

**Application for Certification
For a RF Transmitter**

ConectiSys Corp.
24730 Ave Tibbitts, Suite 130
Valencia, CA 91355

Wireless Power Usage Monitoring System
M/N: HNET 5.0-BS

FCC ID: SNKHN50BS

REPORT # RV58090A-003

This report was prepared in accordance with the requirements of the FCC Rules and Regulations Part 2, Subpart J, 2.1033, Part 15.247, and other applicable sections of the rules as indicated herein.

Prepared By:

DNB Engineering, Inc.
5969 Robinson Avenue
Riverside, CA 92503

26 Feb 2005

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Paragraph numbers in this report follow the application section numbers found in the FEDERAL COMMUNICATIONS COMMISSION Rules and Regulations, Part 2, Subpart J for Certification of electronic equipment.

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1.0 ADMINISTRATIVE DATA

1.1 Certifications and Qualifications

I certify that DNB Engineering, Inc conducted the tests performed in order to obtain the technical data presented in this application. Also, based on the results of the enclosed data, I have concluded that the equipment tested meets or exceeds the requirements of the Rules and Regulations governing this application.

1.2 Measurement Repeatability Information

The test data presented in this report has been acquired using the guidelines set forth in FCC Part 2.1031 through 2.1057, Part 15. The test results presented in this document are valid only for the equipment identified herein under the test conditions described. Repeatability of these test results will only be achieved with identical measurement conditions. These conditions include: The same test distance, EUT Height, Measurement Site Characteristics, and the same EUT System Components. The system must have the same Interconnecting Cables arranged in identical placement to that in the test set-up, with the system and/or EUT functioning in the identical mode of operation (i.e. software and so on) as on the date of the test. Any deviation from the test conditions and the environment on the date of the test may result in measurement repeatability difficulties.

All changes made to the EUT during the course of testing as identified in this test report must be incorporated into the EUT or identical models to ensure compliance with the FCC regulations.



C. L. Payne III (Para. 1.1)
Sr Engineering Manager
Riverside Facility.
DNB Engineering, Inc.
Tel. (951) 637-2630
FAX (951) 637-2704

2.1033 (b) (1) Application for Certification

Name of Applicant: ConectiSys Corp.
24730 Ave Tibbitts, Suite 130
Valencia, CA 91355

FRN Number: 0009559063

Applicant is: Manufacturer
Vendor
Licensee
Prospective Licensee
Other

Name of Manufacturer ConectiSys Corp.

Description: Wireless Power Usage Monitoring System

Part Number: HNET 5.0-BS

Anticipated Production Quantity: Multiple Units

Frequency Band: 902.36-927.56 MHz

Rated Power: 209mW (23.2dBm)

Type of Signal: FHSS

Hopping Channels: 64 minimum

Max Data Rate: 9.2 kbps

2.1033 (b) (2) FCC Identifier

FCC ID: SNKHNET50BS

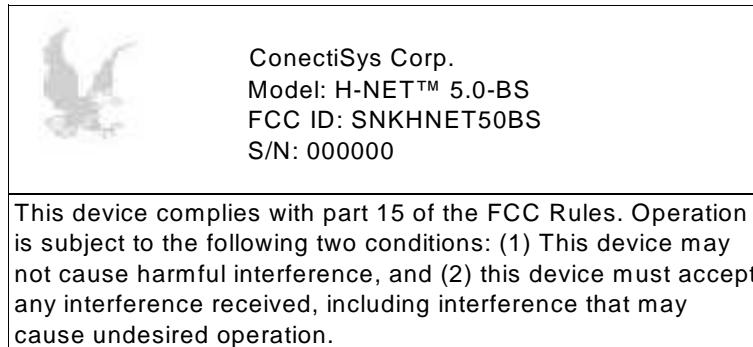


Figure 1 - Label

2.1033 (b) (3) Installation and Operating Instructions



Applied Innovative Sciences, Inc.

ConectiSys H-Net? 5.0 Basestation Installation and Operations Manual

Sections:

- I. FCC Warning, Compliance and Radio Frequency Exposure Statements**
- II. Introduction and Basestation Description**
- III. Basestation Mounting and Wiring.**
- IV. Basestation Software Configuration.**
- V. Reference Figures.**

I. FCC Warning, Compliance and Radio Frequency Exposure Statements

FCC Warning

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance (ConectiSys) could void the user's authority to operate the equipment.

FCC Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subjected to the following two conditions 1) this device may not cause harmful interference and 2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Radio Frequency Exposure Statement

The H-Net? 5.0 Base Station has been evaluated under FCC Bulletin OET 65 and found compliant to the requirements as set forth in CFR 47 Sections 2.1091, 2.1093, and 15.247 (b) (4) addressing RF Exposure from radio frequency devices. The radiated output power of the H-Net? 5.0 Base Station is well below the FCC radio frequency exposure limits. Nevertheless, this device should be installed in such a manner that the potential for human contact during normal operation is minimized. To ensure RF exposure compliance, in order to comply with RF exposure limits established in the ANSI C95.1 standards, the distance between the antenna and the user should not be less than 20 cm.



II. Introduction and Basestation Description

Introduction: The H-Net? radio system has been developed by ConectiSys Corp. as an Automatic Meter Reading (AMR) solution for residential and commercial energy markets. H-Net? utilizes a proprietary protocol for two-way communication using a wireless, tower-less network. The H-Net? 5.0 Single Channel Basestation is the controlling hub for an H-Net? 5.0 radio system network. The basestation provides a central point for data collection from individual meter units, synchronizing and communicating with individual meters in a TDMA scheme. The single channel basestation may only receive data from a single meter unit at any given time in the basestation's receive sequence. The design provides a solid foundation for future iterations of basestations that will integrate additional receivers for simultaneous data reception from multiple meter units.

The basestation consists of an H-Net? 5.0 radio, PC/104 computer, Compact Flash drive, AC/DC converter, DC/DC converter, battery back-up system and surge protectors. The power system is comprised of a 120VAC to 12VDC converter with a 12VDC-battery backup and a 12VDC to 5VDC/3.3VDC converter to power the PC/104 and radio respectively. The radio system is composed of two PCB assemblies (controller module and RF module) and an omnidirectional vertically mounted, horizontally polarized antenna. The controller and RF modules interface together via PCB mounted headers. The controller is interfaced to the PC/104 via RS232 serial lines. The antenna is weather sealed and mounted on the top of the basestation. The basestation is housed within an environmentally sealed enclosure meeting the following standards:

- UL 508 Type 3R, 4, 12 and 13
- CSA Type 3R, 4, 12 and 13 Complies with
 - ?? NEMA Type 3R, 4, 12 and 13
 - ?? JIC EGP-1-1967 unless marked¹
 - ?? IEC 529, IP66



III. Installation and wiring:

WARNING: Failure to wire as instructed may cause damage to device or connected equipment or personal injury. To be installed or checked by an electrician or qualified person only.

Note:

- ?? Before basestation installation has begun, the basestation should be checked to ensure the AC circuit breaker and battery backup switches are in the off position. (See Figure 1).
- ?? All wiring devices must be installed and used in accordance with applicable listings, ratings, and codes. References to National Electrical Code are applicable to installations in the United States only.

1. Basestation Mounting:

- a. The H-Net? single-channel basestation comes configured to be mounted on a vertical 2 3/4 inch diameter pole.
- b. Mounting pole must be sturdy enough to support 50 pounds against maximum local wind conditions.
- c. Basestation mounting height will be determined by a qualified technician after a local site survey has been conducted.
- d. Basestation is mounted to pole by two 360° Clamping U-Bolts. (See Figure 2).

2. Basestation Wiring

- a. 120VAC and modem wiring are to be run through 1/2 inch flexible metallic conduit designed for such applications.
- b. Conduit is connected to bottom of basestation through two Liqua-Seal connectors. (See Figure 3).
- c. Modem cable should be run through left conduit and 120VAC through the right.
- d. Modem cable should be a standard RJ-11 telephone cord connected to a direct telephone line.
- e. Modem cable is plugged into topside of telephone line surge protector (See Figure 4).
- f. 120VAC wiring is connected circuit breaker and ground block. Wiring should be white wire (neutral) connected to circuit breaker left terminal, black wire (hot) connected to circuit breaker right terminal and green wire (ground) connected to the green and yellow DIN rail grounding block (See Figure 4).



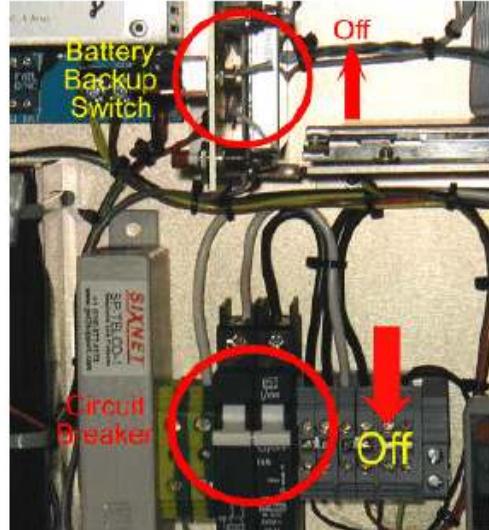
IV. Software Configuration:

H-Net? 5.0 Basestation software needs to be configured for each installation.

1. After the basestation has been properly installed connect a PS/2 mouse and keyboard to the indicated connectors in the basestation.
2. Connect a standard VGA PC monitor to the DB15 monitor connector. (See Figure 5).
3. Power up monitor.
4. Power up basestation by flipping the battery back up and circuit breaker switches to the on position.
5. After Windows has finished loading, the H-Net? software will launch automatically. Close this program by clicking exit.
6. Open hnetbase.ini (configuration file) for editing (See Figure 6).
7. Change "phone = #####" to dial-up number for desired ConectiSys server.
8. Ensure "make_call = 1".
9. Save and exit file.
10. Reboot basestation by shutting down Windows and turning off circuit breaker and battery back up switches, then turning switches back on again.
11. Basestation will dial up and connect to ConectiSys server after reboot.

V. Reference Figures:

Figure 1 – Circuit Breaker and Battery Backup Switches





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Figure 2 – Basestation Pole Mounting

Figure 3 – Liqua-Seal Connector's with Conduit

Figure 4 Modem cable and AC wiring



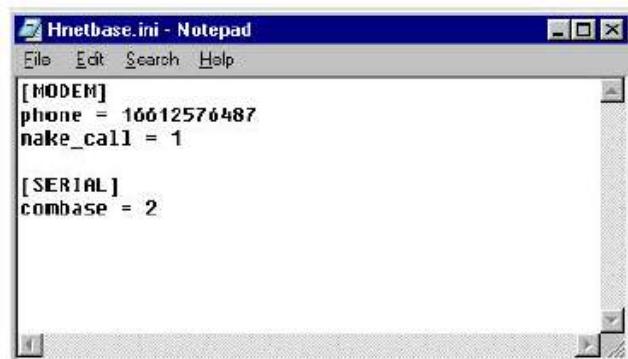


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Figure 5 – Monitor, Mouse and Keyboard Connections



Figure 6 – Software Configuration File



2.1033 (b) (4) Brief Description of Circuit Function

Introduction: The H-Net radio system has been developed by ConectiSys Corp. as an Automatic Meter Reading (AMR) solution for residential and commercial energy markets. H-Net utilizes a proprietary protocol for two-way communication using a wireless, tower-less network. The H-Net 5.0 Single Channel Basestation is the controlling hub for an H-Net 5.0 radio system network. The basestation provides a central point for data collection from individual meter units, synchronizing and communicating with individual meters in a TDMA scheme. The single channel basestation may only receive data from a single meter unit at any given time in the basestation's receive sequence. The design provides a solid foundation for future iterations of basestations that will integrate additional receivers for simultaneous data reception from multiple meter units.

The basestation consists of an H-Net 5.0 radio, PC/104 computer, Compact Flash drive, AC/DC converter, DC/DC converter, battery back-up system and surge protectors. The power system is comprised of a 120VAC to 12VDC converter with a 12VDC-battery backup and a 12VDC to 5VDC/3.3VDC converter to power the PC/104 and radio respectively. The radio system is composed of two PCB assemblies (controller module and RF module) and an omnidirectional vertically mounted, horizontally polarized antenna. The controller and RF modules interface together via PCB mounted headers. The controller is interfaced to the PC/104 via RS232 serial lines. The antenna is weather sealed and mounted on the top of the basestation. The basestation is housed within an environmentally sealed enclosure meeting the following standards:

UL 508 Type 3R, 4, 12 and 13
CSA Type 3R, 4, 12 and 13 Complies with
NEMA Type 3R, 4, 12 and 13
JIC EGP-1-1967 unless marked¹
IEC 529, IP66

2.1033 (b) (5) Block Diagram

Supplied separately for confidentiality.

2.1033 (b) (6) Report of Measurements

Test Procedure:

To measure conducted emissions, the EUT was set upon a wooden table in the shielded enclosure. AC power was fed into the EUT from the Artificial Mains Network. With the Artificial Mains Network connected to an HP 8568B Spectrum Analyzer, and using the HP 9825 Computer/Controller and the HP 85864B EMI Measurement Software, the spectrum was searched from 0.15 - 30 MHz for emissions emanating from the EUT.

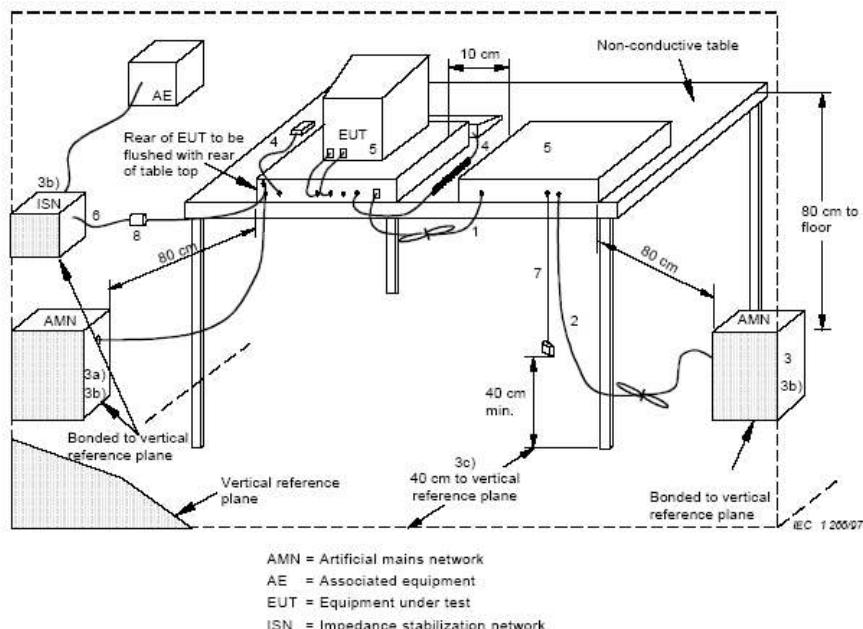
Frequency of emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency.

EUT operating conditions:

The software provided by the client to enable the EUT to transmit continuously.

Test Set Up:





5969 Robinson Avenue
Riverside, CA 92503
(951) 637-2630
FAX (951) 637-2704

Conducted Emissions

DNB Job Number:	58090	Date:	24 Feb 2005	Specification [X] 15.207	
Customer:	ConectiSys Corp.				
Model Number:	HNET 5.0-BS	Serial Number:	Proto		
Description:	RF Transmitter				
	Set Up				

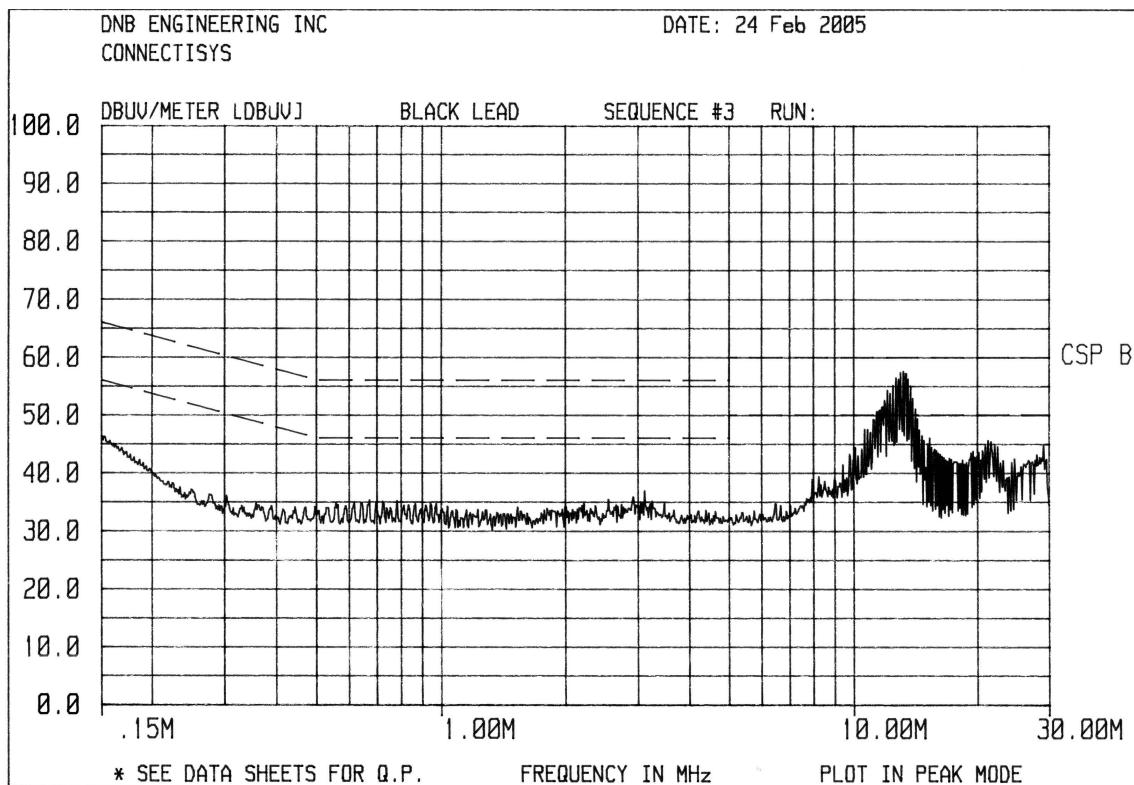




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Riverside, CA 92503
(951) 637-2630
FAX (951) 637-2704

Conducted Emissions

DNB Job Number:	58090	Date:	24 Feb 2005	Specification [X] 15.207	
Customer:	ConectiSys Corp.				
Model Number:	HNET 5.0-BS	Serial Number:	Proto		
Description:	RF Transmitter				
	Line - Peak				

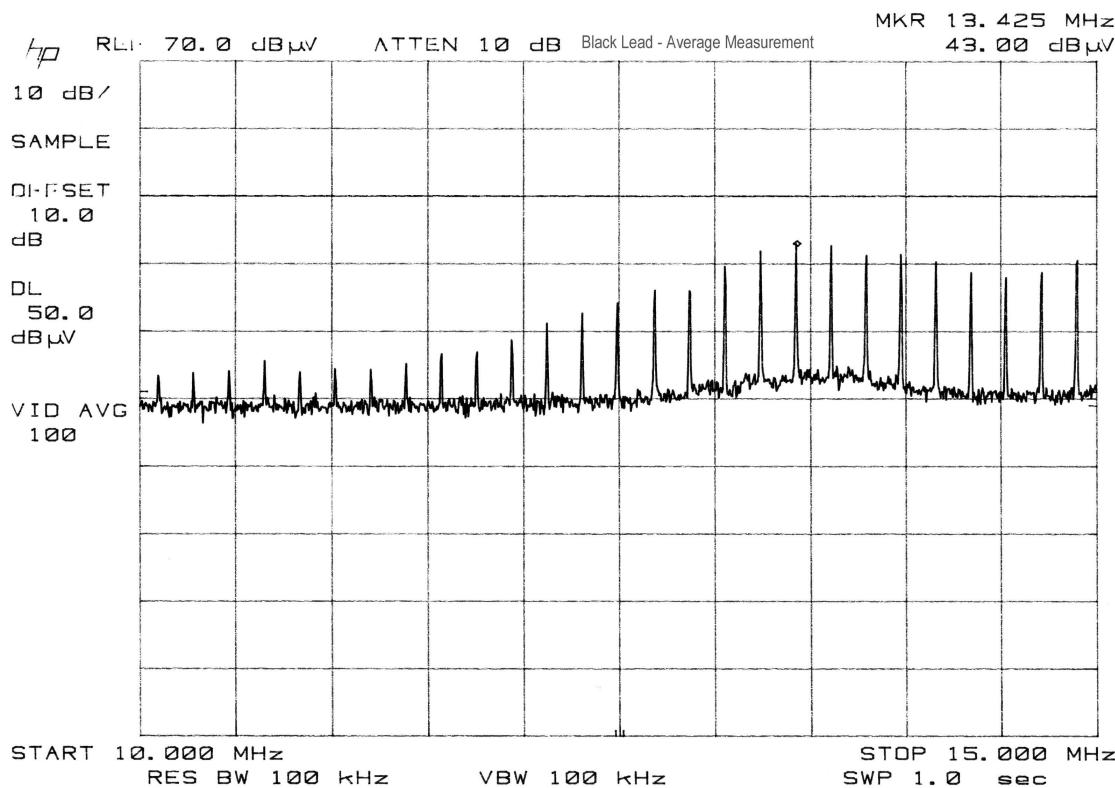




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(951) 637-2630
FAX (951) 637-2704

Conducted Emissions

DNB Job Number:	58090	Date:	24 Feb 2005	Specification [X] 15.207	
Customer:	ConectiSys Corp.				
Model Number:	HNET 5.0-BS	Serial Number:	Proto		
Description:	Wireless Power Usage Monitoring System Line - Average				

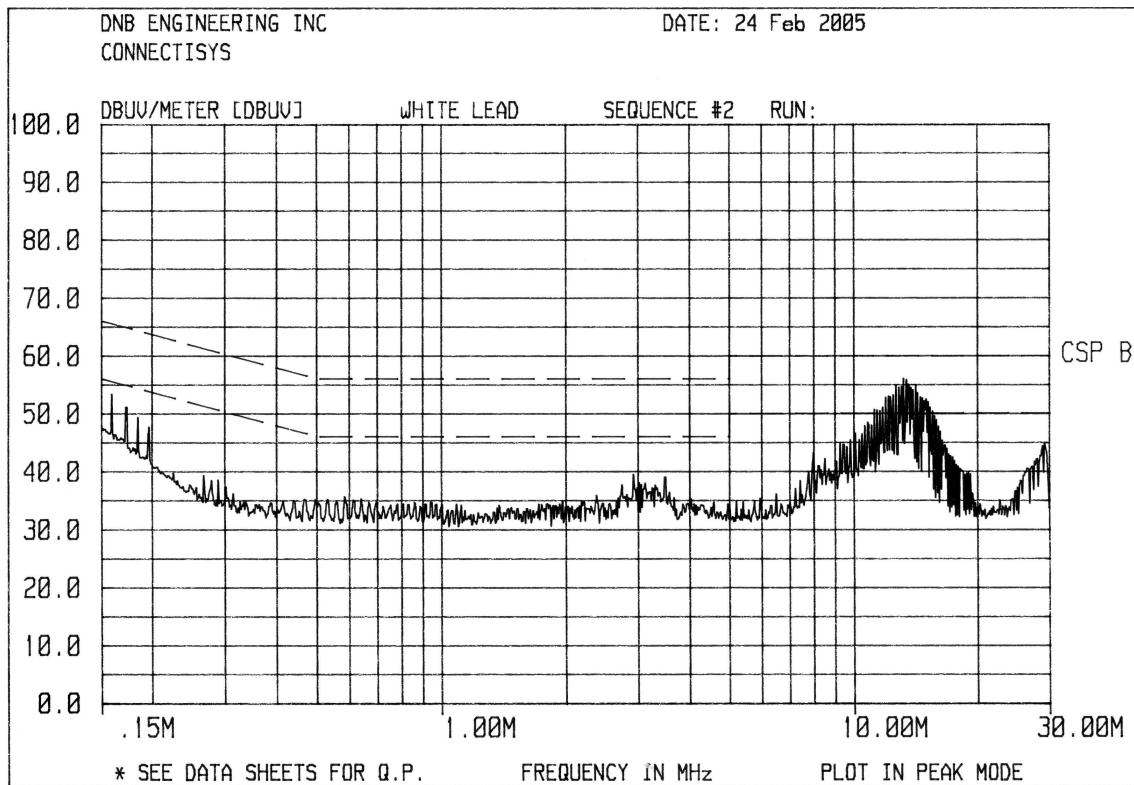




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Riverside, CA 92503
(951) 637-2630
FAX (951) 637-2704

Conducted Emissions

DNB Job Number:	58090	Date:	24 Feb 2004	Specification [X] 15.207	
Customer:	ConectiSys Corp.				
Model Number:	HNET 5.0-BS	Serial Number:	Proto		
Description:	Wireless Power Usage Monitoring System		Neutral - Peak		

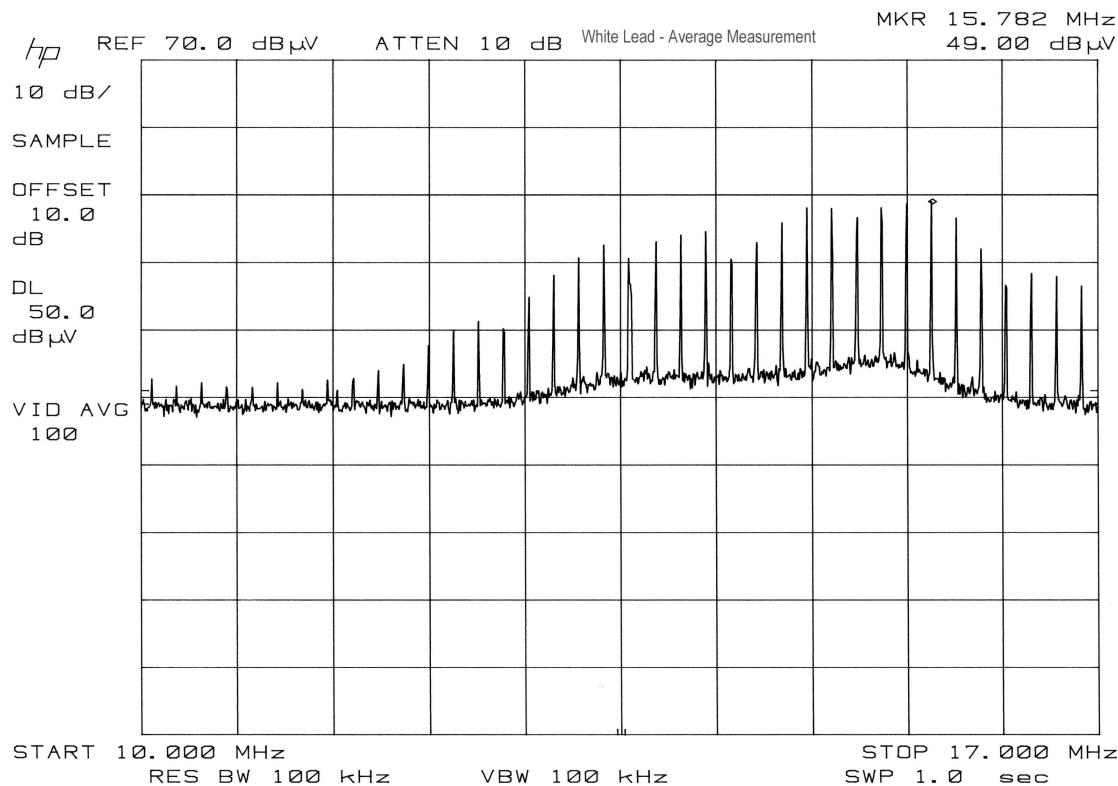




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(951) 637-2630
FAX (951) 637-2704

Conducted Emissions

DNB Job Number:	58090	Date:	24 Feb 2005	Specification [X] 15.207	
Customer:	ConectiSys Corp.				
Model Number:	HNET 5.0-BS	Serial Number:	Proto		
Description:	Wireless Power Usage Monitoring System		Neutral - Average		



15.209 Radiated Emissions (General Provisions)

Test Procedure:

The EUT was measured on an open area test site (OATS).

A measuring distance of at least 3 m shall be used for measurements at frequencies up to 1 GHz. For frequencies above 1 GHz, any suitable measuring distance may be used. The equipment size (excluding the antenna) shall be less than 20 % of the measuring distance.

Sufficient precautions shall be taken to ensure that reflections from extraneous objects adjacent to the site do not degrade the measurement results, in particular:

- no extraneous conducting objects having any dimension in excess of a quarter wavelength of the highest frequency tested shall be in the immediate vicinity of the site;
- all cables shall be as short as possible; as much of the cables as possible shall be on the ground plane or preferably below; and the low impedance cables shall be screened.

The EUT shall be placed upon a non-conductive table 1.5 meters above the ground plane and shall be placed in the “worst case” transmitting mode. The EUT shall be rotated 360 degrees to find the azimuth maxima. The receive antenna shall then be raised and lowered between 1 to 4 meters to find the maximum signal emanating from the EUT. This signal strength is then recorded on the data sheets.

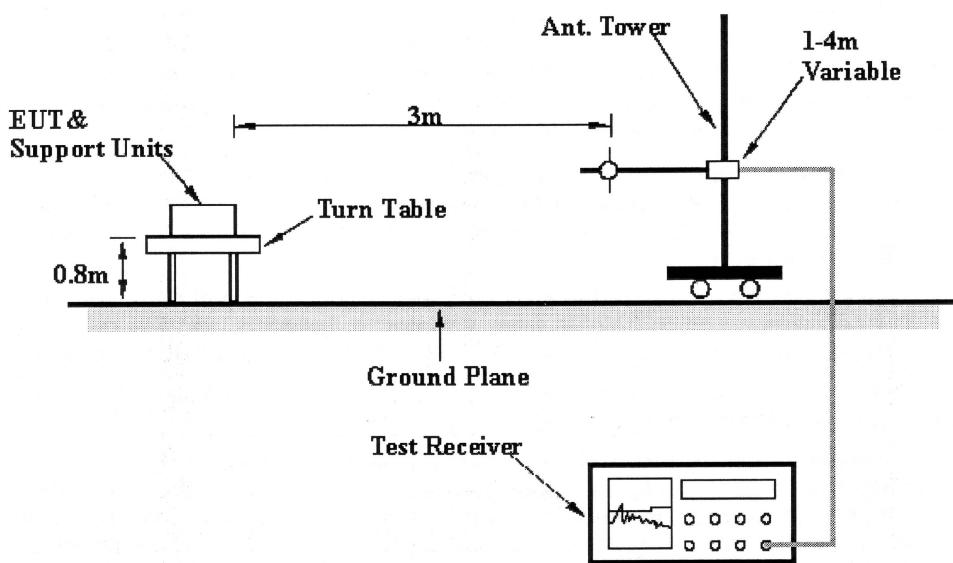
Frequency (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measurement Distance (meters)
.0009 - 0.490	2400/F(kHz)	$20 * (\log_{10}(2400/F(kHz)))$	300
0.490 - 1.705	24000/F(kHz)	$20 * (\log_{10}(24000/F(kHz)))$	30
1.705 - 30.0	30	29.5	30
30 - 88	100	40.0	3
88 - 216	150	43.5	3
216 - 960	200	46.0	3
Above 960	500	54.0	3



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Riverside, CA 92503
(951) 637-2630
FAX (951) 637-2704

Radiated Emissions (Spurious)

DNB Job Number:	58090	Date:	24 Feb 2005	Specification [X] 15.209	
Customer:	ConectiSys Corp.				
Model Number:	HNET 5.0-BS	Serial Number:	Proto		
Description:	Wireless Power Usage Monitoring System Test Set Up				



	5969 Robinson Avenue Riverside, CA 92503 (951) 637-2630 FAX (951) 637-2704	Radiated Emissions (Spurious)	
DNB Job Number:	58090	Date:	24 Feb 2005
Customer:	ConectiSys Corp.		
Model Number:	HNET 5.0-BS	Serial Number:	Proto
Description:	Wireless Power Usage Monitoring System		
Test Set Up - Bicon Antenna			



	5969 Robinson Avenue Riverside, CA 92503 (951) 637-2630 FAX (951) 637-2704	Radiated Emissions (Spurious)	
DNB Job Number:	58090	Date:	24 Feb 2005
Customer:	ConectiSys Corp.		
Model Number:	HNET 5.0-BS	Serial Number:	Proto
Description:	Wireless Power Usage Monitoring System		
Test Set Up - Log Periodic			



	<p>5969 Robinson Avenue Riverside, CA 92503 (951) 637-2630 FAX (951) 637-2704</p>	Radiated Emissions (Spurious)	
DNB Job Number:	58090	Date:	24 Feb 2005
Customer:	ConectiSys Corp.		
Model Number:	HNET 5.0-BS	Serial Number:	Proto
Description:	Wireless Power Usage Monitoring System		
Test Set Up - DRG Horn			





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Riverside, CA 92503
(951) 637-2630
FAX (951) 637-2704

Radiated Emissions (General)

DNB Job Number:	58090	Date:	24 Feb 2005	Specification [X] 15.209		
Customer:	ConectiSys Corp.					
Model Number:	HNET 5.0-BS	Serial Number:	Proto			
Description:	Wireless Power Usage Monitoring System					
EUT is in conformance with FCC 15.209		X	YES	NO	Signed	Tom Elders

FREQ (Mhz)	Meter	Correction Factors			dBuV/m			Positions			
		Ant	Cbl	Amp	Corr	Lim	Delta	Typ	Tbl	Pl	Hgt
30.016	41.8	12.6	0.6	-24.4	30.6	40	-9.4	PK	0	H	4.00
40.071	42.0	12.5	0.7	-24.3	30.9	40	-9.1	PK	0	H	4.00
79.274	36.9	8.8	1.1	-24.2	22.6	40	-17.4	PK	0	H	4.00
110.305	41.4	10.1	1.4	-24.2	28.7	43.5	-14.8	PK	0	H	4.00
112.907	46.0	10.4	1.4	-24.2	33.6	43.5	-9.9	PK	0	H	4.00
116.459	38.0	10.8	1.5	-24.2	26.1	43.5	-17.4	PK	0	H	4.00
144.033	33.5	11.6	1.7	-24.2	22.6	43.5	-20.9	PK	0	H	4.00
169.367	32.2	12.7	1.9	-24.2	22.6	43.5	-20.9	PK	0	H	4.00
225.822	42.1	12.4	2.2	-24.2	32.5	46	-13.5	PK	0	H	1.00
229.109	40.6	12.4	2.2	-24.2	31	46	-15	PK	0	H	1.00
233.314	41.5	12.3	2.3	-24.2	31.9	46	-14.1	PK	0	H	1.00
240.047	50.9	12.3	2.3	-24.3	41.2	46	-4.8	PK	0	H	1.00
266.562	39.7	12.5	2.4	-24.4	30.2	46	-15.8	PK	0	H	1.00
288.058	37.5	13.2	2.5	-24.4	28.8	46	-17.2	PK	0	H	1.00
30.030	44.1	12.6	0.6	-24.4	32.9	40	-7.1	PK	0	V	1.21
35.789	44.2	11.9	0.7	-24.3	32.5	40	-7.5	PK	0	V	1.21
38.655	50.4	12.3	0.7	-24.3	39.1	40	-0.9	PK	0	V	1.21
50.614	45.6	9.5	0.8	-24.3	31.6	40	-8.4	PK	0	V	1.21
79.202	46.0	8.8	1.1	-24.2	31.7	40	-8.3	PK	0	V	1.21
84.702	43.9	8.9	1.2	-24.2	29.8	40	-10.2	PK	0	V	1.21
116.197	41.2	10.7	1.5	-24.2	29.2	43.5	-14.3	QP	0	V	1.21
133.362	42.1	11.5	1.6	-24.2	31	43.5	-12.5	PK	0	V	1.21
224.987	39.7	14.8	2.2	-24.2	32.5	46	-13.5	PK	0	V	1.83



5969 Robinson Avenue
Riverside, CA 92503
(951) 637-2630
FAX (951) 637-2704

Radiated Emissions (General)

DNB Job Number:	58090	Date:	24 Feb 2005	Specification
Customer:	ConectiSys Corp.			[X] 15.209
Model Number:	HNET 5.0-BS	Serial Number:	Proto	
Description:	Wireless Power Usage Monitoring System			

	5969 Robinson Avenue Riverside, CA 92503 (951) 637-2630 FAX (951) 637-2704	Spurious - Restricted Bands	
DNB Job Number:	58090	Date: 24 Feb 2005	Specification [X] 15.209
Customer:	ConectiSys Corp.		
Model Number:	HNET 5.0-BS	Serial Number: Proto	
Description:	Wireless Power Usage Monitoring System		

15.205 Transmitter Radiated Spurious - Restricted Bands

The following table identifies harmonics of the fundamental and the associated restricted bands as defined in 15.205(a) of the FCC Rules. Offset is defined as Ant+Cbl+Amp and is used on the spectrum analyzer to display the corrected reading.

For measurements above 1GHz the following instrument settings are used:

For Peak readings RBW=1MHz VBW=1MHZ or 3MHz

For Average readings RBW=1MHz VBW=10Hz

Basic test procedure is in accordance with 15.209

	Channels			Restricted		Limit		Factors			
	Lo	Mid	Hi	Bands		Peak	Average	Ant	Cbl	Amp	Offset
1	902	915	928			Fund	Fund				
2	1804	1830	1856	N/A	N/A						
3	2706	2745	2784	2655	2900	74	54	29.5	0.8	31.3	-1.0
4	3608	3660	3712	3600	4400	74	54	32.1	0.9	30.6	2.4
5	4510	4575	4640	4500	5150	74	54	32.9	1.2	27.4	6.7
6	5412	5490	5568	5350	5460	74	54	34.2	1.4	28.9	6.7
7	6314	6405	6496	N/A	N/A						
8	7216	7320	7424	7250	7750	74	54	36.5	1.6	28.7	9.4
9	8118	8235	8352	8025	8500	74	54	37.5	2.1	27.0	12.6
10	9020	9150	9280	9000	9200	74	54	37.9	2.7	21.3	19.3



5969 Robinson Avenue
Riverside, CA 92503
(951) 637-2630
FAX (951) 637-2704

Spurious - Restricted Bands

DNB Job Number:	58090	Date:	24 Feb 2005	Specification [X] 15.209	
Customer:	ConectiSys Corp.				
Model Number:	HNET 5.0-BS	Serial Number:	Proto		
Description:	Wireless Power Usage Monitoring System		Horizontal - Peak		

