GTM_TOM_PWM_1 for KIT_AURIX_TC237_TFT

GTM TOM PWM generation

AURIX™ TC2xx Microcontroller Training
V1.0.0

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.

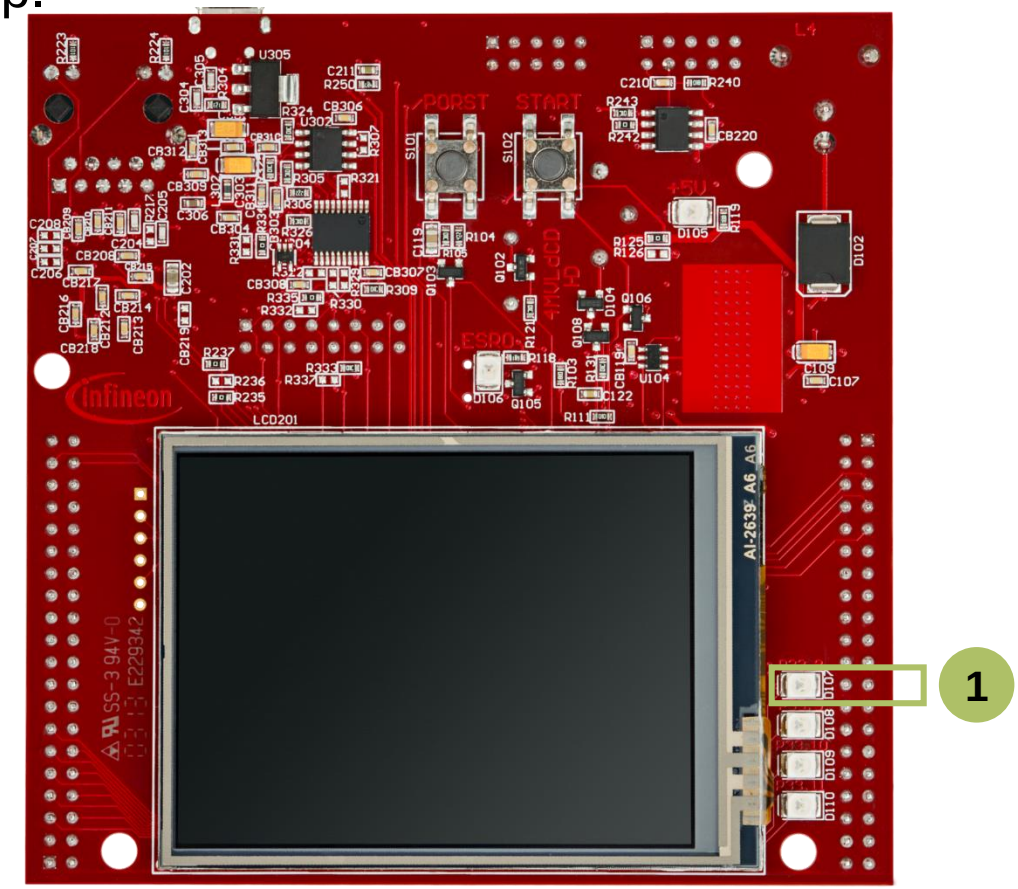
Introduction

- 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_TC237_TFT_AC-Step.

LED D107 (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 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.

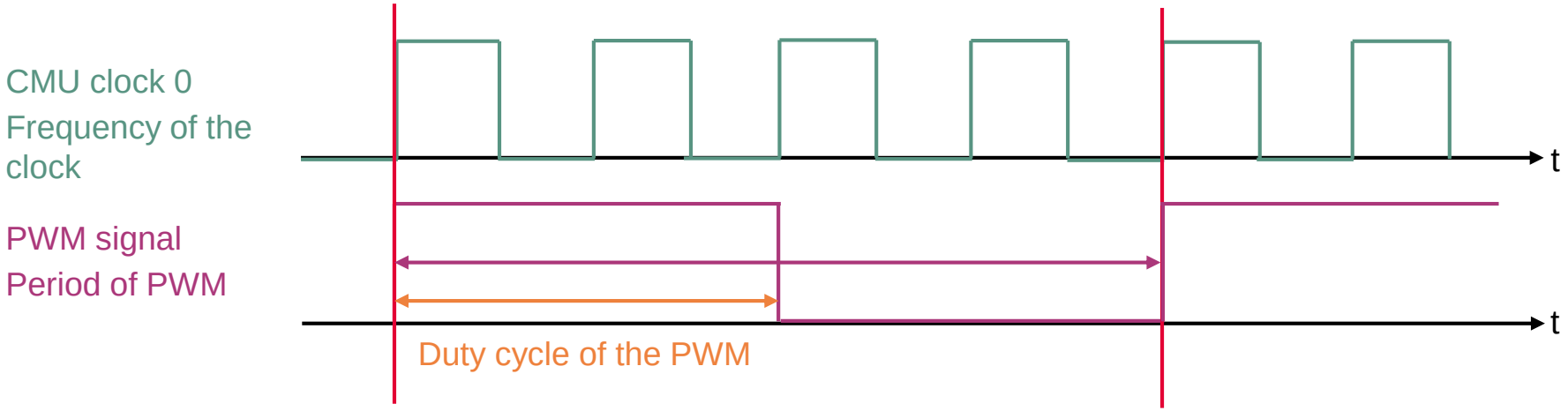
Implementation

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:

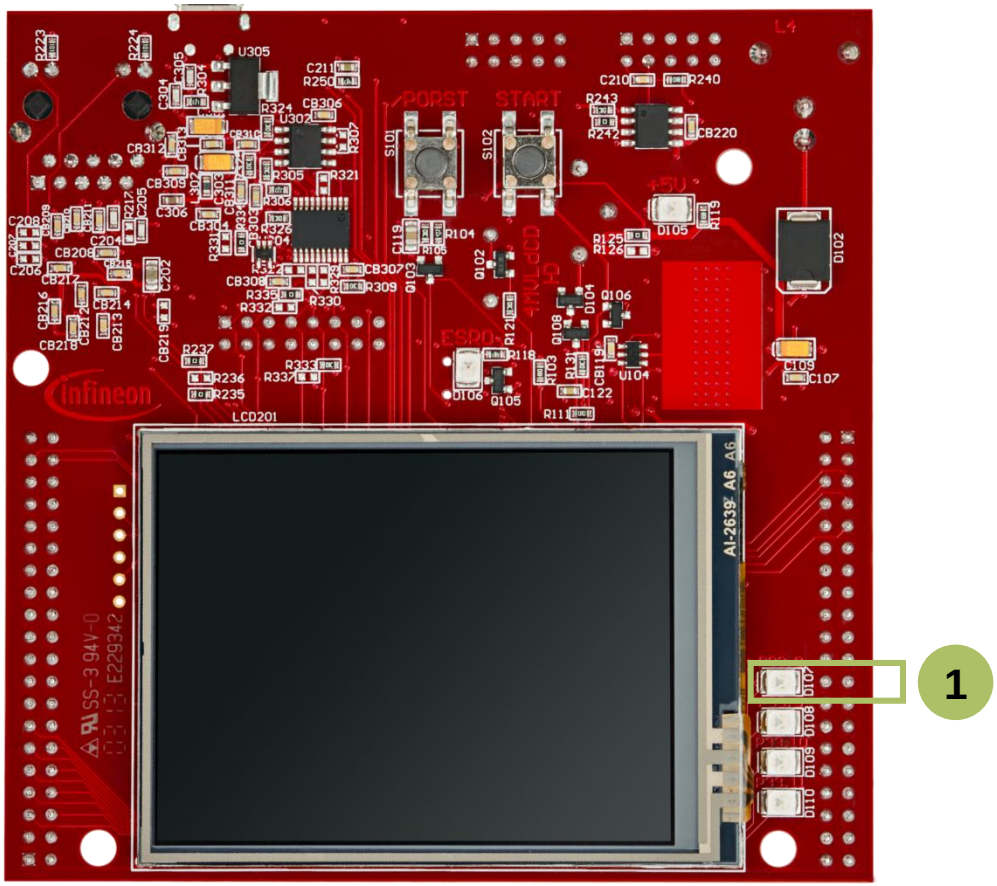
$$Period = \frac{f_{fxclk0}}{f_{PWM}}$$

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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