

# FFD™ 2.5" SCSI

## Smallest, Rugged SCSI Solid-State Flash Disk



### Technology Overview

M-Systems' Fast Flash Disk (FFD) 2.5" SCSI disk is a state-of-the-art solid-state disk based on NAND flash technology, containing no moving parts.

The outstanding reliability of the FFD 2.5" 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 2.5" SCSI eliminates seek time, latency and other electro-mechanical delays inherent in conventional disk drives. The FFD 2.5" SCSI performance is 9.7 MByte/sec burst rate, 3.6 MByte/sec sustained read rate, and a 2.2 MByte/sec sustained write rate.

The FFD 2.5" 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 2.5" SCSI provides an ideal storage solution for mission-critical applications that must operate under harsh environmental conditions.

M-Systems' family of FFDs have been used since 1997 as mass storage solutions for data recorders, moving maps, sonar, radar, fire control systems, black boxes, data acquisition systems, C4ISR and rugged laptops and servers in air force, navy and army installations worldwide.

FFD 2.5" 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.

FFD 2.5" 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.

FFD 2.5" 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

### IDE/SCSI Product Line

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

- FFD 2.5" IDE
- FFD 2.5" IDE Plus
- IDE 3000 2.5"
- IDE 3000 3.5"
- IDE 3000 1.8"
- FFD 2.5" SCSI
- FFD 3.5" SCSI
- FFD 3.5" Ultra -Narrow SCSI
- FFD 3.5" Ultra -Wide SCSI
- 6U VME, 3U and 6U Compact PCI and PCM flash disks



### Main Features

- 128MB to 5.3GB disk capacity
- 2.5" standard form factor
- Case height options:
  - 8.0 mm
  - 12.0 mm
  - 17.0 mm
- SCSI-2 interface (SCSI-1 upon request)
- 9.7 MByte/sec burst read/write
- 3.6 MByte/sec sustained read
- 2.2 MByte/sec sustained write
- Quick security erase in 10 seconds
- TrueFFS® technology
- More than 5,000,000 write/erase cycles
- Enhanced endurance by dynamic wear-leveling
- Bad-block mapping-out algorithm
- Ensures data integrity under unstable power conditions
- No moving parts
- MIL-STD 810F compliant
- NEBS Level-3 compliant
- 1500G operating shock
- 16.3G RMS operating random vibration
- -40°C to +85°C operating temperature
- -55°C to +95°C storage temperature
- 80,000 ft operating altitude
- 5-year warranty

## FFD 2.5" SCSI Specifications

### Disk Capacity

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

*The FFD 2.5" Ultra Narrow SCSI will be available in capacities of up to 14GB.*

### SCSI Compatibility

Industry Standard SCSI-2, CCS. ANSI SCSI Standard

X3.131-1994. A SCSI-1 interface is available upon request

### Performance

Burst Read/Write: 9.7 MByte/sec  
Sustained Read: 3.6 MByte/sec  
Sustained Write: 2.2 MByte/sec  
Access time: <0.1 ms

### Physical

Form factor: 2.5"  
Mounting: Industry standard

Dimensions (mm)

17.0 mm height case: 100.2(L) X 69.8(W) X 17.0(H)

12.0 mm height case: 100.2(L) X 69.8(W) X 12.0(H)

8.0 mm height case: 100.2(L) X 69.8(W) X 8.0(H)

Weight

0.195 kg for a 5,376MB unit

### Environmental

Operating temperature

Commercial: 0°C to +70°C

Enhanced: -25°C to +75°C

Extended: -40°C to +85°C

Storage temperature: -55°C to +95°C

Humidity: 5% to 95% relative, non-condensing

Operating altitude: Up to 80,000 ft

Operating shock: 1,500 G (half sine 0.5 ms), MIL-STD-810F

Operating vibration: 16.3 G RMS (random, 20 Hz to 2000 Hz;  
3 vibration axes), MIL-STD-810F

### Quick Security Erase

Entire disk erase: 10 sec (typical)

### Power

Input voltage: 5VDC  $\pm 5\%$

Power consumption

1.0GB unit: 545 mA (2.7 W)

5.3GB unit: 600 mA (3.0 W)

### Compliance

CE, UL, FCC Class B, MIL-STD-810F



### Reliability

MTBF: 4,545,475 hours MTBF for 128MB unit  
2,631,586 hours MTBF for 512MB unit  
2,173,922 hours MTBF for 1280MB unit  
based on British-Telecom-HRD5, GB, 25°C  
EDC/ECC: On-the-fly H/W+S/W embedded EDC/ECC  
based on 48-bit Reed Solomon algorithm  
BER (Bit Error Rate) <10<sup>-20</sup>

Reliability features

Built-in power-up self-test (BIT)  
Manual and automatic self-diagnostics  
TrueFFS<sup>®</sup> Bad Block Mapping (BBM) management  
Data integrity under power-cycling

Endurance

Read unlimited  
>5,000,000 Write/Erase cycles  
TrueFFS<sup>®</sup> Dynamic Wear-Leveling  
Garbage collection process  
>10 years data retention

### User Interface & Configuration

Configuration options

SCSI ID: 0-7  
Write protect: On/Off  
Termination power: On/Off  
Termination: On/Off  
Firmware upgrade: Field upgrade capability  
Electrical interface: 8-bit interface, SE (Single -Ended)  
Transfer Modes: Sync (Fast)/Async  
Format: Factory low-level format  
Drivers: None required

### Warranty

5 years (a longer warranty period can be supported)

### Customization

PCB conformal coating  
Customized case dimensions  
Higher disk capacities  
SCSI-I support  
Hardware interrupt quick security erase  
Read/write rate customization  
Manufactured available in the USA & for FMF

### Contact Us

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### Ordering Information

FFD-250-SCSI-CCCCC-T-HXX  
CCCCC: Unformatted capacity (MB) 512 to 5376  
T: Temperature range  
Blank – Commercial: 0°C to +70°C  
N – Enhanced: -25°C to +75°C  
X – Extended: -40°C to +85°C  
H: Case height  
Blank – 17 mm  
H12 – 12 mm  
H8 – 8 mm



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