



MAX31341 RTC Shield Software User Guide

Abstract

This document provides the information to program and evaluate the MAX31341 real-time clock (RTC) on the MAX31341 shield board (MAX31341SHLD) using the provided GUI software.

Table of Contents

General Description	3
Requirements.....	3
MAX31341 Shield.....	3
MAX31341 RTC Shield Software	3
Functional Description and Programming	4
Menu and Status Information	4
Configuration & Time Tab	4
Real-Time Monitoring	6
Interrupts & Flags.....	6
Alarms & Timer Tab	7
Registers Tab.....	9
RAM Tab.....	9

List of Figures

<i>Figure 1. MAX31341 shield with MAX32625PICO.</i>	3
<i>Figure 2. GUI menus.</i>	4
<i>Figure 3. Configuration & Time tab.</i>	5
<i>Figure 4. Alarms & Timer tab.</i>	8
<i>Figure 5. Registers tab.</i>	9
<i>Figure 6. RAM Registers tab.</i>	10

General Description

The MAX31341 shield is a fully assembled and tested PCB to evaluate the MAX31341B/C, low-current, real-time clock (RTC) with power management and I²C interface. The shield operates from a single supply, either from USB or external power, and the onboard crystal provides a 32.768 kHz clock signal. This device is accessed through an I²C serial interface provided by a MAX32625PICO board.

This document provides all the information to understand and use the various functions of the GUI software provided with the shield.

Requirements

MAX31341 Shield

Figure 1 shows the MAX31341 shield. It contains a MAX31341B (WLP) and a MAX31341C (TDFN) soldered onto the board with test points for V_{CC}, V_{BAT}, GND, INTA/CLKIN, and INTB/CLKOUT. A programmed MAX32625PICO board must be connected to connectors J1 and J2 (Figure 1).

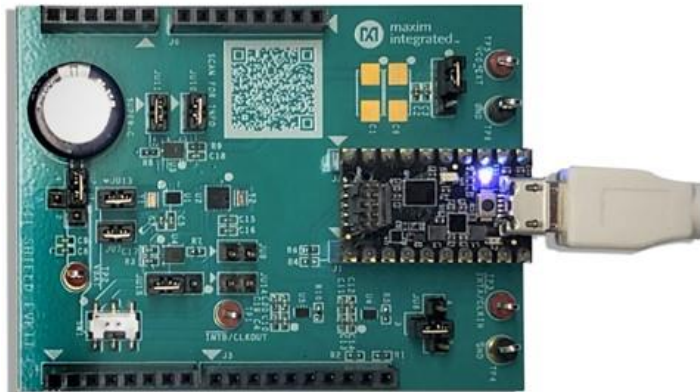


Figure 1. MAX31341 shield with MAX32625PICO.

MAX31341 RTC Shield Software

Maxim Integrated provides a graphical user interface (GUI) application 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 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 an .ini file that is loaded anytime later to restore the device state. The **Device Menu** can **Reconnect** to the shield if the need arises. The **Help menu** offers an option to open the **MAX31342SHLD webpage**.

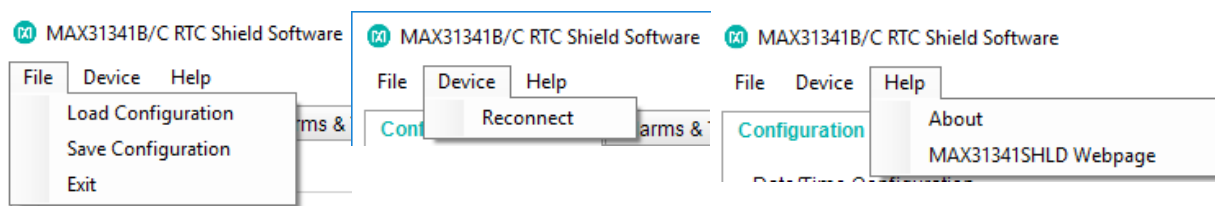


Figure 2. GUI menus.

The **status bar** at the bottom of the GUI shows the information on the software's mode of operation and shield board connection status. The **Status Log** tracks all the actions and outcomes of these actions (success/failure). These messages are also logged to an external file using the **Log to File** checkbox.

Configuration & Time Tab

The GUI has four tabs with two more static group boxes to the right of the tabs.

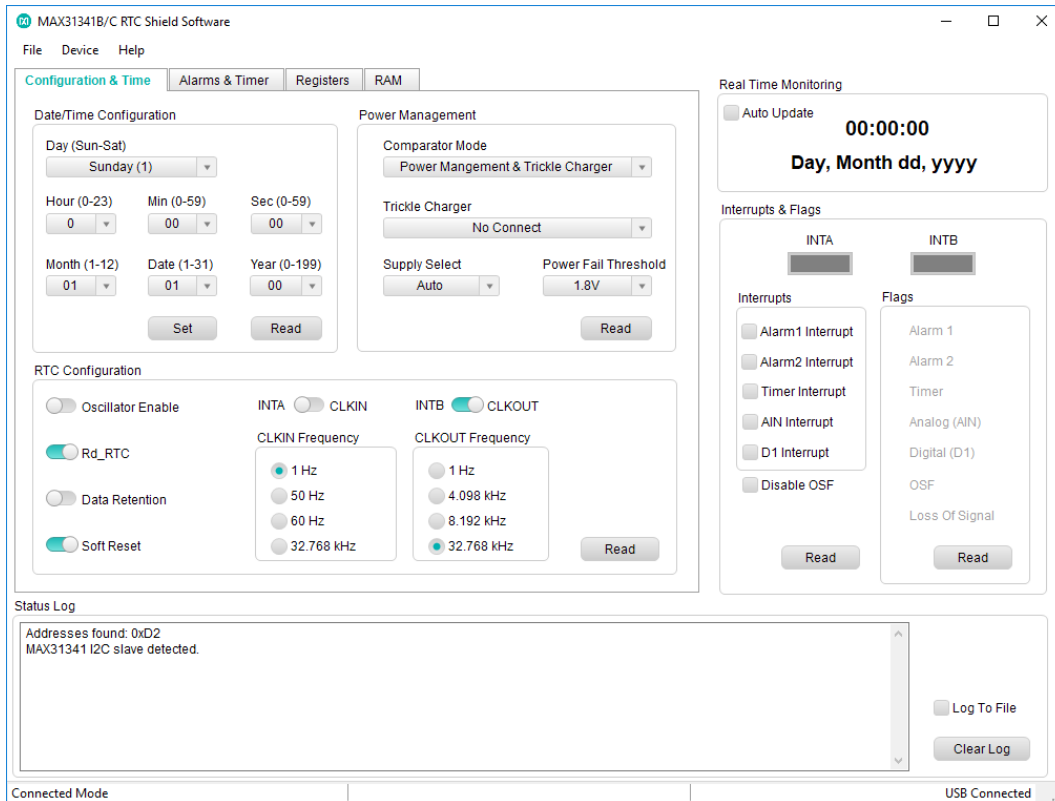


Figure 3. Configuration & Time tab.

The **Configuration & Time** tab (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 launches. All the GUI fields are populated with the values read from the device if it is powered and connected to the PC at the software launch.

1. Date/Time Configuration

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

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

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

2. RTC Configuration

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

Rd_RTC: This toggle switch is used to toggle the Rd_RTC bit in Config_reg2 (01h). Reading the time registers returns the latest date/time values when enabled. Reading the time register returns the previously programmed date/time values when disabled.

Data Retention: This toggle switch is used to enter or exit the data retention mode. The oscillator enable must be toggled after exiting the data retention mode for the date/time to resume ticking.

Soft Reset: This toggle switch is used to toggle the device between the reset and normal modes. The device goes through a digital reset when enabled. Disable the soft reset to bring the device back to the normal mode prior to any other task.

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

INTB/CLKOUT: This toggle switch is used to toggle the INTB/CLKOUT pin between the interrupt and CLKOUT modes. The CLKOUT Frequency radio buttons are used to select the desired CLKOUT frequency. Refer to the MAX31341B/C data sheet to determine which interrupt pin is used for an interrupt based on the CLKIN/CLKOUT selections.

Read: Press the Read button to read all the settings in this groupbox. The status log indicates when Read is complete.

3. Power Management

Comparator Mode: This combo box is used to choose between the Power management and Trickle Charger mode or standalone AIN Interrupt mode (where the AIN pin is connected to an analog signal and the RTC is configured to raise an interrupt when the signal goes above/below a threshold value).

Trickle Charger: This combo box is only available in the Power Management and Trickle Charger mode. It selects the trickle charger resistor and diode configuration.

Supply Select: This combo box is only available in the Power Management and Trickle Charger mode. It manually selects the active supply rail (V_{CC} or AIN), or sets it to auto for automatic selection.

Power Fail Threshold: This combo box is only available in the Power Management and Trickle Charger mode. It selects the power fail threshold for automatic supply selection.

Read: Press the Read button to read all the settings in this groupbox. The status log indicates when the Read is complete.

Real-Time Monitoring

Auto Update: The software reads the date and time from the device at one second intervals when this checkbox is checked, and updates the date/time labels in this group box. No further reads happen when unchecked and the date/time labels remain static.

Interrupts & Flags

Interrupt Indicators: The label and color of the interrupt indicators indicate the state of the INTA and INTB pins on the shield board. These must be grey by default. The corresponding indicator turns green when an interrupt occurs and the pin is asserted. This is an indicator to read the flags.

These jumper settings must be made on the shield board for the feature to work correctly: JU6:1-3.

Interrupt Checkboxes: The **Alarm1, Alarm2, Timer, AIN, and D1 Interrupt** checkboxes is used to enable or disable the corresponding interrupts. The **Disable OSF** checkbox is used to enable or disable the OSF (oscillator stop flag) functionality.

Read: The **Read** button in the **Flags** group box is used to read the flags register and display the status of all flags. Asserted flags are displayed with a green highlight. Unasserted flags are greyed out.

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

Alarms & Timer Tab

The **Alarms & Timer** tab covers the remaining device functions: Alarm 1, Alarm 2, Timer, and AIN/D1 Inputs (Figure 4)

1. Alarm 1 Configuration

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

Date/Time Selections: Some or all of the remaining combo boxes in this group box are enabled based on the selected repetition rate. The exact alarm match condition are selected using these combo boxes.

Read: The **Read** button is used to read the current Alarm 1 configuration from the device.

2. Alarm 2 Configuration

Repetition Rate: This combo box is 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: Some or all of the remaining combo boxes in this group box are enabled based on the selected repetition rate. The exact alarm match condition are selected using these combo boxes.

Read: The Read button is used to read the current Alarm 2 configuration from the device.

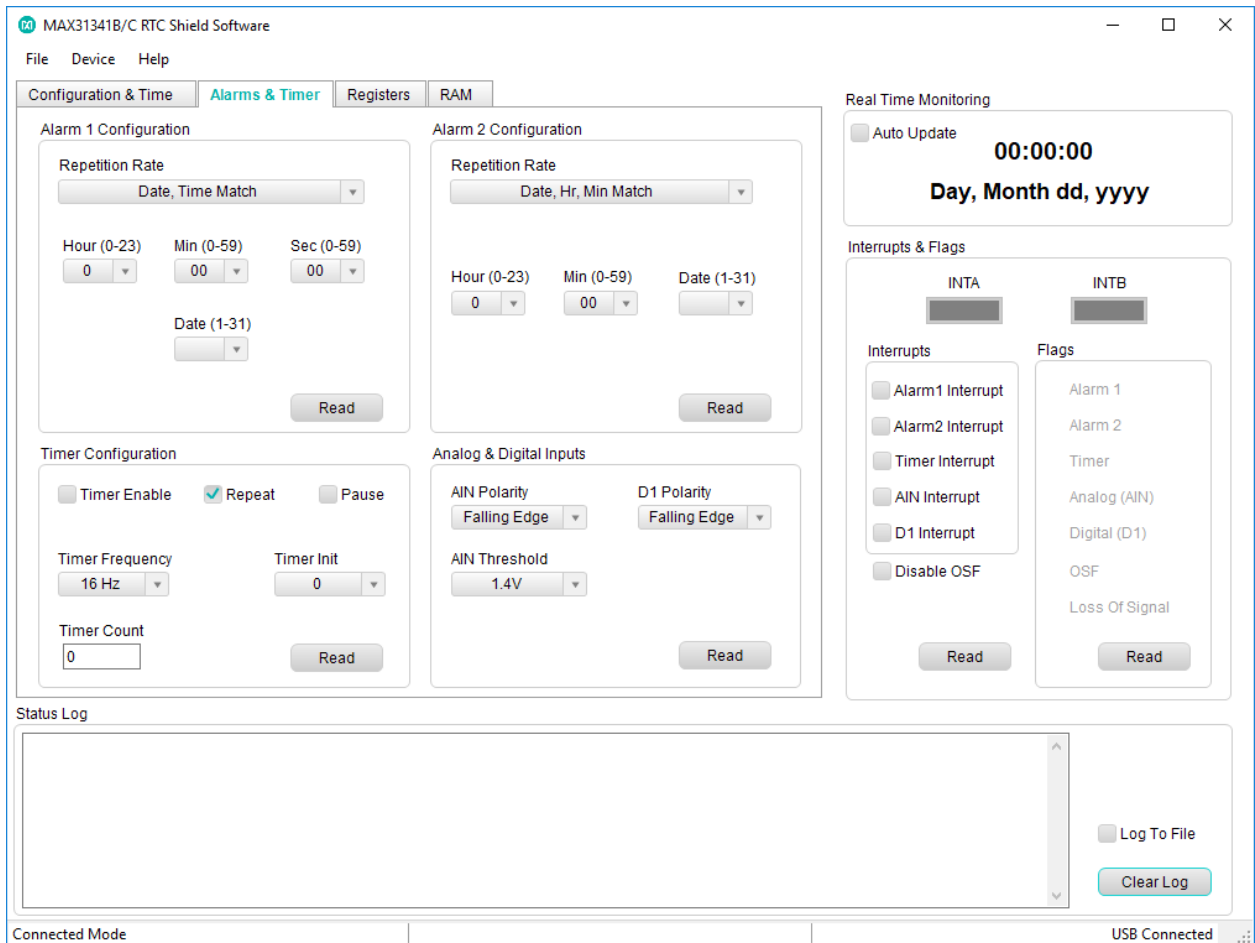


Figure 4. Alarms & Timer tab.

3. Timer Configuration

Timer Enable: This checkbox is used to start/stop the timer. The timer starts counting down when checked. The timer is reset when unchecked.

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

Repeat: The timer reloads its last unit value when checked and starts counting when it reaches zero. The timer stops after counting to zero when unchecked.

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

Timer Init: This combo box is 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 timer count and updates on clicking the Read button.

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

4. Analog & Digital Inputs

AIN Polarity: This combo box is used to choose a falling or rising edge polarity for the analog input (AIN) interrupt.

AIN Threshold: This combo box is used to choose the threshold for the AIN interrupt comparator.

D1 Polarity: This combo box is used to choose a falling or rising edge polarity for the digital input (D1) interrupt.

Read: This button is used to read the current values of all the AIN/D1 configurations.

Registers Tab

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

Select the corresponding checkboxes and click **Read** to read registers.

Enter the desired 8-bit value in the hexadecimal format (e.g., 0xAB) in the corresponding **Value** field, select the corresponding checkboxes, and click **Write** to write to the registers.

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

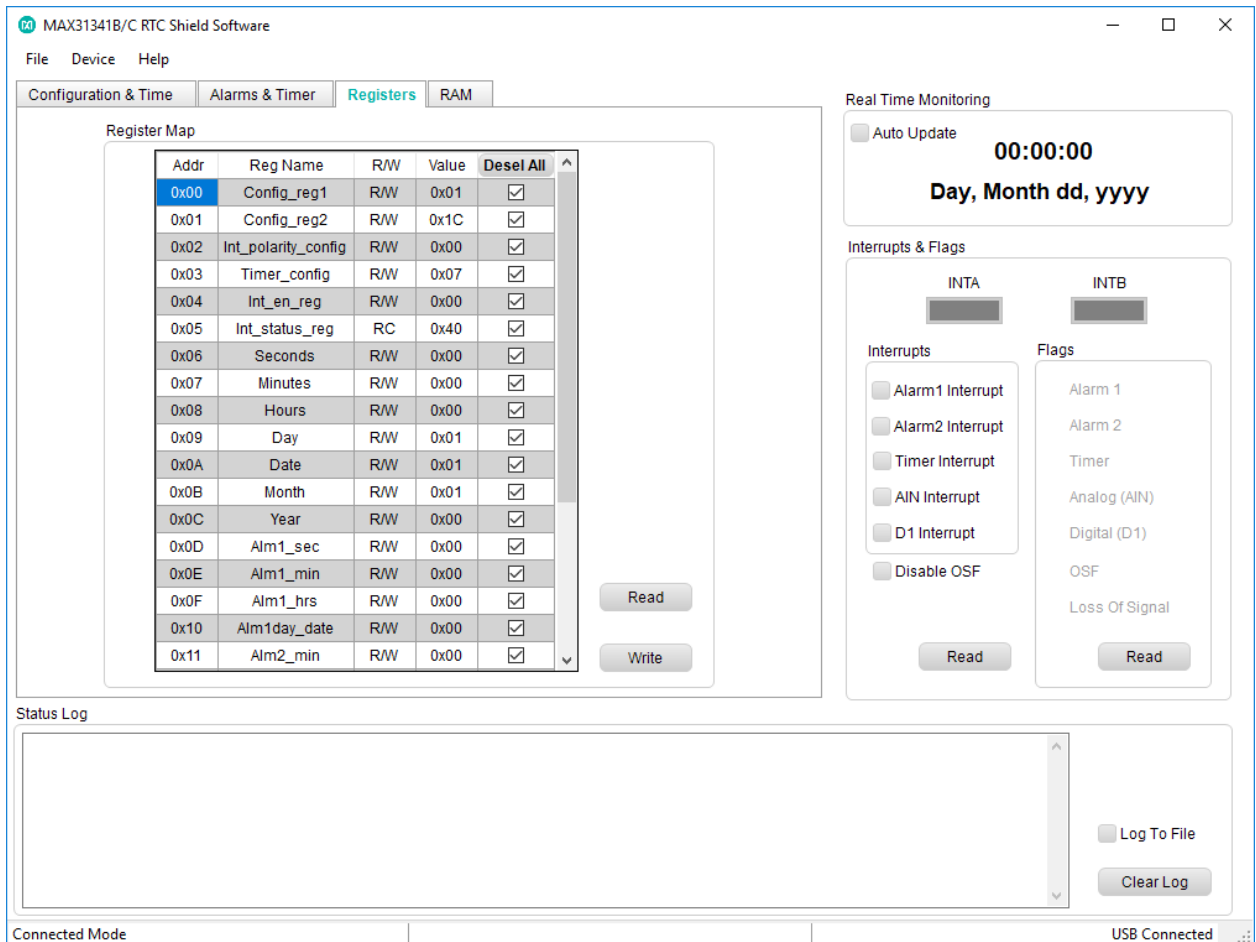


Figure 5. Registers tab.

RAM Tab

The **RAM** tab provides access to all the 64 bytes of the RAM registers (Figure 6).

Select the corresponding checkboxes and click **Read** to read the RAM registers.

Enter the desired 8-bit value in the hexadecimal format (e.g. 0xAB) in the corresponding **Value** field, select the corresponding checkboxes, and click **Write** to write to the RAM registers.

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

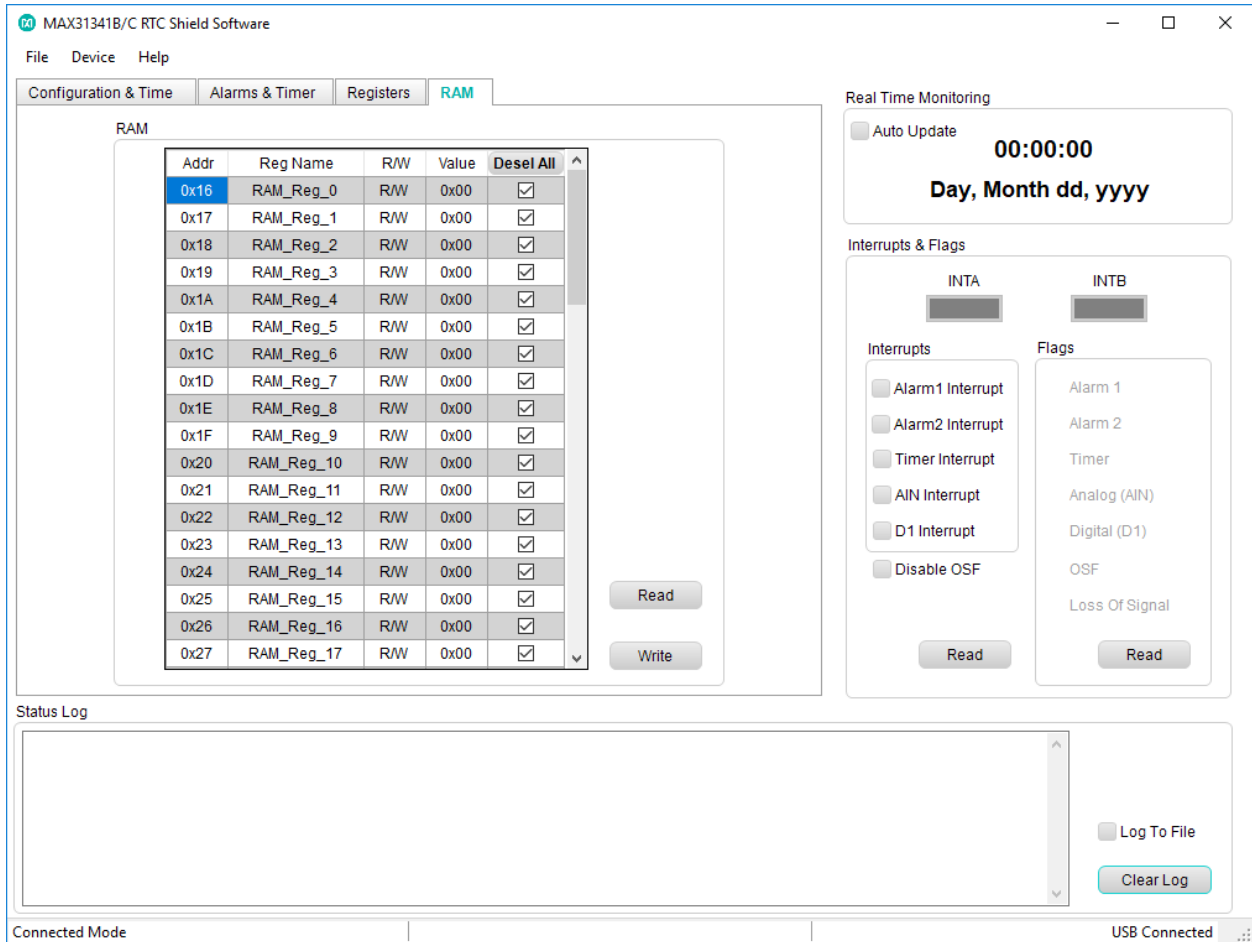


Figure 6. RAM Registers tab.