Pepper C1 Module Baseboard User Manual

Manual version: V1.1[1]
23/07/2024

Table of Contents

[1] The newest User manual can be found here: https://eccel.co.uk/wp-content/downloads/Pepper_C1/Pepper_C1_Module_Baseboard_user_manual.pdf

1. Introduction

1.1 Device Overview

Features

- Low cost RFID Reader with MIFARE® Classic® in 1K, 4K memory, ICODE, MIFARE Ultralight®, MIFARE DESFire® EV1/EV2, MIFARE Plus® support
- Wireless connectivity:
  - Wi-Fi: 802.11 b/g/n
  - 2.4 GHz wireless communication (WPAN)
  - can be disabled by the user
- Built in WEB interface
- Over-the-Air lifetime updates
- Command interface via UART and TCP sockets
- UART baud rate up to 921600 bps
- 6 configurable GPIOs
- Stand-alone mode (polling)
- IoT interfaces: MQTT, WebSocket
- High transponder read and write speed
- -25°C to 85°C operating range
- Multiple internal reference voltages
- RoHS compliant

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 C1 module baseboard is a development and evaluation board for the Pepper C1 Module product with wireless connectivity via Wi-Fi 802.11b/g/n and WPAN. Thanks to this, the customer receives free lifetime Over-the-Air updates, and of course the communication protocol can be used over TCP instead of traditional UART/USB interface. Combining these features with standalone mode provides a ready to use device in many applications “straight out of the box.” In standalone mode, the module can also send a tag UID over MQTT or WebSockets, and so can easily be integrated with IoT systems.

The baseboard is intended to be used for quick and easy learning of the functionalities of the Pepper C1 Module before incorporating the Pepper C1 module into a final design.

Only USB connection is needed to start using this powerful RFID Reader development board.

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	-	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 (Micro USB connector)	4.5	5	5.5	V

Table 2-2. Operating conditions

2.3 DC characteristics (V_{DD} = 3.3V, T_S = 25 °C)

Symbol	Parameter	Min	Typ	Max	Unit
V_{IH}	High-level input voltage (Any GPIO)	0.75 x V_{DD}	-	V_{DD} + 0.3	V
V_{IL}	Low-level input voltage (Any GPIO)	0	-	0.3 x V_{DD}	V
V_{OH}	High-level output voltage (Any GPIO)	0.8 x V_{DD}	-	-	V
V_{OL}	Low-level output voltage (Any GPIO)	-	-	0.3 x V_{DD}	V

Table 2-3. DC characteristics

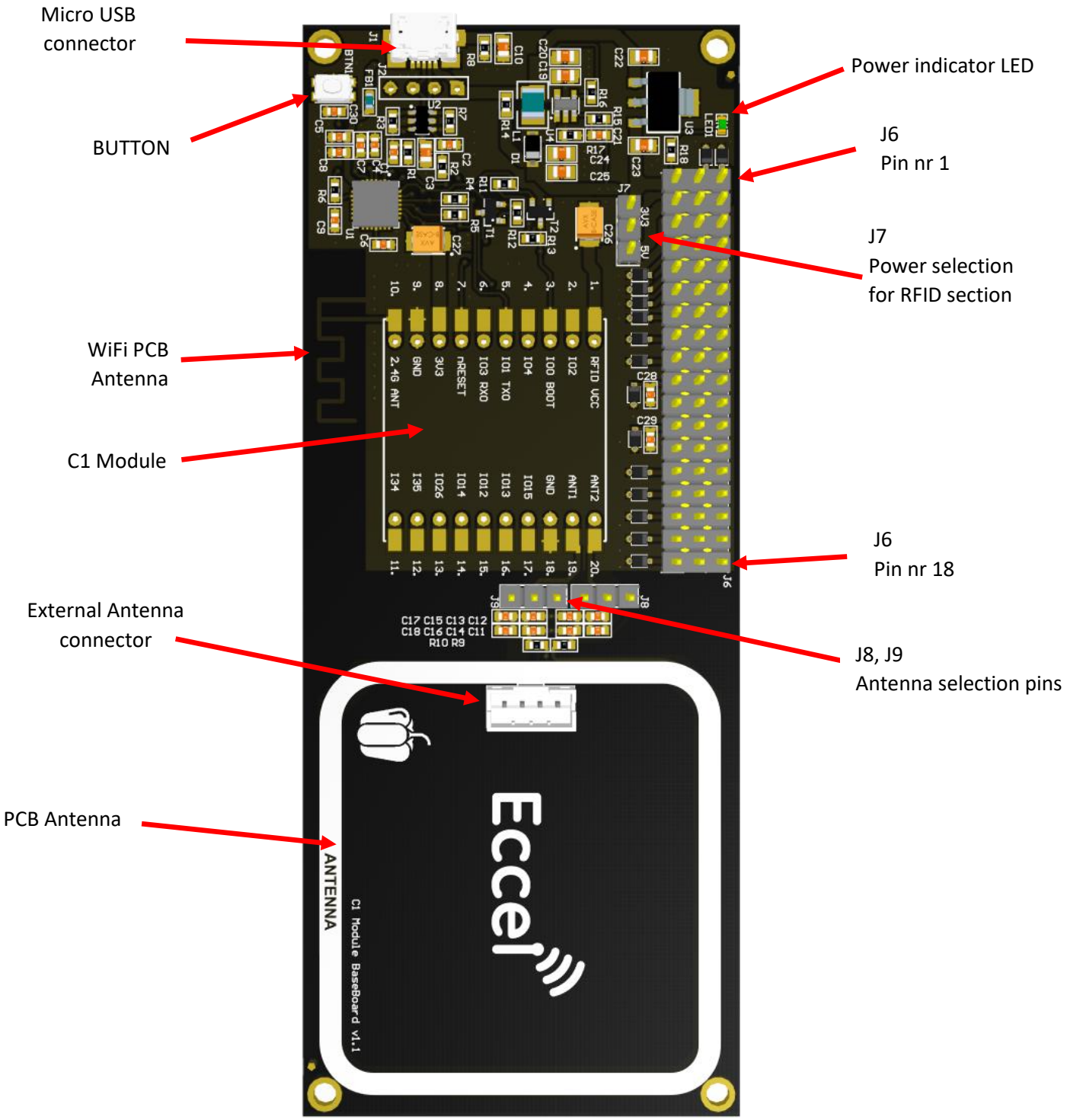
2.4 Current consumption (5V USB)

Symbol			Parameter	Typ	Max	Unit
Wi-Fi enabled	Access Point mode	$I_{PN\_RFOFF\_AP}$	RF field off (AP)	160	180	mA
		$I_{PN\_RFON\_AP}$	RF field on (AP)	200	220	mA
	Station mode	$I_{PN\_RFOFF\_STA}$	RF field off (STA)	85	105	mA
		$I_{PN\_RFON\_STA}$	RF field on (STA)	140	160	mA
Wi-Fi Off	I_{PN_RFOFF}		RF field off	75	80	mA
	I_{PN_RFON}		RF field on	130	150	mA

Table 2-4. Current consumption

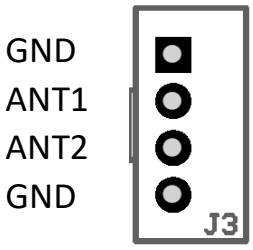
3. Getting started

3.1 IO and peripherals



3.2 Pinout description

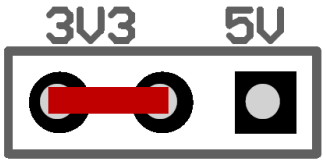
3.2.1 J3 - External antenna connector



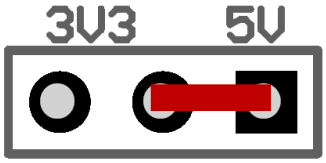
3.2.2 J6 - GPIO's connector

Number	Name	Description
1	3.3V	3.3V Output. 1A current shared between the C1 Module and external peripherals (depends upon the type of connected USB port)
2	5V	5V Output. Up to 0.5A available for the user (depends upon the type of connected USB port)
3	GND	Ground
4	GPIO2	UART2 data transmit pin
5	GPIO0	Button pin
6	GPIO4	UART2 data receive pin
7	TX0	UART0 data transmit pin
8	RX0	UART0 data receive pin
9	RESET	Active low reset pin
10	I34	General purpose input / analog input (for future use)
11	GND	Ground
12	I35	General purpose input / analog input (for future use)
13	GND	Ground
14	GPIO26	General Purpose Input Output pin nr 26
15	GPIO14	General Purpose Input Output pin nr 14
16	GPIO12	UART2 RS485 DE pin
17	GPIO13	UART2 RS485 RE pin
18	GPIO15	General Purpose Input Output pin nr 15

3.2.3 J7 - RFID power selection

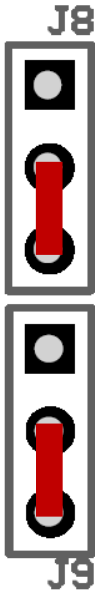


3.3V selected

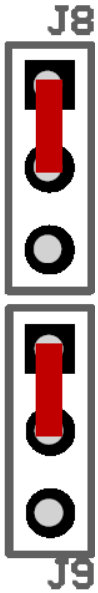


5V selected

3.2.4 J8, J9 – Antenna selection connectors



Onboard PCB
Antenna selected



External
Antenna selected

Flexible Antenna
on C1 module

Please make sure that jumpers are removed from J8 and J9 when flexible antenna on the C1 module is used.

3.3 Typical connection and usage

The Pepper C1 Module Baseboard can be connected to a host (computer or another device) using the USB connector.

A Pepper C1 Module can be populated onto the baseboard either as an SMT device or THT by using 2.54mm headers.

By default, UART0 interface is used for communication using the binary protocol described in the Pepper C1 Module datasheet.
The baseboard is equipped with a Silicon Labs CP2102 USB to UART converter to enable communication with the C1 Module. The default configuration is : baud: 115200, Data: 8 bit, Parity: none, Stop bits: 1 bit, Flow Control: none.

Drivers are available at this link - https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers

The Reader also has UART2 available. Using this connection, the user can view output logs which contain additional information about temporary executing commands. The default configuration is also: 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.

For a detailed description of the C1 Module please refer to its datasheet available on www.eccel.co.uk website.

4. Mechanical dimension

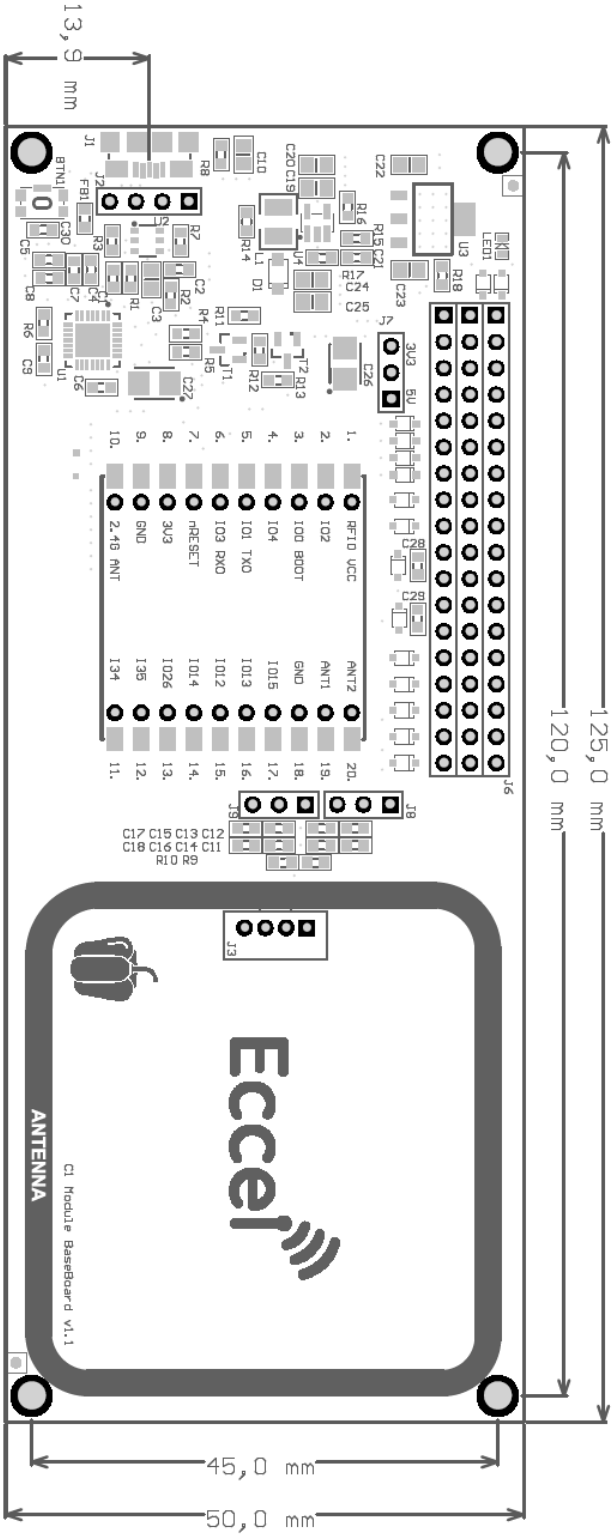


Figure 4-1

No responsibility is taken for the method of integration or final use of the Pepper C1 modules

More information about the Pepper C1 module 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