

# MM32F013x

## RCC

### What are the precautions for using the external clock?

2、使用外置晶振，如需在全温-40 ~ 85℃，全压 2.0 ~ 5.5V 下使用外部晶振作为 HSE 时钟，需要根据外部匹配的晶振内置电阻，设置内部 Rf 电阻和驱动电流，以作全温全压匹配；

3、使用外置晶振，需要确保 HSE ready 有足够长时间，不同的外部晶振内阻不一样，需要做相关的调配。

1. The input range of external crystal: 2-24MHz
2. For using the external crystal, the internal Rf resistance and drive current should be set according to the internal resistance of the crystal that is matched externally in order to match the full temperature and voltage, if the external crystal is used as the HSE clock at -40 ~ 85°C (full temperature) and 2.0 ~ 5.5V (full voltage).
3. For using the external crystal, the time of HSE ready should be sufficient and relevant adjustment should be made since the internal resistances vary with different external crystals.

### What are the precautions for using the internal clock?

It supports the calibration to  $\pm 3\%$  over full temperature and voltage and the effective communication among ports. External crystal is still recommended to be used in CAN, USB, etc., which are demanding in the clock accuracy.

### How to check the reset status of RCC->CSR register after chip reset?

This register can give normal feedback on the reset status of the chip.

## **Does the chip support the automatic switch between HSI and HSE?**

When an anomaly is shown in the external crystal such as short circuit, or one of the PINs of OSC-IN and OSC OUT is connected to stable level, it will cause the crystal to stop oscillating. In that case, the software needs to enable the CSS and switch to the built-in HIS in the NMI interrupt.

## **What is the maximum frequency that the chip can run?**

96MHz. At that time, there is a need to set 3 latencies. PLL clock output is SYSCLK and HIS, HSE as well as HSE/2 are available to PLL.

## **GPIO**

### **What are the precautions for using GPIO?**

1. After power-on, MCU's GPIOs are all in the high impedance state, except PA13/14 (internally weak pull-up)
2. All GPIOs are TC ports and the external voltage of GPIO cannot be greater than the voltage supplied by MCU.

## **ADC**

### **What are the precautions for using ADC?**

1. If high accuracy ADC is required, VDDA and VSSA are recommended to offer independent and reliable power supply voltage and the voltage difference between VDDA and VDD should not be greater than 100mv.
2. Attention should be paid to input impedance match. If 1Mbps is used as the sampling rate, it only supports 50ohm input impedance.
3. For multiplex sampling and channel switching, an accurate sampling value is required and the sampling hold time of each channel should be enlarged, such as 7.5 cycles.

## **Does MM32 support TIM to trigger ADC conversion and the converted value be output to memory via DMA?**

It supports TIM to trigger ADC conversion and then ADC conversion sends DMA request in which DMA response is triggered to convey data. The DMA request channel of ADC can be mapped to DMA CH1 and CH2, which is configured via SYSCFG\_CFCG.

## **CAN**

### **What are the precautions for using CAN?**

1. It supports 20 sets of filters and accepts that “1” and “0” are regarded as “irrelevant” and “relevant” respectively in the mask registers.
2. When using CAN module, the external crystal must be used as the clock source.

## **CRC**

### **What are the precautions for using MM32 CRC?**

1. When using CRC for single computing, two NOP operation instructions need to be added.
2. Relevant clocks need to be turned on when using. It only supports 32bit computing and is not allowed to be embedded into modules like UART, SPI and I2C.
3. Software CRC is recommended for 16bit and 32bit mixed operations.

## **DMA**

### **Does it support device to device?**

It does not support device-to-device P2P and only supports M2M, P2M and M2P modes.

## **EXTI**

### **What are the precautions for using MM32 EXTI?**

It supports external wake-up of STOP. For example, EXTI0 can be mapped to PA0, PB0 and PC0, which use the same interrupt line. If they are all configured to enable, only the last configured one is valid.

## **IWDG**

### **What are the precautions for using IWDG?**

1. IWDG supports interrupt and reset modes.
2. Watchdog function can be turned off by closing LSI. IWDG can be turned off in this way before entering Stop mode.

### **Does it support debugging when IWDG is turned on?**

Turning on/off watchdog counter is supported in the Debug mode.

## **SPI**

### **Does SPI support single-line half duplex?**

Single PIN is not supported to achieve single-line half duplex. Single-line half duplex can be achieved by the combination of two PIN MISO and MOSI, supplemented with software configuration.

## **SYSTICK**

### **Does MCU support 1/8 SYSCLK and SYSCLK as the clock source of Systick?**

It only supports SYSCLK as the clock source of Systick/4.

## **UART**

## **What are the precautions for using MM32 UART?**

UART supports communication at full temperature and voltage range and it has the register configuration as to whether the hardware baud rate self-adaptation be turned on or not. This function can ensure that UART communication works properly. Please refer to section 24.3.11 Automatic Baud Rate Detection of the user manual.

## **USBFS**

### **What are the precautions for using MM32 USBFS?**

1. USBFS only supports 4 data endpoints and does not support ISO synchronization.
2. MM32 supports 2.0 ~ 5.5V power supply. However, incompatibility will occur to some host devices when they are connected to 5v. Thus, it is recommended to use 2.0 ~ 3.6V of power supply VDD when the system is used as USB device.

## **WWDG**

### **Does it support debugging when WWDG is turned on?**

Turning on/off watchdog counter is supported in the Debug mode.

## **Flash**

### **Can Flash be written directly without erasing?**

1. Flash memory space can store both code and data. The main flash is divided into blocks based on 16 pages (1K byte per page) or 4 sectors (4K bytes per sector). It can be erased by page or by whole chip.
2. The main flash can be programmed 16 bits per time. When PG bit of FLASH\_CR is 1, a half-word is directly written to the corresponding address. This is one programming operation.

3. Flash needs to be erased first and then written. If non 0xFF is written, it will enter hardfault interrupt. This is determined by flash characteristics rather than features specific to the chip.

## **Protect**

### **How to achieve read-protect?**

It supports read-protect. Two half-words, namely RDP2 and RDP3 are written to the corresponding addresses in sequence according to the half-word programming operation in the option byte area.

Write target value 0x7F80 to 0x1FFE0000

Write target value 0xFF00 to 0x1FFE0002

## **Power supply**

### **Can AVDD and DVDD use different power supplies?**

VDD of the chip should not be greater than VDDA by over 0.1V. It is recommended to use the same power supply and the input pins of the power supply are connected to 1uF+0.1uF high pass/low pass decoupling filter capacitor in parallel

### **What are the requirements for the slope as power supply and voltage change when MCU is powered up and down?**

Adjustment is made according to "Timing parameters at power-up and power-down" of the Data Sheet. In addition, it must be noted that MCU cannot be powered up again until the power-down voltage drops below 0.1v.

## **Reset circuit**

### **What are the precautions for MM32 to design reset circuit?**

It is not necessary for low level to be kept too long in the reset circuit. 100K resistor and 0.1uF capacitor are recommended to be the RC value in a typical reset circuit.

## **RTC**

### **What are the precautions for using RTC?**

LSE is slow in starting oscillation. Its waiting time for stable oscillation is inseparable from the characteristics of the external crystals. It is necessary to add TimeOut mechanism to the software properly.

## **ISP**

### **Does ISP only support multiple ports?**

It supports multiplexed IO ports of UART1 for ISP programming.