i.MX35 Family of Multimedia Applications Processors
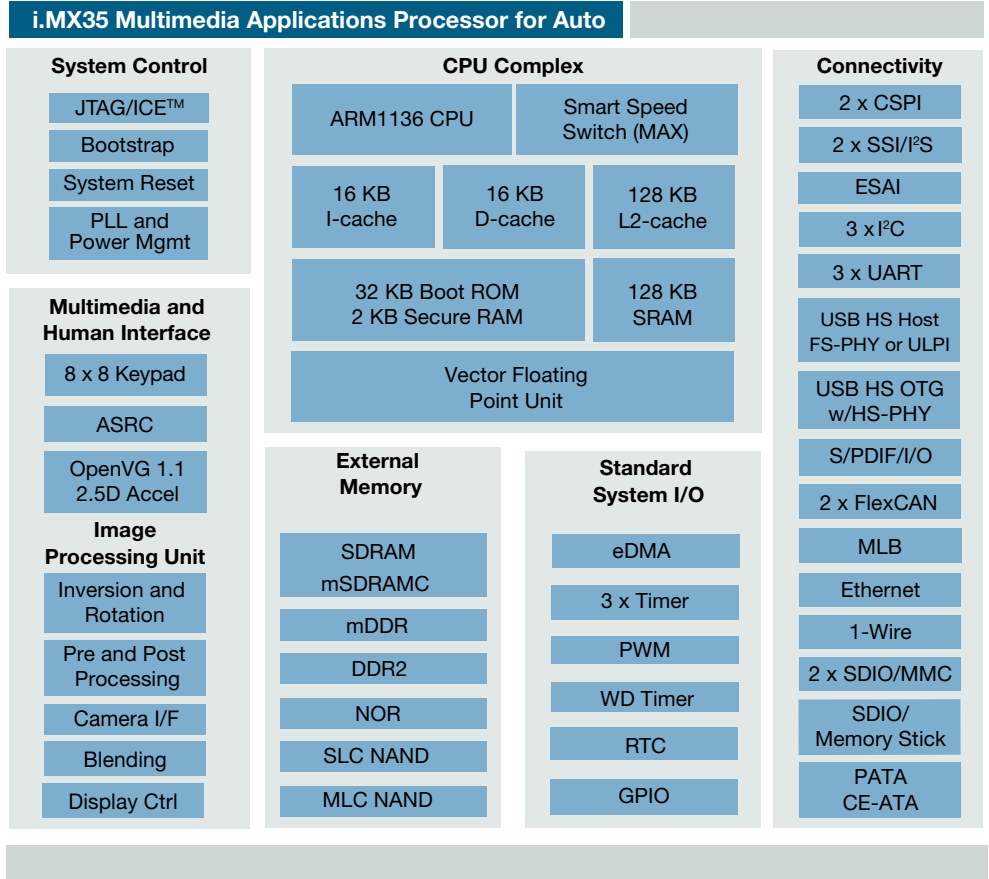## Automotive portfolio: i.MX351, i.MX355 and i.MX356

Overview

Today's automobiles are becoming media rooms on wheels. Infotainment systems have changed the meaning of "road trip," providing driver assistance via integrated telematics or GPS-based navigation systems and passenger entertainment with wireless connectivity to cell phones, portable media players and laptops. Add speech recognition, and you have the ability to control these devices without taking your eyes off the road or your hands off the wheel.

All of this functionality requires an integrated circuit with the ability to drive the entire system. Enter the i.MX35 multimedia applications processor—the central intelligence system for automotive infotainment systems.

Based on the robust ARM1136JF-S™ and derived from the widely-adopted i.MX31 processor, the i.MX35 processor is designed explicitly for the automotive environment. It's packed with connectivity options including two FlexCAN modules, a Media Local Bus (MLB) to connect to MOST INIC transceivers and an Ethernet MAC. The i.MX35 processor has two USB ports with integrated PHYs, three MMC/SD/SDIO ports and the ability to connect to external wireless modules via USB or SDIO. In addition, the i.MX35 processor includes support for cost-effective memory options like DDR2 and multi-level cell NAND that reduce system costs and provide the design engineer great flexibility.

To enhance the audio capabilities of the i.MX35 processor, Freescale added the enhanced serial audio interface (ESAI) for multi-channel (5.1) audio, or multi-speaker outputs, S/PDIF I/O for compressed digital audio connectivity and an asynchronous sample rate converter (ASRC) for mixing digital content with different sampling frequencies.

i.MX35 Multimedia Applications Processor for Auto

System Control
- JTAG/ICE™
- Bootstrap
- System Reset
- PLL and Power Mgmt

Multimedia and Human Interface
- 8 x 8 Keypad
- ASRC
- OpenVG 1.1 2.5D Accel

Image Processing Unit
- Inversion and Rotation
- Pre and Post Processing
- Camera I/F
- Blending
- Display Ctrl

CPU Complex
- ARM1136 CPU
- Smart Speed Switch (MAX)
- 16 KB I-cache
- 16 KB D-cache
- 128 KB L2-cache
- 32 KB Boot ROM 2 KB Secure RAM
- 128 KB SRAM
- Vector Floating Point Unit

External Memory
- SDRAM mSDRAMC
- mDDR
- DDR2
- NOR
- SLC NAND
- MLC NAND

Standard System I/O
- eDMA
- 3 x Timer
- PWM
- WD Timer
- RTC
- GPIO

Connectivity
- 2 x CSPI
- 2 x SSI/I²S
- ESAI
- 3 x I²C
- 3 x UART
- USB HS Host FS-PHY or ULPI
- USB HS OTG w/HS-PHY
- S/PDIF/I/O
- 2 x FlexCAN
- MLB
- Ethernet
- 1-Wire
- 2 x SDIO/MMC
- SDIO/ Memory Stick
- PATA CE-ATA

Comprehensive board support packages (BSPs) for the Microsoft® Windows® CE and Linux® operating systems are available to download at no cost* at **www.freescale.com**. The QNX Neutrino™ operating system and Aviage multimedia suite are also supported.

Upon acceptance of the Freescale Software License Agreement

Key Features
Automotive Grade
- AEC-Q100 grade 3 qualification
- Designed for -40°C to +85°C ambient temperature operating conditions
- Architected and tested for Zero Defects objectives
- 90 nm CMOS process and 0.8 mm pitch MAPBGA

CPU
- ARM1136JF-S runs at up to 532 MHz for up to D1 30 fps video decoding, sophisticated acoustic echo cancellation and speech recognition
- 128 KB L2 unified cache to boost performance
- Vector floating point coprocessor for automotive applications with dynamic ranges greater than the range of a standard microprocessor core

Multimedia and Graphics Processing

- Display controller optimized for up to 24-bit-per-pixel VGA (800 x 480) resolution
- Industry standard OpenVG graphics accelerator capable of up to 133 million pixels per second fill rate
- Image processing unit (IPU) for image scaling, image blending, rotation and color space conversion
- CMOS/CCD sensor interface for rear-view camera or video input
- Audio interfaces
  - 2 x SSI/I²S ports
  - S/PDIF I/O
  - Enhanced Serial Audio Interface (ESAI) for support of 5.1 speaker systems or multi-speaker outputs

Connectivity

- 2 x FlexCAN modules
- MLB interface supports physical and link layer interconnection with other multimedia devices over a MOST® Network
- High-Speed USB OTG with integrated high-speed PHY
- High-Speed USB host with integrated full-speed PHY or high-speed operation through ULPI interface
- 10/100 Ethernet MAC
- 3 x UART
- 2 x configurable serial peripheral interfaces (CSPI)
- 3.3V general purpose I/O

Benefits

Image Processing Unit

The i.MX35 processor features an advanced IPU developed by Freescale. The IPU includes the functionality required for image processing and display management, including deblocking, deringing, color space conversion, independent horizontal and vertical resizing and blending of graphics and video planes. The IPU is equipped with powerful control and synchronization capabilities to perform tasks with minimal to no involvement of the ARM® CPU.

Graphics Processing Unit

Freescale's i.MX35 processor integrates an OpenVG 1.1 hardware accelerator to deliver smooth textural visuals required in today's automotive infotainment systems. The OpenVG core is also capable of native acceleration of Adobe® Flash, with the following benefits:

- Improved Web browsing experience with embedded Adobe Flash animation
- Faster time to market—Adobe animations automatically converted to C-code running on the i.MX35 processor—no hand-coding required

Level 2 Cache Controller

Freescale was the lead partner in formulating the definition of the ARM11™ L2 cache controller architecture and was the first ARM partner to license it. Freescale's level 2 cache controller, containing an ARML210™ core, and the accompanying 128 KB of memory, combined with the ARM1136JF-S processor, can increase CPU performance and reduce system level power consumption. By bringing more data on chip and closer to the CPU, the ARML210 level 2 cache controller helps remove the performance-limiting bandwidth constraints associated with off-chip memory.

Product Development Kit

The i.MX35 product development kit (PDK), is a completely integrated hardware and software solution that simplifies product development so developers can focus on critical differentiation needed for market success. Freescale offers comprehensive board support packages for both Linux® and Windows® Embedded® CE operating systems with the PDK as well as optimized middleware such as audio and video codecs and digital rights management libraries.

Multimedia Alliances Network

Combining resources from Freescale and industry leaders, the Freescale Multimedia Alliances Network offers advanced pre-integrated platforms and solutions designed to work out of the box, accelerating your business and giving you a competitive advantage. The Multimedia Alliances Network includes hardware, software, tools, system integration and services partners. With early access to improved tools, Multimedia Alliances Network members are better equipped to deliver mobile and multimedia solutions to a global audience in less time, with less effort and at a lower cost. For more information about the Multimedia Alliances Network, visit **www.freescale.com/man**.

The i.MX Family

Freescale's i.MX family of applications processors serves a broad range of automotive, consumer, industrial and general purpose embedded applications. To learn more, visit **www.freescale.com/imx**.

Feature	i.MX351	i.MX355	i.MX356
Example Applications	*Automotive Audio *Automotive Infotainment	*Automotive Infotainment *Mid End Navigation	*Automotive Infotainment
Core	ARM11™	ARM11™	ARM11™
CPU Speed	532 MHz	532 MHz	532 MHz
L1 I/D Cache	16K I/D	16K I/D	16K I/D
L2 Cache	128 KB	128 KB	128 KB
OpenVG 1.1	-	-	Y
LCD Interface	-	Y	Y
Ethernet	1-10/100	1-10/100	1-10/100
CAN	2	2	2
USB + PHY	HS OTG, HS Host	HS OTG, HS Host	HS OTG, HS Host
I²C	3	3	3
MLB	Y	Y	Y
SSI/I²S	2	2	2
SD/SDIO/MMC	2	2	2
SPI	2	2	2
UART	3	3	3
PATA/CE-ATA	-/-	Y/Y	Y/Y
Package, Speed, Temperature	17x17 BGA 0.8 mm 400 ball, 532MHz @ -20°C to +70°C, 400MHz/532MHz @ -40°C to +85°C		

Learn More: For current information about Freescale products and documentation, please visit **www.freescale.com**.

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