DLS ELECTRONIC SYSTEMS, INC.
NVLAP 100276-0

1250 Peterson Dr., Wheeling, IL 60090

Company: Stryker Instruments
Model Tested: 5100-201-000
Report Number: 10539

FCC Rules and Regulations / Intentional Radiators

Operational in the Band 13.553-13.567 MHz

Part 15, Subpart C, Section 15.225

THE FOLLOWING **"MEETS"** THE ABOVE TEST SPECIFICATION

Formal Name:	TPS Irrigation Console
Kind of Equipment:	Medical Electrical Equipment
Test Configuration:	The TPS Irrigation Console is connected to the footswitch and handpieces via cables plugged into ports. Formula Shaver with buttons is running and an SE5 with buttons and a Saber Drill is plugged in. (Tested at 120 vac, 60 Hz)
Model Number(s):	5100-050-000, 5100-001-000, 5100-250-000 & 5100-201-000
Model(s) Tested:	5100-201-000
Serial Number(s):	NA
Date of Tests:	January 29 & 30, 2004
Test Conducted For:	Stryker Instruments 4100 East Milham Kalamazoo, Michigan 49001

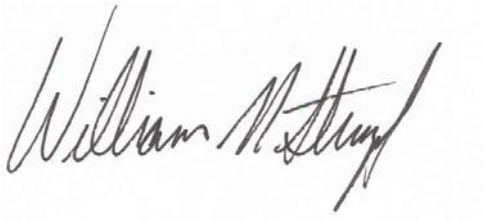
1250 Peterson Dr., Wheeling, IL 60090

SIGNATURE PAGE

Report By:

Arnom C. Rowe
Test Engineer
EMC-001375-NE

Reviewed By:



William Stumpf
OATS Manager

Approved By:

Brian Mattson
General Manager

Company Official:

Stryker Instruments

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United States Department of Commerce
National Institute of Standards and Technology

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DEPARTMENT OF COMMERCE ★ UNITED STATES OF AMERICA ★

Certificate of Accreditation

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WHEELING, IL

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ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

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NVLAP Lab Code: 100276-0

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D.L.S. ELECTRONIC SYSTEMS, INC.
1250 Peterson Drive
Wheeling, IL 60090-6454
Mr. Brian J. Mattson
Phone: 847-537-6400 Fax: 847-537-6488
E-Mail: bmattson@dlsemc.com
URL: http://www.dlsemc.com

NVLAP Code	*Designation / Description*
Emissions Test Methods:	
12/160D21	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 21 - Emission of Radio Frequency Energy
12/300220a	EN 300 220-1 V1.3.1 (2000-09): Electromagnetic compatibility and Radio spectrum Matters; Short Range Devices; Radio equipment to be used in the 25 MHz to 1000 MHz frequency range with power levels ranging up to 500 mW; Part 1: Technical characteristics and test methods
12/300386a	EN 300 386 V.1.2.1: Electromagnetic compatibility and radio spectrum matter (ERM); Telecommunication network equipment; Electromagnetic compatibility (EMC) requirements
12/C63.17	ANSI C63.17-1998: American National Standard for Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices

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NVLAP Code	*Designation / Description*
12/C6317a	ANSI C63.17-1998: American National Standard for Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices
12/CIS11	IEC/CISPR 11 + A1 (1997), EN 55011 (1998), AS/NZS 2064 (1997), and CNS 137803 (1997): Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific, and Medical Radio-Frequency Equipment
12/CIS13	IEC/CISPR 13 (2001-04), EN 55013 (2001), AS/NZS 1053 (2001), and CNS 13439 (2001): Sound and television broadcast receivers and associated equipment - Radio disturbance characteristics - Limits and methods of measurement
12/CIS14	CISPR 14-1 (March 30, 2000): Limits and methods of measurement of radio interference characteristics of household electrical appliances, portable tools and similar electrical apparatus - Part 1: Emissions
12/CIS14a	EN 55014-1 (1993) with Amendments A1 (1997) & A2 (1999)
12/CIS14d	IEC/CISPR 14-1 (2001) and A1 (2001): Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emissions
12/CIS14e	EN 55014-1 (2001) and A1 (2001): Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission

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NVLAP Code	*Designation / Description*
12/CIS14f	AS/NZS 1044 (2001) and A1 (2001): Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission
12/CIS14g	CNS 13783-1 (2001) and A1 (2001): Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission
12/CIS15	IEC/CISPR 15 (2000) + A1 (2001): Limits and methods of measurements of radio disturbance characteristics of electrical lighting and similar equipment
12/CIS15a	AS/NZS CISPR (2002): Limits and methods of measurements of radio disturbance characteristics of electrical lighting and similar equipment
12/CIS15b	CNS 13439 (2000) + A1 (2001): Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
12/CIS15c	EN 55015 (2000) + A1 (2001): Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
12/CIS22	IEC/CISPR 22 (1997) and EN 55022 (1998): Limits and methods of measurement of radio disturbance characteristics of information technology equipment
12/CIS22a	IEC/CISPR 22 (1993): Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Amendment 1:1995, and Amendment 2:1996.

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NVLAP Code	*Designation / Description*
12/CIS22b	CNS 13438 (1997): Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment
12/EM02a	IEC 61000-3-2, Edition 2.1 (2001-10), EN 61000-3-2 (2000), and AS/NZS 2279.1 (2000): Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A)
12/EM03	EN 61000-3-3 (1995), IEC 61000-3-3 (1995), and AS/NZS 2279.3 (1995): EMC - Part 3: Limits - Section 3. Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current up to 16A
12/F18	FCC OST/MP-5 (1986): FCC Methods of Measurement of Radio Noise Emissions for ISM Equipment (cited in FCC Method 47 CFR Part 18 - Industrial, Scientific, and Medical Equipment)
12/FCC15b	ANSI C63.4 (2001) with FCC Method - 47 CFR Part 15, Subpart B: Unintentional Radiators
12/FCC15c	ANSI C63.4 (2001) with FCC Method - 47 CFR Part 15, Subpart C: Intentional Radiators
12/FCC15d	ANSI C63.4 (2001) with FCC Method - 47 CFR Part 15, Subpart D: Unlicensed Personal Communications Service Devices

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NVLAP Code	*Designation / Description*
12/FCC15e	ANSI C63.4 (2001) with FCC Method - CFR Part 15, Subpart E: Unlicensed National Information Infrastructure Service Devices
12/T51	AS/NZS CISPR 22 (2002) and AS/NZS 3548 (1997): Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment
12/VCCIa	Agreement of Voluntary Control Council for Interference by Information Technology Equipment - Technical Requirements: V-3/02.04

Immunity Test Methods:

12/1089a	GR-1089-CORE, Issue 3, October 2002: Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment (sections 2, 3.3, and 3.5)
12/160D16	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 16 - Power Input
12/160D17	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 17 - Voltage Spike
12/160D18	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 18 - Audio Frequency Conducted Susceptibility - Power Inputs

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NVLAP Code	*Designation / Description*
12/160D19	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 19 - Induced Signal Susceptibility
12/160D20	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 20 - Radio Frequency Susceptibility (Radiated and Conducted)
12/160D22	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 22 - Lightning Induced Transient Susceptibility
12/160D25	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 25 - Electrostatic Dischare (ESD)
12/I01	IEC 61000-4-2 (1995) and Amendment 1 (1998) and EN 61000-4-2: Electrostatic Discharge Immunity Test
12/I02	IEC 61000-4-3 (1995) and Amendment 1 (1998) and EN 61000-4-3: Radiated, Radio-Frequency Electromagnetic Field Immunity Test
12/I03	IEC 61000-4-4 (1995) and EN 61000-4-4: Electrical Fast Transient/Burst Immunity Test
12/I04	IEC 61000-4-5 (1995) and EN 61000-4-5: Surge Immunity Test

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NVLAP Code	***Designation / Description***
12/I05	IEC 61000-4-6 (1996) and EN 61000-4-6: Immunity to Conducted Disturbances, Induced Radio-Frequency Fields
12/I06	IEC 61000-4-8 (1993): Power Frequency Magnetic Field Immunity Test
12/I07	IEC 61000-4-11 (1994): Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests
12/J111324	SAE J1113/24: Immunity to radiated electromagnetic fields; 10 kHz to 200 MHz - Crawford TEM cell and 10 kHz to 5 GHz - Wideband TEM cell
12/J111341	SAE J1113/41 (1995-07): Limits and methods of measurement of radio disturbance characteristics of components and modules for the protection of receivers used on board vehicles

Radio Test Methods

12/RSS119	RSS-119, Issue 6 (March 25, 2000): Land Mobile and Fixed Radio Transmitters and Receivers, 27.41 to 960 MHz
12/RSS123	RSS-123, Issue 1, Rev. 2 (November 6, 1999): Low Power Licensed Radiocommunication Devices
12/RSS137	RSS-137, Issue 1, Rev. 1 (September 25, 1999): Location and Monitoring Service (902 - 928 MHz)

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NVLAP Code	*Designation / Description*
12/RSS139	RSS-139, Isssue 1 (February 5, 2000): Licensed Radiocommunications Devices in the Band 2400 - 2483.5 MHz
12/CIS15c	EN 55015 (2000) + A1 (2001): Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
MIL-STD-462 : Conducted Emissions:	
12/A18	MIL-STD-461 Version E Method CE106
MIL-STD-462 : Conducted Susceptibility:	
12/B12	MIL-STD-462 Version D Method CS101
12/B13	MIL-STD-462 Version D Method CS103
12/B25	MIL-STD-461 Version E Method CS114
12/B26	MIL-STD-461 Version E Method CS115
12/B27	MIL-STD-461 Version E Method CS116
MIL-STD-462 : Radiated Emissions:	
12/D04	MIL-STD-462 Version D Method RE101

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NVLAP LAB CODE 100276-0

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NVLAP Code	*Designation / Description*
12/D05	MIL-STD-462 Version D Method RE102
12/D06	MIL-STD-462 Version D Method RE103
MIL-STD-462 : Radiated Susceptibility:	
12/E08	MIL-STD-462 Version D Method RS101
12/E09	MIL-STD-462 Version D Method RS103

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1.0 SUMMARY OF TEST REPORT

It was found that the TPS Irrigation Console, Model Number(s) 5100-201-000, **''meets''** the radio interference conducted and radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.225 for operational in the 13.553-13.567 MHz Band. It should be noted that the amount of margin was only 3.8 dB at .71 MHz, conducted. The normal tolerance of the test equipment is ±3 dB. Due to this tolerance and the variation in normal production, a margin of at least 6 dB is recommended.

This test report relates only to the items tested and contains the following number of pages.

Text: 52

2.0 INTRODUCTION

On January 29 & 30, 2004, a series of radio frequency interference measurements was performed on TPS Irrigation Console, Model Number(s) 5100-201-000, Serial Number: NA. The tests were performed according to the procedures of the FCC as stated in the "Methods of Measurement of Radio-Noise Emissions for Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" found in the American National Standards Institute, ANSI C63.4-2001. Tests were performed by personnel of D.L.S. Electronic Systems, Inc. who are responsible to Donald L. Sweeney, Senior EMC Engineer.

3.0 OBJECT

The purpose of this series of tests was to determine if the test sample could meet the radio frequency interference emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Sections 15.209 & 15.225 for Intentional Radiators operating in the Band 13.553-13.567 MHz.

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4.0 TEST SET-UP

All emission tests were performed at D.L.S. Electronic Systems, Inc. and set up according to the American National Standards Institute, ANSI C63.4-2001, Section 8, (Figures 11a and 11b).

All emissions tests were performed with the test item placed on a 80 cm high rotating non-conductive table, located in the test room. Equipment normally operated on the floor was placed on a metal covered turntable which is flush with the surrounding conducting ground plane. The ground plane has an electrical isolation layer over its surface approximately 7 mm thick. The EUT is separated from the turntable ground plane by a non-conductive layer. The equipment under test was set up according to ANSI C63.4-2001, Sections 6, 7 and 8.

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5.0 TEST EQUIPMENT (Bandwidths and Detector Function)

All preliminary data below 1000 MHz was automatically plotted using the HP Spectrum Analyzer or ESI 26/40 Fixed Tuned Receiver. The data was taken using Peak, Quasi-Peak or the Average Detector Functions as required. This information was then used to determine the frequencies of maximum emissions. Above 1000 MHz, final data was taken using the Average Detector.

Below 1000 MHz, final data was taken using the HP Spectrum Analyzer and/or ESI 26/40 Fixed Tuned Receiver. These plots were made using the Peak or Quasi-Peak Detector functions, with manual measurements performed on the questionable frequencies using the Quasi-Peak or the Average Detector Function of the Analyzer or ESI 26/40 Fixed Tuned Receiver as required. Above 1000 MHz, final data was taken using the Average Detector on the Spectrum Analyzer.

The bandwidths shown below are specified by ANSI C63.4-2001, Section 4.2.

Frequency Range	Bandwidth (-6 dB)
10 to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz
Above 1 GHz	1 MHz

A list of the equipment used can be found in Table 1. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.

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6.0 AMBIENT MEASUREMENTS

For emissions measurements, broadband antennas and an EMI Test Receiver with a panoramic spectrum display are used. First the frequency range is scanned and displayed on the test receiver display. Next the scanned frequency range is divided into smaller ranges, and then it is manually tuned through to determine the emissions from the EUT. A headset or loudspeaker is connected to the test receiver's AM/FM demodulated output as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT. If there is any doubt as to the source of the emission, it is further investigated by rotating the EUT, or by disconnecting the power from the EUT.

The EUT is set up in its typical configuration and operated in its various modes. For tabletop systems, cables are manipulated within the range of likely configurations. For floor-standing equipment, the cables are located in the same manner as the user would install them and no further manipulation is made. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions. For each mode of operation, the frequency spectrum is monitored. Variations in antenna height, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) are explored to produce the emissions that have the highest amplitude relative to the limit. These methods are performed to the specifications in ANSI C63.4: 2001.

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7.0 DESCRIPTION OF TEST SAMPLE: (See also Paragraph 8.0)

7.1 Description:

The TPS System is used for drilling, cutting and shaping bone for surgical procedures. The handpieces may be controlled via handswitch or foot operated footswitch control. The handpiece motor speeds are user selectable via a touch screen on the TPS Console Display and they vary from 6,000 rpm to 75,000 rpm. The system also incorporates an irrigation pump which operates in one of two modes. On demand when the handpiece is activated or in Flush Mode which is a continuous run operation. The TPS System also has the capability of recognizing which cutters are placed into the handpieces via RF.

The standard TPS Console 5100-001-000 is identical to the TPS Irrigation Console 5100-050-000 minus the irrigation pump, therefore the TPS Console is consider the worst case scenario. 5100-201-000 is the same as the 5100-001-000 with the addition of the Hermes (voice recognition). 5100-050-000 is the same as the 5100-250-000 with the addition of the Hermes and irrigation pump.

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7.0 DESCRIPTION OF TEST SAMPLE: (CON'T)

7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

.98' long x .75' wide x .5' high

7.3 LINE FILTER USED:

Corcom Filter 6ED4C or
Corcom Filter 6ED8C

7.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

100 kHz

Clock Frequencies:

24 MHz, 13.56 MHz, 12 MHz, 6 MHz, & .285 MHz

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7.0 DESCRIPTION OF TEST SAMPLE: (CON'T)

7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. TPS + Control Board Assembly — PN: 5100-002-161 Rev 10
2. LCD Screen Interface Assembly — PN: 5100-002-162 Rev 3
3. TPS Irrigation Pump Board Assembly — PN: 5100-001-327 Rev B
4. Universal 400 Watt Power Supply — PN: 5100-002-345 Rev 9

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8.0 ADDITIONAL DESCRIPTION OF TEST SAMPLE:
(See also Paragraph 7.0)

1: There were no changes made at D.L.S. Electronic Systems, Inc.

I certify that the above, as described in paragraph 7.0, describes the equipment tested and will be manufactured as stated.

By: _____ _____
Signature Title

For: _____ _____
Company Date

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9.0 PHOTO INFORMATION AND TEST SET-UP

Item 0 TPS Irrigation Console
Model Number: 5100-201-000 Serial Number: NA

Item 1 Non-shielded AC Power Line Cord. 3m

Item 2 Stryker Instruments Formula Shaver with RFID.
Model # 03K020534 Serial # 375-704-500

Item 3 Stryker Instruments Core Sabre Drill

Item 4 Stryker Instruments SE5/TPS

Item 5 Stryker Instruments TPS Foot Switch.
Model # 5100-8 Serial # 99102653

Item 6 Shielded USB Cable with Metal Shells. 1m

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10.0 RADIATED PHOTOS TAKEN DURING TESTING

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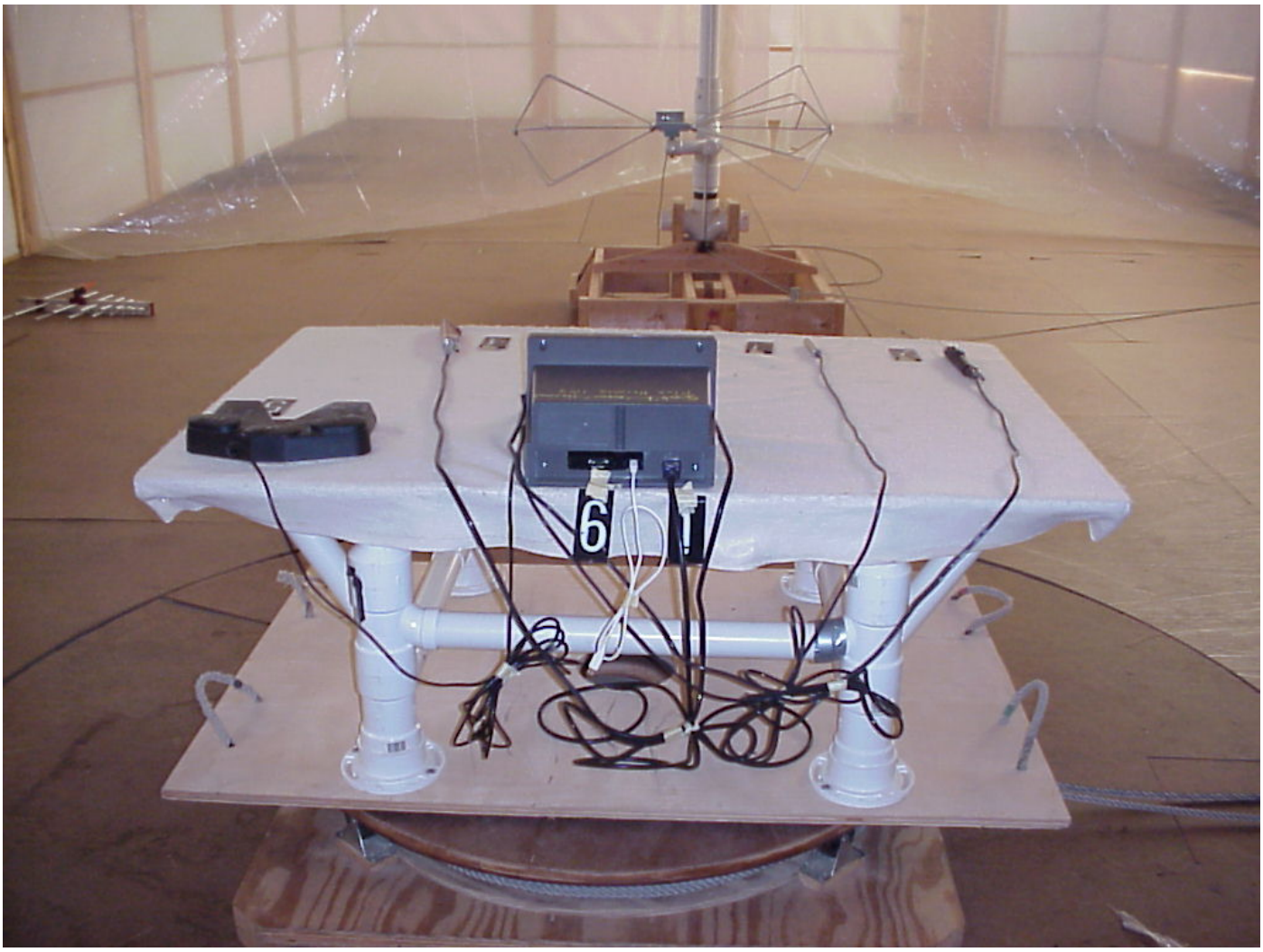
10.0 RADIATED PHOTOS TAKEN DURING TESTING



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10.0 CONDUCTED PHOTOS TAKEN DURING TESTING

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11.0 RESULTS OF TESTS

The radio interference emission charts results can be seen on the pages at the end of this report. Data sheets indicating the test measurements taken during testing can also be found at the end of this report. Those points on the emission charts shown with a yellow mark are background frequencies which were verified during testing.

12.0 CONCLUSION

It was found that the TPS Irrigation Console, Model Number(s) 5100-201-000 **''meets''** the radio interference conducted and radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.225 for operational in the 13.553-13.567 MHz Band. It should be noted that the amount of margin was only 3.8 dB at .71 MHz, conducted. The normal tolerance of the test equipment is ±3 dB. Due to this tolerance and the variation in normal production, a margin of at least 6 dB is recommended.

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TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Spectrum Analyzer	Hewlett/ Packard	8566B	2240A002041	100 Hz – 22 GHz	10/04
Quasi-Peak Adapter	Hewlett/ Packard	85650A	2043A00121	10 kHz – 1 GHz	10/04
Spectrum Analyzer	Hewlett/ Packard	8566B	2421A00452	100 Hz – 22 GHz	2/04
Quasi-Peak Adapter	Hewlett/ Packard	85650A	2043A00450	10 kHz – 1 GHz	2/04
Spectrum Analyzer	Hewlett/ Packard	8591A	3009A00700	9 kHz – 1.8 GHz	3/04
Receiver	Electrometrics	EMC-30	44168	10 kHz – 1 GHz	9/04
Receiver	Rohde & Schwarz	ESI 26	837491/010	20 Hz – 26 GHz	11/04
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	12/04
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	12/04
Antenna	EMCO	3104C	00054891	20 MHz – 200 MHz	2/04
Antenna	Electrometrics	LPA-25	1114	200 MHz – 1 GHz	3/04
Antenna	EMCO	3104C	00054892	20 MHz – 200 MHz	3/04

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.

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TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Antenna	Electrometrics	3146	1205	200 MHz – 1 GHz	3/04
Antenna	EMCO	3104C	97014785	20 MHz – 200 MHz	2/04
Antenna	EMCO	3146	97024895	200 MHz – 1 GHz	3/04
Antenna	EMCO	3115	2479	1 GHz – 18 GHz	8/04
Antenna	EMCO	3115	99035731	1 GHz – 18 GHz	4/04
Antenna	Rohde & Schwarz	HUF-Z1	829381001	20 MHz – 1 GHz	2/04
Antenna	Rohde & Schwarz	HUF-Z1	829381005	20 MHz – 1 GHz	8/04
LISN	Solar	8012-50-R-24-BNC	8305116	10 MHz – 30 MHz	8/04
LISN	Solar	8012-50-R-24-BNC	814548	10 MHz – 30 MHz	8/04
LISN	Solar	9252-50-R-24-BNC	961019	10 MHz – 30 MHz	12/04
LISN	Solar	9252-50-R-24-BNC	971612	10 MHz – 30 MHz	10/04
LISN	Solar	9252-50-R-24-BNC	92710620	10 MHz – 30 MHz	7/04

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.

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APPENDIX A

TEST PROCEDURE

Part 15, Subpart C, Section 15.225a-c

OPERATION WITHIN THE BAND 13.553-13.567 MHz

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APPENDIX A

1.0 CONDUCTED EMISSION MEASUREMENTS

The conducted emissions were measured over the frequency range from .45 MHz to 30 MHz in accordance with the power line measurements, as specified in ANSI C63.4-1992. Since the device is operated from the public utility lines, the 120 Vac, 60 Hz power leads, high and low sides were measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. All signals were then recorded. The allowed levels for Intentional Radiators cannot exceed 250 uV (47.96 dBuV) at any frequency between 150 kHz and 30 MHz, as stated in Section 15.207a.

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APPENDIX A

CONDUCTED DATA AND CHARTS TAKEN DURING TESTING

FORMULA SHAVER USING CORCOM 6ED4C FILTER

PART 15.207

FCC Part 15 Class B

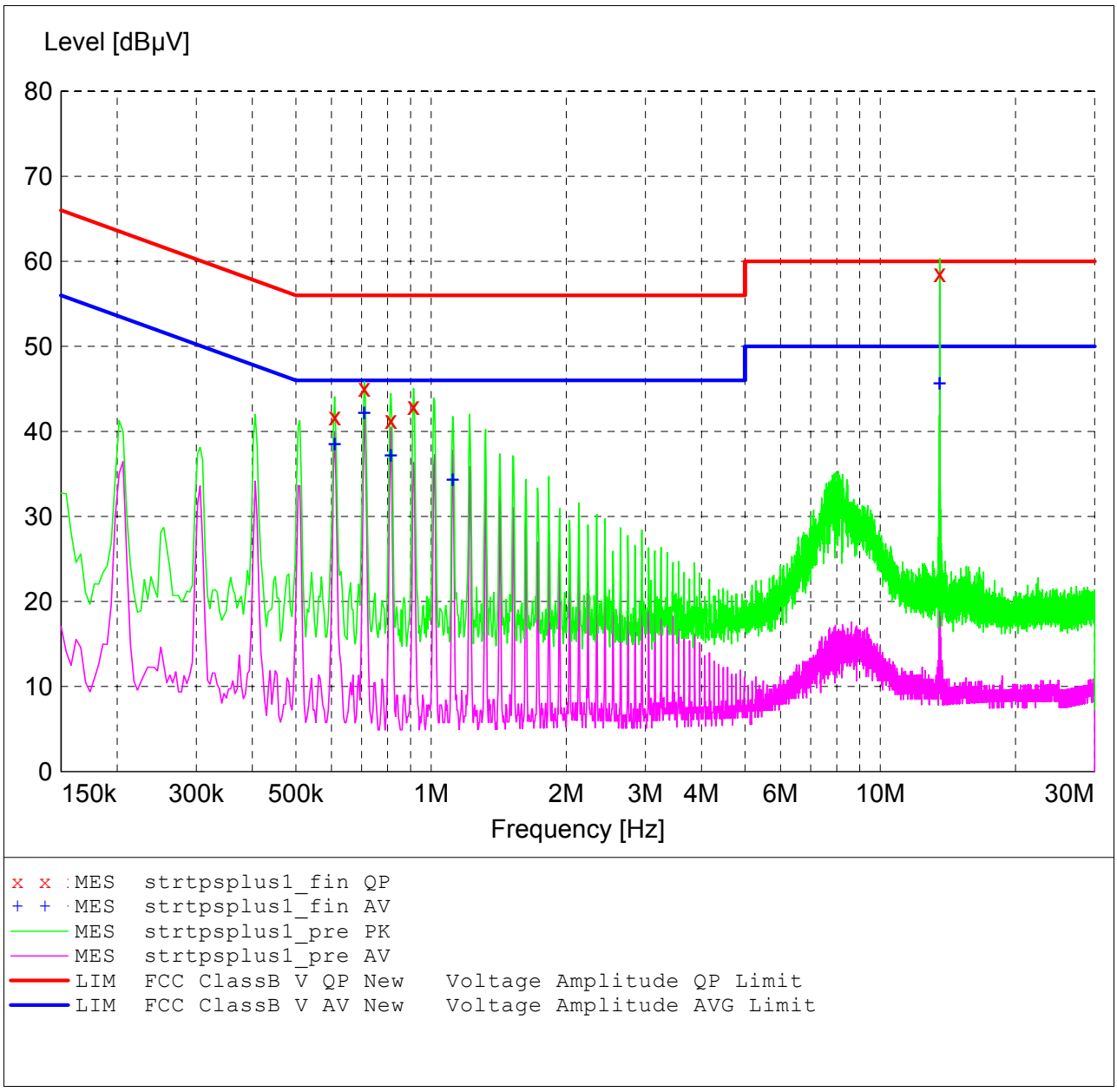
Voltage Mains Test

EUT:	TPS Plus with Hermes Option
Manufacturer:	Stryker Instrument
Operating Condition:	68 deg. F, 22% R.H.
Test Site:	DLS OF Screen Room
Operator:	Jason L
Test Specification:	120 VAC, 60 Hz
Comment:	Line 1
	Date: 1-30-04

SCAN TABLE: "FCC ClassB Voltage"

Short Description: FCC Class B Voltage

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.0 kHz	MaxPeak Average	10.0 ms	9 kHz	LISN 961019



MEASUREMENT RESULT: "strtpsplus1_fin QP"

1/30/2004 12:45PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.610000	41.70	10.5	56	14.3	1	---
0.710000	45.10	10.4	56	10.9	1	---
0.814000	41.40	10.4	56	14.6	1	---
0.914000	43.00	10.5	56	13.0	1	---
13.562000	58.60	11.8	60	1.4	1	---

MEASUREMENT RESULT: "strtpsplus1_fin AV"

1/30/2004 12:45PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.610000	38.50	10.5	46	7.5	1	---
0.710000	42.20	10.4	46	3.8	1	---
0.814000	37.10	10.4	46	8.9	1	---
1.118000	34.30	10.5	46	11.7	1	---
13.562000	45.60	11.8	50	4.4	1	---

FCC Part 15 Class B

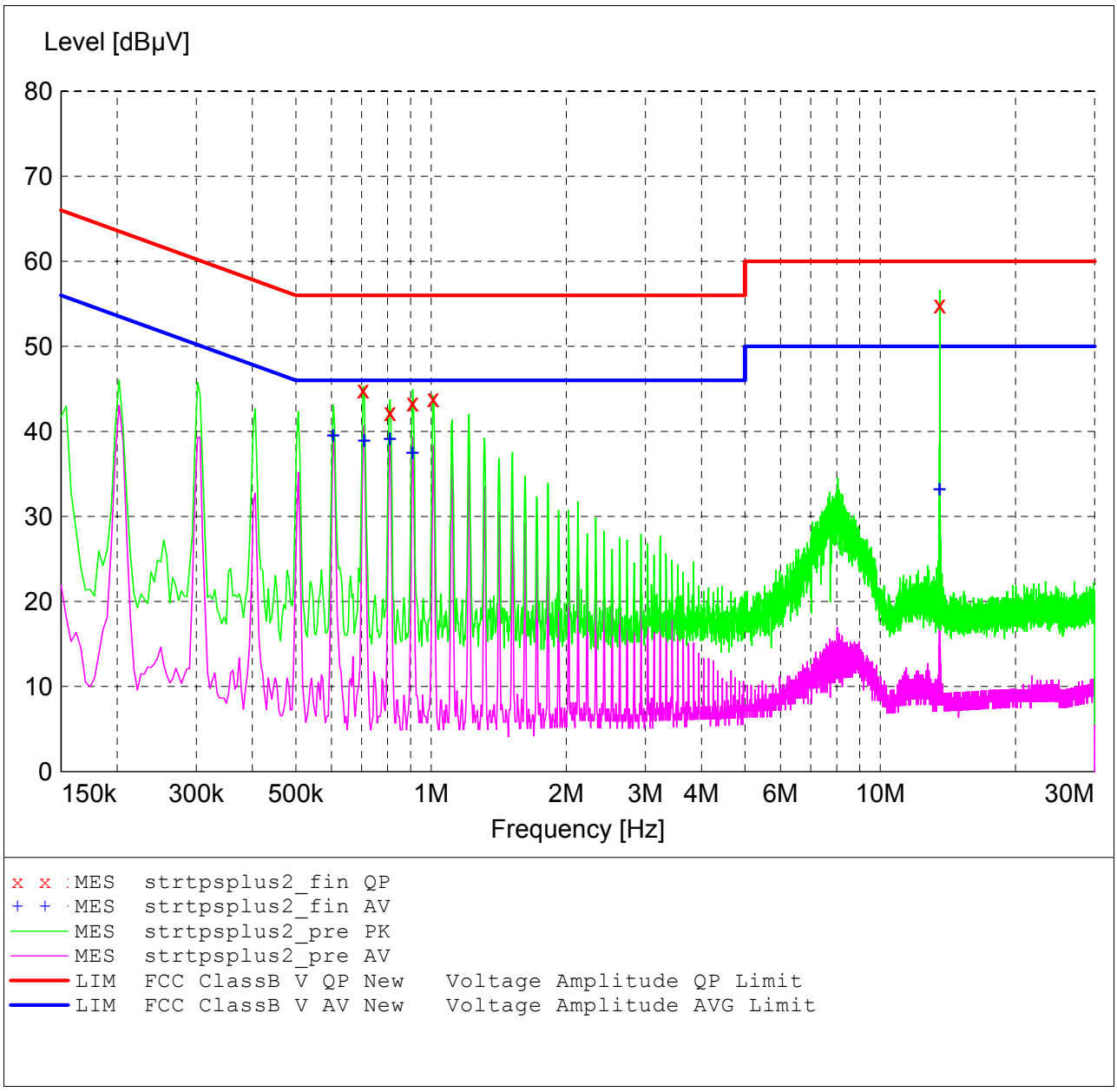
Voltage Mains Test

EUT:	TPS Plus with Hermes Option
Manufacturer:	Stryker Instrument
Operating Condition:	68 deg. F, 22% R.H.
Test Site:	DLS OF Screen Room
Operator:	Jason L
Test Specification:	120 VAC, 60 Hz
Comment:	Line 2
	Date: 1-30-04

SCAN TABLE: "FCC ClassB Voltage"

Short Description: FCC Class B Voltage

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.0 kHz	MaxPeak Average	10.0 ms	9 kHz	LISN 961019



MEASUREMENT RESULT: "strtpsplus2_fin QP"

1/30/2004 12:49PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.706000	44.90	10.4	56	11.1	1	---
0.810000	42.30	10.4	56	13.7	1	---
0.910000	43.40	10.5	56	12.6	1	---
1.010000	43.90	10.5	56	12.1	1	---
13.562000	54.90	11.8	60	5.1	1	---

MEASUREMENT RESULT: "strtpsplus2_fin AV"

1/30/2004 12:49PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.606000	39.50	10.5	46	6.5	1	---
0.710000	38.90	10.4	46	7.1	1	---
0.810000	39.10	10.4	46	6.9	1	---
0.910000	37.50	10.5	46	8.5	1	---
13.566000	33.20	11.8	50	16.8	1	---

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APPENDIX A

2.0 BAND EDGE AND RESTRICT BAND COMPLIANCE

The field strength of any emissions appearing outside the 13.553 to 13.567 MHz band shall not exceed the general radiated emissions limits as stated Section 15.209. The fundamental from the TPS Irrigation Console transmitter shall not be inside the restrict band 13.36 to 13.41 MHz.

NOTE:

This data is on file at the FCC and does not have to be rerun, because the modifications made to this unit will not effect the output characteristics.

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APPENDIX A

3.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS (SECTION 15.225a & b)

The radiated measurements made at D.L.S. Electronic Systems, Inc., for the TPS Irrigation Console, Model Number: 5100-201-000, are shown in tabulated and graph form. Preliminary radiation measurements were performed at a 3 meter test distance with the limits adjusted linearly when required. The frequency range from 9 kHz to over 960 MHz, depending upon the fundamental frequency as stated in Part 15.33a, was automatically scanned and plotted at various angles.

Measurements for the TPS Irrigation Console were made up to MHz, in accordance with Section 15.33a for Intentional Radiators with a fundamental frequency of MHz. For intentional radiators, the frequency range to be investigated is determined by the lowest radio frequency generated by the device without going below 9 kHz, up to at least the tenth harmonic of the highest fundamental frequency or 1000 MHz, whichever is lower. At those frequencies where significant signals were detected, measurements were made at an open field test site, located at Genoa City, Wisconsin, FCC file number **31040/SIT**, to determine the actual radiation levels.

All signals in the frequency range of 9 kHz to 30 MHz were measured with a low frequency Loop Antenna as a pickup device. From 30 to 200 MHz, a Biconical Antenna or tuned dipoles were used and from 200 MHz to 1000 MHz, a Log Periodic or Tuned Dipoles were used. During the test the equipment was rotated and the antenna was raised and lowered from 1 meter to 4 meters to find the maximum level. In order to find maximum emissions, the cables were moved through all the positions the equipment would be expected to experience in the field. Tests were made in the vertical polarization with the Loop Antenna, rotated 360º around its vertical axis. Tests were also made in both the horizontal and vertical planes of polarization with the Biconical and Log Periodic. In each case, the table was rotated to find the maximum emissions.

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APPENDIX A

3.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS (CON'T)

When the equipment is out of limit at 3 meters, and the signals from the equipment at 30 meters cannot be recorded due to the background, a representative sample of these frequencies were re-measured at various distances such as 4, 5, 6, 8, 15 meters and the greatest distance that can be measured to demonstrate graphically that the emissions are dropping off and will be under the limit at the specified distance. All signals were then recorded. The allowed levels for Intentional Radiators in the 13.553 MHz to 13.567 MHz band shall not exceed 10,000 uV measured at 30 meters. The field strength of any emissions appearing outside of this band shall not exceed the radiated emissions limits shown in Section 15.209.

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APPENDIX A

RADIATED DATA AND CHARTS TAKEN

FOR THE FUNDAMENTAL SPURIOUS EMISSIONS

PART 15.225

FCC Part 15.225

Radiated Emissions

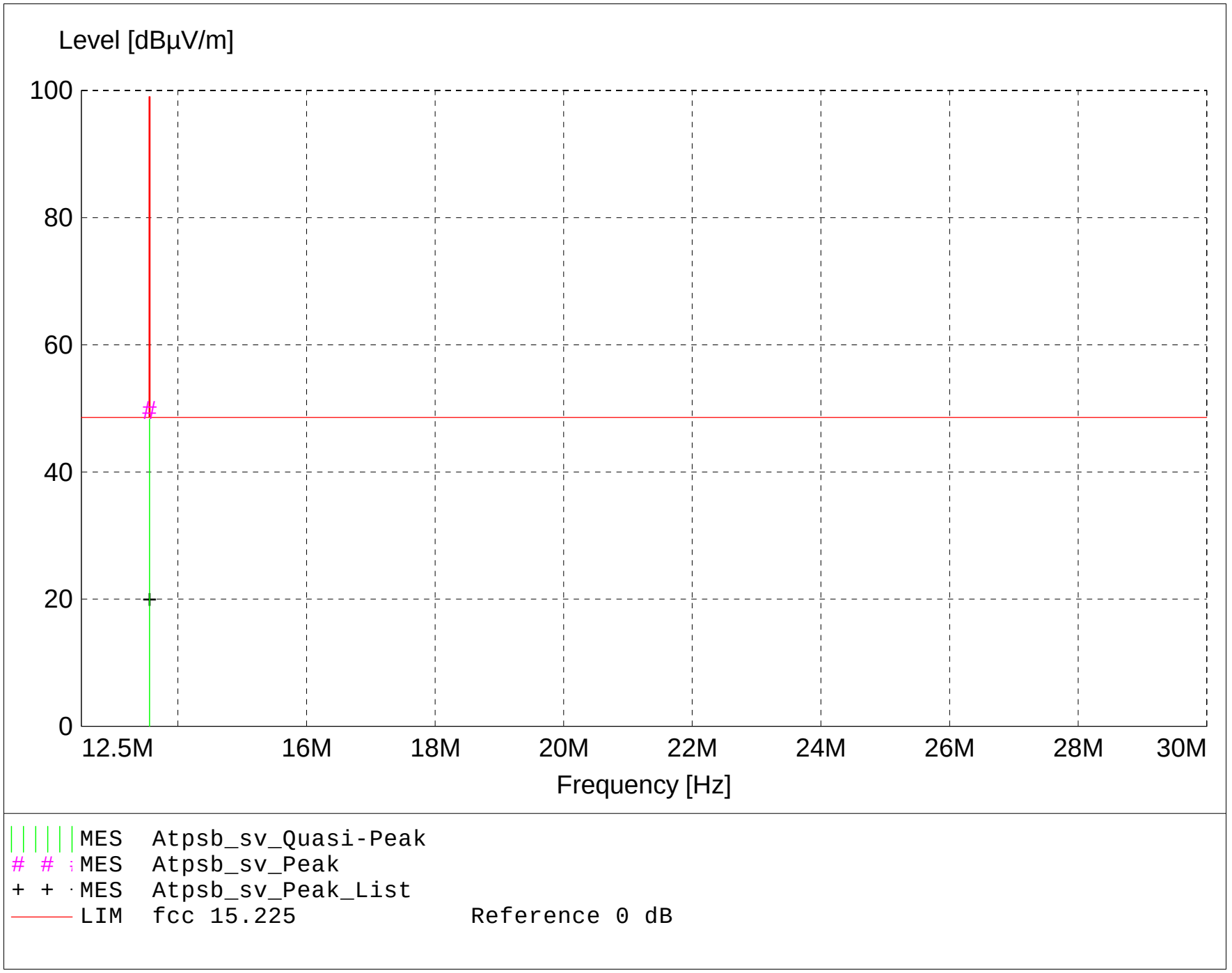
EUT: TPS Plus w/ Hermes
Manufacturer: Stryker Instruments
Operating Condition: 73 deg F; 21% R.H.
Test Site: DLS OF Site 3
Operator: Jason L
Test Specification: 120 VAC, 60 Hz
Comment:
Date: 01/29/2004

TEXT: "Site 3 LowH 10M Act"

Short Description: Test Set-up 10kHz to 30MHz H
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI40 SN: 837808/006

Antennas --- EMCO Active Loop Model: 6502 SN: 1027

TEST SET-UP: EuT Measured at 10 Meters with H-FIELD Antenna


Level [dBµV/m]
100
80
60
40
20
0
12.5M
16M
18M
20M
22M
24M
26M
28M
30M
Frequency [Hz]
MES Atpsb_sv_Quasi-Peak
MES Atpsb_sv_Peak
MES Atpsb_sv_Peak_List
LIM fcc 15.225 Reference 0 dB

MEASUREMENT RESULT: "Atpsb_sv_Final"

1/29/2004 11:46AM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
13.560000	38.66	10.34	0.7	49.7	99.0	49.3	1.00	315	MAX PEAK	Fundamental
13.560000	37.30	10.34	0.7	48.3	99.0	50.7	1.00	315	QUASI-PEAK	None

ELECTRONIC SYSTEMS, INC.
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APPENDIX A

RADIATED DATA

AND CHARTS TAKEN DURING TESTING

FOR FIELD STRENGTH

SPURIOUS EMISSION MEASUREMENTS

PART 15.225

FCC Part 15 Class B

Electric Field Strength

```
EUT:                 TPS Plus w/ Hermes
Manufacturer:        Stryker Instrument
Operating Condition: 72 deg. F; 22% R.H.
Test Site:           DLS OF Site 3
Operator:            Jason L
Test Specification:  120 V; 60 Hz
Comment:             Worst Case Emissions of All Running Configurations       e
                     Date: 1/29/04
```

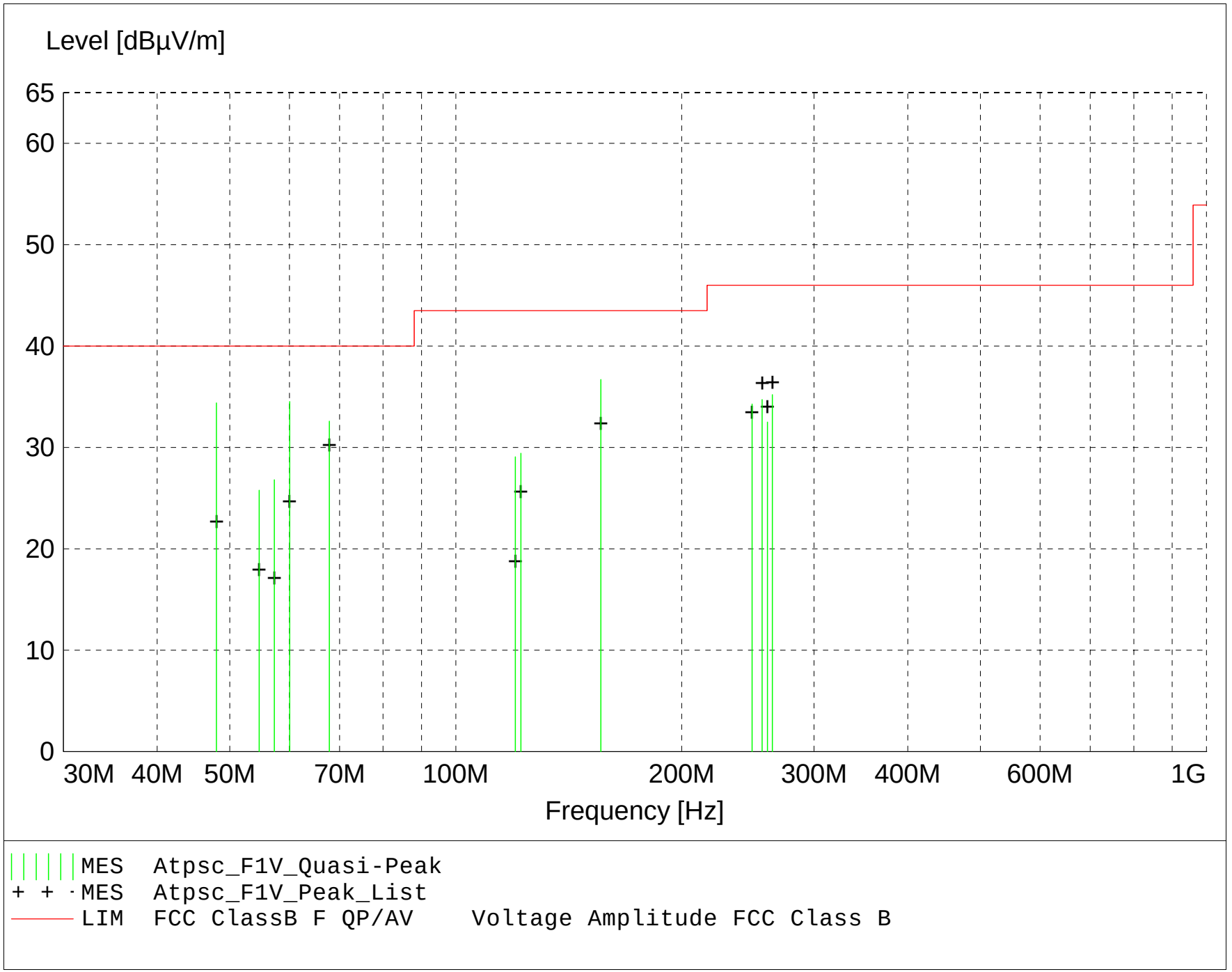
TEXT: "Site 3 MidV 3M"

```
  Short Description:            Test Set-up Vert30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 26 SN: 837491/010

                Antennas ---
                Biconical    -- EMCO 3104C SN: 9701-4785
                Log Periodic -- EMCO 3146  SN: 9702-4895

                Pre-Amp  --- Rohde&Schwarz TS-PR10 SN: 032001/005

TEST SET-UP:    EuT Measured at 3 Meters with VERTICAL Antenna Polarisation
```


Level [dBµV/m]
65
60
50
40
30
20
10
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
MES Atpsc_F1V_Quasi-Peak
MES Atpsc_F1V_Peak_List
LIM FCC ClassB F QP/AV Voltage Amplitude FCC Class B

MEASUREMENT RESULT: "Atpsc_F1V_Final"

1/29/2004 3:32PM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
60.030000	49.03	9.52	-24.0	34.5	40.0	5.5	1.00	0	QUASI-PEAK	None
47.980000	46.91	11.68	-24.2	34.4	40.0	5.6	1.00	290	QUASI-PEAK	None
156.000000	47.11	12.46	-22.9	36.7	43.5	6.8	1.00	90	QUASI-PEAK	None
67.820000	49.25	7.30	-24.0	32.6	40.0	7.4	1.00	180	QUASI-PEAK	None
263.990000	43.97	13.30	-22.1	35.2	46.0	10.8	1.00	45	QUASI-PEAK	None
255.980000	43.87	13.00	-22.1	34.7	46.0	11.3	1.00	45	QUASI-PEAK	None
247.990000	43.97	12.55	-22.2	34.3	46.0	11.7	1.00	0	QUASI-PEAK	None
57.320000	40.72	10.16	-24.1	26.8	40.0	13.2	1.00	0	QUASI-PEAK	None
259.990000	41.46	13.14	-22.1	32.5	46.0	13.5	1.00	45	QUASI-PEAK	None
122.060000	39.85	12.80	-23.2	29.4	43.5	14.1	1.00	135	QUASI-PEAK	None
54.710000	39.02	10.86	-24.1	25.8	40.0	14.2	1.00	0	QUASI-PEAK	None
119.990000	39.63	12.67	-23.2	29.1	43.5	14.4	1.00	340	QUASI-PEAK	None

FCC Part 15 Class B

Electric Field Strength

```
EUT:                 TPS Plus w/ Hermes
Manufacturer:        Stryker Instrument
Operating Condition: 72 deg. F; 22% R.H.
Test Site:           DLS OF Site 3
Operator:            Jason L
Test Specification:  120 V; 60 Hz
Comment:             Worst Case Emissions of All Running Configurations
                     Date: 1/29/04
```

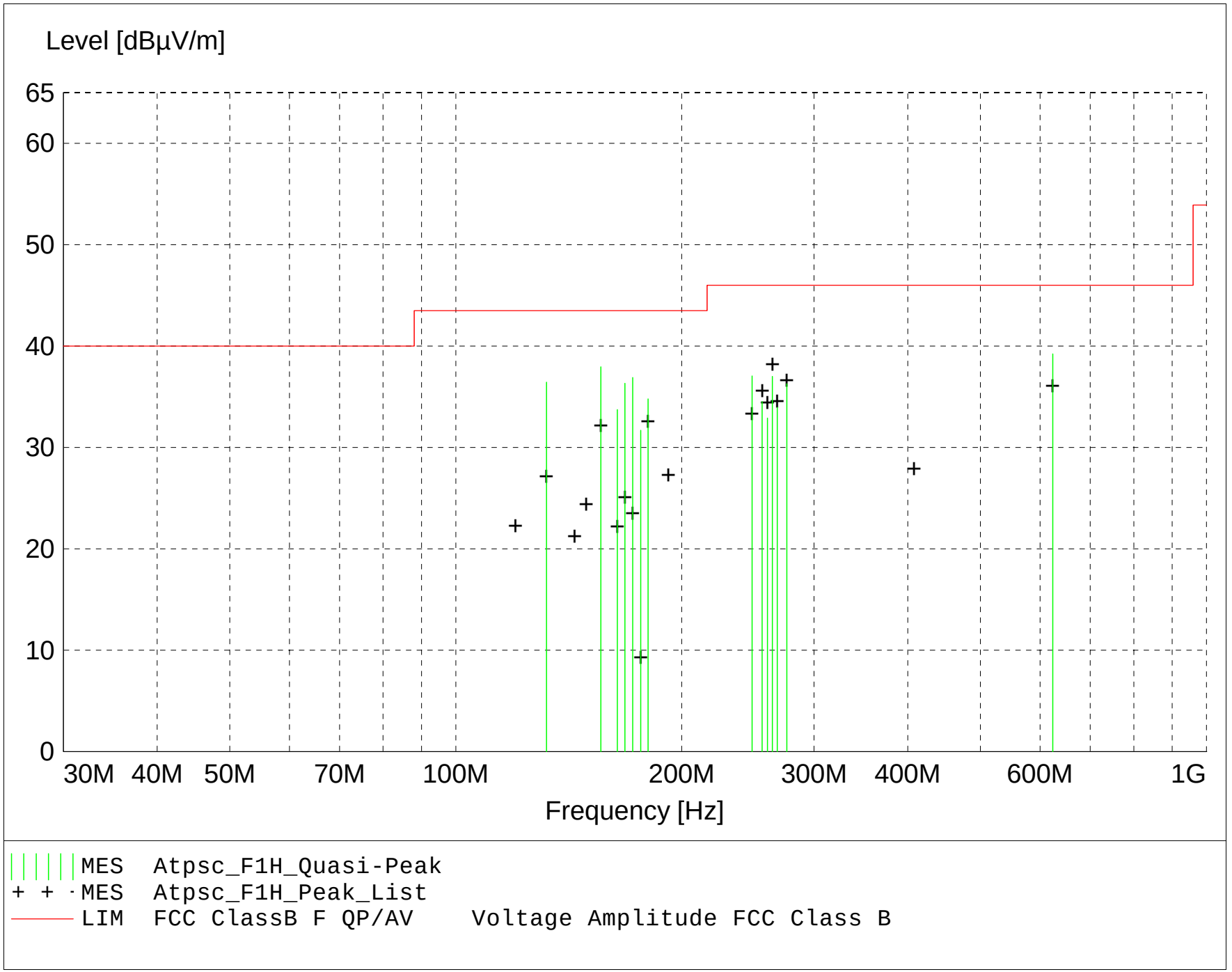
TEXT: "Site 3 MidH 3M"

```
  Short Description:            Test Set-up Horz30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/006

                Antennas ---
                Biconical    -- EMCO 3104C SN: 9701-4785
                Log Periodic -- EMCO 3146  SN: 9702-4895

                Pre-Amp  --- Rohde&Schwarz TS-PR10 SN: 032001/005

TEST SET-UP:    EuT Measured at 3 Meters with HORIZONTAL Antenna Polarisation
```


Level [dBµV/m]
65
60
50
40
30
20
10
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
MES Atpsc_F1H_Quasi-Peak
MES Atpsc_F1H_Peak_List
LIM FCC ClassB F QP/AV Voltage Amplitude FCC Class B

MEASUREMENT RESULT: "Atpsc_F1H_Final"

1/29/2004 3:28PM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
155.990000	48.36	12.46	-22.9	37.9	43.5	5.6	2.00	325	QUASI-PEAK	None
171.980000	44.78	14.83	-22.7	36.9	43.5	6.6	2.00	125	QUASI-PEAK	None
623.990000	40.09	19.34	-20.2	39.2	46.0	6.8	1.50	125	QUASI-PEAK	None
132.000000	47.56	11.99	-23.1	36.4	43.5	7.1	2.50	270	QUASI-PEAK	None
167.990000	44.87	14.21	-22.7	36.3	43.5	7.2	1.80	270	QUASI-PEAK	None
180.320000	41.88	15.58	-22.7	34.8	43.5	8.7	2.00	45	QUASI-PEAK	None
247.980000	46.72	12.55	-22.2	37.0	46.0	9.0	1.20	180	QUASI-PEAK	None
264.010000	45.75	13.30	-22.1	37.0	46.0	9.0	1.00	325	QUASI-PEAK	None
275.990000	44.62	13.60	-21.9	36.3	46.0	9.7	1.00	45	QUASI-PEAK	None
164.010000	42.89	13.63	-22.8	33.7	43.5	9.8	2.00	270	QUASI-PEAK	None
255.980000	43.65	13.00	-22.1	34.5	46.0	11.5	1.00	325	QUASI-PEAK	None
176.280000	39.09	15.29	-22.7	31.7	43.5	11.8	2.00	125	QUASI-PEAK	None
268.010000	42.66	13.30	-22.0	33.9	46.0	12.1	1.00	345	QUASI-PEAK	None
259.990000	41.85	13.14	-22.1	32.9	46.0	13.1	1.00	325	QUASI-PEAK	None

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APPENDIX A

4.0 FREQUENCY STABILITY - PART 2.1055a **(Temperature)**

The frequency stability was measured from -30° to +50° centigrade at intervals of 10° centigrade throughout the range. Prior to each frequency measurement, the equipment was left alone for a sufficient period of time (approximately 30 minutes or more) to allow the components of the TPS Irrigation Console oscillator circuitry to stabilize. The following information was taken:

NOTE:

This data is on file at the FCC and does not have to be rerun, because the modifications made to this unit will not affect the output characteristics.

ELECTRONIC SYSTEMS, INC.
1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

5.0 FREQUENCY STABILITY - PART 2.1055d **(Voltage)**

The frequency stability of TPS Irrigation Console was measured by varying the primary supply voltage from 85% to 115% of nominal value for all equipment other than hand carried battery equipment.

NOTE:

This data is on file at the FCC and does not have to be rerun, because the modifications made to this unit will not affect the output characteristics.