

# FFD™ 3.5" Ultra-Wide SCSI

## High-Performance, High-Density Solid-State Flash Disk



### Technology Overview

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

FFD 3.5" Ultra-Wide SCSI implements M-Systems' TrueFFS® technology to provide full disk emulation, enhanced endurance with dynamic wear-leveling and bad-block management.

Due to its unique design, FFD 3.5" Ultra-Wide SCSI eliminates seek time, latency and other electro-mechanical delays inherent in conventional disk drives. FFD 3.5" Ultra-Wide SCSI delivers superior performance rates, with a 40.0 MByte/sec burst rate, a 30.0 MByte/sec sustained read rate and a 20.0 MByte/sec sustained write rate.

FFD 3.5" Ultra-Wide SCSI is fully compatible with SCSI-2 and SCSI-3 interfaces, with the identical mechanical dimensions of rotating hard disks. This makes it a true drop-in replacement for rotating disks, with the added value of top reliability and endurance.

### Applications

FFD 3.5" Ultra-Wide 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, telemetry and data acquisition systems, C4ISR, rugged laptops and servers in air force, navy and army installations worldwide.

Due to its high performance, reliability, high MTBF and maintenance-free solution, FFD 3.5" Ultra-Wide SCSI is designed into a wide range of applications. In video and audio servers, It performs as file caching to accelerate "hot files" in databases. In telecommunication systems, it is used within optical and ATM switches, IP gateways, wireless base stations and core routers, providing NEBS Level-3 compliance.

FFD 3.5" Ultra-Wide SCSI is also an optimal solution in Factory Automation (FA) systems, Point Of Sale (POS) systems, assembly and robots controllers, and within manufacturing and medical systems.

### 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. FFD product offerings include 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
- 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



### Main Features

- 512MB to 34.8GB disk capacity
- 3.5" standard form factor
- SCSI-2 and SCSI-3 interfaces
- 40.0 MByte/sec burst Read/Write
- 30.0 MByte/sec sustained Read
- 20.0 MByte/sec sustained Write
- Standard connectors
  - 68-pin
  - SCA-2: 80-pin
- Less than 20 micro sec access time
- Quick security erase in 10 sec (typical)
- Sanitize confidential data, complies with NISPOM DoD 5220.22-M, NSA 130-2, Air Force AFSSI 5020 and Army 380-19
- TrueFFS® technology
- >5,000,000 write/erase cycles
- Enhanced endurance by dynamic wear-leveling algorithm
- Bad-block mapping out algorithm
- Ensures data integrity under unstable power conditions
- Supports hot swapping (hot insertion)
- No moving parts
- MIL-STD 810F compliant
- NEBS Level-3 compliant
- Sun Microsystems™ Solaris™ Ready
- 1500 G operating shock
- 16.3 G 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 3.5" Ultra-Wide SCSI Specifications

### Disk Capacity

Unformatted (MBytes): 512, 1024, 1536, 2048, 2560, 3072, 4096, 5120, 6144, 7168, 8192, 9216, 10240, 12288, 14336, 16384, 18432, 20480, 22528, 24576, 26624, 28672, 30720, 32768, 34826

### SCSI Compatibility

Industry Standard SCSI-2, SCSI-3 & CCS; ANSI X3.131-1994; ANSI X3T9.2/85-82; ANSI X3.302-1998; ANSI X3.301-1997; ANSI NCITS 306-1998

### Performance

Burst Read/Write: 40.0 MBytes/sec  
Sustained Read: 30.0 MBytes/sec  
Sustained Write: 20.0 MBytes/sec  
Access time: <20 micro seconds  
IOPS: >2000

### Physical

Connector type: 68-pin or SCA-2 80-pin  
Form factor: 3.5"  
Mounting: Industry standard  
Dimensions (mm)  
Up to 21GB: 146.1(L) X 101.5(W) X 25.4(H)  
Over 21GB: 146.1(L) X 101.5(W) X 40.6(H)  
Weight  
1GB: 0.34 kg; 20.4GB: 0.60 kg; 34.8GB: 0.95 kg

### 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 feet  
Operating shock: 1,500G, MIL-STD-810F  
Operating vibration: 16.3G RMS, MIL-STD-810F  
(random, 20 Hz to 2000 Hz; 3 vibration axes)

### Power

Input voltage: 5VDC  $\pm$ 5%  
Power consumption (1GB unit)  
Bus Free/Idle: 340 mA (1.7 Watt)  
Read/Write: 540 mA (2.7 Watt)

### Compliance

CE, UL, EN 55022 Class B, CISPR 22 Class B, AS/NZS 3548 Class B, BSMI CNS 13438 Class B, CAN/CSA-V-3/2001.04 (VCCI), FCC Part 15 Class B, EN 61000-3-2, EN 61000-3-3, IEC 61000-4-2/3/4/5/6/8/11, MIL-STD-810F, Hot-insertion Class 3, Sun Microsystems™ Solaris™ Ready



### Reliability

MTBF: 971,130 hours MTBF for 512MB  
952,925 hours MTBF for 2.0GB  
Based on Telcordia SR-332, 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 (BBM) management  
Data integrity under power-cycling

#### Endurance:

Unlimited read  
>5,000,000 write/erase cycles  
TrueFFS® dynamic wear-leveling  
Garbage collection process  
>10 years data retention

### Enhanced Security Erase

Entire disk security erase: 10-40 sec (depending on capacity)  
S/W interrupt, H/W interrupt upon request  
Partial security erase; LED indicator security erase  
Auto-resume security erase on power interrupt  
Sanitize complies with NISPOM DoD 5220.22-M, NSA 130-2, Air Force AFSSI 5020, Army 380-19, Navy NAVSO P-5239-26

### User Interface & Configuration

DIP switch configuration for 68-pin connector:  
SCSI ID 0-15; Termination power; Force single-ended  
68-pin auxiliary connector:  
SCSI ID 0-15; Termination; Write protect;  
Fault (LED); Busy/Activity (LED)  
DIP switch configuration for SCA-2 80-pin connector:  
SCSI ID 0-15; Termination; Force single-ended  
Firmware upgrade: Field upgrade capability  
Electrical interface: 16-bit or 8-bit interface, SE (Single-Ended) or LVD (Low-Voltage Differential)  
Busy (Access) LED: Green  
Fault LED: Connecting LED to the 80-pin connector adapter or to the 68-pin auxiliary connector  
Format: Factory low-level format  
Drivers: None required

### Warranty

5 years (a longer warranty period can be supported)

### Customization

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

### Contact Us

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### Ordering Information

FFD35US-CCCCC-T-PXX  
CCCCC: Unformatted capacity (MB), 512 to 34826  
T: Temperature range  
Blank – Commercial: 0°C to +70°C  
N – Enhanced: -25°C to +75°C  
X – Extended: -40°C to +85°C  
PXX: Connector type  
P68 or P80: 68/80-pin connector



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