QSOUND®

Technology Overview

mQFX™

digital audio enhancement engine

About mQFX™

mQFX, also known as “microQ effects”, increases the audio impact of media players with a powerful set of enhancements that will set your products apart from the crowd.

mQFX is a compact, high-performance software digital audio processing package drawn from QSound Labs’ ground-breaking **microQ™** digital audio engine. **microQ** powers portable communications, utility and entertainment devices with features that include wavetable synthesis, full positional 3D audio and multi-format audio playback capability.

mQFX shares with **microQ** inherent modularity, scalability and portability. You can easily choose the functions that suit your exact product application.

mQFX Applications

Product Suite

QXpander® earphone/speaker 3D sound stage expansion.

QSizzle™ active mid/high-frequency spectral enhancement.

QRumble™ active low-frequency spectral enhancement.

QVerb™ reverberation (reflecting sound like echoes).

QCompressor™ dynamic range control.

QEqualizer™ static multi-band equalization.

QLimiter™ anti-saturation dynamic range control.

QLoudness™ Fletcher-Munson equalization loudness curve.

Feature Set Description

QXpander®

Proprietary **QXpander** 3D spatial processing literally adds new dimension 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 headphones.

QXpander employs purpose-specific algorithms for maximum spatial impact on headphones or speakers. Speaker-targeted 3D processing is optimized for narrow speaker geometries and can be OEM-tuned for peak performance on front, rear, and side-firing speaker configurations.

The mQFX Competitive Edge

- *Industry leading:*
  - ARM optimised and qualified
- *Proven track record and established brand recognition*
- *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*

Feature Set Description continued

QSizzle™

An adaptive mid to high-frequency spectral enhancement, **QSizzle** restores a natural-sounding sonic punch to highly compressed audio formats like mp3. **QSizzle** selectively adds upper spectrum energy according to the real-time characteristics of the input signal. The result is lively, sparkling highs without the strident, harsh side-effects of simple frequency boosters.

QRumble™

The low-frequency counterpart to **QSizzle**, **QRumble** also adds energy in a selective fashion, bringing substance and warmth to the low end of the spectrum without overloading on loud passages.

QVerb™

3D acoustic environment simulation enables users to place their music in the sonic context of choice, with presets for stadium, concert hall, club and more.

QCompressor™

Dynamic range control provides a more care-free listening experience, boosting soft passages to prevent them from being lost against ambient noise and reducing the need to fiddle with controls.

QEqualizer™

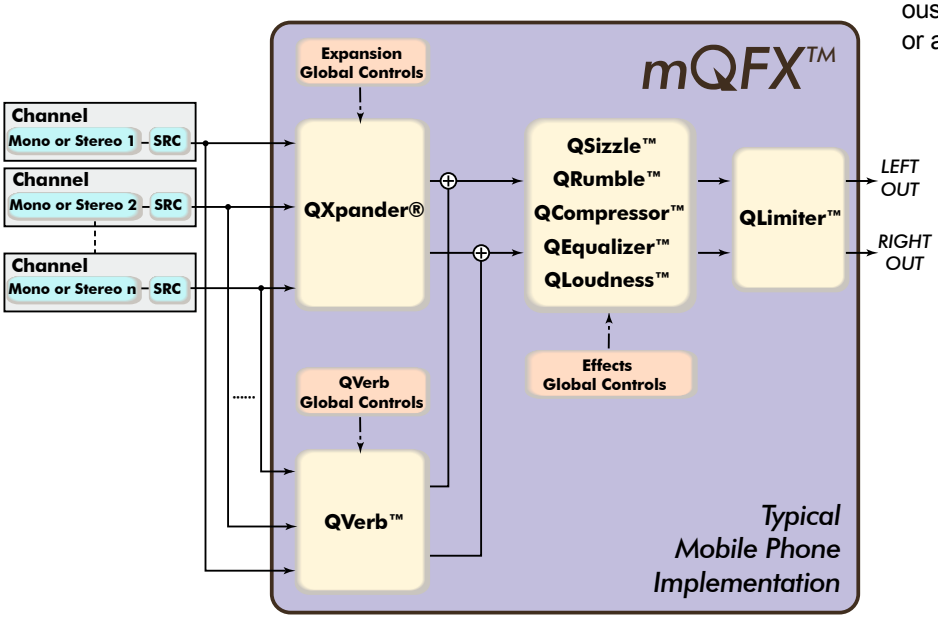
A familiar multi-band equalizer option provides users with a familiar interface for shaping overall frequency response.

QLimiter™

A high-efficiency, anti-saturation dynamic range controller, **QLimiter** handles any combination of signals and extreme effects settings, eliminating output distortion with surprisingly little CPU bandwidth.

QLoudness™

Compensates for human insensitivity to high and low frequencies at low listening levels, restoring natural frequency balance across the spectrum.



Platforms & Implementations

Inherently portable, **microQ** and **mQFX** are written in highly-optimized C++ using fixed-point math, and feature the unique 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 **mQFX** readily adaptable to any target environment, with the requirement for platform-specific code reduced to input and output interfaces.

mQFX is currently available for DSP and RISC architectures, including ARM® and enhanced ARM architectures running Linux, Symbian OS® 7.0s +, Nokia® Series 60, Microsoft® Smartphone, PocketPC®, and PocketPC Phone Edition.

- ARM® 7, ARM® 9
- ARM® 9E & ARM® 11 (Optimized by ARM®)
- CEVA-Teak™ & TeakLite™ DSP cores
- Infineon APOXI® Application Framework
- Qualcomm® MSM 6xxx / MSM 7xxx
- Tensilica® Xtensa®
- ATI Imageon™
- TI® OMAP™

mQFX can be provided in the form of object code, or custom ported by QSound Labs to suit your specifications. **mQFX** can be implemented at various system levels, e.g. within a driver, as a plug-in or as a user application.

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