AN6226

Application note

Migrating between STM32G0 and STM32U0 MCUs

Introduction

For designers of STM32 microcontroller applications, being able to replace one microcontroller type with another from the same product family easily is an important asset. Migrating an application to a different microcontroller is often needed when product requirements grow, putting extra demands on memory size, optimizing power consumption, security, or the number of I/Os. The cost reduction objectives may also be an argument to switch to smaller components and shrink the PCB area.

This application note analyzes the steps required to migrate an existing design between the STM32G0 and STM32U0 series. Three aspects must be considered for the migration: hardware, peripherals, and firmware.

STM32U0 and STM32G0 are based on similar platforms and share the same core, architecture, and peripherals, resulting in easy and fast firmware migration. For hardware migration, a redesign of the PCB is necessary.

This document lists the full set of features available for the STM32G0 series and the equivalent features on the STM32U0 series (some products may have fewer features depending on their part number).

To benefit fully from this application note, the user must be familiar with the STM32 microcontroller documentation available on www.st.com, with a particular focus on the documents listed in Reference documents.

1 General information

The STM32U0 and STM32G0 MCUs are 32-bit microcontrollers based on the Arm® Cortex®-M0+ processor.

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Reference documents

[1] Datasheet *STM32G030x6/x8* (DS12991)
[2] Datasheet *STM32G050x6/x8* (DS13514)
[3] Datasheet *STM32G070CB/KB/RB* (DS12766)
[4] Datasheet *STM32G0B0KE/CE/RE/VE* (DS13565)
[5] Datasheet *STM32G031x4/x6/x8* (DS12992)
[6] Datasheet *STM32G051x6/x8* (DS13303)
[7] Datasheet *STM32G071x8/xB* (DS12232)
[8] Datasheet *STM32G0B1xB/xC/xE* (DS13560)
[9] Datasheet *STM32G041x6/x8* (DS12993)
[10] Datasheet *STM32G061x6/x8* (DS13513)
[11] Datasheet *STM32G081xB* (DS12231)
[12] Datasheet *STM32G0C1xC/xE* (DS13564)
[13] Datasheet *STM32U083xC* (DS14463)
[14] Datasheet *STM32U073x8/B/C* (DS14548)
[15] Datasheet *STM32U031x4/6/8* (DS14581)
[18] Reference Manual *STM32G0x1 advanced Arm®-based 32-bit MCUs* (RM0444)
[19] Reference Manual *STM32G0x0 advanced Arm®-based 32-bit MCUs* (RM0454)
[20] Reference Manual *STM32U0 series advanced Arm®-based 32-bit MCUs* (RM0503)

2 STM32U0 and STM32G0 overview

STM32U0 and STM32G0 devices share the same technology platform, core, and common IP set. While STM32G0 offers advanced features (such as advanced analog and low-power capabilities) at a low price point, STM32U0 focuses on key functions for further ultra-low-power optimization and embedded security.

In particular, STM32U0 series devices offer the additional low-power mode Stop 2. The STM32U0 series features an Arm® Cortex®-M0+ processor at 56 MHz, versus a Cortex®-M0+ processor at 64 MHz featured on the STM32G0 series. STM32U0 devices also feature optimized flash memory access through the adaptive real-time memory accelerator (ART accelerator).

STM32U0 series MCUs increase the low-power efficiency in dynamic mode (µA/MHz), and reach a very low level of static power consumption in the various available low-power modes.

The detailed list of available features and packages for each product is available in the respective datasheets.

STM32U0 series devices include a larger set of peripherals with advanced features than the STM32G0 series, such as:

- Low-power universal asynchronous receiver transmitter (LPUART)
- Low-power timer (LPTIM)
- Liquid-crystal display (LCD)
- Enhanced security features

STM32U0 does not embed controller area network (CAN) or USB Power Delivery (USB PD) interfaces.

The STM32G0 series is available in two variants: the Access line and the Value line.

The Access line is the most advanced variant, with a full set of peripherals, option bytes, and temperature range, and a wide range of package flavours.

The Value line focuses on key features, and offers one temperature range and a more limited set of packages, to enhance cost efficiency.

The STM32U0 series is available only in an equivalent form of the Access line.

3 Migrating between the STM32U0 and STM32G0

All STM32U0 and STM32G0 devices use the same technological platform, making software migration between the two series a straightforward process.

However, the pinouts are different for both series, so a PCB redesign is mandatory when migrating between products. Some GPIO pins are also absent in case of a migration from STM32G0 to STM32U0 in the same package.

4 Hardware migration

4.1 Pinout compatibility

The STM32U0 and STM32G0 series do not share the same pinout. There is a different number of supply pairs on the package, as the STM32G0 series distributes the supply over the chip inside the package. Consequently, there are less GPIOs on the STM32U0 series and they are shifted by one or more pins on the same packages. When both series offer the same peripherals, the digital alternate functions and additional functions are preserved on the same GPIO where possible.

When designing the PCB, the user must consider different requirements for power supply distribution, as well as the position of critical pads, like oscillators and GPIO pins, as indicated by the pink rectangles in the figures below. The yellow rectangles indicate GPIO shifts.

Table 1. LQFP64 package comparison

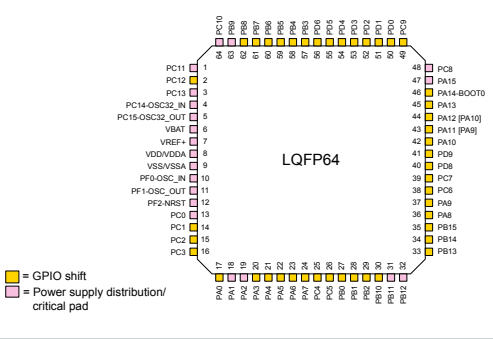
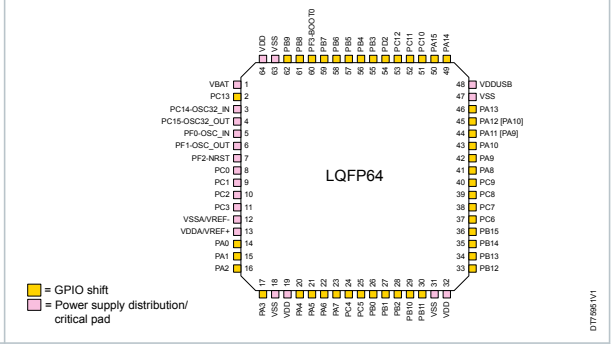
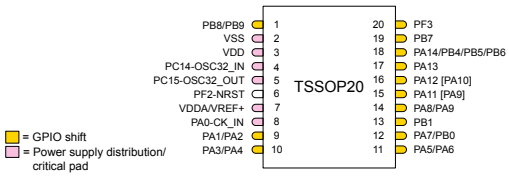
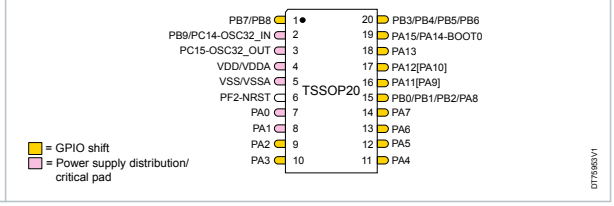
STM32U0	STM32G0
	

Table 2. TSSOP20 package comparison

STM32U0	STM32G0
	

4.2 Package availability

Some packages are available for both the STM32G0 and STM32U0, as illustrated in Table 3. However, each product has its own WLCSP package. Since WLCSP is unique for each product, these packages are listed separately in Table 4.

Table 3. Package availability for STM32U0 and STM32G0

Package	STM32U0		STM32G0			
	STM32U031	STM32U073 STM32U083	STM32G030 STM32G031 STM32G041	STM32G050(1) STM32G051 STM32G061	STM32G070(1) STM32G071 STM32G081	STM32G0B0(1) STM32G0B1 STM32G0C1
SO8N (4.9 × 6 mm)	-	-	X	-	-	-
TSSOP20 (6.5 × 4.4 mm)	X	-	X	X	-	-
UFQFPN28 (4 × 4 mm)	-	-	X	X	X	-
LQFP32 (7 × 7 mm)	-	-	X	X	X	X
UFQFPN32 (5 × 5 mm)	X	X	X	X	X	X
LQFP48 (7 × 7 mm)	X	X	X	X	X	X
UFQFPN48 (7 × 7 mm)	X	X	X	X	X	X
LQFP64 (10 × 10 mm)	X	X	-	-	X	X
UFBGA64 (5 × 5 mm)	X	X	-	-	X	X
LQFP80 (12 × 12 mm)	-	X	-	-	-	X
LQFP100 (14 × 14 mm)	-	-	-	-	-	X
UFGBA100 (7 × 7 mm)	-	-	-	-	-	X

1. *On STM32G0x0 devices (Value line), only SOxN and LQFP packages are available.*

Table 4. WLCSP package availability for STM32U0 and STM32G0

Product	WLCSP package and size
STM32U031	WLCSP27 (2.55 x 2.34 mm)
STM32U073 STM32U083	WLCSP42 (2.82 × 2.93 mm)
STM32G031 STM32G041	WLCSP18 (1.86 × 2.14 mm)
STM32C071	WLCSP19 (2.52 × 1.67 mm)
STM32G051 STM32G061	WLCSP20 (1.94 × 2.40 mm)
STM32C091 STM32C092	WLCSP24 (2.61 × 1.73 mm)
STM32G071 STM32G081	WLCSP25 (2.3 × 2.5 mm)
STM32G0B1 STM32G0C1	WLCSP52 (3.09 × 3.15 mm)

5 STM32 product cross-compatibility

The STM32U0 and STM32G0 series share the same peripheral platform with the same register basis. The sections below show only the differences between the two series.

Table 5. Peripheral summary of STM32U0 and STM32G0

Feature		STM32U0		STM32G0							
		STM32U031	STM32U073 STM32U083	STM32G030	STM32G031 STM32G041	STM32G050	STM32G051 STM32G061	STM32G070	STM32G071 STM32G081	STM32G0B0	STM32G0B1 STM32G0C1
Flash memory (in Kbytes)		Up to 32	Up to 256	Up to 64				Up to 128		Up to 512	
SRAM (in Kbytes)		12	40	8		18		36		144	
ART Accelerator		Yes		No							
V_{DD} minimum		1.7		2	1.7	2	1.7	2	1.7	2	1.7
V_{DD} maximum		3.6									
Maximum speed		56 MHz		64 MHz							
ADC channel		16 + 3									
ADC resolution		12-bit	12-bit	12-bit	12-bit	12-bit	12-bit	12-bit	12-bit	12-bit	12-bit
DAC channel		1		0			2	0	2	0	2
COMP		1	2	0			2	0	2	0	3
VREFBUF		No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Timer	Advanced 16-bit	1									
	General purpose 32-bit	1		0	1	0	1	0	1	0	1
	General purpose 16-bit	3		4				5		6	7
	Low-power	2	3	0	2	0	2	0	2	0	2
	Basic	2		0		2					
	Watchdog	2									

Feature		STM32U0		STM32G0							
		STM32U031	STM32U073 STM32U083	STM32G030	STM32G031 STM32G041	STM32G050	STM32G051 STM32G061	STM32G070	STM32G071 STM32G081	STM32G0B0	STM32G0B1 STM32G0C1
DMA channel		7	12	5		7				12	
USART	Full	4		1				2		3	
	Basic	1	3	2	1	2	1	4	2	6	3
LPUART		2	3	0	1	0	1	0	1	0	2
SPI		2	3	2						3	
I2C	Full	4		2	1	2	1	2	1	3	2
	Basic	0			1	0	1	0	1	0	1
HDMI-CEC		0	0	0	0	0	0	0	1	0	1
AES		No	No/Yes	No	No/Yes	No	No/Yes	No	No/Yes	No	No/Yes
RNG		No	Yes	No	No/Yes	No	No/Yes	No	No/Yes	No	No/Yes
UCPD		0							2	0	2
USB		0	1	0							1
FDCAN		0									2
RTC		1									
LCD		No	Yes	No							
Minimum temperature		-40 °C									
Maximum temperature		Up to 125 °C		85 °C	Up to 125 °C	85 °C	Up to 125 °C	85 °C	Up to 125 °C	85 °C	Up to 125 °C

5.1 RCC

Table 6. RCC differences between the STM32U0 and STM32G0 series

Feature	STM32U0 series	STM32G0 series
PLL	Yes	
HSI clock frequency	16 MHz	
MSI clock frequency	100 kHz to 48 MHz	-
LSI clock frequency	32 kHz	
f_{HCLK}	Up to 56 MHz	Up to 64 MHz
f_{PCLK}		
System clock source	• MSI • HSI16 • HSE • PLL • LSE • LSI	• HSI16 • HSE • PLL • LSE • LSI

5.2 Power

The STM32U0 and STM32G0 series share the same power supply scheme:

- V_{DD}: This is the external power supply for the internal regulator and the system analog such as reset, power management, and internal clocks. It consists of one pair V_{DD}/V_{SS}.
- V_{DDA}: This is the analog power supply for the A/D converter. It is shorted to V_{DD} to reduce the number of power supply pins.
- V_{DDIOx}: This is the power supply for the I/Os. It is typically shorted to V_{DD} to reduce the number of supply pins. However, on some products a second V_{DDIO2} power supply is available.
- V_{DDUSB}: This is the power supply for the USB drivers. It can be shorted to V_{DD} to reduce the number of supply pins.
- V_{REF+}: This is the input reference voltage for the ADC. In lower pin-count packages, V_{REF+} is shorted to V_{DDA}.

Table 7. PWR differences between STM32U0 and STM32G0

Feature	STM32U0 series	STM32G0x1 devices	STM32G0x0 devices
V_{DD} range	1.7 to 3.6 V		2.0 to 3.6 V
V_{DDIO2} range	N/A	1.65 to 3.6 V	N/A
VREFBUF	Yes		No
VBAT pin and RTC domain	Yes		
Dynamic voltage scaling	Yes (2 ranges)		
Low-power regulator	Yes		
Low-power modes	• Run • Low-power run • Sleep • Low-power sleep • Stop 0 • Stop 1 • Stop 2 • Standby • Shutdown • VBAT	• Run • Low-power run • Sleep • Low-power sleep • Stop 0 • Stop 1 • Standby • Shutdown • VBAT	• Run • Low-power run • Sleep • Low-power sleep • Stop 0 • Stop 1 • Standby • VBAT

Feature	STM32U0 series	STM32G0x1 devices	STM32G0x0 devices
Ultralow power enable (ENB_ULP)	Yes		No
Power supply supervisor	POR/PDR BOR PVD		POR/PDR

The STM32U0 series has an additional Stop mode compared to the STM32G0 series. To help calculate the new power budget and ease the comparison between the low-power modes, the user can refer to the power consumption calculator included in STM32CubeMX.

Table 8. STM32U0 series low-power modes

Mode	Regulator	CPU	Flash memory	SRAM	Clock	Peripheral	Consumption(1) (STM32U073)	Wake-up time
Run	Main regulator	On			Any	All available	78 µA/MHz at 48 MHz	N/A
Low-power run	Low-power regulator	On			Any	All available	80 µA/MHz at 2 MHz	5 µs
Sleep	Main regulator	Off	On		Any	All available	1.25 mA at 48 MHz	11 CPU cycles
Low-power sleep	Low-power regulator	Off	On		Any	All available	60 µA at 2 MHz	11 CPU cycles
Stop 0	Main regulator	Off	On	Retained	HSI16, LSE, LSI	RTC/TAMP, USART, I^2C, LPTIM, COMP	105 µA	2 µs
Stop 1	Low-power regulator	Off	On	Retained	HSI16, LSE, LSI	RTC/TAMP, USART, I2C, LPTIM, COMP	3.3 µA	5 µs
Stop 2	Low-power regulator	Off	On	Retained	HSI16, LSE, LSI	RTC/TAMP, USART, I2C, LPTIM, COMP	940 nA	5 µs
Standby	Off			Optional	LSI, LSE	IWDG, RTC/ TAMP	260 nA	30 µs
Shutdown	Off			Off (all content lost)	LSE	RTC/TAMP	235 nA	340 µs

1. *All consumption values are the typical value at T_a = 25 °C and V_{DD} = 3.0 V, with RTC enabled.*

Table 9. STM32G0 series low-power modes

Mode	Regulator	CPU	Flash memory	SRAM	Clock	Peripheral	Consumption(1) (STM32G071)	Wake-up time
Run	Main regulator	On	On	On	Any	All available	91 µA/MHz at 64 MHz	N/A
Low-power run	Low-power regulator	On	On	On	Any	All available	198 µA/MHz at 2 MHz	5 µs
Sleep	Main regulator	Off	On	On	Any	All available	1.8 mA at 64 MHz	11 CPU cycles
Low-power sleep	Low-power regulator	Off	On	On	Any	All available	60 µA at 2 MHz	11 CPU cycles
Stop 0	Main regulator	Off	On	Retained	HSI16, LSE, LSI	RTC/TAMP, USART, I²C, LPTIM, COMP	100 µA	2 µs
Stop 1	Low-power regulator	Off	On	Retained	HSI16, LSE, LSI	RTC/TAMP, USART, I²C, LPTIM, COMP	7.3 µA	5 µs
Standby	Off	Off	Off	Optional	LSI, LSE	IWDG, RTC/ TAMP	200 nA	30 µs
Shutdown(2)	Off	Off	Off	Off (all content lost)	LSE	RTC/TAMP	33 nA	340 µs

1. *All consumption values are the typical value at T_a = 25 °C and V_{DD} = 3.0 V.*
2. *Not available on STM32G0x0 devices.*

5.3 RTC/TAMP and backup registers

Table 10. RTC differences between the STM32U0 and STM32G0 series

Feature	STM32U0 series	STM32G0 series
Wake-up timer	Yes	
Number of alarms	2	
Timestamp feature	Yes	
Low-power mode	All	All except Shutdown
Calendar overflow	Yes	
TAMP	3 externals + 4 internals	
Backup register	9 × 32-bit	5 × 32-bit

5.4 Embedded bootloader

Table 11. Bootloader interfaces on the STM32U0 and STM32G0 series

Peripheral	Pins	STM32U0		STM32G0			
		STM32U031	STM32U073 STM32U083	STM32G030 STM32G031 STM32G041	STM32G050 STM32G051 STM32G061	STM32G070 STM32G071 STM32G081	STM32G0B0 STM32G0B1 STM32G0C1
USB DFU	USB_DM (PA11) USB_DP (PA12)	-	X	-			X(1)
USART1	USART1_RX (PA10) USART1_TX (PA9)	X					
USART2	USART2_RX (PA3) USART2_TX (PA2)	X					
USART3	USART3_RX (PC11) USART3_TX (PC10)	X		-		X	
I2C1	I2C1_SCL (PB6) I2C1_SDA (PB7)	X					
I2C2	I2C1_SCL (PB10) I2C1_SDA (PB11)	X					
SPI1	SPI1_MOSI (PA7) SPI1_MISO (PA6) SPI1_SCK (PA5) SPI1_NSS (PA4)	X		-		X	
SPI2	SPI2_MOSI (PB15) SPI2_MISO (PB14) SPI2_SCK (PB13) SPI2_NSS (PB12)	X		-		X	
FDCAN	FDCAN1_RX (PD0) FDCAN1_TX (PD1)	-	X	-			X(1)

1. *Not available on STM32G0B0 devices.*

5.5 NVIC

Table 12. Interrupt vector differences between the STM32U0 and STM32G0 series

Position	STM32U0 series	STM32G0 series	Address
0	WWDG/IWDG	WWDG	0x0000 0040
1	PVD/PVM	PVD/PVM	0x0000 0044
2	RTC/TAMP	RTC/TAMP	0x0000 0048
3	FLASH	FLASH	0x0000 004C
4	RCC/CRS	RCC/CRS	0x0000 0050
5	EXTI0_1	EXTI0_1	0x0000 0054
6	EXTI2_3	EXTI2_3	0x0000 0058
7	EXTI4_15	EXTI4_15	0x0000 005C
8	USB	UCPD1/UCPD2/USB	0x0000 0060
9	DMA1_CH1	DMA1_CH1	0x0000 0064
10	DMA1_CH2_3	DMA1_CH2_3	0x0000 0068
11	DMAMUX/DMA1_CH4 to 7/ DMA2_CH1 to 5	DMAMUX/DMA1_CH4 to 7/ DMA2_CH1 to 5	0x0000 006C
12	ADC/COMP	ADC/COMP	0x0000 0070
13	TIM1_BRK_UP_TRG_COM	TIM1_BRK_UP_TRG_COM	0x0000 0074
14	TIM1_CC	TIM1_CC	0x0000 0078
15	TIM2	TIM2	0x0000 007C
16	TIM3	TIM3/TIM4	0x0000 0080
17	TIM6/DAC/LPTIM1	TIM6/DAC/LPTIM1	0x0000 0084
18	TIM7/LPTIM2	TIM7/LPTIM2	0x0000 0088
19	TIM14	TIM14	0x0000 008C
20	TIM15	TIM15	0x0000 0090
21	TIM16	TIM16/FDCAN_IT0	0x0000 0094
22	TIM17	TIM17/FDCAN_IT1	0x0000 0098
23	I2C1	I2C1	0x0000 009C
24	I2C2/I2C3	I2C2/I2C3	0x0000 00A0
25	SPI1	SPI1	0x0000 00A4
26	SPI2/SPI3	SPI2/SPI3	0x0000 00A8
27	USART1	USART1	0x0000 00AC
28	USART2/LPUART2	USART2/LPUART2	0x0000 00B0
29	USART3/LPUART1	USART3/USART4/USART5/USART6/ LPUART1	0x0000 00B4
30	USART4/LPUART3	CEC	0x0000 00B8
31	AES/RNG	AES/RNG	0x0000 00BC

Note: As both series embed the same Cortex®-M0+ CPU, they also share the same CPU interrupt structure.

5.6 Memory mapping

The STM32U0 and STM32G0 series share the same memory mapping and register addresses for common peripherals.

5.7 FLASH

Table 13. FLASH differences between STM32U0 and STM32G0

Feature	STM32U0 series	STM32G0 series
ECC	Yes	
Dual bank	No	Yes(1)
Data width	72-bit (64-bit data + 8-bit ECC)	
Page size	2 Kbytes	
Subpage size	512 bytes	
Number of wait-states	3 levels: Zero wait-states One wait-state Two wait-states	

1. *Available only on 256-Kbyte and 512-Kbyte flash memory size devices.*

Table 14. Option-byte differences between the STM32U0 and STM32G0 series

Feature	STM32U0 series	STM32G0x1 devices	STM32G0x0 devices
RDP level	Level 0: No protection Level 1: Read protection Level 2: No debug		
WRP	Two areas	Two areas per bank	Two areas per bank
PCROP	No	Two areas per bank	No
Securable memory area	Yes	Yes	No
Boot lock	Yes	Yes	No
IRHEN	Yes	Yes	No
NRST pin configuration	Yes	Yes	No
UID	Yes	Yes	No

5.8 SRAM

Both series have SRAM with parity check. The data bus width is 36 bits because 4 bits are allocated for the parity check (1 bit per byte). By default, the parity check is disabled. Setting the RAM_PARITY_CHECK option bit in the user option byte enables the parity check.

Table 15. SRAM density between the STM32U0 and STM32G0 series

FLASH size	STM32U0 series SRAM size	STM32G0 series SRAM size (parity check disabled)
16 Kbytes	STM32U031x6: 12 Kbytes	STM32G031x4: 8 Kbytes
	STM32U0x3x6: 40 Kbytes	
32 Kbytes	STM32U031x6: 12 Kbytes	STM32G031x6/STM32G041x6/STM32G030x6: 8 Kbytes
	STM32U0x3x6: 40 Kbytes	STM32G051x6/STM32G061x6/STM32G050x6: 18 Kbytes
64 Kbytes	STM32U031x6: 12 Kbytes	STM32G031x8/STM32G041x8/STM32G030x8: 8 Kbytes
	STM32U0x3x6: 40 Kbytes	STM32G051x8/STM32G061x8/STM32G050x8: 18 Kbytes
		STM32G071x8/STM32G081x8: 36 Kbytes
128 Kbytes	STM32U0x3xB: 40 Kbytes	STM32G071xB/STM32G081xB/STM32G070xB: 36 Kbytes

FLASH size	STM32U0 series SRAM size	STM32G0 series SRAM size (parity check disabled)
256 Kbytes	STM32U0x3xB: 40 Kbytes	STM32G0B1xC/STM32G0C1xC: 144 Kbytes
512 Kbytes	-	STM32G0B1xE/STM32G0C1xE/STM32G0B0xE: 144 Kbytes

5.9 GPIO

Table 16. GPIO differences between the STM32U0 and STM32G0 series

Feature	STM32U0 series	STM32G0 series
Analog switch booster	Yes	
Clamping diode	No	Yes
Pin mux protection when multiple pins are bounded together	No	

5.10 SYSCFG

The STM32U0 and STM32G0 series implement the same SYSCFG features, except these product-specific features:

STM32U0 series:

- TSC-related settings in the SYSCFG_TSCCR register
- SRAM2:
  - Erase in the SYSCFG_SCR register
  - Protection in the SYSCFG_SKR register

STM32G0 series:

- XXX_CDEN bits in the CFGR2 register: these bits enable or disable the clamping diode.

5.11 ADC

Both the STM32U0 and STM32G0 series share the same 12-bit ADC with a sampling rate of up to 2.5 Msps.

Table 17. ADC channel list comparison for the STM32U0 and STM32G0 series

PIN	STM32U0 series		STM32G0 series	
	STM32U031	STM32U073 STM32U083	STM32G030 STM32G031 STM32G041 STM32G050 STM32G051 STM32G061	STM32G070 STM32G071 STM32G081 STM32G0B0 STM32G0B1 STM32G0C1
PA0	IN4		IN0	
PA1	IN5		IN1	
PA2	IN6		IN2	
PA3	IN7		IN3	
PA4	IN8		IN4	
PA5	IN9		IN5	
PA6	IN10		IN6	
PA7	IN14		IN7	
PA8	-			
VSENCE	IN12			

PIN	STM32U0 series		STM32G0 series	
	STM32U031	STM32U073 STM32U083	STM32G030 STM32G031 STM32G041 STM32G050 STM32G051 STM32G061	STM32G070 STM32G071 STM32G081 STM32G0B0 STM32G0B1 STM32G0C1
VREFINT	IN13			
VBAT/3	IN14			
PA11	-		IN15(1)	-
PA12	-		IN16(1)	-
PA13	-		IN17	-
PA14	-		IN18	-
VDDA	-			
VSSA	-			
PB0	IN17		IN8	
PB1	IN18		IN9	
PB2	-		IN10	
PB10	-		IN11	
PB11	-		IN15	
PB12	-		IN16	
PC0	IN0		-	
PC1	IN1		-	
PC2	IN2		-	
PC3	IN3		-	
PC4	IN15	-		IN17
PC5	IN16	-		IN18
PB7	-		IN11(1)	-

1. *Only on packages with less than 48 pins.*

5.11.1 Temperature sensor

Table 18. Temperature sensor comparison for the STM32U0 and STM32G0 series

Feature	STM32U0	STM32G0x1 devices	STM32G0x0 devices
Number of TS_CAL	2		1
VTS linearity	Typ: ±1 °C, Maximum: ±2 °C		

5.12 TSC

The STM32U0 series supports touch sensing, whereas the STM32G0 series does not.

5.13 USB

Both the STM32U0 and STM32G0 series have a compatible USB peripheral.

5.14 USART, CRC, CRS, IWDG, and WWDG

Both the STM32U0 and STM32G0 series share the same peripheral and they are fully compatible.

5.15 I2C

STM32G0 supports System Management Bus (SMBus) and Power Management Bus (PMBus), which are compatible with I2C. This feature is not embedded in the STM32U0 series.

5.16 FDCAN

The STM32G0 series supports FDCAN, whereas the STM32U0 series does not.

5.17 SPI

Both series share the same peripheral and they are fully compatible. However, due to differences in maximum clock frequency, the maximum speed for the STM32U0 series is 27 MHz (f_{PCLK} / 2), while for the STM32G0 series it is 32 MHz (f_{PCLK} / 2).

5.18 DMA and DMAMUX

Both series share the same peripheral architecture. When the same peripherals are available on both products, their DMA assignment of multiplexer inputs to resources, trigger inputs to resources, and synchronization inputs to resources are identical.

5.19 Timer

The STM32U0 and STM32G0 series share the same timer features and instance names. They are described in Table 19.

Refer to Table 21 to compare the timer instances between both series.

Table 19. Timer feature comparison for the STM32U0 and STM32G0 series

Timer type	Timer	Counter resolution	Counter type	Prescaler factor	DMA request generation	Capture/ compare channels	Complementary outputs
Advanced control	TIM1	16-bit	Up, down, up/down	Integer from 1 to 2 × 16	Yes	4 + 2 internal	3
General purpose	TIM2	32-bit	Up, down, up/down	Integer from 1 to 2 × 32	Yes	4	-
	TIM3	16-bit	Up, down, up/down	Integer from 1 to 2 × 16	Yes	4	-
	TIM4	16-bit	Up, down, up/down	Integer from 1 to 2 × 16	Yes	4	-
	TIM14	16-bit	Up	Integer from 1 to 2 × 16	No	1	-
	TIM15	16-bit	Up	Integer from 1 to 2 × 16	Yes	1	1
	TIM16 TIM17	16-bit	Up	Integer from 1 to 2 × 16	Yes	1	1
Basic	TIM6 TIM7	16-bit	Up	Integer from 1 to 2 × 16	Yes	-	-

The STM32U0 series embeds upgraded LPTIM features compared to the STM32G0 series. It supports up to four capture/compare channels and a repetition counter.Table 20 below lists the low-power timer features of both series.

Table 20. Low-power feature comparison for the STM32U0 and STM32G0 series

STM32 series	Timer	Counter resolution	Counter type	Prescaler factor	DMA request generation	Capture/ compare channels	Complementary outputs	Repetition counter
STM32G0	LPTIM1 LPTIM2	16-bit	Up	2 × n where n = 0 to 7	No	N/A	-	No
STM32U0	LPTIM1 LPTIM2 LPTIM3	16-bit	Up	2 × n where n = 0 to 7	No	4 2 4	-	Yes

Table 21. Timer instance comparison between the STM32U0 and STM32G0 series

Feature	Time instance	STM32U0		STM32G0					
		STM32U031	STM32U073 STM32U083	STM32G031 STM32G041	STM32G051 STM32G061 STM32G071 STM32G081	STM32G0B1 STM32G0C1	STM32G030	STM32G050 STM32G070	STM32G0B0
Advance timer (16-bit)	TIM1	X		X(1)			X		
General purpose (32-bit)	TIM2	X					-		
General purpose (16-bit)	TIM3, TIM14, TIM16	X							
	TIM4	-				X	-		X
	TIM15	-	X	-	X(1)		-	X	
	TIM17	-		X					
Basic	TIM6, TIM7	-			X		-	X	
Low power	LPTIM1, LPTIM2	-		X			-		
	LPTIM3	-	X	-					

1. *Timer with 2 × maximum CPU frequency capable*

6 Software migration

This section describes how to migrate an application based on the STM32Cube MCU package.

The STM32U0 and STM32G0 series devices are part of the STM32Cube tool suite (which includes, among others, STM32CubeMX, and STM32CubeIDE, STM32CubeProgrammer).

Both series have the same architecture and are CMSIS compliant; they use the same driver naming and the same APIs for all common peripherals. Concerning the software migration, they use the same STM32Cube firmware libraries methodology with HAL and LL, as with all STM32 products. Using the HAL facilitates migration between the series, while the LL can be slightly different, especially for the RCC and PWR libraries.

Software migration can be executed using one of the following two methods:

- Manual library replacement: this method involves manually replacing the libraries.
- Using STM32CubeMX: this method is easier and reduces the risk of compilation errors.

The second method, using STM32CubeMX, is recommended as it simplifies the process and minimizes the risk of errors.

6.1 Software migration by replacing the libraries in hardware

To update the application code to run on the STM32U0xx library, follow these steps:

1. Update the toolchain startup files:
   a. Project files: device connections and flash memory loader. These files are provided with the latest version of the toolchain that supports STM32U0xx devices. For more information, the users must refer to the toolchain documentation.
   b. Linker configuration and vector table location files: templates of these files, developed following the CMSIS standard, are included in the STM32Cube installation package in the following directory: `Drivers\CMSIS\Device\ST\STM32U0xx\Source\Templates`.
2. Replace STM32U0xx library source files with the application sources:
   a. Replace the `STM32G0xx_conf.h` file with `STM32U0xx_conf.h`
   b. Replace the existing `STM32G0xx_it.c/STM32G0xx_it.h` files with `STM32U0xx_it.c/STM32U0xx_it.h`

However, the RCC and PWR parts must be manually reworked to adapt the software to the new clock tree and power scheme architecture (refer to Section 5.1 and Section 5.2 for more details).

Moreover, in the `_it.c` and `_it.h` files, the functions must be updated to the new names, which can be found in the startup file.

6.2 Software migration by creating a new STM32CubeMX project

1. Create a new STM32CubeMX project with the chosen product.
   a. Pinout and configuration: configure the product according to the previous configuration (such as analog channel and USART).
   b. Clock configuration: choose the dedicated clock tree (such as system clock or peripheral clock) following the previous configuration.
   c. Project manager: in the advanced settings, select the appropriate "Driver selector" based on the driver used in the previous configuration.
   d. Generate the project.
2. Open the desired IDE.
   a. Add all functions written in the previous project inside the STM32Cube tag (`main.c`, `main.h`, `_it.c`, and `_it.h`).
   b. Compile and run.

Some compilation errors can appear when a function is available on one product but not on the other. For example, functions linked to unlocking or locking the RTC domain are not available in the STM32U0 series.

7 Hardware development boards available

Nucleo-64 boards

Nucleo-64 boars are the mainstream boards designed to allow the user to learn about and evaluate the features of an STM32 device.

They use a simple PCB that is common to all Nucleo-64 boards. This includes ST-LINK for chip debugging and to provide an RX-TX link between the computer and the MCU.

To help users with quick prototyping, the Nucleo board typically includes:

- Two buttons (one user button and one reset button).
- Two LEDs (one user LED and one power-up LED).

It is also possible to use add-ons that are compatible with the ARDUINO® Uno and ST morpho connector.

Discovery boards

Discovery boards are more affordable compared to Nucleo boards. They are relatively simple pieces of hardware designed to test the key features of the product.

Evaluation board

The STM32 evaluation boards have been designed as a complete demonstration and development platform for STM32 MCUs.

They include external circuitry, such as transceivers, sensors, memory interfaces, displays, and many more. The evaluation boards can be considered as a reference design for application development.

Table 22. Hardware development boards available for the STM32U0 series

Board	STM32U031	STM32U073	STM32U083
Nucleo	NUCLEO-U031R8	-	NUCLEO-U083RC
Discovery	-	-	STM32U083C-DK

Table 23. Hardware development boards available for the STM32G0 series

Board	STM32G030 STM32G031 STM32G041	STM32G050 STM32G051 STM32G061	STM32G070 STM32G071 STM32G081	STM32G0B0 STM32G0B1 STM32G0C1
Nucleo	NUCLEO-G031K8	-	NUCLEO-G071RB NUCLEO-G070RB	NUCLEO-G0B1RE
Discovery	STM32G0316-DISCO	-	STM32G071B-DISCO	-
Evaluation	-	-	STM32G081B-EVAL	STM32G0C1E-EV

Revision history

Table 24. **Document revision history**

Date	Version	Changes
21-Jan-2025	1	Initial release

Contents

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