i.MX51A + 8”LCD Development Platform

Introduction
Please visit the following website for more information:

--- i.MX51L: based on i.mx51 with Linux OS development platform:
http://www.yuan-ying.com/product_catalog/i.MX51L.htm
--- i.MX51W: based on mx51 with Wince6.0 OS development platform:
http://www.yuan-ying.com/product_catalog/i.MX51W.htm
--- i.MX51A: based on i.mx51 with Android2.2 OS development platform:
--- i.MX51U: based on i.mx51 with Ubuntu OS development platform:
http://www.yuan-ying.com/product_catalog/i.MX51U.htm
Starting from Oct., 2009, Yuan-ying Technology has invested to design MX51 platform, by now we have successfully launched i.MX25 and i.MX35 development platform and the related turn key solution. To meet the market demand and the end user request, Yuan-ying Technology has launched MX51 Android OS development platform and turn key solution --- i.MX51A.

The i.MX51 processor is based on an ARM Cortex A8 as core architecture (with Trust Zone), CPU frequency is 800M~1Ghz, own 32 Kbyte L1 Instruction Cache and 32 Kbyte L1 Data Cache, also 256 Kbyte L2 Cache as well. Integrate Neon Coprocessor to enhance its Vector floating point operation ability. To boost multimedia performance, the following hardware accelerators are integrated: VPU – Video processing unit, IPU – Image processing unit, GPU 3D – Graphic Processing Unit (OpenGL ES 2.0 AMD Z430) and GPU 2D – Graphic Processing Unit (OpenVG1.1 AMD Z160). Support multiple format of HD720P video decode and multiple format of D1 video encode, also support 720P/1080i CVBS analog video signal output directly. Take advantage of DVFS (Dynamic Volt Frequency Scaling) and Smart Speed technology for smart power management. At the equal performance condition, which can run at the lower power consumption, and further reach great multimedia result.

i.MX51A is an Android Platform EVK based on Android 2.2 kernel, and adopt ext2 file system, designed by Yuan-ying Technology. i.MX51L own plateful peripheral interface, such as
## System Introduction

USB HOST, USB OTG, TVE Output, DVI, VGA, LVDS, TFT LCD, SDIO and so on. i.MX5A is widely applied various field, including: Consumer Electronic/Automotive Infotainment, industrial computer and industrial control. Which is the most suitable platform for tablet/Smart Book, Smartphone, MID, E-book, Digital Picture Frame, Home Media Terminal, V2IP, Car Multimedia, Industrial Computer, Factory Automation, HMI design. Customer can only focus on the application software design, and largely shorten the time to market cycle.

### Hardware Brief

#### CPU Processor

- i.MX51
- ARM Cortex A8 800M~1GHz
- 32 Kbyte L1 Instruction Cache and 32 Kbyte L1 Data Cache
- 256K L2 Cache
- NEON Coprocessor for VPU
- Hardware Graphic Accelerator OpenGL ES 2.0 --- 3D
- Hardware Graphic Accelerator OpenVG 1.1 – 2D
- VPU/IPU for Video Procession Unit and Image Processing Unit

#### Memory

- RAM: 512MB DDR2 (128MB X 4)
- Nor Flash: 4MB SPI (For Boot)
- NAND/Nor Flash

#### Peripheral Interface

- USB Interface: HS USB OTG, up to 480 Mbps, Integrated USB Phy, HS USB Host
- SD: Two SD card slot (one of it for system boot)
- FEC: 10/100M Ethernet
- UART: UART Connector for debug using

#### A-V output

- LCD: 7” or 8” TFT LCD display interface
- DVI: DVI 720P video output interface, also support VGA display connector
- Audio-In: MIC-in /LINE-in
- Audio-Out: Line out / Headphones

#### Clock and Power Supply

- RTC: External clock, real time clock supported
- Power Supply: 5V, 2A output
**PCB Board Structure and Size**

※ Bottom Board: 11cm x 12cm  two layers PCB
※ Core System Board: 4cm x 6.5cm  6 layers PCB

◆ i.MX51 SOC Architecture
◆ System Block Diagram

Note:
--- Regarding TFT LCD, customer can select one of 7” and 8”
--- WiFi is an option selection for customer selection
--- Touch Panel: customer can select the resistance touch panel or capacitor touch panel
--- One of SD1 or iNAND Flash is available
◆ Board External Connection:

- RS232
- RS857
- HS USB Host
- Audio Output
- MIC
- UART2 & UART3
- 10/100M Ethernet
- Return/Wake Up/Enter Keys
- NAND/NOR Flash
- JTAG
- I2C1
- I2C2
- TVE Output
- CMOS/CCD Interface
- TFT LCD Connector
- Touch Panel
- WiFi Interface
- SD1 Socket
- SD2 or eNAND
- Power On/Off Switch
- 5V/2A Power

※ Blue Line indicate PCB Back Side
   Red Line indicate PCB Front Side

◆ The related port definition:

※ I2C1

- I2C1_SDA
- I2C1_SCL

※ I2C2

- I2C2_SCL
- I2C2_SDA

※ TVE OUT

- RED
- GREEN
- BLUE
- GFL
### ✤ BOOT mode selection:

![Bootmode Selection Table]

#### Android BSP

<table>
<thead>
<tr>
<th>Bootloader</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redboot</td>
<td>Support SD card upgrade Kernel and file system, via FEC download Kernel and file system</td>
</tr>
<tr>
<td>U-boot</td>
<td>Support SD card upgrade kernel and file system, via FEC network download kernel and file system</td>
</tr>
</tbody>
</table>

#### Android Kernel

- Android 2.2 OS

#### System Driver:

<table>
<thead>
<tr>
<th>Driver Type</th>
<th>Driver Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEC Driver</td>
<td>Ethernet driver</td>
</tr>
<tr>
<td>USB OTG Driver</td>
<td>USB OTG Driver</td>
</tr>
<tr>
<td>USB Host Driver</td>
<td>USB Host driver code</td>
</tr>
<tr>
<td>UART Driver</td>
<td>Serial port driver code</td>
</tr>
<tr>
<td>Audio Driver</td>
<td>Audio codec driver</td>
</tr>
<tr>
<td>IPU Driver</td>
<td>IPU Driver code</td>
</tr>
<tr>
<td>VPU Driver</td>
<td>VPU Driver code</td>
</tr>
<tr>
<td>GPU Driver</td>
<td>GPU driver code</td>
</tr>
<tr>
<td>Camera Driver</td>
<td>Camera driver code</td>
</tr>
<tr>
<td>MMC/SD/SDIO Driver</td>
<td>MMC/SD/SDIO driver code</td>
</tr>
<tr>
<td>SPI Driver</td>
<td>SPI ROM driver code</td>
</tr>
<tr>
<td>TV driver</td>
<td>TVE driver code</td>
</tr>
<tr>
<td>I2C Driver</td>
<td>I2C Driver code</td>
</tr>
<tr>
<td>1-Wire</td>
<td>1-Wire driver code</td>
</tr>
<tr>
<td>PMIC Driver</td>
<td>Power management IC MC13892 Driver code</td>
</tr>
<tr>
<td>RTC Driver</td>
<td>RTC driver code</td>
</tr>
<tr>
<td>WDOG Driver</td>
<td>Watch dog driver code</td>
</tr>
<tr>
<td>PWM Driver</td>
<td>PWM driver code</td>
</tr>
</tbody>
</table>

#### Multimedia Supporting:

- **Video Decoding**
  - MPEG4 decode: 720p, 30fps
  - H.264 decode: 720, 30fps
### System Introduction

<table>
<thead>
<tr>
<th>Video Encoder</th>
<th>Image Decoding</th>
<th>Audio Encoding</th>
</tr>
</thead>
</table>

### Video Encoder
- MPEG-4 encode: D1, 25/30fps
- H.263 encode: D1, 25/30fps
- H.264 encode: D1, 25/30fps
- MJPEG encode: baseline mode

### Image Decoding
- BMP Decode, GIF Decode, JPEG Decode, PNG Decode, JPEG Encode

### Audio Encoding
- MP3/WMA/SBC

#### i.MX51 Android EVK basic package
1. i.MX51 Linux EVK board, 1
2. 7” LCD, 1
3. 4G SD card, 1/demo inside
4. RS232 data line, 1
5. USB data line, 1
6. 5V 2A power supply, 1
7. Document CD, 1
8. Hardcopy for EVK brief, 1

#### i.MX51 Android 2.2 EVK Document list
1. i.MX51 data sheet, 1
2. EVK reference schematic (PDF, 1)
3. EVK hardware manual, 1
4. EVK Linux BSP user manual, 1
5. i.MX51 Linux guideline, 1