Using the LX7730 Analog Multiplexer

Description

The analog multiplexer (AMUX) in LX7730 consists of 64 inputs. The AMUX is physically divided into eight banks with eight inputs each. There are two AMUX outputs which are connected to the non-inverting and inverting inputs of the following instrumentation amplifier stage. Only one CH#, from one input bank can be selected at a time which means that differential measurements must consist of two CH#s from two different input banks.

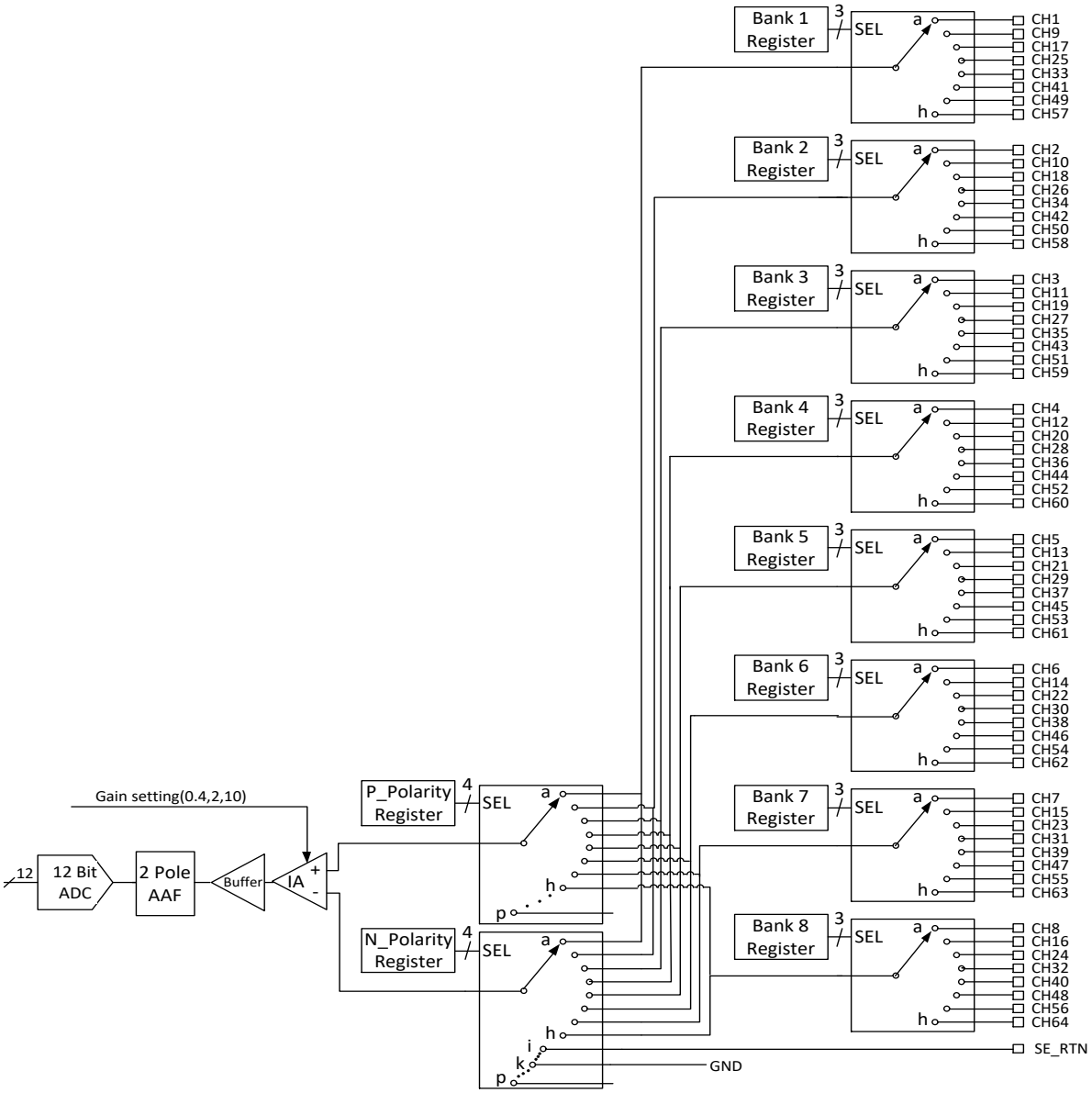


Figure 1. LX7730 Analog Multiplexer Block Diagram

In order to make sure the outputs of AMUX can be properly processed by the following stages, the two voltages applied to the AMUX inputs which are the non-inverting and inverting inputs of instrumentation amplifier have to meet the following specs(Note1):

1. The common mode voltage of two AMUX inputs must be between -5.0V and +5.0V.
2. The differential voltage of two AMUX inputs must be between 0.0V to 5.0V.
3. The output voltage of instrumentation amplifier V_{IA}=Gain x (V_P-V_N) is positive and less than 2V after amplifier gain conditioning (Gain=0.4,2,10).

Examples of AMUX application for wide input voltage range

1. For 64 single ended inputs application with maximum 5.0V differential input and input voltages from 0V - 7.5V

- Input voltage range: 2.5V to 7.5V
  - Set SE_RTN as inverting MUX channel and apply 2.5V to SE_RTN. 2.5V can be generated by a resistor divider connected to VREF pin.
  - Set one of 64 MUX channels as non-inverting MUX channel.

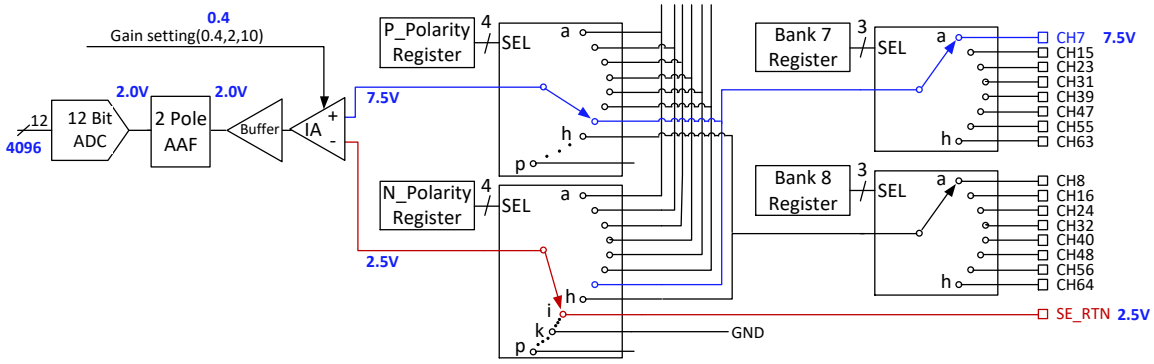


Figure 2. 64 single ended inputs application when input voltages from 2.5V to 7.5V

- Input voltage range: 0.0V to 5.0V
  - Set inverting MUX channel to IC internal ground by selecting I_GND (register address 16 bit 1).
  - Set one of 64 MUX channels as non-inverting MUX channel.

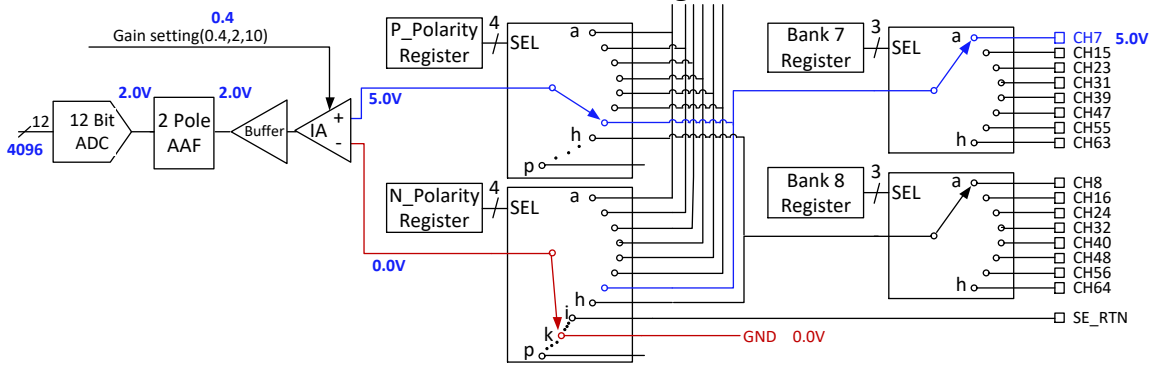


Figure 3. 64 single ended inputs application when input voltages from 0.0V to 5.0V

2. For 56 single ended inputs application with maximum 5.0V differential input and input voltages from -7.5V to 7.5V

   Use one bank for common mode references. In this solution, channel 7 and channel 15 in bank7 (CH 7, 15, 23, 31, 39, 47, 55, 63) are chosen as reference inputs.

   - Set SE_RTN to 2.5V (Input voltage +2.5V to +7.5V).
   - Set channel 7 to 0.0V (Input voltage -5.0V to +5.0V).
   - Set channel 15 to -2.5V (Input voltage -2.5V to -7.5V).

   Channel 23, 31, 39, 47, 55, and 63 are available for single ended measurements while I_GND or SE_RTN is chosen as inverting MUX channel.

- Input voltage range: -7.5V to -2.5V
  - Set Non-Inverting MUX channel to CH15.
  - Set Inverting MUX channel to one of 56 MUX channels.

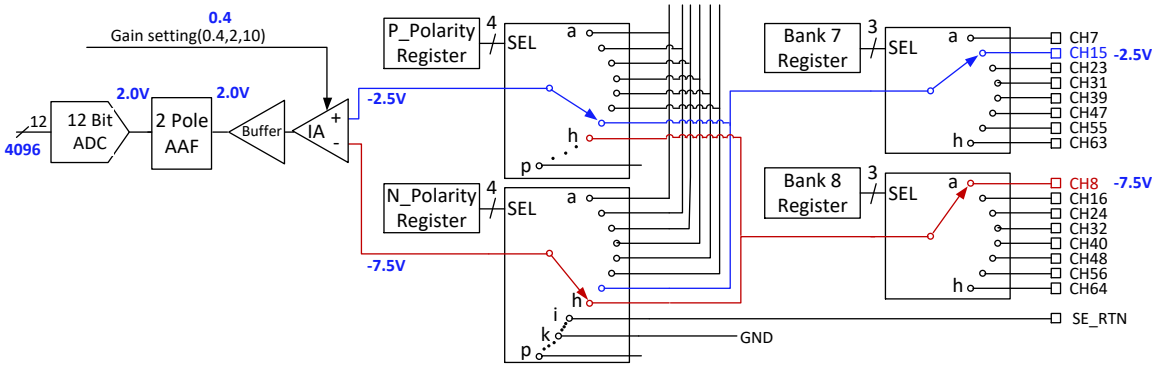


Figure 4. 56 single ended inputs application when input voltages from -7.5V to -2.5V

- Input voltage range: -5.0V to 0.0V
  - Set Non-Inverting MUX channel to CH7.
  - Set Inverting MUX channel to one of 56 MUX channels.

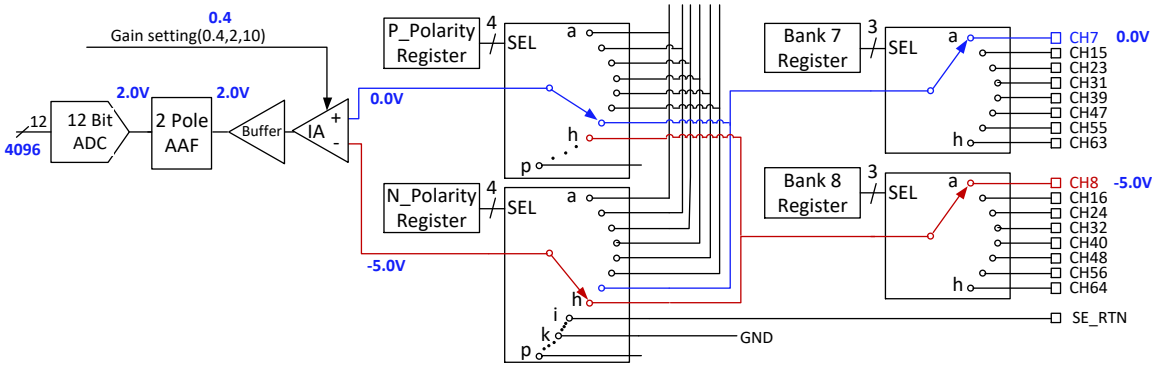


Figure 5. 56 single ended inputs application when input voltages from -5.0V to 0.0V

- Input voltage range: 0.0V to 5.0V
  - Set Inverting MUX channel to CH7.
  - Set Non-Inverting MUX channel to one of 56 MUX channels.

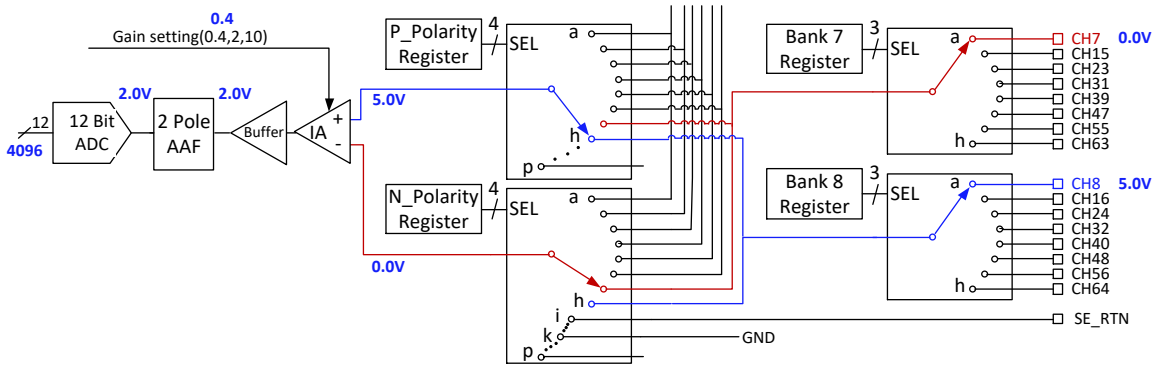


Figure 6. 56 single ended inputs application when input voltages from 0.0V to 5.0V

- Input voltage range: 2.5V to 7.5V
  - Set Inverting MUX channel to SE_RTN.
  - Set Non-Inverting MUX channel to one of 56 MUX channels.

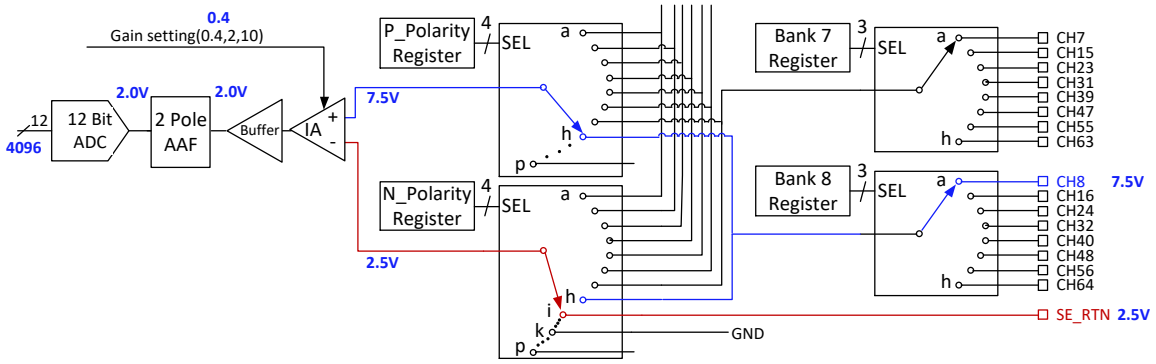
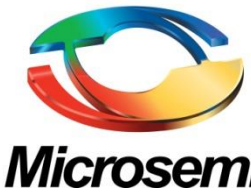


Figure 7. 56 single ended inputs application when input voltages from 2.5V to 7.5V

Note 1: For -10V to +10V input signals on the AMUX, some constraints on supply voltages may apply for sufficient headroom.



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