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TEST REPORT

ACCORDING TO: FCC CFR 47 PART 90 subpart Z

FOR:

WiNetworks Ltd.

Base station operating in 3.65-3.675 GHz

Model: WiN7037-2

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. This test report shall not be reproduced in any form except in full with the written approval of Hermon Laboratories Ltd.



Table of contents

1	Applicant information	3
2	Equipment under test attributes	3
3	Manufacturer information	3
4	Test details	3
5	Tests summary	4
6	EUT description	5
6.1	General information	5
6.2	Ports and lines	5
6.3	Support and test equipment	5
6.4	Changes made in the EUT	5
6.5	Test configuration	5
6.6	Transmitter characteristics	6
7	Transmitter tests according to 47CFR part 90 requirements	7
7.1	Peak output power test	7
7.2	Occupied bandwidth test	44
7.3	Emission mask test	84
7.4	Radiated spurious emission measurements	118
7.5	Spurious emissions at RF antenna connector test	135
7.6	Frequency stability test	156
7.7	RF exposure	159
8	APPENDIX A Test equipment and ancillaries used for tests	161
9	APPENDIX B Measurement uncertainties	163
10	APPENDIX C Test facility description	164
11	APPENDIX D Specification references	164
12	APPENDIX E Test equipment correction factors	165
13	APPENDIX F Abbreviations and acronyms	173



1 Applicant information

Client name: WiNetworks Ltd.
Address: 32 Maskit Street, P.O.Box 12412, Herzeliya 46733, Israel
Telephone: +972 9951 9556
Fax: +972 9951 9557
E-mail: shayc@winetworks.com
Contact name: Mr. Shay Chaim

2 Equipment under test attributes

Product name: Base station operating in 3.65-3.675 GHz
Product type: Transceiver
Model(s): WiN7037-2
Receipt date: 8/31/2008

3 Manufacturer information

Manufacturer name: WiNetworks Ltd.
Address: 32 Maskit Street, P.O.Box 12412, Herzeliya 46733, Israel
Telephone: +972 9951 9556
Fax: +972 9951 9557
E-Mail: shayc@winetworks.com
Contact name: Mr. Shay Chaim




4 Test details

Project ID: 19042
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 8/31/2008
Test completed: 10/28/2008
Test specification(s): 47CFR part 90 subpart Z

5 Tests summary

Test	Status
Transmitter characteristics	
Section 90.205, 90.1321, Maximum output power and peak power spectral density	Pass
Section 90.209, Occupied bandwidth	Pass
Section 90.210, Emission mask	Pass
Section 90.1323, Conducted spurious emissions	Pass
Section 90.1323, Radiated spurious emissions	Pass
Section 90.213, Frequency stability	Pass
Section 2.1091, 90.1335, RF radiation exposure evaluation	Pass

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.
The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

	Name and Title	Date	Signature
Tested by:	Mr. S. Samokha, test engineer Mr. L. Markel, test engineer	October 28, 2008	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	November 6, 2008	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	November 9, 2008	



6 EUT description

6.1 General information

The WiNetworks WiN7000 is member of the Win-MAX E family, line of mobile WiMAX broadband wireless access systems based on the 802.16e mobile deployment and operation costs, for unmatched oper tor competitiveness and fast ROI.

The WiN7000 compact base station is an ideal, cost-effective solution for wireless access services designed for point-to-multipoint broadband wireless access applications in various conditions and locations.

The WiN7000 is one-sector base station which supports up to 800 subscriber units. By adding switch routing units, the system can be extended to as many sectors as required and can support additional subscribers and bandwidths.

6.2 Ports and lines

Port type	Port description	Connected		Connector type	Qty.	Cable type	Cable length
		From	To				
Signal	48 V DC & Ethernet	EUT	DC power supply Laptop	Custom	2	shielded	30 m
RF	Antenna	EUT	50 Ohm termination	N-type	2	NA	NA

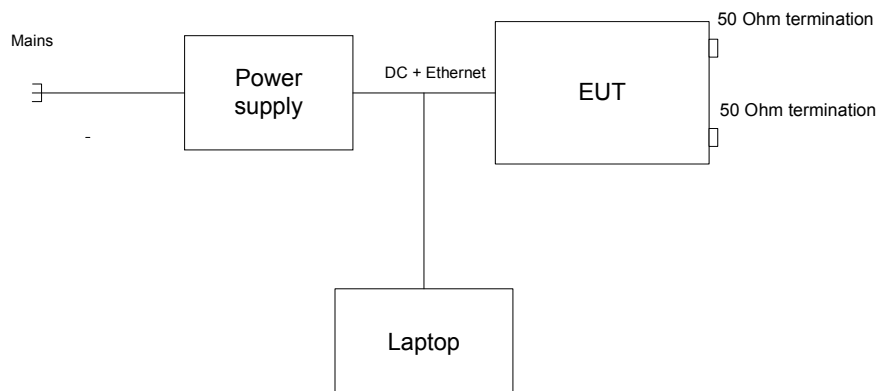
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop	Dell	PP22L	JX190A00
Adapter to laptop	Dell	0334B4848	0507049

6.4 Changes made in the EUT

No changes were implemented.

6.5 Test configuration





6.6 Transmitter characteristics

Type of equipment				
V	Stand-alone (Equipment with or without its own control provisions)			
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)			
	Plug-in card (Equipment intended for a variety of host systems)			
Intended use		Condition of use		
V	fixed	Always at a distance more than 2 m from all people		
	mobile	Always at a distance more than 20 cm from all people		
	portable	May operate at a distance closer than 20 cm to human body		
Assigned frequency range		3650 – 3675 MHz		
Operating frequency range		3652.5 – 3672.5 MHz		
RF channel bandwidth		5 MHz, 7 MHz, 10 MHz		
Maximum rated output power		At transmitter 50 Ω RF output connector - under 22 dBm transmitter output power settings	28.3 dBm	
Is transmitter output power variable?		No		
		V	Yes	
				continuous variable
			V	stepped variable with stepsize
		minimum RF power	17.5 dBm	
		maximum EIRP power	33.3 dBm	
Antenna connection				
	unique coupling	standard connector	V Integral	
			V with temporary RF connector without temporary RF connector	
Antenna/s technical characteristics				
Type	Manufacturer	Model number	Gain	
OMNI	Joymax Electronics Co., Ltd	SAF-6550RS3X	5 dBi	
Transmitter 99% power bandwidth		5 MHz, 7 MHz, 10 MHz		
Transmitter aggregate data rate/s		5 MHz BW: QPSK - 4.19 MBps, 16QAM – 12.565 MBps, 64QAM – 18.85 MBps 7 MHz BW: QPSK - 4.19 MBps, 16QAM – 12.565 MBps, 64QAM – 18.85 MBps 10 MHz BW: QPSK - 8.38 MBps, 16QAM – 25.13 MBps, 64QAM – 37.7 MBps		
Type of modulation		QPSK, 16QAM, 64QAM		
Type of multiplexing		OFDM		
Modulating test signal (baseband)		PRBS		
Maximum transmitter duty cycle in normal use		90%		
Transmitter power source				
V	DC	Nominal rated voltage	Battery type	
	AC mains	Nominal rated voltage	48 V (via DC power supply from the mains)	
		Nominal rated voltage	Frequency	
Common power source for transmitter and receiver		V	yes no	



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Test specification:		Section 90.1321, Maximum output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:	Compliance	Verdict:	PASS
Date:	9/21/2008		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks:			

7 Transmitter tests according to 47CFR part 90 requirements

7.1 Peak output power test

7.1.1 General

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

Table 7.1.1 Peak output power and spectral density limits

Assigned frequency range, MHz	Channel bandwidth, MHz	Maximum peak output power		Power spectral density, dBm/MHz
		W	dBm	
3650.0 – 3700.0	5	5.0	37.00	30.0
	7	7.0	38.45	
	10	10.0	40.00	

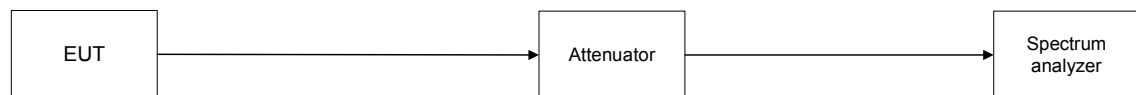
7.1.2 Test procedure

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

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

7.1.2.3 The peak output power was measured with spectrum analyzer as provided in Table 7.1.2 and associated plots.

Figure 7.1.1 Peak output power test setup





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Test specification:		Section 90.1321, Maximum output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:	Compliance	Verdict:	PASS
Date:	9/21/2008		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 5 MHz CBW			

Table 7.1.2 Peak output power test results for 5 MHz channel bandwidth

ASSIGNED FREQUENCY RANGE: 3650.0 – 3675.0 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1000 kHz
 VIDEO BANDWIDTH: 3000 kHz
 MODULATION: QPSK, 16QAM, 64QAM
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: 22 dBm

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss dB	EIRP,* dBm	Limit, dBm	Margin dB	Verdict
Antenna 1							
64QAM, Bit Rate: 18.85 Mbps							
3652.5	27.5	included	included	32.50	37.00	-4.50	Pass
3662.5	27.8	included	included	32.80	37.00	-4.20	Pass
3672.5	28.2	included	included	33.20	37.00	-3.80	Pass
16QAM, Bit Rate : 12.565 Mbps							
3652.5	27.9	included	included	32.90	37.00	-4.10	Pass
3662.5	28.0	included	included	33.00	37.00	-4.00	Pass
3672.5	28.2	included	included	33.20	37.00	-3.80	Pass
QPSK, Bit Rate: 4.19 Mbps							
3652.5	28.0	included	included	33.00	37.00	-4.00	Pass
3662.5	27.8	included	included	32.80	37.00	-4.20	Pass
3672.5	28.2	included	included	33.20	37.00	-3.80	Pass
Antenna 2							
64QAM, Bit Rate: 18.85 Mbps							
3652.5	27.8	included	included	32.80	37.00	-4.20	Pass
3662.5	28.1	included	included	33.10	37.00	-3.90	Pass
3672.5	28.0	included	included	33.00	37.00	-4.00	Pass
16QAM, Bit Rate : 12.565 Mbps							
3652.5	27.8	included	included	32.80	37.00	-4.20	Pass
3662.5	28.1	included	included	33.10	37.00	-3.90	Pass
3672.5	28.1	included	included	33.10	37.00	-3.90	Pass
QPSK, Bit Rate: 4.19 Mbps							
3652.5	28.2	included	included	33.20	37.00	-3.80	Pass
3662.5	27.9	included	included	32.90	37.00	-4.10	Pass
3672.5	28.3	included	included	33.30	37.00	-3.70	Pass

* - EIRP (dBm) = Power meter reading (dBm) + antenna gain (5 dBi)

Reference numbers of test equipment used

HL 1424	HL 2869	HL 2952	HL 3321	HL 3455			
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Full description is given in Appendix A.



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Test specification: Section 90.1321, Maximum output power	
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode: Compliance	Verdict: PASS
Date: 9/21/2008	
Temperature: 23°C	Air Pressure: 1012 hPa
Relative Humidity: 42%	
Power Supply: 48 VDC	
Remarks: 5 MHz CBW	

Table 7.1.3 Power spectral density test results for 5 MHz channel bandwidth

ASSIGNED FREQUENCY RANGE: 3650.0 – 3675.0 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1000 kHz
 VIDEO BANDWIDTH: 3000 kHz
 MODULATION: QPSK, 16QAM, 64QAM
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: 22 dBm

Carrier frequency, MHz	Spectrum analyzer reading, dBm/MHz	Attenuation, dB	Cable loss, dB	Power density**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
Antenna 1							
64QAM, Bit Rate: 18.85 Mbps							
3652.5	23.00	included	included	28.00	30.00	-2.00	Pass
3662.5	23.33	included	included	28.33	30.00	-1.67	Pass
3672.5	23.50	included	included	28.50	30.00	-1.50	Pass
16QAM, Bit Rate: 12.565 Mbps							
3652.5	23.33	included	included	28.33	30.00	-1.67	Pass
3662.5	23.33	included	included	28.33	30.00	-1.67	Pass
3672.5	23.83	included	included	28.83	30.00	-1.17	Pass
QPSK, Bit Rate: 4.19 Mbps							
3652.5	23.33	included	included	28.33	30.00	-1.67	Pass
3662.5	23.17	included	included	28.17	30.00	-1.83	Pass
3672.5	23.50	included	included	28.50	30.00	-1.50	Pass
Antenna 2							
64QAM, Bit Rate: 18.85 Mbps							
3652.5	23.33	included	included	28.33	30.00	-1.67	Pass
3662.5	23.33	included	included	28.33	30.00	-1.67	Pass
3672.5	23.33	included	included	28.33	30.00	-1.67	Pass
16QAM, Bit Rate: 12.565 Mbps							
3652.5	23.33	included	included	28.33	30.00	-1.67	Pass
3662.5	24.00	included	included	29.00	30.00	-1.00	Pass
3672.5	23.33	included	included	28.33	30.00	-1.67	Pass
QPSK, Bit Rate: 4.19 Mbps							
3652.5	23.67	included	included	28.67	30.00	-1.33	Pass
3662.5	23.33	included	included	28.33	30.00	-1.67	Pass
3672.5	23.50	included	included	28.50	30.00	-1.50	Pass

** - Power density = Spectrum analyzer reading + antenna gain (5 dBi)

Reference numbers of test equipment used

HL 1424	HL 2869	HL 2952	HL 3321	HL 3455			
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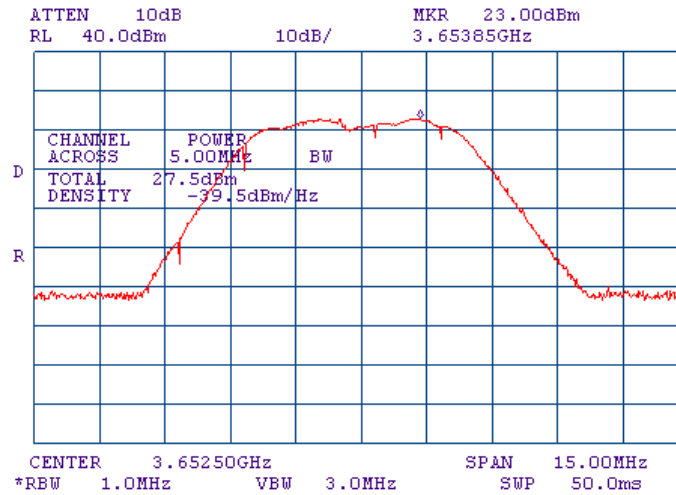
Full description is given in Appendix A.



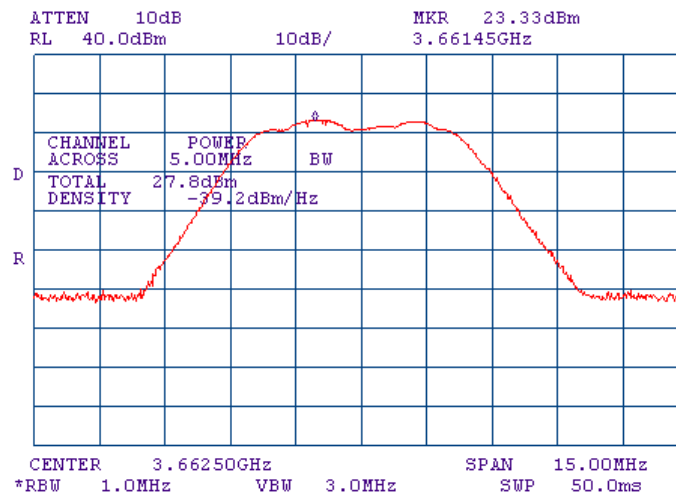
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Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.1.1 Peak output power density test results at low frequency, 64QAM, bit rate 18.85 Mbps



Plot 7.1.2 Peak output power test results at mid frequency, 64QAM, bit rate 18.85 Mbps

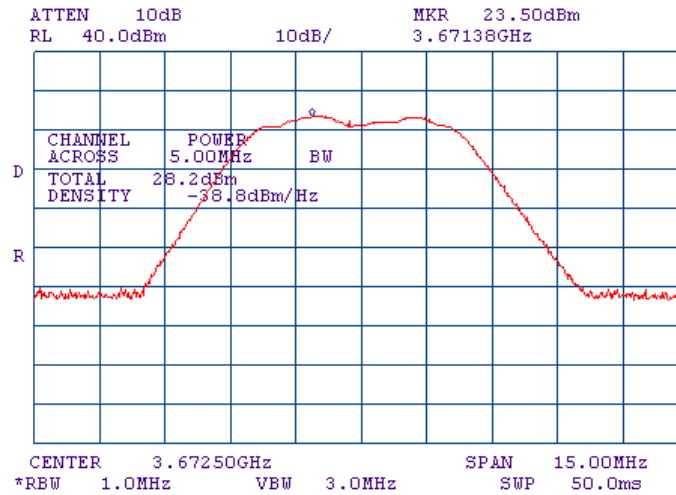




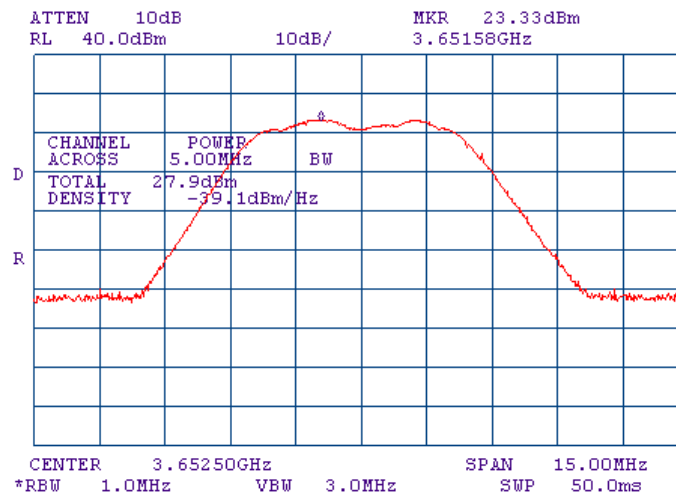
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.1.3 Peak output power test results at high frequency, 64QAM bit rate 18.85 Mbps



Plot 7.1.4 Peak output power test results at low frequency, 16QAM bit rate 12.565 Mbps

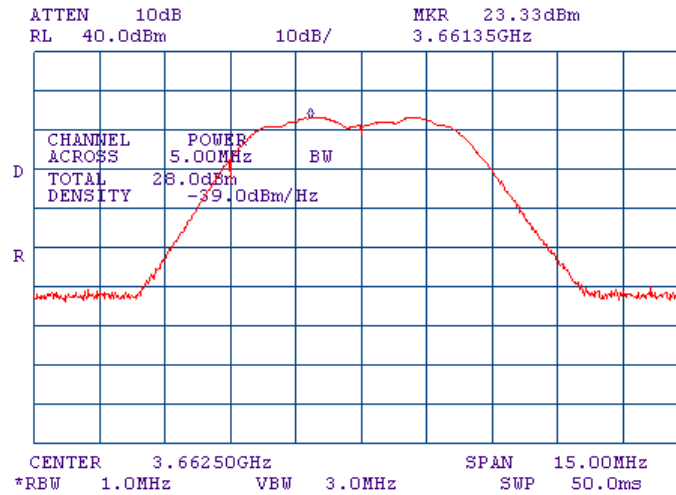




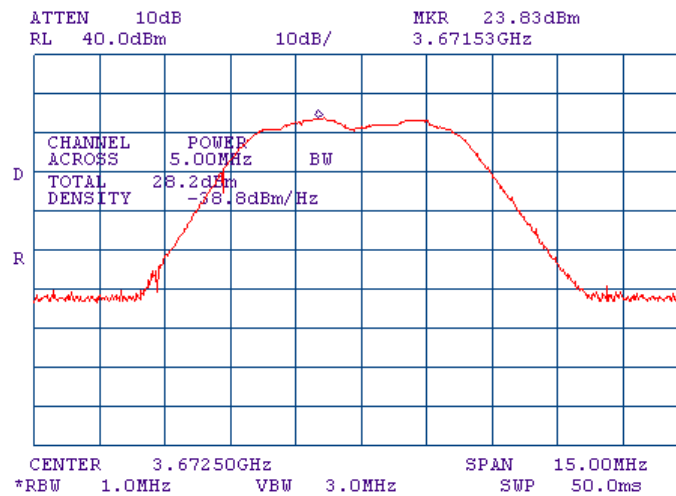
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.1.5 Peak output power test results at mid frequency, 16QAM bit rate 12.565 Mbps



Plot 7.1.6 Peak output power test results at high frequency, 16QAM bit rate 12.565 Mbps

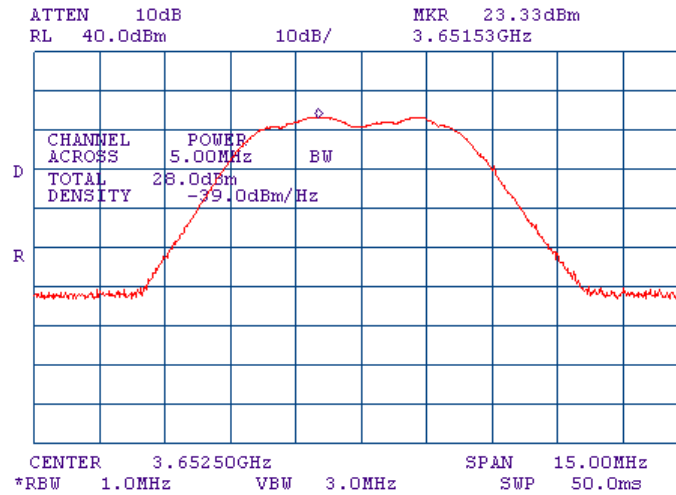




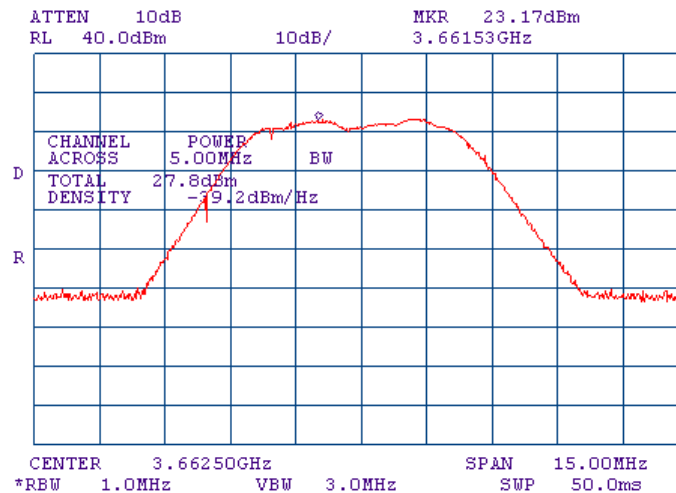
HERMON LABORATORIES

Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	9/21/2008		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.1.7 Peak output power test results at low frequency, QPSK bit rate 4.19 Mbps



Plot 7.1.8 Peak output power test results at mid frequency, QPSK bit rate 4.19 Mbps

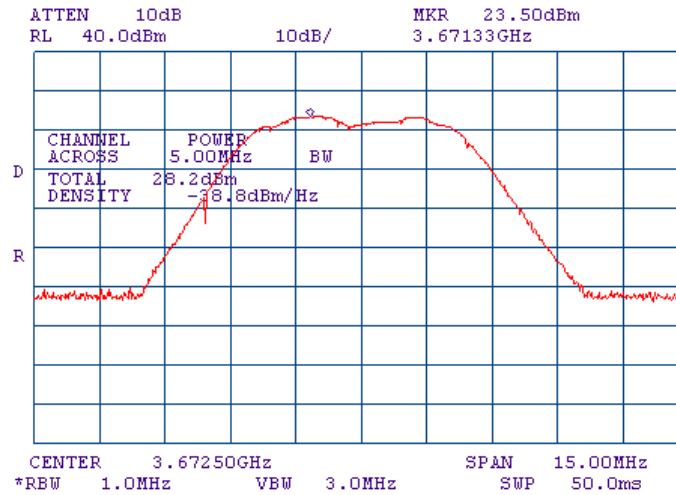




HERMON LABORATORIES

Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	9/21/2008		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.1.9 Peak output power test results at high frequency, QPSK bit rate 4.19 Mbps

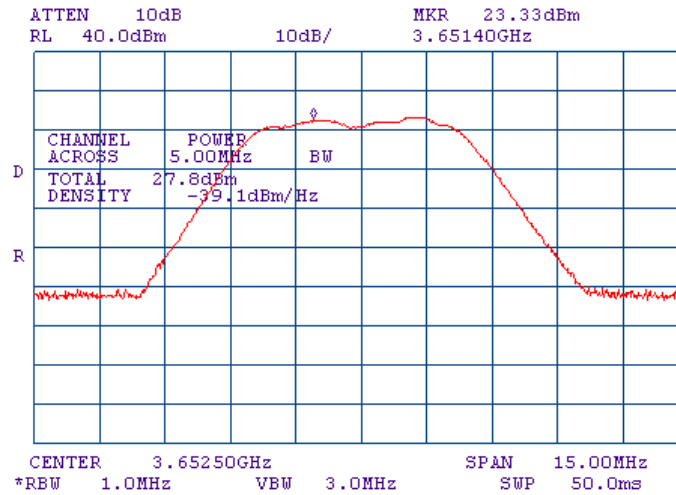




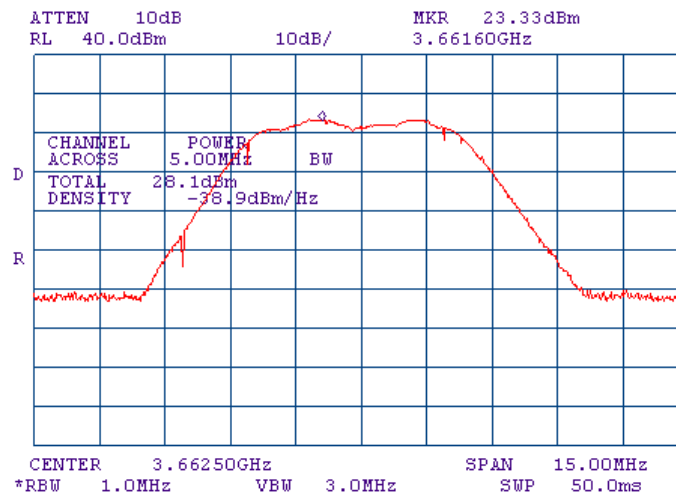
HERMON LABORATORIES

Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	9/21/2008		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.1.10 Peak output power density test results at low frequency, 64QAM, bit rate 18.85 Mbps



Plot 7.1.11 Peak output power test results at mid frequency, 64QAM, bit rate 18.85 Mbps

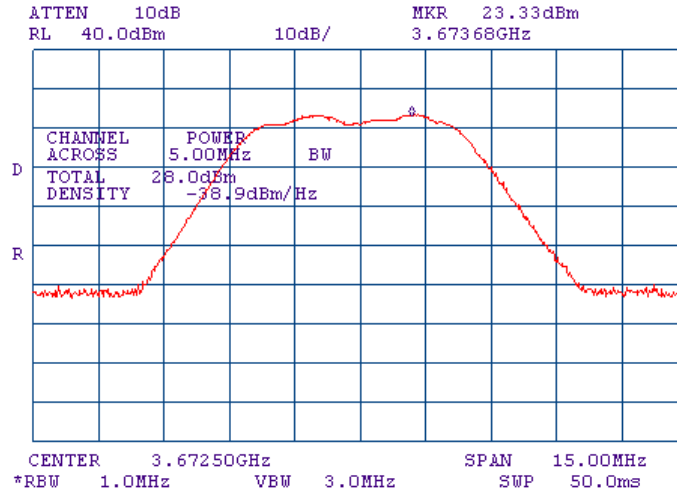




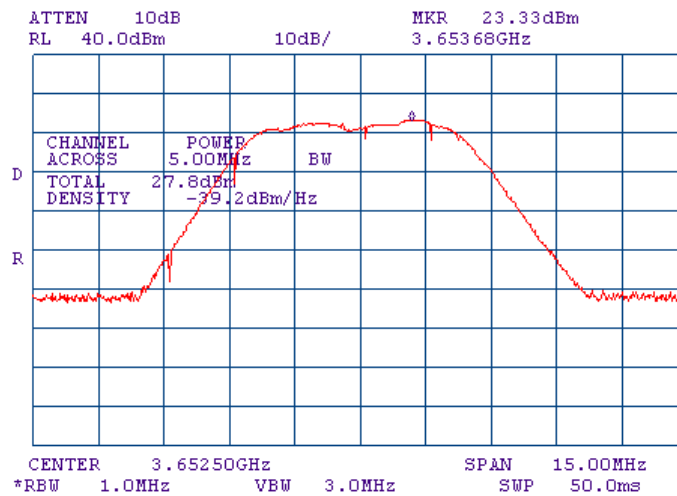
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.1.12 Peak output power test results at high frequency, 64QAM bit rate 18.85 Mbps



Plot 7.1.13 Peak output power test results at low frequency, 16QAM bit rate 12.565 Mbps

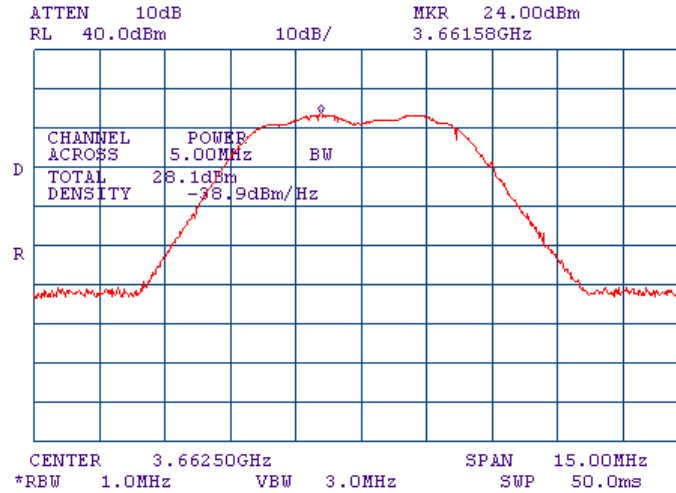




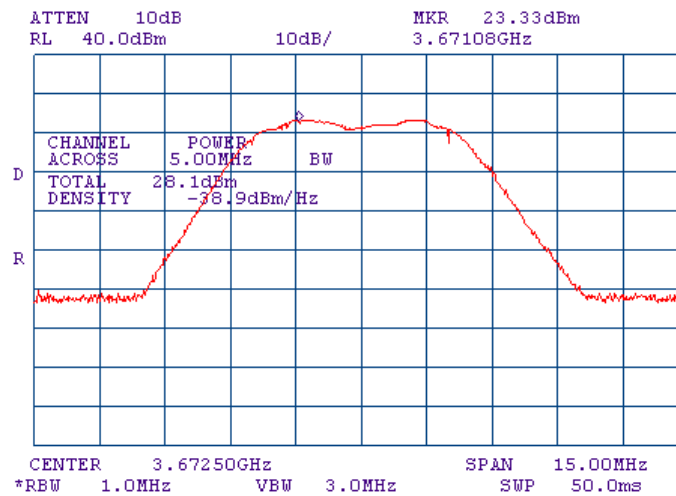
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.1.14 Peak output power test results at mid frequency, 16QAM bit rate 12.565 Mbps



Plot 7.1.15 Peak output power test results at high frequency, 16QAM bit rate 12.565 Mbps

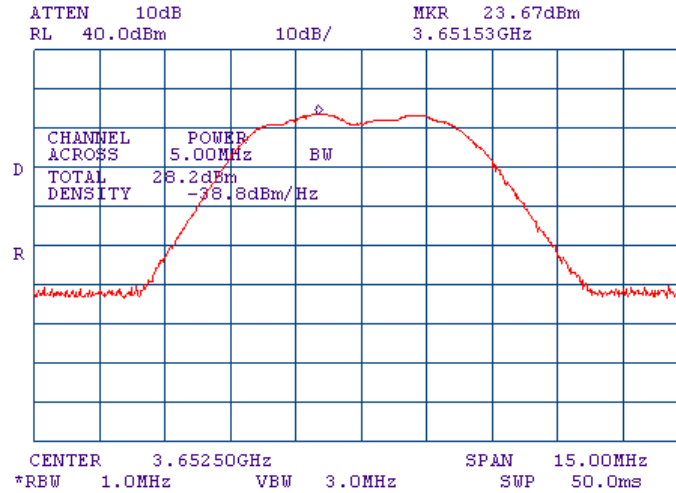




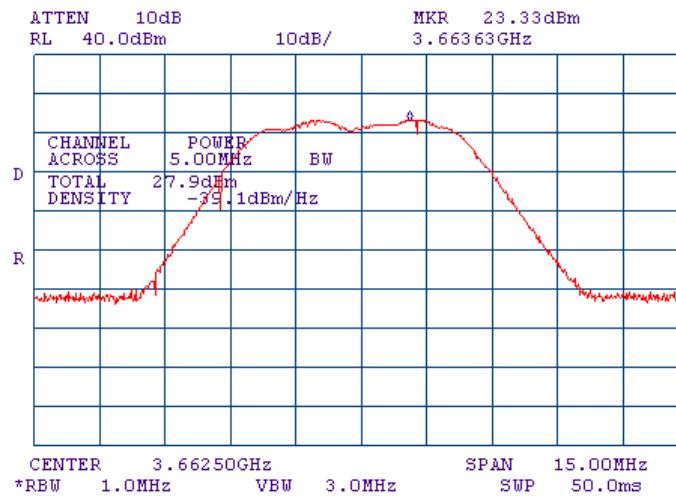
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.1.16 Peak output power test results at low frequency, QPSK bit rate 4.19 Mbps



Plot 7.1.17 Peak output power test results at mid frequency, QPSK bit rate 4.19 Mbps

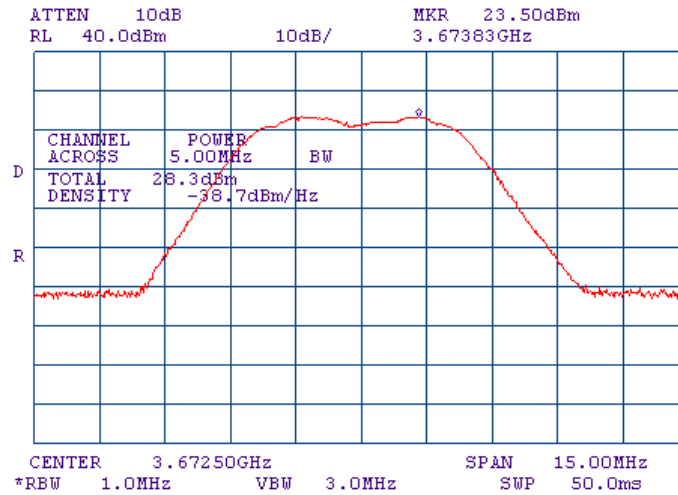




HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.1.18 Peak output power test results at high frequency, QPSK bit rate 4.19 Mbps





HERMON LABORATORIES

Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	9/21/2008		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 7 MHz CBW			

Table 7.1.4 Peak output power test results for 7 MHz channel bandwidth

ASSIGNED FREQUENCY RANGE: 3650.0 – 3675.0 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1000 kHz
 VIDEO BANDWIDTH: 3000 kHz
 MODULATION: QPSK, 16QAM, 64QAM
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: 22 dBm

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss dB	EIRP,* dBm	Limit, dBm	Margin dB	Verdict
Antenna 1							
64QAM, Bit Rate: 18.85 Mbps							
3653.5	26.8	included	included	31.80	38.45	-6.65	Pass
3662.5	27.0	included	included	32.00	38.45	-6.45	Pass
3671.5	27.2	included	included	32.20	38.45	-6.25	Pass
16QAM, Bit Rate : 12.565 Mbps							
3653.5	26.8	included	included	31.80	38.45	-6.65	Pass
3662.5	27.1	included	included	32.10	38.45	-6.35	Pass
3671.5	27.3	included	included	32.30	38.45	-6.15	Pass
QPSK, Bit Rate: 4.19 Mbps							
3653.5	27.0	included	included	32.00	38.45	-6.45	Pass
3662.5	27.1	included	included	32.10	38.45	-6.35	Pass
3671.5	27.2	included	included	32.20	38.45	-6.25	Pass
Antenna 2							
64QAM, Bit Rate: 18.85 Mbps							
3653.5	27.5	included	included	32.50	38.45	-5.95	Pass
3662.5	27.2	included	included	32.20	38.45	-6.25	Pass
3671.5	27.5	included	included	32.50	38.45	-5.95	Pass
16QAM, Bit Rate : 12.565 Mbps							
3653.5	27.2	included	included	32.20	38.45	-6.25	Pass
3662.5	27.4	included	included	32.40	38.45	-6.05	Pass
3671.5	27.4	included	included	32.40	38.45	-6.05	Pass
QPSK, Bit Rate: 4.19 Mbps							
3653.5	27.3	included	included	32.30	38.45	-6.15	Pass
3662.5	27.7	included	included	32.70	38.45	-5.75	Pass
3671.5	27.4	included	included	32.40	38.45	-6.05	Pass

* - EIRP (dBm) = Power meter reading (dBm) + antenna gain (5 dBi)

Reference numbers of test equipment used

HL 1424	HL 2869	HL 2952	HL 3321	HL 3455			
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Full description is given in Appendix A.



HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power	
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode: Compliance	Verdict: PASS
Date: 9/21/2008	
Temperature: 23°C	Air Pressure: 1012 hPa
Relative Humidity: 42%	
Power Supply: 48 VDC	
Remarks: 7 MHz CBW	

Table 7.1.5 Power spectral density test results for 7 MHz channel bandwidth

ASSIGNED FREQUENCY RANGE: 3650.0 – 3700.0 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1000 kHz
 VIDEO BANDWIDTH: 3000 kHz
 MODULATION: QPSK, 16QAM, 64QAM
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: 22 dBm

Carrier frequency, MHz	Spectrum analyzer reading, dBm/MHz	Attenuation, dB	Cable loss, dB	Power density**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
Antenna 1							
64QAM, Bit Rate: 18.85 Mbps							
3653.5	20.83	included	included	25.83	30.00	-4.17	Pass
3662.5	21.50	included	included	26.50	30.00	-3.50	Pass
3671.5	20.83	included	included	25.83	30.00	-4.17	Pass
16QAM, Bit Rate: 12.565 Mbps							
3653.5	20.83	included	included	25.83	30.00	-4.17	Pass
3662.5	21.17	included	included	26.17	30.00	-3.83	Pass
3671.5	20.83	included	included	25.83	30.00	-4.17	Pass
QPSK, Bit Rate: 4.19 Mbps							
3653.5	21.33	included	included	26.33	30.00	-3.67	Pass
3662.5	21.67	included	included	26.67	30.00	-3.33	Pass
3671.5	22.50	included	included	27.50	30.00	-2.50	Pass
Antenna 2							
64QAM, Bit Rate: 18.85 Mbps							
3653.5	22.17	included	included	27.17	30.00	-2.83	Pass
3662.5	20.67	included	included	25.67	30.00	-4.33	Pass
3671.5	21.17	included	included	26.17	30.00	-3.83	Pass
16QAM, Bit Rate: 12.565 Mbps							
3653.5	22.00	included	included	27.00	30.00	-3.00	Pass
3662.5	21.67	included	included	26.67	30.00	-3.33	Pass
3671.5	21.00	included	included	26.00	30.00	-4.00	Pass
QPSK, Bit Rate: 4.19 Mbps							
3653.5	21.00	included	included	26.00	30.00	-4.00	Pass
3662.5	22.33	included	included	27.33	30.00	-2.67	Pass
3671.5	22.83	included	included	27.83	30.00	-2.17	Pass

** - Power density = Spectrum analyzer reading + antenna gain (5 dBi)

Reference numbers of test equipment used

HL 1424	HL 2869	HL 2952	HL 3321	HL 3455			
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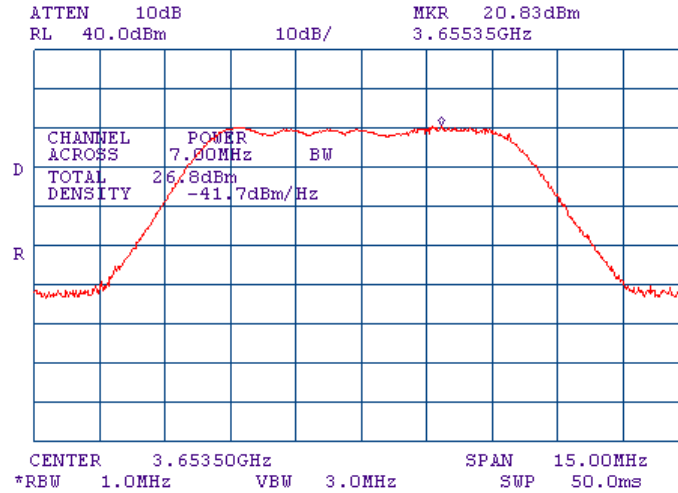
Full description is given in Appendix A.



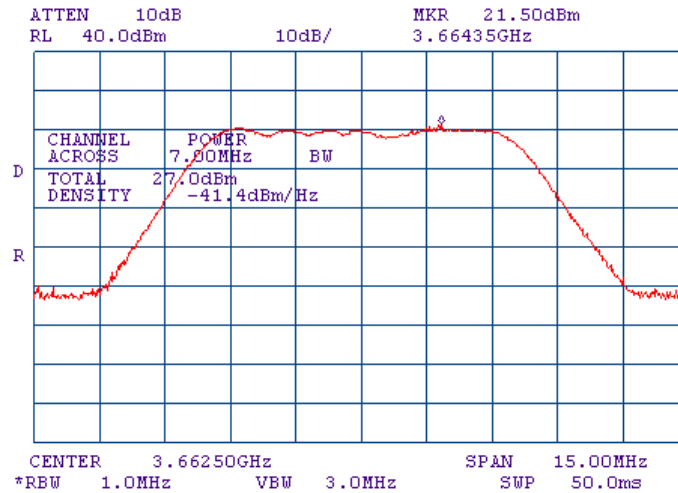
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.1.19 Peak output power density test results at low frequency, 64QAM, bit rate 18.85 Mbps



Plot 7.1.20 Peak output power test results at mid frequency, 64QAM, bit rate 18.85 Mbps

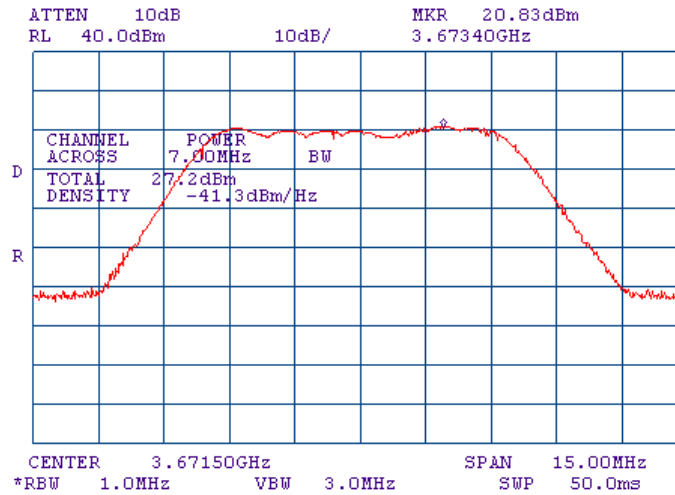




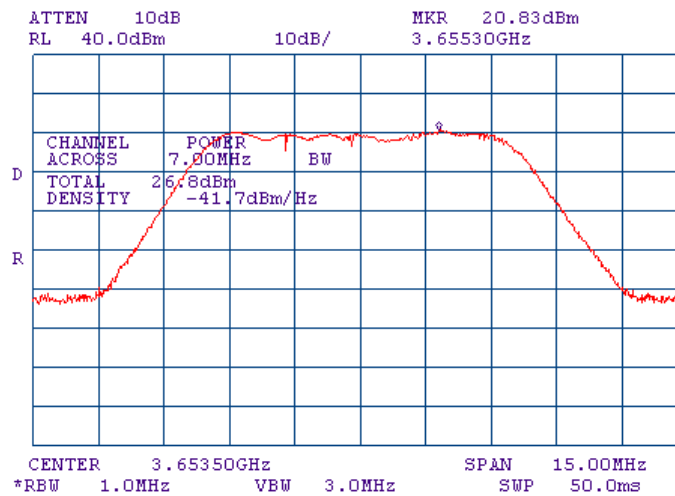
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.1.21 Peak output power test results at high frequency, 64QAM bit rate 18.85 Mbps



Plot 7.1.22 Peak output power test results at low frequency, 16QAM bit rate 12.565 Mbps

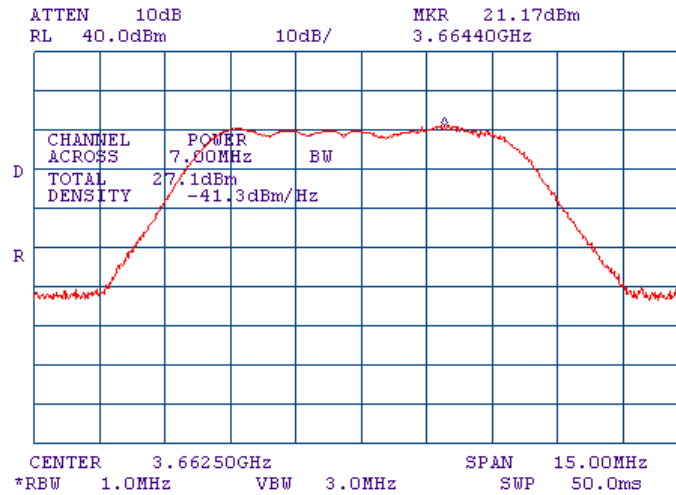




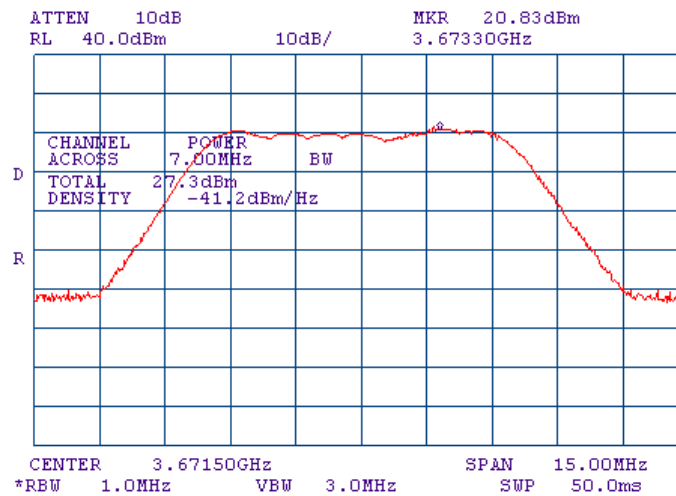
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.1.23 Peak output power test results at mid frequency, 16QAM bit rate 12.565 Mbps



Plot 7.1.24 Peak output power test results at high frequency, 16QAM bit rate 12.565 Mbps

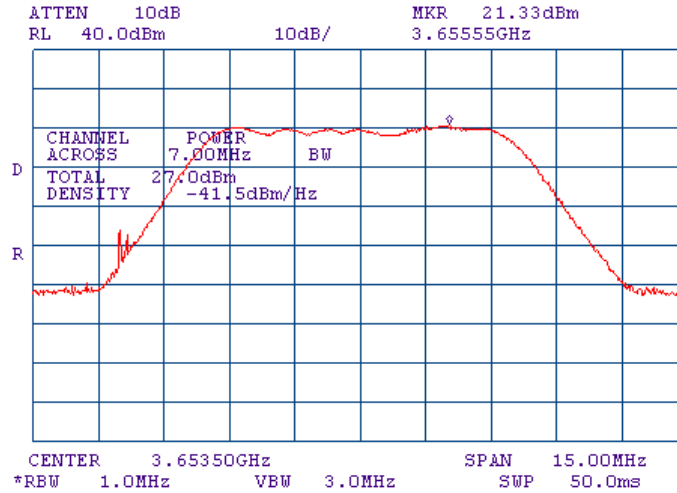




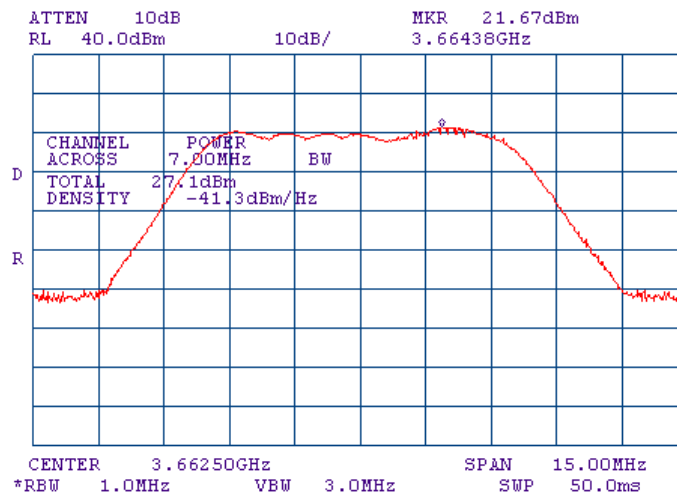
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.1.25 Peak output power test results at low frequency, QPSK bit rate 4.19 Mbps



Plot 7.1.26 Peak output power test results at mid frequency, QPSK bit rate 4.19 Mbps

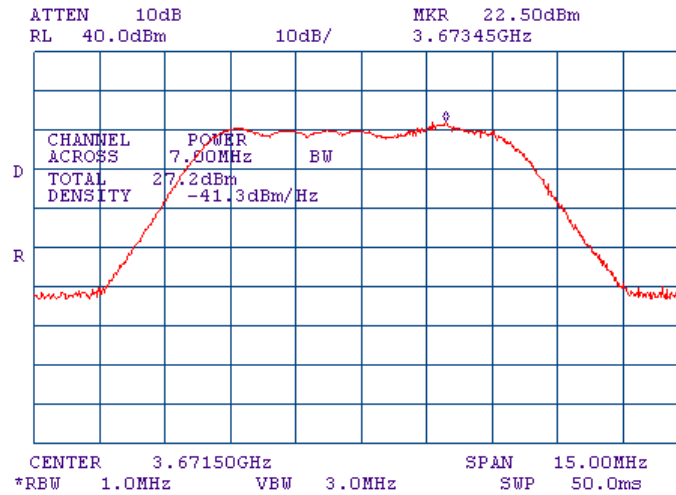




HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.1.27 Peak output power test results at high frequency, QPSK bit rate 4.19 Mbps

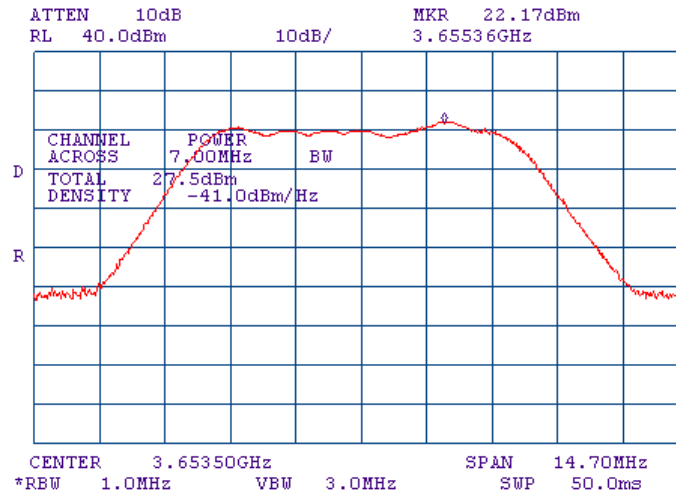




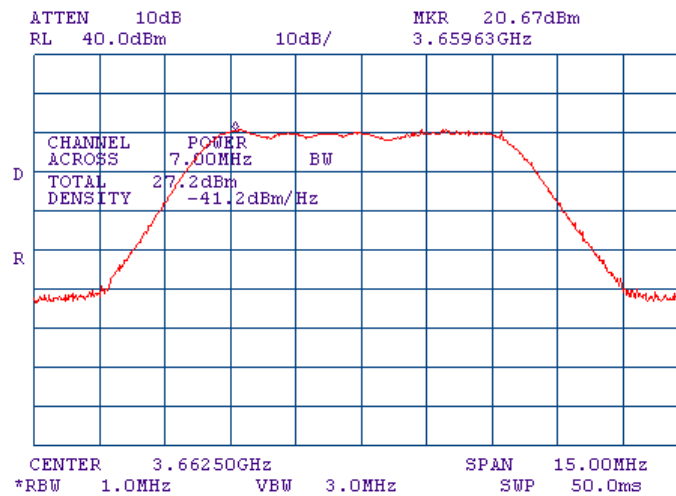
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.1.28 Peak output power density test results at low frequency, 64QAM, bit rate 18.85 Mbps



Plot 7.1.29 Peak output power test results at mid frequency, 64QAM, bit rate 18.85 Mbps

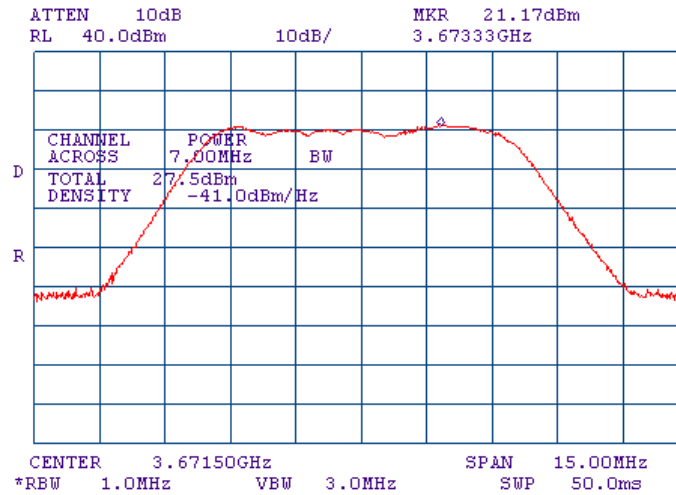




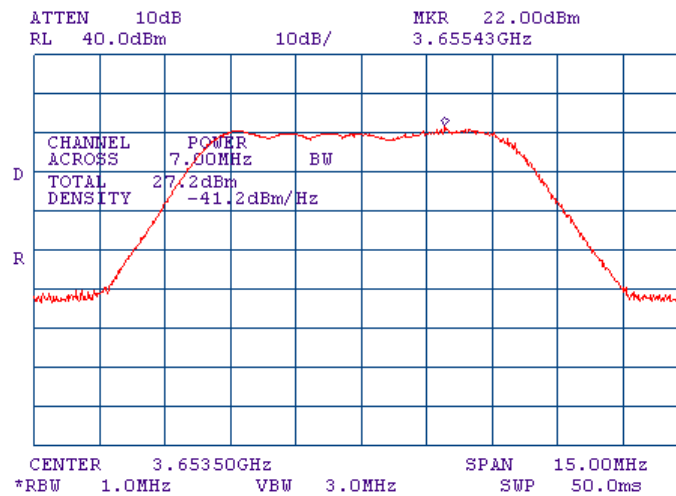
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.1.30 Peak output power test results at high frequency, 64QAM bit rate 18.85 Mbps



Plot 7.1.31 Peak output power test results at low frequency, 16QAM bit rate 12.565 Mbps

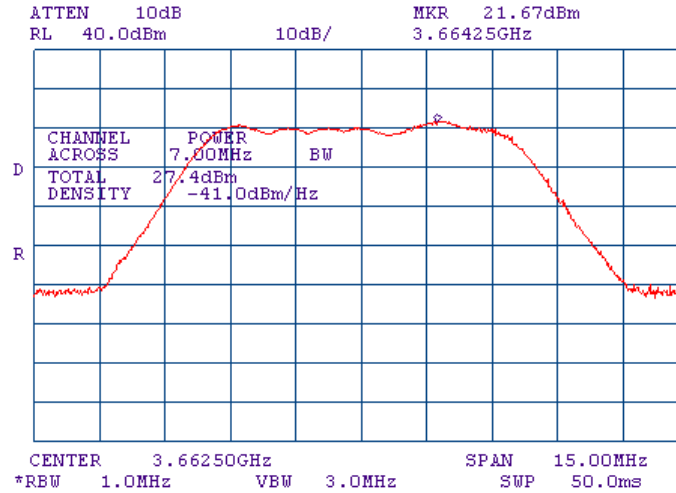




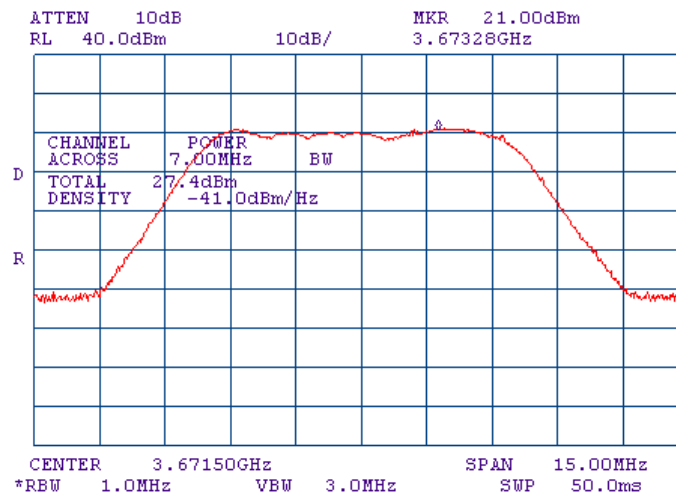
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.1.32 Peak output power test results at mid frequency, 16QAM bit rate 12.565 Mbps



Plot 7.1.33 Peak output power test results at high frequency, 16QAM bit rate 12.565 Mbps

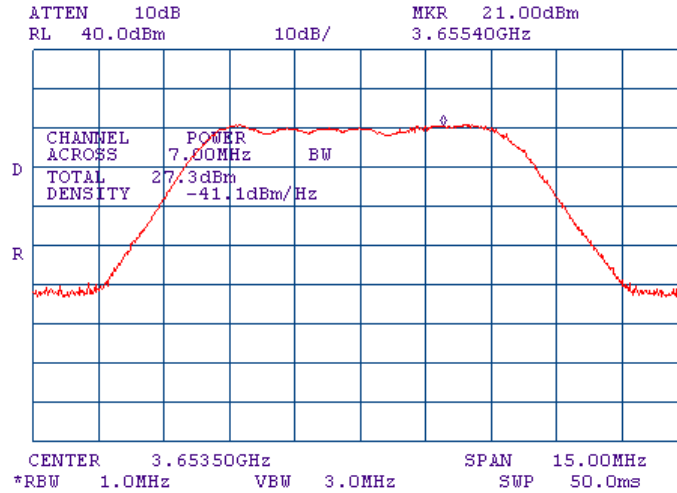




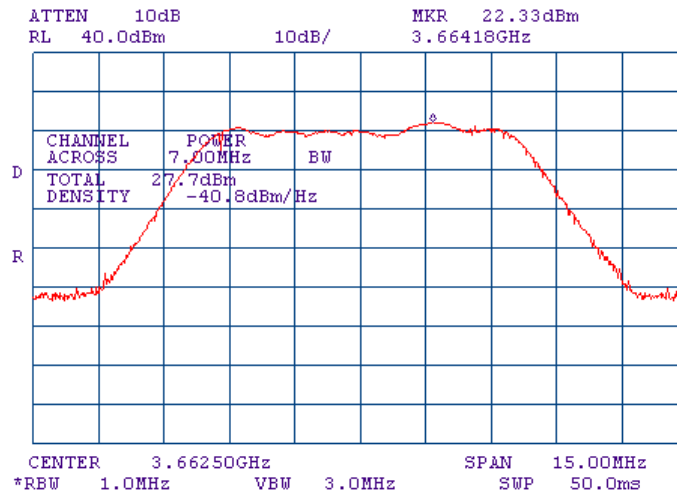
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.1.34 Peak output power test results at low frequency, QPSK bit rate 4.19 Mbps



Plot 7.1.35 Peak output power test results at mid frequency, QPSK bit rate 4.19 Mbps

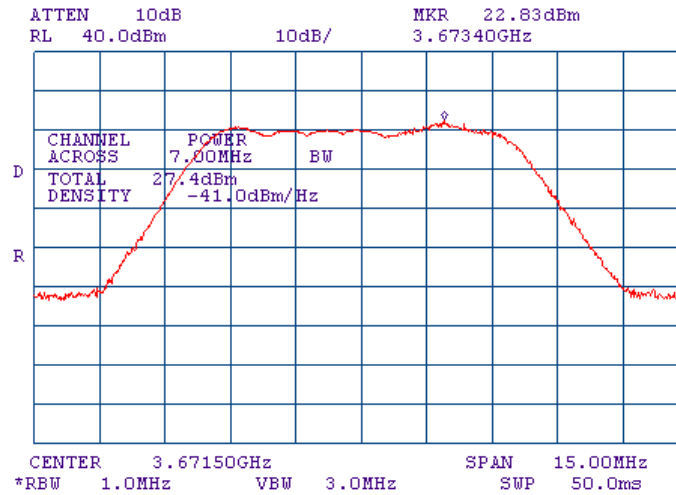




HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.1.36 Peak output power test results at high frequency, QPSK bit rate 4.19 Mbps





HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power	
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode: Compliance	Verdict: PASS
Date: 9/21/2008	
Temperature: 23°C	Air Pressure: 1012 hPa
Relative Humidity: 42%	
Power Supply: 48 VDC	
Remarks: 10 MHz CBW	

Table 7.1.6 Peak output power test results for 10 MHz channel bandwidth

ASSIGNED FREQUENCY RANGE: 3650.0 – 3675.0 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1000 kHz
 VIDEO BANDWIDTH: 3000 kHz
 MODULATION: QPSK, 16QAM, 64QAM
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: 22 dBm

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss dB	EIRP,* dBm	Limit, dBm	Margin dB	Verdict
Antenna 1							
64QAM, Bit Rate: 37.7 Mbps							
3655.0	26.3	included	included	31.30	40.00	-8.70	Pass
3662.5	26.4	included	included	31.40	40.00	-8.60	Pass
3670.0	26.4	included	included	31.40	40.00	-8.60	Pass
16QAM, Bit Rate: 25.13 Mbps							
3655.0	26.1	included	included	31.10	40.00	-8.90	Pass
3662.5	26.4	included	included	31.40	40.00	-8.60	Pass
3670.0	26.4	included	included	31.40	40.00	-8.60	Pass
QPSK, Bit Rate: 8.38 Mbps							
3655.0	26.2	included	included	31.20	40.00	-8.80	Pass
3662.5	26.5	included	included	31.50	40.00	-8.50	Pass
3670.0	26.9	included	included	31.90	40.00	-8.10	Pass
Antenna 2							
64QAM, Bit Rate: 37.7 Mbps							
3655.0	27.4	included	included	32.40	40.00	-7.60	Pass
3662.5	27.6	included	included	32.60	40.00	-7.40	Pass
3670.0	27.7	included	included	32.70	40.00	-7.30	Pass
16QAM, Bit Rate: 25.13 Mbps							
3655.0	27.4	included	included	32.40	40.00	-7.60	Pass
3662.5	27.5	included	included	32.50	40.00	-7.50	Pass
3670.0	27.9	included	included	32.90	40.00	-7.10	Pass
QPSK, Bit Rate: 8.38 Mbps							
3655.0	27.6	included	included	32.60	40.00	-7.40	Pass
3662.5	27.6	included	included	32.60	40.00	-7.40	Pass
3670.0	27.8	included	included	32.80	40.00	-7.20	Pass

* - EIRP (dBm) = Power meter reading + antenna gain (5 dBi)

Reference numbers of test equipment used

HL 1424	HL 2869	HL 2952	HL 3321	HL 3455			
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Full description is given in Appendix A.



HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power	
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode: Compliance	Verdict: PASS
Date: 9/21/2008	
Temperature: 23°C	Air Pressure: 1012 hPa
Remarks: 10 MHz CBW	

Table 7.1.7 Power spectral density test results for 10 MHz channel bandwidth

ASSIGNED FREQUENCY RANGE: 3650.0 – 3675.0 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1000 kHz
 VIDEO BANDWIDTH: 3000 kHz
 MODULATION: QPSK, 16QAM, 64QAM
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: 22 dBm

Carrier frequency, MHz	Spectrum analyzer reading, dBm/MHz	External Attenuation dB	Cable loss, dB	Power density**, dBm/MHz	Limit, dBm/MHz	Margin dB	Verdict
Antenna 1							
64QAM, Bit Rate: 37.7 Mbps							
3655.0	19.00	included	included	24.00	30.00	-6.00	Pass
3662.5	19.67	included	included	24.67	30.00	-5.33	Pass
3670.0	19.17	included	included	24.17	30.00	-5.83	Pass
16QAM, Bit Rate: 25.13 Mbps							
3655.0	18.33	included	included	23.33	30.00	-6.67	Pass
3662.5	18.83	included	included	23.83	30.00	-6.17	Pass
3670.0	19.00	included	included	24.00	30.00	-6.00	Pass
QPSK, Bit Rate: 8.38 Mbps							
3655.0	18.33	included	included	23.33	30.00	-6.67	Pass
3662.5	19.17	included	included	24.17	30.00	-5.83	Pass
3670.0	20.17	included	included	25.17	30.00	-4.83	Pass
Antenna 2							
64QAM, Bit Rate: 37.7 Mbps							
3655.0	21.17	included	included	26.17	30.00	-3.83	Pass
3662.5	19.83	included	included	24.83	30.00	-5.17	Pass
3670.0	20.50	included	included	25.50	30.00	-4.50	Pass
16QAM, Bit Rate: 25.13 Mbps							
3655.0	21.17	included	included	26.17	30.00	-3.83	Pass
3662.5	20.83	included	included	25.83	30.00	-4.17	Pass
3670.0	20.83	included	included	25.83	30.00	-4.17	Pass
QPSK, Bit Rate: 8.38 Mbps							
3655.0	20.33	included	included	25.33	30.00	-4.67	Pass
3662.5	19.83	included	included	24.83	30.00	-5.17	Pass
3670.0	20.33	included	included	25.33	30.00	-4.67	Pass

** - Power density = Spectrum analyzer reading + antenna gain (5 dBi)

Reference numbers of test equipment used

HL 1424	HL 2869	HL 2952	HL 3321	HL 3455			
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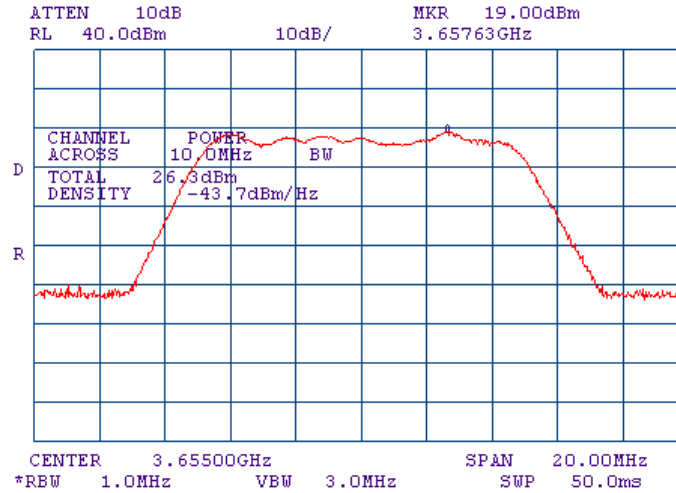
Full description is given in Appendix A.



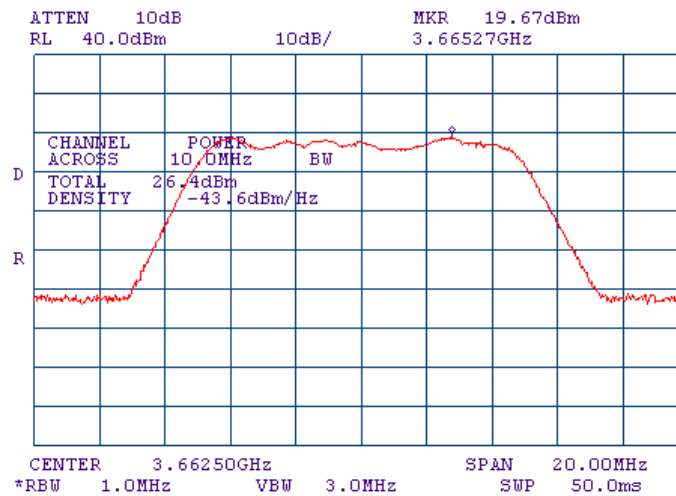
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 1			

Plot 7.1.37 Peak output power test results at low frequency, 64QAM, bit rate 37.7 Mbps



Plot 7.1.38 Peak output power test results at mid frequency, 64QAM, bit rate 37.7 Mbps

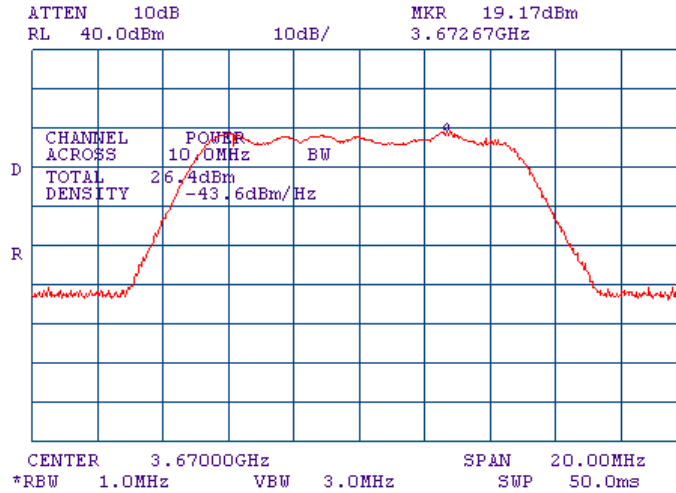




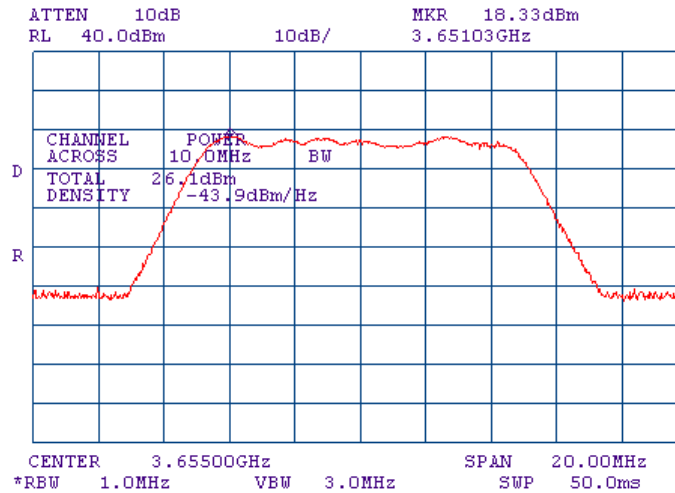
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 1			

Plot 7.1.39 Peak output power test results at high frequency, 64QAM bit rate 37.7 Mbps



Plot 7.1.40 Peak output power test results at low frequency, 16QAM bit rate 25.13 Mbps

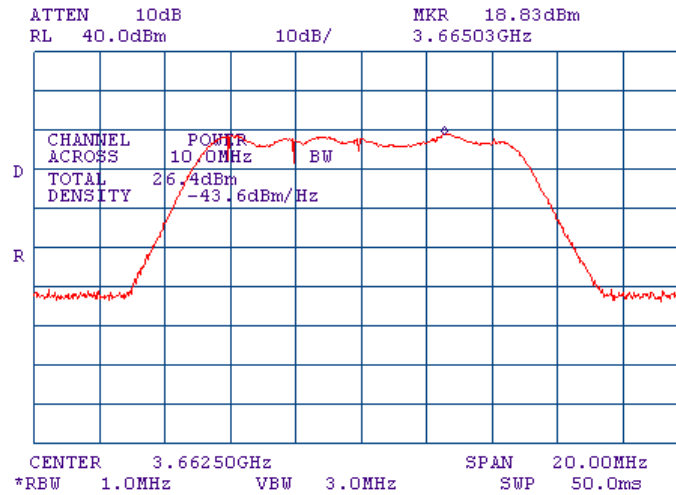




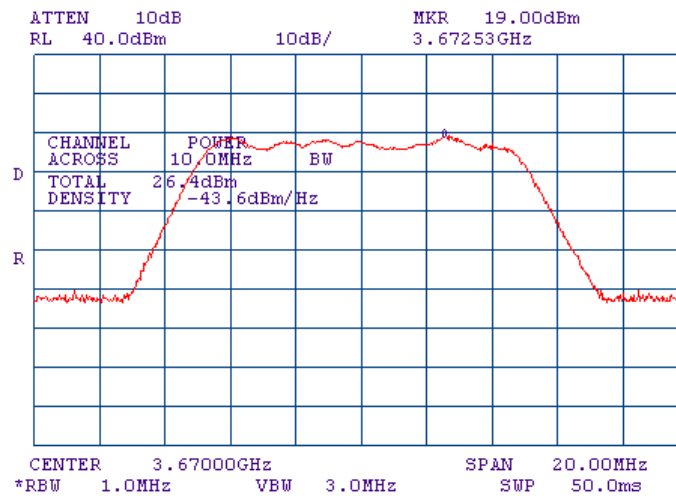
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 1			

Plot 7.1.41 Peak output power test results at mid frequency, 16QAM bit rate 25.13 Mbps



Plot 7.1.42 Peak output power test results at high frequency, 16QAM bit rate 25.13 Mbps

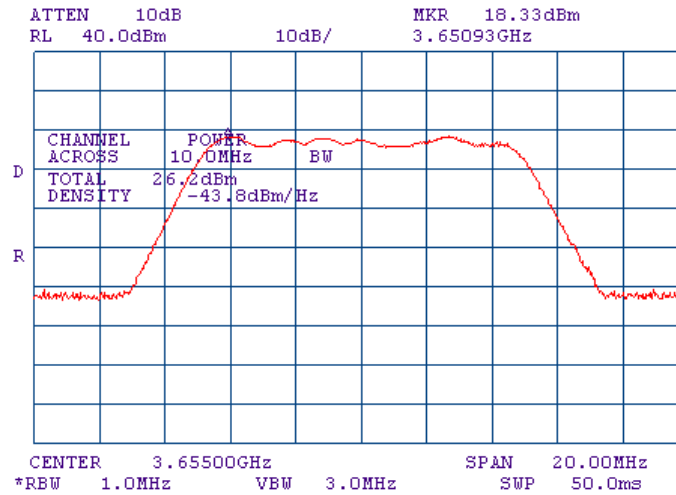




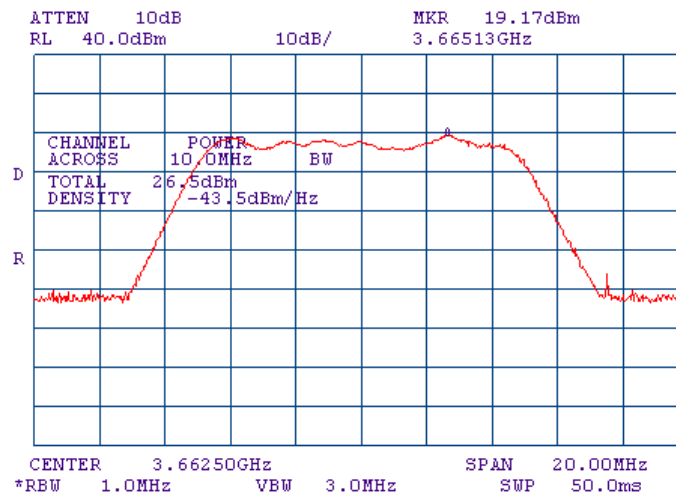
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 1			

Plot 7.1.43 Peak output power test results at low frequency, QPSK bit rate 8.38 Mbps



Plot 7.1.44 Peak output power test results at mid frequency, QPSK bit rate 8.38 Mbps

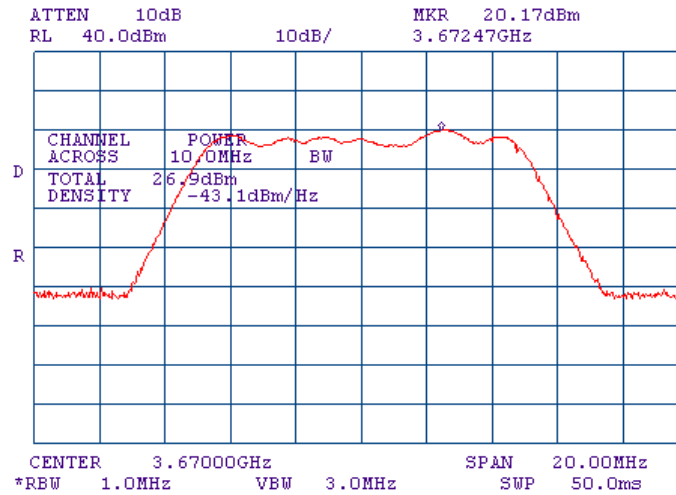




HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 1			

Plot 7.1.45 Peak output power test results at high frequency, QPSK bit rate 8.38 Mbps

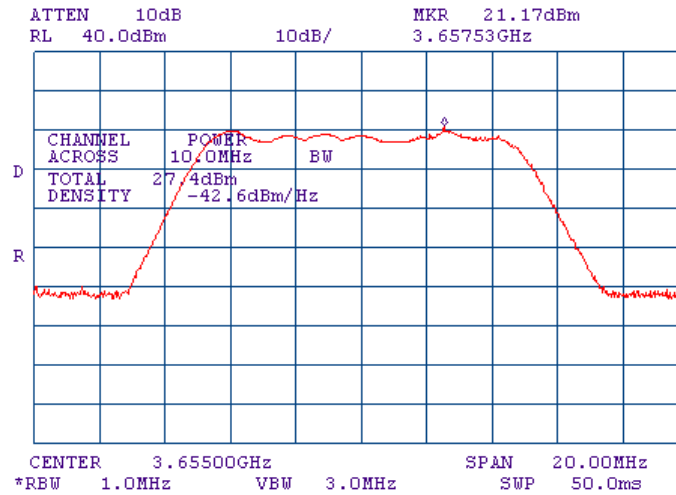




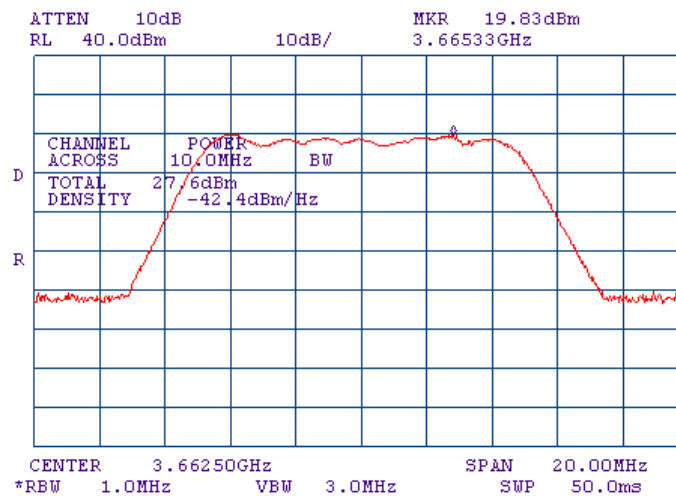
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.1.46 Peak output power test results at low frequency, 64QAM, bit rate 37.7 Mbps



Plot 7.1.47 Peak output power test results at mid frequency, 64QAM, bit rate 37.7 Mbps

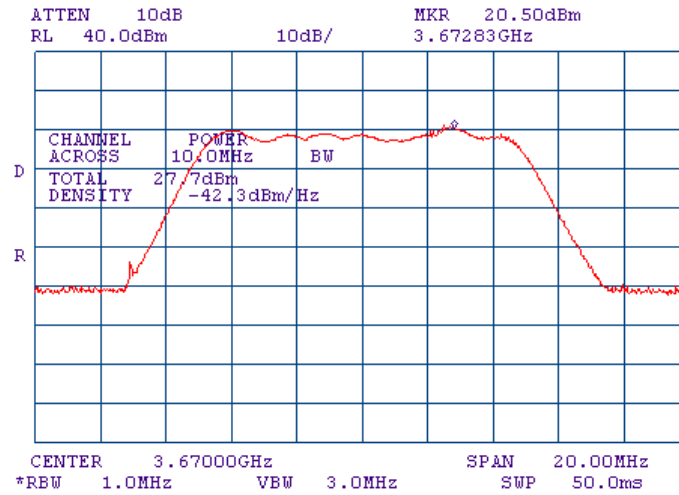




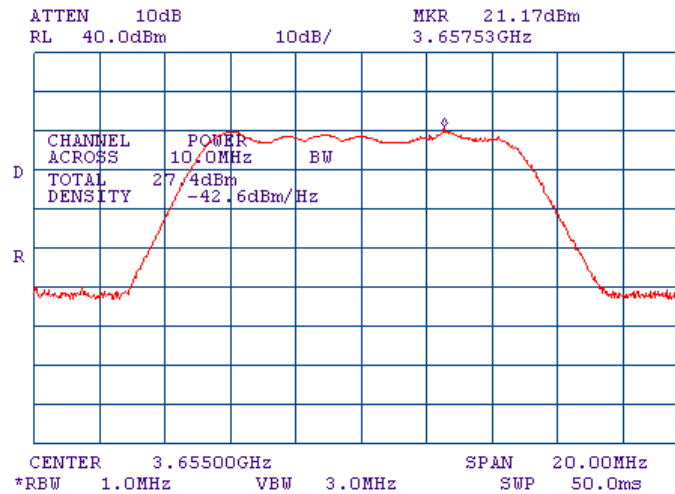
HERMON LABORATORIES

Test specification:		Section 90.1321, Maximum output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Verdict:	
Compliance		PASS	
Date:		9/21/2008	
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.1.48 Peak output power test results at high frequency, 64QAM bit rate 37.7 Mbps



Plot 7.1.49 Peak output power test results at low frequency, 16QAM bit rate 25.13 Mbps

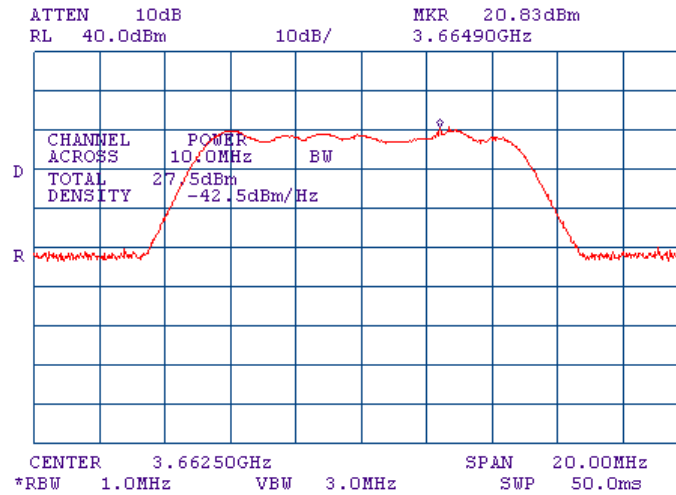




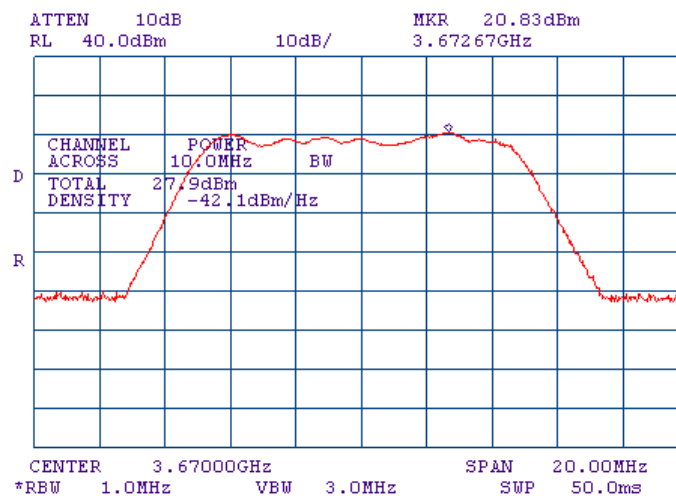
HERMON LABORATORIES

Test specification:		Section 90.1321, Maximum output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	
Date:		9/21/2008	
Temperature: 23°C		Air Pressure: 1012 hPa	
Remarks: 10 MHz CBW, antenna 2		Verdict: PASS	
		Relative Humidity: 42%	
		Power Supply: 48 VDC	

Plot 7.1.50 Peak output power test results at mid frequency, 16QAM bit rate 25.13 Mbps



Plot 7.1.51 Peak output power test results at high frequency, 16QAM bit rate 25.13 Mbps

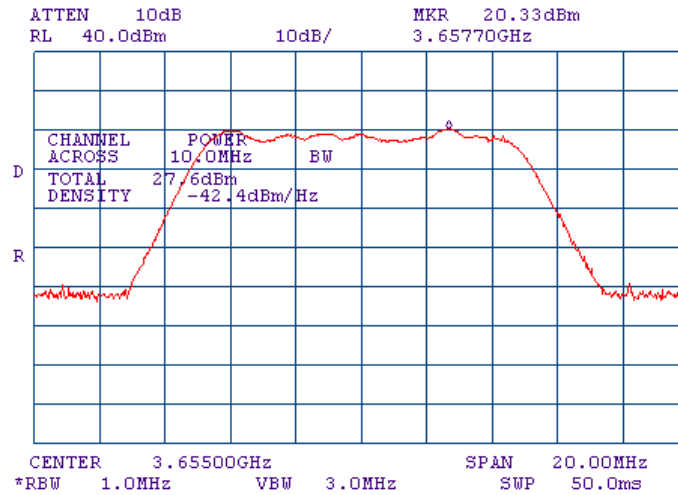




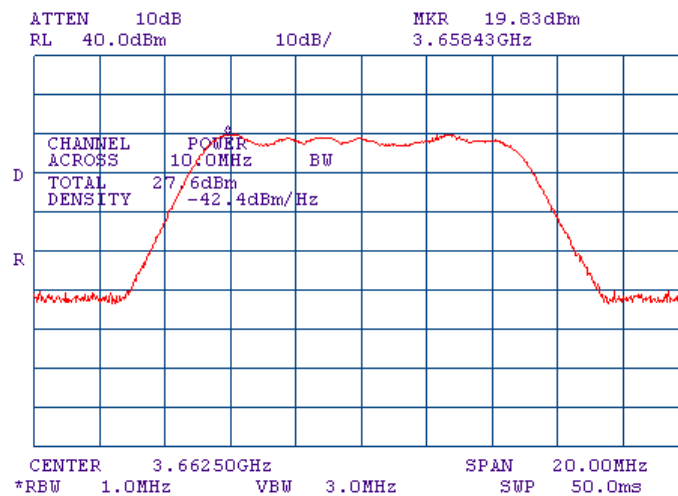
HERMON LABORATORIES

Test specification: Section 90.1321, Maximum output power			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date: 9/21/2008			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.1.52 Peak output power test results at low frequency, QPSK bit rate 8.38 Mbps



Plot 7.1.53 Peak output power test results at mid frequency, QPSK bit rate 8.38 Mbps



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/29/2008 1:52:10 PM		
Temperature: 24°C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

7.2 Occupied bandwidth test

7.2.1 General

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

Table 7.2.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Channel bandwidth, MHz	Maximum allowed bandwidth, MHz
3650.0-3675.0	26	5	5
		7	7
		10	10

* - Modulation envelope reference points are provided in terms of attenuation below the maximum peak output power of carrier.

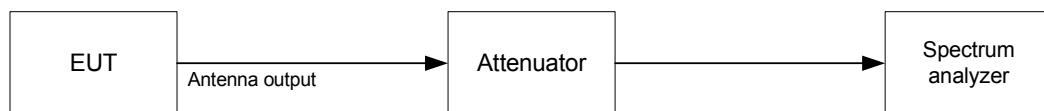
7.2.2 Test procedure

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

7.2.2.2 Maximum peak output power of carrier was taken as the reference level.

7.2.2.3 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.2.2, Table 7.2.3, Table 7.2.4 and the associated plots.

Figure 7.2.1 Occupied bandwidth test setup



Test specification: Section 90.209, Occupied bandwidth	
Test procedure: 47 CFR, Section 2.1049	
Test mode: Compliance	Verdict: PASS
Date & Time: 9/29/2008 1:52:10 PM	
Temperature: 24°C	Air Pressure: 1010 hPa
Remarks: 5 MHz CBW	

Table 7.2.2 Occupied bandwidth test results for 5 MHz channel bandwidth

RESOLUTION BANDWIDTH: 100 kHz*
 VIDEO BANDWIDTH: 300 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
 MODULATING SIGNAL: PRBS

Carrier frequency, MHz	Occupied bandwidth, MHz	Limit, MHz	Margin, MHz	Verdict
Antenna 1				
64QAM, Bit Rate 18.85Mbps				
3652.5	4.779	5	-0.221	Pass
3662.5	4.786	5	-0.214	Pass
3672.5	4.786	5	-0.214	Pass
16QAM, Bit Rate 12.565Mbps				
3652.5	4.800	5	-0.200	Pass
3662.5	4.786	5	-0.214	Pass
3672.5	4.828	5	-0.172	Pass
QPSK, Bit Rate 4.19Mbps				
3652.5	4.800	5	-0.200	Pass
3662.5	4.800	5	-0.200	Pass
3672.5	4.828	5	-0.172	Pass
Antenna 2				
64QAM, Bit Rate 18.85Mbps				
3652.5	4.863	5	-0.137	Pass
3662.5	4.814	5	-0.186	Pass
3672.5	4.835	5	-0.165	Pass
16QAM, Bit Rate 12.565Mbps				
3652.5	4.821	5	-0.179	Pass
3662.5	4.870	5	-0.130	Pass
3672.5	4.828	5	-0.172	Pass
QPSK, Bit Rate 4.19Mbps				
3652.5	4.800	5	-0.200	Pass
3662.5	4.891	5	-0.109	Pass
3672.5	4.842	5	-0.158	Pass

* - RBW ≥ 1% of OBW; 1 % of 5 MHz is 50 kHz, hence, RBW=100 kHz was chosen for the measurements.

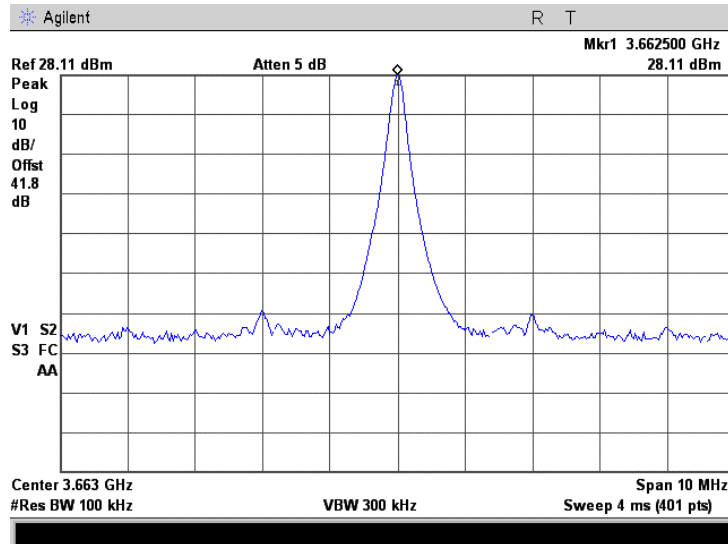
Reference numbers of test equipment used

HL 2909	HL 2869	HL 2952	HL 3321	HL 3435		
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Full description is given in Appendix A.

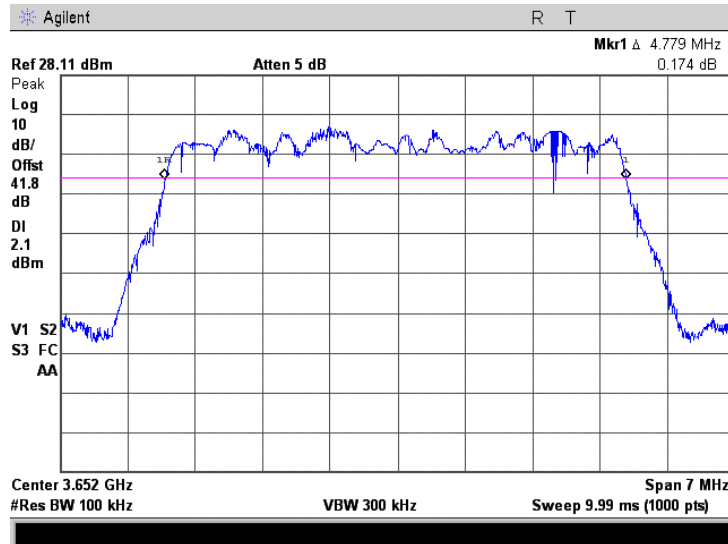
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/29/2008 1:52:10 PM		
Temperature: 24°C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.2.1 Unmodulated signal for reference level

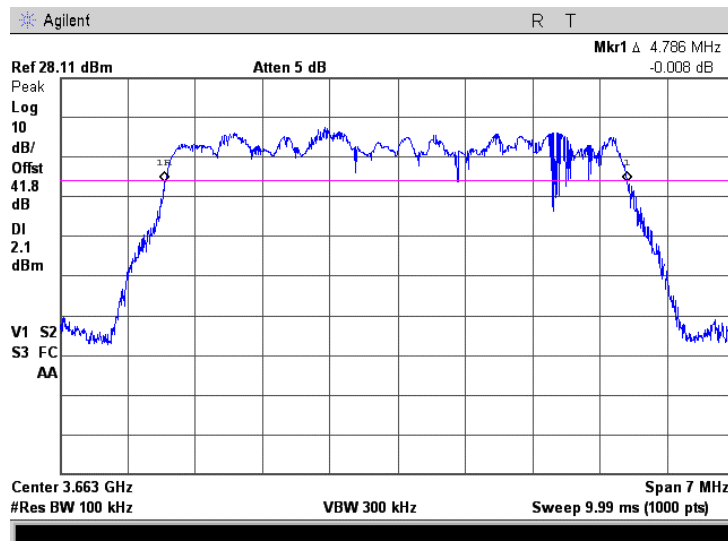


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 9/29/2008 1:52:10 PM			
Temperature: 24°C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.2.2 Occupied bandwidth test result at low frequency, 64QAM, bit rate 18.85 Mbps

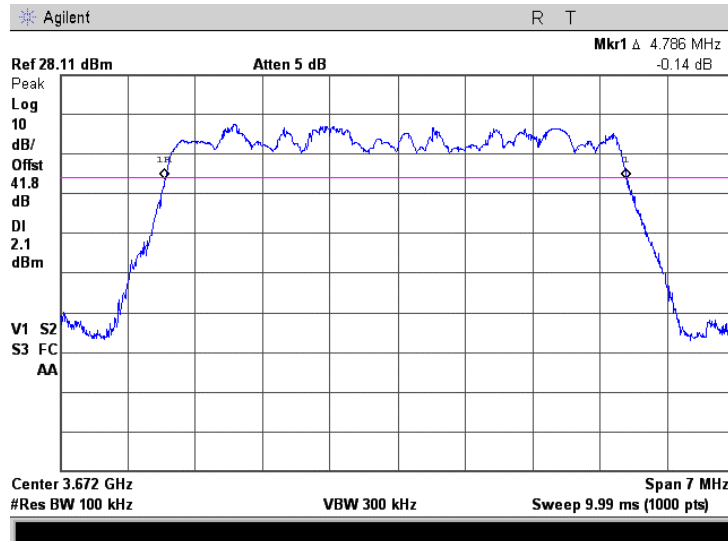


Plot 7.2.3 Occupied bandwidth test result at mid frequency, 64QAM, bit rate 18.85 Mbps

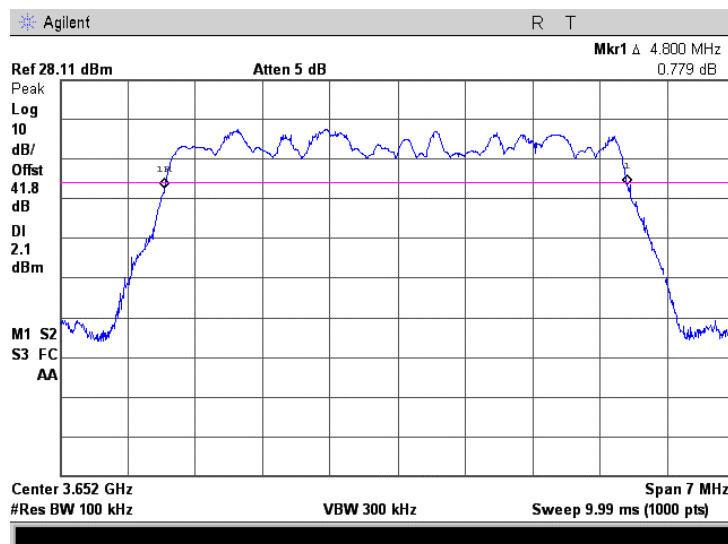


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 9/29/2008 1:52:10 PM			
Temperature: 24°C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.2.4 Occupied bandwidth test result at high frequency, 64QAM, bit rate 18.85 Mbps

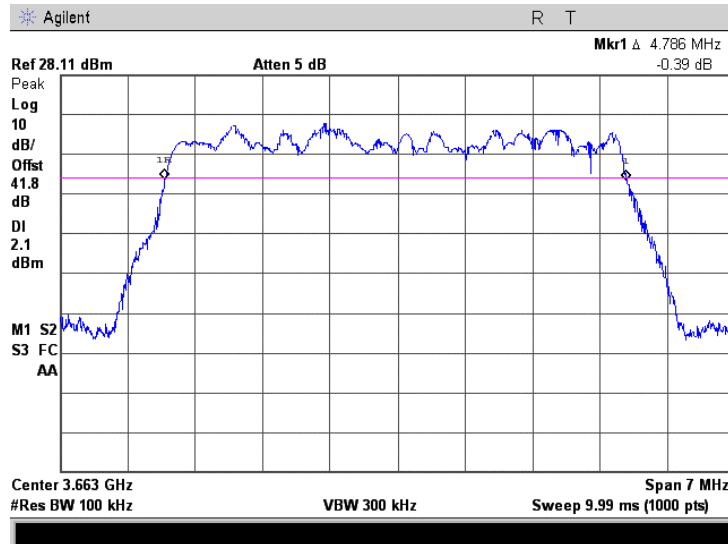


Plot 7.2.5 Occupied bandwidth test result at low frequency, 16QAM, bit rate 12.565 Mbps

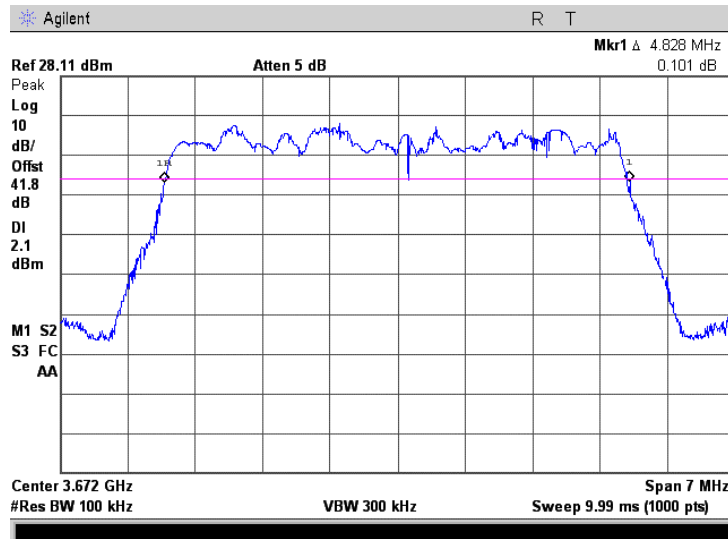


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/29/2008 1:52:10 PM		
Temperature: 24°C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.2.6 Occupied bandwidth test result at mid frequency, 16QAM, bit rate 12.565 Mbps

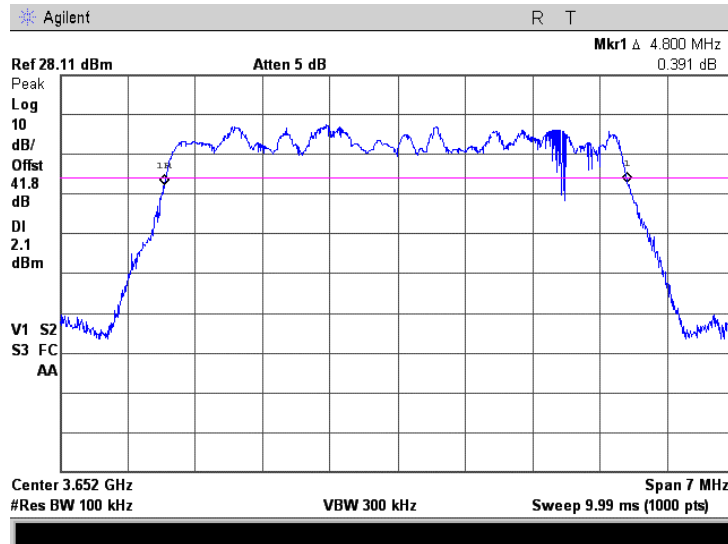


Plot 7.2.7 Occupied bandwidth test result at high frequency, 16QAM, bit rate 12.565 Mbps

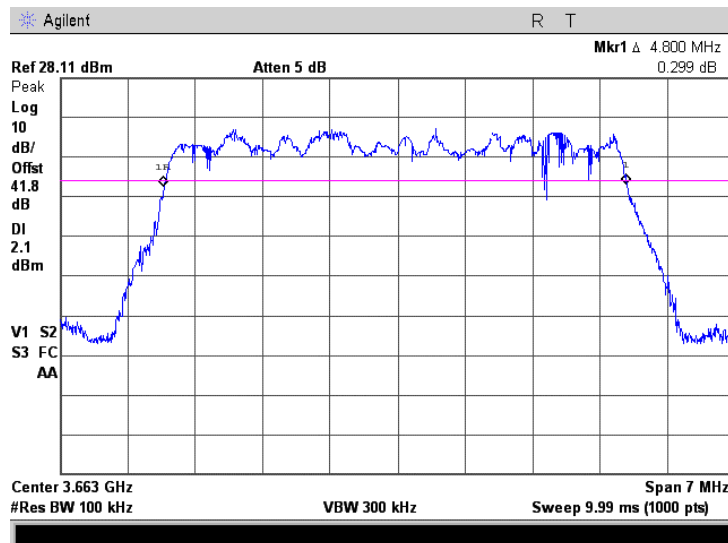


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 9/29/2008 1:52:10 PM			
Temperature: 24°C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.2.8 Occupied bandwidth test result at low frequency, QPSK, bit rate 4.19 Mbps

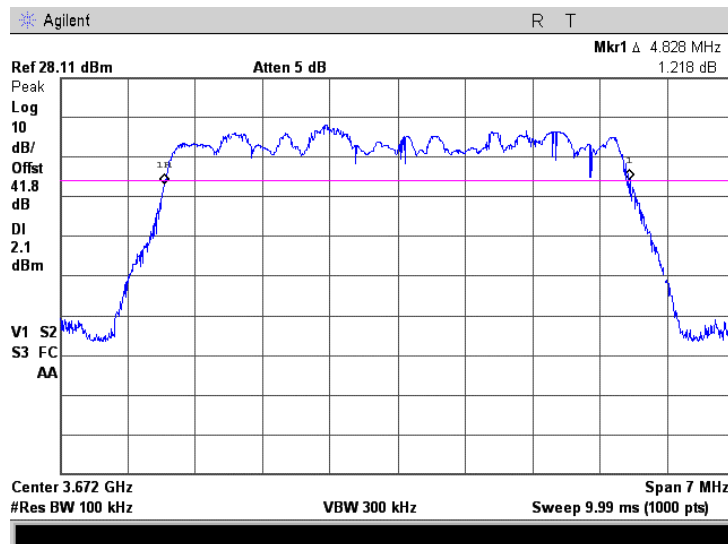


Plot 7.2.9 Occupied bandwidth test result at mid frequency, QPSK, bit rate 4.19 Mbps



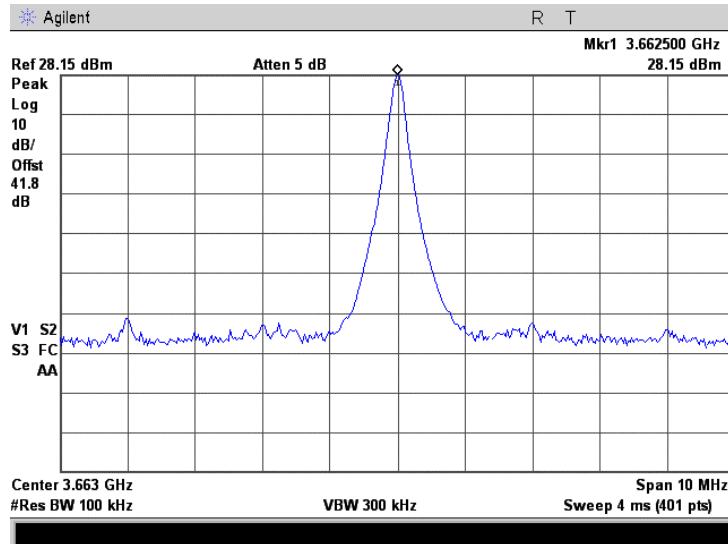
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/29/2008 1:52:10 PM		
Temperature: 24°C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.2.10 Occupied bandwidth test result at high frequency, QPSK, bit rate 4.19 Mbps



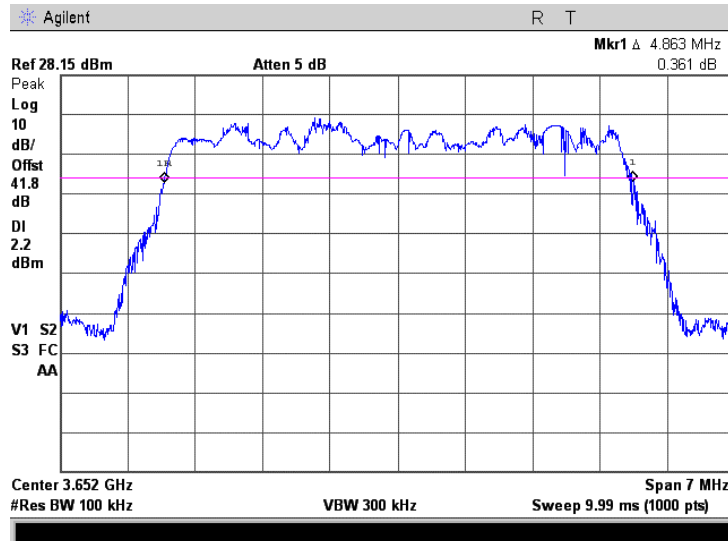
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/29/2008 1:52:10 PM		
Temperature: 24°C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.2.11 Unmodulated signal for reference level

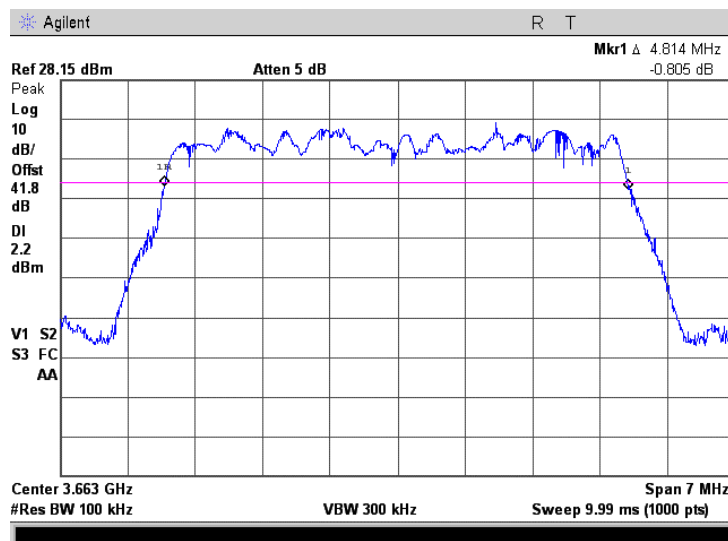


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 9/29/2008 1:52:10 PM			
Temperature: 24°C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.2.12 Occupied bandwidth test result at low frequency, 64QAM, bit rate 18.85 Mbps

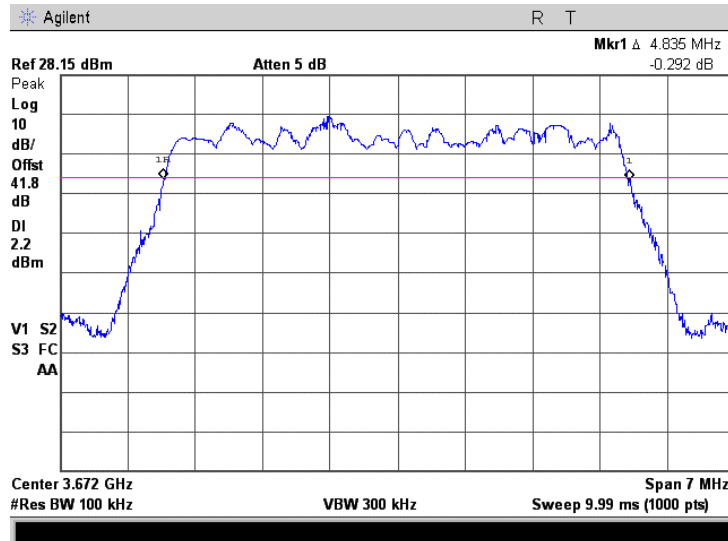


Plot 7.2.13 Occupied bandwidth test result at mid frequency, 64QAM, bit rate 18.85 Mbps

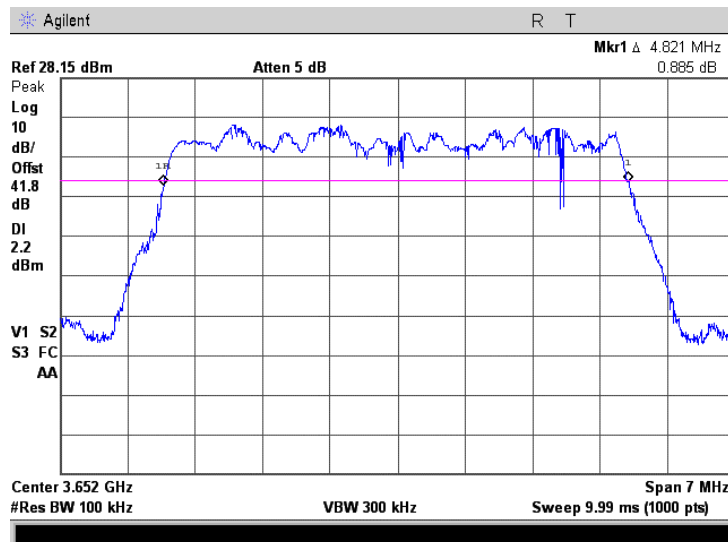


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 9/29/2008 1:52:10 PM			
Temperature: 24°C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.2.14 Occupied bandwidth test result at high frequency, 64QAM, bit rate 18.85 Mbps

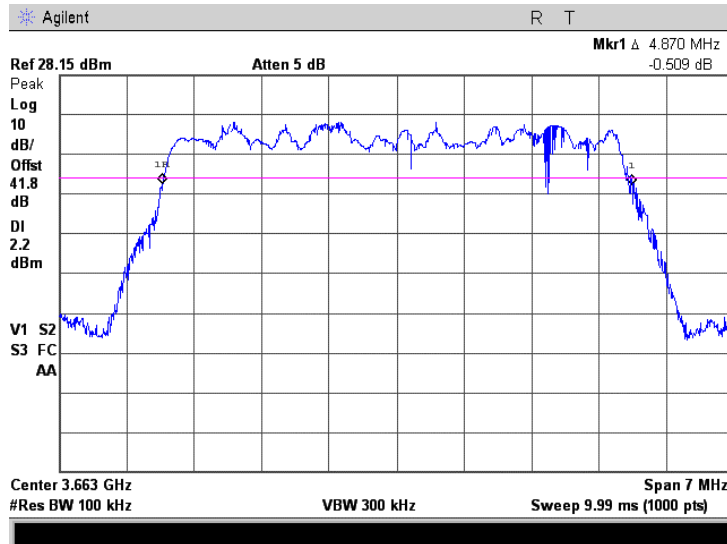


Plot 7.2.15 Occupied bandwidth test result at low frequency, 16QAM, bit rate 12.565 Mbps

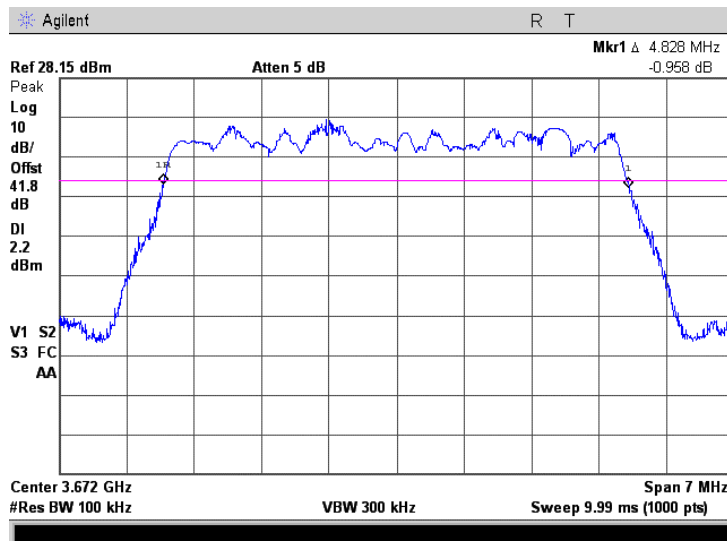


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 9/29/2008 1:52:10 PM			
Temperature: 24°C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.2.16 Occupied bandwidth test result at mid frequency, 16QAM, bit rate 12.565 Mbps

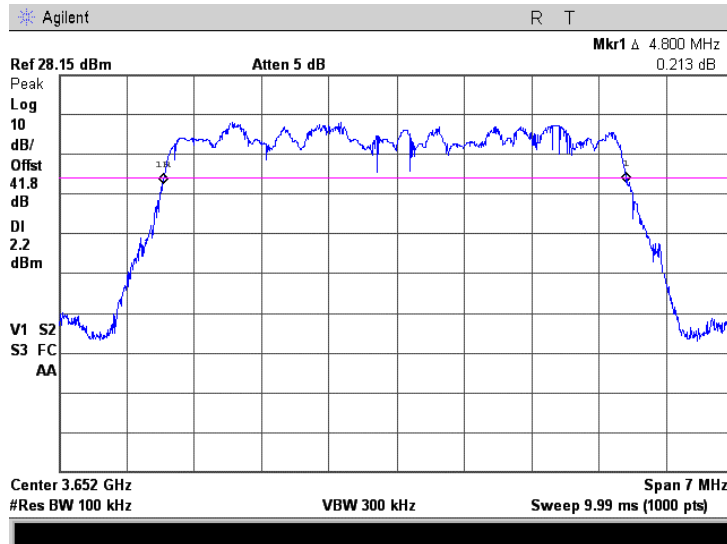


Plot 7.2.17 Occupied bandwidth test result at high frequency, 16QAM, bit rate 12.565 Mbps

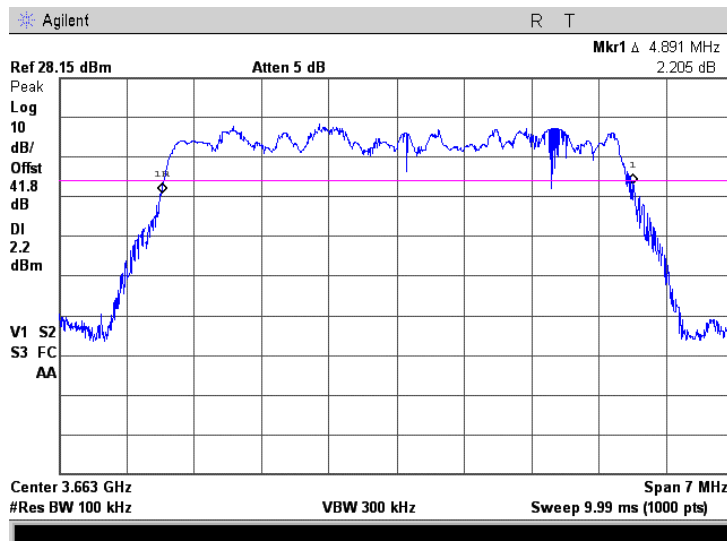


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 9/29/2008 1:52:10 PM			
Temperature: 24°C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.2.18 Occupied bandwidth test result at low frequency, QPSK, bit rate 4.19 Mbps

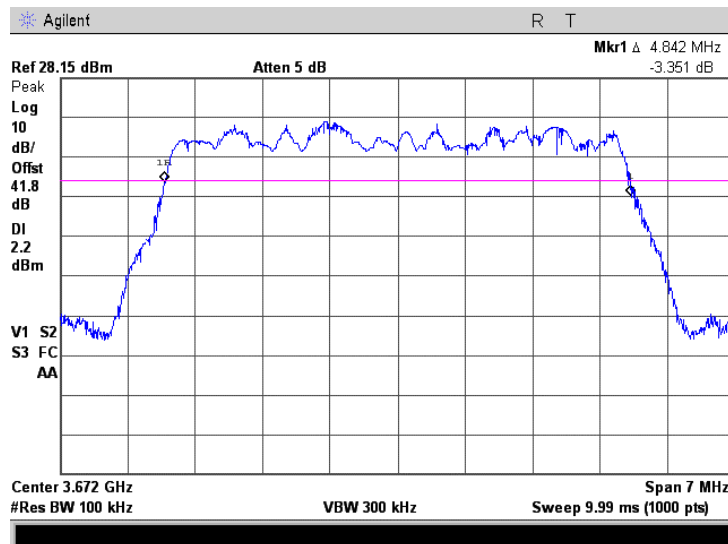


Plot 7.2.19 Occupied bandwidth test result at mid frequency, QPSK, bit rate 4.19 Mbps



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/29/2008 1:52:10 PM		
Temperature: 24°C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.2.20 Occupied bandwidth test result at high frequency, QPSK, bit rate 4.19 Mbps



Test specification: Section 90.209, Occupied bandwidth	
Test procedure: 47 CFR, Section 2.1049	
Test mode: Compliance	Verdict: PASS
Date & Time: 10/5/2008 4:35:14 PM	
Temperature: 24.5 °C	Air Pressure: 1010 hPa
Remarks: 7 MHz CBW	

Table 7.2.3 Occupied bandwidth test results 7 MHz channel bandwidth

RESOLUTION BANDWIDTH: 100 kHz*
 VIDEO BANDWIDTH: 300 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
 MODULATING SIGNAL: PRBS

Carrier frequency, MHz	Occupied bandwidth, MHz	Limit, MHz	Margin, MHz	Verdict
Antenna 1				
64QAM, Bit Rate 37.7Mbps				
3653.5	6.757	7	-0.243	Pass
3662.5	6.787	7	-0.213	Pass
3671.5	3.777	7	-3.223	Pass
BPSK, Bit Rate 8.38Mbps				
3653.5	6.777	7	-0.223	Pass
3662.5	6.747	7	-0.253	Pass
3671.5	6.787	7	-0.213	Pass
16QAM, Bit Rate 25.13Mbps				
3653.5	6.777	7	-0.223	Pass
3662.5	6.737	7	-0.263	Pass
3671.5	6.757	7	-0.243	Pass
Antenna 2				
64QAM, Bit Rate 37.7Mbps				
3653.5	6.807	7	-0.193	Pass
3662.5	6.827	7	-0.173	Pass
3671.5	6.837	7	-0.163	Pass
BPSK, Bit Rate 8.38Mbps				
3653.5	6.817	7	-0.183	Pass
3662.5	6.787	7	-0.213	Pass
3671.5	6.837	7	-0.163	Pass
16QAM, Bit Rate 25.13Mbps				
3653.5	6.777	7	-0.223	Pass
3662.5	6.837	7	-0.163	Pass
3671.5	6.827	7	-0.173	Pass

* - RBW ≥ 1% of OBW; 1 % of 7 MHz is 70 kHz, hence, RBW=100 kHz was chosen for measurements

Reference numbers of test equipment used

HL 2909	HL 2869	HL 2952	HL 3321	HL 3435		
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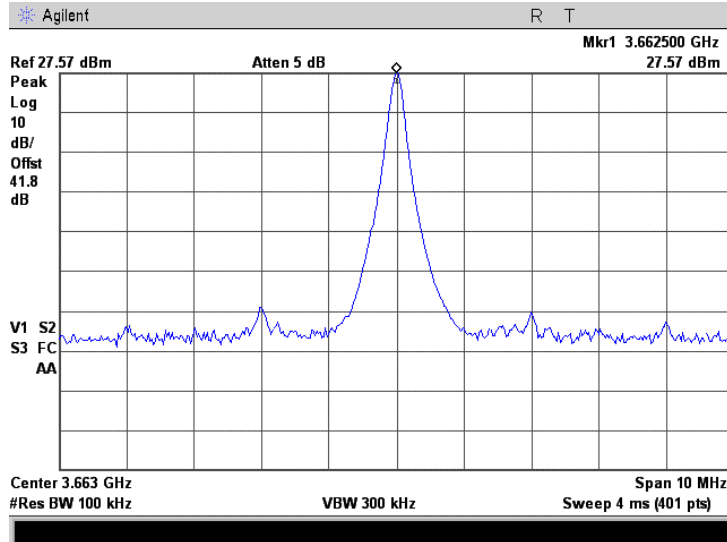
Full description is given in Appendix A.



HERMON LABORATORIES

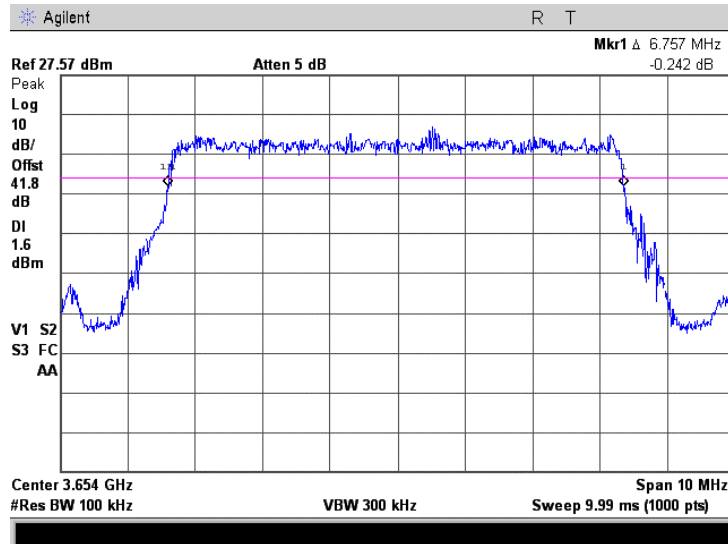
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 4:35:14 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.2.21 Unmodulated signal for reference level

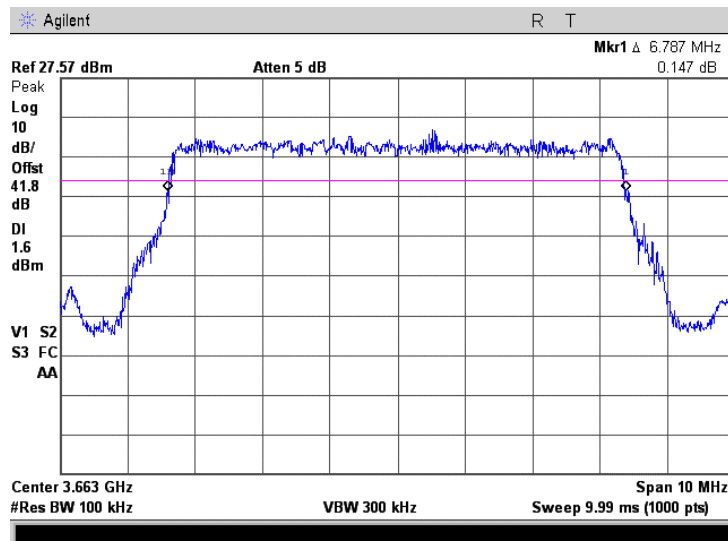


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 4:35:14 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.2.22 Occupied bandwidth test result at low frequency, 64QAM, rate 37.7 Mbps

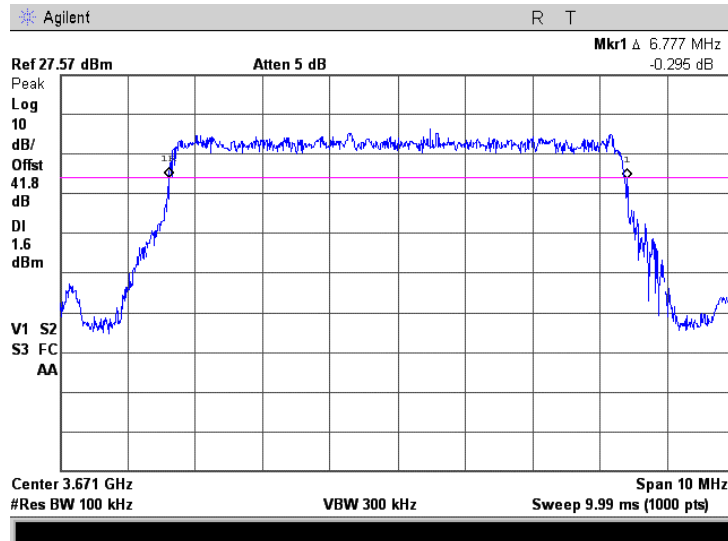


Plot 7.2.23 Occupied bandwidth test result at mid frequency, 64QAM, rate 37.7 Mbps

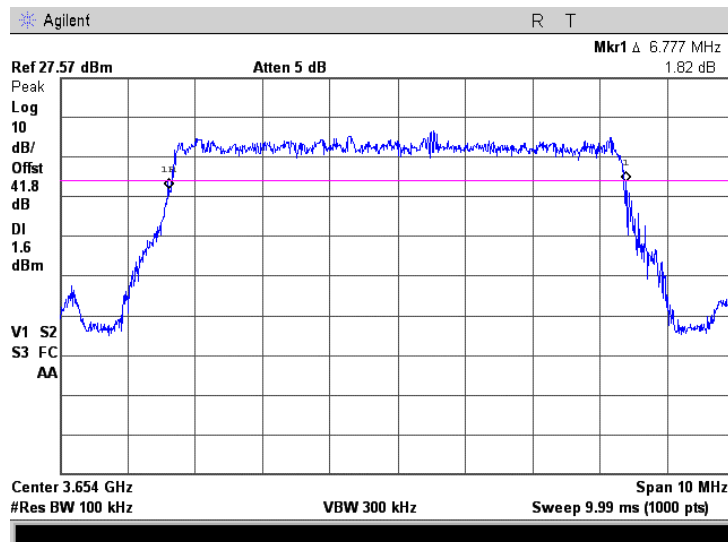


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 4:35:14 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.2.24 Occupied bandwidth test result at high frequency, 64QAM, rate 37.7 Mbps

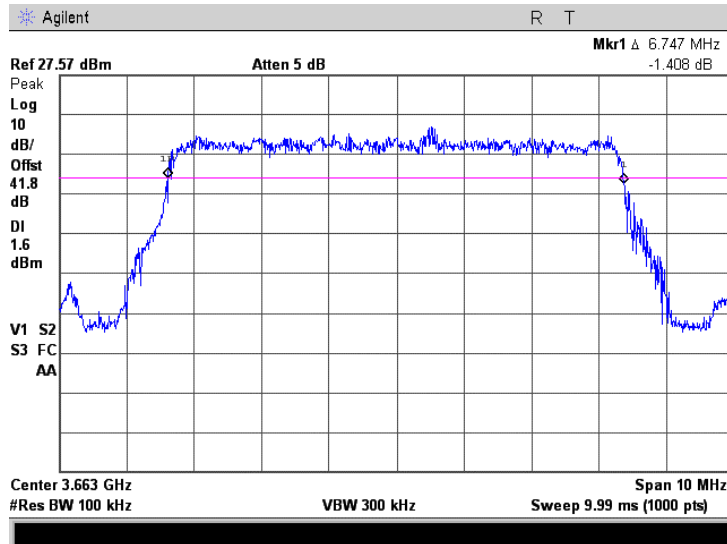


Plot 7.2.25 Occupied bandwidth test result at low frequency, 16QAM, rate 25.13 Mbps

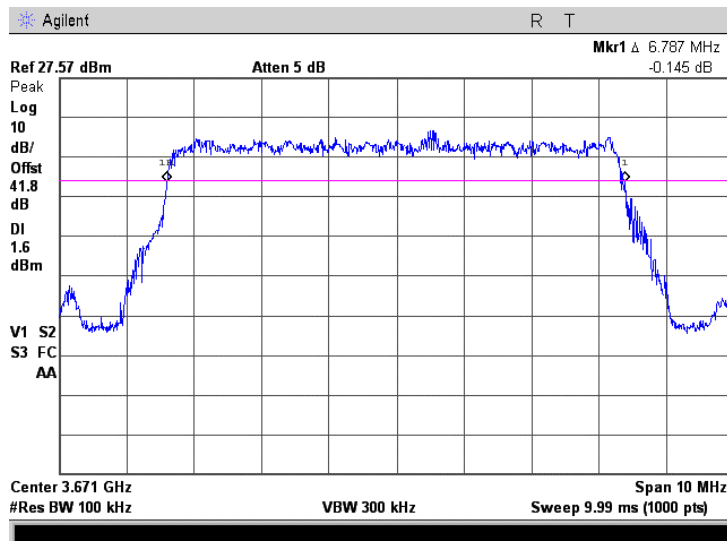


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 4:35:14 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.2.26 Occupied bandwidth test result at mid frequency, 16QAM, rate 25.13 Mbps

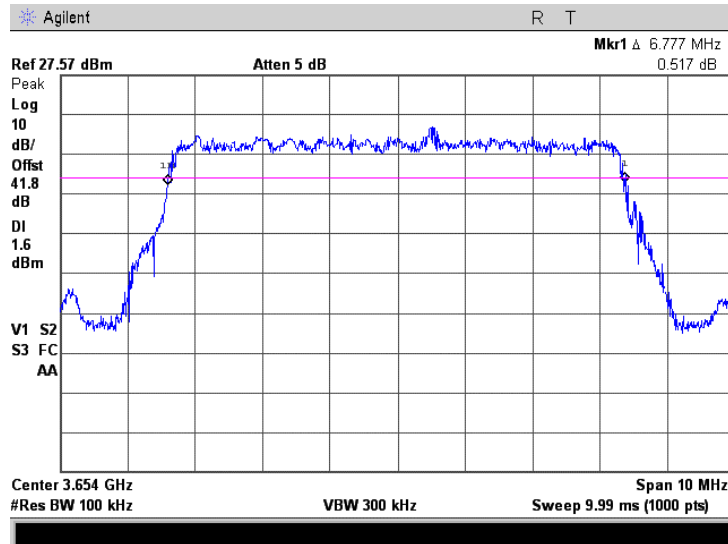


Plot 7.2.27 Occupied bandwidth test result at high frequency, 16QAM, rate 25.13 Mbps

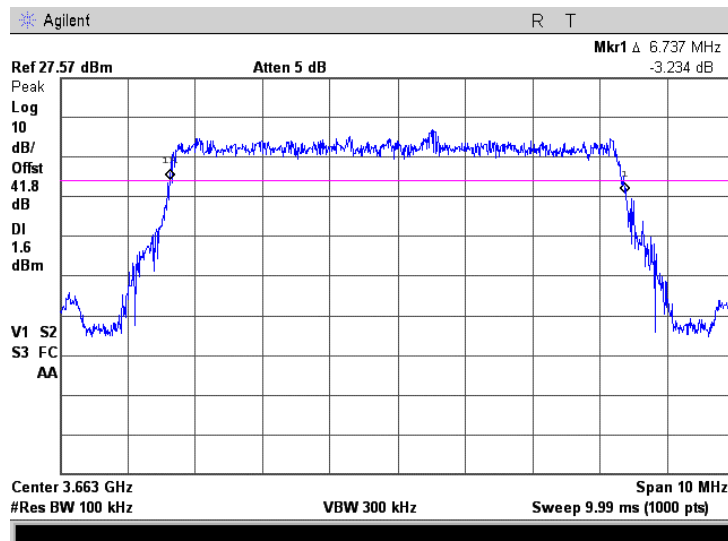


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 4:35:14 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.2.28 Occupied bandwidth test result at low frequency, QPSK, rate 8.38 Mbps

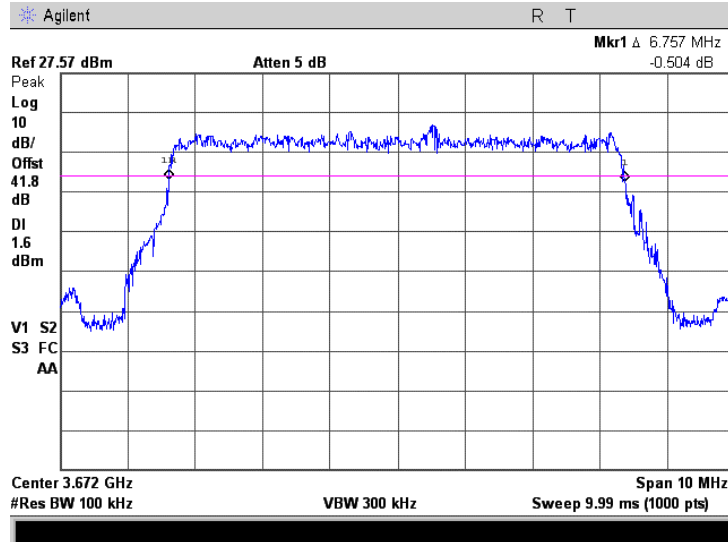


Plot 7.2.29 Occupied bandwidth test result at mid frequency, QPSK, rate 8.38 Mbps



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 4:35:14 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.2.30 Occupied bandwidth test result at high frequency, QPSK, rate 8.38 Mbps

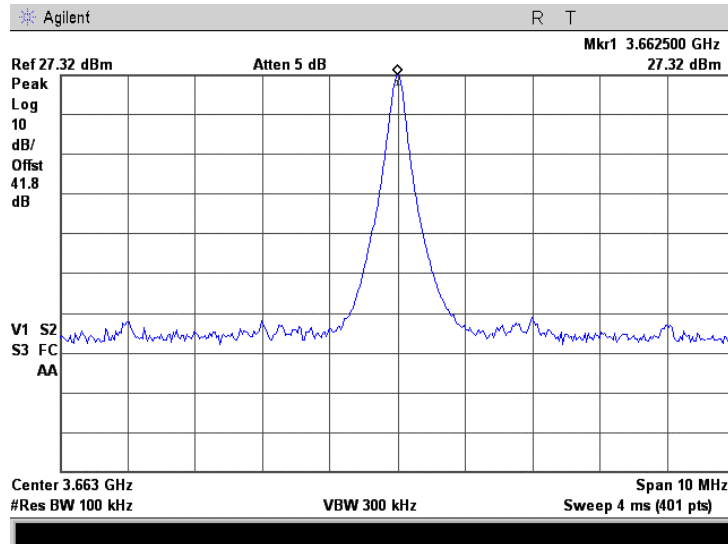




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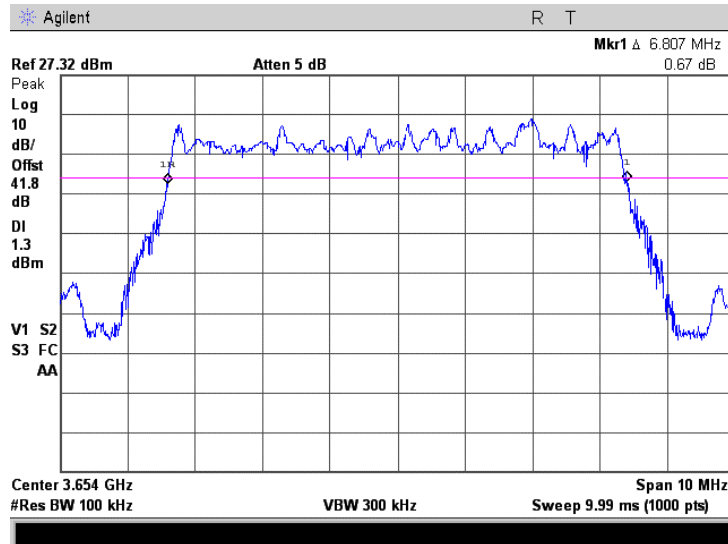
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 4:35:14 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.2.31 Unmodulated signal for reference level

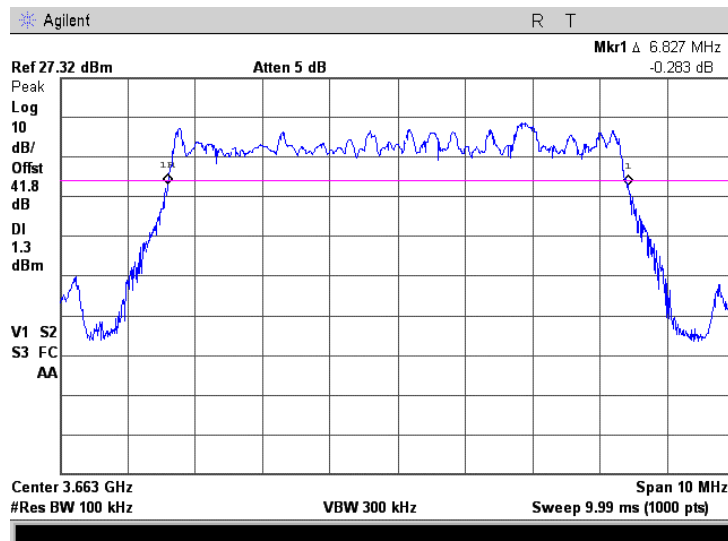


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 4:35:14 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.2.32 Occupied bandwidth test result at low frequency, 64QAM, rate 37.7 Mbps

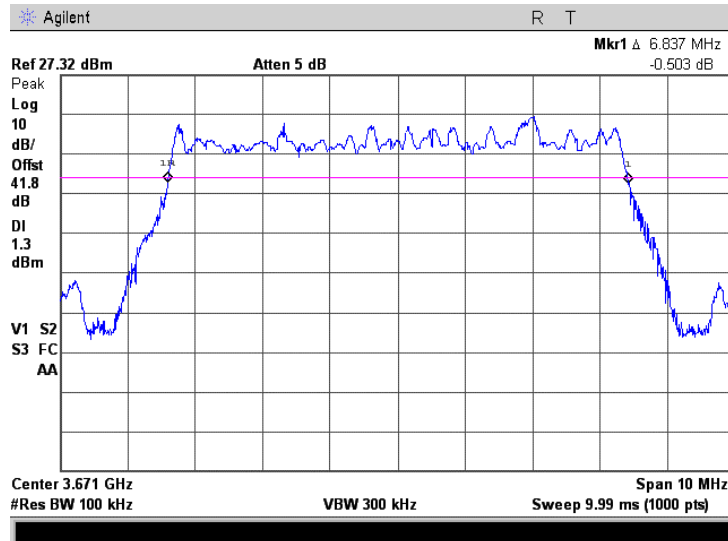


Plot 7.2.33 Occupied bandwidth test result at mid frequency, 64QAM, rate 37.7 Mbps

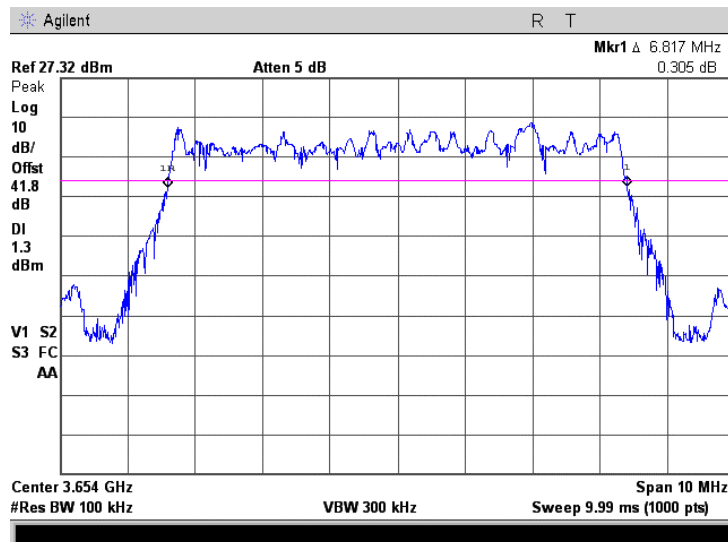


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 4:35:14 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.2.34 Occupied bandwidth test result at high frequency, 64QAM, rate 37.7 Mbps

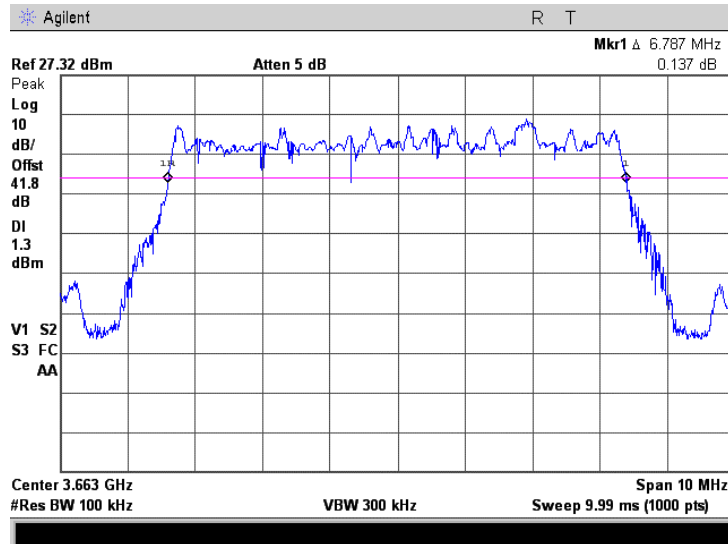


Plot 7.2.35 Occupied bandwidth test result at low frequency, 16QAM, rate 25.13 Mbps

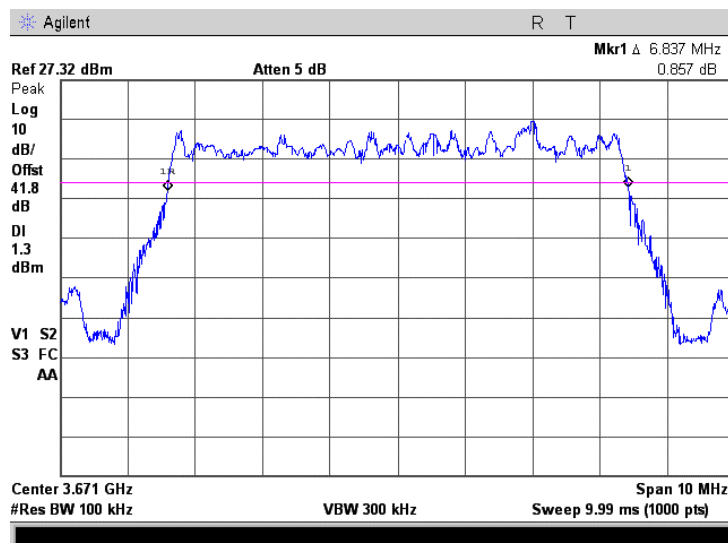


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 4:35:14 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.2.36 Occupied bandwidth test result at mid frequency, 16QAM, rate 25.13 Mbps

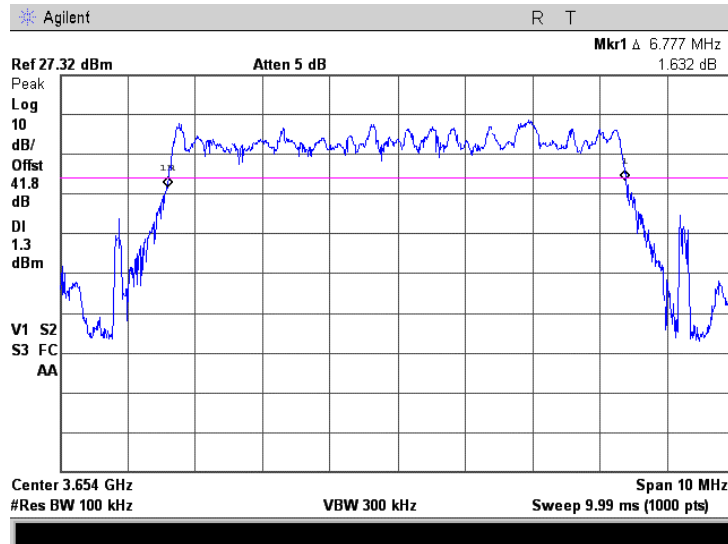


Plot 7.2.37 Occupied bandwidth test result at high frequency, 16QAM, rate 25.13 Mbps

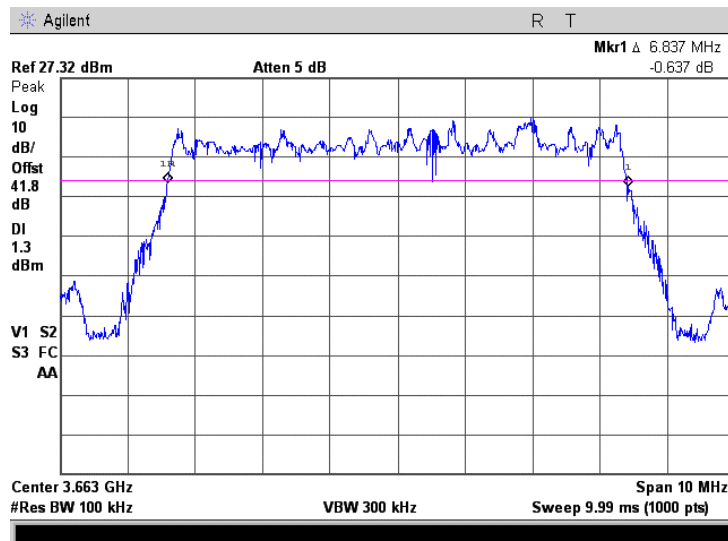


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 4:35:14 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.2.38 Occupied bandwidth test result at low frequency, QPSK, rate 8.38 Mbps

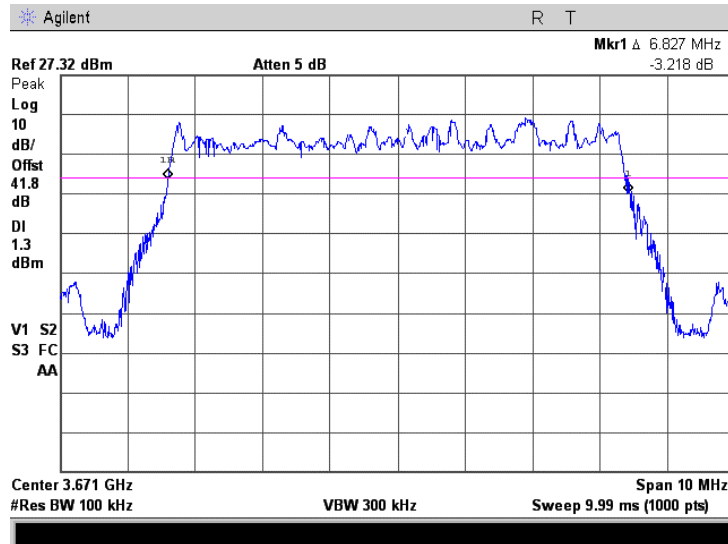


Plot 7.2.39 Occupied bandwidth test result at mid frequency, QPSK, rate 8.38 Mbps



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 4:35:14 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.2.40 Occupied bandwidth test result at high frequency, QPSK, rate 8.38 Mbps





Test specification: Section 90.209, Occupied bandwidth	
Test procedure: 47 CFR, Section 2.1049	
Test mode: Compliance	Verdict: PASS
Date & Time: 10/5/2008 4:35:14 PM	
Temperature: 24.5 °C	Air Pressure: 1010 hPa
Relative Humidity: 37 %	
Power Supply: 48 VDC	
Remarks: 10 MHz CBW	

Table 7.2.4 Occupied bandwidth test results 10 MHz channel bandwidth

RESOLUTION BANDWIDTH: 100 kHz*
 VIDEO BANDWIDTH: 300 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
 MODULATING SIGNAL: PRBS

Carrier frequency, MHz	Occupied bandwidth, MHz	Limit, MHz	Margin, MHz	Verdict
Antenna 1				
64QAM, Bit Rate 37.7Mbps				
3655.0	9.384	10	-0.616	Pass
3662.5	9.399	10	-0.601	Pass
3670.0	9.429	10	-0.571	Pass
16QAM, Bit Rate 25.13Mbps				
3655.0	9.414	10	-0.586	Pass
3662.5	9.384	10	-0.616	Pass
3670.0	9.429	10	-0.571	Pass
QPSK, Bit Rate 8.38Mbps				
3655.0	9.399	10	-0.601	Pass
3662.5	9.429	10	-0.571	Pass
3670.0	9.354	10	-0.646	Pass
Antenna 2				
64QAM, Bit Rate 37.7Mbps				
3655.0	9.505	10	-0.495	Pass
3662.5	9.444	10	-0.556	Pass
3670.0	9.444	10	-0.556	Pass
16QAM, Bit Rate 25.13Mbps				
3655.0	9.474	10	-0.526	Pass
3662.5	9.489	10	-0.511	Pass
3670.0	9.444	10	-0.556	Pass
QPSK, Bit Rate 8.38Mbps				
3655.0	9.459	10	-0.541	Pass
3662.5	9.520	10	-0.480	Pass
3670.0	9.474	10	-0.526	Pass

* - RBW ≥ 1% of OBW; 1 % of 10 MHz is 100 kHz, hence, RBW=100 kHz was chosen for measurements

Reference numbers of test equipment used

HL 2909	HL 2869	HL 2952	HL 3321	HL 3435			
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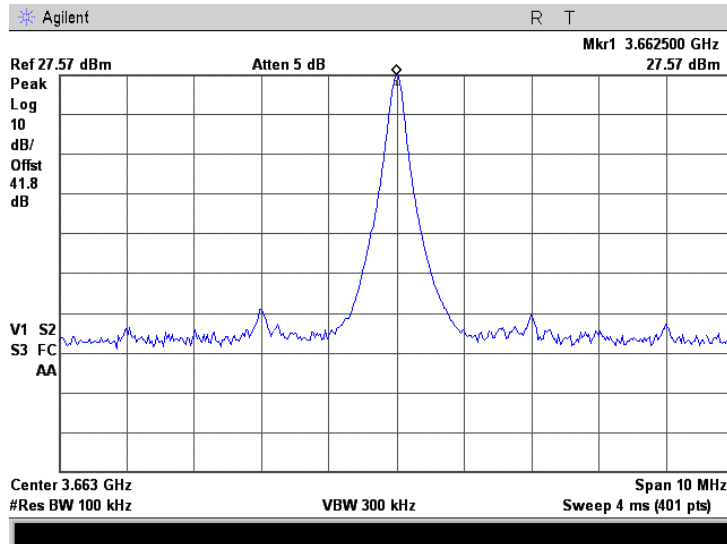
Full description is given in Appendix A.



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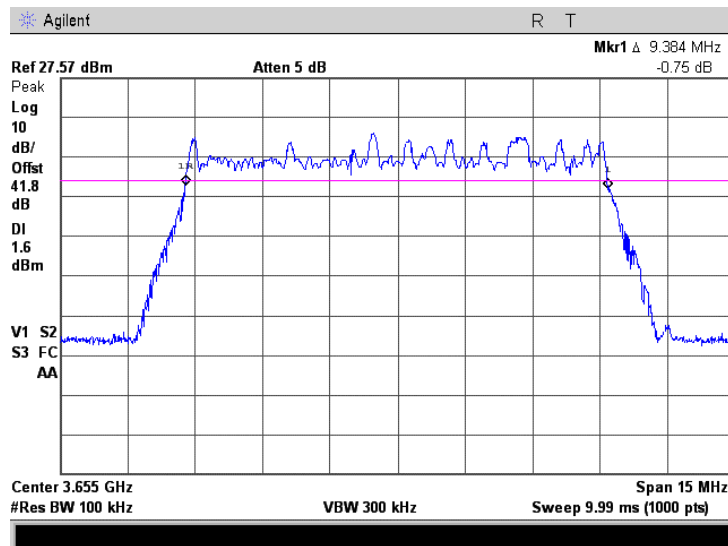
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 4:35:14 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 1			

Plot 7.2.41 Unmodulated signal for reference level

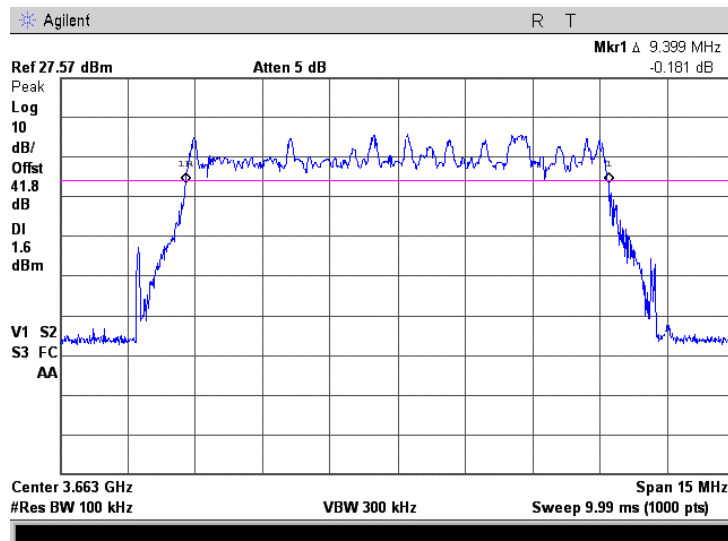


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 4:35:14 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 1			

Plot 7.2.42 Occupied bandwidth test result at low frequency, 64QAM, rate 37.7 Mbps

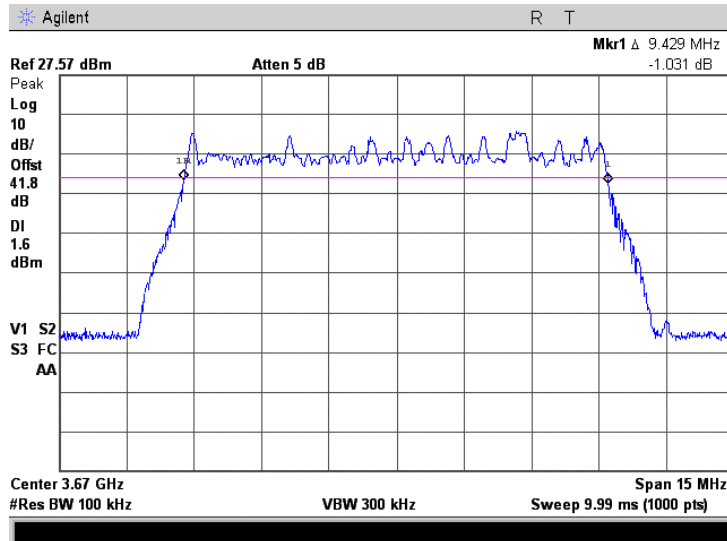


Plot 7.2.43 Occupied bandwidth test result at mid frequency, 64QAM, rate 37.7 Mbps

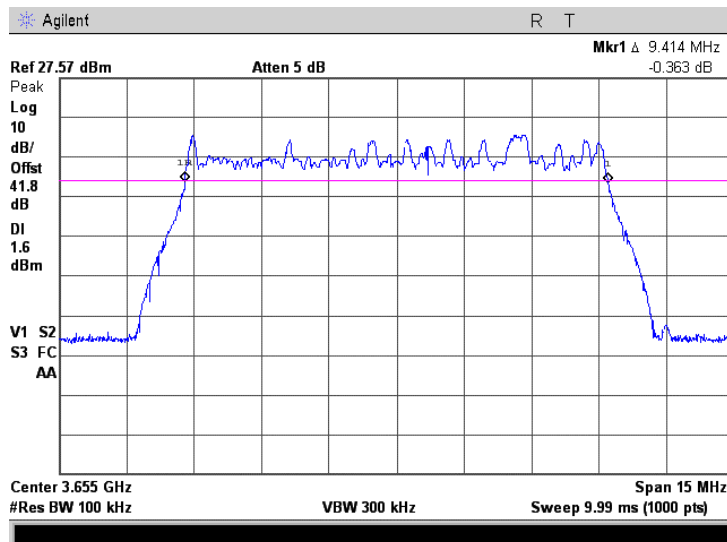


Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date & Time:		10/5/2008 4:35:14 PM	
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 1			

Plot 7.2.44 Occupied bandwidth test result at high frequency, 64QAM, rate 37.7 Mbps

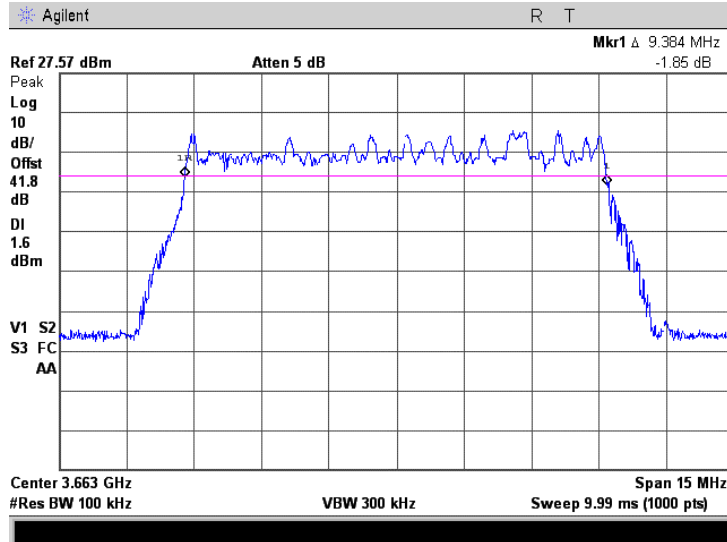


Plot 7.2.45 Occupied bandwidth test result at low frequency, 16QAM, rate 25.13 Mbps

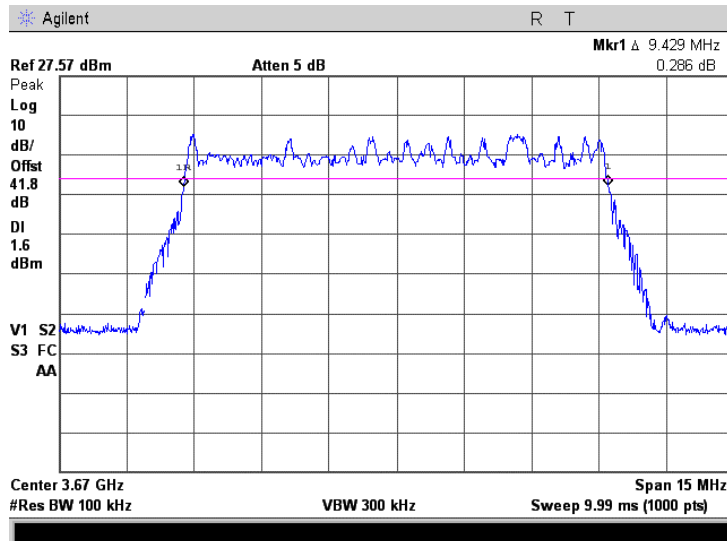


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 4:35:14 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 1			

Plot 7.2.46 Occupied bandwidth test result at mid frequency, 16QAM, rate 25.13 Mbps

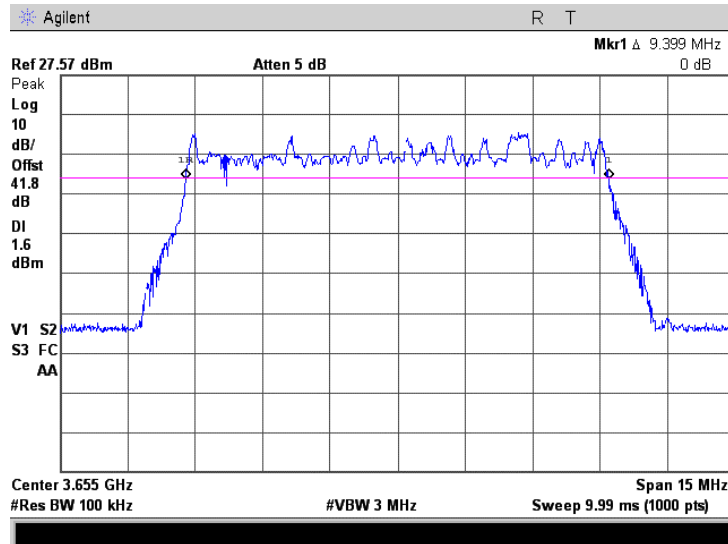


Plot 7.2.47 Occupied bandwidth test result at high frequency, 16QAM, rate 25.13 Mbps

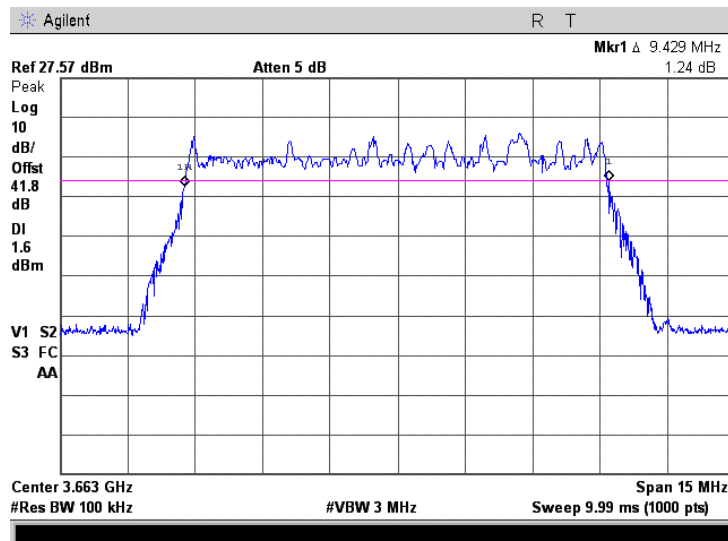


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 4:35:14 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 1			

Plot 7.2.48 Occupied bandwidth test result at low frequency, QPSK, rate 8.38 Mbps

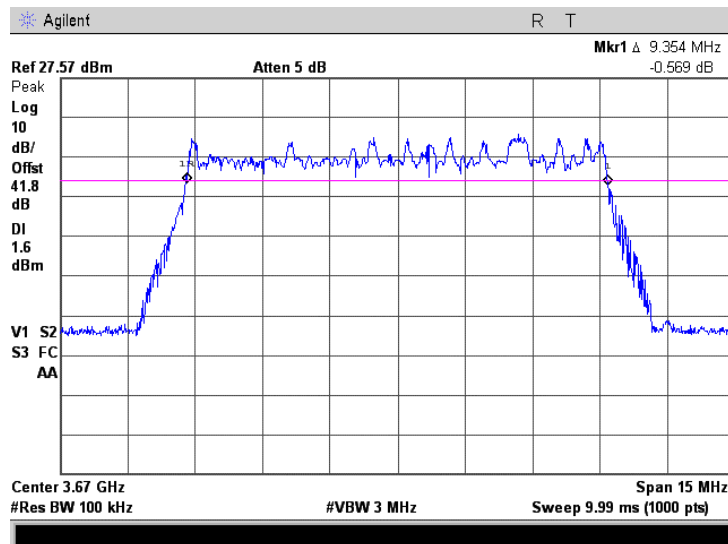


Plot 7.2.49 Occupied bandwidth test result at mid frequency, QPSK, rate 8.38 Mbps



Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 4:35:14 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 1			

Plot 7.2.50 Occupied bandwidth test result at high frequency, QPSK, rate 8.38 Mbps

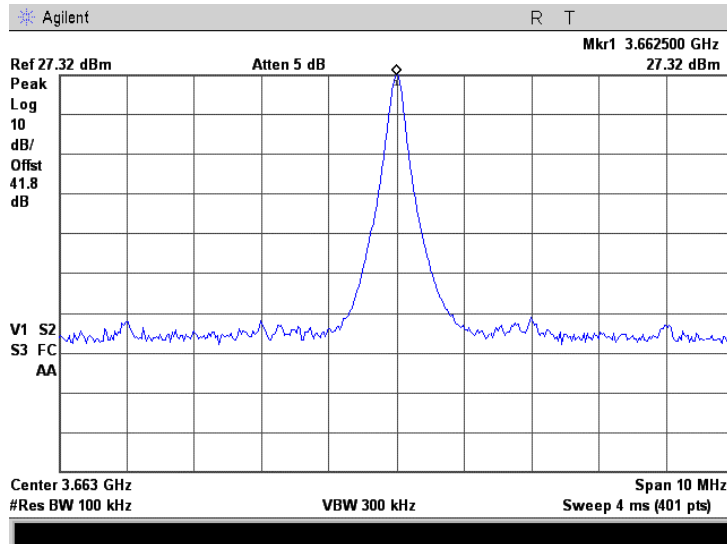




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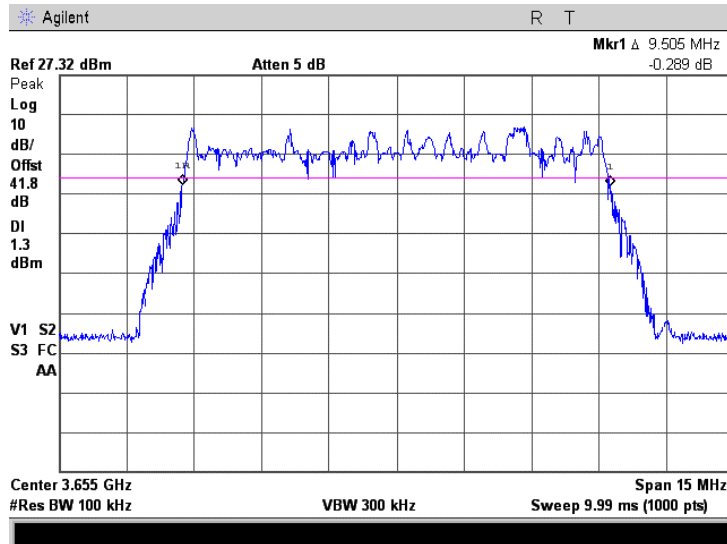
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 4:35:14 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.2.51 Unmodulated signal for reference level

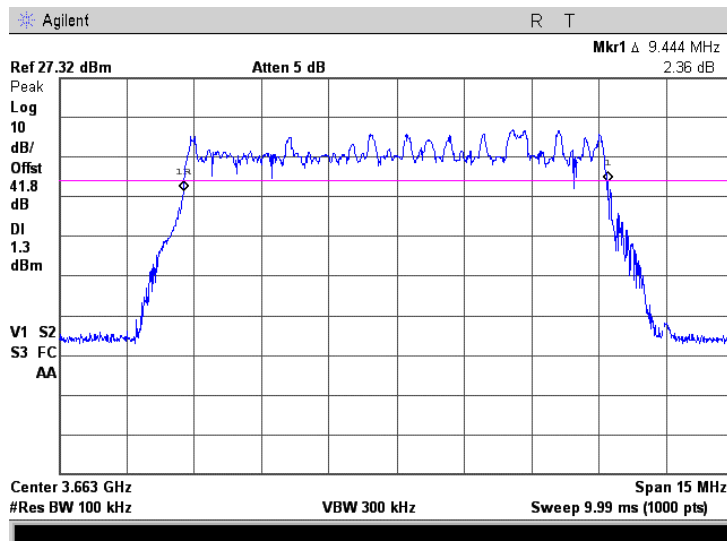


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 4:35:14 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.2.52 Occupied bandwidth test result at low frequency, 64QAM, rate 37.7 Mbps

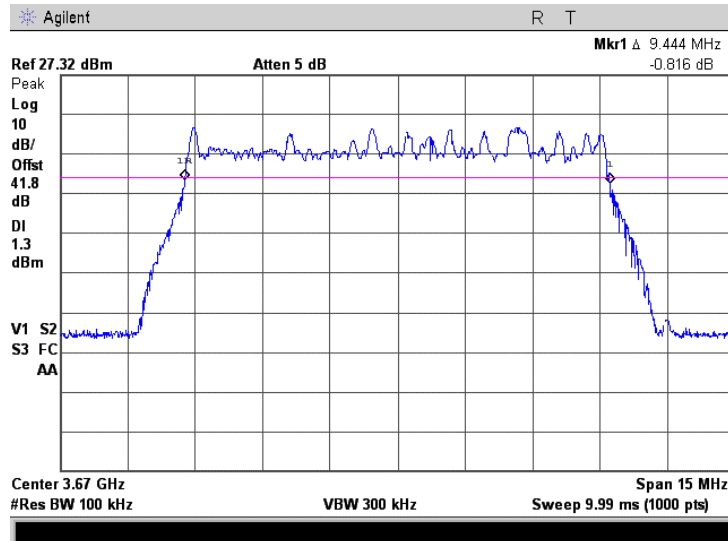


Plot 7.2.53 Occupied bandwidth test result at mid frequency, 64QAM, rate 37.7 Mbps

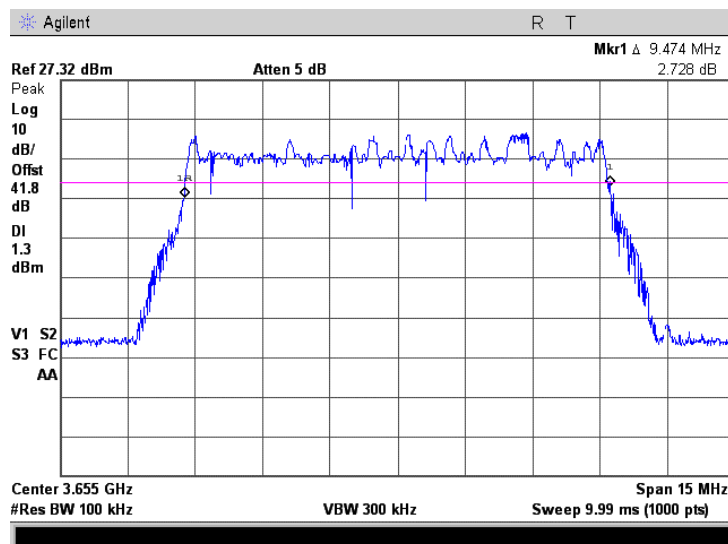


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 4:35:14 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.2.54 Occupied bandwidth test result at high frequency, 64QAM, rate 37.7 Mbps

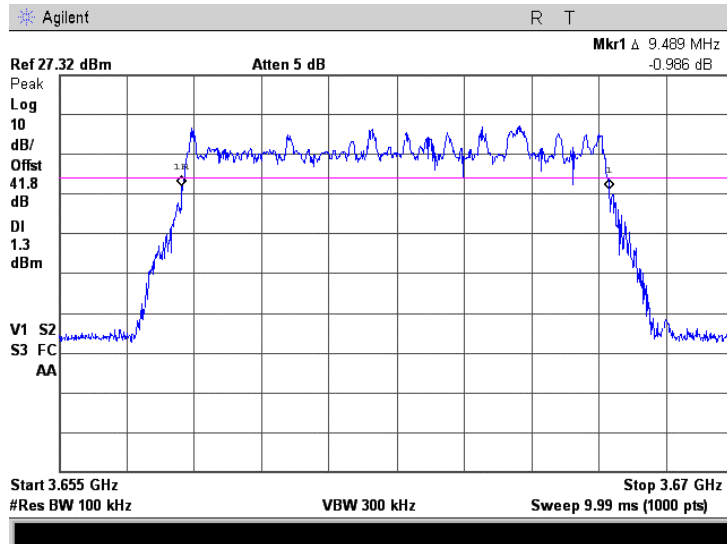


Plot 7.2.55 Occupied bandwidth test result at low frequency, 16QAM, rate 25.13 Mbps

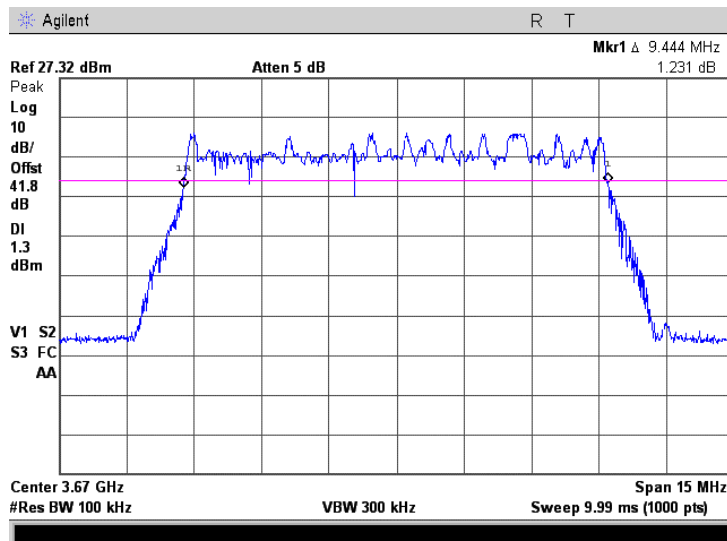


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 4:35:14 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.2.56 Occupied bandwidth test result at mid frequency, 16QAM, rate 25.13 Mbps

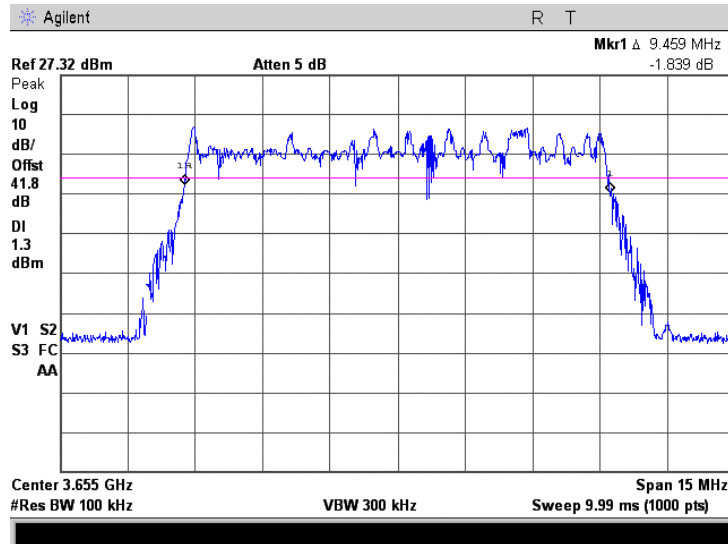


Plot 7.2.57 Occupied bandwidth test result at high frequency, 16QAM, rate 25.13 Mbps

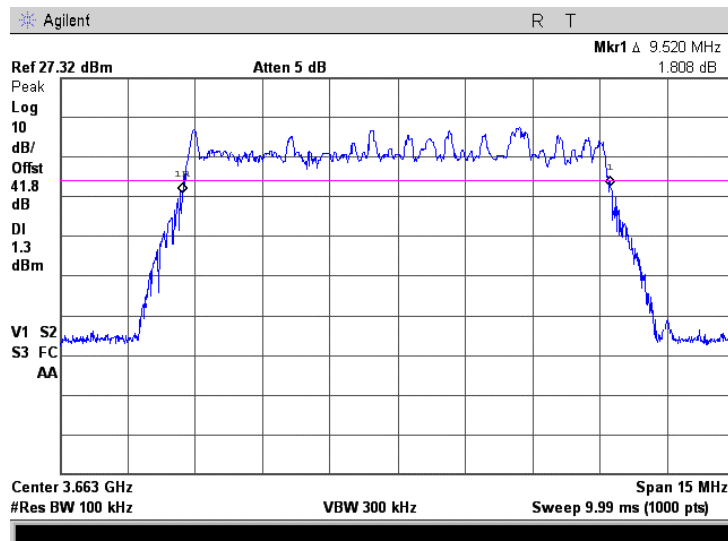


Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 4:35:14 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.2.58 Occupied bandwidth test result at low frequency, QPSK, rate 8.38 Mbps

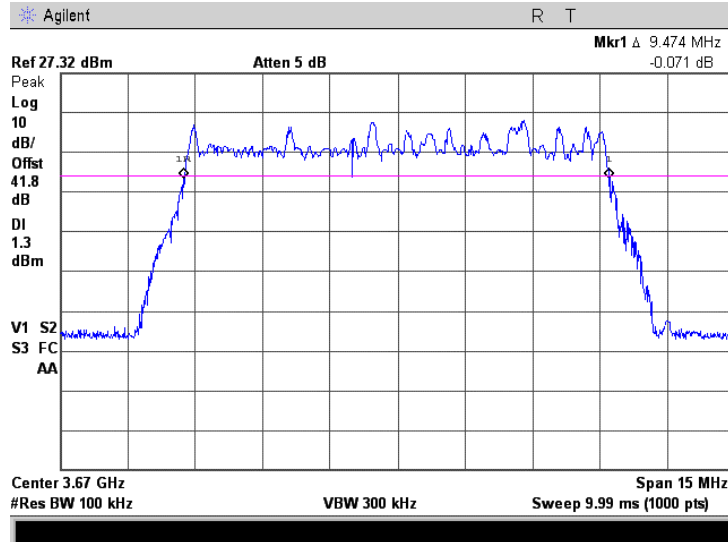


Plot 7.2.59 Occupied bandwidth test result at mid frequency, QPSK, rate 8.38 Mbps



Test specification: Section 90.209, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 4:35:14 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.2.60 Occupied bandwidth test result at high frequency, QPSK, rate 8.38 Mbps





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Test specification:		Section 90.210, Emission mask	
Test procedure:		47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Verdict:	
Compliance		PASS	
Date & Time:		10/2/2008 7:48:41 AM	
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

7.3 Emission mask test

7.3.1 General

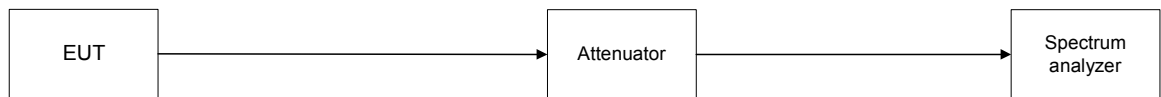
This test was performed to measure emission mask at RF antenna connector. Specification test limits are given in Table 7.3.1, Table 7.3.3, Table 7.3.5.

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 emission mask was measured with spectrum analyzer as provided in the associated plots. The test results are provided in Table 7.3.2, Table 7.3.4.

Figure 7.3.1 Emission mask test setup





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Test specification:		Section 90.210, Emission mask	
Test procedure:		47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Verdict:	
Compliance		PASS	
Date & Time:		10/2/2008 7:48:41 AM	
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW			

Table 7.3.1 Emission mask limits for 5 MHz channel bandwidth

Frequency displacement from carrier	Attenuation below carrier, dBc
Emission mask B (Channel bandwidth 5 MHz)	
0 – 2.5 MHz	0
2.5 – 5.0 MHz	25
5.0 – 12.5 MHz	35
More than** 12.5 MHz	43 + 10 log(P)

* - F – frequency in MHz removed from center

** - emission mask includes carrier modulation envelope within ± 150 % of the authorized bandwidth; the frequency range removed beyond ± 150 % of the authorized bandwidth from carrier was investigated as spurious emission

Table 7.3.2 Emission mask test results for 5 MHz channel bandwidth

Carrier frequency, MHz	Limit	Verdict
3652.5	Emission mask B	Pass
3675.0		
3697.5		

The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth

Reference numbers of test equipment used

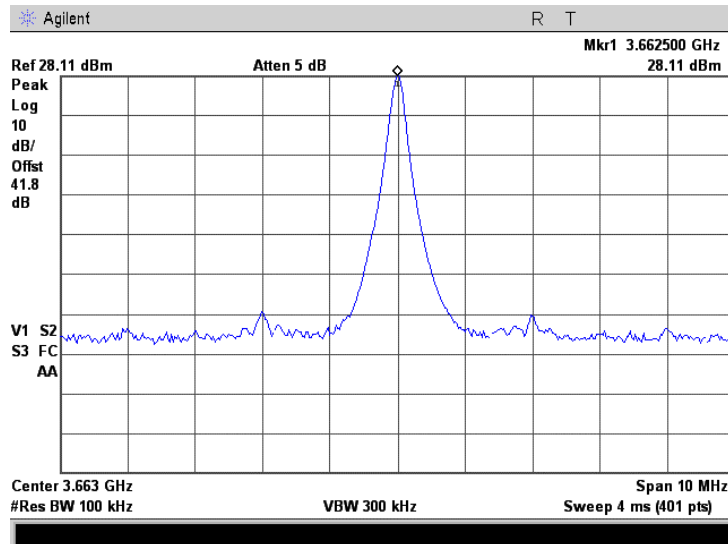
HL 2909	HL 2869	HL 2952	HL 3321	HL 3435			
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Full description is given in Appendix A.

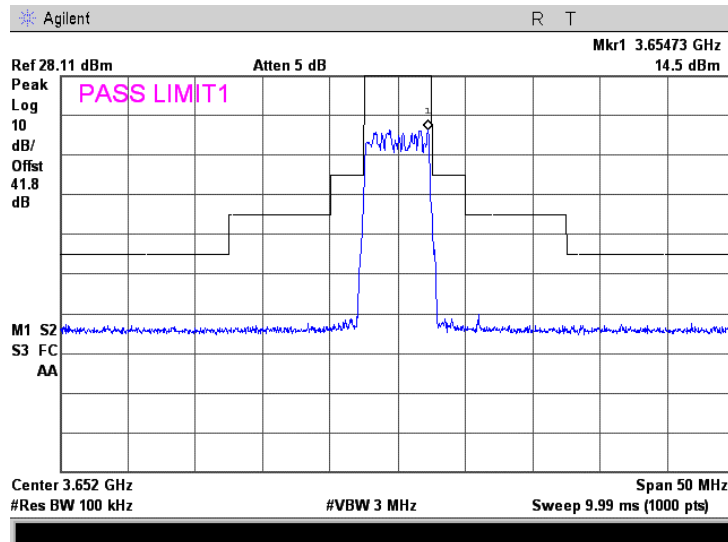


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:48:41 AM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.3.1 Emission mask for 5 MHz channel bandwidth



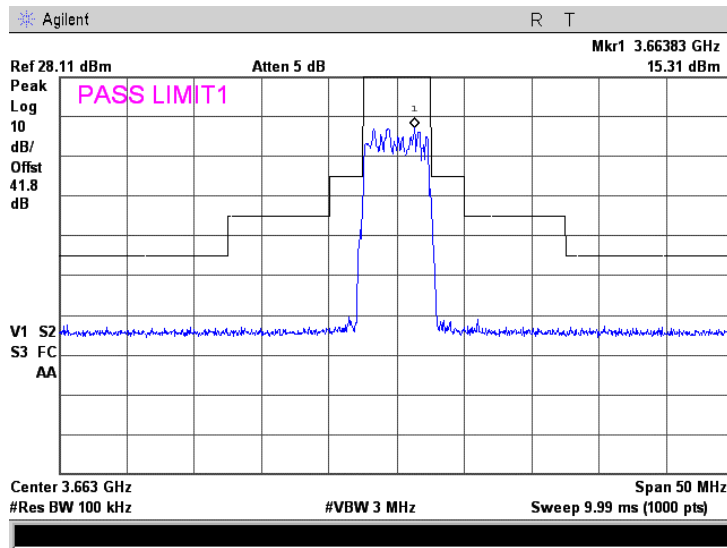
Plot 7.3.2 Emission mask test results at low carrier frequency, 64QAM, bit rate 18.85 Mbps



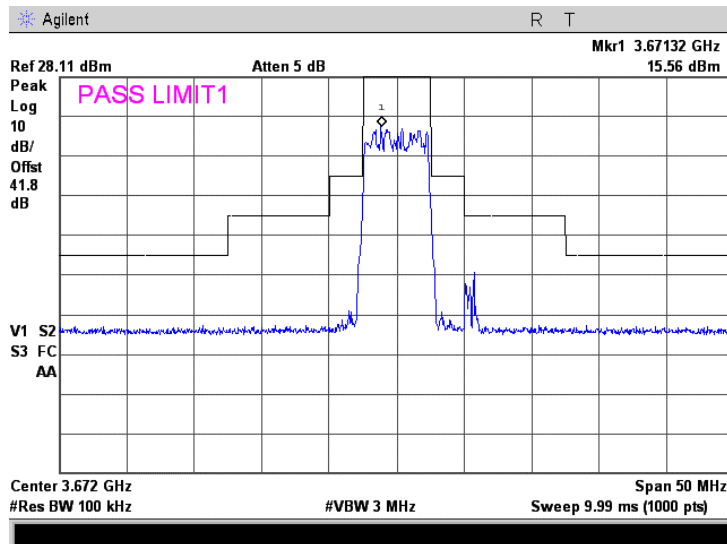


Test specification:		Section 90.210, Emission mask	
Test procedure:		47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date & Time:		10/2/2008 7:48:41 AM	
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.3.3 Emission mask test results at mid carrier frequency, 64QAM, bit rate 18.85 Mbps



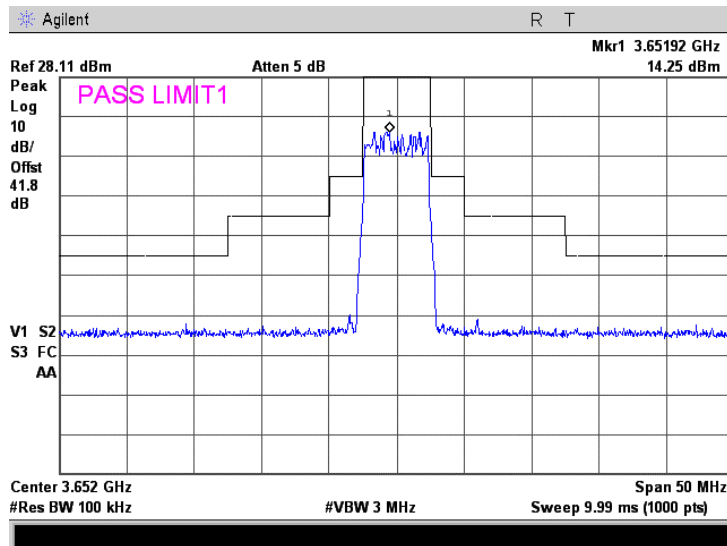
Plot 7.3.4 Emission mask test results at high carrier frequency, 64QAM, bit rate 18.85 Mbps



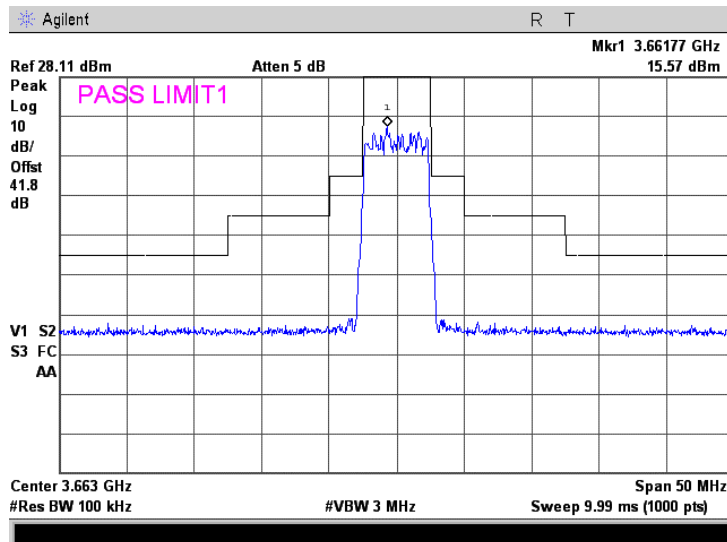


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:48:41 AM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.3.5 Emission mask test results at low carrier frequency, 16QAM, bit rate 12.565 Mbps



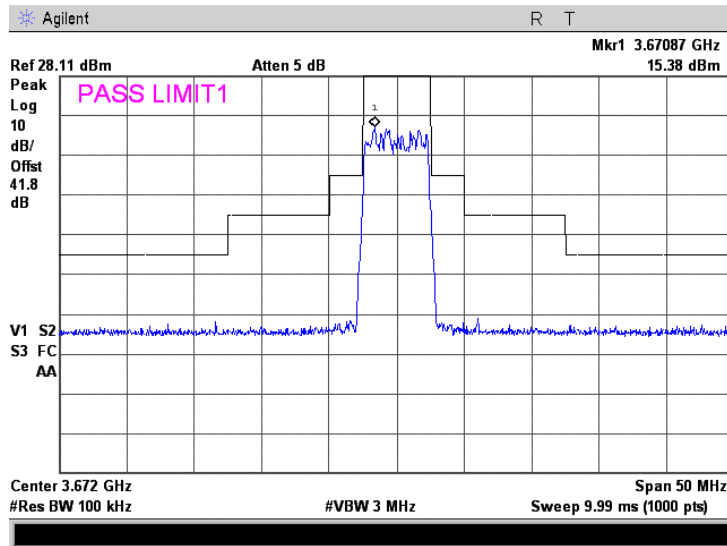
Plot 7.3.6 Emission mask test results at mid carrier frequency, 16QAM, bit rate 12.565 Mbps



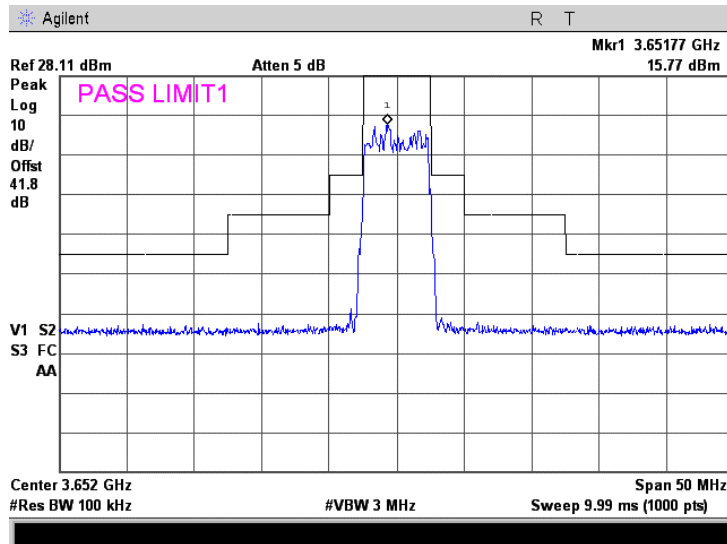


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:48:41 AM	Relative Humidity:	37 %
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Power Supply:	48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.3.7 Emission mask test results at high carrier frequency, 16QAM, bit rate 12.565 Mbps



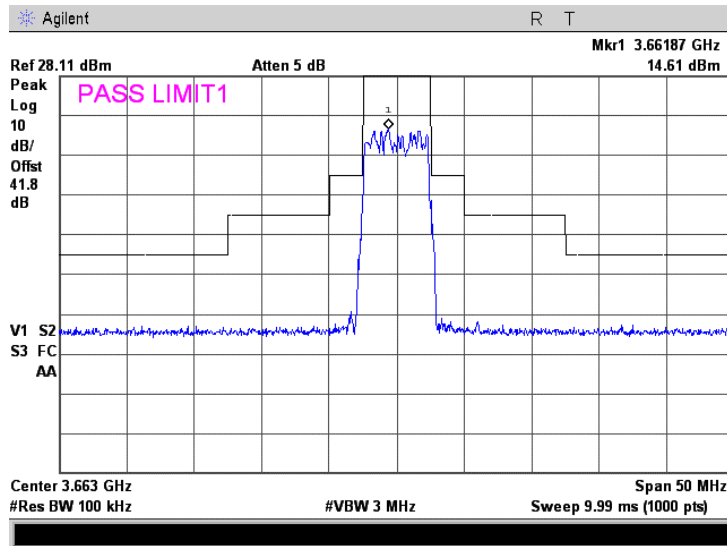
Plot 7.3.8 Emission mask test results at low carrier frequency, QPSK, bit rate 4.19 Mbps



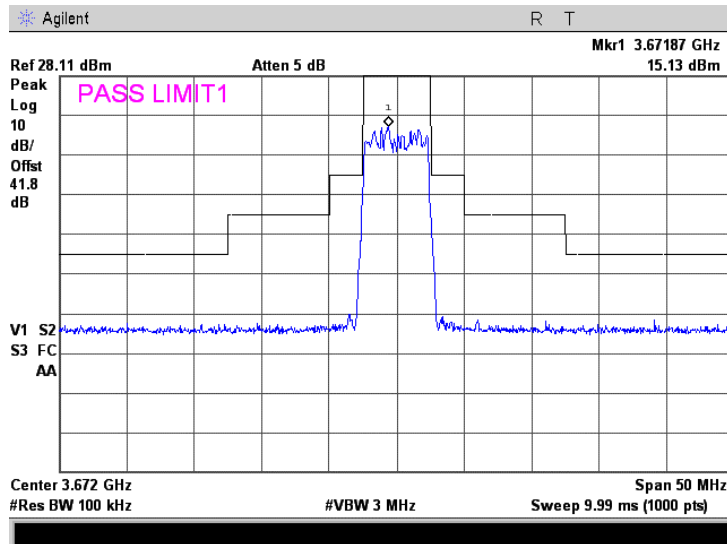


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:48:41 AM	Relative Humidity:	37 %
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Power Supply:	48 VDC
Remarks: 5 MHz CBW, antenna 1			

Plot 7.3.9 Emission mask test results at mid carrier frequency, QPSK, bit rate 4.19 Mbps



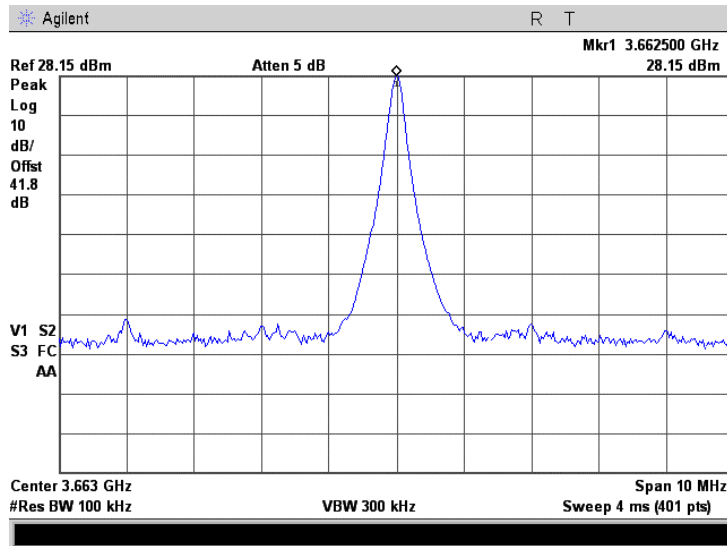
Plot 7.3.10 Emission mask test results at high carrier frequency, QPSK, bit rate 4.19 Mbps



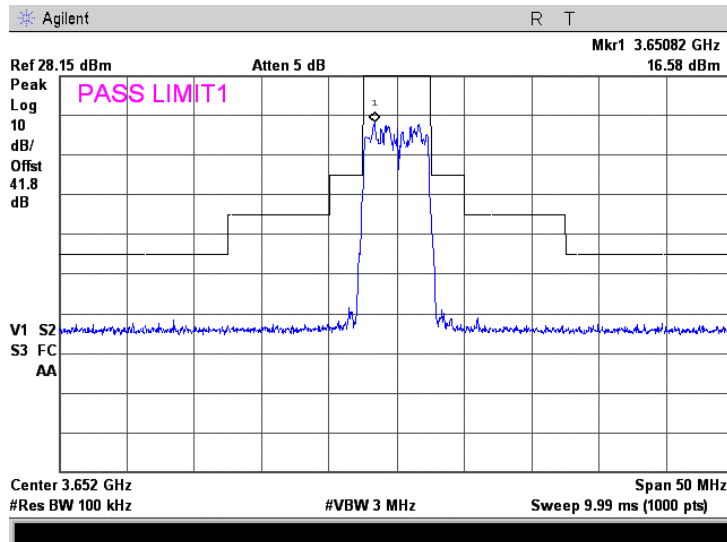


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:48:41 AM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.3.11 Emission mask for 5 MHz channel bandwidth



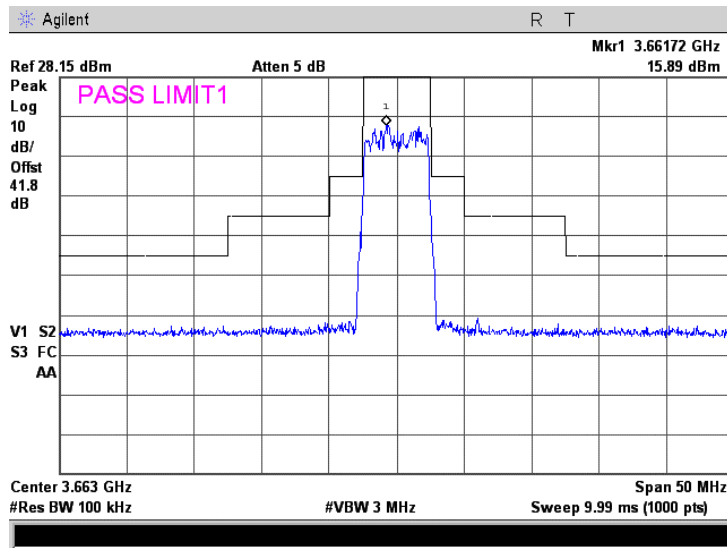
Plot 7.3.12 Emission mask test results at low carrier frequency, 64QAM, bit rate 18.85 Mbps



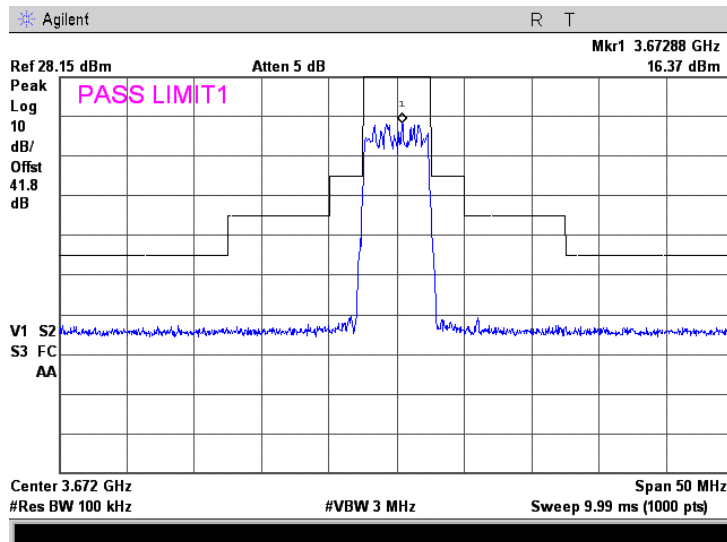


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:48:41 AM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.3.13 Emission mask test results at mid carrier frequency, 64QAM, bit rate 18.85 Mbps



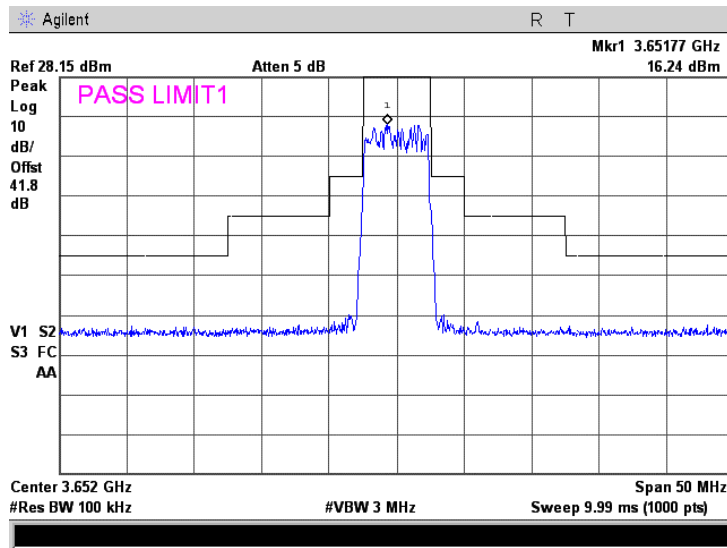
Plot 7.3.14 Emission mask test results at high carrier frequency, 64QAM, bit rate 18.85 Mbps



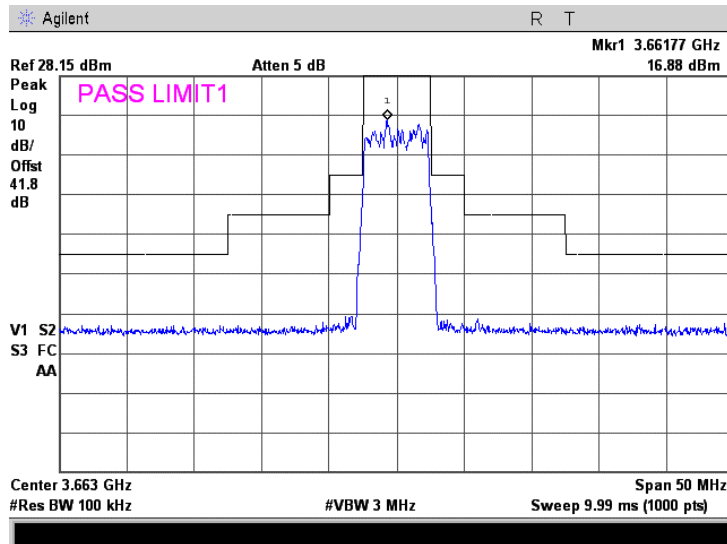


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:48:41 AM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.3.15 Emission mask test results at low carrier frequency,16QAM, bit rate 12.565 Mbps



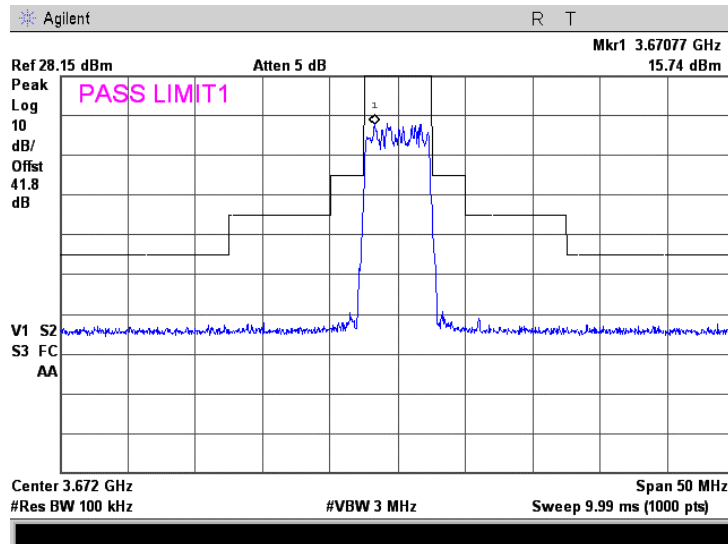
Plot 7.3.16 Emission mask test results at mid carrier frequency,16QAM, bit rate 12.565 Mbps



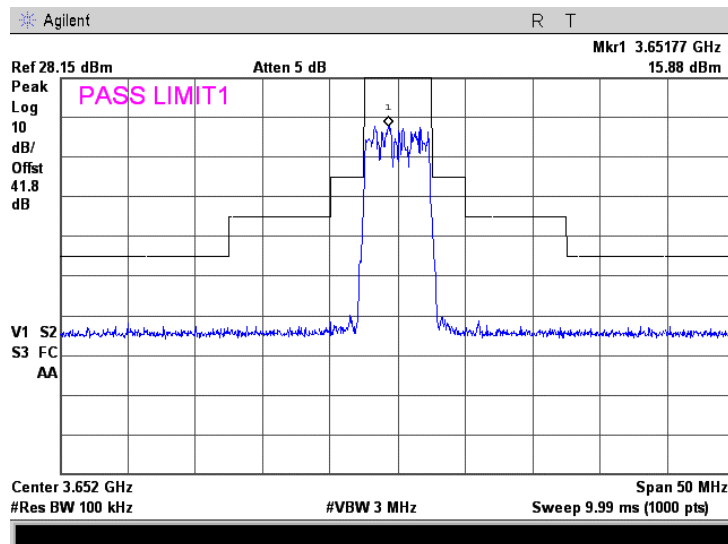


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:48:41 AM	Relative Humidity:	37 %
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Power Supply:	48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.3.17 Emission mask test results at high carrier frequency, 16QAM, bit rate 12.565 Mbps



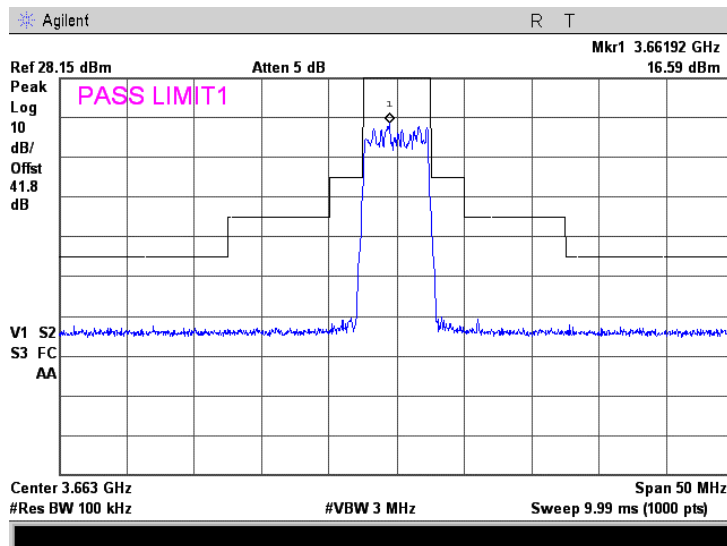
Plot 7.3.18 Emission mask test results at low carrier frequency, QPSK, bit rate 4.19 Mbps



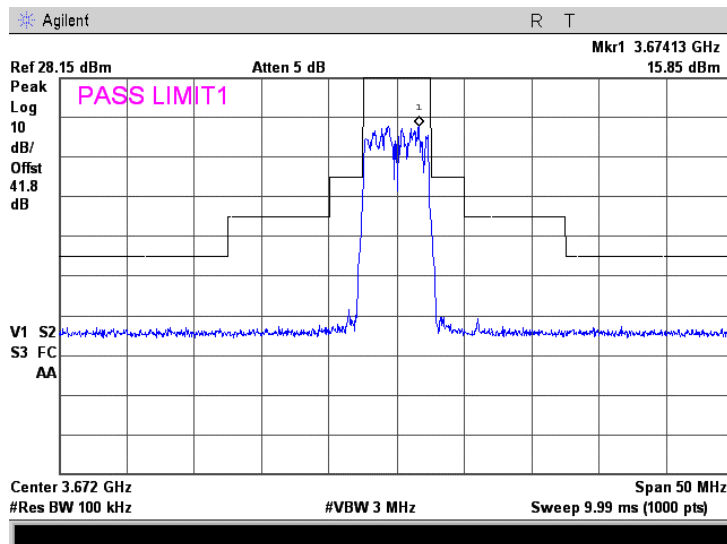


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:48:41 AM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 5 MHz CBW, antenna 2			

Plot 7.3.19 Emission mask test results at mid carrier frequency, QPSK, bit rate 4.19 Mbps



Plot 7.3.20 Emission mask test results at high carrier frequency, QPSK, bit rate 4.19 Mbps





HERMON LABORATORIES

Test specification:		Section 90.210, Emission mask	
Test procedure:		47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	
Date & Time:		10/2/2008 7:48:41 AM	
Temperature: 24.5 °C		Air Pressure: 1010 hPa	
Remarks: 7 MHz CBW		Verdict: PASS	
		Relative Humidity: 37 %	
		Power Supply: 48 VDC	

Table 7.3.3 Emission mask limits for 7 MHz channel bandwidth

Frequency displacement from carrier	Attenuation below carrier, dBc
Emission mask B (Channel bandwidth 5 MHz)	
0 – 3.5 MHz	0
3.5 – 7.0 MHz	25
7.0 – 17.5 MHz	35
More than** 17.5 MHz	43 + 10 log(P)

* - F – frequency in MHz removed from center

** - emission mask includes carrier modulation envelope within ± 150 % of the authorized bandwidth; the frequency range removed beyond ± 150 % of the authorized bandwidth from carrier was investigated as spurious emission

Table 7.3.4 Emission mask test results for 7 MHz channel bandwidth

Carrier frequency, MHz	Limit	Verdict
3653.5	Emission mask B	Pass
3662.5		
3671.5		

The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth

Reference numbers of test equipment used

HL 2909	HL 2869	HL 2952	HL 3321	HL 3435			
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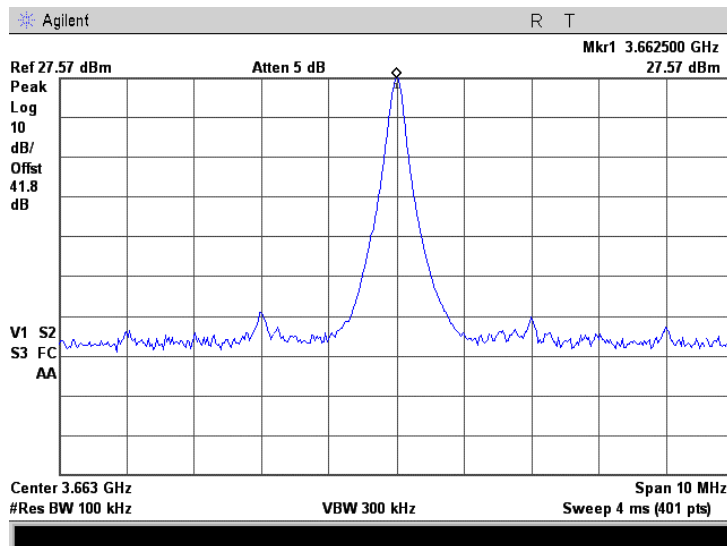
Full description is given in Appendix A.



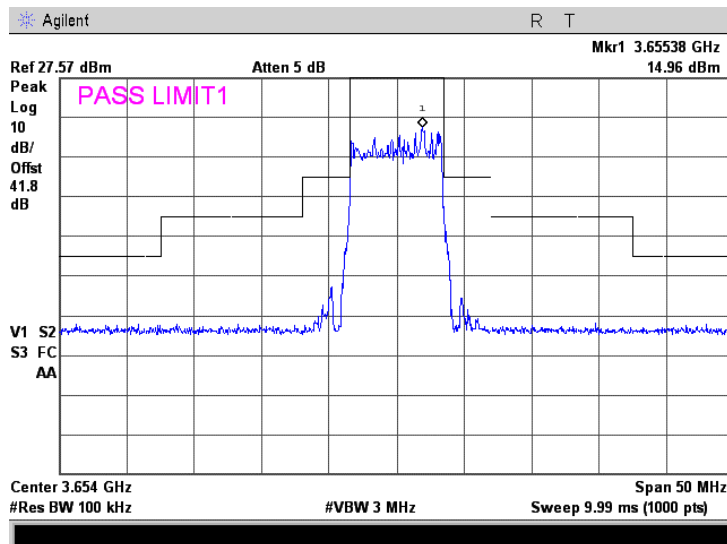
HERMON LABORATORIES

Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:48:41 AM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.3.21 Emission mask for 7 MHz channel bandwidth



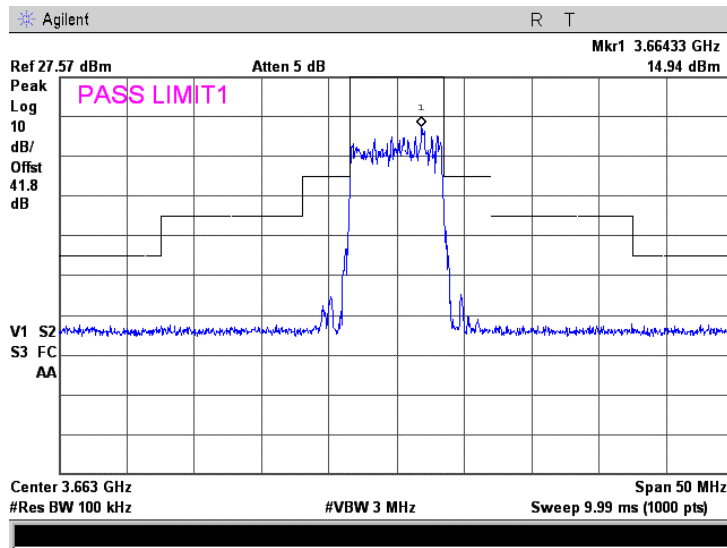
Plot 7.3.22 Emission mask test results at low carrier frequency, 64QAM, bit rate 18.85 Mbps



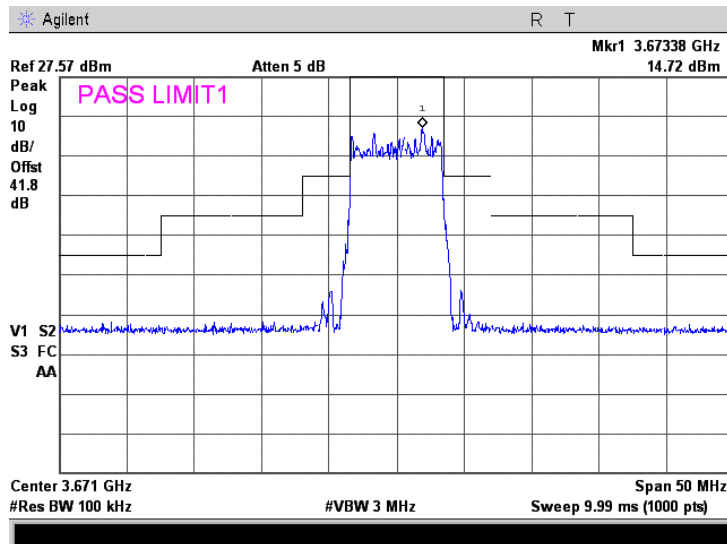


Test specification:		Section 90.210, Emission mask	
Test procedure:		47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date & Time:		10/2/2008 7:48:41 AM	
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.3.23 Emission mask test results at mid carrier frequency, 64QAM, bit rate 18.85 Mbps



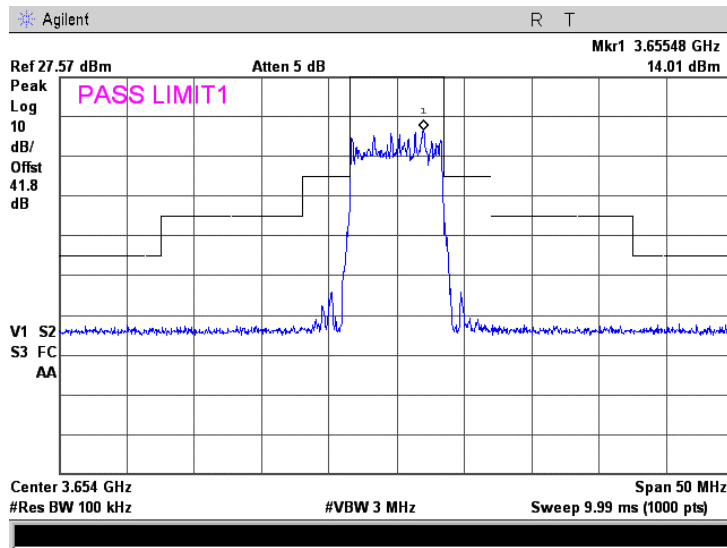
Plot 7.3.24 Emission mask test results at high carrier frequency, 64QAM, bit rate 18.85 Mbps



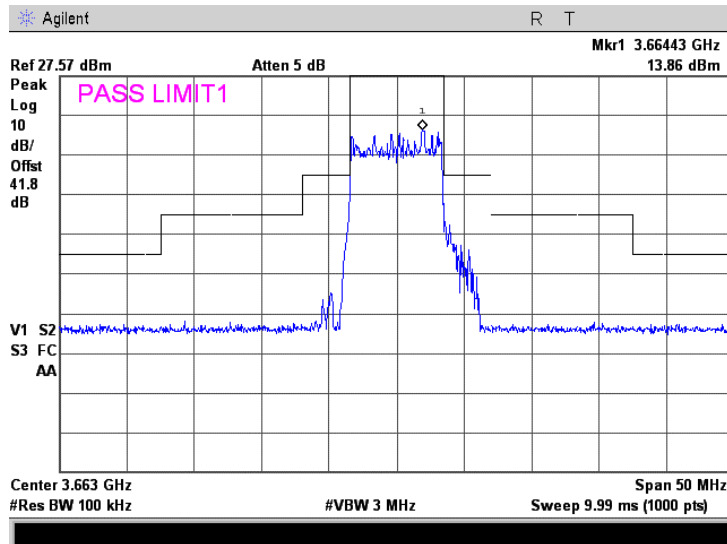


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:48:41 AM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.3.25 Emission mask test results at low carrier frequency,16QAM, bit rate 12.565 Mbps



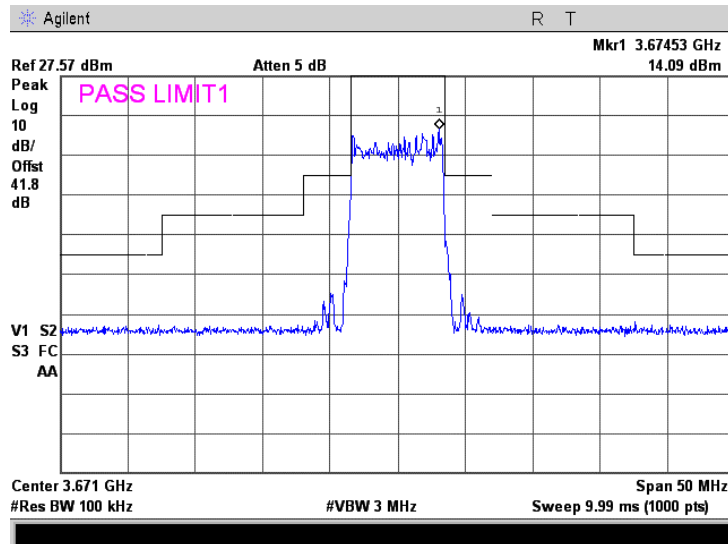
Plot 7.3.26 Emission mask test results at mid carrier frequency,16QAM, bit rate 12.565 Mbps



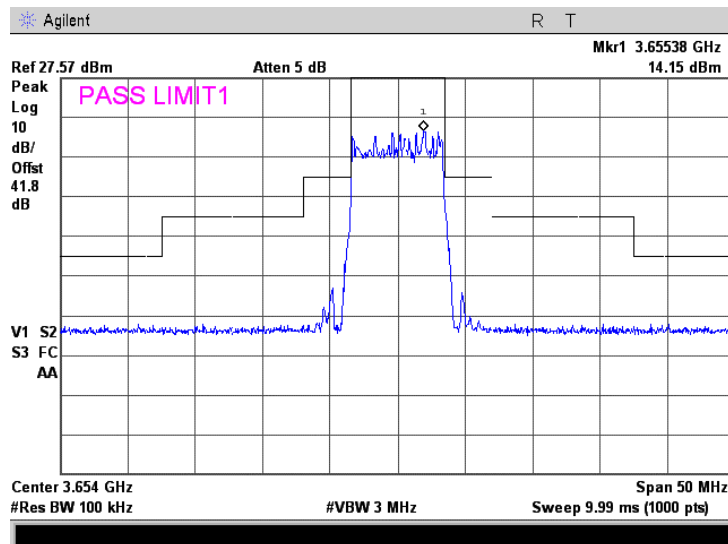


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:48:41 AM	Relative Humidity:	37 %
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Power Supply:	48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.3.27 Emission mask test results at high carrier frequency, 16QAM, bit rate 12.565 Mbps



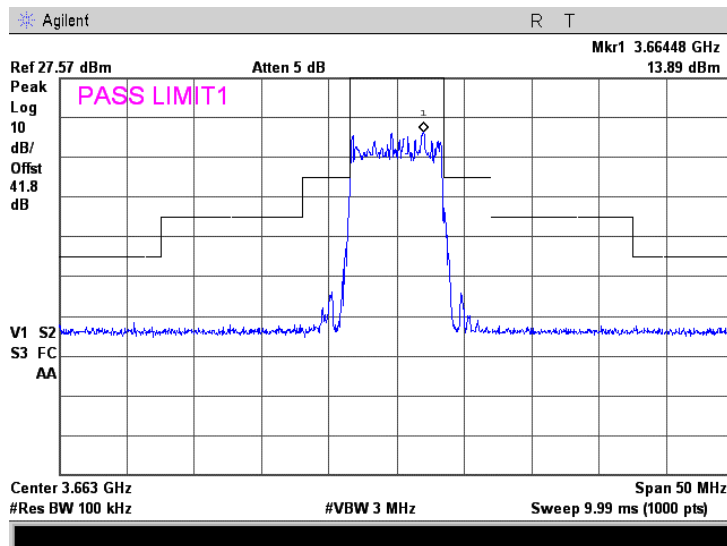
Plot 7.3.28 Emission mask test results at low carrier frequency, QPSK, bit rate 4.19 Mbps



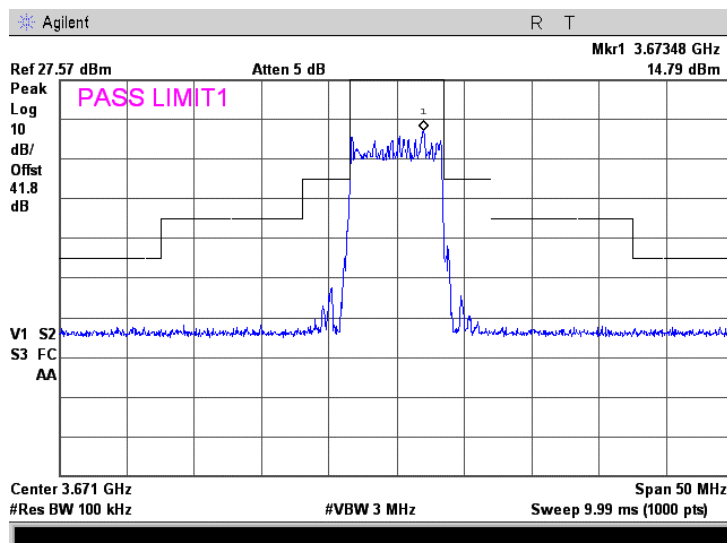


Test specification:		Section 90.210, Emission mask	
Test procedure:		47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date & Time:		10/2/2008 7:48:41 AM	
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 1			

Plot 7.3.29 Emission mask test results at mid carrier frequency, QPSK, bit rate 4.19 Mbps



Plot 7.3.30 Emission mask test results at high carrier frequency, QPSK, bit rate 4.19 Mbps

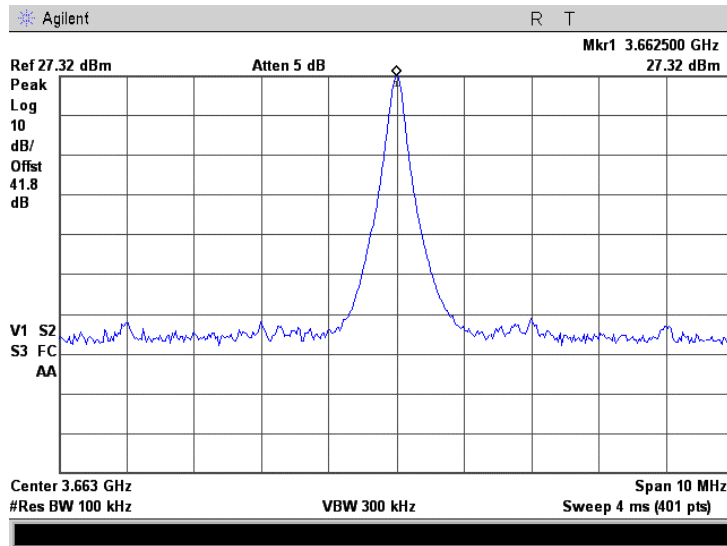




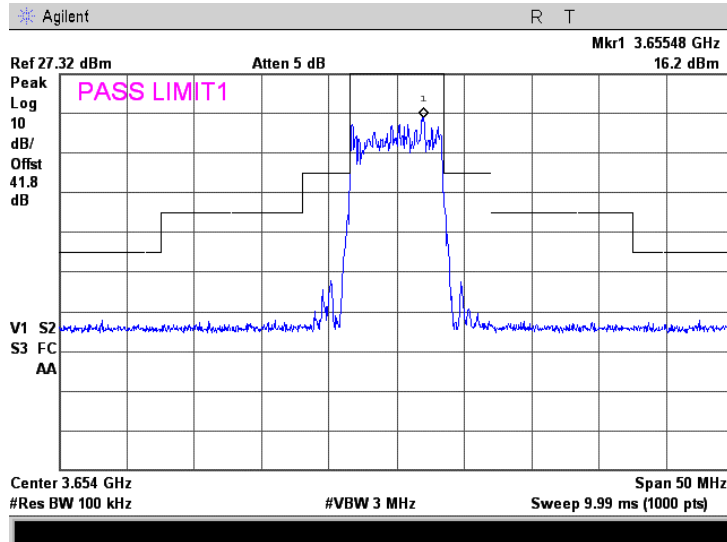
HERMON LABORATORIES

Test specification:		Section 90.210, Emission mask	
Test procedure:		47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date & Time:		10/2/2008 7:48:41 AM	
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.3.31 Emission mask for 7 MHz channel bandwidth



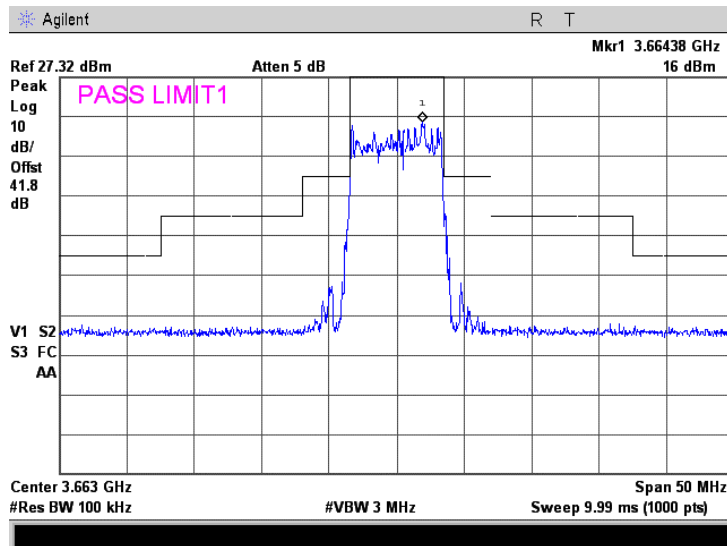
Plot 7.3.32 Emission mask test results at low carrier frequency, 64QAM, bit rate 18.85 Mbps



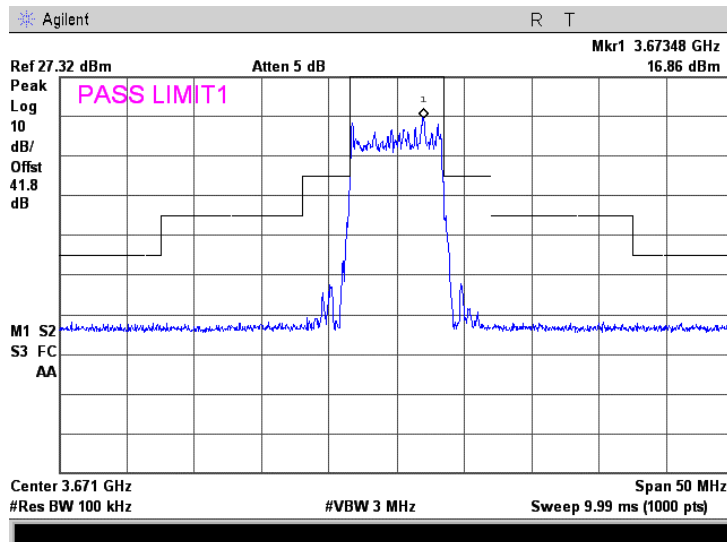


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:48:41 AM	Relative Humidity:	37 %
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Power Supply:	48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.3.33 Emission mask test results at mid carrier frequency, 64QAM, bit rate 18.85 Mbps



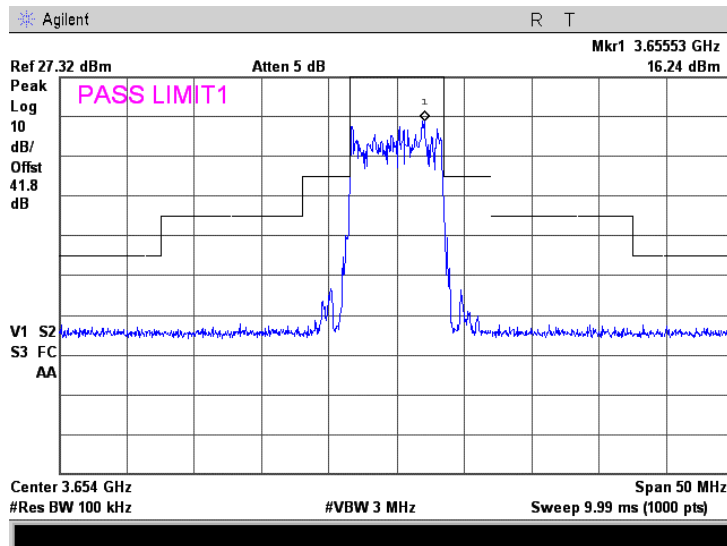
Plot 7.3.34 Emission mask test results at high carrier frequency, 64QAM, bit rate 18.85 Mbps



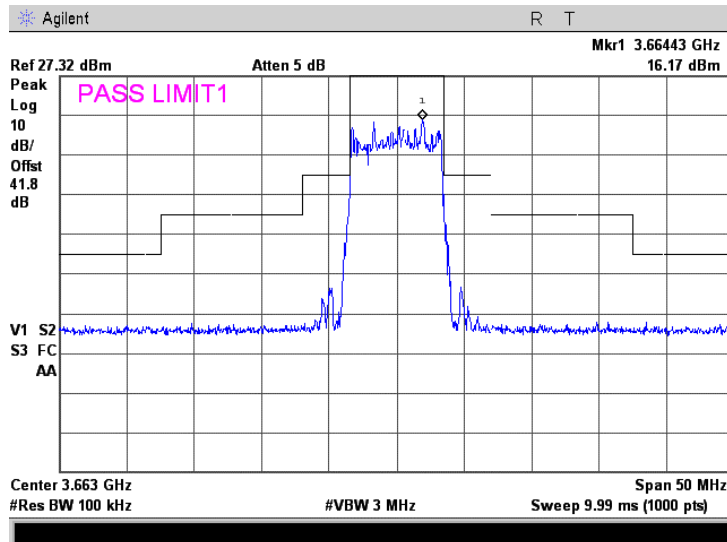


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:48:41 AM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.3.35 Emission mask test results at low carrier frequency,16QAM, bit rate 12.565 Mbps



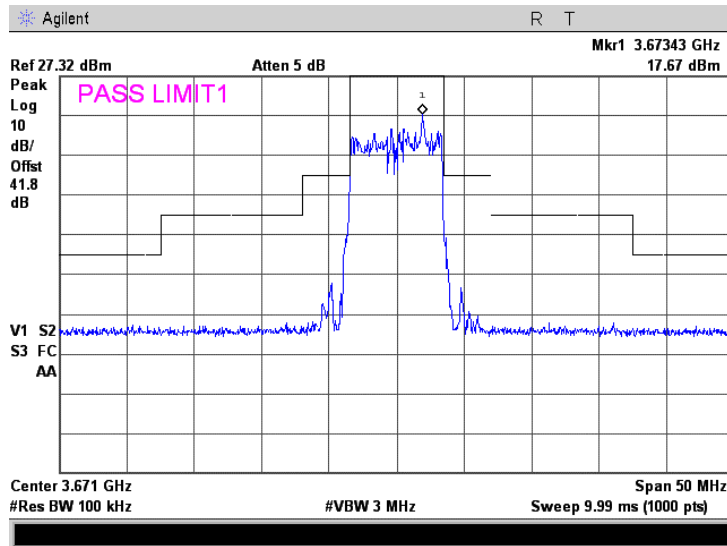
Plot 7.3.36 Emission mask test results at mid carrier frequency,16QAM, bit rate 12.565 Mbps



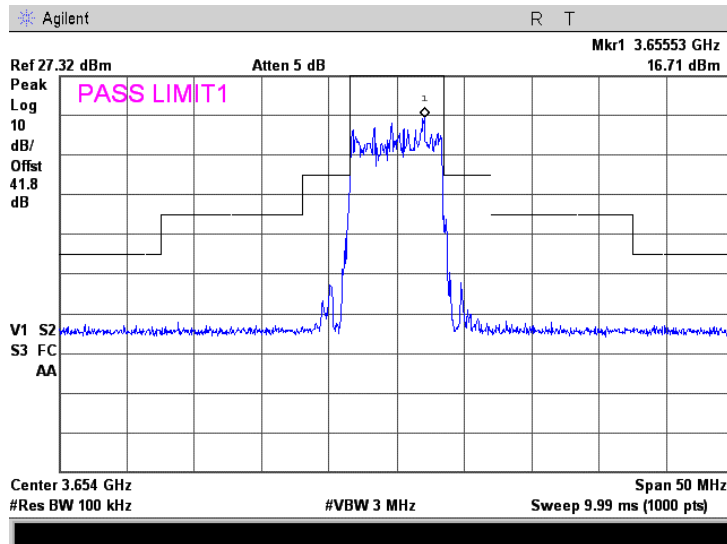


Test specification:		Section 90.210, Emission mask	
Test procedure:		47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date & Time:		10/2/2008 7:48:41 AM	
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.3.37 Emission mask test results at high carrier frequency, 16QAM, bit rate 12.565 Mbps



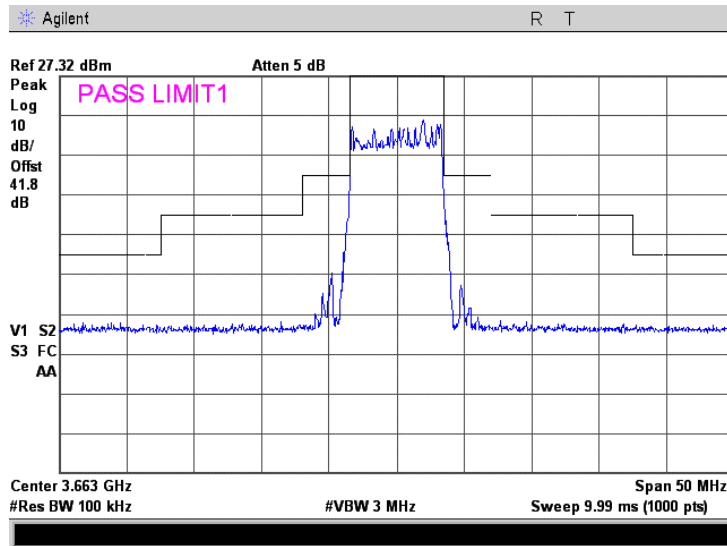
Plot 7.3.38 Emission mask test results at low carrier frequency, QPSK, bit rate 4.19 Mbps



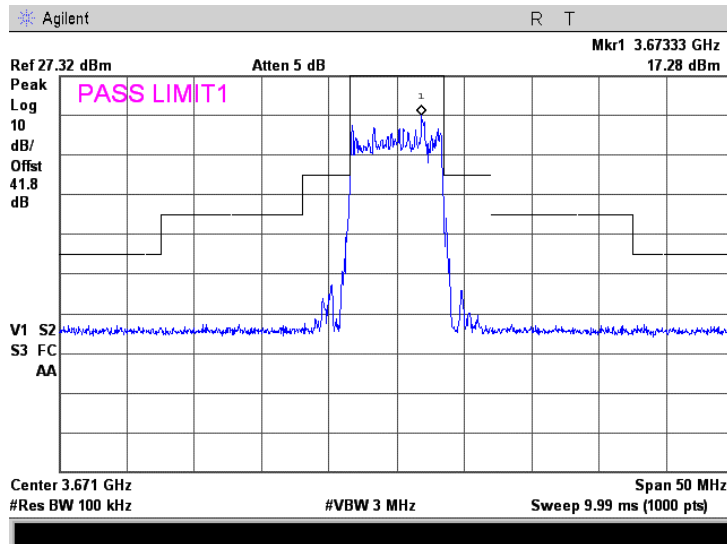


Test specification:		Section 90.210, Emission mask	
Test procedure:		47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date & Time:		10/2/2008 7:48:41 AM	
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks: 7 MHz CBW, antenna 2			

Plot 7.3.39 Emission mask test results at mid carrier frequency, QPSK, bit rate 4.19 Mbps



Plot 7.3.40 Emission mask test results at high carrier frequency, QPSK, bit rate 4.19 Mbps





Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/7/2008 4:46:10 PM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW			

Table 7.3.5 Emission mask limits for 10 MHz channel bandwidth

Frequency displacement from carrier	Attenuation below carrier, dBc
Emission mask B(Channel bandwidth 10 MHz)	
0 – 5 MHz	0
5 – 10 MHz	25
10.0 – 25 MHz	35
More than** 25 MHz	43 + 10 log(P)

* - F – frequency in MHz removed from center

** - emission mask includes carrier modulation envelope within ± 150 % of the authorized bandwidth; the frequency range removed beyond ± 150 % of the authorized bandwidth from carrier was investigated as spurious emission

Table 7.3.6 Emission mask test results for 10 MHz channel bandwidth

Carrier frequency, MHz	Limit	Verdict
3655.0	Emission mask B	Pass
3662.5		
3670.0		

The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth.

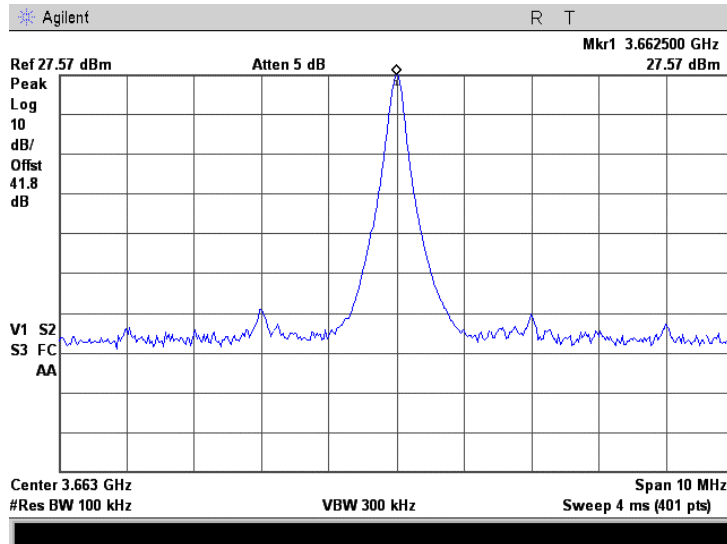
Reference numbers of test equipment used

HL 2909	HL 2869	HL 2952	HL 3321	HL 3435			
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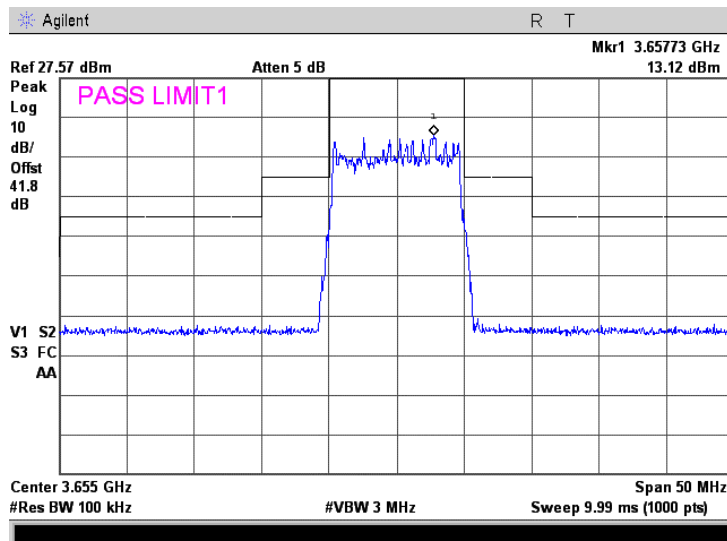
Full description is given in Appendix A.

Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/7/2008 4:46:10 PM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.3.41 Emission mask for 10 MHz channel bandwidth

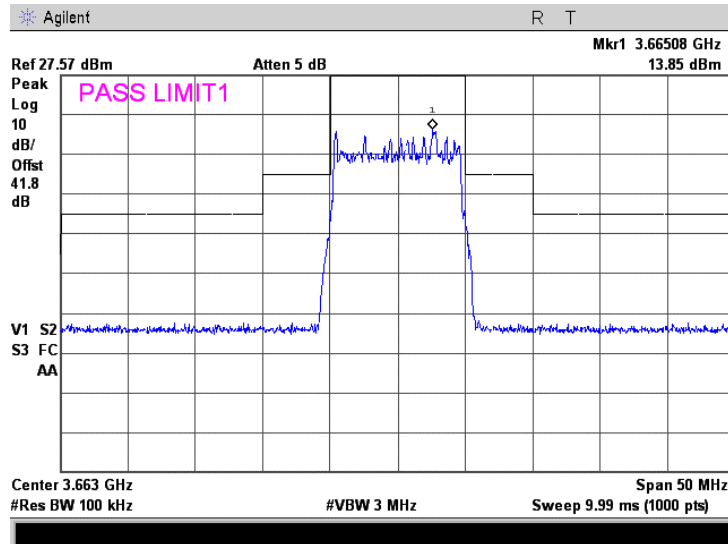


Plot 7.3.42 Emission mask test results at low carrier frequency, 64QAM, bit rate 37.7 Mbps

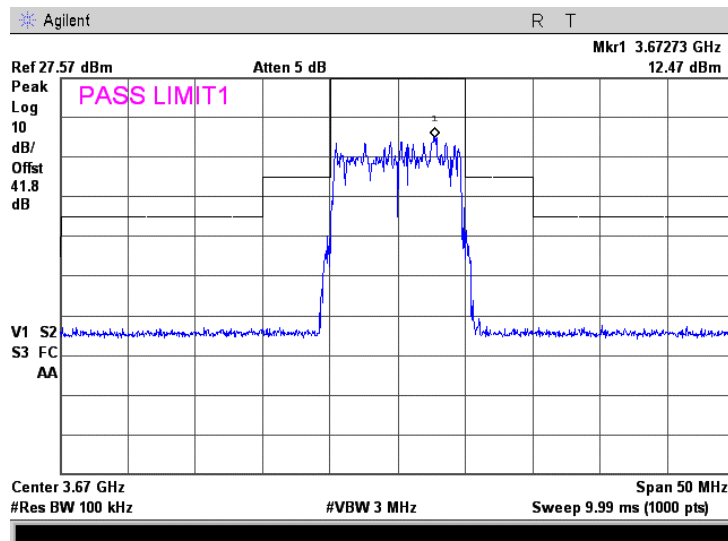


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	10/7/2008 4:46:10 PM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.3.43 Emission mask test results at mid carrier frequency, 64QAM, bit rate 37.7 Mbps

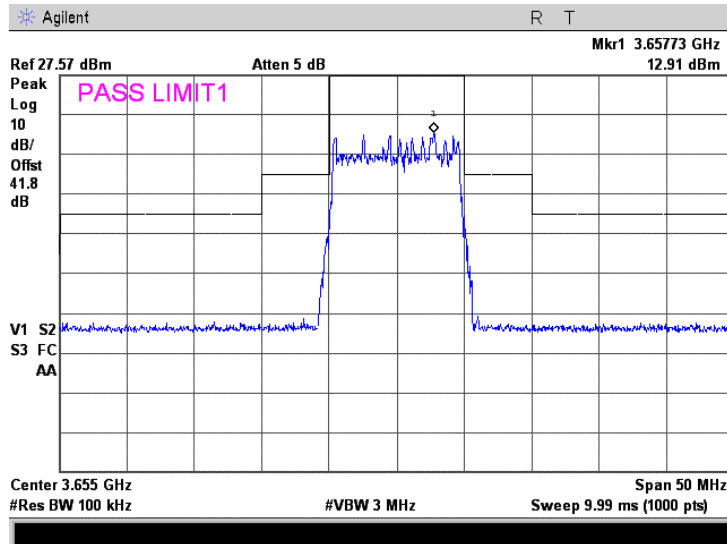


Plot 7.3.44 Emission mask test results at high carrier frequency, 64QAM, bit rate 37.7 Mbps

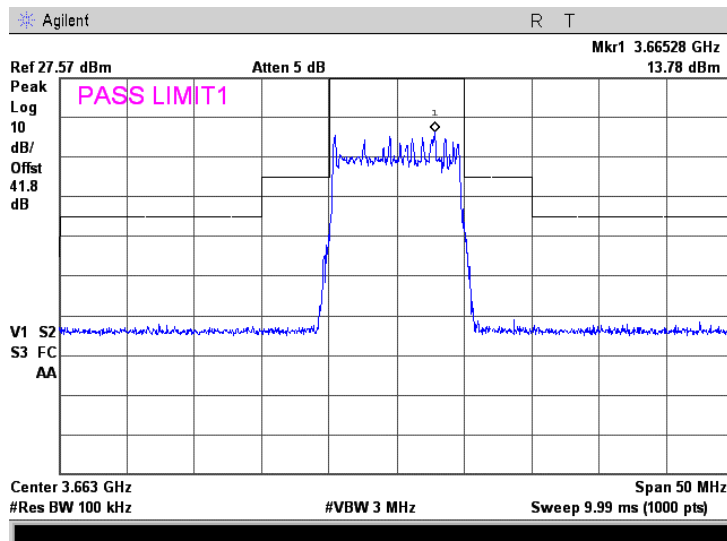


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/7/2008 4:46:10 PM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.3.45 Emission mask test results at low carrier frequency, 16QAM, bit rate 25.13 Mbps

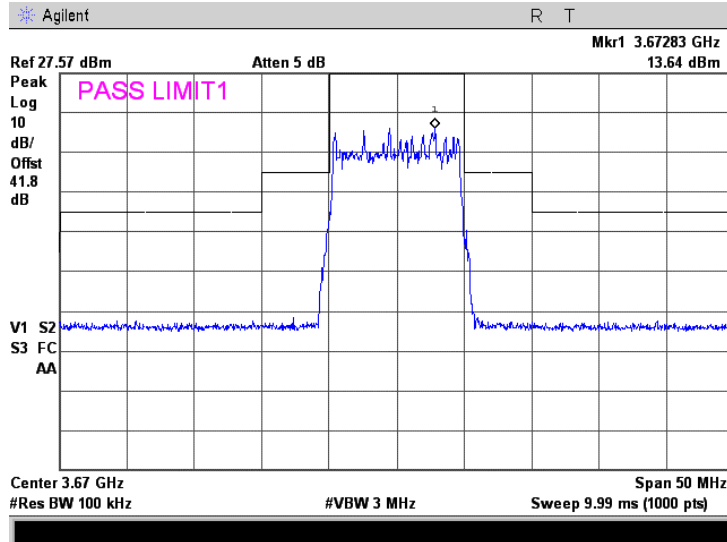


Plot 7.3.46 Emission mask test results at mid carrier frequency, 16QAM, bit rate 25.13 Mbps

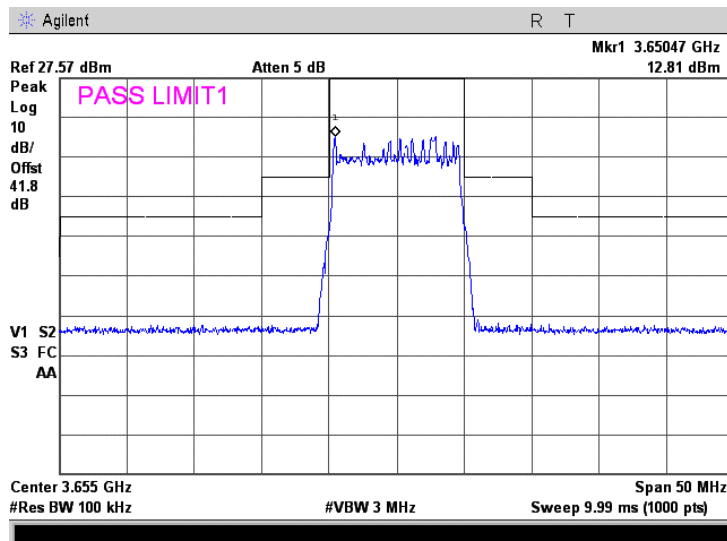


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	10/7/2008 4:46:10 PM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.3.47 Emission mask test results at high carrier frequency, 16QAM, bit rate 25.13 Mbps

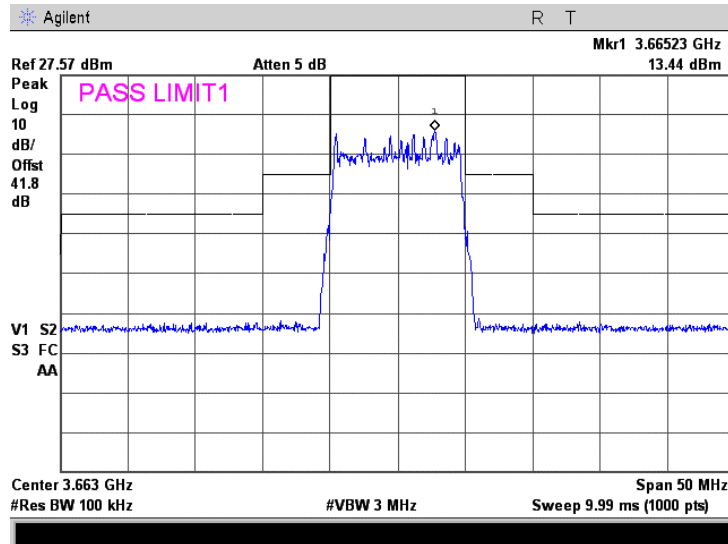


Plot 7.3.48 Emission mask test results at low carrier frequency, QPSK, bit rate 8.38 Mbps

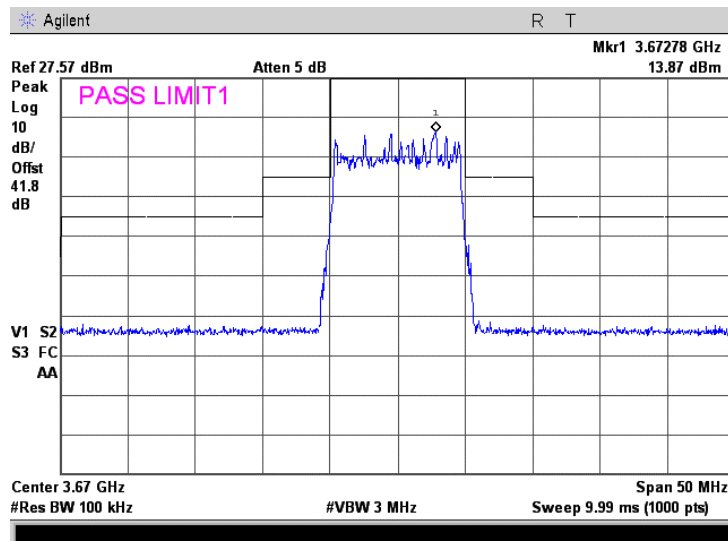


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	10/7/2008 4:46:10 PM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.3.49 Emission mask test results at mid carrier frequency, QPSK, bit rate 8.38 Mbps

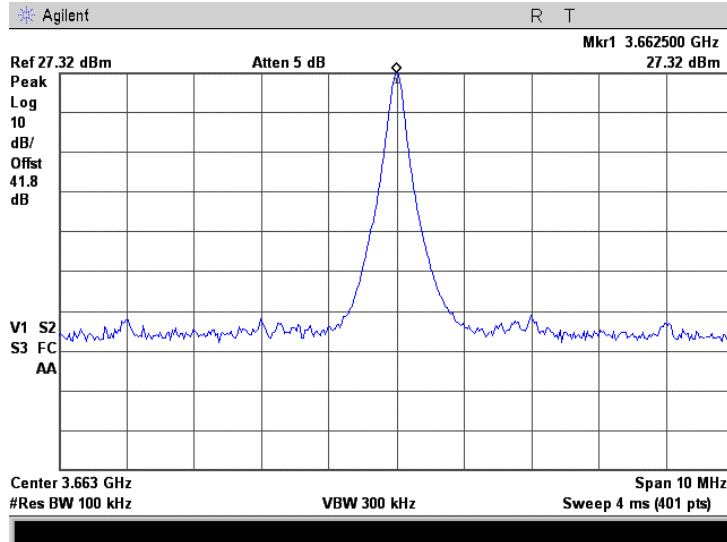


Plot 7.3.50 Emission mask test results at high carrier frequency, QPSK, bit rate 8.38 Mbps

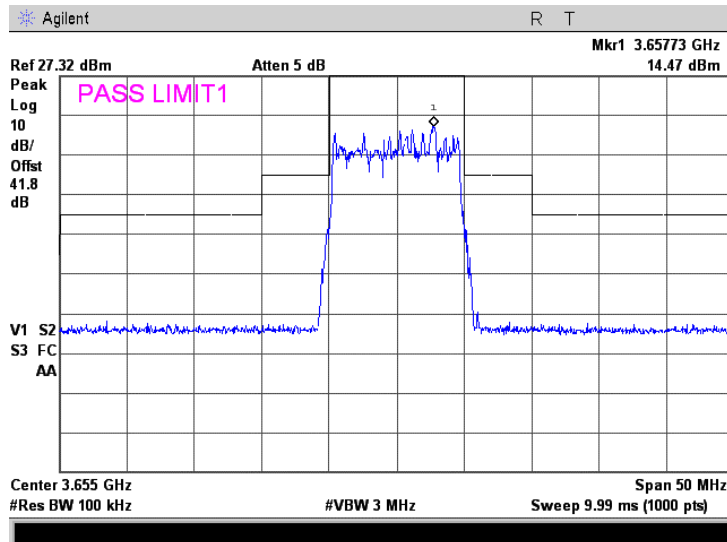


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/7/2008 4:46:10 PM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.3.51 Emission mask for 10 MHz channel bandwidth

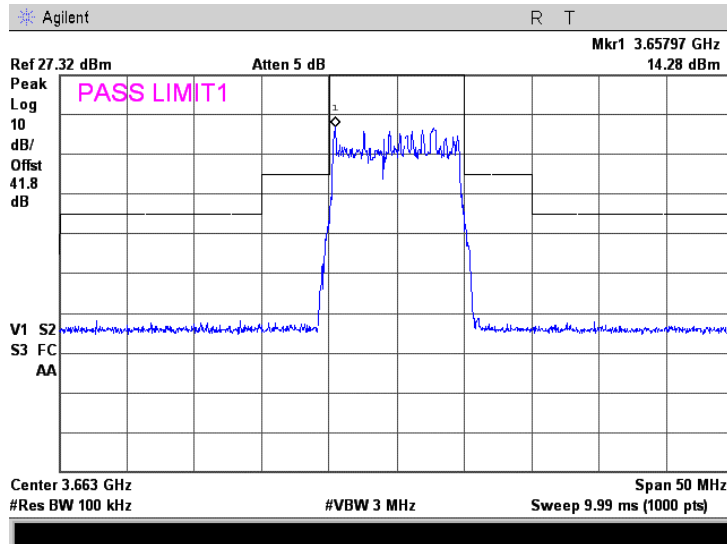


Plot 7.3.52 Emission mask test results at low carrier frequency, 64QAM, bit rate 37.7 Mbps

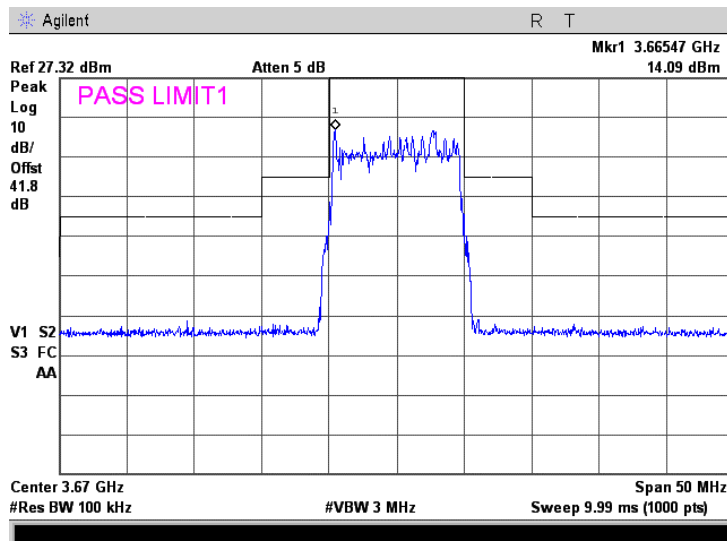


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	10/7/2008 4:46:10 PM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.3.53 Emission mask test results at mid carrier frequency, 64QAM, bit rate 37.7 Mbps

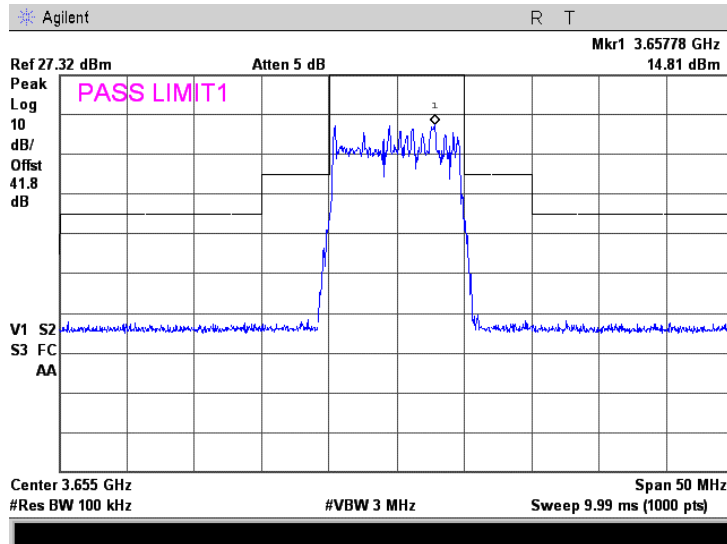


Plot 7.3.54 Emission mask test results at high carrier frequency, 64QAM, bit rate 37.7 Mbps

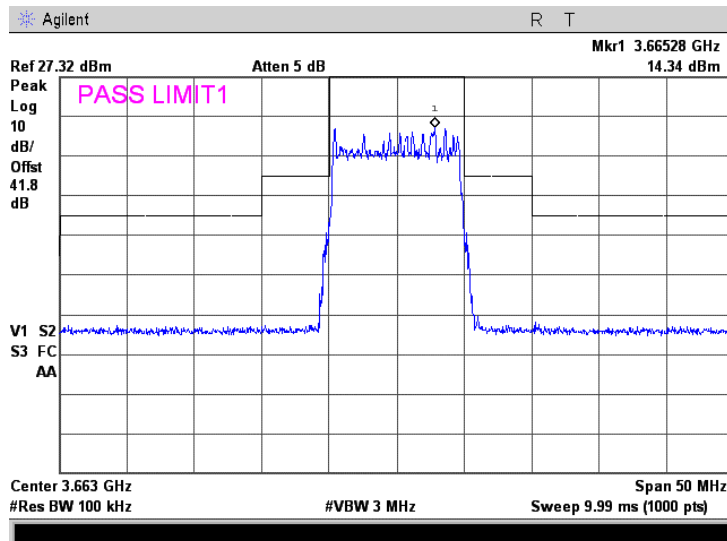


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	10/7/2008 4:46:10 PM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.3.55 Emission mask test results at low carrier frequency, 16QAM, bit rate 25.13 Mbps

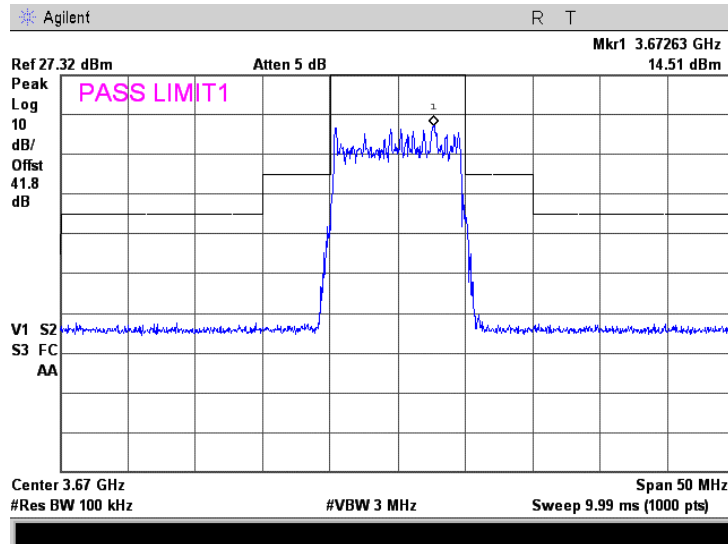


Plot 7.3.56 Emission mask test results at mid carrier frequency, 16QAM, bit rate 25.13 Mbps

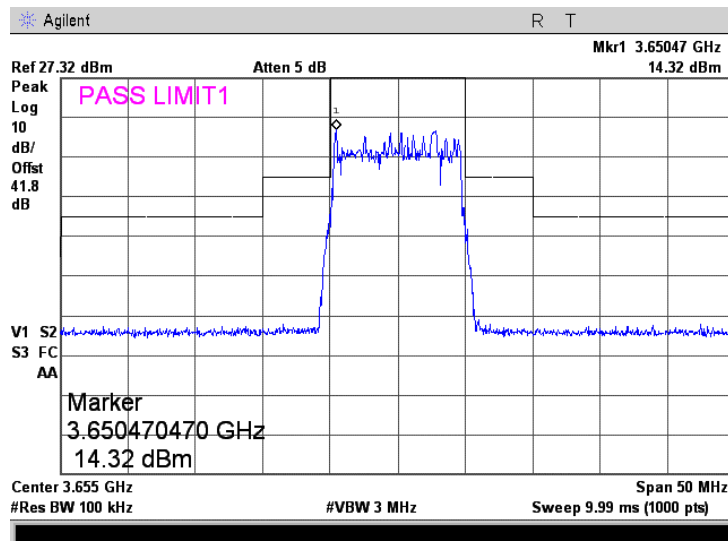


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	10/7/2008 4:46:10 PM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.3.57 Emission mask test results at high carrier frequency, 16QAM, bit rate 25.13 Mbps

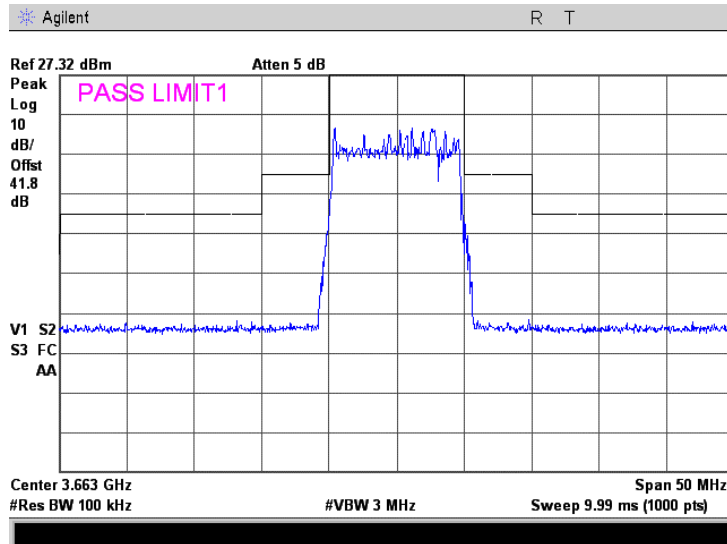


Plot 7.3.58 Emission mask test results at low carrier frequency, QPSK, bit rate 8.38 Mbps

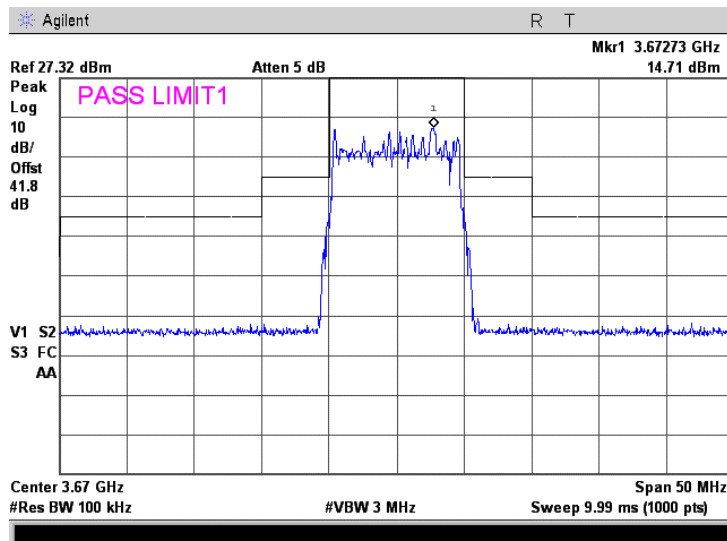


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/7/2008 4:46:10 PM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks: 10 MHz CBW, antenna 2			

Plot 7.3.59 Emission mask test results at mid carrier frequency, QPSK, bit rate 8.38 Mbps



Plot 7.3.60 Emission mask test results at high carrier frequency, QPSK, bit rate 8.38 Mbps



Test specification:		Section 90.210, Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 12:07:53 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

7.4 Radiated spurious emission measurements

7.4.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Radiated spurious emission test limits

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

* - Excluding the in band emission within ± 250 % of the authorized bandwidth from the carrier

** - 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

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

7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized and the performance check was conducted.

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

7.4.2.3 The worst test results (the lowest margins) were recorded in Table 7.4.2 and shown in the associated plots.

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

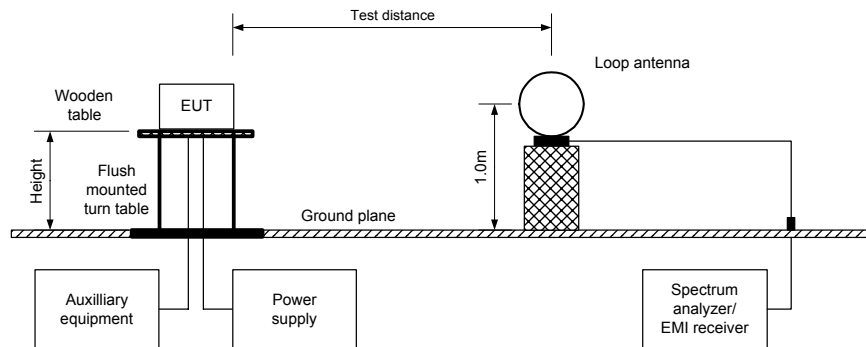
7.4.3.1 The EUT was set up as shown in Figure 7.4.2, energized and the performance check was conducted.

7.4.3.2 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.

7.4.3.3 The worst test results (the lowest margins) were recorded in Table 7.4.2 and shown in the associated plots.

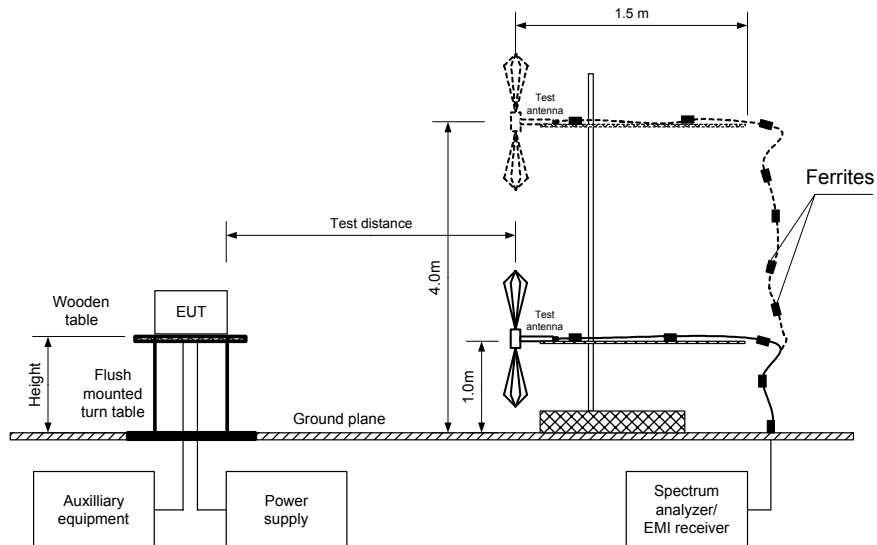
Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 12:07:53 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

Figure 7.4.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band



Photograph 7.4.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band

Figure 7.4.2 Setup for spurious emission field strength measurements above 30 MHz





Test specification:		Section 90.210, Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 12:07:53 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

Table 7.4.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 3650 – 3700 MHz
TEST DISTANCE: 3 m
TEST SITE: Semi anechoic chamber / OATS
EUT HEIGHT: 0.8 m
INVESTIGATED FREQUENCY RANGE: 0.009 – 2000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconical (30 MHz – 200 MHz)
Log periodic (200 MHz – 1000 MHz)
Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)

MODULATION: 16QAM
MODULATING SIGNAL: OFDM
BIT RATE: 12.565 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 22 dBm
CHANNEL SPACING: 5 MHz

Frequency, MHz	Field strength, dB(μ V/m)	Limit, dB(μ V/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Low carrier frequency 3652.5 MHz							
All spurious are at least 20 dB below the limit							
Mid carrier frequency 3662.5 MHz							
All spurious are at least 20 dB below the limit							
High carrier frequency 3672.5 MHz							
All spurious are at least 20 dB below the limit							

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

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

Reference numbers of test equipment used

HL 0446	HL 0521	HL 0554	HL 0604	HL 0768	HL 0769	HL 1424	HL 1947
HL 1984	HL 2254	HL 2259	HL 2260	HL 2780	HL 3123		

Full description is given in Appendix A.

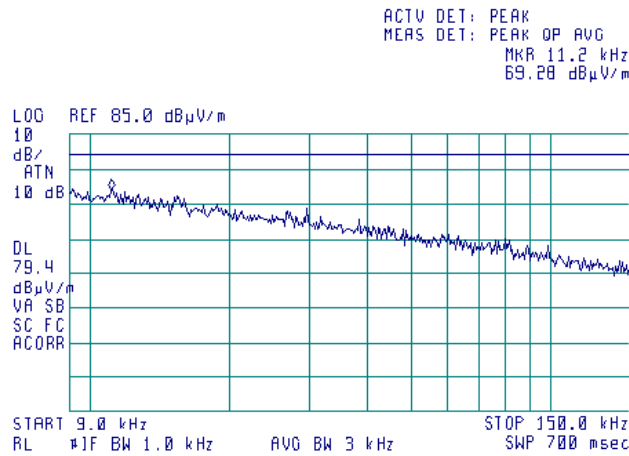


HERMON LABORATORIES

Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 12:07:53 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

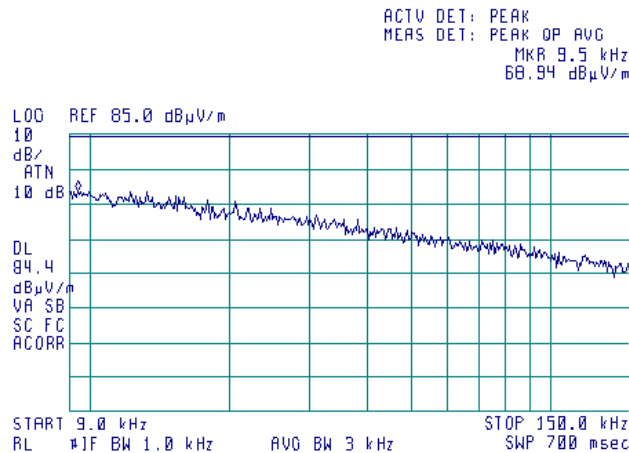
Plot 7.4.1 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.4.2 Radiated emission measurements in 9 - 150 kHz range

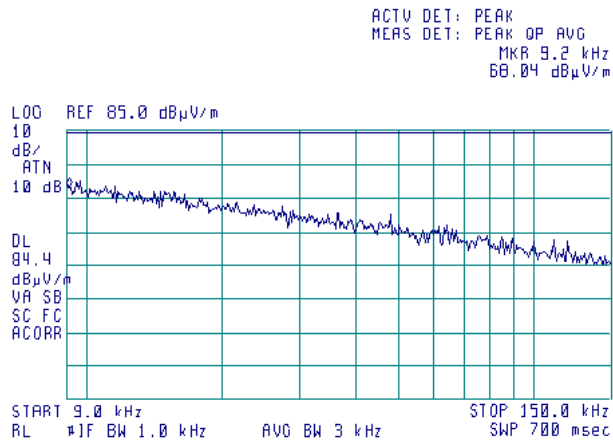
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 12:07:53 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

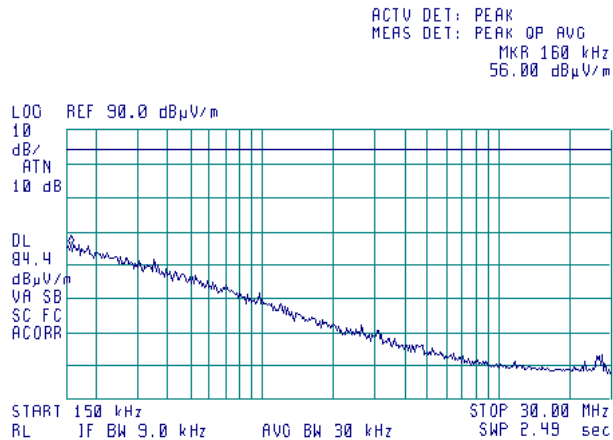
Plot 7.4.3 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.4.4 Radiated emission measurements in 0.15 - 30 MHz range

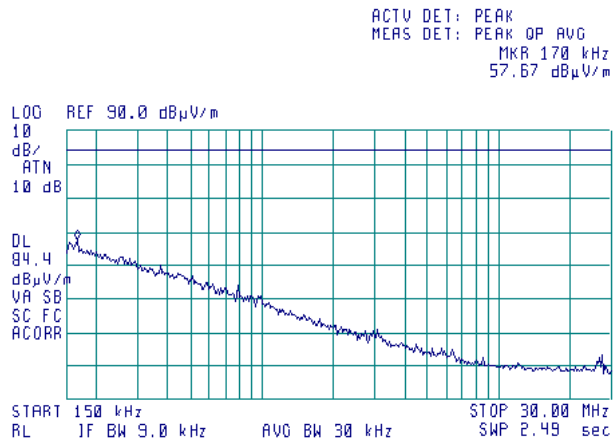
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: Low
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 12:07:53 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

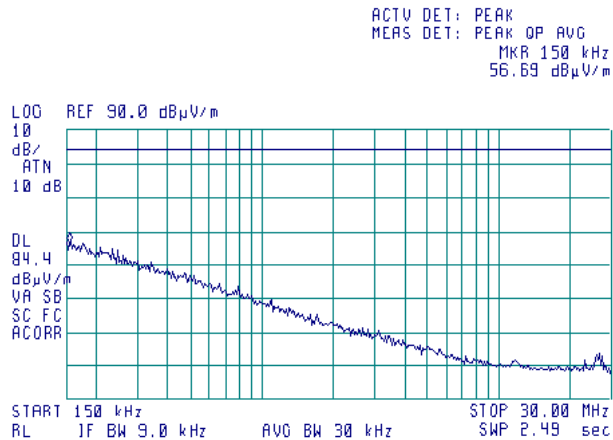
Plot 7.4.5 Radiated emission measurements in 0.15 - 30 MHz range

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



Plot 7.4.6 Radiated emission measurements in 0.15 - 30 MHz range

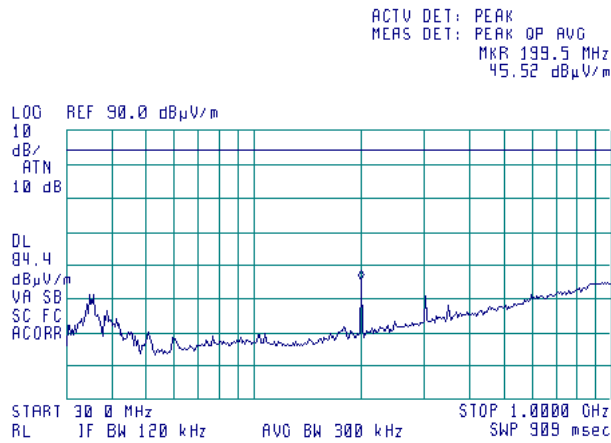
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: High
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification:		Section 90.210, Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 12:07:53 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

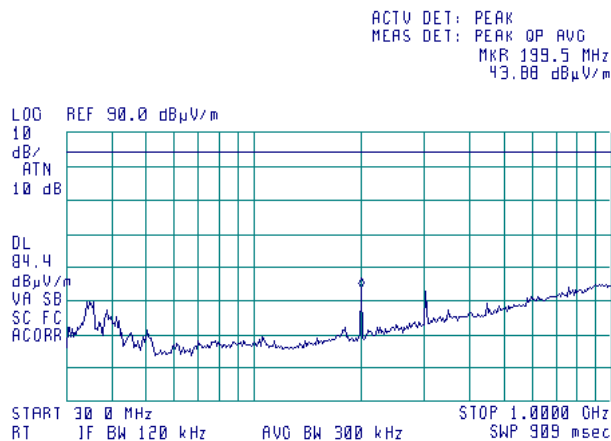
Plot 7.4.7 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.4.8 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



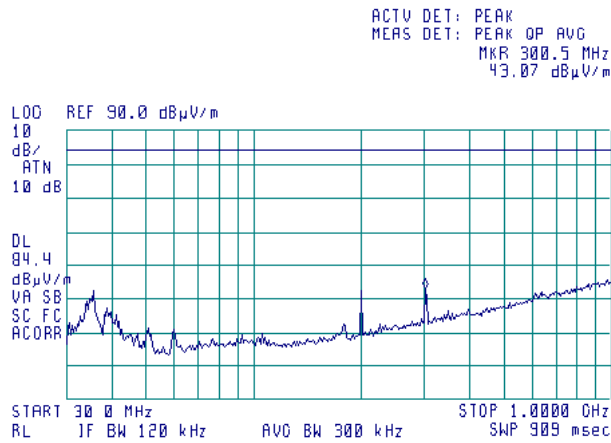


HERMON LABORATORIES

Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 12:07:53 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

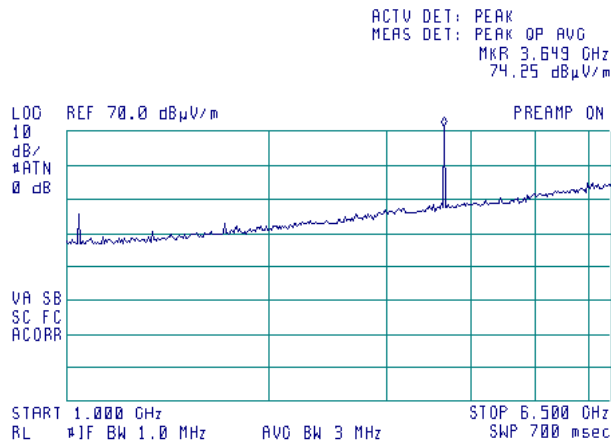
Plot 7.4.9 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.4.10 Radiated emission measurements in 1000 – 6500 MHz range

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



NOTE: 3652.5MHz low fundamental frequency of the transmitter

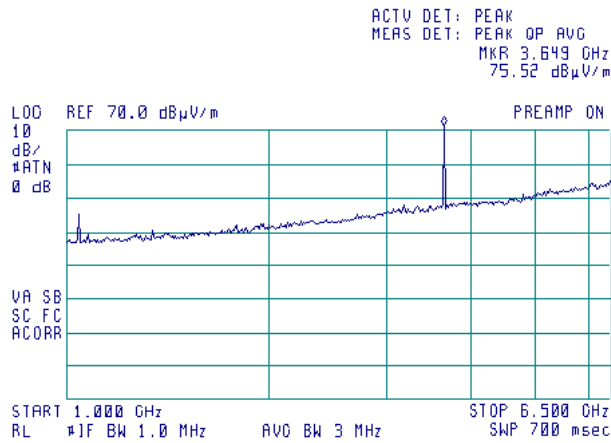


HERMON LABORATORIES

Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 12:07:53 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.11 Radiated emission measurements in 1000 – 6500 MHz range

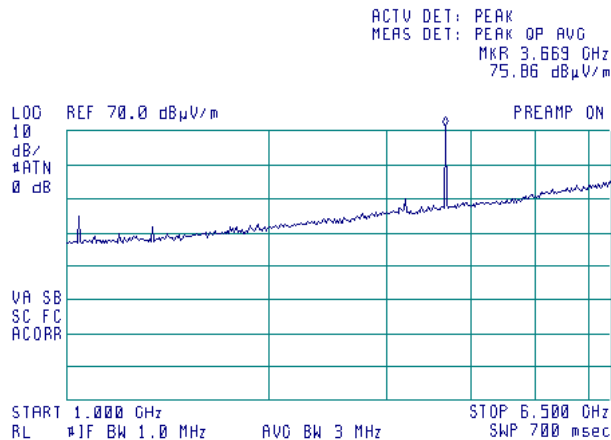
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



NOTE: 3662.5MHz mid fundamental frequency of the transmitter

Plot 7.4.12 Radiated emission measurements in 1000 – 6500 MHz range

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

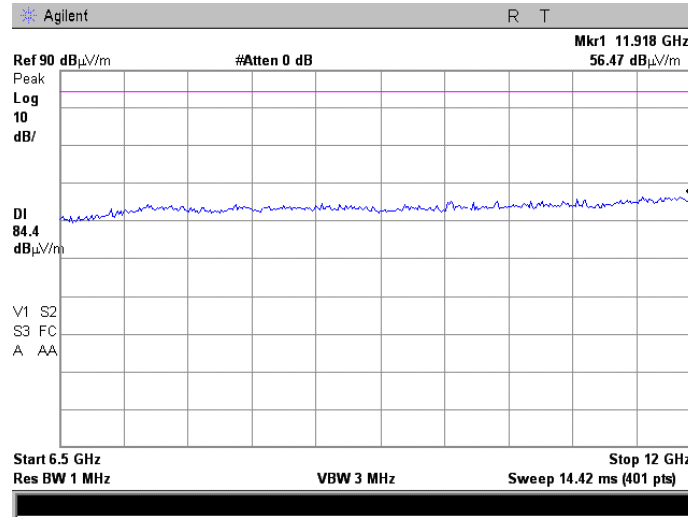


NOTE: 3672.5MHz high fundamental frequency of the transmitter.

Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 12:07:53 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

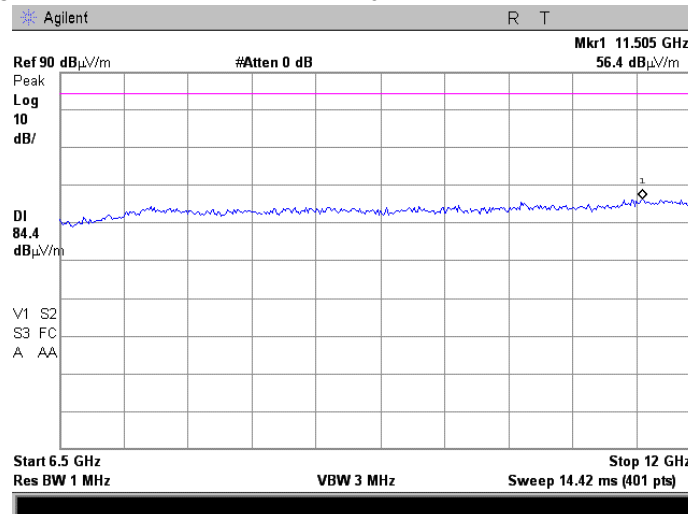
Plot 7.4.13 Radiated emission measurements in 6500 – 12000 MHz range

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



Plot 7.4.14 Radiated emission measurements in 6500 – 12000 MHz range

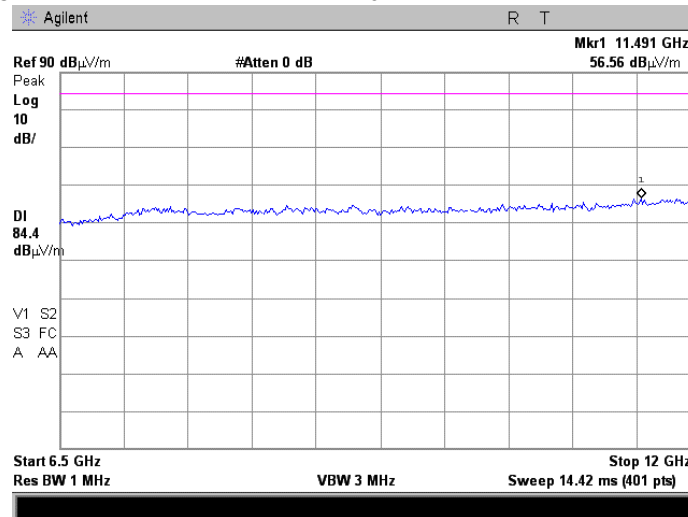
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 12:07:53 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

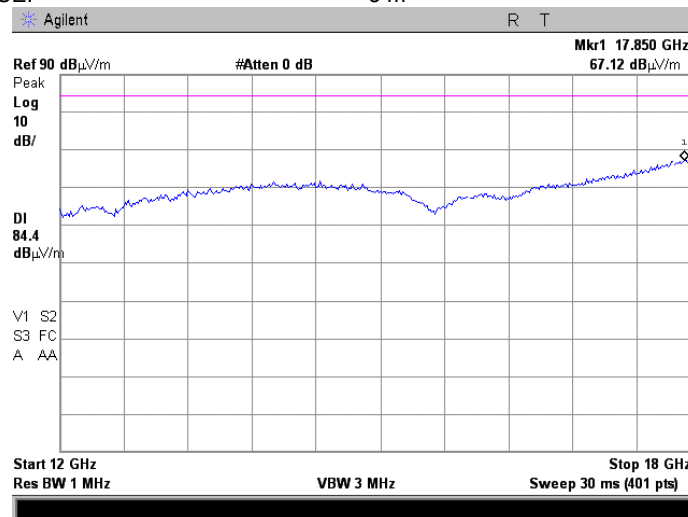
Plot 7.4.15 Radiated emission measurements in 6500 – 12000 MHz range

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



Plot 7.4.16 Radiated emission measurements in 12000 – 18000 MHz range

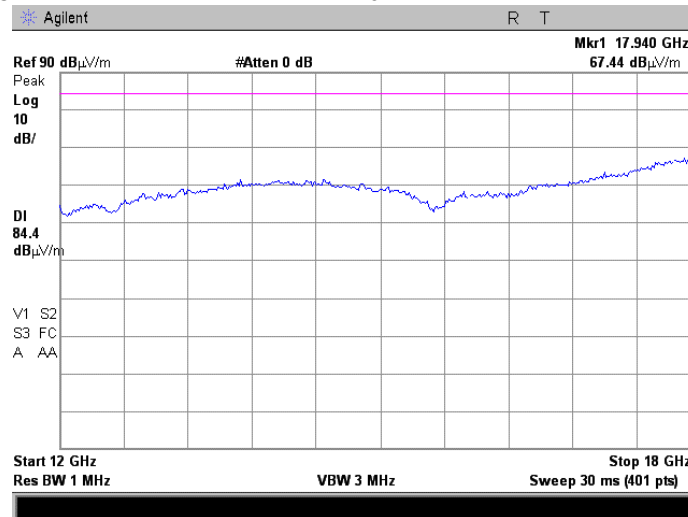
TEST SITE: Anechoic chamber
 CARRIER FREQUENCY: Low
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 12:07:53 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

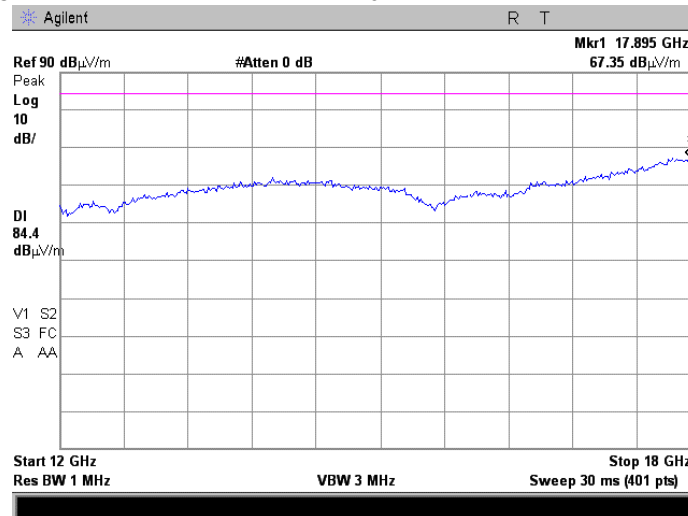
Plot 7.4.17 Radiated emission measurements in 12000 – 18000 MHz range

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



Plot 7.4.18 Radiated emission measurements in 12000 – 18000 MHz range

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

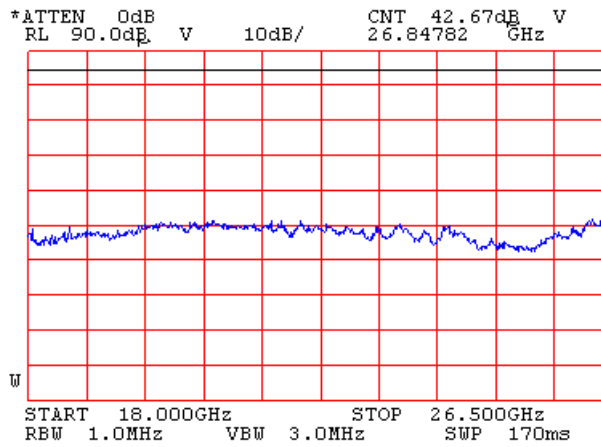




Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 12:07:53 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

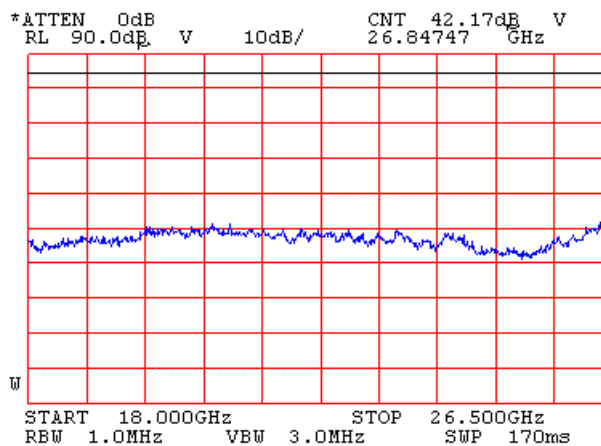
Plot 7.4.19 Radiated emission measurements in 18000 – 26500 MHz range

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



Plot 7.4.20 Radiated emission measurements in 18000 – 26500 MHz range

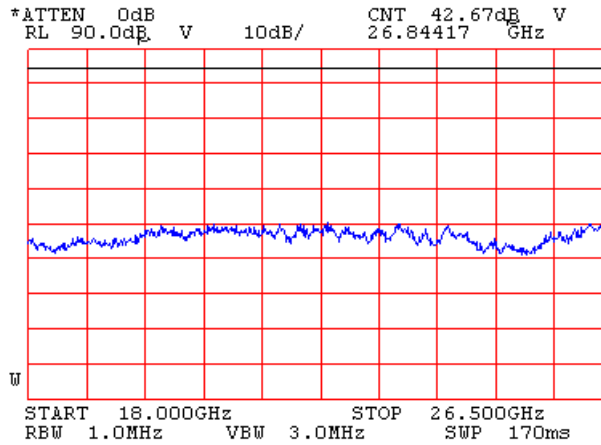
TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification:		Section 90.210, Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 12:07:53 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

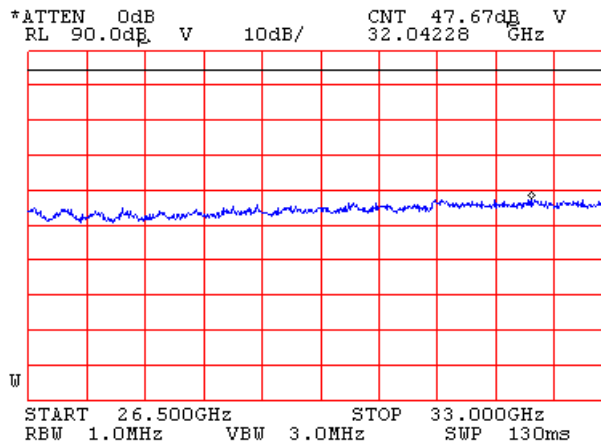
Plot 7.4.21 Radiated emission measurements in 18000 – 26500 MHz range

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



Plot 7.4.22 Radiated emission measurements in 26500 – 33000 MHz range

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

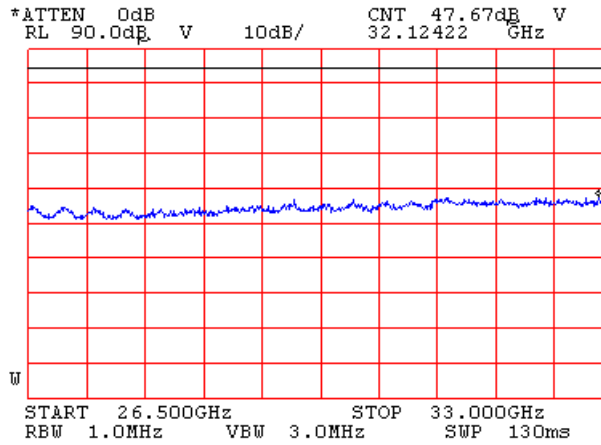




Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/5/2008 12:07:53 PM			
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

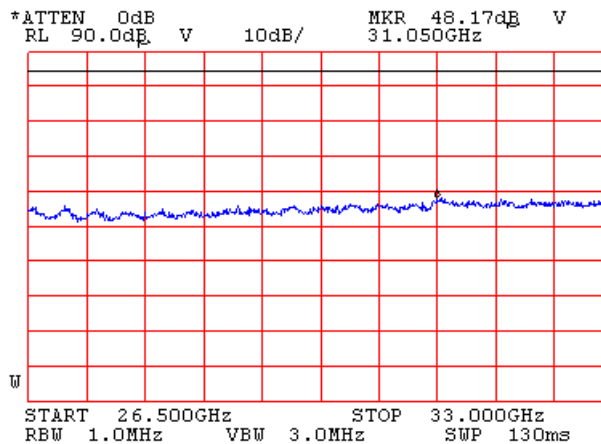
Plot 7.4.23 Radiated emission measurements in 26500 – 33000 MHz range

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



Plot 7.4.24 Radiated emission measurements in 26500 – 33000 MHz range

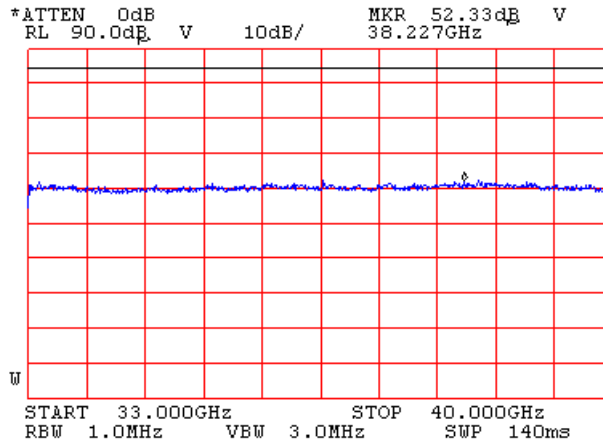
TEST SITE: OATS
 CARRIER FREQUENCY: High
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification:		Section 90.210, Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 12:07:53 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

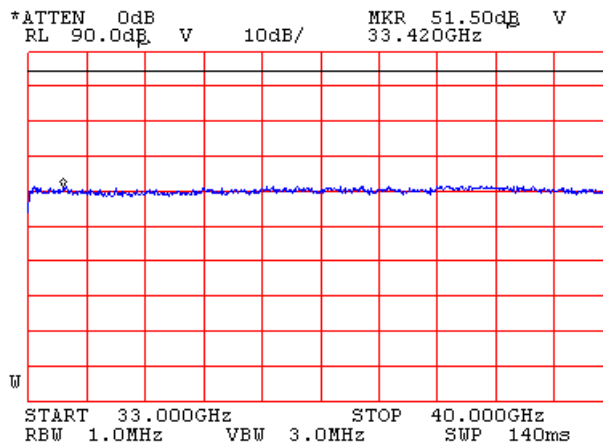
Plot 7.4.25 Radiated emission measurements in 33000 – 40000 MHz range

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



Plot 7.4.26 Radiated emission measurements in 33000 – 40000 MHz range

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



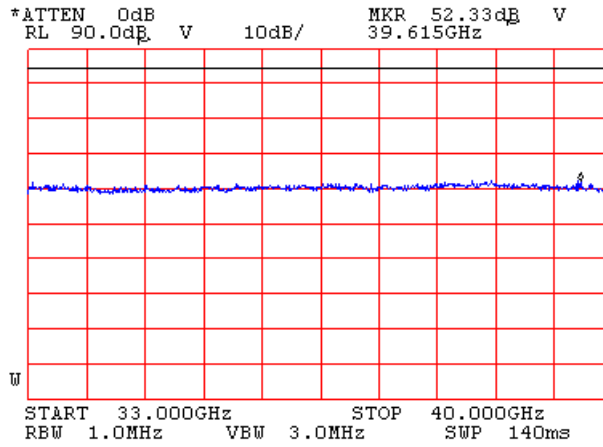


HERMON LABORATORIES

Test specification:		Section 90.210, Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/5/2008 12:07:53 PM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 37 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.27 Radiated emission measurements in 33000 – 40000 MHz range

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



Test specification:		Section 90.210, Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

7.5 Spurious emissions at RF antenna connector test

7.5.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.5.1

Table 7.5.1 Spurious emission limits

Frequency, MHz	ERP of spurious, dBm	
0.009 – 10 th harmonic*	Low carrier frequency	-13
	Mid carrier frequency	-13
	High carrier frequency	-13

* - spurious emission limits do not apply to the in band emission within ± 150 % of the authorized bandwidth from the carrier; investigated in course of emission mask testing

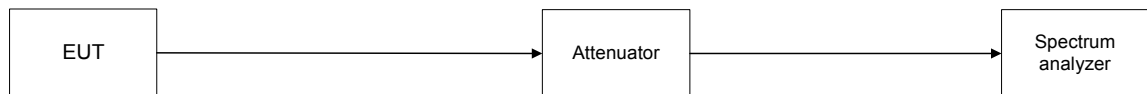
7.5.2 Test procedure

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

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

7.5.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.5.2, Table 7.5.3 and associated plots.

Figure 7.5.1 Spurious emission test setup





Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 1			

Table 7.5.2 Spurious emission test results, antenna 1

ASSIGNED FREQUENCY RANGE: 3650.0 – 3675.0 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 38000 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: 3/30/300/3000 kHz
 MODULATION: 16QAM
 BIT RATE: 12.565 Mbps
 CHANNEL BANDWIDTH: 5 MHz
 TRANSMITTER OUTPUT POWER SETTINGS: 22 dBm

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Low carrier frequency 3652.5 MHz									
No spurious were found									Pass
Mid carrier frequency 3675.0 MHz									
No spurious were found									Pass
High carrier frequency 3697.5 MHz									
No spurious were found									Pass

*- Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

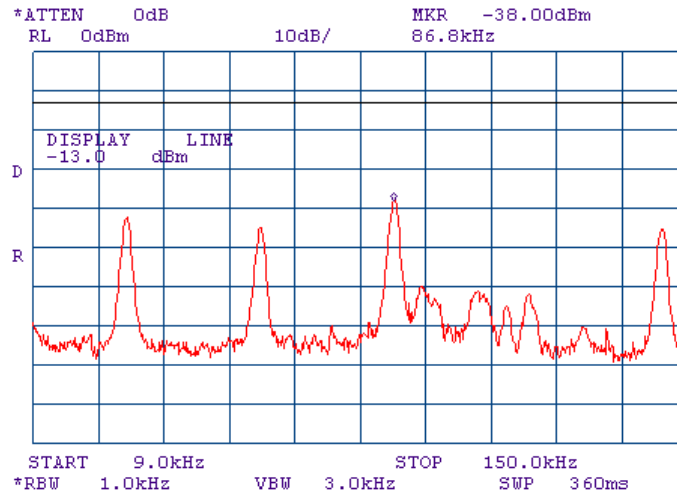
HL 1424	HL 2869	HL 2952	HL 3321	HL 3455			
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Full description is given in Appendix A.

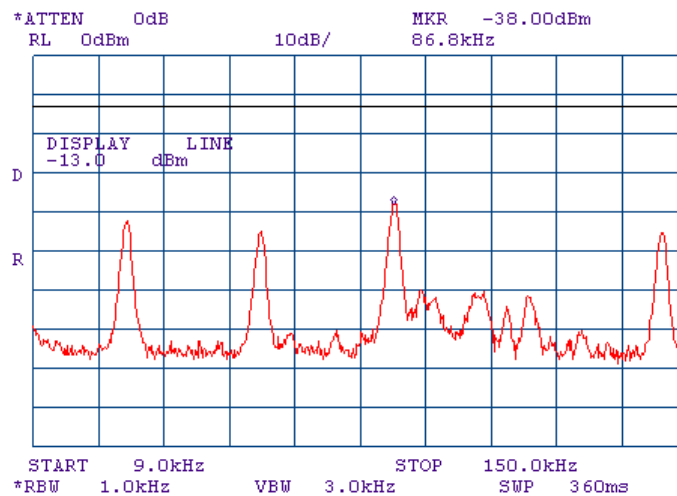


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 1			

Plot 7.5.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency



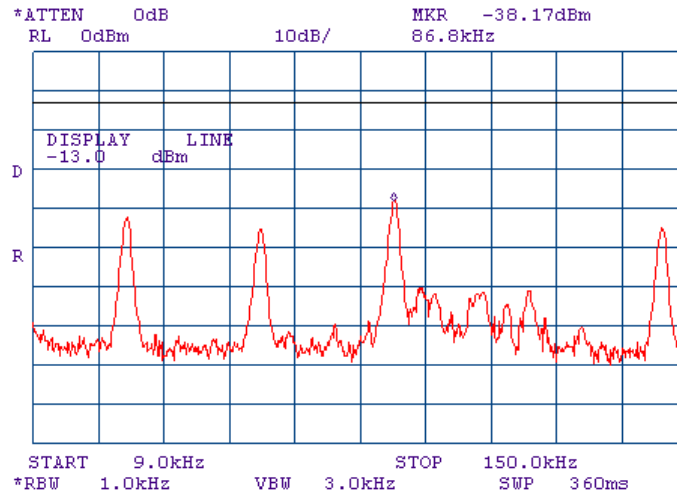
Plot 7.5.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency



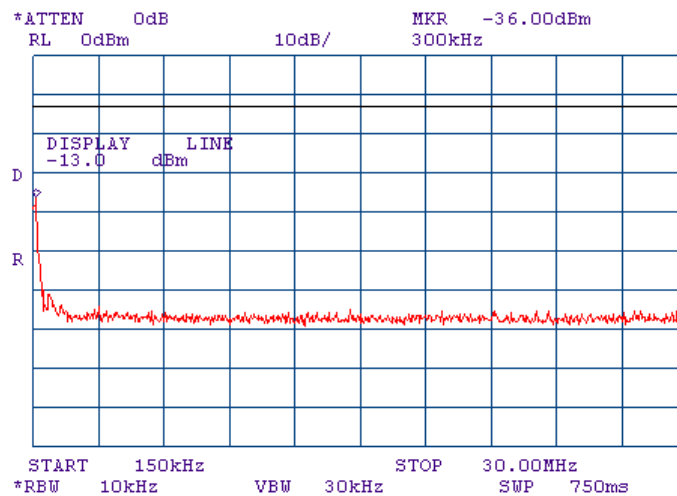


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 1			

Plot 7.5.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency



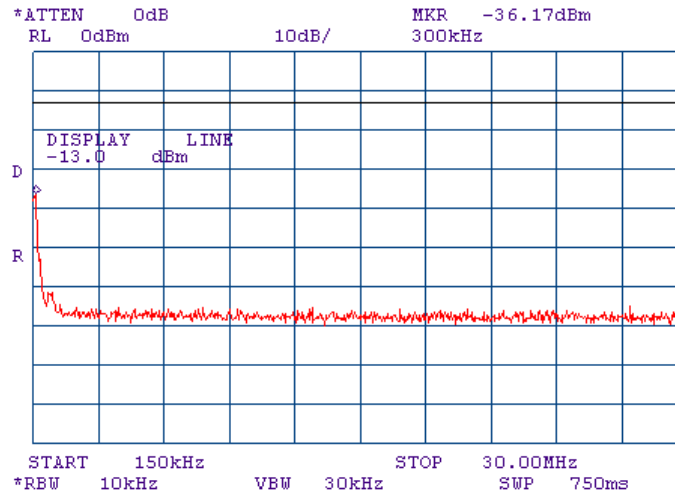
Plot 7.5.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency



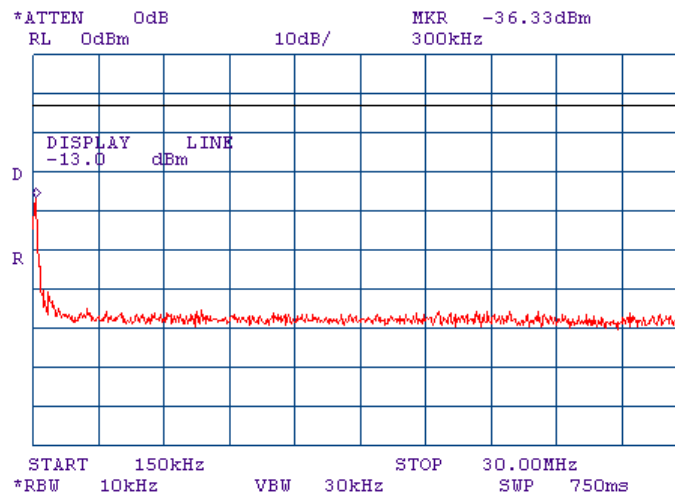


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 1			

Plot 7.5.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency

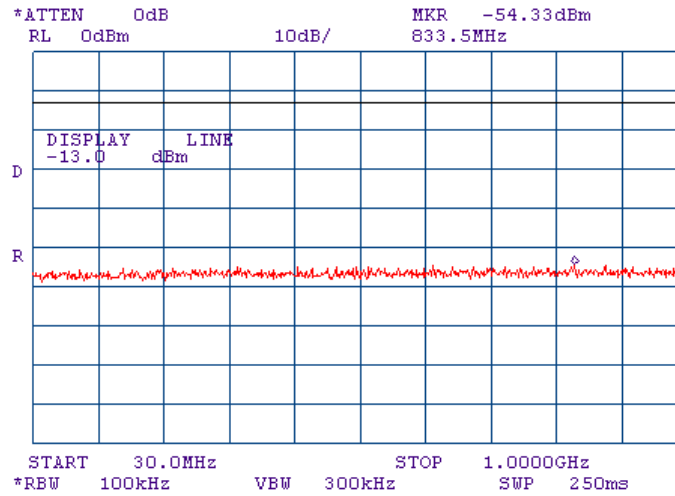


Plot 7.5.6 Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency

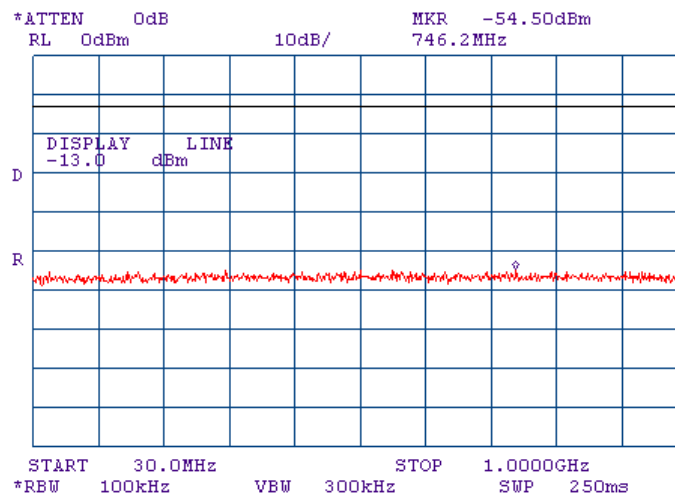


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 1			

Plot 7.5.7 Spurious emission measurements in 30.0 - 1000 MHz range at low carrier frequency



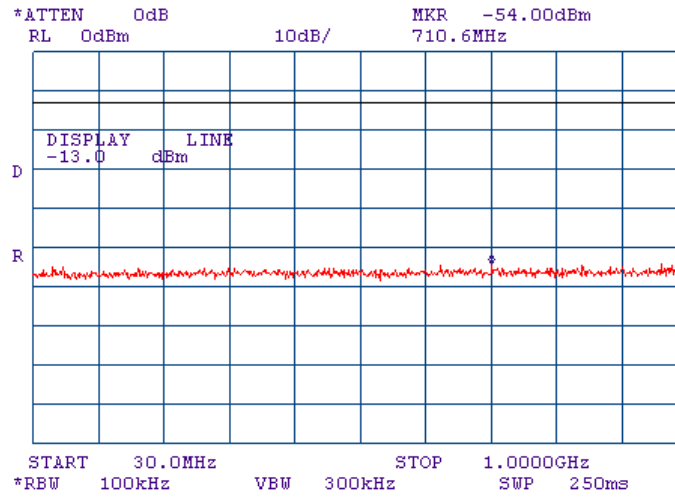
Plot 7.5.8 Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency



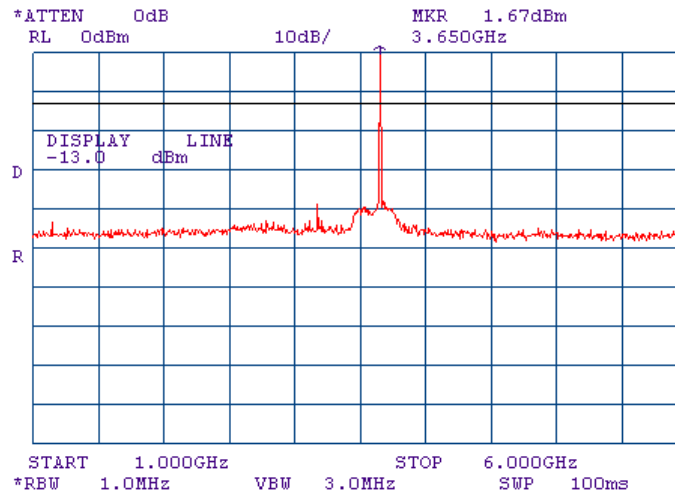


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 1			

Plot 7.5.9 Spurious emission measurements in 30.0 - 1000 MHz range at high carrier frequency



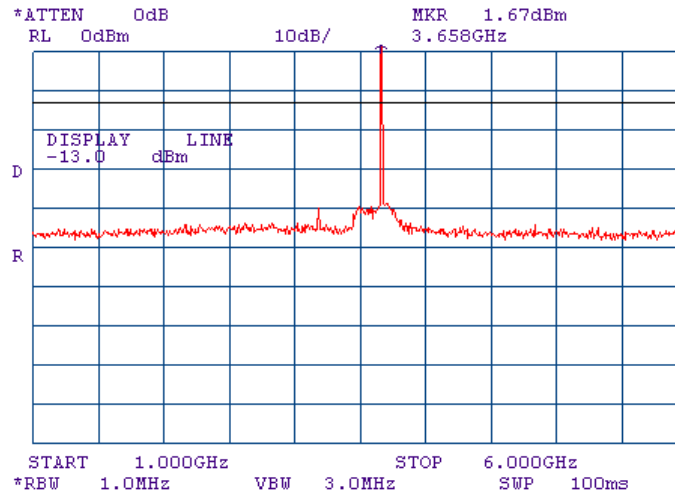
Plot 7.5.10 Spurious emission measurements in 1000 - 6000 MHz range at low carrier frequency





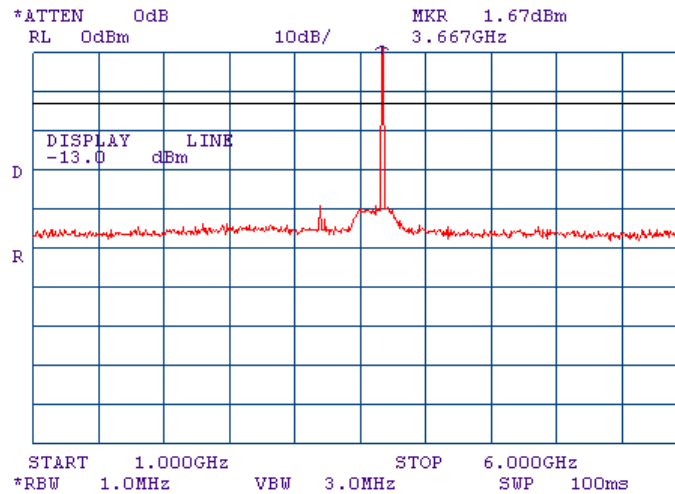
Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 1			

Plot 7.5.11 Spurious emission measurements in 1000 - 6000 MHz range at mid carrier frequency



3183.0MHz -39.83dBm

Plot 7.5.12 Spurious emission measurements in 1000 - 6000 MHz range at high carrier frequency

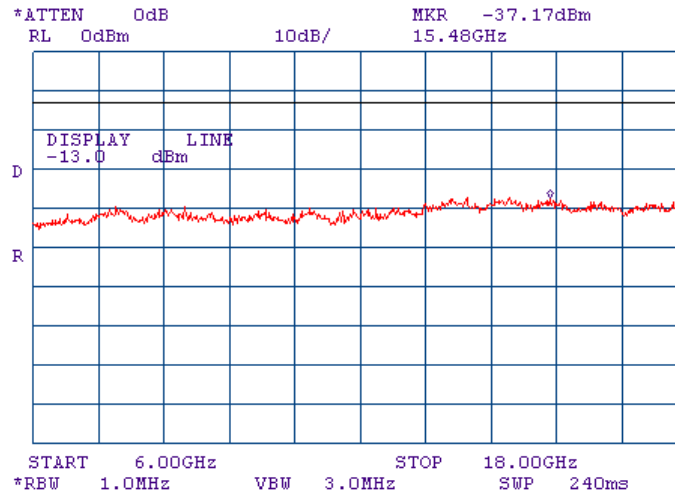


3192.0MHz -39.33dBm

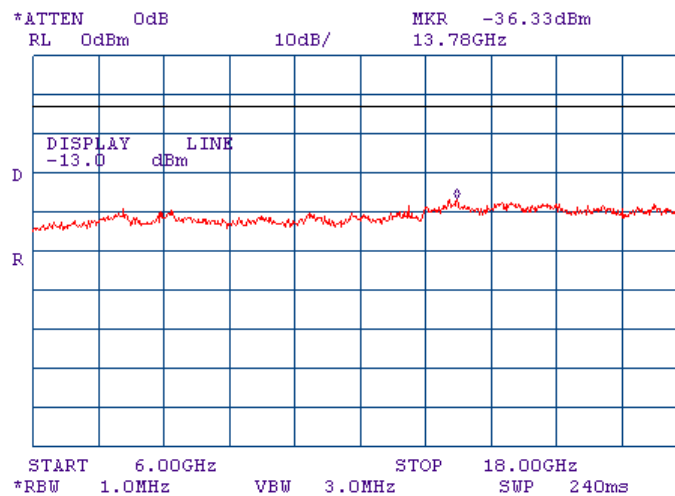


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 1			

Plot 7.5.13 Spurious emission measurements in 6000 - 18000 MHz range at low carrier frequency



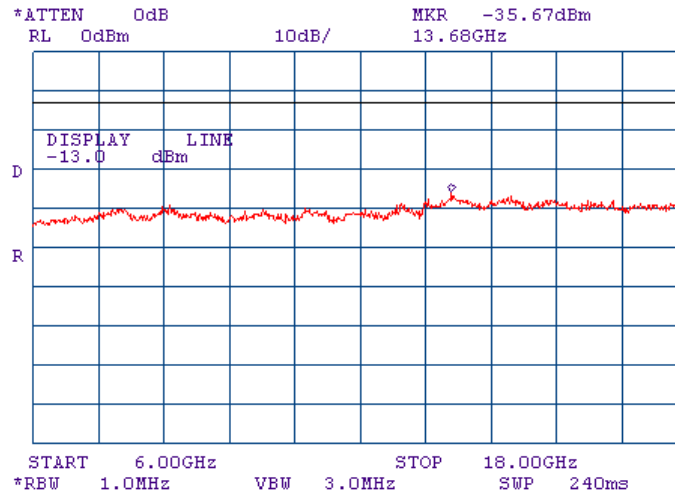
Plot 7.5.14 Spurious emission measurements in 6000 - 18000 MHz range at mid carrier frequency



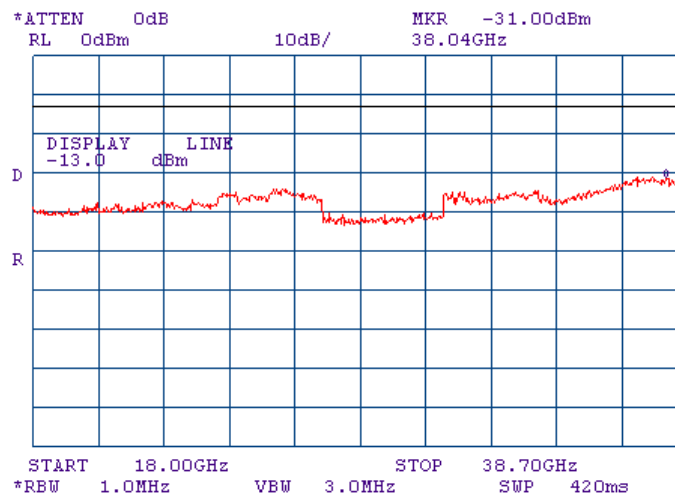


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 1			

Plot 7.5.15 Spurious emission measurements in 6000 - 18000 MHz range at high carrier frequency



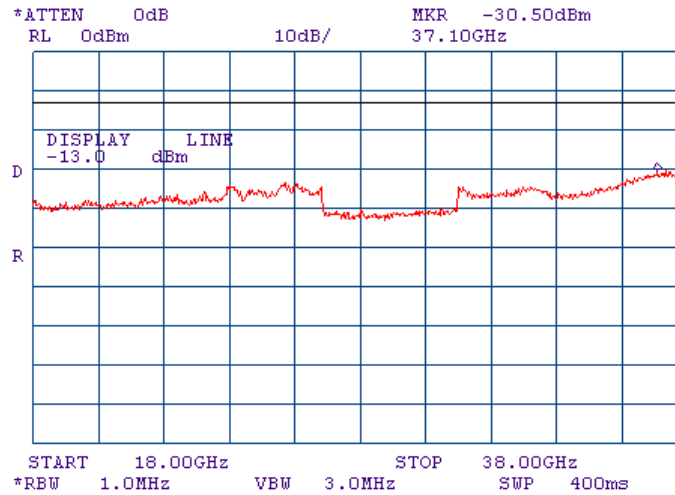
Plot 7.5.16 Spurious emission measurements in 18000 - 38000 MHz range at low carrier frequency



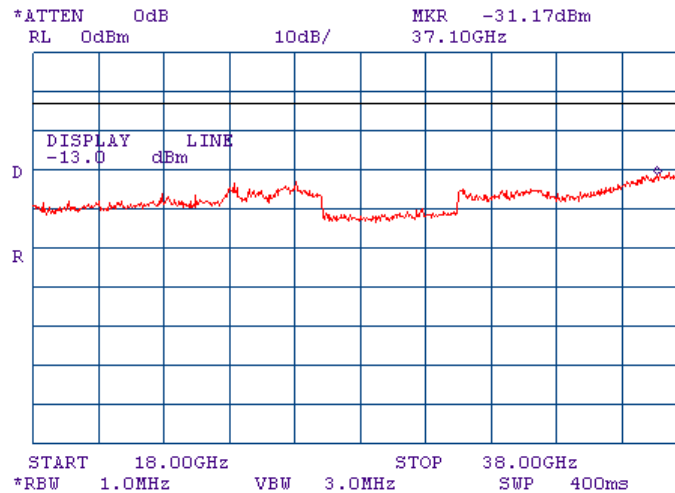


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 1			

Plot 7.5.17 Spurious emission measurements in 18000 - 38000 MHz range at mid carrier frequency



Plot 7.5.18 Spurious emission measurements in 18000 - 38000 MHz range at high carrier frequency





Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 2			

Table 7.5.3 Spurious emission test results, antenna 2

ASSIGNED FREQUENCY RANGE: 3650.0 – 3675.0 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 38000 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: 3/30/300/3000 kHz
 MODULATION: 16QAM
 BIT RATE: 12.565 Mbps
 CHANNEL BANDWIDTH: 5 MHz
 TRANSMITTER OUTPUT POWER SETTINGS: 22 dBm

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Low carrier frequency 3652.5 MHz									
No spurious were found									Pass
Mid carrier frequency 3675.0 MHz									
No spurious were found									Pass
High carrier frequency 3697.5 MHz									
No spurious were found									Pass

*- Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

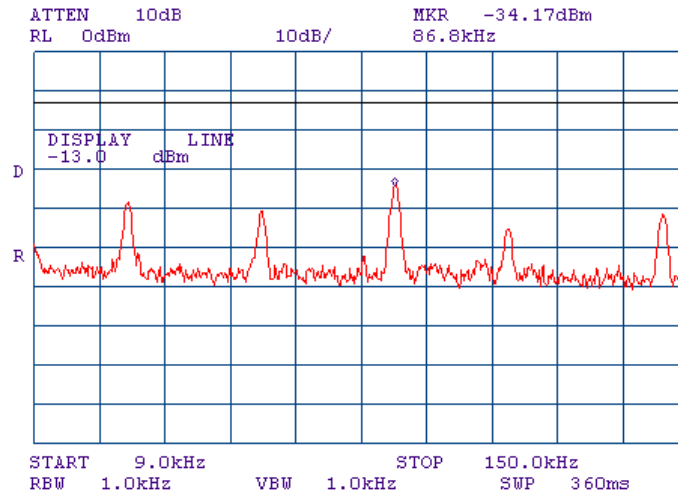
HL 1424	HL 2869	HL 2952	HL 3321	HL 3455			
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Full description is given in Appendix A.

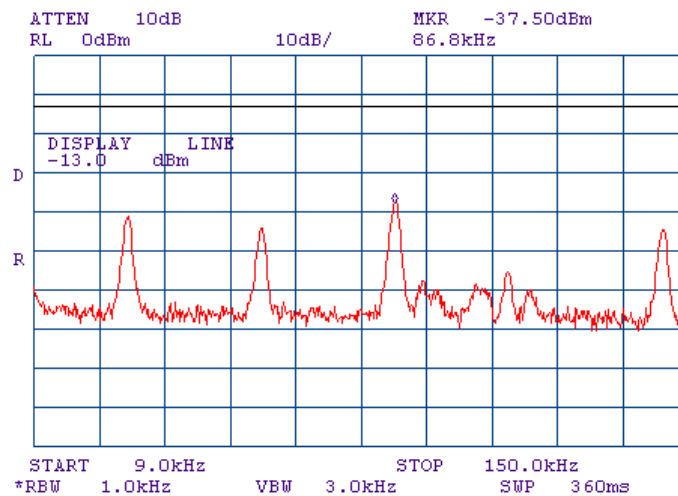


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 2			

Plot 7.5.19 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency



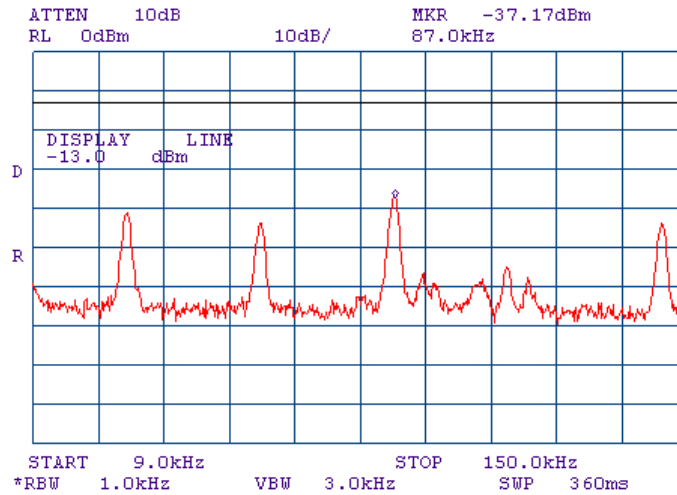
Plot 7.5.20 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency



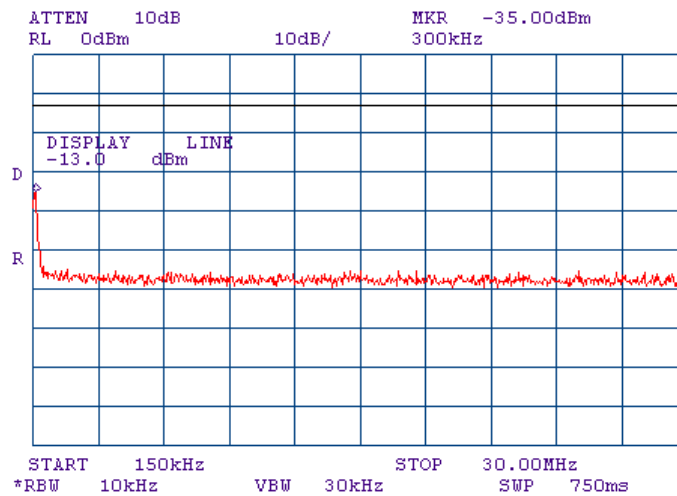


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 2			

Plot 7.5.21 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency



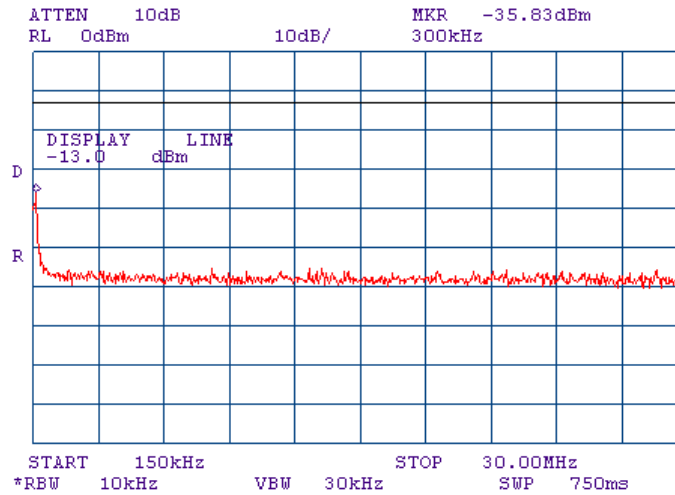
Plot 7.5.22 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency



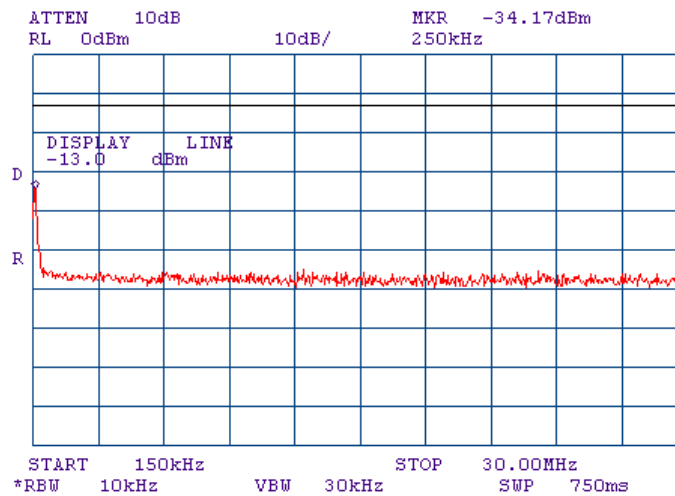


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 2			

Plot 7.5.23 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency

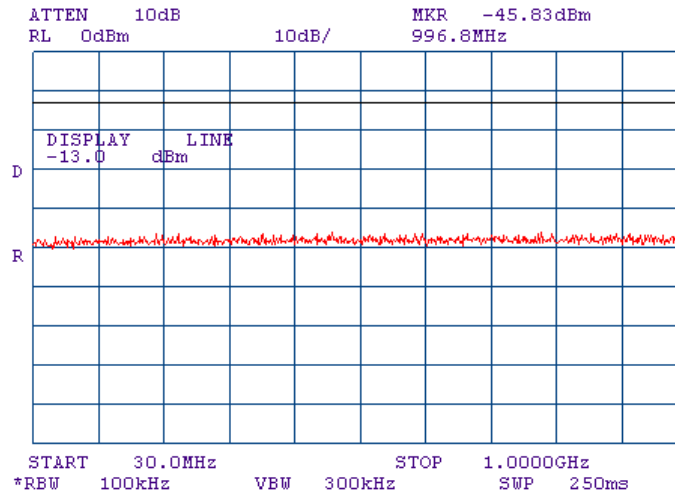


Plot 7.5.24 Spurious emission measurements in 0.15 – 30.0 MHz range at high carrier frequency

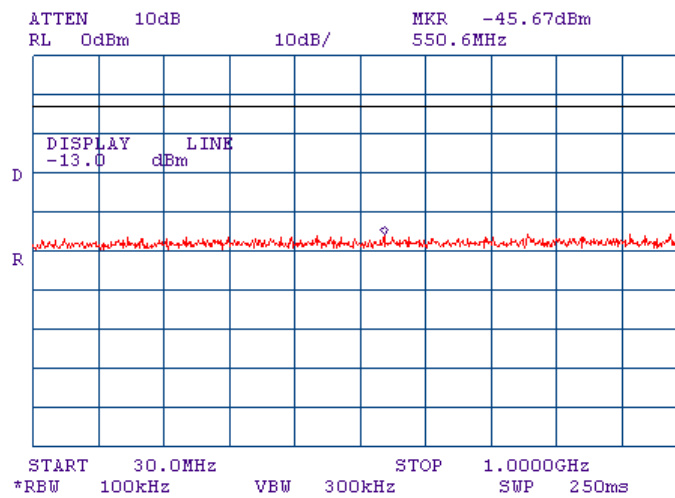


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 2			

Plot 7.5.25 Spurious emission measurements in 30.0 - 1000 MHz range at low carrier frequency



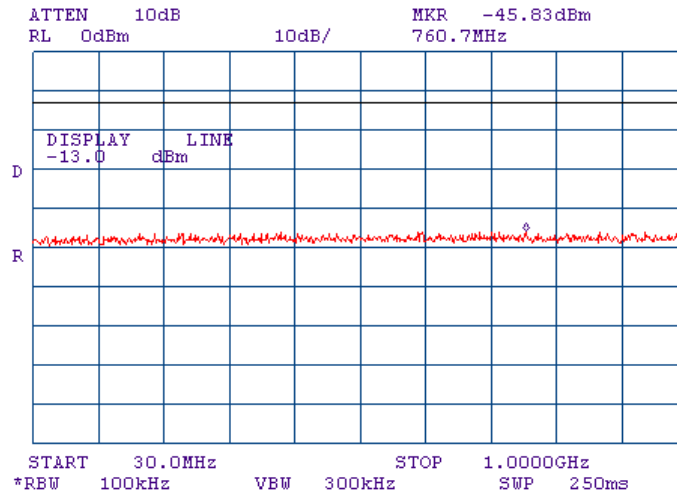
Plot 7.5.26 Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency



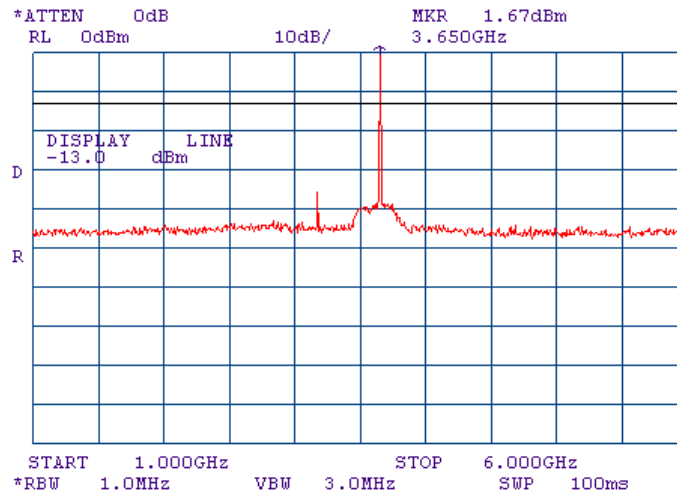


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 2			

Plot 7.5.27 Spurious emission measurements in 30.0 - 1000 MHz range at high carrier frequency



Plot 7.5.28 Spurious emission measurements in 1000 - 6000 MHz range at low carrier frequency

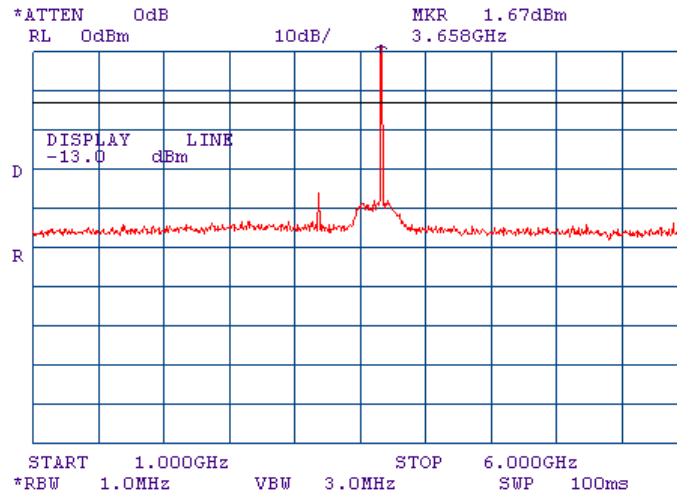


3175.0MHz -35.83dBm



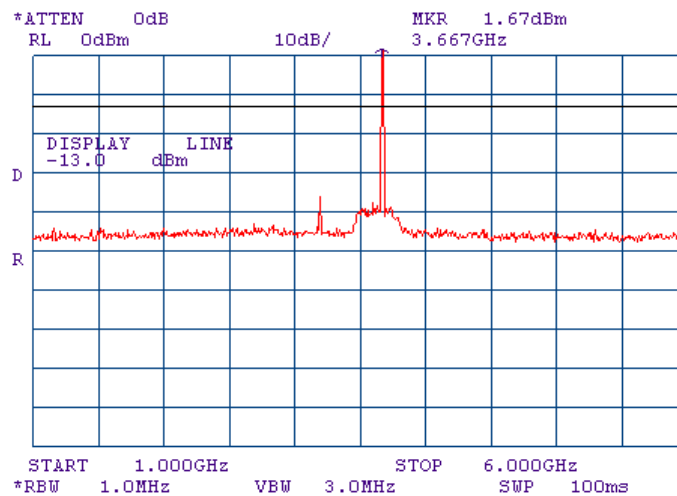
Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 2			

Plot 7.5.29 Spurious emission measurements in 1000 - 8000 MHz range at mid carrier frequency



3183MHz -36.17dBm

Plot 7.5.30 Spurious emission measurements in 1000 - 8000 MHz range at high carrier frequency

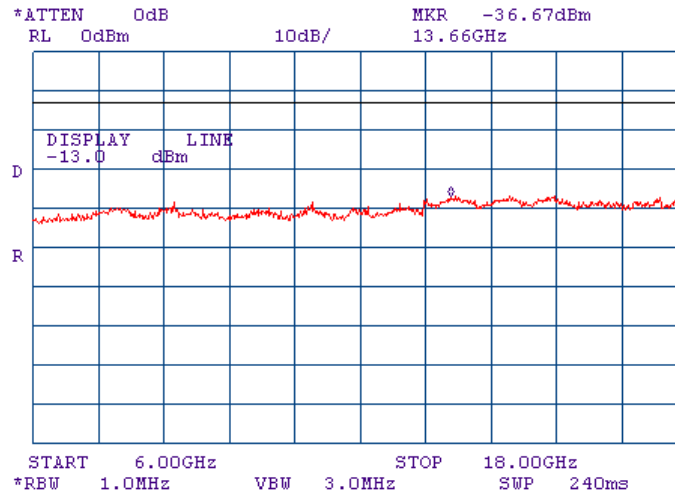


3192.0MHz -36.17dBm

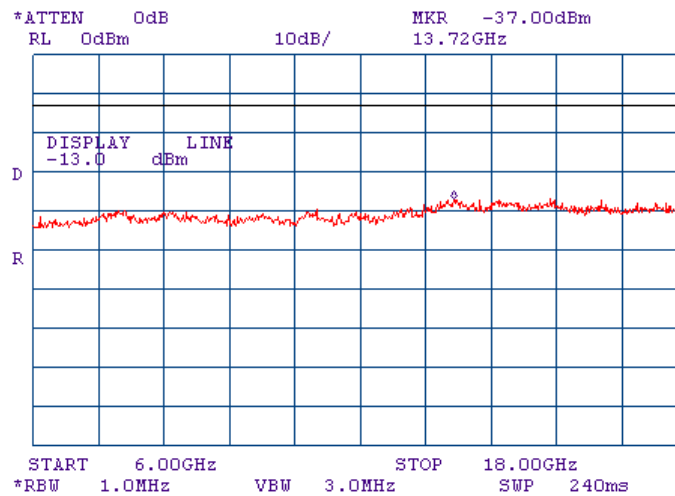


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 2			

Plot 7.5.31 Spurious emission measurements in 6000 - 18000 MHz range at low carrier frequency



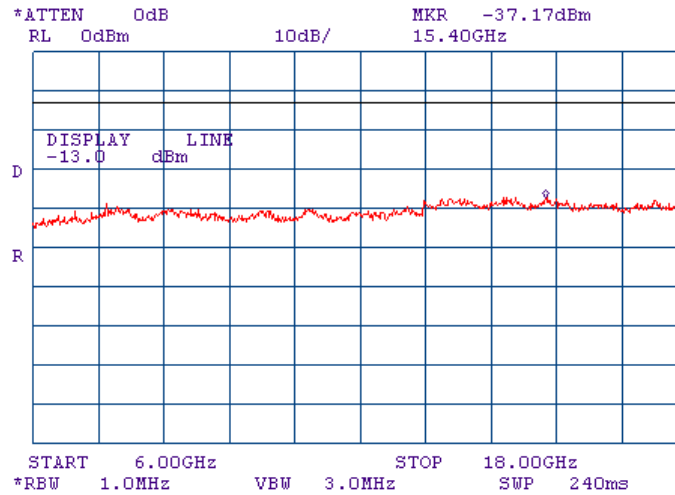
Plot 7.5.32 Spurious emission measurements in 6000 - 18000 MHz range at mid carrier frequency



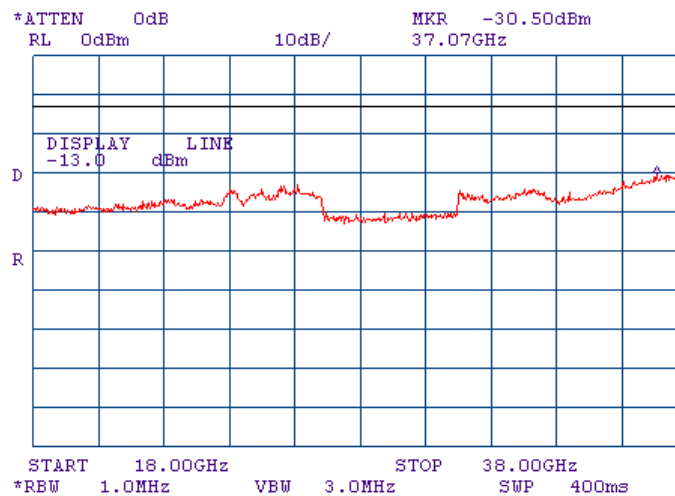


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 2			

Plot 7.5.33 Spurious emission measurements in 6000 - 18000 MHz range at high carrier frequency



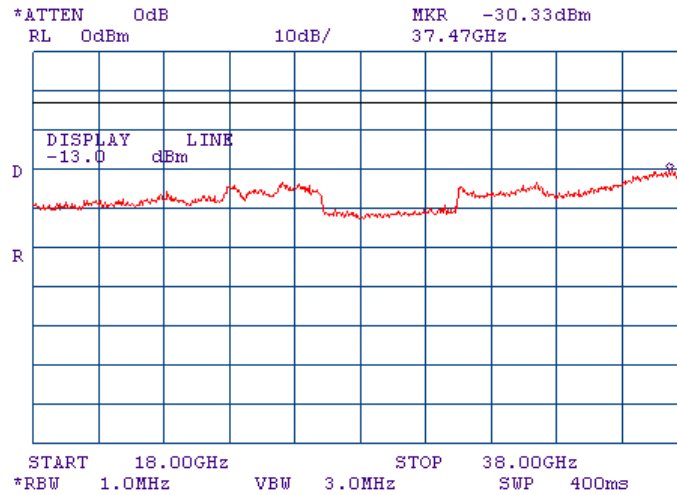
Plot 7.5.34 Spurious emission measurements in 18000 – 38000 MHz range at low carrier frequency



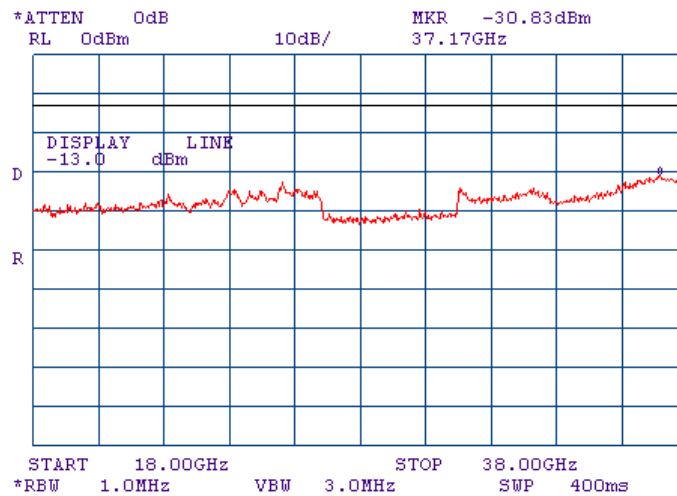


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	9/25/2008 4:35:44 PM		
Temperature: 24.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks: antenna 2			

Plot 7.5.35 Spurious emission measurements in 18000 - 38000 MHz range at mid carrier frequency



Plot 7.5.36 Spurious emission measurements in 18000 - 38000 MHz range at high carrier frequency



Test specification:		Section 90.213, Frequency stability	
Test procedure:		47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:49:08 AM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	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, MHz	Maximum allowed frequency displacement	
	ppm	Hz
3652.5	20	73050
3662.5		73300
3672.5		73450

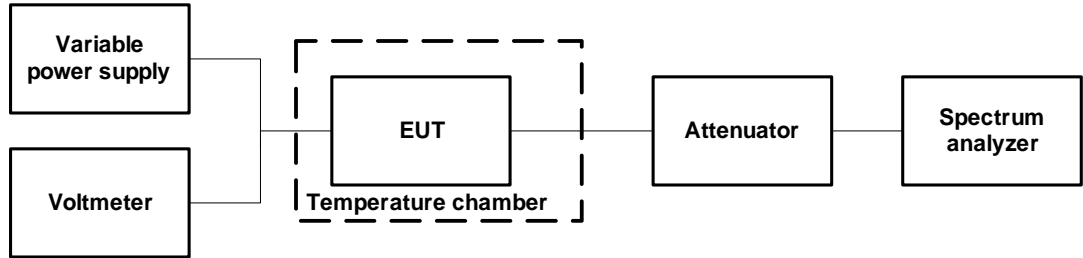
7.6.2 Test procedure

- 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.



Test specification:	Section 90.213, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:49:08 AM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Figure 7.6.1 Frequency stability test setup



Test specification:	Section 90.213, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	10/2/2008 7:49:08 AM		
Temperature: 24.5 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Table 7.6.2 Frequency stability test results

OPERATING FREQUENCY: 3650 - 3700MHz
 NOMINAL POWER VOLTAGE: 24VDC
 TEMPERATURE STABILIZATION PERIOD: 20 min
 POWER DURING TEMPERATURE TRANSITION: Off
 SPECTRUM ANALYZER MODE: Peak Hold
 RESOLUTION BANDWIDTH: 10 Hz
 VIDEO BANDWIDTH: 30 Hz
 MODULATION: Unmodulated

T, °C	Voltage V	Frequency, MHz								Max frequency drift, Hz		Limit, Hz	Margin, Hz	Verdict
		Start up	1 st min	2 nd min	3 rd min	4 th min	5 th min	10 th min	Pos.	Neg.				
Low frequency 3652.5 MHz														
-30	nominal	3652.498437	3652.498463	3652.498481	3652.498500	3652.498510	3652.498512	3652.498539	754	0	73050	-72296	Pass	
-20	nominal	3652.498263	NA	NA	NA	NA	NA	3652.498334	549	0		-72501	Pass	
-10	nominal	3652.498319	NA	NA	NA	NA	NA	3652.498230	534	0		-72516	Pass	
0	nominal	3652.498336	3652.498333	3652.498336	3652.498332	3652.498330	3652.498332	3652.498322	551	0		-72499	Pass	
10	nominal	3652.498197	NA	NA	NA	NA	NA	3652.498202	417	0		-72633	Pass	
20	+15%	3652.497790	NA	NA	NA	NA	NA	3652.497824	39	0		-73011	Pass	
20	nominal	3652.497761	NA	NA	NA	NA	NA	3652.497785	0	-24		-73026	Pass	
20	-15%	3652.497391	NA	NA	NA	NA	NA	3652.497449	0	-394		-72656	Pass	
30	nominal	3652.497667	3652.497673	3652.497677	3652.497681	3652.497682	3652.497685	3652.497698	0	-118		-72932	Pass	
40	nominal	3652.498138	NA	NA	NA	NA	NA	3652.498201	416	0		-72634	Pass	
50	nominal	3652.498274	3652.498282	3652.498288	3652.498294	3652.498303	3652.498303	3652.498372	587	0	-72463	Pass		
Mid frequency 3662.5 MHz														
-30	nominal	3662.498535	3662.498535	3662.498533	3662.498529	3662.498521	3662.498517	3662.498489	780	0	73300	-72520	Pass	
-20	nominal	3662.498150	NA	NA	NA	NA	NA	3662.498252	497	0		-72803	Pass	
-10	nominal	3662.498219	NA	NA	NA	NA	NA	3662.498157	464	0		-72836	Pass	
0	nominal	3662.498345	3662.498343	3662.498342	3662.498341	3662.498338	3662.498338	3662.498333	590	0		-72710	Pass	
10	nominal	3662.498196	NA	NA	NA	NA	NA	3662.498187	441	0		-72859	Pass	
20	+15%	3662.497820	NA	NA	NA	NA	NA	3662.497844	89	0		-73211	Pass	
20	nominal	3662.497730	NA	NA	NA	NA	NA	3662.497755	0	-25		-73275	Pass	
20	-15%	3662.497352	NA	NA	NA	NA	NA	3662.497380	0	-403		-72897	Pass	
30	nominal	3662.497698	3662.497700	3662.497704	3662.497708	3662.497712	3662.497712	3662.497743	0	-57		-73243	Pass	
40	nominal	3662.498064	NA	NA	NA	NA	NA	3662.498731	976	0		-72324	Pass	
50	nominal	3662.498509	3662.498511	3662.498512	3662.498513	3662.498516	3662.498518	3662.498526	771	0	-72529	Pass		
High frequency 3672.5 MHz														
-30	nominal	3672.498479	3672.498471	3672.498467	3672.498462	3672.498457	3672.498451	3672.498428	757	0	73450	-72693	Pass	
-20	nominal	3672.498108	NA	NA	NA	NA	NA	3672.498142	420	0		-73030	Pass	
-10	nominal	3672.498149	NA	NA	NA	NA	NA	3672.498103	427	0		-73023	Pass	
0	nominal	3672.498282	3672.498290	3672.498299	3672.498309	3672.498315	3672.498323	3672.498343	621	0		-72829	Pass	
10	nominal	3672.498182	NA	NA	NA	NA	NA	3672.498177	460	0		-72990	Pass	
20	+15%	3672.497750	NA	NA	NA	NA	NA	3672.497381	28	-341		-73109	Pass	
20	nominal	3672.497697	NA	NA	NA	NA	NA	3672.497722	0	-25		-73425	Pass	
20	-15%	3672.497363	NA	NA	NA	NA	NA	3672.497335	0	-387		-73063	Pass	
30	nominal	3672.497738	3672.497741	3672.497742	3672.497744	3672.497746	3672.497748	3672.497777	55	0		-73395	Pass	
40	nominal	3672.497817	NA	NA	NA	NA	NA	3672.498052	330	0		-73120	Pass	
50	nominal	3672.498521	3672.498522	3672.498523	3672.498526	3672.498523	3672.498530	3672.498537	815	0	-72635	Pass		

* - Reference frequency

Reference numbers of test equipment used

HL 2358	HL 2780	HL 2869	HL 3286			
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Full description is given in Appendix A.

Test specification: Section 2.1091, RF radiation exposure evaluation			
Test procedure: 47 CFR, Section 1.1307(b)1			
Test mode: Compliance	Verdict: PASS		
Date & Time: 10/12/2008 5:42:23 PM			
Temperature: 23 °C	Air Pressure: 1008 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

7.7 RF exposure

7.7.1 General

This test was performed to determine the minimum safe distance between the transmitter antenna and human to avoid public exposure in excess of limits for general population (uncontrolled exposure). Specification test limits are given in Table 7.7.1.

Table 7.7.1 RF exposure limits

Frequency range, MHz	Power density*		Electric field strength**, V/m
	mW/cm ²	W/m ²	
1500 - 100000	1.00	10.0	61.4

* - Power density limit within 300 - 1500 MHz was calculated according to the following equation: $S = F / 1500$, where S is power density in mW/cm² and F is frequency in MHz

** - Electric field strength limit was calculated from power density as follows: $E = \sqrt{S \times 120 \times \pi}$, where E is electric field strength in V/m and S is power density in W/m²

7.7.2 Power density calculation for base station transmitter

The power density at the specified distance was calculated from the following equation as provided in Table 7.7.2:

$$S = P \times G / (4 \times \pi \times r^2),$$

where S is power density in W/m², P is the transmitter output power in W, G is the transmitter antenna numeric gain and r is distance to transmit antenna in m.

Table 7.7.2 Power density calculation

ASSIGNED FREQUENCY: 3650.0 – 3700.0 MHz
 CHANNEL: High
 CHANNEL BANDWIDTH: 5 MHz
 MODULATION: QPSK
 BIT RATE: 4.19 Mbps
 SPECIFIED DISTANCE: 0.2 m*

Carrier frequency MHz	Peak output power dBm	Antenna gain, dBi	EIRP		Power density W/m ²	Limit, W/m ²	Margin W/m ²	Verdict
			dBm	W				
3672.5	33.30	Included	33.30	2.138	4.25	10.0	-5.75	Pass

7.7.3 Safe distance calculation for fixed transmitter

The minimum safe distance was calculated from the following equation as provided in Table 7.7.3:

$$r = \sqrt{P \times G / (4 \times \pi \times S)},$$

where S is power density in W/m², P is the transmitter output power in W, G is the transmitter antenna numeric gain and r is distance to transmit antenna in m.

With power density equal to the RF exposure limit the minimum safe distance was calculated according to the following equation: $r = \sqrt{P \times G / (4 \times \pi \times S)}$



Test specification:		Section 2.1091, RF radiation exposure evaluation	
Test procedure:		47 CFR, Section 1.1307(b)1	
Test mode:		Compliance	Verdict: PASS
Date & Time:		10/12/2008 5:42:23 PM	
Temperature: 23 °C	Air Pressure: 1008 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Table 7.7.3 Safe distance calculation

ASSIGNED FREQUENCY: 3650.0 – 3700.0 MHz
EQUIPMENT INTENDED USE: Fixed*

Carrier frequency, MHz	Peak output power, dBm	Antenna gain, dBi	EIRP		Power density limit, W/m ²	Safe distance, m**	Intended separation, r	Verdict
			dBm	W				
3672.5	33.30	Included	33.30	2.138	10.0	0.135	2.0	Pass

* - The equipment intended for fixed use at a distance of more than 2.0 m from humans.

8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	29-Jun-08	29-Jun-09
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard Co	8546A	3617A 00319, 3448A002 53	29-Aug-08	29-Aug-09
0554	Amplifier, 2-18 GHz RF	Miteq	AFD4	104300	28-Feb-08	28-Feb-09
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	10-Jan-08	10-Jan-09
0768	Antenna Standard Gain Horn, 18-26.5 GHz, WR-42, 25 dB gain	Quinstar Technology	QWH-4200-BA	110	08-Dec-06	08-Dec-08
0769	Antenna Standard Gain Horn, 26.5-40 GHz, WR28, 25 dB gain	Quinstar Technology	QWH-2800-BA	112	08-Dec-06	08-Dec-08
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A002 19	28-Aug-07	28-Aug-09
1947	Cable 18GHz, 6.5 m, blue	Rhophase Microwave Limited	NPS-1803A-6500-NPS	T4974	30-Dec-07	30-Dec-08
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	03-Mar-08	03-Mar-09
2254	Cable 40 GHz, 0.8 m, blue	Rhophase Microwave Limited	KPS-1503A-800-KPS	W4907	10-Jun-08	10-Jun-09
2259	Amplifier Low Noise 2-20 GHz	Sophia Wireless	LNA0220-C	0223	30-Dec-07	30-Dec-08
2260	Amplifier Low Noise 14-33 GHz	Sophia Wireless	LNA28-B	0233	30-Dec-07	30-Dec-08
2358	Power Supply, 2 X 0-36VDC / 5A, 5VDC / 5A	Horizon Electronics	DHR3655 D	767469	06-Mar-08	06-Mar-09
2780	EMC analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY451024 6	11-Jun-07	11-Jun-09
2869	Cable, 18 GHz, 1.2 m, SMA - SMA, Right Angle	Gore	NA	91P72073	11-Feb-08	11-Feb-09
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	07-May-07	07-May-09
2952	Cable, RF, 18 GHz, 1.2 m, SMA-SMA	Gore	10020014	NA	05-Oct-08	05-Oct-09
3123	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3123	13-Dec-07	13-Dec-08
3179	Attenuator, N-type, 20 dB, DC to 18 GHz, 5 W	Mini-Circuits	BW-N20W5+	0651	07-May-08	07-May-09
3181	Attenuator, N-type, 20 dB, DC to 18 GHz, 5 W	Mini-Circuits	BW-N20W5+	0651	07-May-08	07-May-09
3286	Temperature Chamber, (-40 to +170) °C	Thermotron	EL-8-CH-1-1-CO2	21-9048	09-Sep-08	09-Sep-09
3321	Attenuator DC to 22 GHz, 30 dB, 50 W	Aeroflex / Weinschel	86-30-12	380	25-Dec-07	25-Dec-08
3385	Microwave Cable Assembly, 18.0 GHz, 1.0 m, N type/N type	Suhner Sucoflex	104EA	3385	12-Feb-08	12-Feb-09



HERMON LABORATORIES

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HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
3435	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	09-Mar-08	09-Mar-09
3455	Medium Power Fixed Coaxial Attenuator DC to 40 GHz, 20 dB, 5 W	Aeroflex / Weinschel	75A-20-12	1182	17-Mar-08	17-Mar-09

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

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

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

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

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

10 APPENDIX C Test 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) and by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS and IC 2186A-2 for anechoic chamber), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site), assessed by TNO Certification EP&S (Netherlands) for a number of EMC, telecommunications, environmental, safety standards, and by AMTAC (UK) for safety of medical devices. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01).

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Person for contact: Mr. Alex Usoskin, CEO.

11 APPENDIX D Specification references

FCC 47CFR part 90: 2007	Private land mobile radio services
FCC 47CFR part 1: 2007	Practice and procedure
FCC 47CFR part 2: 2007	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: 2005	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
EMC Test Systems, model 6502, S/N 2857, HL 0446

Frequency, MHz	Magnetic Antenna Factor, dB(S/m)	Electric Antenna Factor, dB(1/m)
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	9.7
0.750	-41.9	9.6
1.000	-41.4	10.1
2.000	-41.5	10.0
3.000	-41.4	10.1
4.000	-41.4	10.1
5.000	-41.5	10.0
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(S/m) is to be added to receiver meter reading in dB(μ V) to convert it into field intensity in dB(μ A/m).
Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field intensity in dB(μ V/m).

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

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 intensity in dB(μ V/m).

Antenna factor
Biconilog antenna EMCO, model 3141, serial number 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	560	19.8	1300	27.0
28	7.8	580	20.6	1320	27.8
30	7.8	600	21.3	1340	28.3
40	7.2	620	21.5	1360	28.2
60	7.1	640	21.2	1380	27.9
70	8.5	660	21.4	1400	27.9
80	9.4	680	21.9	1420	27.9
90	9.8	700	22.2	1440	27.8
100	9.7	720	22.2	1460	27.8
110	9.3	740	22.1	1480	28.0
120	8.8	760	22.3	1500	28.5
130	8.7	780	22.6	1520	28.9
140	9.2	800	22.7	1540	29.6
150	9.8	820	22.9	1560	29.8
160	10.2	840	23.1	1580	29.6
170	10.4	860	23.4	1600	29.5
180	10.4	880	23.8	1620	29.3
190	10.3	900	24.1	1640	29.2
200	10.6	920	24.1	1660	29.4
220	11.6	940	24.0	1680	29.6
240	12.4	960	24.1	1700	29.8
260	12.8	980	24.5	1720	30.3
280	13.7	1000	24.9	1740	30.8
300	14.7	1020	25.0	1760	31.1
320	15.2	1040	25.2	1780	31.0
340	15.4	1060	25.4	1800	30.9
360	16.1	1080	25.6	1820	30.7
380	16.4	1100	25.7	1840	30.6
400	16.6	1120	26.0	1860	30.6
420	16.7	1140	26.4	1880	30.6
440	17.0	1160	27.0	1900	30.6
460	17.7	1180	27.0	1920	30.7
480	18.1	1200	26.7	1940	30.9
500	18.5	1220	26.5	1960	31.2
520	19.1	1240	26.5	1980	31.6
540	19.5	1260	26.5	2000	32.0
		1280	26.6		

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

Cable loss
Cable 18 GHz, 6.5 m, blue, model: NPS-1803A-6500-NPS, S/N T4974, HL 1947

Frequency, GHz	Cable loss, dB
0.03	0.30
0.05	0.38
0.10	0.53
0.20	0.74
0.30	0.91
0.40	1.05
0.50	1.18
0.60	1.29
0.70	1.40
0.80	1.50
0.90	1.59
1.00	1.68
1.10	1.77
1.20	1.86
1.30	1.94
1.40	2.01
1.50	2.08
1.60	2.16
1.70	2.22
1.80	2.29
1.90	2.36
2.00	2.42
2.10	2.48
2.20	2.54
2.30	2.60
2.40	2.66
2.50	2.71
2.60	2.77
2.70	2.83
2.80	2.89
2.90	2.95
3.10	3.06
3.30	3.17
3.50	3.28
3.70	3.39
3.90	3.51
4.10	3.62
4.30	3.76
4.50	3.87
4.70	4.01
4.90	4.10
5.10	4.21
5.30	4.31
5.50	4.43
5.70	4.56
5.90	4.71

Frequency, GHz	Cable loss, dB
6.10	4.87
6.30	4.95
6.50	4.94
6.70	4.88
6.90	4.87
7.10	4.83
7.30	4.85
7.50	4.86
7.70	4.91
7.90	4.96
8.10	5.03
8.30	5.08
8.50	5.13
8.70	5.21
8.90	5.22
9.10	5.34
9.30	5.35
9.50	5.52
9.70	5.51
9.90	5.66
10.10	5.70
10.30	5.78
10.50	5.79
10.70	5.82
10.90	5.86
11.10	5.94
11.30	6.06
11.50	6.21
11.70	6.44
11.90	6.61
12.10	6.76
12.40	6.68
13.00	6.66
13.50	6.81
14.00	6.90
14.50	6.90
15.00	6.97
15.50	7.17
16.00	7.28
16.50	7.27
17.00	7.38
17.50	7.68
18.00	7.92

Cable loss
Cable 40 GHz, 0.8 m, blue, model: KPS-1503A-800-KPS, S/N W4907, HL 2254

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
0.03	0.04	5.10	0.80	15.00	1.49
0.05	0.07	5.30	0.83	15.50	1.49
0.10	0.09	5.50	0.83	16.00	1.46
0.20	0.15	5.70	0.84	16.50	1.47
0.30	0.19	5.90	0.87	17.00	1.50
0.40	0.25	6.10	0.86	17.50	1.57
0.50	0.29	6.30	0.89	18.00	1.63
0.60	0.33	6.50	0.90	18.50	1.57
0.70	0.37	6.70	0.89	19.00	1.63
0.80	0.41	6.90	0.93	19.50	1.65
0.90	0.44	7.10	0.92	20.00	1.64
1.00	0.45	7.30	0.95	20.50	1.75
1.10	0.48	7.50	0.96	21.00	1.72
1.20	0.51	7.70	0.97	21.50	1.78
1.30	0.53	7.90	1.01	22.00	1.76
1.40	0.54	8.10	1.00	22.50	1.72
1.50	0.57	8.30	1.05	23.00	1.83
1.60	0.59	8.50	1.04	23.50	1.80
1.70	0.04	8.70	1.07	24.00	1.90
1.80	0.07	8.90	1.11	24.50	1.81
1.90	0.09	9.10	1.09	25.00	1.98
2.00	0.15	9.30	1.14	25.50	1.91
2.10	0.19	9.50	1.12	26.00	2.02
2.20	0.25	9.70	1.15	26.50	1.92
2.30	0.29	9.90	1.16	27.00	1.97
2.40	0.33	10.10	1.16	28.00	2.02
2.50	0.37	10.30	1.19	29.00	1.95
2.60	0.41	10.50	1.14	30.00	1.94
2.70	0.44	10.70	1.19	31.00	2.11
2.80	0.45	10.90	1.17	32.00	2.17
2.90	0.48	11.10	1.13	33.00	2.27
3.10	0.61	11.30	1.20	34.00	2.27
3.30	0.64	11.50	1.13	35.00	2.29
3.50	0.65	11.70	1.20	36.00	2.35
3.70	0.68	11.90	1.18	37.00	2.37
3.90	0.69	12.10	1.14	38.00	2.40
4.10	0.71	12.40	1.19	39.00	2.57
4.30	0.73	13.00	1.34	40.00	2.36
4.50	0.75	13.50	1.33		
4.70	0.77	14.00	1.48		
4.90	0.79	14.50	1.45		

Cable loss
Cable coaxial, Gore, 18 GHz, 1.1 m, SMA - SMA, model Right Angle, S/N 91P72071
HL 2869

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.06	5750	0.87	12000	1.30
30	0.06	6000	0.87	12250	1.33
100	0.10	6250	0.89	12500	1.35
250	0.18	6500	0.92	12750	1.36
500	0.25	6750	0.94	13000	1.38
750	0.27	7000	0.98	13250	1.41
1000	0.34	7250	0.99	13500	1.39
1250	0.35	7500	1.02	13750	1.41
1500	0.42	7750	1.03	14000	1.42
1750	0.44	8000	1.04	14250	1.46
2000	0.49	8250	1.04	14500	1.39
2250	0.52	8500	1.08	14750	1.46
2500	0.55	8750	1.08	15000	1.40
2750	0.59	9000	1.12	15250	1.47
3000	0.61	9250	1.12	15500	1.36
3250	0.64	9500	1.15	15750	1.49
3500	0.67	9750	1.14	16000	1.51
3750	0.69	10000	1.19	16250	1.60
4000	0.70	10250	1.20	16500	1.56
4250	0.74	10500	1.23	16750	1.66
4500	0.76	10750	1.24	17000	1.71
4750	0.77	11000	1.24	17250	1.78
5000	0.79	11250	1.25	17500	1.75
5250	0.82	11500	1.28	17750	1.77
5500	0.84	11750	1.29	18000	1.86

Cable loss
Cable coaxial, Gore, 18 GHz, 1.2 m, SMA-SMA, S/N 10020014
HL 2952

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.03	5750	0.97	12000	1.50
30	0.05	6000	1.01	12250	1.45
100	0.11	6250	1.03	12500	1.48
250	0.19	6500	1.06	12750	1.57
500	0.26	6750	1.08	13000	1.51
750	0.32	7000	1.10	13250	1.64
1000	0.38	7250	1.13	13500	1.60
1250	0.43	7500	1.13	13750	1.63
1500	0.47	7750	1.21	14000	1.59
1750	0.53	8000	1.20	14250	1.66
2000	0.55	8250	1.24	14500	1.60
2250	0.59	8500	1.29	14750	1.65
2500	0.63	8750	1.23	15000	1.72
2750	0.66	9000	1.27	15250	1.68
3000	0.69	9250	1.27	15500	1.73
3250	0.72	9500	1.29	15750	1.70
3500	0.75	9750	1.30	16000	1.82
3750	0.78	10000	1.38	16250	1.79
4000	0.82	10250	1.44	16500	1.81
4250	0.84	10500	1.47	16750	1.91
4500	0.86	10750	1.45	17000	1.92
4750	0.90	11000	1.50	17250	1.98
5000	0.91	11250	1.46	17500	2.05
5250	0.94	11500	1.47	17750	2.04
5500	0.96	11750	1.44	18000	2.05

Cable loss
Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model 198-9155-00
HL 3123

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.11	3600	1.97	7400	3.12	11200	3.90	15100	4.74
30	0.17	3700	1.97	7500	3.13	11300	3.93	15200	4.70
50	0.25	3800	2.03	7600	3.16	11400	3.88	15300	4.73
100	0.32	3900	2.04	7700	3.18	11500	3.87	15400	4.78
200	0.46	4000	2.10	7800	3.20	11600	3.90	15500	4.75
300	0.58	4100	1.97	7900	3.23	11700	3.86	15600	4.76
400	0.65	4200	1.97	8000	3.25	11800	3.88	15700	4.75
500	0.74	4300	2.03	8100	3.26	11900	3.86	15800	4.78
600	0.82	4400	2.04	8200	3.28	12000	3.89	15900	4.79
700	0.89	4500	2.10	8300	3.31	12100	3.94	16000	4.73
800	0.95	4600	1.97	8400	3.31	12200	3.92	16100	4.78
900	1.01	4700	1.97	8500	3.32	12300	3.96	16200	4.84
1000	1.07	4800	2.03	8600	3.34	12400	4.01	16300	4.90
1100	1.11	4900	2.04	8700	3.35	12500	4.07	16400	4.87
1200	1.17	5000	2.10	8800	3.37	12600	4.08	16500	4.90
1300	1.22	5100	2.53	8900	3.39	12700	4.17	16600	4.98
1400	1.27	5200	2.55	9000	3.42	12800	4.26	16700	5.05
1500	1.29	5300	2.60	9100	3.43	12900	4.16	16800	5.04
1600	1.35	5400	2.61	9200	3.51	13000	4.21	16900	5.02
1700	1.40	5500	2.64	9300	3.52	13100	4.24	17000	5.09
1800	1.44	5600	2.70	9400	3.54	13200	4.27	17100	5.07
1900	1.51	5700	2.67	9500	3.63	13300	4.31	17200	5.10
2000	1.49	5800	2.71	9600	3.61	13400	4.33	17300	5.13
2100	1.55	5900	2.74	9700	3.71	13500	4.25	17400	5.23
2200	1.58	6000	2.80	9800	3.66	13600	4.27	17500	5.21
2300	1.62	6100	2.79	9900	3.77	13700	4.33	17600	5.22
2400	1.72	6200	2.81	10000	3.75	13800	4.33	17700	5.36
2500	1.76	6300	2.83	10100	3.77	13900	4.31	17800	5.35
2600	1.78	6400	2.86	10200	3.80	14000	4.30	17900	5.45
2700	1.80	6500	2.88	10300	3.79	14100	4.30	18000	5.43
2800	1.86	6600	2.90	10400	3.87	14200	4.31		
2900	1.90	6700	2.92	10500	3.83	14300	4.37		
3000	1.90	6800	2.98	10600	3.88	14400	4.35		
3100	1.97	6900	2.98	10700	3.86	14600	4.53		
3200	1.97	7000	3.00	10800	3.87	14700	4.50		
3300	2.03	7100	3.02	10900	3.90	14800	4.62		
3400	2.04	7200	3.04	11000	3.84	14900	4.65		
3500	2.10	7300	3.06	11100	3.88	15000	4.79		

13 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
AVRG	average (detector)
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
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
ITE	information technology equipment
k	kilo
kHz	kilohertz
LISN	line impedance stabilization network
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μ s	microsecond
NA	not applicable
OATS	open area test site
Ω	Ohm
PCB	printed circuit board
PM	pulse modulation
PS	power supply
ppm	part per million (10 ⁻⁶)
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
WB	wideband

END OF DOCUMENT