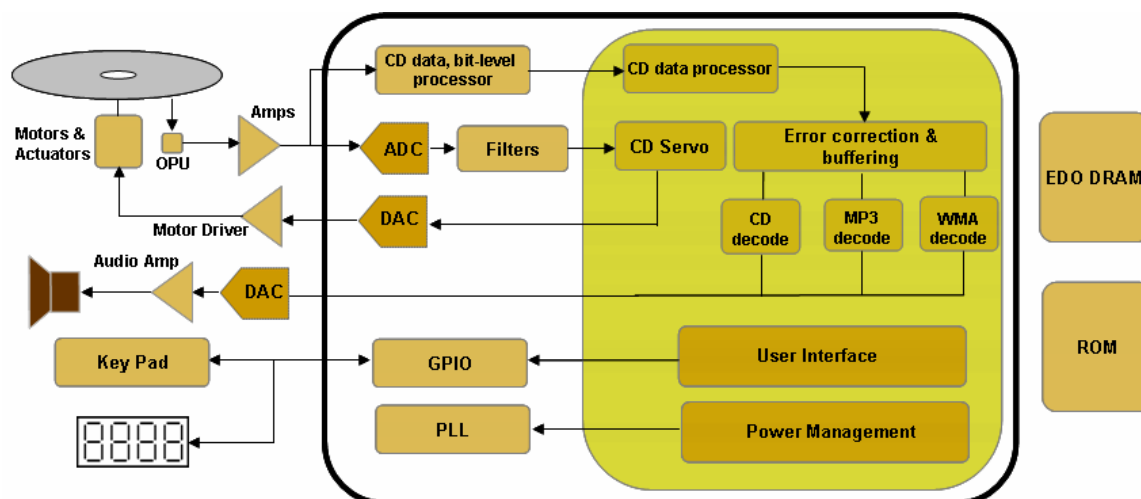# System-on-chip for CD/MP3/WMA Portable Audio

System on Chip Architecture

- Integrated CD servo controller with PDM DACs for actuator control
- Integrated CD Digital Signal Processor
- Integrated MP3 and WMA Decoder

Powerful 135MHz DSP

- 32 bit register architecture R0-R7
- 16 bit opcodes for compact code
- DSP functionality including single cycle 16x16 multiply to 40 bit accumulation

Memory System

- Internal 24Kx16 bit program memory
- Internal 256x32 bit RAM A for fast storage and multiplier inputs
- Internal 3072x32 bit 12KB RAM B for program code, stack and filter coefficients
- External ROM / Flash up to 1MB
- External EDO DRAM up to 6MB total

ADCs, Decode and Servo

- Sigma-Delta ADCs for focus, tracking and central aperture signals
- Digital PLL for clock and data recovery
- EFM data decode logic
- Sigma-Delta PDM DACs for focus, tracking, spindle and sled actuator

ATAPI

- ATAPI PIO mode 4 host controller

Interrupt Controller

- Sourced from UART, CD Frame, IR module, CD Servo, External
- Individually and globally maskable

GPIO

- Up to 62 GPIO pins available
- 30 GPIO lines provide four level output to drive segment LCD (4 COM and 26 SEG lines)

Infrared Interface

- Flexible interface generates interrupt to DSP and reports infrared transition interval
- Software decoding supports all protocols

Serial Peripheral Interface (SPI)

- Dual, programmable bit rate, 8/16/32 bit interfaces to non-volatile memory or displays

I2S Interface

- Supports I2S-compatible DACs and ADCs

Package

- Low cost compact 128 pin LQFP package
- 0.4mm pin spacing, 14mmx14mm size
- Leaded (GSL88303) and lead-free (GSL88303L) versions available

Digital Audio Support

44.1kHz CD-DA digital audio
- CD-DA digital audio

MP3
- File extension .mp3
- MPEG Layer-3 audio coding technology licensed from Fraunhofer IIS and Thomson
- 8-320kbps plus VBR (Variable Bit Rate)
- 8, 11.025, 12, 16, 22.05, 24, 32, 44.1, 48kbps output sample rate
- ID3 tag display (V1.0 and V1.1)

WMA
- File extension .wma
- 32-320kbps plus VBR (Variable Bit Rate)
- WMA Class 1 fully supported with 22.5, 32, 44.1, 48kbps encoding rate
- WMA metatag display
- Compliant with Microsoft requirements for product to carry "Plays Windows Media"

Electronic Shock Protection (ESP)
Times for standard 2MByte configuration
- 10s for CD-DA (no ADPCM)
- 75s for 196kbps MP3 and WMA
- 120s for 128kbps MP3 and WMA
- 240s for 64kbps MP3 and WMA

Software EQ
- Flat, Rock, Classical, Jazz and Pop

Recording format
- Multi-session (only limited by CD disc capacity to approximately 40 sessions)
- Finalised and unfinalised discs

CD Media
- CD-DA (pressed audio CD)
- CD-ROM (with .mp3 or .wma files)
- CD-R (write once)
- CD-RW (write many times)
- 8cm and 12cm media

Disc format
- 650MB, 680MB, 700MB capacities
- Up to 9999 tracks per disc
- Up to 999 albums (folders) per disc
- Up to 9999 tracks per album (folder)
- Abitrary hierarchical nesting of albums
- ISO9660, ISO9660 + Joliet, Joliet
- ISO13346 UDF V2.0.1

Mixed mode CD (single session)
- MP3 / WMA data files written to track 1 followed by up to 98 CD-DA tracks

CD-Extra or Enhanced CD (2 sessions)
- Session 1 contains 1 to 98 CD-DA tracks and session 2 the MP3 / WMA data files

Product Features

LCD display support
- 7 segment, 14 segment and bitmapped
- Tag display on 14 segment or bitmapped
- Title, Album, Artist and time display

Play mode support
- RPT1 1, RPT ALL, RPT ALB, RND, INTRO
- 99 PROG track playlist