User's Manual

MDX ZIGBEE RADIO

Revision: 1
Date: 08/12/14

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Reference Documents			
Document Title	**Revision**	**Document Maintenance Contact**	**Document Location**
CGFS-W-201 Rev4 ***Gen 2 Dual Sensor Wiring Instructions***	***4***	Brad Walker Global Field Service Manager office.630.321.8006 bwalker@midtronics.com	Midtronics internal document for training approved installers. Available upon Request

1. Summary

- **The MDX ZIGBEE RADIO is installed onto the CELLGUARD Battery Sensor during manufacturing of the sensor by Midtronics Inc. The MDX ZIGBEE RADIO module is inside the product enclosure, and is not accessible by the end user.**

- **The configuration and settings of the MDX ZIGBEE RADIO module are preprogrammed during manufacturing by Midtronics Inc and are not accessible to the end user**

- **CELLGUARD Battery Sensor containing the internal MDX ZIGBEE RADIO module is not installed by the end user. The CELLGUARD Battery Sensor shall only be installed by installers trained and certified by Midtronics Inc with explicit approval by Midtronics Inc.**

- **The MDX ZIGBEE RADIO module is only installed only in the products listed in the table below.**

MDX ZIGBEE RADIO module is installed only in the CELLGUARD Battery Sensors in this Table

Sensor Part Number	Description	PCBA Part Number
CGDS-02V	PCBA, CELLGUARD DUAL 2V SENSOR GEN II +	198-000315
CGDS-04V	PCBA, CELLGUARD DUAL 04V SENSOR GEN II +	198-000316
CGDS-12V	PCBA, CELLGUARD DUAL 12V SENSOR GEN II +	198-000314
CGDS-16V	PCBA, CELLGUARD DUAL 16V SENSOR GEN II +	TBD
CGSS-02V	PCBA, CELLGUARD SINGLE 2V SENSOR GEN II +	TBD
CGSS-12V	PCBA, CELLGUARD SINGLE 12V SENSOR GEN II +	TBD
CGDH-02V	PCBA, CELLGUARD DUAL HYBRID 2V SENSOR GEN II +	198-000336
CGDH-04V	PCBA, CELLGUARD DUAL HYBRID 4V SENSOR GEN II +	198-000335
CGDH-06V	PCBA, CELLGUARD DUAL HYBRID 6V SENSOR GEN II +	198-000334
CGDH-08V	PCBA, CELLGUARD DUAL HYBRID 8V SENSOR GEN II +	198-000333
CGDH-12V	PCBA, CELLGUARD DUAL HYBRID 12V SENSOR GEN II +	198-000332
CGDH-16V	PCBA, CELLGUARD DUAL HYBRID 16V SENSOR GEN II +	198-000331

GEN II CELLGUARD Battery Sensor, Model: CGDS-12V

2. MDX ZIGBEE RADIO Installation

The MDX ZIGBEE RADIO module inside the CELLGUARD Battery Sensor shall not be accessed by the end user. The radio module shall not be removed or installed. The radio module requires no setup, configuring, or maintenance by the end user. The radio module inside the CELLGUARD Battery Sensor should be invisible to the end user.

3. Technical Specifications of MDX ZIGBEE RADIO Module

3.1 Description of MDX ZIGBEE RADIO module

Module operates in a sensor Telemetry application in Uninterruptable Power Supply (UPS) systems using IEEE 802.15.4 compliant transport. Radio operates in a non-beaconed private area network to report battery parameters to a wireless access point (Base Coordinator).

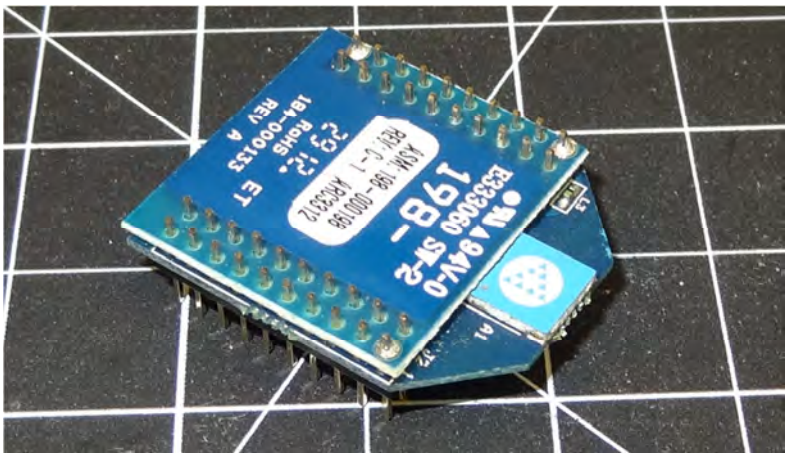
Radio module also contains application firmware to control external peripherals (FET Switches, LED's...)

Direct sequence spread spectrum modulation O-QPSK is used in the 2.4GHz ISM band. 250kbps O-QPSK data is transported in 2MHz channels with 5MHz channel spacing per IEEE 802.15.4 specification.

Circuitry is mounted on a modular printed circuit board which consists of an integrated Freescale device MC13213, connected to a chip antenna.

The antenna is a chip antenna device that is soldered onto the printed circuit board. Antenna is not user replaceable.

The MDX ZIGBEE RADIO module is located on the PCB assembly of the Dual Sensor, and enclosed in the CELLGUARD Battery Sensor case. The radio module is not accessible by the user.



MDX ZIGBEE RADIO Module

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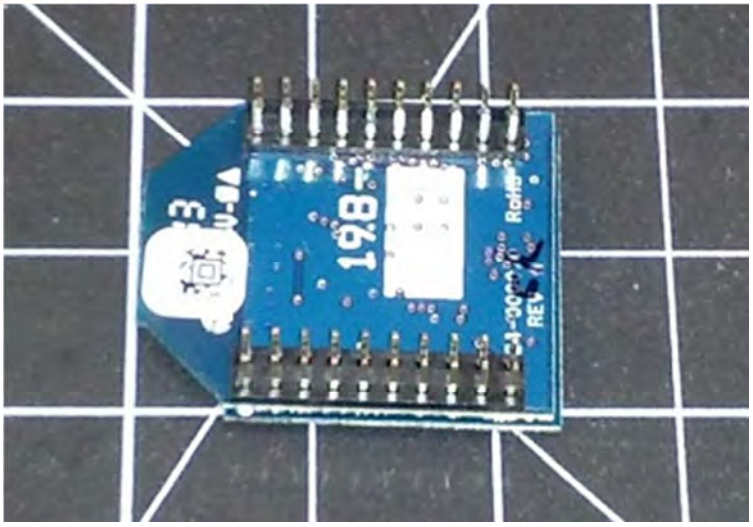
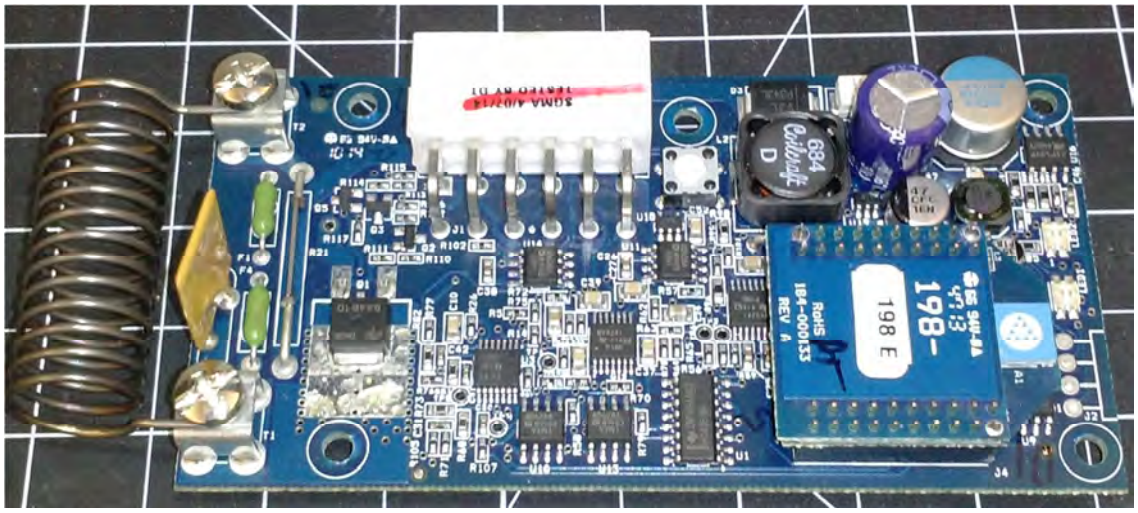


MDX ZIGBEE RADIO Module



MDX ZIGBEE RADIO Installed on PCBA

CELLGUARD Battery Sensor PCBA Inside Enclosure

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3.2 MDX ZIGBEE RADIO Module Specifications Table

Radio Specifications

Data Rate	250kbps
Supply Voltage (Supplied by Dual Sensor)	3.3V
Operating Frequency	ISM 2.4GHz
Operating Temperature	0°C to +65°C
Addressing Option	PAN ID
Channels	12
Channel Separation	5MHz
Mode	Direct Sequence Spread Spectrum
Phase Shift Keying	O-QPSK

3.3 Table of Allowable Channels

Channels Corresponding Frequency

12	0x0C	2.410GHz
13	0x0D	2.415GHz
14	0x0E	2.420GHz
15	0x0F	2.425GHz
16	0x10	2.430GHz
17	0x11	2.435GHz
18	0x12	2.440GHz
19	0x13	2.445GHz
20	0x14	2.450GHz
21	0x15	2.455GHz
22	0x16	2.460GHz
23	0x17	2.465GHz

3.4 MDX ZIGBEE RADIO Module Antenna Specifications Table

Antenna Specifications

Type	Chip
Configuration	Permanent
Frequency Range Minimum Frequency	2400MHz
Frequency Range Maximum Frequency	2500MHz
Polarization	Linear
Peak Gain	2dBi
Dimensions	6.7 x 6.7 x 1 mm
VSWR (~:1)	2:1

4. Agency Certifications for MDX ZIGBEE RADIO

This product complies with FCC OET Bulletin 65 & Industry Canada's RSS-102 radiation exposure limits set forth for an uncontrolled environment

This device complies with Part 15 of the FCC Rules and Industry Canada license-exempt RSS standard(s). 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.

Cet appareil est conforme à des règlements d'Industrie Canada exempts de licence standard RSS (s). Son fonctionnement est soumis aux deux conditions suivantes: (1) Ce dispositif ne doit pas causer d'interférences nuisibles, et (2) cet appareil doit accepter toute interférence reçue, y compris les interférences pouvant entraîner un fonctionnement indésirable.

Pursuant to FCC 15.21 of the FCC rules, changes not expressly approved by Midtronics Inc., might cause harmful interference and void the FCC authorization to operate this product.

WARNING: To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance is not recommended. The antenna used for this transmitter must not be co-located in conjunction with any other antenna or transmitter.

5. Battery Sensor Installation

The end user does not install the CELLGUARD Battery Sensor containing the MDX ZIGBEE RADIO module. CELLGUARD Battery Sensor installation shall only be performed by installers are trained and explicitly certified by Midtronics. All installations shall be explicitly approved by Midtronics. If you are a certified installer and require information about CELLGUARD Battery Sensor Installation, refer to document ***CGFS-W-201 Gen 2 Dual Sensor Wiring Instructions r4*** in its entirety.

CELLGUARD Battery Sensors Monitoring 12V UPS Batteries

6. Intended Use

The CELLGUARD Battery Sensors are installed via a wire harness on large batteries used for Uninterruptable Power Supply Systems. The sensor measures various battery parameters and communicates the data wirelessly to a Base Coordinator Unit. The data is then sent to CELLTRAQ, Midtronics' enterprise battery monitoring software, for interpretation and analysis.

CELLGUARD System Summary

7. Safety

General Safety Information

IMPORTANT SAFETY INSTRUCTIONS: Thoroughly read this manual and follow the safety and operating instructions before installing or servicing the Cellguard Battery Monitoring System.

To avoid electric shock, follow your company's safety practices and these guidelines:

⚠ DANGER

Hazardous Voltage.
Can cause death or serious personal injury.

Batteries and battery cabinets contain potentially lethal voltages. To avoid electrical shock or burn, turn off main and control voltages before performing installation or maintenance. Batteries are energized even when AC power has been disconnected.

Required by California Proposition 65:

⚠ WARNING

Battery posts, terminals, and related accessories contain lead and lead compounds.

These chemicals are known to the state of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.

Personal Precautions

- Always have someone within range of your voice, or close enough to come to your aid, when working around lead acid batteries.
- Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes.
- Wear complete eye protection, clothing protection, and wear rubber soled shoes. Place damp cloth over battery to protect against acid spray. When ground is very wet or covered with snow, wear rubber boots. Avoid touching eyes while working near battery.
- If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters the eye, immediately flush with cold running water for at least 10 minutes, and seek medical attention.
- NEVER smoke or allow a spark or flame in vicinity of a battery or engine.
- Be extra cautious to reduce risk of dropping a metal tool onto the battery. It might spark or short circuit the battery or other electrical part that may cause an explosion.
- Before working with a lead-acid battery, remove personal metal items such as rings, bracelets, necklaces, watches, etc. A lead-acid battery can produce a short circuit current high enough to weld such items causing a severe burn.

General Safety Precautions

⚠ WARNING

Risk of explosive gases

Batteries generate explosive gases during normal operation, and when discharged or charged.

To reduce risk of battery explosion, follow these safety instructions and those published by the battery manufacturer and the manufacturer of any equipment you intend to use in the vicinity of a battery. Review cautionary marking on these products and equipment containing the battery.

Conventions Used in This Manual

To help you learn how to use the Cellguard System, the manual uses these symbols and typographical conventions.

Convention	Description
	The safety symbol indicates instructions for avoiding hazardous conditions and personal injury.
CAUTION	The word **CAUTION** indicates instructions for avoiding equipment damage.
	The wrench symbol indicates procedural notes and helpful information.

8. Patents

PATENTS

Made in the U.S.A. by: Midtronics, Inc., protected by one or more of the following U.S. Patents: 7,058,525. 7,039,533. 7,003,411. 6,926,523. 6,919,725. 6,871,151. 6,795,728. 6,586,941. 6,534,993. 6,392,414. 6,310,481. 6,172,505. 5,945,829. 5,914,605. 5,757,192. 5,574,355. 5,572,136. 5,140,269. Canadian Patent: 2091262. China Patent: ZL99105947. European Patent: 548266. Hong Kong Patent: 1024058. Japan Patent: 30006800. Other U.S. and Foreign Patents issued and pending. This product may utilize technology exclusively licensed to Midtronics, Inc. by Johnson Controls, Inc. and Motorola, Inc.

9. Limited Warranty

LIMITED WARRANTY

The Cellguard System is warranted to be free of defects in materials and workmanship for a period of one year from date of purchase. Midtronics will, at our option, repair or replace components with a remanufactured unit. This limited warranty applies only to the components supplied by Midtronics, and does not cover any other equipment, static damage, water damage, over-voltage damage, dropping the unit, or damage resulting from extraneous causes including owner misuse. Midtronics is not liable for any incidental or consequential damages for breach of this warranty. The warranty is void if owner attempts to disassemble any of the components or to modify the cable assembly.

10. Service

SERVICE

To obtain service, purchaser should contact Midtronics for a Return Authorization number, and return the unit to Midtronics freight prepaid, Attention: RA# _____. Midtronics will service the analyzer and reship the next scheduled business day following receipt, using the same type carrier and service as received. If Midtronics determines that the failure was caused by misuse, alteration, accident, or abnormal condition of operation or handling, purchaser will be billed for the repaired product and it will be returned freight prepaid with freight charges added to the invoice. Battery analyzer beyond the warranty period are subject to the repair charges in effect at that time. Optional remanufacturing service is available to return the tester to like-new condition. Out-of-warranty repairs will carry a 3-month warranty. Remanufactured units purchased from Midtronics are covered by a 6-month warranty.