XENSIV™ sensors Selection guide 2026

We sense what matters

www.infineon.com/sensors

Dear valued customer,

Thomas Schafbauer,
Executive Vice President
Sensor Units & RF

Sensors are driving intelligence across industries, linking the real and the digital world. Our advanced sensor solutions are enabling new use cases and accelerating innovation across industries. By providing precise and reliable data for optimum performance and contextual awareness. Delivering unmatched safety and reliability in sensor-based solutions for our daily life – from vehicles to smart homes.

The world has been changing since the proliferation of AI. The need for high-quality data and advanced decision-making drives the adoption of sensors in basically all applications.

Let me list some examples:

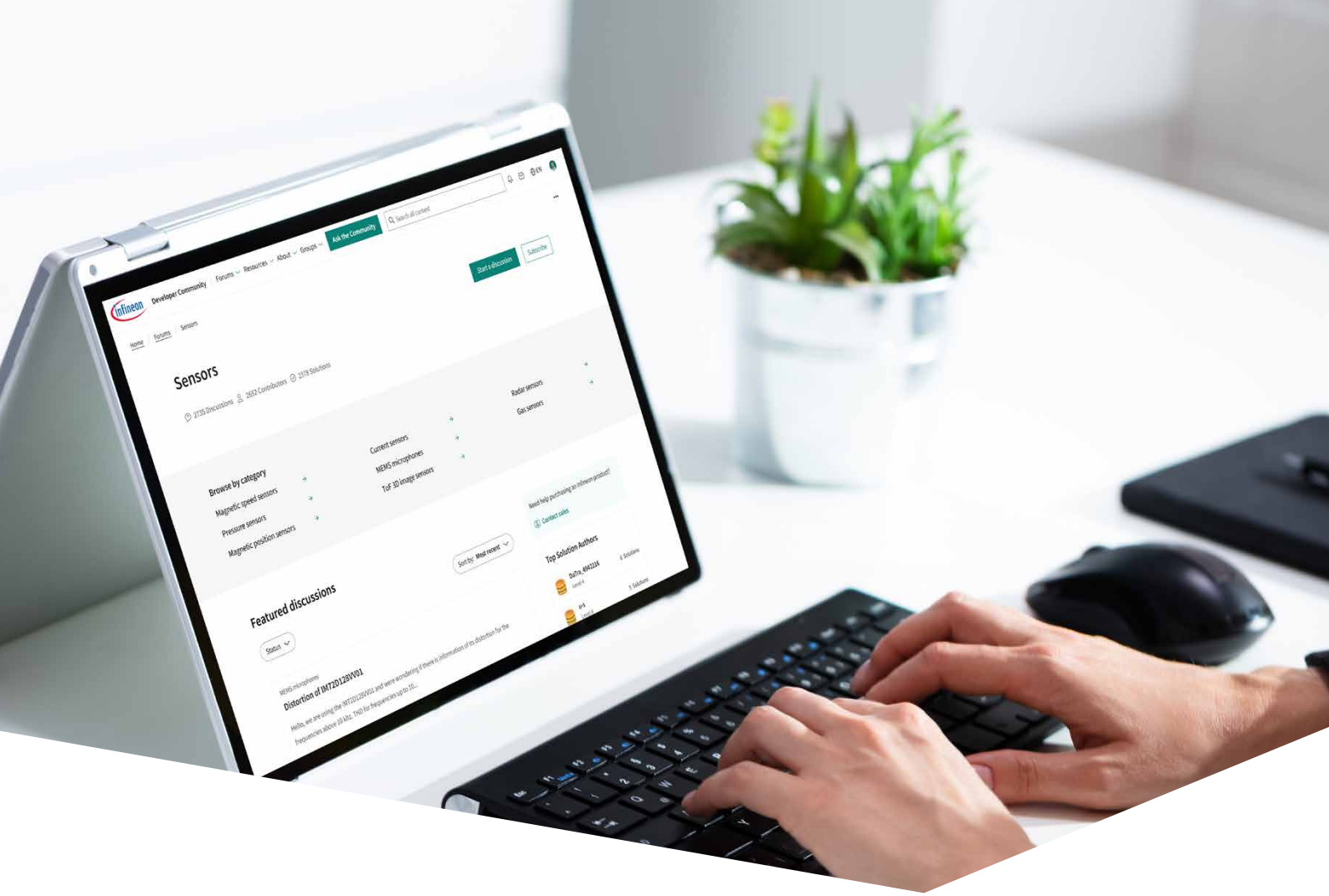
- Infineon's microphones based on high-end microelectromechanical systems (MEMS) are growing beyond smartphones and wearables in all objects
- Infineon radar solutions enable reliable object recognition e.g. in autonomous driving and cobots
- Infineon's magnetic sensors are already widely spread in cars and are now expanding rapidly into current sensing and consumer applications
- Human Machine Interfaces (HMI) and gas/pressure monitors allow for context-aware devices

Our XENSIV™ sensor portfolio represents Infineon's third key product pillar besides power and microcontroller, serving the automotive, industrial, and consumer markets.

The Infineon Sensing Guide 2026–2027 is a comprehensive reference of our vast sensing portfolio and technological advancements. I hope it can serve as a source of inspiration, how our sensors serve you in your journey of digitalization and decarbonization. Together.

Thomas Schafbauer,
Executive Vice President Sensor Units & RF

Contents



Ask the Infineon Developer Community

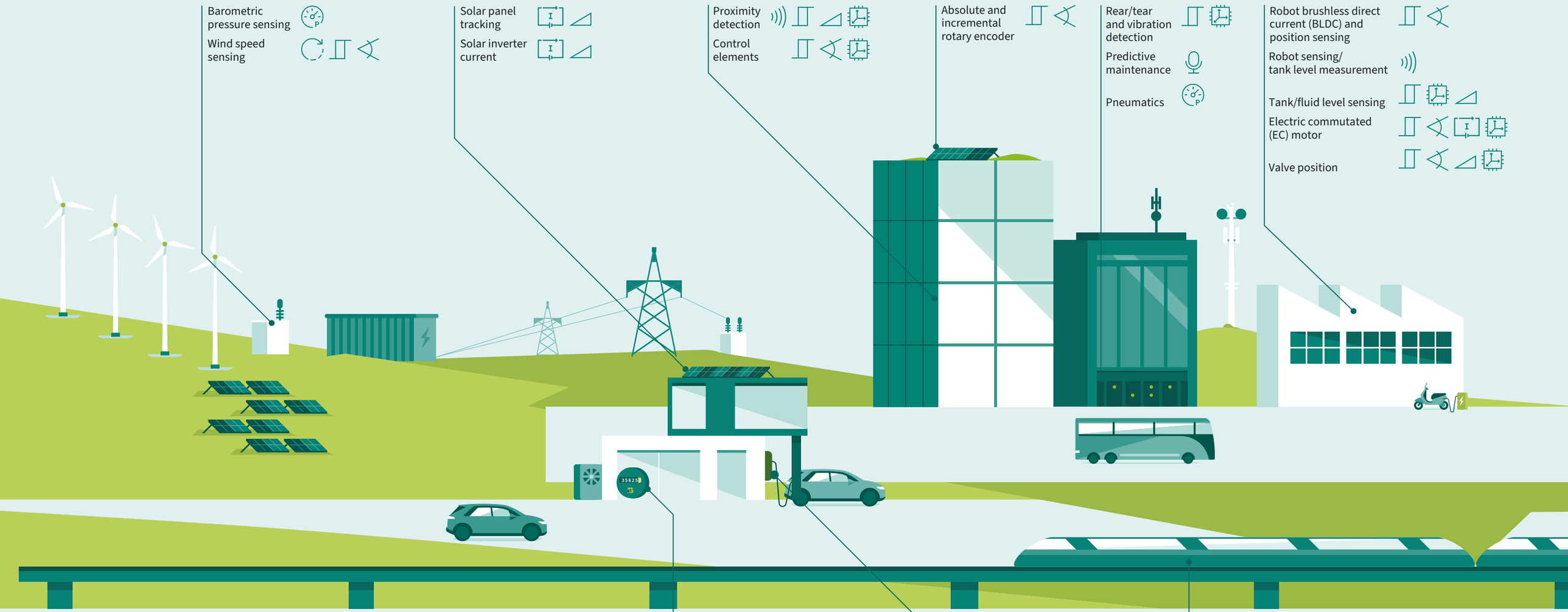
The Infineon Developer Community offers 24/7 self-service and lightning fast responses to customer demands. Any user, anywhere, anytime – any subject. The community is well-organized due to its multi-channel strategy. Unlike unmoderated forums, the developer community is based on high quality content that is professionally moderated and reviewed.

Check it out and be part of the Infineon Developer community.

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/inductive-position-sensors
www.infineon.com/current-sensors
www.infineon.com/mems-microphones
www.infineon.com/gas-sensors
www.infineon.com/radar-sensors

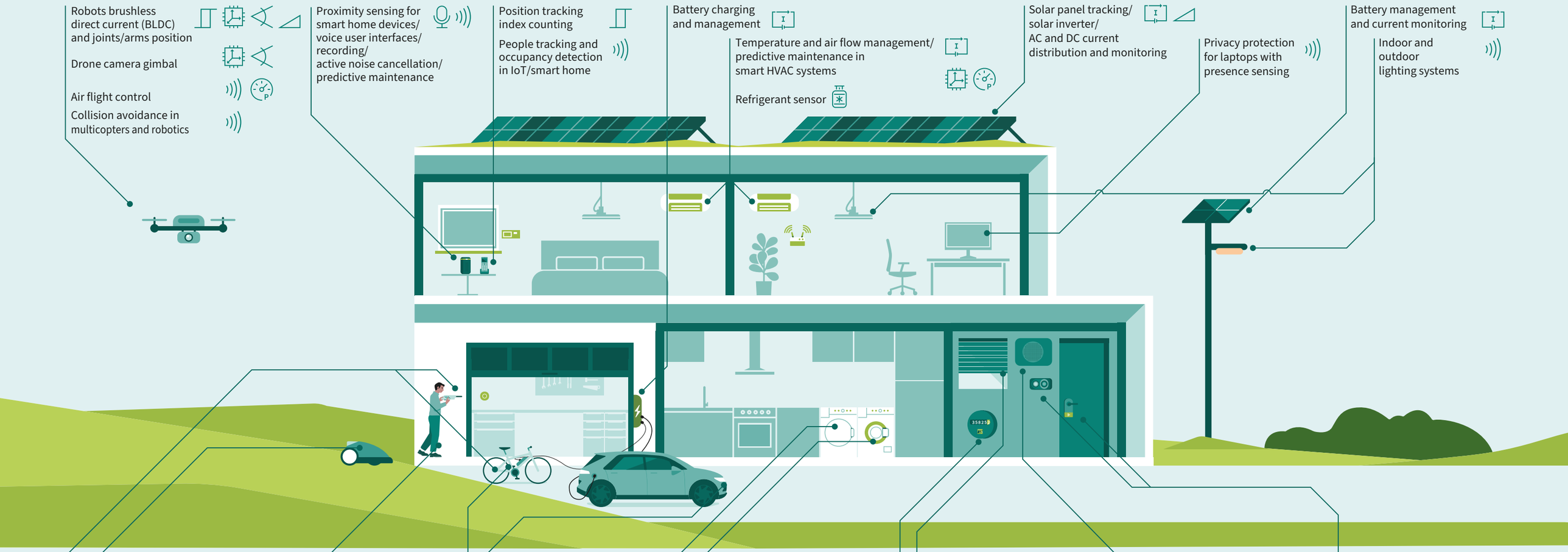
XENSIV™ sensors in smart industry



Switches and latches
Pressure sensors
Radar sensors
Linear sensors
3D sensors
MEMS microphones
Current sensors
Speed sensors
Angle sensors

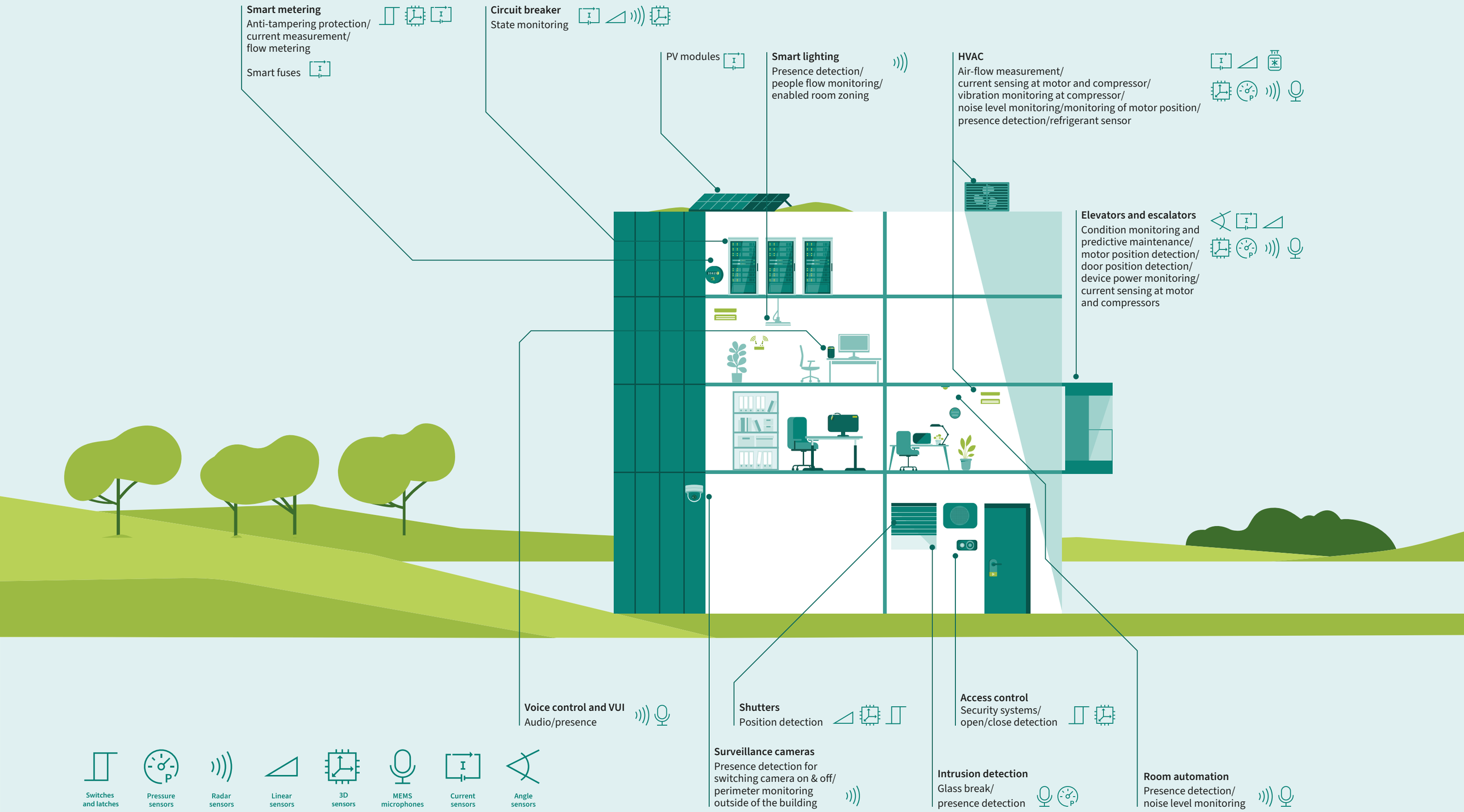
www.infineon.com/industrial

XENSIV™ sensors in smart homes



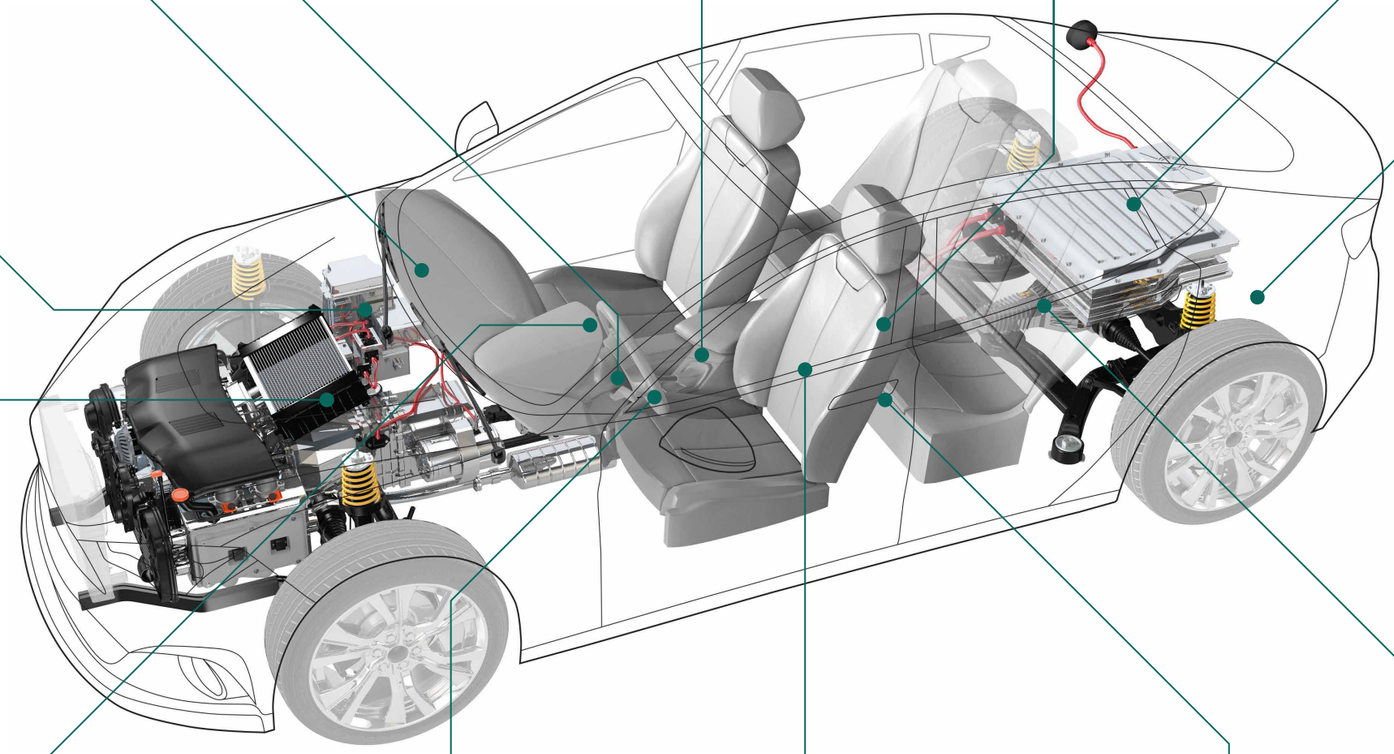
www.infineon.com/smarthome

XENSIV™ sensors in smart buildings



www.infineon.com/smartbuilding

XENSIV™ sensors in body electronics



HVAC flaps

Wipers

Control element/ top column module

Gear stick

Direction indicator

Power seat

Battery monitoring

H2 sensor H_2

Road condition detection

Damage detection

HVAC compressor

Voice interaction

Emergency call (e-call)

In cabin communication (ICC)

Acoustic noise cancellation (ANC)

Hands free (HF)

Steering lock/ immobilization

Seat comfort

Door module

Window lifter/sun roof

Magnetic switches

Linear sensors

Angle sensors

Current sensors

Pressure sensors

3D magnetic sensors

MEMS microphones

www.infineon.com/body-electronics

XENSIV™ sensors in powertrain systems

Engine

- Crankshaft
- Camshaft position
- Manifold air pressure
- Secondary air valve
- Turbo charger
- Throttle position
- Variable valve position
- HEV electric motor
- Pedal position
- Exhaust gas recirculation (EGR)

Transmission

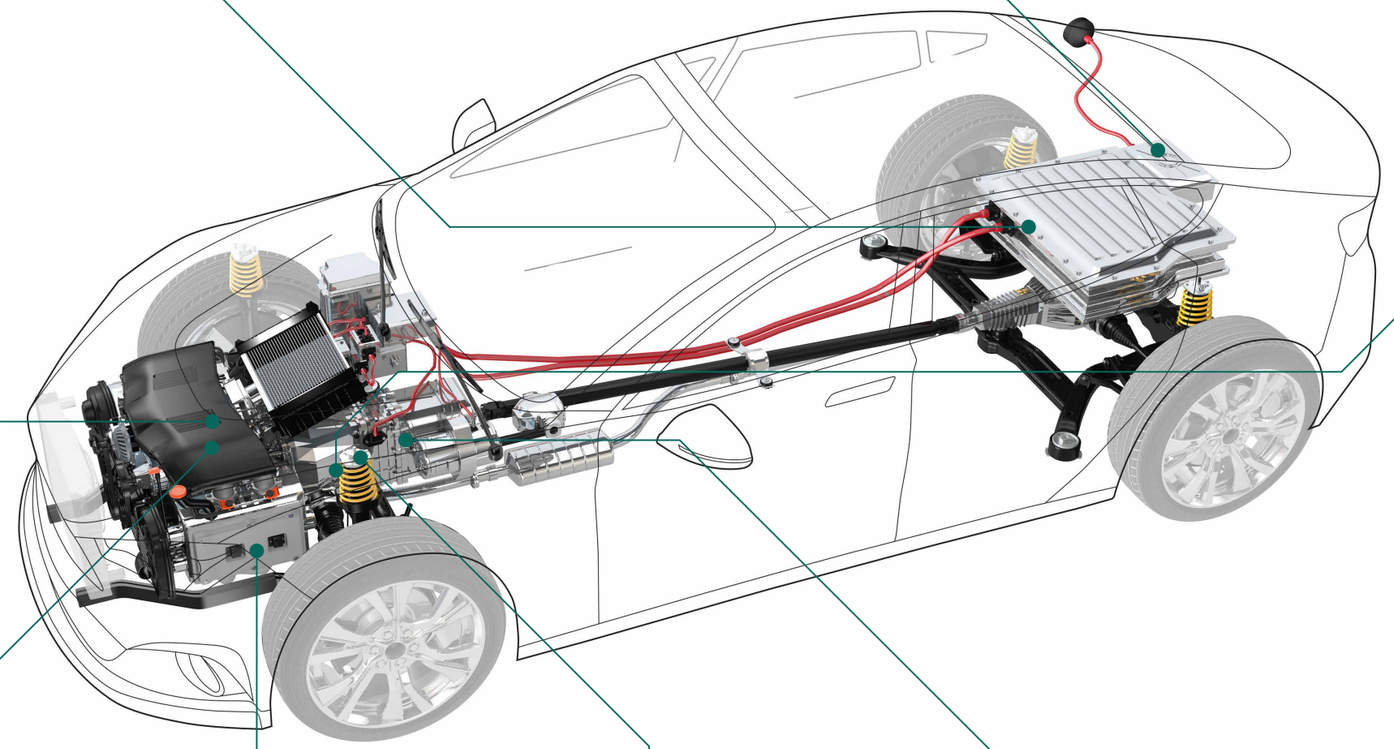
- Clutch position
- Clutch actuator
- Transmission speed
- Transmission actuator
- Transmission gear position
- Oil pump
- Park lock
- Gear stick

Battery monitoring for EV

HV battery disconnect for xEV

H2 sensor H_2

On board charger (OBC)



DC-DC converter

Barometric air pressure

Starter generator

Transfercase

Magnetic switches · Linear sensors · Angle sensors · Current sensors · Pressure sensors · Speed sensors · 3D magnetic sensors

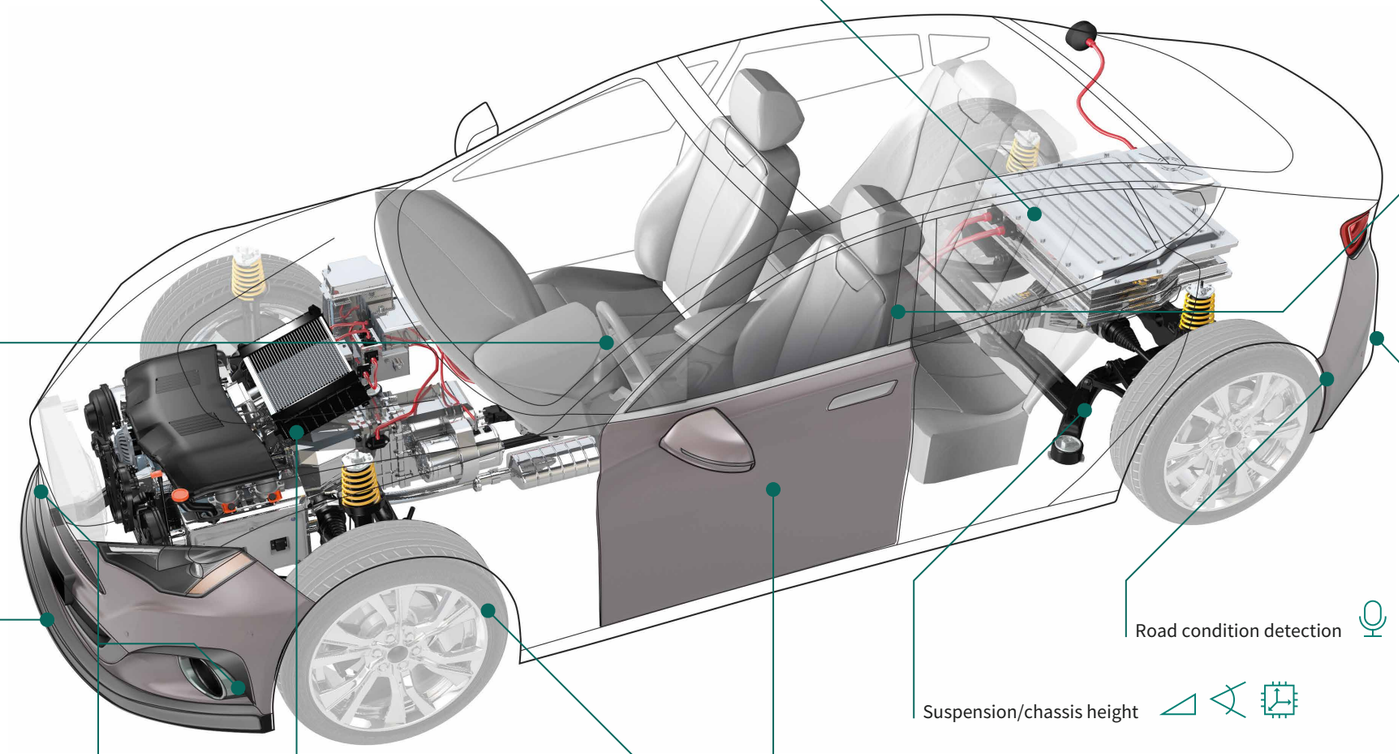
XENSIV™ sensors in chassis, safety, and ADAS

Electric power steering (EPS)

- Steering torque
- Rotor position
- Steering angle

- Battery monitoring for EV
- H2 sensor H_2

- Seatbelt buckle
- Seat position system
- Belt pretensioner



- Road condition detection
- Suspension/chassis height
- Side crash detection
- Wheel speed
- Tire pressure monitoring system (TPMS)
- Indirect TPMS system (iTPMS)
- Emergency vehicle detection/ autonomous parking (at the four vehicle corners)
- Brake booster
- Brake pedal
- Brake light switch
- Pedestrian protection
- Radar

Magnetic switches · Linear sensors · Angle sensors · Pressure sensors · Tire pressure sensor (TPMS) · 3D magnetic sensors · Radar sensors · Speed sensors · MEMS microphones

www.infineon.com/chassis-safety-adas

XENSIV™ current sensors

High-precision coreless current sensors for automotive and industrial applications

Infineon's coreless current sensor portfolio includes integrated current sensors and contactless magnetic field sensors (external current rail). Integrated sensors handle up to 130 A peak, ideal for on-board chargers, PV hybrid inverters, and PSUs. Contactless sensors support 100 A (PCB) to 2 kA (external busbars) and are suited for high-current applications like traction inverters, central inverters, and DC EV charging.

Infineon's XENSIV™ family of high-precision coreless open-loop current sensors is less bulky and costs less than core-based current sensors. Based on Infineon's precise and stable Hall effect current sensor IC technology, the current sensor analog output signal is highly linear over temperature and lifetime. Our newly released TMR sensors offer a high signal-to-noise ratio (SNR), low power consumption, and a high bandwidth of 1 MHz. Due to a lack of an iron core or a flux concentrator, the sensor signal shows neither hysteresis nor does it suffer from saturation.

The differential current sensor measurement with two Hall cells ensures high accuracy even in a noisy environment like crosstalk from adjacent current lines or magnetic stray fields.

System designers can program the sensitivity of the sensor as well as the threshold levels of up to two dedicated overcurrent signals and adapt them to individual requirements without any external components. The contactless current sensor IC also provides advanced diagnostic features for functional safety compliant with ISO 26262.

Product portfolio

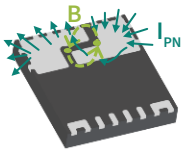
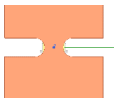
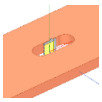
On the one hand, we have the current sensors with an integrated current rail. The sensors in the TISON and DSO package enable accurate high-frequency measurements with minimal impact on the phase shift of the current signal. On the other hand, our current sensors for external current rails are non-invasive Hall-effect sensors that provide safe, reliable solutions for power electronics, as they do not require additional power dissipation. Our selection of isolated, contactless current sensors can be used for current detection and monitoring in SiC and GaN applications, including motor control applications.

Click here to learn more:
www.infineon.com/current-sensors

Different packages & sensing structures enable multiple measurement ranges from 15A on PCB to 2kA on external busbar

Current sensor simulation tool – currentsensorsim

Ampacity range based on sensor & package combination

Measurement geometry	Integrated current rail	External current rail		
	Lateral insertion	Lateral insertion		Vertical insertion
	PCB	PCB	Busbar	Busbar
	– Integrated current rail & sensing structures	– Recommended sensing structure 45° s-bend or straight – Slit width 0.5mm (typical)	– Recommended sensing structure 45° s-bend or straight – Slit width = busbar thickness	– Recommended symmetrical structure
		45° s-bed  Straight 	45° s-bed  Straight 	Symmetric vertical insertion  
Package & current range	TISON, DSO-16 20A – 130A	SOT, TDSO, VSON 100A – 600A	SOT23, VSON, TDSON 500A – 2kA	VSON, Modules 700A – 2kA
XENSIV™ current sensor family	TLx4971 TLE4973 TLE4978 TLE4977*	TLE4972 / 3 TLI5570 TLx5571 / 2*	TLE4972 / 3 TLI5570 TLx5571 / 2*	TLE4972 / 3 Swoboda CSM510HP2

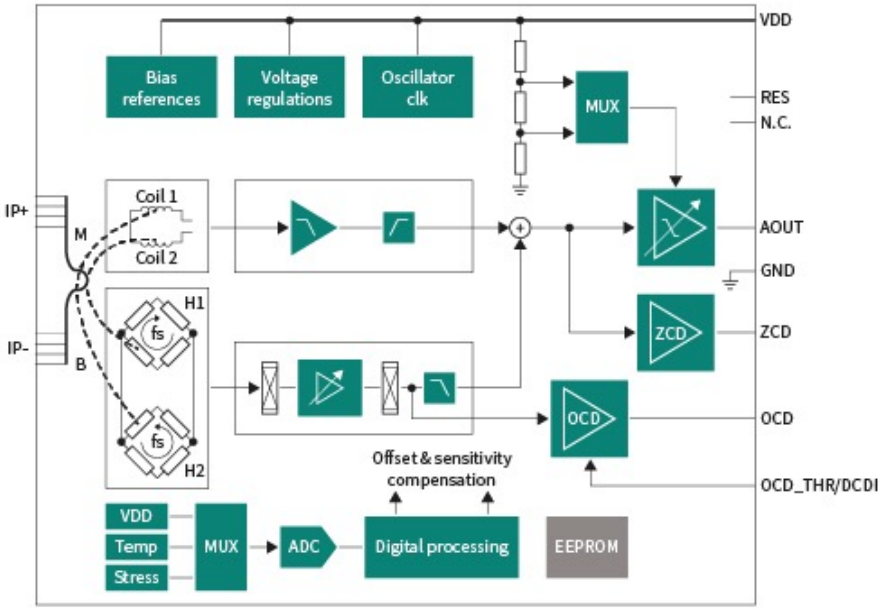
*coming soon

Different packages & sensing structures enable multiple measurement ranges from 15A on PCB to 2kA on external busbar

Click here to learn more:
www.infineon.com/current-sensors

TLE4978
XENSIV™ coreless magnetic current sensor, 5 V for on-board chargers, PV inverters, and AI datacenters)

XENSIV™ TLE4978, a highly precise coreless current sensor, is designed with the hybrid Hall + coil architecture. It delivers bi-directional AC-DC measurements with simultaneous overcurrent and zero-crossing detection (OCD and ZCD). Developed in accordance with ISO 26262 for safety requirements rated up to ASIL-B, its high 9 MHz bandwidth offers exceptional accuracy, low noise (typ. 38 mARMS), minimal sensitivity error over temperature and lifetime (max. ±1.2%), and low offset error over temperature and lifetime (max. 200 mA).



Features and benefits

Key features
– High bandwidth of 9 MHz
– Current measurement from 45 A to 67.5 A
– Supply voltage: 5 V
– 100 ns response overcurrent detection
– Operating ambient temperature: -40°C to 150°C (Grade 0)
– ASIL-B-classified
– DSO-16 300 mil package with basic isolation and reinforced isolation

Key benefits
– High versatility for different power ranges, with OCD and ZCD programming capabilities
– High bandwidth, enabling use across applications
– Highly precise measurement over temperature and lifetime
– Exceptional low-current measurement capabilities, thanks to low noise performance
– Easy integration with pre-calibrated and pre-programmed sensitivity

Product	Current range [A]	Bandwidth typ. [kHz]	Sensitivity [mV/A]	Accuracy [%]	Output noise density [µA/√Hz]	Certification	Indus-trial	Automo-tive	Supply [V]	Current rail	Package
TLE4978-R060W5-O-S0010	60	9 MHz	33	< 0.85	12.67 µA/√Hz	ISO26262, ASIL-B	✓	✓	5	internal	PG-DSO-16
TLE4978-R050W5-O-S0010	50	9 MHz	39	< 0.85	12.67 µA/√Hz	ISO26262, ASIL-B	✓	✓	5	internal	PG-DSO-16
TLE4978-R040W5-O-S0010	40	9 MHz	49	< 0.85	12.67 µA/√Hz	ISO26262, ASIL-B	✓	✓	5	internal	PG-DSO-16

Data Center · EV charging · On-board charger · Solar

Click here to learn more:
www.infineon.com/current-sensors

TLx4971
XENSIV™ coreless current sensor in DSO-16 (300 mm)

The TLI4971/TLE4971 current sensor, currently in mass production in the TISON-8 package, is also available in a DSO-16 (300 mm) package. This new package offers 8 mm clearance and creepage, isolation up to 1.7 kVpk (repetitive isolation voltage), and supports currents from 15 Apk to 50 Apk, with a continuous current rating of 45 Arms at 105°C. The DSO-16 version improves accuracy compared to the TISON-8 (1% vs. 2%) while maintaining the same bandwidth and overcurrent detection performance.

Potential applications

The TLx4971 is suitable for AC as well as DC measurement applications:

- Electrical drives
- Current monitoring
- On-board charger
- Auxiliary drives
- Inverters
- Overcurrent detection (OCD) etc.

Product validation

The “TLE” variant is validated according to AEC-Q100, Grade 0.
The "TLI" variant is UL certified according to UL-1577.
Qualified for automotive applications

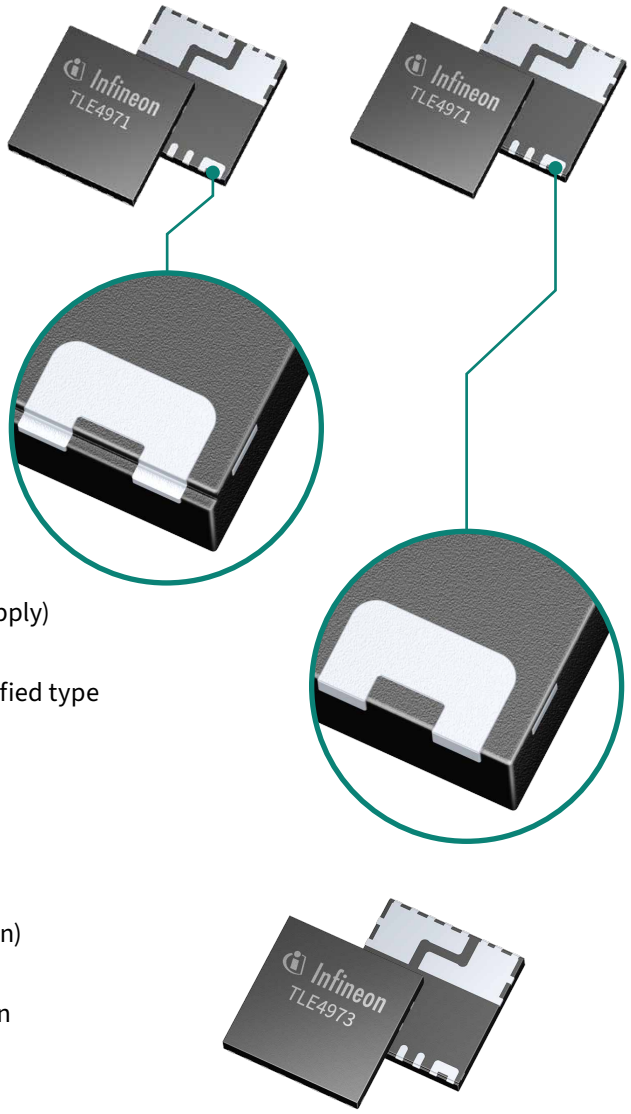
Product	Current range [A]	Bandwidth typ. [kHz]	Sensitivity [mV/A]	Accuracy [%]	Output noise density [µA/√Hz]	Certification	Automotive	Industrial	Current rail	Package
TLI4971-A016W2-U-S0001	16	210	76	<1	300 typ.	UL		✓	Internal	PG-DSO-16-50
TLI4971-A020W2-U-S0001	20	210	61	<1	300 typ.	UL		✓	Internal	PG-DSO-16-50
TLI4971-A030W2-U-S0001	30	210	40	<1	300 typ.	UL		✓	Internal	PG-DSO-16-50
TLI4971-A035W2-U-S0001	35	210	35	<1	300 typ.	UL		✓	Internal	PG-DSO-16-50
TLI4971-A040W2-U-S0001	40	210	30	<1	300 typ.	UL		✓	Internal	PG-DSO-16-50
TLI4971-A050W2-U-S0001	50	210	23	<1	300 typ.	UL		✓	Internal	PG-DSO-16-50
TLE4971-A016W2-S0001	16	210	76	<1	300 typ.	ASIL B	✓	✓	Internal	PG-DSO-16-50
TLE4971-A020W2-S0001	20	210	61	<1	300 typ.	ASIL B	✓	✓	Internal	PG-DSO-16-50
TLE4971-A030W2-S0001	30	210	40	<1	300 typ.	ASIL B	✓	✓	Internal	PG-DSO-16-50
TLE4971-A035W2-S0001	35	210	35	<1	300 typ.	ASIL B	✓	✓	Internal	PG-DSO-16-50
TLE4971-A040W2-S0001	40	210	30	<1	300 typ.	ASIL B	✓	✓	Internal	PG-DSO-16-50
TLE4971-A050W2-S0001	50	210	23	<1	300 typ.	ASIL B	✓	✓	Internal	PG-DSO-16-50

Click here to learn more:
www.infineon.com/current-sensors

TLx4971/TLE4973 in the TISON-8-5 and TISON-8-6

The Infineon TLx4971 and TLE4973 in the TISON package are precise bidirectional AC-DC current sensors for up to 160 A. TLE4971 operates at 3.3 V, while TLE4973 operates at 5 V. Their coreless, open-loop Hall-effect design eliminates saturation and hysteresis, delivering highly linear and accurate readings. A double U-shaped current rail and differential sensing provide immunity to stray magnetic fields. Features include an analog interface, two fast overcurrent detection outputs, and galvanic isolation. Fully calibrated in a compact 8x8 mm TISON-8 SMD package, they require no end-of-line calibration and are reprogrammable for application-specific optimization in industrial drives, xEV auxiliary drives, PV inverters, DC fast chargers, and OBCs.

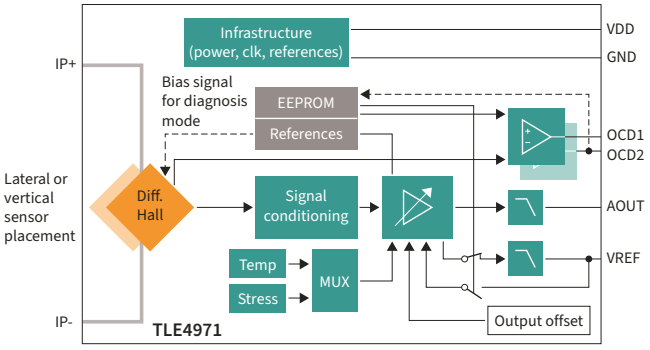
Difference between TISON-8-6 and TISON-8-5



Features and benefits

- Measurement up to 70 A_{RMS} at 690 V_{RMS}
- 120 A_{pk} for TLx4971 (3.3 V supply), 160 A_{pk} for TLE4973 (5 V supply)
- Typical error at 25°C <2%
- Current rail resistance at 220 µΩ and inductance <1 nH specified type
- Analog output signal (with typ. 210 kHz) bandwidth
- Fast (<0.7 µs) overcurrent detection up to 2 x IFSR
- 4 mm clearance and creepage, 975 Vpk Isolation
- AEC-Q100 Grade 1 qualified (125°C) for the TLE variant
- Ultralow power loss due to minimal resistance ofcurrent rail
- Reliable current measurement over lifetime (no re-calibration)
- Functional isolation for high-voltage application
- Easy and compact package allows high-power density design
- Pre-programmed variants for 25, 50, 75, and 120 A
- High accuracy, low noise analog output

Block diagram



Due to its low resistance and inductance, the TLE4971's integrated current rail minimizes power loss and allows for a compact sensing circuit. The analog output (AOUT) offers flexible configuration options, including single-ended, semi-differential, and fully-differential modes, in conjunction with the voltage reference pin (VREF). Two independent overcurrent outputs (OCD1 and OCD2) trigger rapid fault detection when the current surpasses a predefined threshold.

Click here to learn more:
www.infineon.com/current-sensors

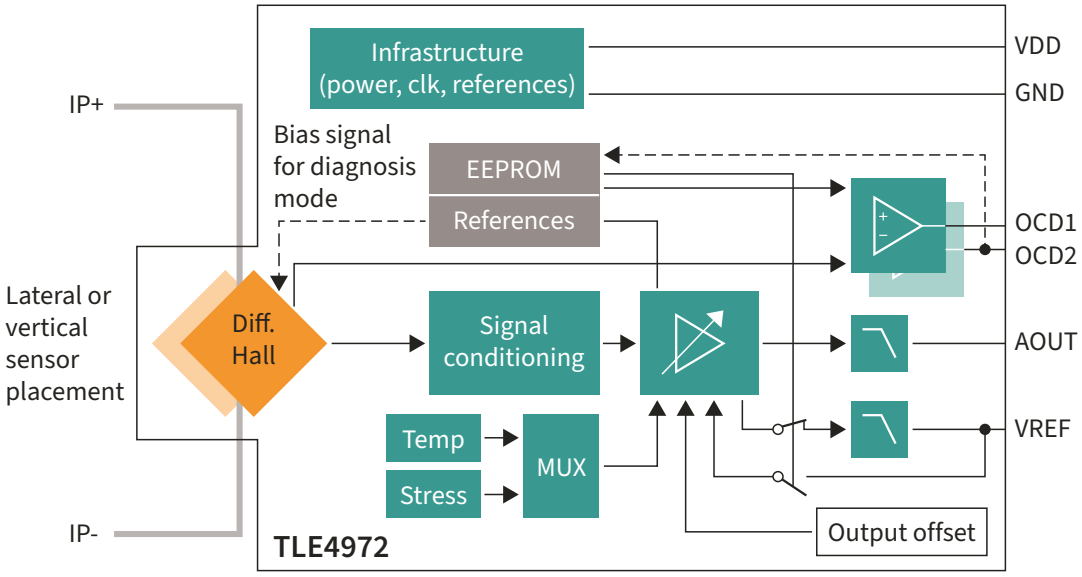
TLE4972/TLE4973
XENSIV™ contactless magnetic field sensors in external current rail packages

The XENSIV™ TLE4972/3 product family of coreless current sensors specifically addresses requirements for current sensing in automotive and industrial applications. The well-established and robust Hall technology enables accurate and highly linear current measurements of the magnetic field induced by the current. The compact design and ISO 26262-compliant ASIL rating, with advanced diagnostic mode, make the TLE4973 in 5 V ideal for high-current, safety-relevant xEV applications. The easy low-voltage programming, ratiometric output and external current rail package make the difference in traction inverters used in hybrid and battery-driven vehicles, as well as for battery main switches.

Features and benefits

- AC and DC Hall-based current sensor
- Differential measurement principle for coreless operation with no saturation or hysteresis effects
- High accuracy with very low error over temperature and lifetime
- Fast overcurrent detection to protect wide-bandgap SiC and GaN switching devices
- Fast overcurrent detection to protect wide band gap SiC and GaN switching devices
- Up to two dedicated pins for overcurrent detection
- Scalable sensitivity ideal for platform designs
- One wire low voltage programming for up to 8 sensors
- ASIL B as SEooC, ISO 26262-compliant for simplified functional safety assessment

Block diagram



Click here to learn more:
www.infineon.com/current-sensors

TLI5570-RE35E1-E0001
XENSIV™ high-precision coreless current sensor, a cost-effective shunt-replacement

The XENSIV™ TLI5570-AE35E1-E0001 is a high-precision miniature coreless magnetic sensor for AC and DC measurement. Our revolutionary, robust, highly linear monolithic Tunnel Magnetoresistance (TMR) technology enables accurate current measurement. With a bandwidth of more than 1.1 MHz, this sensor provides a non-amplified high-speed differential analog output signal to be directly connected to replace shunts.

Utilizing Infineon's new and highly linear TMR technology, this coreless sensor can measure currents accurately from 0 to ±1000 A. In particular, the very high signal-to-noise ratio (SNR) performance of the TMR technology enables precise measurements even in applications with lower currents. Suitable for both AC and DC currents, the sensor's bandwidth of over 1 MHz delivers a non-amplified, high-speed differential analog output signal for direct connection to amplification stages. Our new-generation TMR sensor provides superior temperature and lifetime stability thanks to Infineon's extensive experience in magnetoresistive sensor technologies. Its industrial-grade qualification enables operation in harsh environments up to 125°C.

Potential applications

The TLI5570, a cost-effective shunt-replacement, is suitable for AC as well as DC current measurement applications:

- Power tools
- Home appliances
- Drones and robotics
- Auxiliary drives
- Inverters
- PV Optimizers

Product	Current range [A]	Bandwidth typ. [kHz]	Sensitivity [mV/A]	Accuracy [%]	Output noise density [µA/√Hz]	Certification	Automotive	Industrial	Current rail	Package
TLI5570-AE35E1-E0001	35	>1100	4.8	5%	5 typ.			✓	External	PG-SOT23-6

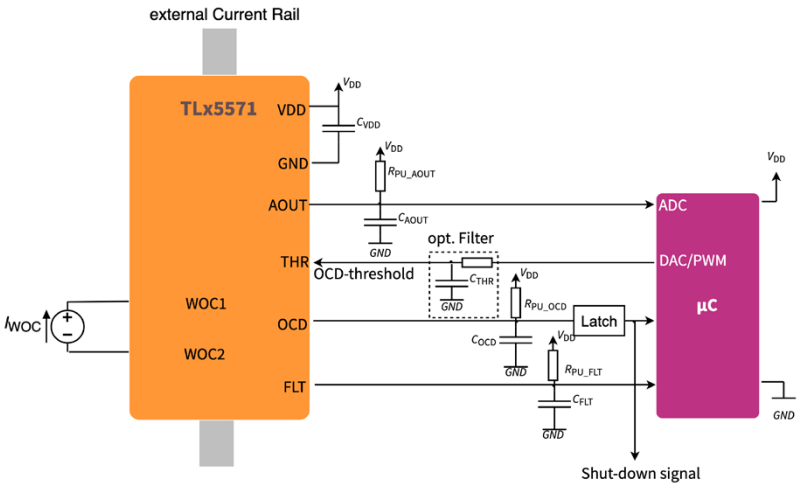
Click here to learn more:
www.infineon.com/current-sensors

TLE5571*

XENSIV™ fast overcurrent detection sensor for protection applications

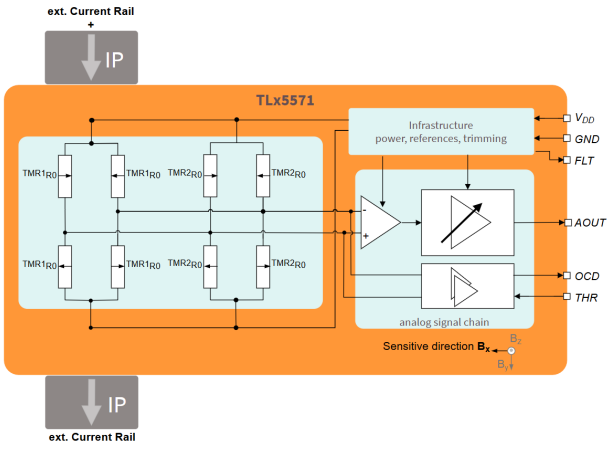
The XENSIV™ TLE5571 is a differential Tunnel Magnetoresistance (TMR) based coreless current sensor with ultrafast single-ended analog output and overcurrent detection (OCD) with a programmable threshold. With a dedicated fault pin to report internal failures and an ASIL C compliant with ISO 26262, the device is particularly suitable for fast protection in automotive and industrial applications, such as HV efuse and solid-state circuit breakers (SSBC) that require current sensing with minimal input to output delay.

Application diagram



Features and benefits

Key features	Key benefits
– 2.5 MHz bandwidth with 200 ns analog output response time	– Fast protection in HV power distribution units from 100 A on PCB to kA on busbar
– Ultrafast 150 ns OCD with programmable threshold	– Compact solution, reduces footprint, and component count on PCB
– Full scale from 5 to 35 mT differential field immune against external stray field	– Flexible sensor placement with possibility for sensing current on high side
– Contactless isolated magnetic sensor with external current rail	– Low resistance and no parasitic inductance effect for highest system efficiency
– ISO 26262 Safety Element out of Context for safety requirements up to ASIL C	– Prevents false OCD trigger due to internal fault and simplify functional safety



The TLE5571 measures a magnetic field via two differential TMR bridges. The signal is fed into a first stage of amplification (OTA) and then through a high-bandwidth and high slew rate differential amplifier, which provides a single-ended output signal on the AOUT pin.

The OCD pin latches whenever the input differential field exceeds the threshold programmed on the THR pin. In case of internal failures, the sensor provides fault information on the FLT pin without affecting the OCD.

USB PD charger | Adapter | Consumer | Smartphone charger

Click here to learn more:
www.infineon.com/current-sensors

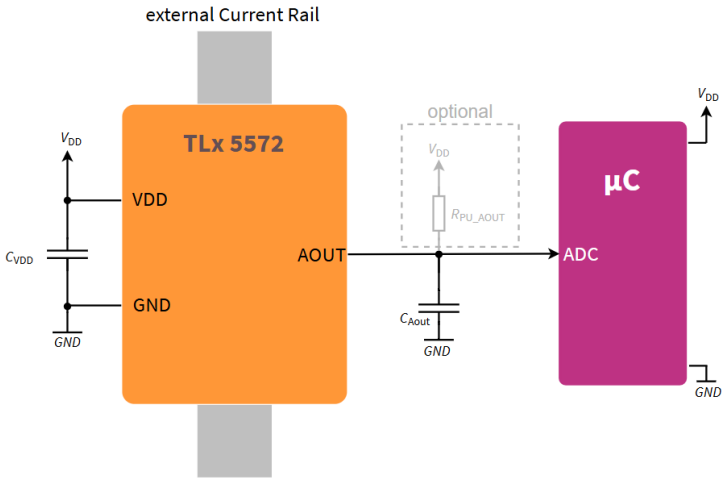
* Coming soon

TLx5572*

XENSIV™ cost competitive current sensor for shunt and OpAmp replacement

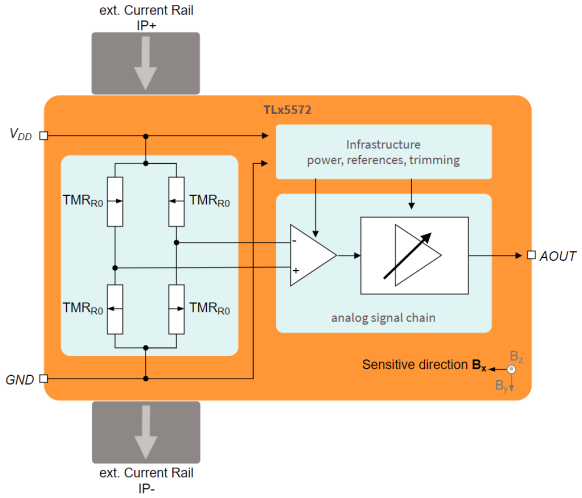
The XENSIV™ TLx5572 is a monocell TMR-based current sensor in a small and cost-competitive SOT23 package, which can replace a shunt and an OpAmp with a single component. The TLx5572 offers intrinsic isolation from the external current rail, with the benefit of reducing insertion resistance and allowing direct in-phase current measurement in automotive and industrial drives. And with its ultrafast response time, it also provides a suitable solution for fast protection.

Application diagram



Features and benefits

Key features	Key benefits
– Small 2.4 x2.9mm SOT23 package	– Cost competitive compact solution, reduces footprint and component count
– Isolated current measurement on external current rail	– Enable direct in-phase measurements in motor drives
– Wide full-scale measuring range from 4 mT to 39 mT	– Low resistance and no parasitic inductance effect for highest system efficiency
– High 1 MHz bandwidth with ultrafast 100 ns analog output	– Suitable to measure currents from 30 A on PCB to kA on busbar
– Available in 3.3 V and 5 V supply	– Fast protection for wide bandgap switching devices in automotive and industrial



The TLx5572 measures a magnetic field via a TMR bridge. The signal is fed into a first stage of amplification (OTA) and then through a high-bandwidth and high slew rate differential amplifier, which provides a single-ended output signal on the AOUT pin. The TLx5572 is compatible with 3.3 V and 5 V supplies.

USB PD charger | Adapter | Consumer | Smartphone charger

Click here to learn more:
www.infineon.com/current-sensors

* Coming soon

Current sensors – overview

Product	Current range [A]	Bandwidth typ. [kHz]	Sensitivity [mV/A]	Accuracy [%]	Output noise density [µA/√Hz]	Classification	Indus-trial	Auto-motive	Supply [V]	Current rail	Package
TLI4971 family											
TLI4971-A025T5-E0001	25	240	48	<2	350	IEC 62368-1	✓	–	3.3	Internal	TISON-8-5
TLI4971-A050T5-E0001	50	240	24	<2	350		✓	–	3.3	Internal	TISON-8-5
TLI4971-A075T5-E0001	75	240	16	<2	350		✓	–	3.3	Internal	TISON-8-5
TLI4971-A120T5-E0001	120	240	10	<2	350		✓	–	3.3	Internal	TISON-8-5
TLI4971-A025T5-U-E0001	25	240	48	<2	350	UL1577/ IEC 62368-1	✓	–	3.3	Internal	TISON-8-5
TLI4971-A050T5-U-E0001	50	240	24	<2	350		✓	–	3.3	Internal	TISON-8-5
TLI4971-A075T5-U-E0001	75	240	16	<2	350		✓	–	3.3	Internal	TISON-8-5
TLI4971-A120T5-U-E0001	120	240	10	<2	350		✓	–	3.3	Internal	TISON-8-5
TLI4971-A016W2-U-S0001*	16	210	76	<1.5	300	UL	✓	–	–	Internal	DSO-16-50
TLI4971-A020W2-U-S0001*	20	210	61	<1.5	300	UL	✓	–	–	Internal	DSO-16-50
TLI4971-A030W2-U-S0001*	30	210	40	<1.5	300	UL	✓	–	–	Internal	DSO-16-50
TLI4971-A035W2-U-S0001*	35	210	35	<1.5	300	UL	✓	–	–	Internal	DSO-16-50
TLI4971-A040W2-U-S0001*	40	210	30	<1.5	300	UL	✓	–	–	Internal	DSO-16-50
TLI4971-A050W2-U-S0001*	50	210	23	<1.5	300	UL	✓	–	–	Internal	DSO-16-50
TLI5570 family											
TLI5570-AE35E1-E0001	35 [mT]	1100	4.8 [mV/V/mT]	5	5 µVrms		✓	–	–	external	SOT23-6-4
TLE4971 family											
TLE4971-A025N5-E0001	25	210	48	<2	260	AEC-Q100	✓	✓	3.3	Internal	TISON-8-5
TLE4971-A050N5-E0001	50	210	24	<2	260		✓	✓	3.3	Internal	TISON-8-5
TLE4971-A075N5-E0001	75	210	16	<2	260		✓	✓	3.3	Internal	TISON-8-5
TLE4971-A120N5-E0001	120	210	10	<2	260		✓	✓	3.3	Internal	TISON-8-5
TLE4971-A025N5-U-E0001	25	210	48	<2	260	AEC-Q100/UL 1577	✓	✓	3.3	Internal	TISON-8-5
TLE4971-A050N5-U-E0001	50	210	24	<2	260		✓	✓	3.3	Internal	TISON-8-5
TLE4971-A075N5-U-E0001	75	210	16	<2	260		✓	✓	3.3	Internal	TISON-8-5
TLE4971-A120N5-U-E0001	120	210	10	<2	260		✓	✓	3.3	Internal	TISON-8-5
TLE4971-A025T5-E0001	25	210	48	<2	260	AEC-Q100/ ISO 26262-compliant	✓	✓	3.3	Internal	TISON-8-6
TLE4971-A050T5-E0001	50	210	24	<2	260		✓	✓	3.3	Internal	TISON-8-6
TLE4971-A075T5-E0001	75	210	16	<2	260		✓	✓	3.3	Internal	TISON-8-6
TLE4971-A120T5-E0001	120	210	10	<2	260		✓	✓	3.3	Internal	TISON-8-6
TLE4971-A025T5-U-E0001	25	210	48	<2	260	AEC-Q100/ ISO 26262-compliant/ UL 1577	✓	✓	3.3	Internal	TISON-8-6
TLE4971-A050T5-U-E0001	50	210	24	<2	260		✓	✓	3.3	Internal	TISON-8-6
TLE4971-A075T5-U-E0001	75	210	16	<2	260		✓	✓	3.3	Internal	TISON-8-6
TLE4971-A120T5-U-E0001	120	210	10	<2	260		✓	✓	3.3	Internal	TISON-8-6
TLE4971-A016W2-S0001	16	210	76	<1.5	300	ASIL B	✓	✓	–	Internal	DSO-16-50
TLE4971-A020W2-S0001	20	210	61	<1.5	300		✓	✓	–	Internal	DSO-16-50
TLE4971-A030W2-S0001	30	210	40	<1.5	300		✓	✓	–	Internal	DSO-16-50
TLE4971-A035W2-S0001	35	210	35	<1.5	300		✓	✓	–	Internal	DSO-16-50
TLE4971-A040W2-S0001	40	210	30	<1.5	300		✓	✓	–	Internal	DSO-16-50
TLE4971-A050W2-S0001	50	210	23	<1.5	300		✓	✓	–	Internal	DSO-16-50
TLE4972 family											
TLE4972-AE35D5	31 [mT]	210	39[1)] [mV/mT]	1	90 [nT/√Hz]	AEC-Q100/ ISO 26262-compliant	✓	✓	3.3	external	TDSO-16
TLE4972-AE35S5	31 [mT]	210	39[1)] [mV/mT]	1	90 [nT/√Hz]		✓	✓	3.3	external	VSON-6

1) Can be reprogrammed by customer

Click here to learn more:
www.infineon.com/current-sensors

Current sensors – overview

Product	Current range [A]	Band-width typ. [kHz]	Sensitivity [mV/A]	Accu-racy [%]	Output noise density [µA/√Hz]	Classification	Indus-trial	Auto-motive	Supply [V]	Current rail	Package
TLE4973 family											
TLE4973-A025T5-S0001	27.5	210	65.5	<2	290	ISO 26262-compliant/ AEC-Q100	✓	✓	5.0	Internal	TISON-8-6
TLE4973-A050T5-S0001	55	210	32.8	<2	290		✓	✓	5.0	Internal	TISON-8-6
TLE4973-A075T5-S0001	82.5	210	21.8	<2	290		✓	✓	5.0	Internal	TISON-8-6
TLE4973-A120T5-S0001	132	210	13.7	<2	290		✓	✓	5.0	Internal	TISON-8-6
TLE4973-R025T5-S0001	27.5	210	65.5	<2	290		✓	✓	5.0	Internal	TISON-8-6
TLE4973-R050T5-S0001	55	210	32.8	<2	290		✓	✓	5.0	Internal	TISON-8-6
TLE4973-R075T5-S0001	82.5	210	21.8	<2	290		✓	✓	5.0	Internal	TISON-8-6
TLE4973-R120T5-S0001	132	210	13.7	<2	290		✓	✓	5.0	Internal	TISON-8-6
TLE4973-R025T5-S0010	27.5	210	65.5	<2	290		✓	✓	5.0	Internal	TISON-8-6
TLE4973-R050T5-S0010	55	210	32.8	<2	290		✓	✓	5.0	Internal	TISON-8-6
TLE4973-R075T5-S0010	82.5	210	21.8	<2	290		✓	✓	5.0	Internal	TISON-8-6
TLE4973-R120T5-S0010	132	210	13.7	<2	290		✓	✓	5.0	Internal	TISON-8-6
TLE4973-R025T5-U-S0010	27.5	210	65.5	<2	290	ISO 26262-compliant/ AEC-Q100/ UL 1577	✓	✓	5.0	Internal	TISON-8-6
TLE4973-R050T5-U-S0010	55	210	32.8	<2	290		✓	✓	5.0	Internal	TISON-8-6
TLE4973-R075T5-U-S0010	82.5	210	21.8	<2	290		✓	✓	5.0	Internal	TISON-8-6
TLE4973-R120T5-U-S0010	132	210	13.7	<2	290		✓	✓	5.0	Internal	TISON-8-6
TLE4973-AE35D5-S0001	34 [mT]	210	53[1] [mV/mT]	1	70 [nT/√Hz]	ISO 26262-compliant/ AEC-Q100	✓	✓	5.0	external	TDSO-16
TLE4973-RE35D5-S0001	34 [mT]	210	53[1] [mV/mT]	1	70 [nT/√Hz]		✓	✓	5.0	external	TDSO-16
TLE4973-RE35D5-S0010	34 [mT]	210	53[1] [mV/mT]	1	70 [nT/√Hz]		✓	✓	5.0	external	TDSO-16
TLE4973-AE35S5-S0001	34 [mT]	210	53[1] [mV/mT]	1	70 [nT/√Hz]		✓	✓	5.0	external	VSON-6
TLE4973-RE35S5-S0001	34 [mT]	210	53[1] [mV/mT]	1	70 [nT/√Hz]		✓	✓	5.0	external	VSON-6
TLE4973-RE35S5-S0010	34 [mT]	210	53[1] [mV/mT]	1	70 [nT/√Hz]		✓	✓	5.0	external	VSON-6
TLE4973-RE35S5-S3510*	17 [mT]	210	105.8 [mV/mT]	1	70 [nT/√Hz]		✓	✓	5.0	external	VSON-6
TLE4978 family											
TLE4978-R060W5-O-S0010	60	9	33	<0.85	12.67 µA/√Hz	ISO26262, ASIL-B	✓	✓	5.0	Internal	DSO-16
TLE4978-R050W5-O-S0010	50	9	39	<0.85	12.67 µA/√Hz		✓	✓	5.0	Internal	DSO-16
TLE4978-R040W5-O-S0010	40	9	49	<0.85	12.67 µA/√Hz		✓	✓	5.0	Internal	DSO-16
TLx5572 family*											
TLE5572-AE24E1-R-E0001*	24~39[2] [mT]	2500	56 [mV/mT]	4	8.1 µTrms	AEC-Q100	–	✓	–	external	SOT23-6-4
TLE5572-AE15E1-R-E0001*	15~24[2] [mT]	2500	90 [mV/mT]	4	8.1 µTrms		–	✓	–	external	SOT23-6-4
TLE5572-AE12E1-R-E0001*	12~20[2] [mT]	2500	112.5 [mV/mT]	4	8.1 µTrms		–	✓	–	external	SOT23-6-4
TLE5572-AE08E1-R-E0001*	8~12[2] [mT]	2500	180 [mV/mT]	4	8.1 µTrms		–	✓	–	external	SOT23-6-4
TLE5572-AE06E1-R-E0001*	6~10[2] [mT]	2500	225 [mV/mT]	4	8.1µTrms		–	✓	–	external	SOT23-6-4
TLE5572-AE04E1-R-E0001*	4~6[2] [mT]	2500	360 [mV/mT]	4	8.1 µTrms		–	✓	–	external	SOT23-6-4
TLI5572-AE24E1-R-E0001*	24~39[2] [mT]	2500	56 [mV/mT]	4	8.1 µTrms		✓	–	–	external	SOT23-6-4
TLI5572-AE15E1-R-E0001*	15~24[2] [mT]	2500	90 [mV/mT]	4	8.1 µTrms		✓	–	–	external	SOT23-6-4
TLI5572-AE12E1-R-E0001*	12~20[2] [mT]	2500	112.5 [mV/mT]	4	8.1 µTrms		✓	–	–	external	SOT23-6-4
TLI5572-AE08E1-R-E0001*	8~12[2] [mT]	2500	180 [mV/mT]	4	8.1 µTrms		✓	–	–	external	SOT23-6-4
TLI5572-AE06E1-R-E0001*	6~10[2] [mT]	2500	225 [mV/mT]	4	8.1 µTrms		✓	–	–	external	SOT23-6-4
TLI5572-AE04E1-R-E0001*	4~6[2] [mT]	2500	360 [mV/mT]	4	8.1 µTrms		✓	–	–	external	SOT23-6-4
TLE5571 family*											
TLE5571-AE36O5-I-S0001*	30 [mT]	2500	72 [mV/mT]	4	6.6µTrms	ISO 26262-compliant/AEC-Q100	–	✓	–	external	TDSO-16-10
TLE5571-AE24O5-I-S0001*	20 [mT]	2500	108 [mV/mT]	4	6.6µTrms		–	✓	–	external	TDSO-16-10
TLE5571-AE12O5-I-S0001*	10 [mT]	2500	216 [mV/mT]	4	6.6µTrms		–	✓	–	external	TDSO-16-10
TLE5571-AE06O5-I-S0001*	5 [mT]	2500	432 [mV/mT]	4	6.6µTrms		–	✓	–	external	TDSO-16-10

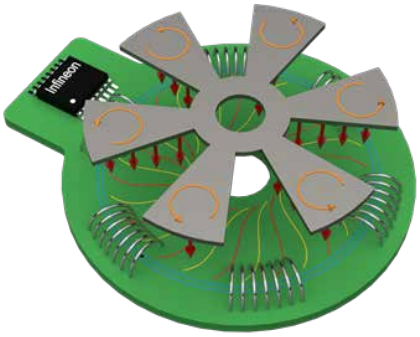
1) Can be reprogrammed by customer
2) X ~ Y [mT] : X is the full scale input magnetic range with 3.3 V supply. Y is the full-scale range with 5 V supply
* Coming soon

Click here to learn more:
www.infineon.com/current-sensors

XENSIV™ inductive position sensors

High accuracy and stray field robustness with TLE480x family

Inductive sensing operates on the electromagnetic coupling principle between a printed circuit board coil and a metal target positioned above it. When the metal target enters the electromagnetic field generated by the sensor coil, a portion of the electromagnetic energy is transferred to the metal target, inducing eddy currents. These eddy currents, in turn, create a reverse electromagnetic field in the sensor coil that alters the effective inductance of the sensor coil. By measuring this change, the position of the target can be accurately determined.



The iTAS products generate an alternating current (AC) through the transmitter coils via TX outputs, creating an alternating magnetic field. This magnetic field induces voltages in the receiving coils. When a metallic rotor is placed above these coils, eddy currents are induced on the rotor surface, which generates a magnetic field that counteracts the flux density below. The amplitude of the voltages in the receiving coils changes according to the rotor's position. TLE480x products then demodulate these output voltages and compute the angle using the tangent inverse function.

Click here to learn more:
www.infineon.com/inductive-position-sensors

TLE480x
XENSIV™ inductive position sensor, stay field robust with high accuracy

The increasing trend of car electrification, including both the conversion of internal combustion engine vehicles and the introduction of electric main drives in electric vehicles, is raising the potential for electromagnetic interference (EMI). This can have a detrimental impact on electronic subsystems. The TLE480x family has been developed to address this challenge, explicitly targeting electric power steering systems, including torque angle sensors, steering angle sensors, and pedal and suspension applications. These devices employ the inductive measurement principle and inherently offer robustness against stray fields, eliminating the need for additional shielding against electromagnetic disturbances.

Furthermore, the TLE480x family meets the increasing demands of passengers for enhanced convenience, boasting an impressive angle error of 0.1 percent full scale (FS) and exceptional accuracy. The monolithic design of these devices enables system cost savings through reduced device count, as they have been developed in accordance with ISO 26262 and fully support system design up to Automotive Safety Integrity Level (ASIL) D, ensuring a high level of safety and reliability.

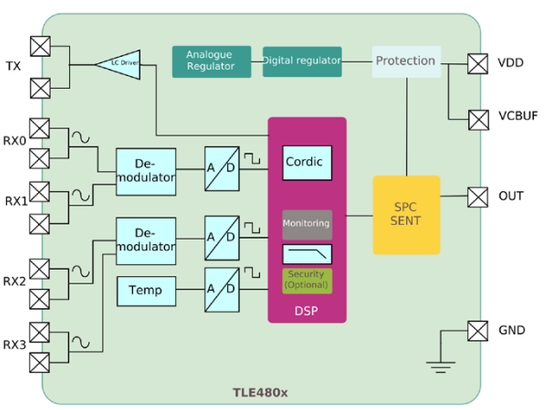
Inductive torque angle sensor (TLE4801/2)

Inductive steering angle sensor (TLE4803)

Features and benefits

Key features	Key benefits
– Stray field robust accordance with ISO 11452-8:2015	– Saves cost of shielding with intrinsic stray field robustness
– ISO 26262:2018 (SEooC) meets ASIL D	– Enables for cost efficient designs with high functional safety rating
– Cyber security (optional) accordance with ISO 21434	– Prevents threats of cyber attacks
– High accuracy angle error (electrical) 0.1% of full scale	– Easy to use high precision sensing

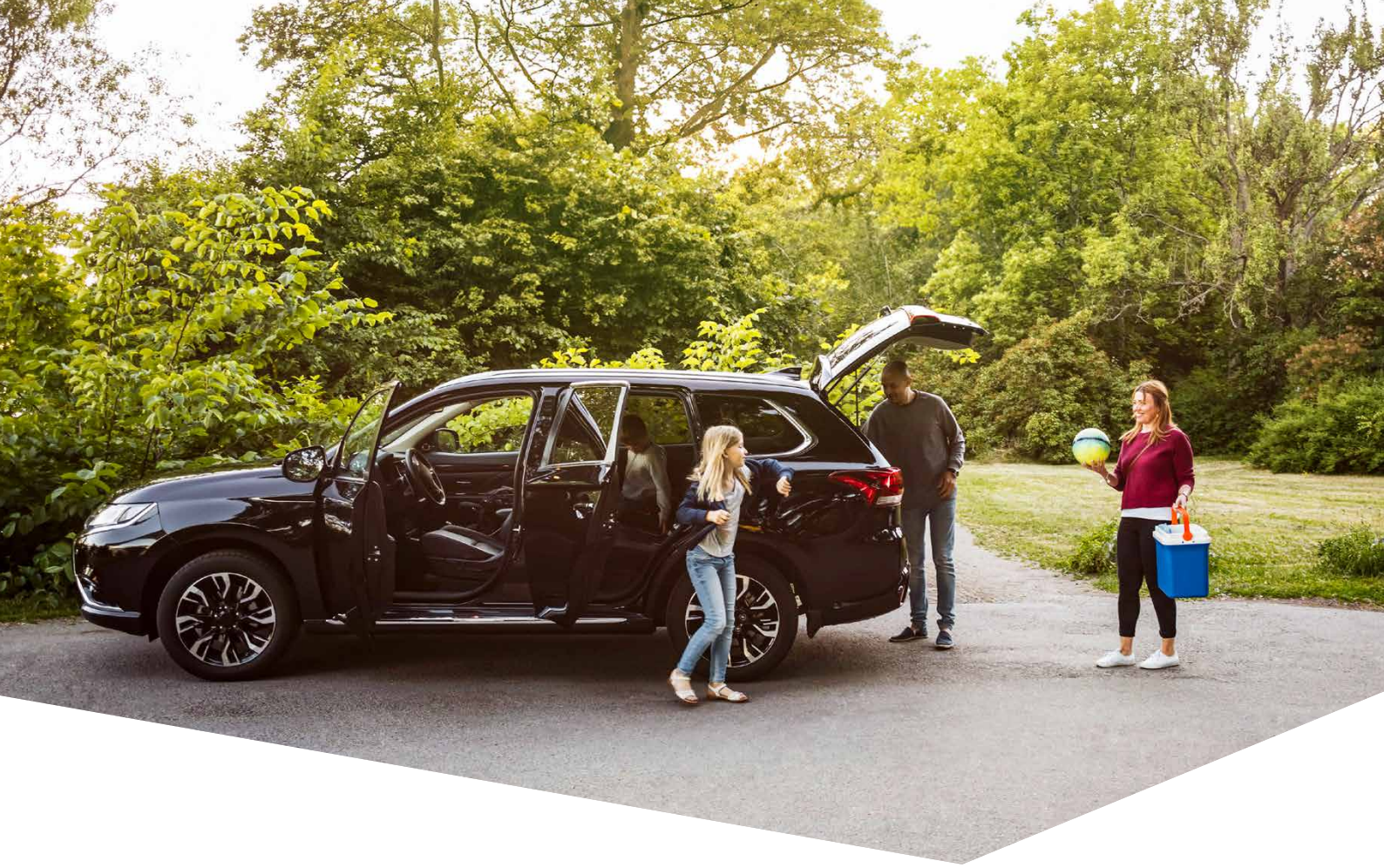
The TLE480x products include a coil system driver, signal conditioning circuits, and a DSP for torque and angle calculation within a single device.
The single-chip is designed according to ISO 26262 Safety Element out of Context (SEooC). It enables safety levels up to ASIL D, which is crucial for meeting future failed operational system safety requirements.



Inductive torque and angle sensors product portfolio

Product	Description	Package	ISO26262 (Functional safety)	ISO11452-8:2015 (Stray field robust)	Ordering code
TLE4801C16-S0000	16-pin SMD package, digital torque, and angle information	TDSO-16	ASIL D	Yes	SP006068554
TLE4801S16-S0000	16-pin SMD package, digital torque, and angle information	TDSO-16	ASIL D	Yes	SP006068552
TLE4802SC16-S0000	16-pin SMD package, digital torque, and angle information	TDSO-16	ASIL D	Yes	SP006068556
TLE4803C16-S0000	16-pin SMD package, digital angle 1, angle 2 information	TDSO-16	ASIL D	Yes	SP006068564
TLE4803S16-S0000	16-pin SMD package, digital angle 1, angle 2 information	TDSO-16	ASIL D	Yes	SP006068562

Click here to learn more:
www.infineon.com/inductive-position-sensors



Magnetic position sensors

XENSIV™ exceptionally precise magnetic position sensors comprising industry-leading 3D, linear, angle, switches and latches.

Infineon XENSIV™ position sensors are exceptionally precise thanks to an industry-leading magnetic technology portfolio. Our benchmark and innovative magnetic sensor portfolio perfectly fits numerous automotive, industrial, and consumer customer applications. We produce all magnetic sensor technologies in-house; thus, our customers can choose between Hall sensors, anisotropic magnetoresistance (AMR), giant magnetoresistance (GMR), and tunnel magnetoresistance (TMR) sensors to find their best-fit solution for their application.

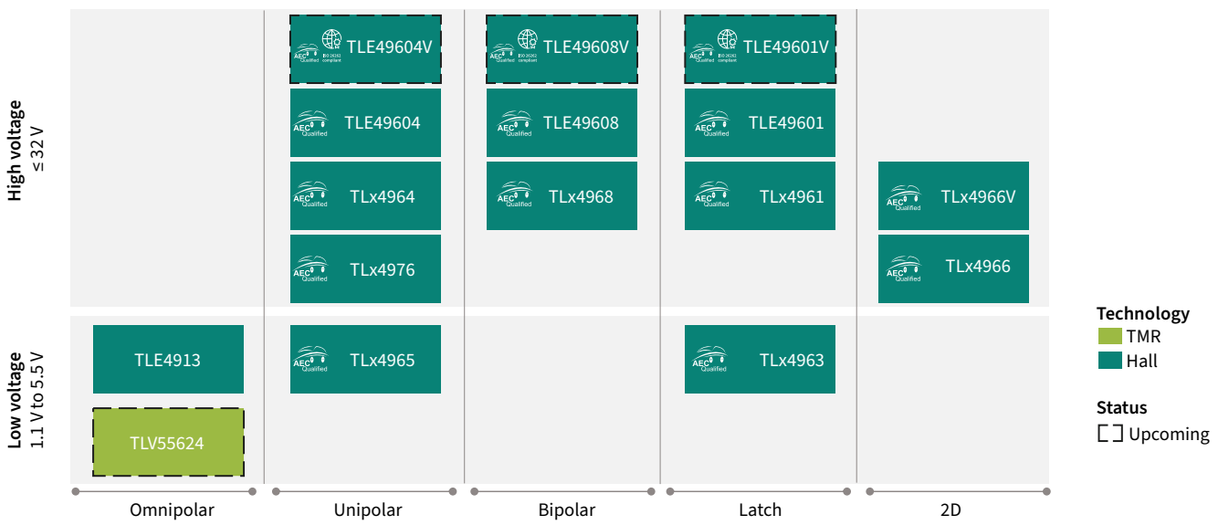
Generally, magnetic sensors measure the strength and/or direction of an applied magnetic field generated by, e.g., ferromagnetic materials and magnets, inductive coils like in motors, etc. The information on the measured field is processed within the sensor and converted into strength, position, speed, angular, and/or direction information. The processed sensor information is transmitted to the application via specific analog or digital interfaces. A wide range of sensors is equipped with additional safety and diagnostic features, options with outstanding stray field robust performance, and ISO 26262-compliant developed.

Our portfolio includes a broad range of ISO 26262-compliant products meeting safety requirements as safety element out of context (SEooC) up to the highest safety level of ASIL D, as well as stray field robust sensors exceeding ISO 11452-1:20015. These are well perceived within the market and used in a wide range of automotive and industrial safety applications.

Click here to learn more:
www.infineon.com/magnetic-position-sensors

Switches and latches

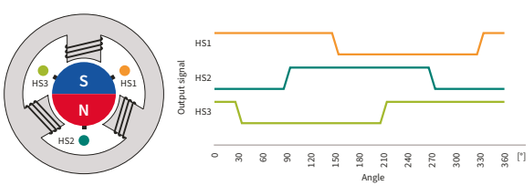
Broadest energy saving portfolio of high precision magnetic switches and latches for automotive, industrial, and consumer applications



TLx4961, TLx4964, TLE4968
XENSIV™ energy-efficient magnetic switch family for up to 32 V

The TLx496x-xM/L family of magnetic switches and latches saves energy and enables designers to create precise and compact systems. With an operational current consumption of just 1.6 mA, TLx496x-xM/L products can cut energy consumption by up to 50 percent compared with similar competitor products. The family paves the way for precise system switching points thanks to its small magnetic hysteresis. The integrated temperature profile compensates for magnetic drifts and enables stable performance over temperature and lifetime.

TLx496x-xM products come in the smallest SOT23 package, reducing height by 10 percent compared with predecessor products on the market. The sensors also feature an integrated functionality test for better system control.



Features
- Current consumption of just 1.6 mA
- 3 to 32 V supply voltage range (overvoltage up to 42 V)
- 7 kV ESD protection (HBM)
- Overtemperature and overcurrent protection
- Temperature compensation
- Smallest SOT23 package on the market
- Dedicated products for industrial applications (TLI496x) and consumer (TLV496x)
- AEC-Q100 qualified

Applications
- Window lifter
- Power closing
- Gear stick
- Seat belt
- BLDC commutation (e.g., wiper, seat belt pretensioner, pump, seating)
- Service robots
- Power tools
- Home appliances

Click here to learn more:
www.infineon.com/magnetic-position-sensors
www.infineon.com/switches-latches

Product	Type	Operating point B_{OP} [mT]	Release point B_{RP} [mT]	Hysteresis ΔB_{HY} [mT]	Automotive	Industrial	Consumer	Package
TLE4961-1M	Latch	2.0	-2.0	4.0	✓	✓	✓	SOT23
TLE4961-1L	Latch	2.0	-2.0	4.0	✓	✓	✓	SSO-3-2
TLE4961-2M	Latch	5.0	-5.0	10	✓	✓	✓	SOT23
TLE4961-3M	Latch	7.5	-7.5	15	✓	✓	✓	SOT23
TLE4961-3L	Latch	7.5	-7.5	15	✓	✓	✓	SSO-3-2
TLE4961-4M	Latch	10.0	-10.0	20	✓	✓	✓	SOT23
TLE4961-5M	Latch	15.0	-15.0	30	✓	✓	✓	SOT23
TLE4964-1M	Switch	18.0	12.5	5.5	✓	✓	✓	SOT23
TLE4964-2M	Switch	28.0	22.5	5.5	✓	✓	✓	SOT23
TLE4964-3M	Switch	12.5	9.5	3.0	✓	✓	✓	SOT23
TLE4964-4M	Switch	10.0	8.5	1.5	✓	✓	✓	SOT23
TLE4964-6M	Switch	3.5	2.5	1.0	✓	✓	✓	SOT23
TLE4964-5M	Switch	7.5	5.0	2.5	✓	✓	✓	SOT23
TLE4968-1M	Bipolar	1.0	-1.0	2.0	✓	✓	✓	SOT23
TLE4968-1L	Bipolar	1.0	-1.0	2.0	✓	✓	✓	SSO-3-2
TLI4961-1M	Latch	2.0	-2.0	4.0	–	✓	✓	SOT23
TLV4961-1M	Latch	2.0	-2.0	4.0	–	–	✓	SOT23
TLV4961-3M	Latch	7.5	-7.0	15.0	–	–	✓	SOT23
TLV4964-1M	Switch	18.0	12.5	5.5	–	–	✓	SOT23
TLV4964-2M	Switch	28.0	22.5	5.5	–	–	✓	SOT23

AEC Qualified

TLx4963, TLx4965
XENSIV™ 5 V high-precision Hall sensor for automotive/industrial applications

TLx496x-xM are integrated Hall-effect sensors specially designed for highly accurate applications. The sensors provide an easy-to-use and cost-effective solution for position sensing applications, requiring high-temperature stability of the magnetic threshold.

Target applications for TLx496x-xM are all applications requesting a precise magnetic latch or switch with a broad operating temperature range.

By offering an excellent magnetic behavior, Infineon's switches are ideally suited for:
- Index counting application with a pole wheel
- Rotor position detection (BLDC motors)
- Open/close detection

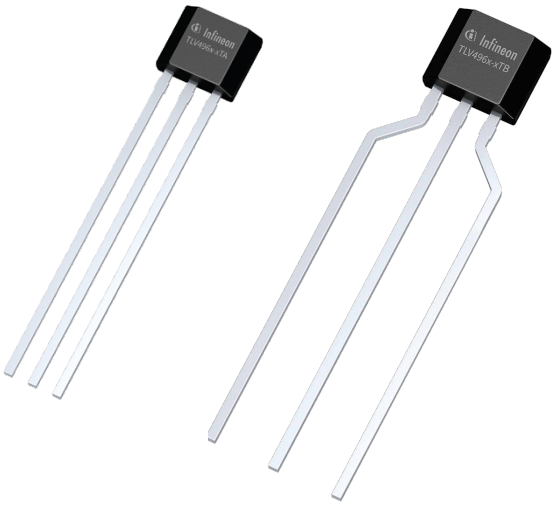
Features
- 3.0 to 5.5 V operating supply voltage
- Low current consumption 1.4 mA
- ESD protection 4 kV HBM
- Active error compensation (chopped)
- High stability of magnetic thresholds
- Low jitter (typ. 0.35 µs)
- Operating temperature range:
  - from -40°C to +170°C (TLE496x-xM)
  - from -40°C to +125°C (TLI496x-xM)
- Small SMD package SOT23
- TLE: AEC-Q100 qualified
- TLI: JEDEC qualified

Product	Type	Operating point B_{OP} [mT]	Release point B_{RP} [mT]	Hysteresis ΔB_{HY} [mT]	Automotive	Industrial	Consumer	Package
TLE4963-1M	Latch	2.0	-2.0	4.0	✓	✓	✓	SOT23
TLE4963-2M	Latch	5.0	-5.0	10.0	✓	✓	✓	SOT23
TLE4965-5M	Unipolar switch	7.5	5.0	2.5	✓	✓	✓	SOT23
TLI4963-1M	Latch	2.0	-2.0	4.0	–	✓	✓	SOT23
TLI4963-2M	Latch	5.0	-5.0	10.0	–	✓	✓	SOT23
TLI4965-5M	Unipolar switch	7.5	5.0	2.5	–	✓	✓	SOT23

Click here to learn more:
www.infineon.com/magnetic-position-sensors
www.infineon.com/switches-latches

TLV496x-xTA/B
XENSIV™ precise Hall-effect sensor for consumer applications in leaded package

The TLV496x-xTA/B Hall-effect sensor family comprises a line of magnetic switches for contactless position sensing. The sensors are specially designed to provide an easy-to-use and cost-effective solution for position sensing applications.



Features

- 3.0 to 26 V operating supply voltage
- Low current consumption 1.6 mA
- ESD protection 4 kV HBM
- Operating temperature range from -40°C to 125°C
- Leaded package TO92S

Applications

- BLDC motor commutation for consumer devices (e.g., e-bikes, fans, air conditioners)
- Position detection (e.g., flaps and control buttons)

Product	Type	Operating point B_{OP} [mT]	Release point B_{RP} [mT]	Hysteresis ΔB_{HY} [mT]	Consumer	Package
TLV4961-1TA	Latch	2.0	-2.0	4.0	✓	TO92S-3-1
TLV4961-1TB	Latch	2.0	-2.0	4.0	✓	TO92S-3-2
TLV4961-3TA	Latch	7.5	-7.5	15.0	✓	TO92S-3-1
TLV4961-3TB	Latch	7.5	-7.5	15.0	✓	TO92S-3-2
TLV4964-4TA	Unipolar switch	10.0	8.5	1.5	✓	TO92S-3-1
TLV4964-4TB	Unipolar switch	10.0	8.5	1.5	✓	TO92S-3-2
TLV4964-5TA	Unipolar switch	7.5	5.0	2.5	✓	TO92S-3-1
TLV4964-5TB	Unipolar switch	7.5	5.0	2.5	✓	TO92S-3-2
TLV4968-1TA	Bipolar switch	1.0	-1.0	2.0	✓	TO92S-3-1
TLV4968-1TB	Bipolar switch	1.0	-1.0	2.0	✓	TO92S-3-2

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/switches-latches

TLx4966-xG family
Two-in-one double Hall-effect sensor

Our XENSIV™ TLx4966-xG family features two integrated, calibrated sensor elements for detecting direction and counting indexes in one device. This two-in-one feature eliminates the need for a second sensor, cutting engineering and production costs. Using just one sensor ensures perfect alignment of the sensor elements, raising system quality and reliability.

Features

- Two Hall probes in one package
- Excellent matching between the two Hall probes
- Hall plate distance of 1.45 mm
- Outstanding quality
- Information on direction and speed
- TSOP6 package
- AEC-Q100 qualified

Applications

- Window lifter
- Sunroof
- Automatic tailgate
- Automated doors
- Sun blinds

AEC Qualified

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/switches-latches

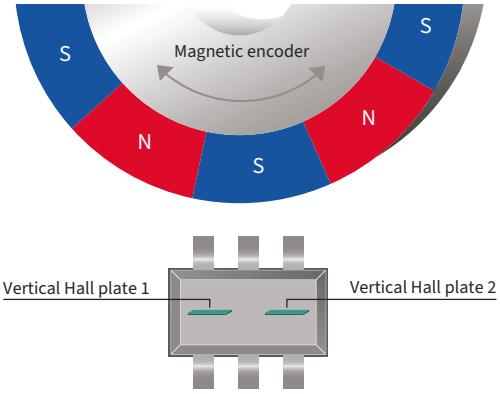
TLE4966V-1G
XENSIV™ vertical dual-Hall switch

The Infineon vertical double Hall-effect switch TLE4966V-1G further develops the TLx4966-xG family. The vertical orientation of the Hall plates, resulting in in-plane field sensitivity, is completely new, enabling entirely new application layouts.

This device offers high-voltage capabilities with very low current consumption. It can be operated from unregulated power supplies, offering our customers unique design freedom for their systems. This product is AEC-Q100 certified, enabling our customers to build systems that meet the highest quality requirements.

Benefits

- Saves space
- Easy mounting of sensor and PCB board
- Allows increased mounting flexibility
- Enables new, compact system designs



Product	Type	Output	Operating point B_{OP} [mT]	Release point B_{RP} [mT]	Hysteresis ΔB_{HY} [mT]	Automotive	Industrial	Consumer	Package
TLE4966G	Double Hall, speed and direction output	Speed and direction	7.5	-7.5	15	✓	✓	✓	TSOP6
TLE4966L	Double Hall, speed and direction output	Speed and direction	7.5	-7.5	15	✓	✓	✓	SSO-4-1
TLE4966-2G	Double Hall, two independent outputs	2 x speed	7.5	-7.5	15	✓	✓	✓	TSOP6
TLE4966-3G	Double Hall, speed and direction output	Speed and direction	2.5	-2.5	5.0	✓	✓	✓	TSOP6
TLE4966V-1G	Vertical double Hall, speed and direction output	Speed and direction	2.5	-2.5	5.0	✓	✓	✓	TSOP6
TLI4966G	Double Hall, speed and direction output	Speed and direction	7.5	-7.5	15	–	✓	✓	TSOP6

AEC Qualified

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/switches-latches

TLx49x6
XENSIV™ high-precision magnetic switches and latches

The TLx49x6 families comprise high-precision, unipolar Hall-effect switches and latches with different magnetic sensitivities.

TLx49x6 products have succeeded in many automotive, industrial, and consumer applications. The family includes two-wire sensors with a current interface.

Features

- Best-in-class quality
- Chopped Hall system for high sensitivity
- High jitter performance
- SMD and leaded packages
- Open collector or current interface
- Temperature compensation
- Up to 18 V supply
- Dedicated products for industrial (TLI49x6) and consumer applications (TLV49x6)
- AEC-Q100 qualified (TLE products)

Applications

- Power closing
- Gear stick
- Seat belt
- HVAC flap
- BLDC commutation
- Two-wheeler application

Product	Type	Operating point B_{OP} [mT]	Release point B_{RP} [mT]	Hysteresis ΔB_{HY} [mT]	Automotive	Industrial	Consumer	Package
TLE4906K	Unipolar switch	10.0	8.5	1.5	✓	✓	✓	SC59
TLE4906L	Unipolar switch	10.0	8.5	1.5	✓	✓	✓	SSO-3-2
TLE4906-2K	Unipolar switch	18.0	12.5	5.5	✓	✓	✓	SC59
TLE4906-3K	Unipolar switch	28.0	22.5	5.5	✓	✓	✓	SC59
TLE4946K	Latch	14.0	-14	28	✓	✓	✓	SC59
TLE4946-1L	Latch	15.0	-15	30	✓	✓	✓	SSO-3-2
TLE4946-2K	Latch	2.0	-2.0	4.0	✓	✓	✓	SC59
TLE4946-2L	Latch	2.0	-2.0	4.0	✓	✓	✓	SSO-3-2
TLE4976-1K	Unipolar switch/ Current interface	9.25	7.25	2.0	✓	✓	✓	SC59
TLE4976-2K	Unipolar switch/ Current interface	4.5	2.7	1.8	✓	✓	✓	SC59
TLV4976-2K	Unipolar switch/ Current interface	4.5	2.7	1.8	–	–	✓	SC59

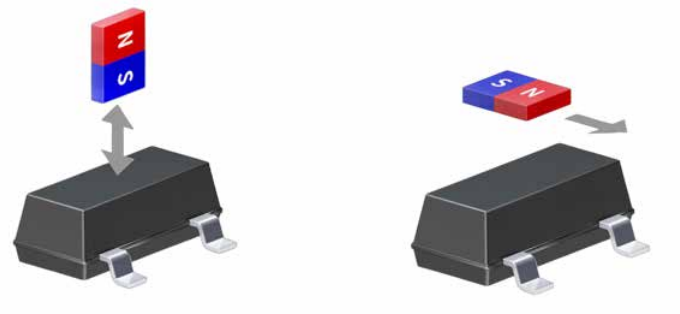
Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/switches-latches

ASIL B-compliant magnetic switches

XENSIV™ ISO 26262-compliant switches with extended mounting flexibility enabling safety on application level up to ASIL B

The TLE4960x family of magnetic Hall switches is a range of high-precision magnetic sensors designed for demanding automotive applications with extended safety requirements. The different sensor variants, sensitive in planar and orthogonal directions, achieve extended mounting flexibility on PCBs, making them a perfect solution for a wide range of applications.



Large portfolio of Hall switches allows a maximum of mounting flexibility

The increasing electrification of vehicles, including safety-relevant areas such as steering and braking, has led to a growing concern about safety and redundancy in the automotive sector. The smallest errors in one magnetic sensor can lead to the failure of an entire system. The TLE4960x family sensors have been developed per ISO 26262 standard to address this issue, avert harm under all possible circumstances, and meet the ASIL B metric on a chip level as a safety element that is out of context. Therefore, sensors are equipped with a fully ASIL B-compliant internal diagnosis and a periodically sent life tick, which can be evaluated externally at the application level to detect faults. The evaluation of the sensor signals is particularly smart and cost-effective since both the magnetic switching signal and the safety diagnostic signals are transmitted via a single output, enabling drop-in replacements for conventional magnetic switches.

The TLE4960x family is designed for various automotive applications, including window lifters, gear sticks, steer-bywire and motor commutation. Some derivatives can be operated in two-wire mode, requiring only a minimum of two wires between the controller unit and sensor, especially for remote peripheral devices inside automotive solutions.

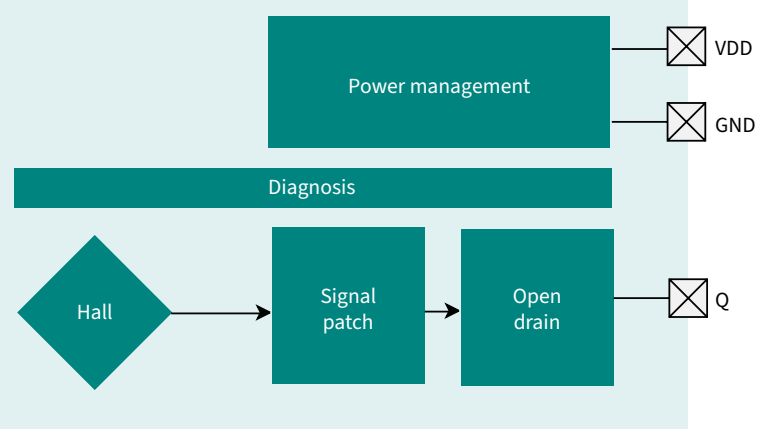
Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/switches-latches

TLE4960x
XENSIV™ ASIL B-compliant magnetic switches with open drain interface
Upgrade your safety and flexibility in cars

Infineon has launched the pilot ASIL B magnetic switch family, which measures the magnetic field orthogonal to the PCB direction in the Z direction. This sensor family is developed according to ISO 26262 and provides built-in diagnosis functions to support functional safety applications with requirements up to ASIL B. It is also AEC-100 compliant and Grade 0 qualified.

The very small SOT23 package reduces overall system cost and ensures design flexibility. By using TLE4960x, safety and flexibility can be redefined in multiple car applications, such as window lifts, sunroofs, power closure actuators, seat positioning, and seat belt pre-tensioners.



Features and benefits

Key features	Key benefits
– Meets safety standard up to ASIL B	– Increased reliability means less fails at the end-customer within warranty time
– Smallest automotive-qualified SMD package on the market	– Reduces system cost, increases flexibility, and enables small designs
– Broad portfolio of specialized sensors for all kind of applications	– Ensures easy replacement and enables supplier flexibility
– Online simulation tool to ensure short design cycles	– Allows first time right designs and ensures fast time to market
– Lowest best-in-class effective noise	– Enables a very accurate time critical switching

Product portfolio

Product	Description	Package	ISO 26262	Orientation	Ordering code
TLE49601-1M-S2	Latch with Bop/Brp (2/-2 mT)	SOT23-3	ASIL B	Z	SP005924303
TLE49601-3M-S2	Latch with Bop/Brp (7.5/-7.5 mT)	SOT23-3	ASIL B	Z	SP005924485
TLE49601-5M-S2	Latch with Bop/Brp (15/-15 mT)	SOT23-3	ASIL B	Z	SP005924491
TLE49604-1M-S2	Unipolar switch with Bop/Brp (18/12.5 mT)	SOT23-3	ASIL B	Z	SP005924627
TLE49604-2M-S2	Unipolar switch with Bop/Brp (28.0/22.5 mT)	SOT23-3	ASIL B	Z	SP005924552
TLE49604-4M-S2	Unipolar switch with Bop/Brp (10/8.5 mT)	SOT23-3	ASIL B	Z	SP005924634
TLE49604-6M-S2	Unipolar switch with Bop/Brp (3.5/2.5 mT)	SOT23-3	ASIL B	Z	SP005924642
TLE49604-7M-S2	Unipolar switch with Bop/Brp (9.5/7 mT)	SOT23-3	ASIL B	Z	SP005924558
TLE49608-1M-S2	Bipolar switch with Bop/Brp (1/-1 mT)	SOT23-3	ASIL B	Z	SP005924532

Click here to learn more:
www.infineon.com/magnetic-position-sensors
www.infineon.com/switches-latches

3D sensors

Infineon's XENSIV™ 3D sensors (TLx493D-xxxx) combine high-accuracy magnetic field measurements with an extremely compact footprint and exceptionally low power consumption (typ. 7 nA). Our sensors open up a lot of exciting new use cases, including innovative human-machine interfaces in the form of industrial joysticks, ergonomic pushbuttons on domestic appliances and highly precise position control in robotics.

XENSIV™ TLE493D-P3I8 /-P3B6 /-W3B6 is our latest magnetic 3D sensor, enabled by new and improved accuracy. With respect to pricing and package size, it is the best product for high-performance applications.

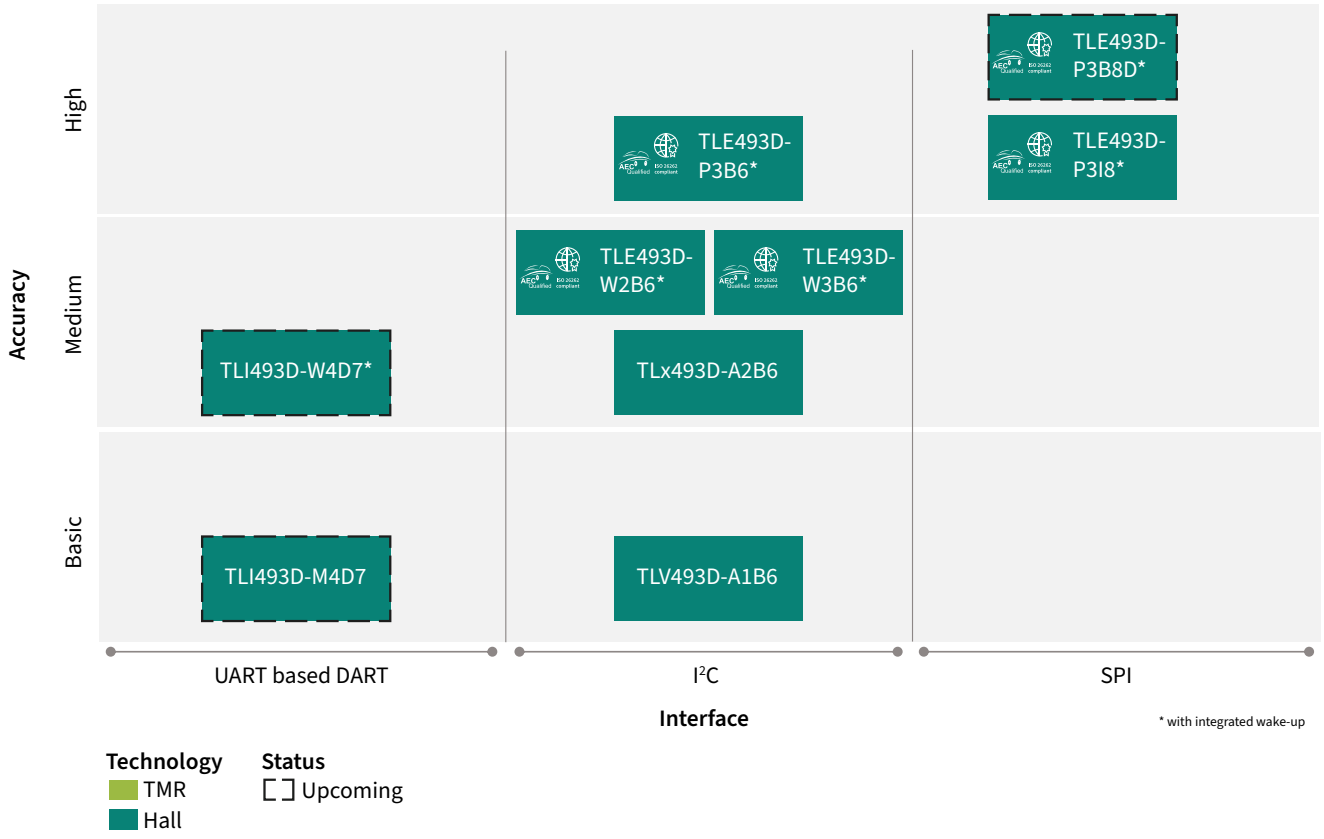
The TLE493D-P3I8 /-P3B6 /-W3B6 has an extremely low current consumption and a wake-up function in a small package. Also, the sensor provides configuration options to best fit customer requirements (e.g., data communication, definition of measurements, etc.). The ISO 26262 compliance includes the safety manual and supports functional safety applications. The configurability of the sensor is used in application platforms to adapt to end customer wishes. TLE493D-P3I8 /-P3B6 /-W3B6 is available in 4 different address variants. It is possible to connect up to 4 sensors to one I^2C bus.

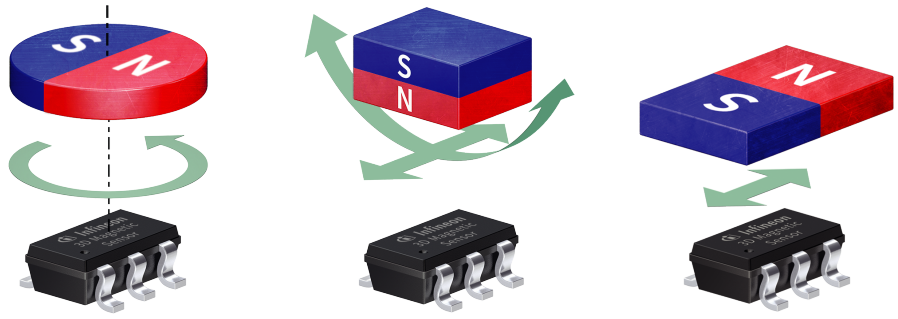
Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/3d-sensors

XENSIV™ 3D sensors for consumer and industrial applications

The TLx493D-AxB6 sensor realizes accurate three-dimensional sensing with extremely low power consumption in a small package. Capable of detecting the magnetic field in the x, y, and z-directions, the sensor is ideally suited for the measurement of linear, rotational, or three-dimensional movements. Thanks to its small package and low power consumption, the TLx493D-AxB6 can be used in new applications, replacing potentiometers and optical solutions. Featuring contactless position sensing and high-temperature stability of the magnetic measurement, the sensor allows systems to get smaller, more accurate, and more robust.





Rotation movement | 3D movement | Linear movement

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/3d-sensors

Features

- 3D magnetic sensing
- Integrated temperature sensing
- Low current consumption
  - 7 nA in power-down mode
- 2.8 to 3.5 V operating supply voltage
- Digital communication via a 2-wire standard I^2C interface
- Bx, By, and Bz linear field measurement up to ±160 mT
- JESD47 qualified
- 12-bit data resolution for each measurement direction
- Various resolution options from 32 to 130 µT/LSB_{12}
- Operating temperature range from -40°C to 125°C

Product	Temperature range	Qualification	Linear magnetic range	Resolution	I_{DD}	Update rate XYZ measurement	Package	Ordering code
TLI493D-A2B6	-40 … 105°C	JESD47	±100 mT ±160 mT	7.7 or 15.4 LSB_{12}/mT	7 nA – 3.4 mA	up to 8.4 kHz	TSOP6	SP001689844
TLV493D-A1B6	-40 … 125°C	JESD47	±130 mT	10.2 LSB_{12}/mT	7 nA – 3.7 mA	up to 3.3 kHz	TSOP6	SP001286056

New features

- Advanced operation modes to provide high flexibility
- Short mode range setting, focusing on the half of the magnetic range, ensuring higher accuracy
- Higher update frequency allows for an application field that requires faster update speed
- Angular mode (for x and y measurement only)

Applications

- Anti-tampering protection in smart meters
- Joysticks
- CCTV-control, game consoles
- Control elements e.g., white goods multifunction knobs
- Ergonomic push- and control buttons on domestic appliances and power tools
- Position control in robotics
- Smart lock position detection
- Tactile sensing for grippers and dexterous robot hands

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/3d-sensors

XENSIV™ 3D sensors for automotive applications

Infineon's TLE493D-xxxx enables automotive control element applications within the passenger compartment or under the hood with a temperature range of -40°C up to +150°C, with linear magnetic range requirements up to ±160 mT.

Features

- 3D magnetic sensing
- Integrated temperature sensing
- 2.8 to 5.5 V operating supply voltage
- Low current consumption
  - 7 nA in power-down mode
  - Up to 10 power modes
- Digital output via I^2C or SPI interface
- Bx, By, and Bz linear field measurement ±160 mT
- AEC-Q100 qualified
- Up to 14-bit data resolution for each measurement direction
- Various resolution options from 8.5 µT/LSB_{14} to 130 µT/LSB_{12}
- Operating temperature range from -40°C up to +150°C
- ISO 26262-compliant for ASIL B

Applications

- Control elements for infotainment/navigation systems, air conditioners, multifunctional steering wheels, seat controls
- Top column modules e.g., direction indicator, wiper control
- Gear stick position sensing
- Multi-function knobs
- Pedal/valve position sensing

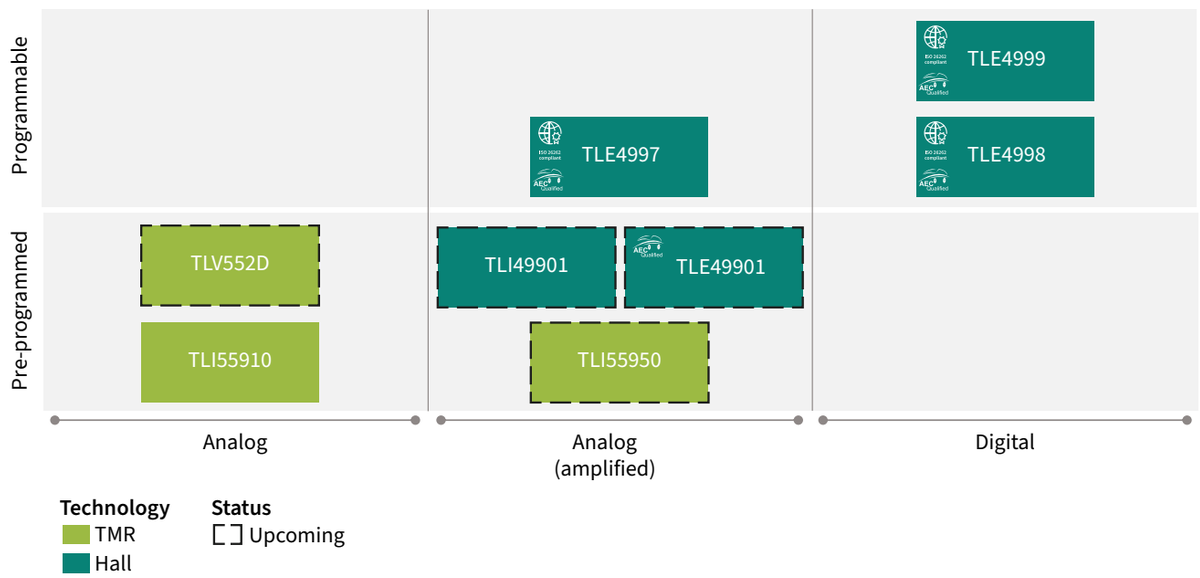
Product	Supply voltage [V]	Inter-face	Qualification	Magnetic range (Se-lectable) [mT]	Sensitivity drift [%]	Matching drift X to Y [%]	Matching drift X/Y to Z [%]	Wake-up	Package	Ordering code
TLE493D-A2B6	2.8-3.5	I^2C	AEC-Q100	±160 ±100	±5	±3.5	±10	No	TSOP6	SP001689848
TLE493D-W286 A0 **TLE493D-W286 A1** **TLE493D-W286 A2** **TLE493D-W286 A3**	2.8-3.5	I^2C	AEC-Q100 ISO 26262-ready	±160 ±100	±5	±3.5	±10	Yes	TSOP6	SP001655334 SP001655340 SP001655344 SP001655348
TLE493D-W3B6 B0 **TLE493D-W3B6 B1** **TLE493D-W3B6 B2** **TLE493D-W3B6 B3**	2.8-3.5	I^2C	AEC-Q100 ISO 26262-compli-ant ASIL-B	±160 ±100 ±50	±5	±1	±10	Yes	TSOP6	SP005952965 SP005952969 SP005952973 SP005952977
TLE493D-P3B6 A0 **TLE493D-P3B6 A1** **TLE493D-P3B6 A2** **TLE493D-P3B6 A3**	2.8-3.5	I^2C	AEC-Q100 ISO 26262-ready ASIL-B	±160 ±100 ±50	±5	±1.7	±6.75	Yes	TSOP6	SP005427119 SP005427121 SP005427123 SP005427125
TLE493D-P3I8	2.8-3.5	I^2C	AEC-Q100 ISO 26262-ready ASIL-B	±160 ±100 ±50	±5	±1.7	±6.75	Yes	VSON-8	SP005633649

ISO 26262 compliant

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/3d-sensors

Linear sensors



XENSIV™ TLE4999C8 programmable dual channel linear Hall sensor with fast SPC interface for high precision applications

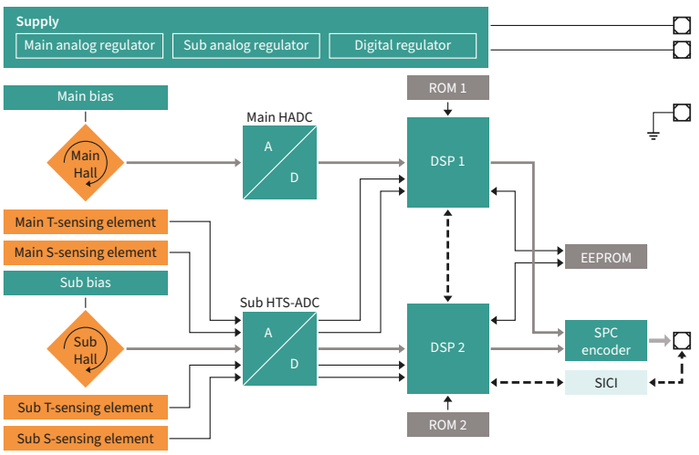
Infineon's TLE4999C8 is a programmable dual-channel linear Hall sensor designed to meet the requirements of safety-critical automotive and industrial applications. It is developed in full compliance with ISO 26262 using two sensor elements included within one monolithic silicon design. The sensor cells are designed to complement the state-of-the-art safety requirements at the system level and enable ASIL D system developments. Their signals follow two independent analog paths. Each signal path has a digital signal processing unit to ensure maximum independence (redundancy, respectively). The sensor offers a multi-point calibration with up to 9 selectable set points for enhanced linearization of the output signal. The chip provides five different calibration characteristics for an easy and flexible adaptation to the non-linearity of magnetic circuit design.

TLE4999C8 features a digital Short-PWM Code (SPC) interface with a bus capability for up to 4 sensor ICs on a single data output. The communication interface with a minimum 0.5 µs unit time guarantees a fast transmission of a complete two-channel data signal in less than 500 µs. The additionally implemented frame holder circuit enables the synchronicity of multiple sensors (e.g., in combination with angle sensors) via an SPC bus. The chip offers a 12-, 14- and 16-bit output signal resolution, ensuring the highest flexibility and superior noise performance.

An integrated digital temperature and stress compensation achieves the highest accuracy over a wide temperature range and lifetime. The chip is available in a thin 8-pin SMD single-sensor package.

Click here to learn more:
www.infineon.com/magnetic-position-sensors
www.infineon.com/linear-sensors

Block diagram



Features

- Fully ISO 26262-compliant, supports ASIL D systems
- <2% sensitivity drift, <100 µT offset drift over temperature and lifetime
- Integrated digital temperature- and stress-compensation
- Fast digital SPC interface (unit time 0.5–3.0 µs)
- Multi-point calibration with up to nine linearization set points

Benefits

- High diagnostic coverage, ISO 26262-compliancy and dual sensor cell integration enable development of fail operational systems
- Multi-point calibration for better fit into various magnetic circuit designs
- Easy system integration due to programmability of several sensor parameters

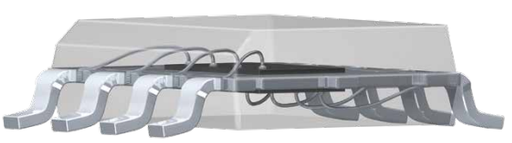
Applications

Automotive safety critical applications

- Electric power steering
- Linear movement position sensing
- Pedal position
- Electric throttle control
- Seat rail adjustment
- Headlight adjustment

Industrial applications

- Small home appliances
- Joystick applications



ISO 26262-ready/compliant dual channel linear sensors

Product	Interface	Magnetic linear range [mT]	Sensitivity	Sensitivity drift [%]	Gain	Magnetic offset drift [µT] [1]	Classification	Ordering code	Package
TLE4997A8D	Analog ratiometric	50, 100, 200	±60 mV/mT default for 100 mT range, with gain 1.5	±3	±4	<±400	ISO 26262-ready	SP000902760	TDSO-8
TLE4998S8D	Digital interface SENT	50, 100, 200	±48 LSB_{12}/mT default for 100 mT range, with gain 1.5	±2	±4	<±400	ISO 26262-ready	SP000902784	TDSO-8
TLE4998C8D	Digital interface SPC	50, 100, 200	±48 LSB_{12}/mT default for 100 mT range, with gain 1.5	±2	±4	<±400	ISO 26262-ready	SP000902768	TDSO-8
TLE4999I3	Digital interface PSI5	12.5, 25	±147.5 LSB_{12}/mT default for 25 mT range, with gain 1.5	±2	±7.59	<±100/ <±200[2]	ISO 26262-compliant	SP001689862	SSO-3
TLE4999C8 (TLE4999C8-S0001)	Digital interface SPC	25, 50	±36.875 LSB_{12}/mT default for in 50 mT range, with gain 1.0	±2	±7.59	<±100/ <±200[2]	ISO 26262-compliant ASIL D (ASIL C)	SP002662500 (SP005727371)	TDSO-8
TLE4999C4 (TLE4999C4-S0001)	Digital interface SPC	25, 50	±36.875 LSB_{12}/mT default for in 50 mT range, with gain 1.0	±2	±7.59	<±100/ <±200[2]	ISO 26262-compliant ASIL D (ASIL C)	SP003420076 (SP005727375)	SSO-4

1) Maximum drift over temperature and lifetime
2) Main channel/sub channel

ISO 26262 ready

ISO 26262 compliant

Click here to learn more:
www.infineon.com/magnetic-position-sensors
www.infineon.com/linear-sensors

TLE499x
XENSIV™ programmable analog/digital single channel linear Hall sensor family

Infineon's family of TLE499x linear Hall ICs is tailored to the needs of highly accurate angular and linear position detection and current measurement applications. Each product measures the vertical component of a magnetic field and outputs a signal that is directly proportional to the magnetic field. These programmable linear Hall sensors come with different interface options: TLE4997 features ratiometric analog output, while TLE4998P comes with pulse width modulation (PWM), TLE4998S with single-edge nibble transmission (SENT), and TLE4998C with short PWM codes (SPC).

These high-precision 12-bit resolution for TLE4997 and 16-bit resolution for TLE4998 linear Hall sensors feature EEPROM memory for flexible programming across a wide range of parameters.

These sensors deliver outstanding temperature stability compared with similar compensation methods, thanks to digital signal processing based on a 20-bit DSP architecture and digital temperature compensation. TLE4998 also includes stress compensation to withstand stress effects from the package, such as moisture, thus ensuring best-inclass accuracy over the device's lifetime.

Features

- Best-in-class accuracy with low drift of output signal temperature range lifetime (including stress compensation in TLE4998)
- Programmable transfer function (gain, offset), clamping, bandwidth, and temperature characteristics
- AEC-Q100 qualified
- Available in various packages including SSO-3-9 with two integrated capacitors to improve ESD and ESC behavior
- For ISO 26262-ready, choose TLE4997, TLE4998

Applications and use cases

- Detecting linear and angular position
- Detecting pedal and throttle position
- Steering torque measurement
- Headlight leveling
- High-current sensing
- Seat position and occupant detection
- Suspension control
- Detecting gear stick/lever positions
- Detecting liquid levels in fuel tanks
- Current sensing e.g., for battery management

Product	Programm.	Number of pins	Sensitivity (programmable range)	Magnetic offset	Supply voltage (extended range)	Automotive	Classification	Interface	Package
TLE4997	EEPROM	3/Single die SMD 8	±12.5 to ±300 mV/mT	<±400 µT	5 V ±10% (7 V)	✓	ISO 26262-ready	Analog	SSO-3-10 TDSO-8
TLE4998P	EEPROM	3/4/Single die SMD 8	±0.2 to ±6%/mT	<±400 µT	5 V ±10% (16 V)	✓	ISO 26262-ready	PWM	SSO-3 SSO-4 SSO-3 (2 capacitors) TDSO- 8
TLE4998S	EEPROM	3/4/Single die SMD 8	±8.2 to ±245 LSB_{12}/mT	<±400 µT	5 V ±10% (16 V)	✓	ISO 26262-ready	SENT	SSO-3 SSO-4 SSO-3 (2 capacitors) TDSO-8
TLE4998C	EEPROM	3/4/Single die SMD 8	±8.2 to ±245 LSB_{12}/mT	<±400 µT	5 V ±10% (16 V)	✓	ISO 26262-ready	SPC	SSO-3 SSO-4 SSO-3 (2 capacitors) TDSO-8

1) 147.44 LSB_{13} converts to 294.88 LSB_{12}

ISO 26262 ready

Click here to learn more:

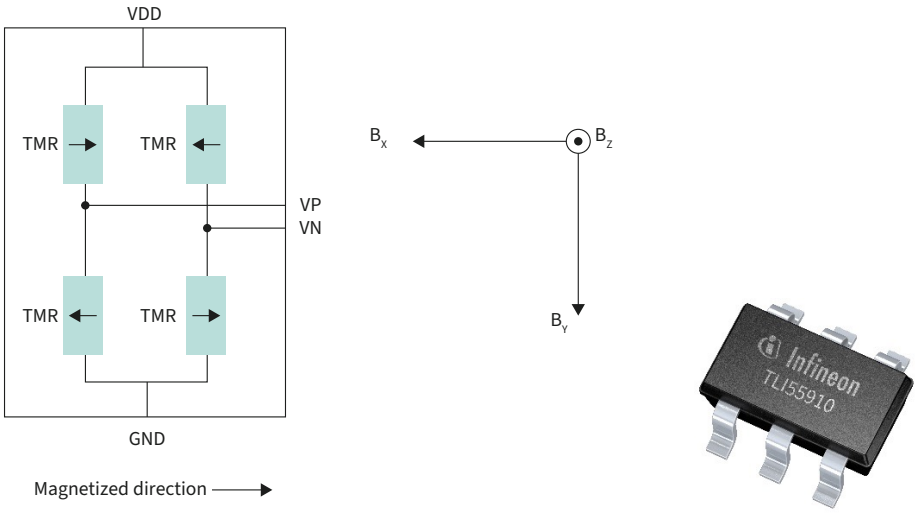
www.infineon.com/magnetic-position-sensors
www.infineon.com/linear-sensors

TMR-based linear sensors

XENSIV™ TLI55910 non-amplified TMR sensors

The TLI55910 is a high-sensitivity and low-power linear position sensor that leverages tunnel magnetoresistance (TMR) technology to deliver precise linear measurements. This non-amplified analog sensor can measure magnetic fields within a range of ±35 mT and boasts a large ratiometric output sensitivity of 5 mV/V/mT. Additionally, the sensor has a low noise level of 5 µVRMS, which helps to minimize errors and ensure reliable measurements. The sensor's low power consumption of 0.25 mA at 1.8 Vdd makes it suitable for battery-powered devices or applications where power consumption is a concern. The TLI55910 sensor complies with JEDEC JESD47 and is available in a compact SOT23-6 package.

The TLI55910 is a versatile solution for various position-sensing applications, including industrial automation, consumer electronics, game controllers, home appliances and medical devices. The sensor is suitable for applications where low power consumption, high accuracy and reliability are beneficial. It can be used for linear, angle and rotary position sensing, displacement measurement, and motor control. It can enhance precision in machinery and robotic systems, improve user experiences in consumer electronics such as game controllers, provide precise feedback for efficient motor operation and ensure accurate and reliable measurements, even in harsh environments.



Features and benefits

Key features	Key benefits
– High signal-to-noise ratio (SNR)	– Enables precise measurements
– Low power consumption (0.25 mA at 1.8 Vdd)	– Ideal for battery-powered devices
– Magnetic measurement range of ±35 mT	– Allows small and cost-effective magnet design
– Strong cross-field immunity	– Robustness against magnetic influences
– Very low temperature drift characteristic	– Stable measurements and operation even in harsh environments

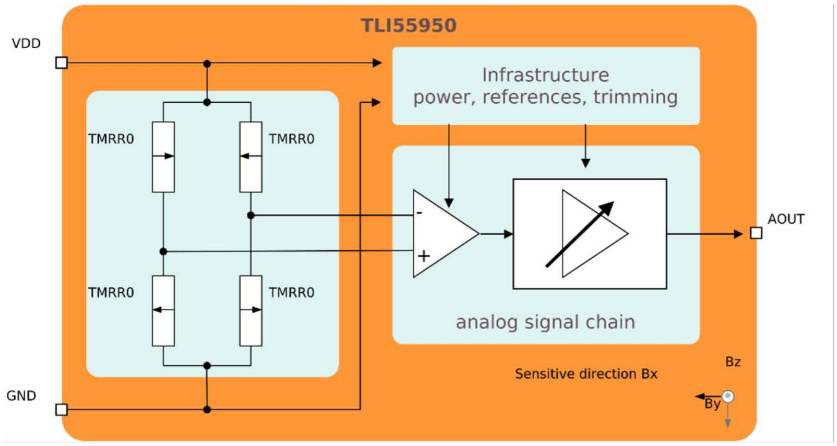
Product	Interface	Magnetic linear range [mT]	Sensitivity [mV/V/mT]	Non-linearity [%]	Offset [mV/VDD]	Classification	Ordering code	Package
TLI55910	Analog	±35	5	±1.8	10	JEDEC JESD47	SP006118939	PG-SOT23-6

Consumer · Game controller · Home appliance · Automation

Click here to learn more:
www.infineon.com/magnetic-position-sensors
www.infineon.com/linear-sensors

TLI55950
XENSIV™ linear TMR sensor with amplified output

The TLI55950 is a Tunnel Magnetoresistance (TMR)- based magnetic linear sensor with an integrated operational amplifier, providing a single-ended full-range voltage output suitable for high-sensitivity sensing applications. It features a linear position sensor in a universal SOT23-6 package, 5 V and 3.3 V supply voltages, and a magnet range with full-scale output amplitudes of ±41/25 mT and ±25/16 mT. The sensor has a high sensitivity of up to 85.5 mV/mT and ultralow noise of 4.1 µTRMS, making it suitable for applications such as power tool trigger detection, service robots and drones angle sensing, and a high-precision dual-encoder setup.



Features and benefits

Key features	Key benefits
– High sensitivity due to integrated operational amplifier	– Flexible magnet choice and reduce the needs for external OpAmp
– High accuracy and low noise (4.1 µTRMS)	– Precise measurements
– High linearity (± 1.8% full range)	– Robust and high reliability
– Low drift and strong cross-field immunity	– Stable measurements and operation even in harsh environment

Sales name	Interface	Supply Voltage	Magnetic linear range [mT]	Sensitivity [mV/mT]	Classification	Ordering code	Package
TLI55950-AE6-E001	Analog	5 V and 3.3 V	±41/±25	53.5	JEDEC JESD47	SP006153153	PG-SOT23-6
TLI55950-AE6-E002	Analog	5 V and 3.3 V	±25/±16	85.5	JEDEC JESD47	SP006206460	PG-SOT23-6

Gimbal · Robotics · Home & building automation · Smart factory

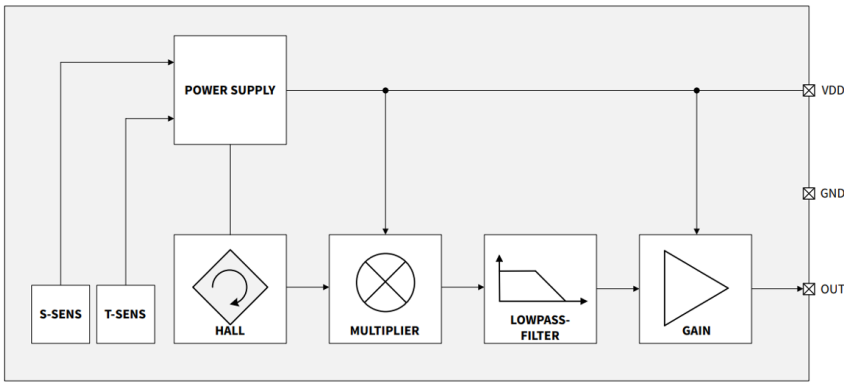
Click here to learn more:
www.infineon.com/magnetic-position-sensors
www.infineon.com/linear-sensors

TLE/TLI49901 – Analog linear sensors
XENSIV™ linear Hall sensor IC with analog output in 3-Pin SOT23 package

XENSIV™ TLE49901 (automotive) and TLI49901 (industrial) are linear Hall-effect sensors in BiCMOS technology with a ratiometric analog output, delivering stable, high-resolution position measurement in automotive and industrial applications. The sensors sense magnetic fields perpendicular to the top side, providing an output voltage proportional to the supply voltage and the applied magnetic field.

There are two versions available: Automotive and industrial, each with four different factory-programmed sensitivities, providing flexibility for different designs and customer requirements. The XENSIV™ analog linear sensors TLE/TLI49901 are suitable for applications that require high accuracy and can operate across an extended temperature range. The sensors offer low noise and a large signal bandwidth of up to 20 kHz. All variants are available in a compact 3-pin SOT23 surface-mount package and are pin-compatible with existing market solutions. The products have high accuracy with low sensitivity drift over temperature and lifetime, enabling precise measurements and reliable systems even in harsh environments.

Typical use cases include HMI controls such as knobs, buttons, and sliders, as well as pedal and valve position sensing in automotive and industrial systems. The sensors are also well-suited for motor commutation, drone gimbals, game controller joysticks and triggers and various linear and angle sensing use cases.



Features and benefits

Key features	Key benefits
– Analog ratiometric output	– ADC with internal low-cost reference voltage can be used
– Best-in-class accuracy ~ 5% error over temperature and lifetime	– Precise measurements
– Low offset and offset drift	– High reliability, even in harsh environments
– High bandwidth	– Accurate measurements even in high frequency signals
– Standard SOT23-3 package	– Pin-to-pin comparable with common linear Hall sensors on the market

HMI · Power sliding door · Game controller · Home & building automation

Click here to learn more:
www.infineon.com/magnetic-position-sensors
www.infineon.com/linear-sensors

TLI49901 for Automotive

Sales name	Interface	Supply Voltage	Magnetic linear range [mT]	Sensitivity [mV/mT]	Classification	Ordering code	Package
TLE49901-1M	Analog	3.3 V and 5 V	±45	50 (VDD = 5 V) 33 (VDD = 3.3 V)	Automotive	SP006041489	PG-SOT23-3
TLE49901-2M	Analog	3.3 V and 5 V	±72	31.25 (VDD = 5 V) 20.6 (VDD = 3.3 V)	Automotive	SP006041498	PG-SOT23-3
TLE49901-3M	Analog	3.3 V and 5 V	±90	25 (VDD = 5 V) 16.5 (VDD = 3.3 V)	Automotive	SP006041506	PG-SOT23-3
TLE49901-4M	Analog	3.3 V and 5 V	±180	12.5 (VDD = 5 V) 8.25 (VDD = 3.3 V)	Automotive	SP006041510	PG-SOT23-3

TLI49901 for Industrial and Consumer

Sales name	Interface	Supply Voltage	Magnetic linear range [mT]	Sensitivity [mV/mT]	Classification	Ordering code	Package
TLI49901-1M	Analog	3.3 V and 5 V	±45	50 (VDD = 5 V) 33 (VDD = 3.3 V)	Industrial	SP006041535	PG-SOT23-3
TLI49901-2M	Analog	3.3 V and 5 V	±72	31.25 (VDD = 5 V) 20.6 (VDD = 3.3 V)	Industrial	SP006041539	PG-SOT23-3
TLI49901-3M	Analog	3.3 V and 5 V	±90	25 (VDD = 5 V) 16.5 (VDD = 3.3 V)	Industrial	SP006041544	PG-SOT23-3
TLI49901-4M	Analog	3.3 V and 5 V	±180	12.5 (VDD = 5 V) 8.25 (VDD = 3.3 V)	Industrial	SP006041548	PG-SOT23-3

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/linear-sensors

Angle sensors

Compact designs in small outline packages – at highest functional safety

Highest variety – low end to high end, standardized and specialized in various technologies: GMR, AMR, TMR, and Hall

Angle sensors detect the orientation of an applied magnetic field by measuring sine and cosine angle components with monolithically integrated magnetoresistive elements. Infineon offers a large variety of high-precision angle sensors in all common technologies, such as anisotropic magnetoresistance (AMR), giant magnetoresistance (GMR), tunnel magnetoresistance (TMR), and Hall.

Key features

- Wide product range, allowing for tailored solutions
- Analog and digital interface options
- Single and dual-chip variants available
- Products specifically designed for safety-relevant applications

Automotive applications

- Electric power steering
- Braking
- BLDC motor control
- Rotational position measurement (e.g., windscreen wiper, valves, flaps, pedals, etc.)

Industrial/consumer applications

- BLDC motor control
- Robotics
- Servo drives
- Industrial automation
- High-end drones

Technology
AMR
GMR
TMR
Hall

Status
[ ] Upcoming

D = Dual Die

Click here to learn more:
www.infineon.com/magnetic-position-sensors
www.infineon.com/angle-sensors

*Coming soon

XENSIV™ TLx49012 angle sensor

High accuracy, low latency, and a built-in self-calibration feature improve motor communication control

Features

- 360° angle measurement range with <0.8° angle error and up to 16 bit resolution
- Low latency to support speeds up to 30000 rpm and accelerations up to 25000 rad/s²
- End-of-Shaft and Out-of-Shaft support

Target applications

- Humanoid robot
- Mobile robot
- Dexterous hand
- Servo Motors
- High-end drones
- High-end gimbals

GMR-, AMR-, and TMR-based angle sensors

Product	Technology	Die configuration	Sin/cos output	Angle output	Second interface	Accuracy	Classification	Package
TLE5009	GMR	Single die	Analog sin/cos	–	–	0.9°	ISO 26262-ready	DSO-8
TLE5009A16D	GMR	Dual die	Analog sin/cos	–	–	0.9°	ISO 26262-ready	TDSO-16
TLI5012B	GMR	Single die	SSC (SPI)	SSC (SPI)	PWM/IIF/SPC/HSM	1.9°	JESD47	DSO-8
TLE5012BD	GMR	Single & dual die	SSC (SPI)	SSC (SPI)	PWM/IIF/SPC/HSM	1.0°	ISO 26262-ready	DSO-8/ TDSO-16
TLI49012*	HALL	Single die	SPI	–	BZ/UVW/PWM	0.8°	JESD47	VSON-8
TLE5014C16(D)	GMR	Single & dual die	–	SPC	–	1.0°	ISO 26262-compliant	TDSO-16
TLE5014P16(D)	GMR	Single & dual die	–	PWM	–	1.0°	ISO 26262-compliant	TDSO-16
TLE5014S16(D)	GMR	Single & dual die	–	SENT	–	1.0°	ISO 26262-compliant	TDSO-16
TLE5014SP16(D)	GMR	Single & dual die	–	SPI	–	1.0°	QM ISO 26262-compliant	TDSO-16
TLE5109A16D	AMR	Single	Analog sin/cos	–	–	0.5°	ISO 26262-ready	TDSO-16
TLE5309D	AMR + GMR	Dual die	Analog sin/cos	–	–	AMR 0.5°, GMR 0.9°	ISO 26262-ready	TDSO-16
TLE5501	TMR	Single die	Analog sin/cos	–	–	1.0°	QM ISO 26262-compliant	DSO-8
TLE5502(D)	TMR	Single & dual die	Analog sin/cos	–	–	0.8°	ISO 26262-compliant	QFN-16

SPI = Serial peripheral interface
IIF = Incremental interface
PWM = Pulse width modulation
HSM = Hall switch mode
SENT = Single edge nibble transmission
SPC = Short PWM code
SSC = Synchronous serial communication

ISO 26262 ready
ISO 26262 compliant

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/angle-sensors

TMR-based angle sensors

Tunneling magnetoresistance (TMR) technology offers high sensing sensitivity with a high output voltage, reducing the need for an internal amplifier. Thus, the sensor can be connected directly to the microcontroller without any further amplification.

In addition, TMR technology shows a very low temperature drift, reducing external calibration and compensation efforts. The TMR technology is also well known for its low current consumption.

TLE5501

Infineon's TMR sensor TLE5501 is available in two versions.

TLE5501 – product versions with different pin out:
- TLE5501 E0001: pin-compatible to TLE5009 automotive qualified acc. AEC-Q100
- TLE5001 E0002: decoupled bridges for redundant external angle calculation and highest diagnostic coverage, realizing ISO 26262-compliant development ASIL D

Features
- Large output signals of up to 0.37 V/V for direct microcontroller connection
- Discrete bridge with differential sine and cosine output
- Very low supply current: ~2 mA
- Magnetic field range (20–100 mT)
- Typ. angle error ~ 1.0° (over temperature and lifetime)
- DSO-8 package
- AEC-Q100, grade 0: T_A = -40°C to +150°C (ambient temperature)
- For TLE5501 E0002:
  - Reaching ASIL D with just one single sensor chip
  - ISO 26262-compliant development ASIL D

TLE5502D

Infineon's latest and improved TMR sensor generation

TLE5502 – product versions with different pin out:
- TLE5502D S0002: de-coupled P/N-bridges for redundant external angle calculation and highest diagnostic coverage
- TLE5502D S0003: SIN/COS bridge design

Features
- Up to 4x ASIL-D (ISO 26262) sensors in one package enabling fail operational designs
- Improved accuracy (0.8° over lifetime and temperature)
- Compact QFN-16 package (3x3 mm)

Applications
- Steering angle sensor
- BLDC motor commutation (e.g., wipers, pumps and actuators)
- Angular position sensing for e.g., robotics or gimbal
- Electric motors
- Industrial automation
- Safety applications

ISO 26262 compliant

Click here to learn more:
www.infineon.com/magnetic-position-sensors
www.infineon.com/angle-sensors

GMR-based angle sensors

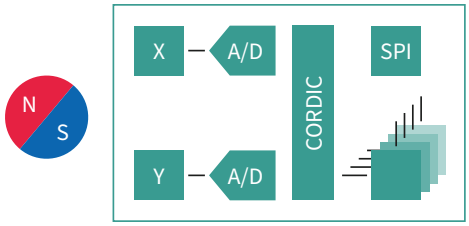
TLE5014(D)
XENSIV™ digital GMR sensor with an easy-to-use plug-and-play concept for highest functional safety applications

All XENSIV™ TLE5014 angle sensors are available as single- and dual-die products. They are easy to use and come pre-configured and pre-calibrated as plug-and-play sensors. Customers can choose between SENT, PWM, SPC, and SPI interfaces. On top of those protocol options, the sensors can be adapted to any application setup via their programmable EEPROM interfaces. TLE5014 magnetic angle sensors meet ISO 26262 ASIL C for the single die and ISO 26262 ASIL D for the dual die versions.

All products are ready for applications with the highest functional safety requirements. The sensors show an extremely small angle error of less than 1° across the entire temperature profile and lifetime. This is particularly helpful in applications requiring very accurate position sensing, such as steering angle sensing or motor commutation. Further application areas range from rotor position measurement to electric power steering (EPS), pedal position, and any other kind of position measurement.

Features

- Easy-to-use, plug-and-play sensors, pre-configured and pre-calibrated
- Offering high flexibility:
  - Available as single- and dual-die products
  - 12-bit digital interface with protocol options PWM, SENT, SPC, and SPI
  - EEPROM and look-up table for customer configuration and calibration
- High angle accuracy: max. 1.0° over temperature and lifetime
- High voltage capability up to 26 V
- Development fully compliant with ISO 26262
  - Developed according to ASIL D level
  - Dual die sensors reaching ASIL D, single die sensors ASIL C metrics
- Safety manual and safety analysis summary report available on request



Applications

- Steering angle sensing (SAS)
- Motor commutation
- Rotor position measurement
- Pedal position
- Safety applications
- Any other kind of high-accuracy position measurement

ISO 26262 compliant

Click here to learn more:
www.infineon.com/magnetic-position-sensors
www.infineon.com/angle-sensors

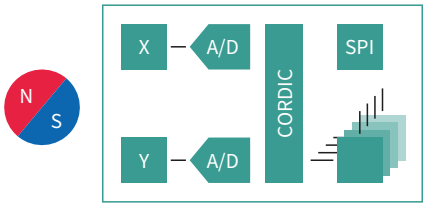
TLE5012B(D), TLI5012B
XENSIV™ GMR-based angle sensor with integrated angle calculation and multiple interfaces

Features

- Integrated angle calculation with CORDIC algorithm
- 15-bit representation of calculated angle value
- High update rate up to 43 µs (23 kHz)
- Range of selectable interfaces
- SPI compatible Synchronous Serial Communication (SSC)
- Bidirectional communication up to 8 Mbps
- Pulse width modulation (PWM)
- Hall switch mode (HSM) for motor commutation
- Incremental Interface (IIF)
- Temperature compensation and auto-calibration algorithm
- Diagnostic function for sensor elements and circuitry with PRO-SIL™ support
- Dual die SMD package (redundancy)
- ISO 26262-ready
- Available as single- and dual-die
- Industrial version TLI5012B in line with JEDEC JESD47

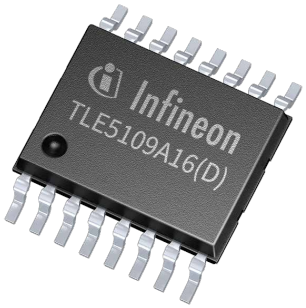
Applications

- Steering angle
- Brushless DC motor commutation, i.e., electric power steering (EPS)
- Rotary switches
- General angular sensing
- Incremental or absolute magnetic encoders
- Gimbals, drones, robots



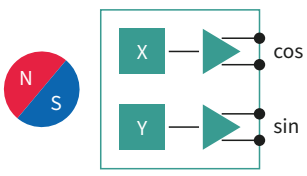
AMR-based angle sensors

TLE5109A16(D)
XENSIV™ analog AMR-based angle sensor with temperature compensation



Features

- Features a differential or single-ended analog interface for sine and cosine values
- Internal temperature drift compensation for gain and offset
- ISO 26262-ready



ISO 26262 compliant

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/angle-sensors

Combined AMR- and GMR-based angle sensors

TLE5309D
XENSIV™ dual angle sensor combining AMR and GMR technologies

The TLE5309D is a diverse redundant angle sensor with analog outputs. It combines a giant magnetoresistance (GMR) sensor for a full 360° angle range with an anisotropic magnetoresistance (AMR) sensor for high precision in a flipped configuration in one package. Magnetoresistive (MR) elements measure a rotating magnetic field's sine and cosine angle components. The sensors provide analog sine and cosine output voltages that describe the magnetic angle from 0 to 180° (AMR sensor) and 0 to 360° (GMR sensor), respectively.

The differential MR bridge signals are independent of the magnetic field strength, and the analog output is designed for differential or single-ended applications.

The output voltages are designed to use the dynamic range of an A/D-converter using the same supply as the sensor as a voltage reference. Both sensor ICs are supplied independently by separate supply and ground pins.

Features

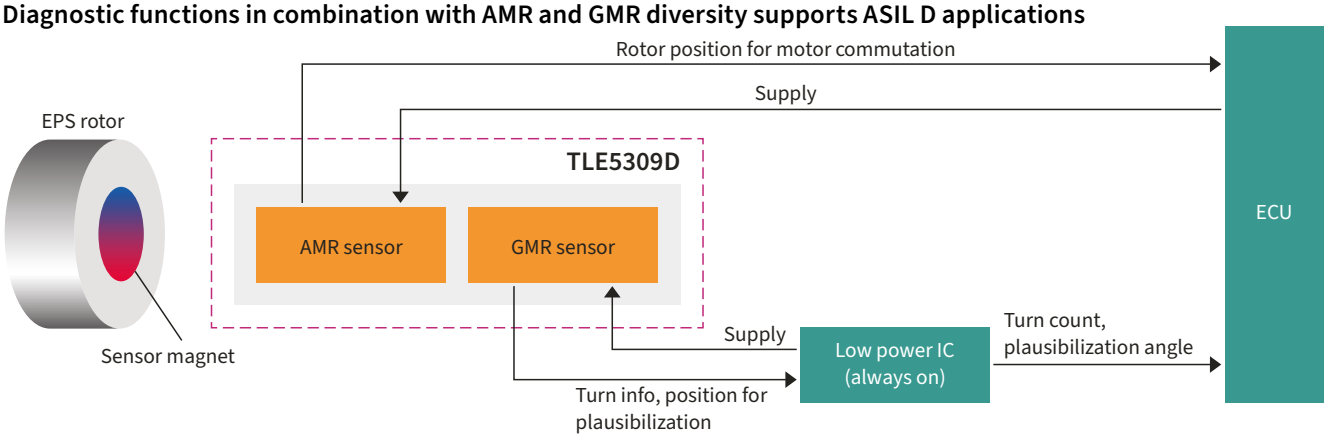
- Separate supply pins for AMR and GMR sensors
- Diverse redundant design with one GMR sensor (top die) and one AMR sensor (bottom die) in one package
- Low current consumption and very fast start up
- 360° contactless angle measurement
- Immune to air gap variations due to MR-based sensing principle
- Operating ambient temperature:
  -40°C to +125°C/-40°C to +150°C (TLE5309DHT)

Applications

The TLE5309D angle sensor is designed for angular position sensing in safety-critical automotive applications.
Its high accuracy, 360° measurement range, and short propagation delay make it suitable for systems with high speeds and high accuracy demands, such as brushless DC (BLDC) motors for actuators and electric power steering systems (EPS). At the same time, its fast start-up time and low overall power consumption enable the device to be employed for low-power turn counting. Extremely low power consumption can be achieved with power cycling, where the advantage of fast power-on time reduces the average power consumption.

- BLDC motors for electric power steering (EPS)
- Low-power turn counter

Diagnostic functions in combination with AMR and GMR diversity supports ASIL D applications



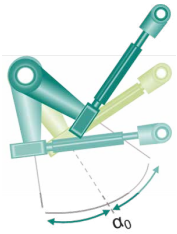
Click here to learn more:
www.infineon.com/magnetic-position-sensors
www.infineon.com/angle-sensors

Stray field robust angle sensors

Outstanding stray field robustness, high accuracy, and flexibility

The TLE49SRx family of angle sensors is a range of high-performance, stray field-robust sensors designed for use in demanding automotive applications. With their advanced measurement capabilities and compliance with key safety and electromagnetic compatibility standards, these sensors offer a reliable and versatile solution for a wide range of applications.

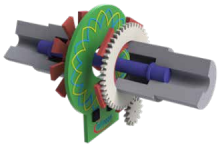
The increasing electrification of vehicles, including integrating electric main drives, has led to a growing concern about electromagnetic interference (EMI) caused by stray fields. These stray fields can potentially disrupt the functioning of electronic subsystems. The TLE49SRx family of angle sensors has been developed to address this issue. It features spatially separated Hall cells that enable robust magnetic field measurement, even in the presence of inhomogeneous stray fields, exceeding the requirements of EMC standards ISO 11452-1:2015.



Chassis height leveling
e.g., TLE49SRI3

Chassis pedal
e.g.TLE49SRS3

Steering angle sensor (SAS)
e.g., 2 x TLE49SRC8(D)



Steering torque angle sensor(TAS)
e.g., (TLE4801-iTAS)+ TLE49SRC8(D)

The TLE49SRx family is designed for various automotive applications, including chassis height, pedal position, and steering angle sensors. Several derivatives of the TLE49SR sensor are available, offering a range of package options, including a package with long leads and integrated capacitors for easy use in remote sensor applications and surface-mounted packages, as well as various communication interfaces.

These sensors have been developed in accordance with the ISO 26262 standard, meeting the ASIL C (D) metric on chip level as a safety element out of context.

Click here to learn more:
www.infineon.com/magnetic-position-sensors
www.infineon.com/angle-sensors

TLE49SR – Stray field robust angle sensors

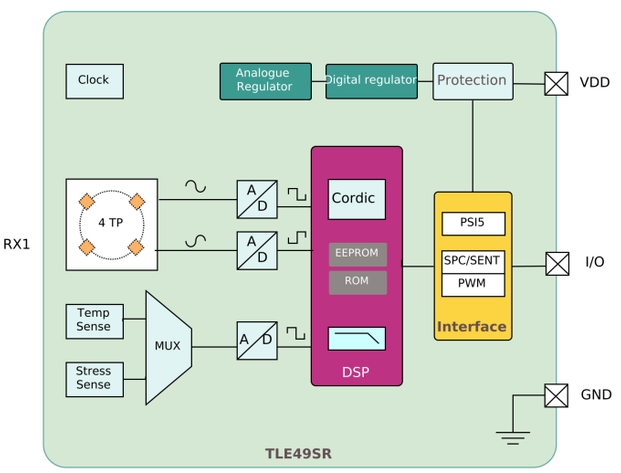
Outstanding stray field robustness, high accuracy, and flexibility

The XENSIV™ TLE49SR magnetic angle sensor family is designed to meet the demands of high-performance applications. It offers excellent stray field robustness up to 8 mT in homogeneous stray fields and complies with EMC standards ISO 11452-1:2015.

The TLE49SR sensors are available in various configurations to suit different application needs. For on-PCB usage, the 8-pin surface-mounted device (SMD) package is available with PWM (TLE49SRP8), SENT (TLE49SRS8), or SPC (TLE49SRC8) communication interfaces. A dual-channel version is also available to support redundancy requirements. For remote sensor applications, derivatives are available in a 3-pin package with long leads, offering PWM (TLE49SRP3), SENT (TLE49SRS3), or SPC (TLE49SRC3) options.

All members of the XENSIV™ TLE49SR magnetic sensor family are developed in compliance with ISO26262 and support the ASIL C metric on the device level, enabling the development of fail-safe systems.

Block diagram



The TLE49SR integrated circuit (IC) features a comprehensive set of on-chip components, including spatially separated Hall-, temperature-, stress sensors, a signal conditioning circuit, analog-to-digital converters, and a digital signal processor. The IC also includes a clock, voltage regulators and internal protection circuitry to ensure safe and reliable operations.
The TLE49SR family offers a range of digital output interfaces, providing flexibility and compatibility with various systems. These interfaces include PSI5, SENT, SPC, and PWM, allowing for seamless integration into a variety of applications.

Features and benefits

Key features	Key benefits
– Stray field Immunity, exceeding ISO 11452-1:2015	– High system reliability eliminates the need for external shielding
– Excellent angle performance with very low jitter and fast response time	– Look-up table for correction of systematic angle errors, angle error <0.5°
– Very low jitter delay ±1 µs and very fast response time 9.8 µs ~ 26 ms	– Enables for highly responsive and fast systems
– EEPROM for customized configuration and customer specific ID	– Easy design with high product flexibility
– PSI5 protocol V1.3 and V2.3, PWM, SENT, and SPC Interface	– Synchronization pulse for PSI5- , frame holder mechanism for SPC-sensors
– ISO 26262-compliant, ASIL C(D), and ASIL D rating	– Dual die version for redundant, ASIL D compliant systems

Product overview

Product	Description	Package	ISO26262 (Functional safety)	ISO 11452-8:2015 (Stray field robust)	Ordering code
TLE49SRI3	Leaded 3-pin package, with 2 internal capacitors, PSI5 Interface	SSO-3	ASIL C	Yes	SP005398935
TLE49SRC3	Leaded 3-pin package, with 3 internal capacitors, SPC Interface	SSO-3	ASIL C	Yes	SP005398941
TLE49SRS3	Leaded 3-pin package, with 3 internal capacitors, SENT Interface	SSO-3	ASIL C	Yes	SP005398939
TLE49SRP3	Leaded 3-pin package, with 3 internal capacitors, PWM Interface	SSO-3	ASIL C	Yes	SP005398937
TLE49SRC8	8-pin SMD package, SPC Interface	TDSO-8	ASIL C	Yes	SP005398933
TLE49SRS8	8-pin SMD package, SENT Interface	TDSO-8	ASIL C	Yes	SP005398931
TLE49SRP8	8-pin SMD package, PWM Interface	TDSO-8	ASIL C	Yes	SP005398929
TLE49SRC8D	8-pin SMD package, dual die, SPC Interface	TDSO-8	ASIL D	Yes	SP005859106
TLE49SRS8D	8-pin SMD package, dual die, SENT Interface	TDSO-8	ASIL D	Yes	SP005948428

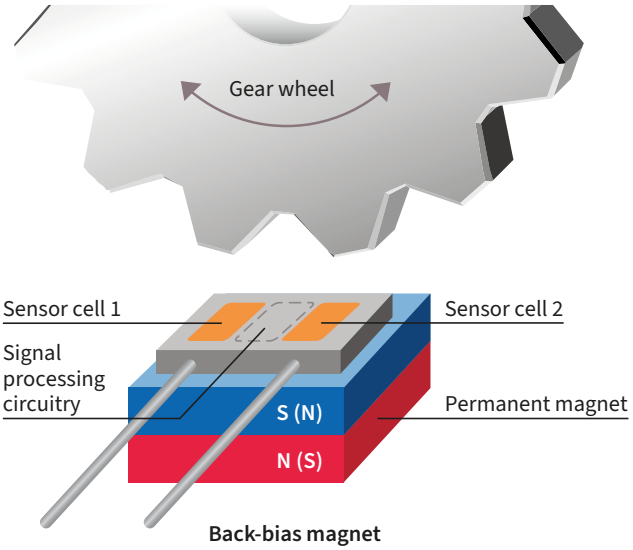
Click here to learn more:
www.infineon.com/magnetic-position-sensors
www.infineon.com/angle-sensors

XENSIV™ magnetic speed sensors

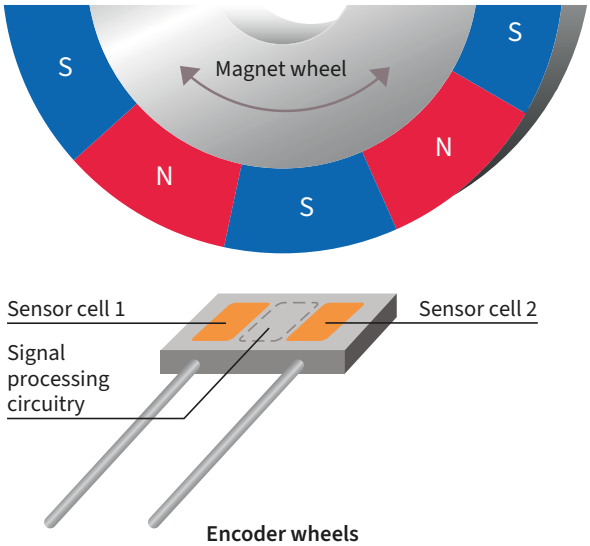
Easy to use, robust, and cost-effective sensors for speed measurement

Infineon's XENSIV™ Hall-, GMR-, and TMR-based magnetic speed sensors are designed specifically for measuring speed in safety and powertrain applications, such as speedometers, ABS, camshafts/crankshafts, and automatic transmissions. These sensors are also applied in similar industrial applications. The speed sensors utilize a ferromagnetic gear tooth or encoder structure to measure linear or rotational speed and position. A Hall-based sensor, for instance, measures rotational speed using a gear tooth and a magnetic encoder wheel. Additionally, the majority of these sensors offer several enhanced features, such as integrated capacitors for superior EMC robustness and top-tier ESD protection.

Typical application of a magnetic differential sensor



Back-bias magnet



Encoder wheels

Click here to learn more:
www.infineon.com/magnetic-speed-sensors

TLE4922
XENSIV™ mono-Hall speed sensor with twist-independent mounting

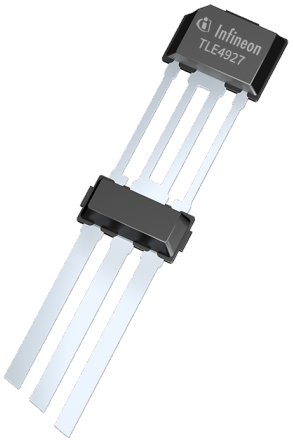
This TLE4922 Hall-based magnetic speed sensor is specifically designed to provide an easy-to-use, robust, and cost-effective solution for vehicle or industrial speed sensing applications. The sensor can be back-biased using a simple and low-cost bulk magnet, while its twist-independent mounting ensures good air gap performance and switching accuracy.
Its hidden adaptive hysteresis and calibration algorithm deliver high accuracy over air gap variations and provide immunity to vibration and run-out events.

Features
- Large operating air gap capability
- Flexible mounting (also known as twist-independent mounting)
- Hidden adaptive hysteresis
- Low current consumption
- Reverse magnetic polarity capability
- Advanced protection technology
  - Reverse voltage protection at VS-pin
  - Short-circuit protection
  - Overtemperature protection
- Wide operating temperature ranges of -40°C ≤ T_j ≤ ±150°C
- High ESD robustness up to ±4 kV HBM
- Three-wire PWM voltage interface

Applications
- Industrial applications
- Two-wheeler and automotive vehicle speed

TLE4927C E6547
XENSIV™ differential Hall effect crankshaft sensor with hidden adaptive hysteresis

Infineon's TLE4927C magnetic speed sensor detects the motion and position of ferromagnetic and permanent magnet structures by measuring the differential flux density of the magnetic field. A self-calibration mode ensures optimum accuracy during operation within just a few transitions after start-up. The sensor combines a fast power-up time with high accuracy and sensitivity, enabling functionality with large operating air gaps. It is qualified for automotive temperature ranges and meets the requirements of the harsh environmental conditions prevalent in automotive applications.
The TLE4927C is available in an SSO package with two integrated capacitors.



Features
- Differential Hall speed sensor to measure speed and position of tooth/pole wheels
- Easy to use single-chip solution in SSO-3-92
- Symmetrical switching point in the middle of the tooth/magnetic pole
- South and north pole pre-induction possible
- Digital output signal (voltage interface)
- Fast start-up time
- Reverse voltage protection at V_S-pin
- Short-circuit and overtemperature protection of output
- Automotive operating temperature range

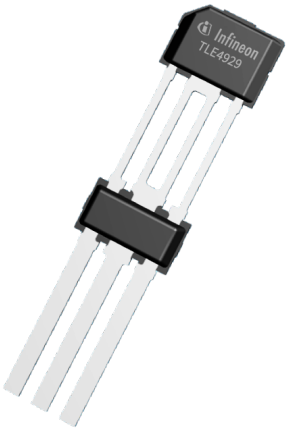
Click here to learn more:
www.infineon.com/magnetic-speed-sensors

TLE4929
XENSIV™ fully programmable crankshaft sensor with direction detection

The TLE4929 is an active differential Hall sensor ideally suited for crankshaft applications and similar industrial applications, such as a speedometer or any speed sensor with excellent accuracy and low jitter capabilities. It also addresses new requirements for crankshaft speed sensing from hybrid powertrains. An advanced vibration detection algorithm ensures valid sensor data for any hybrid powertrain traction. This improves the engine's start efficiency and helps avoid misfiring or ECU error messages caused by wrongly calibrated sensor data. Also, the compatible 3-pin package allows a one-to-one replacement of the former generation of crankshaft sensors without direction detection, TLE4924/25/26/27/28, with widely backward compatible functionality through flexible EEPROM configuration of parameters, meaning the former TLE492x-family can be mimicked.

Features

- Differential Hall speed sensor to measure speed and position of tooth/pole wheels
- Easy-to-use single-chip solution in SSO-3-52
- Switching point in the middle of the tooth enables backward compatibility
- Robustness over magnetic stray-field due to the differential sensing principle
- Precise misfire detection through excellent jitter performance
- Dedicated hybrid engine algorithm keeps combustion engine calibrated during an electric drive cycle
- Digital output signal with programmable output-protocol including diagnosis interface
- Direction detection and stop-start-algorithm
- High accuracy and low jitter
- High sensitivity enables large air gap
- End-of-line programmable to adapt engine parameters
- Can be used as a differential camshaft sensor
- Pre-programmed version TLE4929C-XAN available, TLE4929C-X2A for wheels with 32 teeth
- Automotive operating temperature range



Product	Sensor technology	Classification	Direction detection	Automotive	Industrial	Protocol	RoHS
TLE4922	Mono-Hall	AEC-Q100	–	✓	✓	Single pulse	✓
TLE4927	Differential Hall	AEC-Q100	–	✓	✓	Single pulse	✓
TLE4929	Differential Hall	AEC-Q100	✓	✓	✓	PWM, Single pulse	✓

Click here to learn more:
www.infineon.com/magnetic-speed-sensors

TLE4941PLUSC/TLE4942-1C/TLE4943C
XENSIV™ Hall differential wheel speed sensors

The TLE4941PLUSC is a widely used wheel speed sensor. TLE4942-1C and TLE4943C complement this sensor with additional direction information using PWM or AK protocol.

As a single-chip sensor, it magnetically measures the car's wheel speed with its differential Hall technology. The ideal all-purpose sensor is equally suitable for pole and steel wheel applications. Because of their differential principle, these sensors are immune to any kind of undesired magnetic stray fields, ferromagnetic particles or other disturbances.

Features

- Family of Hall sensors available with and without direction detection
- Excellent stray field robustness

Applications

- Pole wheel applications
- Steel/tooth wheel applications by using back bias magnet

Product	Sensor technology	Pole wheel	Steel wheel	Classification	Direction detection	Protocol	iTPMS
TLE4941PLUSC	Hall differential	✓	✓	ISO 26262-compliant	–	Standard	–
TLE4942-1C	Hall differential	✓	✓	ISO 26262-compliant	✓	PWM	–
TLE4943C	Hall differential	✓	✓	–	✓	AK	–

ISO 26262 compliant

Click here to learn more:
www.infineon.com/magnetic-speed-sensors

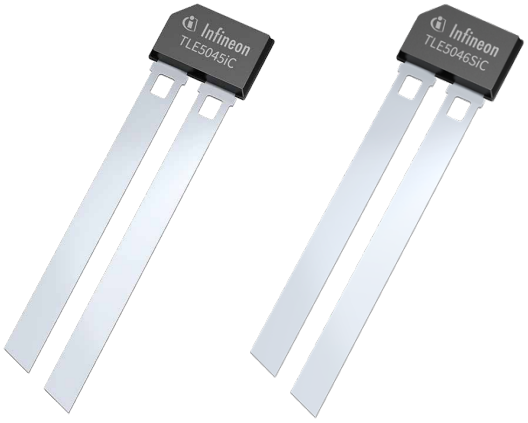
TLE5045IC/TLE5046SIC
XENSIV™ GMR-based wheel speed sensors

The TLE5045IC/TLE5046SIC is our state-of-the-art wheel speed sensor family based on GMR technology. The family consists of a designed-to-cost speed-only TLE5045IC and a high-end TLE5046SIC that provides not only direction detection but also true “zero-speed” capability and the possibility of self-diagnostics.

TLE5045IC and TLE5046SIC are developed according to ISO 26262 to fulfill ASIL B and support ASIL D systems. The TLE5046SIC with direction detection is available with PWM or AK protocol.

Features

- One family of speed sensors for all wheel speed sensing applications in same package
- Best-in-class in sensitivity, jitter, and duty cycle independent from magnetic target wheel
- “Zero speed” capability
- ISO 26262-compliant ASIL B development, supporting ASIL D systems
- Multiple protocol variants with and without self-diagnosis functionality
- Integrated circuitry for improved EMC and ESD robustness even without external capacitor



Applications

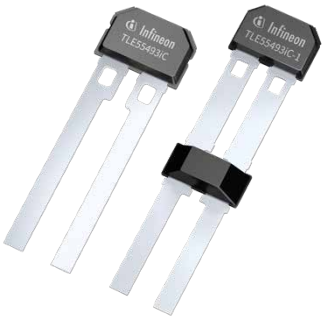
- Pole wheel applications
- Autonomous driving (e.g., park assist)

Product	Sensor technology	Pole wheel	Steel wheel	Classification	Direction detection	Protocol	iTPMS
TLE5045IC-R050	iGMR differential	✓	–	ISO 26262-compliant	–	Standard	✓
TLE5046SIC-PWM2-R050	iGMR differential	✓	–	ISO 26262-compliant	✓	PWM	✓
TLE5046SIC-AK-LR	iGMR differential	✓	–	ISO 26262-compliant	✓	AK	✓

Click here to learn more:
www.infineon.com/magnetic-speed-sensors

TLE55493IC
XENSIV™ high-end TMR wheel speed sensor

TLE55493IC is our next-generation wheel speed sensor family based on TMR technology. Linearized TMR brings together the benefits of GMR and Hall worlds: very good sensitivity, excellent jitter performance, a very big linear range, and excellent linearity for high-resolution algorithms. It perfectly addresses the customer requirements for autonomous parking and low-speed driving. Electric vehicles with fast torque can be perfectly served with valid direction detection with the first pulse. The complete TLE55493 family is compliant according to ISO 26262 ASIL D process.



TLE55493IC is available in two different packages:
PG-SSO-2-51 and PG-SSO-2-53

Product	Sensor technology	Pole wheel	Steel wheel	Classification	Direction detection	Protocol	Resolution
TLE55493IC-LR	iTMR differential	✓		ISO 26262-compliant	✓	AK	Standard
TLE55493IC-PW2-50	iTMR differential	✓		ISO 26262-compliant	✓	PWM	Standard
TLE55493IC-LR-4H	iTMR differential	✓		ISO 26262-compliant	✓	AK-4H	High
TLE55493IC-LR-6M	iTMR differential	✓		ISO 26262-compliant	✓	AK-6M	High
TLE55493IC-LR-8H	iTMR differential	✓		ISO 26262-compliant	✓	AK-8H	High
TLE55493IC-1-LR	iTMR differential	✓		ISO 26262-compliant	✓	AK	Standard
TLE55493IC-1-PW2-50	iTMR differential	✓		ISO 26262-compliant	✓	PWM	Standard
TLE55493IC-1-LR-4H	iTMR differential	✓		ISO 26262-compliant	✓	AK-4H	High

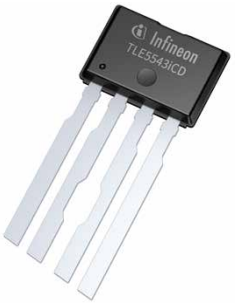
Features and benefits

Key features	Key benefits
– Immediate valid direction with first pulse	– Blind spot detection at automated parking
– Improved spatial resolution	– High protocol variants enable accurate, faster, and smoother control of the car movement
– Improved duty cycle	– Smoother control of car movement at low speed movement

Click here to learn more:
www.infineon.com/magnetic-speed-sensors

TLE55493ICD
XENSIV™ high-end TMR dual die wheel speed sensor

TLE55493ICD is our next-generation wheel speed sensor family based on TMR technology. Linearized TMR brings together the benefits of GMR and Hall worlds: very good sensitivity, excellent jitter performance, very big linear range and excellent linearity for high-resolution algorithms. It perfectly addresses the customer requirements for autonomous parking and low-speed driving. Valid direction detection with the first pulse can perfectly serve electric vehicles with fast torque. The complete TLE55493 family is developed as ASIL C (D) according to ISO 26262. The dual die sensor has two fully galvanic insulated sensors in one slim package that perfectly serve L3+ cars in case redundancy is required.



TLE55493ICD will be offered with two galvanic isolated dies in one package:
PG-SSO-4-52

Product	Sensor technology	Pole wheel	Steel wheel	Classification	Direction detection	Protocol	Resolution
TLE55493ICD-LR	iTMR differential	✓		ISO 26262-compliant	✓	AK	Standard
TLE55493ICD-PW2-50	iTMR differential	✓		ISO 26262-compliant	✓	PWM	Standard
TLE55493ICD-LR-4H	iTMR differential	✓		ISO 26262-compliant	✓	AK-4H	High
TLE55493ICD-LR-6M	iTMR differential	✓		ISO 26262-compliant	✓	AK-6M	High
TLE55493ICD-LR-8H	iTMR differential	✓		ISO 26262-compliant	✓	AK-8H	High

Features and benefits

Key features	Key benefits
– Immediate valid direction with first pulse	– Blind spot detection at automated parking
– Improved spatial resolution	– High protocol variants enable accurate, faster, and smoother control of the car movement
– Improved duty cycle	– Smoother control of car movement at low speed movement
– Redundancy for L3+ cars	– Same TMR chip will be re-used in galvanic isolated dual die package

Click here to learn more:
www.infineon.com/magnetic-speed-sensors

TLE4953C
XENSIV™ two-wire transmission speed sensor

The differential Hall-based magnetic speed sensor TLE4953C can detect direction and was developed specifically to meet the needs of high-end transmission applications. Its jitter performance and high sensitivity enable designers to create high-accuracy systems with excellent vibration suppression. Adaptive hysteresis and the dynamic self-calibration algorithm ensure outstanding measurement results with fine and coarse target wheels. As with other Infineon speed sensors, the south and north poles can be pre-inducted. The TLE4953C features a current interface and comes in a two-wire package with an integrated 1.8 nF over-molded capacitor for improved EMC.

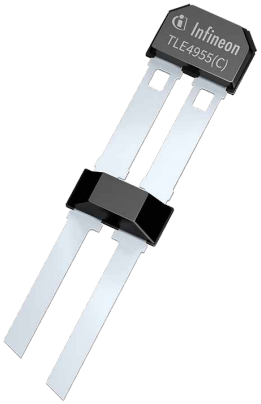
Features
- Detection of rotation direction
- Highly accurate speed measurements from 0 to 12 kHz over large operating air gaps
- Excellent vibration suppression
- Broad operating temperature range
- AEC-Q100 qualified

Applications
- Automatic transmission systems
- Industrial speed sensing using current interface

TLE4955C
XENSIV™ differential Hall-based speed sensor leading the way in vibration robustness

The TLE4955 family of differential Hall-based magnetic speed sensors is specially designed to meet the latest requirements in transmission vibration suppression. It provides best-in-class vibration suppression for applications that require a two-wire current interface.

The TLE4955 family offers advanced algorithms, dynamic self-calibration, jitter control, and precise sensitivity levels, ensuring accurate speed measurements even in the harshest fine and coarse target wheels. Designers can choose different interface protocol versions.



Features
- Detection of rotation direction
- Best-in-class vibration suppression
- Highly accurate speed measurements from zero to 12 kHz over large operating air gaps
- Broad operating temperature range
- Four different interface protocols
- AEC-Q100 qualified

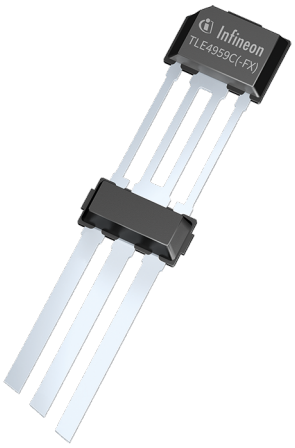
Applications
- Automatic transmission systems
- Industrial speed sensing using current interface

Click here to learn more:
www.infineon.com/magnetic-speed-sensors

TLE4959C/TLE4959C-FX
XENSIV™ three-wire transmission speed sensor with direction detection

The TLE4959C and TLE4959C-FX introduce state-of-the-art technology to Infineon's transmission sensor portfolio, offering ideal solutions for three-wire applications. These differential Hall-based magnetic speed sensors are specifically designed for applications requiring direction detection and active vibration suppression. With exceptional air gap performance, industry-leading Hall jitter, and strong immunity to stray fields, the TLE4959C and TLE4959C-FX are perfectly suited not only for traditional transmissions but also for modern hybrid applications. While the TLE4959C comes with a standard protocol, the TLE4959C-FX variant provides access to customizable protocols (e.g., speed-only) and can be programmed directly at the customer's site.

Features
- Active vibration suppression
- Highly accurate speed measurements from 0 Hz to 10 kHz over large operating air gaps (up to 20 k for TLE4959C-FX)
- Common three-wire voltage interface
- Broad operating temperature range
- AEC-Q100 qualified
- Customer programmable, e.g., protocol and hysteresis level (for TLE4959C-FX)



Applications
- Automatic (hybrid) transmission systems

TLE4959-5U/TLE4959-5U-FX
XENSIV™ four-wire transmission speed sensor with direction detection

TLE4959-5U and TLE4959-5U-FX are four-wire voltage-interface Hall-based magnetic speed sensors designed for transmission-speed applications, offering vibration suppression and direction-detection output. TLE4959-5U-FX provides enhanced flexibility, enabling custom protocol configuration through its customer-programmable EEPROM.

Both TLE4959-5U and TLE4959-5U-FX are integrated Hall-based magnetic speed sensors specifically optimized for transmission applications. Their primary role is to deliver precise information on rotational speed and direction to the transmission control unit, featuring a state-of-the-art algorithm that effectively suppresses vibration while maintaining excellent air-gap performance.

Features
- Voltage interface
- Active vibration suppression
- Direction detection output
- Dynamic self-calibration
- 0 Hz capability
- Customer programmable, e.g., protocol (for TLE4959-5U-FX)

Applications
- Automatic transmission applications
- Transmission applications with speed with direction detection

Click here to learn more:
www.infineon.com/magnetic-speed-sensors

TLE4986C
XENSIV™ mono-Hall based camshaft speed and position sensor

The TLE4986C is an active Hall sensor ideally suited for camshaft applications and similar industrial applications such as speedometers. Its basic function is to map a tooth or a notch into a unique electrical output state. It has an electrical trimming option for post-fabrication trimming to achieve true power on (TPO) capability even in the case of production spreads such as different magnetic configurations or misalignment. A self-calibration algorithm has also been implemented to achieve optimum accuracy during normal running operations. The EEPROM is adaptable to various performance-affecting parameters. It comes in a three-pin SSO-3-52 package for the supply voltage and an open-drain output.

Features

- Hall switching sensor to measure speed or phase of pole/tooth wheels
- Digital output signal (voltage interface)
- Monocell chopped Hall system
- TPO true power-on functionality
- Twist independent mounting (TIM)
- Dynamic self-calibrating algorithm
- IST individual switching threshold
- End-of-line programmable switching points
- EEPROM for various algorithm options
- TC of back-bias magnet pre-programmed
- High resistance to mechanical stress
- Enhanced immunity against ESD and EMC
- Improved µ-cut capability
- Enhanced operating temperature range
- Module package SSO-3-52

Product	Sensor technology	Magnet TC	Automotive	Industrial	Protocol	RoHS
TLE4986C	Mono-Hall	SmCo	✓	✓	Single pulse	✓

Click here to learn more:
www.infineon.com/magnetic-speed-sensors

TLE4988C
XENSIV™ mono-Hall based camshaft speed and position sensor with reduced dependence on rare-earth back-bias magnets

The Infineon XENSIV™ TLE4988C products feature advanced camshaft sensing performance and improved application adoption. One major benefit of advanced sensor performance for module manufacturers is the reduced dependence on rare-earth back-bias magnets. The TLE4988C has proven the right performance with a ferrite back-bias magnet for all relevant parameters such as phase jitter, phase accuracy, and speed effect across key temperature, air gap, and rpm ranges. With automatic in-car TPO calibration, the most accurate start-up sensing in a real application environment is ensured by addressing tolerances of ferromagnetic wheels and magnetic encoders and mounting tolerances of the sensor. Infineon's TLE4988C products are optimized with three different back-bias magnet materials: Fe, SmCo, and NdFeB. All products come inside the well-established camshaft sensor package SSO-3-52, allowing low design switch effort in terms of package and performance compatibility with predecessor products.

Features

- Digital output signal (voltage interface)
- True power on functionality (TPO)
- Auto TPO – automatic in car calibration
- Improved switching level/phase accuracy
- TC range including ferrite
- High-speed digital interface for diagnosis/test
- Twist independent mounting (TIM)
- EEPROM for algorithm options and ID
- Increased ESD and EMC immunity, improved µCut feature
- Digital magnet temperature compensation
- Mechanical stress compensation
- Module package SSO-3-52

Product	Sensor technology	Magnet TC	Automotive	Industrial	Protocol	RoHS
TLE4988C	Mono-Hall	SmCo, NdFeB, Fe	✓	✓	Single pulse	✓

Click here to learn more:
www.infineon.com/magnetic-speed-sensors

TLE5555IC/TLE5555ICB
XENSIV™ TMR-based transmission speed sensor for pole/toothed wheel in top/side read configuration with/without back-bias magnet

The TLE5555IC is a differential magnetic speed sensor based on tunnel magnetoresistive (TMR) sensing technology. This technology enables best-in-class jitter and air gap performance and allows sensing flexibility in top and side read configurations. Its basic function is to provide information about the rotational speed and the direction of the rotation to the transmission control unit. Therefore, the sensor family includes a sophisticated algorithm that actively suppresses vibration. The output has been designed as a two-wire current interface based on a PWM (pulse width modulation) principle. The TLE5555IC operates without external components and is fully EMC-compliant thanks to its capacitor integrated on a silicon level.

Features

- High magnetic field sensitivity enables ultralow jitter over high operating air gap range
- Two wire PWM current interface
- Direction detection
- Vibration suppression (active via protocol suppression; passive via adaptive hysteresis)
- Differential sensing principle enables magnetic stray field robustness
- Equipped with sintered ferrite back-bias magnets and algorithm-optimized for toothed wheel applications
- Package options for top and side read mounting make bending of sensor leads obsolete
- EMC robust without the need of capacitors on sensor leads
- Comprehensive digital diagnostic interface, enabling readout of internal signals and electronic chip ID
- Customer configurable EEPROM in FX version

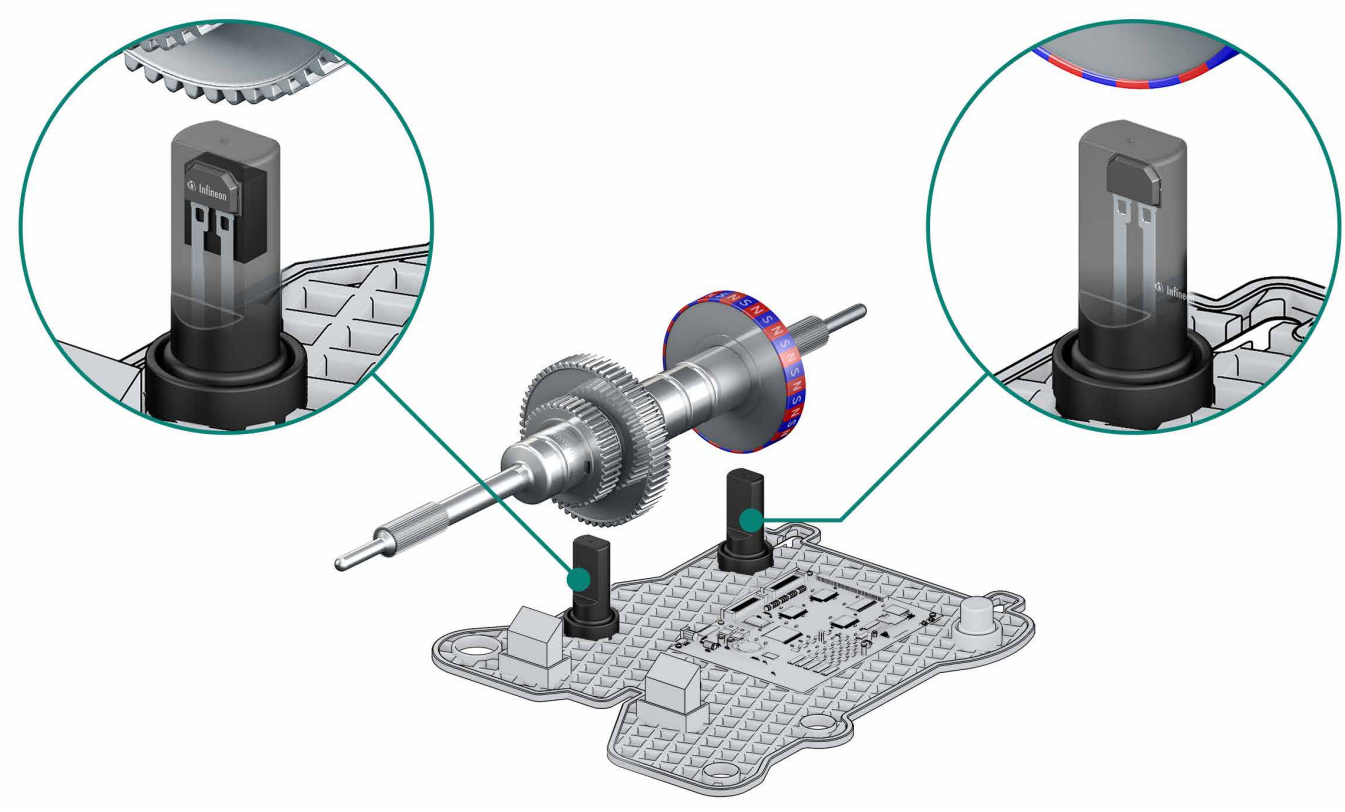
Potential applications

- Ideal for the use in harsh environments, particularly automotive transmissions
- Suitable for all kinds of transmission systems including dedicated hybrid transmission (DHT) and electric vehicle (EV) concepts

The "ICB-TOP" family members are designed for toothed wheel applications and have a ferrite back-bias magnet attached. They come in a RoHS-compliant two-pin package and are qualified for automotive usage. It is recommended that the ICB-TOP be used within an over molded module. For magnetic encoder (ME) applications, other sensors – called the ME family – are available.

The FX version, which provides a programmable EEPROM, offers high flexibility. This sensor offers many protocol options established in transmission applications over the last decades. Additionally, it offers the option to configure the sensor algorithm (e.g., magnetic threshold, vibration robustness) to optimize the sensor performance for the target wheel fully.

Click here to learn more:
www.infineon.com/magnetic-speed-sensors



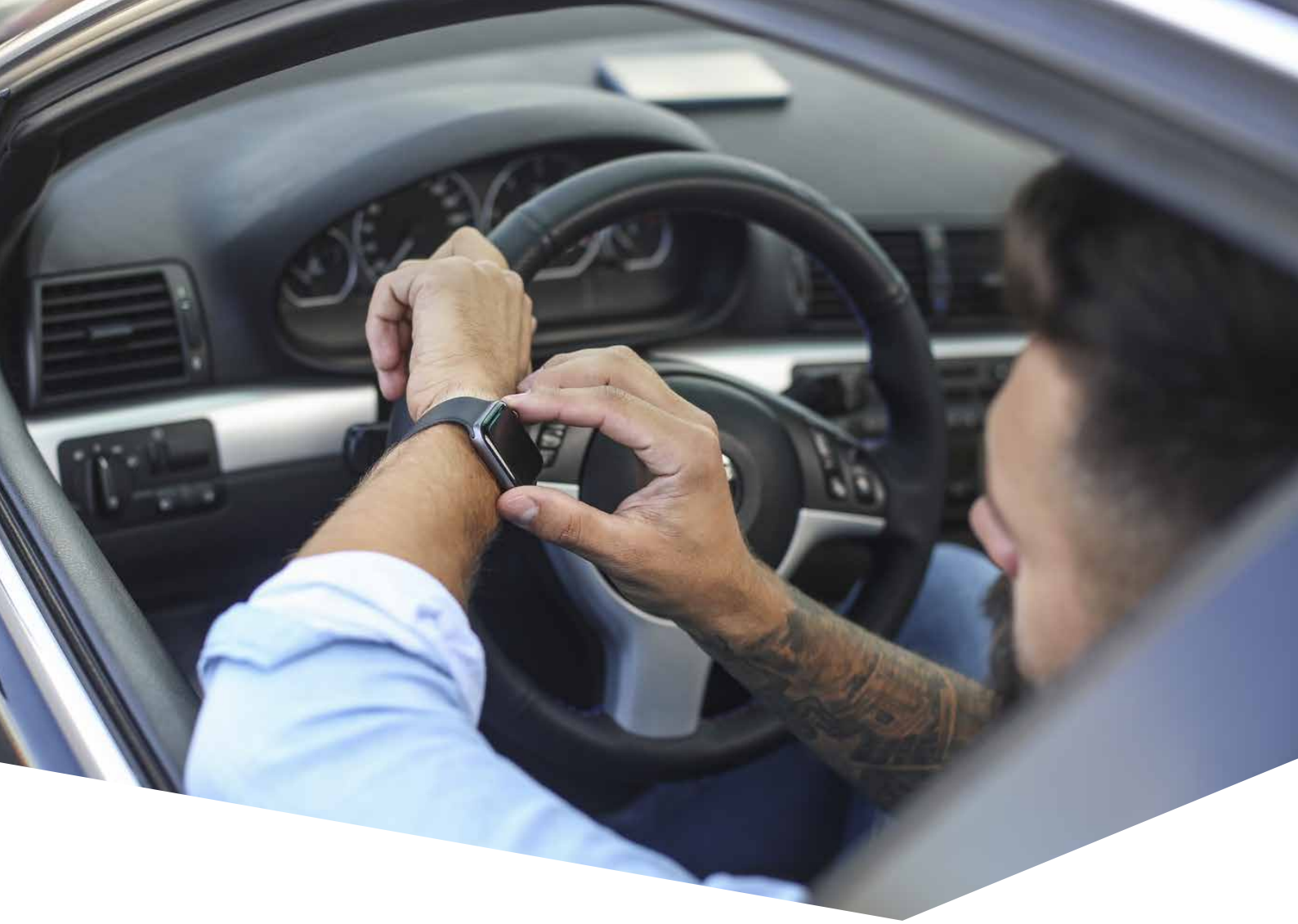
Product overview

Product	Description	Classification	Ordering code	Package
TLE5555IC ME E0	For pole wheel (top + side-read), E0 protocol	ISO 26262-compliant	SP003883456	SSO-2-51
TLE5555IC ME E1	For pole wheel (top + side-read), E1 protocol		SP005832719	SSO-2-51
TLE5555IC ME E4B	For pole wheel (top + side-read), E4B protocol		SP005829763	SSO-2-51
TLE5555ICB E0-TOP	For steelwheel (top-read), E0 protocol, incl. back-bias magnet		SP003883500	SSOA22-2-51
TLE5555ICB E1-TOP	For steelwheel (top-read), E1 protocol, incl. back-bias magnet		SP005401486	SSOA22-2-51
TLE5555ICB E4B-TOP	For steelwheel (top-read), E4B protocol, incl. back-bias magnet		SP005832705	SSOA22-2-51

ISO 26262 compliant

Click here to learn more:

www.infineon.com/magnetic-speed-sensors



XENSIV™ pressure sensors

For automotive, industrial, and consumer applications – ensure the perfect fit for all performance and integrity needs

Infineon XENSIV™ pressure sensors measure the pressure of air and gases across various industries and applications. As pressure transducer sensors, they convert physical pressure into an electric signal. Infineon XENSIV™ pressure sensors combine sensing functions (via a pressure sensor element) and conversion into an electrical signal (via an absolute pressure transducer and signal processing) in one integrated silicon device.

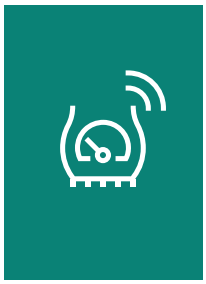
The sensor element and its integrated circuits (ICs) are the heart of pressure sensor technology. Infineon's small pressure sensor IC chips support various applications with best-in-class performance. Infineon is one of the world's largest semiconductor pressure sensor and transducer manufacturers, thanks to a varied portfolio of absolute air pressure sensor ICs. Our comprehensive family of XENSIV™ sensors includes a wide selection of pressure-sensitive sensors tailored specifically to the automotive, consumer, and industrial sectors. XENSIV™ sensors are compact, designed to save energy, and offer a rapid time-to-market – a perfect fit for any performance and integrity needs.

Click here to learn more:
www.infineon.com/pressure-sensors

Infineon XENSIV™ BAP sensors are calibrated for specific automotive applications, especially for BMS thermal runaway detection, pneumatic seats, and electronic engine control. The BMS sensors are ISO 26262-compliant and support the highest ASIL requirements on the system level.

Powertrain systems have to fulfill the constantly increasing stringent media requirements. Environmental legislation aims to deliver cleaner air by ensuring a steady global decrease in CO^2 emissions. Thanks to their accurate measurement capability, Infineon MAP and turbo MAP products with analog or digital interfaces enable engines to meet these requirements.

Typical safety-related automotive pressure sensing applications, such as side impact and pedestrian protection, call for the highest quality and accuracy standards with full ISO 26262 compliance. Every year, thousands of pedestrians are severely injured in traffic due to slow or failing sensing elements.
Our Infineon XENSIV™ safety pressure sensor family includes integrated pressure sensors that tick all these boxes with PSI5 peripheral sensor interfaces for safety-critical use cases. Our sensors support new safety systems, increasing the protection of pedestrians and car occupants in the event of a collision.



Infineon's tire pressure sensors perform all of the functions necessary to implement a state-of-the-art module for a tire pressure monitoring system (TPMS). As part of our XENSIV™ pressure sensors portfolio, our SP49 TPMS sensor ICs are easy to integrate and feature a microcontroller, sensors, wireless communication, and convenient peripherals. They only need a few passive components and a battery to complete a full automotive TPMS sensor assembly.

Our family of digital barometric pressure sensors also gives designers the best choice for smart home, drones, robotics, mobile, and wearable devices. Highlights include small form factors to facilitate system integration, the highest precision and relative accuracy over a wide temperature range, fast read-out speeds via the serial I^2C/SPI interface, and low power consumption to ensure longer battery lifetimes.

Click here to learn more:
www.infineon.com/pressure-sensors

Barometric (BAP) and Manifold (MAP) pressure sensors

Highest accuracy and precision on the smallest footprint and energy bill

Infineon's pressure sensors offer the highest quality and accuracy for safety-relevant automotive, industrial, or consumer lifestyle applications. Typical safety-related automotive pressure sensing applications, such as side-impact and pedestrian protection, call for the highest quality and accuracy standards with full ISO 26262 compliance. Our XENSIV™ family includes integrated pressure sensors that tick all these boxes with PSI5 peripheral sensor interfaces for a safety-critical use case.

Click here to learn more:
www.infineon.com/pressure-sensors

KP21x/KP22x
XENSIV™ analog manifold air pressure sensor family (MAP + turbo MAP)

Features

- Manifold air pressure measurement – MAP and turbo MAP
- Excellent accuracy of up to 1.0 kPa over a large temperature range
- Ratiometric analog voltage output proportional to the applied pressure
- Output signal fully compensated over pressure and temperature
- Pressure range from 10 to 400 kPa
- Temperature range from -40°C to +140°C
- Output clamping (optional)
- Complete product family available with multiple transfer function
- Available increased protective gel (IG) variants for improved media robustness, e.g., EGR (Exhaust Gas Recirculation), ORVR (Onboard Refueling Vapor Recovery)
- Reverse polarity protection
- Green SMD package

KP23x
XENSIV™ analog barometric air pressure (BAP) sensor family

Features

- Absolute air pressure measurement
- Excellent accuracy of 1.0 kPa over a large temperature range
- Ratiometric analog voltage output proportional to the applied pressure
- Output signal fully compensated across pressure and temperature range
- Pressure range from 15 to 165 kPa
- Temperature range from -40°C to +125°C
- Serial service interface
- Open bond detection (OBD) for supply and GND
- Reverse polarity protection
- Green SMD package

KP276
XENSIV™ media robust MAP sensor with digital interface

Features

- High media robustness by gold bond pads for automotive requirements in corrosive environment, e.g., EGR, ORVR
- Digital single edge nibble transmission (SENT) interface (282 clock ticks)
- Excellent accuracy of ±0.77% FSS
- Temperature range from -40°C to +170°C (170°C for 20 min. max., 150°C operating)
- Integrated NTC temperature sensor functionality with fast start up time (typ. 10 ms)
- Green SMD package

Product overview

Product	Max. accuracy [kPa]	Max. operating temperature [°C]	Automotive	Industrial	Classification	Pressure range [kPa]
KP21x	1.0	140	✓	✓	–	10 … 150
KP21xIG x	1.0	140	✓	✓	–	10 … 150
KP22x	2.5	140	✓	✓	–	10 … 400
KP22xIG x	2.5	140	✓	✓	–	10 … 400
KP23x	1.0	125	✓	✓	–	15 … 115
KP236N6165	1.0	125	✓	✓	–	60 … 165
KP276	3.0	150 (170 time limited)	✓	✓	–	10 … 400

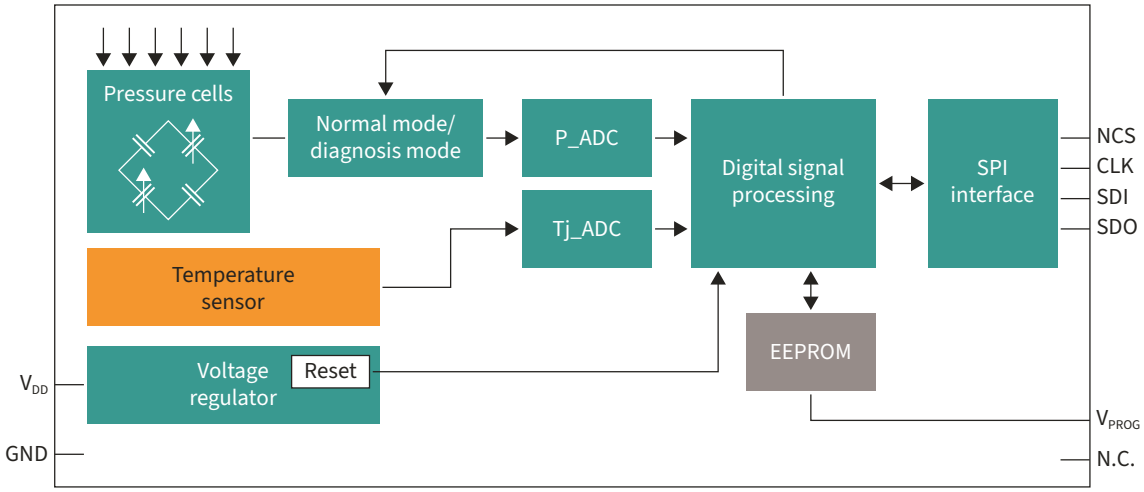
Click here to learn more:
www.infineon.com/pressure-sensors

KP46x
XENSIV™ digital barometric air pressure family in new DFN-8 package

Features
- High accuracy pressure sensing
- Pressure range according to different application needs:
  - ECU/MAF (40–115 kPa)
  - Pneumatic seats (60–165 kPa)
  - BMS thermal runaway (45–200 kPa)
- ISO 26262 compliance for KP467 (ASIL B)
- Operating ambient temperature range -40°C to +125°C, KP467 up to 105°C
- Best-in-class low power consumption with dedicated power-down mode for energy saving
- 10-, 12-, or 14-bit resolution pressure and temperature values via SPI interface and backward compatibility with legacy devices KP25x
- KP467 with autonomous low-power monitoring (LPM) feature for pressure event detection and host wake-up
- Integrated signal path diagnosis features
- Green, small 4.5 × 5.1 mm² 8-pin DFN package for all KP46x

Applications
- KP464/KP464E for ECU and mass airflow sensing to control fuel supply and injection, for air management and ignition
- KP465 for higher pressure levels e.g., within compressed air in fuel-cell applications
- KP466 for pneumatic seat comfort application
- KP466P for pneumatic seat comfort application and thermal runaway detection in battery management system for xEVs
- KP467 for thermal runaway detection in battery management system for xEVs

Block diagram



Product overview

Product	Operating pressure range [kPa]	P-accuracy -40°C [kPa]	P-accuracy 0 … +85°C [kPa]	P-accuracy +125°C [kPa]	T-accuracy +25 … +85 [°C]	Supply current I_{VDD} [mA]	Supply current power down I_{VDD_PD} [µA]	Classification
KP464, KP464E	40 to 115	±1.5	±1.0	±1.5	±3	3.5 (without SPI comm.)	10	AEC-Q103
KP465	60 to 320	±5.0	±3.0	±5.0	±3	3.5 (without SPI comm.)	10	AEC-Q103
KP466	60 to 165	±4.0	±1.0	±2.0	±3	5 (without SPI comm.)	10	AEC-Q103
KP466P	60 to 165	±1.5	±1.0	±1.5	±3	5 (without SPI comm.)	10	AEC-Q103
KP467	45 to 200	±3.0 kPa (lifetime) ±1.5 kPa (0h) ±4% of LPM threshold (±2 kPa max.)			±3	– 3.5 mA (on mode without SPI comm.) – typ. 50 µA (in LPM)	10	AEC-Q103 ISO 26262 -compliant
KP467Q	50 to 140	±1.5	±1.0	±1.5	±3.0	– 3.5 mA (on mode without SPI comm.) – typ. 10 µA (in LPM)	10	AEC-Q103

Click here to learn more:
www.infineon.com/pressure-sensors

KP497
XENSIV™ advanced digital barometric air pressure and acceleration sensor

Features

- Pressure range for thermal runaway detection: 20–250 kPa
- Integrated acceleration sensor for battery shock monitoring
- ISO 26262-compliant (ASIL A)
- 3 kB flash memory available for storage of customer-specific data, e.g., battery passport relevant data
- High accuracy pressure sensing
- Operating ambient temperature range -40°C to +105°C
- Ultralow power consumption with dedicated power-down mode for energy saving
- Autonomous low-power monitoring (LPM) feature for event detection and host wake-up

Applications

- KP497 calibrated for thermal runaway detection in battery management systems for xEVs by sensing critical air pressure
- Determination of the economic value of the battery over the course of its life cycle in relation to mechanical influences and shocks; with that essential part of the information for battery passport for xEVs and for reprocessing and reuse of batteries

Product	Operating pressure range [kPa]	P-accuracy [kPa]	T-accuracy [°C]	Typ. supply current power down at 25°C I_{VDD_PD} [µA]	Classification
KP497	20 to 250	±2	±3	0.24	AEC-Q100 ISO 26262-compliant

ISO 26262 compliant

Click here to learn more:
www.infineon.com/pressure-sensors

Pressure sensors for side crash detection (SAB)

PSI5 PRO-SIL™-ready pressure sensors for side impact detection and pedestrian protection

Passive safety vehicle systems have improved significantly over the last few years, especially in terms of front impact, side impact, and pedestrian impact detection. Legal regulations and consumer tests have been the main drivers (e.g., FMVSS 214, UN ECE R135, NCAP) for increased penetration. Infineon's next-generation PSI5 safety pressure sensor family enables very fast reaction times and will help you to fulfill existing and future tests.

In the side airbag application, the pressure sensor is assembled in a module within the car's side doors. When the door is compressed due to a side impact, the KPx0x provides a signal pulse proportional to the pressure change inside the door. In the pedestrian protection application, the pressure-sensing system based on KP201/KP305/KP405 is mounted within the car's front bumper. In case of an impact, a pedestrian protection device is triggered. The KP201/KP305/KP405 extended pressure range allows common pedestrian protection systems to support front impact detection scenarios and also supports side crash systems.

Features and benefits

Key features	Key benefits
– PSI5 peripheral interfaces	– Fully compliant to PSI5 and AK-LV29/38 and extended pressure range addendum
– Easy customization with end-of-line programming via PSI5 interface in the final customer module	– ISO 26262-compliant development to be used in ASIL B(D) systems
– Low design-in effort due to drop-in compatibility with previous safety pressure sensor family	– Patented built-in diagnosis for pressure cells and circuitry
– Best-in-class cost performance	– SMD package: DFN-8-1

Product overview

Product	Application	Classification	Package
KP200	Side crash detection	ISO 26262-compliant	DSOF-8-16
KP201	Side crash detection Pedestrian impact detection Front crash detection	ISO 26262-compliant	DSOF-8-16
KP204	Side crash detection	ISO 26262-compliant	DSOF-8-164
KP300	Side crash detection	ISO 26262-compliant	DSOF-8-164
KP305	Side crash detection Pedestrian impact detection Front crash detection	ISO 26262-compliant	DSOF-8-164
KP400	Side crash detection	ISO 26262-compliant	DFN-8-1
KP405	Side crash detection Pedestrian impact detection Front crash detection	ISO 26262-compliant	DFN-8-1

ISO 26262 compliant

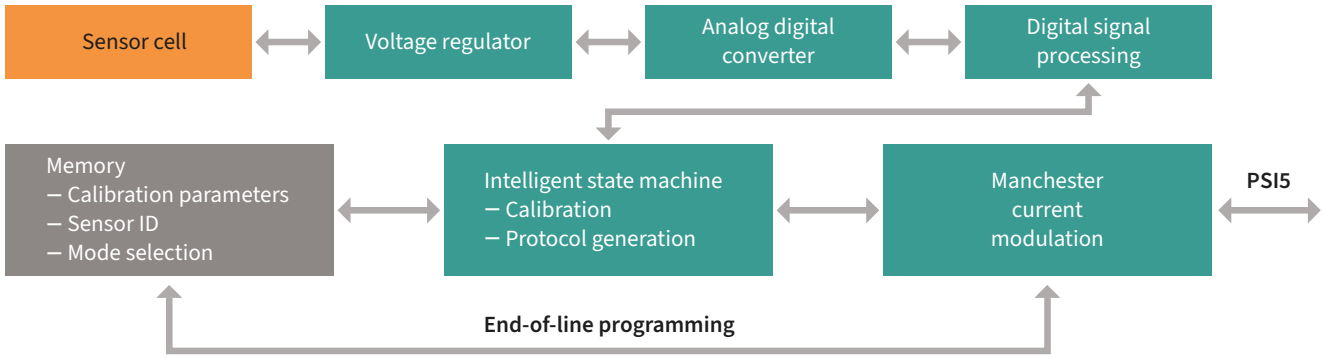
Click here to learn more:

www.infineon.com/pressure-sensors

KP30x
XENSIV™ ISO 26262-compliant pressure sensors for side crash, pedestrian impact, and front crash detection

Infineon's KP30x is a monolithically integrated pressure sensor featuring a programmable PSI5 interface and compliance with AK-LV29/38. An intelligent state machine provides a pressure signal output enabling simple threshold detection algorithms. The amplitude of the signal pulse is independent of the ambient pressure but dependent on the relative pressure change. Several output formats are selectable to provide more design flexibility to the system. The KP30x family forms the next generation of safety pressure sensors and is application-compatible with Infineon's previous generation. ISO 26262-compliant development and corresponding functional safety documentation support the use of the KP30x in ASIL B(D) systems.

Block diagram



Features and benefits

Key features	Key benefits
– Fully compliant to PSI5 and AK-LV29/38 and extended pressure range addendum	– Easy customization with end of line programming via PSI5 interface in the final customer module
– ISO 26262-compliant development to be used in ASIL B(D) systems	– Low design-in effort due to drop-in compatibility to previous safety pressure sensor family
– Patented built-in diagnosis for pressure cells and circuitry	– Best-in-class cost performance
– SMD package: DSOF-8-164	

Product overview

Product	Application	Classification	Package
KP300	Integrated pressure sensors	Side crash detection	DSOF-8-164
KP305	Integrated pressure sensors	Side crash detection Pedestrian impact and front crash detection	DSOF-8-164

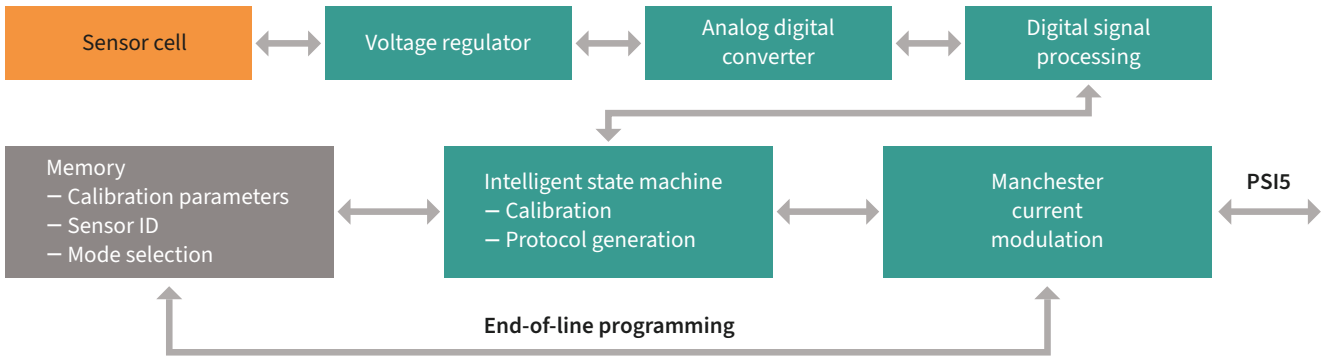
Pedestrian protection
Side airbag
ISO 26262 compliant

Click here to learn more:
www.infineon.com/pressure-sensors

KP40x
XENSIV™ ISO 26262-compliant pressure sensor for side crash, pedestrian impact, and front crash detection in small DFN package

Infineon's KP40x is a monolithically integrated pressure sensor featuring a programmable PSI5 interface and compliance with AK-LV29/38. An intelligent state machine provides a pressure signal output, enabling simple threshold detection algorithms. The amplitude of the signal pulse is independent of the ambient pressure but dependent on the relative pressure change. Several output formats are selectable to provide more design flexibility to the system. The KP40x family forms the next generation of safety pressure sensors and is fully compatible with Infineon's previous generation. ISO 26262-compliant development and corresponding functional safety documentation support the use of the KP40x in ASIL B(D) systems. Based on the proven chip technology, the KP40x offers best-in-class cost performance and is delivered fully calibrated.

Block diagram



Features and benefits

Key features	Key benefits
– Small holes for intrusion protection	– Fully compliant to PSI5 and AK-LV29/38 and extended pressure range addendum
– Safe operation even with two blocked holes	– ISO 26262-compliant development to be used in ASIL B(D) systems
– Easy customization with end-of-line programming via PSI5 interface in the final customer module	– Patented built-in diagnosis for pressure cells and circuitry
– Low design-in effort due to drop-in compatibility to previous safety pressure sensor family	– SMD package: DFN-8-1
– Best-in-class cost performance	

Product overview

Product	Application	Classification	Package
KP400	Integrated pressure sensors	Side crash detection	DFN-8-1
KP405	Integrated pressure sensors	Side crash detection Pedestrian impact and front crash detection	DFN-8-1

Pedestrian protection · Side airbag · RoHS · ISO 26262 compliant

Click here to learn more:
www.infineon.com/pressure-sensors

Tire pressure sensors (TPMS)

SP49
XENSIV™ tire pressure monitoring sensors

The Infineon SP49 product family provides highly integrated devices that perform all functions for a tire pressure monitoring system (TPMS) wheel module suited for high-volume applications. The devices measure pressure in the range from 100 kPa up to 920 kPa and acceleration between -600 g and 600 g, as well as temperature and supply voltage. Furthermore, they feature efficient power management and an integrated microcontroller. An integrated LF receiver and RF transmitter allow wireless communication. For wired data transfer, the hardware master/slave I²C interface can be used. Further wired interfaces, such as UART, SPI, or PWM can be realized in software. Infineon's technical leadership in MEMS technology and patented Glass-Silicon-Glass MEMS pressure sensors with best-in-class media compatibility ensure industry-leading performance in TPMS.

Features

Patented Glass-Silicon-Glass MEMS pressure sensor with Best-in-class media compatibility

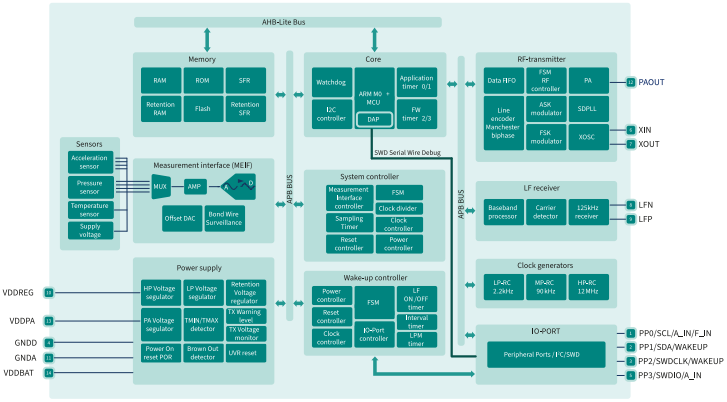
- Industry-standard power-efficient 32-bit Arm® Cortex®
- 19 kB of flash memory for the application code and/or user data storage; also usable for a bootloader
- 1 kB RAM plus 192 bytes of retention RAM
- Best-in-class lifetime charge consumption

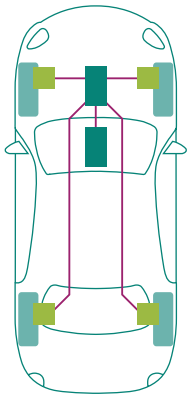
1) Arm® and Cortex® are trademarks of ARM limited, UK

Benefits

Optimized for battery-powered applications, the system controller's flexible wake-up and power management, ultralow power-down current, and wide range of supply voltages ensure a long battery lifetime (for typical TPMS applications, 10 years with a CR2032 battery).
With the possibility of generating a wake-up from the integrated Interval timer, SP49 products are perfectly suited for standalone remote pressure sensing solutions demanding low charge consumption. For such applications, the LF receiver with wake-up capability and best-in-class sensitivity provides the possibility of on-demand measurements.
SP49 has a tailored ASIC, which is optimized for the following new intelligent tire features.

- On-tire auto-position-sensing (APS)
- Tire filling assist
- Tire burst detection
- Load detection





SP49 fully supports all necessary requirements for a tire pressure monitoring system (TPMS)

Product overview

Product variant	Product name	Pressure range [kPa]	Flash size for code [kB]	Package	Ordering code
SP490-01-11	SP49	920	19	DSOSP-14-84	SP005878909
SP490-01-12	SP49i	920	19	DSOSP-14-84	SP005825051
SP49T-05-12	SP49iTruck	1600	19	DSOSP-14-84	SP005957469

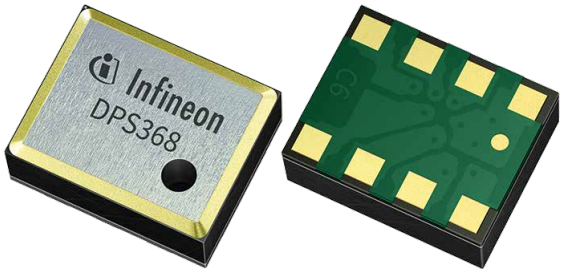
Click here to learn more:
www.infineon.com/pressure-sensors

Pressure sensors for consumer and IoT

DPS368
XENSIV™ digital barometric pressure sensor for mobile and wearable devices

Infineon's digital barometric pressure sensor DPS368 is the best choice for mobile and wearable devices due to its small form factor, high precision, and low power consumption. Pressure sensing is based on capacitive technology, which guarantees ultrahigh precision (±2 cm) and excellent relative accuracy (±0.06 hPa) over a wide temperature range. The sensor's internal signal processor converts the output from the pressure and temperature sensor elements to 24-bit results. Each pressure sensor has been calibrated individually and contains calibration coefficients. The application uses the coefficients to convert the measurement results to true pressure and temperature values. The sensor has a FIFO that can store the last 32 measurements. Since the host processor can remain in sleep mode for longer between readouts, a FIFO can reduce the system's power consumption. Sensor measurements and calibration coefficients are available via the serial I²C/SPI interface.

DPS368 offers the best-in-class resolution (±2 cm), a very fast readout speed, and low current consumption. The sensor can be used in harsh environments, as it is robust against water (IPx8 - 50 m underwater for 1 hour), dust and humidity. The small package size saves up to 80 percent of the space and makes the DPS368 ideal for mobile applications and wearable devices.



Applications

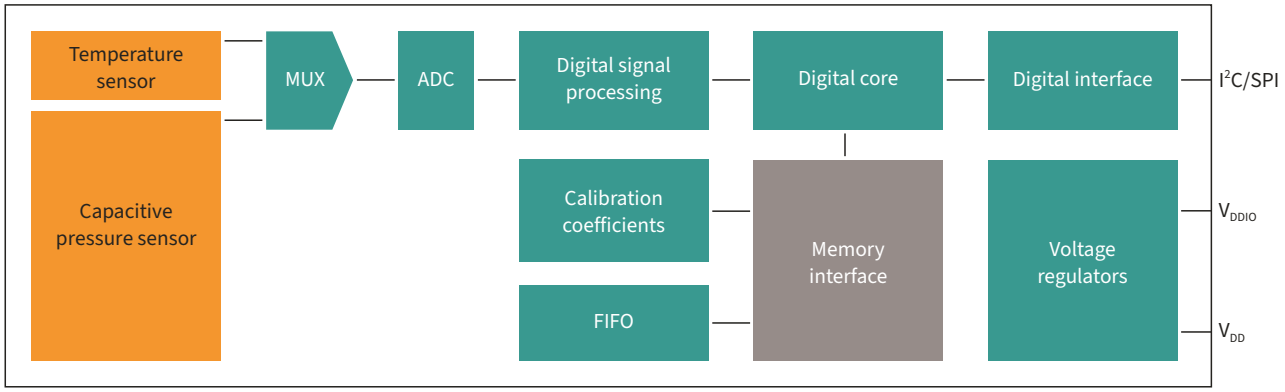
- Drones: altitude detection and height stability
- Health and fitness: accurate elevation gain and step counting (e.g., for smartwatches)
- Outdoor Navigation: GPS start-up time/accuracy improvement; dead reckoning (e.g., in tunnels)
- Indoor navigation: floor detection e.g., in shopping malls and parking garages
- Smart home: micro weather forecasting; room temperature control; intruder detection
- Airflow control: Smart filter replacement alarm (e.g., in home appliances); predictive maintenance
- Health care: fall detection; respiratory devices; smart inhalers

Key features

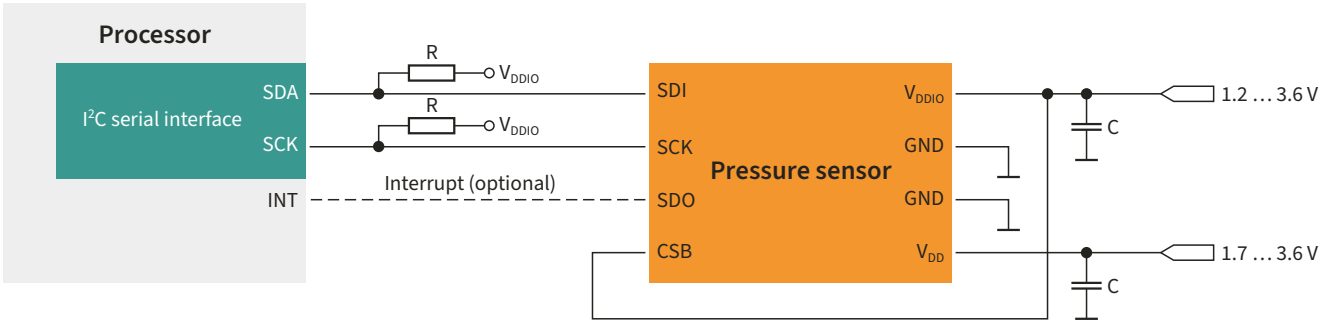
Package size	2.0 x 2.5 x 1.1 mm³
Operating pressure range	300 hPa to 1200 hPa
Operating temperature range	-40°C to 85°C
Pressure level precision	±0.002 hPa (or ±0.02 m)
Relative accuracy	±0.06 hPa (or ±0.5 m)
Absolute accuracy	±1 hPa (or ±8 m)
Temperature accuracy	0.5°C
Pressure temperature sensitivity	0.5 Pa/K
Measurement time	3.6 ms (low precision); 27.6 ms (standard mode)
Average current consumption at 1 Hz sampling rate	1.7 µA pressure measurement, 1.5 µA temp. measurement, standby 0.5 µA
Supply voltage	V_{DDIO}: 1.2–3.6 V; V_{DD}: 1.7–3.6 V
Operating modes	Command (manual), background (automatic), standby
Interface	I²C and SPI, both with optional interrupt

Click here to learn more:
www.infineon.com/pressure-sensors

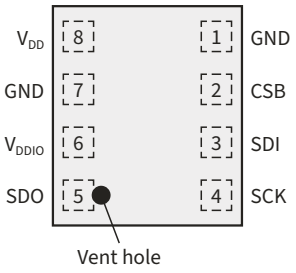
Functional block diagram



Application circuit example (in I²C configuration)



Pin configuration (top view)



Pin	Name	Function
1	GND	Ground
2	CSB	Chip select
3	SDI	Serial data in/out
4	SCK	Serial clock
5	SDO	Serial data out
6	VDDIO	Digital interface supply
7	GND	Ground
8	VDD	Analog supply

Infineon inside pressure sensor partners

Building upon its best-in-class technology, Infineon offers a full range of barometric pressure sensors as chipsets. Infineon's network of global partners offers customers a comprehensive portfolio of Infineon inside pressure sensors that will propel performance to the next level, even for the most demanding applications.

Infineon Partner Program

Learn more about our partner program and purchase our partner solutions here.

Click here to learn more:
www.infineon.com/pressure-sensors

XENSIV™ MEMS microphones

For automotive, industrial, and consumer applications – redefine a growing number of use cases

XENSIV™ MEMS microphones are setting new performance benchmarks across a growing number of industries. These innovative silicon microphones are designed to provide the benefits of the lowest possible self-noise (high SNR) and minimal distortion for an ever-expanding range of applications.

Dedicated digital and analog MEMS microphones
Our digital and analog MEMS microphones for consumer applications deliver a studio-quality audio experience in compact form factors such as smartphones or earbuds. On the other hand, our automotive-qualified solutions enable the best audio performance in harsh automotive environments, improving the in-cabin user experience and passenger comfort. Additionally, they enhance autonomous driving features and contribute to road safety.

MEMS microphones for consumer and industrial applications
Infineon's XENSIV™ MEMS microphones are designed to capture unprecedented precision and quality audio signals. The microphones comprise Infineon's MEMS microphone chips and ASICs, the world's best-selling microphone components.

Due to advanced technical characteristics, high-quality standards, and robustness at the chip level, XENSIV™ MEMS microphones add 'hearing' to many consumer applications (earbuds, headphones, wearables, smart speakers, laptops, tablets, etc.) and industrial and medical applications (predictive and preventive maintenance, security, patient monitoring systems, etc.).

MEMS microphones for automotive applications
We also offer high-performance MEMS microphones qualified to the AEC-Q103-003 automotive quality standard. They are suited for all applications inside and outside the car where the best audio performance in harsh automotive environments is required. The extended availability of these silicon devices matches the typical long lifecycle of a vehicle.

Typical applications include speech (hands-free/e-call/ICC), voice commands with microphone arrays and beamforming, active and road noise cancellation, and detecting event sounds, sirens, contact, and road conditions.

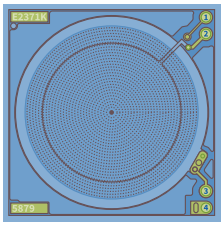
The extended availability of these silicon devices matches a vehicle's typical long lifecycle, revolutionizing the use of automotive microphones for a wide range of applications.

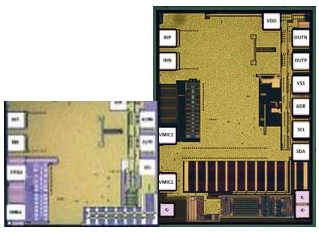
Click here to learn more:
www.infineon.com/mems-microphones

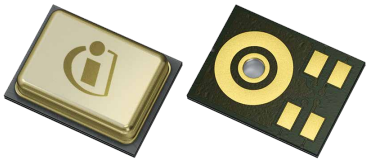
MEMS microphones technology

Infineon's XENSIV™ MEMS microphones are designed to capture audio signals with unprecedented precision and quality. The microphones consist of Infineon's MEMS microphone chips and ASICs, which are widely regarded as the world's best-selling microphone components.

Infineon microphone system		
MEMS	ASIC	Package







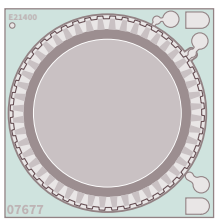
Infineon owns all building blocks of MEMS microphones allowing to develop MEMS, ASIC, and package combinations which achieve the best possible performance and are optimized to each application.

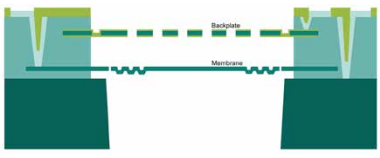
Infineon XENSIV™ MEMS microphones shape the industry on the technology level

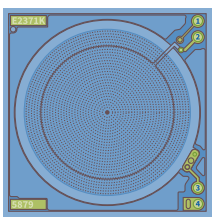
MEMS microphones use an electrically charged backplate and a membrane to form a capacitive sound transducer. The flexible membrane moves proportionally to the amplitude and frequency of incoming sound waves. The resulting change in voltage is measured, processed and output by an integrated analog or digital ASIC. Infineon distinguishes two main MEMS technologies:

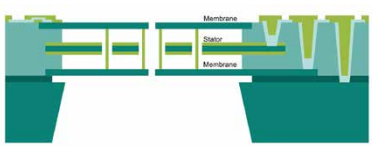
Single backplate technology (SBP)
Single backplate technology (SBP) represents an industry standard for mid-end microphones with its simplicity and robustness. The SBP technology offers the best performance-to-cost ratio, especially for small package sizes and SNR values up to 69 dB SNR.

Sealed dual membrane (SDM)
Sealed dual membrane (SDM) is Infineon's revolutionary MEMS microphone technology that utilizes two membranes and a charged stator to create a sealed low-pressure cavity and a differential output signal. The architecture enables ultrahigh SNR (up to 75 dB SNR) and very low distortions and delivers high ingress protection (IP57) at a microphone level. Select SDM technology for best-in-class acoustic performance in medium and larger packages.









Click here to learn more:
www.infineon.com/mems-microphones

MEMS microphones for automotive applications

Qualified according to automotive standard, AEC-Q103-003

As part of our comprehensive XENSIV™ microphone family, we also offer automotive microphones, especially tested and qualified to the stringent needs of automotive use cases. These microphones close the gap in the automotive industry, providing the best possible fit for automotive applications.

XENSIV™ MEMS microphones for automotive – product portfolio

	Product	Classification	Key features	Interfaces	Package dimensions [mm³]	SNR [dB(A)]	AOP [dB]	Sensitivity [dBFS]	Current consumption [µA]	Environmental robustness	Operating temp. [°C]
Digital	**IM63D135A**	AEC-Q103-003	Optimized for external applications	PDM	3.50 x 2.65 x 0.98	63.5	135	-41	1100	IP57	-40 to +105
	IM64D121A	AEC-Q103-003	Optimized for mid performance use cases	PDM	3.50 x 2.65 x 0.98	64	121	-26	1100	IP57	-40 to +85
	IM64D130A	AEC-Q103-003	Optimized for mid performance use cases	PDM	3.50 x 2.65 x 0.98	64	130	-36	1100	IP57	-40 to +85
	IM66D120A	AEC-Q103-003	Optimized for ANC and speech	PDM	3.50 x 2.65 x 0.98	66	120	-26	1100	IP57	-40 to +105
	IM66D130A	AEC-Q103-003	Optimized for ANC and speech	PDM	3.50 x 2.65 x 0.98	66	130	-36	1100	IP57	-40 to +105
	IM67D120A	AEC-Q103-003	Optimized for speech	PDM	4.00 x 3.00 x 1.20	67	120	-26	980		-40 to +105
	IM67D130A	AEC-Q103-003	Optimized for speech	PDM	4.00 x 3.00 x 1.20	67	130	-36	980		-40 to +105
Analog	**IM64A130A**	AEC-Q103-003	Optimized for mid performance use cases	Analog single-ended	3.35 x 2.50 x 0.98	64	130	-38	105	IP57	-40 to +85
	IM68A130A	AEC-Q103-003	Optimized for ANC	Analog single-ended	3.35 x 2.50 x 0.98	68	130	-38	105	IP57	-40 to +105

Key features and benefits of automotive qualified microphones

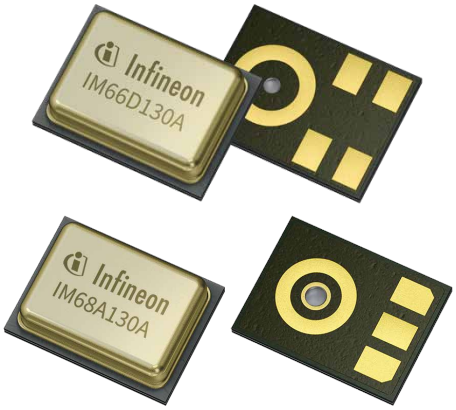
- Full automotive qualification according to AEC-Q103-003
- Increased operating temperature range up to +105°C [1)]
- Environmental robust up to IP57 [1)]
- Narrow sensitivity matching for enhanced performance of beam-forming arrays
- Flat frequency and stable phase response down to 7 Hz for optimal performance in acoustic noise cancellation (ANC) applications [1)]
- Very high AOP for high wind-noise robustness ensures stable performance in extremely loud environments of exterior use cases [1)]
- Best-in-class audio performance (SNR, AOP, THD) for optimum speech quality and capture of distortion-free audio signals in loud environments such as inside a car

Click here to learn more:
www.infineon.com/mems-microphones

1) Depending on selected product. See parameter table above for details.

Customer benefits of automotive qualified microphones

Cost saving	– Reduced re-qualification cost for Tier 1 due to minimized risk of qualification failure – Longer available parts enable platform concepts at Tier1/OEM
Quality	– Quality assured for the whole vehicle life by running qualification tests at three different temperatures over the full operating temperature range (-40°C to +105°C) – Compliance with AEC-Q103 and automotive style documentation (PPAP, Qual report, ...) simplifies OEM discussions (no waivers needed)
Performance	– Characterization data over full temperature range provides full transparency of acoustic behavior and avoids late discrepancies – Best-in-class audio performance leads to increased speech intelligibility and improved satisfaction of the end user
Flexibility	– Extended temperature range allow flexible use in different operational areas (internal and external) and various applications – High acoustic-overload-point (AOP) allows flexible placement inside/outside the vehicle
Service and knowledge	– Good reputation of Infineon-Automotive simplifies product selection procedures with OEMs – Premium services with our worldwide support teams shorten the learning curve and design-in cycles – Fast FAR handling, including high traceability, facilitates efficient incident management



Click here to learn more:
www.infineon.com/mems-microphones

Typical applications for automotive MEMS microphones in-cabin and outside of the vehicle

Speech: Hands free/e-call/ICC
Enabling distortion-free audio capturing for all speech-related applications thanks to the high SNR and low distortions.
Recommended products:
IM64A130A, IM64D121A, IM64D130A, IM66D120A, IM66D130A, IM68A130A

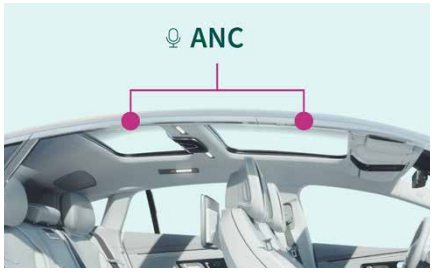
Interior

Speech: Microphone arrays/beamforming
Improved beam forming and noise suppression capabilities of microphone arrays, due to the narrow sensitivity and phase matching.
Recommended products:
IM66D120A, IM66D130A, IM67D120A, IM67D130A

Interior

Speech recognition/voice commands
Best speech intelligibility for speech recognition due to high SNR and low distortions.
Recommended products:
IM66D120A, IM66D130A, IM67D120A, IM67D130A, IM68A130A

Interior



Active and road noise cancellation (ANC/RNC)
Enabling a quite environment for comfortable travels with best ANC performance, thanks to the flat and stable frequency and phase response at lowest frequencies.
Recommended products:
IM66D120A, IM66D130A, IM68A130A

Interior

Event sound detection/siren detection
The large dynamic range and high acoustic overload point contribute to road safety by detecting sounds like sirens from emergency vehicles or even dangerous road conditions.
Recommended products:
IM63D135A, IM66D130A, IM68A130A

Exterior

Voice recognition/external interaction
Allowing external interaction via voice commands and good speech intelligibility due to high SNR and low distortions (THD)
Recommended products:
IM66D130A, IM63D135A

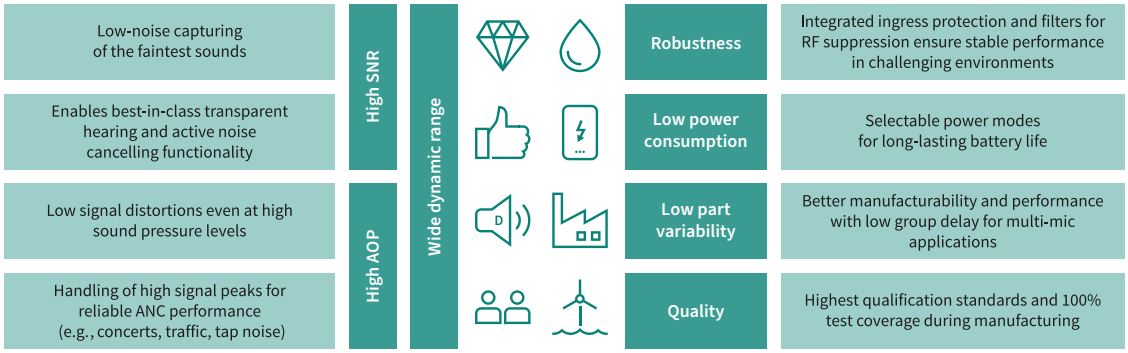
Exterior

Click here to learn more:
www.infineon.com/mems-microphones

MEMS microphones for consumer applications

XENSIV™ MEMS microphones feature ultralow self-noise (high SNR), extremely low distortions (THD) even at high sound pressure levels (SPL), very tight part-to-part phase and sensitivity matching, a flat frequency response with a low LFRO (low frequency roll-off), and an ultralow group delay.

With selectable power modes and a very small package size, Infineon XENSIV™ MEMS microphones are an excellent match for consumer electronics, offering outstanding audio-capturing capabilities, as well as for industrial applications, such as predictive maintenance and security.



XENSIV™ MEMS microphones for consumer - product portfolio

	Product	Key features	Interface	Package dimensions [mm³]	SNR [dB(A)]	AOP (1/10%THD) [dBSPL]	Current consumption [µA]	Sensitivity [dBFS]	LFRO [Hz]
Digital	**IM69D130**	High SNR and high AOP	PDM	4.00 x 3.00 x 1.20	69	128/130	980 (at 3.072 MHz)	-36 dBFS	28
	IM69D120	High SNR and sensitivity	PDM	4.00 x 3.00 x 1.20	69	118/120	980 (at 3.072 MHz)	-26 dBFS	28
	IM69D127	High performance in small size	PDM	3.60 x 2.50 x 0.98	69	123/127	980 (at 3.072 MHz)	-34 dBFS	40
	IM69D128S	Ultralow current consumption	PDM	3.50 x 2.65 x 0.98	69	125/128	520 (at 3.072 MHz)	-37 dBFS	30
	IM67D128B	Ultralow power	PDM	3.00 x 2.00 x 0.98	67	128	540 (at 3.072 MHz)	-37 dBFS	10
	IM70D122	High SNR and sensitivity	PDM	3.50 x 2.65 x 0.98	70	120/122	980 (at 3.072 MHz)	-26 dBFS	30
	IM72D128	Ultrahigh SNR	PDM	4.00 x 3.00 x 1.20	72	126/128	980 (at 3.072 MHz)	-36 dBFS	20
	IM73D122	Ultrahigh SNR and sensitivity	PDM	4.00 x 3.00 x 1.20	73	120/122	980 (at 3.072 MHz)	-26 dBFS	20
	IM72D128V	Ultralow current consumption	PDM	4.00 x 3.00 x 1.20	71.5	125/128	430 (at 3.072 MHz)	-36 dBFS	11
	IM68D121J	High SNR, high sensitivity and low IDD	PDM	3.50 x 2.65 x 0.98	68	118/121	580 (at 3.072 MHz)	-26 dBFS	20
	IM68D128B	High SNR and low IDD	PDM	3.50 x 2.65 x 0.98	67.5	122/128	580 (at 3.072 MHz)	-37 dBFS	20
	IM66D132H	High 1%/10% THD and low IDD	PDM	3.50 x 2.65 x 0.98	66	128/132	580 (at 3.072 MHz)	-37 dBFS	20
	IM69D129F	Ultralow power	PDM	3.50 x 2.65 x 0.98	69	127/129	450 (at 3.072 MHz)	-36 dBFS	11
	IM66D130M	Small package and low IDD	PDM	3.00 x 2.00 x 0.98	66	124/130	550 (at 3.072 MHz)	-37 dBFS	35
Analog	**IM68A130**	Small package and low LFRO	Single-ended	3.35 x 2.50 x 0.98	68	118/130	110 (at 2.75 V)	-38 dBV	10
	IM70A135	High SNR and high AOP	Differential	3.5 x 2.65 x 0.98	70	132/135	170 (at 2.75 V)	-38 dBV	37
	IM73A135	Ultrahigh SNR and high AOP	Differential	4.00 x 3.00 x 1.20	73	132/135	170 (at 2.75 V)	-38 dBV	20

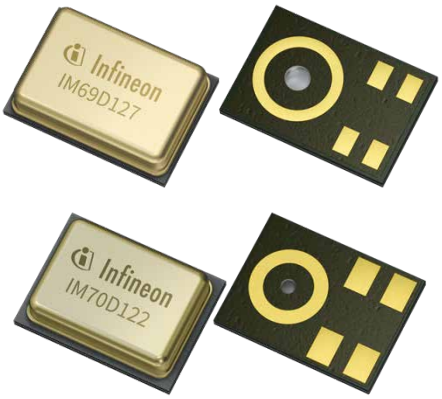
All XENSIV™ consumer microphones feature a bottom port. All sealed dual membrane (SMD) XENSIV™ microphones deliver IP57 ingress protection at the component level, ensuring better manufacturability and enhanced robustness against water and dust.

Click here to learn more:
www.infineon.com/mems-microphones

Features, applications, and use cases for MEMS microphones for consumer

Features

- Ultralow self-noise/ultrahigh SNR
- Selectable power modes for longer battery life
- Sealed dual membrane (SDM) technology with ingress protection at the microphone level
- Extremely low distortion (THD), even at high sound pressure levels (SPL)
- High dynamic range and very high acoustic overload points (AOP)
- Very tight part-to-part phase and sensitivity matching
- Flat frequency response with a low LFRO (low-frequency roll-off)
- Ultralow group delay for multi-microphone applications
- Very small package sizes for various applications



Typical use cases

- Studio quality audio capturing for communication devices
- Low-latency wide-band audio signal capturing for active noise cancellation (ANC) and transparent hearing functionality
- Small form factor and current consumption for battery and size-constrained devices
- Multi-microphone (array) based beamforming and source separation for audio zoom features and multiuser audio capturing
- High range, far field voice pickup for multi room applications
- Capturing of audio signals in loud environments, such as outdoor
- Audio pattern detection for predictive and preventive maintenance and security

Applications

- TWS earbuds
- ANC headphones
- Smart speakers
- Conference speakers
- Laptops/tablets
- Wearables
- AR/VR devices
- Cameras
- Video doorbells
- Smart home
- Smart infrastructure
- Home appliances
- Industrial applications
- Medical applications

Visit the Infineon Developer Community to get the support on your design with our audio experts. Furthermore, you can delve into Knowledge Based Articles, learn about MEMS mics specifications, foundational differences between ECM and MEMS technologies, get electrical implementation hints, and so much more!

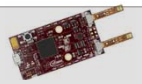
Click here to learn more:
www.infineon.com/mems-microphones

XENSIV™ MEMS microphone boards

The Infineon Audiohub Nano

The Infineon Audiohub Nano enables better evaluation of Infineon XENSIV™ microphones. The kit includes an Infineon Audiohub Nano and four microphones on flex board. Up to two additional Infineon XENSIV™ MEMS microphones can be connected to the mono or stereo output evaluation board. The evaluation board provides a USB audio interface to stream audio data from the microphone to any audio recording and editing software. The board has two different interfaces: analog and digital.

XENSIV™ MEMS microphones Audiohub Nano boards

Board	Description	SP	OPN	Audiohub Nano boards
EVAL AHNB DIGITALV01	Audiohub Nano Digital XENSIV™ MEMS microphones evaluation board	SP005955184	EVALAHNBDIGITALV01TOBO1	
EVAL AHNB ANALOGV01	Audiohub Nano Analog XENSIV™ MEMS microphones evaluation board	SP005568087	EVALAHNBANALOGV01TOBO1	

XENSIV™ MEMS microphones flex boards

Board	Key features	SP	OPN	Flex kit
EVAL_IM69D120_FLEXKIT	– Quick and easy connection to evaluation system – Small size: 25 x 4.5 mm² – Pre-soldered MEMS microphone – Configurable select pin configuration for digital microphones	SP002153026	EVALIM69D120FLEXKITTOBO1	
EVAL_IM69D130_FLEXKIT		SP002153022	EVALIM69D130FLEXKITTOBO1	
KIT_IM66D130MV01_FLEX		SP006038060	KITIM66D130MV01_FLEXTOBO1	
KIT_IM66D132HV01_FLEX		SP006038061	KITIM66D132HV01_FLEX TOBO1	
KIT_IM68A130V01_FLEX		SP005728206	KITIM68A130V01FLEXTOBO1	
KIT_IM68D121JV01_FLEX		SP006155584	KITIM68D121JV01FLEXTOBO1	
KIT_IM68D128BV01_FLEX		SP006114517	KITIM68D128BV01_FLEX TOBO1	
KIT_IM69D127V11_FLEX		SP005403891	KITIM69D127V11FLEXTOBO1	
KIT_IM69D128SV01_FLEX		SP005744505	KITIM69D128SV01FLEXTOBO1	
KIT_IM69D129FV01_FLEX		SP006038667	KITIM69D129FV01FLEXTOBO1	
KIT_IM70A135V01_FLEX		SP005728204	KITIM70A135V01FLEXTOBO1	
KIT_IM70D122V01_FLEX		SP005826638	KITIM70D122V01FLEXTOBO1	
KIT_IM72D128V01_FLEX		SP005429924	KITIM72D128V01FLEXTOBO1	
KIT_IM72D128VV01_FLEX		SP006038668	KITIM72D128VV01FLEXTOBO1	
KIT_IM73A135V01_FLEX		SP005415695	KITIM73A135V01FLEXTOBO1	

XENSIV™ Audio Shield for MEMS microphones evaluation

The XENSIV™ Audio Shield simplifies the evaluation of up to 8 XENSIV™ MEMS microphones, facilitating the exploration of complex arrays and algorithms for applications in beamforming or AI. The shield is equipped with an Arduino interface, an audio codec, and a headset jack, and is compatible with the available PSOC™ 6 evaluation kits.

Board	SP	OPN	Audiohub Nano boards
EVAL_XENSIV_AUDIO_SHLD	SP006237639	EVALXENSIVAUDIOSHLDTOBO1	

Click here to learn more:
www.infineon.com/mems-microphones

XENSIV™ radar sensors

For consumer, IoT, industrial, and automotive applications – giving technology the ability to “see”

Radar offers a host of advantages over passive infrared (PIR) technology in motion detection applications. These include increased robustness against false alarms, greater accuracy, and more precise measurement of detected objects, paving the way for new speed-detection and motion-sensing capabilities. These advanced capabilities enable all sorts of “things,” such as robots, cars, smart home devices and even lights, to “see” their surroundings and respond dynamically.

As a leading provider of radar chip technology, we offer a comprehensive range of mmWave radar sensors within our XENSIV™ family, which operates at 24 GHz and 60 GHz frequencies. These sensors cater to diverse consumer, IoT, industrial and automotive applications. In addition, our RASIC™ family of radar front-end MMICs supports 77/79 GHz frequencies and is designed for automotive radar applications, offering a complete solution for a wide range of use cases, from basic warning functions such as lane change assist (LCA) and blind spot detection (BSD) to advanced active safety systems like automatic emergency braking (AEB) and dynamic driving features like adaptive cruise control (ACC).

Click here to learn more:
www.infineon.com/radar-sensors

As the market leader in radar chips, we offer a wide portfolio of mmWave radar sensors as part of our XENSIV™ sensor family – including Doppler radar as well as FMCW radar systems. This portfolio includes the smallest 24 GHz MMIC in the market and the most integrated and prominent 24 GHz radar transceiver family currently available. These radar chips are designed to support different industrial, smart home, and consumer applications. In addition, we offer radar sensors in the 60 GHz range, used in consumer products like the Google Pixel 4 smartphone, Google Nest Thermostat, Google Nest Hub, and Samsung Frame Smart TV.

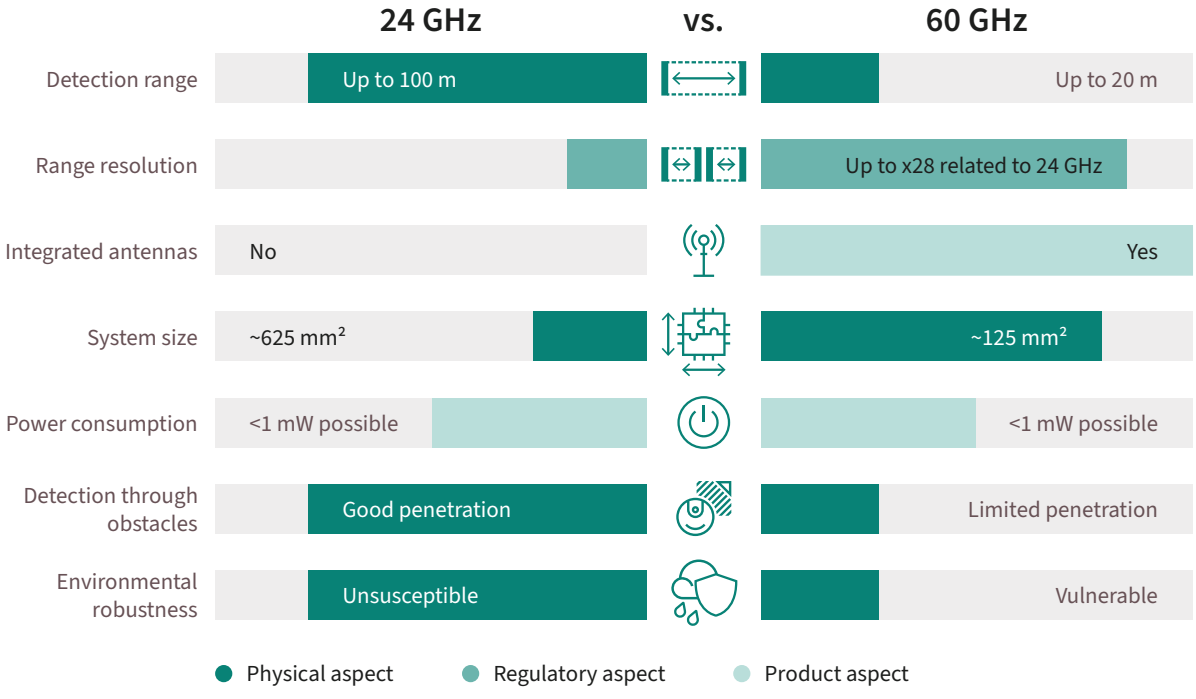
Motion detection with radar offers significant advantages over PIR and other motion-sensing technologies

Our 24- and 60-GHz radar sensors cover a wide range of applications. Many of them are based on motion detection triggering systems, such as lighting solutions, automatic doors, security camera and video doorbell, or smart home devices. In contrast to other motion detection technologies like PIR, radar technology offers significant advantages.

These include smaller system sizes, greater accuracy, and more precise measurements of detected objects. With increased robustness and fewer false alarms, radar will also enable improved energy efficiency as the overall system power budget will be reduced. In addition, radar can determine the direction, speed, distance, and, depending on the antenna configuration, even the position of a moving object.

When to use 24 GHz or 60 GHz radar technology

In the 24 GHz range, the bandwidth for FMCW radar operations covers 250 MHz within the regulated ISM band. In the 60 GHz regime, an unlicensed ultrawideband of up to 7 GHz can be used for short-range applications. Consequently, 60 GHz FMCW radar systems can offer a better resolution, allowing additional use cases such as people localization and tracking. Due to micromotion detection, radar technology makes gesture control, material classification, and monitoring of various vital functions (respiration, heartbeat, or blood pressure) possible.



Click here to learn more:
www.infineon.com/radar-sensors

Radar implementation can bring several benefits to different applications:

Smart TV

Save energy and OLED lifetime by turning off

HVAC systems

Track people to move the airflow away from them

Security

Security camera and video doorbells

Lighting

Indoor and outdoor. Resistant to harsh weather

Monitors and laptops

Small, hidden, sensitive

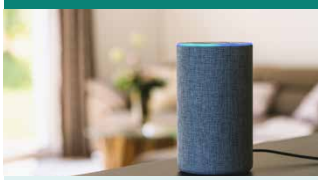
Home appliances

Activate displays and control it with gestures

Door opening

Direction of travel to remove false opening

Smart speaker



Eliminate keyword based activation

Smart home

Robust, discreet, small

Gaming and VR

Enhance gaming experience

Smart toilet

Presence sensing and water level detection

Service robots

Robust, small footprint, accurate

Robotics

Safety, accuracy and efficiency

Sleep monitoring systems

Breathing and heart rate measurement

Summary of key benefits

- Direction, proximity, and speed detection
- Localization and tracking functionalities
- Detection through non-conductive materials (Product design flexibility, anonymous sensing)
- Operation is sustained through harsh environmental conditions such as rain, snow, fog, and dust
- Sensitive enough to capture not only presence, but also vital signs, like breathing and heartbeat
- Performance parameters are adjustable, ensuring adaptability to different application requirements

Click here to learn more:

www.infineon.com/radar-sensors

24 GHz radar sensors for automotive

BGT24ATR22
XENSIV™ 24 GHz pulsed Doppler radar transceiver

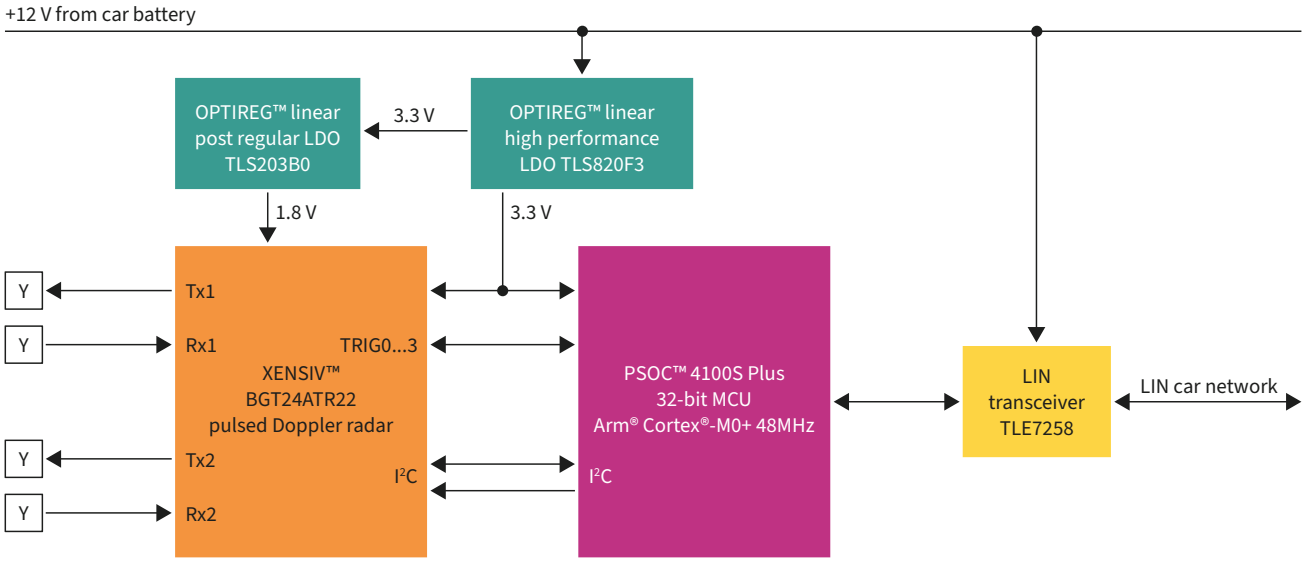
The BGT24ATR22 is a monolithic microwave integrated circuit (MMIC) for 24 GHz radar applications. It provides building blocks for analog signal generation and reception, operating in the frequency range from 24 GHz up to 24.25 GHz.

Key features
- 24 GHz radar transceiver
- 2Tx/2Rx channels
- Low-phase noise VCO
- Automatic frequency control
- Automatic DC offset compensation
- State machine with ultralow power modes
- 12-bit ADC
- Digital radar data processing unit
- Temperature range: -40°C to +105°C
- VQFN-32 RoHS compliant, leadless package

Applications
- Automotive short-range radar
- Hands-free trunk and door opening
- Motion detection
- Touchless switches

Benefits
- Compact PCB design due to high level of integration
- Ultralow power consumption modes for 24/7 use cases
- Low system costs due entry-level only microcontrollers
- Autonomous motion sensing
- Globally approved 24 GHz radar with excellent characteristics for robust and reliable performance in harsh environmental conditions

Smart trunk opener (STO) system diagram



XENSIV™ 24 GHz radar for automotive – Product overview

Product	OPN	Qualification	Frequency min Frequency max	NF	Packages
BGT24ATR22	BGT24ATR22E6433XUMA1	AEC-Q100	24–24.25	NFSSB: 13 dB at 1 kHz	VQFN-32-9

Click here to learn more:
www.infineon.com/radar-sensors

60 GHz radar sensors for automotive

BGT60ATR24AIP
XENSIV™ 60 GHz radar sensor for automotive enables highly reliable in-cabin monitoring systems

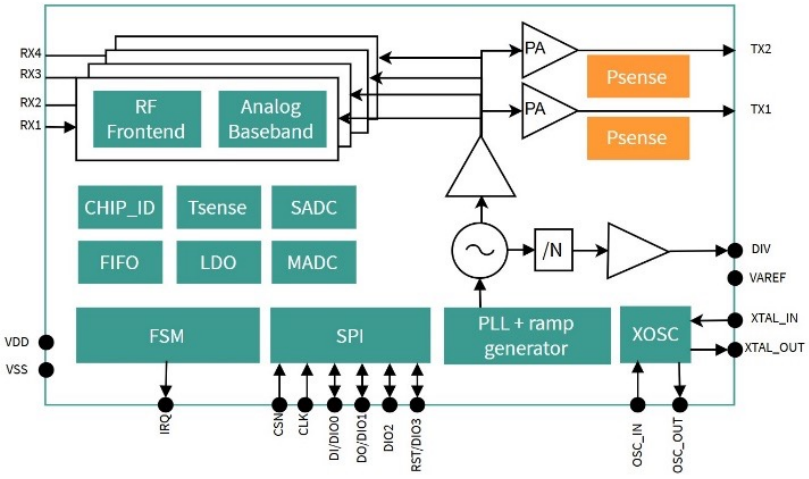
The XENSIV™ BGT60ATR24AIP is a state-of-the-art automotive 60 GHz radar sensor that enables ultrawide bandwidth FMCW operation within a compact, integrated package. Equipped with a digital interface for seamless sensor configuration and data acquisition, it features an integrated state machine that allows independent data collection while optimizing power modes for minimal energy consumption. This versatile design enables efficient and reliable in-cabin monitoring. It is ideal for safety and driver assistance applications where precise occupant detection, seat sensing, or activity monitoring are essential.

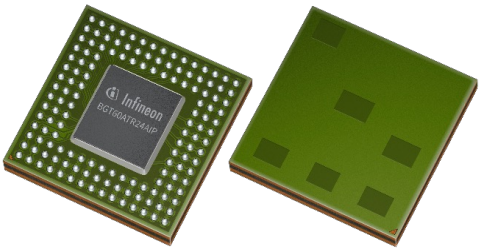
The BGT60ATR24AIP incorporates integrated antennas, simplifying system design and enhancing overall performance. This innovative antenna-in-package solution offers automotive manufacturers a compact, robust platform that elevates in-cabin sensing capabilities. It provides real-time, accurate detection of motion, presence, and activity. Ultimately, the BGT60ATR24AIP helps create smarter, safer, and more connected vehicle environments by delivering high-performance, low-power radar sensing tailored to automotive needs.

Features
- 60 GHz radar sensor for FMCW operation
- 4.7 GHz bandwidth
- 2Tx 4Rx Antenna-in-Package (AIP)
- Digital interface for chip configuration and radar data acquisition
- Optimized power modes for low-power operation
- Integrated state machine for independent operation
- AEC-Q100 qualified

Benefits
- Low power consumption
- Integrated antenna-in-package (AIP)
- Accurate and robust performance
- Excellent thermal management
- Size- and space-optimized solution

Block diagram





XENSIV™ 60 GHz radar for automotive – Product overview

Product	OPN	Qualification	Frequency min Frequency max	NF	Package
BGT60ATR24AIP	BGT60ATR24AIPE6327XUMA1	AEC-Q100 (Grade 2)	57.7 GHz - 62.4 GHz	NFSSB:12 dBm at 100 KHz	PG-VF2BGA-144-1

Click here to learn more:
www.infineon.com/radar-sensors

77/79 GHz radar ICs for automotive

RASIC™ front-end radar transceiver ICs

Infineon has been delivering automotive 77 GHz radar products for over a decade. Infineon's RASIC™ family of radar transceiver MMICs addresses the needs of 77/79 GHz radar for all safety-critical applications, from automatic emergency braking (AEB) to high-resolution radars in automated driving. It supports precise distance measurement and simultaneous transmitter operation for MIMO.

The CTRX8191F is a highly integrated device that performs all functions of a radar front-end in a single device, from FMCW signal conditioning to the generation of digital receive data output. On-chip temperature and output power sensors and multiple monitoring circuits allow for calibration and monitoring. The MMIC is controlled via SPI. Additionally, the CTRX8191F offers cascading functionality, enabling the creation of up to 24T24R radar systems.

Features

- Radar 77 GHz transceiver MMIC (RASIC™ CTRX8191F)
- Radar MCU family featuring radar signal processing units (AURIX™ TC3xx and TC4xx)
- Radar system power supply with numerous safety functions (TLF3068x)

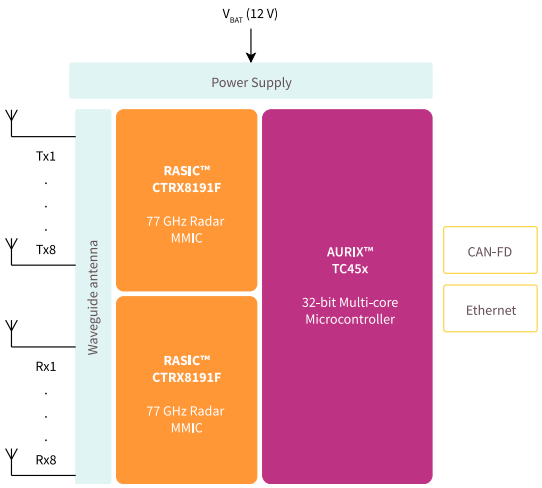
Benefits

- One 77/79 GHz radar platform supporting all types of automotive radar applications
- Scalability by cascading multiple MMICs and MCUs enabling most advanced sensors
- Flexibility through numerous configuration parameters
- ASIL C support reducing customer R&D efforts

Product overview

Product	Config.	Key benefits	Features
CTRX8191F	4Tx4Rx	Transceiver MMIC with cascading	– Transmit channels (4Tx, up to 4 GHz BW within 76–81 GHz) – Receive channels: 4Rx – Integrated PLL (Phase Locked Loop) – Sequencer enabling the execution of a user-defined ramp configuration – Integrated Analog-to-Digital Converter (ADC) – Integrated calibration functionality – Built-in monitoring functionality – Compliant with ISO 26262; capable for up to ASIL C
CTRX8191FS	4Tx4Rx	Standalone transceiver MMIC	

Please be aware that 77/79 GHz radar products are not available via Infineon's distribution partners.



ISO 26262 compliant

Click here to learn more:
www.infineon.com/radar-sensors

60 GHz radar sensors for consumer and IoT

Infineon's innovative XENSIV™ 60 GHz radar chip enables things to see and revolutionizes the human-machine interface.

XENSIV™ 60 GHz radar for consumer and IoT – Product overview

Product	SP	OPN	Description	Packages
BGT60TR13C	SP002262606	BGT60TR13CE6327XUMA1	XENSIV™ 60 GHz FMCW radar sensor for advanced sensing	VF2BGA-40
BGT60UTR11AIP	SP005407929	BGT60UTR11AIPXUMA1	XENSIV™ 60 GHz highly integrated FMCW radar sensor	VF2BGA-28-1
BGT60LTR11AIP	SP005537624	BGT60LTR11SAIPXUMA1	XENSIV™ 60 GHz completely autonomous pulsed-Doppler radar sensor, operating in the frequency band from 61 GHz to 61.5 GHz.	UF2BGA-421
BGT60LTR11SAIP	SP005832449	BGT60LTR11SAIPXUMA1	Down-specified version of XENSIV™ BGT60LTR11AIP with reduced detection range (autonomous mode) and operating temperature from -10 to +70°C	
BGT60LTR11BAIP	SP005547020	BGT60LTR11BAIPXUMA1	Japanese version of XENSIV™ BGT60LTR11AIP, operating in the frequency band from 60.5 GHz to 61 GHz (Japanese ISM band)	
BGT60CUTR13AIP	SP005729332	BGT60CUTR13AIPXUMA1	XENSIV™ 60 GHz CMOS FMCW radar sensor with integrated processing via HW Accelerator	PG-VF2BGA-38

XENSIV™ 60 GHz radar for consumer and IoT – Evaluation boards

Board	SP	OPN	Description
DEMO BGT60TR13C	SP005728718	DEMOBGT60TR13CTOBO1	Demonstration kit, consisting of a Radar Baseboard MCU7 and a XENSIV™ BGT60TR13C sensor shield.
DEMO BGT60UTR11AIP	SP005745304	DEMOBGT60UTR11AIPTOBO1	Demonstration kit, consisting of a Radar Baseboard MCU7 Plus and a XENSIV™ BGT60UTR11AIP sensor shield.
DEMO BGT60LTR11AIP	SP005422969	DEMOBGT60LTR11AIPTOBO1	Demonstration kit, consisting of a Radar Baseboard MCU7 and a XENSIV™ BGT60LTR11AIP sensor shield.
SHIELD_AUTONOM_BGT60	SP005630363	SHIELDAUTONOMBGT60TOBO1	Shield for fully autonomous operation of XENSIV™ BGT60LTR11AIP; directly fits on Arduino MKR board.
S2GO RADAR BGT60LTR11	SP005594890	S2GORADARBGT60LTR11TOBO1	Shield2Go version of XENSIV™ BGT60LTR11AIP, that can be used in both autonomous/SPI modes.
REF_BGT60LTR11AIP_M0	SP005894766	REFBGT60LTR11AIPM0TOBO1	Reference design with XENSIV™ BGT60LTR11AIP (SPI mode) and XMC™ Cortex®-M0 Microcontroller for data processing.
REF_BGT60LTR11AIP_AUT	SP005636053	REFBGT60LTR11AIPAUTTOBO1	Reference design with XENSIV™ BGT60LTR11AIP (autonomous mode), FCC, CE certified.
KIT_CSK_BGT60TR13C	SP005635357	KITCSKBGT60TR13CTOBO1	Connected Sensor Kit (CSK), consisting of a Rapid IoT Connect Developer Kit Feather board and a XENSIV™ BGT60TR13C Wing board.
KIT_CSK_BGT60UTR11AIP	SP006089336	KITCSKBGT60UTR11AIPTOBO1	Connected Sensor Kit (CSK), consisting of a Rapid IoT Connect Developer Kit Feather board and a XENSIV™ BGT60UTR11AIP Wing board.
KIT_CSK_BGT60CUTR13	SP006232440	KITCSKBGT60CUTR13TOBO1	Connected Sensor Kit (CSK), consisting of a Rapid IoT Connect Developer Kit Feather board and a XENSIV™ BGT60CUTR13AIP Wing board

Click here to learn more:
www.infineon.com/radar-sensors

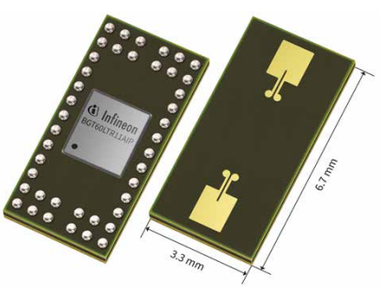
BGT60LTR11AIP
XENSIV™ 60 GHz first completely autonomous radar sensor for motion sensing

The BGT60LTR11AIP is a fully integrated microwave motion sensor that includes antennas in package (AIP) and built-in detectors for motion and direction of motion. A state machine enables the device to operate without any external microcontroller. This autonomous mode detects a human target up to 7 m with a low power consumption of less than 2 mW. The BGT60LTR11AIP enables radar technology for everyone since it does not require RF, antenna design, or radar signal processing know-how. These features make the small-sized radar solution a compelling, smart, and cost-effective replacement for conventional PIR sensors in low-power or battery-powered applications. Also, with its small form factor, Infineon's highly integrated radar sensor solutions bring innovative, intuitive sensing capabilities to many applications. BGT60LTR11AIP has a high sensitivity and can detect if a person is present, and if the device needs to be ready – similar to a screensaver that deactivates the PC monitor after a certain time without mouse or keyboard input and reactivates it as soon as new input is noticed.

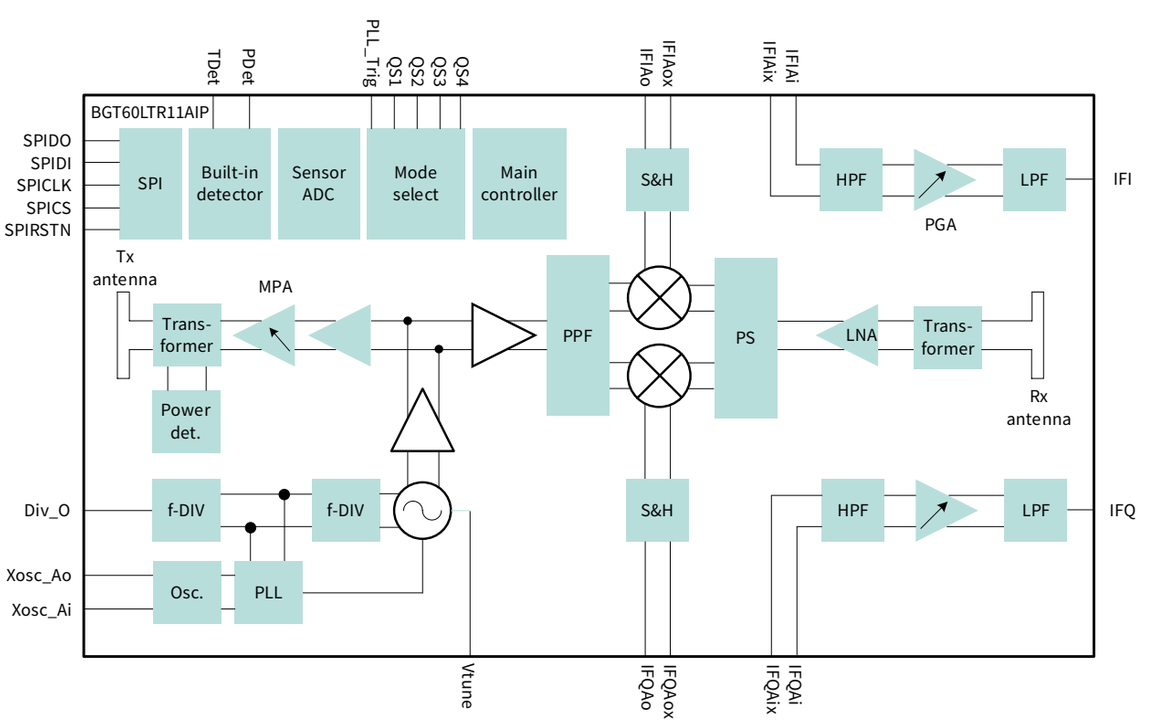
Features
- 3.3 x 6.7 x 0.56 mm^3 package size
- 1Tx 1Rx Antennas in Package (AIP) with 80° field of view
- Built-in motion and direction of motion detectors
- Multiple modes of operation including a completely autonomous mode
- Adjustable performance parameters: detection sensitivity, hold time, and frequency of operation
- FR4 material for PCB design is sufficient

Benefits
- Autonomous mode
  - Up to 7 m detection range
  - Less than 2 mW power consumption
  - Requires minimal external circuitry including crystal, LDO, and some resistors capacitors
- Adding a Cortex®-M0 MCU extends flexibility
  - Up to 14 m detection range (SPI mode)
  - Less than 2 mW power consumption possible

Application
- Smart building and smart home
- Home appliances
- Smart home security
- Room air conditioners
- Automated door openers
- Displays such as TVs, monitors, laptops, or tablets
- Lighting systems and lighting control



Block diagram



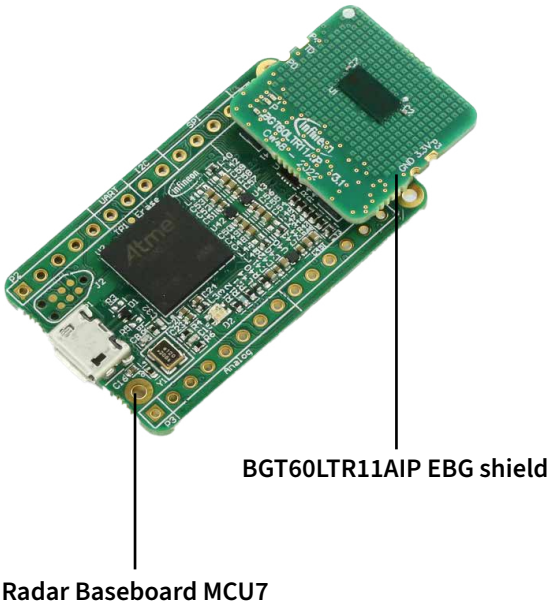
Click here to learn more:
www.infineon.com/radar-sensors

DEMO BGT60LTR11AIP
XENSIV™ 60 GHz demo board for motion sensing

This demo features Infineon's first completely autonomous radar sensor, the BGT60LTR11AIP. The 60 GHz radar MMIC is a fully integrated microwave motion sensor that includes antennas in package (AIP) as well as integrated detectors for motion and direction of motion. A state machine enables the device to operate without any external microcontroller. This autonomous mode detects a human target up to 7 m with a low-power consumption of less than 2 mW. These features make the small-sized radar solution a compelling, smart, and cost-effective replacement for conventional PIR sensors in low-power or battery-powered applications.

For evaluation of the BGT60LTR11AIP MMIC, this demo includes the BGT60LTR11AIP shield as well as the Infineon Radar Baseboard MCU7.

The BGT60LTR11AIP shield can be attached to an Arduino MKR board or the included Infineon Radar Baseboard MCU7. For the first evaluation of the radar sensor, we offer the DEMO BGT60LTR11AIP and the Radar Development Kit (RDK), which can be downloaded via the Infineon Developer Center (IDC).



Click here to learn more:
www.infineon.com/radar-sensors

BGT60TR13C
XENSIV™ highly integrated 60 GHz radar sensor for consumer electronics and IoT applications

Enablement of horizontal and vertical angular measurement

The BGT60TR13C MMIC is a 60 GHz radar sensor with integrated antennas and comes with one transmitting and three receiving antennas. Thanks to the antennas in package (AIP) concept, the antenna design complexity at the user end can be eliminated and the PCB-designed with standard FR4 materials.

BGT60TR13C offers innovative and intuitive sensing capabilities

With its small form factor and low power consumption, BGT60TR13C MMIC brings innovative, intuitive sensing capabilities to many applications.

Features

- Integrated finite-state-machine (FSM)
- Very fast chirp speed: 400 MHz/µs
- High signal-to-noise ratio (SNR)
- Ultrawide bandwidth >5 GHz
- FMCW operation
- Integrated L-shaped antennas and small package size (6.5 x 5.0 x 0.9 mm^3)
- <5 mW (duty cycling according to released FCC waiver)

Benefits

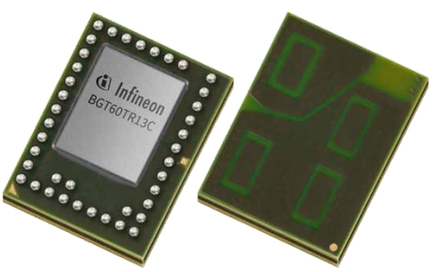
- Allows semi-autonomous operation
- Highly configurable modulation and power modes
- MCU only needs to configure sensor and fetch data
- High velocity resolution
- People can be detected up to 15 m
- High sensitivity allows submillimeter level motion detection
- Allows simultaneous measurement of target range and velocity
- High accuracy of range measurements
- Reduced interference with other sensors
- L-shape enables horizontal and vertical angular measurements
- Thanks to small package size, PCB area can be saved and design-in process simplified
- Reduces average power consumption
- Optimized power modes for low power consumption

Based on the developed algorithm, the MMIC can serve established and new applications and use cases without intruding on privacy. Thanks to its feature set, the MMIC can measure velocity, angle, horizontal, and vertical.

BGT60TR13C demonstrates to be a powerful sensor for:

- Presence detection/localization/tracking: BGT60TR13C enables people presence detection, tracking, and localization while providing extremely high accuracy in detecting micro and macro motions
- Gesture sensing: BGT60TR13C ensures detection of submillimeter motions
- Vital sensing: BGT60TR13C is able to track vital signs in consumer electronics, healthcare as well as industrial applications

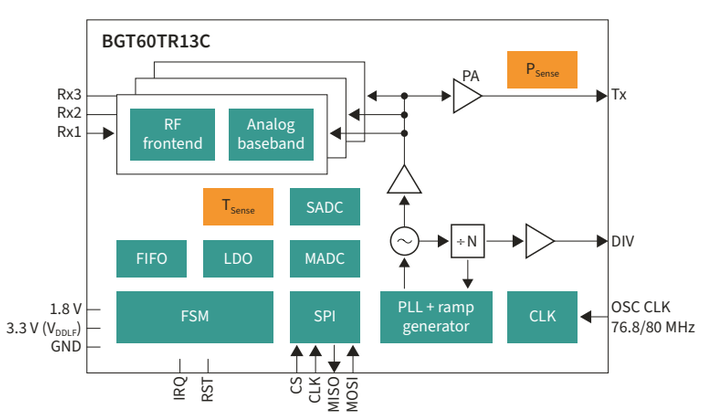
For first evaluation of the radar sensor, we offer the DEMO BGT60TR13C and the Radar Development Kit (RDK), which can be downloaded via the Infineon Developer Center (IDC).



Applications

- Smart TV
- Heating ventilation and air conditioning (HVAC)
- Smart speaker
- Smart home and building
- Elderly monitoring
- Vital sensing
- Home appliances

Block diagram



Click here to learn more:
www.infineon.com/radar-sensors

DEMO BGT60TR13C
XENSIV™ 60 GHz demo board for advanced sensing

BGT60TR13C offers innovative and intuitive sensing capabilities

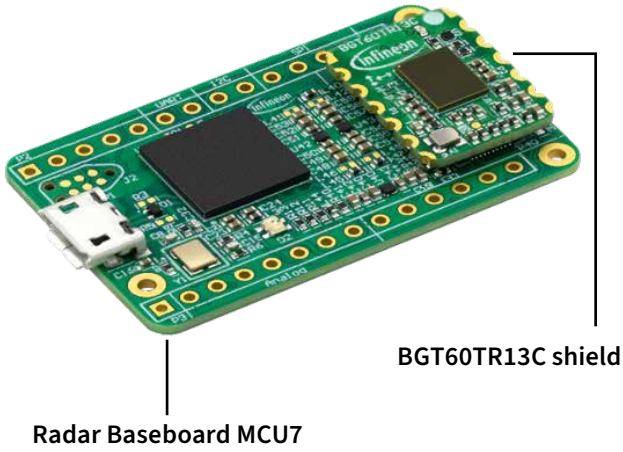
This demo board features Infineon's XENSIV™ 60 GHz radar sensor BGT60TR13C, consisting of a Radar Baseboard MCU7 and a BGT60TR13C shield.

The radar baseboard is a 40.64 x 25.4 mm^2 printed circuit board (PCB). Its main purpose is to provide a generic sensor interface for BGT60TR13C MMIC. The central microcontroller unit (MCU) can process radar data or forward the sensor data to a USB interface or an Arduino MKR interface.

Benefits

- Flexible platform selection
- Variable connector options, and option to solder onto other PCBs
- Highly flexible configuration on FMCW modulation
- Power consumption can be optimized according to use case

The BGT60TR13C shield presents a minimized form factor of 17 x 12.7 mm^2 and comes with an integrated BGT60TR13C Antenna-in-Package (AIP) radar chip of 6.5 x 5.0 x 0.85 mm^3. Moreover, the shield contains a digital interface for configuring and transferring the acquired radar data to a microcontroller board. The shield is optimized for fast prototyping designs, system integrations, and initial product feature evaluations. In addition, it offers developers the flexibility to choose their platform depending on their preferred use cases.



Click here to learn more:
www.infineon.com/radar-sensors

BGT60UTR11AIP
XENSIV™ highly integrated 60 GHz radar sensor for consumer electronics and IoT applications

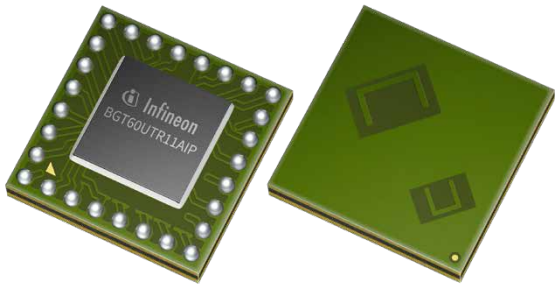
The BGT60UTR11AIP is optimized for low power consumption and system cost optimization. Its compact size of only 16 mm^2 makes it suitable for integration into the smallest devices. The MMIC is manufactured using Infineon's B11 SiGe BiCMOS technology, ensuring excellent RF performance.

Its 5.6 GHz ultrawide bandwidth allows FMCW operations with extremely high resolution. The detection of sub-mm movements ensures not only extremely sensitive presence and motion detection up to a range of 15 m but also enables mm precise range measurements, 1D gestures, and the measurement of vital signs such as breathing rate and heart rate.

The sensor features a 50 MHz digital SPI interface for configuration and data transfer, while an integrated state machine enables real-time data acquisition without requiring constant interaction with the processor. With three different power modes, users can optimize between performance and power consumption. The BGT60UTR11AIP's sub-mA average current consumption makes it suitable for battery-powered devices.

For the first evaluation of the radar sensor, we offer the DEMO BGT60UTR11AIP and the Radar Development Kit (RDK), which can be downloaded via the Infineon Developer Center (IDC).

Features
- 60 GHz radar operating with 6 GHz bandwidth and ramp speed of up to 400 MHz/µs
- Antenna in package (AIP) with ±60° field of view (FoV)
- Integrated finite state machine (FSM) for low power consumption and real-time operation
- 4 MSps ADC sampling rate
- Single 50 MHz SPI for chip configuration and data transfer
- Broadcast mode to trigger and configure multiple devices



Benefits
- High sensitivity to detect sub-mm movements for human presence detection and vital sensing applications
- High bandwidth for precise distance measurements with mm accuracy
- Small size for integration into space-constrained environments
- Low power consumption for battery-driven applications

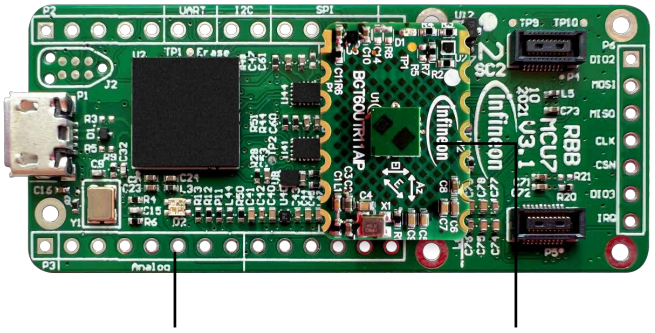
Applications
- Smart building devices, such as door locks, smart doorbells, and air conditioners
- Smart home devices, such as smart speakers and thermostats
- Smart appliances, such as refrigerators and kitchen machines
- Healthcare devices, such as baby monitors and sleep tracker
- Service robots, such as vacuum cleaners and lawn mowers
- Security devices, such as motion detectors and IP cameras
- Wearables such, as headphones and smartwatches
- TVs and notebooks

Click here to learn more:
www.infineon.com/radar-sensors

DEMO BGT60UTR11AIP
XENSIV™ BGT60UTR11AIP 60 GHz radar sensor FMCW demo board

This demo board features Infineon's 60 GHz XENSIV™ radar sensor BGT60UTR11AIP. It consists of a Radar Baseboard MCU7 Plus and a BGT60UTR11AIP sensor shield. The board can be used for product feature evaluations, fast prototyping, and radar algorithm development with the BGT60UTR11AIP.
The BGT60UTR11AIP MMIC has integrated antennas with one transmit and one receive antenna. With its compact size of only 16 mm² and extremely high FMCW performance (5.6 GHz bandwidth), this radar sensor is suitable for a wide range of applications.

The DEMO BGT60UTR11AIP board is supported by our Radar Development Kit (RDK), which can be downloaded from the Infineon Developer Center (IDC).



It contains the Radar Fusion GUI for an instant display of the radar signals as well as predefined applications such as presence detection or distance measurement. For further development of application-specific radar algorithms, C, C++, Python and MATLAB interfaces are provided.

Features of BGT60UTR11AIP shield
- 19 mm x 12.7 mm small form factor
- Digital SPI interface for configuration and data transfer to an MCU
- Standard FR4 laminate
- Castellated holes on the PCB edges for additional signal access
- MCU-controllable LED on board indicating radar sensor status
- 59 mm x 25.4 mm size
- Can perform radar data processing Arm® Cortex®-M7 processor or forward the sensor data to a USB interface or an Arduino MKR interface
- Hi-Speed USB 2.0 interface
- Operates with Radar Development Kit and Radar Fusion GUI

Benefits
- Flexible platform selection
- Variable connector options, and option to solder onto other PCBs
- Highly flexible configuration on the FMCW modulation
- Advanced functionalities by SPI configuration or further signal processing
- Power consumption can be optimized according to the radar use case

Applications
- Smart building devices, such as door locks, smart doorbells, and air conditioners
- Smart home devices, such as smart speakers and thermostats
- Smart appliances, such as refrigerators and kitchen machines
- Healthcare devices, such as baby monitors and sleep tracker
- Service robots, such as vacuum cleaners and lawn mowers
- Security devices, such as motion detectors and IP cameras
- Wearables such, as headphones and smartwatches
- TVs and notebooks

Click here to learn more:
www.infineon.com/radar-sensors

BGT60CUTR13AIP
First XENSIV™ 60 GHz CMOS radar with integrated processing for ultralow-power and cost-sensitive IoT applications

The XENSIV™ BGT60CUTR13AIP is the flagship device of Infineon's new CMOS radar sensor family for consumer and IoT applications. This sensor is optimized for ultralow power consumption and system cost efficiency. Manufactured using advanced 28 nm RF CMOS technology, the device features an integrated processing via a hardware accelerator, as well as integrated supporting structures such as LDO and XTAL.

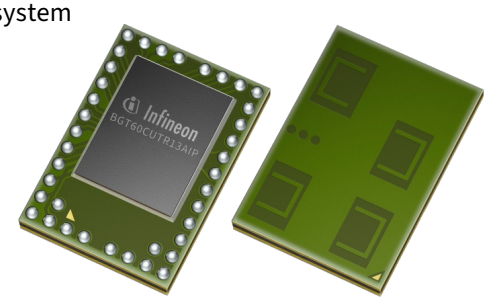
The device can operate autonomously with its integrated hardware accelerator and dedicated bootloader. It can offload complex tasks from the host MCU by running pre-processing steps or direct motion detection on the chip.
The BGT60CUTR13AIP achieves exceptional resolution through its ultra-wide 7 GHz bandwidth FMCW operation, enabling detection of even sub-millimeter movements and micro-motions of nearly static targets. The improved output power of 11 dBm ensures reliable detection ranges of over 20 meters at boresight and up to 16 meters across the entire field of view.

The compact Antenna-in-Package (AIP) design features one transmit (Tx) channel and three receive (Rx) channels in an L-shaped antenna array. This design supports azimuth and elevation angle measurement, while maintaining a small form factor of just 4.3 x 6.05 mm^2. Overall, this cost-optimized solution offers an excellent balance of performance and affordability.

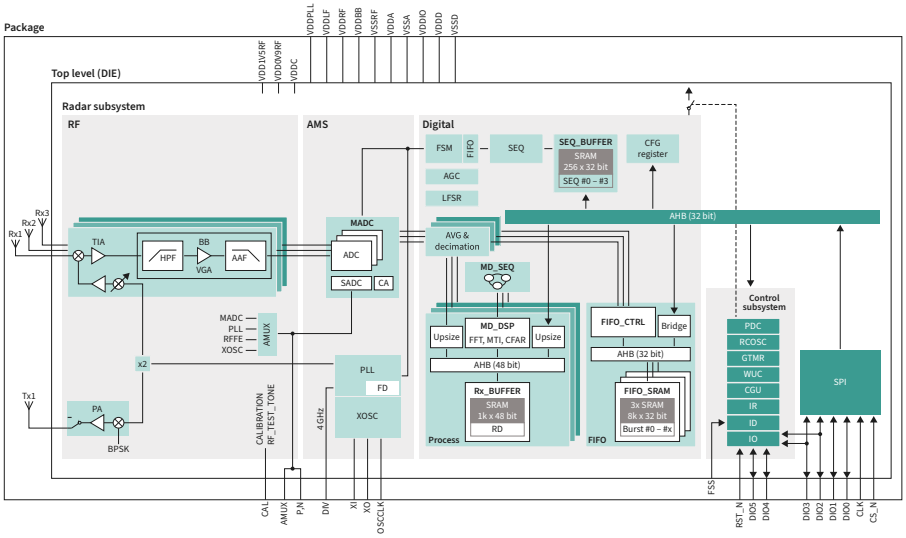
Features
- Package size: 4.3 x 6.05 x 0.9 mm^3
- 1Tx 3Rx Antenna-in-Package (AIP)
- 11 dBm output power
- 7 GHz ultra-wide bandwidth

Benefits
- Optimized for ultralow power consumption and battery-powered IoT use cases
- On-chip processing enabled by a hardware accelerator
- Integrated bootloader for autonomous wake-up of the host processor

Applications
- Room air conditioner (HVAC)
- Smart home and building
- Security camera and video doorbell
- Smart TV
- Smart thermostat
- Lighting system



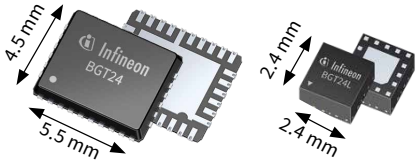
Block diagram



Click here to learn more:
www.infineon.com/radar-sensors

24 GHz radar sensors for consumer and IoT

Infineon's range of 24 GHz industrial radar chips provides five configurations of the transmit and receiver channels, ensuring that there is a chip to support your specific application. From basic applications such as motion detection in security systems, which only requires one transmit and one receive channel, to more complex applications like 3D positioning, which requires two or more receive channels, our range of radar chips supports all of your requirements.

Features	Infineon MMIC	Benefits
– 24 GHz ISM band operation for motion, speed, direction movement and distance measurements – Five 24 GHz chips available – Highly integrated MMICs		– Long-range distance detection of moving objects up to 50 m – Wide range speed detection up to ±100 km/h – Low BOM costs

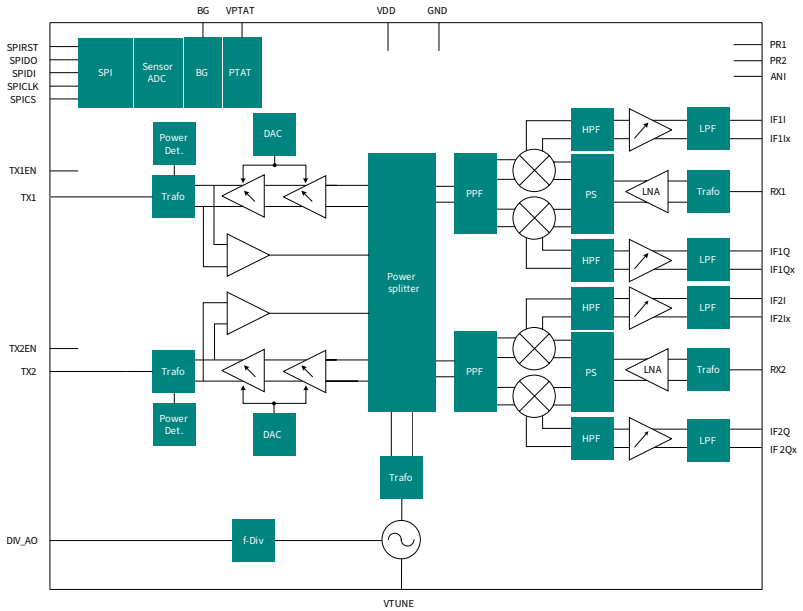
Product	Configuration	Features	
BGT24LTR11	1Tx + 1Rx	– Measures, not just motion, but also speed, direction, and distance – Small form factor – Resistance to moisture, dirt, and temperature – Increased area coverage – Discrete design	– Low power MMICs for energy saving – Privacy protection – Adaptable to different application requirements – Highly integrated chips eliminating costly external components
BGT24LTR22	2Tx + 2Rx		

BGT24LTR22
XENSIV™ 24 GHz radar sensor

Features

- 24 GHz transceiver MMIC
- Fully integrated low phase noise VCO
- Integrated analog base band stage with programmable gain and filter settings
- Bidirectional pin for synchronization
- Built-in temperature compensation circuit for VCO stabilization, no PLL needed
- Low power consumption
- Fully ESD protected device
- Single-ended RF and IF terminals
- Single supply voltage 1.5 V

Block diagram



Click here to learn more:
www.infineon.com/radar-sensors

Radar module partners

Infineon Partner Program

Strategic partnerships for radar innovation

Infineon's XENSIV™ radar sensor partners offer a complete range of cost-effective design services, turnkey solutions, and product accelerators to help our customers shorten their time-to-market, achieve a higher market share, revenue, and create new business opportunities. Working closely with you, our partners are equipped to handle all aspects of the development process of radar-based solutions from hardware and software design to prototyping, integration, RF testing, and certification. Our partners are skilled at delivering tailored radar-based expertise to meet specific customer needs, including those with unique requirements to support dedicated use cases, and comply with industry standards and regulations.

Accelerating radar modules prototyping and compliance

Our XENSIV™ radar sensor hardware module partners offer a wide range of development and evaluation kits, including optimized hardware modules such as system-on-modules (SOMs), which can be integrated into final hardware platforms. These modules allow for quick creation and verification of use cases, making them ideal as prototype hardware for application design. They also facilitate the transition to production while reducing development time, which is essential in the fast-paced world of hardware development. Moreover, our hardware partners can assist our customers in the design of hardware components such as antennas, transceivers, and millimeter-wave radio frequency components. This ensures that the designed radar module complies with regulatory requirements, such as FCC, CE, or other local standards.

Leading the way in innovative radar software solutions

Our radar software solutions partners contribute significantly to developing innovative radar-enabled applications and algorithms. They enhance the capabilities of our XENSIV™ radar sensors and also excel the implementation in various industries. Our partners showcase their proficiency in seamlessly integrating radar technology with notable strengths spanning automotive, industrial automation, smart cities, and beyond. This involves delving into sophisticated signal processing capabilities that our partners bring to the table, including fine-tuning radar data to achieve unparalleled precision and accuracy. Additionally, witness the seamless integration of machine learning and AI algorithms, elevating the intelligence and adaptability of radar systems to new heights. This dynamic fusion of advanced signal processing and machine learning integration reflects our software partners' commitment to pushing the boundaries of innovation in the radar technology landscape.

Our trusted network of XENSIV™ radar sensor partners is helping you accelerate your product's time-to-market by minimizing your development time. Learn more about our partner program and discover our partners' solutions here.

Do you have a question?

Learn more and ask questions in our Infineon Developer Community.

Click here to learn more:
www.infineon.com/radar-sensors

XENSIV™ gas sensors

For automotive, industrial, and consumer applications

“Invisible danger, visible safety.”

Thermal conductivity (TC) sensors are increasingly crucial for gas detection across sectors that demand high performance, speed, and reliability. Their unique properties make them especially well-suited for applications within the hydrogen economy, HVAC refrigerant leak detection, and early identification of thermal runaway in advanced energy systems.

Hydrogen sensing in the hydrogen economy with TCI sensor

As the hydrogen economy expands, ensuring safety through rapid and accurate gas detection is essential. The TCI sensor, based on thermal conductivity principles, can detect hydrogen leaks with astonishing speed, within just 100 ms. This immediate response is critical for early warning systems in hydrogen storage, pipelines, and fuel cell facilities. The TCI sensor exploits hydrogen's significantly higher thermal conductivity compared to air and most industrial gases, enabling high selectivity and sensitivity. Unlike many conventional sensors, TC sensors exhibit very low drift and are inherently robust, maintaining accuracy over time and in harsh environments. Additionally, they are not prone to chemical poisoning, ensuring long operational lifespans and minimal maintenance, a crucial advantage for mission-critical hydrogen applications.

Refrigerant leakage detection in HVAC systems with TCI-R sensor

Refrigerant leaks in HVAC systems can harm both equipment and the environment. The TCI-R sensor, optimized for refrigerants, detects leaks quickly and reliably by measuring changes in thermal conductivity specific to common refrigerants like R32, R454A-B-C, R455A, R1234yf and CO_2 (R744). The TCI-R sensor responds instantly to leakage events, helping prevent compressor damage, loss of cooling efficiency, and regulatory noncompliance. Thanks to its low drift and resistance to cross-sensitivity or poisoning, the TCI-R sensor maintains accuracy over years of operation, reducing maintenance costs and environmental impact.

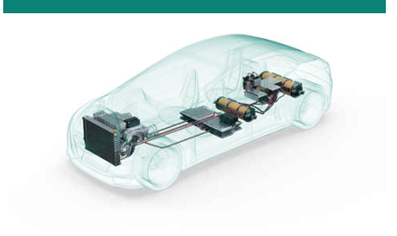
Early thermal runaway in automotive and energy storage systems with TCI-B sensor

In battery packs for electric vehicles and energy storage, early detection of dangerous fault conditions is vital. The TCI-B sensor detects changes in thermal conductivity caused by early gas emissions, such as hydrogen and hydrocarbons, providing an instant indication of thermal runaway, well before temperatures reach critical levels. Its fast response enables proactive safety interventions, while immunity to poisoning ensures consistent, long-term protection.
Overall, TC sensors, TCI, TCI-R, and TCI-B deliver rapid, robust, and reliable gas detection, making them indispensable tools for safety and operational efficiency in modern, energy-critical industries.

Hydrogen economy

Stationary fuel cell

FCEV



Battery management system

Energy storage systems

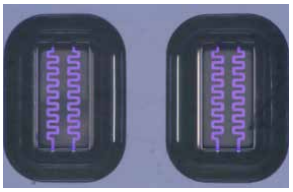
HVAC systems

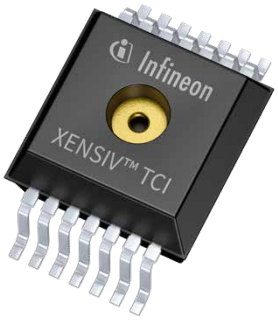
Click here to learn more:
www.infineon.com/gas-sensors

Thermal conductivity-based H2 sensor

XENSIV™ TCI: H2 sensor with I²C, ultralow power, and 15-year lifetime

Infineon's XENSIV™ TCI gas sensor provides reliable detection of hydrogen (H2) gas in demanding automotive and industrial applications, including FCEVs, H2 combustion engines, H2 refueling stations, battery electric vehicles (BEVs), energy storage systems (ESS), H2 electrolyzers, and stationary fuel cells. Infineon's TCI gas sensor operates on the principle of Thermal Conductivity (TC) and utilizes a full differential MEMS sensor concept. The TC is measured by heating parts of the MEMS structures and measuring the heat transfer through the gas. TC sensing provides the highest robustness and stability for rough automotive applications. Unlike metal oxide-based (MOX) and catalytic combustion (CC) sensors, which rely on chemical reactions, TC gas sensors operate on a physical measurement principle. This makes the TC gas sensor immune to poisoning and immune to the tendency to offset high drift shown by chemical sensors.





Key features

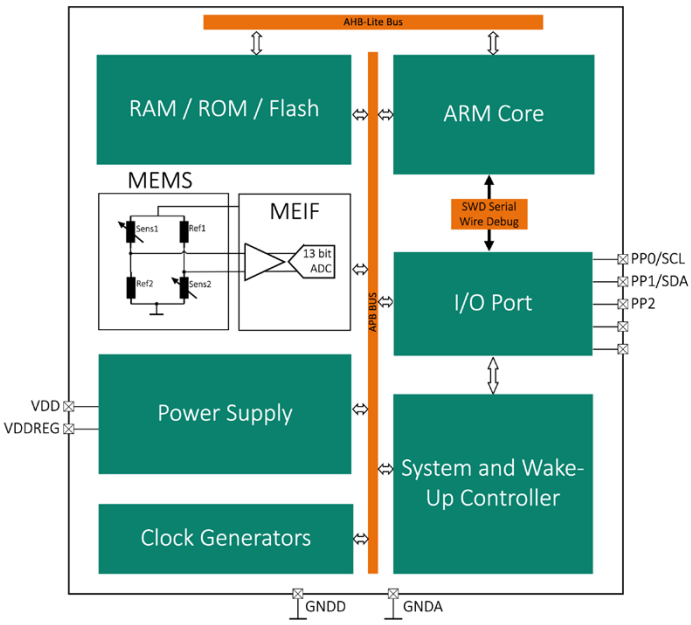
- AEC-Q100 up to 105°C
- Fast response time <100 ms
- Ultralow current consumption
- Robust and proven packages
- Lifetime of 15 years with low drift
- UL 2075 certification

Benefits

- No maintenance or replacement costs
- Robustness and stability compared to catalytic- or metal oxide-sensors
- Low power mode state can be enabled by the customer

Potential applications

- Fuel-cell electric vehicle (FCEV) drivetrain system
- Hydrogen economy (production, storage, and transportation)
- ESS leakage detection



TCI product overview

Product	Accuracy	Interfaces	Supply voltage	Detection range
TCI	±0.12% vol H2	I²C	3.3 V	0-16% vol H2

Click here to learn more:
www.infineon.com/gas-sensors

Thermal conductivity-based H2 sensor for early thermal runaway detection

XENSIV™ TCI-B: ASIL B H2 sensor with I²C, ultralow power, and 15-year lifetime

Battery technology is vital to the fast-growing BEV sector, but lithium-ion batteries pose risks, including thermal runaway. In the early stages of thermal runaway, battery materials decompose chemically, releasing gases, most notably Hydrogen, before a significant temperature rise occurs. Gas sensors, such as hydrogen (H2) sensors, can detect these emissions at very low concentrations, providing an early warning of potential thermal runaway, much sooner than traditional temperature sensors or smoke detectors.

Early detection is essential to prevent failures and ensure safety. The TCI-B sensor addresses this by enabling real-time monitoring and rapid detection of thermal events in battery packs. It supports timely interventions, such as driver alerts or automatic safety system activation, before temperatures become critical. This proactive response not only enhances safety but also helps automakers meet regulatory standards such as GTR20. Beyond its use in BEVs, the TCI-B sensor provides early, precise detection of thermal event precursors in energy storage systems (ESS), enabling rapid response and mitigation. Continuous monitoring increases reliability, lowers the risk of catastrophic failures, and helps protect both assets and personnel.

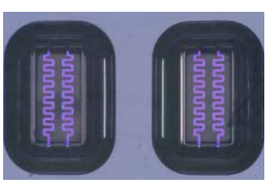
Infineon's XENSIV™ TCI-B hydrogen sensor operates using thermal conductivity (TC) and a differential MEMS sensor design. By measuring the heat transfer through gases after heating parts of the MEMS structure, TC sensing ensures robust, stable performance in tough automotive conditions. Unlike metal oxide (MOX) or catalytic combustion (CC) chemical sensors, TC sensors rely on a physical principle, making them immune to poisoning and high offset drift, thereby improving reliability.

Features

- FuSa QM/ASIL B capable
- AEC-Q100 up to 105°C
- Fast response time <100 ms
- Ultralow current consumption
- Robust and proven packages
- Lifetime of 15 years with low drift
- Autonomous operating mode for system level power saving UL-2075 certification

Benefits

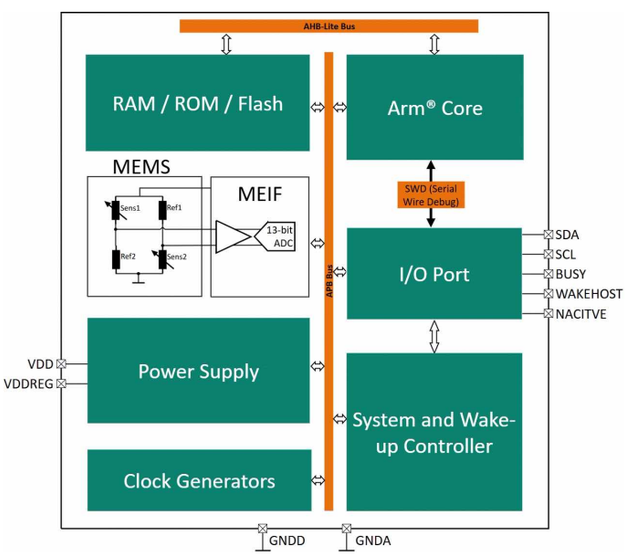
- Automotive grade sensor reliability
- ISO 26262 compliance capabilities up to ASIL B
- No maintenance or replacement costs
- Robustness and stability compared to catalytic- or metal-oxide-sensors
- Low power mode can be enabled by customer



Potential applications

- Early thermal runaway detection in BEVs
- Automotive battery management system (BMS)
- Early thermal runaway detection in ESS

Block diagram



TCI-B product overview

Product	Accuracy	Interfaces	Supply voltage	Detection range
TCI-B	±0.12% vol H2	I²C	3.3 V	0-16% vol H2

Click here to learn more:
www.infineon.com/gas-sensors

Thermal conductivity-based sensor for refrigerant leakage detection in HVAC systems

XENSIV™ TCI-R: Refrigerant leakage sensor with I²C, ultralow power, and 15-years lifetime

Automotive and industrial HVAC manufacturers are increasingly using alternative refrigerants that are classified as mildly flammable (A2L) or flammable (A3). This shift introduces new safety risks from refrigerant leakage, prompting standards such as UL 60335-2-40 and IEC 60335-2-40 to require Refrigerant Detection Systems (RDS) for specific refrigerant loads and room sizes.

The TCI-R sensor, which detects refrigerants using the thermal conductivity principle, is a vital component of RDS. Compared to other detection technologies, the TCI-R sensor provides low power consumption and fast response time, making it ideal for continuous monitoring. Its versatility is demonstrated by the ability to detect a broad range of refrigerants, including R32, R454A, R454B, R454C, R455A, R1234yf, and R744 (CO_2), all common in modern HVAC systems. When a leak is detected, the system can automatically trigger safety measures, such as activating fans to dilute refrigerant, improving occupant safety and ensuring regulatory compliance. As manufacturers shift toward low-GWP refrigerants, TCI-R sensors play an essential role in safe, reliable HVAC operation.

Infineon's XENSIV™ TCI-R sensor operates using thermal conductivity (TC) and a differential MEMS sensor design. By measuring the heat transfer through gases after heating parts of the MEMS structure, TC sensing ensures robust, stable performance in tough automotive and industrial conditions. Unlike metal oxide (MOX) or catalytic combustion (CC) chemical sensors, TC sensors rely on a physical principle, making them immune to sensor poisoning and high offset drift, resulting in greater reliability.

Features

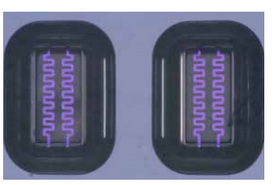
- AEC-Q100 up to 105°C
- Fast response time < 5 s
- Ultralow current consumption
- Robust and proven packages
- Lifetime of 15 years with low drift
- Autonomous operating mode for system level power saving UL-60335-2-40/89 recognition (construction review)

Benefits

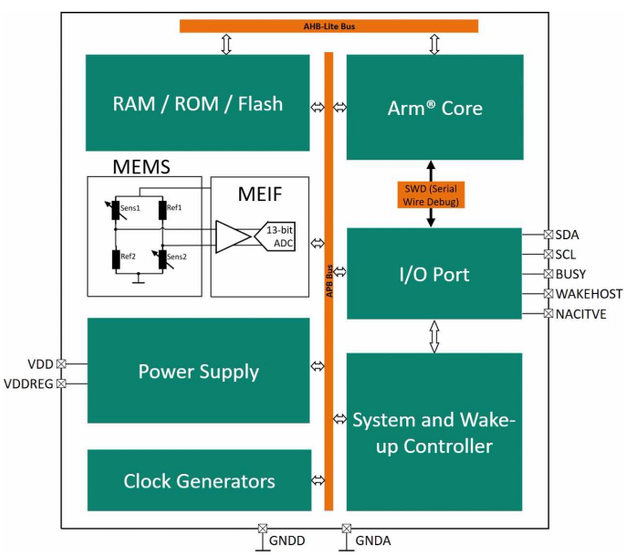
- No maintenance or replacement costs
- Robustness and stability compared to catalytic- or metal-oxide-sensors
- Low power mode can be enabled by customer

Potential applications

- Refrigerant leakage detection in automotive HVACs
- Refrigerant leakage detection in commercial, residential HVACs and heat pumps



Block diagram



TCI-R product overview

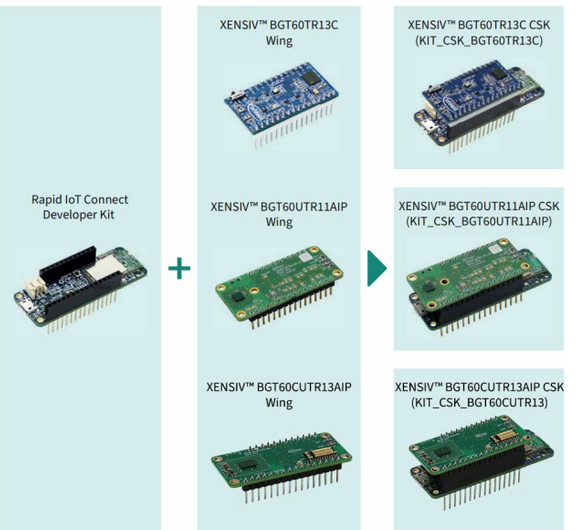
Product	Accuracy	Interfaces	Supply voltage	Detection range
TCI-R	±2.5% LFL (nominal) ±5% LFL (extreme)	I²C	3.3 V	0-25% LFL

Click here to learn more:
www.infineon.com/gas-sensors

XENSIV™ connected sensor kit

Rapid IoT prototyping experience enabled by XENSIV™ sensors

The XENSIV™ connected sensor kit enables rapid development of a custom solution built on Infineon products. The CSK supports customers in testing sensor-driven IoT products and use cases, as well as in prototyping. It offers a real-time sensor evaluation with custom configurations. The development kit supports use cases based on XENSIV™ sensors, e.g., BGT60CUTR13AIP, BGT60TR13C and BGT60UTR11AIP 60 GHz radars, and DPS368 pressure sensor (sense), PSOC™ 62 microcontroller embedded processing (compute), connectivity via Infineon AIROC™ CYW43012 dual-band 2.4 GHz and 5 GHz Wi-Fi 4 (802.11n) and Bluetooth® 5.4 combo radio module (connect), and hardware security with OPTIGA™ Trust M (secure). Code examples and sensor libraries are available in the ModusToolbox™ to help customers create use case-specific application codes for new product offerings.

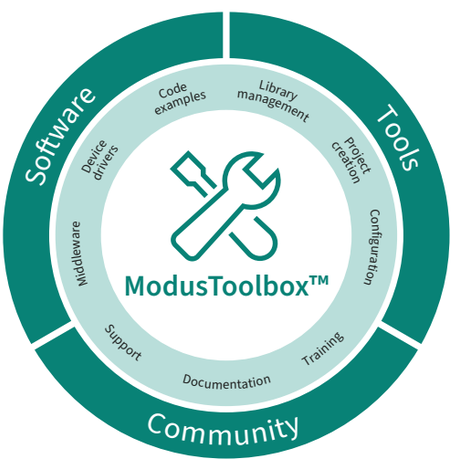


Features

- Small form factor: 22.5 x 63 x 30 mm^3 – Adafruit Feather compatible
- Wi-Fi and Bluetooth® 5.0-compliant combo radio module
- Power optimized design, deployable with battery
- Interchangeable sensor Wing boards stacked individually or combined
- Seamless integration into ModusToolbox™
- FCC and CE certified

Benefits

- Ideal for prototyping battery-powered IoT devices due to optimized power consumption. Suited for customer field trials.
- Rapid development and deployment via code examples in ModusToolbox™ for presence detection, entrance counter, air quality measurements. Enabler for multi-sensor data fusion.



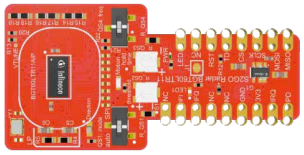
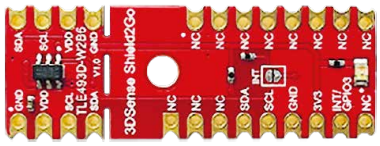
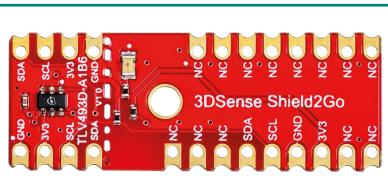
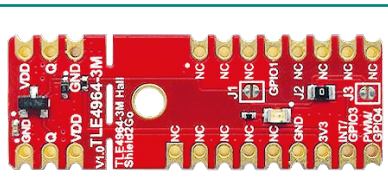
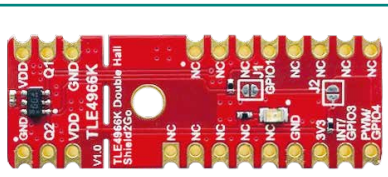
Product	Description	OPN No.
KIT_CSK_BGT60TR13C	Connected sensor kit (CSK) featuring XENSIV™ BGT60TR13C 60 GHz radar sensor Wing board	KITCSKBGT60TR13CTOBO1
KIT_CSK_BGT60UTR11AIP	Connected sensor kit (CSK) featuring XENSIV™ BGT60UTR11AIP 60 GHz radar sensor Wing board	KITCSKBGT60UTR11AIPTOBO1
KIT_CSK_BGT60CUTR13	Connected sensor kit (CSK) featuring XENSIV™ BGT60CUTR13AIP 60 GHz CMOS radar sensor Wing board	KITCSKBGT60CUTR13TOBO1

Click here to learn more:
www.infineon.com/gas-sensors

Shield2Go

Infineon's Shield2Go boards offer a unique customer and evaluation experience

The boards are equipped with one Infineon IC and a ready-to-use Arduino library. Customers can now develop their own system solutions by combining Sensor2Go boards together with Infineon MyIoT adapters. MyIoT adapters are gateways to external hardware solutions like Arduino and Raspberry Pi, popular IoT hardware platforms. All this enables the fastest evaluation and development of the IoT system.

	**Product name:** BGT60LTR11AIP Radar Shield2Go **Sales name:** S2GO RADAR BGT60LTR11 **Ordering code:** SP005594890	Product information
	**Product name:** DPS368 pressure sensor Shield2Go **Sales name:** KIT_DPS368_2GO **Ordering code:** SP005729572	Product information
	**Product name:** TLE493DW2B6 3D Sense Shield2Go **Sales name:** S2GO_3D_TLE493DW2B6-A0 **Ordering code:** SP004308594	Product information
	**Product name:** TLV493D 3D Sense Shield2Go **Sales name:** S2GO_3D-SENSE_TLV493D **Ordering code:** SP001823678	Product information
	**Product name:** TLE4964-3M Hall Sense Shield2Go **Sales name:** S2GO_HALL_TLE4964-3M **Ordering code:** SP004308590	Product information
	**Product name:** TLE4966K Double Hall Sense Shield2Go **Sales name:** S2GO_2_HALL_TLE4966K **Ordering code:** SP004308598	Product information

Click here to learn more:

www.infineon.com/magnetic-position-sensors www.infineon.com/current-sensors www.infineon.com/gas-sensors
www.infineon.com/pressure-sensors www.infineon.com/mems-microphones www.infineon.com/radar-sensors

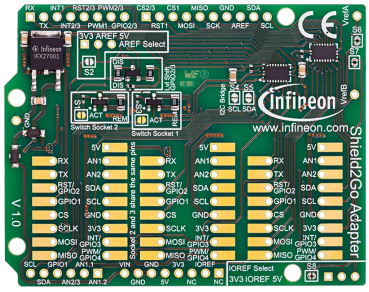
Shield2Go

Microcontroller

Product name: XMC1400 2Go kit
Sales name: KIT_XMC14_2GO
Ordering code: SP006065576

Product information

MyIoT Adapter



Product name: MyIoT Adapter
Sales name: MY IOT ADAPTER
Ordering code: SP002434972

Infineon's Shield2Go boards offer a unique customer and evaluation experience – the boards are equipped with one Infineon IC and a ready-to-use Arduino library. Customers can now develop their own system solutions by combining Shield2Go boards with Infineon MyIoT adapters.
MyIoT adapters are gateways to external hardware solutions like Arduino and Raspberry Pi, popular IoT hardware platforms. This enables the fastest evaluation and development of IoT systems.

Product information

XENSIV™ Sensor Shield

Product name: XENSIV™ Sensor Shield
Sales name: SHIELD_XENSIV_A
Ordering code: SP006018677

Infineon's XENSIV™ Sensor Shield provides seamless hardware compatibility between sensors, microcontrollers, and connectivity products. When paired with an MCU / Wi-Fi baseboard via the Arduino UNO interface, the board enables developers to quickly evaluate and develop with environmental sensors like:

- 60 GHz radars
- PDM microphones
- Pressure sensors
- Six-axis IMU
- Three-axis magnetometer
- Temperature and humidity

The shield also features a TFT display (80x160), and OPTIGA™ Trust-M secure element, and a QWIIC connector for additional peripheral expandability.

Product information

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/current-sensors
www.infineon.com/gas-sensors
www.infineon.com/pressure-sensors
www.infineon.com/mems-microphones
www.infineon.com/radar-sensors

Sensor2Go kits

Affordable plug-and-play development boards

Sensor2Go kits come equipped with advanced sensors and an integrated Arm® Cortex®-M0 CPU, making them the perfect choice for developers and hobbyists. These kits include a complete set of on-board devices, such as an on-board debugger, allowing you to quickly build and customize your own applications and gadgets.

Absolute Pressure (MAP and BAP) Sensor2Go kits

Product name:	Ordering code:
KP215F1701-PS2GO-KIT	SP002676652
KP229E3518-PS2GO-KIT	SP002676656
KP236-PS2GO-KIT	SP002676664
KP254-PS2GO-KIT	SP002676664
KP276-PS2GO-KIT	SP005910372

Product information

Magnetic 3D Sensor2Go kits

Product name:	Ordering code:
TLE493D-W2B6 MS2GO	SP001707578
TLV493D-A1B6 MS2GO	SP001707574

Product information

Magnetic angle Sensor2Go kits

Product name:	Ordering code:
TLE5012B_E1000_MS2GO	SP002133956
TLI5012B_E1000_MS2GO	SP002133960
TLE5012B_E5000_MS2GO	SP002133964
TLE5012B_E9000_MS2GO	SP002133968

Product information

Current Sensor2Go kits

Product name:	Ordering code:
TLI4971_MS2GO	SP005345474
TLE4973_MS2GO	SP006039680

Product information

Magnetic speed Sensor2Go kits

Product name:	Ordering code:
TLE4922 MS2GO	SP003029974

Product information

Magnetic switches Sensor2Go kits

Product name:	Ordering code:
TLE4966_MS2GO	SP005406992

Product information

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/current-sensors
www.infineon.com/gas-sensors
www.infineon.com/pressure-sensors
www.infineon.com/mems-microphones
www.infineon.com/radar-sensors

Add ons for Sensor2Go kits and Shield2Go

	**Joystick for all 3D magnetic Sensor2Go kits and Shield2Go** **Product name:** JOYSTICK FOR 3D 2 GO KIT **Ordering code:** SP001491834	Product information
	**Rotate knob for all 3D magnetic Sensor2Go kits, angle Sensor2Go kits and 3D magnetic sensor Shield2Go** **Product name:** ROTATE KNOB 3D 2 GO KIT **Ordering code:** SP001504602	Product information
	**Linear slider for all 3D magnetic Sensor2Go kits and Shield2Go** **Product name:** LINEAR-SLIDER 2GO **Ordering code:** SP002043034	Product information
	**Out of shaft adapter for all 3D magnetic Sensor2Go kits and Shield2Go** **Product name:** OUT OF SHAFT FOR 3D 2 GO **Ordering code:** SP003475178	Product information
	**Linear control trigger for all 3D magnetic Sensor2Go kits and Shield2Go** **Product name:** POWER_DRILL2GO **Ordering code:** SP005350194	Product information
	**Human machine interface (HMI) direction indicator for all 3D magnetic Sensor2Go kits and Shield2Go** **Product name:** DIR_INDICATOR2GO **Ordering code:** SP005350196	Product information
	**HMI mini control with 4 directions and 360° rotation for all 3D magnetic Sensor2Go kits and Shield2Go** **Product name:** MINI_CONTROL2GO **Ordering code:** SP005350192	Product information

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/current-sensors
www.infineon.com/gas-sensors
www.infineon.com/pressure-sensors
www.infineon.com/mems-microphones
www.infineon.com/radar-sensors

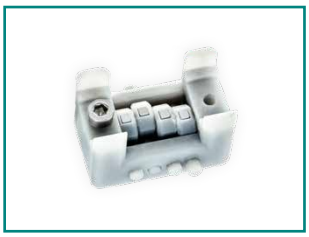
Add ons for Sensor2Go kits and Shield2Go

OpenClose adapter for Hall switch Shield2Go
Product name: OPENCLOSE2GOHS
Ordering code: SP005544849

Product information

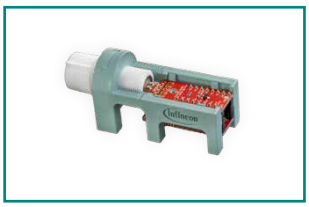
Play2Go for 3D magnetic sensor
Product name: 3D PLAY2GO KIT
Ordering code: SP005731811

Product information



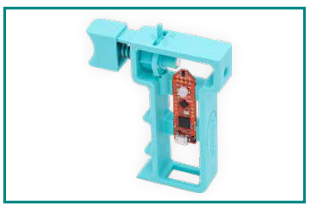
Contactless switch array for all 3D magnetic Sensor2Go kits and Shield2Go
Product name: Contactless switch array
Ordering code:
Simply use our 3D printing files, link to, and start your 3D print.

Product information



Spindle2Go for all 3D magnetic sensor Shield2Go
Product name: SPINDLE2GO
Ordering code: SP005989689

Product information



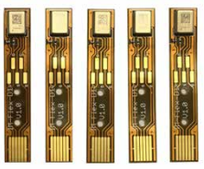
Drill Trigger V2 for all 3D magnetic Sensor2Go kits
Product name: DRILL TRIGGER V2
Ordering code: SP006066136

Product information

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/current-sensors
www.infineon.com/gas-sensors
www.infineon.com/pressure-sensors
www.infineon.com/mems-microphones
www.infineon.com/radar-sensors

Evaluation boards – for simple and easy evaluation



MEMS microphones flex evaluation kits

Product name:	Ordering code:
EVAL_IM69D120_FLEXKIT	SP002153026
EVAL_IM69D130_FLEXKIT	SP002153022
KIT_IM66D130MV01_FLEX	SP006038060
KIT_IM66D132HV01_FLEX	SP006038061
KIT_IM68A130V01_FLEX	SP005728206
KIT_IM68D121JV01_FLEX	SP006155584
KIT_IM68D128BV01_FLEX	SP006114517
KIT_IM69D127V11_FLEX	SP005403891
KIT_IM69D128SV01_FLEX	SP005744505
KIT_IM69D129FV01_FLEX	SP006038667
KIT_IM70A135V01_FLEX	SP005728204
KIT_IM70D122V01_FLEX	SP005826638
KIT_IM72D128V01_FLEX	SP005429924
KIT_IM72D128VV01_FLEX	SP006038668
KIT_IM73A135V01_FLEX	SP005415695

Product information

MEMS microphones Audiohub Nano boards

Product name:	Ordering code:
EVAL AHNB DIGITALV01	SP005955184
EVAL AHNB ANALOGV01	SP005568087

Product information

Current sensors evaluation boards

Product name:	Ordering code:
TLE4973 EVAL 120A	SP006015313
TLE4973 EVAL INLAY	SP005853842
TLE4973 EVAL STD PCB	SP005853840
TLE4973 EVAL VER BAR	SP005853847
TLE4973 EVAL LAT BAR	SP005853844
TLE4972 EVAL LAT BAR	SP005632140
TLE4972 EVAL STD PCB	SP005632136
TLE4972 EVAL INLAY	SP005632138
TLI4971 EVAL 120A	SP005876845
TLE4971 EVAL 120A	SP005343588

Product information

Linear sensors evaluation boards

Product name:	Ordering code:
TLI5590 SATELLITE	SP005857647
TLI5590 EVAL KIT	SP005857645

Product information

Magnetic position sensors evaluation boards
Product name: GAME CONTROLLER
Ordering code: SP006056290

Product information

Position sensors evaluation boards

Product name:	Ordering code:
TLI49012 EVAL KIT*	SP006227376

Product information

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/current-sensors
www.infineon.com/gas-sensors
www.infineon.com/pressure-sensors
www.infineon.com/mems-microphones
www.infineon.com/radar-sensors

* Coming soon

Choose the best fit magnetic sensor solution from the broadest portfolio

Our sensor simulation tools allow you to compare products in application conditions. The tools are easy-to-use and will guide you in identifying the most suitable Infineon XENSIV™ sensor combined with the best-fit magnet.

Current sensor

XENSIV™ current sensors simulation tool
Define and optimize your system's current sensing structure. The tool supports the design of lateral and vertical insertions for PCB (two to ten-layer stack) or bus-bar-based applications. The simulation will provide insertion resistance, field transfer factor, sensitivity range, measurement range, and power dissipation, as well as cross-talk in a three-phase system.

Try it out

3D sensor

XENSIV™ 3D sensors simulation tool
3D magnetic field sensor for smaller, more accurate, and robust designs. The sensor family, with low current consumption and cost-optimized design, specifically addresses the needs of new magnetic sensor applications in consumer, industrial, and automotive. They are ideally suited for measuring three-dimensional movement within a magnetic field, linear slide movement, and 360° angle rotation.

Try it out

Switches and latches

XENSIV™ switches and latches simulation tool
Discover Infineon’s broad energy-saving portfolio of Hall switches and latches in the smallest package. Simulate your Hall switch applications and see the results in an accurate simulation of the magnetic field and the switching behavior of the Hall switch in the application.

Try it out

Angle sensor

XENSIV™ angle sensors simulation tool
Highest variety - low end to high end, standardized and specialized in all four magnetic technologies: Hall, GMR, AMR, and TMR. This tool calculates the valid distance from the magnet surface to the sensor and the assembly error, given certain parameters: magnetic properties, sensor specification, and assembly tolerances.

Try it out

Magnetic speed sensor

XENSIV™ magnetic speed sensors solution tool
Infineon’s innovative speed sensor solution tool will provide a sensor recommendation for your tooth wheel and back bias magnet geometry. The sensors are ranked according to their expected maximum air gap capability. Customer constraints like enhanced stray field immunity, the necessity for a direction channel, or the sensor interface are considered in the selection process.

Try it out

Magnetic position sensors

XENSIV™ magnetic position sensors design tool
Infineon's innovative design tool covers some typical applications which can be addressed with 3D, angle or linear magnetic sensors:
– Angle measurement (rotational movement of the magnet)
– Linear position measurement (linear movement of the magnet)
– Joystick (3D movement of the magnet)
– Additionally: stray field consideration

The tool provides pre-defined or user-customized magnets. The tool automatically calculates the magnetic field components at the sensor location. Calculation is based on the sensor arrangement defined by the user. Mechanical mounting tolerances of the sensor and the magnet are considered.

Try it out

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/current-sensors
www.infineon.com/gas-sensors
www.infineon.com/pressure-sensors
www.infineon.com/mems-microphones
www.infineon.com/radar-sensors

ISO 26262 – Functional Safety (FuSa)

Dependable electronics based on Functional Safety

Automotive Functional Safety – we simplify the process of integrating safety features with our safety guidelines and services.

Infineon provides dependable electronics to support today's safety-relevant systems and future fail-operational solutions, serving as essential components that allow customers to meet their safety requirements at the application level. Highly integrated systems equipped with reliable electronic semiconductors play a crucial role in key application areas like connectivity, electromobility, and advanced levels of automated driving. The ISO 26262 standard establishes requirements and provides guidance for integrating products into automotive safety applications.

Discover Infineon's products with ISO 26262 classification

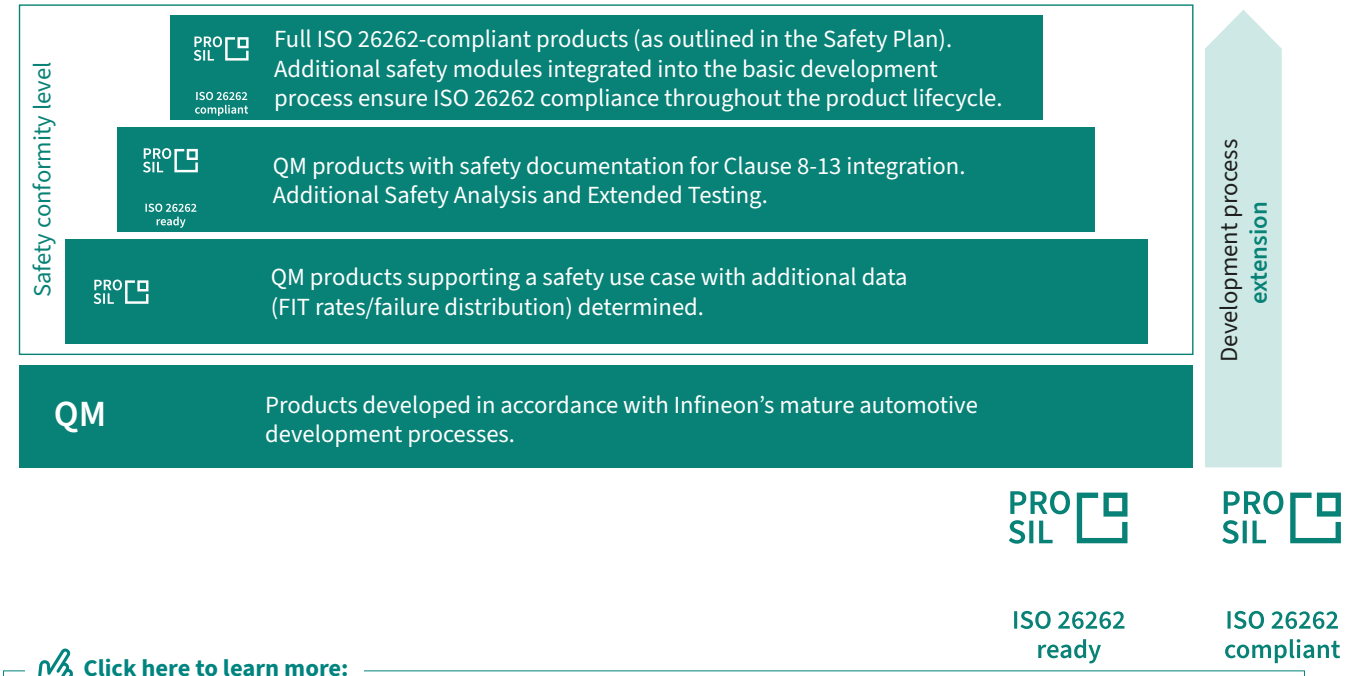
With our holistic approach to functional safety, Infineon is addressing the increased complexity and stringent requirements that make functional safety projects costly and time-consuming. We provide the necessary products, including documentation and supporting information, to ease integration and reduce efforts for system integrators.

Benefit from:

- Innovative solutions for automotive safety-related applications
- Improved time-to-market through comprehensive safety documentation for ISO 26262-compliant products
- Reduced integrators' efforts with ISO 26262-compliant and ready-to-use products
- A broad portfolio of ISO 26262-compliant products already available
- Newly developed automotive parts that will primarily follow an ISO 26262-compliant development flow

Safety conformity levels:

- PRO-SIL™ ISO 26262-compliant devices meet all relevant requirements for semiconductors as defined in the ISO 26262 series of standards for automotive functional safety
- The PRO-SIL™ ISO 26262-ready marking designates QM devices that can be integrated into a safety-related application by utilizing the ISO 26262:2018 Clause 8-13, Class II hardware evaluation framework
- The Infineon Automotive Ensured Compliance process framework was certified by SGS-TÜV Saar for compliance with ISO 26262:2018 as of April 2022. This certification reinforces our commitment to automotive functional safety



Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/current-sensors
www.infineon.com/gas-sensors
www.infineon.com/pressure-sensors
www.infineon.com/mems-microphones
www.infineon.com/radar-sensors

Dependability is the key driver for the megatrend towards autonomous driving

The future car will be fully connected and always online. It will be all-electric and autonomous. At Infineon, we believe that realizing this vision requires both technology and trust.

The growing demand for safe electronic systems in vehicles that drivers and passengers can rely on lays the foundation for trust and drives progress toward higher levels of automated driving.

Earning the trust of tomorrow's passengers begins with dependable electronics that enable highly available, reliable, robust, safe, and secure systems, capable of operating in all conditions.

Infineon is your trusted partner, offering all the essential components for your dependable systems – automotive quality, functional safety, cybersecurity, innovative products, system expertise, and operational excellence.

Dependable electronics for safer, smarter vehicles

As vehicles become increasingly reliant on electronic components, demand for safe, reliable systems continues to grow. Rising levels of automated driving especially depend on drivers' and passengers' trust in the quality and reliability of each component. The complexity and requirements in the automotive industry are expected to increase further, particularly in terms of quality and dependability, to ensure vehicles operate safely and smoothly throughout their 15-year lifespan.

Infineon's commitment to delivering high-quality, dependable products has resulted in a portfolio that offers superior performance and unmatched durability, driven by our zero-defect mentality. We go beyond industry standards to meet the real-world requirements of applications.

Enhance your automotive systems and applications with our high-quality semiconductor components designed for your needs.

Dependable electronics based on quality
Automotive quality beyond the standards with a zero-defect mindset.
Vehicle complexity and functionality will continue to grow, driving the need for dependable electronics, with quality being one of its key ingredients. Our passion for quality creates a product portfolio that meets high standards and delivers highly reliable, robust products.

How Infineon differentiates as a quality leader:

1. Our goal is to go beyond standards to better meet real application requirements: from intensive screening methods to detect production defects, to advanced AEC Q100/101 tests (where required), to sub-1 dpm validation aimed at achieving ultralow defect rates.
2. Our track record of achievements, including multiple quality awards from customers such as Toyota (Honor Quality Award in 2020) and Continental (Supplier of the Year in 2019), demonstrates that we consistently meet and exceed outstanding quality targets in the automotive industry.
3. Infineon offers best-in-class customer service, supported by a regional network of failure analysis labs, strong localized expertise, technical training programs, and state-of-the-art regional quality analysis labs equipped for advanced failure analysis.
4. We meet customer needs through industry-leading product requirements, design, manufacturing, and testing practices. Quality is integrated into our development processes (e.g., RDDF), design rules (e.g., ADeGo), materials, manufacturing processes, process controls, proprietary testing, and screening methods.

Infineon's Zero Defect mentality is built upon:

- Producing 24/7/365 at sub-dpm levels: Translated into a year's timeline, this means we deliver zero defects for all but the last three seconds of the year.
- Delivering sub-ppm quality levels.
- Achieving Zero Defect status for 90 percent of our products.

We go beyond the standards to better meet real application requirements.

Click here to learn more:

www.infineon.com/magnetic-position-sensors
www.infineon.com/current-sensors
www.infineon.com/gas-sensors
www.infineon.com/pressure-sensors
www.infineon.com/mems-microphones
www.infineon.com/radar-sensors

Infineon support for sensors

Useful links and helpful information

Further information, datasheets, and documents

www.infineon.com/xensiv
www.infineon.com/sensors
www.infineon.com/tof-3d-image-sensors
www.infineon.com/current-sensors
www.infineon.com/gas-sensors
www.infineon.com/h2-sensors
www.infineon.com/inductive-position-sensors
www.infineon.com/mems-microphones
www.infineon.com/pressure-sensors
www.infineon.com/radar-sensors
www.infineon.com/magnetic-position-sensors
www.infineon.com/3d-sensors
www.infineon.com/angle-sensors
www.infineon.com/linear-sensors
www.infineon.com/switches-latches

Info
Documents
Boards and designs
Tools
Play

Infineon powerful support

Find an answer to your question

About Infineon
www.infineon.com/green
www.infineon.com/quality

General support
www.infineon.com/support
www.infineon.com/packages
www.infineon.com/wheretobuy
www.infineon.com/opn
www.infineon.com/academy

Design Resources
Solution finder
Evaluation boards finder
Simulation and modeling
Infineon Designer
Infineon for Makers

Connect with us
Infineon developer community
Facebook
Instagram
LinkedIn
Youtube

Subscribe to marketing communications here

Contact our technical support here

Infineon customized solutions

Your specific needs, realized

A customized solution (commonly known in the industry as an ASIC — Application Specific IC, or CSP — Customer Specific Product) is designed, planned, developed, and used for a specific purpose. Its mission is to be optimized and efficient, with all the required functionalities and features for a specific application for a single customer.

Infineon as your one-stop-shop from design to delivery

Infineon, as a market leader in customized solutions, believes innovation comes through collaboration and exploring new paths. Working closely with our customers, understanding their needs, and combining their needs with our cutting-edge solutions, we know there is always a benefit for every customer and application. Whether the challenge is related to IP or BOM constraints or requires higher integration, an ASIC can be the solution. Furthermore, customers benefit from Infineon's trusted quality, supply guarantee, and experience, combined with additional advantages such as IP protection and a well-established partner network.

Click here to learn more:
www.infineon.com/asic

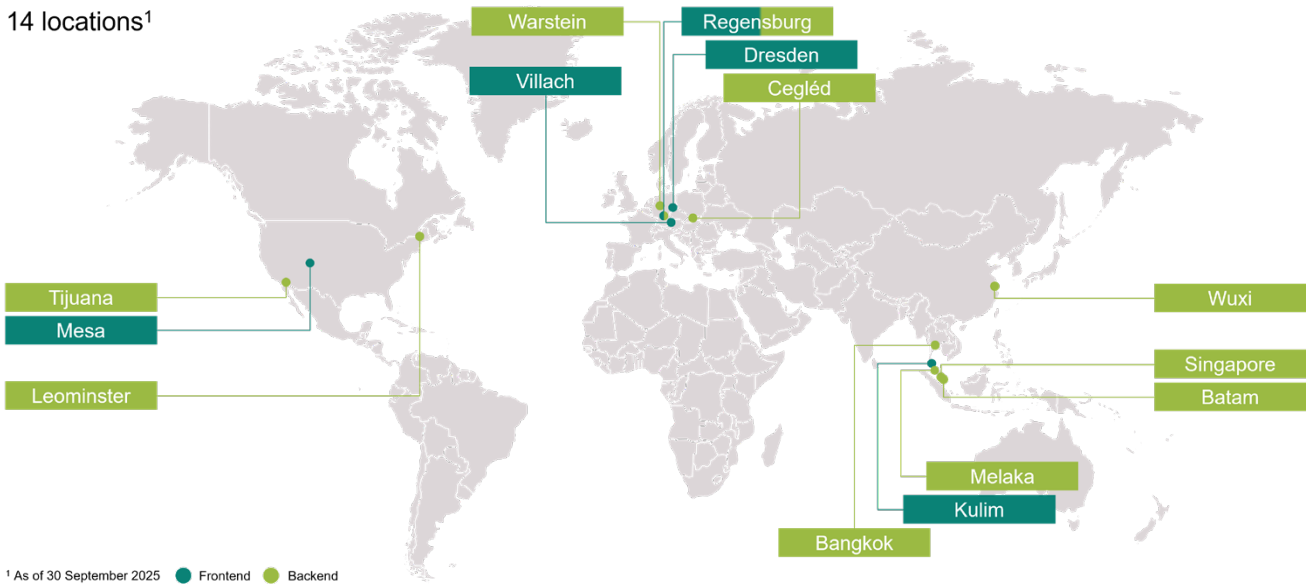
A process streamlined through efficiency, expertise, and experience

The journey starts with you and a focus on feasibility – we match your needs early on with our 40 years of expertise in building world-class, industry-leading semiconductors and ensure the successful implementation of your requirements.

From technology advantage to supply stability

Whether it is digital, analog, or mixed-signal devices, an embedded processor, or integrated sensors, we have the experience and product know-how. Being one of the largest semiconductor companies, we also have a vast array of IPs. We can integrate almost anything into your chip from our wide variety of sensors, discrete devices, drivers, and many more, including support for higher voltage levels. Our in-house fabrication facilities and design centers around the globe are known for the highest quality standards. We also have well-established partnerships with all major silicon foundries and assembly test fabs to complement our in-house technologies. At every step along the way, we take pride in the highest quality Infineon is known for.

If you are interested and would like to find out further information, visit **www.infineon.com/asic**



Click here to learn more:
www.infineon.com/asic

The Infineon Partner Program

Together we create and innovate for our customers' success

Find solutions from our partners to accelerate your next business opportunity. Infineon's global network of partners is an expert in designing products, solutions, and services leveraging Infineon components in 5 key domains: software, hardware, services, tools, and end applications.

The Infineon Partner Program is a global ecosystem of qualified companies, offering knowledge and experience to enable and implement Infineon products. Our associated, preferred, and premium partners help design your device and application based on our components. They have been carefully selected by us on the basis of their competence and ability to design and deliver strong and trustworthy solutions, especially for new technologies and use cases.

Hardware	Software	Tools	Services	End applications
Partners manufacturing electronic components, demo boards, and turnkey modules	Partners programming various types of software, algorithms, and operating systems	Partners designing computer programs for the development of embedded systems	Partners providing cloud and engineering services, application support or trainings	Partners creating end products and related applications
... jointly we create and commercialize value-added solutions, while reaching new buyers	... jointly we enhance our portfolio with complementary components and expand technology know-how	... jointly we enable a complete and immersive development experience for customers	... jointly we build up engineering capabilities and offer them to a world class customer network	... jointly we provide customers with state-of-the-art solutions and innovative use cases

Find out more about the Infineon Partner Program, the latest news and solutions from our partners, and much more on our Partner ecosystems webpage.

Looking for a specific partner solution in your region? Our partner finder provides an overview of our partners and their offerings. Simply specify your search in the dropdown menu and browse through the companies and their solutions to navigate directly to the respective website for further information.

Additionally, use the "Partner solutions" tab on our product and application pages to find out more about Infineon's partner solutions.

Click here to learn more:
www.infineon.com/partners

Published by
Infineon Technologies AG
Am Campeon 1-15, 85579 Neubiberg
Germany

Public

Version: V1.0_EN
Date: 05/2026

Stay connected!

Scan QR code and explore offering
www.infineon.com