

24C01A Compatibility Issue and Its Mobility for Memory Upgrade

INTRODUCTION

The 24C01A is a 1K (128 x 8) Serial EEPROM which is currently offered by Microchip and Xicor. There are several important differences between the two devices which are discussed in this report. This report refers to the Microchip part as the 24C01A and the Xicor part as the X24C01. It is intended to assist in designing a memory subsystem which is compatible with either device.

COMPATIBILITY ISSUES

There are three major differences between Microchip's 24C01A and Xicor's X24C01 as detailed below.

1.1 PAGE MODE DIFFERENCES

The 24C01A was originally designed to work in the same socket as the PCD8572 which has a two-byte page mode. Therefore, its page buffer is two bytes deep. The X24C01 has a page mode of four bytes depth.

If more than two bytes are transmitted to the 24C01A during a page programming cycle, the 24C01A will terminate the write cycle.

In many applications where serial EEPROMs are used and speed is not a key issue, the byte write mode can be used without any loss of system performance. If only the byte write mode is used, there is no compatibility problem (other than the slave address software differences discussed in 1.2).

If the page write feature must be used, two different page mode algorithms can be transmitted by the master depending upon whose device is being used. The master will have to first do a polling routine to determine if it is interfacing with a 24C01A or X24C01. This polling technique is discussed in 1.2.

Interestingly, the 24C01A actually updates faster in the page mode even though it has one-half the page depth of the X24C01. This is due to the faster write cycle time of the 24C01A. The two devices are compared in Figure 1.

1.2 SOFTWARE DIFFERENCES

Microchip's 24C01A is designed to share a 2-wire bus on which it resides with other devices. To support this, the first byte of each command sequence from the master to the 24C01A must be a slave address. The 24C01A monitors the 2-wire bus for its slave address and "wake-up" from standby mode if the address transmitted matches its address as defined by the voltage level (Vss or Vcc) on pins 1, 2 and 3. X24C01 does not support a multiple device bus and will always "wake-up" if a start condition is detected.

A slave address must be transmitted to the 24C01A at certain points during reading and writing. This slave address is not required by the X24C01. Transmitting a slave address to X24C01 will result in erroneous operation. This problem can be solved by having the master transmit the proper serial bit pattern to the slave, but first the master has to ascertain with which 24C01A it is communicating.

The master can do a simple polling routine before beginning serial communication with 24C01A or X24C01 to determine with which device it is working. The proper serial protocol for both devices must be contained in the master controller's firmware. Once the master knows which 24C01A is on the bus, it can execute the proper serial commands.

FIGURE 1 - PAGE MODE DIFFERENCES

	<i>Microchip</i>	<i>Xicor</i>
Max byte program time	1 ms	10 ms
Max page program time	2 ms (2 bytes)	10 ms (4 bytes)
Max time to program 4 bytes	4 ms	10 ms
Max time to rewrite device	128 ms	320 ms

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The polling consists of the pattern like the one shown below:

SDA LINE: | **START BIT** | 00000001 | **ACKNOWLEDGE BIT** | **DATA 7...0** |

If an X24C01 is used on the 2-wire bus, an acknowledge bit and eight data bits will be returned whereas 24C01A will issue no response and will ignore the command.

2.3 HARDWARE DIFFERENCES

Unlike the X24C01, the 24C01A is designed to share a 2-wire bus with other devices. Chip address bits are included in the slave address for the 24C01A, and are incorporated into pins 1, 2 and 3 of the device. They must be connected to Vcc or Vss for proper operation. Since pins 1, 2 and 3 of the Xicor part are NC (no connect) pins and they are not internally connected, they can be tied high or low.

Another hardware difference involves pin 7 which *MUST* be connected to Vss on the X24C01. The 24C01A can have pin 7 connected to Vss or Vcc.

If only one device is planned for the 2-wire bus, the board can be made compatible for either device by connecting pins 1, 2 and 3 to either Vss or Vcc and tying pin 7 to Vss.

Mobility For Memory Upgrade And Expansion

In system applications where the master device needs to address more than one serial EEPROM on a 2-wire bus, the Microchip 24C01A offers the flexibility. Up to eight 24C01A's can be connected to the 2-wire bus. More than one Xicor X24C01 connected to the bus may result in bus contention.

If memory upgrade is required, the Microchip 24C01A can be upgraded to the 24C02A (256 x 8) or the 24C04A (512 x 8) in the same IC socket with *NO change* in hardware. Using the Xicor X24C01, both software and hardware would have to be reconfigured to accommodate the changes.

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