

RAM_Run_Function_1 for KIT_AURIX_TC297_TFT

Function running from RAM

AURIX™ TC2xx Microcontroller Training
V1.0.1



Scope of work

A function is stored and executed from SRAM.

This example implements twice the same function which toggles an LED with a wait loop. One function is implemented to be executed from SRAM and the other one from Flash memory.

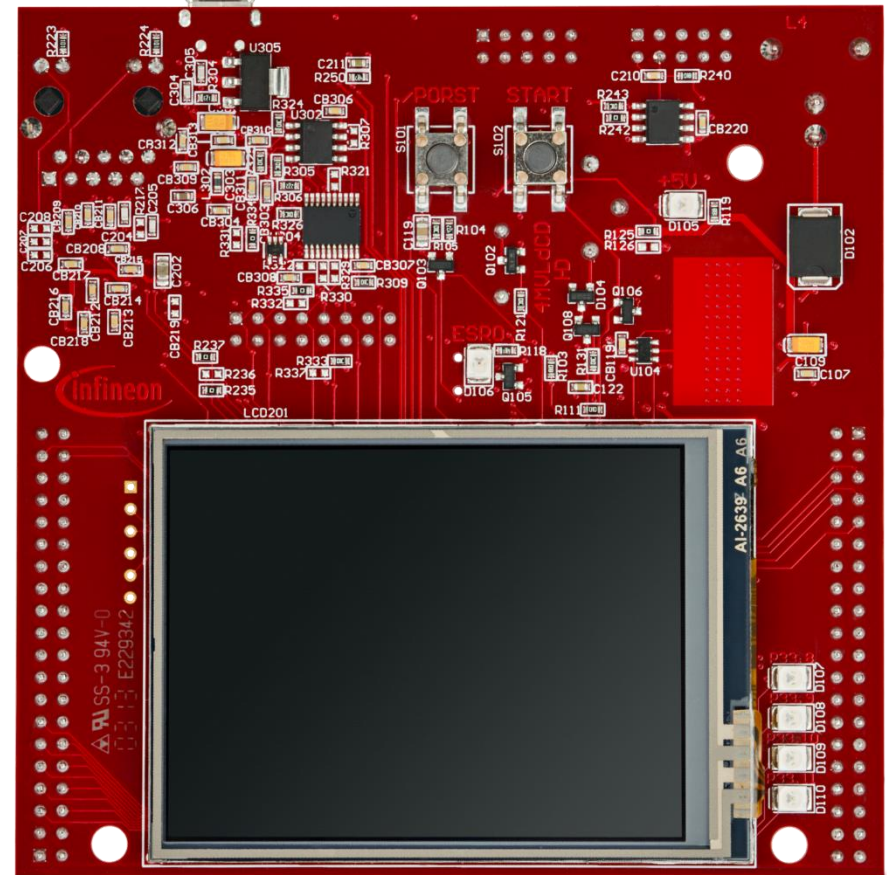
The SRAM function is toggling LED1 (P13.0), while the flash function is toggling LED2 (P13.1).

Introduction

- › The Local Memory Unit (LMU) SRAM can be used for **code execution**, data storage or overlay memory
- › The LMU can be accessed via cached (segment 9_H) or via non-cached (segment B_H) memory addresses
- › If a code is programmed to be executed from SRAM memory, it is copied from Flash to SRAM by the Start-up Software (SSW) code

Hardware setup

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



Implementation

SRAM code section creation

The linker file “*Lcf_Tasking_Tricore_Tc.Isf*” is updated by adding a memory section (called ***code_lmuram_nc***) for code execution from LMURAM memory. The memory section should be assigned to the **non-cached** memory addresses (segment B_H) to avoid any data inconsistency.

Locating function code in a specific memory section

The ***pragma*** compiler keyword with the attribute ***section code*** “***<section_identifier>***” is used to specify the memory section from which the implemented function code will be fetched and executed.

The ***section code restore*** attribute is used after the function implementation to ensure that next implemented functions will be located in the default code memory section (Flash memory).

Implementation

LED Toggling

Two functions are implemented, ***toggleLedSram()*** and ***toggleLedFlash()***, to toggle two LEDs from different memory regions.

Using the previously mentioned ***pragma*** compiler keyword, the ***toggleLedSram()*** can be executed from LMURAM memory not-cached addresses segment.

Both functions are implemented as following:

- Switch On the LED by calling ***IfxPort_setPinLow()***
- Wait for a one second delay
- Switch Off the LED by calling ***IfxPort_setPinHigh()***
- Wait for a one second delay

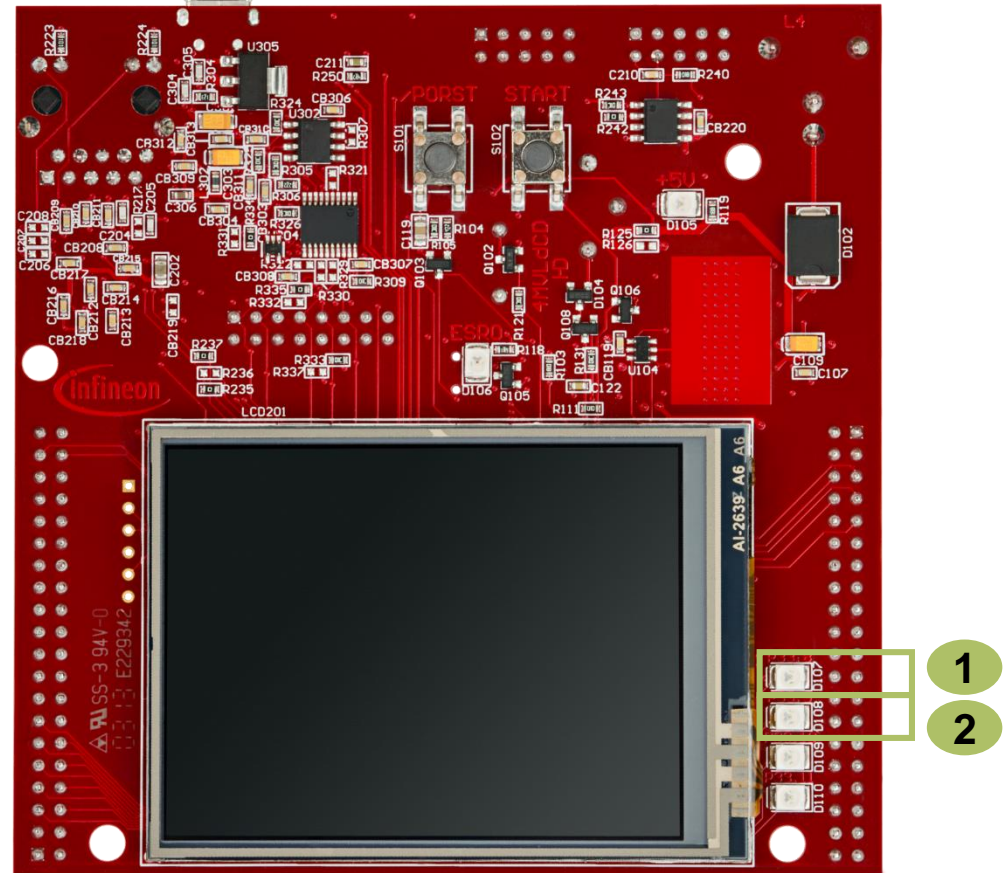
The above Port functions can be found in the iLLD header ***IfxPort.h***.

Note: The LEDs on the used board are low-level active.

Run and Test

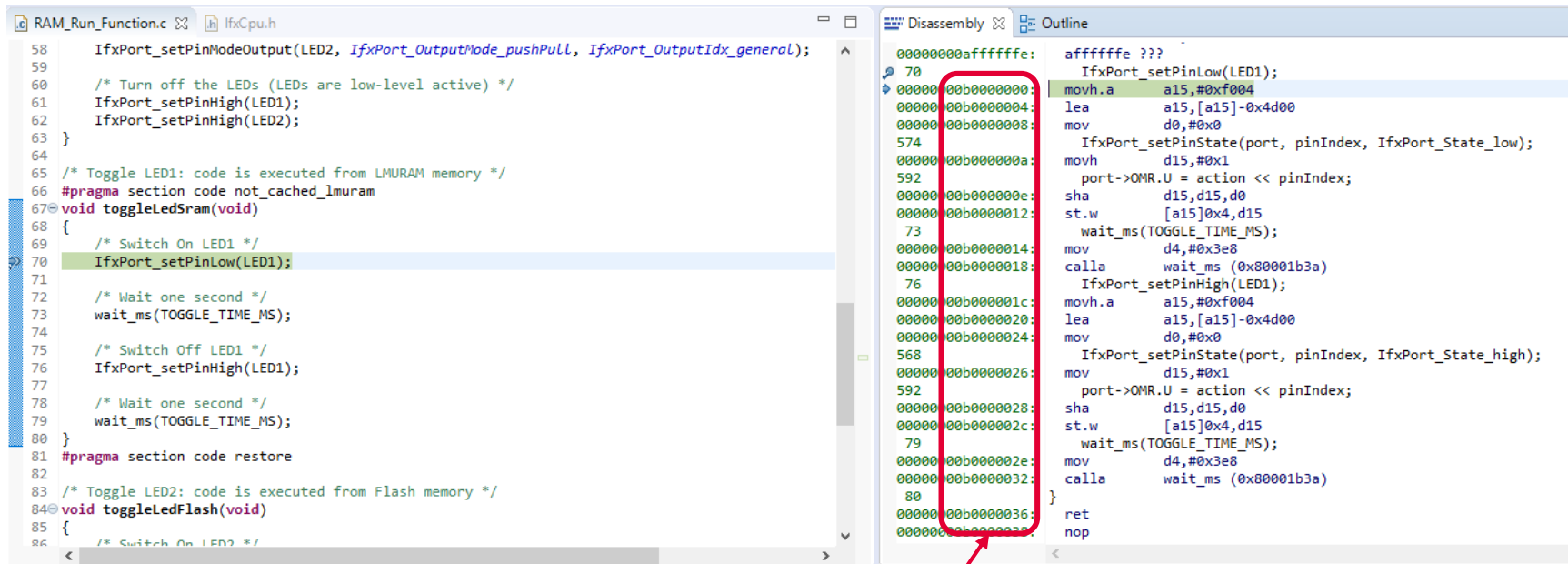
After code compilation and flashing the device:

- › Check that LED1 (D107) and LED2 (D108) are toggling



Run and Test

Additionally, the execution from RAM can be checked by adding a breakpoint inside the ***toggleLedSram()*** function and verify in the disassembly window of the debugger that the CPU is executing it from LMURAM (Addresses segment B_H).



```

58  IfxPort_setPinModeOutput(LED2, IfxPort_OutputMode_pushPull, IfxPort_OutputIdx_general);
59
60  /* Turn off the LEDs (LEDs are low-level active) */
61  IfxPort_setPinHigh(LED1);
62  IfxPort_setPinHigh(LED2);
63  }
64
65  /* Toggle LED1: code is executed from LMURAM memory */
66  #pragma section code not_cached_lmram
67  void toggleLedSram(void)
68  {
69      /* Switch On LED1 */
70      IfxPort_setPinLow(LED1);
71
72      /* Wait one second */
73      wait_ms(TOGGLE_TIME_MS);
74
75      /* Switch Off LED1 */
76      IfxPort_setPinHigh(LED1);
77
78      /* Wait one second */
79      wait_ms(TOGGLE_TIME_MS);
80  }
81  #pragma section code restore
82
83  /* Toggle LED2: code is executed from Flash memory */
84  void toggleLedFlash(void)
85  {
86      /* Switch On LED2 */

```

```

00000000affffffe:  affffffe ???
70  IfxPort_setPinLow(LED1);
71  movh.a  a15,#0xf004
72  lea      a15,[a15]-0x4d00
73  mov      d0,#0x0
74  IfxPort_setPinState(port, pinIndex, IfxPort_State_low);
75  movh     d15,#0x1
76  port->OMR.U = action << pinIndex;
77  sha      d15,d15,d0
78  st.w     [a15]0x4,d15
79  wait_ms(TOGGLE_TIME_MS);
80  mov      d4,#0x3e8
81  calla    wait_ms (0x80001b3a)
82  IfxPort_setPinHigh(LED1);
83  movh.a   a15,#0xf004
84  lea      a15,[a15]-0x4d00
85  mov      d0,#0x0
86  IfxPort_setPinState(port, pinIndex, IfxPort_State_high);
87  mov      d15,#0x1
88  port->OMR.U = action << pinIndex;
89  sha      d15,d15,d0
90  st.w     [a15]0x4,d15
91  wait_ms(TOGGLE_TIME_MS);
92  mov      d4,#0x3e8
93  calla    wait_ms (0x80001b3a)
94  }
95  ret
96  nop

```

- › Addresses from where the ***toggleLedSram()*** function is executed

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	Changed picture in Run and Test slide
V1.0.0	Initial version

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