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| ET-MINI DS3232 |
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**Module ET-MINI DS3232** is Module Real Time Clock (RTC) that is used as Time Base in the format of clock, time, calendar, and thermometer. It is I$^2$C Interface that uses 3.3V-5V Power Supply.

## Specifications

- Run by 3.3V-5V Power Supply; has Battery Backup for timekeeping when user has removed Power Supply from Module.

- Be used as time that shows hours (24-Hour or 12-Hout), second, minute, day, date, month, year (validate up to 2099).

- Two programmable time-of-day alarms and 4 of programmable Square-Wave Output through Pin SQW

- Has Digital Temp Sensor to measure temperature; the accuracy rate is ±3 °C and it always updates the temperature every 64 seconds.

- Has 236Byte Internal RAM by using Battery for Backup

- Use I2C Interface; it can receive the maximum frequency of 100KHz in Normal Mode, and 400KHz in fast Mode.

- Has ID Slave Address; it is 1101000X; when X is state of Read (1) or Write(0).

## How to use

1. Interface Power Supply VCC and GND with Module.

2. Interface Signal SCL, SDA, and GND with MCU. If user requires using Alarm Mode, it has to interface Pin SQW/INT to check Signal INT when it reaches the setting time. Other pins that are not used are floating.

3. Set jumper SCL, SDA to the position of "ENA" if external circuit of Module is not interfaced with R-Pull Up; on the other hand, if external circuit of Module is interfaced with R-Pull Up, it has to set Jumper SCL, SDA to the position of "DIS". For Jumper INT#; if it is used in Alarm Mode and user requires using Pin SQW/INT, it has to set Jumper to the position of "ENA" to interface R-Pull Up with this pin.

4. Insert Battery Backup for timekeeping when user has removed Power Supply from Module.
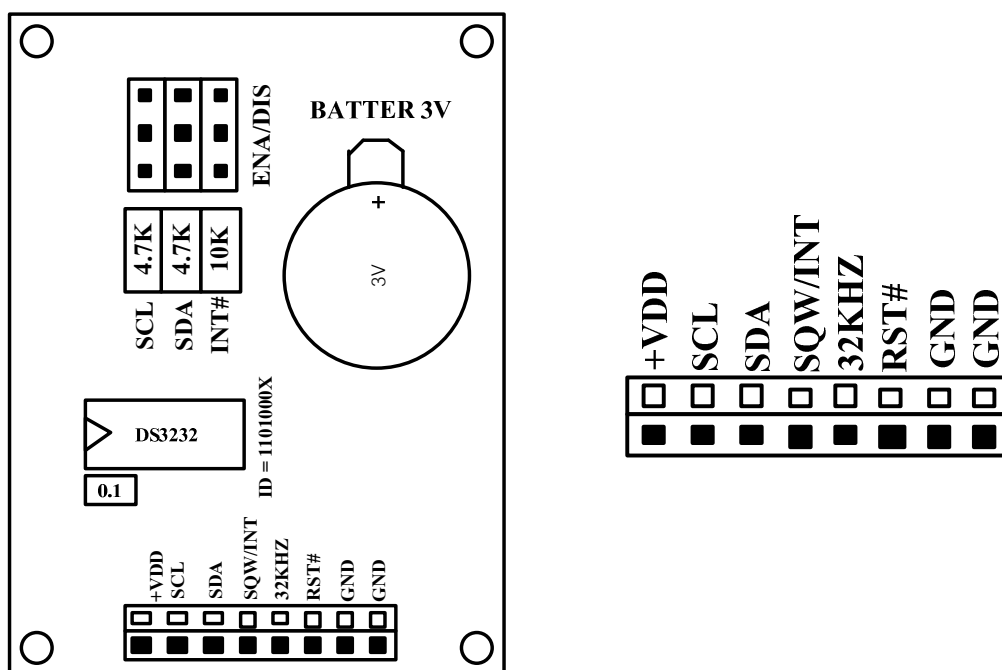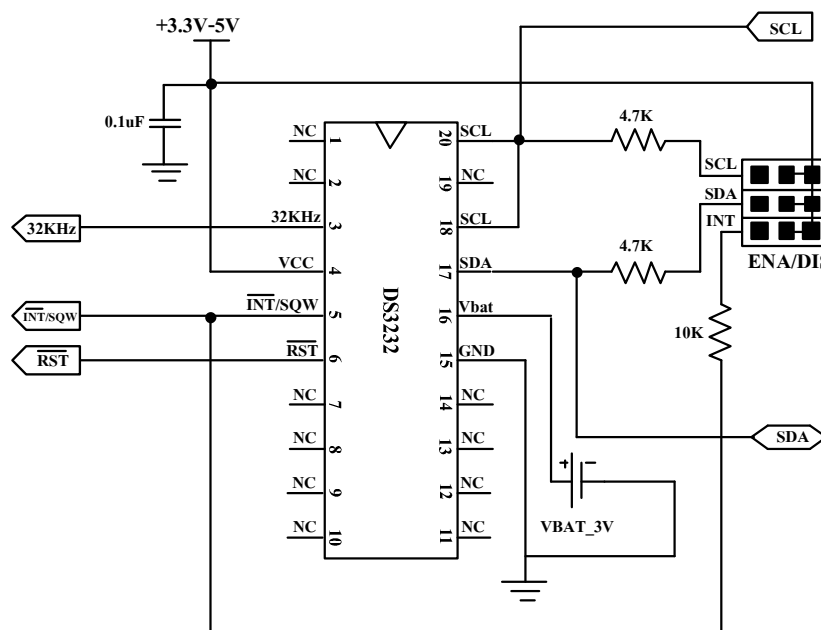
5. Write program to control the operation.



**Figure shows structure of ET-MINI DS3232 and position of Pin Port.**

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**Table shows internal Address positions of DS3232 for Read/Write**

| ADDRESS | BIT 7 MSB | BIT 6 | BIT 5 | BIT 4 | BIT 3 | BIT 2 | BIT 1 | BIT 0 LSB | FUNCTION | RANGE |
|---------|-----------|-------|-------|-------|-------|-------|-------|-----------|----------|-------|
| 00h | 0 | 10 Seconds | | | Seconds | | | | Seconds | 00–59 |
| 01h | 0 | 10 Minutes | | | Minutes | | | | Minutes | 00–59 |
| 02h | 0 | 12/$\overline{24}$ | $\overline{AM}$/PM / 10 Hour | 10 Hour | Hour | | | | Hours | 1–12 + $\overline{AM}$/PM / 00–23 |
| 03h | 0 | 0 | 0 | 0 | 0 | Day | | | Day | 1–7 |
| 04h | 0 | 0 | 10 Date | | Date | | | | Date | 1–31 |
| 05h | Century | 0 | 0 | 10 Month | Month | | | | Month/ Century | 01–12 + Century |
| 06h | 10 Year | | | | Year | | | | Year | 00–99 |
| 07h | A1M1 | 10 Seconds | | | Seconds | | | | Alarm 1 Seconds | 00–59 |
| 08h | A1M2 | 10 Minutes | | | Minutes | | | | Alarm 1 Minutes | 00–59 |
| 09h | A1M3 | 12/$\overline{24}$ | $\overline{AM}$/PM / 10 Hour | 10 Hour | Hour | | | | Alarm 1 Hours | 1–12 + $\overline{AM}$/PM / 00–23 |
| 0Ah | A1M4 | DY/$\overline{DT}$ | 10 Date | | Day | | | | Alarm 1 Day | 1–7 |
| | | | | | Date | | | | Alarm 1 Date | 1–31 |
| 0Bh | A2M2 | 10 Minutes | | | Minutes | | | | Alarm 2 Minutes | 00–59 |
| 0Ch | A2M3 | 12/$\overline{24}$ | $\overline{AM}$/PM / 10 Hour | 10 Hour | Hour | | | | Alarm 2 Hours | 1–12 + $\overline{AM}$/PM / 00–23 |
| 0Dh | A2M4 | DY/$\overline{DT}$ | 10 Date | | Day | | | | Alarm 2 Day | 1–7 |
| | | | | | Date | | | | Alarm 2 Date | 1–31 |
| 0Eh | $\overline{EOSC}$ | BBSQW | CONV | RS2 | RS1 | INTCN | A2IE | A1IE | Control | — |
| 0Fh | OSF | BB32kHz | CRATE1 | CRATE0 | EN32kHz | BSY | A2F | A1F | Control/Status | — |
| 10h | SIGN | DATA | DATA | DATA | DATA | DATA | DATA | DATA | Aging Offset | — |
| 11h | SIGN | DATA | DATA | DATA | DATA | DATA | DATA | DATA | MSB of Temp | — |
| 12h | DATA | DATA | 0 | 0 | 0 | 0 | 0 | 0 | LSB of Temp | — |
| 13h | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Not used | Reserved for test |
| 14h–0FFh | x | x | x | x | x | x | x | x | SRAM | 00h–0FFh |

*See more details of Register in each bit in each Address from datasheet of DS3232 and user can download them from Internet*



**Picture shows Circuit ET-MINI DS3232.**