SEED TECHNOLOGY INC (SEEEDUINO)
Grove - RTC
Model: SEN12671P

Introduction

The RTC module is a member of Grove. It is based on the clock chip DS1307 which supports the I2C protocol. It uses a Lithium cell battery (CR1225). The clock/calendar provides seconds, minutes, hours, day, date,month, and year information. The end of the month date 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 AM/PM indicator.

Note: Battery is not included.

Features

- Real-Time Clock (RTC) Counts Seconds,Minutes, Hours, Date of the Month, Month,Day of the week, and Year with Leap-Year Compensation Valid Up to 2100
- 56-Byte, Battery-Backed, Nonvolatile (NV)RAM for Data Storage
- I2C Serial Interface
- 5V DC supply
- Programmable Square-Wave Output Signal
- Automatic Power-Fail Detect and Switch Circuitry
- Consumes Less than 500nA in Battery-Backup Mode with Oscillator Running

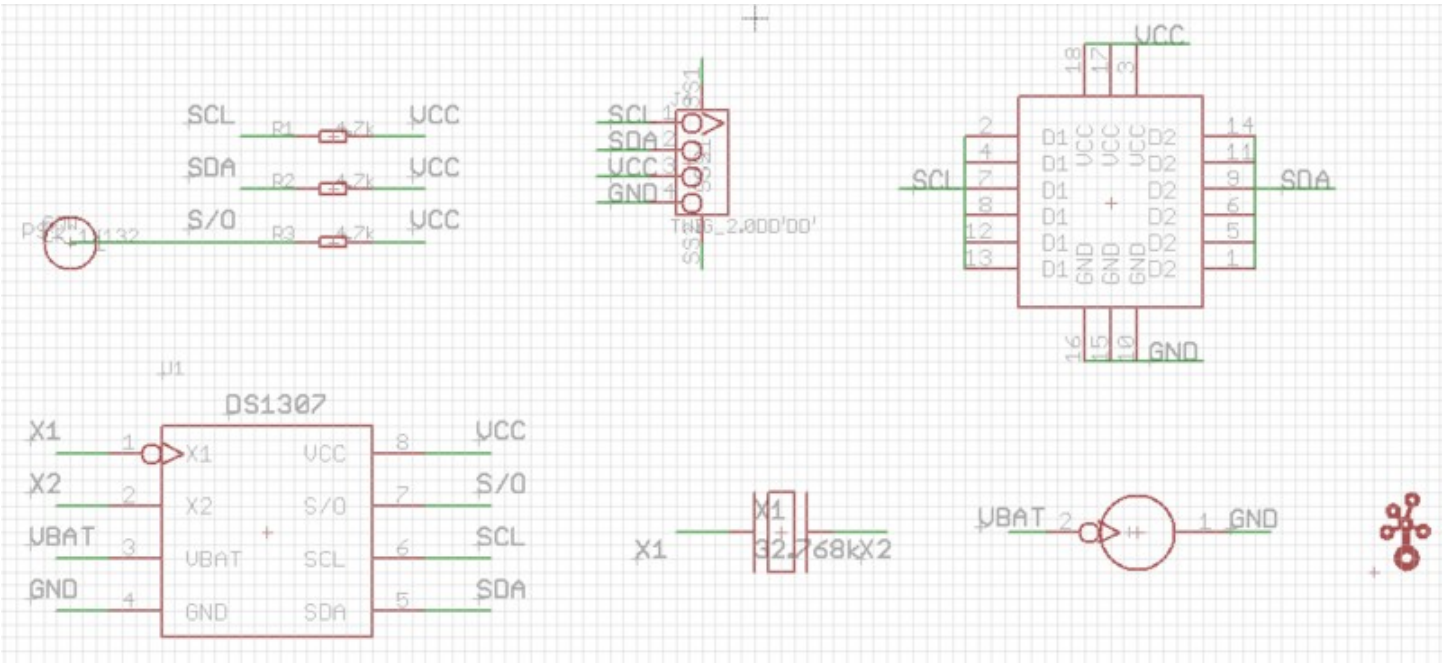
Application Ideas

- Calendar
- Intelligent instrument
- Industrial control

Cautions

In order to gain a robust performance, you must put a 3-Volt CR1225 lithium cell in the battery-holder. If you use the primary power only, the module may not work normally, because the crystal may not oscillate.

Schematic



Specification

May include key specification and other specifications.

Key Specification

Items	Min
PCB Size	2.0cm*4.0cm
Interface	2.0mm pitch pin header
IO Structure	SCL,SDA,VCC,GND
ROHS	YES

Electronic Characterstics

Items	Conditions	Min	Norm	Max	Unit
VCC		4.5	5.0	5.5	V
Logic 1 Input		2.2	-	VCC+0.3	V
Logic 0 Input		-0.3	-	+0.8	V
V_{BAT} (Battery Voltage)		2.0	3.0	3.5	V
V_{BAT} Current	(OSC ON);SQW/OUT OFF	-	300	500	nA
	(OSC ON);	-	480	800	nA

	SQW/OUT ON (32kHz)				
	Data-Retention Current (Oscillator Off)	-	10	100	nA

Here is only the main part of the parameters of DS1307, for more information please consult the DS1307 specification.

Pin definition and Rating

Mechanic Dimensions

Usage

Hardware Installation

Connect the module to the Grove Base board using the I²C interface. Provide a 5V DC power supply (4.5V – 5.5V allowed). Then you can gain the time and calendar information by reading the appropriate register bytes. After powered on, you should set the time by initiating the related registers. When bit 7 of Register 0 is cleared to 0, the oscillator is enabled and the time starts increasing.
Please refer the data sheet for complete information.

Programming

The following sketch demonstrates a simple application of setting the time and reading it out.
First, you should send the command “T” followed by the time you want to set through the Serial Monitor. Then you can see the current time through the Serial Monitor. The command format is as below.
/*T(00-59)(00-59)(00-23)(1-7)(01-31)(01-12)(00-99) */ which means */T(sec)(min)(hour)(dayOfWeek) (dayOfMonth)(month)(year) */ - T Sets the date of the RTC DS1307 Chip.
For example, to set the time for 02-DEC-10 @ 19:57:11 for the 3 day of the week, send this command - T1157193021210.
Demo code like :

```
#include "Wire.h"
#define DS1307_I2C_ADDRESS 0x68  // This is the I2C address
// Global Variables
int command = 0;       // This is the command char, in ascii form, sent from the serial
port
int i;
long previousMillis = 0;        // will store last time Temp was updated
byte second, minute, hour, dayOfWeek, dayOfMonth, month, year;
byte test;

// Convert normal decimal numbers to binary coded decimal
byte decToBcd(byte val)
{
  return ( (val/10*16) + (val%10) );
}

// Convert binary coded decimal to normal decimal numbers
byte bcdToDec(byte val)
{
  return ( (val/16*10) + (val%16) );
}

// 1) Sets the date and time on the ds1307
// 2) Starts the clock
// 3) Sets hour mode to 24 hour clock
// Assumes you're passing in valid numbers, Probably need to put in checks for valid
numbers.

void setDateDs1307()
```

```
{

   second = (byte) ((Serial.read() - 48) * 10 + (Serial.read() - 48)); // Use of (byte)
type casting and ascii math to achieve result.
   minute = (byte) ((Serial.read() - 48) *10 +  (Serial.read() - 48));
   hour  = (byte) ((Serial.read() - 48) *10 +  (Serial.read() - 48));
   dayOfWeek = (byte) (Serial.read() - 48);
   dayOfMonth = (byte) ((Serial.read() - 48) *10 +  (Serial.read() - 48));
   month = (byte) ((Serial.read() - 48) *10 +  (Serial.read() - 48));
   year= (byte) ((Serial.read() - 48) *10 +  (Serial.read() - 48));
   Wire.beginTransmission(DS1307_I2C_ADDRESS);
   Wire.send(0x00);
   Wire.send(decToBcd(second));    // 0 to bit 7 starts the clock
   Wire.send(decToBcd(minute));
   Wire.send(decToBcd(hour));      // If you want 12 hour am/pm you need to set
                                   // bit 6 (also need to change readDateDs1307)
   Wire.send(decToBcd(dayOfWeek));
   Wire.send(decToBcd(dayOfMonth));
   Wire.send(decToBcd(month));
   Wire.send(decToBcd(year));
   Wire.endTransmission();
}

// Gets the date and time from the ds1307 and prints result
void getDateDs1307()
{
  // Reset the register pointer
  Wire.beginTransmission(DS1307_I2C_ADDRESS);
  Wire.send(0x00);
  Wire.endTransmission();

  Wire.requestFrom(DS1307_I2C_ADDRESS, 7);

  // A few of these need masks because certain bits are control bits
  second     = bcdToDec(Wire.receive() & 0x7f);
  minute     = bcdToDec(Wire.receive());
  hour       = bcdToDec(Wire.receive() & 0x3f);  // Need to change this if 12 hour am/pm
  dayOfWeek  = bcdToDec(Wire.receive());
  dayOfMonth = bcdToDec(Wire.receive());
  month      = bcdToDec(Wire.receive());
  year       = bcdToDec(Wire.receive());

  Serial.print(hour, DEC);
  Serial.print(":");
  Serial.print(minute, DEC);
  Serial.print(":");
  Serial.print(second, DEC);
  Serial.print("  ");
  Serial.print(month, DEC);
  Serial.print("/");
  Serial.print(dayOfMonth, DEC);
  Serial.print("/");
  Serial.print(year, DEC);
  Serial.print("  ");
}
void setup() {
  Wire.begin();
  Serial.begin(57600);
}
void loop() {
  delay(2000);
  /*T(00-59)(00-59)(00-23)(1-7)(01-31)(01-12)(00-99) - T(sec)(min)(hour)(dayOfWeek)
(dayOfMonth)(month)(year) - T Sets the date of the RTC DS1307 Chip.
Example to set the time for 02-DEC-10 @ 19:57:11 for the 3 day of the week, send this
command - T1157193021210
  */
     if (Serial.available())
     {      // Look for char in serial que and process if found
      command = Serial.read();
      if (command == 84) {      //If command = "T" Set Date
```

```
        setDateDs1307();
        getDateDs1307();
        Serial.println(" ");
       }
       while(1)
       {
         getDateDs1307();
         delay(500);
       }
    }
  }
```

Bill of Materials (BOM) /parts list

Part	Value	Device	Package	Notes
J4	GROVE_2.0DD'DD'	GROVE_2.0DD'DD'	2.0_1X4DD	Chip 4 pin base
R2	4.7k	R0603	0603	
R2	4.7k	R0603	0603	
R3	4.7k	R0603	0603	
U3	CR1225	CR1225		CR1225 Chip battery holder
U1	DS1307	DS1307	SO08	DS1307 Chip
X1	32.768k	XTL_S	3*8mm	32.768K Crystal

FAQ

Please list your question here:

Support

If you have questions or other better design ideas, you can go to our forum or wish to discuss.

Version Tracker

Revision	Descriptions	Release
v0.9b	Initial public release	Jan 14, 2011

Bug Tracker

Bug Tracker is the place you can publish any bugs you think you might have found during use. Please write down what you have to say, your answers will help us improve our products.

Additional Idea

The Additional Idea is the place to write your project ideas about this product, or other usages you've found. Or you can write them on Projects page.

Resources

- File:Real Time Clock.zip
- File:DS1307.pdf

See Also

- GROVE - Starter Bundle
- 2-axis compass Module
- Grove - I2C 3-axis Accelerometer

- Grove - 3-axis Compass
- Grove - Water Sensor
- Grove - Light Sensor
- Grove - Touch Sensor
- Grove- Temperature and Humidity Sensor
- Grove - Magnetic Switch
- Grove - Alcohol Sensor
- Grove - OLED Display 128*64
- Grove - Serial LCD
- Grove - 3-axis Gyro
- Grove - Electricity Sensor
- Grove - Sound Sensor
- Grove - Base Shield

Licensing