MAX31342 RTC Shield Software User Guide

UG6890; Rev 1; 4/19

Abstract

This document provides the information needed to program and evaluate the MAX31342 real-time clock (RTC) on the MAX31342 shield board (MAX31342SHLD) using the provided graphical user interface (GUI) software.

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General Description

The MAX31342 shield is a fully assembled and tested PCB for evaluation of the MAX31342, low-current, real-time clock (RTC) with an I²C interface. The shield operates from a single supply, either USB or external power supply, and the on-board crystal provides a 32.768kHz clock signal. This device is accessed through an I²C serial interface provided by a MAX32625PICO board.

This document provides all the information needed to understand and use the various functions of the graphical user interface (GUI) provided with the shield.

Requirements

MAX31342 Shield

The MAX31342 shield is shown in **Figure 1**. It contains the MAX31342EWA+T IC soldered onto the board with test points for VCC, GND, INTA/CLKIN and INTB/CLKOUT. A programmed MAX32625PICO board should be connected to connectors J1 and J2, as seen in **Figure 1**.

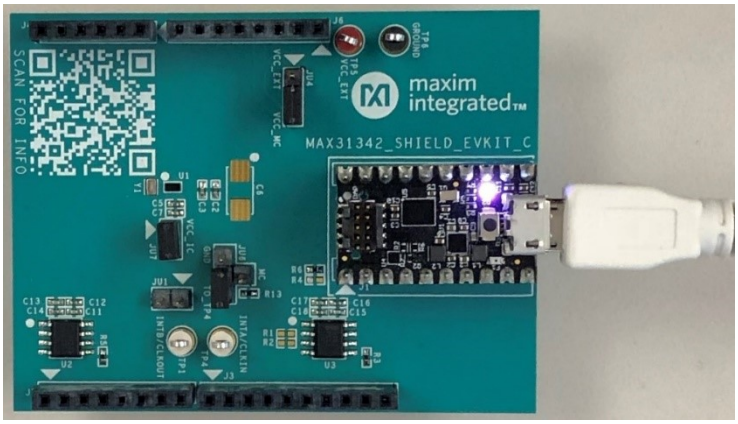

Figure 1. MAX31342 Shield with MAX32625PICO.

MAX31342 RTC Shield Software

Maxim provides a GUI to communicate with and program the device registers. The GUI runs on Windows 7 or later and provides a user-friendly approach to understand, program, and test the various functions of the device. The following sections will explain this in detail.

Functional Description and Programming

Menu and Status Information

The GUI offers **File**, **Device**, and **Help** menus on the menu bar at the top of the window (**Figure 2**).

The **File** menu has options to save and load configuration information. This stores all the device register values to a .ini file that can be loaded anytime later to restore the device state. The **Device** menu allows the user to reconnect to the shield if the need arises. The **Help** menu offers an option to open the **MAX31342SHLD Webpage**.

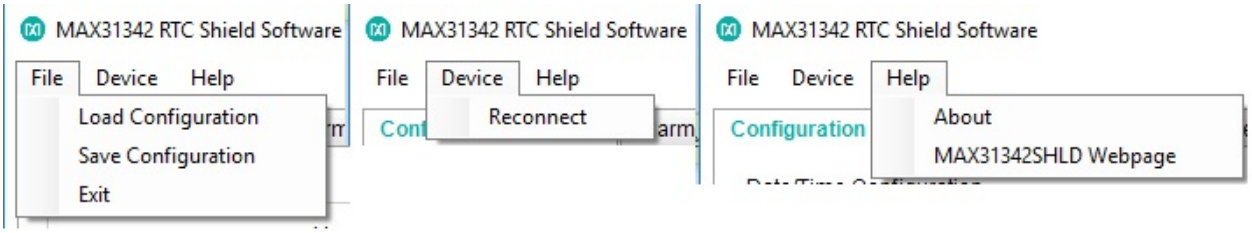

Figure 2. GUI menus.

The status bar at the bottom of the GUI, as seen in **Figure 3**, shows information about the software's current mode of operation and the current shield board connection status. The **Status Log** helps keep track of all the actions performed by the user and the outcome of these actions (success/failure). These messages can also be logged to an external file using the **Log to File** checkbox.

Configuration & Time Tab

The GUI has three tabs in total, with two more static group boxes to the right of the tabs.

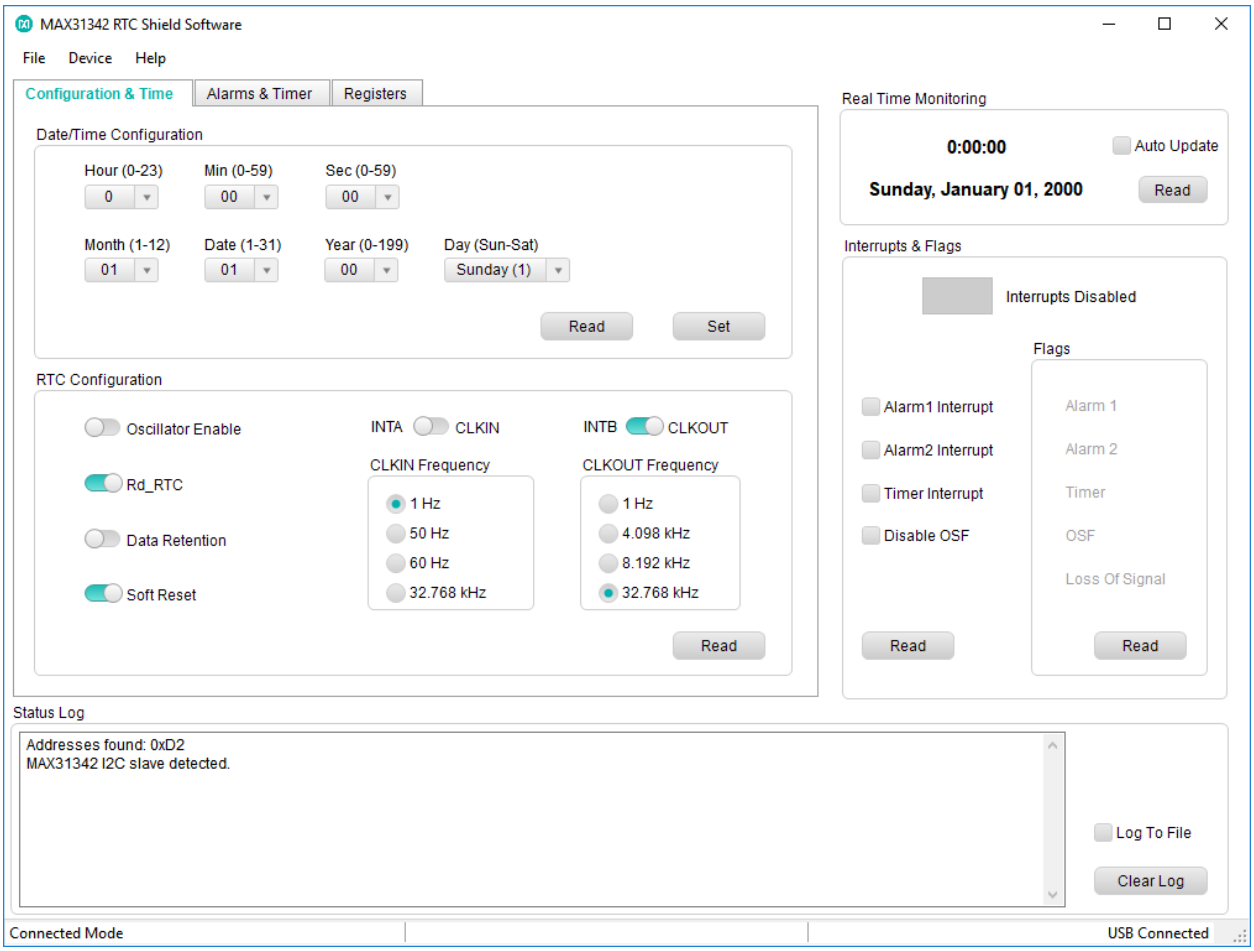

Figure 3. Configuration & Time tab.

The **Configuration & Time** tab shown in **Figure 3** has options to configure the device and clocks and program the date and time. This is the default tab that opens when the software is launched.

If the device is powered and connected to the PC at the time of software launch, all the GUI fields are populated with the current values read from the device.

- **Date/Time Configuration**

  This group box has combo boxes for **Hour**, **Min**, **Sec**, **Month**, **Date**, **Year**, and **Day** selections.

  Read: The current date and time values can be read from the device using the **Read** button in this group box. The status log indicates when the read operation is completed and all GUI elements in the group box are updated.

  Set: The user needs to enter the desired date and time values by selecting valid values in all the combo boxes of this group box and click on the **Set** button to program these values to the device. The status log indicates when the operation is completed. This action starts the device's internal oscillator if it is not already running.

- **RTC Configuration**

  Oscillator Enable: This toggle switch can be used to enable or disable the internal oscillator.

  Rd_RTC: This toggle switch can be used to toggle the Rd_RTC bit in Config_reg2 (01h). When enabled, reading the time registers will return the latest date/time values. When disabled, reading the time register will return the previously programmed date/time values.

  Data Retention: This toggle switch can be used to enter or exit data retention mode. After exiting data retention mode, the **Oscillator Enable** must be toggled by the user for the date/time to resume ticking.

  Soft Reset: This toggle switch can be used to toggle the device between reset and normal modes. When enabled, the device goes through a digital reset. Disable the **Soft Reset** to bring the device back to normal mode prior to performing any other task.

  INTA/CLKIN: This toggle switch can be used to toggle the INTA/CLKIN pin between interrupt and CLKIN modes. The **CLKIN Frequency** radio buttons can be used to select the reference CLKIN frequency. When in CLKIN mode, the **CLKIN frequency** selection also updates the Sync_Delay bitfield in the Clock_sync_reg (58h) accordingly.

  INTB/CLKOUT: This toggle switch can be used to toggle the INTB/CLKOUT pin between interrupt and CLKOUT modes. The **CLKOUT Frequency** radio buttons can be used to select the desired CLKOUT frequency. Refer to the MAX31342 data sheet to determine which interrupt pin is used for an interrupt based on CLKIN/CLKOUT selections.

  Read: Press the **Read** button to read all settings in this group box. The status log indicates when the read is completed.

Real Time Monitoring

Auto Update: When this checkbox is selected, the software will read the date and time from the device at 1 second intervals and update the date/time labels in this group box. When unchecked, no further reads will happen and the date/time labels will remain static.

Read: This button can be used for a one-time read and update of the date/time labels in this group box.

Interrupts & Flags

Interrupt Indicator: The label and color of the interrupt indicator indicates the current state of the INTA/INTB pins on the shield. By default, this should be grey and read **"Interrupts Disabled"**. When any of the interrupts are enabled and the INTA/INTB pins are not asserted, the label reads **"No Interrupt"**. When an interrupt occurs and the pin is asserted, the label reads **"Interrupt Available"** and turns green. The user can use this as an indicator to read the flags.

These jumper settings should be made on the shield board for this feature to work correctly: JU1:1–2 and JU6:1–3.

Interrupt Checkboxes: The **Alarm1**, **Alarm2**, and **Timer Interrupt** checkboxes can be used to enable or disable the corresponding interrupts. The **Disable OSF** checkbox can be used to enable or disable the OSF (oscillator stop flag) functionality.

Read: The **Read** button in the **Flags** group box can be used to read the flags register and display the current status of all flags. Any flag that is asserted is displayed with a green highlight. Unasserted flags are greyed out.

The **Read** button within the **Interrupts & Flags** group box (outside the **Flags** group box) can be used to read the current status of the interrupt enable bits and the DOSF bit.

Alarms & Timer Tab

As seen in **Figure 4**, the **Alarms & Timer** tab covers the remaining device functions: Alarm 1, Alarm 2, and Timer.

- **Alarm 1 Configuration**

  Repetition Rate: This combo box can be used to select the alarm repetition rate. Perform this step first when configuring the alarm.

  Date/Time Selections: Based on the repetition rate selected, some or all of the remaining combo boxes in this group box will be enabled. The exact alarm match condition can be selected using these combo boxes.

  Read: The **Read** button can be used to read the current Alarm 1 values from the device.

- **Alarm 2 Configuration**

  Repetition Rate: This combo box can be used to select the alarm repetition rate. Perform this step first when configuring the alarm. Alarm 2 offers fewer repetition rates than Alarm 1.

  Date/Time Selections: Based on the repetition rate selected, some or all of the remaining combo boxes in this group box will be enabled. The exact alarm match condition can be selected using these combo boxes.

  Read: The **Read** button can be used to read the current Alarm 2 values from the device.

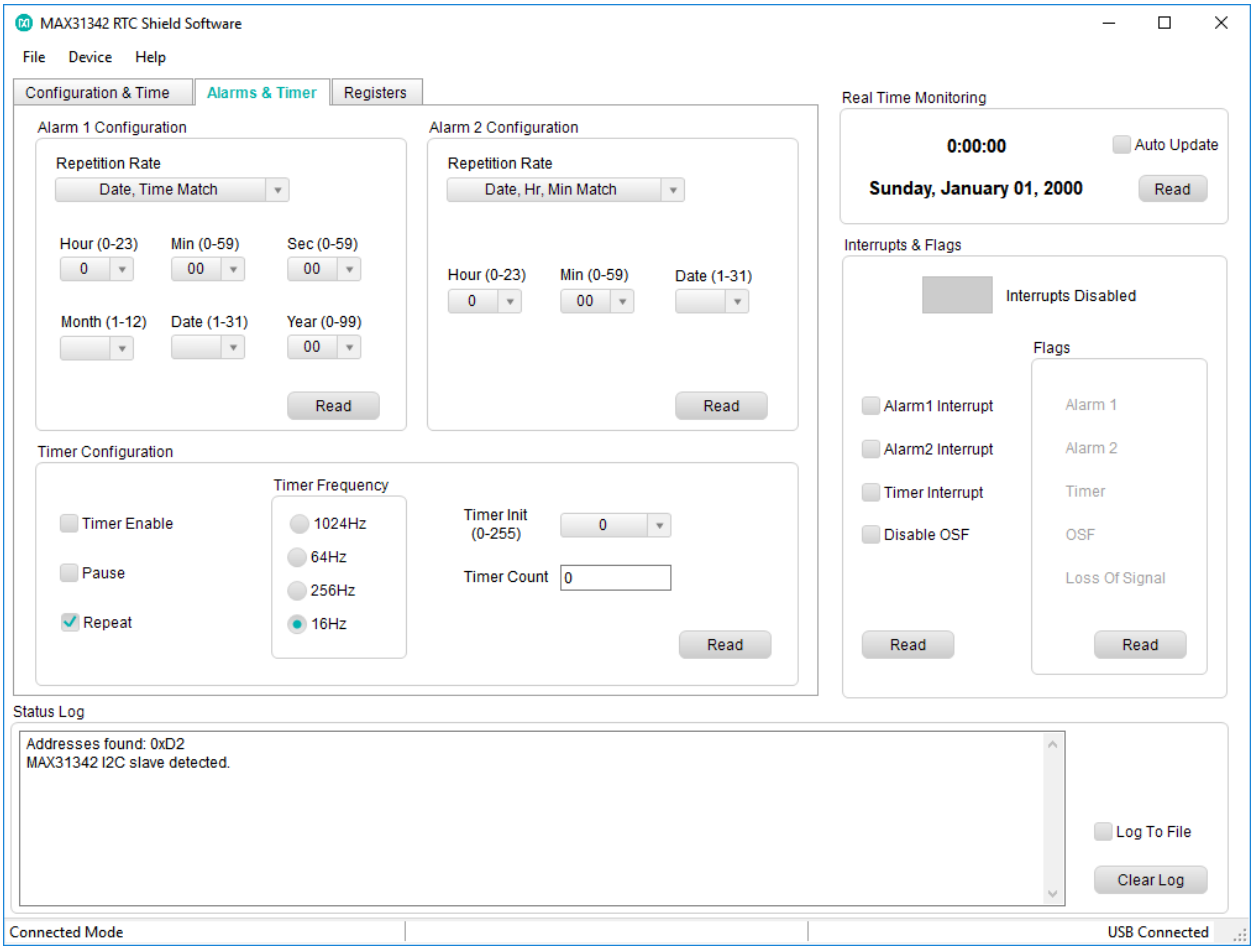

Figure 4. Alarms & Timer tab.

- **Timer Configuration**

  Timer Enable: This checkbox can be used to start/stop the timer. When checked, the timer starts counting down. When unchecked, the timer is reset.

  Pause: When checked, the timer pauses at its current count. When unchecked, the timer resumes counting. This can only be used when timer enable is checked.

  Repeat: When checked, the timer reloads its last init value and starts counting when it reaches zero. When unchecked, the timer stops after counting down to zero.

  Timer Frequency: These radio buttons can be used to select the frequency of the timer clock.

  Timer Init: This combo box can be used to select the timer initial value. This is an 8-bit field (0–255) and the timer starts counting down from this value when enabled.

  Timer Count: This read-only field displays the current timer count and is updated only when the **Read** button is clicked.

  Read: This button can be used to read the current values of all timer fields from the device and display them in this group box.

Registers Tab

The **Registers** tab provides access to all device registers (**Figure 5**).

To read registers, select the corresponding checkboxes and click **Read**.

To write to registers, enter the desired 8-bit value in hex format (e.g., 0xAB) in the corresponding **Value** field. Select the corresponding checkboxes and click **Write**.

The status log indicates success/failure of the register read/write action.

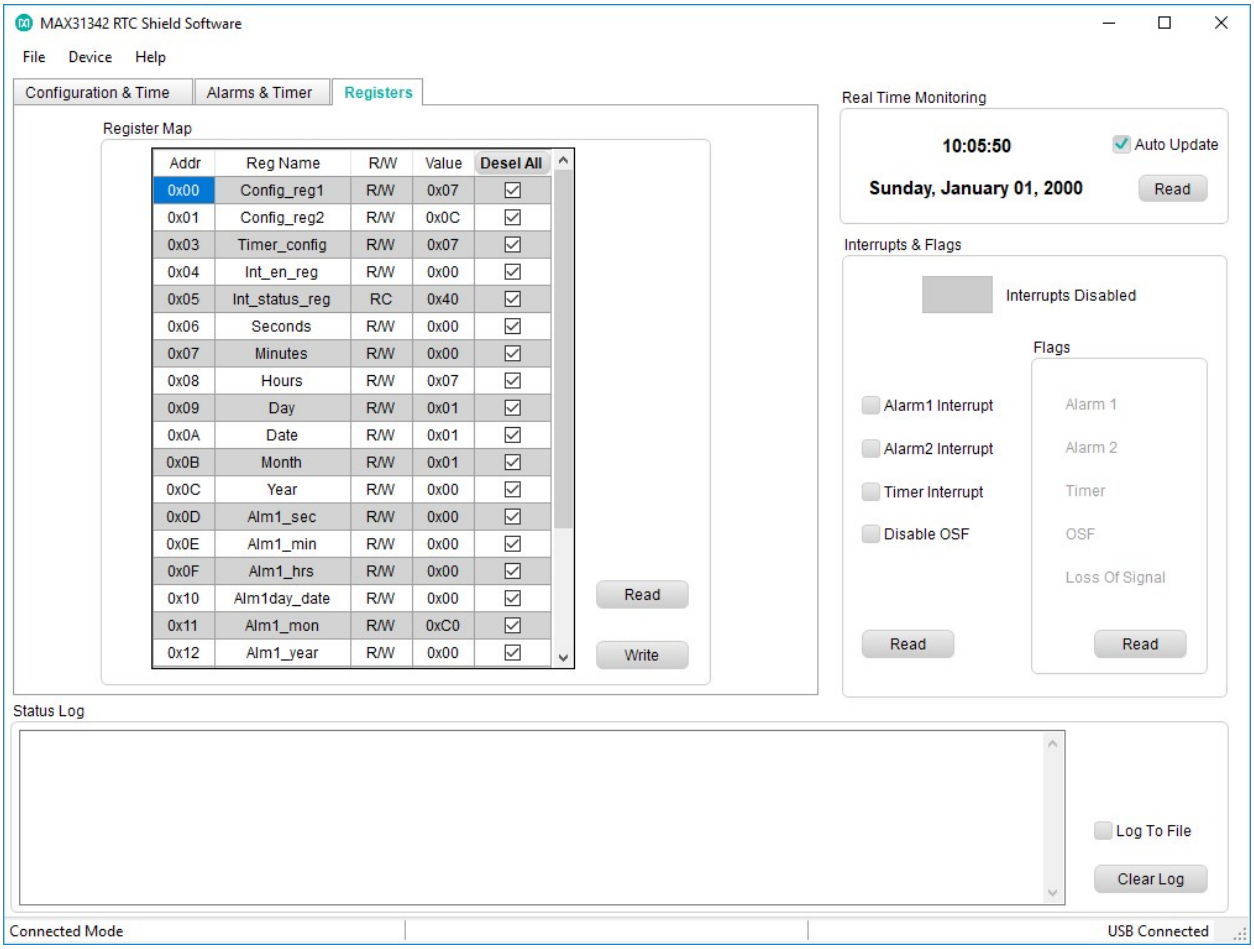

Figure 5. Registers tab.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	04/19	Initial release	—
1	04/19	Revision 1 – Figures 3 and 4 replaced; descriptive text updated	4, 5, 7