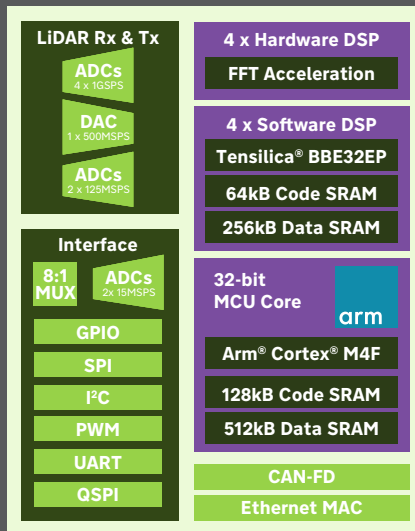


## iND83301 – Surya™

### LiDAR SoC

#### Surya™ Features

- 12-bit differential ADCs:
  - 4 channels @ 1GSPS or 8 channels @ 500MSPS
  - 2 channels @ 125MSPS
- 500MSPS 14-bit differential DAC
- Hardware-accelerated FFT processing unit
- Quad-core 800MHz Tensilica® DSP processor
- 500 MHz Arm® Cortex® M4F processor for supervisory control
- I²C, SPI, QSPI and UART controllers
- 4 PWM outputs
- 2 General Purpose ADCs @ 15MSPS
- 100/1000Mbps Ethernet MAC
- CAN-FD Controller



#### Applications

- ADAS functionalities including highway pilot and traffic jam assist
- Autonomous Vehicles
- Smart Infrastructure
- Industrial Automation

Surya™ is a mixed-signal SoC which enables advanced driver assistance systems (ADAS) and autonomous driving functionality. The device is designed for high performance LiDAR and integrates both high speed analog to digital converters and digital signal processing to facilitate the reliable detection of long-range targets. Surya™ consumes significantly lower power and is substantially more cost-effective than current designs based on FPGAs and discrete data converters.

The device incorporates a software-configurable receiver, transmitter, and baseband signal processor. The receiver portion provides flexible high-bandwidth analog-to-digital conversion as well as a hardware-accelerated FFT processing unit. The transmitter enables waveform synthesis and digital-to-analog conversion, synchronized to both the receiver and optomechanical LiDAR sub-systems. The baseband signal processor is a powerful quad-core Tensilica® software-defined, signal processing unit for point cloud generation.

Additionally, the SoC integrates a 32-bit Arm® Cortex® M4F supervisory processor and several I/Os which monitor, control and synchronize sub-systems of the LiDAR that require analog or digital interfaces such as:

- Optical front-ends
- Global timing references such as GPS
- Beam steering devices
- Inertial measurement units

Furthermore, Surya™ comes with drivers for accessing all its peripherals and subsystems, and its processors use the 2-wire SWD interface for debugging.

With its programmable DSP firmware, Surya™ is able to acquire and process LiDAR waveforms for frequency modulated continuous wave (FMCW) or other coherent detection LiDAR systems operating at any wavelength.

Typical LiDAR electronic implementations contain a very large number of discrete ICs with complex PCB design, including multi-lane high-speed SERDES interfaces between data converters and an FPGA. Surya™ simplifies signal processing by containing all critical high-speed interfaces on-chip, such as between the ADC and DSP, which greatly reduces both power and PCB routing complexity, while improving latency and throughput.

With the ability to load all firmware securely from an off-chip Flash memory device, the SoC retains the field upgradeability of legacy FPGA solutions to support evolving processing and perception algorithms.

#### Ordering Information

Device Name	Platform	Temp Range	Package	Pins
iND83301	Automotive	-40°C to +85°C	17 x 17 mm FCBGA	400 Pins @ 0.8 mm Pitch

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