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Objective

This example demonstrates the usage of the real-time clock (RTC) in PSoC® 6 MCU.

Overview

This code example demonstrates how to get and set the time in a real-time clock (RTC), using the RTC driver API in the Peripheral Driver Library (PDL).

Requirements

Tool: PSoC Creator™ 4.2; Peripheral Driver Library (PDL) 3.0.1

Programming Language: C (Arm® GCC 5.4-2016-q2-update, Arm MDK Generic)

Associated Parts: PSoC 6 MCU

Related Hardware: CY8CKIT-062-BLE PSoC 6 BLE Pioneer Kit

Hardware Setup

This example uses the kit's default configuration. See the kit guide to ensure that the kit is configured correctly.

Software Setup

This code example requires a PC terminal emulator to get and set the time information.

Operation

Follow the directions that came with your kit to ensure that your kit is connected to your PC.

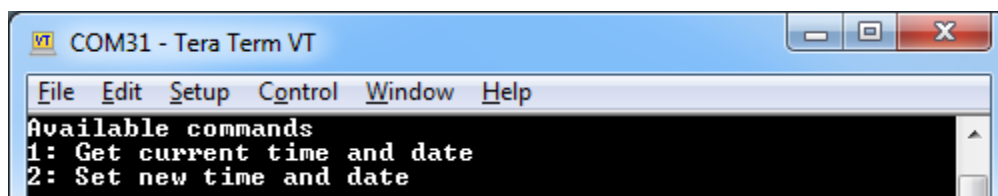
1. Open terminal software such as Tera Term and select the KitProg2's COM port with a baud rate setting of 115200 bps, data bits 8, parity none, and stop bit 1. Make sure the terminal sends a line feed (LF) character for a new line, and enable local echo to see entered commands.
2. Build the project and program it into the PSoC 6 MCU device. Choose **Debug > Program**. For more information on device programming, see PSoC Creator Help. Flash for both CPUs is programmed in a single program operation.

Note: During the build process, do not replace the *stdio_user.h* file if prompted by PSoC Creator.

3. Confirm that the terminal program is working.

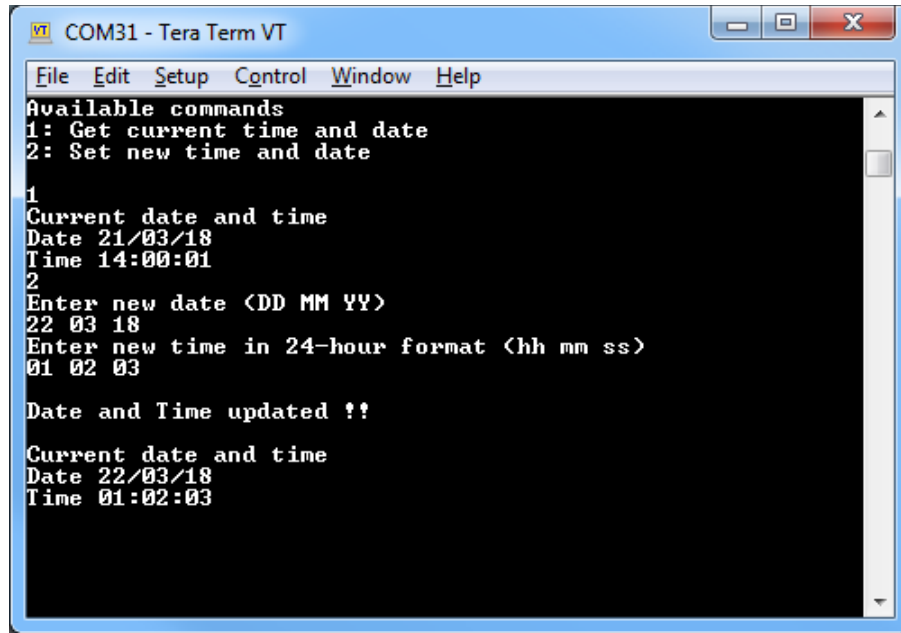
It should show a message with the available commands, like [Figure 1](#).

Figure 1. Available Commands in Terminal Window



4. Type "1". The terminal program shows the current time from the RTC, as shown in [Figure 2](#).
5. Type "2". After that it will ask for new date and time. Enter the new date and time, and press **Enter** ([Figure 2](#)).

Figure 2. Display Terminal Messages

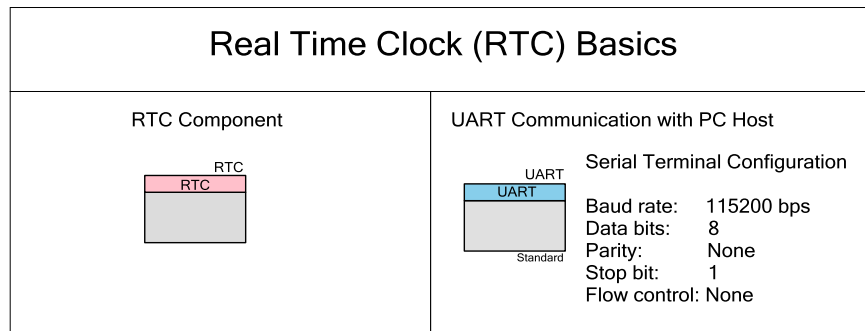


6. Type “1”. The terminal program shows the current time every second.

Design and Implementation

This code example features one Real Time Clock Component and one UART Component, as shown in [Figure 3](#).

Figure 3. PSoC Creator Project Schematic



The RTC provides time and date information – second, minute, hour, day of the week, date, month, and year. The time and date information are updated every second with automatic leap year compensation performed by the RTC HW block. The firmware uses the RTC API in the Peripheral Driver Library (PDL).

The CPU waits for the line feed (LF) character from the serial terminal. When it is received, the code parses the commands that have been sent.

- If the input command is ‘1’, display the current date and time.
- If the input command is ‘2’, update the RTC with new date and time.

Design Considerations

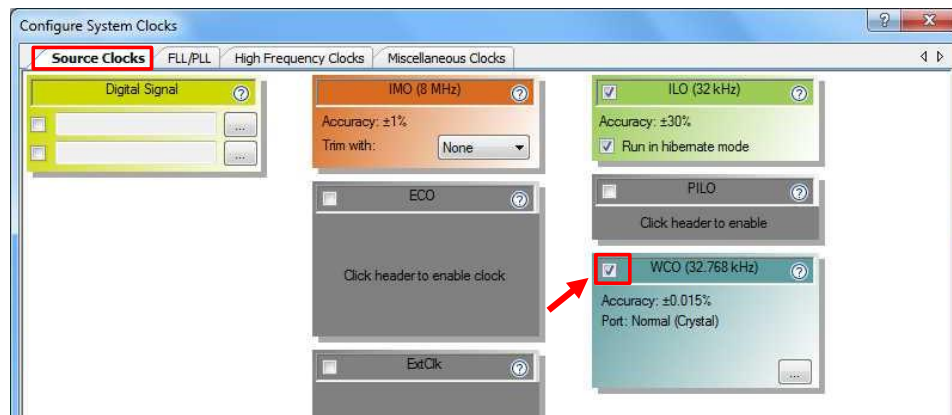
This code example runs on CY8CKIT-062-BLE, which has a PSoC 6 MCU device.

It is necessary to provide a 32.768-kHz clock for the RTC function in the backup power domain. For accurate RTC operation, it is recommended that you use a Watch Crystal Oscillator (WCO).

Do the following to configure the RTC clock (BakClk) as WCO.

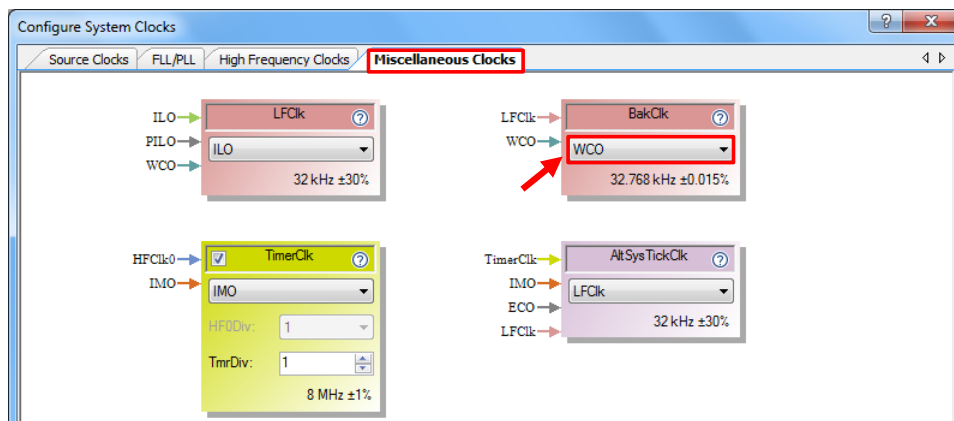
1. Double-click **Clocks** in **Design Wide Resources**.
2. Click **Edit Clock...** and open **Configure System Clocks**.
3. Enable WCO clock for the backup clock source in **Source Clocks**, as [Figure 4](#) shows.

Figure 4. Enable WCO for RTC Clock



4. Select WCO for BakClk in **Miscellaneous Clocks**, as [Figure 5](#) shows.

Figure 5. Set the Backup Clock Source to WCO



Components

[Table 1](#) lists the PSoC Creator Components used in this example, how they are used in the design, and the non-default settings required so they function as intended.

Table 1. List of PSoC Creator Components

| Component | Instance Name | Purpose | Non-default Settings |
|-----------------|---------------|-------------------------------------|----------------------|
| Real-Time Clock | RTC | Provide date and time information | Default |
| UART | UART | Print messages on terminal program. | Default |

For information on the hardware resources used by a Component, see the Component datasheet.

Table 2 shows the pin assignment for the project done through the **Pins** tab in the **Design Wide Resources** window. These assignments are compatible with CY8CKIT-062-BLE.

Table 2. Pin Names and Locations

| Pin Name | Location |
|----------|----------|
| UART:rx | P5[0] |
| UART:tx | P5[1] |

Reusing This Example

This example is designed for the CY8CKIT-062-BLE Pioneer Kit. To port the design to a different PSoC 6 MCU device and/or kit, change the target device using the Device Selector and update the pin assignments in the Design Wide Resources Pins settings as needed. For single-core PSoC 6 MCU devices, port the code from *main_cm4.c* to *main.c*.

Related Documents

| Application Notes | |
|---|---|
| AN210781 – Getting Started with PSoC 6 MCU with BLE Connectivity | Describes PSoC 6 MCU with BLE Connectivity devices and how to build your first PSoC Creator project |
| AN215656 – PSoC 6 MCU Dual-CPU system Design | Describes the dual-core CPU architecture in PSoC 6 MCU, and shows how to build a simple dual-core design |
| AN219434 – PSoC 6 MCU Importing Generated Code into an IDE | Describes how to import the code generated by PSoC Creator into your preferred IDE |
| Code Examples | |
| CE218964 PSoC 6 MCU RTC Daily Alarm | |
| CE218542 PSoC 6 MCU Customer Tick Timer Using RTC Alarm Interrupt | |
| CE219339 PSoC 6 MCU - MCWDT and RTC Interrupts (Dual Core) | |
| PSoC Creator Component Datasheets | |
| UART | Provides asynchronous communication interface using SCB hardware |
| Pins | Supports connection of hardware resources to physical pins |
| RTC | Component provides an application interface for keeping track of time and date |
| Device Documentation | |
| PSoC 6 MCU: PSoC 63 with BLE Datasheet | PSoC 6 MCU: PSoC 63 with BLE Architecture Technical Reference Manual PSoC 6 MCU: PSoC 63 with BLE Registers Technical Reference Manual |
| Development Kit (DVK) Documentation | |
| CY8CKIT-062-BLE Pioneer Kit | |

Document History

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| *A | 5988200 | AJYA | 12/08/2017 | Initial Public Release |
| *B | 6079291 | AJYA | 03/07/2018 | Updated to PSoC Creator 4.2 |

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