



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	400-LFBGA
Supplier Device Package	400-MAPBGA (14x14)
Purchase URL	https://www.e-xfl.com/product-detail/nxp-semiconductors/mcimx6x3evk10ab

Email: info@E-XFL.COM

Address: Room A, 16/F, Full Win Commercial Centre, 573 Nathan Road, Mongkok, Hong Kong



## **Objectives**

- Learn about the Freescale i.MX 6 series of application processors' key features, capabilities, uses and market segment targets
- Learn about the Development Ecosystem available for the i.MX 6 Series family of processors
- Understand the power and performance advantages of the 6 Series family





## Six Generations of Application Processors

1995

2001

2003

2005

2009

2011

**Dragonball** 

1st FSL Apps Processor

i<sub>MX1</sub>

1st FSL ARM9 **Apps Processor**  i.MX2 Series

90nm LP **HW Video Accel Analog Integration**  i.MX3 Series

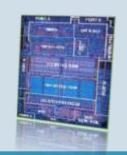
ARM11 **GPU Integration** 

i.MX5 Series 65nm LP/GP

ARM Cortex-A8 >1GHz

i.MX 6 Series

40nm LP ARM Cortex-A9 Multi-core family













50+ Products >150M Units

- Clear market leader for eReader apps processors (IDC)
- No. 1 in Apps Processors (IDC 12/2011)
- No. 2 in Auto Infotainment (Strategy Analytics)



## Freescale i.MX Applications Processors

i.MX 6Quad



High Performance Tablet



Media Box



Luxury Infotainment



Advanced HMI

Capability Performance/ Multimedia

**Technology Driver** 

Content Creation,

Differentiation Best Better, Good,

i.MX 6Dual i.MX 6DualLite

i.MX53



Color eReader



Business Tablet



Mainstream Infotainment



Medical

i.MX 6Solo i.MX 6SoloLite

i.MX28, i.MX233, i.MX25, i.MX35, i.MX50



Monochrome eReader



Single Function Tablet



Connected Radio



Smart Energy Meter

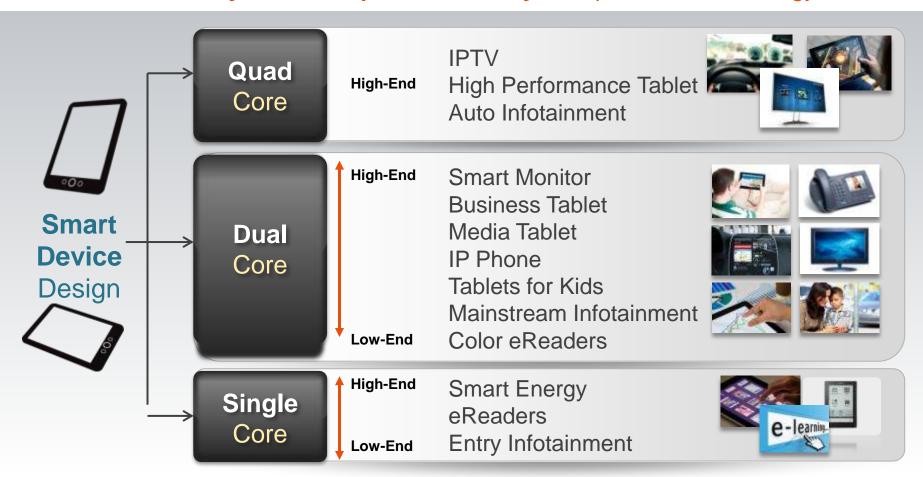




## i.MX 6: One Platform, Differentiated Products

Saves development costs and improves time to market.

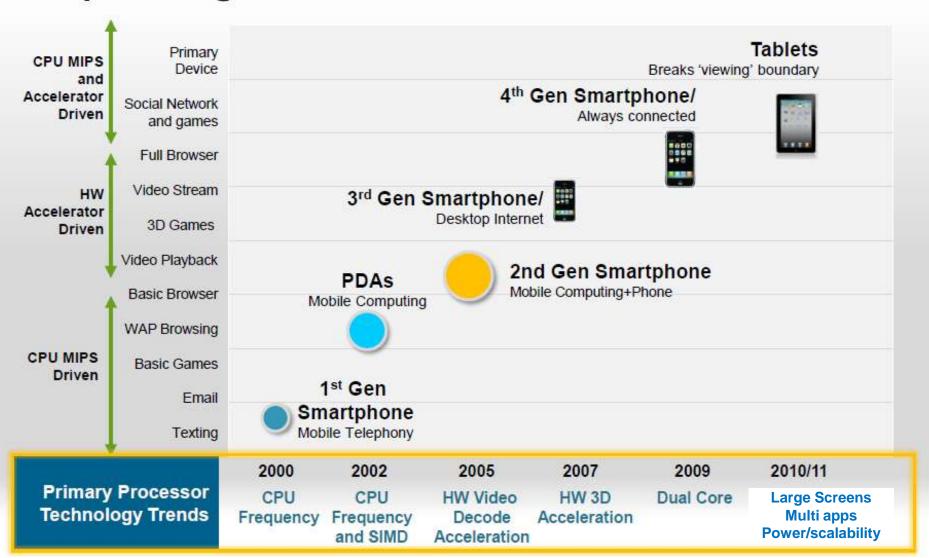
Scalability with multiple cores is key to implement this strategy.







## Optimizing the Processor Platform







## **Android Support Quad Core**

# The Good News: Heavy Lifting Already Done

The work required to go from 1 to 2 cores was much greater than to go from 2 to 4 (or more) cores... Android 3.0 (Honeycomb) natively supported Quad core out of the box in June 2011

If you have 4 threads and 4 cores, Android will schedule a thread per core









## Vivante GC2000 Ultra-threaded GPU







## **Browsing and Image Viewing**



 All workloads implemented on CPU

- Does not use HW accelerators at all
- Done in order to test CPU capabilities

Арр	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=JYFmBlk3itl#t=2m49s ...





## Tile Based Rendering (Chunkers)

- Size of scene buffer <u>unknown</u> 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 <u>dynamic</u> scenes in new and future applications with lots of objects, details and post-processing effects, tile based Chunkers require multipass memory access to constantly process changing 3D/scene data
  - PC Level Applications (Performance, Quality, Effects) → Tablets → Smartphones → Infotainment

# Westminster Bridge Road A3202 Waterloo York R 100m A211 Canon Row Gity of Westm Bridge Street A302



## Tile (Complex Scene)





## Freescale i.MX 6 series Development Systems

## SABRE Board for Smart Devices



P/N: MCIMX6Q-SDB

- Cost-effective (\$399), open source development platform
- Designed to simplify product evaluation

## SABRE Platform for Smart Devices



P/N: MCIMX6Q-SDP MCIMX6DL-SDP

- Smart Device Marketfocused
- Form-factor ready to accelerate design & time to market (\$999)

## SABRE Platform for Automotive Infotainment



P/N: MCIMXABASEV1
MCIMX6SAICPU1
MCIMX6QAICPU1

- Automotive Market-focused
- Standard base board (\$699) and adaptable CPU card (\$799) system







# ....IX 6 Quad SABRE Lite Board (TO1.0 Silicon)

## http://boundarydevices.com/products/sabre-lite-imx6-sbc/

#### **Low Cost Community Board**



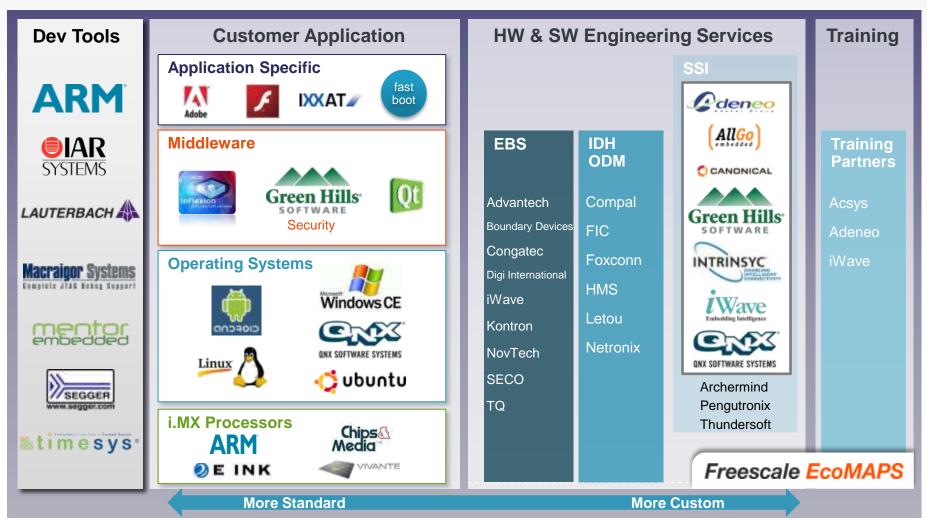
- 1GByte of 64-bit wide DDR3 @ 532MHz
- Three display ports (24-bit RGB, LVDS, HDMI)
- Two camera ports (1xParallel, 1xMIP!)
- Serial ATA (SATA)
- Dual SDHC card slots (1 std, 1 micro)
- PCI express port
- Analog (headphone/mic) and Digital (HDMI) audio
- Compact size (3½"x3½")
- 10/100/1G Ethernet
- 10-pin JTAG interface
- 3 High speed USB ports (2xHost, 1xOTG)
- CAN port
- UART debug port
- I2C
- Purchase directly from Boundary Devices
  - PO, Credit Card or PayPal placed directly with Boundary Devices
  - Schematics and user manual available on Boundary website
- Additional supply partners available in Q3

SABRE-Lite will not be stocked, sold, or supported by Freescale All support from Boundary Devices, partners or IMXCommunity.org





## Freescale EcoMAPS for i.MX Architectures



**IDE:** Integrated Development Environment **BDM:** Background Debug Module

**EBS**: Embedded Board Solutions

IDH: Independent Design House
ODM Original Design Manufacturer

SSI: Software & Solution Integrators







- 802.11a/b/g/n low power SDIO cad based on Qualcomm Atheros AR6003
- Wi-Fi driver software integrated with Freescale i.MX 6 platform
- Family of hardware solutions available
  - System-in-Package (SiP)
  - Radio Module
  - SD Card Form Factor





# Freescale 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









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





# **Backup**



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## 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



Display (9.7"): MCIMX-LVDS1 (\$499) Display (4.3"): MCIMX28LCD (\$199)



#### **Tools Support**

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

#### **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 3<sup>rd</sup> parties





# 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
- PCle
- 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

# \*\* freescale ™

#### **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 3<sup>rd</sup> parties

# NXP

## **Linux Roadmap**

