GreenPAK Macro Circuit Design: Wake and Sleep for Analog Comparator

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Introduction

Wake and sleep mode is required when the power consumption reduction is needed. An analog comparator generates HIGH-level signal on output when signal on positive input is higher than signal on negative input. Analog Comparator is used when it is need to monitor a certain level of voltage.

Wake and Sleep Circuit Design and Analysis

The screen capture of Wake and Sleep function for analog comparator can be seen on Figure 3. These were created in GreenPAK2 Designer software. Reference voltage of ACMP0 is 600mV. Analog comparator is connected to PIN3, which is configured as analog in without any pull up/down resistors. Counter0 is configured to output pulses with 10ms period, it's a time for "Wake". Also Counter0 operates as a clock for Counter1. Counter0 and Counter1 form Wake and sleep generator which turns ON ACMP0 for 10ms and turns OFF for 990ms. Delay2 is configured to be 100 µs both edge delay. 2-bit LUT1 is connected to clock input of LATCH0. 2-bit LUT2 switch ACMP0. When comes Wake in the same time ACMP turns on, but ACMP turns off after 100us after end wake mode.

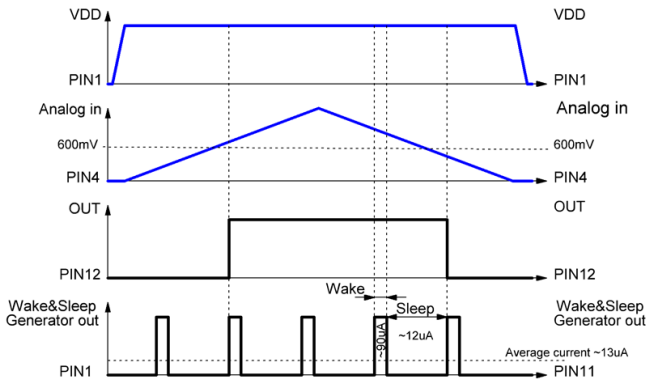

Figure 1. Wake and Sleep for comparator timing diagram

Data input of LATCH0 is connected to ACMP0 output. Counters to be operational RC OSC must be set to Force Power ON. When chip is turned on counters will start count. When Wake and Sleep generator is in Wake mode in 100 µs LATCH0 transmits signal from input to output. If voltage on Analog input will be higher than 600mV then OUT will be HIGH else OUT will be LOW.

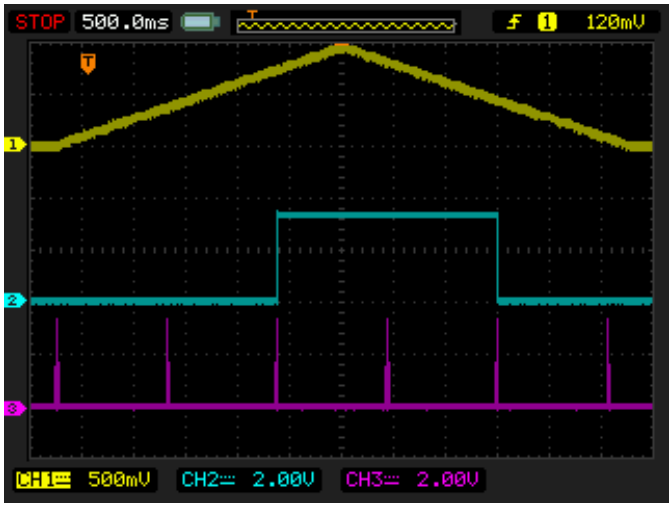

Figure 2. Wake and Sleep waveform. Top line is ACMP0 input, 2nd line is OUT output, 3rd line – Wake and Sleep Generator out

Related Files

Programming code for **GreenPAK Designer**.

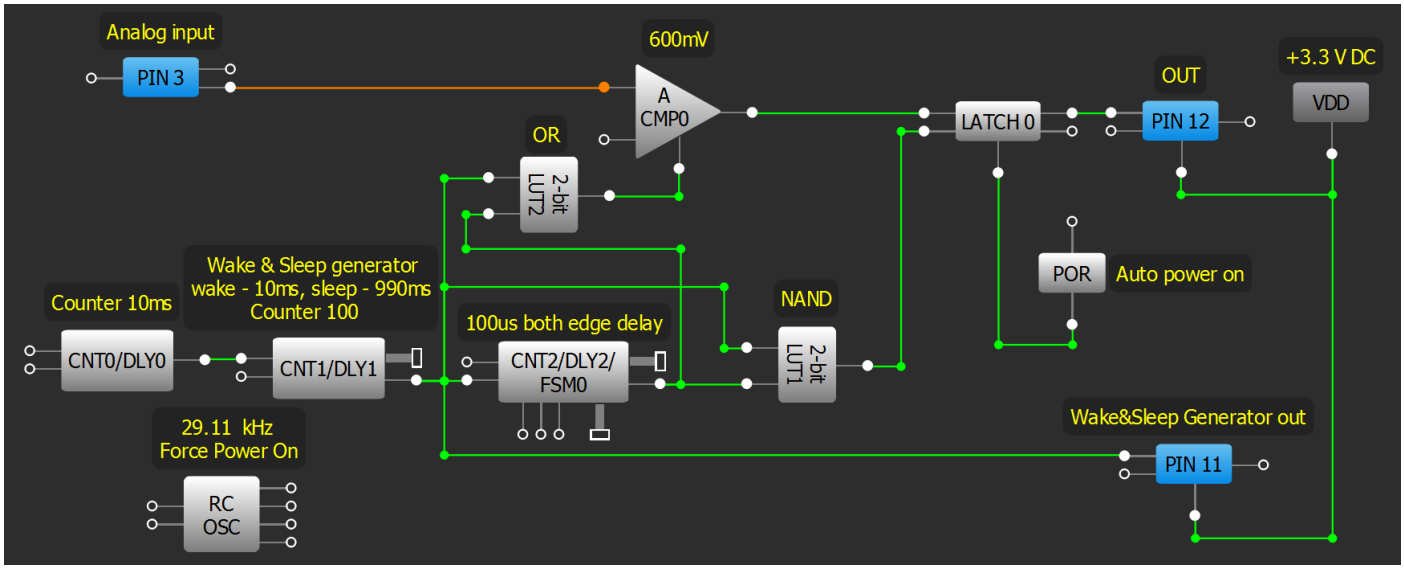

Figure3. Dynamic switching comparator block diagram

Conclusions

This mode reduces current consumption by several times Other features can also be included in the design such as adding an external signal to start Wake&Sleep generator. Also we can change wake time and sleep time. Many designs can benefit from the usage of a Wake&Sleep 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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Revision	Orig. of Change	Submission Date	Description of Change
A	Oleg Basovych	08/19/2013	New application note

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