

SanDisk Flash ChipSet

Introducing

the world's smallest ATA/IDE data storage system.



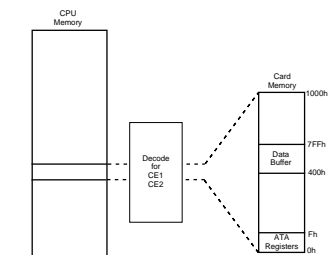
The SanDisk Flash ChipSet (FCS) is the world's smallest resident solid-state ATA/IDE data, image and audio storage system. The FCS consists of a 100 pin TQFP controller chip and flash memory in a 56 pin TSOP package.

Flash ChipSet Features

- Density: 32 Mbit, 64 Mbit, and 128 Mbit
- PC Card ATA compatible—memory mapped or I/O operation
- Supports True IDE Mode
- Very low CMOS power
- Auto-sensing +5 V \pm 10% or 3.3 V \pm 5% operation
- Very High Performance
 - Data transfer rate to/from flash—4.0 Mbytes/sec burst
 - Data transfer rate to/from host—6.0 Mbytes/sec burst
- Supports Pre-Erase and Write without Erase Commands to effectively double write performance
- Supports programmable power
- Small controller package, 100 pin TQFP (14x14)
- Two 512 Byte ping-pong data buffers
- Powerful Risc controller built in for real time control
- 50 bit Reed Solomon ECC
- Built in power-on reset circuit
- Automatic error correction and retry
- Automatic Sleep Mode
- Non-volatile storage

Memory Mapped Mode Support

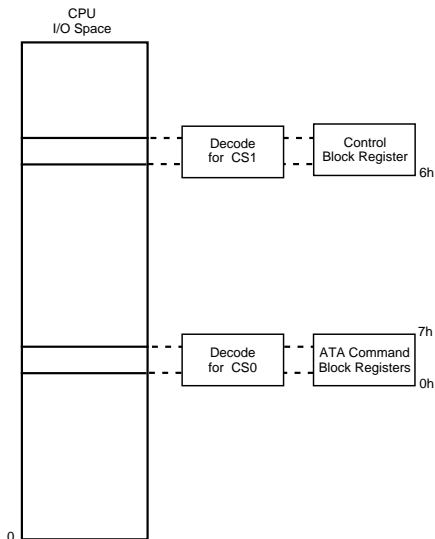
The memory mapped mode is the default power-on mode for the SanDisk Flash Chipset if the "OE" pin is not grounded. This mode provides for a simple, straightforward interface to the user's hardware. It is particularly applicable in embedded 8 bit microprocessor applications, since 8 bit data transfers can be accomplished without issuing a command to the Flash ChipSet.



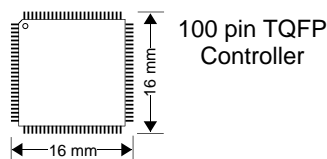
Memory Mapped Mode Block Diagram

True IDE mode support.

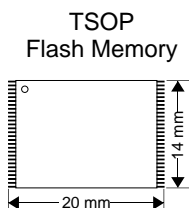
The SanDisk Flash ChipSet may be configured in the True IDE Mode by grounding the "OE" pin. This provides the same interface as that used by IDE hard disk drives. The IDE interface is very simple, requiring a minimum of hardware and software development. Because this is an industry standard interface, in many cases the hardware and software are built into the host system. This mode also supports 8 bit data transfers after a "Set Features" command is issued.



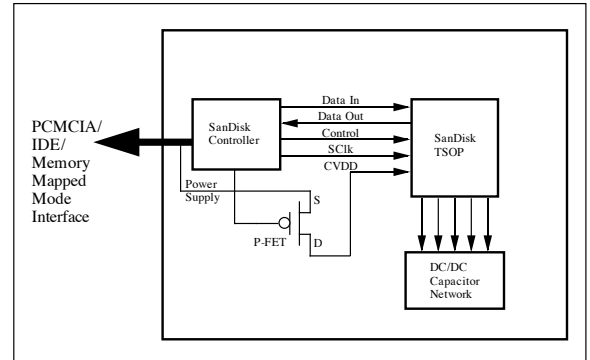
True IDE Mode Block Diagram



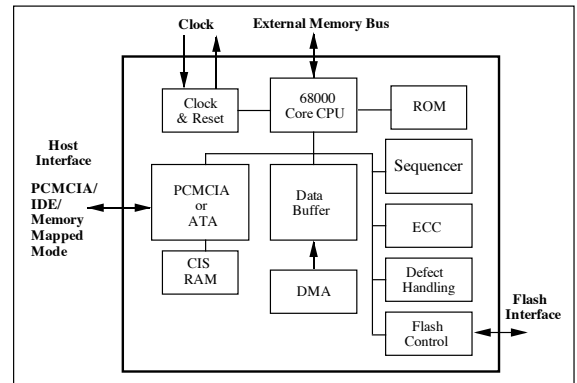
100 pin TQFP Controller



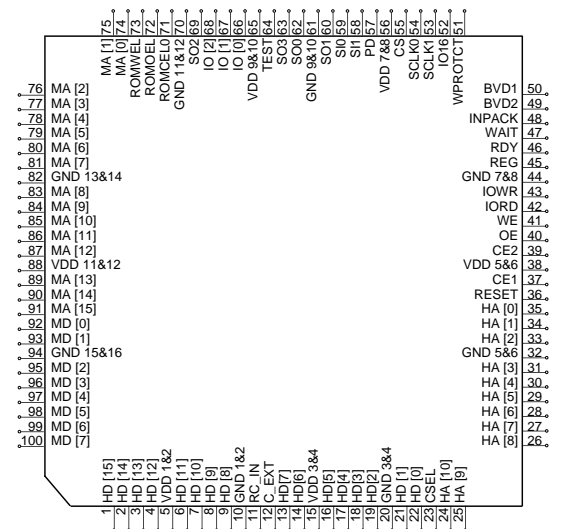
Flash ChipSet Dimensions



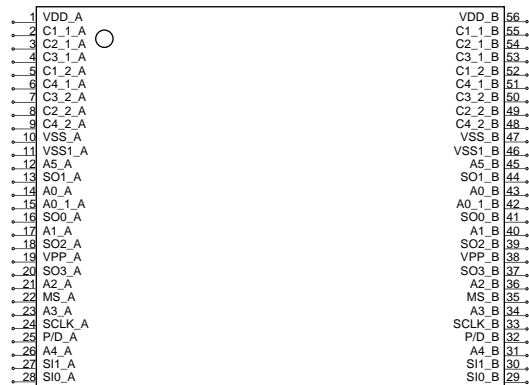
Flash ChipSet System Block Diagram



Flash ChipSet Controller Block Diagram



Flash ChipSet Controller Pinout



Flash ChipSet TSOP Pinout

Technical service program.

SanDisk offers professional design services to save system designers valuable time by ensuring accurate FCS designs the first time. SanDisk's Technical Services Program provides the following:

- Expert review of customer's schematics to ensure correct interconnections and compliance with PCMCIA ATA or IDE standards.
- Model Orcad schematic files provided that can be modified to fit the customer's requirements.
- Application notes with detailed design instructions available.
- Toll-free phone access.
- On-site consultations available.

Product Specifications

System Performance (Notes 2 and 3)

Start-up Time	
Sleep to Write	2.5 msec maximum
Sleep to Read	2.0 msec maximum
Reset to Ready	50 msec typical, 400 msec maximum
Data Transfer Rate to/from Flash	4 MBytes/sec Burst
Data Transfer Rate to/from Host	6.0 MBytes/sec Burst
Active to Sleep Delay	Programmable
Controller Overhead Command to DRQ	1.25 msec max.

Product Specifications (con't)

System Power Requirements

DC Input	3.3V \pm 5%	5.0V \pm 10%
Voltage (Vcc)		
Ripple (Peak to Peak)	100 mV	
Current (Note 1)	3.3V	5.0V
Sleep	200 μ A	500 μ A
Reading	32-45 mA	46-75 mA
Writing	32-60 mA	46-90 mA
Read/Write Peak	150 mA/50 μ s	150 mA/50 μ s

Environmental Specifications

Temperature	
Operating	0°C to 70°C
Non-Operating	-25°C to 85°C
Humidity	
Operating	8% to 95% non-condensing
Non-Operating	8% to 95% non-condensing
Acoustic Noise (at 1 meter) 0db	

System Reliability and Maintenance

MTBF (Mean Time Between Failure)	1,000,000 hours
Endurance	300,000 writes
Preventive Maintenance	None
Data Reliability	<1 non-recoverable error in 10 ¹⁴ bits read

Physical Specifications

Controller	100 Pin TQFP
TSOP	56 Pin TSOP

Note 1: Sleep mode current is specified under the condition that all card inputs are static CMOS levels and in a "Not Busy" operating mode.

Note 2: All values quoted are typical at ambient temperature and nominal supply voltages unless otherwise stated.

Note 3: All performance specifications assume the controller is in the default (i.e., fastest) mode.

SanDisk Flash ChipSet ordering information

Products

SanDisk Flash ChipSet

Model SDFCSTB-32—(4 MB TSOP and Controller)
Model SDFCSTB-64—(8 MB TSOP and Controller)
Model SDFCSTB-128—(16 MB TSOP and Controller)

SanDisk Flash ChipSet Components

Model SDCD (Controller)
Model SDTB-32 (4 MB TSOP)
Model SDTB-64 (8 MB TSOP)
Model SDTB-128 (16 MB TSOP)

Additional Tools

Model SDFCSEV-03—FCS Evaluation Kit
Model SDDK-01—Host Developer's Tool Kit
Application Note: How to Design the Flash ChipSet into User Applications
Application Note: Using SanDisk Flash ATA Components with an 80C51 Microcontroller
Application Note: Interfacing SanDisk ATA PC Cards and Flash ChipSets in Memory Mapped Mode

about SanDisk

SanDisk Corporation, the world's largest supplier of flash data storage products, designs, manufactures and markets industry-standard, solid-state data, image and audio storage products using patented, high density flash memory and controller technology. SanDisk has strategic alliances with Seagate Technology, Matsushita Electronic Corp., NEC Corp. and LG Semicon.

To order, or for more information, call: 408-542-0595.

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