FCC PART 15, SUBPART C
TEST REPORT

for

REMOTE CONTROL (TRANSMITTER)(PILOT PRO) Model: VP6450

FCC ID: IE3VP64XX04

Prepared for

INTERLINK ELECTRONICS
546 FLYNN ROAD
CAMARILLO, CA 93012

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DATE: DECEMBER 13, 2004

	REPORT BODY	APPENDICES					TOTAL
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GENERAL REPORT SUMMARY

This electromagnetic emission 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 except in full, without 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: Remote Control (Transmitter)(Pilot Pro)
Model: VP6450
S/N: 001

Product Description: This is a hand held wireless remote control for use with PC based computers.

Modifications: The EUT was not modified during the testing.

Manufacturer: Interlink Electronics
546 Flynn Road
Camarillo, CA 93012

Test Dates: Nov. 30 & Dec. 1, 2004

Test Specifications: EMI requirements
FCC CFR Title 47, Part 15 Subpart C
Test Procedure: ANSI C63.4: 2003

Industry Canada Registration No.: Test Site: IC 2372-F

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Radiated RF Emissions, 9 kHz to 25 GHz	Complies with the limits of FCC CFR Title 47, Part 15 Subpart C 15.205, 15.209 & 15.249, and the requirements of 15.31(e).

1. PURPOSE

This document is a Qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Remote Control (Transmitter)(Pilot Pro) Model: **VP6450**. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 2003. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits and requirements defined in FCC CFR Title 47, Part 15 Subpart A (15.31e), Subpart B and Subpart C (15.205, 15.209 and 15.249).

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 2337 Troutdale Drive, Agoura, California 91301.

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

Interlink Electronics

Ken Johnson	Senior Hardware/Firmware Engineer
Daniel Grieder	Member Technical Staff

Compatible Electronics Inc.

Reynald O. Ramirez	Sr. Test Technician
Joey J. Madlangbayan	Test Engineer
Ruby A. Hall	Lab Manager

2.4 Date Test Sample was Received

The test sample was received on November 30, 2004.

2.5 Disposition of the Test Sample

The test sample remains at Compatible Electronics, Inc.

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 CFR Title 47, Part 15 Subpart A	FCC Rules – General
FCC CFR Title 47, Part 15 Subpart B	FCC Rules – Unintentional Radiators
FCC CFR Title 47, Part 15 Subpart C	FCC Rules – Intentional Radiators.
CISPR 16 1993	Specification for radio disturbance and immunity measuring apparatus and methods.
ANSI C63.4 2003	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.

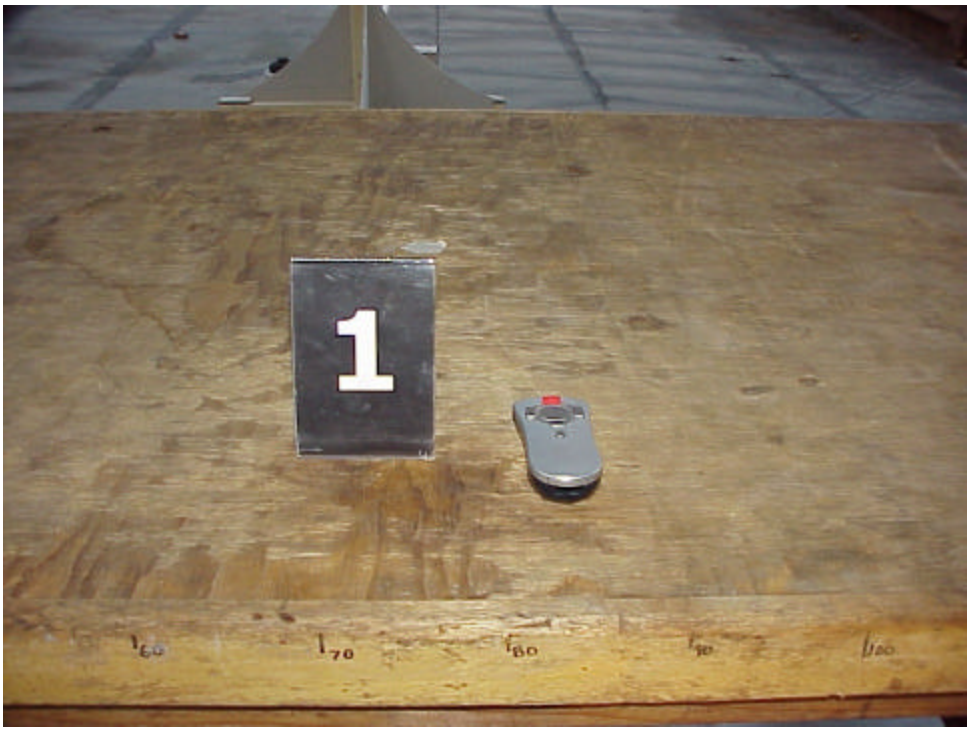
4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

The EUT was set-up in a tabletop configuration in all the three Orthogonal Axes with a new battery installed. The antenna of the EUT is a fixed element incorporated in the PCB design. The EUT was continuously transmitting. All 3 frequencies of the EUT were measured and recorded.

The highest emissions were found when the EUT was running in the above configuration. The final radiated data was taken in this mode of operation. All initial investigations were performed with the spectrum analyzer in manual mode scanning the frequency range continuously. The EUT was setup and tested as shown in the photographs in Appendix D.

4.1.1 Photograph of Test Configuration – EMI



4.1.1 Cable Construction and Termination

The EUT does not have any external cables.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

#	EQUIPMENT TYPE	MANUFACTURER	MODEL	SERIAL NUMBER
1	REMOTE CONTROL (TRANSMITTER) (PILOT PRO)(EUT)	INTERLINK ELECTRONICS	VP6450	SN: 001 FCC ID: IE3VP64XX04

5.2 EMI Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Spectrum Analyzer	Hewlett Packard	8566B	2729A04566	Jan. 16, 2004	Jan. 16, 2005
Quasi-Peak Adapter	Hewlett Packard	85650A	2521A00682	Jan. 16, 2004	Jan. 16, 2005
Preamplifier	Com Power	CPPA-102	01018	Jul. 12, 2004	Jul. 12, 2005
Active Loop Antenna	Com Power	AL-130	17067	Mar. 24, 2004	Mar. 24, 2005
Biconical Antenna	Com Power	AB-100	01535	Mar. 05, 2004	Mar. 05, 2005
Log Periodic Antenna	Com Power	AL-100	01116	Jan. 23, 2004	Jan. 23, 2005
Horn Antenna	A. R. A.	DRG 118/A	1015	Jul. 15, 2004	Jul. 15, 2006
Horn Antenna	Com Power	AH-826	081005	Mar. 18, 2004	Mar. 18, 2005
Microwave Amplifier	Com Power	PA-122	181915	Feb. 25, 2004	Feb. 25, 2005
Microwave Amplifier	Com Power	PA-840	711878	Jun. 02, 2004	Jun. 02, 2005
Microwave Amplifier	Com Power	PA-840	711883	Aug. 11, 2004	Aug. 11, 2005
Antenna Mast	Com Power	AM-400	N/A	N/A	N/A
Turntable	Com Power	TT-106A	N/A	N/A	N/A
Computer	Hewlett Packard	Pavilion 4530	US91912022	N/A	N/A
Printer	Hewlett Packard	C6427B	MY066160TW	N/A	N/A
(Software) Radiated Emissions Transmitter Data Program	Compatible Electronics	DOC No: EMI_PART15TX-B-0-50	Rev. A	N/A	N/A
Radiated Emissions Test Software	Compatible Electronics	Vcap1A	2.3	N/A	N/A
EMI Receiver	Rohde & Schwarz	ESIB40	100218	Jul. 27, 2004	Jul. 27, 2005

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 7.1.2 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. TEST PROCEDURES

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

7.1 RF Emissions

7.1.1 Conducted Emissions Test

The Spectrum Analyzer was used as a measuring meter along with the quasi-peak adapter. 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 Spectrum Analyzer offset was adjusted accordingly to read the actual data measured. The LISN output was read by the Spectrum Analyzer. The output of the second LISN was terminated by a 50 ohm termination. The effective measurement bandwidth used for the conducted emissions 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. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The initial test data was taken in manual mode while scanning the frequency ranges of 0.15 MHz to 1.6 MHz, 1.6 MHz to 5 MHz and 5 MHz to 30 MHz. The conducted emissions from the EUT were maximized for operating mode as well as cable placement. Once a predominant frequency (within 12 dB of the limit) was found, it was more closely examined with the spectrum analyzer span adjusted to 1 MHz.

The EUT is a battery-powered unit; therefore this test was not performed.

7.1.2 Radiated Emissions Test

The spectrum analyzer was used as a measuring meter along with a quasi-peak adapter. A Preamplifier was used to increase the sensitivity of the instrument. 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. This final reading is then recorded into the a Computer data recording program, which takes into account the cable loss, amplifier gain and antenna factors, so that a true reading is compared to the true limit. The quasi-peak measurement was used only for those readings, which are marked accordingly on the data sheets. The effective measurement bandwidth used for the radiated emissions test was according to the frequency measured (200 Hz for 9kHz-150kHz, 9 kHz for 0.150kHz-30MHz, 120 kHz for 30-1000MHz and 1 MHz for 1000 MHz and above).

Broadband loop, biconical, log periodic and horn antennas were used as transducers during the measurement. The loop antenna was used from 9 kHz to 30 MHz, the biconical antenna was used from 30 MHz to 300 MHz, the log periodic antenna was used from 300 MHz to 1 GHz and the horn antenna was used from 1 GHz to 25 GHz. The frequency spans were wide (9 kHz to 30 MHz, 30 MHz to 88 MHz, 88 MHz to 216 MHz, 216 to 300 MHz, 300 MHz to 1 GHz and 1 GHz to 24.835 GHz) during preliminary investigations. The final data was taken with a frequency span of 1 MHz. Furthermore, the frequency span was reduced during the preliminary investigations as deemed necessary.

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. 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 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 test distance of 3 meters to obtain final test data. The test data is located in Appendix E.

Preliminary Testing and Monitoring:

Preliminary testing was done at a distance of 1 meter instead of 3 meters to determine the predominant harmonics and spurious emission frequencies. An open field test site was used for the preliminary investigations. Broadband antennas were used to scan large frequency bands while manipulating the X, Y and Z azimuth of the unit. All significant frequencies were further examined carefully at a frequency span on the spectrum analyzer while changing the antenna height and EUT orientation. The EUT was tested again at a test distance of 3 meters to obtain the final test data. The bandwidth of the spectrum analyzer was varied to ensure that pulse desensitization did not occur.

7.1.3 RF Emissions Test Results

The fundamental and up to the 10th harmonic emissions are within the specifications.

INTERLINK ELECTRONICS
REMOTE CONTROL (Transmitter)(Pilot Pro)

RADIATED EMISSIONS – SPURIOUS

Table 1.0
The following bands were specifically scanned.
Frequency Band 9 kHz – 25 GHz

RF Energy From Transmitter in MHz at 3 meters (µV/m)

0.090-0.110	<50	37.5-38.25	<100
0.495-0.505	<50	73-74.6	<100
2.1735-2.1905	<50	74.8-75.2	<100
4.125-1.128	<50	108-121.94	<100
4.17725-4.17775	<50	123-138	<150
4.20725-4.20775	<50	149.9-150.05	<150
6.215-6.218	<50	156.52-156.52	<150
6.26775-6.26825	<50	162.01-167.17	<150
6.31175-6.31225	<50	167.72-173.2	<150
8.291-8.294	<50	240-285	<200
8.362-8.366	<50	322-335.4	<200
8.37625-8.38675	<50	399.9-410	<200
8.41425-8.41475	<50	608-614	<200
12.29-12.293	<50	960-1240	<500
12.51975-12.52025	<50	1300-1427	<500
12.57675-12.57725	<50	1435-1626.5	<500
13.36-13.41	<50	1645.5-1646.5	<500
16.42-16.423	<50	1660-1710	<500
16.69475-16.69525	<50	1718.8-1722.2	<500
16.80425-16.80475	<50		
25.5-25.67	<50		

7.1.3.1 RF Emissions Test Results (Continued)

RF Energy From Transmitter in MHz at 3 meters (µV/m)

2200-2300	<500	8025-8500	<500
2310-2390	<500	9000-9200	<500
2483.5-2500	<500	9.3-9.5	<500
2655-2900	<500	10.6-12.7	<500
3260-3267	<500	13.25-13.4	<500
3332-3339	<500	14.47-14.5	<500
3345.8-3358	<500	15.35-16.2	<500
3600-4400	<500	17.7-21.4	<500
4500-5150	<500	22.01-23.12	<500
5350-5460	<500	23.6-24.0	<500
7250-7750	<500		

7.1.4 Sample Calculations

A correction factor for the antenna, cable and a distance factor (if any) must be applied to the meter reading before a true field strength reading can be obtained. For greater efficiency and convenience, instead of using these correction factors for each meter reading, the specification limit was modified to reflect these correction factors at each frequency, so that the meter readings can be compared directly to the modified specification limit, referred to henceforth as the corrected meter reading limit (CML).

The equation can be derived in the following manner:

Specification limit (µV/m) log x 20 = Specification Limit in dBuV

(Specification distance / test distance) log x 40 = distance factor

(Specification Limit dBuV + distance factor) + Antenna factor – effective gain = Corrected Meter Limit

Note: When using an Active Antenna, the Antenna factor shall be subtracted due to the combination of the internal amplification and antenna loss. At lower frequencies the cable loss is negligible.

OR

Corrected Meter Reading = meter reading + F – A + C

where: F = antenna factor
A= amplifier gain
C = cable loss

Therefore, the equation for determining the corrected meter reading is:

CMR = spec. limit - F - A + C

A table of corrected meter reading limits was used to permit immediate comparison of the meter reading and determine if the emission level exceeded the specification limit at that frequency. The correction factors for the antenna and the amplifier gain are attached in Appendix D of this report. The data sheets are attached in Appendix E.

The distance factor D is 0 when the test is performed at the required specification distance.

8. TEST PROCEDURE DEVIATIONS

There were no deviations from the test procedures.

9. CONCLUSIONS

The Remote Control (Transmitter)(Pilot Pro) Model: **VP6450** meets all of the requirements of the FCC CFR, Title 47, Part 15, Subpart A, B and C (15.205, 15.209, 15.31e and 15.249).

APPENDIX A

LABORATORY ACCREDITATIONS

LABORATORY ACCREDITATIONS AND RECOGNITIONS

NVLAP CODES 200063-0, 200528-0, 200527-0

For US, Canada, Australia/New Zealand, Taiwan and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025 an ISO 9002 equivalent. Please follow the link to the NIST site for each of our facilities NVLAP certificate and scope of accreditation.

Silverado/Lake Forest Division: http://ts.nist.gov/ts/htdocs/210/214/scopes/2005270.htm
Brea Division: http://ts.nist.gov/ts/htdocs/210/214/scopes/2005280.htm
Agoura Division: http://ts.nist.gov/ts/htdocs/210/214/scopes/2000630.htm

Compatible Electronics has been accredited by ANSI and appointed by the FCC to serve as a Telecommunications Certification Body (TCB). Compatible Electronics ANSI TCB listing can be found at: http://www.ansi.org/public/ca/ansi_cp.html

Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for EMC under the US/EU Mutual Recognition Agreement (MRA). Compatible Electronics NIST US/EU CAB listing can be found at: http://ts.nist.gov/ts/htdocs/210/gsig/emc-cabs-mar02.pdf

Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for Taiwan/BSMI under the US/APEC (Asia-Pacific Economic Cooperation) Mutual Recognition Agreement (MRA). Compatible Electronics NIST US/APEC CAB listing can be found at: http://ts.nist.gov/ts/htdocs/210/gsig/apec/bsmi-cabs-may02.pdf

World Wide Market Access with Nemko

Compatible Electronics has been validated by NEMKO against ISO/IEC 17025 under the NEMKO EMC Laboratory Authorization (ELA) program to all EN standards required by the European Union (EU) EMC Directive 89/336/EEC. Please follow the link to the Compatible Electronics' web site for each of our facilities NEMKO ELA certificate and scope of accreditation. http://www.celectronics.com/certs.htm

We are also certified/listed for IT products by the following country/agency:

Compatible Electronics VCCI listing can be found at:
http://www.vcci.or.jp/vcci_e/member/tekigo/setsubi_index_id.html

Just type "Compatible Electronics" into the Keyword search box.

Compatible Electronics FCC listing can be found at:
https://gullfoss2.fcc.gov/prod/oet/index_ie.html

Just type "Compatible Electronics" into the Test Firms search box.

Industry Canada Industrie Canada

Compatible Electronics IC listing can be found at:
http://spectrum.ic.gc.ca/~cert/labs/oats_lab_c_e.html

APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

There were no modifications made to the EUT during the test.

APPENDIX C

ADDITIONAL MODELS COVERED UNDER THIS REPORT

ADDITIONAL MODELS COVERED UNDER THIS REPORT

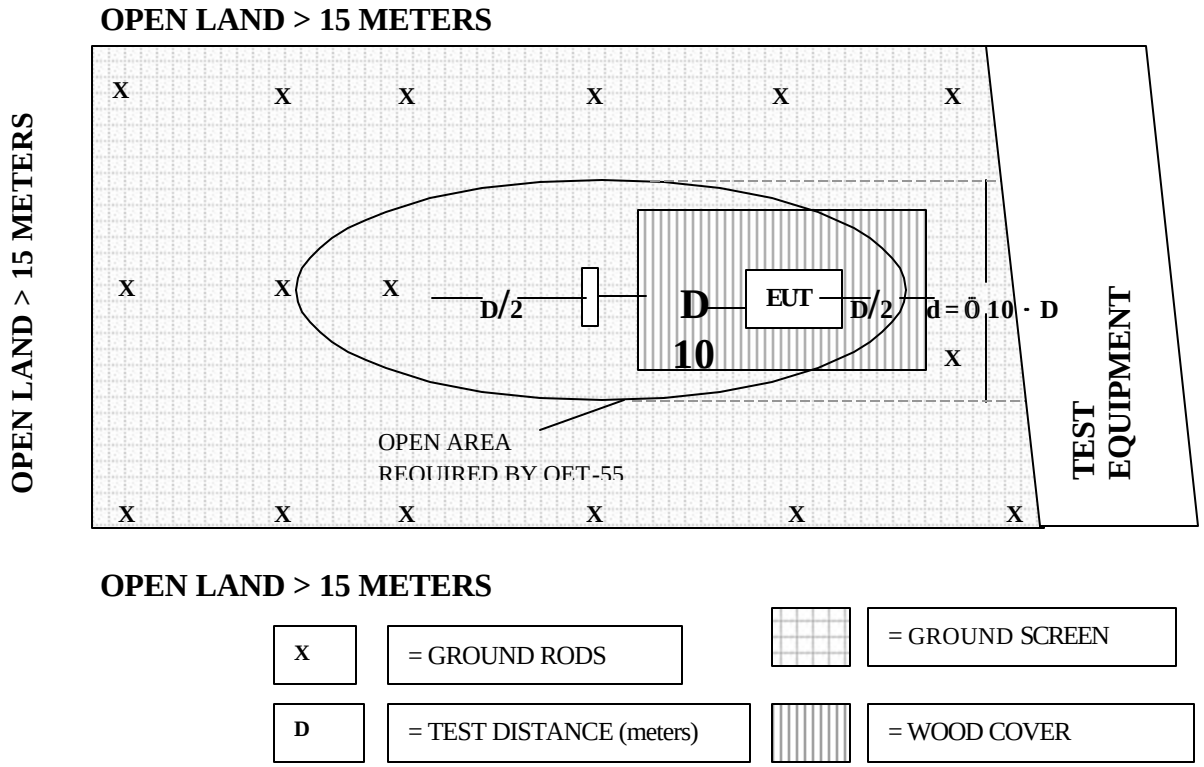
USED FOR THE PRIMARY TEST	REMOTE CONTROL (Transmitter)(Pilot Pro) Model: VP6450

There were no additional models covered under this report.

APPENDIX D

DIAGRAMS, CHARTS AND PHOTOS

FIGURE 1: PLOT MAP AND LAYOUT OF RADIATED SITE



COM-POWER AL-130

ACTIVE LOOP ANTENNA

S/N: 17067

CALIBRATION DATE: MARCH 24, 2004

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
0.009	12.0	1	10.7
0.01	11.2	2	11.3
0.02	10.5	3	11.0
0.03	12.2	4	11.0
0.04	11.8	5	11.6
0.05	10.2	6	11.7
0.06	11.5	7	11.2
0.07	10.5	8	11.1
0.08	10.1	9	11.4
0.09	10.1	10	8.8
0.1	10.0	12	10.8
0.2	7.8	14	11.0
0.3	10.2	15	11.1
0.4	10.3	16	11.2
0.5	10.3	18	9.0
0.6	10.6	20	9.0
0.7	10.5	25	9.0
0.8	10.4	30	7.7
0.9	10.7		

COM-POWER AB-100

BICONICAL ANTENNA

S/N: 1535

CALIBRATION DATE: MARCH 5, 2004

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	14.2	120	10.1
35	13.7	125	11.5
40	12.2	140	11.5
45	12.7	150	12.0
50	12.1	160	13.3
55	11.4	175	13.5
60	10.4	180	14.5
65	10.6	200	15.4
70	9.0	225	15.1
80	8.5	250	16.8
90	8.5	275	16.7
100	8.9	300	18.6

COM-POWER AL-100

LOG PERIODIC ANTENNA

S/N: 01116

CALIBRATION DATE: JAN. 23, 2004

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
300	13.5	650	20.1
330	17.1	700	21.3
340	15.5	725	21.1
350	16.2	750	22.2
360	15.3	800	23.0
370	14.7	850	23.0
400	16.8	900	23.2
425	17.0	925	22.9
450	16.0	950	23.7
500	16.8	975	25.0
550	18.9	1000	26.6
600	19.0		

COM-POWER PA-102

PREAMPLIFIER

S/N: 1018

CALIBRATION DATE: JULY 12, 2004

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	35.7	300	34.5
40	36.7	350	34.6
50	35.7	400	34.5
60	35.6	450	34.2
70	35.6	500	34.4
80	35.5	550	34.4
90	35.1	600	33.9
100	35.5	650	34.0
125	35.4	700	34.0
150	35.2	750	34.2
175	35.0	800	33.8
200	35.1	850	33.4
225	35.0	900	33.4
250	34.9	950	33.4
275	34.7	1000	32.5

COM-POWER PA-122

PREAMPLIFIER

S/N: 181915

CALIBRATION DATE: FEBRUARY 25, 2004

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
1000	33.4	7000	33.3
1100	33.0	7500	33.3
1200	33.0	8000	33.0
1300	32.9	8500	32.4
1400	33.3	9000	30.3
1500	33.0	9500	31.1
1600	32.9	10000	32.6
1700	32.9	11000	33.6
1800	32.9	12000	32.8
1900	33.1	13000	32.8
2000	33.0	14000	32.9
2500	32.9	15000	32.4
3000	32.8	16000	32.6
3500	33.1	17000	31.2
4000	33.2	18000	30.2
4500	33.2		
5000	33.0		
5500	32.3		
6000	32.8		
6500	33.6		

A.R.A DRG-118/A

HORN ANTENNA

S/N: 1015

CALIBRATION DATE: JULY 15, 2004

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
1000	24.8	10000	39.0
1500	25.2	10500	39.8
2000	28.2	11000	39.3
2500	28.5	11500	40.1
3000	30.0	12000	41.0
3500	30.5	12500	40.6
4000	30.8	13000	39.9
4500	31.5	13500	40.5
5000	33.1	14000	41.3
5500	33.4	14500	42.7
6000	34.0	15000	41.6
6500	34.9	15500	39.2
7000	36.7	16000	39.0
7500	37.8	16500	38.8
8000	39.9	17000	41.1
8500	38.2	17500	43.8
9000	38.2	18000	45.4
9500	38.8		

COM-POWER PA-840

PREAMPLIFIER 18-40 GHz

S/N: 711878

CALIBRATION DATE: JUNE 2, 2004

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
18.0	27.7	29.5	31.3
18.5	28.8	30.0	31.0
19.0	29.9	30.5	30.6
19.5	30.4	31.0	31.5
20.0	30.9	31.5	30.5
20.5	30.3	32.0	30.1
21.0	30.7	32.5	29.4
21.5	30.2	33.0	28.9
22.0	30.2	33.5	28.5
22.5	30.4	34.0	28.2
23.0	30.7	34.5	27.8
23.5	30.7	35.0	27.7
24.0	31.4	35.5	28.2
24.5	31.8	36.0	28.5
25.0	32.0	36.5	29.0
25.5	31.6	37.0	30.2
26.0	30.7	37.5	30.1
26.5	30.2	38.0	31.4
27.0	29.6	38.5	31.2
27.5	29.1	39.0	31.4
28.0	30.2	39.5	30.2
28.5	31.2	40.0	29.2
29.0	32.4		

COM-POWER PA-840

PREAMPLIFIER 18-40 GHz

S/N: 711883

CALIBRATION DATE: AUGUST 11, 2004

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
18.0	31.7	29.5	28.8
18.5	32.1	30.0	29.2
19.0	30.9	30.5	28.8
19.5	30.5	31.0	28.6
20.0	29.9	31.5	28.4
20.5	29.5	32.0	27.8
21.0	29.2	32.5	27.8
21.5	28.8	33.0	27.7
22.0	28.2	33.5	27.7
22.5	28.3	34.0	27.4
23.0	28.5	34.5	27.7
23.5	29.1	35.0	28.2
24.0	29.4	35.5	29.0
24.5	29.8	36.0	29.3
25.0	30.8	36.5	30.1
25.5	30.9	37.0	30.4
26.0	30.5	37.5	31.3
26.5	30.4	38.0	31.7
27.0	30.0	38.5	30.5
27.5	30.2	39.0	30.0
28.0	29.8	39.5	30.1
28.5	29.5	40.0	28.8
29.0	29.4		

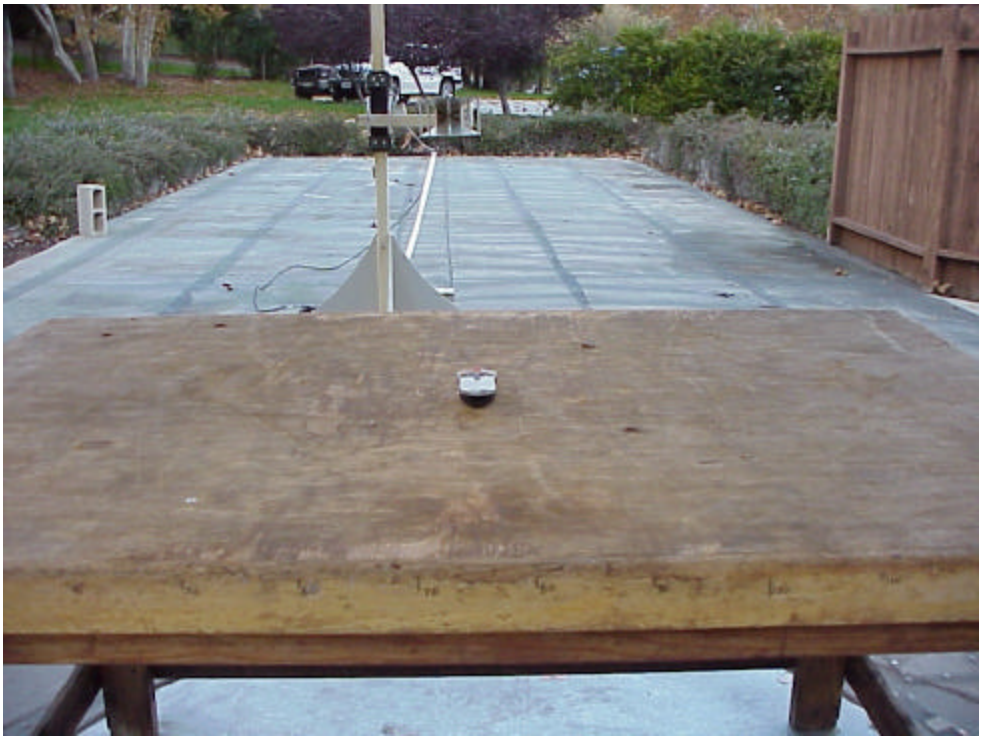
COM-POWER AH-826

HORN ANTENNA 18-26 GHz

S/N: 081005

CALIBRATION DATE: MARCH 18, 2004

FREQUENCY (MHz)	FACTOR (dB/m)
18000	31.5
18500	30.7
19000	30.2
19500	32.2
20000	29.7
20500	34.2
21000	29.8
21500	30.7
22000	30.4
22500	31.0
23000	32.2
23500	32.6
24000	32.1
24500	30.7
25000	31.4
25500	31.5
26000	34.2
26500	32.6



X-AXIS

INTERLINK ELECTRONICS
REMOTE CONTROL
(TRANSMITTER)(PILOT PRO)
Model: VP6450
FCC PART 15 SUBPART C - RADIATED EMISSIONS – 11-30-04

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

Y-AXIS

INTERLINK ELECTRONICS
REMOTE CONTROL
(TRANSMITTER)(PILOT PRO)
Model: VP6450
FCC PART 15 SUBPART C - RADIATED EMISSIONS – 11-30-04

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

Z-AXIS

INTERLINK ELECTRONICS
REMOTE CONTROL
(TRANSMITTER)(PILOT PRO)
Model: VP6450
FCC PART 15 SUBPART C - RADIATED EMISSIONS – 11-30-04

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

APPENDIX E

DATA SHEETS

RADIATED EMISSIONS (FCC SECTION 15.249)

COMPANY	Interlink Electronics	DATE	11/30/04
EUT	Remote Control	DUTY CYCLE	13.79296316 %
MODEL	Pilot Pro (Bass)	PEAK TO AVG	-17.2068485 dB
S/N	1	TEST DIST.	3 Meters
TEST ENGINEER	Rey Ramirez	LAB	F

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)	Distance Factor (dB)	Mixer Factor (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
2403.0000	51.8	A	H	1.0	180	X	LOW	28.4	4.3	0.0	0.0	0.0	84.6	-9.4	94.0	
2403.0000	54.7	A	H	2.0	180	Y	LOW	28.4	4.3	0.0	0.0	0.0	87.5	-6.5	94.0	
2403.0000	47.8	A	H	3.0	180	Z	LOW	28.4	4.3	0.0	0.0	0.0	80.6	-13.4	94.0	
2403.0000	49.0	A	V	2.0	90	X	LOW	28.4	4.3	0.0	0.0	0.0	81.8	-12.2	94.0	
2403.0000	51.3	A	V	2.0	90	Y	LOW	28.4	4.3	0.0	0.0	0.0	84.1	-9.9	94.0	
2403.0000	53.1	A	V	4.0	180	Z	LOW	28.4	4.3	0.0	0.0	0.0	85.9	-8.1	94.0	
2446.0000	54.7	A	H	1.0	180	X	LOW	28.5	4.4	0.0	0.0	0.0	87.5	-6.5	94.0	
2446.0000	58.1	A	H	2.0	180	Y	LOW	28.5	4.4	0.0	0.0	0.0	90.9	-3.1	94.0	
2446.0000	46.7	A	H	1.0	90	Z	LOW	28.5	4.4	0.0	0.0	0.0	79.5	-14.5	94.0	
2446.0000	49.8	A	V	3.0	90	X	LOW	28.5	4.4	0.0	0.0	0.0	82.6	-11.4	94.0	
2446.0000	51.3	A	V	3.0	90	Y	LOW	28.5	4.4	0.0	0.0	0.0	84.1	-9.9	94.0	
2446.0000	52.2	A	V	3.0	180	Z	LOW	28.5	4.4	0.0	0.0	0.0	85.0	-9.0	94.0	
2480.0000	54.8	A	H	4.0	0	X	LOW	28.5	4.4	0.0	0.0	0.0	87.7	-6.3	94.0	
2480.0000	57.2	A	H	2.0	180	Y	LOW	28.5	4.4	0.0	0.0	0.0	90.1	-3.9	94.0	
2480.0000	49.1	A	H	4.0	90	Z	LOW	28.5	4.4	0.0	0.0	0.0	82.0	-12.0	94.0	
2480.0000	50.3	A	V	3.0	90	X	LOW	28.5	4.4	0.0	0.0	0.0	83.2	-10.8	94.0	
2480.0000	52.0	A	V	2.0	270	Y	LOW	28.5	4.4	0.0	0.0	0.0	84.9	-9.1	94.0	
2480.0000	53.0	A	V	3.0	0	Z	LOW	28.5	4.4	0.0	0.0	0.0	85.9	-8.1	94.0	

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

RADIATED EMISSIONS (FCC SECTION 15.249)

COMPANY	Interlink Electronics	DATE	11/30/04
EUT	Remote Control	DUTY CYCLE	13.79296316 %
MODEL	Pilot Pro (Bass)	PEAK TO AVG	-17.2068485 dB
S/N	1	TEST DIST.	3 Meters
TEST ENGINEER	Rey Ramirez	LAB	F

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)	Distance Factor (dB)	Mixer Factor (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
4806.0000	40.0	A	H	3.0	180	X	LOW	32.5	6.5	33.1	0.0	0.0	45.9	-8.1	54.0	
4806.0000	43.0	A	H	3.0	180	Y	LOW	32.5	6.5	33.1	0.0	0.0	48.9	-5.1	54.0	
4806.0000	46.6	29.4 A	H	3.0	90	Z	LOW	32.5	6.5	33.1	0.0	0.0	35.3	-18.7	54.0	
4806.0000	39.9	A	V	1.0	180	X	LOW	32.5	6.5	33.1	0.0	0.0	45.8	-8.2	54.0	
4806.0000	43.9	A	V	1.0	180	Y	LOW	32.5	6.5	33.1	0.0	0.0	49.8	-4.2	54.0	
4806.0000	45.6	28.4 A	V	2.0	90	Z	LOW	32.5	6.5	33.1	0.0	0.0	34.3	-19.7	54.0	
4892.0000		A	H			X	MED.	32.8	6.1	33.0	0.0				54.0	no reading found
4892.0000	41.7	A	H	4.0	180	Y	MED.	32.8	6.1	33.0	0.0	0.0	47.5	-6.5	54.0	
4892.0000	39.6	A	H	3.0	180	Z	MED.	32.8	6.1	33.0	0.0	0.0	45.4	-8.6	54.0	
4892.0000		A	V			X	MED.	32.8	6.1	33.0	0.0				54.0	no reading found
4892.0000	40.5	A	V	2.0	180	Y	MED.	32.8	6.1	33.0	0.0	0.0	46.3	-7.7	54.0	
4892.0000	41.0	A	V			Z	MED.	32.8	6.1	33.0	0.0	0.0	46.8	-7.2	54.0	
4960.0000		A	H			X	HIGH	33.0	5.9	33.0	0.0				54.0	no reading found
4960.0000		A	H			Y	HIGH	33.0	5.9	33.0	0.0				54.0	no reading found
4960.0000		A	H			Z	HIGH	33.0	5.9	33.0	0.0				54.0	no reading found
4960.0000		A	V			X	HIGH	33.0	5.9	33.0	0.0				54.0	no reading found
4960.0000	42.8	A	V	1.0	0	Y	HIGH	33.0	5.9	33.0	0.0	0.0	48.6	-5.4	54.0	
4960.0000		A	V			Z	HIGH	33.0	5.9	33.0	0.0				54.0	no reading found

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

RADIATED EMISSIONS (FCC SECTION 15.249)

COMPANY	Interlink Electronics	DATE	11/30/04
EUT	Remote Control	DUTY CYCLE	13.79296316 %
MODEL	Pilot Pro (Bass)	PEAK TO AVG	-17.2068485 dB
S/N	1	TEST DIST.	3 Meters
TEST ENGINEER	Rey Ramirez	LAB	F

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)	Distance Factor (dB)	Mixer Factor (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
7209.0000		A	H			X	LOW	37.2	7.8	33.3	0.0				54.0	No Reading found after the
7209.0000		A	H			Y	LOW	37.2	7.8	33.3	0.0				54.0	2nd harmonic
7209.0000		A	H			Z	LOW	37.2	7.8	33.3	0.0				54.0	
7209.0000		A	V			X	LOW	37.2	7.8	33.3	0.0				54.0	
7209.0000		A	V			Y	LOW	37.2	7.8	33.3	0.0				54.0	
7209.0000		A	V			Z	LOW	37.2	7.8	33.3	0.0				54.0	
7338.0000		A	H			X	MED.	37.4	7.9	33.3	0.0				54.0	
7338.0000		A	H			Y	MED.	37.4	7.9	33.3	0.0				54.0	
7338.0000		A	H			Z	MED.	37.4	7.9	33.3	0.0				54.0	
7338.0000		A	V			X	MED.	37.4	7.9	33.3	0.0				54.0	
7338.0000		A	V			Y	MED.	37.4	7.9	33.3	0.0				54.0	
7338.0000		A	V			Z	MED.	37.4	7.9	33.3	0.0				54.0	
7440.0000		A	H			X	HIGH	37.7	8.0	33.3	0.0				54.0	
7440.0000		A	H			Y	HIGH	37.7	8.0	33.3	0.0				54.0	
7440.0000		A	H			Z	HIGH	37.7	8.0	33.3	0.0				54.0	
7440.0000		A	V			X	HIGH	37.7	8.0	33.3	0.0				54.0	
7440.0000		A	V			Y	HIGH	37.7	8.0	33.3	0.0				54.0	
7440.0000		A	V			Z	HIGH	37.7	8.0	33.3	0.0				54.0	

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

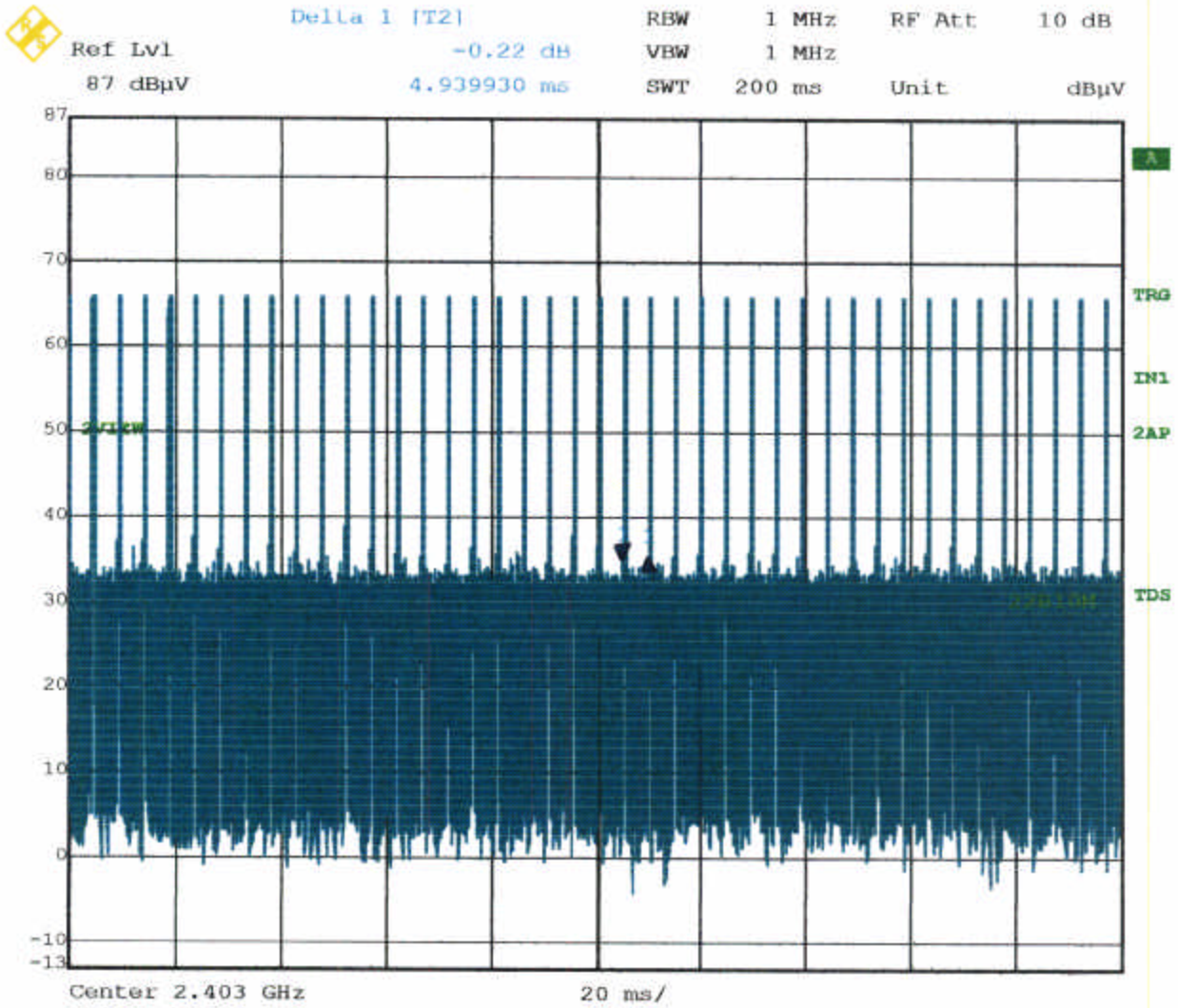
DUTY CYCLE CALCULATIONS

PULSE TRAIN = 4.939930 ms

PULSE WIDTH = 681.362725 ìs

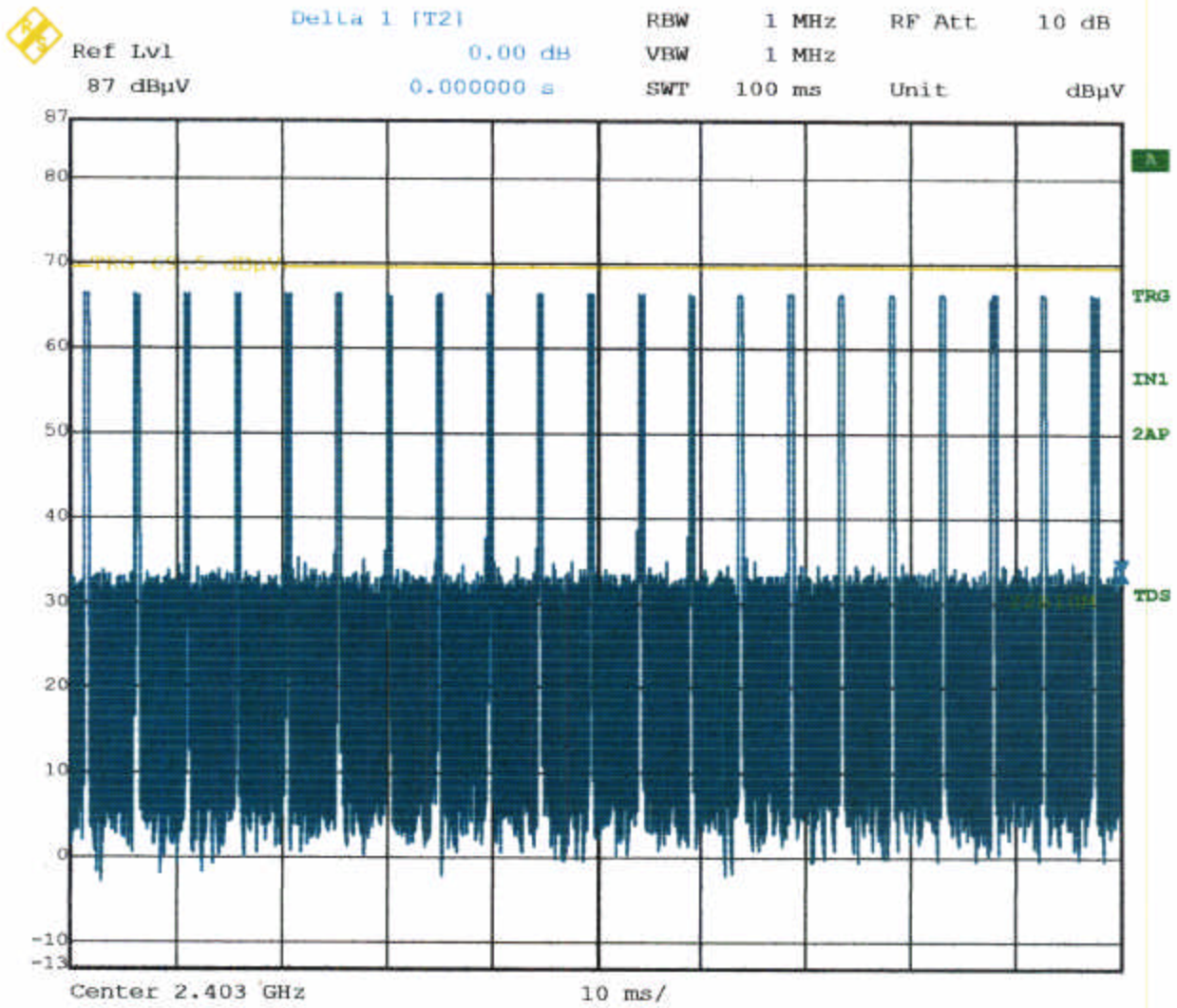
$$\frac{681.362725 \text{ ìs}}{4.939930 \text{ ms}} \times 100$$

DUTY CYCLE = 13.79296316 %



Date: 2.FEB.2005 15:11:57

lot #1 : pulse train



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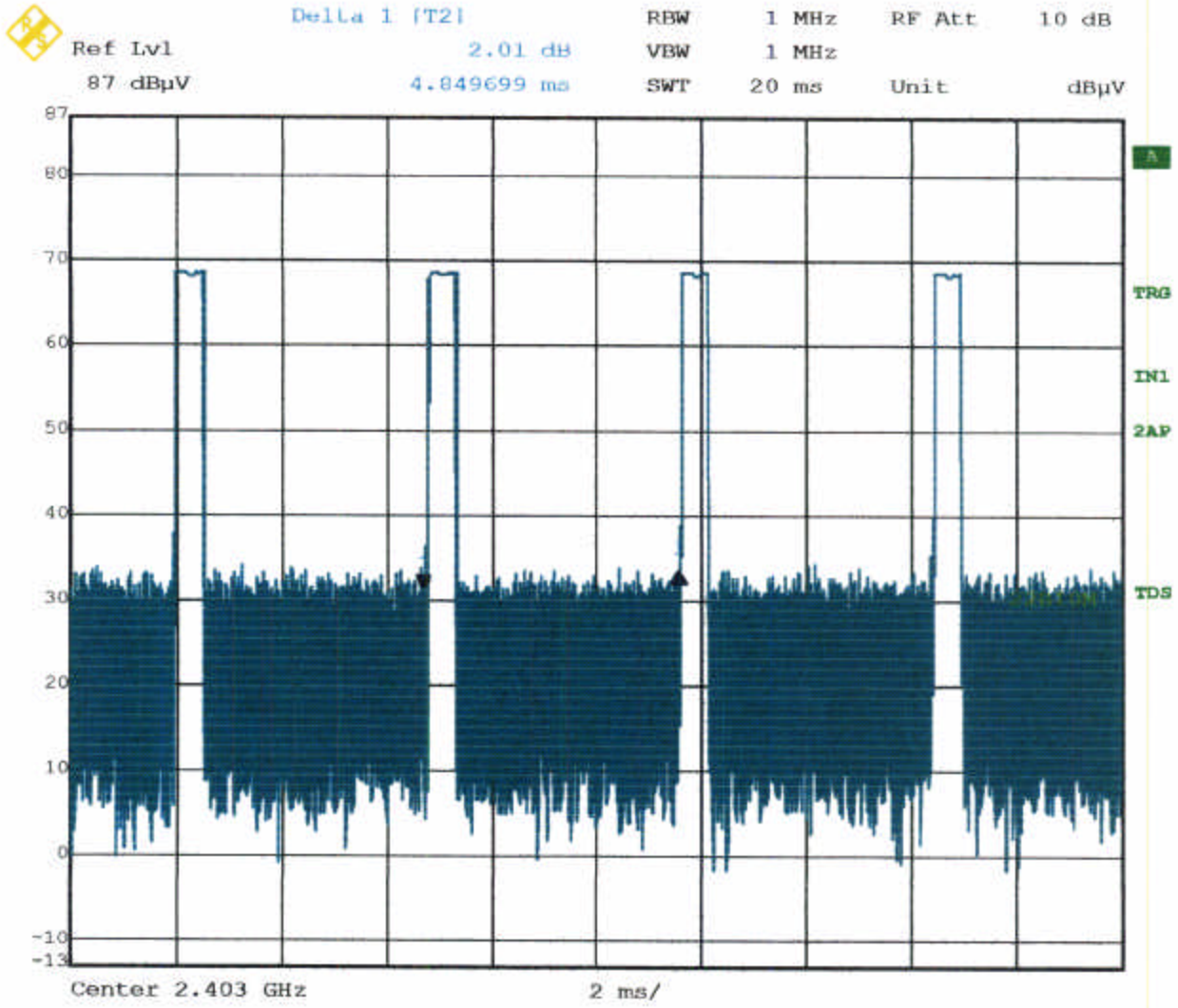
Plot #2: Set of pulses



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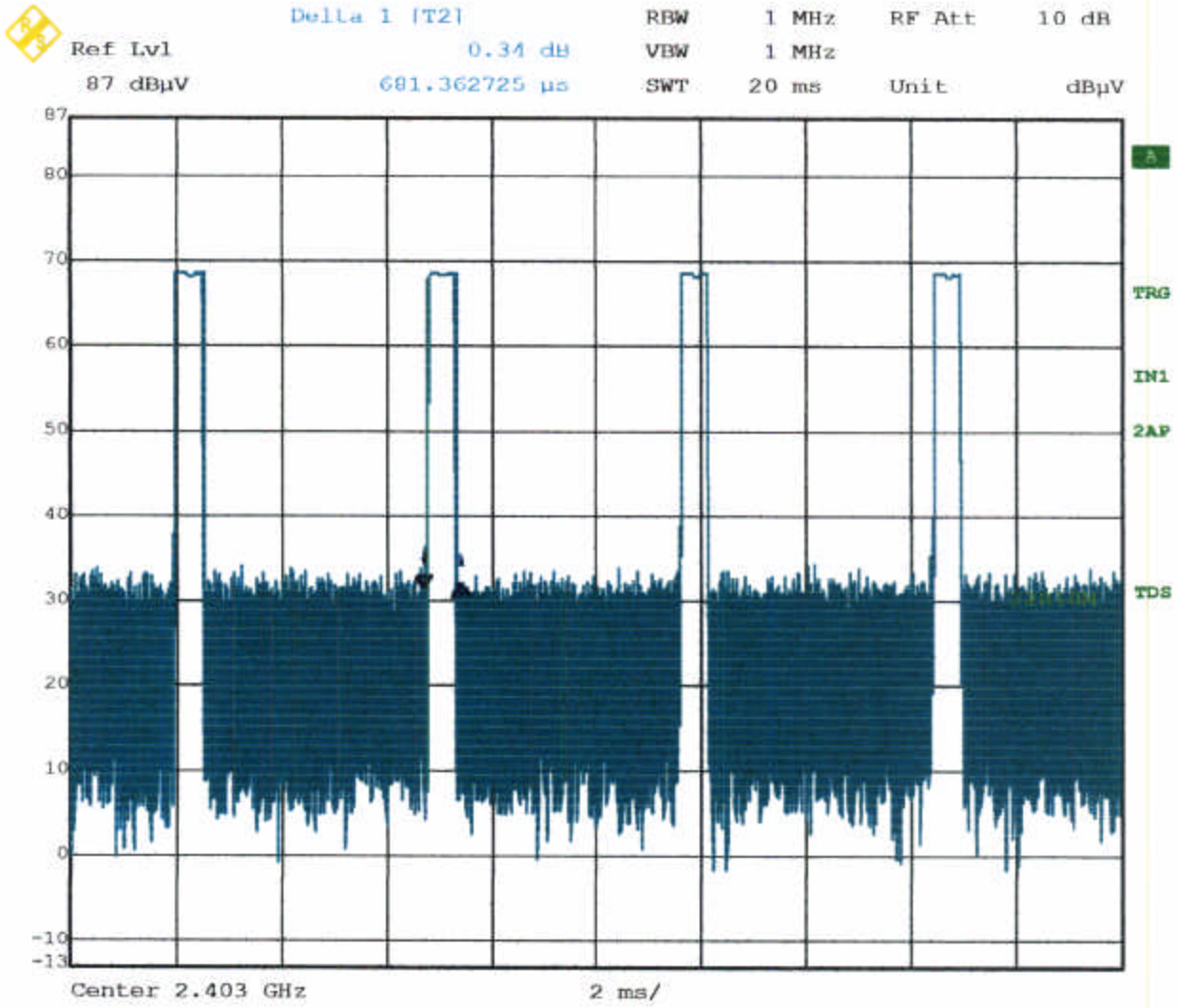
plot #3: set of pulses



Date: 2.FEB.2005 15:18:52

plot #4: pulse width

RADIATED EMISSIONS

COMPANY NAME: Interlink Electronics **DATE:** 12/1/04

EUT: Remote Control **EUT S/N:** 001

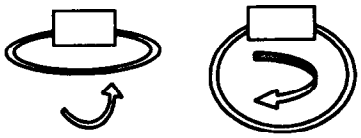
EUT MODEL: Pilot Pro (Bass) **LOCATION:** ☐ BREA ☐ SILVERADO ☑ AGOURA

SPECIFICATION: Fcc **CLASS:** B **TEST DISTANCE:** 3m **LAB:** F

ANTENNA: ☑ LOOP ☐ BICONICAL ☐ LOG ☐ HORN **POLARIZATION:** ☐ VERT ☐ HORIZ

☐ QUALIFICATION ☐ ENGINEERING ☐ MFG. AUDIT **ENGINEER:** R. Ramirez

NOTES: X, Y, Z axis



Pol. A Pol. B

Frequency (MHz)	Peak Reading (dBuV/m)	Quasi-Peak (dBuV/m)	Antenna Height (meters)	Azimuth (degrees)	Delta * (dB)	Corrected Limit (dBuV/m)	Comments
							no readings
							found from
							9KHz - 30MHz

* DELTA = METER READING - CORRECTED LIMIT

COMPATIBLE ELECTRONICS

Test Location : Compatible Electronics
Customer : Daniel Grieder
Manufacturer : Interlink Electronics
Eut name : Remote Control
Model : Pilot Pro (Bass) VP4650
Serial # : 001
Specification : FCC Pt. 15- Class B
Distance correction factor (20 * log(test/spec)) : 0.00
Test Mode : Qualification
temp: 50 Humid: 60%
Sr. Test Engineer: R. Ramirez
Spurious Emisions 30-1000MHz.

Page : 1/1
Date : 11/30/2004
Time : 03:51:50 PM
Lab : E
Test Distance : 3.00 Meters

Pol	Freq MHz	Reading dBuV	Cable loss dB	Antenna factor dB	Amplifier gain dB	Corr'd rdg = R dBuV/m	Limit = L dBuV/m	Delta R-L dB
1V	33.200	38.60	1.44	13.87	35.70	18.21	40.00	-21.79
2V	39.700	42.30	1.50	12.28	35.70	20.38	40.00	-19.62
3V	54.300	45.20	1.99	11.49	35.65	23.03	40.00	-16.97
4V	69.700	42.70	2.10	9.09	35.60	18.29	40.00	-21.71
5V	85.714	41.50	2.32	8.50	35.27	17.05	40.00	-22.95
6V	93.410	43.00	2.47	8.64	35.24	18.87	43.50	-24.63
7V	125.000	40.80	2.90	11.50	35.40	19.80	43.50	-23.70
8V	148.300	39.40	3.18	11.92	35.21	19.29	43.50	-24.21
9V	204.700	33.60	3.60	15.34	35.08	17.46	43.50	-26.04
10H	33.200	37.00	1.44	13.87	35.70	16.61	40.00	-23.39
11H	39.700	39.20	1.50	12.28	35.70	17.28	40.00	-22.72
12H	54.300	37.10	1.99	11.49	35.65	14.93	40.00	-25.07
13H	69.700	39.30	2.10	9.09	35.60	14.89	40.00	-25.11
14H	85.714	39.70	2.32	8.50	35.27	15.25	40.00	-24.75
15H	93.436	44.20	2.47	8.64	35.24	20.07	43.50	-23.43
16H	125.008	44.70	2.90	11.50	35.40	23.70	43.50	-19.80
17H	148.308	36.10	3.18	11.92	35.21	15.99	43.50	-27.51
18H	204.708	34.70	3.60	15.34	35.08	18.56	43.50	-24.94
19V	367.208	36.40	4.62	14.87	34.56	21.32	46.00	-24.68
20V	538.708	34.50	5.28	18.44	34.40	23.82	46.00	-22.18
21H	367.208	40.70	4.62	14.87	34.56	25.62	46.00	-20.38
22H	538.708	33.30	5.28	18.44	34.40	22.62	46.00	-23.38

No spurious emissions found above 500MHz.

RADIATED EMISSIONS

COMPANY NAME: Interlink Electronics **DATE:** 11/30/04

EUT: tx Remote Control **EUT S/N:** 001

EUT MODEL: VP 6450 **LOCATION:** ☐ BREA ☐ SILVERADO ☑ AGOURA

SPECIFICATION: FCC **CLASS:** B **TEST DISTANCE:** 3m **LAB:** F

ANTENNA: ☐ LOOP ☐ BICONICAL ☑ LOG ☑ HORN **POLARIZATION:** ☑ VERT ☑ HORIZ

☑ QUALIFICATION ☐ ENGINEERING ☐ MFG. AUDIT **ENGINEER:** R. Ramirez

NOTES:

Frequency (MHz)	Peak Reading (dBuV/m)	Quasi-Peak (dBuV/m)	Antenna Height (meters)	Azimuth (degrees)	Delta * (dB)	Corrected Limit (dBuV/m)	Comments
		No Spurious		emissions			
		found	from	1000 -	25.000	GHz.	

* DELTA = METER READING - CORRECTED LIMIT

COMPATIBLE ELECTRONICS

Test Location	:	Compatible Electronics	**Page**	:	1/1
Customer	:	Daniel Grieder	**Date**	:	11/30/2004
Manufacturer	:	Interlink Electronics	**Time**	:	01:06:11 PM
Eut name	:	Remote Control	**Lab**	:	E
Model	:	Pilot Pro (Bass) VP4650	**Test Distance**	:	3.00 Meters
Serial #	:	001			
Specification	:	FCC Pt. 15- Class B			
Distance correction factor (20 * log(test/spec))				:	0.00
Test Mode	:	Qualification temp: 50 Humid: 60% Sr. Test Engineer: R. Ramirez			

Pol	Freq MHz	Reading dBuV	Cable loss dB	Antenna factor dB	Amplifier gain dB	Corr'd rdg = R dBuV/m	Limit = L dBuV/m	Delta R-L dB
1H	2400.000	63.80	5.66	28.45	32.92	64.99	54.00	10.99
2H	2483.500	63.30	5.69	28.49	32.90	64.58	54.00	10.58

RADIATED EMISSIONS

COMPANY NAME: Interlink Electronics **DATE:** 11/30/04

EUT: Remote Control **EUT S/N:** 001

EUT MODEL: Pilot Pro VP4650 **LOCATION:** ☐ BREA ☐ SILVERADO ☑ AGOURA

SPECIFICATION: FCC **CLASS:** B **TEST DISTANCE:** _____ **LAB:** F

ANTENNA: ☐ LOOP ☐ BICONICAL ☐ LOG ☑ HORN **POLARIZATION:** ☐ VERT ☑ HORIZ

☑ QUALIFICATION ☐ ENGINEERING ☐ MFG. AUDIT **ENGINEER:** R. Ramirez

NOTES: Duty Cycle: 13.79291631b
Peak to Avg.: -17.20685

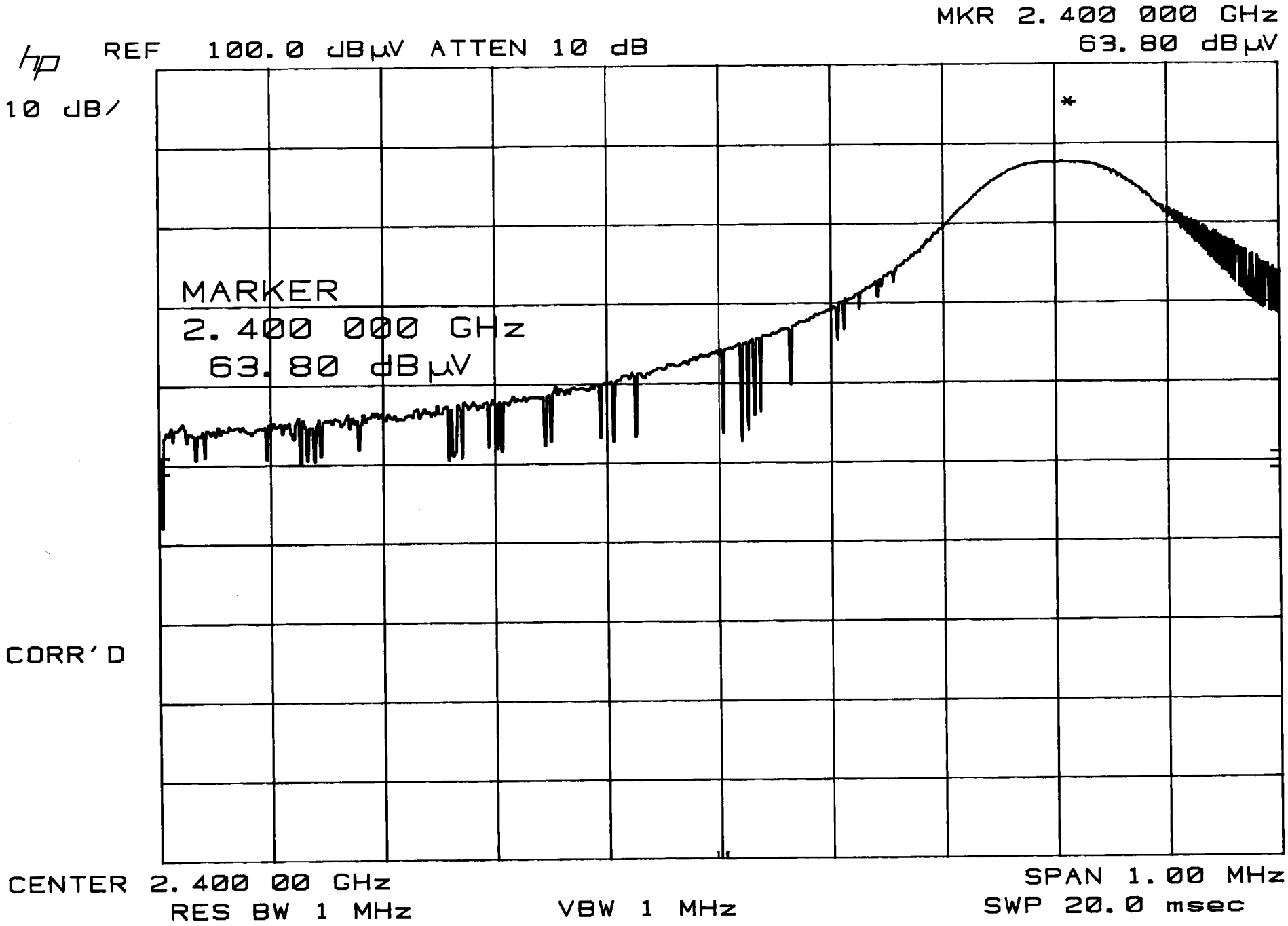
Corr'd

BANDEDGE READINGS

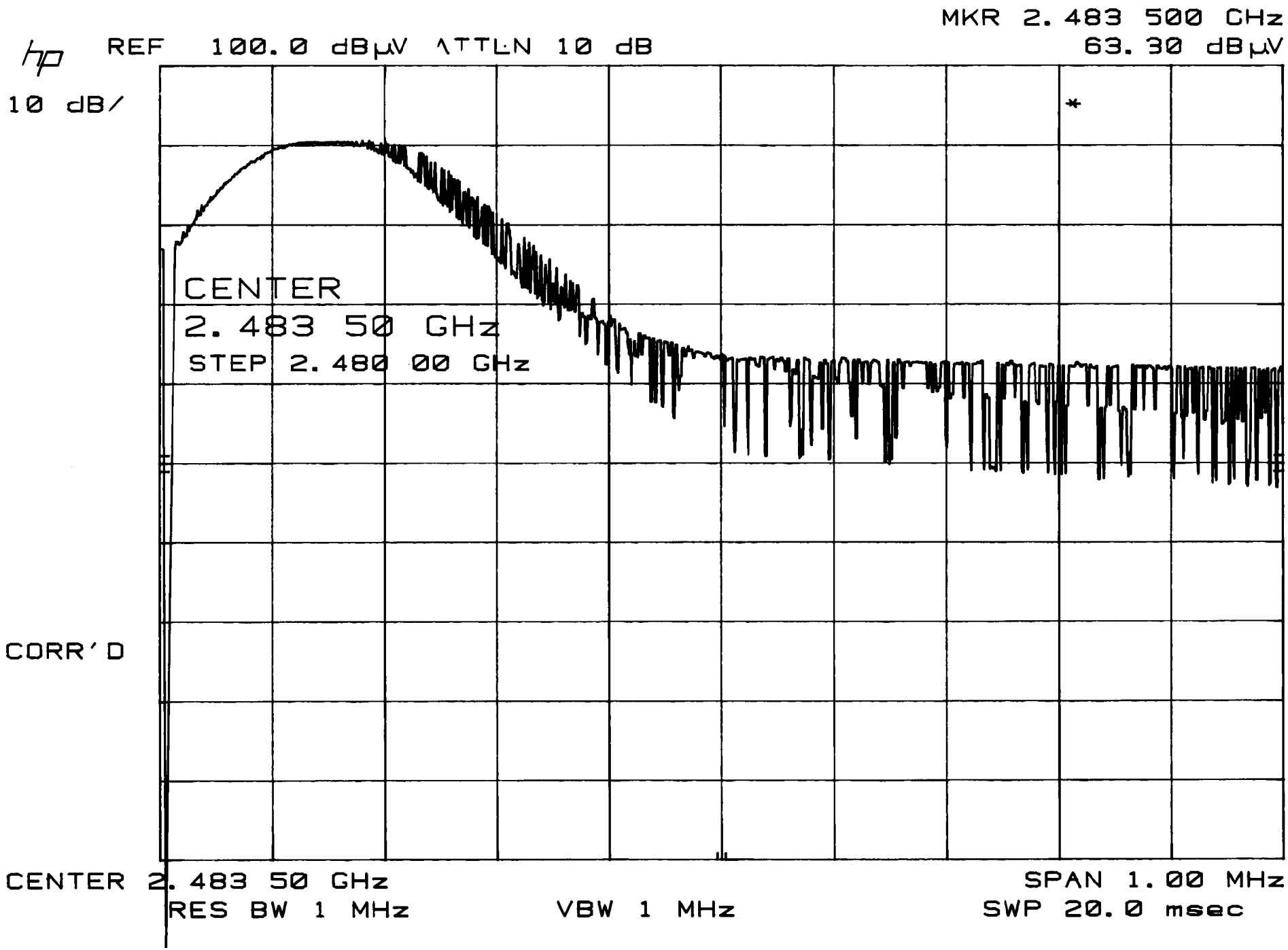
Frequency (MHz)	Peak Reading (dBuV/m)	Quasi-Peak (dBuV/m)	Antenna Height (meters)	Azimuth (degrees)	Delta * (dB)	Corrected Limit (dBuV/m)	Comments
2400.00	64.99				10.99	54.00	
2400.00	47.78				-6.21	54.00	w/ Peak to Avg.
2483.500	64.58				10.58	54.00	
2483.500	47.37				-6.62	54.00	w/ Peak to Avg.

* DELTA = METER READING - CORRECTED LIMIT

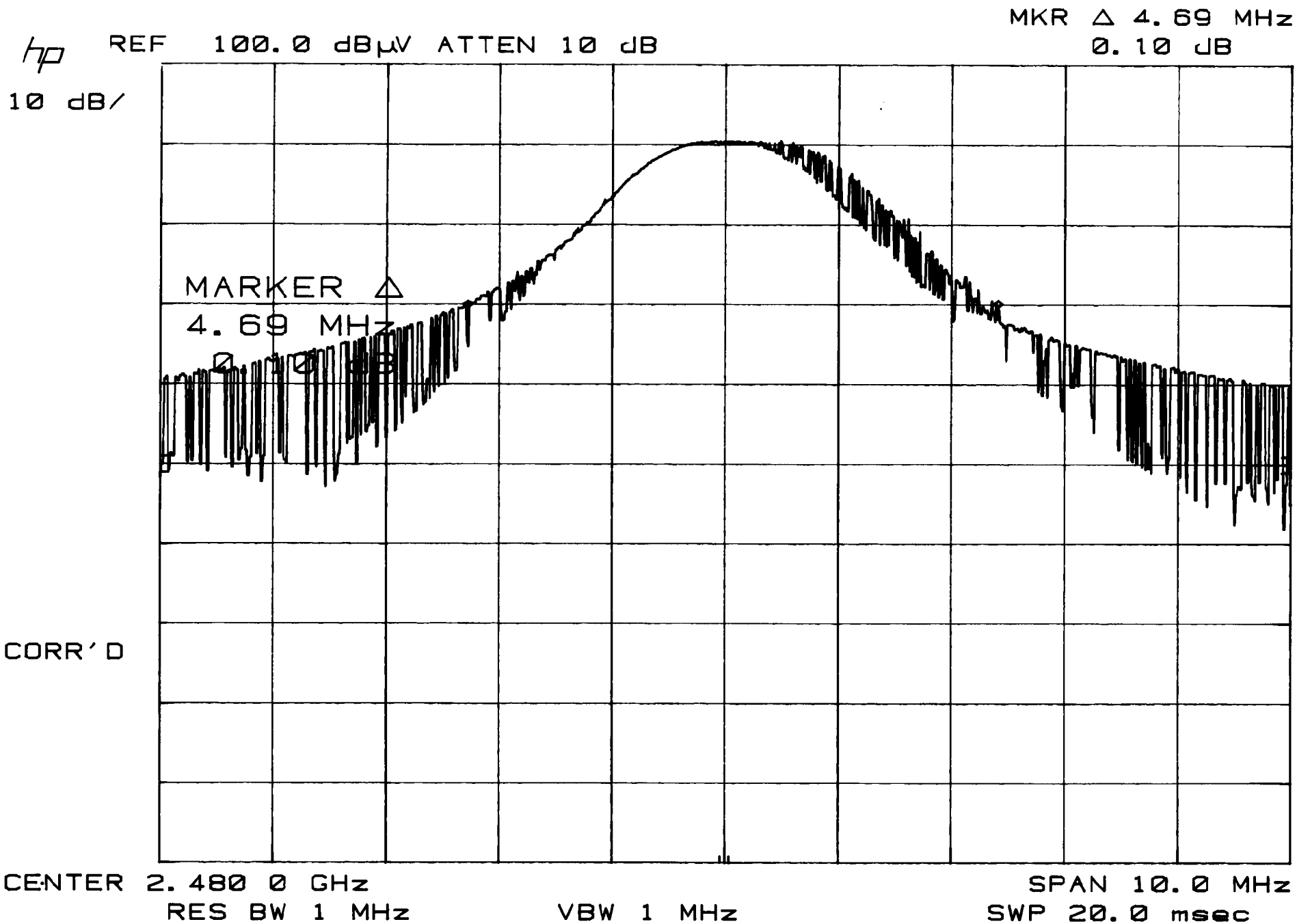
Lower Band Edge



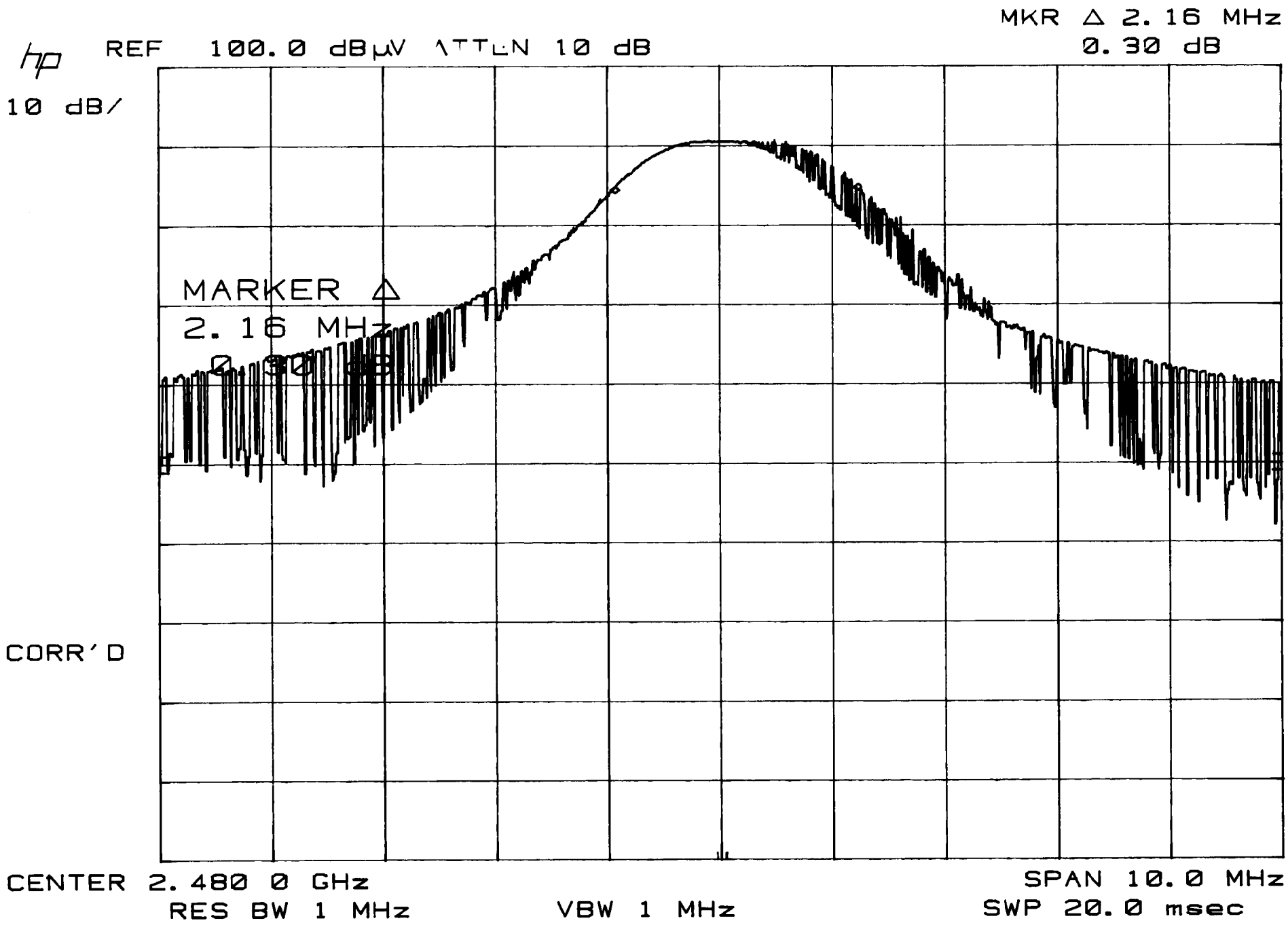
Upper Band Edge



20 dB BW


MKR Δ 4.69 MHz
0.10 dB
REF 100.0 dBμV ATTEN 10 dB
10 dB/
MARKER Δ
4.69 MHz
0.00 dB
CORR'D
CENTER 2.480 0 GHz
SPAN 10.0 MHz
RES BW 1 MHz
VBW 1 MHz
SWP 20.0 msec

6 dB BW


MKR Δ 2.16 MHz
0.30 dB
REF 100.0 dBμV ATTEN 10 dB
10 dB/
MARKER Δ
2.16 MHz
0.30 dB
CORR'D
CENTER 2.480 0 GHz
RES BW 1 MHz
VBW 1 MHz
SPAN 10.0 MHz
SWP 20.0 msec