

420-N23-LA Introduction to IOT

Sensor/Actuator Reference Sheet

Real time clock memory module– DS3231

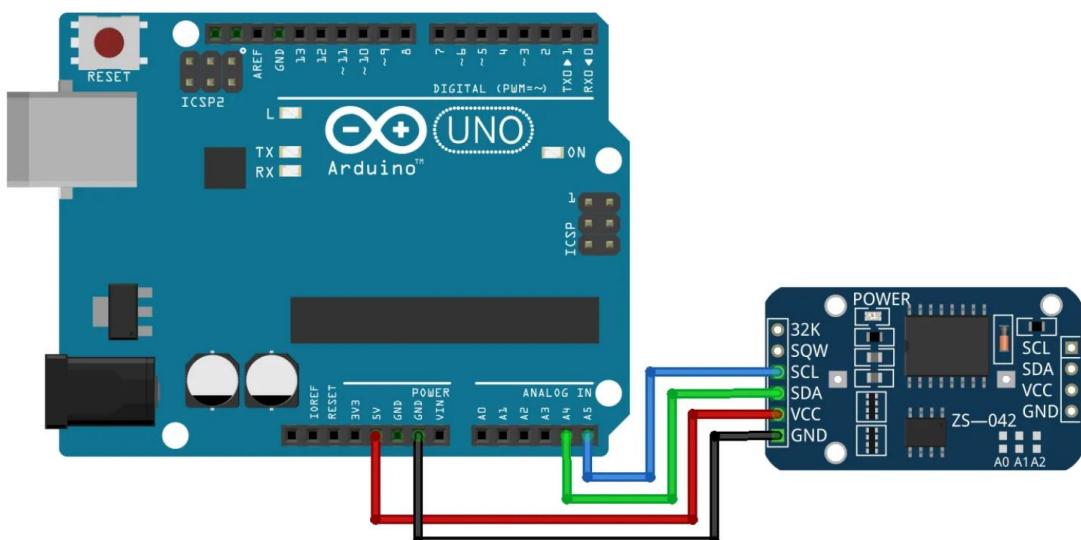
- TYPE: DIGITAL SENSOR
- This is a slow sensor, please wait at least 20ms before asking it for the time again.
- In case you use Arduino Mega, the pins change:
 - Uno: SDA (A4); SCL(A5)
 - MEGA: SDA (20); SCL(21)



DS3231 Connections

Connect:

- SCL to A5 (must be A5)
- SDA to A4 (must be A4)
- VCC to 5V, GND to GND



fritzing

- Counts Hours, Minutes and Seconds

- Day of the Week, Day, Month and Year

- Automatic compensation for leap-years
and for months with fewer than 31 days

- Operating voltage from 3.3 to 5V

- 3V Battery

- I2C Communication Protocol

Download and Install the Software

- Download the ZIP file for DS3231 from:

<http://www.rinkydinkelectronics.com/library.php?id=73>

- UNZIP this – put it in your “libraries” folder which is inside your sketch folder.

The screenshot shows a website for Rinky-Dink Electronics. At the top, there's a navigation bar with links: HOME, PROJECTS, LIBRARIES (which is the active tab), RESOURCES, LINKS, and CONTACT. Below the navigation is a banner with the text "Rinky-Dink Electronics". On the left, there's a sidebar titled "Select category:" with a dropdown menu for "Arduino" containing items like DS1302, DS1307, DS3231, DS3234, KeyPad, LCD5110_Basic, LCD5110_Graph, LCD5110_SPIflash, LEDmatrix7219, MCP4725, MGLCD, OLED_I2C, OLED_SPIflash, OLED_StatusIcons, relay8, SPIflash, SPIflash_Audio, tinyFAT, UTFT, UTFT.Buttons, UTFT_Geometry, UTFT_SPIflash, UTFT_tinyFAT, and Wiichuck. There are also sections for chipKit, ESP8266/32, and TI LaunchPad. A "Donate" button is located at the bottom of this sidebar. In the main content area, the title "Library: DS3231" is displayed. A text block states: "This library has been made to easily interface and use the DS3231 RTC with an Arduino or chipKit. The library will also work with the DS3232 RTC chip but you will not be able to use the internal SRAM." Below this are three images: a physical DS3231 chip, its package outline diagram, and a circuit diagram. A detailed description of the DS3231 follows: "The DS3231 is a low-cost, extremely accurate I²C realtime clock (RTC) with an integrated temperature-compensated crystal oscillator (TCXO) and crystal. The device incorporates a battery input, and maintains accurate timekeeping when main power to the device is interrupted. The integration of the crystal resonator enhances the long-term accuracy of the device as well as reduces the piece-part count in a manufacturing line. The DS3231 is available in commercial and industrial temperature ranges, and is offered in a 16-pin, 300-mil SO package." Another text block explains the RTC's functionality: "The RTC maintains seconds, minutes, hours, day, date, month, and year information. The date at the end of the month is automatically adjusted for months with fewer than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format with an AM/PM indicator. Two programmable time-of-day alarms and a programmable square-wave output are provided. Address and data are transferred serially through an I²C bidirectional bus." A third text block discusses the voltage reference and comparator circuit: "A precision temperature-compensated voltage reference and comparator circuit monitors the status of VCC to detect power failures, to provide a reset output, and to automatically switch to the backup supply when necessary. Additionally, the RST pin is monitored as a pushbutton input for generating a µP reset." A note at the bottom of the page says: "Please note that this library only makes use of the 24-hour format, and that alarms are not implemented." A yellow box labeled "IMPORTANT:" contains a note about pin-sharing: "The library has not been tested in combination with the Wire library and I have no idea if they can share pins. **Do not send me any questions about this.** If you experience problems with pin-sharing you can move the DS3231/DS3232 SDA and SCL pins to any available pins on your development board. This library will in this case fall back to a software-based, TWI-/I²C-like protocol which will require exclusive".

DS3231-Code

Class level code

```
DS3231 rtc(SDA, SCL);
```

Setup method code

```
rtc.begin();
```

```
// The following lines can be uncommented to set the date and time
```

```
// Set the date and time only the first time, then comment the lines again.
```

```
//rtc.setDOW(WEDNESDAY); // Set Day-of-Week to SUNDAY
```

```
//rtc.setTime(12, 0, 0); // Set the time to 12:00:00 (24hr format)
```

```
//rtc.setDate(1, 1, 2014); // Set the date to January 1st, 2014
```

DS3231 Methods

SD Class Methods

- ❑ rtc.getDOWStr()
- ❑ rtc.getDateStr()
- ❑ rtc.getTimeStr()

Gets the day of week, the date or the time as a string.

Usage:

String t = rtc.getTimeStr()

Manual

- See the manual for LOTS of good information on the available methods:

<http://www.rinkydinkelectronics.com/resource/DS3231/DS3231.pdf>