ADC_Queue_Scan_1 for KIT_AURIX_TC297_TFT
ADC queued source
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 1, 4 and 5 of group 2.
Introduction

- The Versatile Analog-to-Digital Converter module (VADC) of the AURIX™ TC29x comprises 11 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_TC297_TFT_BC-Step. The signals to be measured have to be connected to channels 1, 4 and 5 of the group 2 of the VADC (pins AN17, AN20, AN21).
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`.  

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Run and Test

The signals to be measured have to be connected to channels 1, 4 and 5 of the group 2 of the VADC (pins AN17, AN20, AN21).

Note: For the testing purposes, connect V_UC or GND. Avoid using the VCC_IN (this is the power supplied to the board).
Run and Test

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

› Run the code and then pause it
› Resume step number one to see that the result is changing accordingly to the signal you measure, AN17 is `g_results[0]`, AN20 is `g_results[1]` and AN21 is `g_results[2]`.

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<thead>
<tr>
<th>Expression</th>
<th>Type</th>
<th>Value</th>
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<tr>
<td><code>resultTrace[0].RESULT</code></td>
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<tr>
<td><code>resultTrace[1].RESULT</code></td>
<td>unsigned short</td>
<td>2451</td>
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<tr>
<td><code>resultTrace[2].RESULT</code></td>
<td>unsigned short</td>
<td>2583</td>
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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:
<table>
<thead>
<tr>
<th>Revision</th>
<th>Description of change</th>
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<tbody>
<tr>
<td>V1.0.1</td>
<td>Update of version to be in line with the code example’s version</td>
</tr>
<tr>
<td>V1.0.0</td>
<td>Initial version</td>
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