

Pepper C2 Module User Manual

Manual version: V1.0¹

22/10/2025

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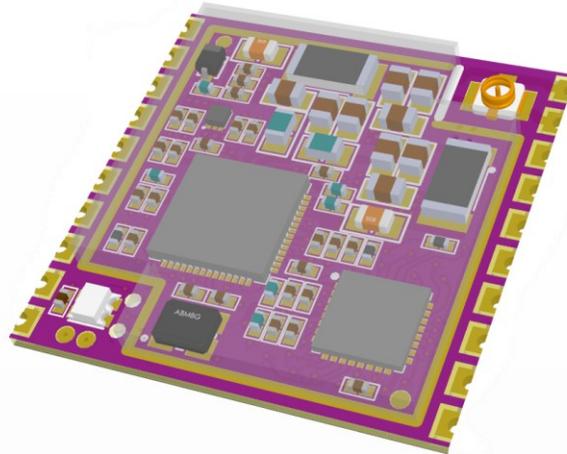
¹ The newest User manual can be found on our website: https://eccel.co.uk/wp-content/downloads/Pepper_C2/C2_User_manual.pdf

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 and TCP sockets
- 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



Description

The Pepper C2 Module RFID reader is the advanced successor to the Pepper C1 Module, maintaining full compatibility with most of the tag types and protocols supported by its predecessor. It offers lifetime firmware updates, ensuring continuous improvements and security. The device features a configurable USB interface, capable of emulating either a UART interface or functioning as a HID profile, such as keyboard emulation. Additionally, the Pepper C2 Module is cost-optimized compared to previous C1 modules, providing enhanced functionality at a competitive price point.

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

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 (pin nr 8)	4.5	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 (pin nr 8)	4.5	5	5.5	V

Table 2-2. Operating conditions

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

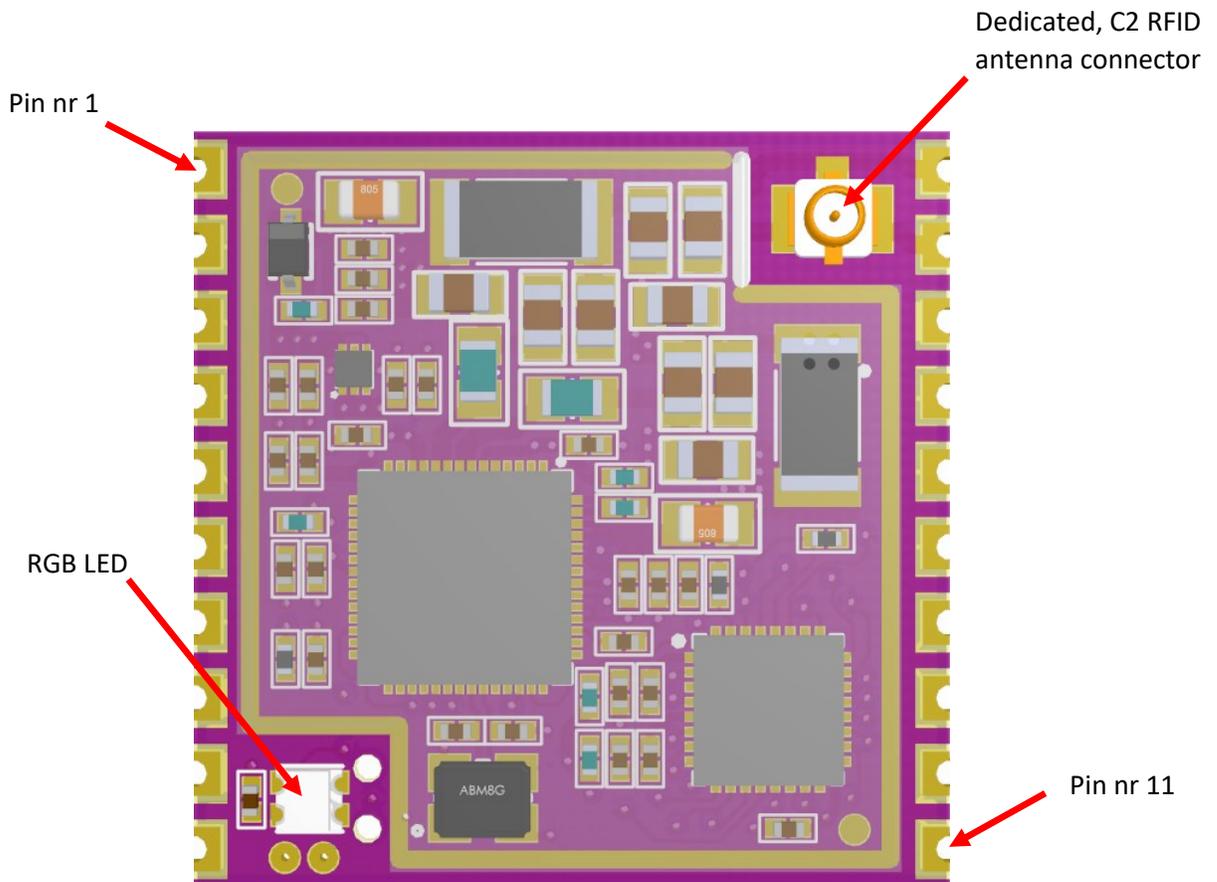
Symbol	Parameter	Typ.	Max	Unit
I_{RFON}	RF field on (no tag, pooling 200ms)	97	110	mA
	RF field on (tag in read range, pooling 200ms)	295	315	mA
	RF field on (continuously)	300	322	mA
	RF field on (tag on antenna)	316	336	mA
I_{RFOFF}	RF field off	23	30	mA

Table 2-3. Current consumption

*A metal environment near the antenna can increase the current consumption of the RFID Reader. Therefore, it is recommended to ensure a minimum 500mA of current from the power supply.

3. Getting started

3.1 IO and peripherals



3.1.1 Pinout description

Number	Name	Description
1	NC	Leave pin unconnected
2	UART2_TX	Secondary UART/Console logs data transmit pin
3	BUTTON	Button pin
4	UART2_RX	Secondary UART/Console Logs data receive pin
5	UART0_TX	Main UART data transmit pin
6	UART0_RX	Main UART data receive pin
7	RESET	Active low reset pin (3.3V Level)
8	V _{DD}	Main power supply – recommended value 5.0V
9	GND	Ground
10	NC	Leave pin unconnected
11	USB-	USB Data Negative Signal
12	USB+	USB Data Positive Signal
13	GPIO2	General Purpose Input Output pin nr 2
14	GPIO1	General Purpose Input Output pin nr 1
15	RS485_DE	UART2 RS485 Driver Enable pin
16	RS485_RE	UART2 RS485 Receiver Enable pin
17	GPIO0	General Purpose Input Output pin nr 0
18	GND	Ground for RFID Antenna. Can be connected to the main ground when on-board RFID antenna is used
19	RFID ANT1	RFID antenna signal nr 1. Do not use when on-board antenna connector is used.
20	RFID ANT2	RFID antenna signal nr 2. Do not use when on-board antenna connector is used.

**All digital signals are at 3.3V level*

3.2 Typical connection

The Pepper C2 Module can be connected to a host (computer or another device) using USB or UART0. Both interfaces can be used for communication using the binary protocol described below.

The Module also has secondary UART (UART2) available. Using this connection, the user can view output logs which contain additional information about temporary executing commands. The default configuration is : baud: 115200, Data: 8 bit, Parity: none, Stop bits: 1 bit, Flow Control: none. Data lines can be configured to work using any free GPIO's available on the module. Additionally, it can be used to operate the RS485 interface with hardware flow control using the DE and Re lines (pin no. 15 and 16).

The Pepper C2 device can be connected directly to a host computer using a standard USB interface. 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 virtual com port or USB serial device and it should appear in Windows device manager as a COM port.

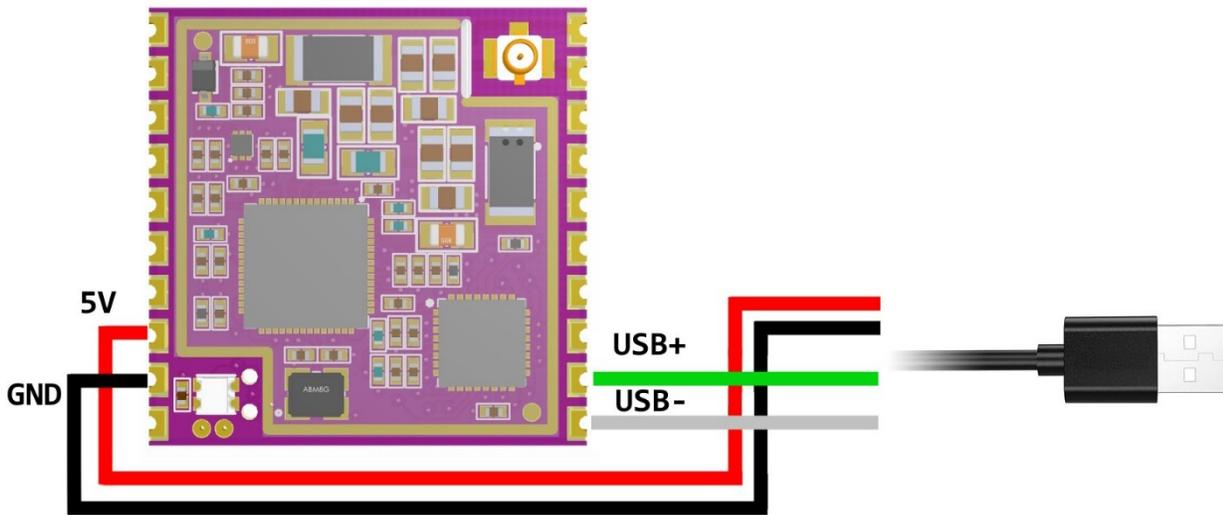


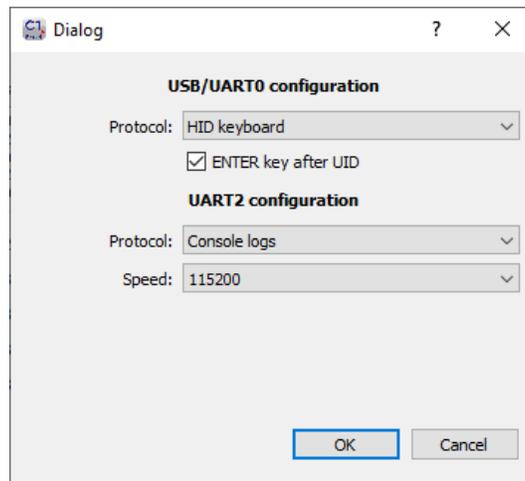
Figure 3-1. Typical connection

Hint – If you don't have a USB-UART converter to see the logs on the UART2, 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

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 pin should be held at LOW state 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 pin must be held at LOW state for 10 seconds. The device will indicate the completion of the factory reset process by flashing the RGB LED in white.

4. Mechanical dimension

4.1 Pepper C2 Module

All dimensions are in mm.

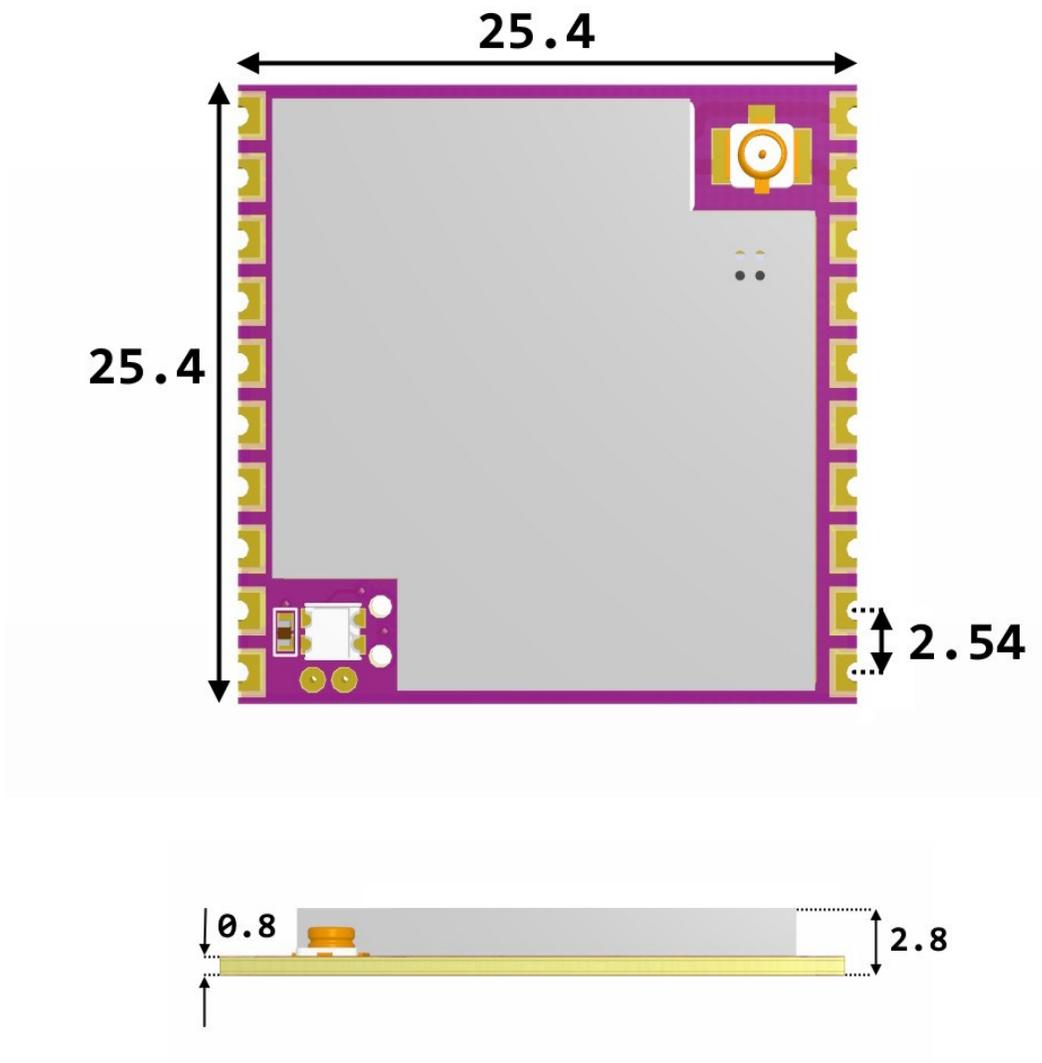


Figure 4-1

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/>

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
1.0	22-October-2025	Initial release

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:

<http://www.eccel.co.uk>

or alternatively contact ECCEL Technology (IB Technology) by e-mail at:

sales@eccel.co.uk