**GPIO**

Subject to the specific hardware characteristics of each I/O port listed in the datasheet, each port bit of the General-Purpose IO (GPIO) Ports, can be individually configured by software in several modes:

* Input mode
* Analog mode
* Output mode
* Alternate function mode
* External interrupt/event lines

During and just after reset, the alternate functions and external interrupt lines are not active and the I/O ports are configured in input floating mode.

All GPIO pins have weak internal pull-up and pull-down resistors, which can be activated or not.

In Output or Alternate mode, each IO can be configured on open-drain or push-pull type and the IO speed can be selected depending on the VDD value.

All ports have external interrupt/event capability. To use external interrupt lines, the port must be configured in input mode. All available GPIO pins are connected to the 16 external interrupt/event lines from EXTI0 to EXTI15.

The external interrupt/event controller consists of up to 23 edge detectors (16 lines are connected to GPIO) for generating event/interrupt requests (each input line can be independently configured to select the type (interrupt or event) and the corresponding trigger event (rising or falling or both). Each line can also be masked independently.

**How to use this driver**

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1. Enable the GPIO AHB clock using the following function: **\_\_HAL\_RCC\_GPIOx\_CLK\_ENABLE().**
2. Configure the GPIO pin(s) using **HAL\_GPIO\_Init().**

* Configure the IO mode using "Mode" member from **GPIO\_InitTypeDef** structure
* Activate Pull-up, Pull-down resistor using "Pull" member from **GPIO\_InitTypeDef** structure.
* In case of Output or alternate function mode selection: the speed is configured through "Speed" member from **GPIO\_InitTypeDef** structure.
* In alternate mode is selection, the alternate function connected to the IO is configured through "Alternate" member from **GPIO\_InitTypeDef** structure.
* Analog mode is required when a pin is to be used as ADC channel or DAC output.
* In case of external interrupt/event selection the "Mode" member from
* **GPIO\_InitTypeDef** structure select the type (interrupt or event) and the corresponding trigger event (rising or falling or both).

1. In case of external interrupt/event mode selection, configure NVIC IRQ priority mapped to the EXTI line using **HAL\_NVIC\_SetPriority()** and enable it using **HAL\_NVIC\_EnableIRQ().**
2. To get the level of a pin configured in input mode use **HAL\_GPIO\_ReadPin().**
3. To set/reset the level of a pin configured in output mode use **HAL\_GPIO\_WritePin()/HAL\_GPIO\_TogglePin().**
4. To lock pin configuration until next reset **use HAL\_GPIO\_LockPin().**
5. During and just after reset, the alternate functions are not active and the GPIO pins are configured in input floating mode (except JTAG pins).
6. The LSE oscillator pins OSC32\_IN and OSC32\_OUT can be used as general purpose (PC14 and PC15, respectively) when the LSE oscillator is off. The LSE has priority over the GPIO function.
7. The HSE oscillator pins OSC\_IN/OSC\_OUT can be used as general purpose PH0 and PH1, respectively, when the HSE oscillator is off. The HSE has priority over the GPIO function.