GTM_TOM_PWM_1
for KIT_AURIX_TC334_LK
GTM TOM PWM generation
Scope of work

GTM TOM is used to generate a PWM signal, which is driving the intensity of an LED.

The LED is driven by pin 5 of the port 00. The state of the pin is controlled by the PWM signal generated by the TOM timer of GTM.
Introduction

- The Generic Timer Module (GTM) is a modular timer unit designed to accommodate many timer applications

- It has an in-built Timer Output Module (TOM) that can offer up to 16 independent channels to generate output signals

- The Clock Management Unit (CMU) is responsible for clock generation of the GTM. The Fixed Clock Generation (FXU) is one of its subunits and it provides five predefined non-configurable clocks for GTM modules, including the TOM
Hardware setup

This code example has been developed for the board KIT_A2G_TC334_LITE.

LED1 (1) is used for this example.
Implementation

Configuring the TOM

The configuration of the TOM is done by calling the initialization function `initGtmTomPwm()` containing the following steps:

- Enable the GTM by calling the function `IfxGtm_enable()`
- Enable the FXU clocks by calling the function `IfxGtm_Cmu_enableClocks()`

The function `IfxGtm_Tom_Pwm_initConfig()` initializes an instance of the structure `IfxGtm_Tom_Pwm_Config` with its default values.

The `IfxGtm_Tom_Pwm_Config` structure can be modified to set the following parameters to initialize the module:
- `tom` – Selection of the TOM which is counting (TOM 1 in this example)
- `tomChannel` – Selection of the channel which is driving the LED (Channel 4 in this example)
- `period` – Setting of the period for the PWM signal to the desired value
- `pin.outputPin` – Selection of the LED as output pin
- `synchronousUpdateEnable` – Enabling of synchronous update of the timer
Implementation

Configuring the TOM

After configuration, the function `IfxGtm_Tom_Pwm_init()` initializes and activates the TOM with the user configuration.
Start the PWM with the function `IfxGtm_Tom_Pwm_start()`.

Setting the duty cycle

The setting of the duty cycle is done by calling the function `setDutyCycle()`, which contains the following steps:
› Set the `dutyCycle` parameters of the configuration structure to set the duty cycle of the PWM signal to the desired value
› Call the function `IfxGtm_Tom_Pwm_init()` to reconfigure the TOM with the new value of the duty cycle

All the functions used for the configuration of the TOM are provided by the iLLD header `IfxGtm_Tom_Pwm.h`.

Fading the LED

The fading of the LED is done in the function `fadeLED()` by repeatedly adding or removing a step value to the duty cycle of the PWM.
Implementation

Calculation example

The FXU clock 0 frequency ($f_{fxclk0}$) is 100 MHz. The period value to have the desired PWM frequency ($f_{PWM}$) is calculated with the following formula:

$$Period = \frac{f_{fxclk0}}{f_{PWM}}$$

In this example: $Period = \frac{100 \text{ MHz}}{2 \text{ kHz}} = 50000 \text{ ticks}$
Run and Test

After code compilation and flashing the device, observe the **LED1 (1)**, which should be fading.
References

- AURIX™ Development Studio is available online:
  - [https://www.infineon.com/aurixdevelopmentstudio](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:
  - [https://www.infineon.com/aurix-expert-training](https://www.infineon.com/aurix-expert-training)

- For questions and support, use the AURIX™ Forum:
IMPORTANT NOTICE
The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer’s compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer’s products and any use of the product of Infineon Technologies in customer’s applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer’s technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office (www.infineon.com).

WARNINGS
Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies’ products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.