

Radar Co-Processor for Advanced Driver Assistance Systems

The EnSilica eSi-ADAS™ radar co-processor provides a small, highly efficient and low-power digital signal processing solution that enhances the overall performance and capabilities of radar-based ADAS systems that require fast and responsive situational awareness.



The compact, low gate-count architecture of the eSi-ADAS co-processor enables the high bandwidth and computationally intensive operations involved in plot extraction and tracking to be quickly and efficiently processed at the radar receiver stage.

Industry Leading Capabilities

Compared to current ADAS processing methods, eSi-ADAS offers a number of industry leading capabilities:

- Short, Long, Parking and 360° radar modes
- Real-time tracking of over 128+ objects
- Ultra Low latency
- Support for range, doppler and azimuth
- Offload of radar target processing from the ECU
- Up to 10x lower power
- Up to 20x lower memory

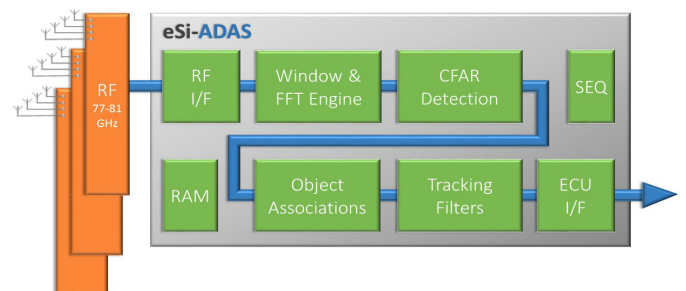
Typical Application Areas

- Automotive
- Drones
- Robotics
- Unmanned and Autonomous Vehicles

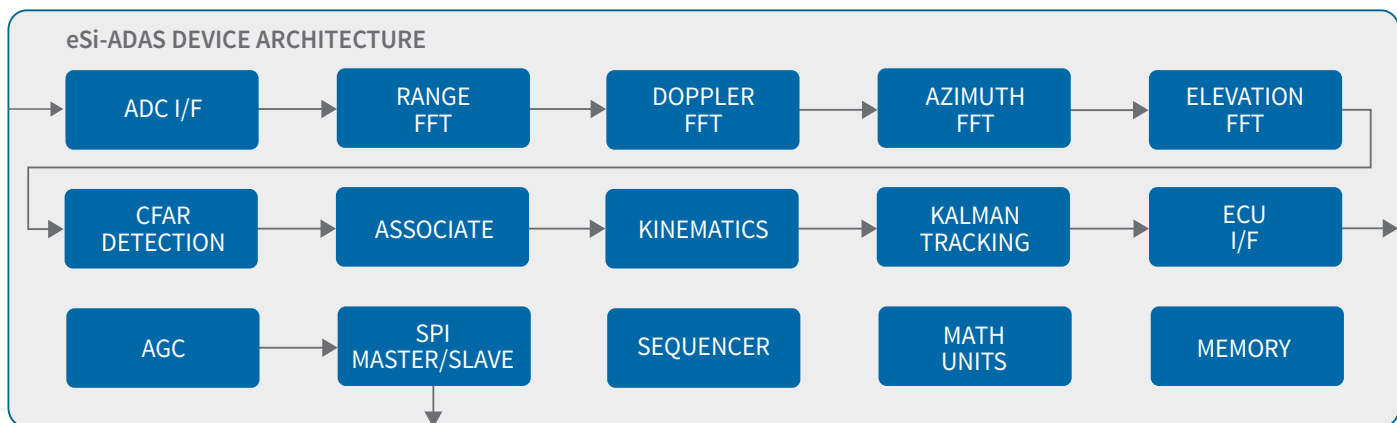
Benefits

- Simplify ADAS design and implementation
- Lower system cost
- Lower power requirements
- Free ECU resources to enhance overall ADAS performance and capabilities

Technical Summary



Operating on range, velocity and angular measurements eSi-ADAS applies advanced digital processing techniques including 3D Fast Fourier Transforms, burst averaging to improve signal-to-noise ratio, Constant False Alarm (CFAR) detection and Kalman Filtering. These operations all take place in real-time to constantly update over 128 objects and their associated movement.



Technical Overview

The dedicated mathematical hardware engines that form the core of eSi-ADAS significantly reduce the load and overhead of processing radar data on the main ECU, enabling overall ADAS capabilities to be enhanced.

The radar samples are first demodulated using Range, Doppler, Azimuth and Elevation Fast Fourier Transforms (FFT), then detected, and the resulting measurements are tracked by a high performance Kalman Filter. This means that the final bus output is a low data rate object list with position, speed and confidence values that can be used by an ECU for sensor fusion with other radar object lists or images.

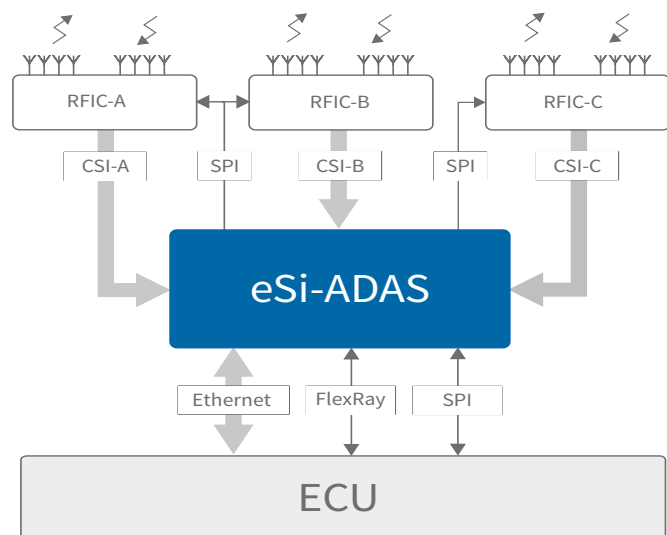
Key Features

- Demodulates and tracks over 128 objects
- Maximum 20ms latency
- Industry leading power consumption
- Industry leading DSP processing
- Fast Chirp De-modulation
- 16 receive channels
- ADC sample rates to 100 Mpsps
- Supports Long Aperture Array configuration
- Supports 3D Antenna configuration
- Supports three independent radar modules
- CSI-2/LVDS data plane interface to RF devices
- SPI control plane interface to RF devices
- Ethernet/SPI/FlexRay control plane interface to ECU
- Multiple sleep and power saving modes
- Autonomous operation
- Software support library
- BIST for safety critical self-test
- Compliant to ISO26262
- Automotive temperature range -40°...+125°C
- AEC-Q100 qualified

Ultra Low Latency

The eSi-ADAS co-processors exceptionally low latency of 20ms enables critical safety decisions to be made with confidence.

RF Integration



To provide the most precise plot extraction eSi-ADAS operates in conjunction with modern fast chirp capable RF devices. EnSilica's patented chirp processing techniques over-comes the challenges usually associated with processing fast chirp modulation, notably its high computational and memory requirements.

Package Details

- 8mm x 8mm 100-pin low profile BGA package
- Bare-die for chip level integration with RF or ECU

Demonstrator

An eSi-ADAS module is available to enable the full capabilities of eSi-ADAS to be evaluated.

