

## PMRTC Evaluation Kit

### CBC921 Real-Time Clock with Power Manager/Switch and Backup Battery/Supercap Charger

#### System Features and Overview

CBC-EVAL-14 PMRTC Evaluation Kit is a demonstration platform featuring the Cymbet CBC921 - an integrated circuit featuring **Power Management**, **Real-Time Clock (PMRTC)**, backup battery charger, and other functions in a 3mm x 3mm 16L thin QFN surface mount package. The backup power source charger supports both 4.1V and 3.2V charging options, covering a range of rechargeable energy storage devices. CBC-EVAL-14 includes the following elements:

- Low power RTC with I2C interface bus (SPI option available)
- Crystal and RC oscillator operating modes
- Power fail detect with automatic switchover from main power to backup power source
- Integrated battery management that controls battery charging and discharge cutoff, ensuring maximum service life of the backup storage cell
- Automatic and user-configurable backup power charging source duty cycle and temperature-compensated charge voltage
- USB connector for easy demonstration and application development on personal computer
- Input/output access on development board for easy connection to external microcontroller
- On-chip temperature sensor with 10-bit ADC
- Graphical User Interface supports application development

Figure 2 shows the USB Interface Board to the left, and the CBC921 PMRTC Tab Board to the right.



Figure 2: CBC-EVAL-14 PMRTC Evaluation Boards.

#### EVAL-14 Graphical User Interface

The CBC-EVAL-14 includes a PC-based software application that communicates with the CBC921 PMRTC Tab Board through a USB dongle. Users can set the time of day, date, and countdown timer values to experiment with RTC power-back-up. The application also allows the user access to the RTC registers for viewing and modification. The software works with Microsoft Windows XP, Windows 7, and Windows 8 operating systems. Once the EVAL-14 USB dongle is inserted into the PC, the Connect button is clicked in the GUI to establish communication over the USB port. The entire USB dongle or just the PMRTC Tab Board can then be removed from the PC and the RTC will be powered by any backup power source the user has connected to the VCHG pin on the CBC921 PMRTC Tab Board.

Figure 1 illustrates the CBC921 PMRTC, a low power RTC with power manager and battery charger.

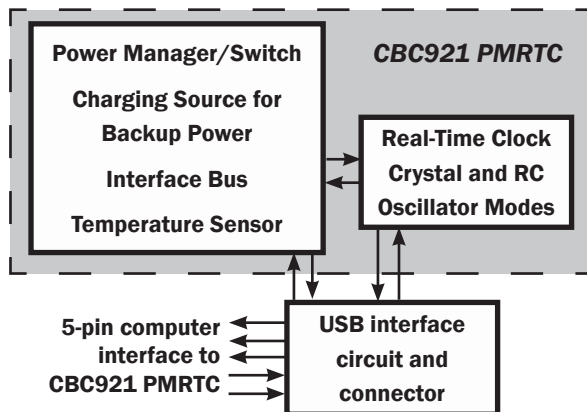
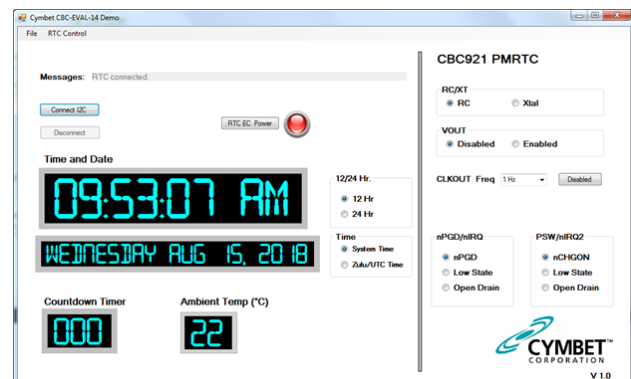


Figure 1: CBC-EVAL-14 Block Diagram.

#### Graphical User Interface for Easy Application Development!



CBC-EVAL-14 Module Connector, Jumpers, and Test Points

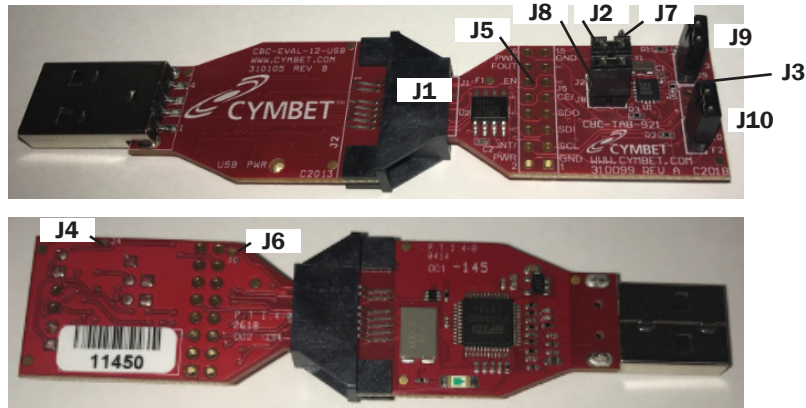


Figure 3: Locations of Jumpers.

JUMPERS AND CONNECTORS		
Jumper	Pin Number	Designation
J1	1	GND
	2	RTC PWR
	3	NC
	4	To J3 pin 1
	5	NC
	6	NC
	7	/PGD
	8	5V
	9	SPI_SDO
	10	SPI_/CE
	11	SPI_SCL
	12	SPI_SDI
	13	EEDATAIN
	14	EEDATAOUT
	15	EECS
	16	EESK
J2	1	RTC PWR bus - power from pin 16 of J5
	2	VDD and VDD2 of CBC921
J3	1	Through-hole via - to J1 pin 4
	2	Through-hole via - GND
J4	PCB Trace	Cut jumper to disable power from RTC PWR to LED D1

JUMPERS AND CONNECTORS		
Jumper	Pin Number	Designation
J5	1	GND
	2	RTC PWR
	3	SPI_SCL
	4	PSW_/IRQ2 pin 6 CBC921
	5	SPI_SDI
	6	NC
	7	SPI_SDO
	8	NC
	9	SPI_/CE
	10	NC
	11	NC
	12	To J6 PCB trace to RTC PWR
	13	NC
	14	FOUT
	15	GND
	16	RTC PWR
J6	PCB Trace	RTC power to SPI_SDI line and header J5 - cut to disable
J7	1	VOUT of CBC921 [Caution: Draws current from backup battery!]
J8	1, 2	Short pins 1 and 2 together to connect R3 pull-up resistor from CBC921 PSW_/IRQ2 to RTC PWR
J9	1	SPI_SDO header pin (short to SDI)
	2	SPI_SDI header pin (short to SDO)
J10	1	SPI_/CE (short to GND)
	2	GND (short to SPI_/CE)

**Getting Started**

BEFORE inserting the USB dongle into the USB port, proceed with the file downloads as described below.

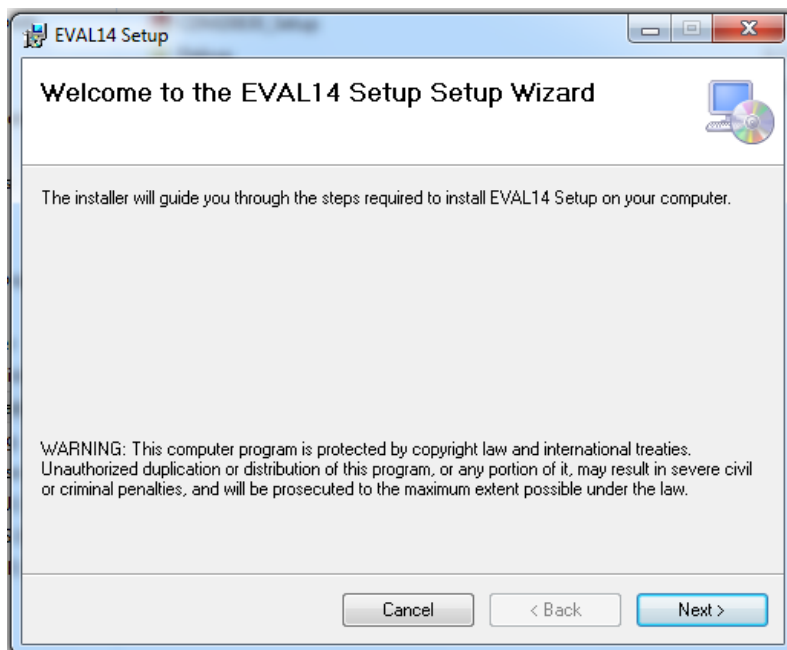
For first time users who have not installed the demonstration software, follow these steps:

1. Download the CBC-EVAL-14 files from the web site and save them to your computer:

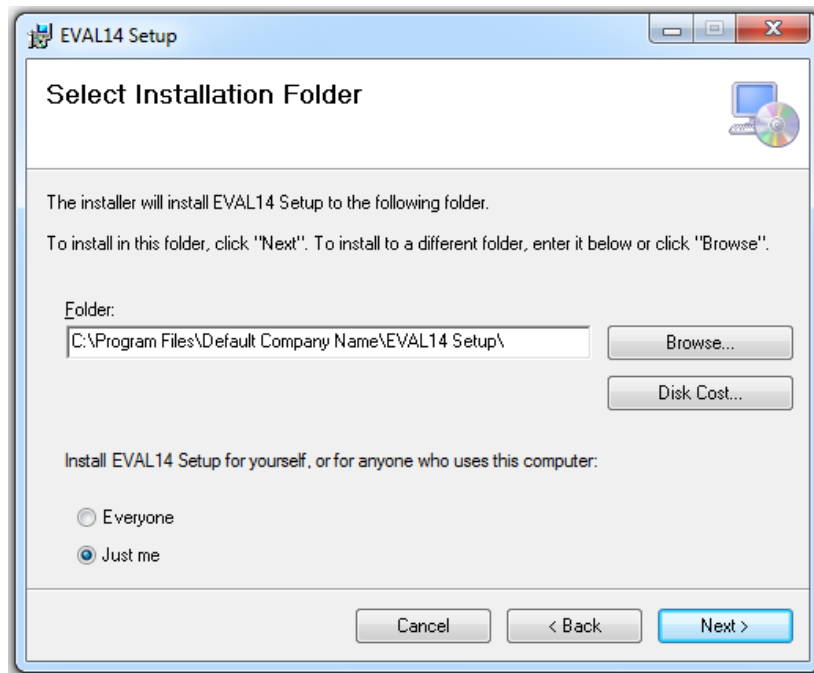
The directory structure loaded to your computer will look like the following:

Name	Date modified	Type	Size
EVAL14 Setup	8/15/2018 2:22 PM	Windows Installer ...	3,059 KB
setup	8/15/2018 2:22 PM	Application	418 KB
EVAL14 Setup.vdproj	8/15/2018 2:22 PM	VDPROJ File	51 KB
CDM20830_Setup	11/22/2013 7:35 AM	Application	1,893 KB
Debug	8/15/2018 2:22 PM	File folder	
Release	6/19/2018 10:03 AM	File folder	

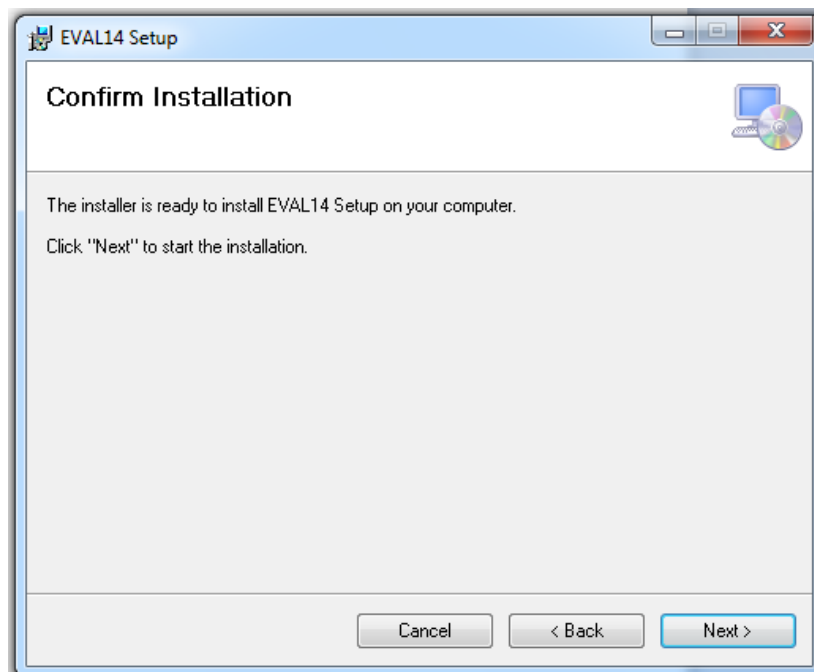
2. Do not yet insert any hardware into the USB port. Install the application by clicking on 'setup'.
3. A dialog box will appear, asking: "Do you want to allow the following program to make changes to this computer?" Click the 'Yes' option.
4. The following window will appear. Click 'Next.'



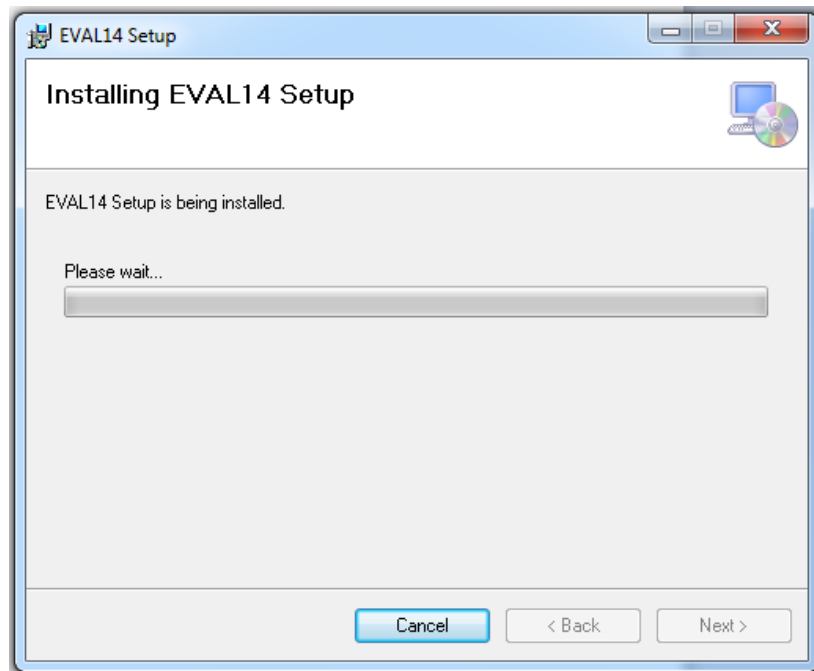
5. When the following window appears, click 'Next.'



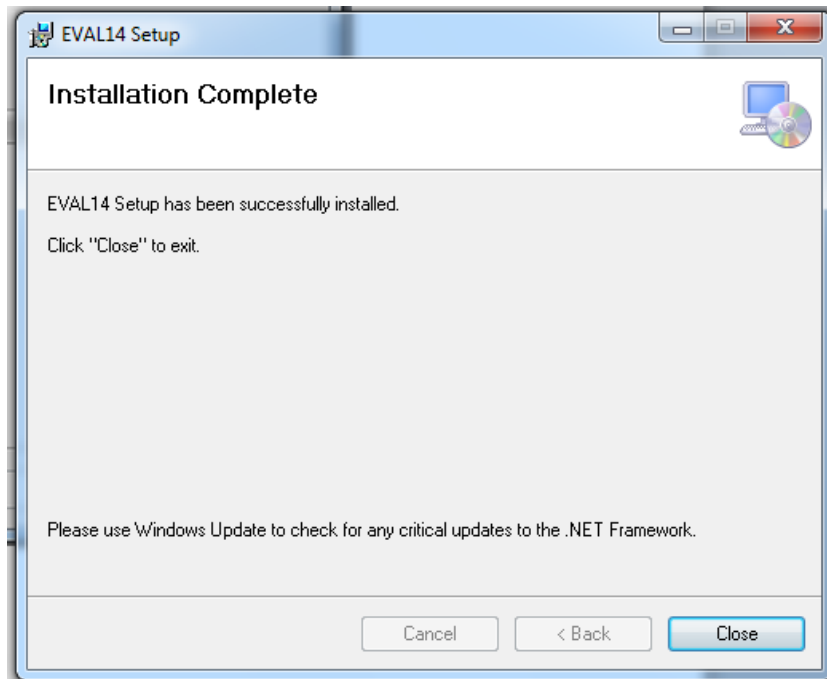
6. The following window will appear. Click 'Next.'



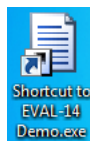
7. Allow the installation to continue and when the message "Do you want to allow the following program from an unknown publisher to make changes to this computer?" appears, answer 'Yes.'



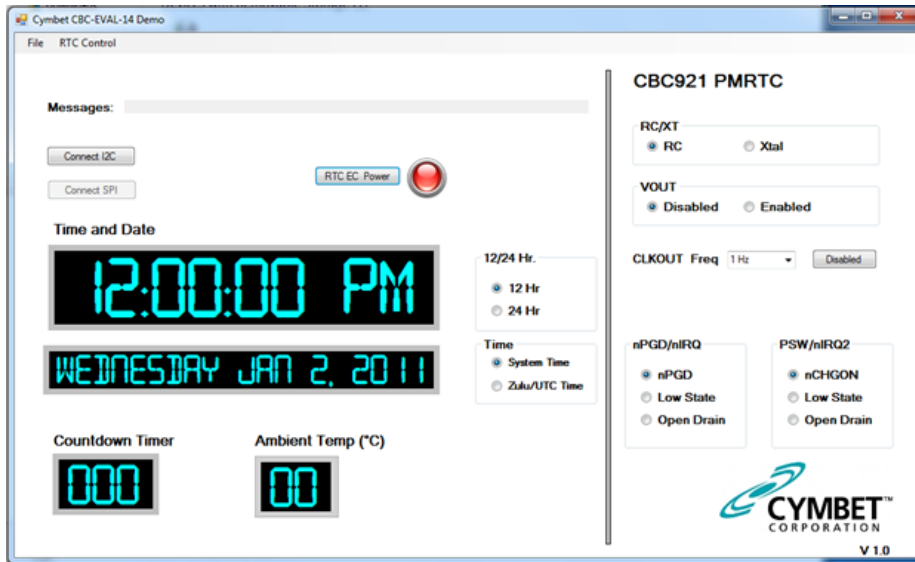
8. Once the installation is complete, the following window will appear. Click 'Close.'



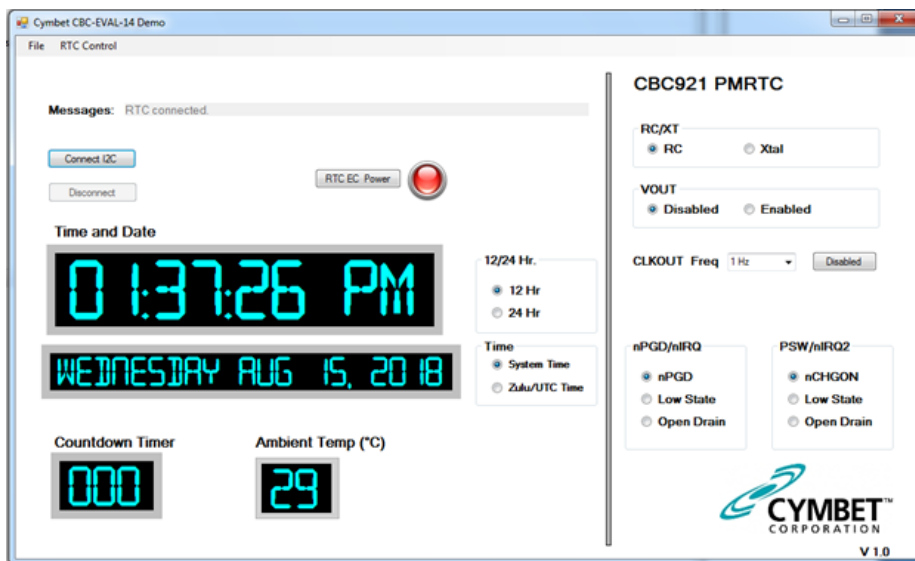
9. There should now be a Shortcut on your desktop, as shown below.



10. Open the application and the following graphical user-interface (GUI) window will appear.

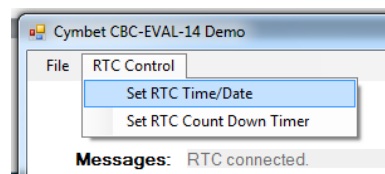


11. Insert the USB dongle and CBC921 PMRTC Tab Board pair into the computer's USB port. Click on the 'Connect I2C' button and the GUI will refresh, showing the current date and time.

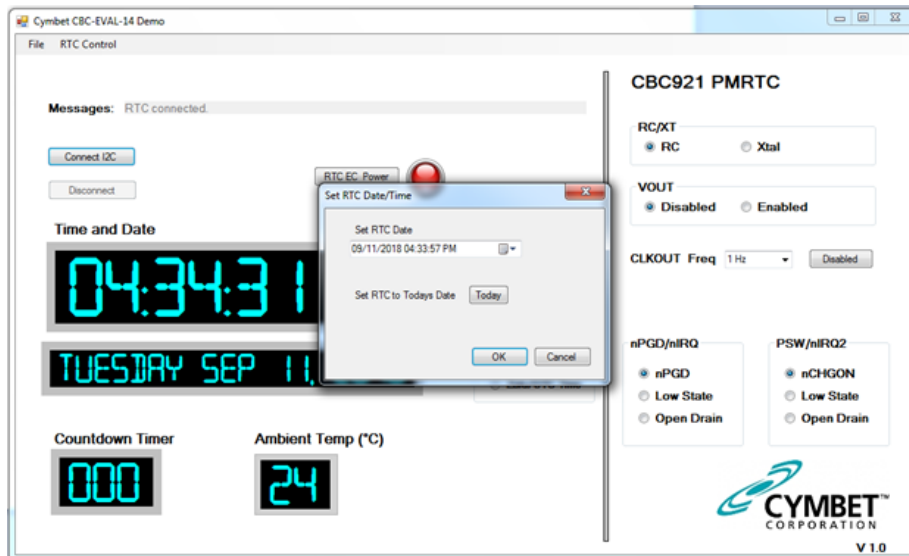


12. Click 'RTC EC Power' to disable power from the dongle. The 'RTC EC Power' indicator on the GUI will turn off, as will the 'PWR' LED on the CBC921 PMRTC Tab Board. Click 'RTC EC Power' to again apply power to the dongle.

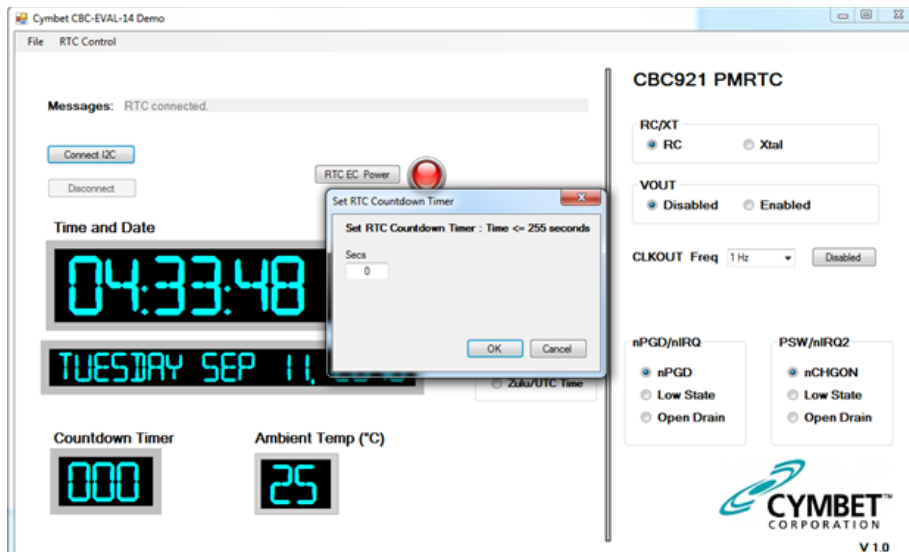
13. There are several configuration options available to the user from the 'RTC Control' menu and the main panel of the GUI. For example, open the 'RTC Control' drop-down menu in the upper left corner of the GUI and select from the two options as shown below.



14. The 'Set RTC Date/Time' option allows the user to set a specific date and time. Enter any arbitrary date and time as the starting time, using either the drop-down calendar menu, or by manually entering the data. Click 'OK' to execute the command.



The 'RTC Count Down Timer' option allows the user to apply a value from 0 to 255 in 'Secs' field.



15. Enter a valid number and click 'OK' to execute the command. The timer will then be set and begin to count down to zero.

16. The system set-up is now complete. Once the countdown timer or date and time have been set, a backup power source can be used to maintain the timer or real time by either disabling power from the dongle by clicking the 'RTC EC Power' button or removing the dongle from the USB port. In the absence of USB power, the CBC921 PMRTC clock will operate from the backup power source, if any, that the user has connected to the VCHG pin. Simply re-insert the dongle or re-apply power to verify that the countdown timer or time and date were maintained while the dongle was not under USB power. Additional PMRTC configuration options are available as shown on the GUI panel.

**Note: Depending on the speed of the computer running the application, the seconds in the RTC Time and Date and RTC Countdown Timer might skip a count occasionally.**

**RTC Register Access**

The CBC921 PMRTC registers are not accessible through the EVAL-14 GUI at this time. Contact Cymbet for supporting GUI code.

**Reference Documents**

CBC921 PMRTC Data Sheet: <http://www.cymbet.com/pdfs/DS-72-47> CBC921 PMRTC Datasheet

Guidelines for crystal selection and other important information pertaining to the CBC921 PMRTC can be found on Cymbet's web site: [www.cymbet.com](http://www.cymbet.com).

**CBC-EVAL-14 PMRTC Circuit Schematic**

The schematic of Figure 4 depicts the CBC-EVAL-14 PMRTC board. For the purpose of supporting hardware development, CBC921x PMRTC package pins are accessible by way of through-hole vias on the EVAL-14 evaluation board.

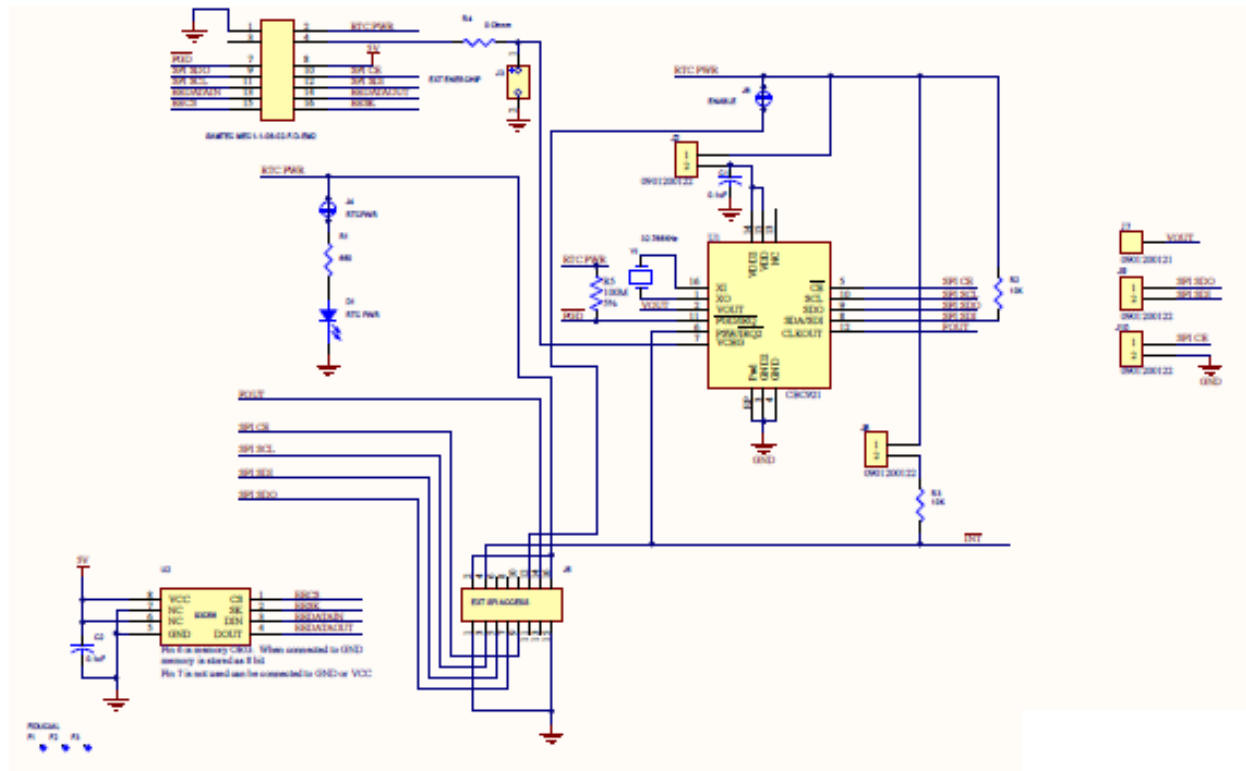


Figure 4: CBC-EVAL-14 PMRTC Board Circuit Schematic.

Table 1: CBC-EVAL-14 PMRTC Board Bill of Materials.

**To be supplied.**



CBC-EVAL-14 Assembly Diagrams

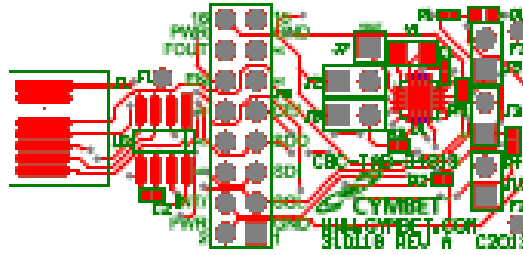


Figure 5: CBC-EVAL-14 PMRTC Board Assembly Diagram (Top View).

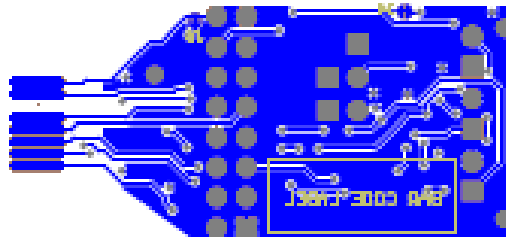


Figure 6: CBC-EVAL-14 PMRTC Board Assembly Diagram (Bottom View).

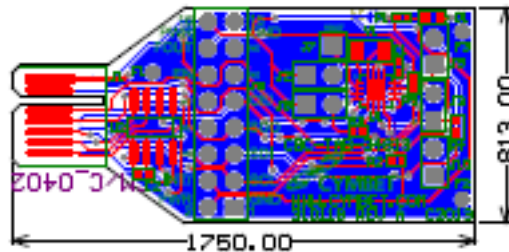


Figure 7: CBC-EVAL-14 PMRTC Board Assembly Diagram (Multi-Layer Composite View).

Ordering Information

Part Number	Description	Notes
CBC92141C	Real-Time Clock with Power Manager and 4.1V Backup Battery/Supercap Charger; I2C Interface Bus	Tube or Reel
CBC92132C	Real-Time Clock with Power Manager and 3.2V Backup Battery/Supercap Charger; I2C Interface Bus	Tube or Reel
CBC-EVAL-14	CBC-EVAL-14 PMRTC Evaluation Kit	USB Dongle + PMRTC Board

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