GTM_TOM_PWM_1
for KIT_AURIX_TC234_TFT
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 0 of the port 13. 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_AURIX_TC234_TFT_AC-Step.

LED D107 (1) is used for this example.
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 0 in this example)
- `tomChannel` – Selection of the channel which is driving the LED (Channel 5 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: \( Period = \frac{100 \, MHz}{2 \, kHz} = 50000 \, ticks \)
Run and Test

After code compilation and flashing the device, observe the **LED D107 (1)**, which should be fading.
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

› For additional trainings, visit our webpage:
  › https://www.infineon.com/aurix-expert-training

› For questions and support, use the AURIX™ Forum:
  › https://www.infineonforums.com/forums/13-Aurix-Forum
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