

Pepper C2 User Manual

Manual version: V1.3¹

24/09/2026

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¹ The newest User manual can be found on our website: https://eccel.co.uk/wp-content/downloads/Pepper_C2/C2-User-manual.pdf

1. Introduction

1.1 Device Overview

Features

- Low cost RFID Reader with MIFARE® Classic® in 1K, 4K memory, ICODE, MIFARE Ultralight®, NTAG21x
- lifetime firmware updates
- Command interface via UART
- UART baud rate up to 921600 bps
- High speed USB-UART emulated interface
- HID keyboard emulation
- Configurable RGB LED indicator for RFID events
- 6 configurable GPIOs
- Stand-alone mode (polling)
- High transponder read and write speed
- -25°C to 85°C operating range
- Multiple internal reference voltages
- RoHS compliant
- CE (RED) and UKCA compliant. FCC/ISED/PSE and other approvals easily obtained

Applications

- Access control
- Monitoring goods
- Approval and monitoring consumables
- Pre-payment systems
- Managing resources
- Contact-less data storage systems
- Evaluation and development of RFID systems



Description

The Pepper C2R RFID reader is a complementary addition to the Pepper family, designed for applications that require increased RF output and greater read-range potential while retaining compatibility with most of the tag types and protocols supported by the Pepper C1. It includes lifetime firmware update support, providing access to future improvements and security updates. Its configurable USB interface can operate as a virtual serial port or as a HID device, including keyboard emulation. With its integrated antenna and cost-optimised design, Pepper C2R provides powerful RFID functionality in a ready-to-use format at a competitive price.

2. Electrical specification

2.1 Absolute maximum ratings

Stresses beyond the absolute maximum ratings listed in the table below may cause permanent damage to the device. These are stress ratings only, and do not refer to the functional operation of the device that should follow the recommended operating conditions.

Symbol	Parameter	Min	Max	Unit
T_S	Storage temperature	-40	+125	°C
T_A	Ambient temperature	-40	+85	°C
V_{DDMAX}	Supply voltage (USB or J4 header)	3	5.5	V

Table 2-1. Absolute maximum ratings

2.2 Operating conditions

Symbol	Parameter	Min	Typ.	Max	Unit
T_S	Operating temperature	-25	25	+85	°C
H	Humidity	5	60	95	%
V_{DD}	Supply voltage (USB or J4 header)	3	5	5.5	V

Table 2-2. Operating conditions

2.3 DC characteristics ($V_{DD} = 5\text{ V}$, $T_S = 25\text{ °C}$)

Symbol	Parameter	Min	Typ.	Max	Unit
V_{OUT}	Output voltage (regulator output, 3V3 pin on the J1 header)	3.23	3.3	3.37	V
V_{IH}	High-level input voltage (J1 header)	$0.75 \times V_{OUT}$	-	$V_{OUT} + 0.3$	V
V_{IL}	Low-level input voltage (J1 header)	0	-	$0.3 \times V_{OUT}$	V
V_{OH}	High-level output voltage (J1 header)	$0.8 \times V_{OUT}$	-	-	V
V_{OL}	Low-level output voltage (J1 header)	-	-	$0.3 \times V_{OUT}$	V
V_{ORS232}	V output RS232 (J2 header, RS232_TX pin)	-	5	-	V
V_{IRS232}	V input RS232 (J2 header, RS232_RX pin)	-25	-	+25	V

Table 2-3. DC characteristics

2.4 Current consumption ($V_{DD} = 5V$)

Symbol	Parameter	Typ.	Max	Unit
I_{RFON}	RF field on (no tag, pooling 200ms)	97	110	mA
	RF field on (tag in read range, pooling 200ms)	295	315	mA
	RF field on (continuously)	300	322	mA
	RF field on (tag on antenna)	316	336	mA
I_{RFOFF}	RF field off	23	30	mA
Sleep mode	RF field off	4	5	mA

Table 2-4. Current consumption

3. Getting started

3.1 IO and peripherals

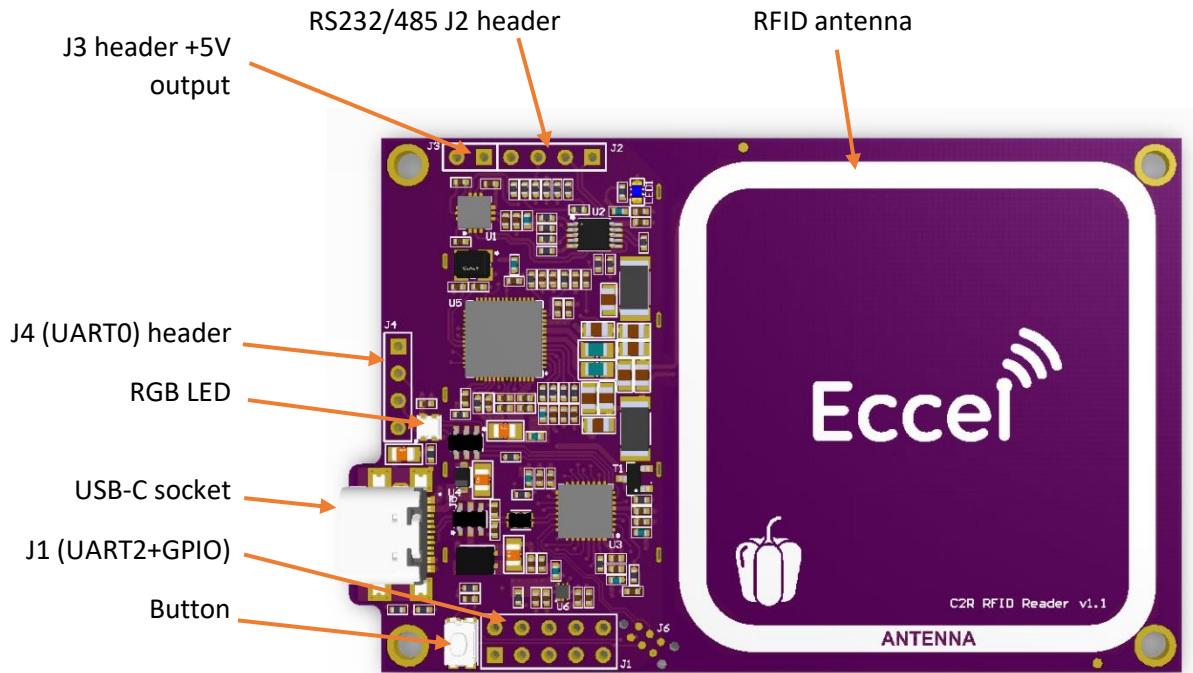
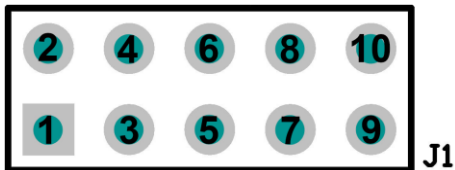


Figure 3-1. Pepper C2 RFID Reader

RS232/485 header – this connection is for optional built in RS232/485 converter. These options are available here: <https://eccel.co.uk/product/pepper-c2-fcc-approved-rfid-reader>

3.1.1 J1 header description



1	UART2 TX
2	UART2 RX
3	GPIO 01
4	GPIO 02
5	GPIO 03
6	GPIO 04
7	GND
8	3.3V Output
9	GPIO 05
10	GPIO 06

3.1.2 J2 header description (RS232 version only)



1. **Not connected**
2. **Not connected**
3. **RS232 RX** (from host to the Pepper C2, max input voltage level $\pm 25V$)
4. **RS232 TX** (from the Pepper C2 to host, max output voltage level $\pm 5V$)

3.1.3 J2 header description (RS485 version only)

By default, the Pepper C2 reader operates in full-duplex mode, using all four wires for RS485 communication. For half-duplex communication, connect pins A and Y together, and pins B and Z together.



1. **A** Noninverting Receiver Input
2. **B** Inverting Receiver Input
3. **Z** Inverting Driver Output
4. **Y** Noninverting Driver Output

3.1.4 J3 header description

The J3 header is an additional power supply output socket.



1. **+5V output** (100mA)
2. **GND**

3.1.5 J4 UART0 header

This is the UART0 header in the TTL standard with 3.3V levels. This is the same UART as it available on the USB port in the USB version.



1. **Vin** – Power supply, 3-5.5Voltage
2. **UART0 TX** – UART TX data from the reader
3. **UART0 RX** – UART RX data to the reader
4. **GND**

3.2 Typical connection

The Pepper C2 device can be connected to a host computer using a standard USB-C cable. In the same way it can be powered to operate as a standalone device by using power sources such as a USB charger or power bank.

The computer operating system should recognize this device as a USB to UART bridge or a USB to Serial port converter and it should appear in Windows device manager as a COM port. By default this COM port can be used for communication using the binary protocol described below.

The Reader also has the UART2 interface (J1 header) where the user can view console logs which contain additional information about temporary executing commands. The default configuration: baud: 115200, Data: 8 bit, Parity: none, Stop bits: 1 bit, Flow Control: none.

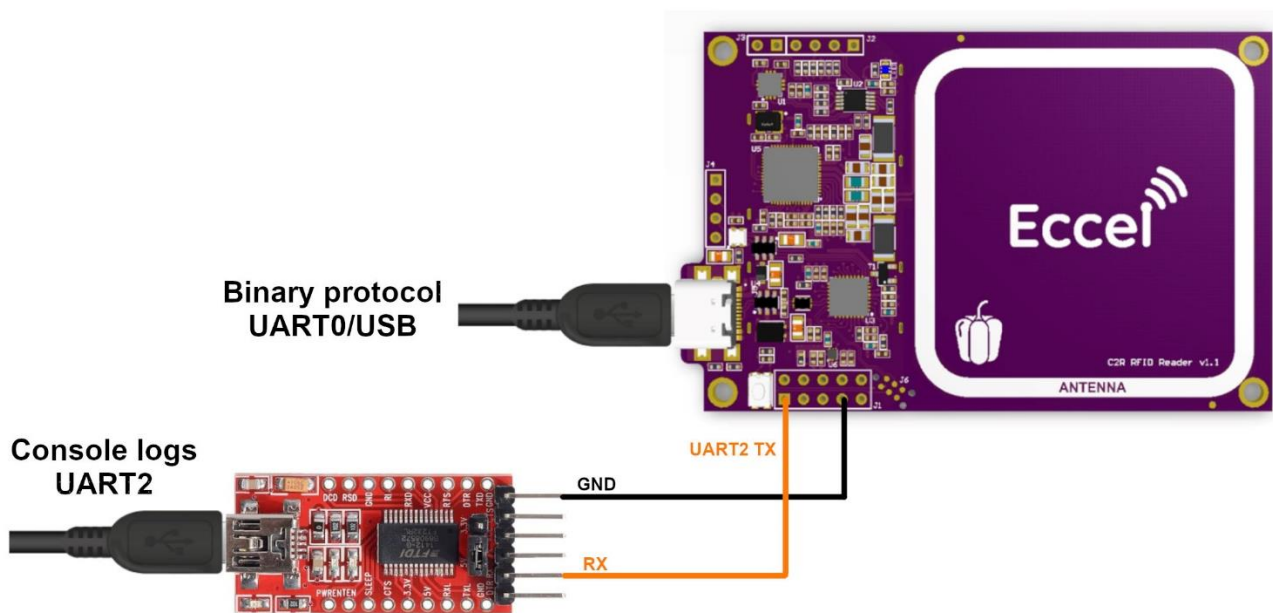


Figure 3-2. Typical connection to see the console logs on UART2

Hint – If you don't have a USB-UART converter to see the logs on the UART2 (J1 header), you can temporary change the default log interface from UART2 to UART0 in Cx-Client UART configuration button. Then, the logs should be available on the USB port

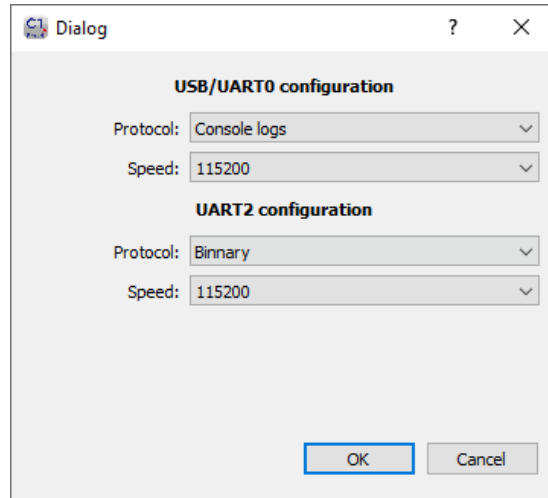


Figure 3-3. Console logs on the UART0/USB

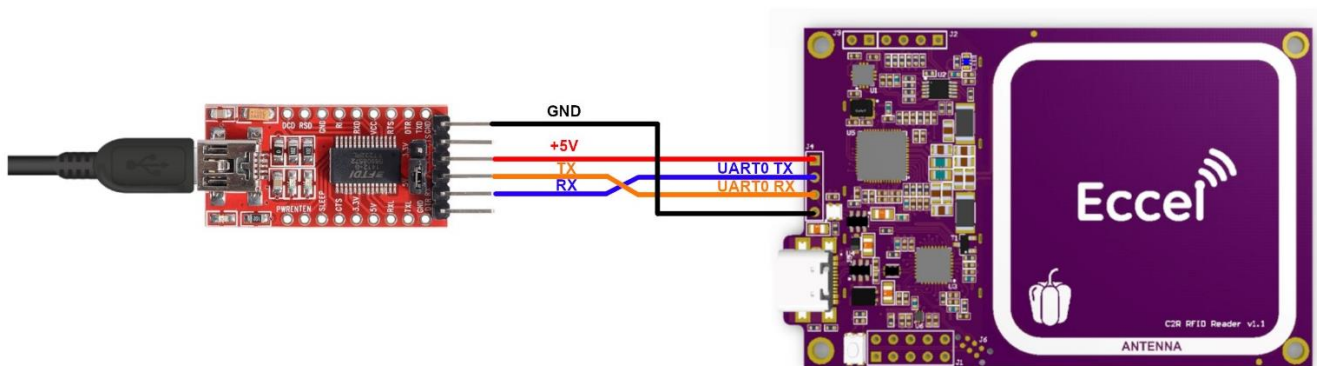
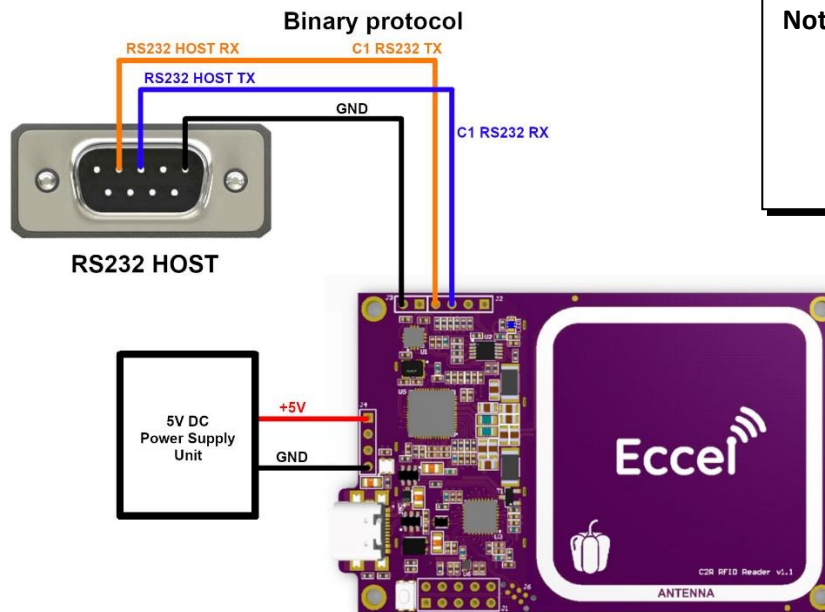
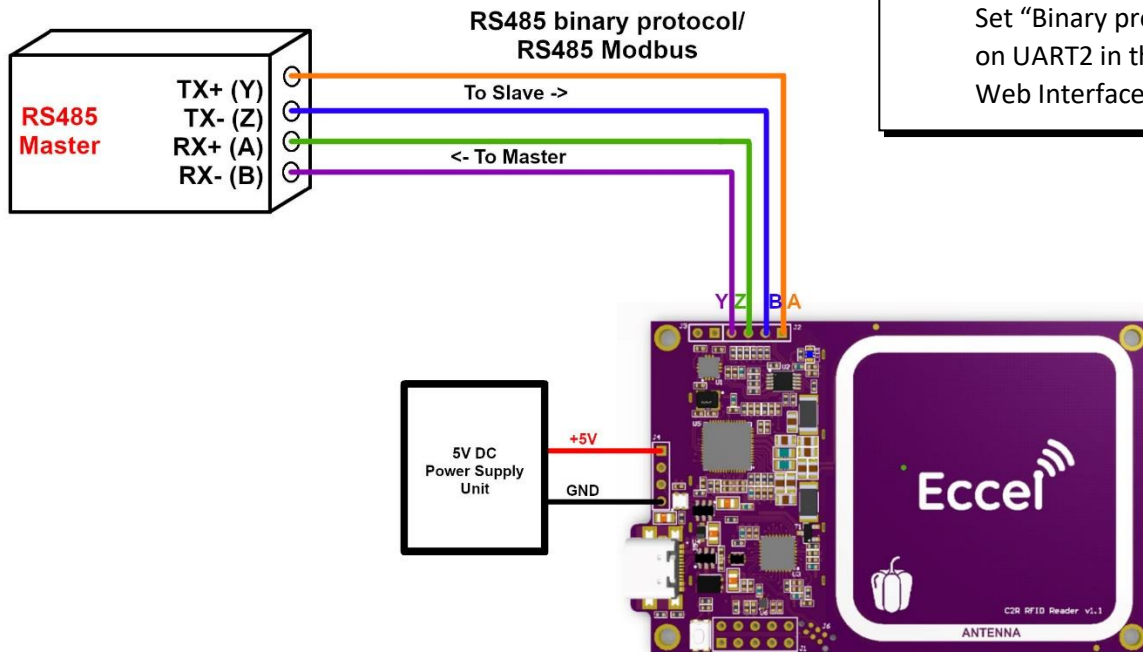


Figure 3-4. Pepper C2 UART0 - typical connection with the USB-UART converter
 *do not use UART0 TTL connection at the same time with USB connection



Note: RS232 is connected internally to UART2. Set “Binary protocol” on UART2 in the Web Interface

Figure 3-5. Pepper C2 RS232 - typical connection with the RS232 host device



Note: RS485 is connected internally to UART2. Set “Binary protocol” on UART2 in the Web Interface

Figure 3-6. Pepper C2 RS485 - Full duplex connection with the RS485 Master device

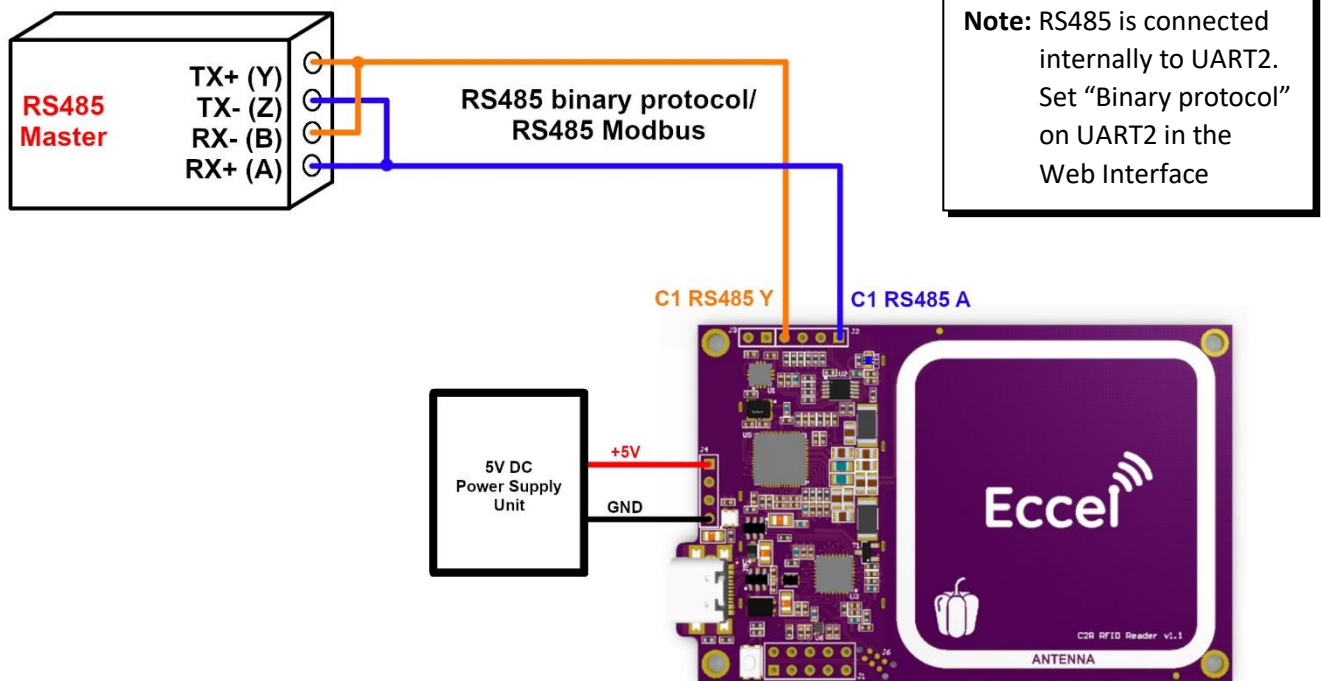


Figure 3-7. Pepper C2 RS485 - half duplex connection with the RS485 Master device

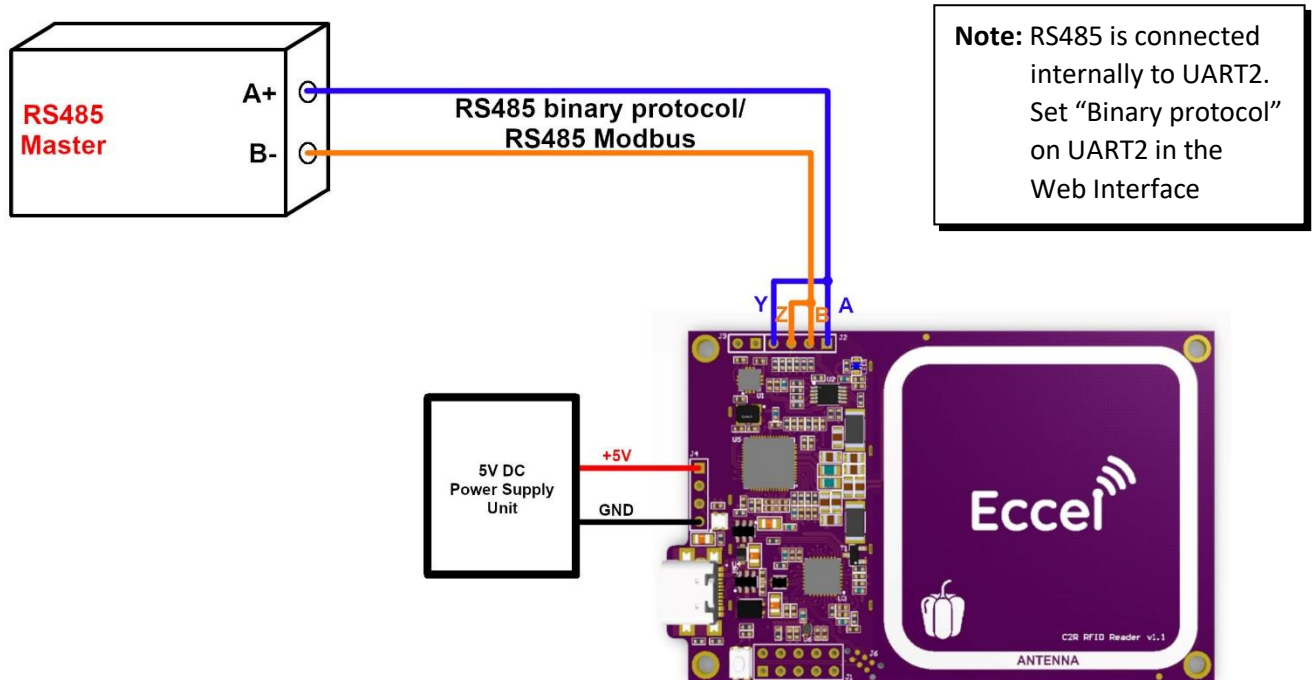


Figure 3-8. Pepper C2 RS485 - half duplex example

The user can make jumpers between A – Y and B – Z pins by placing two 0R resistors here:

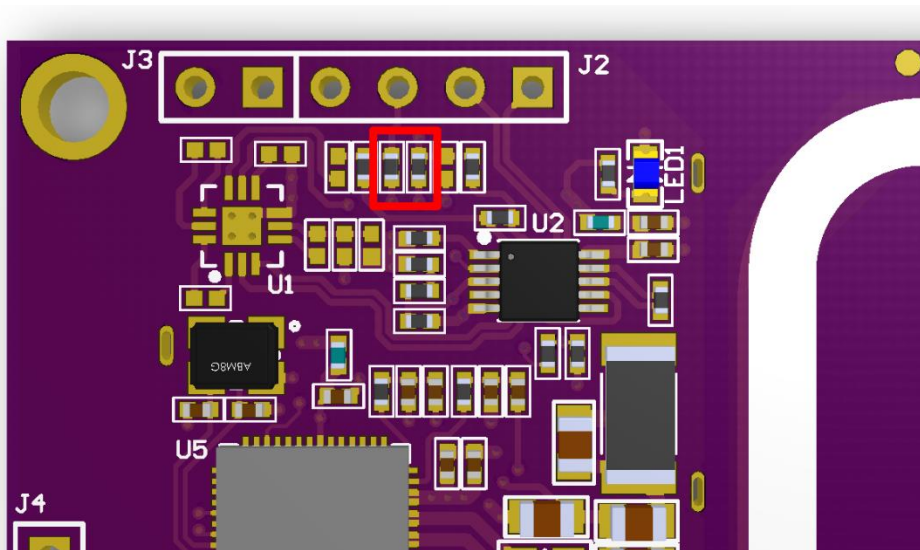
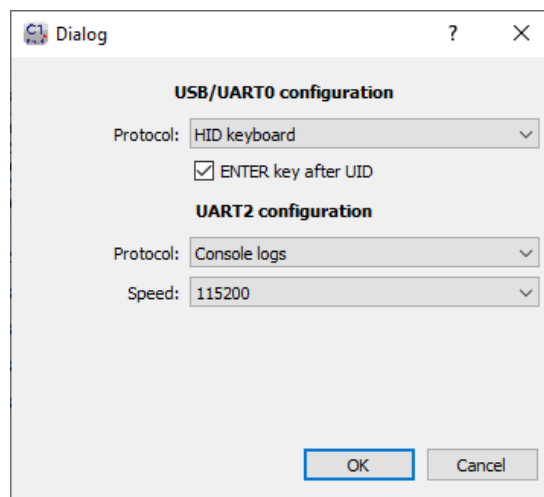


Figure 3-9. Pepper C2 RS485 v2 - jumpers between A-Y and B-Z pins

3.3 HID keyboard emulation

The RFID reader can be configured to enable USB port emulation of the HID Keyboard profile. With this functionality, UID numbers of tags read during polling are transmitted as a keyboard input stream to any host device that accepts USB keyboards. To activate this profile, the Cx-Client application should be used to select the HID Keyboard profile for the USB port within the USB/UART configuration menu.

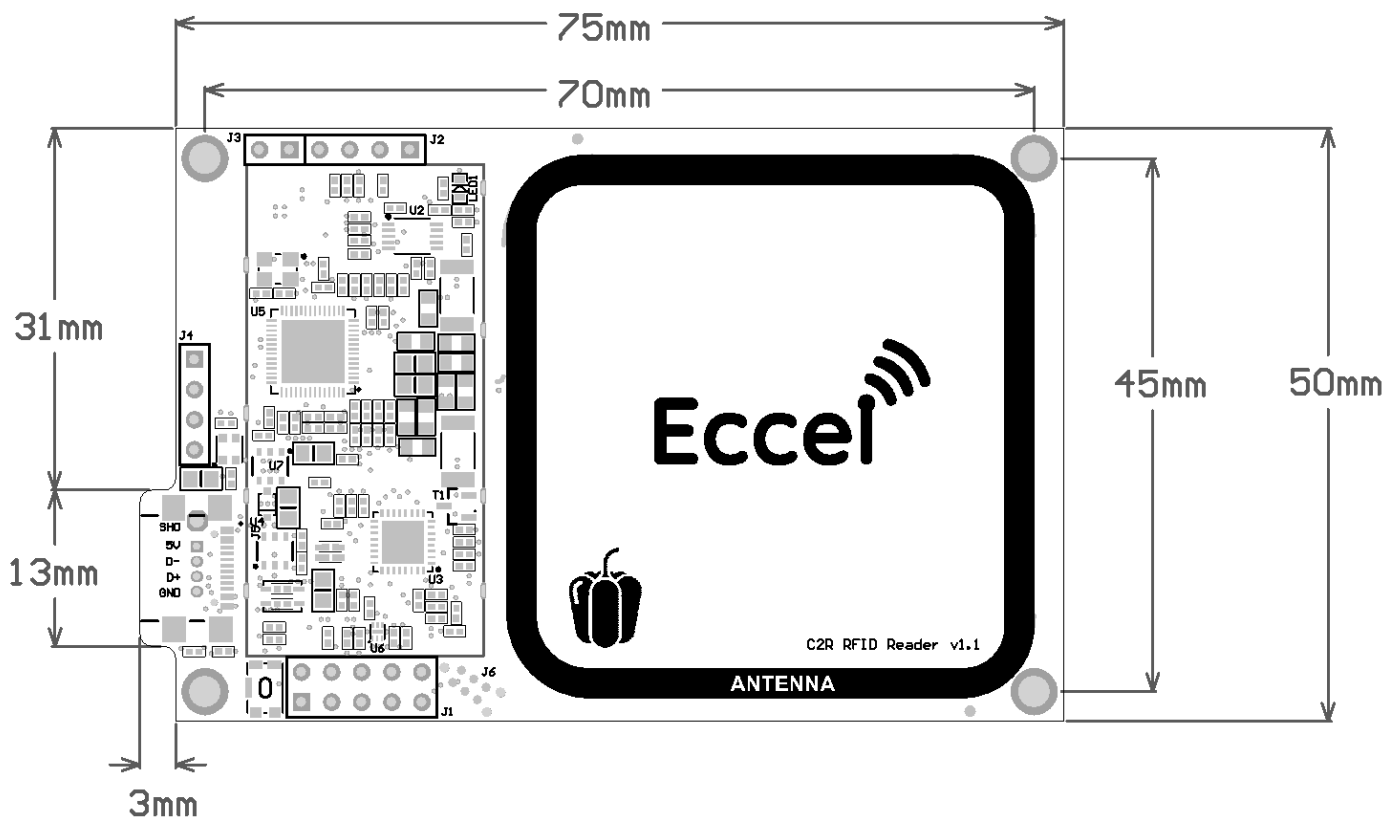
Once the device is configured via the USB/UART0 interface in HID Keyboard mode, further connection to this port using the Cx-Client application becomes unavailable. In order to temporarily restore the binary protocol, the button on the reader must be pressed and held for 3 seconds. During this process, the device's RGB LED blinks once every second and flashes red when the default UART emulation profile has been temporarily restored. Additionally, configuration options allow enabling automatic transmission of the ENTER key after each UID is sent.



3.4 Factory reset

To restore the device to its factory default settings, the button on the device must be pressed and held for 10 seconds. The device will indicate the completion of the factory reset process by flashing the RGB LED in white.

4. Mechanical dimension



5. Configuration and functional description

Here is the document describing configuration, communication protocol, commands and all functions of the Pepper C2 reader:

https://eccel.co.uk/wp-content/downloads/Pepper_C2/C2-software-manual.pdf

Eccel provides a variety of free tools & libraries ready to be downloaded from this link:

<https://eccel.co.uk/support-free-libraries/>

Note: Should you experience any difficulties integrating our readers into your device, please contact us at technical@eccel.co.uk. Our team can provide integration support and, where required, adapt the software and/or hardware to meet specific customer requirements. We specialize in developing custom solutions. Further information is available at: <https://eccel.co.uk/custom-design/>

6. RF Emissions and Susceptibility Approvals

Eccel have tested and declare that this product meets all the requirements of the relevant RF directives (RED) to be declared CE (European Union) and UKCA (United Kingdom) compliant. Please see our declaration of conformity for this on the downloads tab of the product webpage.

This product is designed to be incorporated into products easily and quickly such that those products can pass any national or regional statutory RF requirements and certifications such as FCC (USA), ISED (Canada) and PSE (Japan) for example.

This product is designed to meet all statutory RF requirements applicable worldwide using the most cost effective but robust design methodology.

Eccel is pleased to offer customers very cost-effective certification for their end equipment that incorporate this product. Prices start from £3K per approval/ certification. Please contact us for more details at sales@eccel.co.uk.

7. Revision history

Revision	Date	Changes
1.1	28-July-2025	Initial release
1.2	03-Dec-2025	Current consumption updated
1.3	24-Sep-2026	Product photo update

MIFARE, MIFARE Ultralight, MIFARE Plus, MIFARE Classic, and MIFARE DESFire are trademarks of NXP B.V.

No responsibility is taken for the method of integration or final use of the C2 readers

More information about the C2 reader and other products can be found at the Internet site:

www.eccel.co.uk

or alternatively contact ECCEL Technology by e-mail at:

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