ADC_Queue_Scan_1 for KIT_AURIX_TC334_LK
ADC queued source

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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™ TC33x comprises 4 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_TC334_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).

Note: The reference voltage (VAREF) of the EVADC on the board KIT_A2G_TC334_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™ TC334 lite Kit’s User Manual to check which channels are filtered by HW.
Implementation

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 \textit{initEVADCGroup()}

The configuration of the EVADC group is done by initializing an instance of the \textit{IfxEvadc_Adc_GroupConfig} structure with default values through the function \textit{IfxEvadc_Adc_initGroupConfig()} and modifying the following fields:

› \textbf{groupId} – to select which converters to configure
› \textbf{master} – to indicate which converter is the master. In this example, only one converter is used, therefore it is also the master
› \textbf{arbiter} – a structure that represents the enabled request sources. In this example, it is set to \textit{arbiter.requestSlotQueue0Enabled}
› \textbf{triggerConfig} – a parameter that specify the trigger configuration

Then, the user configuration is applied through the function \textit{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 Table](image)

**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](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:
  - [https://www.infineon.com/aurix-expert-training](https://www.infineon.com/aurix-expert-training)

- For questions and support, use the AURIX™ Forum:
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