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Connecting Unused Data Lines of MirrorBit™ Flash

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AN99110 discusses how to properly treat unused data lines of MirrorBit Flash memory in a system.

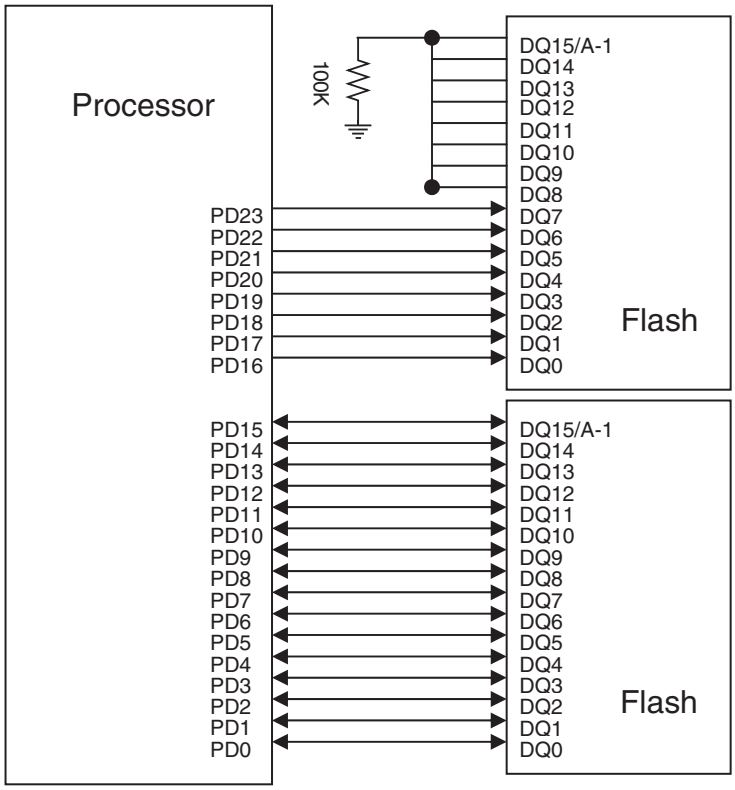
1 Organization Modes

Most Cypress MirrorBit Flash devices can support either x8 or x16 wide organization. The BYTE# pin controls whether the device data I/O pins DQ15-DQ0 operate in the byte or word configuration. If the BYTE# pin is set at logic '1', the device is in word configuration and DQ15-DQ0 are active. If the BYTE# pin is set at logic '0', the device is in byte configuration, and only data I/O pins DQ7-DQ0 are active. The data I/O pins DQ15-DQ8 are tri-stated.

2 Customer Applications

Typically, system designers select the byte mode memory configuration when only 8 data lines are required, but it is acceptable to configure Flash devices in word mode and utilize only one byte portion of the 16-bit data bus. For example, a system controller may have a 24-bit wide data bus. In order to support 24-bit wide bus, the designer may choose to use two x16 Flash devices connected in a parallel fashion and configure both devices in word mode. The first Flash is connected to the low word lane, DQ15-DQ0, and the second flash is connected to the high word lane, DQ23 to DQ16 (Figure 1). To address the 24-bit wide flash memory space, the processor would issue software commands to provide the required addresses to the flash devices as needed.

Figure 1. Processor Connected to Two Word Mode x8/x16 Flash on a 24-bit Wide Bus



Note that on Figure 1 the unused data pins on the Flash device of the upper word lane are pulled-down to ground through an external resistor (100 KΩ is recommended). Handling unused data lines in this matter is necessary for successful write buffer programming.

The Write buffer programming capability was introduced to MirrorBit based Flash by Cypress. This capability allows the system to write 16 words (GL-A and GL-N family) in one programming operation. This results in faster effective programming time than the standard programming algorithms. Please refer to specific Cypress MirrorBit Flash data sheet for detailed information on the write buffer program command sequence of a device.

When a Flash device is configured as x16 or word mode, as in this design example, data I/O pins DQ15-DQ0 become active signals. During a write buffer programming operation, in the fourth cycle of write-to-buffer command, DQ15-DQ0 data bits are used to set appropriate word count (WC). Since maximum word count is 16 words for devices in the both the GL-A and GL-N family, data bits DQ15-DQ4 have to be logic '0' to set the correct word count (WC) value.

In this particular example (Figure 1), if the upper unused data bits were tied externally to power instead of ground, it would inadvertently set DQ15-DQ8 data lines to logic '1' and lead to an illegal word count (WC) during a write-to-buffer command sequence. As a result, the write buffer programming command would fail to complete.

3 Conclusion

When using a Cypress MirrorBit flash device, unused data lines need to be treated appropriately to ensure successful write buffer programming. It is recommended that unused data lines be tied to ground through an external 100 KΩ resistor so that the write buffer word count value is valid.

Document History Page

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