# SCU_Emergency_Stop_1 for KIT_AURIX_TC375_LK

## Emergency Stop via SCU

AURIX™ TC3xx Microcontroller Training
V1.0.2

# Scope of work

**This example shows how to trigger an emergency stop via an external signal and how port pins can be set to a defined state in this case.**

The LED1, which is driven by the port pin P00.5, is blinking until an external signal triggers an emergency stop and sets the pin to emergency stop mode.

# Introduction

- The System Control Unit (SCU) contains miscellaneous control registers associated with other functions such as controlling Application Test Mode and chip identification
- The Emergency Stop (EMS) is one of these functions. It provides a fast reaction to an emergency without the intervention of the software
- An emergency stop can be triggered by a transition on the port pin state which is configured as the EMS input or by an alarm event
- The Emergency Stop control logic for the port pins can operate in two modes:
  - Synchronous Mode: emergency case is activated by hardware and released by software (default and used in this training)
  - Asynchronous Mode: emergency case is activated and released by hardware

# Hardware setup

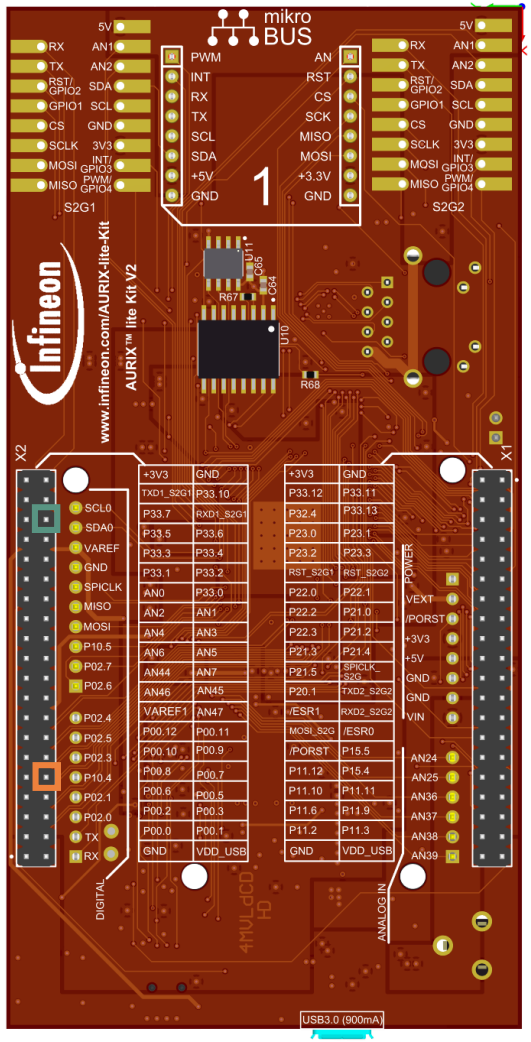
This code example has been developed for the board KIT_A2G_TC375_LITE.

Connect the emergency stop port pin P33.8 to the port pin P00.7 via a jumper.

| | | X2 | | |
|---|---|---|---|---|
| | +3V3 | 39 | 40 | GND |
| TXD1_S2G1 - | P33.9 | 37 | 38 | P33.10 |
| | P33.7 | 35 | 36 | P33.8 - RXD1_S2G1 |
| | P33.5 | 33 | 34 | P33.6 |
| | P33.3 | 31 | 32 | P33.4 |
| | P33.1 | 29 | 30 | P33.2 |
| Potentiometer - | AN0 | 27 | 28 | P33.0 |
| | AN2 | 25 | 26 | AN1 |
| | AN4 | 23 | 24 | AN3 |
| | AN6 | 21 | 22 | AN5 |
| | AN44 | 19 | 20 | AN7 |
| | AN46 | 17 | 18 | AN45 |
| | VAREF1 | 15 | 16 | AN47 |
| | P00.12 | 13 | 14 | P00.11 |
| | P00.10 | 11 | 12 | P00.9 |
| | P00.8 | 9 | 10 | P00.7 - Button1 |
| LED2 - | P00.6 | 7 | 8 | P00.5 - LED1 |
| | P00.2 | 5 | 6 | P00.3 |
| | P00.0 | 3 | 4 | P00.1 |
| | GND | 1 | 2 | VDD_USB |

Emergency stop

Button



# Implementation

## Configuring System Control Unit

Configuration of the System Control Unit (SCU) is done once in the setup phase by calling the initialization function ***initScuEmergency()***, which contains the following steps:

- Call the iLLD function ***IfxScuWdt_clearSafetyEndinitInline()*** to disable the Safety Endinit protection in order to modify the SCU register
- Set ***SCU_EMSR.B.POL*** to 0x1 to set input state as active low
- Set ***SCU_EMSR.B.MODE*** to 0x0 to select the synchronous mode
- Set ***SCU_EMSR.B.PSEL*** to 0x0 to select port A (pin P33.8) as emergency stop input
- Set ***SCU_EMSR.B.ENON*** to 0x1 to enable emergency stop flag
- Call the iLLD function ***IfxScuWdt_setSafetyEndinitInline()*** to re-enable the Safety Endinit protection

The functions ***IfxScuWdt_clearSafetyEndinitInline()*** and ***IfxScuWdt_setSafetyEndinitInline()*** are contained in the iLLD header ***IfxScuWdt.h***, while ***initScuEmergency()*** function is contained in ***SCU_Emergency_Stop.h***.

# Implementation

## Configuring port pin

Configuration of the port pins for emergency stop input and for the LED are also done in the function ***initScuEmergency()*** with the following steps:

- Call the iLLD function ***IfxPort_setPinMode()*** with ***IfxPort_Mode_inputPullDown*** as parameter to configure the emergency stop pin as input
- Call the iLLD function ***IfxPort_setPinMode()*** with ***IfxPort_Mode_outputPushPullGeneral*** as parameter for the input to configure the LED as output
- Enable the emergency stop for the LED with the function ***IfxPort_setESR()***

## Toggling the LED

The LED is toggled in the function ***toggleLED()***, which contains a call of the iLLD function ***IfxPort_togglePin()***.

All of the above functions, called inside ***initSCUEmergency()*** and ***toggleLED()***, are contained in the iLLD header ***IfxPort.h***.

# Run and Test

After code compilation and flashing the device, perform the following steps:

- Observe the LED1 (1) which should be blinking
- Switch the emergency pin state P33.8 by pressing the button (2)
- Observe the LED1 (1), which should be off

# 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 |
|---|---|
| V1.0.2 | Fixed polarity value set in initScuEmergency() function |
| V1.0.1 | Update of version to be in line with the code example’s version |
| V1.0.0 | Initial version |
| | |

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