MAX 10 – Toolkit ADC Example

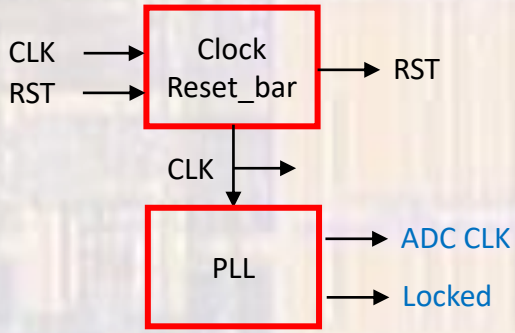
Last updated 7/20/23

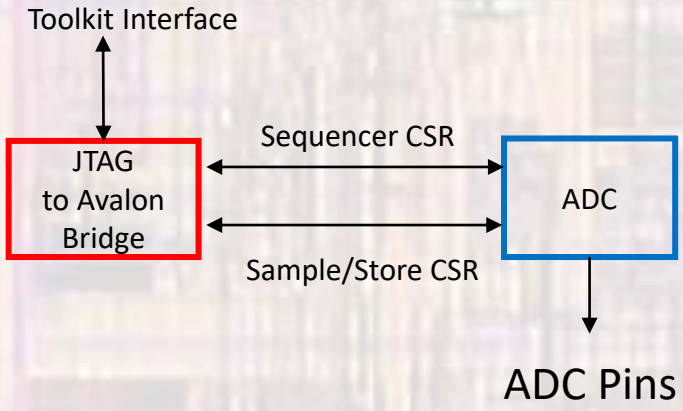
Max10 ADC Example - Toolkit

- ADC Configuration
  - 3 approaches to using the ADCs
    - Used as part of a NIOS system
      - Avalon interface built in by Platform Designer
    - Used with a hand built interface
      - Emulate the Avalon interface
    - Used with the Quartus ToolKit (Inside System Console) to verify operation
      - Avalon interface built into the toolkit

Max10 ADC Example - NIOS

- Nios ADC
  - Create a system to use the ADC with the Toolkit





Max10 ADC Example - Toolkit

- ADC Example – using ADC Toolkit
  - Platform Planner

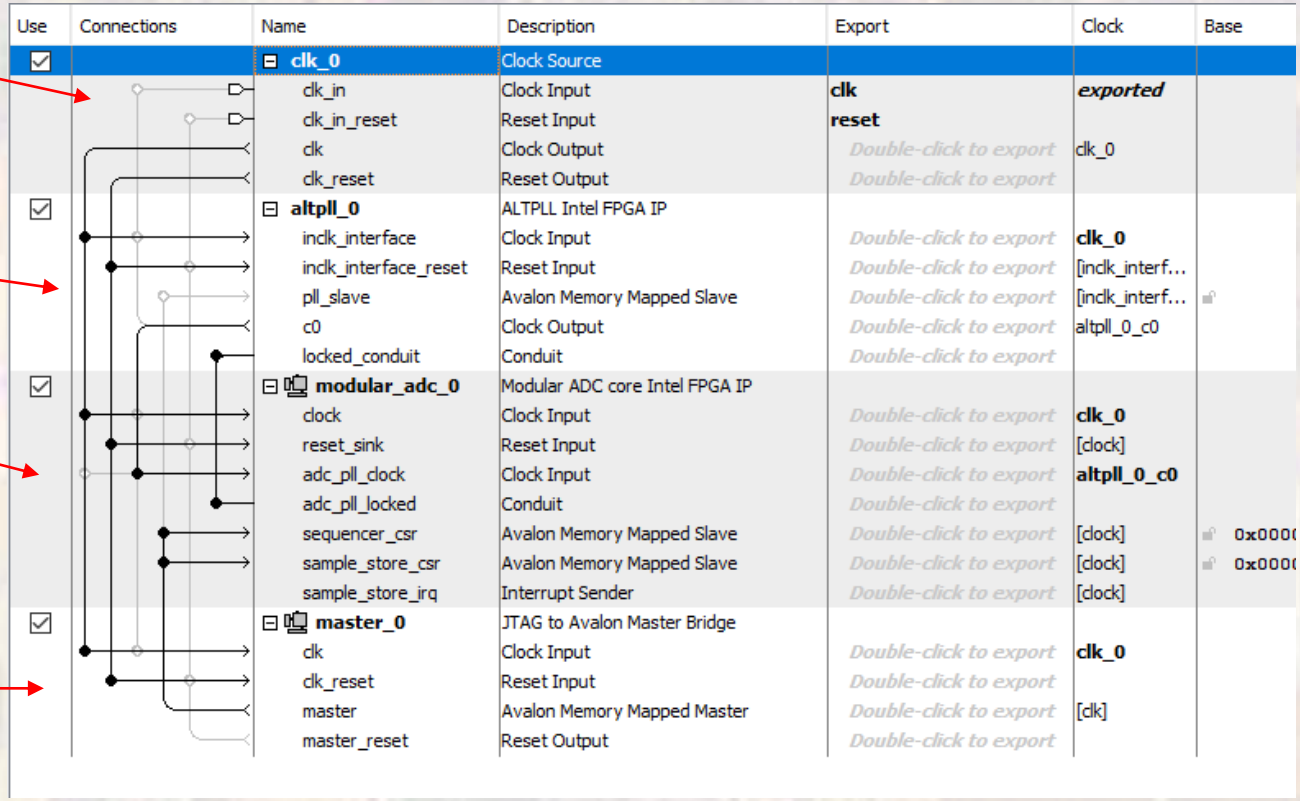
Clk driver required for PLL

10MHz PLL output

ADC Block

Debug interface for Toolkit

Toolkit controls the Avalon Interface through this module



Max10 ADC Example - Toolkit

- ADC Example – using ADC Toolkit
  - ADC Module

Configuration

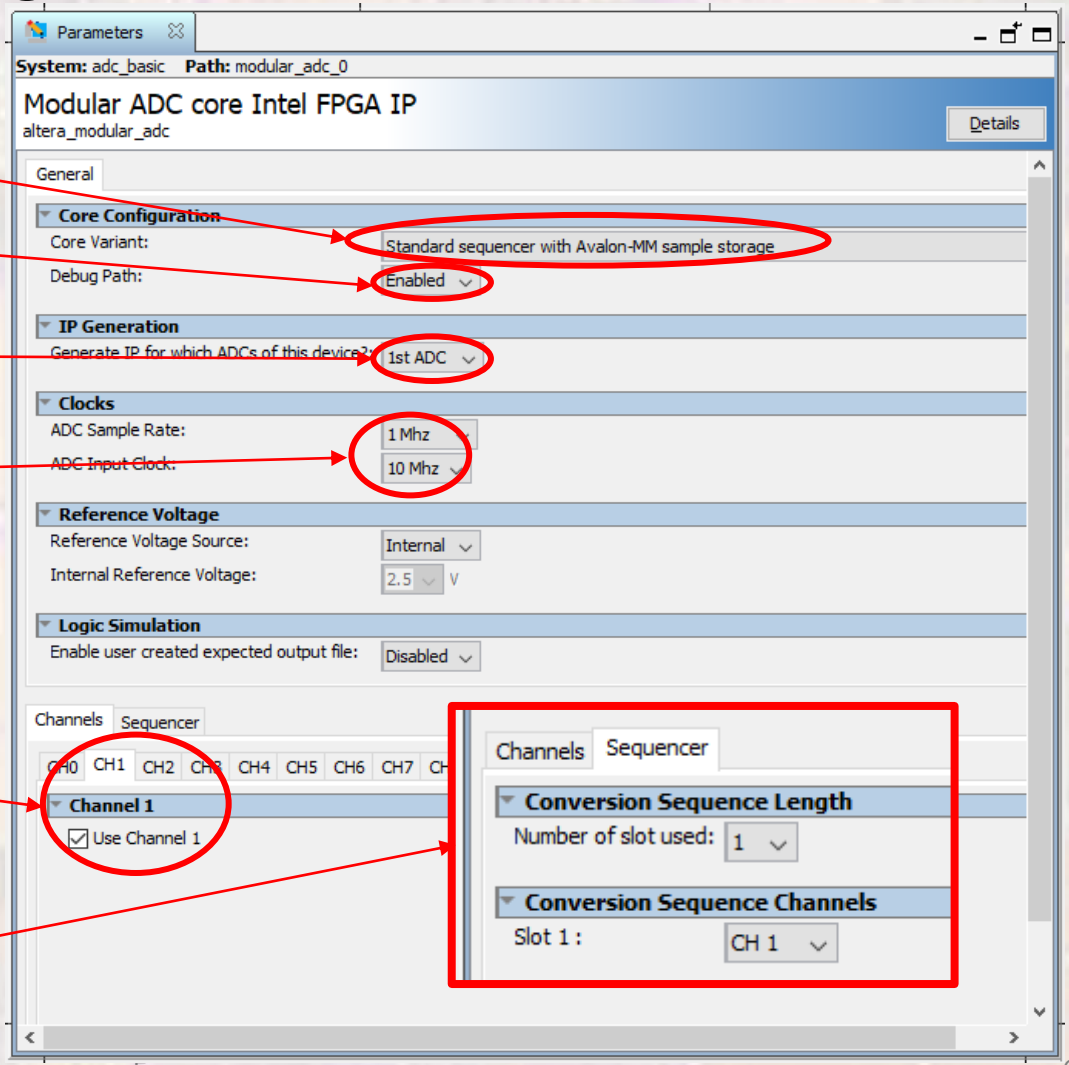
Enabled for the Toolkit

Only ADC1 available on DE10-Lite

Max Sample Rate
Required Clock

Channel 1
Arduino A0 pin

Sequencer Setup



Max10 ADC Example - Toolkit

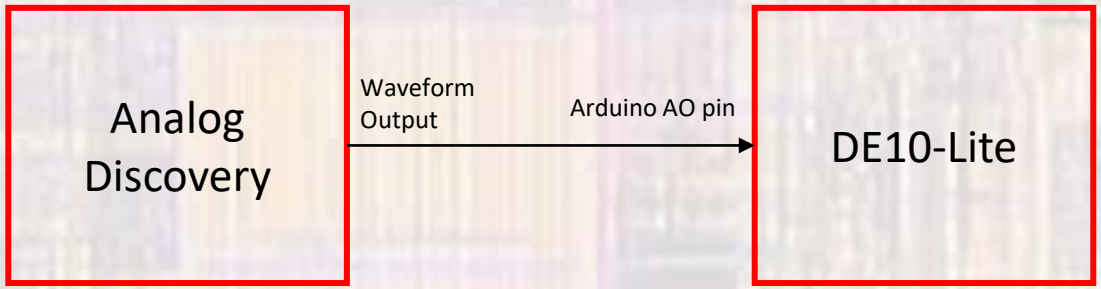
- ADC Example – using ADC Toolkit
  - DE10 top level design

```
----------------------------------
--
--  adc_basic_de10.vhdl
--
--  by: johnsontimoj
--
--  created: 6/28/2018
--
--  version: 0.0
--
----------------------------------
----------------------------------
--
--  ADC example - de10 implementation
--
--  inputs: CLK, ADCin 1 (via IP)
--
--  outputs: none
--
--  Use System Console - ADC Toolkit for validation
--
----------------------------------

library ieee;
use ieee.std_logic_1164.all;
use ieee.numeric_std.all;

entity adc_basic_de10 is
   port  (  CLOCK_50:      in std_logic
         );
end entity;
```

```
architecture toplevel of adc_basic_de10 is
   component adc_basic is
      port (
         clk_clk       : in std_logic := 'X'; -- clk
         reset_reset_n : in std_logic := 'X'  -- reset_n
      );
   end component adc_basic;

begin

   u0 : component adc_basic
      port map (
         clk_clk       => CLOCK_50,       --   clk.clk
         reset_reset_n => '1'             -- reset.reset_n
      );

   -- no activity
end architecture;
```

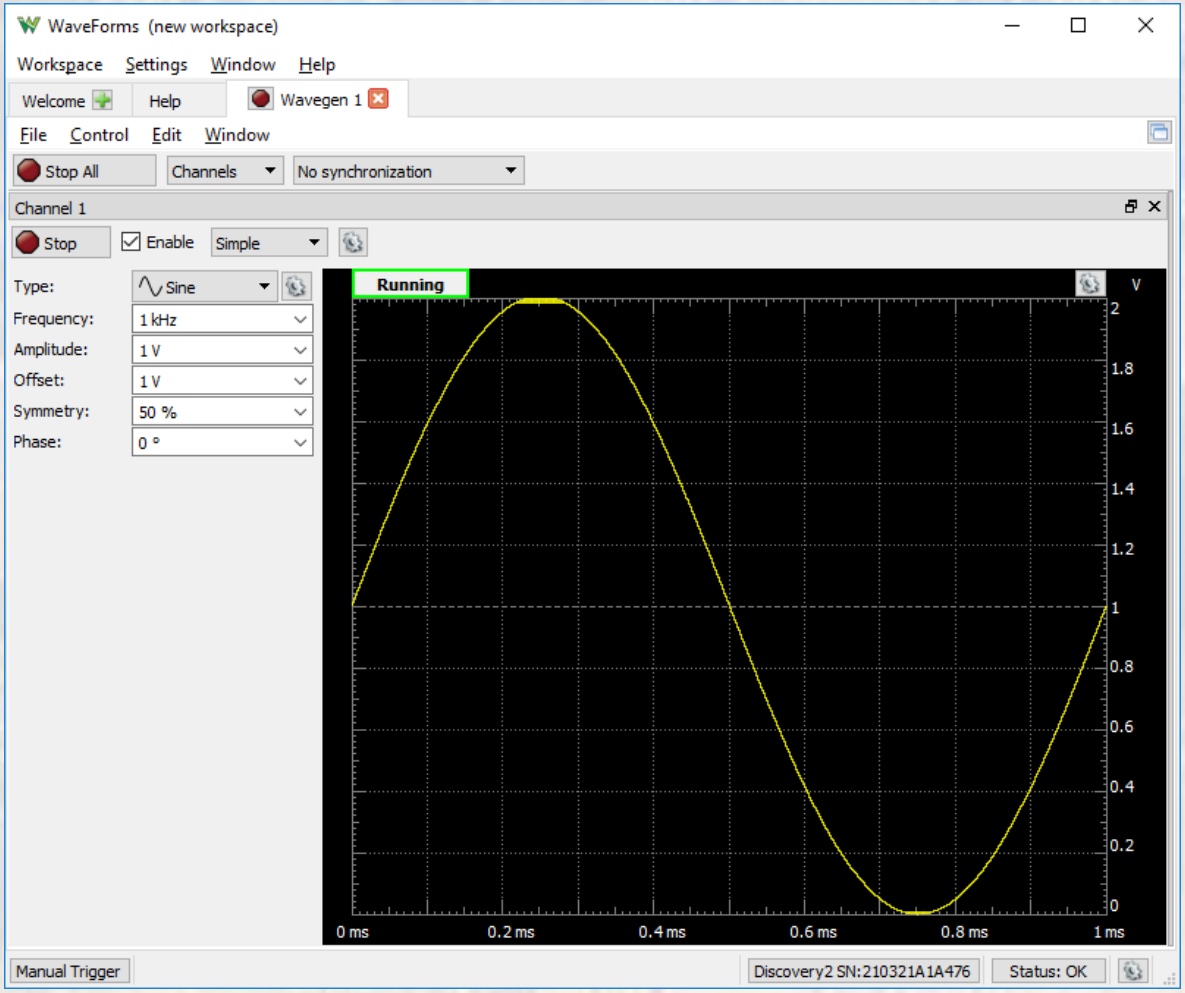
Max10 ADC Example - Toolkit

- ADC Example – using ADC Toolkit
  - Setup



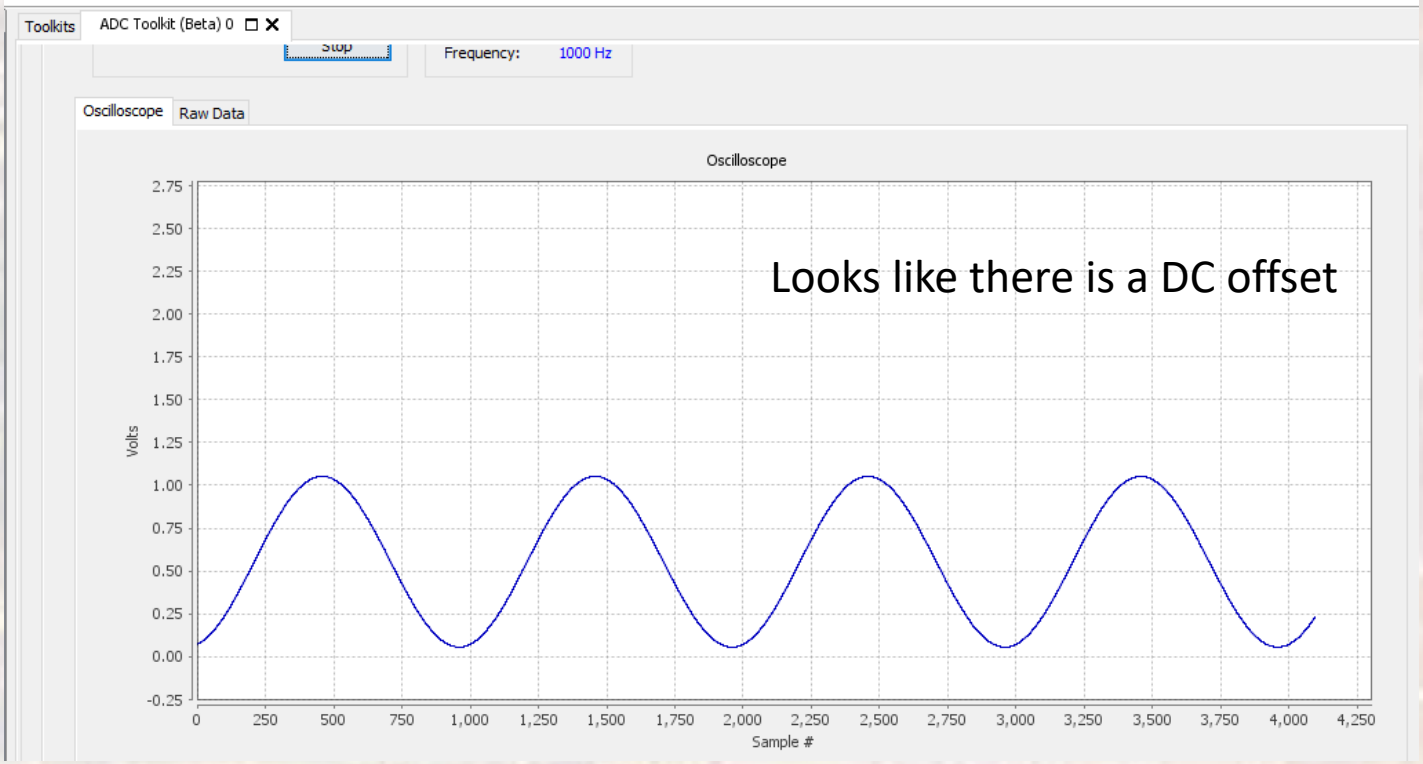
Max10 ADC Example - Toolkit

- ADC Example – using ADC Toolkit



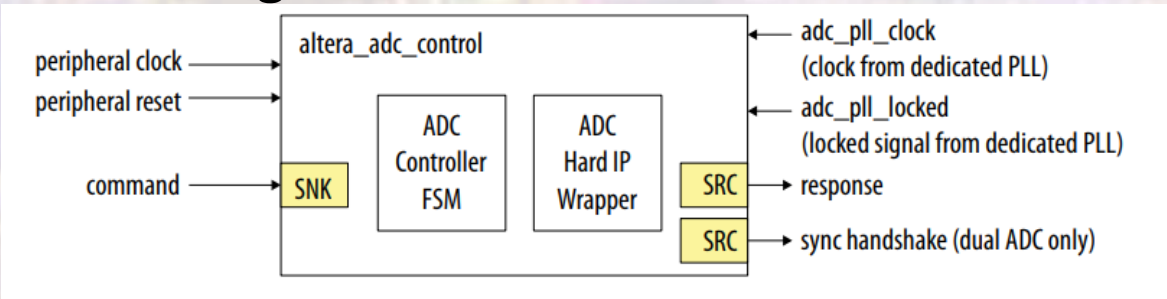
Max10 ADC Example - Toolkit

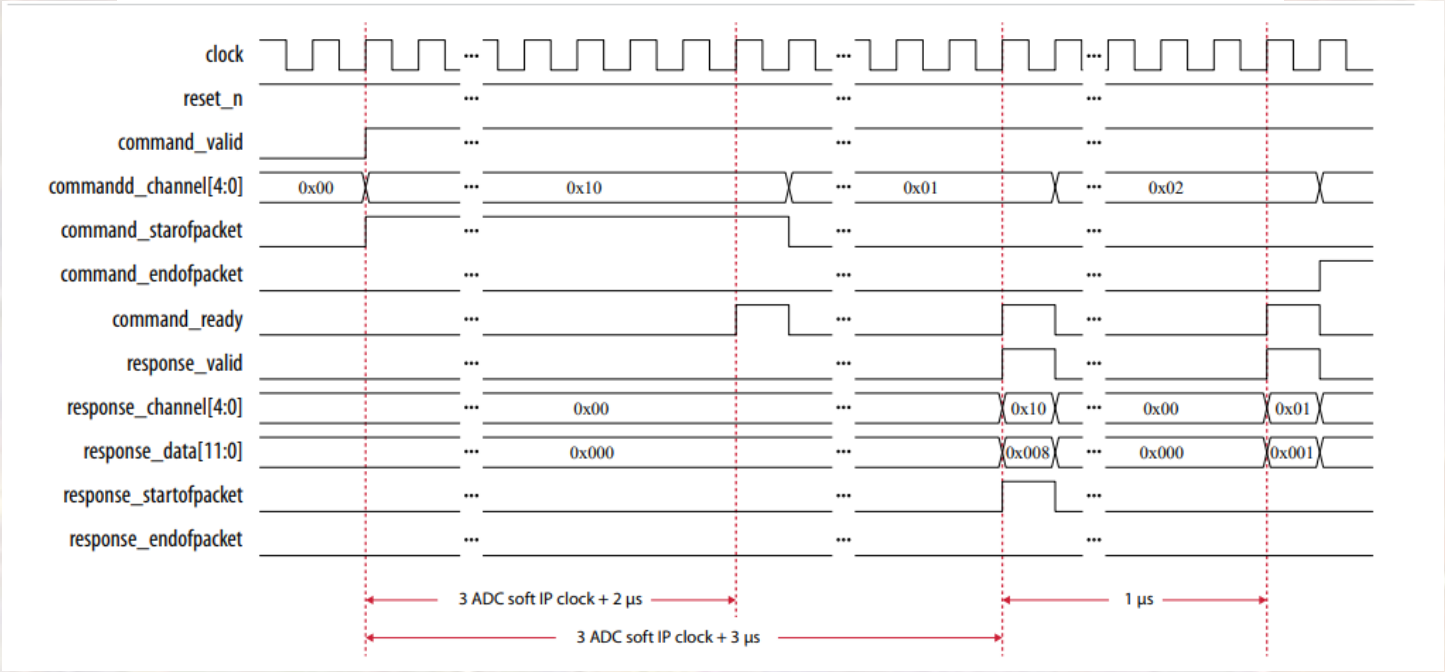
- ADC Example – using ADC Toolkit
  - In Platform designer – Tools – System Console – ADC Toolkit
  - ADC Toolkit results



Max10 ADC Example - Toolkit

- ADC Control Interfaces
  - To create a logic controller





Max10 ADC Example - Toolkit

- DE10-Lite – ADC WARNINGS
  - Only ADC1 is brought out to pins
    - No access to ADC2 inputs at the FPGA pins
  - The pin #s are shifted
    - Arduino A0 is mapped to ADC1_in1

      …
    - Arduino A5 is mapped to ADC1_in6
  - No other ADC inputs are pinned out