

Microsoft exFAT by Tuxera—Technical specifications

1. General features

Supported operating system	<ul style="list-style-type: none"> • Android, Linux, Chrome OS, Firefox OS, Tizen, QNX, and Nucleus
Hardware architectures	<ul style="list-style-type: none"> • ARM, ARM64, Intel x86/x86_64 or compatible, MIPS, MIPS64, PowerPC, SH4, and more • Conforms to all Microsoft exFAT versions including XP, Vista, Windows 7, Windows 8, and Windows 10 (Microsoft Interop Vendor Alliance) • Conforms to SD Association (SDA) specifications • Support for all flash-based storage types such as SD cards, eSD, CF cards, SSD, 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

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.

2. 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: 0–10%
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3. Proprietary file system features

Power-safe / fail-safe	<ul style="list-style-type: none"> • Volume consistency ensured if storage is removed, or power or battery is disconnected.
Tuxera POSIX test suite	<ul style="list-style-type: none"> • Tuxera maintains POSIX File System Test Suite. The following system calls are tested: <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 regular files, symbolic links, fifos, and sockets
Free space bitmaps	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • OEM Parameters Sector for device-dependent parameters
UTC timestamps	<ul style="list-style-type: none"> • Support for Universal Coordinated Time (UTC) timestamps

4. 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 Hash • When saving files to SDXC cards, full speed can be achieved • Zero-copy support (direct I/O) • No data fragmentation
Reliability	<ul style="list-style-type: none"> • Rigorous quality assurance, wide deployment, and fault-tolerant design guarantee outstanding file system robustness.

5. Licensing and maintenance

Customization and maintenance	<ul style="list-style-type: none"> • Provides maintenance services so exFAT development can be safely customized using: <ul style="list-style-type: none"> » product answers to inquiries » minor version product available • Microsoft exFAT by Tuxera can be custom-adapted to any software
Licensing	<ul style="list-style-type: none"> • Proprietary, commercial <p>Note! Tuxera licenses the exFAT software implementation. Tuxera has a patent coverage from Microsoft that covers development and exFAT evaluation. The end customer distributing a product that incorporates exFAT must obtain a patent distribution license from Microsoft.</p>

6. Optional features

Tools	<ul style="list-style-type: none"> • mkexfat: formats volumes • exfatck: checks and repairs volumes • exfatlabel: shows/sets volume label • exfatinfo: shows information about volumes • exfatdebug/exfatdump: collect debug images
Recovery	<ul style="list-style-type: none"> • Recovery in the event of power failure or hot-unplug.