Leverage the i.MX 6 Series Applications Processors for Automotive Applications

APF-ACC-T1551

JULY.2015

freescale™

External Use

A *Global Leader* in
Microcontrollers and Digital Networking Processors

>50 Year Legacy

>5,500 Engineers

>6,000 Patent Families

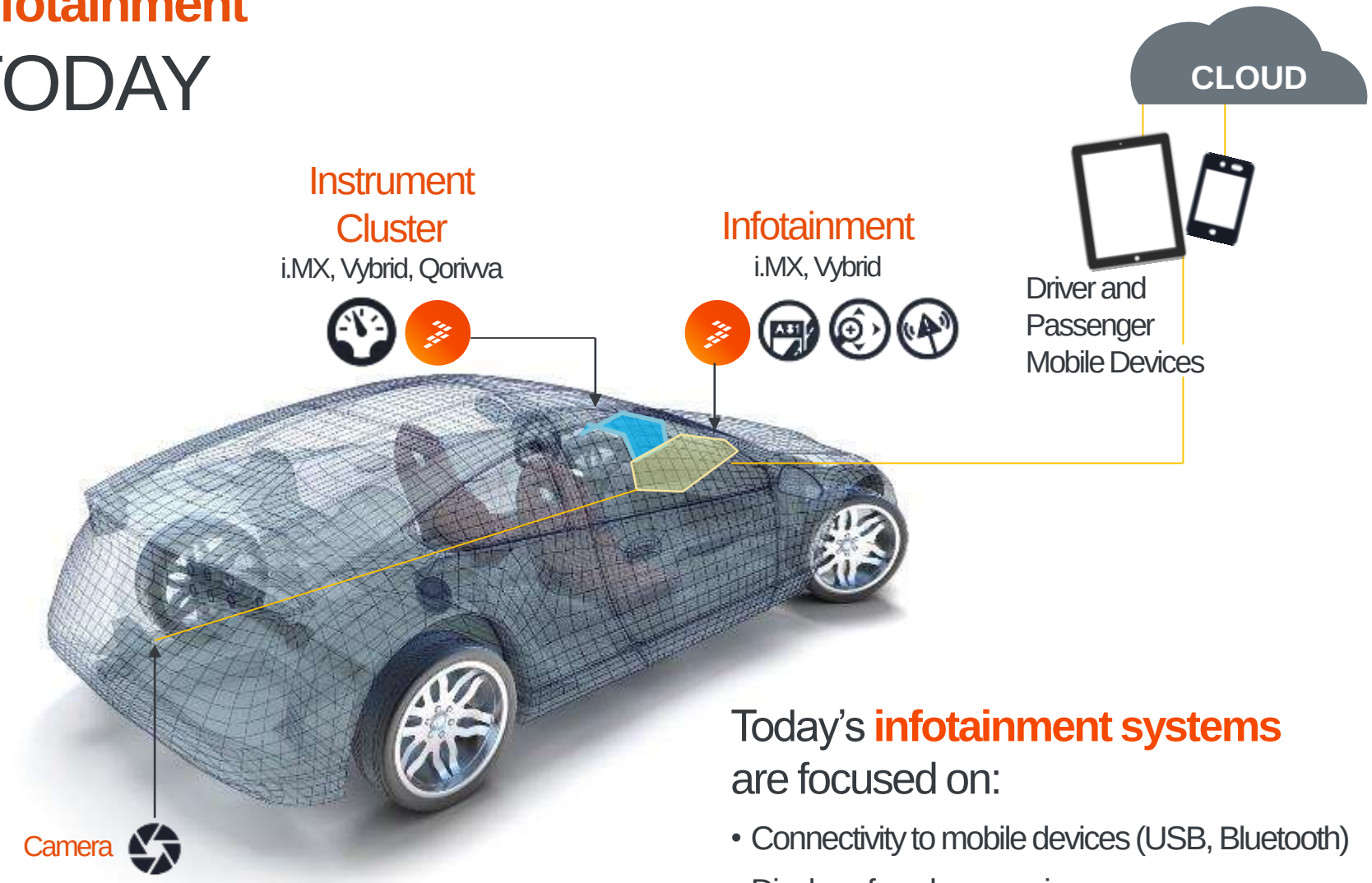
Five Core Product Groups

- Microcontrollers
- Digital Networking
- Automotive MCU
- Analog & Sensors
- RF

Four Primary Markets

- Automotive
- Networking
- Industrial
- Consumer

Infotainment
TODAY

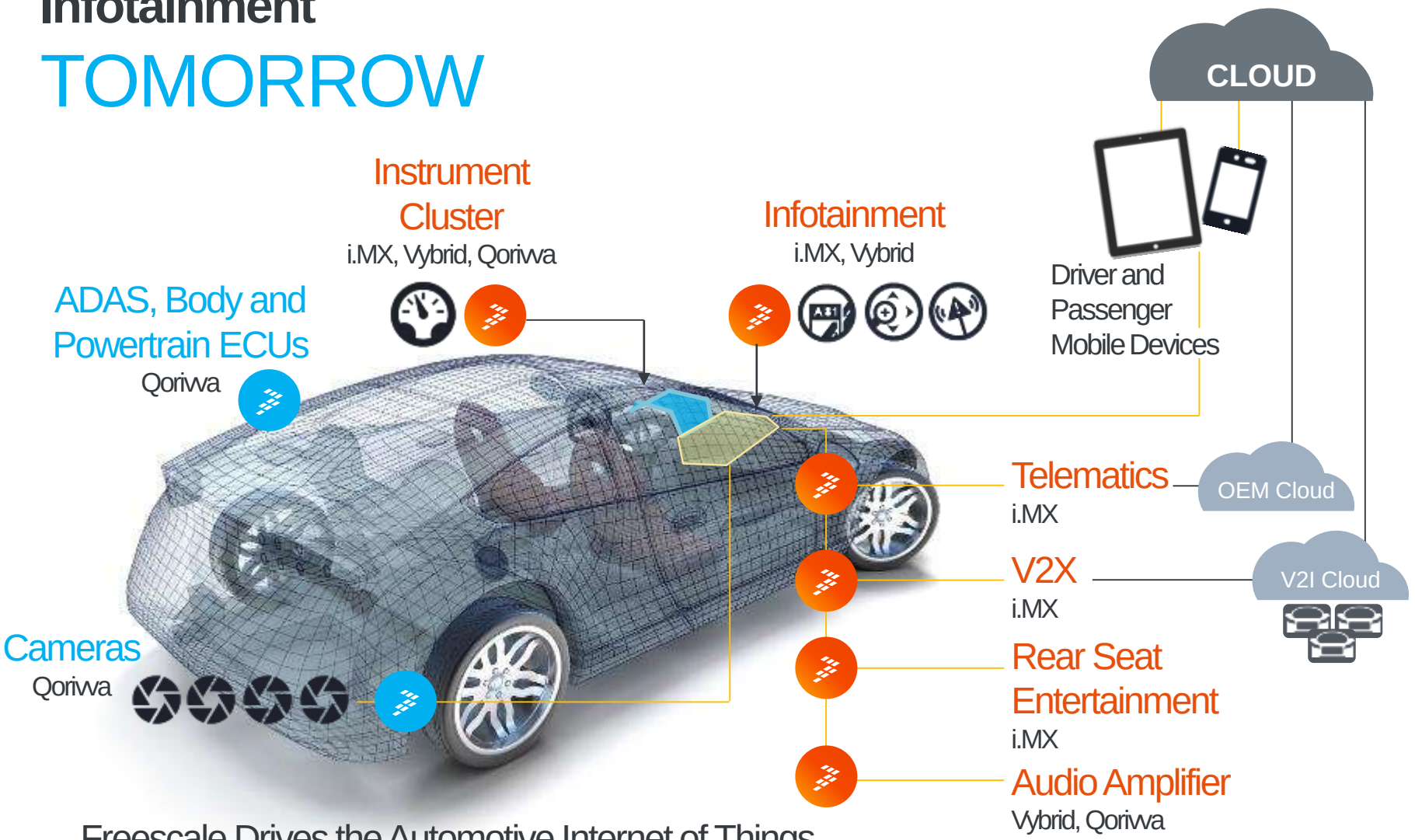


Today's **infotainment systems** are focused on:

- Connectivity to mobile devices (USB, Bluetooth)
- Display of analog rear view camera
- Sharing HMI information with the instrument cluster

Infotainment

TOMORROW

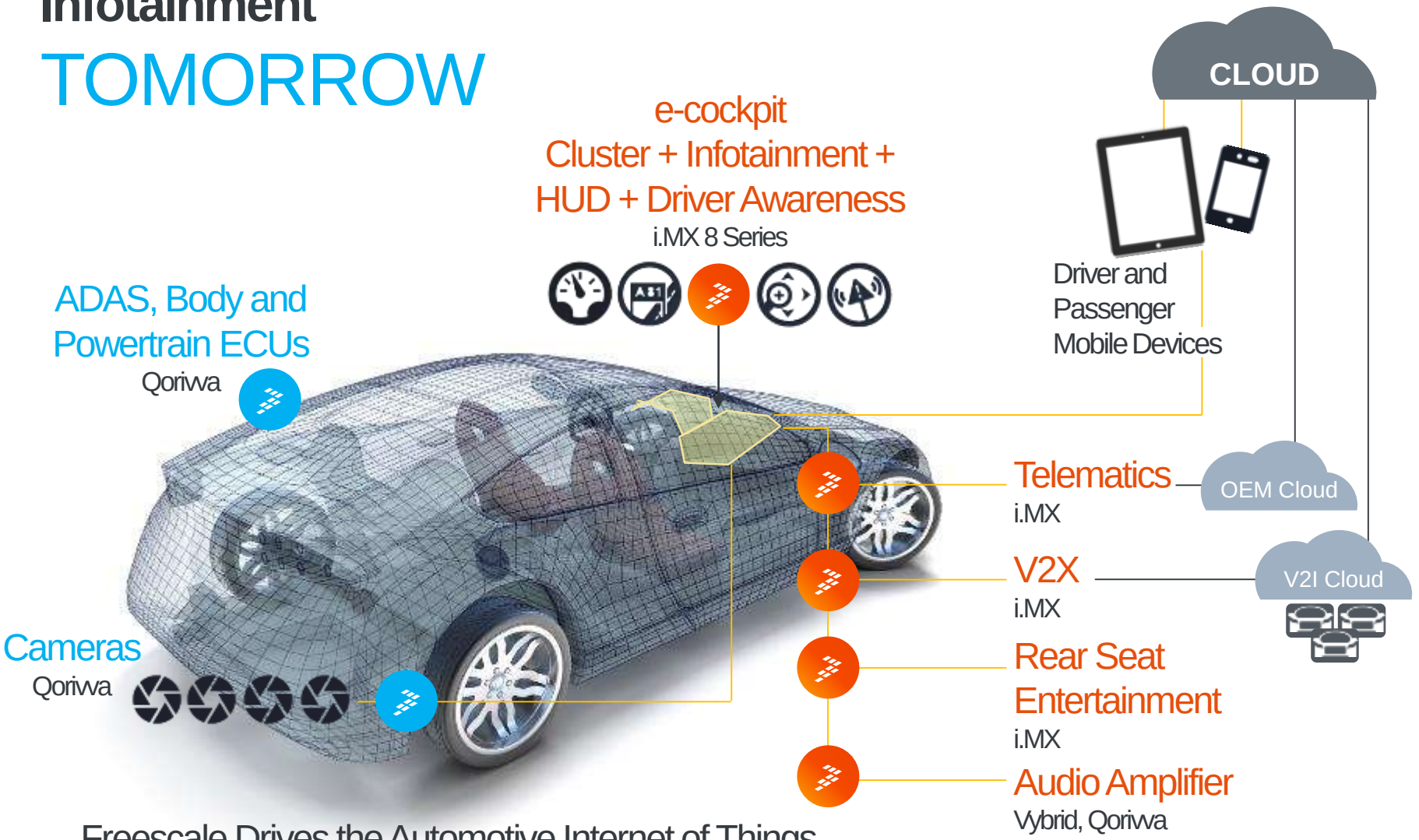


Freescale Drives the Automotive Internet of Things
Connecting Your Car to Your World

Infrastructure — Home — Big Data — Smart Grid — Transportation Network

Infotainment

TOMORROW



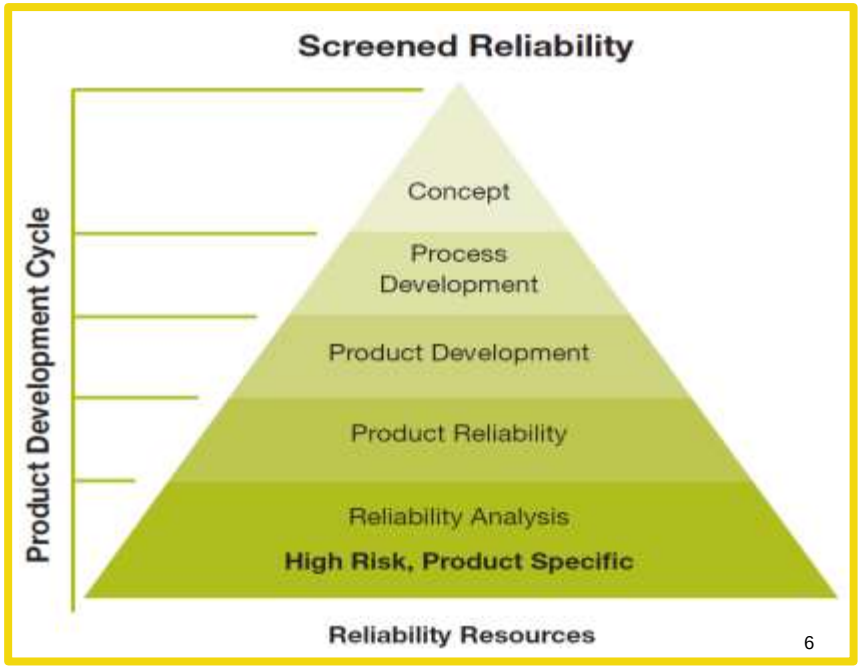
Freescale Drives the Automotive Internet of Things
Connecting Your Car to Your World

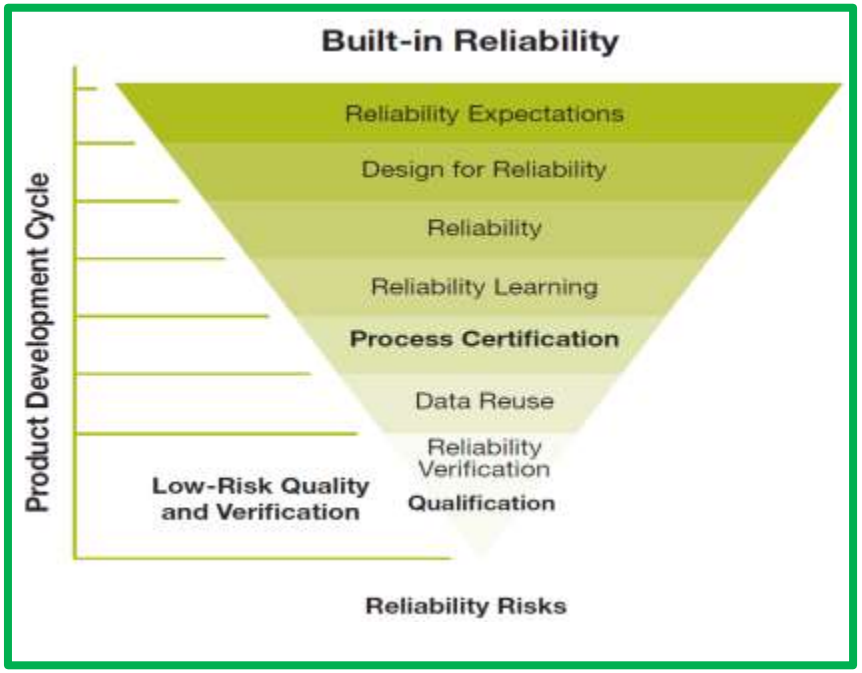
Infrastructure — Home — Big Data — Smart Grid — Transportation Network

Freescale's Product Longevity Program

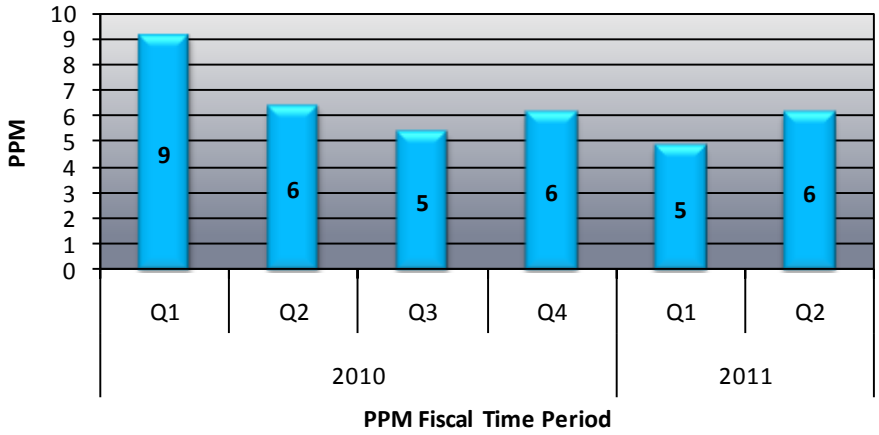
- The automotive market requires **long-term product support**
- Freescale has a longstanding track record of **providing long-term production support** for our products
- Freescale is pleased to introduce a **formal product longevity program** for the market segments we serve
  - For the automotive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

Freescale Quality Commitment





MAD Product Quality - PPM



i.MX Automotive Products

All i.MX Automotive Products

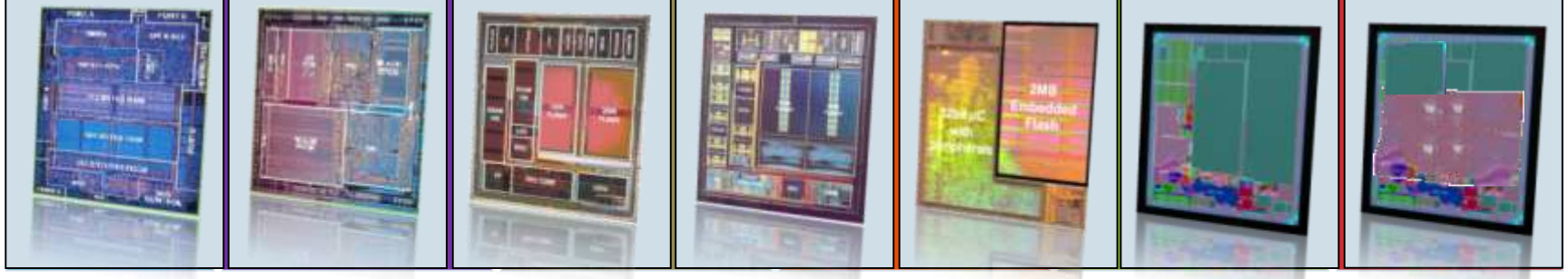
- Qualified to the AEC-Q100 Grade 3 specification
- PPAP's are available
- Automotive-specific datasheets are available
- Products promoted for automotive applications
  - i.MX25, i.MX28 (ARM926EJ-S CPU)
  - i.MX35 (ARM1136JF-S CPU)
  - i.MX53 (ARM Cortex-A8 CPU)
  - i.MX 6x (ARM Cortex-A9 CPUs)
- All Automotive products are rated "Quality Managed" for ASIL level
  - i.MX Automotive products have been used in higher level ASIL solutions where the customer assumes the responsibility for the system level ASIL rating about Quality Managed

  *More information see:
  http://www.aecouncil.com/AECDocuments.html

i.MX Applications Processors

Seven Generations of Application Processors

1995	2001	2003	2005	2009	2012	2014
Dragonball 1st FSL Apps Processor	**i.MX1** 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	**i.MX 7 Series** 28nmLP ARM Cortex-A7 Multi-core family



50+ Products
>200M Units

- **No.1** for eReader apps processors (IDC)
- **No. 2** in Auto Infotainment (Strategy Analytics)
- Freescale ARM SOC **Momentum**:
  - ARM based products (Kinetis, i.MX) >50% y/y
  - Strong growth in Auto Infotainment (i.MX > 50% y/y)
  - Industrial & consumer MCU's double-digit growth y/y
  - i.MX double-digit growth in all regions

i.MX: One Platform, Differentiated Products

- Provide customers and partners with the **broadest range** of choices
- Reduce **development costs** and **improve** time to market
- **Performance scalability** is key to implement this strategy

i.MX Application Processors Core Values

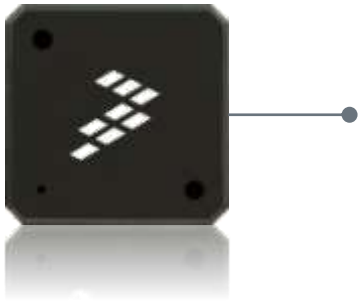
- **Scalability**
  - CPU (single/dual/quad, asymmetric), GPU, IO
  - Software: Linux, Android, QNX, Windows Embedded, RTOS
  - Industry Leading Ecosystem and Partnerships
- **Integration**
  - Automotive/Industrial/Consumer peripheral sets
  - Packaging to Meet Market Requirements
  - Qualifications: AEC-Q100, JEDEC Industrial and Consumer
- **Trust**
  - Longevity: Minimum of 10-15 years in all markets
  - Consistency of Supply, Accessibility
  - Quality, Robustness, Zero-defect methodology
  - Security and Safety
- **Ease of Adoption**
  - Communities, Innovation, Support
  - Design Collateral, Distribution
  - System Solutions: SoC, Sensors, PMIC, IoT Comms, SBC

i.MX 6 Series Automotive Momentum

8 of top 10 Automotive OEMs
Infotainment Systems

6 Top Luxury Brands
Reconfigurable LCD Instrument Clusters

Rapid Expansion
Into Other Applications Such as Telematics and Driver Awareness



i.MX 6 Quad
i.MX 6 Dual
i.MX 6 DualLite
i.MX 6 Solo

Autoliv · ALPINE · BOSCH · Continental · DENSO · DELPHI · FOXCONN · HARMAN · Johnson Controls · LG · MAGNETI MARELLI · NSI INTERNATIONAL, LTD · Pioneer · TechniSat · Visteon · YAZAKI

i.MX Automotive Customers

- Freescale has solid, long-standing customer relationships with nearly every automotive manufacturer and Tier 1 supplier in the world. We know what it takes to meet the stringent requirements of the global automotive market
- Freescale has dedicated account teams for most car OEM's including BMW, GM, Ford, Chrysler, Daimler, VW/Audi, Fiat, Renault, PSA, Volvo, and Hyundai Kia
- ***Over 20M i.MX Automotive units shipped to date***

Automotive Systems Powered by i.MX Applications Processors

i.MX Overview: Enablement

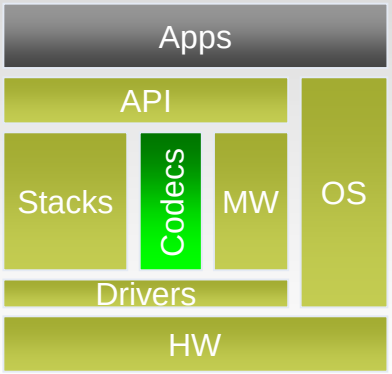
Hardware Platform

PDKs, EVKs, SABRE, Quick Start Board

- Ease of Use – BSP and demo images, development environment build demonstration, video tutorials, schematic and layout, documentation
- Ranging from $149 development board to $999 full reference platform.

Full Hardware evaluation and Development Platforms

+ Software



- Full-featured, scalable, optimized and proven OS – Linux, Windows, Android
- Software codecs for video, audio, graphics and communications.
- Product-worthy software for reference platforms and product development

Complete software package to streamline software development

+ Ecosystem

- Tool chains
- Software – RTOS, OS, codecs, middleware/applications
- Hardware – embedded board solutions
- Design services
- System integrators
- Training

Technology alliances for building smarter, better

www.imxcommunity.org

Key **i.MX Partners** for Innovation Areas in Automotive Infotainment

OS Virtualization & Security

- Green Hills Software
- mentor embedded
- Open Kernel Labs — Be open. Be safe.
- OPENSYNERGY
- QNX
- Red Bend Software
- WIND RIVER

Graphics & HMI Development Toolkits

- EB
- Qt
- RIGHTWARE
- altia
- SoftKinetic

Supported Technologies

- HTML 5
- OpenGL ES
- WebGL
- OpenCL
- OpenVG

i.MX 6 Series Platform Support

i.MX 6 Solo **i.MX 6**DualLite **i.MX 6**Dual **i.MX 6**Quad

GENIVI

QNX CAR Application Platform

ANDROID

i.MX 6 Applications Processors

i.MX 6 Series: Supreme Scalability and Flexibility

Leverage One Design Into Diverse Product Portfolio

Seven

Scalable series of **SIX** ARM Cortex-A9-based SoC Families

i.MX **6**UltraLite Family

i.MX **6**SoloLite Family

i.MX **6**SoloX Family

i.MX **6**Solo Family

i.MX **6**DualLite Family

i.MX **6**Dual Family

i.MX **6**Quad Family

Pin-to-pin Compatible

Software Compatible

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i.MX 6 Series At a Glance

Scalable series of six ARM Cortex A9-based SoC families

i.MX 6SoloLite

- ARM® Cortex™-A9 at 1GHz
- 256KB L2 cache
- 32-bit DDR3 and LPDDR2 at 400MHz
- eMMC
- 2D graphics
- Display: RGB, E-Ink
- Camera: RGB
- 10/100 Ethernet

i.MX 6SoloX

- ARM Cortex-A9 up to 1GHz
- **ARM Cortex-M4 at 200MHz**
- 256KB L2 cache
- 32-bit DDR3 and LPDDR2 at 400MHz
- eMMC, **QSPI, NOR, NAND**
- 2D and **3D** graphics
- Display: RGB**, LVDS**
- Camera: RGB**, Analog**
- **Dual Gigabit Ethernet**
- **PCIe (x1 lane)**

i.MX 6Solo

- ARM Cortex-A9 up to 1GHz
- **512KB** L2 cache
- 32-bit DDR3 and LPDDR2 at 400MHz
- eMMC, NOR, NAND
- 2D graphics
- **3D graphics with 1 shader**
- Display: RGB, LVDS, **E-Ink, MIPI, HDMI**
- **1080p30 video**
- Camera: Parallel**, MIPI**
- Gigabit Ethernet
- PCIe (x1 lane)

i.MX 6DualLite

- **Dual** ARM Cortex-A9 up to 1GHz
- 512KB L2 cache
- **64-bit** DDR3 and dual-channel 32-bit LPDDR2 at 400MHz
- eMMC, NOR, NAND
- 2D graphics
- 3D graphics with 1 shader
- 1080p30 video
- Display: RGB, LVDS, E-Ink, MIPI, HDMI
- Camera: Parallel, MIPI
- Gigabit Ethernet
- PCIe (x1 lane)

i.MX 6Dual i.MX 6DualPlus

- Dual ARM Cortex-A9 up to **1.2GHz**
- **1 MB** L2 cache
- 64-bit DDR3 and 2-channel 32-bit LPDDR2 at **533MHz**
- eMMC, NOR, NAND
- 3D graphics with **4 shaders**
- **Two** 2D GFX engines
- **1080p60 video**
- Display: RGB, LVDS, MIPI, HDMI
- Camera: Parallel, MIPI
- PCIe (x1 lane)
- Gigabit Ethernet
- **SATA-II**

i.MX 6Quad i.MX 6QuadPlus

- **Quad** ARM Cortex-A9 up to 1.2GHz
- 1 MB L2 cache
- 64-bit DDR3 and 2-channel 32-bit LPDDR2 at 533MHz
- eMMC, NOR, NAND
- 3D graphics with 4 shaders
- Two 2D GFX engines
- 1080p60 video
- Display: RGB, LVDS, MIPI, HDMI
- Camera: Parallel, MIPI
- PCIe (x1 lane)
- Gigabit Ethernet
- SATA-II

Pin-to-pin and Power Compatible (*except PoP)

Software Compatible

- ARM Cortex-A9 based solutions ranging up to 1.2GHz
- HD 1080p encode and decode (except 6SoloLite/6SoloX), 3D video playback in high definition (except 6SoloLite/6SoloX)
- Integrated IO's may include HDMI v1.4, MIPI and LVDS, display ports, MIPI camera, Gigabit Ethernet, multiple USB 2.0, SATA and PCI-Express
- SW support: Google Android™, Linux®, QNX (3rd party), Windows® Embedded CE (3rd party)

i.MX 6Quad/6Dual Applications Processor

Specifications:

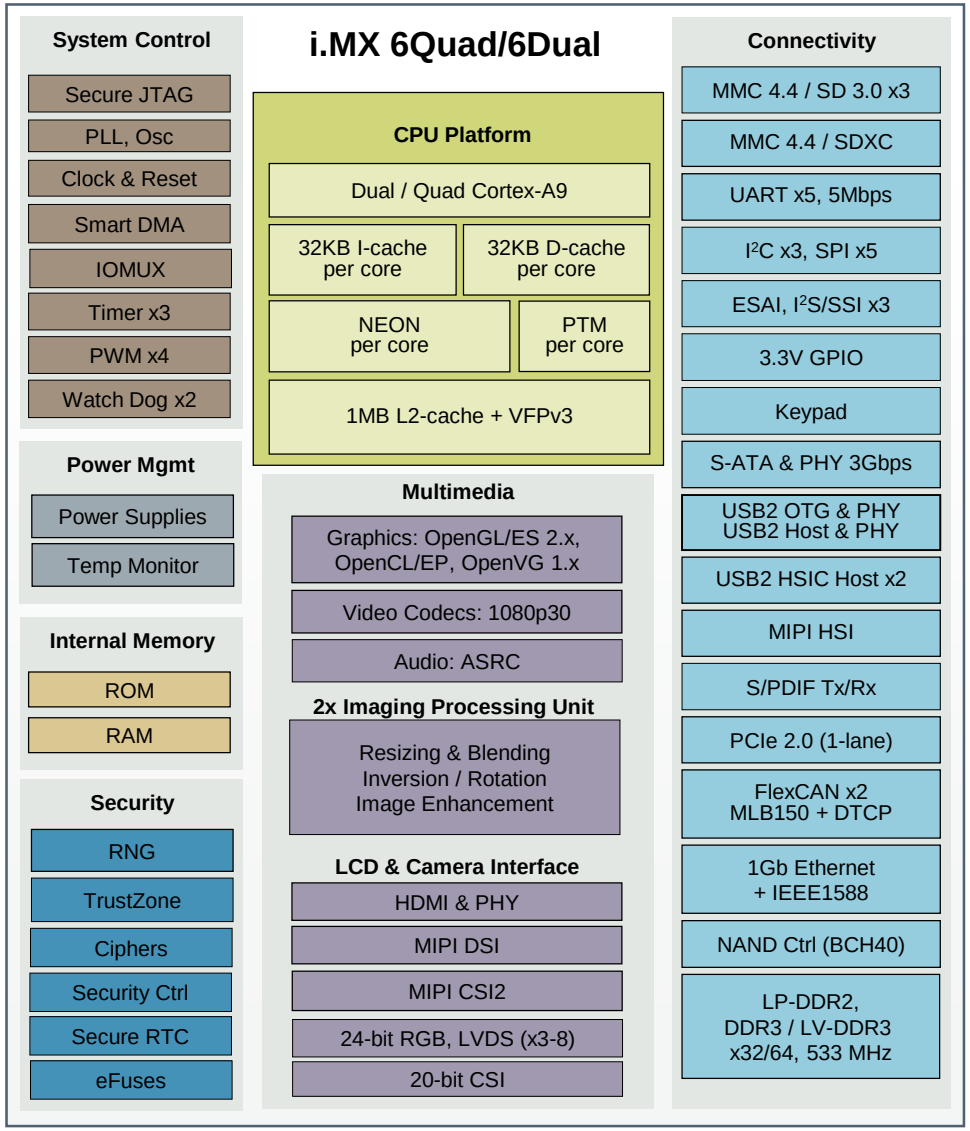
- **CPU**: i.MX6Quad: 4x Cortex-A9 @ 850MHz/1GHz/1.2GHz
  i.MX6Dual: 2x Cortex-A9 @ 850MHz/1GHz/1.2GHz
- **Process**: 40nm
- **Package**: 21x21 0.8mm Flip-chip BGA
- **Temp Range (Tj):** Up to -40 to 125C, AEC-Q100 Grade 3
- **Qual Tiers**: Commercial, Automotive, Industrial
- **Pin compatible with i.MX 6DualLite and i.MX 6Solo**
- **Up to 10000 / 5000 DMIPS**

Key Features and Advantages:

- Multi-core architecture for high performance, 1MB L2 cache
- 64-bit LP-DDR2, DDR3 and raw / managed NAND
- S-ATA 3Gbps interface (SSD / HDD)
- Delivers rich graphics and UI in HW
  - OpenGL/ES 2.x 3D accelerator with OpenCL EP support and OpenVG 1.1 acceleration
  - Drives high resolution video in HW
  - Multi-format HD1080 video decode and encode
  - High quality video processing (resizing, de-interlacing, etc.)
- Flexible display support
  - Four simultaneous: 2x Parallel, 2x LVDS, MIPI-DSI, or HDMI
  - Dual display up to WUXGA (1920x1200) and HD1080
- MIPI-CSI2 and HSI
- Increased analog integration for simplified power supplies
- Temperature monitor for smart performance control
- Expansion port support via PCIe 2.0
- Car network: 2xCAN, MLB25/50/150 with DTCP, 1Gb Ethernet with IEEE1588 time stamping hardware

Availability

- **Samples:** Now
- **Production**: Q4 2012



Blue indicates feature advantage

When to Choose i.MX 6SoloX vs. i.MX 6Solo/6SoloLite
Key Differences

Feature	i.MX 6SoloLite	i.MX 6SoloX	i.MX 6Solo
CPU1	1GHz Cortex-A9 (2400 DMIPS)	800MHz -1GHz Cortex-A9 (2400 DMIPS)	800MH-1GHz Cortex-A9 (2400 DMIPS)
CPU2	-	**166MHz-200MHz Cortex-M4 (208 DMIPS)**	-
On-chip memory	256KB L2 + **256KB SRAM**	256KB L2 + 128KB SRAM	**512KB L2** + 128KB SRAM
Serial Flash I/F	SPI	**Dual DDR QuadSPI**	SPI
Raw NAND Flash I/F	-	**8-bit NAND BCH60**	**8-bit NAND BCH40**
DRAM interface	32-bit LPDDR2/DDR3 @400MHz	32-bit LPDDR2/DDR3 @400MHz	32-bit LPDDR2/DDR3 @400MHz
Ethernet	1x 10/100	**2x Gb AVB**	1x Gb + 1588
PCIe	-	**1x PCIe 2.0 (x1 lane)** *n/a on all packages	**1x PCIe 2.0 (x1 lane)**
USB	1x USB OTG HS w/PHY 1x USB Host HS w/PHY 1x HSIC	1x USB OTG HS w/PHY 1x USB Host HS w/PHY 1x HSIC	1x USB OTG HS w/PHY 1x USB Host HS w/PHY **2x HSIC**
UART, SPI, I2C	5, 4, 4	**6**, 4, 4	5, 4, 4
SD/MMC interface	3x SD/MMC, 1x SDXC	3x SD/MMC, 1x SDXC	3x SD/MMC, 1x SDXC
12-bit ADC	-	**2x 12-bit SAR** *n/a on all packages	-
Camera Input	16-bit parallel	**20-bit parallel** *n/a on all packages **4x Composite** *n/a on all packages	20-bit parallel **1x MIPI CSI**
GPU 2D	**GC320 Composition (600Mpxl/s)** *n/a on all devices	via GPU 3D (300Mpxl/s) *n/a on all devices	**GC320 Composition (600Mpxl/s)** *n/a on all devices
GPU 3D	-	**GC400T Open GLES 2.0** *n/a on all devices **27M Tri/s, 133 Mpxl/s**	**GC880 Open GLES 2.0** *n/a on all devices **53M Tri/s, 266 Mpxl/s**
Video Decode	via Software	via Software	**1080p30 + D1**
Display interface	1x 24-bit RGB up to WXGA 1x EPDC	1x 24-bit RGB up to WXGA 1x LVDS *n/a on all packages	**2x 24-bit RGB up to WXGA** **1x LVDS, HDMI, MIPI DSI, EPDC**
Package	13x13, 0.5P	17 x17, 0.8P or 19x19, 0.8P	21 x 21, 0.8P
Qual. Tiers	Commercial	Commercial, Industrial, Automotive	Commercial, Industrial, Automotive
Availability	Now	Sampling – now (alpha) Production – 4Q14	Now

i.MX 6SoloX Devices, Major Differences

Pin compatibility within package type
No pin compatibility across packages
VO = pin compatible options
VN = pin compatible options
VK = pin compatible options

	Consumer Devices					Industrial Devices					Automotive Devices	
Tj	-20C to 105C					-40C to +105C					-40C to +125C	
Cortex-A9	1GHz					800MHz					800MHz	
Cortex-M4	200MHz					166MHz					166MHz	
Other Features	2x GbE, CAN Parallel LCD					2x GbE, CAN Parallel LCD					2x GbE, CAN, MLB Parallel LCD	
	6X1	**6X3**	**6X2**	**6X3**	**6X4**	**6X1**	**6X3**	**6X2**	**6X3**	**6X4**	**6X1**	**6X4**
GPU	N	Y	N	Y	Y	N	Y	N	Y	Y	N	Y
	Pin Compatible		Pin Compatible			Pin Compatible		Pin Compatible				
Package	17x17 VO 0.8mm pitch 400-ball OR 14x14 VK 0.65mm pitch 400-ball		17x17 VN 0.8mm pitch 400-ball		19x19 VM 0.8mm pitch 529-ball	17x17 VO 0.8mm pitch 400-ball		17x17 VN 0.8mm pitch 400-ball		19x19 VM 0.8mm pitch 529-ball	17x17 VO 0.8mm pitch 400-ball	19x19 VM 0.8mm pitch 529-ball
PCIe	n/a		Y		Y	n/a		Y		Y	n/a	Y
LVDS	n/a		n/a		Y	n/a		n/a		Y	n/a	Y
Parallel CSI	8-bit via RGMII2		8-bit via RGMII2		20-bit	8-bit via RGMII2		8-bit via RGMII2		20-bit	8-bit via RGMII2	20-bit
SDIO	3		3		4	3		3		4	3	4
Analog Camera	n/a		n/a		Y	n/a		n/a		Y	n/a	Y
12-bit ADC	Y		n/a		Y	Y		n/a		Y	Y	Y

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

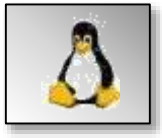
P/N: MCIMX6Q-SDP
MCIMX6DL-SDP

- Smart Device Market-focused
- 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



i.MX 6 Series feature list (1/4)

Red indicates change from column to the left

	i.MX 6SoloLite	i.MX 6SoloX (in development)	i.MX 6Solo	i.MX 6DualLite	i.MX 6Dual	i.MX 6Quad
Cortex-A9 Platform	1x 1GHz (max) 2400 DMIPS 32K+32K I/D L1 256KB L2	1x 1GHz (max) 2400 DMIPS 32K+32K I/D L1 256KB L2	1x 1GHz (max) 2400 DMIPS 32K+32K I/D L1 **512KB L2**	**2x** 1GHz (max) **4800 DMIPS** 32K+32K I/D L1 512KB L2	2x 1.2GHz (max) **5700 DMIPS** 32K+32K I/D L1 **1MB L2**	**4x** 1.2GHz (max) **11500 DMIPS** 32K+32K I/D L1 1MB L2
Cortex-M4 Platform	-	**1x 200MHz** **250 DMIPS** **16K+16K I/D** **64K TCM**	-	-	-	-
OCRAM	128KB	128KB	128KB	128KB	**256KB**	256KB
Process	40nm, LP	40nm, LP	40nm, LP	40nm, LP	40nm, LP	40nm, LP
DRAM Interface	Up to 2GB 16/32-bit LP-DDR2-800 DDR3-800	**Up to 4GB** 16/32-bit LP-DDR2-800 DDR3-800 **DDR3L-800**	Up to 4GB 16/32-bit LP-DDR2-800 DDR3-800 DDR3L-800	Up to 4GB **16/32/64-bit** LP-DDR2-800 DDR3-800 DDR3L-800 **2x32-bit** LP-DDR2-800	Up to 4GB 16/32/64-bit **LP-DDR2-1066** **DDR3-1066** **DDR3L-1066** 2x32-bit **LP-DDR2-1066**	Up to 4GB 16/32/64-bit LP-DDR2-1066 DDR3-1066 DDR3L-1066 2x32-bit LP-DDR2-1066
External Flash Support	-	**8-bit SLC/MLC NAND, 62-bit ECC, ONFI2.2**	8-bit SLC/MLC NAND, **40-bit ECC**, ONFI2.2	8-bit SLC/MLC NAND, 40-bit ECC, ONFI2.2	8-bit SLC/MLC NAND, 40-bit ECC, ONFI2.2	8-bit SLC/MLC NAND, 40-bit ECC, ONFI2.2
	16/32-bit NOR	16/32-bit NOR	16/32-bit NOR	16/32-bit NOR	16/32-bit NOR	16/32-bit NOR
	eMMC 4.4	eMMC **4.5**	eMMC **4.4**	eMMC 4.4	eMMC 4.4	eMMC 4.4
	-	**2x DDR QuadSPI**	-	-	-	-
	4x SPI	**5x** SPI	**4x** SPI	4x SPI	**5x** SPI	5x SPI

i.MX 6 Series feature list (2/4)

Red indicates change from column to the left

	i.MX 6SoloLite	i.MX 6SoloX (in development)	i.MX 6Solo	i.MX 6DualLite	i.MX 6Dual	i.MX 6Quad
Ethernet	1x 10/100	**2x GbE* + IEEE1588, AVB** * performance limited to 1x 1GbE + 1x 10/100	**1x GbE*** + IEEE1588 *** performance limited to 480Mbps duplex**	1x GbE* + IEEE1588 * performance limited to 480Mbps	1x GbE*+ IEEE1588 * performance limited to 480Mbps	1x GbE*+ I EEE1588 * performance limited to 480Mbps
USB	3x USB2.0 HS • 2x OTG + PHY • 1x Host HSIC	3x USB 2.0 HS • 1x OTG + PHY • 1x Host + PHY • 1x Host HSIC	**4x** USB2.0 HS • 1x OTG + PHY • 1x Host + PHY • **2x** Host HSIC	4x USB2.0 HS • 1x OTG + PHY • 1x Host + PHY • 2x Host HSIC	4x USB2.0 HS • 1x OTG + PHY • 1x Host + PHY • 2x Host HSIC	4x USB2.0 HS • 1x OTG + PHY • 1x Host + PHY • 2x Host HSIC
CAN	-	**2x FlexCAN/CANFD*** *n/a on all packages	2x **FlexCAN**	2x FlexCAN	2x FlexCAN	2x FlexCAN
MLB	-	**MLB 25/50*** *n/a on all packages	MLB 25/50/**150**	MLB 25/50/150	MLB 25/50/150	MLB 25/50/150
PCIe	-	**1x PCIe 2.0 (x1 lane)*** *n/a on all packages	1x PCIe 2.0 (x1 lane)	1x PCIe 2.0 (x1 lane)	1x PCIe 2.0 (x1 lane)	1x PCIe 2.0 (x1 lane)
SD/MMC	3x SD/MMC 4.4 1x SDXC	3x SD/MMC 4.4 1x SDXC	3x SD/MMC 4.4 1x SDXC	3x SD/MMC 4.4 1x SDXC	3x SD/MMC 4.4 1x SDXC	3x SD/MMC 4.4 1x SDXC
MIPI	-	-	**MIPI-CSI2** **MIPI-DSI**	MIPI-CSI2 MIPI-DSI	MIPI-CSI2 MIPI-DSI **MIPI-HSI**	MIPI-CSI2 MIPI-DSI MIPI-HSI
Camera Interface	1x Input • 1x 16-bit Parallel	**2x** Input* • 1x **20-bit** Parallel • 1x Composite *n/a on all packages	**2x** Inputs • 1x 20-bit Parallel • **2x lane MIPI-CSI2**	2x Inputs • 1x 20-bit Parallel • 2x lane MIPI-CSI2	**3x** Inputs • 1x 20-bit Parallel • **4x** lane MIPI-CSI2	3x Inputs • 1x 20-bit Parallel • 4x lane MIPI-CSI2
HDD I/F	-	-	-	-	**S-ATA II 3Gbps**	S-ATA II 3Gbps
Audio Acc.	-	**ASRC**	ASRC	ASRC	ASRC	ASRC
Audio	3x I2S SPDIF Tx/Rx	**5x I2S** SPDIF Tx/Rx **ESAI, 2x SAI**	3x I2S SPDIF Tx/Rx ESAI	3x I2S SPDIF Tx/Rx ESAI	3x I2S SPDIF Tx/Rx ESAI	3x I2S SPDIF Tx/Rx ESAI

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

Red indicates change from column to the left

	i.MX 6SoloLite	i.MX 6SoloX (in development)	i.MX 6Solo	i.MX 6DualLite	i.MX 6Dual	i.MX 6Quad
Display Resolution (@60Hz)	WXGA (WXGA=1366x768)	**2 x WXGA**	2 x WXGA	2 x WXGA	**2 x 4XGA or 2 x [1080p + WXGA]** (4XGA=2048x1536)	2 x 4XGA or 2 x [1080p + WXGA]
Display Interfaces	2x Active Outputs • 1x Parallel • EPDC	2x Active Outputs* • 1x Parallel • **1x LVDS** *n/a on all packages	2x Active Outputs • **1x** Parallel • **2x** LVDS • **HDMI** • **2x lane MIPI-DSI** • **EPDC**	2x Active Outputs • 1x Parallel • 2x LVDS • HDMI • 2x lane MIPI-DSI • EPDC	**4x** Active Outputs • 1x Parallel • 2x LVDS • HDMI • 2x lane MIPI-DSI	4x Active Outputs • 1x Parallel • 2x LVDS • HDMI • 2x lane MIPI-DSI
GPU 3D	-	**Vivante GC400T*** • **27Mtri/s** • **133Mpxl/s** • **OpenGL ES 1.1/2.0** *n/a on all packages	**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 *n/a on all packages	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 GC300*** • **300Mpxl/s** *n/a on all packages	**Vivante GC320** • **600Mpxl/s**	Vivante GC320 • 600Mpxl/s	Vivante GC320 • 600Mpxl/s	Vivante GC320 • 600Mpxl/s
Video Dec	SW Only	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 6SoloX (in development)	i.MX 6Solo	i.MX 6DualLite	i.MX 6Dual	i.MX 6Quad
UART SPI I2C	5x UART, 4x SPI 3x I2C	**6x** 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	-	**2x 8ch 12-bit SAR*** *not available on all packages	-	-	-	-
Temp. Monitor	Yes	Yes	Yes	Yes	Yes	Yes
PMU	Partial PMU integration	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	HAB, Secure RAM, Crypto Acc., TrustZone, NIST approved RNG
Commercial Qual.	Available	**4Q14**	Available	Available	Available	Available
Automotive Qual. AEC-Q100	-	**4Q14**	Available	Available	Available	Available
Industrial Qual.	-	**4Q14**	Available	Available	Available	Available
Package	13x13 0.5P BGA	**17x17 0.8P BGA** **19x19 0.8P BGA**	**21x21 0.8P BGA** **Pin compatible with i.MX 6Dual/Quad**		**21x21 0.8P FCBGA** **Pin compatible with i.MX 6DualLite/Solo**	

i.MX 6DualPlus/QuadPlus

Enhanced GPU & Memory Bandwidth

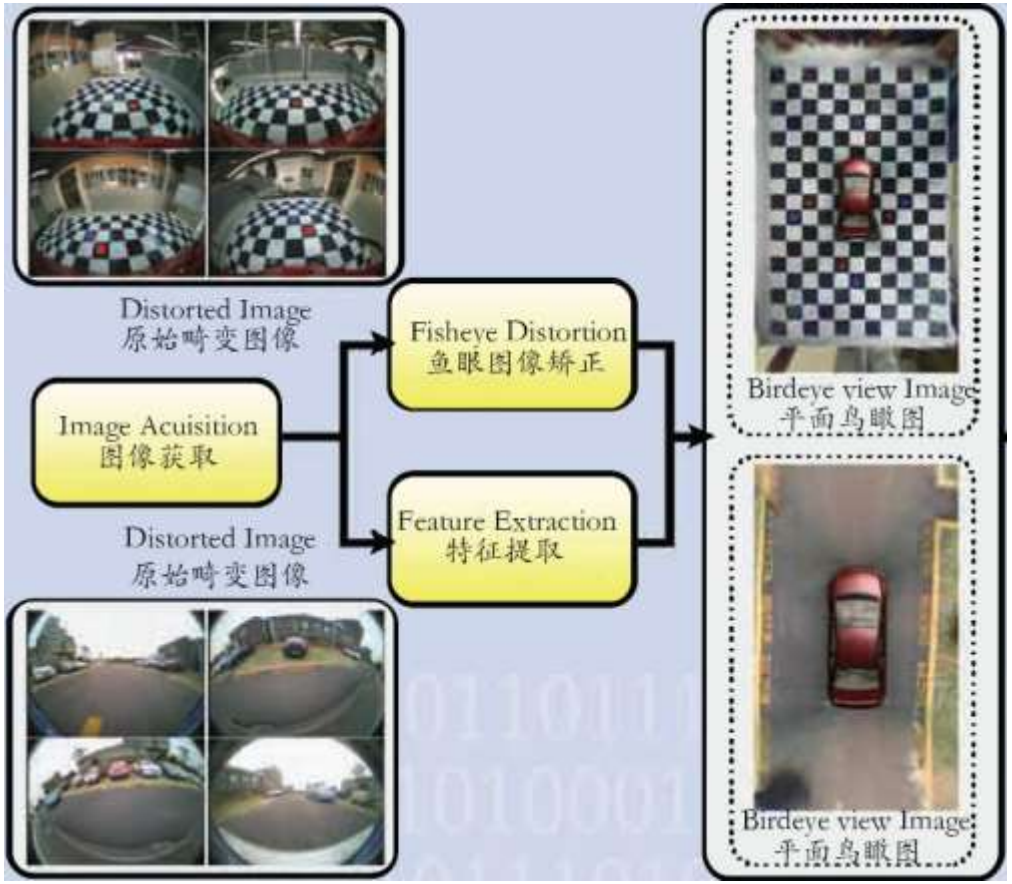
i.MX 6DualPlus/6QuadPlus Summary

- i.MX 6DualPlus/6Quad Plus will offer superior graphics performance and significant overall bandwidth utilization improvements over i.MX 6Dual/6Quad.
- Improvements in i.MX 6DualPlus/6QuadPlus
  - Implement new versions of 3D, 2D and OpenVG GPUs
  - Implement a prefetch and resolve module to improve efficiency
  - Fabric modifications to improve memory bandwidth
  - Multiple errata fixes from revision 1.3
  - Pin compatibility with revision 1.x products
  - The maximum current for VDD_SOC_IN increased to 3390mA, requiring power supply redesign
- Samples Available: Q2, 2015
- AEC-Q100 Qualification Complete: Q4, 2015
- The i.MX 6DualPlus/6QuadPlus versions will have new part numbers and will be sold at a price premium over i.MX 6Dual/6Quad. All i.MX 6Dual/6Quad part numbers will be available in an i.MX 6DualPlus/6QuadPlus version.

Surroundview

Surroundview

- Image acquisition + Stitching
- *Current Status*:
  - i.MX6x for image acquisition
  - i.MX6x for stitching algorithm
- *Future*:
  - One stop solution using iMxV84 Treerunner



中国科学院微电子研究所昆山分所 **Diagram**

Image acquisition using i.MX6x: Analog Camera

- Camera resolution is 720x480 (NTSC) or 720x576 (PAL)
- Analog signal is interlace mode (隔行扫描) needs deinterlacing (去交错)
- Processing pipeline:

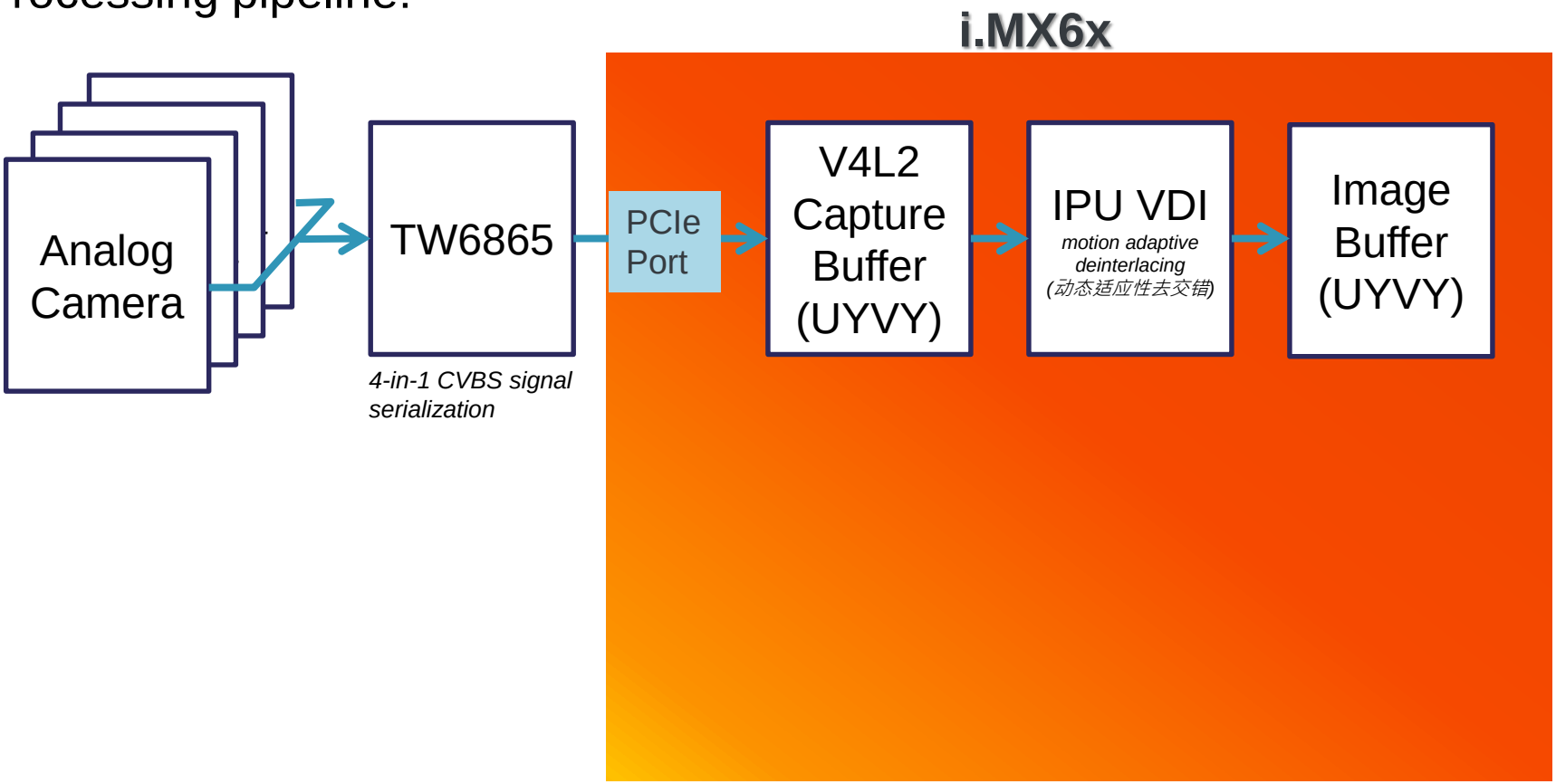


Image acquisition using i.MX6x: Digital Camera

- Camera resolution is 720p
- Digital signal in progressive (逐行扫描) format
- Processing pipeline:

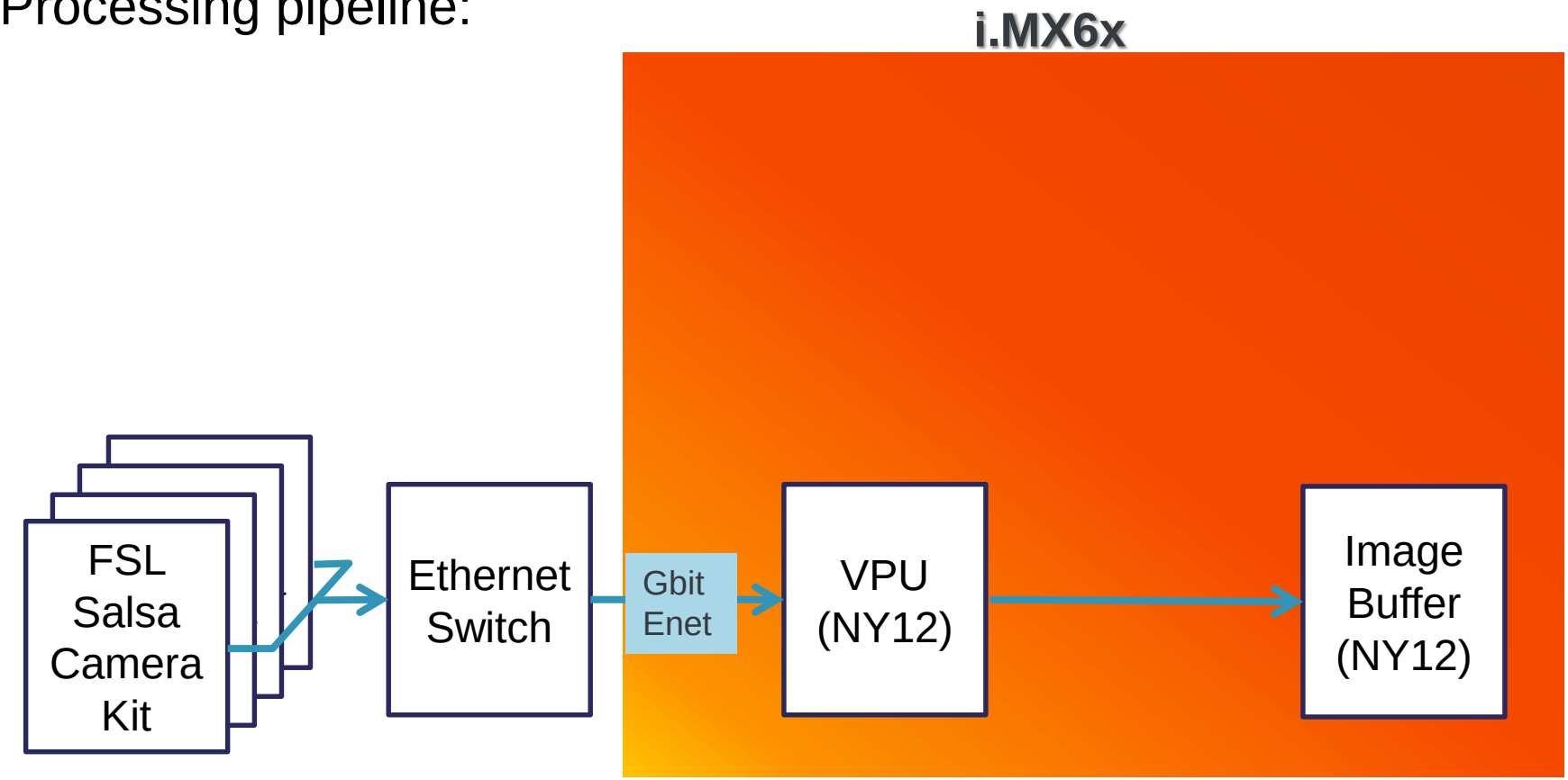
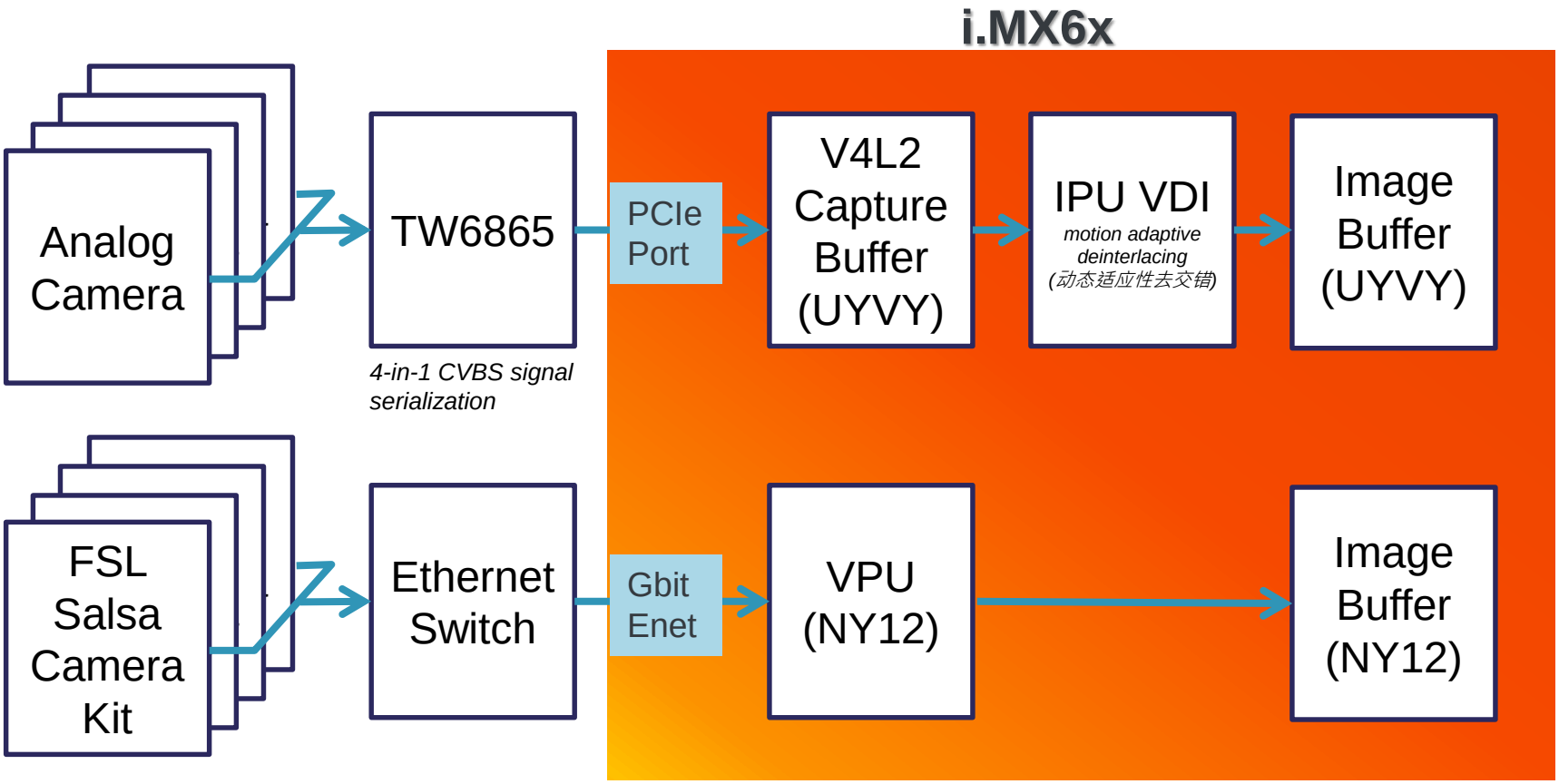
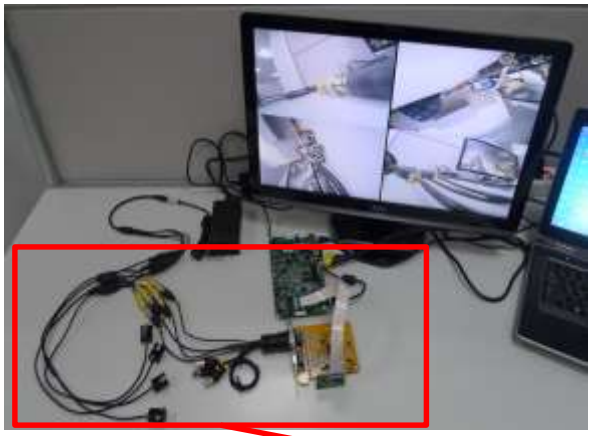


Image acquisition using i.MX6x: Summary



Analog camera image acquisition kit



Item	QTY	Source
TW6869视频卡	1	http://item.taobao.com/item.htm?spm=a230r.1.14.5.qNzDQC&id=21941724829&ns=1#detail
MINI-PCIE转PCIE转换板	1	http://item.taobao.com/item.htm?spm=a1z10.1.w4004-5299295193.32.YwybCE&id=22108840583
高清摄像头	4	http://item.taobao.com/item.htm?spm=a1z09.5.0.0.8NuatC&id=17702994946&_u=nnqd8es6aa4
BNC Male to RCA Female Adapter	4	深圳华强北
12V5A电源	1	深圳华强北
电源1拖4转换线	1	深圳华强北

Virtual Cluster

i.MX6x Virtual Cluster

- Linux OS
- BYD provided panel: 1280x420
- BYD kick-off project using i.MX6x

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