



## 32-bit microcontroller

### RTC module of **HC32L110 series**

#### Suitable

series	Product number
<b>HC32L110</b>	HC32L110C6UA
	HC32L110C6PA
	HC32L110C4UA
	HC32L110C4PA
	HC32L110B6PA
	HC32L110B4PA

Huada MCU exchange group: 164973950

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## 1 Summary

This application note mainly introduces the RTC module of the HC32L110 series.

This application note mainly includes:

• RTC Calendar

• RTC cycle timing function

• RTC alarm clock

• RTC calibration function

Notice:

- This application note is a supplementary material for the application of the HC32L110 series and cannot replace the user manual, specific functions and registers

Please refer to the user manual for related matters such as operation.

## 2 Function introduction

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The HC32L110 series RTC module is an independent BCD timer/counter. RTC can realize calendar, alarm clock, cycle

Timing, calibration and other functions.

## 3 RTC Calendar

### 3.1 Clock Source

• Off-chip low-speed crystal oscillator

• On-chip low-speed oscillator (32.768KHz)

• Off-chip high-speed crystal oscillator

### 3.2 Calendar function

• Year, month, week, day, hour, minute, second (BCD format)

• Automatic adjustment of days in month and leap year

• Time system 12/24h can be set

### 3.3 Initialize and read and write the calendar

The RTC module is reset only once when powered on, and the module cannot be reset by various external resets.

• Initialize

Stop counting, set time system, period and other configurations, start counting start=1

• Read calendar

Method 1: CR1.WAIT=1, read calendar data while waiting for CR1.WAITF=1, then CR1.WAIT=0, wait

When CR1.WAITF=0, the reading is completed;

Method 2: Directly read the calendar register, read the second register, read the second register again, if the two are the same, the reading is completed

operate;

Method 3: Read the calendar register during periodic interrupt.

• Write a calendar

When the RTC does not start counting, the calendar register can be written directly.

After start start, CR1.WAIT=1, write calendar data when waiting for CR1.WAITF=1, then CR1.WAIT=0,

(Complete within 1s) Wait for CR1.WAITF=0, restart counting.

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## 4-cycle timing function

The HC32L110 has two periodic types of periodic interrupts:

• PRDSEL = 1, the step is 0.5s periodic interrupt, PRDX is used to configure the periodic interval;

• PRDSEL = 0, PRDS configuration period interval is 0.5s, 1s, 1min, 1h, 1d, 1month or 0, no period is generated interrupt.

## 5 Alarm clock

HC32L110 series MCU provides week, hour and minute alarm clock registers, which will be generated when the calendar time is equal to the three at the same time.

The alarm clock is interrupted.

Notice:

- In the description of the weekly alarm clock register, b0:b6 correspond to Sunday and Saturday respectively, and the corresponding position is 1, which represents the alarm clock on this day of the week efficient.

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## 6 Calibration function

### 6.1 Low speed compensation

The external crystal oscillator clock source is 32.768kHz, and the average compensation accuracy per  $\frac{1}{\text{second is 32768}}$  \*106=30.5ppm, can not meet the high precision requirements,

Therefore, it is necessary to adjust the algorithm to expand the maximum compensation period by 32 times, so that the average compensation unit per second becomes

30.5/32=0.96ppm, but every 1hz accuracy is inaccurate. Because the expansion is 32 times, the compensation register introduces 5 bits

decimal.

$$\text{Compensation target value} = \frac{\text{actual frequency} - \text{target frequency}}{\text{target frequency}} * 106$$

$$\text{Compensation Register CR}[8:0] = \left( \frac{\text{Compensation target value [PPM]} * 215}{106} \right) \text{ Take 2's complement +0001.00000B}$$

This compensation method cannot meet the requirement of precision per second.

### 6.2 High-speed compensation

Based on high-speed Pclk clock compensation (4M~32M), the compensation precision can be dispersed to every second. Guaranteed 0.96ppm per second

compensation unit.

Regarding high-speed compensation, the relevant register configuration should be noted:

• The SYSCRTL1.RTC\_FREQ\_ADJUST bit should be selected according to the actual pclk clock.

• RTC\_CR0.1HZSEL=1, high precision 1hz output, RTC\_CR0.1HZOE enables 1hz output.

## 7 Reference samples and drivers

Through the above introduction and in conjunction with the user manual of HC32L110 series, we have discussed the functions and functions of the RTC module of the above series of MCUs.

The operation method has been further mastered.

Huada Semiconductor (HDC) officially provides the application sample and driver library of this module at the same time. Users can open the sample by opening the

The project is further intuitively familiar with the application of the module and the driver library, and can also directly refer to the sample and use in the actual development

Driver library to quickly implement the operation of this module.

• Example reference: ~/HC32L110\_DDL/example/rtc

• Driver library reference: ~/HC32L110\_DDL/driver/.../rtc

## 8 Summary

The above chapters briefly introduced the RTC module of the HC32L110 series, and explained the functions and operation steps of this module in detail.

step. In the actual application development process, if the user needs to have a deeper understanding of the usage and operation of this module,

The corresponding user manual shall prevail. The samples and driver libraries mentioned in this chapter can be used as user's further experiments and learning.

It can also be directly applied in actual development.

## 9 Additional information

Technical support information: [www.hdsc.com.cn](http://www.hdsc.com.cn)

## 10 Version Information & Contact

date	Version revision record
2018/5/31	Rev1.0 initial release



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If you have any comments or suggestions in the process of purchasing and using, please feel free to contact us.

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