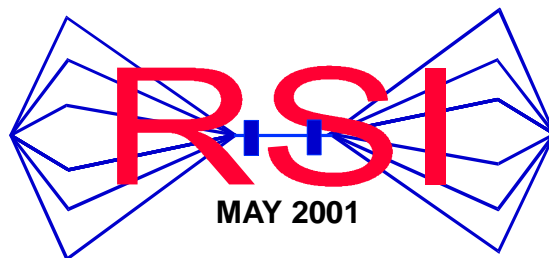


RUBICOM SYSTEMS, INC.



FCC TEST REPORT
INTENTIONAL RADIATOR
FOR THE
INTERSIL CORP.
MODEL ISL 37400M
2.4GHZ WIRELESS TRANSMITTER



Rubicom Systems, Inc.
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THIS REPORT SHALL NOT BE REPRODUCED
EXCEPT IN FULL WITHOUT THE WRITTEN
APPROVAL OF THE TESTING LABORATORY

FCC TEST REPORT
(INTENTIONAL RADIATOR)
FOR THE
INTERSIL CORP.
MODEL ISL 37400M
2.4GHz WIRELESS TRANSMITTER
S/N: 0022

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Received: April 24, 2001

Completed: May 2, 2001

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CERTIFICATION

Rubicom Systems, Inc. certifies the information obtained in this report was performed consistent with the requirements of ANSI C63.4-1992. The Intersil Corp. Model ISL 37400M, 2.4GHz Wireless Transmitter complies with the requirements of CFR 47 Part 15 for Intentional Radiators as required in Paragraph 15.247(a)(2)(b)(1)(c) and (d).

This data was obtained while testing an ISL 37400M Wireless Transmitter, s/n: 0022, furnished by Intersil Corp. Any modifications to the unit as tested may invalidate the data and void this certification.

ABSTRACT

This report presents test results of the emanations found emitting from the Intersil Corp. Model ISL 37400M, 2.4GHz Wireless Transmitter and the comparison of these emissions to the requirements of FCC Title 47, Part 15, Subpart C for Intentional Radiators as required for direct sequence type spread spectrum systems operating in the 2.4 to 2.4835GHz range.

The testing was performed on a 3-meter open field test site at Rubicom Systems, Inc. (RSI). The testing was performed for Intersil Corp. under purchase order 0261046. The results of this test effort demonstrate compliance of the Intersil Corp. Model ISL 37400M, 2.4GHz Wireless Transmitter to FCC Title 47, Part 15, Subpart C for Intentional Radiators (Paragraph 15.247(2)). The unit under test was serial number 0022 for radiated and conducted measurements.

1.0 INTRODUCTION

1.1 Purpose

The purpose of this report is to show compliance of the Intersil Corp. ISL 37400M, 2.4GHz Wireless Transmitter to the requirements of Part 15 of the FCC Rules and Regulations (47CFR, Part 15, Subpart C) for Intentional Radiators. The applicable paragraphs covered by this report are 15.247(2)(b)(c) and (d).

1.2 Requirements

The test requirements for an intentional radiator are as follows:

RADIATED (15.205/15.209)

| Frequency (MHz) | Field Strength ($\mu\text{V}/\text{m}$) | Measurement Distance (m) |
|-----------------|---|--------------------------|
| 0.009-0.490MHz | 2400/F (KHz) | 300 |
| 0.490-1.705MHz | 240000/F (KHz) | 30 |
| 1.705-30.0MHz | 30 | 30 |
| 30-88MHz | 100 | 3 |
| 88-216MHz | 150 | 3 |
| 216-960MHz | 200 | 3 |
| Above 960MHz | 500 Average | 3 |

CONDUCTED (15.207)

| Frequency (MHz) | μ Volts | dB μV |
|-----------------|-------------|------------------|
| .450-30MHz | 250 | 48 |

DIRECT SEQUENCE SPREAD SPECTRUM SYSTEM

15.247(2) Bandwidth

The minimum 6dB bandwidth shall be greater than 500KHz.

15.247(2)(b) Maximum Peak Power

The Maximum peak output power of the transmitter shall not exceed 1 watt.

15.247(2)(c) Out of Band Emissions, Radiated and Conducted

Power produced by Modulation Products of the Spreading Sequence, Information Sequence and the Carrier Frequency.

Levels in any 100KHz outside of the frequency band shall be 20dB below that of any 100KHz band within the band that contains the highest level of desired power or the requirements of 15.209, whichever results in lesser attenuation. All other emissions shall not exceed the limits of Section 15.209(a). Section 15.205 requirements are applicable.

15.247(d) Power Density

Transmitted power density averaged over any one (1) second interval shall not be greater than 8dBm in any 3KHz bandwidth.

1.3 Unit Under Test Description

The PRISM 2.5 solution includes integrated circuits (ICs), software, firmware and a companion voltage-controlled oscillator (VCO) to give systems manufacturers a highly integrated, full-featured solution for designing 802.11b-compliant wireless networking capability into small, handheld computing devices such as laptop PCs, Personal Digital Assistants and next generation "Web Pad" Internet appliance devices. PRISM 2.5-based products will provide users with wireless access to networks and the Internet for fast and efficient transmission of data, video and Voice over Internet Protocol (VoIP) services.

PRISM 2.5 consists of four main ICs. The ISL3984 Power Amplifier and Detector, the ISL3685 RF/IF Converter, the HFA3783 I/Q Modulator/Demodulator and Synthesizer, and the world's first single-chip integrated Baseband Processor/Medium Access Controller (BBP/MAC), the ISL3873.

The ISL3984 is a 2.4GHz monolithic Power Amplifier and Detector designed to maximize battery life while yielding all the power necessary for high performance, 802.11b-compliant, 11 Mbps wireless networking systems while operating in a high-density enterprise environment. The use of advanced MLF packaging and sophisticated SiGe technology has made it a smaller and more power efficient Power Amplifier and Detector.

PRISM 2.5 utilizes the existing I/Q modem from the PRISM II chip set, the HFA3783, which features all the necessary blocks for quadrature modulations and demodulation of "I" and "Q" baseband signals. With the HFA3783, the receive and transmit IF paths share a common differential matching network so that only a single IF filter is required for half duplex transceivers.

The ISL3685 is a small, highly integrated SiGe half duplex RF/IF Converter and Synthesizer. The receiver chain features a gain selectable, low noise amplifier (LNA) followed by a down-converter mixer. The transmit chain's configuration includes an up-converter mixer and a high performance pre-amplifier. The ISL3685 is housed in a MLFP package that saves board space and reduces costs.

The ISL3873 is the world's first single-chip BBP/MAC supporting wireless Ethernet speeds for use in IEEE 802.11b standard-based systems. The integration of the BBP and MAC conserves significant board real estate, eliminating large numbers of I/O pins and reducing board complexity, size and manufacturing costs. Providing improved multipath performance, the ISL3873 combines a PRISM Baseband Processor with a CHOICE-based MAC. The ISL3873 features a PCMCIA and USB interface for customers deploying easy-to-use, plug-and-play solutions.

1.4 Summary of Results

Paragraph 6.0 of this document presents the detailed results of each required test for the transmitter.

No modifications were required of the unit under test for this test effort.

The data shows compliance to the requirements stated in Paragraph 1.2 of this document.

2.0 APPLICABLE DOCUMENTS

The following documents form a part of this report to the extent expressed herein:

FCC Code of Federal Regulations Title 47, Part 15

FCC Procedure for Measuring RF Emissions from Computing Devices
FCC/OET MP-4, July 1987

ANSI C63.4-1992

FCC Characteristics of Open Field Test Sites Bulletin OET 55, October
1989

3.0 TEST SITE DESCRIPTION

This testing was performed at Rubicom Systems, Inc. 3-meter test site. The description of the measurement facility was found to be compliant with the requirements of Section 2.948 of the FCC Rules. A copy of the compliance letter is attached to this report as Appendix A.

3.1 Environmental Conditions

This test effort was performed from April 24, 2001 through May 2, 2001.

Typical conditions for the test site during this testing was:

Temperature: 83°

Barometer: 29.50 inches

Humidity: 60 - 80%

4.0 TEST INSTRUMENTATION

The following test equipment was used to perform this testing.

| Qty. | Description | Manufacturer | Model No. | Cal. Due Date | Cal. Cycle |
|------|--------------------------|-----------------|-------------|---------------|------------|
| 1 | Spectrum Analyzer | Advantest | R3271A | 12/19/01 | 1 Yr. |
| 2 | Bi-Log Antenna | Chase | CLB6111B | 07/17/01 | 1 Yr. |
| 1 | Plotter | Hewlett Packard | 7440A | NCR | 1 Yr. |
| 1 | Peak Power Meter | Wavetek | 1018B | 06/01/01 | 1 Yr. |
| 1 | Ridge Guide Horn Antenna | A.H. Systems | SAS-200/571 | 10/25/01 | 1 Yr. |
| 1 | Pre-Amplifier | Hewlett Packard | 8449B | 05/25/01 | 1 Yr. |
| 1 | Bandreject Filter | Lorch Microwave | 6BR6-2440 | 03/21/03 | 2 Yr. |

5.0 TEST SAMPLE SETUP AND CONFIGURATIONS

The ISL 37400M Transmitter was placed on a nonconductive table inside a shielded enclosure. The transmitter was installed in an IBM ThinkPad laptop computer. During conducted measurements the output was coupled directly to the spectrum analyzer.

During radiated emissions the transmitter was placed on the turntable. The transmitter was put into operation with a 1MBPS modulation during radiated measurements. Figure 5.0-1 is the test configuration of the equipment.

Photo 1 presents the unit placed on the turntable during radiated testing.

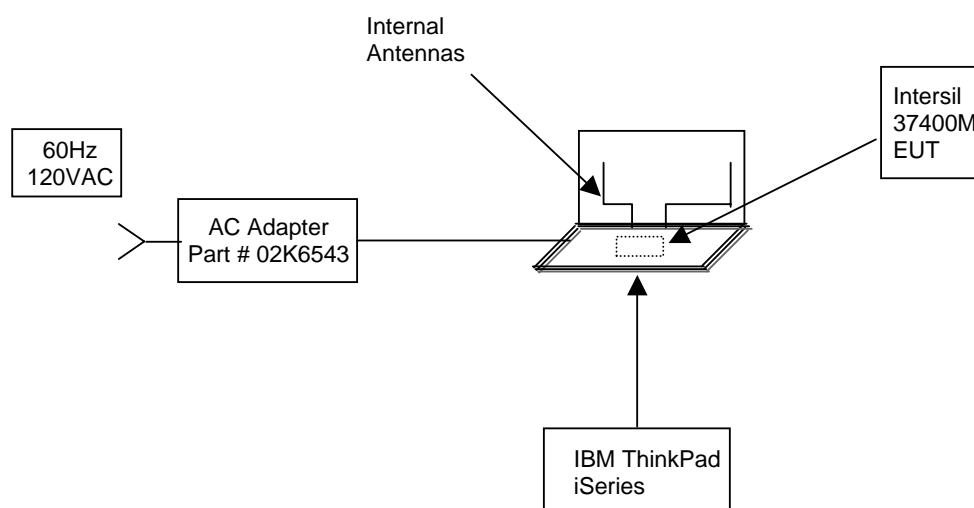


FIGURE 5.0-1



PHOTO 1

6.0 PROCEDURES AND RESULTS

6.1 General

The data presented in this report is provided using the Advantest spectrum analyzer. The analyzer allows the antenna factors/cable loss, etc., to be listed in tables on a memory card. The setups for recall are preprogrammed. This method allows the tester to record data instantaneously against the specification requirement. The specification limits are presented with the extrapolation for distance (20dB/decade) where necessary. When external attenuation is required for analyzer protection, the reference level offset is used.

Signal identification is partially accomplished by turning the system power “on” and “off” while observing the spectrum. All signals found to be emitting from the EUT are maximized in azimuth and elevation. The maximized signal levels are recorded in the tabulated list of signals.

The displayed levels are calculated in the analyzer as followed: $MTR \text{ Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Gain (where appropriate)} = \text{Signal Level}$.

NOTE: The correction factors and conversion factors are combined in the memory card.

6.2 Power Line Conducted 15.207

The unit was installed in an IBM laptop computer. Power line conducted was then performed on the laptop. Both the phase and neutral leads were tested using a Solar Model 8012-50-24-BNC PLISN (50 μ H/50ohm). Data Sheets 6.2-1 and 6.2-2 present the 450KHz-30MHz quasi-peak sweeps. Photo 2 presents the conducted emissions setup.

6.3 Radiated Emissions 15.209/15.205

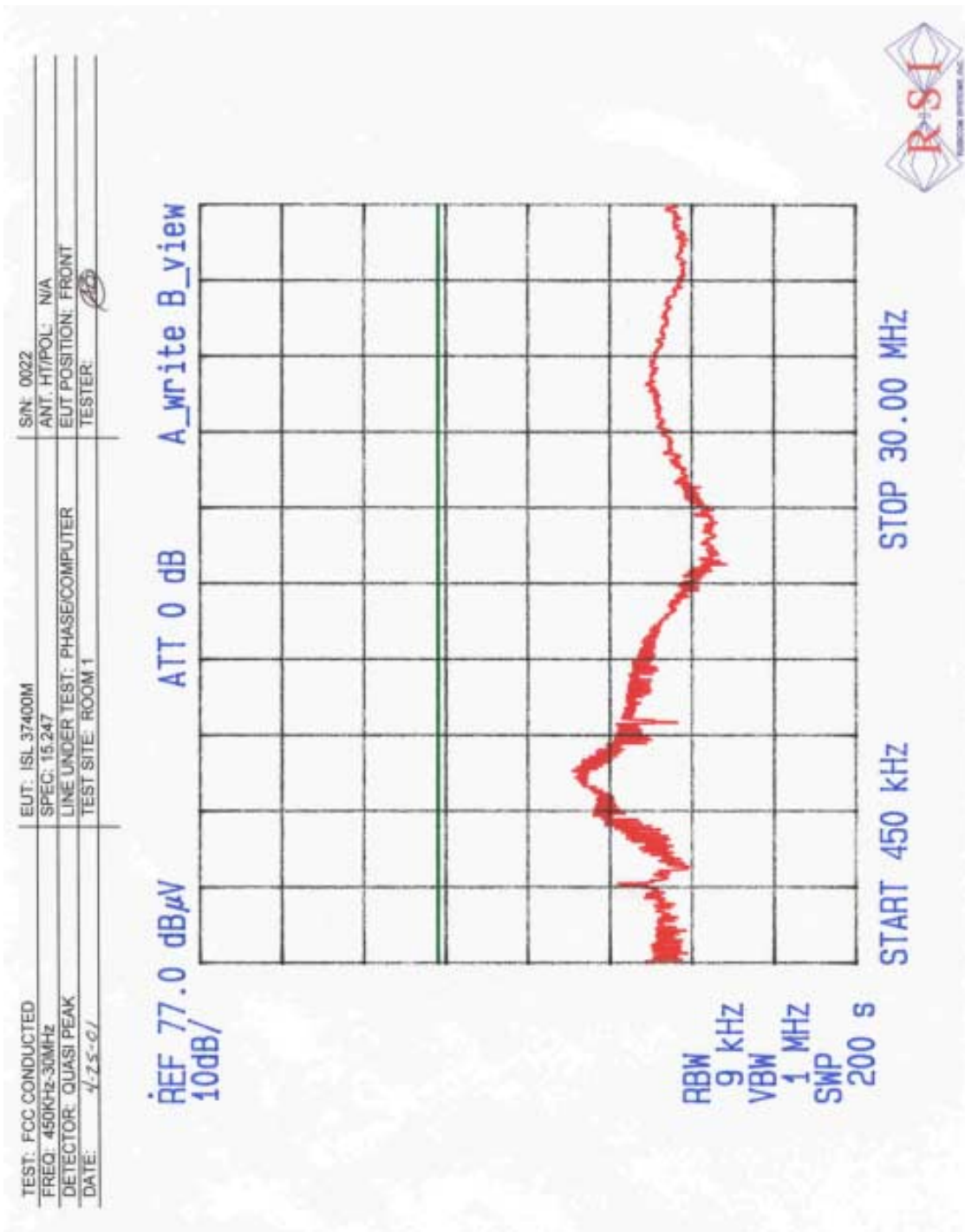
6.3.1 Radiated Emissions (Pre-Scans)

Radiated emissions pre-testing was performed on the system inside the shielded enclosure. Peak pre-scans were performed over the frequency range of

30MHz-25GHz. These scans are for frequency content in the high ambient range. This test is performed at 1 meter. No significant signals were detected during this evaluation. Data Sheets 6.3.1-1 through 6.3.1-10 present the results of this testing.

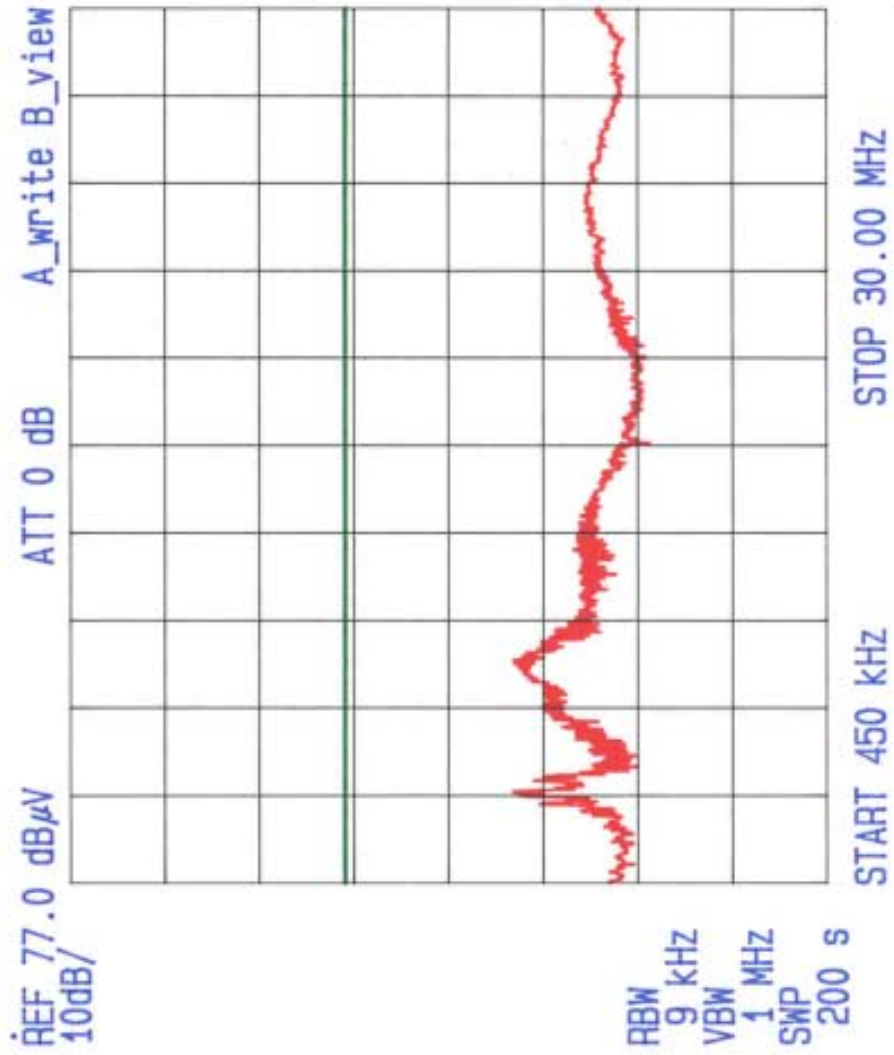


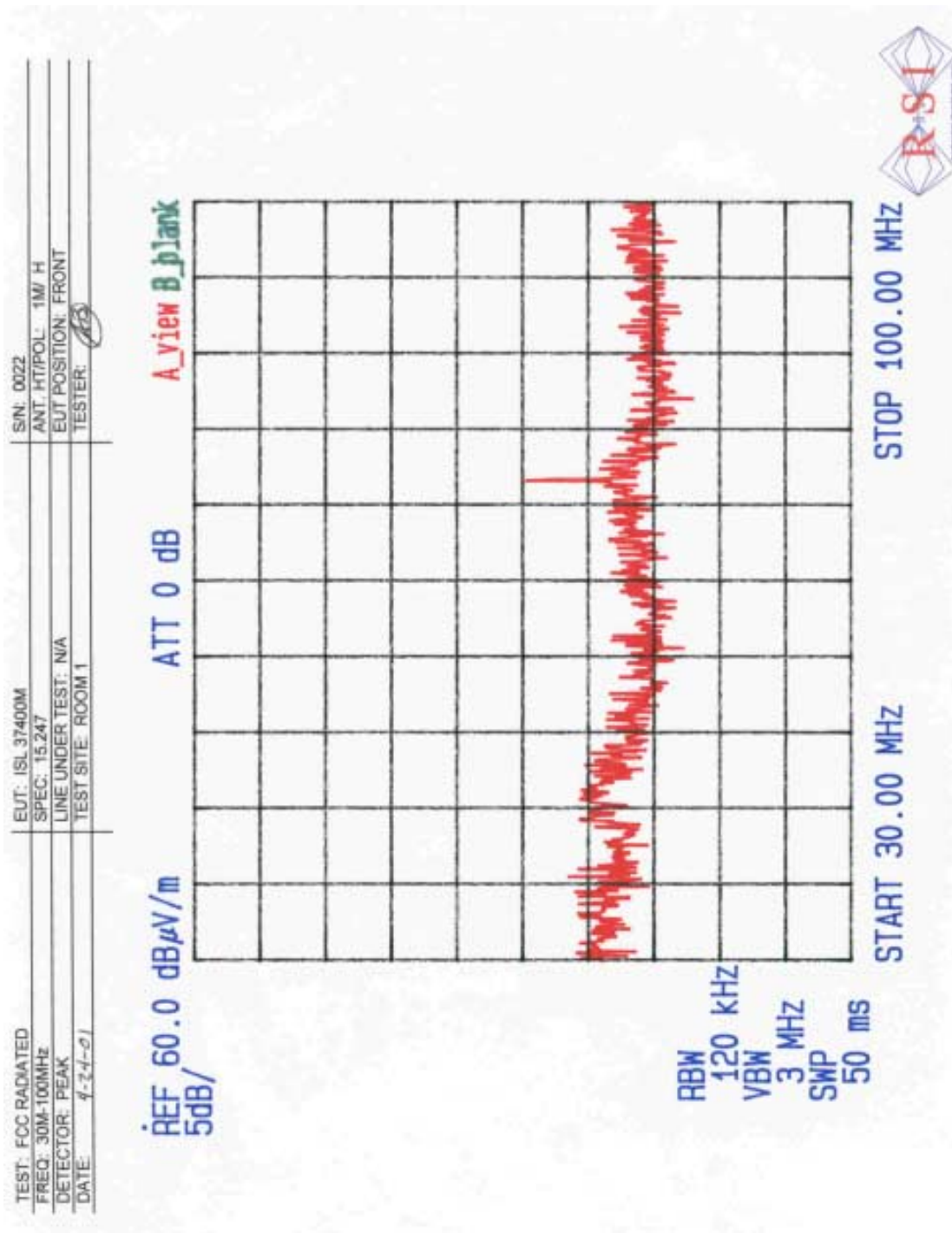
PHOTO 2



DATA SHEET 6.2.1

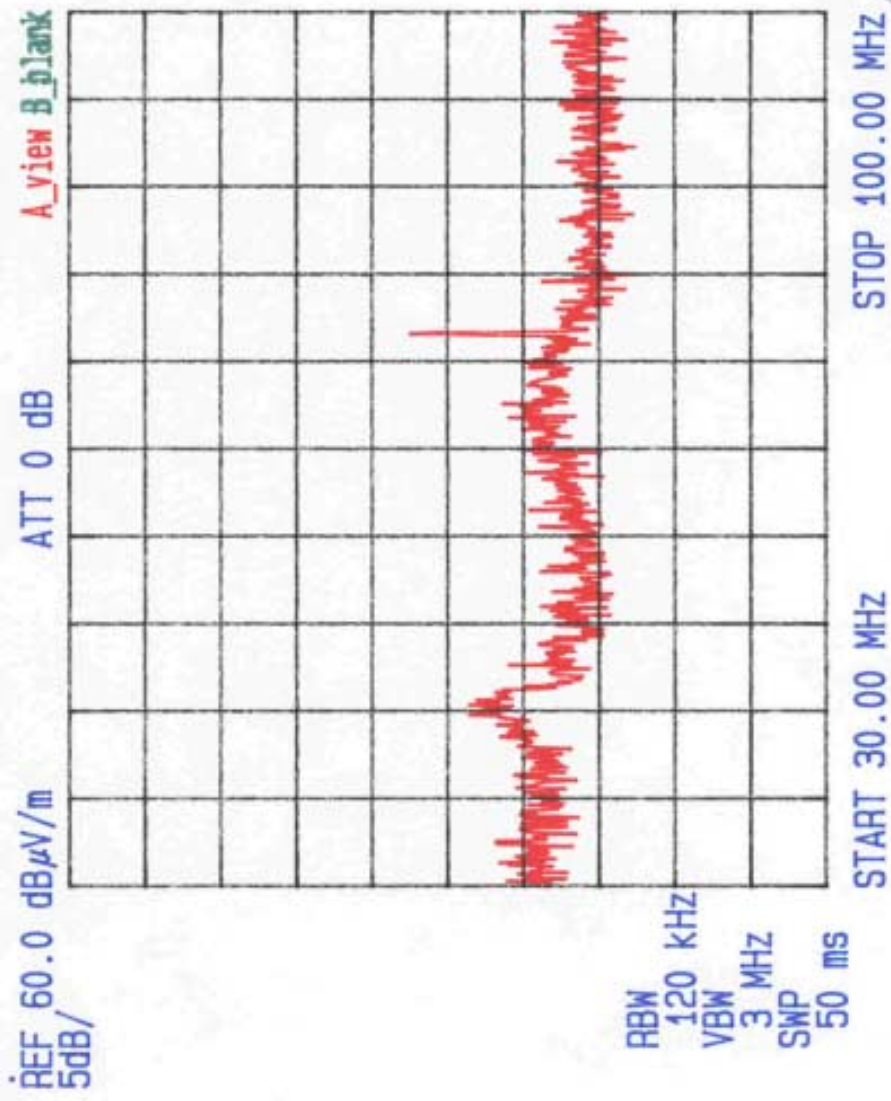
| | | |
|----------------------|-----------------------------------|----------------------------|
| TEST: FCC CONDUCTED | EUT: ISL 37400M | S/N: 0022 |
| FREQ: 450kHz-30MHz | SPEC: 15.247 | ANT. HT/POL: N/A |
| DETECTOR: QUASI PEAK | LINE UNDER TEST: NEUTRAL/COMPUTER | EUT POSITION: FRONT |
| DATE: 4-25-01 | TEST SITE: ROOM | TESTER: <i>[Signature]</i> |



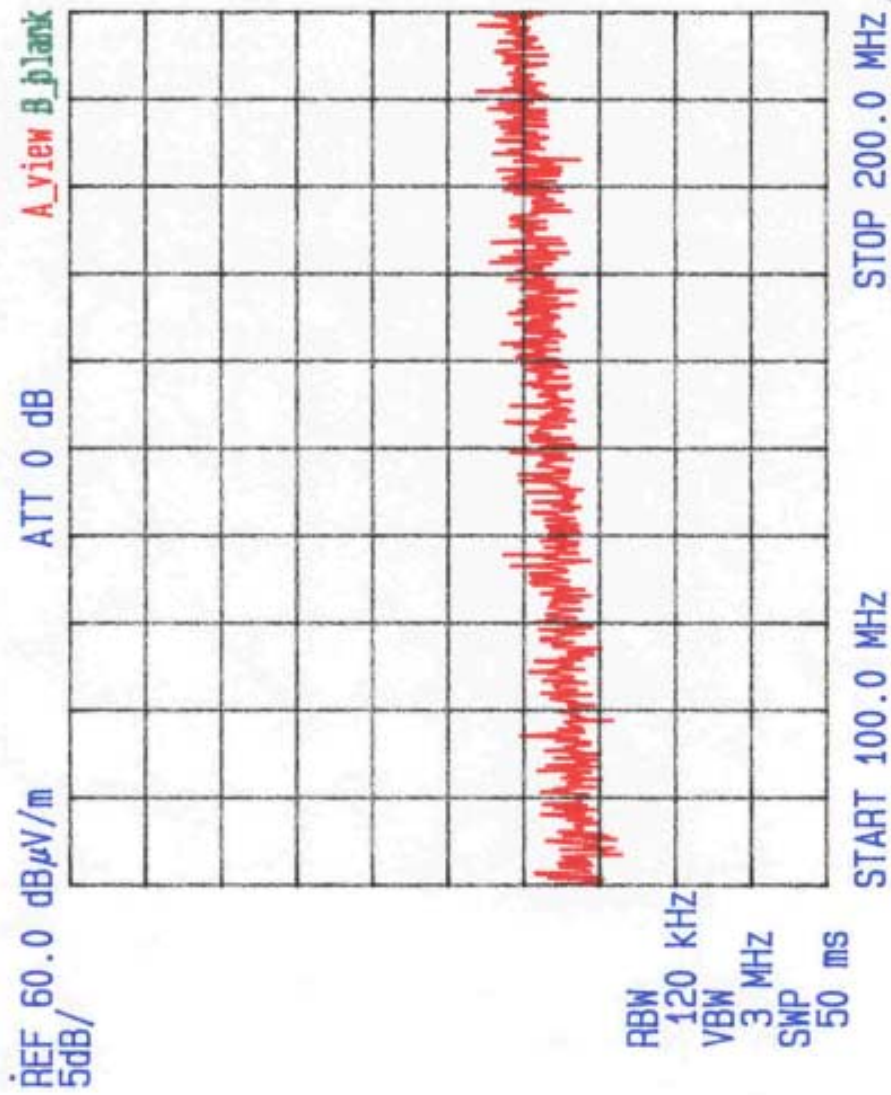


DATA SHEET 6.3.1-1

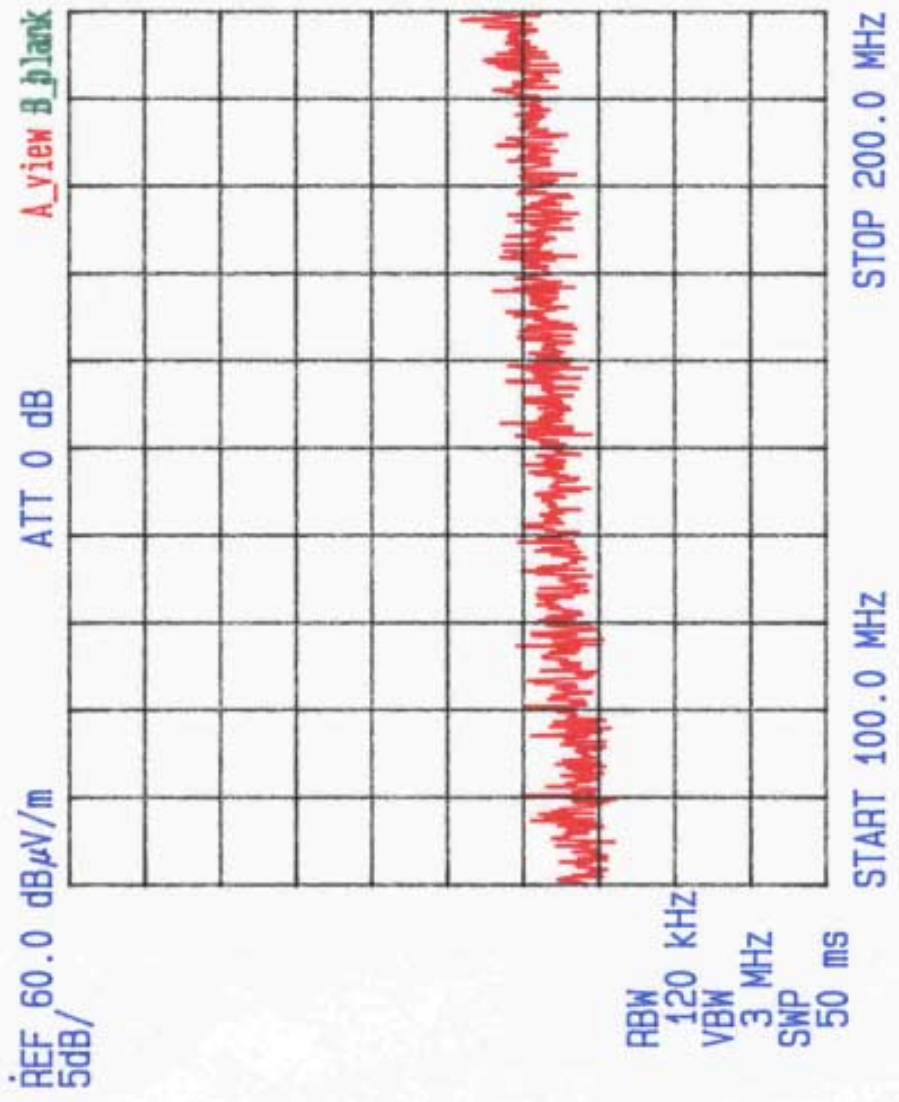
| | | |
|--------------------|----------------------|----------------------------|
| TEST: FCC RADIATED | EUT: ISL 37400M | S/N: 0022 |
| FREQ: 30M-100MHz | SPEC: 15.247 | ANT. HT/POL: 1M V |
| DETECTOR: PEAK | LINE UNDER TEST: N/A | EUT POSITION: FRONT |
| DATE: 4-24-01 | TEST SITE: ROOM 1 | TESTER: <i>[Signature]</i> |



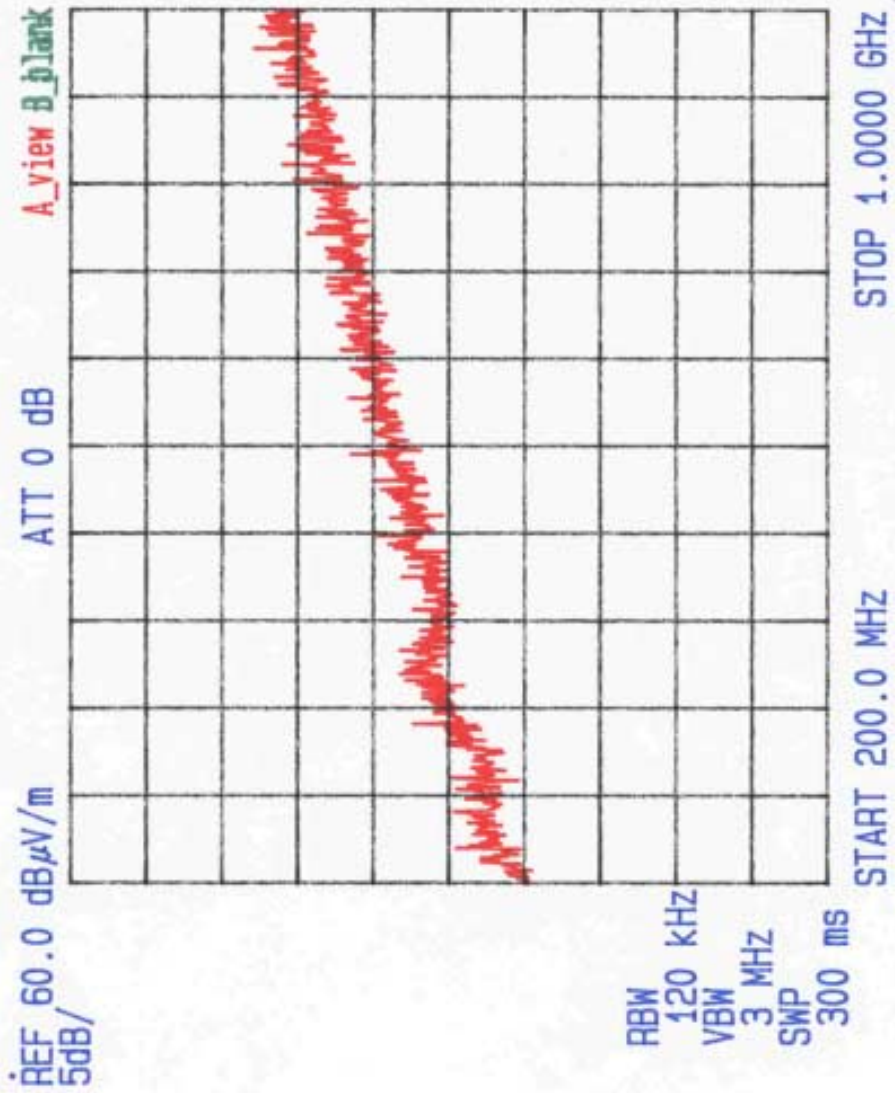
| | | |
|--------------------|----------------------|---------------------|
| TEST: FCC RADIATED | EUT: ISL 37400M | S/N: 0022 |
| FREQ: 100M-200MHz | SPEC: 15.247 | ANT. HT/POL: 1M/ H |
| DETECTOR: PEAK | LINE UNDER TEST: N/A | EUT POSITION: FRONT |
| DATE: 7-24-01 | TEST SITE: ROOM 1 | TESTER: <i>AB</i> |



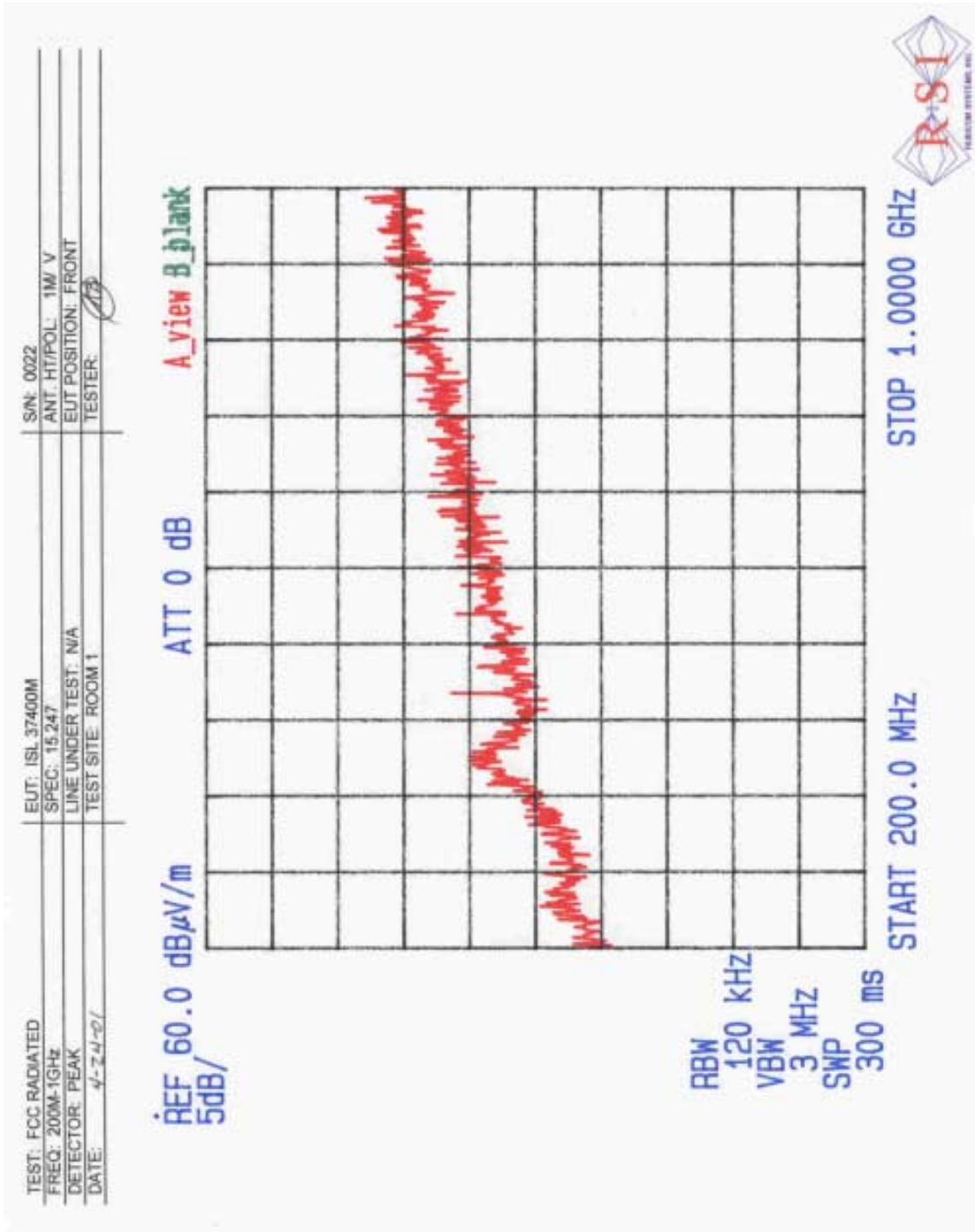
| | | |
|--------------------|----------------------|---------------------|
| TEST: FCC RADIATED | EUT: ISL 37400M | S/N: 0022 |
| FREQ: 100M-200MHz | SPEC: 15.247 | ANT. HI/POL: 1M V |
| DETECTOR: PEAK | LINE UNDER TEST: N/A | EUT POSITION: FRONT |
| DATE: 4-27-01 | TEST SITE: ROOM 1 | TESTER: <i>AD</i> |



| | | |
|--------------------|----------------------|---|
| TEST: FCC RADIATED | EUT: ISL 37400M | S/N: 0022 |
| FREQ: 200M-TGHZ | SPEC: 15.247 | ANT_HT/POL: 1M/ H |
| DETECTOR: PEAK | LINE UNDER TEST: N/A | EUT POSITION: FRONT |
| DATE: 7-24-01 | TEST SITE: ROOM 1 | TESTER:  |

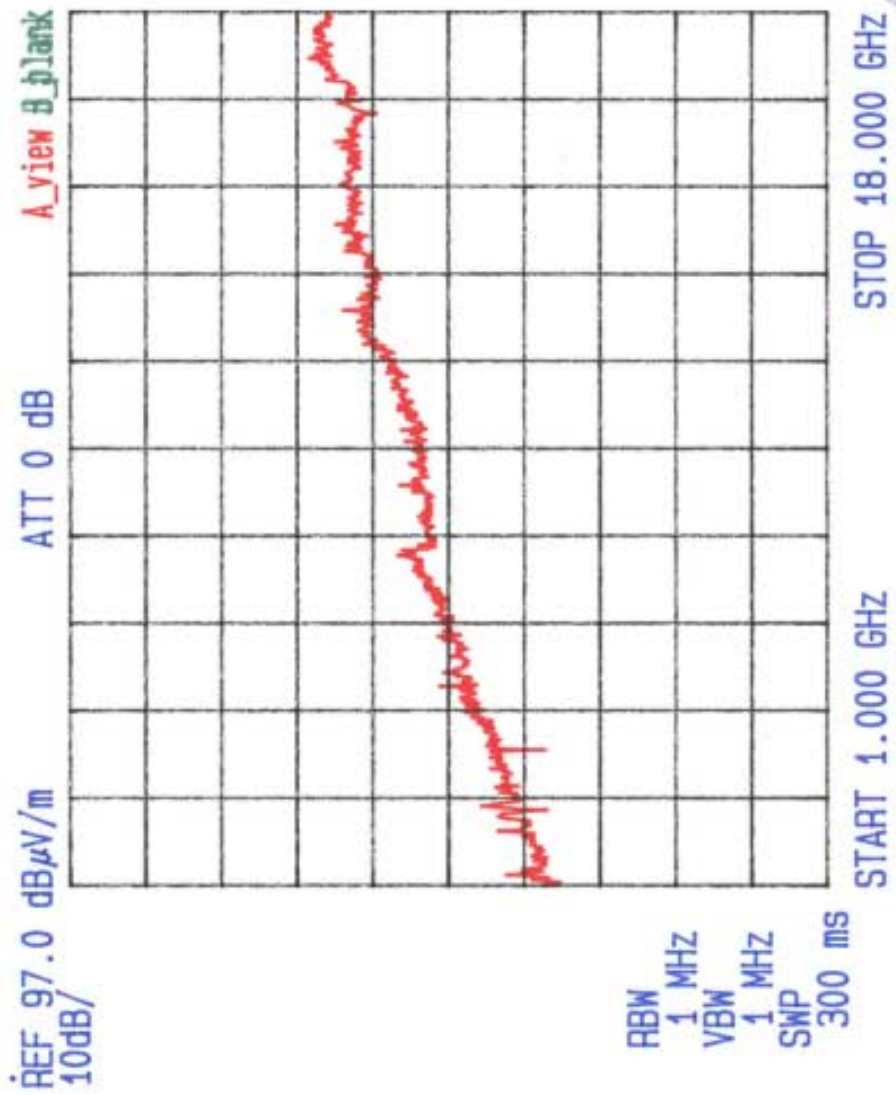


DATA SHEET 6.3.1-5

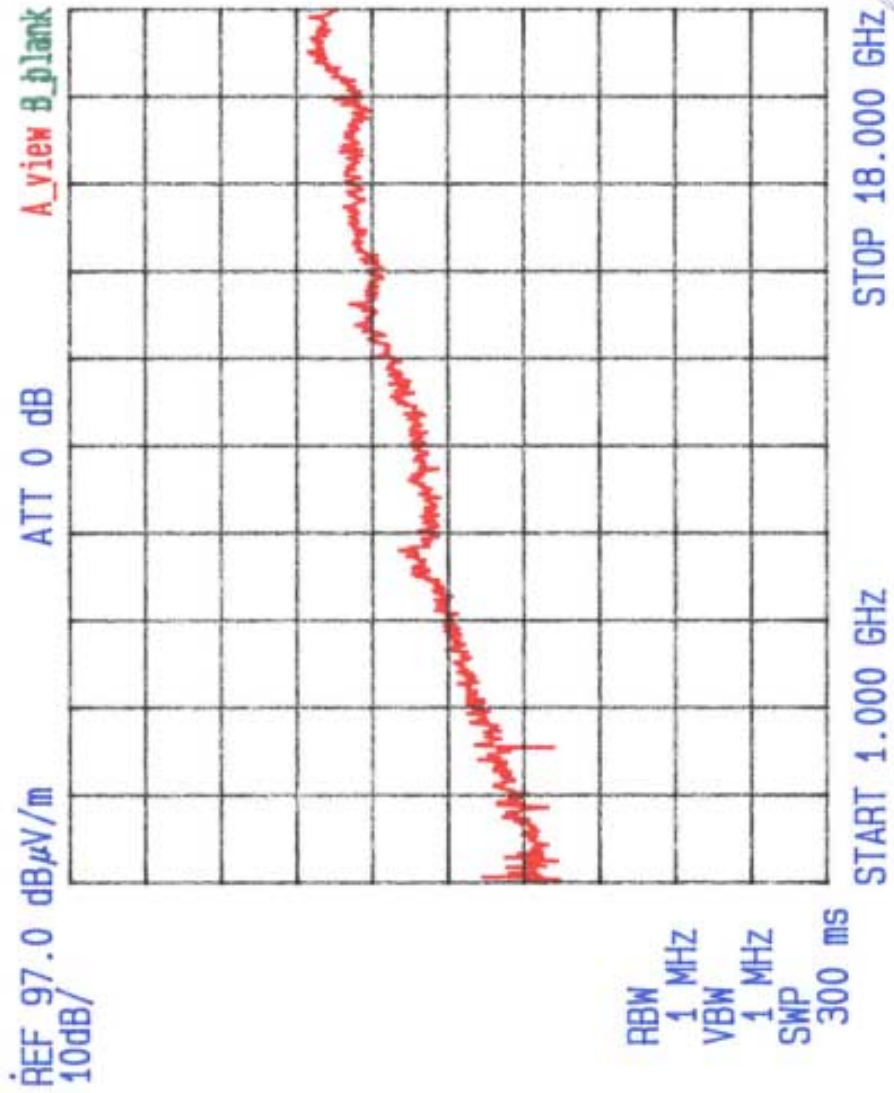


DATA SHEET 6.3.1-6

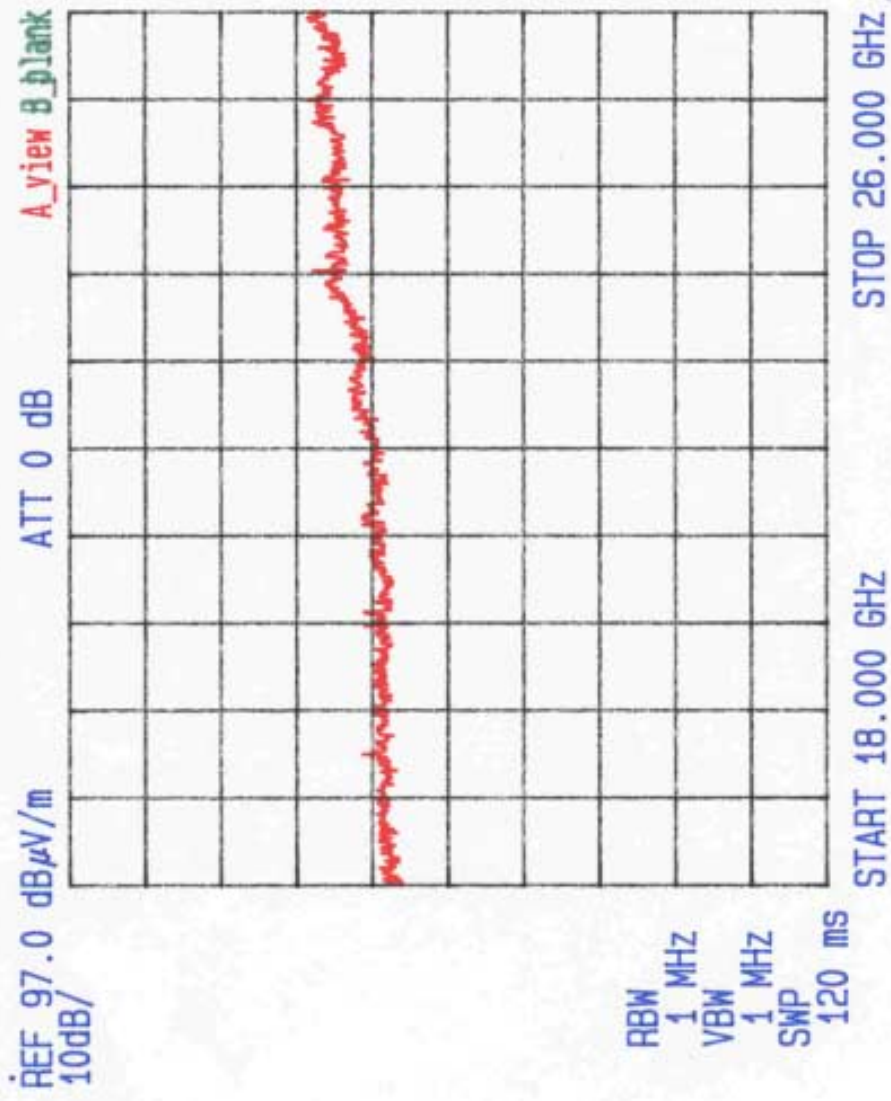
| | | |
|--------------------|----------------------|----------------------------|
| TEST: FCC RADIATED | EUT: ISL 37400M | S/N: 0022 |
| FREQ: 1G-18GHZ | SPEC: 15.247 | ANT. HT/POL: H |
| DETECTOR: PEAK | LINE UNDER TEST: N/A | EUT POSITION: |
| DATE: 4-24-01 | TEST SITE: ROOM 1 | TESTER: <i>[Signature]</i> |



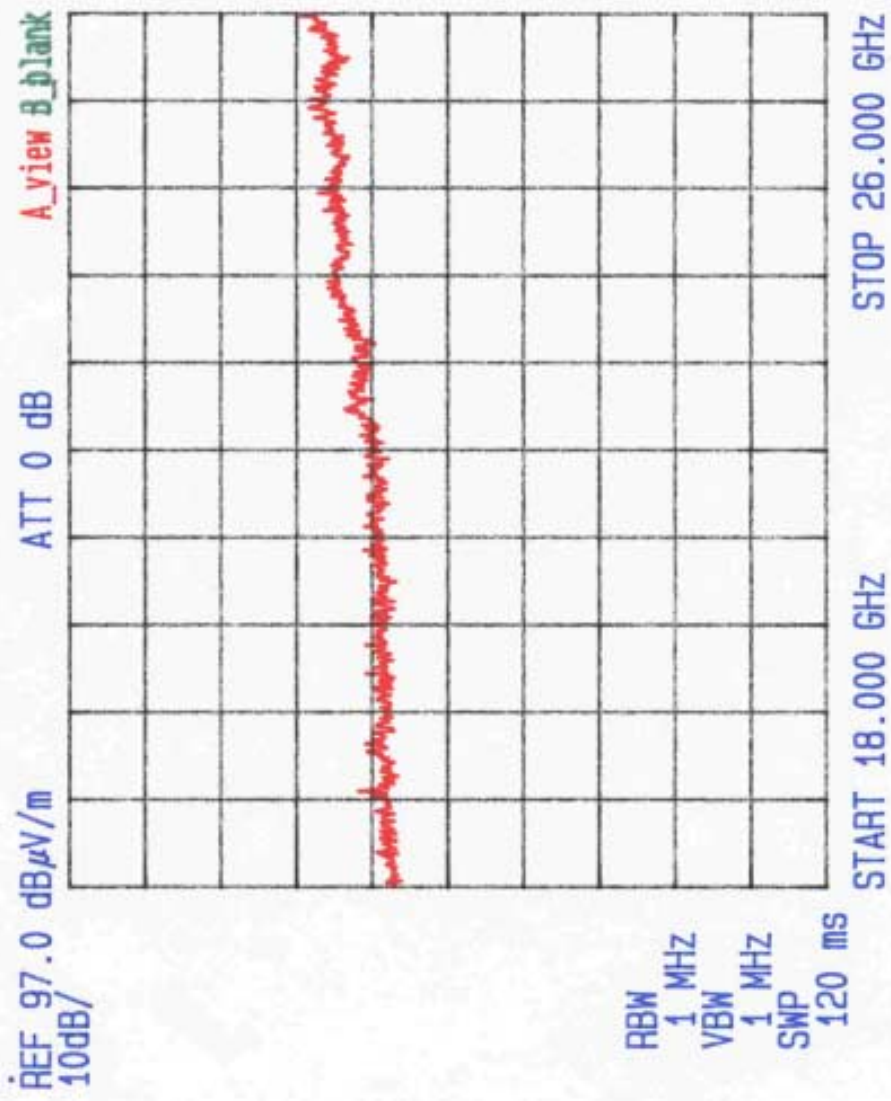
| | | |
|--------------------|----------------------|-------------------|
| TEST: FCC RADIATED | EUT: ISL 37400M | S/N: 0022 |
| FREQ: 1G-18GHz | SPEC: 15.247 | ANT. HT/POL: V |
| DETECTOR: PEAK | LINE UNDER TEST: N/A | EUT POSITION: |
| DATE: 4-24-01 | TEST SITE: ROOM 1 | TESTER: <i>AB</i> |



| | | |
|--------------------|----------------------|----------------------------|
| TEST: FCC RADIATED | EUT: ISL 37400M | S/N: 0022 |
| FREQ: 18GHz-25GHz | SPEC: 15.247 | ANT. HI/POL: H |
| DETECTOR: PEAK | LINE UNDER TEST: N/A | EUT POSITION: |
| DATE: 4-24-01 | TEST SITE: ROOM 1 | TESTER: <i>[Signature]</i> |



| | | |
|--------------------|----------------------|-------------------|
| TEST: FCC RADIATED | EUT: ISL 37400M | S/N: 0022 |
| FREQ: 18GHZ-25GHZ | SPEC: 15.247 | ANT. HT/POL: V |
| DETECTOR: PEAK | LINE UNDER TEST: N/A | EUT POSITION: |
| DATE: 4-24-01 | TEST SITE: ROOM 1 | TESTER: <i>AS</i> |



6.3.2 Radiated Emissions

Radiated emissions were performed on the ILS 37400M Transmitter over the frequency range of 30MHz-25GHz. The transmit frequency was 2.437GHz (or channel 6). Data plots are presented in three groups:

Data Sheets 6.3.2-1 - 6.3.2-6 30MHz-1GHz Quasi-Peak Detector
 Data Sheets 6.3.2-7 - 6.3.2-12 1GHz-25GHz Peak Plots (1MHz-RBW, 1MHz-VBW)
 Data Sheets 6.3.2-13 - 6.3.2-24 1GHz-25GHz Average Plots (1MHz-RBW, 10Hz-VBW)

A notch filter was added in front of the analyzer during these plots to prevent intermods and harmonics from being generated. The transmit signal is attenuated.

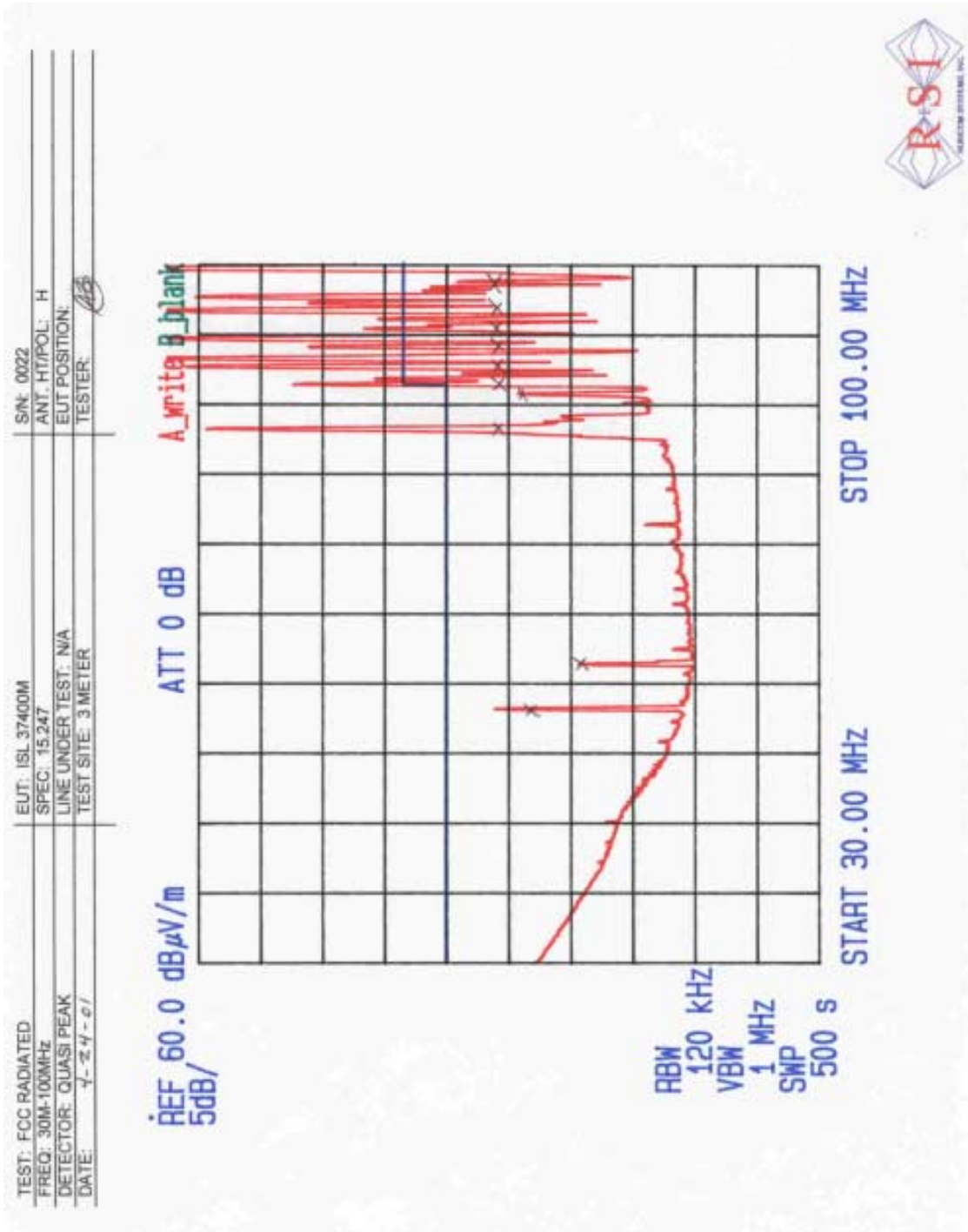
6.3.3 Peak Ambient (EUT Off/Support Equipment On)

Peak and average ambient data is used to compare the peak EUT data to the environmental ambient and determine true EUT signals. The tester uses a more detailed procedure to analyze signals by investigating frequency bands of 25MHz to 50MHz. The ambient is displayed and saved on the analyzer screen. The unit is then turned on and the true EUT signals are maximized. Ambient data plots are presented in three groups:

Data Sheets 6.3.3-1 - 6.3.3-6 30MHz-1GHz Quasi-Peak Ambient
 Data Sheets 6.3.3-7 - 6.3.3-12 1GHz-25GHz Peak Ambient Plots (1MHz-RBW, 1MHz-VBW)
 Data Sheets 6.3.3-13 - 6.3.3-24 1GHz-25GHz Average Ambient Plots (1MHz-RBW, 10Hz-VBW)

The following is a tabulated listing of the signals detected during the radiated testing. Calculation of field strength is described in Paragraph 6.1 of this document.

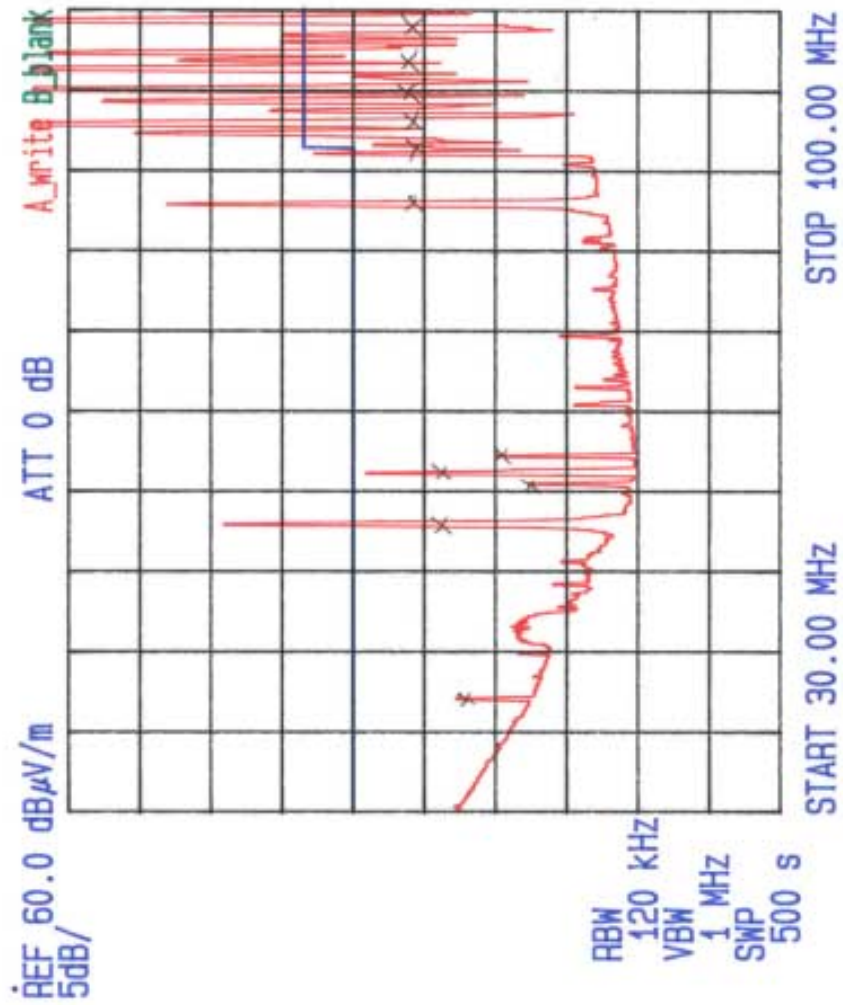
| Frequency (MHz) | Antenna Pol. | Measured (dB μ V/m) | Q.P. Limit (dB μ V/m @ 3 Meters) | Margin (dB) | Restricted Band |
|-----------------|--------------|-------------------------|--------------------------------------|-------------|-----------------|
| 2437 | H | 99 Avg. | N/A | N/A | NO |
| 2437 | V | 97 Avg. | N/A | N/A | NO |
| 2437 | H | 107 Peak | N/A | N/A | NO |
| 2437 | V | 107 Peak | N/A | N/A | NO |



DATA SHEET 6.3.2-1

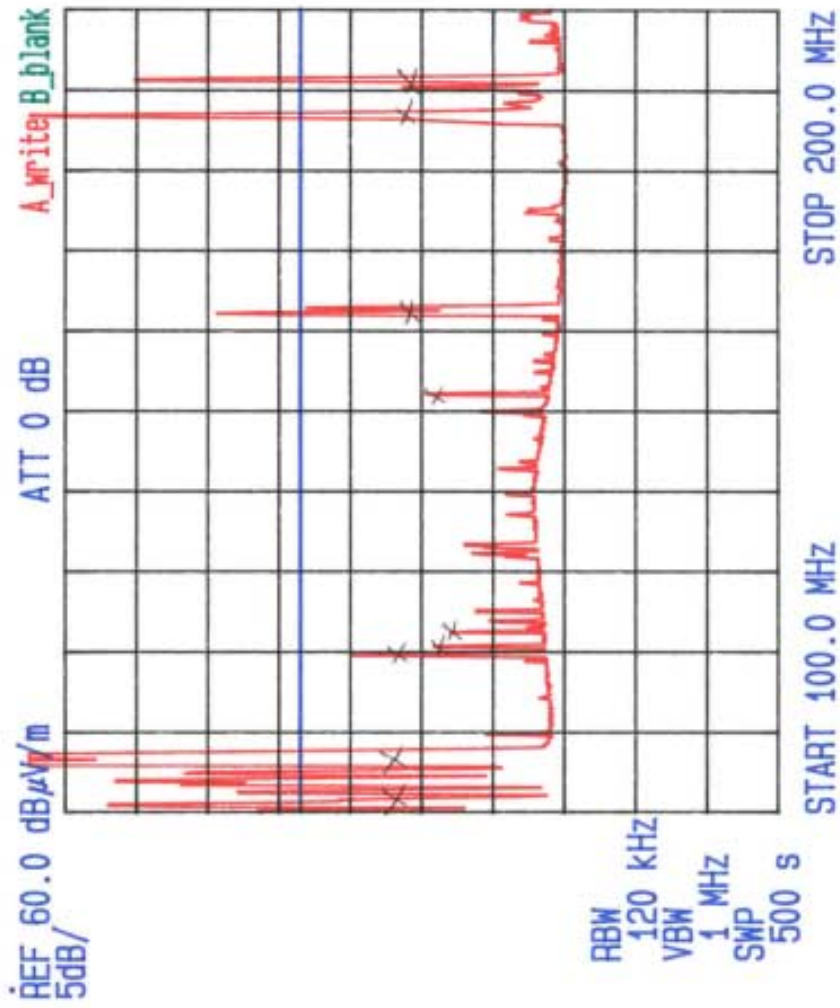


| | | |
|----------------------|----------------------|-------------------|
| TEST: FCC RADIATED | EUT: ISL 37400M | S/N: 0022 |
| FREQ: 30M-100MHz | SPEC: 15.247 | ANT. HT/POL: V |
| DETECTOR: QUASI PEAK | LINE UNDER TEST: N/A | EUT POSITION: |
| DATE: 4-25-01 | TEST SITE: 3 METER | TESTER: <i>AB</i> |



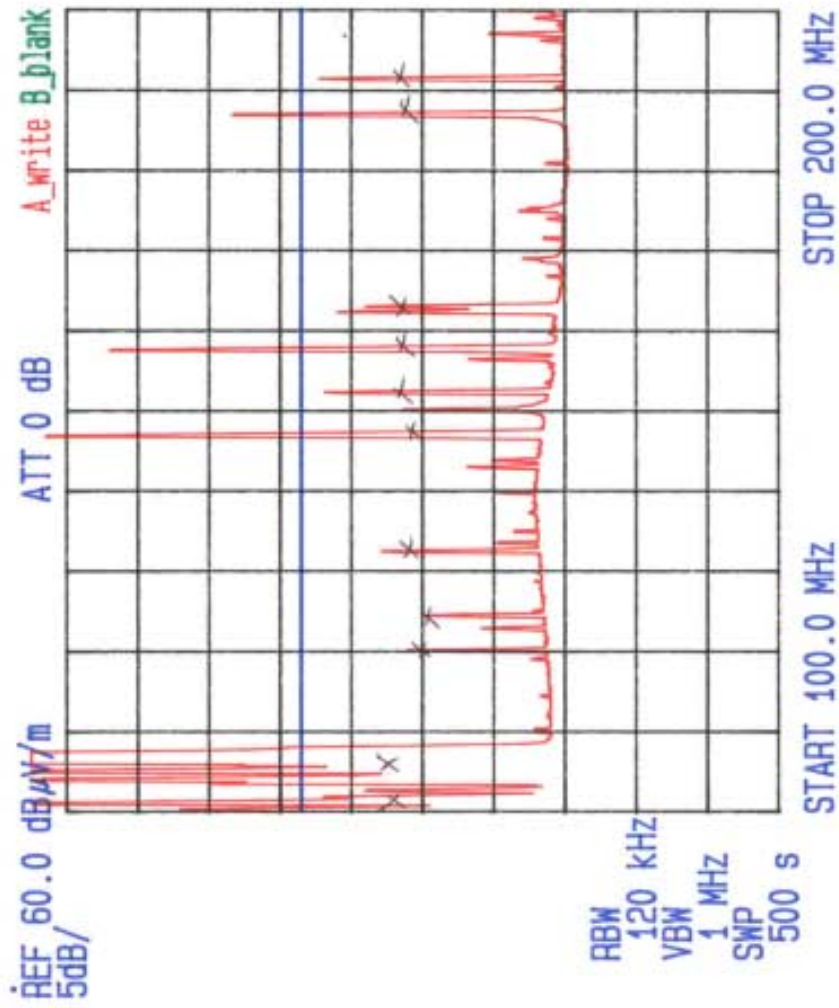
DATA SHEET 6.3.2-2

| | | |
|----------------------|----------------------|----------------------------|
| TEST: FCC RADIATED | EUT: ISL 37400M | S/N: 0022 |
| FREQ: 100M-200M | SPEC: 15.247 | ANT HT/POL: H |
| DETECTOR: QUASI PEAK | LINE UNDER TEST: N/A | EUT POSITION: |
| DATE: 4-24-01 | TEST SITE: 3 METER | TESTER: <i>[Signature]</i> |

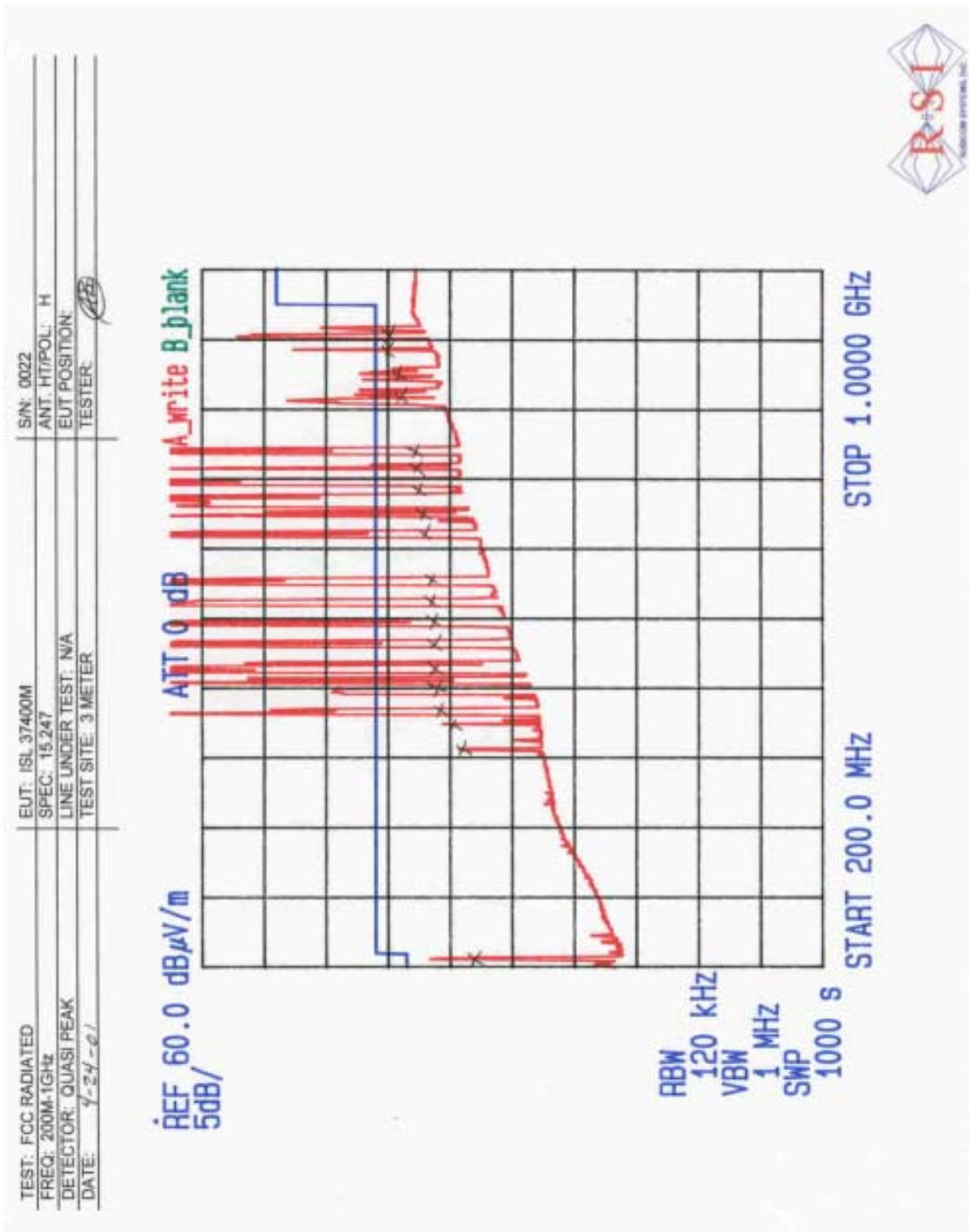




| | | |
|----------------------|----------------------|----------------------------|
| TEST: FCC RADIATED | EUT: ISL 37400M | SIN: 0022 |
| FREQ: 100M-200M | SPEC: 15.247 | ANT. HT/POL: V |
| DETECTOR: QUASI PEAK | LINE UNDER TEST: N/A | EUT POSITION: |
| DATE: 4-24-01 | TEST SITE: 3 METER | TESTER: <i>(Signature)</i> |



DATA SHEET 6.3.2-4



DATA SHEET 6.3.2-5