

i.MX53 Linux Embedded System Platform



**Yuan-ying
Technology**

2011-06-06



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:

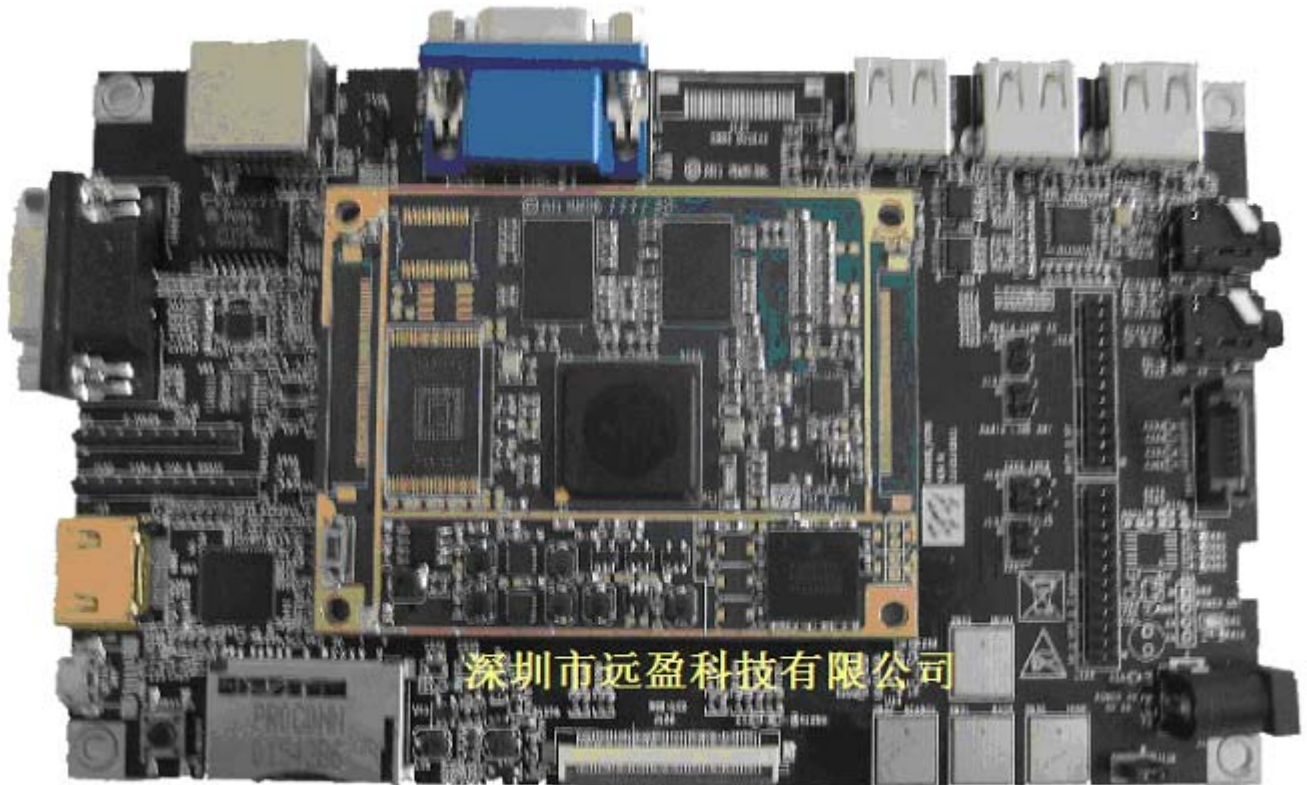
http://www.yuan-ying.com/product_catalog/i.MX51A.htm

--- i.MX51U: based on i.mx51 with Ubuntu OS development platform:

http://www.yuan-ying.com/product_catalog/i.MX51U.htm



◆ System Introduction:



Yuanying Tech is one advanced technical company, in past few year we focus on embedded system solution offering, from low end to high end. Our platform including MX25, MX28, MX35 and MX51. From Nov of last year, Yuanying Tech. have started to design MX53 platform based on Linux OS. Now, we have successfully finished this project and launched MX53 Linux OS embedded system platform --- YY- i.MX53L.

i.MX53 is Soc processor based on an ARM Cortex A8 as core architecture (with Trust Zone), CPU frequency up to 1Ghz ~1.2Ghz, own 32 Kbyte L1 Instruction Cache and Data Cache, and 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 HD1080P video decode and multiple format of 720P video encode, also support 1080P TV analog video signal output directly。 Dual camera CSI interface and dual display interface largely enhance MX53 application field. By means of DVF and Smart Speed technology for smart power management, At the equal performance condition, which can run at the lower power consumption, and perform the great multimedia result。

i.MX53L is an Linux System Platform based on Linux-2.6.35 kernel, adopt ext2 file system, designed by Yuan-ying Technology. i.MX53L own plentiful peripheral interface, such as USB



HOST, USB OTG, TVE Output, DVI, VGA, LVDS, Camera CSI input, SDIO and so on, i.MX53L is widely applied various field, including: HD internet monitor/Automotive Infotainment, industrial computer and thin client machine(cloud computer), MID, Home Media Terminal, V2IP, Factory Automation, HMI design, etc. The dual display feature is the most suitable platform for education equipment. Customer need only focus on the application software design, and largely shorten the time to market cycle.

◆ Hardware Brief

CPU Processor

- MX535/6
- ARM Cortex A8 1~1.2GHz
- 32 Kbyte L1 I-Cache and D-Cache, 256K L-2 Cache
- NEON Coprocessor for VFPU
- 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: 1GB DDR3 (256MB X 4)
- NAND Flash: 2GB
- SD card or NAND Flash boot

Peripheral Interface

- USB Interface: 1 x HS USB OTG, up to 480 Mbps, Integrated USB Phy, 3 x HS USB Host
- SD: Two SD card slot (one of it for system boot)
- FEC: 10/100M Ethernet with IEEE 1588 QUICC engine
- UART: 5 x UART Connector
- PATA with U-DMA mode 5 and SATA II supported
- 2 x CAN interface and MLB interface
- 3x I2S/SSI/AC97 interface

A-V output

- LCD: 7" LVDS 1024X600
- VGA/HDMI interface
- LVDS: support dual LVDS display the same time (default one 7" LVDS panel)
- Audio-In: MIC-in /LINE-in
- Audio-Out: Line out / Headphones

Clock and Power Supply

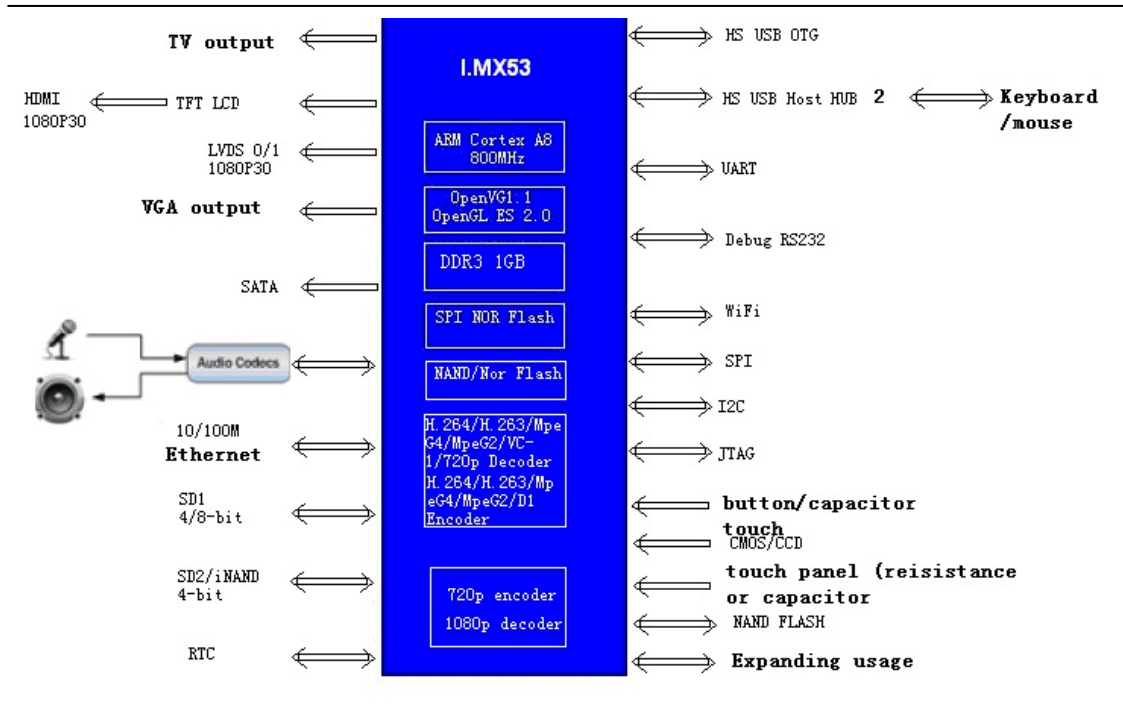


- RTC: External clock, real time clock supported
- Power Supply: 5V, 2A output

PCB Board Structure and Size

- Bottom Board: 10cm x 16.5cm 2- layers
- Mini System Board: 8cm x 6cm 6- layers

◆ System Block Diagram

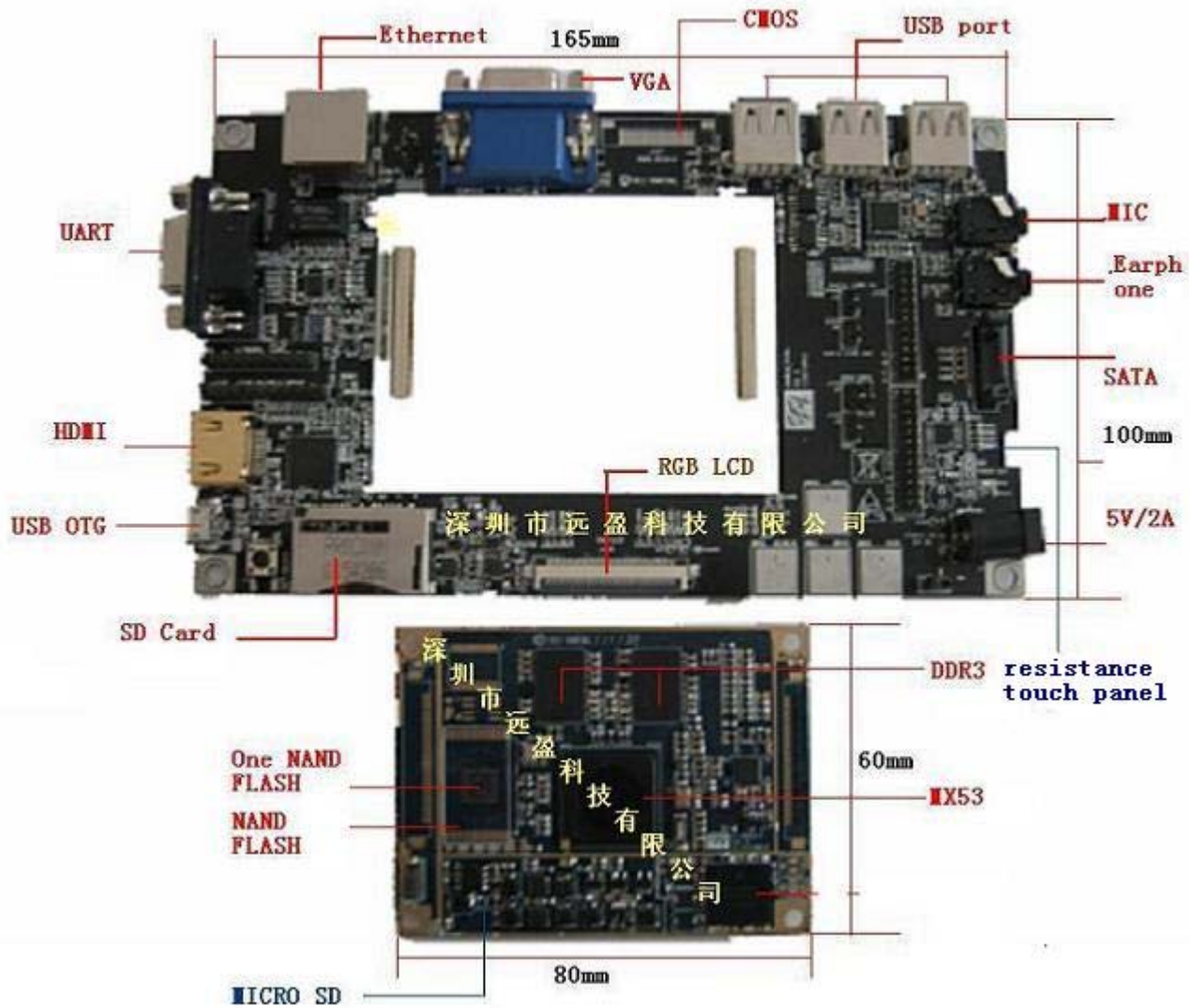


Note:

- 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:



BOOT mode selection:

| SW26 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|------------|---------------|---------------|--|--|---|---------------|---|
| | BOOT_CFG1 [6] | BOOT_CFG1 [5] | BOOT_CFG1 [4] | BOOT_CFG1 [3] | BOOT_CFG2 [7] | BOOT_CFG2 [6] | BOOT_CFG2 [5] |
| Serial-ROM | 0 | 1 | 1 | Serial ROM select: 0 - I2C 1 - SPI | Reserved | Reserved | SPI Addressing: 0 - 2-bytes (16-bit) 1 - 3-bytes (24-bit) |
| SD/eSD | 1 | 0 | Fast Boot: 0 - Regular 1 - Fast Boot | Reserved | Reserved | Reserved | Bus Width: 0 - 1-bit 1 - 4-bit |
| MMC/eMMC | 1 | 1 | Fast Boot: 0 - Regular 1 - Fast Boot | Reserved | Bus Width: 000 - 1-bit 001 - 4-bit 010 - 8-bit 101 - 4-bit DDR (MMC 4.4) 110 - 8-bit DDR (MMC 4.4) Else - reserved. | | |
| HD | 0 | 1 | 0 | HD Type: 0 - PATA 1 - SATA | Reserved | Reserved | Reserved |



| SW28 | 8 | 7 | 6 | 5 |
|------------|--|---------------|--|---------------|
| | BOOT_CFG3 [5] | BOOT_CFG3 [4] | BOOT_CFG3 [3] | BOOT_CFG3 [2] |
| Serial-ROM | Port Select: 00 - I2C1 / eCSP11 01 - I2C2 / eCSP12 10 - I2C3 / CSPI 11 - Reservd | | CS select (SPI only): 00 - CS#0 (default) 01 - CS#1 10 - CS#2 11 - CS#3 | |
| SD/eSD | Port Select: 00 - eSDHC1 01 - eSDHC2 10 - eSDHC3 11 - eSDHC4 | | Reserved | Reserved |
| MMC/eMMC | Port Select: 00 - eSDHC1 01 - eSDHC2 10 - eSDHC3 (eMMC4.4) 11 - eSDHC4 | | DLL Override: 0 - Boot ROM default. 1 - Apply value per fuse field MMC_DLL_DLY[3:0] | Reserved |
| HD | Reserved | Reserved | Reserved | Reserved |

◆ Linux BSP

Bootloader

| | |
|---------|---|
| Redboot | Support SD card upgrade Kernel and file system, via FEC download Kernel and file system |
| U-boot | Support SD card upgrade kernel and file system, via FEC network download kernel and file system |

Linux Kernel

Linux 2.6.35

System Driver:

| | |
|--------------------|---|
| FEC Driver | Ethernet driver |
| USB OTG Driver | USB OTG Driver |
| USB Host Driver | USB Host driver code |
| UART Driver | Serial port driver code |
| Audio Driver | Audio codec driver |
| IPU Driver | IPU Driver code |
| VPU Driver | VPU Driver code |
| GPU Driver | GPU driver code |
| Camera Driver | Camera driver code |
| MMC/SD/SDIO Driver | MMC/SD/SDIO driver code |
| SPI Driver | SPI ROM driver code |
| TV driver | TVE driver code |
| I2C Driver | I2C Driver code |
| 1-Wire | 1-Wire driver code |
| PMIC Driver | Power management IC MC13892 Driver code |
| RTC Driver | RTC driver code |



| | |
|-------------|-----------------------|
| WDOG Driver | Watch dog driver code |
| PWM Driver | PWM driver code |

| Multimedia Supporting: | |
|-------------------------------|---|
| Video Decoder | <ul style="list-style-type: none"> ● MPEG4/Xvid: 1080p,30fps, AP/ASP profile, 40M bit rate ● H.264: HD1080p,30fps, BP/MP/HP profile, 40M bps bit rate ● H.263: HD1080p,30fps, P0/P3 profile, 40M bps bit rate ● VC-1/WMV9: HD1080p,30fps,SP/MP/AP profile, 40M bps bit rate ● MPEG-2: HD1080p,30fps, Main-high profile,40M bps bit rate ● Divx3/4/5/6 : HD1080p,30fps, HT/HD profile, 40M bps bit rate ● RV10: HD1080p,30fps, 8/9/10 profile, 40M bps bit rate ● MJPEG decode: 8Kx8K,baseline, 40M bps bit rate |
| Video Encoder | <ul style="list-style-type: none"> ● MPEG-4 encode: 720p,30fps, simple, 20M bps bit rate ● MPEG-2 encode: 720p,30fps, main-main, 20M bps bit rate ● H.263 encode: 720p, 30fps, P0/P3 profile, 20M bps bit rate ● H.264 encode: 720p, 30fps, baseline, 20M bps bit rate ● MJPEG encode: baseline mode |
| Image Decoding | BMP Decode, GIF Decode, JPEG Decode, PNG Decode, JPEG Encode |
| Audio Encoding | MP3/WMA/SBC |

※ **i.MX53 Linux EVK basic package**

- ① i.MX53 Linux EVK board, 1
- ② 7" LCD LVDS1024X600, 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.MX53 Linux EVK Document list**

- ① i.MX53 data sheet, 1
- ② EVK reference schematic (partial)
- ③ EVK hardware manual, 1
- ④ EVK Linux BSP user manual, 1
- ⑤ i.MX53 Linux guideline, 1