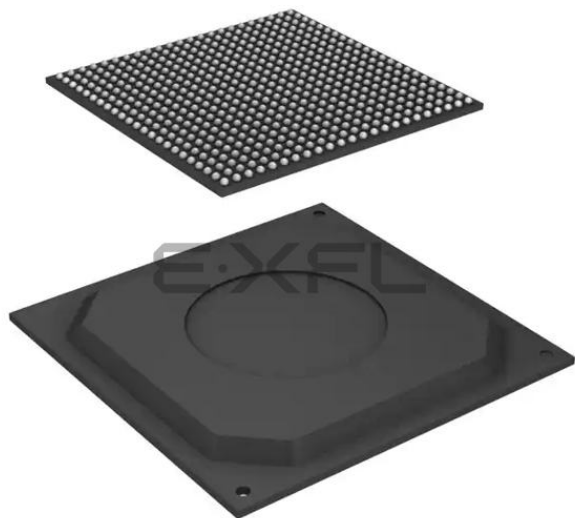




Welcome to [E-XFL.COM](#)

Understanding [Embedded - Microprocessors](#)

Embedded microprocessors are specialized computing chips designed to perform specific tasks within an embedded system. Unlike general-purpose microprocessors found in personal computers, embedded microprocessors are tailored for dedicated functions within larger systems, offering optimized performance, efficiency, and reliability. These microprocessors are integral to the operation of countless electronic devices, providing the computational power necessary for controlling processes, handling data, and managing communications.

Applications of [Embedded - Microprocessors](#)

Embedded microprocessors are utilized across a broad spectrum of applications, making them indispensable in

Details

Product Status	Active
Core Processor	ARM® Cortex®-A9, ARM® Cortex®-M4
Number of Cores/Bus Width	2 Core, 32-Bit
Speed	227MHz, 1GHz
Co-Processors/DSP	Multimedia; NEON™ MPE
RAM Controllers	LPDDR2, LVDDR3, DDR3
Graphics Acceleration	Yes
Display & Interface Controllers	Keypad, LCD, LVDS
Ethernet	10/100/1000Mbps (2)
SATA	-
USB	USB 2.0 + PHY (1), USB 2.0 OTG + PHY (2)
Voltage - I/O	1.8V, 2.5V, 2.8V, 3.15V
Operating Temperature	-20°C ~ 105°C (TJ)
Security Features	A-HAB, ARM TZ, CAAM, CSU, SNVS, System JTAG, TVDECODE
Package / Case	529-LFBGA
Supplier Device Package	529-MAPBGA (19x19)
Purchase URL	https://www.e-xfl.com/product-detail/nxp-semiconductors/mcimx6x4evm10ab

Your Interface to the World

i.MX families offer some of the most versatile platforms for multimedia and display applications, bringing personality and interactivity to a whole new world of products

i.MX Smart Devices



Giant Waterproof Tablet – i.MX53



Honeywell Lynx Touch security panel with the i.MX25



Icephone, Medical Phone with i.MX31



**Navico
Marine Navigation
i.MX51**



Maxtrack tablet for Brazilian Police with i.MX51



Avaak Vue Personal Video Network With the i.MX25



Invoxia
IP Phone - i.MX503



Gigaset DECT phone with i.MX233



Sophia systems' non-contact card Reader/Writer for DoCoMo with i.MX51



AMX 20.3" Modero X Series Panoramic Table Top Touch Panel with i.MX53



Televisie in België trams using MX51



**Line6
“Stagescape”
audio mixing
system with
i.MX51**



Self service touch screen terminal



i.MX233 based i'mWatch



Sharp e-Dictionary with i.MX28



Harris military communication equipment with i.MX27



Japanese Boarding Gate Pass Reader with i.MX27



i.MX 6 Series Overview

Scalable series of five ARM Cortex A9-based SoC families



i.MX 6SoloLite

- 1x 1GHz
- x32 400MHz DDR3
- No HW video accel.
- 2D graphics (2 GPUs)
- LCD, EPD



i.MX 6Solo

- 1x 1GHz
- x32 400MHz DDR3
- **HD1080p video**
- 2D+**3D** (2 GPUs), 53Mtri/s
- LCD, EPD



i.MX 6DualLite

- **2x** 1GHz
- **x64** 400MHz DDR3
- HD1080p video
- 2D+3D (2 GPUs),
53Mtri/s
- LCD, EPD



i.MX 6Dual

- 2x 1/**1.2GHz**
- x64 **533MHz** DDR3
- **Dual** HD1080p video
- 2D+3D (3 GPUs),
176 Mtri/s
- LCD



i.MX 6Quad

- **4x** 1/1.2GHz
- x64 533MHz DDR3
- Dual HD1080p video
- 2D+3D (3 GPUs),
176 Mtri/s
- LCD

Pin-to-pin Compatible

Software Compatible



Intelligent Integration of Multi-Media

i.MX 6Dual/6Quad VPU

- H.264 MVC1080p60 decode
- H.264 MVC 720p60 encode
- 350mW power consumption for single video!



Recording Video



Movie Content



Game Content

i.MX 6Dual/6Quad IPU

- Four Display support (2x MIPI-DSI, Parallel, HDMI v1.4a)
- Stereoscopic camera input
- Color adjustments and gamut mapping
- Gamma correction and contrast stretching
- Compensation for low-light conditions & backlight reduction



3D LCD



Publish



3D Television

i.MX 6Dual/6Quad Triple-Play Graphics

- 3 engines: 3D, OpenVG and BLT
- 200 MT/s, 4 shaders, 3 separate engines
- High quality 3D games optimized for mobile
- Augmented reality views (real world + 3D objects)
- Advanced 3D video formats (source/depth format)

i.MX 6Dual/6Quad– 2x/4x cores

- Create, transform, enhance, & publish multimedia fast!
- Intuitive User Interfaces for content viewing
- Scalability for 'the next big use case'

Why Dual or Quad Core?

Webkit Browser page rendering and scrolling

2D 'Fish Tank' (HTML5)

JPEG decode + encode
1024x768

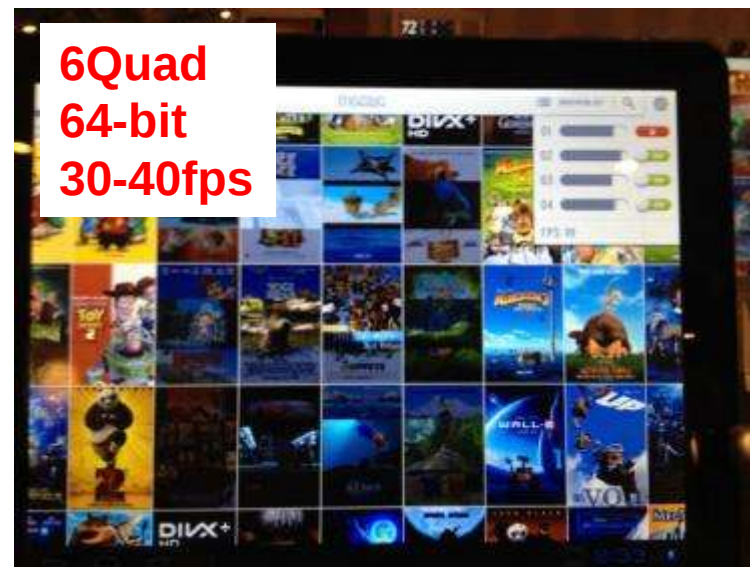
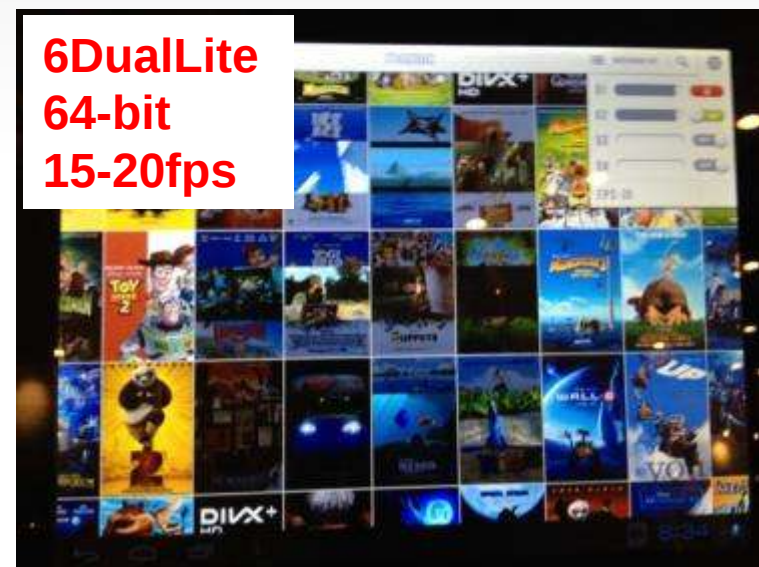
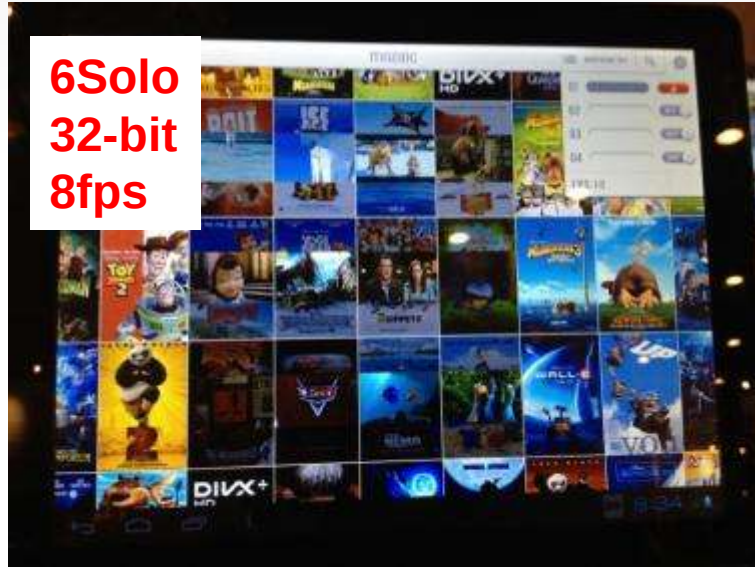
- All workloads implemented on CPU
- Does not use HW accelerators at all
- Done in order to test CPU capabilities

CPU Utilization
(1, 2 and 4 cores)

Android Honeycomb Application	1 Core	2 Core	4 Core	Quad speedup vs Dual Core
JPEG	.2 fps	~1fps	~4.5 fps	4x faster
Browser Scroll Time	289	36.25	15	>50% faster
Browser FPS	3.45	27.58	64.4	>2x higher
Fish Tank FPS	~14-20fps	~18-25fps	~22-30fps	~25% higher

Watch it live! <http://www.youtube.com/watch?v=JYFmBlk3itI#t=2m49s>

User Interfaces in Action – Dual Core + 64-bit matters



Browsing and Image Viewing

Webkit Browser page rendering and scrolling

JPEG decode +
encode
1024x768



- All workloads implemented on CPU
- Does not use HW accelerators at all
- Done in order to test CPU capabilities

App	1 Core	2 Core	Dual Core vs Single Core	4 Core	Quad Core vs Dual Core
JPEG	.2 fps	~1fps	5x faster	~4.5 fps	4x faster
Browser Scroll Time	289	36.25	>87% faster	15	>50% faster
Browser FPS	3.45	27.58	8x higher	64.4	>2x higher

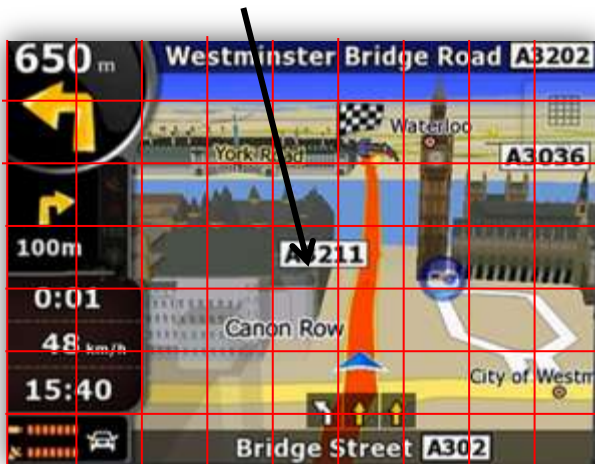
Watch it live!

[http://www.youtube.com/watch?v=JYFmBlk3itI#t=2m49s ...](http://www.youtube.com/watch?v=JYFmBlk3itI#t=2m49s)

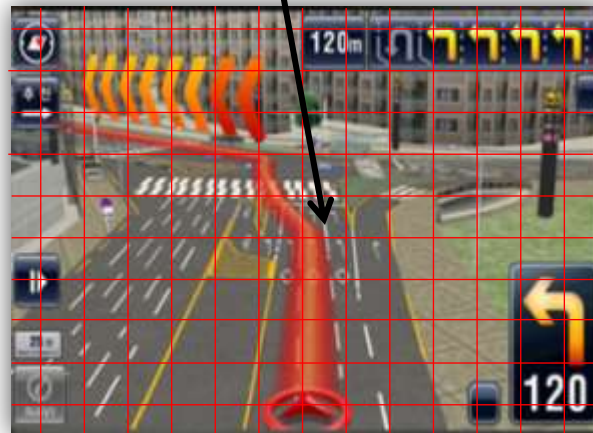
Tile Based Rendering (Chunkers)

- Size of scene buffer unknown before rendering
 - Possible overflow if scene requires more data than expected
- Good rendering method for baseline GUI/3D Apps with smaller object count (less details)
 - More bandwidth efficient than FMR in simple (yesterday) use cases
- For next generation dynamic scenes in new and future applications with lots of objects, details and post-processing effects, tile based Chunkers require multi-pass memory access to constantly process changing 3D/scene data
 - PC Level Applications (Performance, Quality, Effects) → Tablets → Smartphones → Infotainment

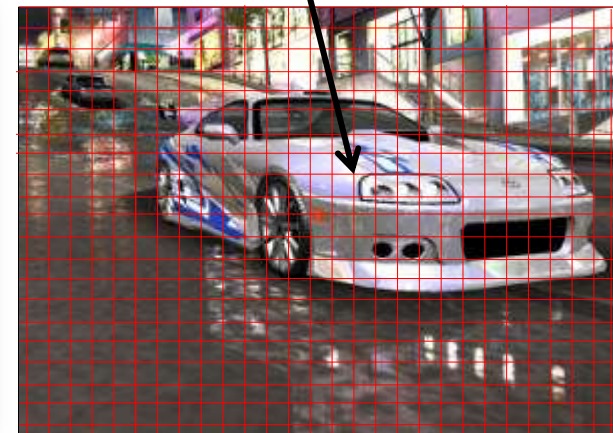
Tile



Tile



Tile (Complex Scene)



i.MX 6 Series VPU: *Multi-streams*

	Standard	Profile	Max # Streams			
			D1@ 30fps	720p@ 30fps	1080p@ 24fps	1080p@ 30fps
HW Decoder	H.264	BP/MP/HP	8	3	2	1
	On2 VP8	--	4	2	1	1 (iMX6Q/D, TBD) 1 (iMX6D/S)
	VC1	SP/MP/AP	8	3	2	1
	MPEG4	SP/ASP	8	3	2	1
	H.263	P0/P3	8	3	2	1
HW Encoder	H.264	BP	6	2	2 (TBD)	1
	MPEG4-SP/H.263	MPEG4-SP H.263-P0/P3	6	2	--	--

i.MX 6 Series VPU: *Transcoding & Full-duplex On-fly-transcoding*

Source Resolution (decoded stream)	Max # Streams @ 30fps Target Resolution (encoded stream)		
	SD (720x480)	HD720p (1280x720)	HD1080p (1920x1080)
SD	4	--	--
HD720p	2	2 (24fps, TBD))	--
HD1080p	1	1	1 (24fps) 1 (TBD for 30fps)

Full-duplex

	Standard	Profile	Performance	
Full-duplex HW Codec	H.264	BP	720p@30fps, 1080p@24fps	20Mbps
			1080p@30fps (TBD) Dual 720p@30fps (TBD) <i>(TBD, current VPU standalone testing shows 29fps for bitrate less than 5Mbps, but see room for encoder optimization)</i>	5Mbps
	MPEG4	Simple	720p@30fps	15Mbps
	H.263	P0/P3	720p@30fps	15Mbps

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i.MX 6 Series feature list (3/4)

Red indicates change from column to the left

	i.MX 6SoloLite	i.MX 6Solo	i.MX 6DualLite	i.MX 6Dual	i.MX 6Quad
Display Resolution (@60Hz)	WXGA (WXGA=1366x768)	2x WXGA	2x WXGA	2x 4XGA or 2x [1080p + WXGA] (4XGA=2048x1536)	2x 4XGA or 2x [1080p + WXGA]
Display Interfaces	2x Outputs • 1x Parallel • EPDC	2x Outputs • 2x Parallel • 2x LVDS • HDMI • MIPI-DSI • EPDC	2x Outputs • 2x Parallel • 2x LVDS • HDMI • MIPI-DSI • EPDC	4x Outputs • 2x Parallel • 2x LVDS • HDMI • MIPI-DSI	4x Outputs • 2x Parallel • 2x LVDS • HDMI • MIPI-DSI
GPU 3D	-	Vivante GC880 • 53Mtri/s • 266Mpxl/s • OpenGL ES 1.1/2.0/3.0	Vivante GC880 • 53Mtri/s • 266Mpxl/s • OpenGL ES 1.1/2.0/3.0	Vivante GC2000 • 176Mtri/s • 1000Mpxl/s • OpenGL ES 1.1/2.0/3.0 • OpenCL 1.1 EP	Vivante GC2000 • 176Mtri/s • 1000Mpxl/s • OpenGL ES 1.1/2.0/3.0 • OpenCL 1.1 EP
GPU 2D (Vector Graphics)	Vivante GC355 • 300Mpxl/s • OpenVG 1.1	via GPU 3D • OpenVG 1.1	via GPU 3D • OpenVG 1.1	Vivante GC355 • 300Mpxl/s • OpenVG 1.1	Vivante GC355 • 300Mpxl/s • OpenVG 1.1
GPU 2D (BLIT)	Vivante GC320 • 600Mpxl/s	Vivante GC320 • 600Mpxl/s	Vivante GC320 • 600Mpxl/s	Vivante GC320 • 600Mpxl/s	Vivante GC320 • 600Mpxl/s
Video Dec	SW Only	1080p30 + D1 MPEG-2, H.264 MVC, VC1, MPEG-4/Xvid, DivX 6, H.263, MJPEG, VP6 / WebM VP8	1080p30 + D1 MPEG-2, H.264 MVC, VC1, MPEG-4/Xvid, DivX 6, H.263, MJPEG, VP6 / WebM VP8	1080p60 + D1 2x 1080p30 MPEG-2, H.264 MVC, VC1, MPEG-4/Xvid, DivX 6, H.263, MJPEG, VP6 / WebM VP8	1080p60 + D1 2x 1080p30 MPEG-2, H.264 MVC, VC1, MPEG-4/Xvid, DivX 6, H.263, MJPEG, VP6 / WebM VP8
Video Enc	-	1080p30 2x 720p H.264, H.263, MPEG-4, MPEG-2, MJPEG	1080p30 2x 720p H.264, H.263, MPEG-4, MPEG-2, MJPEG	1080p30 2x 720p H.264, H.263, MPEG-4, MPEG-2, MJPEG	1080p30 2x 720p H.264, H.263, MPEG-4, MPEG-2, MJPEG

i.MX 6 Series feature list (4/4)

Red indicates change from column to the left

	i.MX 6SoloLite	i.MX 6Solo	i.MX 6DualLite	i.MX 6Dual	i.MX 6Quad
UART SPI I2C	5x UART, 4x SPI 4x I2C	4x SPI 5x UART 4x I2C	4x SPI 5x UART 4x I2C	5x SPI 5x UART 3x I2C	5x SPI 5x UART 3x I2C
ADC	-	-	-	-	-
Temp. Monitor	Yes	Yes	Yes	Yes	Yes
PMU	Partial PMU integration	Partial PMU integration	Partial PMU integration	Partial PMU integration	Partial PMU integration
Security	HAB, Secure RAM, Crypto Acc., TrustZone, NIST approved RNG	HAB, Secure RAM, Crypto Acc., TrustZone, NIST approved RNG	HAB, Secure RAM, Crypto Acc., TrustZone, NIST approved RNG	HAB, Secure RAM, Crypto Acc., TrustZone, NIST approved RNG	HAB, Secure RAM, Crypto Acc., TrustZone, NIST approved RNG
Commercial Qual.	Available	Available	Available	Available	Available
Automotive Qual. AEC-Q100	-	Available	Available	Available	Available
Industrial Qual.	-	Available	Available	Available	Available
Package	13x13 0.5P BGA	21x21 0.8P BGA Pin compatible with i.MX 6Dual/Quad		21x21 0.8P FCBGA Pin compatible with i.MX 6DualLite/Solo	

SABRE Platforms: Enabling Faster Time to Market

i.MX 6 series development tools are Freescale designed and Freescale supported

SABRE Platform for Smart Devices

- i.MX 6Quad/6DualLite 1 GHz ARM Cortex-A9
- Multiple connectivity options: Wi-Fi®, Bluetooth®, GPS, Ethernet, SD, parallel/serial interfaces, SATA (i.MX 6Quad only), PCIe and MIPI CSI
- SABRE Board plus:
 - 10.1" capacitive multi-touch display
 - Battery charging ICs
 - The SPI NOR Flash
 - MIPI display and MIPI camera connectors
 - 2x MIPI camera sensors
 - Digital microphones
 - Ambient light sensor, GPS
 - EPDC connector (i.MX 6DualLite only)



SABRE for Auto Infotainment

- Available to Tier 1 automotive OEMs
- i.MX 6Quad or i.MX6DualLite CPU card and i.MX 6 series base board
- Support for terrestrial and satellite radio tuners, Wi-Fi, Bluetooth, GPS, cellular modem, iAP authentication modules, MOST vehicle networking, cameras and displays
- Processor capability ranges from single ARM Cortex-A9 core at 800 MHz up to a quad core at up to 1 GHz



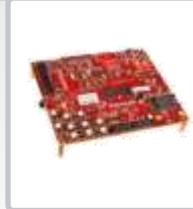
SABRE Board for Smart Devices

- i.MX 6Quad 1 GHz ARM Cortex-A9
- Intelligently designed with connectors on only two sides of board to eliminate 'octopus effect' on lab tables
- Evaluate the smartly integrated features of the i.MX 6Quad processor including an LVDS controller, USB PHYs, HDMI PHYs, SATA, PCI Express®, on-board power management and Ethernet



i.MX 6SoloLite Evaluation Kit

- i.MX 6SoloLite 1 GHz ARM Cortex-A9
- Integrated E Ink® display controller
- Enables EPD and/or LCD or HDMI display, touch control and audio playback, and the ability to add WLAN, a 3G modem or Bluetooth technology
- E Ink display available separately





Freescal Product Longevity Program

- The embedded market needs **long-term product support**
- Freescale has a longstanding track record of **providing long-term production support** for our products
- Freescale is pleased to introduce a **formal product longevity program** for the market segments we serve
 - For the automotive and medical segments, Freescale will make a broad range of program devices available for a minimum of **15 years**
 - For all other market segments in which Freescale participates, Freescale will make a broad range of devices available for a minimum of **10 years**
 - **Life cycles** begin at the time of launch
- A list of participating **Freescale products** is available at:
www.freescale.com/productlongevity



www.imxcommunity.org

A Freescale supported open web community of developers sharing common interest in transforming i.MX applications processors into practically anything imaginable.

Community Facts at a Glance

- Over 3,800 members and over 200 Freescale engineers and marketers interacting with you
- Support and enablement for i.MX processors and software
- Forums, Groups and Blogs Posts
- News, Photos and Videos
- Training, Events and Promotions

SABRE Board for Smart Devices (SDB)

i.MX 6Quad 1Ghz Cortex-A9 Processor

- Can be configured as i.MX 6Dual
- Freescale MMPF0100 PMIC
- 1 GB DDR3 memory (non terminated)
- 3" x 7" 8-layer PCB

Display connectors

- 2x LVDS connectors
- Connector for 24 bit 4.3" 800x480 WVGA with 4-wire touch screen
- HDMI Connector

Audio

- Wolfson Audio Codec
- Microphone and headphone jacks

Expansion Connector

- Camera CSI port signals
- I2C, SSI, SPI signals

Part Numbers:

MCIMX6Q-SDB (\$399)

Display (9.7"):

MCIMX-LVDS1 (\$499)

Display (4.3"):

MCIMX28LCD (\$199)



Connectivity

- 2x Full-size SD/MMC card slot
- 22-pin SATA connector
- 10/100/1000 Ethernet port
- 1x high-speed USB OTG port
- mPCI-e connector

Debug

- JTAG connector
- Serial to USB connector

Additional Features

- 3-axis Freescale accel
- eCompass
- Power supply
- No battery charger

OS Support

- Linux and Android IceCream Sandwich from Freescale;
- Others: support by 3rd parties

Tools Support

- Lauterbach, ARM (DS-5), Macraigor debug/IDE tool chain

SABRE Platform for Automotive Infotainment (AI)

CPU Card Details

- **Power and Memory**
- Freescale MMPF0100 PMIC
- 2 GB DDR3 memory (i.MX 6Dual/Quad)
- 1GB DDR3 memory (i.MX 6Solo)
- 32GB Parallel NOR Flash
- NAND Socket

Display

- LVDS connector
 - compatible with MCIMX-LVDS1
- Parallel RGB display interface
- HDMI output connector

Debug

- JTAG connector
- Debug UART connector

Connectivity and Expansion

- SD Card Slot
 - High Speed USB OTG
 - Ethernet
 - SATA
 - MIPI CSI
 - PCIe
 - MLB150 INIC connector
 - 281-pin MXM card edge connector for main board expansion
- 

Expansion Modules from 3rd party planned availability in Q4 2012

SABRE AI boards will only be supported at automotive customers

Part Numbers

Base Board: MCIMXABASEV1 (\$699)

CPU Cards: MCIMX6SAICPU1 (\$799)
MCIMX6QAICPU1 (\$799)

Display: MCIMX-LVDS1 (\$499)



Base Board Details

Can be reused from i.MX53 SABRE AI Connectivity and Expansion

- SD card slot (WiFi module or SD)
- Bluetooth or Bluetooth+WiFi header
- AM/FM tuner header
- Sirius XM Module header (de-pop'd)
- GPS (UART) module connector
- 2x CAN
- Dual High Speed USB Host connectors
- MLB 25/50 INIC connector
- SPI NOR flash

Display I/O

- LVDS connector
 - compatible with MCIMX-LVDS1
- Analog Video Input
- LVDS Input

Audio

- Cirrus multichannel audio codec
 - Up to 8 outputs
 - Dual microphone inputs
 - Stereo Line Level Input
- SPDIF receiver

OS Support

- Linux
- Others: future support by 3rd parties