FFD™ 3.5" SCSI

Highly Reliable, Narrow SCSI Solid-State Flash Disk

M-Systems
Flash Disk Pioneers

Technology Overview

M-Systems' Fast Flash Disk (FFD) 3.5" SCSI disk is a state-of-the-art solid-state disk based on NAND flash technology, containing no moving parts.

The outstanding performance of the FFD 3.5" SCSI is based on M-Systems' TrueFFS® technology that provides full disk emulation, enhanced endurance with dynamic wear-leveling and bad-block mapping-out flash management.

Due to its unique design, the FFD 3.5" SCSI eliminates seek time, latency and other electro-mechanical delays inherent in conventional disk drives with a 9.7 MBytes/sec burst read/write rate.

The FFD 3.5" SCSI is equipped with on-the-fly EDC/ECC implementing 48-bit Reed Solomon algorithm with DIP switch configurations and front panel LED indicators.

The FFD 3.5" SCSI is fully compatible with the SCSI-2 interface, and has the same mechanical dimensions of traditional mechanical disks. It is a drop-in replacement for rotating disks where top reliability is required.

Applications

FFD 3.5" SCSI provides an ideal storage solution for mission-critical applications that must operate under harsh environmental conditions.

M-Systems' family of FFDs has been used since 1997 as mass storage solutions for data recorders, moving maps, sonar, radar, fire control systems, black boxes, data acquisition systems, and rugged laptops and servers in air force, navy and army installations worldwide.

The FFD 3.5" SCSI is used in telecommunication systems within optical and ATM switches, IP gateways, wireless base stations and core routers, providing NEBS Level 3 compliance, top reliability and a maintenance-free solution.

The FFD 3.5" SCSI top reliability and high MTBF (>1,000,000 hours) enables it to be used in Factory Automation (FA) systems, Point Of Sales (POS) systems, assembly and robots controllers, and within manufacturing and medical systems.

The FFD 3.5" SCSI provides the most reliable solution without compromising speed, capacity, data integrity, or portability, making it an ideal solution for demanding applications operating under harsh environmental condition

FFD Product Line

M-Systems' FFD product line offers complete solutions for customers who require rugged and high-performance solid-state flash disks. FFD product offering includes IDE/ATA, Narrow SCSI and Ultra-Wide SCSI interfaces in 1.8", 2.5" and 3.5" form factors. Solutions available include:

- FFD 2.5" IDE
- IDE 3000 2.5"
- IDE 3000 3.5"
- IDE 3000 1.8"
- FFD 2.5" SCSI
- FFD 3.5" SCSI
- FFD 3.5" Ultra-Wide SCSI

Main Features

- 128MB to 5.6GB disk capacity
- 3.5" standard form factor
- SCSI-2 interface
- Front panel LEDs
  - Power and Diagnostics
  - Busy/Access
- DIP Switch configuration
- 9.7 MBytes/sec burst read/write
- 3.0 MBytes/sec sustained read
- 2.0 MBytes/sec sustained write
- Quick security erase in 10 seconds
- TrueFFS® technology
- Enhanced 1,000,000 write/erase cycles endurance by dynamic wear-leveling
- Bad-block mapping-out algorithm
- Ensures data integrity under unstable power conditions
- Hardware and software EDC/ECC
- No moving parts
- MIL-STD 810F compliant
- NEBS Level 3 compliant
- Sun Microsystems™ Solaris™ Ready
- 1500G operating shock
- 16.3G RMS operating random vibration
- -40ºC to +85ºC operating temperature
- -55ºC to +95ºC storage temperature
- 80,000 feet operating altitude
- 5-year warranty

FFD 3.5" SCSI Specifications

Disk Capacity

Unformatted (MBytes): 128, 256, 384, 512, 640, 768, 896, 1024, 1280, 1536, 1792, 2048, 2176, 2304, 2432, 2560, 2688, 2816, 3072, 3328, 3584, 3840, 4096, 4352, 4608, 4864, 5120, 5376, 5632

SCSI Compatibility

Industry Standard SCSI-2, CCS
ANSI SCSI Standard X3.131-1994

Performance

Burst Read/Write:	9.7 MBytes/sec
Sustained Read:	3.0 MBytes/sec
Sustained Write:	2.0 MBytes/sec
Access time:	<0.1ms

Physical

Form factor:	3.5"
Mounting:	Industry standard
Dimensions (mm):	146.1(L) X 101.5(W) X 25.4(H)
Weight:	0.435Kg for a 5,632 MB unit

Environmental

Operating temperature	
Commercial:	0ºC to +70ºC
Enhanced:	-25ºC to +75ºC
Extended:	-40ºC to +85ºC
Storage temperature:	-55ºC to +95ºC
Humidity:	5% to 95% relative, non-condensing
Operating altitude:	Up to 80,000 feet
Operating shock:	1,500G (half sine 0.5ms), MIL-STD-810F
Operating vibration:	16.3G RMS (random, 20Hz to 2000Hz; 3 vibration axes), MIL-STD-810F

Quick Security Erase

Entire disk erase: 10 sec (typical)

Power

Input voltage:	5VDC ±5%
Power consumption	
1.0GB unit:	550mA (2.75 Watt)

Compliance

CE, UL, FCC Class B, MIL-STD-810F
Sun Microsystems™ Solaris™ Ready

Reliability

MTBF:	3,717,472 hours MTBF for 128MB unit 1,667,222 hours MTBF for 1792 MB unit 1,639,882 hours MTBF for 3,584MB unit based on British-Telecom-HRD5, GB, 25°C
EDC/ECC:	On-the-fly hardware and software embedded EDC/ECC based on 48-bit Reed Solomon algorithm

Reliability features
- Built-in power-up self-test (BIT)
- Manual and automatic self-diagnostics
- TrueFFS® Bad Block Mapping-out (BBM management
- Data integrity under power-cycling

Endurance
- Read unlimited
- 1,000,000 Write/Erase cycles
- TrueFFS® Dynamic Wear-Leveling
- Garbage collection process
- >10 years data retention

User Interface & Configuration

Configuration options

SCSI ID:	0-7
Write protect:	On/Off
Termination pwr:	On/Off
Termination:	On/Off
Firmware upgrade:	Field upgrade capability
Electrical interface:	8-bit Interface, SE (Single-ended)
Transfer Modes:	Sync (Fast)/Async
Front panel LEDs:	Power and Diagnostics Busy/Access
Format:	Factory low-level format
Drivers:	None required

Warranty

5 years (longer warranty period can be supported)

Customization

PCB conformal coating
Customizing case dimensions
Higher disk capacities
SCSI-I support
Hardware interrupt quick security erase
Read/write rate customization

Contact Us

USA: +1-510-494-2090
Taiwan: +886-2-8770-6226
China: +86-755-2519-4732
Japan: +81-3-5423-8101
Europe & Israel:
+972-9-764-5000
E-mail: ffd@m-sys.com
Web: http://www.m-sys.com

Ordering Information

FFD-350-CCCC-T
CCCC: Unformatted capacity (MB) 128 to 5632
T: Temperature range

Blank – Commercial:	0°C to +70°C
N – Enhanced:	-25°C to +75°C
X – Extended:	-40°C to +85°C

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45-SR-001-13-6L Rev. 5.0 Sep 2002