MLC3890

Digital Audio Processor

▌General description

The MLC3890 is designed as a System On a Chip: system controller and decoder controller for multi-format digital audio player.
The independent dual 32-bit RISC processors provide optimized performance and code density for the combination of control code
and signal processing required for digital audio decode, file system management and system control.
The MLC3890 integrate programmable and approved ARM7TDMI™, as a system controller, MCS Logic proprietary 32-bit RISC-DSP
processor for advanced multi-format digital audio (MP3/WMA/Ogg) decoding, low power dedicated hard-wired CDROM decoder,
On-chip SRAM and ROM, versatile audio interfaces and large number of GPIO (General Purpose Input Output) ports. The MLC3890
provides CD-ROM, MP3, WMA decoding features. Also MLC3890 has option of Ogg Vorbis® decoding and SRS(WOW) effect.
By utilizing advanced 0.18 micron technology, the MLC3890 is the perfect solution for digital audio products with low power requirements;
high performance and powerful processing with 144 LQFP/FBGA and 128 TQFP packages.

▌Common Features

Process
· Low power 0.18μm CMOS technology
· Core Supply power: 1.8V +/- 10%, I/O supply power: 3.3V +/- 10%
· Low Power consumption

Architecture
· Independent Dual Processor Architecture
  - 32-bit ARM7TDMI™ RISC processor for system control
  - 32-bit MCS Logic proprietary RISC-DSP processor for audio processing

Package Type
· 144 LQFP/FBGA
· 128 TQFP

Memory
· 4-Kbyte Cache SRAM
· 2-Kbyte On-chip Data SRAM

· 32-Kbyte On-chip General purpose Data SRAM

· Maximum 256-Mbit SDRAM interface with 16-bit data width

· Maximum 32-Mbit parallel NVRAM interface with 8/16-bit data width

· Maximum 32-Mbit serial SPI Flash interface

GPIO (General Purpose Input Output)

· 144 LQFP/BGA : 54 GPIOs

· 128 TQFP : 37 GPIOs

· Extra external memory interface function

Interrupt

· 25 programmable interrupt sources

Serial I/O Interface

· Two 3-wire ultra high-speed synchronous serial interfaces

· Two 2-wire high-speed Asynchronous serial interface with IrDA functionality (UART)

I²C

· Master mode operation only

· Baud rate generation for serial clock

Basic Timer & Watchdog Timer

· Three timers with PWM functionality

· One Watchdog timer

General Purpose DMA

Real Time Clock (RTC)

· Clock and Calendar functions (BCD display); seconds, minutes, hours, date, day of week, month, year

· Alarm interrupt

· System release from power down status

A/D Converter

· One 10-bit resolution 6-channel high speed ADC

SPDIF Transceiver

· IEC-958 (SPDIF) compliant digital audio output

· IEC-958 (SPDIF) compliant digital audio input

NAND Flash controller

· Dedicated NAND type flash memory controller

· Two independent Chip Selector

USB 1.1 Full-speed Device controller

· 5 End point, 576 byte FIFO

· Compliant to USB1.1 specification

· Support USB1.1 FS(Full Speed, 12Mbps)

· Support Interrupt, Bulk transfer

USB 1.1 Full-speed Host controller

· USB Rev1.1 compatible

· Open HCI Rev1.0 compatible

· Support for both Low Speed and Full Speed USB Devices
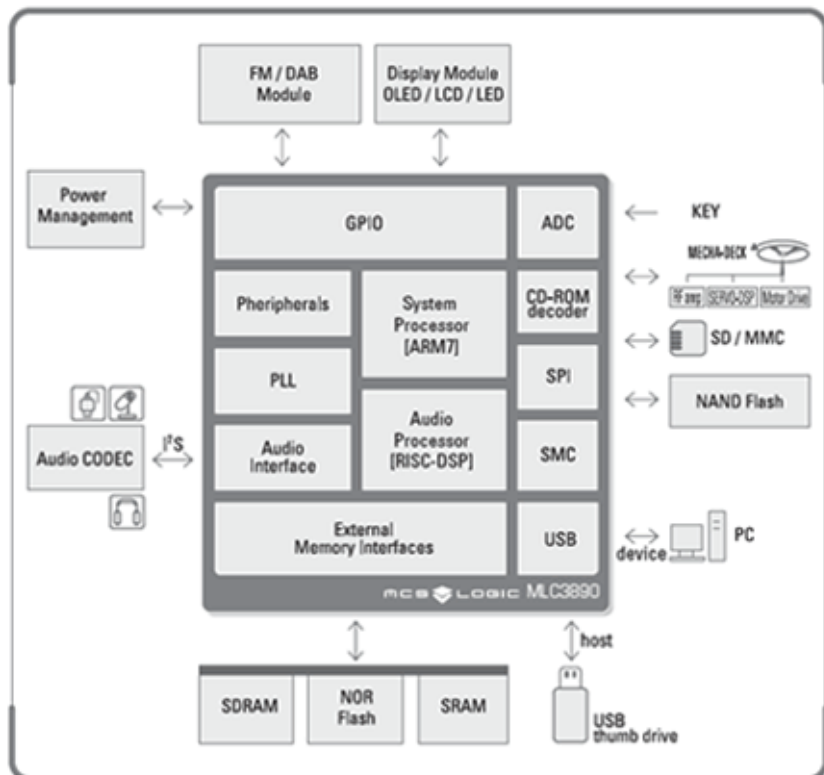
Decoder Core and Functions

· MPEG1/2/2.5 layer 2 and 3 decoding

· Window Media Audio (WMA V9 compatible) decoding

· Audio decoding of Window Media Video (WMV)

· Advanced System Format (ASF) decoding
· Ogg (Ogg Vorbis®) decoding
· High quality MLPCM voice recording
· Supports SRS_ WOW sound effect
· Supports Software MUTE / Pause / Resume / volume
· Digital volume control
· 7-band sound / graphic Equalizer for MP3, WMA, Ogg and Red book audio CD
· Optional sampling rate conversion to 44.1Khz for off-chip general audio DAC
· Channel mixing or separating for two different audio sources
· Supports time display (Normal / FF / FB)
· MEBB (MCS Logic Enhanced Bass Boost) sound algorithm
· CD-TEXT decoding in Lead-in area
· High quality ESP sound with high compression rate

Format Decoding
· ID3 tag V1.1 and V2.3 extraction
· Supports ISO9660 CDROM Mode1/Mode2 format (CDROM-XA)
· Supports Joliet decoding both single-session and multi-session disc
· Supports Joliet Level 3 decoding
· Supports UDF V1.02/V1.5/V2.01
· Supports UDF decoding in Packet writing format on CD-RW disc
· Supports UDF decoding in single/multi session Non-Packet writing on CD-R disc
· Supports the sorting directories and files in name order.
· Supports the playing list file as like [.pls] and [.m3u]

‖ Block Diagram

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