ASCLIN_SPI_Master_1 for KIT_AURIX_TC397_TFT
SPI Master Communication via ASCLIN module
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_A2G_TC397_5V_TFT. 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.
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:

![Oscilloscope screenshot](image-url)
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.
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

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