Texas Instruments

TI *Live!* 相約在 AMPA

探索汽車電氣化的重大趨勢

Designing automotive systems can be challenging

- Functional safety requirements
- Time to market
- Cost
- Various worldwide regulations
- Continuous innovation demands
- Supply chain issues

Why TI for automotive

Our technology, design resources, manufacturing and purchasing process empower you to create innovative automotive solutions and bring them to market faster.

Broad portfolio designed for auto

7,000+ auto-qualified analog and embedded processing products

Source a wide range of automotive products from a single supplier

The right parts for your design needs

Continuously innovating

40+ years designing products for automotive

Consistently introduced 500+ new automotive ICs annually since 2014

Driving innovation at every step of the product cycle

System expertise

Our engineers work with you to understand your unique vision, meet your deadlines and get you to production

Tools, software and local support help accelerate time to market

Support for 150 automotive applications and 350+ fully tested reference designs on TI.com

Delivering automotive quality and global supply

Automotive quality

Holistic approach to quality, from process technology and design through manufacturing, packaging, test and delivery

Easy access to industry documentation helps you effectively meet rigorous quality and safety requirements

We deliver quality products, manufacturing and support you can rely on.

Industry-leading global supply chain

15 manufacturing sites worldwide, multiple new factories coming on line 2022

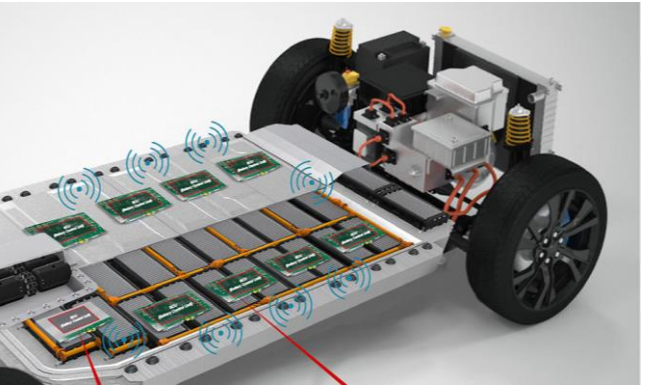
Increased manufacturing capacity by 50% from 2016 to 2020

Investing in 40nm – 130nm process nodes

Continuously redesigning popular, durable parts to new technology processes, for higher quality and greater device longevity

Expanding manufacturing to increase supply and enhance business continuity

Driving automotive innovation forward



Hybrid and electric vehicles

Highly accurate battery monitoring for longer distances between charges and safer, more affordable vehicles

Advanced driver assistance systems

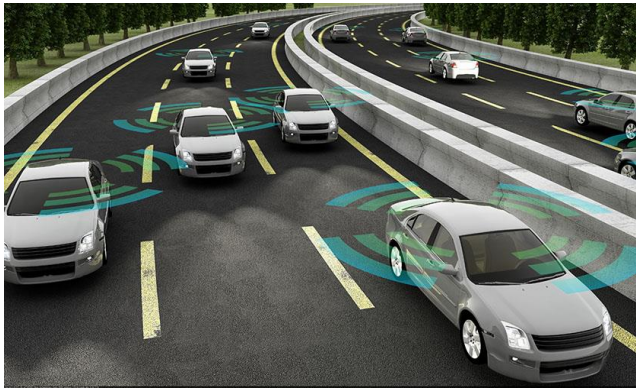
Portfolio of automotive-qualified ICs, including highly-accurate radar SoCs, powerful processors and reliable power management products

Infotainment and cluster

Immersive systems that keep drivers more informed and less distracted

Body electronics and lighting

Innovative analog and embedded processors to optimize comfort and convenience



Hybrid and electric vehicles

Our continuous innovation, technology and expertise help you maximize driving range, make EVs more affordable, enable faster charging and safer operation.

HEV/EV | Trends and Technology

HEV/EV Trends

30% of new cars will be HEV/EV in 2025

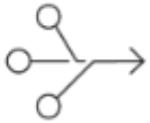
800V batteries for higher efficiency and faster charging

Sustainable battery chemistries like LFP

Wireless battery management and EIS

100kW to 500kW motors ASIL-C & ASIL-D FuSa

Wide bandgap switches like GaN & SiC



Powertrain Integration

TI Technology |

Maximizing driving range with industry's leading performance and reliable solution

Real-time Control MCUs

Double the speed of your motor and increase efficiency with our Real-Time Control MCUs with less than 2µs current loop speed. ASIL-D, Security, and AUTOSAR + Control for highest system integration.

Battery Monitors

Maximize drive range by enhancing state-of-charge accuracy with high-precision, 1mV accurate Battery Monitors with voltage + current synchronization & Electrical Impedance Spectroscopy (EIS)

Connectivity

Our wireless protocol enables secure, high-performance Connectivity Products with high data throughput up to 1.2 Mbps and latency less than 2ms per node.

Isolated Gate Drivers & Bias Supplies

Drive high-power SiC MOSFETs and IGBTs with our 30A, adjustable strength Isolated Gate Drivers. Provide 1.5W power at ±1.3% accuracy with Integrated Transformer Technology Bias Supplies.

GaN

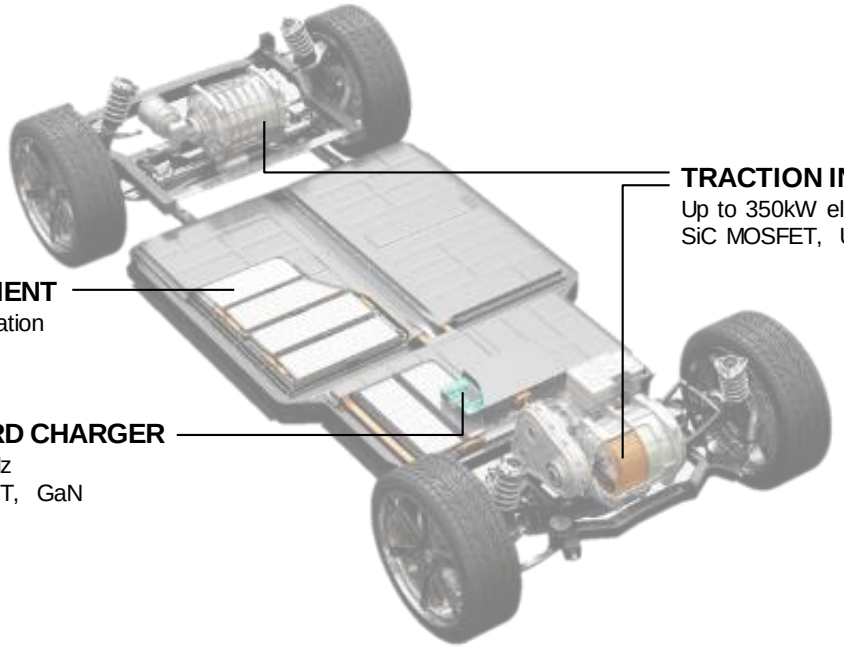
Switch up to 1MHz and shrink magnetics by over 60% with TI's Automotive GaN. Integrated drivers and protections offer switching speeds as fast as 150V/ns.

Hybrid, electric & powertrain systems

Giving you the power

TO ELECTRIFY

Accelerating EV and powertrain design by innovating vehicle electrification to reduce emissions, decrease weight and boost efficiency with fewer mechanical components.



Emerging trends in powertrain integration

- **Powertrain integration** towards Domain Controller integrates Traction Inverters together with OBC/DCDC/PDU/BMU
- **E-Axle / Dual Inverter** vehicles (AWD) and/or architecture from 3-phase to 6-phase (better torque control, higher power, higher motor efficiency)
- Increasing power level and FuSa requirement (100kW to 500kW, ASILC to ASILD)
- Shifting towards **800V Technology** with increased switching dv/dt, more stringent on system reliability and efficiency requirement
- **Adjustable gate drive strength** needed to reduce overshoot, optimize efficiency and EMI
- **Inductive position sensing** technology as alternative to resolver for cost reduction (xMR, eddy current)

Inverter + Motor + Reducer

Inverter + OBC + HV DCDC

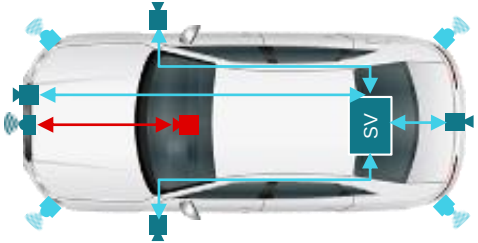
Inverter + HV DCDC

Advanced driver assistance systems (ADAS)

Vehicle safety systems are constantly evolving, leading automakers to envision a world where vehicle collisions are a thing of the past.

ADAS vehicle architecture continues to evolve

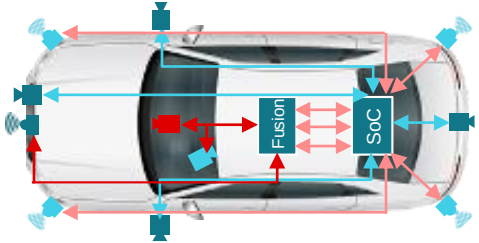
Distributed systems



- State of the art today
- Processing on the edge – processor close to sensor
- Easy to manage
- Power and size constraints

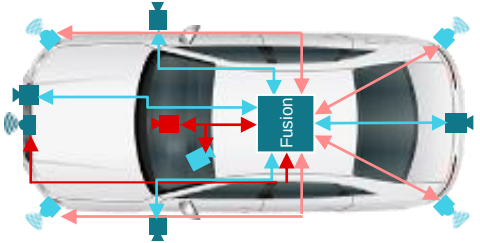
Parking Camera
Front Camera
Interior Camera
LR Radar
Multi-Mode Radar

Hybrid centralized system



- High-speed RAW data transmission to node processor
- Aggregate common sensor nodes into central fusion ECU (each processor node transmits object data to fusion ECU)
- Easy to manage
- Easily scalable
- Sensing units can be very small
- Power and size can be relaxed

Fully centralized processing

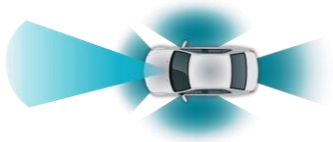


- Massive compute
- Challenges:
  - Scaling across the fleet
  - Managing multi-vendor collaboration on one chip
  - Multiple vendor systems on one chip raises safety & responsibility issues

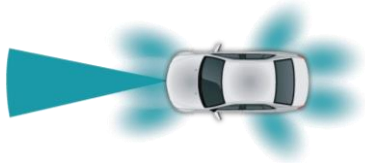
Broad portfolio designed for ADAS

Our portfolio of automotive-qualified ICs, including highly-accurate radar SoCs, powerful processors and reliable power management products, **enables you to build high-performance ADAS.**

Camera

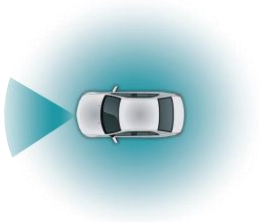


Radar



Sensor fusion

Lidar



Ultrasound

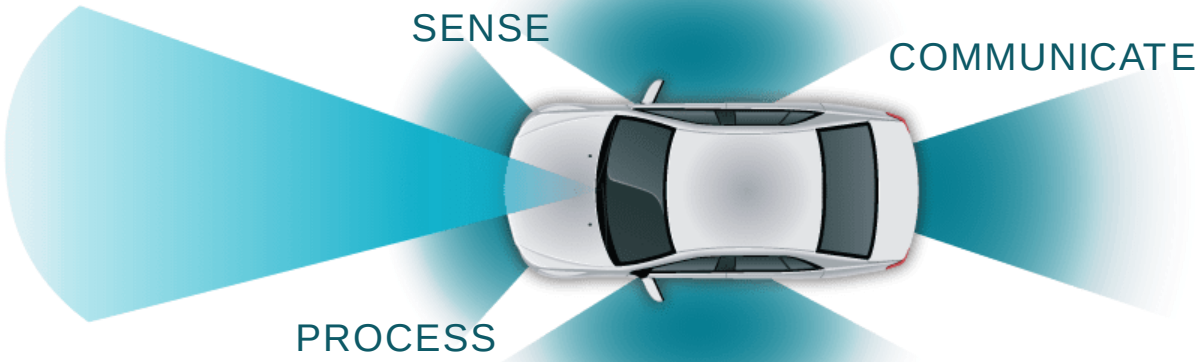
Enhancing ADAS with innovative technology

mmWave radar sensors

TI mmWave radar solutions enable safer and easier driving experiences by sensing and reacting to exterior and interior environments.

Reduce system size and cost while optimizing high-speed data transfer in camera designs for advanced driver assistance systems.

SERDES FPDLink



Arm® based processors

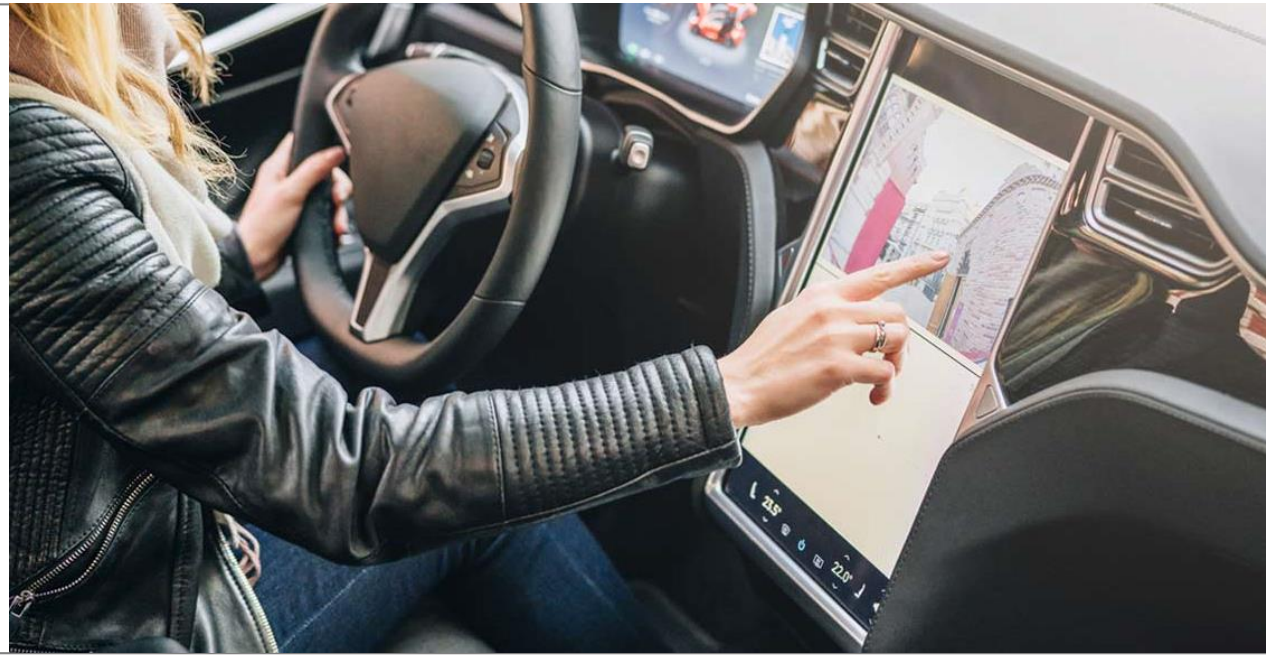
Enhance automated driving with AEC Q100-qualified Arm-based processors.

PMIC solutions for automotive camera and radar applications, most with robust fault protection and monitoring.

Power Management ICs

Infotainment and cluster systems

Create an in-vehicle experience that connects the car and presents information and entertainment with sound and display quality that rivals consumer electronics.



The next-generation digital cockpit

Enable infotainment, display and vehicle-to-everything (V2X) systems that minimize distractions, and help drivers stay informed and connected to the world.

Cluster

Telematics

Display

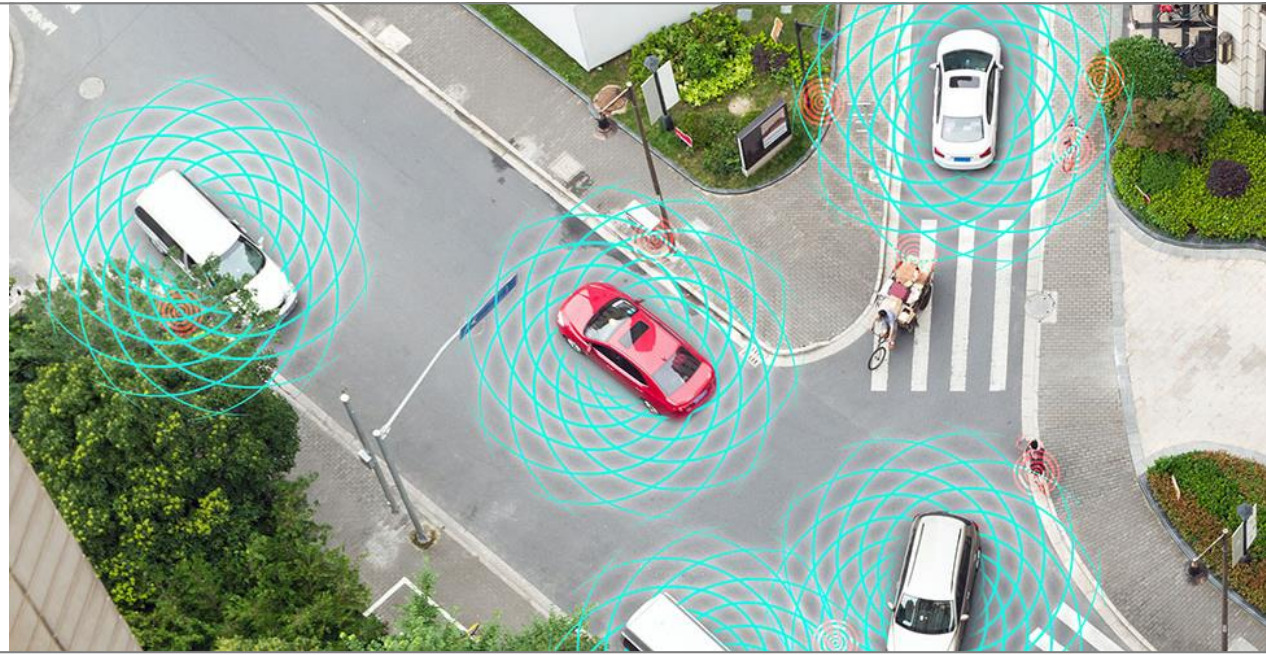
Integrated cockpit

Head unit

Media interface

Premium audio

Vehicle-to-everything (V2X), Safe and reliable communication between vehicles, infrastructure and the cloud.



Body electronic and lighting systems

Accelerating the evolution of passenger comfort and convenience. Advance your body electronics and lighting system design with our smart, scalable and efficient solutions.

Personalize the in-vehicle experience

Leverage our products and system resources to create body electronics and lighting systems that are more advanced, efficient and flexible.

Automotive lighting

Body control module & gateway

Body motors

Heating & cooling

Car access and security systems

Power seats

Steering column

Automotive HMI

Mirrors

Body sensors

Auxiliary power

Driving body electronics, lighting, passenger comfort and convenience forward.

Driving automotive forward

Paving the way for safer, more reliable EVs with cutting-edge automotive systems

- ✓ We address the most complex design challenges through our decades of automotive expertise.
- ✓ We enable you to easily and cost-effectively integrate high-performance driver assistance capabilities into any vehicle.
- ✓ We anticipate the ever-evolving regulatory and technological needs of tomorrow.

THANK YOU

Visit www.ti.com for more information and useful resources.

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