L. S. Compliance, Inc.
W66 N220 Commerce Court
Cedarburg, Wisconsin 53012

Phone: 414 - 375 - 4400 Fax: 414 - 375 - 4248

L. S. Compliance, Inc.

Compliance Testing of:

MODEL NCL 1100

SPREAD SPECTRUM BRIDGE

Prepared for:

Ivan Rodrigues

Test Report Number: 90222

Date(s) of Testing:

August, September, October, 1999

All results of this report relate only to the items that were tested.
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Table of Contents:

FCC ID: OOX-NCL1100

DESCRIPTION OF MEASUREMENT FACILITIES

Site on File with the FCC

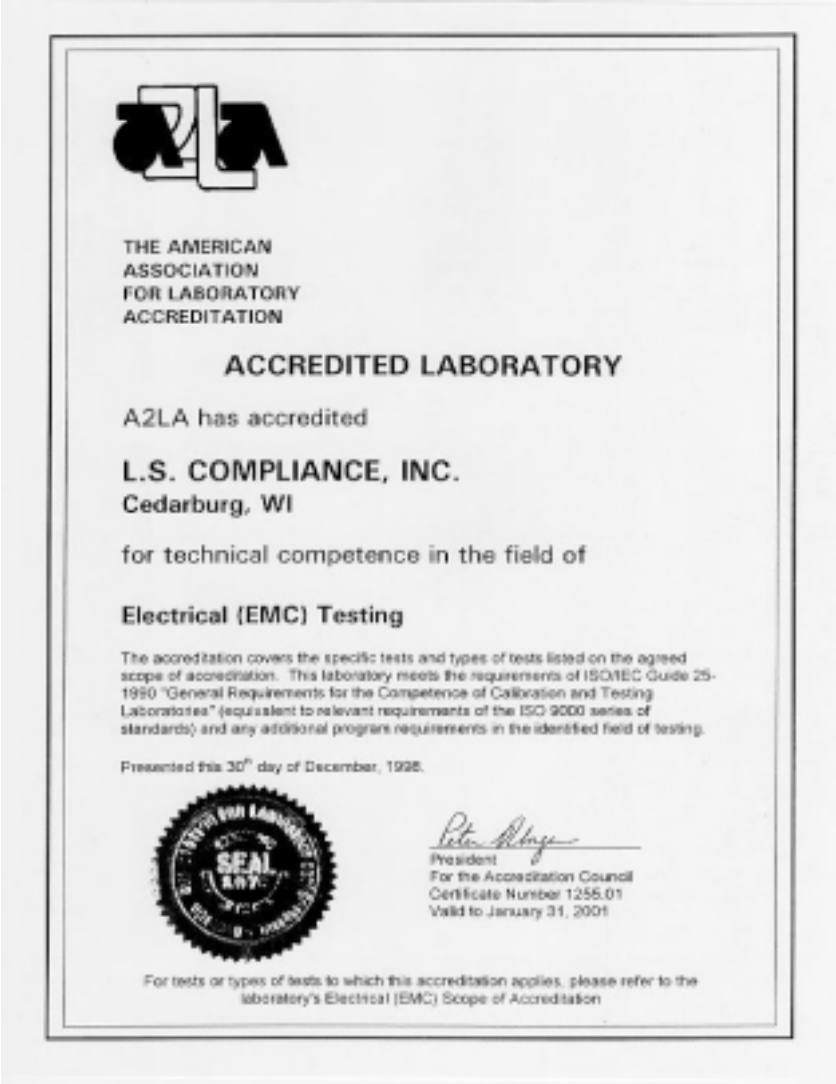
ID Number: 31040/SIT

1300F2

Site on file with Industry Canada:

ID Number: IC 3088

" The site referenced above has been found to comply with the test site criteria found in ANSI C63.4-1992 and 47CFR Section 2.948."



THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

L.S. COMPLIANCE, INC.
Cedarburg, WI

for technical competence in the field of

Electrical (EMC) Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC Guide 25-1990 "General Requirements for the Competence of Calibration and Testing Laboratories" (equivalent to relevant requirements of the ISO 9000 series of standards) and any additional program requirements in the identified field of testing.

Presented this 30th day of December, 1998.

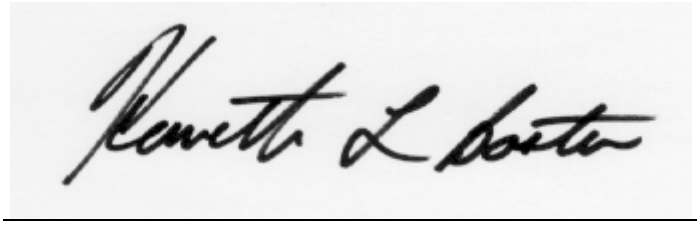
President
For the Accreditation Council
Certificate Number 1255.01
Valid to January 31, 2001

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical (EMC) Scope of Accreditation

SIGNATURE PAGE

Tested By:

Report Prepared By:
Approved:



20 December, 1999

Kenneth L. Boston, EMC Lab Manager Date
PE #31926
Registered Professional Engineer
(State of Wisconsin)

2.3 SUMMARY OF TEST REPORT

MANUFACTURER: Waverider

MODEL: NCL 1100

SERIAL: pre-production

DESCRIPTION: SPREAD SPECTRUM BRIDGE MODULE

FREQUENCY RANGE: 2400-2483.5

The Waverider NCL-1100 was found to **"meet"** the radiated emission specification of Title 47 CFR FCC, Part 15, subpart C. for an intentional radiator. The NCL 1100 was also evaluated to pat 15 for emissions as a class A digital product.

The NCL-1100 is a wireless data link, or bridge, that is intended for high speed data transfer via a 2.4 GHz spread spectrum transceiver. It is intended only for commercial and industrial users.

2.4 INTRODUCTION

During August, September and October of 1999, a series of Radiated and Conducted Emissions tests were performed on two sample models of the Waverider model NCL 1100, a spread spectrum transceiver module, designed for moderate distance data transmission. These tests were performed using the test procedures outlined in ANSI C63.4-1992 for intentional radiators, and in accordance with the requirements set forth in FCC Part 15.247 for a direct sequence spread spectrum transmitter. Tests were also performed as outlined in ANSI C63.4-1992 for non-intentional radiators, in order to verify compliance with the limits set forth in part 15.109 for and to allow verification of emissions for the digital section of the product. These tests were performed by Kenneth L. Boston, PE, of L. S. Compliance, Inc.

2.5 PURPOSE

The above mentioned tests were performed in order to determine the compliance of the Waverider model NCL-1100 with limits contained in various provisions of Title 47 CFR, FCC Part 15, including:

15.207	15.247b	15.247e
15.205	15.247c	15.109
15.247a2	15.247d	

All radiated emissions tests were performed to measure the emissions in the frequency bands described by the above sections, and to determine whether said emissions are below the limits established by the above sections. These tests were performed in accordance with the procedure described in the 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 C63.4-1992). Another document used as reference for the EMI receiver specification was the International Special Committee on Radio Interference (CISPR) number 16-1 (1993). Measurement technique guidelines found in Appendix C to FCC 97-114 were also consulted.

2.6 Power Output Test Performed

For the 15.247b measurement, the output of the Waverider model NCL 1100 module, including bandpass filter and lightning arrestor, was connected via a short jumper cable created only for this measurement, into the input of the HP E4407B Spectrum Analyzer. The unit was configured to run in a continuous transmit mode, with a pseudo-random test code supplied by software to provide modulation. The HP receiver was set to a 5 MHz Bandwidth, and the transmitted signal was then stored, with the peak signal level stored. This power level was collected for the lowest, highest and middle channels and can be seen in the chart presented below.

FCC ID: OOX-NCL1100

CHANNEL	CENTER FREQ (MHz)	LIMIT (dBm)	MEASURED POWER (dBm)	MARGIN (dB)
1	2412	30 dBm	15.17	14.83
3	2432	30 dBm	15.66	14.34
6	2462	30 dBm	17.00	13.00

2.7 Conducted RF Test Setup and measurements

FCC part 15.247 (c) requires an antenna conducted measurement of conducted harmonic and spurious levels, as reference to the carrier frequency in a 100 kHz bandwidth. For this test, the video transmitter module was directly connected to the HP E4407B spectrum analyzer, through a very short coaxial cable and a 10 DB attenuator. Plots were then taken, with any noticeable spurious or harmonic signals identified. No significant levels at any spurious products could be found within -20 dBc of the fundamental of the transmitter. Signals that were observed were greater than 50 dB down. (in the 100 kHz bandwidth)

2.8 Occupied Bandwidth Measurements

The 6 dB bandwidth requirement found in 15.247.a.2 is a minimum of 500 kHz. Direct measurement of the transmitted signal, via a direct cabled connection to the HP E4407B analyzer, was then used to determine the signal bandwidth. For each of the representative channels, refer to the graphs found in Appendix C. From this data, the bandwidth of channel 6, which is the closest data to the specification limit, is 7.45 MHz, which is above the minimum of 500 kHz.

CHANNEL	CENTER FREQ (MHz)	MEASURED 6 dB BW (kHz)	MINIMUM LIMIT (kHz)
1	2412	8200	500
3	2432	7700	500
6	2462	7450	500

2.9 Power Spectral Density

In accordance with FCC part 15.247(d), the peak power spectral density should not exceed +8 dBm in any 3 kHz band. This measurement was performed along with the conducted power output readings performed as described in section 2.6. The peak output frequency for each representative frequency was scanned, with a 3 kHz bandwidth; until the peak signal level in the transmitted spectrum could be located. Since individual modulation products were identifiable, the highest level was measured and compared to the limit, and can be determined by inspection of the graphs found in Appendix C. The highest density was found to be no greater than 1.5 dBm, which is under the allowable limit by 6.5 dB.

CHANNEL	CENTER FREQ	MEASURED P	SPEC	MARGIN
1	2411.99	1.5dBm	+8.0dBm	6.5dB

3	2431.99	0.0dBm	+8.0dBm	8.0dB
6	2461.99	0.0dbm	+8.0dBm	8.0dB

2.10 Processing Gain

A report detailing the results of a jamming margin test performed upon a typical system containing the Harris Prism chipset is attached to this report, wherein the processing gain of the system was determined by using the CW jamming margin method. Because this product contains the same base-band processing chipset, reference is made to this report as fulfilling the processing gain requirement. The justification for this means of showing compliance is contained in an E-mail from the FCC engineering staff, a copy of which is found in appendix D. This test was performed within a screened room located on the L.S. Compliance facility, by Brian Petted, of L.S. Research, which is co-located with L. S. Compliance in Cedarburg.

2.11 RADIATED EMISSIONS TEST SETUP

The test sample was operated within the 3 meter Semi-Anechoic, FCC listed chamber located at L.S. Compliance in Cedarburg, WI. The sample was set up on a small fixture and placed on a wooden pedestal, which was centered on the flush-mounted 2m diameter metal turntable. The test sample was operated on its own [new] internal power supply. The test sample was configured to run in a continuous transmit mode during the 15.247 and 15.205 measurements. One test sample was set to operate on either channel 1 (2412Mhz), channel 3 (2432 MHz), or channel 6 (2462 MHz) while being tested as an intentional radiator, in order to determine compliance within the frequency band of 2400-2483.5 MHz, as dictated by FCC part 15.31m

Please refer to Section 2.15 for pictures of the test setup.

2.12 RADIATED EMISSION TEST PROCEDURE

The fundamental and spurious (harmonic) emissions of the transmitter were tested for compliance to Title 47 CFR, FCC Part 15.247c limits for Direct Sequence Spread Spectrum systems, and the 15.205 general limits, within the restricted bands. For the calculations used to determine the 1 meter limits, see Appendix A. The test sample was tested from the lowest frequency generated by the transmitter to the 10th harmonic of the fundamental frequency generated by the device. The appropriate limits were also observed where any spurious signals were located within any of the restricted bands as described in Part 15.205a. These frequencies, and their associated limits, are referenced in Section 2.14. The sample was positioned on an 80 CM high pedestal and placed in the 3 Meter chamber and the antenna mast was placed such that the antenna was either 1 meter or 3 meters from the test object. A biconical antenna was used to measure emissions from 30 to 200 MHz, a log periodic was used to measure emissions from 200 to 1000 MHz, and a double ridged waveguide horn was used to measure emissions above 1 GHz. The test object was set to operate in continuous transmit, and the resultant signals were maximized by rotating the turntable 360 degrees, and by raising and lowering the antenna between 1 and 4 meters. The test object was also given several different orientations to determine the maximum signal levels, using both

horizontal and vertical antenna polarities. Emissions above 5 GHz were also measured at a 1 meter separation, using the HP 8563E analyzer and 8348A preamplifier.

No significant emissions were found aside from the transmitter fundamental and some spurious signals. The unit was scanned for emissions, over the range 30 to 25000 MHz to establish compliance with Part 15.247c and 15.205 for the system. The results of the system measurements are found in Appendix B, with graphs of the signature scans found in Appendix

2.13 TEST EQUIPMENT UTILIZED FOR RADIATED EMISSIONS TEST

A list of the test equipment and antennas used for the tests can be found in Section 2.17, which includes the calibration information as well as the equipment description. All equipment is calibrated and used according to the user manuals supplied by the manufacturer. All antenna calibrations were performed at a N.I.S.T traceable site, and the resultant correction factors were entered into the Hewlett Packard 8546A EMI receiver software database. The connecting cables used were also measured for loss using a calibrated signal generator and the HP 8546A EMI receiver. The resulting loss factors were entered into the HP 8546A database. This allowed for automatic changes in the antenna correction factor, as well as cable loss or other corrections, to be added to the EMI receiver display while taking measurements. Thus, the resulting data taken from the HP 8546A is an actual reading and can be entered into the database as a corrected meter reading. The HP 8546A EMI receiver was operated with a bandwidth of 120 kHz when receiving signals below 1 GHz, and with a bandwidth of 1 MHz when receiving signals above 1 GHz, in accordance with CISPR 16. Both the peak and Quasi-peak detector functions were used.

For measurements in the upper microwave region, a HP E4407B Spectrum analyzer was utilized. Being that this instrument is an integrated system, all antenna factors, cable factors, and preamplifier gain factors are stored and recalled when initially calibrated and configured for use. Data appearing on the screen and measured during emissions testing is then presented as corrected readings. During emissions testing, signals where significant levels were noted were measured using the 1 MHz IF bandwidth, and a 10 or 100 Hz video bandwidth, resulting in an average measurement mode of the analyzer. During Tx/Rx switching modes, the video bandwidth was raised to 1 MHz, and peaks were compared to the Average limits, plus 20 dB. Signal levels were also inspected using the 100 kHz bandwidth during conducted emission testing, and compared to the maximum radiated signal in a 100 kHz bandwidth of the fundamental modulated carrier for the three channels tested.

2.14 - Restricted Bands affecting this product

3 Meter limits

Frequency (MHz)	Limit (μV)	Limit (dB/μV/m)
2310-2390	500	54.0
2483.5-2500	500	54.0
2655-2900	500	54.0
3260-3267	500	54.0
3332-3339	500	54.0
3345.8-3358	500	54.0
3600-4400	500	54.0
4500-5150	500	54.0
5350-5460	500	54.0
7250-7750	500	54.0
8025-8500	500	54.0
9000-9200	500	54.0
9300-9500	500	54.0
10600-12700	500	54.0
13250-13400	500	54.0
14470-14500	500	54.0
15350-16200	500	54.0
17700-21400	500	54.0
22010-23120	500	54.0
23600-24000	500	54.0

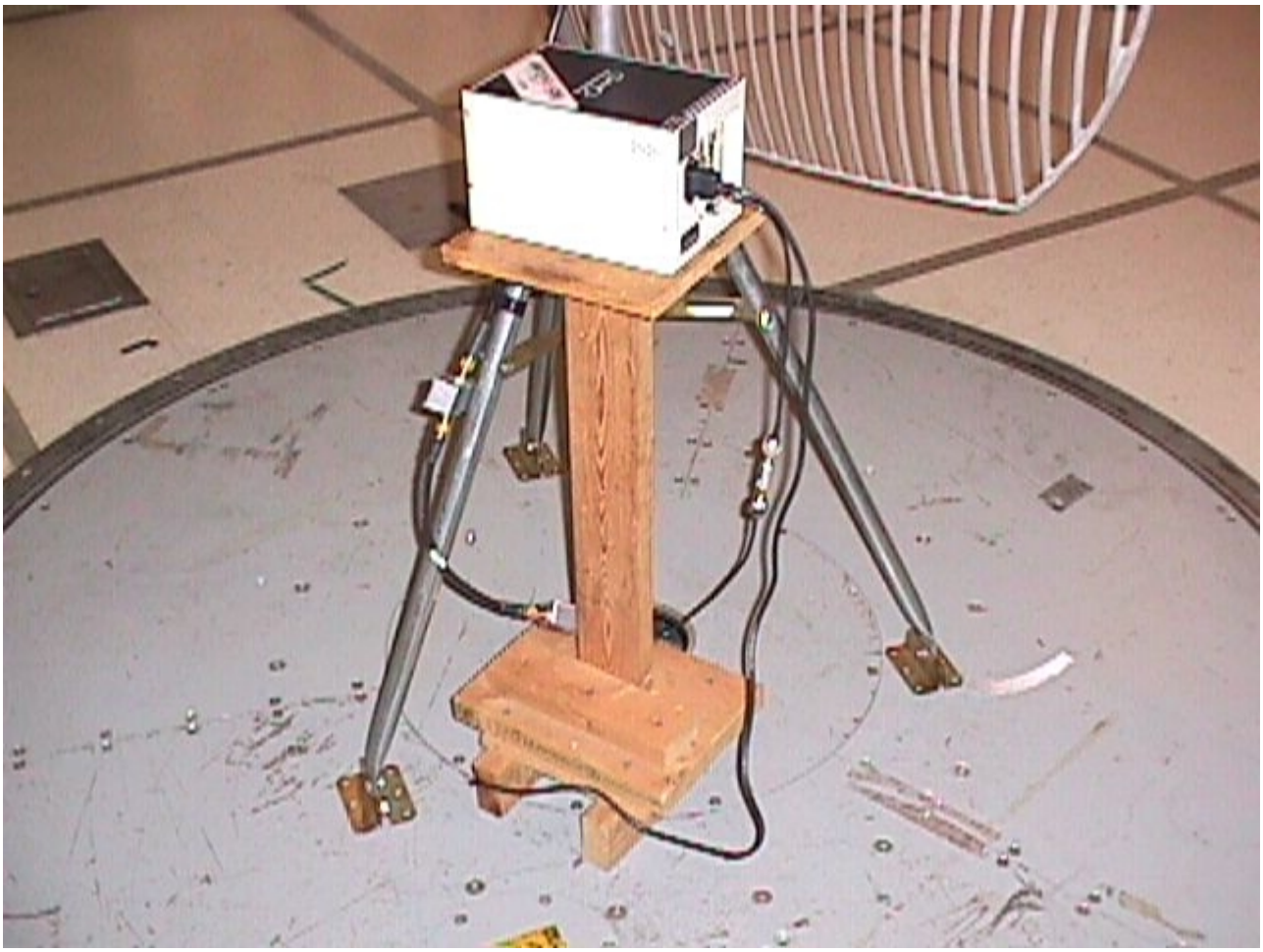
1 Meter limits; 54.0 dB plus 20log(3/1)= 54.0+9.54 = 63.54

3 Meter peak limits; 54.0 dB plus 20 dB= 54.0+20.0 = 74.0

1 Meter peak limits; 63.54 dB plus 20 dB= 63.54+20.0 = 83.54

2.15 – Photos taken during testing

View of the Waverider NCL 1000 module during the Radiated Emissions tests. This view shows the orientation of the product during tests of the emission from the system.



View of the Waverider NCL 1000 module during the Radiated Emissions tests.

View of the Waverider NCL 1000 module during conducted emission testing.

2.16 SUMMARY OF RESULTS AND CONCLUSIONS

Based on the procedures outlined in this report, and the test results included in appendices B and C, it can be determined that the Waverider NCL 1000 module does **"meet"** the emission requirements of Title 47 CFR, FCC Part 15 Subpart C for an intentional radiator. Some of the emissions in the restricted bands immediately adjacent to the 2.4 GHz ISM are within 4 dB of the limits respectively, and could be found to be over the limits if these samples, or others were to be tested by another agency.

During the testing, it was determined that an additional 2 pole filter for the ISM band would be required in the RF output path, in addition to the existing 2 pole filter. Therefore a Murata 2447F BPF was installed in the output cable, and will be required to be integrated along with the present band-pass filter in the cast aluminum box that contains the filter, resulting in a four pole band-pass filter.

The enclosed test results pertain to the samples of the test item listed, and only for the tests performed on the data sheets. Any subsequent modification or changes to the test items could invalidate the data contained herein, and could therefore invalidate the findings of this report.

2.17 - Test Equipment

Asset #	Manufacturer	Model #	Serial#	Description	Due Date
AA960004	EMCO	3146	9512-4276	Log Periodic Antenna	3aug2000
AA960005	EMCO	3110B	9601/2280	Biconical Antenna	3aug2000
AA960007	EMCO	3115	99111-4198	Double Ridge Horn Antenna	1aug2000
EE960004	EMCO	2090	9607-1164	Mast/Ttable controller	I.O.
EE960014	HP	85460	3617A00320	EMI receiver Display section	23aug2000
EE960013	HP	85462	3205A00103	EMI receiver Preselector section	23aug2000
CC000221	HP	E4407b	Us39160256	26.5 GHz Spectrum Analyzer	16june2000
	LSC	Cable	0011	3 meter heliax	23 feb2000
	LSC	Cable	0038	1 meter RG214	30dec1999
	LSC	cable	0050	10 meter RG214	30dec2000

APPENDIX A:

SAMPLE CALCULATIONS

FCC ID: OOX-NCL1100

Manufacturer: Waverider
Model: NCL 1000
Serial Number(s): preproduction

Calculation of Radiated Emissions limits for FCC Part 15.205 (above 1 GHz)

The following table depicts the limits for spurious products for an intentional radiator: Limits are included which are established at a measurement distance of 3 meters and also limits corrected for a 1 meter measurement distance, which are extrapolated from the 3 meter limit.

Frequency (MHz)	3m limit (dB μV/m)	1m limit (dB μV/m)
960 MHz up	54	63.54

- The 1 meter limits were calculated by adding a factor of 9.54 dB, derived from:

$$20\log_{10}(3/1) = 9.54 \text{ dB uV/m}$$

1m limit = 3m limit + factor

$$= 54 \text{ dB } \mu V/m + 9.54 \text{ dB } \mu V/m$$

$$= 63.54 \text{ dB } \mu V/m$$

APPENDIX B:

DATA CHARTS

FCC ID: OOX-NCL1100

Measurement of Electromagnetic Radiated Emission within 3 Meter FCC Listed Chamber

Frequency Range inspected: 30 to 1000 MHz

Date of Test:	1 October and 22 October, 1999	Manufacturer:	Waverider
Location:	L. S. Compliance, Inc. W66 N220 Commerce Court Cedarburg, WI 53012	Model No.:	NCL 1000
Specifications:	47CFR FCC Part 15.109, class A	Serial No.:	Pre-production
Distance:	3 meters	Configuration:	Rx / idle on channel 1,3 or 6 worst case observed
Equipment:	HP 8546A EMI Receiver EMCO 3146A Log Periodic EMCO 3110B Biconical	Detector(s) Used:	Quasi-peak

The following table depicts the level of significant spurious emissions found:

Frequency (MHz)	Antenna Polarity	Height (meters)	Azimuth (0° - 360°)	EMI Meter Reading (dB µV / m)	15.109 Limit (dB µV / m)	Margin (dB)
60.1	V	1.0	170	33.6	49.5	15.9
66.8	V	1.0	133	40.8	49.5	8.7
120.0	V	1.0	340	41.5	54.0	12.5
200.5	V	1.0	140	43.0	54.0	11.0
200.5	H	1.7	250	39.7	54.0	14.3
233.9	V	1.0	75	49.3	56.9	7.6
233.9	H	1.5	125	49.6	56.9	7.3
267.3	V	1.0	55	47.4	56.9	9.5
267.3	H	1.25	220	53.5	56.9	3.4
280.0	V	1.0	65	41.2	56.9	15.7
292.3	V	1.0	170	37.0	56.9	19.9
334.0	V	1.0	290	47.6	56.9	9.3
334.0	H	1.0	275	51.1	56.9	5.8
360.0	V	1.0	290	44.6	56.9	12.3
399.9/401	V	1.0	310	53.9	56.9	3.0

401.0	H	1.0	100	56.1	56.9	0.8
420.0	V	1.0	330	46.9	56.9	10.0
420.0	H	1.0	90	51.0	56.9	5.9
467.7	V	1.0	140	47.2	56.9	9.7
467.7	H	1.0	280	48.6	56.9	8.3

FCC ID: OOX-NCL1100

Measurement of Electromagnetic Radiated Emission within 3 Meter FCC Listed Chamber

Frequency Range inspected: to 25 GHz

Date of Test:	1 September, 1999	Manufacturer:	Waverider
Location:	L.S. Compliance, Inc. W66 N220 Commerce Court Cedarburg, WI 53012	Model No.:	NCL 1000
Specifications:	47CFR, FCC Part 15.247(c), 15.205	Serial No.:	Pre-production
Distance:	1 meter	Configuration:	Tx on Ch 1, 3, 6
Equipment:	HP 8546A EMI Receiver HP 84125C microwave EMI system EMCO 3115 Double Ridged Waveguide	Detector(s) Used:	Average

The following table depicts the level of significant spurious and harmonic emissions found:

Frequency (GHz)	Antenna Polarity	Height (meters)	Azimuth (0° - 360°)	EMI Reading (dBuV/m)	Channel	Limit (dB µV/m)	Margin (dB)
1691.0	H	1.0	0	60.7	3	63.54	2.84
2352.0	H	1.0	0	53.5	1	63.54	10.04
2372.5	H	1.0	0	56.0	1	63.54	7.54
2372.5	H	1.0	0	54.9	3	63.54	8.64
2382.5	H	1.0	0	54.5	1	63.54	9.04
2382.5	H	1.0	0	53.5	6	63.54	10.04
2384.0	H	1.0	0	54.0	3	63.54	9.54
2385.5	H	1.0	0	56.5	1	63.54	7.04
2385.5	H	1.0	0	54.0	3	63.54	9.54
2390.0	H	1.0	0	57.4	1	63.54	6.14
2483.5	H	1.0	0	60.1	6	63.54	3.44
2484.0	H	1.0	0	56.4	1	63.54	7.14
2486.3	H	1.0	0	61.5	3	63.54	2.04
2864.5	H	1.0	0	54.8	1	63.54	8.74

FCC ID: OOX-NCL1100

Measurement of Conducted Emissions with direct connection to the antenna port.

Date of Test:	August 30, September1, 1999	Manufacturer:	Waverider
Location:	L. S. Compliance, Inc.	Model No.:	NCL 1000
	W66 N220 Commerce Court		
	Cedarburg, WI 53012		
Specifications:	Title 47CFR, FCC Part 15.247	Serial No.:	Pre-production
Distance:	N / A	Configuration:	Channel 1, 3,6 Tx
Equipment:	HP 85460A, 85462A EMI Receiver	Detector(s) Used:	Peak
	HP-E4407B		
Lab Conditions:	Temp.: 72° F	Humidity:50%	

The following table depicts the level of significant spurious emissions found:

Frequency (MHz)	Channel	EMI Meter Reading (dBm)	Output power Measured in a .1 MHz bandwidth (dBm)	Power difference (-dBc)
2183	6	-46.1	5.1	51.2
2402	6	-48.3	5.1	53.4
2487	6	-43.6	5.1	48.7
2492	6	-45.5	5.1	50.6
2513	6	-48.5	5.1	53.6
2517	6	-44.4	5.1	49.5
2486	3	-46.3	6.1	52.4
2530	3	-44.1	6.1	50.2
2530	1	-44.9	6.0	50.9
7250	1	-49.6	6.0	55.6

FCC ID: OOX-NCL1100

Measurement of Conducted Emissions within 8' X 10' FCC Listed Shielded Room.

Date of Test:	October 28, 1999	Manufacturer:	Waverider
Location:	L. S. Compliance, Inc.	Model No.:	NCL-1100
	W66 N220 Commerce Court		
	Cedarburg, WI 53012		
Specifications:	Title 47CFR, FCC Part 15 Subpart C	Serial No.:	preproduction
Distance:	40 cm to vert. G.P.	Configuration:	Channel 3, RX (worst case)
Equipment:	HP 85460A, 85462A EMI Receiver	Detector(s) Used:	Quasi-Peak
	EMCO 3810/2NM LISN		
	HP 11947A Limiter		
Lab Conditions:	Temp.: 72° F	Humidity:50%	

The following table depicts the level of significant spurious emissions found:

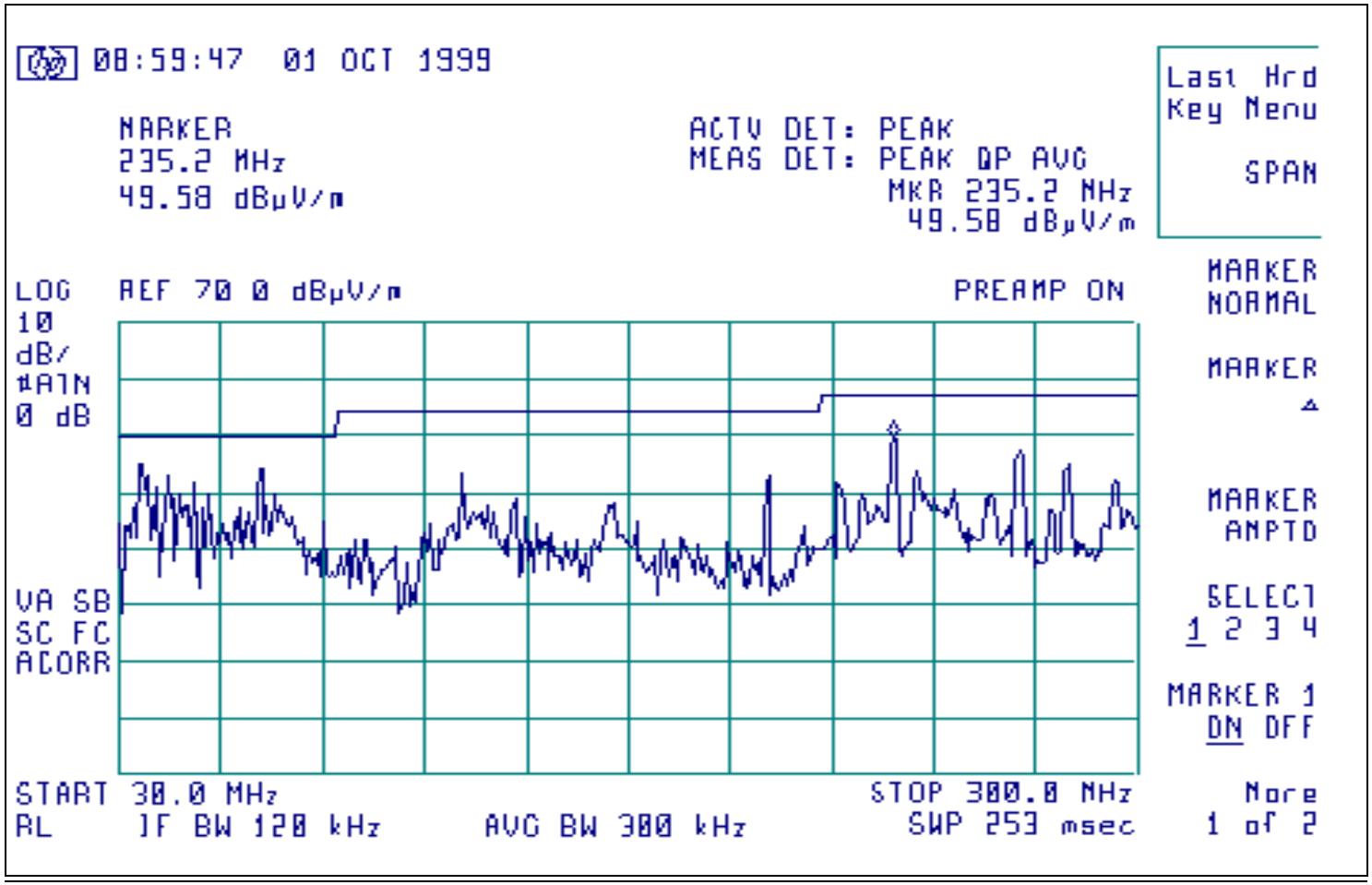
Frequency (MHz)	Line	EMI Meter Reading (dB µV)	FCC 15.107 Limit (dB µV)	Margin (dB)
0.46	L1	38.0	60.0	22.0
0.615	L1	35.3	60.0	24.7
0.96	L1	34.3	60.0	25.7
20.3	L1	37.3	69.5	32.2
0.882	L2	37.0	60.0	23.0
0.968	L2	37.9	60.0	22.1
1.04	L2	37.9	60.0	22.1
1.118	L2	39.9	60.0	20.1
1.124	L2	40.1	60.0	19.9

APPENDIX C:

GRAPHS

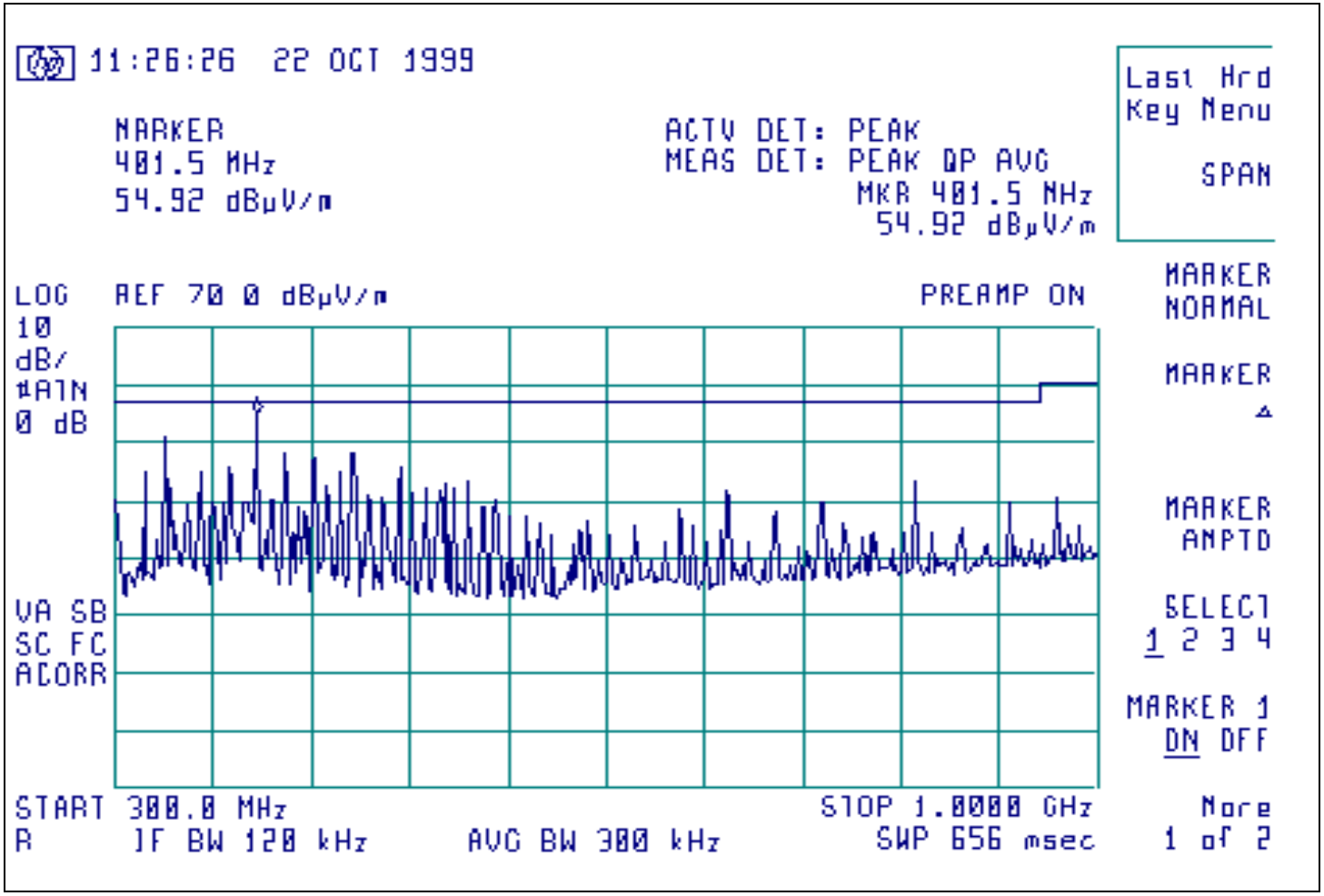
FCC ID : OOX-NCL1100

TX channel 2, 30-300 MHz, horizontal polarity



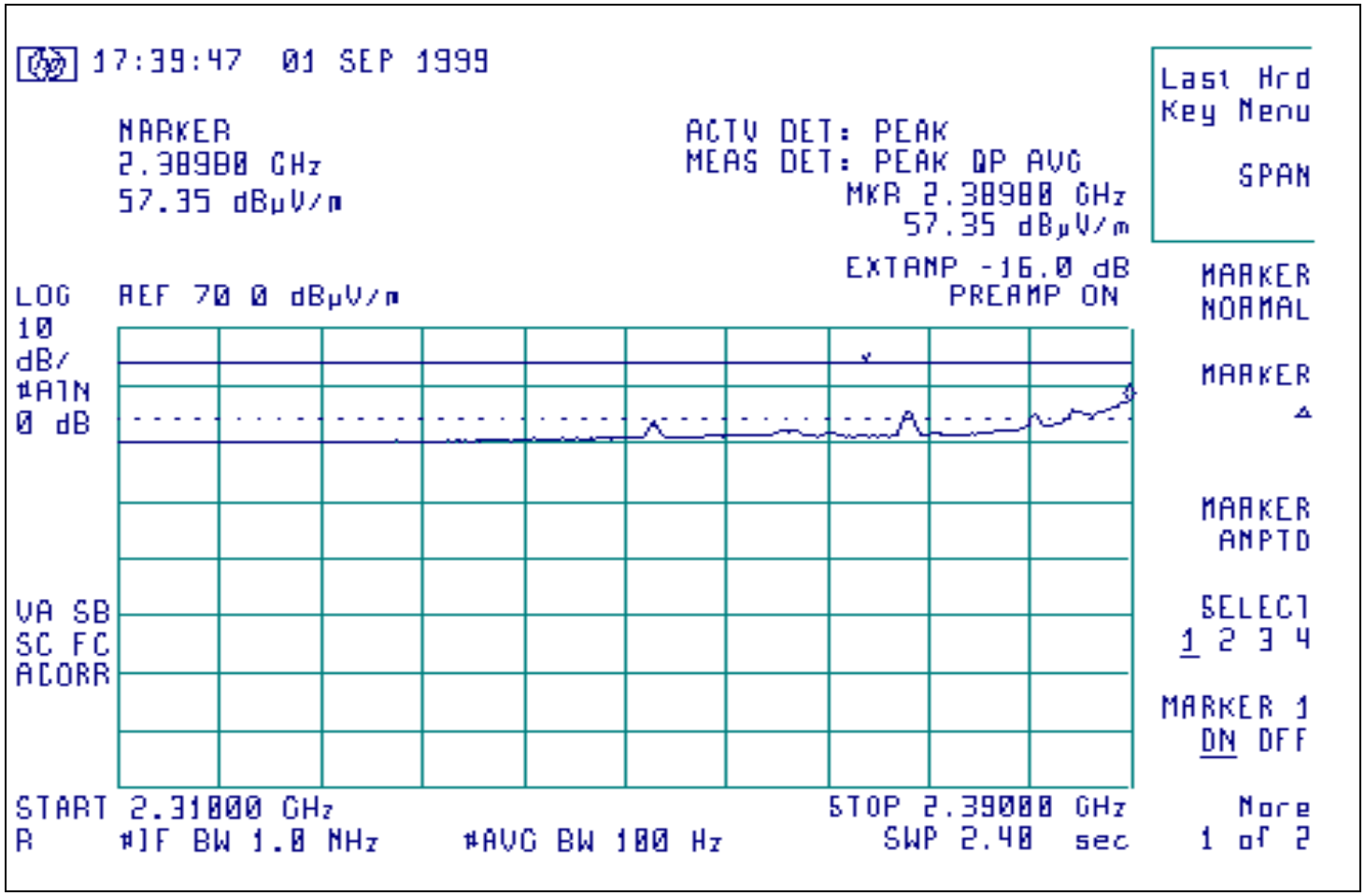
FCC ID : OOX-NCL1100

Tx channel 2, 300-1000 MHz, Horizontal polarity



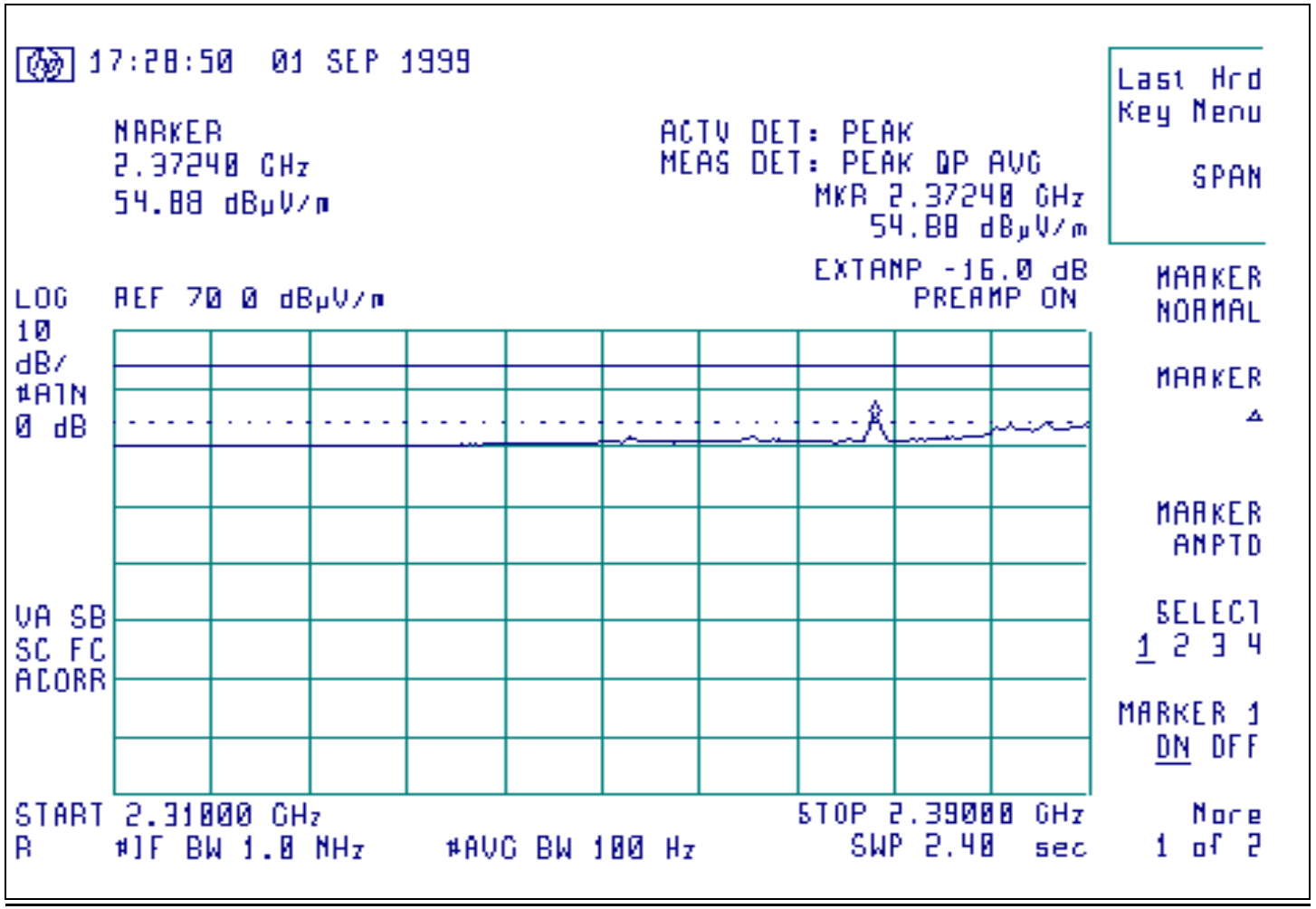
FCC ID : OOX-NCL1100

Tx channel 1, 2.31-2.39 GHz, vertical polarity, 1 meter separation



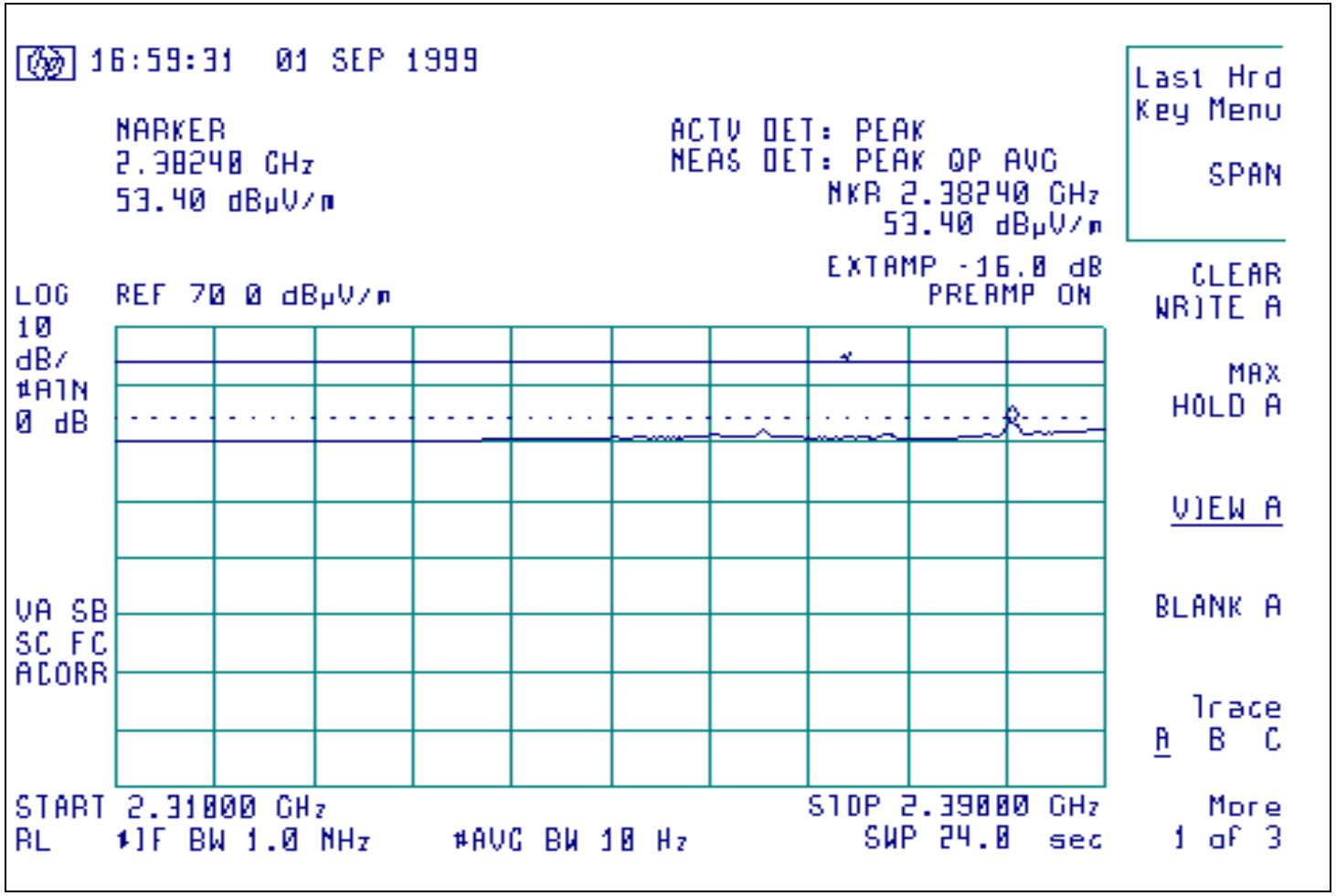
FCC ID : OOX-NCL1100

Tx channel 3, 2.31-2.39 GHz, vertical polarity, 1 meter separation



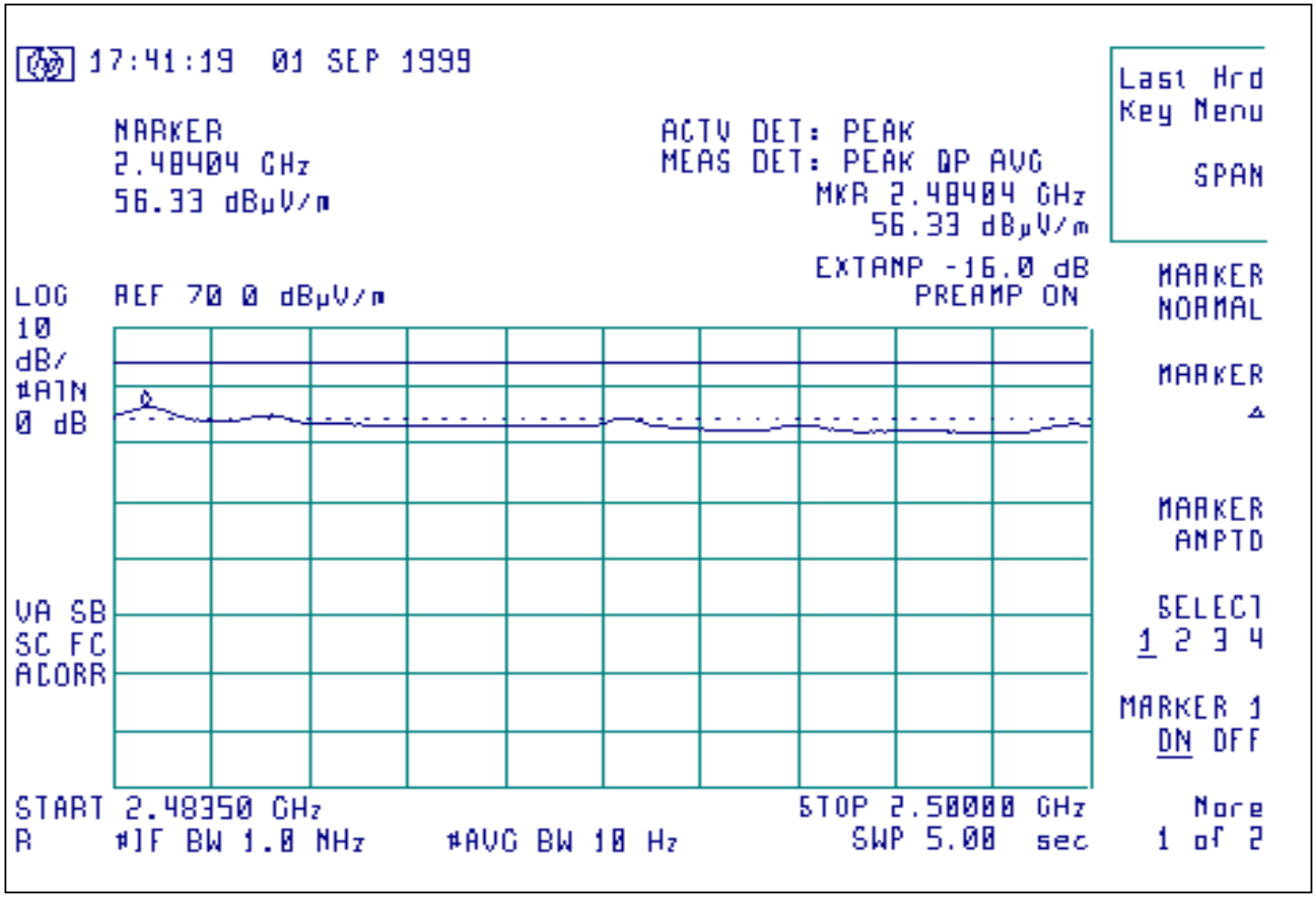
FCC ID : OOX-NCL1100

Tx channel 6, 2.31-2.39 GHz, vertical polarity, 1 meter separation



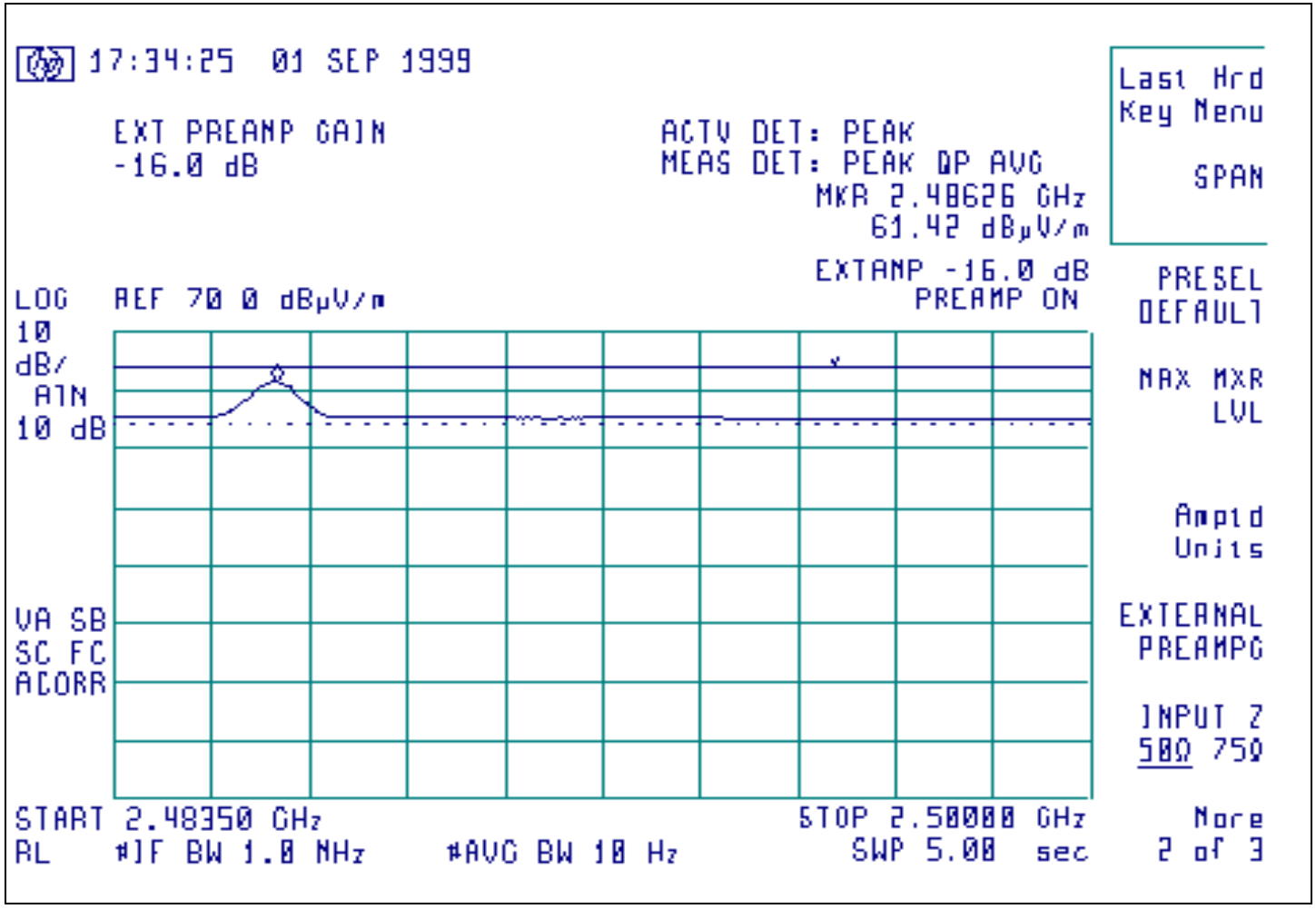
FCC ID : OOX-NCL1100

Tx channel 1, 2.483-2.5 GHz, vertical polarity, 1 meter separation



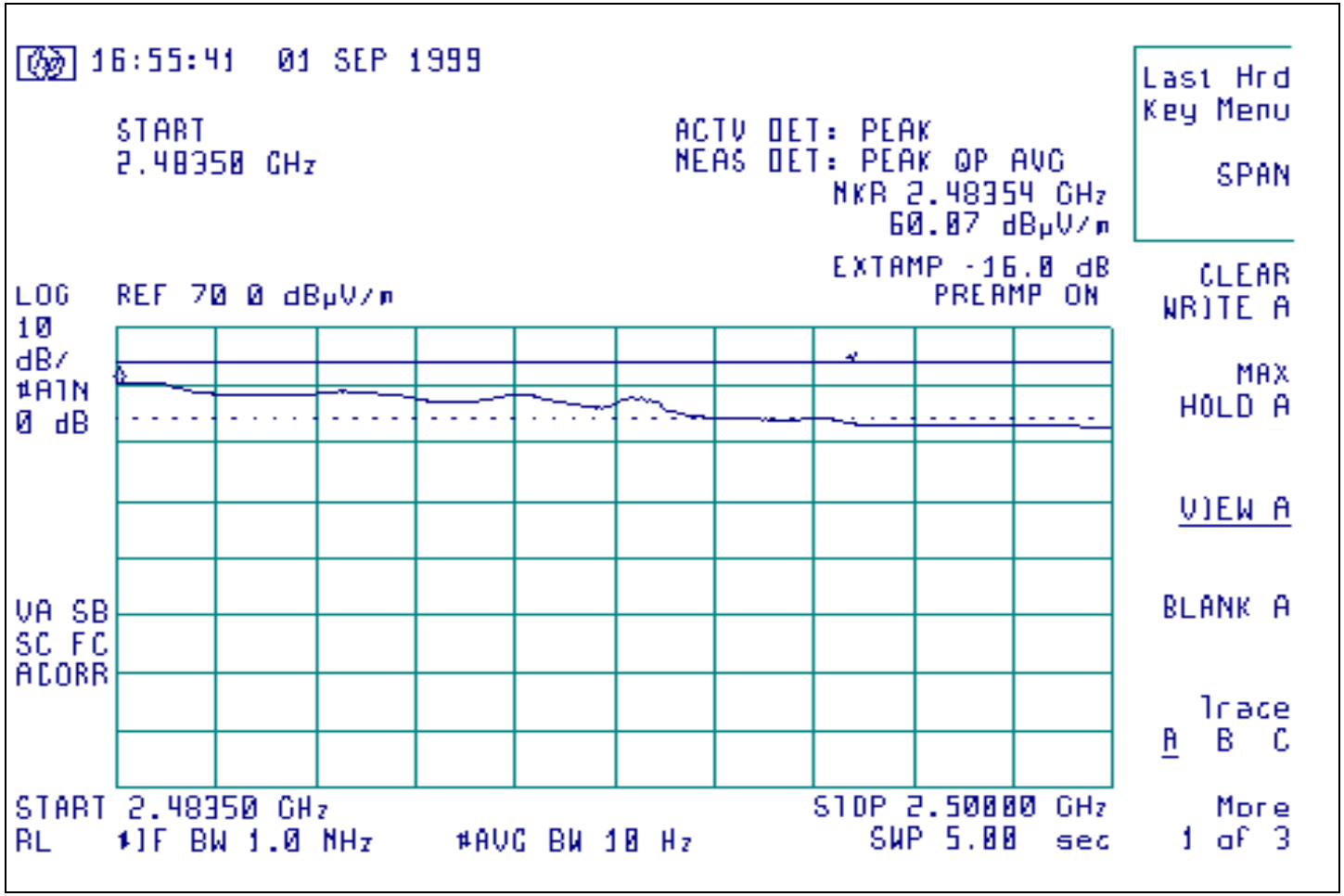
FCC ID : OOX-NCL1100

Tx channel 3, 2.483-2.5 GHz, vertical polarity, 1 meter separation



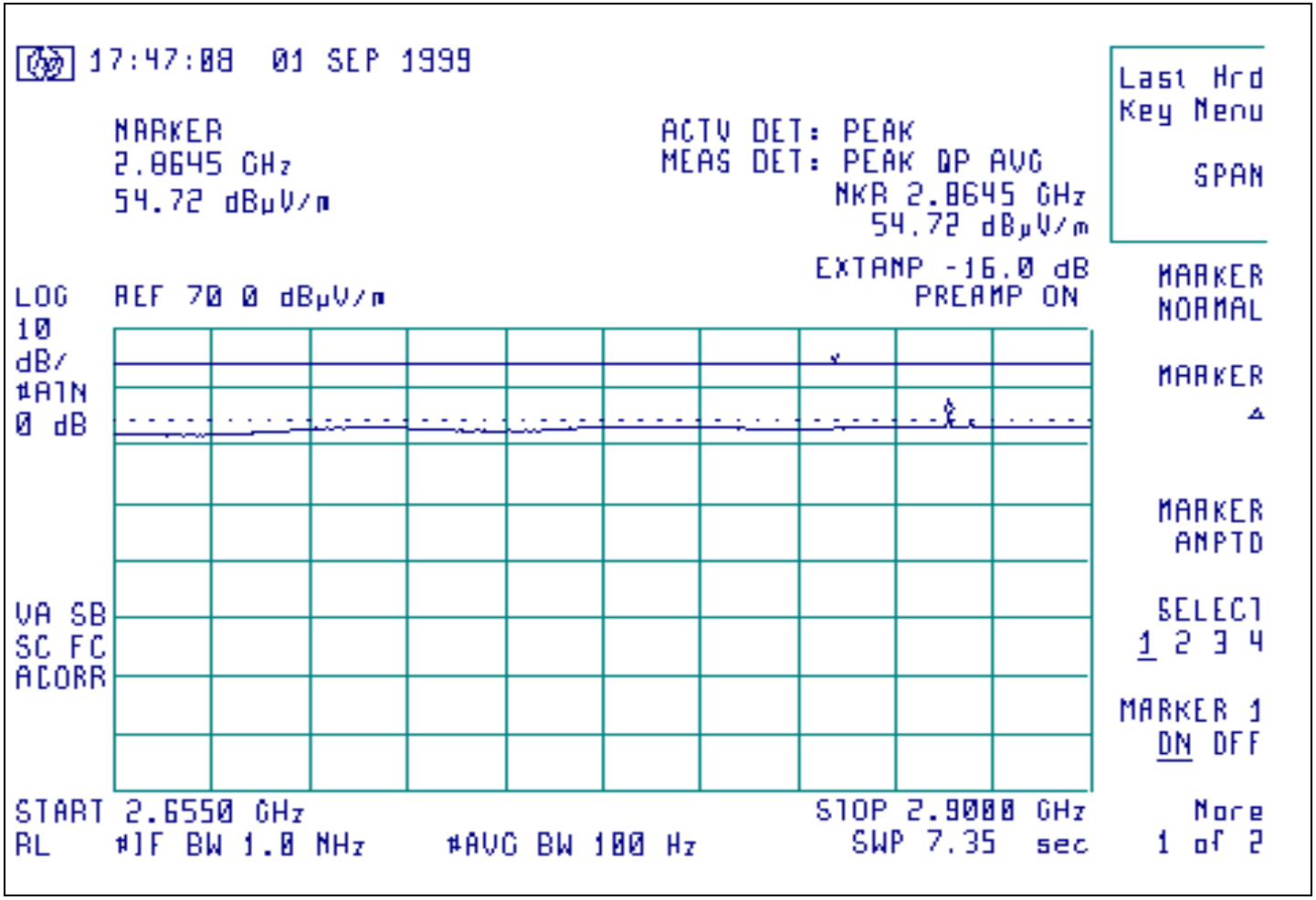
FCC ID : OOX-NCL1100

Tx channel 6, 2.483-2.5 GHz, vertical polarity, 1 meter separation



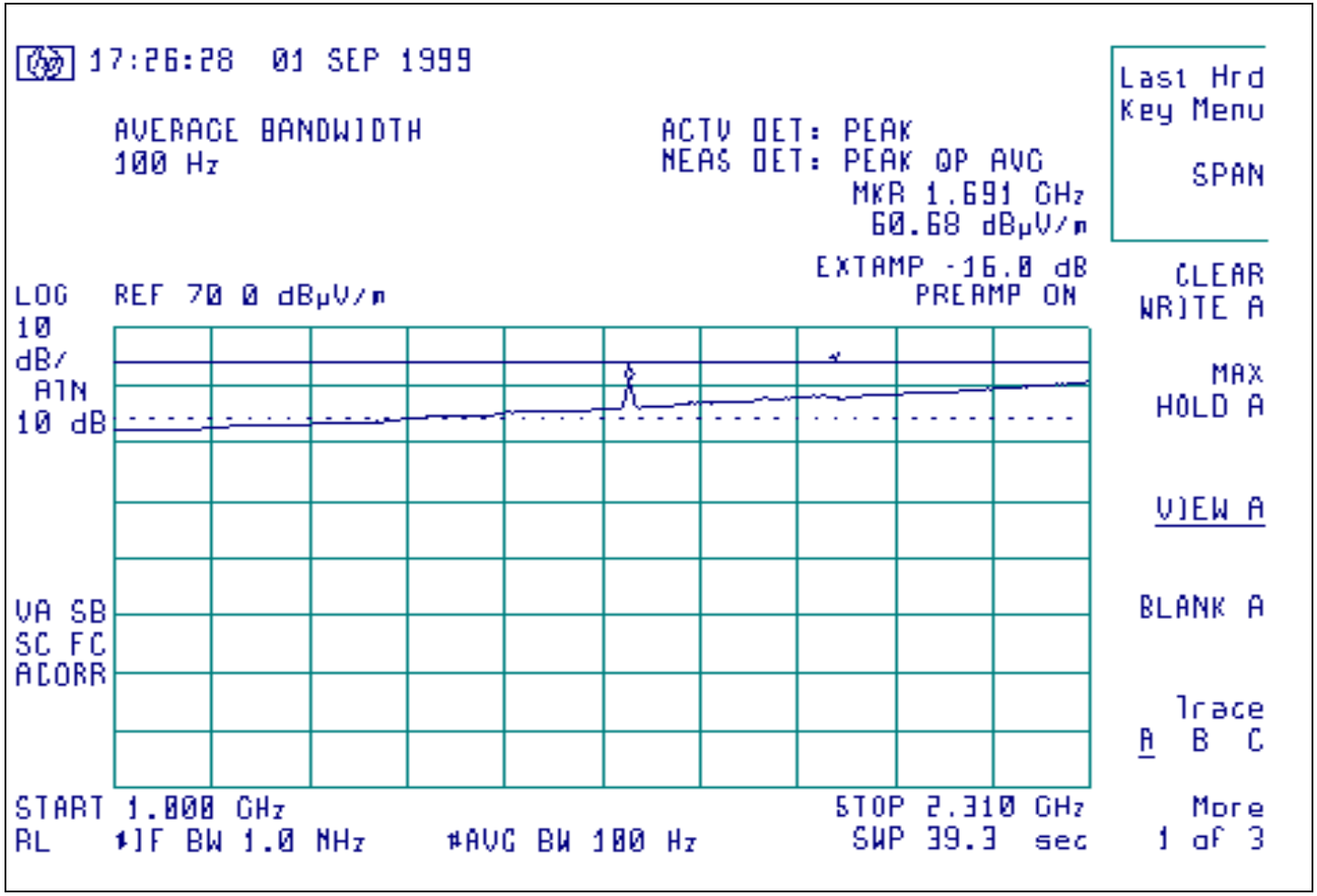
FCC ID : OOX-NCL1100

Tx channel 4, 2.5-5 GHz, vertical Polarity



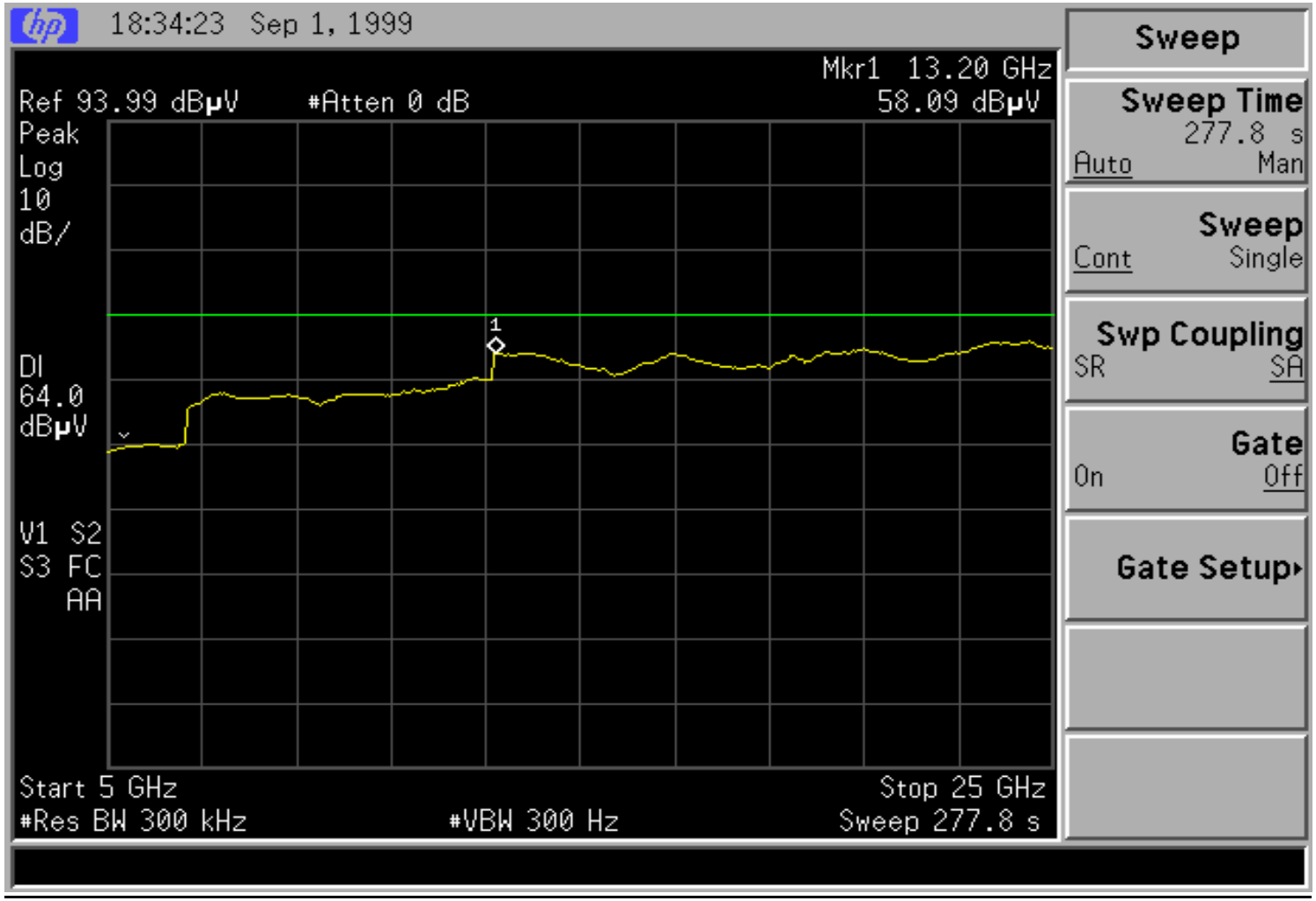
FCC ID : OOX-NCL1100

Tx channel 4; 1.0-2.31 GHz, vertical Polarity

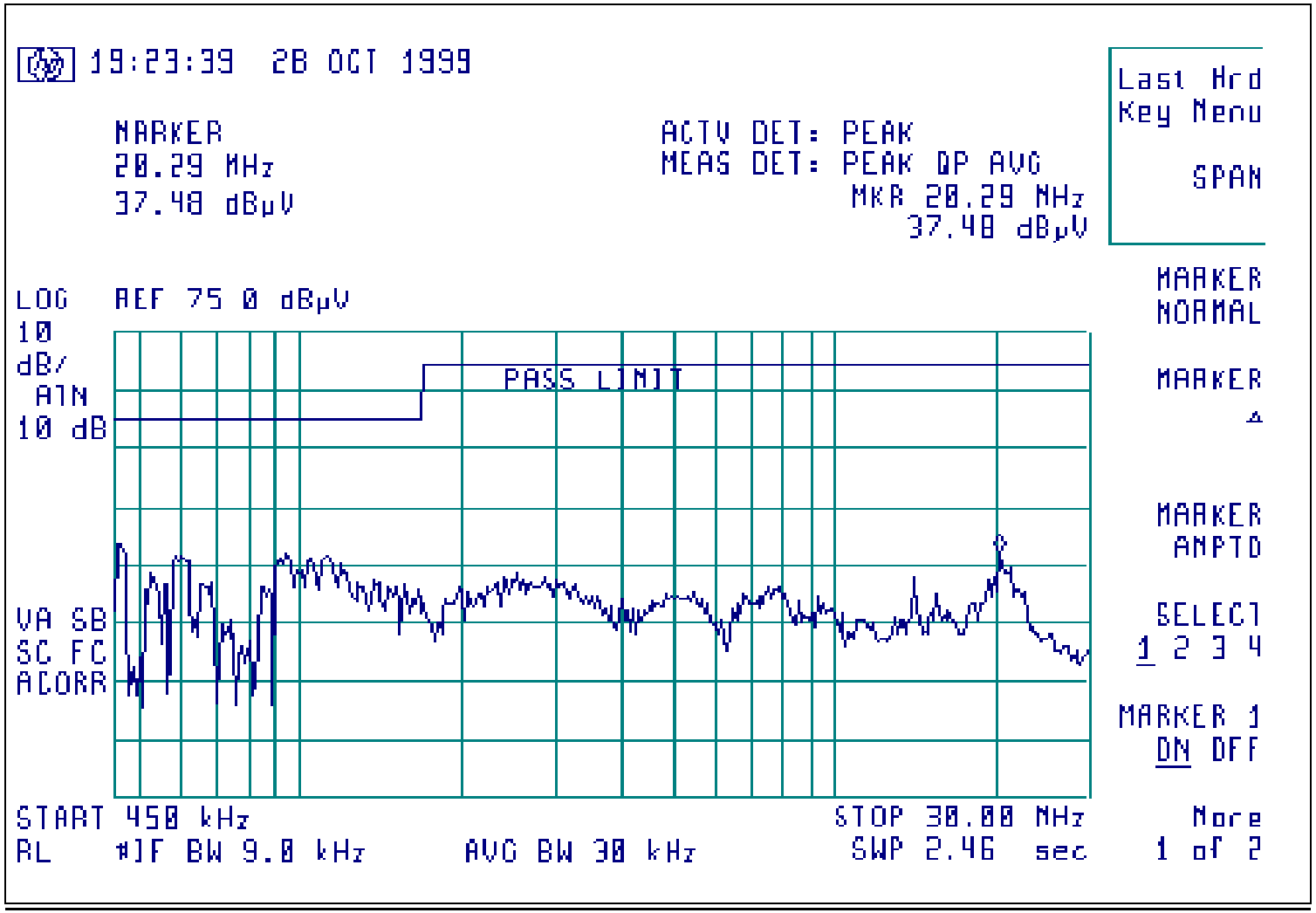


FCC ID : OOX-NCL1100

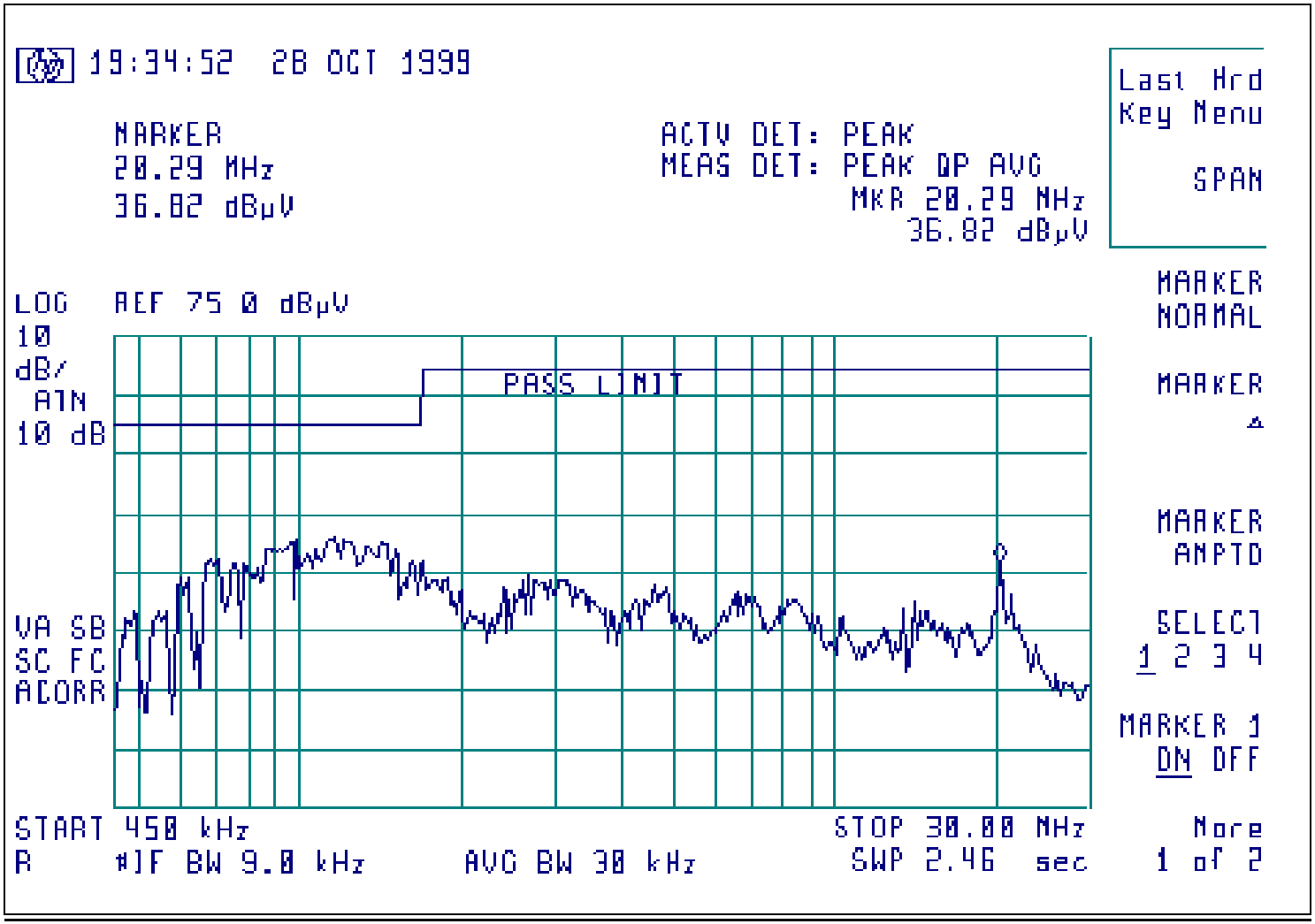
5-25 ghz, vertical polarity, tx on channel 3



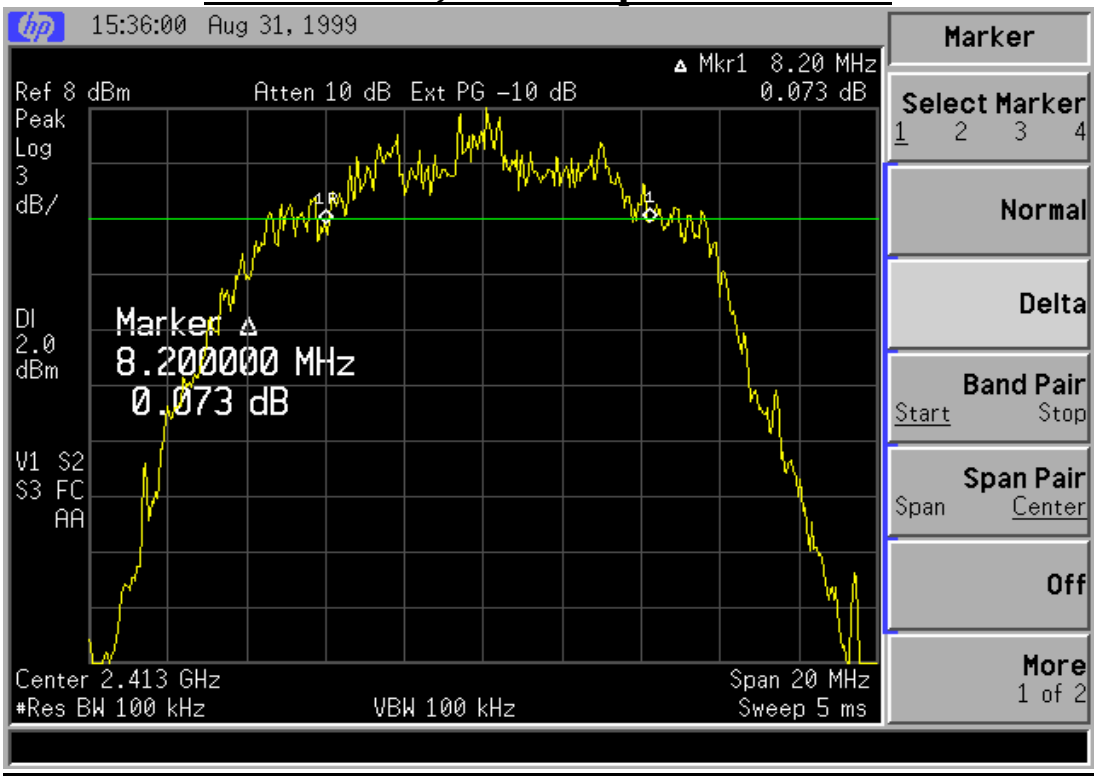
AC LINE CONDUCTED EMISSIONS, CHANNEL3 RX, L1



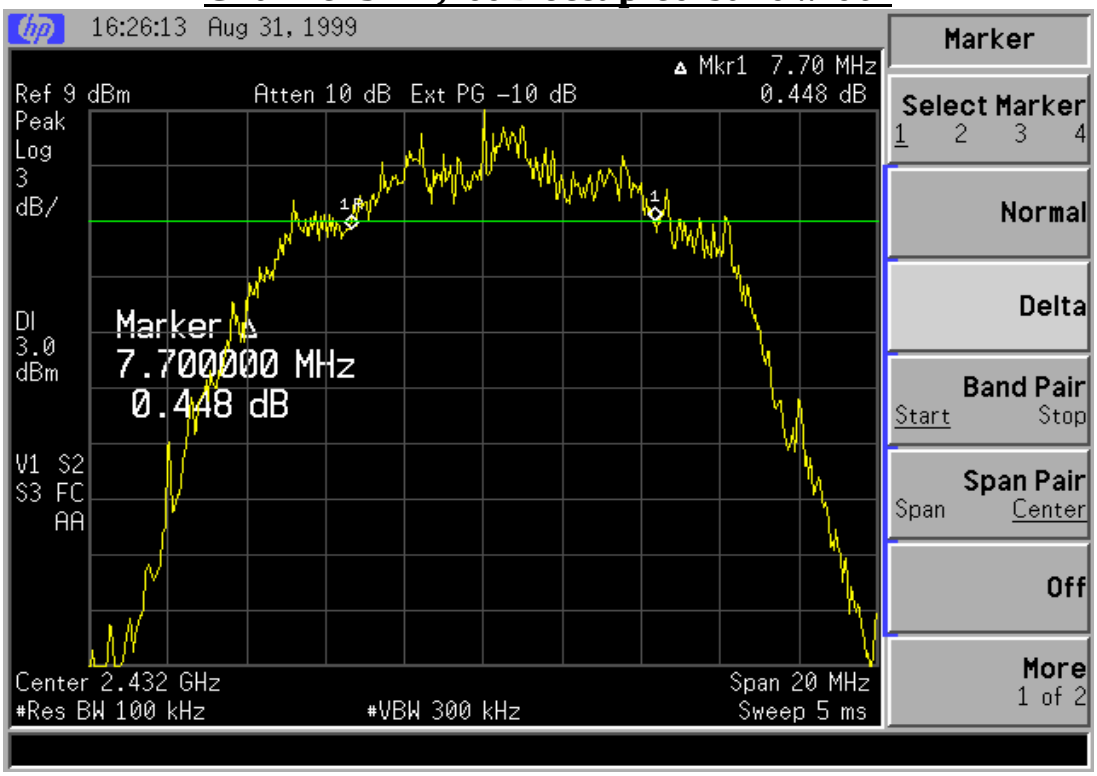
AC LINE CONDUCTED EMISSIONS, CHANNEL3 RX, L2


19:34:52 28 OCT 1999
MARKER
20.29 MHz
36.82 dBµV
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 20.29 MHz
36.82 dBµV
Last Hrd Key Menu
SPAN
LOG REF 75 0 dBµV
10 dB/
ATN 10 dB
PASS LIMIT
VA SB
SC FC
ACORR
MARKER NORMAL
MARKER Δ
MARKER AMPTD
SELECT 1 2 3 4
MARKER 1 ON OFF
More 1 of 2
START 450 kHz
STOP 30.00 MHz
R IF BW 9.0 kHz
AVG BW 30 kHz
SWP 2.46 sec

Channel 1 TX, 6dB occupied bandwidth

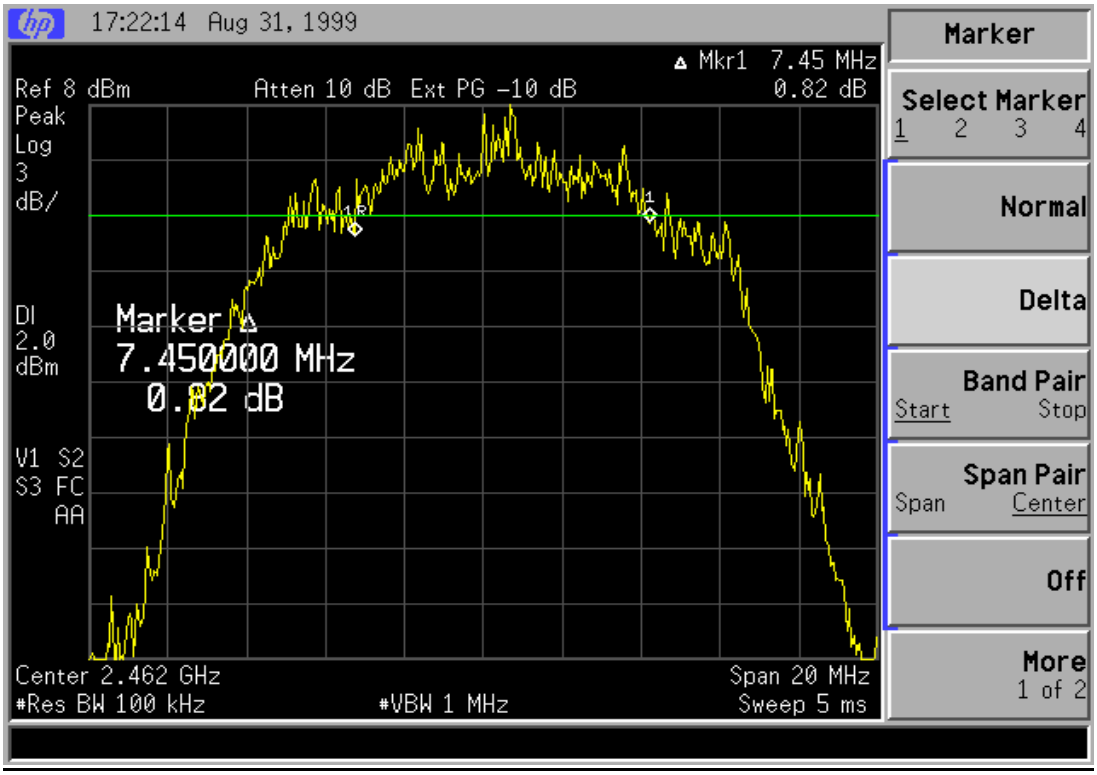


Channel 3 TX, 6dB occupied bandwidth

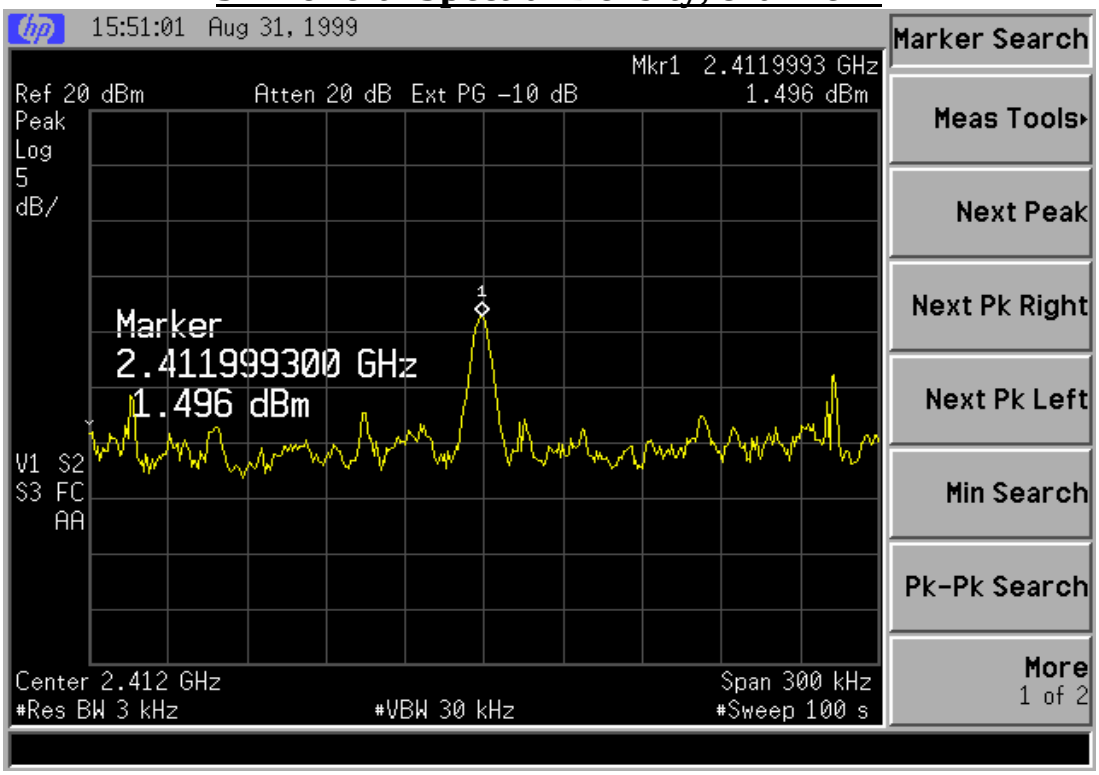


FCC ID : OOX-NCL1100

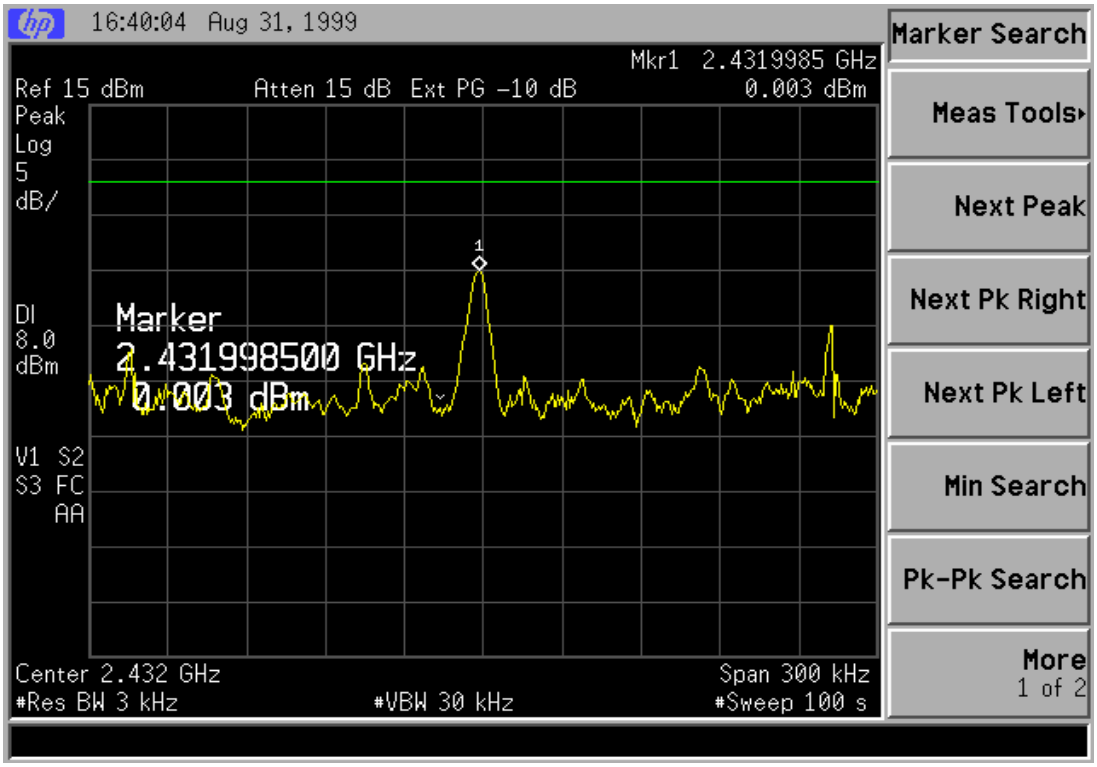
Channel 6 TX, 6dB occupied bandwidth



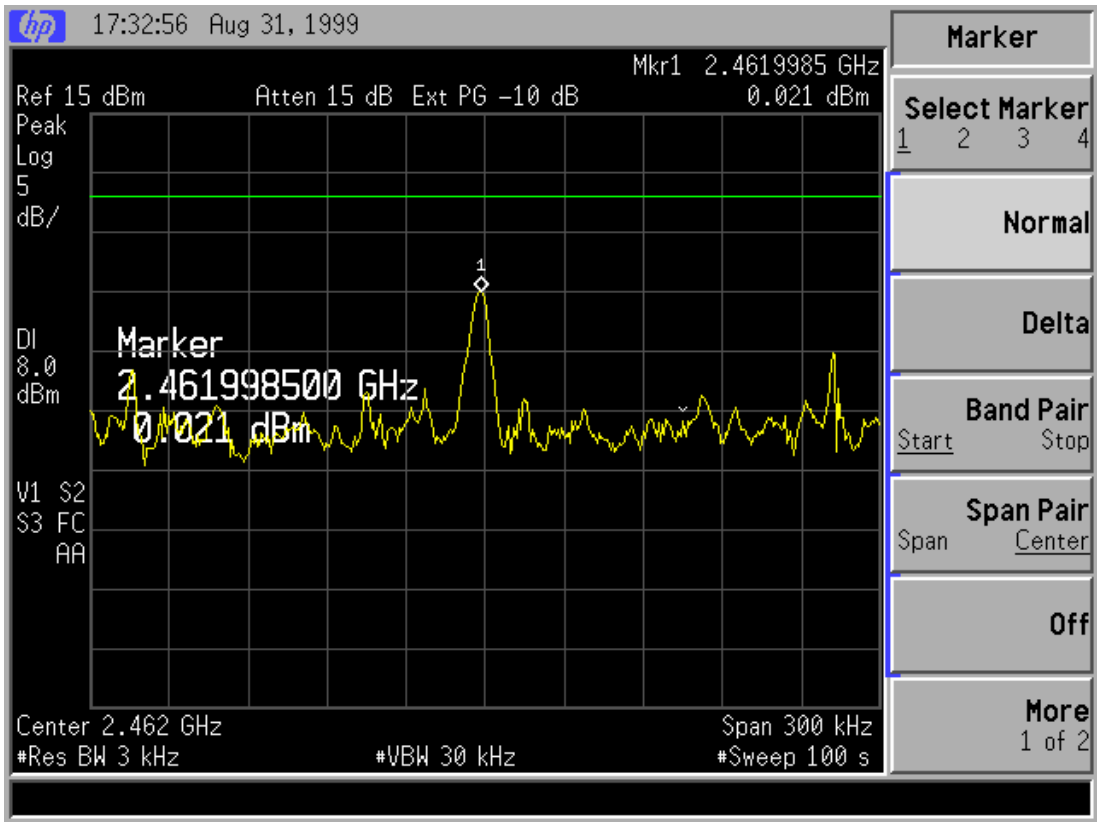
3 Kilohertz Spectral Density; channel 1



3 Kilohertz Spectral Density; channel 3

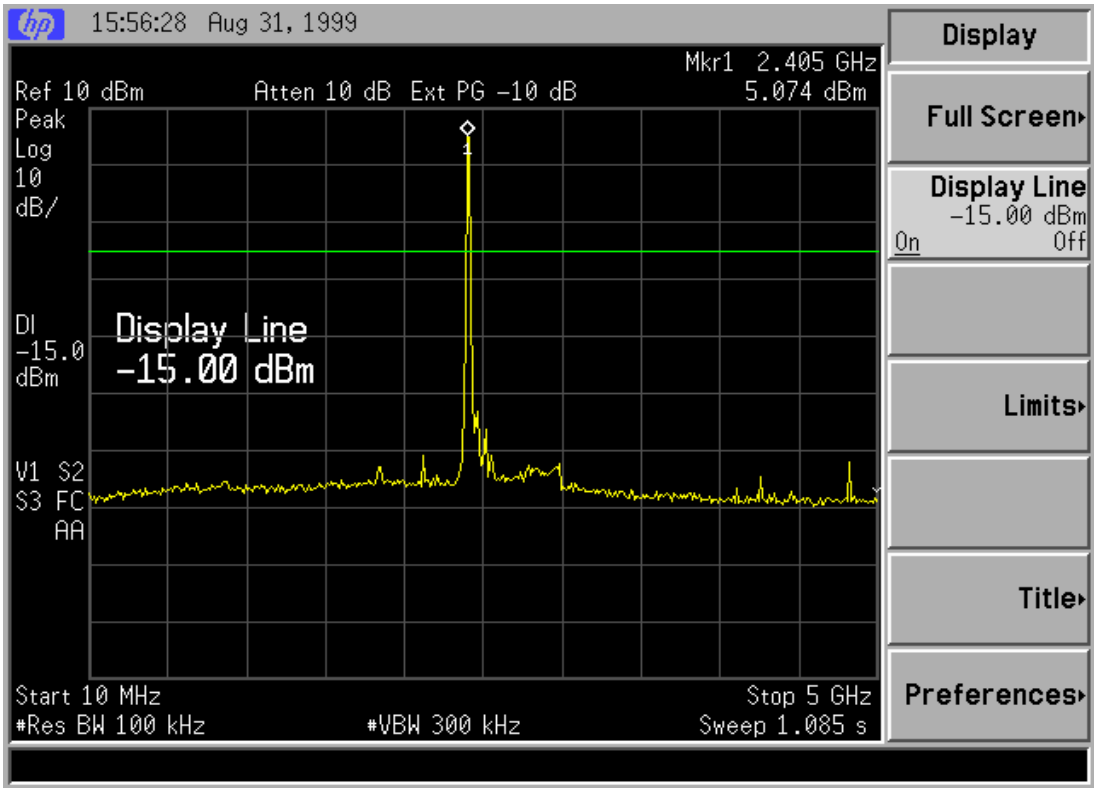


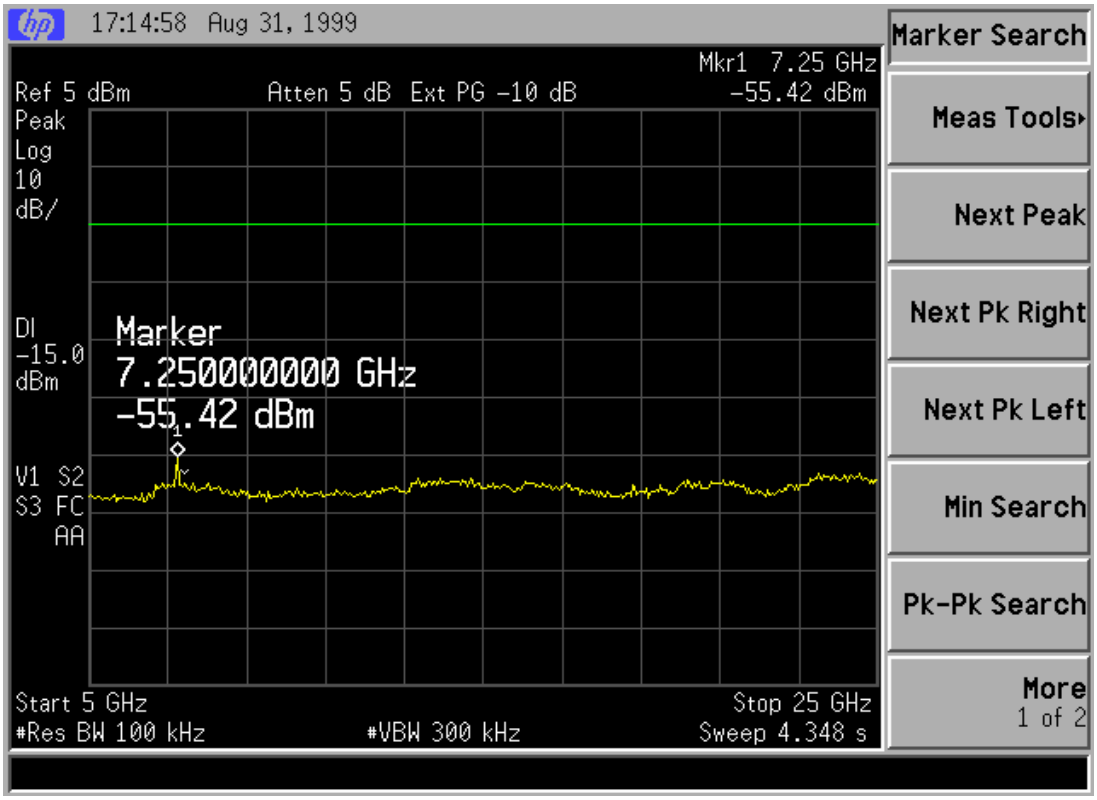
3 Kilohertz Spectral Density; channel 6



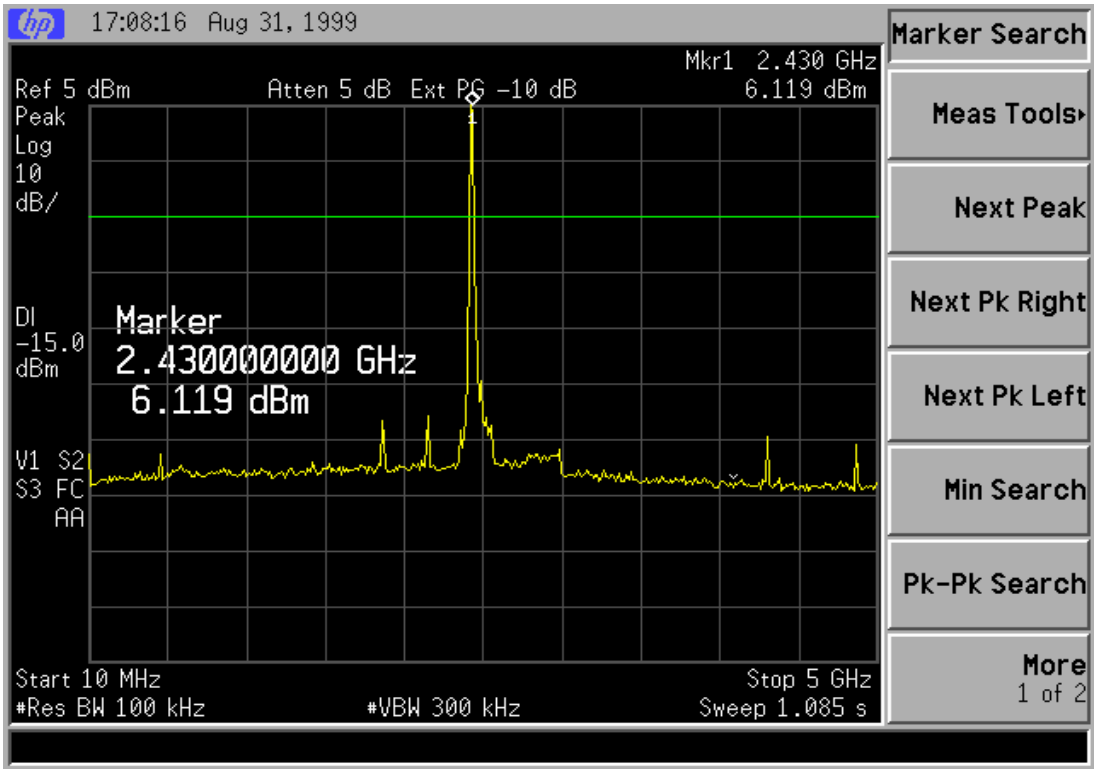
FCC ID : OOX-NCL1100

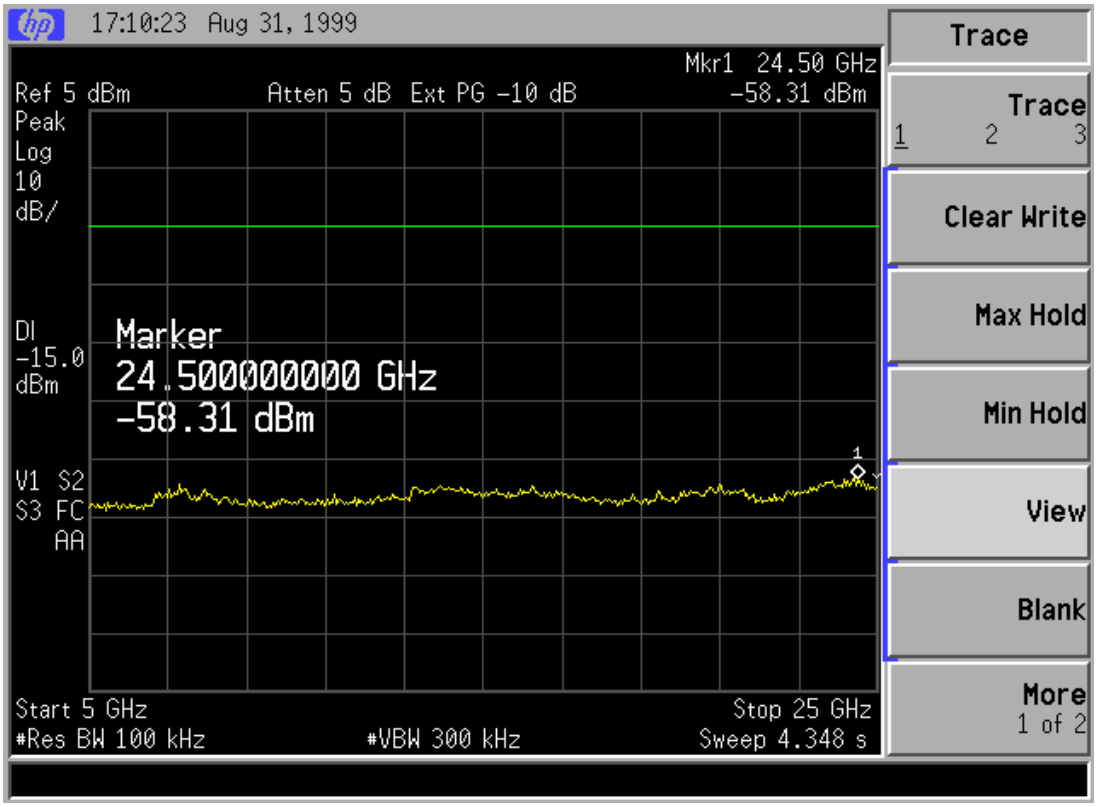
Conducted RF emissions from the antenna port, channel 1



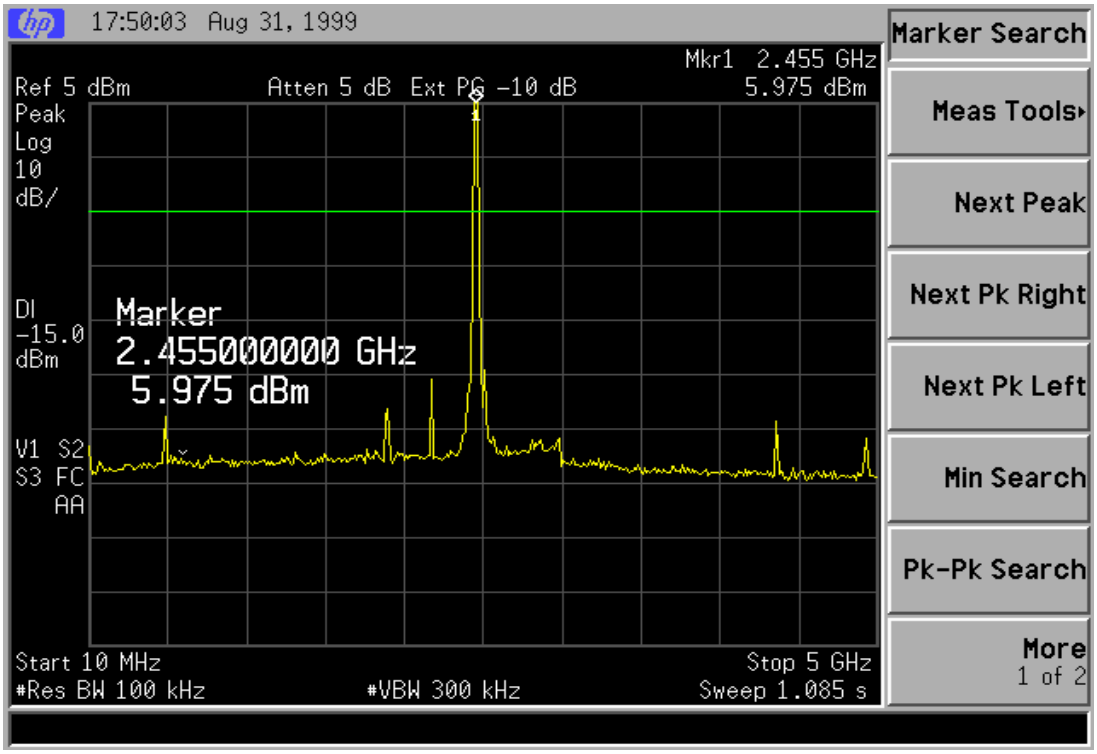

17:14:58 Aug 31, 1999
Mkr1 7.25 GHz
Ref 5 dBm
Atten 5 dB Ext PG -10 dB
-55.42 dBm
Peak
Log
10
dB/
Marker
7.250000000 GHz
-55.42 dBm
Dl
-15.0
dBm
V1 S2
S3 FC
AA
Start 5 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25 GHz
Sweep 4.348 s
Marker Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

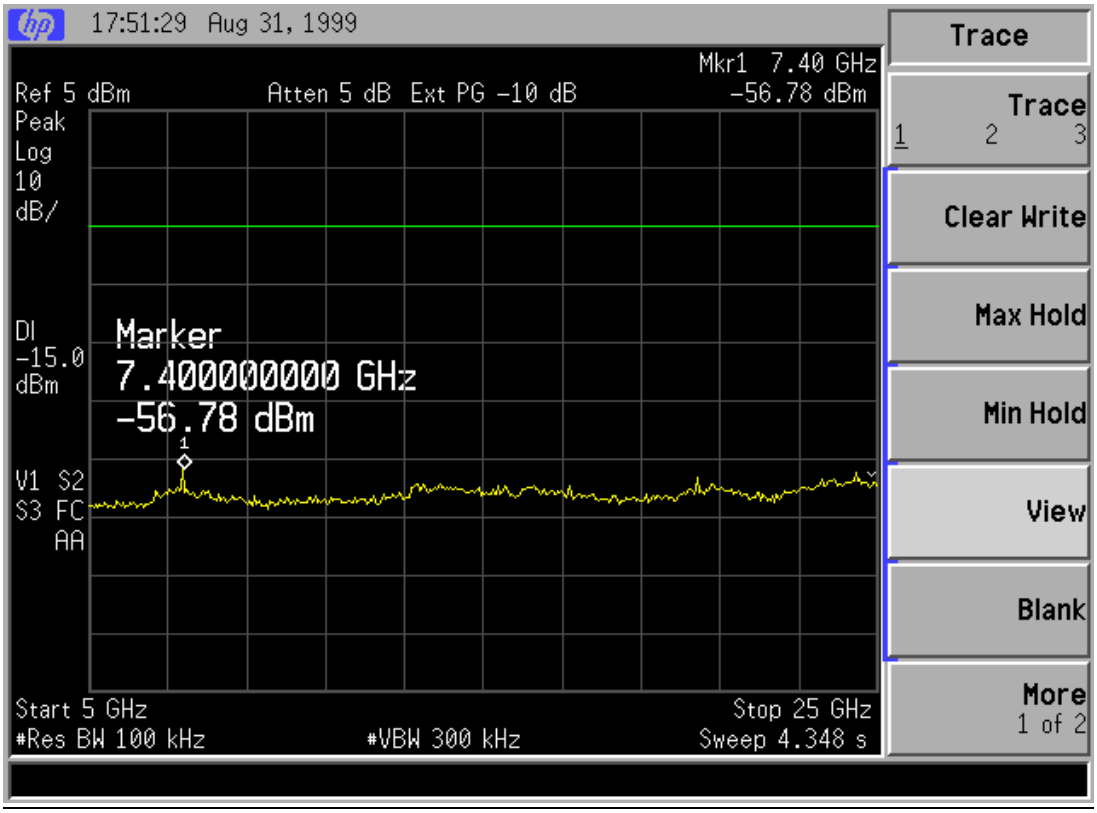
Conducted RF emissions from the antenna port; channel 3





Conducted RF emissions from the antenna port, channel 6





APPENDIX D:

Abrahams, Richard
From: Greg Czumak [GCZUMAK@fcc.gov]
Sent: Tuesday, December 29, 1998 8:51 AM
To: Abrahams, Richard
Cc: Willingham, J B Bartow; Andren, Carl; Fakatselis, John; Ciaccia, Larry; Rood, Robert
Subject: Processing Gain Measurements -Reply

This is in response to your e-mail dated December 4, 1998. With respect to your proposed "Reference Design," after discussing the issue here, we have decided that Harris should obtain an authorization (FCC ID) for the reference design (even if you never actually market this product). In this way, your customers may submit a copy of the processing gain (jamming margin) data from the granted application with their own applications, assuming they are using the exact same design. They would simply have to submit a statement verifying that the design is identical, along with the copied data. The advantage of this approach is that they will be referencing an authorized product, and not some unapproved design, thus avoiding any appearance of impropriety.

I hope this has been responsive to your inquiry. Please contact me with any additional questions.

FCC 15.247(e) Jamming Margin Test