

Microsoft exFAT by Tuxera— Technical specifications

General information



Supported operating systems	Android, Linux, QNX, FreeRTOS, SafeRTOS, Integrity, ThreadX <i>Available on a wide range of RTOS environments. Features and/or specifications may vary depending on the operating system.</i>
Hardware architectures	ARM, ARM64, Intel x86/x86_64 or compatible, MIPS, MIPS64, PowerPC, SH4, and more
Conformance	<ul style="list-style-type: none"> • Conforms to all Microsoft exFAT versions including XP, Vista, Windows 7, Windows 8, Windows 10 (Microsoft Interop Vendor Alliance), and Windows 11 • Conforms to SD Association (SDA) specifications • Support for all flash-based storage types such as SD cards, eSD, CF cards, SSD, UFS, USB-connected storages, SATA, eSATA, FireWire, and eMMC • Support for APM, GPT, and MBR partition schemes
Capacity	<ul style="list-style-type: none"> • Maximum volume size: 128 PiB • Minimum cluster size: 512 bytes • Maximum cluster size: 32 MiB • Maximum file size: 128 PiB* • Maximum number of entries per directory: 2,796,202 • Maximum filename length: up to 255 characters • Supported sector sizes: 512, 1024, 2048, and 4096 bytes <p><i>The operating system and hardware platform may place additional limits on maximum file size. E.g., Linux on 32-bit platforms limits the maximum file size to 8 TiB with 4 KiB page size, and 128 TiB with 64 KiB page size.</i></p>

System requirements

Minimum system requirements	<ul style="list-style-type: none"> • 1 MiB of RAM • Processor: 25 MHz
Memory and CPU footprint	<ul style="list-style-type: none"> • Read-write: 70-90 KiB • Read-only: 40-60 KiB • CPU usage: 0-10%

Proprietary file system features

Power-safe/fail-safe	Volume consistency ensured if storage is removed, or power or battery is disconnected
Tuxera POSIX test suite	<p>Tuxera maintains POSIX File System Test Suite. The following system calls are tested:</p> <ul style="list-style-type: none"> • chmod: changes permission • chown: changes ownership • mkdir: creates directories • open: opens a file • rename: changes file name • rmdir: removes directories • truncate: decreases/increases file size • unlink: removes files
Free space bitmaps	Microsoft exFAT by Tuxera uses free space bitmaps to reduce fragmentation and to improve space allocation when files are deleted.
Windows filename compatibility	<ul style="list-style-type: none"> • Unicode Character Set (UTF-16). Exceptions: U+0000 (NUL) through U+001F (US), / (slash), \ (backslash), : (colon), *(asterisk), ? (question mark), " (quote), < (less than), > (greater than), and (pipe) • Unicode fulfills the need to support character differences in national and regional languages (Japanese, Korean, Chinese, Western, etc.).
OEM parameters	OEM Parameters Sector for device-dependent parameters
UTC timestamps	Support for Universal Coordinated Time (UTC) timestamps

Performance and reliability

High performance	<ul style="list-style-type: none"> • Active superblock (FAT), file, directory, attribute and data caching. Advanced algorithms and data structures ensure maximum I/O throughput, low CPU usage for small and large files, and achieve high IOPS for file operations. Tunable settings. Low power use optimized for increased battery life. • Free Area Management: Allocation Bitmap • Cluster Chain Management: <ul style="list-style-type: none"> • FAT Chain • Directory Entry • FAT + Continuous Information • Name Search: Comparison of Name • When saving files to SD, SDHC, SDXC, or SDUC cards, full speed can be achieved • Zero-copy support (direct I/O) • Low data fragmentation
Reliability	Rigorous quality assurance, wide deployment, and fault-tolerant design guarantee outstanding file system robustness.

Licensing and maintenance

Customization and maintenance	<p>Provides maintenance services so exFAT development can be safely customized using:</p> <ul style="list-style-type: none">• Product answers to inquiries• Minor version product available
Licensing	<p>Proprietary, commercial</p> <p>Note! Tuxera licenses the exFAT software implementation. We're also a part of the Microsoft exFAT licensing program. With our special arrangement with Microsoft, you can purchase our proprietary exFAT file system implementation, already covered by a full Microsoft exFAT patent license.</p>

Optional features

Tools	<ul style="list-style-type: none">• mkexfat: formats volumes• exfatck: checks and repairs volumes• exfatlabel: shows/sets volume label• exfatsvn: displays/changes the volume serial number on an exFAT file system• exfatdebug: collects debug images
Recovery	<p>Recovery in the event of power failure or hot-unplug.</p>

Get in touch to start your evaluation of Microsoft exFAT by Tuxera: sales@tuxera.com