



# TDA2E SoC Processor for Advanced Driver Assist Systems (ADAS) Technical Brief

## 1 Device Overview

### 1.1 Features

- Architecture Designed for ADAS Applications
- Video, Image, and Graphics Processing Support
  - Full-HD Video (1920 x 1080p, 60 fps)
  - Multiple Video Input and Video Output
- ARM® Cortex®-A15 Microprocessor Subsystem
- C66x Floating-Point VLIW DSP
  - Fully Object-Code Compatible With C67x and C64x+
  - Up to Thirty-two 16 x 16-Bit Fixed-Point Multiplies per Cycle
- Up to 512KB of On-Chip L3 RAM
- Level 3 (L3) and Level 4 (L4) Interconnects
- DDR3/DDR3L Memory Interface (EMIF) Module
  - Supports up to DDR3-1333 (667MHz)
  - Up to 4GB Across Two Chip Selects
- Two ARM Dual Cortex-M4 Image Processing Units (IPUs)
- IVA-HD Subsystem
- Display Subsystem
  - Display Controller With DMA Engine and up to Three Pipelines
  - HDMI Encoder: HDMI 1.4a and DVI 1.0 Compliant
- Single-Core PowerVR™ SGX544 3D GPU
- 2D-Graphics Accelerator (BB2D) Subsystem
  - Vivante® GC320 Core
- Video Processing Engine (VPE)
- One Video Input Port (VIP) Module
  - Support for up to 4 Multiplexed Input Ports
- General-Purpose Memory Controller (GPMC)
- Enhanced Direct Memory Access (EDMA) Controller
- 2-Port Gigabit Ethernet (GMAC)
  - Up to Two External Ports, One Internal
- Sixteen 32-Bit General-Purpose Timers
- 32-Bit MPU Watchdog Timer
- Six High-Speed Inter-Integrated Circuit (I<sup>2</sup>C) Ports
- Ten Configurable UART/IrDA/CIR Modules
- Four Multichannel Serial Peripheral Interfaces (MCSPIs)
- Quad SPI Interface (QSPI)
- SATA Interface
- Multichannel Audio Serial Port (MCASP)
- SuperSpeed USB 3.0 Dual-Role Device
- High Speed USB 2.0 Dual-Role Device
- High Speed USB 2.0 On-The-Go
- PCI Express® 2.0 Port With Integrated PHY
  - One 2-lane Gen2-Compliant Port
  - or Two 1-lane Gen2-Compliant Ports
- Dual Controller Area Network (DCAN) Modules
  - CAN 2.0B Protocol
- Up to 215 General-Purpose I/O (GPIO) Pins
- Real-Time Clock Subsystem (RTCSS)
- Power, Reset, and Clock Management
- On-Chip Debug With CTools Technology
- 28-nm CMOS Technology
- 23 mm x 23 mm, 0.8-mm Pitch, 760-Pin BGA (ABC)



## 1.2 Applications

- LVDS or Ethernet Surround View
  - 3D surround view
  - Rear object detection
  - Parking assist
  - Pedestrian Detection
  - Lane tracking
  - Drive Recording
- Sensor Fusion – Vision, Radar, Ultrasonic, Lidar sensors
  - Object data fusion
  - Raw data fusion

## 1.3 Description

TI's new TDA2Ex (TDA2Eco) system-on-chips (SoCs) are a highly optimized and scalable family of automotive processors designed to meet the requirements of leading Advanced Driver Assistance Systems (ADAS). The TDA2Eco family targets today's entry-to-mid-range automobiles by integrating an optimal mix of performance, low power and ADAS vision analytics processing that aims to facilitate a more autonomous and collision-free driving experience.

The TDA2Ex SoC enables sophisticated embedded vision technology in today's automobile by enabling a broad range of ADAS applications including park assist, surround view and sensor fusion on a single architecture.

The TDA2Ex SoC incorporates a heterogeneous, scalable architecture that includes a mix of TI's fixed and floating-point TMS320C66x digital signal processor (DSP) generation core, ARM Cortex-A15 MPCore™ and dual-Cortex-M4 processors. The integration of a video accelerator for decoding multiple video streams over an Ethernet AVB network, along with graphics accelerator for rendering virtual views, enable a 3D viewing experience. And the TDA2Ex SoC also integrates a host of peripherals including multi-camera interfaces (both parallel and serial including CSI-2) to enable Ethernet or LVDS-based surround view systems, displays and GigB Ethernet AVB.

Additionally, TI provides a complete set of development tools for the ARM and DSP, including C compilers, a DSP assembly optimizer to simplify programming and scheduling, and a debugging interface for visibility into source code execution.

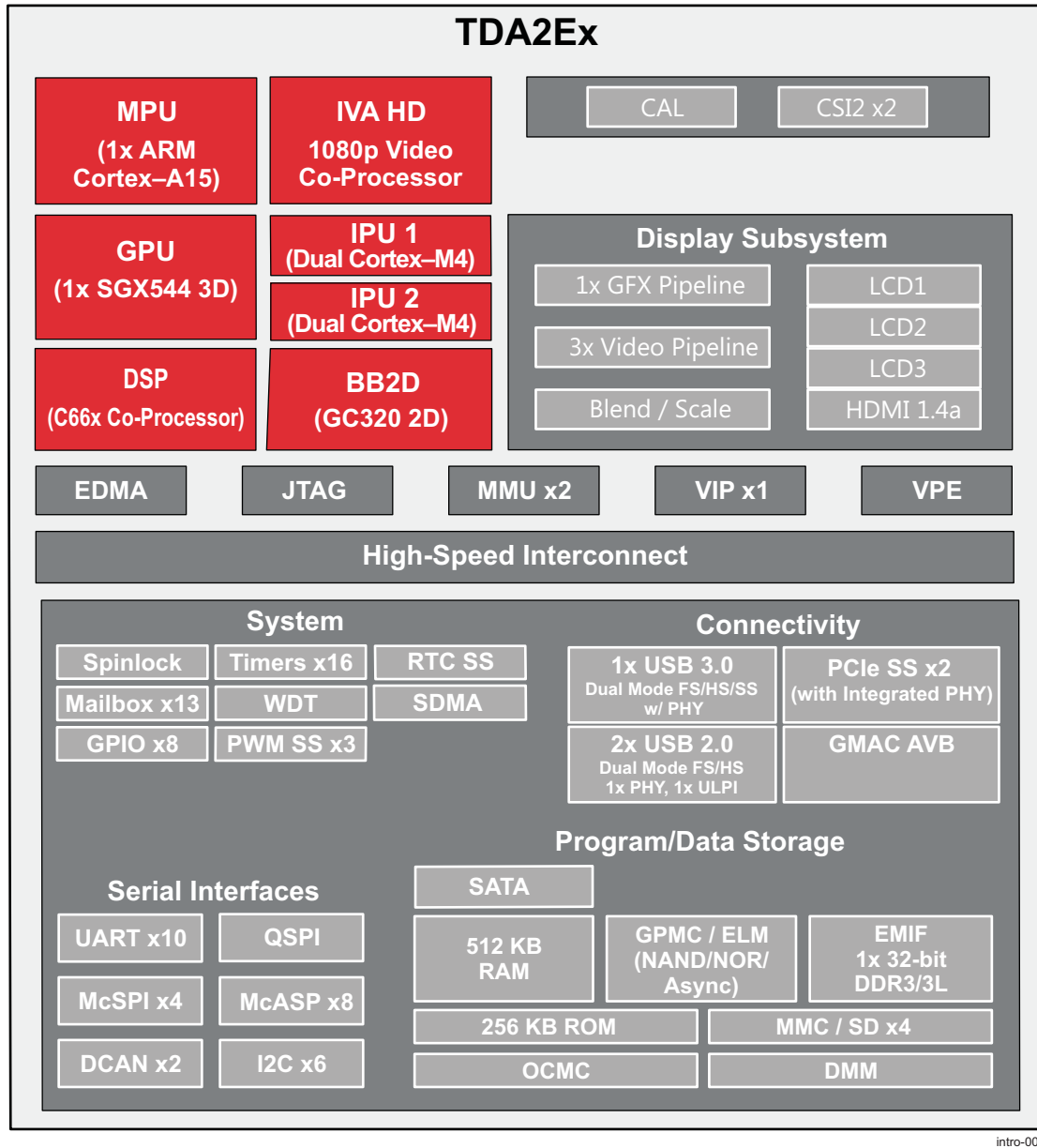
The TDA2Ex ADAS processor is qualified according to the AEC-Q100 standard.

**Device Information**

PART NUMBER	PACKAGE	BODY SIZE
TDA2Ex	FCBGA (760)	23.0 mm × 23.0 mm

## 1.4 Functional Block Diagram

Figure 1-1 is functional block diagram for the device.



**Figure 1-1. TDA2Ex Block Diagram**

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