

Fact Sheet

Automotive Radar

High-resolution 77 GHz radar

Overview

The automotive industry's efforts to achieve a goal of zero automotive-related fatalities, along with meeting consumer demand and government legislation, are driving adoption of advanced automotive safety systems.

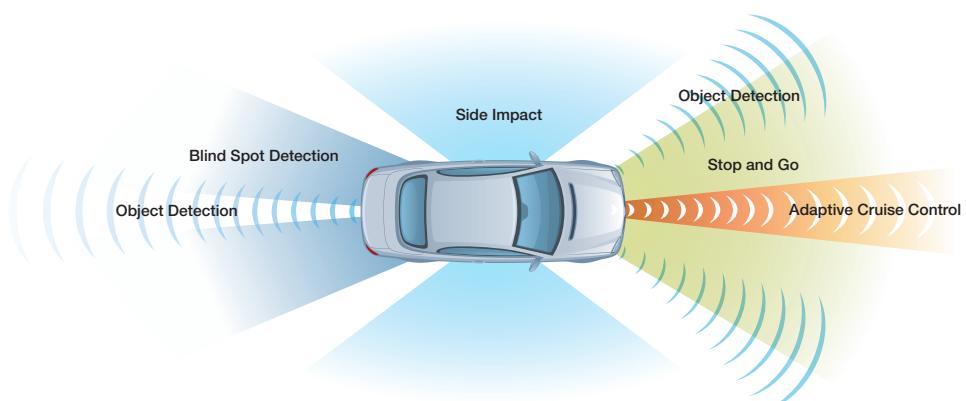
Advanced driver assistance systems (ADAS), radar and camera systems are expected to become government-mandated in the future.

Freescale's 77 GHz silicon germanium (SiGe) chipset advances automotive safety by enabling vehicles to sense potential crash situations. This radar solution provides long- and mid-range functionality, allowing automotive systems to monitor the environment around the vehicle to help prevent crashes.

Freescale's radar system is based on multi-channel receivers and transmitters that allow high-level integration and complex

signal generation and processing. A typical Freescale RF front-end solution consists of a transmitter chip with an integrated PLL, power amplifier and local oscillator (LO) output and an on-chip ramp generator, along with one or several multi-channel receivers that provide the low-noise down conversion of the radar signals into the intermediate frequencies (IF) domain.

The chips are manufactured in Freescale's 0.18 μ BiCMOS technology, which allows the combination of high-speed bipolar devices with the high integration level of CMOS. This technology is ideal for automotive safety systems and is also applicable for aerospace, military and industrial markets.



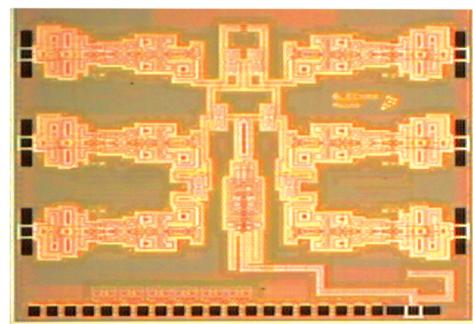
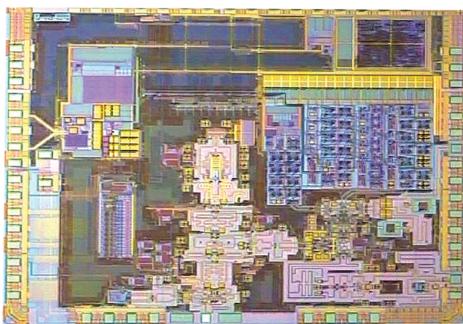
Freescale 77 GHz Technology

Advantages

- Multi-mode, multi-application capability
- Simultaneous long- and mid-range functionality
 - Allows one radar to be used for multiple safety systems:
 - Adaptive cruise control
 - Headway alert
 - Collision warning
 - Mitigation and brake support
- Solid-state technology
 - Highest level integration
 - Most advanced SiGe technology with multi-channel transmitter and receiver chips
 - No moving parts
 - Extremely reliable
- Mixed-signal technology
- Class-leading performance and durability

Freescale: A Leader in Sensing Solutions

Expanding on its more than 30-year heritage of sensor innovation, Freescale's Xtrinsic sensing solutions are designed with the right combination of high-performance sensing capability, processing capacity and customizable software to help deliver smart, differentiated sensing applications. With Xtrinsic sensing solutions, our vision is to offer a diverse and differentiated product portfolio to meet the expanding needs of the automotive, consumer and industrial segments. Xtrinsic solutions offer ideal blends of functionality and intelligence designed to help our customers differentiate and win in highly competitive markets.



Transmitter

- Low power consumption
- Extremely low phase noise
- High output power at 3.3V
- Very precise control over frequency (+/-100 ppm)
- No trimming, no adjustments
- Supports RX designs with local oscillator at half of the RF frequency (38.25 GHz)
- Ability to monolithically integrate frequency stabilization (PLL), PA and programmable FMCW modulation
- SPI interface (optional)

Multi-Channel Receiver

- Multiple channels supported
- Local oscillator at 38.25 GHz
- Local oscillator input power level typical -7 dBm
- Differential IF
- Lowest noise figures
- High IF-to-IF isolation
- Low residual power levels
- Gain/linearity on customer request
- ESD protection (RF and DC)
- SPI (optional)

| Application | Detection Range | Safety Aspect | Technology |
|-------------------------|-----------------|------------------------------------|--|
| Adaptive Cruise Control | 200 meters | Normal driving, accident avoidance | • 77 GHz Radar |
| Pre-Crash | 30 meters | Accident, mitigation of impact | • 77 GHz Radar/24 GHz Radar • 76/81 GHz Radar |
| Blind Spot Detection | 20 meters | Normal driving, accident avoidance | • 77 GHz/24 GHz Radar/ Vision sensor |
| Lane Departure Warning | 60 meters | Normal driving, accident avoidance | • Vision sensor |
| Stop and Go | 30 meters | Normal driving, accident avoidance | • 77 GHz/24 GHz Radar • 76/81 GHz Radar |

Learn More:

For current information about Freescale products and documentation, please visit freescale.com/sensors.