

# Audio Format Guide for Ambient Audio Capture

## Supported Audio Formats

### WAV (Waveform Audio File Format) - RECOMMENDED

**File Extension:** `.wav`

#### Description:

WAV is an uncompressed audio format that captures the raw audio signal exactly as recorded by your microphone. It's the industry standard for professional audio recording and archival purposes.

#### Technical Details:

- Format: Linear PCM (Pulse Code Modulation)
- Quality: Lossless (bit-perfect reproduction)
- Bit Depth: 16-bit or 32-bit float
- Sample Rate: Typically 44.1kHz or 48kHz (matches hardware)
- File Size: ~10 MB per minute (stereo, 44.1kHz, 16-bit)

#### Best For:

- Professional ambient recordings
- Audio that will be edited or processed later
- Maximum quality preservation
- Archival purposes
- Sound design and music production

#### Advantages:

- Zero quality loss
- Universal compatibility (plays on all devices)
- No CPU overhead during recording
- Immediate write to disk (most reliable)
- Perfect for later conversion to other formats

#### Disadvantages:

- Large file sizes
- Minimal metadata support

# AIFF (Audio Interchange File Format)

**File Extension:** `.aiff`

## Description:

AIFF is Apple's equivalent to WAV, offering the same uncompressed quality with enhanced metadata capabilities. It's the native format for Apple's professional audio applications.

## Technical Details:

- Format: Linear PCM (identical to WAV internally)
- Quality: Lossless (bit-perfect reproduction)
- Bit Depth: 16-bit or 32-bit float
- Sample Rate: Matches hardware (44.1kHz, 48kHz, etc.)
- File Size: Same as WAV (~10 MB per minute)

## Best For:

- Logic Pro and Apple audio software users
- macOS-centric workflows
- Recordings requiring detailed metadata
- Professional audio work on Mac

## Advantages:

- Same quality as WAV
- Better metadata support (ID3 tags)
- Native format for Apple ecosystem
- Can store markers and loop points
- Excellent for collaborative Mac-based projects

## Disadvantages:

- Large file sizes (same as WAV)
- Slightly less universal than WAV on non-Apple platforms

## **M4A (MPEG-4 Audio with AAC codec)**

**File Extension:** .m4a

### **Description:**

M4A uses AAC (Advanced Audio Codec) compression to create much smaller files while maintaining good audio quality. It's the format used by Apple Music, iTunes, and most modern streaming services.

### **Technical Details:**

- Format: MPEG-4 AAC (lossy compression)
- Quality: Perceptually transparent at 256kbps+
- Bit Rate: Configurable (192-320kbps typical)
- Sample Rate: Matches source
- File Size: ~2 MB per minute (256kbps stereo)

### **Best For:**

- Long recordings where storage is limited
- Casual listening (not professional editing)
- Sharing recordings online
- Mobile device playback
- Podcast-style ambient recordings

### **Advantages:**

- 80-90% smaller files than WAV
- Excellent metadata support
- Modern, efficient codec
- Good quality at reasonable bitrates
- Universal playback support

### **Disadvantages:**

- Lossy compression (permanently discards audio data)
- CPU overhead during encoding
- Not ideal for editing or processing
- Quality depends on bitrate setting
- Longer recording start time (encoding setup)

**Note:** M4A encoding is currently disabled in this version to ensure recording stability. Files are automatically saved as WAV until proper AAC encoding is implemented.

# Which Format Should You Choose?

## For Ambient Recording → Choose WAV

- Preserves every detail of the ambient soundscape
- No quality compromises
- Most reliable recording (no encoding delays)
- Maximum flexibility for future use

## For Apple-Centric Workflows → Choose AIFF

- Same quality as WAV
- Better integration with Logic Pro and other Apple tools
- Richer metadata for organizing recordings

## For Storage Efficiency → Choose M4A

- Dramatically smaller files
- Good enough quality for casual listening
- Better for long-term storage of many recordings

# Technical Implementation Notes

## Recording Format Selection

The app uses 32-bit float PCM when possible for maximum dynamic range and headroom. This prevents clipping and allows for greater flexibility in post-processing.

## Sample Rate

The app automatically matches your audio interface's native sample rate to avoid unnecessary resampling and maintain optimal quality.

## Buffer Size

8192 samples provides a good balance between low latency and CPU efficiency, resulting in stable long-duration recordings.

# File Size Reference

## 1 Hour of Stereo Recording:

Format	Bit Depth	Sample Rate	Approximate Size
WAV	16-bit	44.1kHz	~600 MB
WAV	32-bit	48kHz	~1.3 GB
AIFF	16-bit	44.1kHz	~600 MB
AIFF	32-bit	48kHz	~1.3 GB
M4A	256kbps	48kHz	~115 MB

## Recommendations by Use Case

### Sound Design / Music Production:

→ WAV or AIFF, 32-bit, highest sample rate

### Ambient Field Recording:

→ WAV, 32-bit float for maximum dynamic range

### Podcast / Voice Recording:

→ WAV or M4A (256kbps), 48kHz is sufficient

### Casual Background Recording:

→ M4A for efficient storage, 192-256kbps

### Archival / Library Building:

→ WAV, highest quality settings, never use lossy formats