New TDA3x SoC for ADAS solutions in entry- to mid-level automobiles

Overview

TI's new TDA3x device family extends TI's System-on-Chip (SoC) offerings in the Advanced Driver Assistance Systems (ADAS) space. TI announced the TDA2x device last year, to target front, surround and fusion ADAS solutions. The TDA3x SoC device family builds on that offering to scale sophisticated innovation into ADAS solutions for entry- to mid-segment automobiles for front, rear, surround, radar and fusion applications (see Figure 1).

Key features and benefits

- Heterogeneous, scalable architecture providing optimal mix of performance, low power and ADAS vision analytics for entry- to mid- segment automobiles to meet or exceed NCAP requirements
- Supports front camera, surround view, smart rear camera and radar and sensor fusion technologies
- Automotive industry's first Package-on-Package (PoP) for system miniaturization
- Integrated Image Signal Processor (ISP) to support lower cost Bayer sensors and reduce overall bill of materials (BOM)
- Offers hardware and software scalability from the TDA2x SoC to allow for reduced cost and time to market
- Evaluation boards for various processors in TDA3x device family
- Low-power footprint

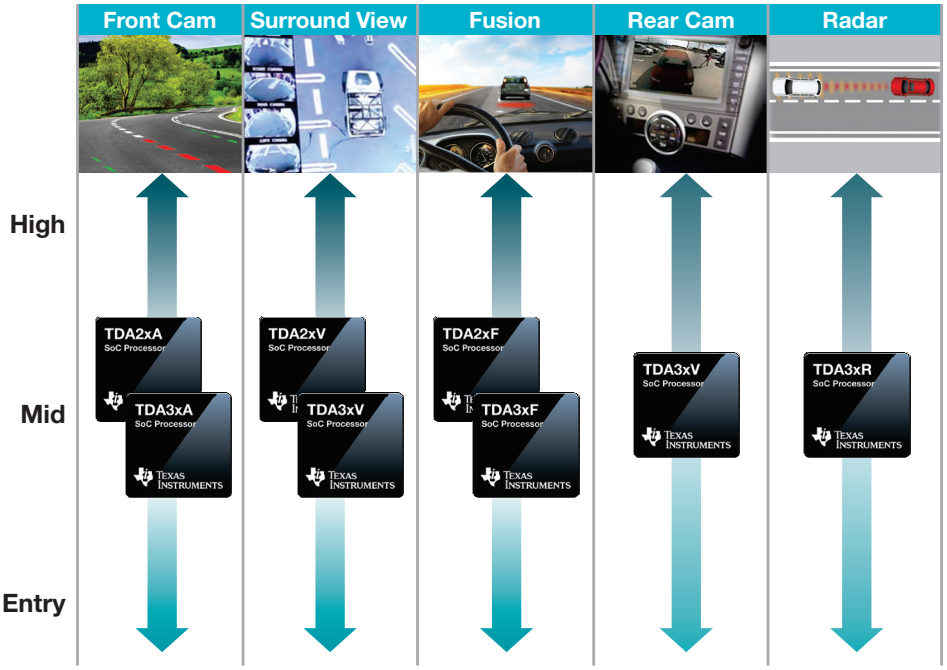


Figure 1: Scalability between TDA2 and TDA3x SoCs for various ADAS applications

With the TDA3x SoC, car manufacturers can develop sophisticated ADAS applications that meet or exceed NCAP requirements, reduce collisions on the road and enable a more autonomous driving experience in entry- to mid-level automobiles.

TDA3x architecture

The TDA3x SoC is based on a heterogeneous, scalable architecture that includes TI's fixed- and floating-point dual-TMS320C66x generation of DSP cores, a fully programmable Vision AccelerationPac (EVE) and dual ARM® Cortex®-M4 cores along with an image signal processor (ISP). The TDA3x SoC also integrates a host of peripherals including displays, CAN and multi-camera interfaces (both parallel and serial) for LVDS-based surround view systems. See Figure 2 on the following page.

Integration for efficient processing

The TDA3x SoC broad range of cores is aimed at supporting and delivering the fastest and most efficient processing. It includes two, next-generation TMS320C66x fixed-/floating-point DSP cores that operate at up to 500 MHz to support high-level signal processing. With 200 MHz of processing performance, the M4 cores deliver efficient control and processing camera stream.

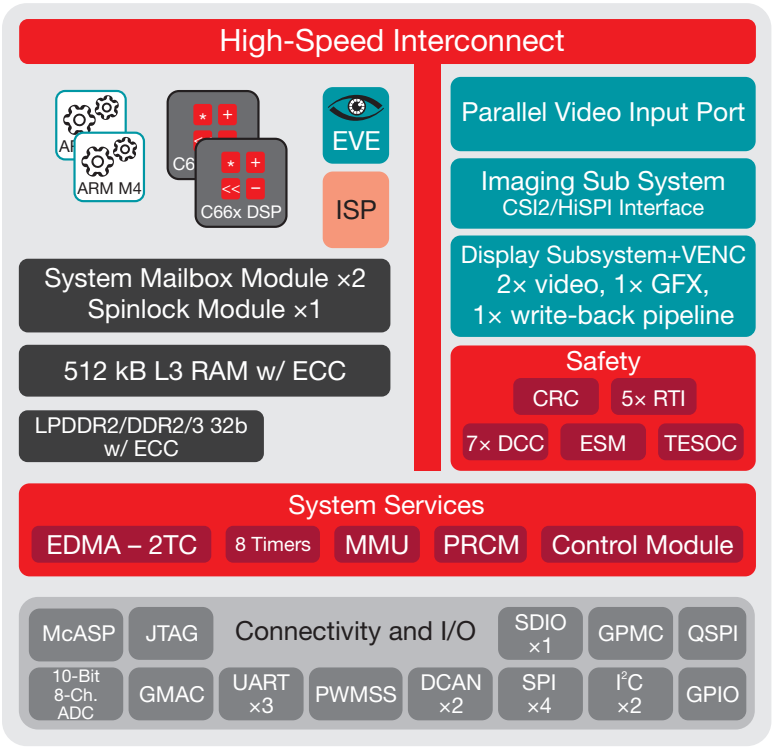


Figure 2: TDA3x SoC block diagram

Additionally, the TDA3x SoC has 512KB of on-chip L3 RAM with Single Error Correct and Double Error Detect (SECDED) support to minimize impact of Soft Error Rate (SER). Each of the DSP cores has 32 KB of L1D data and 32KB L1P programming memory as well as 288 KB of L2 memory (L1 and L2 memory can be configured as either flat memory or cache).

The TDA3x SoC offers a rich set of integrated peripherals:

- Video input port providing 4×8-bit or 2×16-bit camera inputs.
- TI's versatile display subsystem offering video and graphic overlay.
- Two high-end CAN controllers allowing communications within the vehicle without the need for a host computer, thus reducing system cost and footprint.
- QSPI delivers fast booting times for instantaneous video display when the vehicle is started.

Industry's first automotive POP driving system miniaturization

The TDA3x SoC introduces the automotive industry to the first package-on-package (POP) including DDR memory, enabling miniaturization of the ADAS camera or radar systems. Having the capability to mount memory on top of the TDA3x SoC package reduces both the footprint and board complexiy. This adds processing capability without increasing the size of the module. Multiple memory vendors including Micron, ISSI and Winbond will provide custom POP memory for the TDA3x SoC. Unlike anything else available on the automotive market today, the TDA3x 12×12 mm POP solution can be leveraged to create the smallest ADAS system.

ISP integration reducing system cost, complexity and size

By integrating an ISP that enables raw/Bayer sensors, the TDA3x processor delivers improved image quality without increasing the size, cost or complexity of the solution. Variants of the TDA3x SoC have full featured ISP including noise filters, color filter array (CFA), video noise temporal filtering (VNTF), exposure and white balance controls, as well as optional support for wide dynamic range (WDR) and lens distortion correction (LDC). The ISP can support a range of combinations for mono, stereo and up to four camera inputs providing an industry leading integrated solution.

Enhanced design for functional safety to help customers develop safer vehicles

TI's TDA3x processor is being developed to meet the relevant requirements of the ISO 26262 functional safety standard. The TDA3x SoC leverages a wide range of diagnostics from TI's award-winning Hercules™ TMS570 safety MCU family to enhance the existing TDA2x platform safety concept. The combination of hardware, software, tools and support helps TDA3x processor customers develop

	Front camera	Surround view CSI	Surround view parallel	Rear view
DSP1	•	•	•	•
DSP2	•			
EVE	•	•	•	•
CSI input	•	•		•
ISP		•	•	•
VOUT		• (24b)	• (8b)	•
VIN1a	•		•	•
VIN1b			•	
VIN2a			•	
VIN2b			•	

Table 1. TDA3x SoC processor and video input/output usage for different applications

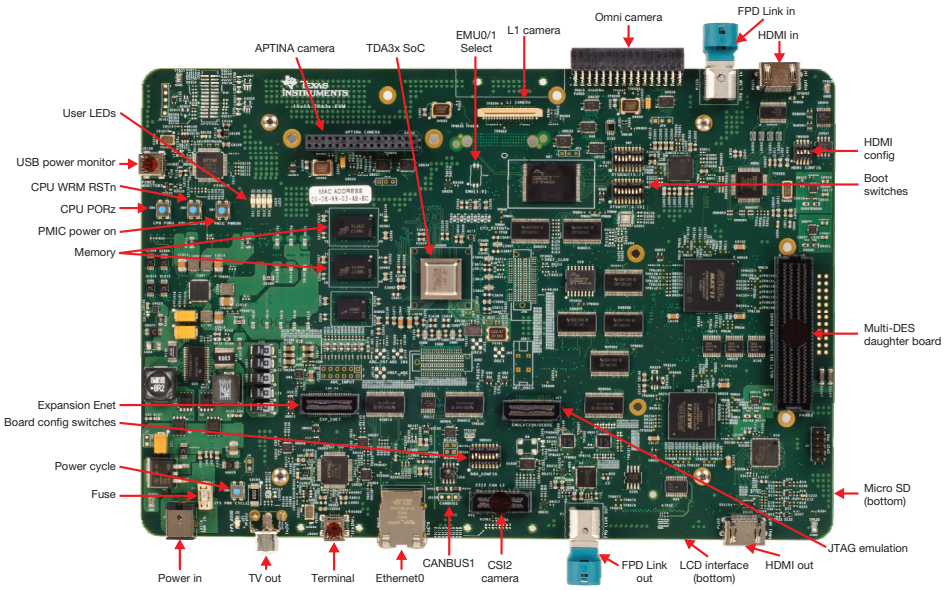
systems to meet challenging functional safety requirements and achieve system-level functional safety certification more efficiently.

Scalability with the TDA3x device family

The TDA3x SoC scalable architecture allows for significant reuse. Variations of TDA3x are available for front camera, surround view, rear view, radar and CMS (camera mirror replacement systems). As shown in Table 1, front camera application uses 1–2 camera inputs and both DSP and EVE to enable 3–5 algorithms. Surround view systems can use CSI-2 or parallel camera inputs with ISP and DSP processing for low-to-mid-segment surround view.

Tools and software for quickly getting started

TI's ADAS-related Vision Software Design Kit (SDK) enables customers to quickly and easily integrate the Vision Acceleration Pac (EVE) and DSP algorithms and then benchmark and partition them across multiple processing elements. The TI Vision SDK is a set of software development APIs, framework, tools and documentation allowing the creation of vision and analytics applications for the TI TDA3x SoC hardware platform. In addition to the SDK, TI also has a number of libraries available for vision kernels on Vision AccelerationPac (EVE) and DSP. The SDK and libraries reduce development efforts and time to market while enabling customers to innovate and differentiate on their solution.



▲ *Figure 3. TDA3x Evaluation Module with imager interfaces*

TDA3x family development tools

The TDA3x EVM is an evaluation platform designed to speed up development efforts and reduce time to market for ADAS applications. The main board integrates key peripherals such as Ethernet, FPD Link and HDMI. Start evaluating and developing solutions for TDA3x SoCs today with TI's evaluation boards.

Additional information

For product details, white papers and support for TDA3x SoCs, visit **ti.com/adastda** or contact your TI sales representative today.

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