Product Overview

AM623 and AM625 Arm® Cortex® A53 Microprocessor

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AM623 and AM625 MPUs are versatile and high-performance system-on-chip (SoC) designs for general-purpose, industrial, and automotive applications. Built for Linux, the devices feature a quad-core Arm® Cortex®-A53 processor and an ARM Cortex-M4 core for real-time processing. The devices excel in providing robust computing capabilities, advanced connectivity, and multimedia processing. With efficient power consumption, the devices are a great choice for a wide range of applications.

Target Applications and Key Markets

The processor is particularly well designed for several key markets. In the industrial sector, the processor is great for factory automation, robotics, and industrial communication systems, providing the necessary performance and reliability for these demanding environments. In the automotive industry, the processor supports advanced driver assistance systems (ADAS), in-vehicle infotainment (IVI), and digital instrument clusters, enhancing both safety and user experience. Additionally, the processor is used in consumer electronics, such as smart home devices and IoT gateways, where the processors efficient power consumption and robust connectivity are critical.

- *Industrial Automation:* Factory automation, robotics, industrial communication, industrial HMI, retail automation and payment
- *Grid Infrastructure:* EV charging and supply equipment, smart meter, solar gateway
- *Building Automation:* Thermostat, Smart home devices, video doorbells, HVAC controllers, IP cameras, Fire Control Panel
- *Healthcare:* Medical devices, patient monitoring systems
- *Automotive:* Advanced driver assistance systems (ADAS), in-vehicle infotainment (IVI), digital instrument clusters, body electronics

Key Features

- *CPU:* Quad-core ARM Cortex-A53, up to 1.4GHz
- *Memory:* Supports LPDDR4 and DDR4
- *Graphics:* Integrated 8 GFLOPS GPU (AM625 only)
- *Real-time Processing:* ARM Cortex-M4F for real-time control up to 400MHz
- *Connectivity:* Dual Gigabit Ethernet w/ TSN, 2x USB 2.0, 3x CAN-FD
- *Display:* 2x HD Display, OLDI (LVDS) and DPI
- *Security:* Secure enclave, Secure boot, hardware encryption, ARM Trustzone, and OP-TEE
- *Operating Systems:* Linux, RTOS
- *Power Consumption:* Average industrial power consumption is around 1.5W depending on usage and configuration
- *Power Management Design:* TPS65219

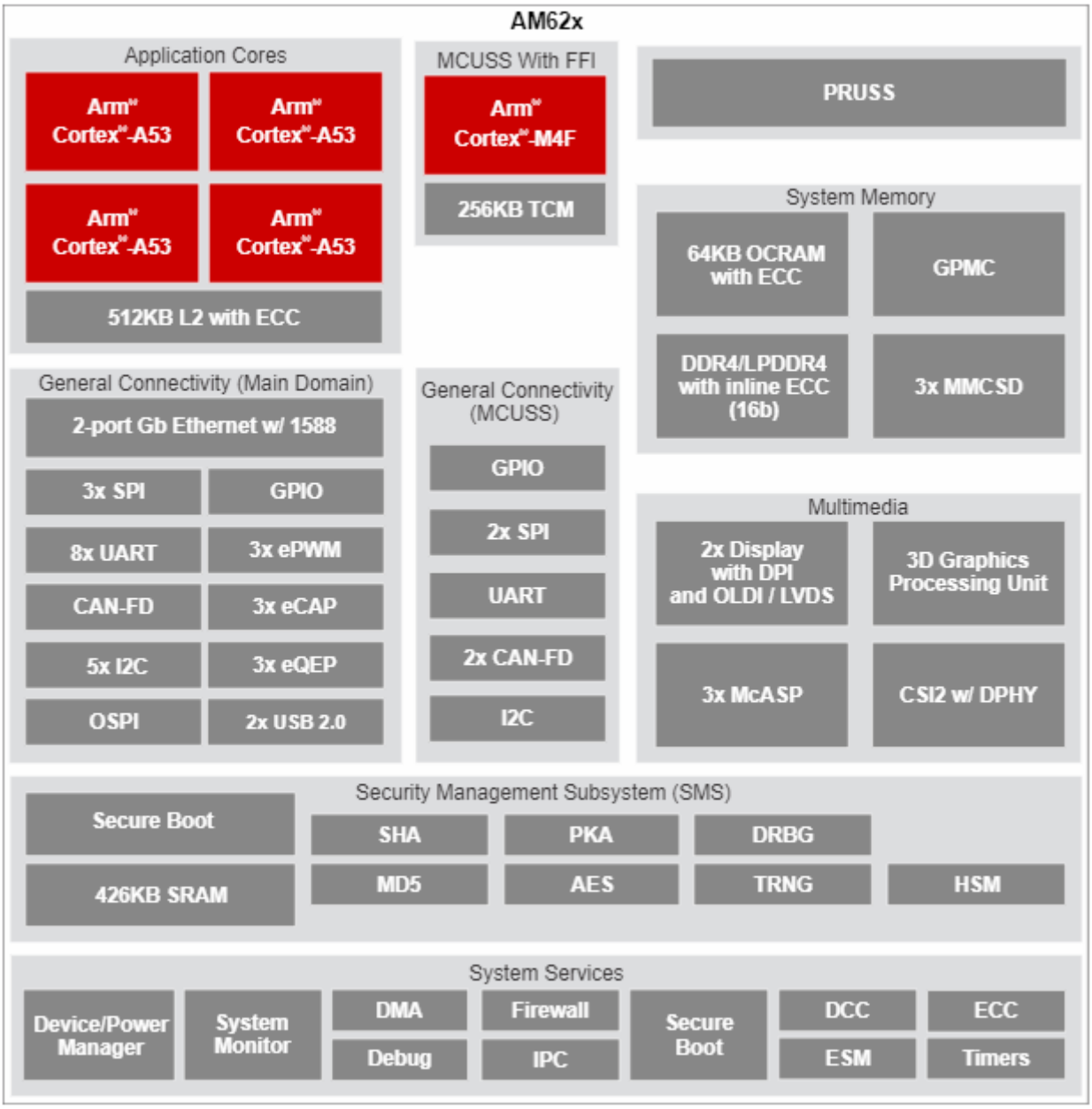

Figure 1. Functional Block Diagram

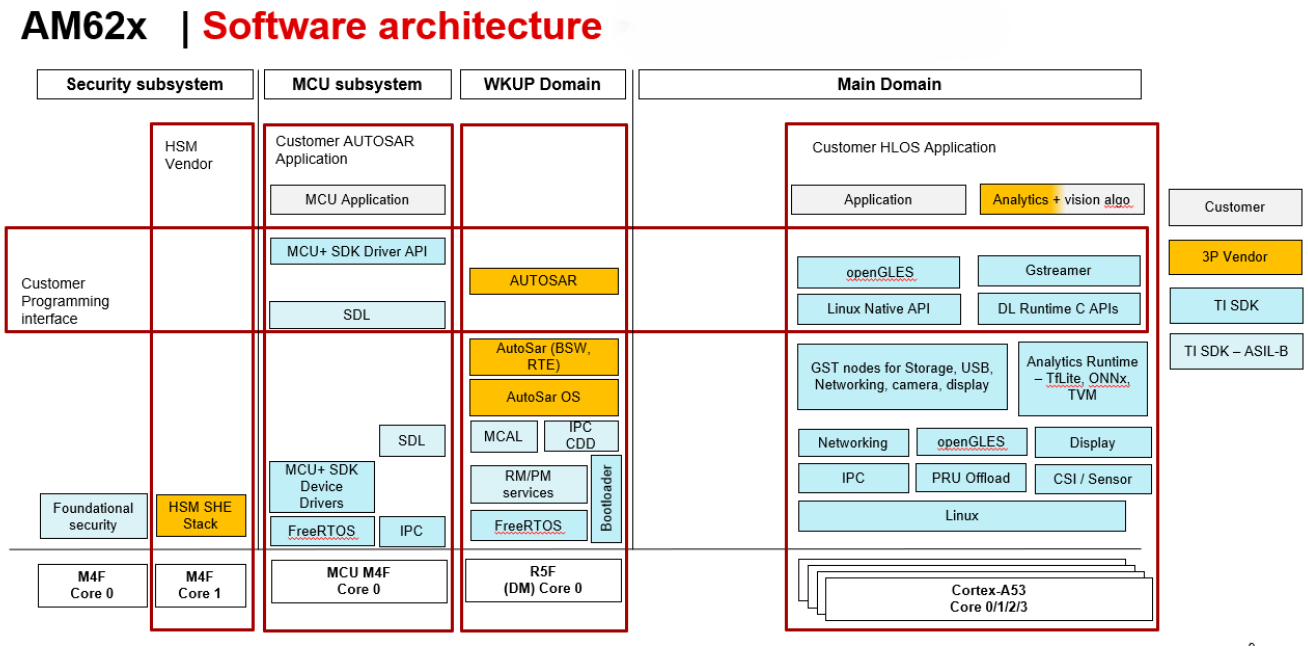

Figure 2. AM62x Software Architecture

Software

The AM623 and AM625 are capable of supporting high-level operating systems, including both *Linux* and *RTOS*. There are Software Development Kits (SDKs) created for both. The SDKs are feature-rich and allow you to easily begin your software development on these processors with integrated demonstrations and examples, as well as long-term stable kernel support on the ARM Cortex-A53 cores. There is also SDK support for the ARM Cortex-R5F core, including FreeRTOS. For development help, look to *TI's Developer Zone*.

Scalability

These processors offer scalable performance and feature sets to cater to a wide range of application needs. All AM623 and AM625 devices are pin-to-pin compatible, allowing developers to select the appropriate model for their current system and to easily adapt as their requirements change. There is a single Software Development Kit (SDK) for the entire AM623 and AM625 families. This simplifies the development process by providing a unified platform for software development, reducing time and effort spent on software integration and testing when using different processors. This scalability maintains that developers can use the processors across different projects, including when moving from the simpler AM623 or the more complex AM62P, while reducing development time and costs.

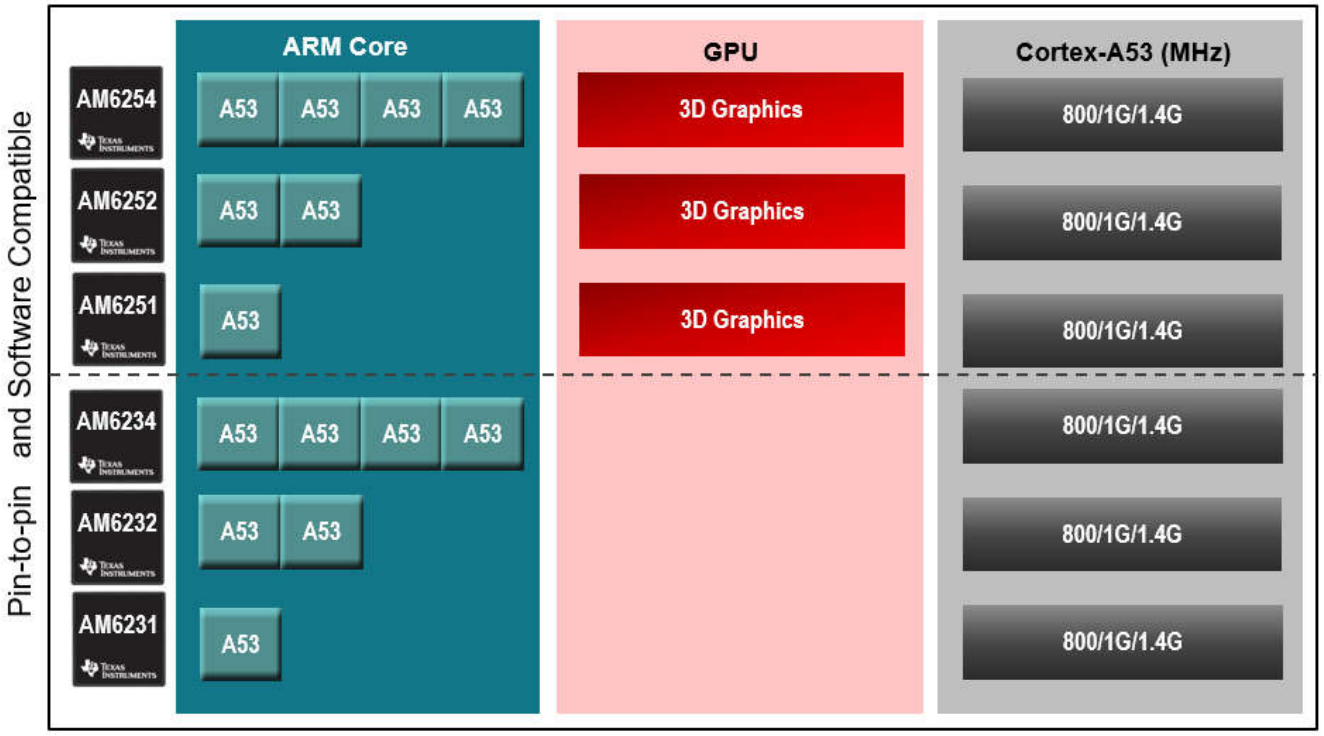

Figure 3. AM62x Device Configuration

Graphics and Multimedia

The device support two full-HD displays over OLDI (LVDS) and DPI. The device has four display pipelines with a maximum of two display pipelines per display. The AM625 also has a 3D GPU that supports 8 GFLOPS for high definition graphics. Other peripherals, including a CSI-2, allow you to easily display what your system needs like a camera feed.

Demos

Explore HMI graphics and reference demos created by TI and third-party hardware and software vendors in the TI ecosystem in the *Design Gallery*.

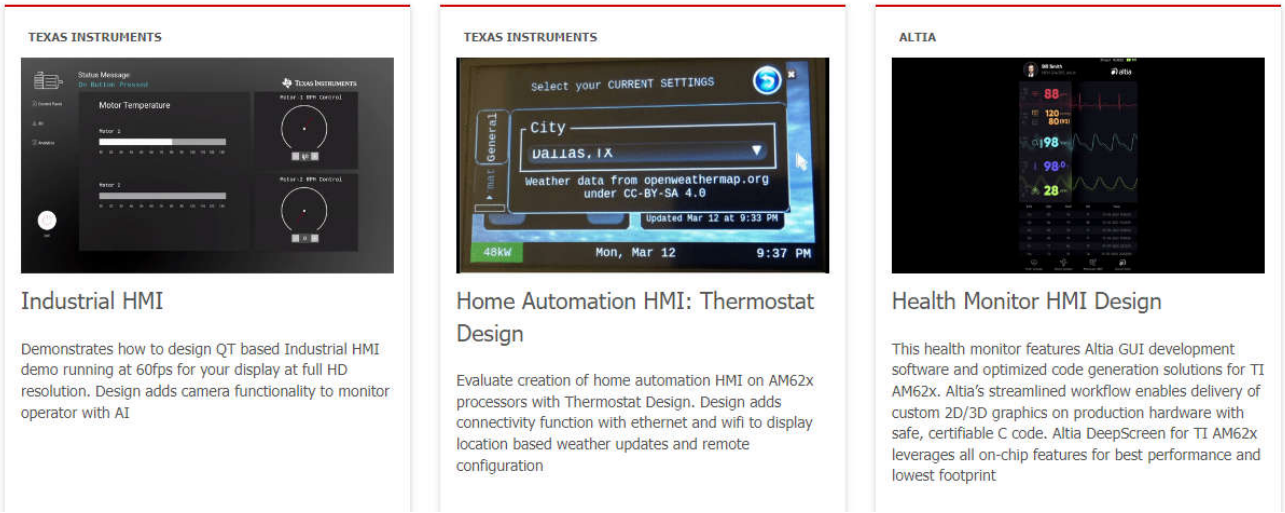

Figure 4. Design Gallery

Security

The AM623 and AM625 processors have several security features to support device protection and help meet new security regulations. The security features include a secure enclave to isolate the security functions from the rest of the device, securely enabling features like secure boot with hardware-enforced Root-of-Trust. The devices have extensive firewall support and a dedicated security DMA and Inter-Processor Communication (IPC) for isolation and secure storage support, as well as cryptographic acceleration. The security subsystem includes an HSM core for HSM stack integration. The security subsystem employs ARMs Trustzone technology to provide a Trusted Execution Environment (TEE) via OP-TEE. AM623 and AM625 are security-centric to enable you to protect your device, system, and data.

Evaluation Module

The starter kit Evaluation Module (EVM) is the *SK-AM62B-P1*. The SK-AM62B-P1 is a great fit for those looking to develop automotive and industrial applications. The SK-AM62B-P1 allows you to use and test the AM623 and AM625 and explore the broad range of peripherals before developing your design. The SK-AM62B-P1 has multiple display connectors for two displays, M.2 key E interface to support for WiFi and Bluetooth capabilities, 2 Ethernet ports, and UART connections. The SK-AM62B-P1 also has a software development kit (SDK) to start you Linux

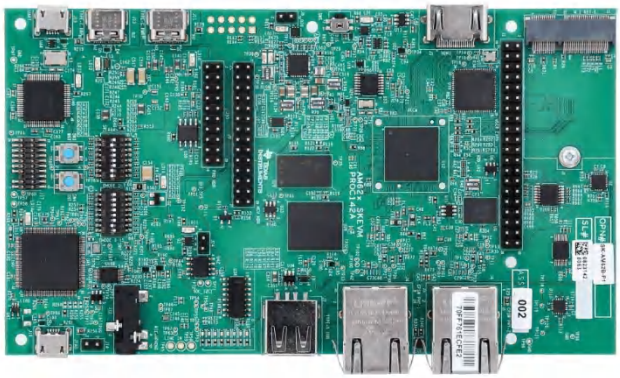

Figure 5. Board Images

Commonly Asked Questions

1. *What operating systems are supported by the AM623 and AM625 processors?* The AM623 and AM625 processors support multiple operating systems, including Linux and Android.
2. *How do I power the AM623 and AM625?* TPS65219 Power Management ICs (PMIC) is a companion PMIC specially designed to power the AM623 and AM625 processors. Learn more in this *application note*
3. *What is the difference between the AM623 and AM625?* The AM623 is the non-GPU version and the AM625 has an 8 GFLOP GPU.
4. *If I start my design with the AM623 can I move to the AM625?* Yes, the AM623 and AM625 are software compatible. You can start your software development on the AM623 and easily move to the AM625.
5. *How does the AM623 and AM625 maintain data security?* The AM623 and AM625 include advanced security features such as secure boot, hardware encryption, and support for secure software updates, maintaining that data is protected from unauthorized access and tampering.
6. *What development tools are available for the AM623 and AM625?* TI provides *SYSCFG* tools for PinMux , peripheral/driver configuration (R5/M4), clock tree visualization and memory configuration etc, *DDR Register Configuration Tool* . These tools help streamline the development process and reduce time-to-market. Visit *TI developer zone AM625* and *TI developer zone AM623* for all the software, tools and training academies for the device family.
7. *How to get started with AM623/AM625 Academy?* You can first visit the *AM623/AM625 Academy*. Here, you can find a variety of training modules, tutorials, and resources that guide you through setting up and developing Linux SDK, MCU + SDK and multi-core aspects of the AM623 and AM625 processors. These resources are designed to help both beginners and experienced developers efficiently leverage the capabilities of these processors.

8. *How to get demos?* Visit the *TI Resource Explorer (Tirex)*, which provides a wide range of demos, code examples, and application notes that showcase the processor's capabilities in various use cases. The *Design Gallery* contains further demos to show the AM623 and AM625 capabilities.

For more detailed information and resources, visit the *Linux Academy*, *Multicore Academy*, and *TI Design Gallery* for demos.

Development Tools and Resources

- *AM625 Product Folder*: AM625 product details, technical documentation, and additional information.
- *AM623 Product Folder*: AM623 product details, technical documentation, and additional information.
- *AM62x Starter Kit*: Evaluation module built around the AM623 and AM625 to streamline intuitive software design.
- *AM62x SDK*: Software development kit for easy setup and fast out-of-box access to benchmarks and demonstrations.
- *SysConfig*: Configuration tool designed to simplify hardware and software challenges.
- *Pinmux*: SysConfig file to aid in configuring pins.
- *AM62x IBIS Model:* IBIS simulation model
- *AM62x AMI Model*: IBIS-AMI simulation model
- *AM62x BSDL Model*: BSDL simulation model
- *AM62x Thermal Model*: Thermal simulation model
- *AM62x Academy*: Guides and trainings designed to simplify and accelerate development.
- *TI Linux Academy*: Comprehensive training and resources for developing Linux-based applications.
- *Multicore Academy*: Guides and best practices for implementing multicore systems.
- *TI Developer Zone*: Tools, software, and training to easily develop code.
- *E2E Forums*: Get technical support from our engineers.
- *AM62x Design Gallery*: Analytics, HMI, and connectivity designs to showcase the capabilities of the AM62x processors.
- *TI Resource Explorer (Tirex)*: Access to demos, code examples, and documentation.
- *TI Partner Directory*: Discover our partners, offering specialized products and services to help you get to market faster.

Learn more about our other related processors.

- *AM625SIP (System in Package)*
- *AM62P (Plus)*
- *AM62A (Analytics)*

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