

# TLE9893\_2QKW62S\_PMU\_STOP\_EXTRG

## About this document

### Scope and purpose

The aim of this guide is to present the scope, the implementation, the algorithm and a demonstration of the **TLE9893\_2QKW62S\_PMU\_STOP\_EXTRG** example code for the TLE98xx Infineon Embedded Power ICs based on Arm® Cortex® M3. This example code can be found in the Keil µVision Pack Installer.

The full functionalities and characteristics of the embedded power devices are described in the datasheet and user's manual. Please refer to these documents for more detailed information. Furthermore, a low level (line-by-line) description of the code is not the aim of this document, although occasionally some code blocks might be reported if necessary to the comprehension.

*Note: The following information is given as a hint for the implementation of the system only and shall not be regarded as a description or warranty of a certain functionality, condition or quality of the referred devices or presented software example.*

### Intended audience

Design engineers, system engineers, embedded power designers.

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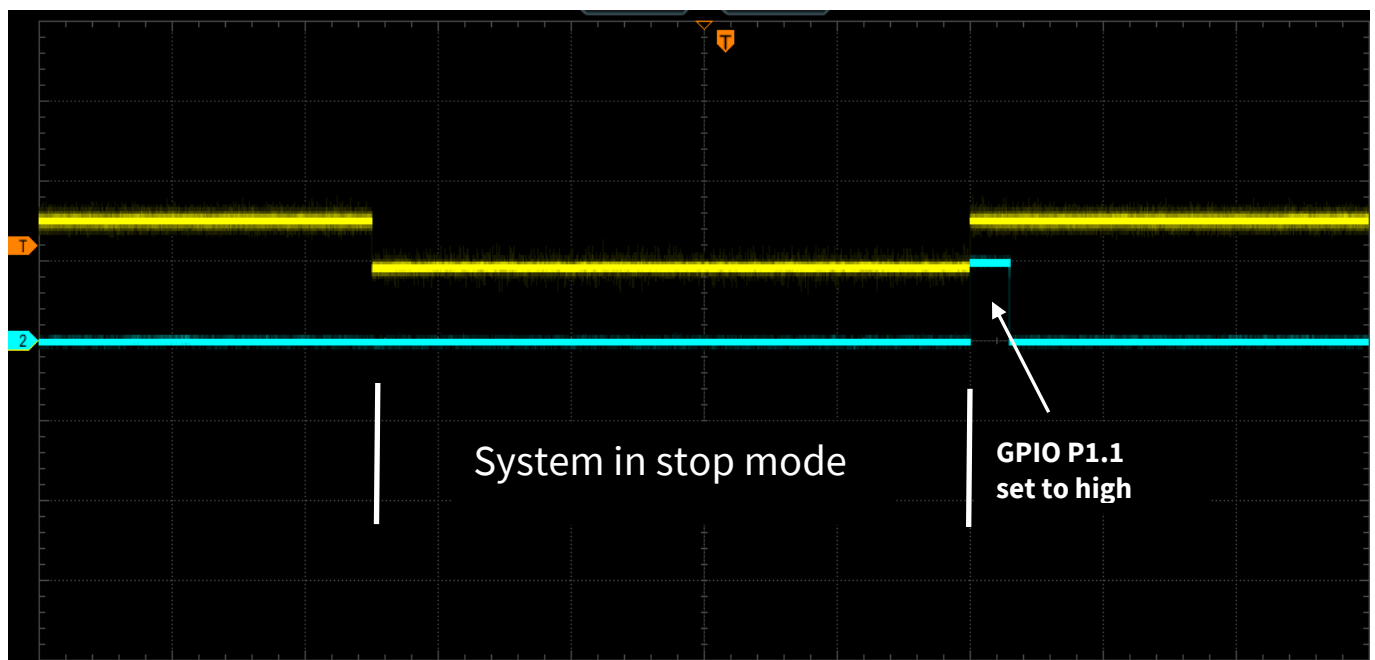
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## 1 Introduction

In this TLE9893\_2QKW62S\_PMU\_STOP\_EXTRG example, the VDDC signal is captured (yellow signal). The blue signal captures the signal on the GPIO P1.1 pin.

If the system enters the stop mode, the VDDC power supply is reduced from 1.5V to 0.9V which can be seen by the falling edge.

Within the stop mode, the GPIO P1.1 pin is set to high for a short period of time and the system exits the stop mode. The VDDC is supplied with 1.5V again.



*Figure 1 Capture of VDDC signal(yellow) and GPIO P1.1 signal (blue)*

## 2 Hardware

This chapter shows how to run the TLE9893\_2QKW62S\_PMU\_STOP\_EXTRG example with the TLE988X/TLE989X evaluation board. For this, the project must be opened and compiled.

Figure 2 shows the TLE988X/TLE989X evaluation board. The application code must be loaded via a debugger (e.g. ULINK or J-Link) to the board. The board must be powered with 12V (red and black connections).

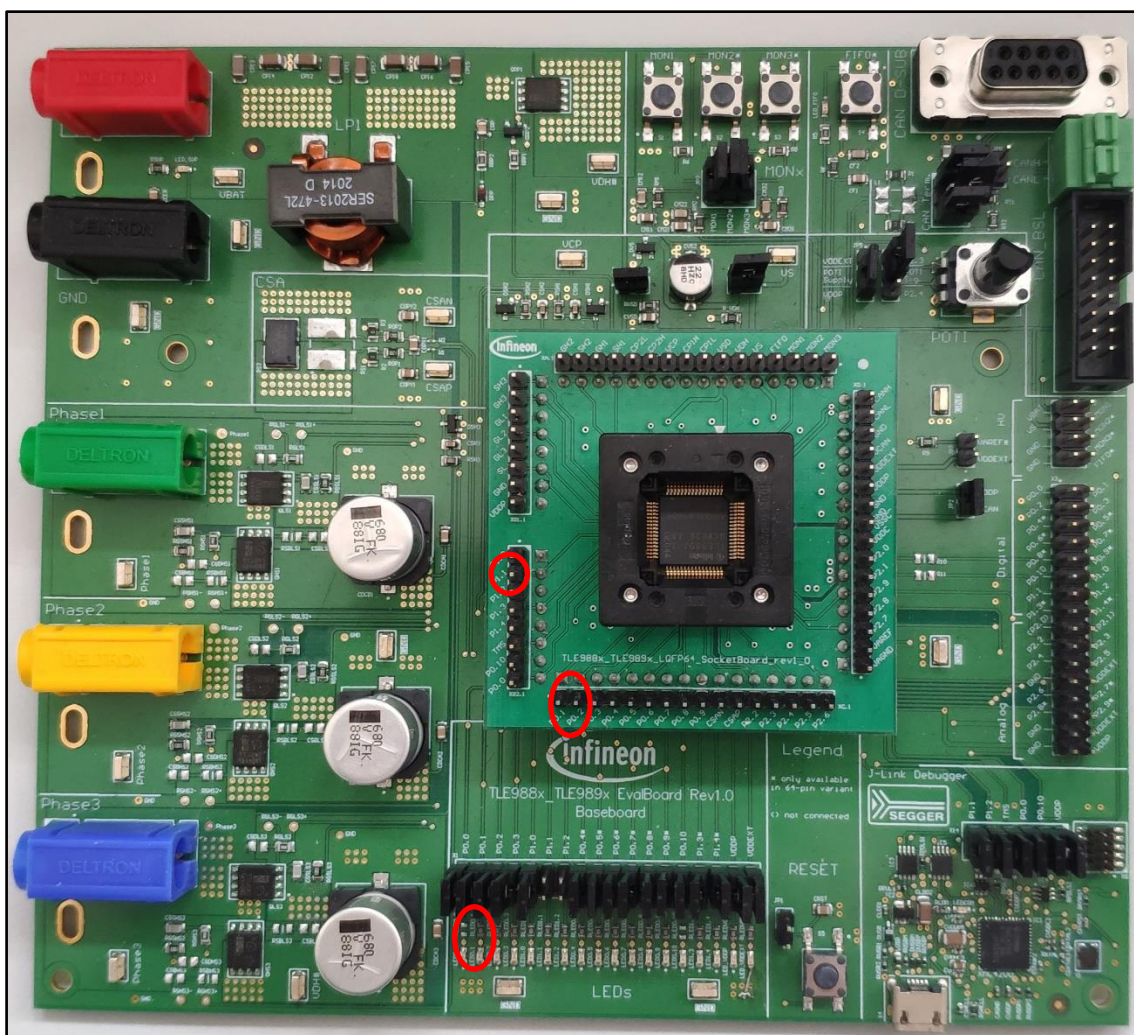


Figure 2 TLE988X/TLE989X evaluation board

If the system is in the normal operation mode, the LED 0.2 is on. If there is a high signal on GPIO P0.1, the system enters the stop mode.

The system can be woken up from the stop mode when the GPIO P1.1 pin is set to high.

## 3 Implementation

This chapter shows the process to follow to get a working TLE9893\_2QKW62S\_PMU\_STOP\_EXTRG example.

### 3.1 Get the example via the Pack Installer for Keil

Open the Pack Installer within the Keil IDE. See Figure 3 below.

Choose the appropriate device (here TLE9893\_2QKW62S) on the left-hand side. On the right-hand side, select the tab Examples, where you can access the TLE9893\_2QKW62S\_PMU\_STOP\_EXTRG example.

Clicking on “Copy” will copy the example on your computer and open it.

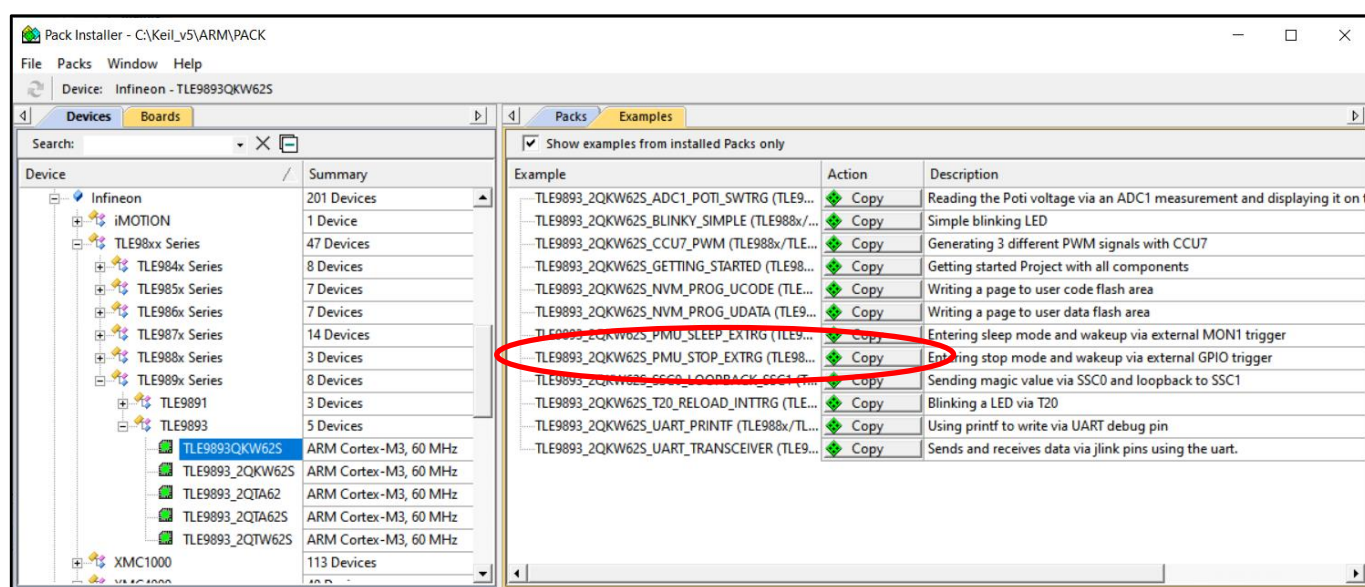


Figure 3 Keil Pack Installer

### 3.2 Configuration

In order to see the configured pins, start the tool Config Wizard. It is available within the Keil IDE through a shortcut in the Tools menu.

The Config Wizard opens and shows an overall status of the current pin configuration. The pin P0.1 is used as input signal. If this signal is high, the system enters the stop mode. The pin P0.2 is configured as output signal and controls the LED0.2. If the system is in the normal operating mode, the LED is on. If the system is in the stop mode, the LED is off.

The GPIO P1.1 pin is the configured wakeup signal. If the signal on pin P1.1 becomes high (e.g. by connecting a power supply to this pin), the system leaves the stop mode.

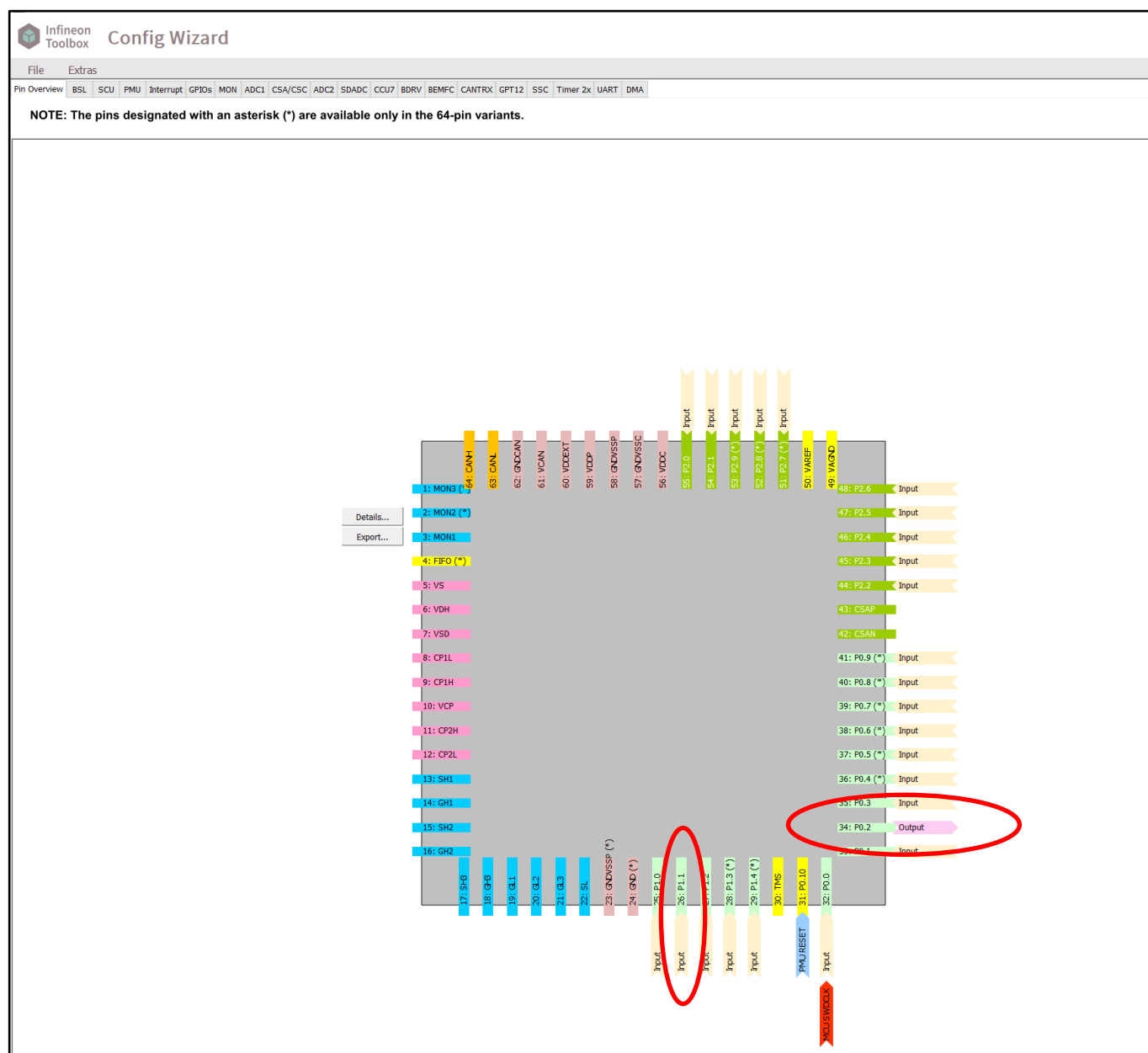


Figure 4 Config Wizard pin overview

In order to change the PMU configuration for the TLE9893\_2QKW62S\_PMU\_STOP\_EXTRG example, select the PMU tab.

Figure 5 shows the available components for the PMU module. In this example, all wake-up sources are disabled except the GPIO\_0 click box (see the orange box).

In the GPIO\_0 configuration box within the wake-up controls (right hand side of the wake-up sources), the input pin is set to P1.1. The falling and rising edge for this wake-up source are enabled as well.



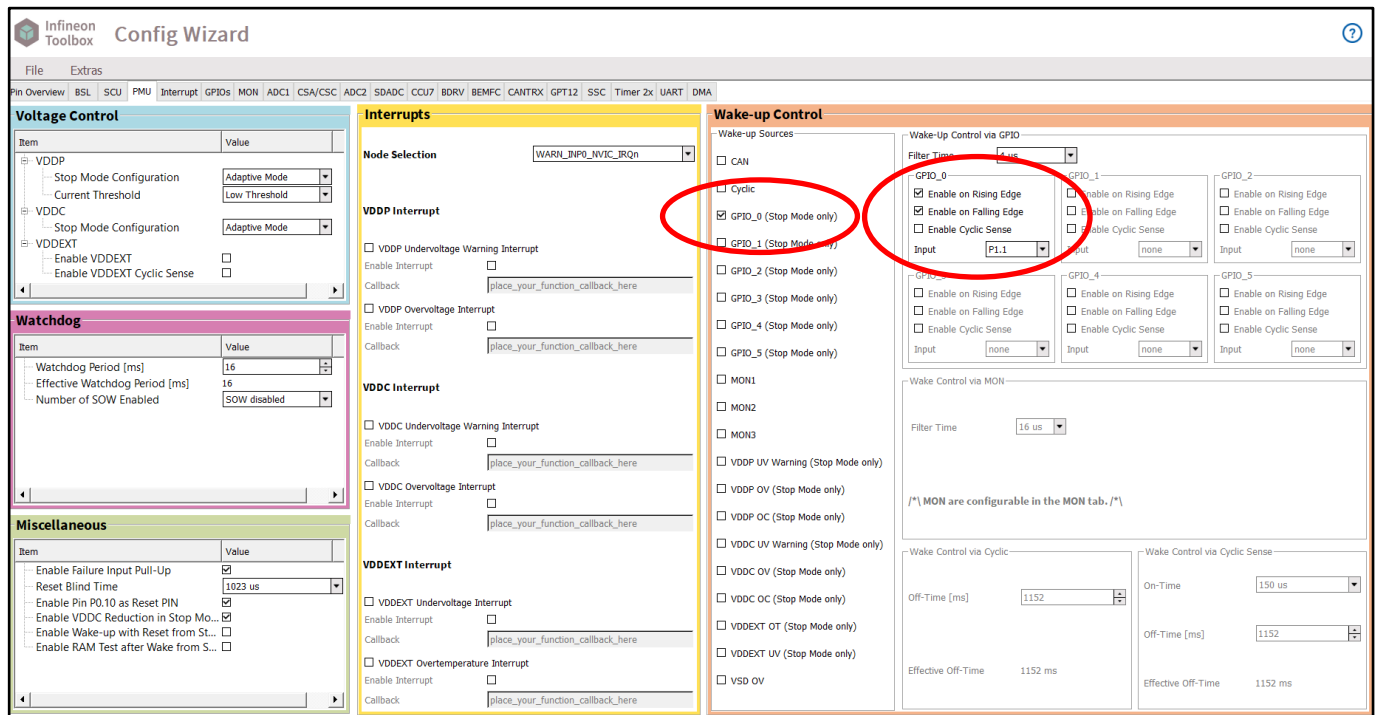


Figure 5 Config Wizard, module PMU

Additionally, within the GPIO tab, the pin P0.2 is configured as output to show the normal operation mode with a lightning LED. When the system is in the stop mode, this LED is switched off.

Finally, save your configuration to take these changes into account (File -> Save).

### 3.3 Sample code

Figure 6 shows the application code of the TLE9893\_2QKW62S\_PMU\_STOP\_EXTRG application.

Within the main endless loop, the LED 0.2 is set to high as long as there is no high signal on GPIO P0.1 (line 99) detected.

If the GPIO P0.1 becomes high, the system enters the stop mode (line 103). Power supplies (e.g. VDDC, etc.) are reduced. Therefore, the LED is also switched off. The system stays in the stop mode even if the high signal on GPIO P0.1 is removed.

If a wake-up signal on the pin P1.1 by setting this pin to high is detected, the system exits the stop mode and the LED is switched on again (the high signal on GPIO P0.1 must be removed as well).

```
93     for (;;)
94     {
95         /* Main watchdog1 (WDT1) service */
96         (void) PMU_serviceFailSafeWatchdog();
97
98         /* Check if GPIO 0.1 is high. */
99         if (GPIO_P01_HIGH == GPIO_getP01State())
100         {
101             GPIO_setP02State(GPIO_STATE_LOW);
102             /* Enter stop mode. Pl.1 is configured as wakeup signal. */
103             SCU_enterStopModeWithoutResetWakeup();
104         }
105         else
106         {
107             /* If the cpu is not in stop mode set GPIO 0.2 to high. */
108             GPIO_setP02State(GPIO_STATE_HIGH);
109         }
110     }
```

Figure 6 TLE9893\_2QKW62S\_PMU\_STOP\_EXTRG application code

## References

A Reference. See the code examples at [www.infineon.com](http://www.infineon.com)



## Revision history

Document version	Date of release	Description of changes
1.0	2021-03-29	Initial version
1.1	2022-10-13	Editorial changes

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