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

Company: Intermatic Incorporated
Model Tested: HA22
Report Number: 11905

FCC Rules and Regulations / Intentional Radiators

Operational in the 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz Bands

Part 15, Subpart C, Section 15.249

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

Formal Name:	USB Z-Wave Stick
Kind of Equipment:	USB Device
Test Configuration:	USB Type A (Male) connector (Tested at 120 vac, 60 Hz)
Model Number(s):	HA22
Model(s) Tested:	HA22
Serial Number(s):	N/A
Date of Tests:	January 6 & 9, 2006
Test Conducted For:	Intermatic Incorporated 7777 Winn Road Spring Grove, Illinois 60081

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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:

Intermatic Incorporated

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United States Department of Commerce
National Institute of Standards and Technology

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Certificate of Accreditation to ISO/IEC 17025:1999

NVLAP LAB CODE: 100276-0

D.L.S. Electronic Systems, Inc.
Wheeling, IL

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ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

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Effective dates

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NVLAP-01C (REV. 2005-05-19)

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SCOPE OF ACCREDITATION TO ISO/IEC 17025:1999

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ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS **NVLAP LAB CODE 100276-0**

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
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 CISPR 11 (2002), and CNS 13803 (1997): Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific, and Medical Radio-Frequency Equipment

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NVLAP Code	*Designation / Description*
12/CIS13	IEC/CISPR 13 (2001-04), EN 55013 (2001), AS/NZS CISPR 13 (2003), 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 Similiar Electrical Apparatus - Part 1: Emissions
12/CIS14a	EN 55014-1 (1993), 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
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 15 (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) & EN 55022 (1998) + A1(2000): Limits and methods of measurement of radio disturbance characteristics of information technology equipment

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NVLAP Code	*Designation / Description*
12/CIS22a	IEC/CISPR 22 (1993) and EN 55022 (1994): Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Amendment 1 (1995) and Amendment 2 (1996)
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	IEC 61000-3-3(1995); EN 61000-3-3(1995); 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 (2003) with FCC Method 47 CFR Part 15, Subpart B: Unintentional Radiators
12/FCC15c	ANSI C63.4 (2003) with FCC Method 47 CFR Part 15, Subpart C: Intentional Radiators
12/FCC15d	ANSI C63.17(1998) and ANSI C63.4 (2003): with FCC Method - 47 CFR Part 15, Subpart D: Unlicensed Personal Communications Service Devices
12/FCC15e	ANSI C63.4 (2003) with FCC Method 47 CFR Part 15, Subpart E: Unlicensed National Information Infrastructure Service Devices
12/T51a	AS/NZS CISPR 22 (2004): Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
12/VCCIa	VCCI: Agreement of Voluntary Control Council for Interference by Information Technology Equipment - Technical Requirements: V-3/2005.04

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NVLAP Code	*Designation / Description*
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
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, Ed. 1.2 (2001) + A1, A2; EN 61000-4-2: Electrostatic Discharge Immunity Test
12/I02	IEC 61000-4-3, Ed. 2.0 (2002-03); EN 61000-4-3 (2002): Radiated Radio-Frequency Electromagnetic Field Immunity Test
12/I03	IEC 61000-4-4(1995), A1(2000), A2(2001); EN 61000-4-4: Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical Fast Transient/Burst Immunity Test

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NVLAP Code	*Designation / Description*
12/I04	IEC 61000-4-5, Ed. 1.1 (2001-04); EN 61000-4-5: Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
12/I05	IEC 61000-4-6, Ed. 2.0 (2003-05); EN 61000-4-6: Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
12/I06	IEC 61000-4-8, Ed. 1.1 (2001); EN 61000-4-8: Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test
12/I07	IEC 61000-4-11, Ed. 1.1 (2001-03); EN 61000-4-11: 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/RSS125	RSS-125 (March 25, 2000): Land Mobile and Fixed Radio Transmitters and Receivers, 1.705 to 50.0 MHz, Primarily Amplitude Modulated
12/RSS131	RSS-131, Issue 2 (July 2003): Zone Enhancers for the Land Mobile Service
12/RSS132	RSS-132, Issue 1 (August 2002): 800 MHz Cellular Telephones Employing New Technologies
12/RSS133	RSS-133, Issue 3 (June 2005): 2GHz Personal Communications Services

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NVLAP Code	*Designation / Description*
12/RSS134	RSS-134, Issue 1, Rev. 1 (March 25, 2000): 900 MHz Narrowband Personal Communication Service
12/RSS135	RSS-135, Issue 1 (October 26, 1996): Digital Scanner Receivers
12/RSS136	RSS-136, Issue 5 (October 2002): Land and Mobile Station Radiotelephone Transmitters and Receivers Operating in the 26.960 - 27.410 MHz General Radio Service Band
12/RSS137	RSS-137, Issue 1, Rev. 1 (September 25, 1999): Location and Monitoring Service (902 - 928 MHz)
12/RSS139	RSS-139, Isssue 1 (February 5, 2000): Licensed Radiocommunications Devices in the Band 2400 - 2483.5 MHz
12/RSS141	RSS-141, Issue 1, Revision 1 (February 7, 2004): Aeronautical Radiocommunication Equipment in the Frequency Band 117.975 - 137 MHz
12/RSS142	RSS-142, Issue 2 (August 2002): Narrowband Multipoint Communication Systems in the 1,427 - 1,430 MHz and 1,493.5 - 1,496.5 MHz Bands
12/RSS170	RSS-170, Issue 1, Rev. 1 (November 6, 1999): Satellite Mobile Earth Stations
12/RSS191	RSS-191, Issue 2 (August 2002): Local Multipoint Communication Systems in the 28 GHz Band; Point-to-Point and Point-to-Multipoint Broadband Communication Systems in the 24 GHz and 38 GHz Bands
12/RSS192	RSS-192, Issue 2 (2004): Fixed Wireless Access Systems in the Band 3450 - 3650 MHz
12/RSS193	RSS-193, Issue 1 (July 2003): Multipoint and Point-to-Point Communication Systems (MCS) in the Fixed Service Operating in the 2,150 - 2,160 MHz, 2,500 - 2,596 MHz and 2,686 - 2,690 MHz Bands
12/RSS210	RSS-210, Issue 6 (Sept. 2005): Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category 1 Equipment
12/RSS212	RSS-212, Issue 1 (February 27, 1999): Test Facilities and Test Methods for Radio Equipment

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NVLAP Code	*Designation / Description*
12/RSS213	RSS-213, Issue 1 (April 24, 1999): 2 GHz Licence-Exempt Personal Communications Service Devices (PCS)
12/RSS215	RSS-215, Issue 1 (November 6, 1999): Analogue Scanner Receivers
12/RSS310	RSS-310, Issue 1 (Sept. 2005): Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category II Equipment
12/RSSgen	RSS-Gen, Issue 1 (Sept. 2005): General Requirements and Information for the Certification of Radiocommunication Equipment

Telecommunications Test Methods:

12/FCC2a2	TIA/EIA 603-B (2002) with 47 CFR Part 2: Public Mobile Services in 47 CFR Part 22
12/FCC2b2	TIA/EIA 603-B (2002) with 47 CFR Part 2: Private Land Mobile Radio Services in 47 CFR Part 90
12/FCC2d1	TIA/EIA 603-B (2002) with 47 CFR Part 2: Experimental Radio, Auxiliary, Special Broadcast and Other Program Distributional Services in 47 CFR Part 74
12/FCC2e1	TIA/EIA 603-B (2002) with 47 CFR Part 2: International Fixed Public Radiocommunication Services in 47 CFR Part 23

MIL-STD-462 : Conducted Emissions:

12/A13	MIL-STD-462 Version D Method CE101
12/A14	MIL-STD-462 Version D Method CE102
12/A16	MIL-STD-461 Version E Method CE101
12/A17	MIL-STD-461 Version E Method CE102
12/A18	MIL-STD-461 Version E Method CE106

MIL-STD-462 : Conducted Susceptibility:

12/B12	MIL-STD-462 Version D Method CS101

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NVLAP Code	*Designation / Description*
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
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 USB Z-Wave Stick, Model Number(s) HA22, **''meets''** the radio interference conducted and radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.249 for operational in the 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz Bands.

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

Text: 53

2.0 INTRODUCTION

On January 6 & 9, 2006, a series of radio frequency interference measurements was performed on USB Z-Wave Stick, Model Number(s) HA22, Serial Number: N/A. 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 C63.4-2003. 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 15.35(b), 15.37(d), 15.209 & 15.249 for Intentional Radiators operating in the Bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24-24.25 GHz.

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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 C63.4-2003, Section 8, (Figures 11a and 11b). The conducted tests were performed with the test item placed on a non-conductive table (table top equipment), located in the test room. Equipment normally operated on the floor was tested by placing it on the metal ground plane. The ground plane has an electrical isolation layer over its surface approximately 7mm thick. The power line supplied was connected to a dual line impedance stabilization network electrically bonded to the ground plane, located on the floor. The networks were constructed per the requirements of the American National Standards Institute, ANSI C63.4-2003, Section 4, (Figure 2).

All radiated 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 C63.4-2003, Sections 6 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 C63.4-2003, 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 MP-5 or ANSI C63.4-2003, as appropriate.

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

7.1 Description:

The USB stick is an interface device that plugs into a computer's USB port. It allows a program running on the computer to command and control various RF devices not directly connected to the computer. This is accomplished by transmitting and receiving commands and replies through the USB controller chip to the RF transceiver, both contained within the USB stick.

7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

Length: 3.4" Width: 1.28" Height: 0.84"

7.3 LINE FILTER USED:

N/A

7.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

N/A

Clock Frequencies:

7.376974 MHz

7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. RF Module PCB PN: 900-010257-102110
2. Main PCB PN: 900-223627-101000 V3

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

1: Re-routed antenna wire from top of circuit board to bottom of circuit board.

2. Set power level to F0.

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 USB Z-Wave Stick
Model Number: HA22; Serial Number: N/A

Item 1 Shielded USB Cable with Metal Shells. 1m

Item 2 Gateway Solo PC.
Model Number: Solo 2550; SN: B2509470610

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10.0 RADIATED PHOTOS TAKEN DURING TESTING

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10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)

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10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)

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10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)

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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. Points on the emission charts shown with a yellow mark are background frequencies that were verified during testing.

12.0 CONCLUSION

It was found that the USB Z-Wave Stick, Model Number(s) HA22 **''meets''** the radio interference conducted and radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.249 for operational in the 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz Bands.

TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 26	837491/010	20 Hz – 26 GHz	11/06
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	12/06
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	12/06
Antenna	EMCO	3104C	00054891	20 MHz – 200 MHz	2/06
Antenna	Electrometrics	LPA-25	1114	200 MHz – 1 GHz	3/06
Antenna	EMCO	3104C	00054892	20 MHz – 200 MHz	3/06
Antenna	Electrometrics	3146	1205	200 MHz – 1 GHz	3/06
Antenna	EMCO	3104C	97014785	20 MHz – 200 MHz	2/06
Antenna	EMCO	3146	97024895	200 MHz – 1 GHz	3/06
Antenna	EMCO	3115	2479	1 GHz – 18 GHz	8/06
Antenna	EMCO	3115	99035731	1 GHz – 18 GHz	4/06
Antenna	Rohde & Schwarz	HUF-Z1	829381001	20 MHz – 1 GHz	2/06
Antenna	Rohde & Schwarz	HUF-Z1	829381005	20 MHz – 1 GHz	8/06

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

TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
LISN	Solar	8012-50-R-24-BNC	8305116	10 MHz – 30 MHz	8/06
LISN	Solar	8012-50-R-24-BNC	814548	10 MHz – 30 MHz	8/06
LISN	Solar	9252-50-R-24-BNC	961019	10 MHz – 30 MHz	12/06
LISN	Solar	9252-50-R-24-BNC	971612	10 MHz – 30 MHz	10/06
LISN	Solar	9252-50-R-24-BNC	92710620	10 MHz – 30 MHz	7/06

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

APPENDIX A

TEST PROCEDURE

Part 15, Subpart C, Section 15.249a-e

OPERATION WITHIN THE BANDS 902-928 MHz,
2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz MHz

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

1.0 CONDUCTED EMISSION MEASUREMENTS

Conducted emissions were measured over the frequency range from 150 kHz to 30 MHz in accordance with the power line measurements as specified in FCC Part 15, Subpart C, Section 15.207 & ANSI C63.4-2003. Since the device is operated from the public utility lines, the 120 Vac, 60 Hz power leads, high (hot) and low (neutral) sides, were measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. During the test, the cables were placed and items moved (when appropriate) to maximize emissions. All signals were then recorded. The allowed levels for Intentional Radiators which is designed to connected to the public utility (AC) power line shall not exceed 250 uV (47.96 dBuV) from 150 kHz to 30 MHz

NOTE:

All test measurements were made at a screen room temperature of **68°F** at **32%** relative humidity.

APPENDIX A

CONDUCTED DATA AND GRAPH(S) TAKEN DURING TESTING

PART 15.207

FCC Part 15 Class B

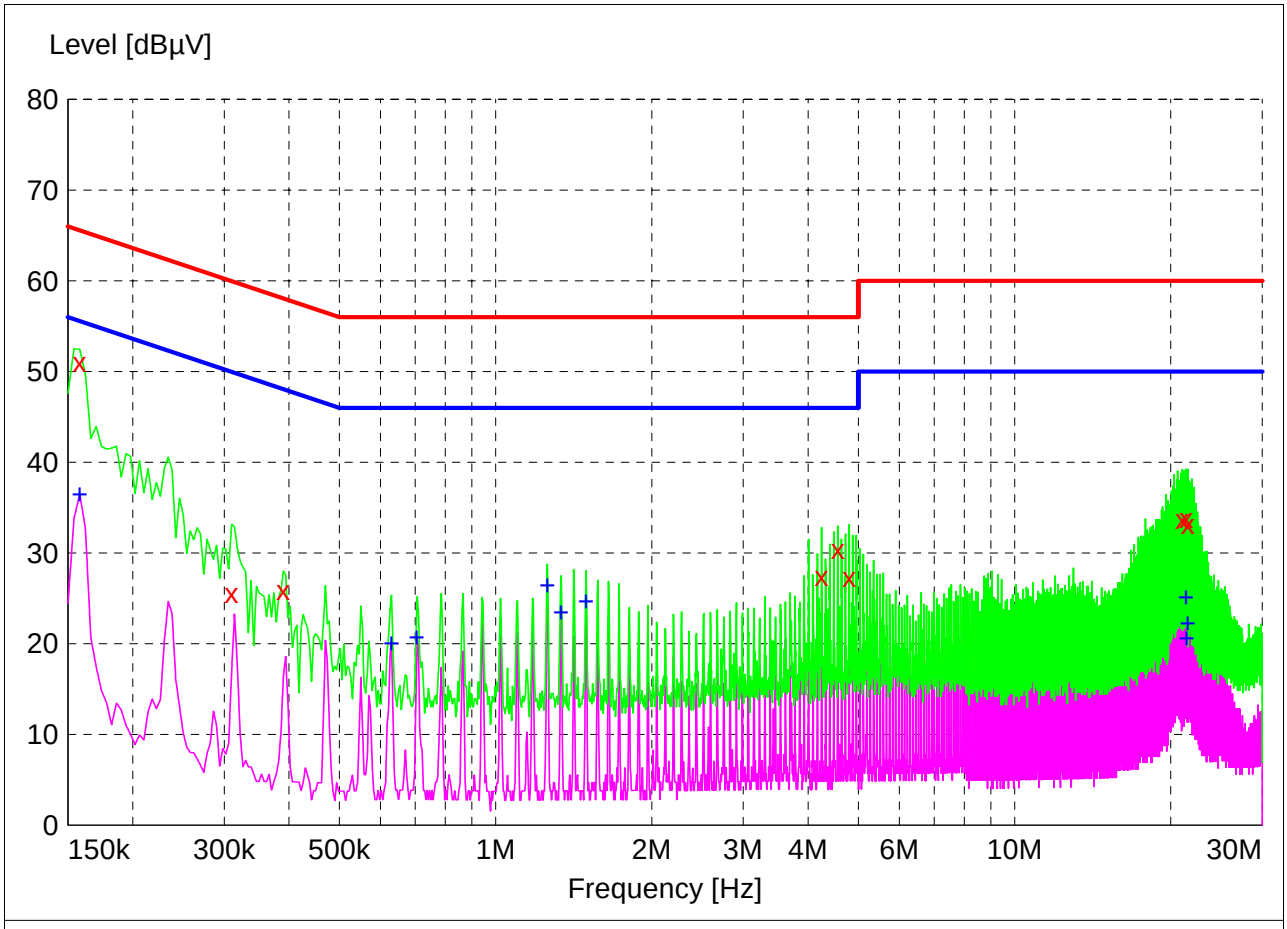
Voltage Mains Test

EUT:	USB Stick Model: HA22
Manufacturer:	Intermatic, Inc.
Operating Condition:	68 deg. F, 32% R.H.
Test Site:	DLS O.F. Site 1 (Screenroom)
Operator:	Craig Brandt
Test Specification:	120 VAC; 60 Hz
Comment:	Line 1
	Date: 01-09-2006

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 DLS#128



MEASUREMENT RESULT: "HA22L1_fin QP"

1/9/2006 9:41AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.158000	51.00	11.4	66	14.5	---	---
0.310000	25.60	10.5	60	34.4	---	---
0.390000	25.90	10.3	58	32.1	---	---
4.246000	27.40	10.4	56	28.6	---	---
4.562000	30.40	10.4	56	25.6	---	---
4.802000	27.30	10.4	56	28.7	---	---
21.010000	33.70	10.9	60	26.3	---	---
21.406000	33.80	10.9	60	26.2	---	---
21.562000	33.20	10.9	60	26.8	---	---

MEASUREMENT RESULT: "HA22L1_fin AV"

1/9/2006 9:41AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.158000	36.50	11.4	56	19.1	---	---
0.630000	20.00	10.3	46	26.0	---	---
0.706000	20.70	10.3	46	25.3	---	---
1.258000	26.50	10.3	46	19.5	---	---
1.338000	23.50	10.3	46	22.5	---	---
1.494000	24.70	10.3	46	21.3	---	---
21.406000	25.10	10.9	50	24.9	---	---
21.482000	20.60	10.9	50	29.4	---	---
21.562000	22.20	10.9	50	27.8	---	---

FCC Part 15 Class B

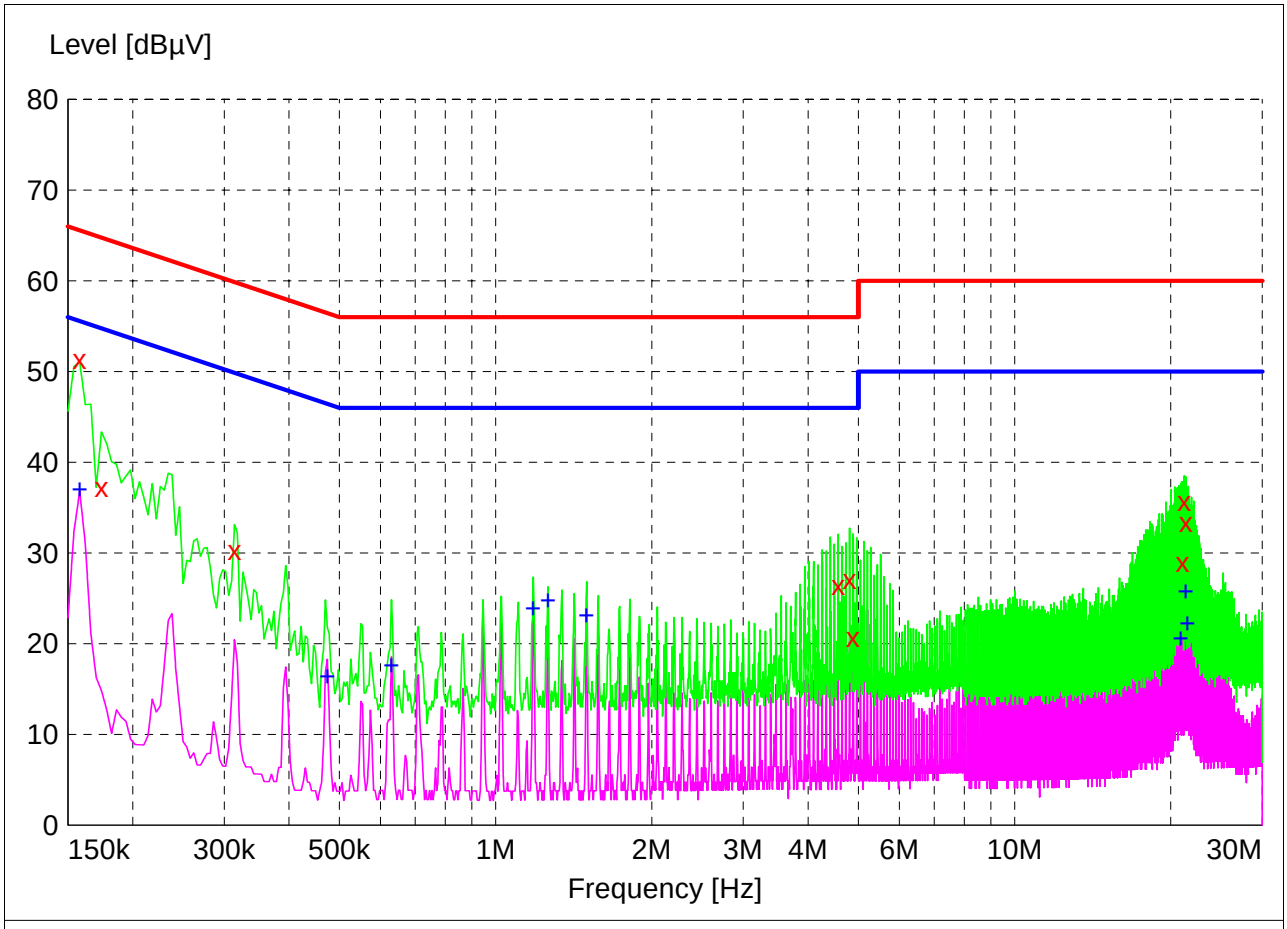
Voltage Mains Test

EUT:	USB Stick Model: HA22
Manufacturer:	Intermatic, Inc.
Operating Condition:	68 deg. F, 32% R.H.
Test Site:	DLS O.F. Site 1 (Screenroom)
Operator:	Craig Brandt
Test Specification:	120 VAC; 60 Hz
Comment:	Line 2
	Date: 01-09-2006

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 DLS#128



MEASUREMENT RESULT: "HA22L2_fin QP"

1/9/2006 9:47AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.158000	51.40	11.4	66	14.2	---	---
0.174000	37.20	11.1	65	27.5	---	---
0.314000	30.30	10.5	60	29.6	---	---
4.570000	26.40	10.4	56	29.6	---	---
4.806000	27.10	10.4	56	28.9	---	---
4.882000	20.70	10.4	56	35.3	---	---
21.050000	29.00	10.9	60	31.0	---	---
21.218000	35.70	10.9	60	24.3	---	---
21.374000	33.40	10.9	60	26.6	---	---

MEASUREMENT RESULT: "HA22L2_fin AV"

1/9/2006 9:47AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.158000	37.00	11.4	56	18.6	---	---
0.474000	16.40	10.2	46	30.0	---	---
0.630000	17.60	10.3	46	28.4	---	---
1.182000	23.90	10.3	46	22.1	---	---
1.262000	24.80	10.3	46	21.2	---	---
1.498000	23.20	10.3	46	22.8	---	---
20.898000	20.60	10.9	50	29.4	---	---
21.374000	25.80	10.9	50	24.2	---	---
21.530000	22.20	10.9	50	27.8	---	---

APPENDIX A

2.0 BAND EDGE AND RESTRICT BAND COMPLIANCE

The field strength of any emissions appearing outside the 902 to 928 MHz band shall not exceed the general radiated emissions limits as stated Section 15.209. The fundamental from the USB Z-Wave Stick transmitter shall not be inside the restrict band 960 to 1240 MHz.

As stated in Section 15.205a, the fundamental emission from the USB Z-Wave Stick shall not fall within any of the bands listed below:

Frequency in MHz	Frequency in MHz	Frequency in MHz	Frequency in GHz
.0900 to .1100	162.0125 to 167.17	2310.0 to 2390	9.30 to 9.50
.4900 to .5100	167.7200 to 173.20	2483.5 to 2500	10.60 to 12.70
2.1735 to 2.1905	240.000 to 285.00	2655.0 to 2900	13.25 to 13.40
8.362 to 8.3660	322.200 to 335.40	3260.0 to 3267	14.47 to 14.50
13.36 to 13.410	399.900 to 410.00	3332.0 to 3339	15.35 to 16.20
25.50 to 25.670	608.000 to 614.00	3345.8 to 3358	17.70 to 21.40
37.50 to 38.250	960.000 to 1240.00	3600.0 to 4400	22.01 to 23.13
73.00 to 75.500	1300.000 to 1427.00	4500.0 to 5250	23.60 to 24.00
108.00 to 121.94	1435.000 to 1626.50	5350.0 to 5450	31.20 to 31.80
123.00 to 138.00	1660.000 to 1710.00	7250.0 to 7750	36.43 to 36.50
149.90 to 150.00	1718.800 to 1722.20	8025.0 to 8500	ABOVE 38.60
156.70 to 156.90	2200.000 to 2300.00	9000.0 to 9200	

NOTE:

The noise floor within the Restricted Bands for the EMC Receiver and HP Spectrum Analyzer will typically lay 20 dB below the limit.

See the following page (s) for the graph (s) made showing compliance for Band Edge and Restrict Band: Also see the table of measurements made for the Fundamental and Spurious emissions in paragraph 3 of this section.

APPENDIX A

DATA AND GRAPH(S) TAKEN SHOWING THE BAND EDGE AND RESTRICT BAND COMPLIANCE

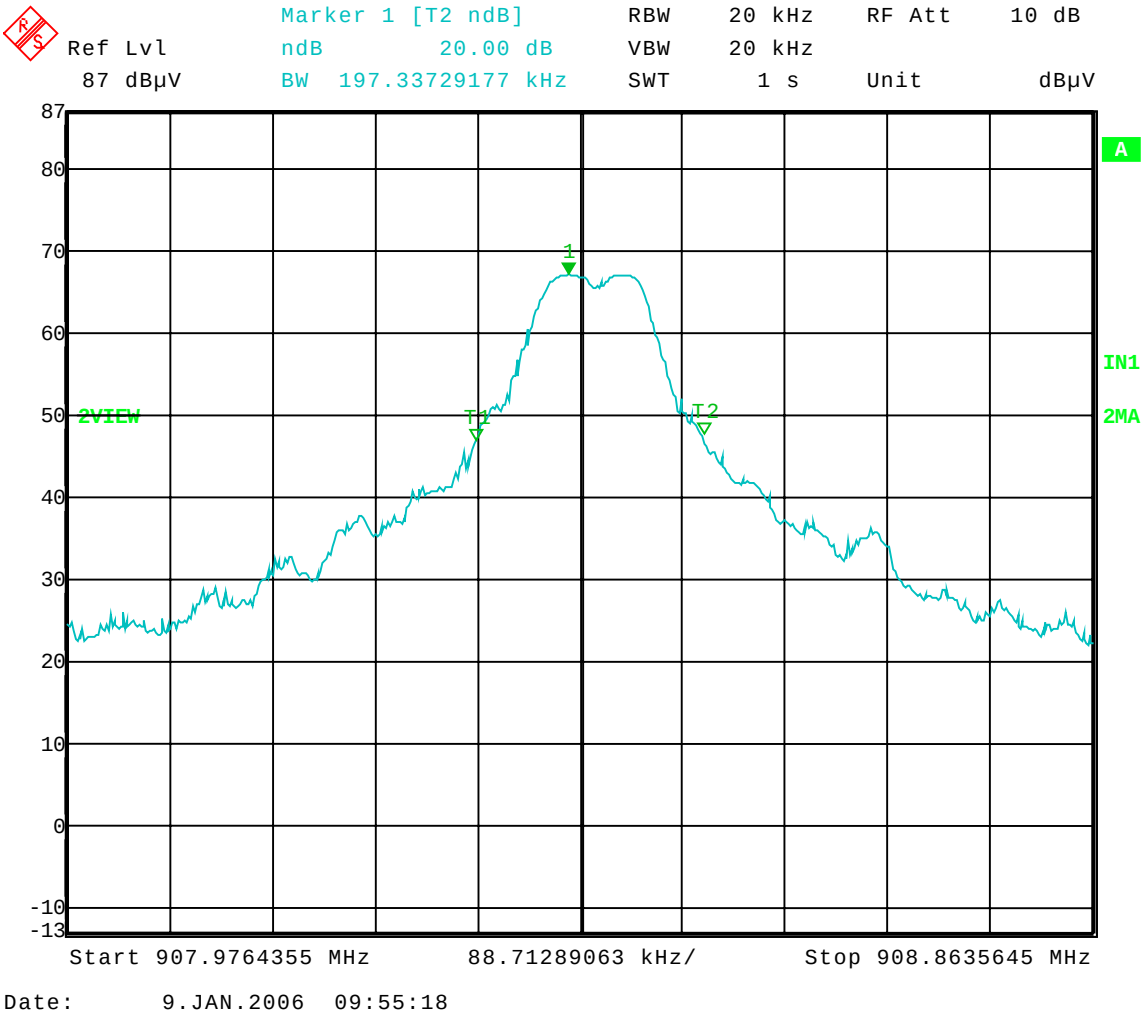
PART 15.249

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 01-09-2006
Company: Intermatic, Inc.
EUT: USB Stick Model: HA22
Test: 20 dB Bandwidth
Operator: Craig Brandt
Comment:

20 dB Bandwidth = 197 kHz



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APPENDIX A

3.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS (SECTION 15.249a-d)

The radiated measurements made at D.L.S. Electronic Systems, Inc., for the USB Z-Wave Stick, Model Number: HA22, 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 30 MHz 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 USB Z-Wave Stick were made up to 10000 MHz, in accordance with Section 15.33a for Intentional Radiators with a fundamental frequency of 908.42 MHz. For intentional radiators, the frequency range to be investigated is determined by the lowest radio frequency generated by the device without going below 30 MHz, up to at least the tenth harmonic of the highest fundamental frequency or 10 GHz, whichever is lower. At those frequencies where significant signals were detected, measurements were made over the entire frequency range specified in FCC Part 15, Subpart C, Section 15.249 at the open field test site, located at Genoa City, Wisconsin, FCC file number **31040/SIT**. When required, levels were extrapolated from 10 meters to 3 meters using a linear extrapolation.

All signals in the frequency range of 30 MHz to 2000 MHz were measured with a Biconical Antenna or tuned dipoles and from 200 MHz to 1000 MHz, a Log Periodic or Tuned Dipoles were used. From 1000 MHz to 10 GHz Horn Antennas 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 of emissions. In order to find maximum emissions, the cables were moved through all the positions the equipment would be expected to experience in the field. The EUT, peripheral equipment and cables were configured to meet the conditions in ANSI C63.4-2003, Clauses 6 & 8. Tests were made with the receive antenna(s) in both the horizontal and vertical planes of polarization. In each case, the table was rotated to find the maximum emissions.

APPENDIX A

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

For operation in the bands 902 to 928 MHz, 2400 to 2483.5 MHz, 5725 to 5875 MHz, and 24.0 to 24.25 GHz the field strength of any emissions within this band shall not exceed the field strength levels specified in the following table as stated in FCC, Part 15, Section 15.249(a).

Frequency range in MHz	Field Strength of Fundamental millivolts/meter	Field Strength of Fundamental dBuV/meter	Field Strength of Harmonics microvolts/meter	Field Strength of Harmonics dBuV/meter
902 to 928	50	93.98	500	53.98
2400 to 2483.5	50	93.98	500	53.98
5725 to 5875	50	93.98	500	53.98
24000 to 24250	250	107.96	2500	67.96

Field strength limits are at a distance of 3 meters. The emission limits shown are based on measurement instrumentation employing an average detector.

Emissions radiated outside of the specified frequency bands, except for harmonics are attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Preliminary radiated emission measurements were performed at a 3 meter test distance. The frequency range from 30 MHz to 1000 MHz was automatically scanned and plotted at various angles.

NOTE:

All radiated emissions measurements were made at a test room temperature of **71°F** at **29%** relative humidity.

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RADIATED DATA AND GRAPH(S) TAKEN FOR

FUNDAMENTAL EMISSION MEASUREMENTS

PART 15.249

FCC Part 15.249

Electric Field Strength

```
EUT:                  USB Stick  Model: HA22
Manufacturer:         Intermatic, Inc.
Operating Condition:  71 deg. F; 29% R.H.
Test Site:            DLS OF Site 3
Operator:             Craig Brandt
Test Specification:
Comment:              Continuous Transmit  908.42 MHz
                      Date: 01-06-2006
```

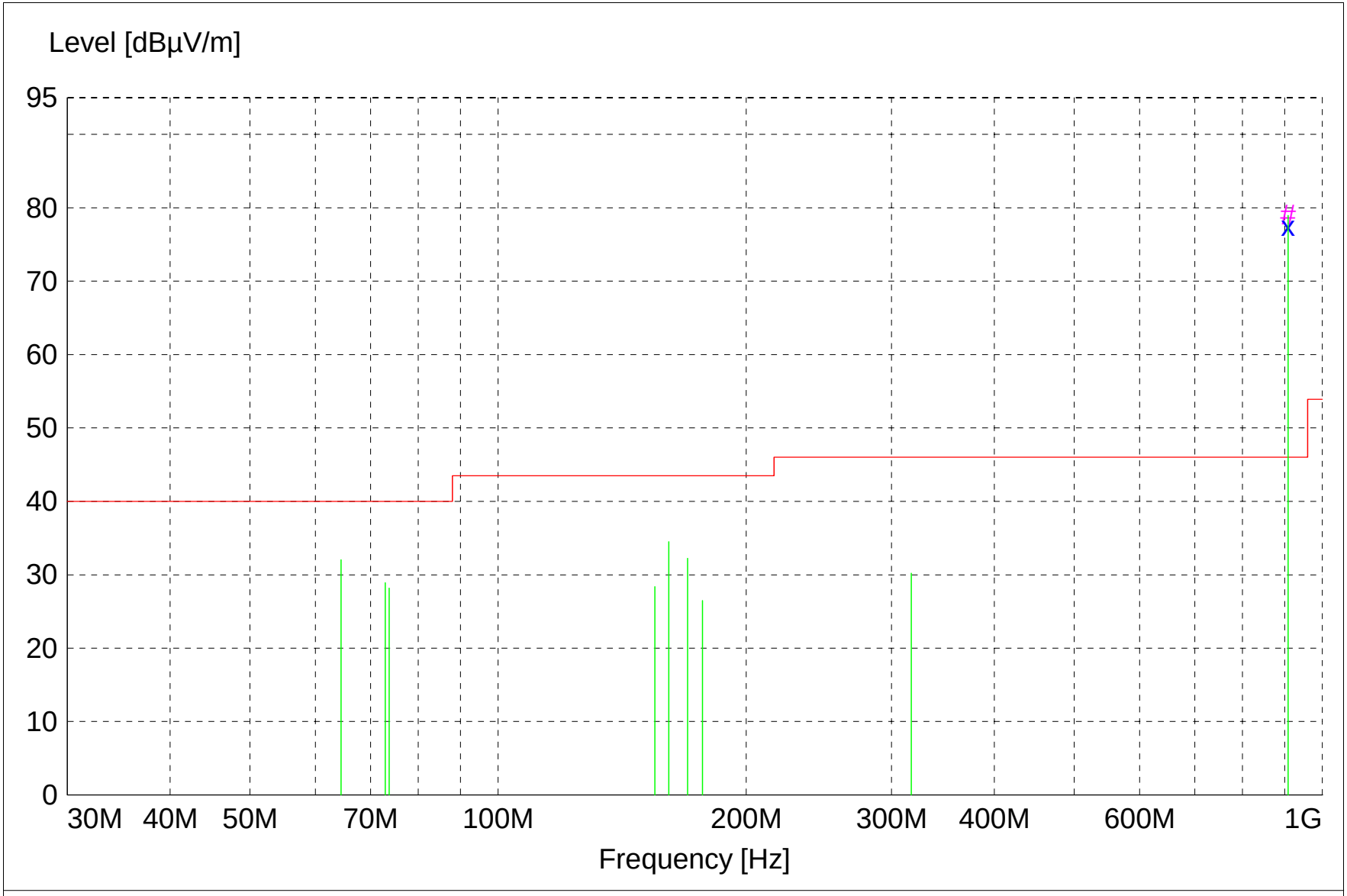
TEXT: "Site 3 MidV 3M"

```
  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 Polarization
```



MES Aha01_F1V_Quasi-Peak
MES Aha01_F1V_Average
MES Aha01_F1V_Peak
LIM FCC ClassB F QP/AV Field Strength FCC Class B 3m

MEASUREMENT RESULT: "Aha01_F1V_Final"

1/6/2006 2:49PM

Frequency MHz	Level dBµV	Antenna Factor dBµV/m	System Loss dB	Total Level dBµV/m	Limit dBµV/m	Margin dB	Height Ant. m	EuT Angle deg	Final Detector	Comment
908.420000	74.81	22.67	-18.4	79.1	94.0	14.9	1.10	135	MAX PEAK	fundamental
908.420000	74.70	22.67	-18.4	79.0	94.0	15.0	1.10	135	QUASI-PEAK	fundamental
908.420000	73.15	22.67	-18.4	77.4	94.0	16.6	1.10	135	AVERAGE	fundamental
64.445000	47.55	8.63	-24.1	32.1	40.0	7.9	1.00	160	QUASI-PEAK	None
161.070000	44.28	13.18	-22.9	34.5	43.5	9.0	1.00	180	QUASI-PEAK	None
72.900000	46.32	6.61	-24.0	28.9	40.0	11.1	1.00	180	QUASI-PEAK	None
169.675000	40.61	14.53	-22.9	32.2	43.5	11.3	1.00	225	QUASI-PEAK	None
73.775000	45.53	6.62	-24.0	28.2	40.0	11.8	1.00	180	QUASI-PEAK	None
154.920000	38.77	12.62	-23.0	28.4	43.5	15.1	1.00	200	QUASI-PEAK	None
317.210000	36.51	15.53	-21.8	30.2	46.0	15.8	1.90	195	QUASI-PEAK	None
177.050000	33.75	15.57	-22.8	26.5	43.5	17.0	1.00	225	QUASI-PEAK	None

FCC Part 15.249

Electric Field Strength

```
EUT:                  USB Stick  Model: HA22
Manufacturer:         Intermatic, Inc.
Operating Condition:  71 deg. F; 29% R.H.
Test Site:            DLS OF Site 3
Operator:             Craig Brandt
Test Specification:
Comment:              Continuous Transmit  908.42 MHz
                      Date: 01-06-2006
```

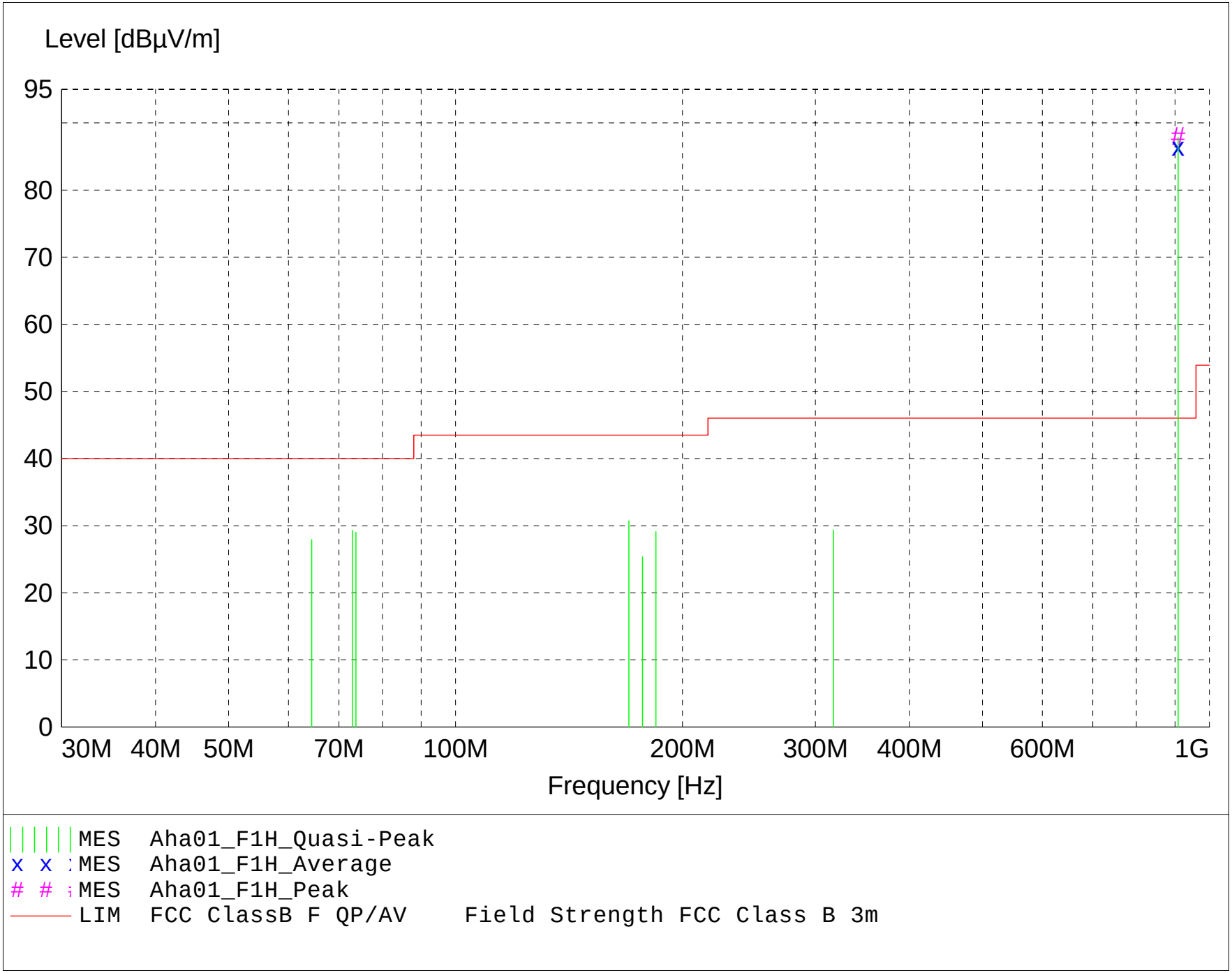
TEXT: "Site 3 MidH 3M"

```
  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 Polarization
```


Level [dBµV/m]
95
80
70
60
50
40
30
20
10
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
MES Aha01_F1H_Quasi-Peak
MES Aha01_F1H_Average
MES Aha01_F1H_Peak
LIM FCC ClassB F QP/AV Field Strength FCC Class B 3m

MEASUREMENT RESULT: "Aha01_F1H_Final"

1/6/2006 2:47PM

Frequency MHz	Level dBµV	Antenna Factor dBµV/m	System Loss dB	Total Level dBµV/m	Limit dBµV/m	Margin dB	Height Ant. m	EuT Angle deg	Final Detector	Comment
908.420000	83.70	22.67	-18.4	88.0	94.0	6.0	1.00	225	MAX PEAK	fundamental
908.420000	83.58	22.67	-18.4	87.8	94.0	6.2	1.00	225	QUASI-PEAK	fundamental
908.420000	82.21	22.67	-18.4	86.5	94.0	7.5	1.00	225	AVERAGE	fundamental
72.910000	46.69	6.61	-24.0	29.3	40.0	10.7	3.00	170	QUASI-PEAK	None
73.775000	46.32	6.62	-24.0	29.0	40.0	11.0	3.00	170	QUASI-PEAK	None
64.435000	43.39	8.64	-24.1	27.9	40.0	12.1	3.00	180	QUASI-PEAK	None
169.675000	39.07	14.53	-22.9	30.7	43.5	12.8	1.10	160	QUASI-PEAK	None
184.435000	35.15	16.73	-22.8	29.1	43.5	14.4	1.30	180	QUASI-PEAK	None
317.230000	35.69	15.53	-21.8	29.4	46.0	16.6	1.00	60	QUASI-PEAK	None
177.050000	32.61	15.57	-22.8	25.3	43.5	18.2	1.90	140	QUASI-PEAK	None

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RADIATED DATA AND GRAPH(S) TAKEN FOR

FIELD STRENGTH

SPURIOUS EMISSION MEASUREMENTS

PART 15.209

FCC Part 15.249

Electric Field Strength

```
EUT:                  USB Stick  Model: HA22
Manufacturer:         Intermatic, Inc.
Operating Condition:  71 deg. F; 29% R.H.
Test Site:            DLS OF Site 3
Operator:             Craig Brandt
Test Specification:
Comment:              Continuous Transmit  908.42 MHz
                      Date: 01-06-2006
```

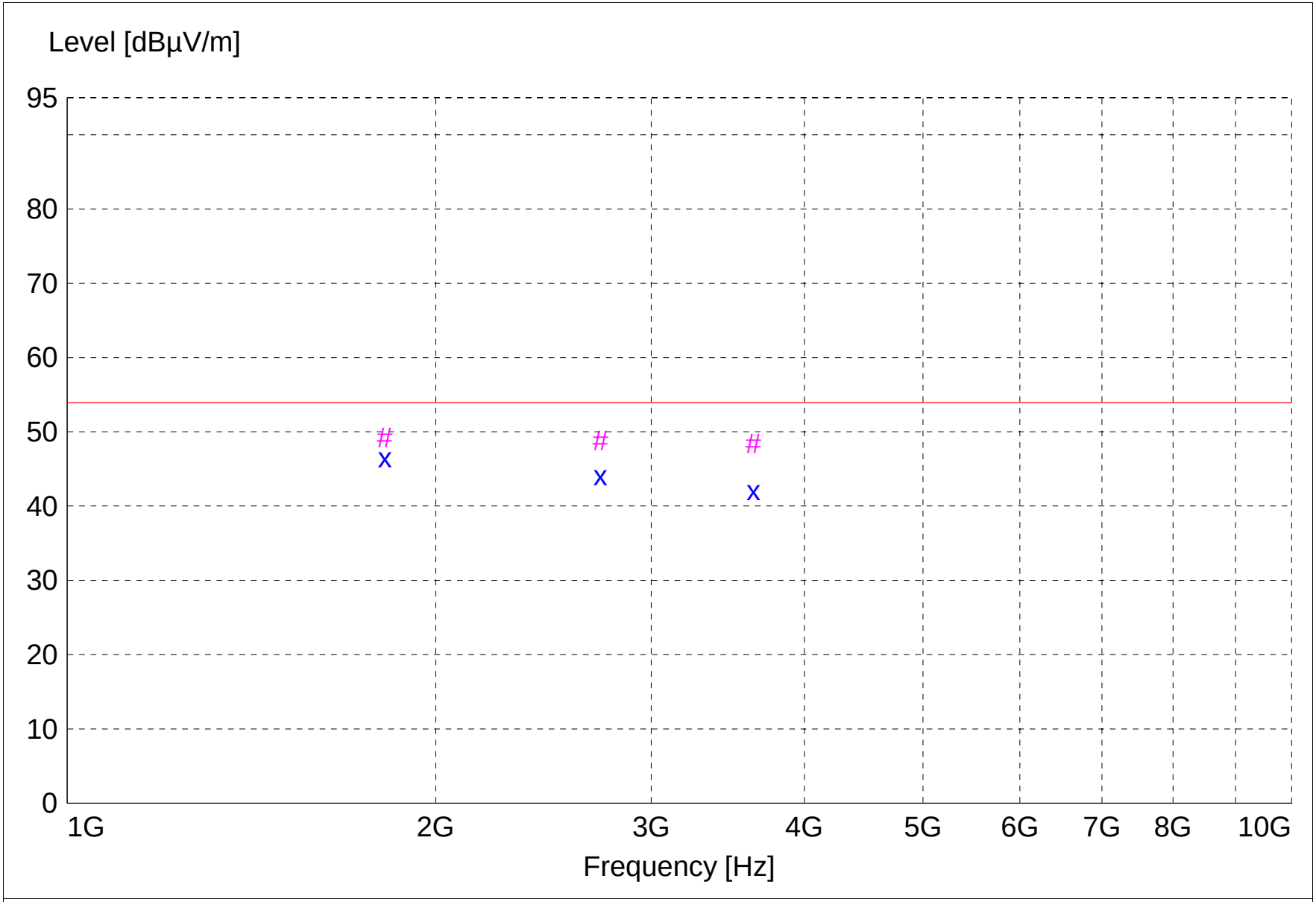
TEXT: "Site 3 5731&184 V3M"

```
  Short Description:            Test Set-up Vert1GHz-
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/006

                Horn Antenna --- EMCO 3115 SN: 9903-5731

                Pre-Amps ---
                                1 - 10 GHz  -- CIAO CA118-4010  SN: 101
                                10 - 18 GHz -- Miteq AMF-6F-100200-50-10P SN: 668382

TEST SET-UP:    EUT Measured at 3 Meters with VERTICAL Antenna Polarization
```



x x : MES Aha01_sv_Average
: MES Aha01_sv_Peak
——— LIM FCC ClassB F QP/AV Field Strength FCC Class B 3m

MEASUREMENT RESULT: "Aha01_sv_Final"

1/6/2006 10:52AM

Frequency MHz	Level dBµV	Antenna Factor dBµV/m	System Loss dB	Total Level dBµV/m	Limit dBµV/m	Margin dB	Height Ant. m	EuT Angle deg	Final Detector	Comment
1816.840000	60.30	26.67	-37.8	49.2	53.9	4.7	1.20	90	MAX PEAK	None
2725.260000	57.22	29.15	-37.6	48.7	53.9	5.2	1.20	180	MAX PEAK	None
3633.680000	53.49	31.41	-36.5	48.4	53.9	5.5	1.20	225	MAX PEAK	None
1816.840000	57.61	26.67	-37.8	46.5	53.9	7.4	1.20	90	AVERAGE	None
2725.260000	52.53	29.15	-37.6	44.0	53.9	9.9	1.20	180	AVERAGE	None
3633.680000	47.22	31.41	-36.5	42.1	53.9	11.8	1.20	225	AVERAGE	None

FCC Part 15.249

Electric Field Strength

```
EUT:                  USB Stick  Model: HA22
Manufacturer:         Intermatic, Inc.
Operating Condition:  71 deg. F; 29% R.H.
Test Site:            DLS OF Site 3
Operator:             Craig Brandt
Test Specification:
Comment:              Continuous Transmit  908.42 MHz
                      Date: 01-06-2006
```

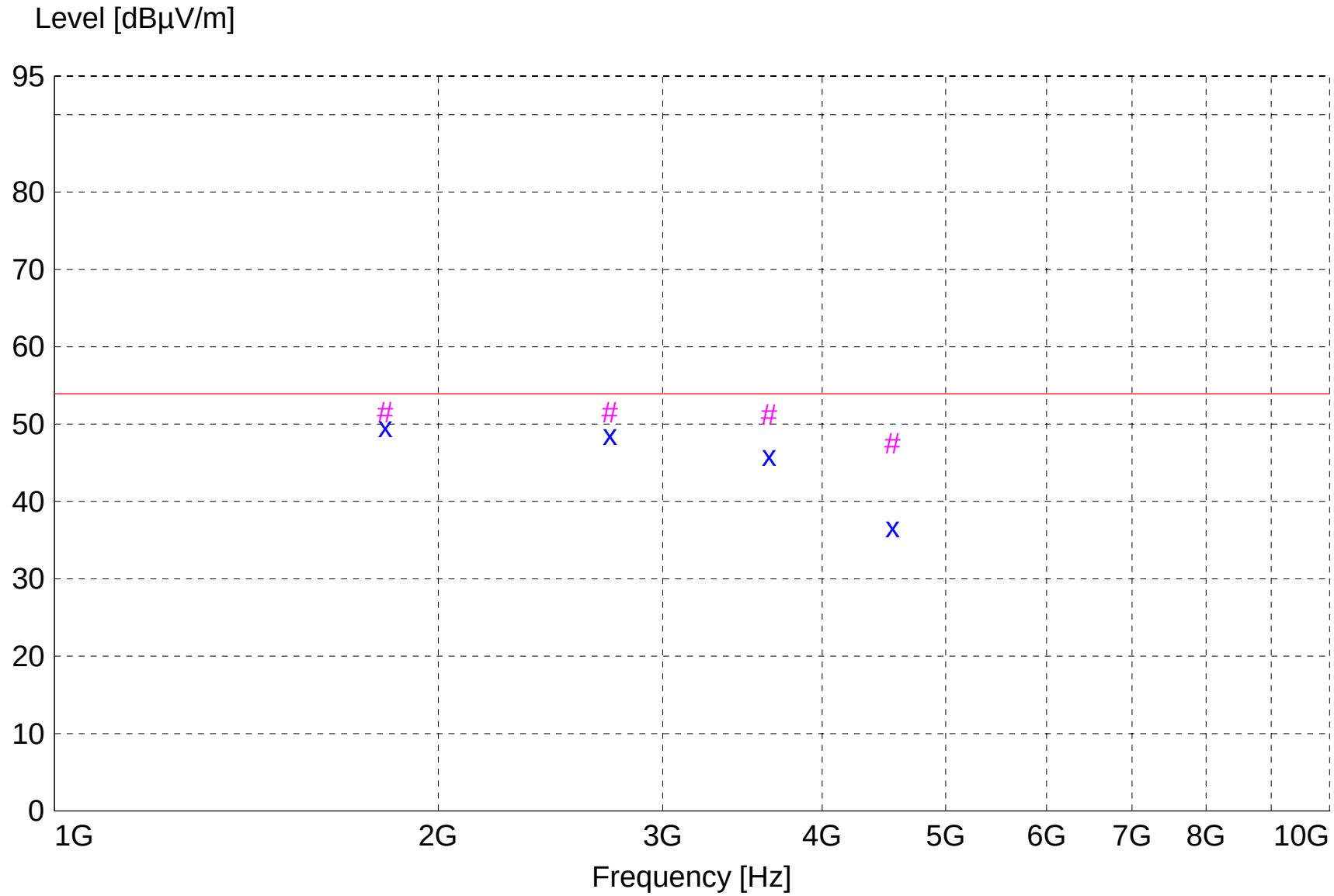
TEXT: "Site 3 5731&184 H3M"

```
  Short Description:            Test Set-up Horz1GHz-
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/006

                Horn Antenna --- EMCO 3115 SN: 9903-5731

                Pre-Amps ---
                                1 - 10 GHz  -- CIAO CA118-4010  SN: 101
                                10 - 18 GHz -- Miteq AMF-6F-100200-50-10P SN: 668382

TEST SET-UP:    EUT Measured at 3 Meters with HORIZONTAL Antenna Polarization
```



x x : MES Aha01_sh_Average
: MES Aha01_sh_Peak
——— LIM FCC ClassB F QP/AV Field Strength FCC Class B 3m

MEASUREMENT RESULT: "Aha01_sh_Final"

1/6/2006 11:06AM

Frequency MHz	Level dBµV	Antenna Factor dBµV/m	System Loss dB	Total Level dBµV/m	Limit dBµV/m	Margin dB	Height Ant. m	EuT Angle deg	Final Detector	Comment
2725.260000	60.04	29.15	-37.6	51.6	53.9	2.3	1.20	270	MAX PEAK	None
1816.840000	62.63	26.67	-37.8	51.5	53.9	2.4	1.20	225	MAX PEAK	None
3633.680000	56.31	31.41	-36.5	51.2	53.9	2.7	1.00	270	MAX PEAK	None
1816.840000	60.78	26.67	-37.8	49.7	53.9	4.2	1.20	225	AVERAGE	None
2725.260000	57.11	29.15	-37.6	48.6	53.9	5.3	1.20	270	AVERAGE	None
4542.100000	50.47	32.16	-35.1	47.5	53.9	6.4	1.00	160	MAX PEAK	None
3633.680000	50.94	31.41	-36.5	45.8	53.9	8.1	1.00	270	AVERAGE	None
4542.100000	39.56	32.16	-35.1	36.6	53.9	17.3	1.00	160	AVERAGE	None