NXP magnetoresistive sensors KMA2xx series

Improve the ride with fully integrated angular sensor systems

These advanced sensors, with their ability to help reduce emissions, increase vehicle stability, and add driver-independent control functions, create a safer, cleaner, more comfortable ride, and help realize the future of green cars.

Key features

- Contactless angle measurements up to 180°
- High temperature range up to 160 °C
- Automotive qualification according to AEC-Q100
- Excellent EMC and ESD performance
- No external components required
- Overvoltage protection up to 16 V
- Reflow capable due to MSL1

Key benefits

- Insensitive to
  - magnetic drift over lifetime
  - magnetic drift with temperature
  - mechanical tolerances
  - mechanical shifts caused by thermal stress

Applications

- Throttle position
- Pedal position
- Active suspension
- Wiper position
- Electronic steering

The NXP KMA2x magnetoresistive (MR) angular sensors support the worldwide commitment to reduce CO_2 emissions from cars. They help OEMs enhance their engine concepts, creating new ways to meet environmental targets.

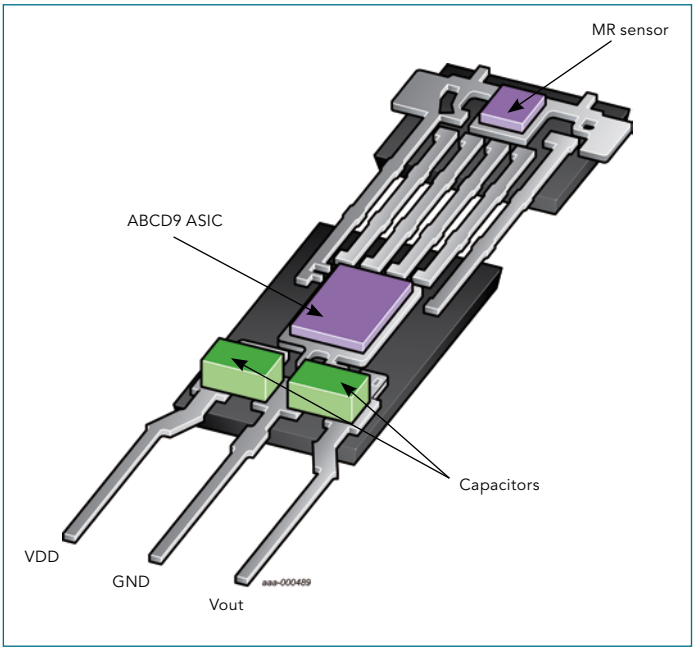
In electronic valve actuators, for example, they can help reduce untreated emissions through optimization of the combustion air supply and the recirculation rate of exhaust gas.

In diesel engines, they can assist with particle filter regeneration by throttling the intake air and thereby reducing the amount of emitted particulate mass.

As part of the load control unit on drive-by-wire engines, the sensors can enable a range of features, including driver-independent control of air intake, control functions for idle speed and cruise control, and Electronic Stability Program (ESP) functions.

Fully integrated single angular sensor KMA210

This is the first in a new family of system-in-package solutions that require no external components. It integrates NXP's latest magnetoresistive sensor chip, produced in six-inch technology, plus a unique signal conditioning ASIC, developed in ABCD9 technology. It is specially designed to improve overall performance and increase robustness in automotive applications. The solution also contains two embedded capacitors in the same package. This lowers cost as no PCB or external filter components are required for operation.

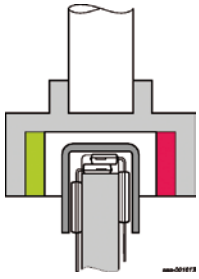


Highlights

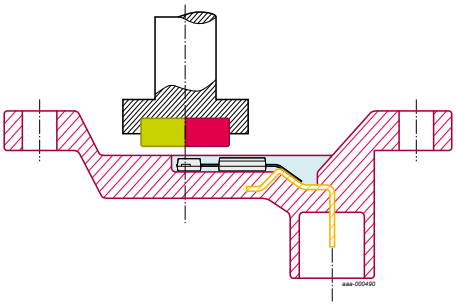
- The ABCD9 technology, with its Silicon-on-Insulator process, is an automotive-grade technology based on NXP's CMOS14 process.
- Electromagnetic Compatibility (EMC) performance is significantly enhanced compared to previous sensor products with integrated ASICs.
- With respect to robustness, the KMA210 sensor is qualified according to the new HMM (Human Metal Model) and therefore extremely robust with excellent electrostatic discharge (ESD) behavior.

Specification	KMA210
Overvoltage protection	+16 V
Number of outputs	1x analog
Operating temperature range	-40 to +160 °C
Temperature drift error -25 to +125 ° (3 sigma) -40 to +140 ° (3 sigma) Referred to 25 ° (3 sigma)	 - ±0.8 ° ±0.55 °
Linearity error -40 to +140 ° -40 to +160 °	 ±1.0 ° ±1.2 °
Diagnosis	ESD and CRC at power on Magnet lost Power lost

Assembly example



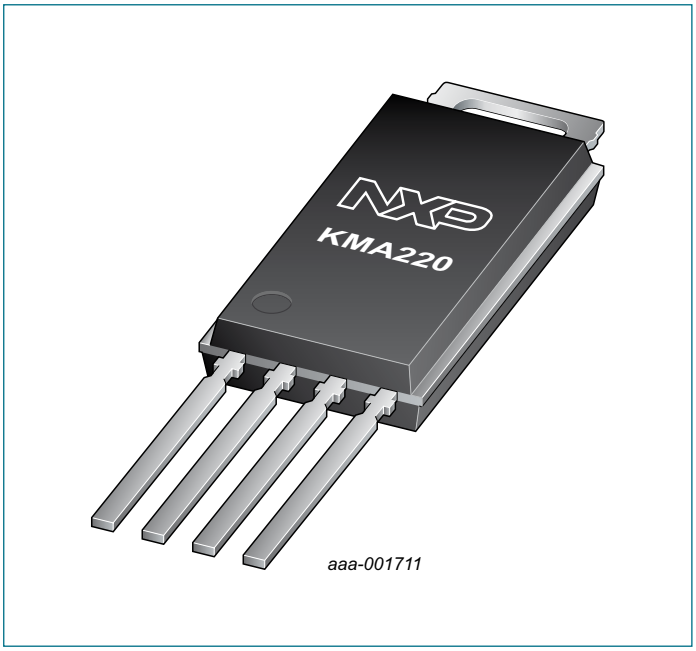
Dual-sensor application

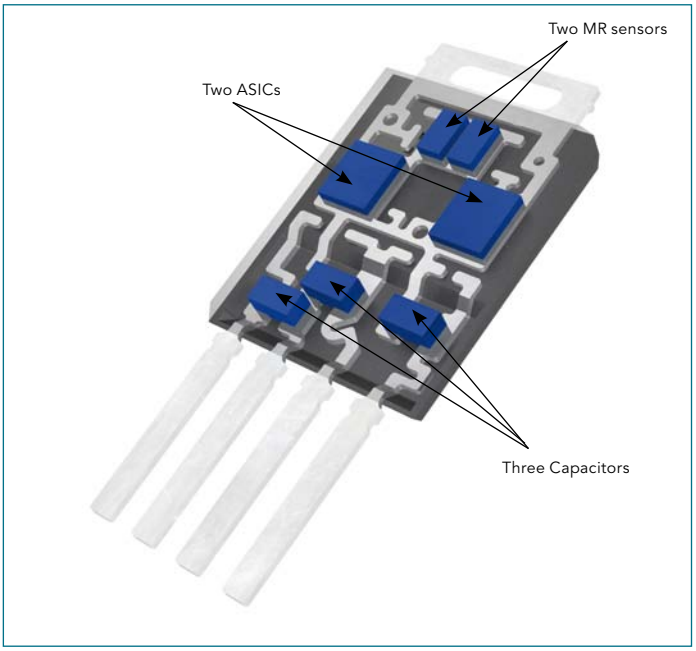


Single-sensor application

Fully integrated dual -channel angular sensor KMA220

Like KMA210 this product is a fully integrated sensor as well but containing two sensor channels. It is intended for all applications requiring redundant sensor solutions as e.g. throttle applications. The sensor is equipped with two MR sensor dies and two ASICs providing two statistical independent output signals. Furthermore the block capacitor for the supply line and the two capacitors for both outputs are inside the package as well. KMA220 does not require any external components for stable operation.





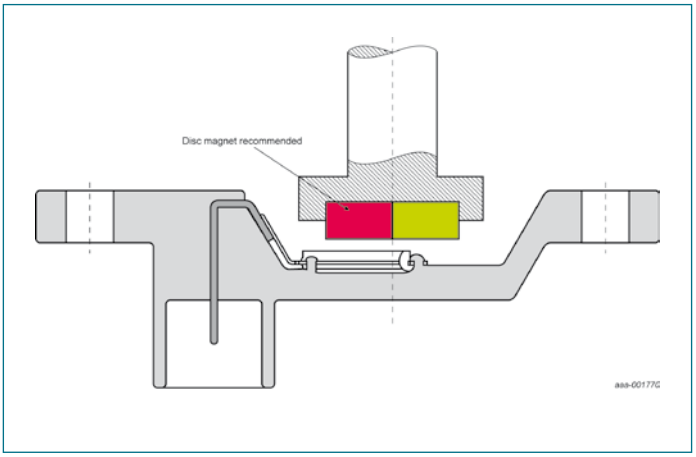
Highlights

- Uses the KMA210 ASIC, do it delivers the same key performance parameters, including excellent performance for EMC and ESD.
- Enables significant cost reductions by making it possible to use a disc magnet instead of a ring magnet configuration. Distortion from external magnetic fields is negligible because the sensor operates in magnetic saturation for all angles.

Specification [1]	KMA220
Overvoltage protection	+16 V
Number of outputs	2x analog: (1 output per channel)
Ambient operating temperature range	-40 to +160 °C
Temperature drift error -25 to +125 ° (3 sigma) -40 to +140 ° (3 sigma) Referred to 25 ° (3 sigma)	 - ±0.8 ° ±0.55 °
Linearity error -40 to +140 ° -40 to +160 °	 ±1.0 ° ±1.2 °
Diagnosis	ESD and CRC at power on Magnet lost Power lost

[1] Data subject to change until final release

Assembly example

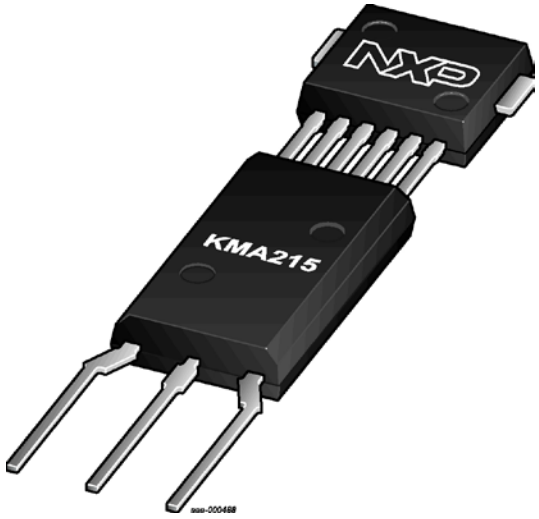


Coming soon:

Fully integrated angular sensor KMA215 with SENT protocol

This derivative, based on the KMA210, will replace the analog output signal with the digital SENT protocol. The part will comply to SAE2716 JAN2010 (rev. 3), and, thanks to a special push-pull output with pulse shaping, will be a fully integrated sensor equipped with all the required capacitors.

SENT



Highlights

- Similar to the KMA210 but with the following:
  - Digital output: SENT J2716 rev. 3
  - 12-bit angular resolution
  - Temperature information (e.g. accuracy ±10 °C)
  - Push-pull output with pulse shaping
  - SOT1288 package with integrated capacitors
  - Overvoltage protection and inverse-polarity current protection
  - Product configuration similar to KMA210 (zero angle, range)

KMA2xx overview

Specification	KMA210	KMA220 [1)]	KMA215 [1)]
Overvoltage protection	+16 V	+16 V	+16 V
Number of outputs	1x analog	2x analog (1 output per channel)	1x SENT
Ambient operating temperature range	-40 to +160 °C		
Temperature drift error -25 to +125 ° (3 sigma) -40 to +140 ° (3 sigma) Referred to 25 ° (3 sigma)	 - ±0.8 ° ±0.55 °	 - ±0.8 ° ±0.55 °	 - ±0.8 ° ±0.55 °
Linearity error -40 to +140 ° -40 to +160 °	 ±1.0 ° ±1.2 °	 ±1.0 ° ±1.2 °	 ±1.0 ° ±1.2 °
Diagnosis	ESD and CRC at power on Magnet lost Power lost	ESD and CRC at power on Magnet lost Power lost	ESD and CRC at power on

[1)] Data subject to change until final release

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