

# SCU\_Die\_Temp\_Sensor\_1 for KIT\_AURIX\_TC297\_TFT

## Die Temperature Sensor

AURIX™ TC2xx Microcontroller Training  
V1.0.3



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## Scope of work

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**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

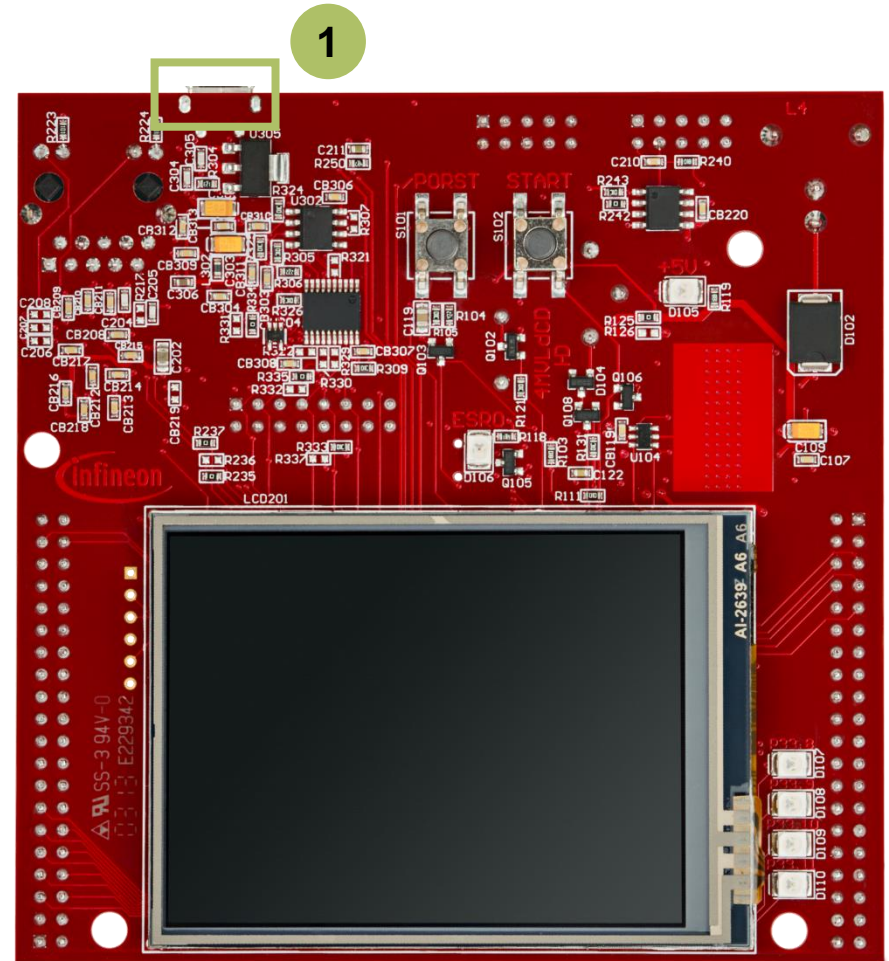
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- › The Die Temperature Sensor (DTS) is an internal sensor to measure the microcontroller's chip temperature.  
It generates a measurement value that indicates the current temperature of the die
- › Among other features, the DTS has the capability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

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## 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

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## 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

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## Read measurements from the DTS

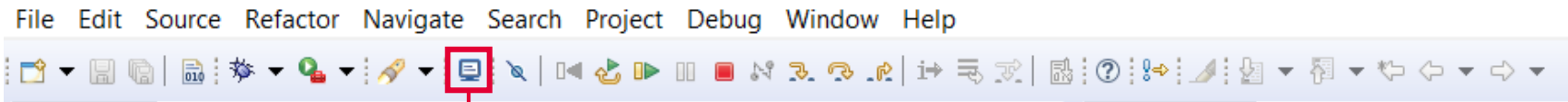
After the DTS configuration, a new measurement can be started through the function ***IfxDts\_Dts\_startSensor()***.

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***.

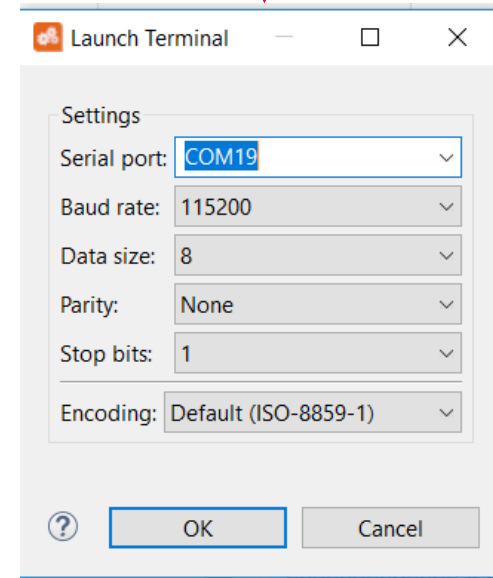
# Run and Test

- > For this training, a serial monitor is required for visualizing the values of the DTS. The monitor can be opened inside the AURIX™ Development Studio using the following icon:



- > The serial monitor must be configured with the following parameters to enable the communication between the board and the PC:

- Speed (baud): 115200
- Data bits: 8
- Stop bit: 1

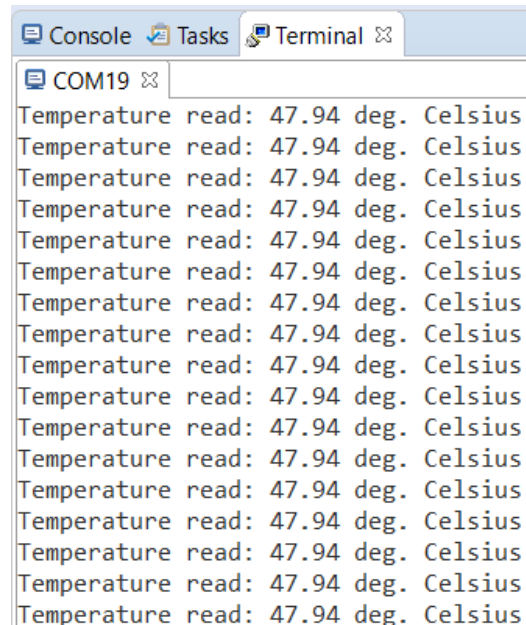




# Run & Test

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

- › Open the terminal program with the given configuration and connect
- › Check the temperature measurements



```
COM19
Temperature read: 47.94 deg. Celsius
Temperature read: 47.94 deg. Celsius
Temperature read: 47.94 deg. Celsius
Temperature read: 47.94 deg. Celsius
Temperature read: 47.94 deg. Celsius
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Temperature read: 47.94 deg. Celsius
```

# 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](https://github.com/Infineon/AURIX_code_examples)



- › For additional trainings, visit our webpage:
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- › For questions and support, use the AURIX™ Forum:
- › <https://www.infineonforums.com/forums/13-Aurix-Forum>

# Revision history

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<b>Revision</b>	<b>Description of change</b>
V1.0.2	Update of version to be in line with the code example's version
V1.0.1	Run and Test section updated with the new terminal feature
V1.0.0	Initial version

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**Document reference**

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\_KIT\_TC297\_TFT**

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