A State Machine Linear Sequencer
SLG46537

The application note gives step-by-step guidelines for creating a state machine linear sequencer using a SLG46537V device. A unique set of components of the SLG46537 allows the creation of such a system.

The application note comes complete with design files which can be found in the Reference section.

Contents

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1. Terms and Definitions

ASM	Asynchronous State Machine
LUT	Look-Up Table
RAM	Random-Access Memory

2. References

For related documents and software, please visit:

GreenPAK Programmable Mixed-Signal Products | Renesas

Download our free Go Configure software hub [1] to open the .gp file [2] and view the proposed circuit design. Use the GreenPAK development tools [3] to freeze the design into your own customized IC in a matter of minutes. Renesas provides a complete library of application notes [4] featuring design examples as well as explanations of features and blocks within the Renesas IC.

[1] Go Configure Software Hub, Software Download and User Guide, Renesas Electronics

[2] AN-1105 A State Machine Linear Sequenxer.gp, GreenPAK Design File, Renesas Electronics

[3] GreenPAK Development Tools, GreenPAK Development Tools Webpage, Renesas Electronics

[4] Application Notes, GreenPAK Application Notes Webpage, Renesas Electronics

3. Introduction

This application note demonstrates how to implement a Linear Sequencer using the Asynchronous State Machine in the SLG46537 GreenPAK IC. The sequencer can control up to 7 lines with a constant delay of switching.

4. Structure of a State Machine

Figure 1. ASM Editor Window

Figure 1 shows the ASM editor window. The initial state is State0. The value of outputs in each state are shown in the RAM window. When transitioning from state to state (like S0>S1>S2>S3>S4>S5>S6>S7), every incrementing state output switches HIGH. Conversely, when decrementing through the states they switch to LOW (like S7>S6>S5>S4>S3>S2>S1>S0).

Incrementing from S0 to S7 occurs when the input ENABLE signal goes HIGH, and decrements when it goes LOW.

5. Lines Sequencer Control

Control of switch direction between states is done by 2-bit LUT1 and 2-bit LUT0. They pass the pulses of CLK GENERATOR, as shown in Figure 2. Each subsequent clock pulse makes the transition from one state to another with a delay of 100ms. ENABLE signal input level sets the direction of the Sequencer.

To turn the generator ON and OFF 3-bit LUT1 is used. This reduces current consumption. ENABLE, Line1 and Line2 signals are fed into IN2, IN1 and IN0 3-bit LUT1 inputs respectively. When all inputs are High or Low, then the output is LOW and the generator turned OFF. In all other cases it is turned ON.

GENERATOR, 3-bit LUT0 is used. When the rising or the falling are edge signal ENABLE, then the PDLY logic cells output will be High. This pulse will reset the generator, and that provides the proper delay.

Blocks configuration is presented in Figure 3. Lines Sequencer functionality signals is shown in Figure 4.

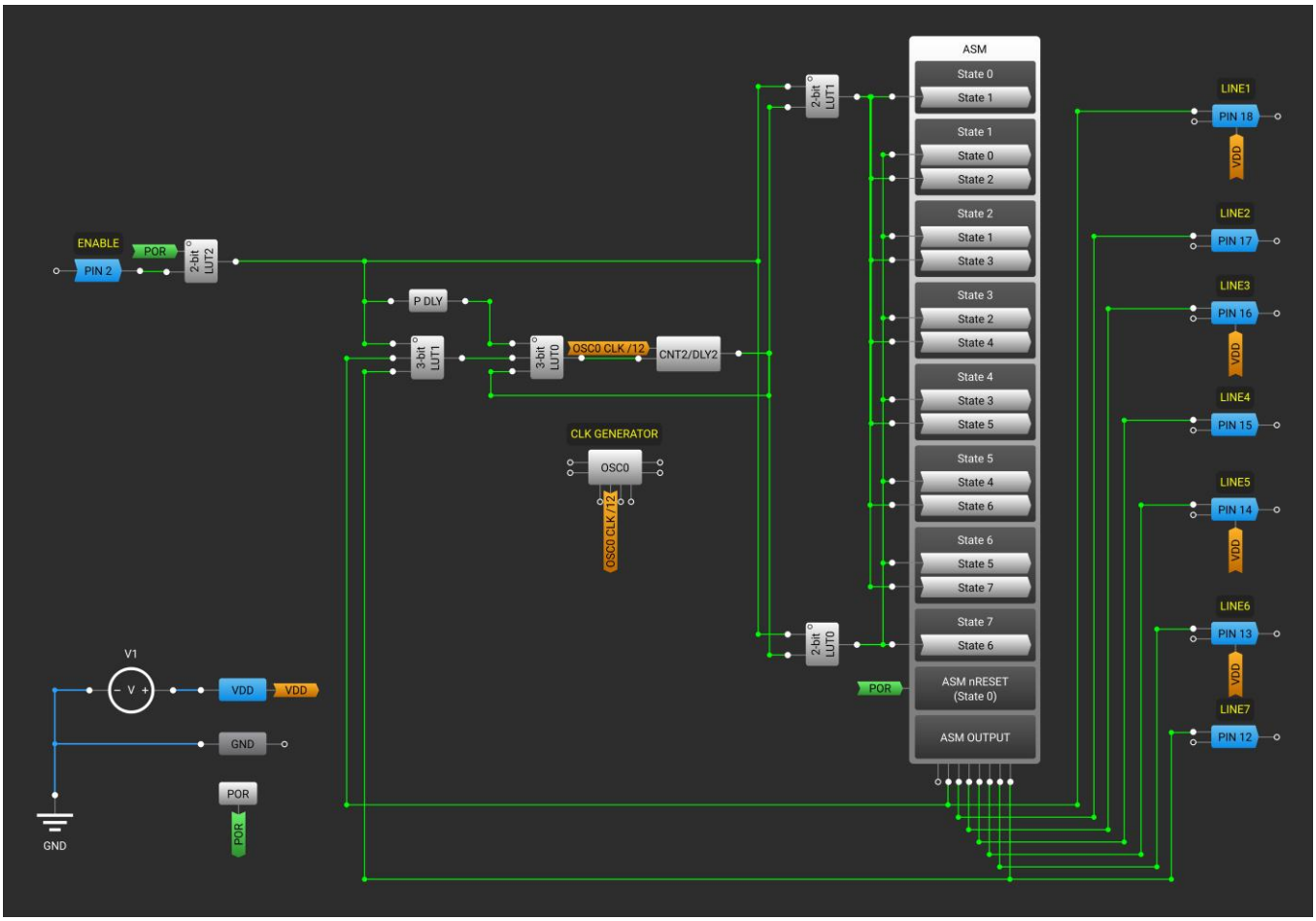

Figure 2. Linear Sequencer Schematic

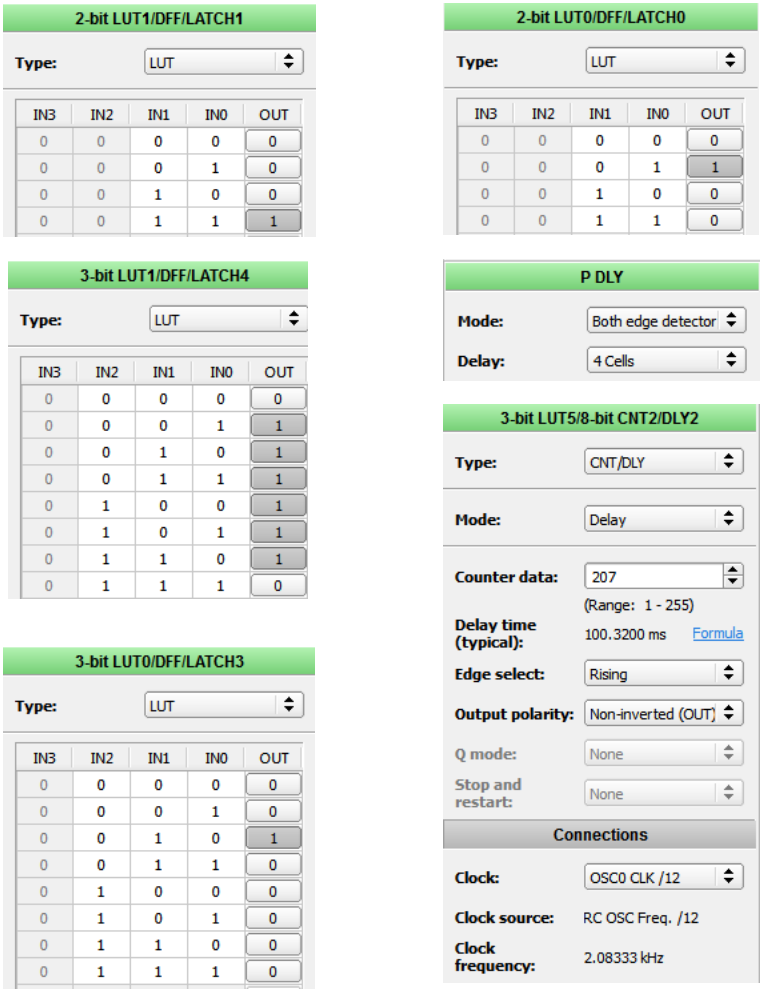

Figure 3. Blocks Configurations

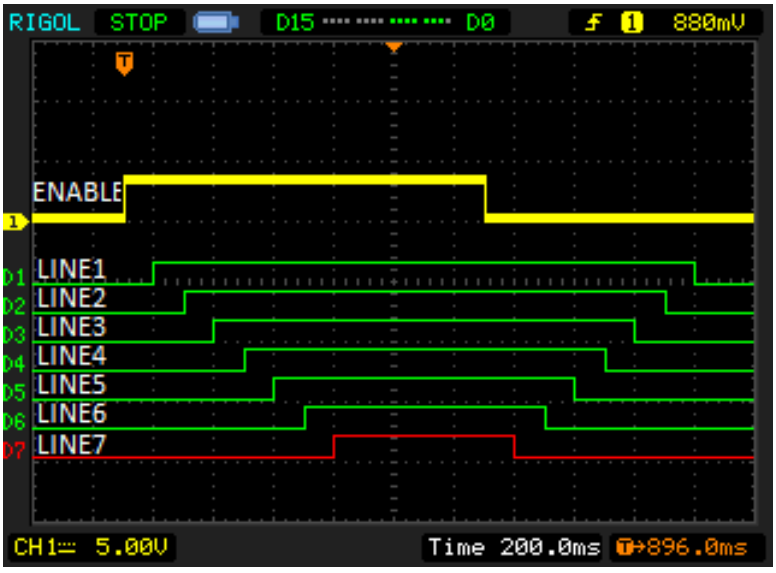

Figure 4. Linear Sequencer Functionality Waveform

6. Conclusion

Using the Asynchronous State Machine in the SLG46537 GreenPAK IC, we can make a 7- Line Sequencer. It was shown that using the ASM simplifies the design task nicely.

7. Revision History

Revision	Date	Description
1.00	May 27, 2016	Initial release.
2.00	April 22, 2026	The part number has been changed from SLG46531V to SLG46537V.

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