关于 DS1307 模块的技术文档

一、模块描述

简介：

DS1307是一款低功耗,具有56字节非失性RAM的全BCD码时钟日历实时时钟芯片.地址和数据通过两线双向的串行总线传输.芯片可提供秒,分,小时,天数,日期,月份,年份等信息.每一个月的天数能自动调整,并具有闰年补偿功能. AM/PM标志位决定时钟工作于24小时或12小时模式.芯片有一个内置的电源感应电路，具有掉电检测和电池切换功能.

参数：

- 可对秒,分,小时,每月的天数,月份,每周的天数进行记数.并具有闰年补偿功能,纪年上限2100.
- 56字节非失性RAM
- 两线串行接口
- 可编程方波输出
- 自动掉电检测和切换电路
- 在电池备份模式下,功耗小于500nA
- 工业级的工作温度: -40℃到+80℃
- 8脚DIP和SOIC封装
- UL实验室认证

购买链接：

https://detail.tmall.com/item.htm?spm=a220m.1000858.1000725.46.e193068FR6yRo&id=41179618335&areaId=110100&user_id=2207691322&cat_id=2&is_b=1&rn=29c8269b5f0fc902ff899f9791fa1d3c

资料链接：http://pan.baidu.com/s/1c05rIvu

引脚说明：

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	X1	Connections for Standard 32.768kHz Quartz Crystal. The internal oscillator circuitry is designed for operation with a crystal having a specified load capacitance (C_L) of 12.5pF. X1 is the input to the oscillator and can optionally be connected to an external 32.768kHz oscillator. The output of the internal oscillator, X2, is floated if an external oscillator is connected to X1. **Note:** For more information on crystal selection and crystal layout considerations, refer to *Application Note 58: Crystal Considerations with Dallas Real-Time Clocks*.
2	X2	
3	V_{BAT}	Backup Supply Input for Any Standard 3V Lithium Cell or Other Energy Source. Battery voltage must be held between the minimum and maximum limits for proper operation. Diodes in series between the battery and the V_{BAT} pin may prevent proper operation. If a backup supply is not required, V_{BAT} must be grounded. The nominal power-fail trip point (V_{PF}) voltage at which access to the RTC and user RAM is denied is set by the internal circuitry as 1.25 x V_{BAT} nominal. A lithium battery with 48mAh or greater will back up the DS1307 for more than 10 years in the absence of power at +25°C. UL recognized to ensure against reverse charging current when used with a lithium battery. Go to: www.maxim-ic.com/qa/info/ul/.
4	GND	Ground
5	SDA	Serial Data Input/Output. SDA is the data input/output for the I^2C serial interface. The SDA pin is open drain and requires an external pullup resistor. The pullup voltage can be up to 5.5V regardless of the voltage on V_{CC}.
6	SCL	Serial Clock Input. SCL is the clock input for the I^2C interface and is used to synchronize data movement on the serial interface. The pullup voltage can be up to 5.5V regardless of the voltage on V_{CC}.
7	SQW/OUT	Square Wave/Output Driver. When enabled, the SQWE bit set to 1, the SQW/OUT pin outputs one of four square-wave frequencies (1Hz, 4kHz, 8kHz, 32kHz). The SQW/OUT pin is open drain and requires an external pullup resistor. SQW/OUT operates with either V_{CC} or V_{BAT} applied. The pullup voltage can be up to 5.5V regardless of the voltage on V_{CC}. If not used, this pin can be left floating.
8	V_{CC}	Primary Power Supply. When voltage is applied within normal limits, the device is fully accessible and data can be written and read. When a backup supply is connected to the device and V_{CC} is below V_{TP}, read and writes are inhibited. However, the timekeeping function continues unaffected by the lower input voltage.

寄存器：

Table 2. Timekeeper Registers

ADDRESS	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0	FUNCTION	RANGE
00h	CH	10 Seconds			Seconds				Seconds	00–59
01h	0	10 Minutes			Minutes				Minutes	00–59
02h	0	12 1	10 Hour	10 Hour	Hours				Hours	1–12 +AM/PM 00–23
		24 0	PM/ AM							
03h	0	0	0	0	0	DAY			Day	01–07
04h	0	0	10 Date		Date				Date	01–31
05h	0	0	0	10 Month	Month				Month	01–12
06h	10 Year				Year				Year	00–99
07h	OUT	0	0	SQWE	0	0	RS1	RS0	Control	—
08h–3Fh									RAM 56 x 8	00h–FFh

0 = Always reads back as 0.

时钟和日历：

通过读取相应的寄存器字节,可以获取时钟和日历信息.RTC寄存器如下图所示：时间和日历信息以BCD码形式存放.寄存器0的bit7为时钟停止位,当设为1时,振荡器停止工作.请注意在DS1307初次上电时,所有的寄存器的状态是不确定的,所以一定要把寄存器0的bit7在初始化时设为0.

芯片可以工作于24小时模式或12小时模式.这取决于小时寄存器的bit6为1还是0.置为1时,工作于12小时模式,这时小时寄存器的bit5为AM/PM标志.bit5为1,则为PM.

在24小时模式中，小时寄存器的bit5和bit4一起组成小时的十位.

CONTROL REGISTER

The DS1307 control register is used to control the operation of the SQW/OUT pin.

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
OUT	0	0	SQWE	0	0	RS1	RS0

- OUT (输出控制):当方波输出禁止时,此位决定SQW/OUT脚输出电平的高低,为1则输出高电平,为0则输出低电平.
- SQWE(方波输出使能):当此位为1时,允许输出方波.频率则由RS1和RS0位的值决定.
- RS(频率选择):控制输出方波的频率当SQWE为1时.下表列出了可供选择的频率:

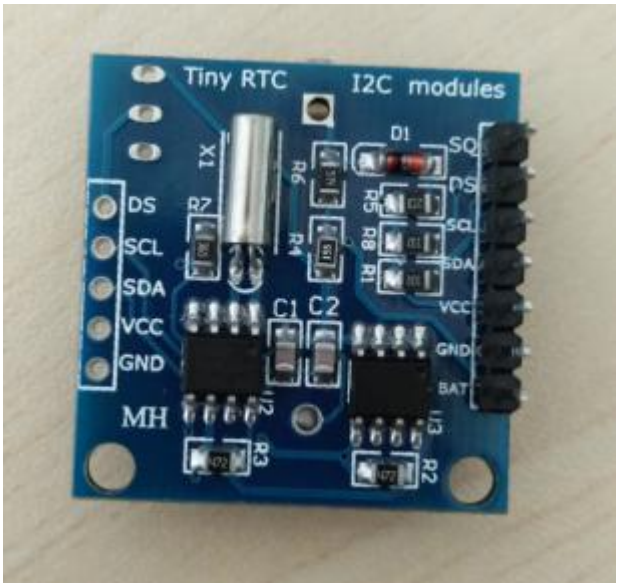
RS1	RS0	SQW OUTPUT FREQUENCY
0	0	1 Hz
0	1	4.096 kHz
1	0	8.192 kHz
1	1	32.768 kHz

接口定义：

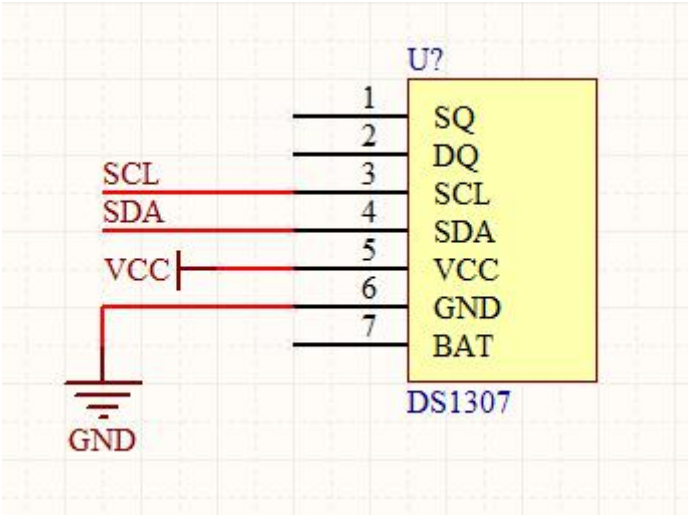
1. SQ -----方波输出　　DS -----温度传感器数据线（不接）
2. SCL ----- IIC 时钟线　　SDA ----- IIC 数据线
3. VCC ----- 电源正　　BAT ----- V 锂电池或其它电源供电输入

二、硬件调试

（1）硬件实物图展示如下图：



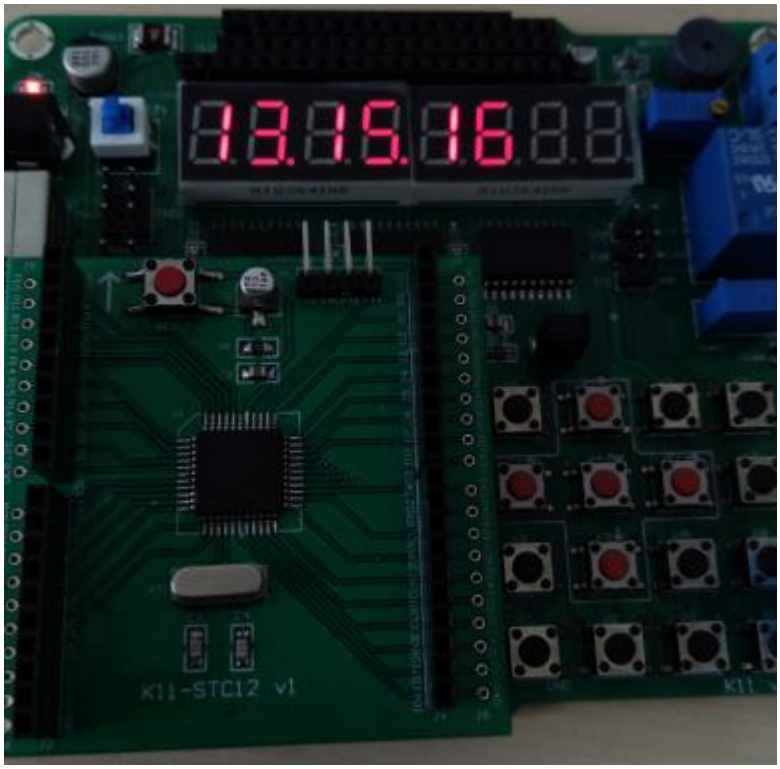
（2）模块原理图接口展示如图：



（3）单片机管脚链接表：详见收到的 AD 工程中的 Device For Clock 中的 DS1307 时钟模块原理图。

三、软件调试

本工程实现的功能是通过模拟 IIC 对模块的驱动控制。显示效果以图片的效果呈现，如下图所示：



本案例基于光轮电子公司 TreeOS 软件开发架构运行，具体软件工程还请关注光轮电子公司 TreeOS 驱动库文件。以下是工程架构截图和主要工程文件: