



HERMON LABORATORIES



Electrical

Hermon Laboratories Ltd.
P.O.Box 23, Binyamina 30500, Israel
Tel. +972 4628 8001
Fax. +972 4628 8277
E-mail: mail@hermonlabs.com

TEST REPORT

ACCORDING TO: FCC CFR 47 PART 90 and part 15 subpart B

FOR:

RadWin Ltd.

Wireless Radio Transmission System

**Model: WinLink 1000/F49 (AirMux-200/F49,
FibAir 4849, MRL-500)**

This report is in conformity with ISO/ IEC 17025. The A2LA logo endorsement applies only to the test methods and the standards 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.



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1 Applicant information

Client name: RadWin Ltd.
Address: 32 Habarzel str., Tel Aviv, Israel, 69710
Telephone: +972 3766 2971
Fax: +972 3766 2902
E-mail: e_menashe@radwin.com
Contact name: Mr. Menashe Ezra

2 Equipment under test attributes

Product name: Wireless Radio Transmission System
Product type: Point to point
Model(s): WinLink 1000/F49 (AirMux-200/F49, FibAir 4849, MRL-500)
Serial number: E490616500002
Receipt date: 2/20/2005

3 Manufacturer information

Manufacturer name: RadWin Ltd.
Address: 32 Habarzel str., Tel Aviv, Israel, 69710
Telephone: +972 3766 2971
Fax: +972 3766 2902
E-Mail: e_menashe@radwin.com
Contact name: Mr. Menashe Ezra

4 Test details

Project ID: 16288
Location: Hermon Laboratories Ltd. P.O.Box 23, Binyamina 30500, Israel
Test started: 2/20/2005
Test completed: 3/2/2005
Test specification(s): 47CFR part 90
Test suite: FCC_90_BS_with_RF_connector (7/15/2004 12:12:27 AM, modified)



5 Tests summary

Test	Status
Transmitter characteristics	
Section 90.1215, Maximum output power and power spectral density	Pass
Section 90.209, Occupied bandwidth	Pass
Section 90.210, Emission mask	Pass
Section 90.210, Conducted spurious emissions	Pass
Section 90.210, Radiated spurious emissions	Pass
Section 90.213, Frequency stability	Pass
Section 90.214, Transient frequency behaviour	Not required
Section 2.1091, RF radiation exposure evaluation	Pass
Unintentional emissions	
Section 15.107, Conducted emission at AC power port	Pass
Section 15.109, Radiated emission	Pass
Section 15.111, Conducted emission at receiver antenna port	Not required

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. A. Adelberg, test engineer	March 2, 2005	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	March 24, 2005	
	Mr. M. Nikishin, EMC group leader	March 25, 2005	
Approved by:	Mr. A. Usoskin, C.E.O.	March 27, 2005	



6 EUT description

6.1 General information

The EUT is a carrier class, high capacity and low cost point-to-point broadband wireless transmission system. It provides high capacity connectivity of up to 48 Mbps. The EUT is powered from mains via AC/DC power adapter.

6.2 Ports and lines

Port type	Port description	Connected		Connector type	Q-ty	Cable type	Cable length, m	Indoor / outdoor
		From	To					
Signal	Ethernet	IDU	LAPTOP	RJ45	1	FTP	100	Indoor
Power	DC power	IDU	AC/DC adapter	Terminal block	1	2 wire	2	Indoor
RF	Antenna	ODU	Load 50Ω	N-type	1	NA	NA	NA
Signal	WAN PoE (power over Ethernet)	IDU	ODU	RJ45	1	See note*	100	Outdoor
Functional earth	Functional earth	ODU	GND	Screw	1	NA	NA	NA
Functional earth	Functional earth	IDU	GND	Screw	1	NA	NA	NA
Signal	Monitor/RS232	ODU	PC	RJ45	1	Not connected, for configuration and service use only		
Signal	Monitor/RS232	IDU	PC	RJ45	1	Not connected, for configuration and service use only		

*Four-pair category 5e, double jacket 4x2x24 AWG FTP type

6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
AC/DC adapter	HITRON	HE551-58007	0022
Lap top	Compaq	Armada PP2060	AESP3600T4X12 DC6458

6.4 Operating frequencies

Source	Frequency, MHz			
Digital portion	(clock)	2.048	10	16.38
Receiver	(LO)	40	(IF)	4940 – 4990
Transmitter	(LO)	40	(IF)	4940 – 4990

6.5 Changes made in the EUT

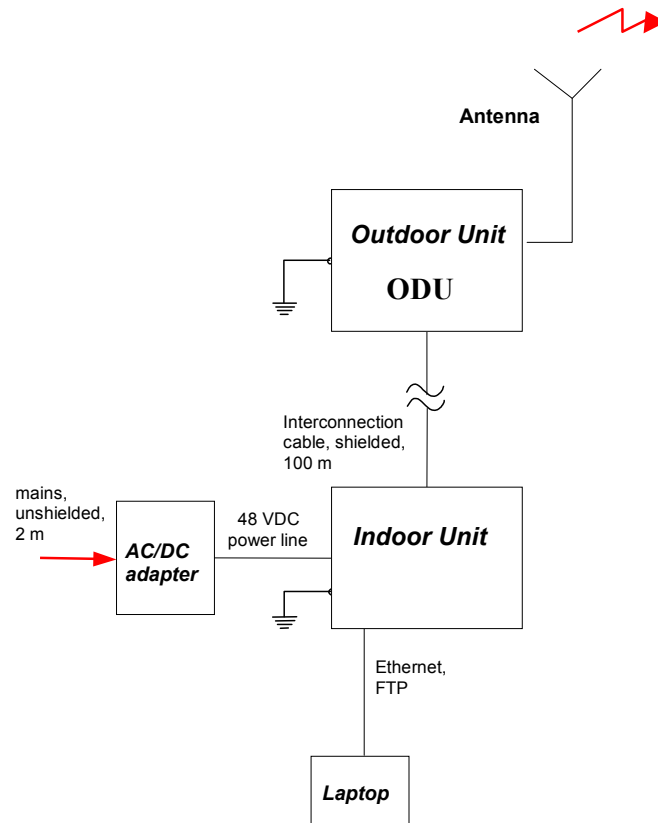
No changes were implemented.

**6.6 Transmitter characteristics**

Type of equipment					
X	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			
X	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		4940 - 4990 MHz			
Operating frequency range		4950 - 4980 MHz			
RF channel spacing		5 MHz			
Maximum rated output power		At transmitter 50 Ω RF output connector			+12.8 dBm @ 6, 9, 12, 24, 36, 48 Mbps
Is transmitter output power variable?		X	No		
			Yes		
			continuous variable		
			stepped variable with stepsize		
		minimum RF power			dBm
		maximum RF power			dBm
Antenna connection					
unique coupling	X	standard connector	N-Type	integral	X with temporary RF connector without temporary RF connector
Antenna/s technical characteristics					
Type	Manufacturer	Model number	Gain		
Planar Array (external)	MTI	MT-466003-N	27 dBi		
Transmitter 99% power bandwidth		20 MHz			
Transmitter aggregate data rate/s		16.25; 31.25; 61.25; 91.25 Mbps depend on rate			
Transmitter aggregate symbol (baud) rate/s		16.25 MBaud			
Type of modulation		BPSK, 4QAM, 16QAM, 64QAM			
Type of multiplexing		OFDM			
Modulating test signal (baseband)		PRBS			
Maximum transmitter duty cycle in normal use		100%	Tx ON time	msec	Period msec
Transmitter duty cycle supplied for test		100 %	Tx ON time	msec	Period msec
Transmitter power source					
Battery	Nominal rated voltage	VDC	Battery type		
DC	Nominal rated voltage	VDC			
AC mains	Nominal rated voltage	100/240 VAC	Frequency	50/60 Hz	
Common power source for transmitter and receiver		yes		no	
Emission designator		20MOD2WEF			
Spread spectrum technique used		Digital transmission system (DTS)			



6.7 Test configuration





Test specification:		Section 90.1215, Maximum output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

7 Transmitter tests according to 47CFR part 90

7.1 Peak output power and power spectral density test

7.1.1 General

This test was performed to measure the peak output power and power spectral density at RF antenna connector. Specification test limits are given in Table 7.1.1. The test results are provided in Table 7.1.2, Table 7.1.3 and the associated plots.

Table 7.1.1 Peak output power limits

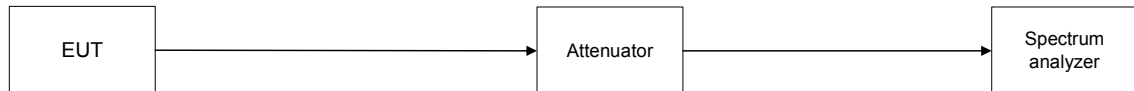
Assigned frequency range, MHz	Maximum peak output power		Power spectral density, dBm/MHz
	W	dBm	
4950.0 – 4980.0	1.995262	33.0	20

*- If transmitting antennas of directional gain greater than 9 dBi are used, both the peak output power and peak power spectral density limit should be reduced below the stated value as follows:
 by the amount in dB that the directional gain of antenna exceeds 9 dBi;
 without any corresponding reduction for fixed point-to-point and point-to-multipoint transmitters employing antennas with directional gain up to 26 dBi;
 corresponding reduction in the peak output power and peak power spectral density limit should be the amount in dB that the directional gain of antenna exceeds 26 dBi.

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.
- 7.1.2.4 The power spectral density was measured with spectrum analyzer as provided in Table 7.1.3 and associated plots.

Figure 7.1.1 Peak output power test setup





Test specification:		Section 90.1215, Maximum output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Table 7.1.2 Peak output power test results

OPERATING FREQUENCY RANGE: 4950 – 4980 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: BPSK, 4QAM, 16QAM, 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 6, 9, 12, 18, 24, 36, 48 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	RF output power, dBm	Limit, dBm	Margin, dB	Verdict
Bit Rate: 6 Mbps							
4950.000	12.6	included	included	12.6	32.0	-19.4	Pass
4965.000	12.7	included	included	12.7	32.0	-19.3	Pass
4980.000	12.6	included	included	12.6	32.0	-19.4	Pass
Bit Rate: 9 Mbps							
4950.000	12.5	included	included	12.5	32.0	-19.5	Pass
4965.000	12.7	included	included	12.7	32.0	-19.3	Pass
4980.000	12.8	included	included	12.8	32.0	-19.2	Pass
Bit Rate: 12 Mbps							
4950.000	12.5	included	included	12.5	32.0	-19.5	Pass
4965.000	12.3	included	included	12.3	32.0	-19.7	Pass
4980.000	12.7	included	included	12.7	32.0	-19.3	Pass
Bit Rate: 18 Mbps							
4950.000	12.5	included	included	12.5	32.0	-19.5	Pass
4965.000	12.1	included	included	12.1	32.0	-19.9	Pass
4980.000	12.5	included	included	12.5	32.0	-19.5	Pass
Bit Rate: 24 Mbps							
4950.000	12.7	included	included	12.7	32.0	-19.3	Pass
4965.000	11.5	included	included	11.5	32.0	-20.5	Pass
4980.000	12.0	included	included	12.0	32.0	-20.0	Pass
Bit Rate: 36 Mbps							
4950.000	12.4	included	included	12.4	32.0	-19.6	Pass
4965.000	12.4	included	included	12.4	32.0	-19.6	Pass
4980.000	11.5	included	included	11.5	32.0	-20.5	Pass
Bit Rate: 48 Mbps							
4950.000	12.4	included	included	12.4	32.0	-19.6	Pass
4965.000	12.5	included	included	12.5	32.0	-19.5	Pass
4980.000	12.2	included	included	12.2	32.0	-19.8	Pass

The equipment is used with the 27 dBi external antenna, the peak output limit was reduced by 1 dB.

Reference numbers of test equipment used

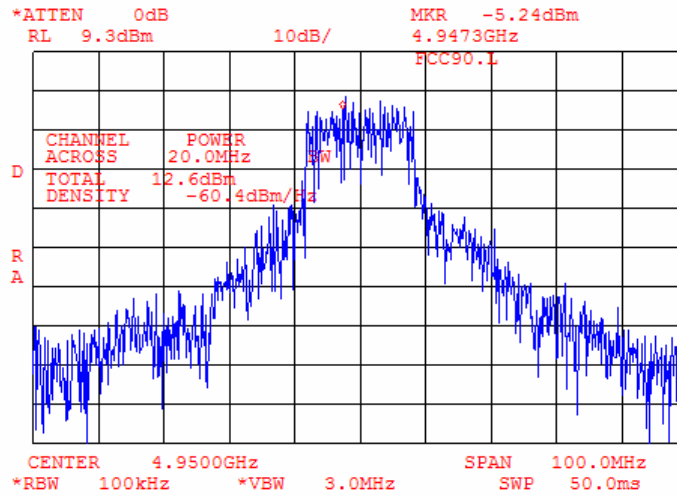
HL 1424	HL 2254						
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Full description is given in Appendix A.

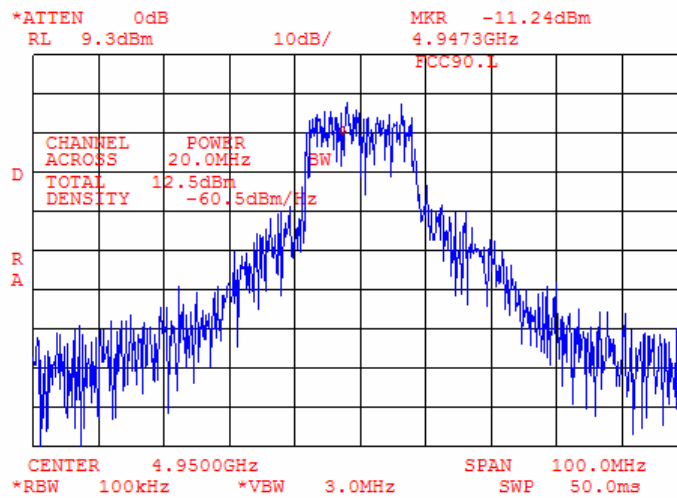


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.1 Peak output power test results at low frequency, Bit Rate: 6 Mbps



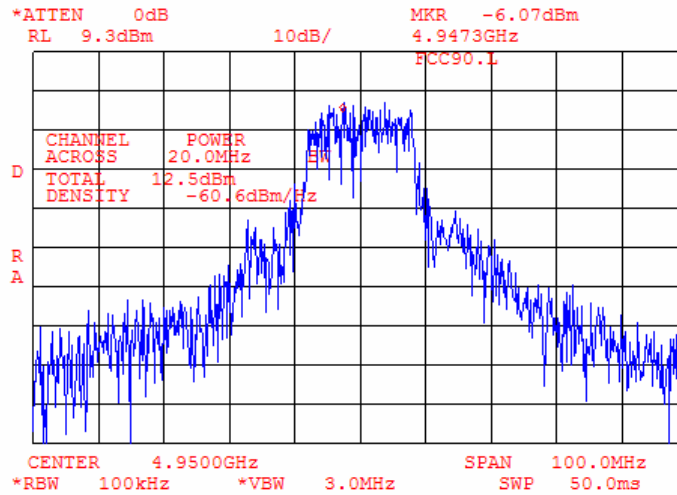
Plot 7.1.2 Peak output power test results at low frequency, Bit Rate: 9 Mbps



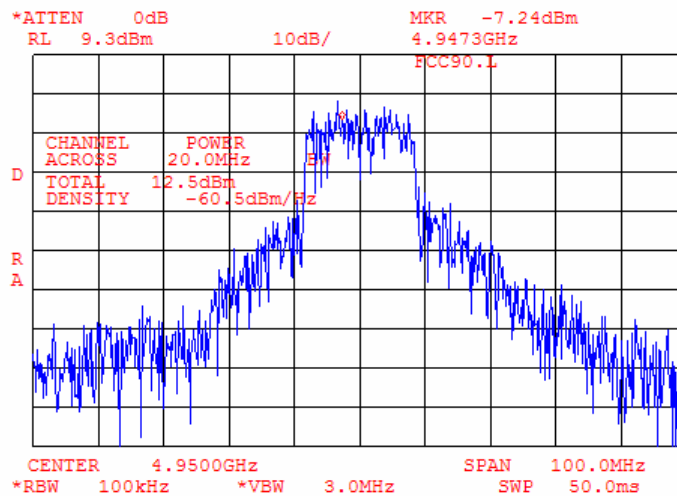


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.3 Peak output power test results at low frequency, Bit Rate: 12 Mbps



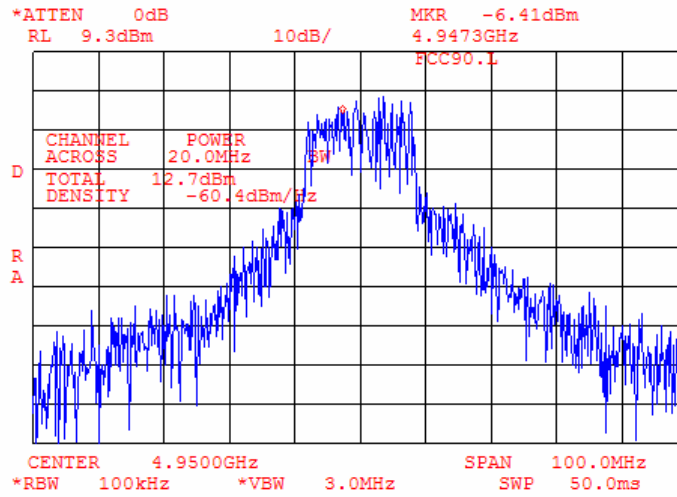
Plot 7.1.4 Peak output power test results at low frequency, Bit Rate: 18 Mbps



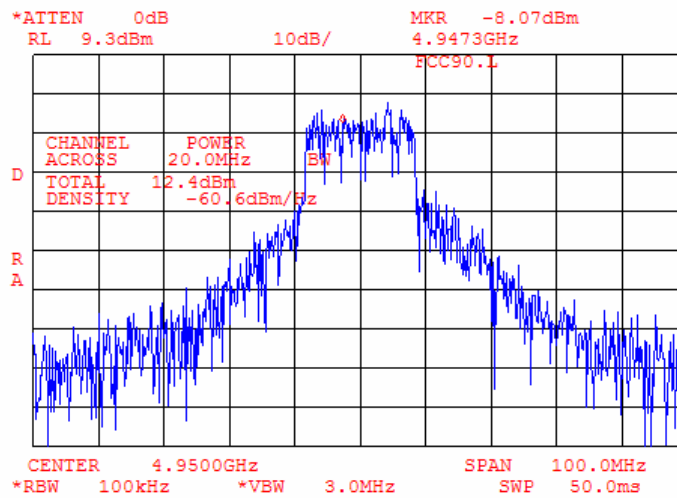


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.5 Peak output power test results at low frequency, Bit Rate: 24 Mbps



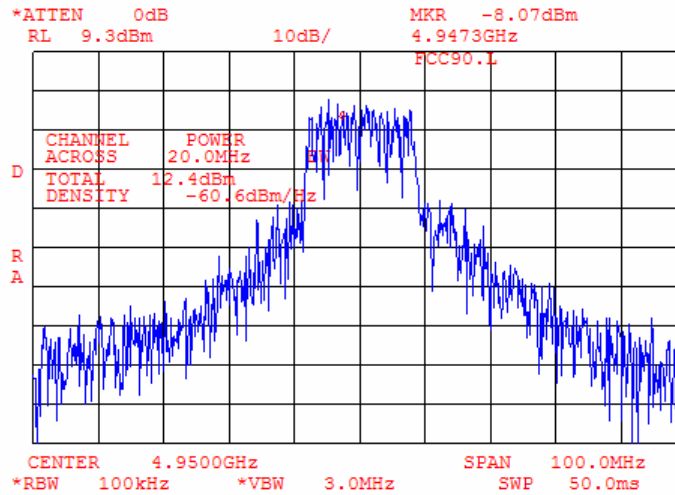
Plot 7.1.6 Peak output power test results at low frequency, Bit Rate: 36 Mbps





Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

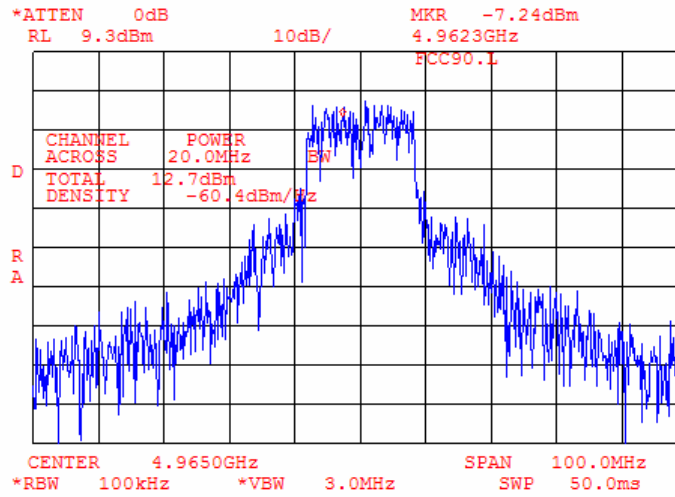
Plot 7.1.7 Peak output power test results at low frequency, Bit Rate: 48 Mbps



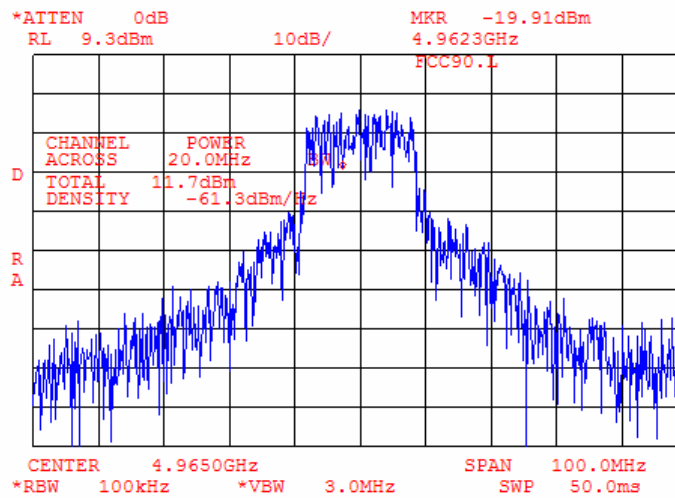


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.8 Peak output power test results at mid frequency, Bit Rate: 6 Mbps



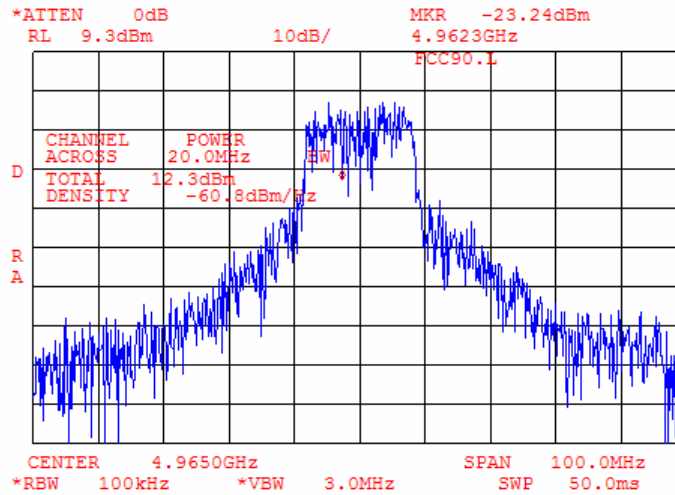
Plot 7.1.9 Peak output power test results at mid frequency, Bit Rate: 9 Mbps



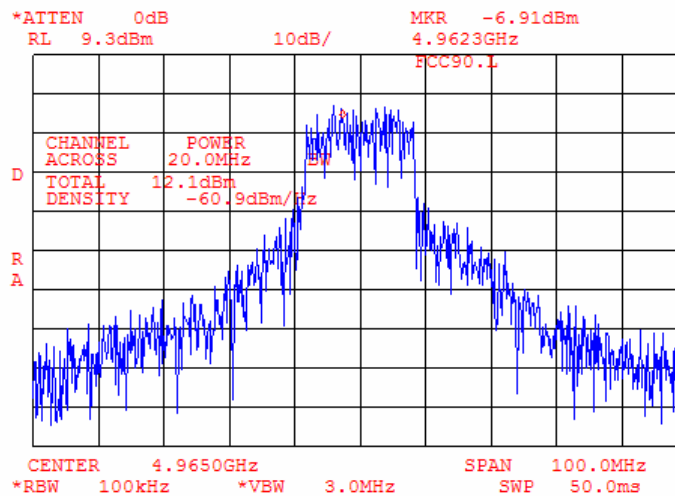


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.10 Peak output power test results at mid frequency, Bit Rate: 12 Mbps



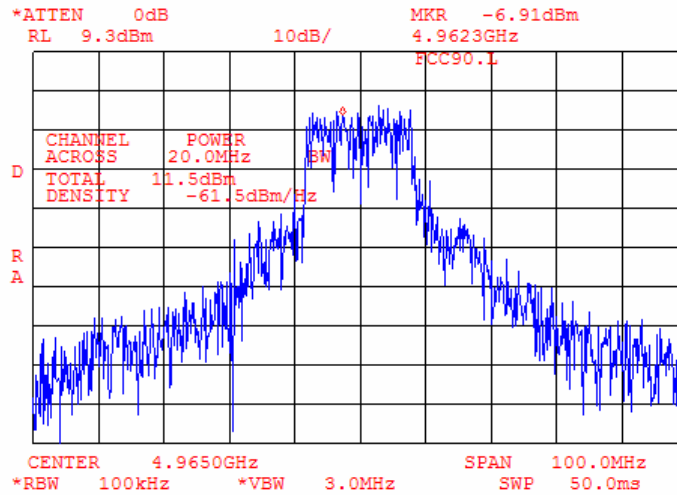
Plot 7.1.11 Peak output power test results at mid frequency, Bit Rate: 18 Mbps



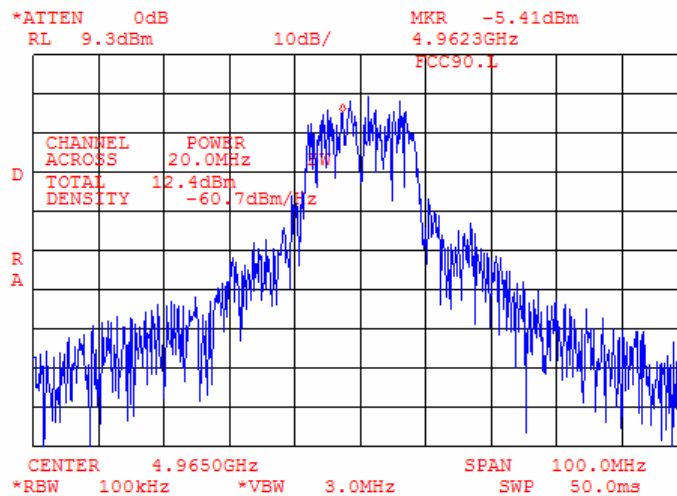


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.12 Peak output power test results at mid frequency, Bit Rate: 24 Mbps



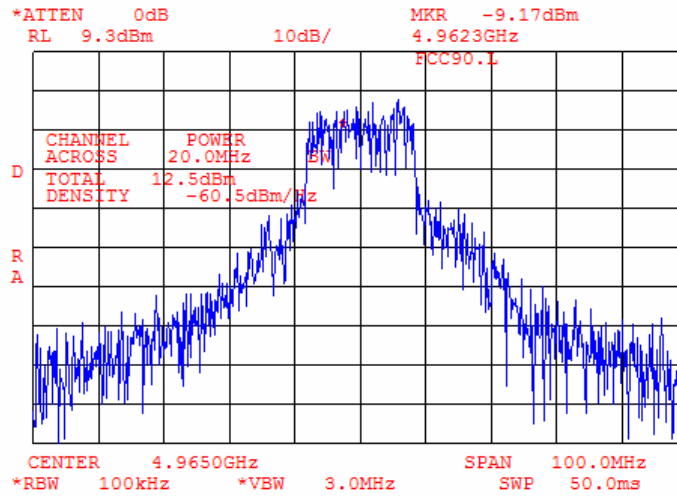
Plot 7.1.13 Peak output power test results at mid frequency, Bit Rate: 36 Mbps





Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

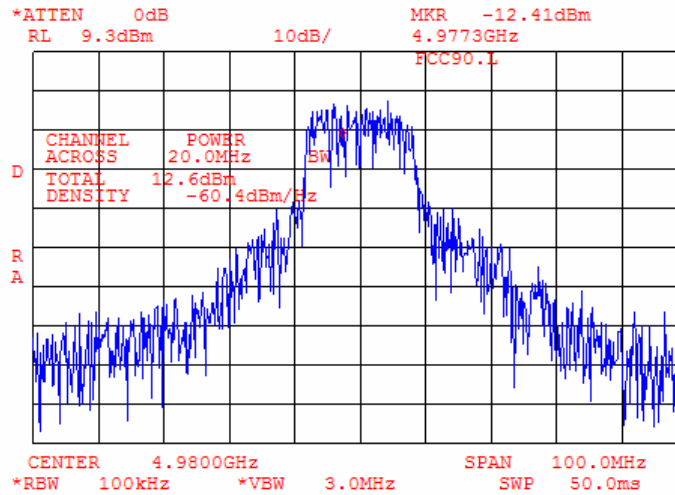
Plot 7.1.14 Peak output power test results at mid frequency, Bit Rate: 48 Mbps



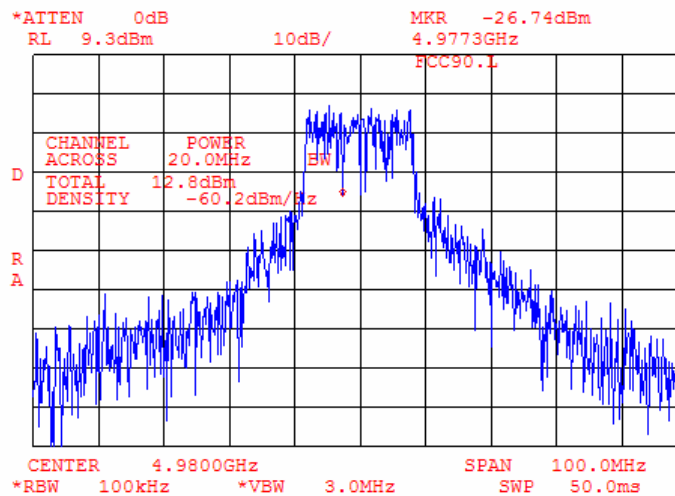


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.15 Peak output power test results at high frequency, Bit Rate: 6 Mbps



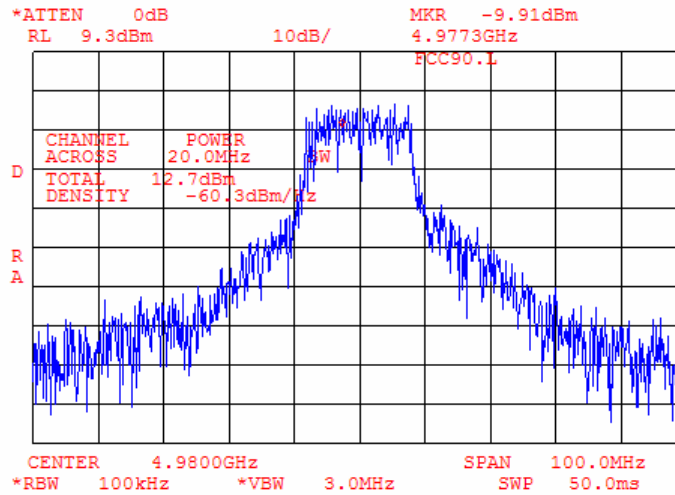
Plot 7.1.16 Peak output power test results at high frequency, Bit Rate: 9 Mbps



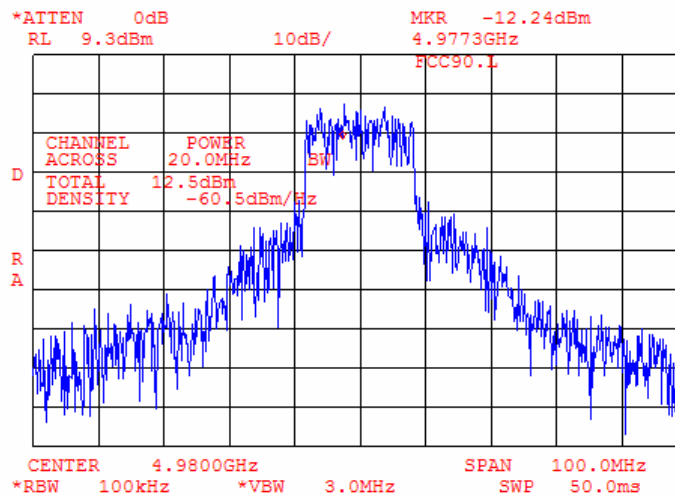


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.17 Peak output power test results at high frequency, Bit Rate: 12 Mbps



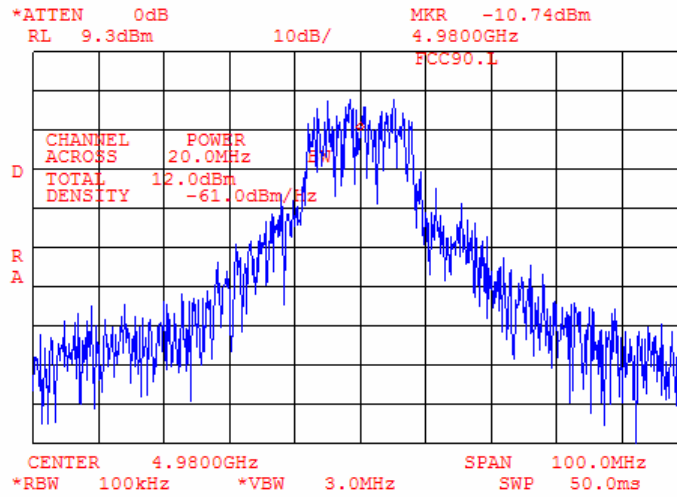
Plot 7.1.18 Peak output power test results at high frequency, Bit Rate: 18 Mbps



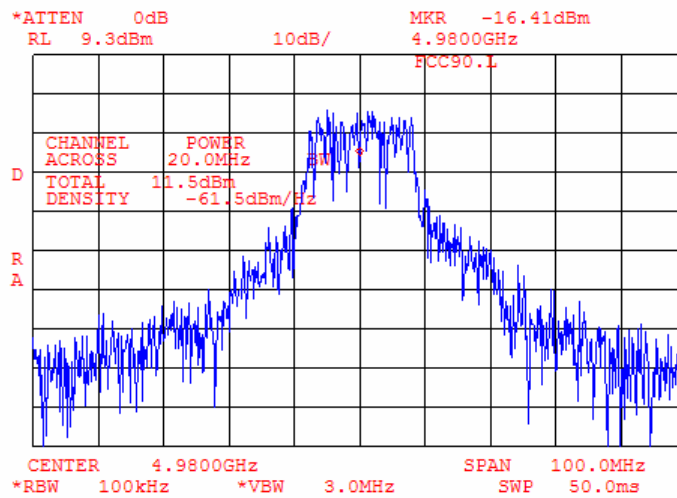


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.19 Peak output power test results at high frequency, Bit Rate: 24 Mbps



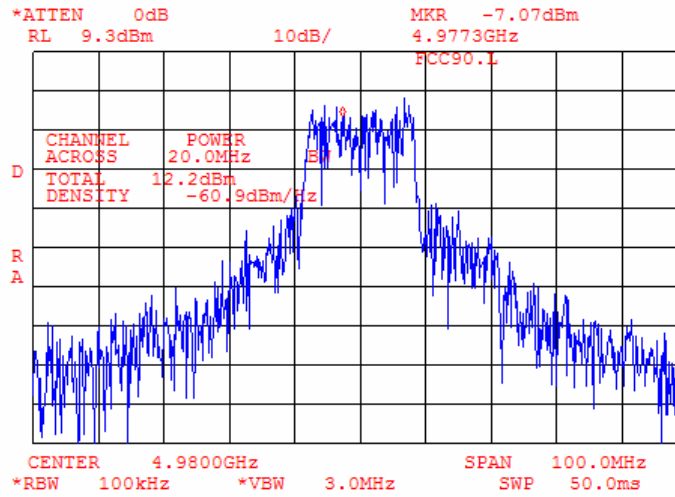
Plot 7.1.20 Peak output power test results at high frequency, Bit Rate: 36 Mbps





Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.21 Peak output power test results at high frequency, Bit Rate: 48 Mbps





Test specification:		Section 90.1215, Maximum output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Table 7.1.3 Power spectral density test results

OPERATING FREQUENCY RANGE: 4950 – 4980 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: BPSK, 4QAM, 16QAM, 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 6, 9, 12, 18, 24, 36, 48 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Carrier frequency, MHz	Spectrum analyzer reading, dBm/Hz	External attenuation, dB	Factor, dB	RF power spectral density, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
Bit Rate: 6 Mbps							
4950.000	-63.3	included	60.0	-3.3	19.0	-22.3	Pass
4965.000	-63.4	included	60.0	-3.4	19.0	-22.4	Pass
4980.000	-63.3	included	60.0	-3.3	19.0	-22.3	Pass
Bit Rate: 9 Mbps							
4950.000	-63.7	included	60.0	-3.7	19.0	-22.7	Pass
4965.000	-63.4	included	60.0	-3.4	19.0	-22.4	Pass
4980.000	-63.5	included	60.0	-3.5	19.0	-22.5	Pass
Bit Rate: 12 Mbps							
4950.000	-63.0	included	60.0	-3.0	19.0	-22.0	Pass
4965.000	-63.3	included	60.0	-3.3	19.0	-22.3	Pass
4980.000	-63.5	included	60.0	-3.5	19.0	-22.5	Pass
Bit Rate: 18 Mbps							
4950.000	-63.1	included	60.0	-3.1	19.0	-22.1	Pass
4965.000	-63.3	included	60.0	-3.3	19.0	-22.3	Pass
4980.000	-63.3	included	60.0	-3.3	19.0	-22.3	Pass
Bit Rate: 24 Mbps							
4950.000	-63.2	included	60.0	-3.2	19.0	-22.2	Pass
4965.000	-63.2	included	60.0	-3.2	19.0	-22.2	Pass
4980.000	-62.9	included	60.0	-2.9	19.0	-21.9	Pass
Bit Rate: 36 Mbps							
4950.000	-63.2	included	60.0	-3.2	19.0	-22.2	Pass
4965.000	-64.0	included	60.0	-4.0	19.0	-23.0	Pass
4980.000	-63.7	included	60.0	-3.7	19.0	-22.7	Pass
Bit Rate: 48 Mbps							
4950.000	-63.0	included	60.0	-3.0	19.0	-22.0	Pass
4965.000	-63.1	included	60.0	-3.1	19.0	-22.1	Pass
4980.000	-63.0	included	60.0	-3.0	19.0	-22.0	Pass

The equipment is used with the 27 dBi external antenna, the peak power spectral density limit was reduced by 1 dB.

Reference numbers of test equipment used

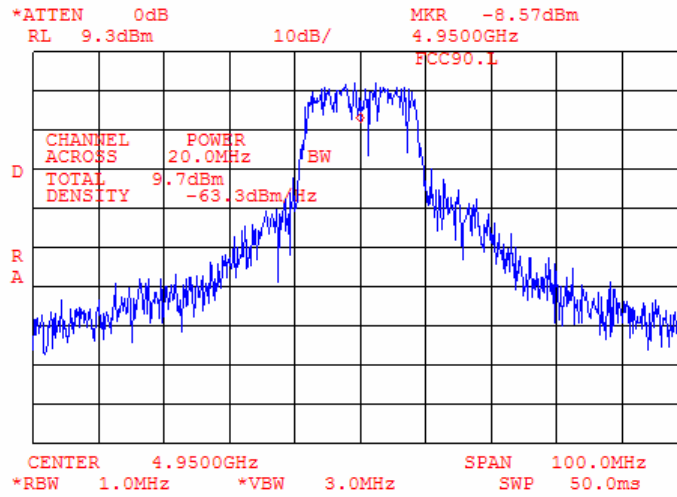
HL 1424	HL 2254						
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Full description is given in Appendix A.

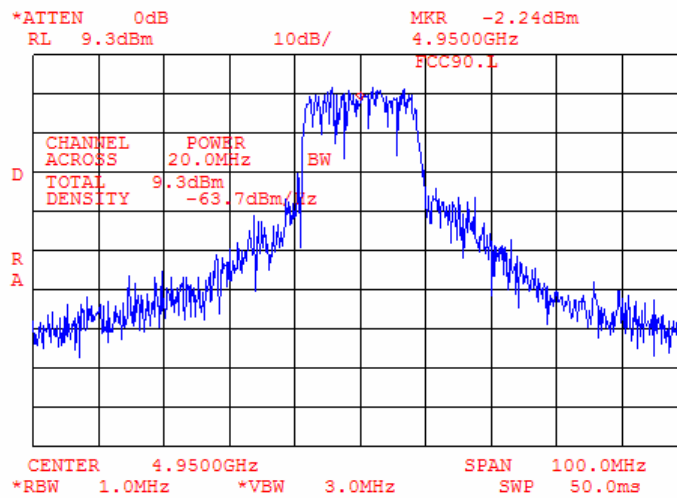


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.22 Power spectral density test results at low frequency, Bit Rate: 6 Mbps



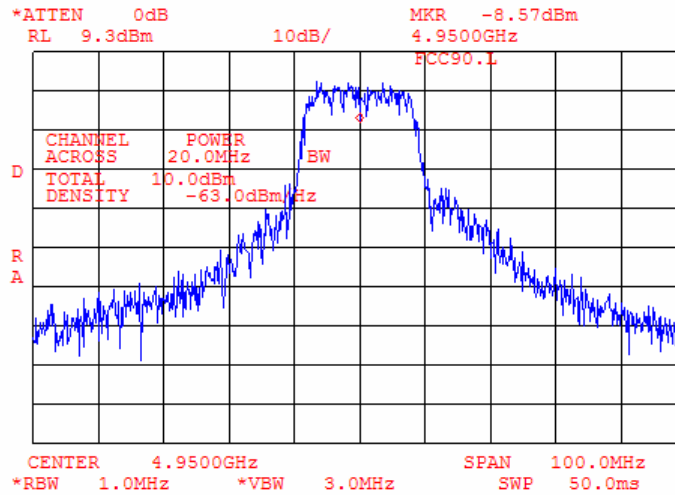
Plot 7.1.23 Power spectral density test results at low frequency, Bit Rate: 9 Mbps



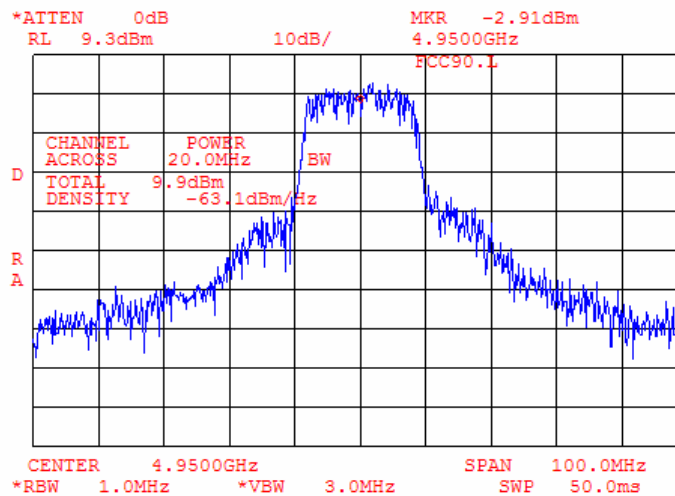


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.24 Power spectral density test results at low frequency, Bit Rate: 12 Mbps



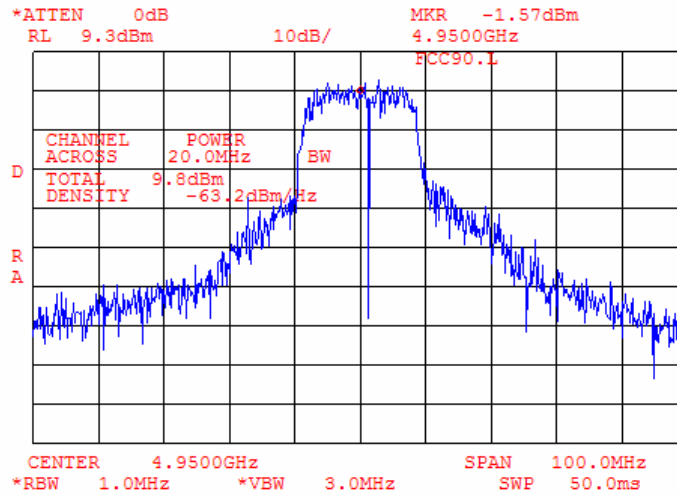
Plot 7.1.25 Power spectral density test results at low frequency, Bit Rate: 18 Mbps



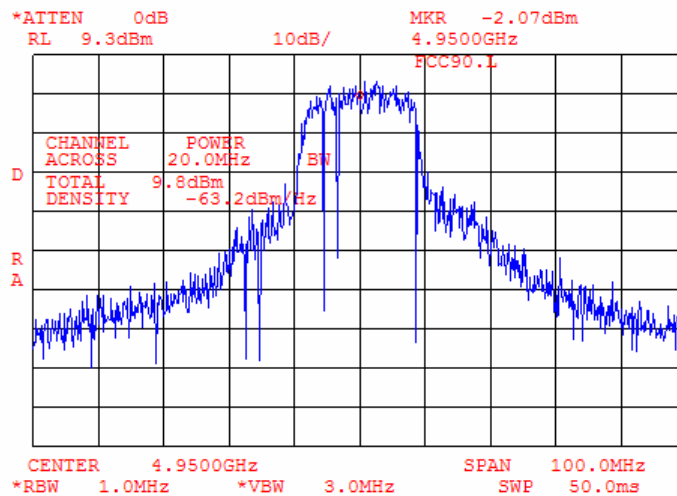


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.26 Power spectral density test results at low frequency, Bit Rate: 24 Mbps



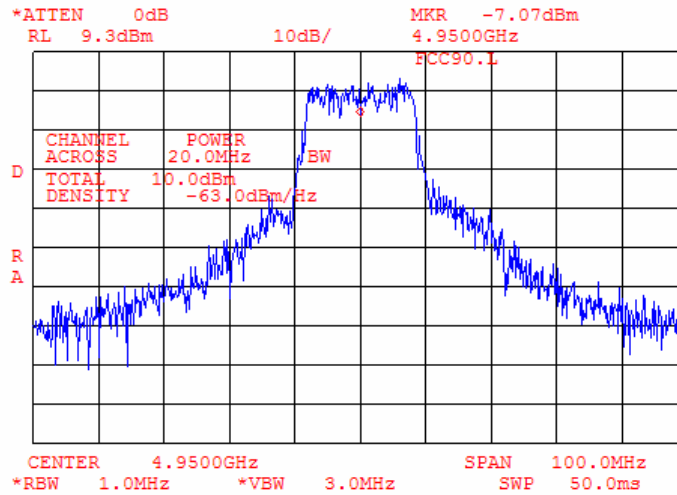
Plot 7.1.27 Power spectral density test results at low frequency, Bit Rate: 36 Mbps





Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

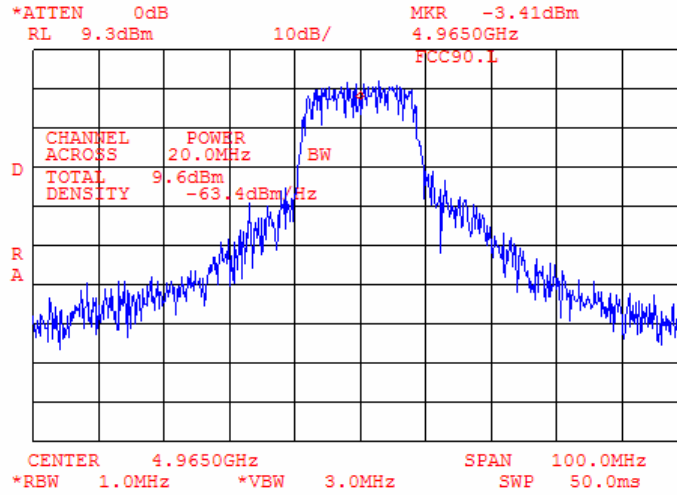
Plot 7.1.28 Power spectral density test results at low frequency, Bit Rate: 48 Mbps



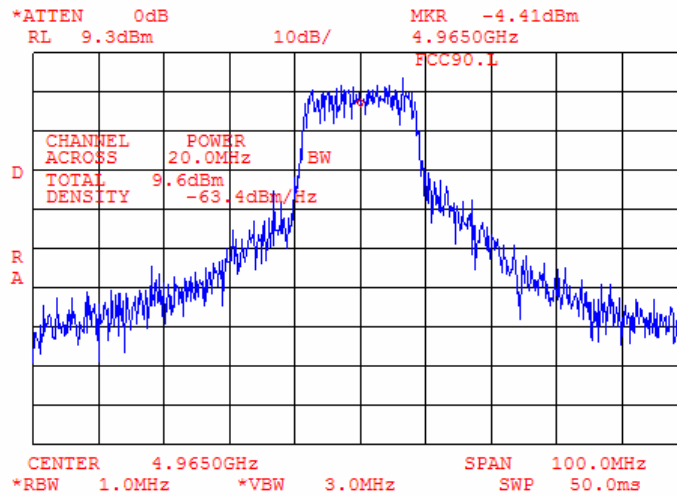


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.29 Power spectral density test results at middle frequency, Bit Rate: 6 Mbps



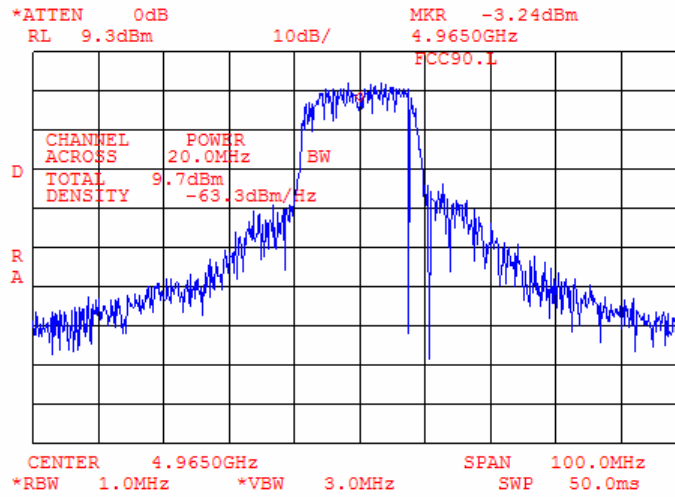
Plot 7.1.30 Power spectral density test results at middle frequency, Bit Rate: 9 Mbps



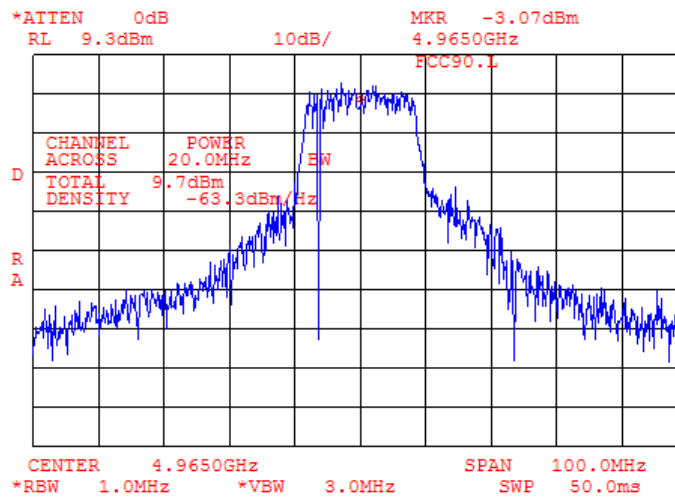


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.31 Power spectral density test results at middle frequency, Bit Rate: 12 Mbps



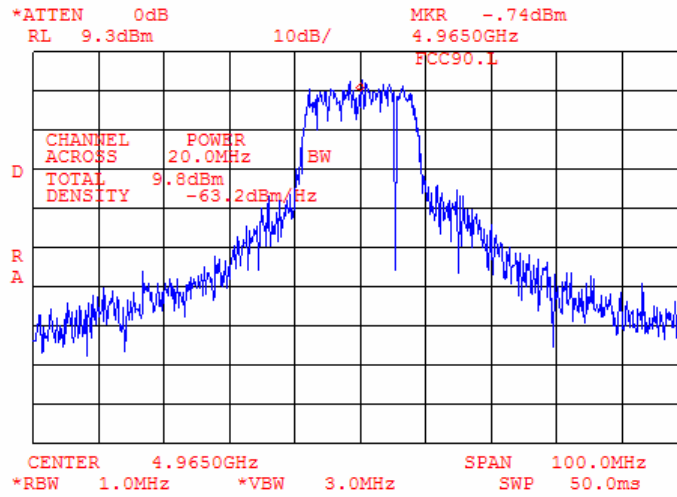
Plot 7.1.32 Power spectral density test results at middle frequency, Bit Rate: 18 Mbps



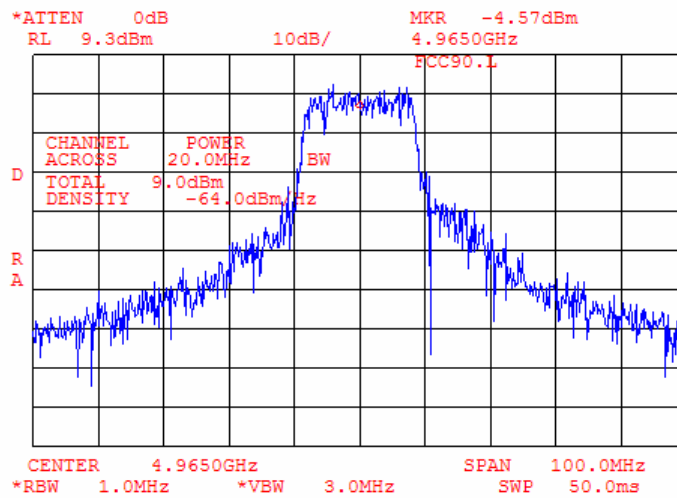


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.33 Power spectral density test results at middle frequency, Bit Rate: 24 Mbps



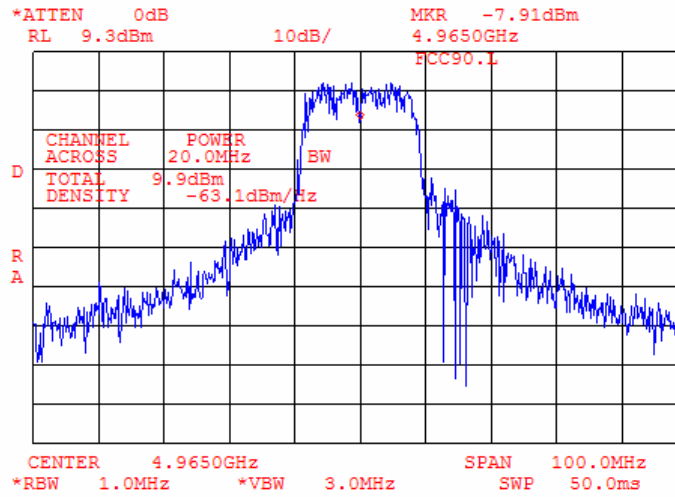
Plot 7.1.34 Power spectral density test results at middle frequency, Bit Rate: 36 Mbps





Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

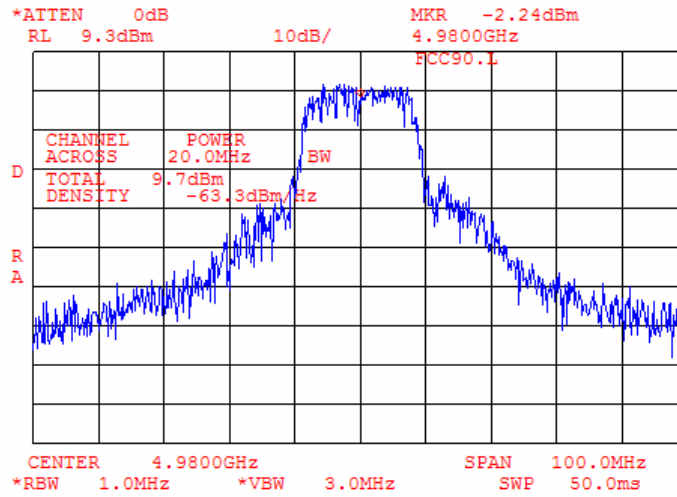
Plot 7.1.35 Power spectral density test results at middle frequency, Bit Rate: 48 Mbps



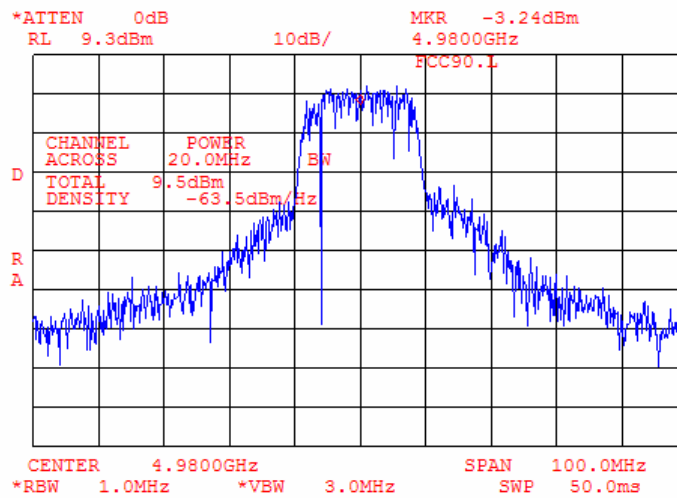


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.36 Power spectral density test results at high frequency, Bit Rate: 6 Mbps



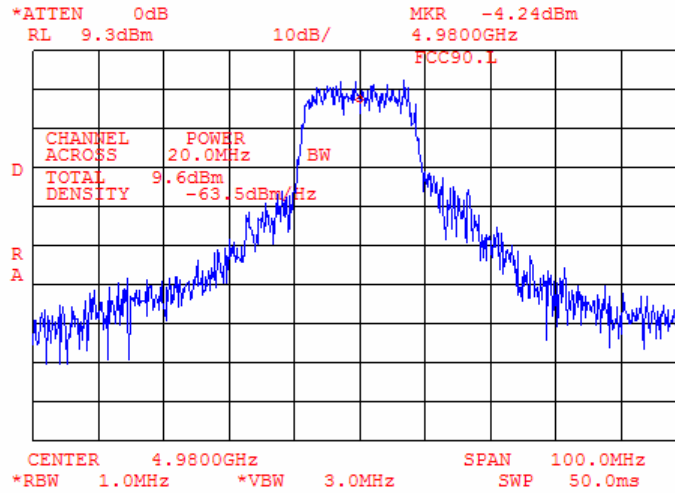
Plot 7.1.37 Power spectral density test results at high frequency, Bit Rate: 9 Mbps



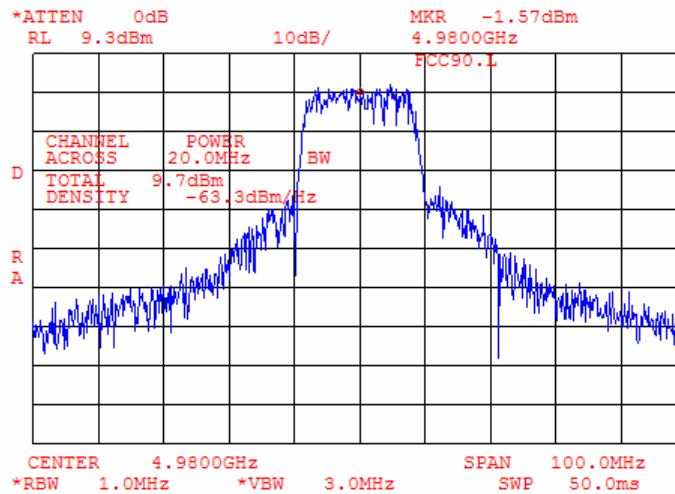


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.38 Power spectral density test results at high frequency, Bit Rate: 12 Mbps



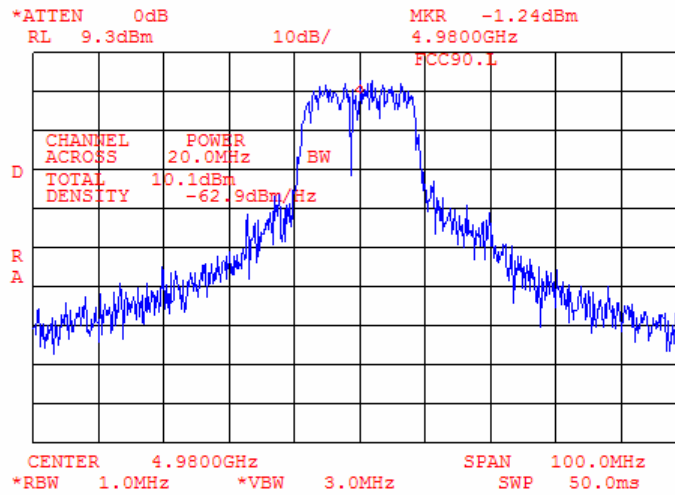
Plot 7.1.39 Power spectral density test results at high frequency, Bit Rate: 18 Mbps



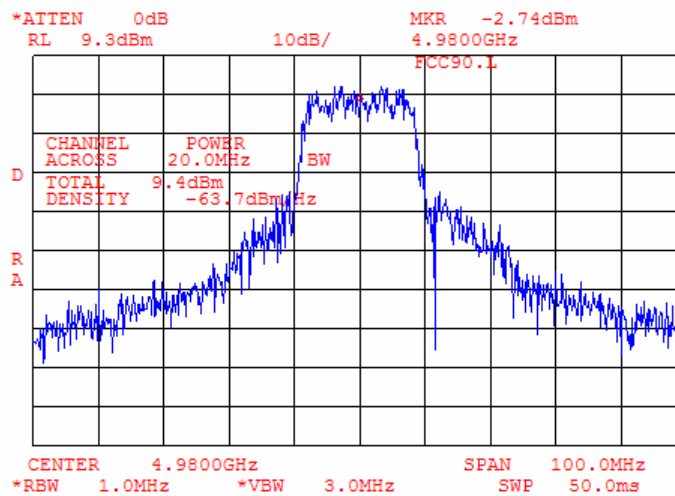


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.40 Power spectral density test results at high frequency, Bit Rate: 24 Mbps



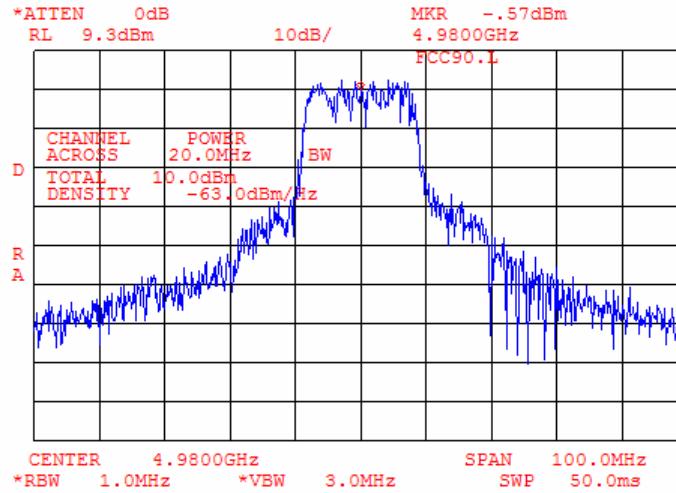
Plot 7.1.41 Power spectral density test results at high frequency, Bit Rate: 36 Mbps





Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:40:08 AM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.42 Power spectral density test results at high frequency, Bit Rate: 48 Mbps





Test specification:		Section 90.1215, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:54:59 AM		
Temperature: 24 °C	Air Pressure: 1016 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
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. The test results are provided in Table 7.2.2 and the associated plots.

Table 7.2.1 Occupied bandwidth limits

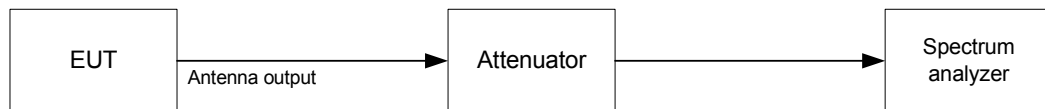
Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, MHz
4950 - 4980	26	20.0

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

7.2.2 Test procedure

- 7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.
- 7.2.2.2 The EUT was set to transmit the unmodulated carrier and the reference peak power level was measured.
- 7.2.2.3 The EUT was set to transmit the normally modulated carrier.
- 7.2.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.2.2 and the associated plots.

Figure 7.2.1 Occupied bandwidth test setup





Test specification:		Section 90.1215, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:54:59 AM		
Temperature: 24 °C	Air Pressure: 1016 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Table 7.2.2 Occupied bandwidth test results

DETECTOR USED: Peak hold
RESOLUTION BANDWIDTH: 300 kHz
VIDEO BANDWIDTH: 1000 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
MODULATION: BPSK, 4QAM, 16QAM, 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 6, 9, 12, 18, 24, 36, 48 Mbps

Carrier frequency, MHz	Occupied bandwidth, MHz	Limit, MHz	Margin, MHz	Verdict
Rate 6 Mbps				
4950.000	17.5	20.0	-2.5	Pass
4965.000	17.3	20.0	-2.7	Pass
4980.000	17.3	20.0	-2.7	Pass
Rate 9 Mbps				
4950.000	17.5	20.0	-2.5	Pass
4965.000	17.5	20.0	-2.5	Pass
4980.000	17.3	20.0	-2.7	Pass
Rate 12 Mbps				
4950.000	17.3	20.0	-2.7	Pass
4965.000	17.3	20.0	-2.7	Pass
4980.000	17.5	20.0	-2.5	Pass
Rate 18 Mbps				
4950.000	17.3	20.0	-2.7	Pass
4965.000	17.3	20.0	-2.7	Pass
4980.000	17.3	20.0	-2.7	Pass
Rate 24 Mbps				
4950.000	17.3	20.0	-2.7	Pass
4965.000	17.3	20.0	-2.7	Pass
4980.000	17.3	20.0	-2.7	Pass
Rate 36 Mbps				
4950.000	17.5	20.0	-2.5	Pass
4965.000	17.5	20.0	-2.5	Pass
4980.000	17.5	20.0	-2.5	Pass
Rate 48 Mbps				
4950.000	17.2	20.0	-2.8	Pass
4965.000	17.3	20.0	-2.7	Pass
4980.000	17.3	20.0	-2.7	Pass

Reference numbers of test equipment used

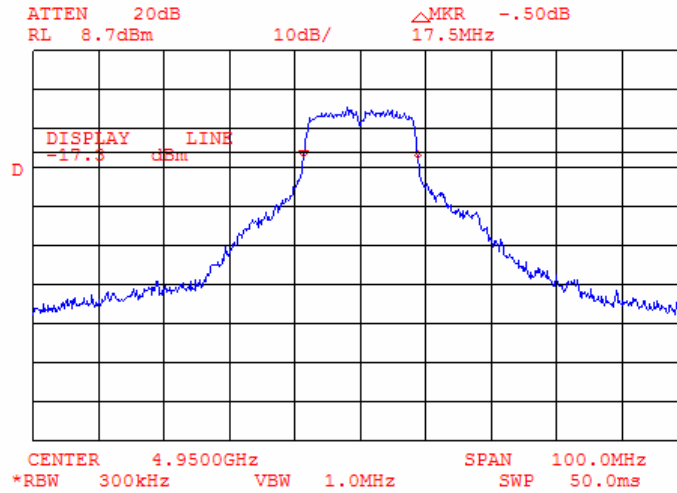
HL 1424	HL 2399	HL 2524					
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Full description is given in Appendix A.

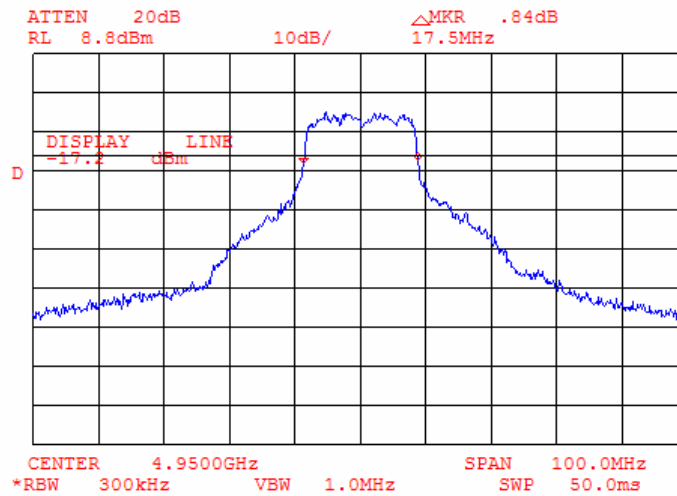


Test specification:	Section 90.1215, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:54:59 AM		
Temperature: 24 °C	Air Pressure: 1016 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.2.1 Occupied bandwidth test result at low frequency, 6 Mbps



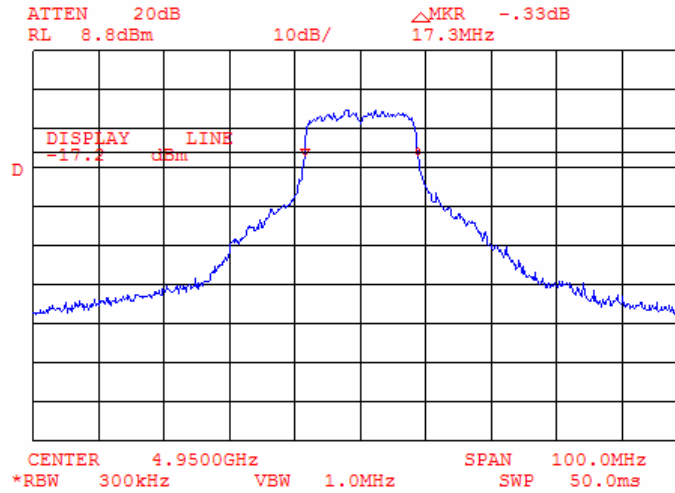
Plot 7.2.2 Occupied bandwidth test result at low frequency, 9 Mbps



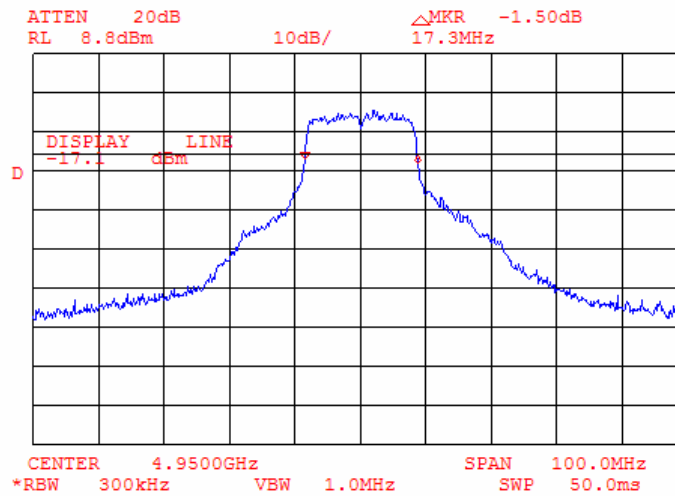


Test specification:	Section 90.1215, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:54:59 AM		
Temperature: 24 °C	Air Pressure: 1016 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.2.3 Occupied bandwidth test result at low frequency, 12 Mbps



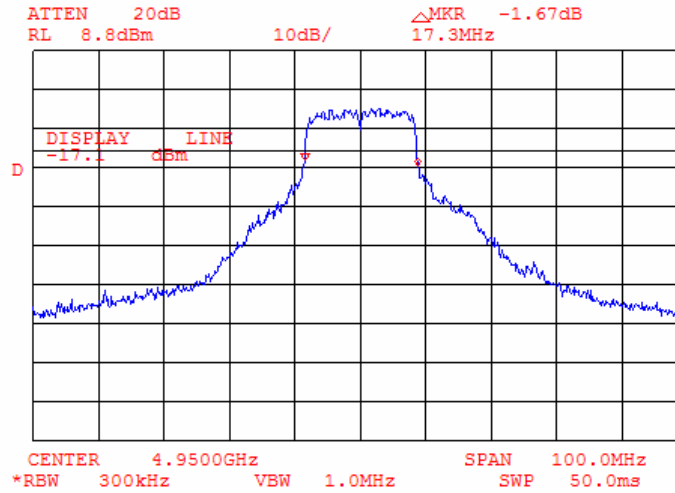
Plot 7.2.4 Occupied bandwidth test result at low frequency, 18 Mbps



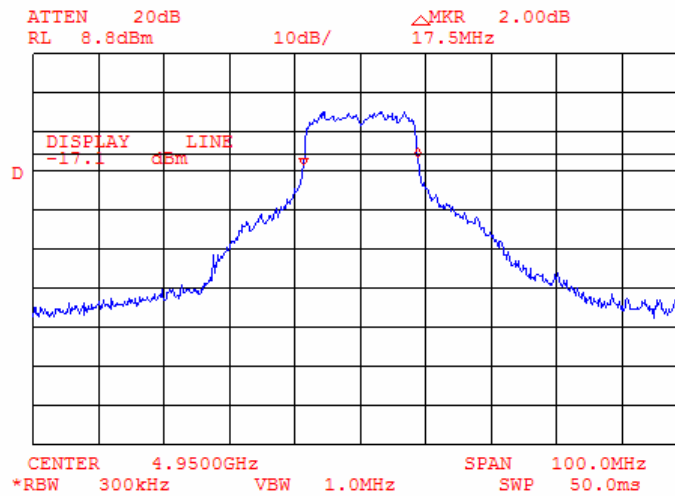


Test specification:	Section 90.1215, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:54:59 AM		
Temperature: 24 °C	Air Pressure: 1016 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.2.5 Occupied bandwidth test result at low frequency, 24 Mbps



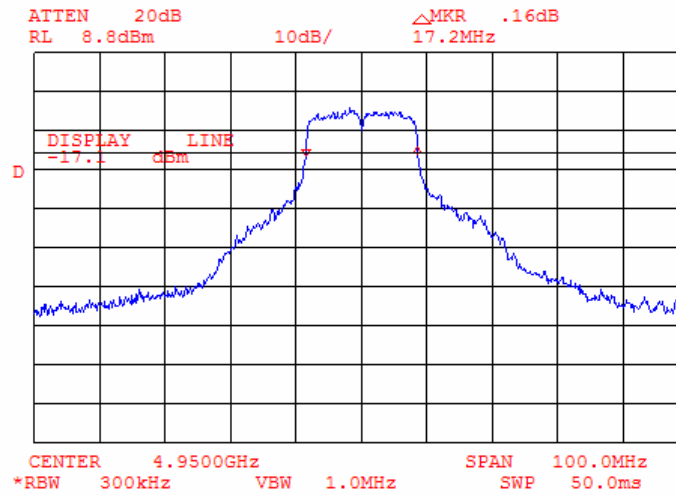
Plot 7.2.6 Occupied bandwidth test result at low frequency, 36 Mbps





Test specification:	Section 90.1215, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:54:59 AM		
Temperature: 24 °C	Air Pressure: 1016 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

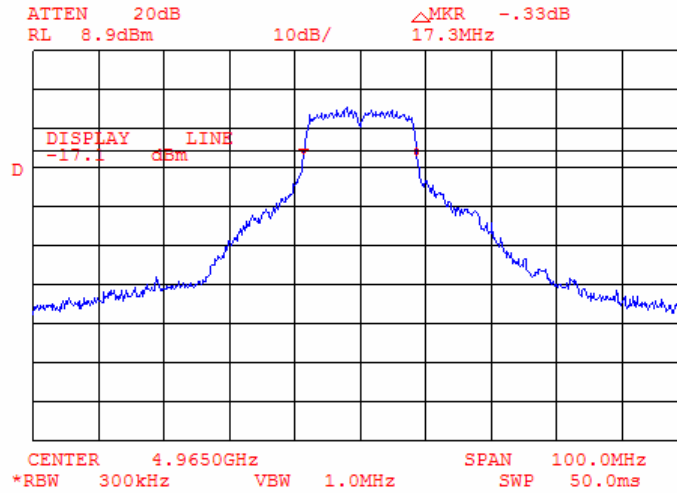
Plot 7.2.7 Occupied bandwidth test result at low frequency, 48 Mbps



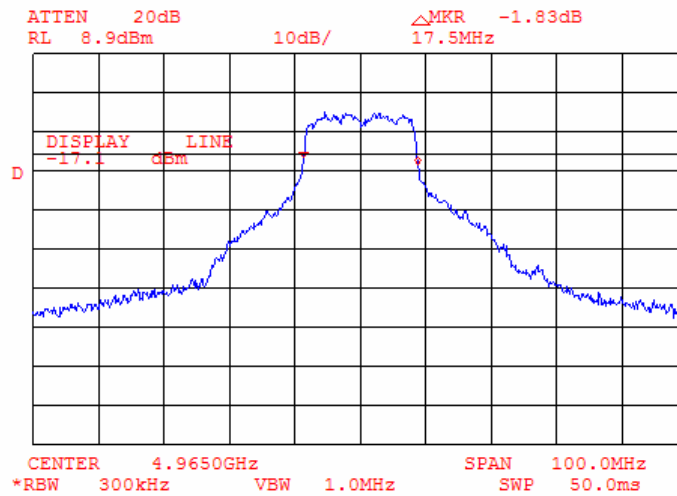


Test specification:	Section 90.1215, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:54:59 AM		
Temperature: 24 °C	Air Pressure: 1016 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.2.8 Occupied bandwidth test result at mid frequency, 6 Mbps



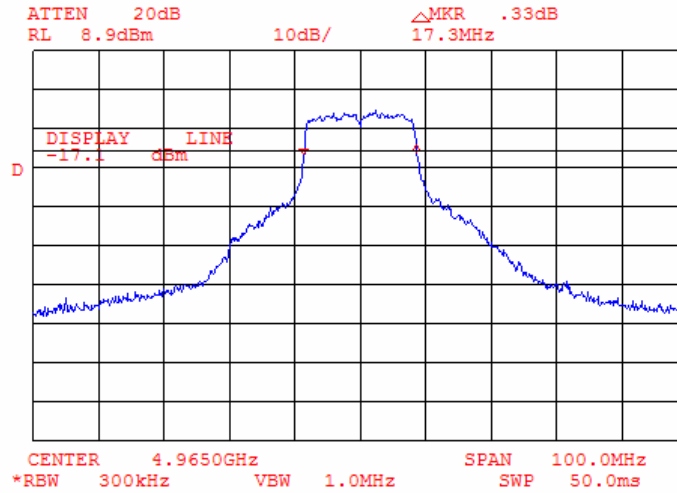
Plot 7.2.9 Occupied bandwidth test result at mid frequency, 9 Mbps



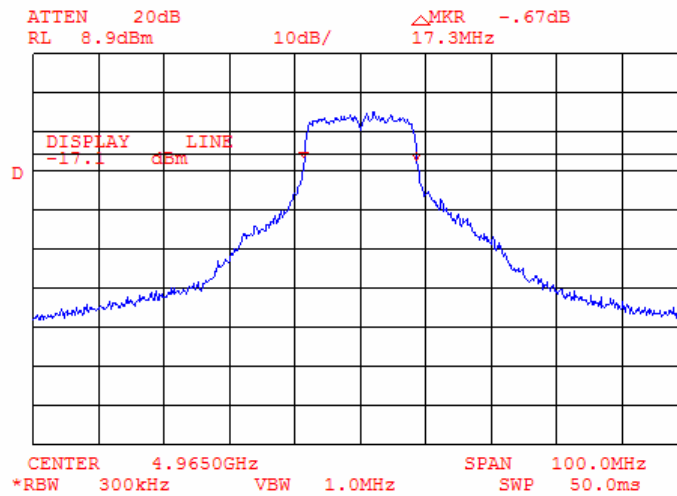


Test specification:	Section 90.1215, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:54:59 AM		
Temperature: 24 °C	Air Pressure: 1016 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.2.10 Occupied bandwidth test result at mid frequency, 12 Mbps



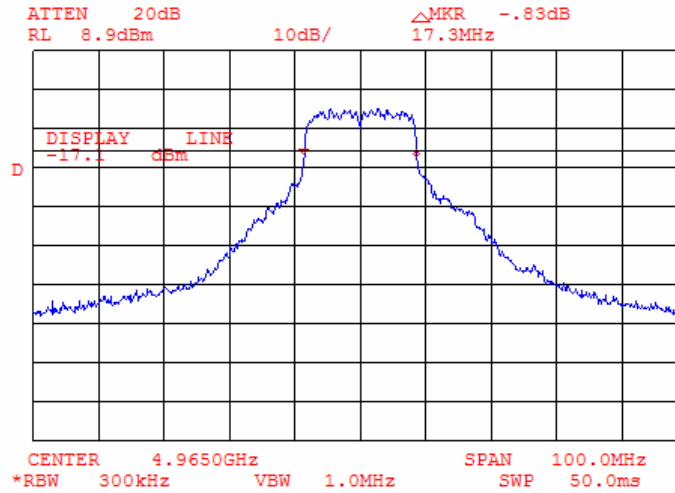
Plot 7.2.11 Occupied bandwidth test result at mid frequency, 18 Mbps



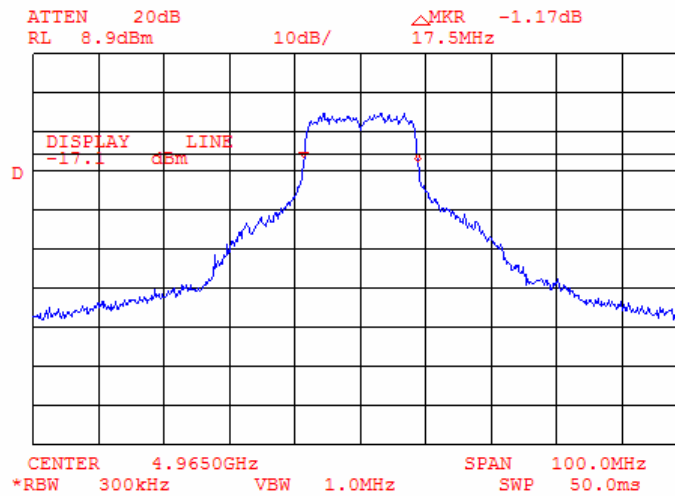


Test specification:	Section 90.1215, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:54:59 AM		
Temperature: 24 °C	Air Pressure: 1016 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.2.12 Occupied bandwidth test result at mid frequency, 24 Mbps



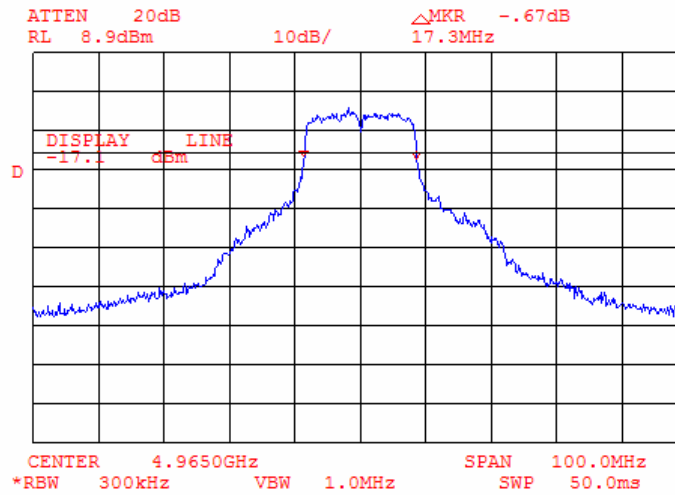
Plot 7.2.13 Occupied bandwidth test result at mid frequency, 36 Mbps





Test specification:	Section 90.1215, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:54:59 AM		
Temperature: 24 °C	Air Pressure: 1016 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

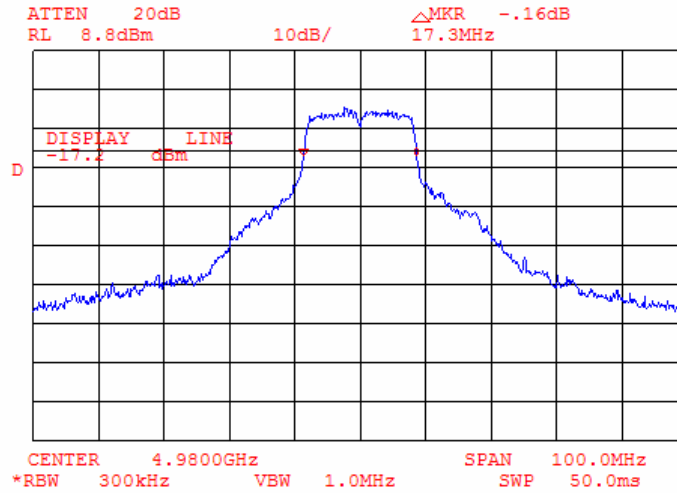
Plot 7.2.14 Occupied bandwidth test result at mid frequency, 48 Mbps



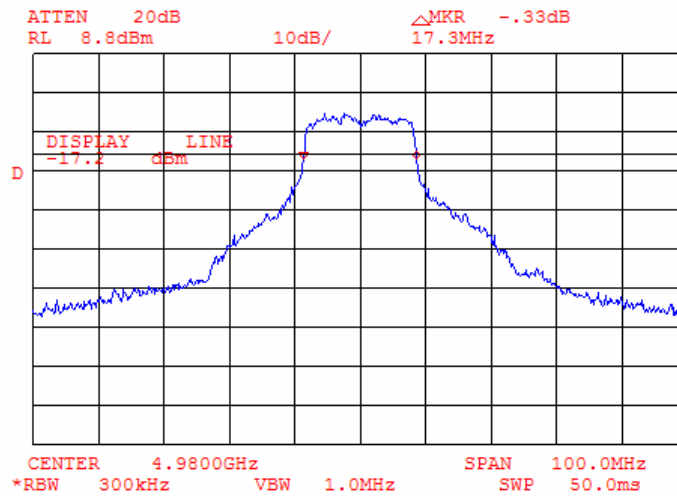


Test specification:	Section 90.1215, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:54:59 AM		
Temperature: 24 °C	Air Pressure: 1016 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.2.15 Occupied bandwidth test result at high frequency, 6 Mbps



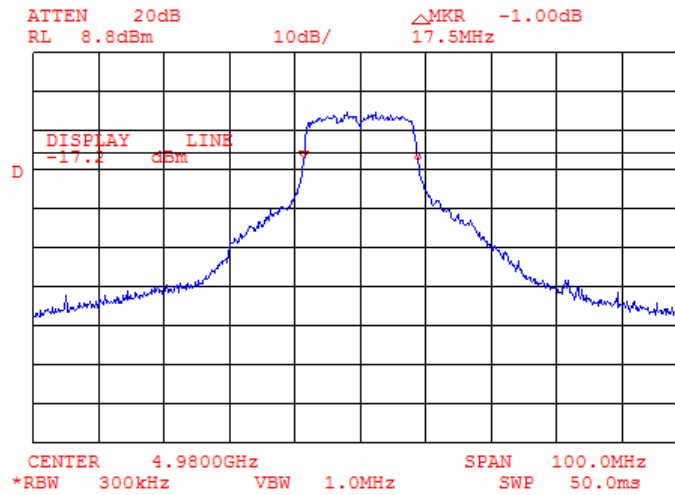
Plot 7.2.16 Occupied bandwidth test result at high frequency, 9 Mbps



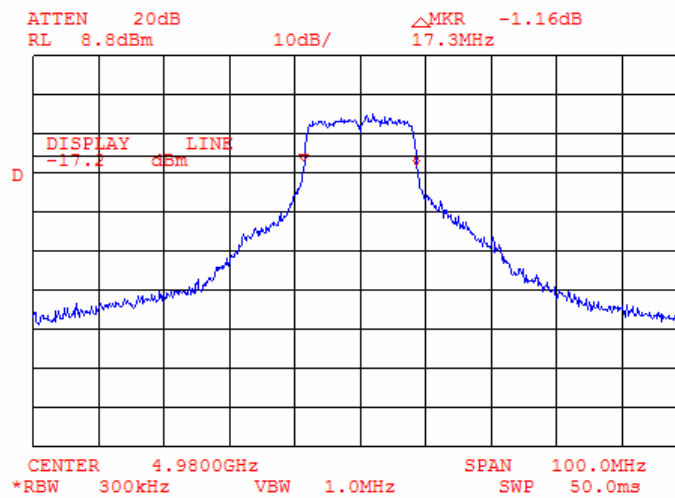


Test specification:	Section 90.1215, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:54:59 AM		
Temperature: 24 °C	Air Pressure: 1016 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.2.17 Occupied bandwidth test result at high frequency, 12 Mbps



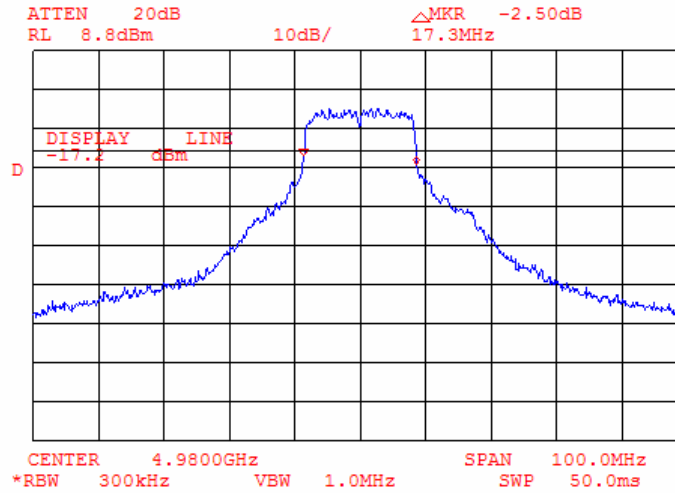
Plot 7.2.18 Occupied bandwidth test result at high frequency, 18 Mbps



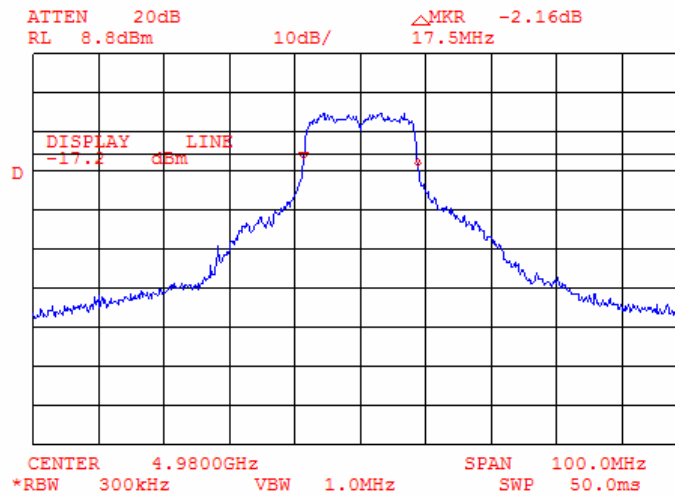


Test specification:	Section 90.1215, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:54:59 AM		
Temperature: 24 °C	Air Pressure: 1016 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.2.19 Occupied bandwidth test result at high frequency, 24 Mbps



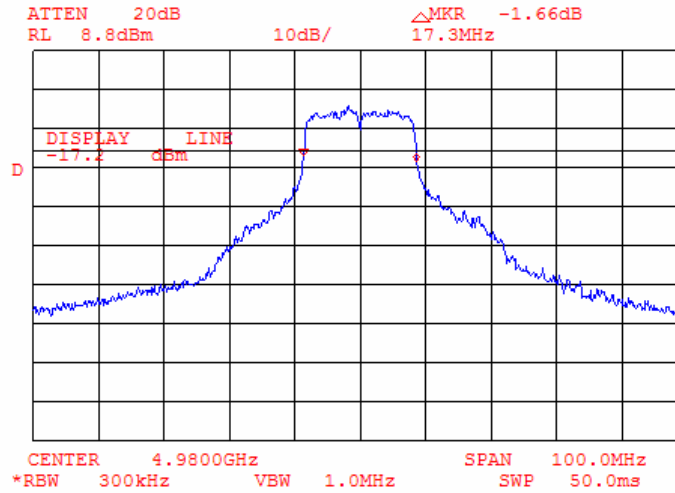
Plot 7.2.20 Occupied bandwidth test result at high frequency, 36 Mbps





Test specification:	Section 90.1215, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:54:59 AM		
Temperature: 24 °C	Air Pressure: 1016 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.2.21 Occupied bandwidth test result at high frequency, 48 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:	3/1/2005 4:24:06 PM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
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. The test results are provided in the associated plots.

Table 7.3.1 Emission mask limits

Frequency displacement from carrier	Attenuation below carrier, dBc
Emission mask L	
0 – 20.0 MHz	0
20.0 – 37.5 MHz	28.0
37.5 – 62.5 MHz	37.0
62.5 – 75.0 MHz	41.0
More than 75.0 MHz	53.0

* - linearly increase with frequency

** - emission mask includes carrier modulation envelope within ± 250 % of the authorized bandwidth; the frequency range removed beyond ± 250 % of the authorized bandwidth from carrier was investigated as spurious emission

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.

Figure 7.3.1 Emission mask test setup

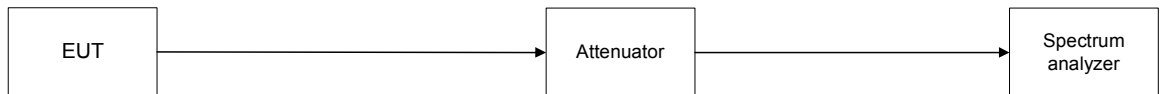


Table 7.3.2 Emission mask test results

Carrier frequency, MHz	Limit	Verdict
4950.0	Emission mask L	Pass
4965.0		
4980.0		

Reference numbers of test equipment used

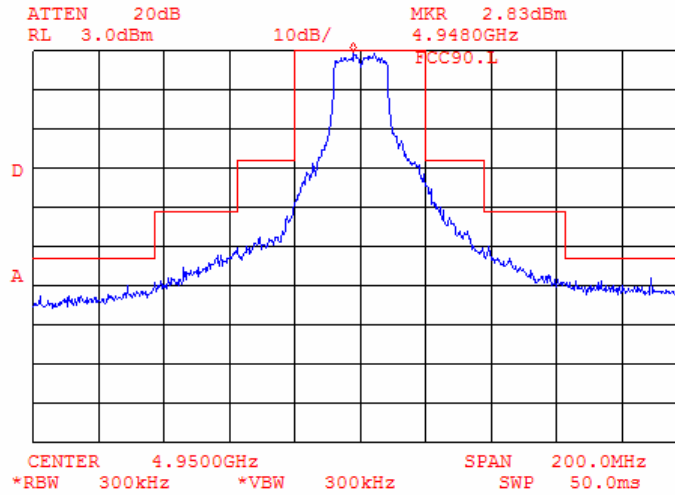
HL 1424	HL 2254						
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Full description is given in Appendix A.

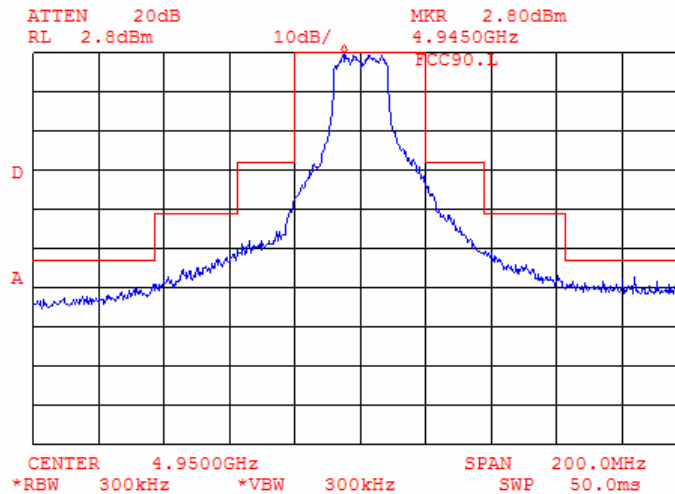


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/1/2005 4:24:06 PM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.1 Emission mask test results at low carrier frequency, 4950 MHz, Rate: 6 Mbps



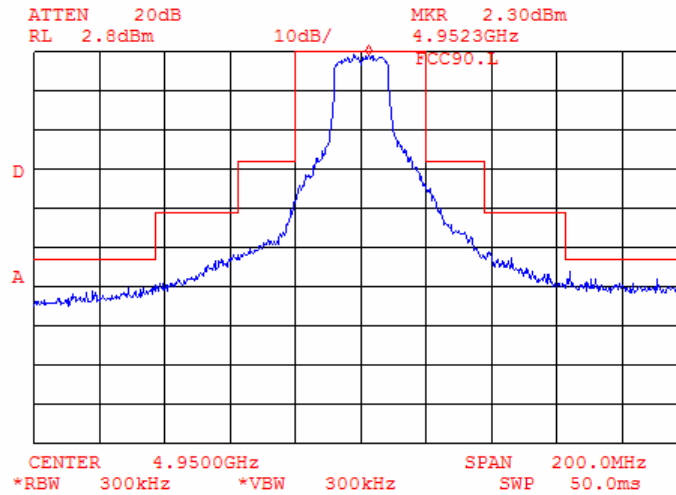
Plot 7.3.2 Emission mask test results at low carrier frequency, 4950 MHz, Rate: 9 Mbps



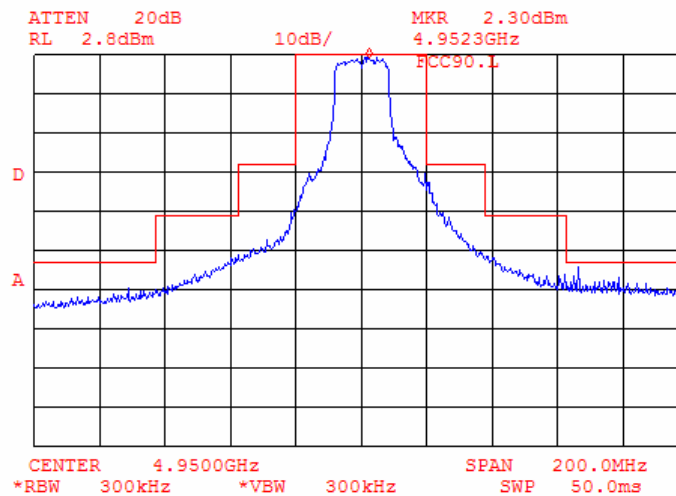


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/1/2005 4:24:06 PM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.3 Emission mask test results at low carrier frequency, 4950 MHz, Rate: 12 Mbps



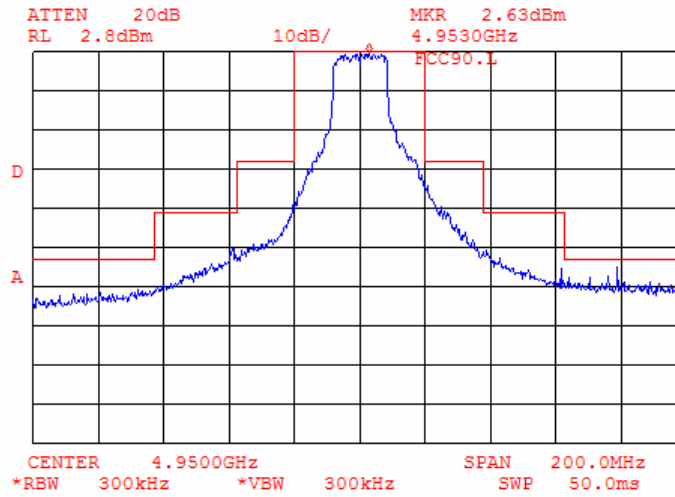
Plot 7.3.4 Emission mask test results at low carrier frequency, 4950 MHz, Rate: 18 Mbps



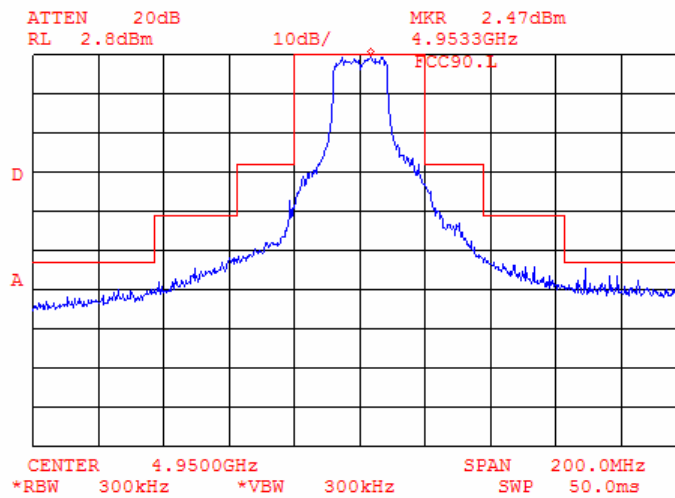


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/1/2005 4:24:06 PM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.5 Emission mask test results at low carrier frequency, 4950 MHz, Rate: 24 Mbps



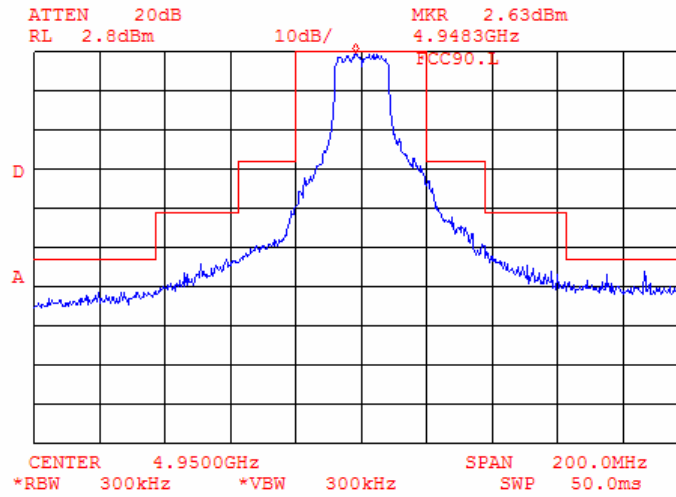
Plot 7.3.6 Emission mask test results at low carrier frequency, 4950 MHz, Rate: 36 Mbps





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:	3/1/2005 4:24:06 PM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

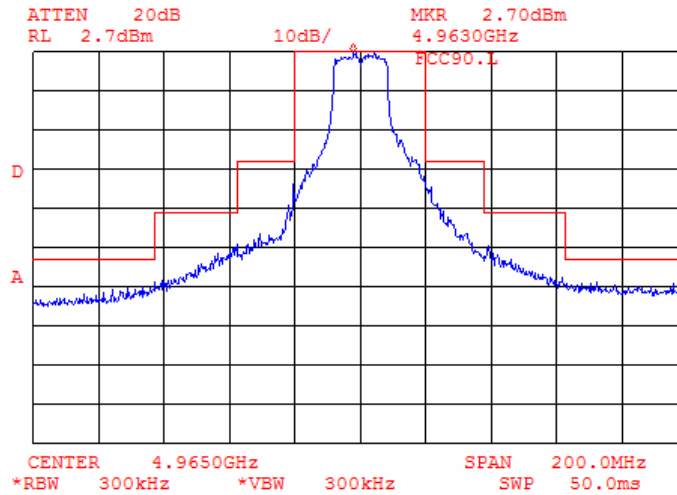
Plot 7.3.7 Emission mask test results at low carrier frequency, 4950 MHz, Rate: 48 Mbps



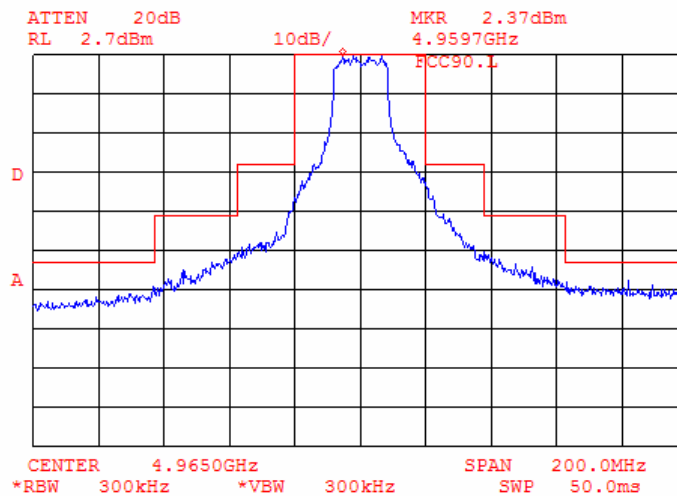


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/1/2005 4:24:06 PM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.8 Emission mask test results at mid carrier frequency, 4965 MHz, Rate: 6 Mbps



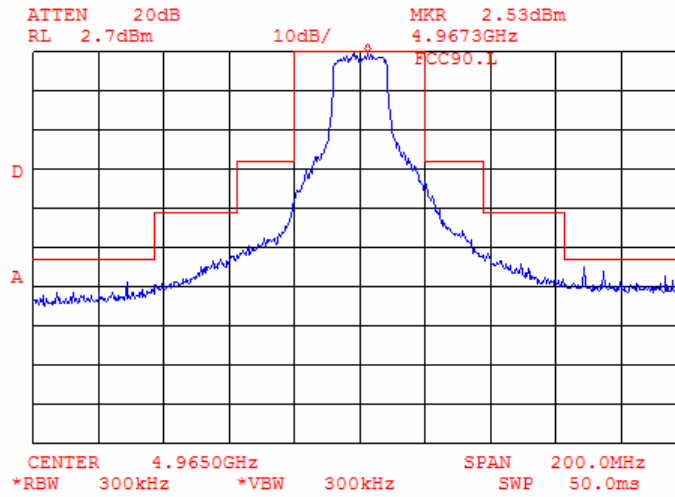
Plot 7.3.9 Emission mask test results at mid carrier frequency, 4965 MHz, Rate: 9 Mbps



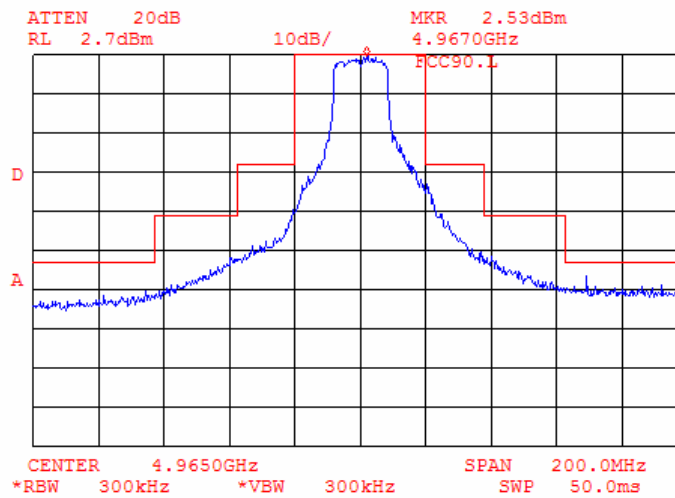


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/1/2005 4:24:06 PM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.10 Emission mask test results at mid carrier frequency, 4965 MHz, Rate: 12 Mbps



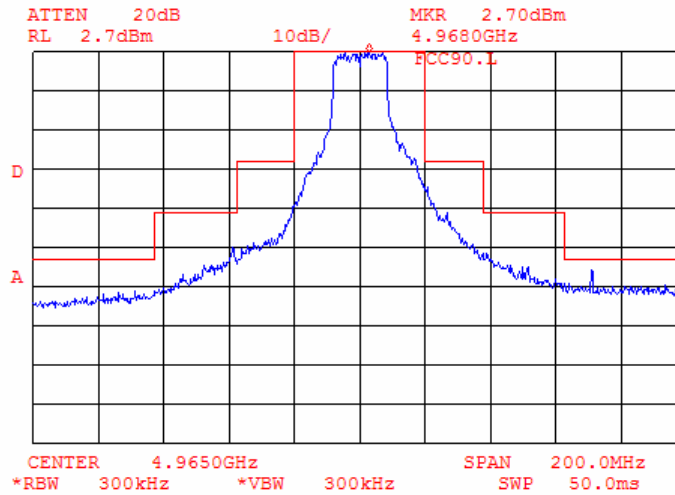
Plot 7.3.11 Emission mask test results at mid carrier frequency, 4965 MHz, Rate: 18 Mbps



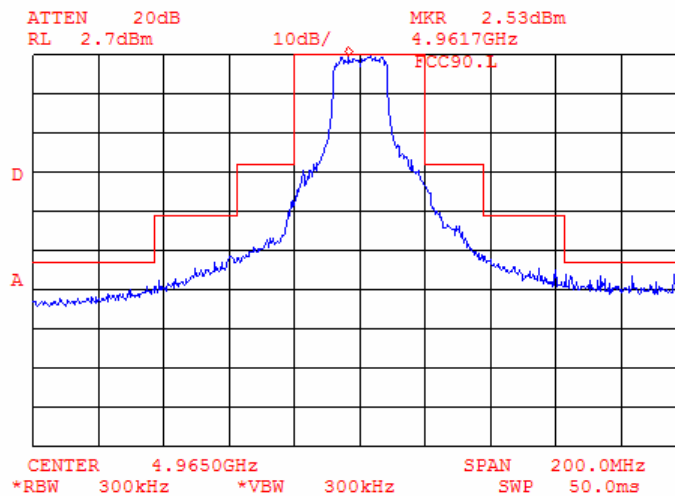


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/1/2005 4:24:06 PM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.12 Emission mask test results at mid carrier frequency, 4965 MHz, Rate: 24 Mbps



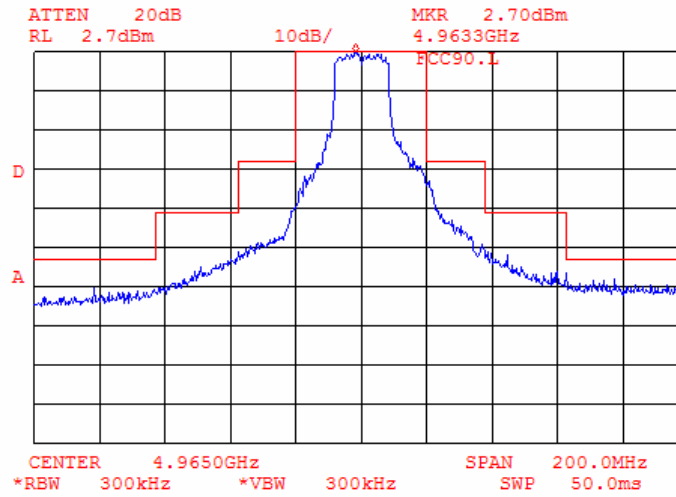
Plot 7.3.13 Emission mask test results at mid carrier frequency, 4965 MHz, Rate: 36 Mbps





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:	3/1/2005 4:24:06 PM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

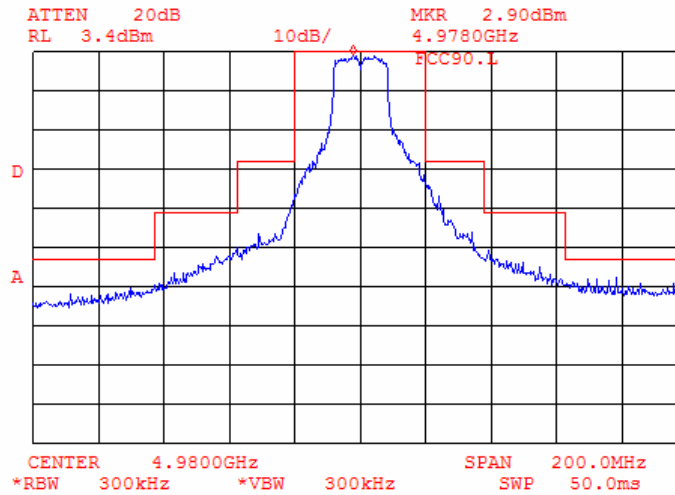
Plot 7.3.14 Emission mask test results at mid carrier frequency, 4965 MHz, Rate: 48 Mbps



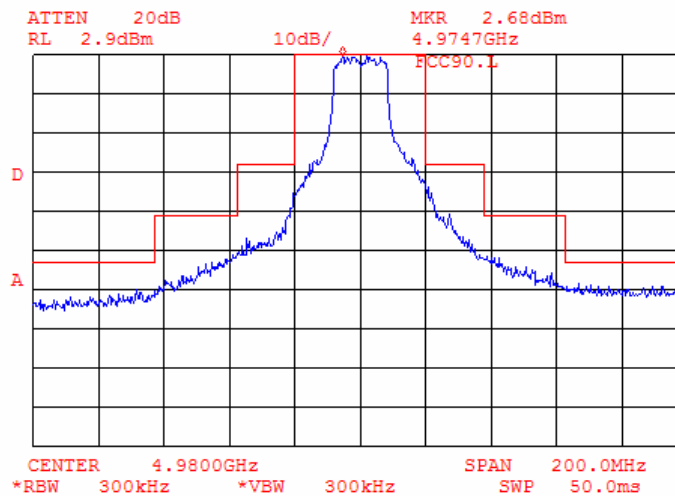


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/1/2005 4:24:06 PM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.15 Emission mask test results at high carrier frequency, 4980 MHz, Rate: 6 Mbps



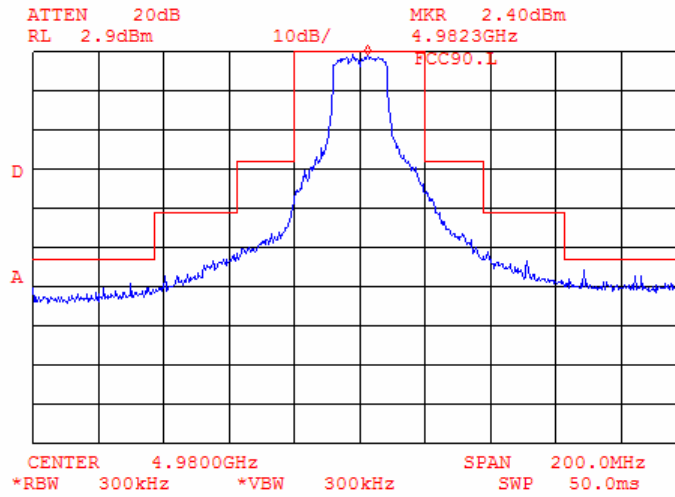
Plot 7.3.16 Emission mask test results at high carrier frequency, 4980 MHz, Rate: 9 Mbps



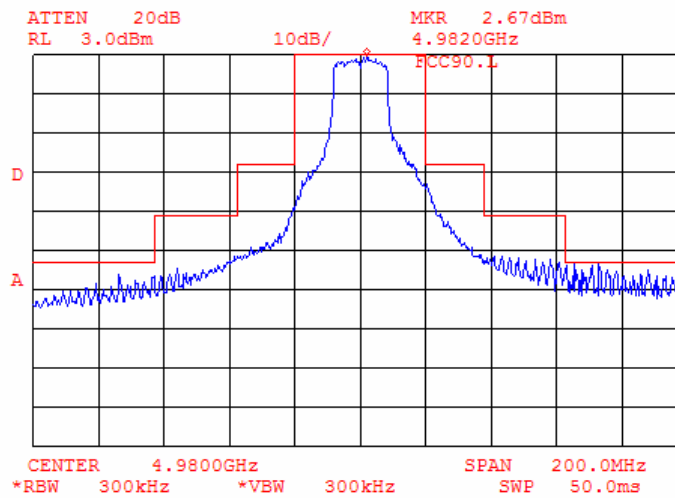


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/1/2005 4:24:06 PM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.17 Emission mask test results at high carrier frequency, 4980 MHz, Rate: 12 Mbps



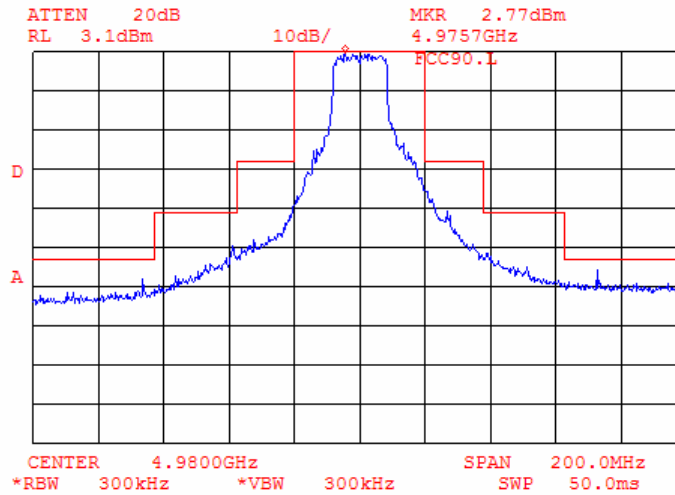
Plot 7.3.18 Emission mask test results at high carrier frequency, 4980 MHz, Rate: 18 Mbps



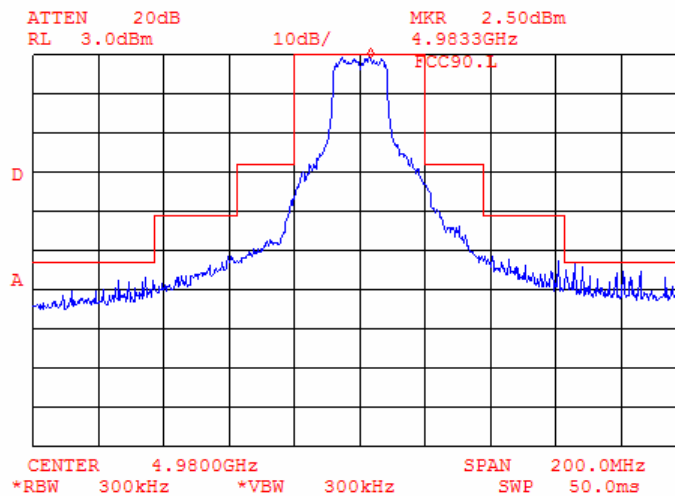


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/1/2005 4:24:06 PM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.19 Emission mask test results at high carrier frequency, 4980 MHz, Rate: 24 Mbps



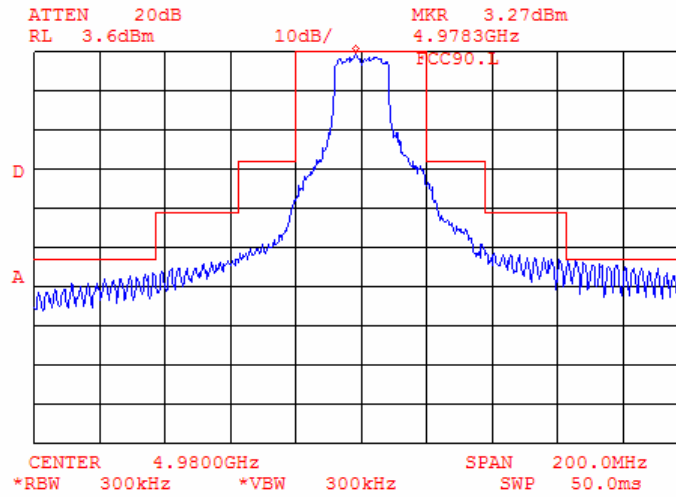
Plot 7.3.20 Emission mask test results at high carrier frequency, 4980 MHz, Rate: 36 Mbps





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:	3/1/2005 4:24:06 PM		
Temperature: 25 °C	Air Pressure: 1013 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.21 Emission mask test results at high carrier frequency, 4980 MHz, Rate: 48 Mbps





Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

7.4 Spurious emissions at RF antenna connector test

7.4.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.4.1. The test results are provided in Table 7.4.2 and associated plots.

Table 7.4.1 Spurious emission limits

Frequency, MHz	Attenuation below carrier, dBc
0.009 – 10th harmonic*	53.0

* - spurious emission limits do not apply to the in band emission within ± 250 % of the authorized bandwidth from the carrier; investigated in course of emission mask testing

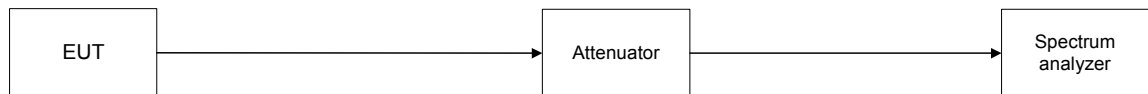
7.4.2 Test procedure

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

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

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

Figure 7.4.1 Spurious emission test setup





Test specification:		Section 90.210, Conducted spurious emissions			
Test procedure:		47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13			
Test mode:	Compliance	Verdict:		PASS	
Date & Time:	3/2/2005 8:41:49 PM				
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC		
Remarks:					

Table 7.4.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 4950 - 4980 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 40000 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER: 12.7 dBm at low frequency
 12.7 dBm at mid frequency
 12.8 dBm at high frequency

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									
400.0030	-52.83	Included	Included	100	-52.83	65.23	53.00	12.23	Pass
608.3130	-54.50	Included	Included	100	-54.50	66.90	53.00	13.90	Pass
649.9570	-52.83	Included	Included	100	-52.83	65.23	53.00	12.23	Pass
3300.8000	-59.00	Included	Included	1000	-59.00	71.40	53.00	18.40	Pass
6599.8700	-45.50	Included	Included	1000	-45.50	57.90	53.00	4.90	Pass
9897.0000	-51.67	Included	Included	1000	-51.67	64.07	53.00	11.07	Pass
14850.0000	-47.33	Included	Included	1000	-47.33	59.73	53.00	6.73	Pass
Mid carrier frequency									
1066.8000	-51.17	Included	Included	1000	-51.17	62.67	53.00	9.67	Pass
6265.7000	-53.00	Included	Included	1000	-53.00	64.50	53.00	11.50	Pass
6620.0300	-42.33	Included	Included	1000	-42.33	53.83	53.00	0.83	Pass
9931.3000	-44.50	Included	Included	1000	-44.50	56.00	53.00	3.00	Pass
High carrier frequency									
1067.0000	-50.00	Included	Included	1000	-50.00	61.50	53.00	8.50	Pass
4630.7000	-56.33	Included	Included	1000	-56.33	67.83	53.00	14.83	Pass
6323.7000	-46.50	Included	Included	1000	-46.50	58.00	53.00	5.00	Pass
6639.9700	-46.33	Included	Included	1000	-46.33	57.83	53.00	4.83	Pass
9961.2500	-43.00	Included	Included	1000	-43.00	54.50	53.00	1.50	Pass

*- Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

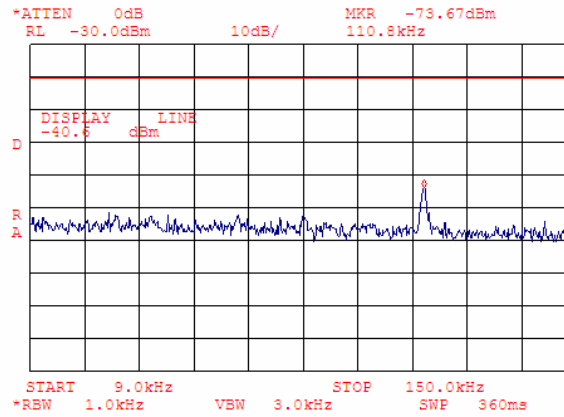
HL 1424	HL 2254						
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Full description is given in Appendix A.

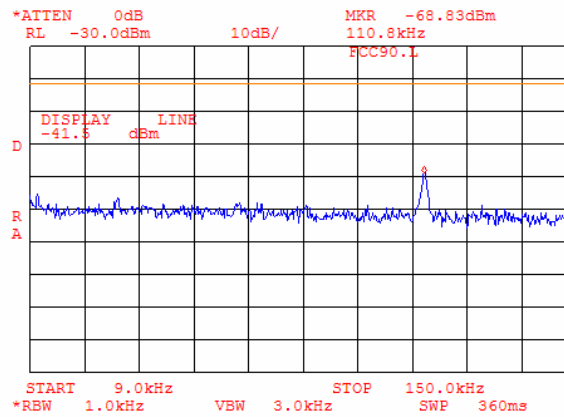


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency



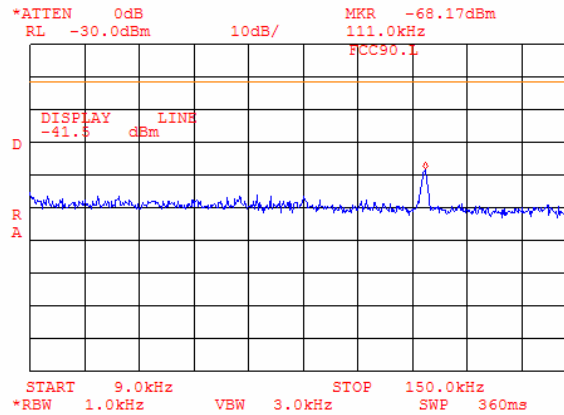
Plot 7.4.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency



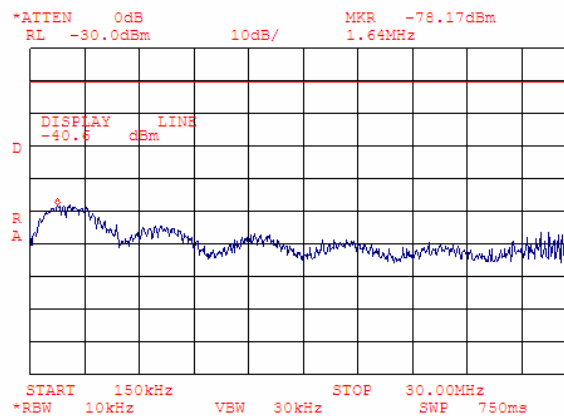


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency



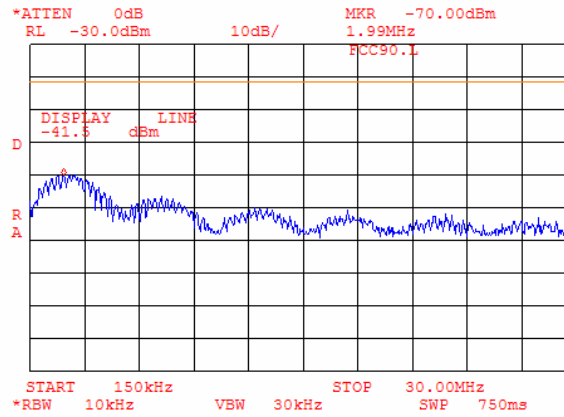
Plot 7.4.4 Spurious emission measurements in 0.15 - 30 MHz range at low carrier frequency



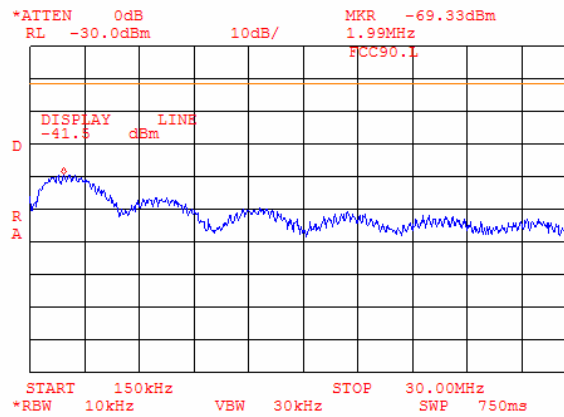


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.5 Spurious emission measurements in 0.15 - 30 MHz range at mid carrier frequency



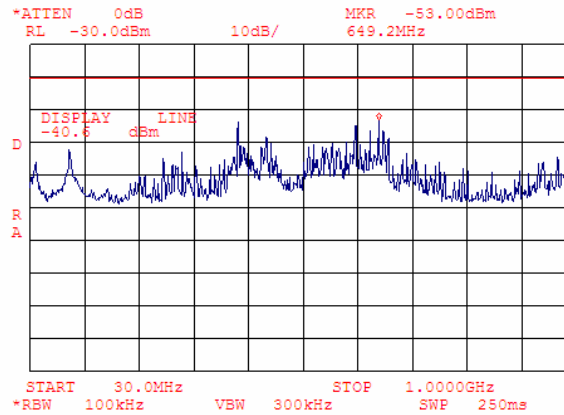
Plot 7.4.6 Spurious emission measurements in 0.15 - 30 MHz range at high carrier frequency



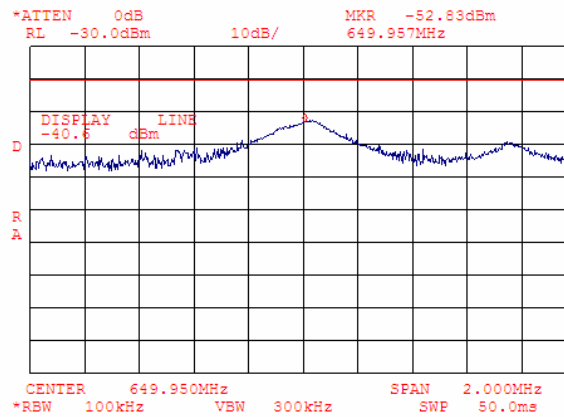


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.7 Spurious emission measurements in 30 - 1000 MHz range at low carrier frequency



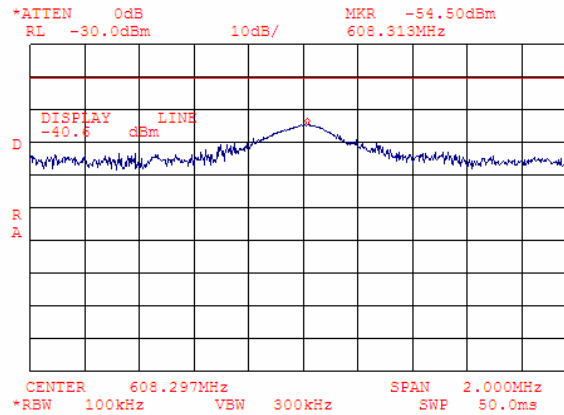
Plot 7.4.8 Spurious emission measurement at 649.9 MHz at low carrier frequency



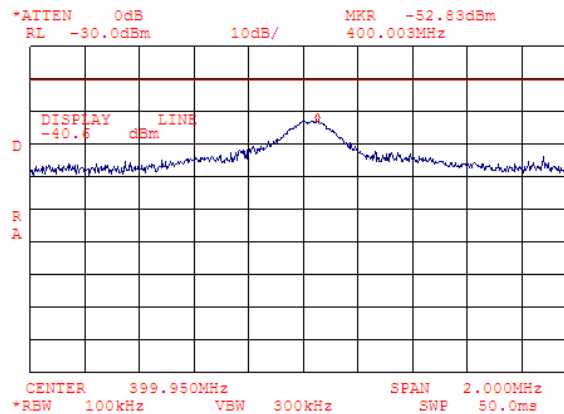


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.9 Spurious emission measurement at 608.3 MHz at low carrier frequency



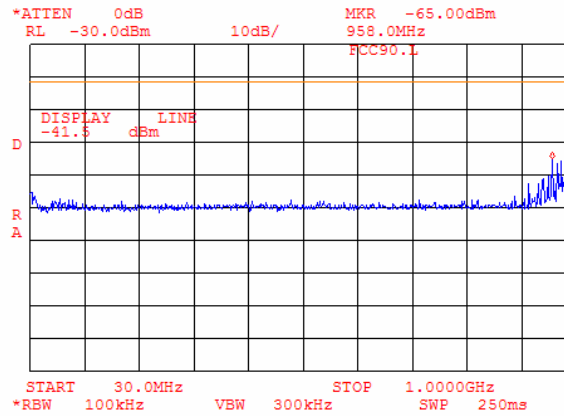
Plot 7.4.10 Spurious emission measurement at 400.0 MHz at low carrier frequency



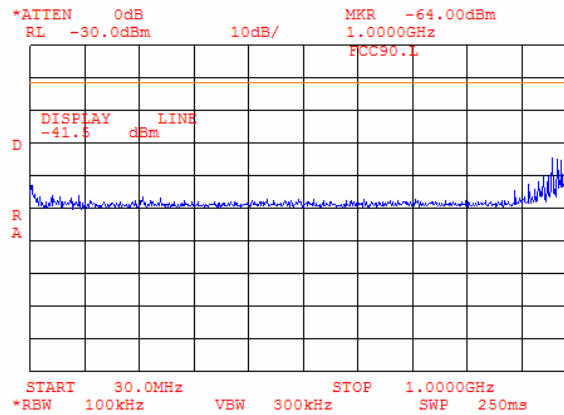


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.11 Spurious emission measurements in 30 - 1000 MHz range at mid carrier frequency



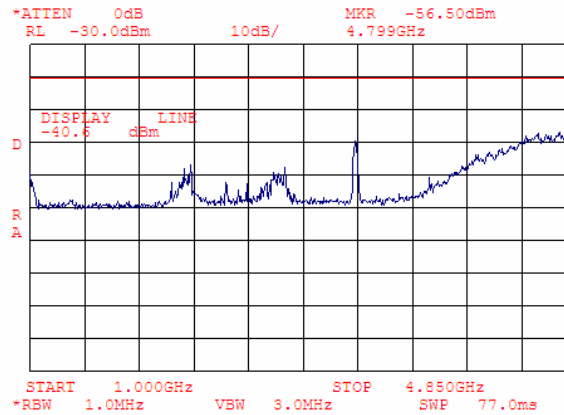
Plot 7.4.12 Spurious emission measurements in 30 - 1000 MHz range at high carrier frequency



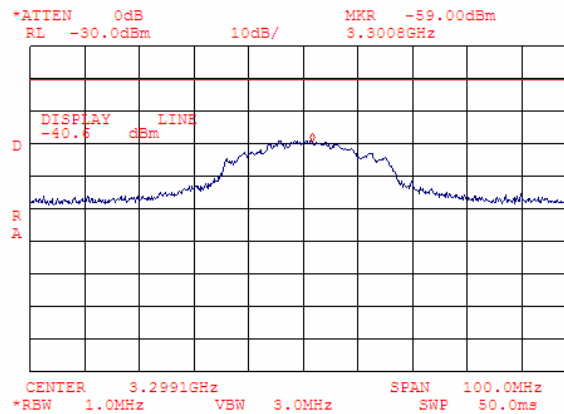


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.13 Spurious emission measurements in 1000 - 4850 MHz range at low carrier frequency



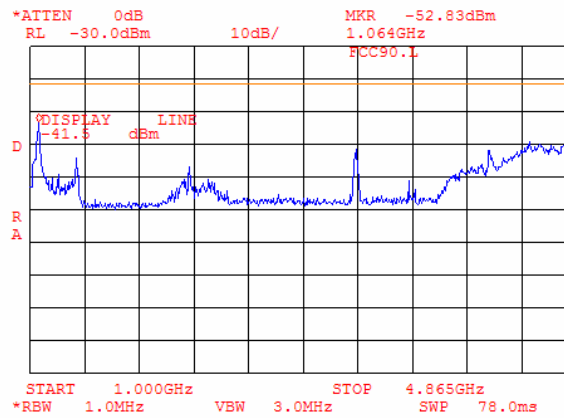
Plot 7.4.14 Spurious emission measurement at 3.30 GHz at low carrier frequency



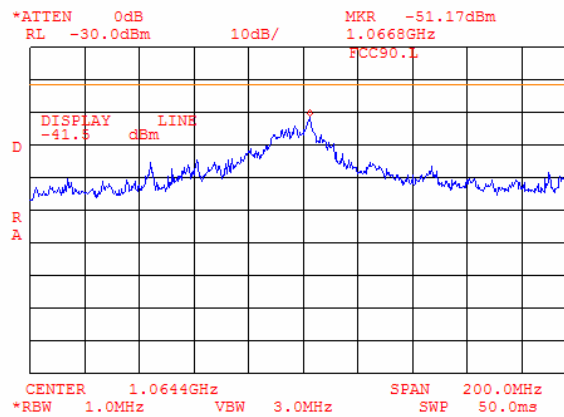


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.15 Spurious emission measurements in 1000 - 4865 MHz range at mid carrier frequency



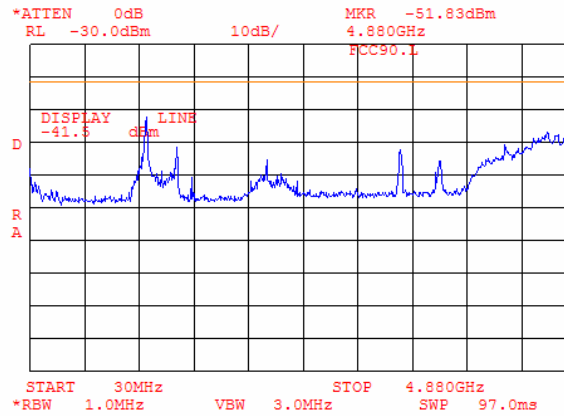
Plot 7.4.16 Spurious emission measurement at 1.06 GHz at mid carrier frequency





Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.17 Spurious emission measurements in 30 - 4880 MHz range at high carrier frequency



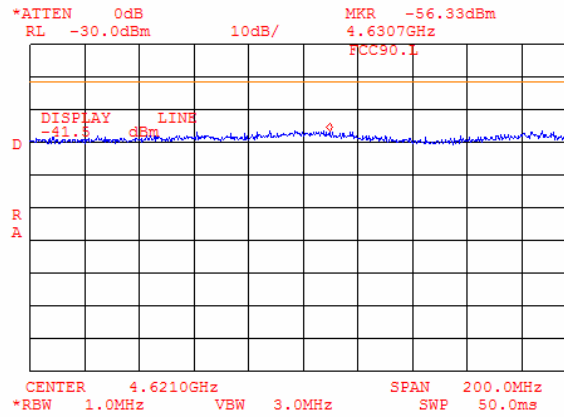
Plot 7.4.18 Spurious emission measurement at 1.07 GHz at high carrier frequency





Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

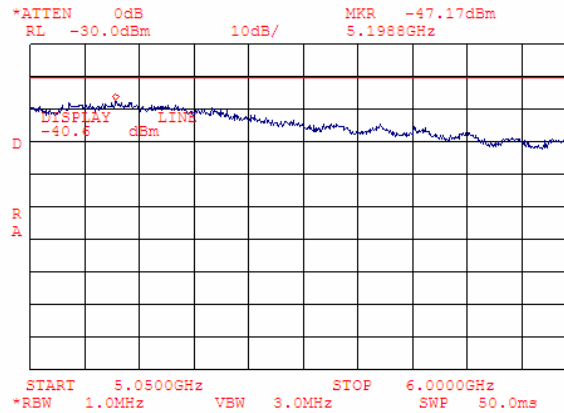
Plot 7.4.19 Spurious emission measurement at 4.6 GHz at high carrier frequency



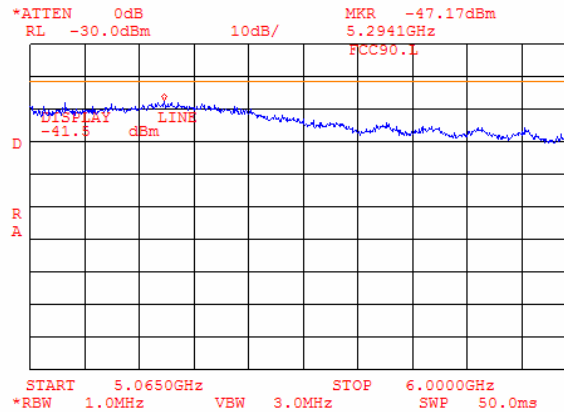


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.20 Spurious emission measurements in 5050 - 6000 MHz range at low carrier frequency



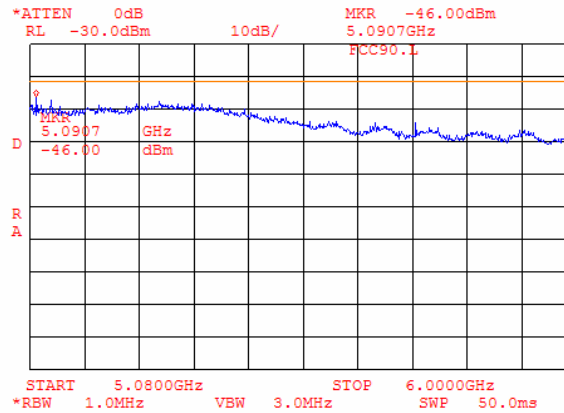
Plot 7.4.21 Spurious emission measurements in 5065 - 6000 MHz range at mid carrier frequency



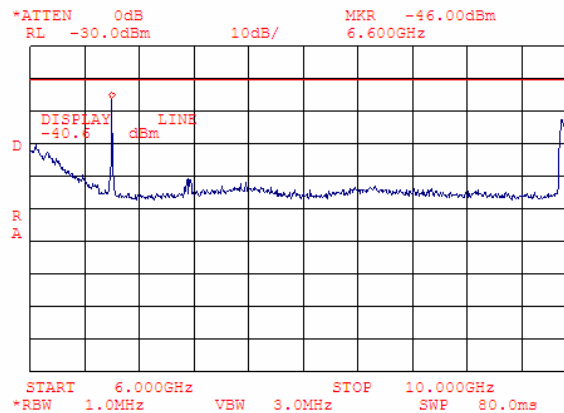


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.22 Spurious emission measurements in 5080 - 6000 MHz range at high carrier frequency



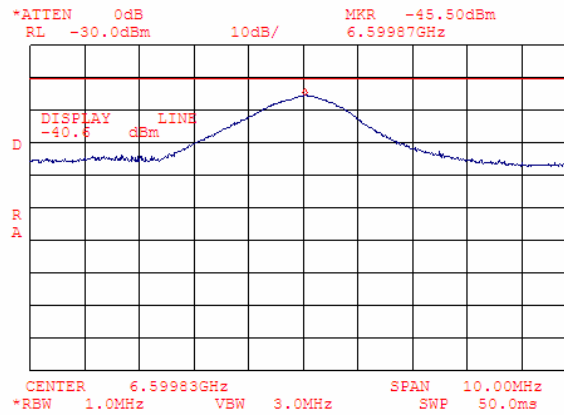
Plot 7.4.23 Spurious emission measurements in 6000 - 10000 MHz range at low carrier frequency



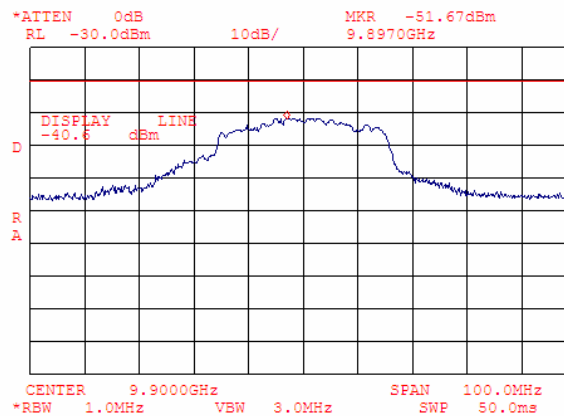


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.24 Spurious emission measurement at 6.6 GHz at low carrier frequency



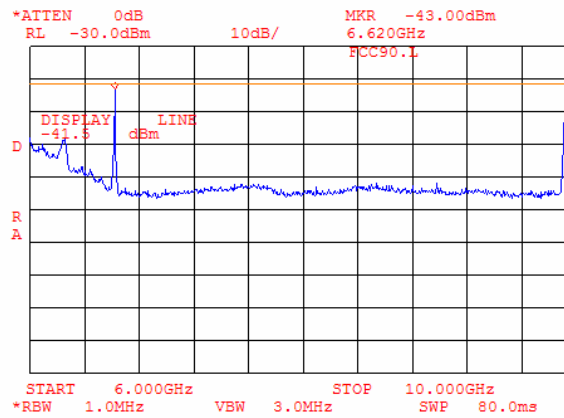
Plot 7.4.25 Spurious emission measurement at 9.9 GHz at low carrier frequency



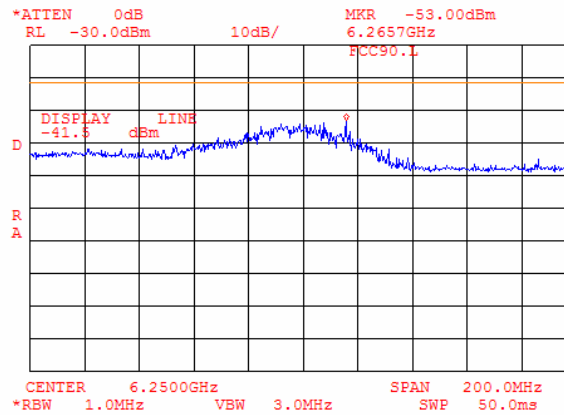


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.26 Spurious emission measurements in 6000 - 10000 MHz range at mid carrier frequency



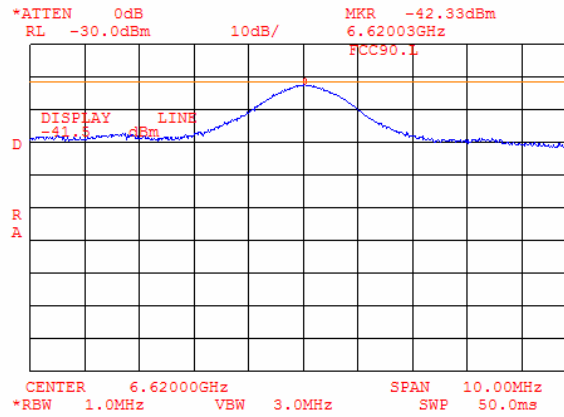
Plot 7.4.27 Spurious emission measurement at 6.26 GHz at mid carrier frequency



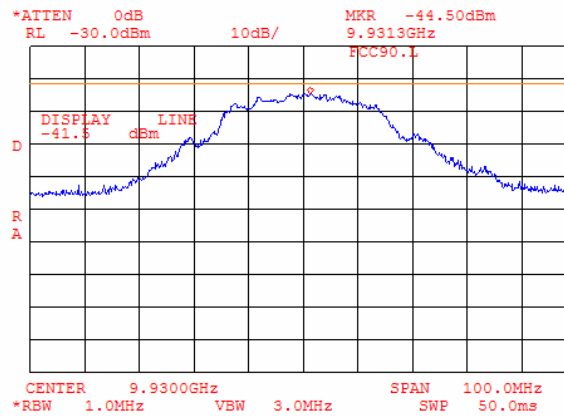


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.28 Spurious emission measurement at 6.62 GHz at mid carrier frequency



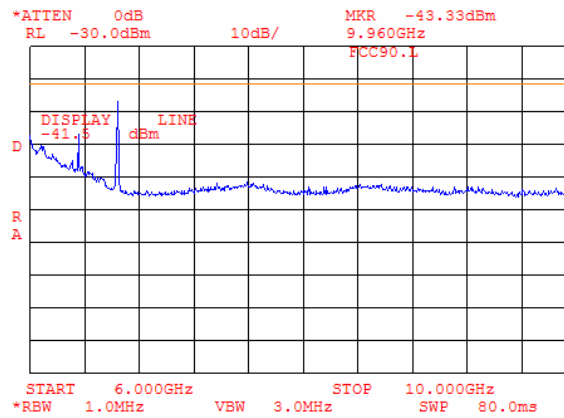
Plot 7.4.29 Spurious emission measurement at 9.93 GHz at mid carrier frequency



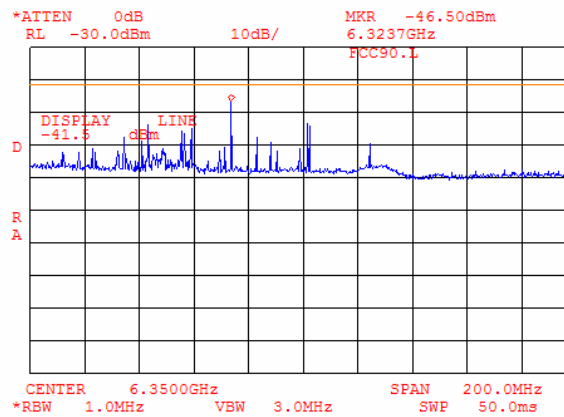


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.30 Spurious emission measurements in 6000 - 10000 MHz range at high carrier frequency



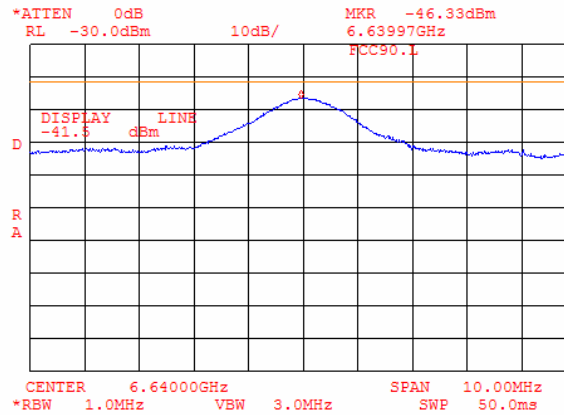
Plot 7.4.31 Spurious emission measurement at 6.32 GHz at high carrier frequency



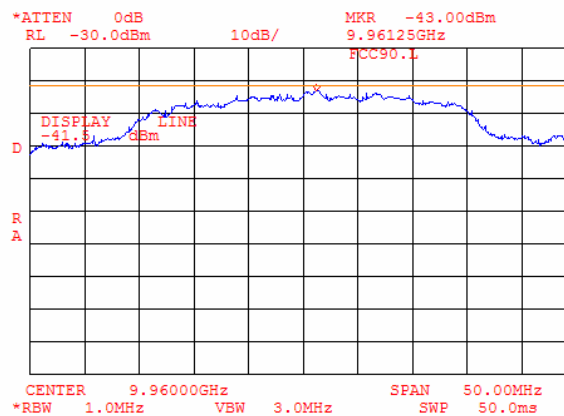


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.32 Spurious emission measurement at 6.64 GHz at high carrier frequency



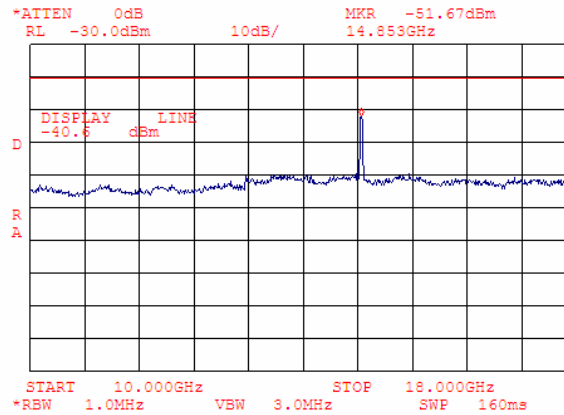
Plot 7.4.33 Spurious emission measurement at 9.96 GHz at high carrier frequency



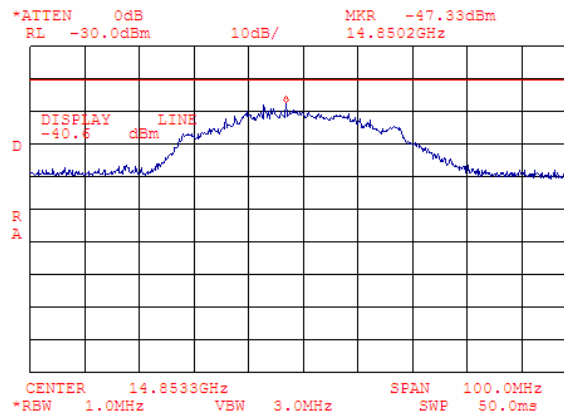


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.34 Spurious emission measurements in 10 - 18 GHz range at low carrier frequency



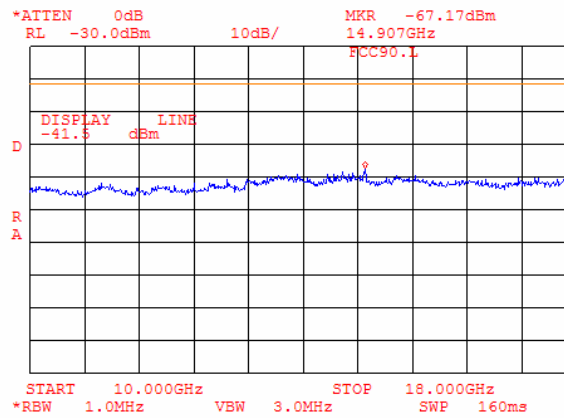
Plot 7.4.35 Spurious emission measurement at 14.85 GHz at low carrier frequency



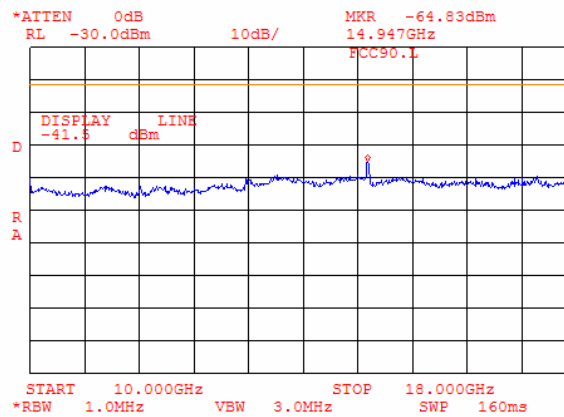


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.36 Spurious emission measurements in 10 - 18 GHz range at mid carrier frequency



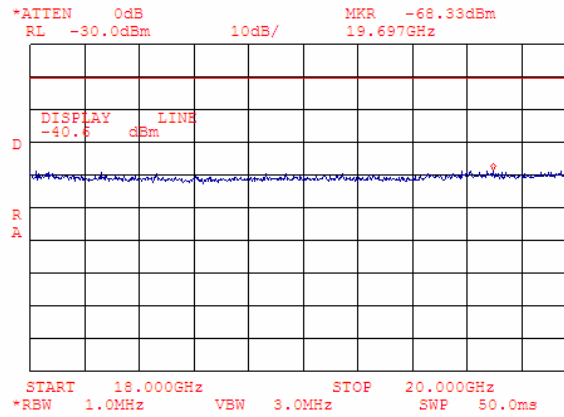
Plot 7.4.37 Spurious emission measurements in 10 - 18 GHz range at high carrier frequency



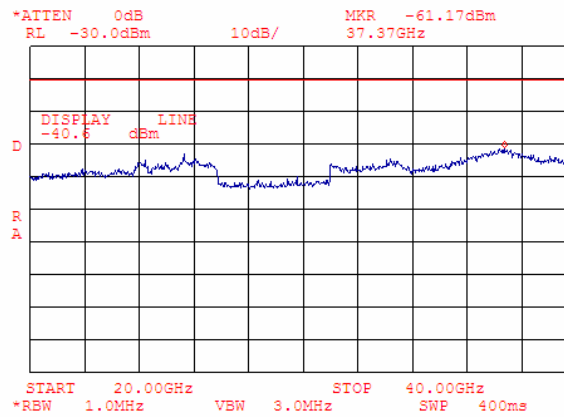


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.38 Spurious emission measurements in 18 - 20 GHz range at low carrier frequency



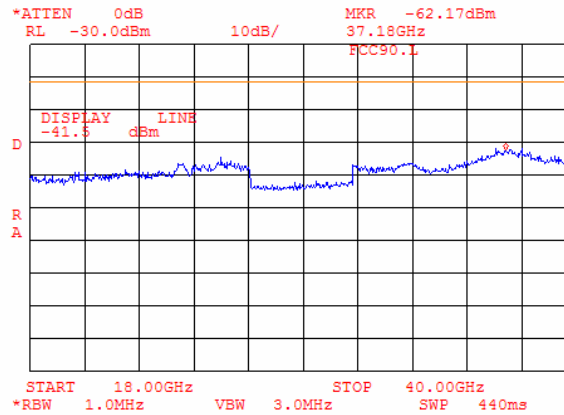
Plot 7.4.39 Spurious emission measurements in 20 - 40 GHz range at low carrier frequency



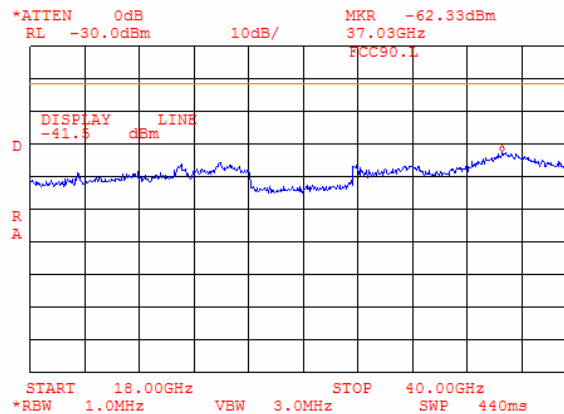


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 8:41:49 PM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.40 Spurious emission measurements in 18 - 40 GHz range at mid carrier frequency



Plot 7.4.41 Spurious emission measurements in 18 - 40 GHz range at high carrier frequency





Test specification:		Section 90.210, Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

7.5 Radiated spurious emission measurements

7.5.1 General

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

Table 7.5.1 Radiated spurious emission test limits

Frequency, MHz	Attenuation below carrier, dBc	Equivalent field strength limit @ 3m, dB(μV/m)***
0.009 – 10th harmonic*	53	53.73

* - 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

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

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

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

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

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

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

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

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



Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 3/2/2005 5:58:51 PM			
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

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

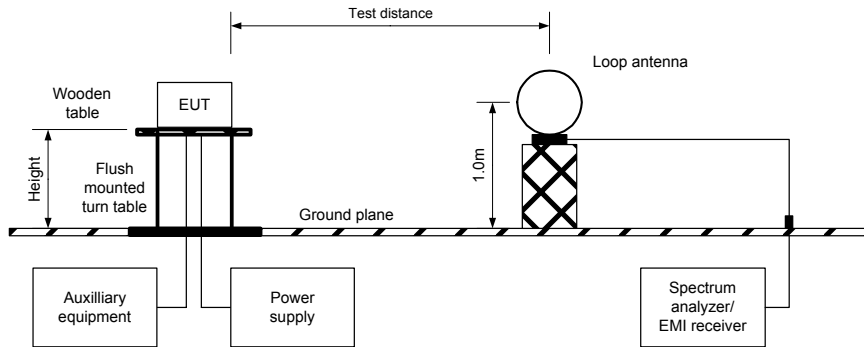
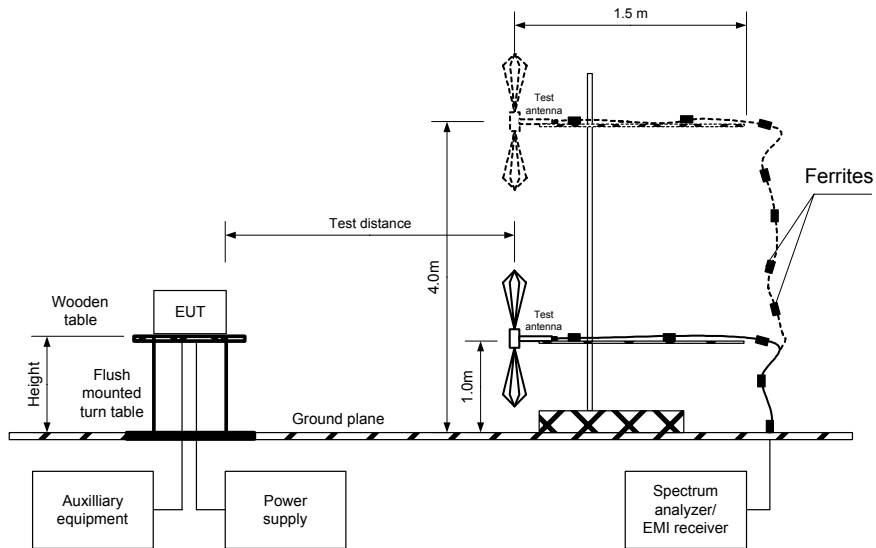


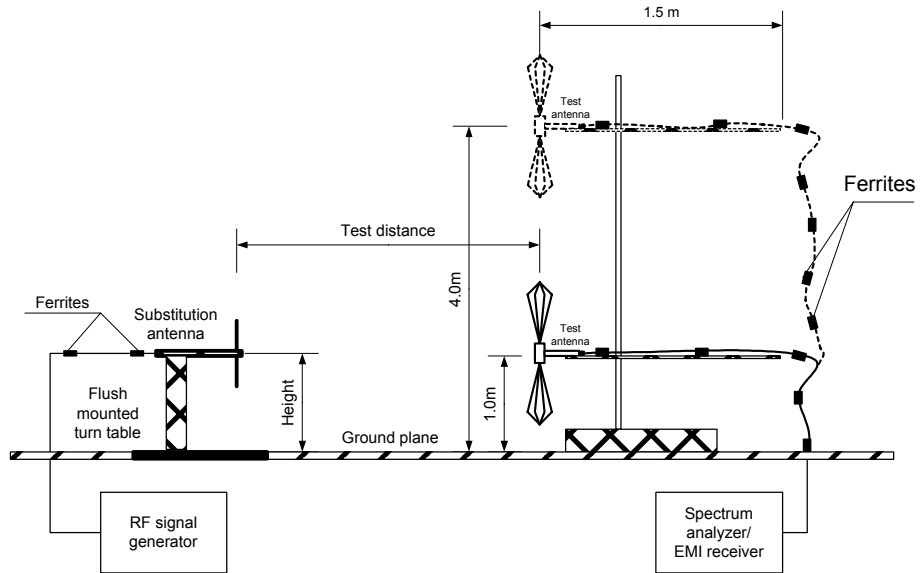
Figure 7.5.2 Setup for spurious emission field strength measurements above 30 MHz





Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

Figure 7.5.3 Setup for substitution ERP measurements of spurious





Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

Table 7.5.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 4950 - 4980 MHz
TEST DISTANCE: 3 m
TEST SITE: Semi anechoic chamber / OATS
EUT HEIGHT: 0.8 m
INVESTIGATED FREQUENCY RANGE: 0.009 – 40000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)
MODULATING SIGNAL: PRBS
BIT RATE: 6 – 48 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

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 4950 MHz							
No spurious emissions were found							
Mid carrier frequency 4965 MHz							
No spurious emissions were found							
High carrier frequency 4980 MHz							
No spurious emissions were found							

*- 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 0589	HL 0592	HL 0593	HL 0594	HL 0604	HL 0768
HL 0769	HL 1424	HL 1947	HL 2009	HL 2259	HL 2260	HL 2261	HL 2387
HL 2432	HL 2499						

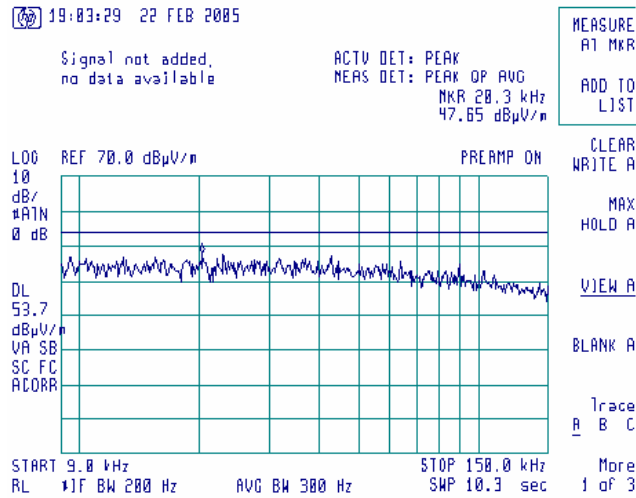
Full description is given in Appendix A.



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

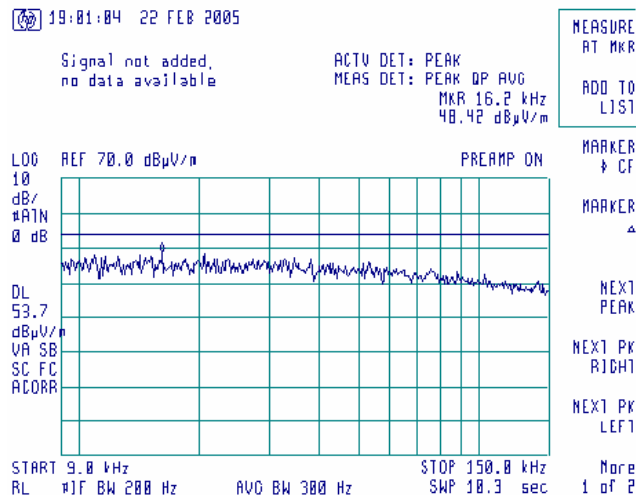
Plot 7.5.1 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.5.2 Radiated emission measurements in 9 - 150 kHz range

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

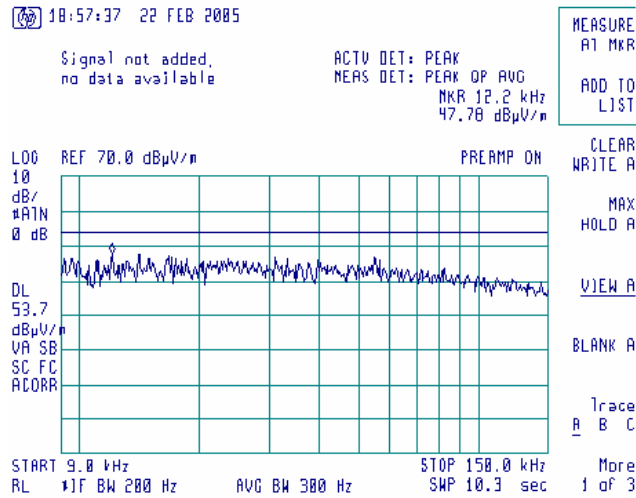




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

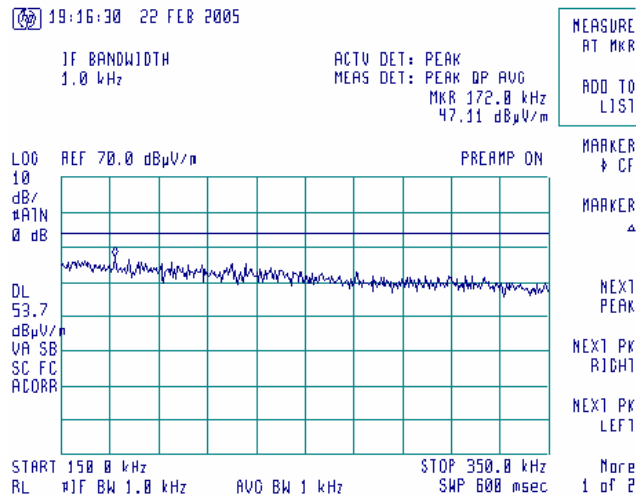
Plot 7.5.3 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.5.4 Radiated emission measurements in 0.15 – 0.35 MHz range

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

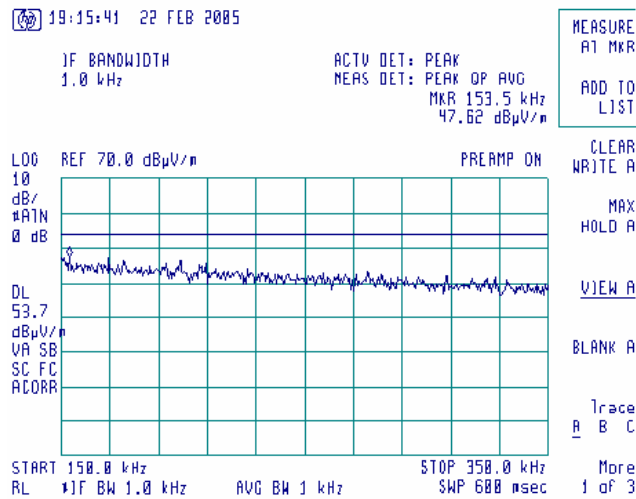




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

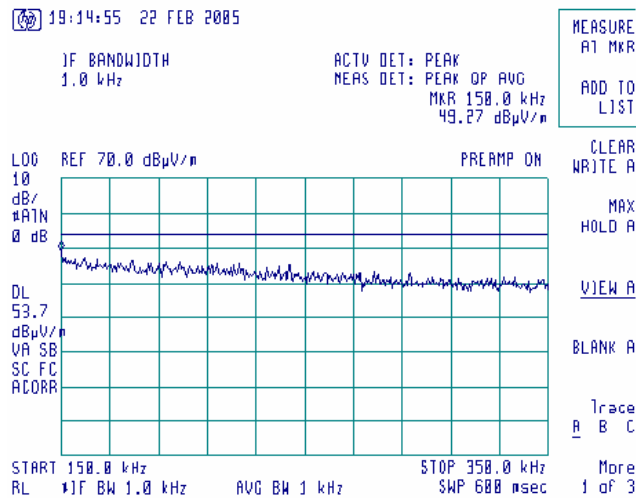
Plot 7.5.5 Radiated emission measurements in 0.15 – 0.35 MHz range

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



Plot 7.5.6 Radiated emission measurements in 0.15 – 0.35 MHz range

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

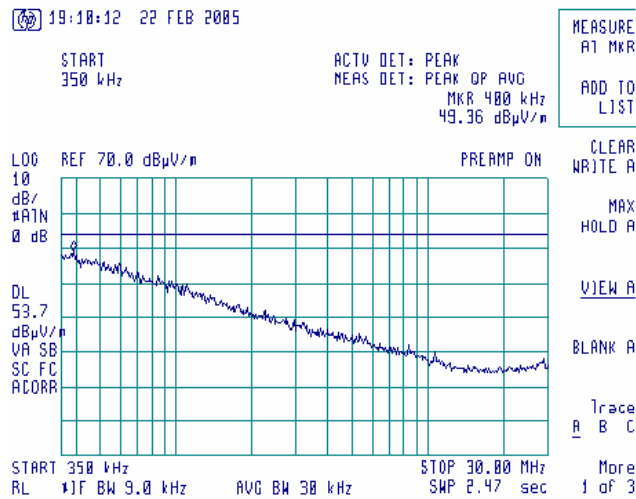




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

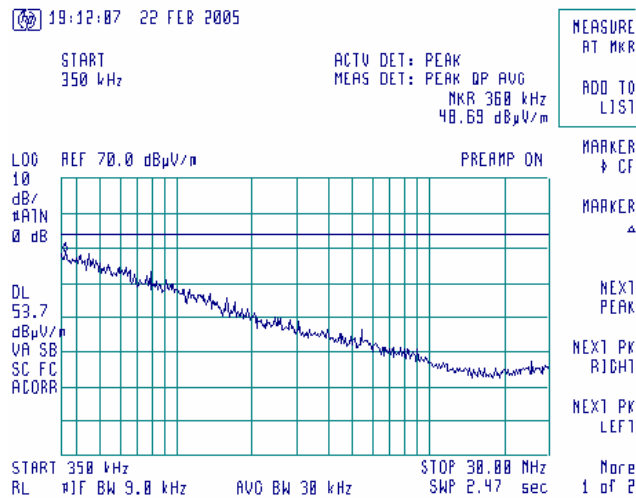
Plot 7.5.7 Radiated emission measurements in 0.35 - 30 MHz range

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



Plot 7.5.8 Radiated emission measurements in 0.35 - 30 MHz range

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

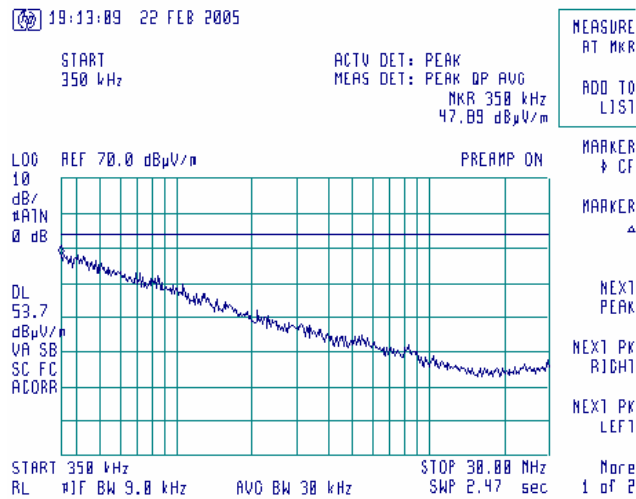




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

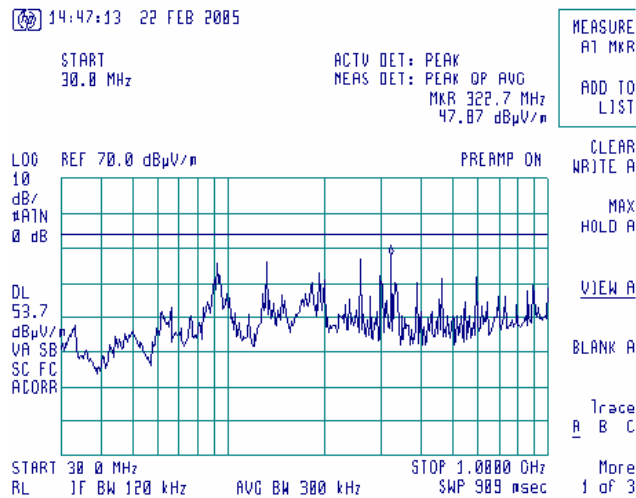
Plot 7.5.9 Radiated emission measurements in 0.35 - 30 MHz range

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



Plot 7.5.10 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

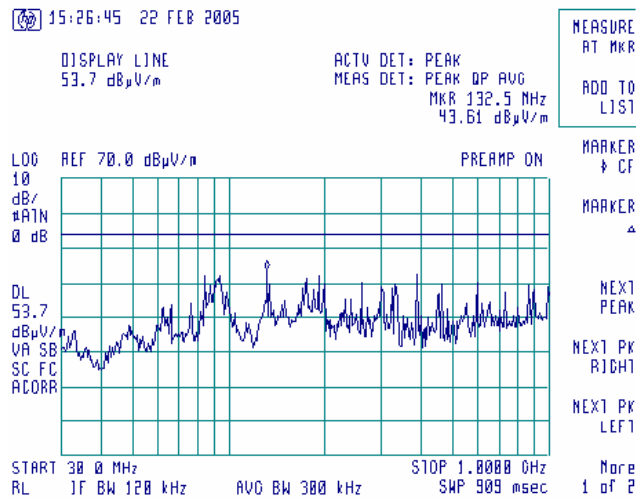




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

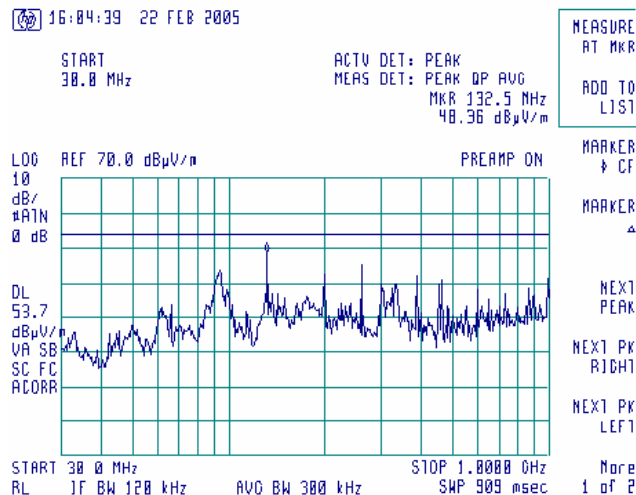
Plot 7.5.11 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.5.12 Radiated emission measurements in 30 - 1000 MHz range

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

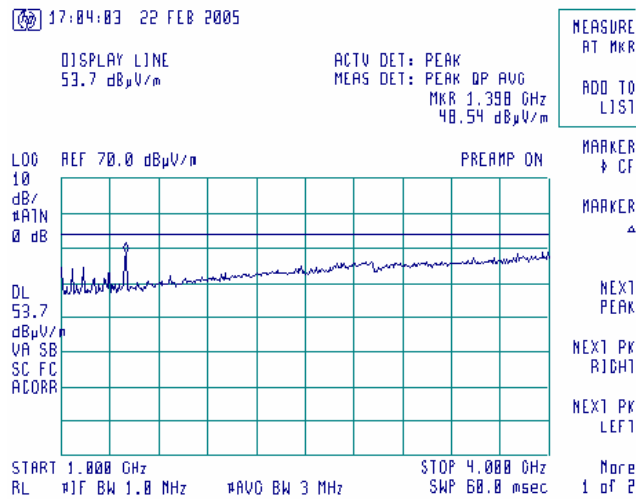




Test specification: Section 90.210, Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 3/2/2005 5:58:51 PM			
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

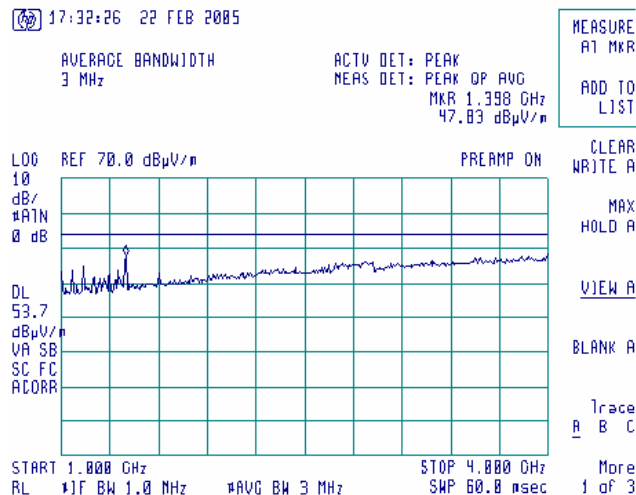
Plot 7.5.13 Radiated emission measurements in 1000 – 4000 MHz range

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



Plot 7.5.14 Radiated emission measurements in 1000 – 4000 MHz range

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

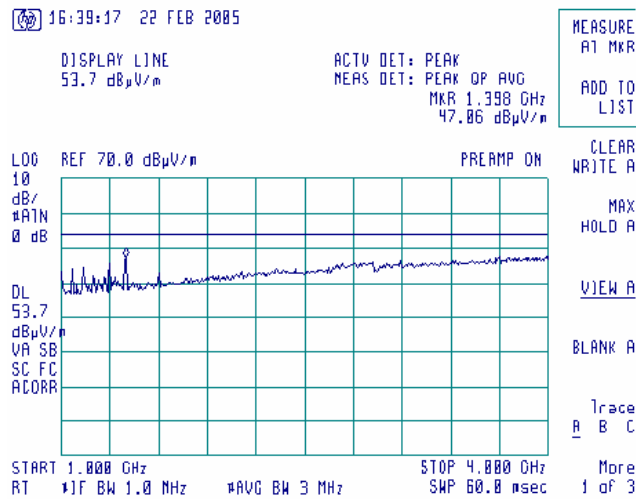




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

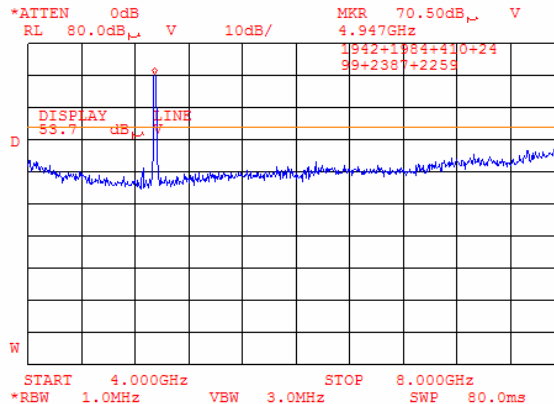
Plot 7.5.15 Radiated emission measurements in 1000 – 4000 MHz range

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



Plot 7.5.16 Radiated emission measurements in 4 – 8 GHz range

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

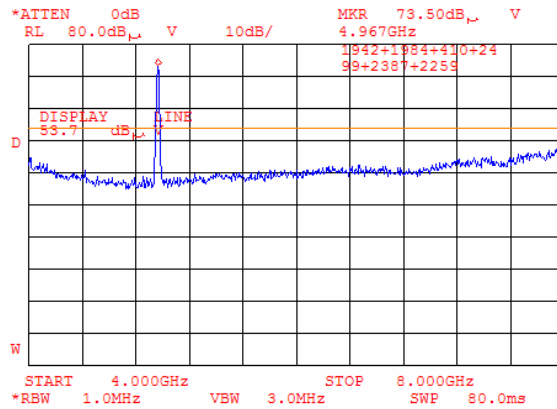




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

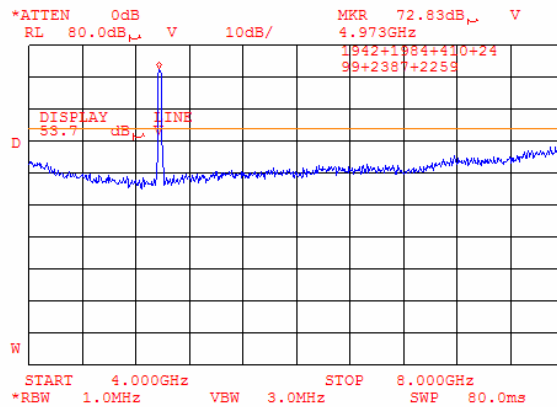
Plot 7.5.17 Radiated emission measurements in 4 – 8 GHz range

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



Plot 7.5.18 Radiated emission measurements in 4 – 8 GHz range

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

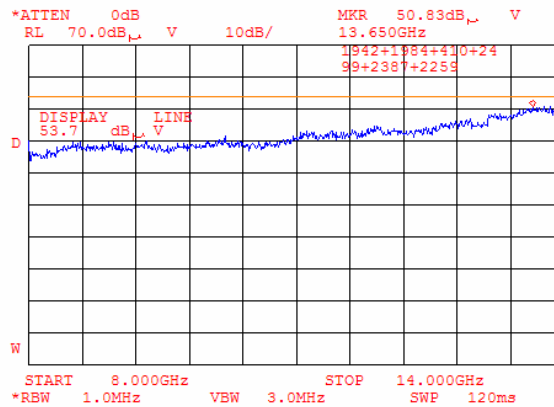




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

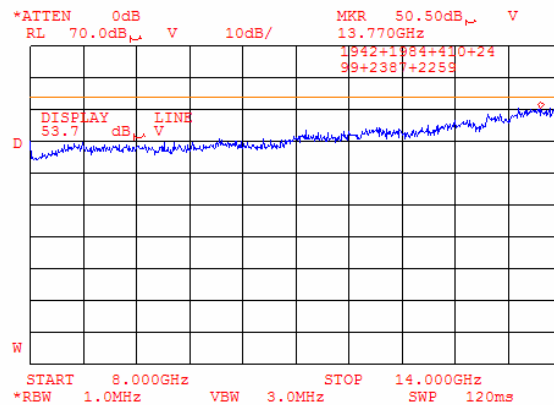
Plot 7.5.19 Radiated emission measurements in 8 – 14 GHz range

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



Plot 7.5.20 Radiated emission measurements in 8 – 14 GHz range

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

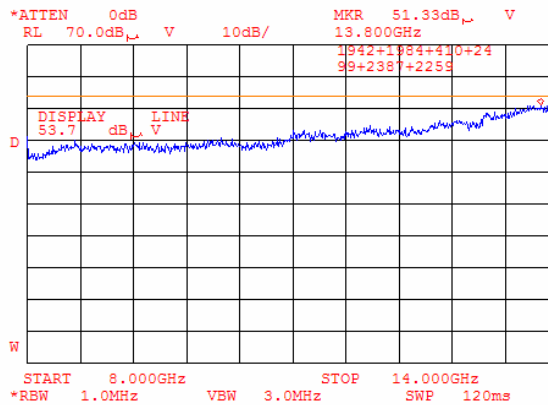




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

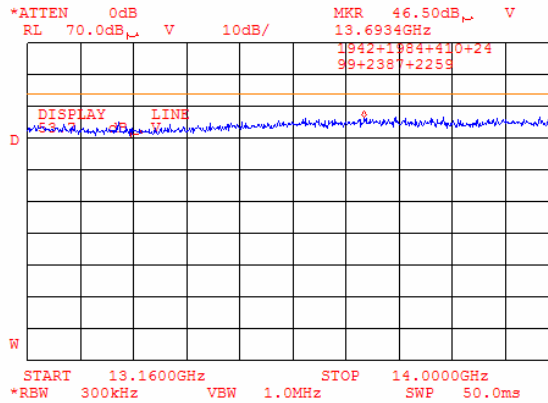
Plot 7.5.21 Radiated emission measurements in 8 – 14 GHz range

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



Plot 7.5.22 Radiated emission measurements in 13.16 – 14 GHz range

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

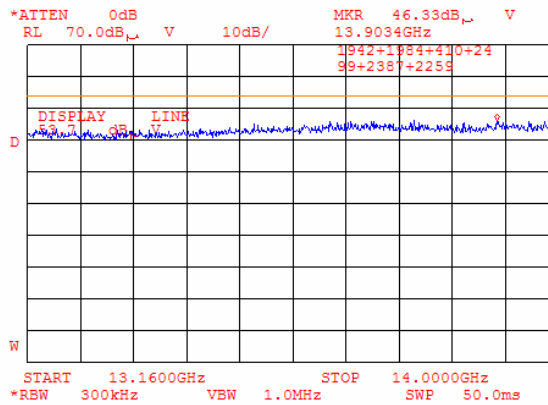




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

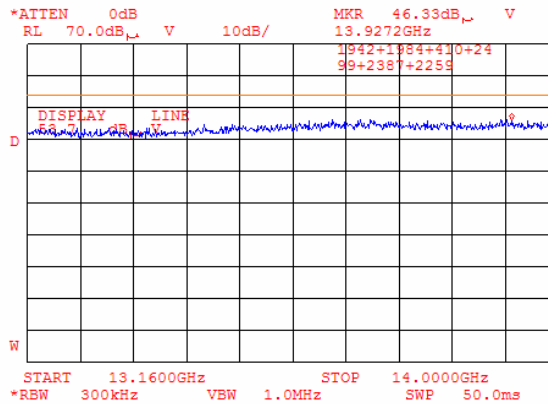
Plot 7.5.23 Radiated emission measurements in 13.16 – 14 GHz range

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



Plot 7.5.24 Radiated emission measurements in 13.16 – 14 GHz range

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

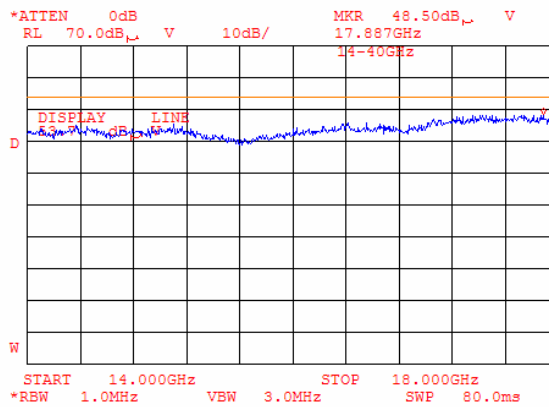




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

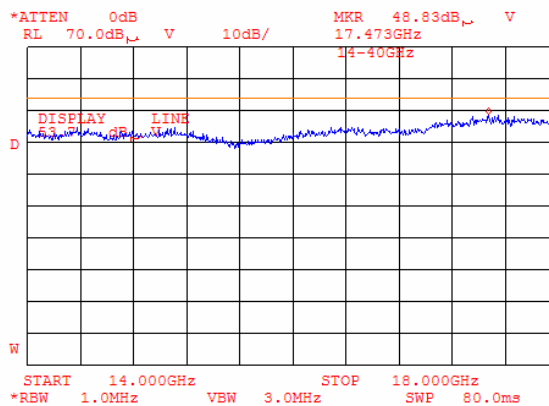
Plot 7.5.25 Radiated emission measurements in 14 – 18 GHz range

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



Plot 7.5.26 Radiated emission measurements in 14 – 18 GHz range

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

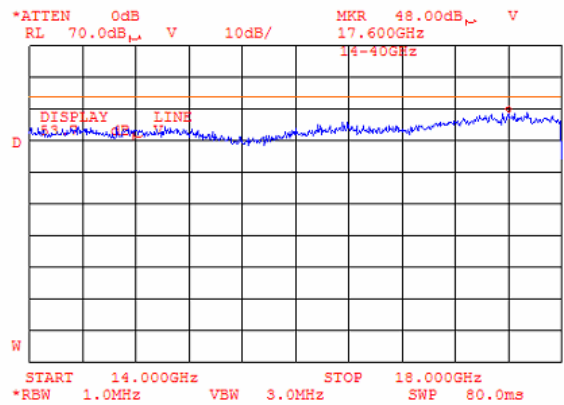




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.27 Radiated emission measurements in 14 – 18 GHz range

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

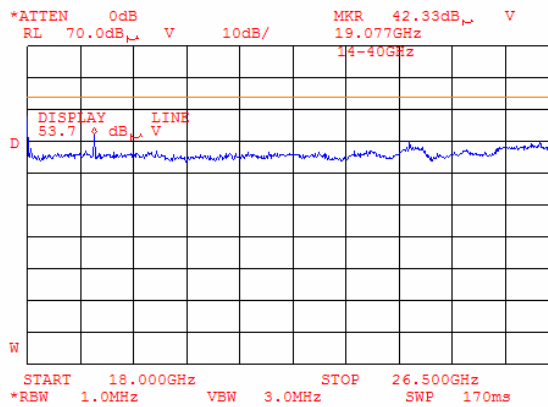




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

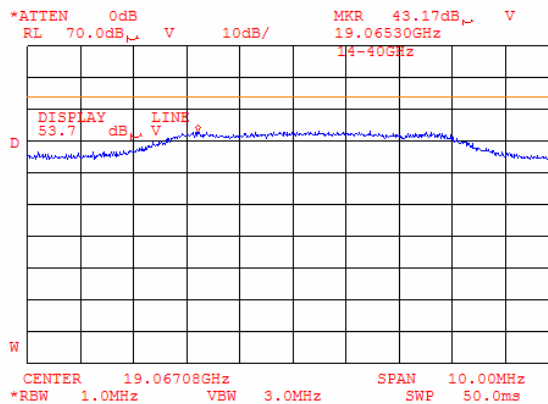
Plot 7.5.28 Radiated emission measurements in 18 – 26.5 GHz range

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



Plot 7.5.29 Spurious measurement at 19.065 GHz

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

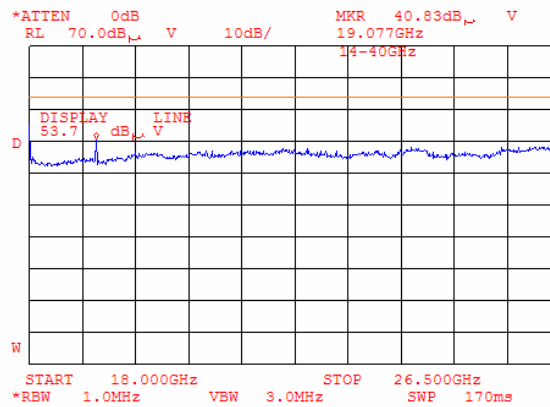




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

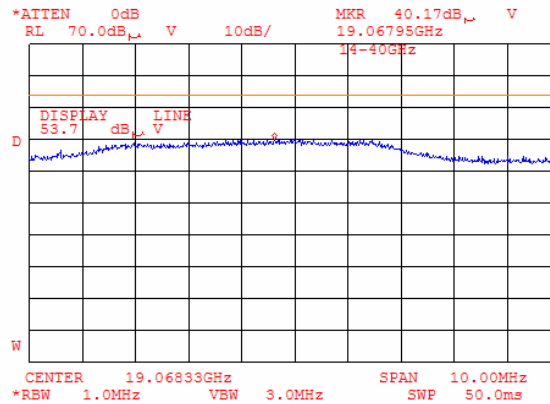
Plot 7.5.30 Radiated emission measurements in 18 – 26.5 GHz range

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



Plot 7.5.31 Spurious measurement at 19.068 GHz

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

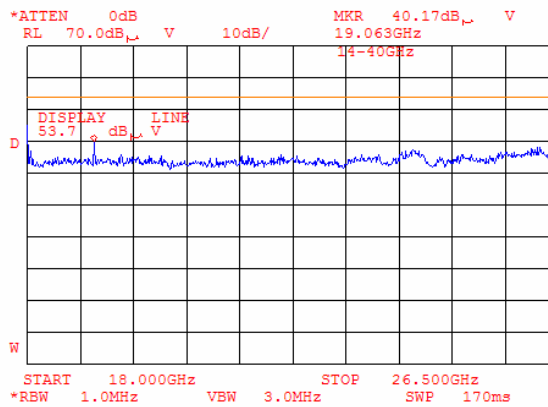




Test specification:		Section 90.210, Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

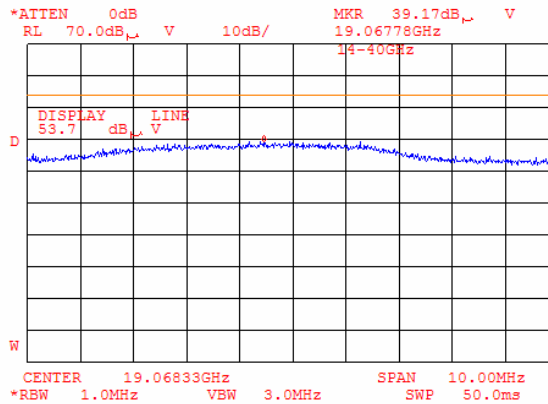
Plot 7.5.32 Radiated emission measurements in 18 – 26.5 GHz range

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



Plot 7.5.33 Spurious measurement at 19.067 GHz

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

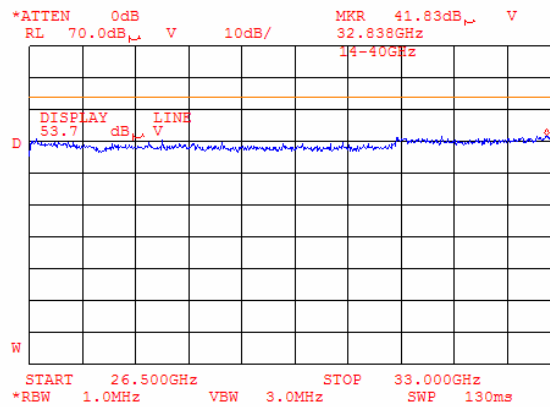




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

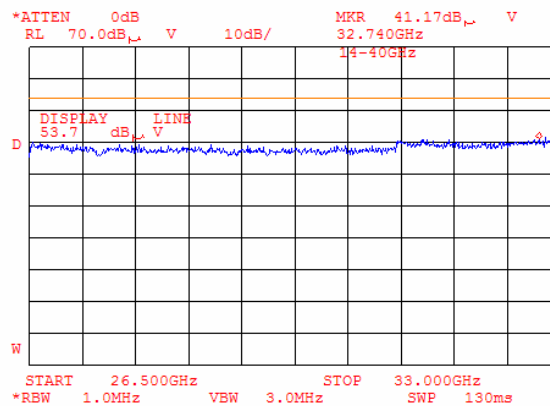
Plot 7.5.34 Radiated emission measurements in 26.5 – 33 GHz range

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



Plot 7.5.35 Radiated emission measurements in 26.5 – 33 GHz range

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

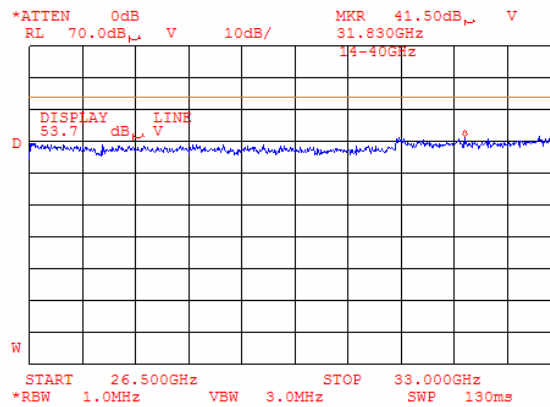




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

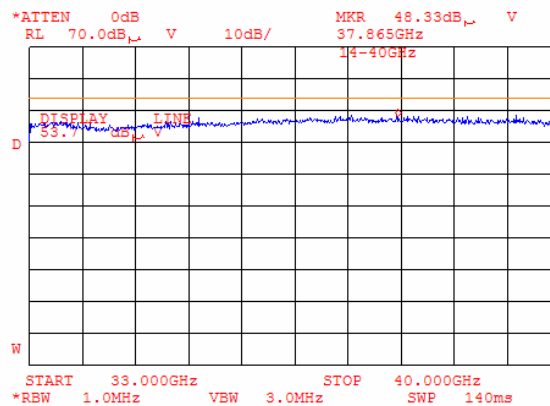
Plot 7.5.36 Radiated emission measurements in 26.5 – 33 GHz range

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



Plot 7.5.37 Radiated emission measurements in 33 – 40 GHz range

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

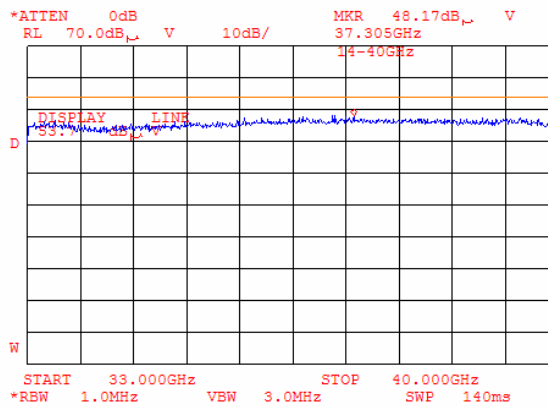




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

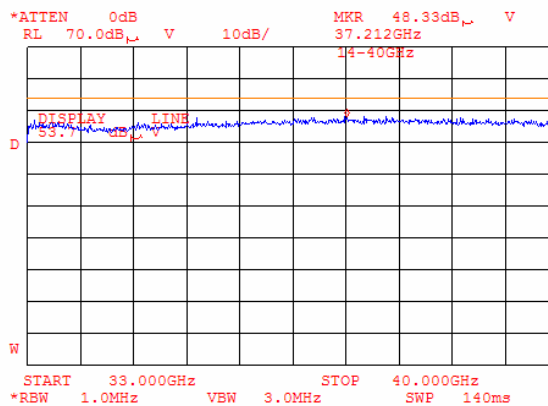
Plot 7.5.38 Radiated emission measurements in 33 – 40 GHz range

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



Plot 7.5.39 Radiated emission measurements in 33 – 40 GHz range

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

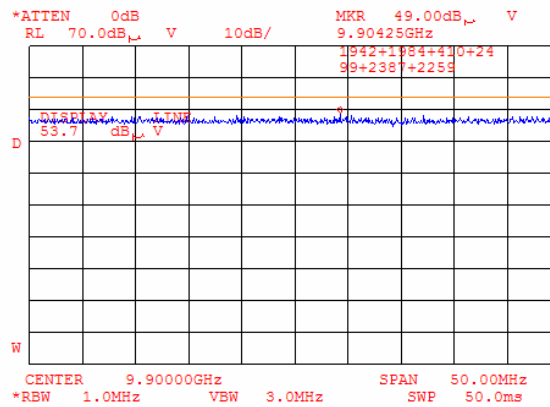




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

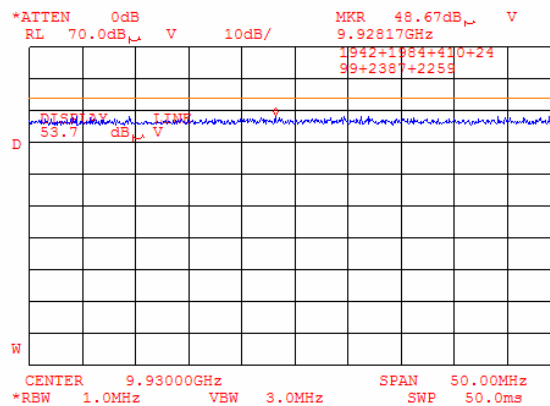
Plot 7.5.40 Radiated emission measurements at the 2nd harmonic

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



Plot 7.5.41 Radiated emission measurements at the 2nd harmonic

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

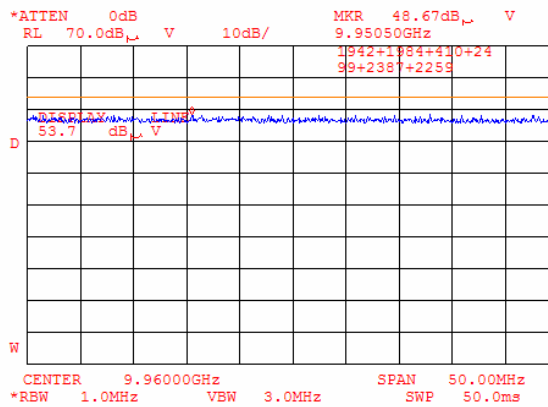




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

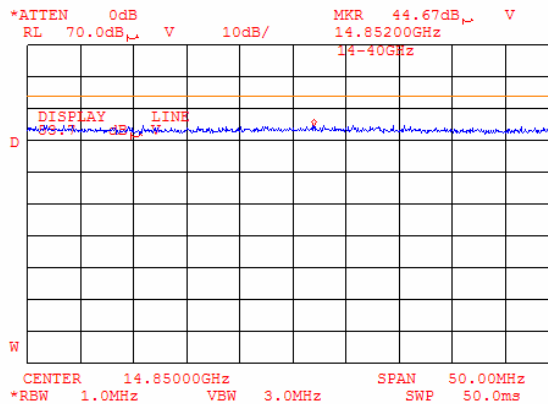
Plot 7.5.42 Radiated emission measurements at the 2nd harmonic

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



Plot 7.5.43 Radiated emission measurements at the 3rd harmonic

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

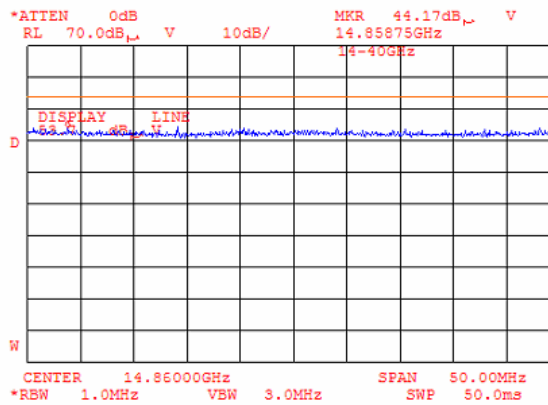




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

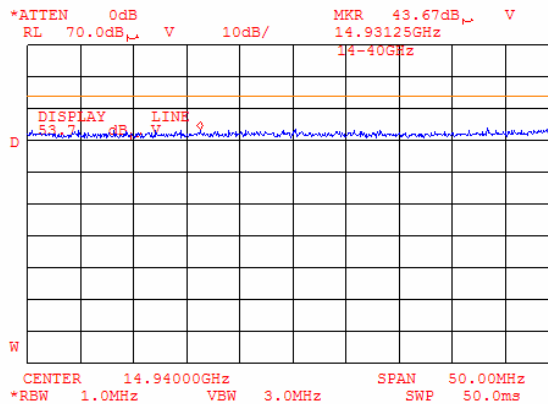
Plot 7.5.44 Radiated emission measurements at the 3rd harmonic

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



Plot 7.5.45 Radiated emission measurements at the 3rd harmonic

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

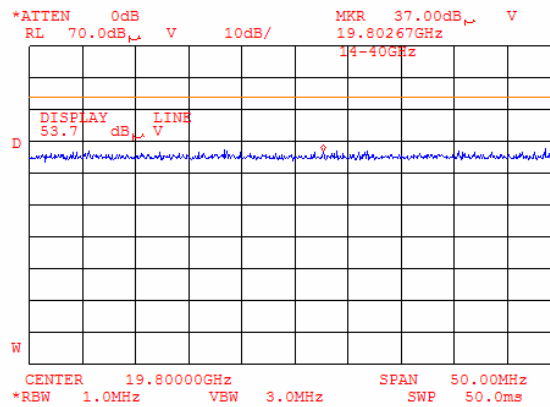




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

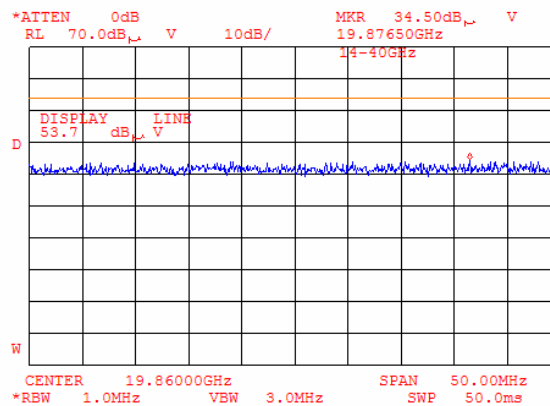
Plot 7.5.46 Radiated emission measurements at the 4th harmonic

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



Plot 7.5.47 Radiated emission measurements at the 4th harmonic

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

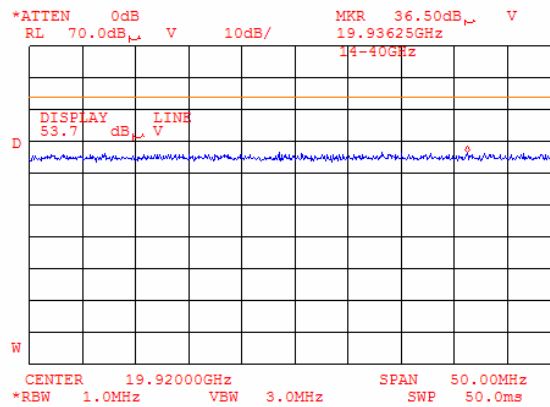




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

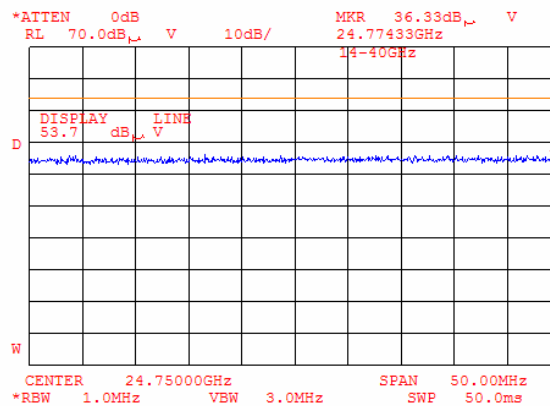
Plot 7.5.48 Radiated emission measurements at the 4th harmonic

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



Plot 7.5.49 Radiated emission measurements at the 5th harmonic

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

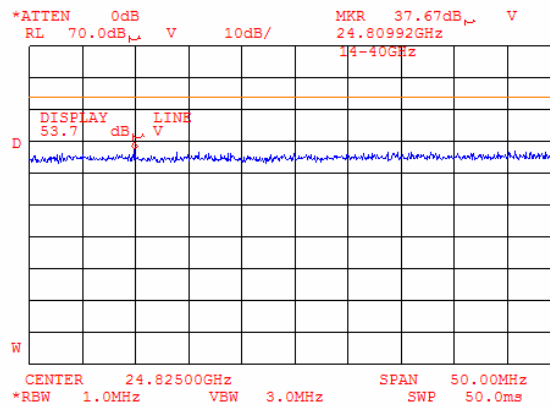




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

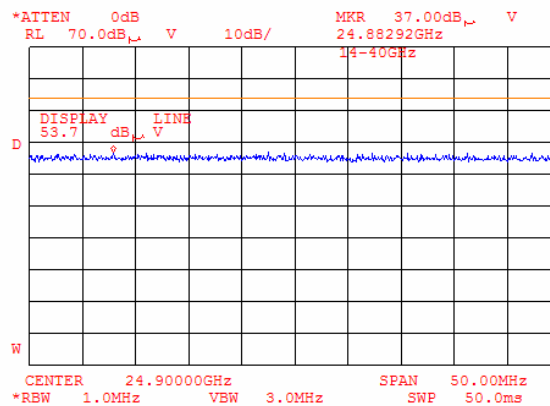
Plot 7.5.50 Radiated emission measurements at the 5th harmonic

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



Plot 7.5.51 Radiated emission measurements at the 5th harmonic

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

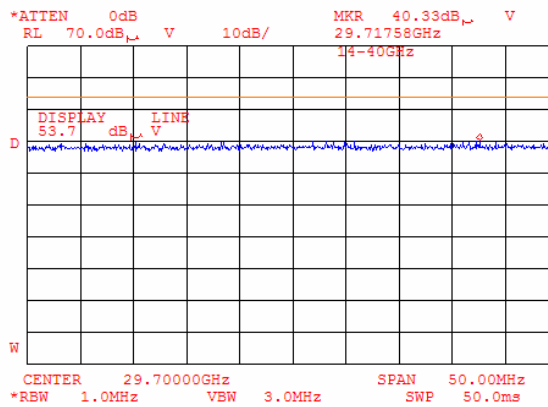




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

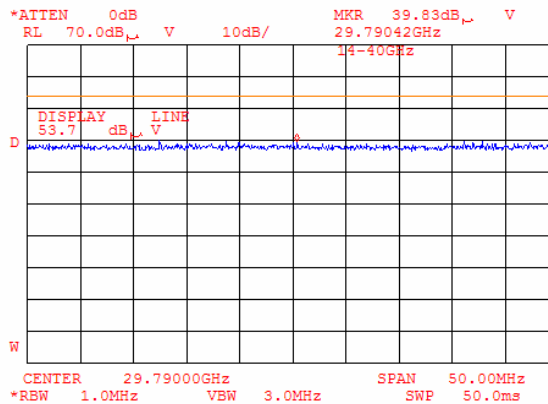
Plot 7.5.52 Radiated emission measurements at the 6th harmonic

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



Plot 7.5.53 Radiated emission measurements at the 6th harmonic

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

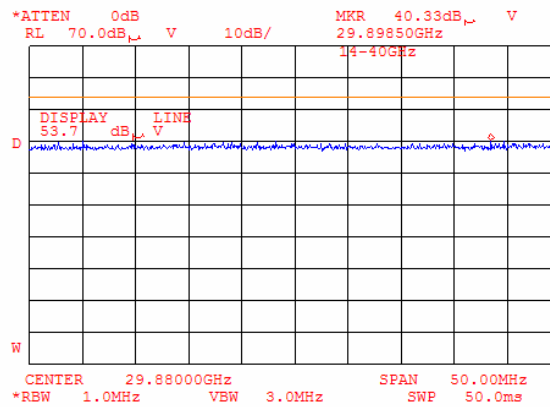




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

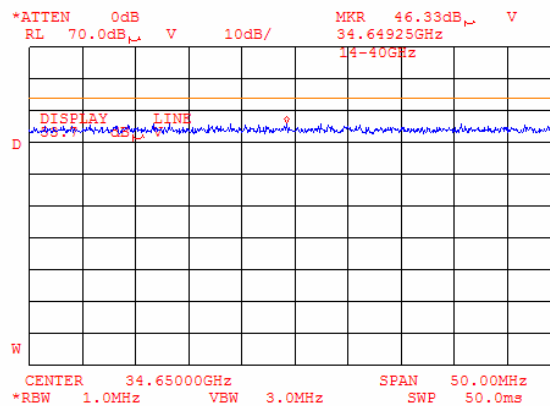
Plot 7.5.54 Radiated emission measurements at the 6th harmonic

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



Plot 7.5.55 Radiated emission measurements at the 7th harmonic

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

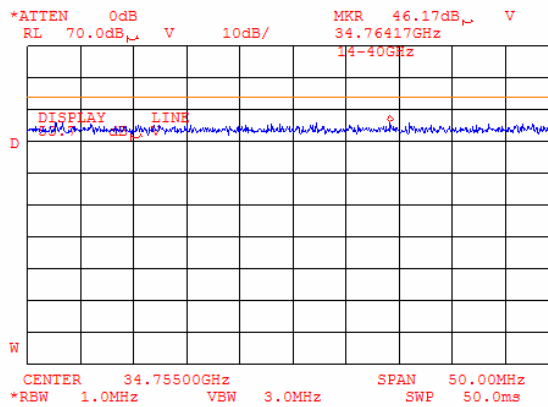




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

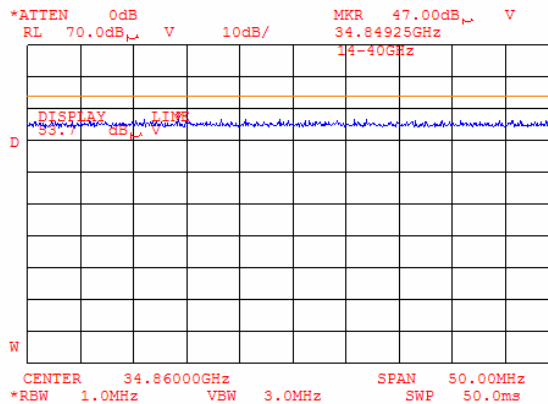
Plot 7.5.56 Radiated emission measurements at the 7th harmonic

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



Plot 7.5.57 Radiated emission measurements at the 7th harmonic

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

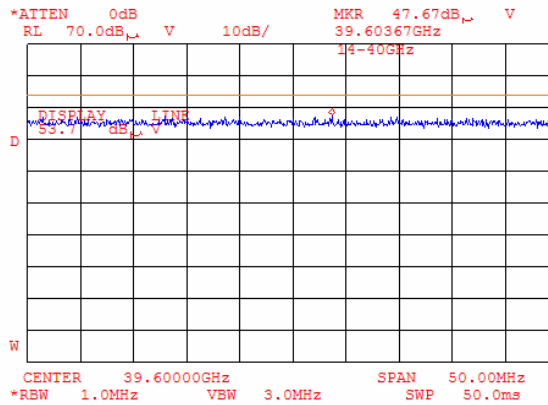




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

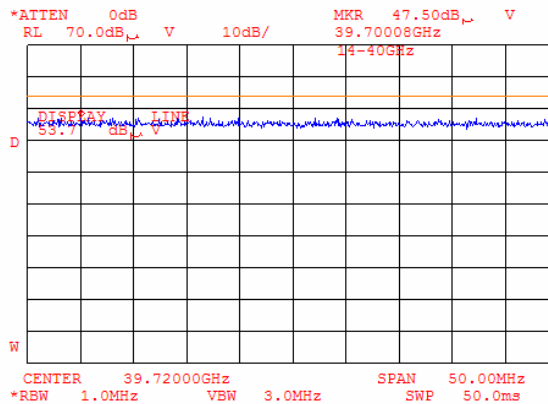
Plot 7.5.58 Radiated emission measurements at the 8th harmonic

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



Plot 7.5.59 Radiated emission measurements at the 8th harmonic

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

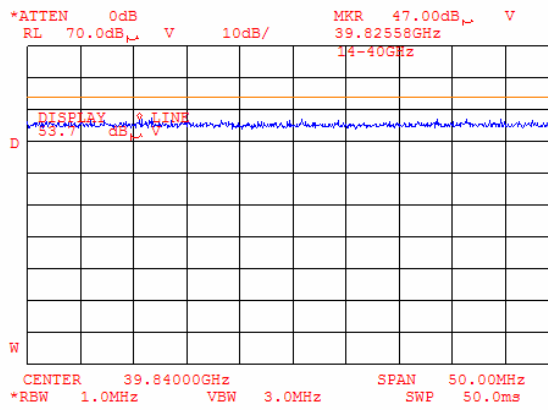




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	3/2/2005 5:58:51 PM		
Temperature: 26 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.60 Radiated emission measurements at the 8th harmonic

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





Test specification:		Section 90.213, Frequency stability	
Test procedure:		47 CFR, Section 2.1055; TIA/EIA-603-A Section 2.2.2	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/24/2005 9:58:32 AM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
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. The test results are provided in Table 7.6.2.

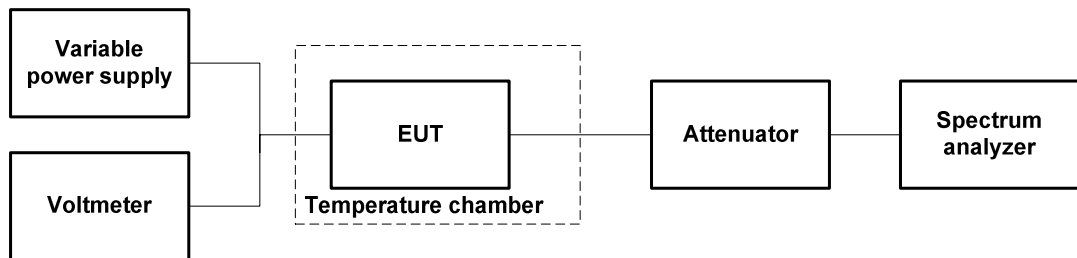
Table 7.6.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement	
	ppm	Hz
4950.000	20	99000
4965.000		99300
4980.000		99600

7.6.2 Test procedure

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

Figure 7.6.1 Frequency stability test setup





Test specification:	Section 90.213, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-A Section 2.2.2		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/24/2005 9:58:32 AM		
Temperature: 26 °C	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Table 7.6.2 Frequency stability test results

OPERATING FREQUENCY: 4950 – 4980 MHz
 NOMINAL POWER VOLTAGE: 120 VAC
 TEMPERATURE STABILIZATION PERIOD: 20 min
 POWER DURING TEMPERATURE TRANSITION: Off
 SPECTRUM ANALYZER MODE: Counter
 RESOLUTION BANDWIDTH: 1000 Hz
 VIDEO BANDWIDTH: 3000 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	Positive	Negative				
Low frequency 4950 MHz														
-30	nominal	4950.005000	4950.017000	4950.015000	4950.01300	4950.01200	4950.01100	4950.010000	0	-14000	99000	-85000	Pass	
-20	nominal	4950.015000	NA	NA	NA	NA	NA	4950.005000	0	-14000		-85000	Pass	
-10	nominal	4950.016000	NA	NA	NA	NA	NA	4949.999000	0	-20000		-79000	Pass	
0	nominal	4949.996000	4949.997000	4949.997000	4949.99700	4949.99700	4949.99700	4949.997000	0	-23000		-76000	Pass	
10	nominal	4950.013000	NA	NA	NA	NA	NA	4950.000000	0	-19000		-80000	Pass	
20	+15%	4949.996000	NA	NA	NA	NA	NA	4950.022000	3000	-23000		-76000	Pass	
20	nominal	4949.997000	NA	NA	NA	NA	NA	4950.019000*	0	-22000		-77000	Pass	
20	-15%	4950.000000	NA	NA	NA	NA	NA	4950.014000	0	-19000		-80000	Pass	
30	nominal	4950.001000	4950.016000	4950.037000	4950.03200	4950.03200	4950.03200	4950.034000	18000	-18000		-81000	Pass	
40	nominal	4950.039000	NA	NA	NA	NA	NA	4950.063000	44000	0		-55000	Pass	
50	nominal	4950.033000	NA	NA	NA	NA	NA	4950.096000	77000	0		-22000	Pass	
Mid frequency 4965 MHz														
-30	nominal	4965.016000	4965.016000	4965.014000	4965.01300	4965.01200	4965.01100	4965.011000	0	-10000	99300	-89300	Pass	
-20	nominal	4965.011000	NA	NA	NA	NA	NA	4965.003000	0	-18000		-81300	Pass	
-10	nominal	4965.011000	NA	NA	NA	NA	NA	4965.000000	0	-21000		-78300	Pass	
0	nominal	4964.998000	4964.997000	4964.998000	4964.99800	4964.99800	4964.99800	4964.998000	0	-24000		-75300	Pass	
10	nominal	4964.999000	NA	NA	NA	NA	NA	4965.002000	0	-22000		-77300	Pass	
20	+15%	4964.997000	NA	NA	NA	NA	NA	4965.020000	0	-24000		-75300	Pass	
20	nominal	4964.998000	NA	NA	NA	NA	NA	4965.021000*	0	-23000		-76300	Pass	
20	-15%	4964.997000	NA	NA	NA	NA	NA	4965.017000	0	-24000		-75300	Pass	
30	nominal	4965.002000	4964.999000	4965.002000	4965.00700	4965.02000	4965.04100	4965.032000	20000	-22000		-77300	Pass	
40	nominal	4965.003300	NA	NA	NA	NA	NA	4965.061000	40000	-17700		-59300	Pass	
50	nominal	4965.005600	NA	NA	NA	NA	NA	4965.009600	0	-15400		-83900	Pass	
High frequency 4980 MHz														
-30	nominal	4980.014000	4980.014000	4980.011000	4980.01000	4980.00900	4980.00900	4980.008000	0	-10000	99600	-89600	Pass	
-20	nominal	4980.015000	NA	NA	NA	NA	NA	4980.003000	0	-15000		-84600	Pass	
-10	nominal	4980.002000	NA	NA	NA	NA	NA	4979.998000	0	-20000		-79600	Pass	
0	nominal	4980.006000	4979.998000	4979.996000	4979.99600	4979.99700	4979.99600	4979.997000	0	-22000		-77600	Pass	
10	nominal	4979.997000	NA	NA	NA	NA	NA	4979.999000	0	-21000		-78600	Pass	
20	+15%	4979.999500	NA	NA	NA	NA	NA	4980.003100	0	-18500		-81100	Pass	
20	nominal	4980.002000	NA	NA	NA	NA	NA	4980.018000*	0	-16000		-83600	Pass	
20	-15%	4979.999000	NA	NA	NA	NA	NA	4980.025000	7000	-19000		-80600	Pass	
30	nominal	4979.999000	4980.027000	4980.031000	4980.03100	4980.03100	4980.03200	4980.034000	16000	-19000		-80600	Pass	
40	nominal	4980.001000	NA	NA	NA	NA	NA	4980.067000	49000	-17000		-50600	Pass	
50	nominal	4980.038000	NA	NA	NA	NA	NA	4980.096000	78000	0		-21600	Pass	

* - Reference frequency

Reference numbers of test equipment used

HL 0493	HL 1206	HL 1453	HL 1620	HL 2171	HL 2287		
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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:	3/2/2005 7:14:53 PM		
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
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	
4940.0 – 4990.0	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 Test procedure for E-field strength measurements

- 7.7.2.1 The EUT, connected to the antenna providing the maximum directional gain, was set up as shown in Figure 7.7.1.
- 7.7.2.2 The E-field probe was pointed to the EUT antenna zero azimuth at a 3 m distance, the maximum field strength reading was recorded in Table 7.7.2.
- 7.7.2.3 The E-field probe was slowly moved toward the EUT until E-field equivalent to the maximum permitted power density was measured.
- 7.7.2.4 The obtained antenna to probe distance was recorded in Table 7.7.2 as a minimum separation distance.
- 7.7.2.5 The test was repeated at the rest of test distances according to Table 7.7.2.

Table 7.7.2 Maximum permissible exposure (MPE) measurement

Test distance, m	Field strength, V/m	Equivalent power density, mW/cm ²	Limit, mW/cm ²	Margin, mW/cm ²	Verdict
3.0	2.00	0.0011	1.0	-0.9989	Pass
2.5	2.30	0.0014	1.0	-0.9986	Pass
2.0	3.20	0.0027	1.0	-0.9973	Pass
1.5	4.50	0.0054	1.0	-0.9946	Pass
1.0	5.10	0.0069	1.0	-0.9931	Pass
0.5	5.80	0.0089	1.0	-0.9911	Pass
0.3	6.20	0.0102	1.0	-0.9898	Pass
0.2	6.70	0.0119	1.0	-0.9881	Pass
0.1	7.60	0.0153	1.0	-0.9847	Pass

* - Equivalent power density was calculated from electric field strength as follows: $S = 0.1 \times E^2 / (120 \times \pi)$, where E is electric field strength in V/m and S is power density in mW/cm²

Reference numbers of test equipment used

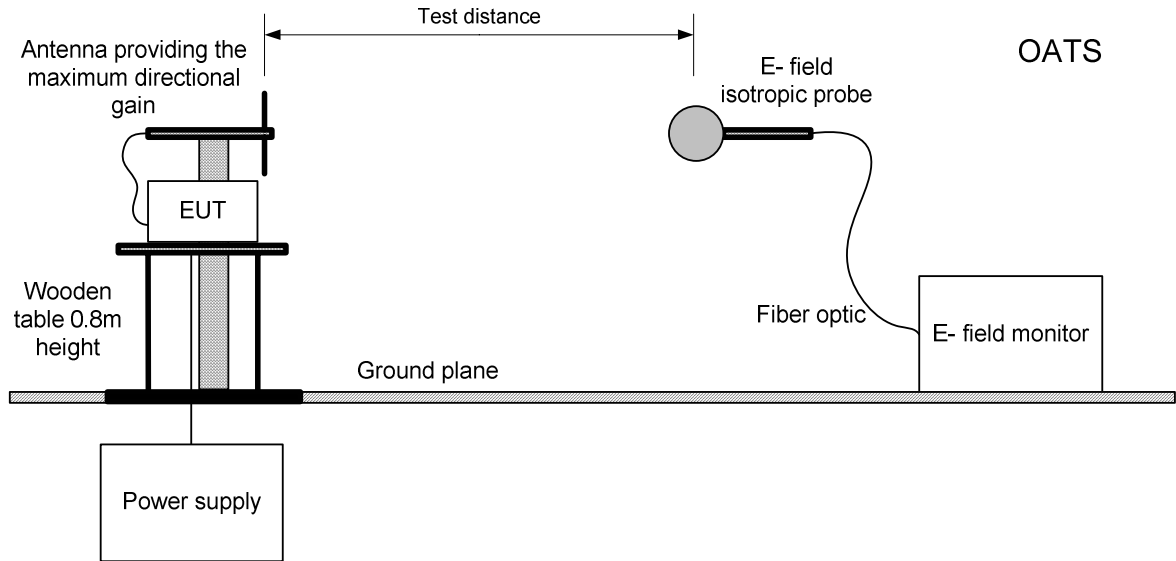
HL 0613	HL 1629					
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Full description is given in Appendix A.



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:	3/2/2005 7:14:53 PM		
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

Figure 7.7.1 Maximum permissible exposure (MPE) measurement set up





Test specification: Section 15.107, Conducted emission at AC power port			
Test procedure: ANSI C63.4, Sections 11.5 and 12.1.3			
Test mode: Compliance	Verdict: PASS		
Date & Time: 2/22/2005 12:46:38 PM			
Temperature: 24 °C	Air Pressure: 1017 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

8 Emissions tests according to 47CFR part 15 subpart B requirements

8.1 Conducted emissions

8.1.1 General

This test was performed to measure common mode conducted emissions at the mains power port. Specification test limits are given in Table 8.1.1. The worst test results (the lowest margins) were recorded in Table 8.1.2, Table 8.1.3 and shown in the associated plots.

Table 8.1.1 Limits for conducted emissions

Frequency, MHz	Class B limit, dB(μV)		Class A limit, dB(μV)	
	QP	AVRG	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*	79	66
0.5 - 5.0	56	46	73	60
5.0 - 30	60	50	73	60

* The limit decreases linearly with the logarithm of frequency.

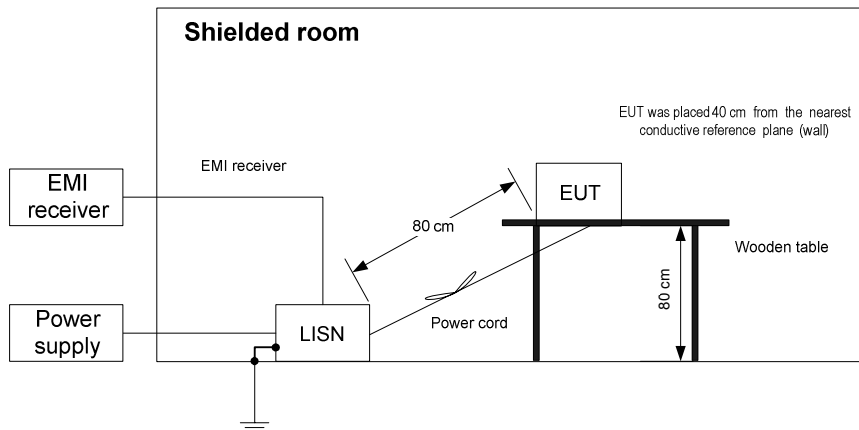
8.1.2 Test procedure

8.1.2.1 The EUT was set up as shown in Figure 8.1.1, energized and the performance check was conducted.

8.1.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 8.1.2, Table 8.1.3. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

8.1.2.3 The position of the device cables was varied to determine maximum emission level.

Figure 8.1.1 Setup for conducted emission measurements, table-top equipment





Test specification:		Section 15.107, Conducted emission at AC power port	
Test procedure:		ANSI C63.4, Sections 11.5 and 12.1.3	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/22/2005 12:46:38 PM		
Temperature: 24 °C	Air Pressure: 1017 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

Table 8.1.2 Conducted emission test results

LINE: AC mains
LIMIT: Class B
EUT OPERATING MODE: Transmit
EUT SET UP: TABLE-TOP
TEST SITE: SHIELDED ROOM
DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
FREQUENCY RANGE: 150 kHz - 30 MHz
RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Peak emission, dB(µV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*	Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*		
Laptop									
0.151709	58.39	51.48	65.92	-14.44	17.69	55.92	-38.23	L1	Pass
0.203449	57.42	52.90	63.52	-10.62	31.34	53.52	-22.18		
0.286961	53.27	48.49	60.67	-12.18	28.28	50.67	-22.39		
0.692052	48.47	43.47	56.00	-12.53	21.97	46.00	-24.03		
0.908540	47.74	40.70	56.00	-15.30	25.14	46.00	-20.86		
1.072094	46.38	40.96	56.00	-15.04	24.99	46.00	-21.01	L2	Pass
0.204233	49.89	43.75	63.49	-19.74	34.09	53.49	-19.40		
0.751541	48.98	41.73	56.00	-14.27	20.24	46.00	-25.76		
0.977960	49.00	42.58	56.00	-13.42	24.22	46.00	-21.78		
1.269625	47.11	40.60	56.00	-15.40	25.91	46.00	-20.09		
1.581623	49.02	39.36	56.00	-16.64	23.63	46.00	-22.37	L2	Pass
1.797654	47.20	39.08	56.00	-16.92	25.41	46.00	-20.59		
IDU									
0.150000	54.78	54.19	66.00	-11.81	49.71	56.00	-6.29	L1	Pass
0.221911	49.30	48.74	62.81	-14.07	45.99	52.81	-6.82		
0.296168	41.49	40.50	60.39	-19.89	36.28	50.39	-14.11		
0.370143	43.82	43.06	58.54	-15.48	41.47	48.54	-7.07		
0.445261	42.70	41.93	57.02	-15.09	41.04	47.02	-5.98		
0.518474	40.96	39.89	56.00	-16.11	39.29	46.00	-6.71	L2	Pass
0.150000	55.39	54.72	66.00	-11.28	49.61	56.00	-6.39		
0.222108	49.18	48.61	62.80	-14.19	46.47	52.80	-6.33		
0.370504	43.59	42.86	58.54	-15.68	40.45	48.54	-8.09		
0.444848	42.78	42.20	57.03	-14.83	41.55	47.03	-5.48		
0.518794	39.98	38.78	56.00	-17.22	37.64	46.00	-8.36	L2	Pass
0.889995	36.25	35.64	56.00	-20.36	35.26	46.00	-10.74		

*- Margin = Measured emission - specification limit.



Test specification:	Section 15.107, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/22/2005 12:46:38 PM		
Temperature: 24 °C	Air Pressure: 1017 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

Table 8.1.3 Conducted emission test results

LINE: AC mains
LIMIT: Class B
EUT OPERATING MODE: Receive / Stand-by
EUT SET UP: TABLE-TOP
TEST SITE: SHIELDED ROOM
DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
FREQUENCY RANGE: 150 kHz - 30 MHz
RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Peak emission, dB(µV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*	Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*		
Laptop									
0.150650	63.43	61.46	65.97	-4.51	44.72	55.97	-11.25	L1	Pass
0.158789	62.07	58.89	65.57	-6.68	37.48	55.57	-18.09		
0.170987	61.02	57.46	64.98	-7.52	34.69	54.98	-20.29		
0.210906	57.91	53.76	63.23	-9.47	35.83	53.23	-17.40		
0.529003	49.47	46.52	56.00	-9.48	32.00	46.00	-14.00		
0.806191	46.86	40.75	56.00	-15.25	28.74	46.00	-17.26		
0.807522	46.87	40.99	56.00	-15.01	29.18	46.00	-16.82		
1.361326	47.71	44.12	56.00	-11.88	30.90	46.00	-15.10	L2	Pass
0.150000	60.17	57.76	66.00	-8.24	37.66	56.00	-18.34		
0.159118	57.79	54.58	65.56	-10.98	32.02	55.56	-23.54		
0.293200	43.47	40.83	60.48	-19.65	29.90	50.48	-20.58		
0.546340	47.76	45.49	56.00	-10.51	28.60	46.00	-17.40		
0.800964	45.40	39.55	56.00	-16.45	23.35	46.00	-22.65		
1.806403	44.54	39.12	56.00	-16.88	28.38	46.00	-17.62		
5.563644	44.76	40.55	60.00	-19.45	37.64	50.00	-12.36		
IDU									
0.150000	55.30	54.60	66.00	-11.40	49.31	56.00	-6.69	L1	Pass
0.223326	49.98	48.78	62.76	-13.98	46.69	52.76	-6.07		
0.371638	42.76	42.14	58.51	-16.37	39.68	48.51	-8.83		
0.445479	42.38	42.00	57.02	-15.02	41.42	47.02	-5.60		
2.453445	37.33	36.73	56.00	-19.27	36.19	46.00	-9.81		
6.988552	38.85	37.66	60.00	-22.34	36.20	50.00	-13.80	L2	Pass
0.150150	54.58	53.72	65.99	-12.27	49.28	55.99	-6.71		
0.223085	49.97	48.87	62.77	-13.90	46.37	52.77	-6.40		
0.371506	43.11	42.48	58.51	-16.03	40.90	48.51	-7.61		
0.445027	42.55	42.08	57.03	-14.95	41.34	47.03	-5.69		
0.520365	38.59	37.69	56.00	-18.31	36.59	46.00	-9.41		
4.683543	36.87	35.84	56.00	-20.16	34.43	46.00	-11.57		

Reference numbers of test equipment used

HL 0447	HL 0787	HL 1430	HL 1502	HL 1510			
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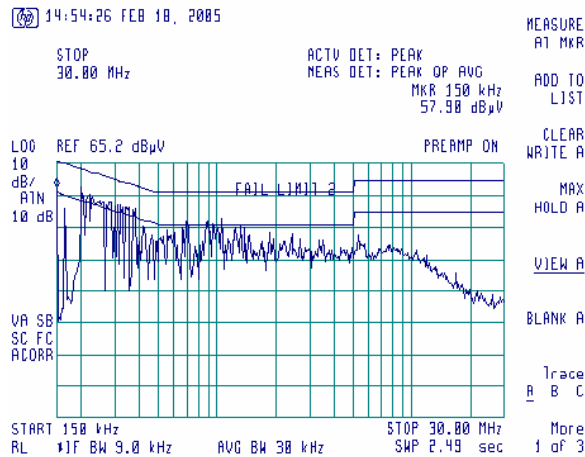
Full description is given in Appendix A.



Test specification:	Section 15.107, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/22/2005 12:46:38 PM		
Temperature: 24 °C	Air Pressure: 1017 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

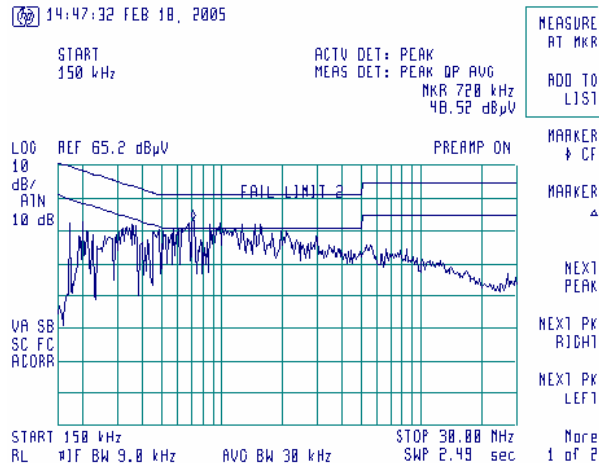
Plot 8.1.1 Conducted emission measurements, at Laptop AC mains

LINE: L1
LIMIT: Class B
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Plot 8.1.2 Conducted emission measurements, at Laptop AC mains

LINE: L2
LIMIT: Class B
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK

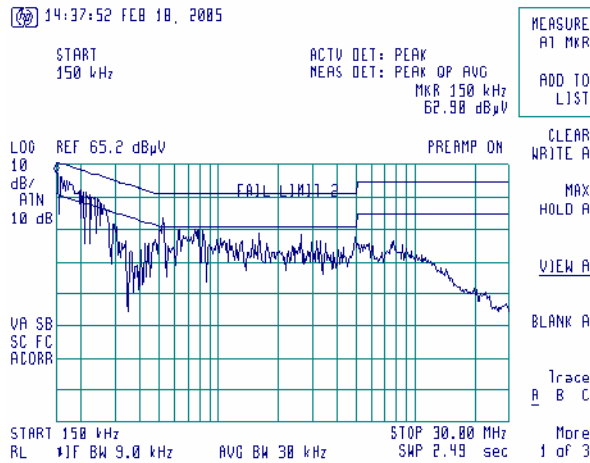




Test specification: Section 15.107, Conducted emission at AC power port			
Test procedure: ANSI C63.4, Sections 11.5 and 12.1.3			
Test mode: Compliance	Verdict: PASS		
Date & Time: 2/22/2005 12:46:38 PM			
Temperature: 24 °C	Air Pressure: 1017 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

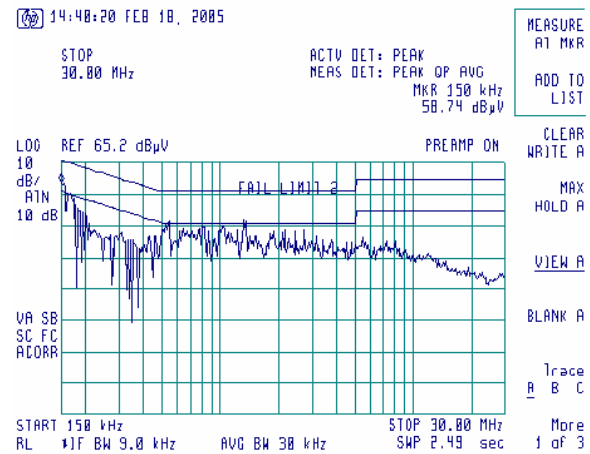
Plot 8.1.3 Conducted emission measurements, at Laptop AC mains

LINE: L1
LIMIT: Class B
EUT OPERATING MODE: Receive / Stand-by
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Plot 8.1.4 Conducted emission measurements, at Laptop AC mains

LINE: L2
LIMIT: Class B
EUT OPERATING MODE: Receive / Stand-by
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK

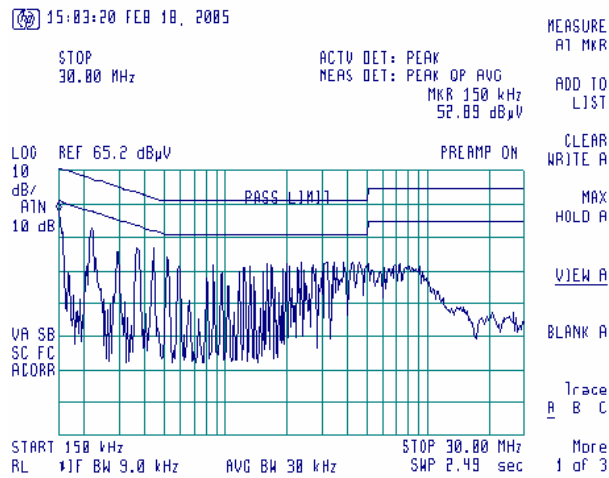




Test specification: Section 15.107, Conducted emission at AC power port			
Test procedure: ANSI C63.4, Sections 11.5 and 12.1.3			
Test mode: Compliance	Verdict: PASS		
Date & Time: 2/22/2005 12:46:38 PM			
Temperature: 24 °C	Air Pressure: 1017 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

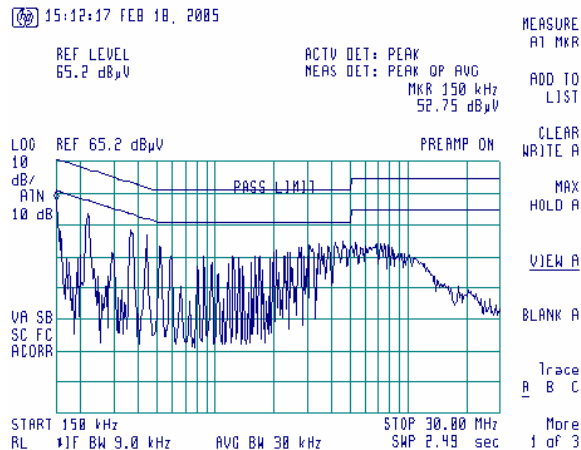
Plot 8.1.5 Conducted emission measurements, at IDU AC mains

LINE: L1
LIMIT: Class B
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Plot 8.1.6 Conducted emission measurements, at IDU AC mains

LINE: L2
LIMIT: Class B
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK

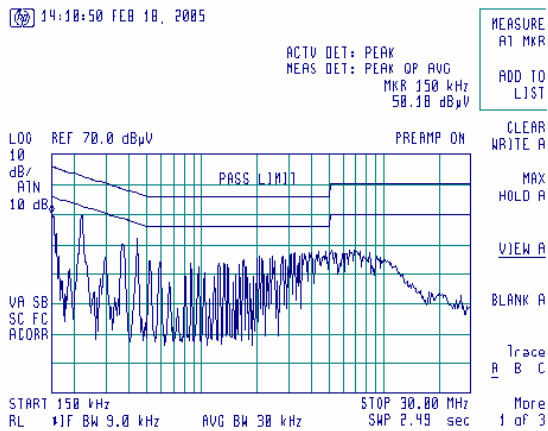




Test specification:	Section 15.107, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/22/2005 12:46:38 PM		
Temperature: 24 °C	Air Pressure: 1017 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

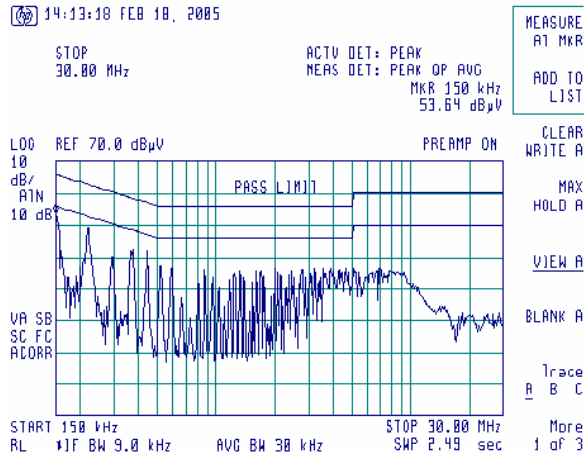
Plot 8.1.7 Conducted emission measurements, at IDU AC mains

LINE: L1
LIMIT: Class B
EUT OPERATING MODE: Receive / Stand-by
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Plot 8.1.8 Conducted emission measurements, at IDU AC mains

LINE: L2
LIMIT: Class B
EUT OPERATING MODE: Receive / Stand-by
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK





Test specification:		Section 15.109, Radiated emission	
Test procedure:		ANSI C63.4, Sections 11.6 and 12.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 6:01:04 PM		
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

8.2 Radiated emission measurements

8.2.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits are given in Table 8.2.1.

Table 8.2.1 Radiated emission test limits

Frequency, MHz	Class B limit, dB(μV/m)		Class A limit, dB(μV/m)	
	10 m distance	3 m distance	10 m distance	3 m distance
30 - 88	29.5*	40.0	39.0	49.5*
88 - 216	33.0*	43.5	43.5	54.0*
216 - 960	35.5*	46.0	46.4	56.9*
Above 960	43.5*	54.0	49.5	60.0*

* The limit for test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $Lim_{S_2} = Lim_{S_1} + 20 \log(S_1/S_2)$, where S_1 and S_2 – standard defined and test distance respectively in meters.

8.2.2 Test procedure for measurements in semi-anechoic chamber

8.2.2.1 The EUT was set up as shown in Figure 8.2.1, energized and the performance check was conducted.

8.2.2.2 The specified frequency range was investigated with biconilog antenna connected to EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal and the EUT cables position was varied.

8.2.2.3 The worst test results (the lowest margins) were recorded in Table 8.2.2 and shown in the associated plots.

8.2.3 Test procedure for measurements at OATS

8.2.3.1 The EUT was set up as shown in Figure 8.2.2, energized and the performance check was conducted.

8.2.3.2 Final measurements were performed at the open area test site at 10 m test distance. The EUT wires and cables were arranged to produce maximum emission as it was found during preliminary measurements. The frequencies yield the worst test results (the lowest margins) during preliminary testing were investigated with biconilog antenna connected to EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m and its polarization was changed from vertical to horizontal. At frequencies where high ambient noise was encountered, the final measurements were taken in the anechoic chamber at 3 m distance.

8.2.3.3 The worst test results (the lowest margins) were recorded in Table 8.2.2 and shown in the associated plots.



Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 6:01:04 PM		
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

Figure 8.2.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment

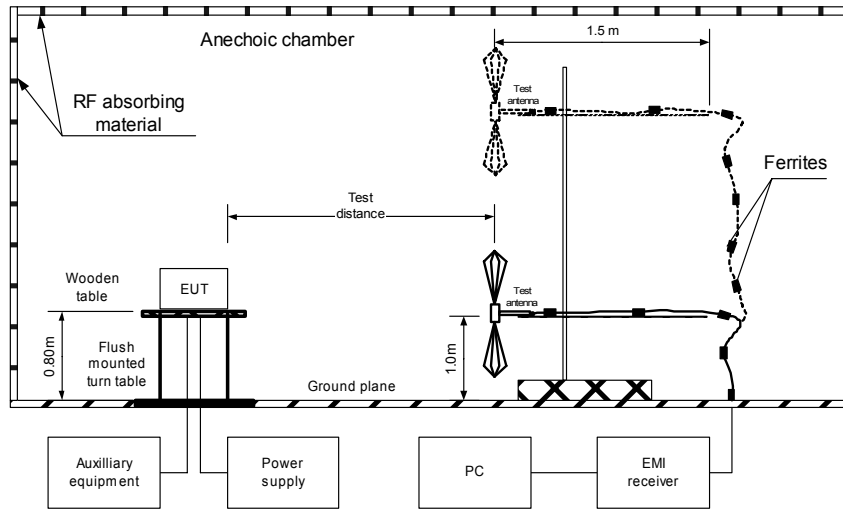
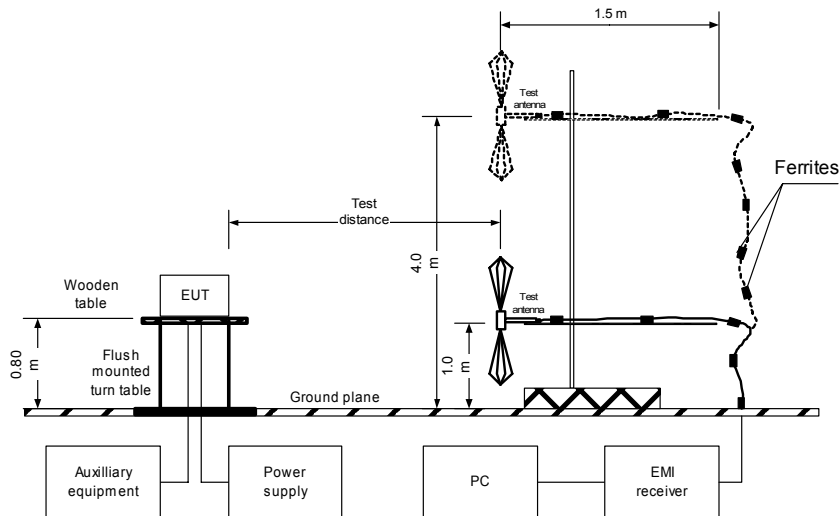


Figure 8.2.2 Setup for radiated emission measurements at OATS, table-top equipment





Test specification: Section 15.109, Radiated emission			
Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4			
Test mode: Compliance	Verdict: PASS		
Date & Time: 3/2/2005 6:01:04 PM			
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

Table 8.2.2 Radiated emission test results

EUT SET UP: TABLE-TOP
LIMIT: Class B
EUT OPERATING MODE: Receive / Stand-by

TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / QUASI-PEAK
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz

Frequency, MHz	Peak emission, dB(µV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
94.387500	43.42	40.85	43.50	-2.65	Vertical	1.0	13	Pass
132.762500	44.78	41.55	43.50	-1.95	Vertical	1.0	243	
192.001000	40.66	38.89	43.50	-4.61	Horizontal	1.6	103	
259.927500	42.99	40.77	46.00	-5.23	Horizontal	1.0	242	
300.002500	47.28	44.55	46.00	-1.45	Horizontal	1.0	50	
324.900600	42.04	40.26	46.00	-5.74	Vertical	1.3	209	
332.508750	42.47	40.90	46.00	-5.10	Horizontal	1.0	360	
389.888750	44.64	43.62	46.00	-2.38	Vertical	1.2	206	
598.600000	43.16	38.27	46.00	-7.73	Vertical	1.0	79	

TEST SITE: OATS
TEST DISTANCE: 10 m
DETECTORS USED: PEAK / QUASI-PEAK
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz

Frequency, MHz	Peak emission, dB(µV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
178.194750	32.90	27.44	33.00	-5.56	Horizontal	3.8	60	Pass

TEST SITE: OATS / SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1 GHz – 25 GHz
RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak emission, dB(µV/m)	Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
1130.42500	46.60	42.20	54.00	-11.80	Horizontal	1.2	17	Pass
1397.43438	48.98	30.40	54.00	-23.60	Vertical	1.0	274	
19065.3000	43.17	34.67	54.00	-19.33	Vertical	1.0	90	

*- Margin = Measured emission - specification limit.

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

Reference numbers of test equipment used

HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604	HL 0768	HL 0784
HL 0813	HL 1430	HL 1552	HL 1947	HL 1984	HL 2009		

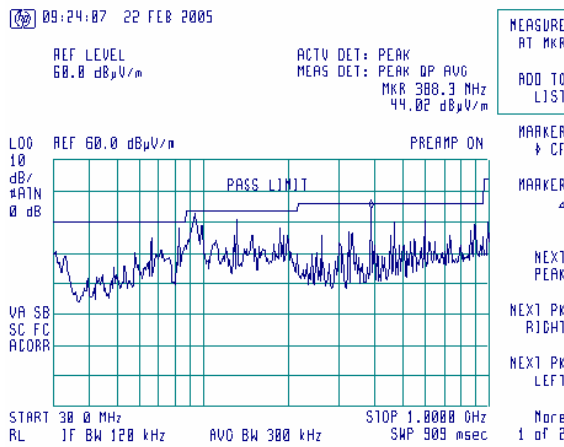
Full description is given in Appendix A.



Test specification: Section 15.109, Radiated emission			
Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4			
Test mode: Compliance	Verdict: PASS		
Date & Time: 3/2/2005 6:01:04 PM			
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

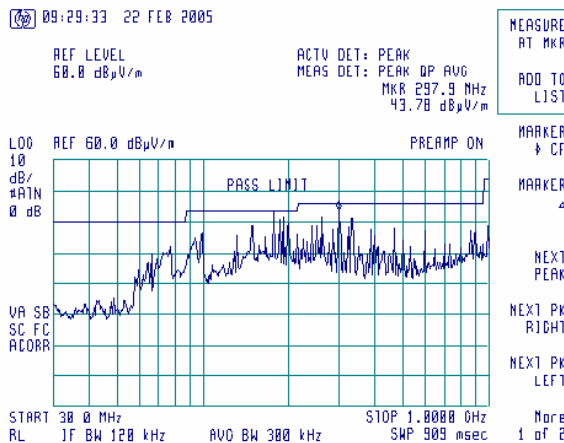
Plot 8.2.1 Radiated emission measurements in 30- 1000 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Plot 8.2.2 Radiated emission measurements in 30- 1000 MHz range, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by

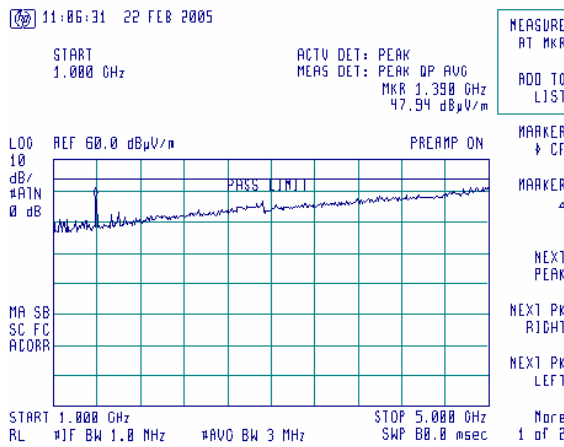




Test specification: Section 15.109, Radiated emission			
Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4			
Test mode: Compliance			Verdict: PASS
Date & Time: 3/2/2005 6:01:04 PM			
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

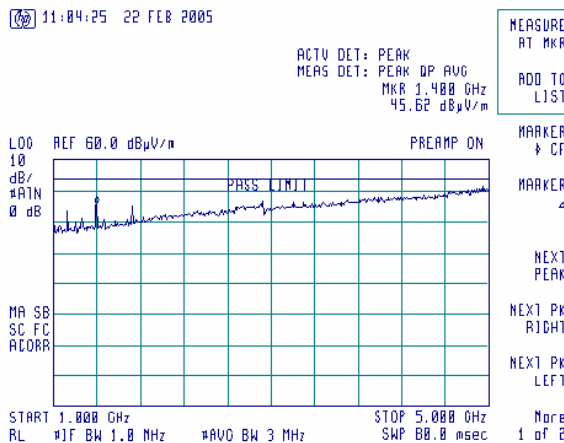
Plot 8.2.3 Radiated emission measurements in 1- 5 GHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class
B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Plot 8.2.4 Radiated emission measurements in 1- 5 GHz range, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by

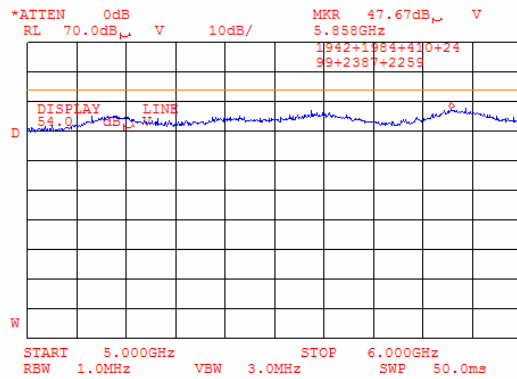




Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 6:01:04 PM		
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

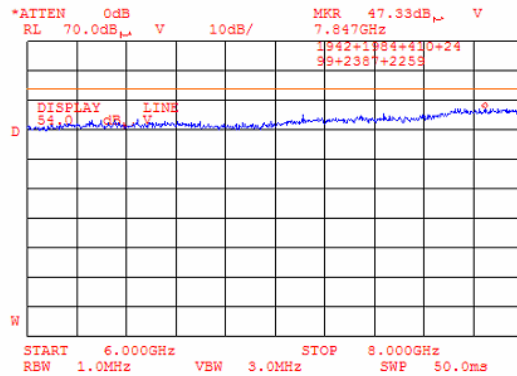
Plot 8.2.5 Radiated emission measurements in 5- 6 GHz range, vertical and horizontal antenna polarization

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Plot 8.2.6 Radiated emission measurements in 6- 8 GHz range, vertical and horizontal antenna polarization

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by

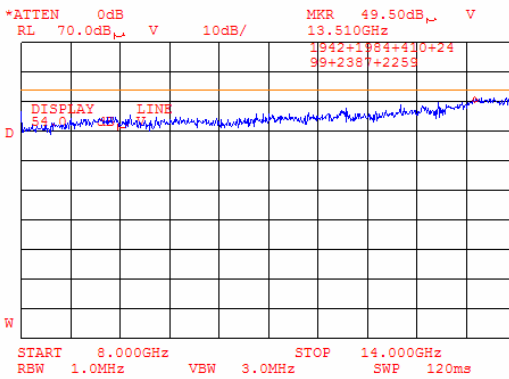




Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 6:01:04 PM		
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

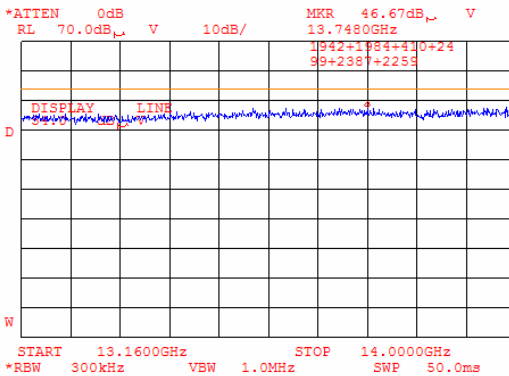
Plot 8.2.7 Radiated emission measurements in 8- 14 GHz range, vertical and horizontal antenna polarization

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Plot 8.2.8 Radiated emission measurements in 13.16- 14 GHz range, vertical and horizontal antenna polarization

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by

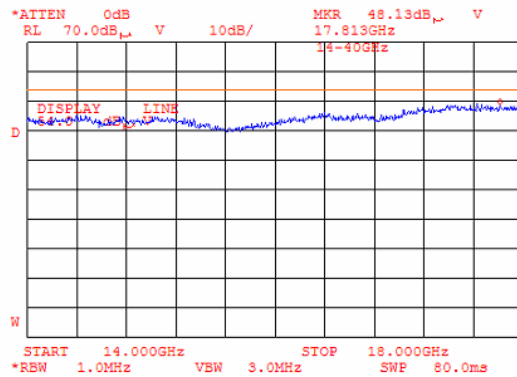




Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/2/2005 6:01:04 PM		
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 29 %	Power Supply: 120 VAC
Remarks:			

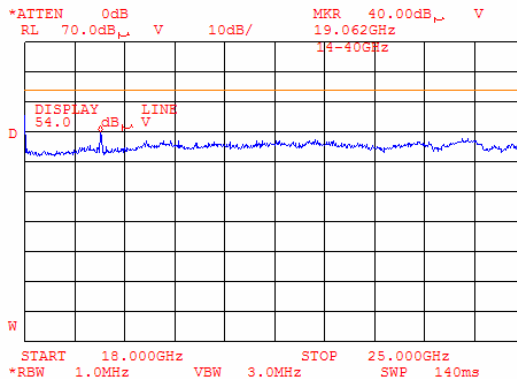
Plot 8.2.9 Radiated emission measurements in 14- 18 GHz range, vertical and horizontal antenna polarization

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Plot 8.2.10 Radiated emission measurements in 18- 25 GHz range, vertical and horizontal antenna polarization

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



**9 APPENDIX A Test equipment and ancillaries used for tests**

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0446	Antenna, Loop active, 10kHz-30MHz	EMCO	6502	2857	28-Jun-04	28-Jun-05
0447	LISN, 16/2, 300V RMS	HL	LISN 16 - 1	066	03-Nov-04	03-Nov-05
0493	Oven temperature -45...175 deg C	Thermotron	S-1.2 Mini-Max	14016	23-Sep-04	23-Sep-05
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	26-Sep-04	26-Sep-05
0589	Cable Coaxial, GORE A2P01POL118, 2.3 m	HL	GORE-3	176	02-Dec-04	02-Dec-05
0592	Position Controller	HL	L2-SR3000 (HL CRL-3)	100	02-Dec-04	02-Dec-05
0593	Antenna Mast, 1-4 m Pneumatic	Madgesh	AM-F1	101	03-Feb-05	03-Feb-06
0594	Turn Table FOR ANECHOIC CHAMBER flush mount d=1.2 m Pneumatic	HL	TT-WDC1	102	27-Jan-05	27-Jan-06
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE 26 - 2000 MHz	EMCO	3141	9611-1011	27-Jan-05	27-Jan-06
0613	Sensor Electric Field 10 kHz-1.0 GHz, 1-300 V/m (probe), w/charger	Amplifier Research	FP2000	18677	27-Feb-05	27-Feb-06
0768	Antenna Standard Gain Horn, 18-26.5 GHz, WR-42, K-band, Gain - 25 dB	Quinstar Technology	QWH-4200-BA	110	27-Feb-05	27-Feb-06
0769	Antenna Standard Gain Horn, 26.5-40 GHz, WR28, Ka band, Gain 25 dB	Quinstar Technology	QWH-2800-BA	112	27-Feb-05	27-Feb-06
0784	Antenna X-WING BILOG 20 MHz - 2 GHz	Schaffner-Chase EMC	CBL6140 A	1120	10-Jan-05	10-Jan-06
0787	Transient Limiter	Hewlett Packard	11947A	3107A018 77	21-Nov-04	21-Nov-05
0813	Cable Coax, RG-214, 12 m, N-type connectors	HL	C214-12	149	02-Dec-04	02-Dec-05
1206	One phase voltage regulator, 2kVA, 0-250V	HL	TDGC-2	142	02-Dec-04	02-Dec-05
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies (HP)	8564EC	3946A002 19	30-Aug-04	30-Aug-05
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies (HP)	8542E	3807A002 62,3705A0 0217	01-Sep-04	01-Sep-05
1453	Cable, 1 m	Harbour Industries	MIL 17/60-RG142	1453	23-Sep-04	23-Sep-05
1502	Cable RF, 6 m	Belden	M17/167 MIL-C-17	1502	12-Feb-05	12-Feb-06
1510	Cable RF, 8 m	Belden	M17/167 MIL-C-17	1510	02-Dec-04	02-Dec-05
1552	Cable RF, 8 m	Alpha Wire	RG-214	1552	02-Dec-04	02-Dec-05
1620	Attenuator, 50 Ohm, 2W, DC to 8 GHz, 10 dB	Midwest Microwave	0217-10-NNN-02	1620	15-Jan-05	15-Jan-06
1629	Isotropic Field Monitor	Amplifier Research	FM2000	23308	13-Feb-05	13-Feb-06



HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
1947	Cable 18GHz, 6.5 m, blue	Rhophase Microwave Limited	NPS-1803A-6500-NPS	T4974	13-Feb-05	13-Feb-06
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W, N-type	EMC Test Systems	3115	9911-5964	22-Mar-05	22-Mar-06
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	13-Feb-05	13-Feb-06
2171	Multimeter	Fluke	177	79960418	13-Feb-05	13-Feb-06
2254	Cable 40GHz, 0.8 m, blue	Rhophase Microwave Limited	KPS-1503A-800-KPS	W4907	13-Feb-05	13-Feb-06
2259	Amplifier Low Noise 2-20 GHz	Sophia Wireless	LNA0220-C	0223	13-Feb-05	13-Feb-06
2260	Amplifier Low Noise 14-33 GHz	Sophia Wireless	LNA28-B	0233	13-Feb-05	13-Feb-06
2261	Amplifier Low Noise 33-40 GHz	Sophia Wireless	LNA38-B	0234	13-Feb-05	13-Feb-06
2287	Attenuator 10 dB, DC-18 GHz	Weinschel	NA	5776	13-Feb-05	13-Feb-06
2387	Filter Bandpass, 8-14 GHz	HL	FBP8-14	2387	13-Feb-05	13-Feb-06
2399	Cable 40GHz, 1.5 m, blue	Rhophase Microwave Limited	KPS-1503A-1500-KPS	X2945	13-Feb-05	13-Feb-06
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	13-Feb-05	13-Feb-06
2499	Quadruplexer 1-12 GHz (1-2 GHz; 2-4GHz;4-8 GHz; 8-12GHz)	Elettronica S.p.A. - Roma	UE 84	D/00239	13-Feb-05	13-Feb-06
2524	Attenuator, 10 dB, DC-18 GHz	Midwest Microwave	263-10	2524	13-Feb-05	13-Feb-06

**10 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

The test equipment has been calibrated according to its recommended procedures and is within the manufacturer's published limit of error. The standards and instruments used in the calibration system conform to the present requirements of ISO/IEC 17025 (or alternately ANSI/NCSL Z540-1).

The laboratory calibrates its measurement standards by a third party (traceable to NIST, USA) on a regular basis according to equipment manufacturer requirements. The Hermon Labs EMC measurements uncertainty is given in the table above.



11 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 2186-1 for OATS and IC 2186-2 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).

Address: P.O. Box 23, Binyamina 30500, Israel.
Telephone: +972 4628 8001
Fax: +972 4628 8277
e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

12 APPENDIX D Specification references

47CFR part 90: 2004	Private land mobile radio services
47CFR part 1: 2004	Practice and procedure
47CFR part 2: 2004	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: 2001	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-A:2001	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards



13 APPENDIX E Abbreviations and acronyms

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

**14 APPENDIX F Test equipment correction factors****Correction factor
Line impedance stabilization network
Model LISN 16 – 1, Hermon Laboratories**

Frequency, kHz	Correction factor, dB
10	4.9
15	2.86
20	1.83
25	1.25
30	0.91
35	0.69
40	0.53
50	0.35
60	0.25
70	0.18
80	0.14
90	0.11
100	0.09
125	0.06
150	0.04

The correction factor in dB is to be added to meter readings of an interference analyzer or a spectrum analyzer.

**Antenna Factor
Active Loop Antenna
EMC Test Systems, model 6502, serial number 2857**

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****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**Standard gain horn antenna****Quinstar Technology****Model QWH****Ser.No.112, HL 0768, 0769, 0770**

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).



Biconilog antenna factor

Schaffner Chase EMC, model CBL 6140A, serial number 1120, HL 0784

Frequency, MHz	Antenna factor, dB(1/m)
20	12.1
22	8.8
24	5.5
26	3.0
28	2.8
30	3.9
40	8.4
50	9.3
60	9.7
70	9.3
80	7.5
90	6.8
100	7.6
110	6.6
120	6.9
140	7.6
160	11.6
170	8.3
190	9.2
200	9.9
220	10.5
240	11.2
260	12.9
280	12.1
300	12.9
320	13.2
340	13.9
360	15.2
380	15.3
400	15.7
420	16.6
440	16.8
460	17.6
480	18.3
500	18.0
520	18.0
540	18.7
560	19.2
580	19.0

Frequency, MHz	Antenna factor, dB(1/m)
600	19.1
620	19.8
640	20.6
660	20.7
680	20.9
700	21.0
720	21.4
740	21.7
760	21.6
780	21.6
800	21.9
820	22.2
840	22.6
860	22.7
880	22.7
900	22.9
920	23.2
940	23.7
960	24.3
980	24.6
1000	24.4
1.060	24.3
1.120	24.8
1.180	25.3
1.240	26.1
1.300	26.9
1.360	27.6
1.420	26.8
1.480	26.9
1.520	28.1
1.560	28.1
1.640	28.2
1.700	28.6
1.760	30.0
1.840	31.3
1.900	31.8
1.960	31.6
2.000	32.0

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
EMC Test Systems, model 3115, serial no: 9911-5964, HL 1984

Frequency, MHz	Antenna gain, dBi	Antenna factor. dB(1/m)
1000.0	5.8	24.5
1500.0	9.0	24.8
2000.0	8.6	27.7
2500.0	9.5	28.7
3000.0	8.9	30.8
3500.0	8.2	32.9
4000.0	9.6	32.7
4500.0	11.2	32.1
5000.0	10.6	33.6
5500.0	9.8	35.3
6000.0	10.1	35.7
6500.0	10.7	35.8
7000.0	10.9	36.2
7500.0	10.5	37.2
8000.0	11.1	37.2
8500.0	10.8	38.1
9000.0	10.7	38.6
9500.0	11.5	38.3
10000.0	11.8	38.4
10500.0	12.3	38.3
11000.0	12.3	38.8
11500.0	11.5	39.9
12000.0	12.2	39.6
12500.0	12.6	39.5
13000.0	12.0	40.5
13500.0	11.7	41.1
14000.0	11.7	41.5
14500.0	12.7	40.8
15000.0	14.2	39.5
15500.0	16.0	38.1
16000.0	16.2	38.1
16500.0	14.5	40.1
17000.0	12.2	42.6
17500.0	9.7	45.4
18000.0	6.6	48.7

Antenna factor 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
EMC Test Systems, model 3115, serial no: 00027177, HL 2432

Frequency, MHz	Antenna gain, dBi	Antenna factor. dB(1/m)
1000.0	5.5	24.7
1500.0	8.0	25.7
2000.0	8.4	27.8
2500.0	9.3	28.9
3000.0	9.0	30.7
3500.0	9.3	31.8
4000.0	9.3	33.0
4500.0	10.4	32.8
5000.0	10.0	34.2
5500.0	10.1	34.9
6000.0	10.6	35.2
6500.0	11.0	35.4
7000.0	10.8	36.3
7500.0	10.4	37.3
8000.0	10.8	37.5
8500.0	10.8	38.0
9000.0	11.0	38.3
9500.0	11.5	38.3
10000.0	11.5	38.7
10500.0	11.9	38.7
11000.0	12.2	38.9
11500.0	11.9	39.5
12000.0	12.3	39.5
12500.0	12.7	39.4
13000.0	12.0	40.5
13500.0	12.0	40.8
14000.0	11.6	41.5
14500.0	12.2	41.3
15000.0	13.6	40.2
15500.0	15.3	38.7
16000.0	15.8	38.5
16500.0	14.8	39.8
17000.0	12.9	41.9
17500.0	9.2	45.8
18000.0	6.2	49.1

Antenna factor 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 RG-214, HL 0813

No.	Frequency, MHz	Cable loss, dB
1	10	0.15
2	20	0.40
3	30	0.51
4	40	0.61
5	50	0.68
6	60	0.76
7	70	0.80
8	80	0.92
9	90	0.96
10	100	0.99
11	200	1.60
12	300	1.85
13	400	2.25
14	500	2.43
15	600	2.80
16	700	3.14
17	800	3.34
18	900	3.75
19	1000	4.05
20	1200	4.41
21	1400	4.81
22	1600	5.18
23	1800	5.58
24	2000	6.09
25	2500	7.27
26	2900	8.01



Cable loss

**Cable Coaxial, GORE A2P01POL118, 2.3 m, model:GORE-3, HL 0589
+ Cable Coaxial, ANDREW PSWJ4, 6m, model: ANDREW-6, HL 1004**

No.	Frequency, MHz	Cable loss, dB	Tolerance (Specification), dB	Measurement uncertainty, dB
1	30	0.33	≤ 6.5	±0.12
2	50	0.40		
3	100	0.57		
4	300	0.97		
5	500	1.25		
6	800	1.59		
7	1000	1.81		
8	1200	1.97		
9	1400	2.15		
10	1600	2.28		
11	1800	2.43		
12	2000	2.61		
13	2200	2.75		
14	2400	2.89		
15	2600	2.97		
16	2800	3.21	≤ 6.5	±0.12
17	3000	3.32		
18	3300	3.47		
19	3600	3.62		
20	3900	3.84		
21	4200	3.92		
22	4500	4.07		±0.17
23	4800	4.36		
24	5100	4.62		
25	5400	4.78		
26	5700	5.16		
27	6000	5.67		
28	6500	5.99		



Cable loss
Cable coaxial, 6 m, model: M17/167 MIL-C-17, HL 1502

Frequency, MHz	Cable loss, dB
0.1	0.02
1	0.07
3	0.15
5	0.17
10	0.26
30	0.43
50	0.57
80	0.72
100	0.81
300	1.48
500	2.00
800	2.70
1000	3.09

Cable loss
Cable M17/167 MIL-C-17, HL 1510

No.	Frequency, MHz	Cable loss, dB
1	0.1	0.05
2	1	0.09
3	3	0.16
4	5	0.18
5	10	0.27
6	30	0.44
7	50	0.58
8	80	0.69
9	100	0.82
10	300	1.48
11	500	2.01
12	800	2.65
13	1000	3.12



Cable loss
RF cable 8 m, model RG-214-8m, HL 1552

No.	Frequency, MHz	Cable loss, dB	Measurement uncertainty, dB	Notes
1	0.010	0.01	±0.05	
2	0.1	0.01		
3	1	0.03		
4	10	0.12		
5	20	0.23		
6	30	0.30		
7	40	0.32		
8	50	0.34		
9	60	0.39		
10	70	0.43		
11	80	0.48		
12	90	0.50		
13	100	0.55		
14	200	0.78		
15	300	1.04		
16	400	1.16		
17	500	1.33		
18	600	1.51		
19	700	1.65		
20	800	1.77		
21	900	1.92		
22	1000	2.04		
23	1200	2.26		
24	1400	2.49		
25	1600	2.74		
26	1800	2.94		
27	2000	3.18		
28	2500	3.65		
29	2900	4.08		



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
RF cable 8 m, model RG-214, HL 2009

No.	Frequency, MHz	Cable loss, dB	Tolerance (Specification), dB	Measurement uncertainty, dB
1	1	0.10	NA	±0.12
2	10	0.14		
3	30	0.25		
4	50	0.34		
5	100	0.53		
6	300	0.99		
7	500	1.31		
8	800	1.73		
9	1000	1.98		
10	1100	2.11		
11	1200	2.21		
12	1300	2.35		
13	1400	2.46		
14	1500	2.55		
15	1600	2.68		
16	1700	2.78		
17	1800	2.88		
18	1900	2.98		
19	2000	3.09		



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, 40GHz, 1.5 m, Blue, Rhophase Microwave Limited, model: KPS-1503A-1500-KPS, HL 2399

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
0.03	0.07	6.5	1.57	15.50	2.50
0.05	0.10	6.7	1.60	16.00	2.51
0.1	0.16	6.9	1.55	16.50	2.58
0.2	0.26	7.1	1.65	17.00	2.65
0.3	0.33	7.3	1.65	17.50	2.73
0.5	0.38	7.5	1.70	18.00	2.74
0.7	0.41	7.7	1.71	18.50	2.67
0.9	0.58	7.9	1.73	19.00	2.67
1.1	0.64	8.1	1.79	19.50	2.74
1.3	0.70	8.3	1.81	20.00	2.69
1.5	0.75	8.5	1.84	20.50	2.80
1.7	0.79	8.7	1.85	21.00	2.82
1.9	0.83	8.9	1.90	21.50	2.87
2.1	0.88	9.1	1.95	22.00	2.87
2.3	0.93	9.3	1.93	22.50	2.92
2.5	0.97	9.5	1.98	23.50	3.04
2.7	1.01	9.7	1.96	24.00	3.05
2.9	1.04	9.9	2.03	24.50	3.03
3.1	1.08	10.1	1.99	25.00	3.11
3.3	1.14	10.30	2.02	25.50	3.10
3.5	1.17	10.50	2.02	26.00	3.17
3.7	1.21	10.70	2.02	26.50	3.11
3.9	1.24	10.90	2.08	27.00	3.16
4.1	1.26	11.10	2.02	28.00	3.19
4.3	1.26	11.30	2.09	29.00	3.19
4.5	1.29	11.50	2.05	30.00	3.30
4.7	1.34	11.70	2.11	31.00	3.31
4.9	1.34	11.90	2.11	32.00	3.35
5.1	1.40	12.10	2.12	33.00	3.46
5.3	1.43	12.40	2.17	34.00	3.45
5.5	1.45	13.00	2.29	35.00	3.49
5.7	1.47	13.50	2.31	36.00	3.54
5.9	1.40	14.00	2.43	37.00	3.62
6.1	1.53	14.50	2.43	39.00	3.69
6.3	1.55	15.00	2.46	40.00	3.75