

Seeing More in the Mirror Is Not Just about Your Perspective!



Joe Folkens

Advanced Driver Assist Systems (ADAS) continue to expand across many types of vehicle applications with various levels of functionality, and Texas Instruments (TI) continues to provide scalable solutions to address them. One emerging ADAS application is CMS (camera monitoring system) which replaces the rear view mirror and both side mirrors with cameras and monitor(s). There are several advantages of these electronic systems when compared to today's typical mechanical mirrors.

- Less wind resistance for improved gas mileage
- Enhanced visibility for increased safety
- Supports vision-based analytics
- Potential cost reduction
- Vehicle aesthetics



Fig. 1a



Fig. 1b



Fig. 1c

To begin, upwards of six percent drag or more can potentially be reduced just by replacing the side mirrors on a vehicle alone (Fig 1a). That reduction in wind resistance directly improves gas mileage given the same set of test conditions and depending on the car and type of side mirrors, the use of cameras to replace those mirrors can potentially reduce the cost of the system while enhancing the overall appearance of the vehicle as well. In the near-term, the monitors replacing the mirrors will typically be positioned in the same general line of sight to help in driver transition and familiarity with using them (Fig. 1b). The rearview monitor can be designed to display a traditional, interior camera, view as well as an unobstructed, rear camera, view via a switch setting (Fig. 1c). In the future, there may be a time where no side monitors will be integrated into the vehicle's interior and only the rearview monitor will display the images for all cameras, i.e. left, right and rear (Figure 1). Of course, this will be at the discretion of the car manufacturers and/or the governing regulations.



Figure 1. Fig. 2

The key enhancements of CMS are from a safety perspective which offers increased image/view quality and vision-based analytics for accident-avoidance alerts and/or autonomy, both of which can be provided through the implementation of these types of systems. The ability to electronically adjust in real time to various light levels and environmental conditions can clearly increase the driver's visibility and in-turn, all of the occupants' safety. Some examples of these capabilities can be seen in this [video](#) from TI at CES 2016. In addition, the use of computer vision analytics can provide object detection, distance information, time-to-impact and more as the basis for early warning, automatic braking and/or steering systems.

The examples highlighted above and seen in the video can be readily implemented using the processing capabilities of TI's [TDA3](#) family of processors. Building upon a strong history and expertise in digital signal and vision processing, the TDA3 extends TI's broad portfolio of devices targeted for ADAS applications by providing another strong set of options for customers to choose from when considering their automotive ADAS offerings. The TDA3 family provides highly compelling options with key functional integration to enable cost-effective solutions for CMS systems. Combined with TI's vast analog portfolio, TI's automotive customers can scale across a wide range of ADAS applications using the extensive TDA product line to enable their end customers to incrementally build out their ADAS offering based on an industry-leading heterogeneous architecture.

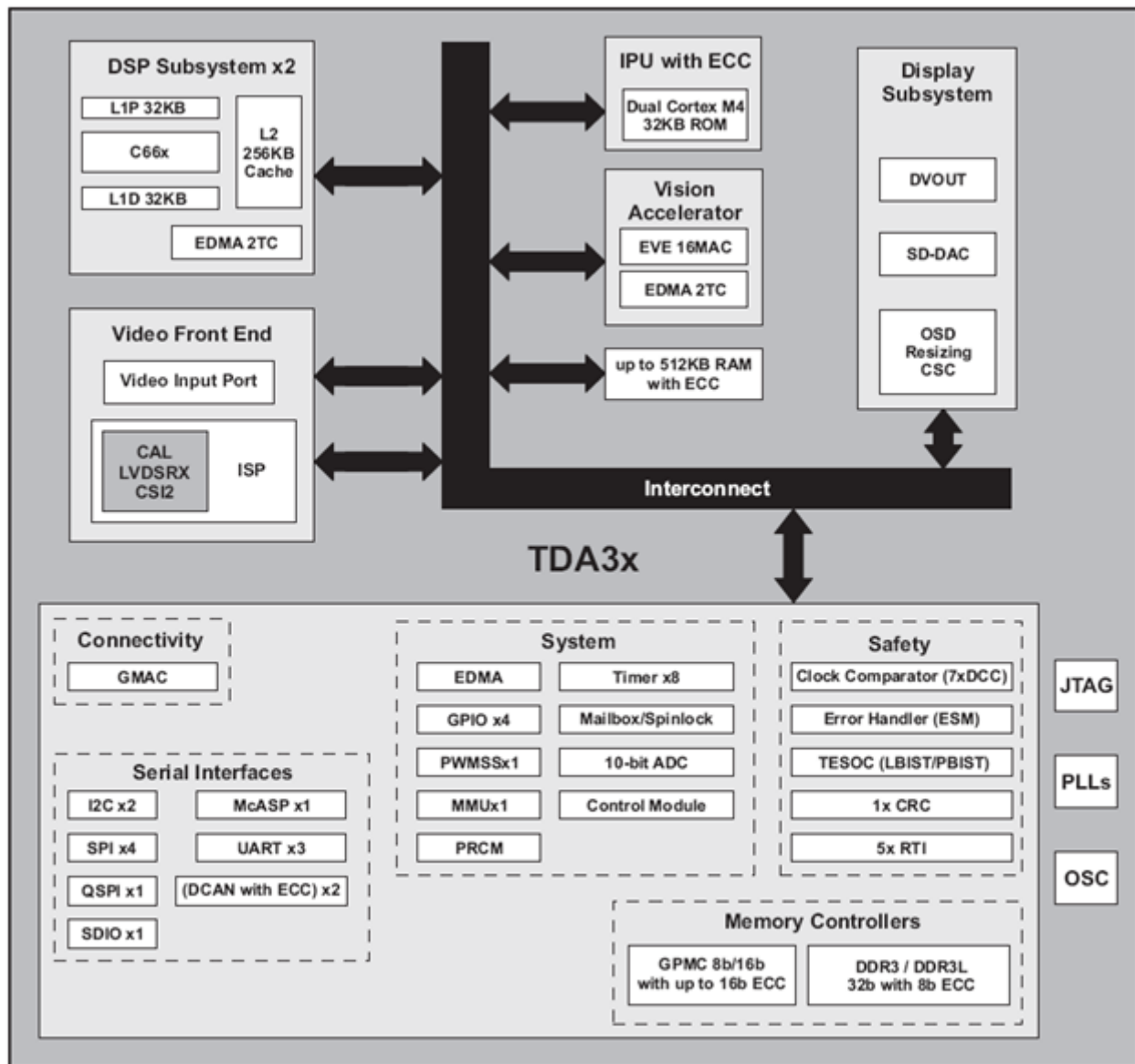


Figure 2. TDA Family Block Diagram

Developed with an integrated set of processing cores and key functions, this cost-effective architecture enables the required visual processing to successfully produce highly functional CMS solutions. In addition to this optimized heterogeneous processing architecture, the TDA3 provides a great set of peripheral functions that apply to not only CMS applications, but other ADAS applications being staged for market release in the near-term and future as well. When coupled with TI's Vision Software Development Kit (SDK) and TI's broad catalog of automotive devices, a customer can successfully design, develop and deploy a very compelling vehicle Camera Monitor System and other [Automotive ADAS solutions](#) for many model years to come.

For additional insight into Texas Instruments' ADAS technology, please read the below information:

[Paving the way to self-driving cars with advanced driver assistance systems](#)

[Advanced Driver Assistance \(ADAS\) Solutions Guide](#)

[Empowering automotive vision with TI's Vision AccelerationPac](#)

[TI Gives Sight to Vision-Enabled Automotive Technologies](#)

[Making cars safer through technology innovation](#)

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#) or other applicable terms available either on [ti.com](https://www.ti.com) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2023, Texas Instruments Incorporated