DLS ELECTRONIC SYSTEMS, INC.
NVLAP 100276-0

1250 Peterson Dr., Wheeling, IL 60090

Company: Klipsch Audio Technologies
Model Tested: iFi
Report Number: 11323

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:	Klipsch iFi 2.1 Audio System
Kind of Equipment:	Onboard RF Transmitter for Upgradeable Two-Way Remote Control of iFi Audio System
Test Configuration:	Control/Docking Station with integrated RF Transmitter, 2 Satellite Speakers, 1 Subwoofer with Amplifier (Tested at 120 vac, 60 Hz)
Model Number(s):	iFi
Model(s) Tested:	iFi
Serial Number(s):	NA
Date of Tests:	April 13 & 14, 2005
Test Conducted For:	Klipsch Audio Technologies 3502 Woodview Trace, Suite 200 Indianapolis, Indiana 46268

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:

Klipsch Audio Technologies

1250 Peterson Dr., Wheeling, IL 6009

Company: Klipsch Audio Technologies
Model Tested: iFi
Report Number: 11323

United States Department of Commerce
National Institute of Standards and Technology

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ISO 9002:1994

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ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

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D.L.S. ELECTRONIC SYSTEMS, INC.
1250 Peterson Drive
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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 CISPR 11 (2002), and CNS 13803 (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 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

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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 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
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)

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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	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 (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 47 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, Ed. 2.1 (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
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

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NVLAP Code	*Designation / Description*
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

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NVLAP Code	*Designation / Description*
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 2, Rev. 1 (November 6, 1999): 2GHz Personal Communications Services
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

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NVLAP Code	*Designation / Description*
12/RSS141	RSS-141, Issue 1 (July 2003): 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 1 (November 6, 1999): Fixed Wireless Access Systems in the Band 3400 - 3700 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 5 (November 2001): Low Power Licence-Exempt Radiocommunication Devices
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

Telecommunications Test Methods:

12/FCC2a2	TIA/EIA 603A (2001) with 47 CFR Part 2: Public Mobile Services in 47 CFR Part 22
12/FCC2b2	TIA/EIA 603A (2001) with 47 CFR Part 2: Private Land Mobile Radio Services in 47 CFR Part 90
12/FCC2d1	TIA/EIA 603A (2001) with 47 CFR Part 2: Experimental Radio, Auxiliary, Special Broadcast and Other Program Distributional Services in 47 CFR Part 74
12/FCC2e1	TIA/EIA 603A (2001) with 47 CFR Part 2: International Fixed Public Radiocommunication Services in 47 CFR Part 23
12/CIS15c	EN 55015 (2000) + A1 (2001): Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment

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NVLAP Code	*Designation / Description*
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
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

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NVLAP Code	*Designation / Description*
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 Klipsch iFi 2.1 Audio System, Model Number(s) iFi, **"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. For the receiver portion, a DOC is available upon request.

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

Text: 56

2.0 INTRODUCTION

On April 13 & 14, 2005, a series of radio frequency interference measurements was performed on Klipsch iFi 2.1 Audio System, Model Number(s) iFi, 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 C63.4-2003. 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.

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

7.1 Description:

The iFi system consist of a base unit to cradle an iPod, satellite speakers, and a subwoofer/amplifier that contains additional power supply circuitry. The dock/controller unit of the iFi system contains a system processor operating at a crystal frequency of 9.8304Mhz. This microcontroller is responsible for overall control of the iFi system including communicating to the iPod via a serial-like connection at 19.2K baud, and to an internal integrated FSK based RF transceiver device. The RF transceiver section uses FSK to send and receive data, incorporates a PLL and VCO, and operates with a 16.0Mhz reference crystal for a final transmit/receive frequency of 916.7Mhz. When in transmit mode, data is sent via FSK at a carrier of 916.7Mhz with the deviation set at 170Khz. And as data is transmitted, a "1" corresponds to 916.78Mhz, and a "0" corresponds to 916.61Mhz.

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7.0 DESCRIPTION OF TEST SAMPLE: (CON'T)

7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

Dock: Length: 5.5" x Width: 4" x Height: 1"
Subwoofer: Length: 14" x Width: 10.5"x Height: 11.5"
Satellite Speaker: Length: 5.75" x Width: 5"x Height: 9"

7.3 LINE FILTER USED:

KAT 1400-06 B

7.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

NA

Clock Frequencies:

16.000 MHz, 9.8304 MHz, 300 kHz (oscillator in audio amplifier)

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7.0 DESCRIPTION OF TEST SAMPLE: (CON'T)

7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. Preamplifier and Power Supply PN: 1000-07D
2. Power Amplifier PN: 1100-06C
3. AC Filter Board PN: 1400-06B
4. Transmitter/Receiver and controller board PN: ifi_d2
5. Switch and Rotary encoder board PN: ifi2_d

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

1: There were no additional descriptions noted at the time of test.

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

1250 Peterson Dr., Wheeling, IL 60090

9.0 PHOTO INFORMATION AND TEST SET-UP

Item 0 Klipsch iFi 2.1 Audio System
Model Number: iFi, Serial Number: NA

Item 1 Non-shielded AC Power Line Cord. 6'

Item 2 Shielded Auxiliary Input Cable. 1m

Item 3 Right Satellite Speaker and non-shielded Right Satellite Speaker Cable.

Item 4 Left Satellite Speaker and non-shielded Left Satellite Speaker Cable.

Item 5 Apple iPOD, Model Number: A1051, SN: JQ50915N543

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10.0 RADIATED PHOTOS TAKEN DURING TESTING

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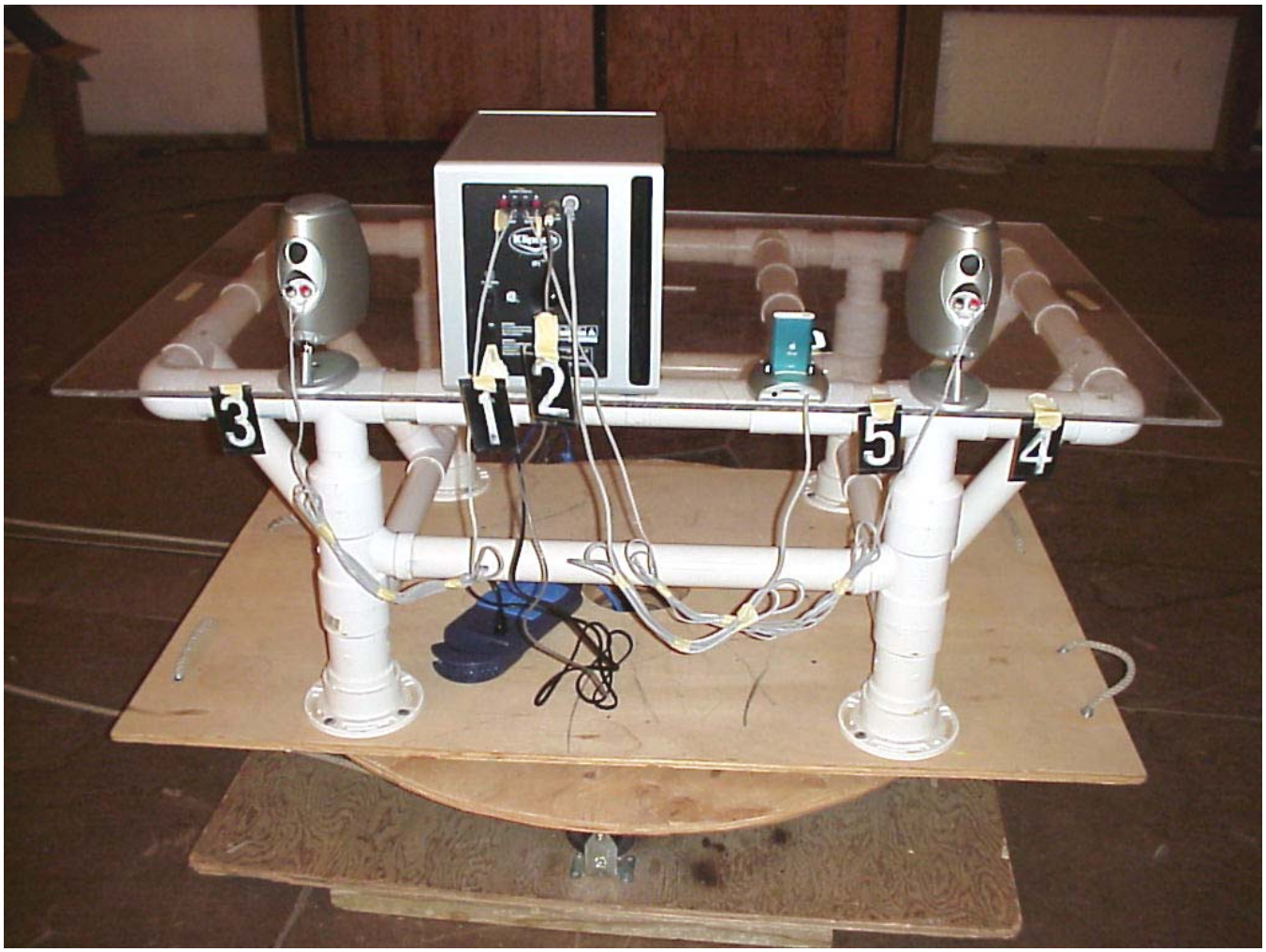
10.0 RADIATED PHOTOS TAKEN DURING TESTING: (CON'T)



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10.0 CONDUCTED PHOTOS TAKEN DURING TESTING

1250 Peterson Dr., Wheeling, IL 60090

10.0 CONDUCTED PHOTOS TAKEN DURING TESTING: (CON'T)

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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 Klipsch iFi 2.1 Audio System, Model Number(s) iFi **"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. For the receiver portion, a DOC is available upon request.

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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	10/05
Quasi-Peak Adapter	Hewlett/ Packard	85650A	2043A00121	10 kHz – 1 GHz	10/05
Spectrum Analyzer	Hewlett/ Packard	8566B	2421A00452	100 Hz – 22 GHz	2/06
Quasi-Peak Adapter	Hewlett/ Packard	85650A	2043A00450	10 kHz – 1 GHz	2/06
Spectrum Analyzer	Hewlett/ Packard	8591A	3009A00700	9 kHz – 1.8 GHz	3/06
Receiver	Electrometrics	EMC-30	44168	10 kHz – 1 GHz	9/05
Receiver	Rohde & Schwarz	ESI 26	837491/010	20 Hz – 26 GHz	11/05
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	12/05
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	12/05
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

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	3/06
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	8/05
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	8/05
LISN	Solar	8012-50-R-24-BNC	8305116	10 MHz – 30 MHz	8/05
LISN	Solar	8012-50-R-24-BNC	814548	10 MHz – 30 MHz	8/05
LISN	Solar	9252-50-R-24-BNC	961019	10 MHz – 30 MHz	12/05
LISN	Solar	9252-50-R-24-BNC	971612	10 MHz – 30 MHz	10/05
LISN	Solar	9252-50-R-24-BNC	92710620	10 MHz – 30 MHz	7/05

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 15.249a-e

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

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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 **71°F** at **36%** relative humidity.

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APPENDIX A

CONDUCTED DATA AND GRAPH(S) TAKEN DURING TESTING

PART 15.207

FCC Part 15 Class B

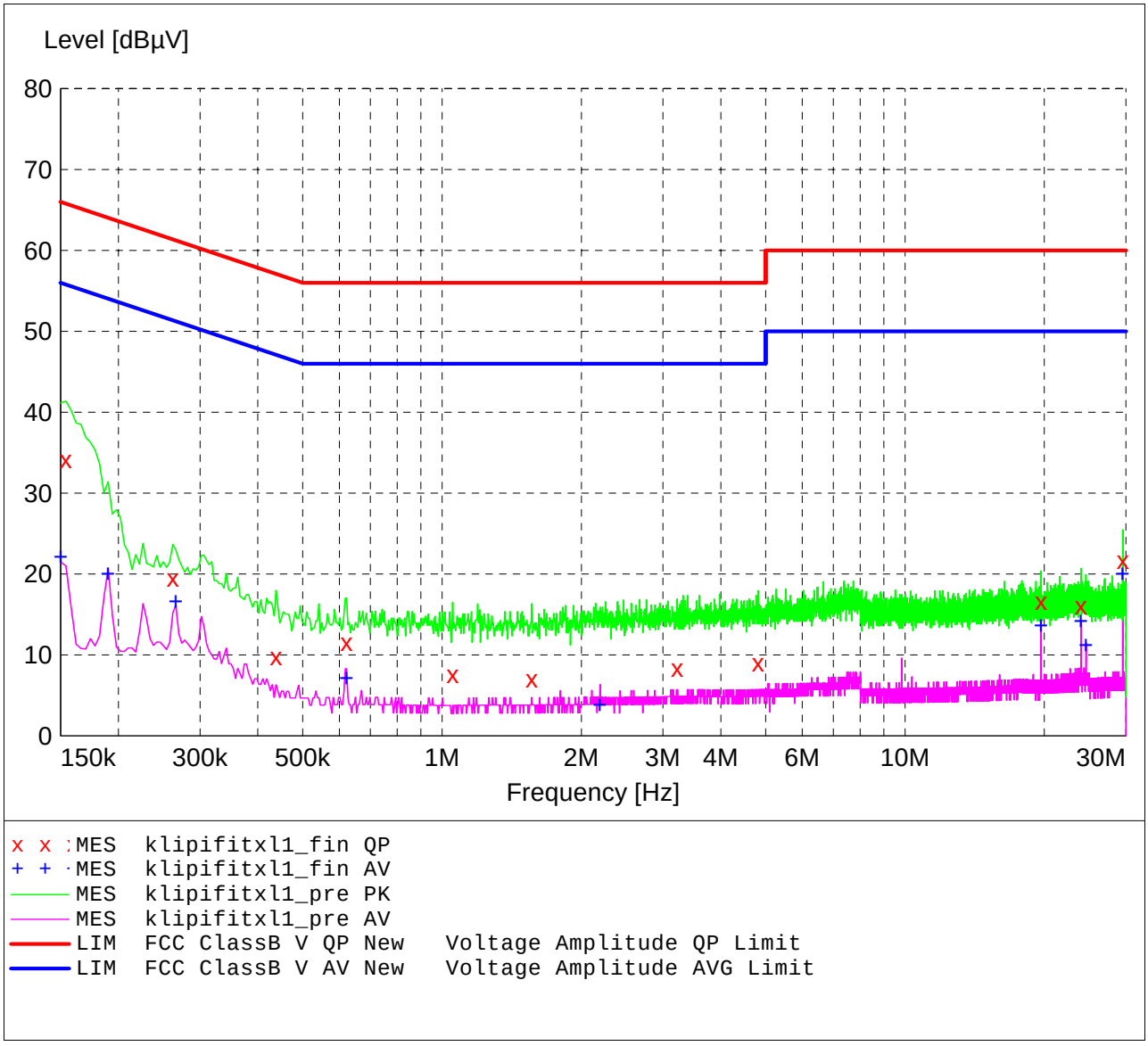
Voltage Mains Test

EUT:	iFi
Manufacturer:	Klipsch
Operating Condition:	71 deg. F, 36% R.H.
Test Site:	DLS O.F. Screen Room
Operator:	Jason L
Test Specification:	120 VAC @ 60 Hz
Comment:	Line 1 - Tx Mode: 916.7 MHz
	Date: 04-14-2005

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: "klipifitxl1_fin QP"

4/14/2005 9:17AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.154000	34.20	11.4	66	31.6	---	---
0.262000	19.50	10.6	61	41.8	---	---
0.438000	9.80	10.3	57	47.3	---	---
0.622000	11.60	10.3	56	44.4	---	---
1.054000	7.60	10.2	56	48.4	---	---
1.562000	7.00	10.3	56	49.0	---	---
3.222000	8.40	10.5	56	47.6	---	---
4.814000	9.00	10.5	56	47.0	---	---
19.682000	16.60	10.8	60	43.4	---	---
24.002000	16.10	11.0	60	43.9	---	---
29.522000	21.70	11.2	60	38.3	---	---

MEASUREMENT RESULT: "klipifitxl1_fin AV"

4/14/2005 9:17AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.150000	22.10	11.5	56	33.9	---	---
0.190000	20.10	11.0	54	33.9	---	---
0.266000	16.60	10.6	51	34.7	---	---
0.622000	7.20	10.3	46	38.8	---	---
2.194000	3.90	10.3	46	42.1	---	---
19.682000	13.70	10.8	50	36.3	---	---
23.998000	14.20	11.0	50	35.8	---	---
24.602000	11.20	11.0	50	38.8	---	---
29.522000	20.10	11.2	50	29.9	---	---

FCC Part 15 Class B

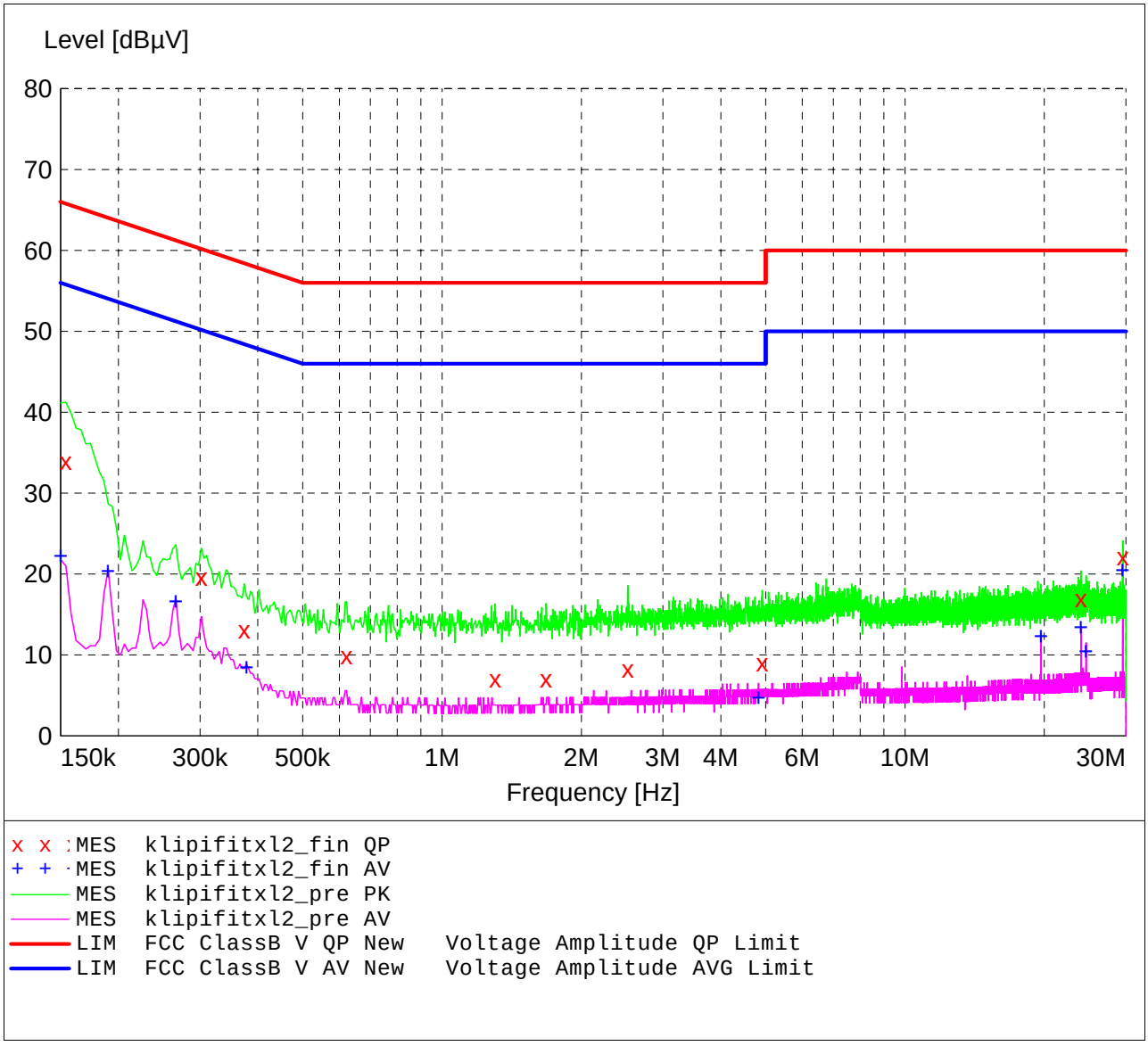
Voltage Mains Test

EUT:	iFi
Manufacturer:	Klipsch
Operating Condition:	71 deg. F, 36% R.H.
Test Site:	DLS O.F. Screen Room
Operator:	Jason L
Test Specification:	120 VAC @ 60 Hz
Comment:	Line 2 - Tx Mode: 916.7 MHz
	Date: 04-14-2005

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: "klipifitxl2_fin QP"

4/14/2005 9:25AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.154000	33.90	11.4	66	31.9	---	---
0.302000	19.60	10.5	60	40.6	---	---
0.374000	13.10	10.4	58	45.3	---	---
0.622000	9.90	10.3	56	46.1	---	---
1.302000	7.00	10.3	56	49.0	---	---
1.678000	7.00	10.3	56	49.0	---	---
2.518000	8.30	10.3	56	47.7	---	---
4.918000	9.00	10.5	56	47.0	---	---
23.998000	17.00	11.0	60	43.0	---	---
29.522000	22.10	11.2	60	37.9	---	---

MEASUREMENT RESULT: "klipifitxl2_fin AV"

4/14/2005 9:25AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.150000	22.20	11.5	56	33.8	---	---
0.190000	20.40	11.0	54	33.7	---	---
0.266000	16.60	10.6	51	34.7	---	---
0.378000	8.50	10.4	48	39.9	---	---
4.826000	4.70	10.5	46	41.3	---	---
19.682000	12.30	10.8	50	37.7	---	---
23.998000	13.50	11.0	50	36.5	---	---
24.602000	10.50	11.0	50	39.5	---	---
29.522000	20.50	11.2	50	29.5	---	---

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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 Klipsch iFi 2.1 Audio System transmitter shall not be inside the restrict band 960 to 1240 MHz.

NOTE: See the following page (s) for the graph (s) made showing compliance for Band Edge and Restrict Band:

See the radiated data taken of the Fundamental and Spurious Emissions on pages 43 to 56.

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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 Klipsch iFi 2.1 Audio System, Model Number: iFi, 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 Klipsch iFi 2.1 Audio System were made up to 10000 MHz, in accordance with Section 15.33a for Intentional Radiators with a fundamental frequency of 916.7 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.

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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 **70°F** at **43%** relative humidity.

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APPENDIX A

RADIATED DATA AND GRAPH(S) TAKEN FOR

FUNDAMENTAL EMISSION MEASUREMENTS

PART 15.249

FCC Part 15.249 Fundamental and Spurious Emissions

Electric Field Strength

```
EUT:                 iFi Docking System
Manufacturer:        Klipsch
Operating Condition: 70 degF; 38% R.H.
Test Site:           DLS O.F. Site 2
Operator:            Jason L.
Test Specification:  120 VAC; 60 Hz
Comment:
                     Date: 04/13/2005
```

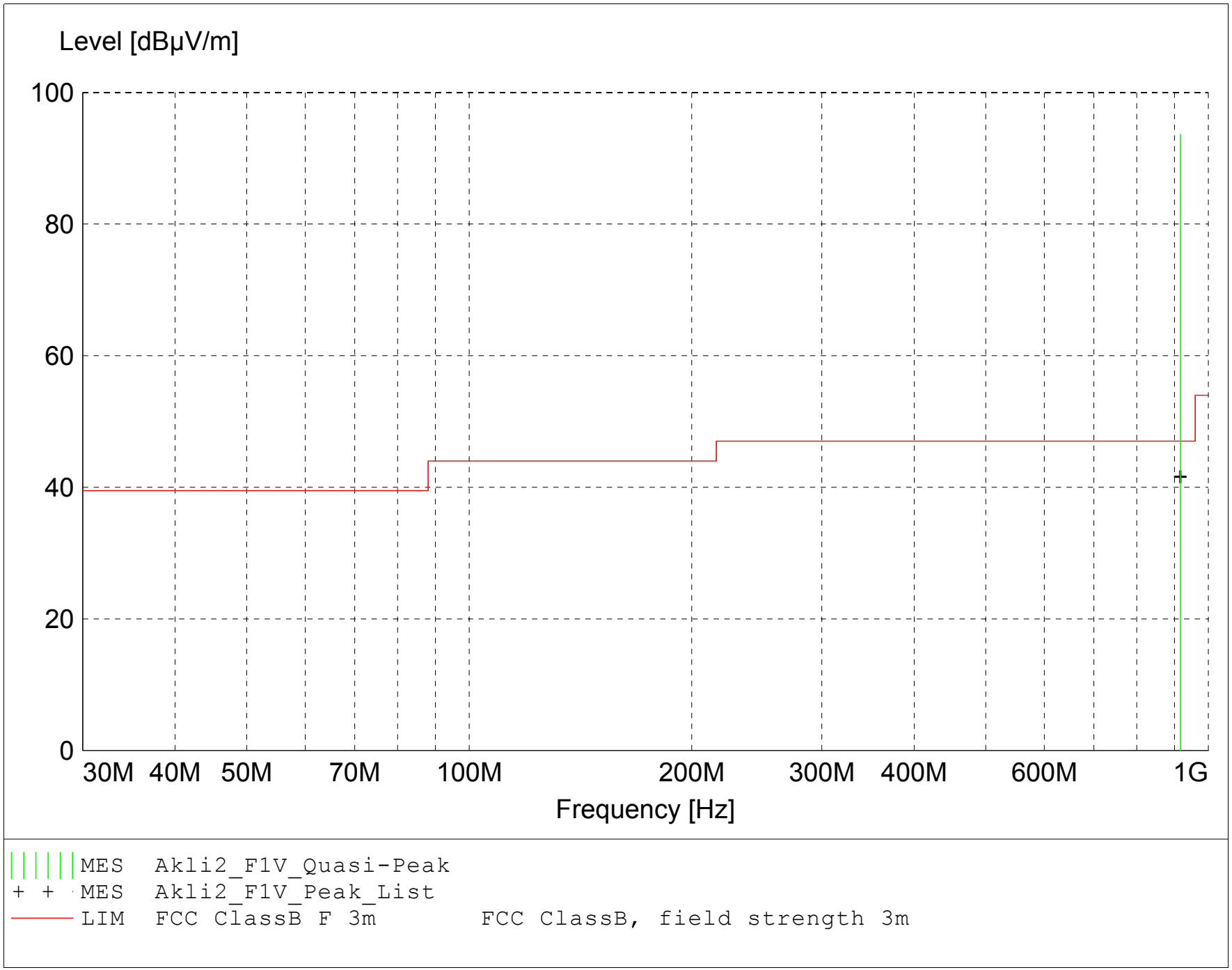
TEXT: "Site 2 MidV 3M"

```
  Short Description:            Test Set-up Vert30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/005

                Antennas ---
                Biconical    -- EMCO 3104C SN: 0005-4892
                Log Periodic -- Electro Metrics LPA-25 SN: 1205

                Pre-Amp  --- Rohde&Schwarz TS-PR10 SN: 032001/004

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



MES Akli2_F1V_Quasi-Peak
MES Akli2_F1V_Peak_List
LIM FCC ClassB F 3m FCC ClassB, field strength 3m

MEASUREMENT RESULT: "Akli2_F1V_Final"

4/13/2005 1:06PM

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		
916.700000	63.03	23.11	7.4	93.6	47.0	-46.6	1.20	180	QUASI-PEAK	Fundamental

FCC Part 15.249 Fundamental and Spurious Emissions

Electric Field Strength

```
EUT:                 iFi Docking System
Manufacturer:        Klipsch
Operating Condition: 70 degF; 38% R.H.
Test Site:           DLS O.F. Site 2
Operator:            Jason L.
Test Specification:  120 VAC; 60 Hz
Comment:
                     Date: 04/13/2005
```

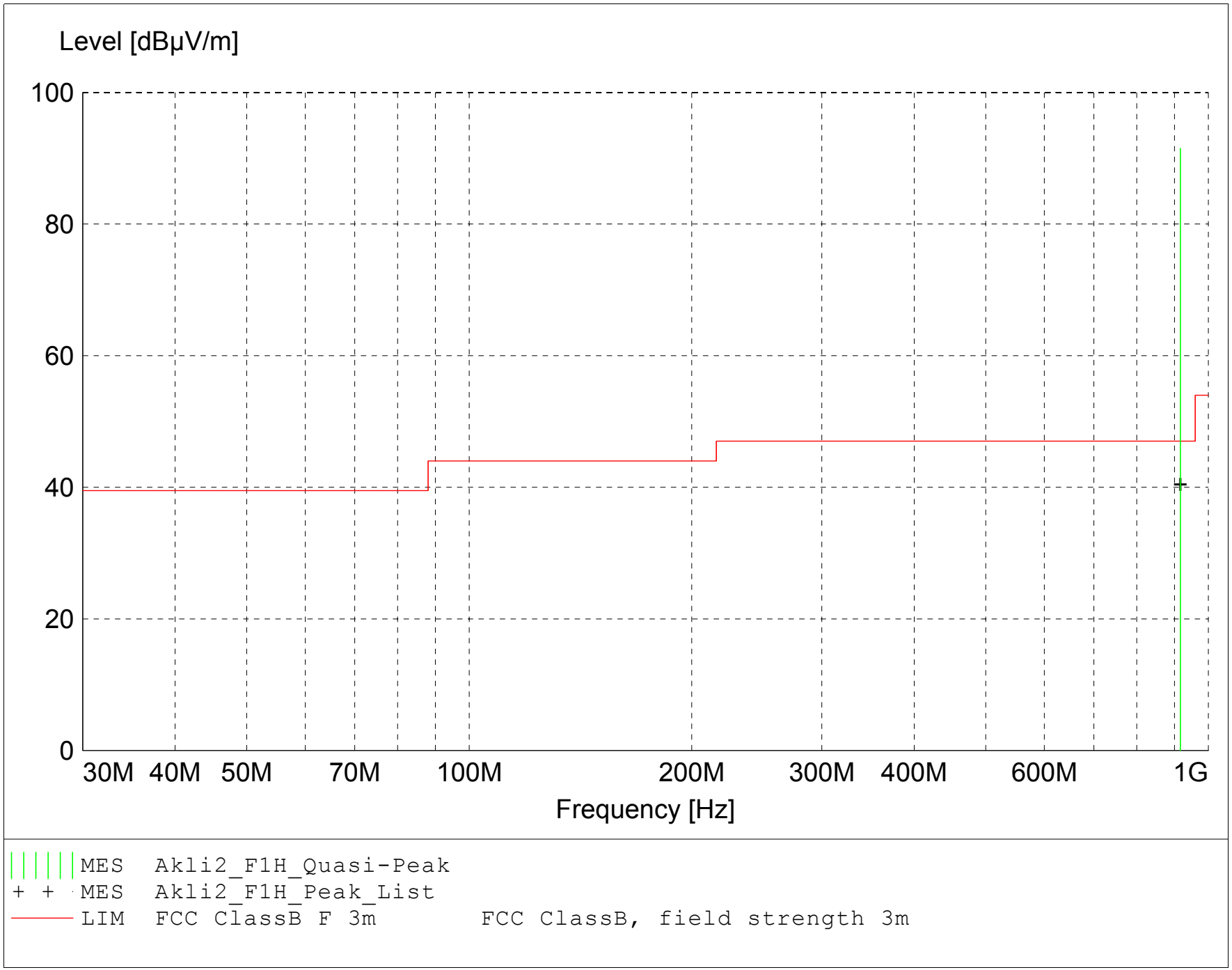
TEXT: "Site 2 MidH 3M"

```
  Short Description:            Test Set-up Horz30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/005

                Antennas ---
                Biconical    -- EMCO 3104C SN: 0005-4892
                Log Periodic -- Electro Metrics LPA-25 SN: 1205

                Pre-Amp  --- Rohde&Schwarz TS-PR10 SN: 032001/004

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


Level [dBµV/m]
100
80
60
40
20
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
MES Akli2_F1H_Quasi-Peak
MES Akli2_F1H_Peak_List
LIM FCC ClassB F 3m
FCC ClassB, field strength 3m

MEASUREMENT RESULT: "Akli2_F1H_Final"

4/13/2005 1:12PM

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		
916.700000	60.97	23.11	7.4	91.5	47.0	-44.5	1.00	325	QUASI-PEAK	Fundamental

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APPENDIX A

RADIATED DATA AND GRAPH(S) TAKEN FOR

FIELD STRENGTH

SPURIOUS EMISSION MEASUREMENTS

PART 15.209

FCC Part 15.249 Spurious Emissions

Electric Field Strength

```
EUT:                 iFi Docking Station
Manufacturer:        Klipsch
Operating Condition: 70 deg F; 43% R.H.
Test Site:           DLS O.F. Site 2
Operator:            Jason L.
Test Specification:  120 Volts; 60 Hz
Comment:
                     Date: 04/13/05
```

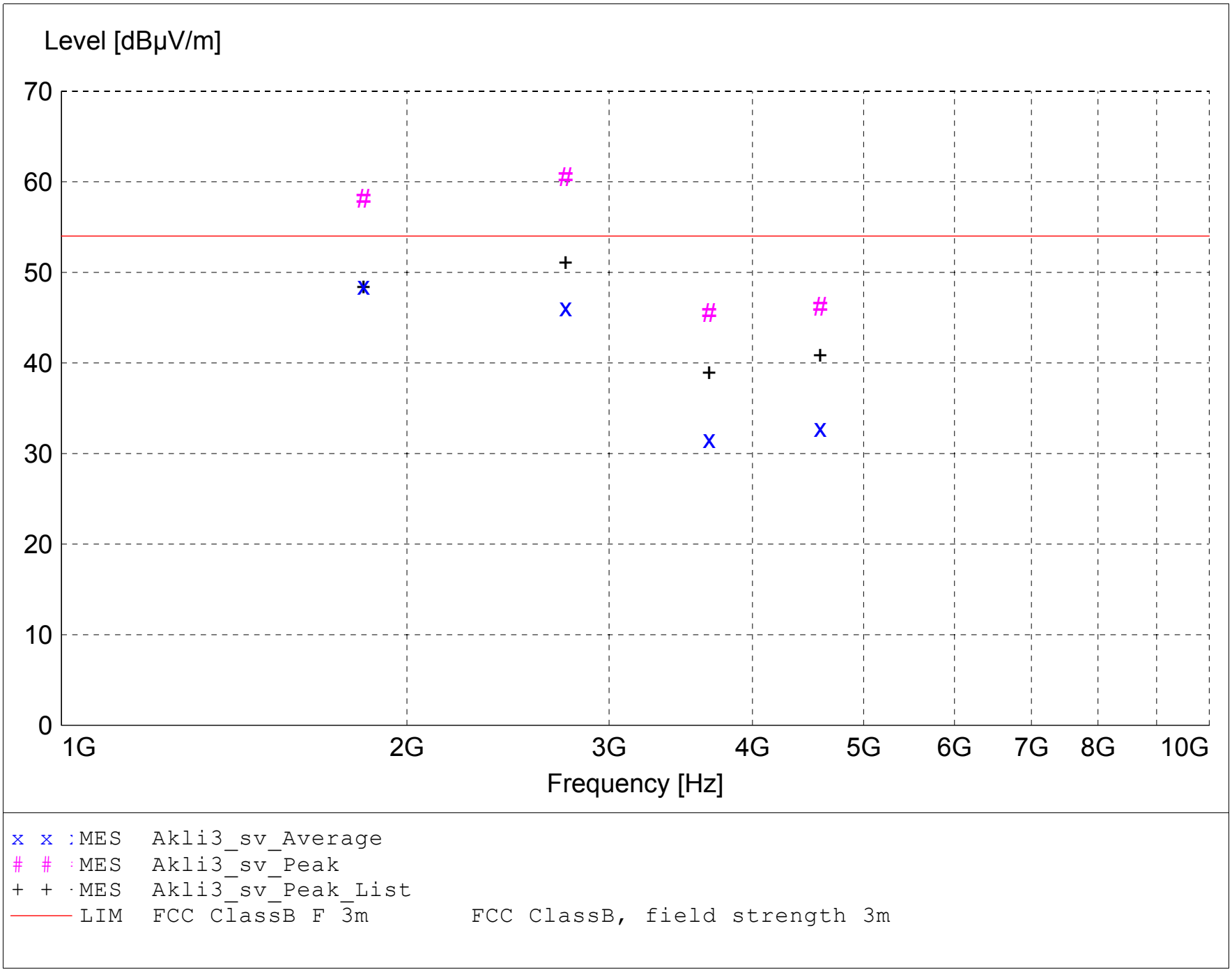
TEXT: "Site 2 6204&106 V3M"

```
  Short Description:            Test Set-up Vert1GHz-
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/005

                Horn Antenna --- ETS 3115 SN: 6204

                Pre-Amps ---
                               1 - 18 GHz  -- Miteq AMF-6D-010100-50 SN: 213976
                               18 - 26 GHz -- Miteq AMF-6B-100200-50 SN: 313936

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



x x :MES Akli3_sv_Average
:MES Akli3_sv_Peak
+ + :MES Akli3_sv_Peak_List
——— LIM FCC ClassB F 3m FCC ClassB, field strength 3m

MEASUREMENT RESULT: "Akli3_sv_Final"

4/13/2005 2:08PM

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		
2750.100000	66.70	29.35	-35.5	60.5	54.0	-6.5	1.10	200	MAX PEAK	3rd Harmonic
1833.400000	67.69	26.57	-36.2	58.1	54.0	-4.1	1.10	180	MAX PEAK	2nd Harmonic
1833.400000	58.12	26.57	-36.2	48.5	54.0	5.5	1.10	180	AVERAGE	2nd Harmonic
4583.000000	48.21	32.47	-34.5	46.2	54.0	7.8	1.10	180	MAX PEAK	5th Harmonic
2750.100000	52.26	29.35	-35.5	46.1	54.0	7.9	1.10	200	AVERAGE	3rd Harmonic
3668.000000	49.14	31.67	-35.3	45.5	54.0	8.5	1.10	180	MAX PEAK	4th Harmonic
4583.000000	34.81	32.47	-34.5	32.8	54.0	21.2	1.10	180	AVERAGE	5th Harmonic
3668.000000	35.21	31.67	-35.3	31.6	54.0	22.4	1.10	180	AVERAGE	4th Harmonic

FCC Part 15.249 Spurious Emissions

Electric Field Strength

```
EUT:                 iFi Docking Station
Manufacturer:        Klipsch
Operating Condition: 70 deg F; 43% R.H.
Test Site:           DLS O.F. Site 2
Operator:            Jason L.
Test Specification:  120 Volts; 60 Hz
Comment:
                     Date: 04/13/05
```

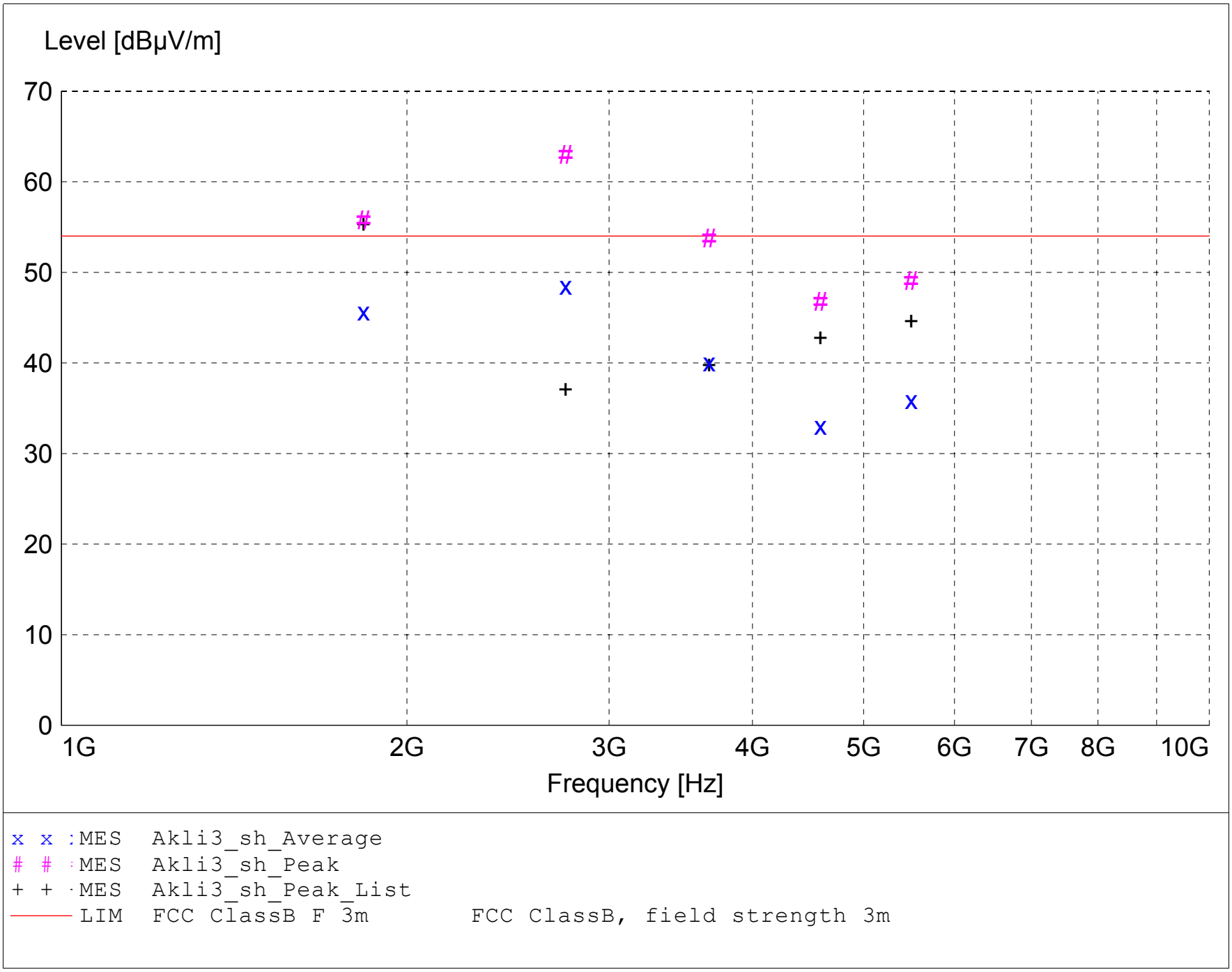
TEXT: "Site 2 6204&106 H3M"

```
  Short Description:            Test Set-up Horz1GHz-
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/005

                Horn Antenna --- ETS 3115 SN: 6204

                Pre-Amps ---
                               1 - 18 GHz  -- Miteq AMF-6D-010100-50 SN: 213976
                               18 - 26 GHz -- Miteq AMF-6B-100200-50 SN: 313936

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



x x :MES Akli3_sh_Average
:MES Akli3_sh_Peak
+ + :MES Akli3_sh_Peak_List
——— LIM FCC ClassB F 3m FCC ClassB, field strength 3m

MEASUREMENT RESULT: "Akli3_sh_Final"

4/13/2005 2:25PM

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		
2750.100000	69.15	29.35	-35.5	63.0	54.0	-9.0	1.20	225	MAX PEAK	3rd Harmonic
1833.400000	65.32	26.57	-36.2	55.7	54.0	-1.7	1.20	290	MAX PEAK	2nd Harmonic
3666.800000	57.38	31.67	-35.3	53.7	54.0	0.3	1.10	160	MAX PEAK	4th Harmonic
5500.200000	48.47	34.10	-33.5	49.1	54.0	4.9	1.20	290	MAX PEAK	6th Harmonic
2750.100000	54.67	29.35	-35.5	48.5	54.0	5.5	1.20	225	AVERAGE	3rd Harmonic
4583.500000	48.74	32.47	-34.5	46.7	54.0	7.3	1.20	270	MAX PEAK	5th Harmonic
1833.400000	55.27	26.57	-36.2	45.7	54.0	8.3	1.20	290	AVERAGE	2nd Harmonic
3666.800000	43.70	31.67	-35.3	40.0	54.0	14.0	1.10	160	AVERAGE	4th Harmonic
5500.200000	35.31	34.10	-33.5	35.9	54.0	18.1	1.20	290	AVERAGE	6th Harmonic
4583.500000	35.05	32.47	-34.5	33.0	54.0	21.0	1.20	270	AVERAGE	5th Harmonic