GTM_ATOM_PWM_1
for KIT_AURIX_TC297_TFT
GTM ATOM PWM generation
Scope of work

GTM ATOM 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 ATOM 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 Advanced Router Unit (ARU) that can be used to exchange specific data between sub-modules without CPU interaction.

- The ARU-connected Timer Output Module (ATOM), which is part of the GTM, is able to generate complex output signals.

- The Clock Management Unit (CMU) is responsible for clock generation of the GTM. The Configurable Clock Generation Subunit (CFGU) provides eight clock sources for the GTM submodules: TIM, TBU, MON and ATOM.
Hardware setup

This code example has been developed for the board KIT_AURIX_TC297_TFT_BC-Step.

LED D107 (1) is used for this example.
Implementation

Configuring the ATOM

The configuration of the ATOM is done once in the setup phase by calling the initialization function `initGtmAtomPwm()` containing the following steps:

› Enable the GTM by calling the function `IfxGtm_enable()`.

› Set the CMU clock 0 frequency to 1 MHz with the function `IfxGtm_Cmu_SetClkFrequency()`.

› Enable the CMU clock 0 by calling the function `IfxGtm_Cmu_enableClocks()`.

The function `IfxGtm_Atom_Pwm_initConfig()` initializes an instance of the structure `IfxGtm_Atom_Pwm_Config` with its default values.
Implementation

Configuring the ATOM

- The `IfxGtm_Atom_Pwm_Config` structure allows to set the following parameters to initialize the module:
  - `atom` – Selection of the ATOM which is counting (ATOM 2 in this example)
  - `atomChannel` – 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 the LED as output pin
  - `synchronousUpdateEnable` – Enabling of Synchronous Update of the timer

- After configuration, the function `IfxGtm_Atom_Pwm_init()` initializes and activates the ATOM with the user configuration.

- Start the PWM with the function `IfxGtm_Atom_Pwm_start()`.

All the functions used for the configuration of the ATOM are provided by the iLLD header `IfxGtm_Atom_Pwm.h`. 
Implementation

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 instance of the configuration structure to set the duty cycle for the PWM signal to the desired value
- Call the function `IfxGtm_Atom_Pwm_init()` to re-initialize and re-activates the ATOM with the new configuration.

The functions `IfxGtm_Atom_Pwm_init()` is provided by the iLLD header `IfxGtm_Atom_Pwm.h`.

Fading the LED

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

Calculation example

The CMU clock 0 frequency \( (f_{\text{clk0}}) \) is set to 1 MHz in this example. The period value to have the desired PWM frequency \( (f_{\text{PWM}}) \) is calculated with the following formula:

\[
\text{Period} = \frac{f_{\text{clk0}}}{f_{\text{PWM}}}
\]

In this example: \( \text{Period} = \frac{1\, \text{MHz}}{200\, \text{Hz}} = 5\, 000 \)
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](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:
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