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Electrical

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TEST REPORT

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

FOR:

Airspan Networks (Israel) Ltd.

Terminal station

Models: EasyST 4.9 GHz TDD, ProST 4.9 GHz TDD

Table of contents

1 Applicant information

Client name:	Airspan Networks (Israel) Ltd.
Address:	1, Harava street, "Unitronics" building, POB 199, Airport City, 70100, Israel
Telephone:	+972 3977 7444
Fax:	+972 3977 7400
E-mail:	zlevi@Airspan.com
Contact name:	Mr. Zion Levi

2 Equipment under test attributes

Product name:	Terminal station
Product type:	Transceiver
Model(s):	EasyST 4.9 GHz TDD (indoor unit), S.N.750F5CL03CDA; ProST 4.9 GHz TDD (outdoor unit), S.N. 746F61C05642
Software release:	V.161
Hardware version:	E1
Receipt date	1/22/2006

3 Manufacturer information

Manufacturer name:	Airspan Networks (Israel) Ltd.
Address:	1, Harava street, "Unitronics" building, POB 199, Airport City, 70100, Israel
Telephone:	+972 3977 7444
Fax:	+972 3977 7400
E-Mail:	zlevi@Airspan.com
Contact name:	Mr. Zion Levi

4 Test details

Project ID:	16897
Location:	Hermon Laboratories Ltd. P.O.Box 23, Binyamina 30500, Israel
Test started:	1/22/2006
Test completed:	4/5/2006
Test specification(s):	47CFR part 90
Test suite:	FCC_90_BS_with_RF_connector (3/2/2005 6:04:18 PM, modified)

5 Tests summary

Test	Status
Transmitter characteristics	
Section 90.205, 90.1215 Maximum output power and peak power spectral density	Pass
Section 90.209, Occupied bandwidth	Pass
Section 90.210 (m), 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, provided in Application for certification exhibit
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

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

This test report replaces the previously issued test report identified by Doc ID:AIRRAD_FCC.16897.

	Name and Title	Date	Signature
Tested by:	Mr. A. Lane, test engineer	April 5, 2006	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	May 7, 2006	
Approved by:	Mr. M. Nikishin, EMC and Radio group leader	May 9, 2006	

6 EUT description

6.1 General information

The EUT, model names EasyST and ProST, is a customer premises equipment (CPE) that connects IP-enabled devices directly to WiMAX networks providing high-speed broadband Internet access and a Fast Ethernet connection to the subscriber's local area network (LAN). It supports IP services at speeds of up to 13.1 Mbit/s over-the-air. The EasyST is an indoor unit, the ProST is an outdoor unit powered from the mains via AC/DC adapter.

6.2 Ports and lines

Port type	Port description	Connected		Connector type	Qty.	Cable type	Cable length
		From	To				
EasyST (outdoor unit)							
Power	DC power	EUT	Adapter	DC jack	1	unshielded	1.5 m
Signal	Ethernet	EUT	Laptop	RJ-45	1	unshielded	1 m
Signal	RS232	EUT	Laptop	D-type 9 pin	1	Used for initial configuration only	
RF	Antenna	EUT	50 Ohm termination	N-type	1	NA	NA
ProST (outdoor unit)							
Signal	48 V DC& Ethernet	EUT	SDA	D-type 15 pin	1	unshielded	10 m
Signal	RS232	EUT	Laptop	D-type 9 pin	1	unshielded	0.2 m
RF	Antenna	EUT	50 Ohm termination	N-type	1	NA	NA

6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop	Dell	PPx	4898T
Adapter to laptop	Dell	AA20031	93640
Mouse	Microsoft	PS/2	X04-72169
SDA	Airspan	NA	023-00500
AC/DC adapter	Fuhuna	UE15WCP	UE030112HU1 W1

6.4 Operating frequencies

Source	Frequency, MHz
Transmitter	4940 – 4990

6.5 Changes made in the EUT

No changes were implemented.

6.6 Transmitter characteristics

Type of equipment		
V	Stand-alone (Equipment with or without its own control provisions)	
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)	
	Plug-in card (Equipment intended for a variety of host systems)	

Intended use		**Condition of use**
V	Fixed (ProST)	Always at a distance more than 2 m from all people
V	mobile (EasyST**)**	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	2.5 MHz			
Maximum rated output power	At transmitter 50 Ω RF output connector			20.8 dBm
Is transmitter output power variable?		No		
	V	Yes		continuous variable
			V	stepped variable with stepsize 1 dB
				minimum RF power -30 dBm
				maximum RF power 20.8 dBm

Antenna connection						
unique coupling	**V**	standard connector **(EasyST)**	**V**	Integral **(ProST)**	**V**	with temporary RF connector
						without temporary RF connector

Antenna/s technical characteristics			
Type	Manufacturer	Model number	Gain
Directional 4-sector antenna	SmartAnt Telecom Co.	NA	9 dBi (EasyST)
Vipol	MTI	MT-464008/MV	17 dBi (ProST)

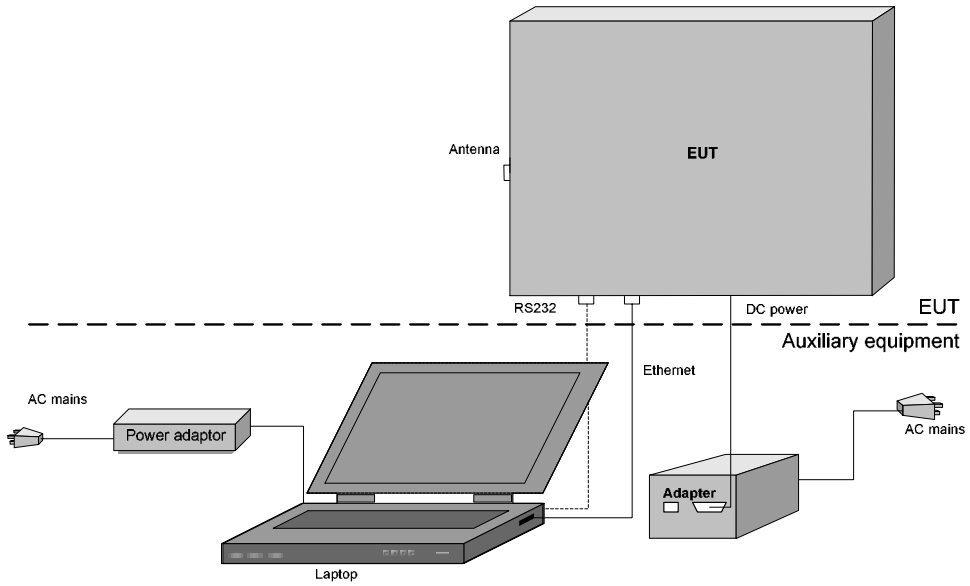
Transmitter 99% power bandwidth	5 MHz, 10 MHz
Transmitter aggregate data rate/s	5 MHz BW: BPSK – 2.095 MBps, QPSK - 4.19 MBps, 16QAM – 12.565 MBps, 64QAM – 18.85 MBps
	10 MHz BW: BPSK - 4.19 MBps, QPSK-8.38 MBps, 16QAM - 25.13 MBps, 64QAM - 37.7 MBps
Type of modulation	BPSK, QPSK, 16QAM, 64QAM
Type of multiplexing	OFDM
Modulating test signal (baseband)	PRBS
Maximum transmitter duty cycle in normal use	90%

Transmitter power source					
		Nominal rated voltage		Battery type	
V	DC	**Nominal rated voltage**	ProST: 48 V; EasyST: 6 V		
	AC mains	**Nominal rated voltage**		Frequency	Hz

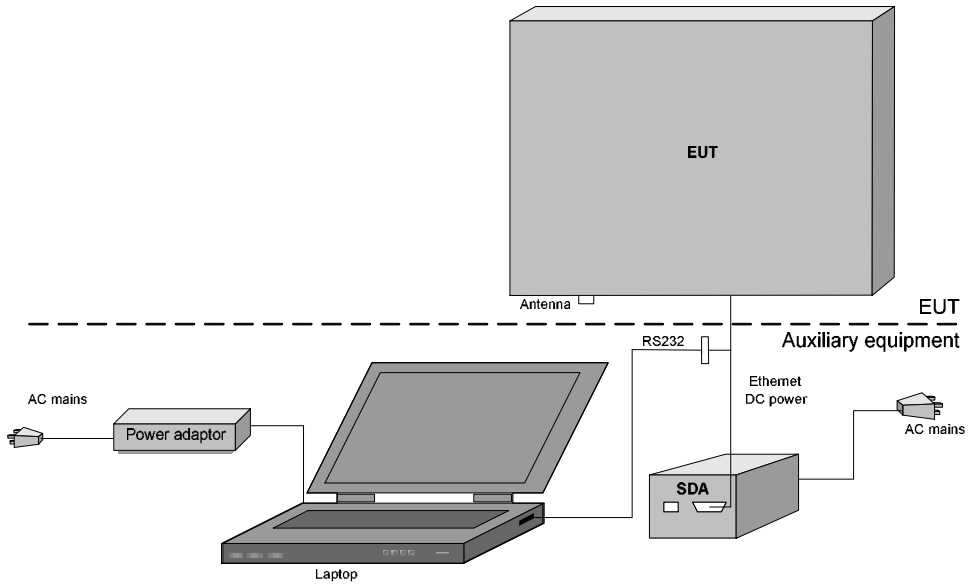
Common power source for transmitter and receiver	**V**	yes		no

6.7 Test configuration

a) EasyST



b) ProST



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:	3/27/2006		
Temperature: 21ºC	Air Pressure: 1010 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks:			

7 Transmitter tests according to 47CFR part 90 requirements

7.1 Peak output power and power spectral density tests

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.

Table 7.1.1 Peak output power and spectral density limits

Assigned frequency range, MHz	Channel bandwidth, MHz	Maximum peak output power		Power spectral density, dBm/MHz
		mW	dBm	
4940.0 – 4990.0	5	500	27.0	21
	10	1000	30.0	
	20	2000	33.0	

*- 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.

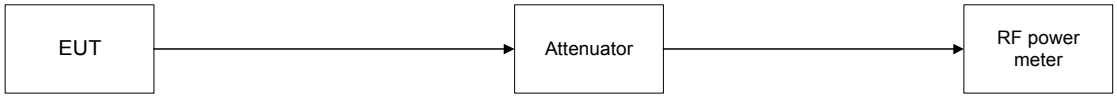
7.1.2 Test procedure

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 power meter as provided in Table 7.1.2, Table 7.1.4, and associated plots. The power spectral density was measured with power meter as provided in Table 7.1.3, Table 7.1.5and 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:	3/27/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

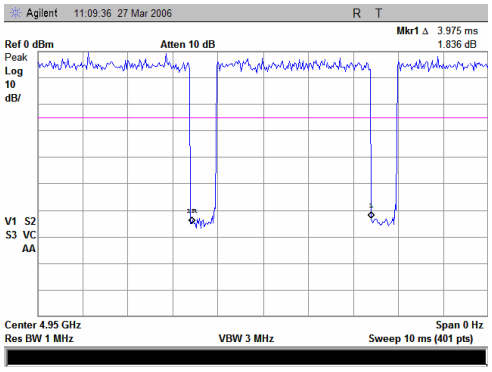
Table 7.1.2 Peak output power test results for 5 MHz channel bandwidth

OPERATING FREQUENCY RANGE:	4950 – 4980 MHz
DETECTOR USED:	Power meter
RESOLUTION BANDWIDTH:	N.A
VIDEO BANDWIDTH:	N.A
MODULATION:	BPSK, 4QAM (QPSK), 16QAM, 64QAM
MODULATING SIGNAL:	PRBS
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum

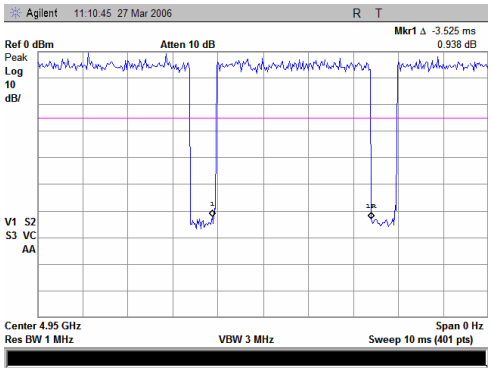
Carrier frequency, MHz	Power meter reading, dBm	External attenuation, dB	Cable loss, dB	RF output power, dBm	Limit, dBm	Margin, dB	Verdict
64QAM, Bit Rate: 18.85Mbps							
4950	20.10	included	included	20.10	27.00	-6.9	Pass
4965	20.40	included	included	20.40	27.00	-6.60	Pass
4980	20.68	included	included	20.68	27.00	-6.32	Pass
16QAM, Bit Rate :12.565Mbps							
4950	20.15	included	included	20.15	27.00	-6.85	Pass
4965	20.45	included	included	20.45	27.00	-6.55	Pass
4980	20.73	included	included	20.73	27.00	-6.27	Pass
4QAM (QPSK), Bit Rate: 4.19 Mbps							
4950	20.05	included	included	20.05	27.00	-6.95	Pass
4965	20.36	included	included	20.36	27.00	-6.64	Pass
4980	20.66	included	included	20.66	27.00	-6.34	Pass
BPSK, Bit Rate: 2.095Mbps							
4950	20.15	included	included	20.15	27.00	-6.95	Pass
4965	20.33	included	included	20.53	27.00	-6.67	Pass
4980	20.77	included	included	20.77	27.00	-6.40	Pass

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:	3/27/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

Plot 7.1.1 Duty cycle measurement for average factor calculation



Plot 7.1.2 Duty cycle measurement for average factor calculation



***AVG FACTOR (dB) = 10 log(duty cycle)=10log(0.88)=0.52 dB included.**

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:	3/27/2006		
Temperature: 21ºC	Air Pressure: 1010 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

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

OPERATING FREQUENCY RANGE: 4950 – 4980 MHz
DETECTOR USED: RMS
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: BPSK, 4QAM, 16QAM, 64QAM
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Carrier frequency, MHz	Spectrum analyzer reading, dBm/Hz	Attenuation and cable loss, dB	Integration factor*, dB	Power density**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
64QAM,Bit Rate: 18.85 Mbps							
4950	-48.3	included	60	11.7	21	-9.3	Pass
4965	-47.7	included	60	12.3	21	-8.7	Pass
4980	-47.8	included	60	12.2	21	-8.4	Pass
16QAM, Bit Rate: 12.565 Mbps							
4950	-48.0	included	60	12.0	21	-9.0	Pass
4965	-48.3	included	60	11.7	21	-9.3	Pass
4980	-48.4	included	60	11.6	21	-9.4	Pass
4QAM ,Bit Rate: 4.19 Mbps							
4950	-48.3	included	60	11.7	21	-9.3	Pass
4965	-48.6	included	60	11.4	21	-9.6	Pass
4980	-48.4	included	60	11.6	21	-9.4	Pass
BPSK, Bit Rate: 2.095 Mbps							
4950	-47.6	included	60	12.4	21	-8.6	Pass
4965	-47.7	included	60	12.3	21	-8.7	Pass
4980	-47.7	included	60	12.3	21	-8.7	Pass

* - Integration factor = 10*log(MHz/Hz) = 10*log(1000000) = 60 dB
** - Power density = Spectrum analyzer reading + integration factor
Note: Additional alternative measurement settings used for peak power spectral density at low and high carrier frequencies at minimum and maximum data rates

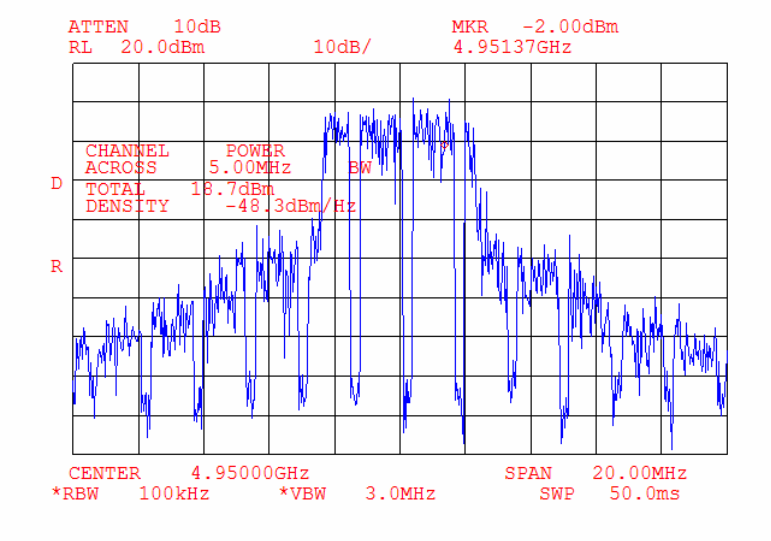
Reference numbers of test equipment used

HL 2399	HL 2780						

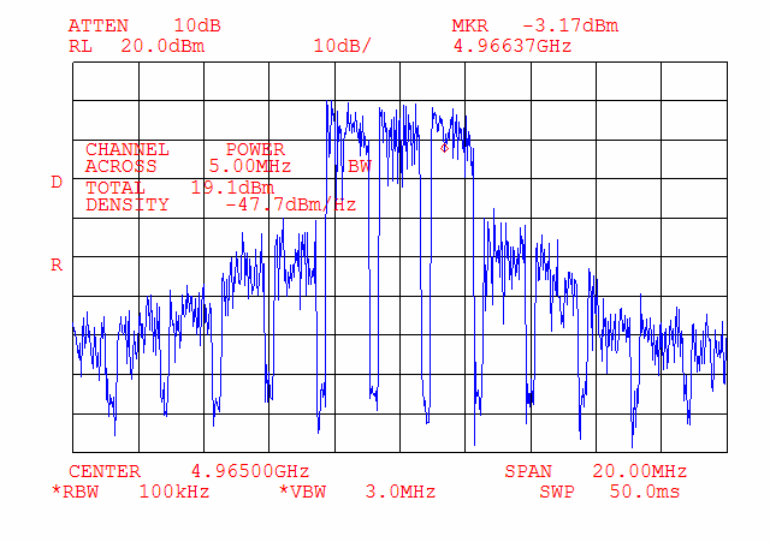
Full description is given in Appendix A.

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:	3/27/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

Plot 7.1.3 Peak output power test results at low frequency, 64QAM, Bit Rate: 18.85 Mbps

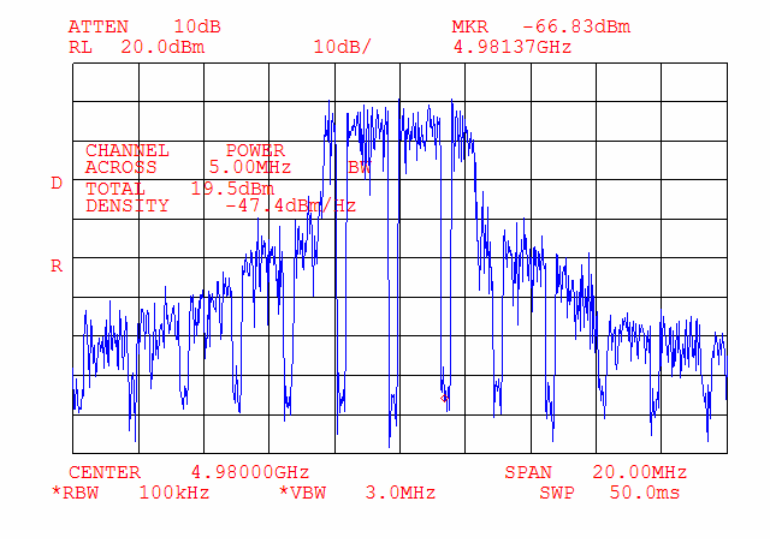


Plot 7.1.4 Peak output power test results at mid frequency, 64QAM, Bit Rate: 18.85 Mbps

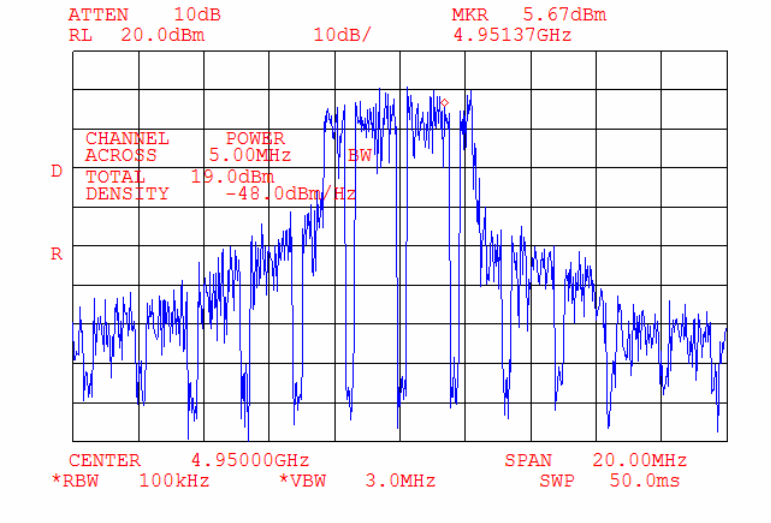


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

Plot 7.1.5 Peak output power test results at high frequency, 64QAM Bit Rate: 18.85 Mbps

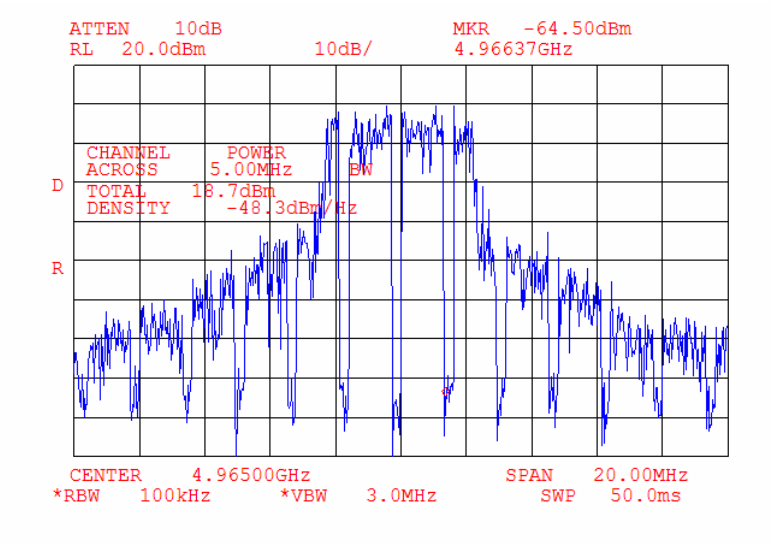


Plot 7.1.6 Peak output power test results at low frequency, 16QAM Bit Rate:12.565 Mbps

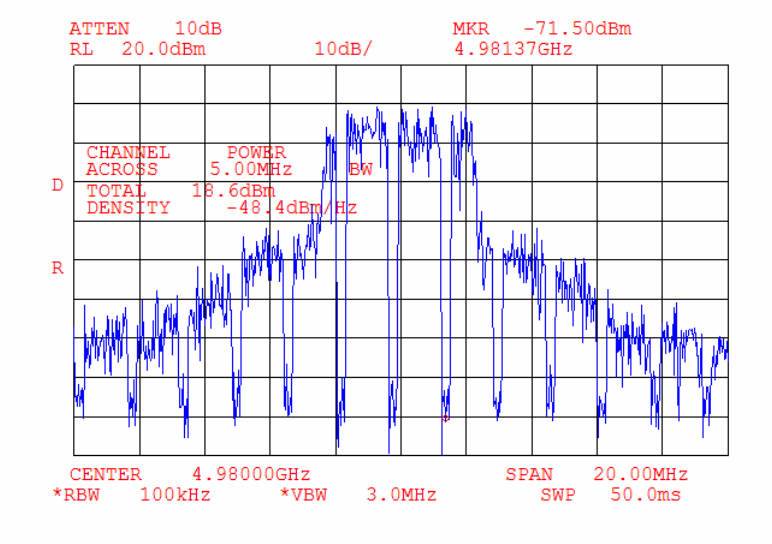


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

Plot 7.1.7 Peak output power test results at mid frequency, 16QAM Bit Rate: 12.565 Mbps

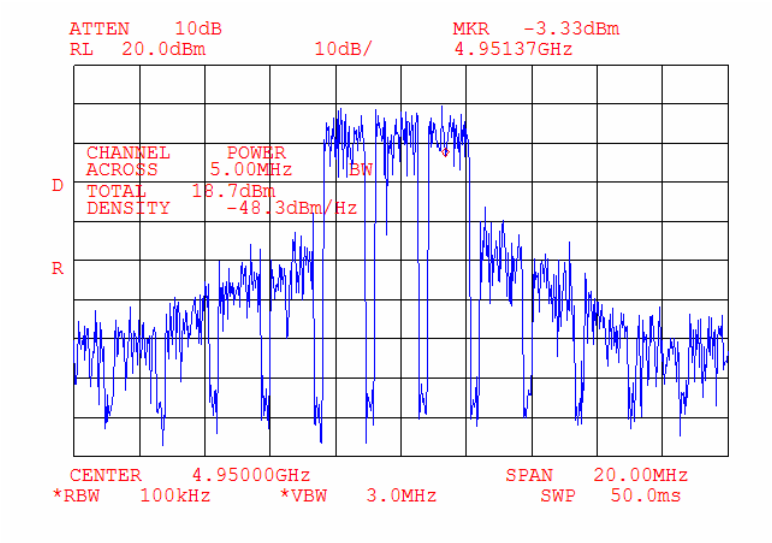


Plot 7.1.8 Peak output power test results at high frequency, 16QAM Bit Rate: 12.565 Mbps

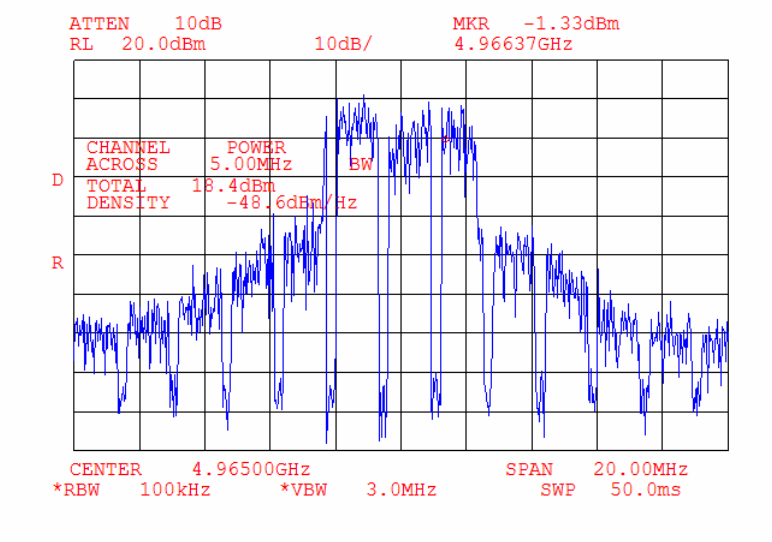


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

Plot 7.1.9 Peak output power test results at low frequency, QPSK Bit Rate: 4.19 Mbps

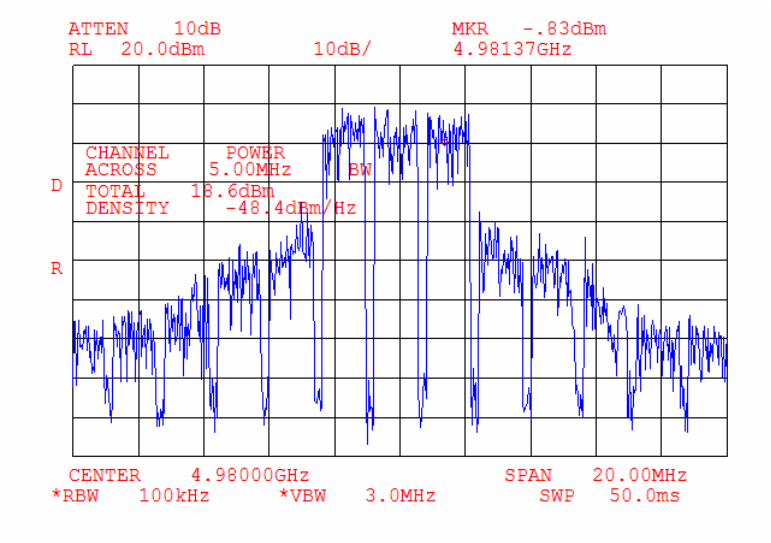


Plot 7.1.10 Peak output power test results at mid frequency, QPSK Bit Rate: 4.19 Mbps

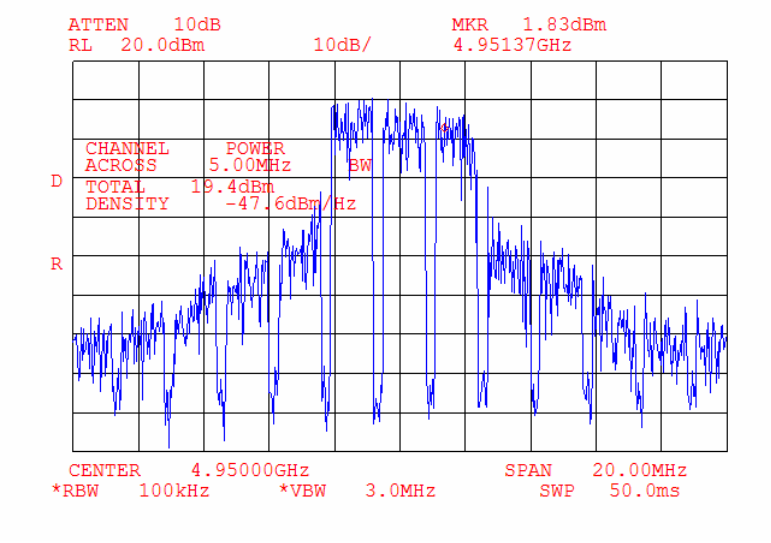


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

Plot 7.1.11 Peak output power test results at high frequency, QPSK Bit Rate: 4.19 Mbps

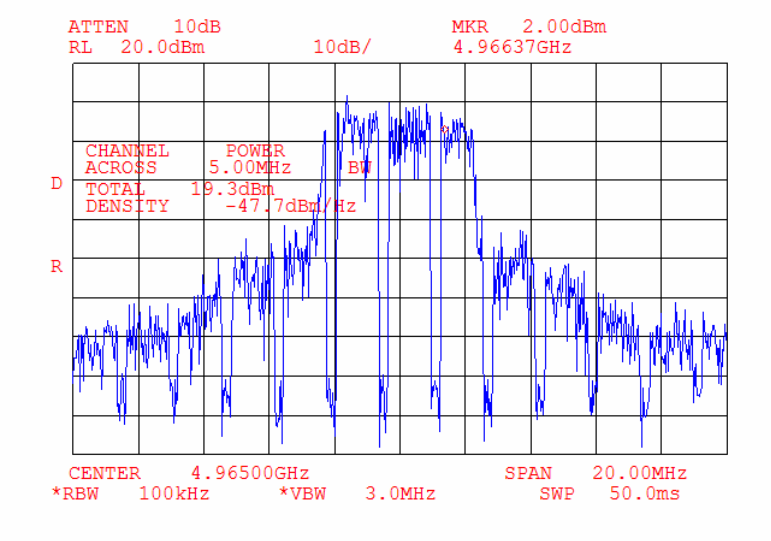


Plot 7.1.12 Peak output power test results at low frequency, BPSK, Bit Rate: 2.095 Mbps

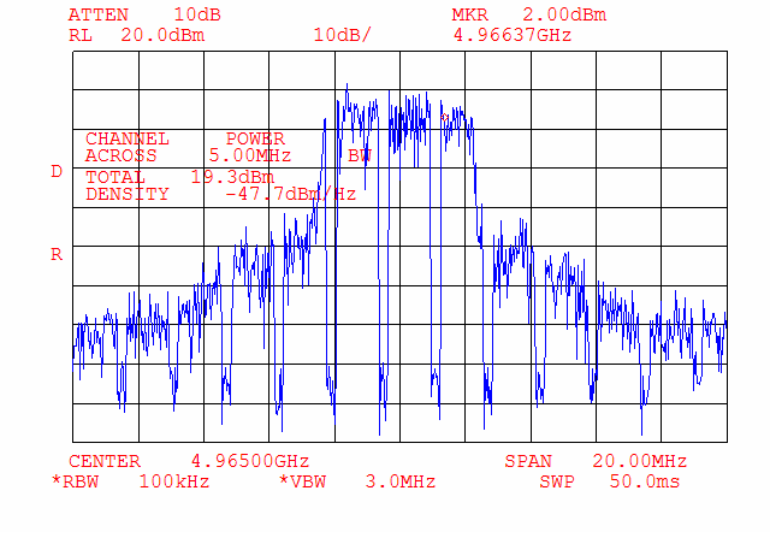


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

Plot 7.1.13 Peak output power test results at mid frequency, BPSK Bit Rate: 2.095 Mbps



Plot 7.1.14 Peak output power test results at high frequency, BPSK Bit Rate: 2.095 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:	3/27/2006		
Temperature: 21ºC	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Table 7.1.4 Peak output power test results for 10 MHz channel bandwidth

OPERATING FREQUENCY RANGE:	4950 – 4980 MHz
DETECTOR USED:	Power meter
RESOLUTION BANDWIDTH:	N.A
VIDEO BANDWIDTH:	N.A
MODULATION:	BPSK, 4QAM, 16QAM, 64QAM
MODULATING SIGNAL:	PRBS
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum

Carrier frequency, MHz	Power meter reading, dBm	External attenuation +AVG factor, dB	Cable loss, dB	RF output power, dBm	Limit, dBm	Margin, dB	Verdict
64QAM, Bit Rate: 37.7Mbps							
4950	20.20	included	included	20.20	30.00	-9.80	Pass
4965	20.46	included	included	20.46	30.00	-9.54	Pass
4980	20.73	included	included	20.73	30.00	-9.27	Pass
16QAM, Bit Rate: 25.13Mbps							
4950	20.20	included	included	20.20	30.00	-9.80	Pass
4965	20.45	included	included	20.45	30.00	-9.55	Pass
4980	20.71	included	included	20.71	30.00	-9.29	Pass
4QAM (QPSK), Bit Rate: 8.38 Mbps							
4950	20.00	included	included	20.00	30.00	-10.00	Pass
4965	20.36	included	included	20.36	30.00	-9.64	Pass
4980	20.65	included	included	20.65	30.00	-9.35	Pass
BPSK, Bit Rate:4.19 Mbps							
4950	20.05	included	included	20.05	30.00	-9.95	Pass
4965	20.35	included	included	20.35	30.00	-9.65	Pass
4980	20.58	included	included	20.58	30.00	-9.42	Pass

***AVG FACTOR (dB) = 10 log(duty cycle)=10log(0.88)=0.52 dB included.**

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:	3/27/2006		
Temperature: 21ºC	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Table 7.1.5 Power spectral density test results for 10 MHz channel bandwidth

OPERATING FREQUENCY RANGE: 4950 – 4980 MHz
DETECTOR USED: RMS
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: BPSK, 4QAM, 16QAM, 64QAM
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Carrier frequency, MHz	Spectrum analyzer reading, dBm/Hz	Attenuation and cable loss, dB	Integration factor*, dB	Power density**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
64QAM,Bit Rate: 37.7 Mbps							
4950	-52.5	included	60	7.5	21	-13.5	Pass
4965	-51.8	included	60	8.2	21	-12.8	Pass
4980	-51.4	included	60	8.6	21	-12.4	Pass
16QAM, Bit Rate: 25.13 Mbps							
4950	-52.6	included	60	7.4	21	-13.6	Pass
4965	-51.1	included	60	8.9	21	-12.1	Pass
4980	-51.1	included	60	8.9	21	-12.1	Pass
4QAM ,Bit Rate: 8.38 Mbps							
4950	-52.0	included	60	8	21	-13.0	Pass
4965	-50.9	included	60	9.1	21	-11.9	Pass
4980	-50.9	included	60	9.1	21	-11.9	Pass
BPSK, Bit Rate: 4.19 Mbps							
4950	-51.7	included	60	8.3	21	-12.7	Pass
4965	-51.8	included	60	8.2	21	-12.8	Pass
4980	-51.1	included	60	8.9	21	-12.1	Pass

* - Integration factor = 10*log(MHz/Hz) = 10*log(1000000) = 60 dB
** - Power density = Spectrum analyzer reading + Integration factor
Note: Additional alternative measurement settings used for peak power spectral density at low and high carrier frequencies at minimum and maximum data rates

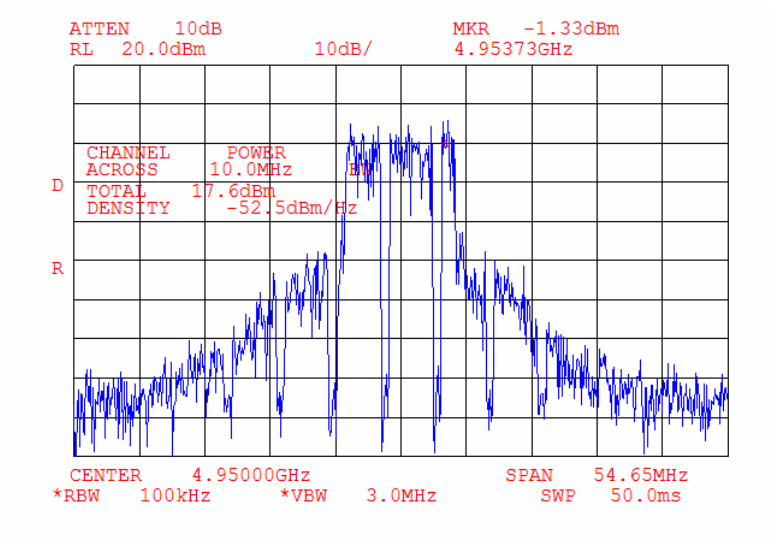
Reference numbers of test equipment used

HL 2399	HL 2780						

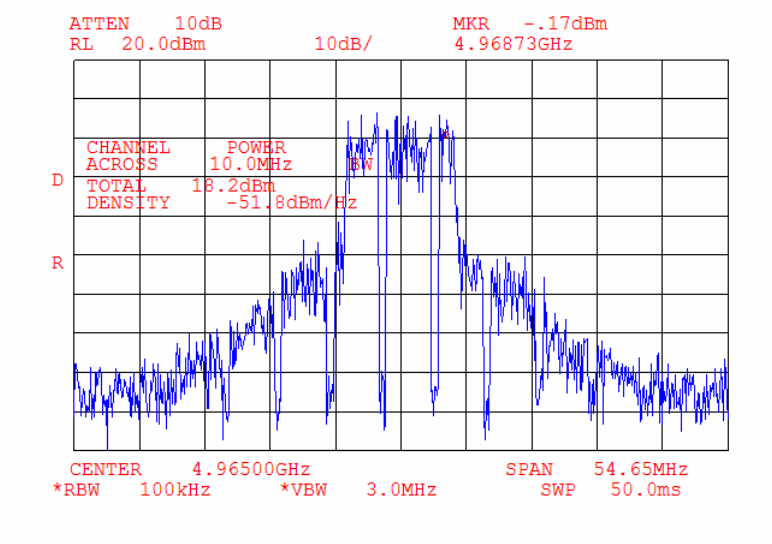
Full description is given in Appendix A.

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:	3/27/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.1.15 Peak output power test results at low frequency, 64QAM, Bit Rate: 37.7 Mbps

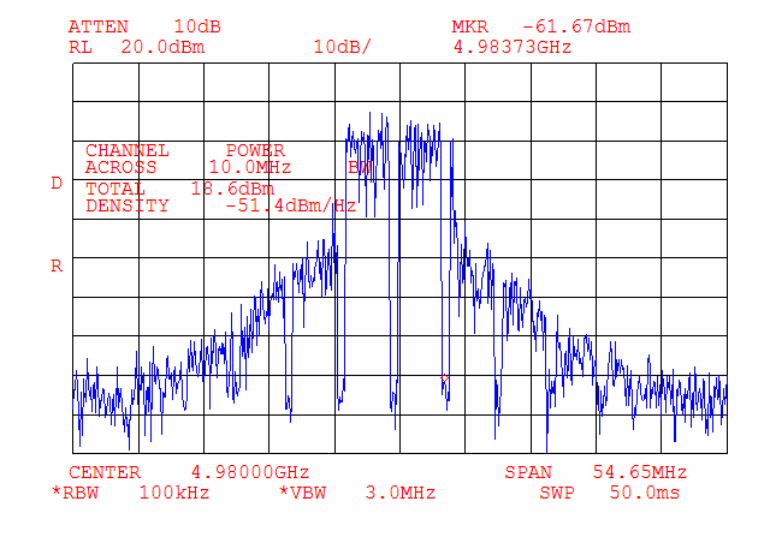


Plot 7.1.16 Peak output power test results at mid frequency, 64QAM, Bit Rate: 37.7 Mbps

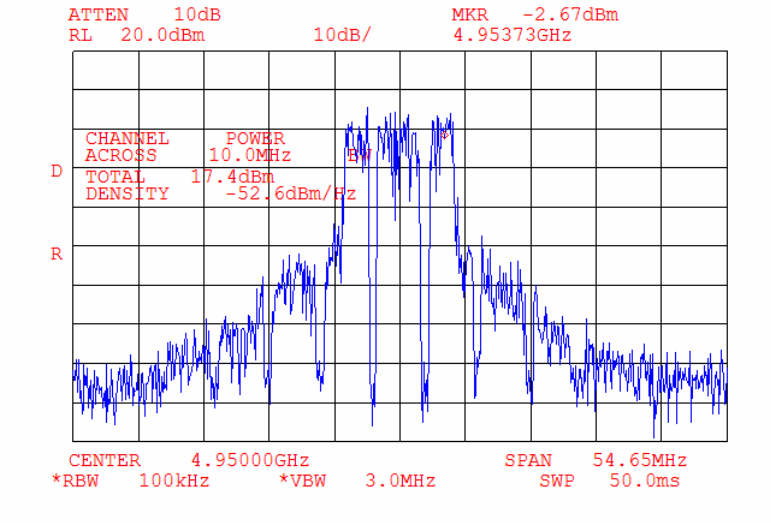


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.1.17 Peak output power test results at high frequency, 64QAM Bit Rate: 37.7 Mbps

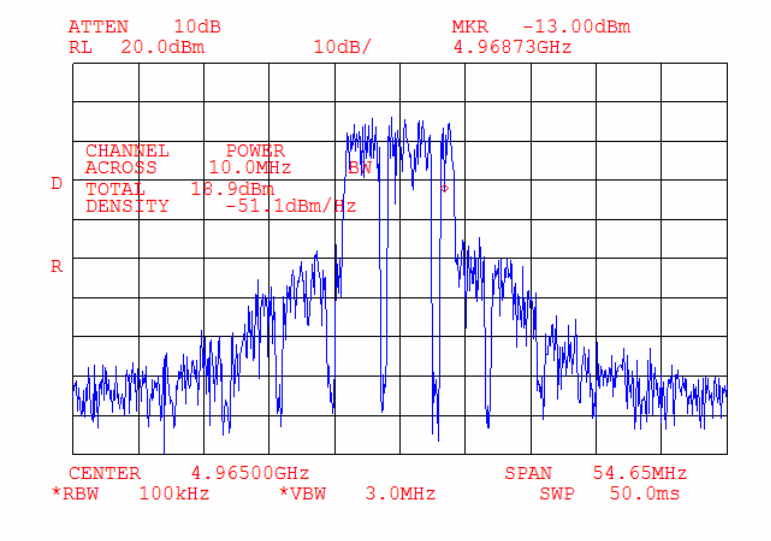


Plot 7.1.18 Peak output power test results at low frequency, 16QAM Bit Rate: 25.13 Mbps

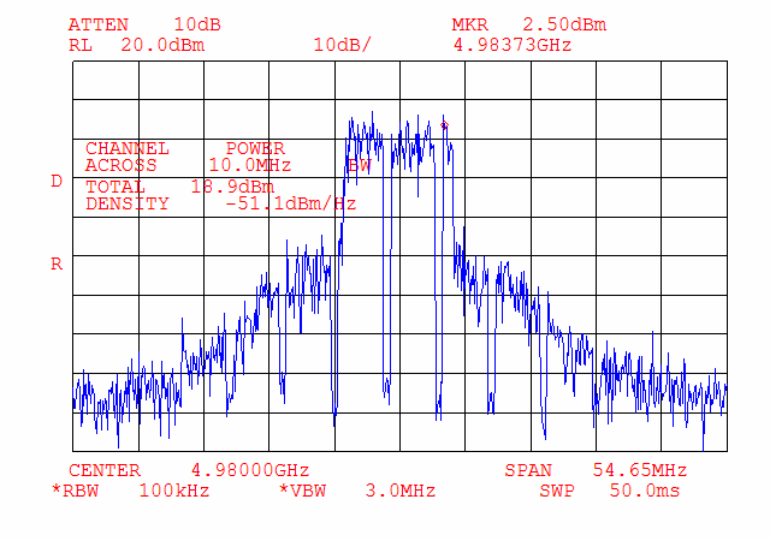


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.1.19 Peak output power test results at mid frequency, 16QAM Bit Rate: 25.13 Mbps

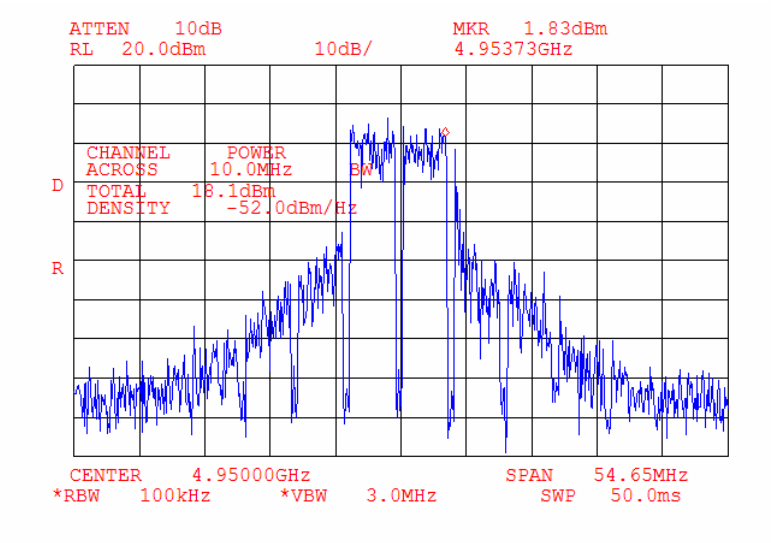


Plot 7.1.20 Peak output power test results at high frequency, 16QAM Bit Rate: 25.13 Mbps

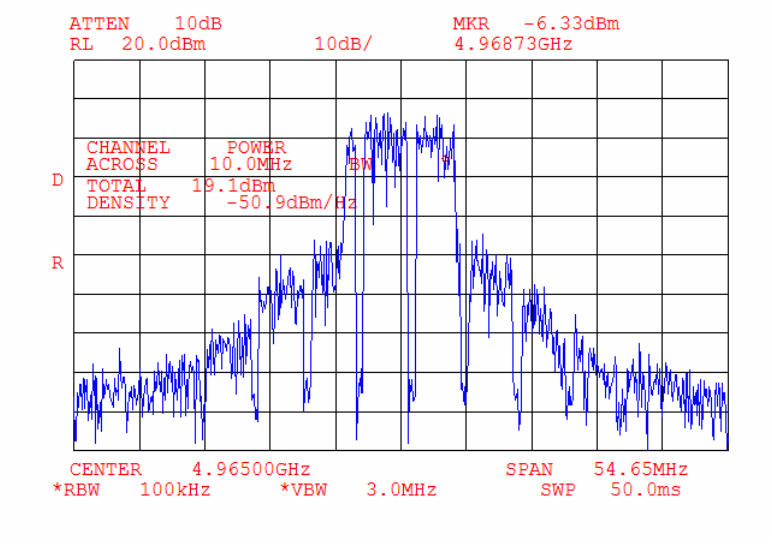


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.1.21 Peak output power test results at low frequency, QPSK Bit Rate: 8.38 Mbps

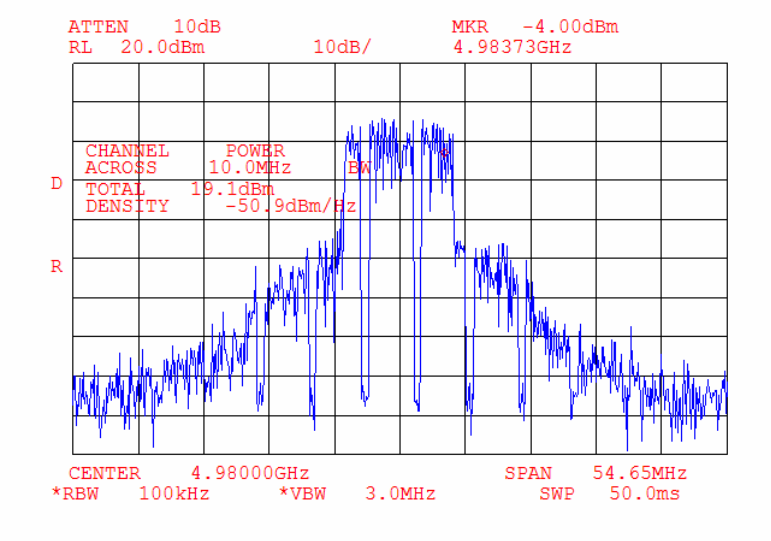


Plot 7.1.22 Peak output power test results at mid frequency, QPSK Bit Rate: 8.38 Mbps

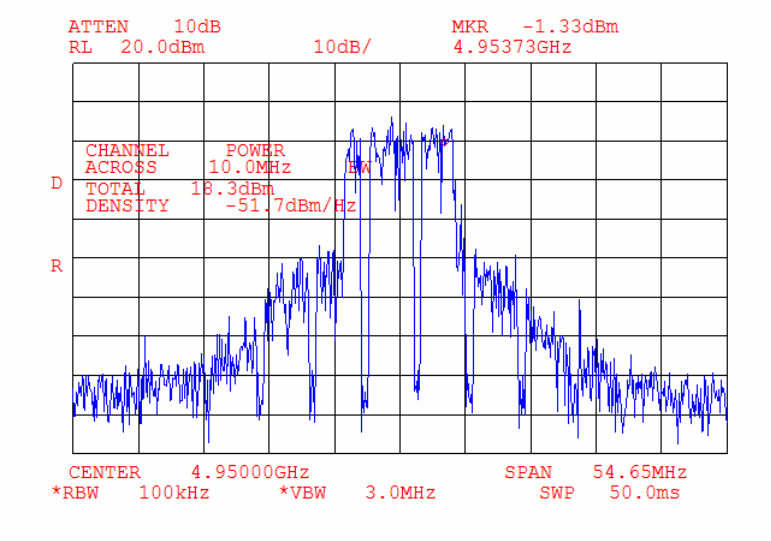


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.1.23 Peak output power test results at high frequency, QPSK Bit Rate: 8.38 Mbps

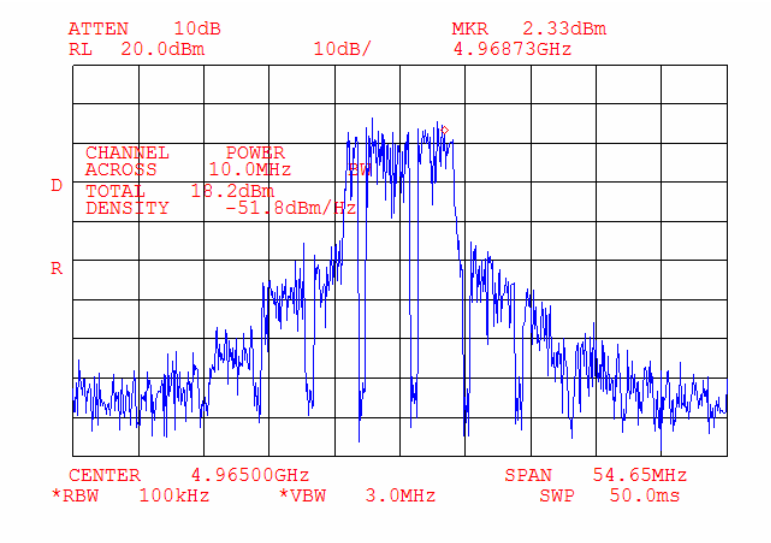


Plot 7.1.24 Peak output power test results at low frequency, BPSK, Bit Rate: 4.19 Mbps

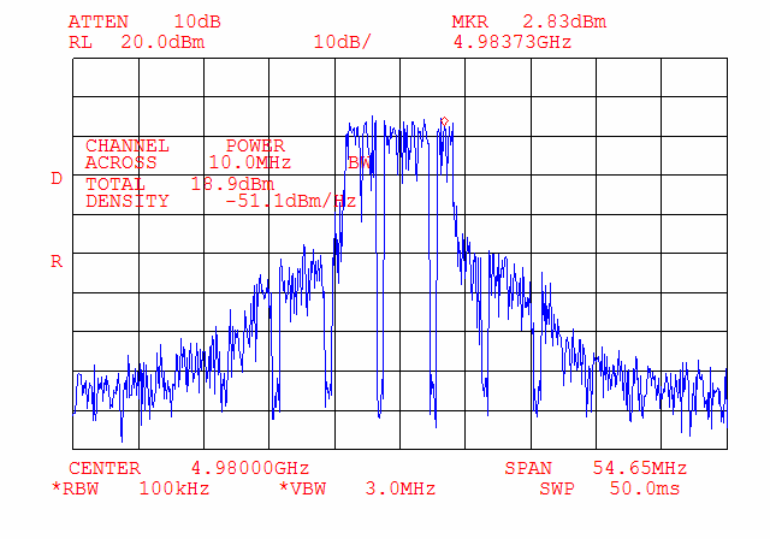


Test specification:	Section 90.1215, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.1.25 Peak output power test results at mid frequency, BPSK Bit Rate: 4.19 Mbps



Plot 7.1.26 Peak output power test results at high frequency, BPSK Bit Rate: 4.19 Mbps



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21ºC	Air Pressure: 1010 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks:			

7.2 Occupied bandwidth test

7.2.1 General

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

Table 7.2.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Channel bandwidth, MHz	Maximum allowed bandwidth, MHz
4940 – 4990	26	5	5
		10	10
		20	20

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

7.2.2 Test procedure

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

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

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

Figure 7.2.1 Occupied bandwidth test setup

Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21ºC	Air Pressure: 1010 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

Table 7.2.2 Occupied bandwidth test results for 5 MHz channel bandwidth

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

Carrier frequency, MHz	Occupied bandwidth, MHz	Limit, MHz	Margin, MHz	Verdict
64QAM,Bit Rate 18.85Mbps				
4950	4.6250	5	-0.3750	Pass
4965	4.6375	5	-0.3625	Pass
4980	4.6375	5	-0.3625	Pass
16QAM,Bit Rate 12.565 Mbps				
4950	4.6250	5	-0.375	Pass
4965	4.6375	5	-0.3625	Pass
4980	4.6500	5	-0.3500	Pass
QPSK, Bit Rate 4.19Mbps				
4950	4.6375	5	-0.3625	Pass
4965	4.6250	5	-0.3750	Pass
4980	4.6375	5	-0.3625	Pass
BPSK ,Bit Rate 2.095Mbps				
4950	4.6250	5	-0.3750	Pass
4965	4.6375	5	-0.3625	Pass
4980	4.6375	5	-0.3625	Pass

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

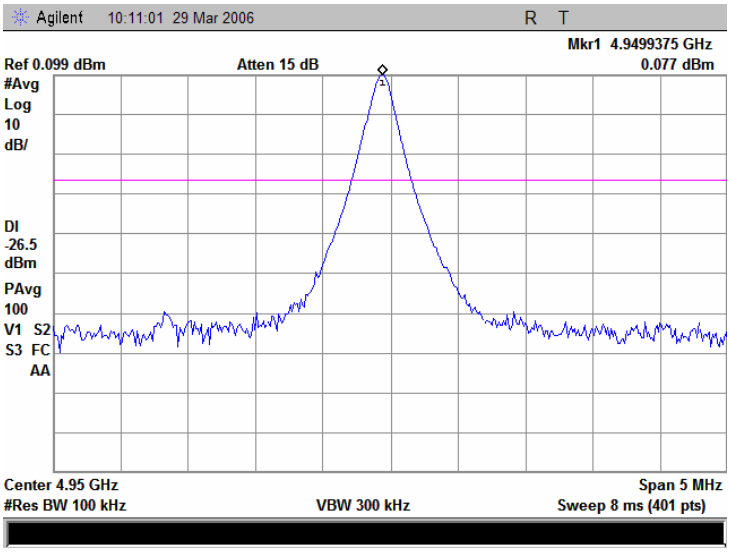
Reference numbers of test equipment used

HL 2399	HL 2780						

Full description is given in Appendix A.

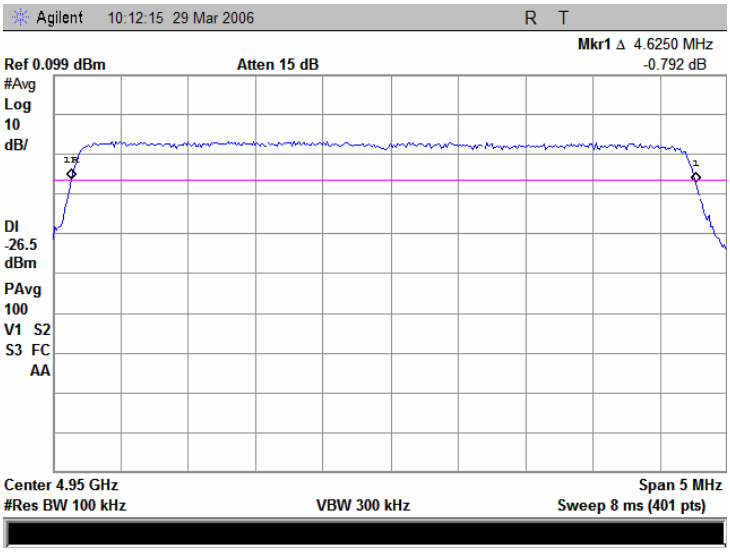
Test specification:	**Section 90.209, Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date:	3/29/2006		
Temperature: 21°C	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42%	**Power Supply:** 120 V AC
Remarks: 5 MHz CBW			

Plot 7.2.1 Unmodulated signal for reference level

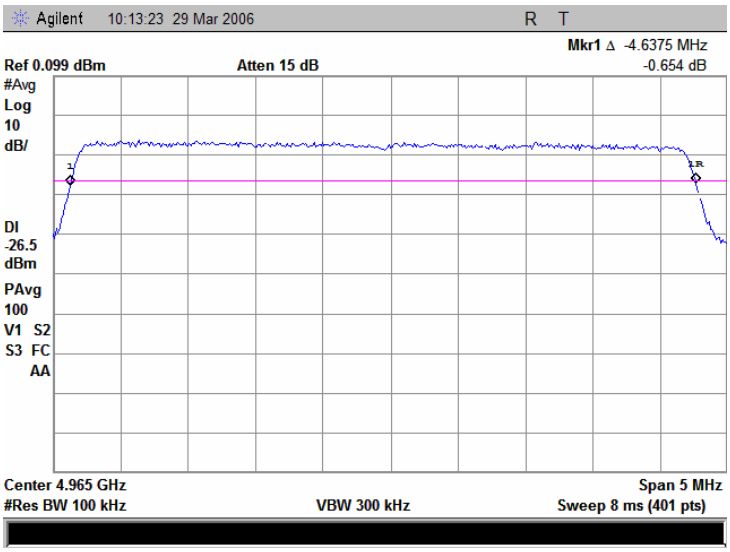


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

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

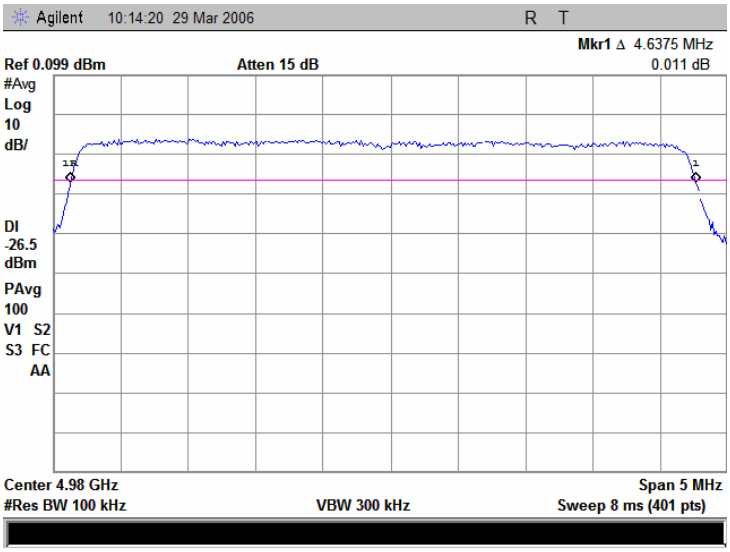


Plot 7.2.3 Occupied bandwidth test result at mid frequency, 64QAM, rate 18.85 Mbps

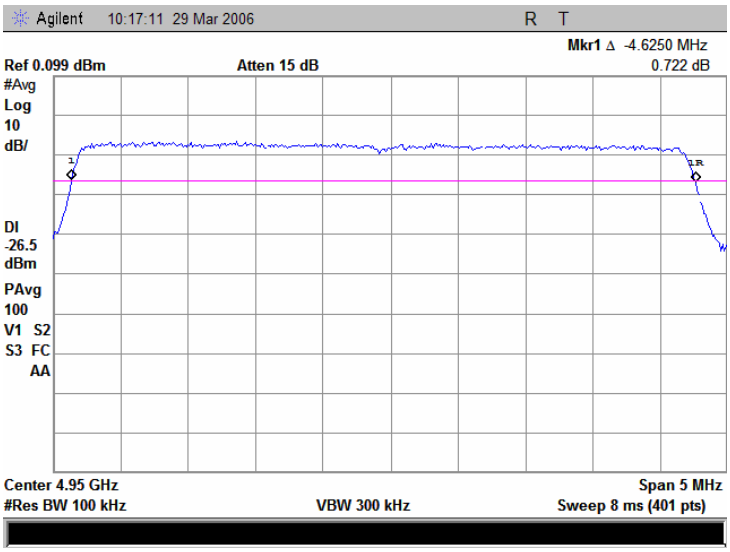


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

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

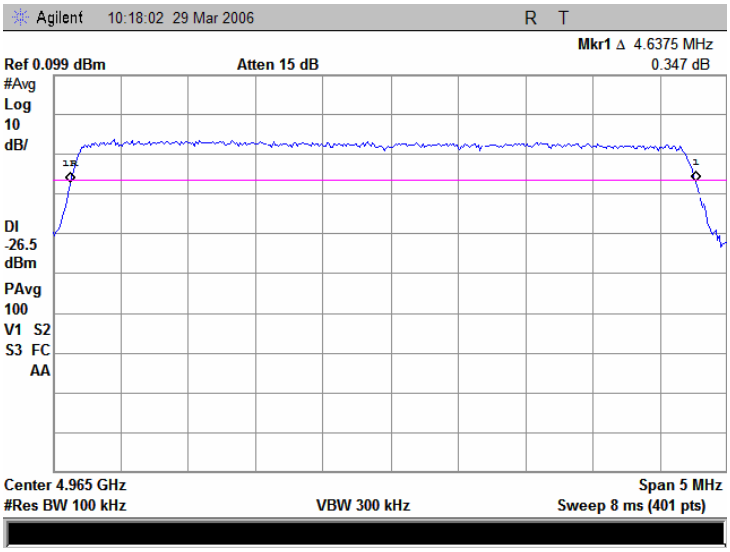


Plot 7.2.5 Occupied bandwidth test result at low frequency, 16QAM, rate 12.565 Mbps

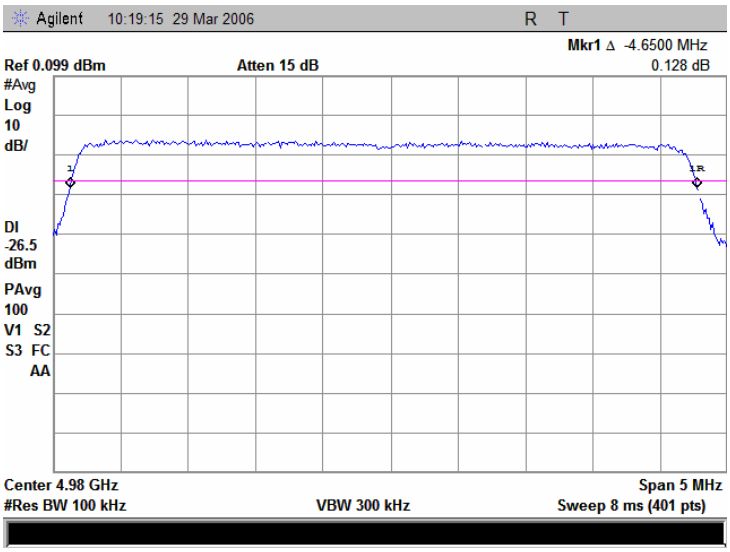


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

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

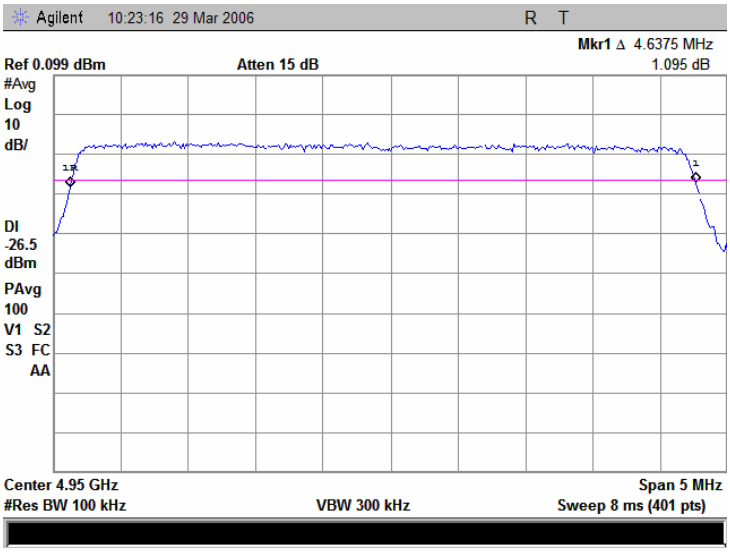


Plot 7.2.7 Occupied bandwidth test result at high frequency, 16QAM, rate 12.565 Mbps

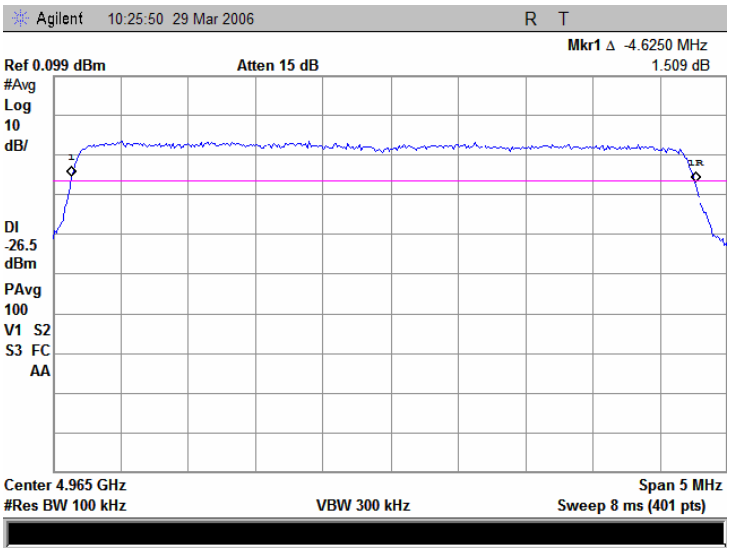


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

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

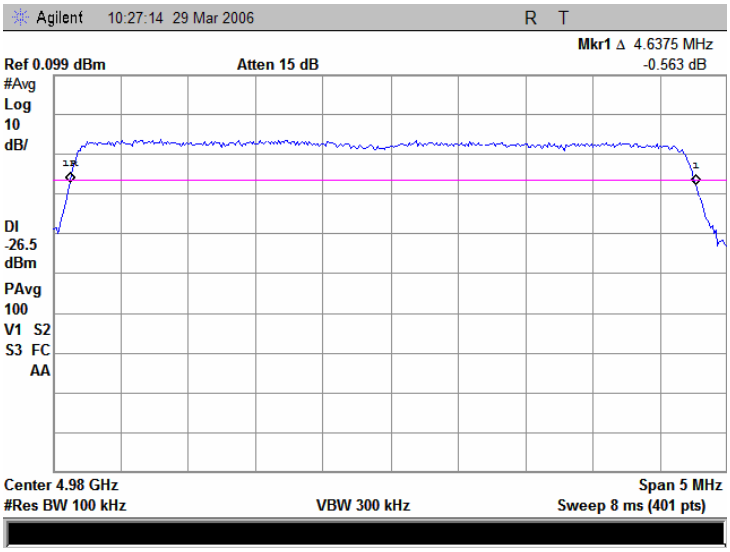


Plot 7.2.9 Occupied bandwidth test result at mid frequency, QPSK, rate 4.19 Mbps

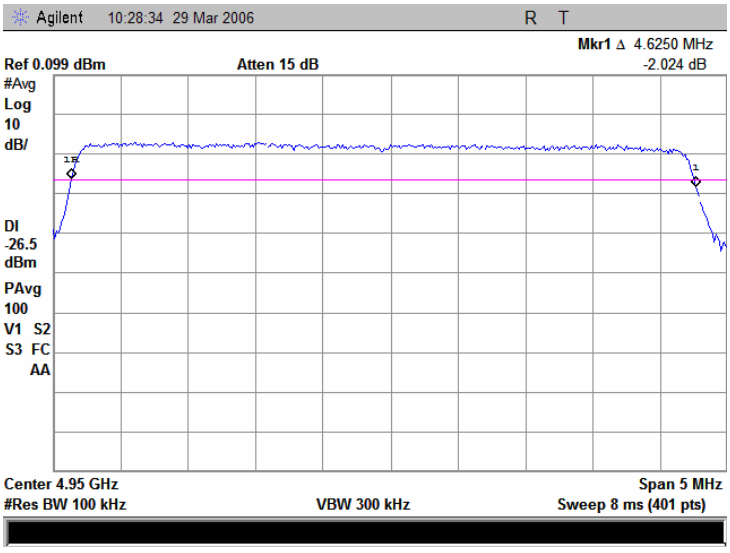


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

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

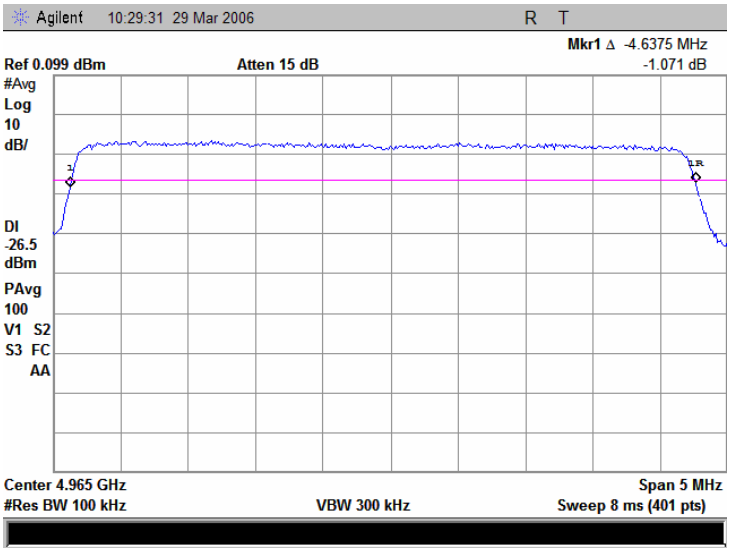


Plot 7.2.11 Occupied bandwidth test result at low frequency, BPSK, rate 2.095 Mbps

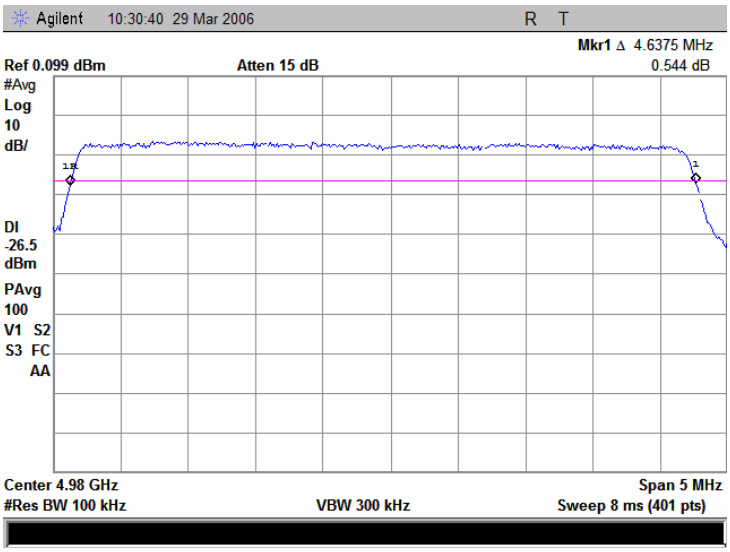


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

Plot 7.2.12 Occupied bandwidth test result at mid frequency, BPSK, rate 2.095 Mbps



Plot 7.2.13 Occupied bandwidth test result at high frequency, BPSK, rate 2.095 Mbps



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21ºC	Air Pressure: 1010 hPa	Relative Humidity: 44%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Table 7.2.3 Occupied bandwidth test results 10 MHz channel bandwidth

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

Carrier frequency, MHz	Occupied bandwidth, MHz	Limit, MHz	Margin, MHz	Verdict
64QAM,Bit Rate 37.7Mbps				
4950	9.1	10	-0.9	Pass
4965	9.1	10	-0.9	Pass
4980	9.1	10	-0.9	Pass
16QAM,Bit Rate 25.13Mbps				
4950	9.1	10	-0.9	Pass
4965	9.1	10	-0.9	Pass
4980	9.1	10	-0.9	Pass
QPSK ,Bit Rate 8.38Mbps				
4950	9.1	10	-0.9	Pass
4965	9.1	10	-0.9	Pass
4980	9.1	10	-0.9	Pass
BPSK, Bit Rate 4.19Mbps				
4950	9.1	10	-0.9	Pass
4965	9.1	10	-0.9	Pass
4980	9.1	10	-0.9	Pass

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

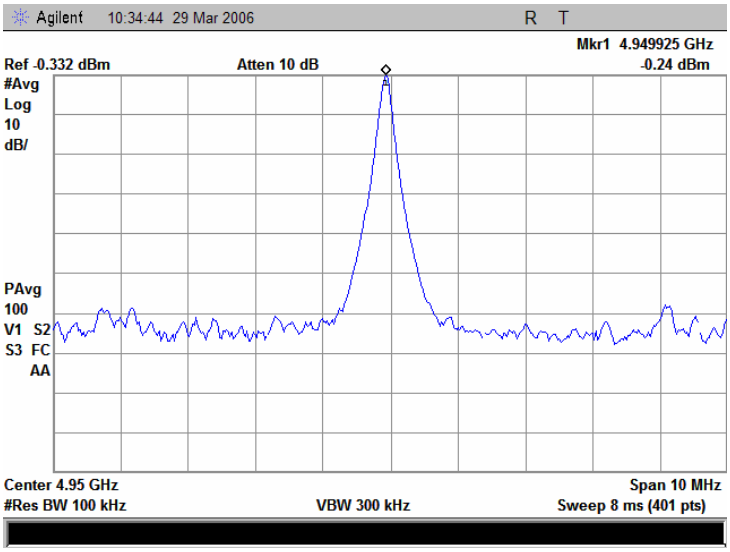
Reference numbers of test equipment used

HL 2399	HL 2780						

Full description is given in Appendix A.

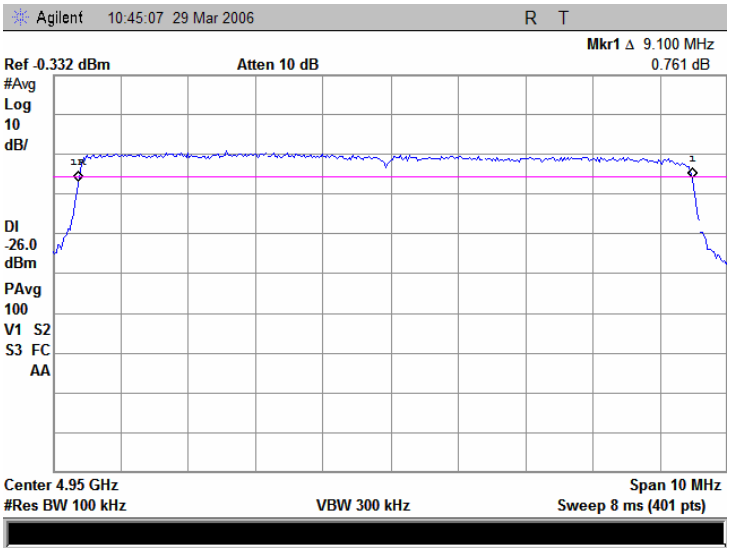
Test specification:	**Section 90.209, Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date:	3/29/2006		
Temperature: 21°C	**Air Pressure:** 1010 hPa	**Relative Humidity:** 44%	**Power Supply:** 120 V AC
Remarks: 10 MHz CBW			

Plot 7.2.14 Unmodulated signal for reference level

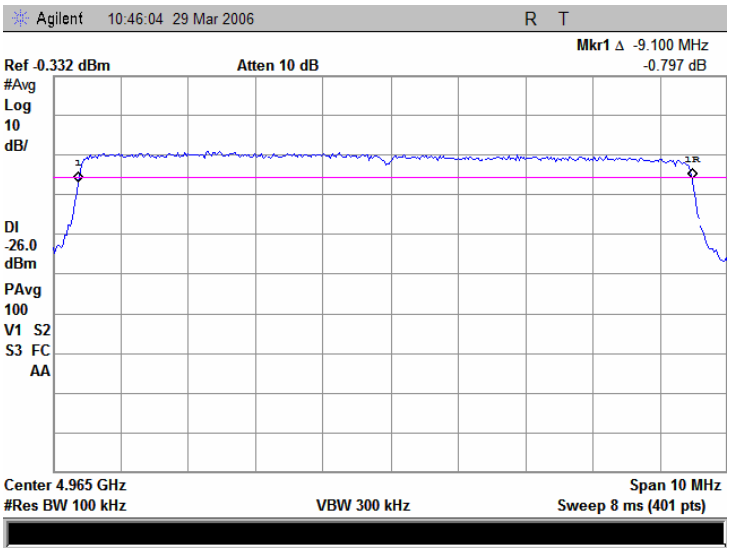


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 44%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.2.15 Occupied bandwidth test result at low frequency, 64QAM, rate 37.7 Mbps

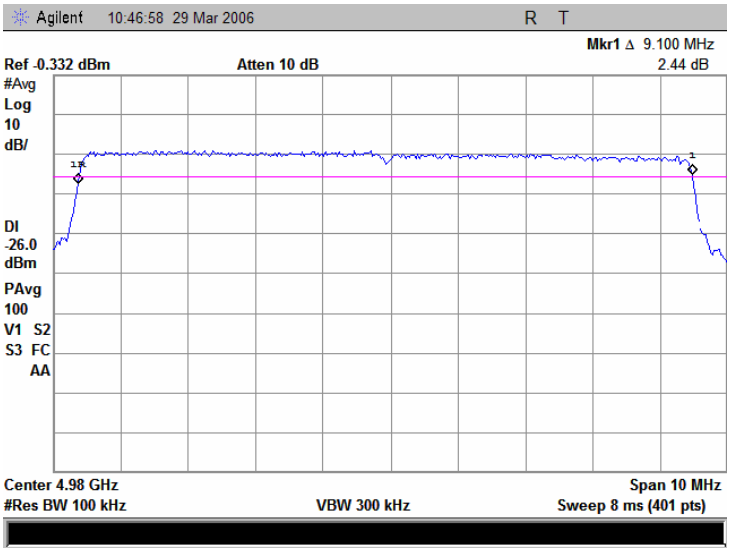


Plot 7.2.16 Occupied bandwidth test result at mid frequency, 64QAM, rate 37.7 Mbps

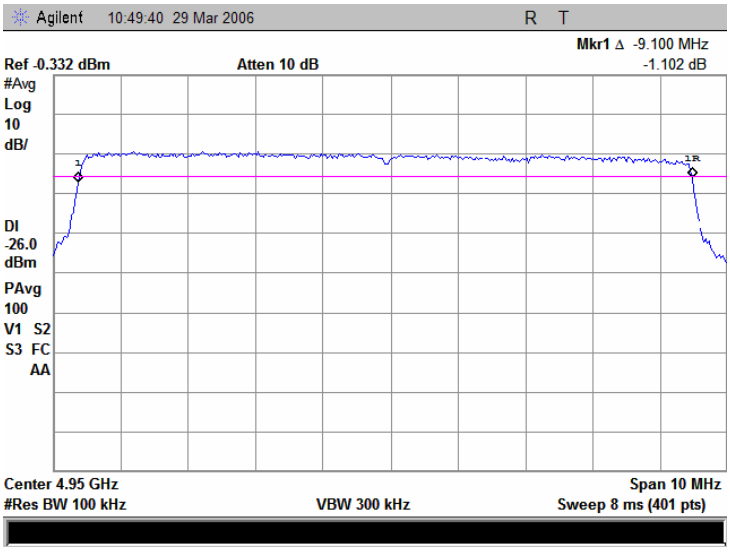


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 44%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.2.17 Occupied bandwidth test result at high frequency, 64QAM, rate 37.7 Mbps

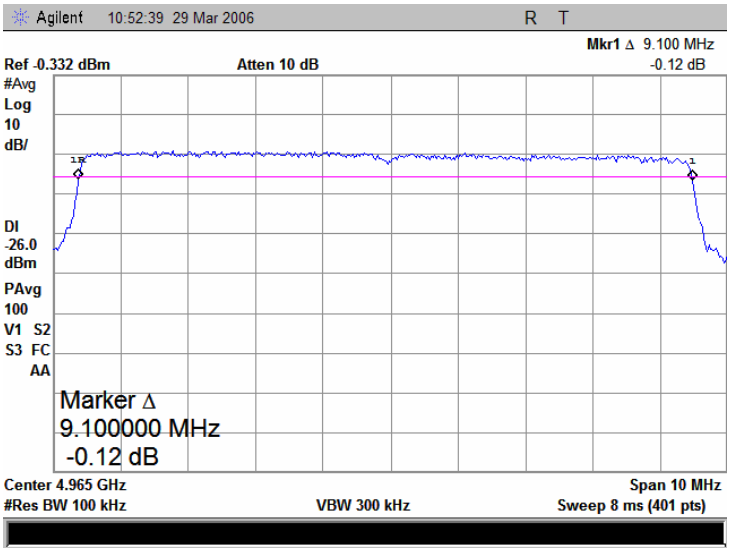


Plot 7.2.18 Occupied bandwidth test result at low frequency, 16QAM, rate 25.13 Mbps

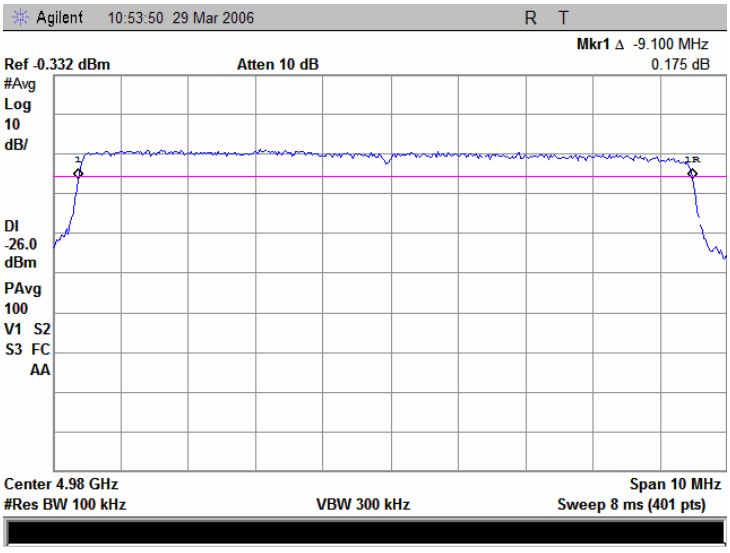


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 44%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.2.19 Occupied bandwidth test result at mid frequency, 16QAM, rate 25.13 Mbps

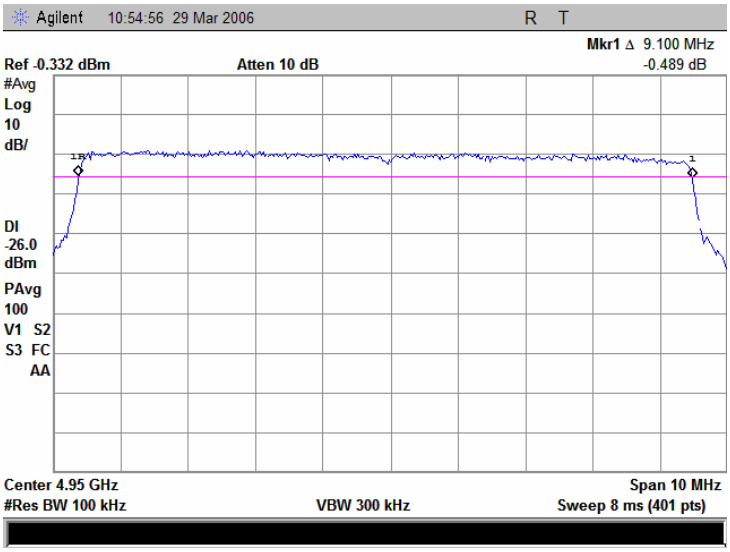


Plot 7.2.20 Occupied bandwidth test result at high frequency, 16QAM, rate 25.13 Mbps

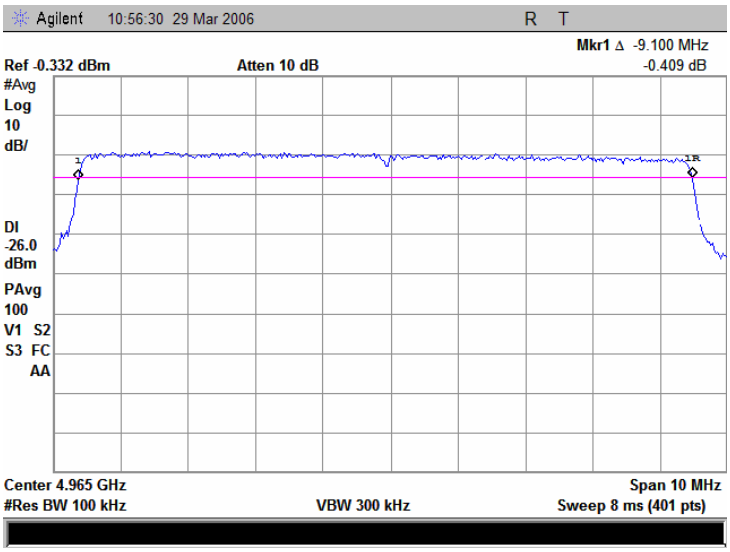


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 44%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.2.21 Occupied bandwidth test result at low frequency, QPSK, rate 8.38 Mbps

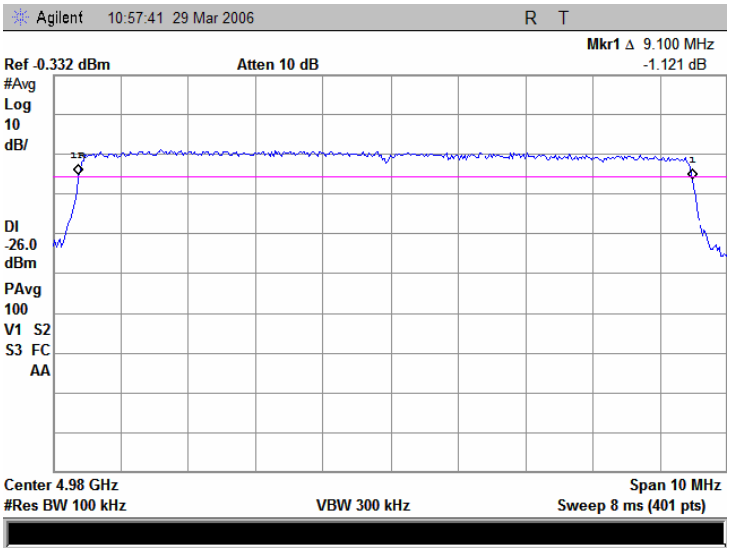


Plot 7.2.22 Occupied bandwidth test result at mid frequency, QPSK, rate 8.38 Mbps

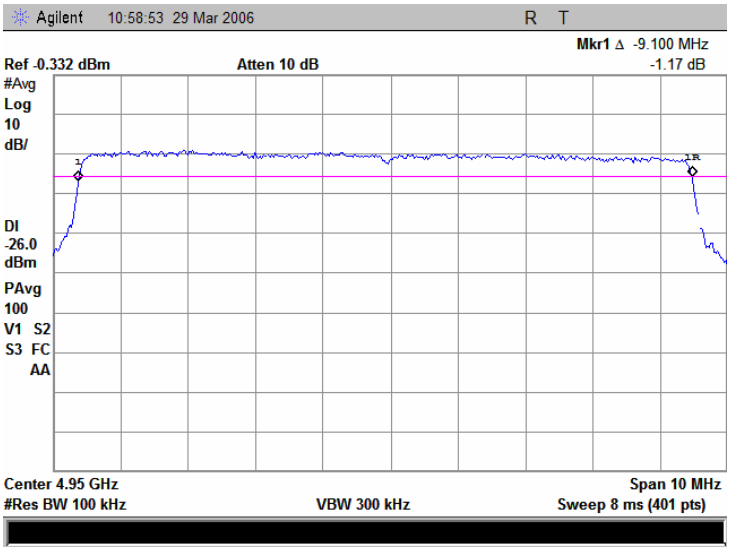


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 44%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.2.23 Occupied bandwidth test result at high frequency, QPSK, rate 8.38 Mbps

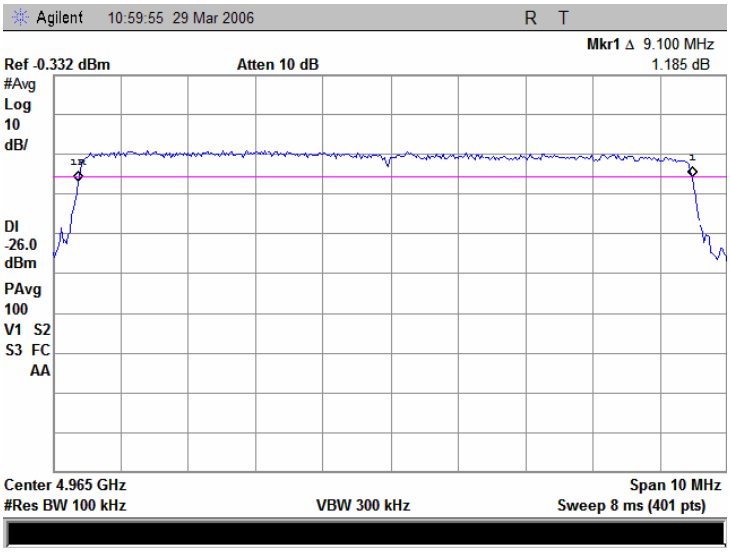


Plot 7.2.24 Occupied bandwidth test result at low frequency, BPSK, rate 4.19 Mbps

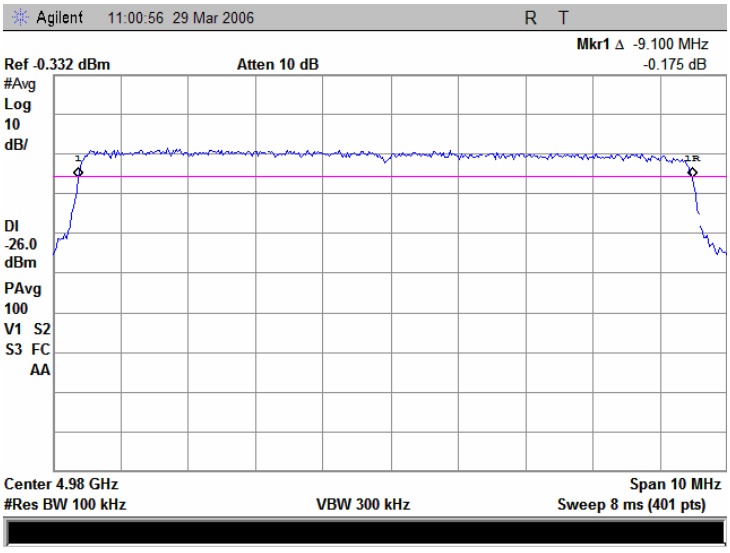


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 44%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.2.25 Occupied bandwidth test result at mid frequency, BPSK, rate 4.19 Mbps



Plot 7.2.26 Occupied bandwidth test result at high frequency, BPSK, rate 4.19 Mbps



Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21ºC	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks:			

7.3 Emission mask test

7.3.1 General

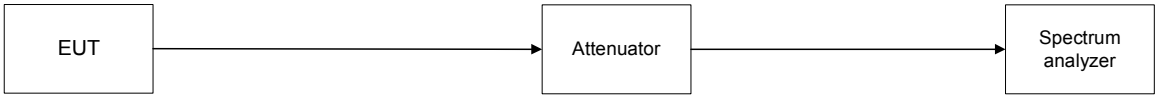
This test was performed to measure emission mask at RF antenna connector. Specification test limits are given in Table 7.3.1, Table 7.3.3.

7.3.2 Test procedure

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

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

Figure 7.3.1 Emission mask test setup



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:	3/27/2006		
Temperature: 21ºC	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

Table 7.3.1 Emission mask limits for 5 MHz channel bandwidth

Frequency displacement from carrier	Attenuation below carrier, dBc
Emission mask L (Channel bandwidth 5 MHz)	
0 – 2.25 MHz	0
2.25 – 2.5 MHz	219log(F*/2.25)
2.5 – 2.75 MHz	10+242log(F*/2.5)
2.75 – 5.0 MHz	20+31log(F*/2.75)
5.0 – 7.5 MHz	28+68log(F*/5.0)
More than** 7.5 MHz	50
Emission mask M (Channel bandwidth 5 MHz)	
0 – 2.25 MHz	0
2.25 – 2.5 MHz	568log(F*/2.25)
2.5 – 2.75 MHz	26+145log(F*/2.5)
2.75 – 5.0 MHz	32+31log(F*/2.75)
5.0 – 7.5 MHz	40+57log(F*/5.0)
More than** 7.5 MHz	50 or 55+10logP(W) (whichever is the lesser attenuation)

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

Table 7.3.2 Emission mask test results for 5 MHz channel bandwidth

Carrier frequency, MHz	Limit	Verdict
4950	Emission mask L and M	Pass
4965		
4980		

Note: Highest Power measured in Output power test was 20.77 dBm, therefore 55+10log(0.119 W) = 45.76 dBc is the lesser attenuation than 50 dBc for emission mask M.
According to FCC Part 90.210(L)(7) and (M)(7), RBW ≥ 1% of OBW and VBW = 30 kHz. 1% of 5 MHz is 50 kHz, hence RBW of 100 kHz was chosen.
The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth

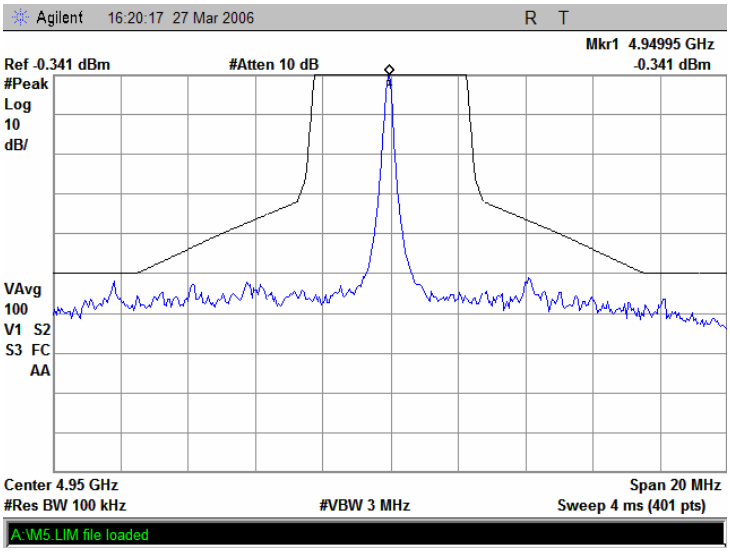
Reference numbers of test equipment used

HL 1650	HL 2399	HL 2780					

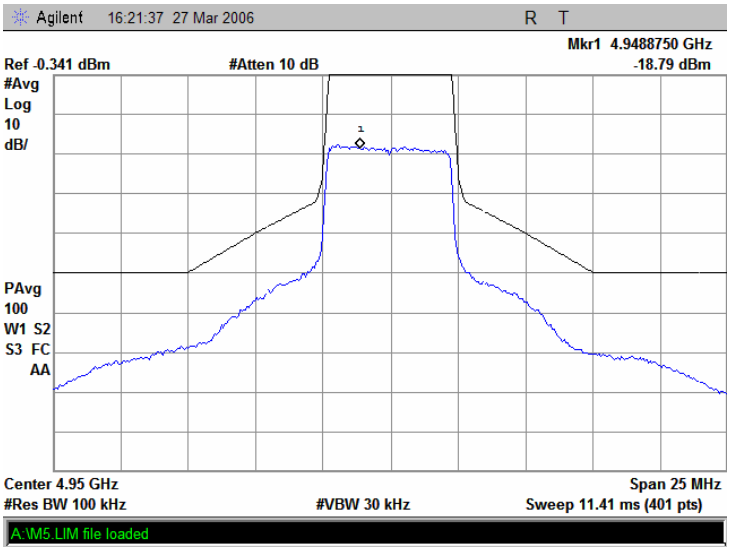
Full description is given in Appendix A.

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:	3/27/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

Plot 7.3.1 Emission mask for 5 MHz channel bandwidth

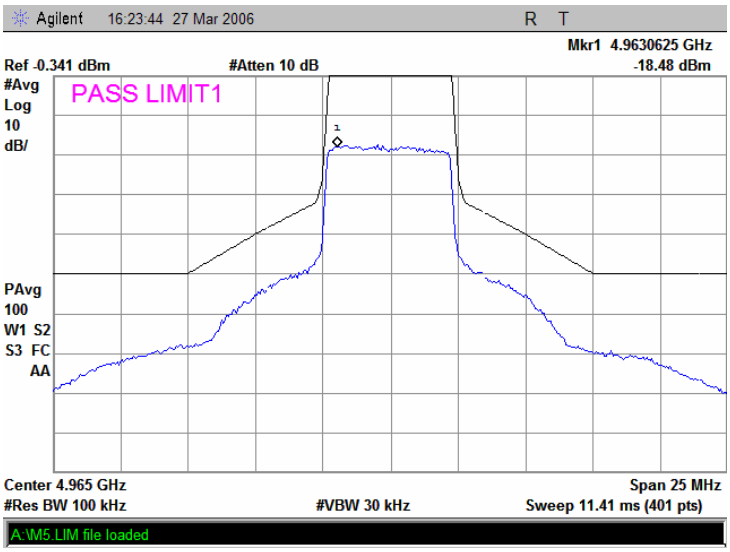


Plot 7.3.2 Emission mask test results at low carrier frequency, 64QAM rate 18.85 Mbps

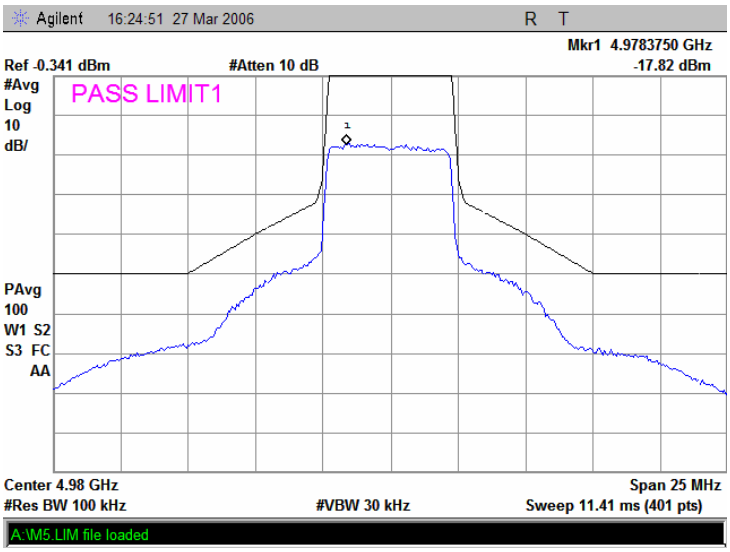


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

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

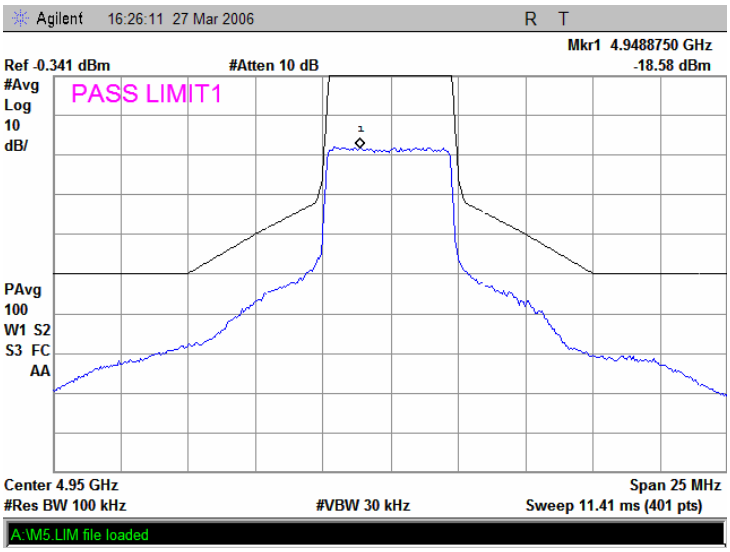


Plot 7.3.4 Emission mask test results at high carrier frequency, 64QAM rate 18.85 Mbps

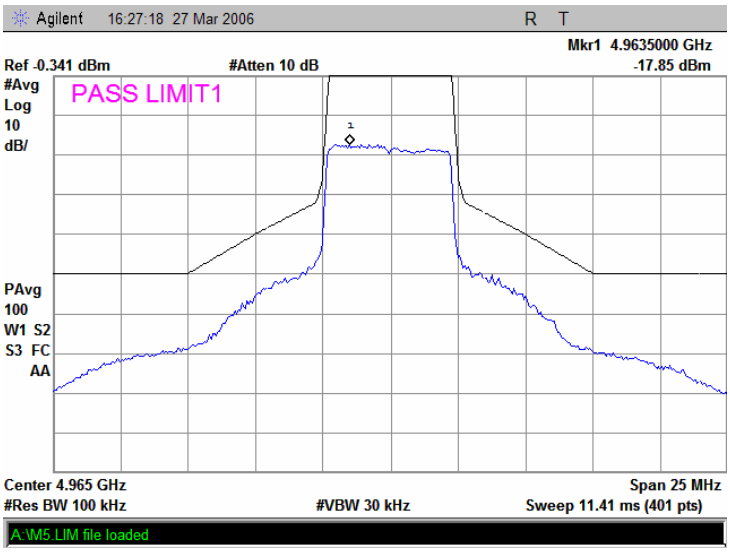


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

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

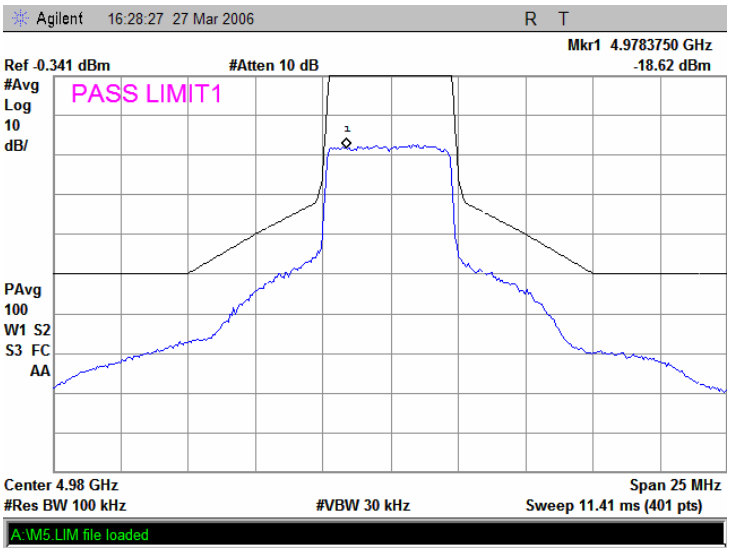


Plot 7.3.6 Emission mask test results at mid carrier frequency,16QAM rate 12.565 Mbps

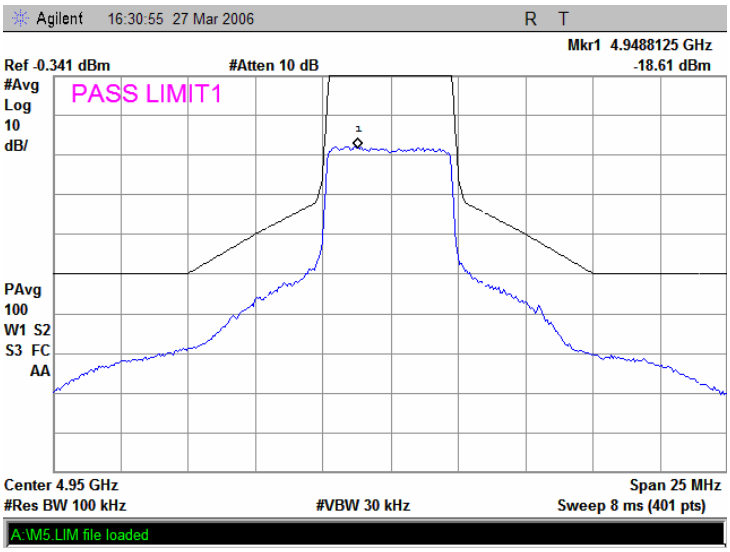


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

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

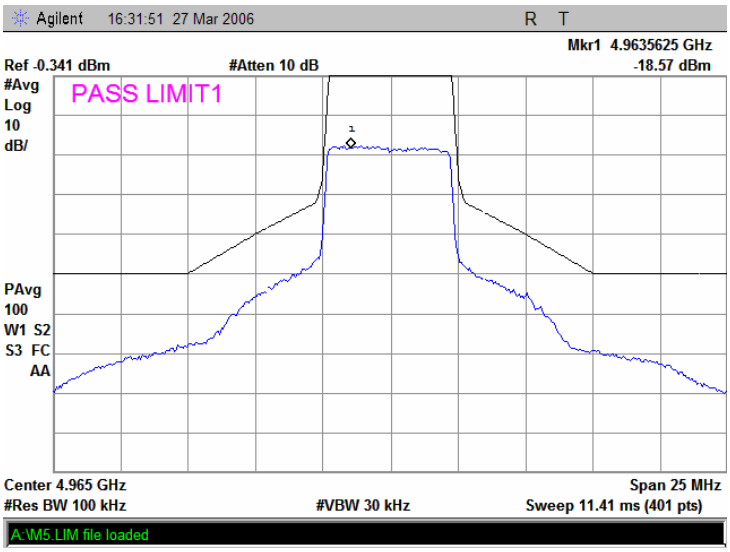


Plot 7.3.8 Emission mask test results at low carrier frequency, QPSK rate 4.19 Mbps

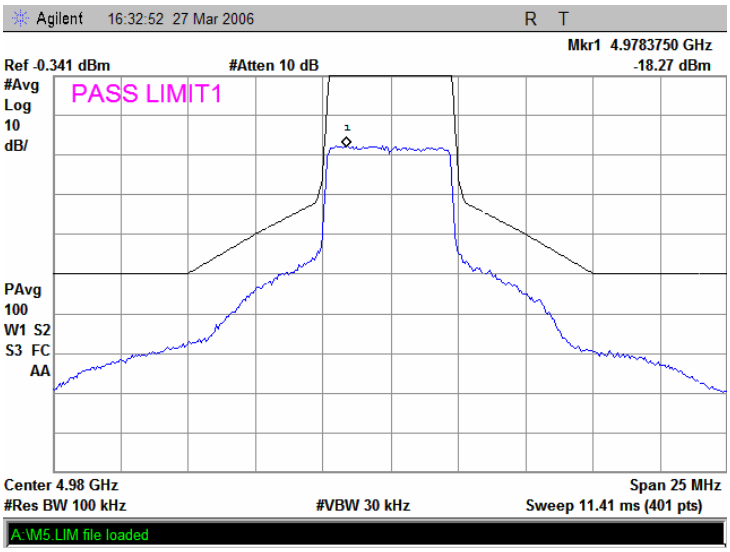


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

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

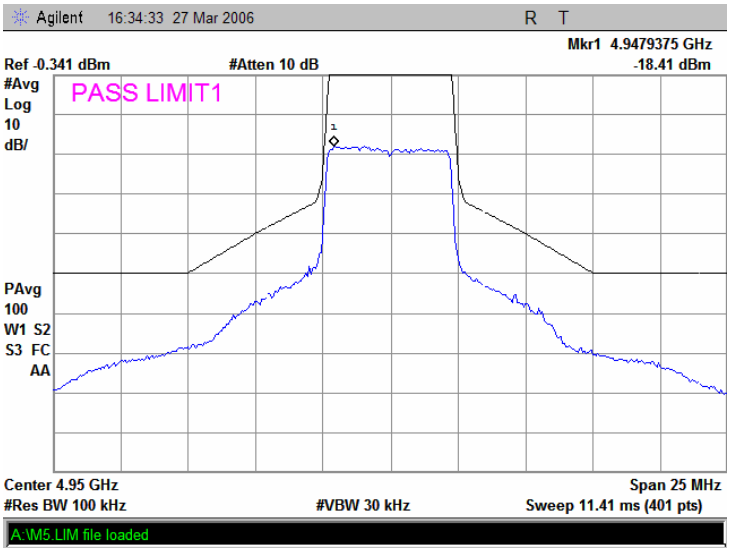


Plot 7.3.10 Emission mask test results at high carrier frequency, QPSK rate 4.19 Mbps

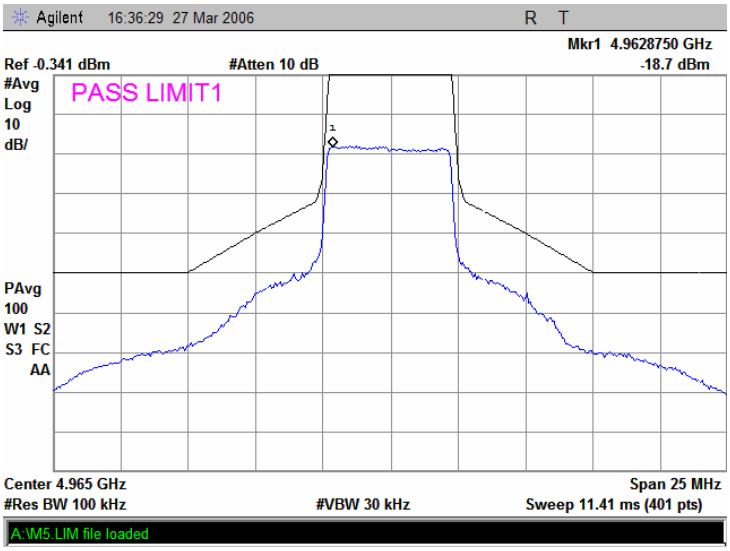


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 5 MHz CBW			

Plot 7.3.11 Emission mask test results at low carrier frequency, BPSK rate 2.095 Mbps

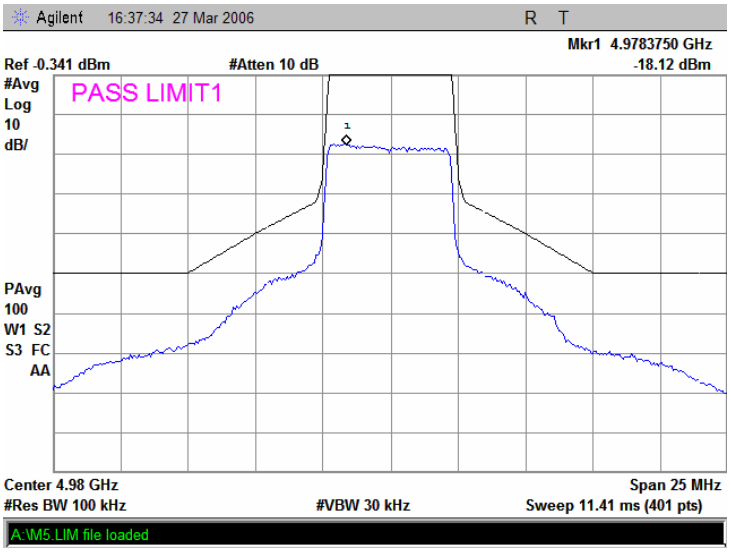


Plot 7.3.12 Emission mask test results at mid carrier frequency, BPSK rate 2.095 Mbps



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:	3/27/2006		
Temperature: 21°C	**Air Pressure:** 1015 hPa	**Relative Humidity:** 48%	**Power Supply:** 120 V AC
Remarks: 5 MHz CBW			

Plot 7.3.13 Emission mask test results at high carrier frequency, BPSK rate 2.095 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:	3/27/2006		
Temperature: 21ºC	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Table 7.3.3 Emission mask limits for 10 MHz channel bandwidth

Frequency displacement from carrier	Attenuation below carrier, dBc
Emission mask L (Channel bandwidth 10 MHz)	
0 – 4.5 MHz	0
4.5 – 5 MHz	219log(F*/4.5)
5 – 5.5 MHz	10+242log(F*/5.0)
5.5 – 10.0 MHz	20+31log(F*/5.5)
10.0 – 15 MHz	28+68log(F*/10.0)
More than** 15 MHz	50
Emission mask M (Channel bandwidth 10 MHz)	
0 – 4.5 MHz	0
4.5 – 5 MHz	568log(F*/4.5)
5 – 5.5 MHz	26+145log(F*/5.0)
5.5 – 10.0 MHz	32+31log(F*/5.5)
10.0 – 15 MHz	40+57log(F*/10.0)
More than** 15 MHz	50 or 55+10logP(W) (whichever is the lesser attenuation)

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

Table 7.3.4 Emission mask test results for 10 MHz channel bandwidth

Carrier frequency, MHz	Limit	Verdict
4950	Emission mask L and M	Pass
4965		
4980		

Note: Highest Power measured in Output power test was 20.73 dBm, therefore 55+10log (0.118W) = 45.7 dBc is the lesser attenuation than 50 dBc for emission mask M.
According to FCC Part 90.210(L)(7) and (M)(7), RBW ≥ 1% of OBW and VBW = 30 kHz. 1% of 100 MHz is 100 kHz, hence RBW of 100 kHz was chosen.
The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth.

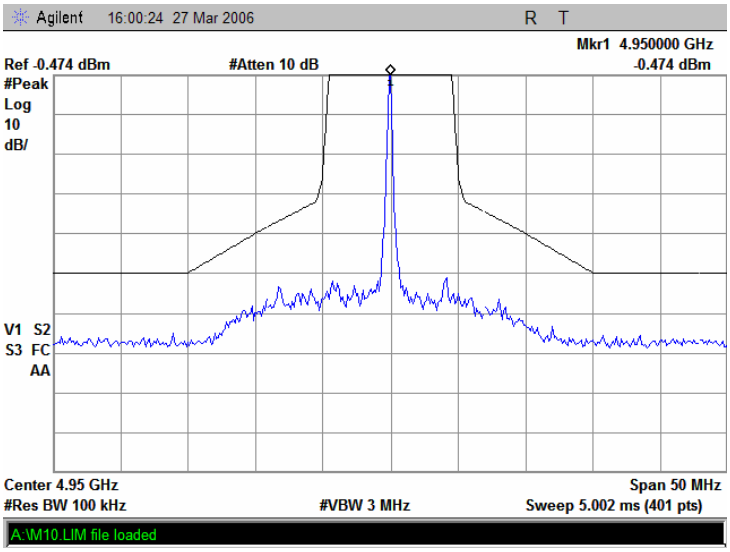
Reference numbers of test equipment used

HL 2399	HL 2780						

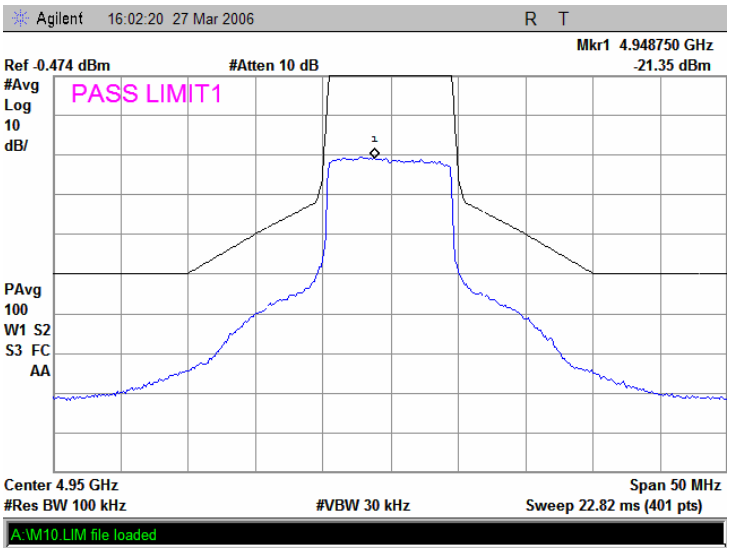
Full description is given in Appendix A.

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:	3/27/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.3.14 Emission mask for 10 MHz channel bandwidth

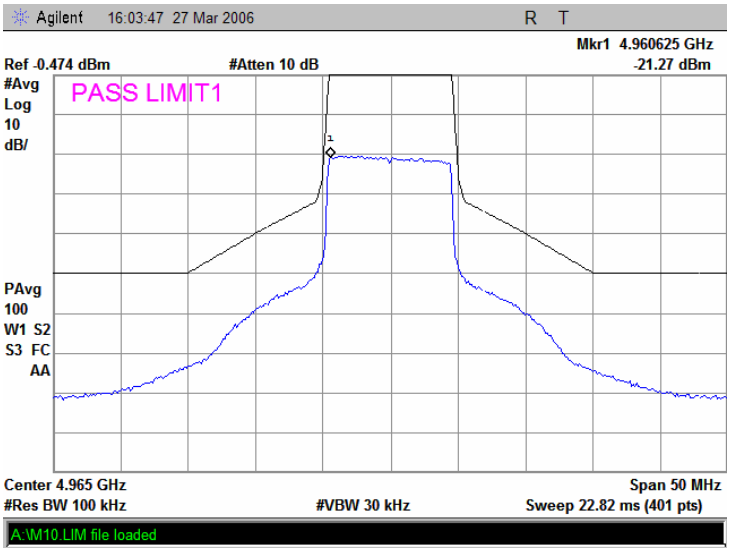


Plot 7.3.15 Emission mask test results at low carrier frequency, 64QAM rate 37.7 Mbps

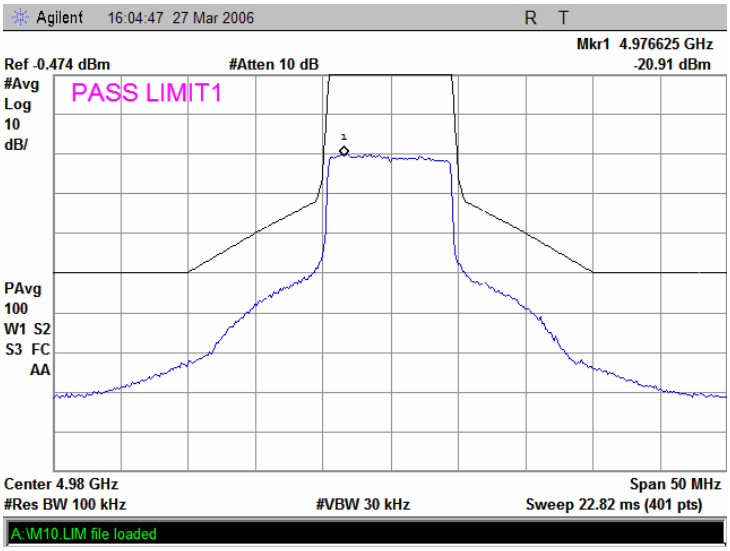


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.3.16 Emission mask test results at mid carrier frequency, 64QAM, rate 37.7 Mbps

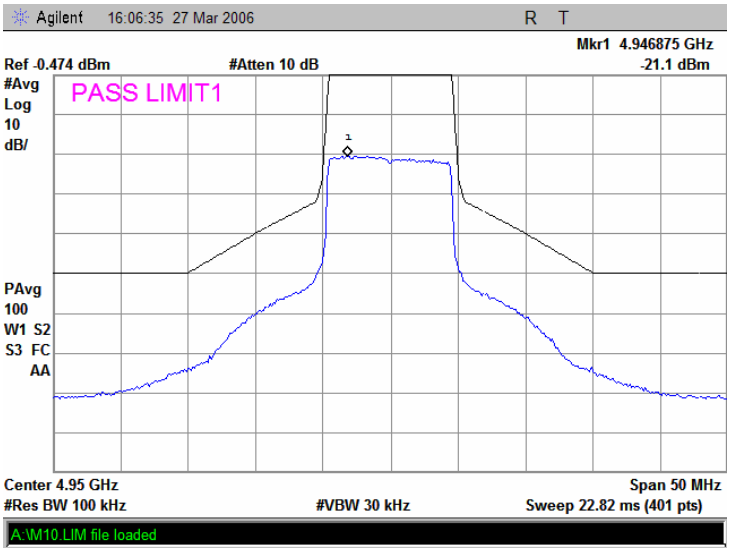


Plot 7.3.17 Emission mask test results at high carrier frequency, 64QAM, rate 37.7 Mbps

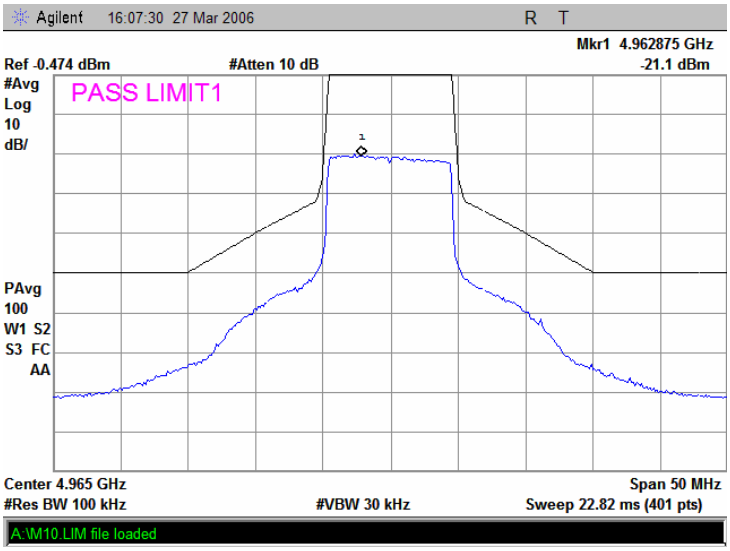


Test specification:	**Section 90.210, Emission mask**		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date:	3/27/2006		
Temperature: 21°C	**Air Pressure:** 1015 hPa	**Relative Humidity:** 48%	**Power Supply:** 120 V AC
Remarks: 10 MHz CBW			

Plot 7.3.18 Emission mask test results at low carrier frequency, 16QAM, rate 25.13 Mbps

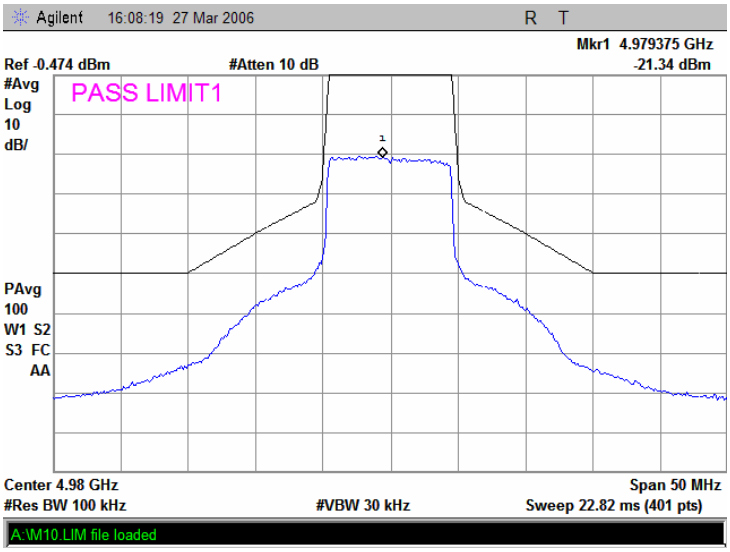


Plot 7.3.19 Emission mask test results at mid carrier frequency,16QAM rate 25.13 Mbps

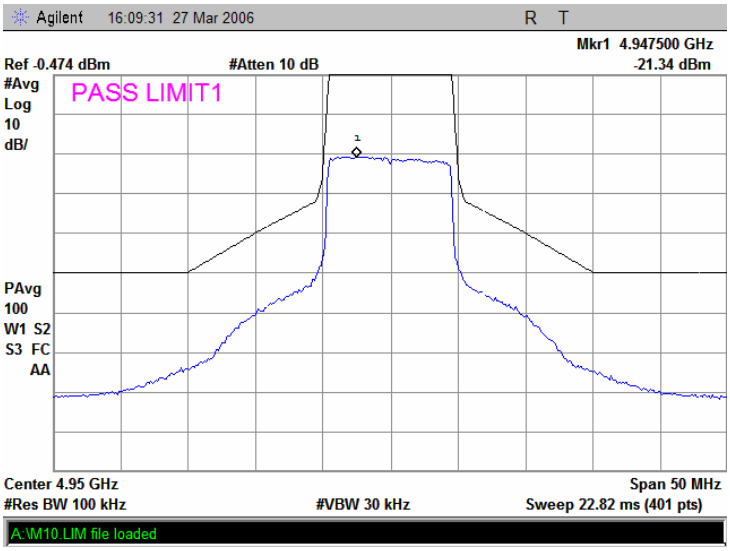


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.3.20 Emission mask test results at high carrier frequency, 16QAM rate 25.13 Mbps

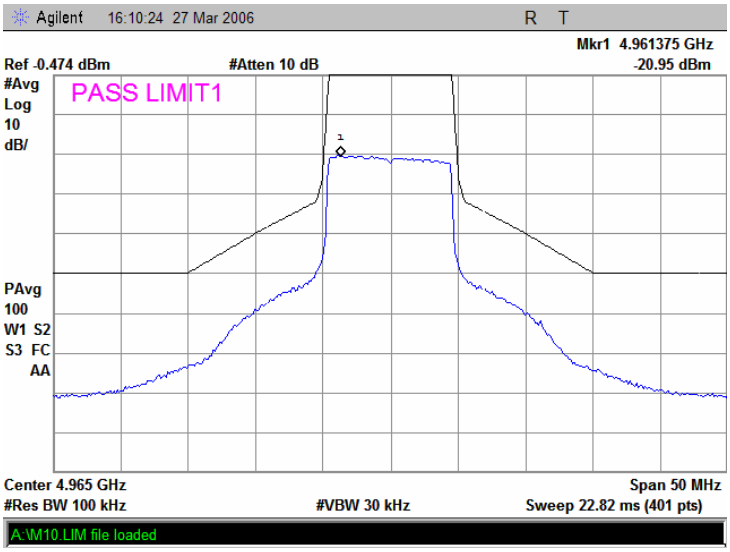


Plot 7.3.21 Emission mask test results at low carrier frequency, QPSK rate 8.38 Mbps

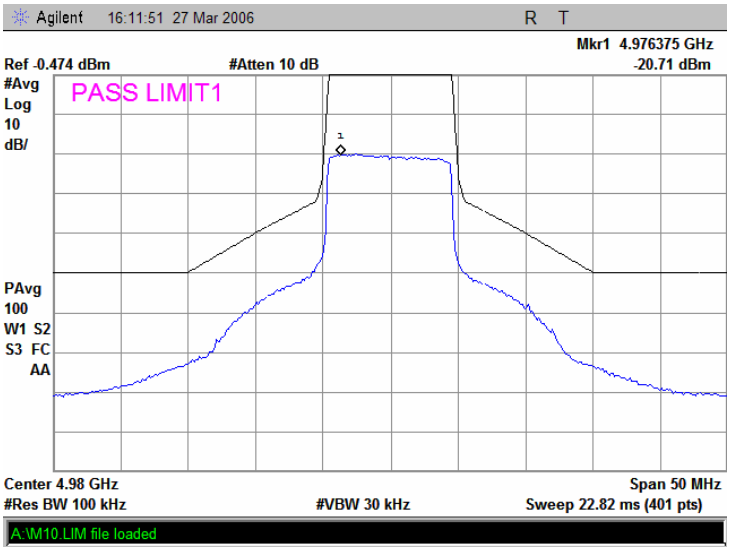


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.3.22 Emission mask test results at mid carrier frequency, QPSK rate 8.38 Mbps

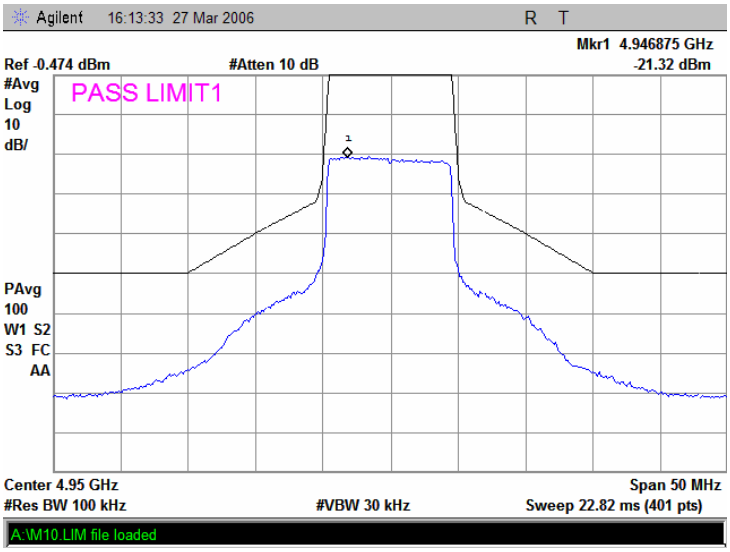


Plot 7.3.23 Emission mask test results at high carrier frequency, QPSK rate 8.38 Mbps

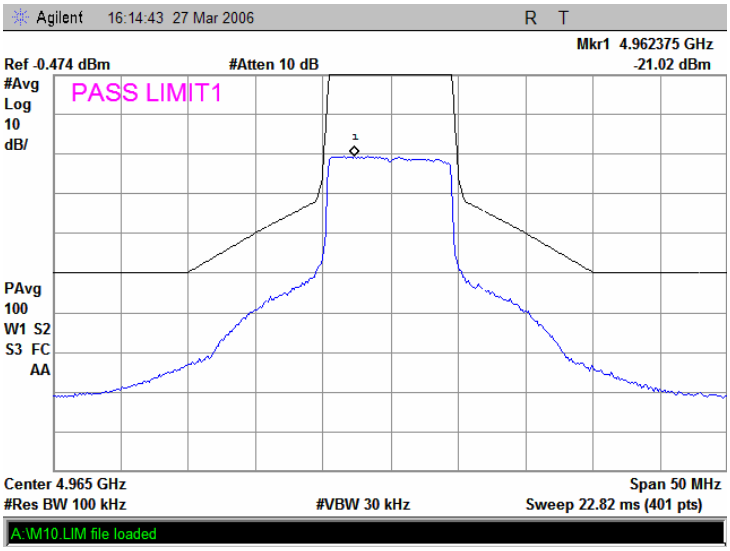


Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.3.24 Emission mask test results at low carrier frequency, BPSK rate 4.19 Mbps

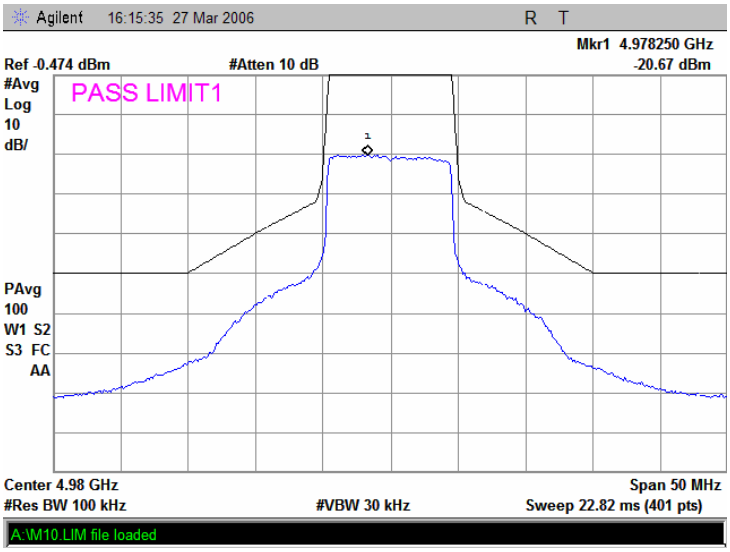


Plot 7.3.25 Emission mask test results at mid carrier frequency, BPSK rate 4.19 Mbps



Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/27/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: 10 MHz CBW			

Plot 7.3.26 Emission mask test results at high carrier frequency, BPSK rate 4.19 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:	3/29/2006		
Temperature: 21ºC	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

7.4 Spurious emissions at RF antenna connector test

7.4.1 General

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

Table 7.4.1 Spurious emission limits

Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious**, dBm	
0.009 – 10th harmonic*	45 (mask M) {55 + 10 log P (W)}	Low carrier frequency	-25
		Mid carrier frequency	-25
		High carrier frequency	-25

* - spurious emission limits do not apply to the in band emission within ± 150 % of the authorized bandwidth from the carrier; investigated in course of emission mask testing
** - ERP = Output power of carrier – attenuation below carrier = 20 – 45 = -25 (dBm). Maximum output power was measured at the lowest bit rate 2.095 Mbps and channel band of 5 MHz.

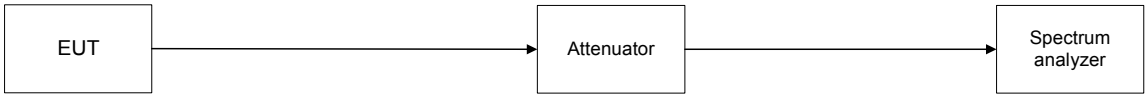
7.4.2 Test procedure

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:	3/29/2006		
Temperature: 21ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 45%	**Power Supply:** 120 V AC
Remarks:			

Table 7.4.2 Spurious emission test results

OPERATING FREQUENCY RANGE: 4950 – 4980 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 40000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: 30 kHz
MODULATING SIGNAL: PRBS
BIT RATE: 2.095 Mbps
CHANNEL BANDWIDTH: 5 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

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									
No spurious were found									Pass
Mid carrier frequency									
No spurious were found									Pass
High carrier frequency									
No spurious were found									Pass

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

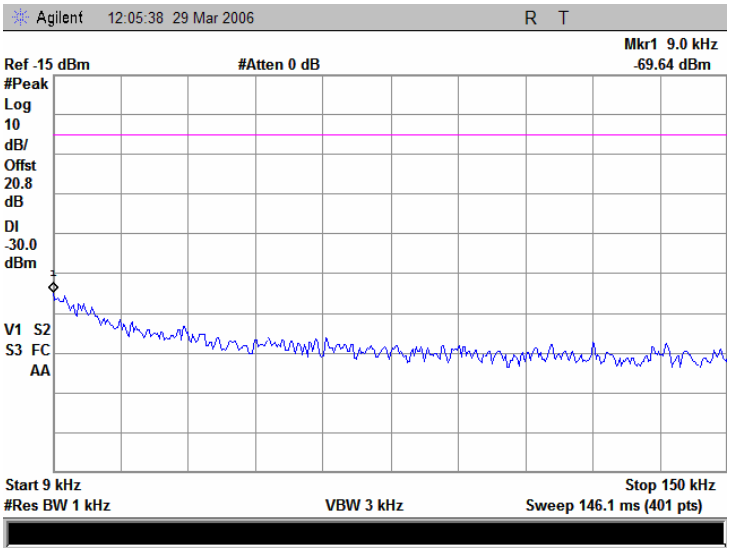
Reference numbers of test equipment used

HL 2399	HL 2780						

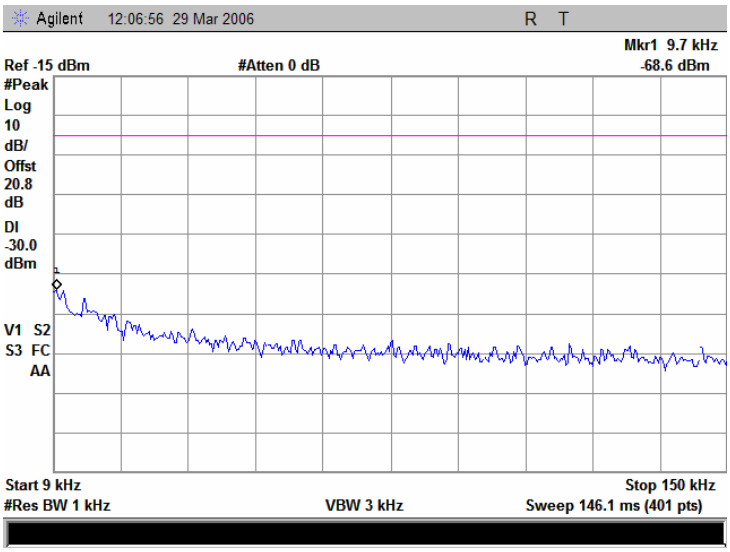
Full description is given in Appendix A.

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:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

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

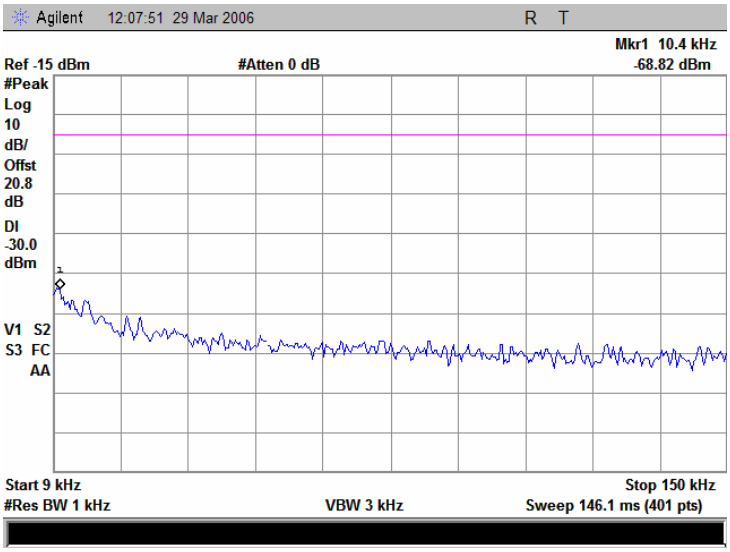


Plot 7.4.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

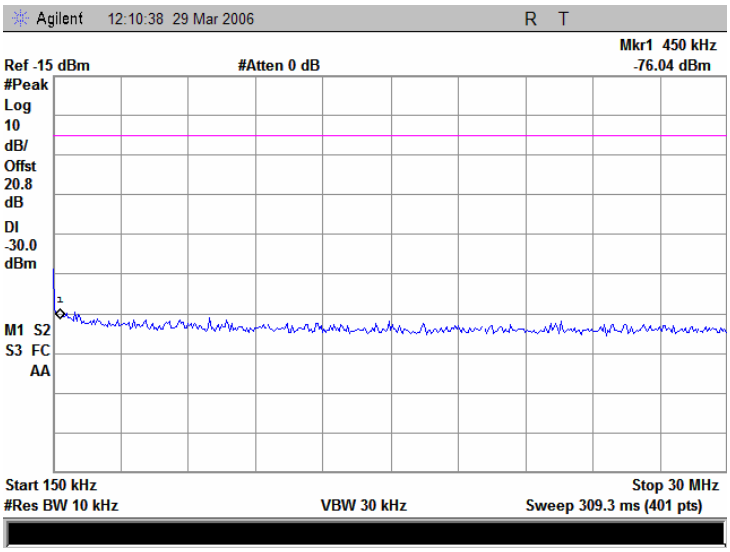


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

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

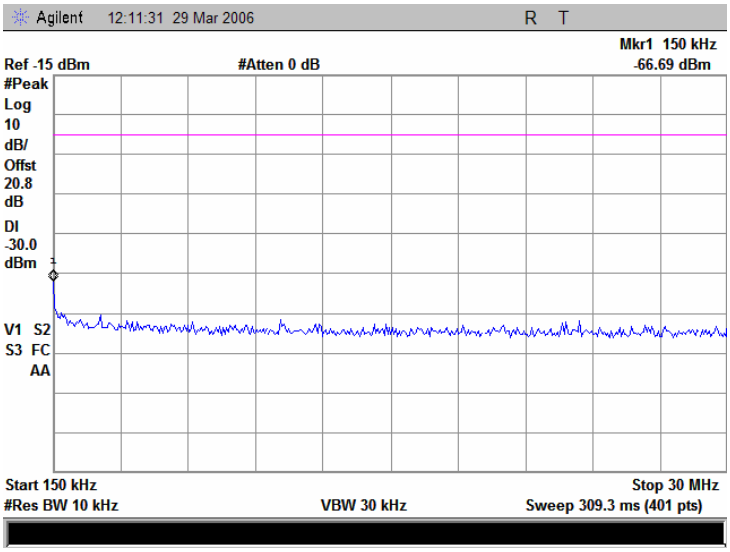


Plot 7.4.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

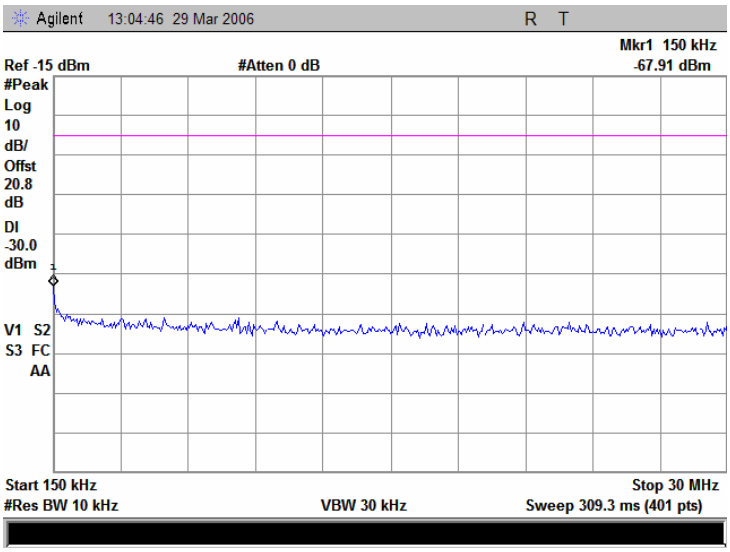


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency

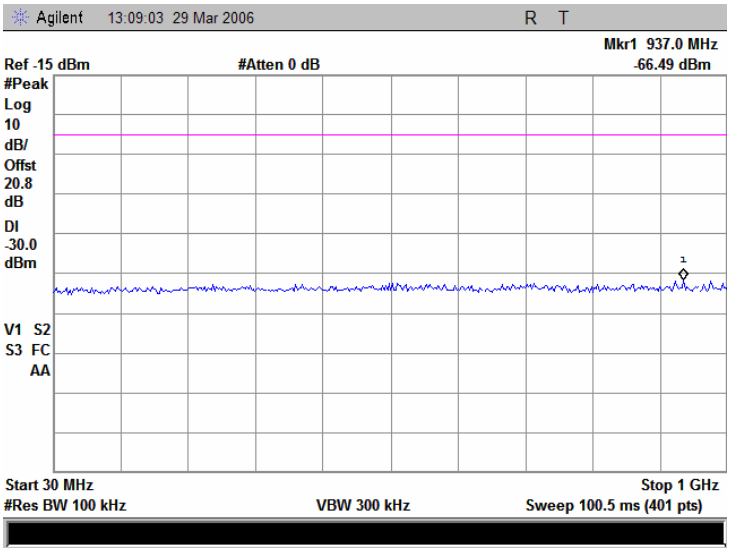


Plot 7.4.6 Spurious emission measurements in 0.15 – 30.0 MHz range at high carrier frequency

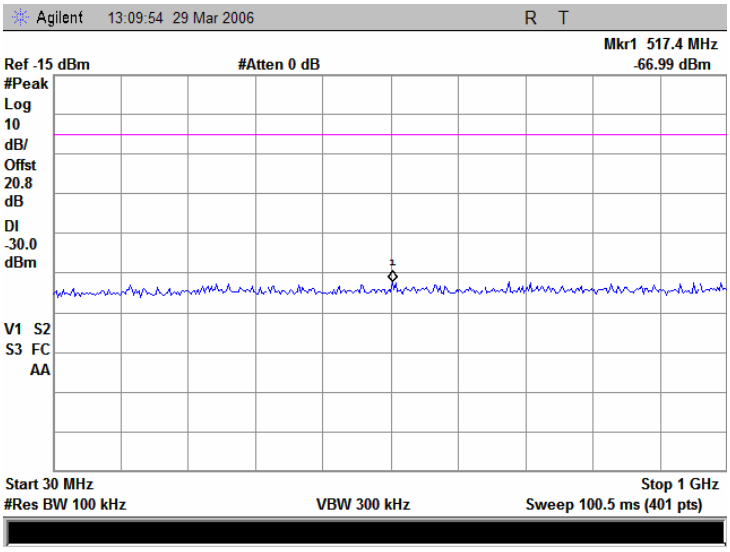


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.7 Spurious emission measurements in 30.0 - 1000 MHz range at low carrier frequency

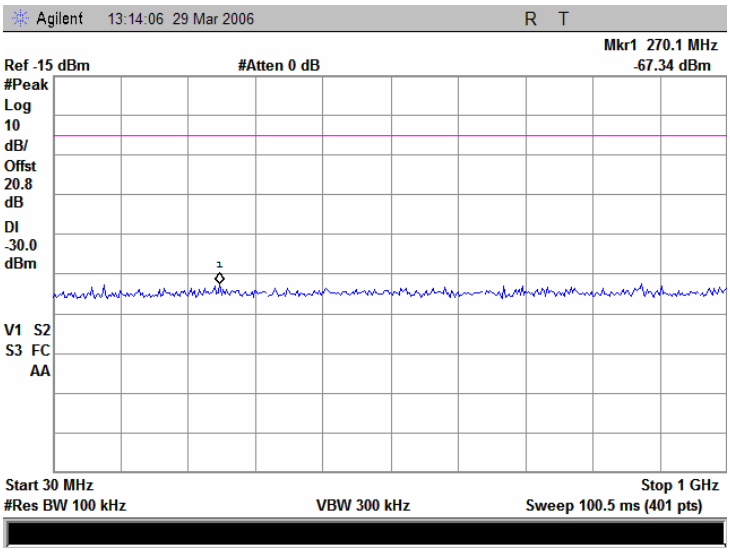


Plot 7.4.8 Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency

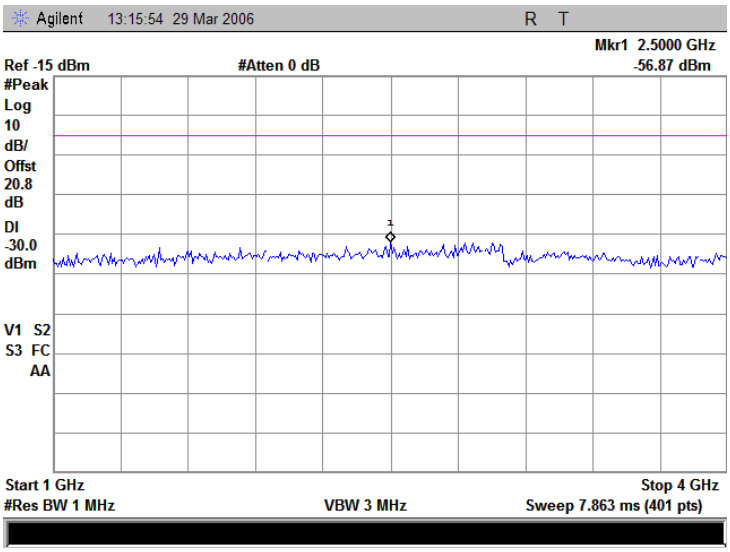


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.9 Spurious emission measurements in 30.0 - 1000 MHz range at high carrier frequency

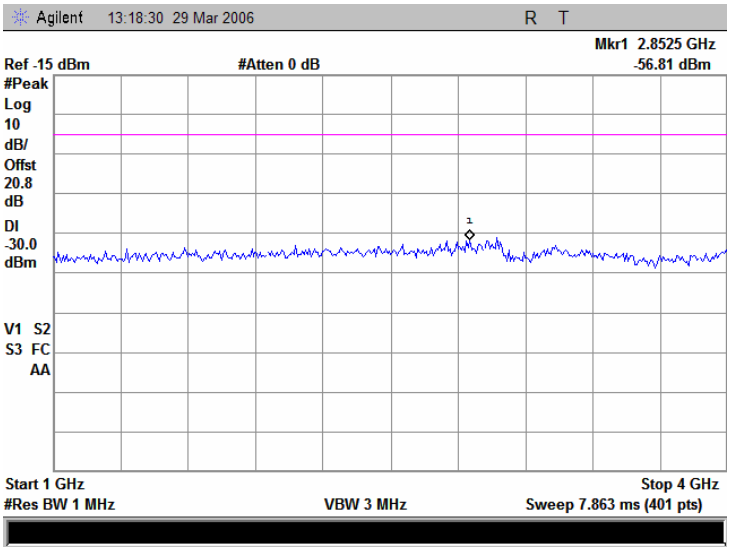


Plot 7.4.10 Spurious emission measurements in 1000 - 4000 MHz range at low carrier frequency

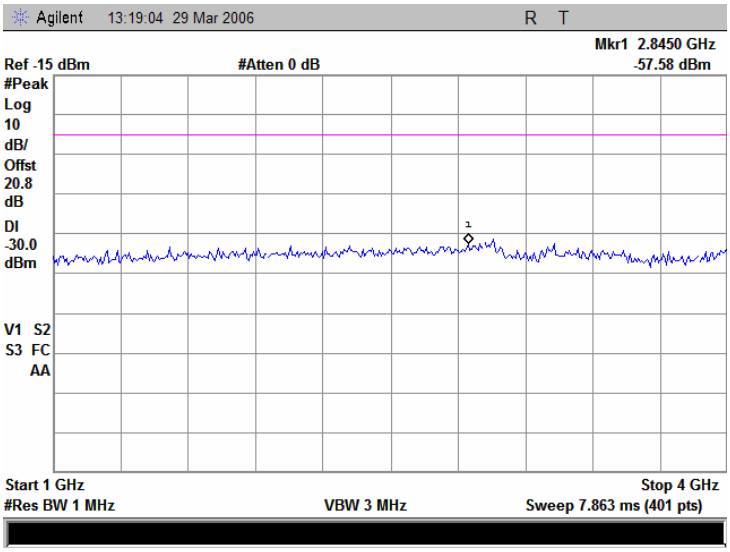


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.11 Spurious emission measurements in 1000 - 4000 MHz at mid carrier frequency

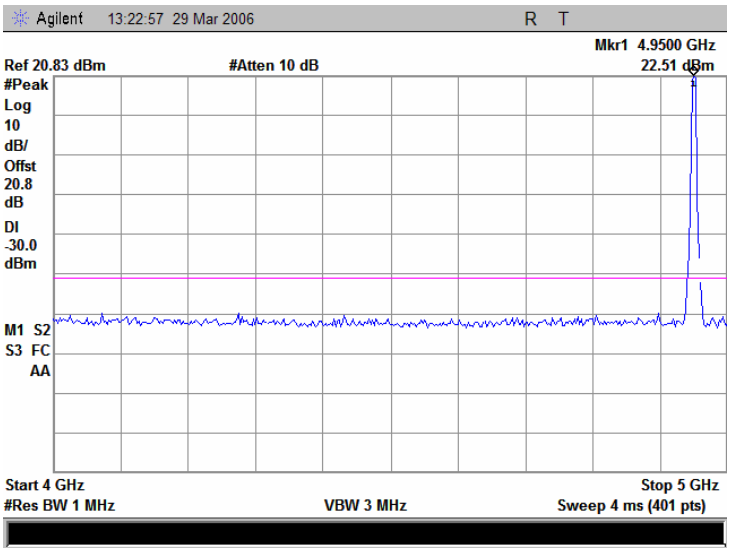


Plot 7.4.12 Spurious emission measurements in 1000 - 4000 MHz at high carrier frequency

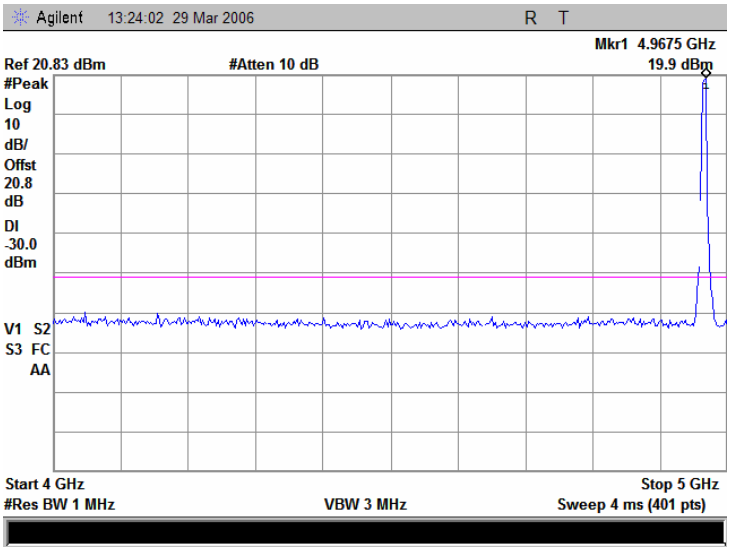


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.13 Spurious emission measurements in 4000 - 5000 MHz range at low carrier frequency

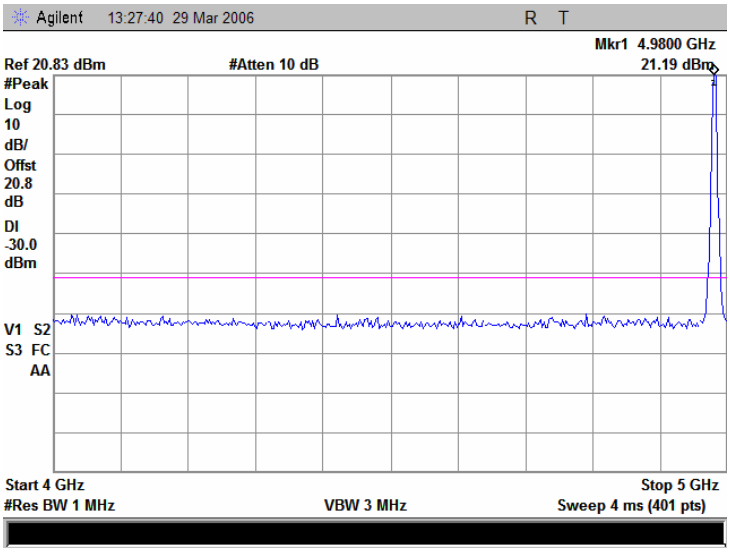


Plot 7.4.14 Spurious emission measurements in 4000 - 5000 MHz range at mid carrier frequency

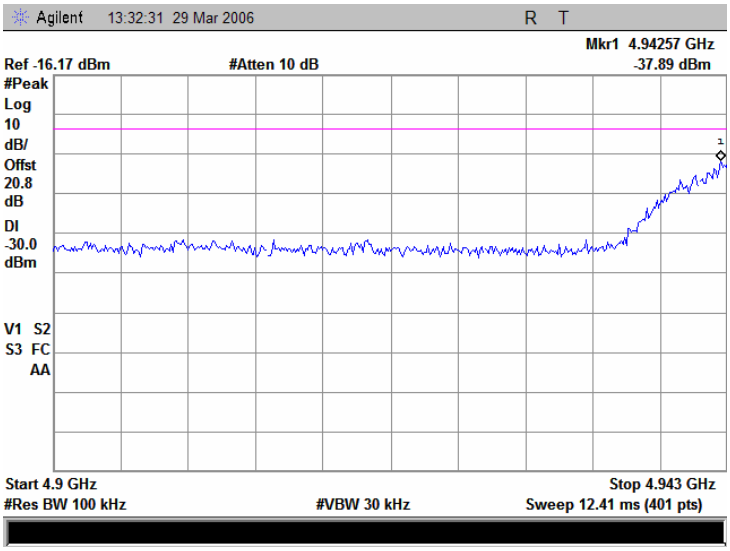


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.15 Spurious emission measurements in 4000 - 5000 MHz range at high carrier frequency



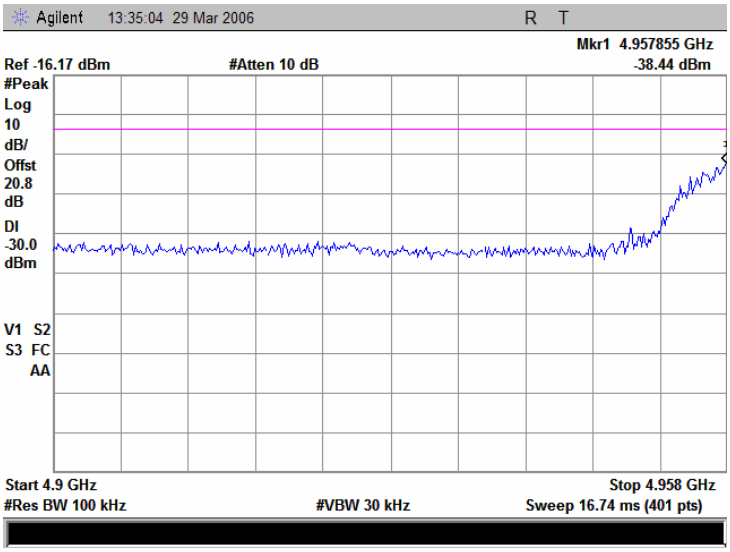
Plot 7.4.16 Spurious emission measurements in 4900 - 4943 MHz at low carrier frequency



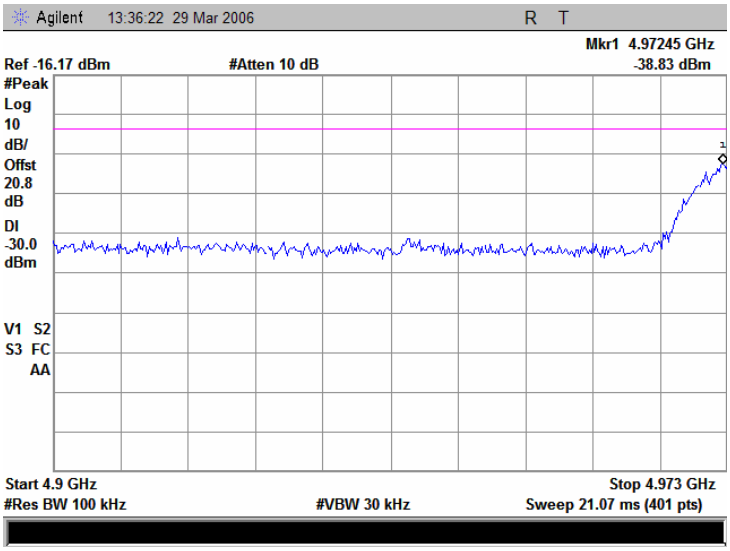
Note: according to FCC part 90.210(L)(7) and 90.210(M)(7), RBW should be at least 1% of occupied bandwidth and VBW of 30 kHz. 1% of 5 MHz is 50 kHz, hence RBW of 100 kHz was chosen for the measurements.

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:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.17 Spurious emission measurements in 4900 - 4958 MHz at mid carrier frequency

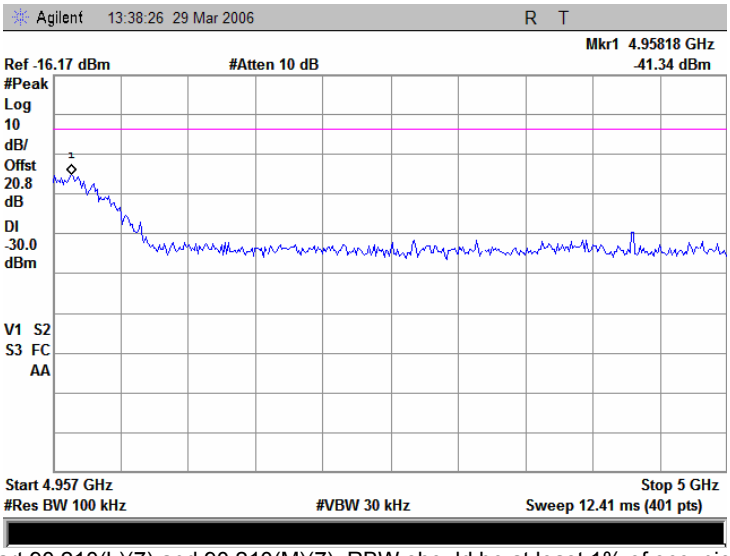


Plot 7.4.18 Spurious emission measurements in 4000 - 4950 MHz at high carrier frequency



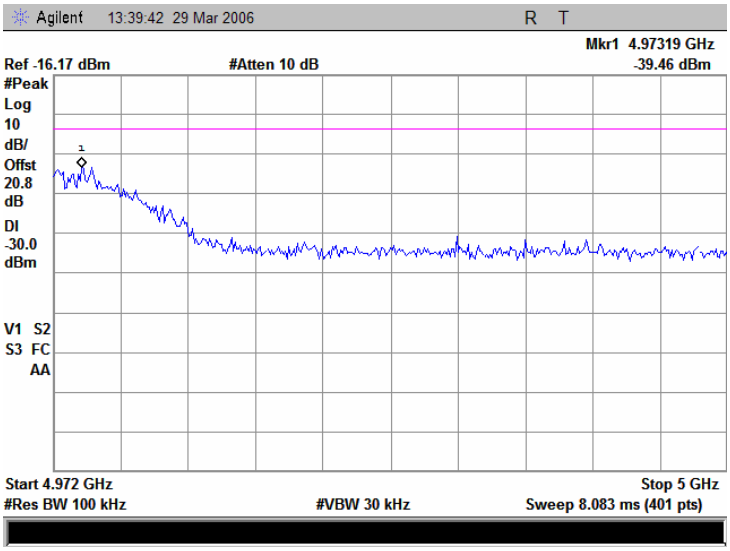
Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.19 Spurious emission measurements in 4957 - 5000 MHz at low carrier frequency



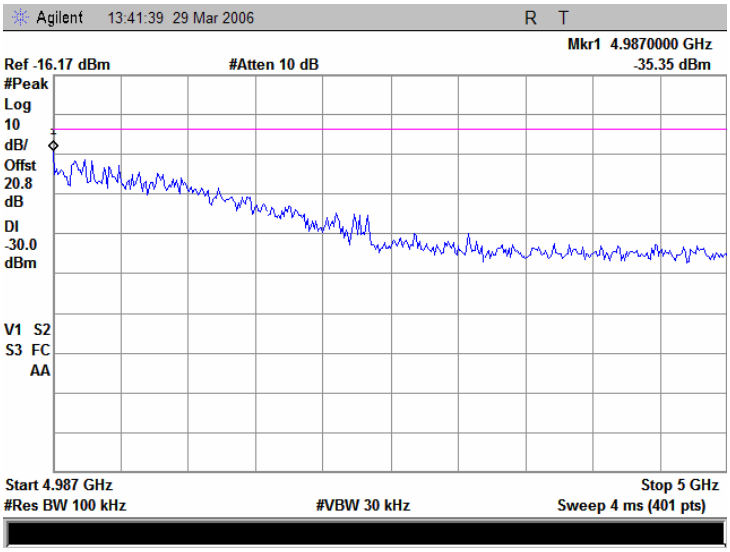
Note: according to FCC part 90.210(L)(7) and 90.210(M)(7), RBW should be at least 1% of occupied bandwidth and VBW of 30 kHz. 1% of 5 MHz is 50 kHz, hence RBW of 100 kHz was chosen for the measurements.

Plot 7.4.20 Spurious emission measurements in 4972 - 5000 MHz at mid carrier frequency

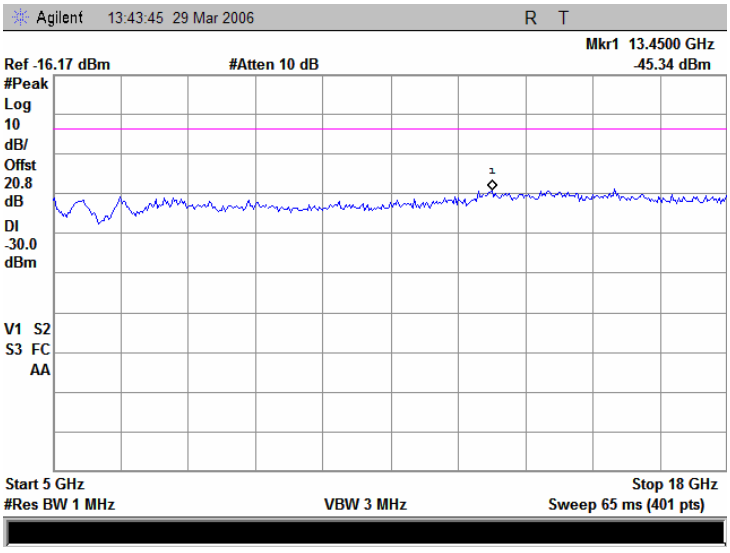


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.21 Spurious emission measurements in 4987 - 5000 MHz at high carrier frequency

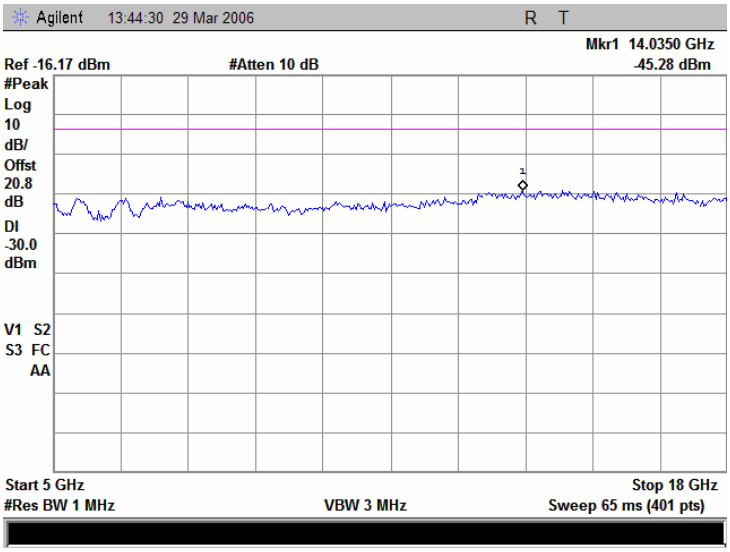


Plot 7.4.22 Spurious emission measurements in 5000 - 18000 MHz range at low carrier frequency

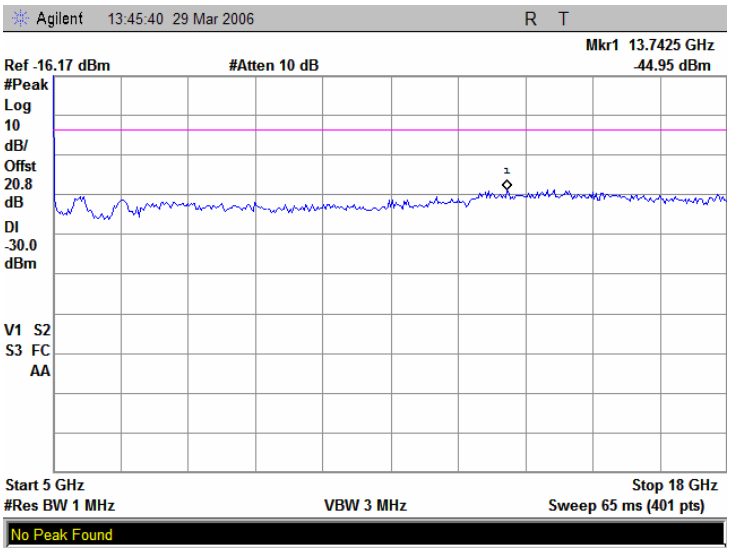


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.23 Spurious emission measurements in 5000 - 18000 MHz range at mid carrier frequency

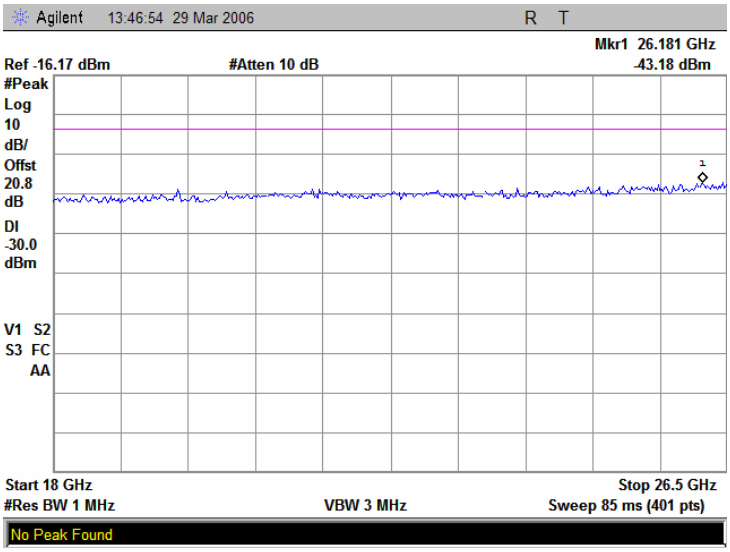


Plot 7.4.24 Spurious emission measurements in 5000 - 18000 MHz range at high carrier frequency

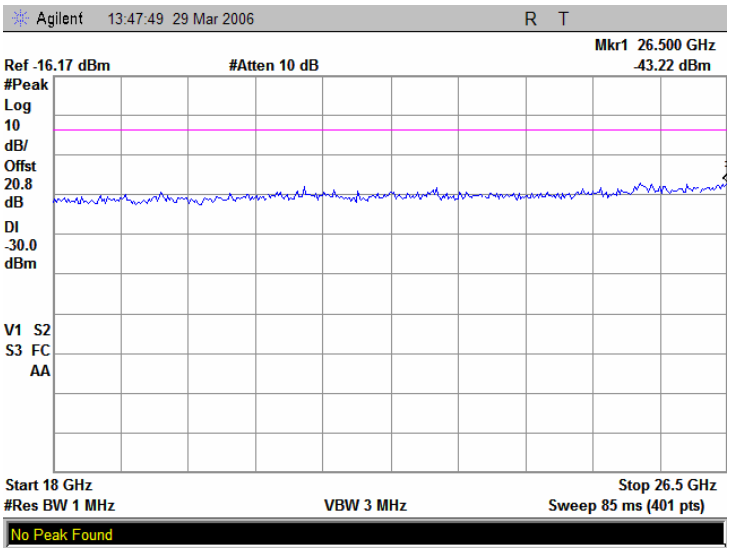


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.25 Spurious emission measurements in 18000 - 26500 MHz range at low carrier frequency

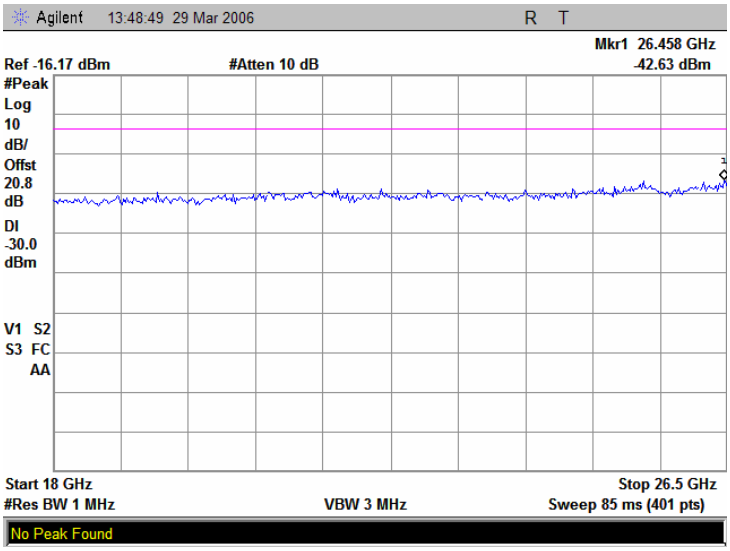


Plot 7.4.26 Spurious emission measurements in 18000 - 26500 MHz range at mid carrier frequency

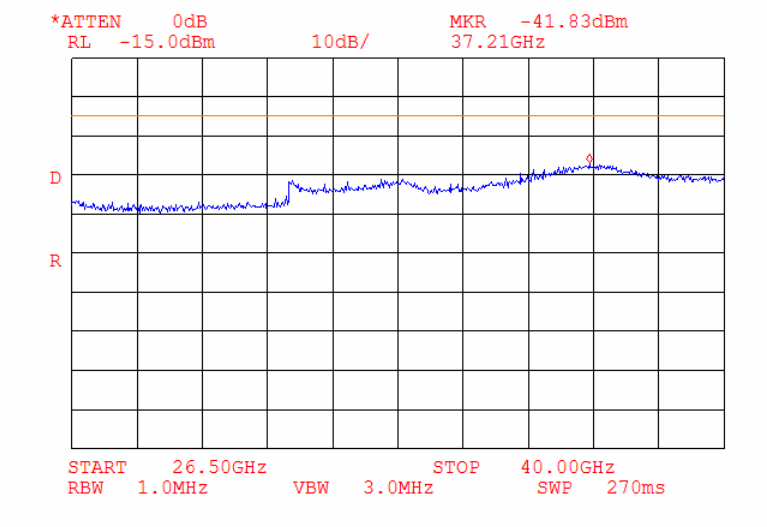


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.27 Spurious emission measurements in 18000 - 26500 MHz range at high carrier frequency

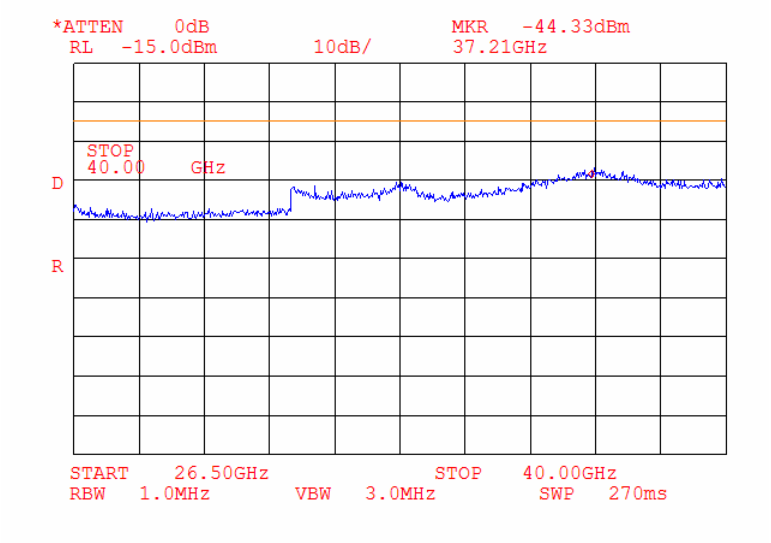


Plot 7.4.28 Spurious emission measurements in 26500 - 40000 MHz range at low carrier frequency

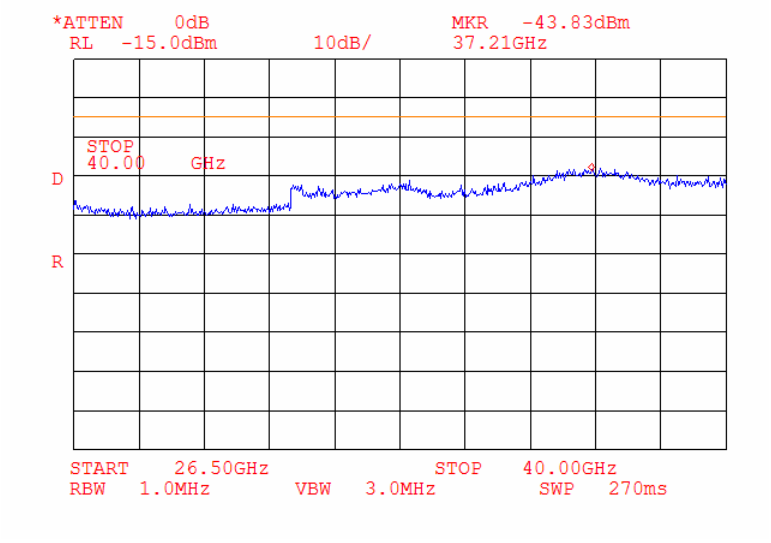


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.29 Spurious emission measurements in 26500 - 40000 MHz range at mid carrier frequency

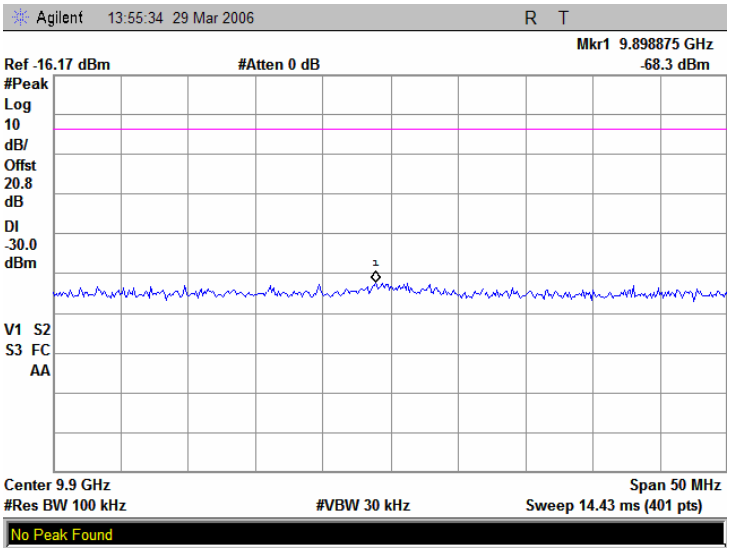


Plot 7.4.30 Spurious emission measurements in 26500 - 40000 MHz range at high carrier frequency

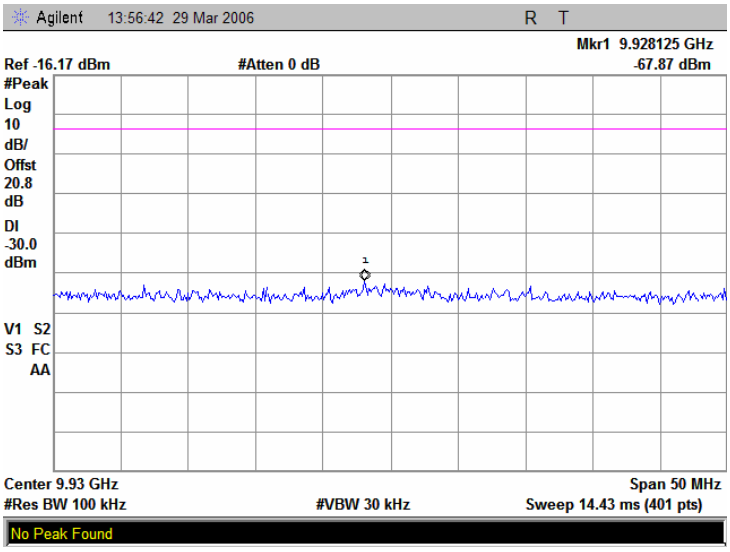


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.31 Conducted spurious emission measurements at the 2nd harmonic of low carrier frequency



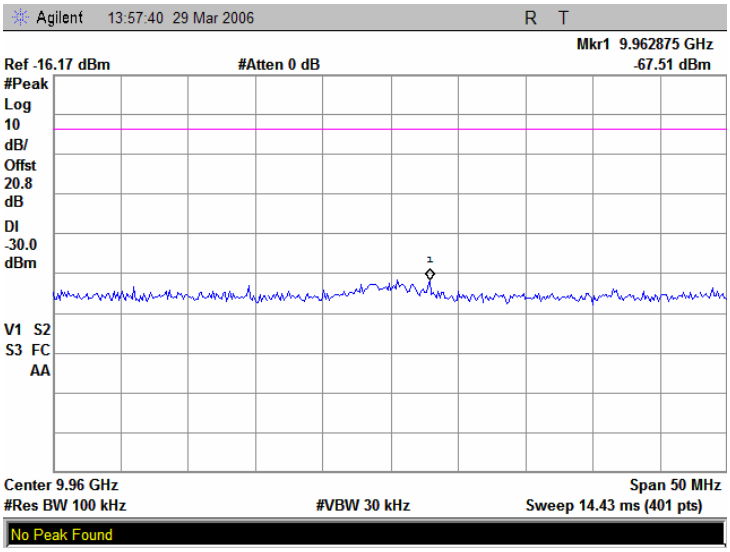
Plot 7.4.32 Conducted spurious emission measurements at the 2nd harmonic of mid carrier frequency



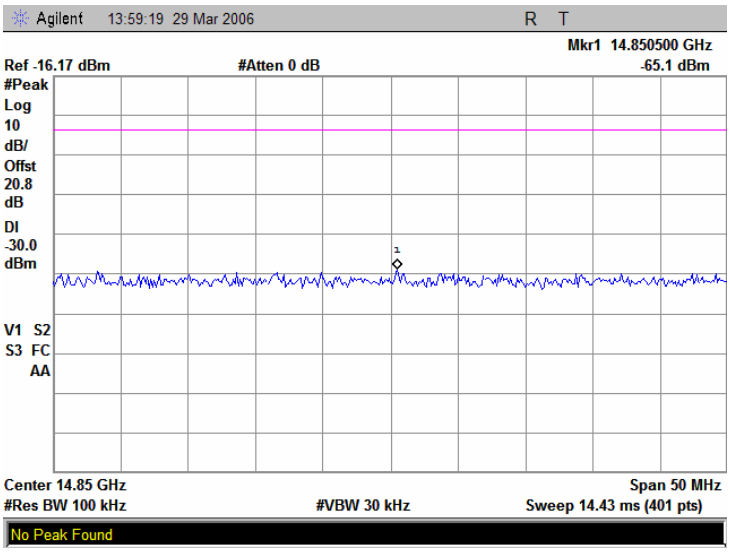
Note: according to FCC part 90.210(L)(7) and (M)(7), RBW should be at least 1% of occupied BW and VBW = 30 kHz.

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:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.33 Conducted spurious emission measurements at the 2nd harmonic of high carrier frequency

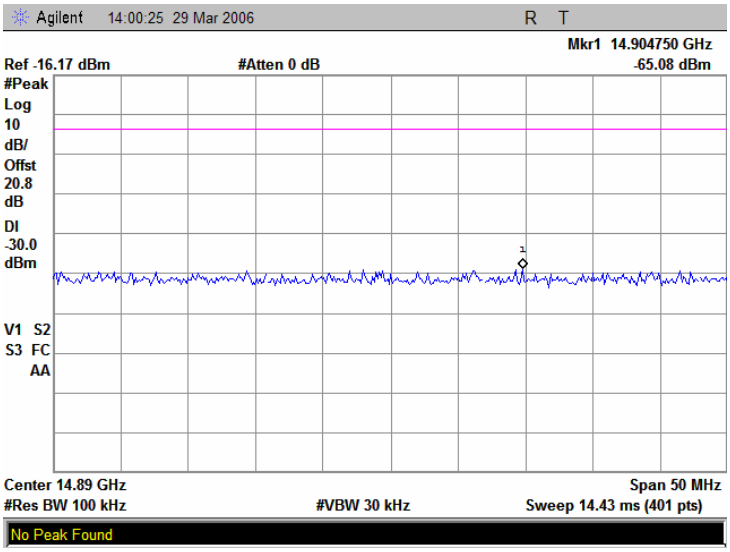


Plot 7.4.34 Conducted spurious emission measurements at the 3rd harmonic of low carrier frequency

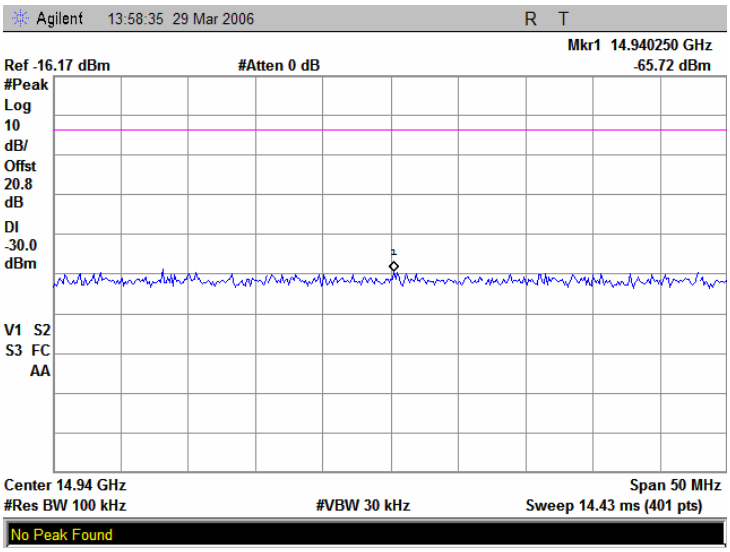


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.35 Conducted spurious emission measurements at the 3rd harmonic of mid carrier frequency

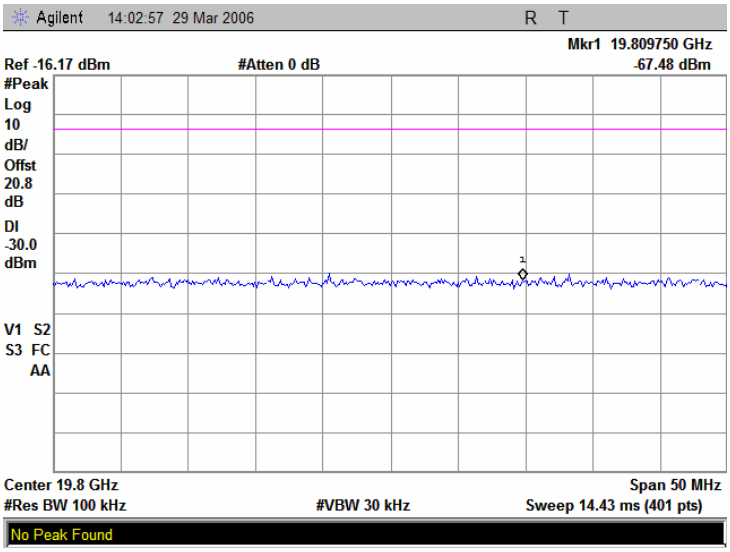


Plot 7.4.36 Conducted spurious emission measurements at the 3rd harmonic of high carrier frequency

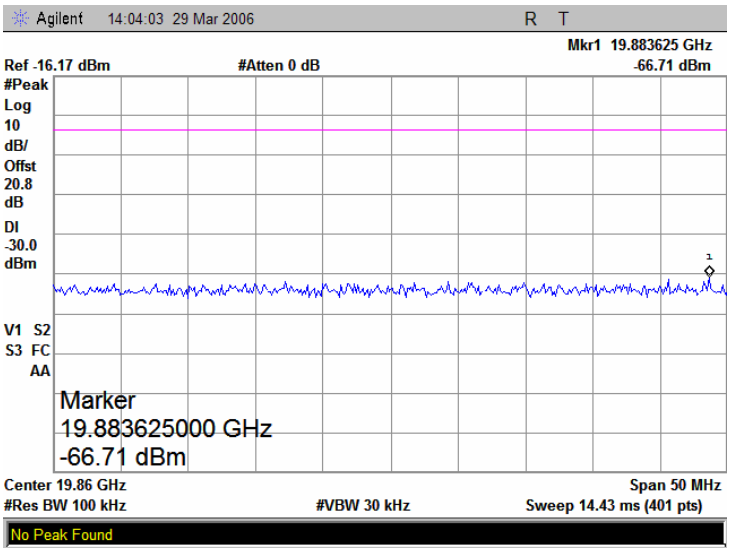


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.37 Conducted spurious emission measurements at the 4th harmonic of low carrier frequency

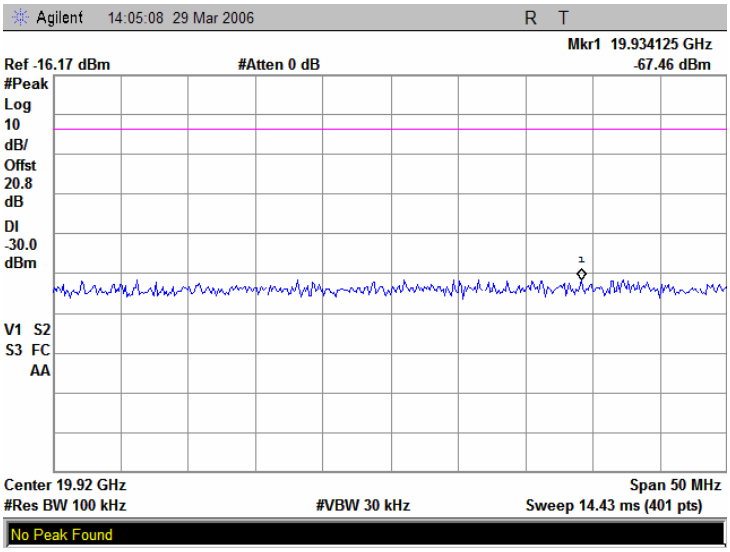


Plot 7.4.38 Conducted spurious emission measurements at the 4th harmonic of mid carrier frequency



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:	3/29/2006		
Temperature: 21°C	Air Pressure: 1010 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.39 Conducted spurious emission measurements at the 4th harmonic of 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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

7.5 Radiated spurious emission measurements

7.5.1 General

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

Table 7.5.1 Radiated spurious emission test limits

Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm	Equivalent field strength limit @ 3m, dB(µV/m)**
0.009 – 10th harmonic*	55+10logP	-25	70.23

* - Excluding the in band emission within ± 150 % of the authorized bandwidth from the carrier
** - Equivalent field strength limit was calculated from maximum allowed ERP of spurious as follows:
E=sqrt(30×P×1.64)/r, where P is ERP in Watts, 1.64 is numeric gain of ideal dipole and r is antenna to EUT distance in meters
Worst case for spurious emission limitation is 45 dBc.

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 360^0 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 360^0 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, Table 7.5.4 and shown in the associated plots.

7.5.4 Test procedure for substitution ERP measurements of spurious

7.5.4.1 The test equipment was set up as shown in Figure 7.5.3 and energized.

7.5.4.2 RF signal generator was set to the frequency of investigated spurious emission and the RF output level was preliminary adjusted to produce the same field strength as it was measured from the EUT.

7.5.4.3 The test antenna height was swept from 1 to 4 m to find maximum emission from substitution antenna and RF signal generator output was fine adjusted to produce the same field strength as it was measured from the EUT.

7.5.4.4 The above procedure was performed in both, horizontal and vertical, polarizations of the test and substitution antennas.

7.5.4.5 The ERP of spurious emissions was calculated as a sum of signal generator output power in dBm and antenna gain in dBd reduced by cable loss in dB.

7.5.4.6 The above procedure was repeated at the rest of investigated frequencies.

7.5.4.7 The worst test results (the lowest margins) were recorded in Table 7.5.3, Table 7.5.5 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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

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

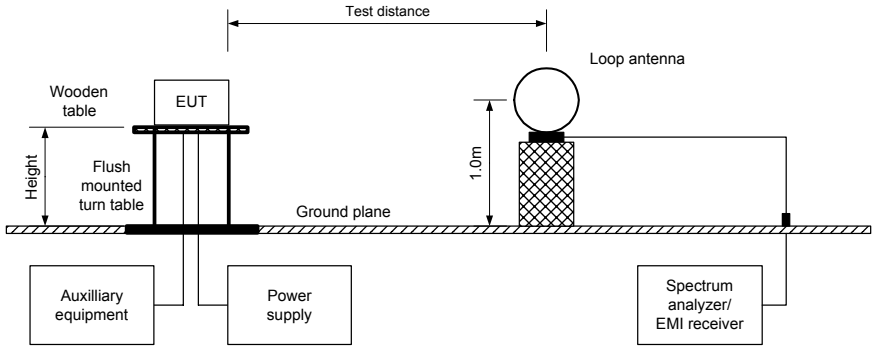
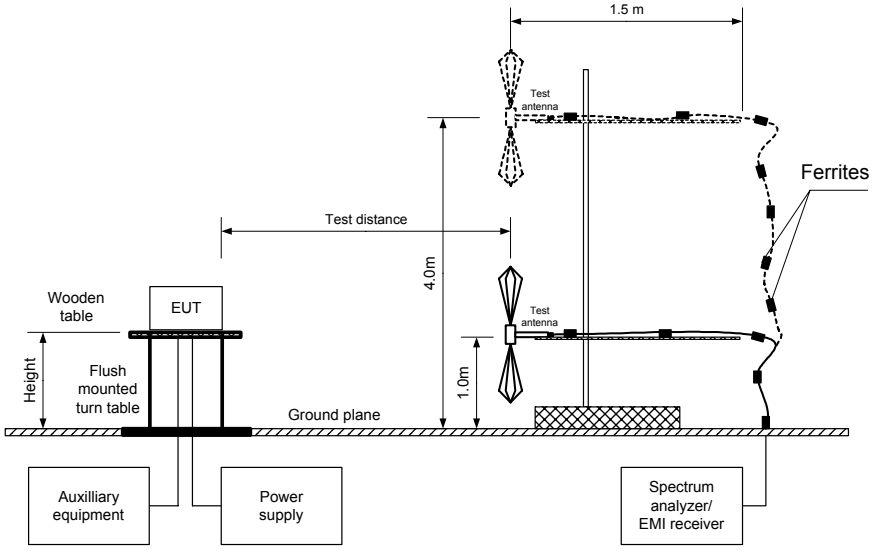
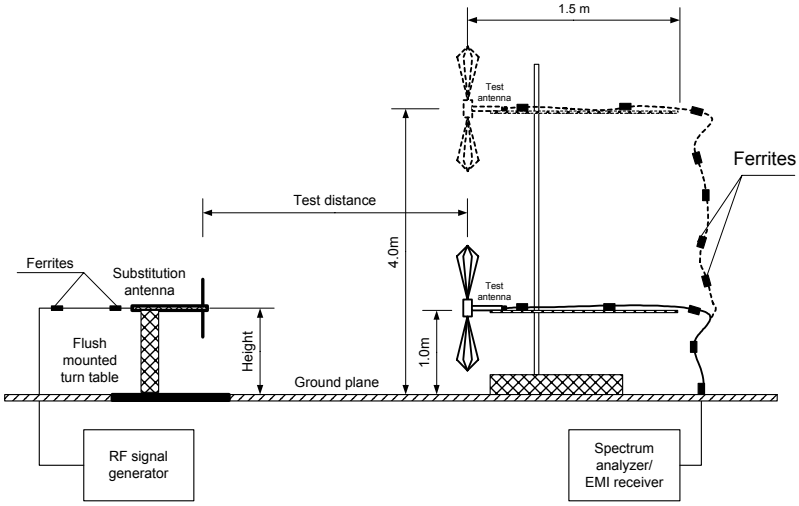


Figure 7.5.2 Setup for spurious emission field strength measurements above 30 MHz



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

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:	4/2/2006		
Temperature: 22ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 42%	**Power Supply:** 120 V AC
Remarks: EasyST (indoor) unit			

Table 7.5.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE:	4940 - 4990 MHz
TEST DISTANCE:	3 m
TEST SITE:	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 (1000 MHz – 18000 MHz) Standard gain horn (above 18000 MHz)
MODULATING SIGNAL:	PRBS
BIT RATE:	2 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Low carrier frequency MHz							
8279.83	67.50	70.23	-2.73	1000	V	1.3	200
9900	69.83	70.23	-0.4	1000	V	1.2	340
Mid carrier frequency MHz							
8310.00	68.87	70.23	-1.36	1000	V	1.5	120
9930	70.12	70.23	-0.11	1000	V	1.3	320
High carrier frequency MHz							
8339.81	69.83	70.23	-0.4	1000	V	1.5	230
9960	68.33	70.23	-1.9	1000	V	1.5	320

*****- Margin = Field strength of spurious – calculated field strength limit.
******- EUT front panel refers to 0 degrees position of turntable.

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:	4/2/2006		
Temperature: 22ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 42%	**Power Supply:** 120 V AC
Remarks: EasyST (indoor) unit			

Table 7.5.3 Substitution ERP of spurious test results

ASSIGNED FREQUENCY RANGE: 4940 - 4990 MHz
TRANSMITTER CARRIER ERP: 20dBm at low frequency
20dBm at mid frequency
20dBm at high frequency
DATA RATE: 2Mbps
CHANNEL BANDWIDTH: 5 MHz
TEST SITE: OATS
TEST DISTANCE: 3 m
SUBSTITUTION ANTENNA HEIGHT: 0.8 m
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
SUBSTITUTION ANTENNA TYPE: Double ridged guide (1000 MHz – 18000 MHz)

Frequency, MHz	Field strength, dB(µV/m)	RBW, kHz	Antenna polarization	RF generator output, dBm	Ant gain, dBd	Cable loss, dB	ERP, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Low carrier frequency											
8279.83	67.50	1000	V	-32.83	8.85	2.22	-26.20	46.20	45	-1.20	Pass
9900	69.83	1000	V	-34.16	9.75	2.37	-26.78	46.78	45	-1.78	Pass
Mid carrier frequency											
8310.00	68.87	1000	V	-34.07	8.85	2.22	-27.44	47.44	45	-2.44	Pass
9930	70.12	1000	V	-35.12	9.75	2.37	-27.74	47.74	45	-2.74	Pass
High carrier frequency											
8339.81	69.83	1000	V	-35.33	8.85	2.22	-28.7	48.70	45	-3.70	Pass
9960	68.33	1000	V	-34.16	9.75	2.37	-26.78	46.78	45	-3.78	Pass

*****- Margin = Attenuation below carrier – specification limit.

Reference numbers of test equipment used

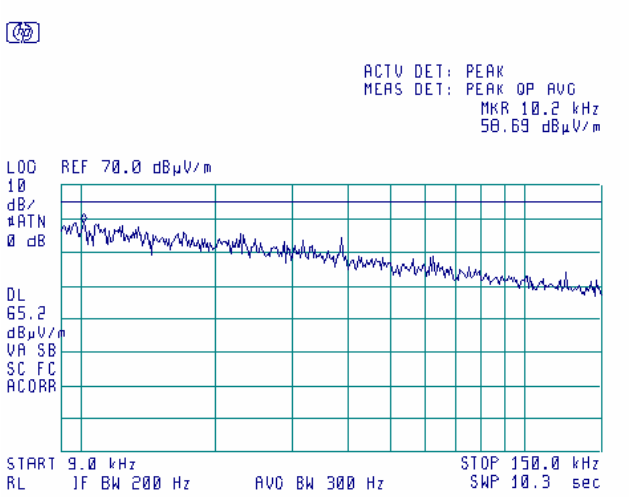
HL 0410	HL 0446	HL 0521	HL 0589	HL 0661	HL 0768	HL 0769	HL 1200
HL 1424	HL 1552	HL 1566	HL 1941	HL 1947	HL 1984	HL 2009	HL 2109
HL 2259	HL 2260	HL 2261	HL 2399	HL 2432	HL 2697	HL 2811	

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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

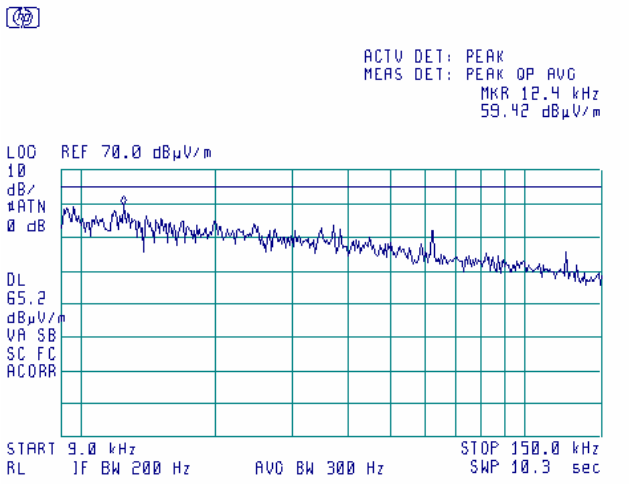
Plot 7.5.1 Radiated emission measurements in 9 - 150 kHz range

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

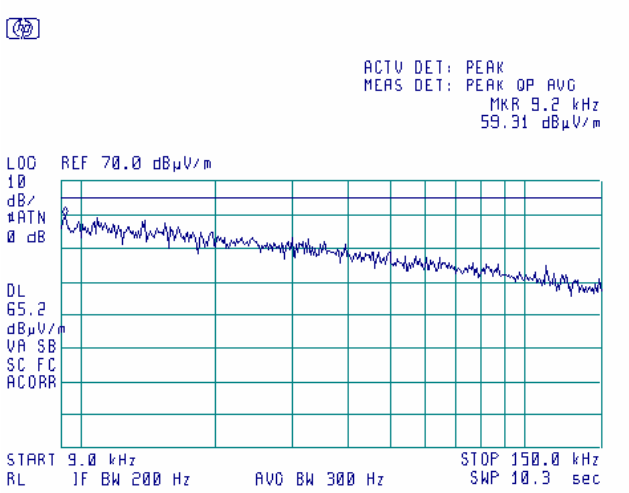
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

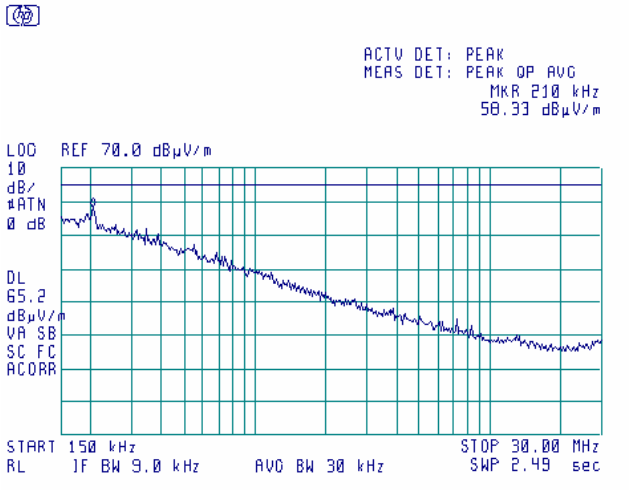
Plot 7.5.3 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.5.4 Radiated emission measurements in 0.15 - 30 MHz range

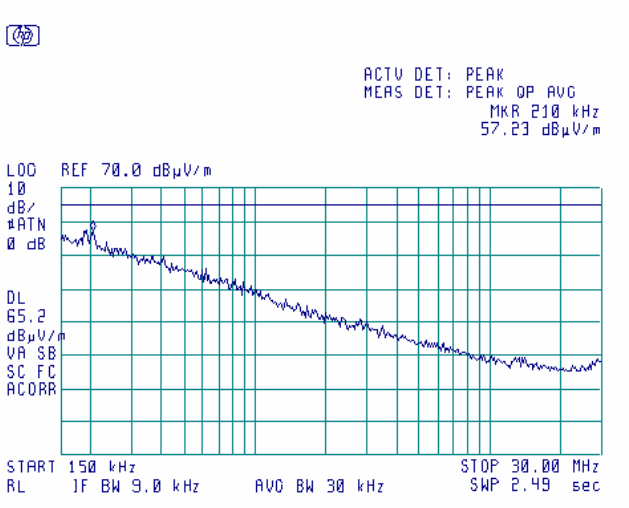
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

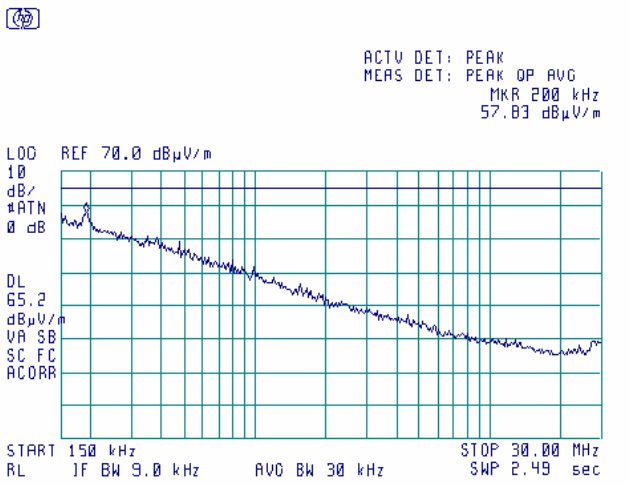
Plot 7.5.5 Radiated emission measurements in 0.15 - 30 MHz range

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



Plot 7.5.6 Radiated emission measurements in 0.15 - 30 MHz range

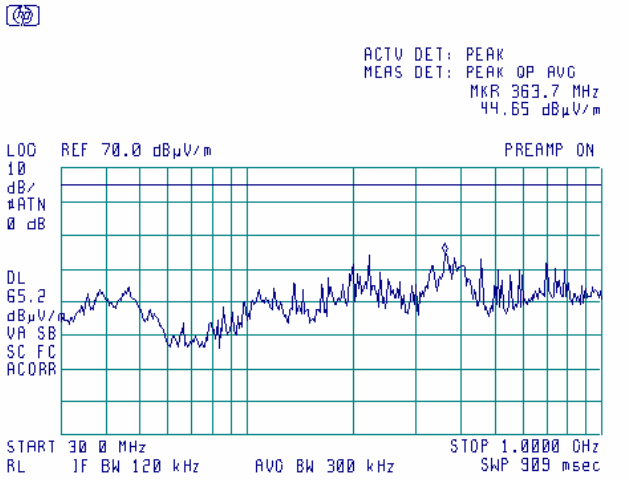
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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:	4/2/2006		
Temperature: 22ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 42%	**Power Supply:** 120 V AC
Remarks: EasyST (indoor) unit			

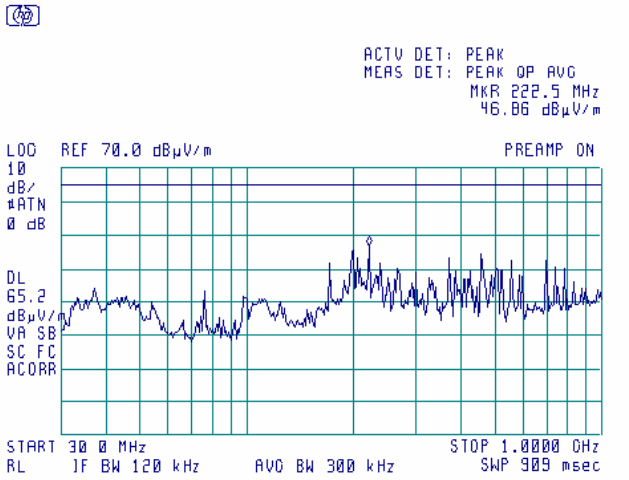
Plot 7.5.7 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.5.8 Radiated emission measurements in 30 - 1000 MHz range

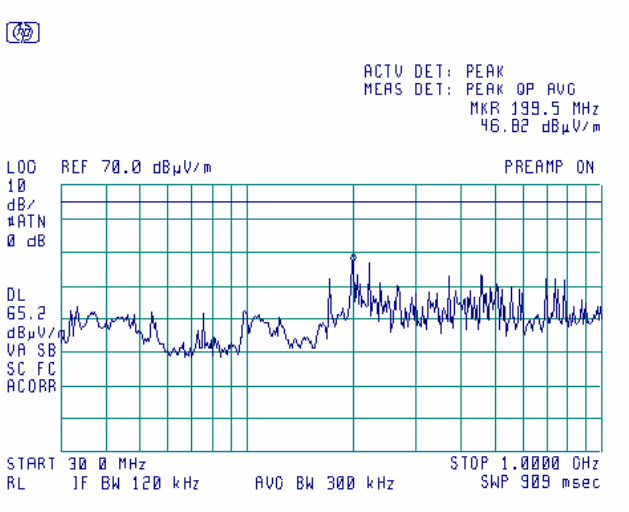
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

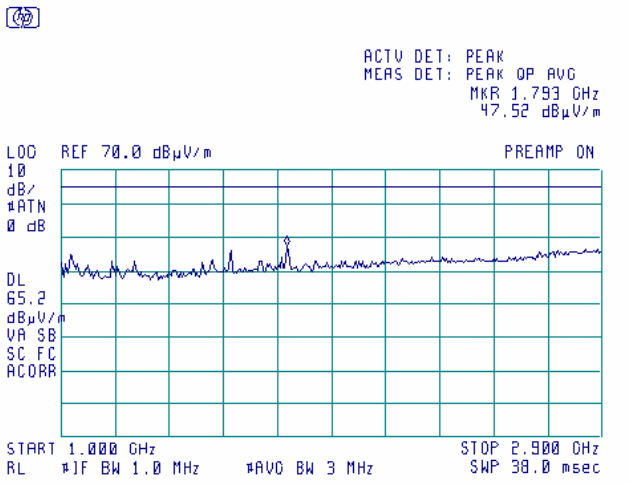
Plot 7.5.9 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.5.10 Radiated emission measurements in 1000 – 2900 MHz range

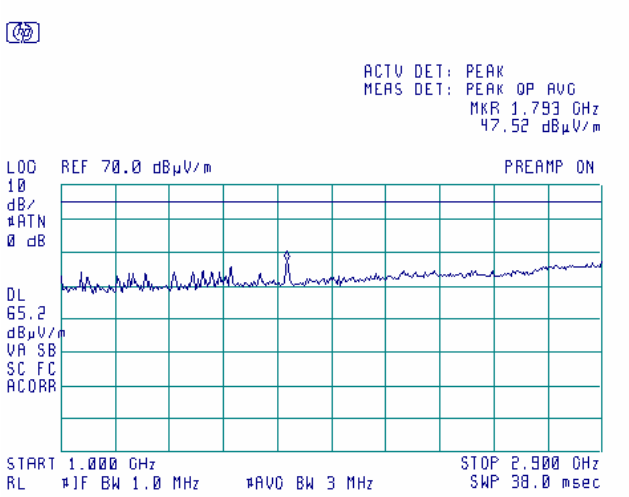
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

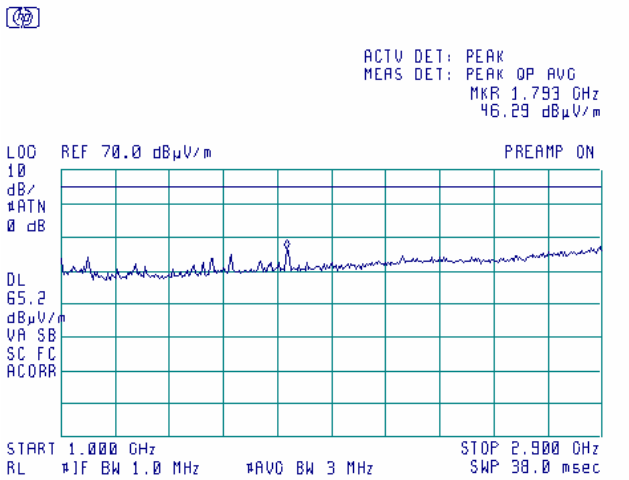
Plot 7.5.11 Radiated emission measurements in 1000 – 2900 MHz range

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 1000 – 2900 MHz range

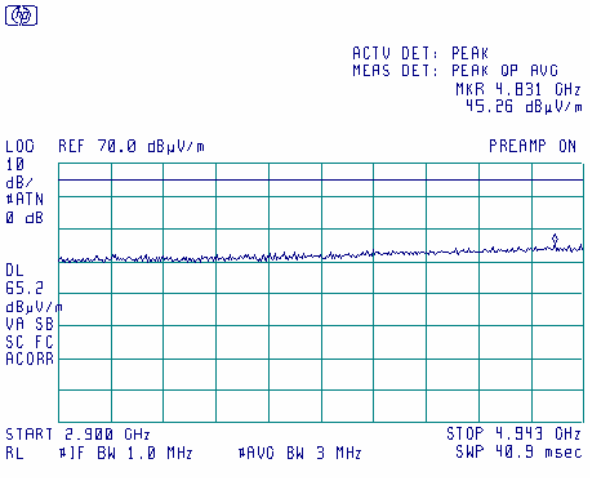
TEST SITE:	Semi- anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

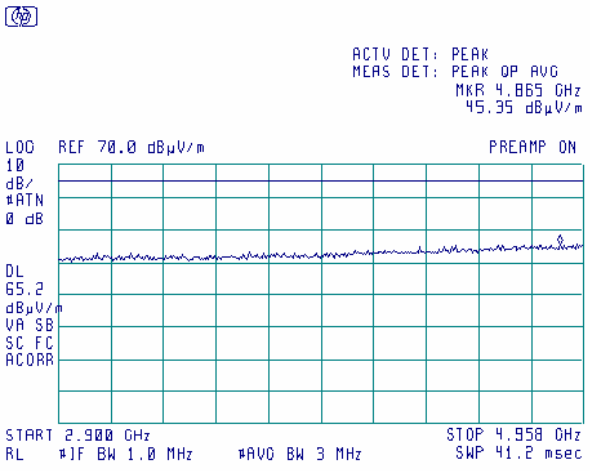
Plot 7.5.13 Radiated emission measurements in 2900 – 4943 MHz range

TEST SITE:	Semi- anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
NOTE:	Lower band-edge: 4950 – (5 MHz + 150 %) = 4943MHz



Plot 7.5.14 Radiated emission measurements in 2900 – 4958 MHz range

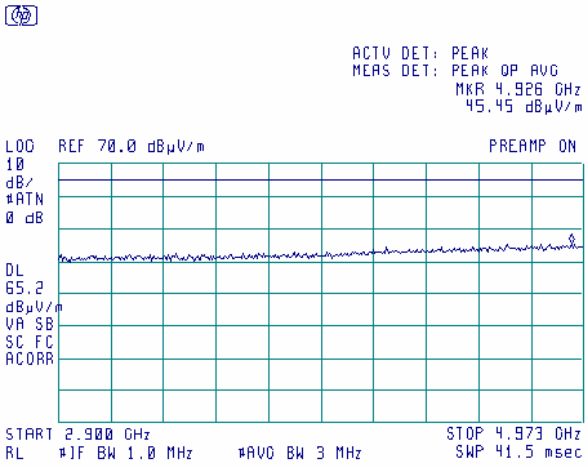
TEST SITE:	Semi- anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
NOTE:	Lower band-edge: 4965 – (5 MHz + 150 %) = 4958 MHz



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

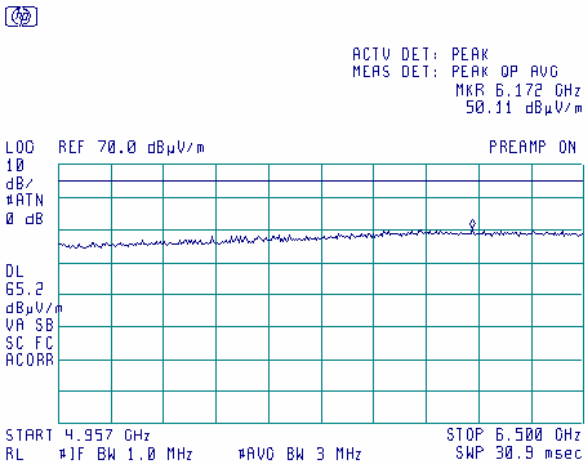
Plot 7.5.15 Radiated emission measurements in 2900 – 4973 MHz range

TEST SITE:	Semi- anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
NOTE:	Lower band-edge: 4980 – (5 MHz + 150 %) = 4973 MHz



Plot 7.5.16 Radiated emission measurements in 4957 – 6500 MHz range

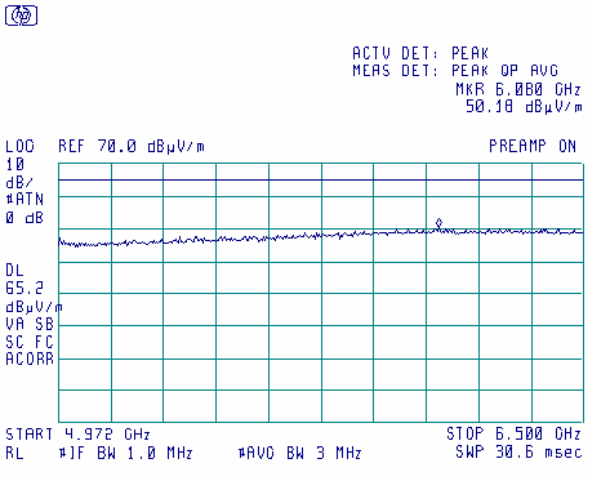
TEST SITE:	Semi- anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
NOTE:	Upper band-edge: 4950 + (5MHz + 150 %) = 4957 MHz



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

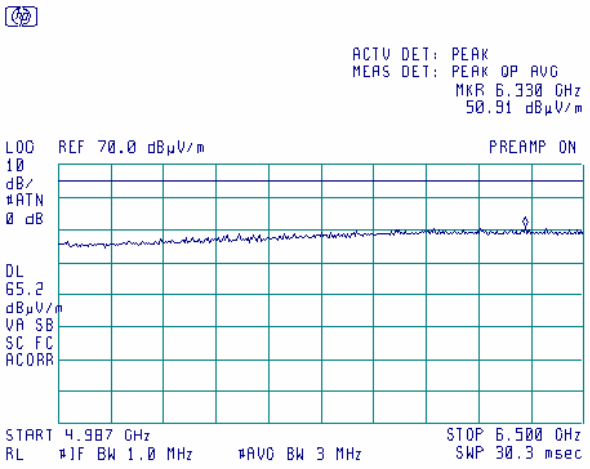
Plot 7.5.17 Radiated emission measurements in 4972 – 6500 MHz range

TEST SITE:	Semi- anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
NOTE:	Upper band-edge: 4965 + (5 MHz + 150 %) = 4972 MHz



Plot 7.5.18 Radiated emission measurements in 4987– 6500 MHz range

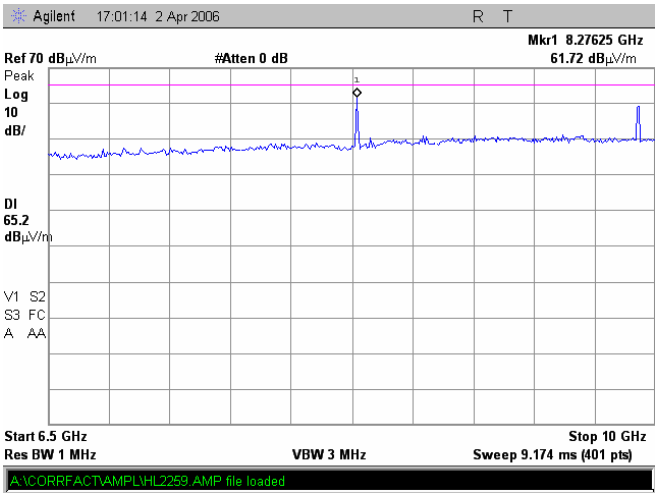
TEST SITE:	Semi- anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
NOTE:	Upper band-edge: 4980 + (5 MHz + 150 %) = 4987 MHz



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

Plot 7.5.19 Radiated emission measurements in 6500 – 10000 MHz range

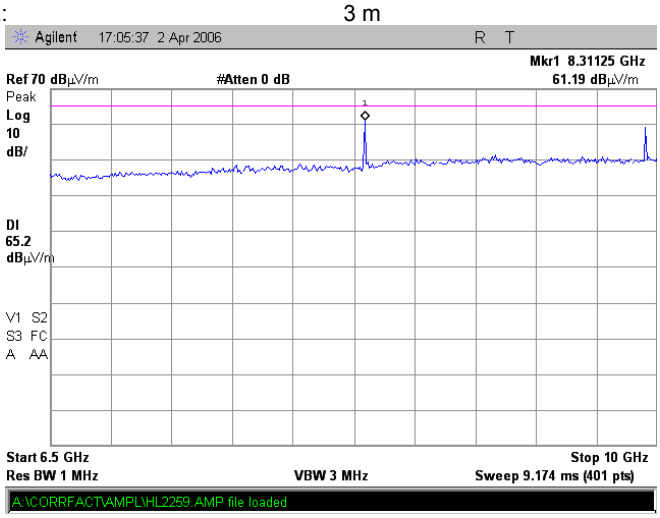
TEST SITE: Semi- anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Note: 9.90 GHz – second harmonic of RF module.

Plot 7.5.20 Radiated emission measurements in 6500 – 10000 MHz range

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

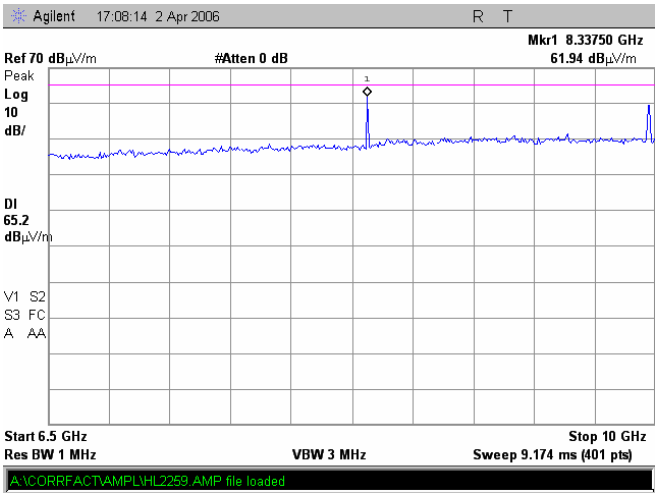


Note: 9.93 GHz – second harmonic of RF module.

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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

Plot 7.5.21 Radiated emission measurements in 6500 – 10000 MHz range

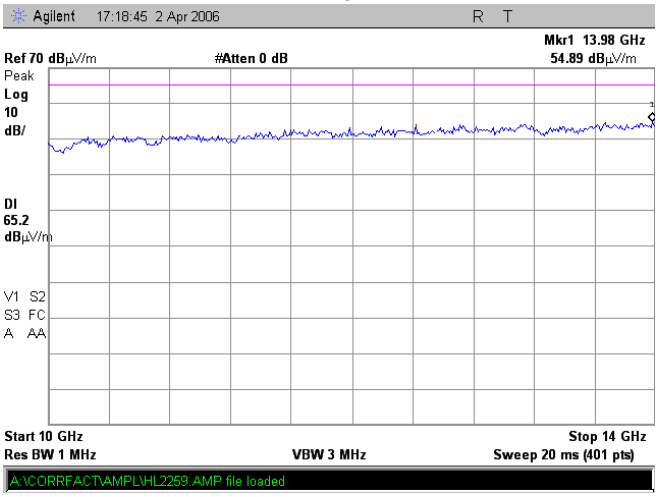
TEST SITE: Semi- anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Note: 9.96 GHz – second harmonic of RF module.

Plot 7.5.22 Radiated emission measurements in 10000 – 14000 MHz range

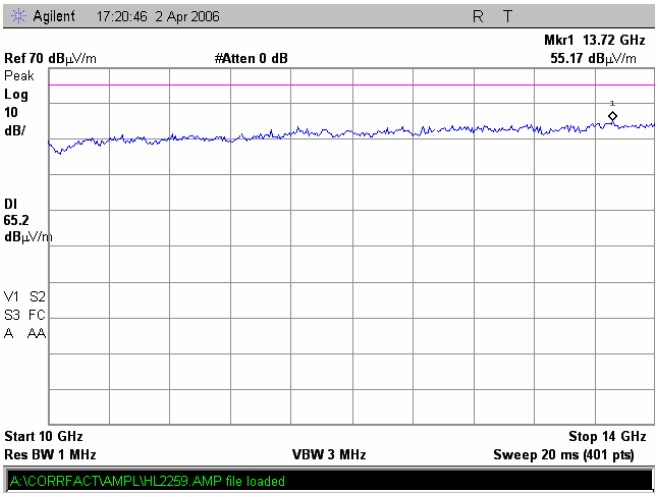
TEST SITE: Semi- anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

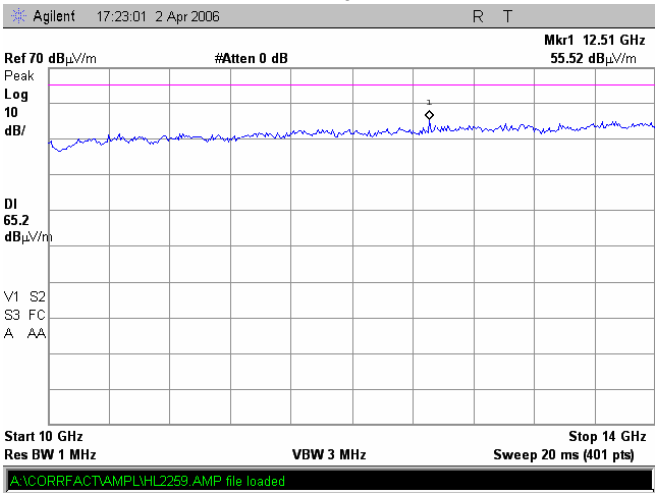
Plot 7.5.23 Radiated emission measurements in 10000 – 14000 MHz range

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



Plot 7.5.24 Radiated emission measurements in 10000 – 14000 MHz range

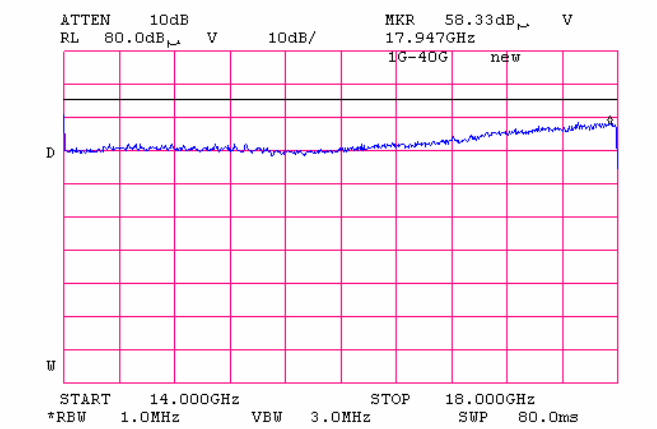
TEST SITE: Semi- anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

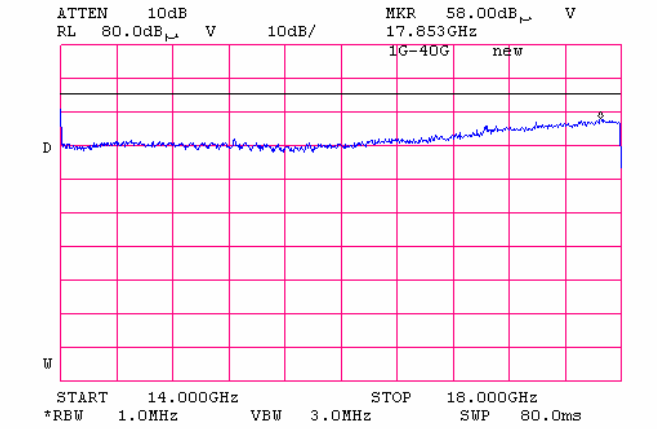
Plot 7.5.25 Radiated emission measurements in 14000 – 18000 MHz range

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



Plot 7.5.26 Radiated emission measurements in 14000 – 18000 MHz range

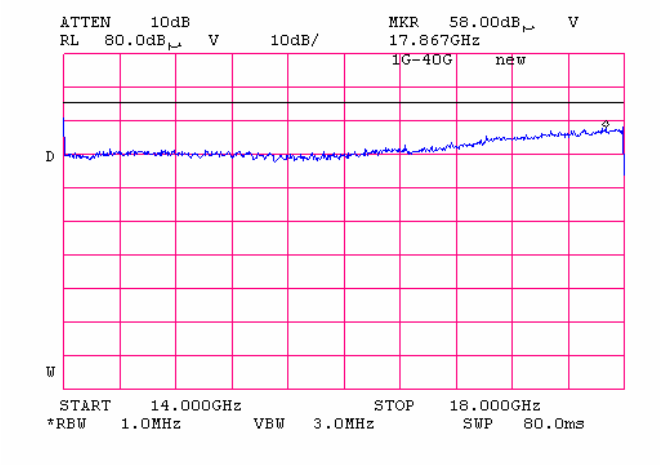
TEST SITE:	OATS
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

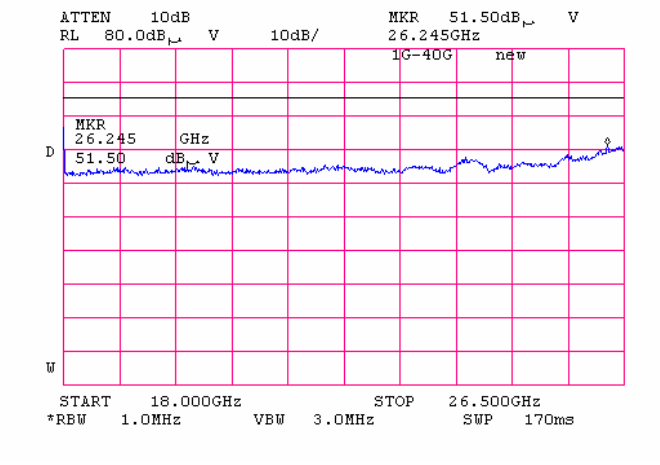
Plot 7.5.27 Radiated emission measurements in 14000 – 18000 MHz range

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



Plot 7.5.28 Radiated emission measurements in 18000 – 26500 MHz range

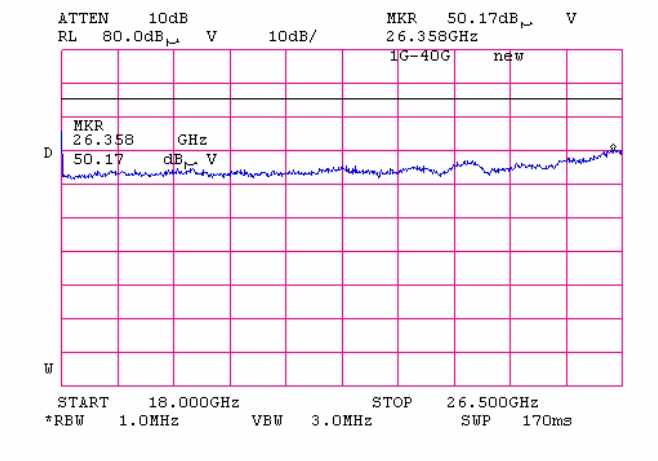
TEST SITE:	OATS
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

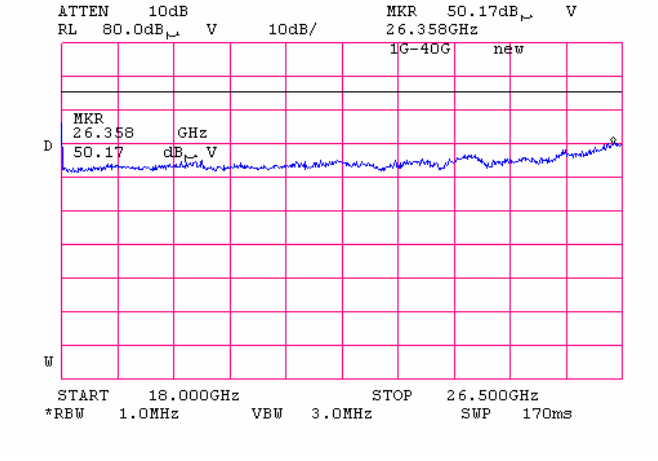
Plot 7.5.29 Radiated emission measurements in 18000 – 26500 MHz range

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



Plot 7.5.30 Radiated emission measurements in 18000 – 26500 MHz range

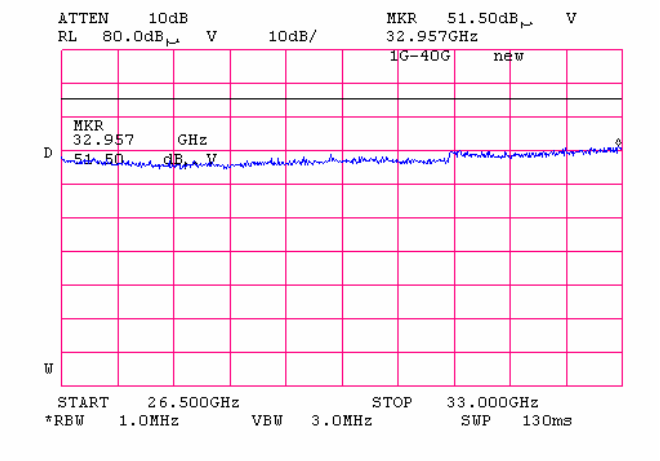
TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

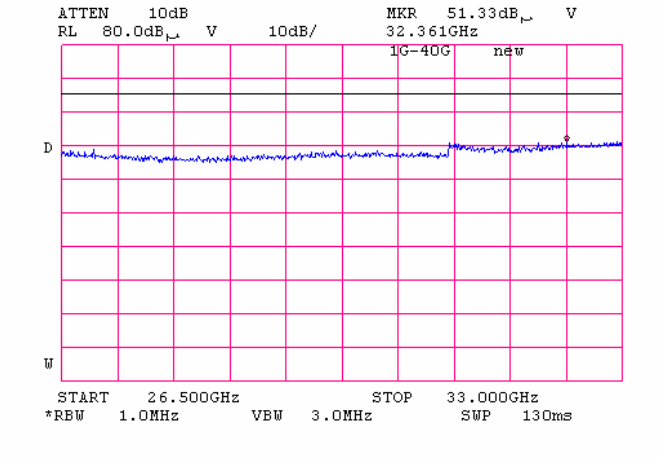
Plot 7.5.31 Radiated emission measurements in 26500 – 33000 MHz range

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



Plot 7.5.32 Radiated emission measurements in 26500 – 33000 MHz range

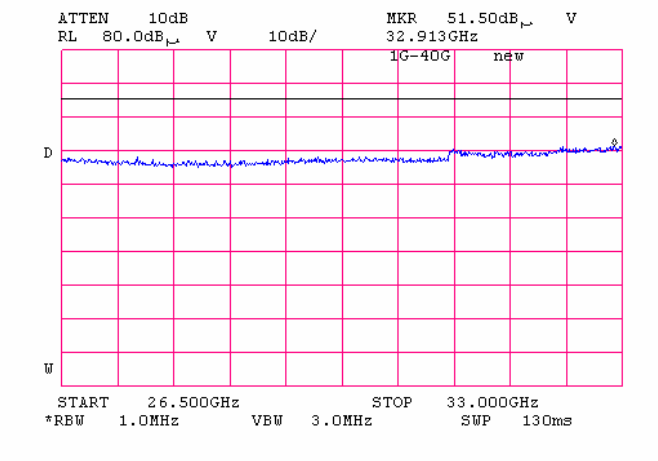
TEST SITE: OATS
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

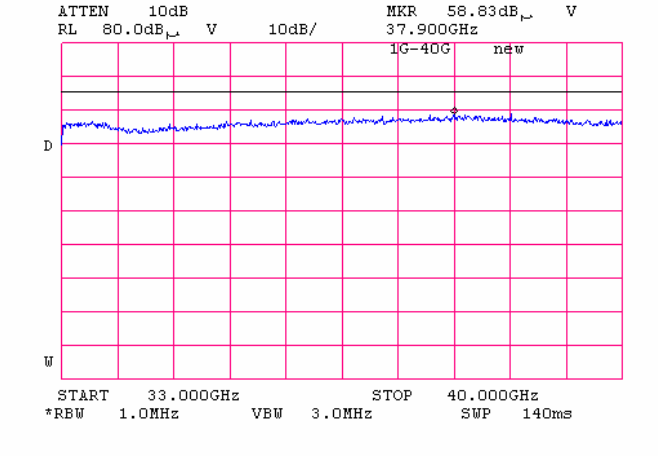
Plot 7.5.33 Radiated emission measurements in 26500 – 33000 MHz range

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



Plot 7.5.34 Radiated emission measurements in 33000 – 40000 MHz range

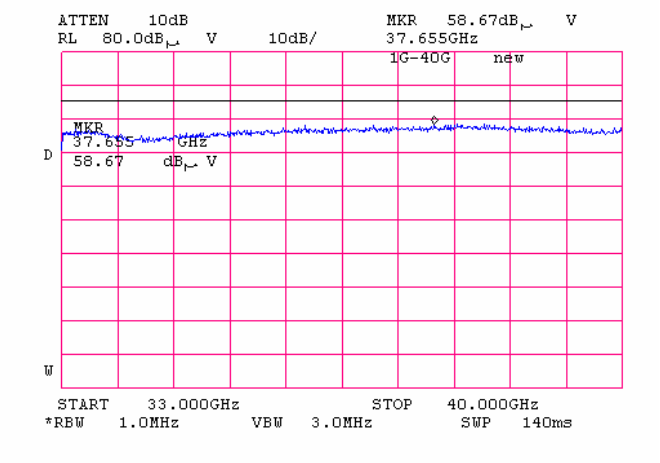
TEST SITE: OATS
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

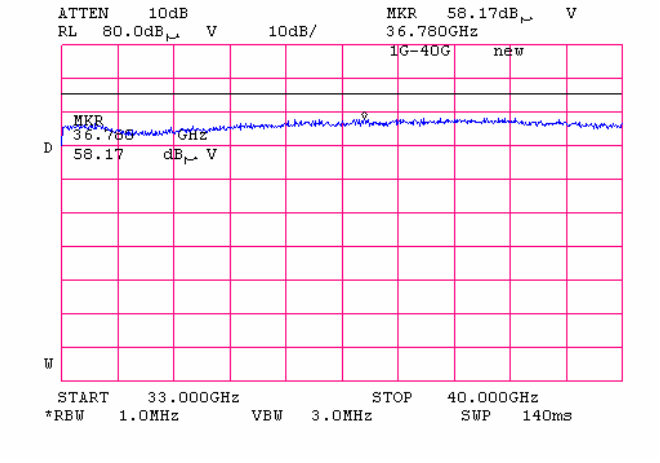
Plot 7.5.35 Radiated emission measurements in 33000 – 40000 MHz range

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



Plot 7.5.36 Radiated emission measurements in 33000 – 40000 MHz range

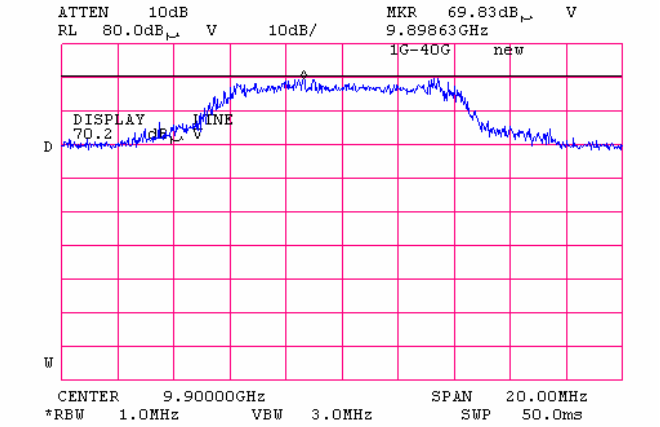
TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	**Section 90.210, 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:	4/2/2006		
Temperature: 22ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 42%	**Power Supply:** 120 V AC
Remarks: EasyST (indoor) unit			

Plot 7.5.37 Radiated emission measurements at the 2nd harmonic

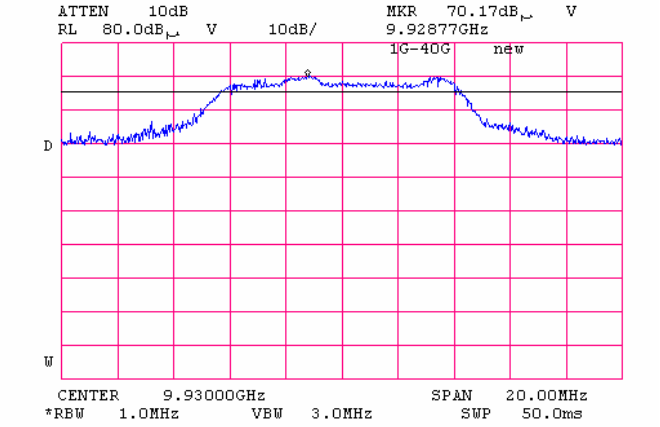
TEST SITE:	OATS
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical & Horizontal
TEST DISTANCE:	3 m



Limit 70.23 dBuV/m according to 90.210 mask M.

Plot 7.5.38 Radiated emission measurements at the 2nd harmonic

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

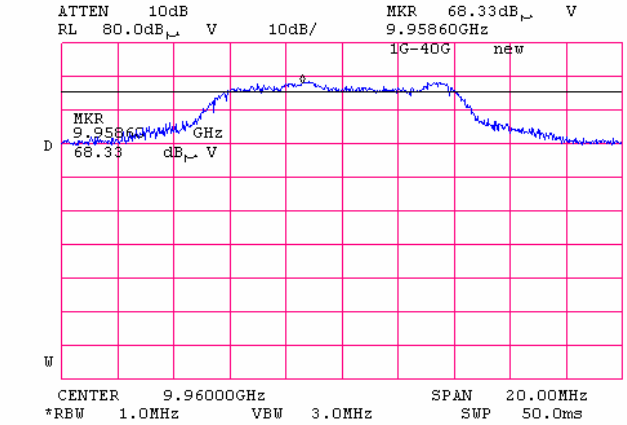


Limit 70.23 dBuV/m according to 90.210 mask M.

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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

Plot 7.5.39 Radiated emission measurements at the 2nd harmonic

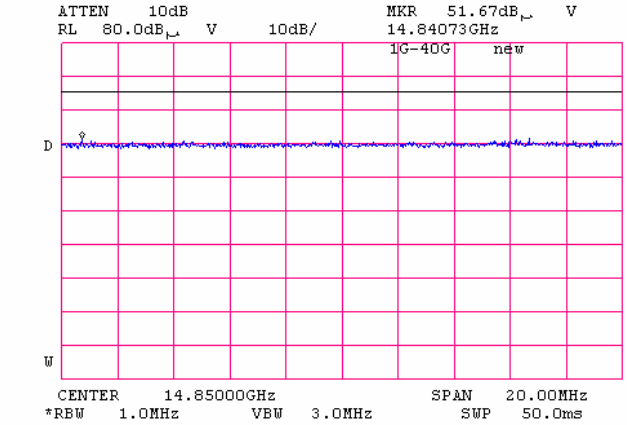
TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical & Horizontal
TEST DISTANCE:	3 m



Limit 70.23 dBuV/m according to 90.210 mask M.

Plot 7.5.40 Radiated emission measurements at the 3rd harmonic

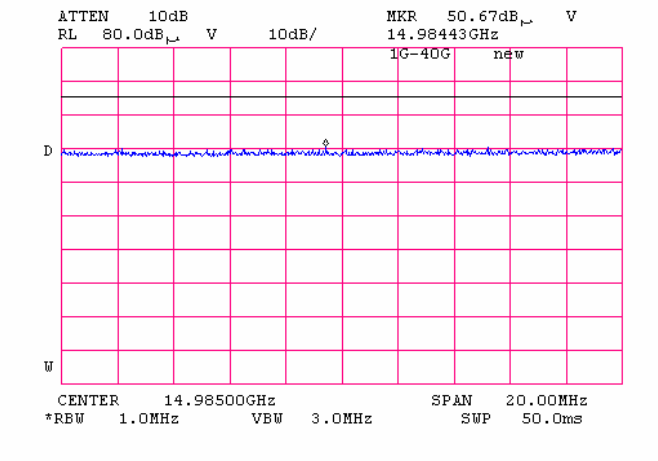
TEST SITE:	OATS
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical & Horizontal
TEST DISTANCE:	3 m



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

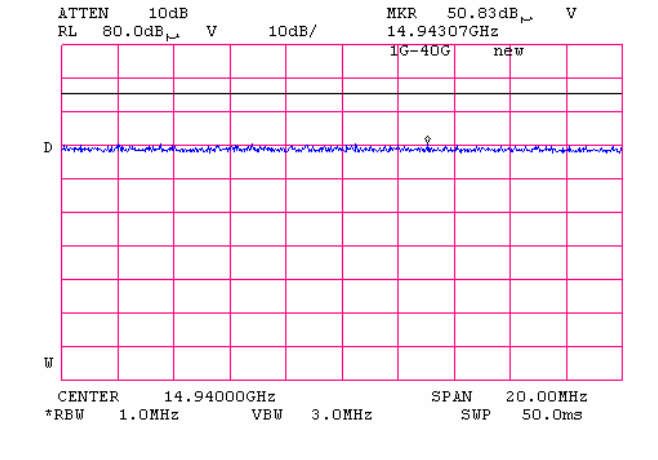
Plot 7.5.41 Radiated emission measurements at the 3rd harmonic

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



Plot 7.5.42 Radiated emission measurements at the 3rd harmonic

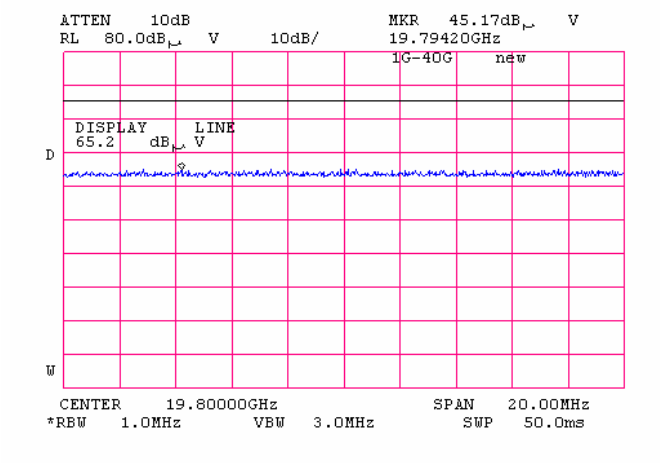
TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical & Horizontal
TEST DISTANCE:	3 m



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

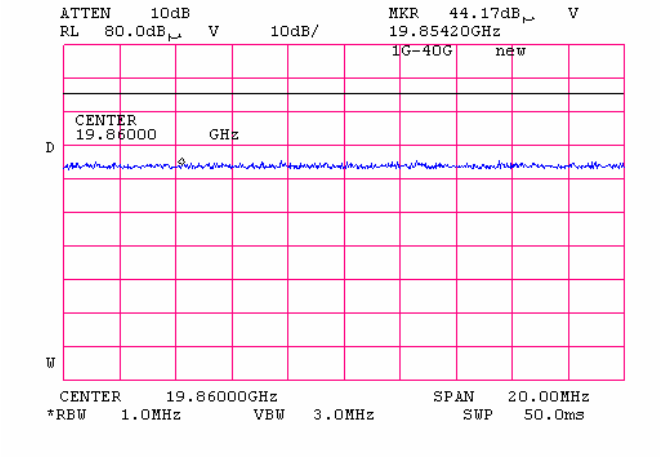
Plot 7.5.43 Radiated emission measurements at the 4rd harmonic

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



Plot 7.5.44 Radiated emission measurements at the 4rd harmonic

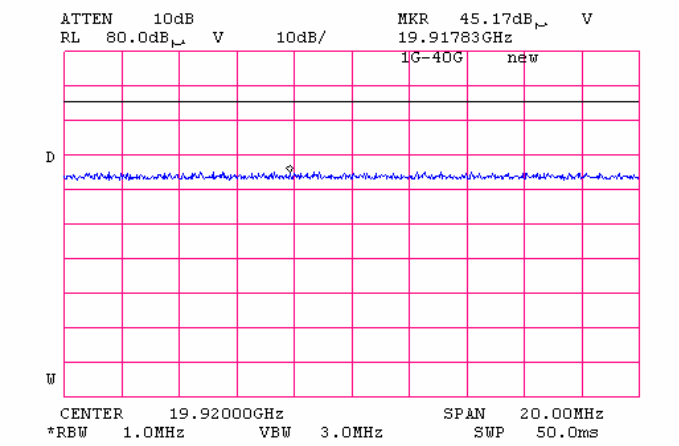
TEST SITE:	OATS
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical & Horizontal
TEST DISTANCE:	3 m



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

Plot 7.5.45 Radiated emission measurements at the 4rd harmonic

TEST SITE:	Vertical & Horizontal
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	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:	4/2/2006		
Temperature: 22ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 42%	**Power Supply:** 120 V AC
Remarks: ProST (outdoor) unit			

Table 7.5.4 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 4940 - 4990 MHz
TEST DISTANCE: 3 m
TEST SITE: 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 (1000 MHz – 18000 MHz)
Standard gain horn (above 18000 MHz)
MODULATING SIGNAL: PRBS
BIT RATE: 2 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Low carrier frequency MHz							
8280	56.50	70.23	-13.73	1000	V	1.3	150
9900	70.33	70.23	0.1	1000	V	1.2	300
Mid carrier frequency MHz							
8310.00	55.00	70.23	-15.23	1000	V	1.5	120
9930	72.17	70.23	1.94	1000	V	1.3	320
High carrier frequency MH							
8339.81	55.33	70.23	-14.9	1000	V	1.5	230
9960	73.00	70.23	2.77	1000	V	1.5	320

*****- Margin = Field strength of spurious – calculated field strength limit.
******- EUT front panel refers to 0 degrees position of turntable.

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:	4/2/2006		
Temperature: 22ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 42%	**Power Supply:** 120 V AC
Remarks: ProST (outdoor) unit			

Table 7.5.5 Substitution ERP of spurious test results

ASSIGNED FREQUENCY RANGE: 4940 - 4990 MHz
TRANSMITTER CARRIER ERP: 20dBm at low frequency
20dBm at mid frequency
20dBm at high frequency
DATA RATE: 2 Mbps
CHANNEL BANDWIDTH: 5 MHz
TEST SITE: OATS
TEST DISTANCE: 3 m
SUBSTITUTION ANTENNA HEIGHT: 0.8 m
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
SUBSTITUTION ANTENNA TYPE: Double ridged guide (1000 MHz – 18000 MHz)

Frequency, MHz	Field strength, dB(µV/m)	RBW, kHz	Antenna polarization	RF generator output, dBm	Ant gain, dBd	Cable loss, dB	ERP, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Low carrier frequency											
8280	56.50	1000	V	-48.17	8.85	2.22	-41.54	61.54	45	-16.54	Pass
9900	70.33	1000	V	-35.34	9.75	2.37	-27.96	47.96	45	-2.96	Pass
Mid carrier frequency											
8310.00	55.00	1000	V	-49.80	8.85	2.22	-43.17	63.17	45	-18.17	Pass
9930	72.17	1000	V	-32.83	9.75	2.37	-25.45	45.45	45	-0.45	Pass
High carrier frequency											
8339.81	55.33	1000	V	-49.17	8.85	2.22	-42.54	62.54	45	-17.54	Pass
9960	73.00	1000	V	-32.57	9.75	2.37	-25.19	45.19	45	-0.19	Pass

*****- Margin = Attenuation below carrier – specification limit.

Reference numbers of test equipment used

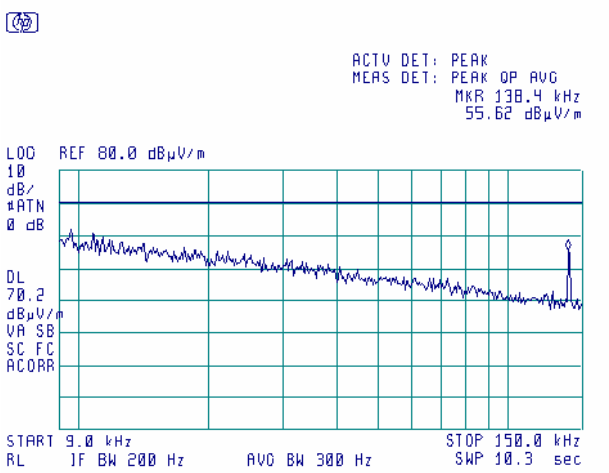
HL 0410	HL 0446	HL 0521	HL 0589	HL 0663	HL 0768	HL 0769	HL 1200
HL 1424	HL 1552	HL 1566	HL 1941	HL 1947	HL 1984	HL 2009	HL 2109
HL 2259	HL 2260	HL 2261	HL 2399	HL 2432	HL 2697	HL 2811	

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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

Plot 7.5.46 Radiated emission measurements in 9 - 150 kHz range

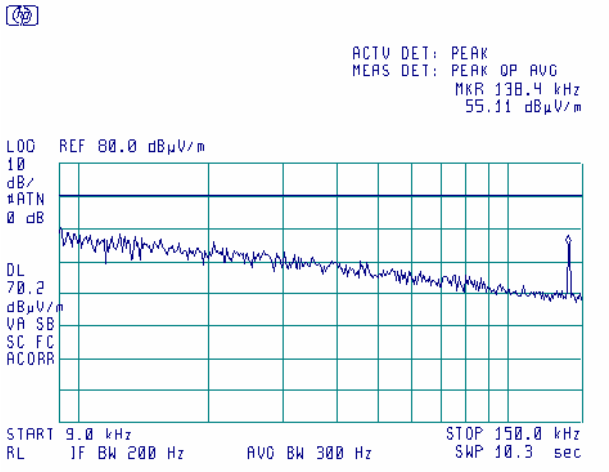
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Spurious from digital part of EUT, no restrictions at this frequency range

Plot 7.5.47 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

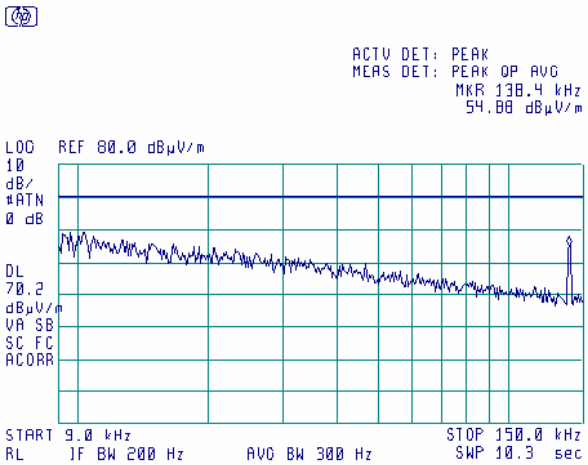


Spurious from digital part of EUT, no restrictions at this frequency range

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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

Plot 7.5.48 Radiated emission measurements in 9 - 150 kHz range

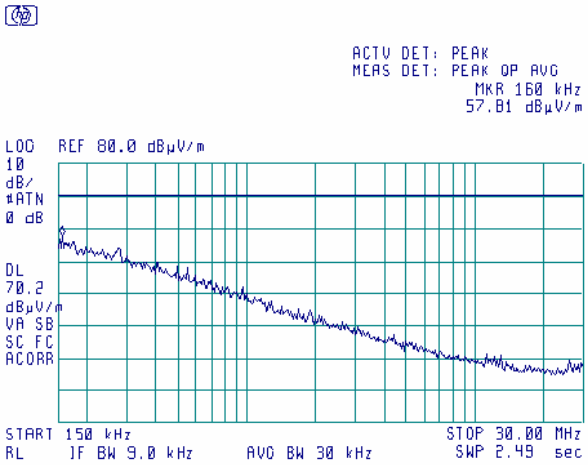
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Spurious from digital part of EUT, no restrictions at this frequency range

Plot 7.5.49 Radiated emission measurements in 0.15 - 30 MHz range

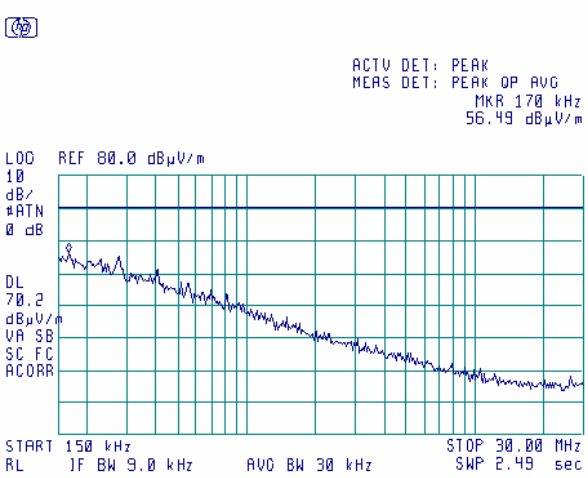
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

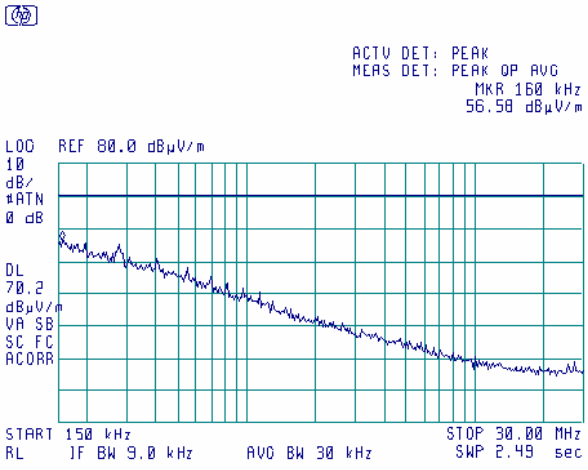
Plot 7.5.50 Radiated emission measurements in 0.15 - 30 MHz range

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



Plot 7.5.51 Radiated emission measurements in 0.15 - 30 MHz range

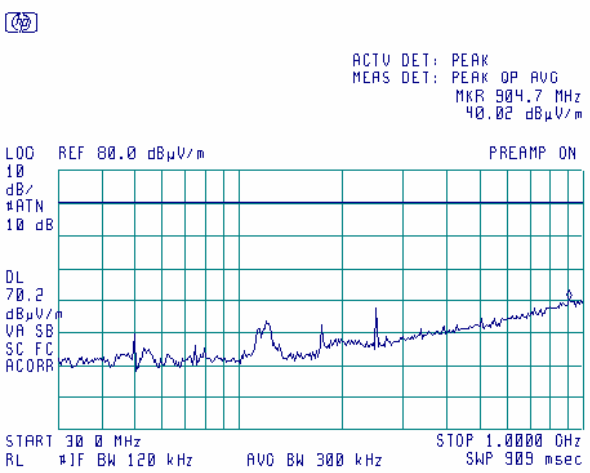
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

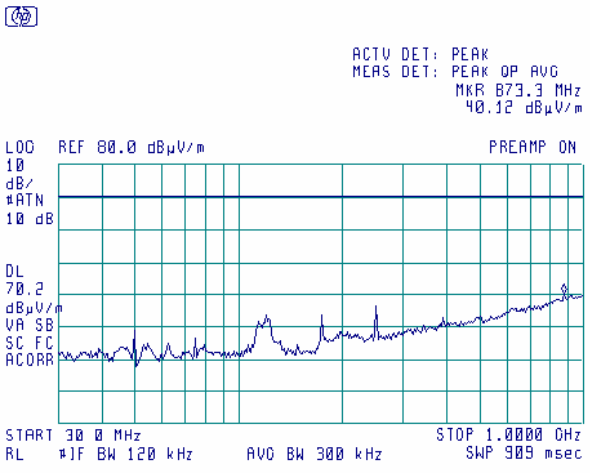
Plot 7.5.52 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.5.53 Radiated emission measurements in 30 - 1000 MHz range

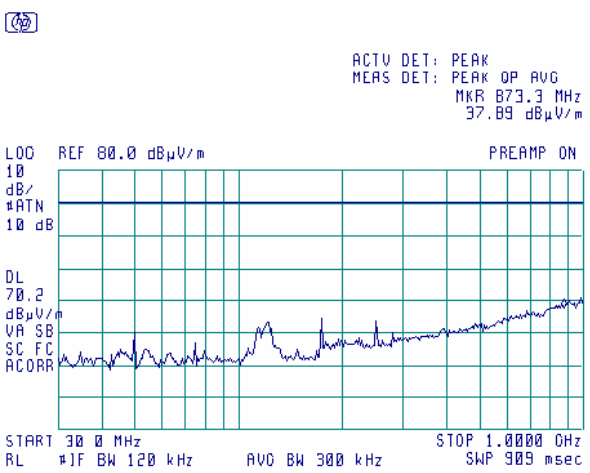
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

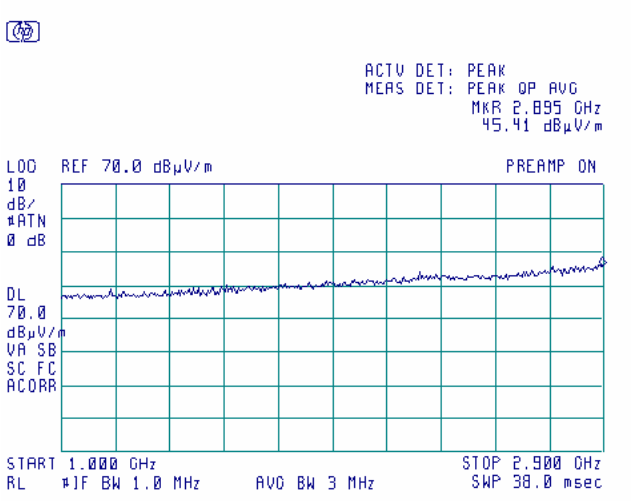
Plot 7.5.54 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.5.55 Radiated emission measurements in 1000 – 2900 MHz range

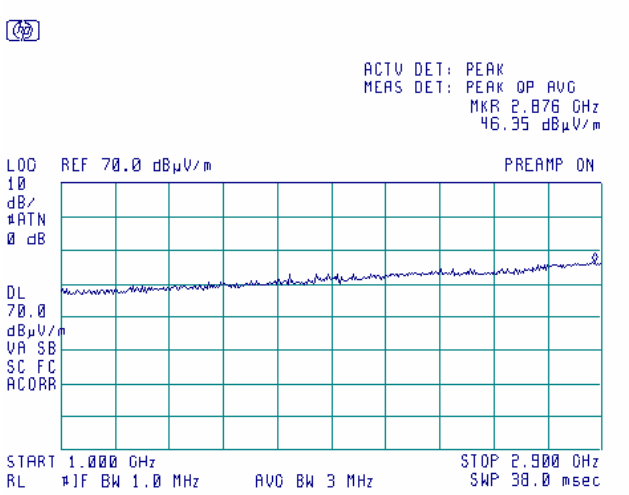
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

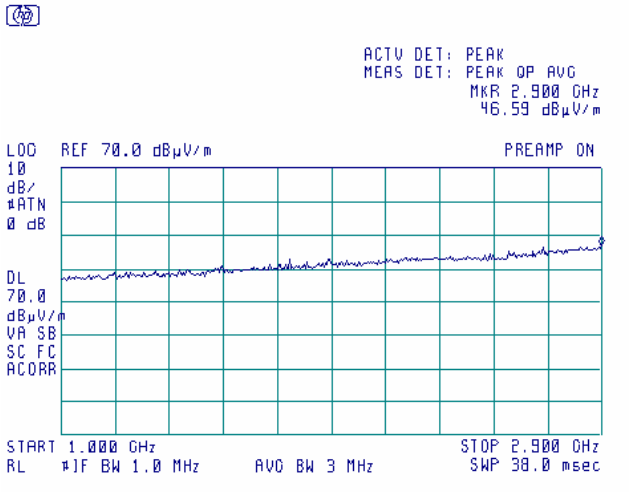
Plot 7.5.56 Radiated emission measurements in 1000 – 2900 MHz range

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



Plot 7.5.57 Radiated emission measurements in 1000 – 2900 MHz range

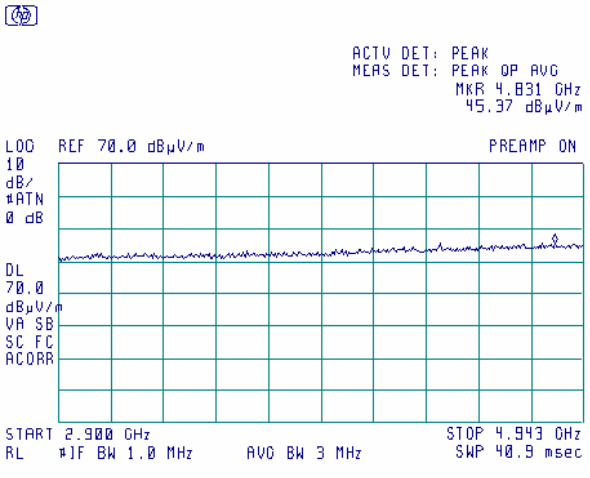
TEST SITE:	Semi- anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

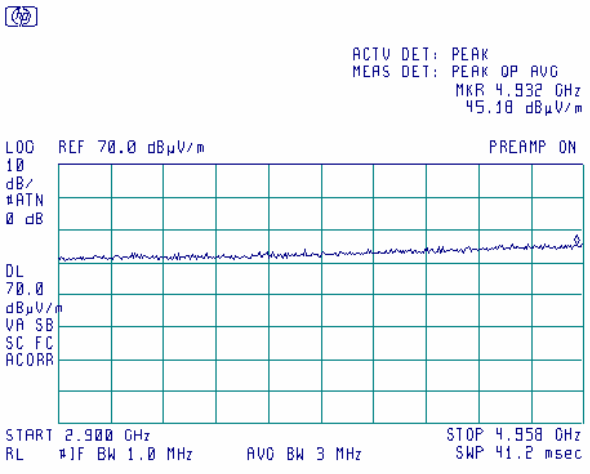
Plot 7.5.58 Radiated emission measurements in 2900 – 4943 MHz range

TEST SITE:	Semi- anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
NOTE:	Lower band-edge: 4950 – (5 MHz + 150 %) = 4943MHz



Plot 7.5.59 Radiated emission measurements in 2900 – 4958 MHz range

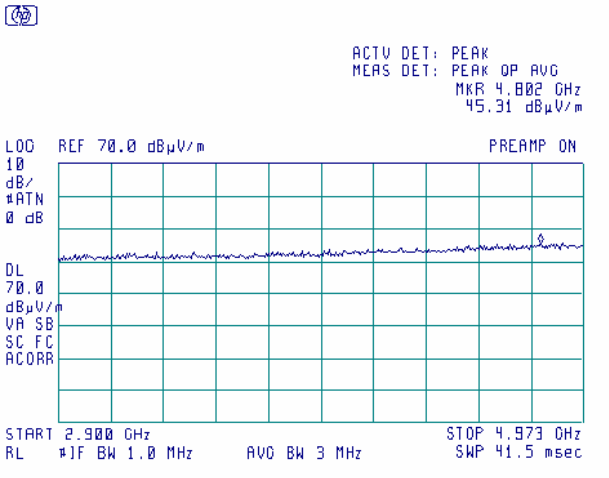
TEST SITE:	Semi- anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
NOTE:	Lower band-edge: 4965 – (5 MHz + 150 %) = 4958 MHz



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

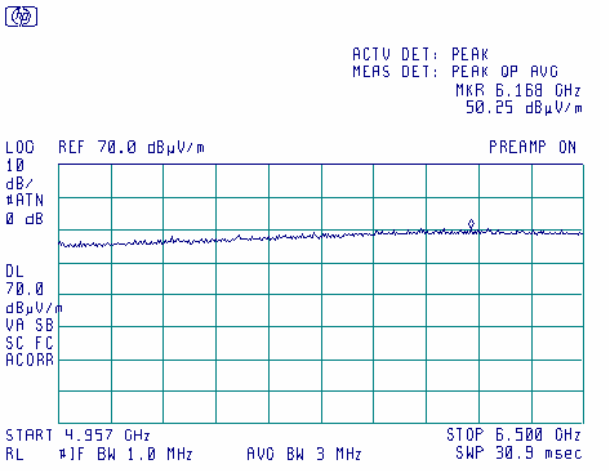
Plot 7.5.60 Radiated emission measurements in 2900 – 4973 MHz range

TEST SITE:	Semi- anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
NOTE:	Lower band-edge: 4980 – (5 MHz + 150 %) = 4973 MHz



Plot 7.5.61 Radiated emission measurements in 4957 – 6500 MHz range

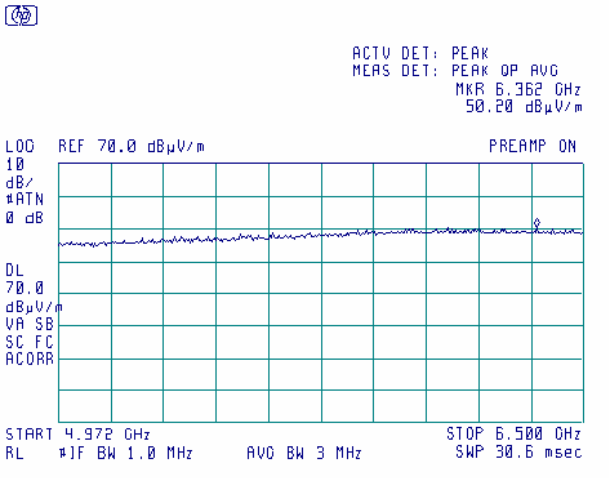
TEST SITE:	Semi- anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
NOTE:	Upper band-edge: 4950 + (5MHz + 150 %) = 4957 MHz



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

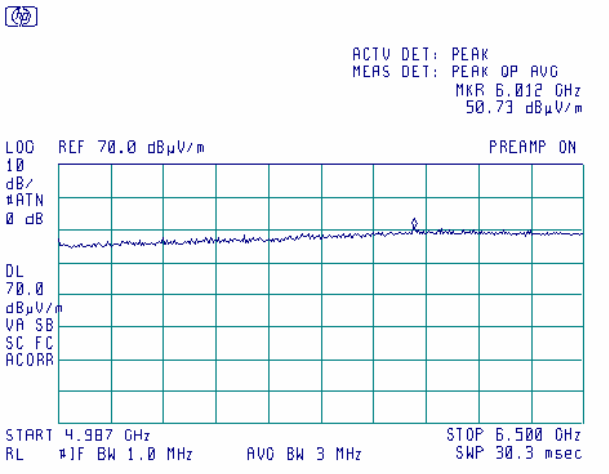
Plot 7.5.62 Radiated emission measurements in 4972 – 6500 MHz range

TEST SITE:	Semi- anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
NOTE:	Upper band-edge: 4965 + (5 MHz + 150 %) = 4972 MHz



Plot 7.5.63 Radiated emission measurements in 4987– 6500 MHz range

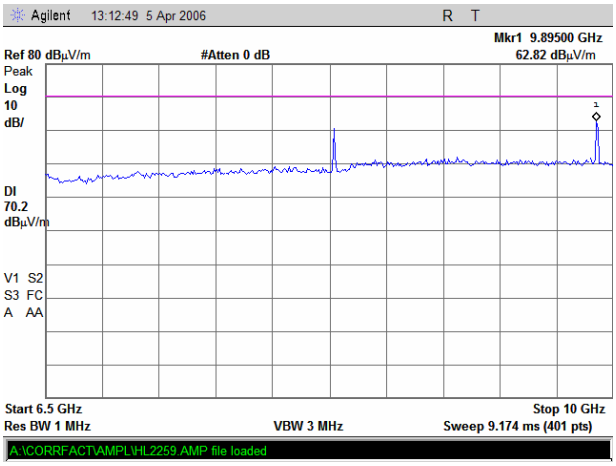
TEST SITE:	Semi- anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
NOTE:	Upper band-edge: 4980 + (5 MHz + 150 %) = 4987 MHz



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

Plot 7.5.64 Radiated emission measurements in 6500 – 10000 MHz range

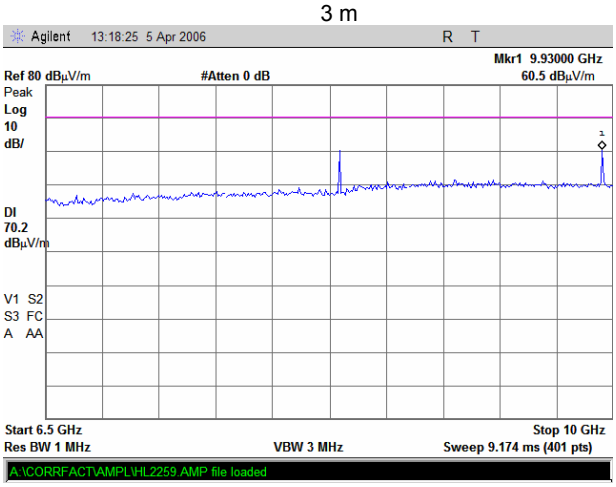
TEST SITE: Semi- anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Note: 9.90 GHz – second harmonic of RF module.

Plot 7.5.65 Radiated emission measurements in 6500 – 10000 MHz range

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

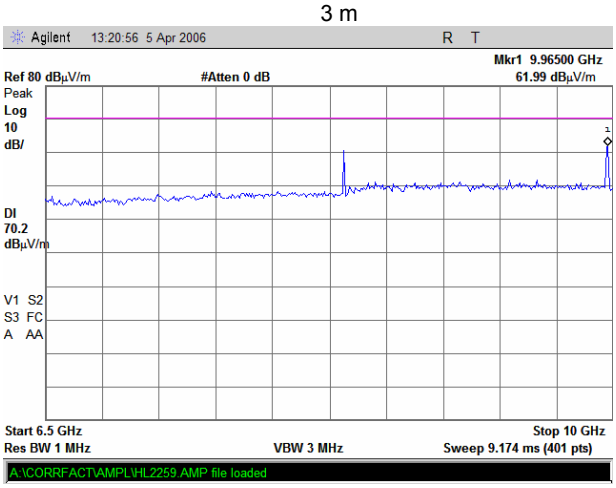


Note: 9.93 GHz – second harmonic of RF module.

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:	4/2/2006		
Temperature: 22ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 42%	**Power Supply:** 120 V AC
Remarks: ProST (outdoor) unit			

Plot 7.5.66 Radiated emission measurements in 6500 – 10000 MHz range

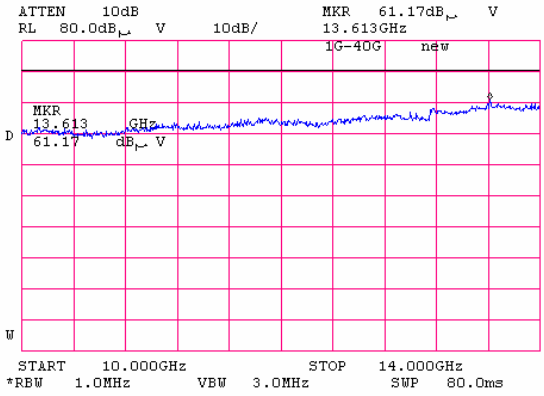
TEST SITE: Semi- anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Note: 9.96 GHz – second harmonic of RF module.

Plot 7.5.67 Radiated emission measurements in 10000 – 14000 MHz range

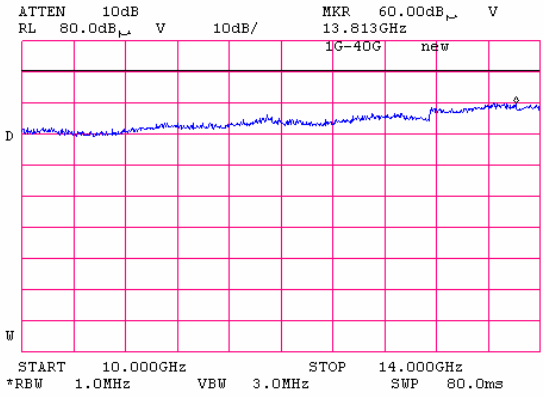
TEST SITE: OATS
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

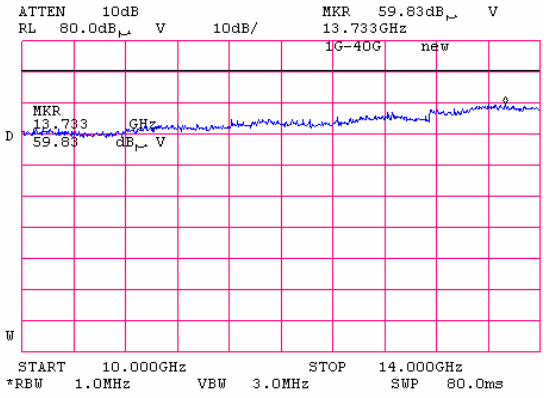
Plot 7.5.68 Radiated emission measurements in 10000 – 14000 MHz range

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



Plot 7.5.69 Radiated emission measurements in 10000 – 14000 MHz range

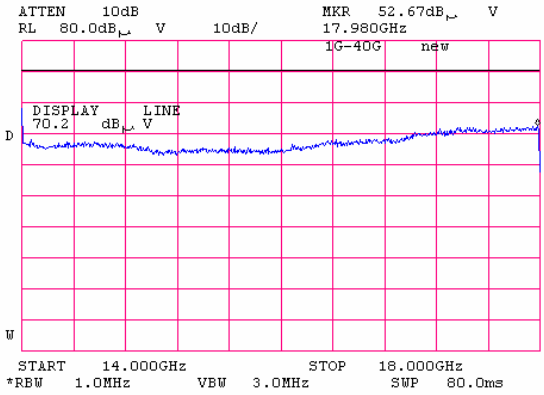
TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

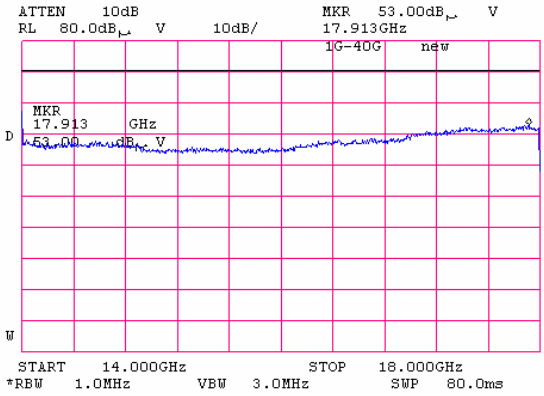
Plot 7.5.70 Radiated emission measurements in 14000 – 18000 MHz range

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



Plot 7.5.71 Radiated emission measurements in 14000 – 18000 MHz range

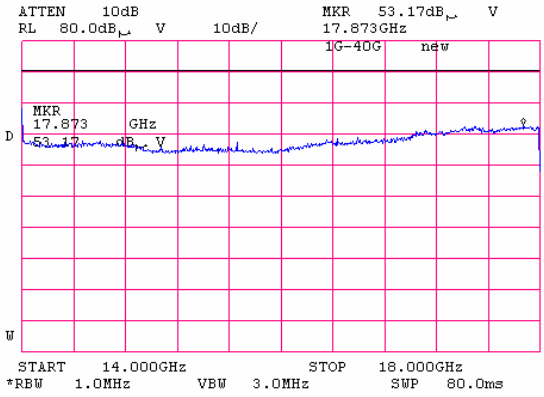
TEST SITE:	OATS
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	**Section 90.210, Radiated spurious emissions**		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/2/2006		
Temperature: 22ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 42%	**Power Supply:** 120 V AC
Remarks: ProST (outdoor) unit			

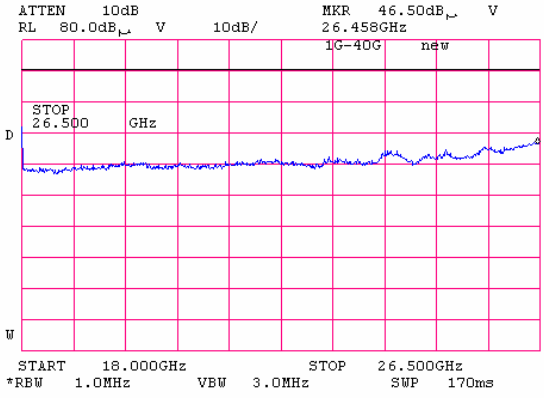
Plot 7.5.72 Radiated emission measurements in 14000 – 18000 MHz range

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



Plot 7.5.73 Radiated emission measurements in 18000 – 26500 MHz range

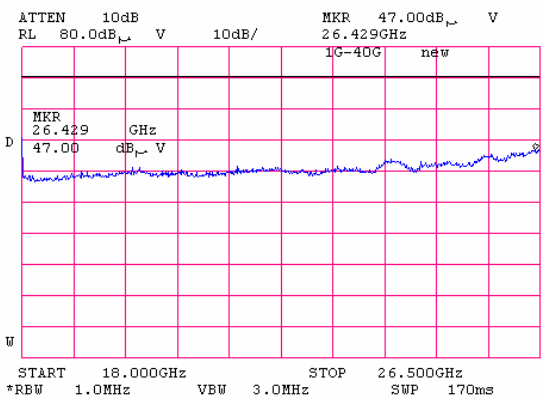
TEST SITE: OATS
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

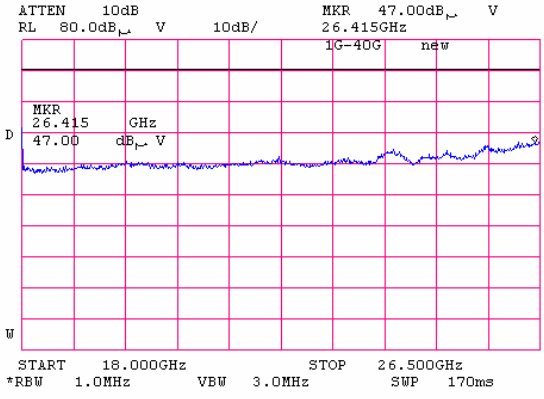
Plot 7.5.74 Radiated emission measurements in 18000 – 26500 MHz range

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



Plot 7.5.75 Radiated emission measurements in 18000 – 26500 MHz range

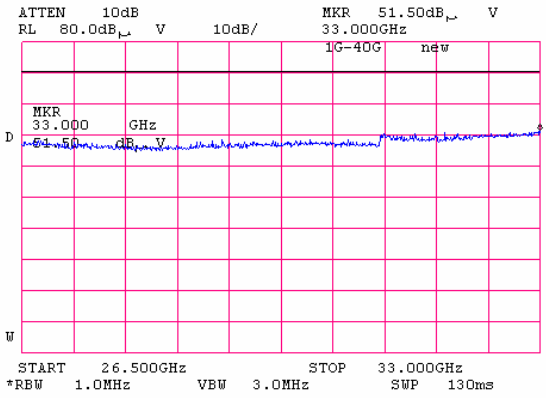
TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

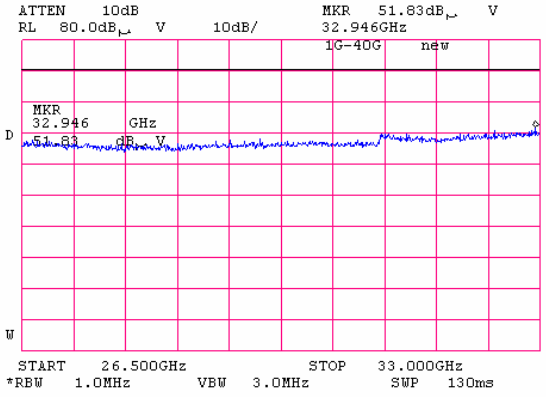
Plot 7.5.76 Radiated emission measurements in 26500 – 33000 MHz range

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



Plot 7.5.77 Radiated emission measurements in 26500 – 33000 MHz range

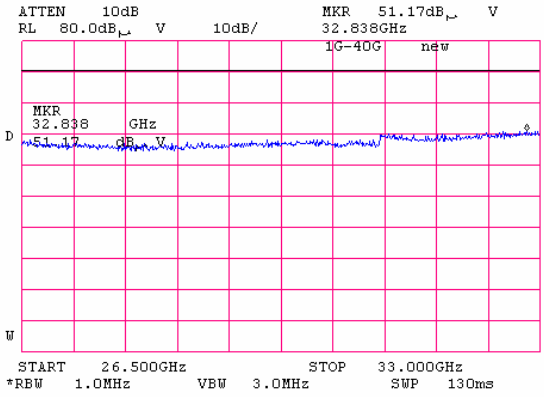
TEST SITE:	OATS
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

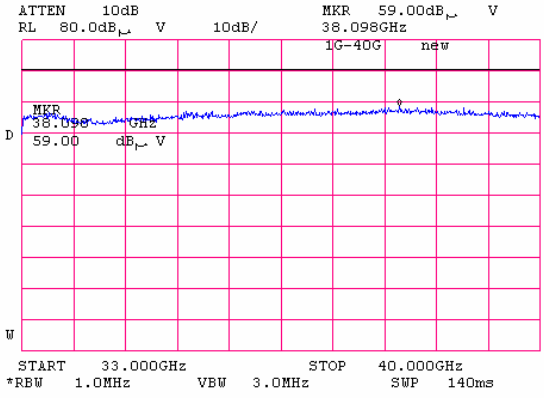
Plot 7.5.78 Radiated emission measurements in 26500 – 33000 MHz range

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



Plot 7.5.79 Radiated emission measurements in 33000 – 40000 MHz range

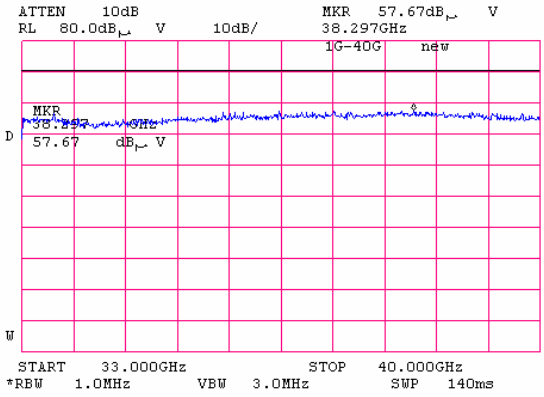
TEST SITE:	OATS
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

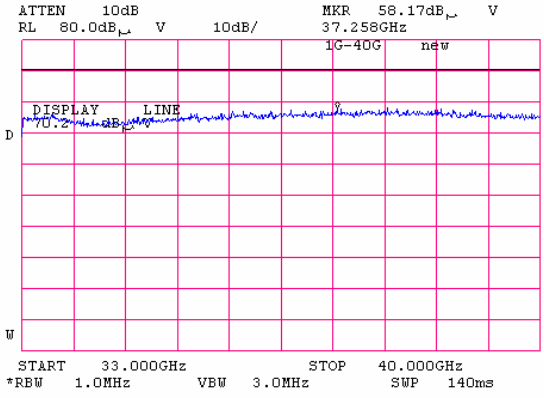
Plot 7.5.80 Radiated emission measurements in 33000 – 40000 MHz range

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



Plot 7.5.81 Radiated emission measurements in 33000 – 40000 MHz range

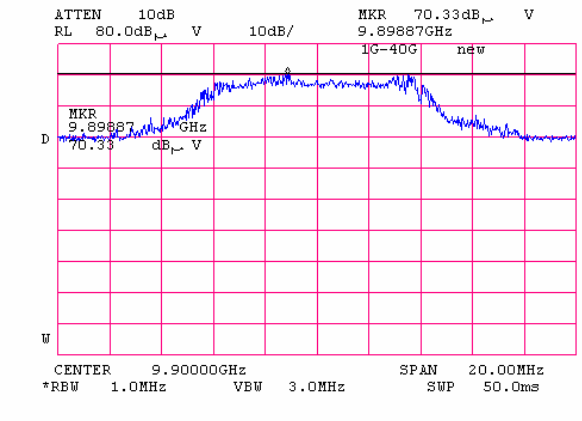
TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.210, 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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

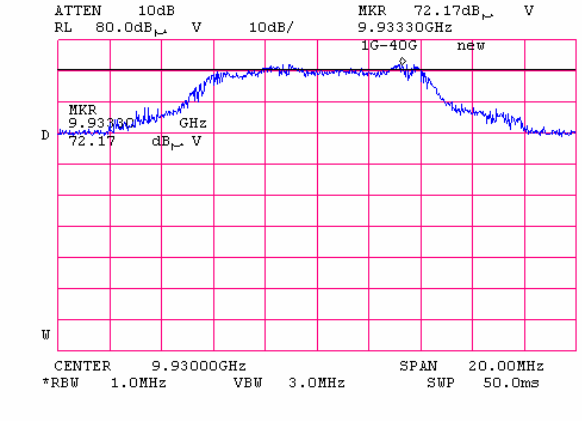
Plot 7.5.82 Radiated emission measurements at the 2nd harmonic

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



Plot 7.5.83 Radiated emission measurements at the 2nd harmonic

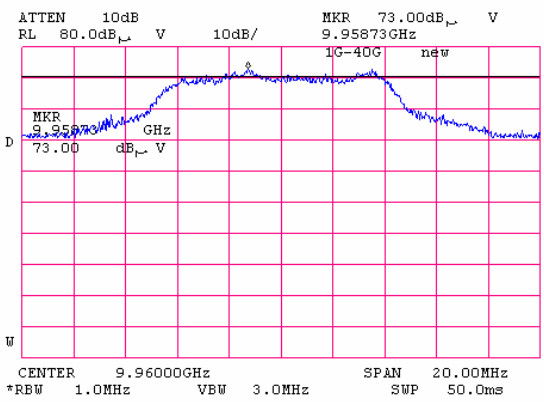
TEST SITE:	OATS
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical & Horizontal
TEST DISTANCE:	3 m



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

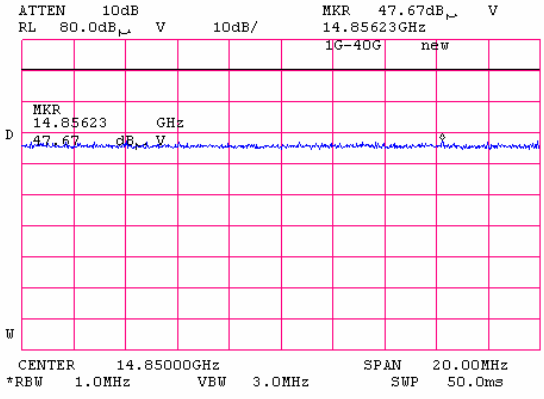
Plot 7.5.84 Radiated emission measurements at the 2nd harmonic

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



Plot 7.5.85 Radiated emission measurements at the 3rd harmonic

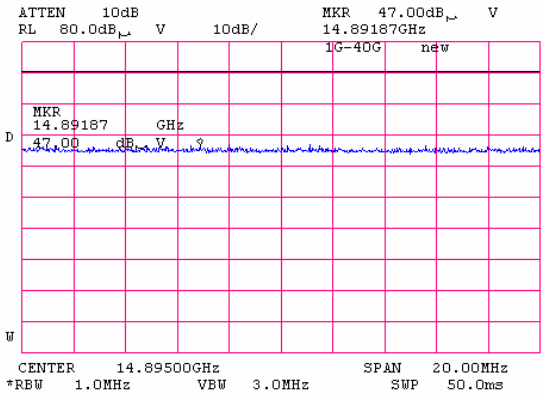
TEST SITE:	OATS
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical & Horizontal
TEST DISTANCE:	3 m



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

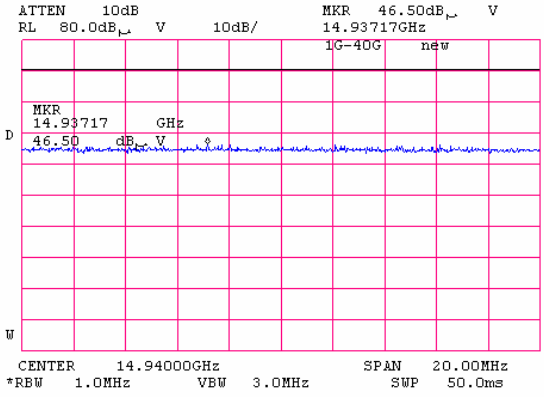
Plot 7.5.86 Radiated emission measurements at the 3rd harmonic

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



Plot 7.5.87 Radiated emission measurements at the 3rd harmonic

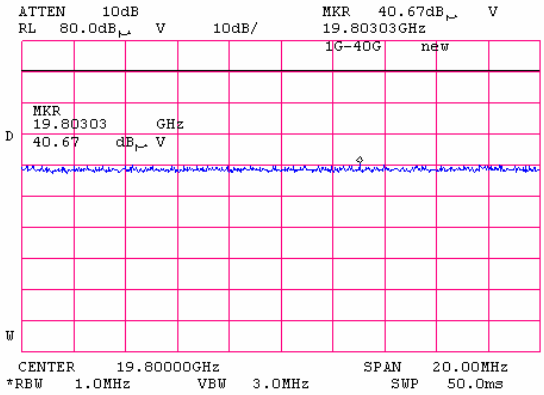
TEST SITE: OATS
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical & Horizontal
TEST DISTANCE: 3 m



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:	4/2/2006		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

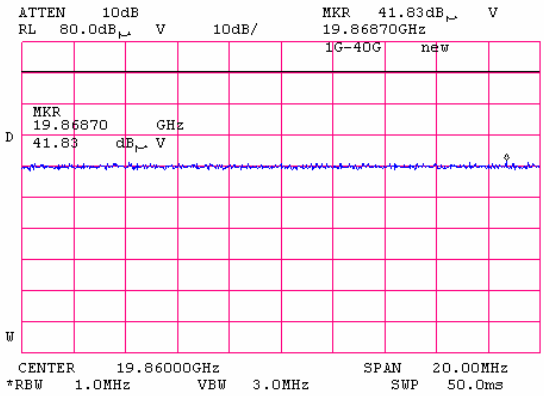
Plot 7.5.88 Radiated emission measurements at the 4rd harmonic

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



Plot 7.5.89 Radiated emission measurements at the 4rd harmonic

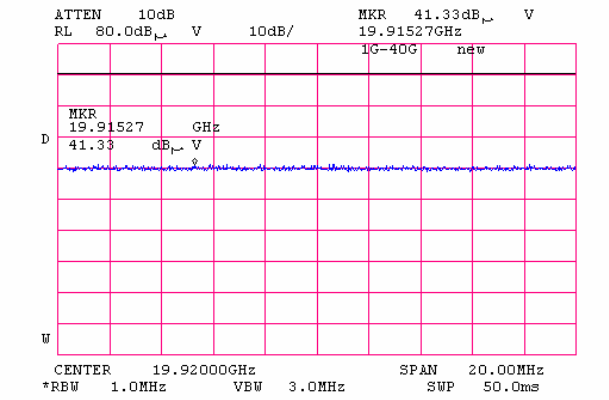
TEST SITE:	OATS
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical & Horizontal
TEST DISTANCE:	3 m



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:	4/2/2006		
Temperature: 22ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 42%	**Power Supply:** 120 V AC
Remarks: ProST (outdoor) unit			

Plot 7.5.90 Radiated emission measurements at the 4rd harmonic

TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical & 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:	3/29/2006		
Temperature: 21ºC	Air Pressure: 1010 hPa	Relative Humidity: 45%	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.

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.

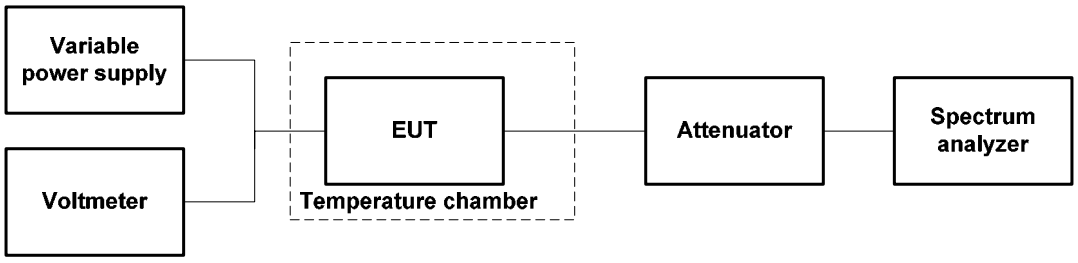
7.6.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

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:	3/29/2006		
Temperature: 21ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 45%	**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: peak
RESOLUTION BANDWIDTH: 1000 Hz
VIDEO BANDWIDTH: 3000 Hz
MODULATION: Unmodulated

T, ºC	Voltage, V	Frequency, MHz							Max frequency drift, Hz		Limit, Hz	Margin, Hz	Verdict
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative			
Low frequency 4950 MHz													
-30	nominal	4949.988000	4949.995000	4949.998000	4950.00000	4950.00300	4950.00300	4950.004000	74000	0		-25000	Pass
-20	nominal	4950.010000	NA	NA	NA	NA	NA	4950.013000	83000	0		-16000	Pass
-10	nominal	4950.013000	NA	NA	NA	NA	NA	4950.012000	83000	0		-16000	Pass
0	nominal	4949.999000	4949.999000	4949.998000	4949.9890	4949.99800	4949.99800	4949.998000	69000	0		-30000	Pass
10	nominal	4949.960000	NA	NA	NA	NA	NA	4949.960000	30000	0		-69000	Pass
20	15%	4949.950000	NA	NA	NA	NA	NA	4949.960000	30000	0	99000	-69000	Pass
20	nominal	4949.950000	NA	NA	NA	NA	NA	4949.930000	20000	0		-79000	Pass
20	-15%	4949.950000	NA	NA	NA	NA	NA	4949.950000	20000	0		-79000	Pass
30	nominal	4949.971000	4949.970000	4949.969000	4949.96700	4949.96600	4949.96600	4949.964000	41000	0		-58000	Pass
40	nominal	4949.960000	NA	NA	NA	NA	NA	4949.958000	30000	0		-69000	Pass
50	nominal	4949.948000	NA	NA	NA	NA	NA	4949.946000	18000	0		-81000	Pass
Mid frequency 4965 MHz													
-30	nominal	4964.998000	4965.003000	4965.003000	4965.00400	4965.00400	4965.00400	4965.004000	28000	0		-71300	Pass
-20	nominal	4965.010000	NA	NA	NA	NA	NA	4965.014000	38000	0		-61300	Pass
-10	nominal	4965.011000	NA	NA	NA	NA	NA	4965.012000	36000	0		-63300	Pass
0	nominal	4964.950000	4964.950000	4964.950000	4964.95100	4964.95100	4964.95100	4964.951000	0	-26000		-73300	Pass
10	nominal	4964.977000	NA	NA	NA	NA	NA	4964.977000	1000	0		-98300	Pass
20	15%	4964.976000	NA	NA	NA	NA	NA	4964.976000	0	0	99300	-99300	Pass
20	nominal	4964.977000	NA	NA	NA	NA	NA	4964.976000	1000	0		-98300	Pass
20	-15%	4964.977000	NA	NA	NA	NA	NA	4964.976000	1000	0		-98300	Pass
30	nominal	4964.965000	4964.964000	4964.964000	4964.96400	4964.96400	4964.96400	4964.964000	0	-12000		-87300	Pass
40	nominal	4964.951000	NA	NA	NA	NA	NA	4964.951000	0	-25000		-74300	Pass
50	nominal	4964.946000	NA	NA	NA	NA	NA	4964.946000	0	-30000		-69300	Pass
High frequency 4980 MHz													
-30	nominal	4979.996000	4980.002000	4980.002000	4980.00200	4980.00200	4980.00200	4980.002000	28000	0		-71600	Pass
-20	nominal	4980.008000	NA	NA	NA	NA	NA	4980.012000	38000	0		-61600	Pass
-10	nominal	4980.010000	NA	NA	NA	NA	NA	4980.010000	36000	0		-63600	Pass
0	nominal	4979.999000	4980.000000	4979.999000	4979.99900	4979.99900	4979.99900	4979.999000	26000	0		-73600	Pass
10	nominal	4979.976000	NA	NA	NA	NA	NA	4979.975000	2000	0		-97600	Pass
20	15%	4979.978000	NA	NA	NA	NA	NA	4979.975000	4000	0	99600	-95600	Pass
20	nominal	4979.975000	NA	NA	NA	NA	NA	4979.974000	1000	0		-98600	Pass
20	-15%	4979.975000	NA	NA	NA	NA	NA	4979.974000	1000	0		-98600	Pass
30	nominal	4979.967000	4979.964000	4979.963000	4979.96300	4979.96200	4979.92100	4979.921000	0	-53000		-46600	Pass
40	nominal	4979.949000	NA	NA	NA	NA	NA	4979.949000	0	-25000		-74600	Pass
50	nominal	4979.943000	NA	NA	NA	NA	NA	4979.944000	0	-31000		-68600	Pass

* - Reference frequency

Reference numbers of test equipment used

HL 0025	HL 0493	HL 495					

Full description is given in Appendix A.

Test specification:	Section 15.107 Conducted emission		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22 ºC	Air Pressure: 1011 hPa	Relative Humidity: 44 %	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

8 Unintentional radiation 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 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 and shown in the associated plots.

Table 8.1.1 Limits for conducted emissions

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

* The limit decreases linearly with the logarithm of frequency.

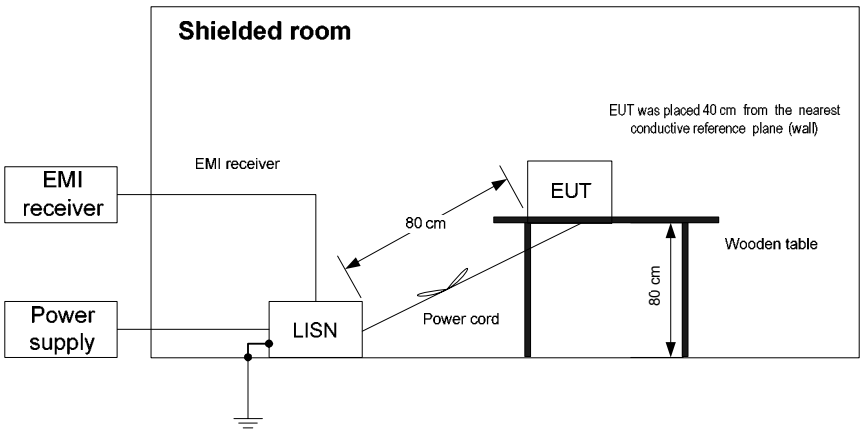
8.1.2 Test procedure

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, Table 8.1.4. 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**		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/4/2006		
Temperature: 22 ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 44 %	**Power Supply:** 120 V AC
Remarks: EasyST (indoor) unit			

Table 8.1.2 Conducted emission test results on the EUT power lines

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*		
0.160251	48.31	39.24	65.50	-26.26	9.39	55.50	-46.11	L1	Pass
0.177485	49.70	40.78	64.66	-23.88	11.64	54.66	-43.02		
0.211417	47.59	38.51	63.21	-24.70	12.70	53.21	-40.51		
0.211417	47.59	38.51	63.21	-24.70	12.70	53.21	-40.51		
0.625802	45.92	44.97	56.00	-11.03	38.32	46.00	-7.68		
1.126652	45.19	44.07	56.00	-11.93	38.68	46.00	-7.32		
0.161073	52.40	44.32	65.46	-21.14	13.22	55.46	-42.24	L2	Pass
0.182123	50.86	42.10	64.43	-22.33	18.23	54.43	-36.20		
0.219003	47.04	37.46	62.92	-25.46	9.68	52.92	-43.24		
1.688423	46.15	42.23	56.00	-13.77	29.98	46.00	-16.02		
1.751107	48.77	44.74	56.00	-11.26	32.41	46.00	-13.59		
7.507620	42.21	39.98	60.00	-20.02	28.92	50.00	-21.08		

*****- Margin = Measured emission - specification limit.

Test specification:	**Section 15.107 Conducted emission**		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/4/2006		
Temperature: 22 ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 44 %	**Power Supply:** 120 V AC
Remarks: EasyST (indoor) unit			

Table 8.1.3 Conducted emission test results on the laptop power lines

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*		
0.153305	66.91	59.54	65.84	-6.30	29.82	55.84	-26.02	L1	Pass
0.193026	61.94	54.16	63.92	-9.76	35.01	53.92	-18.91		
0.204473	61.80	54.27	63.48	-9.21	42.69	53.48	-10.79		
0.226212	58.61	50.67	62.65	-11.98	29.63	52.65	-23.02		
0.246718	55.44	48.31	61.89	-13.58	18.26	51.89	-33.63		
0.290323	52.28	45.06	60.57	-15.51	23.41	50.57	-27.16		
0.150665	64.83	58.18	65.97	-7.79	27.83	55.97	-28.14	L2	Pass
0.171374	62.63	55.59	64.96	-9.37	24.76	54.96	-30.20		
0.192552	62.05	52.57	63.94	-11.37	30.89	53.94	-23.05		
0.214547	59.38	50.97	63.09	-12.12	42.44	53.09	-10.65		
0.226431	56.44	48.66	62.64	-13.98	31.03	52.64	-21.61		
0.229714	58.60	49.85	62.51	-12.66	25.56	52.51	-26.95		

Reference numbers of test equipment used

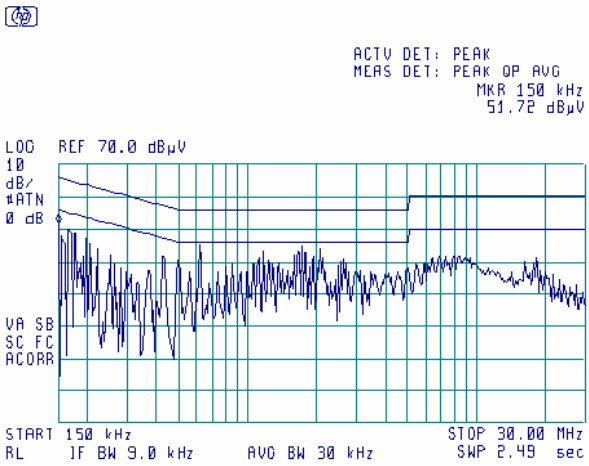
HL 0447	HL 0672	HL 0787	HL 1430	HL 1502	HL 1510		

Full description is given in Appendix A.

Test specification:	Section 15.107 Conducted emission		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22 ºC	Air Pressure: 1011 hPa	Relative Humidity: 44 %	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

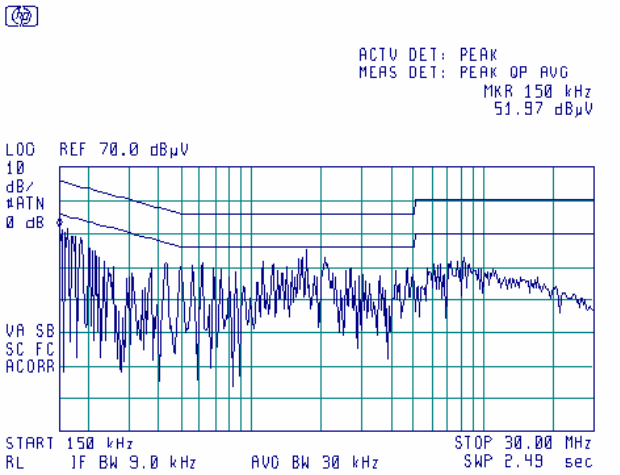
Plot 8.1.1 Conducted emission measurements on the EUT power lines

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



Plot 8.1.2 Conducted emission measurements on the EUT power lines

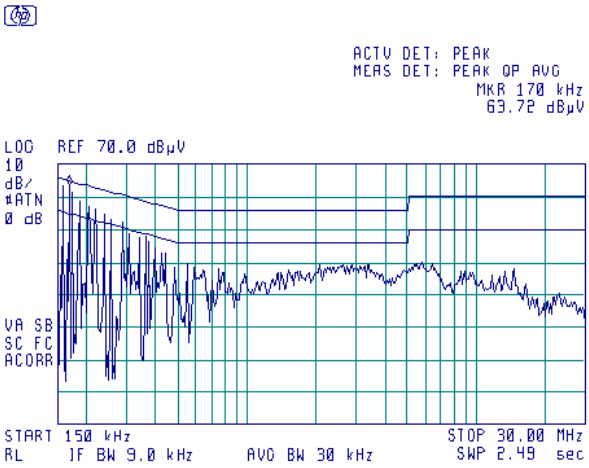
LINE:	L2
LIMIT:	Class B
EUT OPERATING MODE:	Receive / Stand-by
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Test specification:	Section 15.107 Conducted emission		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22 ºC	Air Pressure: 1011 hPa	Relative Humidity: 44 %	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

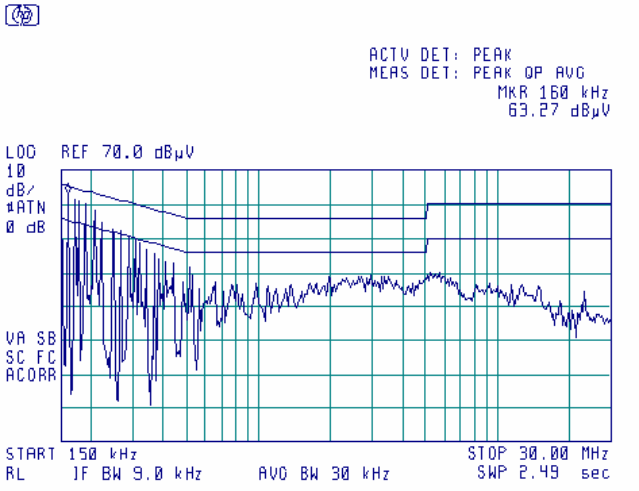
Plot 8.1.3 Conducted emission measurements on the laptop power lines

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



Plot 8.1.4 Conducted emission measurements on the laptop power lines

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



Test specification:	**Section 15.107 Conducted emission**		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/4/2006		
Temperature: 22 ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 44 %	**Power Supply:** 120 V AC
Remarks: ProST (outdoor) unit			

Table 8.1.4 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*		
0.417522	39.41	38.82	57.54	-18.72	36.11	47.54	-11.43	L1	Pass
0.557141	41.29	40.87	56.00	-15.13	38.42	46.00	-7.58		
0.696571	41.19	40.78	56.00	-15.22	39.08	46.00	-6.92		
0.835660	41.47	41.00	56.00	-15.00	38.71	46.00	-7.29		
0.974677	39.57	38.93	56.00	-17.07	37.18	46.00	-8.82		
1.810560	40.13	40.09	56.00	-15.91	40.07	46.00	-5.93		
0.417353	37.71	37.26	57.54	-20.28	36.64	47.54	-10.90	L2	Pass
0.556552	40.11	39.68	56.00	-16.32	38.90	46.00	-7.10		
0.696040	40.30	39.90	56.00	-16.10	39.66	46.00	-6.34		
0.973822	39.24	38.68	56.00	-17.32	37.91	46.00	-8.09		
1.809314	41.58	41.08	56.00	-14.92	41.03	46.00	-4.97		
1.948089	35.81	35.43	56.00	-20.57	35.22	46.00	-10.78		

*****- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

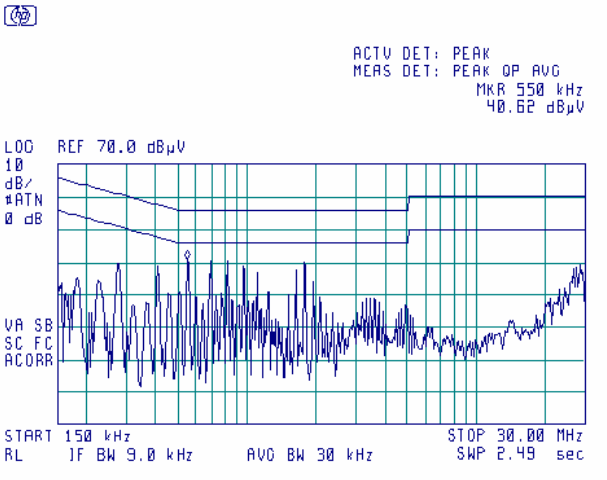
HL 0447	HL 0672	HL 0787	HL 1430	HL 1502	HL 1510		

Full description is given in Appendix A.

Test specification:	**Section 15.107 Conducted emission**		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/4/2006		
Temperature: 22 ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 44 %	**Power Supply:** 120 V AC
Remarks: ProST (outdoor) unit			

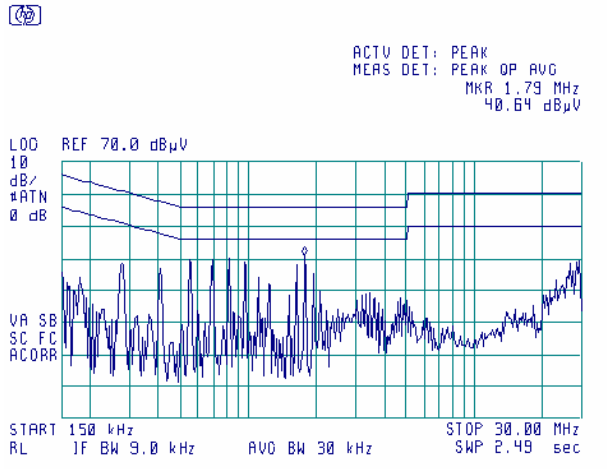
Plot 8.1.5 Conducted emission measurements

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



Plot 8.1.6 Conducted emission measurements

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:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1009 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
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: $Lim_{S2} = Lim_{S1} + 20 \log (S_1/S_2)$,
where S_1 and S_2 – standard defined and test distance respectively in meters.

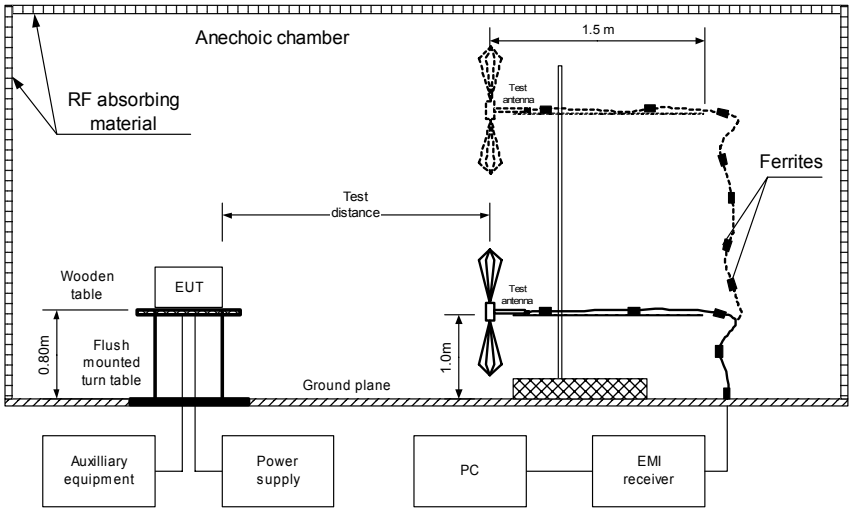
8.2.2 Test procedure for measurements in semi-anechoic chamber

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 360^0, 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, Table 8.2.3 and shown in the associated plots.

Figure 8.2.1 Setup for radiated emission measurements in anechoic chamber, 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:	4/3/2006		
Temperature: 22ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42%	**Power Supply:** 120 V AC
Remarks: EasyST (indoor) unit			

Table 8.2.2 Radiated emission test results

EUT SET UP: TABLE-TOP
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*				
199.215000	44.89	41.03	43.50	-2.47	H	1	165	Pass
221.193750	48.27	45.41	46.00	-0.59	H	1.2	127	
371.000000	46.61	41.27	46.00	-4.73	H	1.2	253	
456.030000	46.62	41.85	46.00	-4.15	V	1	103	
732.462500	35.74	26.76	46.00	-19.24	H	1	120	
783.315000	47.50	43.68	46.00	-2.32	H	1	98	

TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 - 40000 MHz
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*				
1252.82500	40.60	26.41	54.00	-27.59	V	1.2	52	Pass
1794.12500	51.04	32.90	54.00	-21.10	V	1.2	95	

*****- Margin = Measured emission - specification limit.
******- EUT front panel refers to 0 degrees position of turntable.

Reference numbers of test equipment used

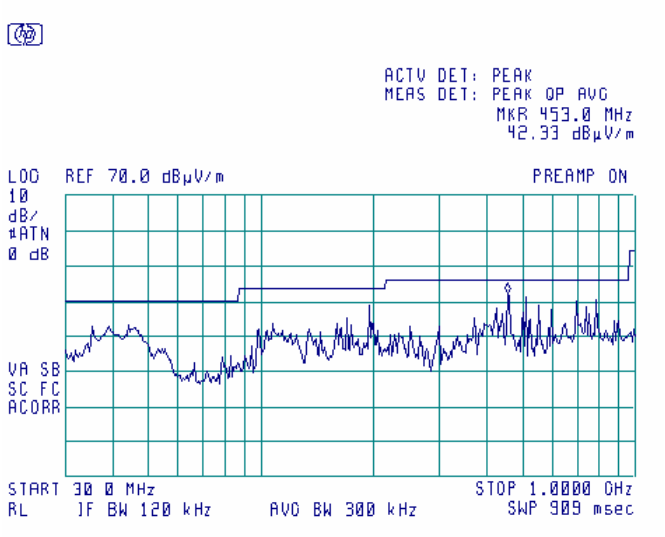
HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604	HL 1947
HL 1984	HL 2009						

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:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1009 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

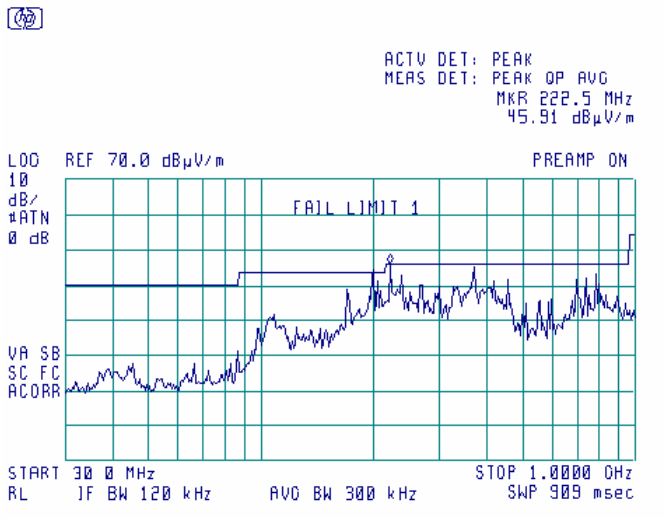
Plot 8.2.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



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

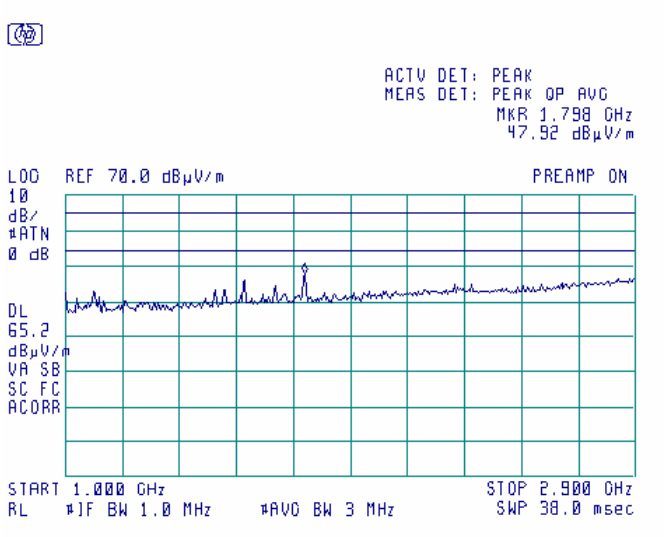
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



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:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1009 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

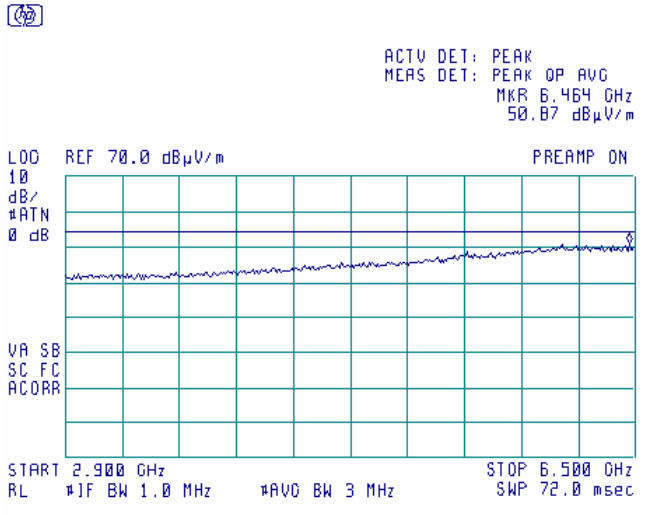
Plot 8.2.3 Radiated emission measurements 1000 -2900MHz, horizontal & vertical antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



Plot 8.2.4 Radiated emission measurements 2900 -6500MHz, horizontal & vertical antenna polarization

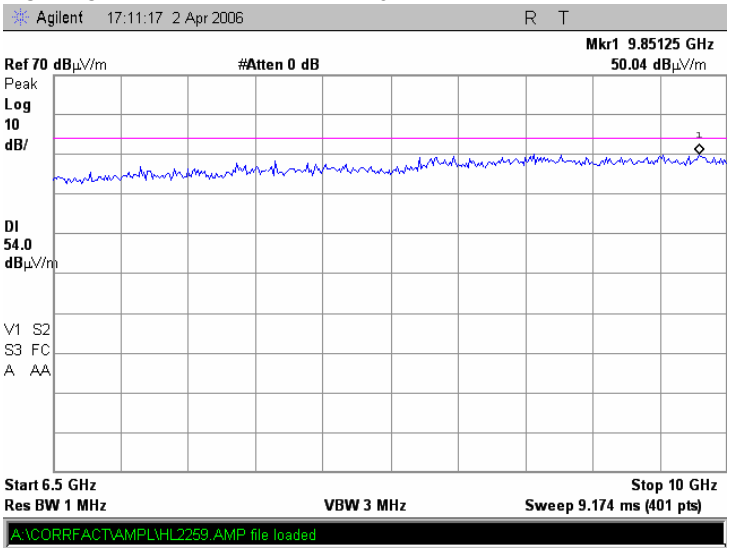
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



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:	4/3/2006		
Temperature: 22ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42%	**Power Supply:** 120 V AC
Remarks: EasyST (indoor) unit			

Plot 8.2.5 Radiated emission measurements 6500 -1000MHz, horizontal & vertical antenna polarization

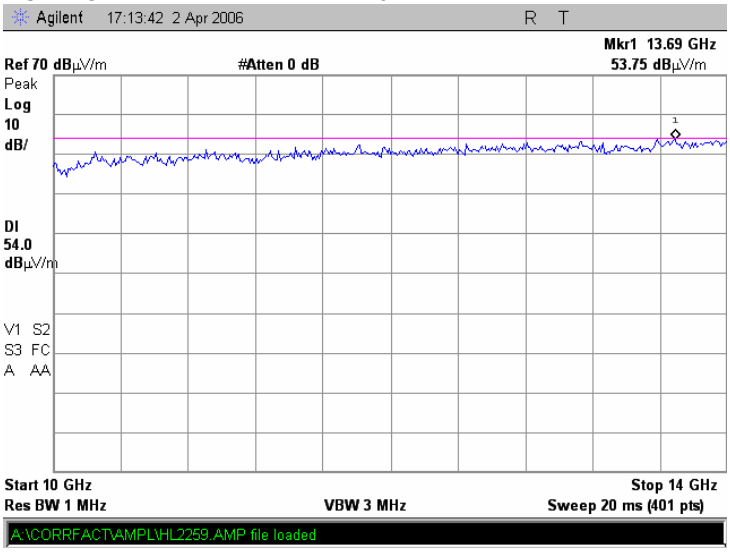
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



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:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1009 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

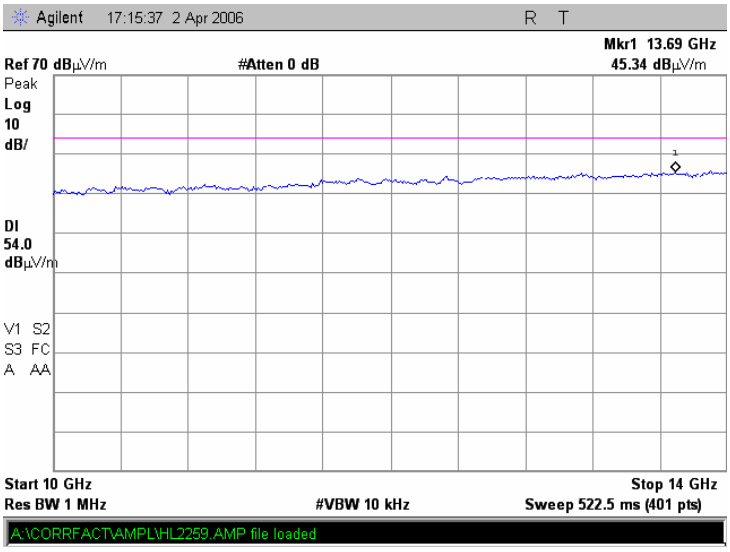
Plot 8.2.6 Radiated emission measurements 10000 -1400MHz, horizontal & vertical antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



Plot 8.2.7 Radiated emission measurements 10000 -1400MHz, horizontal & vertical antenna polarization

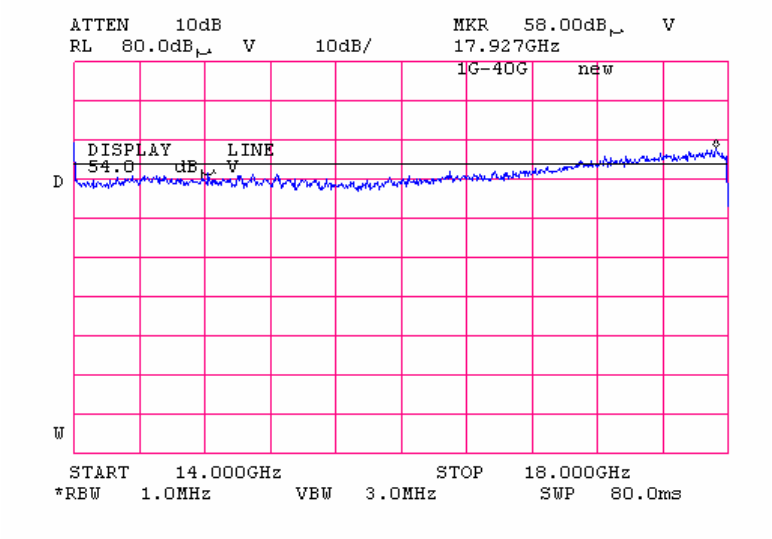
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



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:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1009 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

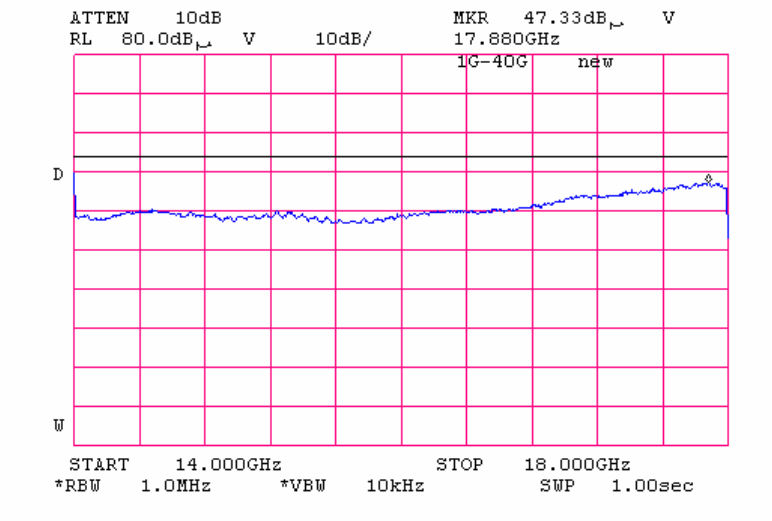
Plot 8.2.8 Radiated emission measurements 14000 -1800MHz, horizontal & vertical antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



Plot 8.2.9 Radiated emission measurements 14000 -1800MHz, horizontal & vertical antenna polarization

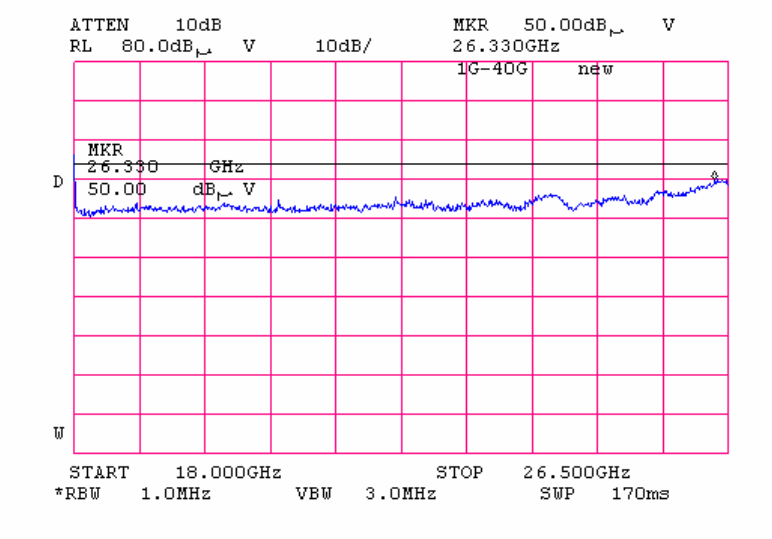
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



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:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1009 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

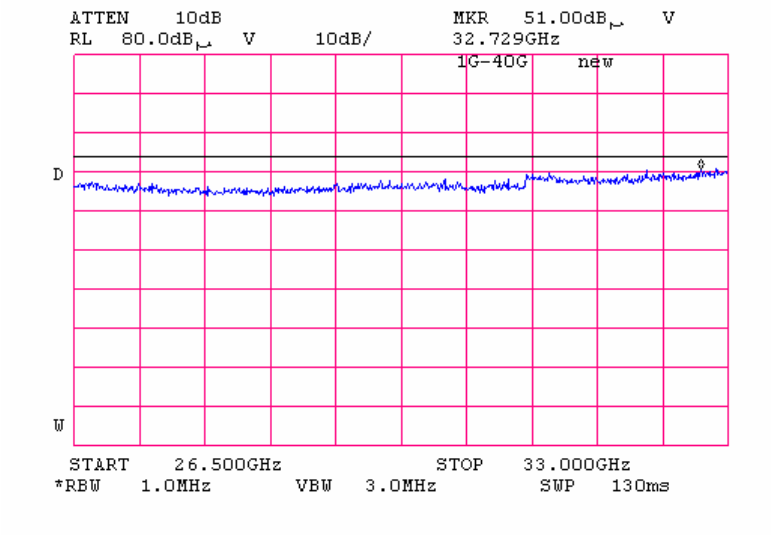
Plot 8.2.10 Radiated emission measurements 18000 -26500MHz, horizontal & vertical antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



Plot 8.2.11 Radiated emission measurements 26500 -33000MHz, horizontal & vertical antenna polarization

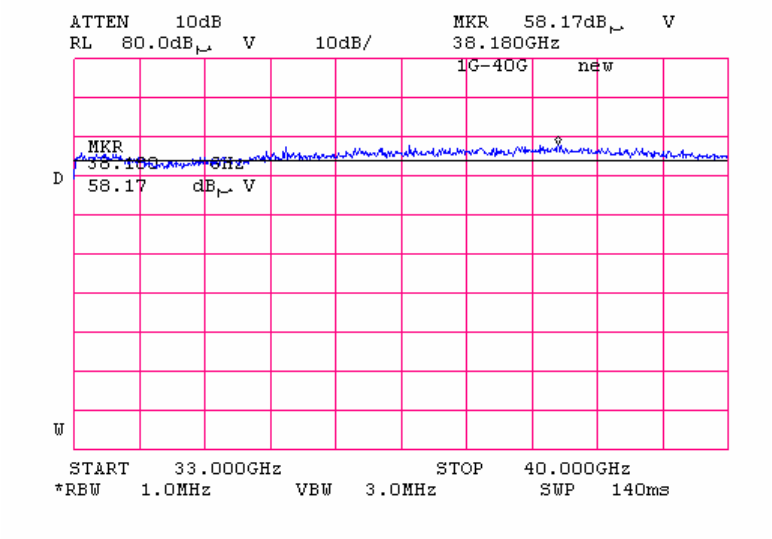
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



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:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1009 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: EasyST (indoor) unit			

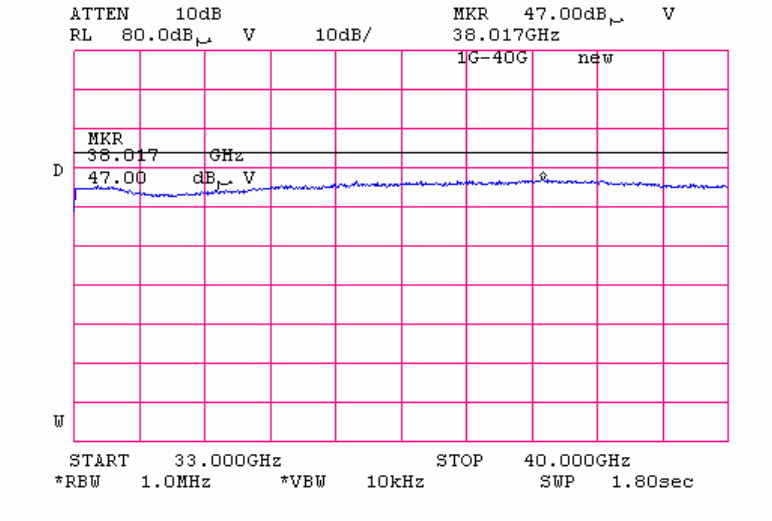
Plot 8.2.12 Radiated emission measurements 33000 -40000MHz, horizontal & vertical antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



Plot 8.2.13 Radiated emission measurements 33000 -40000MHz, horizontal & vertical antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



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:	4/3/2006		
Temperature: 22ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42%	**Power Supply:** 120 V AC
Remarks: ProST (outdoor) unit			

Table 8.2.3 Radiated emission test results

EUT SET UP: TABLE-TOP
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*				
50.000000	28.27	27.03	40.00	-12.97	V	1	0	Pass
175.007500	39.05	38.13	43.50	-5.37	H	1	100	
250.011250	36.76	35.89	46.00	-10.11	H	1.2	120	
392.007500	31.08	27.54	46.00	-18.46	H	1	321	
500.000000	35.70	34.03	46.00	-11.97	H	1	129	

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 - 40000 MHz
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*				
7907.5	61.17	48.50	54	-2.50	H	1.2	320	Pass

*****- Margin = Measured emission - specification limit.
******- EUT front panel refers to 0 degrees position of turntable.

Reference numbers of test equipment used

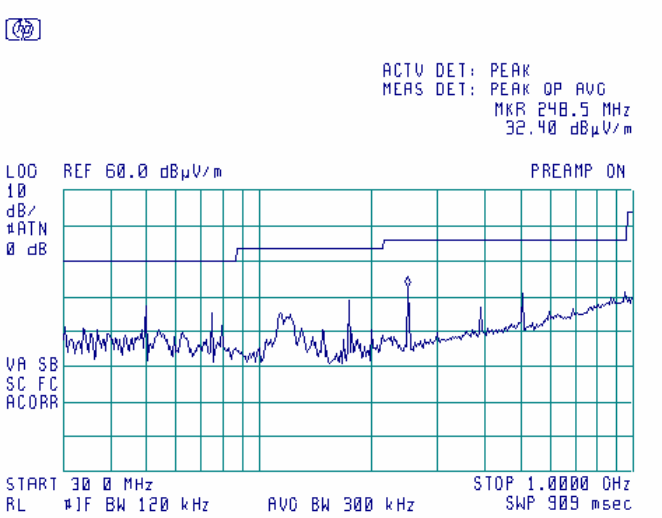
HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604	HL 1947
HL 1984	HL 2009						

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:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1009 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

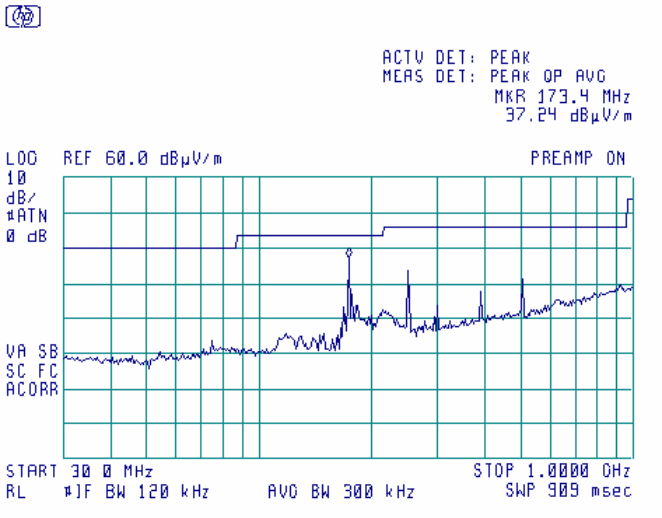
Plot 8.2.14 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



Plot 8.2.15 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization

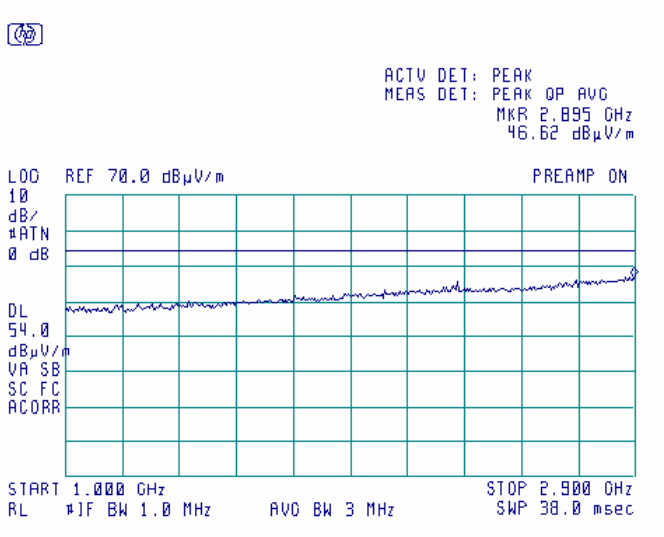
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



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:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1009 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

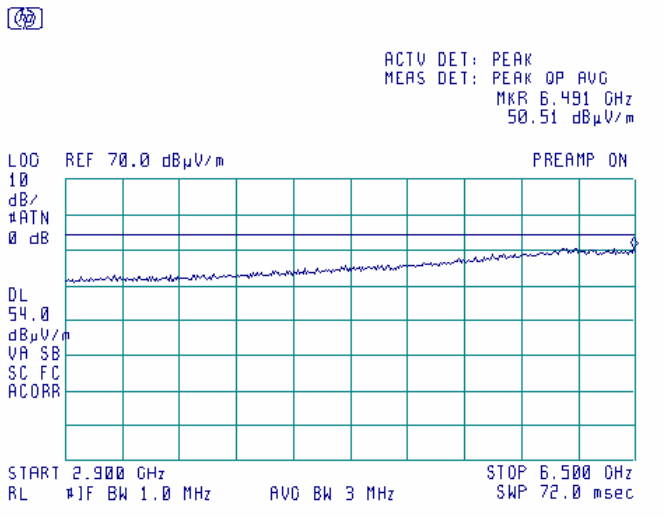
Plot 8.2.16 Radiated emission measurements 1000 -2900MHz, horizontal & vertical antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



Plot 8.2.17 Radiated emission measurements 2900 -6500MHz, horizontal & vertical antenna polarization

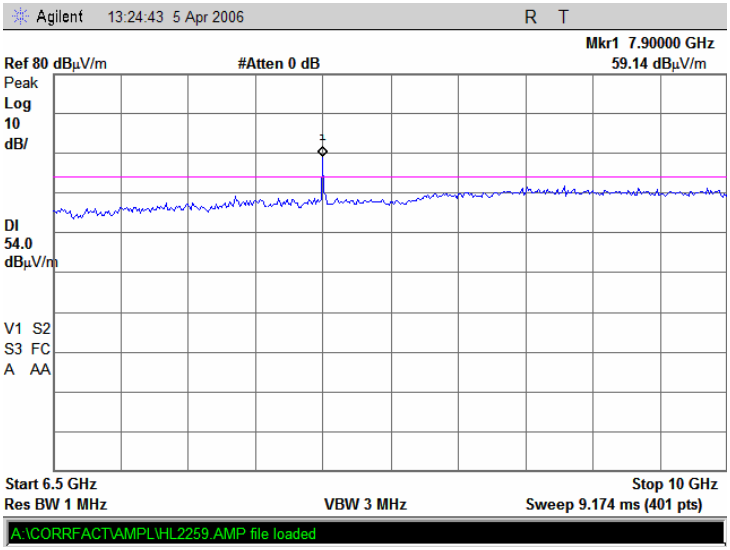
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



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:	4/3/2006		
Temperature: 22ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42%	**Power Supply:** 120 V AC
Remarks: ProST (outdoor) unit			

Plot 8.2.18 Radiated emission measurements 6500 -1000MHz, horizontal & vertical antenna polarization

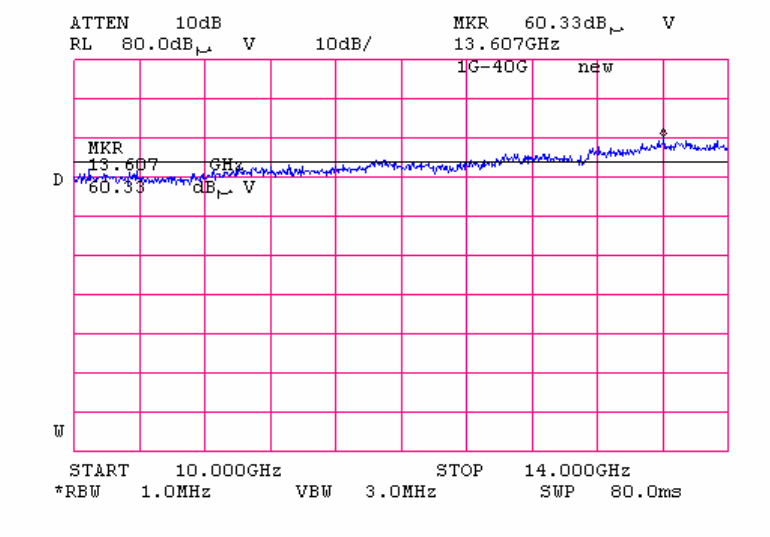
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



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:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1009 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

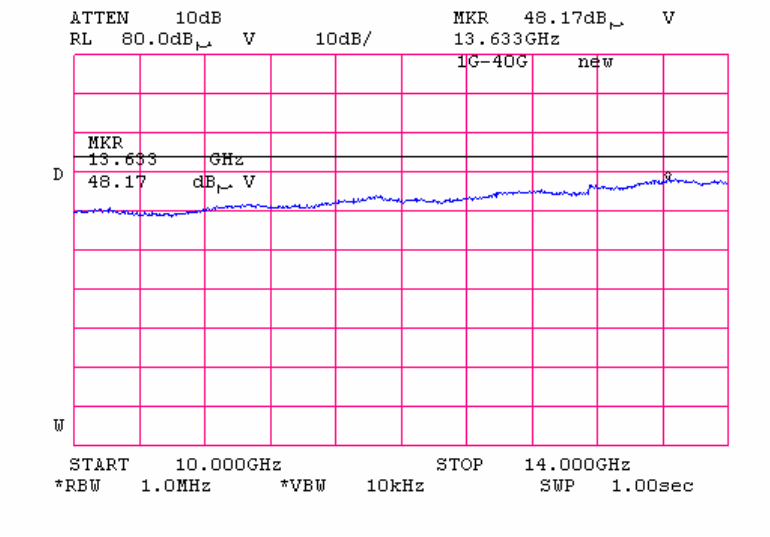
Plot 8.2.19 Radiated emission measurements 10000 -1400MHz, horizontal & vertical antenna polarization

TEST SITE: OATS
TEST DISTANCE: 3 m



Plot 8.2.20 Radiated emission measurements 10000 -1400MHz, horizontal & vertical antenna polarization

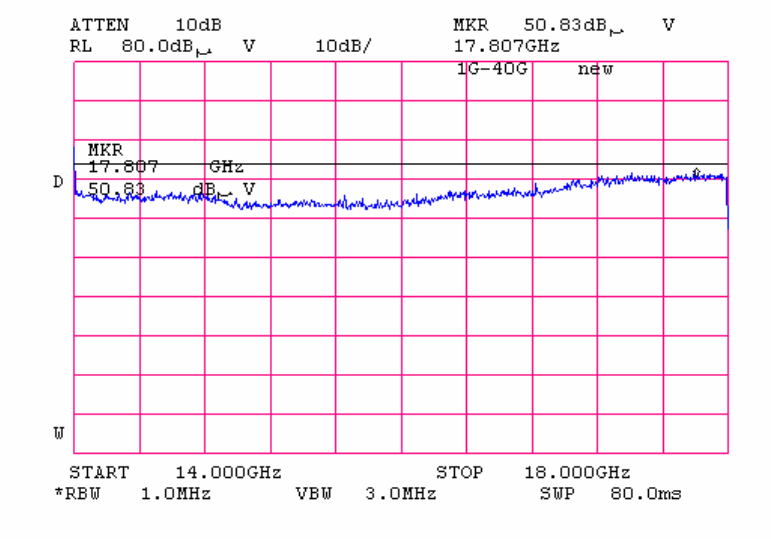
TEST SITE: OATS
TEST DISTANCE: 3 m



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:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1009 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

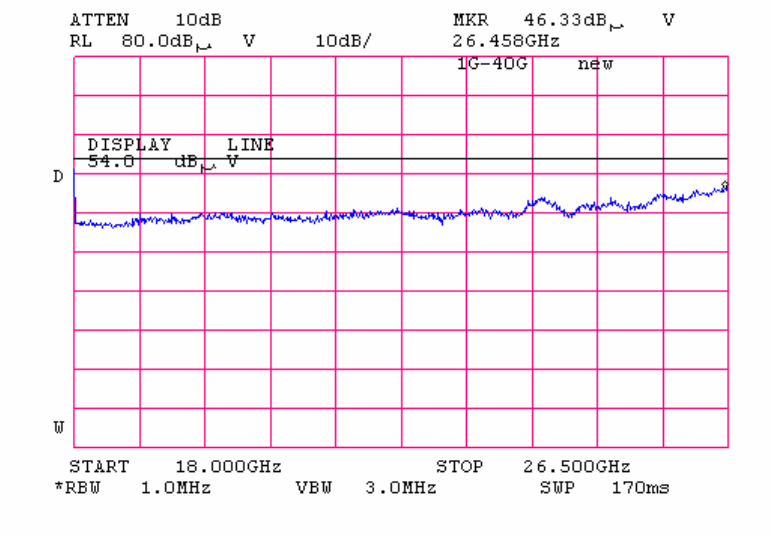
Plot 8.2.21 Radiated emission measurements 14000 -1800MHz, horizontal & vertical antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



Plot 8.2.22 Radiated emission measurements 18000 -26500MHz, horizontal & vertical antenna polarization

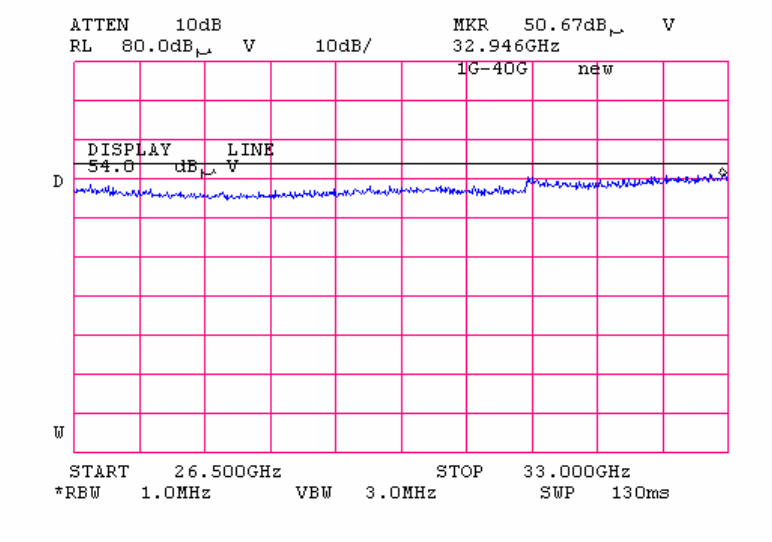
TEST SITE: OATS
TEST DISTANCE: 3 m



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:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1009 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

Plot 8.2.23 Radiated emission measurements 26500 -33000MHz, horizontal & vertical antenna polarization

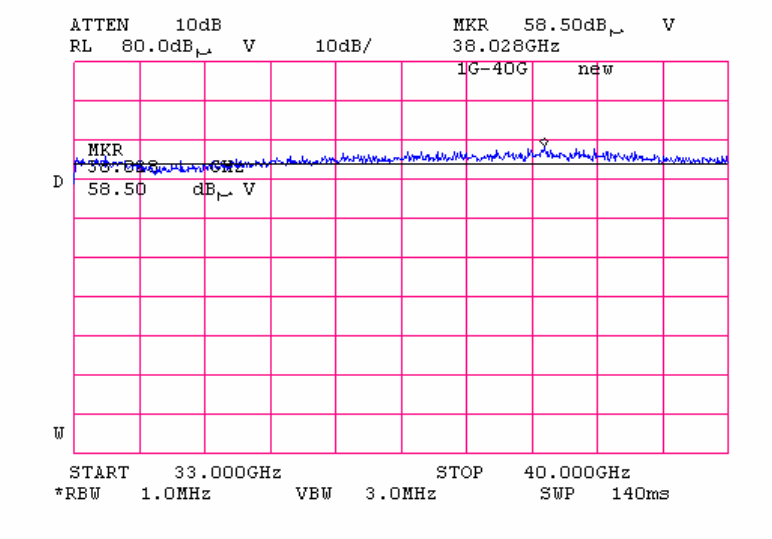
TEST SITE: OATS
TEST DISTANCE: 3 m



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:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1009 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST (outdoor) unit			

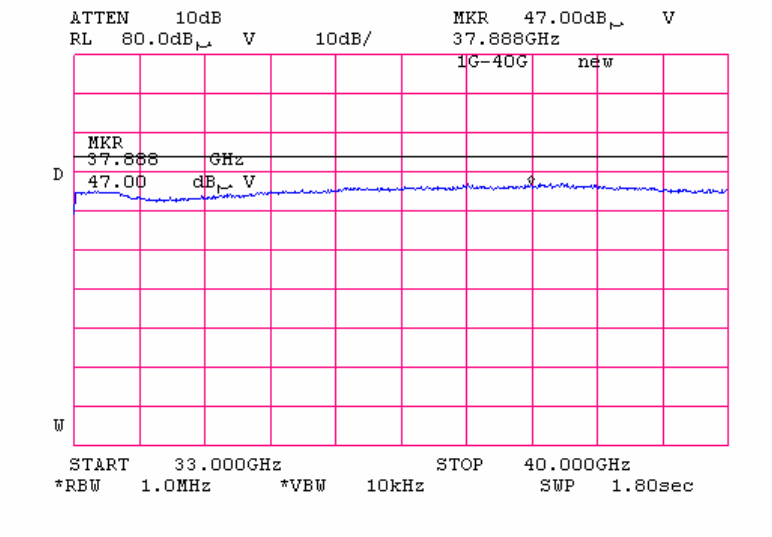
Plot 8.2.24 Radiated emission measurements 33000 -40000MHz, horizontal & vertical antenna polarization

TEST SITE: OATS
TEST DISTANCE: 3 m



Plot 8.2.25 Radiated emission measurements 33000 -40000MHz, horizontal & vertical antenna polarization

TEST SITE: OATS
TEST DISTANCE: 3 m



9 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0025	Analyzer, Spectrum, 10 kHz - 23 GHz / 140 GHz	Anritsu	MS-710C	5837	01-Jan-06	01-Jan-07
0410	Cable, Coax, Microwave, DC-18 GHz, N-N, 1 m	Gore	PFP01P0 1039.4	9338767	17-Oct-05	17-Oct-06
0446	Antenna, Loop active, 10kHz-30MHz	EMCO	6502	2857	28-Jun-05	28-Jun-06
0447	LISN, 16/2, 300V RMS	HL	LISN 16 - 1	066	03-Nov-05	03-Nov-06
0465	Anechoic Chamber 9(L) x 6.5(W) x 5.5(H) m	HL	AC - 1	023	11-Nov-05	11-Nov-06
0493	Oven temperature -45…175 deg C	Thermotron	S-1.2 Mini-Max	14016	08-Mar-06	08-Mar-07
0495	Autotransformer 0-255V, 10A	Variac	EMPL01	495	09-Mar-06	09-Mar-07
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	26-Sep-05	26-Sep-06
0589	Cable Coaxial, GORE A2P01POL118, 2.3 m	HL	GORE-3	176	02-Dec-05	02-Dec-06
0592	Position Controller	HL	L2-SR3000 (HL CRL-3)	100	18-May-05	18-May-06
0593	Antenna Mast, 1-4 m Pneumatic	Madgesh	AM-F1	101	02-Feb-06	02-Feb-07
0594	Turn Table FOR ANECHOIC CHAMBER flush mount d=1.2 m Pneumatic	HL	TT-WDC1	102	26-Jan-06	26-Jan-07
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE 26 - 2000 MHz	EMCO	3141	9611-1011	10-Jan-06	10-Jan-07
0613	Sensor Electric Field 10 kHz-1.0 GHz, 1-300 V/m (probe), w/charger	Amplifier Research	FP2000	18677	08-Dec-05	08-Dec-06
0661	Generator Swept Signal, 10 MHz to 40 GHz, + 10 dBm	Hewlett Packard	83640B	3614A002 66	14-Sep-05	14-Sep-06
0672	Shielded Room 4,6(L) x 4,2(W) x 2,4(H) m	HL	SR - 3	027	11-Nov-05	11-Nov-06
0768	Antenna Standard Gain Horn,18-26.5 GHz, WR-42, K-band, Gain - 25 dB	Quinstar Technology	QWH-4200-BA	110	21-Jul-04	21-Jul-07
0769	Antenna Standard Gain Horn, 26.5-40 GHz, WR28, Ka band, Gain 25 dB	Quinstar Technology	QWH-2800-BA	112	21-Jul-04	21-Jul-07
0787	Transient Limiter	Hewlett Packard	11947A	3107A018 77	21-Nov-05	21-Nov-06
1200	Quadruplexer 1-12 GHz (1-2 GHz; 2-4GHz;4-8 GHz; 8-12GHz)	Elettronica S.p.A. - Roma	UE 84	D/00240	10-Feb-05	10-Feb-07
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A002 19	30-Aug-05	30-Aug-06
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies	8542E	3807A002 62,3705A0 0217	01-Sep-05	01-Sep-06
1502	Cable RF, 6 m	Belden	M17/167 MIL-C-17	1502	02-Dec-05	02-Dec-06
1510	Cable RF, 8 m	Belden	M17/167 MIL-C-17	1510	02-Dec-05	02-Dec-06
1512	Cable RF, 8 m	Belden	M17/167 MIL-C-17	1512	11-Sep-05	11-Sep-06
1552	Cable RF, 8 m	Alpha Wire	RG-214	1552	02-Dec-05	02-Dec-06

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
1566	Cable RF, 2 m	Huber-Suhner	Sucoflex 104PE	13094/4PE	02-Dec-05	02-Dec-06
1629	Isotropic Field Monitor	Amplifier Research	FM2000	23308	13-Feb-06	13-Feb-07
1650	Attenuators Set (2, 3, 5, 20 dB), DC-18 GHz	M/A-COM	2082	1650	03-Jan-06	03-Jan-07
1941	Cable 18GHz, 4 m, green	Rhophase Microwave Limited	SPS-1803A-4000-NPS	T4657	01-Jan-06	01-Jan-07
1947	Cable 18GHz, 6.5 m, blue	Rhophase Microwave Limited	NPS-1803A-6500-NPS	T4974	17-Oct-05	17-Oct-06
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W, N-type	EMC Test Systems	3115	9911-5964	03-Mar-06	03-Mar-07
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	02-Dec-05	02-Dec-06
2109	Anechoic Chamber 6(L) x 5.5(W) x 2.95(H) m	HL	AC-2	2109	11-Nov-05	11-Nov-06
2259	Amplifier Low Noise 2-20 GHz	Sophia Wireless	LNA0220-C	0223	05-Nov-05	05-Nov-06
2260	Amplifier Low Noise 14-33 GHz	Sophia Wireless	LNA28-B	0233	05-Nov-05	05-Nov-06
2261	Amplifier Low Noise 33-40 GHz	Sophia Wireless	LNA38-B	0234	05-Nov-05	05-Nov-06
2399	Cable 40GHz, 1.5 m, blue	Rhophase Microwave Limited	KPS-1503A-1500-KPS	X2945	24-Jun-05	24-Jun-06
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	03-Mar-06	03-Mar-07
2697	Antenna, 30 MHz - 3.0 GHz,	Sunol Sciences. Corp. Pleasanton, California USA	JB3	A022805	10-Jan-06	10-Jan-07
2780	EMS analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY45102406	11-Jun-05	11-Jun-06
2811	Humidity and Temperature Controller	HL	HTCL-7	2811	11-Sep-05	11-Sep-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 Vertical polarization	 Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB 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).

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website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

12 APPENDIX D Specification references

47CFR part 90: 2005	Private land mobile radio services
47CFR part 1: 2005	Practice and procedure
47CFR part 2: 2005	Frequency allocations and radio treaty matters; general rules and regulations
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI/TIA/EIA-603-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(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
dB(μA)	decibel referred to one microampere
dBΩ	decibel referred to one Ohm
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
ITE	information technology equipment
k	kilo
kHz	kilohertz
LISN	line impedance stabilization network
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μs	microsecond
NA	not applicable
NB	narrow band
NT	not tested
OATS	open area test site
Ω	Ohm
QP	quasi-peak
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, S/N 2857, HL 0446

Frequency, MHz	Magnetic Antenna Factor, dB(S/m)	Electric Antenna Factor, dB(1/m)
0.009	-32.8	18.7
0.010	-33.8	17.7
0.020	-38.3	13.2
0.050	-41.1	10.4
0.075	-41.3	10.2
0.100	-41.6	9.9
0.150	-41.7	9.8
0.250	-41.6	9.9
0.500	-41.8	9.7
0.750	-41.9	9.6
1.000	-41.4	10.1
2.000	-41.5	10.0
3.000	-41.4	10.1
4.000	-41.4	10.1
5.000	-41.5	10.0
10.000	-41.9	9.6
15.000	-41.9	9.6
20.000	-42.2	9.3
25.000	-42.8	8.7
30.000	-44.0	7.5

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

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

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

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

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

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

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

Antenna factor
Double-ridged guide horn antenna
Model 3115, serial number: 00027177, HL2432

Frequency, MHz	Antenna factor. dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.8
2500.0	28.9
3000.0	30.7
3500.0	31.8
4000.0	33.0
4500.0	32.8
5000.0	34.2
5500.0	34.9
6000.0	35.2
6500.0	35.4
7000.0	36.3
7500.0	37.3
8000.0	37.5
8500.0	38.0
9000.0	38.3
9500.0	38.3
10000.0	38.7
10500.0	38.7
11000.0	38.9
11500.0	39.5
12000.0	39.5
12500.0	39.4
13000.0	40.5
13500.0	40.8
14000.0	41.5
14500.0	41.3
15000.0	40.2
15500.0	38.7
16000.0	38.5
16500.0	39.8
17000.0	41.9
17500.0	45.8
18000.0	49.1

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

Antenna calibration
Sunol Sciences Inc., model JB3, serial number A022805

Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain
30	22.2	-22.5	0.01	620	19.7	6.3	4.27	1215	24.9	7.0	5.05	1810	28.3	7.1	5.08	2405	30.9	6.9	4.93
35	18.5	-17.4	0.02	625	19.7	6.5	4.42	1220	24.9	7.0	4.99	1815	28.5	6.9	4.91	2410	30.9	6.9	4.89
40	14.7	-12.5	0.06	630	19.6	6.6	4.57	1225	25.1	6.9	4.91	1820	28.6	6.8	4.74	2415	31.0	6.9	4.85
45	11.3	-8.1	0.16	635	19.7	6.5	4.48	1230	25.2	6.8	4.82	1825	28.7	6.8	4.75	2420	31.0	6.8	4.82
45	11.3	-8.1	0.16	640	19.9	6.4	4.40	1235	25.1	7.0	4.96	1830	28.7	6.8	4.76	2425	31.1	6.8	4.81
50	8.9	-4.7	0.34	645	19.9	6.5	4.45	1240	25.0	7.1	5.09	1835	28.7	6.7	4.72	2430	31.0	6.9	4.87
55	7.9	-2.8	0.52	650	19.9	6.5	4.51	1245	25.0	7.1	5.12	1840	28.8	6.7	4.69	2435	31.0	6.9	4.88
60	7.8	-2.1	0.62	655	19.9	6.6	4.60	1250	25.0	7.1	5.15	1845	28.6	6.9	4.90	2440	31.2	6.8	4.74
65	8.5	-2.0	0.63	660	19.9	6.7	4.69	1255	25.0	7.2	5.25	1850	28.4	7.1	5.12	2445	31.1	6.9	4.91
70	9.0	-1.9	0.64	665	19.9	6.7	4.70	1260	24.9	7.3	5.36	1855	28.5	7.0	5.07	2450	31.0	7.0	4.96
75	8.8	-1.1	0.78	670	20.0	6.7	4.71	1265	25.0	7.3	5.31	1860	28.6	7.0	5.01	2455	31.0	7.0	5.01
80	8.4	-0.2	0.97	675	20.1	6.7	4.71	1270	25.1	7.2	5.26	1865	28.5	7.1	5.17	2460	30.9	7.2	5.19
85	8.0	0.8	1.20	680	20.1	6.7	4.71	1275	25.3	7.0	5.05	1870	28.4	7.3	5.33	2465	31.1	6.9	4.95
90	8.2	1.1	1.29	685	20.1	6.8	4.79	1280	25.5	6.8	4.84	1875	28.4	7.2	5.28	2470	31.3	6.8	4.76
95	9.2	0.5	1.13	690	20.1	6.9	4.88	1285	25.4	7.0	4.97	1880	28.5	7.2	5.22	2475	31.4	6.7	4.69
100	10.6	-0.4	0.92	695	20.2	6.8	4.82	1290	25.3	7.1	5.10	1885	28.5	7.2	5.22	2480	31.3	6.8	4.79
105	11.7	-1.1	0.78	700	20.3	6.8	4.76	1295	25.3	7.2	5.22	1890	28.6	7.2	5.21	2485	31.1	7.0	5.00
110	12.6	-1.6	0.70	705	20.4	6.8	4.75	1300	25.2	7.3	5.33	1895	28.6	7.2	5.24	2490	31.1	7.0	4.99
115	13.3	-1.9	0.65	710	20.5	6.8	4.75	1305	25.3	7.2	5.21	1900	28.6	7.2	5.27	2495	31.2	7.0	4.99
120	13.9	-2.1	0.62	715	20.5	6.8	4.80	1310	25.5	7.1	5.09	1905	28.5	7.3	5.36	2500	30.9	7.2	5.27
125	14.2	-2.0	0.63	720	20.5	6.9	4.85	1315	25.4	7.2	5.23	1910	28.5	7.4	5.45	2505	31.1	7.1	5.15
130	14.2	-1.7	0.68	725	20.6	6.8	4.81	1320	25.3	7.3	5.36	1915	28.5	7.3	5.38	2510	31.0	7.2	5.22
135	13.8	-1.0	0.79	730	20.7	6.8	4.77	1325	25.5	7.2	5.21	1920	28.6	7.3	5.31	2515	31.0	7.2	5.26
140	13.4	-0.3	0.94	735	20.9	6.7	4.65	1330	25.6	7.0	5.06	1925	28.6	7.3	5.35	2520	31.2	7.0	5.05
145	13.1	0.3	1.08	740	21.0	6.6	4.53	1335	25.7	7.1	5.07	1930	28.6	7.3	5.39	2525	30.8	7.4	5.54
150	12.9	0.8	1.21	745	21.0	6.6	4.59	1340	25.7	7.1	5.09	1935	28.5	7.4	5.54	2530	31.0	7.3	5.37
155	12.7	1.3	1.34	750	21.0	6.7	4.64	1345	25.7	7.1	5.13	1940	28.4	7.6	5.70	2535	31.2	7.0	5.06
160	12.7	1.6	1.44	755	21.0	6.8	4.74	1350	25.7	7.1	5.17	1945	28.5	7.5	5.59	2540	31.2	7.1	5.09
165	12.5	2.0	1.59	760	21.0	6.8	4.83	1355	25.8	7.0	5.06	1950	28.6	7.4	5.48	2545	31.0	7.3	5.43
170	12.2	2.6	1.83	765	21.1	6.8	4.73	1360	25.9	6.9	4.95	1955	28.6	7.5	5.57	2550	31.0	7.3	5.39
175	11.8	3.3	2.13	770	21.3	6.7	4.64	1365	26.0	6.9	4.95	1960	28.6	7.5	5.65	2555	31.1	7.2	5.30
180	11.6	3.7	2.36	775	21.3	6.7	4.68	1370	26.0	7.0	4.96	1965	28.7	7.4	5.47	2560	31.0	7.4	5.47
185	11.5	4.0	2.54	780	21.3	6.7	4.72	1375	26.0	7.0	5.01	1970	28.9	7.2	5.29	2565	30.8	7.6	5.70
190	11.6	4.2	2.61	785	21.3	6.8	4.77	1380	26.0	7.0	5.06	1975	28.9	7.2	5.22	2570	31.1	7.3	5.37
195	12.1	3.9	2.47	790	21.3	6.8	4.82	1385	26.0	7.0	4.99	1980	29.0	7.1	5.16	2575	31.5	7.0	4.96
200	13.1	3.2	2.07	795	21.4	6.8	4.79	1390	26.1	6.9	4.92	1985	29.1	7.1	5.11	2580	31.6	6.9	4.87
205	12.0	4.4	2.76	800	21.5	6.8	4.77	1395	26.2	6.9	4.94	1990	29.1	7.0	5.06	2585	31.6	6.8	4.79
210	11.0	5.6	3.66	805	21.6	6.7	4.71	1400	26.2	7.0	4.96	1995	29.1	7.1	5.09	2590	31.6	6.9	4.88
215	11.3	5.6	3.59	810	21.7	6.7	4.65	1405	26.1	7.0	5.02	2000	29.1	7.1	5.11	2595	31.5	7.0	4.97
220	11.6	5.5	3.52	815	21.7	6.7	4.72	1410	26.1	7.1	5.09	2005	29.1	7.1	5.16	2600	31.6	6.9	4.86
225	11.7	5.5	3.55	820	21.7	6.8	4.80	1415	26.2	7.0	5.02	2010	29.1	7.1	5.15	2605	31.3	7.2	5.30
230	11.9	5.5	3.57	825	21.7	6.8	4.82	1420	26.3	7.0	4.96	2015	29.2	7.1	5.13	2610	31.4	7.1	5.15
235	12.1	5.5	3.56	830	21.7	6.9	4.85	1425	26.2	7.1	5.10	2020	29.2	7.1	5.18	2615	31.7	6.9	4.88
240	12.3	5.5	3.54	835	21.8	6.8	4.82	1430	26.1	7.2	5.25	2025	29.3	7.1	5.08	2620	31.6	7.0	4.97
245	12.3	5.7	3.71	840	21.9	6.8	4.80	1435	26.1	7.2	5.24	2030	29.3	7.0	5.05	2625	31.4	7.1	5.17
250	12.3	5.9	3.88	845	21.9	6.8	4.83	1440	26.2	7.2	5.24	2035	29.3	7.1	5.07	2630	31.6	7.0	5.00
260	12.7	5.8	3.83	855	22.0	6.8	4.80	1450	26.5	7.0	4.98	2045	29.2	7.2	5.23	2640	31.7	7.0	4.98
270	13.7	5.2	3.27	865	22.0	6.9	4.92	1460	26.4	7.1	5.17	2055	29.3	7.2	5.21	2650	31.8	6.9	4.85
275	13.7	5.3	3.39	870	21.9	7.1	5.11	1465	26.4	7.2	5.19	2060	29.5	7.0	5.02	2655	31.8	6.9	4.85
280	13.7	5.4	3.50	875	22.0	7.1	5.08	1470	26.4	7.2	5.22	2065	29.4	7.1	5.08	2660	31.7	7.0	5.02
285	13.7	5.6	3.61	880	22.1	7.0	5.05	1475	26.4	7.1	5.17	2070	29.4	7.1	5.10	2665	32.0	6.7	4.71
290	13.7	5.7	3.72	885	22.1	7.0	5.06	1480	26.5	7.1	5.12	2075	29.5	7.0	5.01	2670	32.0	6.7	4.67
295	13.8	5.8	3.77	890	22.1	7.0	5.06	1485	26.5	7.1	5.14	2080	29.8	6.8	4.76	2675	31.9	6.8	4.81
300	13.9	5.8	3.81	895	22.2	7.1	5.09	1490	26.5	7.1	5.17	2085	29.7	6.9	4.89	2680	31.7	7.0	5.04
305	14.0	5.9	3.85	900	22.2	7.1	5.12	1495	26.5	7.2	5.24	2090	29.7	6.9	4.86	2685	31.9	6.8	4.83
310	14.1	5.9	3.88	905	22.3	7.1	5.09	1500	26.5	7.2	5.31	2095	29.8	6.8	4.78	2690	32.1	6.7	4.72
315	14.3	5.9	3.89	910	22.3	7.0	5.05	1505	26.5	7.2	5.27	2100	29.9	6.8	4.75	2695	32.1	6.7	4.71
320	14.4	5.9	3.90	915	22.4	7.0	4.99	1510	26.6	7.2	5.23	2105	29.8	6.8	4.81	2700	32.0	6.8	4.81
325	14.5	5.9	3.92	920	22.6	6.9	4.92	1515	26.6	7.2	5.30	2110	29.9	6.8	4.78	2705	32.0	6.8	4.80
330	14.6	5.9	3.93	925	22.7	6.9	4.85	1520	26.5	7.3	5.38	2115	29.9	6.8	4.76	2710	32.1	6.8	4.79
335	14.7	6.0	4.02	930	22.8	6.8	4.77	1525	26.6	7.3	5.37	2120	29.9	6.8	4.84	2715	32.1	6.7	4.71
340	14.7	6.2	4.12	935	22.8	6.8	4.83	1530	26.6	7.3	5.36	2125	29.9	6.9	4.89	2720	32.4	6.5	4.47
345	14.9	6.1	4.06	940	22.8	6.9	4.89	1535	26.6	7.4	5.44	2130	29.9	6.9	4.90	2725	32.2	6.7	4.63
350	15.1	6.0	3.99	945	22.8	6.9	4.87	1540	26.5	7.4	5.53	2135	29.8	6.9	4.94	2730	31.9	7.0	5.05
360	15.6	5.8	3.78	955	23.0	6.8	4.81	1550	26.5	7.5	5.63	2145	29.9	6.9	4.92	2740	31.6	7.1	5.46
365	15.5	5.9	3.89	960	23.1	6.8	4.77	1555	26.7	7.3	5.39	2150	29.9	7.0	4.98	2745	31.9	7.0	5.06
370	15.5	6.0	4.01	965	23.1	6.7	4.73	1560	26.9	7.1	5.16	2155	29.8	7.1	5.10	2750	32.0	6.9	4.94
375	15.6	6.1	4.03	970	23.2	6.7	4.69	1565	26.9	7.2	5.23	2160	29.8	7.1	5.09	2755	32.0	7.0	4.98
380	15.7	6.1	4.05	975	23.3	6.6	4.62	1570	26.9	7.2	5.30	2165	29.9	7.0	5.00	2760	32.0	7.0	5.06
385	15.7	6.2	4.15	980	23.5	6.6	4.54	1575	27.0	7.2	5.23	2170	29.9	7.1	5.07	2765	32.2	6.8	4.80
390	15.7	6.3	4.25	985	23.5	6.6	4.52	1580	27.0	7.1	5.17	2175	29.8	7.2	5.20	2770	32.3	6.8	4.73
395	15.9	6.3	4.22	990	23.6	6.5	4.50	1585	27.0	7.2	5.20	2180	29.8	7.2	5.27	2775	32.3	6.8	4.77
400	16.0	6.2	4.18	995	23.6	6.5	4.48	1590	27.0	7.2	5.22	2185	29.8	7.2	5.27	2780	32.3	6.8	4.82
405	16.3	6.1	4.07	1000	23.7	6.5	4.46	1595	27.0	7.2	5.29	2190	29.8	7.2	5.28	2785	32.7	6.4	4.41
410	16.5	6.0	3.96	1005	23.7	6.5	4.51	1600	27.0	7.3	5.36	2195	29.8	7.2	5.30	2790	32.8	6.3	4.25
420	16.6	6.1	4.03	1015	23.7	6.6	4.55	1610	27.0	7.3	5.41	2205	29.7	7.3	5.41	2800	32.5	6.7	4.66
425	16.6	6.1	4.10	1020	23.8	6.6	4.54	1615	27.1	7.3	5.33	2210	29.7	7.4	5.47	2805	32.5	6.6	4.62
430	16.7	6.2	4.16	1025	23.8	6.6	4.62	1620	27.2	7.2	5.27	2215	29.7	7.4	5.54	2810	32.5	6.7	4.70
435	16.9	6.1	4.05	1030	23.7	6.7	4.70	1625	27.2	7.2	5.30	2220	29.7	7.5	5.57	2815	32.3	6.9	4.85
440	17.1	5.9	3.93	1035	23.7	6.8	4.81	1630	27.2	7.3	5.33	2225	29.8	7.3	5.43	2820	32.2	7.0	5.01
445	17.2	6.0	3.97	1040	23.6	6.9	4.92	1635	27.2	7.3	5.35	2230	29.8	7.4	5.45	2825	32.3	7.0	4.96
450	17.2	6.0	4.00	1045	23.7	6.9	4.91	1640	27.2	7.3	5.36	2235	29.7	7.5	5.61	2830	32.4	6.8	4.80
455	17.3	6.1	4.04	1050	23.7	6.9	4.91	1645	27.3	7.2	5.22	2240	29.5	7.7	5.86	2835	32.5	6.7	4.68
460	17.4	6.1	4.07	1055	23.7	7.0	5.01	1650	27.5	7.1	5.09	2245	29.8	7.4	5.53	2840	32.5	6.8	4.78
470	17.6	6.1	4.04	1065	23.7	7.0	5.06	1660	27.5	7.1	5.13	2255	30.0	7.2	5.28	2850	32.6	6.7	4.70
475	17.7	6.0	3.99	1070	23.8	7.0	5.01	1665	27.6	7.0	5.06	2260	30.1	7.2	5.24	2855	32.4	6.9	4.88
480	17.9	5.9	3.93	1075	23.8	7.0	5.01	1670	27.7	7.0	4.99	2265	30.1	7.2	5.20	2860	32.4	7.0	4.98
485	18.0	5.9	3.88	1080	23.9	7.0	5.01	1675	27.7	7.0	5.02	2270	30.2	7.1	5.12	2865	32.8	6.5	4.52
490	18.2	5.8	3.82	1085	24.0	7.0	4.96	1680	27.7	7.0	5.05	2275	30.3	7.0	5.05	2870	33.0	6.3	4.30
495	18.0	6.0	4.02	1090	24.0	6.9	4.91	1685	27.7	7.0	5.01	2280	30.0	7.0	5.06	2875	33.0	6.4	4.38
500	17.9	6.3	4.23	1095	24.1	6.9	4.86	1690	27.8	7.0	4.98	2285	30.3	7.0	5.05	2880	32.5	6.9	4.87
510	18.0	6.4	4.36	1105	24.3	6.8	4.80	1700	27.8	7.0	5.03	2295	30.3	7.1	5.13	2890	33.1	6.3	4.28
515	18.1	6.4	4.34	1110	24.3	6.8	4.78	1705	27.8	7.1	5.09	2300	30.2	7.2	5.23	2895	33.1	6.4	4.34
520	18.2	6.4	4.32	1115	24.3	6.8	4.79	1710	27.7	7.1	5.16	2305	30.3	7.2	5.20	2900	33.0	6.4	4.41
525	18.2	6.4	4.36	1120	24.4	6.8	4.80	1715	27.8	7.1	5.08	2310	30.2	7.3	5.35	2905	32.9	6.6	4.58
530	18.3	6.4	4.39	1125	24.3	6.9	4.90	1720	27.9	7.0	5.00	2315	30.1	7.4	5.45	2910	32.9	6.5	4.51
535	18.3	6.4	4.41	1130	24.3	7.0	5.00	1725	28.0	7.0	4.99	2320	30.3	7.2	5.27	2915	33.1	6.4	4.33
540	18.4	6.4	4.41	1135	24.4	6.9	4.90	1730	28.0	7.0	4.98	2325	304	7.2	5.22	2920	33.3	6.2	4.16
545	18.4	6.5	4.47	1140	24.5	6.8	4.81	1735	28.0	7.0	5.02	2330	30.4	7.1	5.13	2925	33.0	6.5	4.45
550	18.4	6.6	4.53	1145	24.6	6.8	4.76	1740	28.0	7.1	5.07	2335	30.5	7.0	5.07	2930	33.0	6.5	4.51
555	18.6	6.5	4.45	1150	24.7	6.7	4.71	1745	28.0	7.0	5.04	2340	30.5	7.1	5.11	2935	33.0	6.5	4.48
560	18.8	6.4	4.37	1155	24.7	6.8	4.76	1750	28.1	7.0	5.01	2345	30.6	7.0	5.07	2940	33.0	6.5	4.52
565	18.9	6.4	4.33	1160	24.7	6.8	4.80	1755	27.9	7.1	5.17	2350	30.5	7.1	5.12	2945	33.1	6.5	4.42
570	19.0	6.3	4.28	1165	24.7	6.8	4.81	1760	27.8	7.3	5.34	2355	30.6	7.1	5.08	2950	33.2	6.4	4.32
575	19.1	6.3	4.31	1170	24.7	6.8	4.81	1765	27.9	7.3	5.31	2360	30.9	6.8	4.79	2955	33.3	6.3	4.27
580	19.1	6.4	4.33	1175	24.8	6.8	4.84	1770	27.9	7.2	5.28	2365	31.0	6.7	4.66	2960	33.3	6.3	4.30
590	19.1	6.6	4.52	1185	24.8	6.9	4.92	1780	27.9	7.3	5.35	2375	31.1	6.6	4.60	2970	33.3	6.4	4.36
595	19.0	6.6	4.62	1190	24.7	7.0	4.99	1785	28.1	7.2	5.21	2380	31.1	6.6	4.61	2975	33.0	6.6	4.60
600	19.0	6.7	4.72	1195	24.7	7.0	5.02	1790	28.2	7.0	5.07	2385	31.1	6.7	4.62	2980	32.9	6.8	4.74
605	19.1	6.8	4.74	1200	24.7	7.0	5.05	1795	28.2	7.0	5.07	2390	31.2	6.6	4.56	2985	32.8	6.9	4.93
610	19.1	6.8	4.76	1205	24.08	7.1	5.08	1800	28.3	7.0	5.06	2395	31.2	6.6	4.60	2990	32.9	6.8	4.82

Cable loss
Cable GORE, HL 0410

No.	Frequency, GHz	Cable loss, dB
1	0.5	0.16
2	1	0.28
3	2	0.38
4	4	0.55
5	6	0.85
6	8	0.90
7	10	1.07
8	12	1.11
9	14	1.29
10	16	1.41
11	18	1.73

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		±0.17
22	4500	4.07		
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 RF, 2m, model: Sucoflex 104PE, S/N 13094/4PE, HL 1566

No.	Frequency, MHz	Cable loss, dB	Tolerance, dB	Measurement uncertainty, dB
1	30	0.10	≤ 5.0	±0.12
2	50	0.13		
3	100	0.20		
4	300	0.33		
5	500	0.45		
6	800	0.60		
7	1000	0.65		
8	1500	0.91		
9	2000	1.08		
10	2500	1.19		
11	3000	1.28		
12	3500	1.49		
13	4000	1.63		
14	4500	1.63	≤ 5.0	±0.17
15	5000	1.66		
16	5500	1.88		
17	6000	1.96		
18	6500	1.93		
19	7000	2.07		
20	7500	2.37		
21	8000	2.34		
22	8500	2.64		
23	9000	2.68		
24	9500	2.64		
25	10000	2.70		
26	10500	2.84		
27	11000	2.88		
28	11500	3.19		
29	12000	3.15		
30	12500	3.20	≤ 5.0	±0.26
31	13000	3.22		
32	13500	3.47		
33	14000	3.41		
34	14500	3.59		
35	15000	3.79		
36	15500	4.24		
37	16000	4.12		
38	16500	4.46		
39	17000	4.50		
40	17500	4.49		
41	18000	4.45		

Cable loss
Cable 18 GHz, 4 m, green, model: SPS-1803A-4000-NPS, S/N T4657, HL 1941

Frequency, GHz	Cable loss, dB
0.03	0.39
0.05	0.49
0.1	0.68
0.2	0.95
0.3	1.30
0.5	1.58
0.7	1.84
0.9	2.08
1.1	2.28
1.3	2.56
1.5	2.91
1.7	2.95
1.9	3.17
2.1	3.22
2.3	3.25
2.5	3.39
2.7	3.51
2.9	3.67
3.1	3.81
3.3	3.92
3.5	4.05
3.7	4.14
3.9	4.30
4.1	4.44
4.3	4.55
4.5	4.68
4.7	4.75
4.9	4.84
5.1	4.86
5.3	4.89
5.5	5.00
5.7	5.05
5.9	5.19
6.1	5.28
7.7	5.58

Frequency, GHz	Cable loss, dB
7.9	5.63
8.1	5.67
8.3	5.70
8.5	5.74
8.7	5.78
8.9	5.84
9.1	5.89
9.3	5.94
9.5	6.02
9.7	6.10
9.9	6.12
10.1	6.09
10.3	6.03
10.5	6.01
10.7	6.05
10.9	6.08
11.1	6.10
11.3	6.18
11.5	6.23
11.7	6.20
11.9	6.16
12.1	6.18
12.4	6.33
13.0	6.51
13.5	6.51
14.0	6.75
14.5	6.82
15.0	6.93
15.5	7.16
16.0	7.10
16.5	7.18
17.0	7.67
17.5	7.71
18.0	7.61

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 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