

# TLE9893\_2QKW62S\_T20\_RELOAD\_INTTRG

## 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\_2QKW62D\_T20\_RELOAD\_INTTRG** example code for the TLE989x 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 datasheets 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

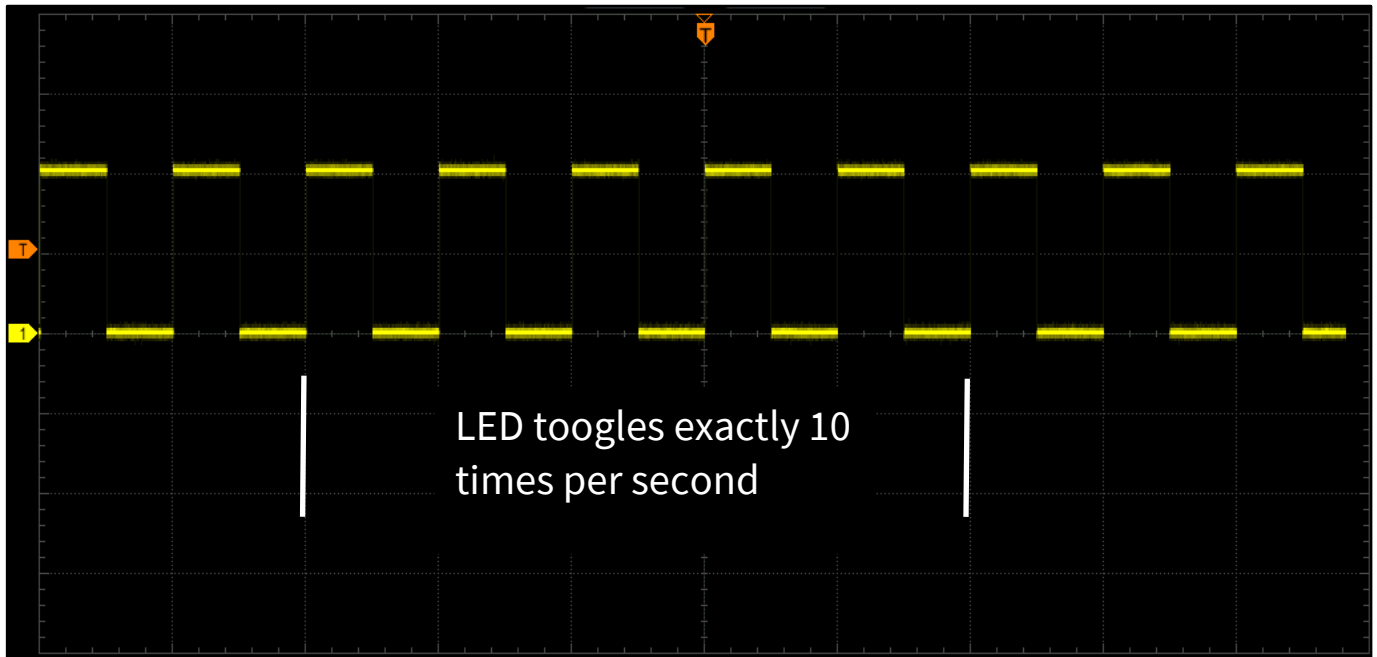
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## 1 Introduction

In this example, the signal is captured at the GPIO pin P0.1.

An interrupt is triggered every 100ms, which toggles the LED on the pin P0.1. This means the LED toggles exactly 10 times in a second.



*Figure 1 Capture of GPIO P0.1 signal*

## 2 Hardware

This chapter shows how to run the TLE9893\_2QKW62S\_T20\_RELOAD\_INTTRG 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). Then the LED at P0.1 is flashing (second LED from the left-hand side).

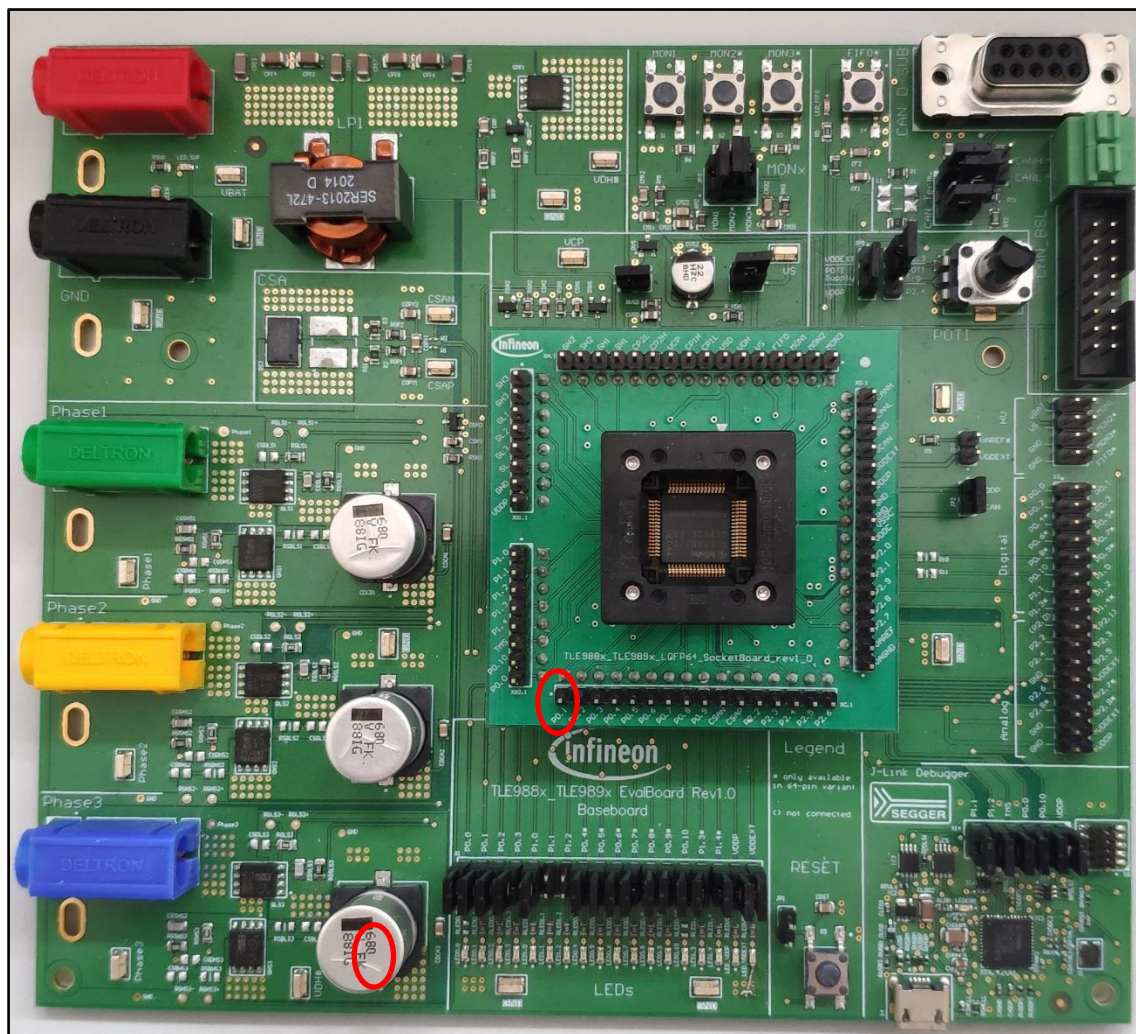


Figure 2 TLE988X/TLE989X evaluation board

The LED connected on GPIO pin P0.1 toggles exactly 10 times a second.

## 3 Implementation

This chapter shows the process to follow to get a working TLE9893\_2QKW62\_T20\_RELOAD\_INTTRG 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 example TLE9893\_2QKW62S\_T20\_RELOAD\_INTTRG.

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

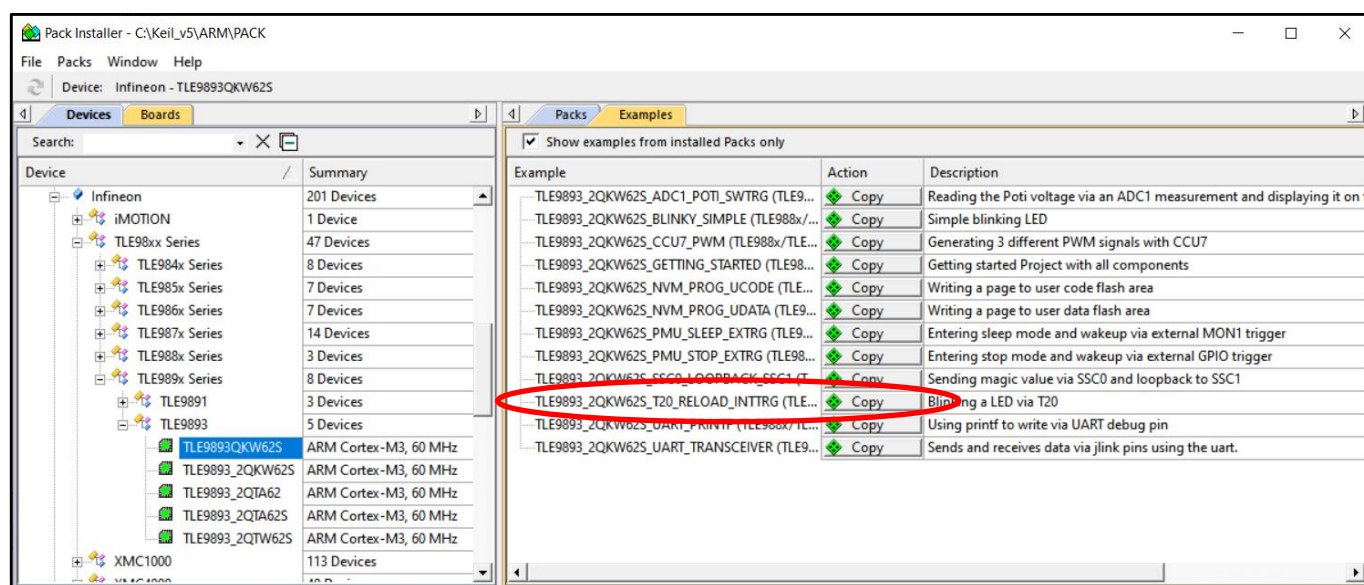


Figure 3 Keil Pack Installer

### 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. In Figure 4 the GPIO P0.1 is used as output signal to toggle the LED.

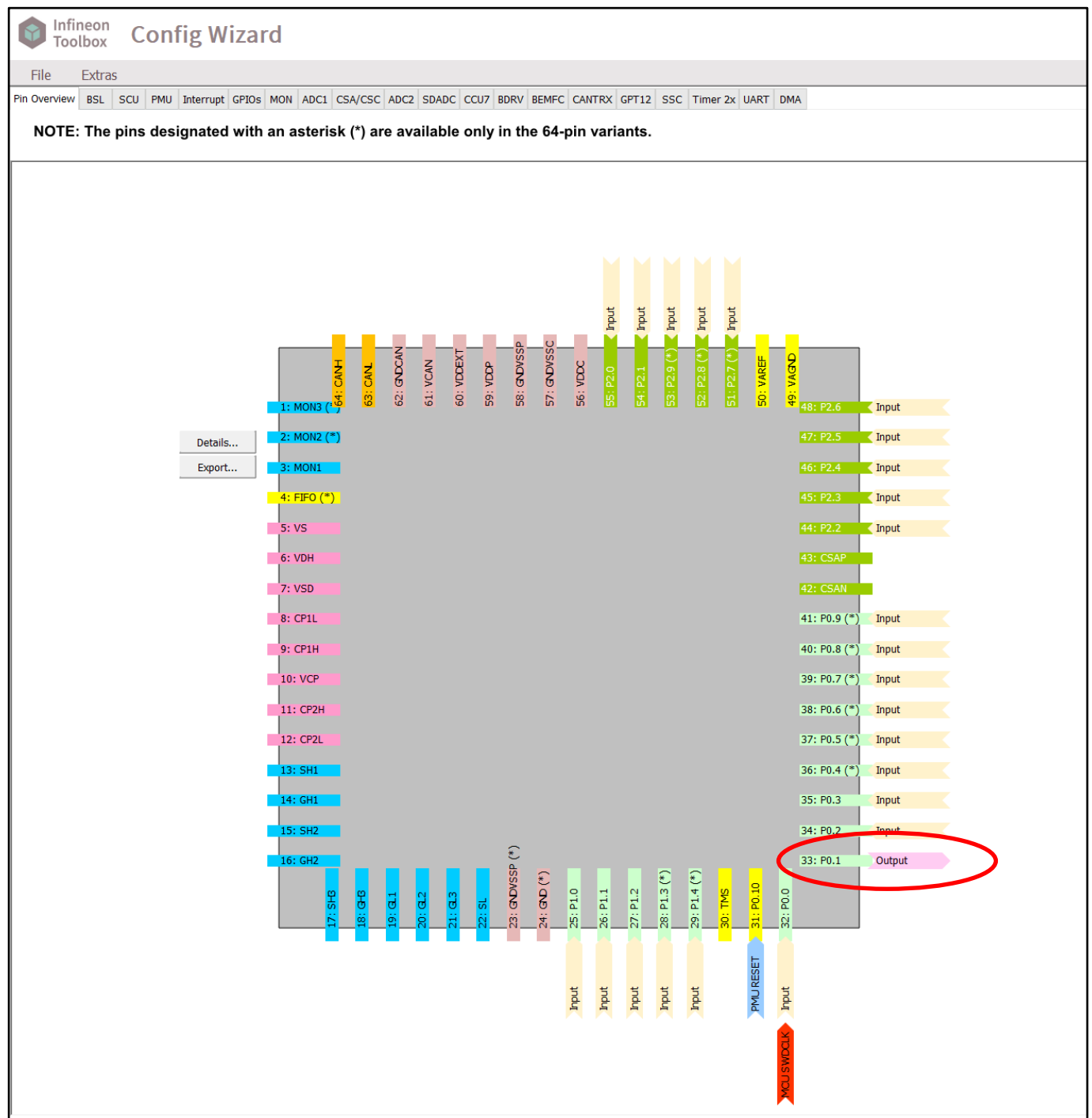


Figure 4 Config Wizard pin overview

In order to change the timer configuration, click on the Timer2x tab, where you can see all available Timer2x settings.

Figure 5 shows the available components for the Timer2x module. In this example the timer T20 is enabled.

In the Clock Settings box (blue), the clock prescaler is set to a divisor of 128. Since the core clock is set to 60MHz, the effective clock output is 468.750kHz (60MHz / 128).

Within the Interrupt box (pink), the underflow/overflow interrupt is set and enabled. Additionally, a function callback name for the interrupt is defined (here `t20_reload_inttrg`).

Next, the reload register is set to 100000µs. This means that the interrupt callback is triggered exactly 10 times each second.

The screenshot displays the Infineon Config Wizard interface for configuring module T20. The 'T20 Configuration' section is expanded, showing four sub-sections: Clock Settings, External Event, Interrupt, and Timer Register. In the 'Clock Settings' section, 'Timer' is selected for Clock Selection and 'fPER / 128' is selected for Clock Prescaler. In the 'Interrupt' section, 'Overflow/Underflow Interrupt' and 'Enable Underflow/Overflow Interrupt' are checked, and the callback is set to 't20\_reload\_inttrg'. In the 'Timer Register' section, the 'Timer Register' is set to 1 and the 'Reload/Capture Register' is set to 100000 µs. The 'T20 Diagram' on the right shows the internal timer structure, including the Prescaler (fPER = 60 MHz / 128), the Timer T20 CNT Register, the Timer T20 RC Register, and the T20 IRQ output.

Figure 5 Config wizard, module T20

Additionally, within the GPIO module tab, the pin P0.1 is configured as output to switch the appropriate LED on and off continuously.

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\_T20\_RELOAD\_INTTRG application.

Within the main function, the Timer module T20 is started (line 85). Then the system runs within the endless loop serving the watchdog periodically.

The configured callback function name is implemented from line 95 to 99. Within this callback, the GPIO P0.1 pin is toggled (line 98). The interrupt service callback is triggered continuously from the timer module and is exactly called 10 times a second.

```
81      /* Clear bridge driver status flags */
82      BDRV->STSCLR.reg = 0xFFFFFFFFU;
83
84      /* Start timer T20 */
85      T20_start();
86
87      for (;;)
88      {
89          /* Main watchdog service */
90          (void) PMU_serviceFailSafeWatchdog();
91      }
92
93
94      /* Callback of timer T20 */
95      void t20_reload_inttrg()
96      {
97          /* Toggle GPIO pin P0.1 */
98          GPIO_setP01State(GPIO_STATE_TOGGLE);
99      }
100
```

Figure 6 TLE9893\_2QKW62S\_T20\_RELOAD\_INTTRG application code

## References

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



## Revision history

Document version	Date of release	Description of changes
1.0	2021-06-21	Initial version
1.1	2022-10-13	Editorial changes

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