ADC_Queued_Scan_1 for KIT_AURIX_TC375_LK

ADC queued source

AURIX™ TC3xx Microcontroller Training
V1.0.0

Scope of work

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

The Queued Request of the Enhanced Versatile Analog-to-Digital Converter (EVADC) module is used to continuously scan the analog inputs channels 7, 6 and 5 of group 8.

Introduction

› The Enhanced Versatile Analog-to-Digital Converter module (EVADC) of the AURIX™ TC37x comprises 8 independent analog to digital converters (EVADC groups) with up to 16 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
  – **Synchronization source**, synchronized conversion request from another ADC master kernel

› A queued source can issue conversion requests for an arbitrary sequence of input channels. The channel numbers for this sequence can be freely programmed.

› The trigger for the conversion via the queued source can be sent:
  – Once (by another external module)
  – On a regular time base (by an external timer)
  – Permanently (by using the refill option)

Hardware setup

This code example has been developed for the board KIT_A2G_TC375_LITE.

The signals to be measured have to be connected to channels 7, 6 and 5 of the group 8 of the EVADC (pins AN39, AN38, AN37).

		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_A2G_TC375_LITE is 3.3 V.
Note: The channels can be HW filtered by the board, depending on which capacitor/resistors couples are soldered. Consult the AURIX™ TC375 lite Kit's User Manual to check which channels are filtered by HW.
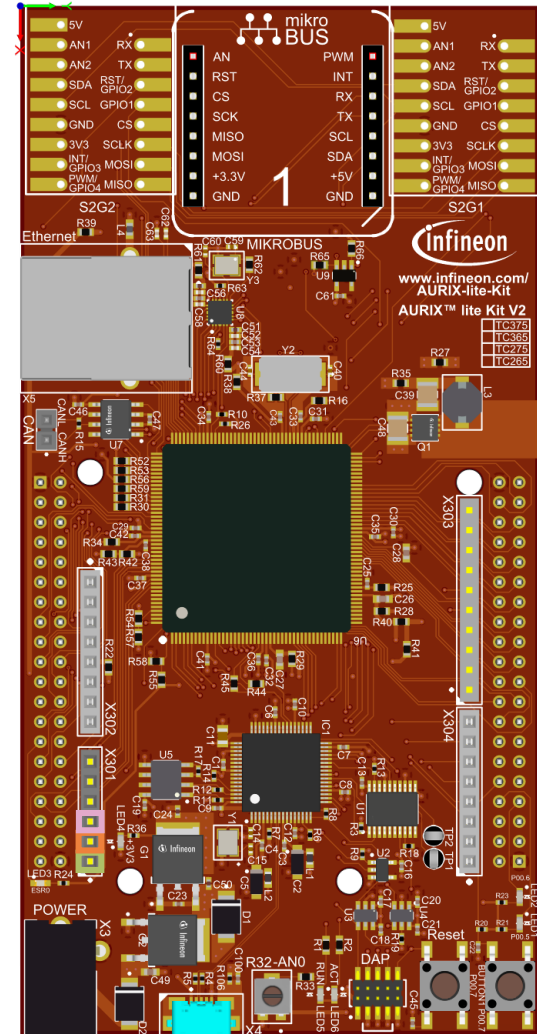
Configuration of the EVADC

The configuration of the EVADC is done in the ***initEVADC()*** function in four different steps:

› Configuration of the **EVADC module**
› Configuration of the **EVADC group**
› Configuration of the **EVADC channels**
› Filling the queue

Configuration of the EVADC module with the function *initEVADCModule()*

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

Implementation

Configuration of the EVADC group with the function *initEVADCGroup()*

The configuration of the EVADC group is done by initializing an instance of the ***IfxEvadc_Adc_GroupConfig*** structure with default values through the function ***IfxEvadc_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. In this example, it is set to ***arbiter.requestSlotQueue0Enabled***
›   ***triggerConfig*** – a parameter that specify the trigger configuration

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

Implementation

Configuration of the EVADC channels with the function *initEVADCChannels()*

The configuration of each channel is done by initializing a separate instance of the ***IfxEvadc_Adc_ChannelConfig*** structure with default values through the function ***IfxEvadc_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 ***IfxEvadc_Adc_initChannel()***.

Filling the queue

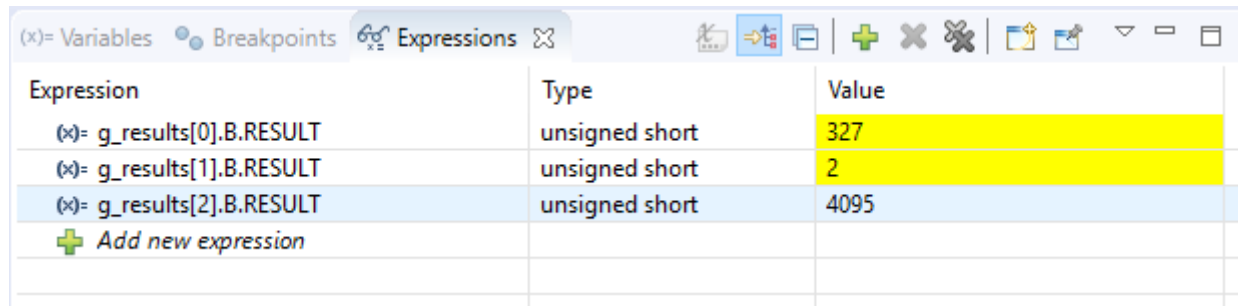Each channel is added to the queue through the function ***IfxEvadc_Adc_addToQueue()***.

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

To read a conversion, the iLLD API ***IfxEvadc_Adc_getResult()*** is used inside the function ***readEVADC()***.

All the functions used for configuring the EVADC module, its groups and channels together with reading the conversion results can be found in the iLLD header ***IfxEvadc_Adc.h***.

Run and Test

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

› Run the code and then pause it
› Repeat step number one to see that the result is changing accordingly to the signal you measure, AN39 is *g_results[0]*, AN38 is *g_results[1]* and AN37 is *g_results[2]*.

Expression	Type	Value
(x)= g_results[0].B.RESULT	unsigned short	327
(x)= g_results[1].B.RESULT	unsigned short	2
(x)= g_results[2].B.RESULT	unsigned short	4095
➕ Add new expression		

(x)= Variables ⚫ Breakpoints 👓 Expressions ✕

Note: The maximum and minimum values are expressed as a 12-bits integer value, in decimal format (0 - 4095 range), 3.3V being the maximum measurable value.

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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