Measurement of RF Interference from a Model CA3000 WALL SWITCH Transceiver

For : Intermatic
Spring Grove, IL

P.O. No. : 925460
Date Received : January 15, 2007
Date Tested : January 15 through 17, 2007
Test Personnel: Richard E. King
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 : Richard E. King

Richard E. King

Approved By : Raymond J. Klouda

Raymond J. Klouda
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Measurement of RF Emissions from a Transceiver, Model No. CA3000 WALL SWITCH

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.CA3000 WALL SWITCH (hereinafter referred to as the test item). No Serial Number was assigned to the test item. 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 902 MHz - 928 MHz 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, 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 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.

1.6 Laboratory Conditions The temperature at the time of the test was 22^{o}C and the relative humidity was 22%.

2.0 TEST ITEM SET-UP AND OPERATION:

The test item is a Transceiver, Model No. CA3000 WALL SWITCH. A block diagram of the test item set-up 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 is grounded through the third wire of the 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 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 was set up so that upon power up it would transmit continuously at 908.4 MHz. The test item was then reprogrammed so that upon power up it would receive continuously at 908.4 MHz.

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 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 15 and 16. The conducted limit for receivers is shown as a reference. The final quasi-peak results are presented on pages 17 and 18.

The plots of the peak preliminary conducted voltage levels on each power line with the test item in transmit mode are presented on pages 19 and 20. The conducted limit for

intentional radiators is shown as a reference. The final quasi-peak results are presented on pages 21 and 22. Photographs of the test setup for conducted emission levels are shown on Figures 2a and 2b.

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 10GHz, the broadband

measuring antenna was positioned at a 3 meter distance from the test item. The frequency range from 30MHz to 10GHz 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 23 and 24. The plots are presented for a reference only, and are not used to determine compliance.The final radiated levels are presented on page 25. 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 908.4 MHz. The emissions level at this frequency was 8.6 dB within the limit. No photographs of the test configuration which yielded the highest or worst case, radiated emission levels are available.

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 10GHz. 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 908.4 MHz, are presented on data pages 26 and 27. 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 908.4 MHz, are presented on data page 28. 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 2725.26 MHz. The emissions level at this frequency was 0.4 dB within the limit. Photographs of the test configuration which yielded the highest or worst case, radiated emission levels are shown in 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 50 dB 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 29. As can be seen from this data page, the transmitter met the occupied bandwidth requirements. The 99% bandwidth was measured to be 130 kHz.

5.0 CONCLUSIONS:

It was determined that the Intermatic Transceiver, Model No. CA3000 WALL SWITCH, Serial Number none assigned, 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 902 MHz -928 MHz 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. 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								
XPQ3	HIGH PASS FILTER	K&L MICROWAVE	4IH30-1804/T	4	1.8GHZ-10GHZ		12	
XZG5	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	2508A05689	PROGRAMMABLE		NOTE 1	
Equipment Type: AMPLIFIERS								
APK5	PREAMPLIFIER	HEWLETT PACKARD	8449B	29331A00183	2GHZ-22GHZ	04/27/06	12	04/27/07
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	08/21/06	12	08/21/07
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: PRINTERS AND PLOTTERS								
HRE1	LASER JET 5P	HEWLETT PACKARD	C3150A	USHB061052	---		N/A	
Equipment Type: RECEIVERS								
RACH	RF PRESELECTOR	HEWLETT PACKARD	85685A	8574A00284	20HZ-2GHZ	10/11/06	12	10/11/07
RAF1	QUASIPEAK ADAPTER	HEWLETT PACKARD	85650A	2043A00271	0.01-1000MHZ	02/13/06	12	02/13/07

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.

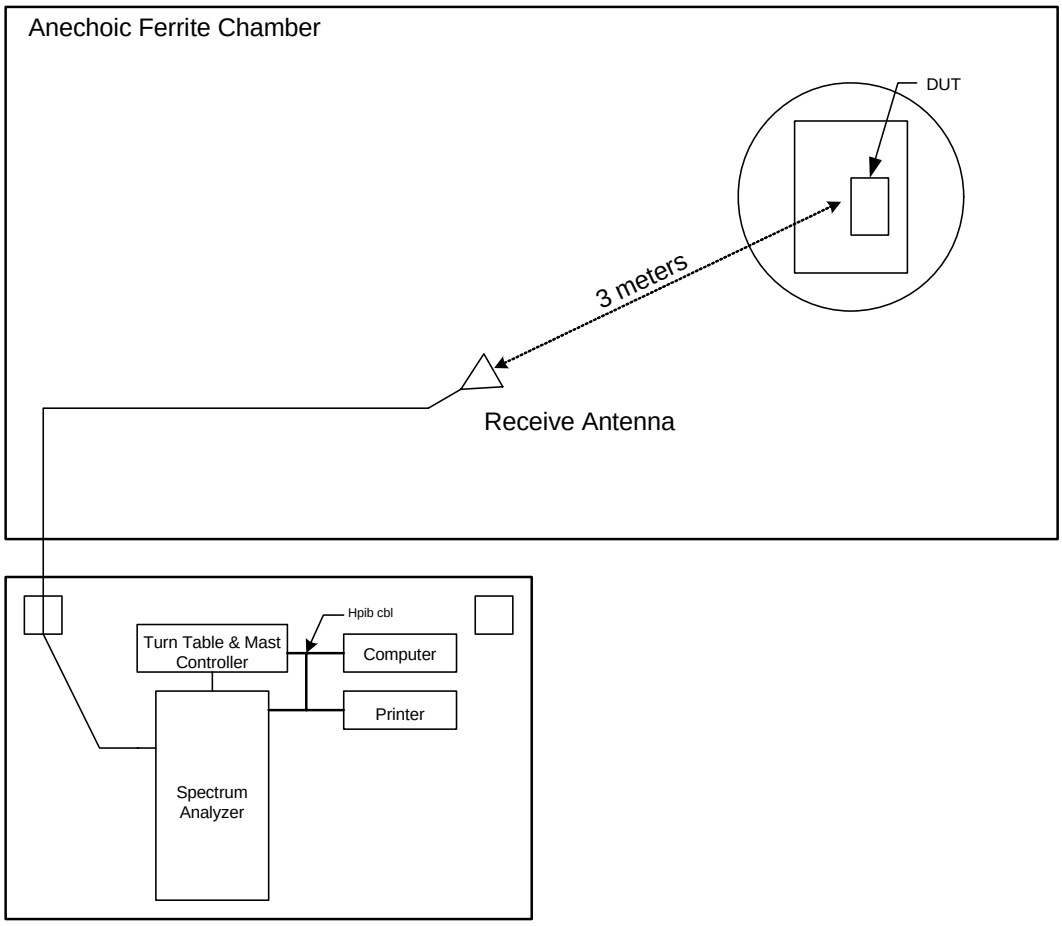


FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

Figure 2a - Receive at 908.4MHz

Test Set-up for Conducted Emissions

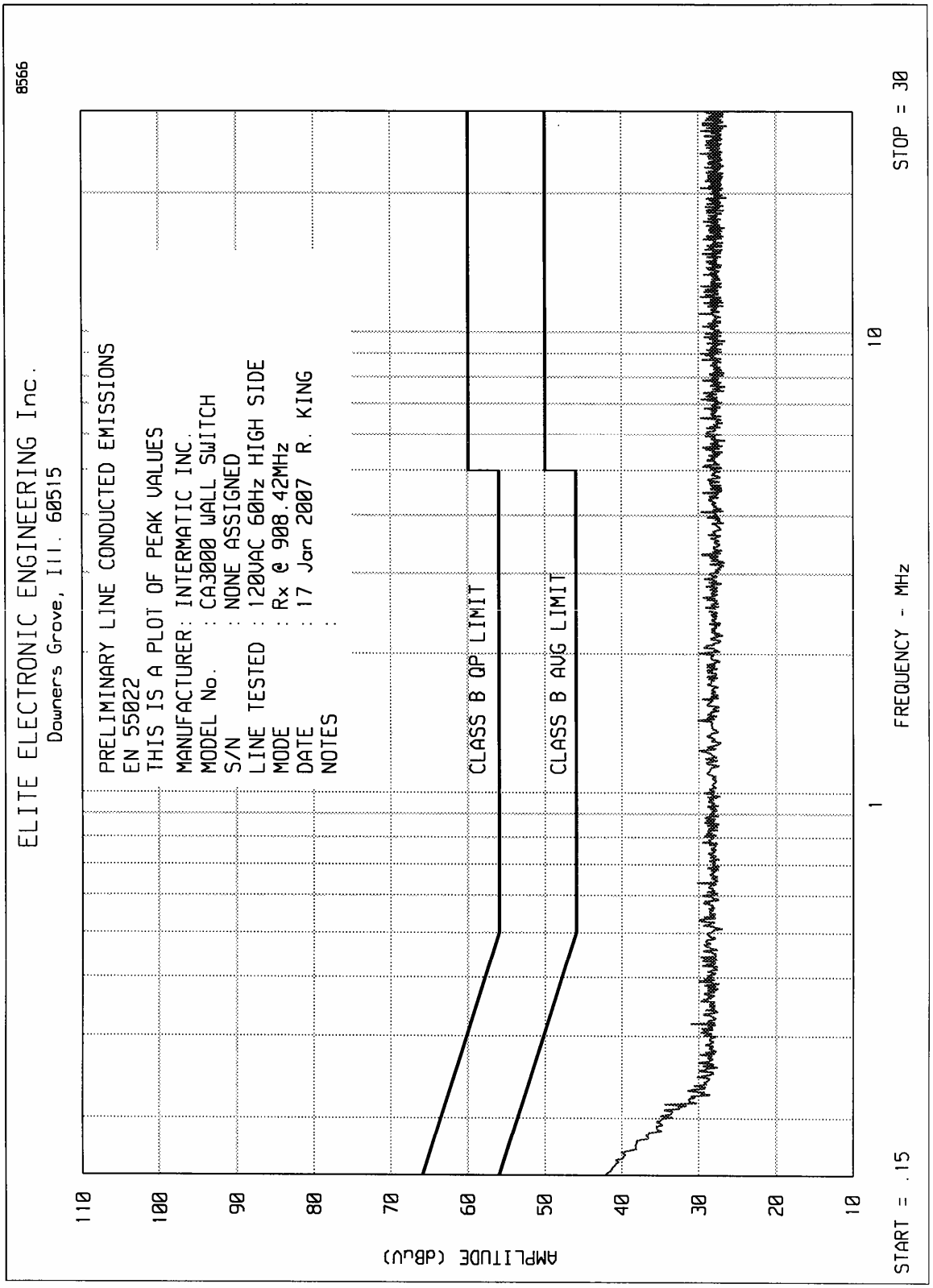
Figure 2b - Transmit at 908.4MHz

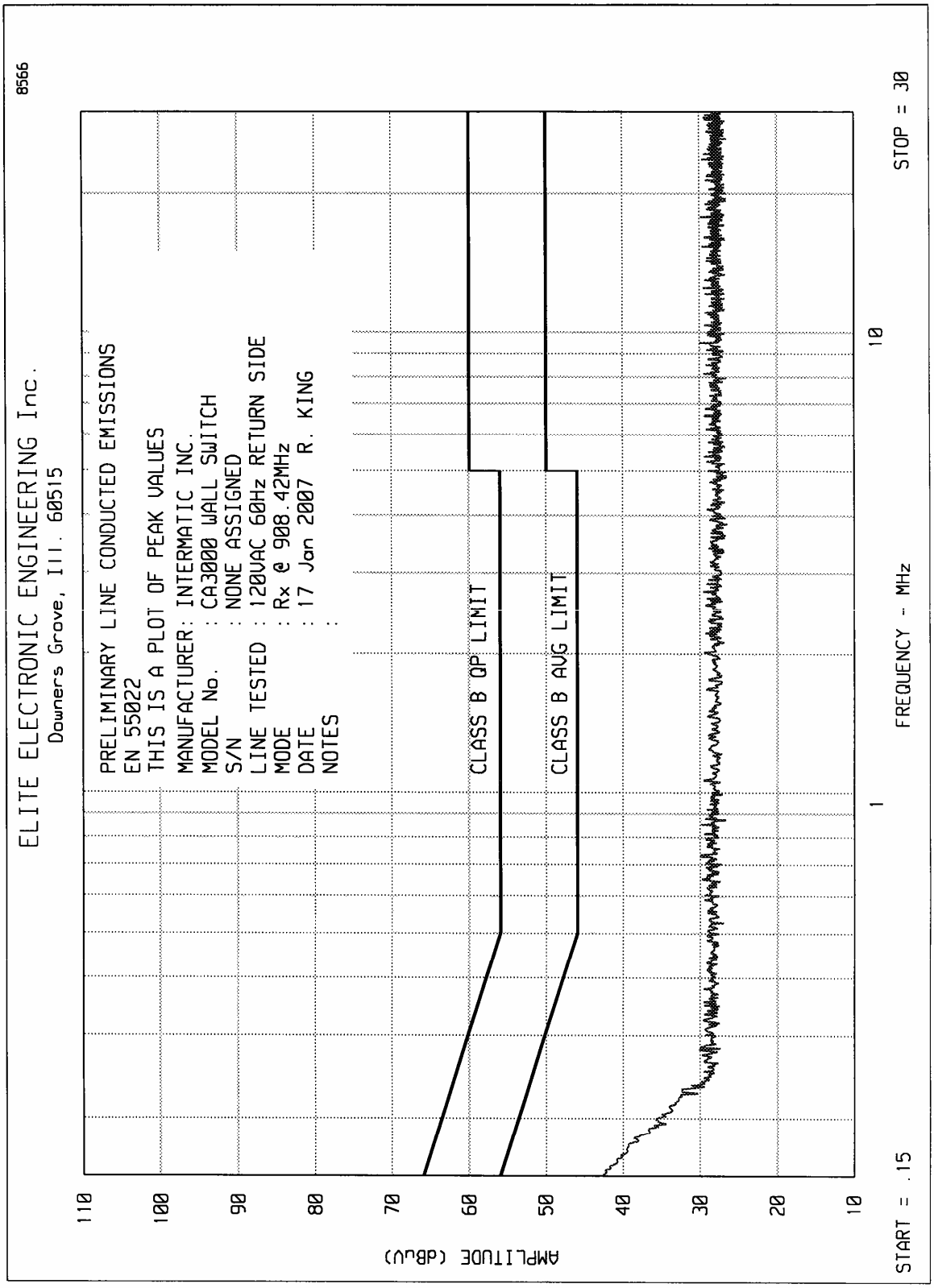
Test Set-up for Conducted Emissions

Figure 3 - Transmit at 908.4MHz

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

Test Set-up for Radiated Emissions 908.4MHz – 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 INC.
MODEL No. : CA3000 WALL SWITCH
S/N : NONE ASSIGNED
LINE TESTED : 120VAC 60Hz HIGH SIDE
MODE : Rx @ 908.42MHz
DATE : 17 Jan 2007 R. KING
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 INC.
MODEL No. : CA3000 WALL SWITCH
S/N : NONE ASSIGNED
LINE TESTED : 120VAC 60Hz RETURN SIDE
MODE : Rx @ 908.42MHz
DATE : 17 Jan 2007 R. KING
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 INC.
MODEL : CA3000 WALL SWITCH
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120VAC 60Hz RETURN SIDE
MODE : Rx @ 908.42MHz
DATE : 17 Jan 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
.270	25.4	61.1		51.1	
.587	25.7	56.0		46.0	
.963	26.0	56.0		46.0	
2.016	25.6	56.0		46.0	
3.414	25.6	56.0		46.0	
5.289	25.0	60.0		50.0	
6.562	25.0	60.0		50.0	
9.470	24.8	60.0		50.0	
12.501	25.0	60.0		50.0	
15.407	25.0	60.0		50.0	
18.995	25.0	60.0		50.0	
21.308	24.8	60.0		50.0	
23.652	25.0	60.0		50.0	
27.177	24.8	60.0		50.0	

CHECKED BY: Richard King
R. KING

ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : INTERMATIC INC.
MODEL : CA3000 WALL SWITCH
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120VAC 60Hz HIGH SIDE
MODE : Rx @ 908.42MHz
DATE : 17 Jan 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	31.3	66.0		56.0	
.357	25.4	58.8		48.8	
.645	25.6	56.0		46.0	
1.450	25.5	56.0		46.0	
2.662	25.5	56.0		46.0	
4.064	25.5	56.0		46.0	
6.498	25.0	60.0		50.0	
9.998	25.0	60.0		50.0	
11.888	25.0	60.0		50.0	
15.901	25.0	60.0		50.0	
18.590	24.8	60.0		50.0	
22.160	25.0	60.0		50.0	
24.314	24.8	60.0		50.0	
27.188	24.8	60.0		50.0	

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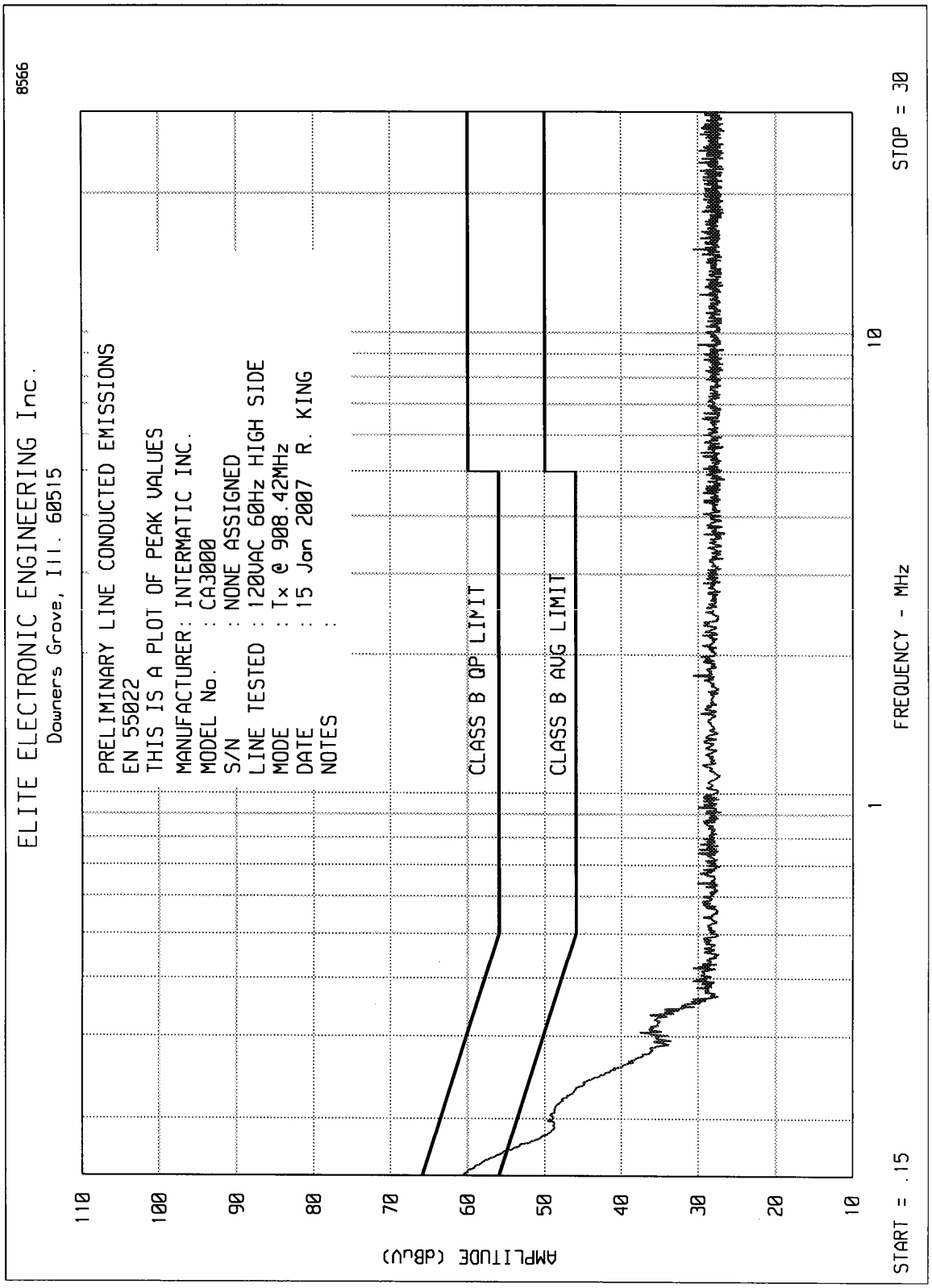
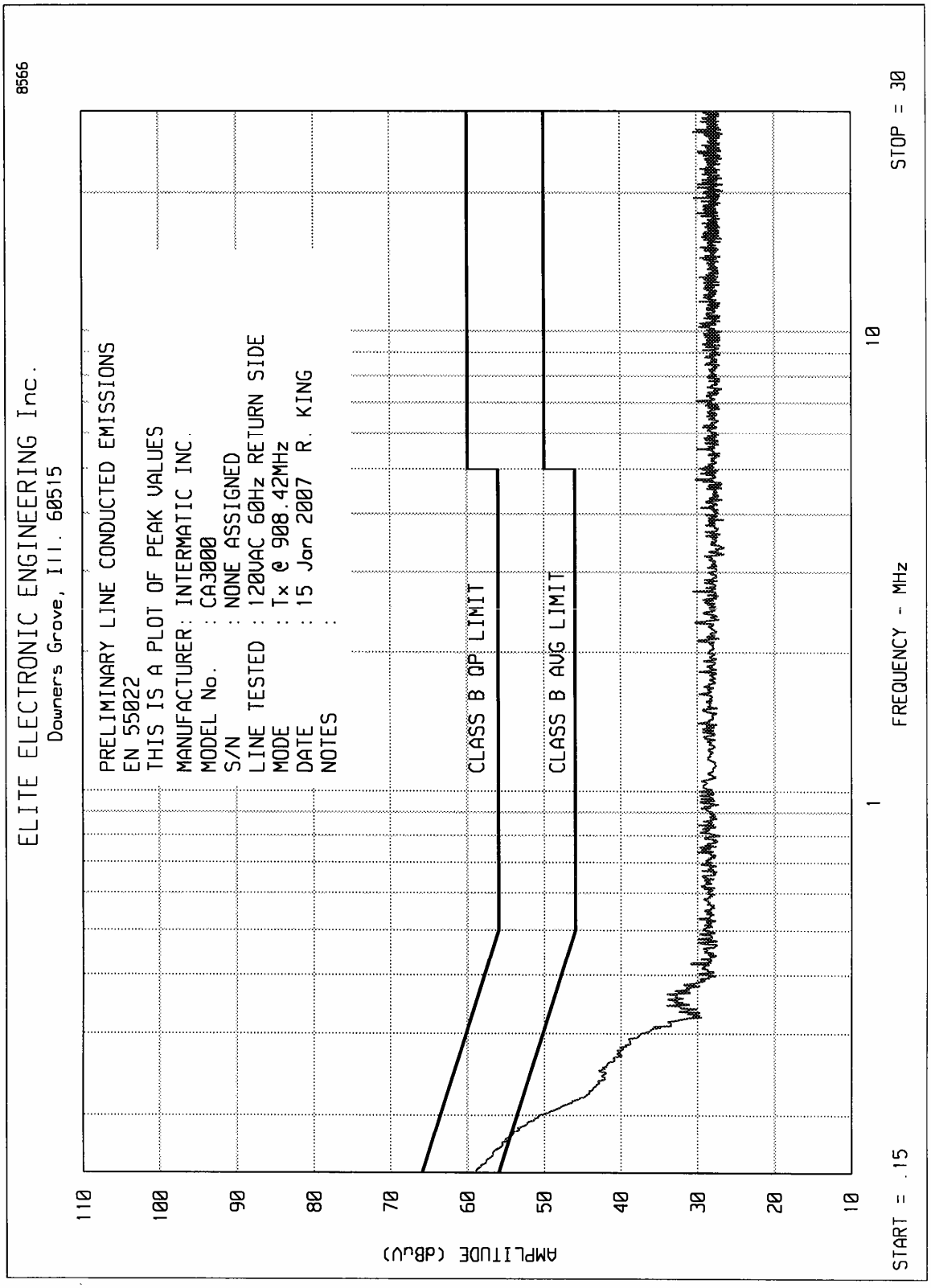
R. KING


8566
ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: INTERMATIC INC.
MODEL No. : CA3000
S/N : NONE ASSIGNED
LINE TESTED : 120VAC 60Hz HIGH SIDE
MODE : Tx @ 908.42MHz
DATE : 15 Jan 2007 R. KING
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 INC.
MODEL No. : CA3000
S/N : NONE ASSIGNED
LINE TESTED : 120VAC 60Hz RETURN SIDE
MODE : Tx @ 908.42MHz
DATE : 15 Jan 2007 R. KING
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 INC.
MODEL : CA3000
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120VAC 60Hz HIGH SIDE
MODE : Tx @ 908.42MHz
DATE : 15 Jan 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
.152	50.6	65.9		55.9	
.246	32.7	61.9		51.9	
.310	26.5	60.0		50.0	
.575	25.6	56.0		46.0	
.991	25.6	56.0		46.0	
1.883	25.6	56.0		46.0	
3.707	25.6	56.0		46.0	
5.165	24.8	60.0		50.0	
7.178	25.0	60.0		50.0	
9.805	25.0	60.0		50.0	
12.084	25.0	60.0		50.0	
15.218	25.0	60.0		50.0	
19.392	24.8	60.0		50.0	
21.352	25.0	60.0		50.0	
24.746	25.0	60.0		50.0	
26.767	24.8	60.0		50.0	

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ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : INTERMATIC INC.
MODEL : CA3000
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120VAC 60Hz RETURN SIDE
MODE : Tx @ 908.42MHz
DATE : 15 Jan 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
.152	48.9	65.9		55.9	
.245	32.4	61.9		51.9	
.291	27.5	60.5		50.5	
.549	25.7	56.0		46.0	
.864	25.6	56.0		46.0	
2.126	25.5	56.0		46.0	
3.224	25.6	56.0		46.0	
5.131	25.0	60.0		50.0	
7.035	25.0	60.0		50.0	
9.765	25.0	60.0		50.0	
13.024	25.0	60.0		50.0	
15.158	25.0	60.0		50.0	
18.637	25.0	60.0		50.0	
22.248	25.0	60.0		50.0	
24.567	25.0	60.0		50.0	
26.993	24.8	60.0		50.0	

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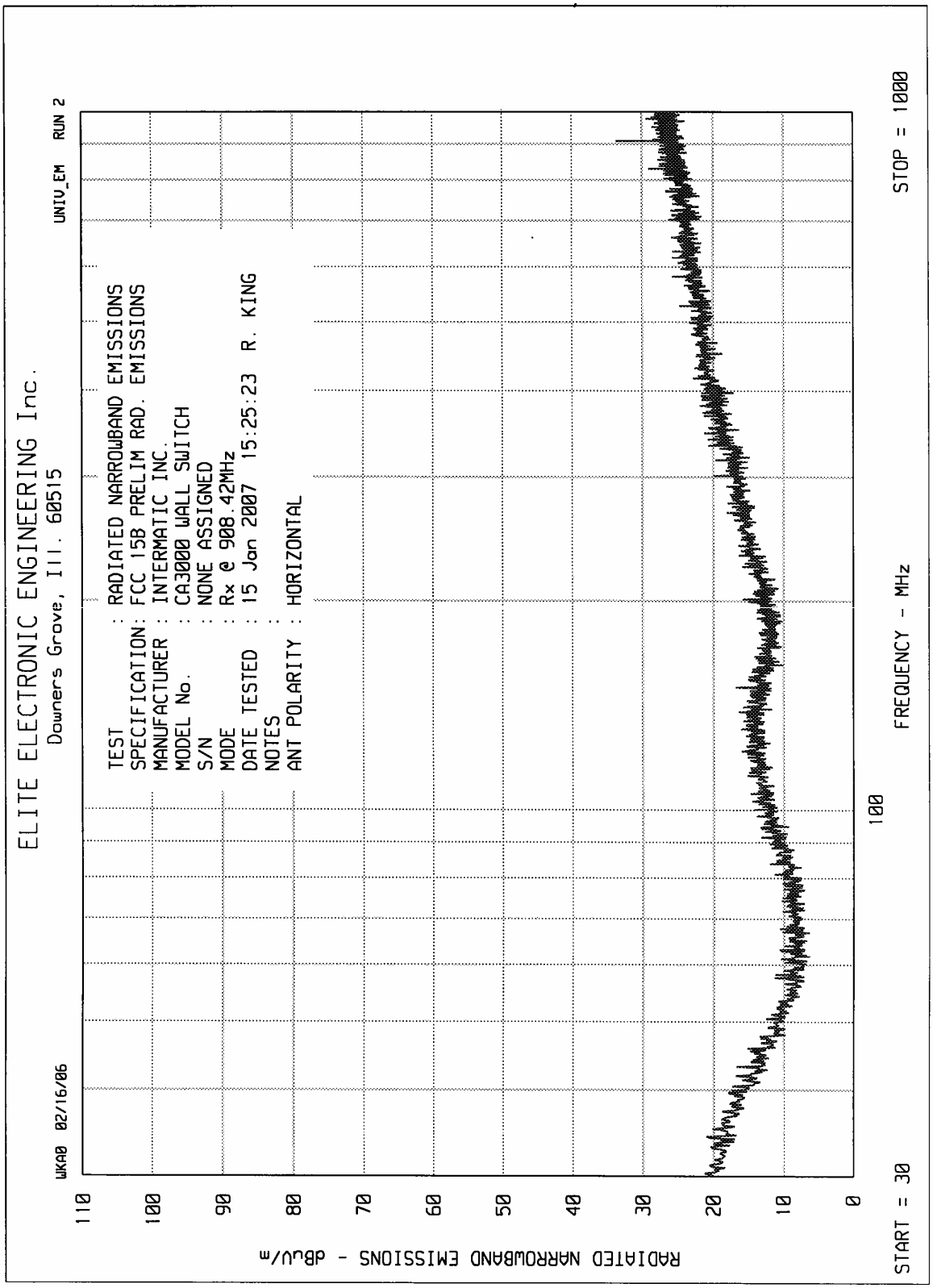
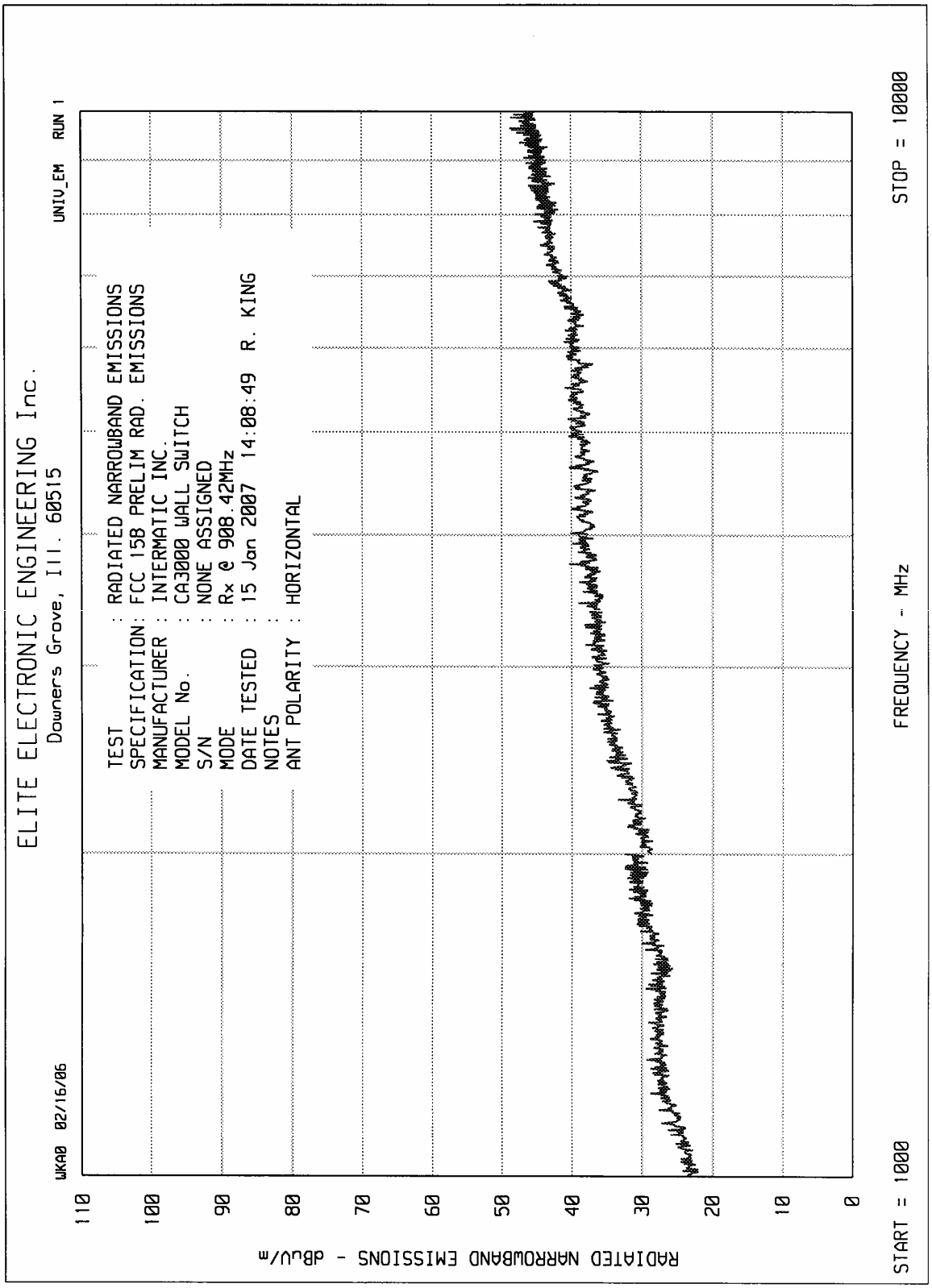
R. KING


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV_EM RUN 2
WKA0 02/16/06
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC 15B PRELIM RAD. EMISSIONS
MANUFACTURER : INTERMATIC INC.
MODEL No. : CA3000 WALL SWITCH
S/N : NONE ASSIGNED
MODE : Rx @ 908.42MHz
DATE TESTED : 15 Jan 2007 15:25:23 R. KING
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 02/16/06
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC 15B PRELIM RAD. EMISSIONS
MANUFACTURER : INTERMATIC INC.
MODEL No. : CA3000 WALL SWITCH
S/N : NONE ASSIGNED
MODE : Rx @ 908.42MHz
DATE TESTED : 15 Jan 2007 14:08:49 R. KING
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

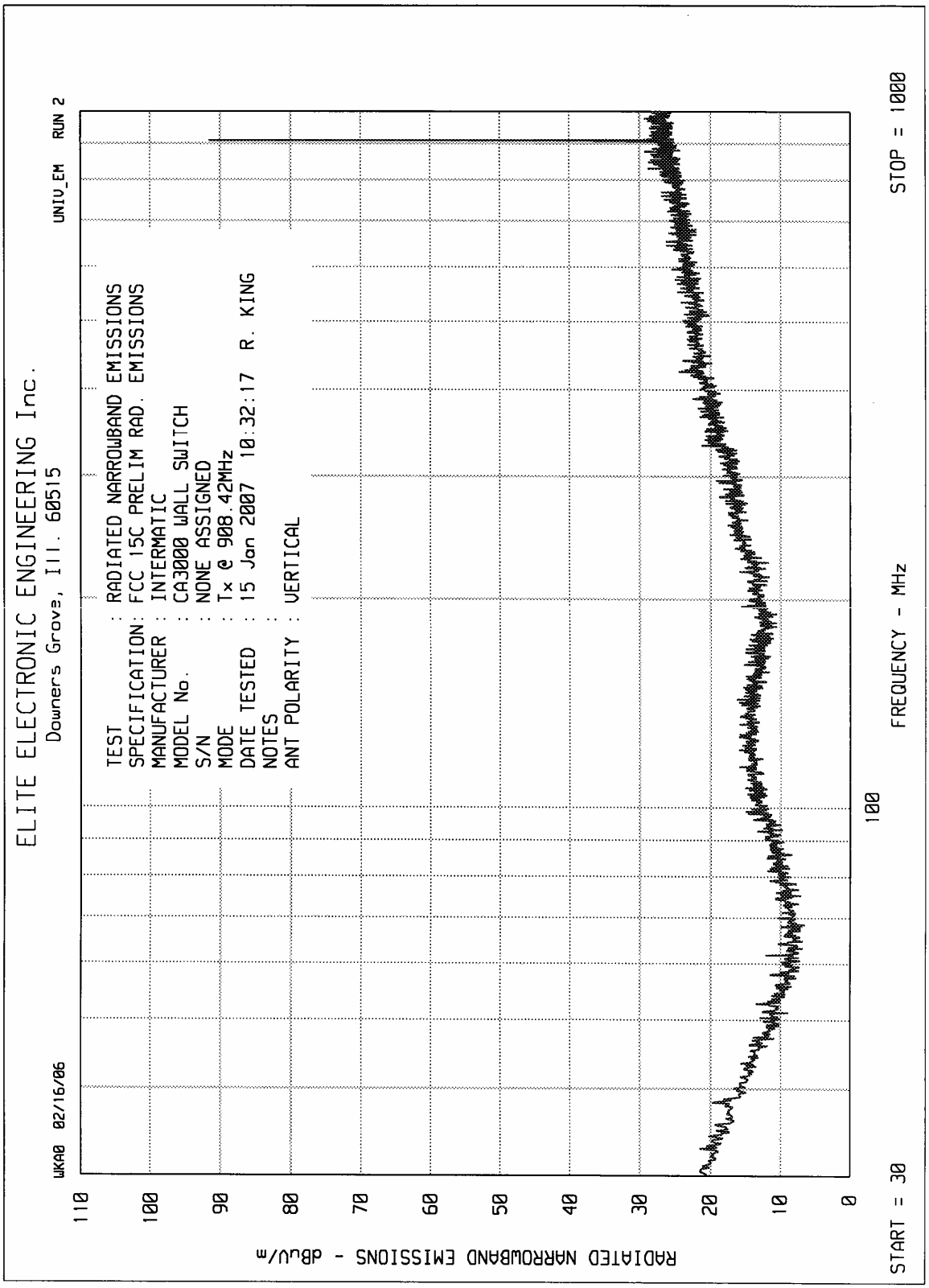
MANUFACTURER : Intermatic
TEST ITEM : Transceiver
MODEL NO. : CA3000 WALL SWITCH
SERIAL NO. : None Assigned
TEST SPECIFICATION : FCC 15.109(a), Radiated Emissions
MODE : Receive @ 908.4MHz
TEST DATE : January 17, 2007
TEST DISTANCE : 3 meters

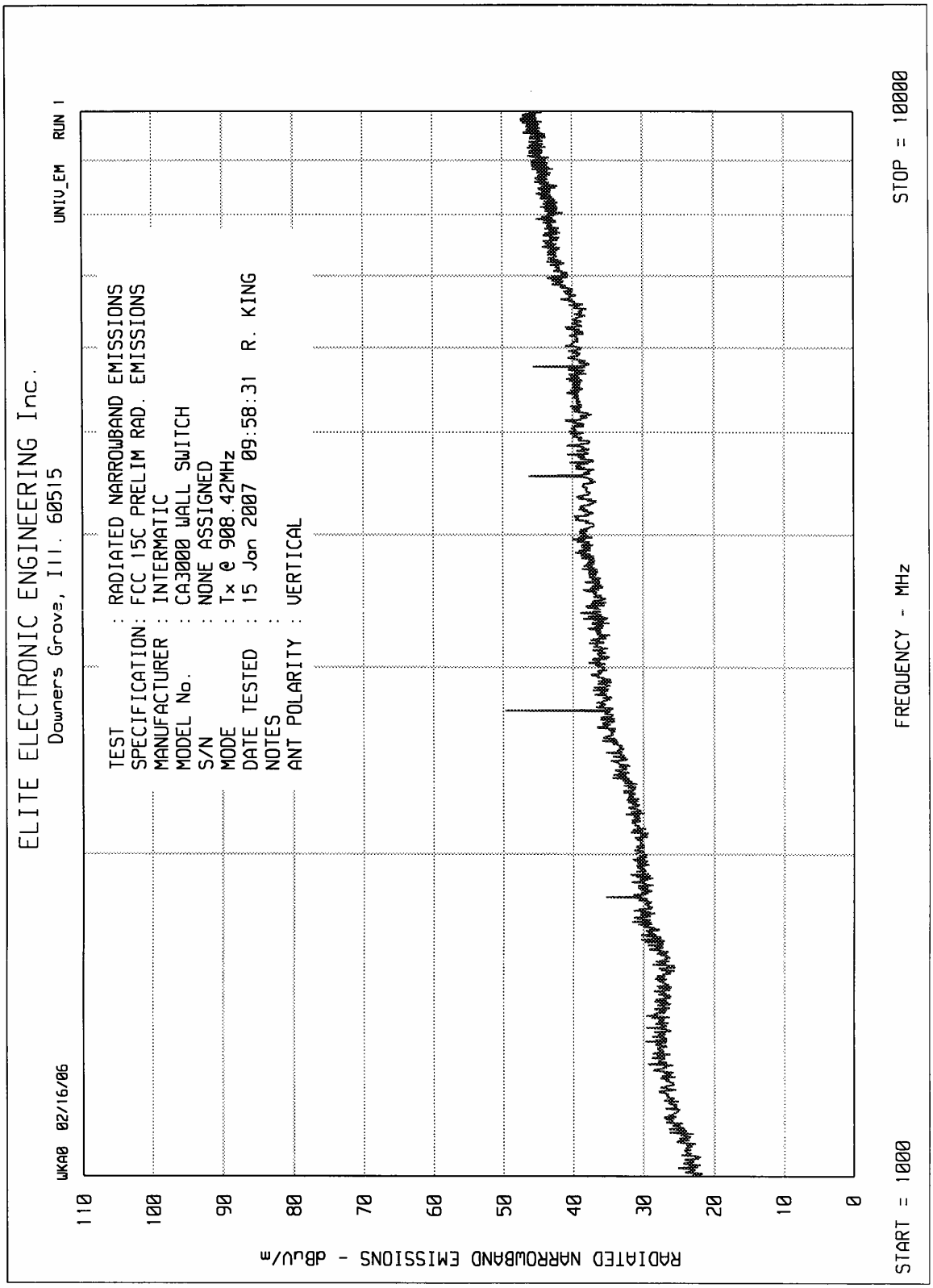
Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Preamp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
908.40	H	7.7		2.0	27.8	0.0	37.4	74.6	200.0
908.40	V	7.4		2.0	27.8	0.0	37.2	72.3	200.0
1816.80	H	33.6		2.9	28.1	-28.8	35.8	61.9	500.0
1816.80	V	30.7		2.9	28.1	-28.8	32.9	44.0	500.0
2725.20	H	26.7	*	3.8	31.5	-29.7	32.3	41.2	500.0
2725.20	V	26.7	*	3.8	31.5	-29.7	32.3	41.3	500.0
3633.60	H	26.8	*	4.4	32.6	-30.1	33.7	48.5	500.0
3633.60	V	26.9	*	4.4	32.6	-30.1	33.8	49.0	500.0
4542.00	H	26.9	*	4.8	33.0	-28.9	35.9	62.5	500.0
4542.00	V	26.9	*	4.8	33.0	-28.9	35.8	62.0	500.0

H – Horizontal V = Vertical

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

Checked By: Richard E. King


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV_EM RUN 2
WKA0 02/16/06
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC 15C PRELIM RAD. EMISSIONS
MANUFACTURER : INTERMATIC
MODEL No. : CA3000 WALL SWITCH
S/N : NONE ASSIGNED
MODE : Tx @ 908.42MHz
DATE TESTED : 15 Jan 2007 10:32:17 R. KING
NOTES : :
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 1
WKA0 02/16/06
TEST : RADIATED NARROWBAND EMISSIONS
SPECIFICATION: FCC 15C PRELIM RAD. EMISSIONS
MANUFACTURER : INTERMATIC
MODEL No. : CA3000 WALL SWITCH
S/N : NONE ASSIGNED
MODE : Tx @ 908.42MHz
DATE TESTED : 15 Jan 2007 09:58:31 R. KING
NOTES :
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 = 10000

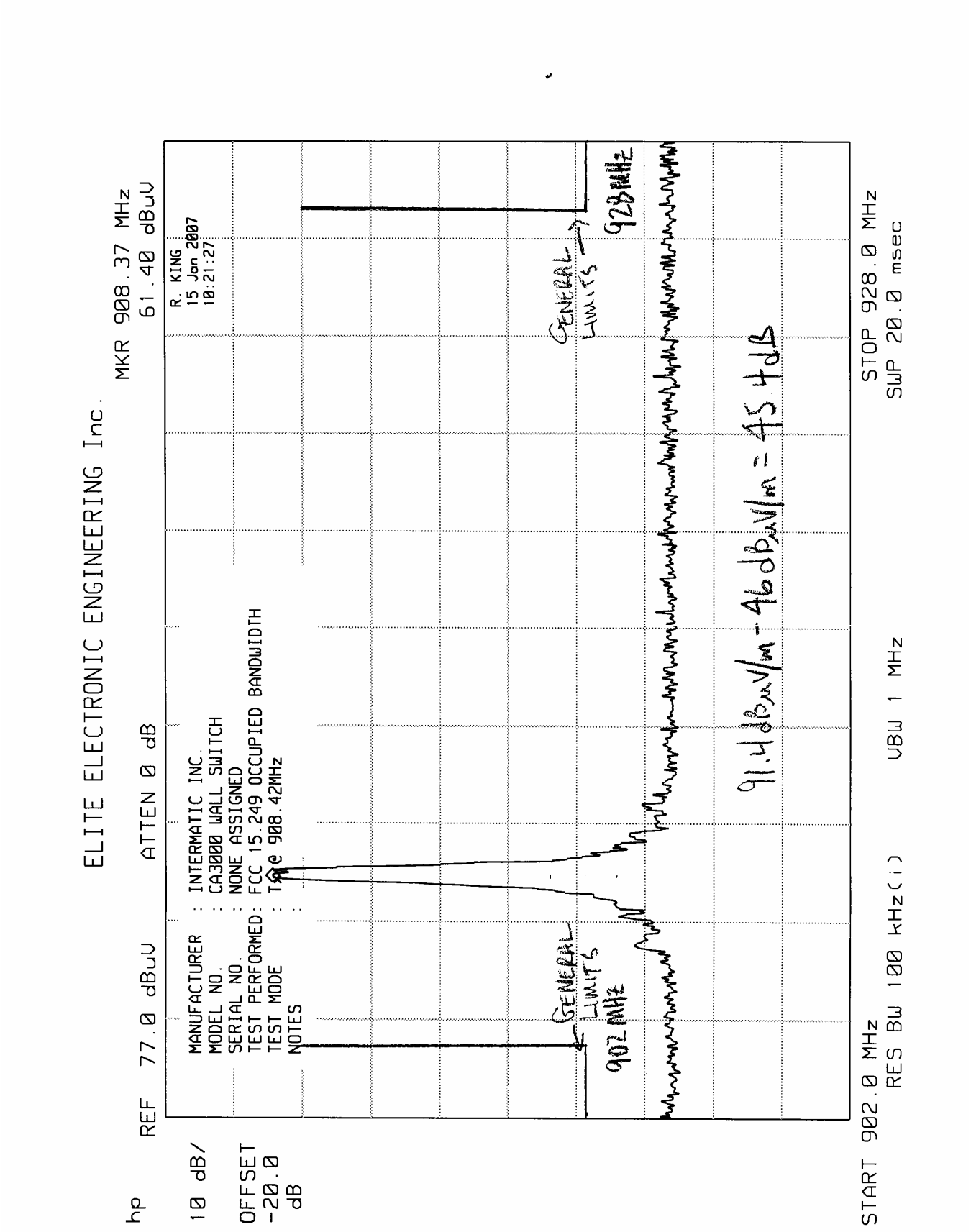
MANUFACTURER : Intermatic
TEST ITEM : Transceiver
MODEL NO. : CA3000 WALL SWITCH
SERIAL NO. : None Assigned
TEST SPECIFICATION : FCC 15.249(a), Radiated Emissions
MODE : Transmit @ 908.4MHz in the base
TEST DATE : January 17, 2007
TEST DISTANCE : 3 meters

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
908.42	H	61.0		2.0	27.8	0.0	90.7	34470.8	50000.0
908.42	V	61.7		2.0	27.8	0.0	91.4	37363.9	50000.0
1816.84	H	46.0		2.9	28.1	-28.8	48.2	257.1	500.0
1816.84	V	44.7		2.9	28.1	-28.8	46.9	220.1	500.0
2725.26	H	41.6		3.8	31.5	-29.7	47.2	229.5	500.0
2725.26	V	48.0		3.8	31.5	-29.7	53.6	477.4	500.0
3633.68	H	40.6		4.4	32.6	-30.1	47.5	237.4	500.0
3633.68	V	38.3		4.4	32.6	-30.1	45.2	182.1	500.0
4542.10	H	35.2		4.8	33.0	-28.9	44.2	162.8	500.0
4542.10	V	36.2		4.8	33.0	-28.9	45.2	181.8	500.0
5450.52	H	26.3	*	5.3	35.5	-28.6	38.4	83.2	500.0
5450.52	V	27.3	*	5.3	35.5	-28.6	39.4	93.3	500.0
6358.94	H	26.9	*	5.9	36.2	-27.7	41.2	114.8	500.0
6358.94	V	26.9	*	5.9	36.2	-27.7	41.2	114.8	500.0
7267.36	H	26.6	*	6.7	37.8	-27.1	44.0	158.7	500.0
7267.36	V	26.7	*	6.7	37.8	-27.1	44.1	160.9	500.0
8175.78	H	26.7	*	7.1	37.7	-27.9	43.7	152.8	500.0
8175.78	V	26.8	*	7.1	37.7	-27.9	43.8	154.6	500.0
9084.20	H	27.9	*	7.5	38.1	-28.5	44.9	176.8	500.0
9084.20	V	27.9	*	7.5	38.1	-28.5	45.0	178.2	500.0

H – Horizontal V = Vertical

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

Checked By: Richard E. King


ELITE ELECTRONIC ENGINEERING Inc.
hp
MKR 908.37 MHz
61.40 dBuV
REF 77.0 dBuV
ATTEN 0 dB
10 dB/
OFFSET
-20.0
dB
R. KING
15 Jan 2007
10:21:27
MANUFACTURER : INTERMATIC INC.
MODEL NO. : CA3000 WALL SWITCH
SERIAL NO. : NONE ASSIGNED
TEST PERFORMED: FCC 15.249 OCCUPIED BANDWIDTH
TEST MODE : T@ 908.42MHz
NOTES :
GENERAL LIMITS
902 MHz
GENERAL LIMITS
928MHz
91.4 dBuV/m - 46 dBuV/m = 45.4 dB
START 902.0 MHz
RES BW 100 kHz(i)
VBW 1 MHz
STOP 928.0 MHz
SWP 20.0 msec