Amlogic Advanced SoC Solution for OTT and IP-STB Applications

- Q1' 2012

Amlogic Corporate Introduction

- Application processors provider for connected multimedia devices

- Technology leader with rich and deep IP portfolio built up over 10 years

  - Advanced SW features and extensive partnerships

  - ~400 employees with a 350 member engineering team

- Seasoned leadership team

- Privately held since 1995

- Headquartered in Santa Clara, CA with offices in Shanghai, Shenzhen, Beijing and Hong Kong
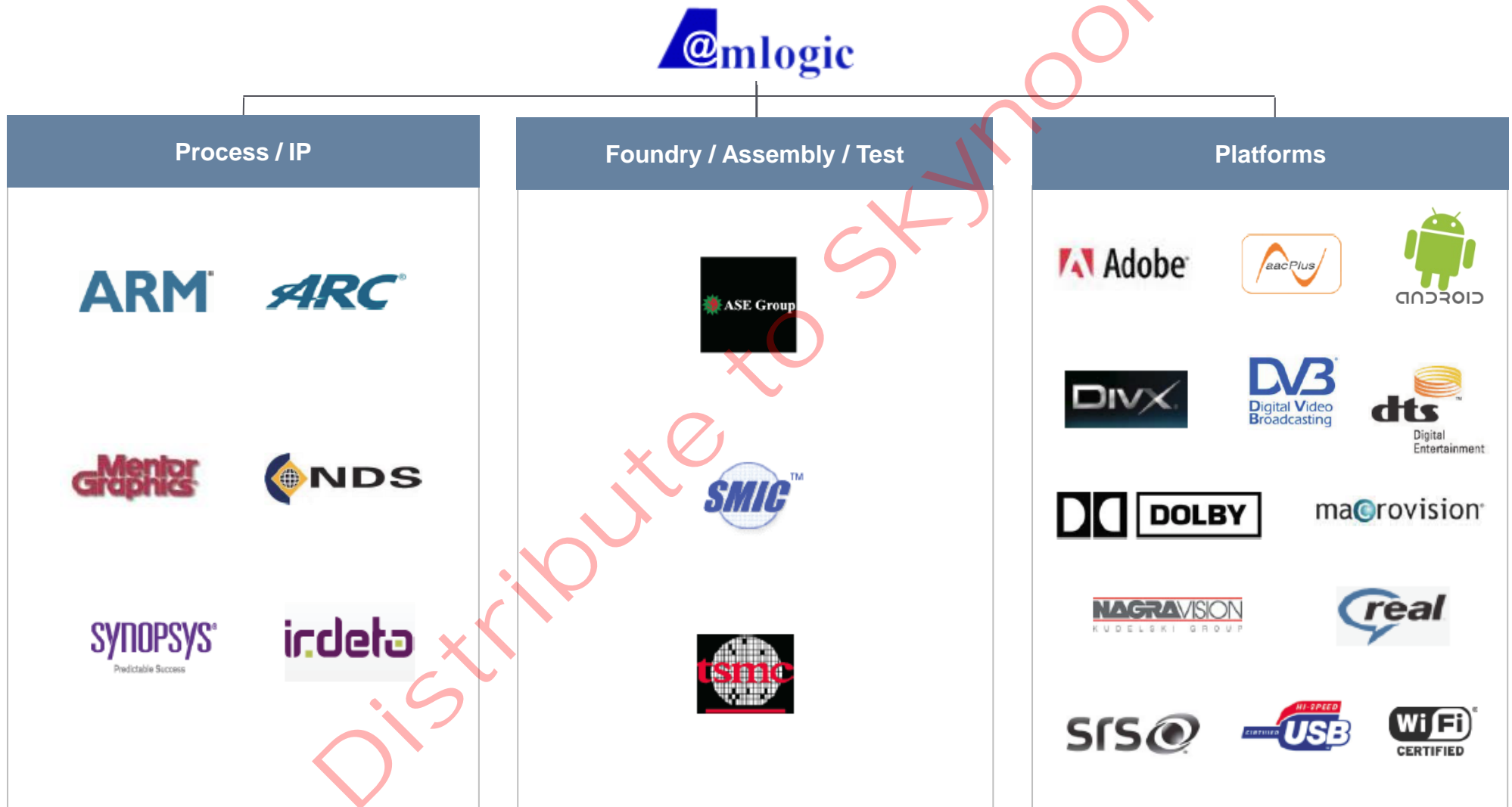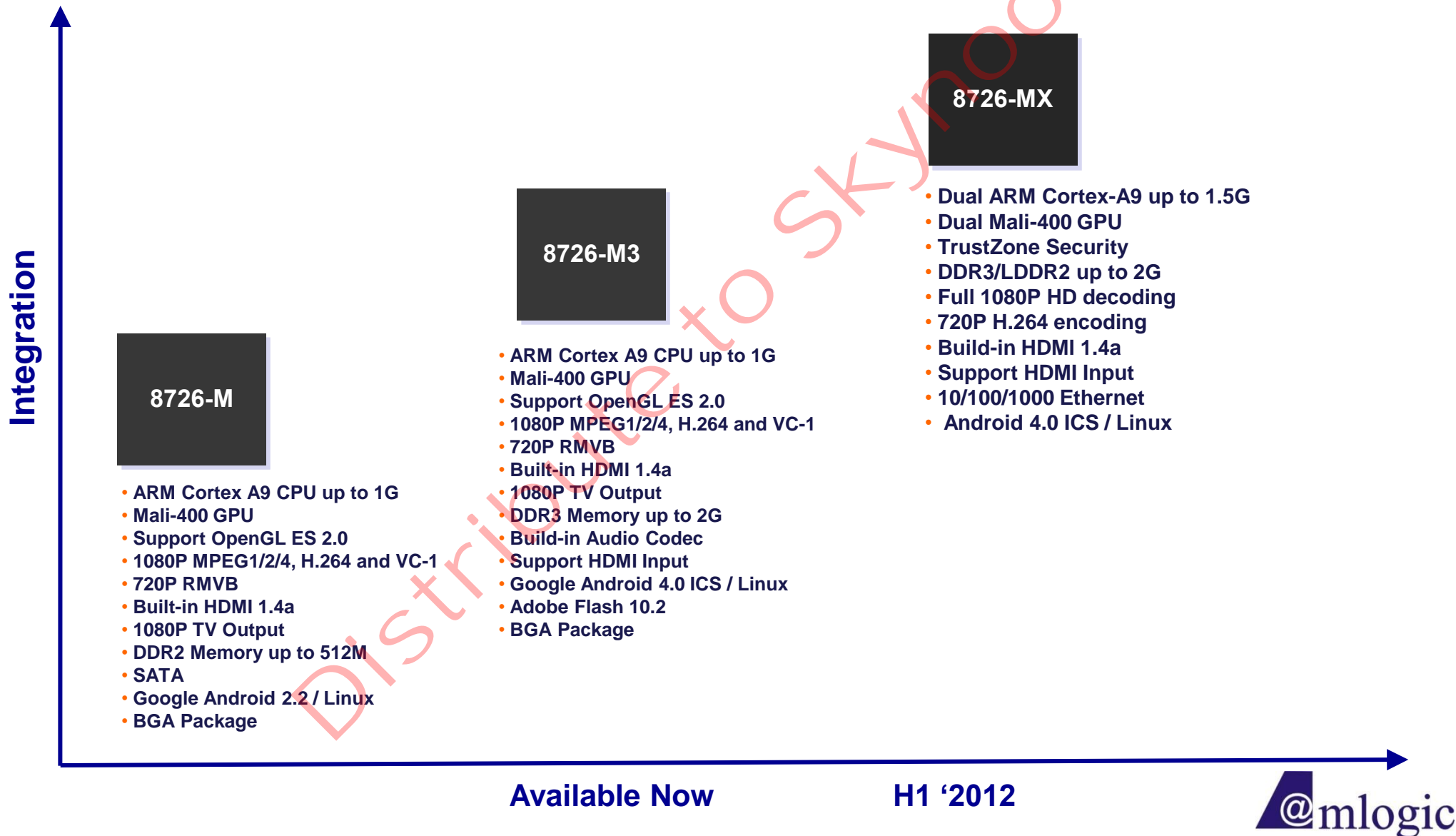
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Amlogic Product Lines

World's First 3D
Android TV
by Skyworth

Best-Selling
Android Tablet
On Taobao

Android-Based
IP-STB with FTA

Shared Core IP:
Powerful CPU
HD Video
Processing
Connectivity
OS
Applications

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Select Customers

Robust Partner Ecosystem

Amlogic OTT/IP-STB SOC Roadmap

Integration

8726-M

- ARM Cortex A9 CPU up to 1G
- Mali-400 GPU
- Support OpenGL ES 2.0
- 1080P MPEG1/2/4, H.264 and VC-1
- 720P RMVB
- Built-in HDMI 1.4a
- 1080P TV Output
- DDR2 Memory up to 512M
- SATA
- Google Android 2.2 / Linux
- BGA Package

8726-M3

- ARM Cortex A9 CPU up to 1G
- Mali-400 GPU
- Support OpenGL ES 2.0
- 1080P MPEG1/2/4, H.264 and VC-1
- 720P RMVB
- Built-in HDMI 1.4a
- 1080P TV Output
- DDR3 Memory up to 2G
- Build-in Audio Codec
- Support HDMI Input
- Google Android 4.0 ICS / Linux
- Adobe Flash 10.2
- BGA Package

8726-MX

- Dual ARM Cortex-A9 up to 1.5G
- Dual Mali-400 GPU
- TrustZone Security
- DDR3/LDDR2 up to 2G
- Full 1080P HD decoding
- 720P H.264 encoding
- Build-in HDMI 1.4a
- Support HDMI Input
- 10/100/1000 Ethernet
- Android 4.0 ICS / Linux

Available Now   **H1 '2012**

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Android 4.0 ICS On AML8726-M3 Ready!

- **Sunspider Performance ~2.8S**

- **75% Faster than Gingerbread 2.3**

- **3D UI Transition**

- **Multitasking**

- **Many Exciting New Features …**

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Amlogic AML8726-M3 Features Highlight

Powerful Embedded Processors

ARM Cortex A9 CPU   Mali 400 GPU

Full HD Capability

1080P H.264, VC-1, WMV, MPEG1/2/4, AVS HD, AVC-HD, RM/RMVB

Powerful OS Flexible SW

High Integration for Lower BOM

HDMI-TX 1.4, DDR3, 2 X USB 2.0 OTG, 10/100 Ethernet SD/MS/MMC, NAND Interface, Video Camera Input

AML8726-M3 Competitive Advantage Highlights

Android 4.0 ICS Ready
- ICS Developed & Optimized for Cortex A9
- Fast Time to ICS Upgrade

Low Power Consumption
- 4.4 mA System Standby Power
- Up to 1 month Standby Power

Adobe Flash Certification
- Certified for Adobe Flash
- Device Certification Process Ready

Most Advanced CPU
- ARM Cortex A9 CPU @ 1GHz
- 30% Faster than Cortex A8
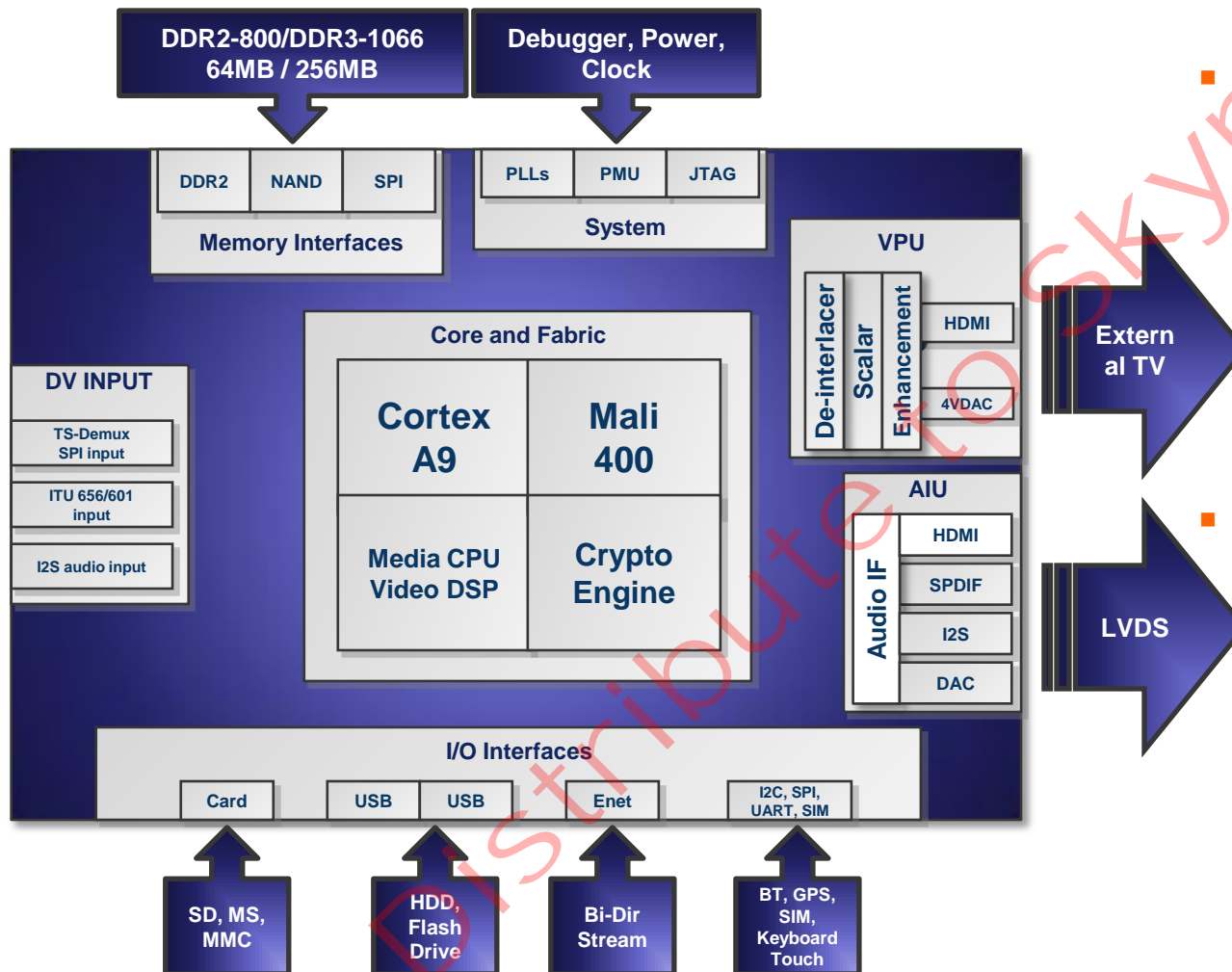
Faster Web Experience
- Sunspider Benchmark @ 2.8S
- Sunspider for A8 CPU's @ ~6.3S

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AML8726-M3 STB Product Features

- **Android 4.0 ICS**
- **Adobe Flash 10.2**
- **Qt Media Hub 4.7.4**
- **DTV Support:**
  - **ATSC**
  - **DVB-T**
  - **ISDB-T**
  - **DVB-S / DVB-S2**
  - **D-TMB**
- **SATA**
- **1080P TV Output**

AML 8726-M3 Block Diagram

Powerful Processor Cores
- 1GHz Cortex A9 CPU
- 200Mhz Media CPU
- 2 X 200Mhz Video DSP
- 250Mhz Mali 400 Engine
- 200Mhz 2D Engine

High Integration
- HDMI-TX 1.4a
- LVDS Interface
- DDR3 Memory
- Dual Video Output
- Integrated Audio ADC/DAC

AML8726-M3 System Features

- **System Core**
  - ARM-Cortex A9
  - Media CPU
  - OpenGL ES 2.0 GPU
  - Dual-core Video DSP
  - Crypto engine supporting DES, 3DES, AES, DVB-CS
  - Multi-channels DMA engine
  - L2 Cache = 128KB
  - Timers and NMI
  - Multiple Power Saving Modes

- **Memory Sub-System**
  - 8-bits SLC/MLC/TLC NAND interface
  - 1-4 bits SPI NOR
  - Support DDR3/1066
  - 16/32 bit DDR3 memory interface
  - Up to 2GB DDR3 memory
  - QoS-based internal fabric

- **Data I/O ports**
  - 2x USB ports (PHY/controller)
  - Ethernet port (controller-only, RMII)
  - SD/SDHC/SDXC (PHY/controller)
  - SDIO Support
  - TS-input parallel SPI port

- **A/V ports**
  - Dual concurrent video output
  - HDMI 1.4 with HDCP and CEC
  - 4x Video DAC (CVBS,S-Video,YPbPr)
  - 2x Audio DAC
  - 2x Audio ADC
  - Single channel LVDS / Mini-LVDS
  - PCM audio channel
  - SPDIF digital output
  - I^2S digital audio input and output
  - ITU 601/656 digital video / camera input

- **Misc**
  - SPI, i2c, UART, PWM interfaces
  - Integrated RTC
  - Spread spectrum clock

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AML8726-M3 Full HD Multimedia Support

- **Video Formats**
  - H.264 (1080p@30fps) HP/MP/BP L1.4 Support - *.mkv, *.ts, *.m2ts, *.mov, *.mp4
  - VC-1 / WMV (1080p @30fps) Interlaced and Progressive Advanced Profile Level 3
  - AVS – Jizhun Profile (1080P@30fps)
  - WebM (D1@30fps)
  - RMVB (720p@30fps) - *.rm, *.rmvb
  - MPEG1/2/4 (1080p@30fps) - *.avi, *.mpg, *.mpeg, *.dat, *.vob, *.ts,*.mov, *.mp4
  - MJPEG (D1@30fps) - *.avi, *.mov
  - H.263 (D1@30fps) - *.avi, *.flv

- **Audio Formats:**
  - *.mp3 (MP3), *.wma (WMA), *.wav (PCM), *.ogg (Ogg Vorbis), *.m4a (AAC), *.mp4 (AAC), *.aac (AAC), *.ape (APE), *.FLAC (FLAC), *.ALAC (ALAC)

- **Advanced Video Enhancement Features**
  - ADV processing: Advanced De-blocking for digitally compressed Video source
  - 3D noise reduction
  - Pixel based motion adaptive edge enhanced de-interlacing
  - Non-linear panaroma scalar
  - Color enhancement and color management

- **Subtitle: SMI, SRT, SUB, SSA, ASS, SUB+IDX, ISO Navigation**

- **Playlist: PLS, M3U, WPL**

- **File System: FAT32, exFAT, NTFS, HFS+, Samba, ext2/3**

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AML8726-M3 Performance Comparisons

Competitive with Dual-Core Solution!

SoC	AML8726-M3	OMAP4460	Tegra2
CPU	Cortex-A9	Dual Cortex-A9	Dual Cortex-A9
GPU	Mali 400	PowerVR540	Nvidia
Android Version	4.0 ICS	4.0 ICS	2.3.4
Quadrant Performance			
Total	2144	1842	2316
CPU	3989	5636	7297
Memory Throughput	1724	1945	2484
I/O	4157	1065	1031
2D	251	186	85
3D	600	377	685
Sunspider 0.9.1 (ms)	2816	2001	2083

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Amlogic IP-STB Solution: AML8726-M3

Device Features

- **Cortex A9 CPU**
- **Mali 400 GPU**
- **512MB Flash / 512MB DDR2/3**
- **10/100/Gbit Ethernet**
- **IR Receiver**

Multimedia

- **1080P MPEG 1/2/4 Playback**
- **OpenGL ES 2.0 Gfx**
- **H.264 HP/MP/BP**
- **VC-1 WMV AP@L3**
- **Full DLNA Compliant**
- **HDMI + SPDIF Output**
- **Dolby, DTS, SRS, DivX**

Web Experience

- **Full Browser Support**
- **Full HTML 5 Support**
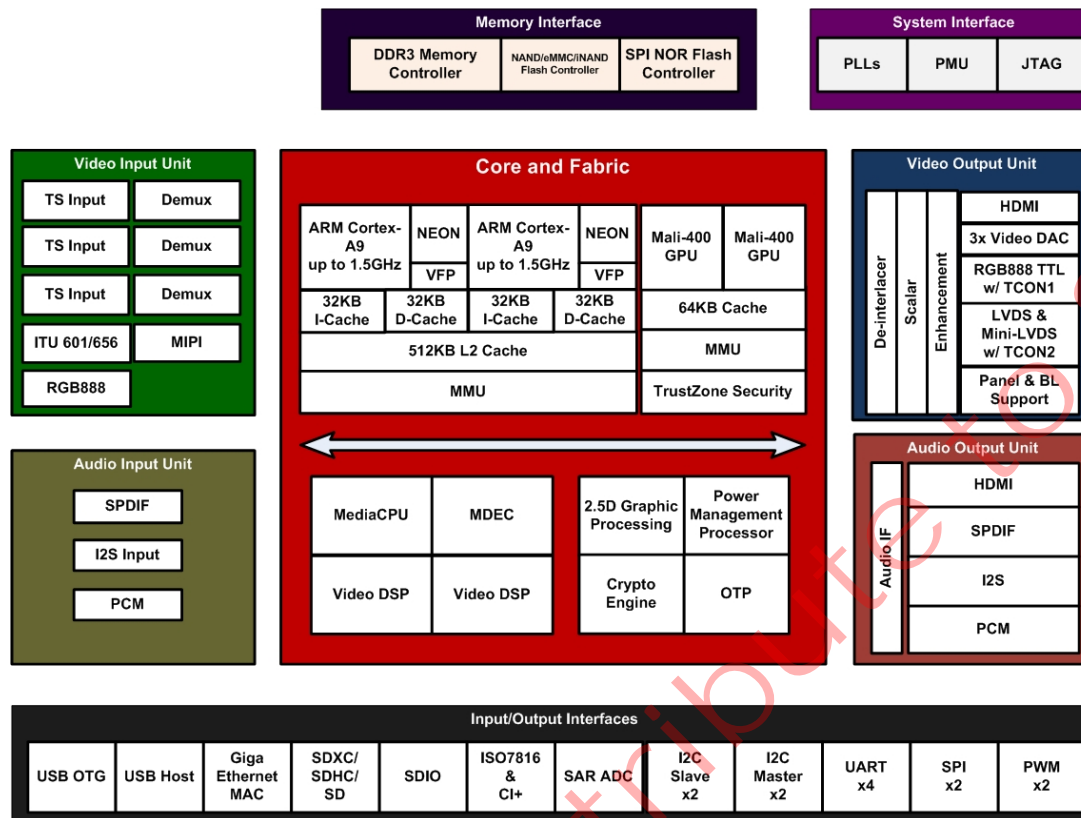- **Adobe Flash 10.2 Support**
- **Adobe StageCraft Support**

Applications

- **Choice of Open Platforms:**
  - **Linux, Android, QT**
- **Access to App Stores**
- **Remote Desktop Services**
- **Apps to Social Networks**
- **3D Games**
- **Over-The-Top Content Delivery**
- **3D UI**
- **DRM Support**

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AML 8726-MX Block Diagram

- Dual Cortex A9 CPU upto 1.5Ghz at 7500DMIPS
- Dual ARM Mali 400 GPU @ 400Mhz
- Up to 2GB DDR3/DDR3L/DDR3U/LPDDR2
- Full 1080P HD video decoding
- MVC 3D video decoding
- 720P HD video encoding
- LVDS/mini-LVDS panel interface and RGB888 TTL interface with dual TCON
- Support 3D panel and 3D HDMI display
- Dual concurrent video output via HDMI, LCD panels or analog video output
- Built-in HDMI 1.4a TX with CEC
- 2 USB High Speed (Host and OTG)
- Gigabit Ethernet
- TS and smart card peripheral ports
- Encrypted Secure Boot
- Android 4.0 ICS and Linux
- Support Adobe Flash
- OpenGL ES 1.1/2.0, OpenVG 1.1
- Support Dolby, DTS , SRS, DivX HD

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AML8726-MX System Features For STB

- **System Core**
  - Dual core ARM-Cortex A9 up to 1.5GHz
  - 7500 DMIPS
  - Dual core ARM Mali 400 GPU up to 400MHz
  - 800Mpix/sec and 40Mtri/sec
  - Advanced NEON and VFP co-processor
  - TrustZone security system
  - Dual-core Video DSP
  - Crypto engine supporting DES, 3DES, AES, DVB-CS
  - Multi-channels DMA engine
  - 512KB L2 Cache
  - Multiple Power Saving Modes

- **Memory And Storage Interface**
  - Support up to 2 GB DDR3/DDR3L/DDR3U/LPDDR2
  - Supports SLC/MLC/TLC NAND Flash with 4 chip enable pins with BCH60
  - Supports serial NOR Flash via SPI interface
  - Build-in 4kbits One-Time-Programming ROM for key storage
  - SDIO with memory card controller with 8-bit data bus supporting SD/SDHC/SDXC/MMC/MS/MS-Pro memory cards

- **Data I/O ports**
  - 2x USB 2.0 high-speed ports (PHY/controller)
  - 10/100/1000 Ethernet port (controller-only, RMII)
  - Four UART Interfaces with RTS/CTS
  - Two I2C master interfaces and two I2C slave interfaces
  - Two high speed bi-directional SPI interfaces
  - Dual PWM channels with feedback control logic
  - Programmable IR remote controller
  - Build-in 10bit SAR ADC with 8 input channels with resistive touch panel controller

- **Audio / Video Interface**
  - Build-in HDMI 1.4a transmitter with CEC, both controller and PHY
  - Programmable 3 channels high speed video DACs for analog video output including CVBS, S-Video, YPbPr and VGA
  - I2S , SPDIF/IEC958 and PCM serial digital audio output
  - Supports concurrent dual audio stereo channel output with combination of I2S+PCM
  - ITU 601/656 parallel video input with down-scalar
  - MIPI camera interface with 4 lanes and 1GHz per lane
  - Supports camera input as YUV422, RGB565, 10bit rawRGB ,16bit RGB or JPEG

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AML8726-MX Full HD Multimedia Support

- **Video Decoding**
  - H.264 (1080p@30fps) HP/MP/BP L1.4 Support - *.mkv, *.ts, *.m2ts, *.mov, *.mp4
  - VC-1 / WMV (1080p @30fps) Interlaced and Progressive Advanced Profile Level 3
  - AVS – Jizhun Profile (1080P@30fps)
  - WebM (D1@30fps)
  - RMVB (720p@30fps) - *.rm, *.rmvb
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  - MJPEG (D1@30fps) - *.avi, *.mov
  - H.263 (D1@30fps) - *.avi, *.flv

- **Audio Decoding**
  - Support MP3, AAC, WMA, RM, FLAC, OGG
  - Dolby, DTS, SRS

- **Advanced Video Post-Processing**
  - Motive adaptive 3D noise reduction filter
  - Advanced motion adaptive edge enhancing de-interlacing engine
  - Programmable poly-phase scalar for both horizontal and vertical dimension for zoom and windowing
  - Programmable color management filter (to enhance blue, green, red, face and other colors)
  - Chroma coring and black extension processing
  - Dynamic Non-Linear Luma filter
  - Programmable color matrix pipeline
  - Video mixer: 2 video planes and 2 graphics planes

- **Subtitle: SMI, SRT, SUB, SSA, ASS, SUB+IDX, ISO Navigation**
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Thank You

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