

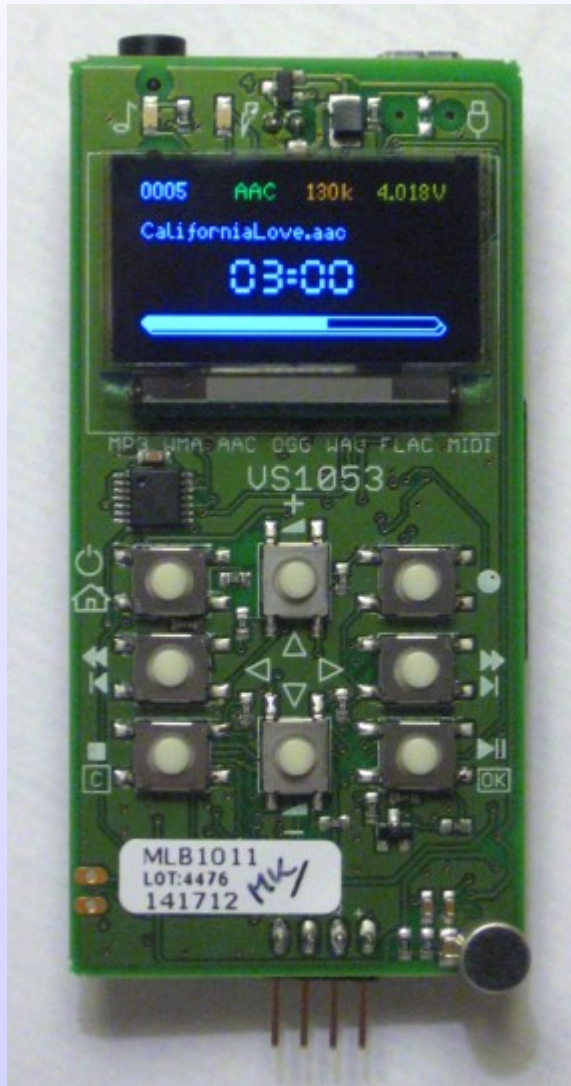


# VS1053 USB HiFi Player

April 2010

v1.0 PkP

# The Concept



- High Quality, Low Cost Personal Music Player solution
- Low component count - no MCU required
- VLSI High Quality mixed-signal design

# File Format Support



Decoders included in ROM:

- MP3
- WMA
- AAC
- AAC+HE+PS (“AAC+”)
  - Ogg Vorbis
  - PCM WAV
  - IMA ADPCM
  - General Midi

Soft Codecs:

- FLAC decoder
- Others can be added

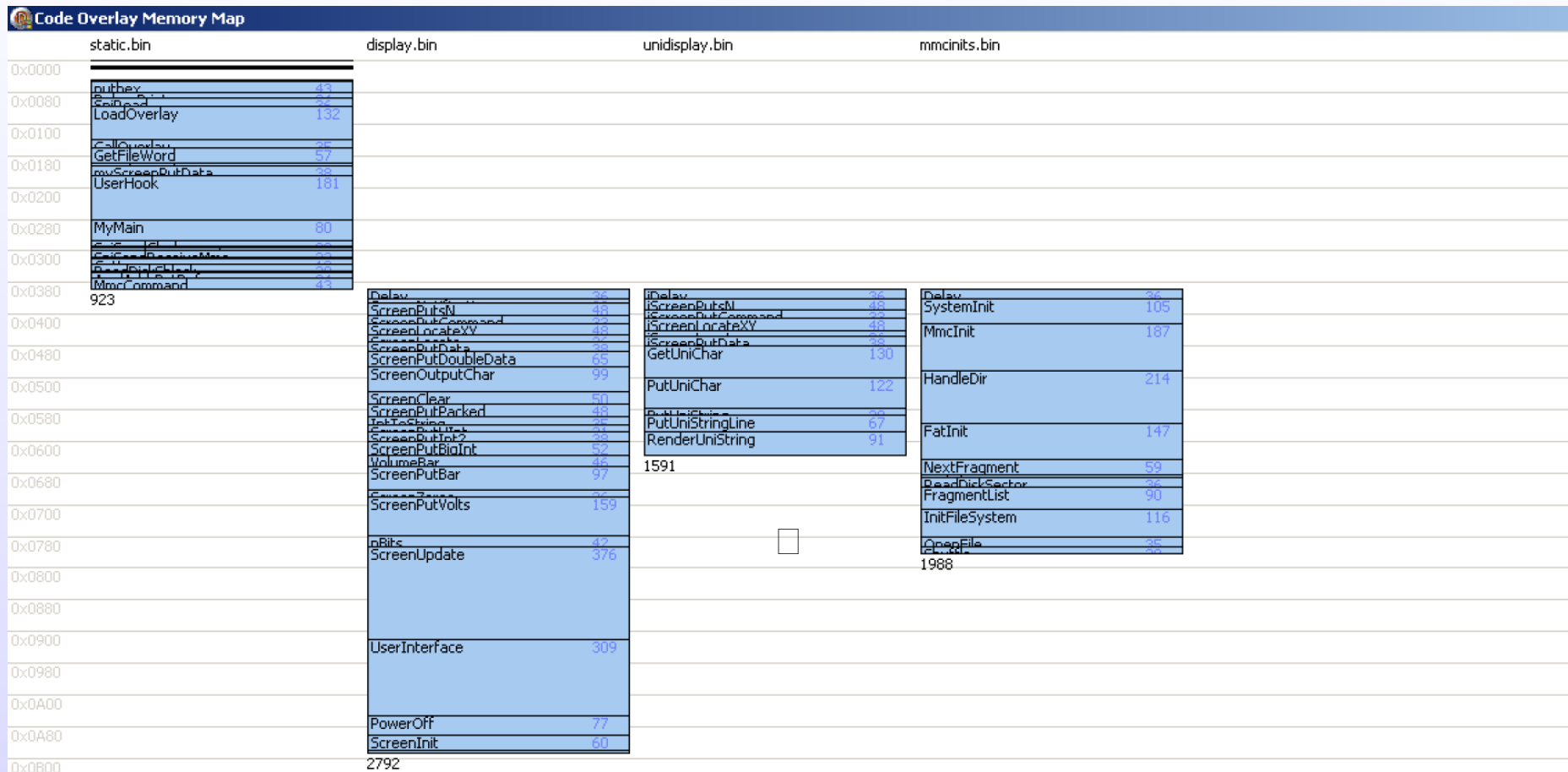
# Options

- Core Player:
- VS1053B
  - SPI EEPROM (minimum 64 kbit)
  - SD / microSD card connector
- USB Option:
- + USB-to-SD bridge (“SDcard reader IC”)
- Display Options:
- + LCD or OLED display
- Control Options:
- 1 to 8 push-buttons
  - External control via UART can be added.
- Memory Options:
- SPI Flash (for pre-loaded contents)
  - Internal nand flash with SD controller ic.
- Asian characters:
- SPI Flash for Unicode font data (1.4 MB)

# Sound Quality

- Uses VLSI Solution's high quality audio IP.
- VLSI has almost 20 years of experience in mixed-signal chip design since 1991.
- VLSI's Crystal-locked SRC Sigma-Delta D/A converters.
- Dynamic Range: 95 dB
- Maximum Output Level: 685 mV RMS
- VLSI's own optimized 16/40-bit audio decoders.
- Signal to Noise Ratio: up to -89 dB
- Harmonic Distortion: up to -82 dB
- Intermodulation Distortion: up to -80 dB

# Extensible Software Architecture



- Overlaying linker can add new software modules.
- ROM codecs and libraries can be called at any time.
- New, clearer architecture makes development easier.

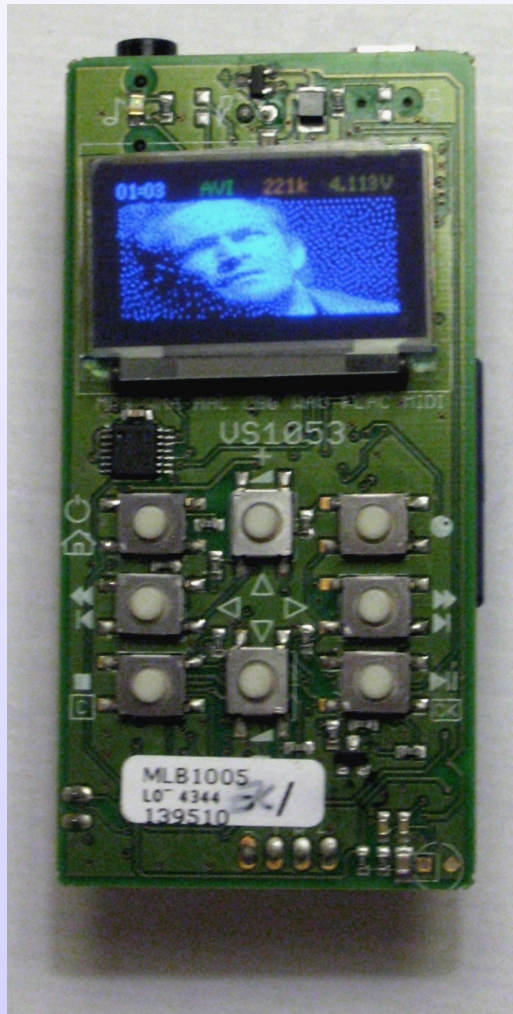
# Software Extension Example 1: UNICODE support



- New module was added to render unicode-16 characters.
- New font structure was created and stored to SPI flash.
- More than 50.000 character shapes in 1.4 megabytes of pixel data.
- Font available for VLSI customers
- Smooth scrolling from internal RAM buffer



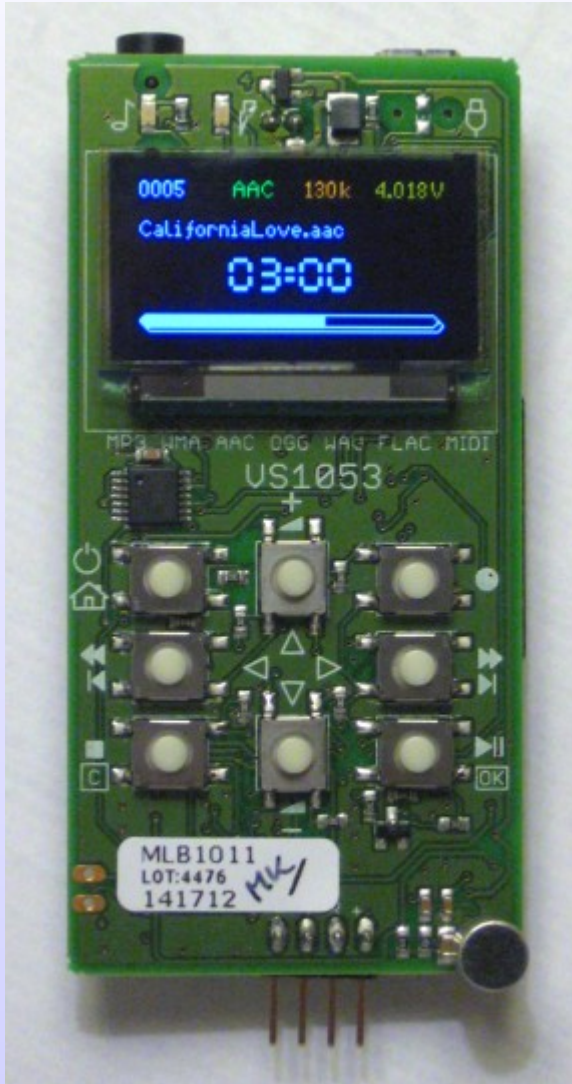
# Software Extension Example 2: AVI Video Support



- New module was added to decode and display AVI formatted video.
- New video codec was added to FFDSHOW codecs (libavcodec) for easy conversion of AVI/DVD.
- The audio in the movie is in MP3 format.
- The display in the reference player is a 1-bit monochrome OLED (not really intended for video).
- Color LCD would have better picture.

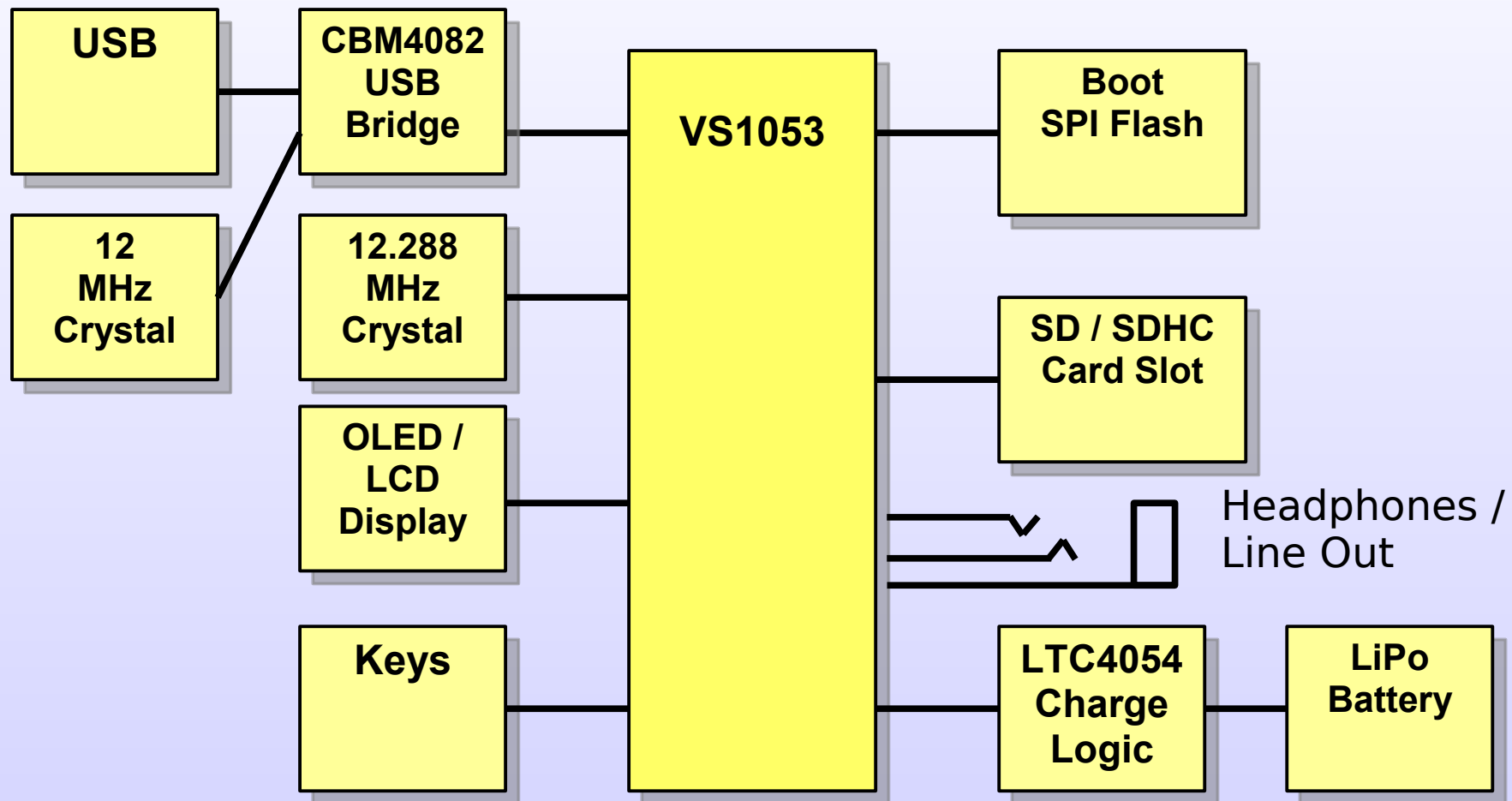


# Reference Design



- VLSI VS1053B Audio DSP IC
- 132X64 OLED Display
- SD / SDHC Memory Card
- 480 Mbps High Speed USB port
- USB SD-card writer function
- 240mAh Lithium Polymer Battery
- Automatic battery charging from USB
- Accurate battery voltage monitor
- Electret mic for voice recording
- 3.5 mm headphone connector
- 16 Mbit SPI Flash
- UART Debug Connector

# Block Diagram



# Summary



- Low cost, high quality Personal Music Player
- Plays .MP3, .OGG, .AAC, .M4A, .WMA, .WAV, .IMA and .MID files
- Powered with a rechargeable LiPo battery.
- High-speed USB (480 Mbit/s)
- SD/SDHC (over 2 GB cards supported)
- Customizable memory and display.
- For more information, please contact [support@vlsi.fi](mailto:support@vlsi.fi)



Thank you.

VLSI Solution Application Support Team  
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