

AMD Geode™ Solutions External NAND Flash Memory Circuit on IDE Interface



1.0 Scope

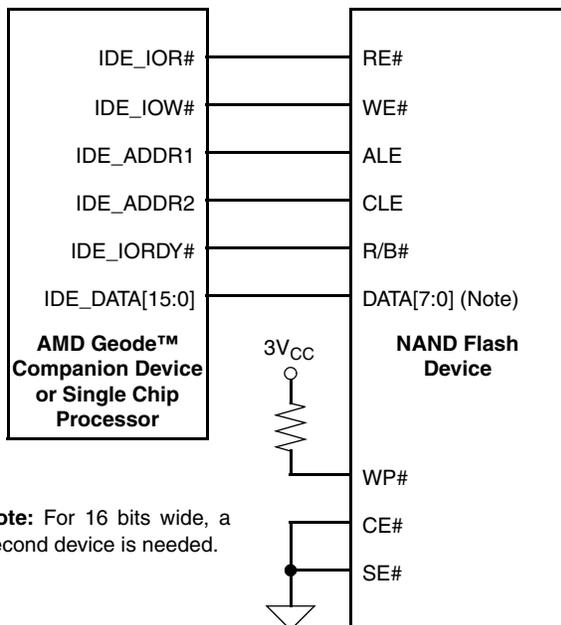
This application note describes an external NAND Flash module and explains how to connect it to an AMD Geode™ Solutions based system via its IDE interface. The Geode™ CS5535 and CS5536 companion devices both feature NAND Flash controllers, however, this Flash on IDE solution yields better performance. The NAND Flash module in this application is used by the system for the operating system. The NAND device is not used for BIOS storage.

Note: This is revision B of this document. The change from revision A (dated July 2005) is the addition of the second sentence in the scope for clarification.

2.0 Discussion

The NAND flash module connects to the AMD Geode device's IDE interface to provide higher data throughput than can be achieved using an ISA bus interface. Figure 2-1 shows a typical application that is functional in a system where the NAND device is the only device on its IDE channel. Two possible architectures that support this scheme are:

- A NAND device on the IDE primary channel.
- A hard disk on the IDE primary channel, and a NAND device on the IDE secondary channel.



Note: For 16 bits wide, a second device is needed.

Figure 2-1. Connection Diagram

Additional decode circuitry is required to have either a hard disk and a NAND device, or multiple NAND devices on the same IDE channel. The decode could exist as a GPIO signal and its complement to gate the CS0# signals to the hard disk and the NAND device. Figure 2-2 shows an example of how this could be realized.

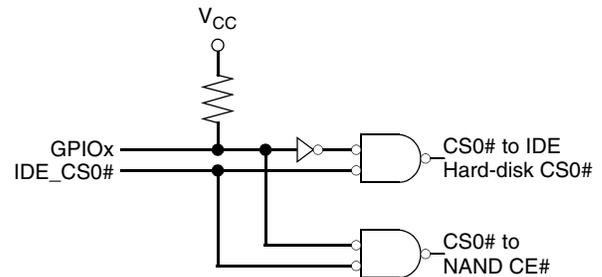


Figure 2-2. Additional Decode Circuitry

The addressing for the various ports on the NAND device are dependant upon which IDE channel the NAND device is connected to. Table 2-1 lists the NAND device ports and corresponding addresses. These addresses are part of the standard IDE I/O address space. Standard IDE PIO (Programmable I/O) mode drivers do not support the NAND interface. Software drivers must be developed. AMD has no plans to develop software drivers to support the NAND interface, however, code is available that verifies the functionality of the interface. (Contact your local sales office for information.)

The Data Port (1F0h) can be accessed as BYTE, WORD, and special DWORD. Special DWORD means that the hardware accesses 1F0h-1F1h twice. Testing has shown that for the AMD Geode SC1100, SC1200/SC1201, SC2200, SC3200, and CS5535 and CS5536 devices, special DWORD accesses produce the best performance. For the AMD Geode CS5530 device, BYTE/WORD accesses perform best.

Table 2-1. Ports and Addresses

NAND Device Port	IDE Primary Channel	IDE Secondary Channel
Data Port	1F0h-1Fh	170h-171h
Address Port (ALE)	1F2h	172h
Command Port (CLE)	1F4h	174h

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