

10. Annex A: FCC Part 15 Subpart B Unintentional Radiator Test Report for the i-Port III Transceiver Operated in Receive Mode

REPORT OF MEASUREMENTS

SYSTEM: NEMA ENCLOSURE-MOUNTED FIXED UHF
INTELLIGENT LONG RANGE INTERROGATOR
SYSTEM WITH AC – DC POWER SUPPLY

MODEL: i-PORT III

MANUFACTURER: IDENTEC SOLUTIONS, INC.

ADDRESS: 102 - 1860 DAYTON STREET,
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CANADA

WORK ORDER: 02-EMC-1219-0423

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11. General

11.1 Document History

REVISION	DATE	COMMENTS
-	26 January 2003	Initial Release, Harry H. Hodes

Note: Acme Testing Co. hereby makes the following statements so as to conform with Chapter 10 (Test Reports) Requirement of ANSI C63.4:1992 “Methods and Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz”:

- The units described in this report were received at Acme Testing Co.’s facilities on 23 December 2002. Testing was performed on the units described in this report on 24 & 26 December 2002.
- The Test Results reported herein apply only to the Units actually tested, and to substantially identical Units.
- This test report must not be used to claim product endorsement by A2LA or any agency of the U.S. Government, or any other foreign government.

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11.2 Purpose

The purpose of this report is to document the Receive-Mode compliance of the NEMA Enclosure-Mounted Fixed UHF Intelligent Long Range Interrogator System with AC - DC Power Supply, Model i-Port III to the FCC Rules (i.e. 47CFR Part 15 Subpart B, for Class B Digital Devices using CISPR Limits). This report references the applicable electromagnetic emissions requirements.

THE DATA CONTAINED IN THIS REPORT WAS COLLECTED AND COMPILED BY:


DANIEL B. STATON
LABORATORY OPERATIONS MANAGER

11.3 Manufacturer

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11.4 Test location

Laboratory: Test Site #2
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11.5 Accreditations and Listings

Acme Testing Co.'s test facilities are accredited by A2LA for a specific scope of accreditation which includes the tests detailed herein, under Certificate Numbers: 0829-01 (Acme, WA), and 0829-02 (Plummer, ID). Acme Testing Co.'s test facilities that are used to perform radiated and conducted emissions are currently registered with the Federal Communications Commission under registration numbers: 90420 (Acme, WA), and 96502 (Plummer, ID). In addition, Acme Testing Co.'s test facilities are also registered with the Industry Canada under registration numbers: IC3251 (Acme, WA), and IC3618 (Plummer, ID).

12. Manufacturer's Statement Of Responsibility

This equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations. To the best of my knowledge, these tests were performed using measurement procedures consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards. Each unit manufactured, imported or marketed, as defined in the Commission's regulations, will conform to the sample(s) tested within the variations that can be expected due to quantity production and testing on a statistical basis. I further certify that the necessary measurements were made by:

Acme Testing Co.
2002 Valley Highway
P.O. Box 3
Acme, Washington 98220
360-595-2785

Signature

Title

13. Test Results Summary

Summary of Test Results

NEMA Enclosure-Mounted Fixed UHF Intelligent Long Range Interrogator System with AC - DC Power Supply, Model i-Port III

Summary of Test Results - Emissions			
Test Specification	Test Description	Compliance Criteria	Result
FCC Rules: 47CFR Part 15, Subpart B, Section 15.107	Conducted Emissions 0.15 MHz - 30 MHz	Class B (CISPR Limits)	Pass
FCC Rules: 47CFR Part 15, Subpart B, Section 15.109	Radiated Emissions 14 MHz - 5000 MHz	Class B (CISPR Limits)	Pass
FCC Rules: 47CFR Part 15, Subpart B, Section 15.111	Antenna Conducted Spurious Emissions 14 MHz - 5000 MHz	2.0 NanoWatts (-57.0 dBm)	Pass

The signed original of this report, supplied to the client, represents the only “official” copy. Retention of any additional copies (electronic or non-electronic media) is at Acme Testing Co.’s discretion to meet internal requirements only. The client has made the determination that EUT Condition, Characterization, and Mode of Operation are representative of production units, and meet the requirements of the specifications referenced herein.

Consistent with Industry practice, measurement and test equipment not directly involved in obtaining measurement results but having an impact on measurements (such as cable loss, antenna factors, etc.) is factored into the “Correction Factor” documented in certain test results. Instrumentation employed for testing meets tolerances consistent with known Industry Standards and Regulations.

The measurements contained in this report were made in accordance with the referenced standards. Acme Testing Co. assumes responsibility only for the accuracy and completeness of this data as it pertains to the sample tested.

REVIEWED AND APPROVED BY:



Harry H. Hodes
President/CEO
Principal EMC Engineer

17 MARCH 2003

Date of Issuance

14. Description of Equipment and Peripherals

14.1 Equipment Under Test (EUT)

Device: NEMA Enclosure-Mounted Fixed UHF Intelligent Long Range Interrogator System with AC - DC Power Supply

Model Number: i-Port III

Note: The EUT consists of: the i-Port III Fixed UHF Interrogator Unit, an AC-DC “Brick” Power Supply, (both installed in a modified NEMA Enclosure) and Quantity = 5 Rectangular Patch Antennas.

i-Port Fixed UHF Interrogator Unit

Serial Number: 02394P0128

FCC ID: 02E-ILR-916IP3 (being applied for)

Power: 120 V/60 Hz

Grounding: None*

Size: 19 cm x 21 cm x 5.5 cm

* Note: The i-Port III is floating relative to the NEMA Enclosure and relative to the output side of the AC-DC Power Supply.

AC-DC Power Supply

Model Number: HUP24-12B2

Serial Number: 01024636

FCC ID: None

Power: 120 V/60Hz

Grounding: Via the Protective Earth (Ground) prong of the 3-Wire AC Plug

Size: 10.5 cm x 6.5 cm x 3 cm

Antennas:

Type: Regular Patch

Quantity: 5 (all identical)

Model Number: S9028PC (Manufactured by Cushcraft)

Note: One antenna is designated the “wake-up” antenna, it is a transmit – only antenna. The other four are identical Transmit/Receive antennas. They are multiplexed to one RF Source.

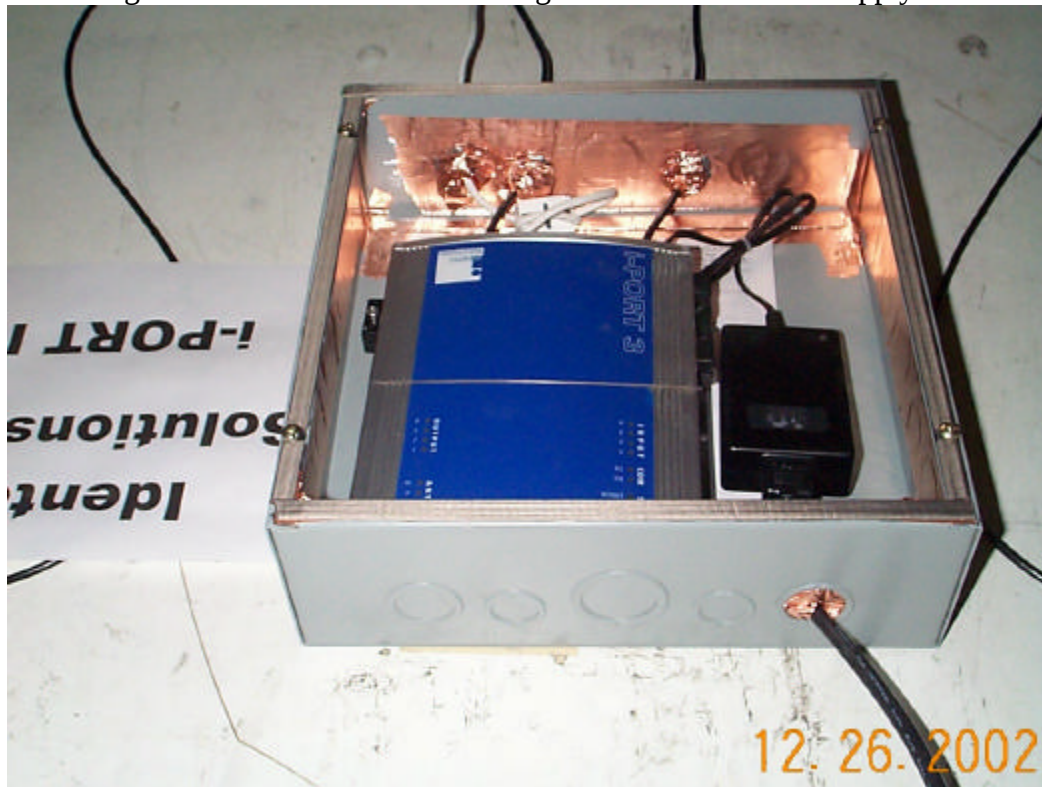
Exterior View of the i-Port III and Power Supply installed in NEMA Enclosure:



Interior view of NEMA Enclosure showing i-Port III, Power Supply and paper insulating stand off (to float the i-Port III relative to the NEMA Enclosure). Also, note the DC Input Cable (on left side), the two Black RF coaxial cables, and the white Ethernet UTP cable).



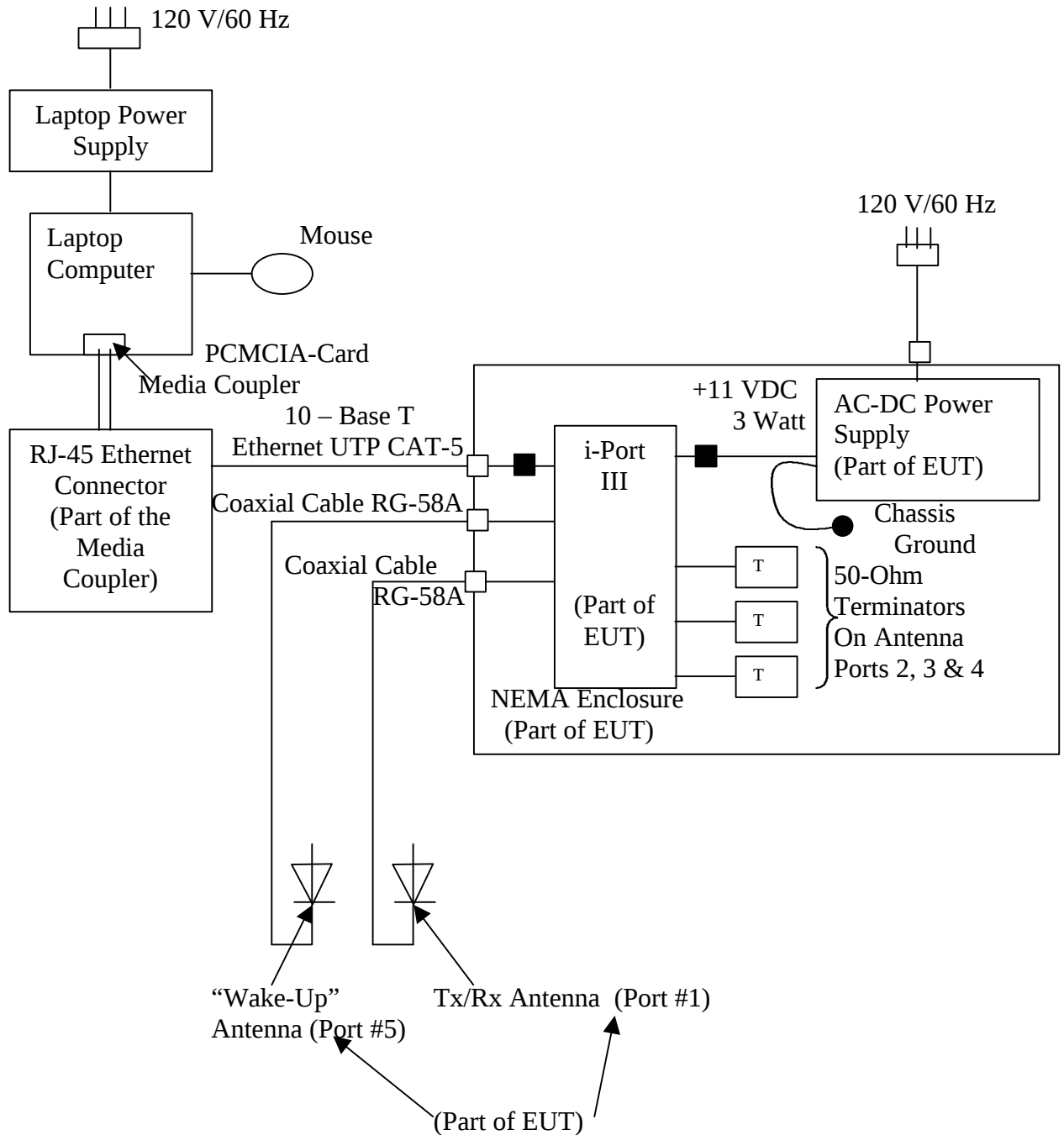
Interior Reverse-Angle of NEMA Enclosure showing i-Port III and Power Supply.



Interior view of NEMA Enclosure, showing the access door of the i-Port III in an "Open" state. Note the bond straps connecting both the door and the RF Bulk Lead of the i-Port III to the i-Port III Chassis. Also, note the RF gasketing on the door edges and on the chassis edges.



14.2 Test Setup Block Diagram



14.3 Support Equipment Used During Testing

Device	Manufacturer	Model Number	FCC ID	Serial Number
Laptop Computer	Panasonic	CF-47	D.O.C.	CF-47LYAGAEM
Laptop Power Supply	Panasonic	CF-AA1639A	None	010106575A
Media Coupler	Network Everywhere	NP10TC	None	None
Mouse	IBM	MU293	D.O.C.	23-011171

14.4 Description of Interface Cables Used During Testing**i-Port III/AC-DC Power Supply**

Shielded	Unshielded	Flat	Round	Length	Ferrite
No	Yes	Yes	No	0.7 m	Yes*

AC-DC Power Supply/AC Mains Input Power (120 V/60 Hz)

Shielded	Unshielded	Flat	Round	Length	Ferrite
No	Yes	Yes	No	1.8 m	No

i-Port III TX-RX Antenna Port (Antenna Port #1)/Antenna #1 (RG-58A Coaxial Cable)

Shielded	Unshielded	Flat	Round	Length	Ferrite
Yes	No	No	Yes	3.3 m	No

i-Port III Wake-up Antenna Port (Antenna Port #5)/Antenna #5 (RG-58A Coaxial Cable)

Shielded	Unshielded	Flat	Round	Length	Ferrite
Yes	No	No	Yes	3.3 m	No

i-Port III/Media Coupler (CAT 5 UTP Ethernet Cable)

Shielded	Unshielded	Flat	Round	Length	Ferrite
No	Yes	No	Yes	14 m	Yes*

Media Coupler RJ-45 Ethernet Connector/Laptop Computer

Shielded	Unshielded	Flat	Round	Length	Ferrite
Yes	No	No	Yes	0.13 m	No

Laptop Computer/Laptop Power Supply

Shielded	Unshielded	Flat	Round	Length	Ferrite
No	Yes	Yes	No	1.8 m	Yes

Laptop Power Supply/AC Mains Input Power (120 V/60 Hz)

Shielded	Unshielded	Flat	Round	Length	Ferrite
No	Yes	Yes	No	1.8 m	No

Laptop Computer/Mouse

Shielded	Unshielded	Flat	Round	Length	Ferrite
Yes	No	No	Yes	1.8 m	No

* Steward Part # 28A2029-0A0

ARRANGEMENT OF INTERFACE CABLES: All interface cables were positioned for worst-case maximum emissions within the manner assumed to be a typical operation condition (please reference photographs).

14.5 Mode of Operation During Testing

The EUT had three modes. Specifically, these were: Transmit [Tag ID Only Mode], Transmit [Tag ID Plus Data Mode], and Receive Mode. For the purposes of Unintentional Radiator testing of the i-Port III (in Receive Mode only), the Receive Mode was selected by downloading commands through the RS-232 serial port to the CPU in the i-Port III.

It should be noted that the i-Port III was designed to operate with quantity = 5 antennas. Each antenna was identical; they were all Rectangular Patch antennas. The internal configuration of the i-Port III was such that one antenna operated from a “Transmit Only” path. This antenna was designated the “Wake-up” antenna. The other four antennas were attached to an internal 4-port multi-coupler. Each of these four ports were identical; consequently only one of these four ports was populated with an rectangular patch antenna and tested. The remaining three ports were terminated with 50-Ohm resistive termination loads.

14.6 Modifications Required for Compliance

i-Port III

1. Ferrite Beads (Steward Part Number 28A2029-0A0) were placed on the CAT-5 LAN and DC Supply Cables inside the i-Port III connection Bay.
2. The DC Return Line was bonded to the chassis.
3. The surface of the i-Port III Chassis was burnished to expose the aluminum case under the anodized surface at the following locations:
 - Inside edge of the rear plate.
 - Edge of the rear of chassis perimeter
 - Rear edges of the back-side of the front RF Bulkhead plate
 - All inner surfaces where the front plate contacts the chassis of the i-Port III
 - The contact surface of the hinged cover and the top of the chassis of the i-Port III

Then, the entire interior of the i-Port III chassis, including the inside of all plates and the inner side of the cover were spray painted with Conductive Nickel shielding spray (M.G. Chemicals Catalog #841-340G).

4. Conductive foam gasket material was placed along every surface that the front and rear plates contact the i-Port III chassis of the i-Port III and, around all for the RF Connectors and on the internal RF Bulkhead of the i-Port III. Various gaskets (manufactured by Schlegel Systems Inc) were used; specifically gasket models: E0813T, E3713T, E6313T, E1213T, EC313T, E5819G-0191.
5. Firmware and software modifications were written by the Identec office in Austria to turn the 916.5 MHz TX carrier off during RX Mode. (Software Version 3.20, Firmware Version 3.70).
6. The unused pins of the CAT-5 Ethernet connector were grounded to the RJ-45 Shielded connector shell.
7. The unused pins of the RS-232 DB-9 Serial connector were grounded to the DB-9 Shielded Connector Shell.
8. The shells of the RJ-45 connector and the DB-9 connector were bonded to both the Return Line of the DC supply, and to the i-Port III Chassis Ground.
9. The i-Port III and the AC-DC Power Supply were installed in a NEMA Enclosure (Hoffman Engineering Model ASE12X12X4).
10. An insulator (prototyped as a paper stand off) was used to insure that the i-Port III Chassis was isolated (floated) from the NEMA Enclosure.
11. All openings in the NEMA Enclosure including the area around the conduit feed through glands were burnished to the metal, and, copper tape was installed over every opening in the NEMA enclosure ensuring that contact with the exposed metals was made in each instance.
12. The digital I/O Port lines (which are accessible on the Molex connector located on the interior RF Bulkhead) are not supported for operational use by the end-user. Consequently, all references to these Digital I/O lines were removed from the user documentation, and no cables were attached to these portlines.
13. The RS-232 Port on the i-Port III is intended for use only during installation and debugging (both performed only by Identec Factory Representatives). Consequently, the user documentation was amended to indicate that in no case is an RS-232 Cable to be permitted to be attached to the i-Port III during routine operations.

15. Conducted Emissions Tests

Test Requirement: FCC Rules: 47CFR Part 15, Subpart B

Test Procedure: ANSI C63.4 - 1992

Date of Test: 24 December 2002

Laboratory: Test Site #2 (Acme, WA)

15.1 Test Equipment

- ⇒ Spectrum Analyzer (blue): Hewlett-Packard 8566B, Serial Number 2410A00168, Calibrated: 17 April 2002, Calibration Due Date: 17 April 2003
- ⇒ RF Preselector (blue): Hewlett-Packard 85685A, Serial Number 2648A00519, Calibrated: 17 April 2002, Calibration Due Date: 17 April 2003
- ⇒ Quasi Peak Adapter (blue): Hewlett-Packard 85650A, Serial Number 2043A00327, Calibrated: 17 April 2002, Calibration Due Date: 17 April 2003
- ⇒ Line Impedance Stabilization Networks: Solar Type 9408-50-R-24-BNC, Serial Number 941702, Calibrated: 08 November 2002, Calibration Due Date: 08 November 2003
- ⇒ Transient Limiter: Hewlett-Packard 11947A, Serial Number 3107A01879, Calibrated: 25 April 2002, Calibration Due Date: 25 April 2003
- ⇒ Line Conduction Test Site: Acme Testing Co., Test Site Number 2, Calibrated: 22 June 2002, Calibration Due Date: 22 June 2003

15.2 Purpose

The purpose of this test was to evaluate the level of conducted noise the EUT imposed on the AC Mains.

15.3 Test Procedures

The EUT was placed on a 1 meter long by 1.5 meters wide and 0.8 meter high nonconductive table that was placed directly on a flush-mounted turntable. The EUT was connected to its associated support equipment, with any excess I/O cabling bundled to approximately 1 meter. The EUT was connected to a dedicated LISN and all support equipment were connected to a second separate LISN circuit. The LISNs were bonded to the groundplane.

Prescan tests were performed to determine the “worst-case” mode of operation. With the EUT operating in “worst-case” mode, final conducted measurements were taken. Conducted measurements were made on each current carrying conductor with respect to ground.

Conducted Emissions Test Characteristics

Frequency range	0.15 MHz - 30.0 MHz
Test instrumentation resolution bandwidth	9 kHz
Lines Tested	Line 1/Line 2

15.4 Test Results

A summary of the highest amplitude conducted emissions is listed below.

FCC RULES: 47CFR PART 15, SUBPART B, SECTION 15.107,
CLASS B CONDUCTED EMISSIONS (CISPR LIMITS)
(0.15 MHz TO 30 MHz) 60 Hz/120 VAC

EUT IN RECEIVE MODE

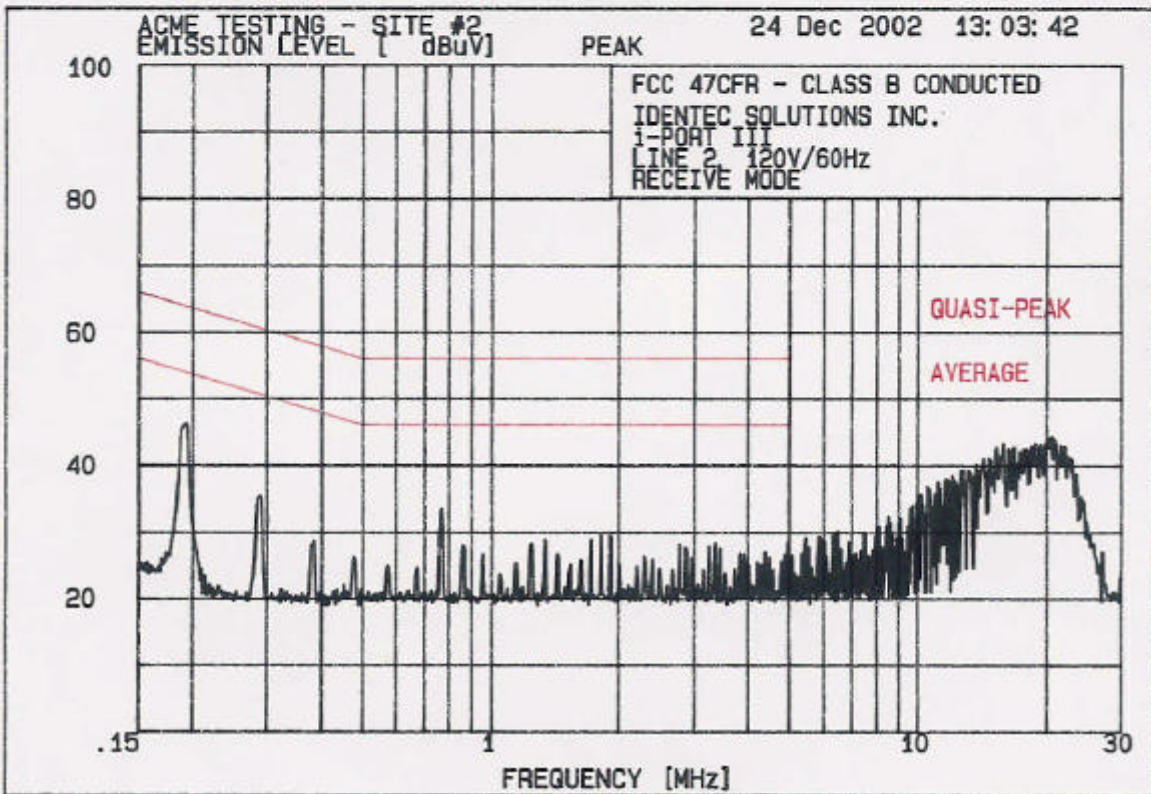
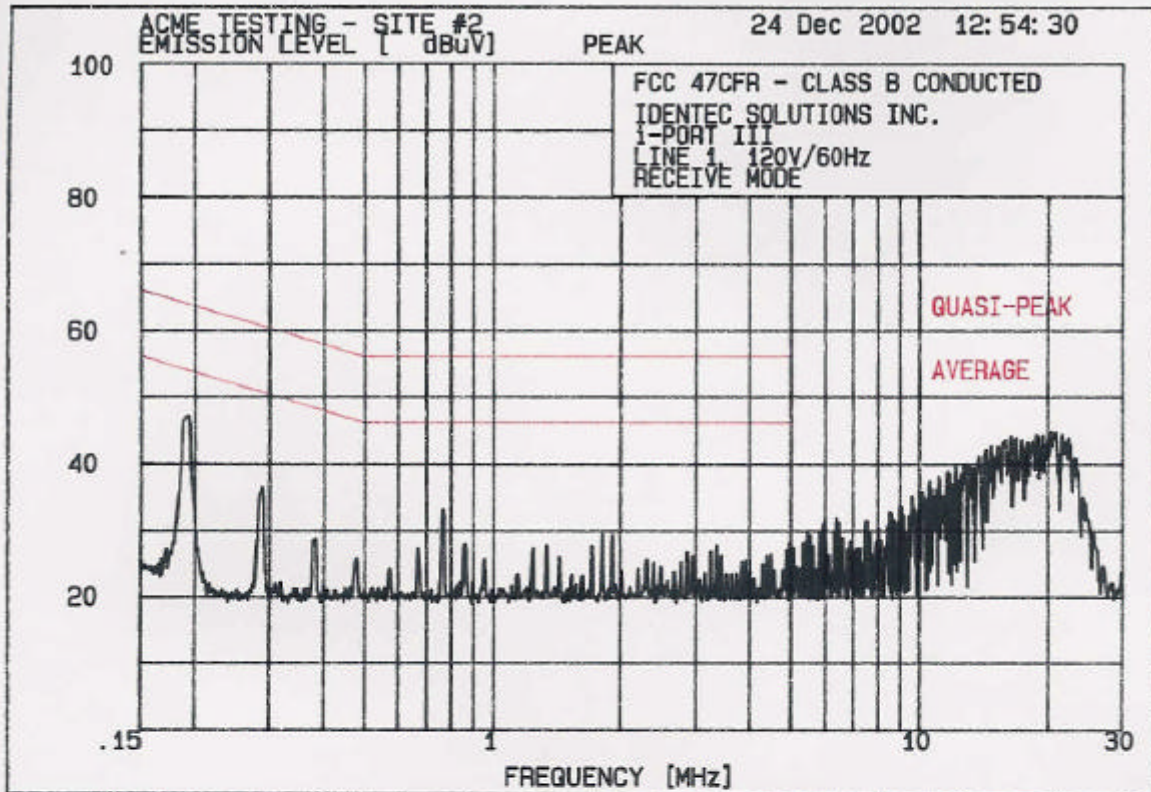
LINE 1 "HOT"

PEAK #	FREQ. (MHz)	AMPL (dB μ V)
1	0.1944	47.2
2	15.98	43.6
3	16.5	44.0
4	16.94	43.8
5	17.48	43.6
6	17.95	43.3
7	18.53	43.4
8	18.93	44.3
9	19.54	44.2
10	20.39	44.8
11	21.72	44.3

LINE 2 "NEUTRAL"

PEAK #	FREQ. (MHz)	AMPL (dB μ V)
1	0.1944	46.2
2	15.32	42.7
3	15.9	43.3
4	16.32	42.4
5	16.85	42.7
6	17.76	42.4
7	18.93	43.3
8	19.44	43.1
9	20.6	44.2
10	21.61	43.0

The EUT complied with the Class B Conducted Emissions Limits specified in 47CFR Part 15 Subpart B Section 15.107.



15.5 Test Setup Photographs

