



## 32 -bit microcontroller

### Working mode of **HC32L110** series

Applicable object

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

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## 1 Summary

This application note mainly introduces the working mode of the HC32L110 series, focusing on the working state of the deep sleep mode module.

This application note mainly includes:

- Introduction of working mode

- Introduction of working mode switching

- Introduction of RTC/WDT/LPTIMER/LPUART module in deep sleep mode

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

The HC32L110 series has three working modes, and users can switch the corresponding modes according to product needs and power consumption requirements.

Modules such as RTC/WDT/LPTIMER/LPUART can work normally in high-degree sleep mode.

## 3 working modes

### 3.1 Introduction to working mode

The HC32L110 series has three working modes:

- Running mode: CPU running, peripheral function modules running
- Sleep mode: CPU is disabled, peripheral function modules are running
- Deep sleep mode: CPU is disabled, high-speed clock is stopped, and each module can work

Working module in deep sleep mode:

- GPIO port
- LPUART module
- Lptimer module
- WDT module
- RTC module
- VC module
- LVD module

## 3.2 Introduction to Working Mode Switching

### 3.2.1 System Control Register

位	标记	功能描述	读写
31:5	RESERVED	保留	
4	SEVONPEND	设置为1时，每次新的中断挂起都会产生一个事件，如果使用了WFE休眠，它可用于唤醒处理器	RW
3	RESERVED	保留	
2	SLEEPDEEP	设为1时，执行 WFI 进入深度休眠，本产品进入 Deep sleep 模式 设置为0时，执行 WFI 进入休眠，本产品进入 sleep/Idle 模式	RW
1	SLEEPONEXIT	设为1时，当退出异常处理并返回程序线程时，处理器自动进入休眠模式(WFI) 设置为0时，该特性就会被自动禁止	RW
0	RESERVED	保留	

Bit1: When SLEEPONEXIT=1, after the system wakes up from the low power mode, it will enter the low power immediately after executing the interrupt service function.

Power mode; otherwise, after waking up, you need to manually operate the \_\_WFI() command to enter the low power mode again.

Bit2: When SLEEPDEEP=1, the program enters deep sleep mode after executing the \_\_WFI() instruction, otherwise it enters sleep mode.

### 3.2.2 Mode switch

According to the introduction in chapter 3.2.1, the user can set the relevant bits of the system control register to enter the corresponding working mode.

sleep mode

```
SLEEPDEEP=0;
```

```
__WFI();
```

No more sleep/deep sleep mode after waking up

```
SELPONEXIT=0;
```

Enter sleep/deep sleep mode after executing interrupt service after wake-up

```
SELPONEXIT=1;
```

deep sleep mode

```
SLEEPDEEP=1;
```

```
__WFI();
```

No more sleep/deep sleep mode after waking up

SELLPONEXIT=0;

Enter sleep/deep sleep mode after executing interrupt service after wake-up

SELLPONEXIT=1;

### 3.2.3 Wake-up from sleep mode

Sleep mode wake-up source:

The system can be woken up from sleep mode by any of the peripheral interrupts responded by the high-priority nested vector terminal controller.

Deep sleep mode wake-up source:

Any peripheral interrupts (peripheral module interrupts that can be run under DeepSleep) are responded to by the nested vectored interrupt controller.

Can wake up the system.

- When performing power consumption test in deep sleep mode, the port in the application needs to be configured to the correct level.

## 4 Deep sleep mode RTC/WDT/LPTIMER/LPUART module introduction

### 4.1 Deep Sleep Mode RTC Module

In deep sleep mode, the high-speed clock stops running, and the RTC module selects the internal low-speed LRC or the external low-speed LXT as the count clock source. After configuring the corresponding registers, the RTC module runs normally, and the count, period, alarm interrupt and 1hz are all normal. Work. It can meet the requirement that the RTC can still count normally in low power mode. Interrupts can wake up from deep sleep mode.

Refer to the "RC32L110 Series RTC Module" application note for details.

### 4.2 Deep Sleep Mode WDT Module

The WDT module counts with the internal 10K clock and can operate normally in deep sleep mode. When the WDT timer interrupt is configured, Can wake up from deep sleep mode. The reset function of the WDT module can reset the module itself, so when users use this module, When the WDT is reset, the WDT module needs to be restarted.

### 4.3 Deep Sleep Mode LPTIMER Module

Refer to the "LPTIMER for HC32L110 Family" application note for details.

### 4.4 Deep Sleep Mode LPUART Module

For details, refer to the "HC32L110\_HC32F003\_HC32F005 Series UART and LPUART Modules" application note.

## 5 Reference samples and drivers

Through the above introduction and in conjunction with the user manual of the HC32L110 series, we describe the low-power module functions of the above series of MCUs.

and operation methods have 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/lowpower

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

~/HC32L110\_DDL/driver/.../lptimer

~/HC32L110\_DDL/driver/.../wdt

~/HC32L110\_DDL/driver/.../rtc

## 6 Summary

The above chapters briefly introduced the working modes of the HC32L110 series, and explained each working mode and switching method in detail. use

In the actual application development process, if the user needs to have a deeper understanding of the use method and operation matters of this module, they should

The appropriate user manual shall prevail. The samples and driver libraries mentioned in this chapter can be used as further experiments and learning by users, or

It can be directly applied in actual development.

## 7 Other information

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



## 8 Version Information & Contact

date	Version revision record
2018/6/1	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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