

# GPT12\_Timer\_Interrupt\_1 for KIT\_AURIX\_TC375\_LK

## GPT12 Timer Interrupt

AURIX™ TC3xx Microcontroller Training  
V1.0.0



[Please read the Important Notice and Warnings at the end of this document](#)

## Scope of work

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**The GPT12 module generates an interrupt each 500 ms and toggles an LED.**

The timer T3 of the GPT12 module is configured to trigger an interrupt each 500 ms. In its interrupt service routine, an LED is toggled.

# Introduction

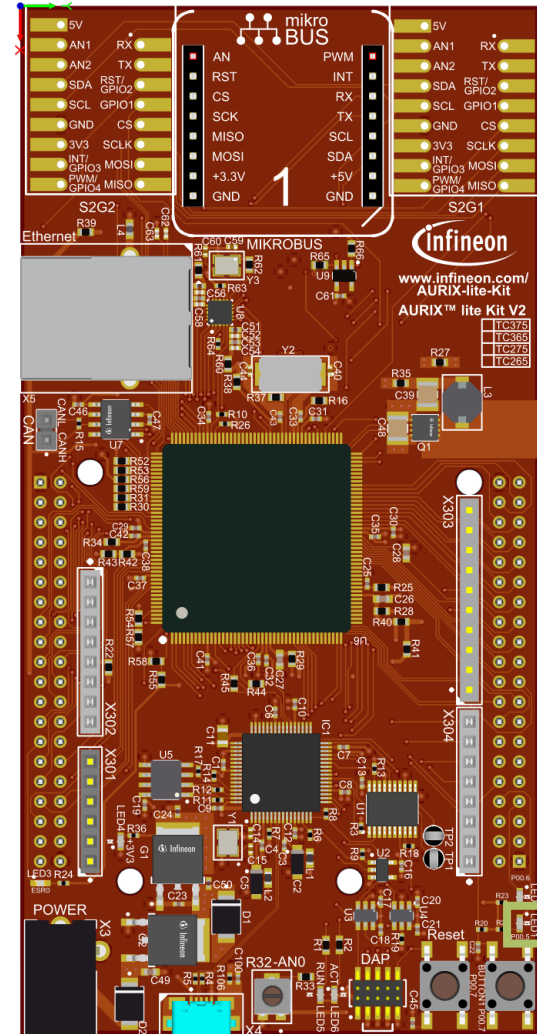
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- › The General Purpose Timer Unit (GPT12) consists of two GPT blocks (GPT1 and GPT2)
- › Each block has a multifunctional timer structure which incorporates several 16-bit timers
- › Block GPT1 contains three timers: The core timer T3 and two auxiliary timers T2 and T4
- › All timers of block GPT1 can run in one of four modes: Timer Mode, Gated Timer Mode, Counter Mode or Incremental Interface Mode
- › In this example, the timer T3 is used in timer mode. The count direction is configured to “down-counting”. On an underflow event of timer T3 the value of timer T2 is transferred into timer T3

# Hardware setup

This code example has been developed for the board KIT\_A2G\_TC375\_LITE.

LED1 (1) is used for this example.



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# Implementation

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## Configuring GPT12 Module

Configuration of the GPT12 is done once in the function ***initGpt12Timer()*** by the following steps:

- › Enable GPT12 module by calling the iLLD function ***IfxGpt12\_enableModule()***
- › Set the GPT1 prescaler with the iLLD function ***IfxGpt12\_setGpt1BlockPrescaler()***
- › Configure the mode of timer T3 by using the iLLD function ***IfxGpt12\_T3\_setMode()***
- › Set the counting direction of the timer T3 by calling the iLLD function ***IfxGpt12\_T3\_setTimerDirection()***
- › Set the prescaler of timer T3 by calling the iLLD function ***IfxGpt12\_T3\_setTimerPrescaler()***
- › Set the timer value with the iLLD function ***IfxGpt12\_T3\_setTimerValue()*** and use an ***uint16*** number as parameter
- › Start the timer T3 by calling the iLLD function ***IfxGpt12\_T3\_run()***

The above configuration functions are provided by the iLLD header ***IfxGpt12.h***.

# Implementation

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## Configuring timer T2 to reload timer T3

Configuration of the timer T2 is done once in the function ***initGpt12Timer()*** by the following steps:

- › Configure the timer T2 in reload mode by using the iLLD function ***IfxGpt12\_T2\_setMode()***
- › Set the trigger event for reload of timer T3 by using the iLLD function ***IfxGpt12\_T2\_setReloadInputMode()***
- › Set an ***uint16*** reload value with the iLLD function ***IfxGpt12\_T2\_setTimerValue()*** (the register has 16-bit length)

The above configuration functions are provided by the iLLD header ***IfxGpt12.h***.

# Implementation

## Reload Value calculation example

Calculate the reload value to adjust to a period of 500 ms. This value needs to fit into 16-bit. In order to get a high resolution, the prescaler values should be as low as possible.

- › GPT12 module base frequency  $f_{GPT} = 100 \text{ MHz}$
- › 500 ms period corresponds to a frequency  $f$  of 2 Hz
- › The GPT1 block prescaler is set to ***IfxGpt12\_Gpt1BlockPrescaler\_16***, therefore  $f_{GPT}$  is divided by **16**
- › The timer prescaler is set to ***IfxGpt12\_TimerInputPrescaler\_64***, therefore  $f_{GPT}$  is divided by **64**

$$\text{Reload Value} = \frac{f_{GPT}}{\mathbf{Gpt1BlockPrescaler * TimerInputPrescaler * f}}$$

$$\text{Reload Value} = \frac{100 \text{ MHz}}{16 * 64 * 2 \text{ Hz}} = 48828$$

# Implementation

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## Configuring the interrupt for GPT12

Configuration of the interrupt is done once in the function ***initGpt12Timer()*** by the following steps:

- Get the address of timer T3 service request with the iLLD function ***lfxGpt12\_T3\_getSrc()***
- Initialize GPT12 interrupt by calling ***lfxSrc\_init()*** with a pointer to the address of the timer T3 service request, the interrupt provider and the interrupt priority number as parameters
- Enable GPT12 interrupt with the iLLD function ***lfxSrc\_enable()*** and the pointer to the address of timer T3 service request as parameter

The function ***lfxGpt12\_T3\_getSrc()*** is provided by the header ***lfxGpt12.h*** and the functions ***lfxSrc\_init()*** and ***lfxSrc\_enable()*** are provided by the header ***lfxSrc.h***.



# Implementation

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## Configuring the LED

The LED is configured and toggled by controlling the port pin to which it is connected.

In the setup phase, the port pin is configured as **output push-pull mode** using the function ***IfxPort\_setPinModeOutput()***.

## The Interrupt Service Routine (ISR)

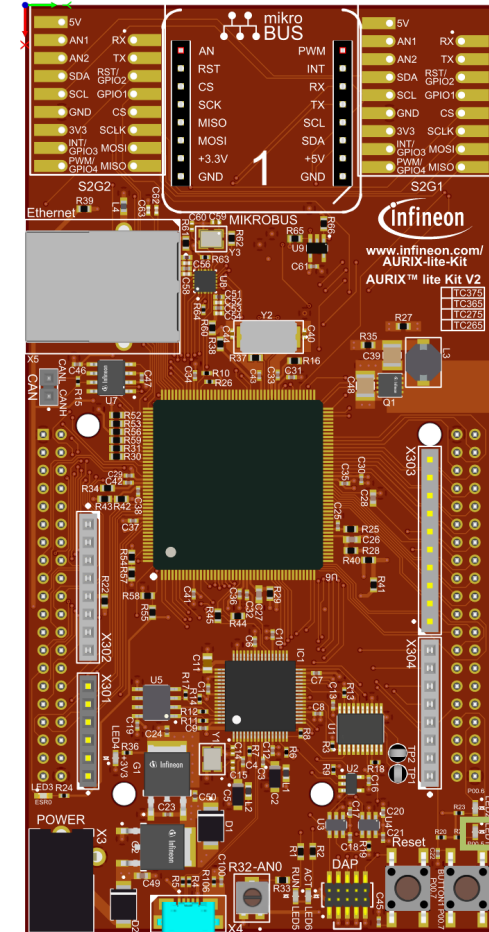
The ISR implemented in this example contains the following:

- › Toggle the LED by calling the iLLD function ***IfxPort\_togglePin()***

Both functions are provided by the iLLD header ***IfxPort.h***.

# Run and Test

After code compilation and flashing the device, observe the **LED1** (1), which should be blinking with a frequency of 1 Hz.



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# References



- › AURIX™ Development Studio is available online:
- › <https://www.infineon.com/aurixdevelopmentstudio>
- › Use the „*Import...*“ function to get access to more code examples.



- › More code examples can be found on the GIT repository:
- › [https://github.com/Infineon/AURIX\\_code\\_examples](https://github.com/Infineon/AURIX_code_examples)



- › For additional trainings, visit our webpage:
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**Document reference**

**GPT12\_Timer\_Interrupt\_1**

**\_KIT\_TC375\_LK**

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