



Measurement of RF Interference from a
User Interface (UI) Transceiver Part No.
00N30982XXX

For : Emerson Appliance Controls
1901 South Street
Elgin, IL 60123

P.O. No. : Y90003
Date Tested : March 2, 2009 through March 24, 2009
Test Personnel : Mark E. Longinotti
Specification : FCC "Code of Federal Regulations" Title 47 Part 15, Subpart B,
for receivers and Subpart C, for Intentional Radiators Operating
within the 2400MHz to 2483.5MHz band
: Industry Canada RSS-210
: Industry Canada RSS-GEN

Test Report By :

MARK E. LONGINOTTI
Mark E. Longinotti

Witnessed by :

Steven Vornsand
Michale DeBoer
Emerson Appliance Controls

Approved By :

Raymond J. Klouda
Raymond J. Klouda
Registered Professional Engineer of
Illinois - 44894

**TABLE OF CONTENTS**

PARAGRAPH	DESCRIPTION OF CONTENTS	PAGE NO.
1	INTRODUCTION	4
1.1	Scope of Tests	4
1.2	Purpose	4
1.3	Deviations, Additions and Exclusions	4
1.4	EMC Laboratory Identification	4
1.5	Laboratory Conditions	4
2	APPLICABLE DOCUMENTS	4
3	TEST ITEM SETUP AND OPERATION	5
3.1	General Description	5
3.1.1	Power Input	5
3.1.2	Peripheral Equipment	5
3.1.3	Interconnect Cables	5
3.1.4	Grounding	5
3.2	Operational Mode	5
3.3	Test Item Modifications	5
4	TEST FACILITY AND TEST INSTRUMENTATION	6
4.1	Shielded Enclosure	6
4.2	Test Instrumentation	6
4.3	Calibration Traceability	6
4.4	Measurement Uncertainty	6
5	TEST PROCEDURES	7
5.1	Powerline Conducted Emissions	7
5.1.1	Receiver	7
5.1.1.1	Requirements	7
5.1.1.2	Procedures	7
5.1.1.3	Results	7
5.1.2	Transmitter	7
5.1.2.1	Requirements	7
5.1.2.2	Procedures	8
5.1.2.3	Results	8
5.2	Radiated Measurements	9
5.2.1	Receiver	9
5.2.1.1	Requirements	9
5.2.1.2	Procedures	9
5.2.1.3	Results	10
5.2.2	Transmitter	10
5.2.2.1	Requirements	10
5.2.2.2	Procedures	10
5.2.2.3	Results	11
5.3	Occupied Bandwidth Measurements	11
5.3.1	Requirements	11
5.3.2	Procedure	12
5.3.3	Results	12
6	OTHER TEST CONDITIONS	12
6.1	Test Personnel and Witnesses	12
6.2	Disposition of the Test Item	12
7	CONCLUSIONS	12
8	CERTIFICATION	13
9	EQUIPMENT LIST	14

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

**REVISION HISTORY**

Revision	Date	Description
—	March 25, 2009	Initial release

**Measurement of RF Emissions from a User Interface (UI) transceiver, Part No. 00N30982XXX****1 INTRODUCTION****1.1 Scope of Tests**

This document represents the results of the series of radio interference measurements performed on a User Interface (UI), Part No. 00N30982XXX, Serial No. None Assigned transceiver, (hereinafter referred to as the test item). The test item was designed to transmit and receive in the frequency range of 2405MHz to 2480MHz using an internal "F" antenna. The test item contained a super-heterodyne type receiver which utilizes an intermediate frequency (IF) of 64MHz. The test item was manufactured and submitted for testing by Emerson Appliance Controls located in Elgin, 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 2400MHz to 2483.5MHz band.

The test series was also performed to determine if the test item meets the conducted and radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.2 and Section 7.2.3 for receivers and the Industry Canada Radio Standards Specification RSS-Gen Section 7.2.2 and RSS-210 Annex 2, section A2.9 for Transmitters.

Testing was performed in accordance with ANSI C63.4-2003.

1.3 Deviations, Additions and Exclusions

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

1.4 EMC Laboratory Identification

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

1.5 Laboratory Conditions

The temperature at the time of the test was 22°C and the relative humidity was 16%.

2 APPLICABLE DOCUMENTS

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

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 15, Subpart B for Receivers, dated 1 October 2008
- ANSI C63.4-2003, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
- Industry Canada RSS-210, Issue 7, June 2007, "Spectrum Management and Telecommunications Radio Standards Specification, Low-power License-exempt radio communication devices (All Frequency Bands): Category I Equipment"
- Industry Canada RSS-GEN, Issue 2, June 2007, "Spectrum Management and



Telecommunications Radio Standards Specification, General Requirements and Information for the Certification of radio communication equipment"

3 TEST ITEM SETUP AND OPERATION

3.1 General Description

The test item is a User Interface (UI), Part No. 00N30982XXX. A block diagram of the test item setup is shown as Figure 1 and Figure 2.

3.1.1 Power Input

The test item was powered by 5VDC from the Main Unit, Part No. 00N30981XXX. The Main Unit was connected to the test item via a 50 foot long 6 wire UI-Main cable for all tests except for conducted emissions tests. For conducted emissions tests, the Main Unit was connected to the test item via a 1.5 meter long 6 wire UI-Main cable.

The Main Unit was powered with 240V, 60Hz via a 1.3 meter long 3 wire unshielded power cable. The Main Unit was external to the test chamber for all tests except for conducted emissions tests. For conducted emissions tests, each lead of the 240V, 60Hz power was connected through a line impedance stabilization network (LISN) which was located on the ground plane. The network complies with the requirements of Paragraph 4.1.2 of ANSI C63.4-2003.

3.1.2 Peripheral Equipment

The test item was submitted for testing with a Main Unit, Part No. 00N30981XXX.

3.1.3 Interconnect Cables

The test item was submitted for testing with a 50 foot long 4 wire UI-Audio cable. For all tests, the cable was unterminated. The test item was submitted for testing with a UI-Main cable which was used to connect the test item to the Main Unit. The UI-Main cable was 50 foot long for all tests except for conducted emissions. For conducted emissions tests, the UI-Main cable was 1.5 meters long.

3.1.4 Grounding

The test item was ungrounded during the test.

3.2 Operational Mode

For all tests, the test item was placed on an 80cm high non-conductive stand. The test item was energized. The unit was programmed to operate in one of the following modes:

- Transmit at 2405MHz
- Transmit at 2445MHz
- Transmit at 2480MHz
- Receive at 2445MHz

3.3 Test Item Modifications

In order to meet the conducted emissions requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 for transmitters and the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.2 for receivers and transmitters the following modification was made:



- C120 on the Main Unit was changed to 0.01uF

In order to meet the radiated emissions requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.109 for receivers and 15.249 for intentional radiators the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.3 for receivers and the Industry Canada RSS-210 Annex 2, section A2.9 for Transmitters the following modification was made:

- A Steward 28A0640-0A2 ferrite bead was placed on the UI-Audio Cable
- A Steward 28A0640-0A2 ferrite bead was placed on the UI-Main Cable
- 47nH surface mount inductors were placed in series with the power pins of the DRAM IC
- 0.01uF surface mount capacitors were placed between the power pins of the DRAM IC and ground at the IC pins

None of the changes involved any modifications to the 2.4GHz transceiver circuitry.

4 TEST FACILITY AND TEST INSTRUMENTATION

4.1 Shielded Enclosure

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

4.2 Test Instrumentation

The test instrumentation and auxiliary equipment used during the tests are listed in **Error! Reference source not found..**

4.3 Calibration Traceability

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

4.4 Measurement Uncertainty

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

The measurement uncertainty 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

5 TEST PROCEDURES

5.1 Powerline Conducted Emissions

5.1.1 Receiver

5.1.1.1 Requirements

Per the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Section 15.101(b), receivers operating above 960MHz are exempt from complying with the technical provisions of part 15.

Per Industry Canada RSS-Gen, Section 7.2.2, all radio frequency voltages on the power lines of a receiver shall be below the values shown below when using a quasi-peak detector:

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

* - Decreases with the logarithm of the frequency.

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

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

5.1.1.2 Procedures

The interference on each power lead was measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. The meter terminal of the LISN not under test was terminated with 50 ohms.

Measurements were first made over the entire frequency range from 150 kHz through 30MHz with a peak detector and the results were automatically plotted. The data thus obtained was then searched by the computer for the highest levels. Quasi-peak measurements were automatically performed at the frequencies selected from the highest peak measurements, and the results printed.

5.1.1.3 Results

With C120 on the Main Unit changed to 0.01uF, all emissions measured from the test item were within the specification limits. The plots of the peak preliminary conducted voltage levels on each power line of the Main Unit with the test item set to receive at 2445MHz are presented on pages 20 and 21. The conducted limit for receivers is shown as a reference. The final quasi-peak results are presented on pages 22 and 23. The emissions level closest to the limit (worst case) occurred at 468kHz. The emissions level at this frequency was 7.6dB within the limit. Photographs of the test configuration which yielded the highest or worst case, conducted emission levels are shown on Figure 3.

5.1.2 Transmitter

5.1.2.1 Requirements

Per the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Per 15.207(a) and Industry Canada RSS-Gen section 7.2.2, all radio frequency voltages on the power lines of a transmitter shall be below the values shown below when using a quasi-peak detector:

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

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

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

5.1.2.2 Procedures

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

5.1.2.3 Results

With C120 on the Main Unit changed to 0.01uF, all emissions measured from the test item were within the specification limits. The plots of the peak preliminary conducted voltage levels on each power line of the Main Unit with the test item set to transmit at 2445MHz are presented on pages 24 and 25. The conducted limit for intentional radiators is shown as a reference. The final quasi-peak results are presented on pages 26 and 27. The emissions level closest to the limit (worst case) occurred at 467kHz. The emissions level at this frequency was 18.7dB within the limit. Photographs of the test configuration which yielded the highest or worst case, conducted emission levels are shown on Figure 3.

5.2 Duty Cycle Correction Factor (Transmitter Only)

5.2.1 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 1msec/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 the "on-time". The trace is recorded.

Next the spectrum analyzer center frequency is set to the transmitter frequency with a zero span width and 10msec/div. This shows if the word is longer than 100msec or shorter than 100msec. If the word period is less than 100msec, the display is set to show at least one word. 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).

5.2.2 Results

Plots of the duty cycle at 2445MHz are shown on data pages 28 and 29. The duty cycle factor was computed to be -29.0dB.

5.3 Radiated Measurements

5.3.1 Receiver

5.3.1.1 Requirements

Per the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Section 15.101(b), receivers operating above 960MHz are exempt from complying with the technical provisions of part 15.

Per Industry Canada RSS-Gen, Section 7.2.3, all radio frequency emissions from a receiver shall be below the limits shown on the following table:

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

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

Per Industry Canada RSS-Gen, section 4.10, spurious emissions shall be measured from 30MHz to 3 times the highest tunable or local oscillator frequency.

5.3.1.2 Procedures

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

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

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

For preliminary radiated emissions sweeps from 30MHz to 8GHz, the broadband measuring antenna was positioned at a 3 meter distance from the test item. The frequency range from 30MHz to 8GHz was investigated using a peak detector function with the bilog antenna below 1GHz and the double-ridged waveguide antenna above 1GHz. The maximum levels were plotted.

Final radiated emissions were performed on all significant broadband and narrowband emissions found in the

preliminary sweeps using the following methods:

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

5.3.1.3 Results

The preliminary plots are presented on pages 30 through 32. The plots are presented for a reference only, and are not used to determine compliance. The final radiated levels are presented on pages 33 and 34. As can be seen from the data, all emissions measured from the test item were within the specification limits for receivers. The emissions level closest to the limit (worst case) occurred at 196.99MHz. The emissions level at this frequency was 6.2dB within the limit. Photographs of the test configuration are shown on Figure 4.

5.3.2 Transmitter

5.3.2.1 Requirements

The test item must comply with the requirements of FCC "Code of Federal Regulations Title 47", Part 15, Subpart C, Section 15.249(a) and Industry Canada RSS-210 Annex 2, Section A2.9. Both standards have the following radiated emission limits:

Fundamental Frequency MHz	Field Intensity mV/m @ 3 meter	Field Strength of Harmonics and Spurious uV/m @ 3 meter
2400 – 2483.5	50	500

The field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits by more than 20 dB under any condition of modulation.

5.3.2.2 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 25GHz 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 25GHz. 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.
- 5) In some instances, it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer and the antenna could not be raised to 4 meters. The measuring antenna was raised and lowered as much as the cable would allow and the test item is rotated through all axis to ensure the maximum readings are recorded. See attached Figure 2.

5.3.2.3 Results

The preliminary plots, with the test item transmitting at 2405MHz, are presented on data pages 35 through 38. 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 2405MHz, are presented on data page 39 and 40. As can be seen from the data, all emissions measured from the test item were within the specification limits. The emissions level closest to the limit (worst case) occurred at 2405MHz. The emissions level at this frequency was 11.8dB within the limit. Photographs of the test configuration which yielded the highest or worst case, radiated emission levels are shown on Figure 4 and Figure 5.

The preliminary plots, with the test item transmitting at 2445MHz, are presented on data pages 41 through 44. 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 2445MHz, are presented on data page 45 and 46. As can be seen from the data, all emissions measured from the test item were within the specification limits. The emissions level closest to the limit (worst case) occurred at 2445MHz. The emissions level at this frequency was 13.9dB within the limit. Photographs of the test configuration which yielded the highest or worst case, radiated emission levels are shown on Figure 4 and Figure 5.

The preliminary plots, with the test item transmitting at 2445MHz, are presented on data pages 47 through 50. 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 2480MHz, are presented on data page 51 and 52. As can be seen from the data, all emissions measured from the test item were within the specification limits. The emissions level closest to the limit (worst case) occurred at 2480MHz. The emissions level at this frequency was 15.3dB within the limit. Photographs of the test configuration which yielded the highest or worst case, radiated emission levels are shown on Figure 4 and Figure 5.

5.4 Occupied Bandwidth Measurements

5.4.1 Requirements

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

5.4.2 Procedure

- 1) The test item was placed on an 80cm high non-conductive stand.
- 2) The unit was set to transmit continuously (CW) on the lowest channel (2405MHz).
- 3) A double ridged waveguide was placed 3 meters away from the test item. The antenna was connected to the input of a spectrum analyzer.
- 4) The center frequency of the analyzer was set to the low band edge (2400MHz).
- 5) The resolution bandwidth was set to 1MHz.
- 6) To ensure that the maximum or worst case emission level was 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.
- 7) The highest measured peak reading was recorded.
- 8) Steps 1 through 7 were repeated with the modulation turned on.
- 9) Steps 1 through 8 were repeated with the following changes:
 - The test item was set to transmit on the highest channel (2480MHz)
 - The center frequency of the analyzer was set to the high band edge (2483.5MHz)

5.4.3 Results

The results of the occupied bandwidth tests are shown on pages 53 through 55. As can be seen from the data, the transmitter met the occupied bandwidth requirements. The 99% bandwidth was measured to be 2.4MHz.

6 OTHER TEST CONDITIONS

6.1 Test Personnel and Witnesses

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

6.2 Disposition of the Test Item

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

7 CONCLUSIONS

With the modifications listed in section 3.3 of this report, it was determined that the Emerson Appliance Controls User Interface (UI), Part No. 00N30982XXX, 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 B, Sections 15.107 and 15.109 for receivers, and Subpart C, Sections 15.207 and 15.249 for Intentional Radiators Operating within



the 2400MHz – 2483.5MHz band, when tested per ANSI C63.4-2003.

With the modifications listed in section 3.3 of this report, it was also determined that the Emerson Appliance Controls User Interface (UI), Part No. 00N30982XXX, Serial No. None Assigned, did fully meet the conducted and radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.2 and Section 7.2.3 for receivers and the Industry Canada Radio Standards Specification RSS-Gen Section 7.2.2 and RSS-210 Annex 2, section A2.9 for transmitters.

8 CERTIFICATION

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

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

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

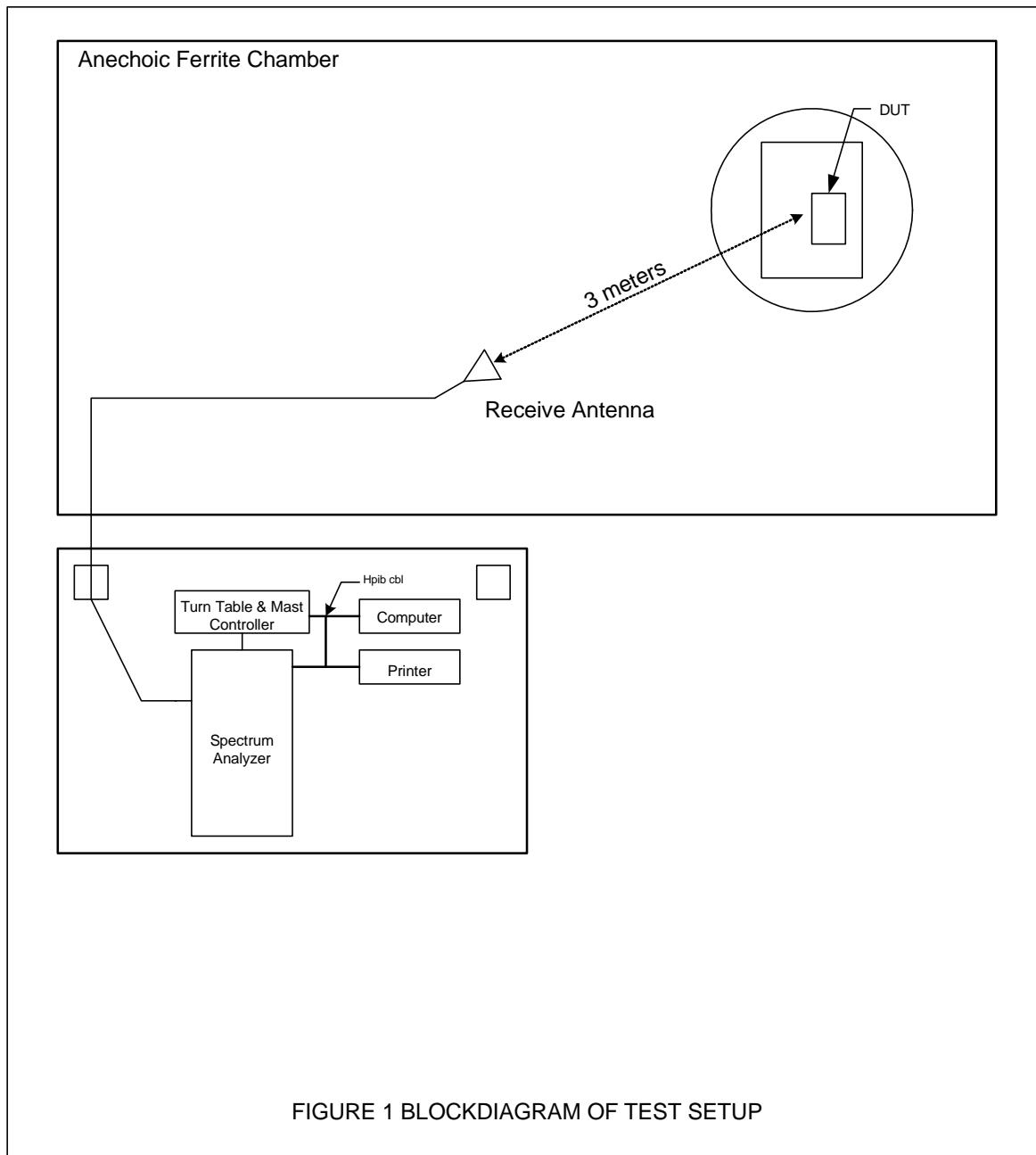


9 EQUIPMENT LIST

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APK2	PREAMPLIFIER	AGILENT TECHNOLOGIES	8449B	3008A01595	1-26.5GHZ	3/26/2008	3/26/2009
APW0	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-30-20G20R6G	PL2926/0646	20GHZ-26.5GHZ	12/16/2008	12/16/2009
CDS2	COMPUTER	GATEWAY	MFATXPNT NMZ 500L	0028483108	1.8GHZ	N/A	
CMA1	Controllers	EMCO	2090	9701-1213	---	N/A	
NHG0	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NTA1	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL6112	2054	0.03-2GHZ	9/2/2008	9/2/2009
NW10	RIDGED WAVE GUIDE	AEL	H1498	153	2-18GHZ	10/25/2008	10/25/2009
PLL9	50UH LISN 462D	ELITE ELECTRONIC ENG	462D/70A	010	0.01-400MHZ	3/5/2009	3/5/2010
PLLA	50UH LISN 462D	ELITE ELECTRONIC ENG	462D/70A	011	0.01-400MHZ	3/5/2009	3/5/2010
RAC0	SPECTRUM ANALYZER	HEWLETT PACKARD	85660B	2449A01117	100HZ-22GHZ	8/21/2008	8/21/2009
RACE	RF PRESELECTOR	HEWLETT PACKARD	85685A	3010A01194	20HZ-2GHZ	8/20/2008	8/20/2009
RAF1	QUASipeak ADAPTER	HEWLETT PACKARD	85650A	2043A00271	0.01-1000MHZ	2/27/2008	2/27/2009
RBA1	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB26	100146	20HZ-26.5GHZ	9/10/2008	9/10/2009
SBA1	DC POWER SUPPLY	APLAB	ZS3205	99071032	0-32VDC;0-5A	NOTE 1	
XPR0	HIGH PASS FILTER	K&L MICROWAVE	11SH10-4800/X20000	001	4.8-20GHZ	7/30/2008	7/30/2009
XZG2	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	2223A01751	---	N/A	

I/O: Initial Only N/A: Not Applicable

Note 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.



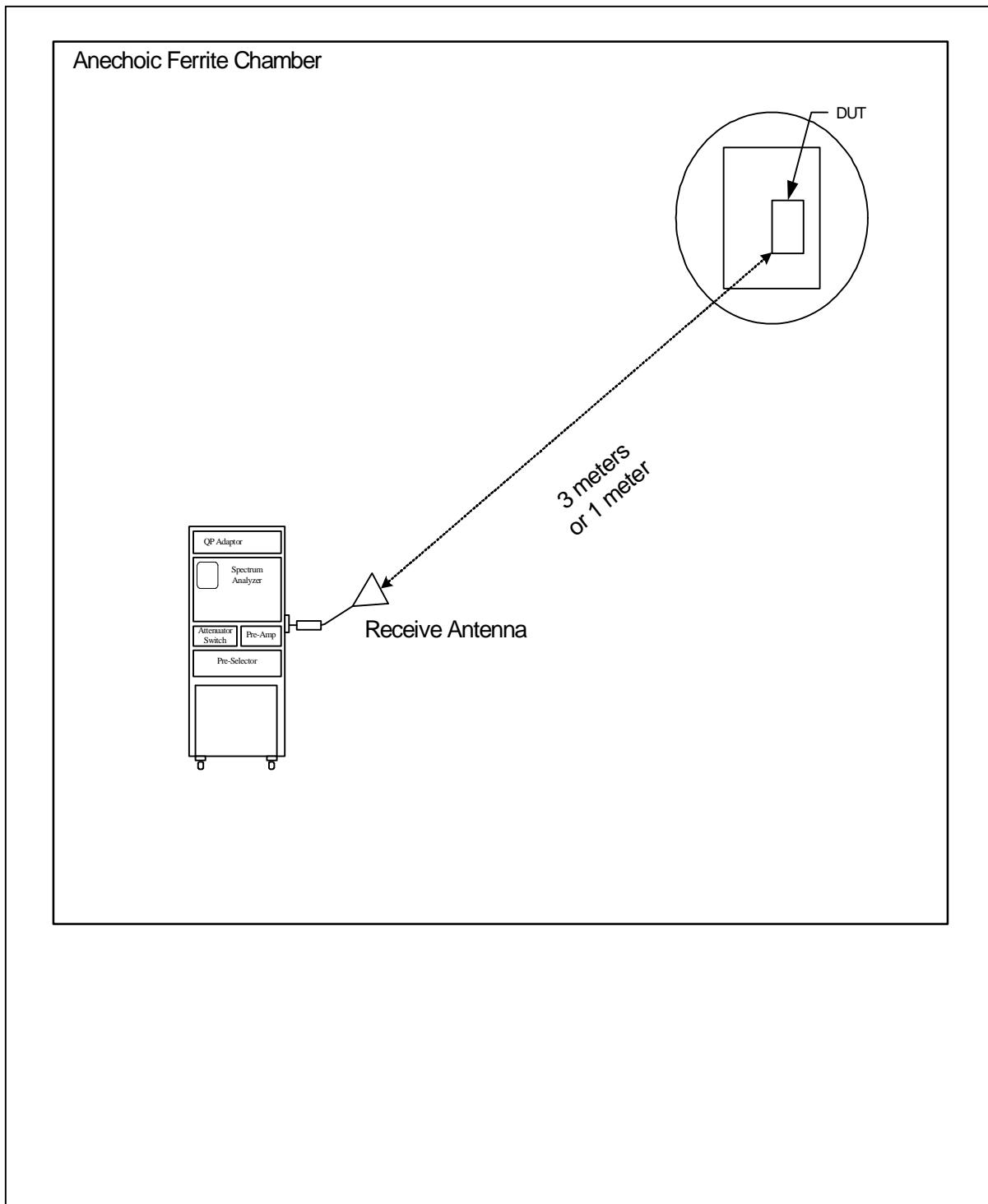


FIGURE 2: TEST SETUP FOR RADIATED EMISSIONS ABOVE 18GHz

Figure 3



Test Setup for Conducted Emissions

Figure 4



Test Setup for Radiated Emissions – 2GHz to 18GHz – Horizontal Polarization

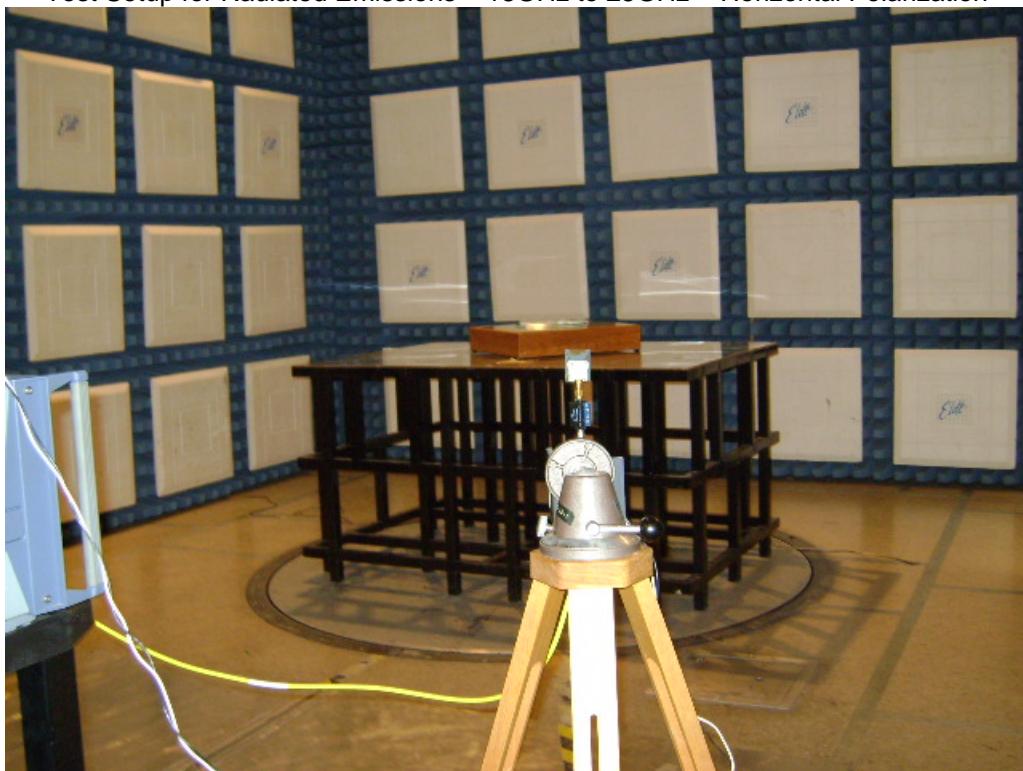


Test Setup for Radiated Emissions – 2GHz to 18GHz - Vertical Polarization

Figure 5



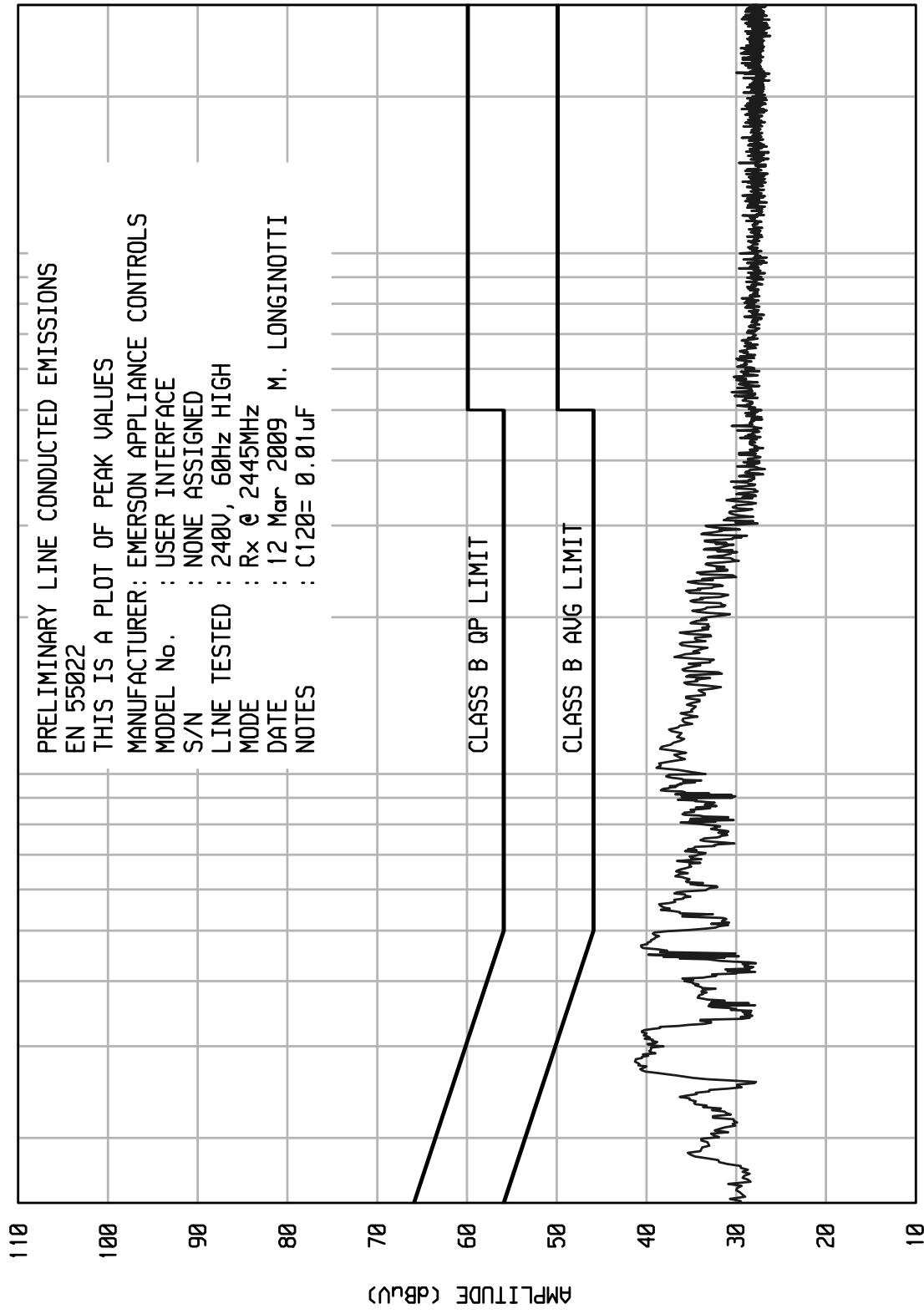
Test Setup for Radiated Emissions – 18GHz to 25GHz - Horizontal Polarization



Test Setup for Radiated Emissions –18GHz to 25GHz - Vertical Polarization

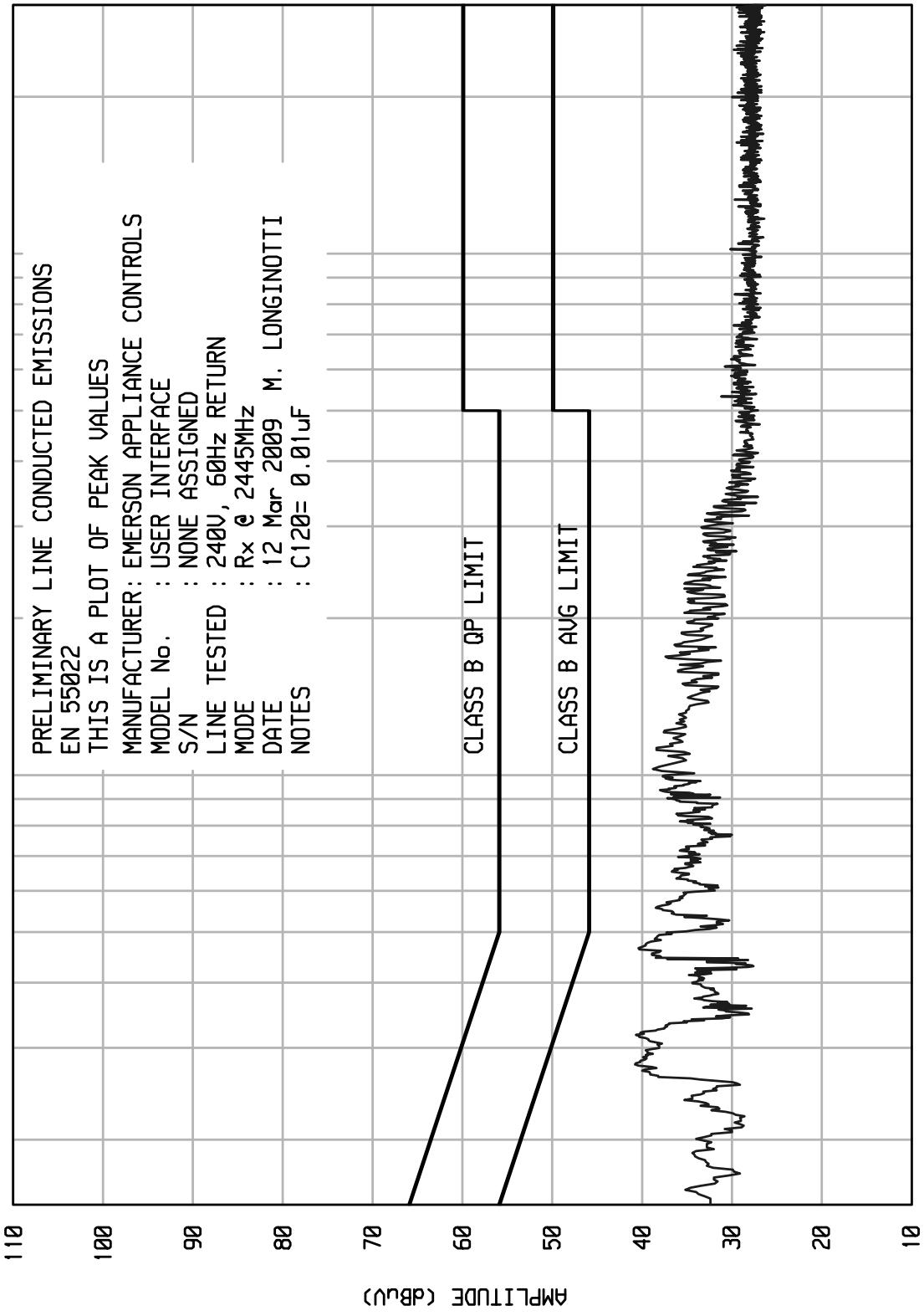
ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

8566



ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

8556





No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : EMERSON APPLIANCE CONTROLS
MODEL : USER INTERFACE
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 240V, 60Hz HIGH
MODE : Rx @ 2445MHz
DATE : 12 Mar 2009
NOTES : C120= 0.01uF
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
.240	31.6	62.1		52.1	
.281	39.2	60.8		50.8	
.320	37.6	59.7		49.7	
.453	34.4	56.8		46.8	
.468	39.0	56.6		46.6	
.639	32.8	56.0		46.0	
.933	36.1	56.0		46.0	
1.027	38.8	56.0		46.0	
1.120	36.8	56.0		46.0	
1.679	34.6	56.0		46.0	
2.332	32.3	56.0		46.0	
3.082	28.7	56.0		46.0	
5.307	25.1	60.0		50.0	
6.249	25.4	60.0		50.0	
9.315	24.1	60.0		50.0	
11.831	24.3	60.0		50.0	
15.659	24.1	60.0		50.0	
17.692	24.1	60.0		50.0	
20.330	24.1	60.0		50.0	
24.148	24.3	60.0		50.0	
28.153	24.1	60.0		50.0	

CHECKED BY: MARK E. LONGINOTTI

M. LONGINOTTI



ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : EMERSON APPLIANCE CONTROLS
MODEL : USER INTERFACE
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 240V, 60Hz RETURN
MODE : Rx @ 2445MHz
DATE : 12 Mar 2009
NOTES : C120= 0.01uF
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
.241	29.9	62.1		52.1	
.281	38.5	60.8		50.8	
.453	33.4	56.8		46.8	
.468	38.5	56.5		46.5	
.654	34.2	56.0		46.0	
.934	35.8	56.0		46.0	
1.026	38.4	56.0		46.0	
1.681	34.3	56.0		46.0	
2.055	31.6	56.0		46.0	
2.336	32.5	56.0		46.0	
4.105	26.3	56.0		46.0	
7.192	24.6	60.0		50.0	
9.023	24.3	60.0		50.0	
12.645	24.1	60.0		50.0	
16.295	24.1	60.0		50.0	
17.648	24.0	60.0		50.0	
21.678	24.1	60.0		50.0	
24.616	25.1	60.0		50.0	
27.181	24.0	60.0		50.0	

MARK E. LONGINOTTI
CHECKED BY: _____
M. LONGINOTTI

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

8556

PRELIMINARY LINE CONDUCTED EMISSIONS

EN 55022

THIS IS A PLOT OF PEAK VALUES

MANUFACTURER: EMERSON APPLIANCE CONTROLS

MODEL No. : USER INTERFACE

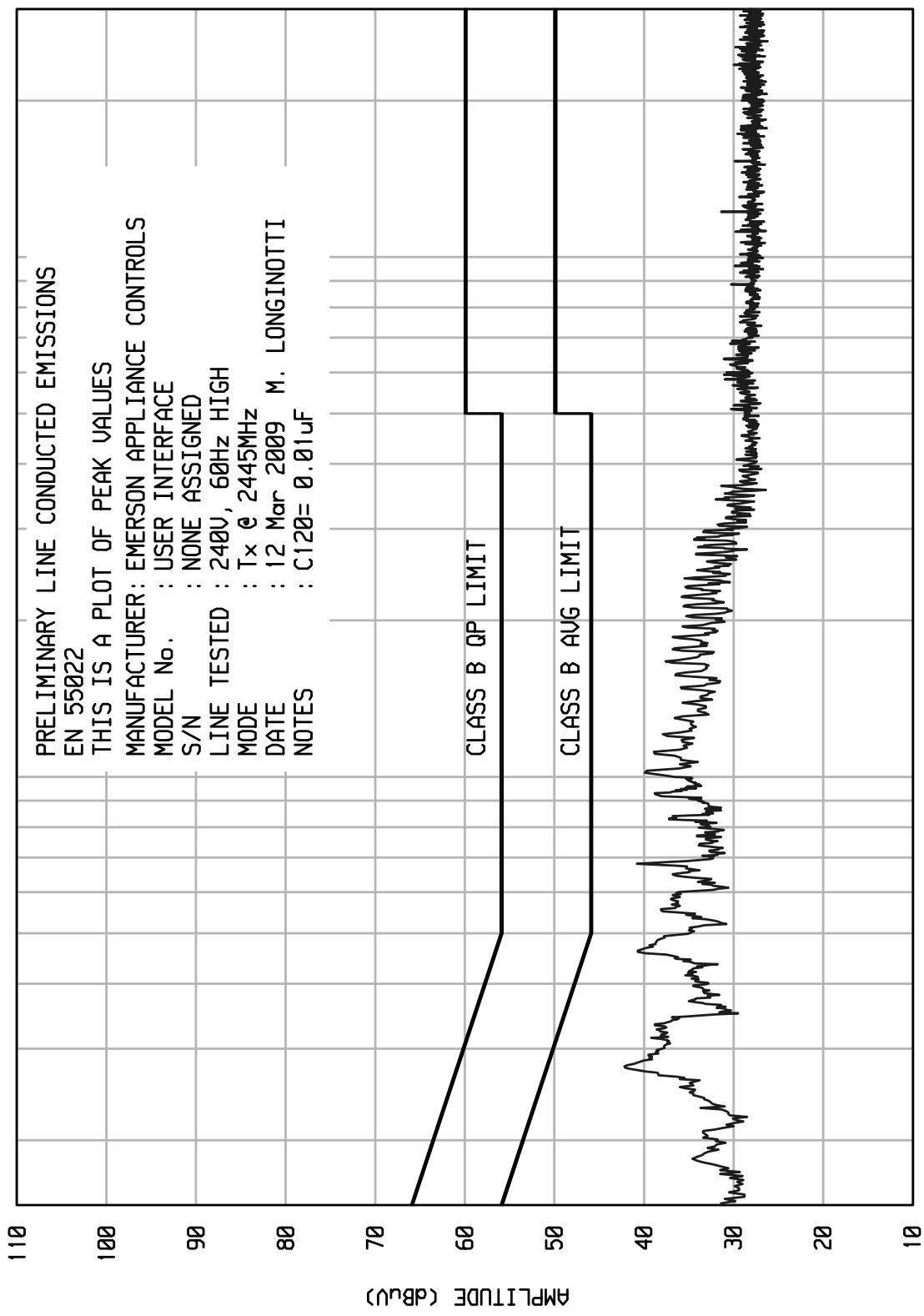
S/N : NONE ASSIGNED

LINE TESTED : 240V, 60Hz HIGH

MODE : Tx @ 2445MHz

DATE : 12 Mar 2009 M. LONGINOTTI

NOTES : C120= 0.01uF



ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

8556

PRELIMINARY LINE CONDUCTED EMISSIONS

EN 55022

THIS IS A PLOT OF PEAK VALUES

MANUFACTURER: EMERSON APPLIANCE CONTROLS

MODEL No. : USER INTERFACE

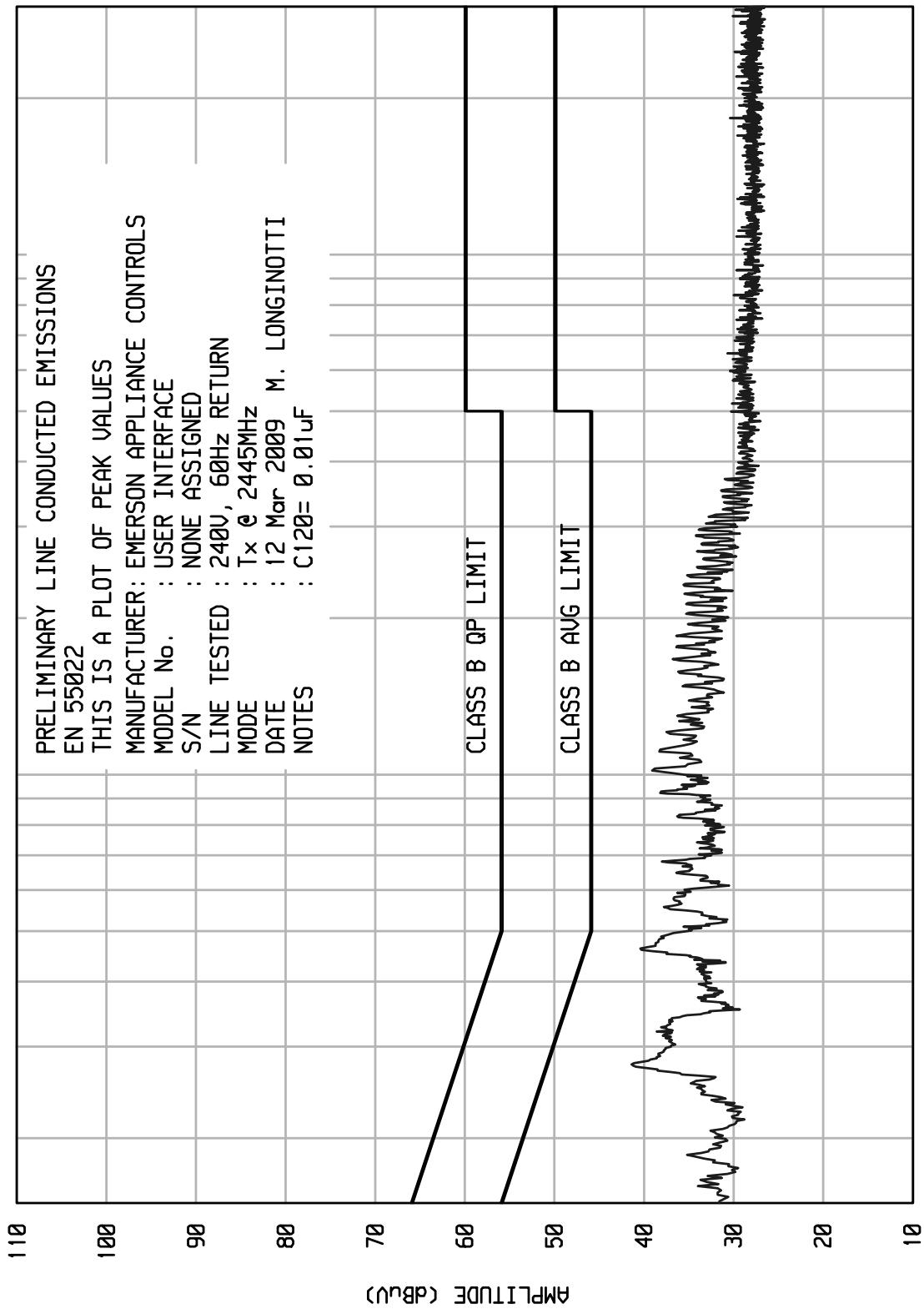
S/N : NONE ASSIGNED

LINE TESTED : 240V, 60Hz RETURN

MODE : Tx @ 2445MHz

DATE : 12 Mar 2009 M. LONGINOTTI

NOTES : C120= 0.01uF





ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : EMERSON APPLIANCE CONTROLS
MODEL : USER INTERFACE
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 240V, 60Hz HIGH
MODE : Tx @ 2445MHz
DATE : 12 Mar 2009
NOTES : C120= 0.01uF
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
.253	29.5	61.7		51.7	
.278	40.0	60.9		50.9	
.463	39.0	56.6		46.6	
.681	34.1	56.0		46.0	
.925	36.4	56.0		46.0	
1.017	37.6	56.0		46.0	
1.665	35.0	56.0		46.0	
2.403	31.6	56.0		46.0	
4.058	26.0	56.0		46.0	
6.737	24.8	60.0		50.0	
8.873	24.3	60.0		50.0	
12.168	24.1	60.0		50.0	
15.271	24.1	60.0		50.0	
18.163	24.1	60.0		50.0	
21.149	24.1	60.0		50.0	
23.435	24.3	60.0		50.0	
27.658	24.0	60.0		50.0	

MARK E. LONGINOTTI
CHECKED BY: _____
M. LONGINOTTI

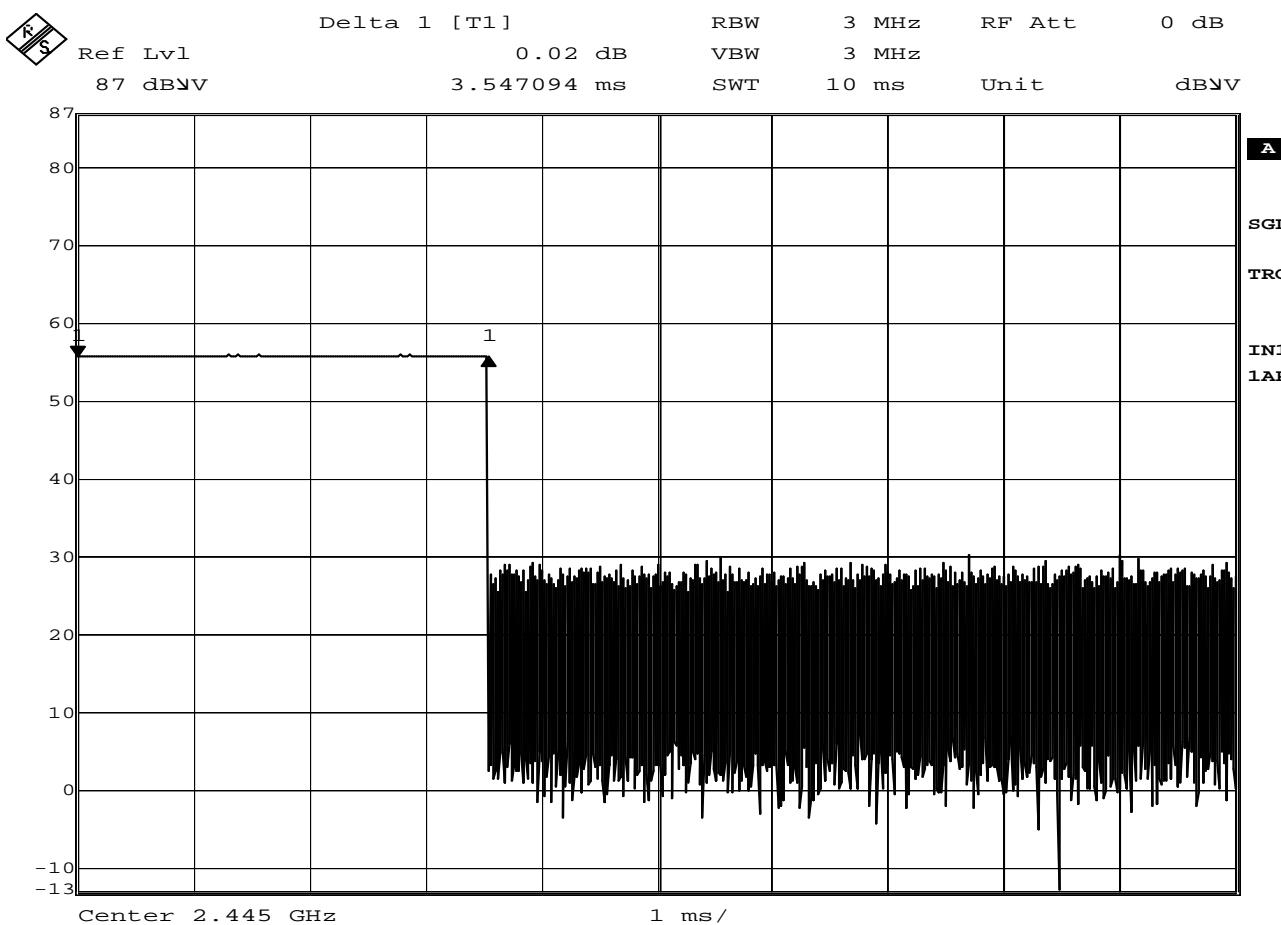


ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : EMERSON APPLIANCE CONTROLS
MODEL : USER INTERFACE
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 240V, 60Hz RETURN
MODE : Tx @ 2445MHz
DATE : 12 Mar 2009
NOTES : C120= 0.01uF
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
.185	29.8	64.2		54.2	
.278	39.3	60.9		50.9	
.464	38.4	56.6		46.6	
.681	33.7	56.0		46.0	
.924	36.0	56.0		46.0	
1.017	37.2	56.0		46.0	
1.665	34.6	56.0		46.0	
2.221	32.9	56.0		46.0	
2.400	32.1	56.0		46.0	
3.055	29.8	56.0		46.0	
5.919	25.4	60.0		50.0	
6.470	25.3	60.0		50.0	
9.288	24.1	60.0		50.0	
12.546	24.1	60.0		50.0	
15.479	24.1	60.0		50.0	
19.346	24.1	60.0		50.0	
21.965	24.1	60.0		50.0	
24.535	25.0	60.0		50.0	
27.793	24.0	60.0		50.0	

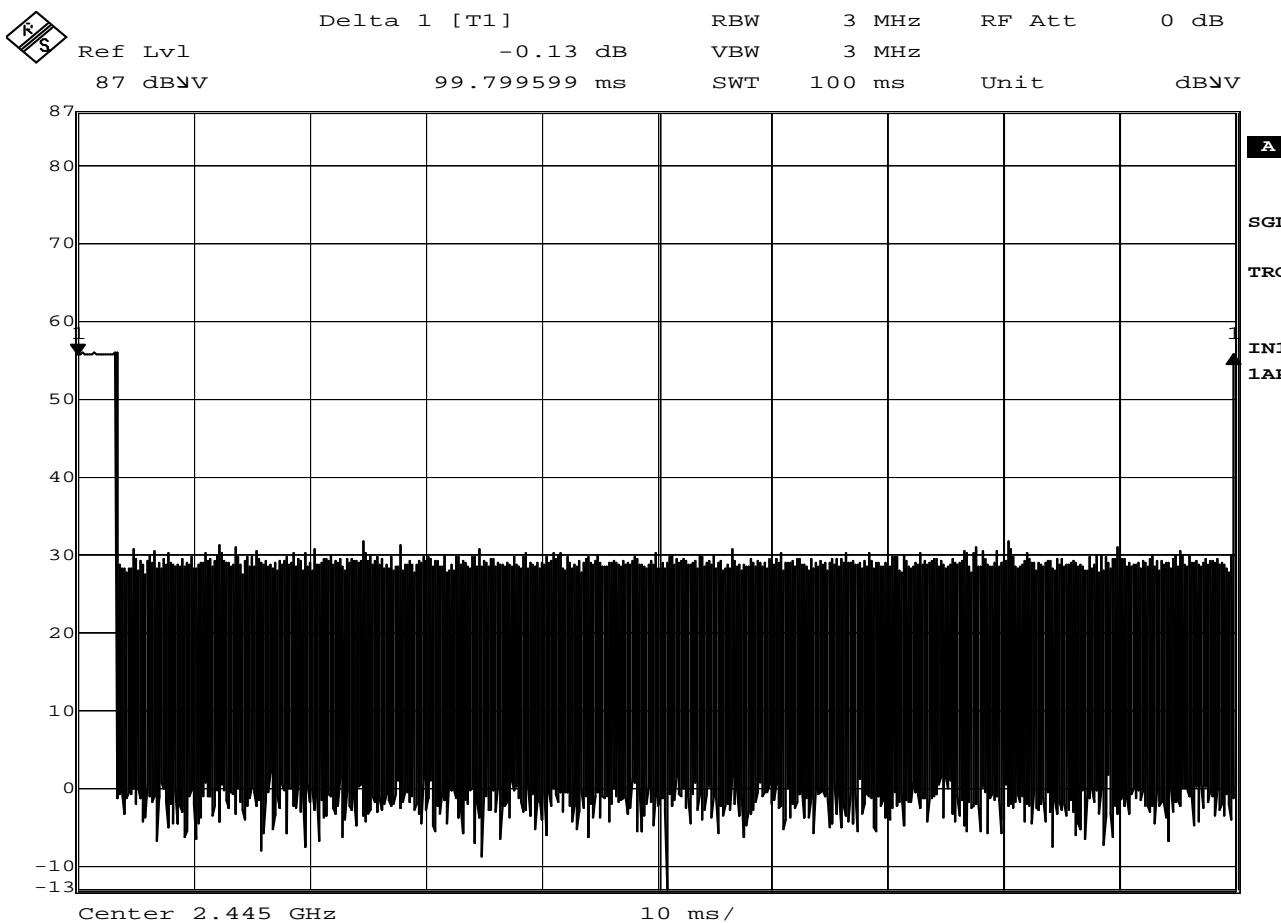
CHECKED BY: MARK E. LONGINOTTI
M. LONGINOTTI



Date: 2.MAR.2009 10:43:34

FCC 15.35 Duty Cycle Correction Factor

MANUFACTURER	:	Emerson Appliance Control
MODEL NUMBER	:	User interface (Part No. 00N30982XXX)
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 2445MHz
TEST PARAMETER	:	On Time is 3.54msec long
EQUIPMENT USED	:	RBA1, NWI0

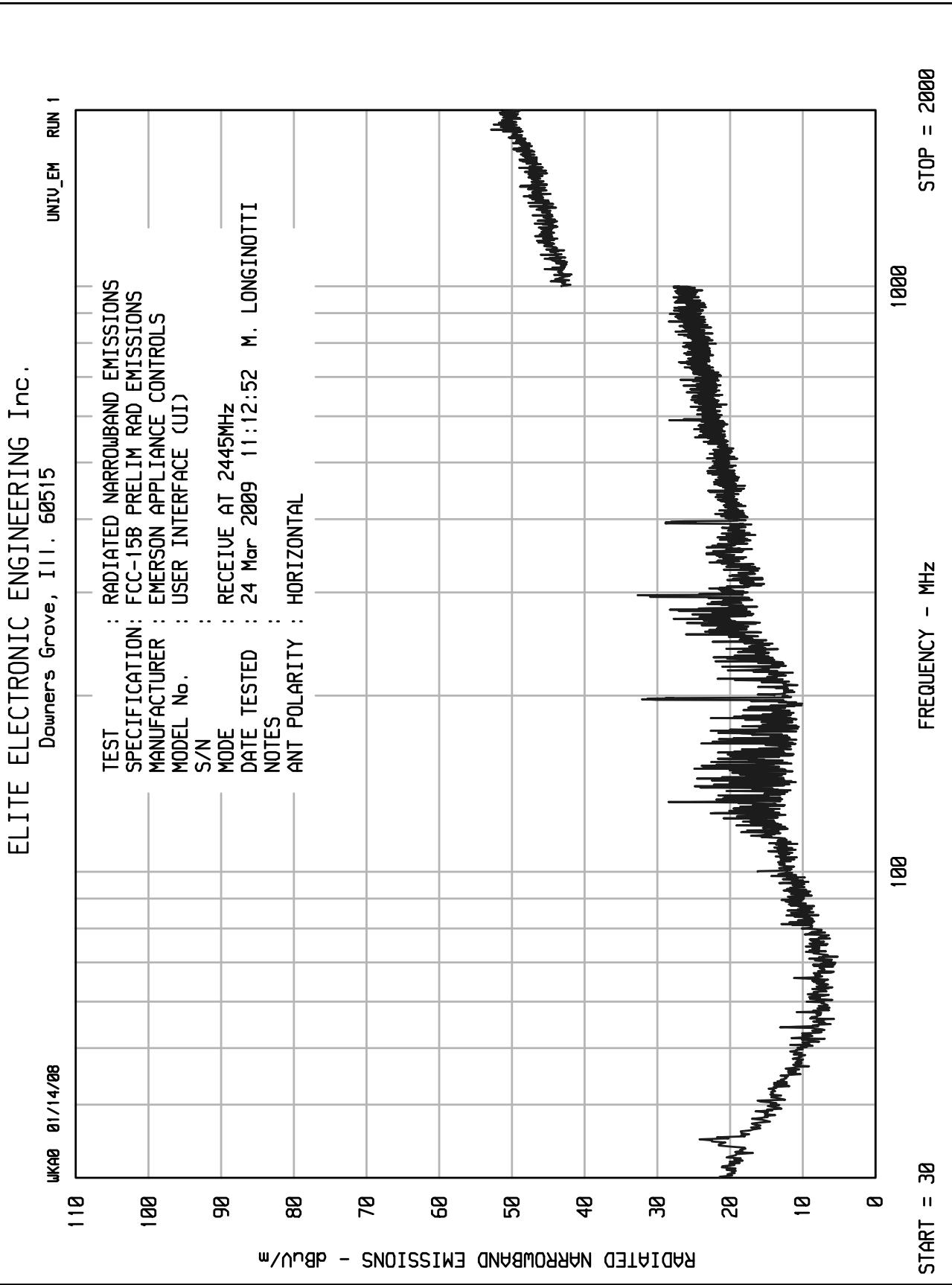


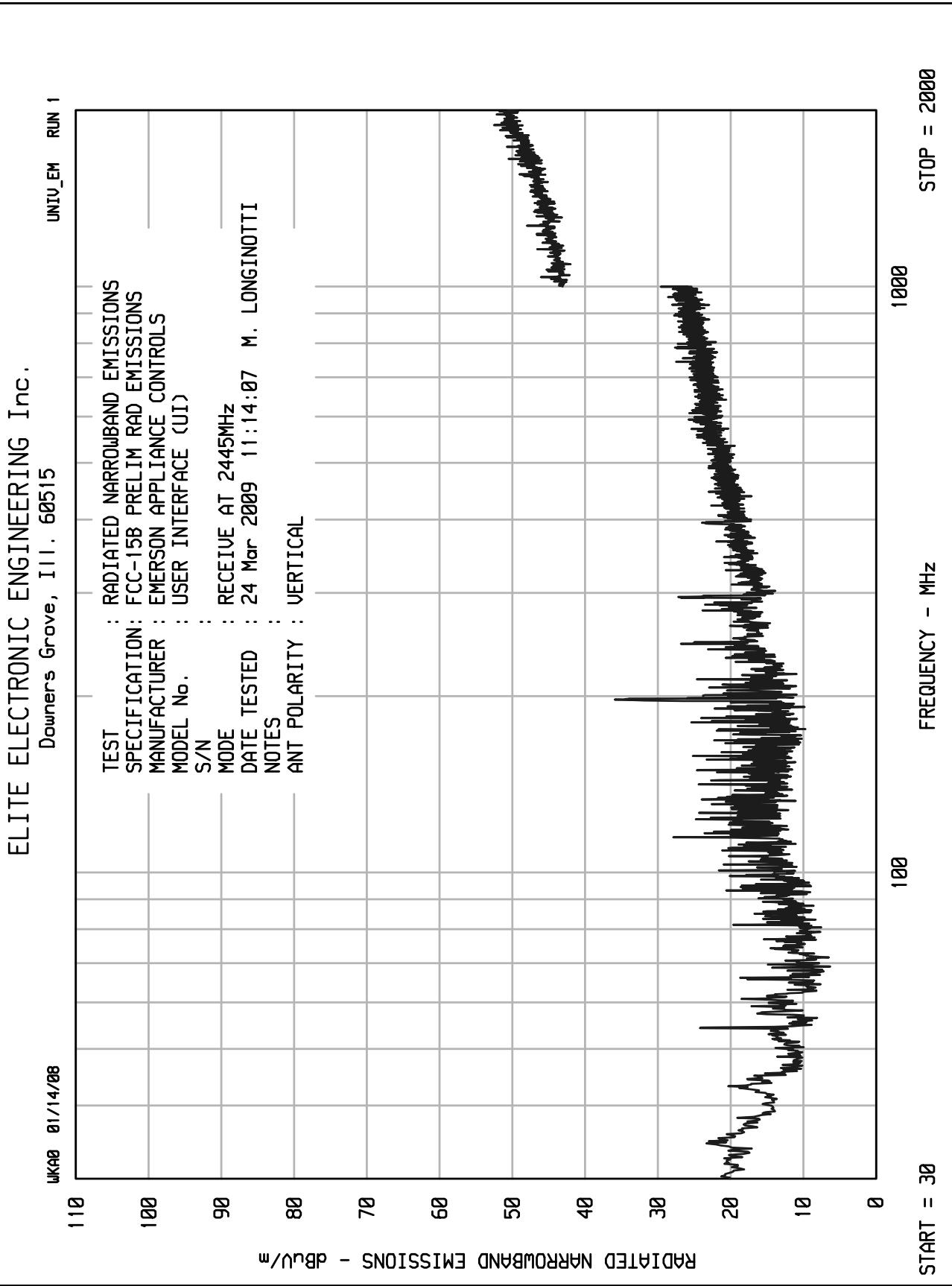
Date: 2.MAR.2009 10:45:58

FCC 15.35 Duty Cycle Correction Factor

MANUFACTURER : Emerson Appliance Control
MODEL NUMBER : User interface (Part No. 00N30982XXX)
SERIAL NUMBER : None Assigned
TEST MODE : Tx @ 2445MHz
TEST PARAMETER : Word is 99.8msec long. On Time is 3.54msec long
: Duty Cycle correction factor =
: $20 \log(\text{on time}/\text{word length}) =$
: $20 * \log(3.54\text{msec}/99.8\text{msec}) = -29.0\text{dB}$

EQUIPMENT USED : RBA1, NWI0





ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

WKA1 01/10/08

120

UNIT RCU EMI RUN 12

SPEC / TEST	:	FCC 15.109 PRELIM RAD EMISS
MANUFACTURER	:	EMERSON APPLIANCE CONTROLS
MODEL No.	:	USER INTERFACE
SERIAL No.	:	NONE ASSIGNED
MODE	:	Rx & 245MHz
SCANS/BAND	:	1
NOTES	:	
TEST DATE	:	3 Mar 2009 14:07:23
ANT. POLARIZ.	:	HORIZONTAL

105

90

75

60

45

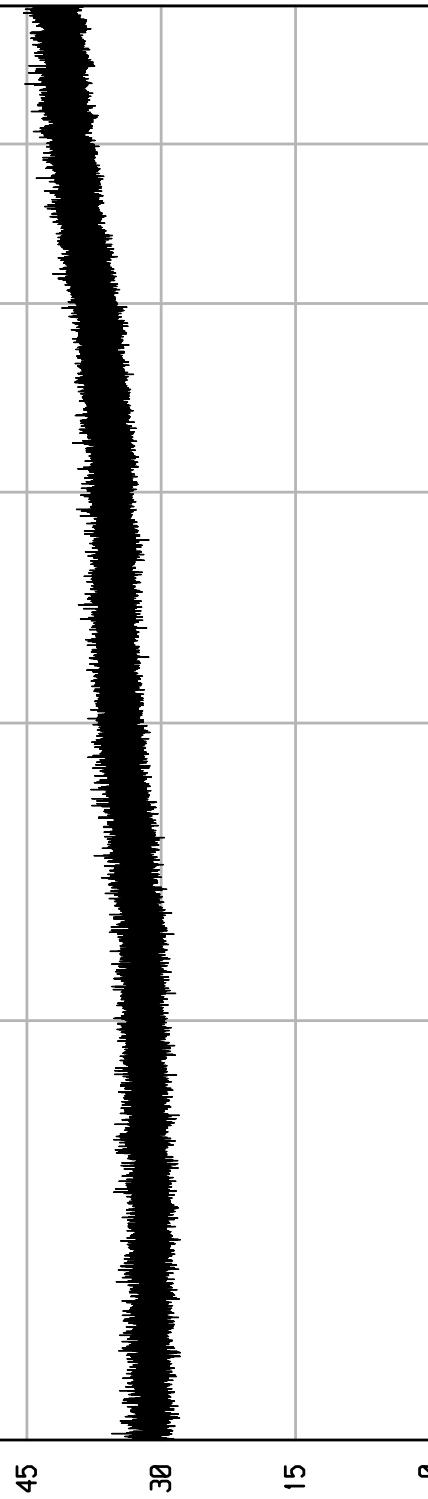
30

15

0

LEVEL dB_U/m

PEAK DETECTOR TRACE



START = 2000

STOP = 8000



ETR No. 8546A
DATA SHEET TEST NO. 2
RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : EMERSON APPLIANCE CONTROLS
MODEL NO. : USER INTERFACE (UI)
SERIAL NO. :
TEST MODE : RECEIVE AT 2445MHz
NOTES : MOD UNIT
TEST DATE : 24 Mar 2009 10:27:16
TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT FAC	CBL FAC	EXT ATTN	DIST FAC	TOTAL dBuV/m	QP LIMIT dBuV/m	AZ deg	ANT HT	POLAR cm
32.33	14.2	18.7	.5	0.0	0.0	33.4	40.0	180	200	H
54.02	17.3	8.0	.7	0.0	0.0	26.0	40.0	45	120	V
81.02	12.2	7.9	.9	0.0	0.0	21.0	40.0	180	120	H
117.46	9.7	12.1	1.0	0.0	0.0	22.9	43.5	45	120	H
131.39	19.8	12.2	1.0	0.0	0.0	33.0	43.5	45	340	H
147.18	16.6	11.4	1.0	0.0	0.0	29.0	43.5	45	120	H
174.49	11.9	10.0	1.0	0.0	0.0	22.9	43.5	225	120	H
196.99	25.9	10.4	1.0	0.0	0.0	37.3	43.5	180	120	H
295.55	19.6	13.9	1.5	0.0	0.0	35.0	46.0	90	120	H
467.35	-5.1	17.4	1.7	0.0	0.0	14.0	46.0	90	340	V
566.14	-5.6	19.3	1.9	0.0	0.0	15.6	46.0	45	120	H
588.48	13.2	19.4	2.0	0.0	0.0	34.5	46.0	135	200	H
787.99	12.3	21.2	2.5	0.0	0.0	36.0	46.0	270	120	H
810.47	-5.6	21.6	2.5	0.0	0.0	18.5	46.0	270	120	V
941.32	-5.4	22.6	2.5	0.0	0.0	19.7	46.0	315	200	H

MARK E. LONGINOTTI
tested by: _____
pg ____ of ____ M. Longinotti

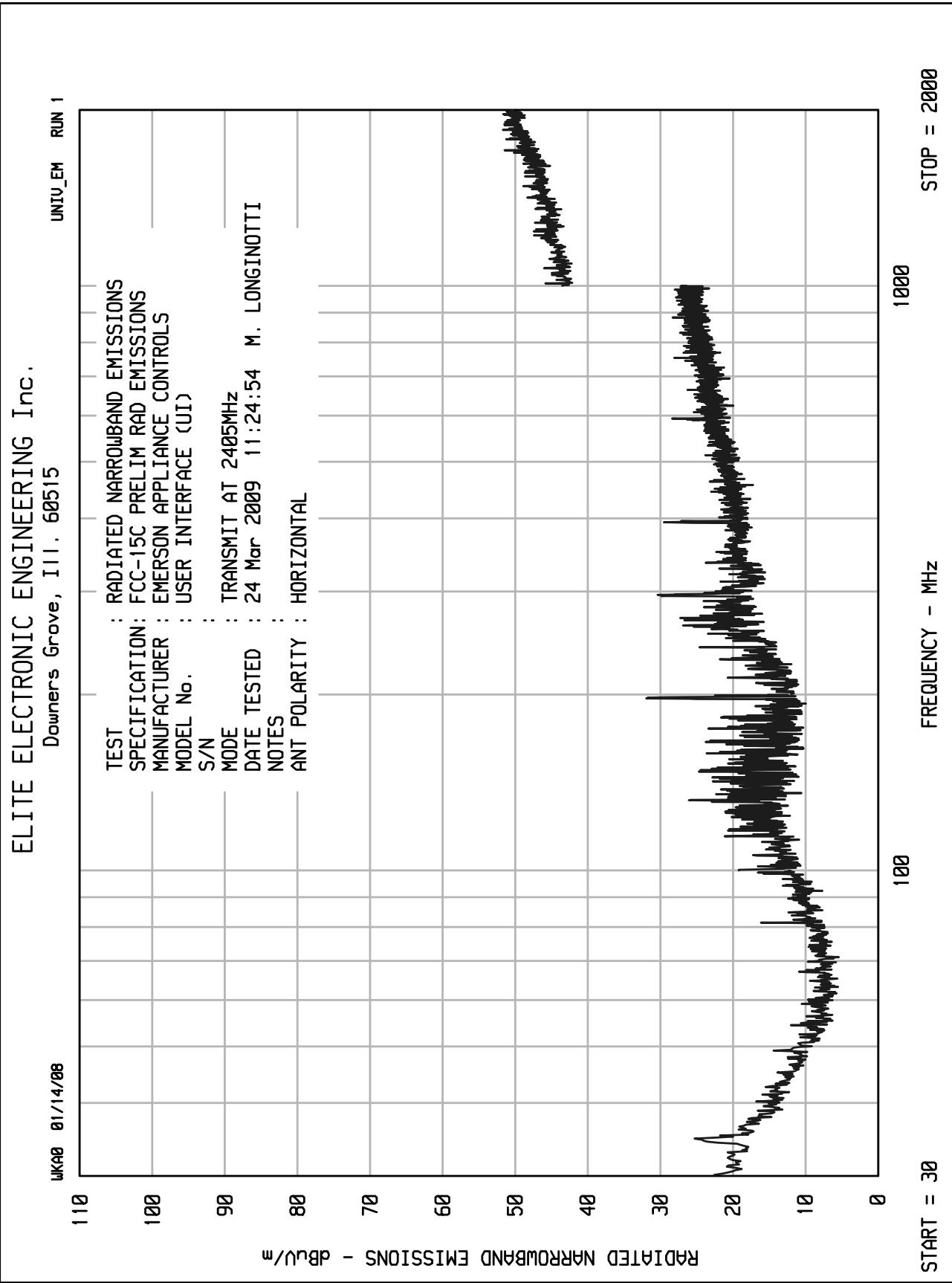


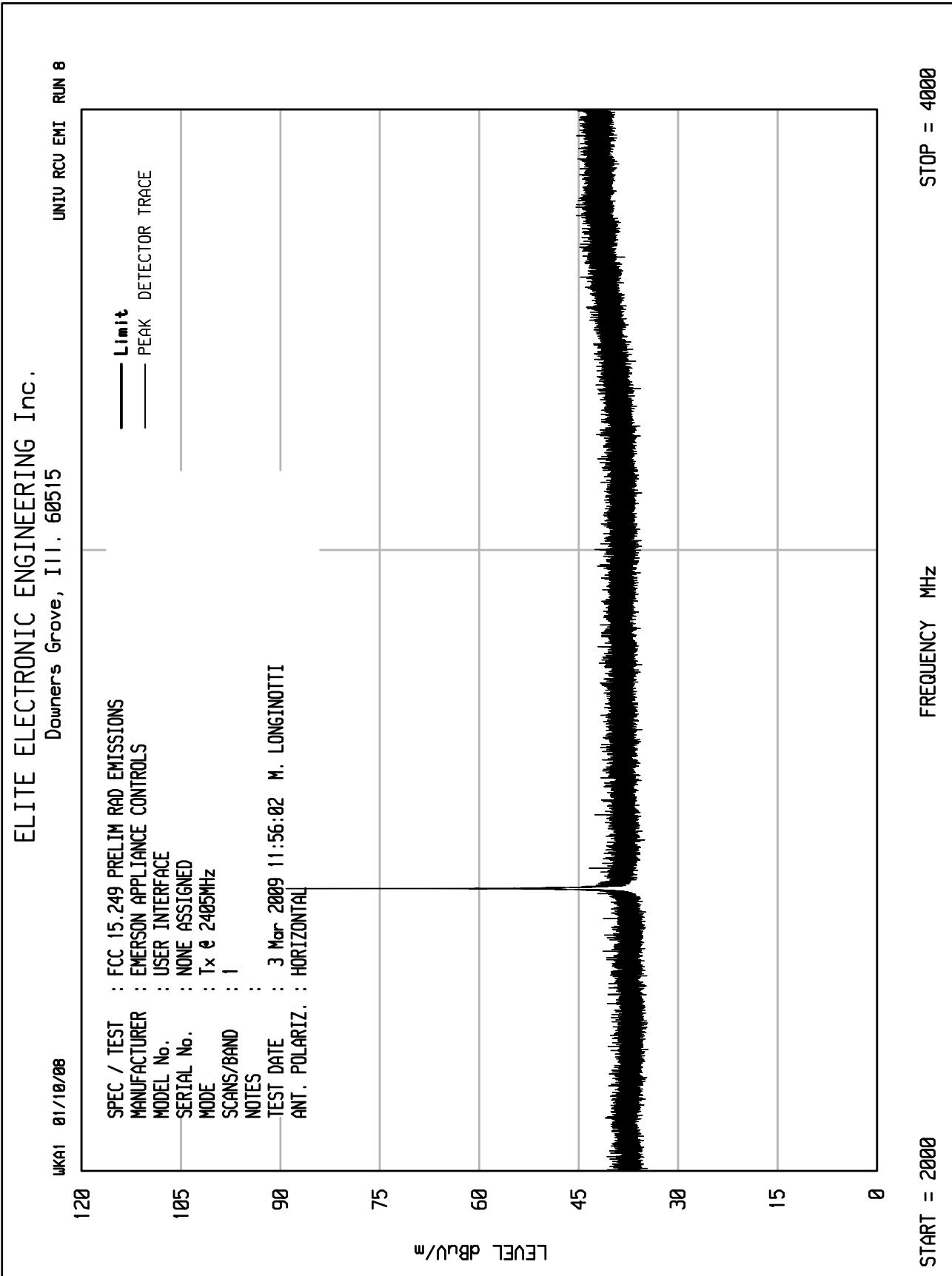
Manufacturer : Emerson Appliance Controls
Model No. : User Interface (Part No. 00N30982XXX)
Serial No. : None Assigned
Mode : Receive at 2445MHz
Test Specification : FCC 15.109 and RSS-Gen
Date : March 3, 2009
Test Distance : 3 meters

Freq (MHz)	Ant Pol	Meter Readin g (dBuV)	Ambien t	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 m	Total uV/m at 3m	Limit at 3m	Margin (dB)
2445.0	H	34.0	Ambient	3.8	31.3	-37.3	31.9	39.4	500.0	-22.1
2445.0	V	34.1	Ambient	3.8	31.3	-37.3			500.0	-22.0
4890.0	H	31.8	Ambient	5.8	34.9	-35.9	36.5	67.0	500.0	-17.5
4890.0	V	31.7	Ambient	5.8	34.9	-35.9			500.0	-17.6
7335.0	H	32.2	Ambient	7.7	38.2	-35.5	42.6	134.4	500.0	-11.4
7335.0	V	32.2	Ambient	7.7	38.2	-35.5			500.0	-11.4

Total (dBuv/m) = Meter reading + Cbl Factor + Ant Fac + Pre Amp

Checked By: MARK E. LONGINOTTI
Mark E. Longinotti

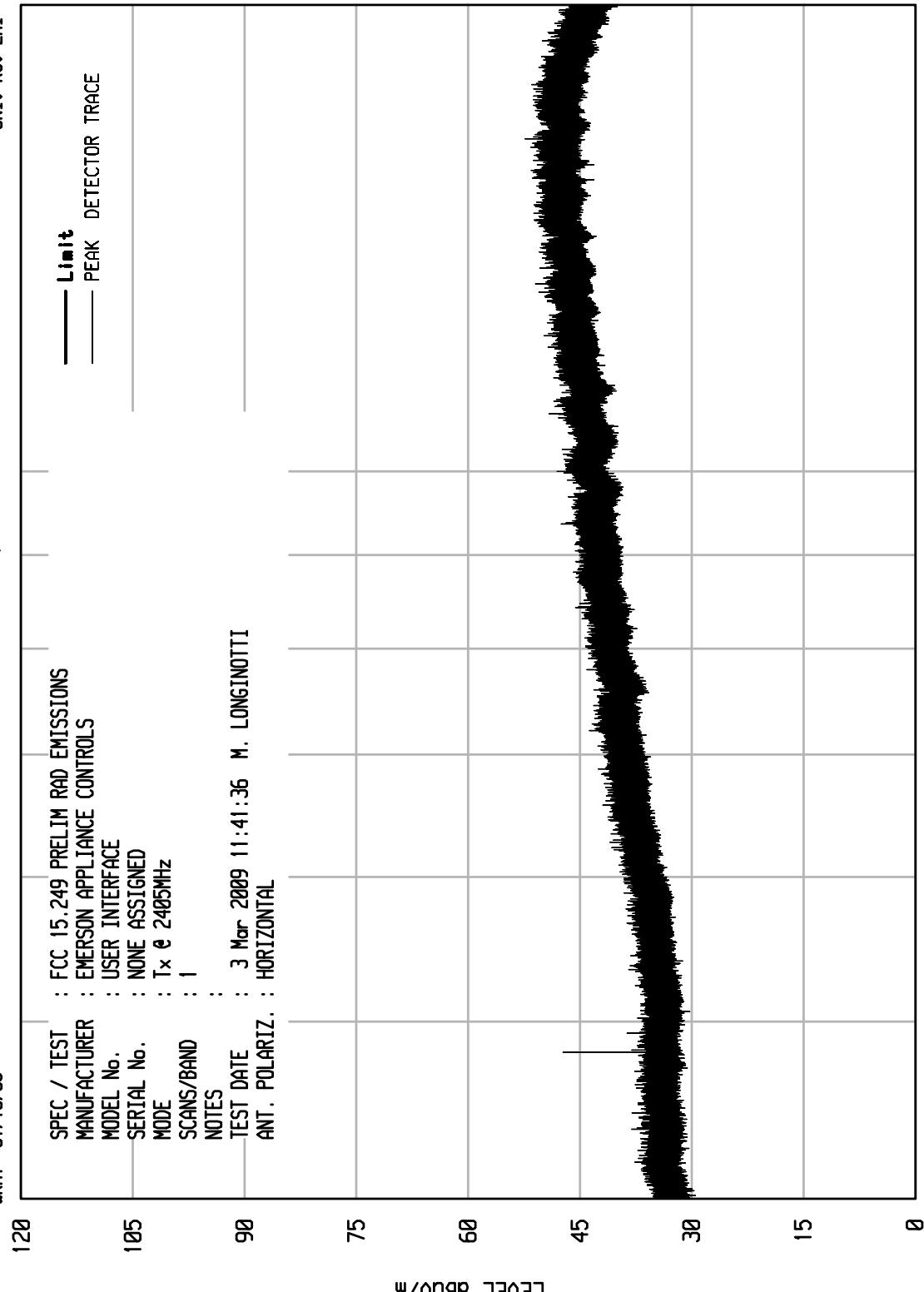


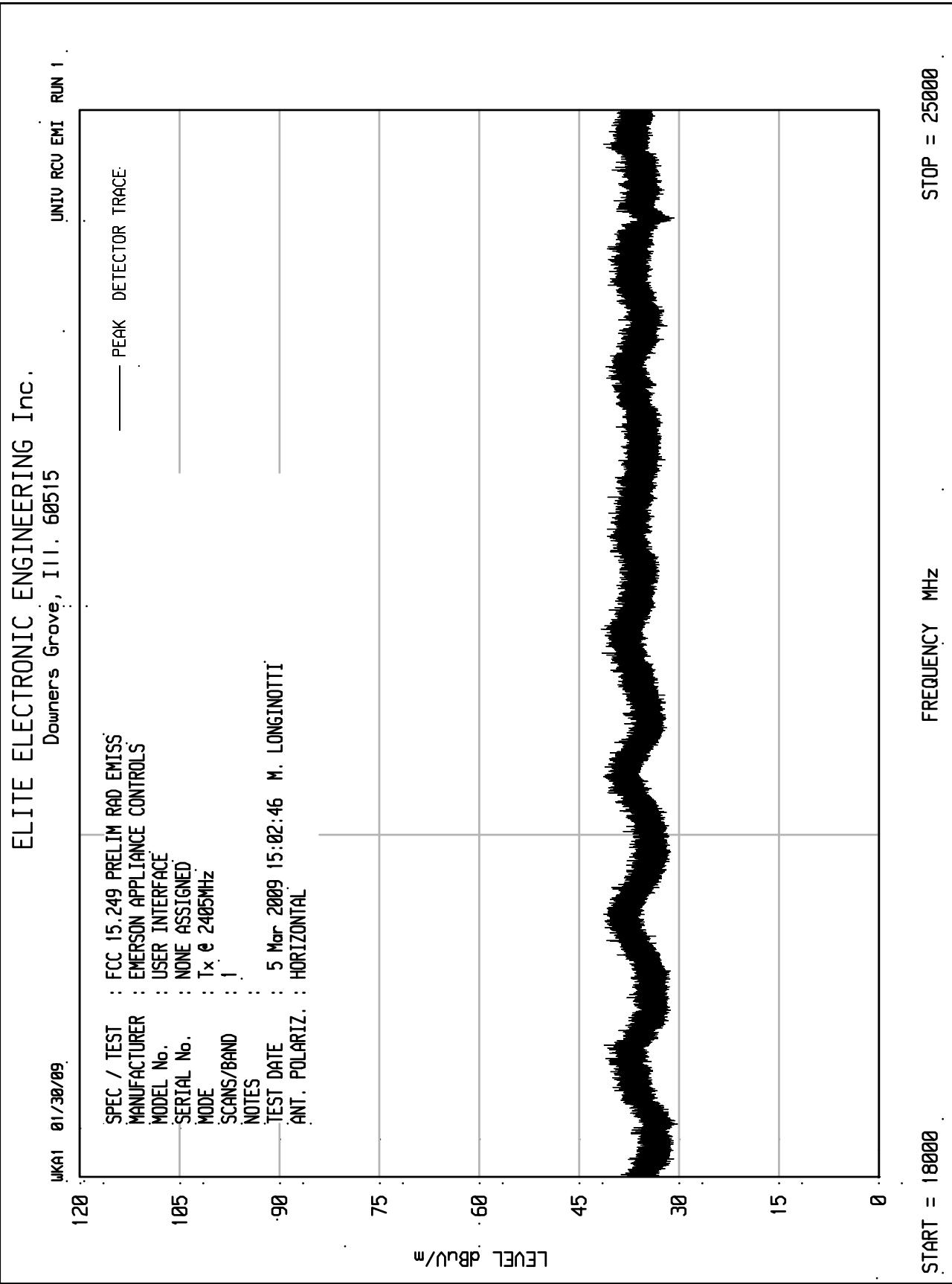


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UNIT RCU EMI RUN 5

WKAI	01/10/08	SPEC / TEST	FCC 15.249 PRELIM RAD EMISSIONS
105		MANUFACTURER	EMERSON APPLIANCE CONTROLS
		MODEL No.	USER INTERFACE
		SERIAL No.	NONE ASSIGNED
		MODE	Tx & 2405MHz
		SCANS/BAND	1
		NOTES	
		TEST DATE	3 Mar 2009 11:41:36 M. LONGINOTTI
		ANT. POLARIZ.	HORIZONTAL







Manufacturer : Emerson Appliance Controls
Model No. : User Interface (Part No. 00N30982XXX)
Serial No. : None Assigned
Mode : Transmit at 2405MHz
Test Specification : FCC 15.249 and Industry Canada Annex 2, section A2.9
Date : March 2, 2009 through March 5, 2009
Test Distance : 3 meters
Note : Peak readings

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Amb	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)
2405.0	H	67.1		3.8	31.3	0.0	102.2	129081.4	500000.0	-11.8
2405.0	V	61.2		3.8	31.3	0.0	96.3	65443.1	500000.0	-17.7
4810.0	H	54.0	Amb	5.7	34.8	-37.2	57.3	731.3	5000.0	-16.7
4810.0	V	50.5	Amb	5.7	34.8	-37.2	53.8	488.7	5000.0	-20.2
7215.0	H	46.1	Amb	7.6	38.1	-35.9	56.0	628.2	5000.0	-18.0
7215.0	V	46.7	Amb	7.6	38.1	-35.9	56.6	673.1	5000.0	-17.4
9620.0	H	44.9	Amb	8.6	39.6	-35.5	57.6	761.0	5000.0	-16.4
9620.0	V	45.1	Amb	8.6	39.6	-35.5	57.8	778.7	5000.0	-16.2
12025.0	H	44.6	Amb	9.8	41.4	-35.1	60.8	1091.3	5000.0	-13.2
12025.0	V	45.0	Amb	9.8	41.4	-35.1	61.2	1142.8	5000.0	-12.8
14430.0	H	44.0	Amb	10.9	43.7	-34.4	64.2	1619.8	5000.0	-9.8
14430.0	V	44.0	Amb	10.9	43.7	-34.4	64.2	1619.8	5000.0	-9.8
16835.0	H	43.5	Amb	11.6	44.7	-33.9	66.0	1996.8	5000.0	-8.0
16835.0	V	43.3	Amb	11.6	44.7	-33.9	65.8	1951.3	5000.0	-8.2
19240.0	H	32.9	Amb	2.2	40.4	-27.5	48.0	252.3	5000.0	-25.9
19240.0	V	34.2	Amb	2.2	40.4	-27.5	49.3	293.0	5000.0	-24.6
21645.0	H	32.3	Amb	2.2	40.6	-26.2	48.9	278.6	5000.0	-25.1
21645.0	V	33.2	Amb	2.2	40.6	-26.2	49.8	309.0	5000.0	-24.2
24050.0	H	34.7	Amb	2.2	40.6	-27.4	50.1	321.7	5000.0	-23.8
24050.0	V	34.9	Amb	2.2	40.6	-27.4	50.3	329.2	5000.0	-23.6

Amb = Ambient

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp

Checked By:

MARK E. LONGINOTTI
Mark E. Longinotti



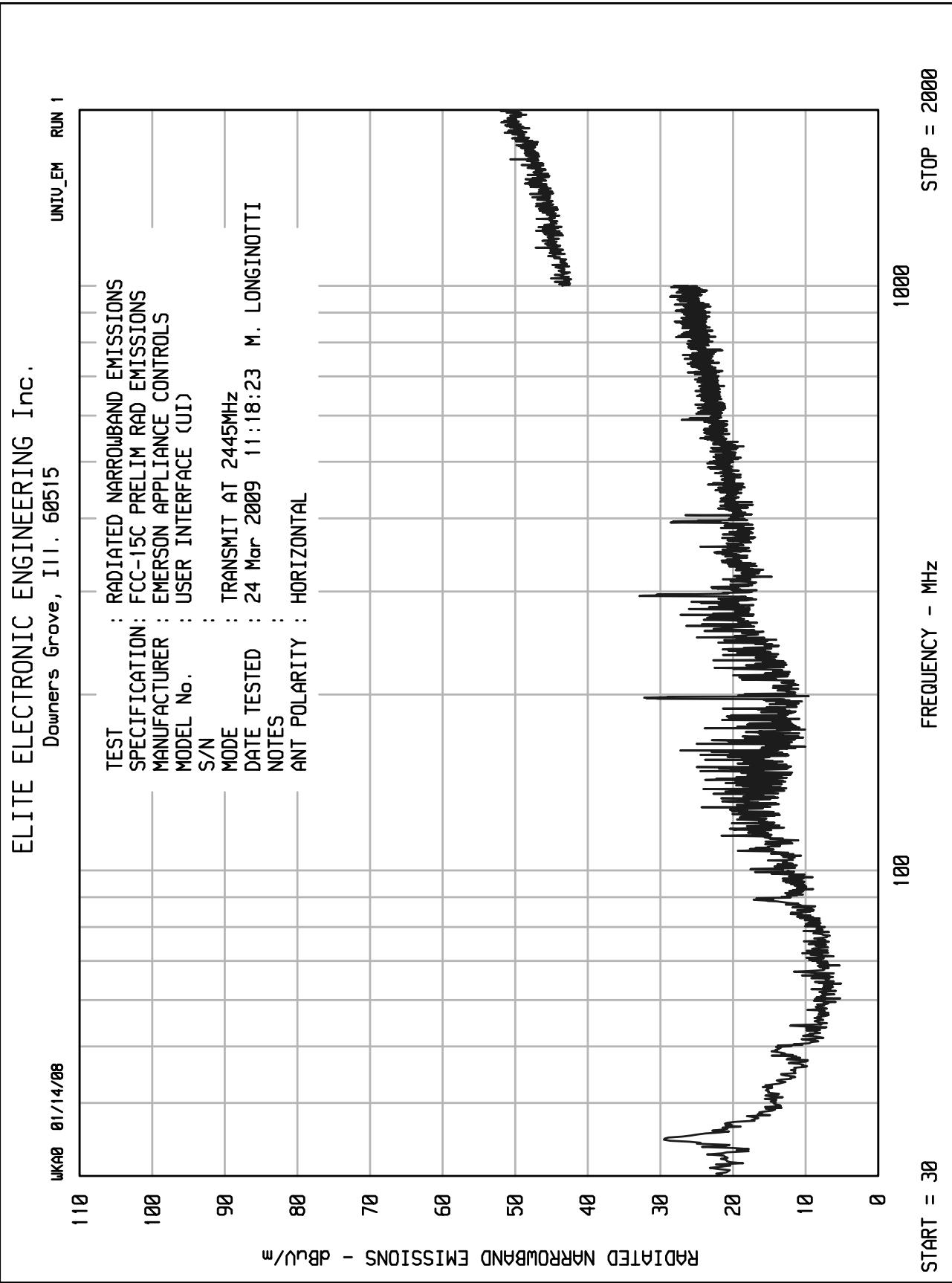
Manufacturer : Emerson Appliance Controls
Model No. : User Interface (Part No. 00N30982XXX)
Serial No. : None Assigned
Mode : Transmit at 2405MHz
Test Specification : FCC 15.249 and Industry Canada Annex 2, section A2.9
Date : March 2, 2009 through March 5, 2009
Test Distance : 3 meters
Note : Average readings

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Amb	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)
2405.0	H	67.1		3.8	31.3	0.0	-29.0	73.2	4580.0	50000.0	-20.8
2405.0	V	61.2		3.8	31.3	0.0	-29.0	67.3	2322.0	50000.0	-26.7
4810.0	H	54.0	Amb	5.7	34.8	-37.2	-29.0	28.3	25.9	500.0	-25.7
4810.0	V	50.5	Amb	5.7	34.8	-37.2	-29.0	24.8	17.3	500.0	-29.2
7215.0	H	46.1	Amb	7.6	38.1	-35.9	-29.0	27.0	22.3	500.0	-27.0
7215.0	V	46.7	Amb	7.6	38.1	-35.9	-29.0	27.6	23.9	500.0	-26.4
9620.0	H	44.9	Amb	8.6	39.6	-35.5	-29.0	28.6	27.0	500.0	-25.4
9620.0	V	45.1	Amb	8.6	39.6	-35.5	-29.0	28.8	27.6	500.0	-25.2
12025.0	H	44.6	Amb	9.8	41.4	-35.1	-29.0	31.8	38.7	500.0	-22.2
12025.0	V	45.0	Amb	9.8	41.4	-35.1	-29.0	32.2	40.5	500.0	-21.8
14430.0	H	44.0	Amb	10.9	43.7	-34.4	-29.0	35.2	57.5	500.0	-18.8
14430.0	V	44.0	Amb	10.9	43.7	-34.4	-29.0	35.2	57.5	500.0	-18.8
16835.0	H	43.5	Amb	11.6	44.7	-33.9	-29.0	37.0	70.8	500.0	-17.0
16835.0	V	43.3	Amb	11.6	44.7	-33.9	-29.0	36.8	69.2	500.0	-17.2
19240.0	H	32.9	Amb	2.2	40.4	-27.5	-29.0	19.0	9.0	500.0	-34.9
19240.0	V	34.2	Amb	2.2	40.4	-27.5	-29.0	20.3	10.4	500.0	-33.6
21645.0	H	32.3	Amb	2.2	40.6	-26.2	-29.0	19.9	9.9	500.0	-34.1
21645.0	V	33.2	Amb	2.2	40.6	-26.2	-29.0	20.8	11.0	500.0	-33.2
24050.0	H	34.7	Amb	2.2	40.6	-27.4	-29.0	21.1	11.4	500.0	-32.8
24050.0	V	34.9	Amb	2.2	40.6	-27.4	-29.0	21.3	11.7	500.0	-32.6

Amb = Ambient

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle

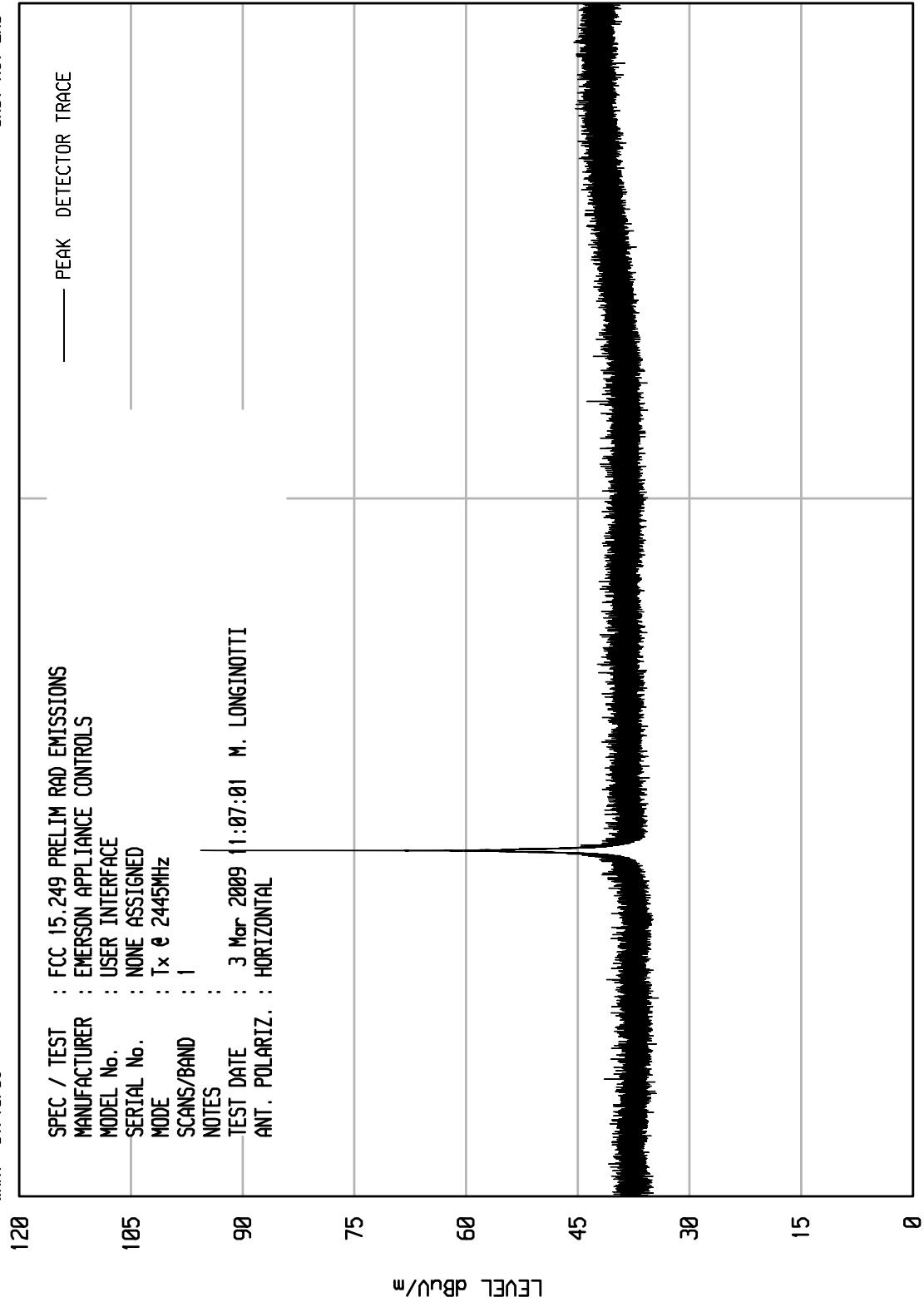
Checked By: MARK E. LONGINOTTI
Mark E. Longinotti



ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UNIV RCU EMI RUN 2

WKA1 01/10/08

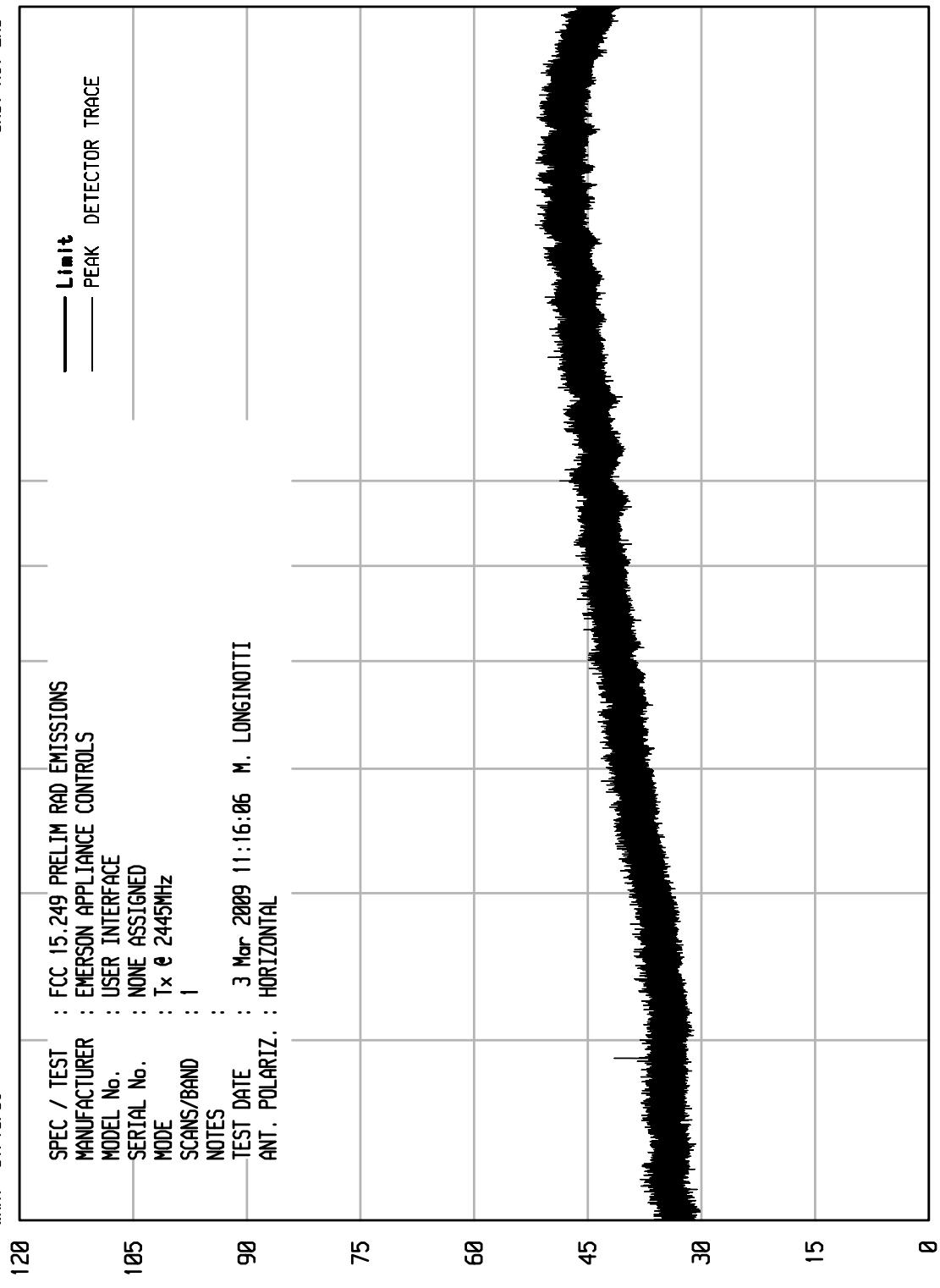


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UNI U RCU EMI RUN 4

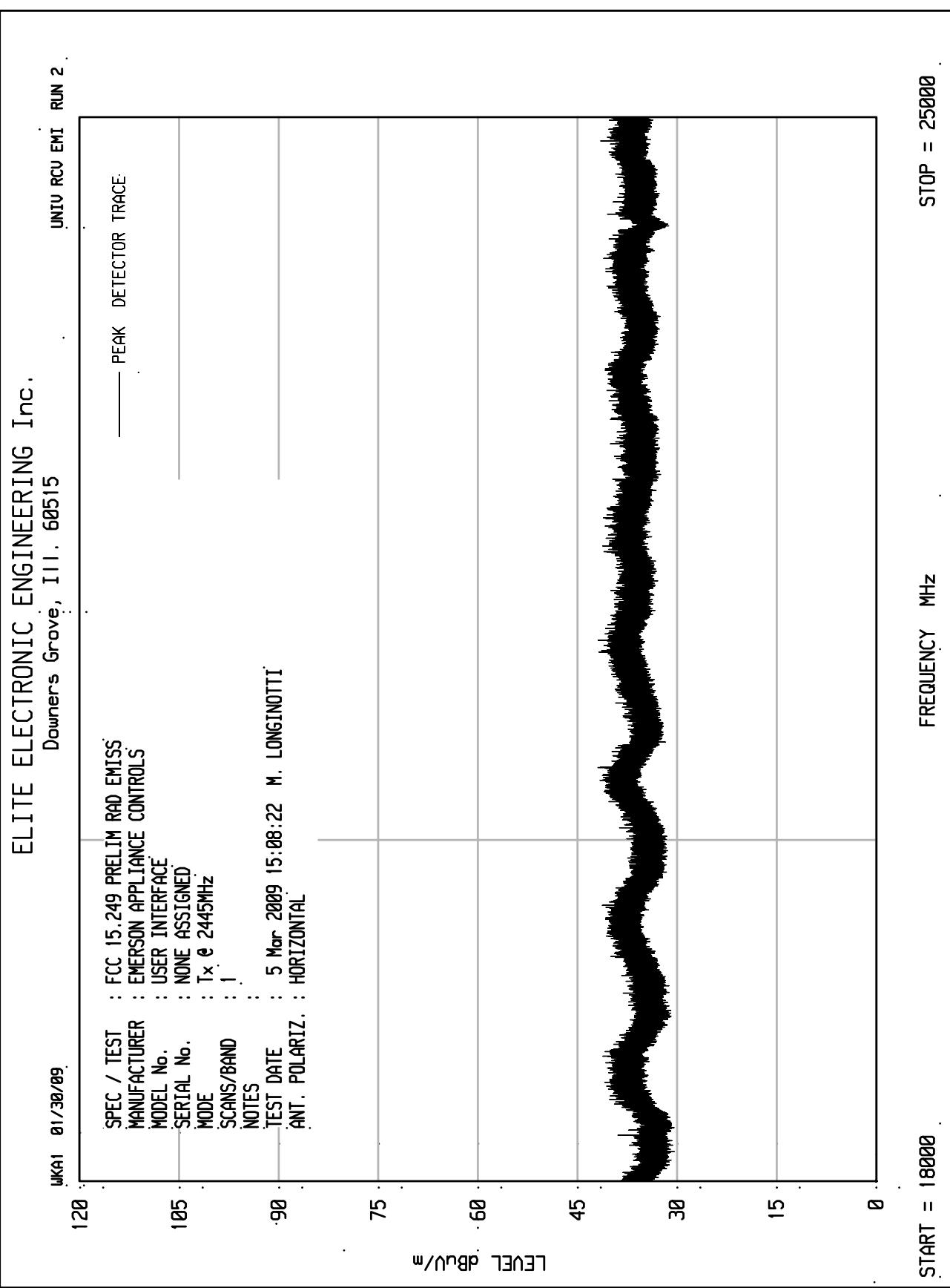
WKA1 01/10/08

	SPEC / TEST	: FCC 15.249 PRELIM RAD EMISSIONS
	MANUFACTURER	: EMERSON APPLIANCE CONTROLS
105	MODEL No.	: USER INTERFACE
	SERIAL No.	: NONE ASSIGNED
	MODE	: Tx & 245MHz
	SCANS/BAND	: 1
	NOTES	
90	TEST DATE	: 3 Mar 2009 11:16:06 M. LONGINOTTI
	ANT. POLARIZ.	: HORIZONTAL



START = 4000

STOP = 18000





Manufacturer : Emerson Appliance Controls
Model No. : User Interface (Part No. 00N30982XXX)
Serial No. : None Assigned
Mode : Transmit at 2445MHz
Test Specification : FCC 15.249 and Industry Canada Annex 2, section A2.9
Date : March 2, 2009 through March 5, 2009
Test Distance : 3 meters
Note : Peak readings

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Amb	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)
2445.0	H	64.9		3.8	31.3	0.0	100.1	100822.5	500000.0	-13.9
2445.0	V	61.0		3.8	31.3	0.0	96.2	64351.3	500000.0	-17.8
4890.0	H	50.9	Amb	5.8	34.9	-37.3	54.2	515.6	5000.0	-19.7
4890.0	V	46.5	Amb	5.8	34.9	-37.3	49.8	310.7	5000.0	-24.1
7335.0	H	46.6	Amb	7.7	38.2	-35.9	56.6	672.8	5000.0	-17.4
7335.0	V	47.4	Amb	7.7	38.2	-35.9	57.4	737.7	5000.0	-16.6
9780.0	H	44.2	Amb	8.6	39.8	-35.5	57.1	712.6	5000.0	-16.9
9780.0	V	44.7	Amb	8.6	39.8	-35.5	57.6	754.8	5000.0	-16.4
12225.0	H	43.2	Amb	9.9	41.5	-35.0	59.5	943.7	5000.0	-14.5
12225.0	V	43.2	Amb	9.9	41.5	-35.0	59.5	943.7	5000.0	-14.5
14670.0	H	42.0	Amb	11.0	44.2	-34.4	62.8	1384.3	5000.0	-11.2
14670.0	V	43.3	Amb	11.0	44.2	-34.4	64.1	1607.8	5000.0	-9.9
17115.0	H	43.2	Amb	12.0	44.7	-33.9	65.9	1981.7	5000.0	-8.0
17115.0	V	43.4	Amb	12.0	44.7	-33.9	66.1	2027.9	5000.0	-7.8
19560.0	H	35.7	Amb	2.2	40.4	-27.1	51.2	361.3	5000.0	-22.8
19560.0	V	35.7	Amb	2.2	40.4	-27.1	51.2	361.3	5000.0	-22.8
22005.0	H	34.3	Amb	2.2	40.6	-27.0	50.1	320.7	5000.0	-23.9
22005.0	V	34.4	Amb	2.2	40.6	-27.0	50.2	324.4	5000.0	-23.8
24450.0	H	34.2	Amb	2.2	40.6	-27.5	49.6	300.9	5000.0	-24.4
24450.0	V	32.8	Amb	2.2	40.6	-27.5	48.2	256.1	5000.0	-25.8

Amb = Ambient

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp

Checked By:

MARK E. LONGINOTTI

Mark E. Longinotti



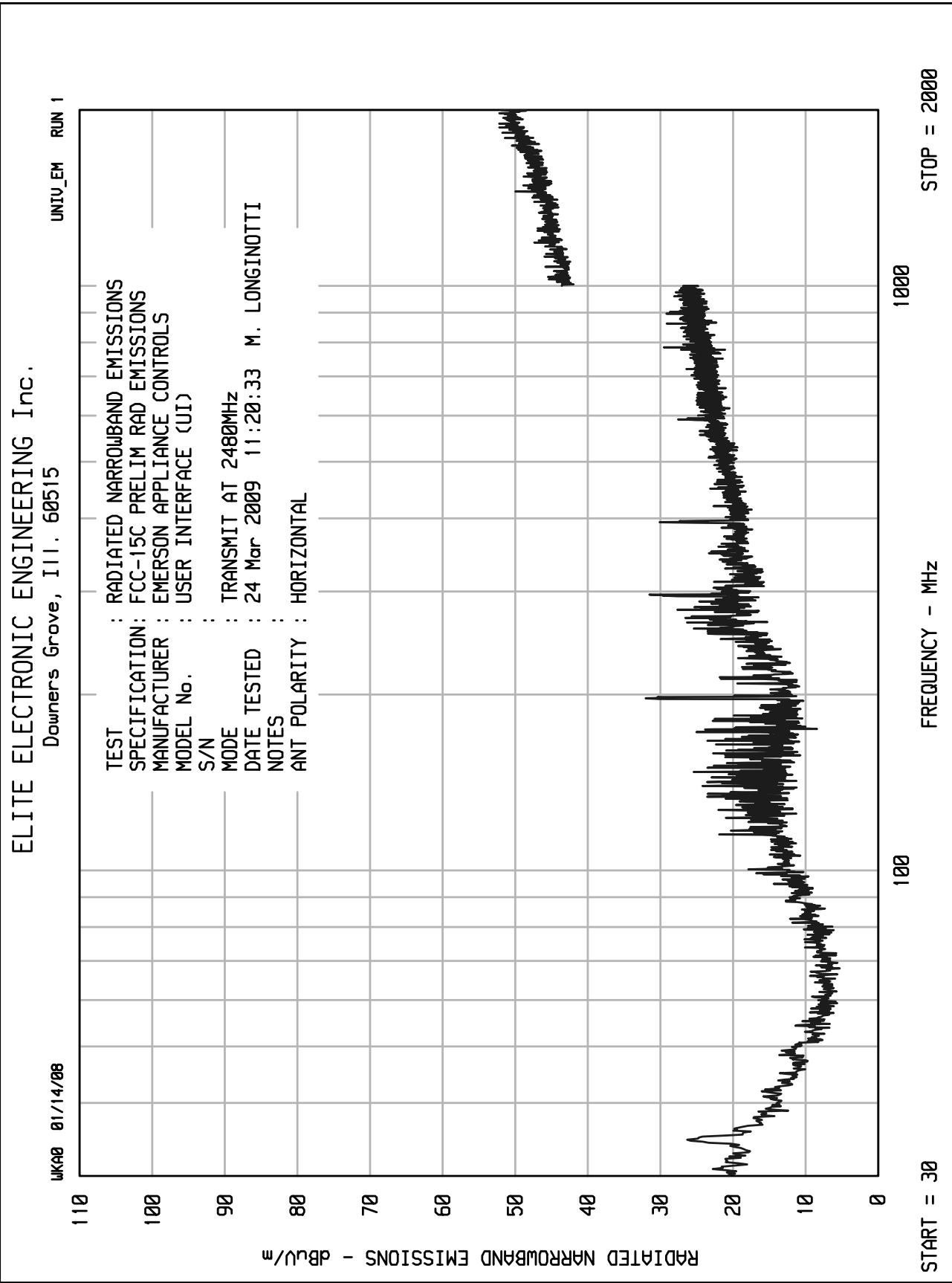
Manufacturer : Emerson Appliance Controls
Model No. : User Interface (Part No. 00N30982XXX)
Serial No. : None Assigned
Mode : Transmit at 2445MHz
Test Specification : FCC 15.249 and Industry Canada Annex 2, section A2.9
Date : March 2, 2009 through March 5, 2009
Test Distance : 3 meters
Note : Average readings

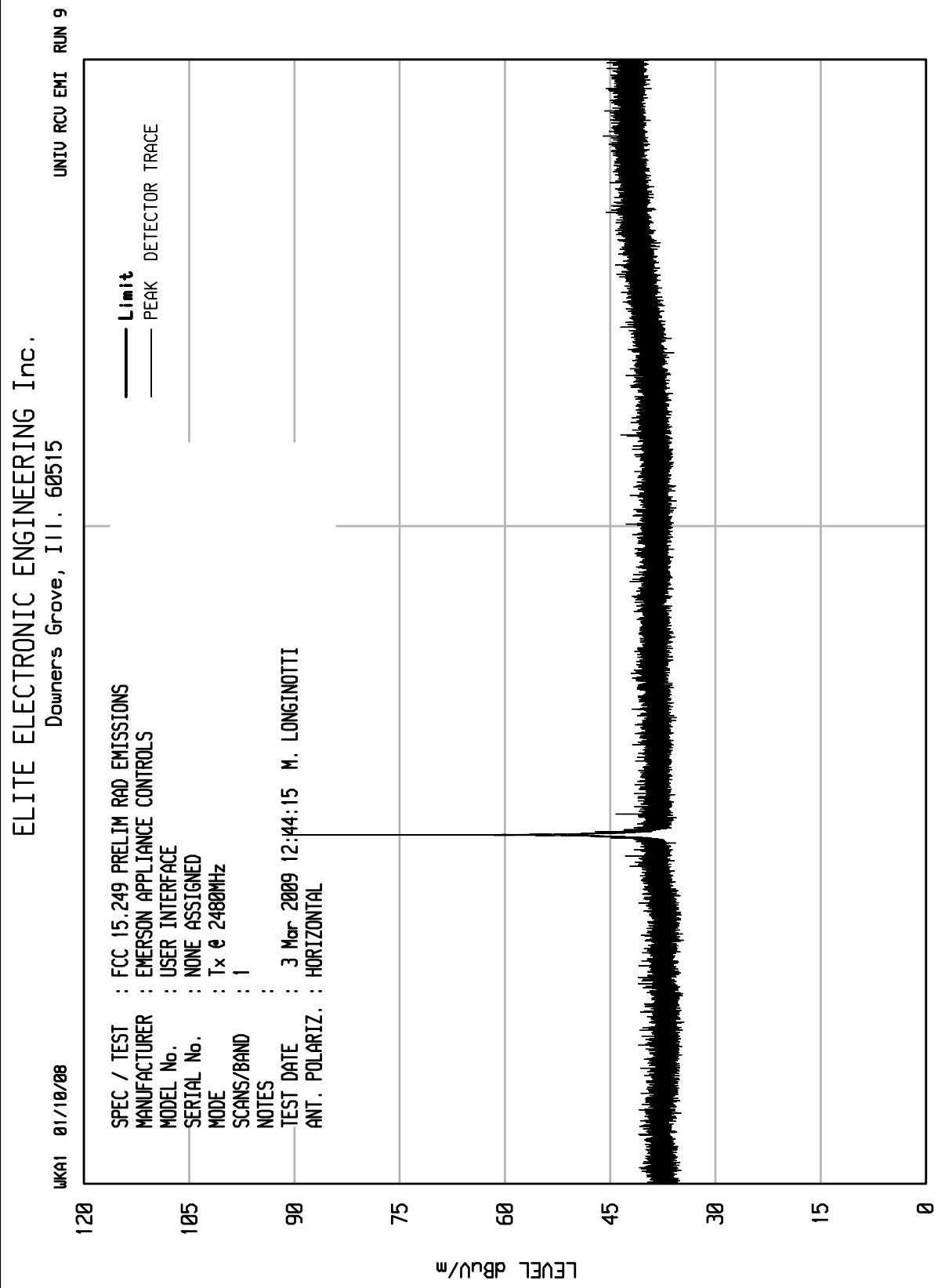
Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Amb	CBL FAC (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3 m	Total uV/m at 3m	Limit uV/m at 3m	Margin (dB)
2445.0	H	64.9		3.8	31.3	0.0	-29.0	71.1	3577.3	50000.0	-22.9
2445.0	V	61.0		3.8	31.3	0.0	-29.0	67.2	2283.3	50000.0	-26.8
4890.0	H	50.9	Amb	5.8	34.9	-37.3	-29.0	25.2	18.3	500.0	-28.7
4890.0	V	46.5	Amb	5.8	34.9	-37.3	-29.0	20.8	11.0	500.0	-33.1
7335.0	H	46.6	Amb	7.7	38.2	-35.9	-29.0	27.6	23.9	500.0	-26.4
7335.0	V	47.4	Amb	7.7	38.2	-35.9	-29.0	28.4	26.2	500.0	-25.6
9780.0	H	44.2	Amb	8.6	39.8	-35.5	-29.0	28.1	25.3	500.0	-25.9
9780.0	V	44.7	Amb	8.6	39.8	-35.5	-29.0	28.6	26.8	500.0	-25.4
12225.0	H	43.2	Amb	9.9	41.5	-35.0	-29.0	30.5	33.5	500.0	-23.5
12225.0	V	43.2	Amb	9.9	41.5	-35.0	-29.0	30.5	33.5	500.0	-23.5
14670.0	H	42.0	Amb	11.0	44.2	-34.4	-29.0	33.8	49.1	500.0	-20.2
14670.0	V	43.3	Amb	11.0	44.2	-34.4	-29.0	35.1	57.0	500.0	-18.9
17115.0	H	43.2	Amb	12.0	44.7	-33.9	-29.0	36.9	70.3	500.0	-17.0
17115.0	V	43.4	Amb	12.0	44.7	-33.9	-29.0	37.1	72.0	500.0	-16.8
19560.0	H	35.7	Amb	2.2	40.4	-27.1	-29.0	22.2	12.8	500.0	-31.8
19560.0	V	35.7	Amb	2.2	40.4	-27.1	-29.0	22.2	12.8	500.0	-31.8
22005.0	H	34.3	Amb	2.2	40.6	-27.0	-29.0	21.1	11.4	500.0	-32.9
22005.0	V	34.4	Amb	2.2	40.6	-27.0	-29.0	21.2	11.5	500.0	-32.8
24450.0	H	34.2	Amb	2.2	40.6	-27.5	-29.0	20.6	10.7	500.0	-33.4
24450.0	V	32.8	Amb	2.2	40.6	-27.5	-29.0	19.2	9.1	500.0	-34.8

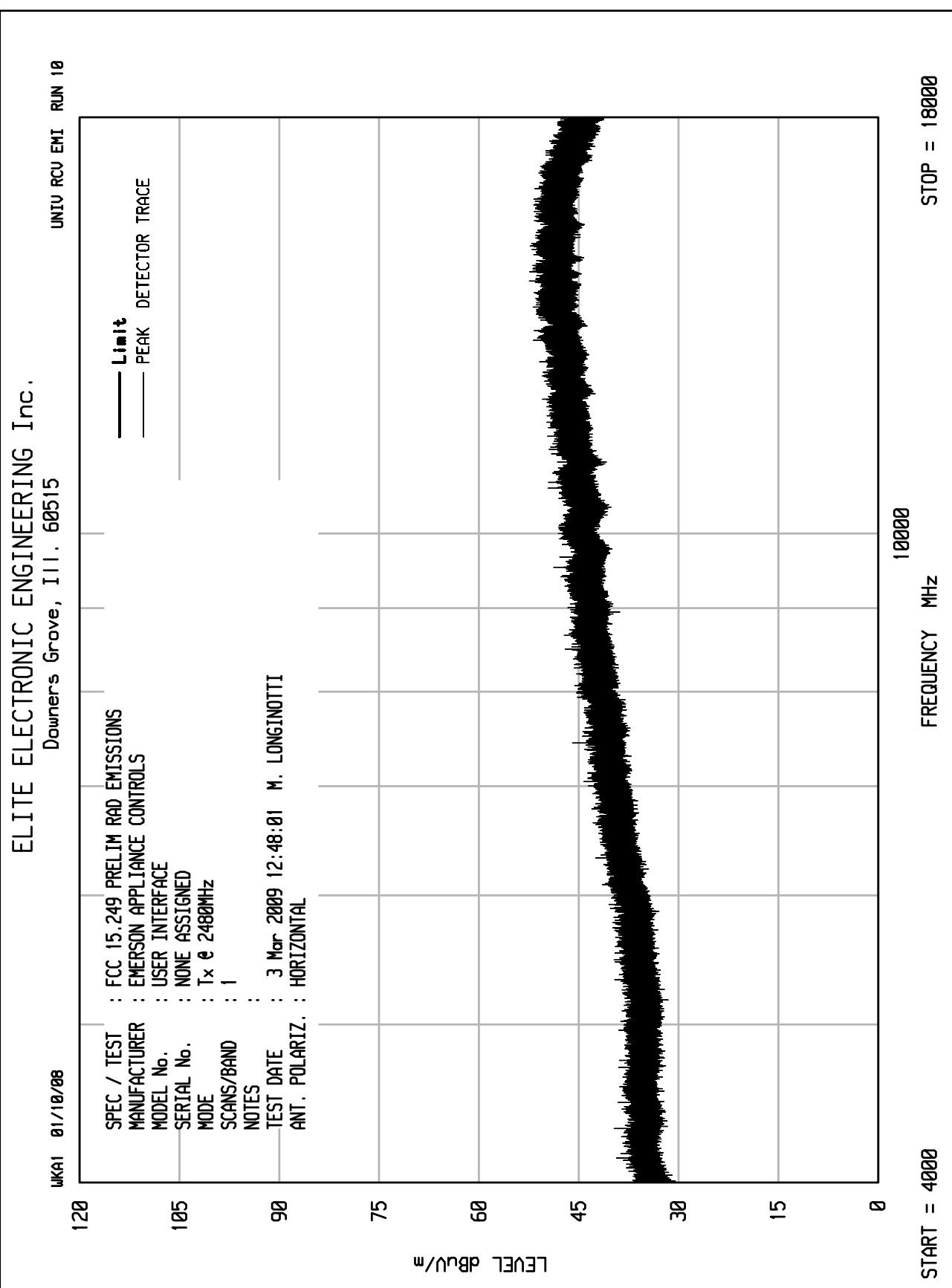
Amb = Ambient

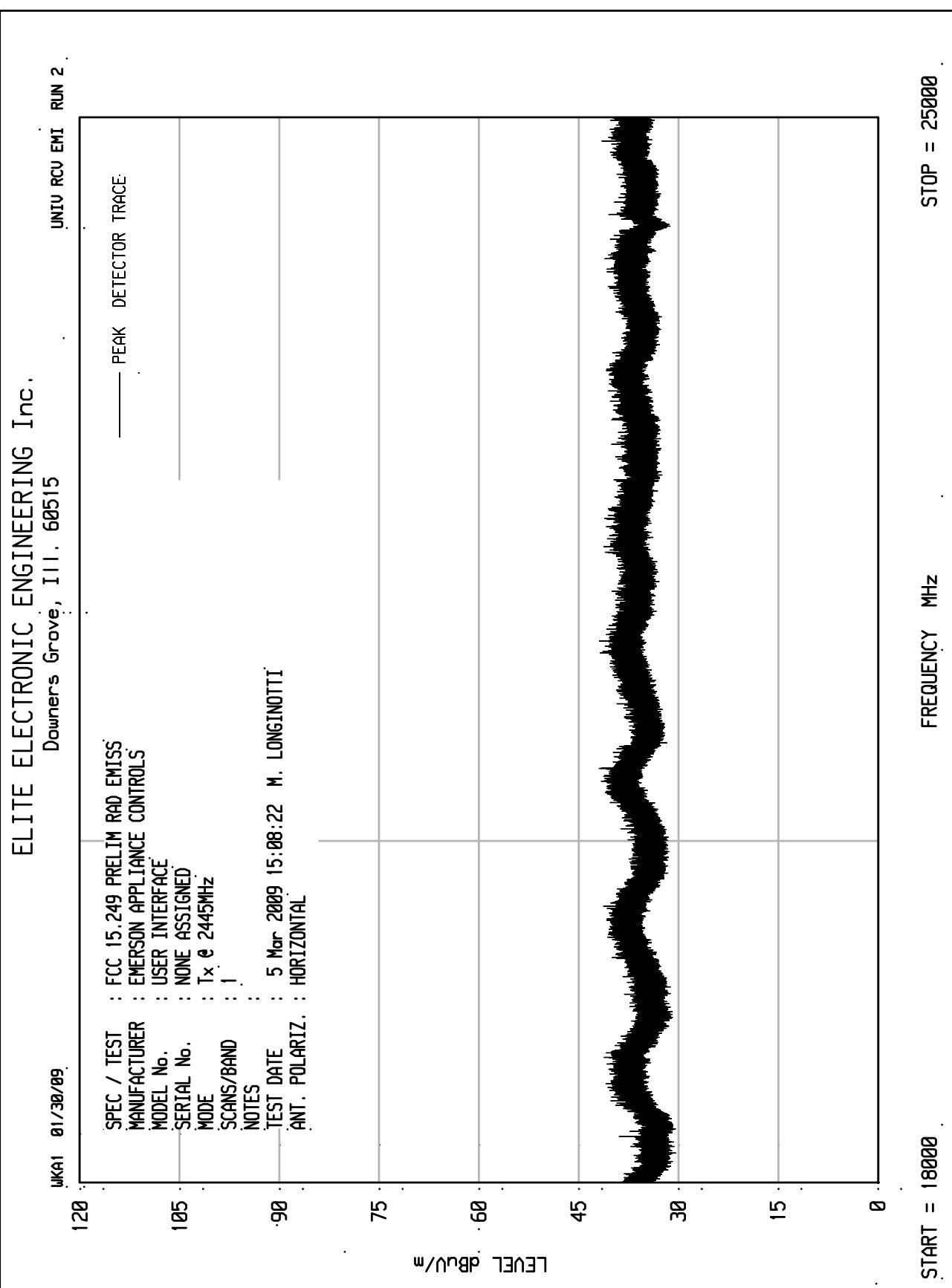
Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle

Checked By: MARK E. LONGINOTTI
Mark E. Longinotti











Manufacturer : Emerson Appliance Controls
Model No. : User Interface (Part No. 00N30982XXX)
Serial No. : None Assigned
Mode : Transmit at 2480MHz
Test Specification : FCC 15.249 and Industry Canada Annex 2, section A2.9
Date : March 2, 2009 through March 5, 2009
Test Distance : 3 meters
Note : Peak readings

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Amb	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)
2480.0	H	63.5		3.8	31.4	0.0	98.7	86273.7	500000.0	-15.3
2480.0	V	57.1		3.8	31.4	0.0	92.3	41293.2	500000.0	-21.7
4960.0	H	46.1	Amb	5.8	34.9	-37.3	49.5	298.6	5000.0	-24.5
4960.0	V	46.8	Amb	5.8	34.9	-37.3	50.2	323.7	5000.0	-23.8
7440.0	H	46.9	Amb	7.7	38.2	-35.9	56.9	703.2	5000.0	-17.0
7440.0	V	48.3	Amb	7.7	38.2	-35.9	58.3	826.1	5000.0	-15.6
9920.0	H	44.9	Amb	8.5	39.9	-35.5	57.9	782.4	5000.0	-16.1
9920.0	V	45.7	Amb	8.5	39.9	-35.5	58.7	857.9	5000.0	-15.3
12400.0	H	44.9	Amb	9.9	41.5	-35.0	61.3	1163.5	5000.0	-12.7
12400.0	V	44.3	Amb	9.9	41.5	-35.0	60.7	1085.9	5000.0	-13.3
14880.0	H	44.4	Amb	11.2	44.6	-34.4	65.8	1943.5	5000.0	-8.2
14880.0	V	43.8	Amb	11.2	44.6	-34.4	65.2	1813.8	5000.0	-8.8
17360.0	H	43.2	Amb	12.0	44.6	-34.0	65.8	1961.1	5000.0	-8.1
17360.0	V	43.6	Amb	12.0	44.6	-34.0	66.2	2053.5	5000.0	-7.7
19840.0	H	31.4	Amb	2.2	40.4	-26.9	47.1	227.5	50000.0	-46.8
19840.0	V	31.7	Amb	2.2	40.4	-26.9	47.4	235.5	50000.0	-46.5
22320.0	H	34.9	Amb	2.2	40.6	-27.1	50.7	341.1	50000.0	-43.3
22320.0	V	33.6	Amb	2.2	40.6	-27.1	49.4	293.7	50000.0	-44.6
24800.0	H	34.9	Amb	2.2	40.6	-27.2	50.6	337.3	50000.0	-43.4
24800.0	V	34.6	Amb	2.2	40.6	-27.2	50.3	325.9	50000.0	-43.7

Amb = Ambient

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp

Checked By: MARK E. LONGINOTTI
Mark E. Longinotti



Manufacturer : Emerson Appliance Controls
Model No. : User Interface (Part No. 00N30982XXX)
Serial No. : None Assigned
Mode : Transmit at 2480MHz
Test Specification : FCC 15.249 and Industry Canada Annex 2, section A2.9
Date : March 2, 2009 through March 5, 2009
Test Distance : 3 meters
Note : Average readings

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Amb	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)
2480.0	H	63.5		3.8	31.4	0.0	-29.0	69.7	3061.1	50000.0	-24.3
2480.0	V	57.1		3.8	31.4	0.0	-29.0	63.3	1465.1	50000.0	-30.7
4960.0	H	46.1	*	5.8	34.9	-37.3	-29.0	20.5	10.6	500.0	-33.5
4960.0	V	46.8	*	5.8	34.9	-37.3	-29.0	21.2	11.5	500.0	-32.8
7440.0	H	46.9	*	7.7	38.2	-35.9	-29.0	27.9	24.9	500.0	-26.0
7440.0	V	48.3	*	7.7	38.2	-35.9	-29.0	29.3	29.3	500.0	-24.6
9920.0	H	44.9	*	8.5	39.9	-35.5	-29.0	28.9	27.8	500.0	-25.1
9920.0	V	45.7	*	8.5	39.9	-35.5	-29.0	29.7	30.4	500.0	-24.3
12400.0	H	44.9	*	9.9	41.5	-35.0	-29.0	32.3	41.3	500.0	-21.7
12400.0	V	44.3	*	9.9	41.5	-35.0	-29.0	31.7	38.5	500.0	-22.3
14880.0	H	44.4	*	11.2	44.6	-34.4	-29.0	36.8	69.0	500.0	-17.2
14880.0	V	43.8	*	11.2	44.6	-34.4	-29.0	36.2	64.4	500.0	-17.8
17360.0	H	43.2	*	12.0	44.6	-34.0	-29.0	36.8	69.6	500.0	-17.1
17360.0	V	43.6	*	12.0	44.6	-34.0	-29.0	37.2	72.9	500.0	-16.7
19840.0	H	31.4	*	2.2	40.4	-26.9	-29.0	18.1	8.1	500.0	-35.8
19840.0	V	31.7	*	2.2	40.4	-26.9	-29.0	18.4	8.4	500.0	-35.5
22320.0	H	34.9	*	2.2	40.6	-27.1	-29.0	21.7	12.1	500.0	-32.3
22320.0	V	33.6	*	2.2	40.6	-27.1	-29.0	20.4	10.4	500.0	-33.6
24800.0	H	34.9	*	2.2	40.6	-27.2	-29.0	21.6	12.0	500.0	-32.4
24800.0	V	34.6	*	2.2	40.6	-27.2	-29.0	21.3	11.6	500.0	-32.7

Amb = Ambient

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle

Checked By: MARK E. LONGINOTTI
Mark E. Longinotti



Manufacturer : Emerson Appliance Controls
Model No. : User Interface (Part No. 00N30982XXX)
Serial No. : None Assigned
Mode : Transmit CW
Test Specification : FCC 15.249 and Industry Canada Annex 2, section A2.9 Occupied Bandwidth
Date : March 2, 2009 through March 5, 2009
Test Distance : 3 meters
Note : Peak readings

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Amb	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)
Tx @ 2405MHz										
2400.0	H	17.0		3.8	31.3	0.0	52.1	402.7	5000.0	-21.9
2400.0	V	10.1		3.8	31.3	0.0	45.2	182.0	5000.0	-28.8
Tx @ 2480MHz										
2483.5	H	28.5		3.8	31.4	0.0	63.7	1531.1	5000.0	-10.3
2483.5	V	22.0		3.8	31.4	0.0	57.2	724.4	5000.0	-16.8

Amb = Ambient

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp

Checked By: MARK E. LONGINOTTI
Mark E. Longinotti



Manufacturer : Emerson Appliance Controls
Model No. : User Interface (Part No. 00N30982XXX)
Serial No. : None Assigned
Mode : Transmit with modulation
Test Specification : FCC 15.249 and Industry Canada Annex 2, section A2.9 Occupied Bandwidth
Date : March 2, 2009 through March 5, 2009
Test Distance : 3 meters
Note : Peak readings

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Amb	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)
Tx @ 2405MHz										
2400.0	H	17.0		3.8	31.3	0.0	52.1	402.7	5000.0	-21.9
2400.0	V	10.1		3.8	31.3	0.0	45.2	182.0	5000.0	-28.8
Tx @ 2480MHz										
2483.5	H	32.3		3.8	31.4	0.0	67.5	2371.4	5000.0	-6.5
2483.5	V	29.6		3.8	31.4	0.0	64.8	1737.8	5000.0	-9.2

Amb = Ambient

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp

Checked By: MARK E. LONGINOTTI
Mark E. Longinotti



Manufacturer : Emerson Appliance Controls
Model No. : User Interface (Part No. 00N30982XXX)
Serial No. : None Assigned
Mode : Transmit with modulation
Test Specification : FCC 15.249 and Industry Canada Annex 2, section A2.9 Occupied Bandwidth
Date : March 2, 2009 through March 5, 2009
Test Distance : 3 meters
Note : Average readings

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Amb	CBL FAC (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3m	Total uV/m at 3m	Limit uV/m at 3m	Margin (dB)
Tx @ 2405MHz											
2400.0	H	17.0		3.8	31.3	0.0	-29.0	23.1	14.2	500.0	-30.9
2400.0	V	10.1		3.8	31.3	0.0	-29.0	16.2	6.5	500.0	-37.8
Tx @ 2480MHz											
2483.5	H	32.3		3.8	31.4	0.0	-29.0	38.5	84.1	500.0	-15.5
2483.5	V	29.6		3.8	31.4	0.0	-29.0	35.8	61.6	500.0	-18.2

Amb = Ambient

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle

Checked By: MARK E. LONGINOTTI
Mark E. Longinotti