# ASCLIN_SPI_Master_1 for KIT_AURIX_TC297_TFT

## SPI master communication via ASCLIN module

AURIX™ TC2xx Microcontroller Training
V1.0.1

# Scope of work

**An ASCLIN module configured as SPI master sends a two bytes message.**

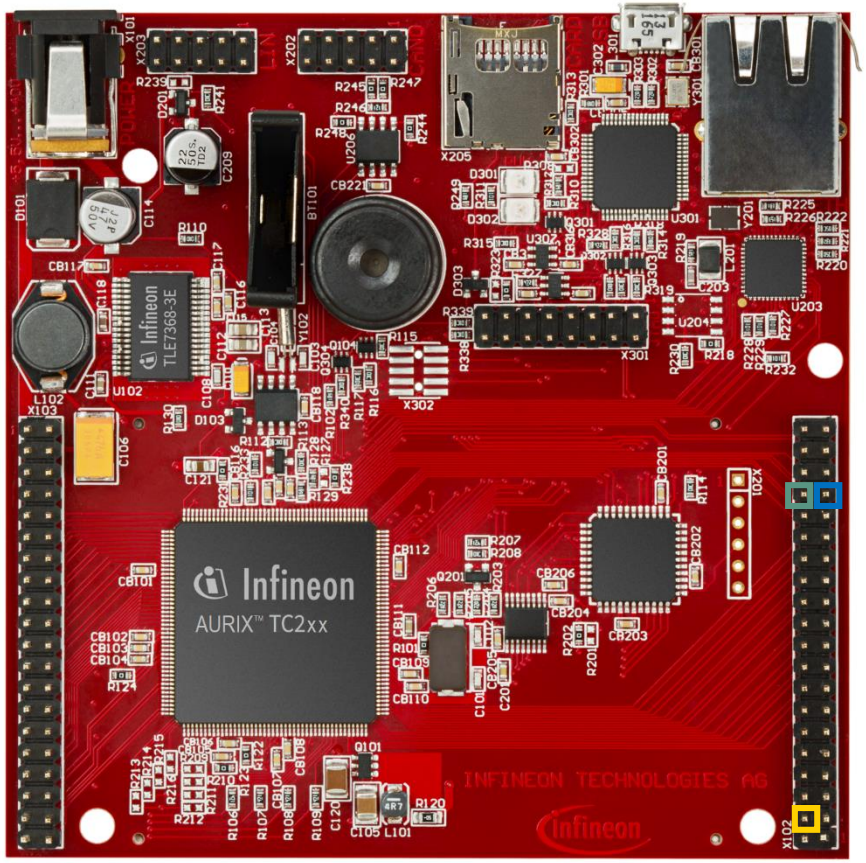
The two bytes message is sent through MTSR (MOSI) port pin P15.4 in loopback mode. This signal can be visualized on the oscilloscope screen.

# Introduction

- The Asynchronous/Synchronous Interface (ASCLIN) module provides synchronous serial communication like SPI with external devices, using data-in and data-out signals only.

- The ASCLIN module in SPI configuration can support master mode only with four-wire or three-wire (without slave select output signal) and up to 16-bit data width.

# Hardware setup




This code example has been developed for the board KIT_AURIX_TC297_TFT_BC-Step.
The port pin P15.4 (SPI-MTSR) should be connected to the port pin P15.5 (SPI-MRST) in order to form an internal loopback.
Those pins can also be connected to an oscilloscope probe for observing the SPI signal.

| | | X102 | | | |
|---|---|---|---|---|---|
| | P14.5 | 40 | 39 | P14.4 | |
| | P20.10 | 38 | 37 | P20.9 | |
| | P15.7 | 36 | 35 | P15.6 | |
| MRST | P15.5 | 34 | 33 | P15.4 | MTSR |
| | P15.3 | 32 | 31 | P15.2 | |
| | P22.3 | 30 | 29 | P22.2 | |
| | P22.1 | 28 | 27 | P22.0 | |
| | P33.11 | 26 | 25 | P23.4 | |
| | P23.3 | 24 | 23 | P23.2 | |
| | P23.1 | 22 | 21 | P23.0 | |
| | P33.6 | 20 | 19 | P33.8 | |
| | P33.12 | 18 | 17 | P33.1 | |
| | P33.2 | 16 | 15 | P33.3 | |
| | P33.4 | 14 | 13 | P33.5 | |
| | AN0 | 12 | 11 | AN8 | |
| | AN2 | 10 | 9 | AN3 | |
| | AN32 | 8 | 7 | AN33 | |
| | AN20 | 6 | 5 | AN21 | |
| Ground | GND | 4 | 3 | GND | |
| | V_UC(+5V) | 2 | 1 | VCC_IN | |

# Implementation

**Configuration of the ASCLIN module:**

Configuration of the ASCLIN module for SPI communication is done in the setup phase by initializing an instance of the ***IfxAsclin_Spi_Config*** structure with the following parameters:

- ***baudrate*** – structure to set the actual communication speed in bit/s
- ***interrupt*** – structure to set:
  - transmit and receive interrupt priorities (***txPriority***, ***rxPriority***)
  - ***typeOfService*** – defines which service provider is responsible for handling the interrupt, which can be any of the available CPUs, or the DMA
- ***pins*** – structure to set which GPIO port pins are used for the communication
- ***rxBuffer***, ***rxBufferSize***, ***txBuffer***, ***txBufferSize*** – to configure the buffers that will hold the incoming/outgoing data

The function ***IfxAsclin_Spi_initModuleConfig()*** fills the configuration structure with default values and ***IfxAsclin_Spi_initModule()*** initializes the module with the user configuration.

All the above functions can be found in the iLLD header ***IfxAsclin_Spi.h***.

# Implementation

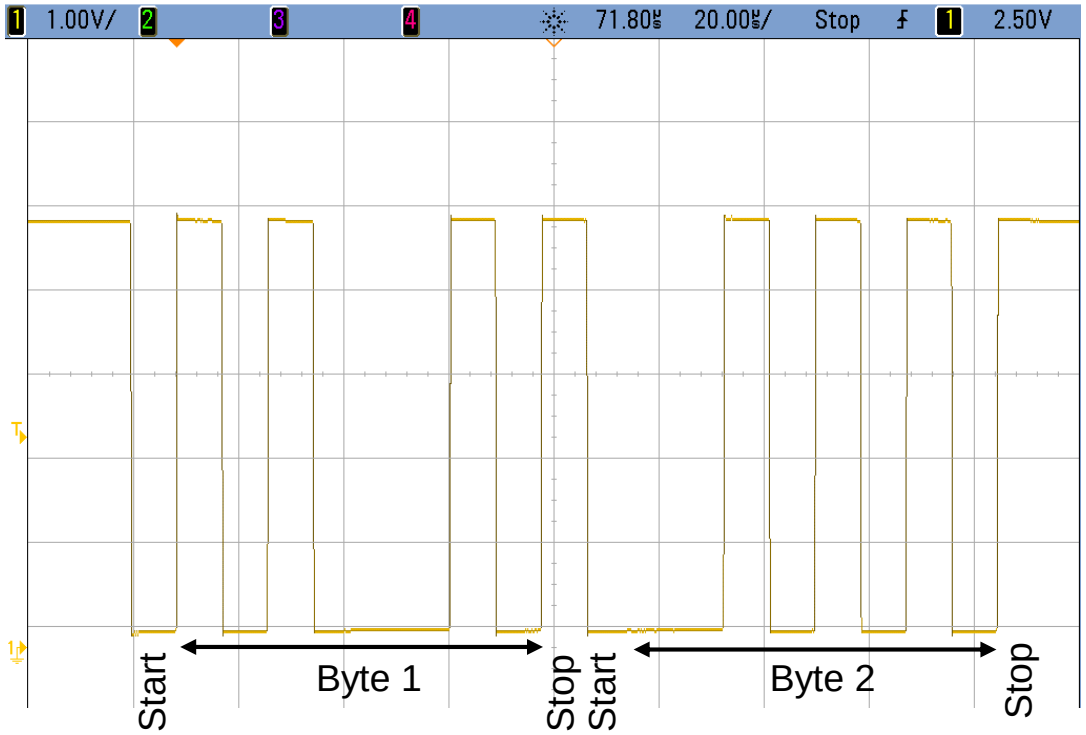
**The SPI message exchange function:**

- The data-out (MTSR/MOSI) is connected via internal loopback to the data-in (MRST/MISO).
- The two bytes message is sent via the function ***exchange_ASCLIN_SPI_message()*** which is called once after initialization of the ASCLIN module.
- The two bytes message is sent from the ***g_spiTxBuffer*** to the ***g_spiRxBuffer*** using the function ***IfxAsclin_Spi_exchange()*** from the ***IfxAsclin_Spi.h*** header file.

# Run and Test

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

- Connect the oscilloscope probe to the MTSR pin (P15.4)
- Reset and run the program by pressing the PORST push button
- Check the oscilloscope for the SPI signal:



# Run and Test

An additional test without using an oscilloscope can be performed with the debugger.

- Before transmission, the buffer ***g_spiTxBuffer*** is filled with a two bytes message and the buffer ***g_spiRxBuffer*** is empty.

- After transmission, both buffers should hold the same message:
  - By using the debugger, you can watch the content of both buffers before and after transmission by setting a breakpoint to ***exchange_ASCLIN_SPI_message()***.
  - When reaching this breakpoint, check the content of both buffers (it should be different).
  - After stepping over this function, the content of the buffers must be equal.

**Note:** The code should run for a few seconds in order to grant enough time for the transmission to be done.

# 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 | Update of version to be in line with the code example’s version |
| V1.0.0 | Initial version |
| | |
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**Email: erratum@infineon.com**

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