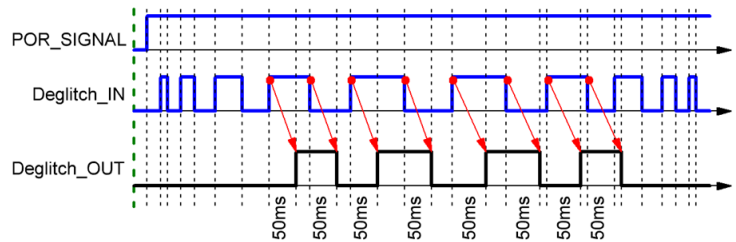


## AN-1012 GreenPAK™ Macro Circuit Design: Digital Deglitch Filter

Digital deglitch filter are functions the main purpose of which is filtering signals according to their temporal parameters. This simple unit has one input and output, main part of which is delay cell that “decides” to pass through input signal or not, see figure 1.



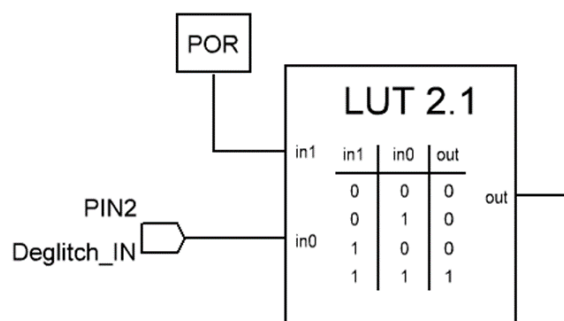
**Figure 1. Digital Deglitch Filter Timing Diagrams**

### Digital Deglitch circuit design

As can be seen in Figure 4, Digital Deglitch is implemented using 2-bit LUT1 (look-up table) connected to data input of CNT/DLY0, output of which is connected to Deglitch\_OUT (PIN12) with Output Enable connected to VDD as it is configured as push-pull.

### Digital Deglitch circuit analysis

POR and input PIN are connected to 2-bit LUT1 input (see on Figure 4) which is not involved in the formation of the delay, it serves for correct startup of the delay cell, see on Figure 2. If HIGH period of input signal is equal or bigger of the delay time of CNT0/DLY0 cell (counter data + 1 divided by the frequency of the oscillator, in this case  $T \geq (1454+1)/29.11\text{kHz} \approx 50\text{ms}$ ). CNT0/DLY0 is sourced from RC OSC and has enough time to count down from 1454 to 0 and signal will be passed through circuit to Deglitch\_OUT (PIN12). In the opposite case CNT0/DLY0 will rerun at each HIGH period of input signal and will not pass any signal on the output of CNT0/DLY0 cell.



**Figure 2. Input LUT Truth Table**

Functionality waveform of real Digital Deglitch Filter circuit created in GreenPAK2 Designer is shown on Figure 3 where Channel1 (yellow/top line) – PIN2 (Deglitch\_IN), Channel2 (light blue/bottom line) – PIN12 (Deglitch\_OUT). As can be seen from Figure 3 the real waveform coincides with the theoretical shown in Figure 1.

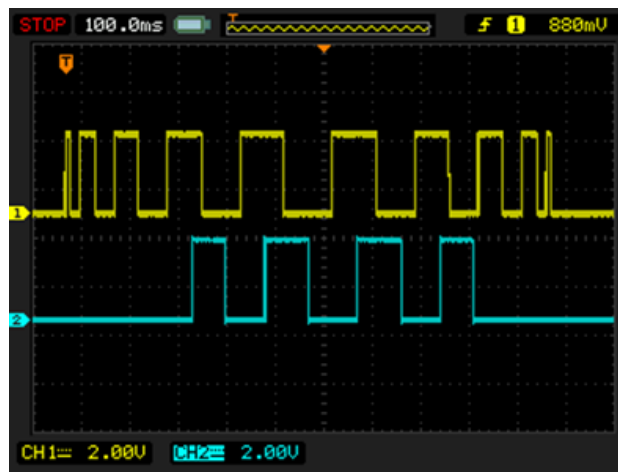


Figure 3. Digital Deglitch functionality waveforms

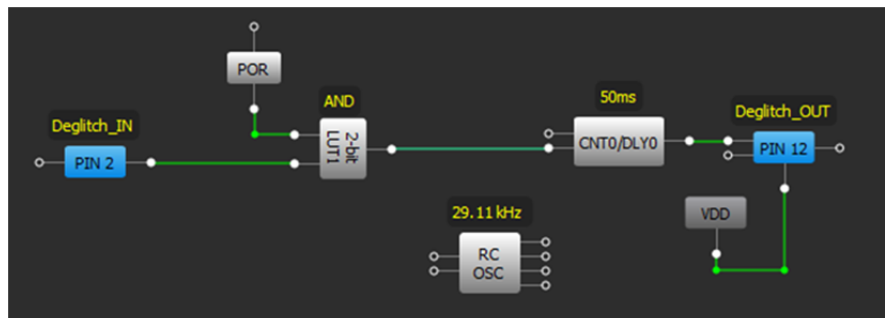


Figure 4. Digital Deglitch Filter Circuit in GreenPAK2 Designer

## Conclusion

Digital Deglitch is a simple and very useful function which helps to solve problems when it comes about input of noisy and signals with glitches, for instance from physical switches or push buttons.

*Note: for proper operation of circuit don't forget to correctly configure input and output pins. In case of the schematic you see on Figure 4 input is configured as digital input with Schmitt trigger, and output as push-pull.*

## About the Author

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Background: Volodymyr Batig graduated from Ivan Franko Lviv National University in 2012, studying at the Department of Medical and Biomedical Electronics. Presently he's working with Configurable Mixed Signal ICs (CMICs) and their application notes. Moreover, for more than 10 years his particular sphere of interest has included design, modernization and repair of everything related to electronics.

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## Files

- [AN-1012 GreenPAK Macro Circuit Design Digital Deglitch Filter.pdf](#)- (301 KB)
- [AN-1012.gp2](#)- (16 KB)
- [AN-1012.zip](#)- (282 KB)

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