

December 17, 2007

**Federal Communications Commission Laboratory
7435 Oakland Mills Road
Columbia, MD 21046**

Re: Response to FCC Request for Information/Wireless Sensor System

Gentlemen:

This correspondence concerns certification data for a useful wireless temperature and humidity monitoring network of devices, the Dickson Wizard Wireless System. The FCC ID for this device is VOHGC859081, Confirmation number EA942065. The FCC registration number of our laboratory is 496406, FRN 0005-8509-95. The technical contact at Dickson on this device is Mr. Dean Tjaden, Chief Engineer, Phone 630-563-45254, Dickson/Unigage Inc., 930 S. Westwood Ave, Addison, Illinois 60101 and for our laboratory is the undersigned. Test data was taken from this device in July through December, 2007. The location of the 10 meter OATS used is 7017 Miller Road, Wonder Lake, Illinois. The location of the 3 and 5 meter indoor site used is 21234 West Commercial Drive, Mundelein, Illinois. The devices derived from this submission include Dickson Instrument models WH120, and WR100 utilizing frequency agile spread spectrum mode of operation. The sponsor group indicates that no encryption of data is utilized nor any special type of encoding. The sponsor group also indicates this device is exclusively for use in accurate monitoring but not controlling building temperatures.

The FCC has requested additional information on this device. The following information has been received from the Dickson engineering team.

- 1) The default transmission frequency is 910.0MHz.
- 2) The range can be set to 902.0-928.0MHz.
- 3) The width of a channel is 200 KHz.
- 4) The step between channels is 0.4 MHz.
- 5) The device will change its channel if either no signal or no acknowledge is received back within the allotted time. The channels are all operated in full duplex mode.
- 6) Once a unit is on a channel it will not hop unless it is forced to change unless by RF interference.
- 7) 32 bytes are sent in each packet
- 8) The transmission is GFSK. (a type of fm)
- 9) After the remote sends a packet, it will wait for an ACK from the host. The host will answer with an ACK packet after it receives a packet. The transmission is valid if the sender gets the ACK, otherwise it is invalid. If no ACK packet is received from the host, the remote stores the temperature/humidity information for 5-15 minutes (programmed in) and changes the channel step. This process continues until the ACK is received, then the remote will send a message of 55 ms to 7 seconds with all the memory saved information including all previous readings not successfully received and the current.
- 10) The antenna is an omnidirectional type with a gain of 2 dB. The sponsor group will affix the antenna using a permanent glue or locktite method so that no other antenna may be used.
- 11) The sponsor group will use the following language in their label (see also attached Operator's Manual):

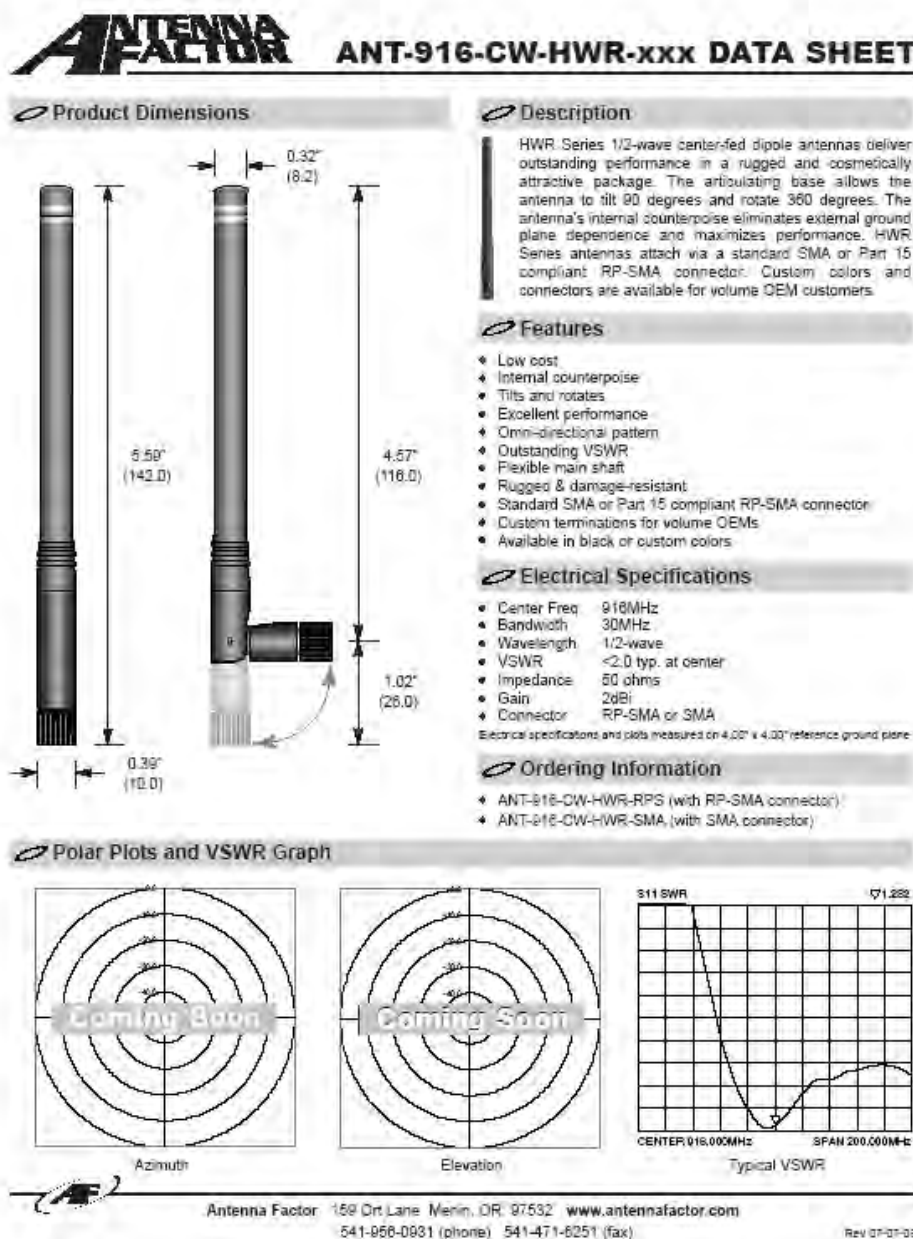
FCC ID: XXXXXXXXXXXXX

This device complies with part 15 of the FCC rules.

Operation is subject 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.

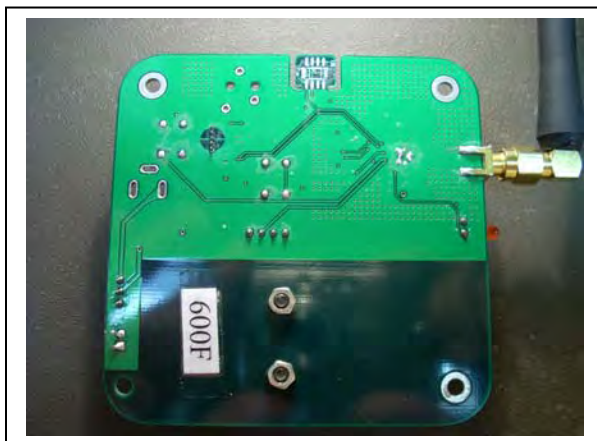
12) Information on the only antenna specified for use on this device is attached below:



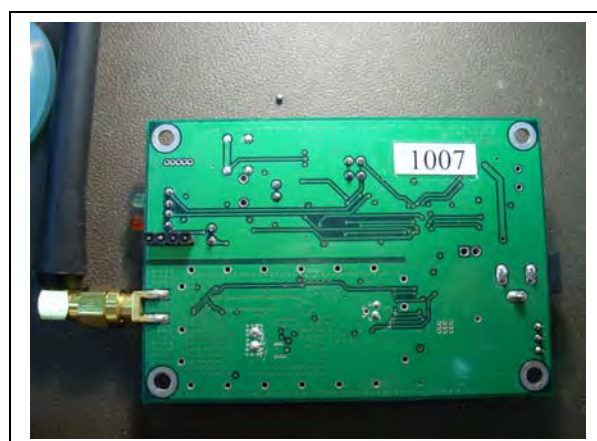
13) The Operator's Manual for this device is attached as an exhibit A:

14) Pictures of the back sides of Sensor and receiver board are shown here:

Sensor Logger



Receiver



- 15) The crystals being used on the PCBs are 30 ppm types, 16 MHz and 18.432 MHz.
- 16) On the remote unit the sponsor group uses an ADS1112 ADC to measure the battery voltage and on the base unit they use an internal ADC to measure the battery voltage. In addition, both units have what is called brownout detection which enables them to shut down before the voltage gets to the point of making the processor erratic.

The sponsor group has asked us to request clarification on the submission pertaining to the initial classification our EMI lab has placed on this device. We believe the most appropriate section for filing is Part 15.231 but the FCC is asking questions as if Dickson had applied for Section 15.249. Although the device is frequency agile it may not be considered a “hopping” device because the rate at which it changes frequency is so slow (5-15 minutes between hops worst case)

We have requested consideration under 15.231 because 1) sponsor group has no telephonically related products currently in production nor does it plan to use the device for any telephonically related endeavor (i.e. cell phone, high speed continuous data carrier), 2) the specific and only use espoused in this proposal is related to its core business of temperature and humidity sensing, 3) Dickson is relying on a team in mainland China to develop said sensor with an IC said specifically to meet FCC recommendations (see our filing) and Dickson has limited control over how this supposedly FCC approved chipset operates, 4) the spectrum of use is not being used intensively (one transmission every 5 to 15 minutes) from a possible wireless transmitter base of up to 50 sensors per facility of use, 5) the use of a “hopping” system is incidentally related to getting the data through to the host in a timely fashion but we believe the FCC has confused its use with that of a full duplex constantly transmitting device which this device is clearly not, 6) Part 15.249 is more difficult to apply for due to the additional technical requirements, 7) Dickson will be using its grant to develop better and more reliable temperature sensing systems for monitoring temperature in buildings from its experience with an initial rollout of these sensors and wishes to start with the easier requirement employing less power which is consistent with saving battery life, and 8) the sponsor group needs experience to see how well their system can succeed in transmitting inside the highly nonlinear building environment that attenuates signals much more readily than in free air.

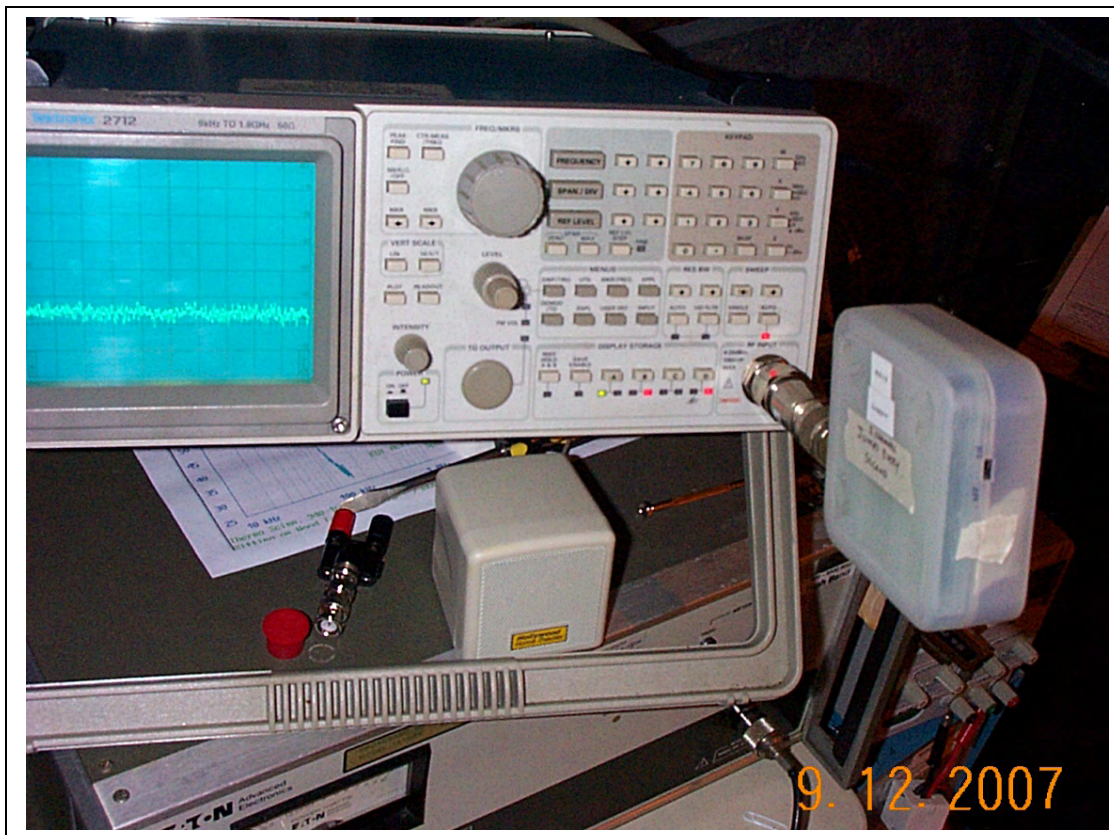
In response to the document sent to us to guide in taking information the following should answer most if not all the OET questions. Note that parts of the document the OET sent are not decipherable (Exhibit B – special characters used for setting RBW) and may need clarification if what we submit is not sufficient.

TECHNICAL DATA for Wizard -- Two Channels

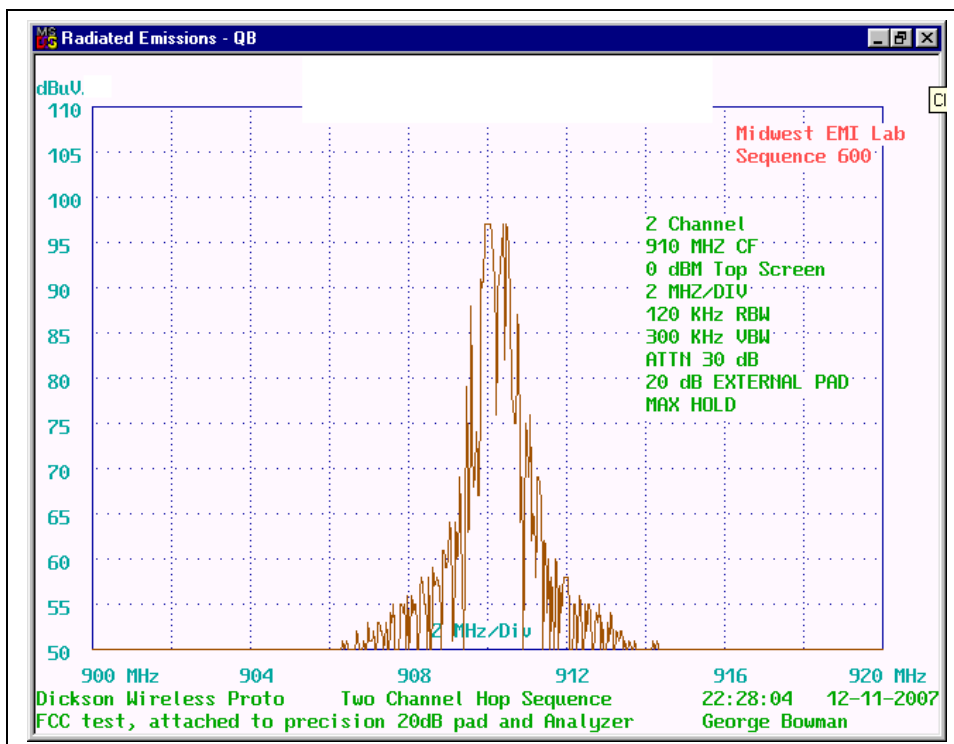
A precision power attenuator of 20 dB was used in all measurements. The attenuation was measured at 910 MHz using a Gigatronics 8542 power meter with 80401A power head. When the output of a Wavetek 2520A was measured the reading was .05 dBm. When the output was again read with the precision power pad of 20 dB the reading was -20.37 dBm or $20.37 - .05 = \underline{20.32 \text{ dB}}$.

Pictures of the test setup are shown, the antenna of the EUT was removed and was applied directly to a precision 20 dB pad, into the Tek 2712 analyzer. The antenna calibration file was changed to “0dB” at all frequencies so that the direct input to the analyzer was read. If the peak reading on the analyzer was 97 dBuV (see the data) the actual level delivered by the EUT as read through the 20 dB pad was 117.32 dBuV. The Gigatronics power meter also read the same level through the pad at -10.67 dBm (96.33 dBuV). The type of pad used was M750-112Q.

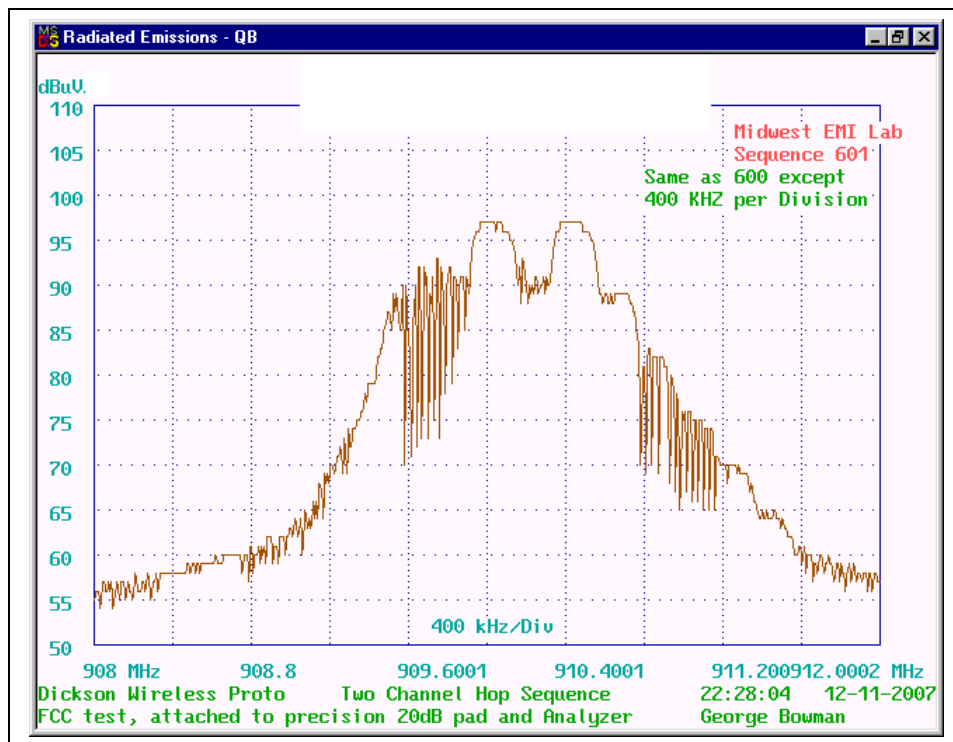




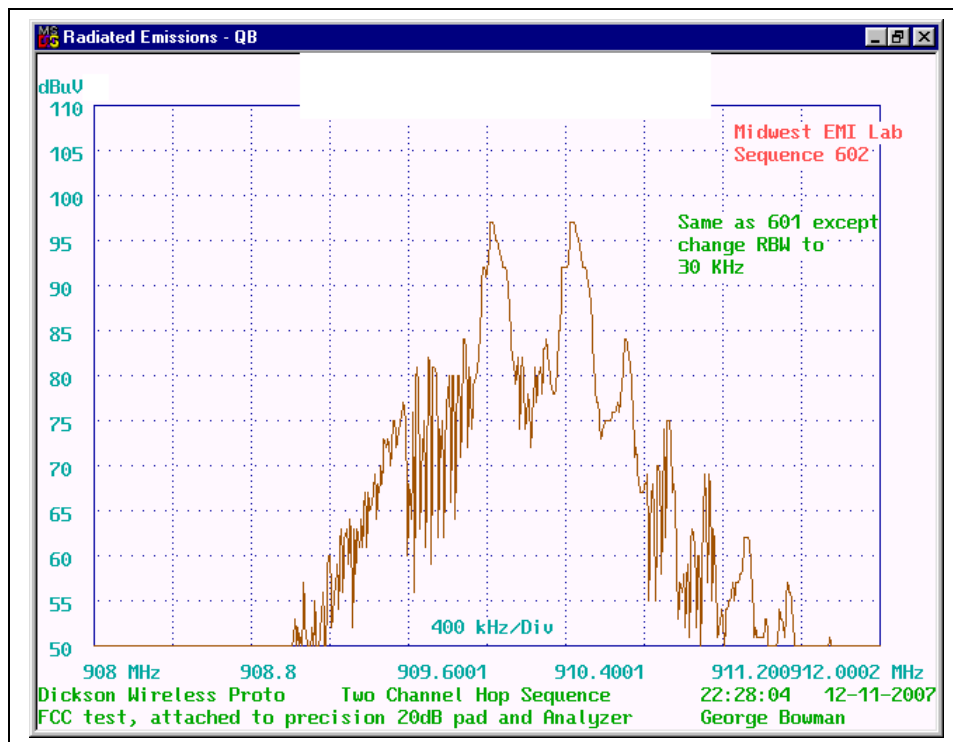
Initial conditions of setup of the Tek 2712 spectrum analyzer were 910 Mhz Center, 2 MHz per division, 120 KHz RBW, 300 KHz VBW, Max Hold ON. All other data relate to changes from this standard condition.



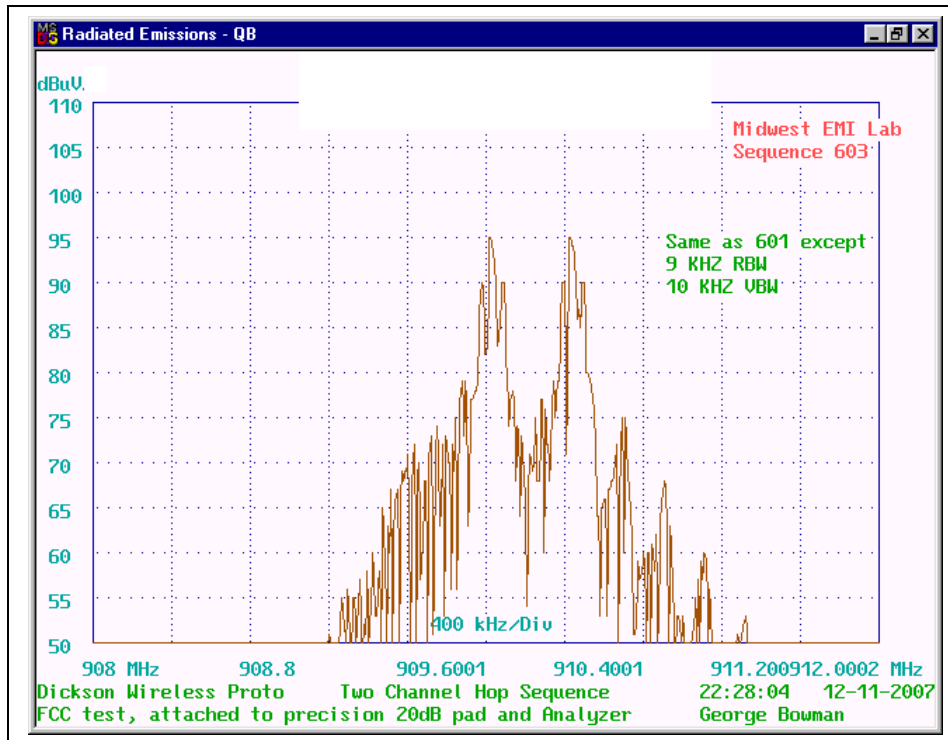
Change the span to 400 KHz per division from 2 MHz per division:



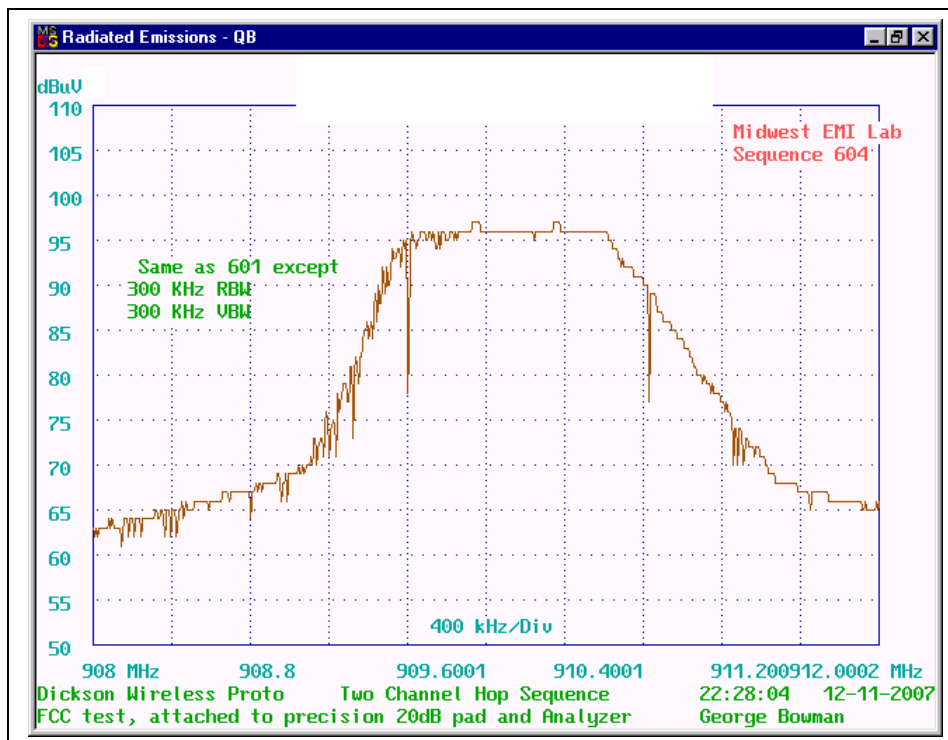
Change the RBW to 30 KHz and the VBW to 30 KHz:



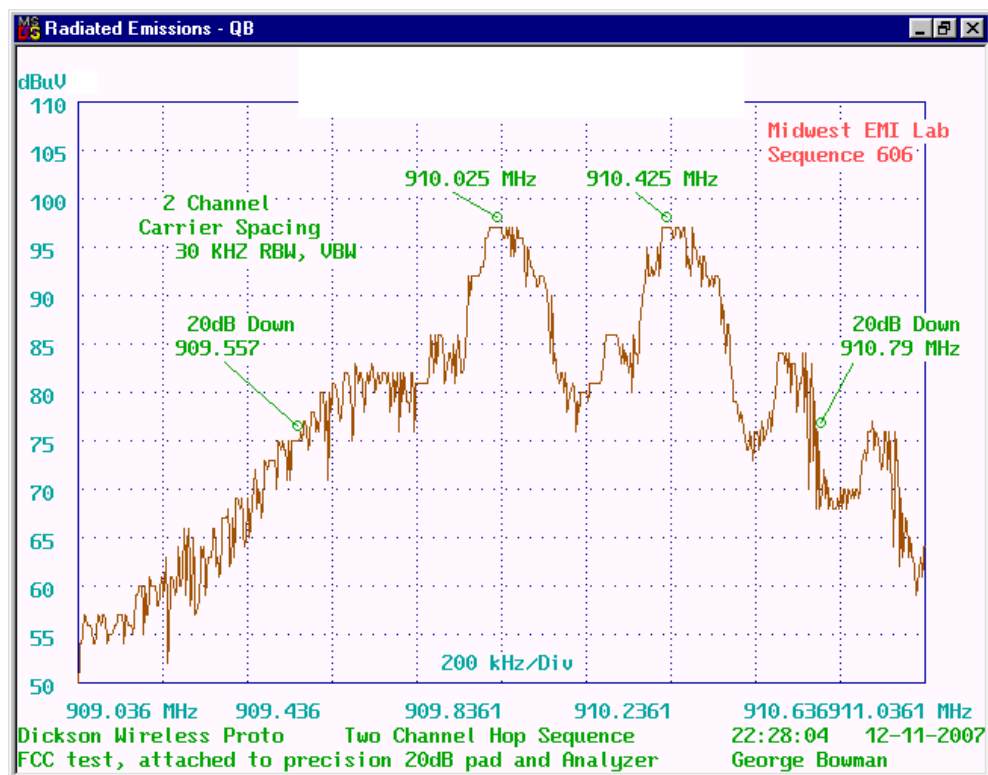
Change the RBW to 9 KHz and the VBW to 10 KHz:



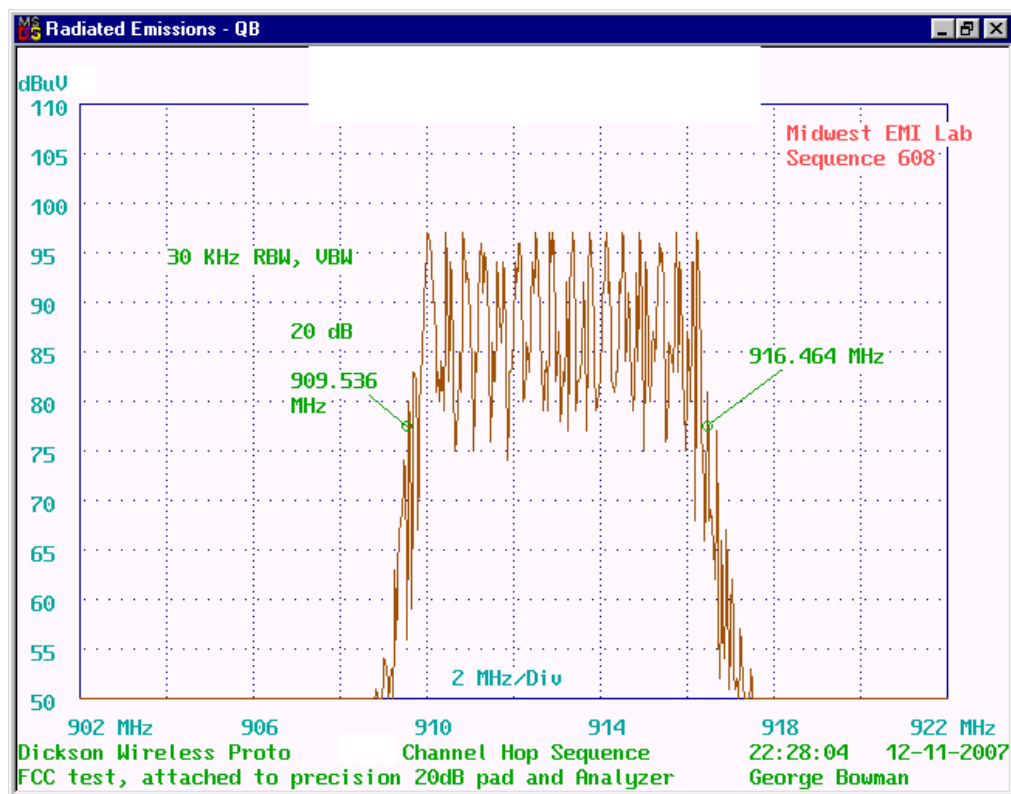
Change the RBW to 300 KHz and the VBW to 300 KHz



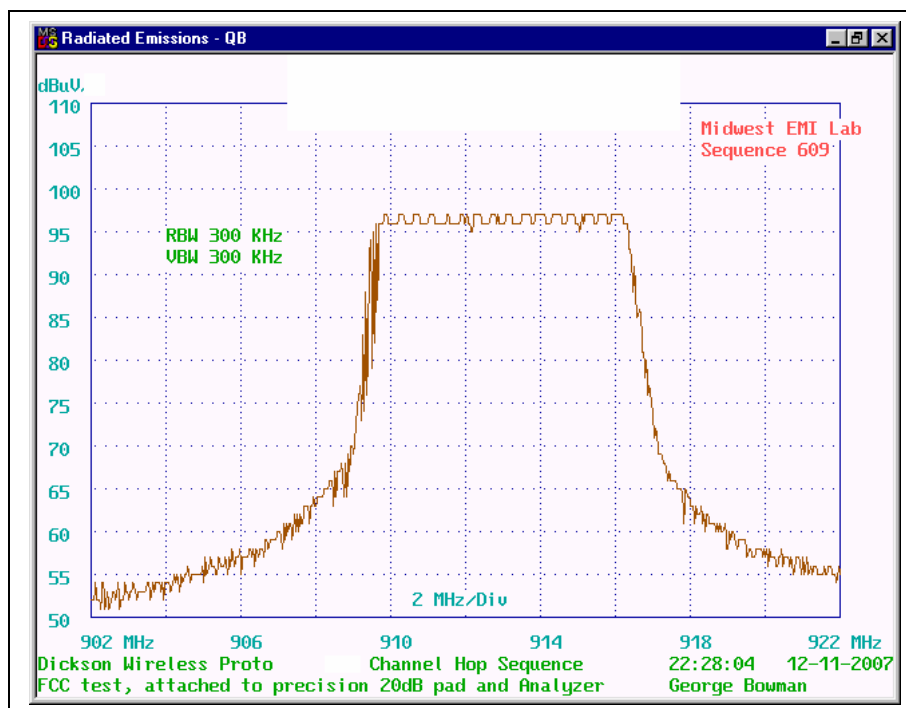
Carrier Spacing and 20 dB down Frequencies:



MultiChannel Band Occupation and Band Edge Occupation, 20 dB down



Multichannel Data with 300 KHz RBW and 300 KHz VBW



Spurious Conducted Emissions

This information was taken by hand. Any spurious signal above the noise floor of the analyzer was recorded. The analyzer was adjusted so that it was not in saturation and the 20 dB pad was maintained in place for all testing. The following frequencies and levels were recorded:

Noise Floor was -78.1 dBm

Frequency (MHz)	Level (dBm)	Frequency (MHz)	Level (dBm)
455.218	-60.8	1364.924 MHz	-60.8
1821	-46.8	2731.6	-70.4
4551.96	-77.6		

Sponsor Group SAR Statement

"The Wizard system is not a personal communication device. It can only be used to monitor temperature and/or humidity. The unit will limit itself to seven seconds of transmission. If it needs more time to catch up on a backlog of data, it will continue to send additional backlogged data on later transmissions."

Conducted Emissions Statement

"The remote sensor is powered by 2 AA cells and has no connection to mains power. The receiver host is powered by an adapter that was measured as part of the original filing. The host is linked to a laptop via a USB cable."

Sincerely,

A handwritten signature in cursive script that reads "George A. Bowman". The signature is written in dark ink and is positioned above a horizontal line.

George A. Bowman, President
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Mundelein, Illinois 60060
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Fax: (847)-918-9719
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EXHIBIT A OPERATOR'S MANUAL

EXHIBIT B FCC REQUEST DOCUMENT

DICKSON WiZARD

Wireless Monitoring Solutions

IMPORTANT PLEASE READ: Before you begin installation, have the Receiver, Logger(s) and any Repeater(s) at the base computer where you plan to install the Wizard Software and Receiver. DO NOT turn on any of the Wizard devices until instructed in the startup instructions.

Wizard Manual Index

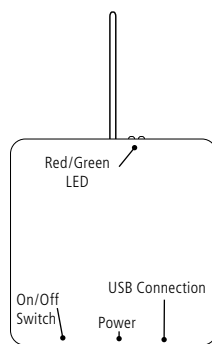
1. Installing Wizard Software	1	7. Modifying Logger Setup	4
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1 - Installing Wizard Software

1. Insert CD – CD installation file opens
2. "Welcome" window opens. Click on NEXT
3. "Destination Folder" window opens. Accept Defaults. Click NEXT
4. "Ready to install" windows opens click "Install"
5. Program begins installation – View progress bar.
6. Installation complete. Click FINISH.
7. Software is now installed and the Dickson Wireless icon is on your desktop.
8. Do not open the software until the Receiver is completely installed.

2 - Install Receiver

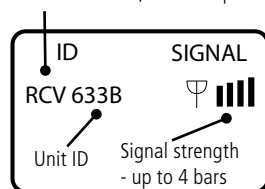
1. Receivers and Repeaters look very similar. Make sure you are installing the Receiver. Check the serial number on the back of the unit, it should start with WR.
2. Insert 2 AA batteries (included with instrument) into battery compartment on back of unit.
3. Plug in AC adapter to Receiver.
4. Connect USB cable to Receiver and available USB port on PC
5. Turn on Receiver via toggle switch on the bottom of the Receiver case (slide to the left). When turned on the Green LED will blink, Red once LED will remain solid.
6. After a few seconds, the Welcome to Found New Hardware Wizard window will pop up.
7. Select "Install New Hardware Automatically". Click on NEXT
8. Software will begin search.
9. Hardware Installation window will pop up. Click on CONTINUE ANYWAY
10. Completing New Found Hardware window opens. Click on FINISH



3 - Signal Sensor

1. Save time and possible lost data by using the Signal Sensor before installing Loggers/Repeaters.
2. Once the Receiver has been installed, go to each designated logger location, with the Signal Sensor, to determine if the logger signal strength will be strong enough to reach the Receiver. (See Signal Sensor Operating Instructions below.)
3. The display will indicate if the Receiver can be found and how strong the signal strength is.
4. If two or less bars show or if the signal strength changes frequently a Repeater will be required to ensure consistent communication of the Logger to the Receiver.

Unit Type:
RCV = Receiver; RPT = Repeater

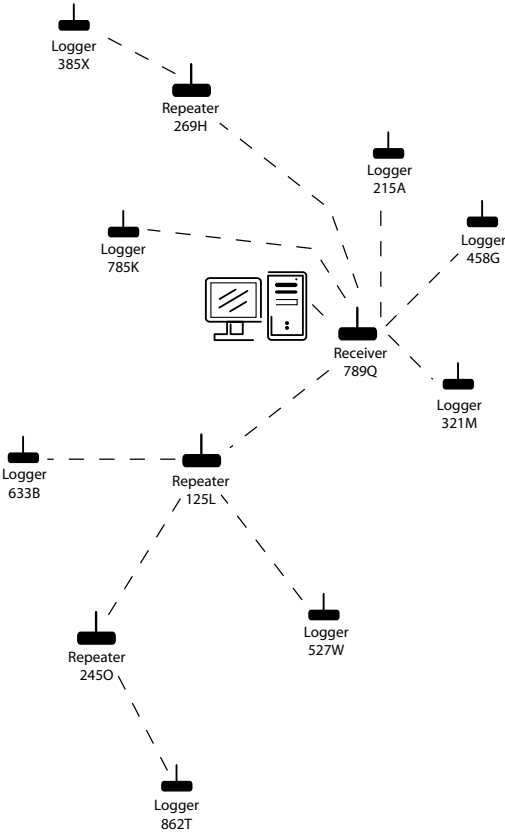


5. Repeat for all logger placement locations.
6. If it has been determined that a Repeater(s) is required, install the Repeater(s) first and link each logger to its designated Repeater when installing.
7. See the Network Layout Example below to see how the Loggers and Repeaters work together to create a robust system.
8. The Signal Sensor is ideal for determining if the target Logger location is within range of the Receiver or Repeater.
9. Operation:
 - a. Hold down the on button on your signal sensor for 3 seconds to turn on and move to the location where you wish to place the logger or repeater. The Signal Sensor will tell you if it can see the receiver or other repeaters and display signal strength. If a repeater or receiver is found, the target location is good. If a repeater or receiver can not be located, move closer to known repeater or receiver locations until one is found.

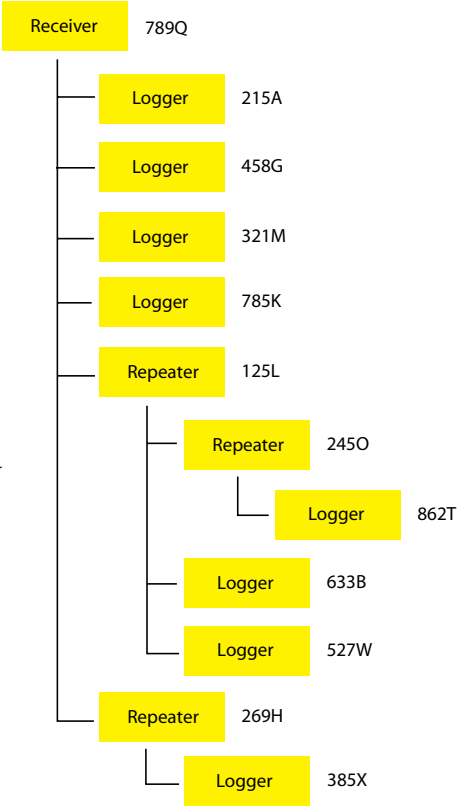
4 - Network Layout Example

Example of Wizard Network layout

1. Only one receiver on base PC
2. Loggers 215A, 458G, 321M, & 785K are close enough to communicate directly with the receiver
3. Logger 385X needs to forward its signal through repeater 269H in order to reach the receiver
4. Logger 862T needs to forward its signal through 2 repeaters (2450 & 125L) to reach the receiver
5. Note: Repeater 125L can forward a signal from multiple loggers and other repeaters



Below is a diagram detailing a wireless network set-up and how it appears under the Structure menu option



5 - Install Loggers

Add Logger/Repeater

IMPORTANT: Turn off logger before entering setup data!

Connect Via **a**

Unit Type **b** ☒ Logger ☐ Repeater

Setting Way **c** ☒ Near ☐ Far

Unit ID (last 4 digits of serial #) **d**

Name **e**

Location **f**

Temp Units **g** ☒ F ☐ C

Status **g**

Push to Start **h**

Sample Rate **i** Minutes
Seconds

Transmission Frequency **j** ☒ 5 Minutes
☐ 10 Minutes
☐ 15 Minutes

Next Calibration Date

Alarm temperature **k**
Min Max
Alarm Delay (in minutes) **l**

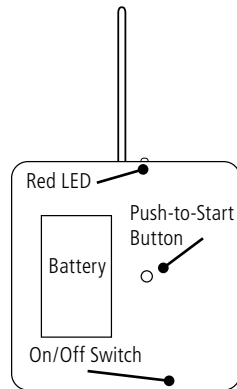
Alarm humidity **k**
Min Max
Alarm Delay (in minutes) **l**

Save Changes & Start **Cancel**

1. Insert 2 standard AA batteries (included with instrument) into battery compartment on back of unit.
2. Open Wizard software by clicking on the Dickson Wizard icon on your desktop.
 - a. Look at the lower LEFT corner of the Main window. "Connected" should show. This indicates that the software has recognized the Receiver. If "Connected" does not show, wait for the software and receiver to initialize before installing loggers. "Connected" should display within 60 seconds. Installation of loggers can begin.
 - b. If "Receiver not found" shows in the lower RIGHT, check all receiver connections and make sure the receiver was installed per the instructions. Go to page 5 to Uninstall receiver and software. After uninstall is complete, install the system again
3. Click on the link in the Welcome window to install loggers or Add Logger in the logger set-up screen.
4. The Add Logger/Repeater screen requires the following information (go to page 6 for detailed descriptions of logger setup fields):
 - a. Connect Via: Tells the logger where to send its signal. Leave on Receiver
 - b. Unit type: Logger = Sensor
 - c. Setting Way: leave at near
 - d. Unit ID: Last 4 digits of serial number (can be alpha and/or numeric).

- e. Name: Any name you wish to give a logger: Alpha/numeric field 15 characters.
- f. Location: Location description of where logger is to be placed: Alpha/numeric field 15 characters.
- g. Status: Active
- h. Push to Start:
 - i. No: Logger will automatically start logging once logger is setup.
 - ii. Yes: Will delay logging till push to start button on logger is pressed. Logger Status Screen will display "no data" until Push-to-Start button is pressed and Logger sends signal based on Transmission Frequency
- i. Sample Rate: Select a sample rate between 30 seconds and 15 minutes in 1 second intervals. Sample Rate can not exceed Transmission Frequency
- j. Transmission Frequency: Select 5, 10 or 15 minutes (tells the Loggers how frequently to send the data to the receiver)
- k. Alarm Temp/Humidity: Set min and max alarm conditions for logger if desired.
- l. Alarm Delay: If desired an alarm delay of up to 999 minutes can be set.

5. Once screen is complete, click on "Save Changes & Start".
6. A window will pop up "Turn on Unit and click OK". Turn on the logger via On/Off switch located on the bottom of the logger (slide switch to the right - Red LED will blink) and click on the OK button.
Note: The logger must be turned on before OK is clicked or the logger will not install.
7. Wizard software will search for logger and tell you when it has been installed.
8. The logger now shows up in the Wizard logger table and can be placed at the desired logging location. Signal Sensor is recommended for proper location of Loggers and Repeaters. See Signal Sensor.
9. NOTE: If the logger will not install (Logger Not Found) please do the following:
 - a. Did the LED flash Red when the logger was turned on?
 - i. NO: Replace the batteries and try again
 - ii. YES: Try the steps below again.
 - a. Stay in Setup screen.
 - b. Double check Unit ID. Should match last 4 digits of serial number.
 - c. Turn the logger off (LED's should not be lit).



- d. Click on SAVE CHANGES AND START button.
- e. Wait for the pop up "Turn on Unit and click OK".
- f. Turn on logger and make sure the Red LED flashes. If the Red LED does not flash, please replace batteries.
- g. Click OK on the pop up window.
- h. The logger should install. If it does not the batteries might be low on power. Replace batteries and try again.

6 - Installing Repeaters

1. If a logger is found to be out of range by the Signal Sensor, will be more than 100 feet from the receiver, or if there are several signal obstacles between the receiver and logger, a repeater can be installed between the receiver and logger.
2. Insert two AA batteries (included with instrument) into battery compartment on back of unit.
3. Plug in AC adapter to Repeater.
4. From the Wizard Status Screen click on SETUP and ADD Logger/ Repeater.
5. The Repeater installation screen is the same as the logger installation screen but only requires the following information (go to page 5 for detailed descriptions of logger setup fields):
 - a. Unit type: Select Repeater
 - b. Unit ID: 4 character alpha/numeric ID number on back of logger case.
 - c. Name: Any name you wish to give a logger: Alpha/numeric field 15 characters.
 - d. Location: Location description of where logger is to be placed: Alpha/numeric field 15 characters.
 - e. Status: Active
6. Once screen is complete, click on SAVE CHANGES AND START button.
7. A window will pop up "Turn on Unit and click OK". Turn on the Repeater via On/Off switch located on the bottom of the case (slide switch to the left). Green LED will blink, Red LED will remain solid. Click on the OK button.
8. Wizard software will search for the repeater and tell you when it has been installed.
9. The Repeater now shows up in the Wizard logger table and can be placed at the desired logging location.
10. If the Repeater did not install, make sure the Repeater was turned on before the OK button was pressed and that the Unit ID matches the last 4 characters of the serial number.

7 - Modifying Logger Setup

To change logger setup such as Sample Rate and Transmission Frequency (do not use to modify Connect Via - see Modifying Logger/Repeater Network Structure):

1. From the Status Screen, right click on the target logger and select Edit. If you are in the Setup Screen, double click on the Logger to Edit.
2. Change Setting Way to FAR
3. Modify desired settings
4. Click on SAVE CHANGES AND START
5. A window will pop up "Online Setting OK". Click OK
6. The changes will take affect after the next scheduled logger transmission.

8 - Modify Logger/Repeater Network Structure

Once a Repeater has been installed existing loggers can be modified to send data to the receiver via the repeater. The Logger/Repeater must be brought to the base PC.

1. From the **Status Screen**, right click on the target logger/repeater and select Edit. If you are in the Setup Screen, double click on Logger or Repeater to edit.
2. The Edit Logger/Repeater window will pop up.
3. Change Setting Way to Near
4. Change Status to Inactive
5. Save Changes and turn off logger/repeater
6. Open Edit Logger/Repeater window again for same logger
7. Change Setting Way to Near
8. Change Connect Via from Receiver to the target Repeater
9. Change Status to Active
10. Click on SAVE CHANGES AND START
11. A window will pop up "Turn on Unit and click OK" turn on Logger/Repeater and press OK.

Note: More than one repeater can be linked together to extended the range of the network.

9 - Setup Screen Definitions

1. **Connect Via:** Allows you to tell the logger where to send its signal to. If you are using repeaters, you can tell the logger to send its data to a specific repeater or directly to the receiver.
2. **Unit type:** Tells the software if a repeater or logger is being installed.
3. **Setting Way:** Near (recommended) - the Logger or Repeater is next to the PC during setup or edit so that you can turn the unit on within a few seconds of being instructed by the Wizard software; Far – the logger/receiver has been placed in the logging location and is not next to the PC. Setup and recognition of the logger/receiver will take longer in these cases. The Logger Status screen will display "no data" while waiting for communication from the Logger or Receiver.
4. **Unit ID:** A 4 digit alpha numeric ID# on the back of the Logger case.
5. **Name:** Any name you wish to give the device to help identify it.
6. **Location:** Where the device should be placed.
7. **Temp Units:** All devices will either read temperature in F or C. This can be changed under Tools/System Settings.
8. **Status:** This should read Active for any newly installed device. Change a device to Inactive when it is taken out of service.
9. **Push to Start:** Loggers only. Setup logger, but delay logging until the device is placed in logging location and the start button on the back of the unit has been pressed..
10. **Sample Rate:** Loggers only. User can determine in minutes & seconds how frequently samples are taken. Sample rate can range from 30 seconds to 15 minutes in 1 second intervals.
11. **Transmission Frequency:** Loggers only. Tells the logger how frequently to send logged data.
12. **Next Calibration Date:** Loggers only. Due date of next calibration.
13. **Alarm Temperature/Humidity:** Set Min and Max alarm limits for each sensor.
14. **Alarm Delay:** Loggers only: Delays alarm notification in minutes.

10 - Uninstallation

1. Loggers and Repeaters can not be uninstalled from the Wizard Software. If a Logger is returned for calibration or a Logger or Repeater is taken out of service, Edit the affected unit and change Logger Status to InActive.
2. The Receiver can be uninstalled and reinstalled without affecting existing network status or saved logged data.
 - a. Uninstalling Receiver (receiver must be on and connected via USB):
 - i. Start, Control Panel, System, Hardware, Device Manager
 - ii. Click on Ports (COM & LPT)(3)
 - iii. Opens to reveal Dickson Wireless Receiver
 - iv. Right Click – Uninstall
 - v. If you want to reinstall the Receiver, follow steps in section 2 above.
3. The Software can be uninstalled and reinstalled without affecting installed Loggers and Repeaters (the Receiver should be uninstalled and reinstalled along with the software. Saved logged data will not be affected).
 - a. Uninstall Software
 - i. Start, Control Panel, Add or Remove Programs
 - ii. Click on Dickson Wireless and Click on Change/Remove
 - iii. An uninstall utility will pop up. Select Uninstall – follow commands

11 - Software Summary

Wizard Software is user friendly and feature packed. (see page 5 for detailed description)

1. Status Screen:
 - a. View all installed loggers and repeaters
 - b. Alarm Conditions for: Low Battery, Min/Max Alarm, Calibration Due, Lost Transmission
 - c. Displays: Current/Min/Max Readings, Active Status, Battery Level and Calibration Due Date
 - d. Right Click on any logger in the table to view logged data in a Graph, Table or Edit logger setup
2. Graph Mode:
 - a. Allows for multiple loggers to be viewed on one graph.
 - b. Multiple graphs can be opened and viewed at the same time.
 - c. Easy export to Excel, save as .jpg or print.
 - d. Quick reference of summary data.
3. Table Mode:
 - a. Multiple tables can be opened and viewed at the same time.
 - b. Easy export to Excel
4. Structure Screen:
 - a. View relationship between Receiver, Repeaters and Loggers
5. Setup:
 - a. View all installed Loggers and Repeaters
 - b. Edit Logger Setup
 - c. Add new Loggers/Repeaters

1. Status Screen

Name	Location	Last Transmission	Current		Minimum		Maximum		Reset Min/Max	Battery Level	Calibration Due Date	Status	Clear Alarm
			Temp	RH	Temp	RH	Temp	RH					
Logger A	desk	11/19/07, 13:37:19	77.40 °F	34.70 %	70.30 °F	30.10 %	79.90 °F	47.00 %		Good	03/14/08	Inactive	
Logger B	file cabinet	11/21/07, 10:32:26	70.10 °F	38.90 %	70.10 °F	34.80 %	82.10 °F	93.50 %		Good	05/19/08	Active	
Repeater A	table											Active	

- View real time status of all Loggers and Repeaters.
- Right click on any Logger to view logged data in a Graph, Table or Edit Unit setup
- Data included in the table:
 - Name: Name of Logger/Repeater
 - Location: Location of Logger/Repeater
 - Last Transmission: Date and Time of last transmission. Will show in red if communications with a logger or repeater are lost. Will display "no data" if logger is waiting for push-to-start or setup with Setting Way of Far and unit has not yet made first transmission.
 - Current Temp/RH: Most current reading displayed
 - Minimum and Maximum Temp/RH: Displays Min/Max readings taken since logger was activated or since Min/Max was reset. Out of range conditions will show in red.
 - Reset Min/Max: Min/Max readings can be reset by clicking on the box in the column.
 - Battery Level: A battery level of Good or Low will display. A Low reading will show in red and batteries should be changed.
 - Calibration Due Date: The calibration due date is 6 months from the last date of calibration. An item due for calibration will display the due date in red. The Calibration Due Date can be modified in the Logger/ Repeater Edit screen.
 - Status: All units should show as Active unless taken out of service and made InActive by the user.
 - Clear Alarm: Box will show in red when any of the below alarm conditions shown exist. Clicking on the box will temporarily clear the alarm until the next transmission.
- Alarm Conditions:
 - Lost Transmission
 - Low Battery
 - Calibration Due
 - High/Low Alarm
- Sort table by clicking on any column header.
- Alarm Conditions automatically move to the top of the table.

2. Setup Screen:

Wizard Wireless Network - Setup Screen										
Home Structure Refresh Help										
Add Logger/Repeater										
Name	Location	Logger ID	Min Alarm Setting		Max Alarm Setting		Alarm Delay		Last Modified	Status
			Temp	RH	Temp	RH	Temp	RH		
Logger A	desk	6013	40	0	302	95	1	1	11/21/07; 10:12:13	Inactive
Logger B	file cabinet	6008	40	0	70	95	1	1	11/21/07; 10:12:33	Active
Repeater A	table	1006							11/21/07; 10:04:45	Active

- View a setup summary of all Loggers and Repeaters
- Double click on any Logger or Repeater to Edit Setup
- Add Logger button brings up Add a New Logger window

3. Add a New Logger Window:

- Add/Edit a Logger or Repeater
- Summary of Fields:
 - Connect Via: Allows you to tell the logger where to send its signal to. If you are using repeaters, you can tell the logger to send its data to a specific repeater or directly to the receiver.
 - Unit type: Tells the software if a repeater or logger is being installed.
 - Setting Way: Near (recommended) - the Logger or Repeater is next to the PC during setup or edit so that you can turn the unit on within a few seconds of being instructed by the Wizard software; Far - the logger/receiver has been placed in the logging location and is not next to the PC. Setup and recognition of the logger/receiver will take longer in these cases. The Logger Status screen will display "no data" while waiting for communication from the Logger or Receiver.
 - Unit ID: A 4 digit alpha numeric ID# on the back of the Logger case.
 - Name: Any name you wish to give the device to help identify it.
 - Location: Where the device should be placed.
 - Temp Units: All devices will either read temperature in F or C. This can be changed under Tools/System Settings.
 - Status: This should read Active for any newly installed device. Change a device to Inactive when it is taken out of service.
 - Push to Start: Loggers only. Setup logger, but delay logging until the device is placed in logging location.
 - Sample Rate: Loggers only. User can determine in minutes & seconds how frequently samples are taken. Sample Rate can range from 30 seconds to 15 minutes in 1 second intervals. The Sample Rate selected can not exceed the Transmission Frequency selected. For example a Sample Rate of 7 minutes can not have a Transmission Frequency of 5 minutes. Must select 10 minutes.

Add Logger/Repeater

IMPORTANT: Turn off logger before entering setup data.

Connect Via:

Unit Type: ☒ Logger ☐ Repeater

Setting Way: ☒ Near ☐ Far

Unit ID (last 4 digits of serial #):

Name:

Location:

Temp Units:

Status:

Push to Start:

Sample Rate: Minutes Seconds

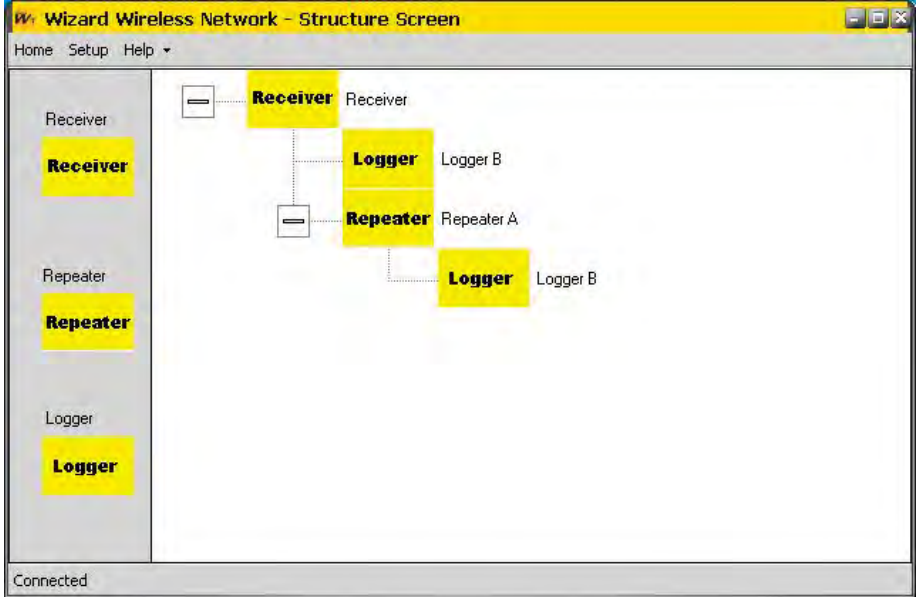
Transmission Frequency: ☐ 5 Minutes ☐ 10 Minutes ☒ 15 Minutes

Next Calibration Date:

Alarm temperature Min: 40	Alarm humidity Min: 0
Max: 302	Max: 95
Alarm Delay (in minutes): 1	Alarm Delay (in minutes): 1

- xi. Transmission Frequency: Loggers only. Tells the logger how frequently to send logged data. User can select intervals of 5, 10 or 15 minutes
- xii. Next Calibration Date: Loggers only. Due date of next calibration. Can be modified by the user.
- xiii. Alarm Temperature/Humidity: Set Min and Max alarm limits for each sensor.
- xiv. Alarm Delay: Loggers only: Delays alarm notification in minutes. Alarm starts after transmission.

4. Structure:



- a. This screen displays the relationship of all Loggers and Repeaters to the Receiver.

5. Tools/Dataset Backup:

The screenshot shows the 'Wizard Wireless Network - Tool Screen'. It has a 'Home' button and a 'Help' dropdown menu. The main area is mostly blank. At the bottom, there is a section for 'Backup Dataset to this Location' which includes a text input field, a 'Browse' button, and a 'Backup' button.

- a. A copy of the database (all logged data) can be stored in another location – recommended.

6. Tools/System Settings:

System Settings

Temperature Unit Setting

☐ C☒ F

Log File Setting

☐ Keep Log File

OKCancel

- a. Changes temperature units between F or C
 - b. Creates a log file of all Wizard activity. This feature takes up a lot of memory and is not recommended unless required by the user.
7. Alarm Pop-Up appears when unit is out of range or communications have been lost.

Over Mix/Max

Alarm Notification: OVER MIN/MAX

Logger Name

Logger B

Location

Packing

Notification Time

10/01/07, 14:58:29

Channel

1temperature

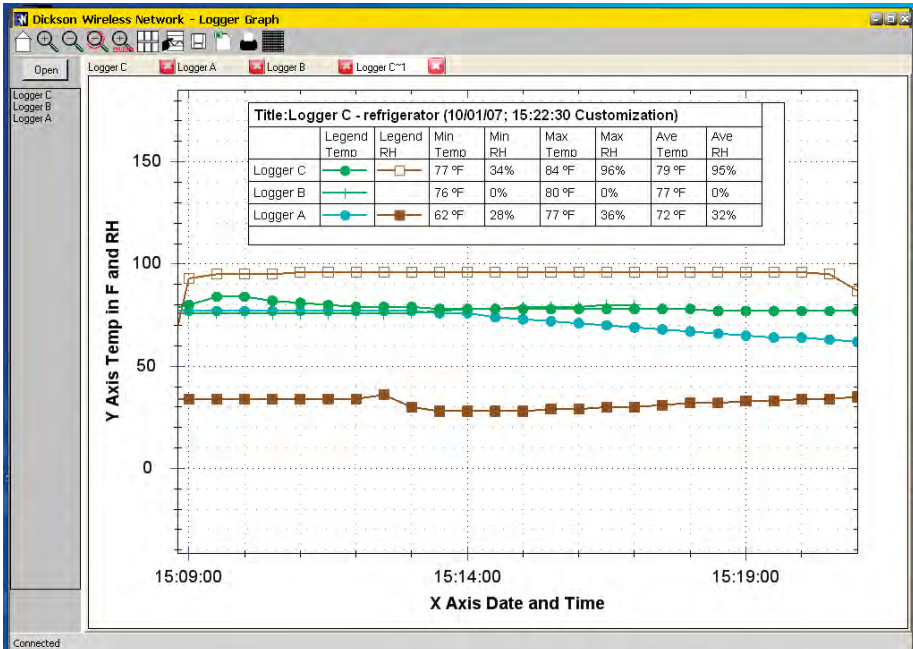
Current Reading

76.3

Alarm Condition

70

8. Graph:

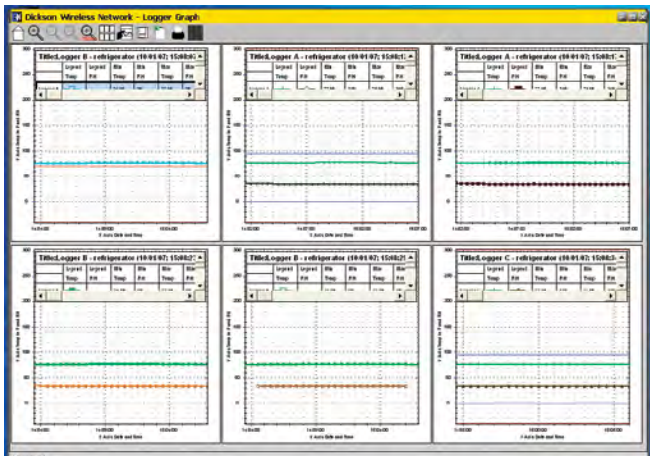


NOTE: Graphed data does not update with most current readings. Real time data can be viewed in the Status Screen.

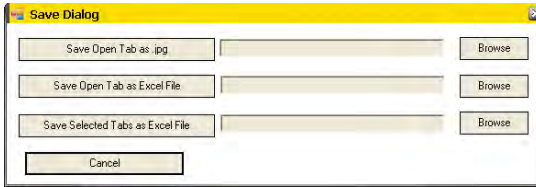
- a. View logged data in a graph by right clicking on any logger on the Status Screen and selecting Graph.
- b. A column of all loggers will appear on the left side of the screen. Multiple loggers can be viewed on the same graph:
 - i. Select each logger while holding the CNTL key. Click on Open to see selected logger on the same graph.
- c. More than one graph can be opened at a time. Tabs across the top of the graph area will show all open graphs.
- d. Zoom: Zoom In/Out, UnZoom and Zoom by Date. The logged data can also be dragged from right to left to scroll back and forth through time.



- e. All open graphs can be viewed at the same time in tile view.

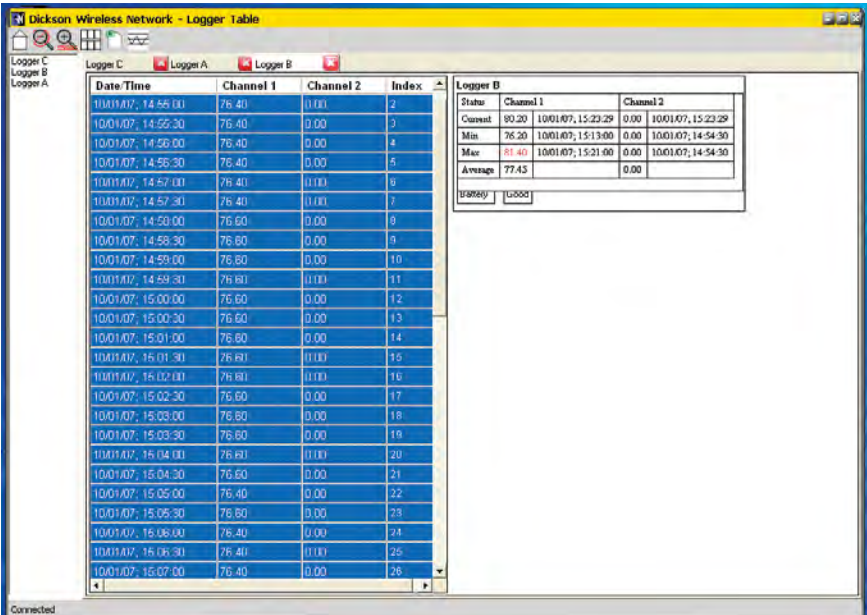


- f. Graph titles, font type, Axis scales, and Line and Point styles can be customized for a graph.
- g. A single graph or multiple graphs can be saved as: .jpg or Excel files.



- h. Graph(s) can also be exported directly to Excel.
- i. Graph(s) can be printed.
- j. All loggers open in graph view can be viewed as a table.

9. Tables:



- a. View logged data in a table by right clicking on any logger on the Status Screen and selecting Table
- b. A column of all loggers will appear on the left side of the screen. Only one logger can be viewed in a table at one time, but multiple tables can be opened at the same time.
- c. The tabular data does not update as new logged data is received from the logger, but the Logger summary table to the right does.
- d. All open tables can be viewed at the same time in tile view.
- e. Tabular data can be saved as an Excel file
- f. All open tables can be viewed in graph view

FCC ID

This device complies with part 15 of the FCC Rules. Operation is subject 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 .

The Wizard system is not a personal communication device. It can only be used to monitor temperature and/or humidity. Therefore, it will not be used on or near a person as a personal communication device. The unit will limit itself to seven seconds of transmission. If it needs more time to catch up on a backlog of data, it will continue to send additional backlogged data on later transmissions.

DA 00-705
Released March 30, 2000

Filing and Measurement Guidelines
for Frequency Hopping Spread Spectrum Systems

Part 15.247 of the FCC Rules provides for operation of frequency hopping spread spectrum transmitters. Examples of devices that operate under these rules include wireless local area networks, cordless telephones, wireless cash registers and wireless inventory tracking systems.

The FCC has no established test procedure for frequency hopping spread spectrum devices. Such tests are to be performed following the general guidance in Section 15.31 of the FCC Rules, using good engineering practice. The following provides both information on the measurement techniques that have been accepted in the past for equipment authorization purposes, as well as general filing guidelines which may be used to address the various technical requirements for frequency hopping spread spectrum transmitters.

NOTE: Unless otherwise specified, the following measurements should be made in an RF conducted manner, with a direct connection between the antenna port of the EUT and the measuring instrument. If any attenuation is required between the EUT and the measuring instrument, this value, in addition to the measured cable loss, must be added to the measured levels. If a direct connection cannot be made to the antenna port, alternative procedures are outlined at the end of this document. All measurement results should be consistent with the technical specifications and descriptions of the EUT with respect to frequency range of operation, peak output power, etc.

Section 15.31(m):

This rule specifies the number of operating frequencies to be examined for tunable equipment. Unless otherwise specified, the hopping function must be disabled for the following tests, which should be performed with the EUT transmitting on the number of frequencies specified in this Section. The measurements made at the upper and lower ends of the band of operation should be made with the EUT tuned to the highest and lowest available channels.

Section 15.203:

Describe how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT. The exception is in those cases where the EUT must be professionally

← DEAN
ANSWER

installed. In order to demonstrate that professional installation is required, the following three points must be addressed: (a) the application (or intended use) of the EUT, (b) the installation requirements of the EUT, and (c) the method by which the EUT will be marketed.

Section 15.204:

Provide the following information for every antenna proposed for use with the EUT: (a) type (e.g., Yagi, patch, grid, dish, etc.), (b) manufacturer and model number, and (c) gain with reference to an isotropic radiator.

R00, 2DB

Section 15.207:

If the unit is designed to be connected to the public utility power line, the voltage conducted back onto the AC power line must be measured, in order to demonstrate compliance with the limit specified in this Section. See ANSI C63.4-1992 for the proper set up and procedures.

**LAPTOP
APPROVED
SUPPLY**

Section 15.247(a):

Describe how the EUT meets the definition of a frequency hopping spread spectrum system, found in Section 2.1, based on the technical description.

Carrier Frequency Separation

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) = 1% of the span

Video (or Average) Bandwidth (VBW) = RBW

← ?
← ?

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

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Number of Hopping Frequencies

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW = 1% of the span

I ?
A ?

VBW = RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

Time of Occupancy (Dwell Time)

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel

RBW = 1 MHz

VBW = RBW

← ?

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

Trace = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat

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WHAT IS
DWELL
TIME?

this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s). An oscilloscope may be used instead of a spectrum analyzer.

20 dB Bandwidth

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW = 1% of the 20 dB bandwidth

VBW = RBW

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

Pseudorandom Frequency Hopping Sequence

Describe how the hopping sequence is generated. Provide an example of the hopping sequence channels, in order to demonstrate that the sequence meets the requirement specified in the definition of a frequency hopping spread spectrum system, found in Section 2.1.

Equal Hopping Frequency Use

Describe how each individual EUT meets the requirement that each of its hopping channels is used equally on average (e.g., that each new transmission event begins on the next channel in the hopping sequence after the final channel used in the previous transmission event).

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System Receiver Input Bandwidth

Describe how the associated receiver(s) complies with the requirement that its input bandwidth (either RF or IF) matches the bandwidth of the transmitted signal.

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System Receiver Hopping Capability

Describe how the associated receiver(s) has the ability to shift frequencies in synchronization with the transmitted signals.

← DEAN

Section 15.247(b):

Peak Output Power

Use the following spectrum analyzer settings:

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

RBW > the 20 dB bandwidth of the emission being measured

VBW = RBW

← ?

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (see the NOTE above regarding external attenuation and cable loss). The limit is specified in one of the subparagraphs of this Section. Submit this plot. A peak responding power meter may be used instead of a spectrum analyzer.

MIDWEST

De Facto EIRP Limit

Describe how the EUT complies with the de facto EIRP limit for every antenna proposed for use with the EUT. This includes those devices that will be used in point-to-point applications. If the peak output power, as measured above, must be reduced so that the de facto EIRP limit may be met for a particular antenna, describe exactly how much it will be

? NO IDEA

reduced for that antenna. If the peak output power level is raised above the limit in order to compensate for cable loss between the EUT and the antenna, specify the minimum length of cable which will always be used, the type of cable, and its loss, in dB per unit length, for the frequency of the emission. The limit is specified in one of the subparagraphs of this Section. Also, specify who will be responsible for ensuring that compliant operation is maintained for every antenna that will be used with the EUT.

**NOT
APPLICABLE?**

Point-to-Point Operation

If the EIRP relaxation for point-to-point operation is proposed for any particular antenna, describe who will be responsible for ensuring that the EUT is only used in such an application.

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RF Exposure Compliance Requirements

Spread spectrum transmitters operating under Section 15.247 are categorically excluded from routine environmental evaluation for demonstrating RF exposure compliance with respect to MPE and/or SAR limits. These devices are not exempted from compliance. As indicated in Section 15.247(b)(4), these transmitters are required to operate in a manner that ensures that exposure to the public (users and nearby persons) does not exceed the Commission's RF exposure guidelines (see Sections 1.1307, 2.1091 and 2.1093). Unless a device operates at substantially low output power levels, with a low gain antenna(s), supporting information is generally needed to establish the various potential operating configurations and exposure conditions of a transmitter and its antenna(s), in order to determine compliance with the RF exposure guidelines.

**NOT
APPLICABLE
NOT
USED
NEAR
HUMAN
BODY**

In order to demonstrate compliance with MPE requirements (see Section 2.1091), the following information is typically needed: (1) calculations that estimate the minimum separation distance (20 cm or more) between an antenna and persons required to satisfy power density limits (defined for free-space), (2) antenna installation and device operating instructions for installers (professional and/or unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirements, (3) any caution statements and/or warning labels that are necessary in order for a device to comply with the exposure limits, and (4) any other RF exposure related issues that may affect MPE compliance.

For portable transmitters (see Section 2.1093), or devices designed to operate next to a person's body, compliance is determined with respect to the SAR limit (defined in body tissues) for near-field exposure conditions. If the maximum average output power, operating configurations, and exposure conditions are comparable to those of existing cellular and PCS phones, an SAR evaluation may be required in order to determine if such a device complies with the SAR limit. When SAR data is not available, and the additional supporting information cannot assure compliance, the Commission may request that an SAR evaluation be

performed, as provided for in Section 1.1307(d).

Installation/Operation Manual Requirements

Submit a copy of the information/instructions that will be included in the installation/operation manual pertaining to: (a) correct peak output power settings required for compliant operation for every antenna proposed for use with the EUT, (b) point-to-point operational requirements and responsibilities, (c) any RF exposure compliance requirements.

← DEAN

Section 15.247(c):

Band-edge Compliance of RF Conducted Emissions

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation

RBW = 1% of the span

VBW = RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed must comply with the limit specified in this Section. Submit this plot.

MIDWEST

Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit. Submit this plot.

Spurious RF Conducted Emissions

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

RBW = 100 kHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section. Submit these plots.

??

Spurious Radiated Emissions

This test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if

**ALREADY
DONE**

appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{dwell time}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

If the emission on which a radiated measurement must be made is located at the edge of the authorized band of operation, then the alternative "marker-delta" method, listed at the end of this document, may be employed.

Section 15.247(g):

Describe how the EUT complies with the requirement that it be designed to be capable of operating as a true frequency hopping system.

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Section 15.247(h):

Describe how the EUT complies with the requirement that it not have the ability to be coordinated with other FHSS systems in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

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ALTERNATIVE TEST PROCEDURES

If antenna conducted tests cannot be performed on this device, radiated tests to show compliance with the peak output power limit specified in Section 15.247(b) and the spurious RF conducted emission limit specified in Section 15.247(c) are acceptable. As stated previously, a pre-amp, and, in the latter case, a high pass filter, are required for the following measurements.

N/A

- 1) Calculate the transmitter's peak power using the following equation:

$$E = \frac{0.30PG}{d}$$

Where: E is the measured maximum fundamental field strength in V/m, utilizing a RBW ³ the 20 dB bandwidth of the emission, VBW > RBW, peak detector function. Follow the procedures in C63.4-1992 with respect to maximizing the emission.

G is the numeric gain of the transmitting antenna with reference to an isotropic radiator.

d is the distance in meters from which the field strength was measured.

P is the power in watts for which you are solving:

$$P = \frac{(E \cdot d)^2}{30G}$$

2) To demonstrate compliance with the spurious RF conducted emission requirement of Section 15.247(c), use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 100 kHz

VBW ³ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Measure the field strength of both the fundamental emission and all spurious emissions with these settings. Follow the procedures in C63.4-1992 with respect to maximizing the emissions. The measured field strength of all spurious emissions must be below the measured field strength of the fundamental emission by the amount specified in Section 15.247(c). Note that if the emission falls in a Restricted Band, as defined in Section 15.205, the procedure for measuring spurious radiated emissions, listed above, must be followed.

} DONE

Marker-Delta Method

In making radiated band-edge measurements, there can be a problem obtaining meaningful data since a measurement instrument that is tuned to a band-edge frequency may also capture some in-band signals when using the resolution bandwidth (RBW) required by measurement procedure ANSI C63.4-1992 (hereafter C63.4). In an effort to compensate for this problem, we have developed the following technique for determining band-edge compliance.

STEP 1) Perform an in-band field strength measurement of the fundamental emission using the RBW and detector function required by C63.4 and our Rules for the frequency being measured. For example, for a device operating in the 902-928 MHz band under Section 15.249, use a 120 kHz RBW with a CISPR QP detector (a peak detector with 100 kHz RBW may alternatively be used). For transmitters operating above 1 GHz, use a 1 MHz RBW, a 1 MHz VBW, and a peak detector (as required by Section 15.35). Repeat the measurement with an average detector (i.e., 1 MHz RBW with 10 Hz VBW). Note: For pulsed emissions, other factors must be included. Please contact the FCC Lab for details if the emission under investigation is pulsed. Also, please note that radiated measurements of the fundamental emission of a transmitter operating under 15.247 are not normally required, but they are necessary in connection with this procedure.

STEP 2) Choose a spectrum analyzer span that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set the analyzer RBW to 1% of the total span (but never less than 30 kHz) with a video bandwidth equal to or greater than the RBW. Record the peak levels of the fundamental emission and the relevant band-edge emission (i.e., run several sweeps in peak hold mode). Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not a field strength measurement, it is only a relative measurement to determine the amount by which the emission drops at the band-edge relative to the highest fundamental emission level.

STEP 3) Subtract the delta measured in step (2) from the field strengths measured in step (1). The resultant field strengths (CISPR QP, average, or peak, as appropriate) are then used to determine band-edge compliance as required by Section 15.205.

STEP 4) The above "delta" measurement technique may be used for measuring emissions that are up to two "standard" bandwidths away from the band-edge, where a "standard" bandwidth is the bandwidth specified by C63.4 for the frequency being measured. For example, for band-edge measurements in the restricted band that begins at 2483.5 MHz, C63.4 specifies a measurement bandwidth of at least 1 MHz. Therefore you may use the "delta" technique for measuring emissions up to 2 MHz removed from the band-edge. Radiated emissions that are removed by more than two "standard" bandwidths must be measured in the conventional manner.

Questions pertaining to this document may be directed to Gregory Czumak, phone: (301) 362-3052, e-mail: GCZUMAK@FCC.GOV