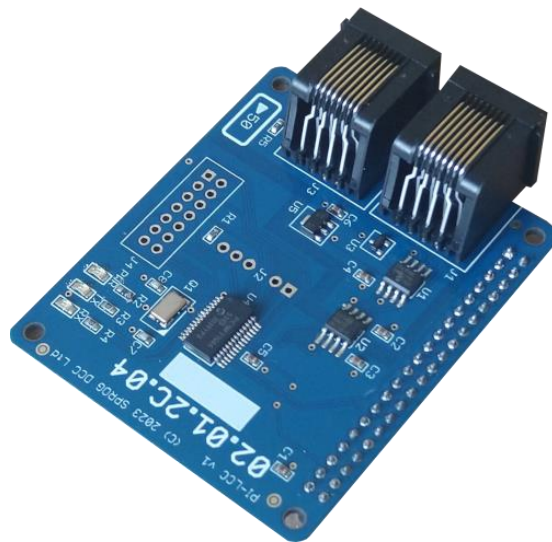
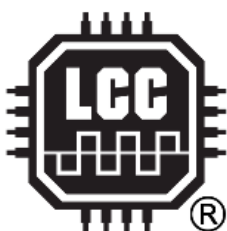


# PI-LCC Interface Module for LCC®/OpenLCB™ SPROG DCC Ltd



Firmware v1.3



Copyright © January 2024 SPROG DCC Ltd.

This document may be distributed it under the terms of Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0/>), version 3.0 or later.

**Contact:**

SPROG DCC Ltd  
Anvil House, Butt Lane  
Harbury  
Leamington Spa CV33 9JL  
United Kingdom  
<https://www.sprog-dcc.co.uk>  
[sprog@sprog-dcc.co.uk](mailto:sprog@sprog-dcc.co.uk)

Date	Revision	Comments
February 2024	1	Created
February 2024	1.1	Added known issues
April 2024	1.1.1	Added known issues
April 2024	1.2	Update for new firmware version Numerous issues fixed
May 2024	1.3	Maintenance release, no material changes

Unless otherwise notes references in this document to LCC apply equally to OpenLCB, and vice-versa.

LCC<sup>®</sup> is a registered trademark of the NMRA

OpenLCB<sup>™</sup> is a trademark of the OpenLCB Group

## Contents

1	Introduction.....	4
1.1	Features.....	4
1.2	Electrical Specification.....	4
2	Installation.....	4
3	Configuration.....	5
3.1	PI-LCC Configuration.....	5
3.1.1	LED Configuration.....	5
3.2	Raspberry Pi Configuration.....	7
3.2.1	R-Pi 4 and earlier.....	7
3.2.2	R-Pi 5.....	8
4	Links to Further Information.....	8

## 1 Introduction

The PI-LCC allows easy connection between a Raspberry-Pi computer and an LCC/OpenLCB network. The PI-LCC is supported by JMRI (Java model Railroad Interface).

### 1.1 Features

- Raspberry Pi Interface for NMRA LCC and OpenLCB™
- Galvanic isolation between USB and LCC network
- Four status LEDs
- Supported by JMRI
- Implements an LCC node
  - LCC bootloader for firmware upgrades
    - Via host or network
  - Configurable functions on two of the status LEDs
- Dual RJ45 for network pass-through or terminator
- Network side is powered from LCC

Unlike generic USB-CAN interfaces, that may also be used for LCC, the PI-LCC implements a true LCC node with its own CDI (Configuration Description Information). The bootloader allows the node firmware be updated via the USB or LCC network connections.

### 1.2 Electrical Specification

The Pi-LCC draws a small current (50 mA max.) from the LCC PWR\_POS/PWR\_NEG conductors in the LCC network cable and will operate properly with a supply voltage of 7.5 V to 15 V.

The R-Pi 3.3 V supply from the GPIO connector is used to power the remaining active circuitry on the PI-LCC.

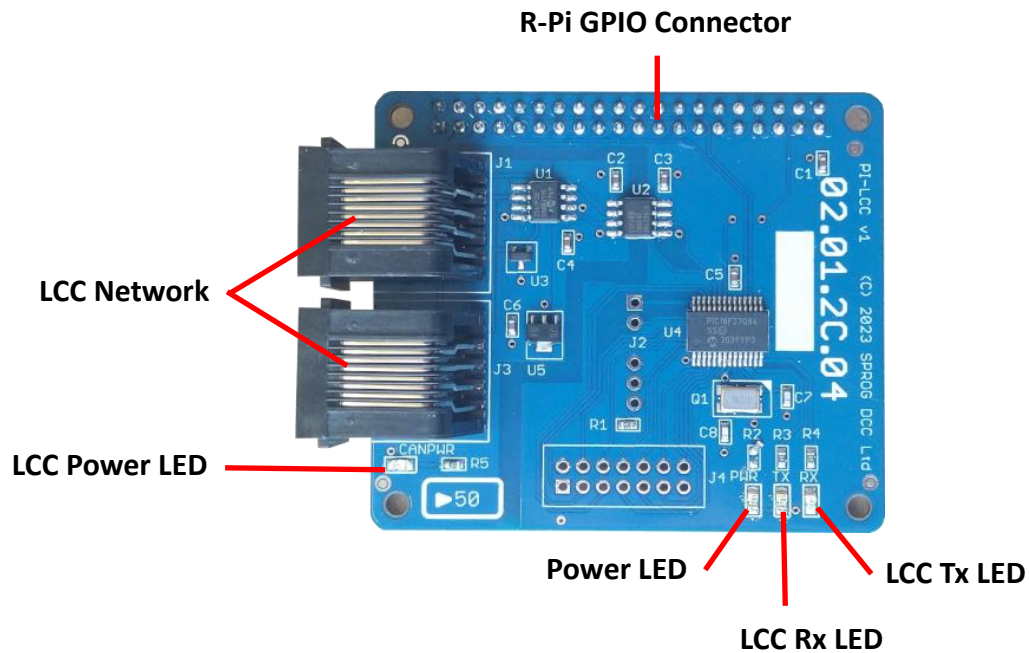
	Minimum (V)	Nominal (V)	Maximum (V)	
<b>LCC Power</b>	7.5	12	15	
<b>R-Pi</b>		3.3 V		Sourced from R-Pi GPIO connector

## 2 Installation

There are no jumper links or other configuration required to use the PI-LCC.

Power for the LCC interface must be available on the LCC network cable(s).

The Pi-LCC can be connected anywhere along the LCC network, subject to the usual LCC cabling requirements (e.g., daisy chain connections, correctly terminated).



The LCC Power LED indicates the presence of power from the LCC network.

The Power LED indicates the presence of power from the R-Pi GPIO connector.

The remaining two LEDs are configurable via the CDI and default to LCC network activity (see [3.1.1 LED CONFIGURATION](#)).

## 3 Configuration

### 3.1 PI-LCC Configuration

The PI-LCC configuration is self-describing via the CDI (Configuration Description Information) and may be configured with suitable software tools such as JMRI.

#### 3.1.1 LED Configuration

Two of the status LEDs are configurable via the CDI. Each LED is controlled by up to four consumer events or internal status.

Segment: LED Configuration

Settings

Configure LEDs to respond to events or indicate network status

LED1 (Green - CAN Activity) LED2 (Red - CAN Fault)

LED Name

Green - CAN Activity Refresh Write

LED Events

C1 C2 C3 C4

Event Name

Optional - enter a user-friendly event name

Refresh Write

Event

Specify the event that (when consumed) will cause the LED action

02.01.2C.04.00.00.00.00 Refresh Write More... Copy Paste Search

Action

Select the LED action to be performed in response to a consumed event, or the network or module status to be displayed by the LED:

Show packets handled by this node Refresh Write

LED Pattern

Select the LED blink pattern, repeating appx. every 2 s

Off with Short (64 ms) blink on Refresh Write

The CDI Action field controls the LED functions

Action

Select the LED action to be performed in response to a consumed event, or the network or module status to be displayed by the LED:

Show combined LCC reception/transmission (LED events ignored) Refresh Write

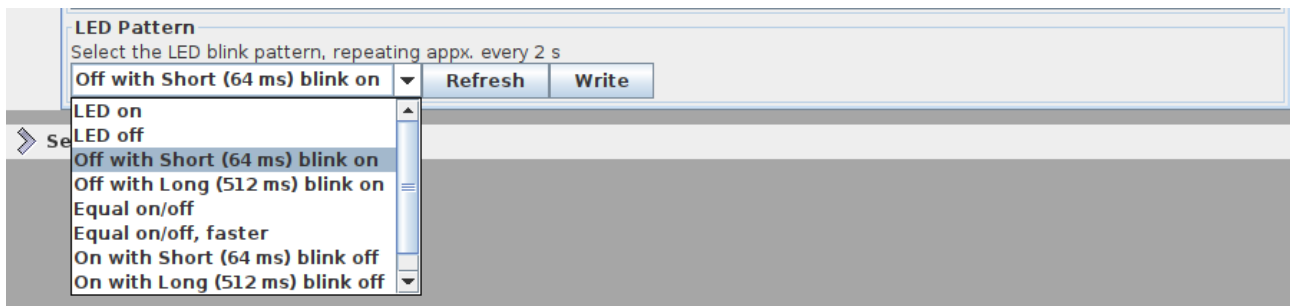
No Action

- Turn LED on if event consumed
- Turn LED off if event consumed
- Toggle LED if event consumed
- Show LCC packet reception (LED events ignored)
- Show LCC packet transmission (LED events ignored)
- Show combined LCC reception/transmission (LED events ignored)
- Indicate fault in the module (LED events ignored)

LED Action	LED function
No Action	LED remains off
Turn LED on if event consumed	The LED displays the selected pattern
Turn LED off if event consumed	The LED turns off
Toggle LED if event consumed	The LED toggles between off and displaying the selected pattern
Show LCC packet	The LED blinks briefly on each LCC message received
Show LCC packet	The LED blinks briefly on each LCC message sent by the PI-LCC
Show combined LCC reception/transmission	The LED blinks briefly for each LCC message sent or received
Show packets handled by this node	The LED blinks briefly for a received message that is processed by the node (e.g. an event is consumed)
Indicate fault in the module (LED events ignored)	The LED indicates an error in the module (more details TBD)

The LED Pattern CDI field controls the way the LED is illuminated

There is one pattern setting available per LED. The LED displays the selected pattern when turned on (or toggled from off to on) by a consumed event.



(One additional selection not shown – Use custom pattern)

## 3.2 Raspberry Pi Configuration

### 3.2.1 R-Pi 4 and earlier

When setting up your Raspberry Pi to use JMRI and the PI-LCC we strongly recommend you follow the procedure for setting up the R-Pi UART in our Pi-SPROG family documentation. This can be found in the downloads section of our website, specifically <https://www.sprog-dcc.co.uk/downloads/linux/pi-sprog-pi4-wifi/pi-sprog-wifi-2023-05-03-5.4.pdf> in the two sections “Get UART Overlays” and “UART Setup”.

This will swap the UARTs so that the full featured UART is used for communicating with the PI-LCC

### 3.2.2 R-Pi 5

The R-Pi 5 with the Bookworm release of Raspberry Pi OS is much easier to configure and just needs the Serial port to be enabled in the R-Pi configuration tool. Full instructions are on the document linked from the LCC Info section of our website, specifically <https://www.sprog-dcc.co.uk/downloads/linux/pi5/pi-lcc-wifi-2023-12-05-arm64-5.7.1.pdf>.

## 4 Links to Further Information

SPROG DCC Ltd website <https://www.sprog-dcc.co.uk> For all our products and support.

SPROG DCC Ltd Official YouTube Channel <https://www.youtube.com/@sprogdcc>

OpenLCB group <https://openlcb.org> The group behind the OpenLCB/LCC standards.

NMRA LCC standards page <https://www.nmra.org/lcc> The LCC standards adopted by the NMRA.

OpenLCB discussion group <https://groups.io/g/openlcb/topics> Discussion of OpenLCB topics, more developer focused.

The NMRA's LCC user group <https://groups.io/g/layoutcommandcontrol/topics> a good starting point for asking questions of other LCC users.

JMRI users <https://groups.io/g/jmriusers/topics> JMRI software topics.

JMRI website <https://www.jmri.org> Download the latest JMRI releases and access support pages.

Book: Introduction to Layout Command Control <https://www.amazon.co.uk/Introduction-Layout-Command-Control-Practical/dp/0988825902> focused on RR-Cirkits products but the concepts are applicable to any LCC hardware.