



Measurement of RF Interference from a Model CA5500R Handheld Remote Control Transceiver

For : Intermatic
7777 Winn Road
Spring Grove, IL 60081

P.O. No. : 925533
Date Received : May 14, 2007
Date Tested : May 14 and 15, 2007
Test Personnel : Daniel E. Crowder
Specification : FCC "Code of Federal Regulations" Title 47
: Part 15, Subpart B, for receivers and Subpart C,
: Section 15.249 for Intentional Radiators
: Operating within the 902MHz to 928MHz band
: Industry Canada RSS-210
: Industry Canada RSS-GEN

Test Report By :


Daniel E. Crowder

Witnessed By : Mike Kass
Intermatic

Approved By :



Raymond J. Klouda
Registered Professional
Engineer of Illinois - 44894



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THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF ELITE ELECTRONIC ENGINEERING INCORPORATED.



REVISION HISTORY

Revision	Date	Description
—	5/23/2007	Initial release

Measurement of RF Emissions from a CA5500R Handheld Remote Control Transceiver

1 INTRODUCTION

1.1 Scope of Tests

This document represents the results of the series of radio interference measurements performed on a Handheld Remote Control, Part No. CA5500R, Serial No. None Assigned transceiver, (hereinafter referred to as the test item). The test item was designed to transmit at approximately 908.42MHz and receive at approximately 908.2MHz using an internal antenna. The test item was manufactured and submitted for testing by Internatic located in Spring Grove, IL.

1.2 Purpose

The test series was performed to determine if the test item meets the conducted and radiated RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109, and Subpart C, Sections 15.207 and 15.249 for Intentional Radiators Operating within the 902MHz -928MHz band. Testing was performed in accordance with ANSI C63.4-2003.

1.3 Deviations, Additions and Exclusions

There were no deviations, additions to, or exclusions from the test specification during this test series.

1.4 EMC Laboratory Identification

This series of tests was performed by Elite Electronic Engineering Incorporated of Downers Grove, Illinois. The laboratory is accredited by the National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP Lab Code: 100278-0.

1.5 Laboratory Conditions

The temperature at the time of the test was 22°C and the relative humidity was 23%.

2 APPLICABLE DOCUMENTS

The following documents of the exact issue designated form part of this document to the extent specified herein:

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 15, Subpart B for Receivers, dated 1 October 2006
- ANSI C63.4-2003, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
- Industry Canada RSS-210, Issue 6, September 2005, "Spectrum Management and Telecommunications Radio Standards Specification, Low-power License-exempt radio communication devices (All Frequency Bands): Category I Equipment"
- Industry Canada RSS-GEN, Issue 1, September 2005, "Spectrum Management and Telecommunications Radio Standards Specification, General Requirements and Information for the Certification of radio communication equipment"

3 TEST ITEM SET-UP AND OPERATION

3.1 General Description

The test item is a Handheld Remote Control, Part No. CA5500R. A block diagram of the test item set-up is shown

as Figure 1.

3.1.1 Power Input

The test item could be powered by 9VDC from an external power supply, M/N: U090050D or by 4.5VDC from 3 "AA" internal batteries. The power supply was connected to the test item via a 2 meter long, 2 wire unshielded power cable. The power supply was powered with 115V, 60Hz. Each primary lead was connected through a line impedance stabilization network (LISN) which was located on the ground plane. The network complies with the requirements of Paragraph 4.1.2 of ANSI C63.4-2003.

3.1.2 Peripheral Equipment

The test item was submitted for testing with no peripheral equipment.

3.1.3 Interconnect Cables

The test item was submitted for testing with no interconnect cables.

3.1.4 Grounding

The test item was ungrounded during the test.

3.2 Operational Mode

For all tests, the test item was placed on an 80cm high non-conductive stand. The test item was energized. One of the units submitted for testing was set up so that upon power up it would receive continuously at 908.2MHz. The second unit submitted for testing was set up so that upon power up it would transmit continuously at 908.4MHz.

3.3 Test Item Modifications

No modifications were required for compliance to the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109, and Subpart C, Sections 15.207 and 15.249 requirements.

4 TEST FACILITY AND TEST INSTRUMENTATION

4.1 Shielded Enclosure

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. With the exception of the floor, the reflective surfaces of the shielded chamber are lined with ferrite tiles on the walls and ceiling. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2003 for site attenuation.

4.2 Test Instrumentation

The test instrumentation and auxiliary equipment used during the tests are listed in Table 9-11. All equipment was calibrated per the instruction manuals supplied by the manufacturer.

Conducted emission tests were performed with a spectrum analyzer in conjunction with a quasi-peak adapter.

Radiated emissions were performed with a spectrum analyzer. This receiver allows measurements with the bandwidths specified by the FCC and with the quasi-peak detector function.

4.3 Calibration Traceability

Test equipment is maintained and calibrated on a regular basis. All calibrations are traceable to the National Institute of Standards and Technology (NIST).

4.4 Measurement Uncertainty

All measurements are an estimate of their true value. The measurement uncertainty characterizes, with a specified confidence level, the spread of values which may be possible for a given measurement system.

The measurement uncertainty budgets were based on guidelines in "ISO Guide to the Expression of Uncertainty in Measurements" and NAMAS NIS81 "The Treatment of Uncertainty in EMC Measurements".

5 TEST PROCEDURES

5.1 Powerline Conducted Emissions

5.1.1 Receiver

5.1.1.1 Requirements

Per 15.107(a), all radio frequency voltages on the power lines of a receiver shall be below the values shown below when using a quasi-peak detector:

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

* - Decreases with the logarithm of the frequency

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: If the levels measured using the QP detector meet both the QP and the Average limits, the test item is considered to have met both requirements and measurements do not need to be performed using the Average detector.

5.1.1.2 Procedures

The interference on each power lead was measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. The meter terminal of the LISN not under test was terminated with 50 ohms. Measurements were first made over the entire frequency range from 150 kHz through 30MHz with a peak detector and the results were automatically plotted. The data thus obtained was then searched by the computer for the highest levels. Quasi-peak measurements were automatically performed at the frequencies selected from the highest peak measurements, and the results printed.

5.1.1.3 Results

As can be seen from the data, all emissions measured from the test item were within the specification limits. The plots of the peak preliminary conducted voltage levels on each power line are presented on pages 16 and 17. The conducted limit for intentional radiators is shown as a reference. The final quasi-peak results are presented on pages 18 and 19. Photographs of the test configuration which yielded the highest or worst case, conducted emission levels are shown on Figure 2.

5.1.2 Transmitter

5.1.2.1 Requirements

Per 15.207(a), all radio frequency voltages on the power lines of a transmitter shall be below the values shown below when using a quasi-peak detector:



Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: If the levels measured using the QP detector meet both the QP and the Average limits, the test item is considered to have met both requirements and measurements do not need to be performed using the Average detector.

5.1.2.2 Procedures

The interference on each power lead was measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. The meter terminal of the LISN not under test was terminated with 50 ohms. Measurements were first made over the entire frequency range from 150 kHz through 30MHz with a peak detector and the results were automatically plotted. The data thus obtained was then searched by the computer for the highest levels. Quasi-peak measurements were automatically performed at the frequencies selected from the highest peak measurements, and the results printed.

5.1.2.3 Results

As can be seen from the data, all emissions measured from the test item were within the specification limits. The plots of the peak preliminary conducted voltage levels on each power line are presented on pages 20 and 21. The conducted limit for intentional radiators is shown as a reference. The final quasi-peak results are presented on pages 22 and 23. Photographs of the test configuration which yielded the highest or worst case, conducted emission levels are shown on Figure 2.

5.2 Radiated Measurements

5.2.1 Receiver

5.2.1.1 Requirements

All emanations from a receiver shall be below the levels shown on the following table:

Frequency MHz	Distance between Test Item And Antenna in Meters	Field Strength uV/m	Field Strength dBuV/m
30-88	3	100	40
88-216	3	150	43.5
216-960	3	200	46
Above 960	3	500	54

Note: The tighter limit shall apply at the edge between the two frequency bands.

5.2.1.2 Procedures

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. The walls and ceiling of the shielded chamber are lined with ferrite tiles. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4 2003 for site attenuation.

The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All powerlines and signal lines entering the enclosure pass through filters on the enclosure wall. The powerline filters prevent extraneous signals from entering the enclosure on these leads.

Since quasi-peak and average measurements require long integration times, it is not practical to automatically sweep through the quasi-peak or average levels. Therefore, radiated emissions from the test item were first scanned using a peak detector and automatically plotted. The frequencies where significant emission levels were noted were then remeasured using the quasi-peak or average detector.

For preliminary radiated emissions sweeps from 30MHz to 5GHz, the broadband measuring antenna was positioned at a 3 meter distance from the test item. The frequency range from 30MHz to 5GHz was investigated using a peak detector function with the bilog antenna below 1GHz and the double-ridged waveguide antenna above 1GHz. The maximum levels were plotted.

Final radiated emissions were performed on all significant broadband and narrowband emissions found in the preliminary sweeps using the following methods:

- 1) Measurements below 1GHz were made using a quasi-peak detector and a bilog antenna. Measurements above 1GHz were made using an average detector and a double ridged waveguide antenna.
- 2) To ensure that maximum or worst case, emission levels were measured, the following steps were taken:
 - a. The test item was rotated so that all of its sides were exposed to the receiving antenna.
 - b. Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
 - c. The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.

5.2.1.3 Results

The preliminary plots, with the test item AC Powered, are presented on pages 24 and 25. The plots are presented for a reference only, and are not used to determine compliance. The final radiated levels are presented on page 26. As can be seen from the data, all emissions measured from the test item were within the specification limits for receivers. Photographs of the test configuration are shown on Figure 3.

The preliminary plots, with the test item DC Powered, are presented on pages 27 and 28. The plots are presented for a reference only, and are not used to determine compliance. The final radiated levels are presented on page 29. As can be seen from the data, all emissions measured from the test item were within the specification limits for receivers. Photographs of the test configuration are shown on Figure 3.

5.2.2 Transmitter

5.2.2.1 Requirements

The test item must comply with the requirements of FCC "Code of Federal Regulations Title 47", Part 15, Subpart C, Section 15.205 et seq. Paragraph 15.249(a) has the following radiated emission limits:

Fundamental Frequency MHz	Field Intensity mV/m @ 3 meter	Field Strength of Harmonics and Spurious uV/m @ 3 meter
902 to 928	50	500

In addition, emissions appearing in the Restricted Bands of Operation listed in paragraph 15.205(a) shall not exceed the general requirements shown in paragraph 15.209.

5.2.2.2 Procedures

All measurements were performed in a 32ft. x 20ft. x 14ft. high shielded enclosure. The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All powerlines and signal lines entering the enclosure pass through filters on the enclosure wall. The powerline filters prevent extraneous signals from entering the enclosure on these leads. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2003 for site attenuation.

A preliminary radiated emissions test was performed to determine the emission characteristics of the test item. For the preliminary test, a broadband measuring antenna was positioned at a 3 meter distance from the test item. The entire frequency range from 30MHz to 9.1GHz was investigated using a peak detector function. The data was then processed by the computer to calculate equivalent field intensity.

The final emission tests were then manually performed over the frequency range of 30MHz to 9.1GHz. Between 30MHz and 1000MHz, a tuned dipole antenna was used as the pick-up device. A broadband double ridged waveguide antenna was used as the pick-up device for all frequencies above 1GHz. All significant broadband and narrowband signals were measured and recorded.

To ensure that maximum or worst case, emission levels were measured, the following steps were taken:

- 1) The test item was rotated so that all of its sides were exposed to the receiving antenna.
- 2) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
- 3) The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.

5.2.2.3 Results

The preliminary plots, with the test item transmitting at 908.4MHz and AC Powered, are presented on data pages 30 and 31. The plots are presented for a reference only, and are not used to determine compliance. The final radiated levels, with the test item transmitting at 908.4MHz and AC Powered, are presented on data page 32. As can be seen from the data, all emissions measured from the test item were within the specification limits. Photographs of the test configuration which yielded the highest or worst case, radiated emission levels are shown on Figure 4.

The preliminary plots, with the test item transmitting at 908.4MHz and DC Powered, are presented on data pages 33 and 34. The plots are presented for a reference only, and are not used to determine compliance. The final radiated levels, with the test item transmitting at 908.4MHz and DC Powered, are presented on data page 35. As can be seen from the data, all emissions measured from the test item were within the specification limits. Photographs of the test configuration which yielded the highest or worst case, radiated emission levels are shown on Figure 4.

5.3 Occupied Bandwidth Measurements

5.3.1 Requirements

In accordance with paragraph 15.249(d), all emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuate by at least 50dB below the level of the fundamental or to the general radiated emissions limits in 15.209, which ever is the lesser attenuation.

5.3.2 Procedure

The test item was placed on an 80cm high non-conductive stand. The unit was set to transmit continuously. With an antenna positioned nearby, occupied bandwidth emissions were displayed on the spectrum analyzer. The resolution bandwidth was set to 100 kHz and span was set to 30 MHz. The frequency spectrum near the fundamental was plotted.

5.3.3 Results

The plots of the emissions near the fundamental frequency are presented on data pages 36 and 37. As can be seen from this data page, the transmitter met the occupied bandwidth requirements.

The 99% bandwidth was measured to be 130 kHz.

6 OTHER TEST CONDITIONS

6.1 Test Personnel and Witnesses

All tests were performed by qualified personnel from Elite Electronic Engineering Incorporated. The test series was witnessed by Intermatic personnel.

6.2 Disposition of the Test Item

The test item and all associated equipment were returned to Intermatic upon completion of the tests.

7 CONCLUSIONS

It was determined that the Intermatic Handheld Remote Control, Part No. CA5500R, Serial No. None Assigned, did not fully meet the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109 for receivers, and Subpart C, Sections 15.207 and 15.249 for Intentional Radiators Operating within the 902MHz -928MHz band, when tested per ANSI C63.4-2003. In addition, the test item meets the Industry Canada RSS-210 and Industry Canada RSS-GEN requirements.

8 CERTIFICATION

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the test specifications.

The data presented in this test report pertains to the test item at the test date *as operated by Intermatic personnel. Any electrical or mechanical modification made to the test item subsequent to the specified test date will serve to invalidate the data and void this certification.

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



9 EQUIPMENT LIST

Table 9-11 Equipment List

ELITE ELECTRONIC ENG. INC.							Page: 1	
Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Cal Inv	Due Date
Equipment Type: ACCESSORIES, MISCELLANEOUS								
XPQ3	HIGH PASS FILTER	K&L MICROWAVE	4IH30-1804/T	4	1.8GHZ-10GHZ		12	
XZG4	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	2223A01683	---		N/A	
Equipment Type: AMPLIFIERS								
APK4	PREAMPLIFIER OPT H02	HEWLETT PACKARD	8449B	3008A00329	1-26.5GHZ	03/12/07	12	03/12/08
Equipment Type: ANTENNAS								
NDQ1	TUNED DIPOLE ANTENNA	EMCO	3121C-DB4	313	400-1000MHZ	03/28/07	12	03/28/08
NTA0	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL611	2057	0.03-2GHZ	08/21/06	12	08/21/07
NWF0	RIDGED WAVE GUIDE	EMCO	3105	2035	1-12.4GHZ	10/09/06	12	10/09/07
Equipment Type: ATTENUATORS								
T1EA	10DB, 25W ATTENUATOR	WEINSCHEL	46-10-34	BN2316	DC-18GHZ	03/22/07	12	03/22/08
Equipment Type: CONTROLLERS								
CDS2	COMPUTER	GATEWAY	MFATXPNT	NMZ 0028483108	1.8GHZ			N/A
Equipment Type: PROBES; CLAMP-ON & LISNS								
PLL9	50UH LISN 462D	ELITE	462D/70A	010	0.01-400MHZ	03/08/07	12	03/08/08
PLLA	50UH LISN 462D	ELITE	462D/70A	011	0.01-400MHZ	03/08/07	12	03/08/08
Equipment Type: PRINTERS AND PLOTTERS								
HRE1	LASER JET 5P	HEWLETT PACKARD	C3150A	USHB061052	---			N/A
Equipment Type: RECEIVERS								
RACA	RF PRESELECTOR	HEWLETT PACKARD	85685A	2926A00980	20HZ-2GHZ	02/16/07	12	02/16/08
RAEC	SPECTRUM ANALYZER	HEWLETT PACKARD	8566B	3014A06690	100HZ-22GHZ	02/16/07	12	02/16/08
RAF5	QUASISPEAK ADAPTOR W/ RECEI	HEWLETT PACKARD	85650A	2043A00151	0.01-1000MHZ	02/16/07	12	02/16/08

Cal. Interval: Listed in Months I/O: Initial Only N/A: Not Applicable
 Note 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

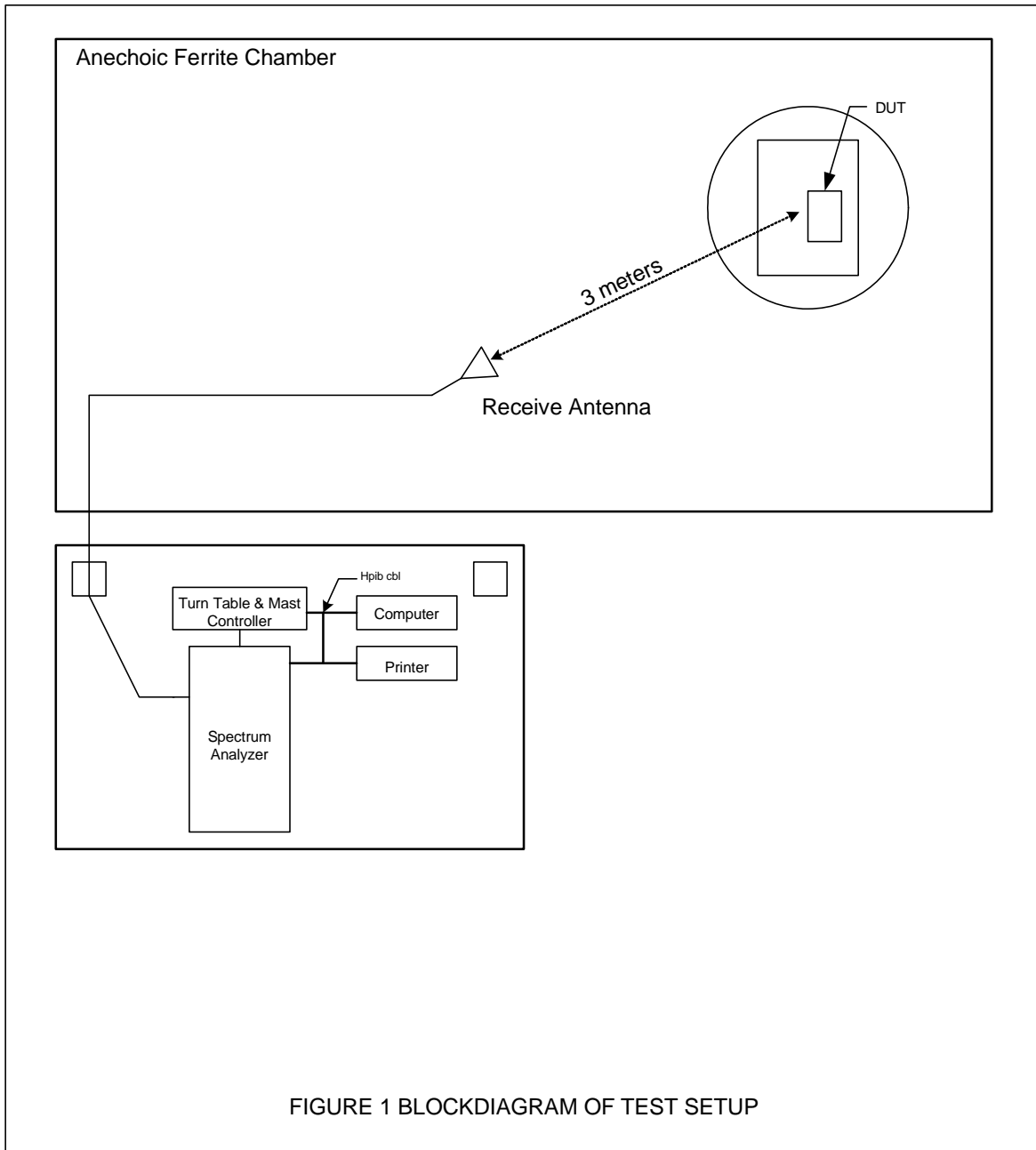
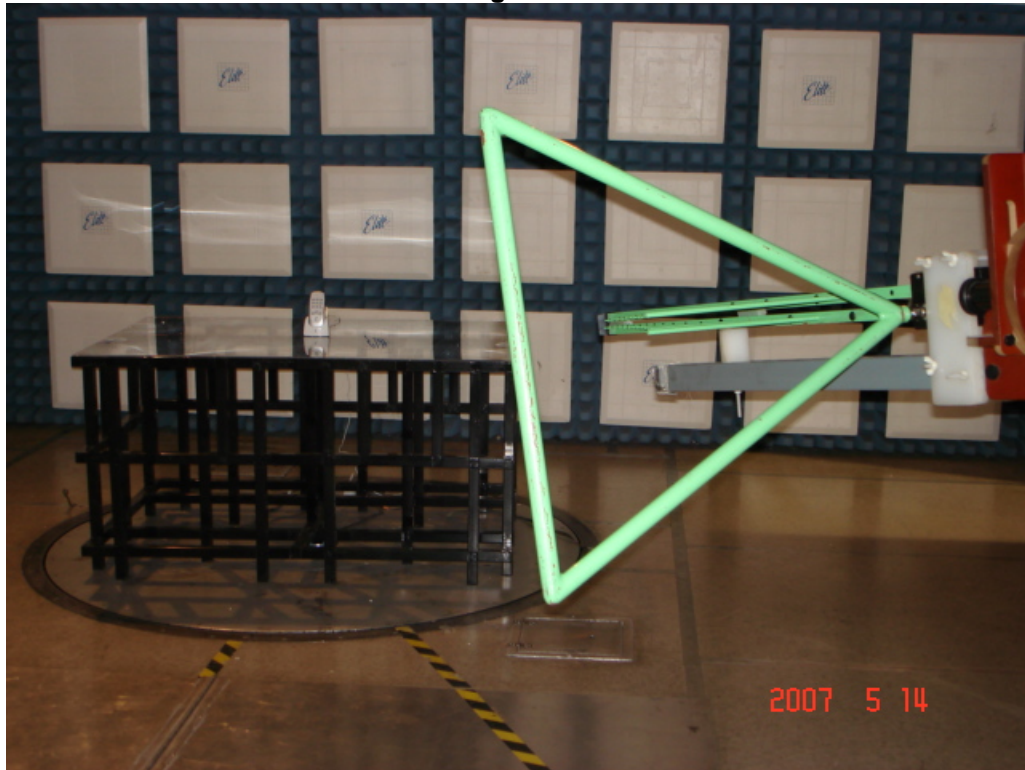


Figure 2

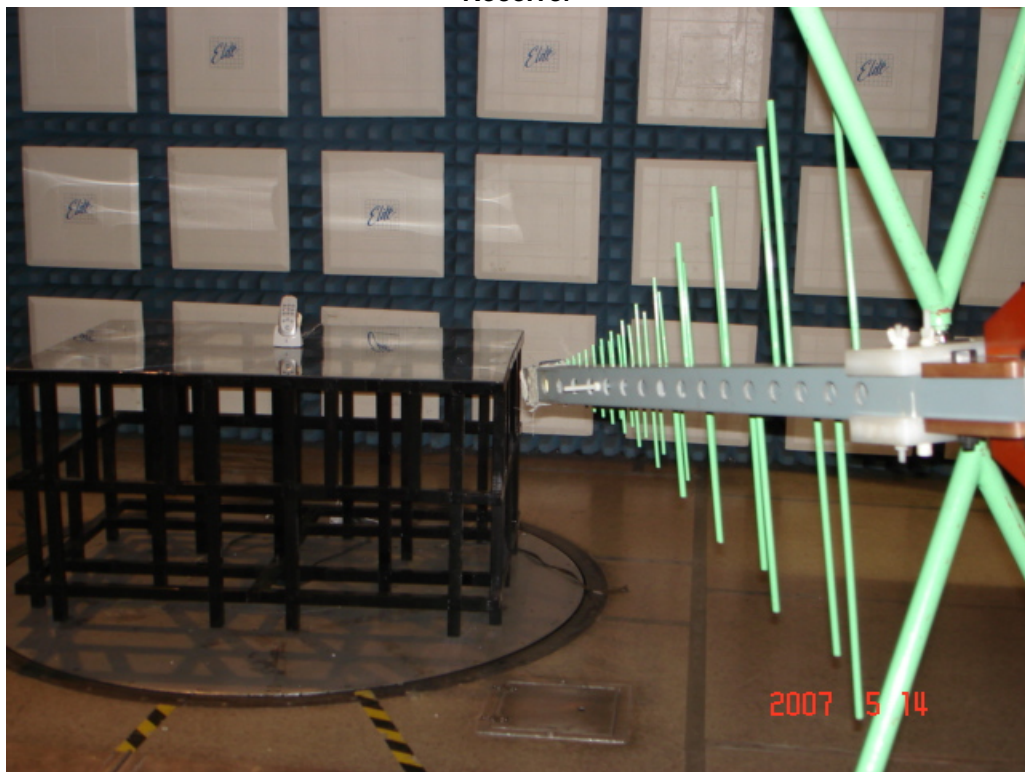


Test Set-up for Conducted Emissions

Figure 3

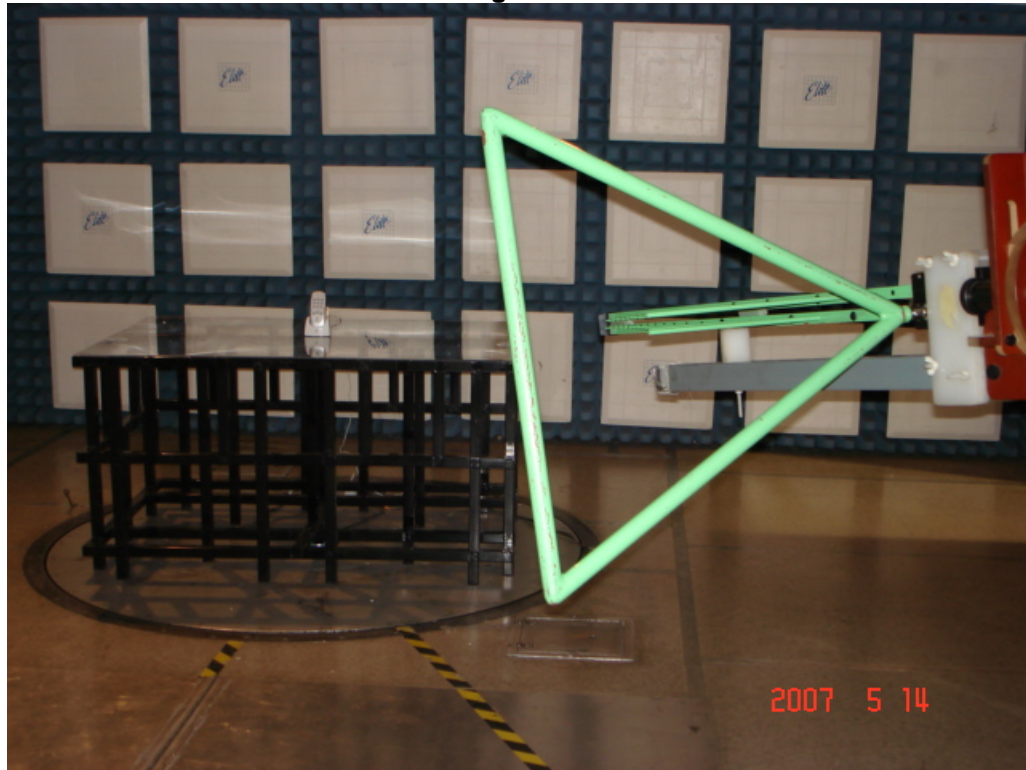


Test Set-up for Radiated Emissions – 30MHz to 1GHz – Horizontal Polarization - Receiver

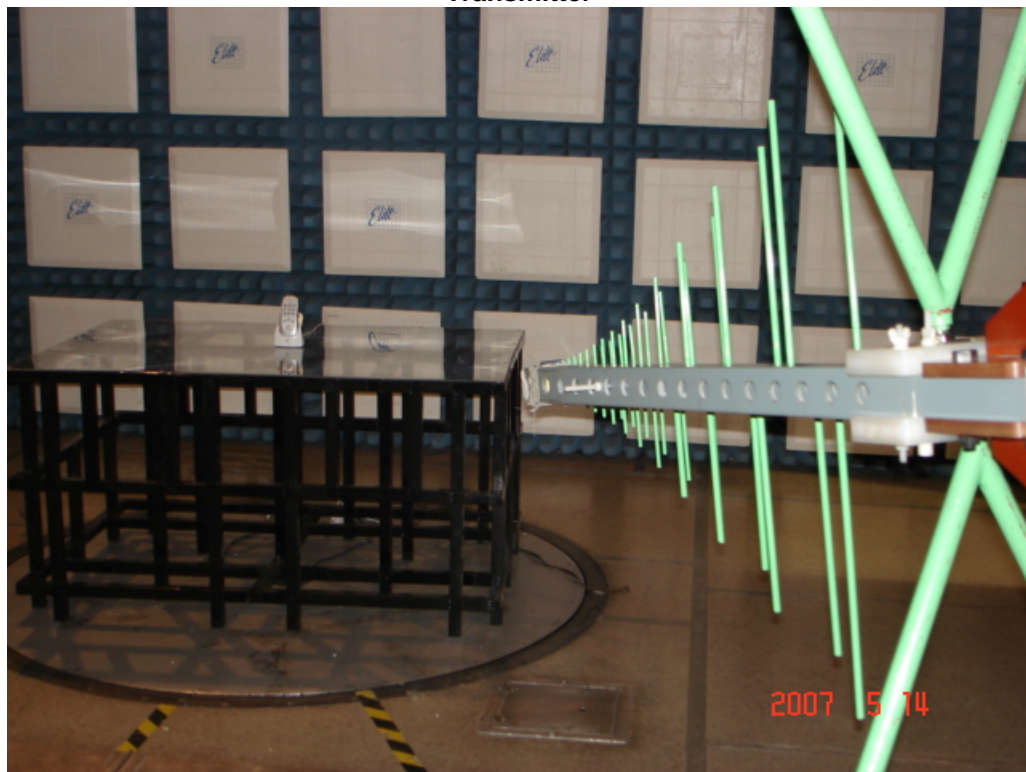


Test Set-up for Radiated Emissions – 30MHz to 1GHz - Vertical Polarization - Receiver

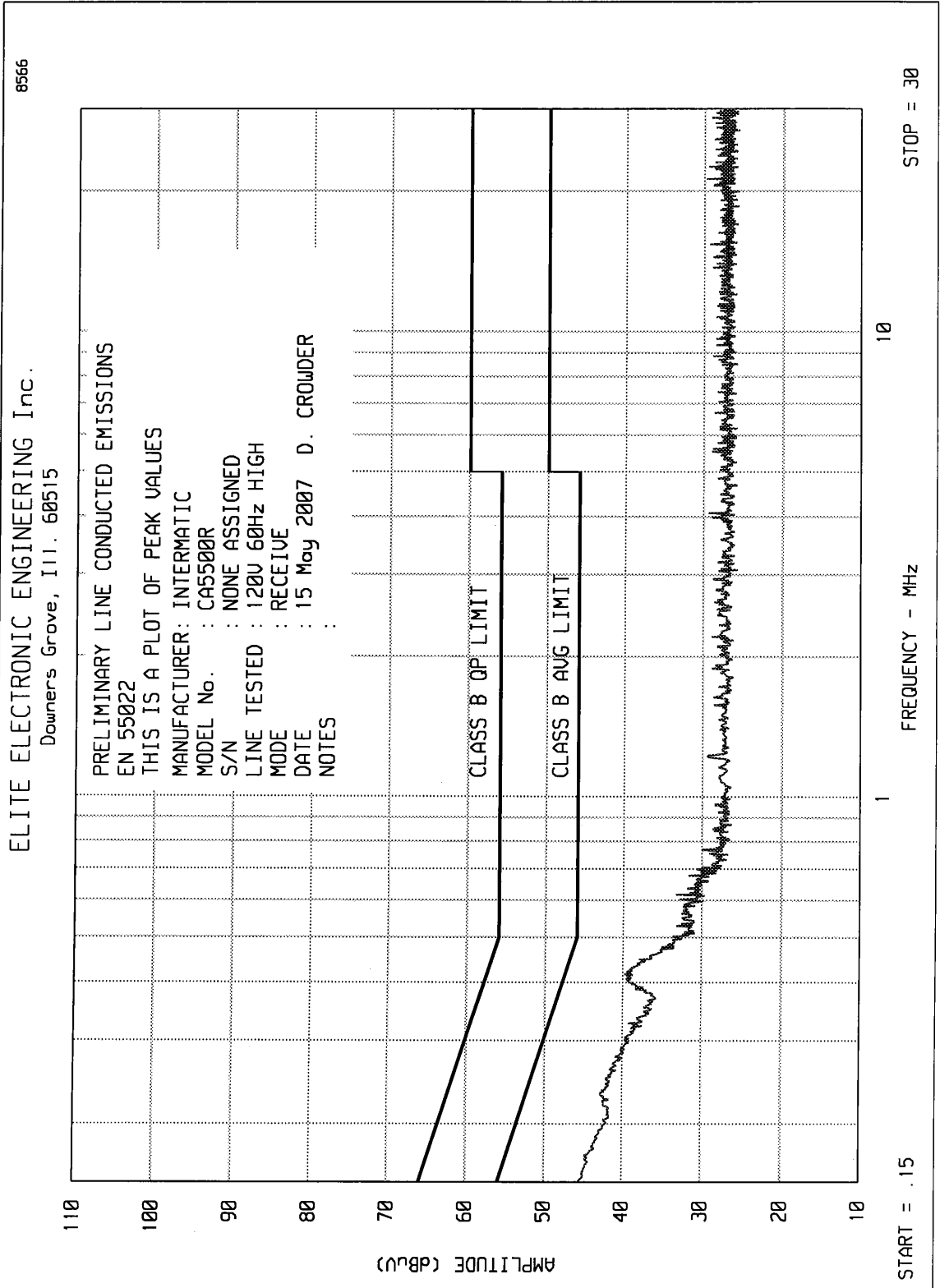
Figure 4

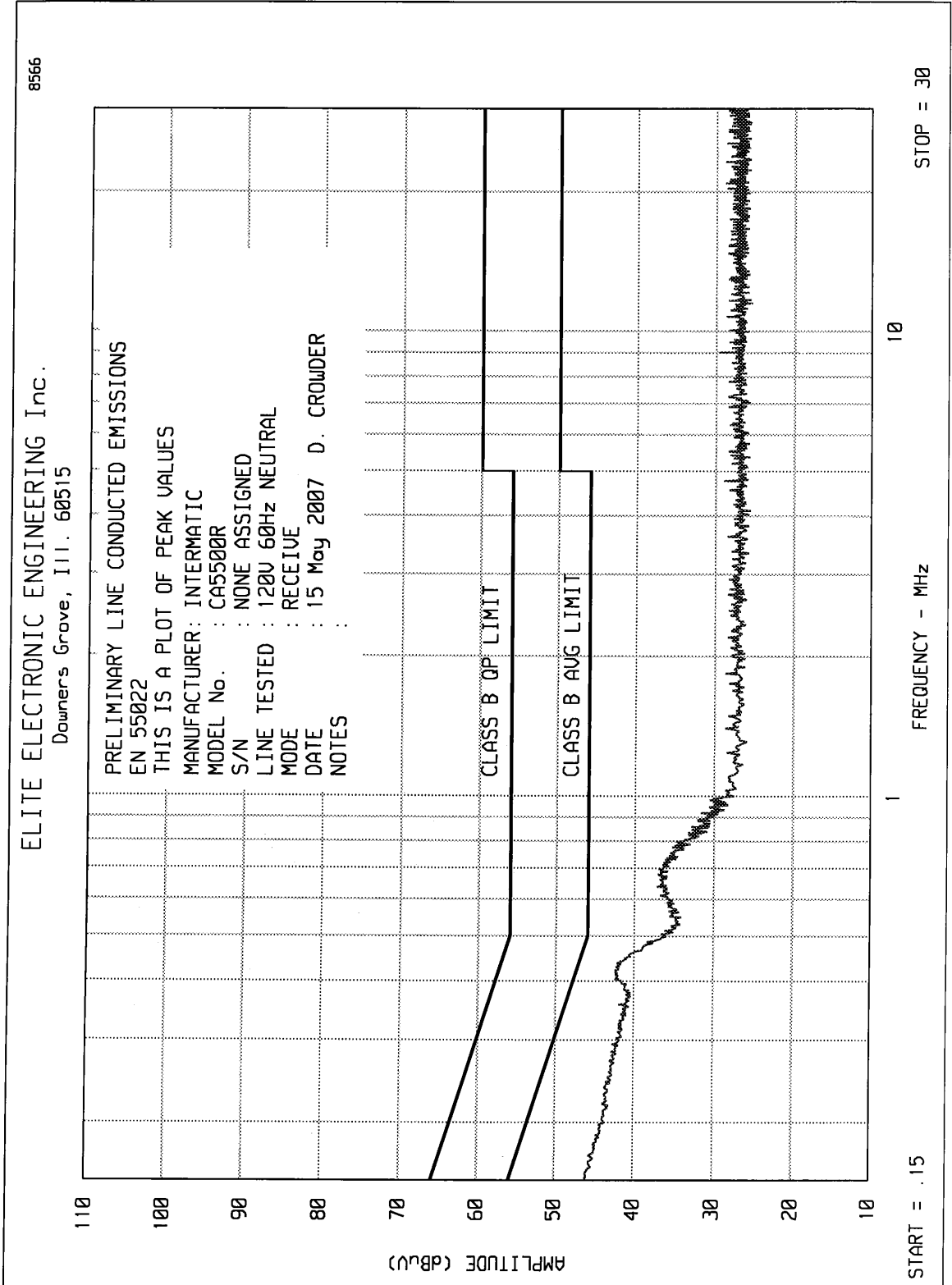


Test Set-up for Radiated Emissions – 908MHz - Horizontal Polarization - Transmitter



Test Set-up for Radiated Emissions – 908MHz – Vertical Polarization – Transmitter







ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : INTERMATIC
MODEL : CA5500R
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V 60Hz HIGH
MODE : RECEIVE
DATE : 15 May 2007
NOTES :
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.150	36.1	66.0		56.0	
.240	33.1	62.1		52.1	
.407	29.4	57.7		47.7	
.444	27.5	57.0		47.0	
.840	26.1	56.0		46.0	
1.870	25.8	56.0		46.0	
3.203	25.7	56.0		46.0	
4.565	25.6	56.0		46.0	
7.362	25.3	60.0		50.0	
8.803	25.3	60.0		50.0	
12.149	25.4	60.0		50.0	
15.368	25.3	60.0		50.0	
17.963	25.4	60.0		50.0	
21.148	25.4	60.0		50.0	
24.463	25.4	60.0		50.0	
27.893	25.3	60.0		50.0	

CHECKED BY:


D. CROWDER



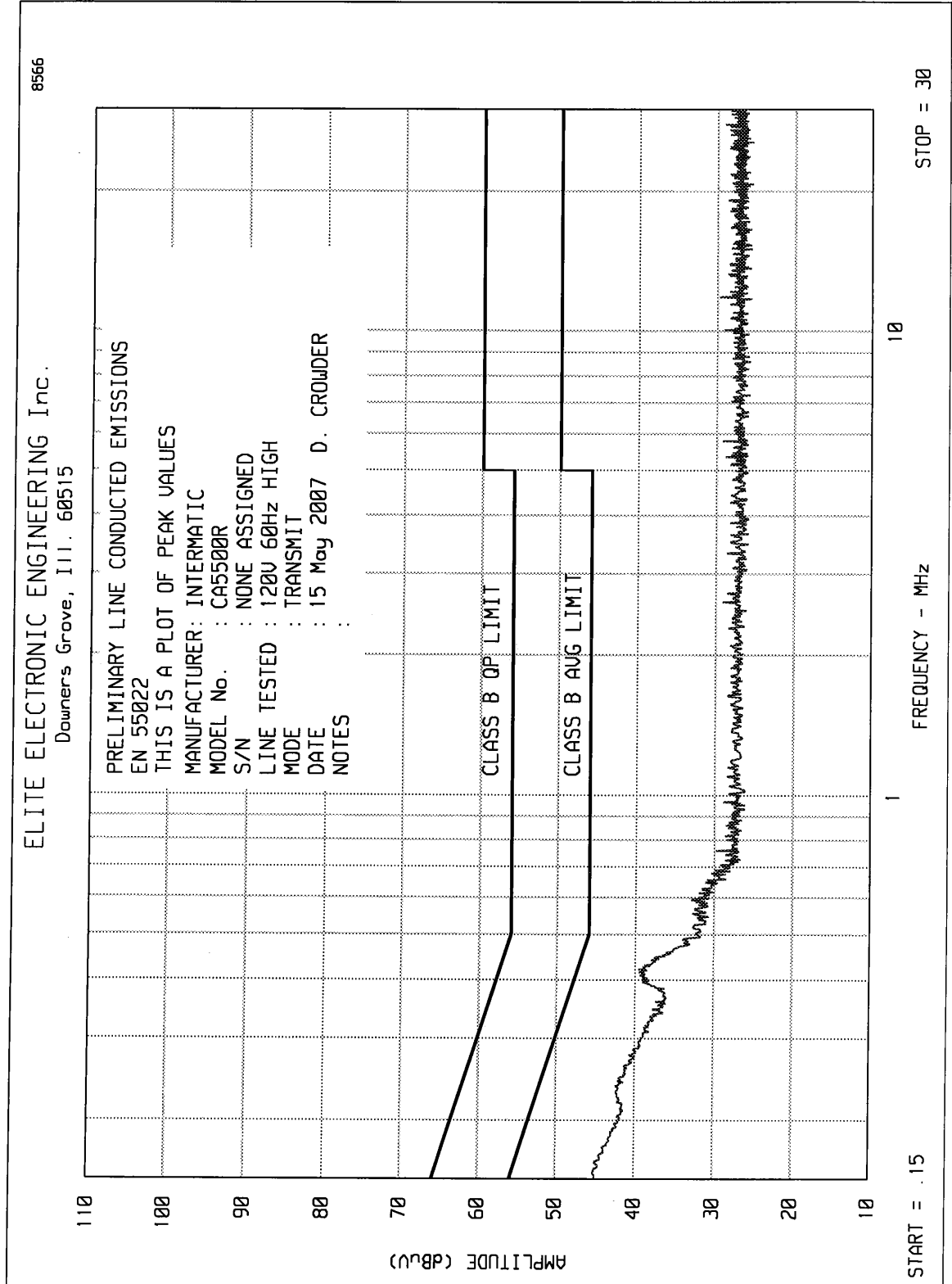
ETR No.
ELITE ELECTRONIC ENGINEERING CO.

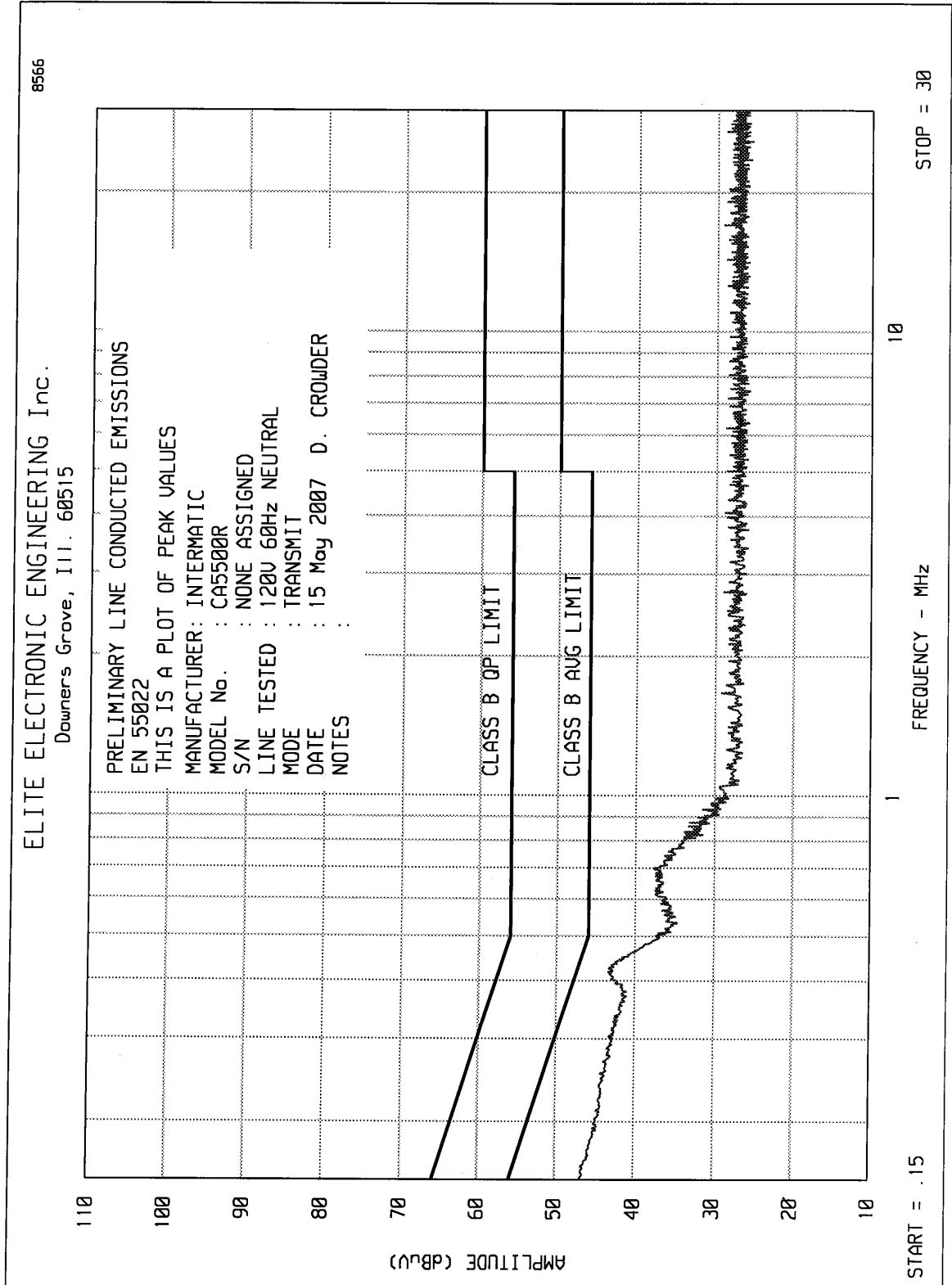
MANUFACTURER : INTERMATIC
MODEL : CA5500R
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V 60Hz NEUTRAL
MODE : RECEIVE
DATE : 15 May 2007
NOTES :
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.150	36.9	66.0		56.0	
.160	36.1	65.5		55.5	
.240	34.5	62.1		52.1	
.413	33.1	57.6		47.6	
.448	31.8	56.9		46.9	
.629	27.8	56.0		46.0	
.818	26.3	56.0		46.0	
1.820	25.8	56.0		46.0	
3.575	25.7	56.0		46.0	
4.718	25.7	56.0		46.0	
6.991	25.4	60.0		50.0	
9.607	25.3	60.0		50.0	
12.848	25.3	60.0		50.0	
15.218	25.3	60.0		50.0	
17.978	25.3	60.0		50.0	
21.688	25.3	60.0		50.0	
24.093	25.1	60.0		50.0	
26.759	25.3	60.0		50.0	

CHECKED BY:


D. CROWDER








ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : INTERMATIC
MODEL : CA5500R
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V 60Hz HIGH
MODE : TRANSMIT
DATE : 15 May 2007
NOTES :
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.150	36.2	66.0		56.0	
.244	33.1	62.0		52.0	
.411	30.1	57.6		47.6	
.443	28.1	57.0		47.0	
.955	26.0	56.0		46.0	
2.270	25.7	56.0		46.0	
3.287	25.7	56.0		46.0	
4.595	25.6	56.0		46.0	
7.015	25.4	60.0		50.0	
9.011	25.3	60.0		50.0	
11.758	25.3	60.0		50.0	
16.602	25.3	60.0		50.0	
18.427	25.3	60.0		50.0	
21.602	25.3	60.0		50.0	
24.693	25.4	60.0		50.0	
27.793	25.3	60.0		50.0	

CHECKED BY: 
D. CROWDER



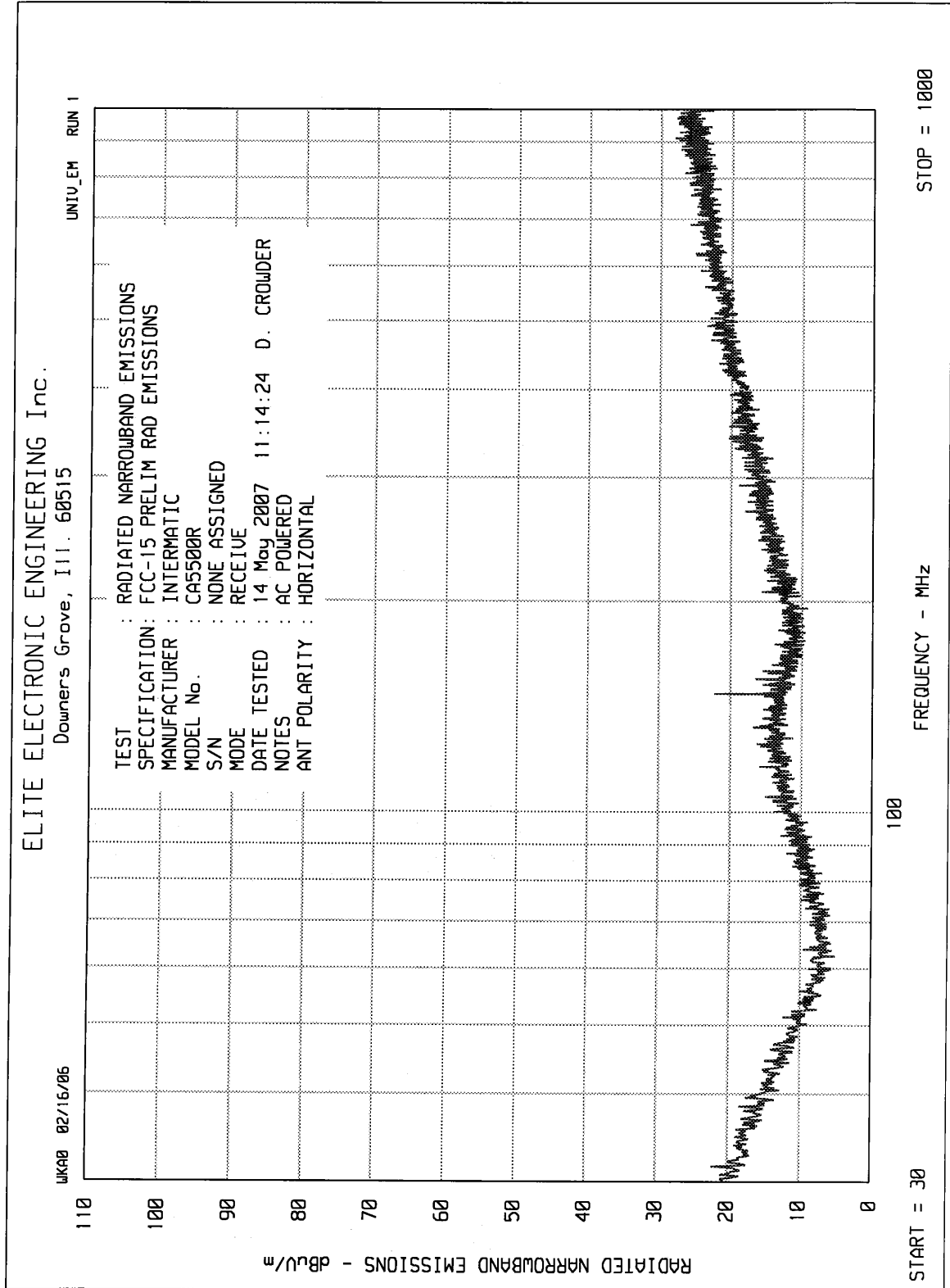
ETR No.
ELITE ELECTRONIC ENGINEERING CO.

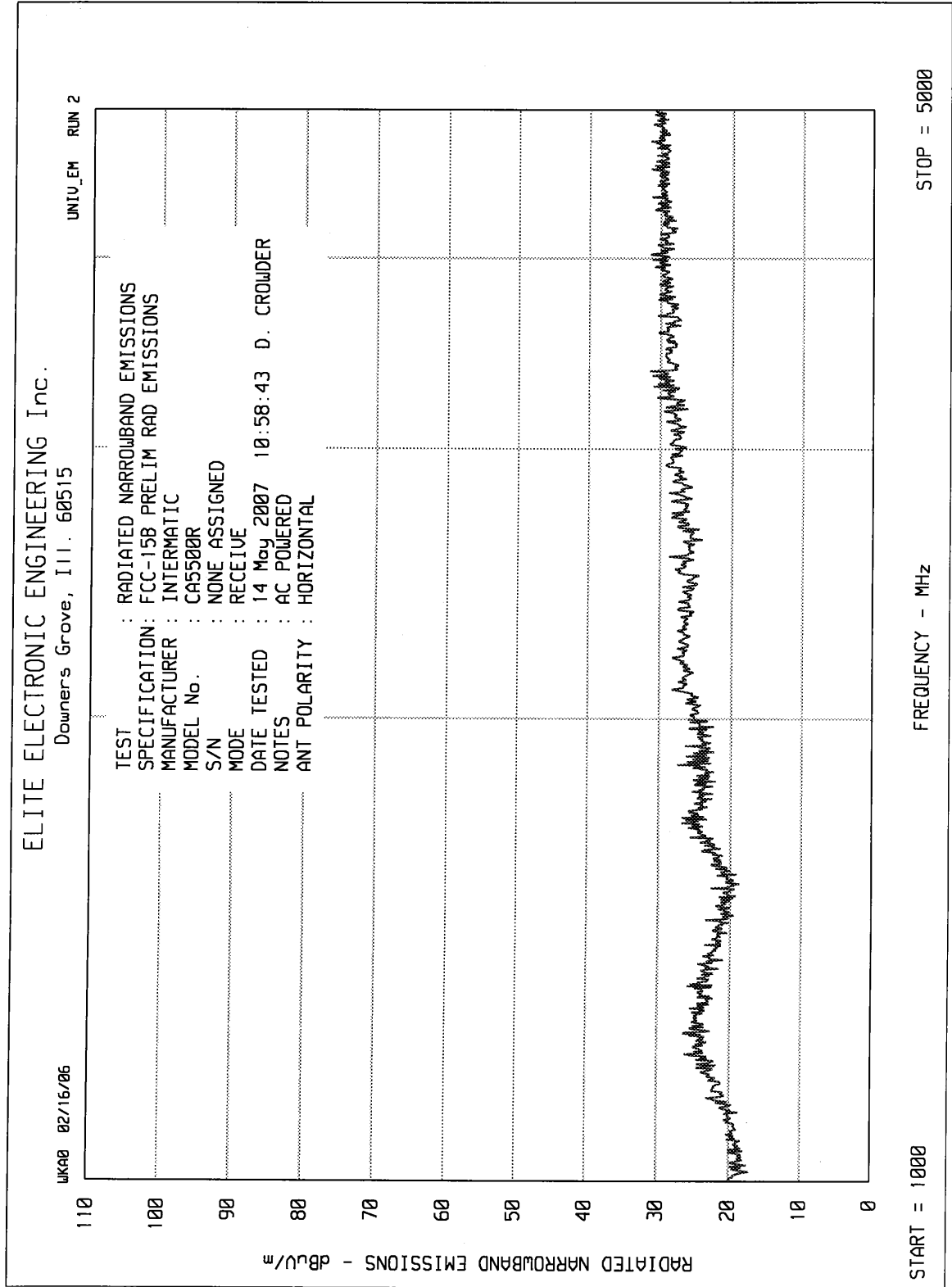
MANUFACTURER : INTERMATIC
MODEL : CA5500R
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V 60Hz NEUTRAL
MODE : TRANSMIT
DATE : 15 May 2007
NOTES :
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.150	37.2	66.0		56.0	
.242	34.7	62.0		52.0	
.414	33.6	57.6		47.6	
.447	32.0	56.9		46.9	
.687	28.1	56.0		46.0	
.825	26.4	56.0		46.0	
1.240	26.0	56.0		46.0	
2.730	25.7	56.0		46.0	
4.385	25.7	56.0		46.0	
6.179	25.4	60.0		50.0	
8.899	25.4	60.0		50.0	
11.353	25.4	60.0		50.0	
14.298	25.4	60.0		50.0	
16.993	25.3	60.0		50.0	
20.328	25.3	60.0		50.0	
23.188	25.3	60.0		50.0	
25.393	25.4	60.0		50.0	

CHECKED BY:

D. CROWDER







MANUFACTURER : Intermatic
TEST ITEM : Transceiver
MODEL NO. : CA5500R
SERIAL NO. : None Assigned
TEST SPECIFICATION : FCC 15.109(a), Radiated Emissions
MODE : Receive @ 908.2MHz, AC Powered
TEST DATE : May 14, 2007
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Preamp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
908.2	H	4.5	Ambient	1.9	22.3	0.0	28.7	27.4	200.0
908.2	V	4.7	Ambient	1.9	22.3	0.0	28.9	28.0	200.0
1816.4	H	43.9	Ambient	2.9	28.1	-36.3	38.5	84.4	500.0
1816.4	V	43.7	Ambient	2.9	28.1	-36.3	38.3	82.5	500.0
2724.6	H	41.2	Ambient	3.8	31.4	-35.9	40.5	105.6	500.0
2724.6	V	41.3	Ambient	3.8	31.4	-35.9	40.6	106.8	500.0
3632.8	H	41.0	Ambient	4.4	32.5	-35.6	42.3	130.9	500.0
3632.8	V	40.5	Ambient	4.4	32.5	-35.6	41.8	123.6	500.0
4541.0	H	41.4	Ambient	4.8	32.9	-35.3	43.8	155.7	500.0
4541.0	V	41.0	Ambient	4.8	32.9	-35.3	43.4	148.7	500.0

H – Horizontal

V = Vertical

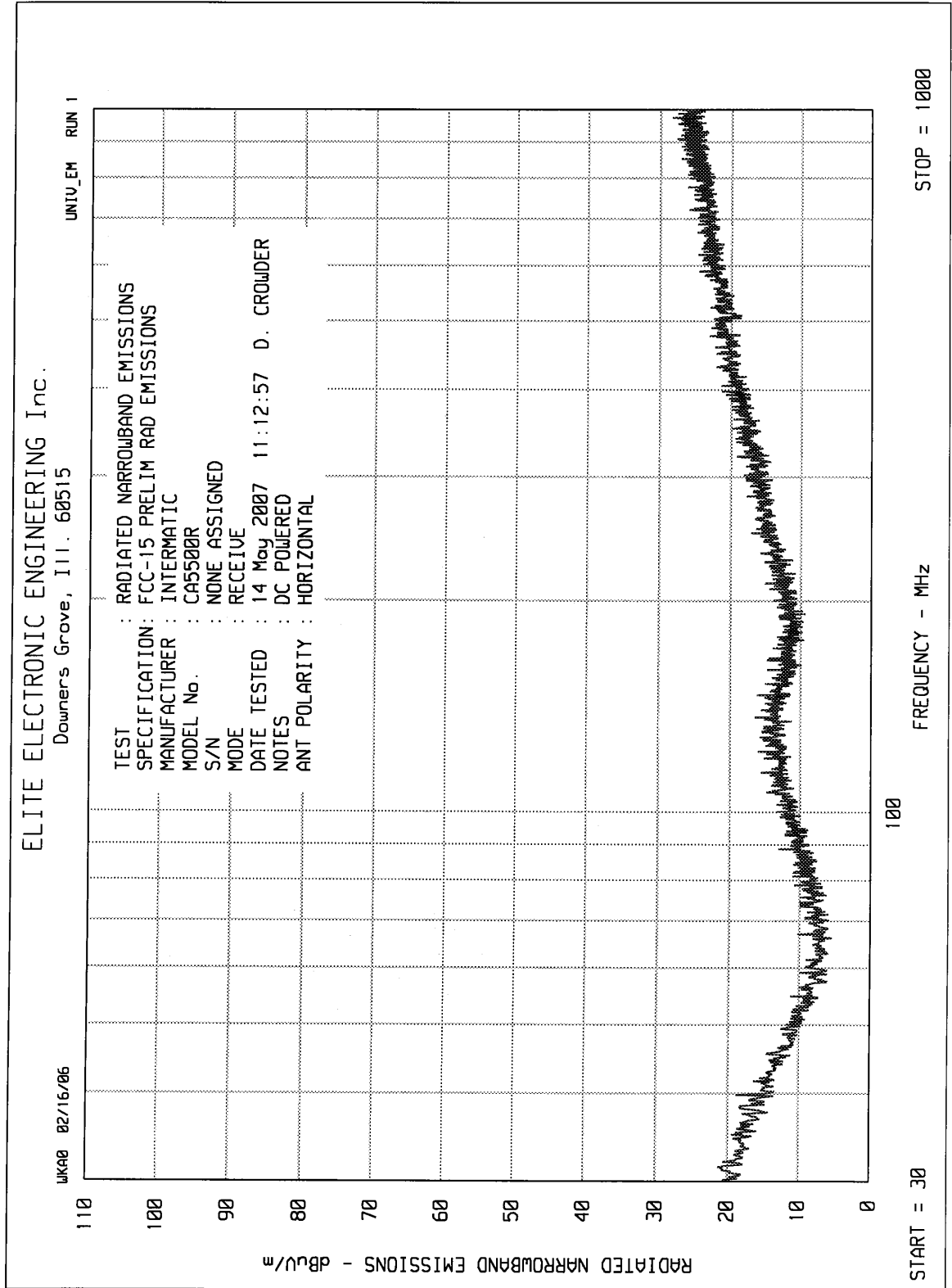
Quasi-Peak detector used for all measurements below 1GHz.

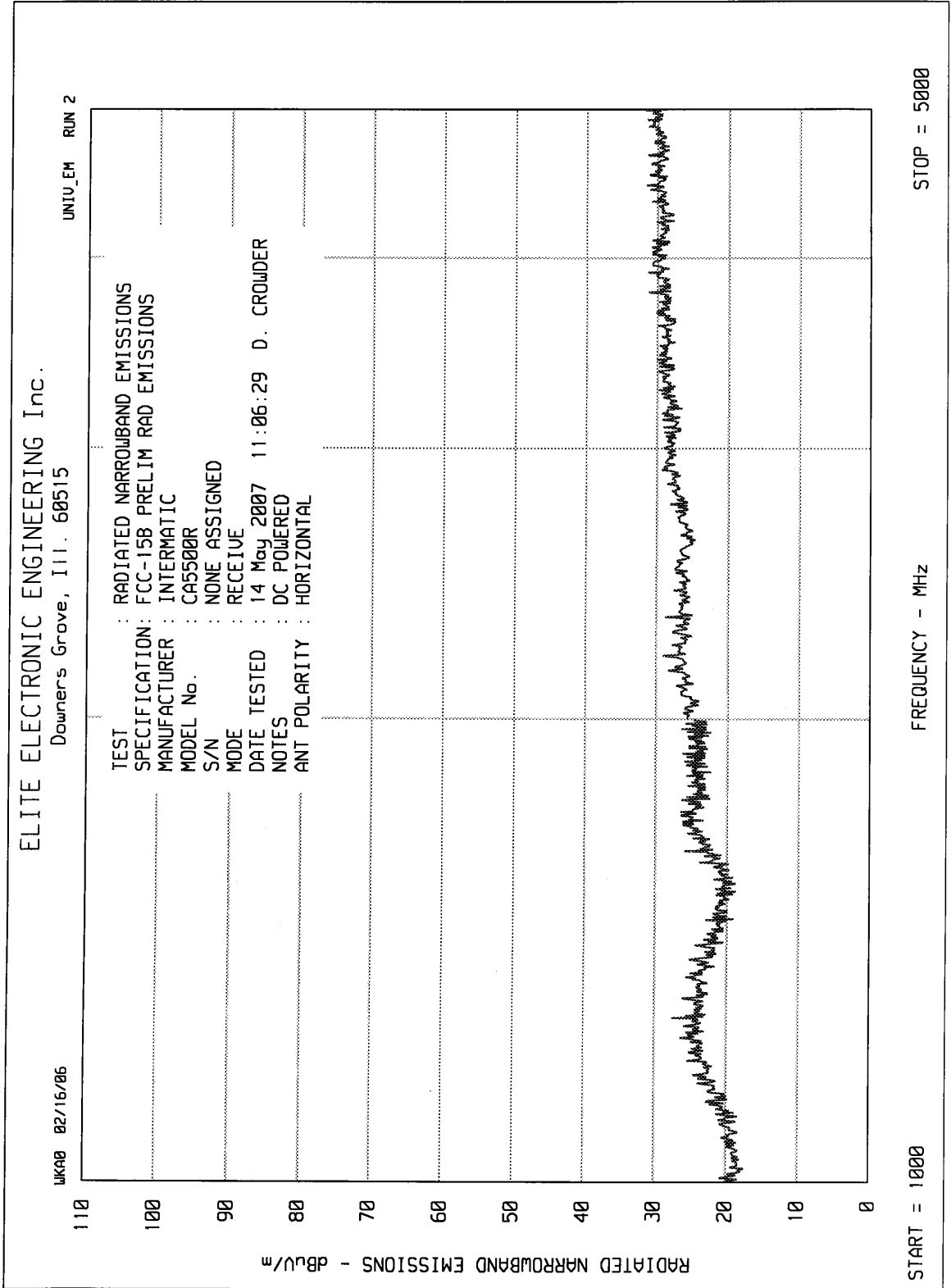
Average detector used for all measurements above 1GHz.

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Checked By : 









MANUFACTURER : Intermatic
TEST ITEM : Transceiver
MODEL NO. : CA5500R
SERIAL NO. : None Assigned
TEST SPECIFICATION : FCC 15.109(a), Radiated Emissions
MODE : Receive @ 908.2MHz, DC Powered
TEST DATE : May 14, 2007
TEST DISTANCE : 3 meters

Frequenc y MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Preamp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
908.2	H	4.5	Ambient	1.9	22.3	0.0	28.7	27.4	200.0
908.2	V	4.7	Ambient	1.9	22.3	0.0	28.9	28.0	200.0
1816.4	H	43.9	Ambient	2.9	28.1	-36.3	38.5	84.4	500.0
1816.4	V	43.7	Ambient	2.9	28.1	-36.3	38.3	82.5	500.0
2724.6	H	41.2	Ambient	3.8	31.4	-35.9	40.5	105.6	500.0
2724.6	V	41.3	Ambient	3.8	31.4	-35.9	40.6	106.8	500.0
3632.8	H	41.0	Ambient	4.4	32.5	-35.6	42.3	130.9	500.0
3632.8	V	40.5	Ambient	4.4	32.5	-35.6	41.8	123.6	500.0
4541.0	H	41.4	Ambient	4.8	32.9	-35.3	43.8	155.7	500.0
4541.0	V	41.0	Ambient	4.8	32.9	-35.3	43.4	148.7	500.0

H – Horizontal
V = Vertical

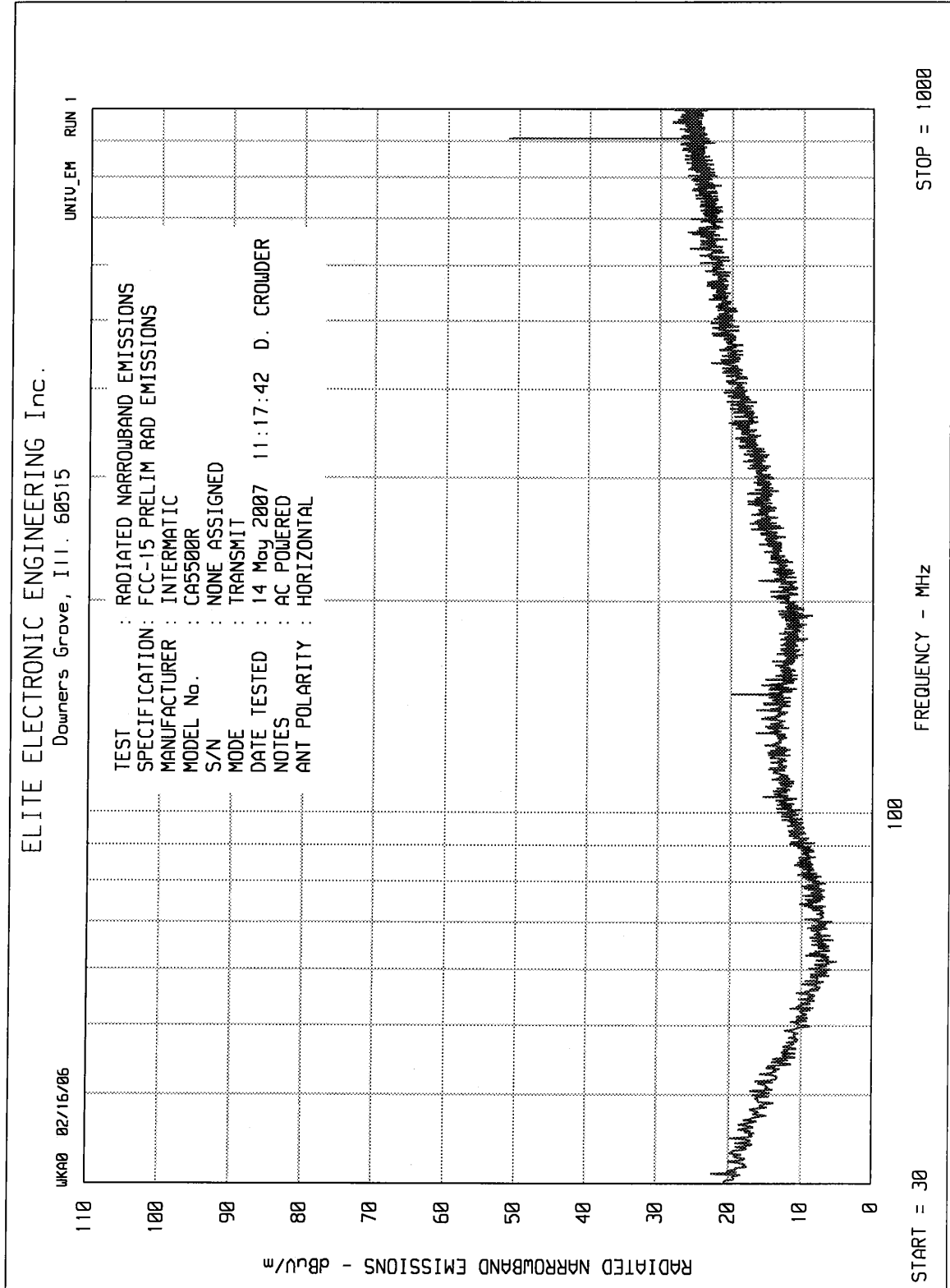
Quasi-Peak detector used for all measurements below 1GHz.

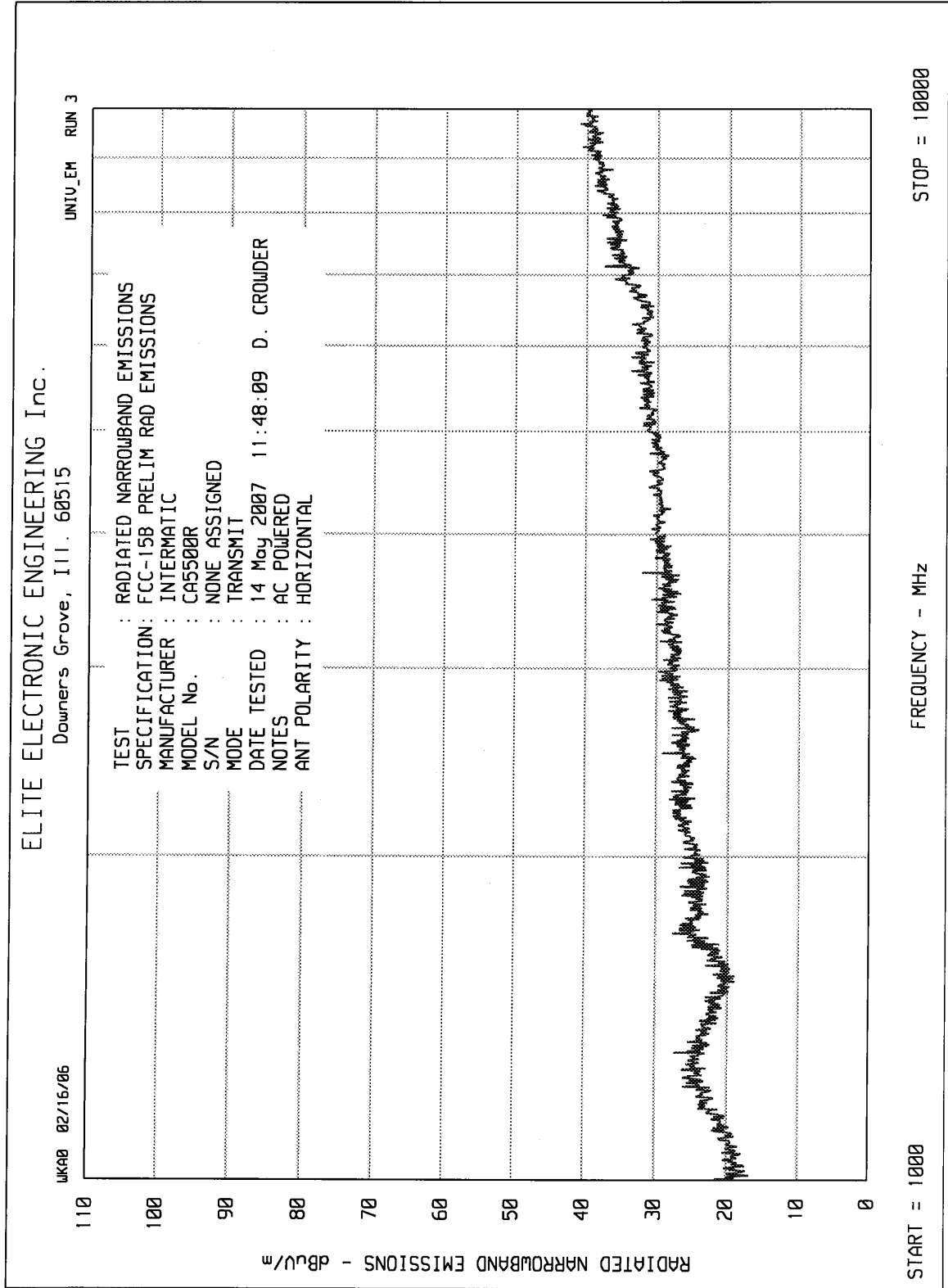
Average detector used for all measurements above 1GHz.

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain



Checked By : 







MANUFACTURER : Intermatic
 TEST ITEM : Transceiver
 MODEL NO. : CA5500R
 SERIAL NO. : None Assigned
 TEST SPECIFICATION : FCC 15.249(a), Radiated Emissions
 MODE : Transmit @ 908.4MHz, AC Powered
 TEST DATE : May 14, 2007
 TEST DISTANCE : 3 meters

Frequenc y MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Preamp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
908.4	H	38.5		1.9	22.3	0.0	62.7	1372.1	50000.0
908.4	V	47.4		1.9	22.3	0.0	71.6	3822.8	50000.0
1816.8	H	44.2	Ambient	2.9	28.1	-36.3	38.8	87.4	500.0
1816.8	V	44.4	Ambient	2.9	28.1	-36.3	39.0	89.4	500.0
2725.3	H	41.9	Ambient	3.8	31.4	-35.9	41.2	114.5	500.0
2725.3	V	41.8	Ambient	3.8	31.4	-35.9	41.1	113.2	500.0
3633.7	H	40.7	Ambient	4.4	32.5	-35.6	42.0	126.5	500.0
3633.7	V	41.6	Ambient	4.4	32.5	-35.6	42.9	140.3	500.0
4542.1	H	41.2	Ambient	4.8	32.9	-35.3	43.6	152.2	500.0
4542.1	V	41.5	Ambient	4.8	32.9	-35.3	43.9	157.5	500.0
5450.5	H	38.3	Ambient	5.2	35.3	-35.2	43.7	152.5	500.0
5450.5	V	38.8	Ambient	5.2	35.3	-35.2	44.2	161.6	500.0
6358.9	H	40.6	Ambient	5.9	36.1	-35.3	47.3	232.6	500.0
6358.9	V	40.2	Ambient	5.9	36.1	-35.3	46.9	222.1	500.0
7267.4	H	39.7	Ambient	6.6	37.7	-35.6	48.4	264.3	500.0
7267.4	V	40.4	Ambient	6.6	37.7	-35.6	49.1	286.5	500.0
8175.8	H	40.9	Ambient	7.1	37.7	-35.8	49.9	311.8	500.0
8175.8	V	40.8	Ambient	7.1	37.7	-35.8	49.8	308.2	500.0
9084.2	H	42.3	Ambient	7.5	38.0	-36.2	51.6	380.2	500.0
9084.2	V	40.8	Ambient	7.5	38.0	-36.2	50.1	319.9	500.0

H – Horizontal

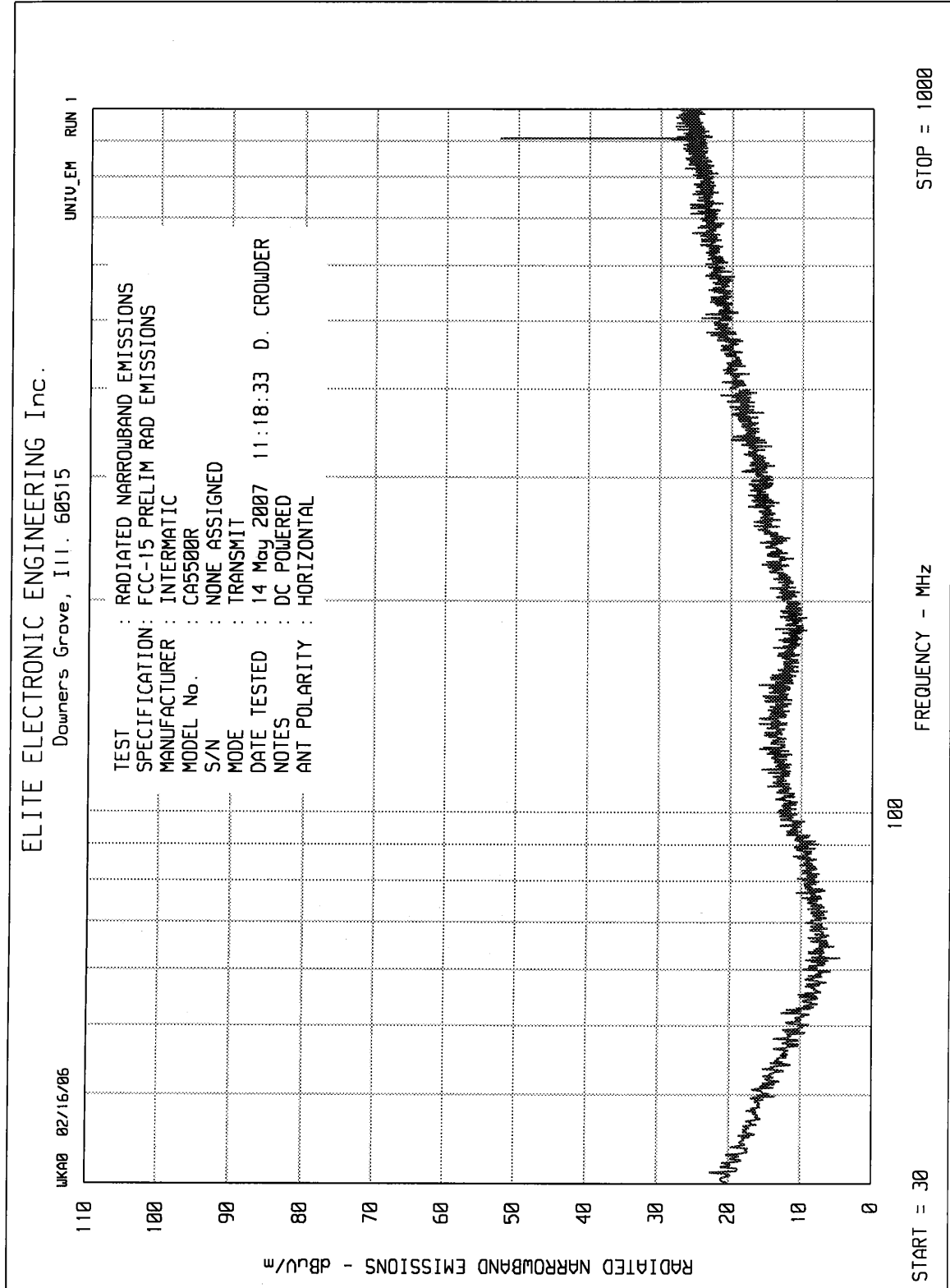
V = Vertical

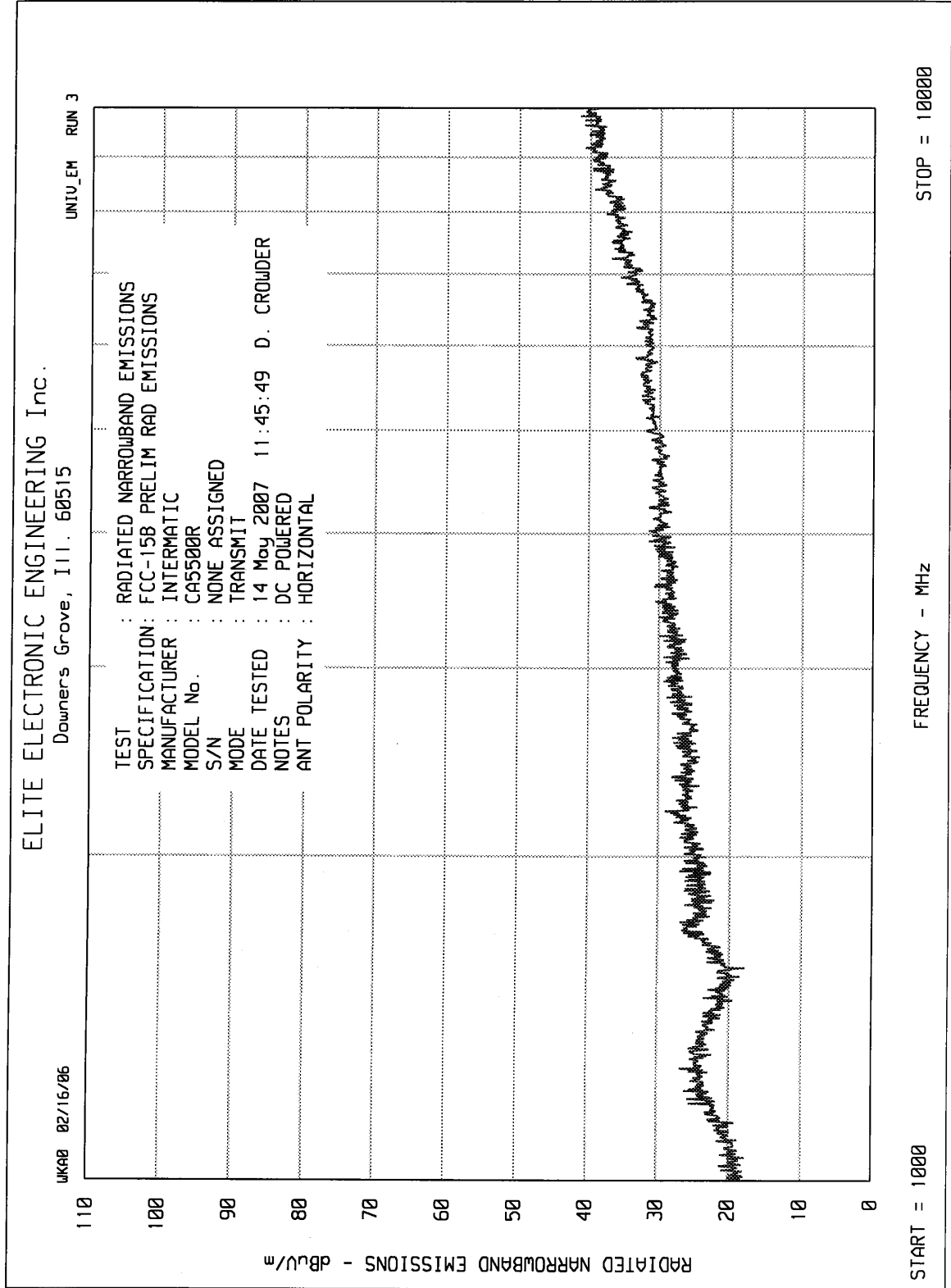
Quasi-Peak detector used for all measurements below 1GHz.

Average detector used for all measurements above 1GHz.

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Checked By : 







MANUFACTURER : Intermatic
 TEST ITEM : Transceiver
 MODEL NO. : CA5500R
 SERIAL NO. : None Assigned
 TEST SPECIFICATION : FCC 15.249(a), Radiated Emissions
 MODE : Transmit @ 908.4MHz, DC Powered
 TEST DATE : May 14, 2007
 TEST DISTANCE : 3 meters

Frequenc y MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Preamp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
908.4	H	46.8		1.9	22.3	0.0	71.0	3567.6	50000.0
908.4	V	48.1		1.9	22.3	0.0	72.3	4143.6	50000.0
1816.8	H	45.9	Ambient	2.9	28.1	-36.3	40.5	106.3	500.0
1816.8	V	44.3	Ambient	2.9	28.1	-36.3	38.9	88.4	500.0
2725.3	H	45.4	Ambient	3.8	31.4	-35.9	44.7	171.3	500.0
2725.3	V	44.2	Ambient	3.8	31.4	-35.9	43.5	149.2	500.0
3633.7	H	40.5	Ambient	4.4	32.5	-35.6	41.8	123.6	500.0
3633.7	V	40.4	Ambient	4.4	32.5	-35.6	41.7	122.2	500.0
4542.1	H	41.8	Ambient	4.8	32.9	-35.3	44.2	163.1	500.0
4542.1	V	41.2	Ambient	4.8	32.9	-35.3	43.6	152.2	500.0
5450.5	H	38.7	Ambient	5.2	35.3	-35.2	44.1	159.7	500.0
5450.5	V	38.9	Ambient	5.2	35.3	-35.2	44.3	163.4	500.0
6358.9	H	40.9	Ambient	5.9	36.1	-35.3	47.6	240.8	500.0
6358.9	V	40.8	Ambient	5.9	36.1	-35.3	47.5	238.0	500.0
7267.4	H	41.4	Ambient	6.6	37.7	-35.6	50.1	321.4	500.0
7267.4	V	40.7	Ambient	6.6	37.7	-35.6	49.4	296.5	500.0
8175.8	H	41.3	Ambient	7.1	37.7	-35.8	50.3	326.5	500.0
8175.8	V	40.9	Ambient	7.1	37.7	-35.8	49.9	311.8	500.0
9084.2	H	40.1	Ambient	7.5	38.0	-36.2	49.4	295.1	500.0
9084.2	V	40.1	Ambient	7.5	38.0	-36.2	49.4	295.1	500.0

H – Horizontal
 V = Vertical

Quasi-Peak detector used for all measurements below 1GHz.

Average detector used for all measurements above 1GHz.

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Checked By : 

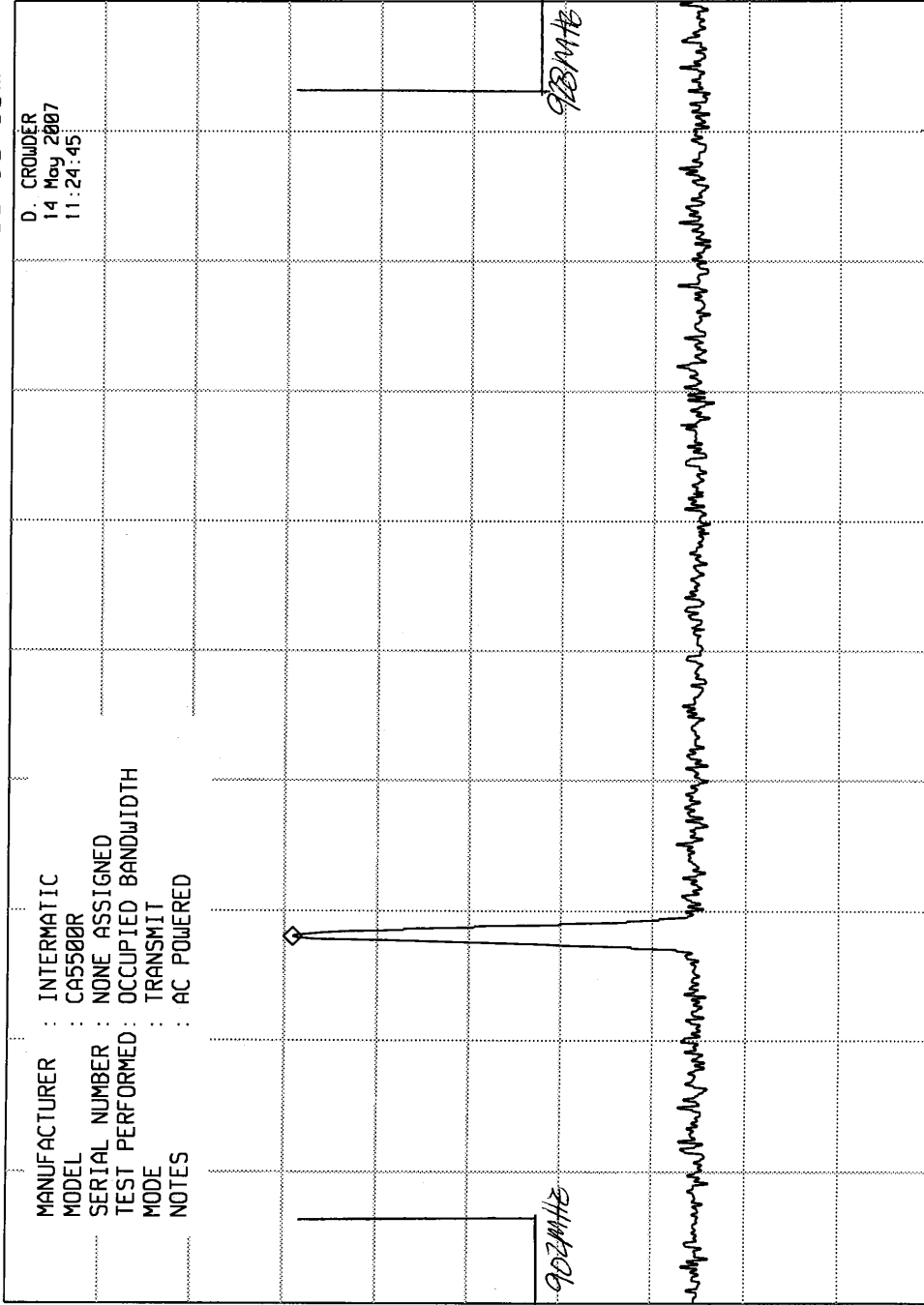
ELITE ELECTRONIC ENGINEERING Inc.

MKR 908.37 MHz
-60.90 dBm

REF -30.0 dBm ATTN 0 dB

hp

10 dB/
OFFSET
-20.0
dB



D. CROWDER
14 May 2007
11:24:45

MANUFACTURER : INTERMATIC
MODEL : CA5500R
SERIAL NUMBER : NONE ASSIGNED
TEST PERFORMED : OCCUPIED BANDWIDTH
MODE : TRANSMIT
NOTES : AC POWERED

STOP 930.0 MHz
SWP 22.5 msec

UBW 1 MHz

RES BW 100 kHz(i)

START 900.0 MHz

GENERAL
LIMIT

GENERAL
LIMIT

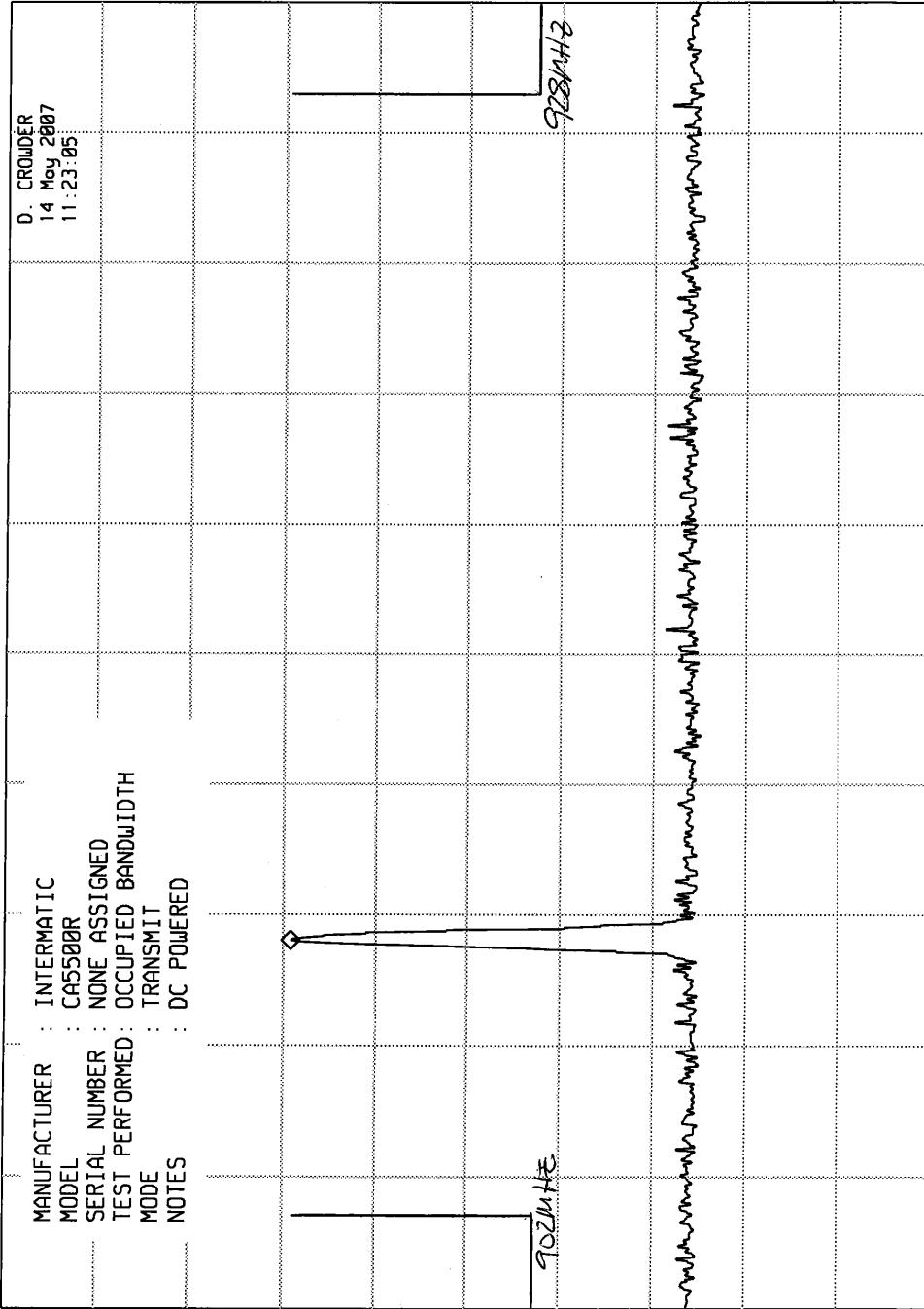
ELITE ELECTRONIC ENGINEERING Inc.

MKR 908.37 MHz
-60.80 dBm

REF -30.0 dBm ATTN 0 dB

hp 10 dB/

OFFSET
-20.0
dB



START 900.0 MHz
RES BW 100 kHz(i)

UBW 1 MHz

STOP 930.0 MHz
SWP 22.5 msec