Measurement of RF Interference from a Model CA3750 Transceiver

For : Intermatic
Spring Grove, IL

P.O. No. : 912511
Date Received : October 13, 2005
Date Tested : October 13, 2005 through October 14, 2005
Test Personnel : Mark E. Longinotti, NARTE® Certified EMC Test Engineer, ATL-0154-E
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 : MARK E. LONGINOTTI
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Approved By : Raymond J Klouda
Raymond J. Klouda
Registered Professional Engineer of Illinois - 44894

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TABLE OF CONTENTS

Measurement of RF Emissions from a Transceiver, Model No. CA3750

1.0 INTRODUCTION:

1.1 Description of Test Item - This document presents the results of the series of radio interference measurements performed on a Transceiver, Model No.CA3750 (hereinafter referred to as the test item). Serial No. 09 was assigned to the unit set to continuously receive and Serial No. 07 was assigned to the unit set to continuously transmit. The test item was designed to transmit and receive at approximately 908MHz using an internal antenna. The test item was 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, 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 C63.4-2001.

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, dated 1 October 2004

ANSI C63.4-2001, "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 Subcontractor 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^{o}C and the relative humidity was 47%.

2.0 TEST ITEM SET-UP AND OPERATION:

The test item is a Transceiver, Model No. CA3750. A block diagram of the test item set-up is shown

as Figure 1.

2.1 Power Input - The test item was powered with 115V, 60Hz via a 2 wire, unshielded power cable. For radiated emissions the power cord was 0.5 meters long. For Conducted emissions the power cord was 2.0 meters long. For conducted emissions tests, each AC power lead to the test item 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 C63.4-2001.

2.2 Grounding - The test item was ungrounded during the tests.

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

2.4 Interconnect Cables - The test item was submitted for testing with no 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. The test item, serial no. 09, was set up so that upon power up it would receive continuously at 908.3MHz. The test item, serial no. 07, was set up so that upon power up it would transmit continuously at 908.4MHz.

2.6 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.

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 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".

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 Receiver

4.1.1.1 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:

CONDUCTED LIMITS FOR CLASS B DEVICE

Frequency MHz	RFI Voltage dBuV(QP)	RFI Voltage dBuV(Average)
0.15-0.5	66 decreasing with logarithm of frequency to 56	56 decreasing with logarithm of frequency 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.

4.1.1.2 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.

4.1.1.3 Results - The plots of the peak preliminary conducted voltage levels on each power line with the test item operated in the continuous receive at 908.3MHz mode are presented on pages 19 and 20. The conducted limit for receivers is shown as a reference. The final quasi-peak

results are presented on pages 21 and 22. As can be seen from the data, all conducted emission levels met the requirements for receivers. The emissions level closest to the limit (worst case) occurred at 659kHz. The emissions level at this frequency was 12.6dB within the limit. Photographs of the test configuration which yielded the highest or worst case, conducted emission levels are shown on Figure 2.

4.1.2 Transmitter

4.1.2.1 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:

CONDUCTED LIMITS FOR CLASS B DEVICE

Frequency MHz	RFI Voltage dBuV(QP)	RFI Voltage dBuV(Average)
0.15-0.5	66 decreasing with logarithm of frequency to 56	56 decreasing with logarithm of frequency 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.

4.1.2.2 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.

4.1.2.3 Results - The plots of the peak preliminary conducted voltage levels on each power line with the test item operated in the continuous transmit at 908.4MHz mode are presented on pages 23 and 24. The conducted limit for receivers is shown as a reference. The final quasi-peak results are presented on pages 25 and 26. As can be seen from the data, all conducted emission levels met the requirements for transmitters. The emissions level closest to the limit (worst case) occurred at 439kHz. The emissions level at this frequency was 17.7dB within the limit. Photographs of the test configuration which yielded the highest or worst case, 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 CLASS B DEVICE

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.

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 2001 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 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 pages 29. 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 908.3MHz. The emissions level at this frequency was 1.0dB within the limit. Photographs of the test configuration which yielded the highest or worst case, radiated emission levels are shown on Figures 3a and 3b.

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 C63.4-2001 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.

4.2.2.3 Results - The preliminary plots, with the test item transmitting at 908.4MHz, 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, 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. The emissions level closet to the limit (worst case) occurred at 908.4MHz. The emissions level at this frequency was 2.1dB within the limit. Photographs of the test configuration which yielded the highest or worst case, radiated emission levels are shown on Figures 3c and 3d.

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 30 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 33. As can be seen from this data page, the transmitter met the occupied bandwidth requirements.

5.0 CONCLUSIONS:

It was determined that the Intermatic Transceiver, Model No. CA3750, (Serial No. 09 was assigned to the unit set to continuously receive and Serial No. 07 was assigned to the unit set to continuously transmit.) 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 C63.4-2001.

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. 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								
XPQ0	HIGH PASS FILTER	K&L MICROWAVE	4IH30-1804/T	001	1.8-10GHZ	07/27/05	12	07/27/06
XZG0	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	3439A02724	---		N/A	
Equipment Type: AMPLIFIERS								
APK0	PRE-AMPLIFIER	HEWLETT PACKARD	8449B	3008A00662	1-26.5GHZ	02/07/05	12	02/07/06
Equipment Type: ANTENNAS								
NDQ0	TUNED DIPOLE ANTENNA	EMCO	3121C-DB4	311	400-1000MHZ	02/01/05	12	02/01/06
NTA1	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL611	2054	0.03-2GHZ	08/08/05	12	08/08/06
NWF0	RIDGED WAVE GUIDE	EMCO	3105	2035	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	
CMA0	MULTI-DEVICE CONTROLLER	EMCO	2090	9701-1213	---		N/A	
Equipment Type: PROBES; CLAMP-ON & LISNS								
PLL9	50UH LISN 462D	ELITE	462D/70A	010	0.01-400MHZ	03/04/05	12	03/04/06
PLLA	50UH LISN 462D	ELITE	462D/70A	011	0.01-400MHZ	03/04/05	12	03/04/06
Equipment Type: PRINTERS AND PLOTTERS								
HRE1	LASER JET 5P	HEWLETT PACKARD	C3150A	USHB061052	---		N/A	
Equipment Type: RECEIVERS								
RAC1	SPECTRUM ANALYZER	HEWLETT PACKARD	85660B	3407A08369	100HZ-22GHZ	02/04/05	12	02/04/06
RACB	RF PRESELECTOR	HEWLETT PACKARD	85685A	3506A01491	20HZ-2GHZ	02/07/05	12	02/07/06
RAF3	QUASIPEAK ADAPTER	HEWLETT PACKARD	85650A	3303A01775	0.01-1000MHZ	02/04/05	12	02/04/06

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.

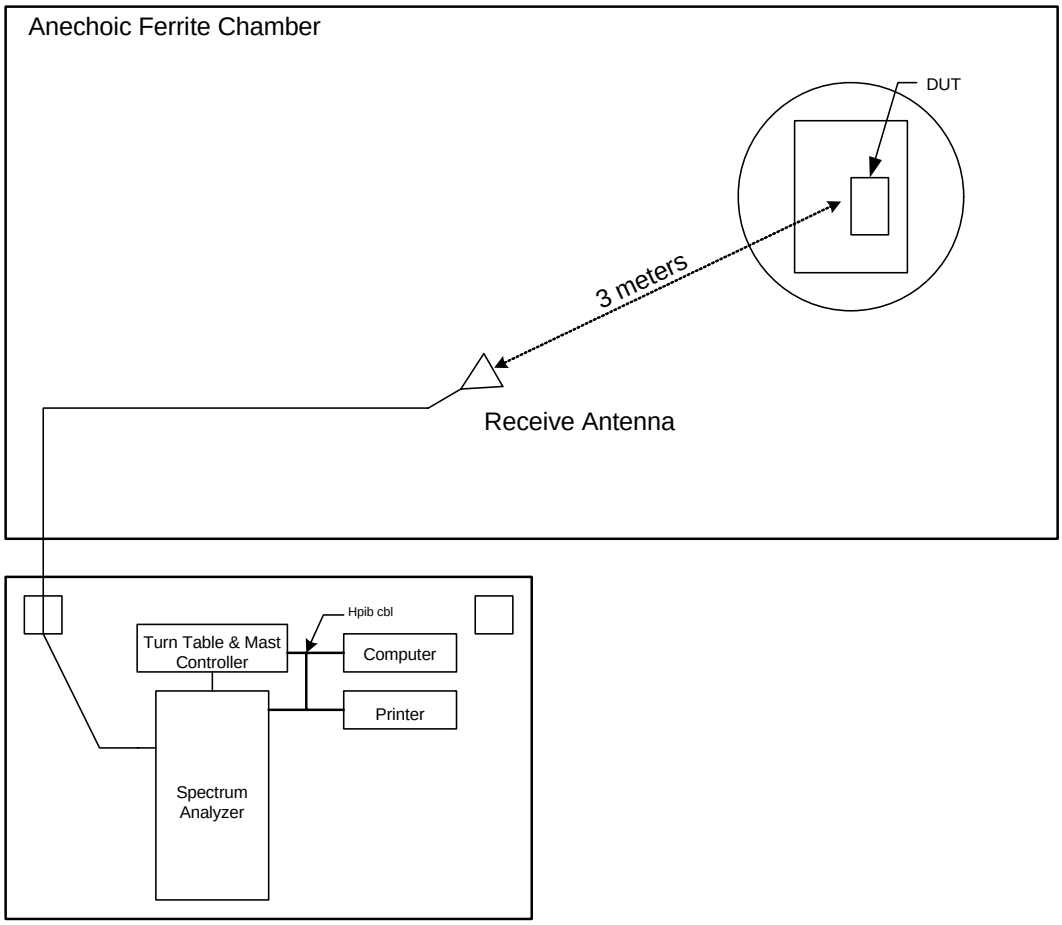


FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

Figure 2

Test Set-up for Conducted Emissions – Receive at 908.3MHz

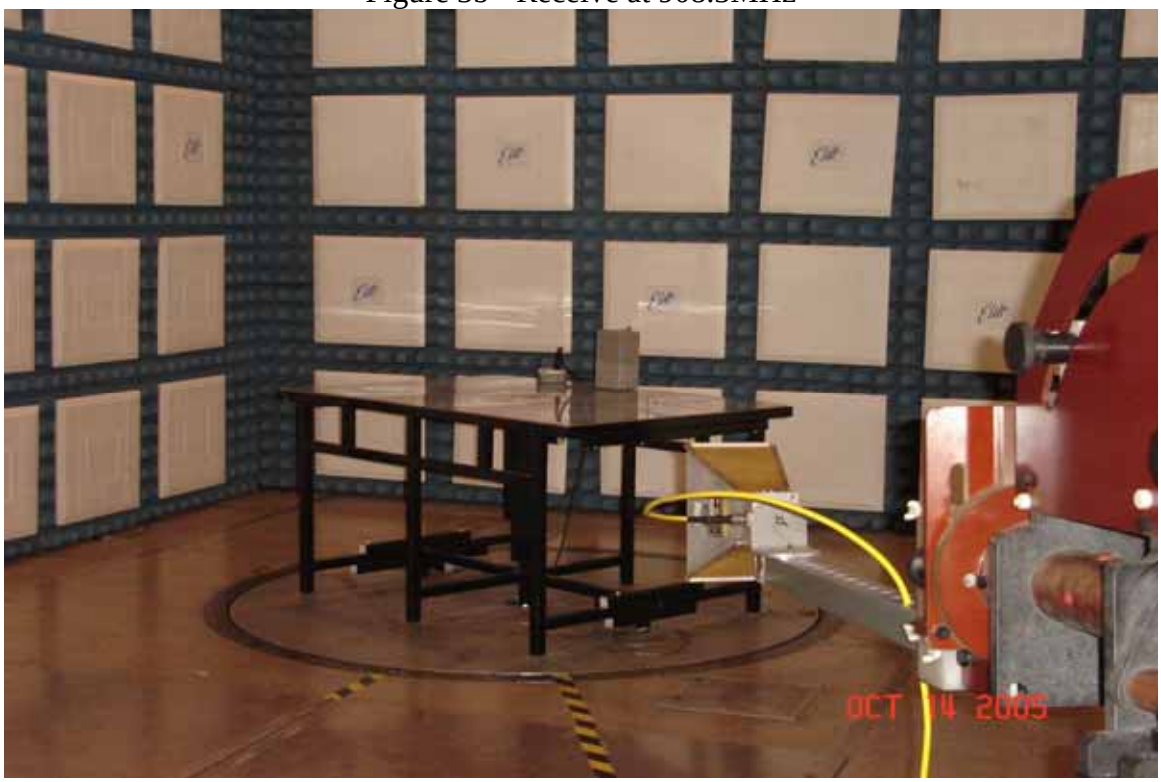
Test Set-up for Conducted Emissions – Transmit at 908.4MHz

Figure 3a - Receive at 908.3MHz

Test Set-up for Radiated Emissions, 908.3MHz – Horizontal Polarization

Test Set-up for Radiated Emissions, 908.3MHz – Vertical Polarization

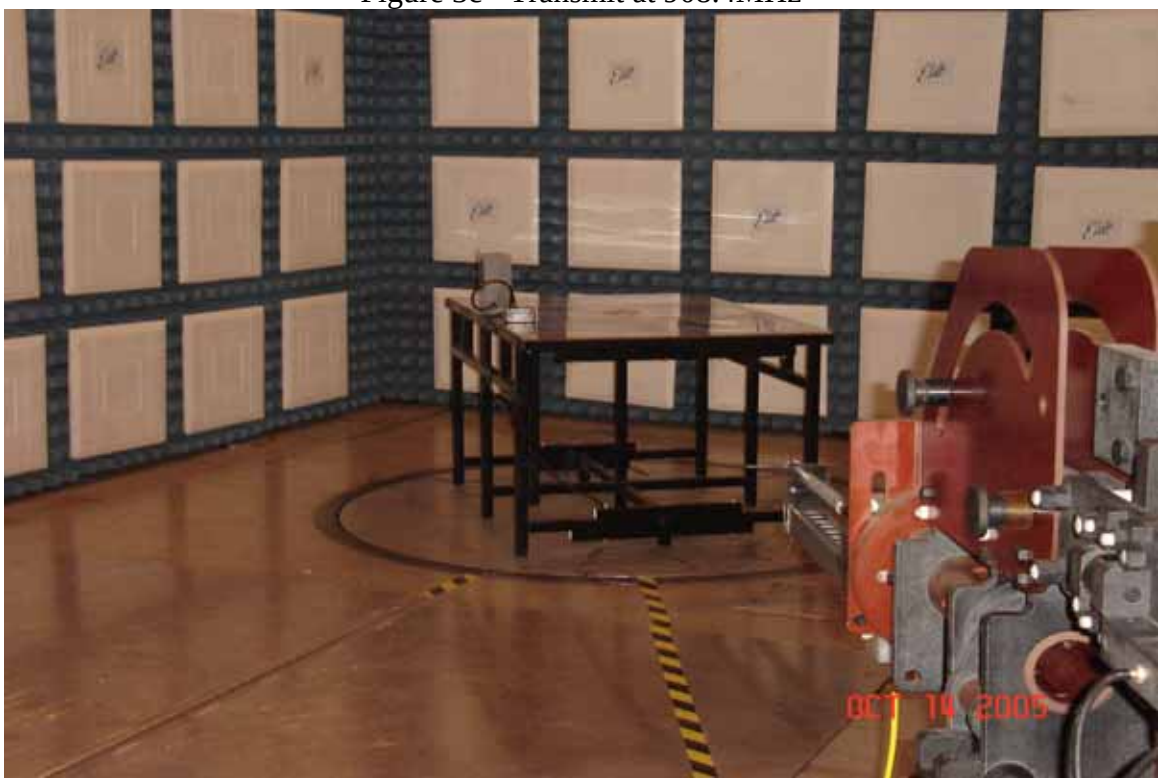
Figure 3b - Receive at 908.3MHz



Test Set-up for Radiated Emissions, 1GHz to 5GHz – Horizontal Polarization

Test Set-up for Radiated Emissions, 908.3MHz – Vertical Polarization

Figure 3c - Transmit at 908.4MHz



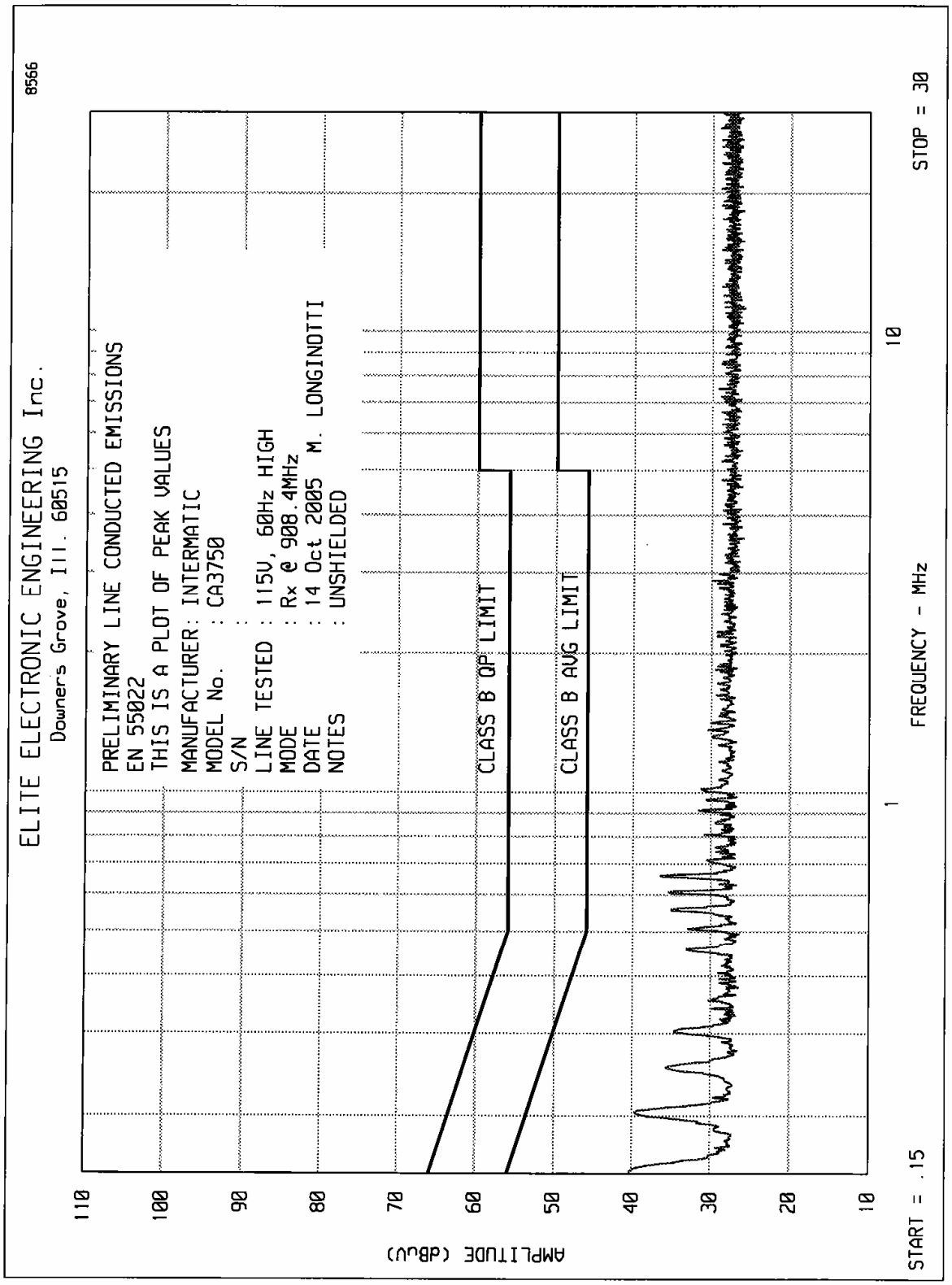
Test Set-up for Radiated Emissions 908.4MHz – Horizontal Polarization

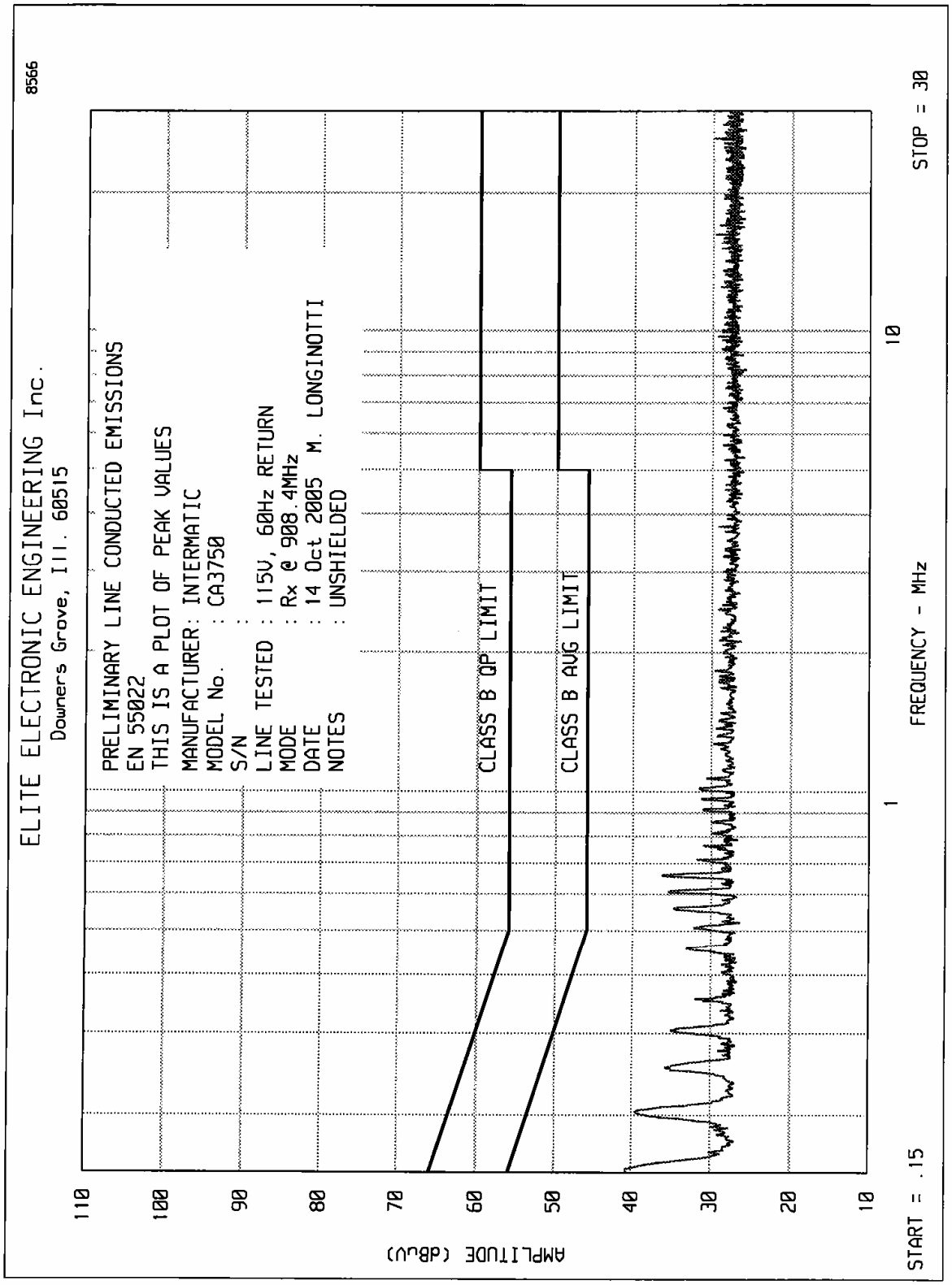
Test Set-up for Radiated Emissions 908.4MHz – Vertical Polarization

Figure 3d - Transmit at 908.4MHz

Test Set-up for Radiated Emissions, 1GHz to 9.1GHz – Horizontal Polarization

Test Set-up for Radiated Emissions, 1GHz to 9.1GHz – 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. : CA3750
S/N :
LINE TESTED : 115V, 60Hz HIGH
MODE : Rx @ 908.4MHz
DATE : 14 Oct 2005 M. LONGINOTTI
NOTES : UNSHIELDED
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. : CA3750
S/N : :
LINE TESTED : 115V, 60Hz RETURN
MODE : Rx @ 908.4MHz
DATE : 14 Oct 2005 M. LONGINOTTI
NOTES : UNSHIELDED
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 : CA3750
S/N :
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 115V, 60Hz HIGH
MODE : Rx @ 908.4MHz
DATE : 14 Oct 2005
NOTES : UNSHIELDED
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
.154	37.2	65.8		55.8	
.343	26.7	59.1		49.1	
.608	31.6	56.0		46.0	
.659	33.4	56.0		46.0	
.912	28.7	56.0		46.0	
2.075	26.6	56.0		46.0	
3.821	25.8	56.0		46.0	
7.079	25.4	60.0		50.0	
8.886	25.4	60.0		50.0	
12.388	25.4	60.0		50.0	
14.403	25.4	60.0		50.0	
17.578	25.4	60.0		50.0	
21.574	25.4	60.0		50.0	
24.848	25.4	60.0		50.0	
27.668	25.4	60.0		50.0	

CHECKED BY: Mark E. Longinotti
M. LONGINOTTI

ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : INTERMATIC
MODEL : CA3750
S/N :
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 115V, 60Hz RETURN
MODE : Rx @ 908.4MHz
DATE : 14 Oct 2005
NOTES : UNSHIELDED
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
.154	37.0	65.8		55.8	
.345	27.1	59.1		49.1	
.609	31.3	56.0		46.0	
.660	33.3	56.0		46.0	
.912	28.7	56.0		46.0	
1.824	26.8	56.0		46.0	
3.342	26.1	56.0		46.0	
4.860	26.0	56.0		46.0	
7.191	25.6	60.0		50.0	
9.679	25.4	60.0		50.0	
12.403	25.3	60.0		50.0	
16.008	25.4	60.0		50.0	
19.398	25.4	60.0		50.0	
21.708	25.4	60.0		50.0	
24.403	25.4	60.0		50.0	
27.988	25.4	60.0		50.0	

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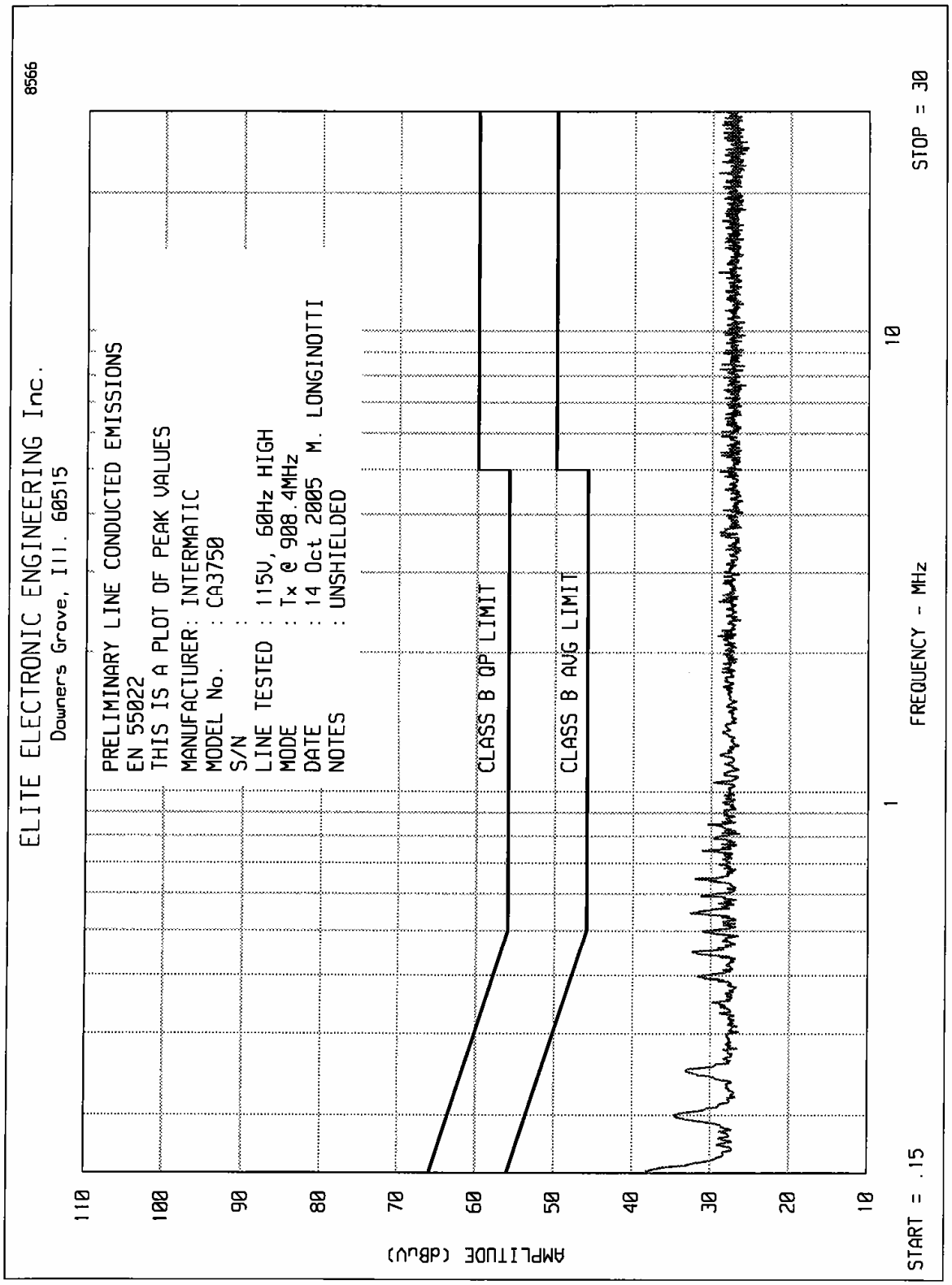
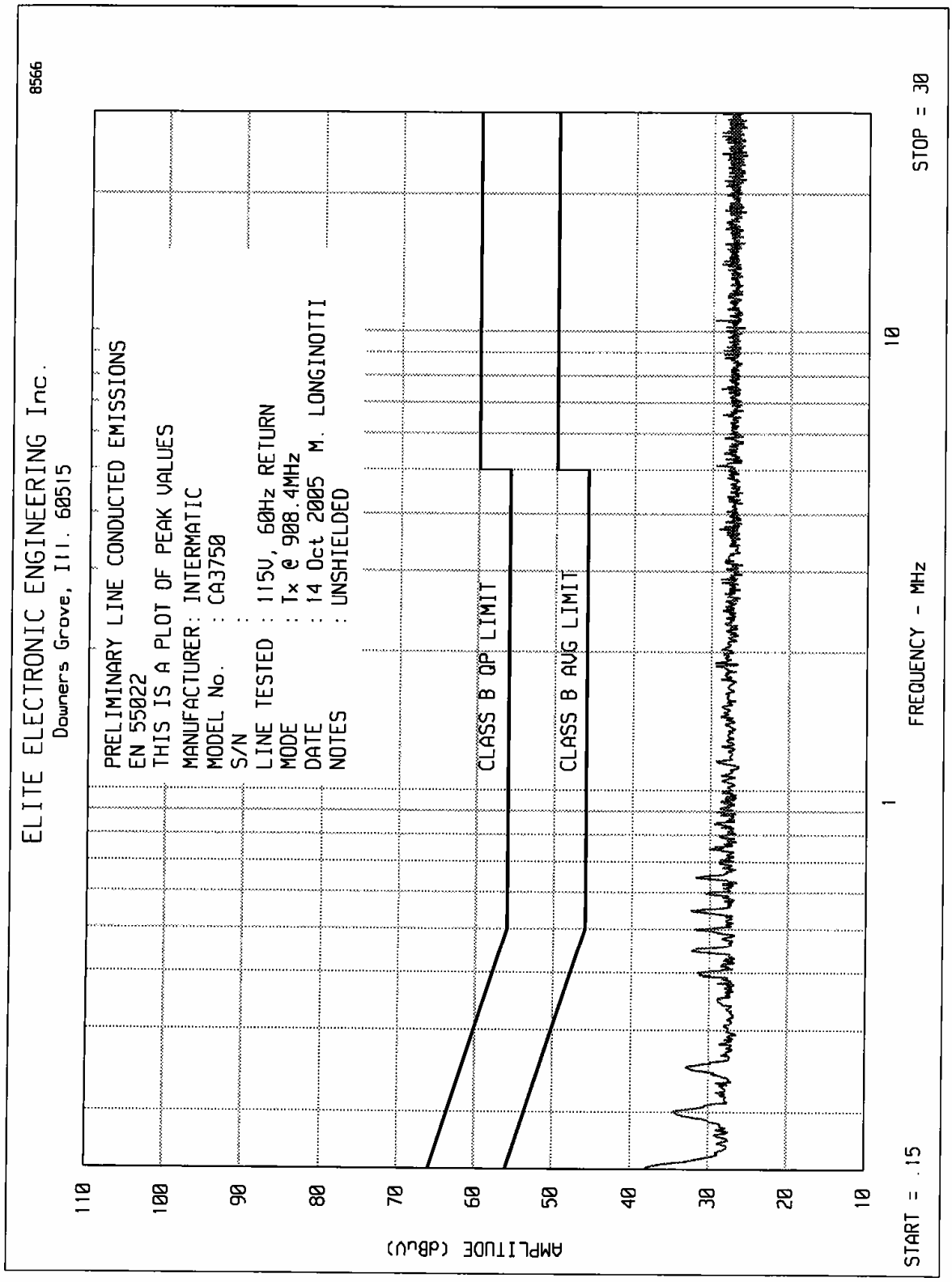
M. LONGINOTTI


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. : CA3750
S/N : .
LINE TESTED : 115V, 60Hz HIGH
MODE : Tx @ 908.4MHz
DATE : 14 Oct 2005 M. LONGINOTTI
NOTES : UNSHIELDED
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


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8566
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: INTERMATIC
MODEL No. : CA3750
S/N :
LINE TESTED : 115V, 60Hz RETURN
MODE : Tx @ 908.4MHz
DATE : 14 Oct 2005 M. LONGINOTTI
NOTES : UNSHIELDED
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 : CA3750
S/N :
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 115V, 60Hz HIGH
MODE : Tx @ 908.4MHz
DATE : 14 Oct 2005
NOTES : UNSHIELDED
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
.439	29.4	57.1		47.1	
.840	27.1	56.0		46.0	
2.162	25.8	56.0		46.0	
3.569	25.9	56.0		46.0	
5.410	25.4	60.0		50.0	
7.079	25.4	60.0		50.0	
9.887	25.4	60.0		50.0	
12.123	25.3	60.0		50.0	
14.973	25.4	60.0		50.0	
18.993	25.4	60.0		50.0	
20.618	25.4	60.0		50.0	
24.533	25.4	60.0		50.0	
27.953	25.4	60.0		50.0	

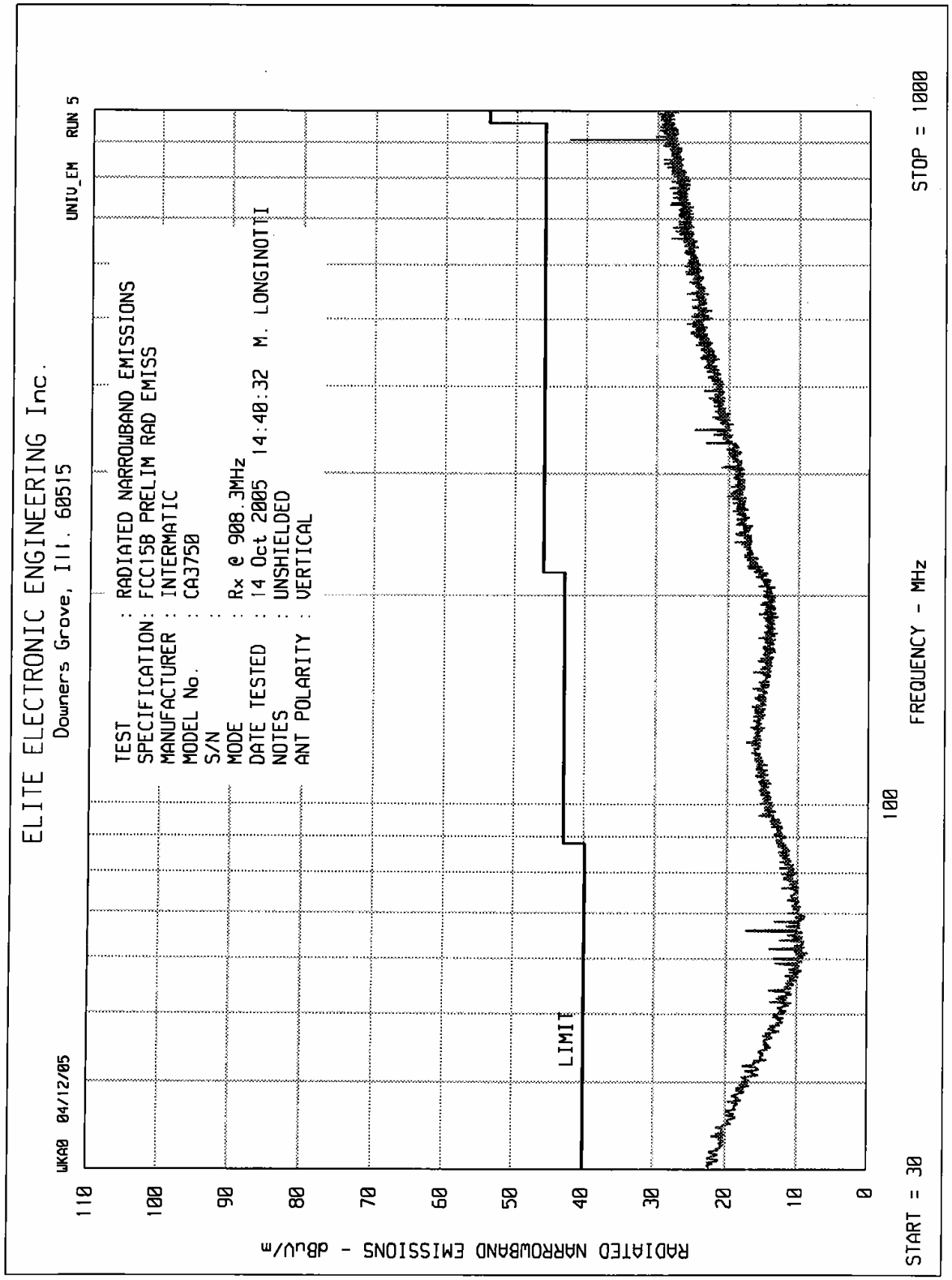
CHECKED BY: Mark E. Longinotti
M. LONGINOTTI

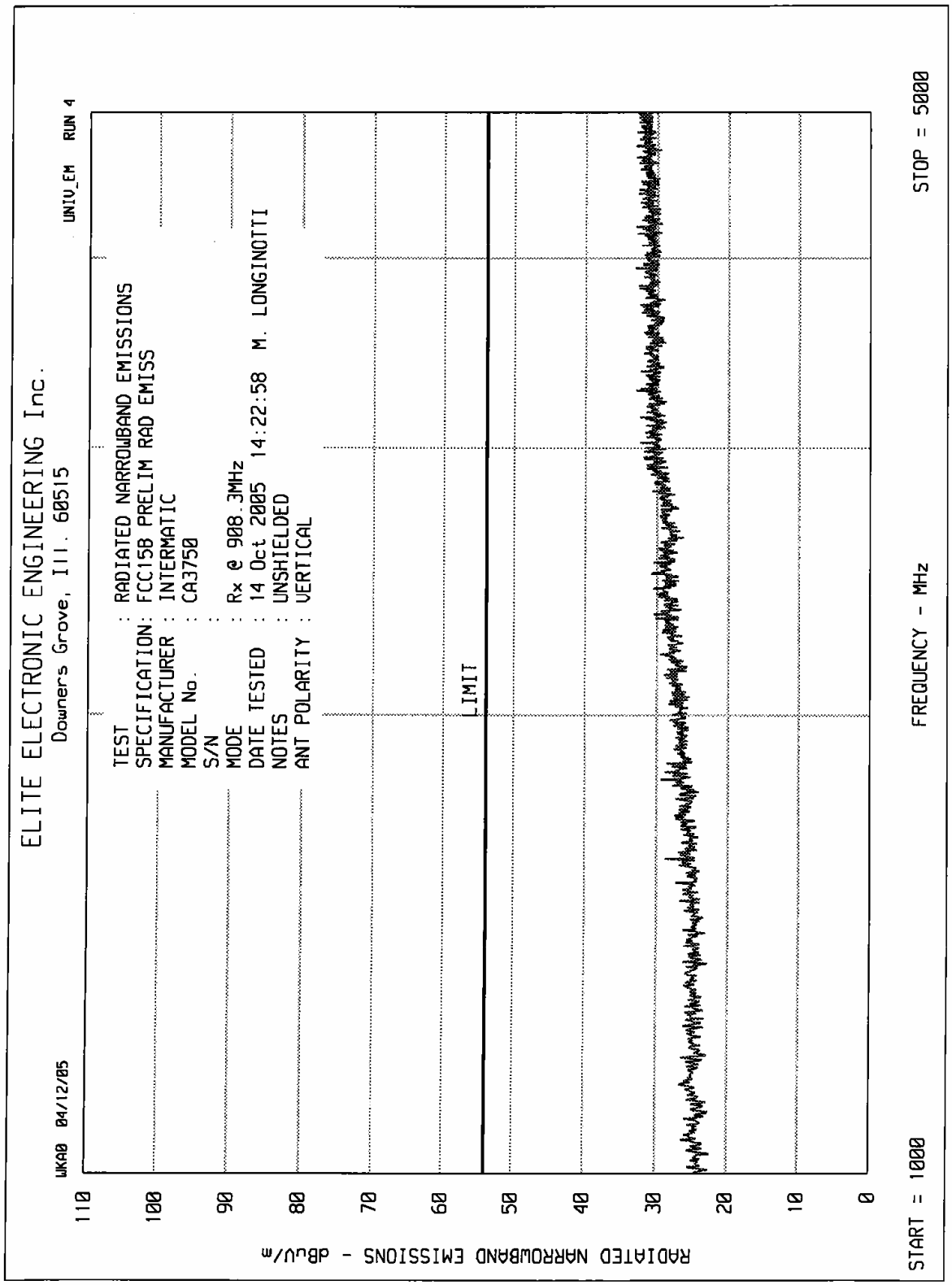
ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : INTERMATIC
MODEL : CA3750
S/N :
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 115V, 60Hz RETURN
MODE : Tx @ 908.4MHz
DATE : 14 Oct 2005
NOTES : UNSHIELDED
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
.448	29.2	56.9		46.9	
.747	27.3	56.0		46.0	
1.880	26.0	56.0		46.0	
3.471	25.8	56.0		46.0	
5.064	25.6	60.0		50.0	
7.463	25.6	60.0		50.0	
9.051	25.4	60.0		50.0	
12.398	25.3	60.0		50.0	
15.533	25.4	60.0		50.0	
18.403	25.4	60.0		50.0	
21.278	25.4	60.0		50.0	
24.363	25.4	60.0		50.0	
27.073	25.4	60.0		50.0	

CHECKED BY: Mark E Longinotti
M. LONGINOTTI


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV_EM RUN 5
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC15B PRELIM RAD EMISS
MANUFACTURER : INTERMATIC
MODEL No. : CA3750
S/N :
MODE : Rx @ 908.3MHz
DATE TESTED : 14 Oct 2005 14:40:32 M. LONGINOTTI
NOTES : UNSHIELDED
ANT POLARITY : VERTICAL
LIMIT
WKA0 04/12/05
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 4
WKA0 04/12/05
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC15B PRELIM RAD EMISS
MANUFACTURER : INTERMATIC
MODEL No. : CA3750
S/N :
MODE : Rx @ 908.3MHz
DATE TESTED : 14 Oct 2005 14:22:58 M. LONGINOTTI
NOTES : UNSHIELDED
ANT POLARITY : VERTICAL
LIMIT
RADIATED NARROWBAND EMISSIONS - dBuV/m
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 5000

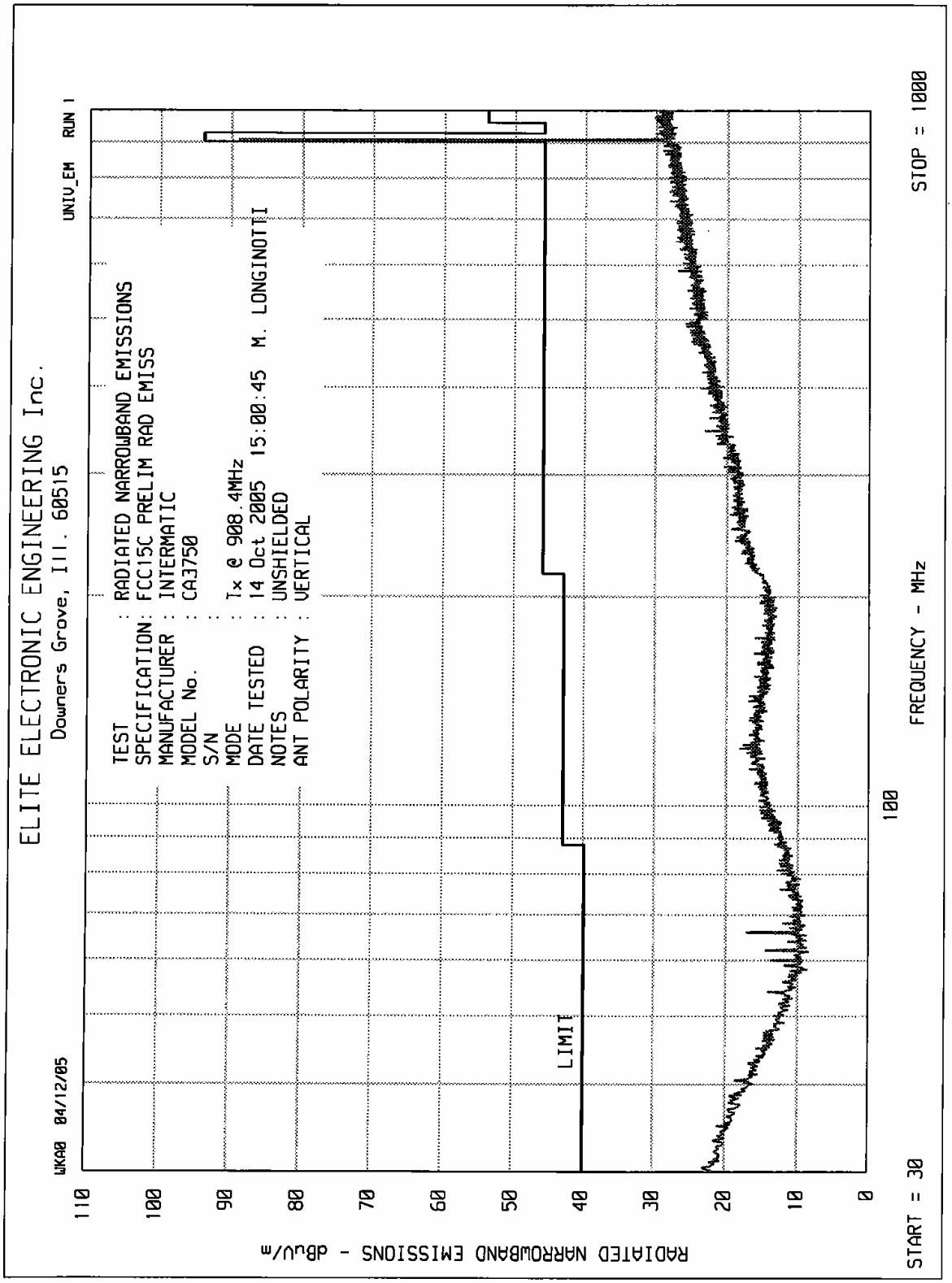
MANUFACTURER : Intermatic
TEST ITEM : Transceiver
MODEL NO. : CA3750
SERIAL NO. : 09
TEST SPECIFICATION : FCC 15.109(a), Radiated Emissions
MODE : Receive @ 908.3MHz
TEST DATE : October 14, 2005
TEST DISTANCE : 3 meters

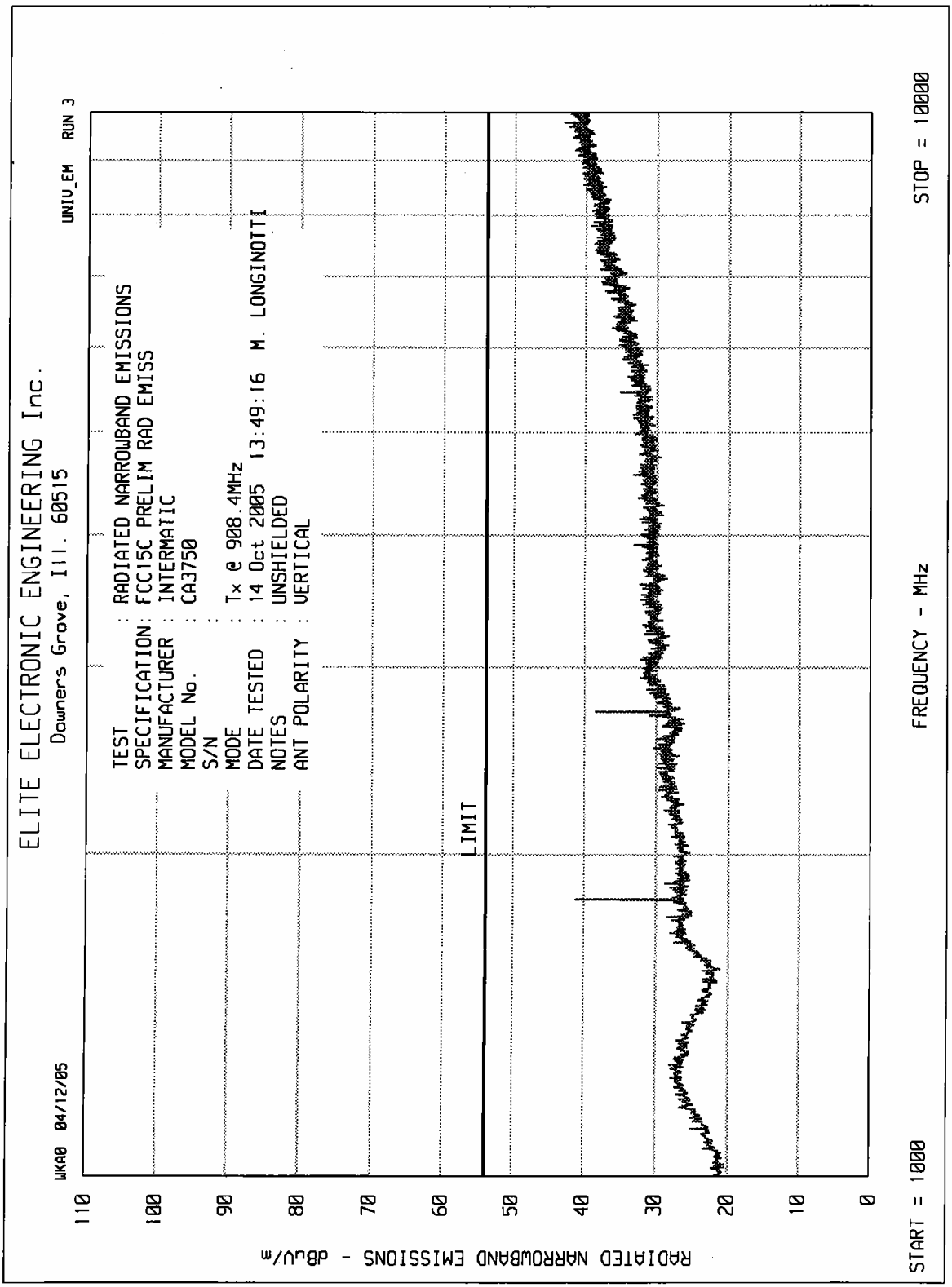
Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Preamp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
908.3	H	15.3		1.9	27.8	0.0	45.0	178.8	200.0
908.3	V	12.8		1.9	27.8	0.0	42.5	134.1	200.0
1816.6	H	34.8	*	2.9	28.1	-36.3	29.4	29.6	500.0
1816.6	V	38.7		2.9	28.1	-36.3	33.3	46.4	500.0
2724.9	H	30.9	*	3.8	31.4	-35.9	30.2	32.3	500.0
2724.9	V	30.9	*	3.8	31.4	-35.9	30.2	32.3	500.0
3633.2	H	29.9	*	4.4	32.5	-35.6	31.2	36.5	500.0
3633.2	V	29.9	*	4.4	32.5	-35.6	31.2	36.5	500.0
4541.5	H	29.5	*	4.8	32.9	-35.3	31.9	39.6	500.0
4541.5	V	29.5	*	4.8	32.9	-35.3	31.9	39.6	500.0

H – Horizontal
V = Vertical

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

Checked By : MARK E. LONGINOTTI


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV_EM RUN 1
WKA0 04/12/05
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC15C PRELIM RAD EMISS
MANUFACTURER : INTERMATIC
MODEL No. : CA3750
S/N :
MODE : 1x @ 908.4MHz
DATE TESTED : 14 Oct 2005 15:00:45 M. LONGINOTTI
NOTES : UNSHIELDED
ANT POLARITY : VERTICAL
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 3
WKA0 04/12/05
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC15C PRELIM RAD EMISS
MANUFACTURER : INTERMATIC
MODEL No. : CA3750
S/N :
MODE : Tx @ 908.4MHz
DATE TESTED : 14 Oct 2005 13:49:16 M. LONGINOTTI
NOTES : UNSHIELDED
ANT POLARITY : VERTICAL
LIMIT
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
TEST ITEM : Transceiver
MODEL NO. : CA3750
SERIAL NO. : 07
TEST SPECIFICATION : FCC 15.249(a), Radiated Emissions
MODE : Transmit @ 908.4MHz
TEST DATE : October 14, 2005
TEST DISTANCE : 3 meters

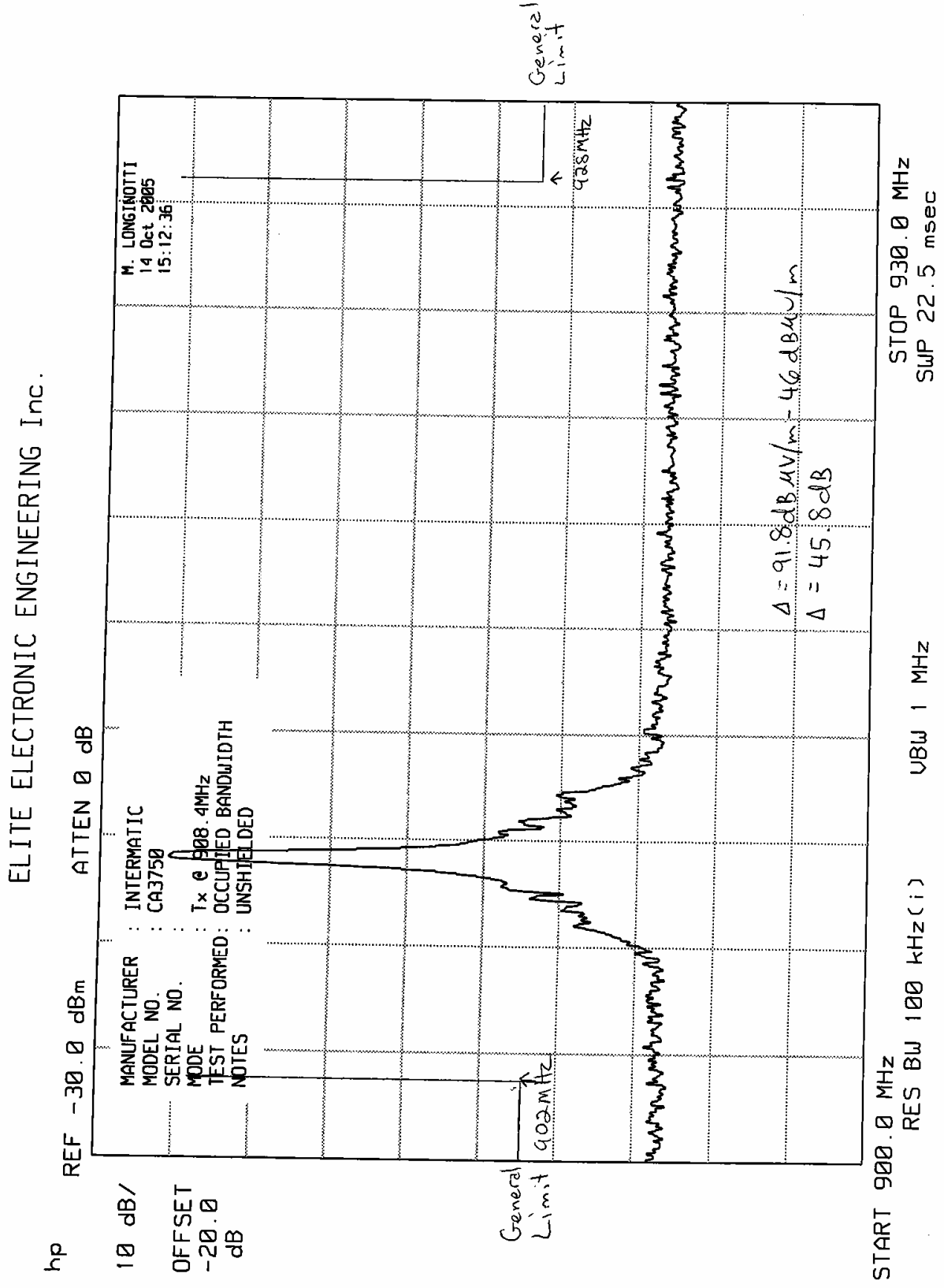
Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Preamp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
908.4	H	61.3		1.9	27.8	0.0	91.0	35683.3	50000.0
908.4	V	62.1		1.9	27.8	0.0	91.8	39125.9	50000.0
1816.8	H	50.7		2.9	28.1	-36.3	45.3	184.7	500.0
1816.8	V	57.1		2.9	28.1	-36.3	51.7	385.9	500.0
2725.2	H	42.2		3.8	31.4	-35.9	41.5	118.5	500.0
2725.2	V	45.2		3.8	31.4	-35.9	44.5	167.4	500.0
3633.6	H	31.2	*	4.4	32.5	-35.6	32.5	42.4	500.0
3633.6	V	33.7	*	4.4	32.5	-35.6	35.0	56.5	500.0
4542.0	H	36.6		4.8	32.9	-35.3	39.0	89.6	500.0
4542.0	V	36.5		4.8	32.9	-35.3	38.9	88.6	500.0
5450.4	H	37.2		5.2	35.3	-35.2	42.6	134.4	500.0
5450.4	V	35.8		5.2	35.3	-35.2	41.2	114.4	500.0
6358.8	H	29.6	*	5.9	36.1	-35.3	36.3	65.6	500.0
6358.8	V	29.5	*	5.9	36.1	-35.3	36.2	64.8	500.0
7267.2	H	29.0	*	6.6	37.7	-35.6	37.7	77.1	500.0
7267.2	V	29.1	*	6.6	37.7	-35.6	37.8	78.0	500.0
8175.6	H	30.3	*	7.1	37.7	-35.8	39.3	92.0	500.0
8175.6	V	30.1	*	7.1	37.7	-35.8	39.1	89.9	500.0
9084.0	H	30.2	*	7.5	38.0	-36.2	39.5	94.4	500.0
9084.0	V	30.3	*	7.5	38.0	-36.2	39.6	95.5	500.0

H – Horizontal

V = Vertical

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

Checked By : MARK E. LONGINOTTI


ELITE ELECTRONIC ENGINEERING Inc.
hp
REF -30.0 dBm
ATTEN 0 dB
10 dB/
OFFSET
-20.0
dB
MANUFACTURER : INTERMATIC
MODEL NO. : CA3750
SERIAL NO. :
MODE : Tx @ 908.4MHz
TEST PERFORMED: OCCUPIED BANDWIDTH
NOTES : UNSHIELDED
M. LONGINOTTI
14 Oct 2005
15:12:36
General Limit
902MHz
928MHz
General Limit
Δ = 91.8dBμV/m - 46dBμV/m
Δ = 45.8dB
START 900.0 MHz
RES BW 100 kHz(i)
VBW 1 MHz
STOP 930.0 MHz
SWP 22.5 msec