About microQ®

microQ is a compact, modular and highly efficient software digital audio engine enabling polyphonic ringtones, 3D game sound and enhanced music playback with multiple effects for mobile devices. **microQ** represents the culmination of over 20 years of PC host and DSP audio software development and product deployment by QSound Labs, Inc., a world leader in sonic innovation.

Product Suite

Unmatched by any single vendor, **microQ's** modular audio suite consists of the following major components:

mQSynth™ Polyphonic Wavetable Synthesizer

mQSynth plays polyphonic ringtone files, game music as well as interactive real-time sound events using digital wavetable instruments. mQSynth's QSound Realtime Ringtone Remixer (QR3™) re-authors non-optimized content on the fly to produce consistent, distortion-free output.

mQ3D™ Positional 3D Audio Engine

mQ3D Positional places multiple sounds independently in 3D space for interactive gaming. Applicable to arbitrary streams or mQSynth synthesizer channels using native or custom instruments and sound effects. Optional: QEM™ environmental modeling (reverberation).

mQFX™ Digital Effects

Enhancing the music listening experience, the mQFX suite includes:

- **QXpander®** 3D stereo sound stage expansion.
- **QSizzle™** dynamic high-frequency enhancement.
- **QRumble™** dynamic low-frequency enhancement.
- **QVerb™** digital reverberation effect.
- **QCompressor™** dynamic range control.
- **QEqualizer™** static multi-band equalization.
- **QLimiter™** anti-saturation dynamic range control.
- **QLoudness™** Fletcher-Munson equalization loudness curve.

QXpander®

Proprietary **QXpander** 3D spatial processing literally adds new dimensions to music playback, expanding the sound stage beyond the physical limitations of speaker locations and expanding the acoustic image outside the listener's head when listening with earphones.

The microQ Competitive Edge

- *Industry leading, ARM® optimised*
- *Proven track record and established brand recognition*
- *Replaces dedicated hardware music synthesizer*
- *Single-vendor full audio solution:*
  - Simplifies integration
  - Saves platform resources
- *Selectable, scalable modular components for easy implementation*
- *Small memory footprint*
- *High efficiency processing*
- *Supports earphones and speakers*
- *Tunable 3D for all narrow geometry speaker configurations*

Platforms and Implementations

microQ® is written in highly-optimized C++ using fixed-point math, featuring the combination of small footprint and high efficiency that is the hallmark of QSound audio platforms. An optional C interface is also available.
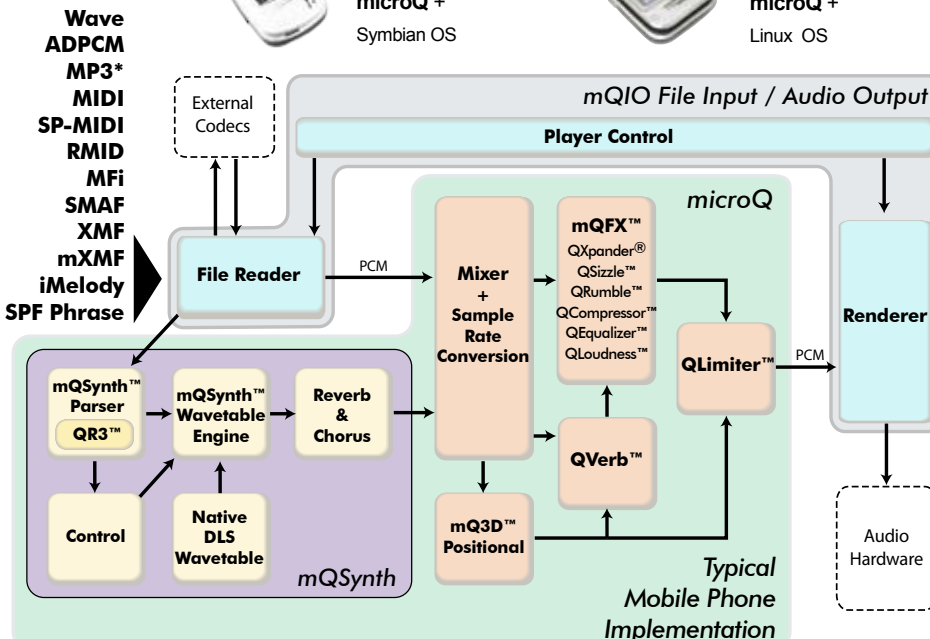
Modular, scalable components make **microQ** readily adaptable to any target environment, with the requirement for platform-specific code reduced to input and output interfaces.

microQ is currently available for DSP and RISC architectures running Linux, Symbian OS®, Nokia® Series 60, and Microsoft® Windows Mobile.

- ARM7™, ARM9™ and ARM11™ processor families (Optimized by ARM)
- Qualcomm® MSM 6xxx/MSM 7xxx
- Tensilica® HiFi 2 Audio Engine
- CEVA-Teak™ & Teak Lite™ DSP cores
- AMD Imageon™
- Infineon MP-E
- TI® OMAP™

microQ can be implemented at various system levels, e.g. within a driver, as a plug-in, or as a user application.

microQ can be provided in the form of object code, or custom ported by QSound Labs to suit your specifications.

LG KE970 Shine
LG KE850 PRADA
microQ +
Proprietary OS

UTStarcom X20
UTStarcom X22
microQ +
Proprietary OS

BenQ E72
microQ +
MS Windows
Mobile 6.0

Lenovo P930
microQ +
Symbian OS

ZTE e3
microQ +
Linux OS

Wave
ADPCM
MP3*
MIDI
SP-MIDI
RMID
MFi
SMAF
XMF
mXMF
iMelody
SPF Phrase

Diagram: Typical Mobile Phone Implementation

External Codecs

mQIO File Input / Audio Output [1]

Player Control

microQ

File Reader → PCM → Mixer + Sample Rate Conversion → **mQFX™** (QXpander® QSizzle™ QRumble™ QCompressor™ QEqualizer™ QLoudness™) → **QLimiter™** → PCM → Renderer

mQSynth™ Parser / QR3™ → mQSynth™ Wavetable Engine → Reverb & Chorus

Control → Native DLS Wavetable

mQSynth

mQ3D™ Positional → **QVerb™**

Renderer → Audio Hardware

Typical Mobile Phone Implementation

* On Marvell XScale parts

[1] *mQIO is an optional component and is not available for all operating systems*

Support for APIs and Standard Formats

microQ renders polyphonic sequenced content (MIDI, SP-MIDI, XMF, mXMF, iMelody, MFi v4.0, SMAF-MA2/MA3/MA5/MA7 with LED, Vibration and .SPF Phrases) with its native wavetable synthesizer sample set or by using custom downloadable instrument sounds (DLS, DLS2.0, Mobile DLS).

microQ plays multiple common linear and compressed digital audio formats (WAV, PCM, ADPCM, MP3*). *On Marvell parts

microQ API support: Vodafone® VFX, JSR-135, JSR-234, OpenSL ES™.

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