



### Introduction

An analog comparator generates high-level signal on its output when signal on positive input is higher than signal on negative input. Analog comparator is used when there is a need to monitor a certain level of voltage.

### Window Comparator Circuit Design

The screen capture of 2 analog comparators with logic output can be seen in Figure 3. It was created using GreenPAK2. Reference voltage of ACMP0 is 870mV and reference voltage of ACMP1 is 600mV. Two analog comparators are connected to PIN4, which is configured as analog input without any pull up/down resistor. Output of 2-bit LUT1 will be HIGH when IN1 is LOW and IN0 – HIGH. All outputs are configured to be push-pull.

When voltage is higher than reference voltage of ACMP1 (600mV in this case) and less than ACMP0 then ACMP1 output will go HIGH, ACMP0 output does not change (stays LOW) and output of 2-bit LUT1 will be HIGH. But if voltage goes higher than 870mV outputs of both comparators will be in HIGH state, but the output of 2-bit LUT1 will be in LOW (see Figure 2 for truth table for LUT).

2-bit LUT2			
in0	in1	in0	out
	0	0	0
	0	1	0
	1	0	1
	1	1	0

Figure 2. Truth Table for LUT

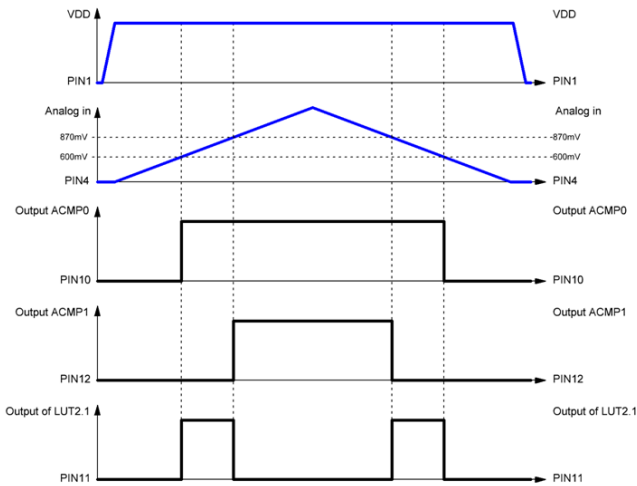


Figure 1. Window comparators timing diagram

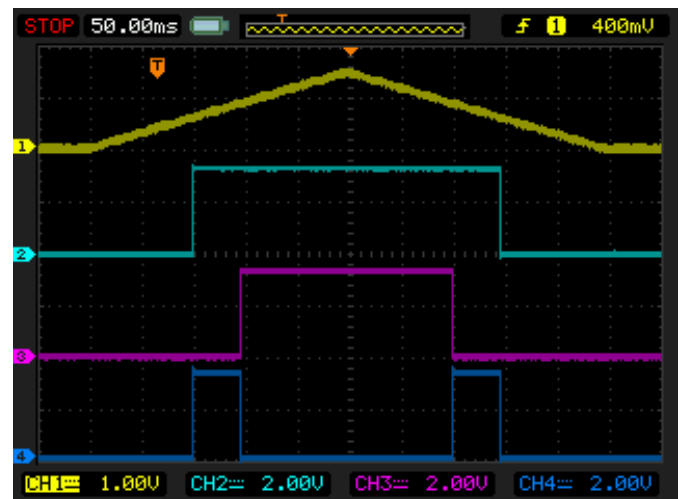


Figure 3. Window comparators output waveform. Top line is ACMPs input, 2nd line is ACMP0 output, 3rd line – ACMP1 output, bottom line – 2-bit LUT1 output

### Window Comparator Circuit Analysis

Figure 3 shows the waveform of the project. If voltage on analog input will be less than both reference voltages all outputs will be LOW.

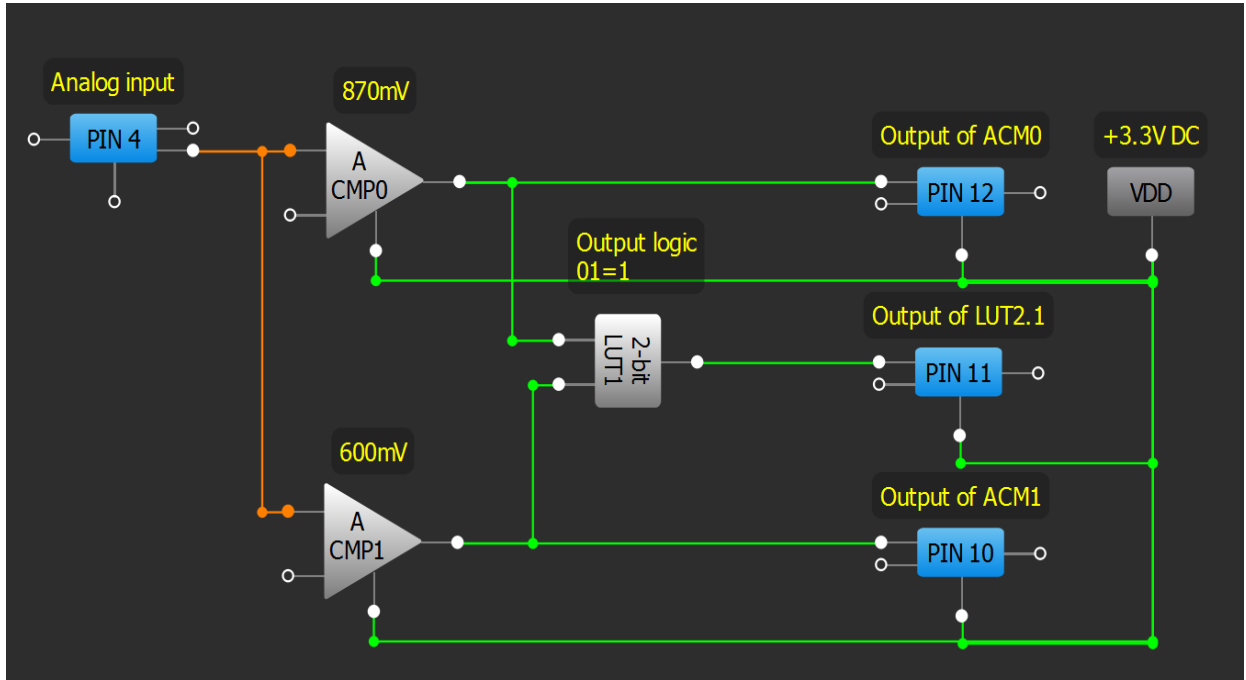


Figure 3. Window comparators block diagram

### Related Files

Programming code for **GreenPAK Designer**.

### Conclusion

Other features can also be included in the design such as adding a POR signal to the output logic to force initial states or creating pulses with different ACMPs output states. Many designs can benefit from the usage of a one-shot circuit which is easy to create in the Silego GreenPAK family of CMIC's.



### About the Author

Name: Oleg Basovych

Background: Oleg Basovych graduated from Lviv Polytechnic National University in 2011, studying at the Institute of Computer Science, department of «Automatic Control Systems». He has 3 years' experience working as an engineer and his particular sphere of interest includes microcontrollers, the construction of high-class acoustic systems and amplifiers. At the moment he is working with the analog and digital circuits and investigating the specifics of its application.

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