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LRNHEL Instruction Manual

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1.0 Overview

The LRNHEL Long Range Transceiver module is based on the Microchip RN2903 module and establishes an encrypted long range communication link between a base station and the processor this module is connected to. It is electrically identical to the Microchip RN2903 module and the same UART commands can be used to interact with it.

For more in-depth technical information the reader is recommended to consult the RN2903 datasheet and command list.

Figure 1: Top view of the LRNHEL module

2.0 Typical PCB Layout

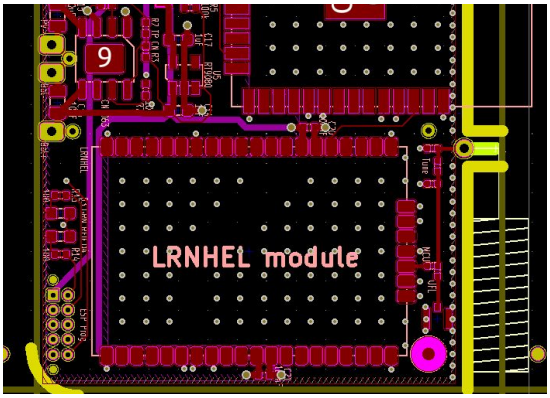

Figure 2: Example LRNHEL module layout on a PCB

3.0 Interfacing with the LRNHEL module

The dedicated UART TX and RX pins (pins 6 and 7 respectively) can be used to interface with the module. The default settings are:

Baud rate - 57600 bps

Packet length - 8 bit

Parity bit - No

Stop bits - 1 bit

Hardware flow control - No

The module can be wired up as shown in figure 3 below.

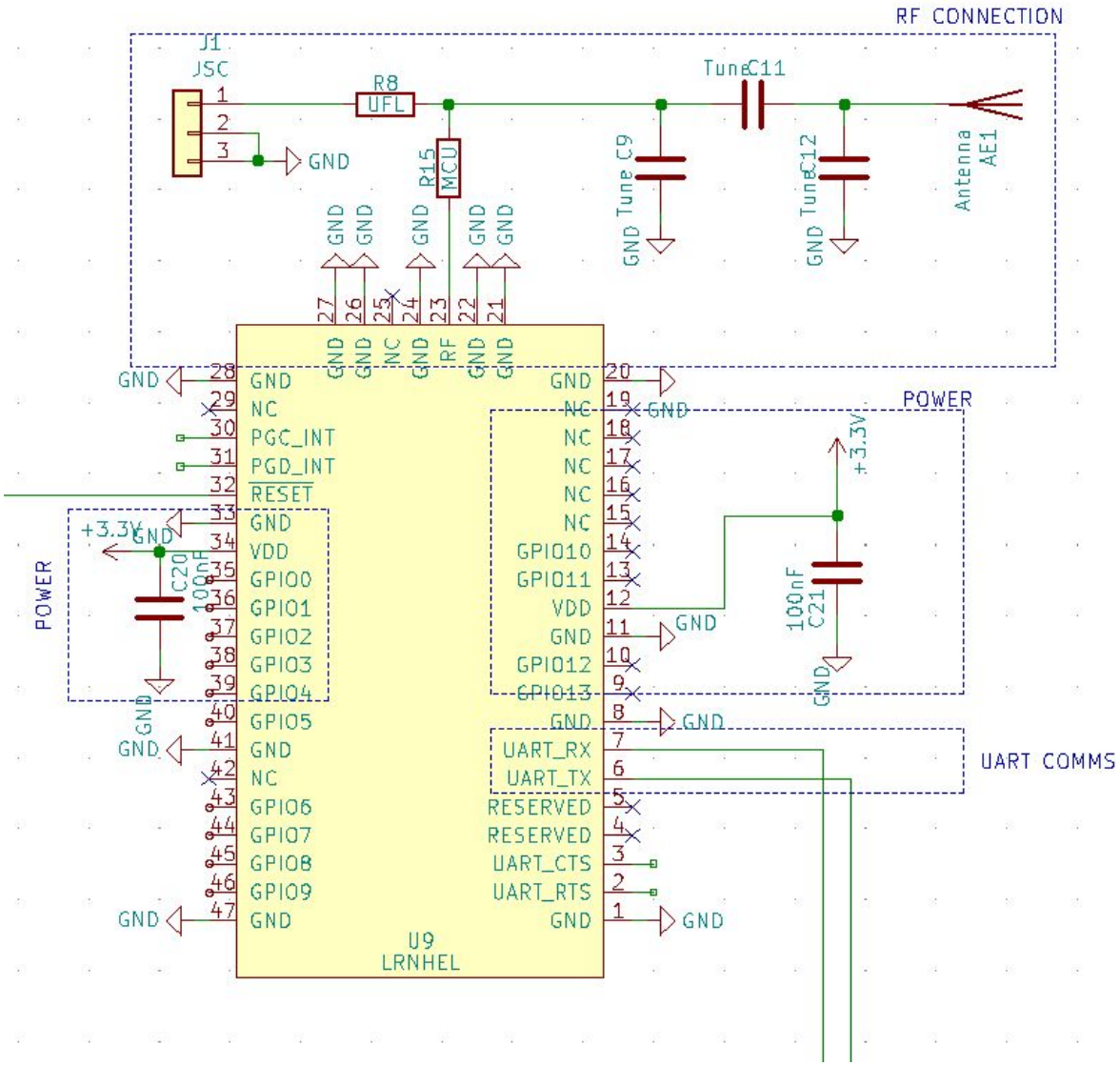

Figure 3: Example interfacing solution for the LRNHEL module

4.0 General Specifications

Parameter	Min.	Typ.	Max.	Units
Supply Voltage	2.1	-	3.6	V
Voltage on VDD with respect to VSS	-0.3	-	3.9	V
Total GPIO sink/source current			200/185	mA
Logic Input Low Voltage	-	-	0.15 x VDD	V
Logic Input High Voltage	0.8 x VDD	_	_	V
Brown-out Reset Voltage	1.75	1.9	2.05	V
RF Input Level	-	-	+10	dBm
Idle mode current consumption at 3V	-	2.7	-	mA
RX mode current consumption at 3V	-	13.5	-	
TX 3 dBm mode current consumption at 3V	-	42.6	-	
TX 18.5 dBm mode current consumption at 3V	-	124.4	-	
Deep Sleep mode current consumption at 3V	-	0.022	-	
Mechanical Dimensions	-	17.8 x 26.7 x3	-	mm
Weight	-	2.05	-	g

5.0 Regulatory information

The 2AURCLRNHEL module has received Federal Communications Commission (FCC) CFR47 Telecommunications, Part 15 Subpart C “Intentional Radiators” modular approval in accordance with Part 15.212 Modular Transmitter approval. Modular approval allows the end user to integrate the 2AURCLRNHEL module into a finished product without obtaining subsequent and separate FCC approvals for intentional radiation, provided no changes or modifications are made to the module circuitry. Changes or modifications could void the user's authority to operate the equipment. The end user must comply with all of the instructions provided by the

Grantee, which indicate installation and/or operating conditions necessary for compliance.

The finished product is required to comply with all applicable FCC equipment authorizations regulations, requirements and equipment functions not associated with the transmitter module portion. For example, compliance must be demonstrated to regulations for other transmitter components within the host product; to requirements for unintentional radiators (Part 15 Subpart B “Unintentional Radiators”), such as digital devices, computer peripherals, radio receivers, etc.; and to additional authorization requirements for the non-transmitter functions on the transmitter module (i.e., Verification, or Declaration of Conformity) (e.g.,transmitter modules may also contain digital logic functions) as appropriate.

5.1 Labeling and user information requirements

The 2AURCLRNHEL module has been labeled with its own FCC ID number, and if the FCC ID is not visible when the module is installed inside another device, then the outside of the finished product into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording as follows:

> Contains Transmitter Module FCC ID: 2AURCLRNHEL
> *or*
> Contains FCC ID: 2AURCLRNHEL 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.

A user's manual for the finished product should include the following statement:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

Additional information on labeling and user information requirements for Part 15 devices can be found in KDB Publication 784748 available at the FCC Office of Engineering and Technology (OET) Laboratory Division Knowledge Database (KDB) https://apps.fcc.gov/oetcf/kdb/index.cfm

5.2 RF Exposure

All transmitters regulated by FCC must comply with RF exposure requirements. KDB 447498 General RF Exposure Guidance provides guidance in determining whether proposed or existing transmitting facilities, operations or devices comply with limits for human exposure to Radio Frequency (RF) fields adopted by the Federal Communications Commission (FCC).

From the 2AURCLRNHEL FCC Grant: Output power listed is conducted. This grant is valid only when the module is sold to OEM integrators and must be installed by the OEM or OEM integrators. This transmitter is restricted for use with the specific antenna(s) tested in this application for Certification and must not be co-located or operating in conjunction with any other antenna or

transmitters within a host device, except in accordance with FCC multi-transmitter product procedures.

5.3 Approved external antenna types

To maintain modular approval in the United States, only the antenna types that have been tested shall be used. It is permissible to use different antenna manufacturer provided the same antenna type and antenna gain (equal to or less than) is used. Testing of the 2AURCLRNHEL module was performed with the antenna types listed in Table 5-1 Tested External Antenna Types.

5.4 Helpful websites

Federal Communications Commission (FCC): http://www.fcc.gov

FCC Office of Engineering and Technology (OET)

Laboratory Division Knowledge Database (KDB):

https://apps.fcc.gov/oetcf/kdb/index.cfm