

PWM_Buzzer_1

for KIT_AURIX_TC397_TFT

PWM controlled melody on Buzzer

AURIX™ TC3xx Microcontroller Training
V1.0.1



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Scope of work

The GTM unit is used to play a PWM-controlled song with a piezo buzzer.

The generated PWM (Pulse-Width Modulation) signal is controlled by timer TOM1 of the GTM block. The signal drives the piezo buzzer via the pin 0 of the port 33.

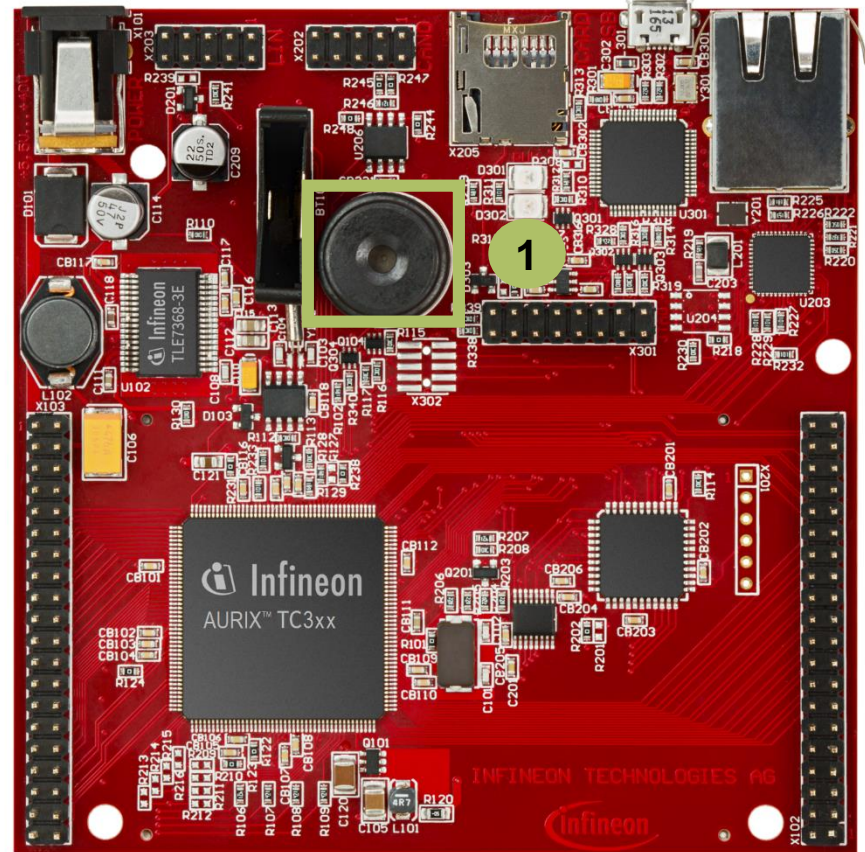
Introduction

- › The Generic Timer Module (GTM) is a modular timer unit designed to accommodate many timer applications.
- › The Timer Output Module (TOM), which is part of the GTM, offers sixteen independent channels to generate output signals.
- › The Clock Management Unit (CMU) is responsible for clock generation of the GTM. The Fixed Clock Generation (FXU), subunit of the CMU, provides five predefined non-configurable clocks for the TOM submodules.

Hardware setup

This code example has been developed for the board KIT_A2G_TC397_5V_TFT.

The piezo buzzer (1) is used for this example.



Implementation

Initialization of PWM Buzzer

The initialization of the PWM Buzzer is done once in the setup phase by calling the function ***initPWMBuzzer()***, which contains the following steps:

- › Initialize a time variable
- › Enable the GTM by calling the function ***IfxGtm_enable()***
- › Enable the FXU clocks by calling the function ***IfxGtm_Cmu_enableClocks()***
- › Initialize the timer configuration with default values by calling the function ***IfxGtm_Tom_Timer_initConfig()***
- › Set the timer configuration variable ***timerCfg*** with the user defined values
- › Initialize the timer through the iLLD function ***IfxGtm_Tom_Timer_init()***
- › Enable the GTM TOM channel 4 by calling the iLLD function ***IfxGtm_Tom_Tgc_enableChannelsUpdate()***

All the functions used for the configuration of the PWM Buzzer are provided by the iLLD header ***IfxGtm_Tom_Pwm.h***.

Implementation

Configuration of the variable `timerCfg`

Setting of the `timerCfg` variable is done once in the setup phase in the function `initPWMBuzzer()` with the following steps:

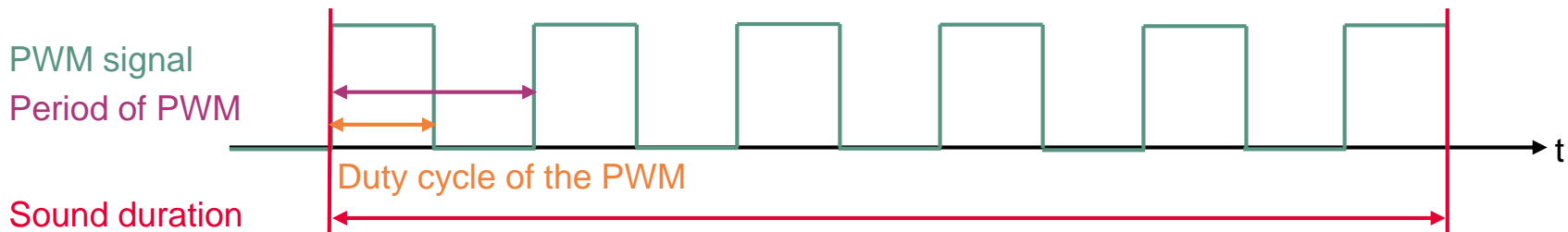
- › Set TOM1 as the timer for generating the PWM signal
`timerCfg.tom = lfxGtm_Tom_1`
- › Set the channel 4 of TOM1 as the channel used for the timer
`timerCfg.timerChannel = lfxGtm_Tom_Ch_4`
- › Select the clock source
`timerCfg.clock = lfxGtm_Tom_Ch_ClkSrc_cmuFxcclk2`
- › Set port and pin for PWM output
`timerCfg.triggerOut = &lfxGtm_TOM1_4_TOUT22_P33_0_OUT`
- › Enable TOM channel
`timerCfg.base.trigger.enabled = TRUE`
- › Enable TOM channel output
`timerCfg.base.trigger.outputEnabled = TRUE`
- › Starting PWM with rising edge
`timerCfg.base.trigger.risingEdgeAtPeriod = TRUE`

Implementation

Playing song

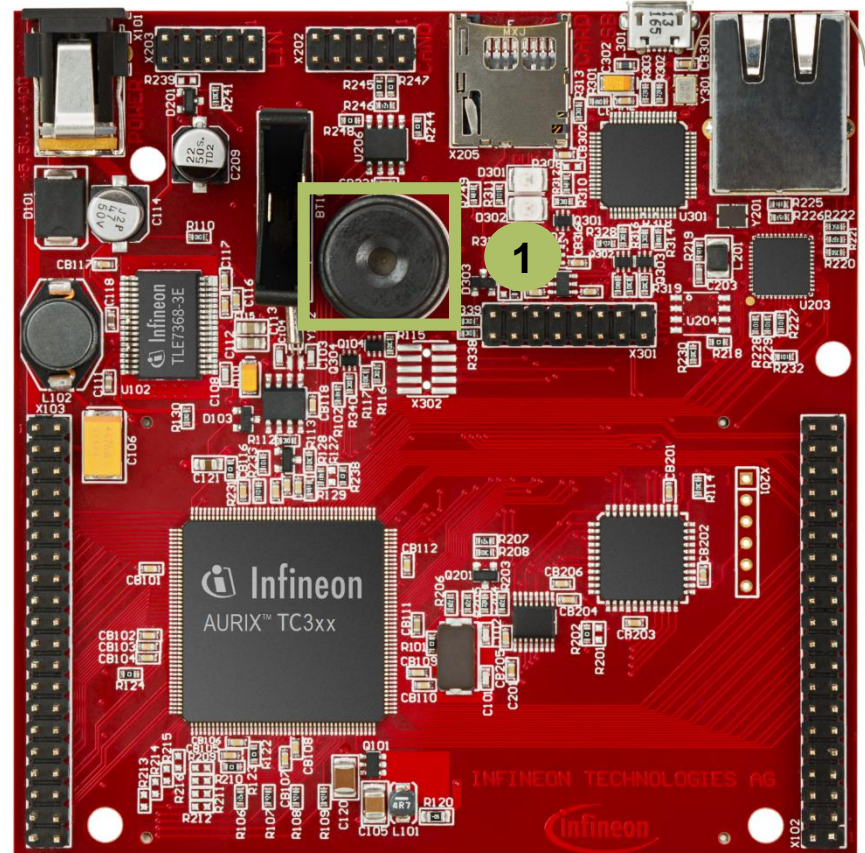
The song is played by repeatedly calling the function ***playTone()*** for each note, which contains the following steps:

1. Set the PWM frequency (in Hz) through the iLLD function ***IfxGtm_Tom_Timer_setFrequency()***
2. Set the volume level by calling the function ***setVolume()***. This is done by setting the PWM duty cycle with the function ***IfxGtm_Tom_Timer_setTrigger()***
3. Start the timer with the iLLD function ***IfxGtm_Tom_Timer_run()***
4. Wait until the end of the note through the service function ***waitTime()***
5. Stop the timer with the iLLD function ***IfxGtm_Tom_Timer_stop()***



Run and Test

After code compilation and flashing the device, listen to the Buzzer (1) which should play the sound from the game Super Mario.



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>

Revision history

Revision	Description of change
V1.0.1	Updated "Initialization of PWM Buzzer" description according to code implementation
V1.0.0	Initial version

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