

## Application note

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### N32G05x series BOOT Jump application note

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#### Introduction

N32G05x series MCU embedded boot program (BOOT), stored in System Memory, used to reprogram user program (Main FLASH) through UART1 interface.

Nsing technologies MCU series products provide a variety of starting mode, can be selected by BOOT0 pin and option byte configuration. In practice, the MCU is usually set to Main Flash boot mode. If you want to use the embedded bootstrap program, you must change the MCU to System Memory boot mode and then power it on again. For details on the startup mode, refer to the corresponding user manual.

This document describes a BOOT jump method to enable users to use the embedded bootstrap mode without changing the BOOT mode.

This document is applicable to the N32G05X and N32A052 series products of Nsing Technology. This article takes the N32G05x series as an example.

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## 1. Hardware requirements

Currently, bootstrap programs embedded in MCU only support UART1 interface, and corresponding IO ports are PA9/PA10 by default, and can be configured as PB10/PB11, PD10/PD11, PA2/PA3 by option byte USER6[1:0]. Ensure that the port connection is available before use.

## 2. Operation method

### 2.1 Parameters definition

#### 2.1.1 Function pointer

A function pointer type must be defined in advance: `typedef void (*pFunction)(void);`

#### 2.1.2 Necessary parameters

The following parameters must be defined:

```
uint32_t BootAddr = 0x1FFF0025;
```

```
uint32_t SPAddr = 0x20000660;
```

Note:

1) The default parameter values are applicable to most applications and do not need to be modified.

### 2.2 Method of use

#### 2.2.1 System Clock Setting

Refer to the following functions to set the system clock to 64MHz and use HSI+PLL as the clock source.

```
void SetSysClock_HSI_PLL(void)
```

```
{
```

```
    /* It is necessary to initialize the RCC peripheral to the reset state.*/
```

```
    RCC_DeInit();
```

```
    /* Enable HSI    */
```

```
    RCC_EnableHsi(ENABLE);
```

```
    while (RCC_WaitHsiStable() != SUCCESS)
```

```
    {
```

```
        /* If HSI failed to start-up,the clock configuration must be wrong.
```

```
        User can add some code here to dela with this problem    */
```

```
}

/* Sets the code latency value */
FLASH_SetLatency(FLASH_LATENCY_2);

/* AHB prescaler factor set to 1,HCLK = SYSCLK = 64M */
RCC_ConfigHclk(RCC_SYSCLK_DIV1);
/* APB2 prescaler factor set to 1,PCLK2 = HCLK = 64M */
RCC_ConfigPclk2(RCC_HCLK_DIV1);
/* APB1 prescaler factor set to 2,PCLK1 = HCLK/2 = 32M */
RCC_ConfigPclk1(RCC_HCLK_DIV2);

/* Config PLL */
RCC_ConfigPll(RCC_PLL_SRC_HSI,RCC_PLL_MUL_16,RCC_PLL_PRE_2,
RCC_PLOUT_DIV_1);

/* Enable PLL */
RCC_EnablePll(ENABLE);
/* Wait till PLL is ready */
while ((RCC->CTRL & RCC_CTRL_PLLRDF) == 0)
{
}
/* Select PLL as system clock source */
RCC_ConfigSysclk(RCC_SYSCLK_SRC_PLLCLK);

/* Wait till PLL is used as system clock source */
while (RCC_GetSysclkSrc() != RCC_CFG_SCLKSTS_PLL);
}
```

### 2.2.2 API functions

By calling the following API (Jump\_To\_BOOT), the MCU jumps directly to the bootstrap program (BOOT)

```
void Jump_To_BOOT(void)
```

```
{  
    /* Disable all interrupt */  
    __disable_irq();  
  
    /* Config IWDG */  
    IWDG_ReloadKey();  
    IWDG_WriteConfig(IWDG_WRITE_DISABLE);  
    IWDG_SetPrescalerDiv(IWDG_PRESCALER_DIV256);  
  
    /* Config system clock as 64M with HSI and PLL */  
    SetSysClock_HSI_PLL();  
  
    /* Set JumpBoot addr */  
    pFunction JumpBoot = (pFunction)BootAddr;  
  
    /* Initalize Stack Pointer */  
    __set_MSP(SPAddr);  
  
    /* Enable interrupt */  
    __enable_irq();  
    /* Jump to BOOT */  
    JumpBoot();  
}
```

## 2.3 The sample application

### Reference example

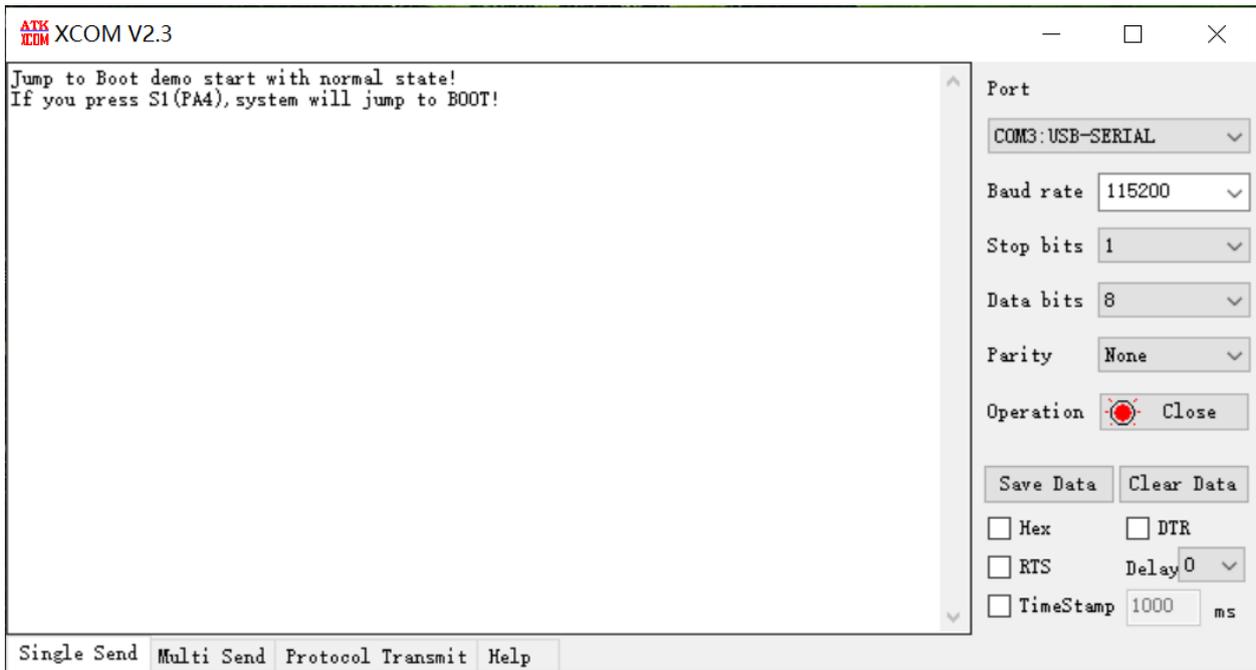
“Nations.N32G05x\_Library.1.2.0\projects\n32g05x\_EVAL\applications\JumpToBoot” it demonstrates how to jump to BOOT. After the jump is successful, the program can be updated through UART1 interface.

### 2.3.1 BOOT test

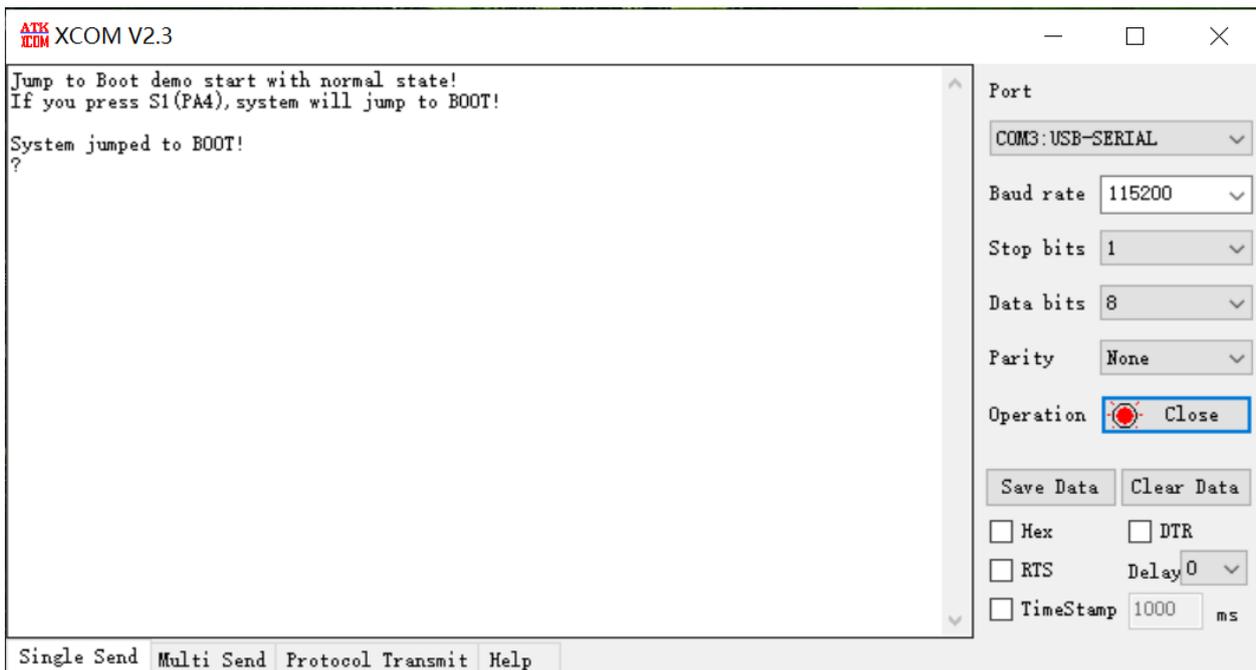
Based on N32G05XRBQ7-STB V1.0, the test process is demonstrated.

1. Under KEIL, change the chip model to N32G05xRB. After compiling, burn it to the

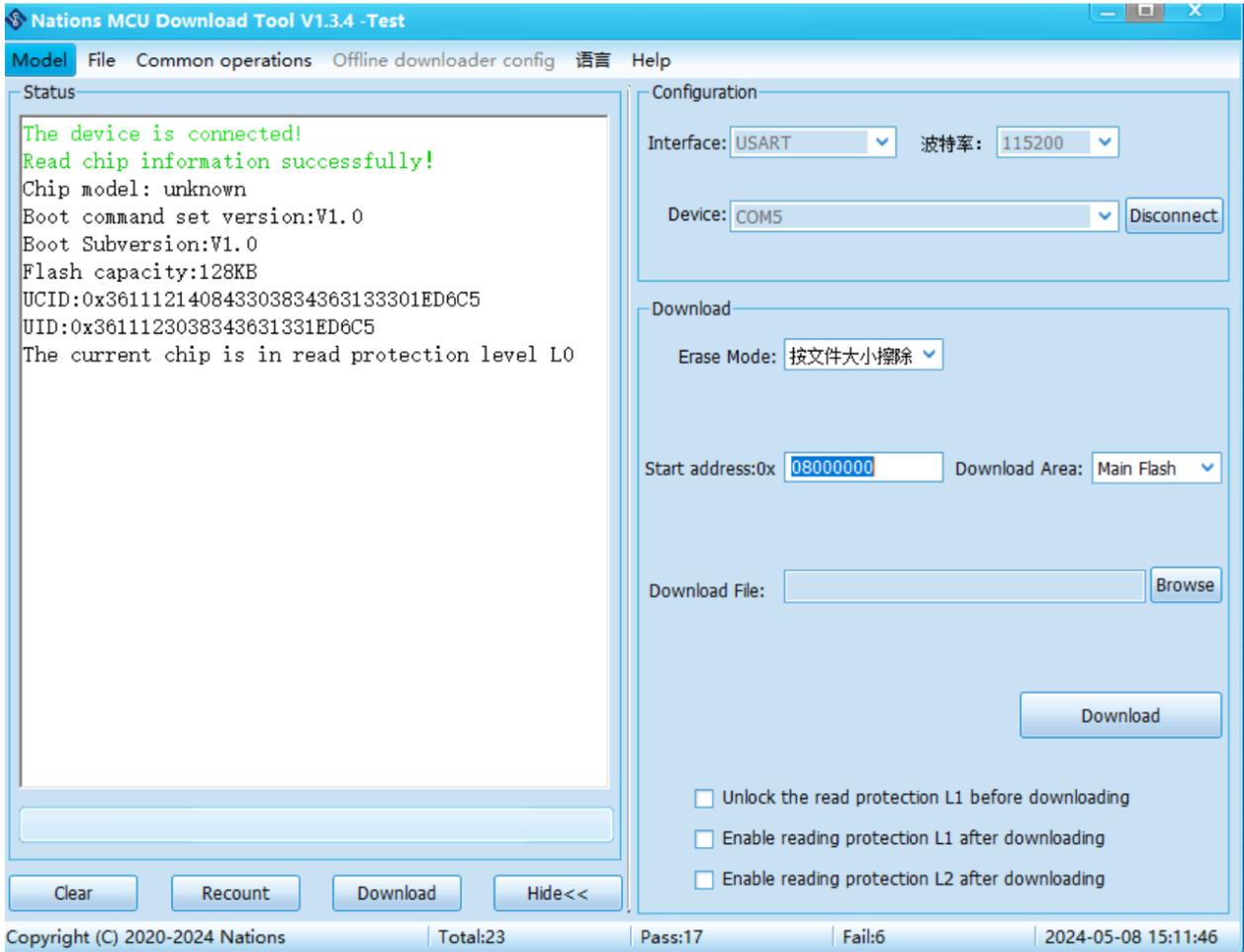
development board. Connect PC through USB cable, turn on the power supply, and check the prompt information through serial port tool on PC.



2. Open the serial port in the serial port tool and press KEY1 to switch to BOOT.



3. Close the serial port again in the serial port tool (If not closed, the download tool will show the serial port failed to open), and the connection is successful through the BOOT download tool, as shown in the following figure.



The screenshot shows the 'Nations MCU Download Tool V1.3.4 - Test' application window. The interface is divided into several sections:

- Status:** A text area displaying the following information:

```
The device is connected!  
Read chip information successfully!  
Chip model: unknown  
Boot command set version:V1.0  
Boot Subversion:V1.0  
Flash capacity:128KB  
UCID:0x361112140843303834363133301ED6C5  
UID:0x3611123038343631331ED6C5  
The current chip is in read protection level L0
```
- Configuration:** Includes dropdown menus for 'Interface' (USART) and '波特率' (115200), and a 'Device' dropdown (COM5) with a 'Disconnect' button.
- Download:** Features an 'Erase Mode' dropdown (按文件大小擦除), 'Start address:0x' (08000000), and 'Download Area' (Main Flash). It also has a 'Download File' field with a 'Browse' button and a 'Download' button.
- Options:** Three checkboxes for protection settings:
  - Unlock the read protection L1 before downloading
  - Enable reading protection L1 after downloading
  - Enable reading protection L2 after downloading
- Footer:** A status bar with 'Copyright (C) 2020-2024 Nations', 'Total:23', 'Pass:17', 'Fail:6', and '2024-05-08 15:11:46'.

### 3. Version history

<b>Version</b>	<b>Date</b>	<b>Modify</b>
<b>V1.0.0</b>	<b>2024-05-14</b>	<b>Create a document</b>
<b>V1.1.0</b>	<b>2026-01-06</b>	<b>1. Update header/footer/notice 2. Update the example project to SDK 3. Add N32A052 series</b>

## 4. Notice

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