FCC PART 15, SUBPART C
TEST METHOD: ANSI C63.4-1992

for

XIRCOM WIRELESS LAN MODULE FOR PALM HANDHELDS

Model: PWE1130

Prepared for

XIRCOM, INC.
2300 CORPORATE CENTER DRIVE
THOUSAND OAKS, CALIFORNIA 91320

Prepared by: _____

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Approved by: _____

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DATE: MAY 25, 2001

	REPORT BODY	APPENDICES						TOTAL
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GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form unless done so in full with the written permission of Compatible Electronics.

This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Device Tested:	Xircom Wireless LAN Module for Palm Handhelds Model: PWE1130 S/N: N/A
Modifications:	The EUT was not modified in order to meet the specifications.
Manufacturer:	Xircom, Inc. 2300 Corporate Center Drive Thousand Oaks, California 91320
Test Dates:	April 19 and 20, 2001
File # For Canada	IC2154-D
Test Specifications:	EMI requirements FCC Title 47, Part 15 Subpart B; and Subpart C, sections 15.205, 15.207, 15.209, and 15.247
Test Procedure:	ANSI C63.4: 1992
Test Deviations:	The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 450 kHz – 30 MHz	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.207
2	Spurious Radiated RF Emissions, 10 kHz – 25000 MHz	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247(c)
3	Fundamental and Emissions produced by the intentional radiator in non-restricted bands, 10 kHz – 25 GHz	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247(c)
4	Emissions produced by the intentional radiator in restricted bands, 10 kHz – 25 GHz	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.205 and 15.209(a)
5	6 dB Bandwidth	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (a)(2)
6	Maximum Peak Output Power	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (b)(1)
7	RF Antenna Conducted	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (c)
8	Peak Power Spectral Density Conducted from the Intentional Radiator to the Antenna	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (d)
9	Processing Gain	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (e)

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Xircom Wireless LAN Module for Palm Handhelds Model: PWE1130. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 1992. The tests were performed in order to determine whether the electromagnetic emissions from the Xircom Wireless LAN Module for Palm Handhelds, referred to as EUT hereafter, are within the specification limits defined by FCC Title 47, Part 15, Subpart C, sections 15.207, 15.209, and 15.247, and also to determine whether the EUT meets the processing gain requirement specified in 15.247.

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Xircom, Inc.

James K. Baer	Manager Global Compliance Engineer
Robert W. Paxman	Compliance Engineer

Compatible Electronics Inc.

Kyle Fujimoto	Test Engineer
Scott McCutchan	Lab Manager

2.4 Date Test Sample was Received

The test sample was received on April 19, 2001

2.5 Disposition of the Test Sample

The test sample was returned to Xircom, Inc. on April 20, 2001.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

SPEC	TITLE
FCC Title 47, Part 15 Subpart C.	FCC Rules - Radio frequency devices (including digital devices) – Intentional Radiators.
ANSI C63.4 1992	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.
FCC Title 47, Part 15 Subpart B	FCC Rules - Radio frequency devices (including digital devices) – Unintentional Radiators.

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

Specifics of the EUT and Peripherals Tested

The Xircom Wireless LAN Module for Palm Handhelds Model: PWE1130 (EUT) was installed inside a Handspring Visor and connected to an AC Adapter via its power port. The low (channel 1), medium (channel 6), and high (channel 11) channels were tested. The EUT was tested in three different orthogonal axis. The EUT was transmitting and receiving on a continuous basis. The radiated data was taken in this mode of operation. All initial investigations were performed with the EMI receiver in manual mode scanning the frequency range continuously. The cables were bundled and routed as shown in the photographs in Appendix C. The data sheets are located in Appendix D.

The antenna connection is a unique MMCX style micro-miniature connector. This connector is on the RF module portion of the EUT.

The conducted emissions were performed when the battery charger was charging the batteries to the EUT, which was the worst cast mode for conducted emissions.

4.1.1 Cable Construction and Termination

Cable 1 This is a 6 foot unshielded cable connecting the Palm Pilot to the AC Adapter. It has a 1/8 inch adapter at the Palm Pilot end and is hard wired into the AC Adapter.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
XIRCOM WIRELESS LAN MODULE FOR PALM HANDHELDS (EUT)	XIRCOM, INC.	PWE1130	N/A	J3OPWE1130
PALM PILOT	N/A	N/A	N/A	N/A
AC ADAPTER	MEI INTERNATIONAL	P/N: MADA-3025-PS	N/A	N/A
BATTERY (INTERNAL TO THE EUT)	FOXLINK	FT-202S	N/A	N/A

5.2 EMI Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Spectrum Analyzer	Hewlett Packard	8566B	3701A22262	June 24, 2000	June 24, 2001
Preamplifier	Com Power	PA-102	1017	Jan. 5, 2001	Jan. 5, 2002
Quasi-Peak Adapter	Hewlett Packard	85650A	2811A01363	June 24, 2000	June 24, 2001
Biconical Antenna	Com Power	AB-100	1548	Oct. 16, 2000	Oct. 16, 2001
Log Periodic Antenna	Com Power	AL-100	16039	Oct. 16, 2000	Oct. 16, 2001
Antenna Mast	Com Power	AM-100	N/A	N/A	N/A
Turntable	Com Power	TT-100	N/A	N/A	N/A
Computer	Hewlett Packard	D5251A 888	US74458128	N/A	N/A
Printer	Hewlett Packard	C5886A	SG7CM1P090	N/A	N/A
Monitor	Hewlett Packard	D5258A	DK74889705	N/A	N/A
Loop Antenna	Com-Power	AL-130	25309	Feb. 5, 1999	Feb. 5, 2000
Horn Antenna	Antenna Research	DRG-118/A	1053	Jan. 15, 2001	Jan. 15, 2002
Horn Antenna	Antenna Research	MWH-1826/B	1004	Jan. 21, 1997	N.C.R.
Microwave Preamplifier	Com-Power	PA-122	25195	Jan. 9, 2001	Jan. 9, 2002
Amplifier	Hewlett Packard	11975A	2403A00202	Feb. 5, 2001	Feb. 5, 2002
Harmonic Mixer	Hewlett Packard	11970K	3003A05460	Feb. 17, 2001	Feb. 17, 2002
Power Meter	Hewlett Packard	436A	2236A15362	May 13, 2000	May 13, 2001
Power Sensor	Hewlett Packard	8482H	GG00000006	May 13, 2000	May 13, 2001

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 8.1.2 of this report for EMI test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.

7. CHARACTERISTICS OF THE TRANSMITTER

7.1 Transmitter Power

Transmit power is herein defined as the power delivered to a 50 Ohm load at the proprietary antenna connector on the EUT.

Power	Channel Number	Accuracy
14.32 dBm	1	+1/-1 dB
14.33 dBm	6	+1/-1 dB
14.76 dBm	11	+1/-1 dB

7.2 Channel Number and Frequencies

Channel Number	Channel center Frequency (MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

7.3 Chipping Rate

11 chips / bits by IEEE 802.11 Standard

7.4 Spreading Gain

The theoretical spreading gain, is 10.4 dB.

7.5 Antenna Gain

0 dBi for the Rangestar antenna

7.6 Description of Transmitter

Please see Appendix F for the description of the transmitter.

7.7 Processing Gain

NOTE: This information is from the OEM Aironet 4800B Radio, FCC-ID: LDK102039 test report (Test Report Number: 20000282C). This testing was performed BY Aironet RF System Engineering. **Xircom, Inc. has received permission from the manufacturer of the OEM Aironet 4800B Radio, Cisco Systems, Inc., to have this information below included in the test report.**

The same exact design of the Aironet 4800B Radio is incorporated in the product being certified.

Jamming Margin Method

The processing gain was measured using the CW jamming margin method. The test consists of stepping a signal generator in 50 kHz increments across the passband of the system. At each point, the generator level required to produce the recommended Bit Error Rate (BER) was recorded. This level is the jammer level. The output power of the transmitting unit is measured at the same point. The Jammer to Signal (J/S) ratio is then calculated. The worst 20% of the J/S data points were discarded. The lowest remaining J/S ratio was used to calculating the Process Gain.

Appendix D will have how the Signal to Noise ratio was derived along with the data.

8. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

8.1 RF Emissions

8.1.1 Conducted Emissions Test

The spectrum analyzer was used as a measuring meter. The data was collected with the spectrum analyzer in the peak detect mode with the "Max Hold" feature activated. The quasi-peak was used only where indicated in the data sheets. A 10 dB attenuation pad was used for the protection of the spectrum analyzer input stage, and the offset was adjusted accordingly to read the actual data measured. The LISN output was measured using the spectrum analyzer. The output of the second LISN was terminated by a 50 ohm termination. The effective measurement bandwidth used for this test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4: 1992. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The conducted emissions from the EUT were maximized for operating mode as well as cable placement. The final data was collected under program control by the Compatible Electronics conducted emissions software in several overlapping sweeps by running the spectrum analyzer at a minimum scan rate of 10 seconds per octave. The final qualification data is located in Appendix D.

8.1.2 Radiated Emissions (Spurious and Harmonics) Test

The spectrum analyzer was used as a measuring meter along with the quasi-peak adapter. Amplifiers were used to increase the sensitivity of the instrument. The Com Power Preamplifier Model: PA-102 was used for frequencies from 30 MHz to 1 GHz, and the Com-Power Microwave Preamplifier Model: PA-122 was used for frequencies above 1 GHz. The spectrum analyzer was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps. The quasi-peak adapter was used only for those readings which are marked accordingly on the data sheets. The frequencies above 1 GHz were averaged manually by narrowing the video filter down to 10 Hz and putting the sweep time on AUTO on the spectrum analyzer to keep the amplitude reading calibrated. The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
10 kHz to 150 kHz	200 Hz	Active Loop Antenna
150 kHz to 30 MHz	9 kHz	Active Loop Antenna
30 MHz to 300 MHz	120 kHz	Biconical Antenna
300 MHz to 1 GHz	120 kHz	Log Periodic Antenna
1 GHz to 25 GHz	1 MHz	Horn Antenna

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4: 1992. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results.

Radiated Emissions (Spurious and Harmonics) Test (con't)

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3 meter test distance to obtain final test data.

For the 22 GHz – 25 GHz span, the Hewlett Packard 11970K Harmonic Mixer and the Hewlett Packard 11975A Amplifier were used to allow the spectrum analyzer to scan up to 25 GHz.

8.2 6 dB Bandwidth for Direct Sequence Systems

The 6 dB Bandwidth was taken using the spectrum analyzer. The bandwidth was measured using a direct connection from the RF out on the RF board. The resolution bandwidth was 100 kHz, and the video bandwidth 300 kHz.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.209 (a)(2). The bandwidth is at least 500 kHz. Please see the data sheets located in Appendix D.

8.3 Peak Output Power

The peak output power was taken using the Hewlett Packard 436A Power Meter and the Hewlett Packard 8482H Power Sensor. The low (channel 1), middle (channel 6), and high (channel 11) were taken.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.209 (b)(1). The maximum peak output power is less than 1 watt.

8.4 Spectral Density Output

The spectral density output was using the spectrum analyzer. The spectral density output power was measured using a direct connection from the RF out on the RF board into the input of the analyzer. The resolution bandwidth was 3 kHz, and the video bandwidth 10 kHz. The highest 4.5 MHz of the signal was used as the frequency span with the sweep rate being 1 second for every 3 kHz of span.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.209 (d). The spectral density output does not exceed 8 dBm in any 3 kHz band.

8.5 RF Antenna Conducted Test

The RF antenna conducted test was taken using the spectrum analyzer. The RF antenna conducted test was measured using a direct connection from the RF out on the RF board into the input of the analyzer. The resolution bandwidth was 100 kHz, and the video bandwidth 300 kHz. The spans were wide enough to include all the harmonics and emissions that were produced by the intentional radiator.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.209 (c). The RF power that is produced by the intentional radiator is at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power.

8.6 RF Band Edges

The RF band edges were taken at the edges of the ISM spectrum (2390 MHz when the EUT was on channel 1 and 2483.5 MHz when the EUT was on channel 11) using the spectrum analyzer. It was also verified that the transmitted signals did not appear in the restricted bands below 2390 MHz and above 2843.5 MHz. A spectral plot of the band edges are included to prove no emissions were found at these frequencies.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (c). The RF power at the band edges at 2390 MHz and 2483.5 MHz meet the limits of section 15.209.

8.7 Processing Gain

Please see section 7.7 of this test report.

9. CONCLUSIONS

The Xircom Wireless LAN Module for Palm Handhelds Model: PWE1130 meets all of the specification limits defined in FCC Title 47, Part 15, Subpart C, sections 15.205, 15.207, 15.209, and 15.247.

APPENDIX A

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC Subpart C specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

Modifications:

No Modifications were made to the EUT during the testing.

APPENDIX B

ADDITIONAL MODELS COVERED UNDER THIS REPORT

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST	Xircom Wireless LAN Module for Palm Handhelds Model: PWE1130 S/N: N/A

There were no additional models covered under this report.

APPENDIX C

DIAGRAMS, CHARTS AND PHOTOS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

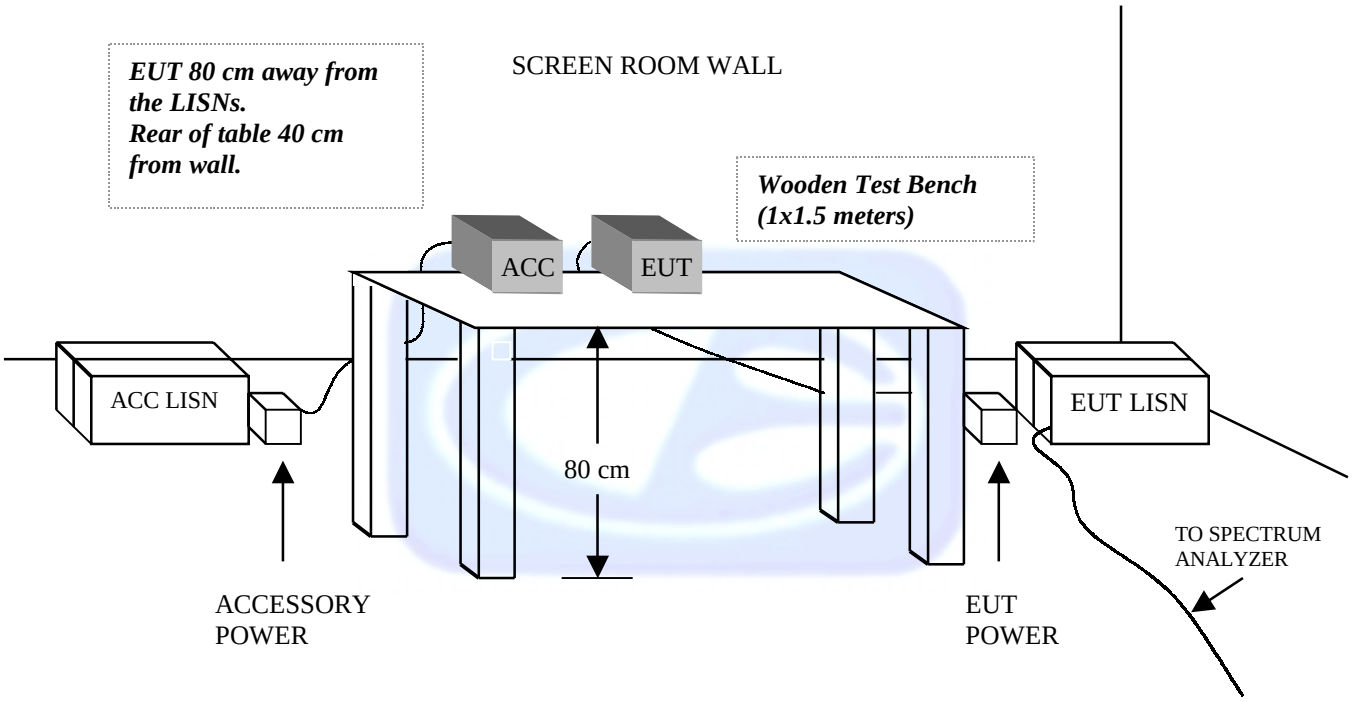
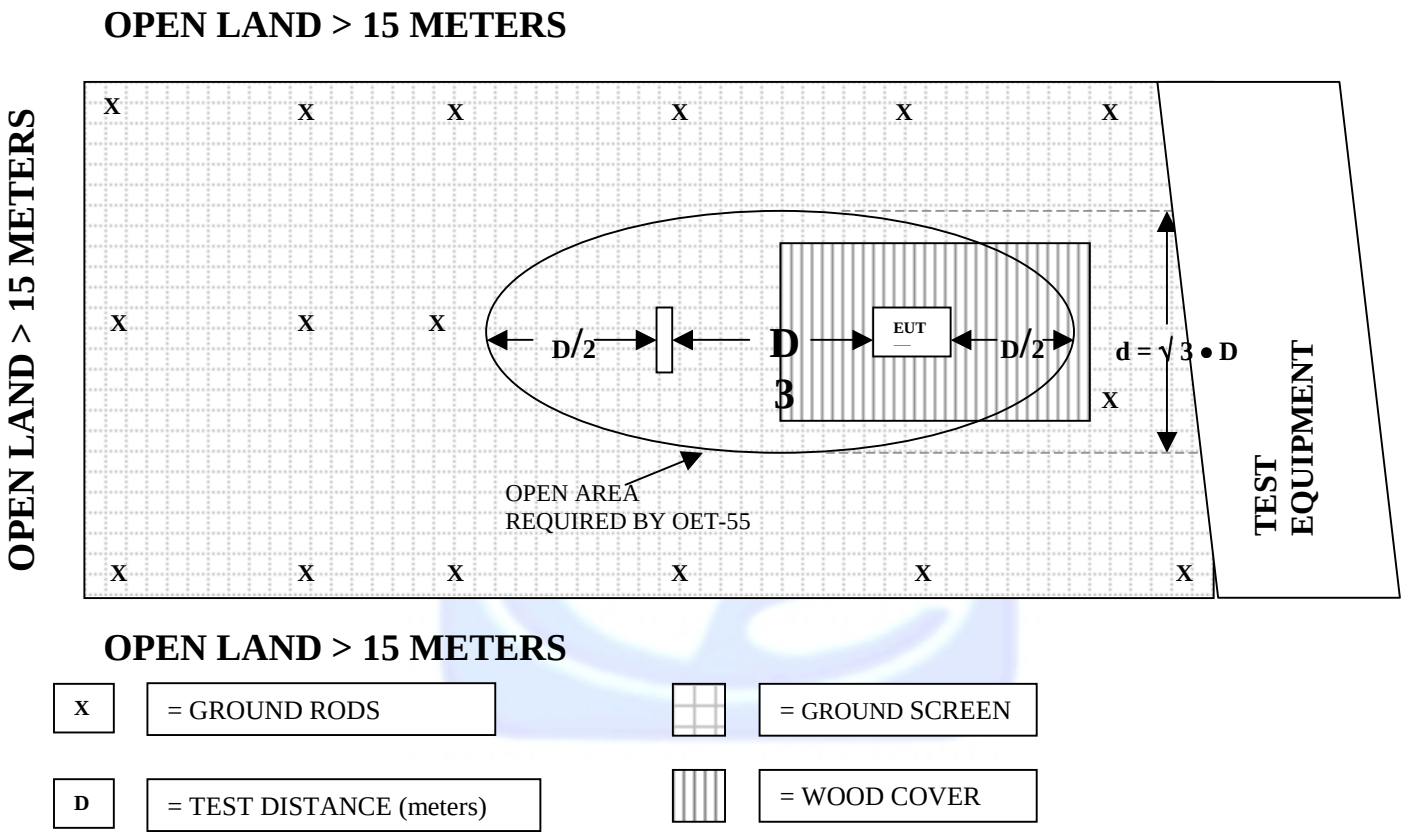


FIGURE 2: PLOT MAP AND LAYOUT OF RADIATED SITE



FRONT VIEW

XIRCOM, INC.
XIRCOM WIRELESS LAN MODULE FOR PALM HANDHELDS
Model: PWE1130
FCC SUBPART C - RADIATED EMISSIONS – 4-19-01

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

XIRCOM, INC.
XIRCOM WIRELESS LAN MODULE FOR PALM HANDHELDS
Model: PWE1130
FCC SUBPART C - RADIATED EMISSIONS – 4-19-01

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

FRONT VIEW

XIRCOM, INC.
XIRCOM WIRELESS LAN MODULE FOR PALM HANDHELDS
Model: PWE1130
FCC SUBPART C – CONDUCTED EMISSIONS – 4-20-01

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

XIRCOM, INC.
XIRCOM WIRELESS LAN MODULE FOR PALM HANDHELDS
Model: PWE1130
FCC SUBPART C – CONDUCTED EMISSIONS – 4-20-01

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

COM-POWER AB-100

BICONICAL ANTENNA

S/N: 01548

CALIBRATION DATE: OCTOBER 16, 2000

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	14.01	120	10.33
35	13.63	125	11.61
40	13.26	140	12.70
45	11.62	150	12.95
50	11.03	160	13.58
60	8.52	175	14.82
70	8.94	180	14.84
80	8.17	200	14.80
90	8.08	250	16.42
100	8.64	300	20.26

COM-POWER AL-100

LOG PERIODIC ANTENNA

S/N: 16101

CALIBRATION DATE: OCTOBER 16, 2000

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
300	12.96	700	19.24
400	16.92	800	21.37
500	16.73	900	22.13
600	16.32	1000	22.19

COM-POWER PA-102

PREAMPLIFIER

S/N: 1017

CALIBRATION DATE: JANUARY 5, 2001

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	39.0	300	38.9
40	39.2	350	38.9
50	39.2	400	38.6
60	39.2	450	38.5
70	38.8	500	38.7
80	38.6	550	38.4
90	38.5	600	38.8
100	38.7	650	38.5
125	39.2	700	38.6
150	38.8	750	38.1
175	38.8	800	37.9
200	39.0	850	38.0
225	38.8	900	37.8
250	38.8	950	36.9
275	39.0	1000	38.2

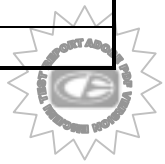
COM-POWER PA-122

MICROWAVE PREAMPLIFIER

S/N: 25195

CALIBRATION DATE: JANUARY 9, 2001

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	33.1	9.5	30.7
1.1	33.0	10.0	31.6
1.2	33.2	11.0	30.6
1.3	33.0	12.0	28.5
1.4	32.4	13.0	31.5
1.5	32.3	14.0	33.2
1.6	32.1	15.0	31.5
1.7	32.0	16.0	30.2
1.8	31.8	17.0	31.6
1.9	32.2	18.0	31.7
2.0	32.6		
2.5	31.9		
3.0	31.7		
3.5	31.7		
4.0	32.3		
4.5	31.5		
5.0	32.3		
5.5	34.2		
6.0	30.9		
6.5	32.0		
7.0	32.1		
7.5	33.0		
8.0	31.9		
8.5	31.9		
9.0	31.3		



ANTENNA RESEARCH DRG-118/A

HORN ANTENNA

S/N: 1053

CALIBRATION DATE: JANUARY 15, 2001

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	25.4	9.5	39.6
1.5	26.7	10.0	39.7
2.0	29.6	10.5	40.8
2.5	30.7	11.0	40.4
3.0	31.2	11.5	42.2
3.5	32.3	12.0	43.0
4.0	33.2	12.5	42.6
4.5	33.2	13.0	41.3
5.0	34.8	13.5	40.3
5.5	35.4	14.0	40.9
6.0	36.6	14.5	44.0
6.5	36.6	15.0	43.3
7.0	38.7	15.5	42.7
7.5	38.6	16.0	42.6
8.0	37.9	16.5	42.8
8.5	37.9	17.0	43.5
9.0	39.9	17.5	44.6
		18.0	42.2

ANTENNA RESEARCH
11317 Frederick Avenue, Beltsville, MD 20705, USA
TEL: (301)937-8888 FAX: (301)937-2796

E-FIELD ANTENNA FACTOR CALIBRATION

$E\ (dB\ V/m) = V_o\ (dB\ V) + AFE\ (dB\ 1/m)$

Model Number : MWH-1826/B

Frequency (GHz)	AFE (dB 1/m)	Gain (dBi)
18.000	23.1	32.2
18.850	23.2	32.5
19.700	23.6	32.5
20.550	23.5	33.0
21.400	23.7	33.1
22.250	24.0	33.2
23.100	24.0	33.5
23.950	24.1	33.7
24.800	24.1	34.0
25.650	24.3	34.1
26.500	24.4	34.3

Serial Number : 1004

Com-Power Corporation

(949) 587-9800

Antenna Calibration

Antenna Type:	Loop Antenna
Model:	AL-130
Serial Number:	25309
Calibration Date:	05/25/00

Frequency MHz	Magnetic (dB/m)	Electric dB/m
0.009	-41.0	10.5
0.01	-41.0	10.5
0.02	-41.9	9.6
0.05	-41.9	9.6
0.075	-41.8	9.7
0.1	-42.2	9.3
0.15	-42.2	9.3
0.25	-40.7	10.8
0.5	-42.1	9.4
0.75	-40.9	10.6
1	-41.3	10.2
2	-40.8	10.7
3	-41.1	10.4
4	-41.2	10.3
5	-40.7	10.8
10	-40.6	10.9
15	-42.0	9.5
20	-42.0	9.5
25	-42.9	8.6
30	-42.3	9.2

Trans. Antenna Height	2 meter
Receiving Antenna Height	2 meter

APPENDIX D

DATA SHEETS

RADIATED EMISSIONS FOR THE RANGESTAR ANTENNA DATA SHEETS

RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.247)

COMPANY	**XIRCOM**	**DATE**	**4/19/01**
EUT	**Xircom Wireless LAN Module for Palm Handhelds**	**DUTY CYCLE**	**N/A**
MODEL	**PWE1130**	**PEAK TO AVG**	**N/A**
S/N	**N/A**	**TEST DIST.**	**3 METERS**
TEST ENGINEER	**KYLE FUJIMOTO**	**LAB**	**D**

Frequency MHz	Peak Reading (dBuV)	Average (A) or Quasi-Peak (QP)	Antenna Polar. (V or H)	Antenna Height (meters)	EUT Azimuth (degrees)	EUT Axis (X,Y,Z)	EUT Tx Channel	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
2412.0000	66.9	63.9 A	H	1.5	90	X	LOW	30.7	3.5	0.0	**98.1**			
2412.0000	71.0	68.2 A	H	1.0	90	Y	LOW	30.7	3.5	0.0	**102.4**			
2412.0000	67.3	63.8 A	H	1.5	90	Z	LOW	30.7	3.5	0.0	**98.0**			
2412.0000	67.6	64.7 A	V	1.0	0	X	LOW	30.7	3.5	0.0	**98.9**			
2412.0000	69.4	66.3 A	V	1.0	90	Y	LOW	30.7	3.5	0.0	**100.5**			
2412.0000	67.5	64.5 A	V	2.0	90	Z	LOW	30.7	3.5	0.0	**98.7**			
2438.0000	68.1	65.2 A	H	1.5	90	X	MED.	30.7	3.5	0.0	**99.4**			
2438.0000	70.7	67.8 A	H	1.5	90	Y	MED.	30.7	3.5	0.0	**102.0**			
2438.0000	65.7	63.1 A	H	1.0	90	Z	MED.	30.7	3.5	0.0	**97.3**			
2438.0000	65.1	62.2 A	V	2.0	90	X	MED.	30.7	3.5	0.0	**96.4**			
2438.0000	68.9	66.0 A	V	1.0	180	Y	MED.	30.7	3.5	0.0	**100.2**			
2438.0000	70.3	67.3 A	V	2.0	90	Z	MED.	30.7	3.5	0.0	**101.5**			
2462.0000	67.0	63.9 A	H	2.0	90	X	HIGH	30.7	3.5	0.0	**98.1**			
2462.0000	71.1	67.9 A	H	1.5	90	Y	HIGH	30.7	3.5	0.0	**102.1**			
2462.0000	62.1	59.3 A	H	2.0	0	Z	HIGH	30.7	3.5	0.0	**93.5**			
2462.0000	64.2	61.6 A	V	1.0	90	X	HIGH	30.7	3.5	0.0	**95.8**			
2462.0000	66.5	63.8 A	V	1.5	90	Y	HIGH	30.7	3.5	0.0	**98.0**			
2462.0000	68.2	65.2 A	V	1.0	90	Z	HIGH	30.7	3.5	0.0	**99.4**			

* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

** DELTA = SPEC LIMIT - CORRECTED READING

RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.247)

COMPANY	**XIRCOM**	**DATE**	**4/19/01**
EUT	**Xircom Wireless LAN Module for Palm Handhelds**	**DUTY CYCLE**	**N/A**
MODEL	**PWE1130**	**PEAK TO AVG**	**N/A**
S/N	**N/A**	**TEST DIST.**	**3 METERS**
TEST ENGINEER	**KYLE FUJIMOTO**	**LAB**	**D**

Frequency MHz	Peak Reading (dBuV)	Average (A) or Quasi-Peak (QP)	Antenna Polar. (V or H)	Antenna Height (meters)	EUT Azimuth (degrees)	EUT Axis (X,Y,Z)	EUT Tx Channel	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
4824.0000	40.0	A	H	1.0	90	X	LOW	34.8	5.8	32.3	**48.3**	**-5.7**	**54.0**	
4824.0000	41.7	A	H	1.0	180	Y	LOW	34.8	5.8	32.3	**50.0**	**-4.0**	**54.0**	
4824.0000	39.6	A	H	1.0	90	Z	LOW	34.8	5.8	32.3	**47.9**	**-6.1**	**54.0**	
4824.0000	36.9	A	V	1.5	90	X	LOW	34.8	5.8	32.3	**45.2**	**-8.8**	**54.0**	
4824.0000	35.2	A	V	1.5	90	Y	LOW	34.8	5.8	32.3	**43.5**	**-10.5**	**54.0**	
4824.0000	39.4	A	V	1.0	90	Z	LOW	34.8	5.8	32.3	**47.7**	**-6.3**	**54.0**	
4876.0000	39.8	A	H	1.0	180	X	MED.	34.8	5.8	32.3	**48.1**	**-5.9**	**54.0**	
4876.0000	38.1	A	H	1.5	90	Y	MED.	34.8	5.8	32.3	**46.4**	**-7.6**	**54.0**	
4876.0000	38.3	A	H	1.5	0	Z	MED.	34.8	5.8	32.3	**46.6**	**-7.4**	**54.0**	
4876.0000	36.6	A	V	1.5	90	X	MED.	34.4	5.6	32.1	**44.5**	**-9.5**	**54.0**	
4876.0000	37.0	A	V	1.0	90	Y	MED.	34.8	5.8	32.3	**45.3**	**-8.7**	**54.0**	
4876.0000	38.4	A	V	1.5	90	Z	MED.	34.8	5.8	32.3	**46.7**	**-7.3**	**54.0**	
4924.0000	39.9	A	H	1.5	0	X	HIGH	34.8	5.8	32.3	**48.2**	**-5.8**	**54.0**	
4924.0000	41.1	A	H	1.0	180	Y	HIGH	34.8	5.8	32.3	**49.4**	**-4.6**	**54.0**	
4924.0000	38.0	A	H	1.5	180	Z	HIGH	34.8	5.8	32.3	**46.3**	**-7.7**	**54.0**	
4924.0000	38.3	A	V	1.5	0	X	HIGH	34.8	5.8	32.3	**46.6**	**-7.4**	**54.0**	
4924.0000	38.3	A	V	1.5	90	Y	HIGH	34.8	5.8	32.3	**46.6**	**-7.4**	**54.0**	
4924.0000	41.0	A	V	1.5	0	Z	HIGH	34.8	5.8	32.3	**49.3**	**-4.7**	**54.0**	

* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

** DELTA = SPEC LIMIT - CORRECTED READING

No Harmonics Nor Emissions Found After the 2nd Harmonic

Test location: Compatible Electronics
Customer : XIRCOM, INC. Date : 4/19/2001
Manufacturer : XIRCOM, INC. Time : 16.49
EUT name : Wireless LAN Module for Palm Handhelds Model: PWE1130
Specification: Fcc_B Test distance: 3.0 mtrs Lab: D
Distance correction factor(20*log(test/spec)) : 0.00
Test Mode : SPURIOUS EMISSIONS OF THE EUT
RANGESTAR ANTENNA
HORIZONTAL POLARIZATION 30 MHz TO 1000 MHz
TEMPERATURE 72 DEGREES F., RELATIVE HUMIDITY 53%
TESTED BY: KYLE FUJIMOTO

Pol	Freq	Rdng	Cable loss	Ant factor	Amp gain	Cor'd rdg = R	limit = L	Delta R-L
	MHz	dBuV	dB	dB	dB	dBuV	dBuV/m	dB
1H	308.06	48.10	2.83	13.28	38.90	25.31	46.00	-20.69
2H	322.74	53.10	2.89	13.86	38.90	30.95	46.00	-15.05
3H	337.40	49.50	2.95	14.44	38.90	27.99	46.00	-18.01
4H	352.12	52.50	3.01	15.02	38.89	31.64	46.00	-14.36
5H	366.78	54.50	3.10	15.60	38.80	34.40	46.00	-11.60
6H	396.08	59.20	3.28	16.76	38.62	40.61	46.00	-5.39
7H	410.78	55.80	3.28	16.89	38.58	37.39	46.00	-8.61
8H	440.06	56.00	3.22	16.84	38.52	37.54	46.00	-8.46
9H	454.72	55.00	3.23	16.81	38.52	36.52	46.00	-9.48
10H	484.06	56.60	3.40	16.76	38.64	38.13	46.00	-7.87
11H	492.55	46.10	3.46	16.74	38.67	27.63	46.00	-18.37
12H	565.34	41.30	3.87	16.46	38.52	23.11	46.00	-22.89
13H	67.84	51.80	1.28	8.85	38.89	23.04	40.00	-16.96
14H	132.08	60.60	1.78	12.12	39.09	35.42	43.50	-8.08
15H	159.92	41.70	2.00	13.57	38.80	18.47	43.50	-25.03
16H	220.12	55.30	2.20	15.45	38.84	34.11	46.00	-11.89
17H	234.73	50.70	2.32	15.93	38.80	30.14	46.00	-15.86
18H	264.06	48.70	2.67	17.50	38.91	29.96	46.00	-16.04

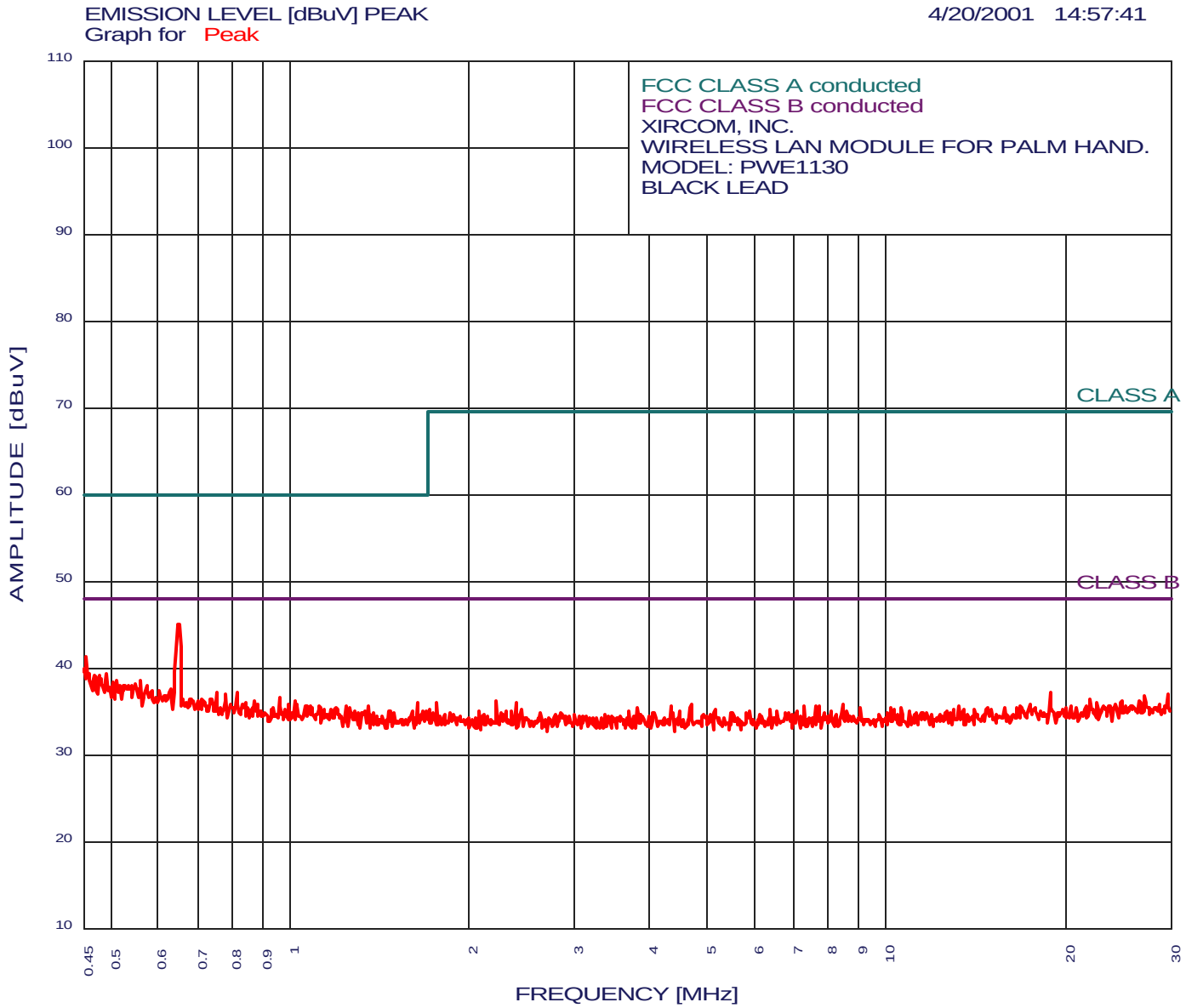
Test location: Compatible Electronics
Customer : XIRCOM, INC. Date : 4/20/2001
Manufacturer : XIRCOM, INC. Time : 8.39
EUT name : Wireless LAN Module for Palm Handhelds Model: PWE1130
Specification: Fcc_B Test distance: 3.0 mtrs Lab: D
Distance correction factor(20*log(test/spec)) : 0.00
Test Mode : SPURIOUS EMISSIONS OF THE EUT
RANGESTAR ANTENNA
VERTICAL POLARIZATION 30 MHz TO 1000 MHz
TEMPERATURE 62 DEGREES F., RELATIVE HUMIDITY 81%
TESTED BY: KYLE FUJIMOTO

Pol	Freq	Rdng	Cable loss	Ant factor	Amp gain	Cor'd rdg = R	limit = L	Delta R-L
	MHz	dBuV	dB	dB	dB	dBuV	dBuV/m	dB
1V	39.97	52.10	1.00	13.26	39.20	27.16	40.00	-12.84
2V	44.07	60.40	1.04	11.92	39.20	34.16	40.00	-5.84
3V	63.98	49.40	1.24	8.69	39.04	20.29	40.00	-19.71
4V	79.98	53.60	1.30	8.17	38.60	24.47	40.00	-15.53
5V	118.04	50.10	1.64	10.16	39.06	22.85	43.50	-20.65
6V	132.11	56.70	1.79	12.13	39.09	31.53	43.50	-11.97
7V	143.26	46.90	1.92	12.78	38.91	22.69	43.50	-20.81
8V	160.25	48.10	2.00	13.60	38.80	24.90	43.50	-18.60
9V	176.10	61.70	2.01	14.82	38.81	39.72	43.50	-3.78
10V	322.77	52.10	2.89	13.86	38.90	29.95	46.00	-16.05
11V	337.45	46.00	2.95	14.44	38.90	24.49	46.00	-21.51
12V	352.07	52.30	3.01	15.02	38.89	31.44	46.00	-14.56
13V	366.73	55.30	3.10	15.60	38.80	35.20	46.00	-10.80
14V	410.77	48.80	3.28	16.89	38.58	30.39	46.00	-15.61
15V	454.76	46.30	3.23	16.81	38.52	27.82	46.00	-18.18
16V	498.76	46.50	3.49	16.73	38.70	28.03	46.00	-17.97
17V	542.75	45.60	3.84	16.55	38.44	27.55	46.00	-18.45

Test location: Compatible Electronics
Customer : XIRCOM, INC. Date : 4/20/2001
Manufacturer : XIRCOM, INC. Time : 9.25
EUT name : Wireless LAN Module for Palm Handhelds Model: PWE1130
Specification: Fcc_B Test distance: 3.0 mtrs Lab: D
Distance correction factor(20*log(test/spec)) : 0.00
Test Mode : SPURIOUS EMISSIONS OF THE EUT
RANGESTAR ANTENNA
HORIZONTAL POLARIZATION 30 MHz TO 1000 MHz
TEMPERATURE 62 DEGREES F., RELATIVE HUMIDITY 81%
TESTED BY: KYLE FUJIMOTO

NO FREQUENCIES FOUND BETWEEN 10 kHz AND 30 MHz IN EITHER POLARIZATION FOR THE EUT

AC CONDUCTED EMISSIONS DATA SHEETS



COMPATIBLE ELECTRONICS

COMPATIBLE ELECTRONICS

4/20/2001 14:57:41

XIRCOM, INC.
WIRELESS LAN MODULE FOR PALM HANDHELDS
MODEL: PWE1130
FCC CLASS B - BLACK LEAD
TEST ENGINEER : KYLE FUJIMOTO

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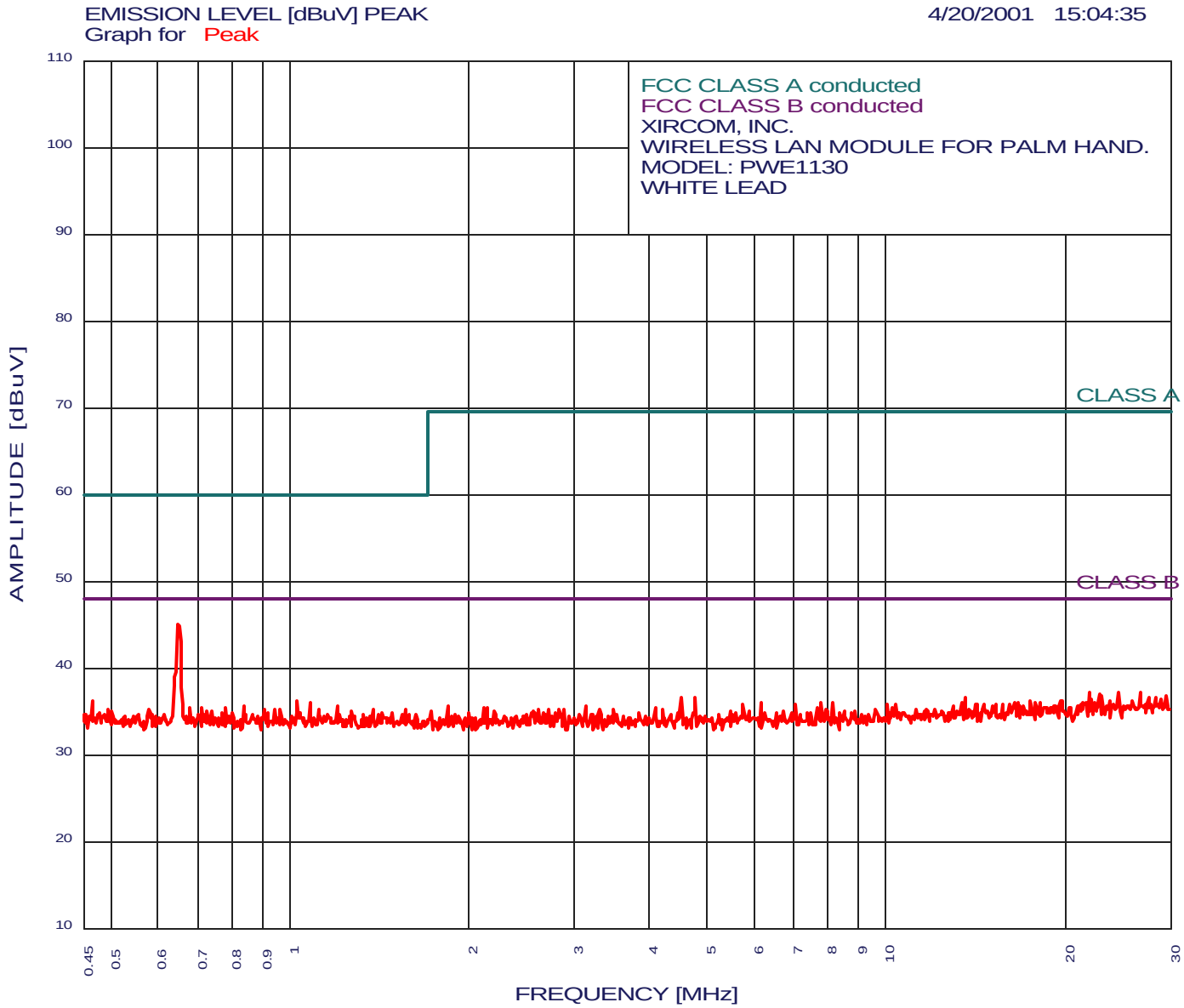
30 highest peaks above -50.00 dB of CLASS B limit line
Peak criteria : 1.00 dB, Curve : Peak

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.652	44.99	48.00	-3.01
2	0.456	41.29	48.00	-6.71
3	0.492	39.39	48.00	-8.61
4	0.478	39.19	48.00	-8.81
5	0.470	39.19	48.00	-8.81
6	0.563	38.59	48.00	-9.41
7	0.513	38.49	48.00	-9.51
8	0.504	38.29	48.00	-9.71
9	0.551	38.19	48.00	-9.81
10	0.528	37.99	48.00	-10.01
11	0.574	37.89	48.00	-10.11
12	0.630	37.59	48.00	-10.41
13	0.604	37.39	48.00	-10.61
14	18.839	37.25	48.00	-10.75
15	0.814	37.10	48.00	-10.90
16	0.751	37.09	48.00	-10.91
17	29.637	36.91	48.00	-11.09
18	0.781	36.89	48.00	-11.11
19	27.139	36.72	48.00	-11.28
20	0.958	36.50	48.00	-11.50
21	0.739	36.39	48.00	-11.61
22	0.712	36.39	48.00	-11.61
23	0.682	36.39	48.00	-11.61
24	22.003	36.34	48.00	-11.66
25	26.583	36.20	48.00	-11.80
26	1.017	36.20	48.00	-11.80
27	24.850	36.14	48.00	-11.86
28	2.220	36.11	48.00	-11.89
29	0.870	36.10	48.00	-11.90
30	22.566	36.05	48.00	-11.95



COMPATIBLE ELECTRONICS

COMPATIBLE ELECTRONICS

4/20/2001 15:04:35

XIRCOM, INC.
WRELESS LAN MODULE FOR PALM HANDHELDS
MODEL: PWE1130
FCC CLASS B - WHITE LEAD
TEST ENGINEER : KYLE FUJIMOTO

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30 highest peaks above -50.00 dB of CLASS B limit line
Peak criteria : 1.00 dB, Curve : Peak

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.649	45.09	48.00	-2.91
2	26.694	37.23	48.00	-10.77
3	21.909	37.19	48.00	-10.81
4	24.544	37.14	48.00	-10.86
5	22.848	36.87	48.00	-11.13
6	29.517	36.76	48.00	-11.24
7	23.036	36.68	48.00	-11.32
8	28.308	36.60	48.00	-11.40
9	4.789	36.60	48.00	-11.40
10	4.537	36.59	48.00	-11.41
11	13.576	36.47	48.00	-11.53
12	27.583	36.47	48.00	-11.53
13	22.097	36.35	48.00	-11.65
14	28.912	36.33	48.00	-11.67
15	19.633	36.25	48.00	-11.75
16	1.030	36.20	48.00	-11.80
17	17.467	36.12	48.00	-11.88
18	23.726	36.11	48.00	-11.89
19	0.466	36.09	48.00	-11.91
20	21.439	36.07	48.00	-11.93
21	17.832	36.06	48.00	-11.94
22	8.133	36.05	48.00	-11.95
23	7.793	36.03	48.00	-11.97
24	16.664	36.03	48.00	-11.97
25	1.079	36.00	48.00	-12.00
26	16.395	35.99	48.00	-12.01
27	6.162	35.96	48.00	-12.04
28	13.406	35.95	48.00	-12.05
29	18.124	35.89	48.00	-12.11
30	10.067	35.87	48.00	-12.13

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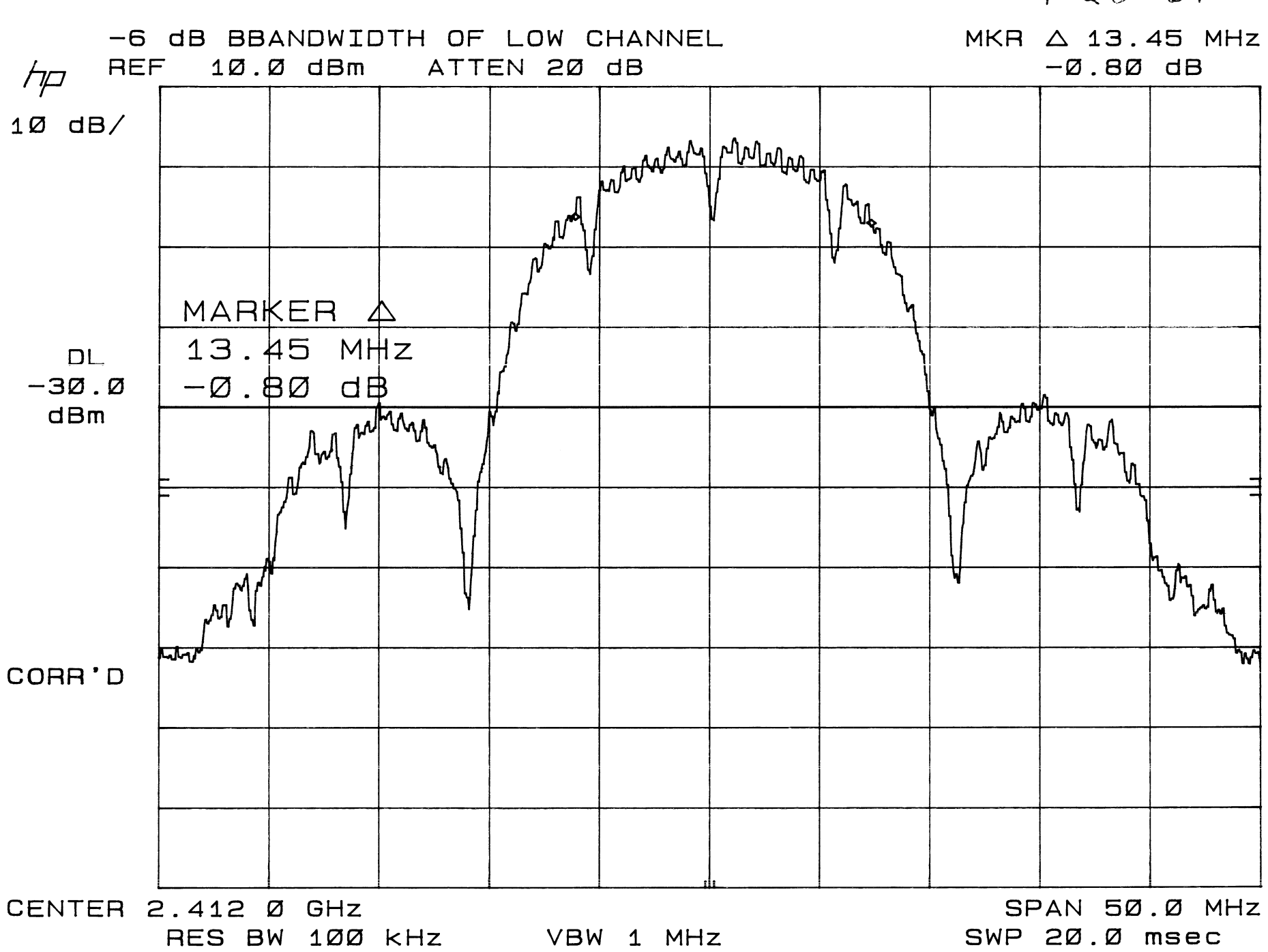
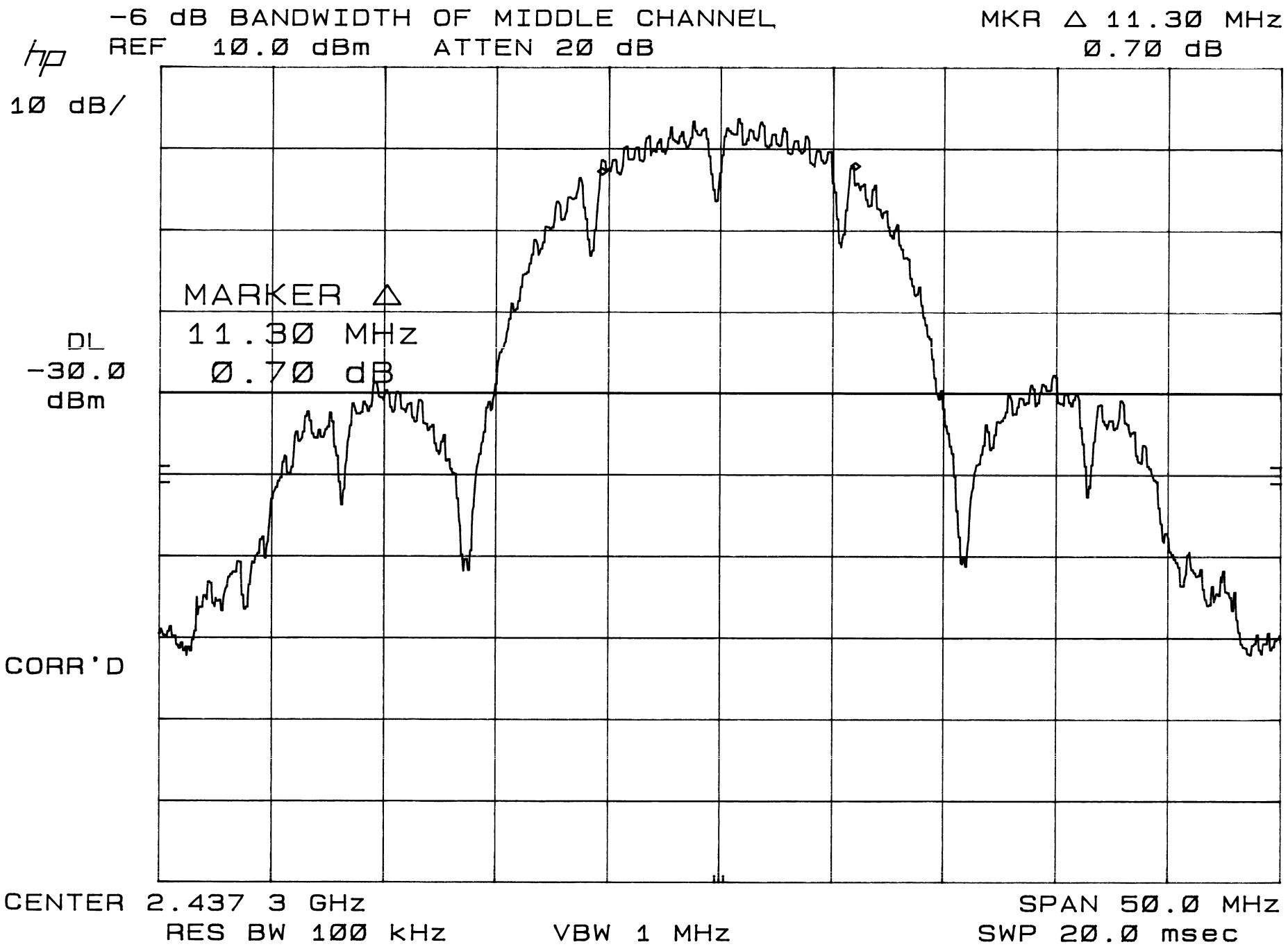
6 dB BANDWIDTH DATA SHEETS

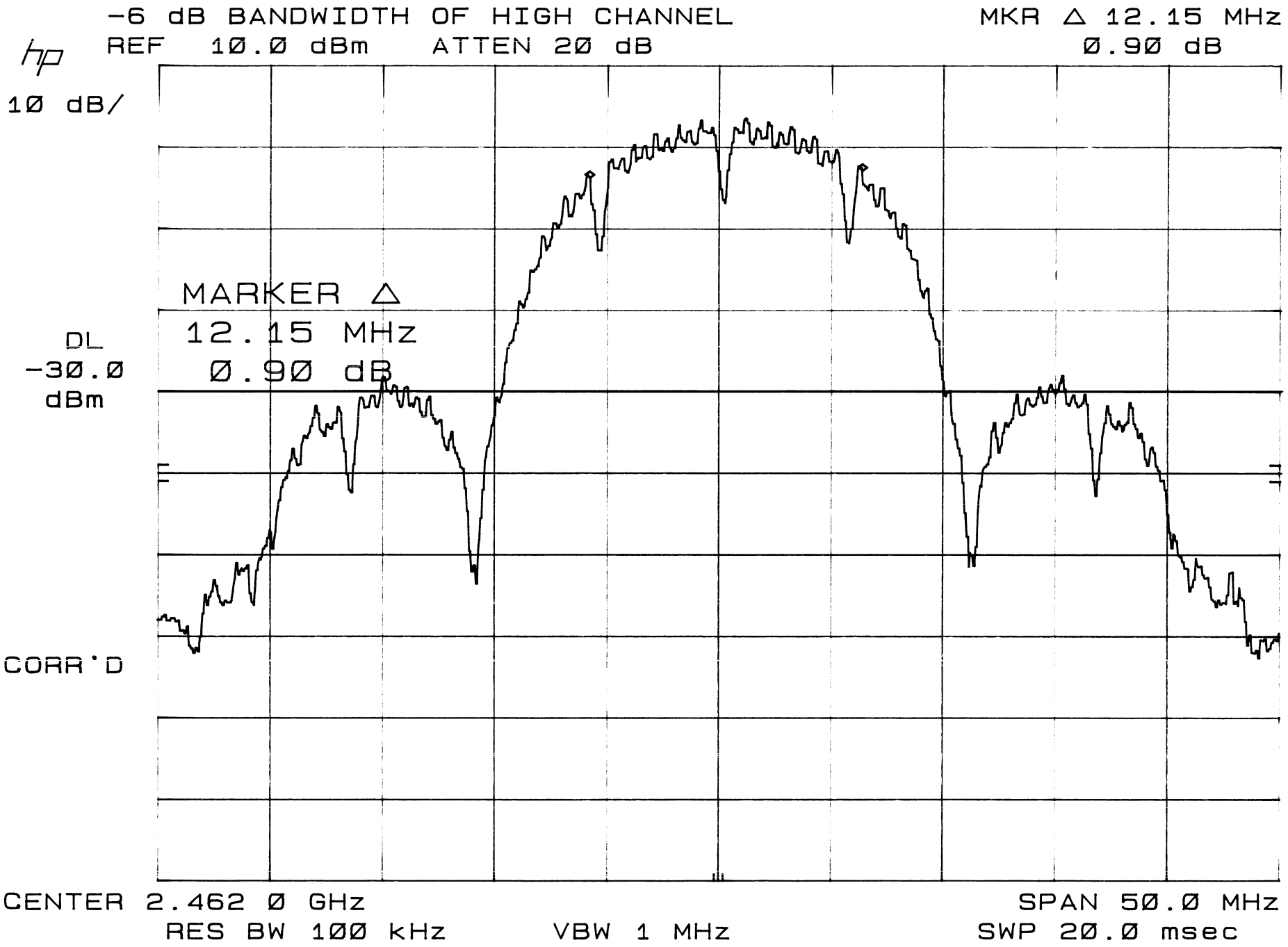
4-20-01


-6 dB BBANDWIDTH OF LOW CHANNEL
MKR Δ 13.45 MHz
REF 10.0 dBm ATTEN 20 dB
-0.80 dB
10 dB/
MARKER Δ
13.45 MHz
-0.80 dB
DL
-30.0
dBm
CORR'D
CENTER 2.412 0 GHz
SPAN 50.0 MHz
RES BW 100 kHz
VBW 1 MHz
SWP 20.0 msec

4-20-01


-6 dB BANDWIDTH OF MIDDLE CHANNEL
MKR Δ 11.30 MHz
REF 10.0 dBm
ATTEN 20 dB
0.70 dB
10 dB/
MARKER Δ
11.30 MHz
0.70 dB
DL
-30.0
dBm
CORR'D
CENTER 2.437 3 GHz
SPAN 50.0 MHz
RES BW 100 kHz
VBW 1 MHz
SWP 20.0 msec

4-20-01


-6 dB BANDWIDTH OF HIGH CHANNEL
MKR Δ 12.15 MHz
REF 10.0 dBm
ATTEN 20 dB
0.90 dB
10 dB/
MARKER Δ
12.15 MHz
0.90 dB
DL
-30.0
dBm
CORR'D
CENTER 2.462 0 GHz
SPAN 50.0 MHz
RES BW 100 kHz
VBW 1 MHz
SWP 20.0 msec

PEAK OUTPUT POWER DATA SHEETS

PEAK OUTPUT POWER

XIRCOM, INC.

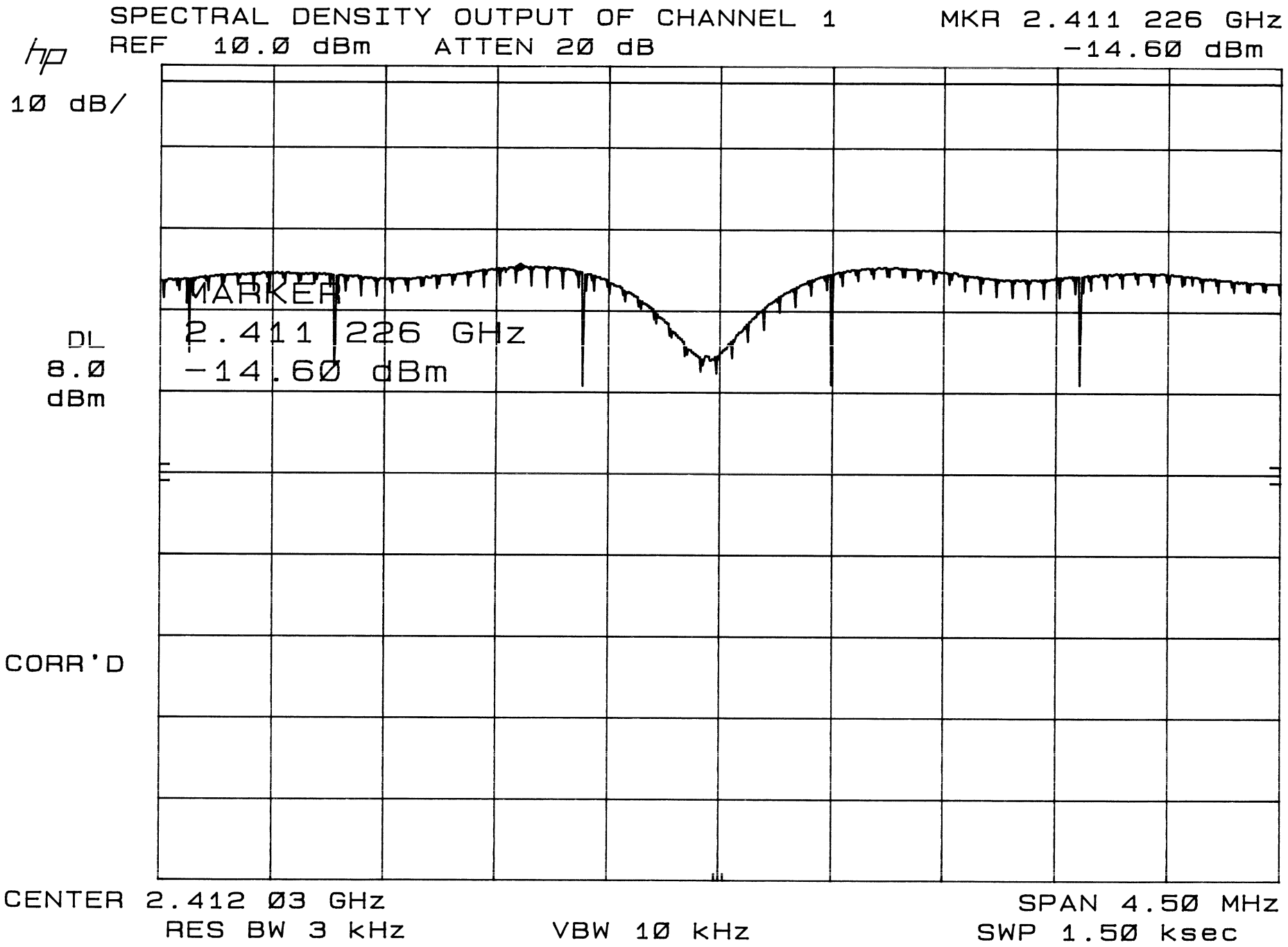
XIRCOM WIRELESS LAN MODULE FOR PALM HANDHELDS

MODEL: PWE1130

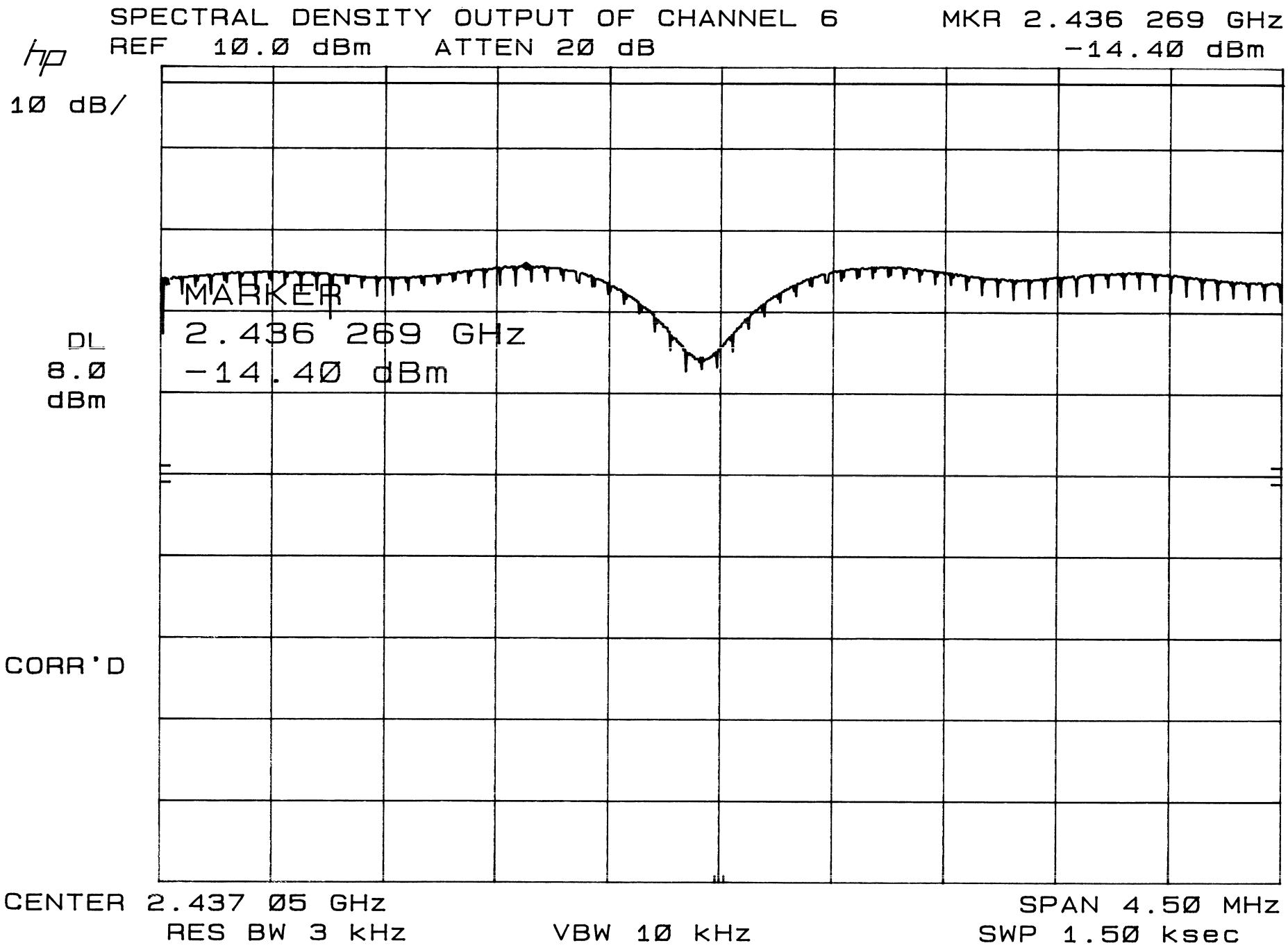
CHANNEL	PEAK POWER OUTPUT (dBm)
1	14.32
6	14.33
11	14.76

SPECTRAL DENSITY OUTPUT DATA SHEETS

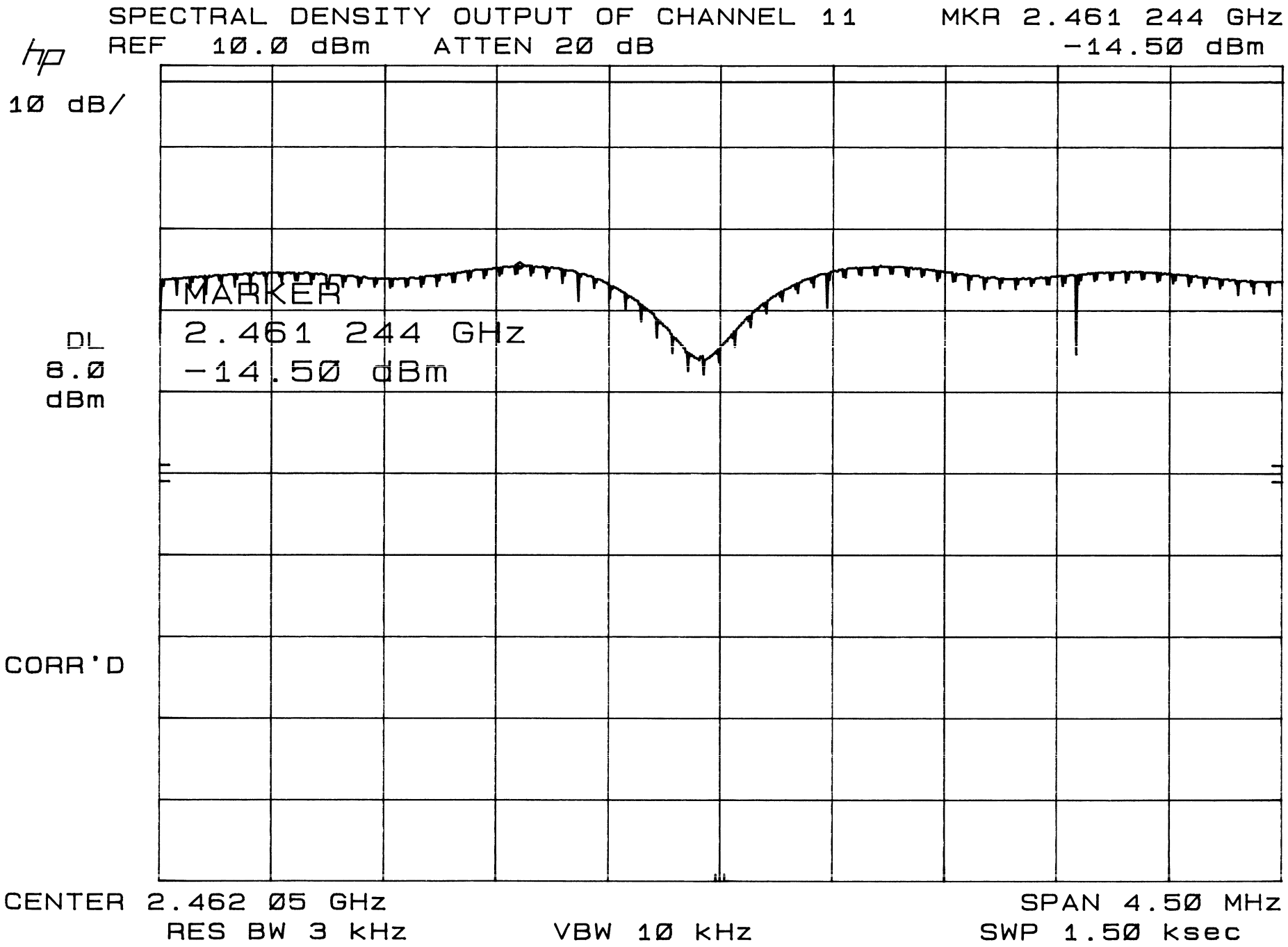
4-20-01


SPECTRAL DENSITY OUTPUT OF CHANNEL 1
MKR 2.411 226 GHz
REF 10.0 dBm
ATTEN 20 dB
−14.60 dBm
10 dB/
MARKER
2.411 226 GHz
−14.60 dBm
DL
8.0
dBm
CORR'D
CENTER 2.412 03 GHz
SPAN 4.50 MHz
RES BW 3 kHz
VBW 10 kHz
SWP 1.50 ksec

4-20-01

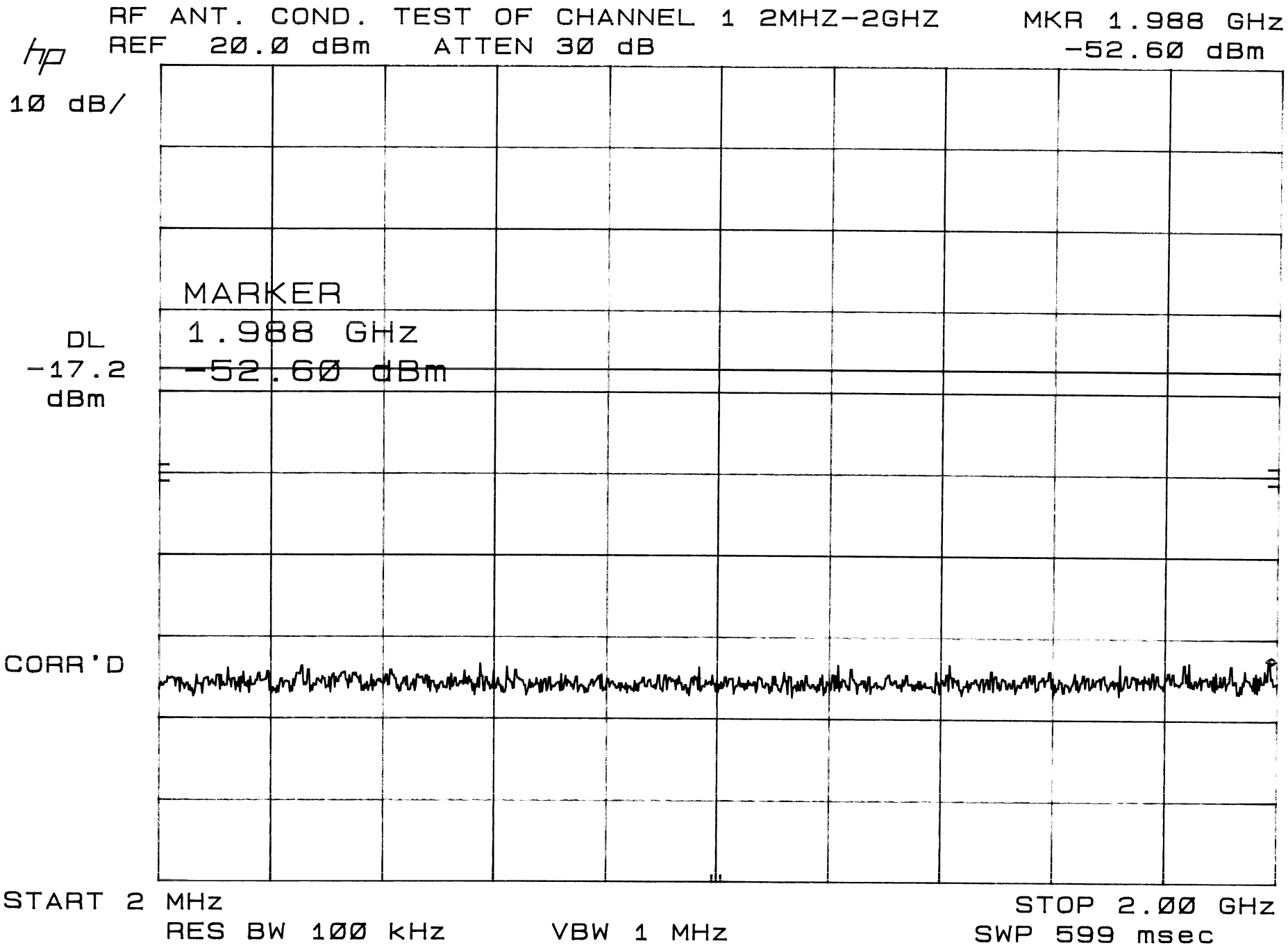

SPECTRAL DENSITY OUTPUT OF CHANNEL 6
MKR 2.436 269 GHz
REF 10.0 dBm
ATTEN 20 dB
-14.40 dBm
10 dB/
MARKER
2.436 269 GHz
-14.40 dBm
DL
8.0
dBm
CORR'D
CENTER 2.437 05 GHz
SPAN 4.50 MHz
RES BW 3 kHz
VBW 10 kHz
SWP 1.50 ksec

4-20-01

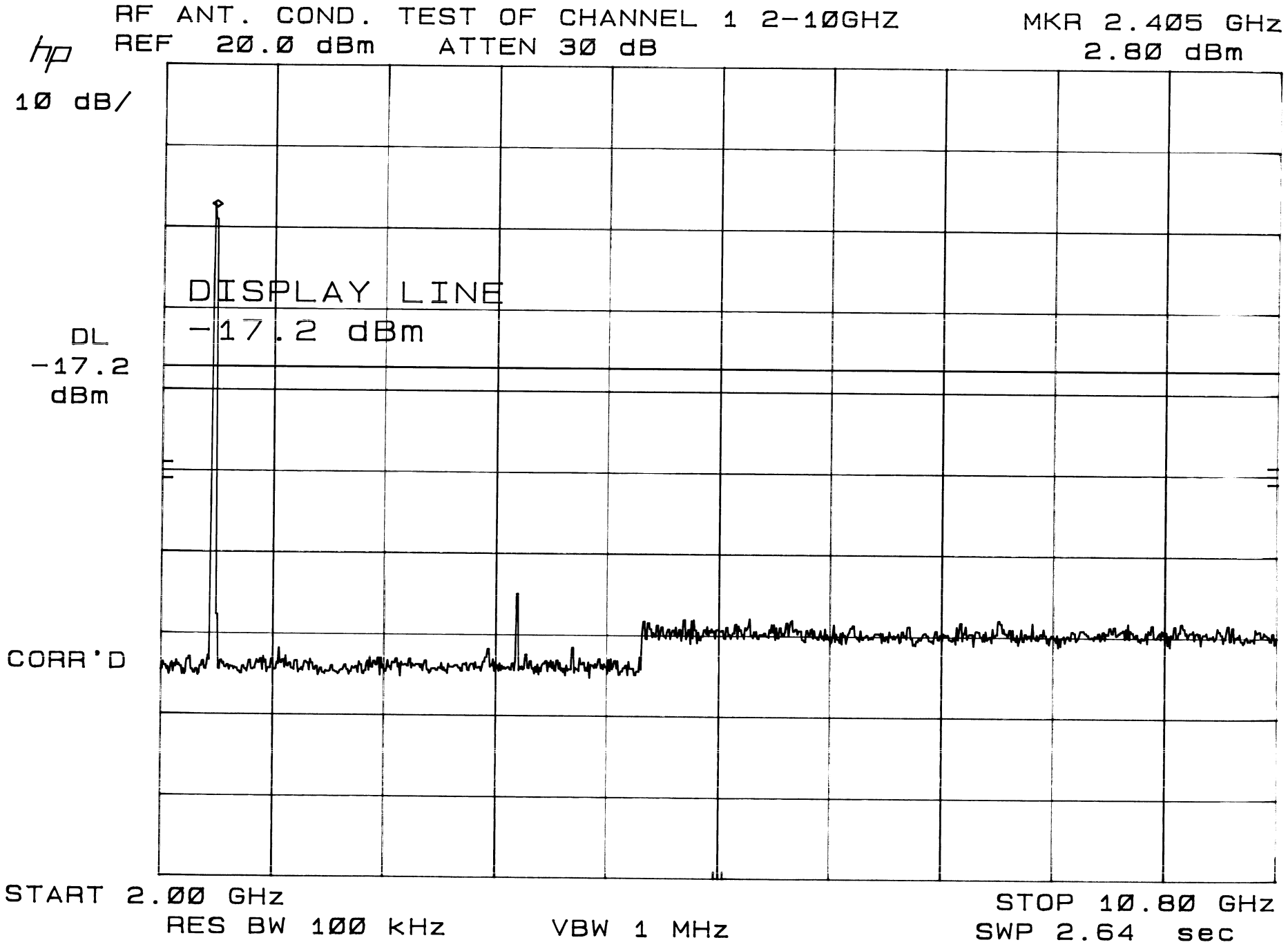

SPECTRAL DENSITY OUTPUT OF CHANNEL 11
MKR 2.461 244 GHz
REF 10.0 dBm
ATTEN 20 dB
-14.50 dBm
10 dB/
MARKER
2.461 244 GHz
-14.50 dBm
DL
8.0
dBm
CORR'D
CENTER 2.462 05 GHz
SPAN 4.50 MHz
RES BW 3 kHz
VBW 10 kHz
SWP 1.50 ksec

RF ANTENNA CONDUCTED DATA SHEETS

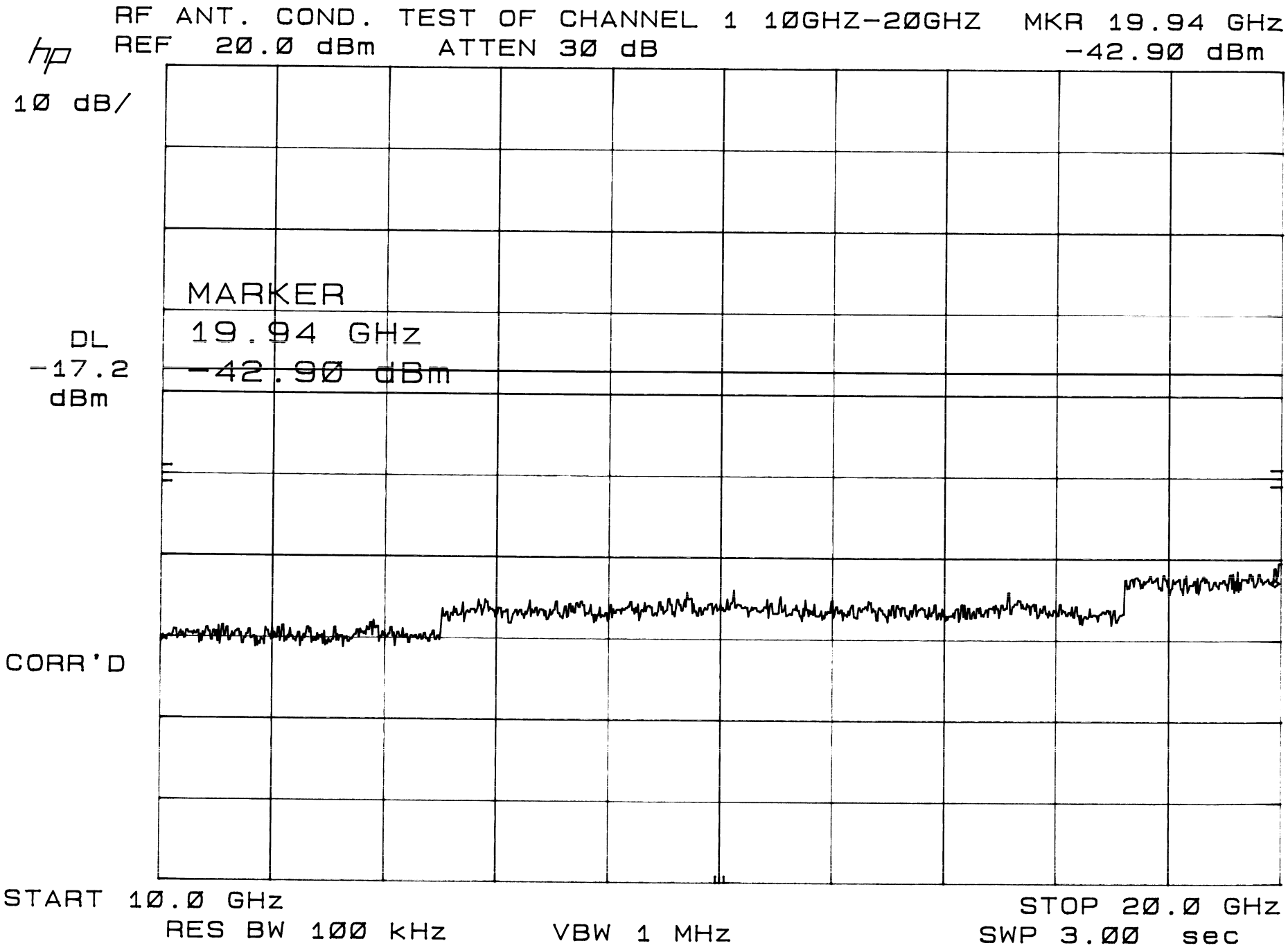
4-20-01


RF ANT. COND. TEST OF CHANNEL 1 2MHZ-2GHZ
MKR 1.988 GHz
REF 20.0 dBm
ATTEN 30 dB
-52.60 dBm
10 dB/
MARKER
1.988 GHz
-52.60 dBm
DL
-17.2
dBm
CORR'D
START 2 MHz
STOP 2.00 GHz
RES BW 100 kHz
VBW 1 MHz
SWP 599 msec

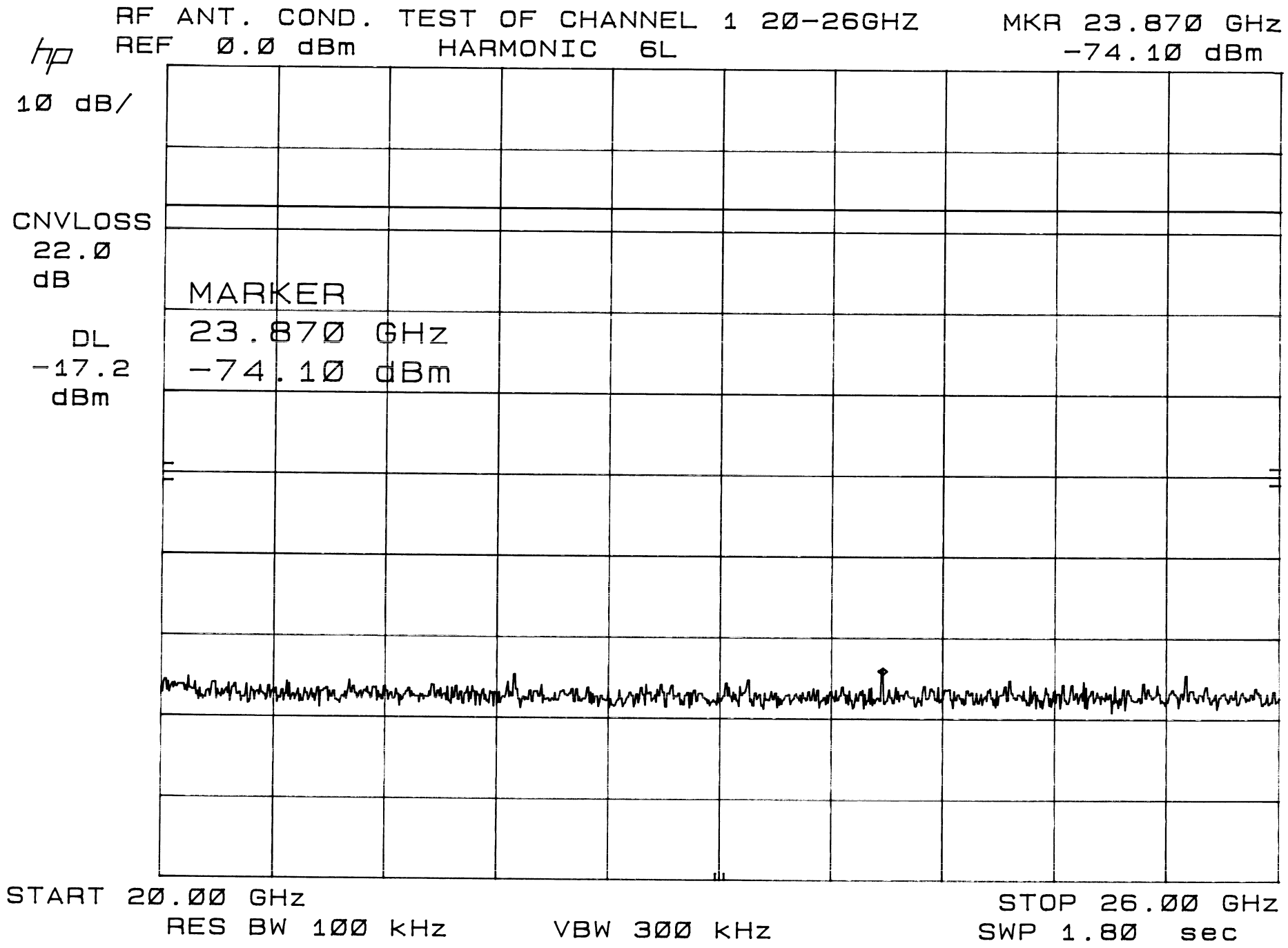
4-20-01


RF ANT. COND. TEST OF CHANNEL 1 2-10GHZ
REF 20.0 dBm
ATTEN 30 dB
MKR 2.405 GHz
2.80 dBm
10 dB/
DISPLAY LINE
-17.2 dBm
DL
-17.2
dBm
CORR'D
START 2.00 GHz
RES BW 100 kHz
VBW 1 MHz
STOP 10.80 GHz
SWP 2.64 sec

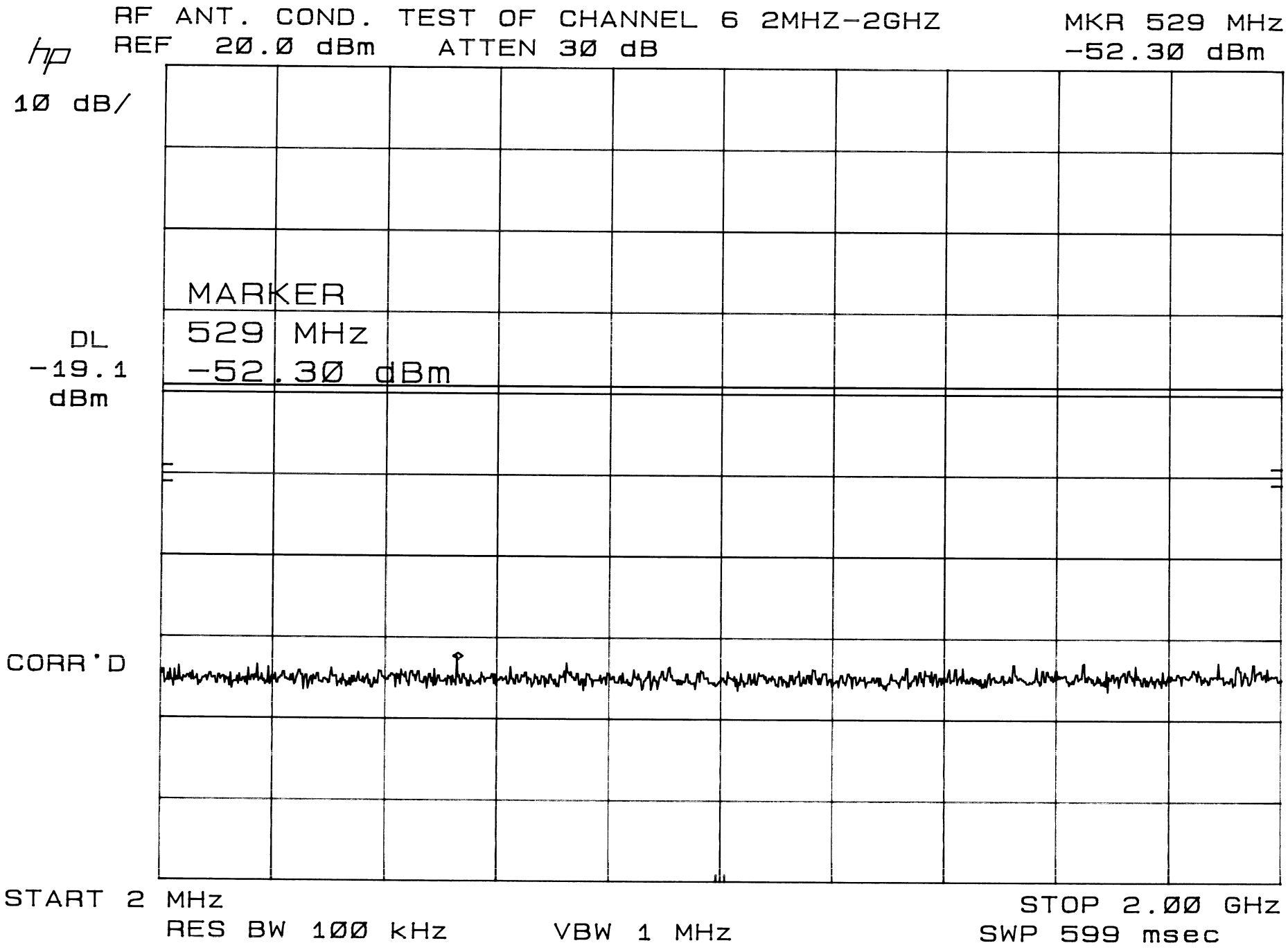
4-20-01


RF ANT. COND. TEST OF CHANNEL 1 10GHZ-20GHZ
MKR 19.94 GHz
REF 20.0 dBm
ATTEN 30 dB
-42.90 dBm
10 dB/
MARKER
19.94 GHz
-42.90 dBm
DL
-17.2
dBm
CORR'D
START 10.0 GHz
STOP 20.0 GHz
RES BW 100 kHz
VBW 1 MHz
SWP 3.00 sec

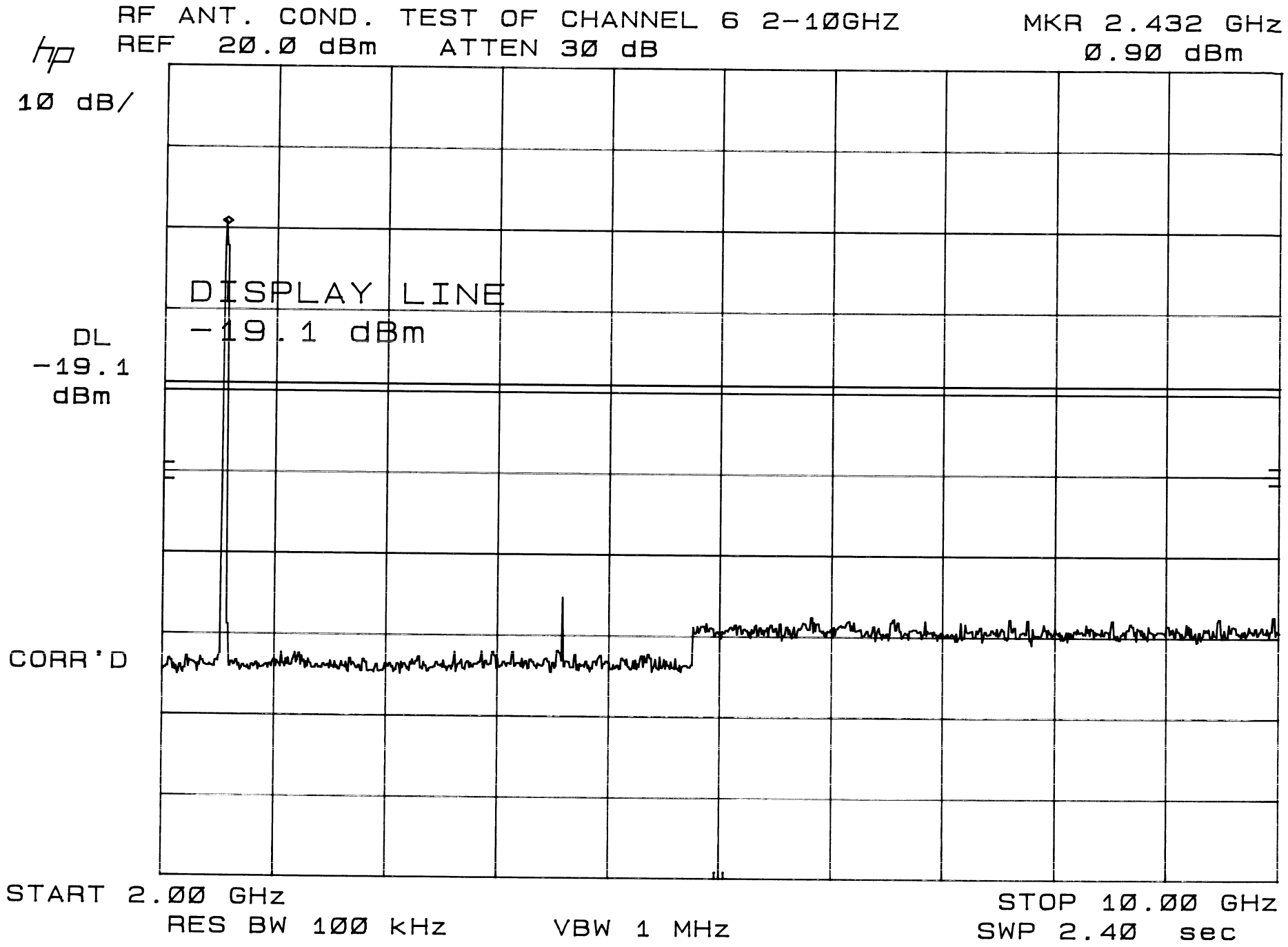
4-20-01


RF ANT. COND. TEST OF CHANNEL 1 20-26GHZ
MKR 23.870 GHz
REF 0.0 dBm
HARMONIC 6L
-74.10 dBm
10 dB/
CNVLOSS
22.0
dB
MARKER
23.870 GHz
-74.10 dBm
DL
-17.2
dBm
START 20.00 GHz
STOP 26.00 GHz
RES BW 100 kHz
VBW 300 kHz
SWP 1.80 sec

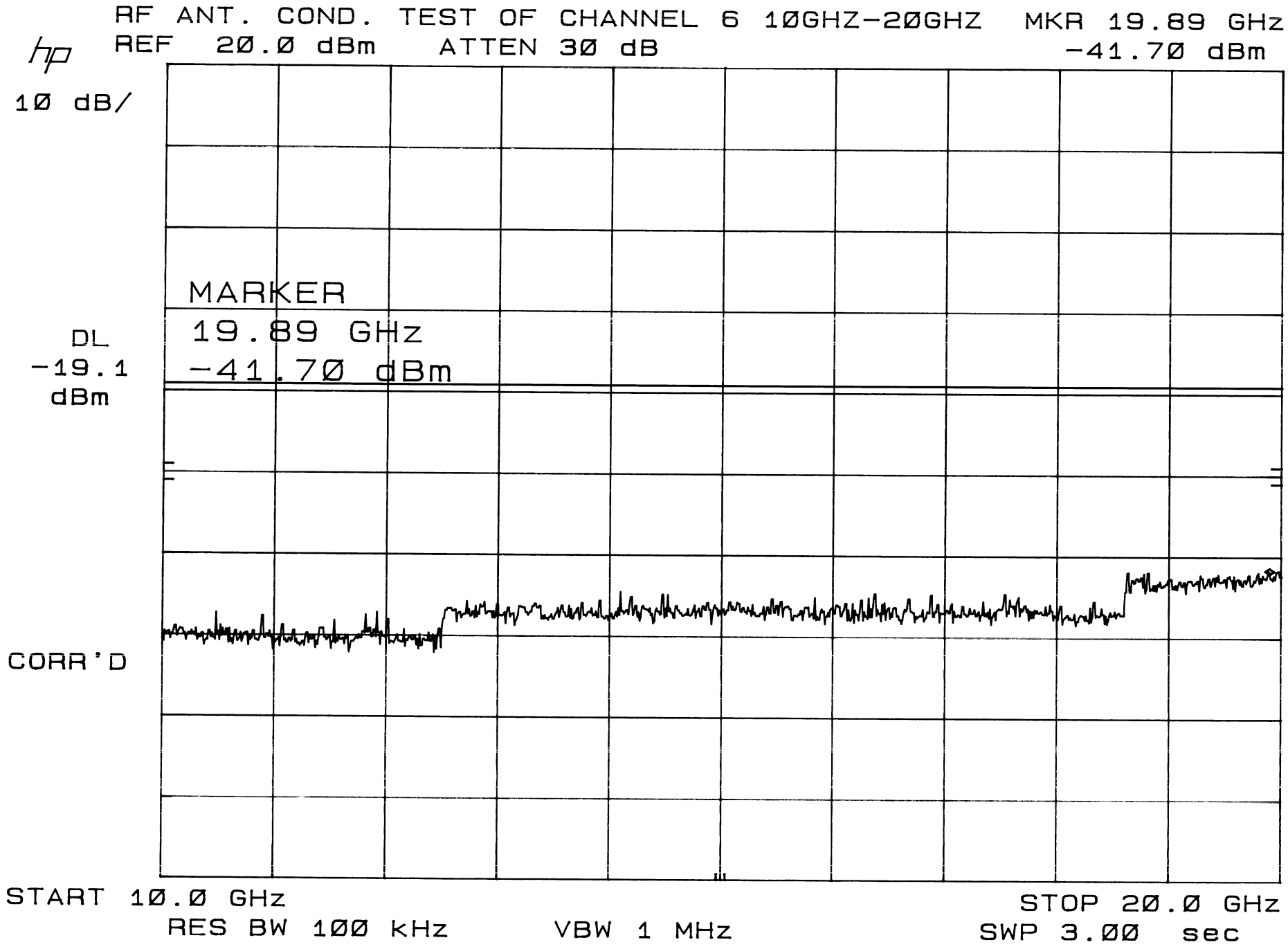
4-20-01


RF ANT. COND. TEST OF CHANNEL 6 2MHZ-2GHZ
MKR 529 MHz
REF 20.0 dBm
ATTEN 30 dB
-52.30 dBm
10 dB/
MARKER
529 MHz
-52.30 dBm
DL
-19.1
dBm
CORR'D
START 2 MHz
STOP 2.00 GHz
RES BW 100 kHz
VBW 1 MHz
SWP 599 msec

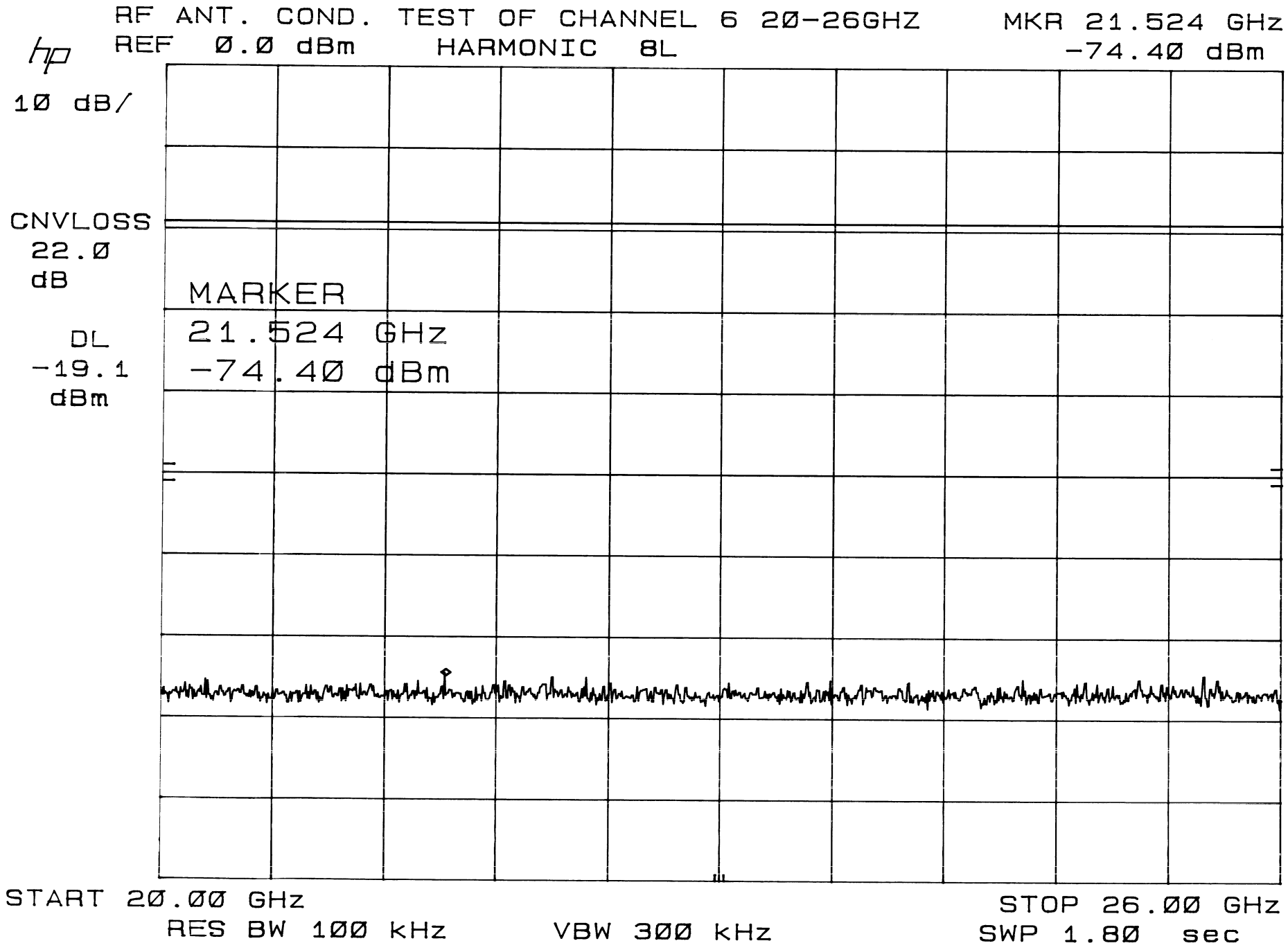
4-20-01


RF ANT. COND. TEST OF CHANNEL 6 2-10GHZ
REF 20.0 dBm
ATTEN 30 dB
MKR 2.432 GHz
0.90 dBm
10 dB/
DISPLAY LINE
-19.1 dBm
DL
-19.1
dBm
CORR'D
START 2.00 GHz
RES BW 100 kHz
VBW 1 MHz
STOP 10.00 GHz
SWP 2.40 sec

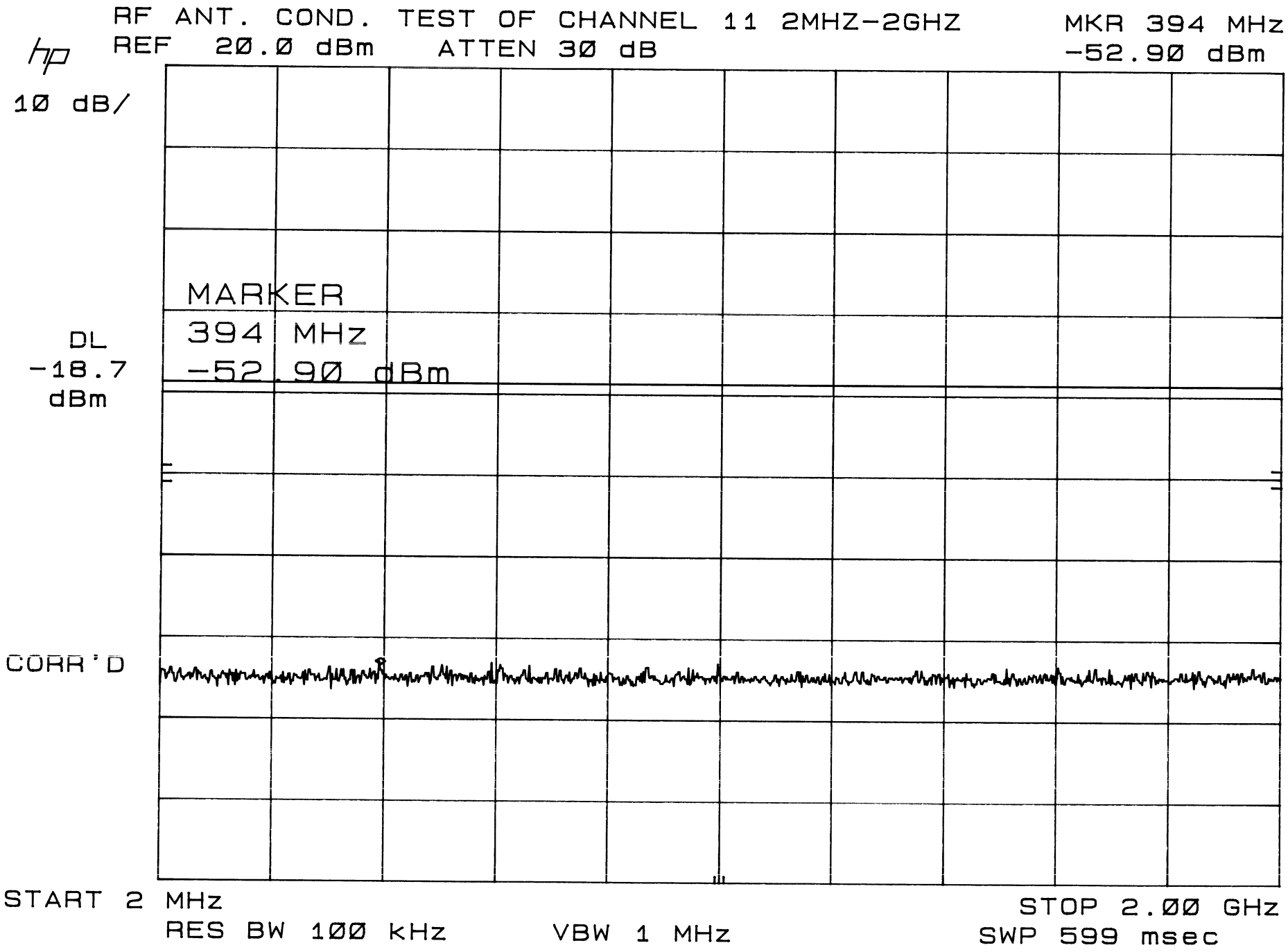
4-20-01


RF ANT. COND. TEST OF CHANNEL 6 10GHZ-20GHZ
MKR 19.89 GHz
REF 20.0 dBm
ATTEN 30 dB
-41.70 dBm
10 dB/
MARKER
19.89 GHz
-41.70 dBm
DL
-19.1
dBm
CORR'D
START 10.0 GHz
STOP 20.0 GHz
RES BW 100 kHz
VBW 1 MHz
SWP 3.00 sec

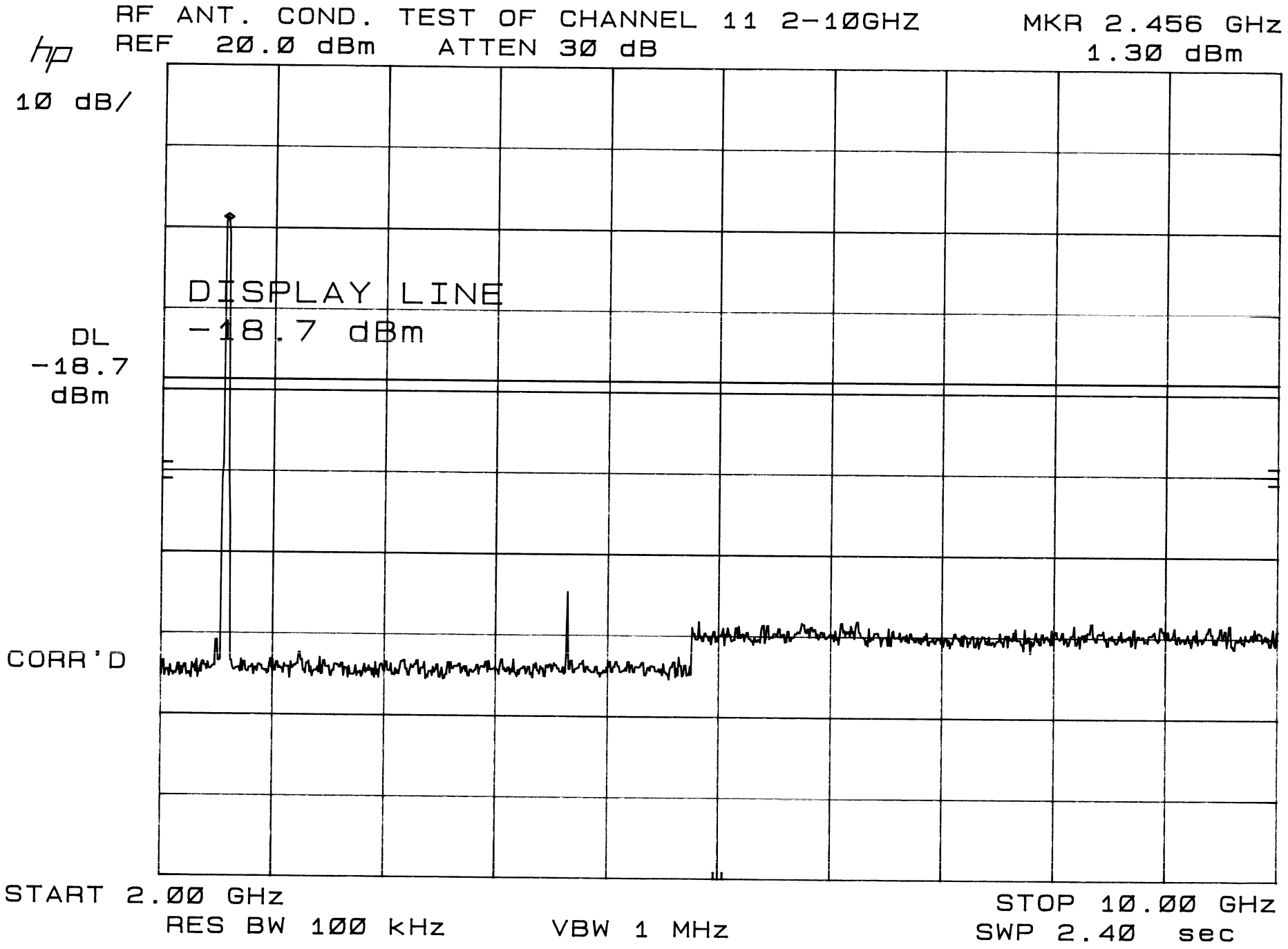
4-20-01


RF ANT. COND. TEST OF CHANNEL 6 20-26GHZ
MKR 21.524 GHz
REF 0.0 dBm
HARMONIC 8L
-74.40 dBm
10 dB/
CNVLOSS
22.0
dB
MARKER
21.524 GHz
-74.40 dBm
DL
-19.1
dBm
START 20.00 GHz
STOP 26.00 GHz
RES BW 100 kHz
VBW 300 kHz
SWP 1.80 sec

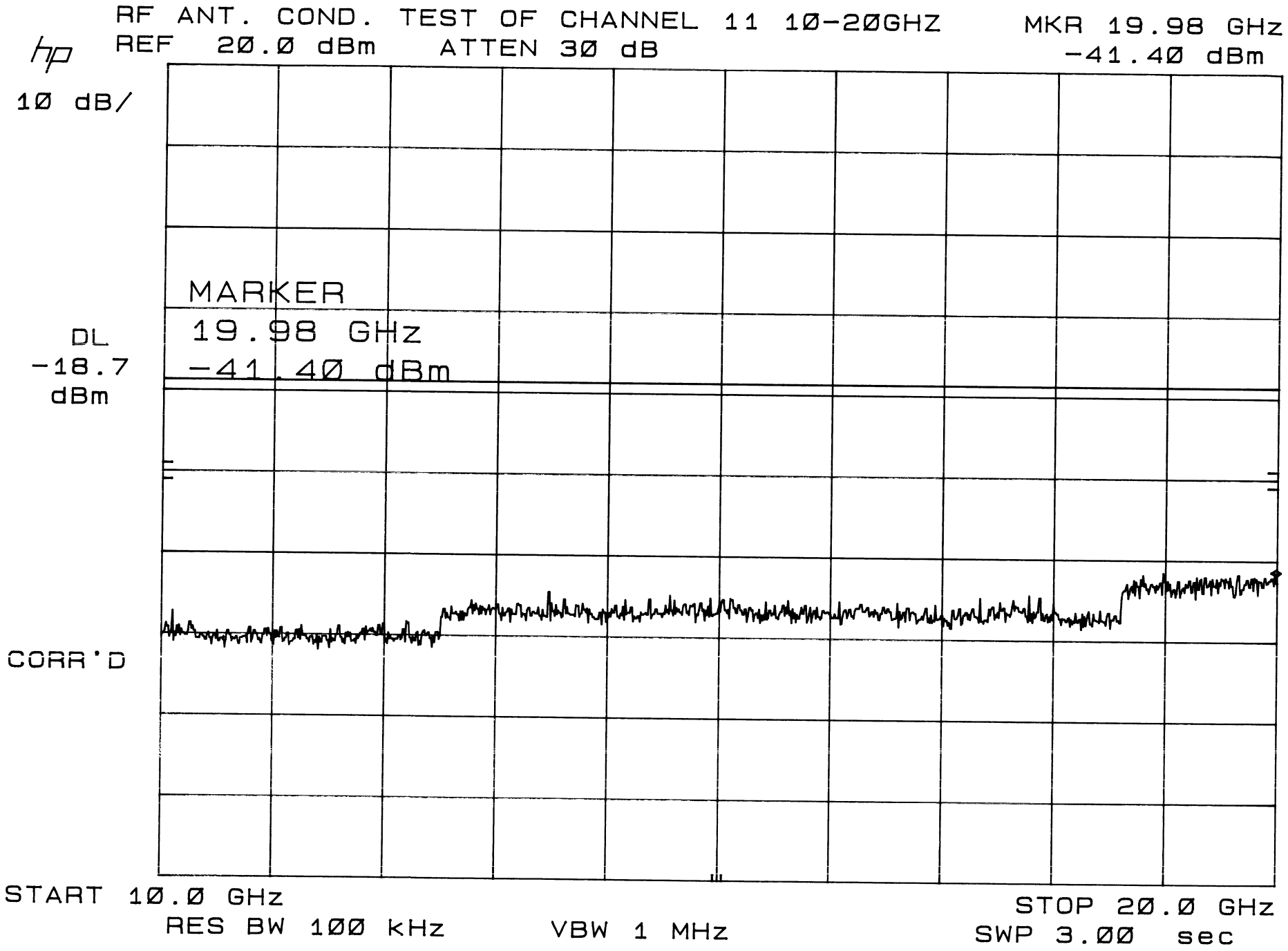
4-20-01


RF ANT. COND. TEST OF CHANNEL 11 2MHZ-2GHZ
MKR 394 MHz
REF 20.0 dBm
ATTEN 30 dB
-52.90 dBm
10 dB/
MARKER
394 MHz
-52.90 dBm
DL
-18.7
dBm
CORR'D
START 2 MHz
STOP 2.00 GHz
RES BW 100 kHz
VBW 1 MHz
SWP 599 msec

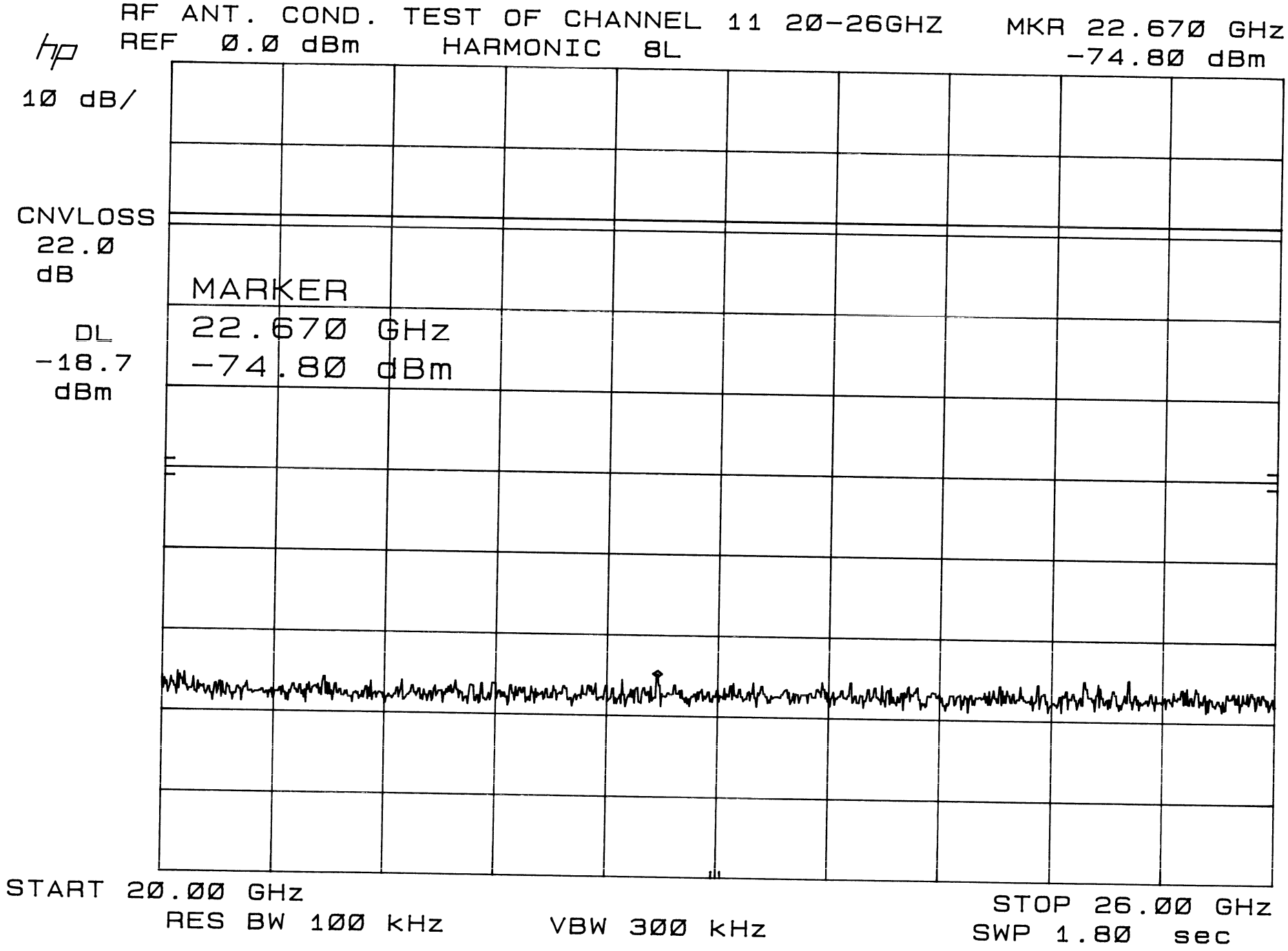
4-20-01


RF ANT. COND. TEST OF CHANNEL 11 2-10GHZ
MKR 2.456 GHz
REF 20.0 dBm
ATTEN 30 dB
1.30 dBm
10 dB/
DISPLAY LINE
-18.7 dBm
DL
-18.7
dBm
CORR'D
START 2.00 GHz
STOP 10.00 GHz
RES BW 100 kHz
VBW 1 MHz
SWP 2.40 sec

4-20-01

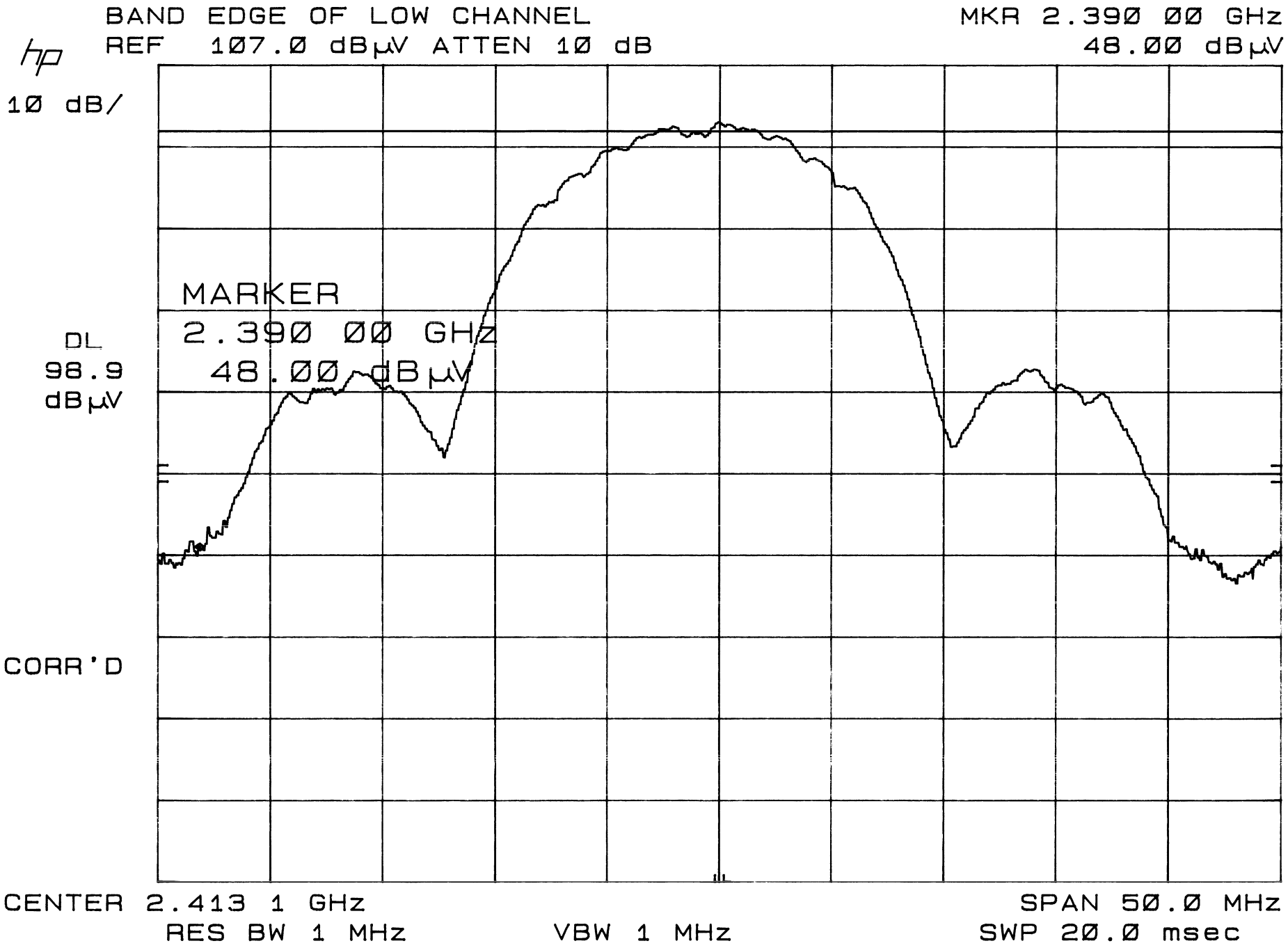

RF ANT. COND. TEST OF CHANNEL 11 10-20GHZ
REF 20.0 dBm ATTEN 30 dB
MKR 19.98 GHz
-41.40 dBm
10 dB/
MARKER
19.98 GHz
-41.40 dBm
DL
-18.7
dBm
CORR'D
START 10.0 GHz
RES BW 100 kHz
VBW 1 MHz
STOP 20.0 GHz
SWP 3.00 sec

4-20-01

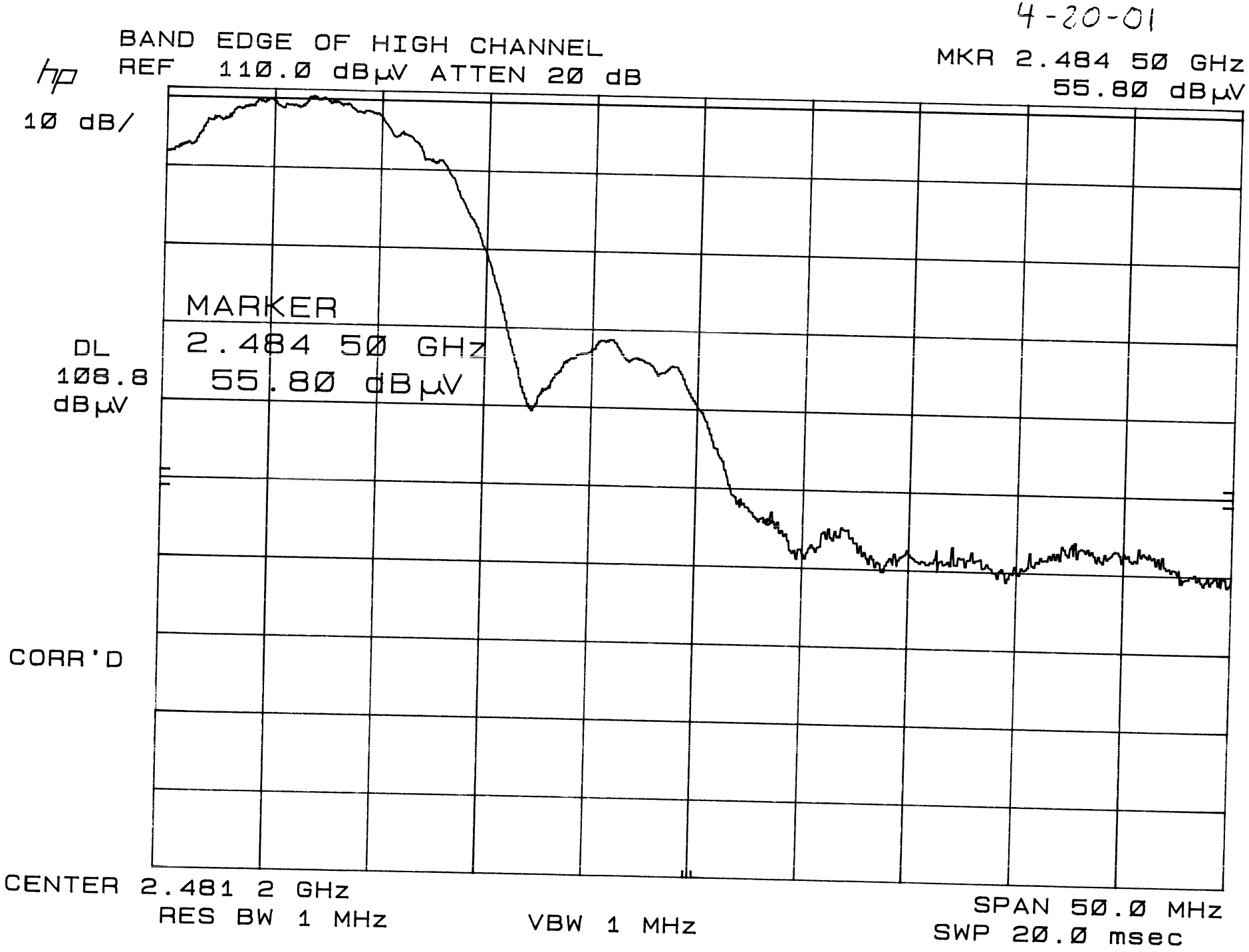

RF ANT. COND. TEST OF CHANNEL 11 20-26GHZ
REF 0.0 dBm
HARMONIC 8L
MKR 22.670 GHz
-74.80 dBm
10 dB/
CNVLOSS
22.0
dB
DL
-18.7
dBm
MARKER
22.670 GHz
-74.80 dBm
START 20.00 GHz
RES BW 100 kHz
VBW 300 kHz
STOP 26.00 GHz
SWP 1.80 sec

RF BAND EDGES DATA SHEETS

4-20-01


BAND EDGE OF LOW CHANNEL
MKR 2.390 00 GHz
REF 107.0 dBµV ATTEN 10 dB
48.00 dBµV
hp
10 dB/
MARKER
2.390 00 GHz
48.00 dBµV
DL
98.9
dBµV
CORR'D
CENTER 2.413 1 GHz
SPAN 50.0 MHz
RES BW 1 MHz
VBW 1 MHz
SWP 20.0 msec

4-20-01


BAND EDGE OF HIGH CHANNEL
hp
REF 110.0 dBµV ATTEN 20 dB
MKR 2.484 50 GHz
55.80 dBµV
10 dB/
MARKER
2.484 50 GHz
55.80 dBµV
DL
108.8
dBµV
CORR'D
CENTER 2.481 2 GHz
RES BW 1 MHz
VBW 1 MHz
SPAN 50.0 MHz
SWP 20.0 msec

RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.247)

COMPANY	**XIRCOM**	**DATE**	**4/20/01**
EUT	**Xircom Wireless LAN Module for Palm Handhelds**	**DUTY CYCLE**	**N/A**
MODEL	**PWE1130**	**PEAK TO AVG**	**N/A**
S/N	**N/A**	**TEST DIST.**	**3 METERS**
TEST ENGINEER	**KYLE FUJIMOTO**	**LAB**	**D**

Frequency MHz	Peak Reading (dBuV)	Average (A) or Quasi-Peak (QP)	Antenna Polar. (V or H)	Antenna Height (meters)	EUT Azimuth (degrees)	EUT Axis (X,Y,Z)	EUT Tx Channel	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
2483.5000	55.8	50.3 A	V	1.5	90	X	LOW	30.7	3.5	31.9	**52.6**	**-1.4**	**54.0**	**BAND EDGE CHANNEL 11**
2390.0000	48.0	A	V	1.0	90	X	LOW	30.7	3.5	31.9	**50.3**	**-3.7**	**54.0**	**BAND EDGE CHANNEL 1**

* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

** DELTA = SPEC LIMIT - CORRECTED READING

PROCESSING GAIN DATA SHEETS

APPENDIX E

LABORATORY RECOGNITIONS

LABORATORY RECOGNITIONS

Compatible Electronics has the following agency accreditations:

National Voluntary Laboratory Accreditation Program - Lab Code: 200063-0

Voluntary Control Council for Interference - Registration Numbers: R-983, C-1026, R-984 and C-1027

Bureau of Standards and Metrology Inspection - Reference Number: SL2-IN-E-1031

Compatible Electronics is recognized or on file with the following agencies:

Federal Communications Commission

Industry Canada

Radio-Frequency Technologies (Competent Body)

Technology International (Europe) Ltd.

APPENDIX F

DESCRIPTION OF THE TRANSMITTER

EXHIBIT G: DESCRIPTION OF OPERATION [2.1033(B4)]

MI-4800B Module Description of Operation

Radio Circuit Description

The 4800B Spread Spectrum Transceiver operates in the 2.4 Ghz ISM band, using Direct Sequence modulation techniques.

The transmit/receive and data packetization operations are under the control of a protocol processor (MAC) internal to the transceiver assembly.

Logic Section : A digital ASIC is employed in the logic section of the radio, providing the following functions:

1) Generation of the spreading code, combination of the code with the incoming data stream.
2) Despreading and demodulation of the incoming baseband spread signal.
3) Determination of the transmit/receive sequence.

RF Section (refer to 4800B radio block diagram) : The transmitter chain includes a shaping bandpass filter followed by a vector modulator. This signal is further filter by a saw filter at the IF frequency of 374 Mhz. This signal is then mixed up to the 2400-2483.5 Mhz band. A RF filter at the output of the mixer removes any other mixing products. A power amplifier chain brings the signal up to the final output level of 30 mwatts. Through the TX/RX switch, the signal is passed through a dielectric bandpass filter to the antenna port. The radio has diversity, so two antenna ports are provided. Transmitter frequency is determined by the 44.0 Mhz reference oscillator, with +/- 25 ppm accuracy.

The receiver utilizes the same antenna filtering and TX/RX, followed by a LNA. A mixer circuit brings the signal to the 374 Mhz IF, where a SAW filter shapes the IF spectral envelope. This filter provides the primary rejection against adjacent channel interference. An IF amplifier followed by an IF limiter brings the signal up to the level needed for the I and Q vector demodulator. A buffer amplifier and filter are used to shape the signal for the PHY digital ASIC which despreads and decodes the signal.

The 374 Mhz voltage controlled oscillator is controlled by a synthesizer/PLL system comprised of a prescaler and programmable dividers. The 2026-2450 Mhz voltage controlled oscillator is also controlled by a synthesizer/PLL system. Both local oscillators use a reference signal for the PLL which is derived from the 44.0 Mhz master reference oscillator.