



FreeWave Technologies, Inc.

**400 MHz Wireless Modem
Installation Guide**

FreeWave Technologies, Inc. products may be subject to control by the Export Administration Regulations (EAR) and/or the International Traffic in Arms Regulations (ITAR). Export, re-export, or transfer of these products without required authorization from the U.S. Department of Commerce, Bureau of Industry and Security, or the U.S. Department of State, Directorate of Defense Trade Controls, as applicable, is prohibited. Any party exporting, re-exporting or transferring FreeWave products is responsible for obtaining all necessary U.S. government authorizations required to ensure compliance with these and other applicable U.S. laws. Consult with your legal counsel for further guidance.

Safety Information



Warning! Do not remove or insert diagnostics cable while circuit is live.

Warranty

FreeWave Technologies, Inc. warrants your FreeWave® Wireless Data Transceiver against defects in materials and manufacturing for a period of two years from the date of shipment, depending on model number. In the event of a Product failure due to materials or workmanship, FreeWave will, at its discretion, repair or replace the Product. For evaluation of Warranty coverage, return the Product to FreeWave upon receiving a Return Material Authorization (RMA) for evaluation of Warranty Coverage.

In no event will FreeWave Technologies, Inc., its suppliers, or its licensors be liable for any damages arising from the use of or inability to use this Product. This includes business interruption, loss of business information, or other losses which may arise from the use of this Product. OEM customer's warranty periods can vary.

Warranty Policy will **not apply** in the following circumstances:

1. If Product repair, adjustments, or parts replacements are required due to accident, neglect, or undue physical, electrical, or electromagnetic stress.
2. If Product is used outside of FreeWave specifications as stated in the Product's data sheet.
3. If Product has been modified, repaired, or altered by Customer unless FreeWave specifically authorized such alterations in each instance in writing. This includes the addition of conformal coating.

Restricted Rights

Any product names mentioned in this manual may be trademarks or registered trademarks of their respective companies and are hereby acknowledged.

This manual is for use by purchasers and other authorized users of FreeWave products.

No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, or for any purpose without the express written permission of FreeWave Technologies, Inc. FreeWave reserves the right to make changes to this manual without notice. FreeWave assumes no responsibility or liability for the use of this manual or the infringement of any copyright or other proprietary right.

FreeWave products are designed and manufactured in the United States of America.

FreeWave Technologies, Inc.

Boulder, CO Phone: 303.381.9200

Toll Free: 866.923.6168

Fax: 303.786.9948

www.FreeWave.com

FCC notifications

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 content of this guide covers FreeWave Technologies, Inc. models sold under FCC ID: KNYLRS455C.

All models sold under the FCC ID(s) listed above must be installed professionally and are only approved for use when installed in devices produced by FreeWave Technologies or third party OEMs with the express written approval of FreeWave Technologies, Inc. Changes or modifications should not be made to the device.



Warning! The transceivers covered in this guide have a maximum transmitted output power of 2 W. The antennas used must provide a separation distance of at least 72 cm from all persons and must not be co-located or operate in conjunction with any other antenna or transmitter. Antennas used with the transceiver must not exceed 7 dBi.

The models described in this guide must be installed in a NEMA enclosure. When any FreeWave Technologies, Inc. module is placed inside an enclosure, a label must be placed on the outside of the enclosure. The label must include the text "Contains FCC ID: KNYLRS455C."

FCC §90.203(g) (g): The transmitter is programmed for frequencies through controls normally inaccessible to the operator.

RSS-119; 3.2: The transmitter is programmed for frequencies through controls that are inaccessible to the user.

Models LRS455C

GENERAL - The devices covered by this Report are wireless data transceivers. They must be installed in a suitable enclosure.

Conditions of Acceptability – When installed in the end use equipment, the following considerations are to be examined:

- The transceivers shall be mounted within an enclosure which is suitable for the intended application. The enclosure shall also have provisions for Division 2 wiring methods as specified in the National Electrical Code or Canadian Electrical Code, as applicable.
- The transceivers must be used within their recognized ratings and transmission rate.
- Installations and use should be in accordance with the National Electrical Code or Canadian Electrical Code, as applicable.
- The connectors shall not be connected or disconnected while the circuit is alive unless the area is known to be nonhazardous. Connector J2 is used only for programming the device; it has not been evaluated as a non-incendive circuit.
- Must be connected to a Class 2 source.
- The diagnostics port and cable do not have a latching connector and cannot be used in a hazardous location.

Transceiver installation steps

Note: LRS455C transceivers should not be powered on without a load connected to the antenna port. Powering an LRS455C transceiver without a load can damage the radio.

To install the LRS455C series transceivers, follow these basic steps:.

1. Mount the transceiver to the flat, stable surface using mounting holes in the corners of the transceiver. Transceiver models sold under FCC ID KNYLRS455C are to be installed professionally in NEMA enclosures.
2. Install the antenna and connect the antenna feedline to the transceiver. If you are installing a directional antenna, preset the antenna's direction appropriately. The antenna must be professionally installed on fixed-mounted permanent outdoor structures for satisfying RF exposure requirements.
3. Connect a computer to the transceiver's RS232 port (please refer to part C of this addendum for more information about the transceiver's pin assignment). This computer will be used to set the radio's configurations.
4. Install the power for the radio.
5. Set the radio configuration according to the system topology and data terminal equipment requirements. Default transceiver settings allow user to do a quick installation without major changes in transceiver's configuration. But there is one parameter that ***must be considered for a new installation – the transceiver's power output settings.***

Note: *It is the installer's responsibility to ensure that the emission limits are not exceeded.*

Transceiver location

Placement of the FreeWave transceiver is likely to have a significant impact on its performance. In general, the rule of thumb with FreeWave is that the higher the placement of the antenna the better the communication link - height is everything! In practice you should also place the transceiver away from computers, telephones, answering machines,

and other similar equipment.

When using an external antenna, placement of that antenna is critical to a solid data link. Other antennas in close proximity are a potential source of interference; use the Radio Statistics or Diagnostics software to help identify potential problems. It is also possible that slight adjustments in antenna placement (as little as two feet) will solve noise problems.

Board-level pin assignments

The board-level transceiver uses standard RS232 polarity and voltage levels for all the RS232 signal lines (DTR, Transmit Data, Receive Data, Carrier Detect, RTS, and Clear to Send).

Pin 1: B+ Power input

Pin 2: Interrupt (INT) – Input – A 0 volt level on this pin will switch the radio into setup mode

Pin	Signal	Assignment
1	Input	B+ input
2	Input	Interrupt (Ground to invoke menu)
3	Input	DTR
4		Ground
5	Output	Transmit Data
6		Ground
7	Input	Receive Data
8	Output	Carrier Detect
9	Input	RTS
10	Output	Clear to Send

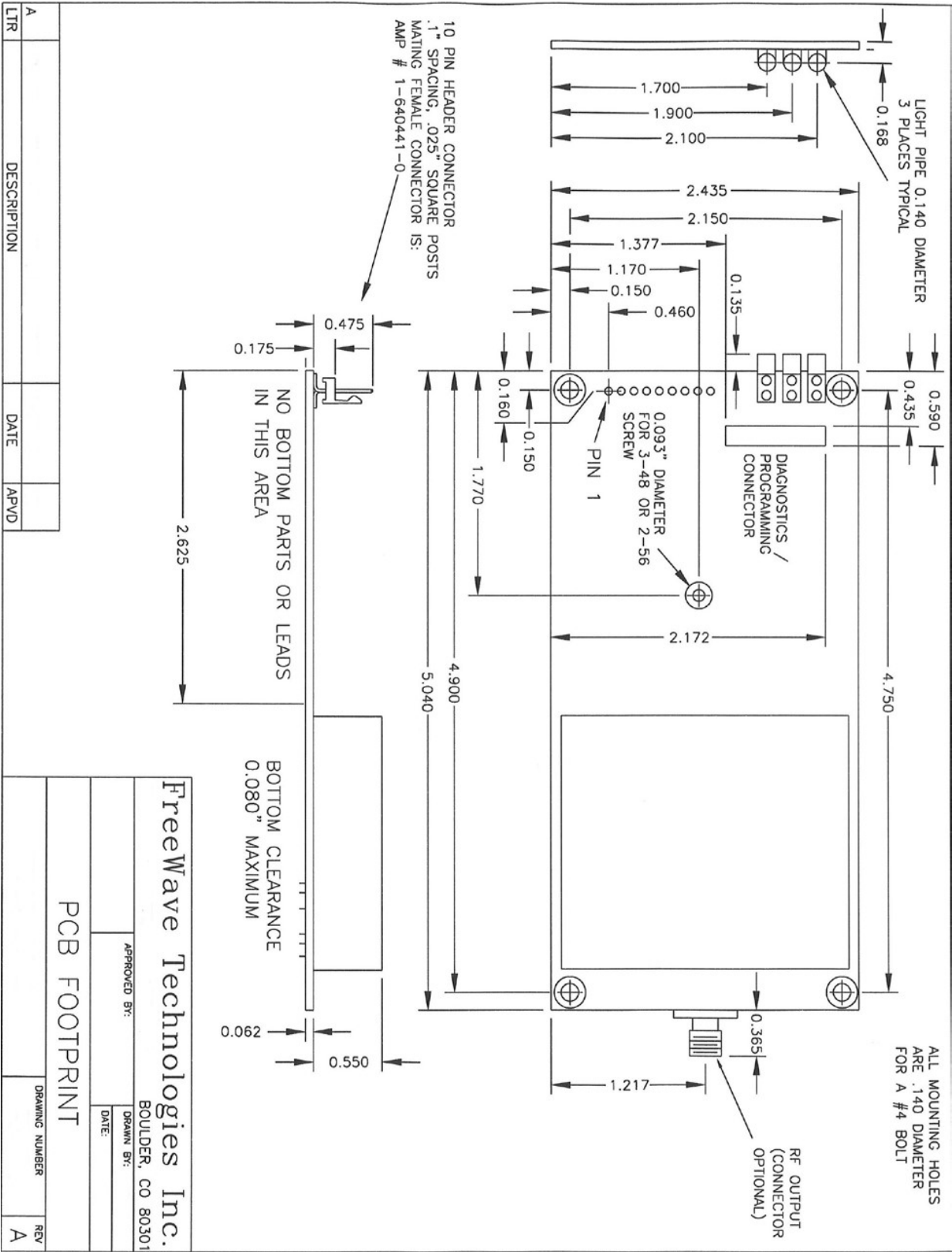
Table – Board-level transceiver pinout

NOTE: Pin 1 on the LRS455C board level transceiver is the pin farthest from the three LEDs, and pin 10 is closest to the LEDs.

Power connection

The LRS455C series transceivers can be operated from any Class 2 power source, input voltages vary by model. The power source should be capable of providing at least 0.8 amperes of continuous current. The pin #1 of the 10-pin connector on the transceiver is the positive lead; pin #4 or pin #6 of this connector should be as a negative lead.

NOTE: The transceiver is designed to operate in negative ground systems only.



Please write an appropriate caption for this image