Keywords: LIU, microcontroller, line interface unit, line interface

APPLICATION NOTE 3556

Configuring Maxim LIUs Without a Microcontroller

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Abstract: This application note describes how to configure Maxim line interface units (LIUs) without adding the extra, and often complex, circuitry of a microcontroller.

Configuration of LIU(s)

It is possible to configure some Maxim line interface units (LIUs) without a microcontroller. These unique LIUs have an extra serial interface (SPI) along with the traditional parallel port. To place the LIU in SPI slave mode, specific LIU pins are floated, pulled to V_{CC}, or grounded. Please see the LIU data sheet for particular pin configurations.

Once the LIU is in serial mode, a PROM can be used to provide the LIU with the specific data needed for configuration. If the data in the PROM is formatted in a defined way, the PROM will act like a controller with a SPI interface in Master Mode.

The PROMs typically used for this type of configuration have an internal address accumulator. It is important that the PROMs have this accumulator feature because the PROM will need to automatically jump to the next available address in the configuration memory. We recommend the Xilinx XC18V00 device family which has byte-wide, nonvolatile memory with an autoincrement address function. These devices are available in 1Mb, 2Mb, and 4Mb densities.

Figure 1 shows the general relationship of the timing for a SPI bus. For this case, all data is clocked into the slave device on the rising edge of SCLK. This feature can be configurable on some devices; please check the device data sheet for details.

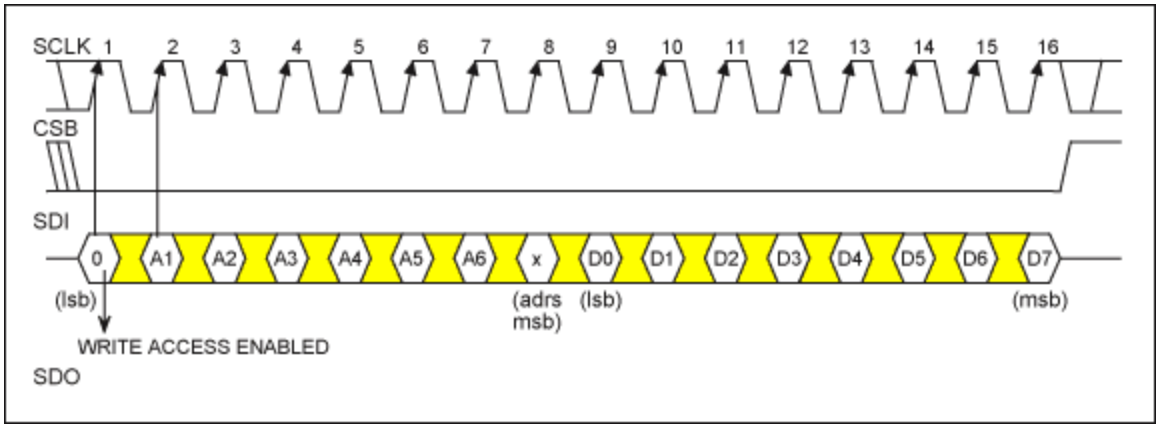

Figure 1. Serial-port operation for write access.

Figure 2 is a simplified diagram of the Xilinx XC18V00 device and a Maxim LIU in SPI mode. Two key points should be noted.

1. The CLK for the Xilinx XC18V00 can be the MCLK for the LIU, but the CLK is not the SCLK for the SPI interface. The SCLK can be programmed as needed. Please see **Table 1** for an example of the memory map.
2. The programming for the LIU will begin when OE on the Xilinx XC18V00 goes high. Therefore, one must consider if any delay is necessary in the application. Generally, connecting the OE pin to a powerup delay device is sufficient.

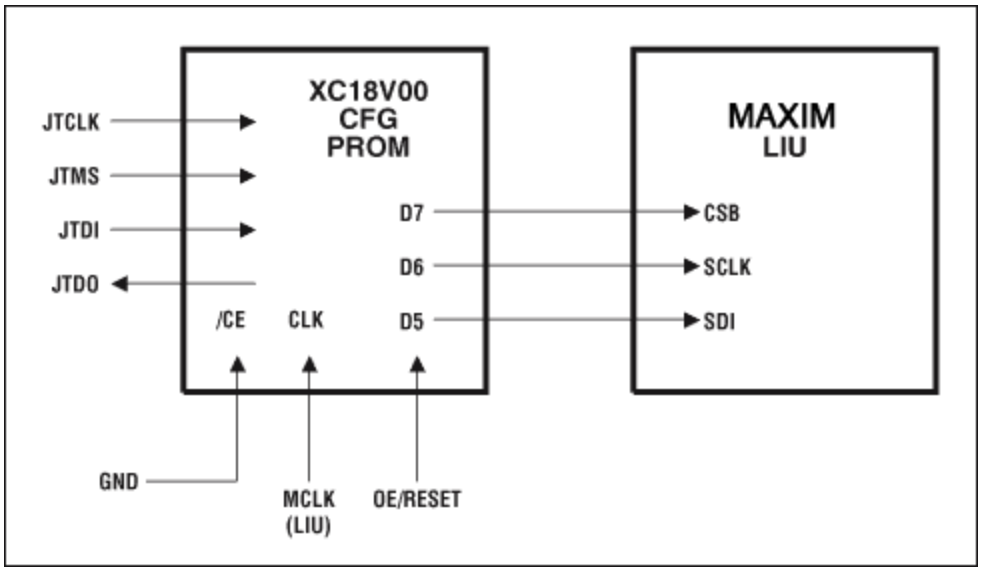

Figure 2. SPI-to-LIU connection diagram.

Table 1. Memory Configuration

D7		D6	D5	D4	D3	D2	D1	D0
Address	CSB	SCLK	SDI	X	X	X		X
0x00	1	0	0	Start of Write Cycle				
0x01	0	0	0	Bit A0 (Always a "0" for a write)				
0x02	0	1	0					
0x03	0	0	1	Bit A1				
0x04	0	1	1					
0x05	0	0	0	Bit A2				
0x06	0	1	0					
0x07	0	0	0	Bit A3				
0x08	0	1	0					
0x09	0	0	0	Bit A4				
0x0A	0	1	0					
0x0B	0	0	0	Bit A5				
0x0C	0	1	0					
0x0D	0	0	0	Bit A6				
0x0E	0	1	0					
0x0F	0	0	0	Bit A7				
0x10	0	1	0					
0x11	0	0	0	Bit D0 (LSB)				
0x12	0	1	0					
0x13	0	0	1	Bit D1				
0x14	0	1	1					
0x15	0	0	1	Bit D2				
0x16	0	1	1					
0x17	0	0	0	Bit D3				
0x18	0	1	0					
0x19	0	0	0	Bit D4				
0x1A	0	1	0					

0x1B	0	0	1	Bit D5
0x1C	0	1	1	
0x1D	0	0	1	Bit D6
0x1E	0	1	1	
0x1F	0	0	0	Bit D7
0x20	0	1	0	
0x21	1	0	X	End of Write Cycle
0x22	1	X	X	

Configuring LIU(s) for Other Operations

By connecting the D5, D6, and D7 pins of the Xilinx XC18V00 device through a switch to the LIU's SDI pin, different loopback configurations can be implemented.

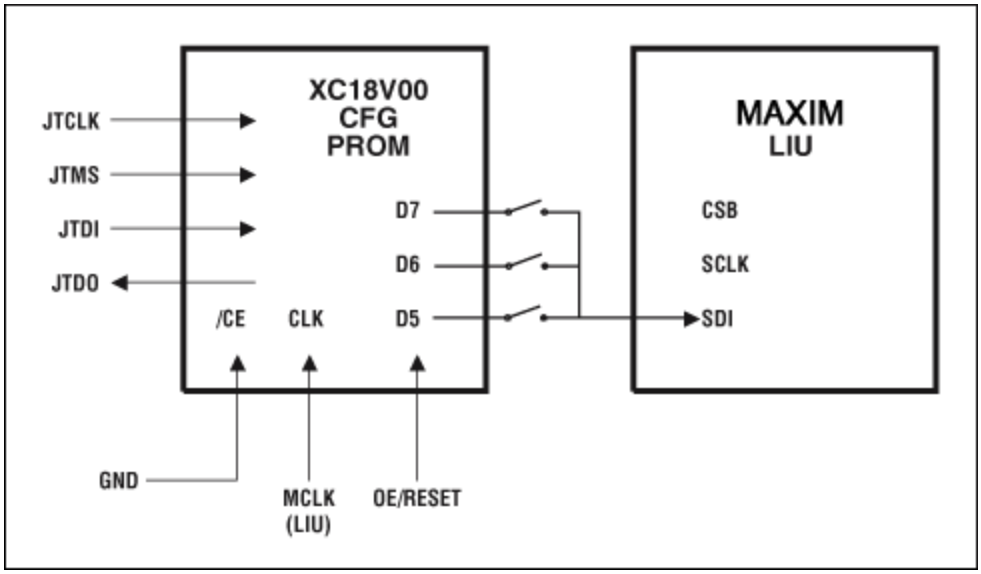

Figure 3. Diagram of an SPI connection which enables loopback.

Conclusion

The Maxim line interface units (LIUs) have different modes of operation that can be implemented without a microcontroller, but instead by using configurable PROM like the Xilinx XC18V00 device family. Modifications to the LIUs should be made based on the customer's needs.

If you have questions about any Maxim telecom products, please contact the Telecom Products applications support team.

Related Parts

DS21348	3.3V E1/T1/J1 Line Interface	Free Samples
DS21448	3.3V E1/T1/J1 Quad Line Interface	Free Samples
DS2148	5V E1/T1/J1 Line Interface	
DS3150	3.3V, DS3/E3/STS-1 Line Interface Unit	Free Samples
DS3151	Single/Dual/Triple/Quad DS3/E3/STS-1 LIUs	
DS3152	Single/Dual/Triple/Quad DS3/E3/STS-1 LIUs	
DS3153	Single/Dual/Triple/Quad DS3/E3/STS-1 LIUs	
DS3154	Single/Dual/Triple/Quad DS3/E3/STS-1 LIUs	Free Samples
DS3251	Single/Dual/Triple/Quad DS3/E3/STS-1 LIUs	Free Samples
DS3252	Single/Dual/Triple/Quad DS3/E3/STS-1 LIUs	Free Samples
DS3253	Single/Dual/Triple/Quad DS3/E3/STS-1 LIUs	Free Samples
DS3254	Single/Dual/Triple/Quad DS3/E3/STS-1 LIUs	Free Samples

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