GigaDevice Semiconductor Inc.

Arm[®] Cortex[®]-M3/4/23/33 32-bit MCU

Application Note AN014



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1. Introduction

This application note describes how to configure and develop a GD32 MCU project using the Arduino IDE, the processes are described in the following paragraphs.



2. Install gd32 library

Users can install the gd32 library by the following steps.

1. Open the Preferences

Figure 2-1. Open the Preferences

0	sketch_jun18a	Arduino 1.8.13		-	×
File	Edit Sketch	Tools Help			
	New	Ctrl+N			Q
	Open	Ctrl+0			
	Open Recent	>			
	Sketchbook	>	to run once.		^
	Examples	>	te, to full once.		
	Close	Ctrl+W			
	Save	Ctrl+S			
	Save As	Ctrl+Shift+S	e, to run repeatedly:		
	Page Setup	Ctrl+Shift+P			
	Print	Ctrl+P			
	Preferences	Ctrl+Comma			
	Quit	Ctrl+Q			
					~

2. Add gd32 package url, then click "OK" button.

Figure 2-2. Add gd32 package url



🥯 sketch_jun18a Arduino 1.8.	13		_		\times	
File Edit Sketch Tools Help						
Preferences						×
Settings Network						
Sketchbook location:						
C:\Users\admin\Documents\Ar	duino					Browse
Editor language:	System Default	~	(requir	es rest	art of A	rduino)
Editor font size:	12					
Interface scale:	Automatic 100 🛖 % (requires	s restart of Arduino)				
Theme:	Default theme \lor (requires res	tart of Arduino)				
Show verbose output during:	🗹 compilation 🗹 upload					
Compiler warnings:	None 🗸					
Display line numbers		🗌 Enable Code Foldi	ng			
✓ Verify code after upload		🗌 Use external edit	or			
🗹 Check for updates on sta	rtup	🗹 Save when verifyi	ng or upl	loading		
🗌 Use accessibility featur	es					
Additional Boards Manager UF	Ls: https://raw.githubusercontent	t. com/ChazJin/gd32mcu/ma	in/packa	ge_gd32_	index. j:	son 🗖
More preferences can be edit	ed directly in the file					
C:\Users\admin\AppData\Local	\Arduino15\preferences.txt					
(edit only when Arduino is r	ot running)					
						OK Cancel
4					×	
1		0 seluin e	Due (Bree		Part	

3. Open boards manager

Figure 2-3.	Open	boards	manager
-------------	------	--------	---------

🥯 sketch_jun18a	a Ard	luino 1.8.13		– 🗆 X
File Edit Sketch	Tools	Help		
		Auto Format	Ctrl+T	<mark>.⊘</mark> .
		Archive Sketch		
sketch_jun18a		Fix Encoding & Reload		
<pre>void setup()</pre>		Manage Libraries	Ctrl+Shift+I	^
// put your		Serial Monitor	Ctrl+Shift+M	
}		Serial Plotter	Ctrl+Shift+L	
<pre>void loop() {</pre>		WiFi101 / WiFiNINA Firmware Updater		
// put your		Board: "Arduino Due (Programming Port)"	;	Boards Manager
}		Port	>	Arduino ARM (32-bits) Boards >
		Get Board Info		Arduino AVR Boards >
		Programmer	>	
		Burn Bootloader		
				~

4. Select contributed type.

Figure 2-4. Select contributed type



🐵 Boards Manager	×
Type All Filter your search Ard All Updatable But Arduino In 1.8.3 INSTALLED Bockardino Certified Ardino Uno WiFi, Arduino Discimila, Arduino Nano, Arduino Mega, Arduino MegaADK, Arduino LedArduino Certified Ard Partner Getartner Getartner ayground, Arduino Pro, Arduino Industrial 101, Linino One. More Info More Info	BT,
Arduino megsAVR Boards by Arduino Boards included in this package: Arduino Uno WiFi Rev2, Arduino Nano Every. Online Help More Info	
	Close

5. Select GD32 ARM Boards to install.

🕺 Boards Manager	×
Type Contributed V Filter your search	
More Info	^
Industruino SAMD Boards (32-bits ARM Cortex-M0+)	
by Industruino Boards included in this package:	
Industruino D21G. Online Help	
More Into	
CR32 ADM Receive	
by GigaDevice	
Boards included in this package: GD32F307VG MBED, GD32F307VC EVAL, GD32F303ZE EVAL.	
Online Help More Info	
Install	~
Close	

Figure 2-5. Select GD32 ARM Boards to install

Figure 2-6. Install the board



💿 Boards Manager	×
Type Contributed V Filter your search	
More Info	^
Industruino SAND Boards (32-bits ARM Cortex-MO+)	
by Industruino Boards included in this package:	
Industruino D21G. Online Help	
More Info	
GD32 ARM Boards	
by GigaDevice Boards included in this package:	
GD32F307VG MBED, GD32F307VC EVAL, GD32F303ZE EVAL. Online Help	
More Info	
Installing	~
Installing tools (1/2)	



3. Develop gd32 Arduino project

Taking GD32F307VG-MBED board as an example, the specific operation is as follows.

1. Open the Arduino IDE

Figure 3-1. Open the Arduino IDE





2. Select the GD32 MCU development board series

Figure 3-2. Select the board series

💿 Blink Arduino	1.8.13				-		×
File Edit Sketch	pols Help						
	Auto Format	Ctrl+T					Ø
	Archive Sketch						
Blink	Fix Encoding & Reload						
1 // flash th	Manage Libraries	Ctrl+Shift+I					^
2 void setup(Serial Monitor	Ctrl+Shift+M					
4 pinMode	Serial Plotter	Ctrl+Shift+L					
5 }	Board: "GD32F30x MBED series"	2	Boards Manager				
7 // the loop	Board part number: "GD32F307VG MBE	D" >	Arduino AVR Boards	>			
8 void loop()	Upload method: "gd32flash (Serial)"	2	GD32 ARM Boards	> • GI	D32F30x M	BED ser	ies
9 {	Optimize: "Smallest (default)"	>		G	D32F303 E\	/AL seri	es
11 delay(5	Port	>		G	D32E23x E\	/AL seri	es
12 digital	Get Board Info						
13 delay(5	Programmer	>					
** 1	Burn Bootloader						
							~
1				GD32F	30× MBED se	ries on C(омзо

3. Select the specific GD32 MCU development board

Figure 3-3. Select the specific board

💿 Blink Arduino 1	.8.13					-		×
File Edit Sketch To	ols Help		_					
	Auto Format	Ctrl+T						Ø
	Archive Sketch							
Blink	Fix Encoding & Reload							M
1 // flash th	Manage Libraries	Ctrl+Shift+I						^
3 (Serial Monitor	Ctrl+Shift+M						
4 pinMode	Serial Plotter	Ctrl+Shift+L						
5 }	Board: "GD32F30x MBED series"	>						
7 // the loop	Board part number: "GD32F307VG MBED"	5	٠	GD32F307VG MBED				
8 void loop()	Upload method: "gd32flash (Serial)"	>						
9 { 10 digital	Optimize: "Smallest (default)"	>						
11 delay(5	Port	>						
12 digital	Get Board Info							
14 }	Programmer	>						
	Burn Bootloader							
3					GD32F30	× MBED sei	ies on C	ом25



4. Select the GD32 MCU programme upload method

Users can select gd32flash(serial), GDlink(SWD) or jlink(SWD) upload methods. For GD32F307VG-MBED board, if use serial upload method, you need connect PD5 pin and PD6 pin to RX and TX of a serial port respectively.

0	Blink Arduin	o 1.8.13						-		×
File	Edit Sketch	Tools Help								
	0 🖪 🖸	Auto Format	Ctrl+T							Ø
F		Archive Sketch								
B	llink	Fix Encoding & Reload								
1	// flash th	Manage Libraries	Ctrl+Shift+I							^
2	void setup(Serial Monitor	Ctrl+Shift+M							
4	t pinMod∈	Serial Plotter	Ctrl+Shift+L							
5	}	Board: "GD32F30x MBED series"	,	>						
7	// the loor	Board part number: "GD32F307VG MBED"	,	>						
8	void loop()	Upload method: "gd32flash (Serial)"	;	•	gd32flash (Serial)					
9	{	Optimize: "Smallest (default)"	3		GDlink (SWD)					
10	digital	Port	,		Jlink (SWD)					
12	digital	Get Board Info		-						
13	delay(5			-						
14	}	Programmer	>	>						
		Burn Bootloader								
1						G	032F30x I	MBED se	ries on C	DM30

Figure 3-4. Select the download method

5. Select the GD32 MCU serial port

Figure 3-5. Select the serial port



🥯 sketch_jun18a Arduino 1.8.13 —								
File Edit Sketch	Tools	5 Help						
00 6		Auto Format	Ctrl+T				Ø	
		Archive Sketch					_	
sketch_jun18a		Fix Encoding & Reload						
<pre>void setup()</pre>		Manage Libraries	Ctrl+Shift+I				^	
// put your		Serial Monitor	Ctrl+Shift+M					
}		Serial Plotter	Ctrl+Shift+L					
<pre>void loop() {</pre>		WiFi101 / WiFiNINA Firmware Updater			_			
// put your		Board: "GD32F30x MBED series"	>					
}		Board part number: "GD32F307VG MBED"	>					
		Upload method: "gd32flash (Serial)"	>					
		Optimize: "Smallest (default)"	>					
		Port	;	Serial ports				
		Get Board Info		COM1				
		Programmer	>					
		Burn Bootloader						
				1				
							~	

6. Select the GD32 MCU development board example, eg. Blink.

Figure 3-6. Select the board example

\odot	Blink Arduine	o 1.8.13									_		×
File	Edit Sketch	Tools Help											
	New	Ctrl+N											0
	Open	Ctrl+O											
	Open Recent	· >											•
	Sketchbook	>											^
	Examples	3	Built-in Examples										
	Close	Ctrl+W	01.Basics	>									
	Save	Ctrl+S	02.Digital	>									
	Save As	Ctrl+Shift+S	03.Analog	>									
	Daga Catura	Chally Shifty D	04.Communication	>									
	Page Setup	Ctrl+Shitt+P	05.Control	>									
	Print	Cuite	06.Sensors	>									
	Preferences	Ctrl+Comma	07.Display	>									
	Quit	Ctrl+Q	08.Strings	>									
17	1		09.USB	>									
			10.StarterKit_BasicKit	>									
			11.ArduinoISP	>									
			Examples for GD32F30x MBED series										
			Analog	>									
			Blink	3	Blink								
			pwm	>		3							
			rtc	>									•
			Servo	>									
			SoftwareSerial	>									
			SPI	>									
			Timer	>									
			Wire	>									
				0.00	0500		00050071//		10041- (0i	-I) Omellen			01105
-11				603	2F30X MBB	ED series, Gl	032F307V0	∍ MBED, go	3211ash (Seri	ai), Smalles	r(defai	m) on C	0M25

7. Compile the project

Figure 3-7. Compile the project





8. Upload the project

When the Blink sketch uploading is done, the LED2 on the board will flash every 500ms.

Figure	3-8.	Upload	the	project
--------	------	--------	-----	---------

	D E	Blink A	rduino 1.8.13			-		×
Fi	le I	Edit Sk	etch Tools Help					
		•	Verify/Compile	Ctrl+R				Ø
		<u> </u>	Upload	Ctrl+U				
	Bli	nk	Upload Using Programmer	Ctrl+Shift+U				
	1	// f	Export compiled Binary	Ctrl+Alt+S				^
	3	{	Show Sketch Folder	Ctrl+K				
	4		Include Library	>				
	5]	}	Add File					
1 1 1 1 1	7 7 7 9 1 0 1 2 3 4]	// the void lo { dig del dig del }	<pre>loop function runs over a op() italWrite(LED2, HIGH); ay(500); italWrite(LED2, LOW); ay(500);</pre>	na over again	IOREVER			
								~
D	one	e upload	ing.					
Re		t. Rese	t device via ATRCR SYSRES	ETREO				^
			U UCVICC VIU AIRON-DIDRE					
Se								
								~
<								>
11	E.				GD32F3	J× MBED se	eries on C	OM25



4. Download Program to GD32F307VG-MBED board

4.1. gd32flash (Serial)

In GD32F307 series, the boot loader is located in the internal boot ROM memory (system memory). It is used to reprogram the Flash memory by using USART0 (PA9 and PA10), USART1 (PD5 and PD6) and USBFS (PA9, PA11 and PA12) is available for boot functions. In GD32F307VG-MBED board, since PA9 and PA10 are occupied, PD5 and PD6 are suitable.

Choose upload method: gd32flash (Serial). Jump the BOOT0 jumper cap to 1-2, BOOT1 jumper cap to 2-3. Connect PD5 to serial RX and PD6 to serial TX. Refer to <u>Table 4-1. Boot</u> <u>modes</u> and <u>Figure 4-1. Description of GD32F307VG-MBED board</u> for details. The programming result is as shown in <u>Figure 4-2. Programming successfully using gd32flash</u> (Serial) upload method.

Selected boot source	Boot mode selection pins				
	Boot1	Boot0			
Main Flash Memory	х	0			
Boot loader	0	1			
On-chip SRAM	1	1			

Table 4-1. Boot modes

Figure 4-1. Description of GD32F307VG-MBED board







💿 Blink Ardui	ino 1.8.13						-		×
File Edit Sketch	n Tools Help								
									0
									~
Blink									
∠ vola setup	P()								^
3 {									
4 pinMoo	ae (LED2, OUTPU:	1);							
6									
7 // the loc	op function ru	ns over and ov	er again forever						
8 void loop	0								
9 {									
10 digita	alWrite(LED2, 1	HIGH);							
11 delay	(SUU);	T OF1) •							
13 delay	(500):	2011),							
14 }	(),								~
Done uploading.									
Opening port	(OF)								^
Opening port	[OK]								
Device GD32F3	307VGT6								
Disabling writ		[OK]							
Reseting devic	ce [0K]								
DOWNLOADING									
Downloading	page 0		size 2.00	<kb></kb>	[OK]				
Downloading	page 1 page 2		size 2.00	<kb></kb>	[OK]				
Downloading	page 2 page 3		size 1.55	<kb></kb>	[OK]				
2.697000 secor									
VERIFYING									
Verifying	page 0				[OK]				
Verifying	page l				[OK]				
Verifying					[OK]				
Verifying					[OK]				
1 793000 88000									
21,55000 2000									
<									>
1						GD32	F30x MBED se	ries on Cl	омзо

4.2. JLink (SWD)

Choose upload method: JLink (SWD). Jump the BOOT0 jumper cap to 2-3, BOOT1 jumper cap to 2-3. The SWD port is as shown in *Figure 4-3. JLink debugging port of GD32F307VG-MBED board*. Use SWD connection between JLINK and GD32 MCU. The programming result is as shown in *Figure 4-4. Programming successfully using JLink (SWD) upload method*.



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Figure 4-3. JLink debugging port of GD32F307VG-MBED board









4.3. GDLink (SWD)

Choose upload method: GDLink (SWD). Jump the BOOT0 jumper cap to 2-3, BOOT1 jumper cap to 2-3. The SWD port is as shown in *Figure 4-5. GDLink debugging port of GD32F307VG-MBED board*. Use SWD connection between GDLINK and GD32 MCU. The programming result is as shown in *Figure 4-6. Programming successfully using GDLink (SWD) upload method*.

Figure 4-5. GDLink debugging port of GD32F307VG-MBED board



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Figure 4-6. Programming successfully using GDLink (SWD) upload method





5. Revision history

Table 5-1. Revision history

Revision No.	Description	Date
1.0	Initial Release	Jul.1, 2021



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