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

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.
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 complexity. 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
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 Acceleration Pac (EVE) and DSP. The SDK and libraries reduce development efforts and time to market while enabling customers to innovate and differentiate on their solution.

**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](http://ti.com/adastda) or contact your TI sales representative today.

---

The platform bar, Hercules and SafeTI are trademarks of Texas Instruments. All other trademarks are the property of their respective owners.
IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as “components”) are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers’ products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have not been so designated is solely at the Buyer’s risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

Audio
Amplifiers
Data Converters
DLP® Products
DSP
Clocks and Timers
Interface
Logic
Power Mgmt
Microcontrollers
RFID
OMAP Applications Processors
Wireless Connectivity

www.ti.com/audio
www.amplifier.ti.com
dataconverter.ti.com
www.dlp.com
dsp.ti.com
www.ti.com/clocks
interface.ti.com
logic.ti.com
power.ti.com
microcontroller.ti.com
www.ti-rfid.com
www.ti.com/omap
www.ti.com/wirelessconnectivity

Applications
Automotive and Transportation
Communications and Telecom
Computers and Peripherals
Consumer Electronics
Energy and Lighting
Industrial
Medical
Security
Space, Avionics and Defense
Video and Imaging
www.ti.com/automotive
www.ti.com/communications
www.ti.com/computers
www.ti.com/consumer-apps
www.ti.com/energy
www.ti.com/industrial
www.ti.com/medical
www.ti.com/security
www.ti.com/space-avionics-defense
www.ti.com/video

www.ti.com/omap
www.ti.com/e2ecommunity