SCU_Die_Temp_Sensor_1

Die Temperature Sensor

AURIX™ TC2xx Microcontroller Training
V1.0.0

Scope of work

The die temperature is measured by an internal sensor and printed on a terminal program.

The internal Die Temperature Sensor (DTS) is continuously read in an infinite loop. When a new temperature result is available, an interrupt service routine (ISR) is triggered. The ISR notifies the availability of a new die temperature value by setting a flag, which is used to start printing the temperature via UART communication using the ASCLIN module. The temperature value can be read by using a terminal program connected to the virtual COM port of the board/kit.

Introduction

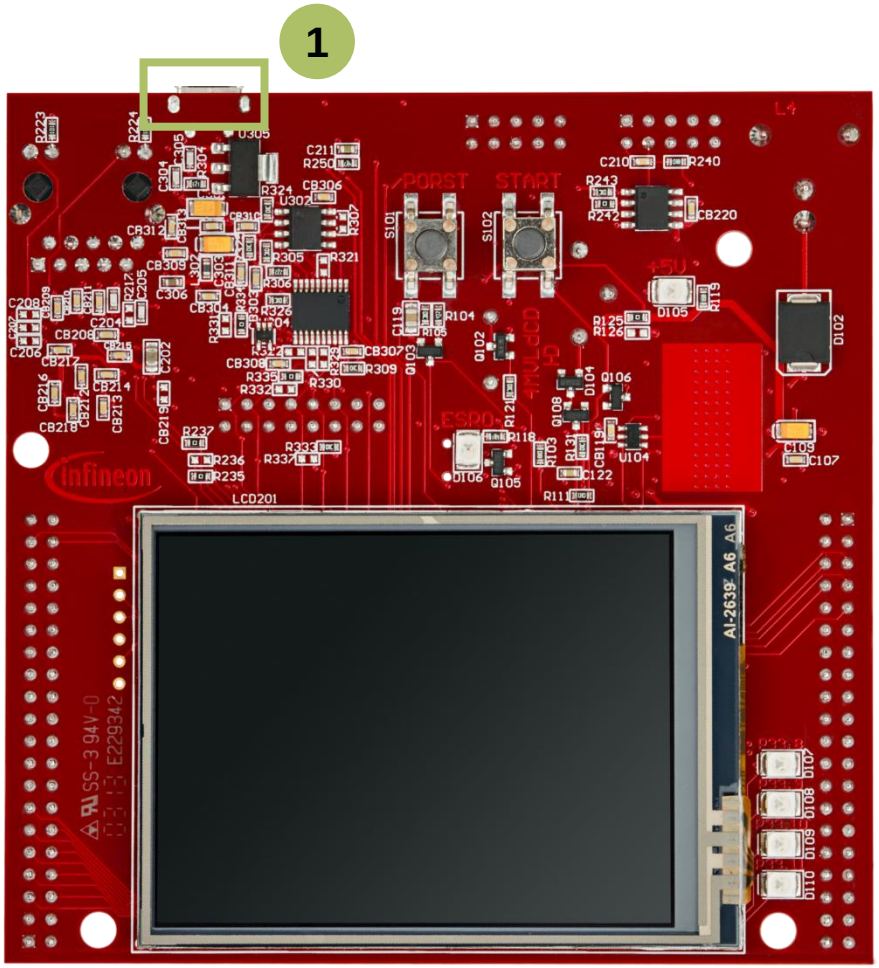
- The Die Temperature Sensor (DTS) is an internal sensor to measure the microcontroller's chip temperature.
  It generates a measurement value that indicates the current temperature of the die.

- Among other features, the DTS has the capability to **trigger an interrupt** when a new measurement is available.

Hardware setup

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

The board should be connected to the PC through the USB port (1).



Implementation

Configure the ASCLIN

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:
  - interrupt priorities for transmit, receive and error events (***txPriority***, ***rxPriority*** and ***erPriority***)
  - ***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 GPIOs 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. The standard interface is configured with the function ***IfxAsclin_Asc_stdIfDPipeInit()***.

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

Implementation

Configure the DTS

Configuration of the DTS is done by initializing an instance of the ***IfxDts_Dts_Config*** structure, which contains the following fields:

- ***isrPriority*** – priority of the interrupt triggered by DTS when a new measurement is available (it can be a value from 0 to 255, with 0 meaning interrupt is disabled, and 255 is the highest priority)
- ***isrTypeOfService*** – defines which service provider is responsible for handling the interrupt, which can be any of the available CPUs, or the DMA
- ***lowerTemperatureLimit*** – to set the lower temperature limit for DTS measurements in Celsius
- ***upperTemperatureLimit*** – to set the upper temperature limit for DTS measurements in Celsius

An SMU alarm will be triggered if the measurement result is outside these limits.

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

Both functions are used in the DTS code section, and can be found in the iLLD header ***IfxDts_Dts.h***.

Implementation

Read measurements from the DTS

After the DTS configuration, a new measurement can be started through the function ***IfxDts_Dts_startSensor()***.

When a new measurement is available, an interrupt service request will be generated and the temperature can then be read with the function ***IfxDts_Dts_getTemperatureCelsius()***.

All functions used for the DTS measurements can be found in the iLLD header ***IfxDts_Dts.h***.

Run & Test

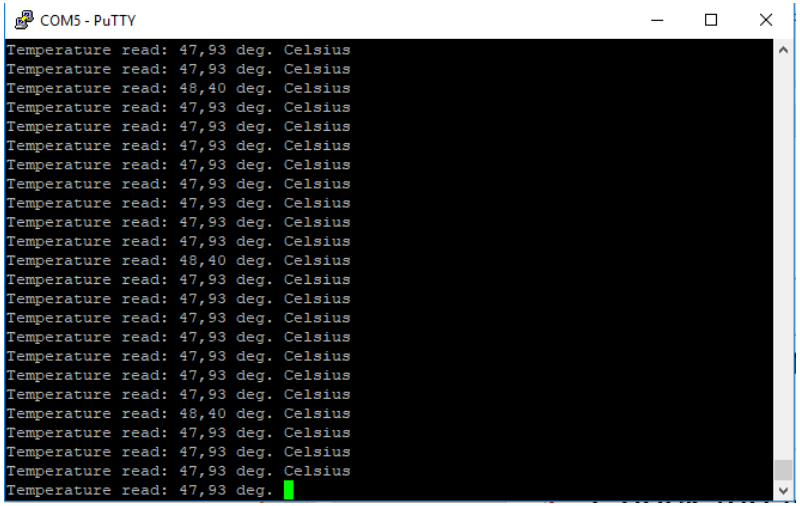
In order to see the DTS results, a terminal program (e.g. PuTTY, HTerm) is required. The terminal program must be configured with the following parameters to enable the communication between the board and the PC:

- **Port:** COMx (e.g. COM8, COM port number depends on the setup)
- **Baud rate**: 115200
- **Data bits**: 8
- **Parity**: None
- **Stop bits**: 1
- **Handshaking**: None

Additionally, the option AURIX C compiler >Floating-Point>Treat ‘double’ as ‘float’ must/should be set.

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

› Open a terminal program with the above configuration and connect.
› Check the temperature measurements.



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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