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EMI TEST REPORT
for
CERTIFICATION
to
FCC PART 15.235 TRANSMITTER

FCC ID: O7B-BIRDDETER49

Manufacturer: BirdDeter Pty. Ltd.
Test Sample: 49 MHz BirdDeter Transmitter

Report Number: M000763A-Tx

Date: 18th January 2001

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This Laboratory is accredited by the National Association of Testing Authorities, Australia. The tests reported herein have been performed in accordance with its terms of accreditation for FCC Part 15.

EMI TEST REPORT FOR CERTIFICATION TO FCC PART 15.235 TRANSMITTER FCC ID: O7B-BIRDDETER49

CERTIFICATION of COMPLIANCE with FCC PART 15 REGULATIONS.
EMC Technologies Report Number: M000763A-TX
Date:18 th January 2001

CONTENTS

EMI TEST REPORT FOR CERTIFICATION TO FCC PART 15.235 TRANSMITTER

Report Number: M000763A-TX

Test Sample: **49 MHz BirdDeter Transmitter**

FCC ID: O7B-BIRDDETER49

Manufacturer: BirdDeter Pty. Ltd.
PO Box 1056, Warwick, Queensland 4370 Australia
Phone: + 61(7) 4667 0491
Fax: + 61(7) 4667 0493

Responsible Party: John Muehlebach
Technical Manager
BirdDeter Pty. Ltd.

Equipment Type: Intentional Radiator, Low Power Transmitter

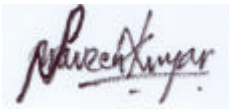
Test Standards: FCC Part 15 Section 235 Intentional Radiators.
ANSI C63.4-1992
OET Bulletin No. 63, October 1993

Tested for: BirdDeter Pty. Ltd.

Test Dates: 24th July 2000

Test Officer: Praveen Rao

Attestation: *I hereby certify that the device(s) described herein were tested as described in this report and that the data included is that which was obtained during such testing.*



Authorised Signature: **Praveen Rao**
EMC Technologies Pty Ltd

EMI TEST REPORT FOR CERTIFICATION
to
FCC PART 15.235 REQUIREMENTS
on the
49 MHz BirdDeter Transmitter

1.0 SUMMARY of RESULTS.

This report details the results of EMI tests and measurements performed on the **49 MHz BirdDeter Transmitter (non-home built)** in accordance with the Federal Communications Commission (FCC) regulations as detailed in **Title 47 CFR, Part 15 Rules for intentional radiators.** The results and photographs of all the EUT are detailed in this report. The EUT complied with requirements for fundamental frequencies and spurious emissions of section 15.235.

Transmitter Fundamental Frequency:	49.88 MHz, Complied, margin of 2.0* dB.
Transmitter Spurious:	worst case, Complied, margin of 1.0* dB.

The measurement procedure was in accordance with ANSI C63.4-1992, and OET Bulletin No. 63. The instrumentation conformed to these requirements.

* Refer to Secion 7.0 Conclusion

2.0 GENERAL INFORMATION

2.1 General Description of Test Setup

Test Sample:	49 MHz BirdDeter Transmitter
FCC ID:	O7B-BIRDDETER49
Equipment Type:	Intentional Radiator, Low Power transmitter

2.2 Technical Specifications

- Purpose : To remotely activate an electronic bird scaring device
- Centre frequency : 49.88 MHz
- Transmit Power : 10 dBm
- Modulation : FM ± 3 kHz deviation
- Modulation Type : DTMF
- Antenna : 37 inch braided whip, 50 Ohm
- Enclosure : Die cast aluminium 170x120x50mm
- Antenna Mounting : Via antenna base mounted on the die cast box
- Power supply : 12 V lead acid battery
- On/Off Control : Via push button momentary contact switch
- Transmit time out : 30 seconds
- Transmitter Board output : BNC Connector

2.3 Test Sample Functional Description

The 49 MHz transmitter is a non-home built device used in open fields to activate an electronic bird scaring device

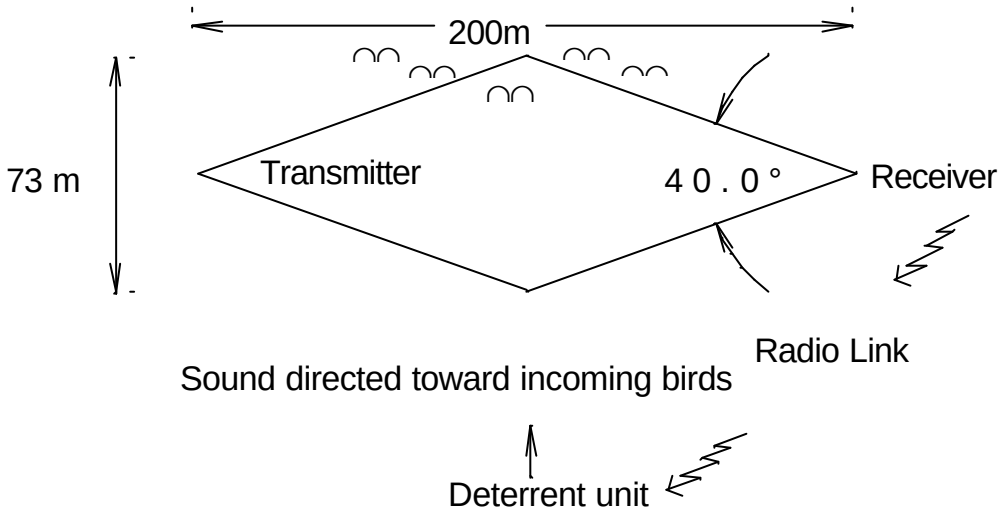
A standard BirdDeter system consists of three separate components: a radar transmitter, a radar receiver and one deterrent module. These components are each powered by twelve-volt battery and solar panel. The deterrent module can deliver up to 120 watts of audio power thus providing coverage of between four and forty hectares (ten to one hundred acres). One person can normally install this system in approximately half a day.

Here is a more detailed description of how the total system operates:

1. The radar receiver recognises the entry of pests into a 'detection zone' and automatically switches on a small radio transmitter. This transmits a radio signal.
2. This radio signal is 'picked up' by a radio receiver which is built into each deterrent module. The deterrent system is immediately switched on and plays a randomly selected group of distress and predator calls.

The 'detection zone' consists of two cone-shaped areas of radar waves created between the radar Transmitter and Receiver components as shown below.

Fig 1.



When a bird enters the detection zone, microwaves from the radar transmitter are reflected from the bird back to the radar receiver. The radar receiver electronically "recognises" the reflected microwaves as a bird. (However, microwaves reflected from slow-moving objects such as tree branches, crops or farm machinery are not normally "viewed" as birds by the detection system because its electronics are designed to ignore such reflections).

Because radio is used to 'link' radar and deterrent components, any number of deterrent modules can be activated by any number of radar detection systems. An optional hand-held

remote control unit can also be used to activate deterrent modules as well as, or instead of radar equipment.

The radar part of this system which is a 2.4 GHz Transmit system, is also subjected to FCC part 15 approval, submitted simultaneously with this application.

2.4 Test Procedure

Radiated emissions measurements were performed in accordance with the procedures of ANSI C63.4-1992. Radiated emission tests were performed at an EUT distance of 10 metres. OET Bulletin 63 dated October 1993 was used for reference.

2.5 Test Facility

- **FCC Registration**

Radiated Emission measurements were performed at EMC Technologies open area test site (OATS) situated at Lerderderg Gorge, near the town of Bacchus Marsh, Victoria, Australia.
The above site has been fully described in a report submitted to the FCC office, and accepted in a letter dated June 24, 1999, **FCC Registration Number 90560**.

EMC Technologies Pty. Ltd. is also accredited by NATA (National Association of Testing Authorities) for FCC part 15 testing. NATA has Mutual Recognition Agreement (MRA) with A2LA and NVLAP.

2.6 Units of Measurements

Radiated Emissions

Measurements are reported in units of dB relative to one microvolt per metre (dBμV/m) at a distance of 10 metres from the EUT.

2.7 Test Equipment Calibration

All measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory such as Hewlett-Packard Australia Limited. All equipment calibration is traceable to Australia national standards at the National Measurements Laboratory (NML). The reference antenna calibration was performed by NML and the working antennas (biconical and log-periodic) calibrated by the direct comparison method. The complete list of test equipment used for the measurements, including calibration dates and traceability, is contained in Appendix A of this report.

2.8 Ambients at OATS.

The OATS site is an area of low background ambient signals. No significant broadband ambients are present however commercial radio and TV signals exceed the limit in the FM radio, VHF and UHF television bands. Radiated prescan measurements were performed in the shielded enclosure to check for possible radiated emissions at the frequencies where the OATS ambient signals exceeded the test limit.

3.0 System Test Configuration.

The transmitter was configured to continuously transmit during the tests.

4.0 RADIATED EMISSION MEASUREMENTS

4.1 Test Procedure 30-1000 MHz

The EUT was set up on the table top (placed flat on the turntable) of total height 80 cm above the ground plane, and operated as described in section 2 of this report. The EMI Receiver was operated under software control via the PC Controller through the IEEE.488 Interface Bus Card Adapter. The 30 MHz to 1000 MHz test frequency range was sub-divided into smaller bands with sufficient frequency resolution to permit reliable display and identification of possible EMI peaks while also permitting fast frequency scan times. The EUT was slowly rotated with the Peak Detector set to Max-Hold. This was performed for two antenna heights. Each significant peak was then investigated and maximised by scanning the height of the antenna between 1 to 4 metres with the Quasi-Peak detector ON. The measurement data for each frequency range was automatically corrected by the software for cable losses, antenna factors and preamplifier gain and all data was then stored on disk in sequential data files. This process was performed for both horizontal and vertical antenna polarisation.

4.2 Plotting of Measurement Data for Radiated Emissions.

The stored measurement data was combined to form a single graph which comprised of all the frequency sub-ranges over the range 30-1000 MHz. The accumulated EMI (EUT ON) was plotted as the Red trace while the Ambient signals (AMBIENT) were plotted as Green trace. The worst case radiated EMI *peak* measurements (as recorded using the Max-Hold data are presented as the upper or **RED** trace while the respective ambient signals are presented as the lower or **GREEN** trace. Occasionally, an intermittent ambient arose during the EUT ON measurement (RED trace) and could not be captured when the Ambient trace was being stored. The ambient peaks of significant amplitude with respect to the limit are tagged with the "#" symbol while EMI peaks are identified with a numeral. Ambient peaks that were present during the EUT ON measurement (RED trace) and not captured during the AMBIENT measurement were also tagged with the "#" symbol.

The highest recorded EMI signals are shown on the Peaks List on the bottom right side of the graph. For radiated EMI, each numbered peak is listed as a frequency, peak field strength, Quasi-peak field strength, limit, antenna height and the margin relative to the limit in dB. A negative margin is the deviation of the recorded value below the limit.

At times, the quasi peak level may appear to be higher than the peak level. This happens because the individual peak is further maximised with the QP detector. This will be apparent when the peaks list at the foot of the graphs shows the quasi peak level higher than the peak level.

4.3 Calculation of Field Strength.

The field strength was calculated automatically by the software using all the pre-stored calibration data. The method of calculation is shown below:

E = V + AF - G + L

Where: **E** = Radiated Field Strength in dBµV/m.
V = EMI Receiver Voltage in dBµV. (measured value)
AF = Antenna Factor in dB(m^{-1}). (stored as a data array)
G = Preamplifier Gain in dB. (stored as a data array)
L = Cable insertion loss in dB. (stored as a data array of Insertion Loss versus frequency)

Example Field Strength Calculation

Assuming a receiver reading of 34.0 dBµV is obtained at 90 MHz, the Antenna Factor at that frequency is 9.2 dB. The cable loss is 1.9 dB while the preamplifier gain is 20 dB.
The resulting Field Strength is therefore as follows:

34.0 + 9.2 + 1.9 - 20 = 25.1 dBmV/m

5.0 Radiated Field Strength Measurement Results

The transmitter was continuously transmitting during the tests.

5.1 30 – 1000 MHz Test Results

Result: The highest radiated spurious emission was 1.0 dB below the limit at 66.49MHz for Vertical Polarisation. The fundamental frequency was 2.34 dB below the specified limit at 49.88 MHz for Vertical Polarisation. The measurement uncertainty was 3.7 dB.
The field strength of emissions appearing between the band edges and upto 10 kHz above and below the band edges were attenuated by > 26 dB below the modulated carrier.

Appendix F, Graph 1: Vertical Antenna Polarisation
Appendix F, Graph 2: Horizontal Antenna Polarisation

Table 1
Summary of Results

Antenna Polarisation	Frequency MHz	Peak Level dBmV/m	Limit @ 10m dBmV/m	Result ±dB
FUNDAMENTAL FREQUENCY				
Vertical	49.88	68.0	70.0	-2.0*
Horizontal	49.88	43.1	70.0	-26.9

*Notice of this reading should be taken with a measurement uncertainty of 3.7 dB.

Antenna Polarisation	Frequency MHz	Quasi-Peak Level dBmV/m	Limit @ 10m dBmV/m	Result ±dB
SPURIOUS EMISSIONS				
Vertical	66.49	29.0	30.0	-1.0*
Vertical	83.11	23.7	30.0	-6.3
Vertical	99.75	23.8	33.5	-9.7
Horizontal	66.49	17.2	30.0	-12.8
Horizontal	99.72	18.7	33.5	-14.8

*Notice of this reading should be taken with a measurement uncertainty of 3.7 dB.

6.0 Conducted Emissions Results

Conducted EMI Tests were not applicable as the transmitter is battery powered.

7.0 CONCLUSION

The 49 MHz BirdDeter Transmitter (FCC ID: O7B-BIRDDETER49), complied with the requirements of the FCC Parts 2 and 15 Rules for low power transmitter tested in accordance with 15.235. The results were as follows:

Transmitter Fundamental : complied, worst case margin of 2.0 dB.
Transmitter Spurious : complied, worst case margin of 1.0 dB.

The recorded levels of radiated EMI were within the measurement uncertainty of 3.7 dB.

APPENDIX A

MEASUREMENT INSTRUMENTATION DETAILS

EQUIPMENT TYPE	MAKE/MODEL SERIAL NUMBER	LAST CAL. DD/MM/YY	DUE DATE DD/MM/YY	CAL. INTERVAL
EMI RECEIVER	HP8574B CISPR Receiver Sn.3146A01297 including MIL-STD-462 Bandwidths	08/02/00	08/02/01	1 YEAR *2
	HP 8546A Sn. 3549A00290 EMI Receiver	20/09/99	20/09/00	1 YEAR *2
ANTENNAS	EMCO 93110B BICONICAL	08/12/99	08/12/00	I YEAR *3
	20 - 300MHz Sn. 9804-3094			
	EMCO 3146A LOG PERIODIC	24/02/00	24/02/01	1 YEAR *3
	300 -1000MHz Sn. 9208-1205			
	EMCO 3115 HORN ANTENNA	09/02/00	09/02/01	1 YEAR *3
	1 – 18 GHz Sn 3282			

Note *1. National Measurements Laboratory calibration.
Note *2. NATA calibration by Hewlett-Packard (Aust) Ltd
Note *3. In-house calibration. Refer to Quality Manual.
Note *4 Calibration not required

TEST SITES

Shielded Room Test Laboratory	**Melbourne** 11m x 8m x 4m Test Chamber 8.8m x 5.8m x 3.1m Test Chamber 3.4m x 6.1m x 2.5m Test Chamber 3.4m x 7.3m x 7.5m Test Chamber			*4
Open Area Test Site	**Melbourne** 3/10 Metre site. 1-4 metre antenna mast. 1.2 metre/400 kg Turntable. (Situated at Lerderderg Gorge, near Bacchus Marsh, Victoria)	30/07/99	30/07/00	1 Year *3

APPENDIX B

PHOTOGRAPHS OF TEST SETUP

SUBMITTED AS ATTACHMENT

APPENDIX C

TEST SAMPLE SCHEMATICS

SUBMITTED AS ATTACHMENT

APPENDIX D

FCC ID LABELLING

SUBMITTED AS ATTACHMENT

APPENDIX E

USER INSTRUCTIONS (MANUAL)

SUBMITTED AS ATTACHMENT

APPENDIX F

GRAPHS OF EMI MEASUREMENTS

RADIATED EMI

30 MHz to 1000 MHz

Graph 1: Vertical Polarisation

Graph 2: Horizontal Polarisation

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FCC 15235 Project No:M000763

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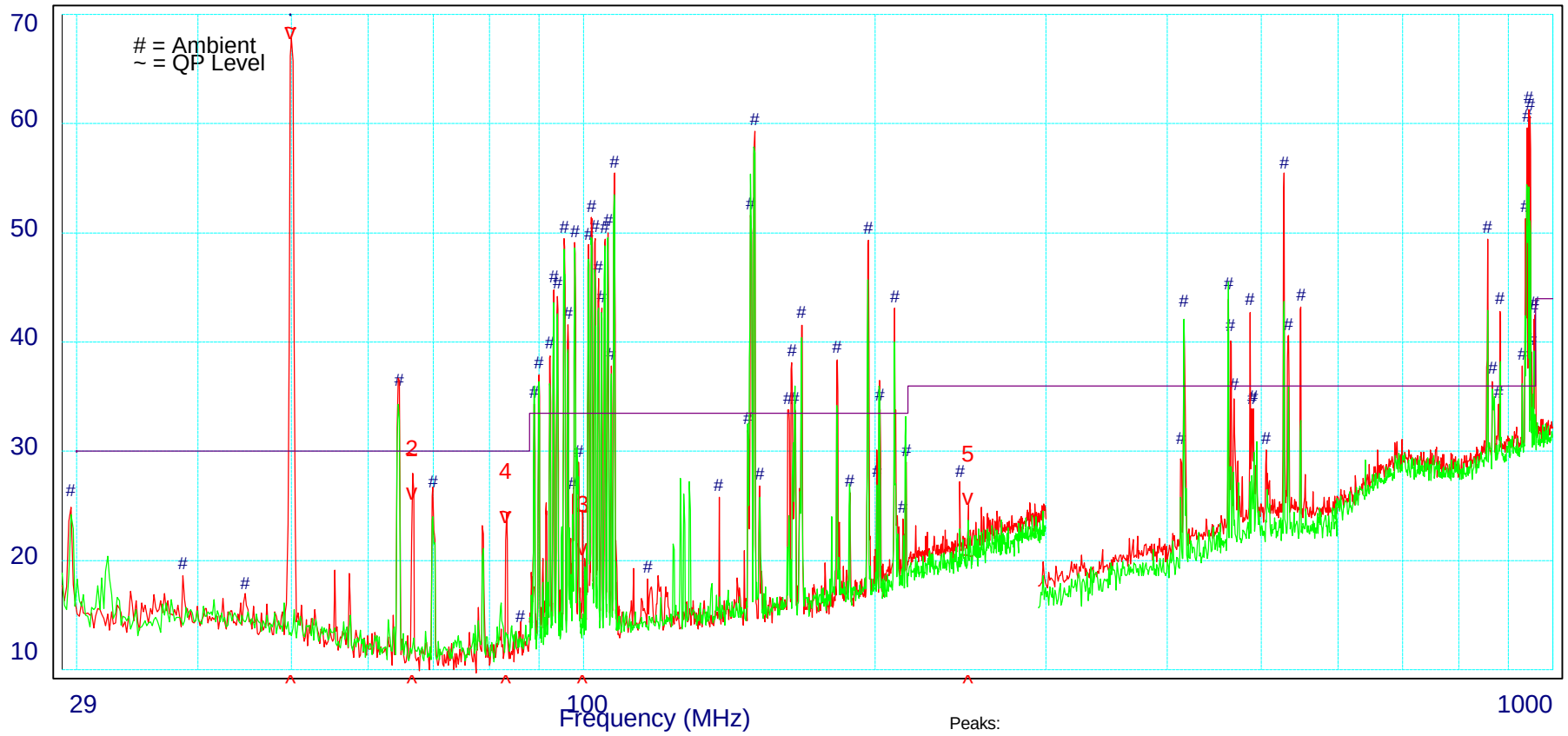
Electric Field Strength dBuV/m Peak Test Date: 24-07-00 GRAPH No. 1



BirdDeter 49 MHz Transmitter

Limits:
FCC235 FCC PART 15.235 TX LMTS FOR 49 MHz AT 10mtrs
F3_15209 FCC CLASS B RAD 10M LIMITS

Legend:
Vertical Ambients
Vertical Emissions

Equipment: HP8546A TST 99B
Transducers: LCABLE2 a1100201 a1360100 NOPREAMP
Site ID: Lerderderg OATS1
Test Officer:Praveen Rao

Source:
analdata 6 7 8 9 2 3
analdata 1 2 3 5 12 13

Peaks:

No	Freq (MHz)	Peak (dBuV/m)	Qp Val	FCC235 (dBuV/m)	dL1 (dB)	F3_15209 (dBuV/m)	dL2 (dB)
1	49.88	67.7	68.0	70.0	-2.0	30.0	38.0
2	66.49	25.5	29.0	70.0	-41.0	30.0	-1.0
3	99.75	20.4	23.8	70.0	-46.2	33.5	-9.7
4	83.11	23.4	23.7	70.0	-46.3	30.0	-6.3
5	249.18	25.0	19.7	70.0	-50.3	36.0	-16.3

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Sydney---- 16,6 Gladstone Rd Castle Hill, 2154, NSW, Australia Ph+(612) 9899 4599 Fax+(612) 9899 4019

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FCC 15235 Project No:M000763

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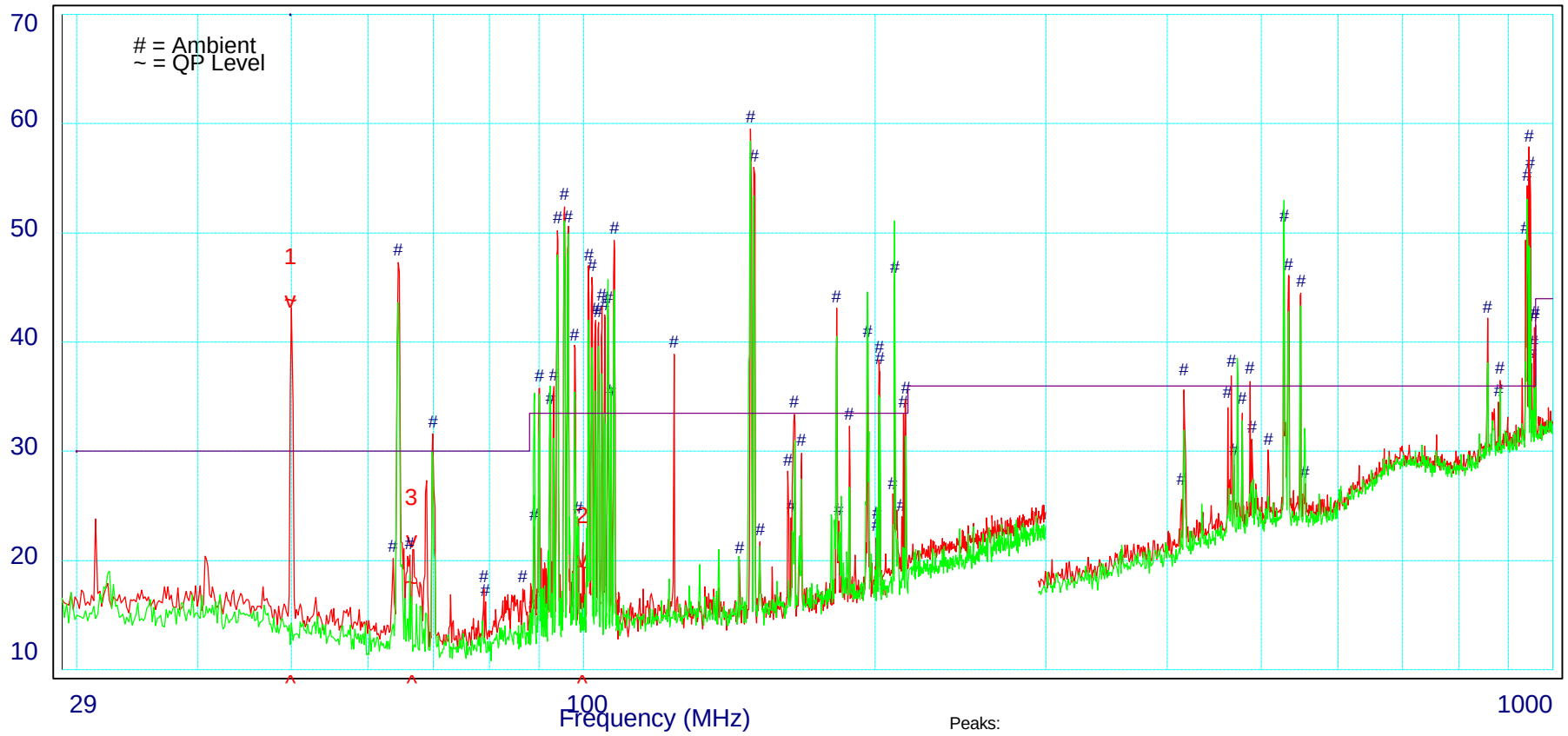
Electric Field Strength dBuV/m Peak

Test Date: 24-07-00 GRAPH No. 2



BirdDeter 49 MHz Transmitter

Limits:
FCC235 FCC PART 15.235 TX LMTS FOR 49 MHz AT 10mtrs
F3_15209 FCC CLASS B RAD 10M LIMITS

Legend:
Horizontal Ambients
Horizontal Emissions

Source:
analdata 10 11 12 13 4 5
analdata 6 7 8 9 10 11

Equipment: HP8546A TST 99B
Transducers: LCABLE2 a1100201 a1360100 NOPREAMP
Site ID: Lerderderg OATS1
Test Officer:Praveen Rao

Peaks:

No	Freq (MHz)	Peak (dBuV/m)	Qp Val	FCC235 (dBuV/m)	dL1 (dB)	F3_15209 (dBuV/m)	dL2 (dB)
1	49.87	43.1	43.1	70.0	-26.9	30.0	13.1
2	99.72	19.4	18.7	70.0	-51.3	33.5	-14.8
3	66.49	21.1	17.2	70.0	-52.8	30.0	-12.8

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