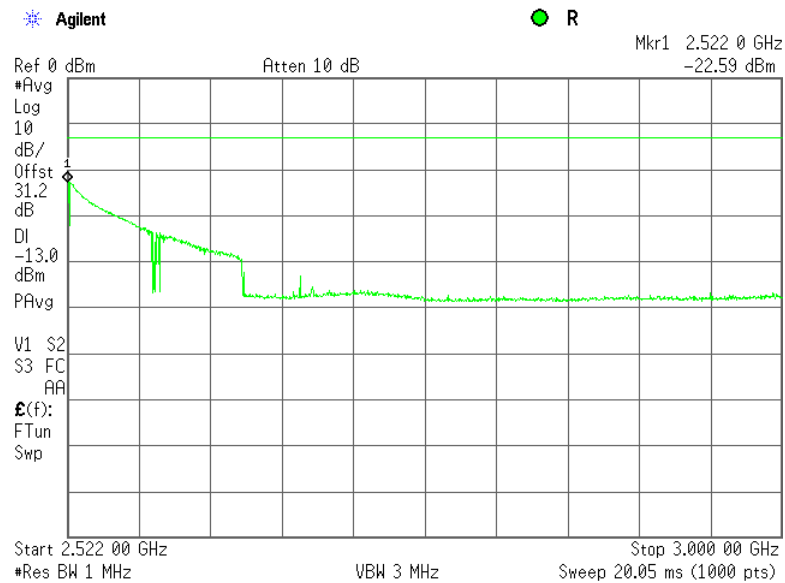
Plot 7.4.20 Spurious emission measurements in 2000 – 2480 MHz range at low carrier frequency, #RF1



NOTE: Average Detector and Max Hold were used.

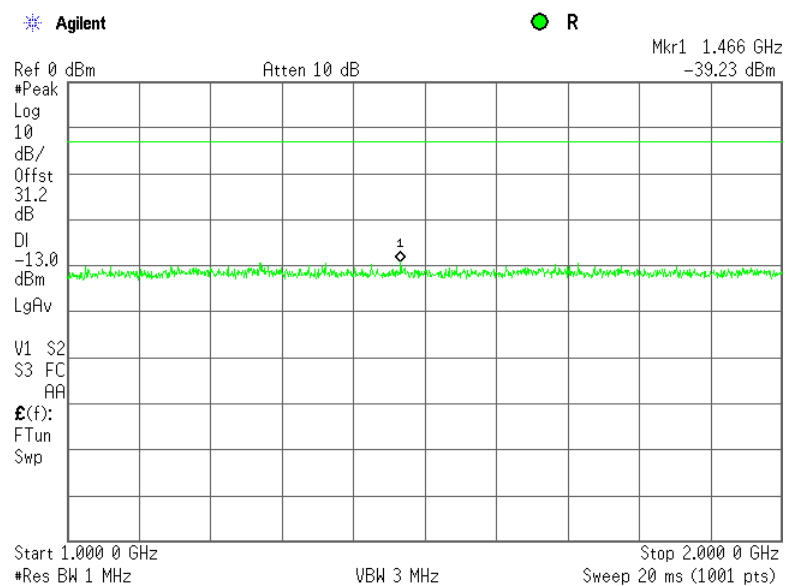
Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.21 Spurious emission measurements in 2522 - 3000 MHz range at low carrier frequency, #RF1



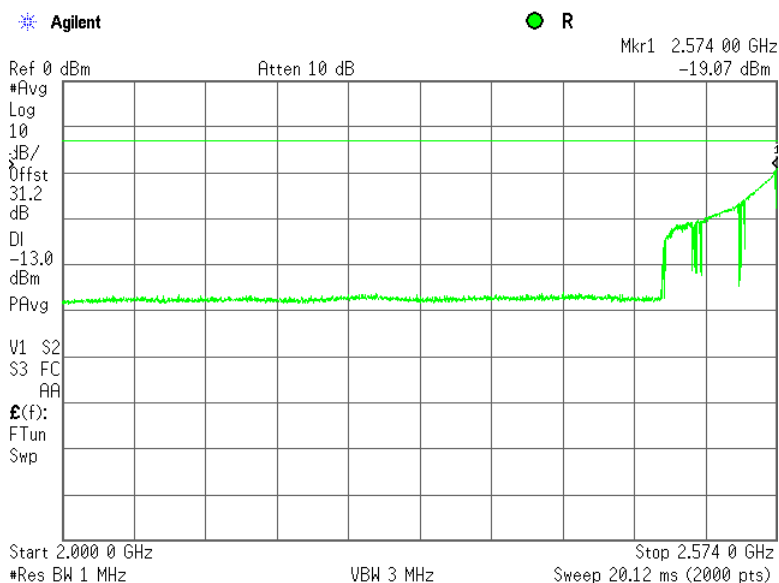
NOTE: Average Detector and Max Hold were used.

Plot 7.4.22 Spurious emission measurements in 1000 - 2000 MHz range at mid carrier frequency, #RF1



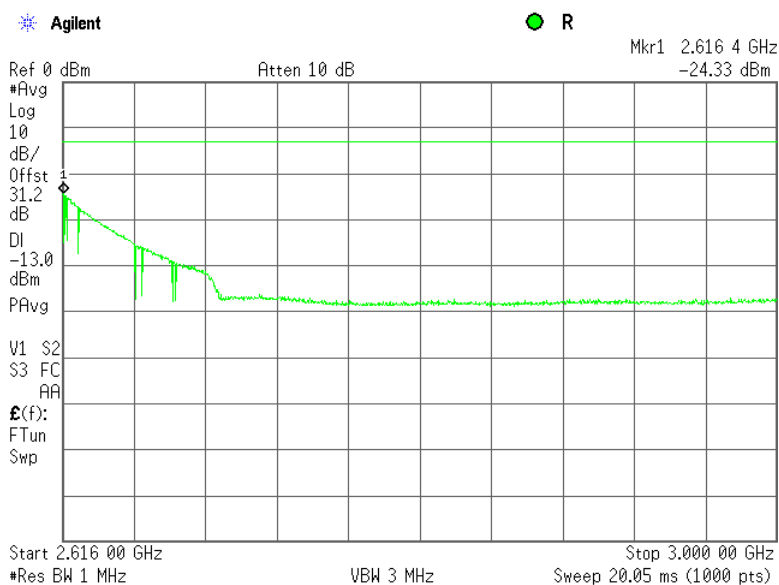
Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.23 Spurious emission measurements in 2000 - 2590 MHz range at mid carrier frequency, #RF1



NOTE: Average Detector and Max Hold were used.

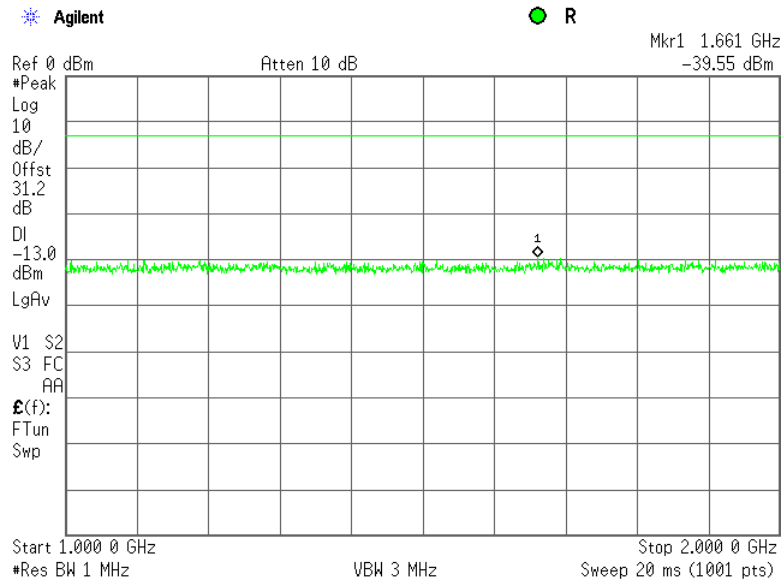
Plot 7.4.24 Spurious emission measurements in 2616 - 3000 MHz range at mid carrier frequency, #RF1



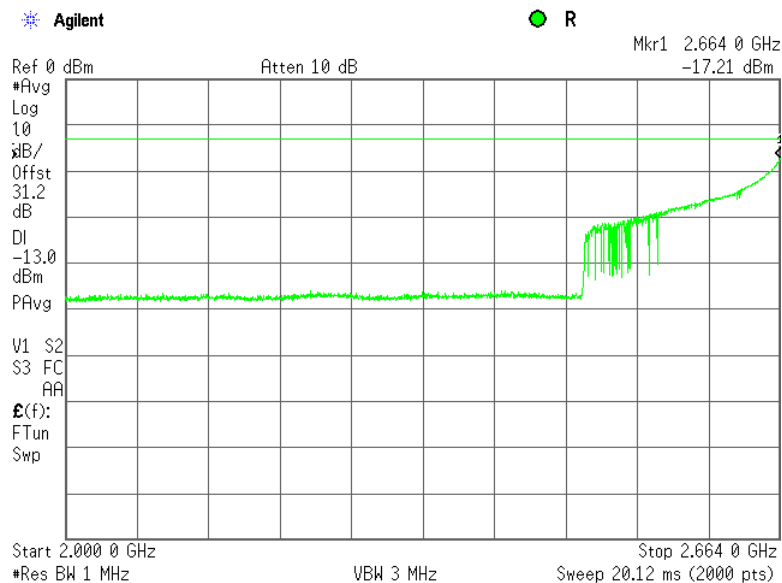
NOTE: Average Detector and Max Hold were used.

Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.25 Spurious emission measurements in 1000 - 2000 MHz at high carrier frequency, #RF1



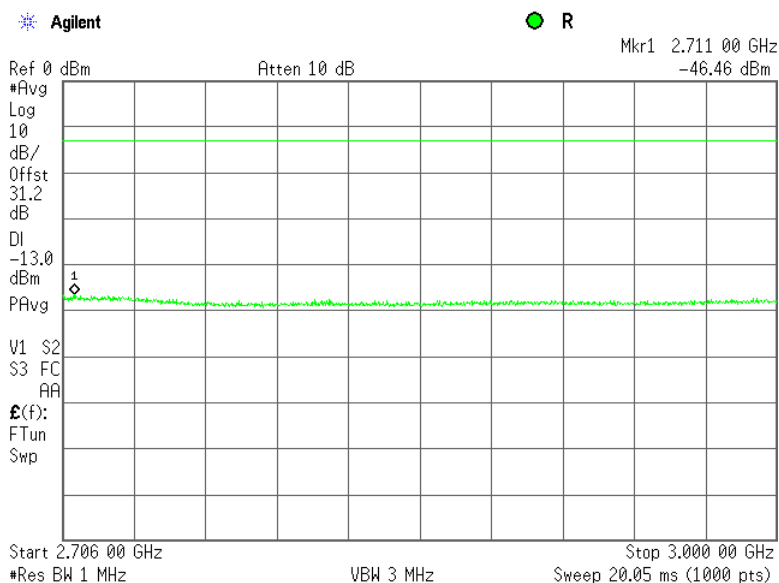
Plot 7.4.26 Spurious emission measurements in 2000 - 2680 MHz at high carrier frequency, #RF1



NOTE: Average Detector and Max Hold were used.

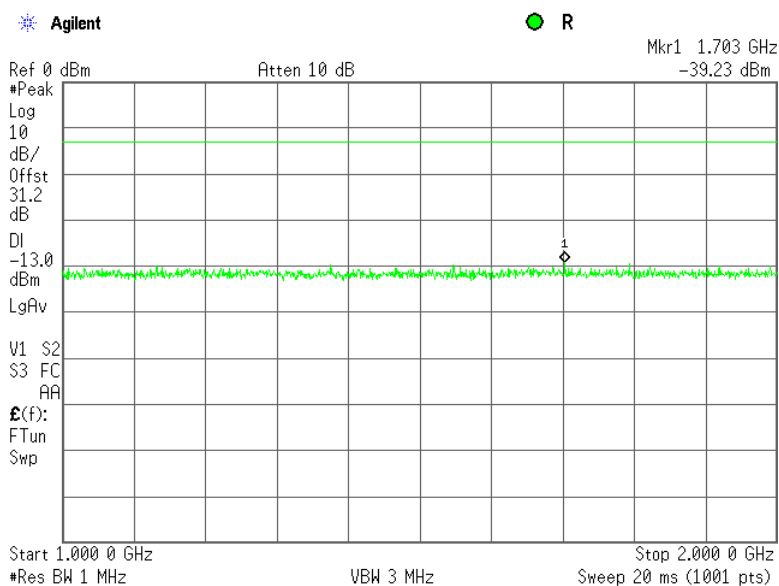
Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.27 Spurious emission measurements in 2706 – 3000 MHz range at high carrier frequency, #RF1



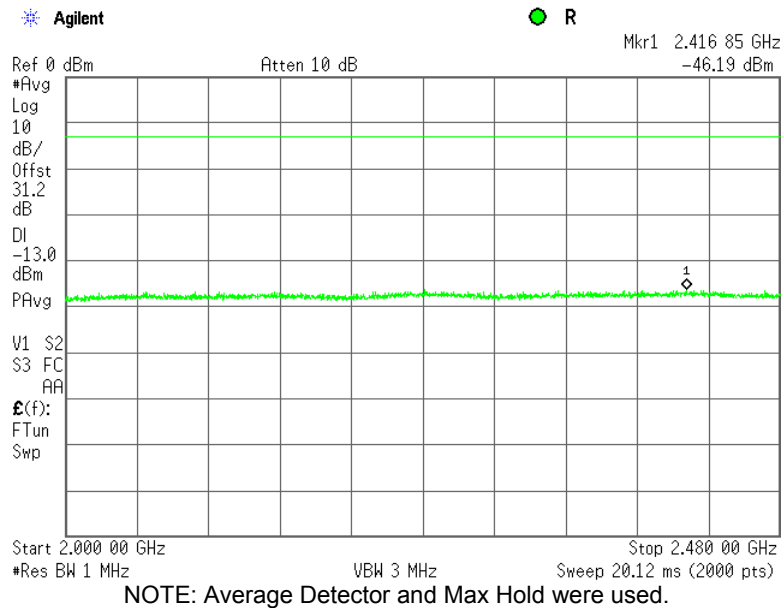
NOTE: Average Detector and Max Hold were used.

Plot 7.4.28 Spurious emission measurements in 1000 – 2000 MHz range at low carrier frequency, #RF2

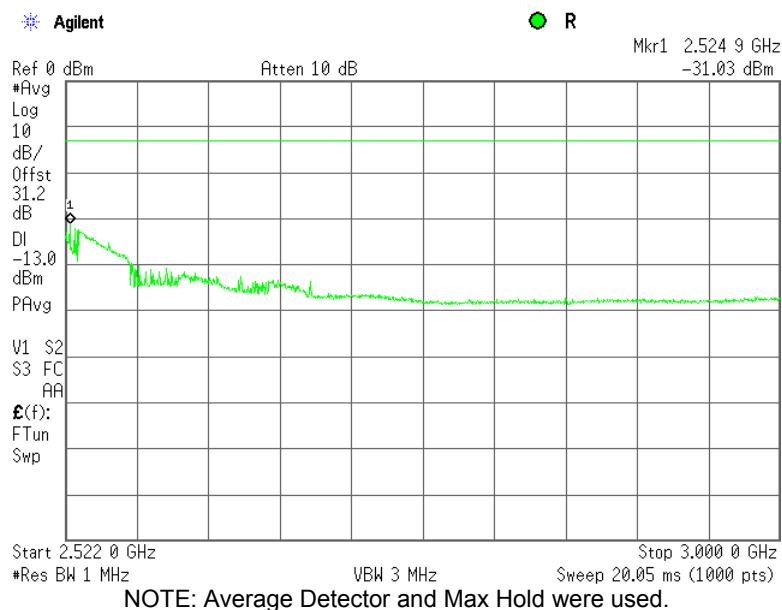


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.29 Spurious emission measurements in 2000 – 2480 MHz range at low carrier frequency, #RF2

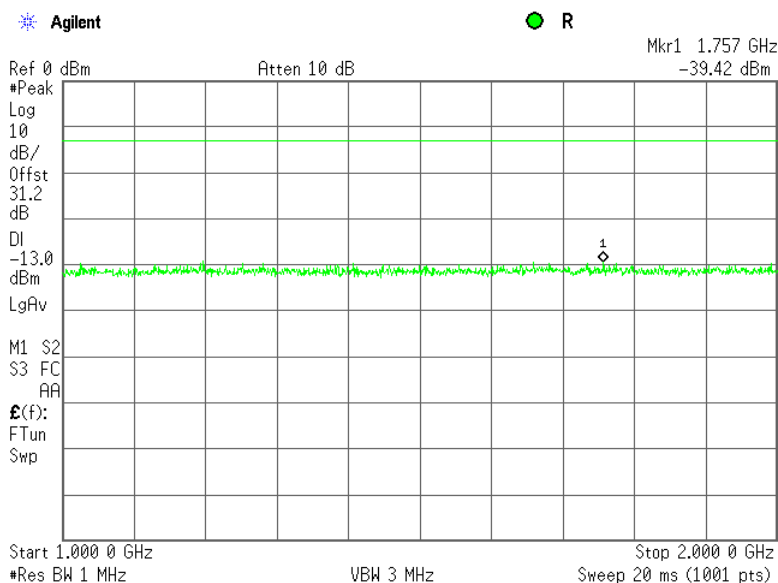


Plot 7.4.30 Spurious emission measurements in 2522 - 3000 MHz range at low carrier frequency, #RF2

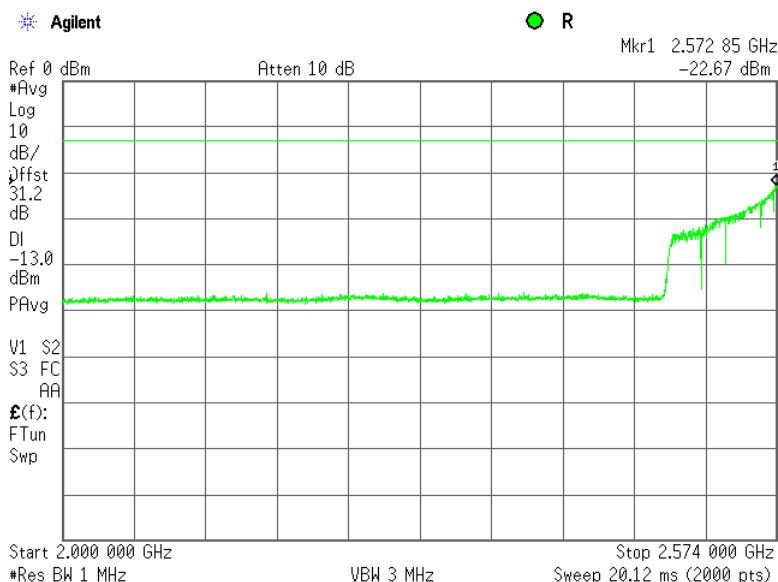


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.31 Spurious emission measurements in 1000 - 2000 MHz range at mid carrier frequency, #RF2



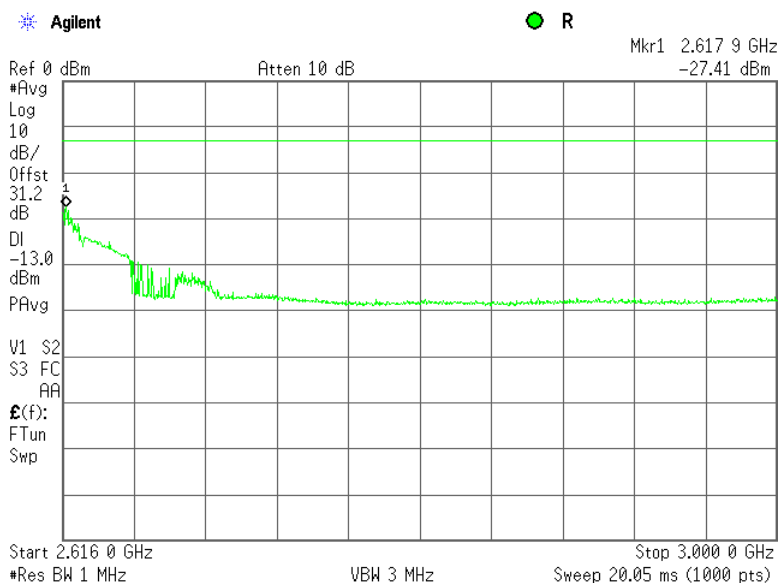
Plot 7.4.32 Spurious emission measurements in 2000 - 2590 MHz range at mid carrier frequency, #RF2



NOTE: Average Detector and Max Hold were used.

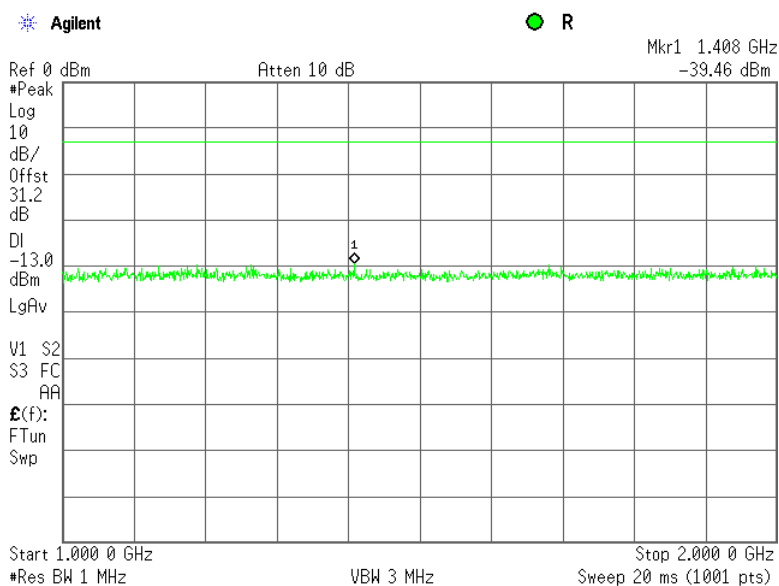
Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.33 Spurious emission measurements in 2616 - 3000 MHz range at mid carrier frequency, #RF2



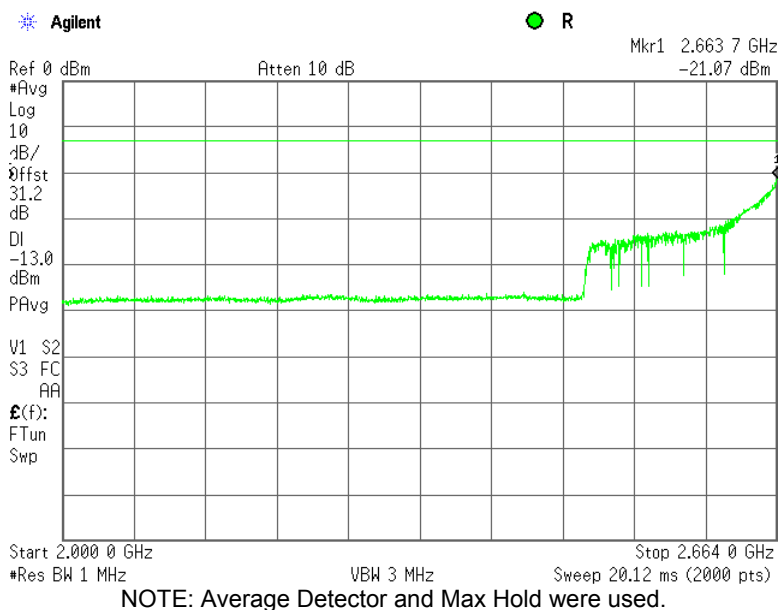
NOTE: Average Detector and Max Hold were used.

Plot 7.4.34 Spurious emission measurements in 1000 - 2000 MHz at high carrier frequency, #RF2

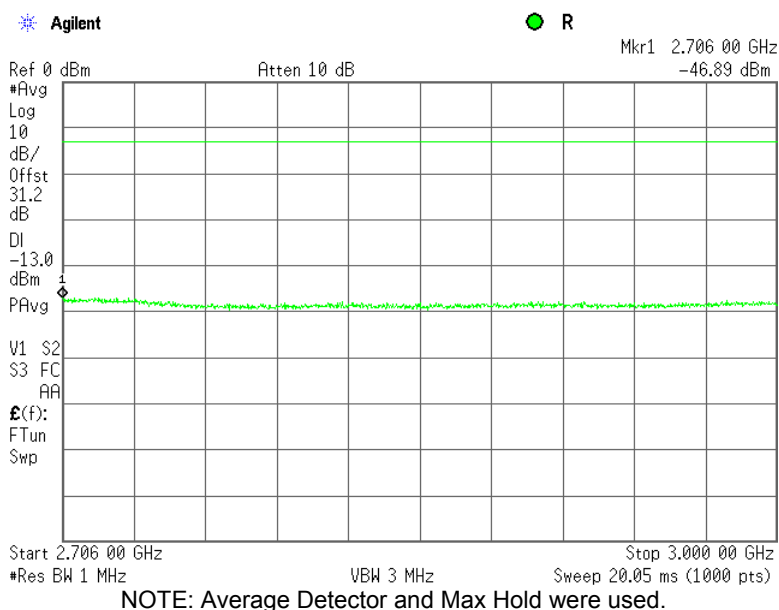


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.35 Spurious emission measurements in 2000 - 2680 MHz at high carrier frequency, #RF2

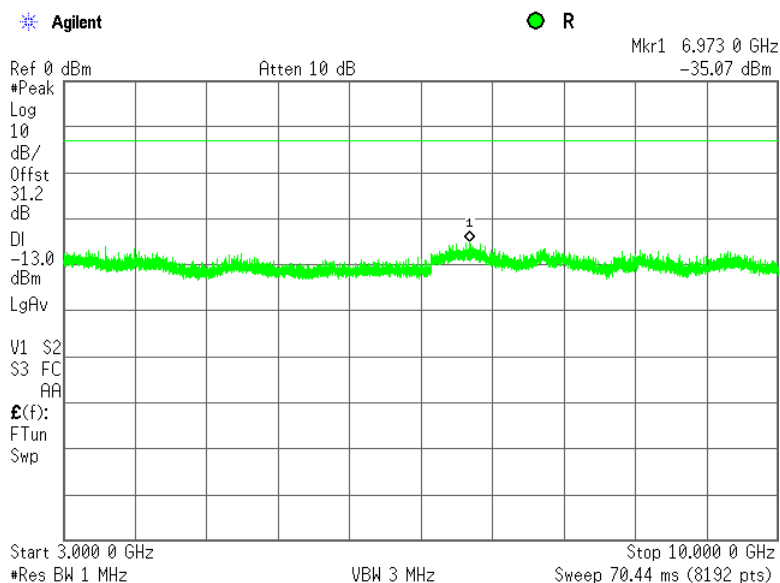


Plot 7.4.36 Spurious emission measurements in 2706 – 3000 MHz range at high carrier frequency, #RF2

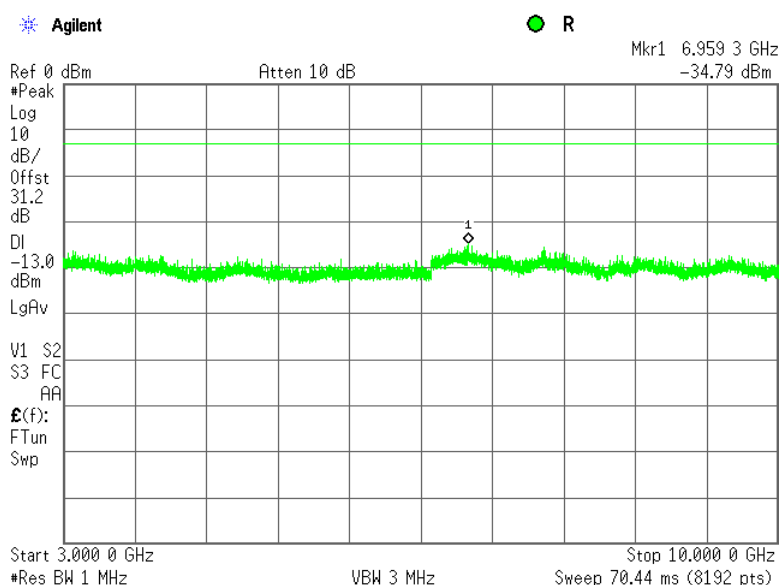


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.37 Spurious emission measurements in 3000 - 10000 MHz range at low carrier frequency, #RF1

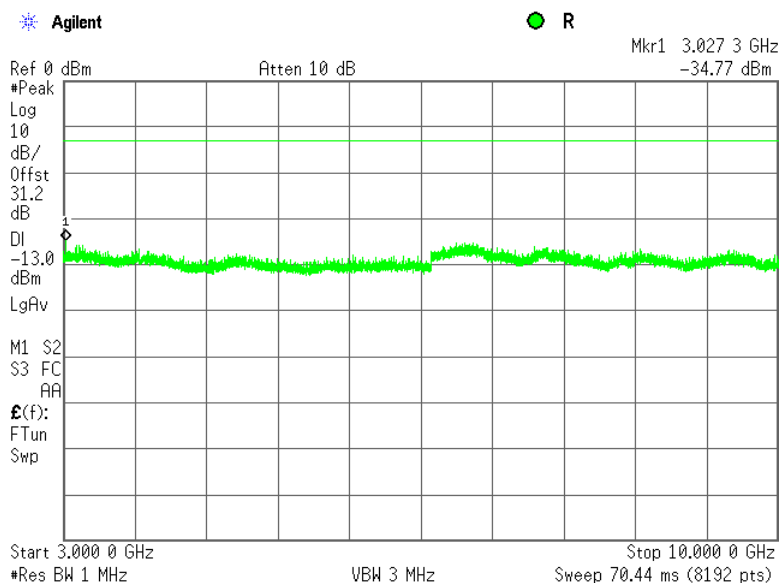


Plot 7.4.38 Spurious emission measurements in 3000 - 10000 MHz at mid carrier frequency, #RF1

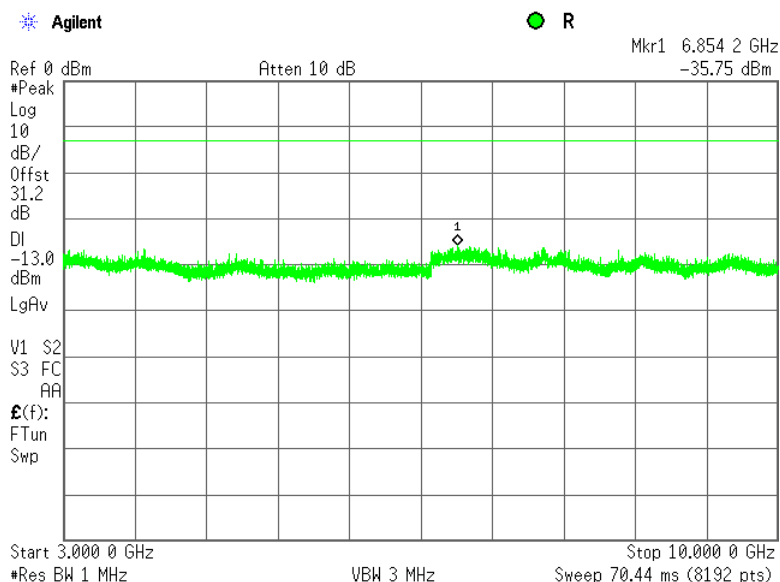


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.39 Spurious emission measurements in 3000 - 10000 MHz at high carrier frequency, #RF1

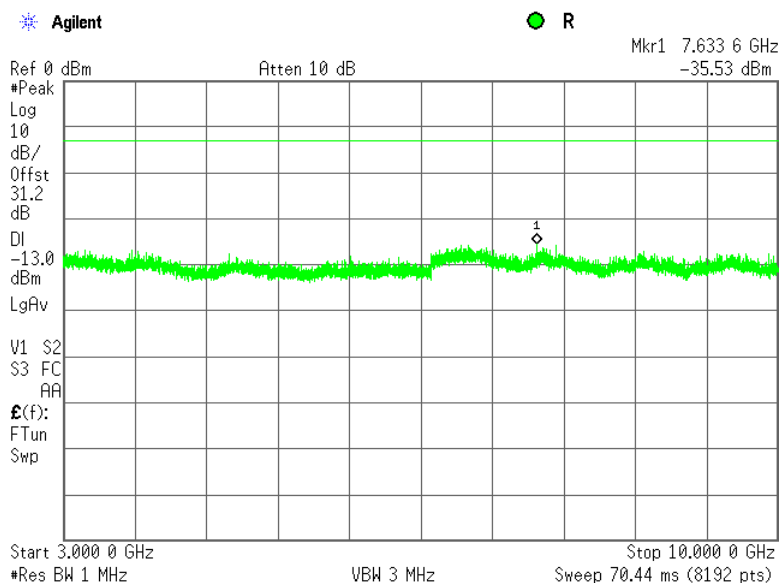


Plot 7.4.40 Spurious emission measurements in 3000 - 10000 MHz range at low carrier frequency, #RF2

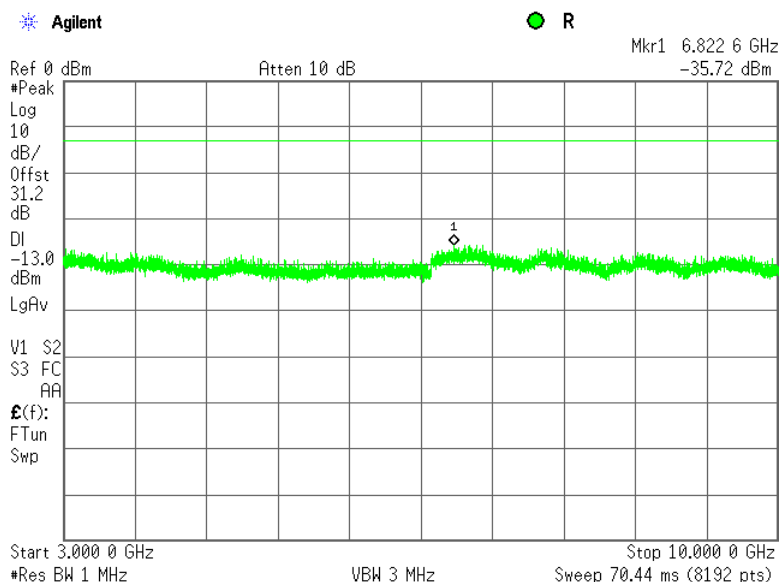


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.41 Spurious emission measurements in 3000 - 10000 MHz at mid carrier frequency, #RF2

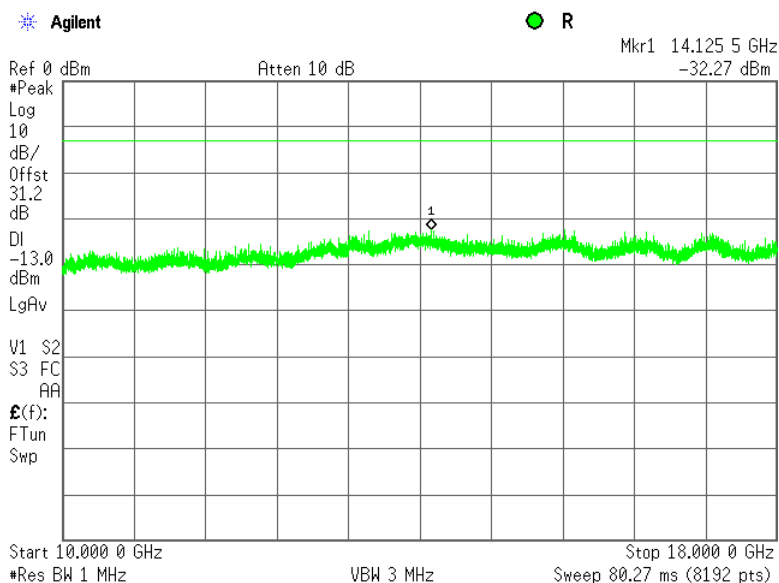


Plot 7.4.42 Spurious emission measurements in 3000 - 10000 MHz at high carrier frequency, #RF2

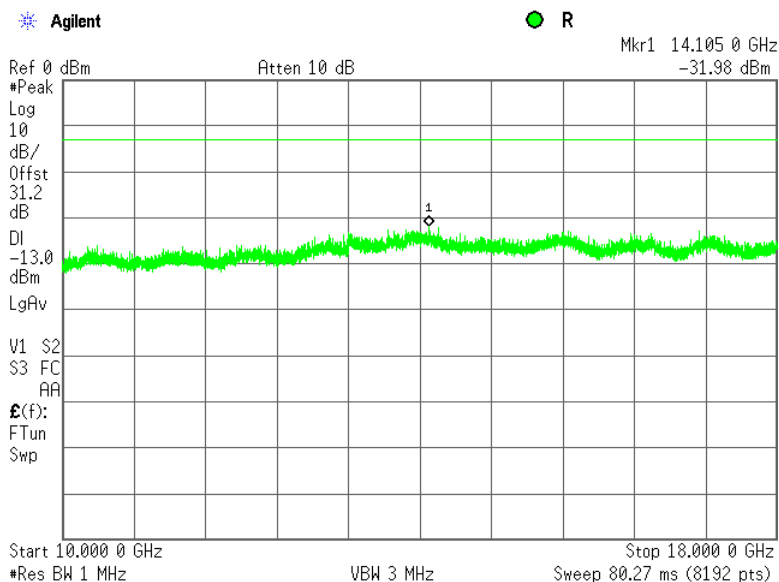


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.43 Spurious emission measurements in 10000 - 18000 MHz range at low carrier frequency, #RF1

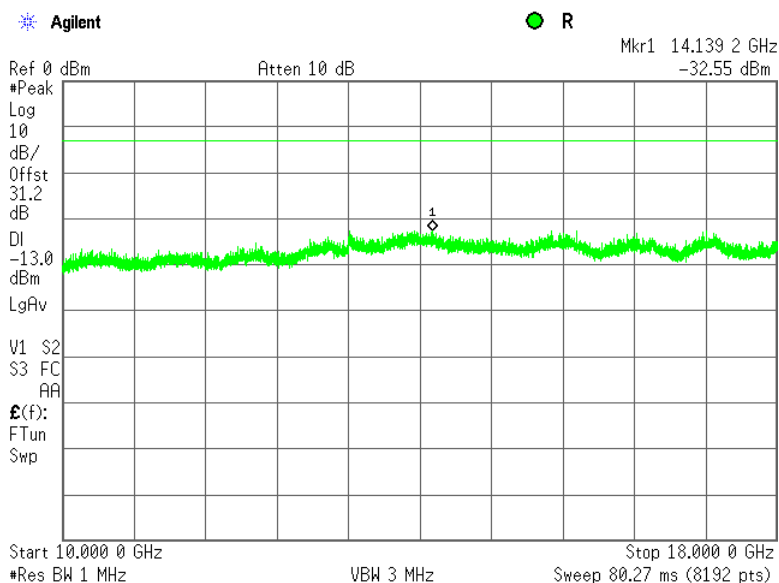


Plot 7.4.44 Spurious emission measurements in 10000 - 18000 MHz at mid carrier frequency, #RF1

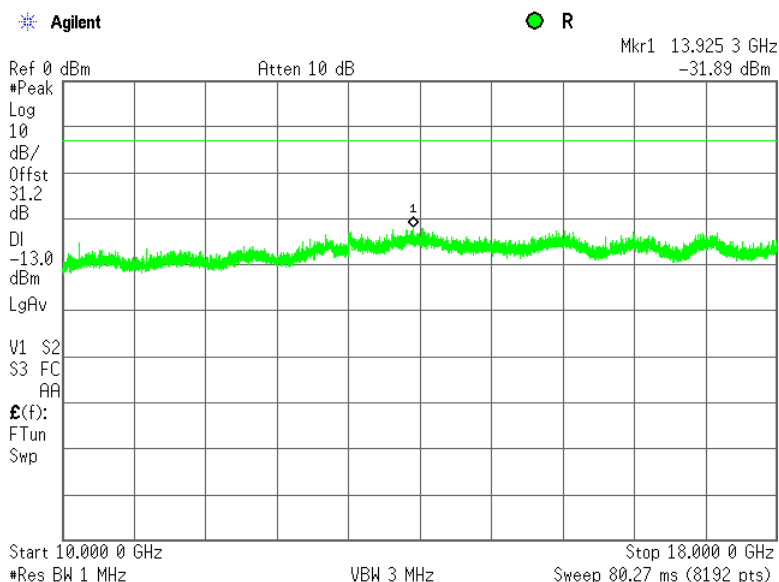


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.45 Spurious emission measurements in 10000 - 18000 MHz at high carrier frequency, #RF1

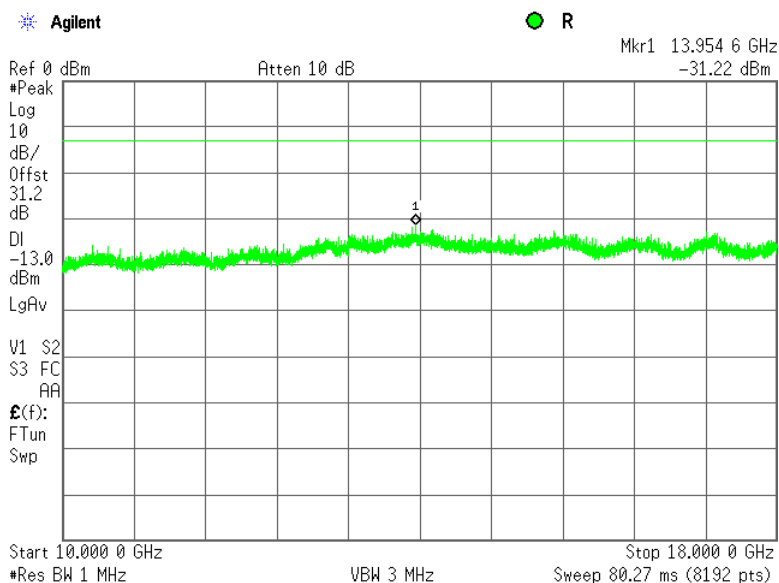


Plot 7.4.46 Spurious emission measurements in 10000 - 18000 MHz range at low carrier frequency, #RF2

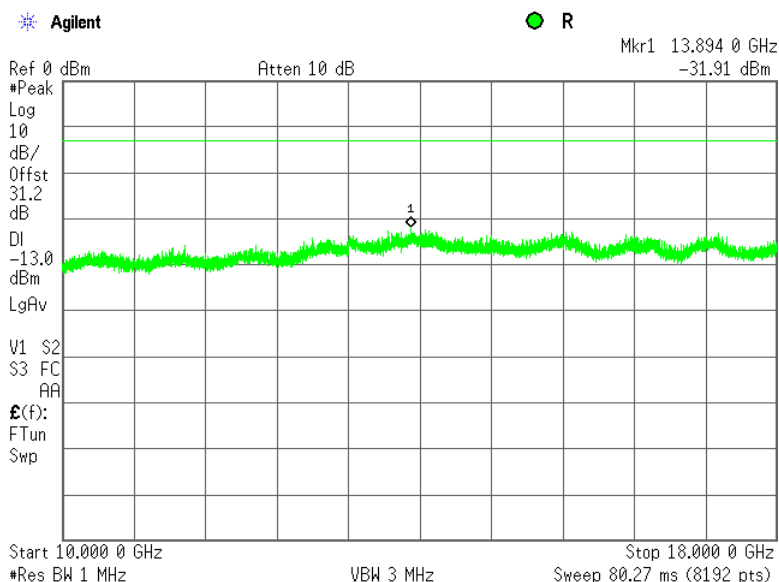


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.47 Spurious emission measurements in 10000 - 18000 MHz at mid carrier frequency, #RF2

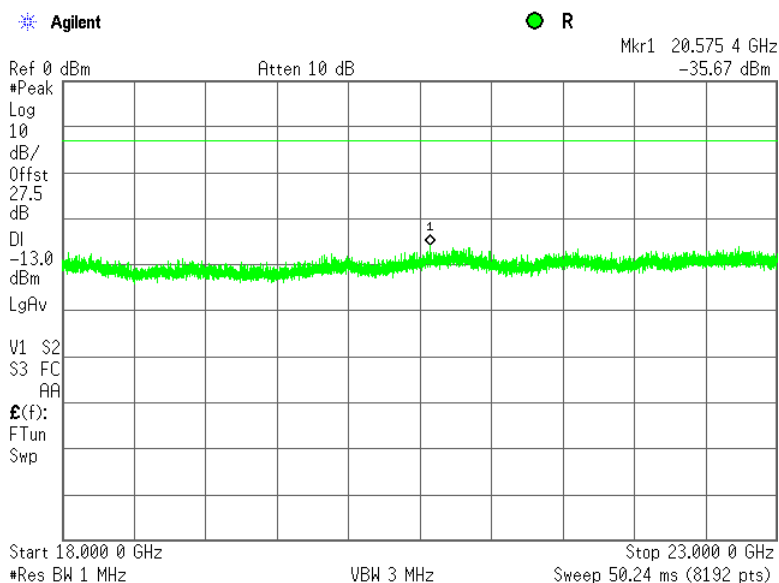


Plot 7.4.48 Spurious emission measurements in 10000 - 18000 MHz at high carrier frequency, #RF2

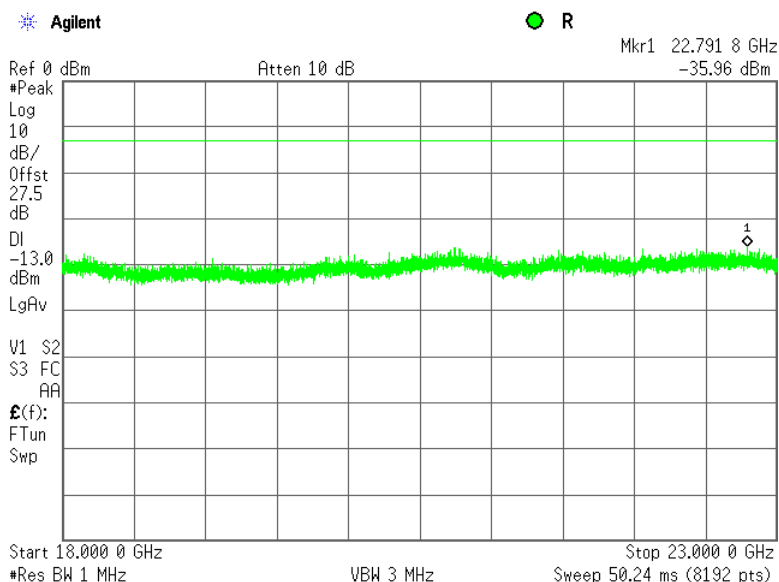


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.49 Spurious emission measurements in 18000 - 23000 MHz range at low carrier frequency, #RF1

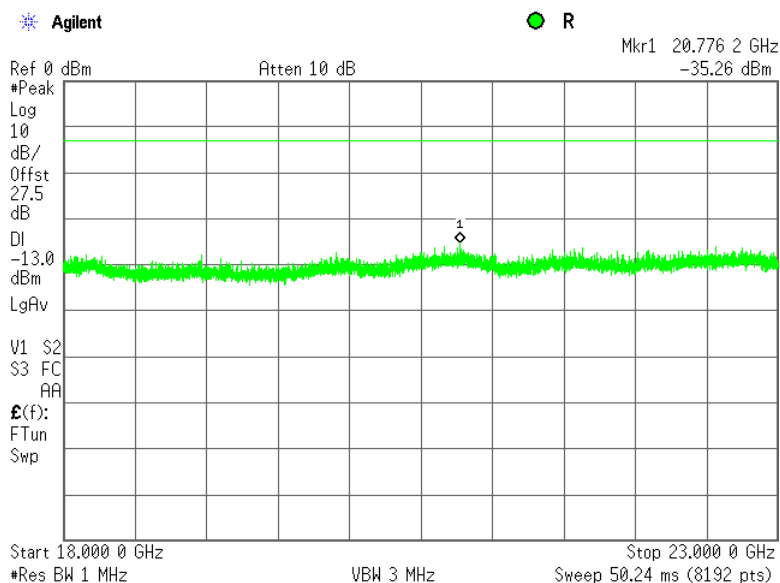


Plot 7.4.50 Spurious emission measurements in 18000 - 23000 MHz at mid carrier frequency, #RF1

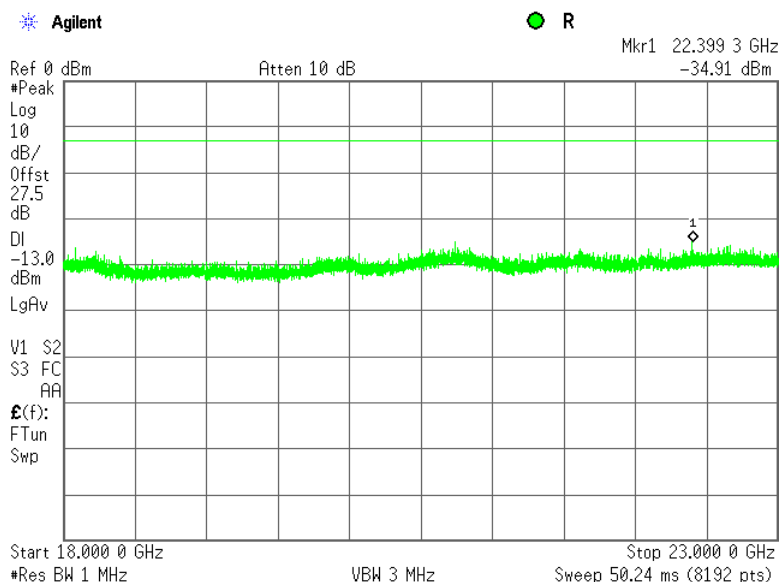


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.51 Spurious emission measurements in 18000 - 23000 MHz at high carrier frequency, #RF1

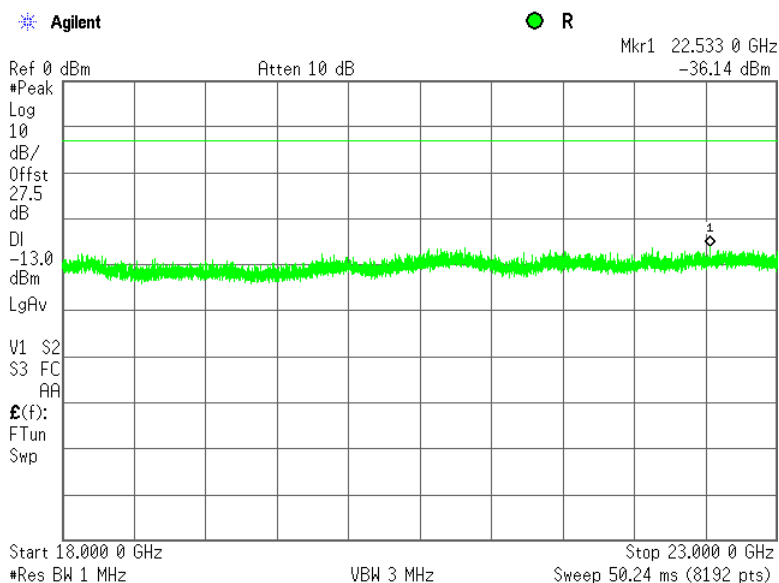


Plot 7.4.52 Spurious emission measurements in 18000 - 23000 MHz range at low carrier frequency, #RF2

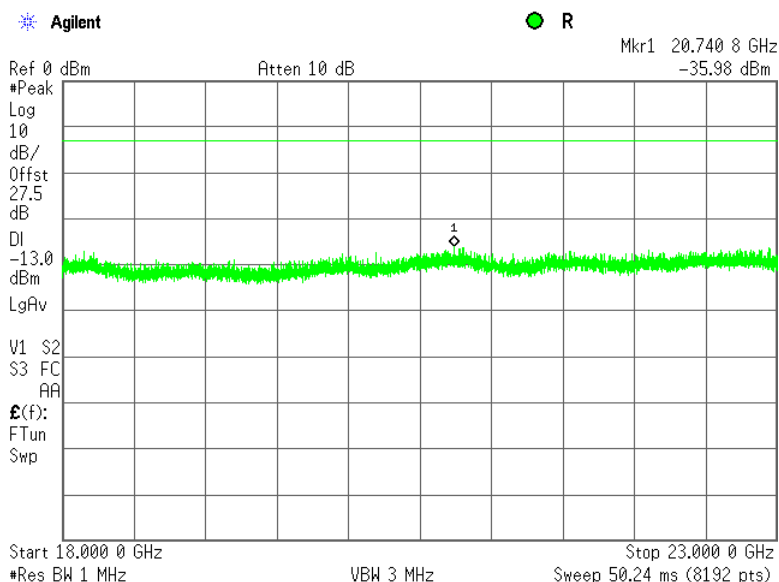


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.53 Spurious emission measurements in 18000 - 23000 MHz at mid carrier frequency, #RF2

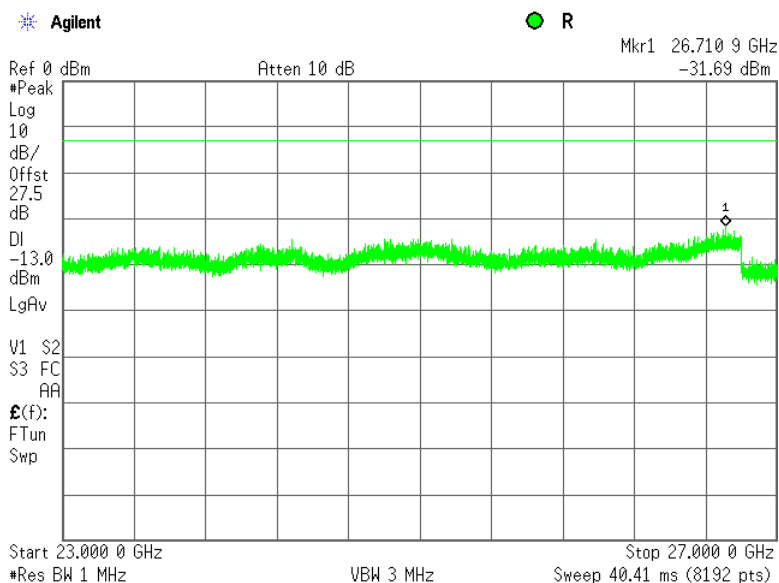


Plot 7.4.54 Spurious emission measurements in 18000 - 23000 MHz at high carrier frequency, #RF2

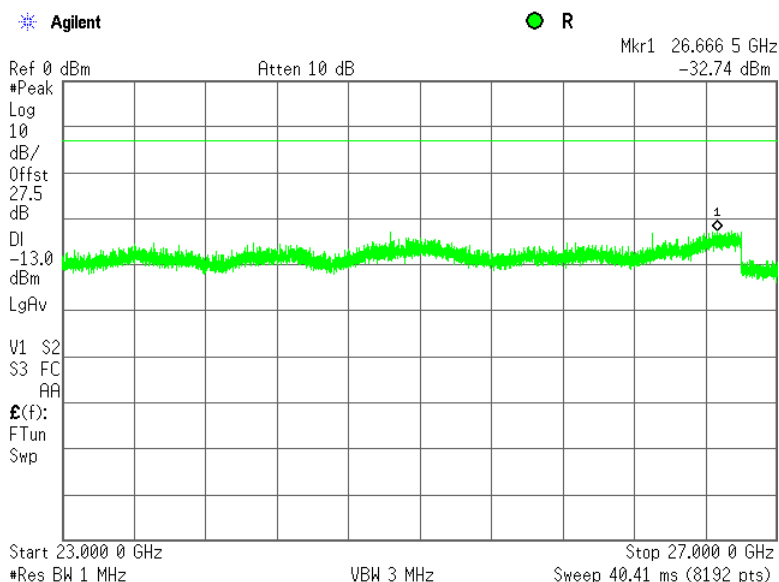


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.55 Spurious emission measurements in 23000 – 27000 MHz range at low carrier frequency, #RF1

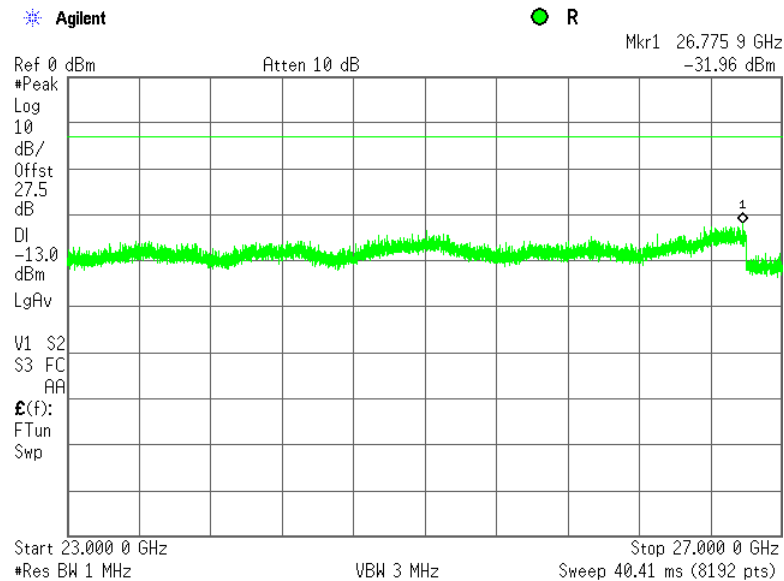


Plot 7.4.56 Spurious emission measurements in 23000 – 27000 MHz at mid carrier frequency, #RF1

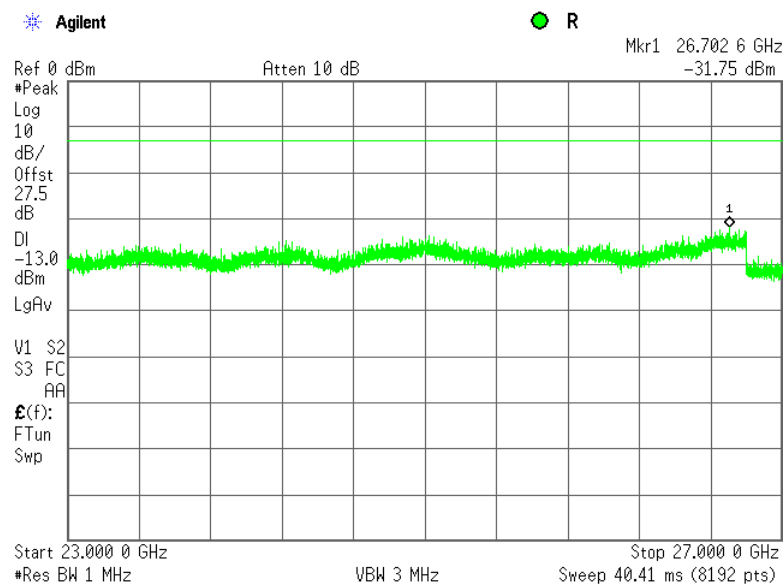


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.57 Spurious emission measurements in 23000 – 27000 MHz at high carrier frequency, #RF1

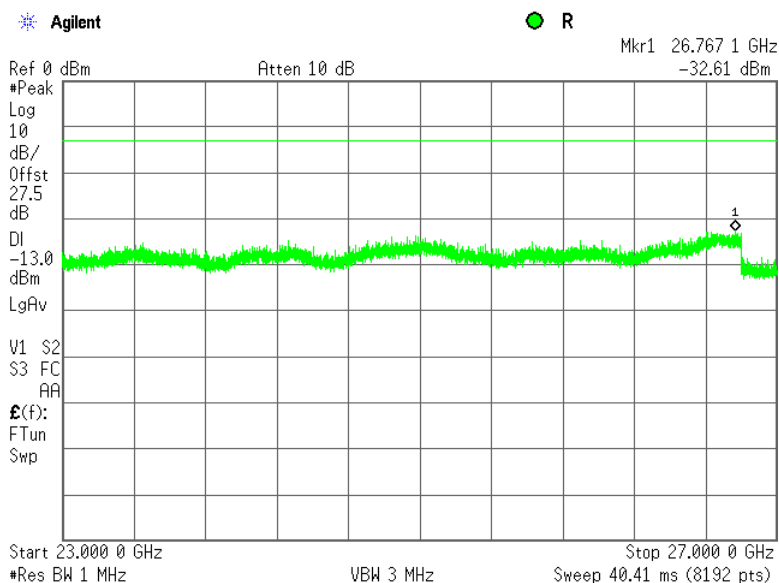


Plot 7.4.58 Spurious emission measurements in 23000 – 27000 MHz range at low carrier frequency, #RF2

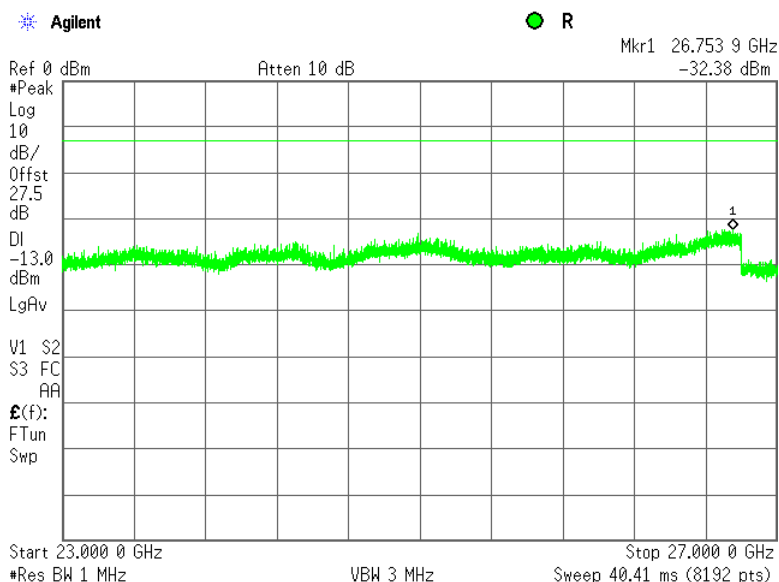


Test specification:		Section 27.53(m)(2), Spurious emissions at RF antenna connector	
Test procedure:		47 CFR, Sections 2.1051, 27.53	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-14	
Temperature: 22 °C	Air Pressure: 1009 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.59 Spurious emission measurements in 23000 – 27000 MHz at mid carrier frequency, #RF2



Plot 7.4.60 Spurious emission measurements in 23000 – 27000 MHz at high carrier frequency, #RF2





Test specification:		Section 27.53(m)(2), 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):		26-Feb-14 - 27-Feb-14	
Temperature: 23 °C	Air Pressure: 1020 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

7.5 Radiated spurious emission measurements

7.5.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Radiated spurious emission test limits

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

* - Excluding the band emission

** - P is transmitter output power in Watts

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

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

7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and the performance check was conducted.

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

The worst test results (the lowest margins) were recorded in Table 7.5.2

7.5.2.3 Table 7.5.2 and shown in the associated plots.

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

7.5.3.1 The EUT was set up as shown in Figure 7.5.2, energized and the performance check was conducted.

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

7.5.3.3 The worst test results (the lowest margins) were recorded in Table 7.5.2 and shown in the associated plots.

Test specification:		Section 27.53(m)(2), 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):		26-Feb-14 - 27-Feb-14	
Temperature: 23 °C	Air Pressure: 1020 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Figure 7.5.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band

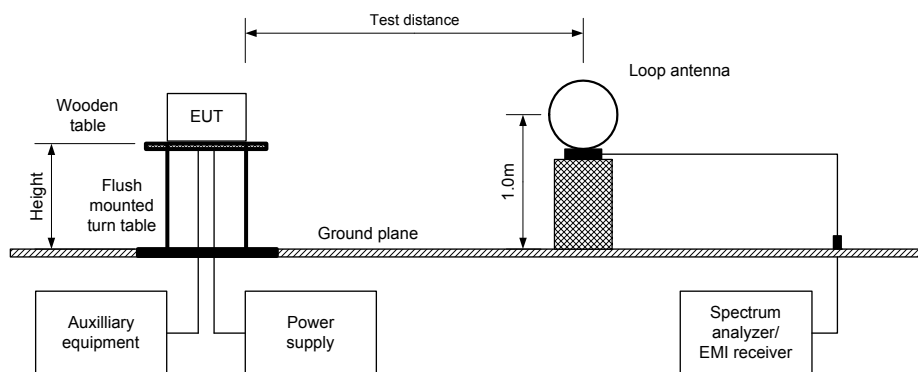
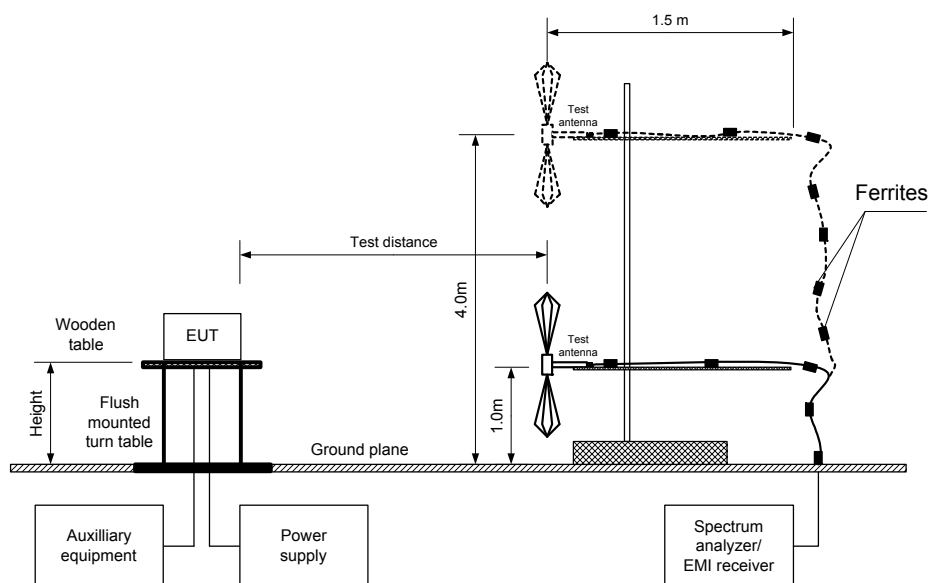


Figure 7.5.2 Setup for spurious emission field strength measurements above 30 MHz





Test specification:		Section 27.53(m)(2), 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):		26-Feb-14 - 27-Feb-14	
Temperature: 23 °C	Air Pressure: 1020 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Table 7.5.2 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 – 27500 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***
 MODULATING SIGNAL: PRBS
 BANDWIDTH: 10MHz***
 BIT RATE: 75.0Mbps***
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum***

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 2501MHz							
No emissions were found							
Mid carrier frequency 2595MHz							
No emissions were found							
High carrier frequency 2690MHz							
No emissions were found							

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

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

*** - Maximum = Highest Output Power and Power Density EUT settings.

Reference numbers of test equipment used

HL 0446	HL 0521	HL 0604	HL 0768	HL 0769	HL 1984	HL 2780	HL 2871
HL 3535	HL 3818	HL 3901	HL 4114	HL 4150	HL 4353		

Full description is given in Appendix A.

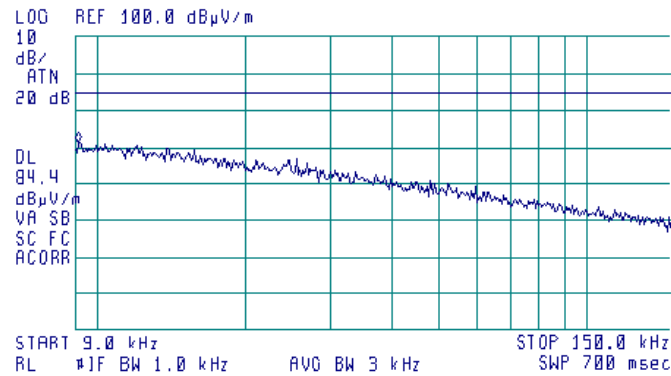
Test specification:		Section 27.53(m)(2), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date(s):		26-Feb-14 - 27-Feb-14	
Temperature: 23 °C	Air Pressure: 1020 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.1 Radiated emission measurements in 9 - 150 kHz range

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



ACTV DET: PEAK
MEAS DET: PEAK OP AVG
MKR 9.2 kHz
71.00 dBμV/m

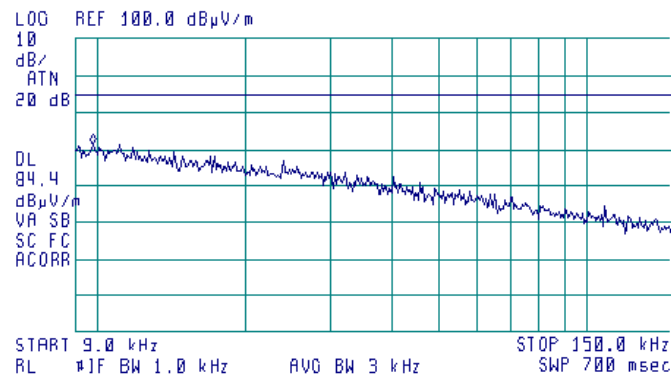


Plot 7.5.2 Radiated emission measurements in 9 - 150 kHz range

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



ACTV DET: PEAK
MEAS DET: PEAK OP AVG
MKR 9.8 kHz
71.11 dBμV/m



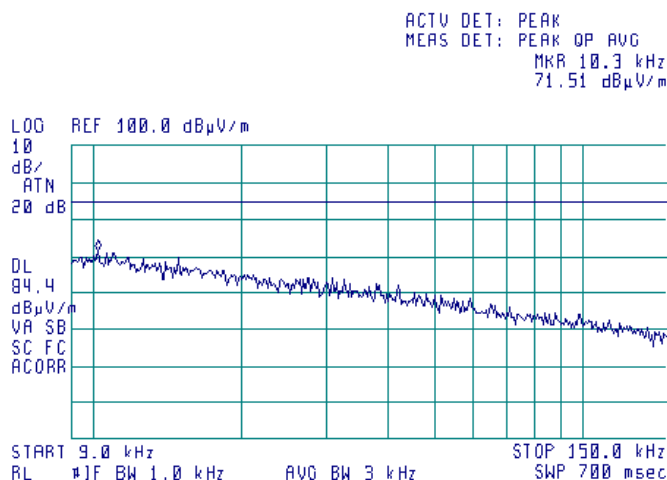


HERMON LABORATORIES

Test specification:		Section 27.53(m)(2), 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):		26-Feb-14 - 27-Feb-14	
Temperature: 23 °C	Air Pressure: 1020 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

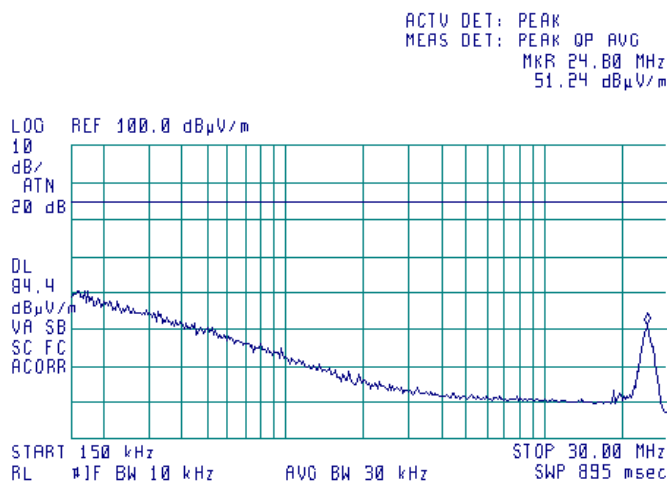
Plot 7.5.3 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.5.4 Radiated emission measurements in 0.15 - 30 MHz range

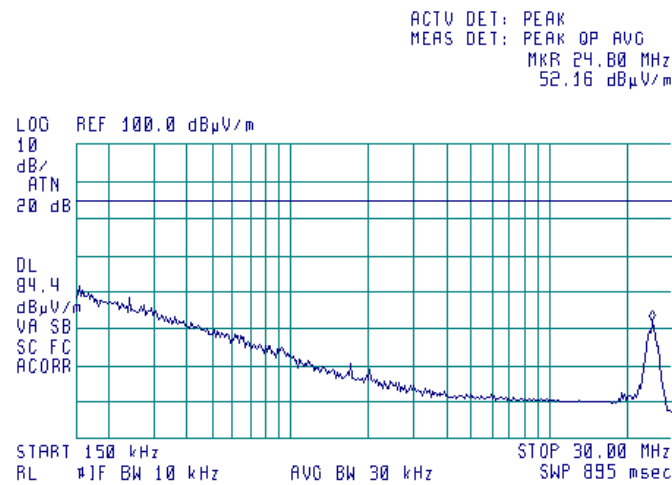
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:		Section 27.53(m)(2), 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):		26-Feb-14 - 27-Feb-14	
Temperature: 23 °C	Air Pressure: 1020 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

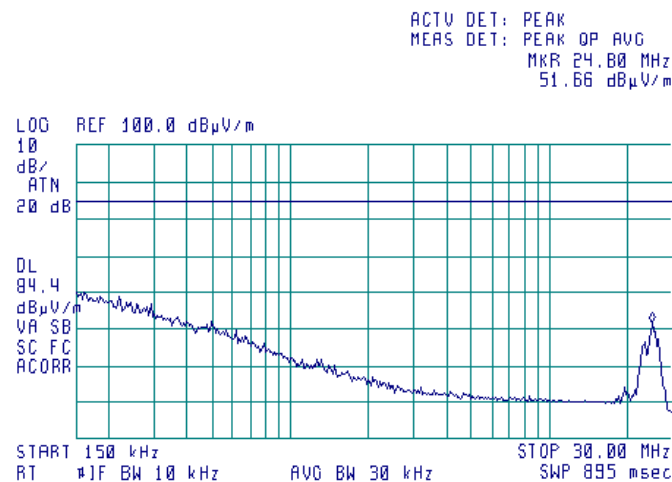
Plot 7.5.5 Radiated emission measurements in 0.15 - 30 MHz range

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



Plot 7.5.6 Radiated emission measurements in 0.15 - 30 MHz range

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



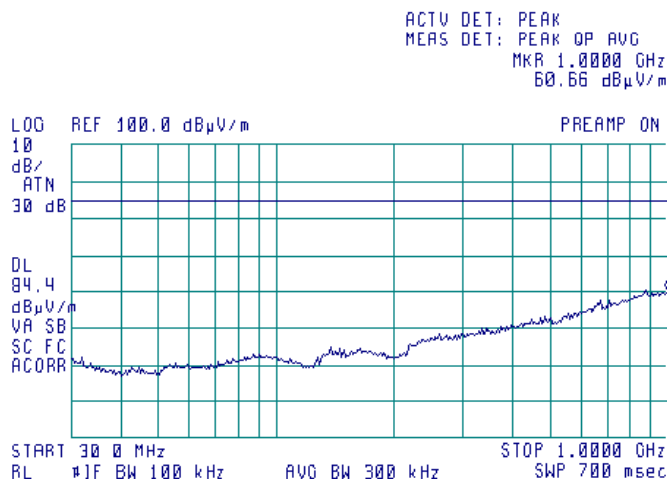


HERMON LABORATORIES

Test specification:		Section 27.53(m)(2), 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):		26-Feb-14 - 27-Feb-14	
Temperature: 23 °C	Air Pressure: 1020 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

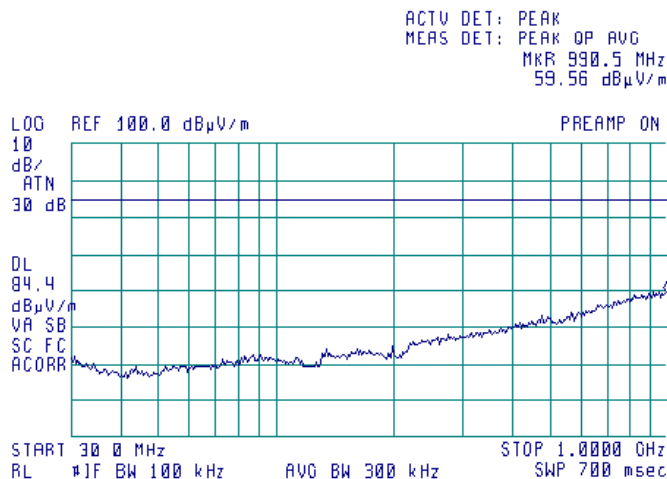
Plot 7.5.7 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.5.8 Radiated emission measurements in 30 - 1000 MHz range

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



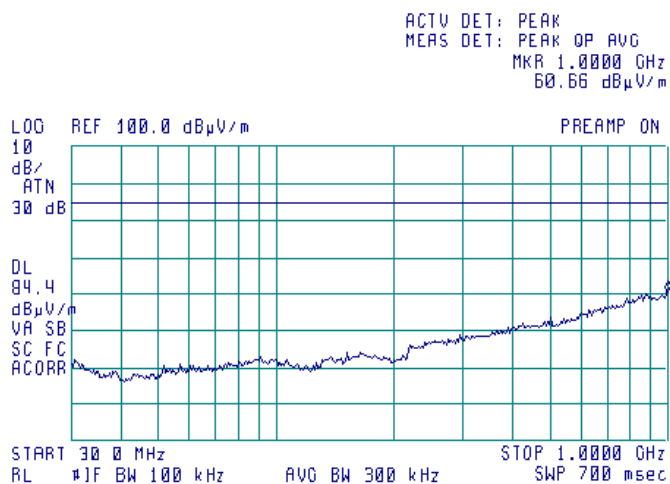


HERMON LABORATORIES

Test specification:		Section 27.53(m)(2), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Verdict: PASS	
Date(s):			
26-Feb-14 - 27-Feb-14			
Temperature: 23 °C	Air Pressure: 1020 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.9 Radiated emission measurements in 30 - 1000 MHz range

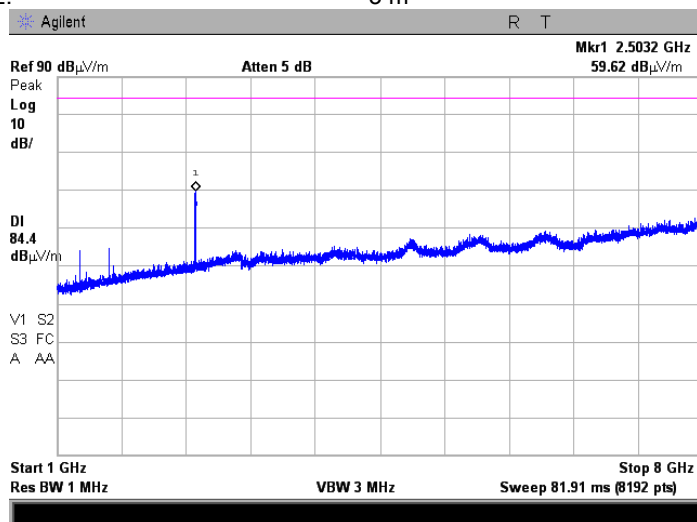
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:		Section 27.53(m)(2), 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):		26-Feb-14 - 27-Feb-14	
Temperature: 23 °C	Air Pressure: 1020 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.10 Radiated emission measurements in 1000 – 8000 MHz range

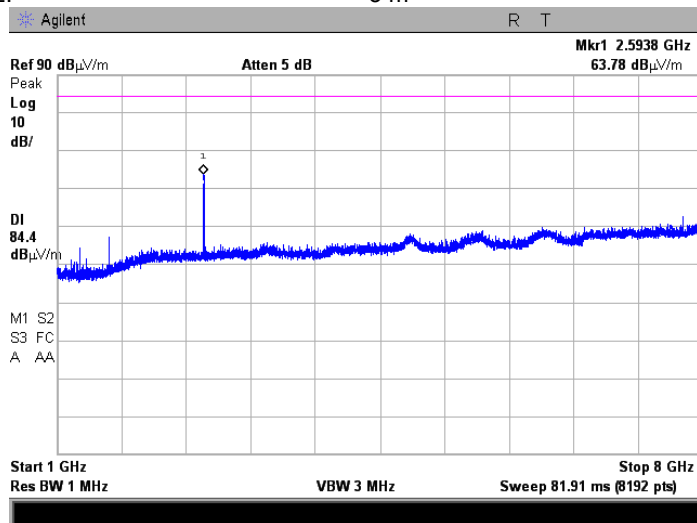
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



NOTE: 2501 MHz - carrier frequency

Plot 7.5.11 Radiated emission measurements in 1000 – 8000 MHz range

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

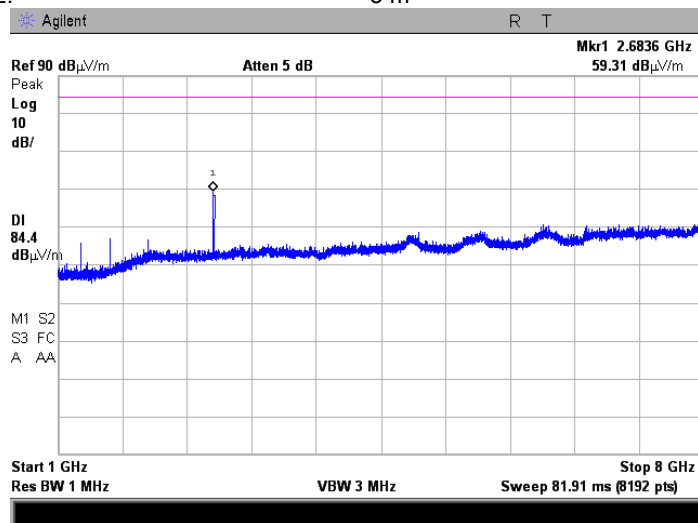


NOTE: 2595 MHz - carrier frequency

Test specification:		Section 27.53(m)(2), 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):		26-Feb-14 - 27-Feb-14	
Temperature: 23 °C	Air Pressure: 1020 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.12 Radiated emission measurements in 1000 – 8000 MHz range

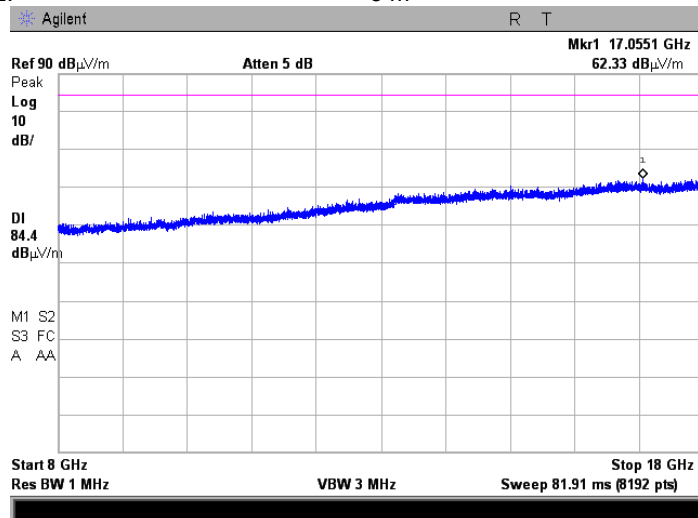
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



NOTE: 2685 MHz - carrier frequency

Plot 7.5.13 Radiated emission measurements in 8000 – 18000 MHz range

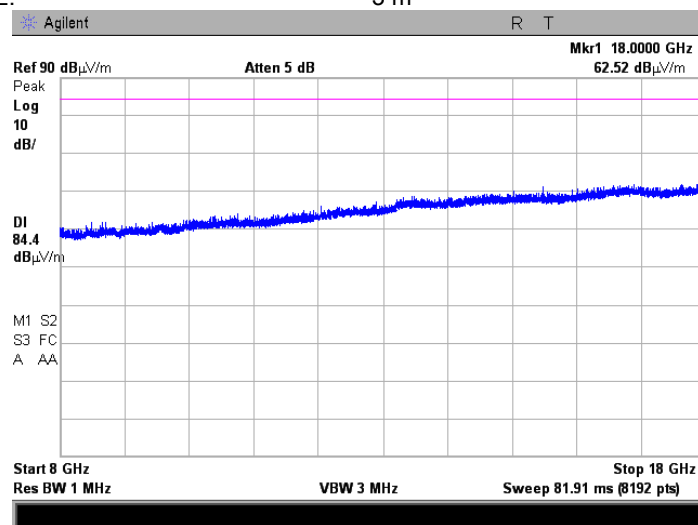
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:		Section 27.53(m)(2), 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):		26-Feb-14 - 27-Feb-14	
Temperature: 23 °C	Air Pressure: 1020 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

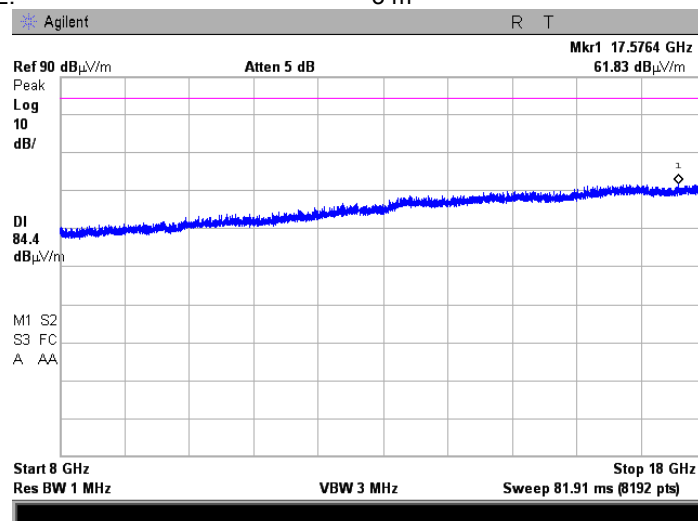
Plot 7.5.14 Radiated emission measurements in 8000 – 18000 MHz range

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



Plot 7.5.15 Radiated emission measurements in 8000 – 18000 MHz range

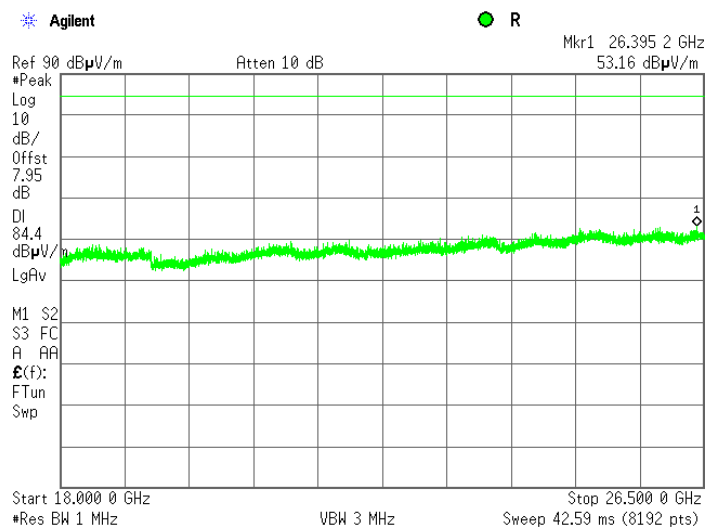
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:		Section 27.53(m)(2), 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):		26-Feb-14 - 27-Feb-14	
Temperature: 23 °C	Air Pressure: 1020 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

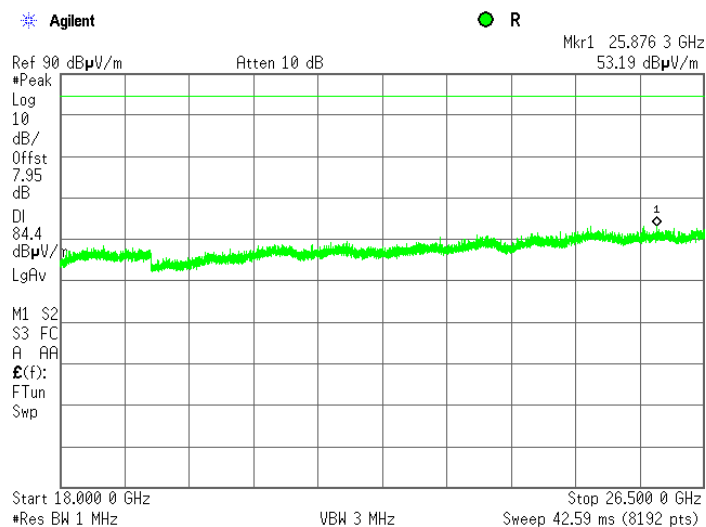
Plot 7.5.16 Radiated emission measurements in 18000 – 26500 MHz range

TEST SITE: OATS
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Plot 7.5.17 Radiated emission measurements in 18000 – 26500 MHz range

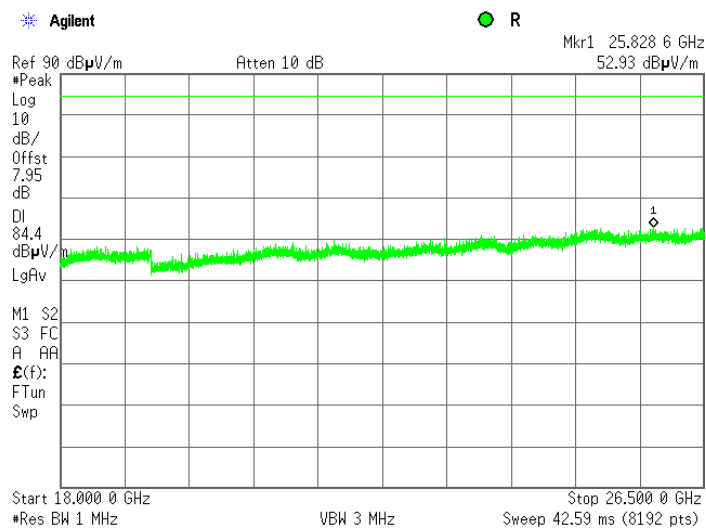
TEST SITE: OATS
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:		Section 27.53(m)(2), 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):		26-Feb-14 - 27-Feb-14	
Temperature: 23 °C	Air Pressure: 1020 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

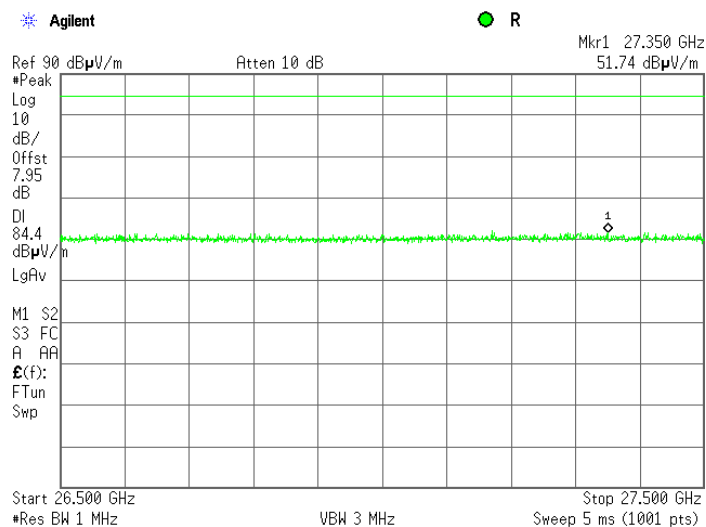
Plot 7.5.18 Radiated emission measurements in 18000 – 26500 MHz range

TEST SITE: OATS
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Plot 7.5.19 Radiated emission measurements in 26500 - 27500 MHz range

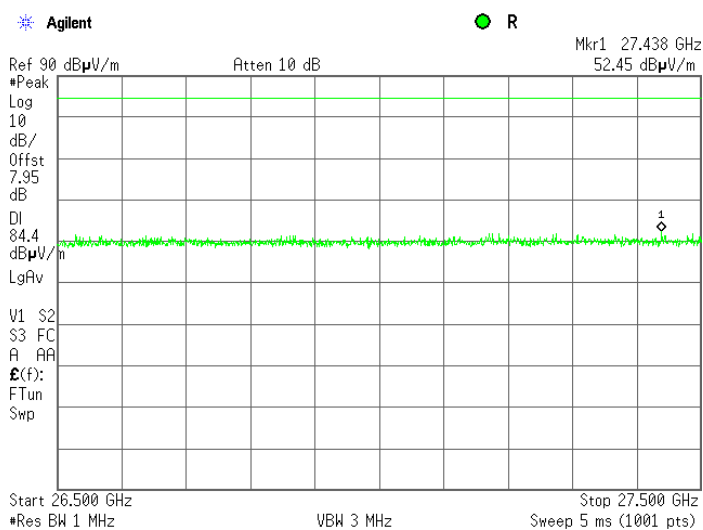
TEST SITE: OATS
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:		Section 27.53(m)(2), 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):		26-Feb-14 - 27-Feb-14	
Temperature: 23 °C	Air Pressure: 1020 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

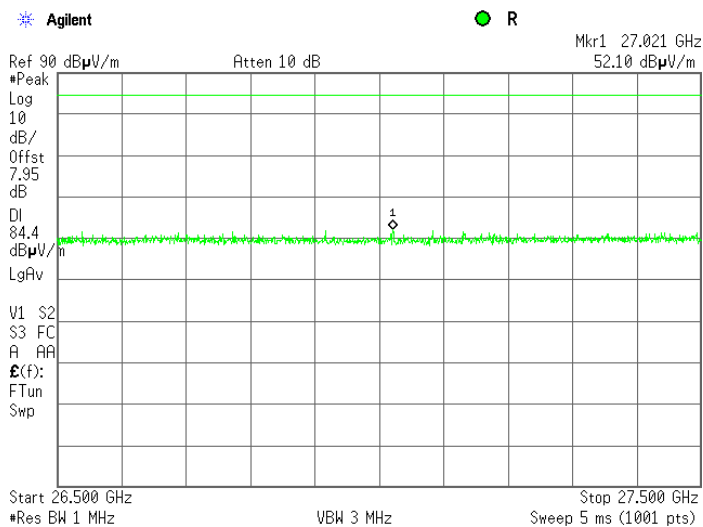
Plot 7.5.20 Radiated emission measurements in 26500 - 27500 MHz range

TEST SITE: OATS
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Plot 7.5.21 Radiated emission measurements in 26500 - 27500 MHz range

TEST SITE: OATS
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):		04-Mar-14	
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

7.6 Frequency stability test

7.6.1 General

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

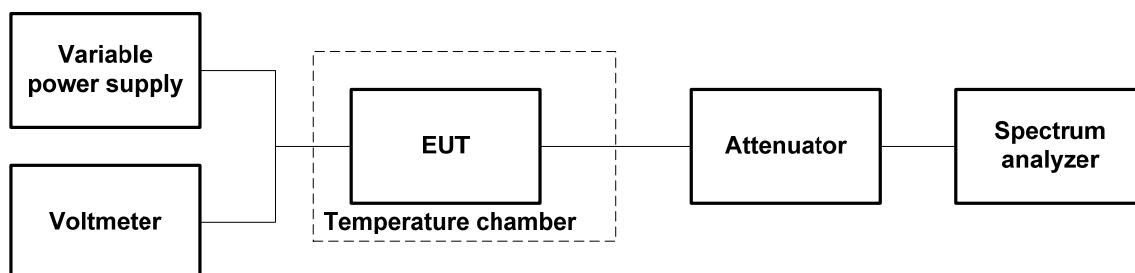
Table 7.6.1 Frequency stability limits

Assigned frequency range, 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.

7.6.2 Test procedure

- 7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized and its proper operation was checked.
- 7.6.2.2 The EUT power was turned off. Temperature within test chamber was set to +30°C and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.
- 7.6.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.
- 7.6.2.4 The above procedure was repeated at 0°C and at the lowest test temperature.
- 7.6.2.5 The EUT was powered on and carrier frequency was measured at start up moment and at the end of stabilization period at the rest of test temperatures and voltages. The EUT was powered off.
- 7.6.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 7.6.2.

Figure 7.6.1 Frequency stability test setup



Test specification:		Section 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):		04-Mar-14	
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

Table 7.6.2 Frequency stability test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 NOMINAL POWER VOLTAGE: 48 VDC
 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, °C	Voltage, V	Frequency, MHz							Max frequency drift, Hz	
		Start up	1 st min	2 nd min	3 rd min	4 th min	5 th min	10 th min	Positive	Negative
Low carrier frequency 2501.0 MHz										
-30	nominal	2501.95977	2501.95976	2501.95973	2501.95960	2501.95977	2501.95977	2501.95977	0.00	170.00
-20	nominal	2501.95975	NA	NA	NA	NA	NA	2501.95983	80.00	0.00
-10	nominal	2501.95983	NA	NA	NA	NA	NA	2501.96000	170.00	0.00
0	nominal	2501.95975	2501.95965	2501.95975	2501.95961	2501.95975	2501.95976	2501.95988	130.00	140.00
10	nominal	2501.95987	NA	NA	NA	NA	NA	2501.95990	30.00	0.00
20	15%	2501.95975	NA	NA	NA	NA	NA	2501.96000	250.00	0.00
20	nominal	2501.95967	NA	NA	NA	NA	NA	2501.96002*	350.00	0.00
20	-15%	2501.95975	NA	NA	NA	NA	NA	2501.96000	250.00	0.00
30	nominal	2501.95977	2501.95957	2501.95957	2501.95987	2501.95990	2501.95967	2501.95963	130.00	200.00
40	nominal	2501.95967	NA	NA	NA	NA	NA	2501.95973	60.00	0.00
50	nominal	2501.95967	NA	NA	NA	NA	NA	2501.95980	130.00	0.00
Mid carrier frequency 2595.0 MHz										
-30	nominal	2595.95975	2595.95975	2595.95975	2595.95992	2595.95983	2595.95992	2595.95983	170.00	0.00
-20	nominal	2595.95992	NA	NA	NA	NA	NA	2595.95992	0.00	0.00
-10	nominal	2595.59975	NA	NA	NA	NA	NA	2595.59975	0.00	0.00
0	nominal	2595.95967	2595.95970	2595.95967	2595.95962	2595.95962	2595.95960	2595.95983	160.00	70.00
10	nominal	2595.95983	NA	NA	NA	NA	NA	2595.95977	0.00	60.00
20	15%	2595.96017	NA	NA	NA	NA	NA	2595.95997	0.00	200.00
20	nominal	2595.95992	NA	NA	NA	NA	NA	2595.95963*	0.00	290.00
20	-15%	2595.95992	NA	NA	NA	NA	NA	2595.95967	0.00	250.00
30	nominal	2595.95973	2595.95963	2595.95970	2595.95973	2595.95973	2595.95973	2595.95967	0.00	100.00
40	nominal	2595.95980	NA	NA	NA	NA	NA	2595.95983	30.00	0.00
50	nominal	2595.95963	NA	NA	NA	NA	NA	2595.95967	40.00	0.00
High carrier frequency 2685.0 MHz										
-30	nominal	2685.95992	2685.95967	2685.95992	2685.95992	2685.95975	2685.96000	2685.95983	80.00	250.00
-20	nominal	2685.95983	NA	NA	NA	NA	NA	2685.95975	0.00	80.00
-10	nominal	2685.95975	NA	NA	NA	NA	NA	2685.95975	0.00	0.00
0	nominal	2685.95980	2685.95980	2685.95973	2685.95977	2685.95983	2685.95977	2685.95983	30.00	70.00
10	nominal	2685.95967	NA	NA	NA	NA	NA	2685.95970	30.00	0.00
20	15%	2685.95980	NA	NA	NA	NA	NA	2685.95987	70.00	0.00
20	nominal	2685.95977	NA	NA	NA	NA	NA	2685.95973*	0.00	40.00
20	-15%	2685.95977	NA	NA	NA	NA	NA	2685.95977	0.00	0.00
30	nominal	2685.95963	2685.95967	2685.95963	2685.95963	2685.95970	2685.95967	2685.95980	170.00	0.00
40	nominal	2685.95983	NA	NA	NA	NA	NA	2685.95973	0.00	100.00
50	nominal	2685.95980	NA	NA	NA	NA	NA	2685.95980	0.00	0.00

* - Reference frequency



HERMON LABORATORIES

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):		04-Mar-14	
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

Table 7.6.3 Maximum frequency displacement

Channel	Maximum frequency displacement			
	ppm		Hz	
	Negative	Positive	Negative	Positive
Low	0.00	1.13	0.00	350.00
Mid	0.88	0.08	290.00	170.00
High	0.72	0.27	250.00	170.00

Table 7.6.4 Transmission occupied bandwidth with frequency drift test results

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
10 MHz BW								
QPSK								
2496.30	2505.68	2496.30	2505.68	2496.00	2506.00	-0.30	-0.32	Pass
2590.28	2599.64	2590.28	2599.64	2590.00	2600.00	-0.28	-0.36	Pass
2680.30	2689.66	2680.30	2689.66	2680.00	2690.00	-0.30	-0.34	Pass
64QAM								
2496.30	2505.76	2496.30	2505.76	2496.00	2506.00	-0.30	-0.24	Pass
2590.36	2599.66	2590.36	2599.66	2590.00	2600.00	-0.36	-0.34	Pass
2680.28	2689.66	2680.28	2689.66	2680.00	2690.00	-0.28	-0.34	Pass
20 MHz BW								
QPSK								
2496.64	2515.32	2496.64	2515.32	2496.00	2516.00	-0.64	-0.68	Pass
2585.64	2604.28	2585.64	2604.28	2585.00	2605.00	-0.64	-0.72	Pass
2670.64	2689.28	2670.64	2689.28	2670.00	2690.00	-0.64	-0.72	Pass
64QAM								
2496.68	2515.24	2496.68	2515.24	2496.00	2516.00	-0.68	-0.76	Pass
2585.68	2604.32	2585.68	2604.32	2585.00	2605.00	-0.68	-0.68	Pass
2670.72	2689.28	2670.72	2689.28	2670.00	2690.00	-0.72	-0.72	Pass

* - Measured under normal test conditions at 26 dBc points

** - Measured band edge with proper drift addition

*** - Margin = Calculated band edge – specified band edge

Reference numbers of test equipment used

HL 1424	HL 3435	HL 4164	HL 2979	HL 3286	HL 4293	HL 4366	HL 4232
HL 4366	HL 4273	HL 3302	HL 3301	HL 4229			

Full description is given in Appendix A.

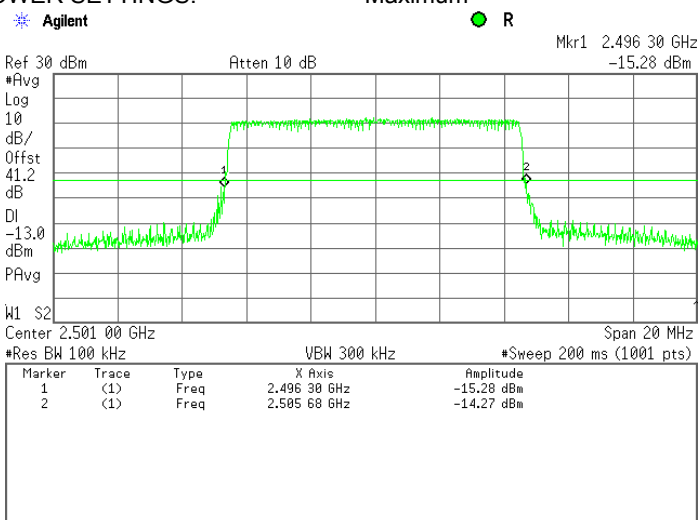


HERMON LABORATORIES

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): 04-Mar-14			
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

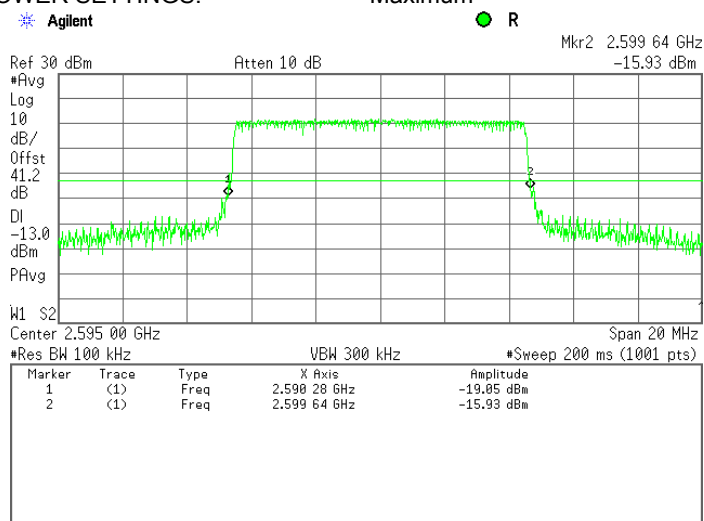
Plot 7.6.1 Emission mask test results at low carrier frequency, 10 MHz EBW

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 15.5 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.6.2 Emission mask test results at mid carrier frequency, 10 MHz EBW

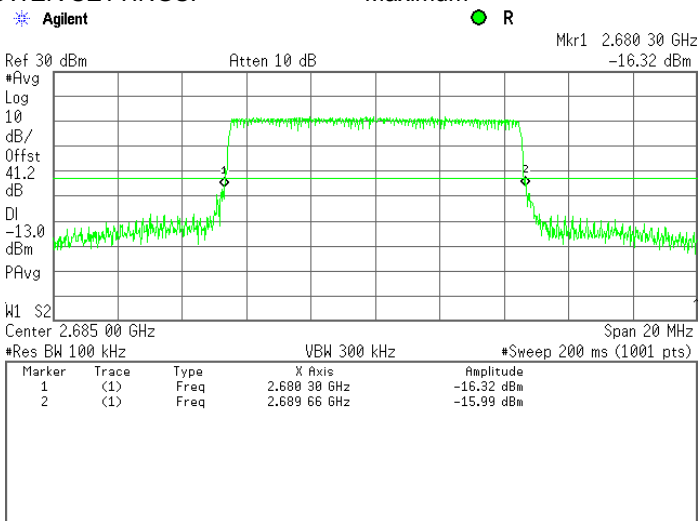
ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 15.5 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



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):		04-Mar-14	
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

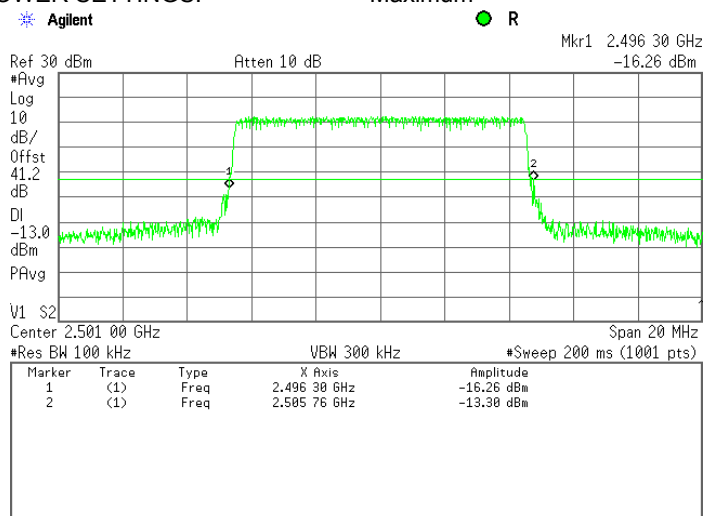
Plot 7.6.3 Emission mask test results at high carrier frequency, 10 MHz EBW

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 15.5 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.6.4 Emission mask test results at low carrier frequency, 10 MHz EBW

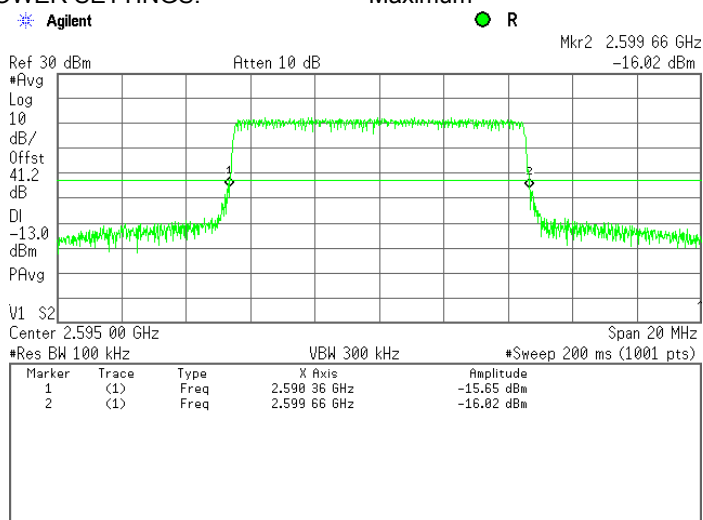
ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 75.0Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



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):		04-Mar-14	
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

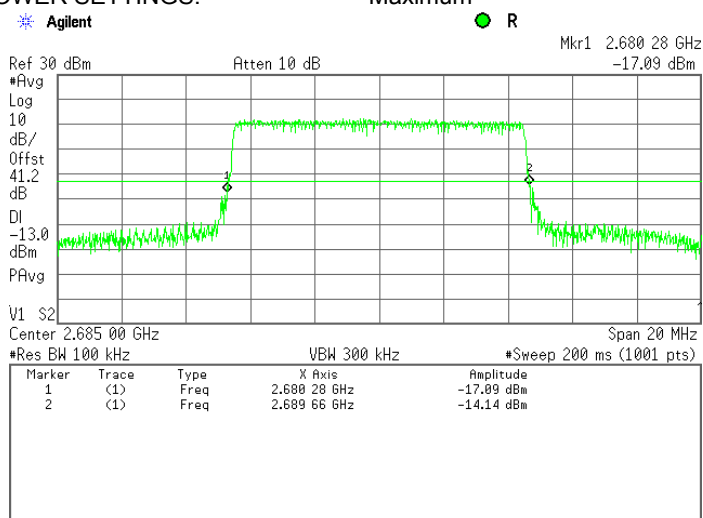
Plot 7.6.5 Emission mask test results at mid carrier frequency, 10 MHz EBW

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 75.0Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.6.6 Emission mask test results at high carrier frequency, 10 MHz EBW

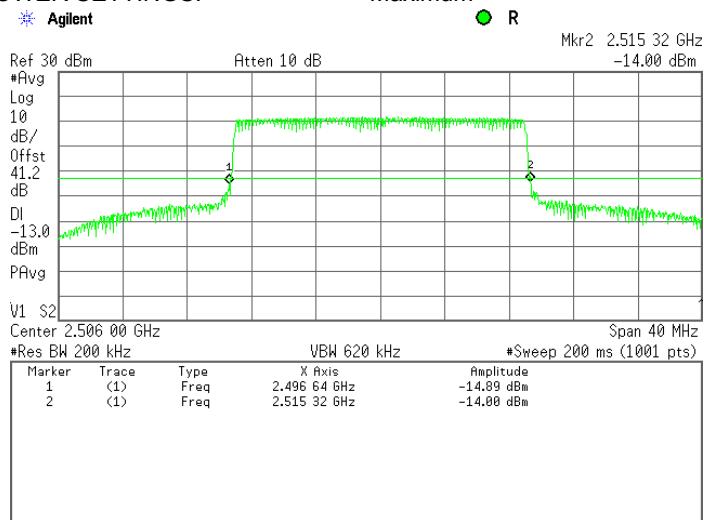
ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 75.0Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



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):		04-Mar-14	
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

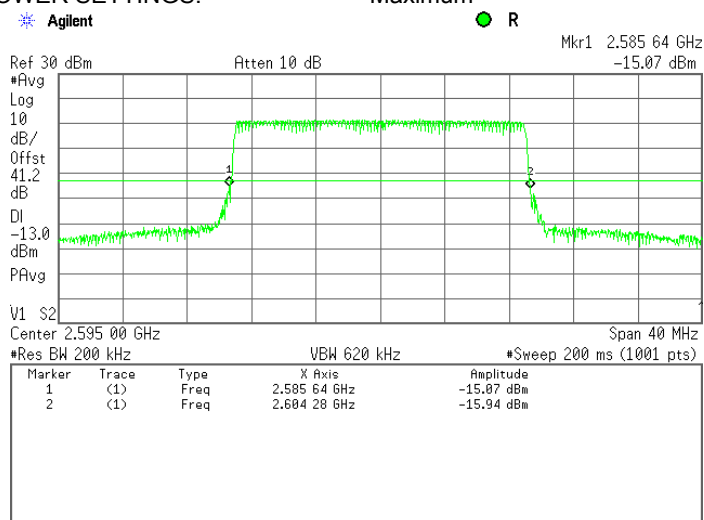
Plot 7.6.7 Emission mask test results at low carrier frequency, 20 MHz EBW

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 31.0 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.6.8 Emission mask test results at mid carrier frequency, 20 MHz EBW

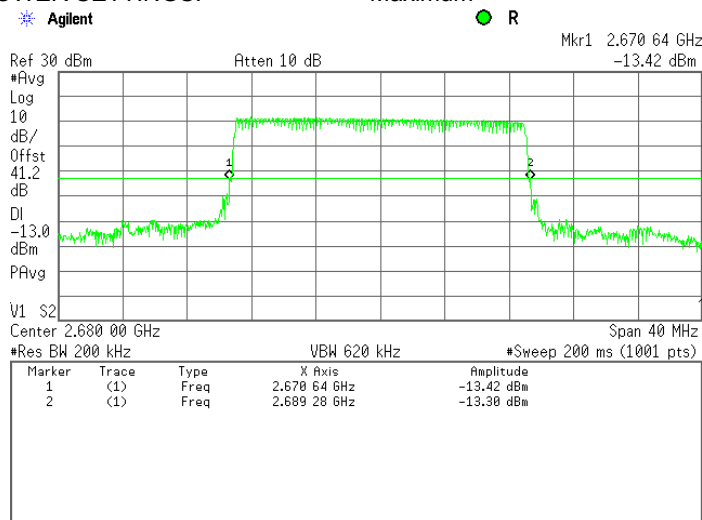
ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 31.0 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



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):		04-Mar-14	
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

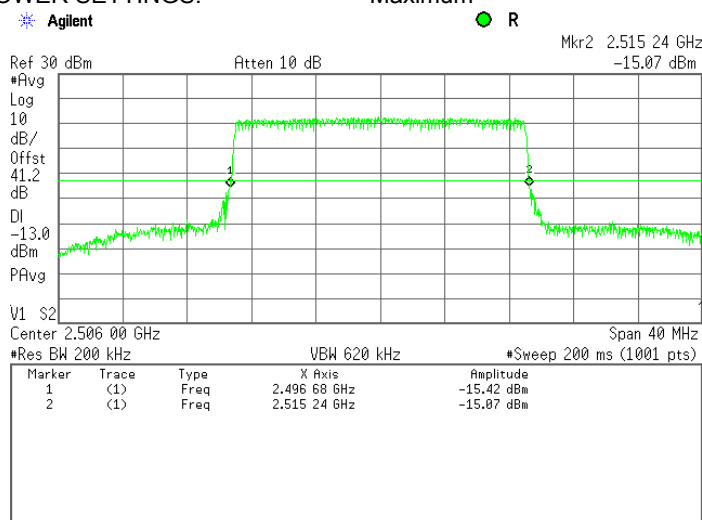
Plot 7.6.9 Emission mask test results at high carrier frequency, 20 MHz EBW

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 31.0 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.6.10 Emission mask test results at low carrier frequency, 20 MHz EBW

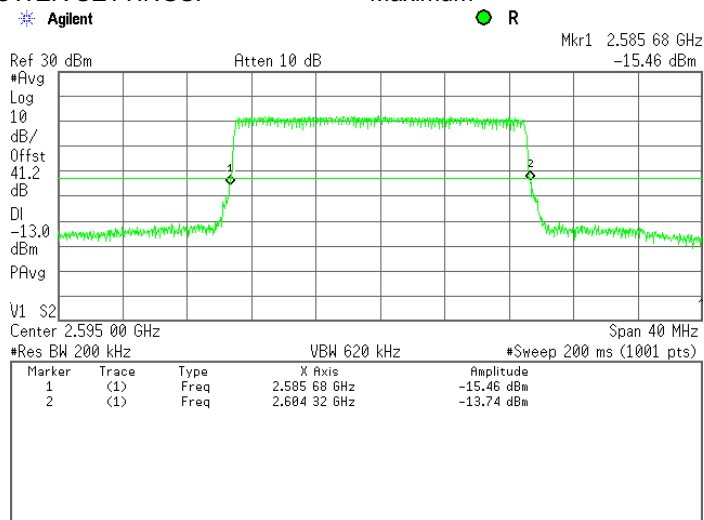
ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 150.0 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



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):		04-Mar-14	
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

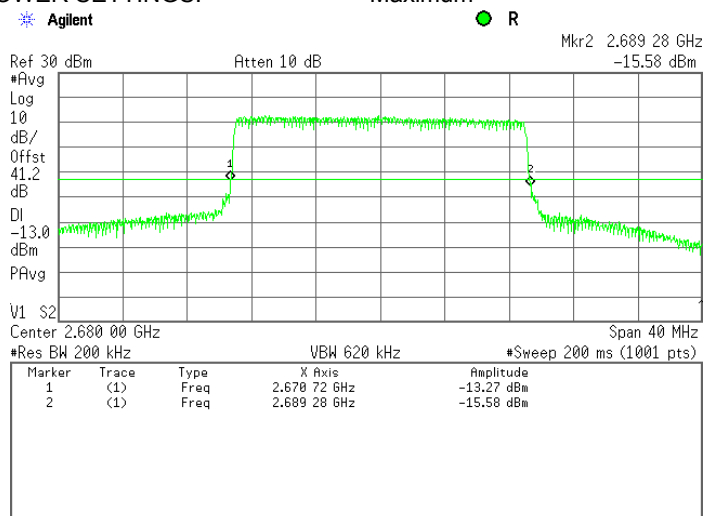
Plot 7.6.11 Emission mask test results at mid carrier frequency, 20 MHz EBW

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 150.0 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.6.12 Emission mask test results at high carrier frequency, 20 MHz EBW

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 150.0 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



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	21-Jan-14	21-Jan-15
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	28-Oct-13	28-Oct-14
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	04-Jun-13	04-Jun-14
0768	Antenna Standard Gain Horn, 18-26.5 GHz, WR-42, 25 dB gain	Quinstar Technology	QWH-4200-BA	110	12-Dec-12	12-Dec-15
0769	Antenna Standard Gain Horn, 26.5-40 GHz, WR28, 25 dB gain	Quinstar Technology	QWH-2800-BA	112	12-Dec-12	12-Dec-15
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A002 19	10-Oct-13	10-Oct-14
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	03-Jan-14	03-Jan-15
2780	EMC analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY451024 62	10-Jul-13	10-Jul-14
2871	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-8155-00	2871	04-Dec-13	04-Dec-14
2979	Cable 1 m, N/N-type	Harbour Industries	7/60-RG142	2979	02-Sep-13	02-Sep-14
3286	Temperature Chamber, (-50 to +170) °C	Thermotron	EL-8-CH-1-1-CO2	21-9048	30-Sep-13	30-Sep-14
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY451010 57	12-Feb-14	12-Feb-15
3302	Power sensor, P-Series, 50 MHz to 40 GHz, -35/30 to 20 dBm	Agilent Technologies	N1922A	MY452405 86	12-Feb-14	12-Feb-15
3435	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	07-Mar-14	07-Mar-15
3455	Medium Power Fixed Coaxial Attenuator DC to 40 GHz, 20 dB, 5 W	Aeroflex / Weinschel	75A-20-12	1182	18-Mar-13	18-Mar-14
3535	Amplifier, low noise, 18 to 40 GHz	Quinstar Technology	QLJ-18404537-J0	111590030 01	30-Dec-13	30-Dec-14
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY482502 88	24-Apr-13	24-Apr-14
3901	Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1225/2A	06-Feb-14	06-Feb-15
4114	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz	ETS Lindgren	3117	00123515	27-Dec-13	27-Dec-14
4150	Preamplifier, 0.1 to 18 GHz, Gain 25 dB, N-type(f) in, N-type(m) out.	Agilent Technologies	87405C	MY470105 91	01-Jul-13	01-Jul-14
4164	DC Power Supply, 60V, 5A	Standig	605D	NA	15-Jan-14	15-Jan-15
4229	Precision Fixed Attenuator, 50 Ohm, 5W, 10dB, DC to 18000 MHz	Mini-Circuits	BW-N10W5+	NA	07-Mar-14	07-Mar-15



HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
4232	Precision Fixed Attenuator, 50 Ohm, 5W, 20dB, DC to 18000 MHz	Mini-Circuits	BW-N20W5+	NA	07-Mar-14	07-Mar-15
4234	Precision Fixed Attenuator, 50 Ohm, 5W, 20dB, DC to 18000 MHz	Mini-Circuits	BW-N20W5+	NA	06-Mar-14	06-Mar-15
4273	Test Cable , DC-18 GHz, 1.8 m, SMA/M - N/M	Mini-Circuits	CBL-6FT-SMNM+	70045	27-Nov-13	27-Nov-14
4293	Microwave Cable Assembly, 18.0 GHz, 3.4 m, SMA/SMA	Huber-Suhner	Sucoflex P103	NA	18-Nov-13	18-Nov-14
4353	Low Loss Armored Test Cable, DC - 18 GHz, 6.2 m, N type-M/N type-M	MegaPhase	NC29-N1N1-244	12025101 003	06-Mar-14	06-Mar-15
4366	Directional coupler, 1 GHz to 18 GHz, 10 dB, SMA Female	Tiger Micro-Electronics Institute	TGD-A1101-10	01e-JSDE805-007	17-Apr-12	17-Apr-14

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Transmitter tests	
Carrier power conducted at antenna connector	± 1.7 dB
Carrier power radiated (substitution method)	± 4.5 dB
Occupied bandwidth	$\pm 8\%$
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Spurious emissions radiated 30 MHz – 40 GHz (substitution method)	± 4.5 dB
Frequency error	30 – 300 MHz: ± 50.5 Hz (1.68 ppm) 300 – 1000 MHz: ± 168 Hz (0.56 ppm)
Transient frequency behaviour	187 Hz $\pm 13.9\%$
Duty cycle, timing (Tx ON / OFF) and average factor measurements	$\pm 1.0\%$

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

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

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

10 APPENDIX C Test facility description

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

Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS, IC 2186A-2 for anechoic chamber, IC 2186A-3 for full-anechoic chamber for RE measurements above 1 GHz), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-27 for full-anechoic chamber for RE measurements above 1 GHz, C-845 for conducted emissions site, T-1606 for conducted emissions at telecommunication ports), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00. 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). The FCC Designation Number is US1003.

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11 APPENDIX D Specification references

47CFR part 27: 2013	Private land mobile radio services
47CFR part 1: 2013	Practice and procedure
47CFR part 2: 2013	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: 2003	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-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

12 APPENDIX E Test equipment correction factors

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

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

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

Antenna factor
Standard gain horn antenna
Quinstar Technology
Model QWH
Ser.No.112, HL 0768, 0769, 0770, 0771, 0772

Frequency min, GHz	Frequency max, GHz	Antenna factor, dB(1/m)
18.000	26.500	32.01
26.500	40.000	35.48
40.000	60.000	39.03
60.000	90.000	42.55
90.000	140.000	46.23
140.000	220.000	50.11

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

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

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

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

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

Antenna factor
Double-ridged waveguide horn antenna
ETS Lindgren, Model 3117, serial number: 00123515, HL 4114

Frequency, MHz	Antenna factor, dB/m		
	Measured	Manufacturer	Deviation
1000	28.0	28.4	-0.4
1500	28.0	27.4	0.6
2000	31.2	30.9	0.3
2500	32.5	33.4	-0.9
3000	32.9	32.6	0.3
3500	32.7	32.8	-0.1
4000	33.1	33.4	-0.3
4500	33.8	33.9	-0.1
5000	33.8	34.1	-0.3
5500	34.4	34.5	-0.1
6000	35.0	35.2	-0.2
6500	35.4	35.5	-0.1
7000	35.7	35.7	0.0
7500	35.9	35.7	0.2
8000	35.8	35.8	0.0
8500	35.9	35.8	0.1
9000	36.3	36.2	0.1
9500	36.6	36.6	0.0
10000	37.1	37.1	0.0
10500	37.6	37.5	0.1
11000	37.9	37.7	0.2
11500	38.5	38.1	0.4
12000	39.2	38.7	0.5
12500	39.0	38.9	0.1
13000	39.1	39.1	0.0
13500	38.9	38.8	0.1
14000	39.0	38.8	0.2
14500	39.6	39.9	-0.3
15000	39.9	39.7	0.2
15500	39.9	40.1	-0.2
16000	40.7	40.8	-0.1
16500	41.3	41.8	-0.5
17000	42.5	42.1	0.4
17500	41.3	41.2	0.1
18000	41.4	40.9	0.5

Antenna factor is to be added to receiver meter reading in dB(μ V) to convert to field strength in dB(μ V/meter)

Cable loss
Cable coaxial, Huber-Suhner, 18 GHz, 6.4 m, SMA - SMA, model 198-8155-00,
HL 2871

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.12	5750	2.34	12000	3.55
30	0.14	6000	2.39	12250	3.61
100	0.27	6250	2.46	12500	3.67
250	0.45	6500	2.52	12750	3.74
500	0.63	6750	2.58	13000	3.79
750	0.76	7000	2.64	13250	3.82
1000	0.89	7250	2.68	13500	3.83
1250	1.01	7500	2.73	13750	3.83
1500	1.12	7750	2.78	14000	3.88
1750	1.23	8000	2.83	14250	3.93
2000	1.32	8250	2.88	14500	3.96
2250	1.41	8500	2.94	14750	4.01
2500	1.49	8750	2.97	15000	4.00
2750	1.58	9000	3.02	15250	4.01
3000	1.66	9250	3.07	15500	4.00
3250	1.73	9500	3.13	15750	4.13
3500	1.80	9750	3.18	16000	4.22
3750	1.87	10000	3.21	16250	4.29
4000	1.93	10250	3.26	16500	4.29
4250	2.01	10500	3.30	16750	4.32
4500	2.06	10750	3.36	17000	4.37
4750	2.12	11000	3.39	17250	4.45
5000	2.17	11250	3.44	17500	4.49
5250	2.24	11500	3.48	17750	4.53
5500	2.29	11750	3.52	18000	4.55

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
Test cable, Mini-Circuits, S/N 70045, 18 GHz, 1.8 m, SMA/M - N/M
CBL-6FT-SMNM+, HL 4273

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.09	4800	1.76	9800	2.70	14800	3.59
30	0.11	4900	1.78	9900	2.71	14900	3.59
50	0.14	5000	1.81	10000	2.73	15000	3.60
100	0.20	5100	1.82	10100	2.75	15100	3.63
200	0.30	5200	1.86	10200	2.76	15200	3.67
300	0.38	5300	1.89	10300	2.79	15300	3.70
400	0.45	5400	1.92	10400	2.81	15400	3.68
500	0.50	5500	1.96	10500	2.82	15500	3.70
600	0.55	5600	2.00	10600	2.83	15600	3.71
700	0.60	5700	2.03	10700	2.87	15700	3.77
800	0.65	5800	2.04	10800	2.87	15800	3.75
900	0.69	5900	2.07	10900	2.88	15900	3.77
1000	0.73	6000	2.10	11000	2.89	16000	3.79
1100	0.77	6100	2.10	11100	2.91	16100	3.85
1200	0.80	6200	2.11	11200	2.92	16200	3.82
1300	0.84	6300	2.11	11300	2.94	16300	3.83
1400	0.88	6400	2.14	11400	2.95	16400	3.88
1500	0.92	6500	2.15	11500	2.98	16500	3.89
1600	0.95	6600	2.15	11600	3.00	16600	3.92
1700	0.98	6700	2.16	11700	3.02	16700	3.88
1800	1.01	6800	2.19	11800	3.04	16800	3.95
1900	1.04	6900	2.22	11900	3.08	16900	3.91
2000	1.07	7000	2.24	12000	3.09	17000	3.97
2100	1.09	7100	2.26	12100	3.12	17100	3.92
2200	1.13	7200	2.29	12200	3.13	17200	3.94
2300	1.15	7300	2.32	12300	3.16	17300	3.94
2400	1.18	7400	2.36	12400	3.17	17400	3.98
2500	1.21	7500	2.39	12500	3.19	17500	3.93
2600	1.24	7600	2.41	12600	3.20	17600	3.95
2700	1.27	7700	2.43	12700	3.21	17700	3.96
2800	1.30	7800	2.46	12800	3.21	17800	3.97
2900	1.34	7900	2.49	12900	3.22	17900	3.96
3000	1.36	8000	2.52	13000	3.22	18000	3.97
3100	1.38	8100	2.52	13100	3.24		
3200	1.41	8200	2.54	13200	3.24		
3300	1.45	8300	2.59	13300	3.27		
3400	1.46	8400	2.61	13400	3.28		
3500	1.49	8500	2.60	13500	3.31		
3600	1.51	8600	2.63	13600	3.31		
3700	1.55	8700	2.65	13700	3.35		
3800	1.34	8800	2.65	13800	3.37		
3900	1.36	8900	2.65	13900	3.40		
4000	1.38	9000	2.66	14000	3.43		
4100	1.41	9100	2.66	14100	3.45		
4200	1.45	9200	2.67	14200	3.46		
4300	1.46	9300	2.67	14300	3.46		
4400	1.49	9400	2.67	14400	3.49		
4500	1.51	9500	2.68	14500	3.50		
4600	1.55	9600	2.69	14600	3.50		
4700	1.34	9700	2.69	14700	3.52		

Cable loss
Microwave Cable Assembly, 18.0 GHz, 3.4 m, SMA/SMA, Huber-Suhner,
Sucoflex P103, HL 4293

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
50	0.20	4900	2.01	9800	2.94	14700	3.85
100	0.28	5000	2.03	9900	2.95	14800	3.87
200	0.39	5100	2.06	10000	2.98	14900	3.89
300	0.48	5200	2.08	10100	3.01	15000	3.94
400	0.55	5300	2.07	10200	3.04	15100	3.94
500	0.61	5400	2.12	10300	3.04	15200	3.91
600	0.68	5500	2.12	10400	3.04	15300	3.93
700	0.73	5600	2.16	10500	3.07	15400	3.94
800	0.78	5700	2.16	10600	3.10	15500	3.96
900	0.83	5800	2.22	10700	3.11	15600	3.96
1000	0.88	5900	2.24	10800	3.12	15700	3.97
1100	0.92	6000	2.28	10900	3.15	15800	4.00
1200	0.96	6100	2.31	11000	3.22	15900	4.01
1300	1.00	6200	2.32	11100	3.20	16000	4.03
1400	1.04	6300	2.34	11200	3.19	16100	4.02
1500	1.07	6400	2.37	11300	3.21	16200	4.05
1600	1.11	6500	2.38	11400	3.26	16300	4.06
1700	1.15	6600	2.38	11500	3.27	16400	4.08
1800	1.19	6700	2.40	11600	3.27	16500	4.07
1900	1.22	6800	2.42	11700	3.28	16600	4.10
2000	1.25	6900	2.43	11800	3.32	16700	4.14
2100	1.28	7000	2.44	11900	3.34	16800	4.12
2200	1.34	7100	2.48	12000	3.34	16900	4.13
2300	1.35	7200	2.46	12100	3.35	17000	4.13
2400	1.39	7300	2.51	12200	3.39	17100	4.19
2500	1.40	7400	2.53	12300	3.44	17200	4.22
2600	1.44	7500	2.50	12400	3.44	17300	4.20
2700	1.47	7600	2.53	12500	3.43	17400	4.21
2800	1.50	7700	2.63	12600	3.45	17500	4.19
2900	1.54	7800	2.62	12700	3.47	17600	4.22
3000	1.56	7900	2.58	12800	3.51	17700	4.24
3100	1.59	8000	2.64	12900	3.51	17800	4.23
3200	1.62	8100	2.66	13000	3.52	17900	4.26
3300	1.64	8200	2.67	13100	3.56	18000	4.27
3400	1.67	8300	2.63	13200	3.57		
3500	1.69	8400	2.64	13300	3.58		
3600	1.72	8500	2.65	13400	3.60		
3700	1.74	8600	2.68	13500	3.61		
3800	1.78	8700	2.72	13600	3.66		
3900	1.80	8800	2.73	13700	3.68		
4000	1.83	8900	2.74	13800	3.67		
4100	1.84	9000	2.77	13900	3.68		
4200	1.86	9100	2.79	14000	3.73		
4300	1.89	9200	2.82	14100	3.74		
4400	1.92	9300	2.81	14200	3.74		
4500	1.94	9400	2.85	14300	3.76		
4600	1.97	9500	2.89	14400	3.78		
4700	1.97	9600	2.90	14500	3.81		
4800	2.01	9700	2.92	14600	3.83		

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		

13 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
AM	amplitude modulation
AVRG	average (detector)
BB	broad band
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
dB(μ A)	decibel referred to one microampere
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
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μ s	microsecond
NA	not applicable
NB	narrow band
OATS	open area test site
Ω	Ohm
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt

END OF DOCUMENT