

*EXHIBIT D*

CKC TEST REPORT



FCC ID:  
JQ653XV

**CERTIFICATION TEST REPORT**

**FOR THE**

**PROXIMITY READERS  
5365C/8C MINIPROX & 5395C/8C THINLINE II  
REV. D ELECTRONICS BOARD**

**FCC PART 15, SUBPART C**

**DATE OF ISSUE: APRIL 16, 1998**

**PREPARED FOR:**

HID Corporation  
9292 Jeronimo Road  
Irvine, CA 92618-1905

**PREPARED BY:**

Monika Lopez  
CKC Laboratories, Inc.  
5473A Clouds Rest  
Mariposa, CA 95338

P.O. No: 1737

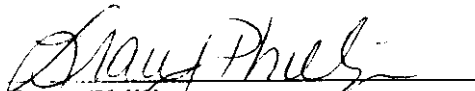
W.O. No: 67990


Report No: **FC98-002**

Date of test: January 20, 1998

**APPROVED BY:**

**DOCUMENTATION CONTROL:**

  
Tracy Phillips

  
Dennis Ward  
Director of Laboratories  
CKC Laboratories

This report contains a total of 26 pages and may be reproduced in full only. Partial reproduction may only be done with the consent of CKC Laboratories, Inc.

**TABLE OF CONTENTS**

Administrative Information .....3  
 Summary Of Results .....4  
 Equipment Under Test (EUT) Description .....4  
 Measurement Uncertainty .....4  
 Peripheral Devices .....4  
 Report Of Measurements .....5  
     Table 1: Six Highest Radiated Emission Levels .....5  
 Table A : List Of Test Equipment .....6  
 EUT Setup .....7  
 Test Instrumentation And Analyzer Settings .....7  
     Table B : Analyzer Bandwidth Settings Per Frequency Range .....7  
     Spectrum Analyzer Detector Functions .....8  
         Peak .....8  
         Quasi-Peak .....8  
         Average .....8  
 Test Methods .....9  
     Radiated Emissions Testing .....9  
     Power Output .....10  
 Sample Calculations .....10  
 Appendix A : Information About The Equipment Under Test .....11  
     I/O Ports .....12  
     Crystal Oscillators .....12  
     Printed Circuit Boards .....12  
     Required EUT Changes To Comply .....12  
     Cable Information .....13  
     Photograph Showing Radiated Emissions .....14  
     Photograph Showing Conducted Emissions .....15  
     Photograph Showing Radiated Emissions .....16  
     Photograph Showing Conducted Emissions .....17  
 Appendix B : Measurement Data Sheets .....18  
 Extrapolation Plot .....21  
 Extrapolation Plot .....22  
 Occupied Bandwidth Plot 15.215(c) .....23  
 Occupied Bandwidth Plot 15.215(c) .....24  
 Occupied Bandwidth Plot 15.215(c) .....25  
 Occupied Bandwidth Plot 15.215(c) .....26

**ADMINISTRATIVE INFORMATION**

**DATE OF TEST:** January 20, 1998

**PURPOSE OF TEST:** To demonstrate the compliance of the Proximity Readers, 5365C/8C MiniProx & 5395C/8C ThinLine II Rev. D Electronics Board, with the requirements of FCC Part 15, Subpart C devices.

**MANUFACTURER:** HID Corporation  
 9292 Jeronimo Road  
 Irvine, CA 92618-1905

**REPRESENTATIVE:** Frank de Vall

**TEST LOCATION:** CKC Laboratories, Inc.  
 5473A Clouds Rest  
 Mariposa, CA 95338

**TEST PERSONNEL:** Dustin Oaks

**TEST METHOD:** ANSI C63.4 1992

**FREQUENCY RANGE TESTED:** 10 kHz - 1000 MHz

**EQUIPMENT UNDER TEST:**

**5395C/8C ThinLine II Rev. D  
 Electronics Board**

Manuf: HID  
 Model: 5365C/8C  
 Serial: Unit#1  
 FCC ID: JQ653XX (Pending)

**5395C/8C ThinLine II Rev. D  
 Electronics Board**

Manuf: HID  
 Model: 5395C/8C  
 Serial: Unit#2  
 FCC ID: JQ653XX (Pending)

## SUMMARY OF RESULTS

The HID Corporation Proximity Readers, 5365C/8C MiniProx & 5395C/8C ThinLine II Rev. D Electronics Board, were tested in accordance with ANSI C63.4 1992 for compliance with the requirements of Part 15, Subpart C of the FCC Rules.

As received, the above equipment was found to be fully compliant with the limits of FCC Part 15, Subpart C.

### EQUIPMENT UNDER TEST (EUT) DESCRIPTION

125 kHz RF ID Proximity Reader for use with passive transponders.

### MEASUREMENT UNCERTAINTY

Associated with data in this report is a  $\pm 4$ dB measurement uncertainty.

### PERIPHERAL DEVICES

The EUT was tested with the following peripheral device:

#### Power Supply

Manuf: HP  
Model: 6205C  
Serial: 2228A-0775

### REPORT OF MEASUREMENTS

The following Table 1 reports the six highest radiated emissions levels recorded during the tests performed on the Proximity Readers, 5365C/8C MiniProx & 5395C/8C ThinLine II Rev. D Electronics Board. The data sheets from which this table was compiled are contained in Appendix B.

**Table 1: Six Highest Radiated Emission Levels**

FREQUENCY MHz	METER READING dB $\mu$ V	CORRECTION FACTORS				CORRECTED READING dB $\mu$ V/m	SPEC LIMIT dB $\mu$ V/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB	Dist dB				
62.590	38.4	8.7	-27.4	1.7		21.4	40.0	-18.6	V
132.185	43.0	11.9	-28.1	2.5		29.3	43.5	-14.2	V
165.962	37.2	14.5	-27.2	2.9		27.4	43.5	-16.1	V
177.750	32.7	16.3	-27.1	3.0		24.9	43.5	-18.6	V
204.565	32.2	17.2	-27.0	3.3		25.7	43.5	-17.8	V
255.162	32.3	16.0	-26.7	3.7		25.3	46.0	-20.7	V

Test Method: ANSI C63.4 1992  
Spec Limit : 15.209  
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization  
V = Vertical Polarization  
N = No Polarization  
D = Dipole Reading  
Q = Quasi Peak Reading  
A = Average Reading

COMMENTS: EUT's are the 5365C/8C MiniProx & 5395C/8C ThinLine II Rev. D Electronics Board. EUT's operating on 12VDC. EUT's operating IAW manufacturer's instructions. Testing IAW FCC 15.209. Frequency range tested from 10kHz to 1000MHz. No signals found below 30MHz.

**TABLE A**

**LIST OF TEST EQUIPMENT**

**VCCI Acceptance No. R-565 & C-580**  
**This equipment is calibrated at regular intervals.**

1. Spectrum Analyzer, Hewlett Packard, Model No. 85662A, S/N 2403A08241.
2. Preamp, Hewlett Packard, Model No. 8447D, S/N -1937A02604.
3. Quasi-Peak Adapter, Hewlett Packard, Model No. 85650A, S/N 2811A01267
4. Biconical Antenna, A & H Systems, Model No. SAS-200/542, S/N 156.
5. Log Periodic Antenna, A & H Systems, Model No. SAS-200/512, S/N 154.
6. Magnetic Loop Antenna, EMCO, Model No. 6502, S/N 1074.
7. Horn Antenna, EMCO, Model No. 3115, S/N 4683.
8. LISN (FCC), Solar Electronics, S/N 855996, 992
9. LISN, Solar Electronics, S/N 8144793, 474.
10. Site B (Barn) Calibration date: April 22, 1997. Site B (Barn) Calibration due date: April 22, 1998.
11. Test software, EMI Test 2.86.

**EUT SETUP**

The equipment under test (EUT) and the peripheral listed were setup in a manner that represented their normal use. Any special conditions required for the EUT to operate normally are identified in the comments that accompany Table 1 for radiated emissions. Additionally, a complete description of the port and I/O cable is included on the information sheets contained in Appendix A.

During radiated emissions testing, the EUT was mounted on a nonconductive, rotating table 1 meter above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters. This configuration is typical for radiated emissions testing of table top devices.

The line cable was connected to the EUT and peripheral in the manner required for normal operation of the system.

**TEST INSTRUMENTATION AND ANALYZER SETTINGS**

The test instrumentation and equipment listed in Table A were used to collect the radiated emissions data for the Proximity Readers, 5365C/8C MiniProx & 5395C/8C ThinLine II Rev. D Electronics Board. For radiated measurements below 30 MHz, the magnetic loop antenna was used. For frequencies from 30 to 300 MHz, the biconical antenna was used. For frequencies from 300 to 1000 MHz, the log periodic antenna was used. All antennas were located at a distance of 3 meters from the edge of the EUT.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dB $\mu$ V, and a vertical scale of 10 dB per division.

**TABLE B : ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE**

TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
RADIATED EMISSIONS	10 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz



## SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in Table 1 indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the six highest readings, this is indicated as a "Q" or an "A" in Table 1. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data for the Proximity Readers, 5365C/8C MiniProx & 5395C/8C ThinLine II Rev. D Electronics Board.

### Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

### Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP 85650A Quasi-Peak Adapter for the HP 8568B Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

### Average

When the frequencies exceed 1 GHz, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

## TEST METHODS

The radiated emissions data of the Proximity Readers, 5365C/8C MiniProx & 5395C/8C ThinLine II Rev. D Electronics Board, was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the "Sample Calculations". The corrected data was then compared to the FCC Part 15, Subpart C emissions limits to determine compliance.

Preliminary and final measurements were taken in order to better ensure that all emissions from the EUT were found and maximized.

### Radiated Emissions Testing

During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode with the line cord facing the antenna. The frequency range of 10 kHz to 30 MHz was scanned with the magnetic loop antenna. The frequency range of 30 MHz - 88 MHz was then scanned with the biconical antenna located about 1.5 meter above the ground plane in the vertical configuration. During this scan, the turntable was rotated and all peaks which were at or near the limit were recorded. The frequency range of 100 - 300 MHz was scanned with the biconical antenna in the same manner, and the peaks recorded. Lastly, a scan of the FM band from 88 - 110 MHz was made, using a reduced resolution bandwidth and a reduced frequency span. The biconical antenna was changed to the horizontal polarity and the above steps were repeated. After changing to the log periodic antenna in the horizontal configuration, the frequency range of 300 - 1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 - 1000 MHz was again scanned. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

For the final radiated scan, the equipment was again positioned with its line cord cable facing the antenna. A thorough scan of all frequencies was manually made using a small frequency span, rotating the turntable as needed. Comparison with the previously recorded measurements was then made.

Using the peak readings from both scans as a guide, the test engineer then maximized the readings with respect to the table rotation, antenna height and configuration of the peripheral and cable. Maximizing of the cable was achieved by monitoring the spectrum analyzer on a closed circuit television monitor while the EUT cable was being moved and rearranged on the EUT table for maximum emissions. Photographs showing the final worst case configuration of the EUT are contained in Appendix A.

### Power Output Measurement

At a test distance of 3 meters, the maximum ERP of these transmitters was measured at 99.1 dBuV/m for the 5365C/8C MiniProx Rev. D Electronic Board and 98.0 dBuV/m for the 5395C/8C ThinLine II Rev. D Electronic Board (in a 50 ohm system). This measurement was made with the EUT's integral antenna, for there is no provision for connecting an external antenna.

### SAMPLE CALCULATIONS

The basic spectrum analyzer reading was converted using correction factors as shown in the six highest emissions readings in Table 1. For radiated emissions in dB $\mu$ V/m, the spectrum analyzer reading in dB $\mu$ V was corrected by using the following formula:

$$\begin{aligned} & \text{Meter reading (dB}\mu\text{V)} \\ & + \text{Antenna Factor (dB)} \\ & + \text{Cable Loss (dB)} \\ & - \text{Distance Correction (dB)} \\ & - \text{Pre-amplifier Gain (dB)} \\ & = \text{Corrected Reading (dB}\mu\text{V/m)} \end{aligned}$$

This reading was then compared to the applicable specification limit to determine compliance.

**APPENDIX A**  
**INFORMATION ABOUT THE EQUIPMENT UNDER TEST**

**INFORMATION ABOUT THE EQUIPMENT UNDER TEST**

Power Supply Manufacturer: | Customer Supplied

DC Power Cord for the MiniProx with terminal strip is shielded and removable.  
 DC Power Cord for the MiniProx & ThinLine II with Pig Tail is shielded and Unremovable

Line voltage used during testing is 12 VDC

**I/O PORTS**

Type	#
DC Power & Signals	1

**CRYSTAL OSCILLATORS**

Type	Freq. In MHz
Ceramic Resonator	4.0

**PRINTED CIRCUIT BOARDS**

Function	Model & Rev	Clocks, MHz	Layers	Location
All Electronics	Rev. D	4.0 MHz	4	

**REQUIRED EUT CHANGES TO COMPLY:**

None.

**CABLE INFORMATION**

Cable #:	1	Cable(s) of this type:	1
Cable Type:	Shielded Multi Conductor	Shield Type:	Foil with Drain Wire
Construction:	Round	Length In Meters:	Up to 152 meters (2 meter test length)
Connected To End (1):	Reader	Connected To End (2):	DC Supply & Controller
Connector At End (1):	None	Connector At End (2):	None
Shield Grounded At (1):	Shield Ground	Shield Grounded At (2):	NC
Part Number:		Number of Conductors:	10
Notes:			

Cable Routing For Worst Case Emissions:  
 Cable length only allows routing as shown in photograph.

**APPENDIX B**  
**MEASUREMENT DATA SHEETS**

Test Location: CKC Laboratories, Inc. • 5473 A Clouds Rest Rd • Mariposa, CA 95338 • (209) 966-5240

Customer:	<b>HID</b>	Date:	Mar-19-98
Specification:	<b>FCC 15 C PARA 15.209</b>	Time:	16:30
Test Type:	<b>Maximized Emissions</b>	Sequence#:	31
Equipment:	<b>Am Reader</b>	Tested By:	Dustin Oaks
Manufacturer:	HID		
Model:	5365/8C		
S/N:	Unit#3		

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Am Reader*	HID	5365/8C	Unit#3

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Supply	HP	6205C	2228A-0775

**Test Conditions / Notes:**

EUT's operating on 12VDC. EUT's operating IAW manufacturer's instructions. Testing IAW FCC 15.209. Frequency range tested from 10kHz to 1000MHz. No signals found below 30MHz.

**Measurement Data:**

Sorted by Margin

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	Pream			Bicon		10mtr		Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar
			dB	dB	dB	dB	dB	dB						
1	132.185	43.0	-28.1	+11.9			+2.5	+0.0	29.3	43.5	-14.2	Vert		
2	165.962	37.2	-27.2	+14.5			+2.9	+0.0	27.4	43.5	-16.1	Vert		
3	204.565	32.2	-27.0	+17.2			+3.3	+0.0	25.7	43.5	-17.8	Vert		
4	177.750	32.7	-27.1	+16.3			+3.0	+0.0	24.9	43.5	-18.6	Vert		
5	62.590	38.4	-27.4	+8.7			+1.7	+0.0	21.4	40.0	-18.6	Vert		
6	255.162	32.3	-26.7	+16.0			+3.7	+0.0	25.3	46.0	-20.7	Vert		
7	108.950	31.3	-27.3	+13.1			+2.4	+0.0	19.5	43.5	-24.0	Vert		



Test Location: CKC Laboratories, Inc. • 5473 A Clouds Rest Rd • Mariposa, CA 95338 • (209) 966-5240

Customer: **HID**  
 Specification: **FCC 15 C PARA 15.209**  
 Test Type: **Maximized Emissions**  
 Equipment: **Am Reader**  
 Manufacturer: **HID**  
 Model: **5395/8C**  
 S/N: **Unit#4**

Date: Mar-19-98  
 Time: 16:31  
 Sequence#: 33

Tested By: Dustin Oaks

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Am Reader*	HID	5395/8C	Unit#4

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Supply	HP	6205C	2228A-0775

**Test Conditions / Notes:**

EUT's operating on 12VDC. EUT's operating IAW manufacturer's instructions. Testing IAW FCC 15.209. Frequency range tested from 10kHz to 1000MHz. No signals found below 30MHz.

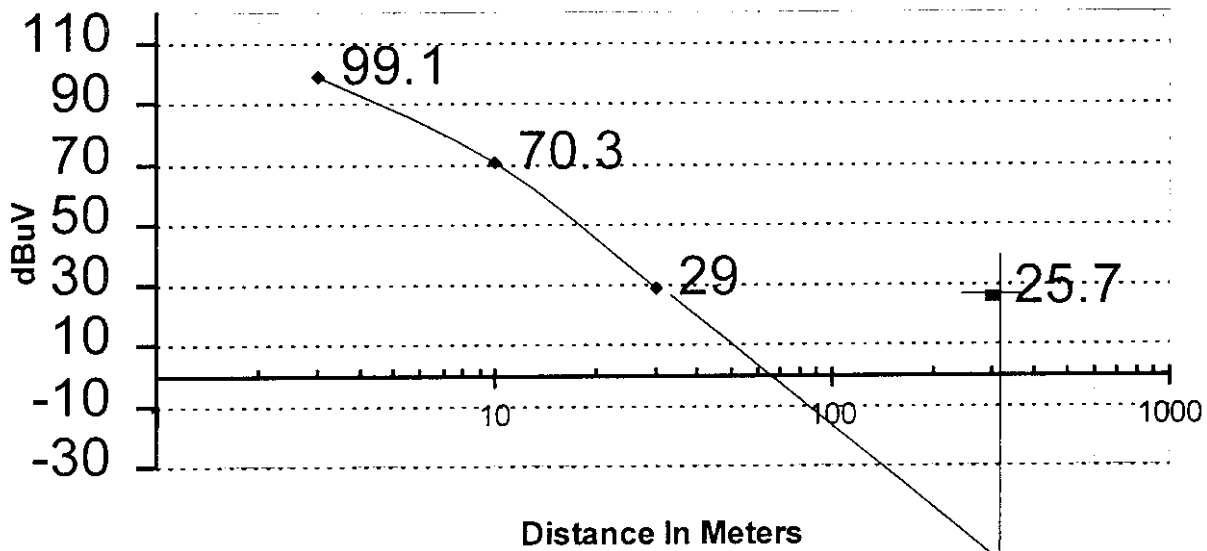
**Measurement Data:**

Sorted by Margin

Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Pream Bicon			10mtr		Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
			dB	dB	dB	dB	dB					
1	132.185	43.0	-28.1	+11.9		+2.5	+0.0	29.3	43.5	-14.2	Vert	
2	165.962	37.2	-27.2	+14.5		+2.9	+0.0	27.4	43.5	-16.1	Vert	
3	204.565	32.2	-27.0	+17.2		+3.3	+0.0	25.7	43.5	-17.8	Vert	
4	177.750	32.7	-27.1	+16.3		+3.0	+0.0	24.9	43.5	-18.6	Vert	
5	62.590	38.4	-27.4	+8.7		+1.7	+0.0	21.4	40.0	-18.6	Vert	
6	255.162	32.3	-26.7	+16.0		+3.7	+0.0	25.3	46.0	-20.7	Vert	
7	108.950	31.3	-27.3	+13.1		+2.4	+0.0	19.5	43.5	-24.0	Vert	

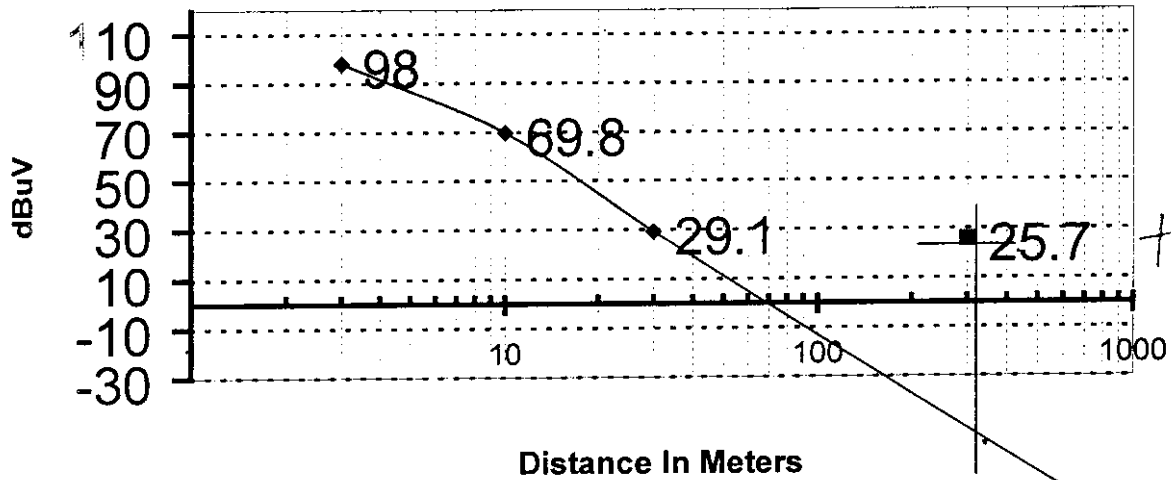
## Extrapolation Plot Model 5365C/8C MiniProx With Rev. D Electronics Board



Test Distance (meters)	Reading (dBuV)
3	99.1
10	70.3
30	29.0 (Ambient Signal)

$$\begin{aligned}
 \text{Spec Limit @ 300 Meters} &= 2400/F(\text{kHz}) \\
 &= (2400/125) \\
 &= (\log 19.2) * 20 \\
 &= 25.7
 \end{aligned}$$

**Extrapolation Plot  
 Model 5395C/8C ThinLine II  
 With Rev. D Electronics Board**

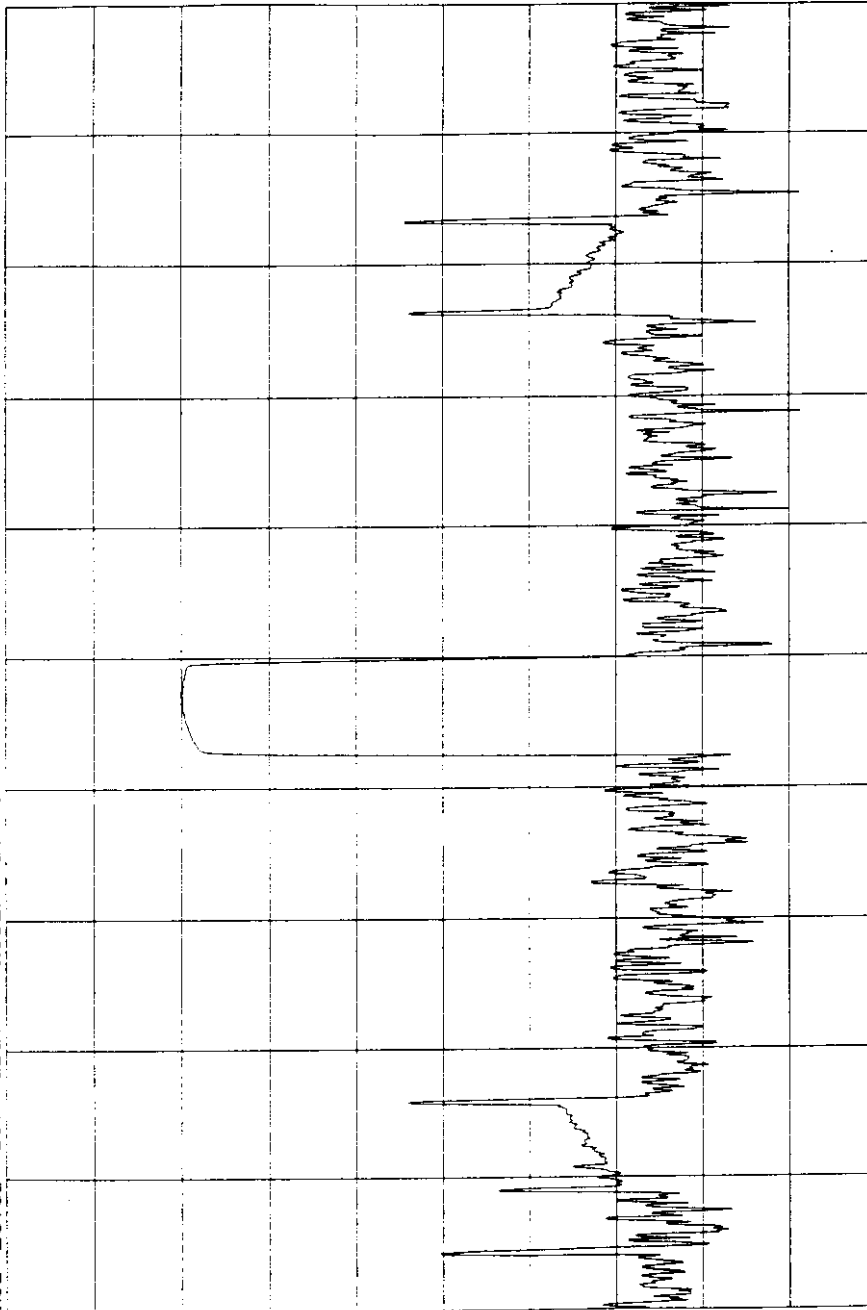


Test Distance (meters)	Reading (dBuV)
3	98.0
10	69.8
30	29.1 (Ambient Signal)

Spec Limit @ 300 Meters =  $2400/F(\text{kHz})$   
 =  $(2400/125)$   
 =  $(\log 19.2) * 20$   
 = **25.7**

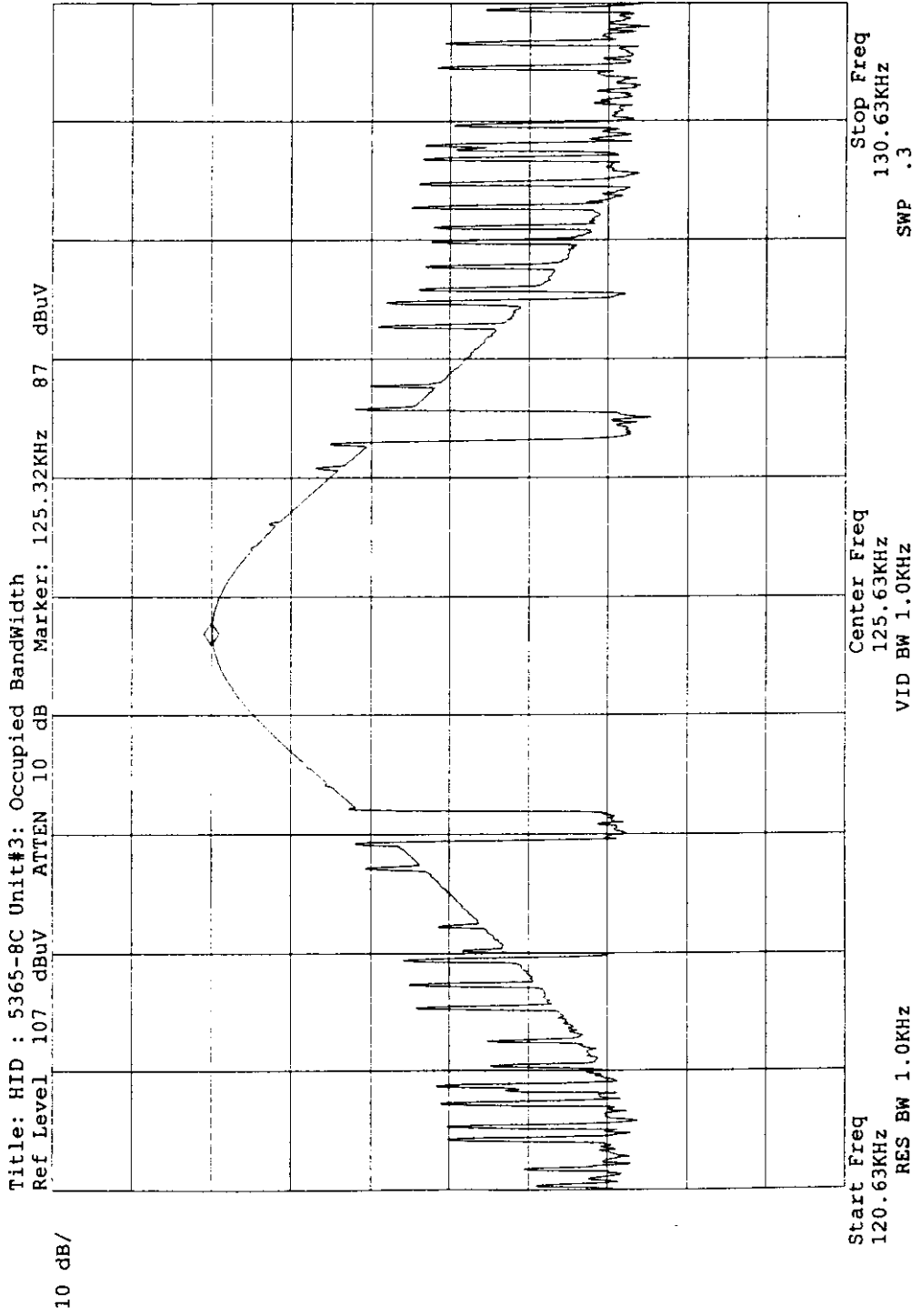


Title: HID : 5365-8C Unit#3: Occupied Bandwidth  
Ref Level 107 dBuV ATTN 10 dB



10 dB/

Start Freq 120.63KHz RES BW 1.0KHz  
Center Freq 125.63KHz VID BW 1.0KHz  
Stop Freq 130.63KHz SWP .3



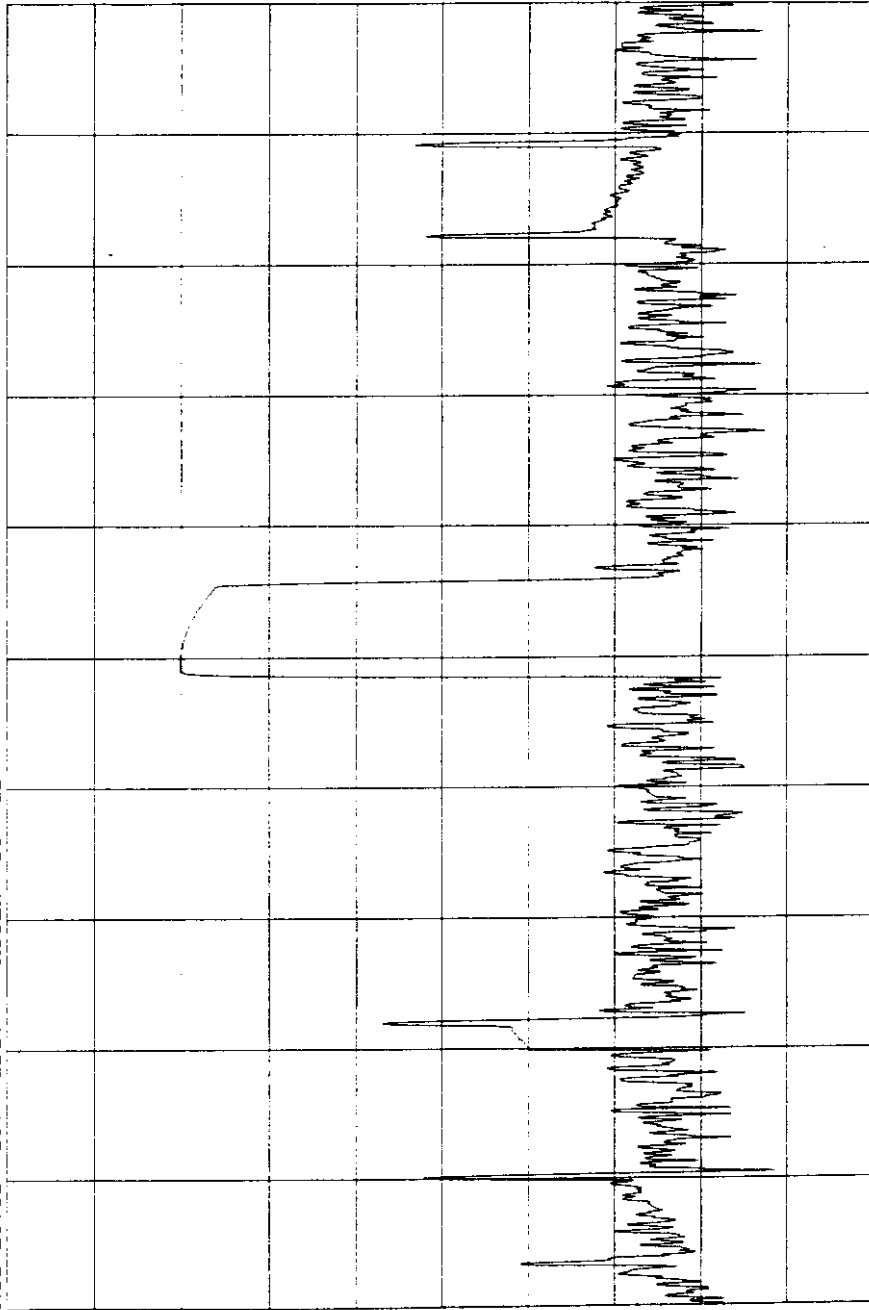


Testing the Future

LABORATORIES, INC.

Title: HID : 5395-8C Unit#4: Occupied Bandwidth  
Ref Level 107 dBuV ATTEN 10 dB

10 dB/



Start Freq  
120.67KHz  
RES BW 1.0KHz

Center Freq  
125.675KHz  
VID BW 1.0KHz

Stop Freq  
130.66KHz  
SWP .3

