Measurement of RF Interference from a Model 1A6226-1 Transmitter

For : Chamberlain Manufacturing
Elmhurst, IL

P.O. No. : 852241
Date Received : April 5, 2006
Date Tested : April 6 and 7, 2006
Test Personnel : Mark E. Longinotti
Specification : FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C

Test Report By : MARK E. LONGINOTTI

Mark E. Longinotti
NARTE® Certified EMC Test Engineer, ATL-0154-E

Approved By : Raymond J Klouda

Raymond J. Klouda
Registered Professional Engineer of Illinois - 44894

Elite Electronic Engineering Inc.
1516 Centre Circle
Downers Grove, IL 60515
Tel : (630) 495-9770
Fax: (630) 495-9785
www.elitetest.com

TABLE OF CONTENTS

REVISION HISTORY

Revision	Date	Description
—	04/14/2006	Initial release

Measurement of RF Emissions from a 1A6226-1 transmitter

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 No. 1A6226-1, Serial No. None Assigned, transmitter, (hereinafter referred to as the test item). The test item was designed to transmit at approximately 433MHz using an internal antenna. The test item was manufactured and submitted for testing by Chamberlain Manufacturing located in Elmhurst, 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 C, Sections 15.207 and 15.231 for Intentional Radiators. 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 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 24°C and the relative humidity was 18%.

2.0 TEST ITEM SET-UP AND OPERATION:

The test item is a transmitter, Part No. 1A6226-1. The test item was installed in a Model No. G3800 Garage Door Opener.

A block diagram of the test item set-up is shown as Figure 1.

2.1 Power Input - The Model No. G3800 Garage Door Opener in which the test item was installed, obtained 115V, 60Hz power via a 3 wire, 1.8 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 only through the third wire of its input power cord.

2.3 Peripheral Equipment - The following peripheral equipment was submitted with the test item:

Item	Description
IR Sensors	2 each - Infrared Sensors
Wall Mount Switch	Wall Mount Switch

2.4 Interconnect Cables - The following interconnect cables were submitted with the test item:

Item	Description
IR Sensor Cables	2 each – 10.5 meter long, unshielded cables
Wall Mount Switch Cables	1 each – 8 meter long, unshielded cable

2.5 Operational Mode - For all tests, the test item was placed on an 80cm high non-conductive stand. The test item was set up so that upon power up it would continuously transmit at approximately 433MHz.

2.6 Test Item Modifications - No modifications were required for compliance to the emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.231 for Intentional Radiators

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 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:

CONDUCTED LIMITS FOR UNITENTIONAL RADIATORS

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	40

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 are presented on pages 15 and 16. The conducted limit for intentional radiators is shown as a reference. The final quasi-peak results are presented on pages 17 and 18. The emissions level closest to the limit (worst case) occurred at 199kHz. The emissions level at this frequency was 7.9dB 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 Duty Cycle Factor Measurements:

4.2.1 Procedures: The duty cycle factor is used to convert peak detected readings to average readings. This factor is computed from the time domain trace of the pulse modulation signal.

With the transmitter set up to transmit for maximum pulse density, the time domain trace is displayed on the spectrum analyzer. This trace is obtained by tuning center frequency to the transmitter frequency and then setting a zero span width with 10msec/div. The amplitude settings are adjusted so that the on/off transitions clear the 4th division from the bottom of the display. The markers are set at the beginning and end of a word period. If the word period exceeds 100 msec the word period is set to 100 msec. The on-time and off-time are then measured. The on-time is total time signal level exceeds the 4th division. Off-time is time under for the word period. The duty cycle is then computed as the (On-time/ word period) where the word period = (On-time + Off-time).

4.2.2 Results: A representative plot of the duty cycle is shown on data page 19. Since the transmitter uses a rolling code, the duty cycle correction factor used was calculated based on the average case. The following average case information was supplied by Chamberlain Manufacturing:

An average ON time is used because of the ever changing rolling code.

<u>For 100 msec period:</u>

1msec average sync pulse (50% of the time the sync pulse is 0.5msec and 50% of the time the sync pulse is 1.5msec)

20 digits for a total time of 40 msec, but only half of them are ON (oscillator running) for an average of 20 msec.

59msec average blanktime

The total is 100msec.

20 log 21/100 = -13.55

With the test item transmitting at 390MHz, the average case duty cycle correction factor would be -13.55dB.

4.3 Radiated Measurements

4.3.1 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 15.231(e) has the following radiated emission limits:

Fundamental Frequency MHz	Field Intensity uV/m @ 3 meters	Field Strength Harmonics and Spurious @ 3 meters
260 to 470	1,500 to 5,000*	150 to 500*

* - Linear Interpolation

For 433.89MHz, the limit at the fundamental is 4398.2uV/m @ 3m and the limit on the harmonics is 439.8uV/m @ 3m.

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.

4.3.2 Procedures - Open field 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.

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 5.0GHz was investigated using a peak detector function. The data was then processed by the computer to calculate equivalent field intensity.

The final open field emission tests were then manually performed over the frequency range of 30MHz to 5000MHz. 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. The peak detected levels were converted to average levels using a duty cycle factor which was computed from the pulse train.

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.

4.3.3 Results - The preliminary plots, with the test item transmitting at 433MHz, are presented on data pages 20 through 23. The plots are presented for a reference only, and are not used to determine compliance.

The final open area radiated levels, with the test item transmitting at 433MHz, are presented on data page 24. 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 433.90MHz. The emissions level at this frequency was 2.7dB within the limit. See data page 24 for details. Photographs of the test configuration which yielded the highest, or worst case, radiated emission levels are shown on Figure 3.

4.4 Occupied Bandwidth Measurements

4.4.1 Requirement - In accordance with paragraph 15.231(c), all emissions within 20dB of the peak amplitude level of the center frequency are required to be within a band less than 0.25% of the center frequency wide.

4.4.2 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 30 kHz and span was set to 2 MHz. The frequency spectrum near the fundamental was plotted.

4.4.3 Results - The plot of the emissions near the fundamental frequency are presented on data page 25. As can be seen from this data page, the transmitter met the occupied bandwidth

requirements. In addition, the 99% emission bandwidth measured 143 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 Chamberlain Manufacturing, Part No. 1A6226-1, Serial No. None Assigned, did fully meet the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.205 et seq. for Intentional Radiators, 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. 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								
XZG2	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	2223A01751	---		N/A	
XZG3	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	2421A03059	---		N/A	
Equipment Type: AMPLIFIERS								
APK2	PREAMPLIFIER	AGILENT TECHNOL	8449B	3008A01595	1-26.5GHZ	04/10/06	12	04/10/07
APK3	PREAMPLIFIER	AGILENT TECHNOL	8449B	3008A01593	1-26.5GHZ	06/03/05	12	06/03/06
Equipment Type: ANTENNAS								
NDQ1	TUNED DIPOLE ANTENNA	EMCO	3121C-DB4	313	400-1000MHZ	03/10/06	12	03/10/07
NTA0	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL611	2057	0.03-2GHZ	08/15/05	12	08/15/06
NWF0	RIDGED WAVE GUIDE	EMCO	3105	2035	1-12.4GHZ	10/01/05	12	10/01/06
Equipment Type: ATTENUATORS								
T1D2	10DB, 20W ATTENUATOR	NARDA	768-10	6	DC-11GHZ	07/27/05	12	07/27/06
Equipment Type: CONTROLLERS								
CDS1	COMPUTER	GATEWAY	MFATXPNT NMZ	0028483110	1.8GHZ		N/A	
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								
PLLC	50UH LISN 462D	ELITE	462D/70A	013	0.01-400MHZ	08/11/05	12	08/11/06
PLLD	50UH LISN 462D	ELITE	462D/70A	014	0.01-400MHZ	01/19/06	12	01/19/07
Equipment Type: PRINTERS AND PLOTTERS								
HRE1	LASER JET 5P	HEWLETT PACKARD	C3150A	USHB061052	---		N/A	
HRL1	PRINTER LASERJET 2200D	HEWLETT PACKARD	C7058A	CNGRG90023	---		N/A	
Equipment Type: RECEIVERS								
RAC0	SPECTRUM ANALYZER	HEWLETT PACKARD	85660B	2449A01117	100HZ-22GHZ	02/11/06	12	02/11/07
RAC2	SPECTRUM ANALYZER	HEWLETT PACKARD	85660B	3638A08770	100HZ-22GHZ	02/10/06	12	02/10/07
RACD	RF PRESELECTOR	HEWLETT PACKARD	85685A	3010A01205	20HZ-2GHZ	12/23/05	12	12/23/06
RACE	RF PRESELECTOR W/ RECEIVER	HEWLETT PACKARD	85685A	3010A01194	20HZ-2GHZ	08/26/05	12	08/26/06
RAF1	QUASIPEAK ADAPTER	HEWLETT PACKARD	85650A	2043A00271	0.01-1000MHZ	02/13/06	12	02/13/07
RAF4	QUASIPEAK ADAPTER	HEWLETT PACKARD	85650A	2043A00320	0.01-1000MHZ	02/10/06	12	02/10/07
RAKG	RF SECTION	HEWLETT PACKARD	85462A	3549A00284	0.009-6500MHZ	11/22/05	12	11/22/06
RAKH	RF FILTER SECTION	HEWLETT PACKARD	85460A	3448A00324	---	11/22/05	12	11/22/06

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.

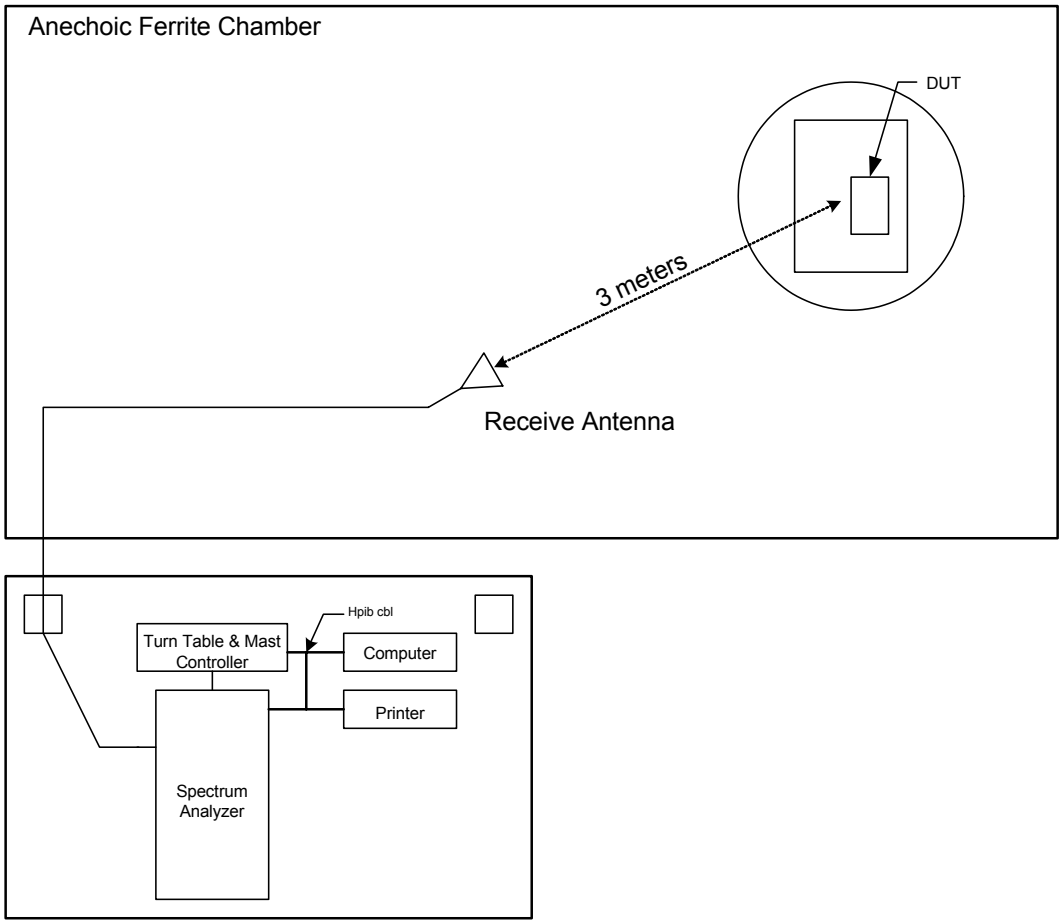
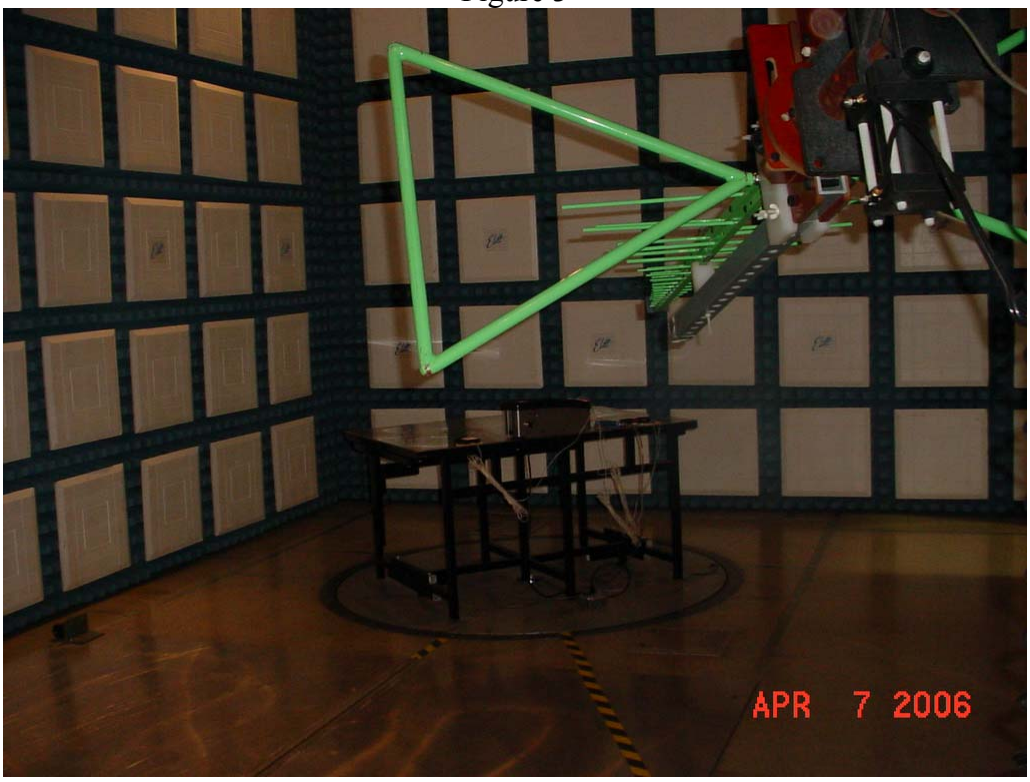


FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

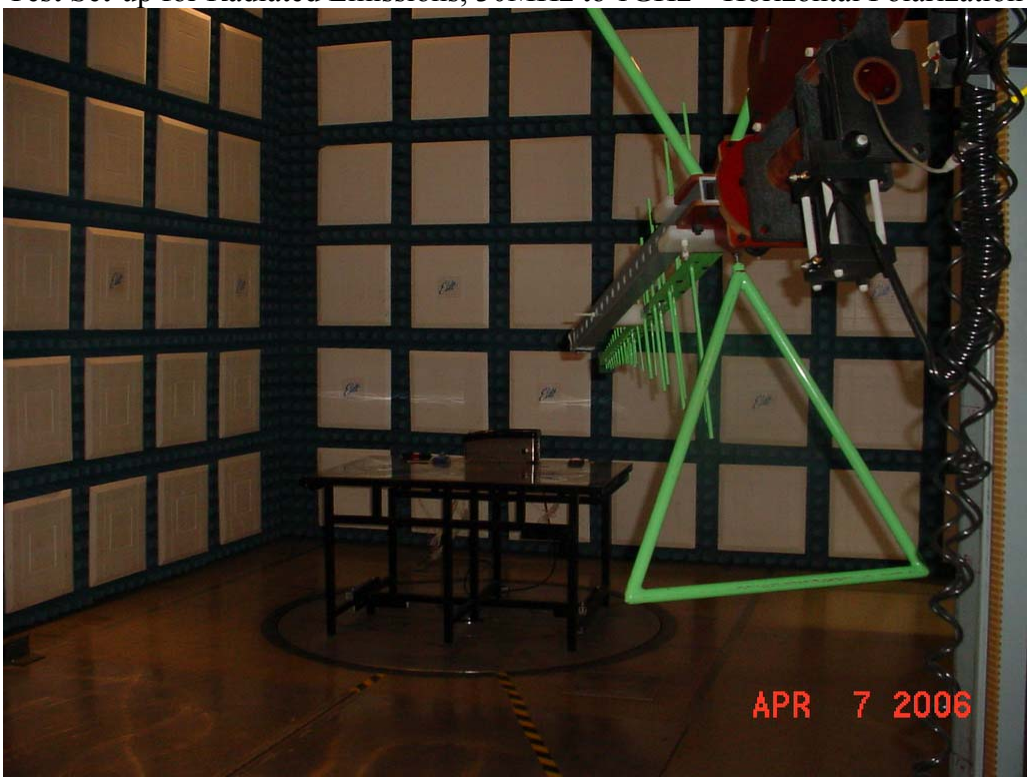
Figure 2

Test Set-up for Conducted Emissions

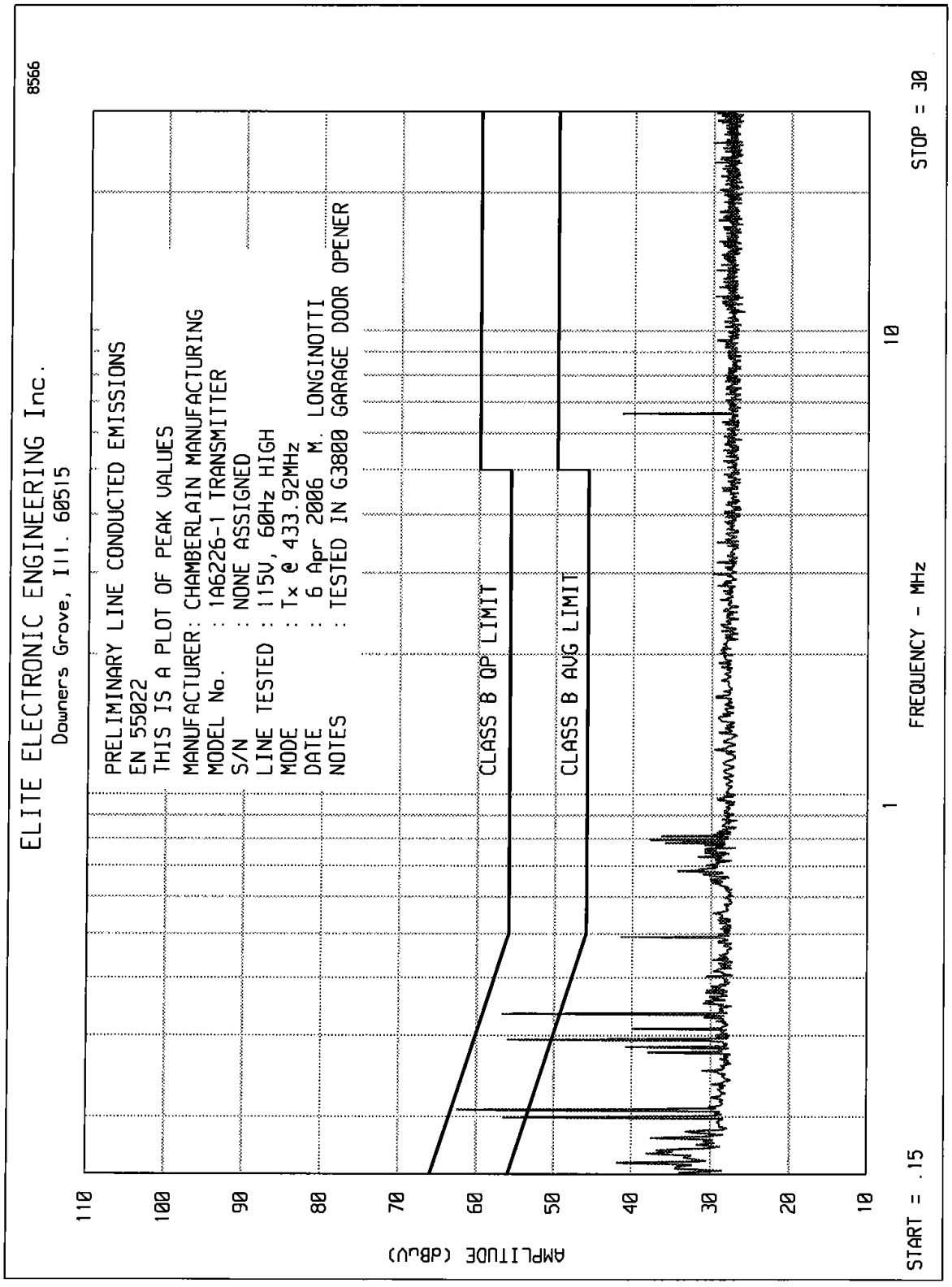
Figure 3

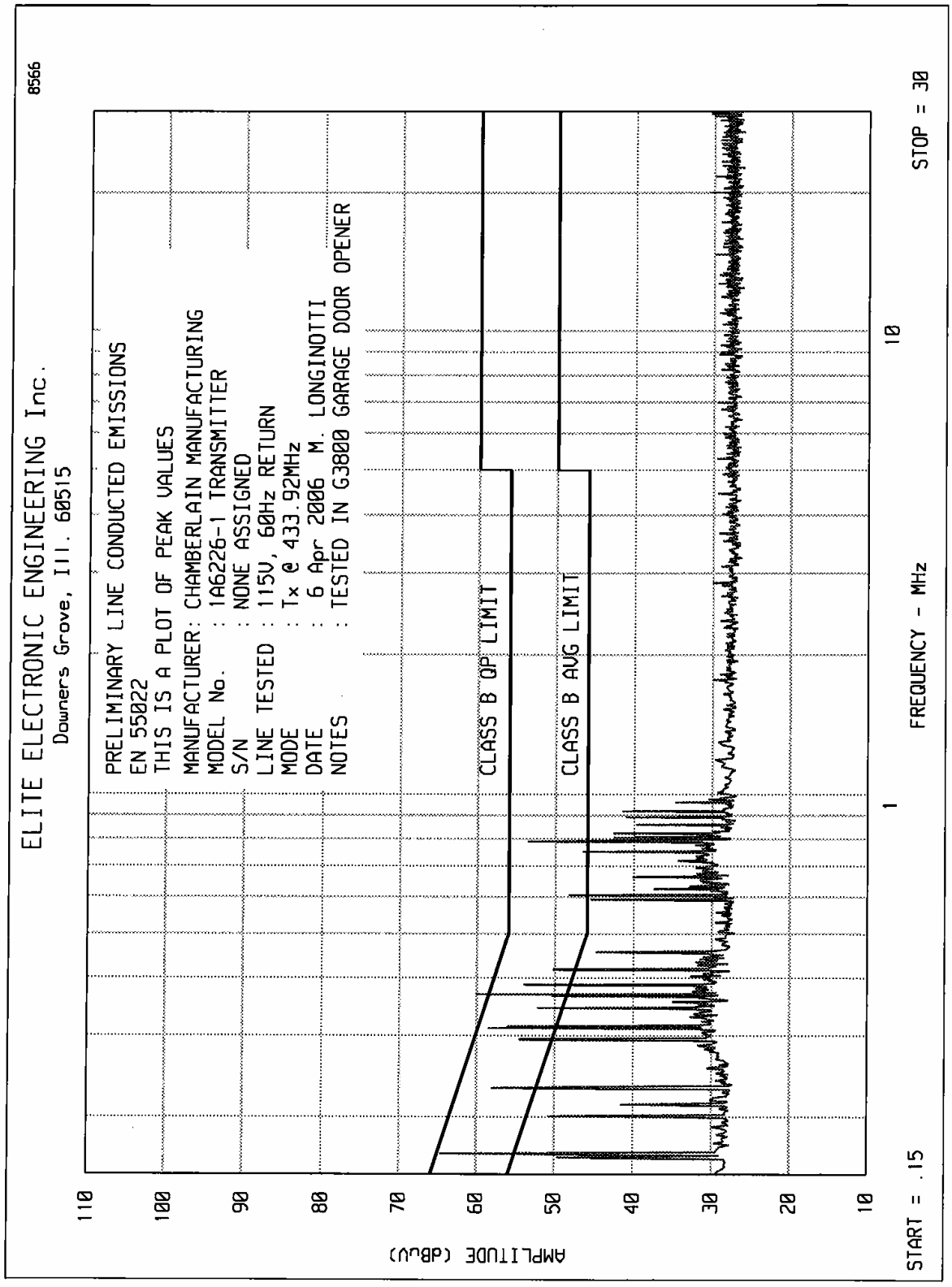


Test Set-up for Radiated Emissions, 30MHz to 1GHz – Horizontal Polarization



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


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8566
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: CHAMBERLAIN MANUFACTURING
MODEL No. : 1A6226-1 TRANSMITTER
S/N : NONE ASSIGNED
LINE TESTED : 115V, 60Hz HIGH
MODE : Tx @ 433.92MHz
DATE : 6 Apr 2006 M. LONGINOTTI
NOTES : TESTED IN G3800 GARAGE DOOR OPENER
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: CHAMBERLAIN MANUFACTURING
MODEL No. : 1A6226-1 TRANSMITTER
S/N : NONE ASSIGNED
LINE TESTED : 115V, 60Hz RETURN
MODE : Tx @ 433.92MHz
DATE : 6 Apr 2006 M. LONGINOTTI
NOTES : TESTED IN G3800 GARAGE DOOR OPENER
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 : CHAMBERLAIN MANUFACTURING
MODEL : 1A6226-1 TRANSMITTER
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 115V, 60Hz HIGH
MODE : Tx @ 433.92MHz
DATE : 6 Apr 2006
NOTES : TESTED IN G3800 GARAGE DOOR OPENER
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
.199	45.8	63.7		53.7	
.337	27.0	59.3		49.3	
.480	25.3	56.3		46.3	
.800	26.8	56.0		46.0	
.818	25.3	56.0		46.0	
1.281	25.1	56.0		46.0	
2.987	25.1	56.0		46.0	
4.542	25.1	56.0		46.0	
6.563	23.8	60.0		50.0	
9.479	23.8	60.0		50.0	
11.855	27.5	60.0		50.0	
15.558	23.8	60.0		50.0	
17.712	24.0	60.0		50.0	
22.473	24.0	60.0		50.0	
24.736	24.0	60.0		50.0	
26.691	23.8	60.0		50.0	

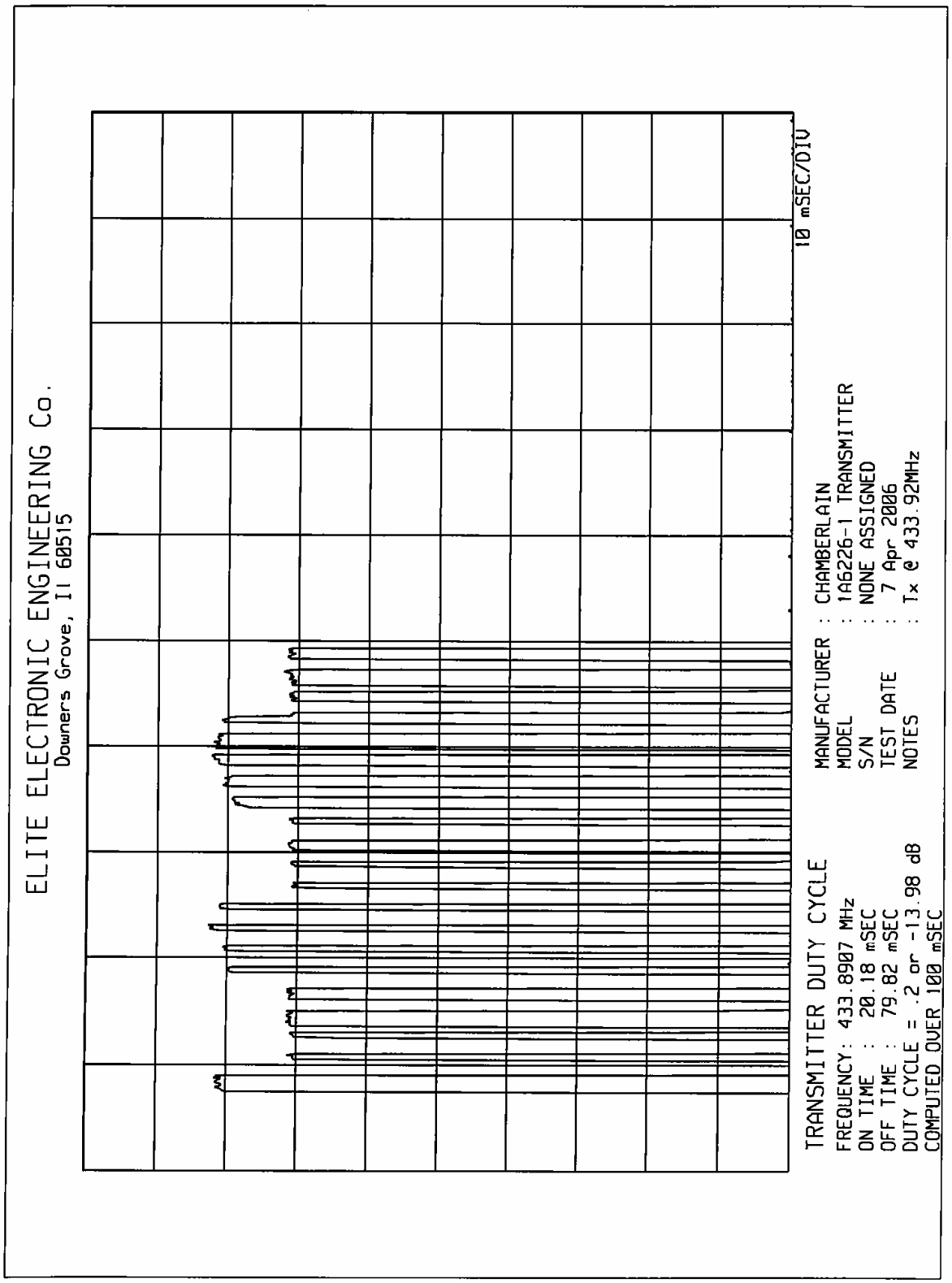
CHECKED BY: Mark E Longinotti
M. LONGINOTTI

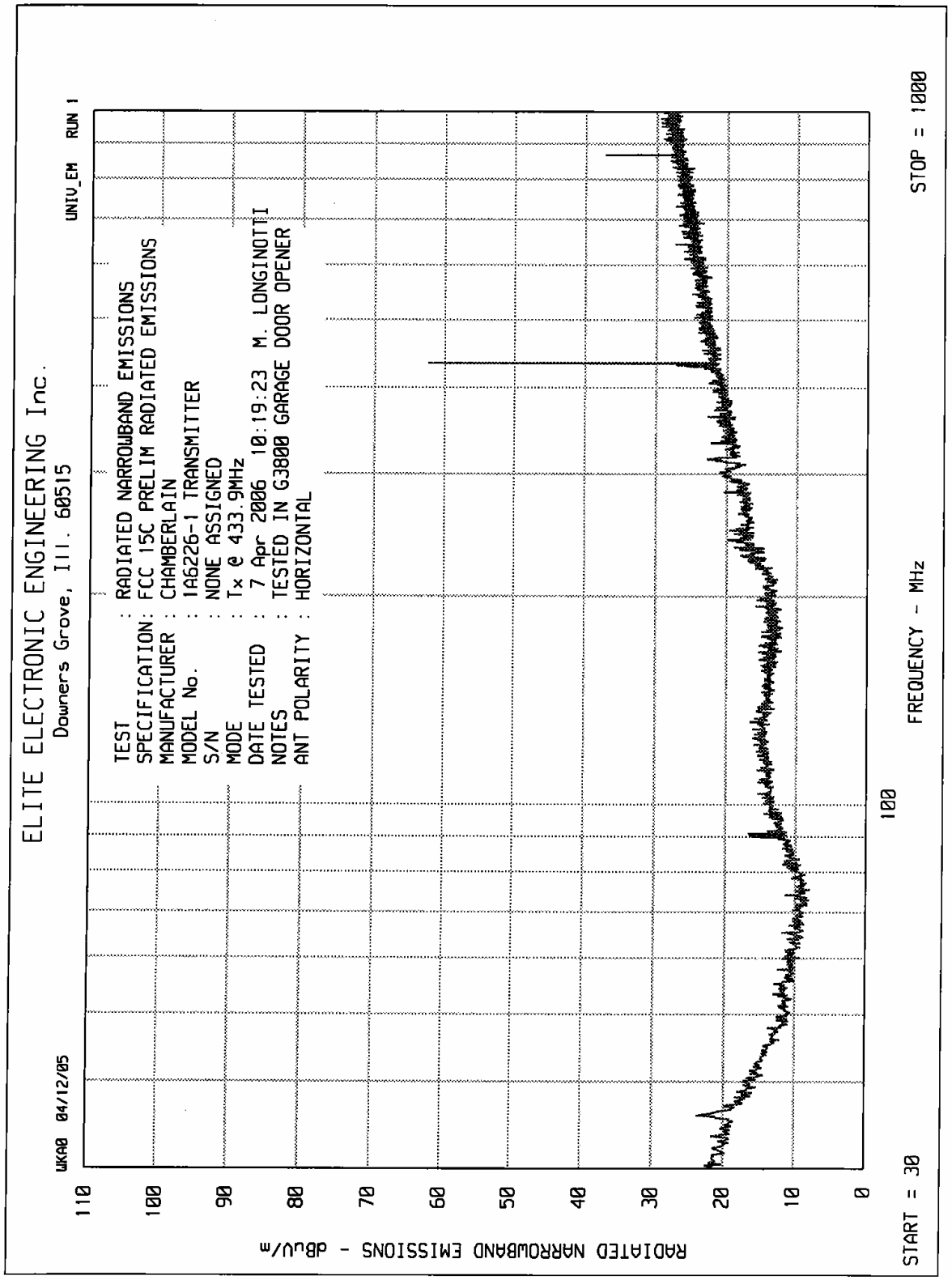
ETR No.
ELITE ELECTRONIC ENGINEERING CO.

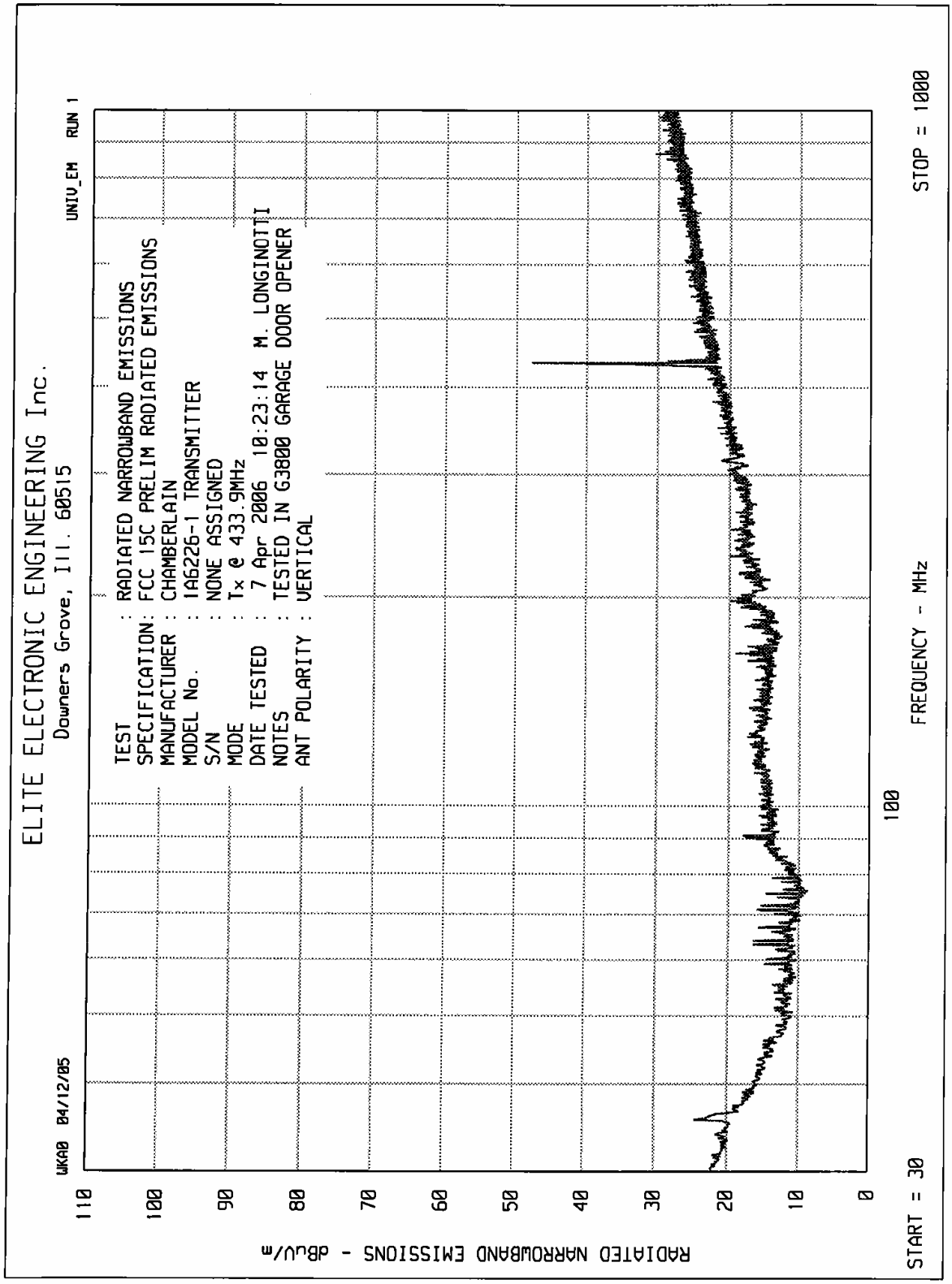
MANUFACTURER : CHAMBERLAIN MANUFACTURING
MODEL : 1A6226-1 TRANSMITTER
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 115V, 60Hz RETURN
MODE : Tx @ 433.92MHz
DATE : 6 Apr 2006
NOTES : TESTED IN G3800 GARAGE DOOR OPENER
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

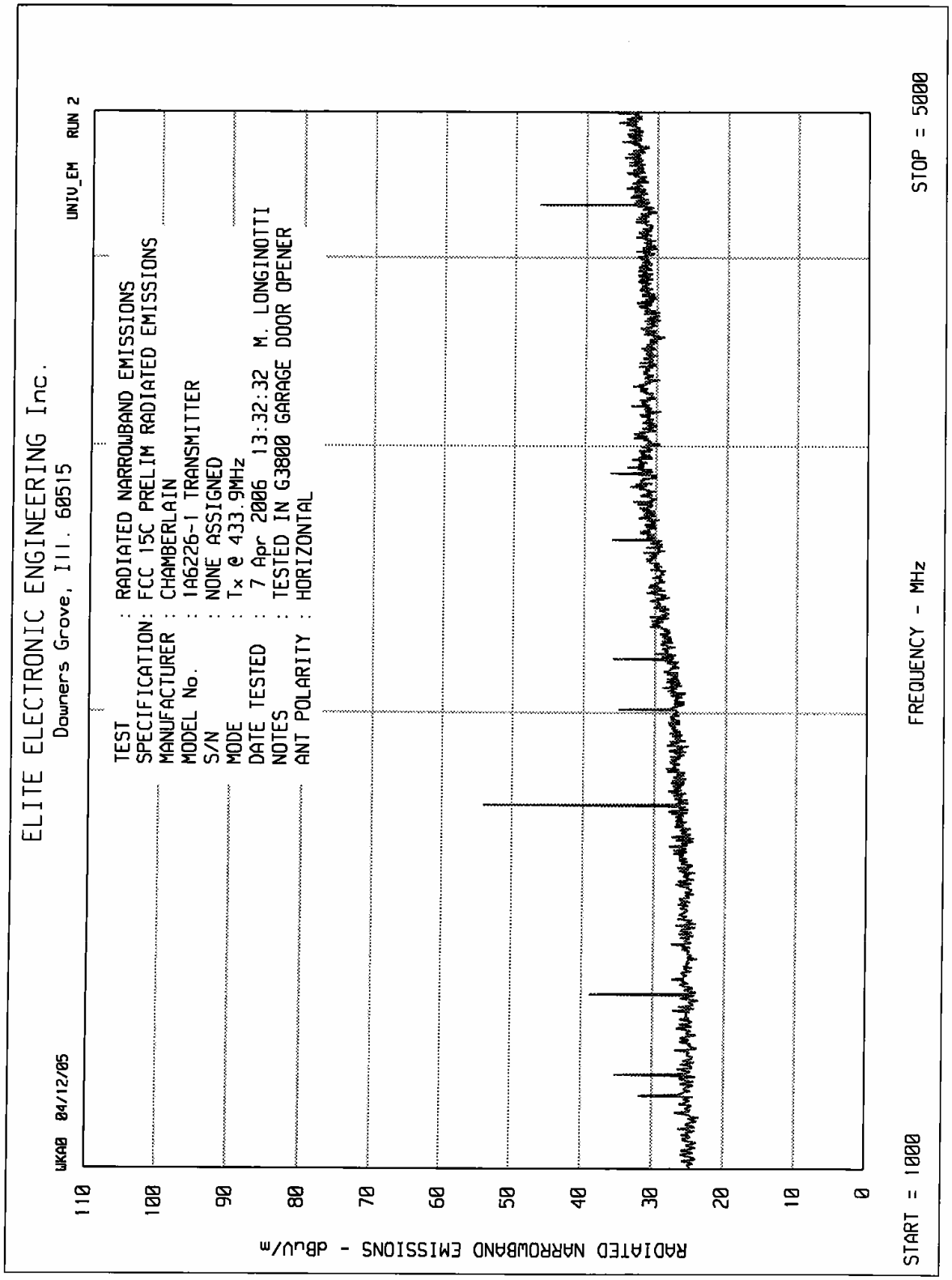
FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.162	37.6	65.4		55.4	
.300	24.0	60.2		50.2	
.358	8.1	58.8		48.8	
.608	23.9	56.0		46.0	
.669	25.3	56.0		46.0	
.781	20.1	56.0		46.0	
.828	25.9	56.0		46.0	
.939	25.1	56.0		46.0	
1.920	25.2	56.0		46.0	
3.472	25.2	56.0		46.0	
5.224	23.6	60.0		50.0	
7.903	26.0	60.0		50.0	
8.875	23.8	60.0		50.0	
12.622	24.0	60.0		50.0	
15.034	24.0	60.0		50.0	
17.927	24.1	60.0		50.0	
20.830	24.0	60.0		50.0	
23.310	24.0	60.0		50.0	
26.992	23.8	60.0		50.0	

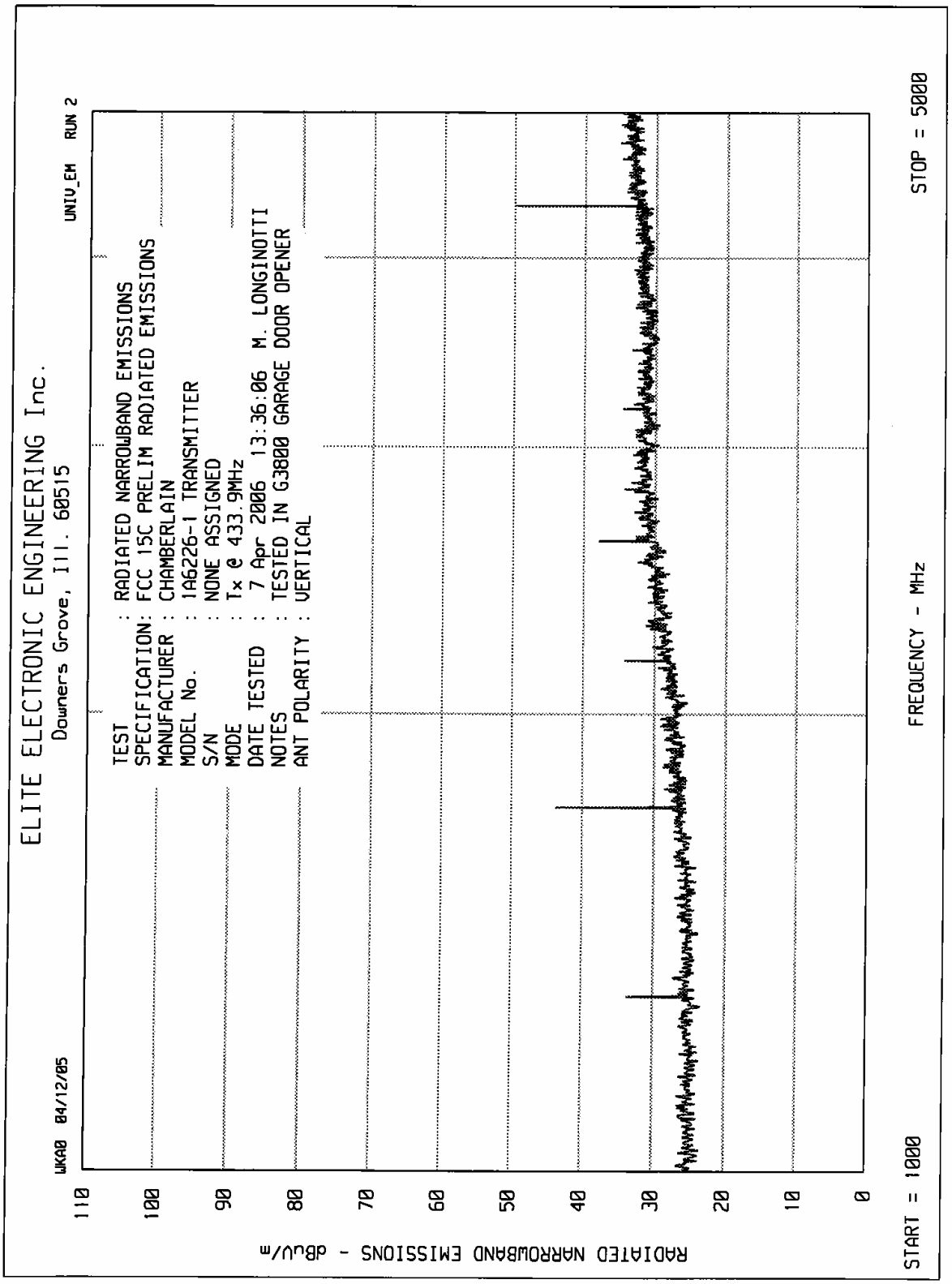
CHECKED BY: Mark E Longinotti
M. LONGINOTTI


ELITE ELECTRONIC ENGINEERING Co.
Downers Grove, Il 60515
10 mSEC/DIV
TRANSMITTER DUTY CYCLE
FREQUENCY: 433.8907 MHz
ON TIME : 20.18 mSEC
OFF TIME : 79.82 mSEC
DUTY CYCLE = .2 or -13.98 dB
COMPUTED OVER 100 mSEC
MANUFACTURER : CHAMBERLAIN
MODEL : 1A6226-1 TRANSMITTER
S/N : NONE ASSIGNED
TEST DATE : 7 Apr 2006
NOTES : Tx @ 433.92MHz


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV_EM RUN 1
WKA0 04/12/05
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC 15C PRELIM RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : 1A6226-1 TRANSMITTER
S/N : NONE ASSIGNED
MODE : Tx @ 433.9MHz
DATE TESTED : 7 Apr 2006 10:19:23 M. LONGINOTTI
NOTES : TESTED IN G3800 GARAGE DOOR OPENER
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
UKA0 04/12/05
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC 15C PRELIM RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : 1A6226-1 TRANSMITTER
S/N : NONE ASSIGNED
MODE : Tx @ 433.9MHz
DATE TESTED : 7 Apr 2006 10:23:14 M. LONGINOTTI
NOTES : TESTED IN G3800 GARAGE DOOR OPENER
ANT POLARITY : VERTICAL
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 15C PRELIM RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : 1A6226-1 TRANSMITTER
S/N : NONE ASSIGNED
MODE : Tx @ 433.9MHz
DATE TESTED : 7 Apr 2006 13:32:32 M. LONGINOTTI
NOTES : TESTED IN G3800 GARAGE DOOR OPENER
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 = 5000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV_EM RUN 2
WKA0 04/12/05
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC 15C PRELIM RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : 1A6226-1 TRANSMITTER
S/N : NONE ASSIGNED
MODE : Tx @ 433.9MHz
DATE TESTED : 7 Apr 2006 13:36:06 M. LONGINOTTI
NOTES : TESTED IN G3800 GARAGE DOOR OPENER
ANT POLARITY : VERTICAL
RADIATED NARROWBAND EMISSIONS - dBuV/m
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 5000

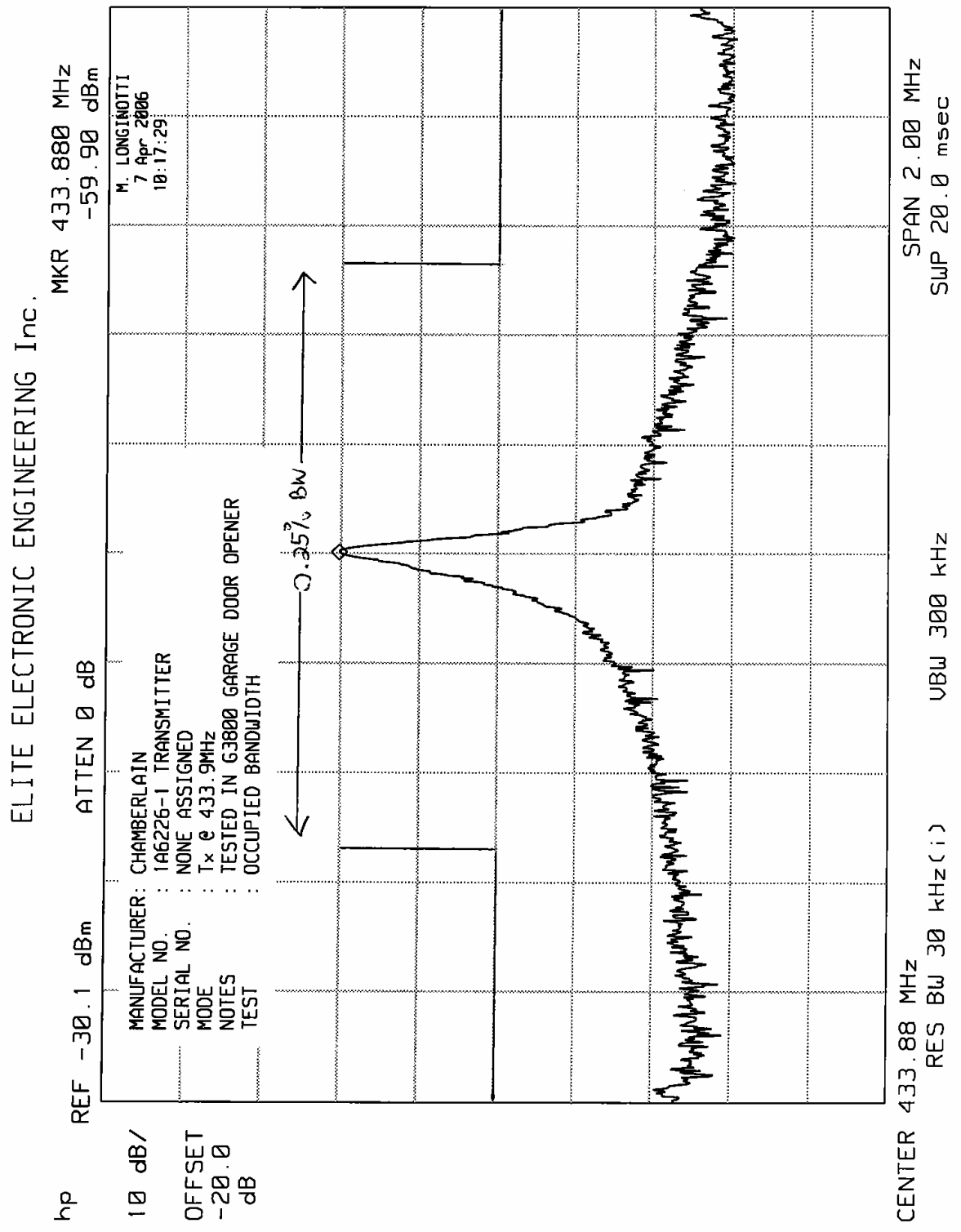
ETR No.
DATA PAGE

SPECIFICATION : FCC PART 15C TRANSMITTER OPEN FIELD DATA
MANUFACTURER : CHAMBERLAIN MANUFACTURING
MODEL : 1A6226-1 TRANSMITTER
S/N : NONE ASSIGNED
TEST DATE : 10 Apr 2006
NOTES : TESTED IN G3800 GARAGE DOOR OPENER
TEST ANTENNA : ROBERTS DIPOLE & DRWG ANTENNAS
(PERIODIC RATES EXCEEDED)

FREQUENCY MHz	ANT POL	MTR RDG dBuV	CBL FAC dB	ANT FAC dB	DUTY CYCLE dB	TOTAL dBuV/m @3m	TOTAL uV/m @3m	LIMIT uV/m @3m	NOTES
433.89	H	59.7	1.5	21.3	-13.5	69.0	2826.7	4398.2	
433.89	V	60.9	1.5	21.3	-13.5	70.2	3245.4	4398.2	
867.80	H	10.5	1.9	27.4	-13.5	26.3	20.6	439.8	
867.80	V	11.7	1.9	27.4	-13.5	27.5	23.7	439.8	
1301.67	H	17.0	2.4	26.4	-13.5	32.3	41.2	500.0	*
1301.67	V	17.7	2.4	26.4	-13.5	33.0	44.7	500.0	*
1735.50	H	31.1	2.8	27.8	-13.5	48.2	255.9	500.0	
1735.50	V	33.1	2.8	27.8	-13.5	50.2	322.1	500.0	
2169.40	H	14.1	3.2	29.5	-13.5	33.3	46.0	500.0	
2169.40	V	14.0	3.2	29.5	-13.5	33.2	45.5	500.0	
2603.30	H	11.0	3.7	31.0	-13.5	32.1	40.4	500.0	
2603.30	V	13.3	3.7	31.0	-13.5	34.4	52.6	500.0	
3037.23	H	14.2	4.0	32.3	-13.5	37.0	71.0	500.0	
3037.23	V	12.4	4.0	32.3	-13.5	35.2	57.7	500.0	
3471.12	H	8.0AMB	4.3	32.3	0.0	44.6	169.5	500.0	
3471.12	V	9.1AMB	4.3	32.3	0.0	45.7	192.4	500.0	
3905.01	H	8.0AMB	4.5	32.9	0.0	45.4	186.0	500.0	*
3905.01	V	8.9AMB	4.5	32.9	0.0	46.3	206.3	500.0	*
4338.90	H	19.2	4.7	32.9	-13.5	43.3	146.0	500.0	*
4338.90	V	19.9	4.7	32.9	-13.5	44.0	158.2	500.0	*

* DENOTES A FREQUENCY CONFLICT WITH RESTRICTED BANDS

checked by: Mark E Longinotti
M. LONGINOTTI


ELITE ELECTRONIC ENGINEERING Inc.
MKR 433.880 MHz
-59.90 dBm
M. LONGINOTTI
7 Apr 2006
10:17:29
hp
REF -30.1 dBm
ATTEN 0 dB
10 dB/
OFFSET
-20.0
dB
MANUFACTURER: CHAMBERLAIN
MODEL NO. : 1A6226-1 TRANSMITTER
SERIAL NO. : NONE ASSIGNED
MODE : Tx @ 433.9MHz
NOTES : TESTED IN G3800 GARAGE DOOR OPENER
TEST : OCCUPIED BANDWIDTH
0.35% BW
CENTER 433.88 MHz
RES BW 30 kHz(i)
VBW 300 kHz
SPAN 2.00 MHz
SWP 20.0 msec