



**44Pin Flash Disk Module Min.16MB~Max.512MB, True IDE Interface  
Mode, 3.3V/5.0V Operating** **Part No. HFDOM44P-xxxSx**

## 1. PRODUCT OVERVIEW

### GENERAL DESCRIPTION

The HFDOM44P-xxxSx series 44Pin Flash Disk Module is a flash technology based with True IDE interface flash memory card. It is constructed with flash disk controller chip and NAND-type (Samsung) flash memory device. The HFDOM44P-xxxSx series operates in both 3.3-Volt and 5.0-Volt power supplies. It comes in capacity of 16, 32, 64, 128, 192, 256, 384 MB and up to 512 MB formatted 44Pin type .

By optimizing flash memory management, the life of this HFDOM44P-xxxSx series can be extended to its maximum level. Because the ECC function is included, the correctness of data transfer between the HFDOM44P-xxxSx series and a True IDE compatible interface device can be guaranteed.

The HFDOM44P-xxxSx series is fully compatible with applications such as CPU card / board, set top box, industry / military PC / Notebook, security equipment, measuring instrument and embedded systems.

### FEATURES

- True IDE compatible host interface
- Direct plug in for 2.5" IDE Connectors
- 44 pin 2.0mm IDE Connector
- Very high performance, very low power consumption
- Automatic error correction
- Support 3 power save mode : stop/idle/active
- Support for CIS implemented with 256 bytes of attribute memory
- 3.3V/5.0V operation voltage
- Host data transfer rate : 20MB/s
- Flash data transfer rate : 10MB/s
- Host Interface bus width : 8/16 bit Access
- Flash Interface bus width : 8 bit Access
- Capacity : Min. 16MB ~ Max. 512MB
- MTBF : 1,000,000 hours, minimum 30,000 insertions
- Operating vibration : 15G peak to peak maximum
- Operating shock : 1,000G maximum

### PRODUCT SPECIFICATIONS

#### Capacities :

16, 32, 64, 128, 192, 256, 384 and up to 512 MB (formatted)

#### Power consumptions :

|            |                          |
|------------|--------------------------|
| Read mode  | 30 mA (typ), 40 Ma (Max) |
| Write mode | 30 mA (typ), 40 Ma (Max) |
| Stop mode  | 30 uA (typ)              |

#### Environment conditions :

|                       |                  |
|-----------------------|------------------|
| Operating temperature | 0°C to + 60°C    |
| Storage temperature   | - 25°C to + 85°C |
| Relative humidity     | 95%(Max)         |

#### Mechanical conditions :

Weight : Maximum 12.0g

**Operating Voltage : 3.3V / 5.0V ±10%**

## ELECTRICAL SPECIFICATIONS

Table 1.1 Absolute Maximum Ratings

| Symbol           | Parameter           | Ratings        | Unit |
|------------------|---------------------|----------------|------|
| V <sub>DD</sub>  | Supply voltage      | - 0.3 to + 7.0 | V    |
| V <sub>IN</sub>  | Input voltage       | - 0.3 to + 7.0 | V    |
| I <sub>IN</sub>  | DC input current    | - 10           | mA   |
| T <sub>STG</sub> | Storage temperature | - 20 to + 85   | °C   |

Table 1.2 Recommended Operating Conditions

| Symbol          | Parameter           |      | Ratings      | Unit |
|-----------------|---------------------|------|--------------|------|
| V <sub>DD</sub> | DC Supply voltage   | 5V   | 4.75 to 5.25 | V    |
|                 |                     | 3.3V | 3.0 to 3.6   | V    |
| T <sub>a</sub>  | Storage temperature |      | - 20 to +70  | °C   |

Table 1.3 DC Characteristics (T<sub>a</sub>=0°C to 70°C, V<sub>DD</sub>=3.0 to 5.3V)

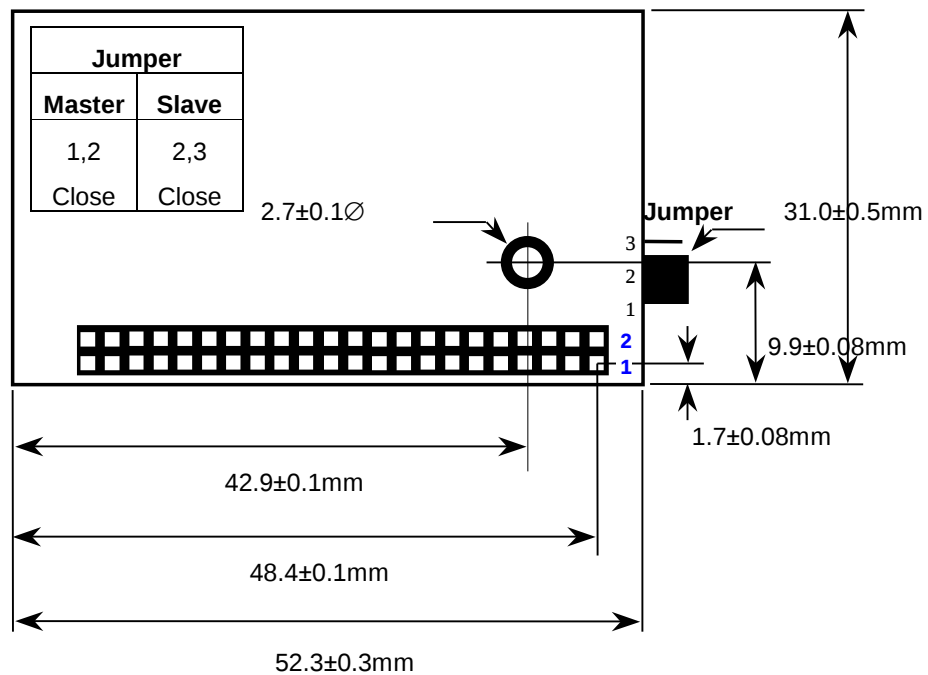
| Symbol          | Parameter                 | Min. | Typ. | Max. | Unit |
|-----------------|---------------------------|------|------|------|------|
| I <sub>DD</sub> | Operating Current         |      | 30   | 70   | mA   |
| I <sub>ds</sub> | Stop Current              |      | 50   | 150  | μA   |
| V <sub>DD</sub> | High Level Output Voltage | 2.4  |      |      | V    |
| V <sub>DD</sub> | Low Level Output Voltage  |      |      | 0.4  | V    |

## CAPACITY SPECIFICATIONS

Table 1.4 Capacity Specifications

| Part Number    | Capacity (Unformatted)   | Total Sector | Cylinders | Heads | Sectors |
|----------------|--------------------------|--------------|-----------|-------|---------|
| HFDOM44P-016Sx | 15,990,784 <i>bytes</i>  | 31,232       | 61        | 16    | 32      |
| HFDOM44P-032Sx | 32,243,712 <i>bytes</i>  | 62,976       | 123       | 16    | 32      |
| HFDOM44P-064Sx | 65,536,000 <i>bytes</i>  | 128,000      | 250       | 16    | 32      |
| HFDOM44P-128Sx | 131,858,432 <i>bytes</i> | 257,536      | 503       | 16    | 32      |
| HFDOM44P-192Sx | 196,608,000 <i>bytes</i> | 384,000      | 750       | 16    | 32      |
| HFDOM44P-256Sx | 265,027,584 <i>bytes</i> | 517,632      | 1011      | 16    | 32      |
| HFDOM44P-384Sx | 395,837,440 <i>bytes</i> | 773,120      | 1510      | 16    | 32      |
| HFDOM44P-512Sx | 531,890,176 <i>bytes</i> | 1,038,848    | 2029      | 16    | 32      |

## PHYSYCAL SPECIFICATIONS



< View from connector side >



< View from Right side >

### Figure 1.1 44 pin Type Flash Disk Module Dimensions

## INSTALLTION GUIDE

### 1) Setting Method

- ① Make sure your computer is turned off before you open the case.
- ② Plug the Flash Disk Module carefully into the 44pin IDE slot on your computer.  
**Caution:** Make sure to align pin1 on host adapter interface connector with pin 1 on your Flash Disk Module. Pin 1 is indicated by printed on the Flash Disk Module PCB.
- ③ The Flash Disk Module is not use power connector cable of the computer.  
**Caution:** If you need to remove your Flash Disk Module, use both hands to pull it out carefully.
- ④ Check all cable connections and then replace your computer cover.

### 2) BIOS setting Method

Before you format or partition your new drive, you must configure your computer's BIOS so that the computer can recognize your new drive.

- ① Turn your computer on. As your computer start up, watch the screen for a message describing how to run the system setup program on the screen (sometimes called BIOS or CMOS setup). This is usually done by pressing a special key, such as **Delete**, **Esc** or **F1** during startup. See your computer manual for details. Press the appropriate key to run the system setup program.
- ② **If your BIOS provides automatic drive detection (an "AUTO" drive type), select this option. ( We recommend to use Normal / CHS mode to partition your Flash Disk Module to get the maximum formatted capacity. )**

This allows your computer to configure itself automatically for your new drive.

**If your BIOS dose not provide "AUTO" drive detection, select "User-defined" drive setting and enter the CHS values from the table.** BIOS Settings (see specification) Capacity Cylinders Heads Sectors(unformatted)

- ③ Save the settings and exit the System Setup program. ( your computer will automatically reboot ) After you configure your computer, you can use the standard DOS commands to partition and format your Flash Disk Module, as described below.

### 3) Formatting Method

To partition your new Flash Disk Module with Microsoft DOS program :

- ① Insert a bootable DOS diskette into your diskette drive and restart your computer.
- ② Insert a DOS program diskette that contains the **FDISK.EXE** and **FORMAT.COM** programs into your diskette drive. Use the same DOS version that is on your bootable diskette. At the **A:\>** prompt, type **"FDISK"** and press **Enter**.
- ③ Select **"Create DOS partition or logical DOS drive"** by pressing **1**. Then press **Enter**.
- ④ Select **"Create primary DOS partition"** by pressing **1** again. Then press **Enter**.  
Create your first drive partition. If you are creating a partition that will be used to boot your computer (drive C), make sure that the partition is marked active.
- ⑤ Create an extended partition and additional logical drives as necessary, until all the space on your new hard drive has been partitioned.
- ⑥ When the partitioning is complete, **FDISK** reboots your computer.  
**Caution:** Make sure to use the correct drive letters so that you do not format a drive that already contains data.
- ⑦ At the **A:\>** prompt, type **"format c:/s"**, where **c** is the letter of your first new partition, Repeat the format process for all the new partitions you have created.
- ⑧ After you format your drive, it is ready to use.

## 2. PIN INFORMATION

### PIN ASSIGNMENTS AND PIN TYPE

Table 2.1 Pin Assignment and Pin type

| Pin | Signal     | Pin Type | Pin | Signal   | Pin Type |
|-----|------------|----------|-----|----------|----------|
| 1   | /RESET     | I        | 2   | GND      | Ground   |
| 3   | D07        | I/O      | 4   | D08      | I/O      |
| 5   | D06        | I/O      | 6   | D09      | I/O      |
| 7   | D05        | I/O      | 8   | D10      | I/O      |
| 9   | D04        | I/O      | 10  | D11      | I/O      |
| 11  | D03        | I/O      | 12  | D12      | I/O      |
| 13  | D02        | I/O      | 14  | D13      | I/O      |
| 15  | D01        | I/O      | 16  | D14      | I/O      |
| 17  | D00        | I/O      | 18  | D15      | I/O      |
| 19  | GND        | DC       | 20  | Key Pin  | --       |
| 21  | Reserved   | --       | 22  | GND      | Ground   |
| 23  | /IOW       | I        | 24  | GND      | Ground   |
| 25  | /IOR       | I        | 26  | GND      | Ground   |
| 27  | IORDY      | O        | 28  | Reserved | --       |
| 29  | Reserved   | --       | 30  | GND      | Ground   |
| 31  | IRQ        | O        | 32  | /IOIS16  | O        |
| 33  | A01        | I        | 34  | /PDIAG   | I/O      |
| 35  | A00        | I        | 36  | A02      | I        |
| 37  | /CS0       | I        | 38  | /CS1     | I        |
| 39  | /DASP(LED) | I/O      | 40  | GND      | Ground   |
| 41  | VCC        | Power    | 42  | VCC      | Power    |
| 43  | GND        | Ground   | 44  | Reserved | --       |

## Signal Descriptions

Table 2.2 Signal Descriptions

| Signal Name | Dir. | Pin                                                      | Description                                                                                                                                                                                                                                                                |
|-------------|------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A[2:0]      | I    | 33,35,36                                                 | In True IDE Mode only A[2:0] are used to select the one of eight registers in the Task File, the remaining address lines should be grounded by the host.                                                                                                                   |
| -PDIAG      | I/O  | 34                                                       | This input / output is the Pass Diagnostic signal in the Master / Slave handshake protocol.                                                                                                                                                                                |
| -DASP(LED)  | I/O  | 39                                                       | This signal used either to drive an <b>LED</b> whenever the Disk Module is being accessed or as indication of a second drive present. This signal is active low when the Disk Module is busy.                                                                              |
| -CS0, -CS1  | I    | 37,38                                                    | CS0 is the chip select for the task file registers while CS2 is used to select the Alternate Status Register and the Device Control Register.                                                                                                                              |
| D[15:00]    | I/O  | 3,4,5,6,<br>7,8,9,10,<br>11,12,13,<br>14,15,16,<br>17,18 | All Task File operations occur in byte mode on the low order bus D00-D07 while all data transfers are 16 bit using D00-D15.                                                                                                                                                |
| GND         | --   | 2,19,22,<br>24,26,<br>30,40,<br>43                       | Ground.                                                                                                                                                                                                                                                                    |
| -IOR        | I    | 25                                                       | This is an I/O Read strobe generated by the host.                                                                                                                                                                                                                          |
| -IOW        | I    | 23                                                       | The I/O Write strobe pulse is used to clock I/O data on the Card Data bus into the Storage Card controller registers when the Storage Card is configured to use the I/O interface. The clocking will occur on the negative to positive edge of the signal (trailing edge). |
| IRQ         | O    | 31                                                       | In True IDE Mode signal is the active high Interrupt Request to the host.                                                                                                                                                                                                  |
| -RESET      | I    | 1                                                        | This input pin is the active low hardware reset from the host.                                                                                                                                                                                                             |
| VCC         | --   | 41,42                                                    | +5 V, +3.3 V power.                                                                                                                                                                                                                                                        |
| IORDY       | O    | 27                                                       | This output signal may be used as IORDY.                                                                                                                                                                                                                                   |
| -IOIS16     | O    | 32                                                       | This output signal is asserted low when this device is expecting a word data transfer cycle.                                                                                                                                                                               |

## BLOCK DIAGRAM

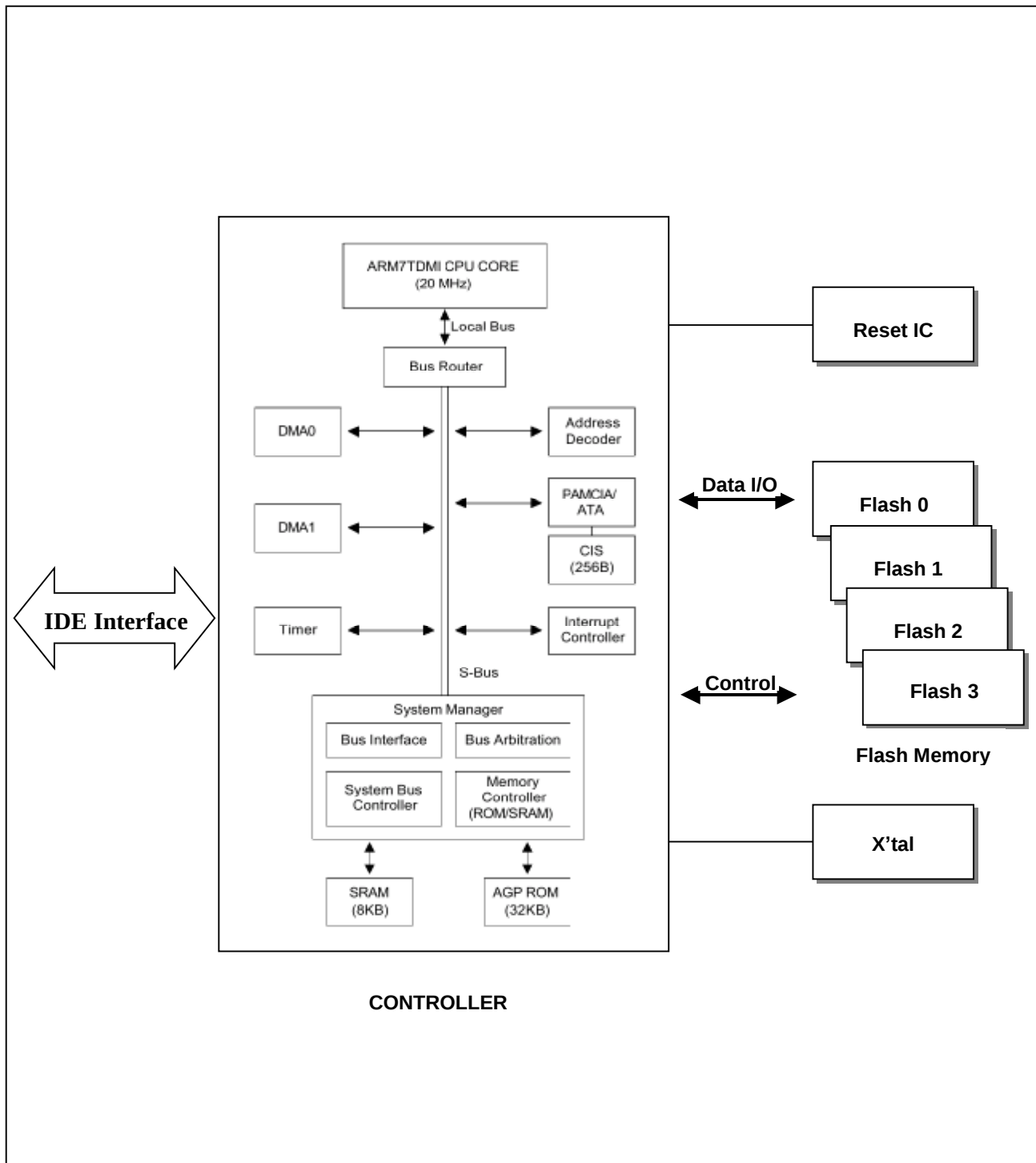


Figure 2.1 Flash Disk Module Block Diagram

### 3. INTERFACE BUS TIMING

#### ACCESS SPECIFICATIONS

##### 1) IDE MODE I/O ACCESS SPECIFICATIONS

In this True IDE Mode the Flash Disk Module protocol and configuration are disabled and only I/O operations to the Task File and Data Register are allowed. In this mode no Memory or Attribute Registers are accessible to the host.

**Table 3.1 IDE Mode I/O Access Mode**

| Mode                   | -CE2 | -CE1 | A2-A0 | -IORD | -IOWR | D15 - D8     | D7 - D0       |
|------------------------|------|------|-------|-------|-------|--------------|---------------|
| Invalid Mode           | L    | L    | x     | x     | x     | High Z       | High Z        |
| Standby Mode           | H    | H    | x     | x     | x     | High Z       | High Z        |
| Task File Write        | H    | L    | 1-7h  | H     | L     | Don't Care   | Data In       |
| Task File Read         | H    | L    | 1-7h  | L     | H     | High Z       | Data Out      |
| Data Register Write    | H    | L    | 0     | H     | L     | Odd Byte in  | Even Byte in  |
| Data Register Read     | H    | L    | 0     | L     | H     | Odd Byte out | Even Byte out |
| Control Register Write | L    | H    | 6h    | H     | L     | Don't Care   | Control In    |
| All Status Read        | L    | H    | 6h    | L     | H     | High Z       | Status Out    |

**Table 3.2 IDE Mode I/O Read Timing**

| Parameter                         | Symbol          | IEEE Symbol | Min. ns | Max. ns |
|-----------------------------------|-----------------|-------------|---------|---------|
| Data Delay after IORD             | td (IORD)       | tIGLQV      |         | 100     |
| Data Hold following IORD          | th (IORD)       | tIGHQX      | 0       |         |
| IORD Width Time                   | tw (IORD)       | tIGLIGH     | 165     |         |
| Address Setup before IORD         | tsuA (IORD)     | tAVIGL      | 70      |         |
| Address Hold following IORD       | thA (IORD)      | tIGHAX      | 20      |         |
| CE Setup before IORD              | tsuCE (IORD)    | tELIGL      | 5       |         |
| CE Hold following IORD            | thCE (IORD)     | tIGHEH      | 20      |         |
| IOIS16 Delay Falling from Address | tdfIOIS16 (ADR) | tAVISL      |         | 35      |
| IOIS16 Delay Rising from Address  | tdrIOIS16 (ADR) | tAVISH      |         | 35      |

**NOTE:** The maximum load on -IOIS16 is 1 LSTTL with 50pF total load. All times are in nanoseconds. Minimum time from -WAIT high to -IORD high is 0nsec, but minimum -IORD width must still be met.

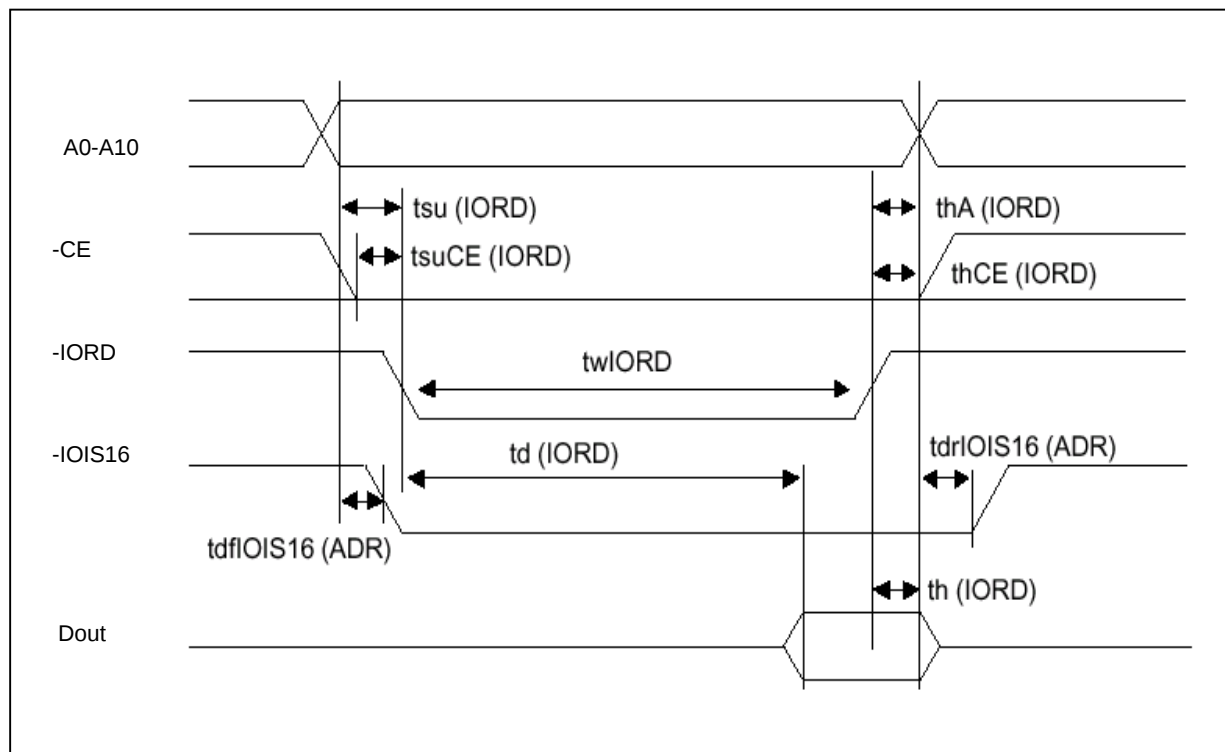
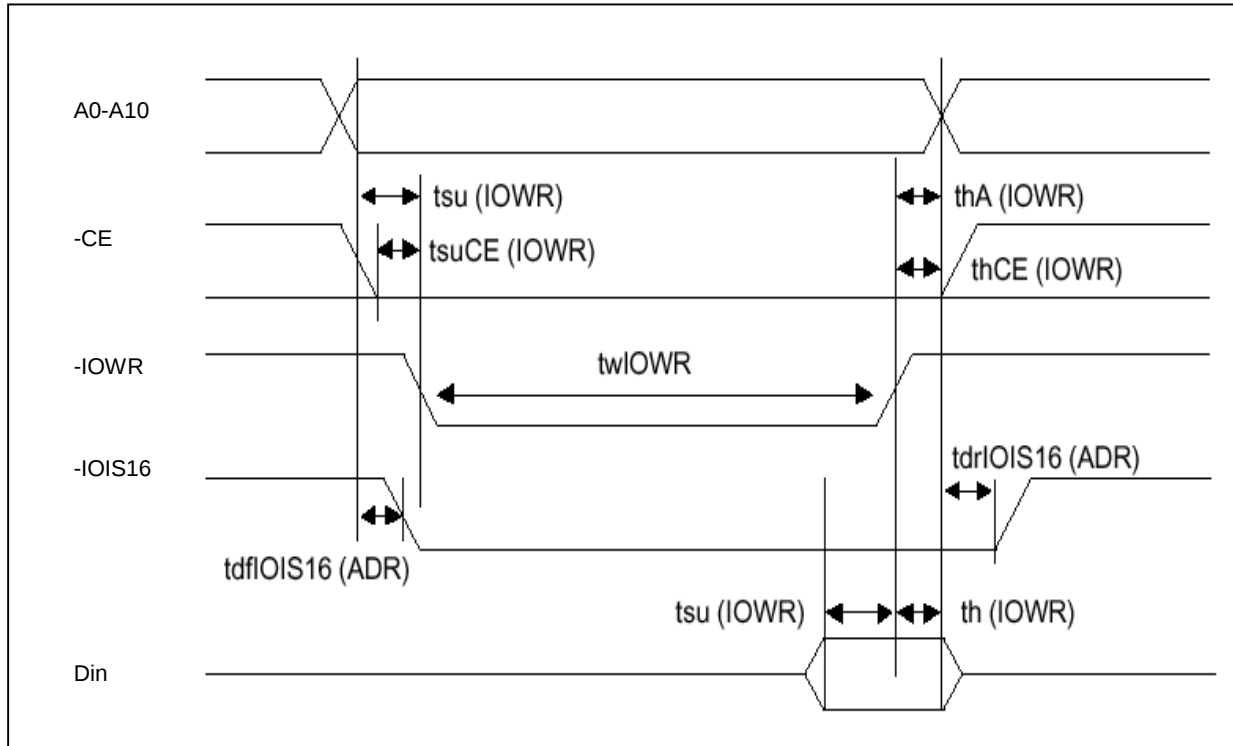


Figure 3.1 IDE Mode I/O Read Timing Example

**Table 3.3 IDE Mode I/O Write Timing**

| Parameter                         | Symbol         | IEEE Symbol | Min. ns | Max. ns |
|-----------------------------------|----------------|-------------|---------|---------|
| Data Setup before IOWR            | tsu(IOWR)      | tDVIWH      | 60      |         |
| Data Hold following IOWR          | th(IOWR)       | tIWHDX      | 30      |         |
| IOWR Width Time                   | tw(IOWR)       | tIWLWH      | 165     |         |
| Address Setup before IOWR         | tsuA(IOWR)     | tAVIWL      | 70      |         |
| Address Hold following IOWR       | thA(IOWR)      | tIWHAX      | 20      |         |
| CE Setup before IOWR              | tsuCE(IOWR)    | tELIWL      | 5       |         |
| CE Hold following IOWR            | thCE(IOWR)     | tIWHEH      | 20      |         |
| IOIS16 Delay Falling from Address | tdfIOIS16(ADR) | tAVISL      |         | 35      |
| IOIS16 Delay Rising from Address  | tdrIOIS16(ADR) | tAVISH      |         | 35      |

**NOTE:** The maximum load on -IOIS16 is 1 LSTTL with 50pF total load. All times are in nanoseconds. Minimum time from -WAIT high to -IOWR high is 0nsec, but minimum -IOWR width must still be met.

**Figure 3.2 IDE Mode I/O Write Timing Example**

## Ordering Infomation

| NO | Parts          | Size            | Capacity | Media transfer mode | Chip Number | Operation Mode |
|----|----------------|-----------------|----------|---------------------|-------------|----------------|
| 1  | HFDOM44P-016S1 | 52.3x31.0x2.0mm | 16Mbyte  | BYTE                | 1           | True IDE       |
| 2  | HFDOM44P-032S1 | 52.3x31.0x2.0mm | 32Mbyte  | BYTE                | 1           | True IDE       |
| 3  | HFDOM44P-032S2 | 52.3x31.0x2.0mm |          | BYTE                | 2           | True IDE       |
| 4  | HFDOM44P-064S1 | 52.3x31.0x2.0mm | 64Mbyte  | BYTE                | 1           | True IDE       |
| 5  | HFDOM44P-064S2 | 52.3x31.0x2.0mm |          | BYTE                | 2           | True IDE       |
| 6  | HFDOM44P-064S4 | 52.3x31.0x2.0mm |          | BYTE                | 4           | True IDE       |
| 7  | HFDOM44P-128S1 | 52.3x31.0x2.0mm | 128Mbyte | BYTE                | 1           | True IDE       |
| 8  | HFDOM44P-128S2 | 52.3x31.0x2.0mm |          | BYTE                | 2           | True IDE       |
| 9  | HFDOM44P-128S4 | 52.3x31.0x2.0mm |          | BYTE                | 4           | True IDE       |
| 10 | HFDOM44P-192S3 | 52.3x31.0x2.0mm | 192Mbyte | BYTE                | 3           | True IDE       |
| 11 | HFDOM44P-256S2 | 52.3x31.0x2.0mm | 256Mbyte | BYTE                | 2           | True IDE       |
| 12 | HFDOM44P-256S4 | 52.3x31.0x2.0mm |          | BYTE                | 4           | True IDE       |
| 13 | HFDOM44P-384S3 | 52.3x31.0x2.0mm | 384Mbyte | BYTE                | 3           | True IDE       |
| 14 | HFDOM44P-512S4 | 52.3x31.0x2.0mm | 512Mbyte | BYTE                | 4           | True IDE       |



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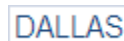
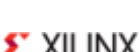
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