## Echosense Features

- Ultrasound transducer single-chip driver capable of 30-70kHz burst frequencies
- High voltage driver with boost regulator
- Programmable receiver sensitivity and echo detection
- DSP with integrated digital filtering and AGC
- ARM M0 32-Bit MCU
- 64kB Flash / 16kB SRAM
- 5 GPIOs
- 8-bit Housekeeping ADC
- On-chip temperature sensor
- 1x master and 1x slave LIN 2.2 controllers with configurable transceivers
- Measurable distance 20-200*cm
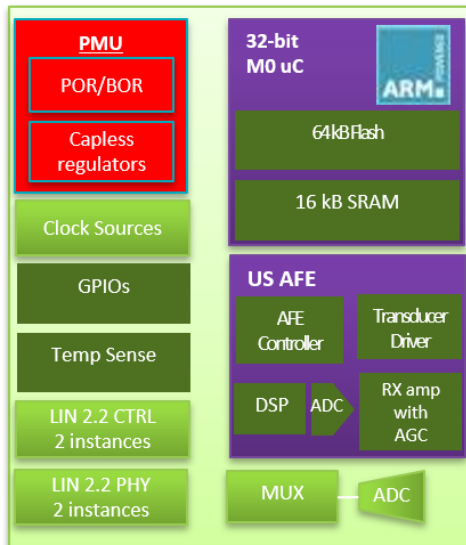
Recommended Applications

- Automotive Park Assist
- Industrial control

iND83208 - "Echosense"
indie ultrasonic parking assist with direct-drive

Device Description

Echosense provides a completely integrated solution for high-performance ultrasonic automotive parking-assist applications. Echosense integrates a powerful 32-bit ARM M0 with 64kB of FLASH and 16kB of SRAM. A portion of the FLASH integrates proprietary DSP algorithms which eases the hardware requirements of the devices and lowers overall system cost.

Echosense also includes an integrated power management block (PMU) directly connected to the car battery, from which all the supplies required by the device are generated. The ultrasound transducer is driven by a high-voltage full-bridge driver which enables a transformer-less solution. The driver is supplied by a boost regulator, which has a programmable output regulation voltage level. The driving frequency and number of pulses can be accurately programmed to match the transducer resonant frequency and the application requirements. Echosense also enables the measurement of transducer reverberation so that the resonant frequency can be accurately measured, and the driving frequency tuned to match, for maximum power transfer.

Sensing of objects is performed by receiving the reflected echo signals via the ultrasonic transducer. The received echo is amplified with a high precision analog front-end which includes a low-noise amplifier (LNA) followed by stages of programmable gain amplifiers (PGAs), and the signal is then fed into an ADC. Digital signal processing (DSP) of the signals follows the ADC and the output of this DSP can be captured into microcontroller memory. Echo detection and association algorithms are implemented in firmware.

Additionally, the IC integrates a LIN master controller, a LIN slave controller and associated transceivers. The two LIN pins can operate as LIN transceivers, or can be used as high-voltage GPIOs, or can be used as speaker drivers. Five GPIOs are provided for any additional requirements the application may require, such as some methods of slave node addressing.

An 8-bit housekeeping ADC allows firmware to monitor all supply voltages, a temperature sensor, the LIN1/2 pins and the GPIOs. This enables system diagnostics to be performed

Ordering Information

Device Name	Platform	Temp Range	Package	Pins
iND83208 Echosense	Automotive	-40C to +85C	4x4 mm QFN	24 Pins @ 0.50 mm Pitch

*using standard 75mm pole