Measurement of RF Interference from a Model CA3500 In-wall Receptacle

For : Intermatic
Spring Grove, IL

P.O. No. : 912824
Date Received : April 27, 2006
Date Tested : April 27 and 28, 2006
Test Personnel : Daniel E. Crowder
Specification : FCC "Code of Federal Regulations" Title 47 Part 15, Subpart B and Subpart C, Section 15.249 for Intentional Radiators Operating within the 902MHz to 928MHz band

Test Report By : Daniel E. Crowder

Witnessed by : Bryan Povish
Intermatic

Approved By : Raymond J. Klouda
Registered Professional Engineer of Illinois - 44894

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REVISION HISTORY

Revision	Date	Description
—	05/19/2006	Initial release

Measurement of RF Emissions from a model CA3500 In-wall Receptacle

1.0 INTRODUCTION:

1.1 Description of Test Item - This document represents the results of the series of radio interference measurements performed on a model CA3500 In-wall Receptacle, (hereinafter referred to as the test item). No serial number was assigned to the test item. The test item was manufactured and submitted for testing by Intermatic 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 for receivers, 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 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 C, dated 1 October 2005

- 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"

1.5 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.

1.6 Laboratory Conditions The temperature at the time of the test was 23°C and the relative humidity was 25%.

2.0 TEST ITEM SETUP AND OPERATION:

The test item is an In-wall Receptacle, model CA3500. A block diagram of the test item setup is shown as Figure 1.

2.1 Power Input - The test item obtained 120V 60Hz power via a 3 wire, one meter long, unshielded power cord. The high and low leads were connected through a line impedance stabilization network (LISN) which was located on the copper ground plane. The network complies with the requirements of Paragraph 4.1.2 of ANSI C63.4-2003.

2.2 Grounding - The test item was grounded through the third wire of its input power cord.

2.3 Peripheral Equipment - The test item was submitted for testing with no peripheral equipment.

2.4 Interconnect Cables - The test item has no ports for interconnect cables.

2.5 Operational Mode - For all tests, the test item was placed on an 80cm high non-conductive stand. The test item was energized. For the transmitter tests, the test item was set up so that upon power up it would transmit continuously at 908.4MHz. For the receiver tests, the test item was then reprogrammed so that upon power up it would receive continuously at 908.4MHz.

2.6 Test Item Modifications - The following modifications were required for compliance:

1. The antenna was lengthened to 8cm.

3.0 TEST EQUIPMENT:

3.1 Test Equipment List - A list of the test equipment used can be found on Table I. All equipment was calibrated per the instruction manuals supplied by the manufacturer.

3.2 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).

3.3 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 for these tests is presented below:

Conducted Emission Measurements		
Combined Standard Uncertainty	1.07	-1.07
Expanded Uncertainty (95% confidence)	2.1	-2.1

Radiated Emission Measurements		
Combined Standard Uncertainty	2.26	-2.18
Expanded Uncertainty (95% confidence)	4.5	-4.4

4.0 REQUIREMENTS, PROCEDURES AND RESULTS:

4.1 Powerline Conducted Emissions

4.1.1 Requirements – All radio frequency voltages on the power lines for any frequency or frequencies of an intentional radiator shall not exceed the limits in the following table:

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.

4.1.2 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 ohm. Measurements were first made over the entire frequency range from 150kHz 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.

4.1.3 Results - The plots of the peak preliminary conducted voltage levels on each power line with the test item in receiver mode are presented on pages 16 and 17. The conducted limit for receivers is shown as a reference. The final quasi-peak results are presented on pages 18 and 19.

The plots of the peak preliminary conducted voltage levels on each power line with the test item in transmit mode 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 setup for conducted emission levels are shown on Figure 2.

4.2 Radiated Measurements

4.2.1 Receiver

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

RADIATION LIMITS FOR RECEIVERS

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. Measurements are required up to 30MHz to 5GHz.

4.2.1.2 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 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.

4.2.1.3 Results - The preliminary plots, with the test item receiving at 908.4MHz, 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. The emissions level closet to the limit (worst case) occurred at 908.4MHz. The emissions level at this frequency was 2.3dB within the limit. Photographs of the test configuration which yielded the highest or worst case, radiated emission levels are shown on Figure 3.

4.2.2 Transmitters -

4.2.2.1 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 meters	Field Strength Harmonics and Spurious uV/m @ 3 meters
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.

4.2.2.2 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 10GHz 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 bilog 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.
(4) For hand-held or body-worn devices, the test item was rotated through three orthogonal axes to determine which orientation produces the highest emission relative to the limit.

4.2.2.3 Results - The preliminary plots, with the test item transmitting at 908.4MHz, are presented on data pages 27 and 28. 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, are presented on data page 29. As can be seen from the data, all emissions measured from the test item were within the specification limits. The emissions level closet to the limit (worst case) occurred at 2725.3MHz. The emissions level at this frequency was 0.7dB within the limit. Photographs of the test configuration which yielded the highest or worst case, radiated emission levels are shown on Figure 3.

4.3 Occupied Bandwidth Measurements

4.3.1 Requirement - 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.

4.3.2 Procedures - 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

33 MHz. The frequency spectrum near the fundamental was plotted.

4.3.3 Results - The plot of the emissions near the fundamental frequency is presented on data page 30. As can be seen from this data page, the transmitter met the occupied bandwidth requirements. In addition, the 99% emission bandwidth measured 150 kHz when using the analyzer's special function key with the measurement BW set to 30 kHz.

5.0 CONCLUSIONS:

It was determined that the Intermatic In-wall Receptacle, Part No. CA3500, did 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.

6.0 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.

7.0 ENDORSEMENT DISCLAIMER:

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

TABLE I: TEST 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								
XLJW	5W,50 OHM TERMINATION	JFW INDUSTRIES	50T-052	31	DC-2GHZ	10/10/05	12	10/10/06
XZG4	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	2223A01683	---		N/A	
Equipment Type: AMPLIFIERS								
APK4	PREAMPLIFIER OPT H02	HEWLETT PACKARD	8449B	3008A00329	1-26.5GHZ	01/27/06	12	01/27/07
Equipment Type: ANTENNAS								
NTA1	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL611	2054	0.03-2GHZ	08/08/05	12	08/08/06
NWH0	RIDGED WAVE GUIDE	TENSOR	4105	2081	1-12.4GHZ	10/01/05	12	10/01/06
Equipment Type: ATTENUATORS								
T1E1	10DB, 25W ATTENUATOR	WEINSCHEL	46-10-43	AU1883	DC-18GHZ	12/02/04	12	12/02/05
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	03/04/06	12	03/04/07
PLLA	50UH LISN 462D	ELITE	462D/70A	011	0.01-400MHZ	03/04/06	12	03/04/07
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	02/05/06	12	02/05/07
RAEC	SPECTRUM ANALYZER	HEWLETT PACKARD	8566B	3014A06690	100HZ-22GHZ	02/02/06	12	02/02/07
RAF3	QUASIPEAK ADAPTER	HEWLETT PACKARD	85650A	3303A01775	0.01-1000MHZ	02/04/06	12	02/04/07

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.

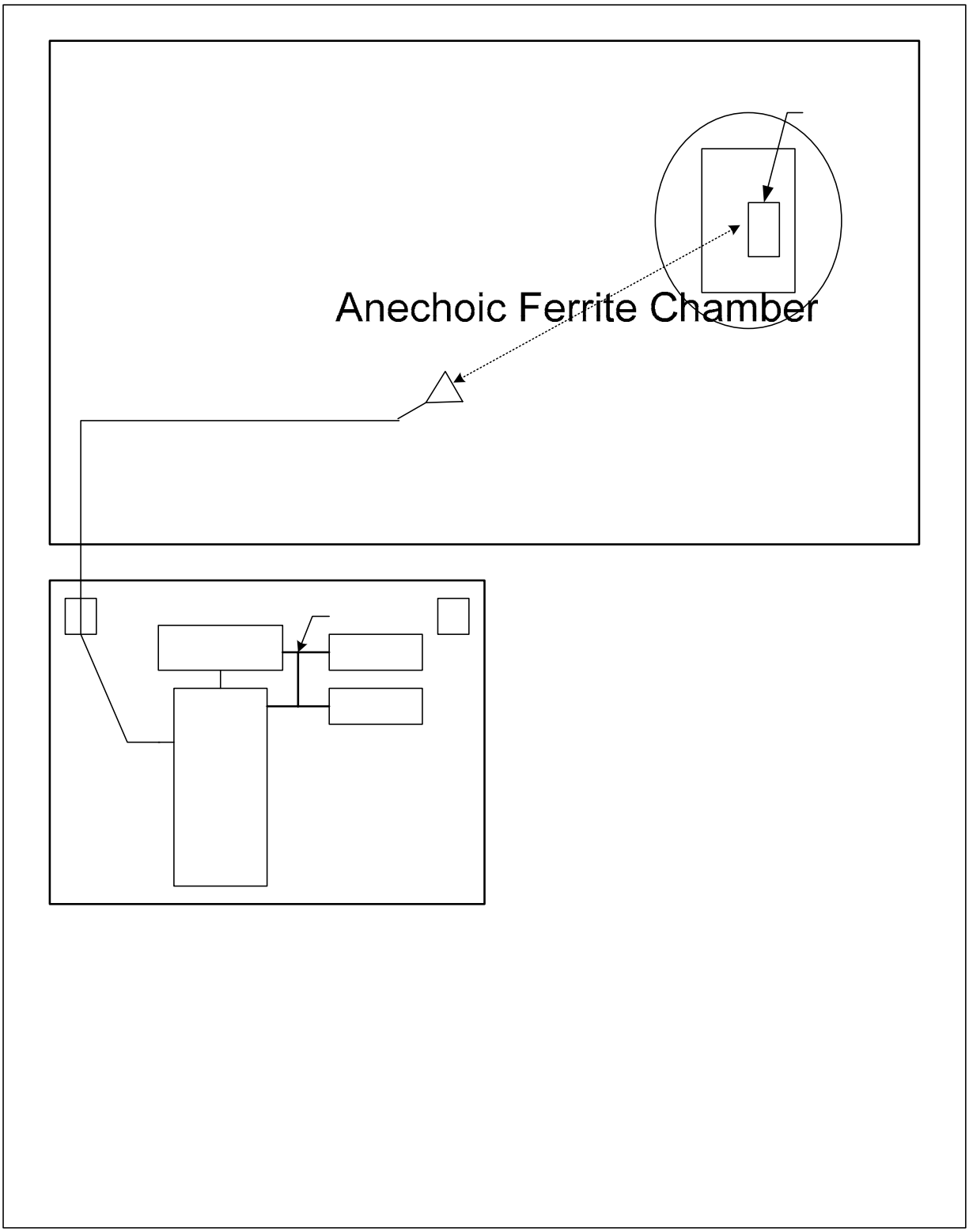
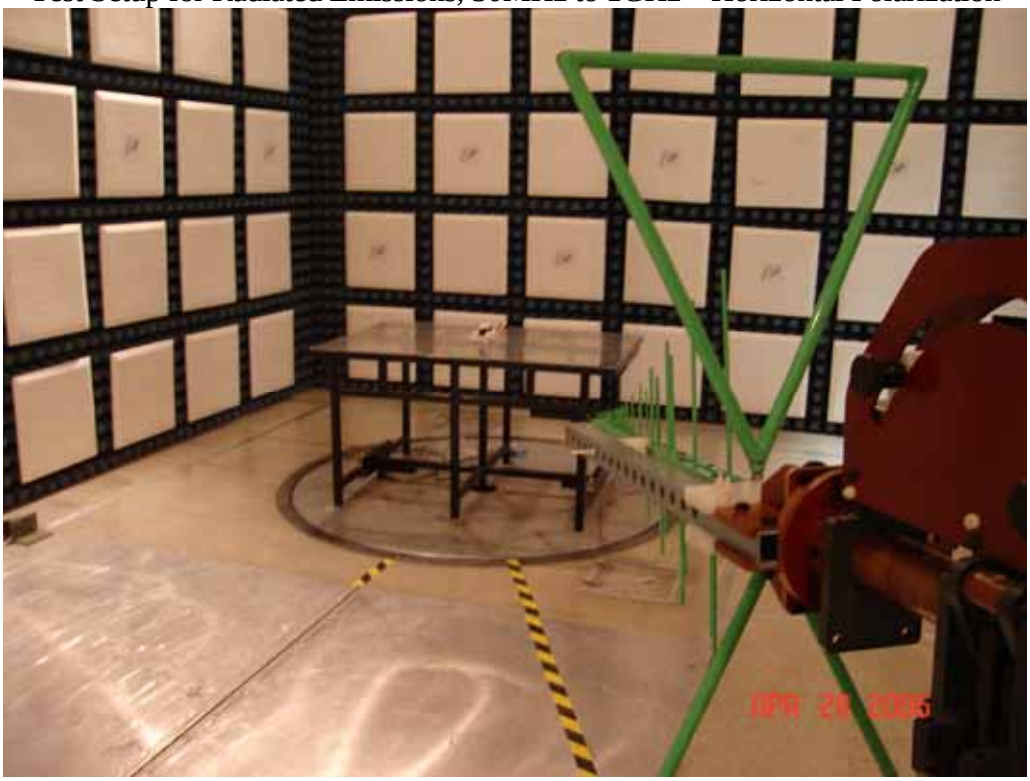

Anechoic Ferrite Chamber
Hpib cbl
Turn Table & Mast

Figure 2

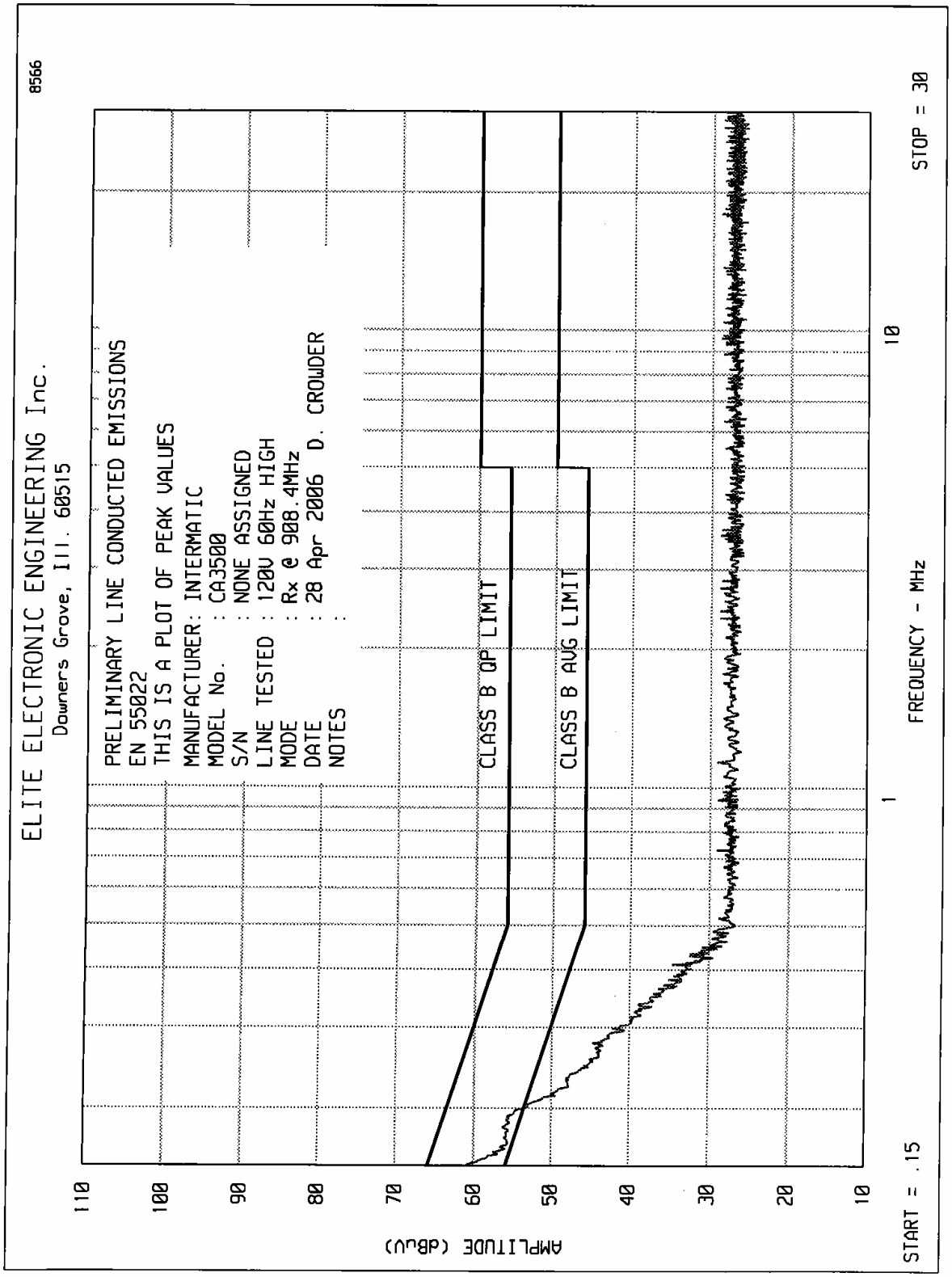
Test Setup for Conducted Emissions

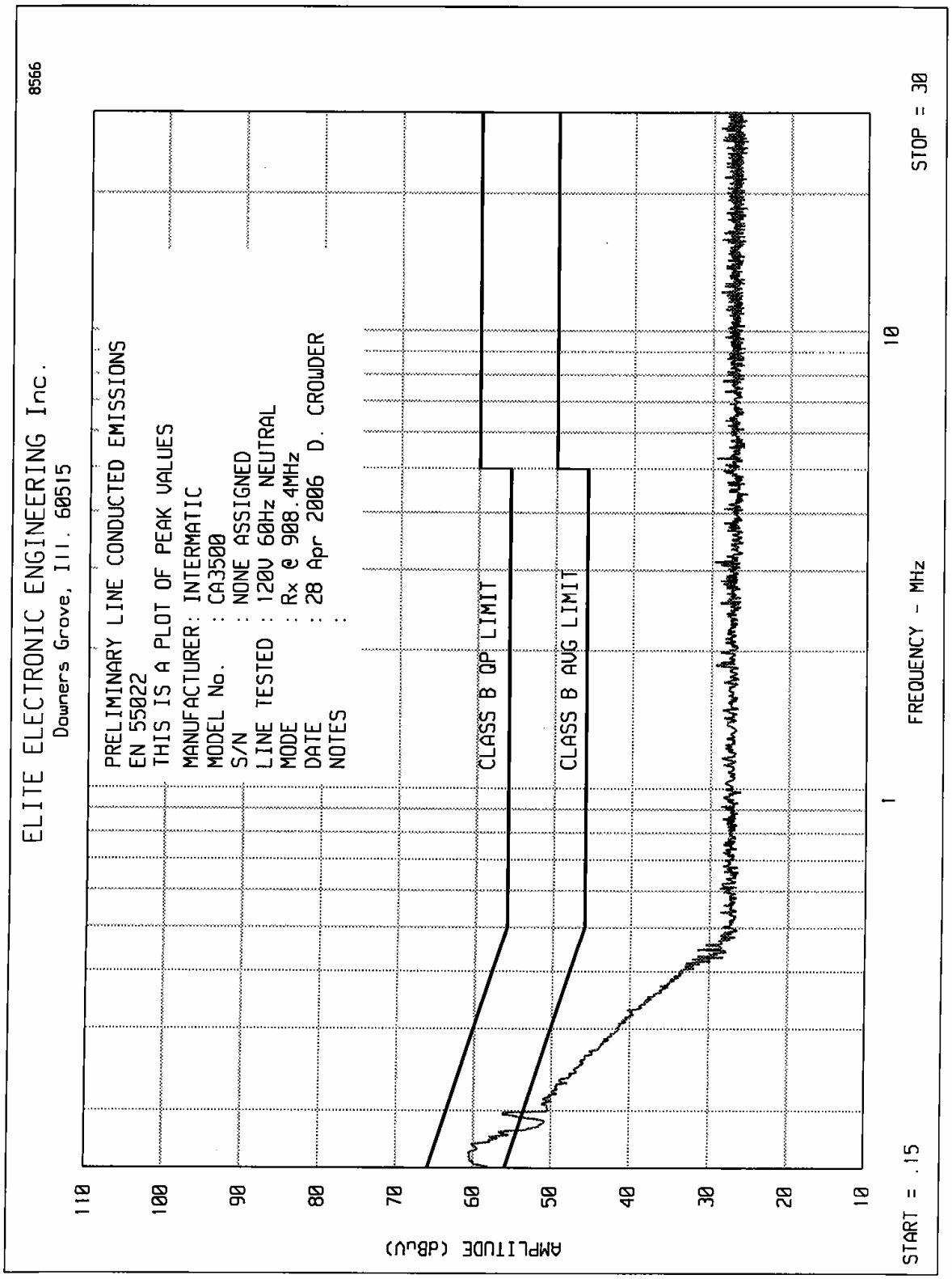
Figure 3

Test Setup for Radiated Emissions, 30MHz to 1GHz – Horizontal Polarization



Test Setup for Radiated Emissions, 30MHz to 1GHz – Vertical Polarization


8566
ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: INTERMATIC
MODEL No. : CA3500
S/N : NONE ASSIGNED
LINE TESTED : 120V 60Hz HIGH
MODE : Rx @ 908.4MHz
DATE : 28 Apr 2006 D. CROWDER
NOTES :
CLASS B QP LIMIT
CLASS B AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
START = .15
1
10
STOP = 30
FREQUENCY - MHz


8566
ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: INTERMATIC
MODEL No. : CA3500
S/N : NONE ASSIGNED
LINE TESTED : 120V 60Hz NEUTRAL
MODE : Rx @ 908.4MHz
DATE : 28 Apr 2006 D. CROWDER
NOTES :
CLASS B QP LIMIT
CLASS B AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
START = .15
1
10
STOP = 30
FREQUENCY - MHz

ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : INTERMATIC
MODEL : CA3500
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V 60Hz HIGH
MODE : Rx @ 908.4MHz
DATE : 28 Apr 2006
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
.153	48.7	65.9		55.9	
.181	46.4	64.4		54.4	
.245	38.4	61.9		51.9	
.328	29.8	59.5		49.5	
.347	28.4	59.0		49.0	
.687	26.4	56.0		46.0	
.929	26.0	56.0		46.0	
1.756	26.1	56.0		46.0	
3.567	26.0	56.0		46.0	
5.063	25.6	60.0		50.0	
6.271	25.7	60.0		50.0	
9.547	25.6	60.0		50.0	
11.653	25.7	60.0		50.0	
15.043	25.7	60.0		50.0	
18.378	25.6	60.0		50.0	
21.163	25.7	60.0		50.0	
24.448	25.7	60.0		50.0	
27.643	25.7	60.0		50.0	

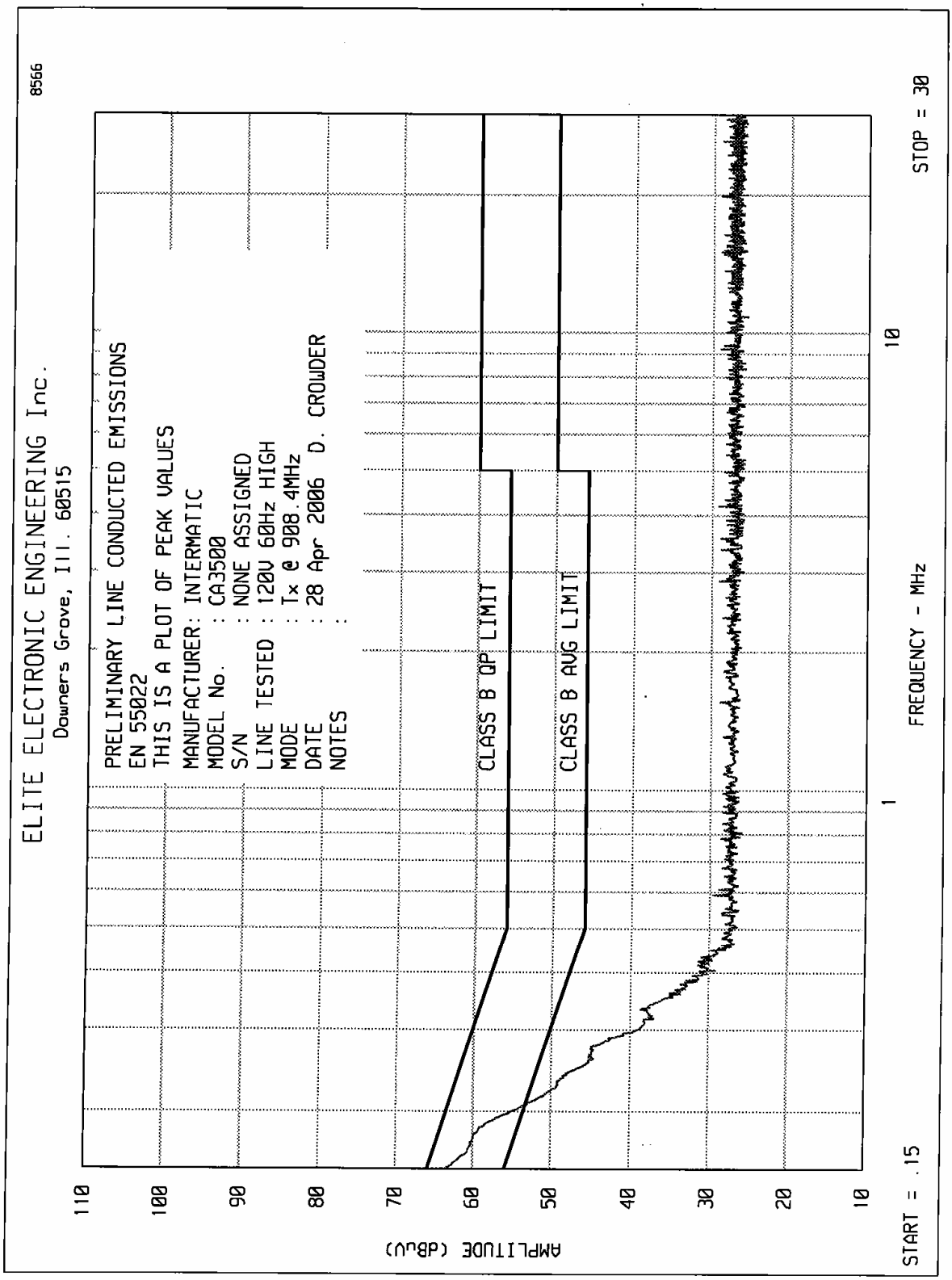
CHECKED BY: _____
D. CROWDER

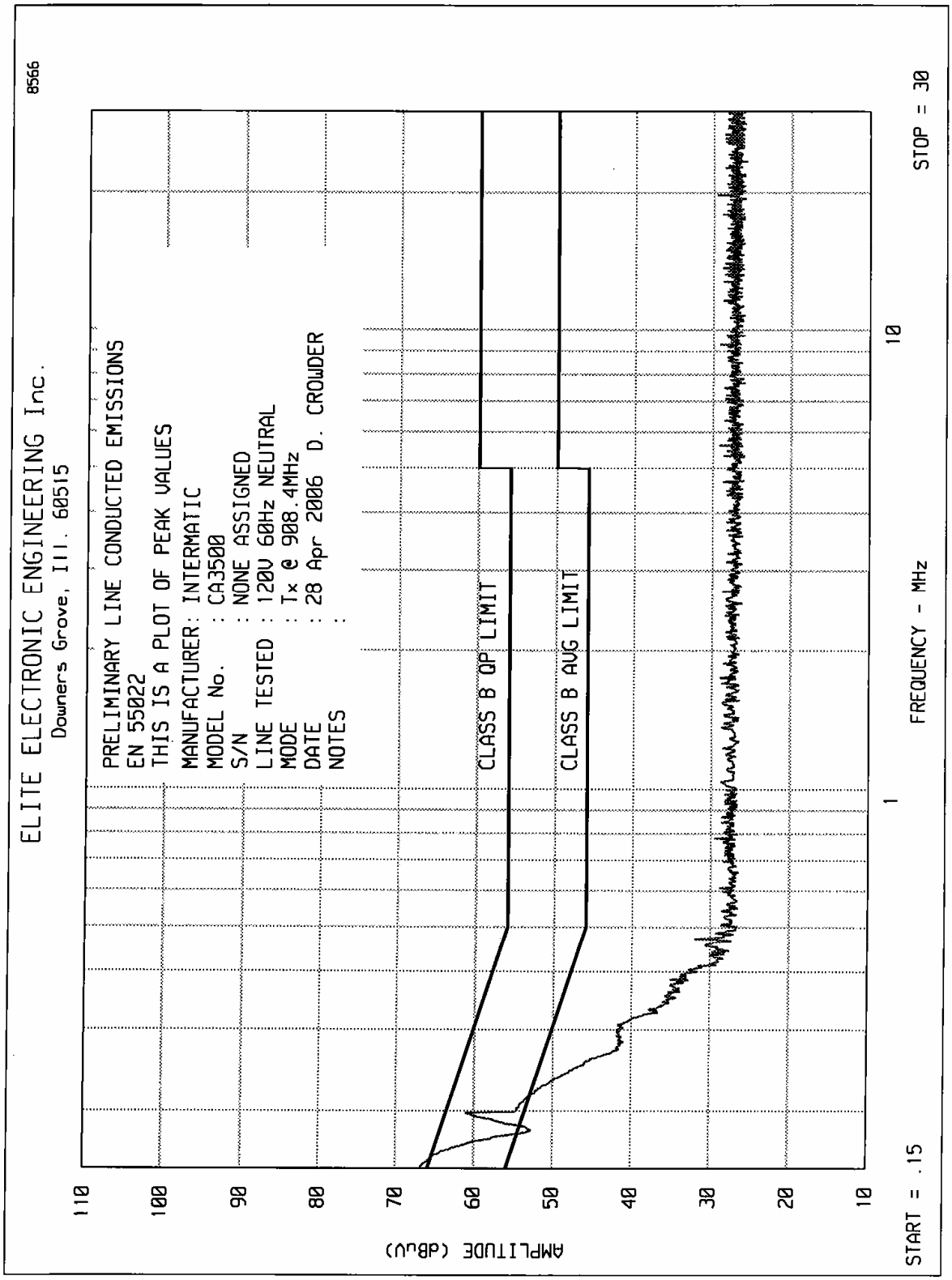
ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : INTERMATIC
MODEL : CA3500
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V 60Hz NEUTRAL
MODE : Rx @ 908.4MHz
DATE : 28 Apr 2006
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	53.1	66.0		56.0	
.182	44.4	64.4		54.4	
.248	38.2	61.8		51.8	
.345	28.0	59.1		49.1	
.448	26.1	56.9		46.9	
.903	26.3	56.0		46.0	
1.848	26.3	56.0		46.0	
3.092	26.2	56.0		46.0	
4.912	26.1	56.0		46.0	
6.915	25.7	60.0		50.0	
9.651	25.6	60.0		50.0	
12.293	25.6	60.0		50.0	
15.848	25.6	60.0		50.0	
19.017	25.6	60.0		50.0	
21.683	25.7	60.0		50.0	
24.352	25.6	60.0		50.0	
27.663	25.7	60.0		50.0	

CHECKED BY: _____
D. CROWDER


8566
ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: INTERMATIC
MODEL No. : CA3500
S/N : NONE ASSIGNED
LINE TESTED : 120V 60Hz HIGH
MODE : Tx @ 908.4MHz
DATE : 28 Apr 2006 D. CROWDER
NOTES :
CLASS B QP LIMIT
CLASS B AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
START = .15
1
10
STOP = 30
FREQUENCY - MHz


8566
ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: INTERMATIC
MODEL No. : CA3500
S/N : NONE ASSIGNED
LINE TESTED : 120V 60Hz NEUTRAL
MODE : Tx @ 908.4MHz
DATE : 28 Apr 2006 D. CROWDER
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CLASS B QP LIMIT
CLASS B AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
START = .15
1
10
STOP = 30
FREQUENCY - MHz

ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : INTERMATIC
MODEL : CA3500
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V 60Hz HIGH
MODE : Tx @ 908.4MHz
DATE : 28 Apr 2006
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
.153	51.7	65.8		55.8	
.181	48.7	64.4		54.4	
.243	38.4	62.0		52.0	
.486	26.2	56.2		46.2	
.833	26.3	56.0		46.0	
1.802	26.3	56.0		46.0	
3.158	26.0	56.0		46.0	
4.556	26.0	56.0		46.0	
7.259	25.7	60.0		50.0	
9.175	25.7	60.0		50.0	
12.503	25.6	60.0		50.0	
15.068	25.9	60.0		50.0	
19.743	25.6	60.0		50.0	
20.203	25.7	60.0		50.0	
24.413	25.6	60.0		50.0	
28.267	25.6	60.0		50.0	

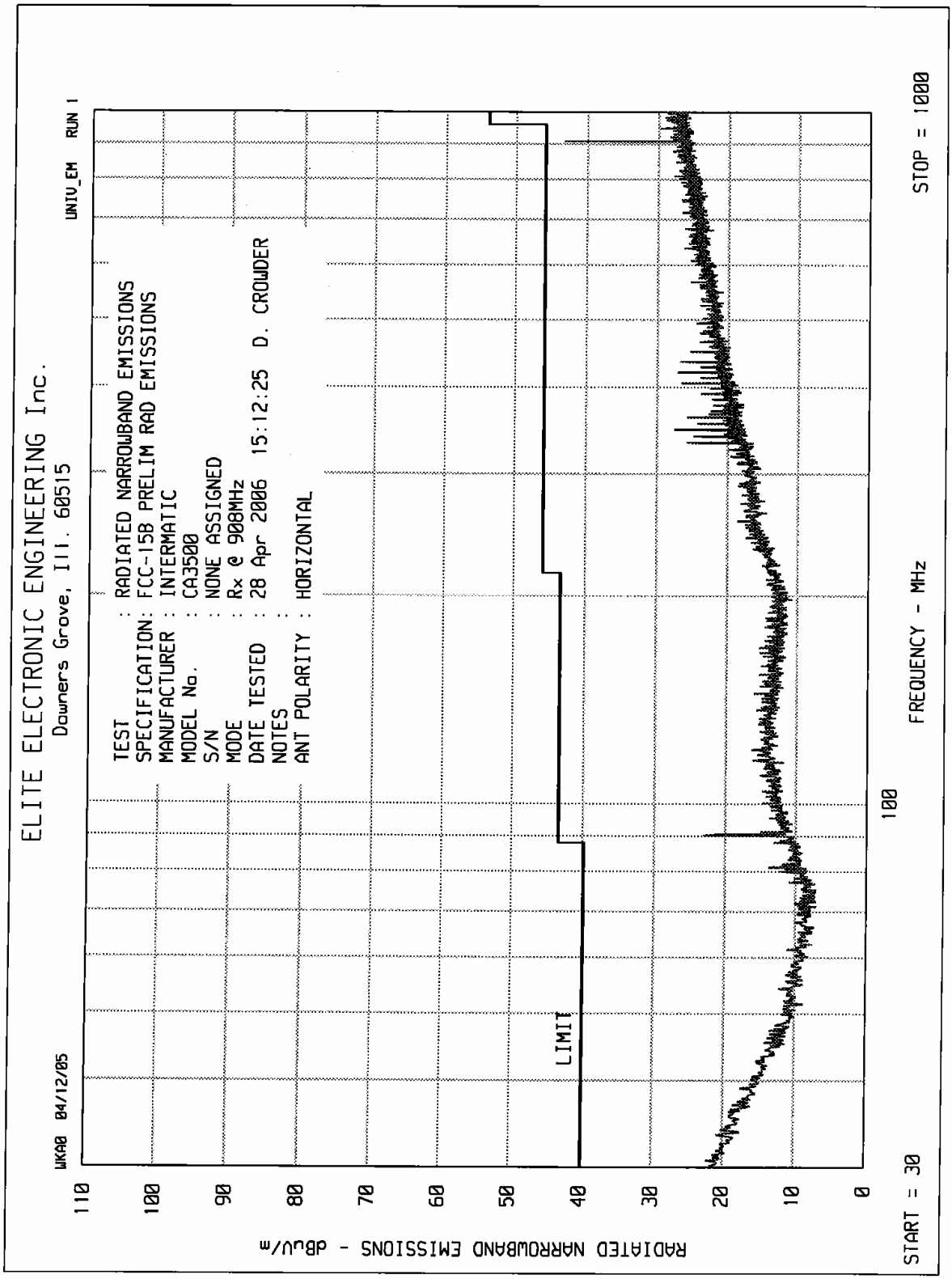
CHECKED BY: _____
D. CROWDER

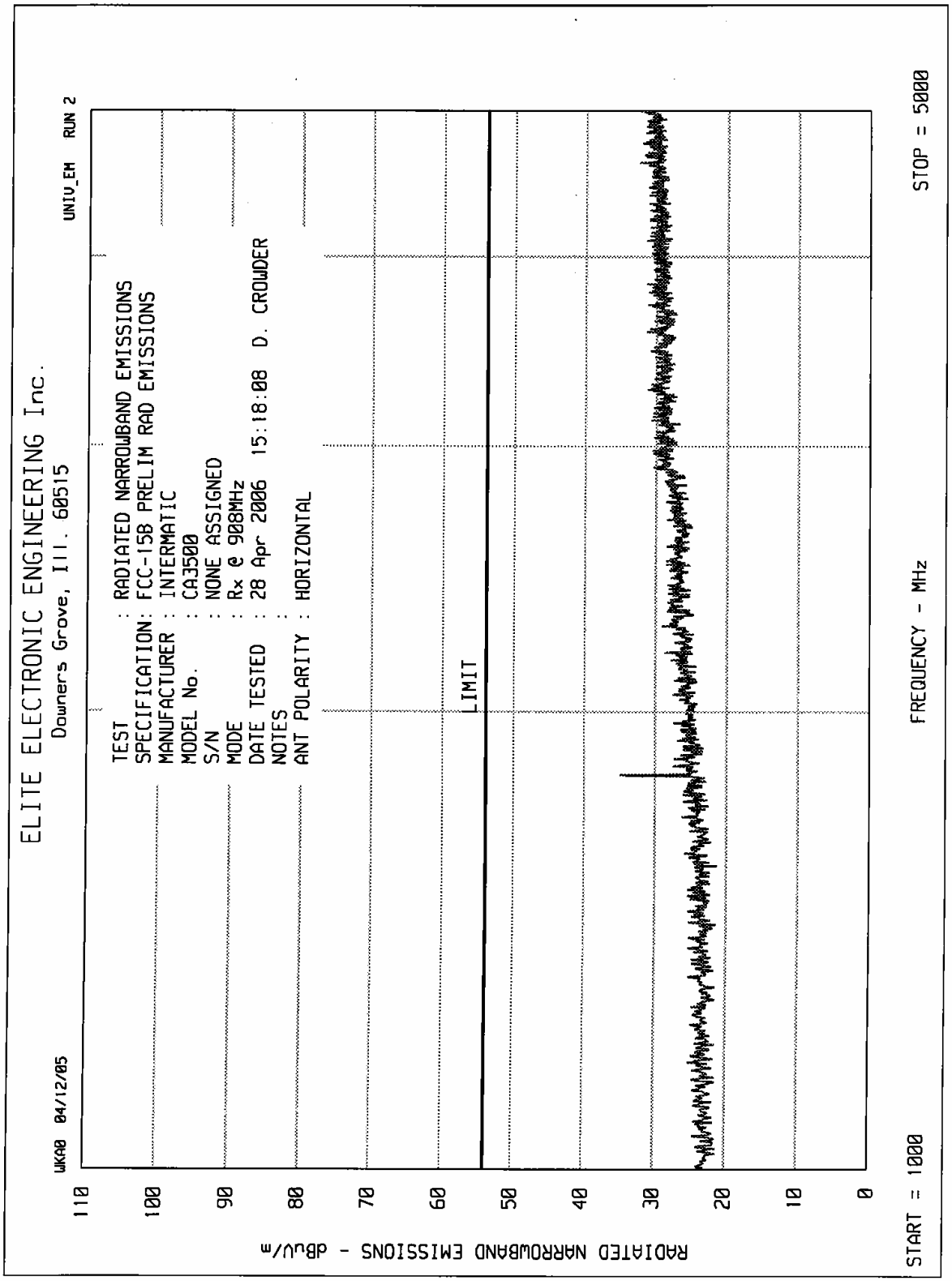
ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : INTERMATIC
MODEL : CA3500
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V 60Hz NEUTRAL
MODE : Tx @ 908.4MHz
DATE : 28 Apr 2006
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
.153	56.5	65.8	24.9	55.8	*
.178	45.9	64.6		54.6	
.244	38.4	62.0		52.0	
.345	27.2	59.1		49.1	
.772	26.3	56.0		46.0	
1.468	26.3	56.0		46.0	
2.982	26.0	56.0		46.0	
4.637	26.0	56.0		46.0	
6.307	25.7	60.0		50.0	
8.226	25.6	60.0		50.0	
11.518	25.7	60.0		50.0	
15.428	25.6	60.0		50.0	
19.163	25.6	60.0		50.0	
22.408	25.6	60.0		50.0	
24.153	25.6	60.0		50.0	
26.708	25.7	60.0		50.0	

* QP EXCEEDS AVG LIMIT, SEE DATA CHECKED BY: D. CROWDER

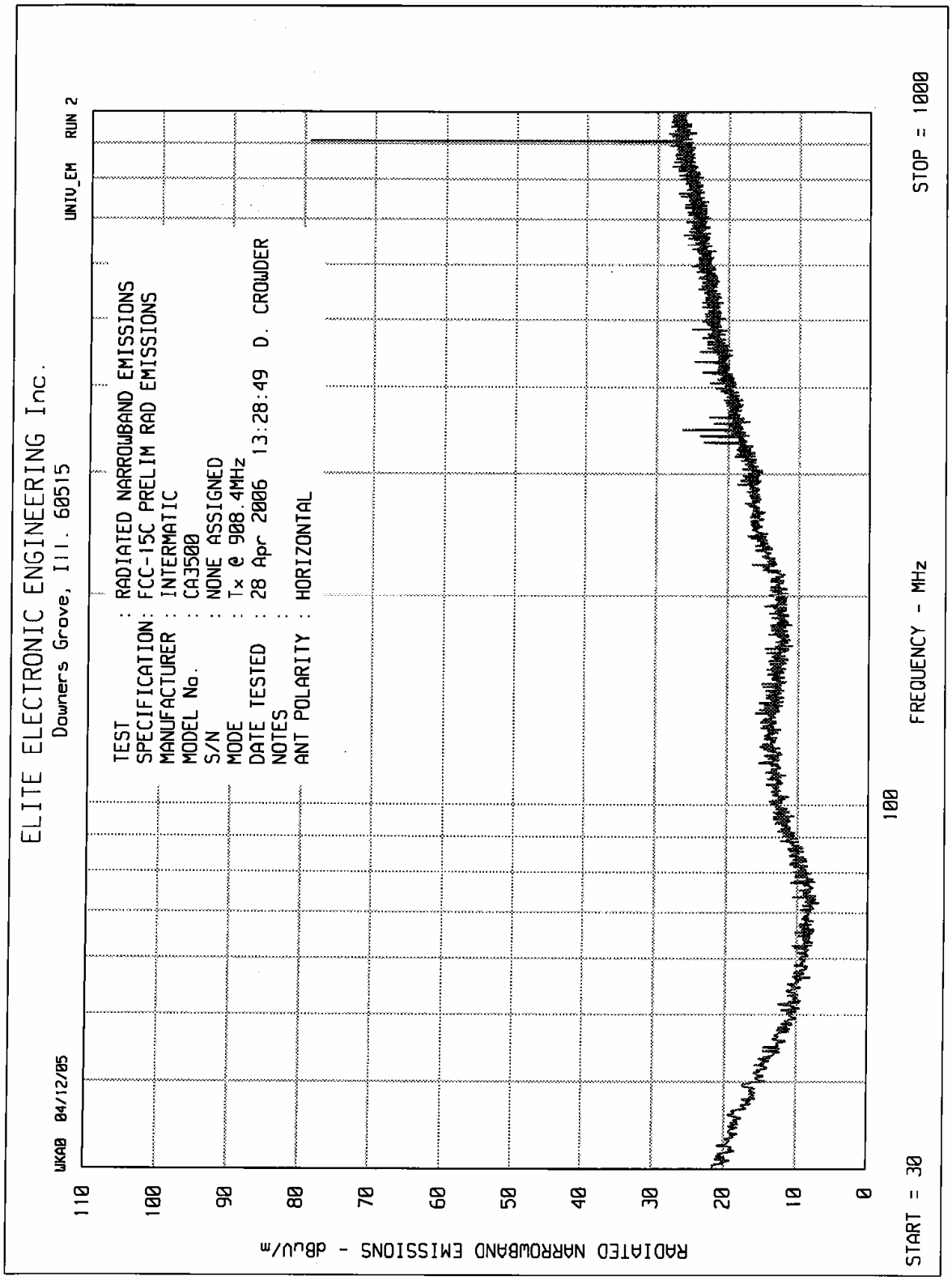

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV_EM RUN 1
WKA0 04/12/05
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC-15B PRELIM RAD EMISSIONS
MANUFACTURER : INTERMATIC
MODEL No. : CA3500
S/N : NONE ASSIGNED
MODE : Rx @ 900MHz
DATE TESTED : 28 Apr 2006 15:12:25 D. CROWDER
NOTES :
ANT POLARITY : HORIZONTAL
LIMIT
RADIATED NARROWBAND EMISSIONS - dBuV/m
110
100
90
80
70
60
50
40
30
20
10
0
START = 30
100
FREQUENCY - MHz
STOP = 1000

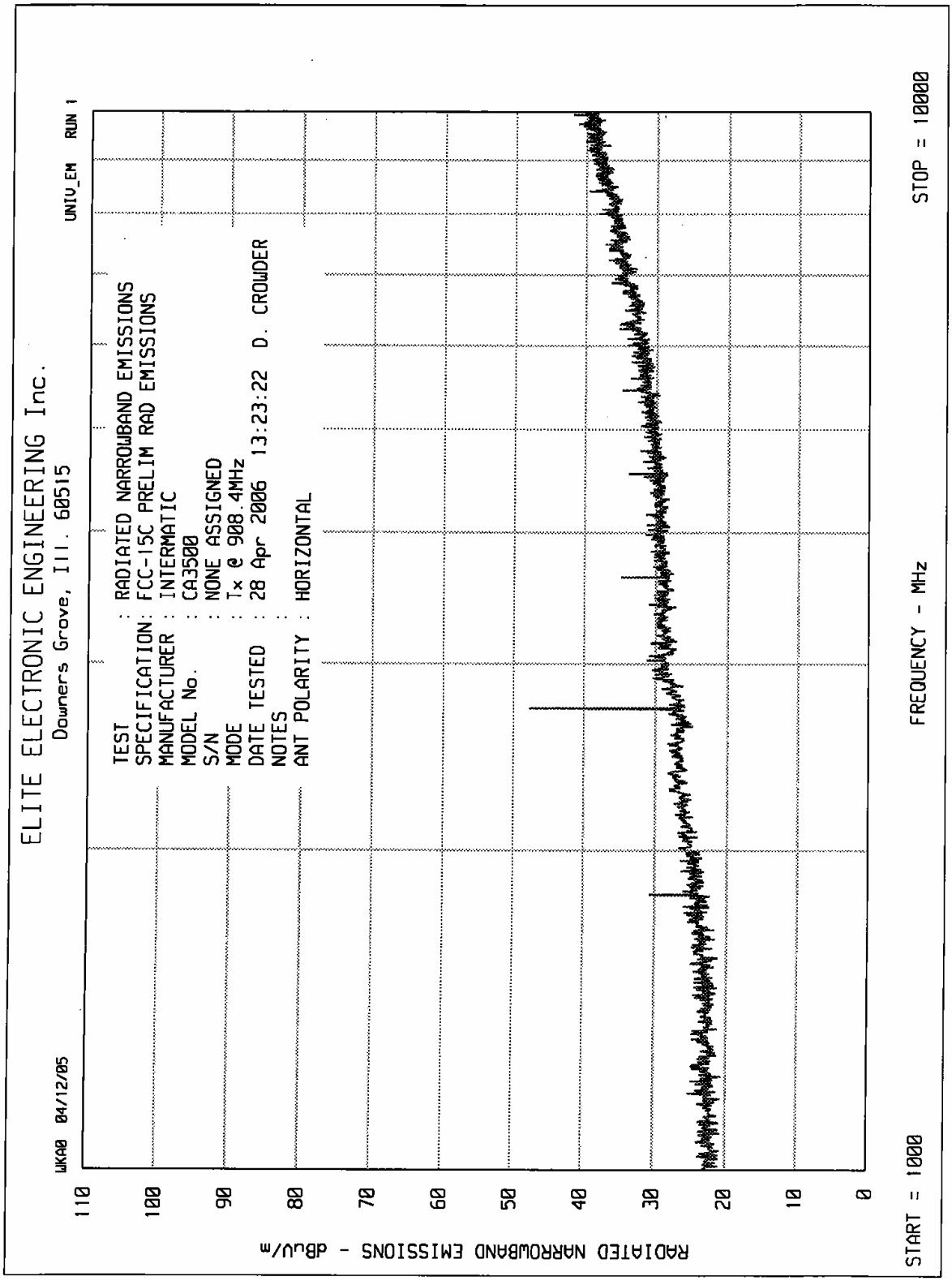

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV_EM RUN 2
WKA0 04/12/05
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC-15B PRELIM RAD EMISSIONS
MANUFACTURER : INTERMATIC
MODEL No. : CA3500
S/N : NONE ASSIGNED
MODE : Rx @ 908MHz
DATE TESTED : 28 Apr 2006 15:18:08 D. CROWDER
NOTES :
ANT POLARITY : HORIZONTAL
LIMIT
RADIATED NARROWBAND EMISSIONS - dBuV/m
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 5000

MANUFACTURER : Intermatic
MODEL : CA3500
S/N : None Assigned
SPECIFICATION : FCC-15B Radiated Emissions
MODE : Rx @ 908.42MHz Shielded
DATE : April 28, 2006
NOTES :

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
908.4	H	19.5		1.9	22.3	0.0	43.7	153.9	200.0	-2.3
908.4	V	15.5		1.9	22.3	0.0	39.7	97.1	200.0	-6.3
1816.8	H	46.6		2.9	28.1	-36.3	41.2	115.2	500.0	-12.8
1816.9	V	46.4		2.9	28.1	-36.3	41.0	112.6	500.0	-12.9
2725.2	H	42.8	*	3.8	31.4	-35.9	42.1	127.0	500.0	-11.9
2725.3	V	42.3	*	3.8	31.4	-35.9	41.6	119.9	500.0	-12.4
3633.6	H	41.5	*	4.4	32.5	-35.6	42.8	138.7	500.0	-11.1
3633.7	V	41.8	*	4.4	32.5	-35.6	43.1	143.6	500.0	-10.8
4542.0	H	41.2	*	4.8	32.9	-35.3	43.6	152.2	500.0	-10.3
4542.2	V	41.6	*	4.8	32.9	-35.3	44.0	159.4	500.0	-9.9

Checked By:

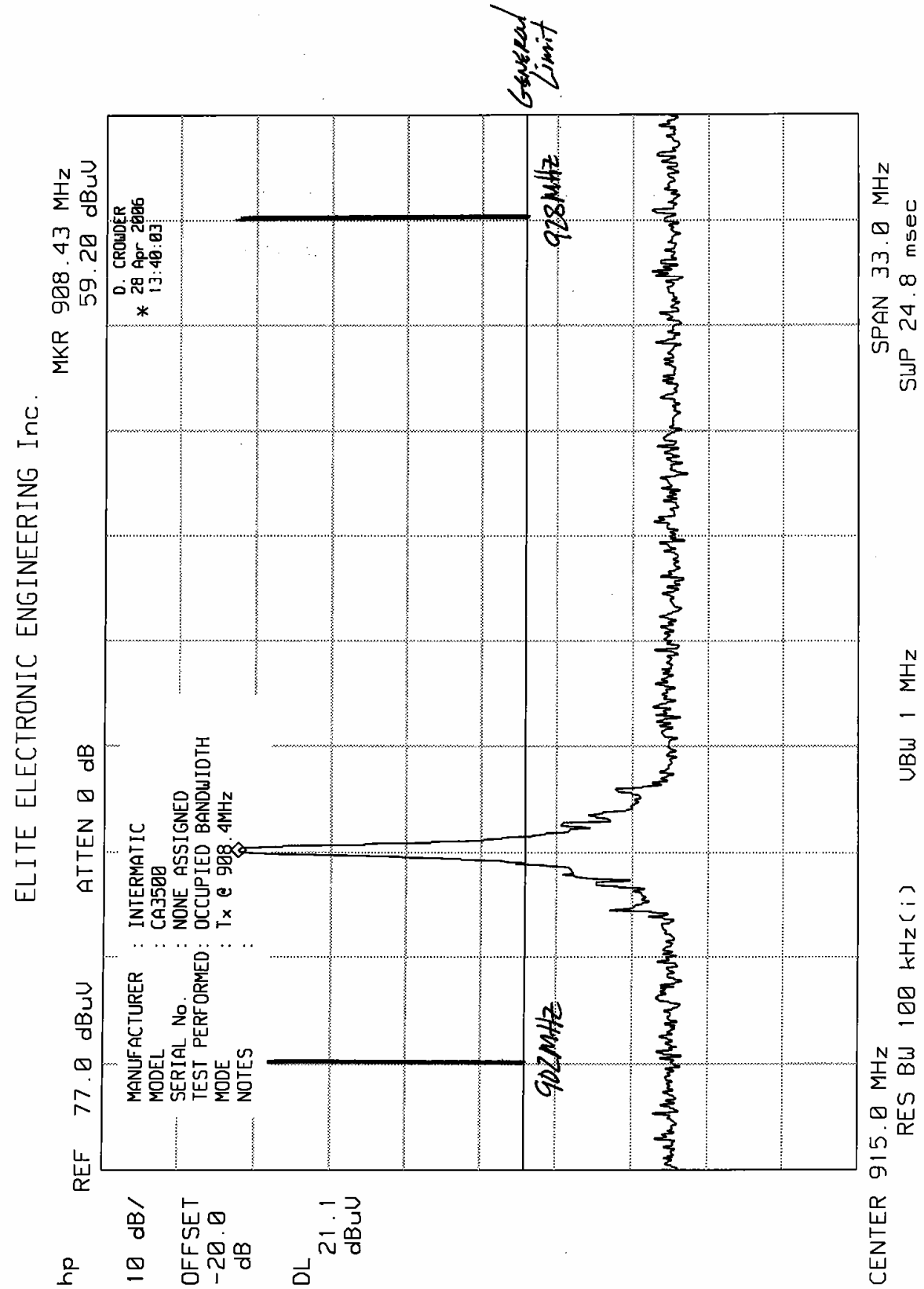

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV_EM RUN 2
WKAB 04/12/05
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC-15C PRELIM RAD EMISSIONS
MANUFACTURER : INTERMATIC
MODEL No. : CA3500
S/N : NONE ASSIGNED
MODE : Tx @ 908.4MHz
DATE TESTED : 28 Apr 2006 13:28:49 D. CROWDER
NOTES : :
ANT POLARITY : HORIZONTAL
RADIATED NARROWBAND EMISSIONS - dBuV/m
110
100
90
80
70
60
50
40
30
20
10
0
START = 30
100
FREQUENCY - MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV_EM RUN 1
WKA0 04/12/05
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC-15C PRELIM RAD EMISSIONS
MANUFACTURER : INTERMATIC
MODEL No. : CA3500
S/N : NONE ASSIGNED
MODE : Tx @ 908.4MHz
DATE TESTED : 28 Apr 2006 13:23:22 D. CROWDER
NOTES :
ANT POLARITY : HORIZONTAL
RADIATED NARROWBAND EMISSIONS - dBuV/m
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 10000

MANUFACTURER : Intermatic
MODEL : CA3500
S/N : None Assigned
SPECIFICATION : FCC-15C Radiated Emissions
MODE : Tx @ 908.42MHz Shielded
DATE : April 28, 2006
NOTES :

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
908.4	H	59.9		1.9	22.3	0.0	0.0	84.1	16120.5	50000.0	-9.8
908.4	V	56.0		1.9	22.3	0.0	0.0	80.2	10289.2	50000.0	-13.7
1816.8	H	55.7		2.9	28.1	-36.3	0.0	50.3	328.3	500.0	-3.7
1816.9	V	57.1		2.9	28.1	-36.3	0.0	51.7	385.7	500.0	-2.3
2725.2	H	53.6		3.8	31.4	-35.9	0.0	52.9	440.3	500.0	-1.1
2725.3	V	54.0		3.8	31.4	-35.9	0.0	53.3	461.1	500.0	-0.7
3633.6	H	44.2	*	4.4	32.5	-35.6	0.0	45.5	189.2	500.0	-8.4
3633.7	V	46.1		4.4	32.5	-35.6	0.0	47.4	235.5	500.0	-6.5
4542.0	H	43.1	*	4.8	32.9	-35.3	0.0	45.5	189.4	500.0	-8.4
4542.2	V	42.9	*	4.8	32.9	-35.3	0.0	45.3	185.1	500.0	-8.6
5450.4	H	40.3	*	5.2	35.3	-35.2	0.0	45.7	192.0	500.0	-8.3
5450.6	V	40.0	*	5.2	35.3	-35.2	0.0	45.4	185.5	500.0	-8.6
6358.8	H	40.8	*	5.9	36.1	-35.3	0.0	47.5	238.0	500.0	-6.4
6359.0	V	41.2	*	5.9	36.1	-35.3	0.0	47.9	249.2	500.0	-6.0
7267.2	H	40.4	*	6.6	37.7	-35.6	0.0	49.1	286.5	500.0	-4.8
7267.4	V	40.3	*	6.6	37.7	-35.6	0.0	49.0	283.2	500.0	-4.9
8175.6	H	41.0	*	7.1	37.7	-35.8	0.0	50.0	315.4	500.0	-4.0
8175.9	V	41.4	*	7.1	37.7	-35.8	0.0	50.4	330.3	500.0	-3.6
9084.0	H	41.8	*	7.5	38.0	-36.2	0.0	51.1	359.0	500.0	-2.9
9084.3	V	42.6	*	7.5	38.0	-36.2	0.0	51.9	393.6	500.0	-2.1

Checked By: 


ELITE ELECTRONIC ENGINEERING Inc.
MKR 908.43 MHz
59.20 dBuV
D. CROWDER
* 28 Apr 2006
13:40:03
hp
REF 77.0 dBuV
ATTEN 0 dB
10 dB/
MANUFACTURER : INTERMATIC
MODEL : CA3500
SERIAL No. : NONE ASSIGNED
TEST PERFORMED: OCCUPIED BANDWIDTH
MODE : Tx @ 908.4MHz
NOTES :
OFFSET
-20.0
dB
DL
21.1
dBuV
General Limit
908MHz
902MHz
CENTER 915.0 MHz
RES BW 100 kHz(i)
VBW 1 MHz
SPAN 33.0 MHz
SWP 24.8 msec