

ASCLIN_UART_1 for KIT_AURIX_TC297_TFT

UART communication via ASCLIN module

AURIX™ TC2xx Microcontroller Training
V1.0.0



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Scope of work

An ASCLIN module configured for UART communication sends "Hello World!" and receives the string via the internal loopback.

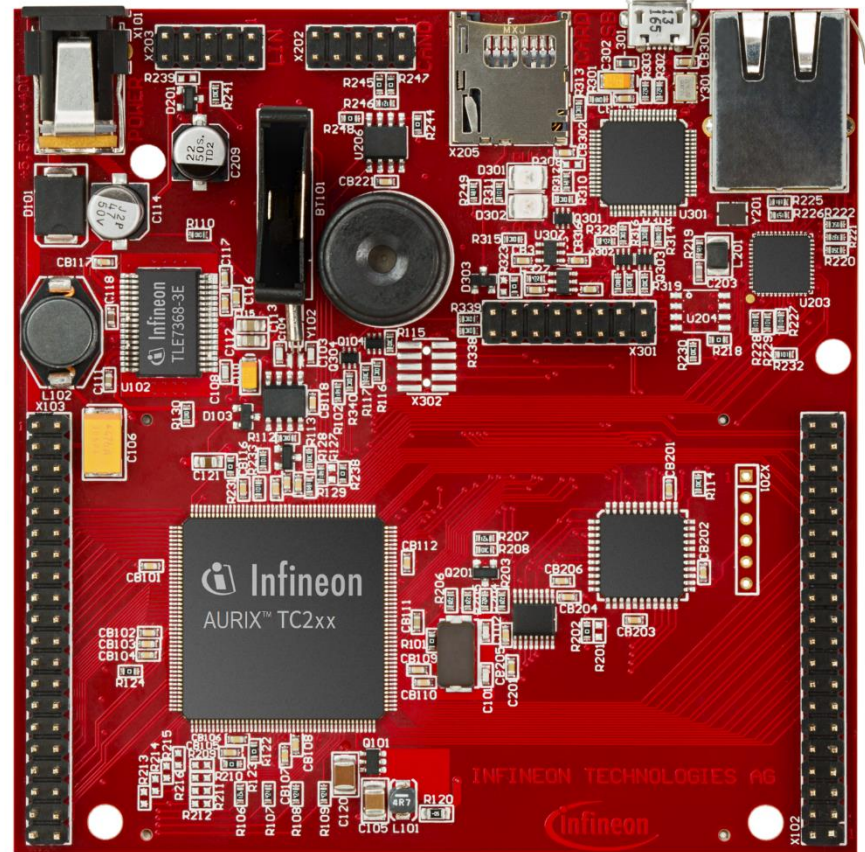
The string "Hello World!" is sent and received via UART through one pin due to the internal loopback. The data can be visualized using an oscilloscope.

Introduction

- › The Asynchronous/Synchronous Interface (ASCLIN) module enables asynchronous/synchronous serial communication with external devices. Among others, it supports asynchronous reception/transmission (UART) for communication.
- › For test purposes, the transmit pin (TX) and receive pin (RX) can be shorted internally on-chip (loopback mode).

Hardware setup

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



Implementation

Configuration of the ASCLIN module:

Configuration of the ASCLIN module for UART communication is done in the setup phase by initializing an instance of the ***IfxAsclin_Asc_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_Asc_initModuleConfig()*** fills the configuration structure with default values and ***IfxAsclin_Asc_initModule()*** initializes the module with the user configuration.

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

Implementation

The UART send/receive function:

- › Sending the string “Hello World!” is implemented inside the function ***send_receive_ASCLIN_UART_message()*** which is called once after initialization of the ASCLIN module.
- › This function calls ***lfxAsclin_Asc_write()*** and ***lfxAsclin_Asc_read()*** which are provided by the iLLD header ***lfxAsclin_Asc.h***.

Implementation

The UART send/receive function:

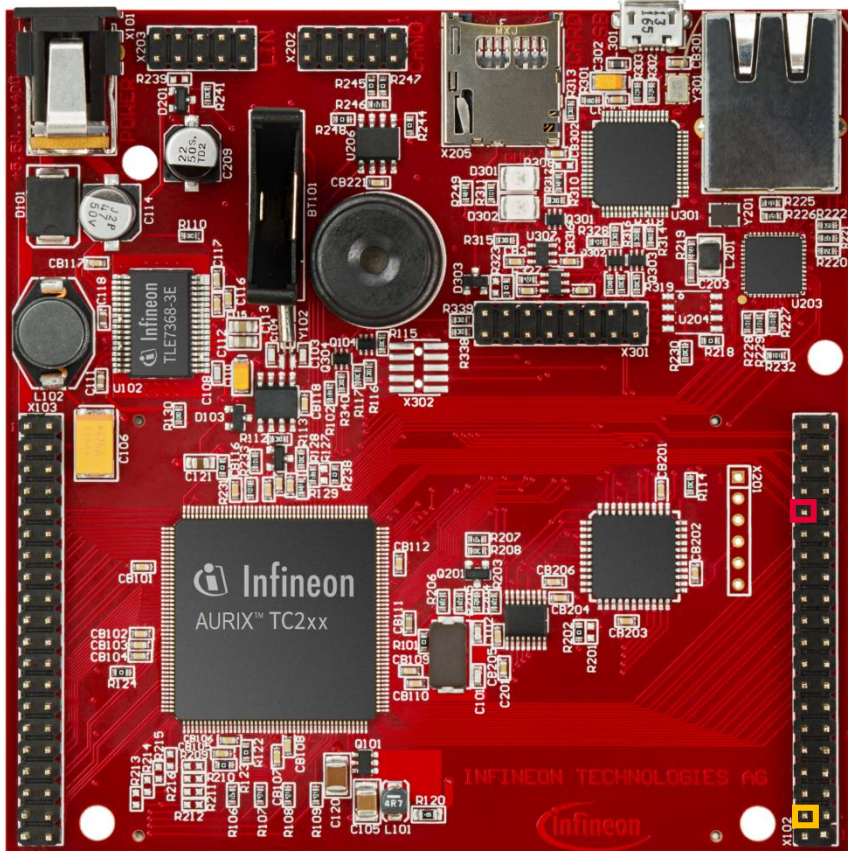
- › The UART frame configured for 115200/8-N-1 consists of different parts:
 - One start bit which is “0”
 - Eight bits of data
 - One stop bit which is “1”

- › Each time when the last byte is taken out of the transmit FIFO (size is 16-bytes), the Transmit FIFO Level (TFL) flag is set and the interrupt service routine ***asclin0TxISR()*** is entered. The ISR calls ***IfxAsclin_Asc_isrTransmit()*** which refills the FIFO with the remaining bytes to be transmitted and clears the interrupt flag.

- › Each time when an UART byte is received, the Receive FIFO Level (RFL) flag is set and the interrupt service routine ***asclin0RxISR()*** is entered. The ISR calls ***IfxAsclin_Asc_isrReceive()*** which moves the received byte to the global array ***g_ascRxBuffer*** and clears the interrupt flag.

Run and Test

An oscilloscope probe must be connected to the UART TX/RX pin (P15.3) to observe the UART signal.



TX/RX

Ground

	X102		
P14.5	40	39	P14.4
P20.10	38	37	P20.9
P15.7	36	35	P15.6
P15.5	34	33	P15.4
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
GND	4	3	GND
V_UC(+5V)	2	1	VCC_IN

Run and Test

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

- › Connect the oscilloscope probe to the TX/RX pin (P15.3)
- › Reset and run the program by pressing the PORST push button
- › Check the oscilloscope for the UART signal:



→ „Hello World!“

Run and Test

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

- › Before transmission, the buffer ***g_txData*** is filled with the message „Hello World!“ and the buffer ***g_rxData*** is empty.

- › After transmission, the buffer ***g_rxData*** should contain the message „Hello World!“:
 - By using the debugger, you can watch the content of the ***g_rxData*** buffer before and after transmission by setting a breakpoint to ***send_receive_ASCLIN_UART_message()***.
 - When reaching this breakpoint, check the content of the buffer (it should be empty).
 - After stepping over this function, the content of the buffer should contain the message „Hello World!“.

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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Document reference

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