ADC_Queued_Scan_1 for KIT_AURIX_TC275_LK

ADC queued source

AURIX™ TC2xx Microcontroller Training
V1.0.0

Scope of work

The Versatile Analog-to-Digital Converter (VADC) is configured to measure multiple analog signals in a sequence using queued request.

The Queued Request of the Versatile Analog-to-Digital Converter (VADC) module is used to continuously scan the analog inputs channels 5, 6 and 7 of group 4.

Introduction

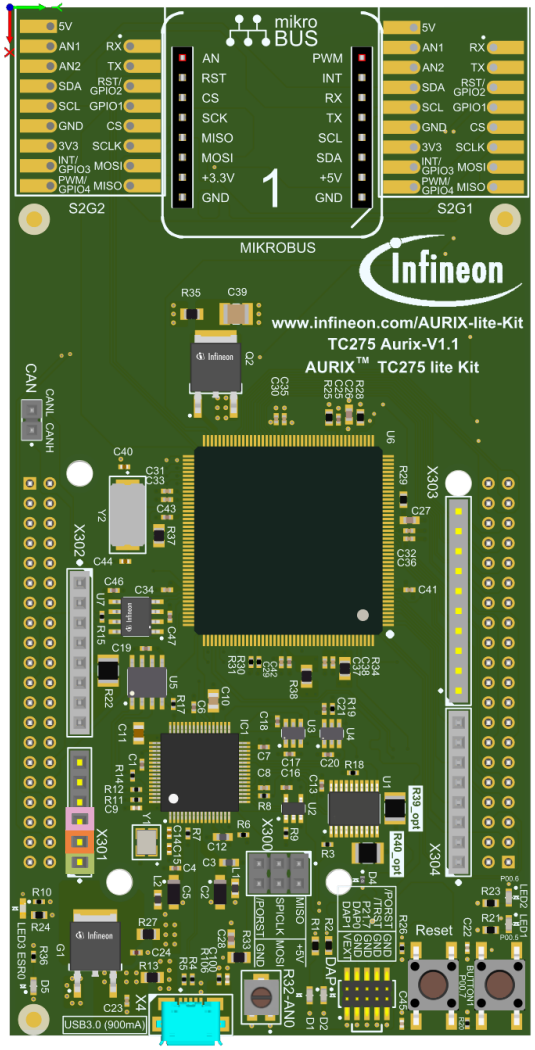
- The Versatile Analog-to-Digital Converter module (VADC) of the AURIX™ TC27x comprises 8 independent analog to digital converters (VADC groups) with up to 8 analog input channels each
- Each channel can convert analog inputs with a resolution of up to 12-bit.
- Analog/Digital conversions can be requested by several request sources:
  - **Queued request source**, specific to a single group
  - Channel scan request source, which comprises:
    - **Group scan source**, specific to a single group
    - **Background scan source**, which can request all channels of all groups
- A queued source can issue conversion requests for an arbitrary sequence of input channels. The channel numbers for this sequence can be freely programmed
- A queued source converts a series of input channels permanently (using the refill option) or on a regular time base

Hardware setup

This code example has been developed for the board KIT_AURIX_TC275_LITE.

The signals to be measured have to be connected to channels 5, 6 and 7 of the group 4 of the VADC (pins AN37, AN38, AN39).

	X301
(P40.1) AN25	6
(P40.0) AN24	5
(P40.6) AN36	4
(P40.7) AN37	3
(P40.8) AN38	2
(P40.9) AN39	1



Note: The reference voltage (VAREF) of the EVADC on the board KIT_AURIX_TC275_LITE is 3.3 V.

Implementation

Configuration of the VADC

The configuration of the VADC is done in the ***initVADC()*** function in four different steps:

- Configuration of the **VADC module**
- Configuration of the **VADC group**
- Configuration of the **VADC channels**
- Filling the queue

Configuration of the VADC module with the function *initVADCModule()*

The default configuration of the VADC module, given by the iLLDs, can be used for this example.
This is done by initializing an instance of the ***IfxVadc_Adc_Config*** structure and applying default values to its fields through the function ***IfxVadc_Adc_initModuleConfig()***.
Then, the configuration can be applied to the VADC module with the function ***IfxVadc_Adc_initModule()***.

Implementation

Configuration of the VADC group with the function *initVADCGroup()*

The configuration of the VADC group is done by initializing an instance of the ***IfxVadc_Adc_GroupConfig*** structure with default values through the function ***IfxVadc_Adc_initGroupConfig()*** and modifying the following fields:

- ***groupId*** – to select which converters to configure
- ***master*** – to indicate which converter is the master. In this example, only one converter is used, therefore it is also the master
- ***arbiter*** – a structure that represents the enabled request sources, which can be Group scan, Queue and/or Background sources. In this example, it is set to ***arbiter.requestSlotQueueEnabled***
- ***triggerConfig*** – a parameter that specify the trigger configuration

Then, the user configuration is applied through the function ***IfxVadc_Adc_initGroup()***.

Implementation

Configuration of the VADC channels with the function *initVADCChannels()*

The configuration of each channel is done by initializing a separate instance of the ***IfxVadc_Adc_ChannelConfig*** structure with default values through the function ***IfxVadc_Adc_initChannelConfig()*** and modifying the following fields:

- ***channelId*** – to select the channel to configure
- ***resultRegister*** – to indicate the register where the A/D conversion value is stored

Then, the configuration is applied to the channel with the function ***IfxVadc_Adc_initChannel()***.

Filling the queue

Each channel is added to the queue through the function ***IfxVadc_Adc_addToQueue()***.

When the VADC configuration is done and the queue is filled, the conversion is started with the function ***IfxVadc_Adc_startQueue()***.

Finally, to read a conversion, the function ***IfxVadc_Adc_getResult()*** from iLLDs is used inside the function ***readVADC()***.

All the functions used to get a conversion and configuring the VADC module, its group and channels can be found in the iLLD header ***IfxVadc_Adc.h***.

Run and Test

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

- Run the code and then pause it
- Repeat the above step to see that the result is changing accordingly to the signal you measure:
  - AN37 is g_results[0]
  - AN38 is g_results[1]
  - AN39 is g_results[2]

Variables | Breakpoints | Expressions

Expression	Type	Value
g_results[0].B.RESULT	unsigned short	3398
g_results[1].B.RESULT	unsigned short	4095
g_results[2].B.RESULT	unsigned short	1857
Add new expression		

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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