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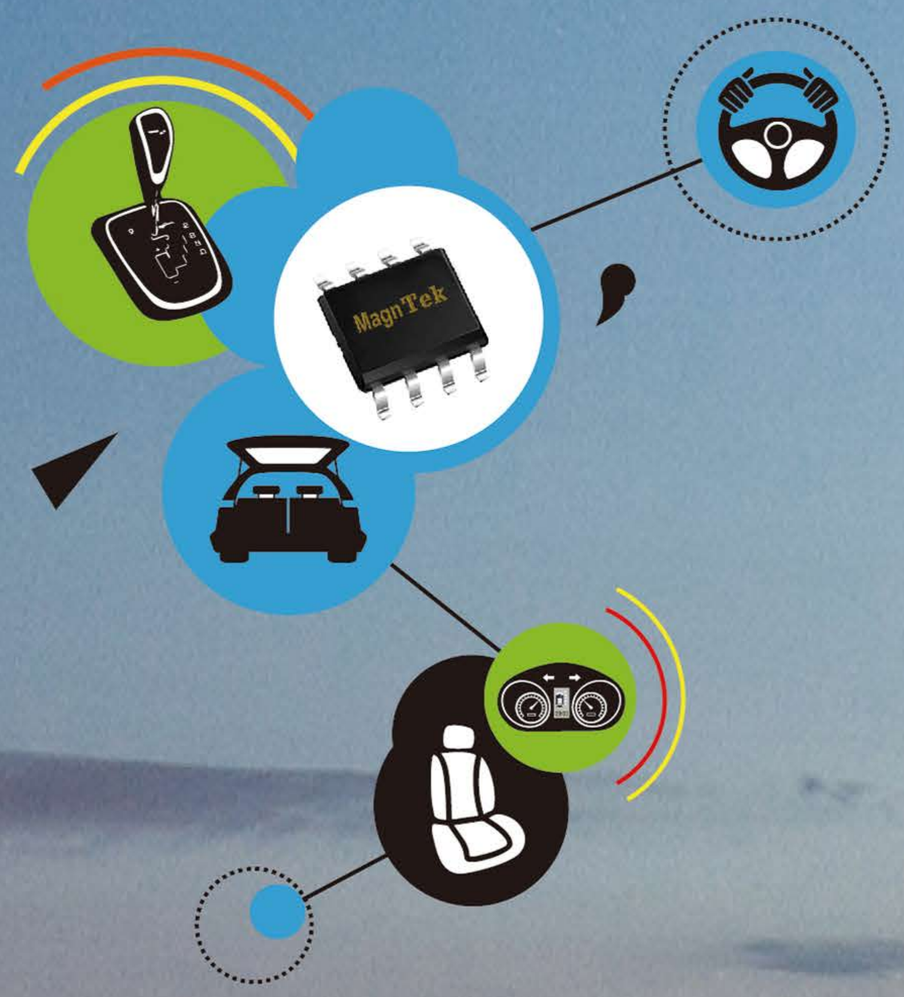


Magnetic Sensor IC
Selection Guide

Magnetic Tech Makes Magic Change

MagnTek

Who We Are

Established in 2009, Shanghai MagnTek Microelectronics Inc. is headquartered in Shanghai, with branches and offices in Shenzhen and Chongqing. It is a high-tech company specializing in the development, production and sales of integrated circuits (IC) based on magnetic sensing technology.

What We Do

MagnTek serves many fields such as intelligent manufacturing, intelligent transportation, and smart home. Research and development capabilities cover magnetic sensitive components and signal processing chips. Based on industry experience, the company’s application technology services have been extended to magnet selection design, magnetic field simulation, motor system application support, etc. MagnTek is a well-known brand in the field of magnetic sensor chip segmentation in China. In the international market, our influence is gradually expanding .

Our Strengths

MagnTek has a high-quality R&D team, with technical talents returning from the United States as the core. The company is composed of multiple doctors and masters. The company has customized solutions for professional magnetic sensor applications. The cost-effective product R&D capabilities have won customers in various industries. Generally recognized.

In terms of products, MagnTek strictly implements the ISO quality management system standard requirements and has exceeded the standard requirements in many aspects. In 2014, it passed the quality management system certification of TUVNORD in Germany and obtained the GB/T19001-2016/ISO9001:2015 certification. Currently, the ISO26262 automotive electronic functional safety certification system is being introduced.

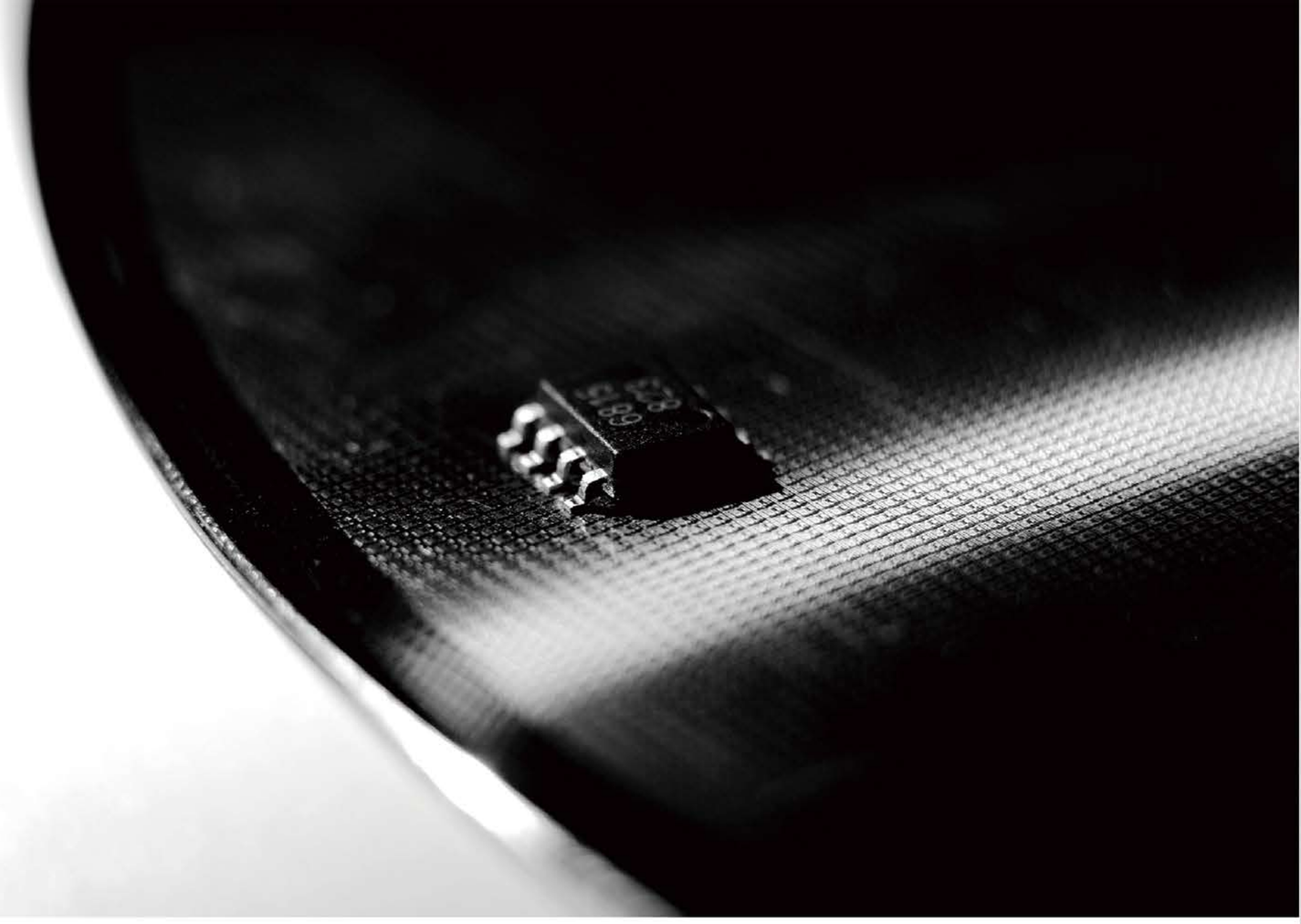
Our Vision

用我们的技术帮助世界变得更智能，更节能！①

CEO: Glenn Fang

MagnTek is committed to continuously providing innovative magnetic sensing technology and value-added application services based on magnetic sensing technology. Our objective is to become an innovative high-tech company that leads the development of magnetic sensing technology.

① Using our technology to help the world become more intelligent and more energy efficient



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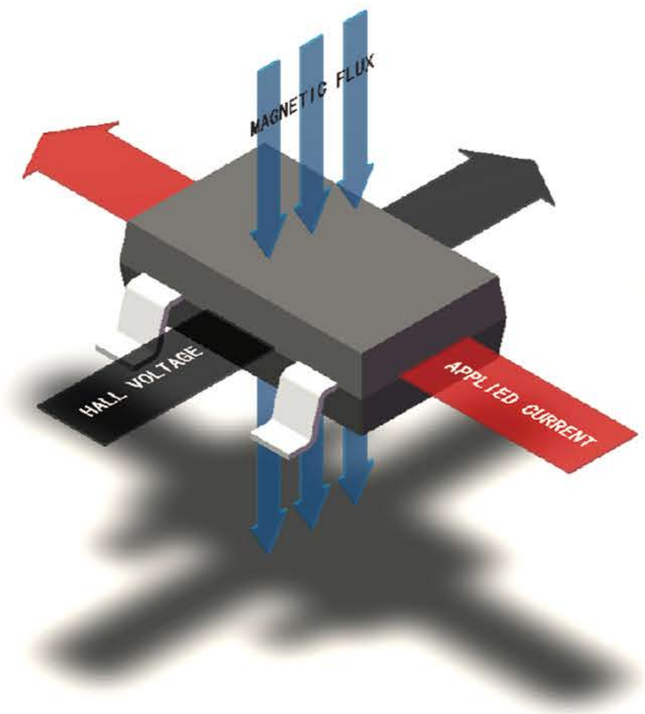
Magnetic Switch Position Detection IC

MagnTek's magnetic switch position detection IC is an analog-digital mixed-signal integrated circuit, which outputs high and low level switching signals to calibrate a magnetic field with a certain threshold, so it can be used to detect the precise position of the measured object. These "on-off" switching devices are widely used in various applications that require position detection, such as seat belt detection, anti-pinch electric window direction and stroke judgment, and shifter position detection in automotive electronics instead of mechanical switches. System; Bluetooth headset wake-up/sleep detection, air-conditioning wind speed detection feedback and other household consumer applications; cylinder stroke limit liquid level detection and other industrial applications, including various DC brushless motor commutation detection. These switch position sensors are not only easy to select and use, but also have the characteristics of small size, low power consumption, high sampling frequency, and low cost, which can help customers effectively improve system miniaturization and reliability.

2 Sensing Technologies

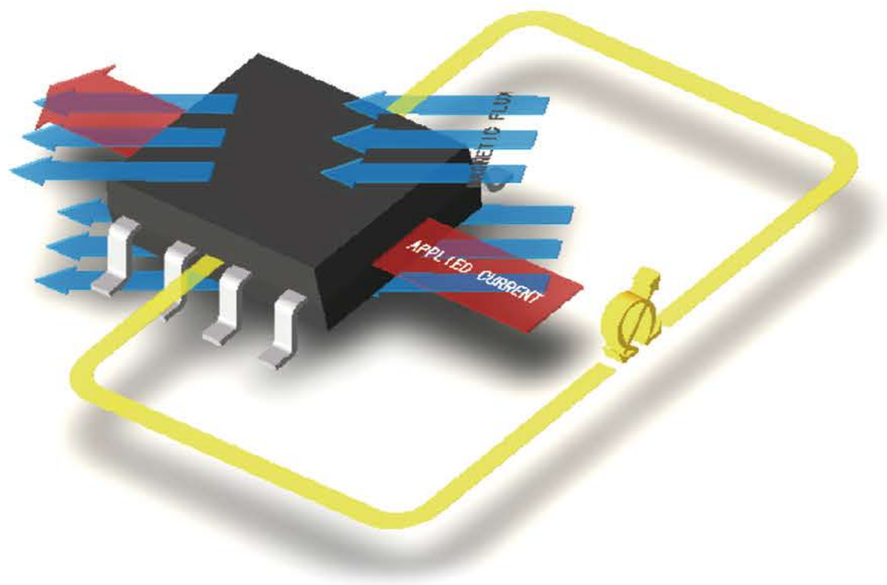
- **Hall-Effect Sensor IC**

  Electric current is applied to the semiconductor thin film, a magnetic field passes through the thin film perpendicularly, and the voltage difference between the two ends of the thin film is proportional to the strength of the magnetic field passing through. This is the induction principle of the Hall effect.



- **Magneto-Resistive Sensor IC**

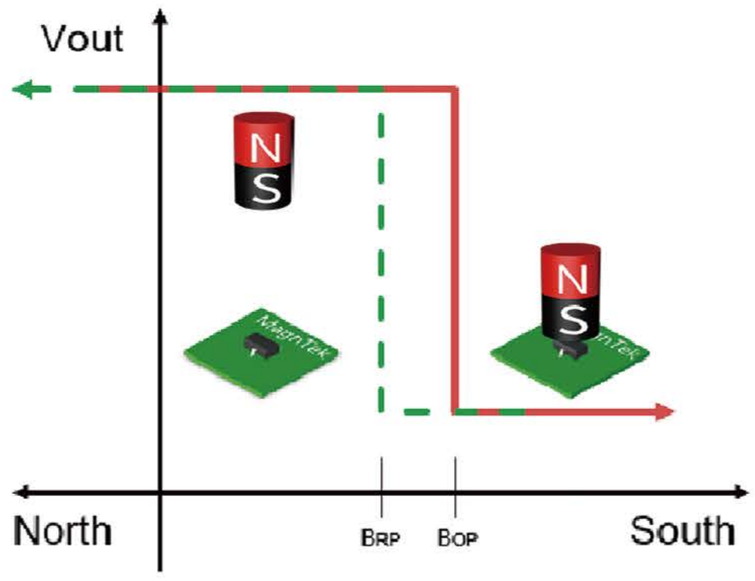
  Magneto-Resistive (MR) material is a magnetic thin-film material that exhibits varying resistance when an external magnetic field is applied parallelly to the film surface. The changing in its resistance can be sensed to measure the strength or the angle of the magnetic field applied.



3 Sensing Styles

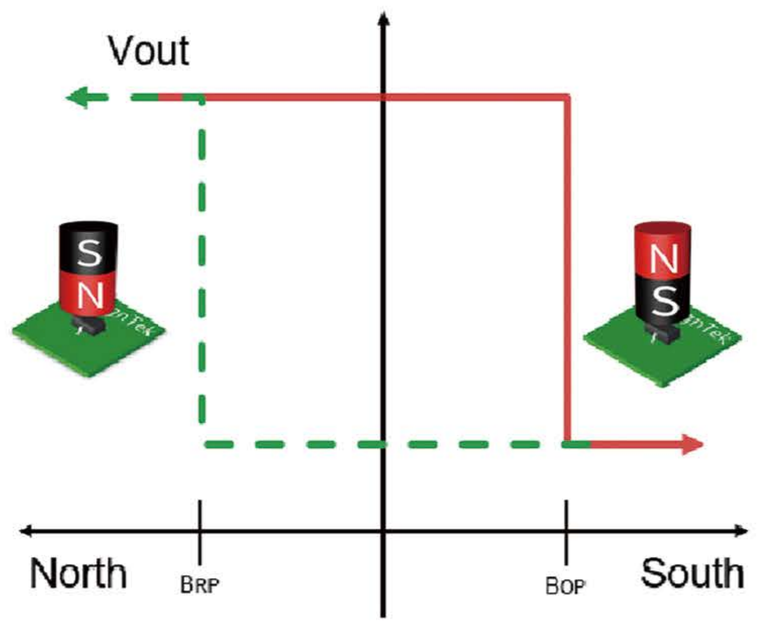
- **Uni-Polar Switch**

  Responds to either a north pole or a south pole to turn on or off.



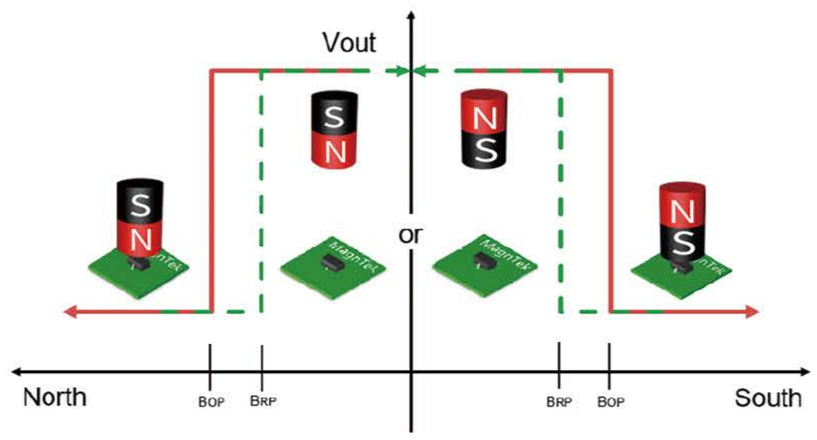
- **Latch Switch**

  Responds to a north pole or a south pole to turn on and its opposite pole to turn off.



- **Omni-Polar Switch**

  Responds to both north and south magnetic poles to turn on or off.



• High Voltage & High Speed Series (AEC-Q100 certified)

AEC Qualified

This series of IC are manufactured in BCD process with integrated Hall sensing element. They offer features such as wide operating voltage (3.8V ~ 60V), reverse voltage protection, overcurrent protection, and 200KHz sampling frequency. With temperature compensation, the IC can work under wide temperature range (-40 ~ 150 ° C) and maintain good performance and consistency.

Recommended applications: e-shifter, electric tailgate, car air conditioner, wiper, etc.

Part Number	Type	Sampling Frequency (Hz)	Supply Voltage (V)	Supply Current (mA)	Temperature Range (℃)	Magnetic Operating Point (Gs)	Magnetic Releasing Point (Gs)	Output Type	Available Packages
MT8311	Uni-Polar	200K	3.8~60	4.0	-40~150	140	105	Open drain	Small SOT-23, SOT-23, Flat TO-92
MT8312	Uni-Polar	200K	3.8~60	4.0	-40~150	255	210	Open drain	Small SOT-23, SOT-23, Flat TO-92
MT8313	Uni-Polar	200K	3.8~60	4.0	-40~150	85	50	Open drain	Small SOT-23, SOT-23, Flat TO-92
MT8315	Uni-Polar	200K	3.8~60	4.0	-40~150	30	20	Open drain	Small SOT-23, SOT-23, Flat TO-92
MT8361	Latch	200K	3.8~60	4.0	-40~150	50	-50	Open drain	Small SOT-23, SOT-23, Flat TO-92
MT8362	Latch	200K	3.8~60	4.0	-40~150	20	-20	Open drain	Small SOT-23, SOT-23, Flat TO-92
MT8381	Latch	200K	3.8~60	4.0	-40~150	50	-50	Internal 10K pull-up resistor	Small SOT-23, SOT-23, Flat TO-92
MT8382	Latch	200K	3.8~60	4.0	-40~150	20	-20	Internal 10K pull-up resistor	Small SOT-23, SOT-23, Flat TO-92

Vertical induction

- **Low Voltage & High Speed Series**

  This series of IC are manufactured in BCD process with integrated Hall sensing element. They offer features such as wide working supply voltage (2.8V~24V), reverse voltage protection, overcurrent protection, 400KHz sampling frequency and excellent temperature stability. The IC can work from -40 to 150 ° C, and still maintain good performance and consistency.

  Recommended applications: electric bicycle, electric scooter, etc.

Part Number	Type	Sampling Frequency (Hz)	Supply Voltage (V)	Supply Current (mA)	Temperature Range (℃)	Magnetic Operating Point (Gs)	Magnetic Releasing Point (Gs)	Output Type	Available Packages
MT8111	Uni-Polar	400K	2.8~24	3.5	-40~150	110	80	Open drain	SOT-23, Small SOT-23, Flat TO-92
MT8161	Latch	400K	2.8~24	3.5	-40~150	20	-20	Open drain	SOT-23, Small SOT-23, Flat TO-92 , WLCSP
MT8181	Latch	400K	2.8~24	3.5	-40~150	20	-20	Internal 10K pull-up resistor	SOT-23, Small SOT-23, Flat TO-92
MT1401-EN	Latch	400K	2.8~24	2.3	-40~150	24	-24	Open drain	SOT-23, Small SOT-23, Flat TO-92
MT3411-EN	Latch	400K	2.8~24	2.3	-40~150	24	-24	Internal 10K pull-up resistor	SOT-23, Flat TO-92
MT4409-EN	Latch	400K	2.8~24	4.25	-40~150	45	-45	Open drain	Flat TO-92
MT3303-EN	Omni-Polar	400K	2.8~24	2.3	-40~150	±150	±120	Open drain	SOT-23, Flat TO-92

• Low Voltage & Low Power Series

This series of IC are manufactured in BCD process with integrated Hall sensing element. They offer features such as wide working supply voltage (3V ~ 24V), Under the condition of maintaining the sampling frequency of 25K, the working current is as low as 1mA, reverse voltage protection, overcurrent protection and excellent temperature stability. The IC can work from -40 to 150 °C, and still maintain good performance and consistency. It is especially suitable for position detection requirements that require a balance between high sampling frequency and low power consumption.

Recommended applications: electric curtain, miniature DC brushless motor, Soft-close automatic door, etc.

Part Number	Type	Sampling Frequency (Hz)	Supply Voltage (V)	Supply Current (mA)	Temperature Range (℃)	Magnetic Operating Point (Gs)	Magnetic Releasing Point (Gs)	Output Type	Available Packages
MT8511	Uni-Polar	25K	3.0~24	1.0	-40~150	28	18	Open drain	SOT-23, Small SOT-23, Flat TO-92
MT8512	Uni-Polar	25K	3.0~24	1.0	-40~150	120	90	Open drain	SOT-23, Small SOT-23, Flat TO-92
MT8562	Latch	25K	3.0~24	1.0	-40~150	20	-20	Open drain	SOT-23, Small SOT-23, Flat TO-92
MT8571	Omni-Polar	25K	3.0~24	1.0	-40~125	±32	±27	Internal 10K pull-up resistor	SOT-23, Flat TO-92
MT8551	Omni-Polar	25K	3.0~24	1.0	-40~125	±32	±27	Open drain	SOT-23, Flat TO-92
MT8572	Omni-Polar	25K	3.0~24	1.0	-40~125	±80	±60	Internal 10K pull-up resistor	SOT-23, Flat TO-92
MT8552	Omni-Polar	25K	3.0~24	1.0	-40~125	±80	±60	Open drain	SOT-23, Flat TO-92
MT8573	Omni-Polar	25K	3.0~24	1.0	-40~125	±60	±40	Internal 10K pull-up resistor	SOT-23, Flat TO-92
MT8553	Omni-Polar	25K	3.0~24	1.0	-40~125	±60	±40	Open drain	SOT-23, Flat TO-92

• Micropower Series

This series of products use CMOS technology and integrate Hall sensor elements in the chip. MT86XX series (upgraded version of MT82XX series): 2~5.5V working voltage and 1.2uA ultra-low power consumption, and has excellent temperature compensation, so that the chip can work in the -40~125C environment to further improve product consistency and Anti-interference ability.

Recommended applications: smart water meter / electricity meter / gas meter, smart door lock, TWS Bluetooth headset, portable juice machine, sweeping robot, etc.

Part Number	Type	Sampling Frequency (Hz)	Supply Voltage (V)	Supply Current (uA)	Temperature Range (℃)	Magnetic Operating Point (Gs)	Magnetic Releasing Point (Gs)	Output Type	Available Packages
MT8631	Omni-Polar	20	2.0~5.5	1.2	-40~125	±37	±25	Push pull	SOT-23, Flat TO-92, DFN1616
MT8632	Omni-Polar	20	2.0~5.5	1.2	-40~125	±15	±9	Push pull	SOT-23, Flat TO-92
MT8633	Omni-Polar	20	2.0~5.5	1.0	-40~125	±10	±6	Push pull	SOT-23 Flat TO-92
MT8651	Omni-Polar	20	2.0~5.5	1.2	-40~125	±37	±25	Open drain	SOT-23, Flat TO-92
MT8652	Omni-Polar	20	2.0~5.5	1.2	-40~125	±15	±9	Open drain	SOT-23, Flat TO-92
MT8691	Uni-Polar	20	2.0~5.5	1.2	-40~125	35	25	Push pull	SOT-23, Flat TO-92, DFN1608, DFN1616
MT8831	Omni-Polar	20	1.6~3.9	1.7	-40~85	±30	±20	Push pull	SOT-23, Flat TO-92, DFN1608 DFN1616
MT8651	Omni-Polar	20	1.6~3.9	1.7	-40~85	±37	±25	Open drain	SOT-23, Flat TO-92, DFN1608 DFN1616
MT8891	Uni-Polar	20	1.6~3.9	1.7	-40~85	30	20	Push pull	SOT-23, Flat TO-92, DFN1608, DFN1616

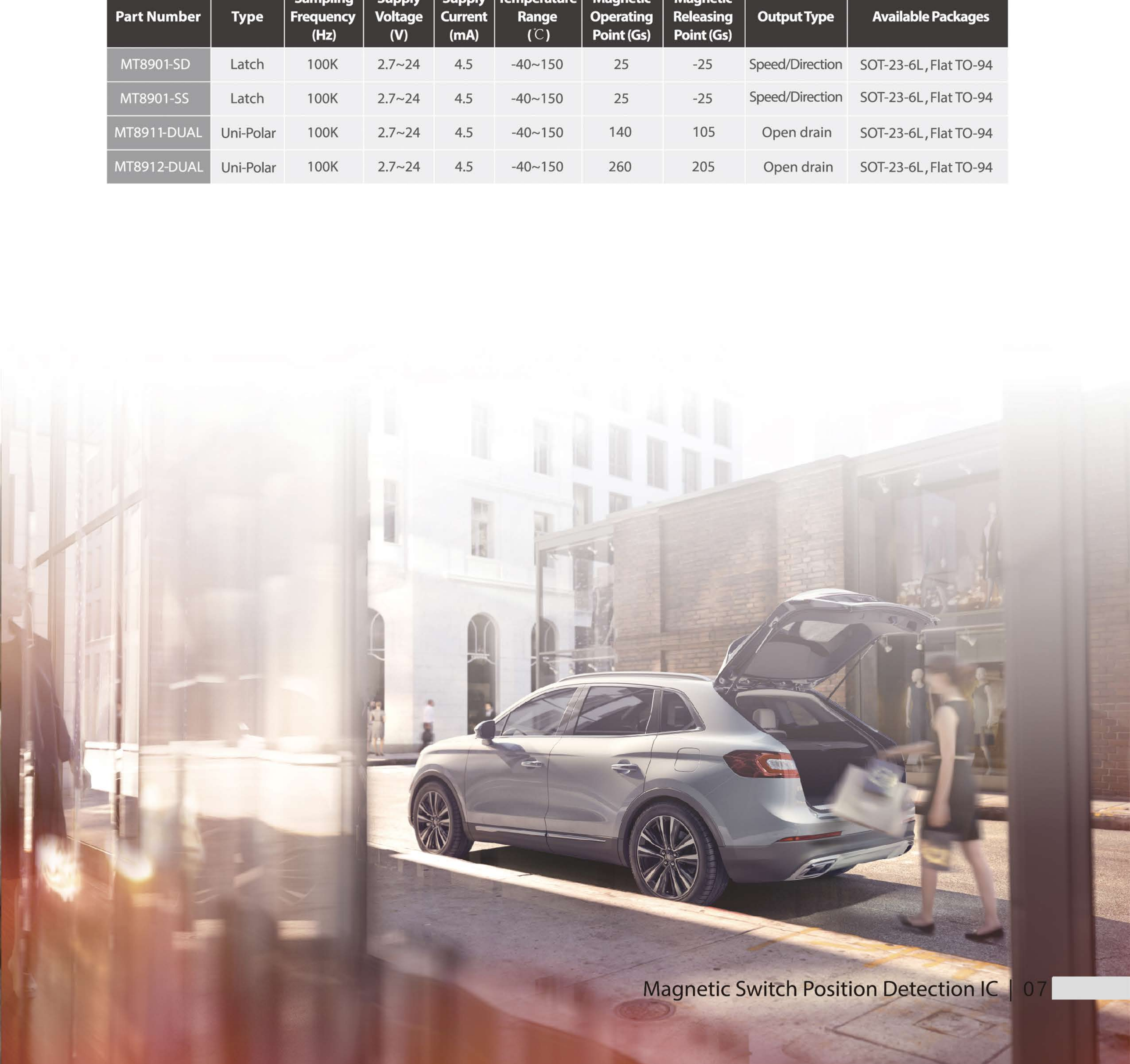
- **Dual Output Type**
  (AEC-Q100 certified)

AEC Qualified

With two Hall-sensing elements with a fixed spacing integrated into the same IC, this type of IC generates 2 switching signals with a phase shift, which can be used to detect not only the speed but also the direction of the moving target.

Recommended applications: car anti-pinch window / sunroof, opening and closing of electric tailgates, adjustment of car seat position, adjustment of antenna angle of communication base stations, etc.

Part Number	Type	Sampling Frequency (Hz)	Supply Voltage (V)	Supply Current (mA)	Temperature Range (℃)	Magnetic Operating Point (Gs)	Magnetic Releasing Point (Gs)	Output Type	Available Packages
MT8901-SD	Latch	100K	2.7~24	4.5	-40~150	25	-25	Speed/Direction	SOT-23-6L, Flat TO-94
MT8901-SS	Latch	100K	2.7~24	4.5	-40~150	25	-25	Speed/Direction	SOT-23-6L, Flat TO-94
MT8911-DUAL	Uni-Polar	100K	2.7~24	4.5	-40~150	140	105	Open drain	SOT-23-6L, Flat TO-94
MT8912-DUAL	Uni-Polar	100K	2.7~24	4.5	-40~150	260	205	Open drain	SOT-23-6L, Flat TO-94



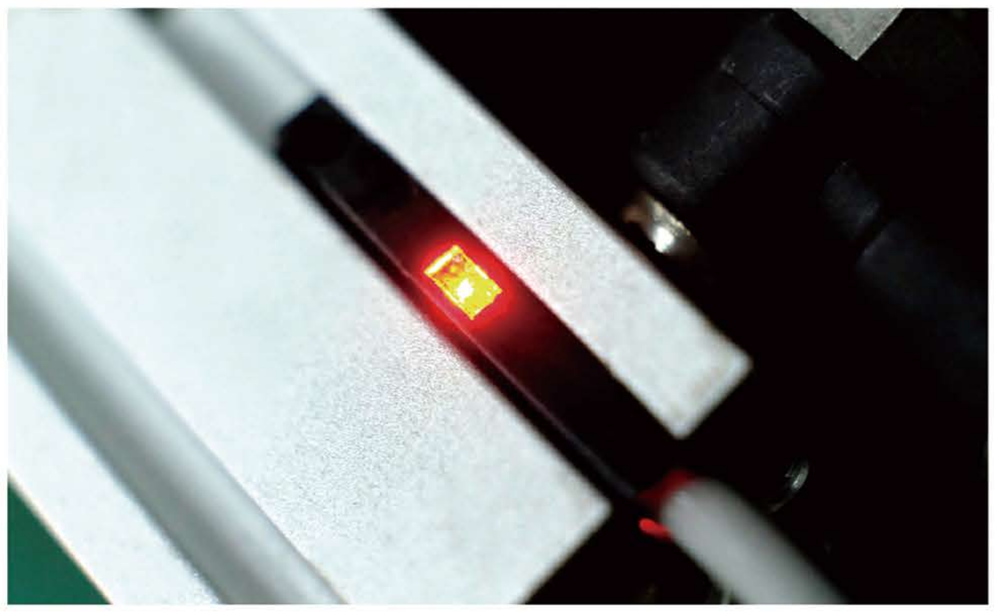
• Magneto-Resistive Switch Series

According to the strength and angle of the parallel magnetic field, the AMR bridge resistance whose impedance value changes is integrated with the ASIC into a single IC. The IC can perform non-contact position detection with magnets. Compared with Hall IC, it has high accuracy (hysteresis window can be less than 3 Gauss), sensing the parallel magnetic fields, and sensing the magnetic fields from 360 °.
It is mainly used in applications with different induction angles and low power high frequency induction. There are two product lines, 1D AMR switch and 2D AMR switch.

1D AMR switch

The IC has built-in a single AMR bridge resistor to realize the detection of the magnetic field within an included angle of ± 25 °. Typical applications are accurate position detection under remanence interference.

Recommended applications: industrial cylinder stroke position detection, smart water and gas meter flow counting and anti-magnetic attack detection, etc.



Part Number	Type	Sampling Frequency (Hz)	Supply Voltage (V)	Supply Current (uA)	Temperature Range (℃)	Magnetic Operating Point (Gs)	Magnetic Releasing Point (Gs)	Output Type	Available Packages
MT6111	Omni-Polar	20	1.8~5.5	1.3	-40~125	±18	±13	Open drain	SOT-23
MT6325	Omni-Polar	900	1.8~5.5	4.1	-40~125	±17	±14	Push pull	SOT-553
MT6341	Omni-Polar	20	1.8~5.5	1.3	-40~125	±10	±8	Push pull	SOT-23, Flat TO-92
MT6343	Omni-Polar	20	1.8~5.5	1.3	-40~125	±18	±15	Push pull	SOT-23, Flat TO-92

2D AMR switch

The IC has built-in multiple AMR bridge resistors to realize the detection of the magnetic field in 360 ° plane through different angles of placement. Typical applications are position detection of magnetic field with a large induction angle.

Recommended applications: industrial liquid level detection, smart electricity meter anti-magnetic attack detection, etc.

Part Number	Type	Sampling Frequency (Hz)	Supply Voltage (V)	Supply Current (uA)	Temperature Range (℃)	Magnetic Operating Point (Gs)	Magnetic Releasing Point (Gs)	Output Type	Available Packages
MT6131	Omni-Polar	20	1.65~5.0	2	-40~125	±18	±13	Push pull	SOT-23
MT6132	Omni-Polar	1K	1.65~5.0	15	-40~125	±18	±13	Push pull	SOT-23
MT6133	Omni-Polar	20	1.65~5.0	2	-40~125	±18	±13	Open drain	SOT-23

Current Detection And Linear Position Detection IC

MagnTek's magnetic current/linear displacement IC provides an output signal proportional to the linear change of the magnetic field. Through reasonable magnetic circuit and circuit design, users can easily develop the linear, angular position or current intensity detection sensor based on this series of products. .The introduction of online programming products has effectively reduced the difficulty of secondary development and made high-precision non-contact position detection possible.
MagnTek's magnetic current/linear displacement IC includes two product lines: current sensors and linear displacement sensors.

Recommended applications: current detection, handheld pan/tilt, accelerator pedal, sewing speed governor, off-axis encoder, etc.

• External magnetic circuit IC

MT9221 is a sensor specially designed for current sensor applications based on Hall sensor technology. MT9211 integrates a temperature compensation circuit, which can control the chip's median voltage and sensitivity drift within a very small error range. With external ferromagnetic core (ferrite, silicon steel, nickel-iron), it can be designed to sense 0~3000A and above current applications. According to the magnitude of the magnetic field generated by the detected current, an output voltage signal proportional to it is output. With a dedicated programmer and internal integrated EEPROM, users can conveniently customize the sensitivity programming (0.707~22.624mV/Gs) according to the actual current; the number of repeated erasing and writing is not less than 200 times.

Recommended applications: photovoltaics, electric welding machines, uninterruptible power supplies, high-power inverters, etc.

Work Functional Picture

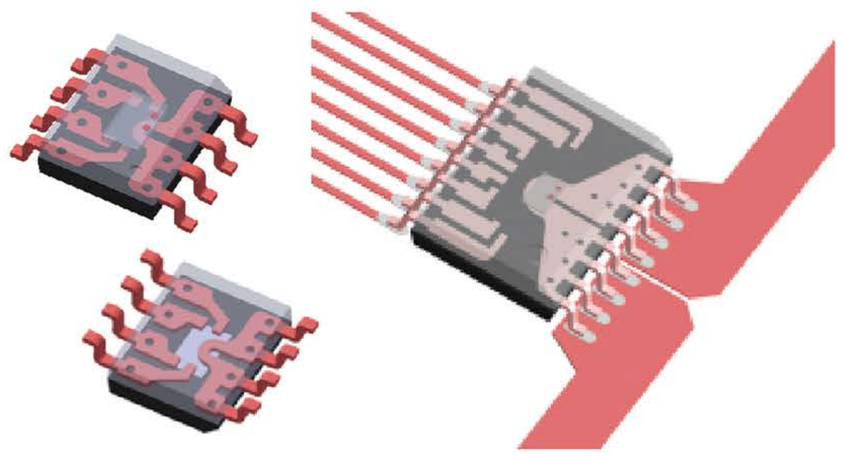
Part Number	Supply Voltage (V)	Supply Current (mA)	Bandwidth (Hz)	Response time (us)	Temperature Range (°C)	Linearity (%)	Typical Sensitivity @5V (mV/Gs)	Zero point voltage (v)	Available Packages
MT9211	4.5~5.5	10	150	<4	-40~150	<±1	0.707~22.624	50% Vcc	SIP-4

• Built-in magnetic circuit IC

This series is a current detection chip with built-in magnetic circuit. The principle is to integrate the "current-magnetic" conversion module in the chip, and use the Hall effect principle to convert the magnetic signal into a voltage output signal proportional to the input current. This series has super dielectric strength (sop-8>2400Vrms, sop16W-4800Vrms), "zero" hysteresis and ultra-high-speed us-level response time. These characteristics are very suitable for the current of various inverters/frequency converters. Detection. The series integrates temperature compensation circuit. The median voltage of the chip and the temperature drift of the sensitivity can be controlled within a very small error range. With the built-in current loop, it can easily achieve 0~±65A current detection applications.

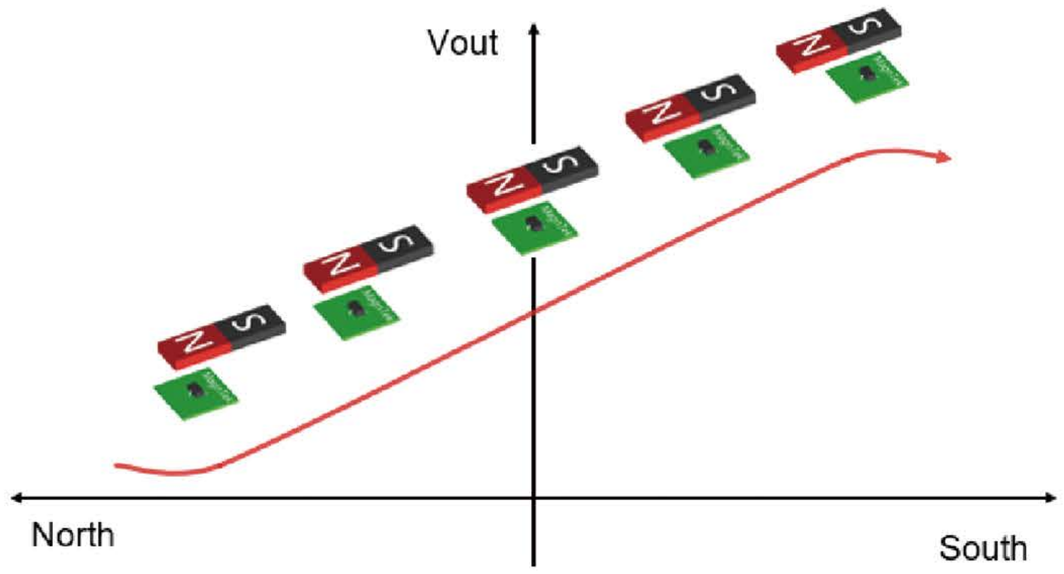
Recommended applications: general inverters, photovoltaic inverters, UPS, elevators, power supplies, stepper drives, servo control, etc.

Work Functional Picture



Part Number	Current type	Static output (V)	Measuring range (A)	Source side resistance (mΩ)	Dielectric strength (rms)	Creepage distance (mm)	Supply Voltage (V)	Power consumption (mA)	Band width (Hz)	Response time (us)	Temperature Range (°C)	Available Packages
MT9221	AC DC	50% Vcc 10% Vcc	0~±30	1.5	2600V	4	4.5~5.5	14	150	<4	-40~125	SOP-8 QFN-12
MT9222	AC DC	50% Vcc 10% Vcc	20~±65	0.85	4800V	8.2	4.5~5.5	14	150	<4	-40~125	SOP-16W
MT9223	AC DC	50% Vcc 10% Vcc	0~±50	1.2	2400V	4	4.5~5.5	14	150	<4	-40~125	SOP-8
MT9224	AC DC	50% Vcc 10% Vcc	24~±80	0.85	4800V	8.2	4.5~5.5	14	225	<3	-40~125	SOP-16W

Work Functional Picture



• Factory-Programmed Linear Position Hall Sensor IC

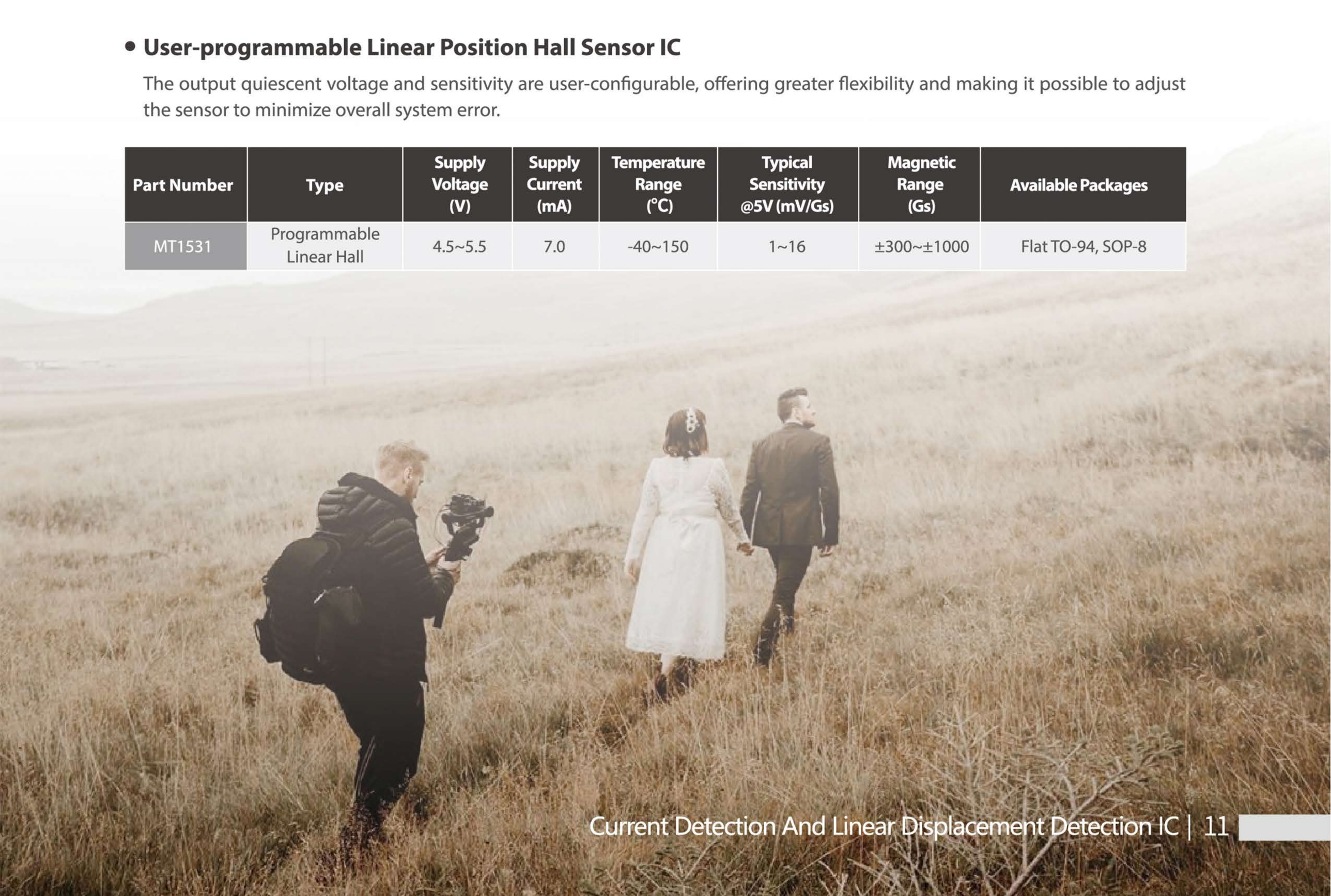
The output quiescent voltage and sensitivity are set at the factory, suitable to simple and low-cost applications.

Part Number	Type	Bandwidth (Hz)	Supply Voltage (V)	Supply Current (mA)	Temperature Range (°C)	Typical Sensitivity @5V (mV/Gs)	Magnetic Range (Gs)	Available Packages
MT9101	Linear Hall	30K	3.0~5.5	6.7	-40~150	1.5	±1466	Small SOT-23 , Flat TO-92 , DFN-1616
MT9102	Linear Hall	30K	3.0~5.5	6.7	-40~150	2.5	±880	Small SOT-23 , Flat TO-92 , DFN-1616
MT9103	Linear Hall	30K	3.0~5.5	6.7	-40~150	3.4	±650	Small SOT-23 , Flat TO-92 , DFN-1616
MT9105	Linear Hall	30K	3.0~5.5	6.7	-40~150	5.0	±440	Small SOT-23 , Flat TO-92 , DFN-1616

• User-programmable Linear Position Hall Sensor IC

The output quiescent voltage and sensitivity are user-configurable, offering greater flexibility and making it possible to adjust the sensor to minimize overall system error.

Part Number	Type	Supply Voltage (V)	Supply Current (mA)	Temperature Range (°C)	Typical Sensitivity @5V (mV/Gs)	Magnetic Range (Gs)	Available Packages
MT1531	Programmable Linear Hall	4.5~5.5	7.0	-40~150	1~16	±300~±1000	Flat TO-94, SOP-8

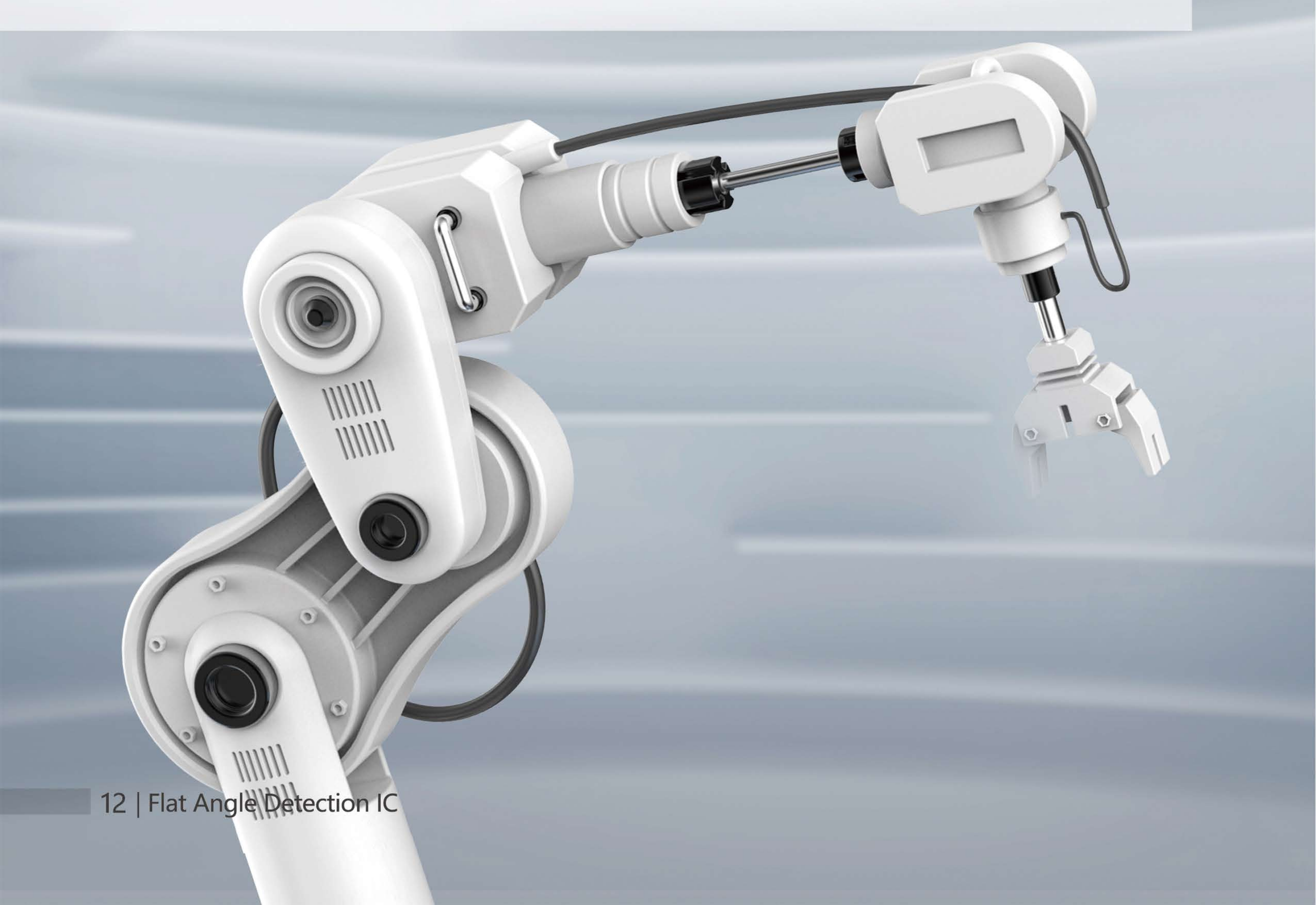


Flat Angle Detection IC

MagnTek's magnetic angle measurement IC is based on anisotropic magneto resistive (AMR) technology, which can realize high-precision 0 ~ 360 ° absolute angle measurement. Our patented technology protects the encoder IC from external stray magnetic fields, enabling a more stable and low cost solution. It can replace absolute or incremental optical encoders and other potentiometers, providing a wide range of angle measurement solutions for industrial, medical, and consumer applications.

MagnTek's plane angle detection IC includes five series of products. Magnetic sensing elements are used as magnetic field sensing elements for system integration developers to collect angle signals. Low-speed magnetic angle encoding ICs are used for low-speed low-resolution systems with a resolution of less than 1000 lines and 3K/rpm. Low-cost solution, high-speed magnetic angle encoder IC is a reliable solution for high-speed and high-resolution systems within16384 lines and below120K/rpm.The on-line programming angle IC can provide programmable analog linear or PWM output from 0 ~ 360°, and has passed the automotive electronics reliability certification. At the same time, we also provide a single-chip solution for off-axis detection-off-axis magnetic angle encoder IC.

In addition, MagnTek also provides technical services for magnetic simulation and magnet selection, help customers to improve design efficiently.

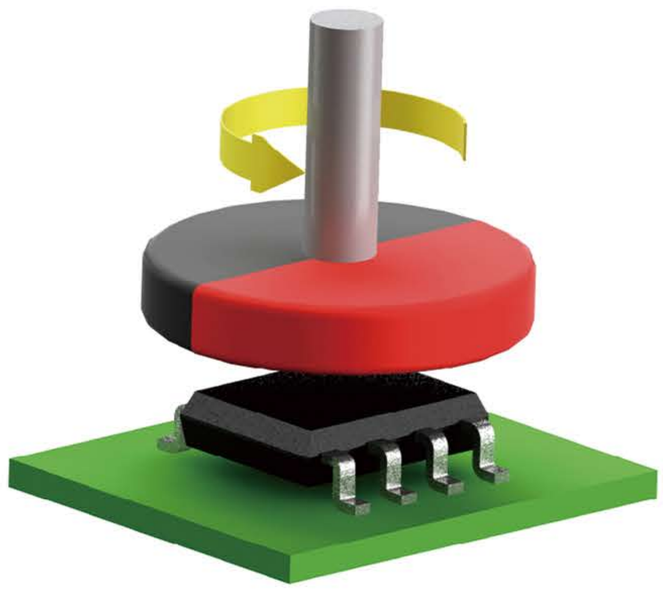


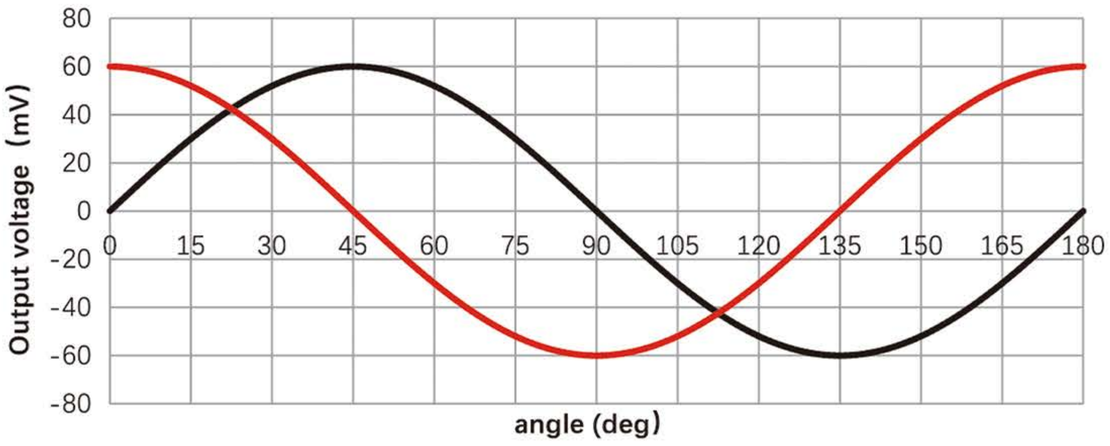
- **Magnetic sensing element**

  MagnTek's magnetic sensing elements are based on anisotropic magneto-resistive (AMR) technology. They have excellent performance with high sensitivity, low offset and high linearity. These elements can be developed as angle control modules to provide a wide range of high performance non-contact rotary angle control solutions for industrial, medical and consumer applications.

  ecommended applications: magnetic encoder modules, rotation angle control, etc.

Work Functional Picture





	MTR611	MTR631
Supply Voltage (VCC)	VCC<12V	VCC<12V
Temperature Range	-40~125℃	-40~125℃
Magnetic Input Field	>20mT	>20mT
Angle Range	0~180°	0~180°
Offset Voltage (Vos)	-2< Vos <2 mV/V	-0.3< Vos <0.3 mV/V
Offset Voltage Temperature Drift (Vosd) (-40~125°C)	-300 < Vos < 300 uV/V	-300 < Vos < 300 uV/V
Output Amplitude (peak to peak) @VCC=5V	115mV	120mV
Temperature Coefficient for Output Amplitude (-40~125°C)	-3300 ppm/℃	-3300 ppm/℃
Orthogonality Error (OE)	-1°< OE < 1°	-1°< OE < 1°
Angle Accuracy After Compensation (INL)	-1°< INL < 1°	-1°< INL < 1°
Bridge Resistance	1KΩ	1KΩ
Temperature Coefficient for Bridge Resistance (-40~125°C)	2800 ppm/℃	2800 ppm/℃
Available Packages	SOP-8	SOP-8

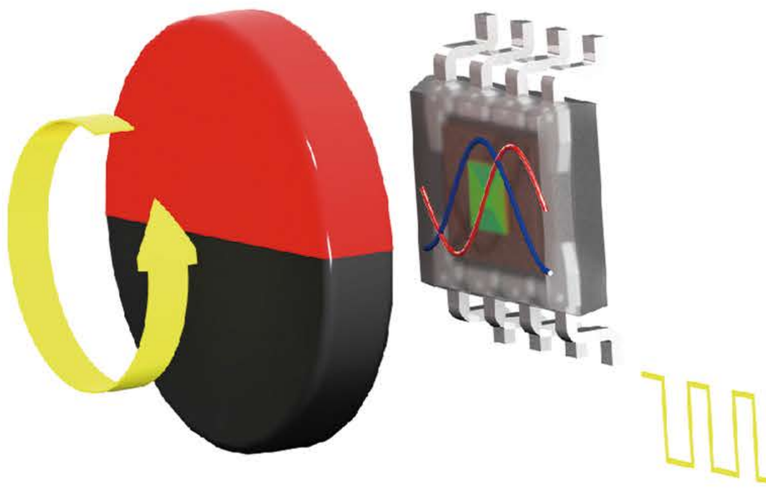
Install on shaft

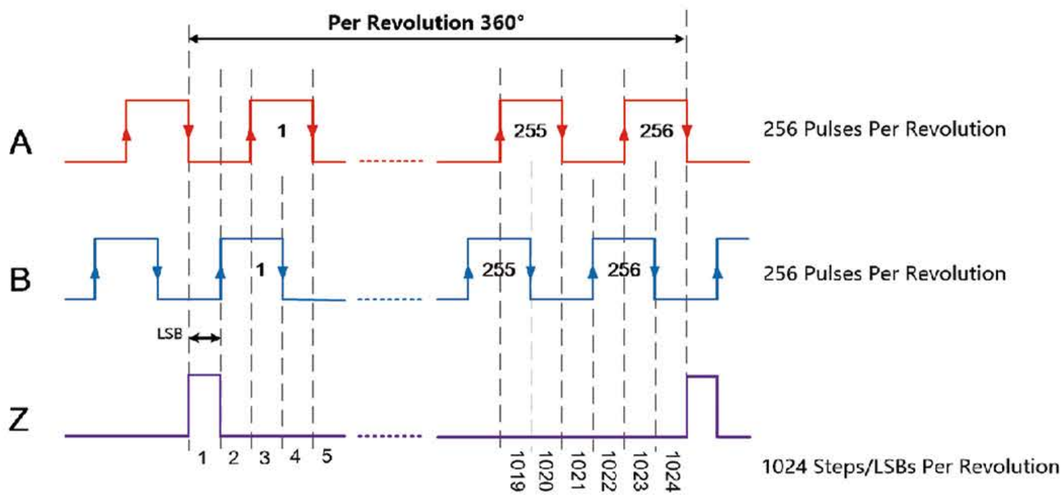
- **Low speed magnetic angle encoder IC**

  MagnTek's low speed magnetic angle encoder IC which integrates the high-precision AMR sensing element and the signal condition ASIC can achieve angle detection accuracy within ±1°; the minimum 3mm x 3mm package can meet the small package requirements of many applications. Also, the non-contact magnetic control has quite high reliability, and its maximum working temperature range is -40~150°C. It has ABZ/UVW incremental output compatible with traditional optical encoders and I^2C , SPI, PWM, Analog output interfaces.

Recommended applications: PTZ(Pan/Tilt/Zoom), servo, robot joint control, stepper motor control, etc.

Work Functional Picture



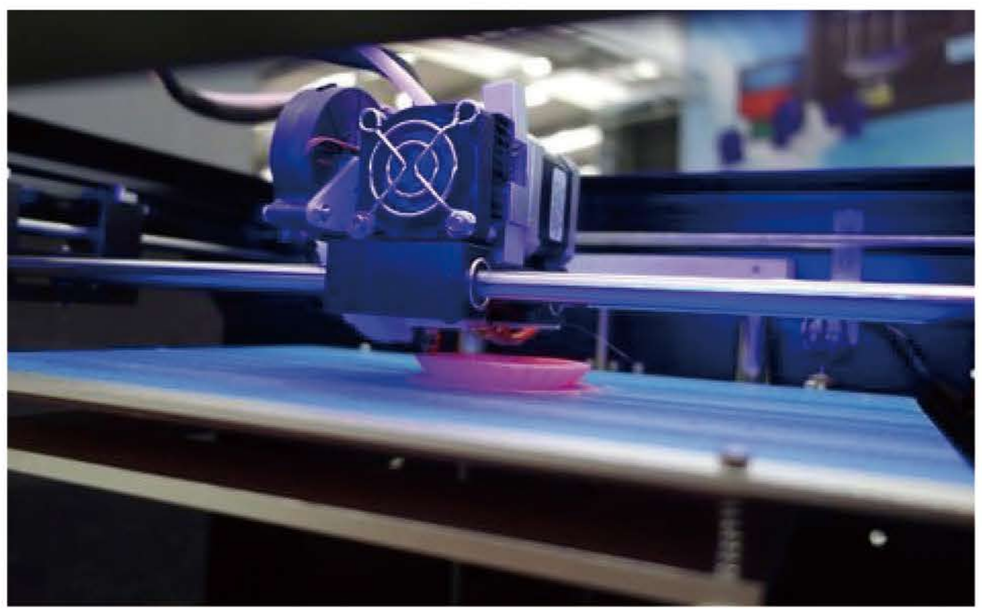


	MT6804	MT6813	MT6815
Supply Voltage VDD	3.3~5.5 V	3.3~5.5 V	3.3~5.5 V
Magnetic Induction Intensity	>20mT	>20mT	>20mT
Angle Range	0~360°	0~360°	0~360°
Supply Current	5.5mA	6mA	6mA
Temperature Range	-40~150℃	-40~125℃	-40~125℃
Integral Non-Linearity (INL)	-1.5°< INL < 1.5°	-1.2°< INL < 1.2°	-1.0°< INL < 1.0°
Out Propagation Delay	100us	100~400us	100~400us
Rotation Speed	<6000rpm	<6000rpm	<6000rpm
ABZ Output	8~12bit	-	8~12bit 100/200/500/1000lines
UVW Output	1~8 Pole Pairs	-	1~8,10,12,14,16 Pole Pairs
PWM Output	-	9~12bit	9~12bit
SPI Output	12bit	14bit	14bit
Communication Interface	I^2C	I^2C/3-Wire SPI/4-Wire SPI	I^2C/3-Wire SPI/4-Wire SPI
Analog Output	10%~90% VDD	rail-to-rail	rail-to-rail
Available Packages	SOP-8	SOP-8, QFN16(3mm×3mm)	SOP-8, QFN16(3mm×3mm)

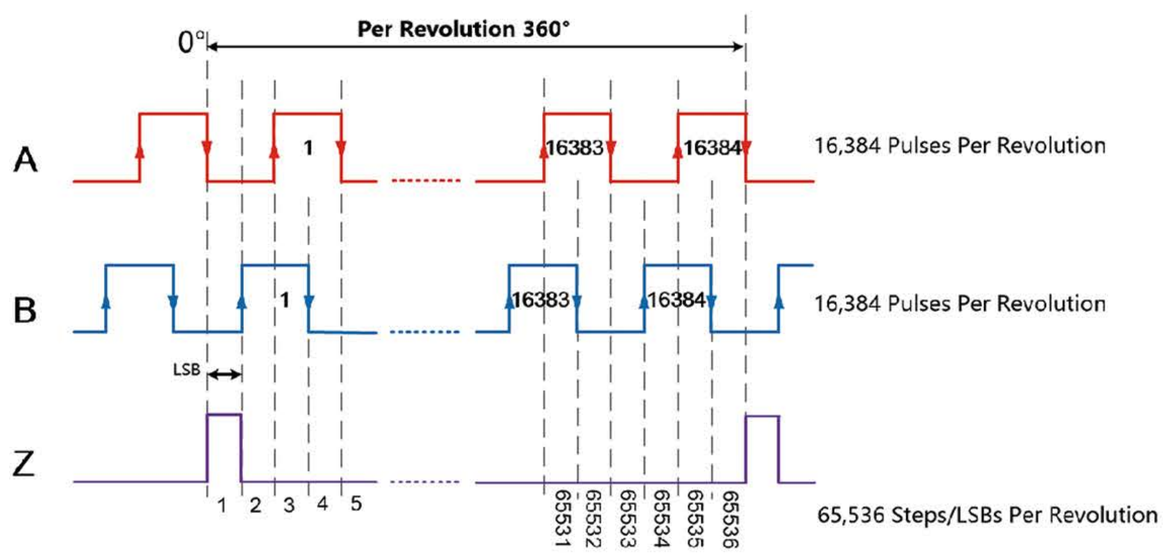
• High speed magnetic angle encoder IC-MT6835

MagnTek's latest generation of high speed magnetic angle encoder IC with advanced signal processing can achieve angle accuracy to less than ±0.5°. It can support rotation speed up to120000 rpm and the resolution of incremental ABZ output can be up to16384 lines, which can replace the traditional 2500 lines optical encoder in industrial servo application and 17-bit photoelectric encoder, the absolute value output is 21wei. It can significantly reduce the cost for customers and improve the reliability.

Recommended applications: closed-loop stepper motor control, servo motor control, etc.



Work Functional Picture



16 bit=2^{16} LSBs=65,536 Steps=16,384 PPR

	MT6701	MT6816	MT6825	MT6835
Principle Of Induction	Differential Hall	AMR	AMR	AMR
Supply Voltage VDD	3.3~5.0 V	3.3~5.0 V	3.3~5.0 V	3.3~5.0 V
Magnetic Induction Intensity	20mT～100mT	>30mT	>30mT	>30mT
Angle Range	0~360°+Z-axis signal output through push pin	0~360°	0~360°	0~360°
Supply Current (mA)	10mA	10mA	10mA	20mA
Temperature Range	-40~125℃	-40~125℃	-40~125℃	-40~125℃
Integral Non-Linearity (INL)	-0.75°< INL < 0.75°	-0.75°< INL < 0.75°	-0.5°< INL < 0.5°	-0.1°< INL < 0.1°
Out Propagation Delay	<5us	<2us	<2us	1us ~ 10us
Transition Noise	0.01°rms	0.003°rms	0.002°rms	0.002°rms
Maximum Resolution Speed	<55,000 rpm	<25,000 rpm	<25,000 rpm	<12,0000 rpm
ABZ Output	1~1024 Pulses Programmable	1~1024 Pulses Programmable	1~4096 Pulses Programmable	1~16384Pulses Programmable
UVW Output	1~16 Pole Pairs Programmable	1~16 Pole Pairs Programmable	1-16 Pole Pairs Programmable	1-16 Pole Pairs Programmable
PWM Output	12bit	12bit	12bit	12bit
SPI Output	14bit	14bit	18bit	21bit
Communication Interface	I^2C(R/W), SSI(read only)	3-Wire SPI/4-Wire SPI	3-Wire SPI/4-Wire SPI	4-Wire SPI
Available Packages	SOP-8 , QFN3X3	SOP-8	TSSOP-16	TSSOP-16

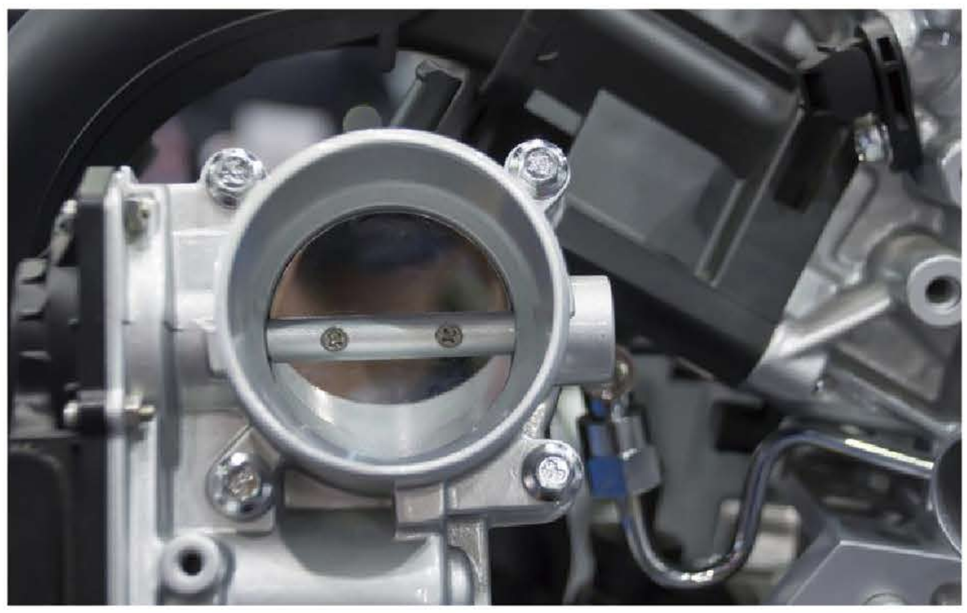
- **Online programming angle position IC-MT6501 (AEC-Q100 certified)**

AEC Qualified

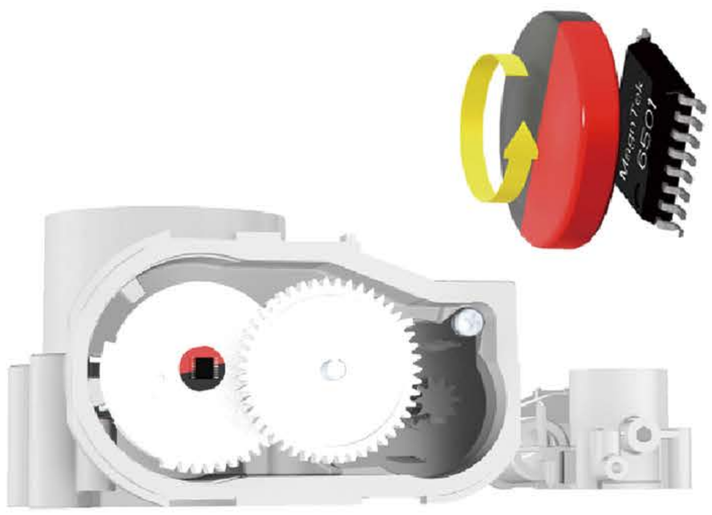
MT6501 is an output programmable magnetic angle position chip developed for the automotive market. MT6501 can provide 0-360° programmable analog linear or PWM output, and also supports SPI or single-wire communication mode. The analog linear output supports up to 4-point programming and high and low clamping voltage programming, which is suitable for various angle control scenarios with harsh operating environments.

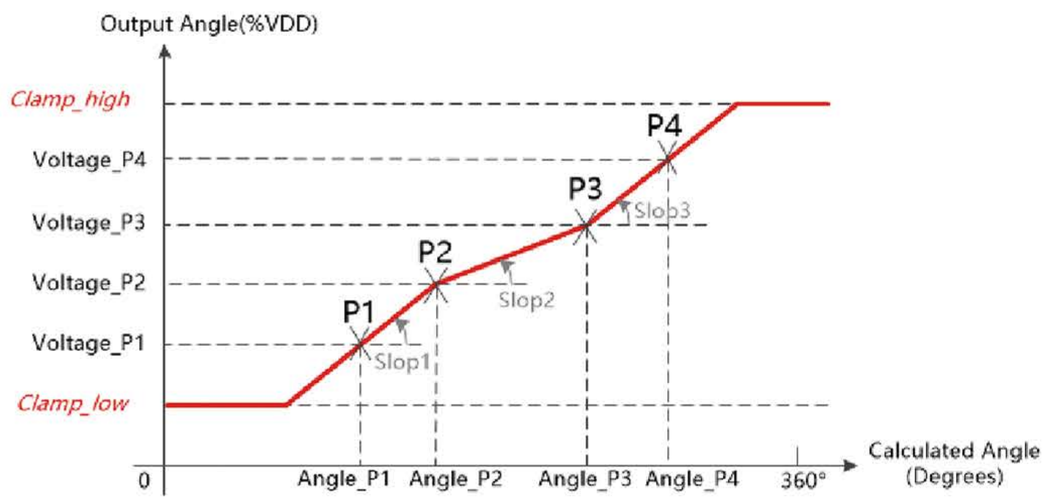
MT6501 has passed the AEC-Q100 reliability certification. The chip can withstand a high voltage of up to ±30V between the power terminal and the ground, and the output terminal can withstand a high voltage of 18V to the ground. It has a strong load driving capability and an overcurrent protection mechanism. MT6501 provides single-channel SOP-8 and dual-channel TSSOP-16 (safety redundancy) packages.

Recommended applications: EGR valve, throttle valve, electronic accelerator pedal, knob shifter, etc.



Work Functional Picture



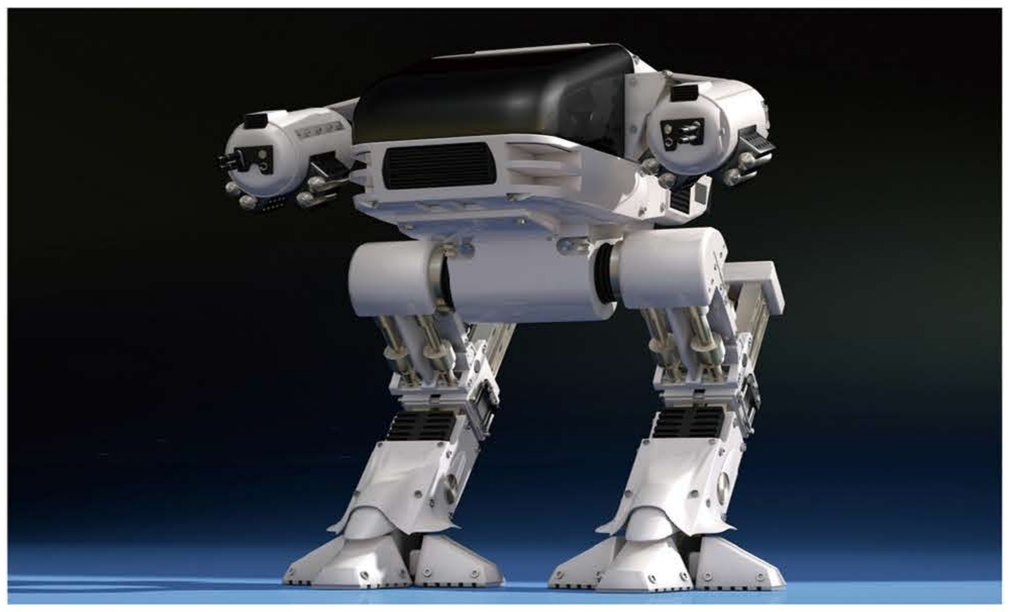


	MT6501
Principle of Magnetic Induction	AMR
Detection angle range	0°~360°
Dual Die redundant design package	Yes
Automotive electronics reliability	AEC-Q100
Power supply overvoltage protection	±30V
Output overvoltage protection	18V
Operating Voltage	4.5V~5.5V
Power consumption	Single 6mA, dual 12mA
Output noise	<1.5mVrms
Programmatically	Output single-wire programming or SPI programming
Working angle range	-40°C~150°C
Analog output curve programming	Any 4 points
PWM output	Yes
Digital interface	4-wire SPI single-wire OWI
Angle absolute accuracy	<±1° (0~360°，No special programming)

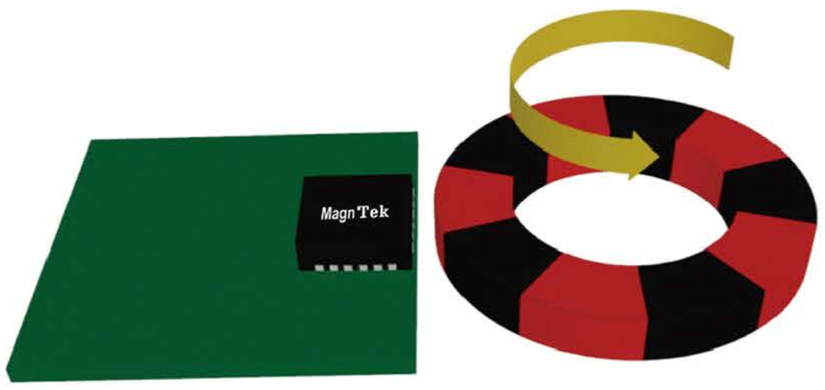
• Off-axis magnetic angle encoder IC-MT6828

MT6828 is an angle encoder chip based on the principle of anisotropic magnetoresistance AMR, which can support both on-axis and off-axis installation. Compared with on-axis applications that need to occupy an end surface of the motor shaft, off-axis installation is more flexible and more suitable for applications such as robot joints and AGV hub motors.

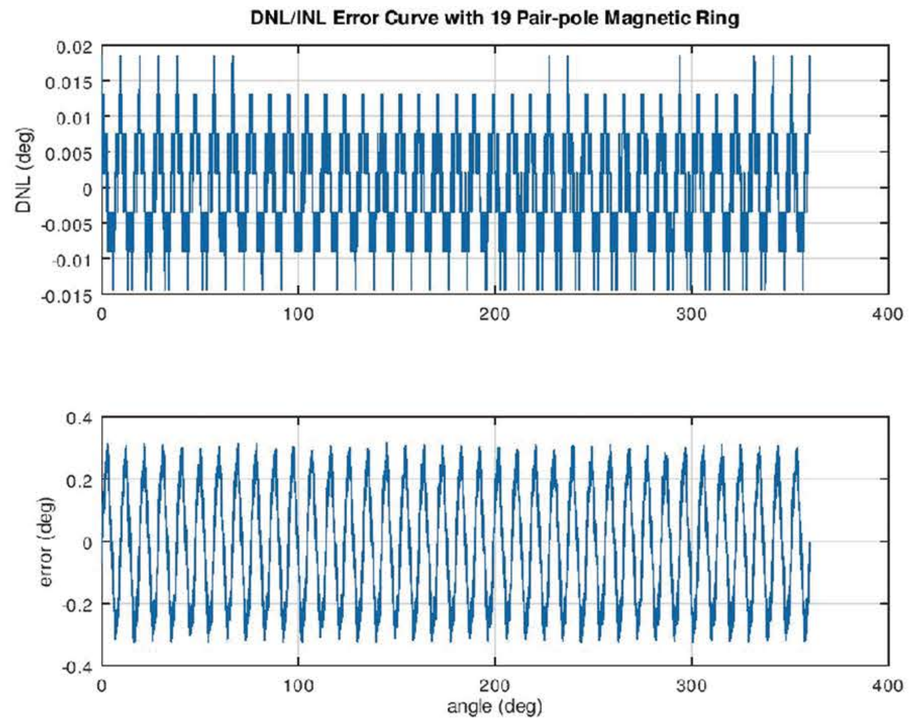
MT6828 provides incremental ABZ, UVW output and absolute value PWM, 4-wire SPI (one pair of pole magnet and magnetic ring can achieve absolute value) output. MT6828 has built-in powerful calibration and compensation algorithms to deal with the INL linearity loss caused by the distortion of the magnetic field induced by the chip during off-axis installation.



Work Functional Picture

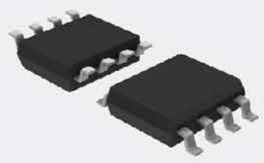


Angular accuracy INL after off-axis calibration of 19 pairs of pole magnetic rings

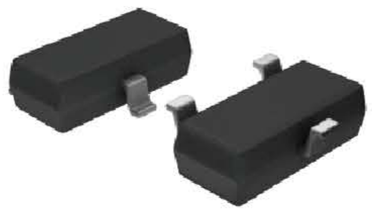


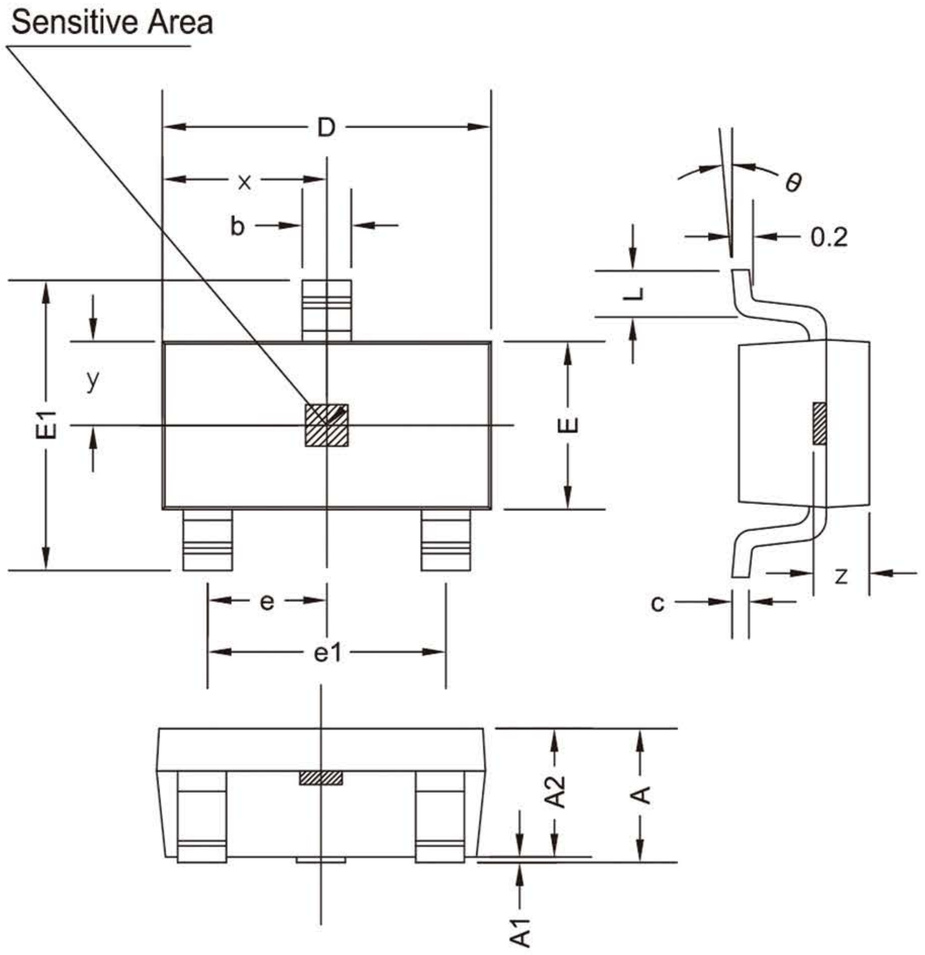
	MT6828
Principle of induction	AMR
Installation method	On-axis or off-axis
Working magnetic field range	>30mT
Supply Voltage	3.3~5.0V
Output angle accuracy	-1° < INL < +1°
System delay	1us ~ 10us
Incremental output	ABZ/UVW
Communication Interface	4-Wire SPI
ABZ output	1~1024 Pulses Programmable
UVW output	1~16 Pole Pairs Programmable
PWM output	12bit
Absolute value output	17bit Angle Data; 12bit PWM
Maximum resolution speed	120,000 rpm (@1Pole magnetic ring)
Available packages	QFN4x4-24

Available packages

Packages		Description
	SOT-23	tape & reel packaging (3000pcs/bag)
	Small SOT-23	tape & reel packaging (3000pcs/bag)
	SOP-8	tape & reel packaging (3000pcs/bag)
	SOT-553	tape & reel packaging (3000pcs/bag)
	QFN-16 (3mmx3mm)	tape & reel packaging (1000pcs/bag)
	TSSOP-16	tube packaging (60 pcs/tube) or tape & reel packaging (3000pcs/reel)
	SOT-89B	tape & reel packaging (1000pcs/bag)
	Flat TO-92	bulk packaging (1000pcs/bag)
	Flat TO-94	bulk packaging (1000pcs/bag)
	DFN1608	tape & reel packaging (10000pcs/bag)
	DNF2*3	tape & reel packaging (3000pcs/bag)
	DFN1616	tape & real packaging (10000pcs/bag)

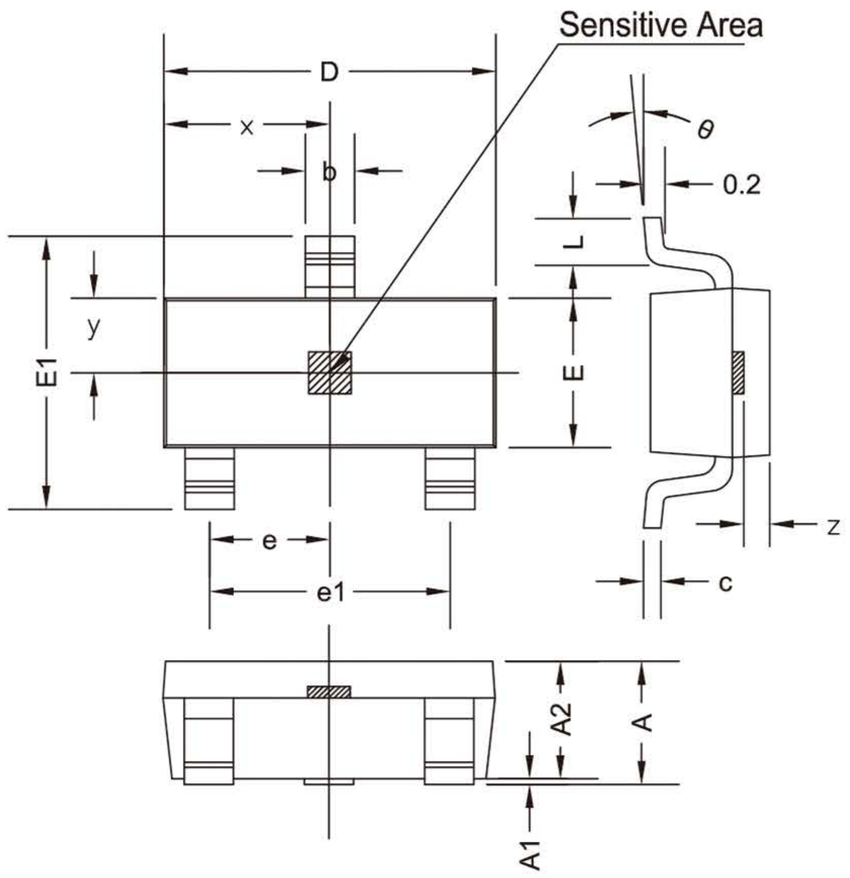
SOT-23





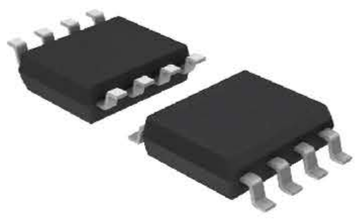
Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0. 100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°
x	1.460TYP		0.057TYP	
y	0.800TYP		0.032TYP	
z	0.600TYP		0.024TYP	

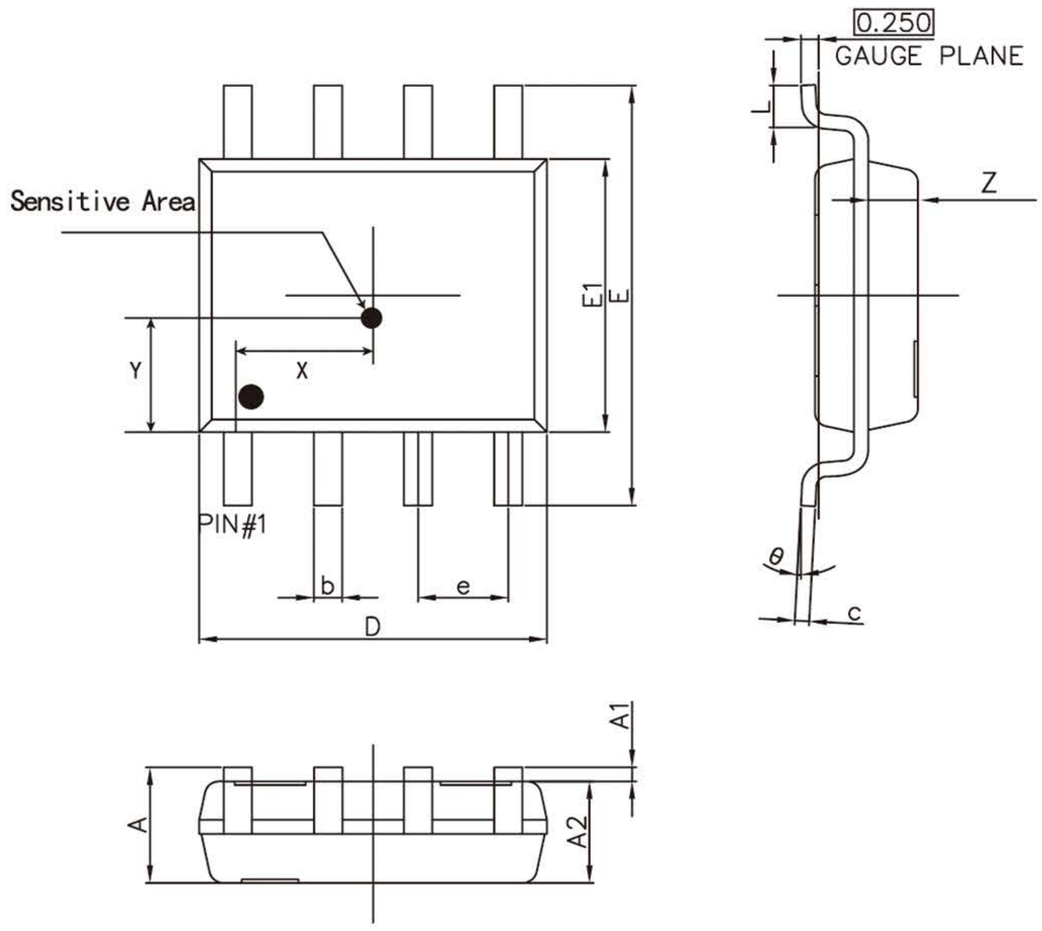
Small SOT-23



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0. 080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550REF		0.022REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°
x	1.460TYP		0.057TYP	
y	0.650TYP		0.026 TYP	
z	0.500TYP		0.020TYP	

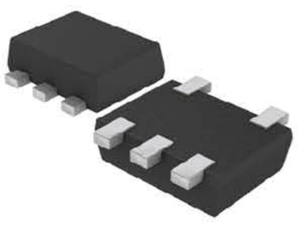
SOP-8

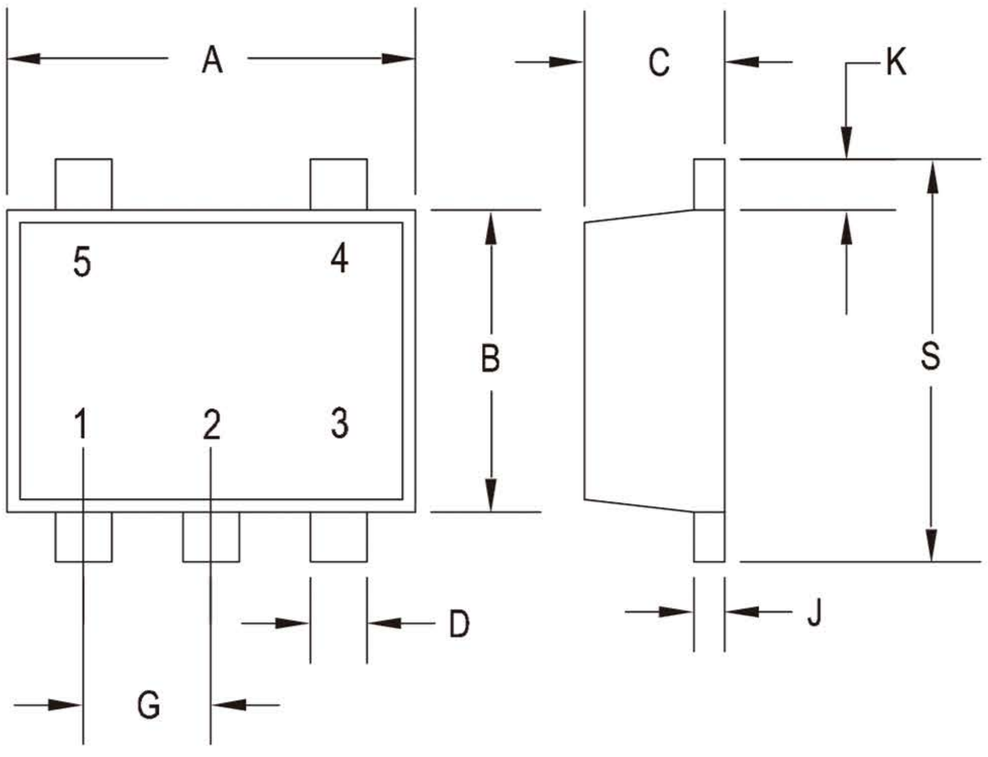




Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.201
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
e	1.270(BSC)		0.050(BSC)	
L	0.400	0.800	0.016	0.031
θ	0°	8°	0°	8°
x	1.97	2.27	0.078	0.089
y	1.34	1.70	0.053	0.067
z	0.42	0.62	0.016	0.024

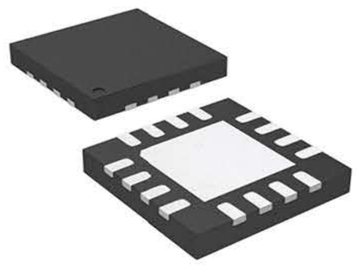
SOT-553

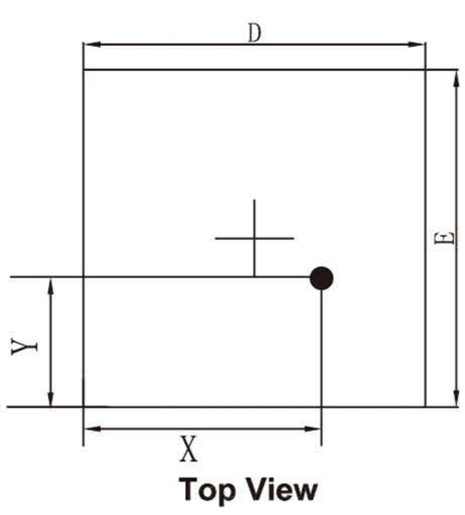




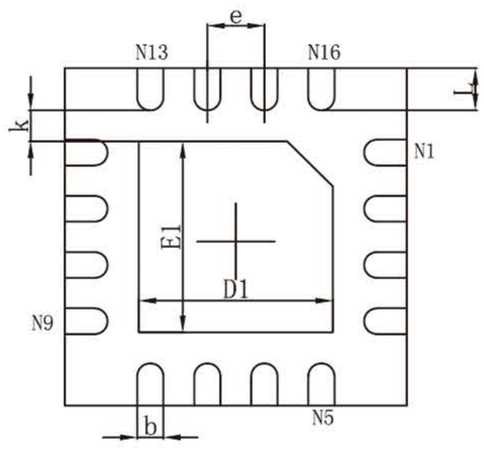
Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.500	1.700	0.059	0.067
B	1.100	1.300	0.043	0.051
C	0.525	0.600	0.021	0.024
D	0.170	0.270	0.007	0.011
G	0.450	0.550	0.018	0.022
J	0.090	0.160	0.004	0.006
K	0.100	0.300	0.004	0.012
S	1.500	1.700	0.059	0.067

QFN-16 (3mmx3mm)

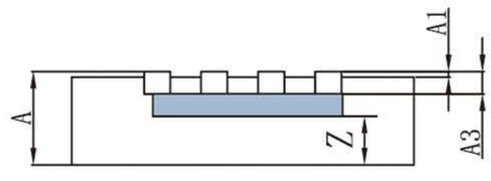




Top View



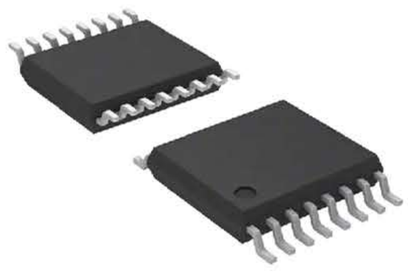
Bottom View

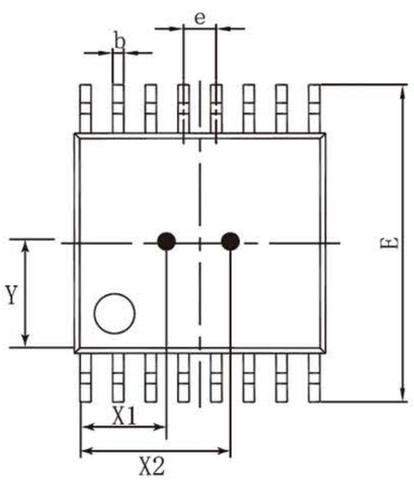


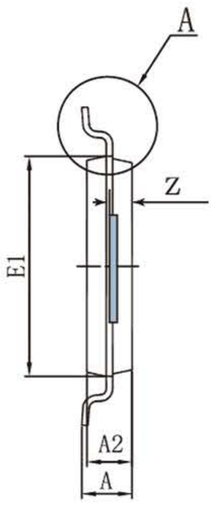
Side View

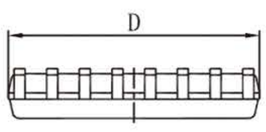
Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A3	0.203REF		0.008REF	
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
D1	1.600	1.800	0.063	0.071
E1	1.600	1.800	0.063	0.071
k	0.275REF		0.011REF	
b	0.180	0.300	0.007	0.012
e	0.500REF		0.020REF	
L	0.300	0.500	0.012	0.020
X	1.690	1.990	0.066	0.078
Y	1.110	1.410	0.043	0.055
Z	0.420	0.620	0.016	0.024

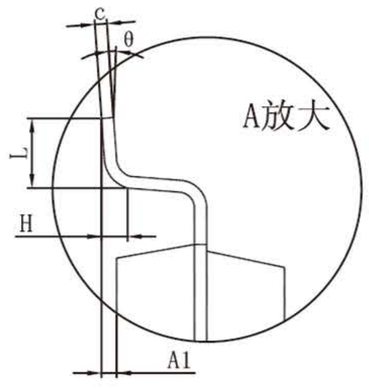
TSSOP-16





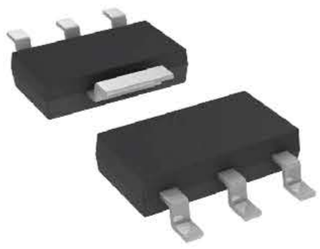


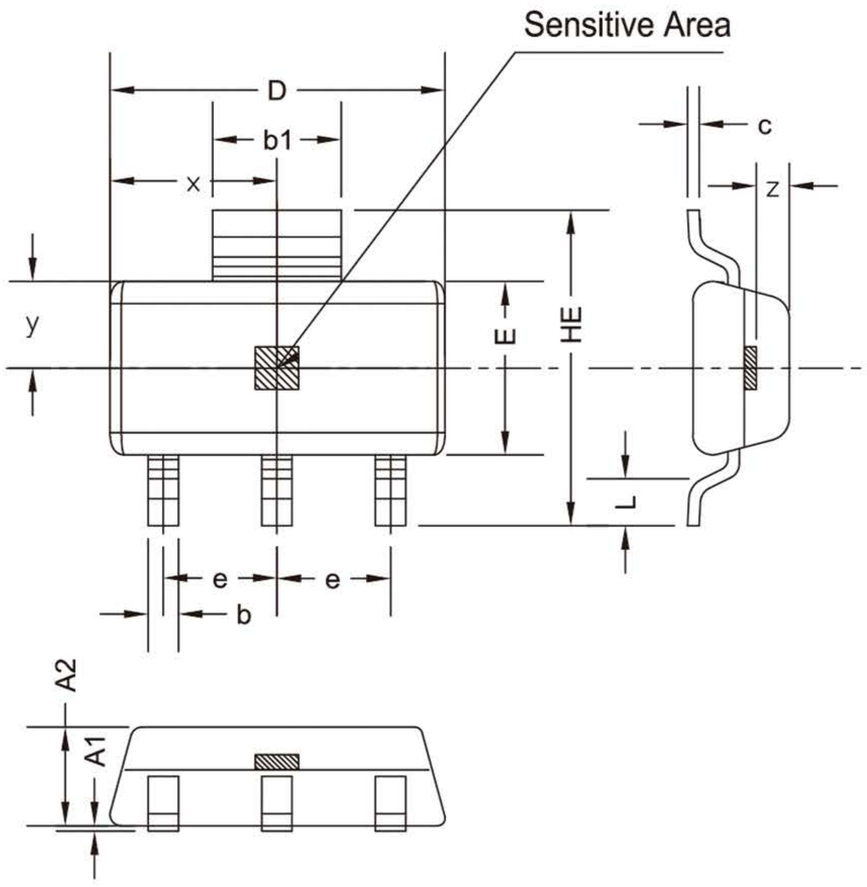




Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
D	4.900	5.100	0.193	0.201
E	6.250	6.550	0.246	0.258
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
E1	4.300	4.500	0.169	0.177
A		1.200		0.047
A2	0.800	1.000	0.031	0.039
A1	0.050	0.150	0.002	0.006
e	0.65BSC		0.026BSC	
L	0.500	0.700	0.020	0.028
H	0.25 TYP		0.01TYP	
θ	1°	7°	1°	7°
X1	1.650	1.890	0.065	0.074
X2	3.110	3.350	0.122	0.132
Y	2.080	2.320	0.081	0.093
Z	0.210	0.370	0.016	0.024

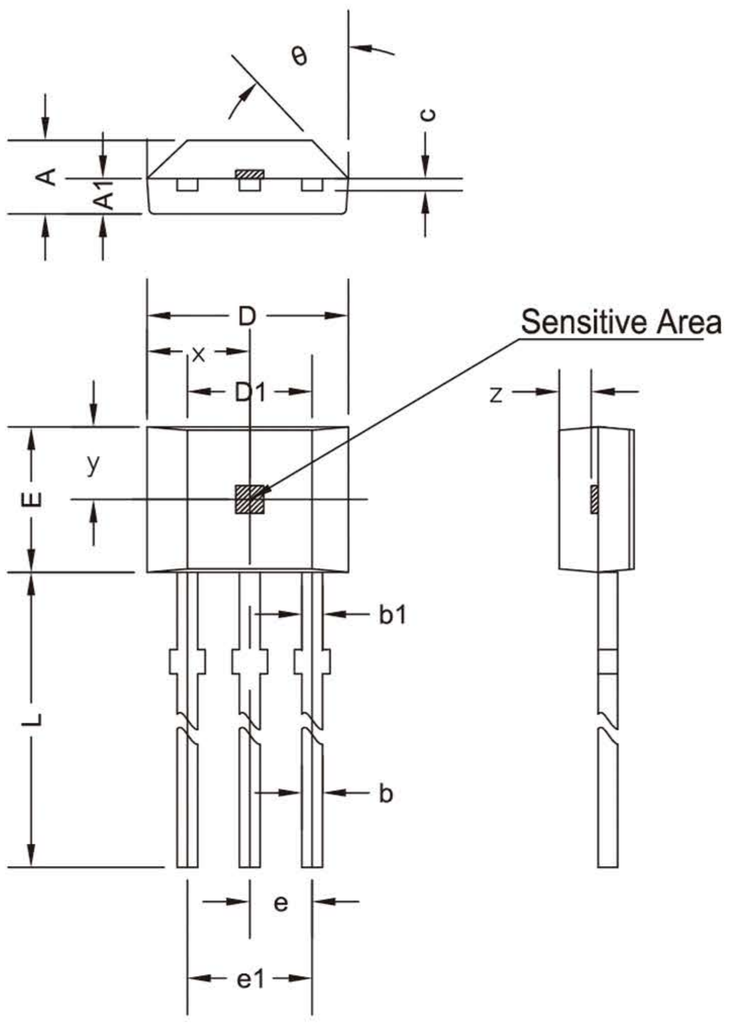
SOT-89B





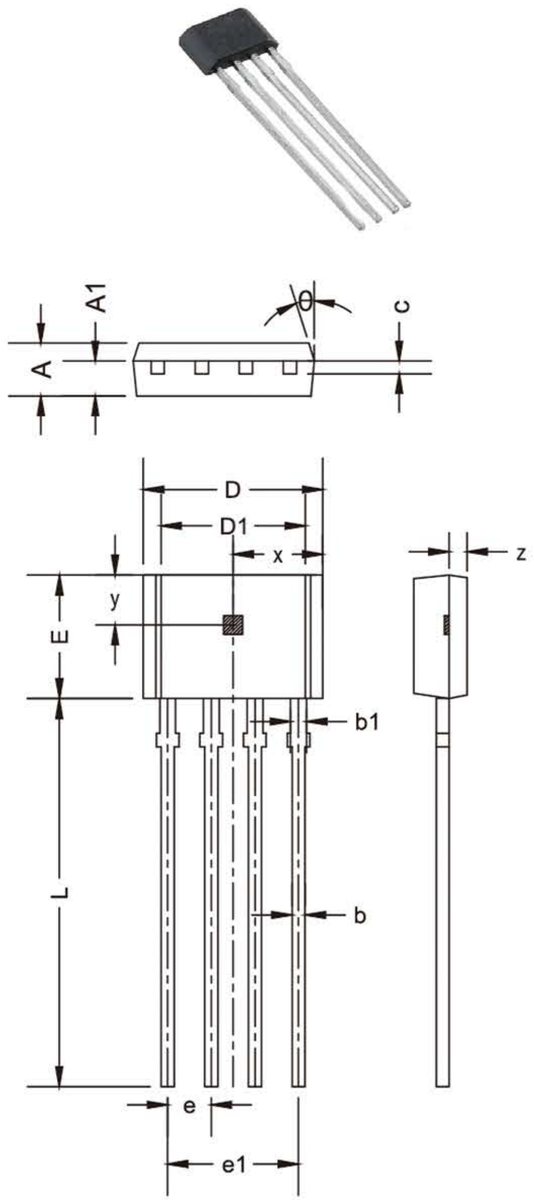
Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A2	1.220	1.420	0.048	0.056
A1	0.000	0.100	0.000	0.004
b	0.300	0.500	0.012	0.020
c	0.052	0.252	0.002	0.010
D	4.400	4.600	0.173	0.181
b1	1.600	1.800	0.063	0.071
E	2.400	2.600	0.094	0.102
HE	4.000	4.400	0.157	0.173
e	1.400	1.600	0.055	0.063
L	0.350	0.550	0.014	0.022
x	2.250TYP		0.089TYP	
y	1.250TYP		0.049TYP	
z	0.300TYP		0.012TYP	

Flat TO-92



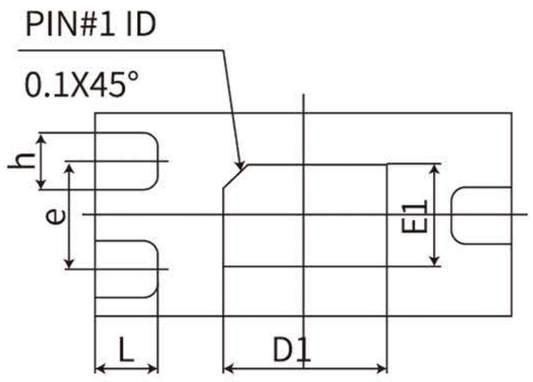
Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.420	1.620	0.056	0.064
A1	0.660	0.860	0.026	0.034
b	0.350	0.480	0.013	0.019
b1	0.400	0.510	0.016	0.020
C	0.330	0.510	0.013	0.020
D	3.900	4.100	0.154	0.161
D1	2.280	2.680	0.090	0.106
E	3.050	3.250	0.120	0.128
e	1.270 TYP		0.050 TYP	
e1	2.440	2.640	0.096	0.104
L	14.350	14.750	0.565	0.581
θ	45° TYP		45° TYP	
x	2.025TYP		0.080TYP	
y	1.545TYP		0.061TYP	
z	0.500TYP		0.020TYP	

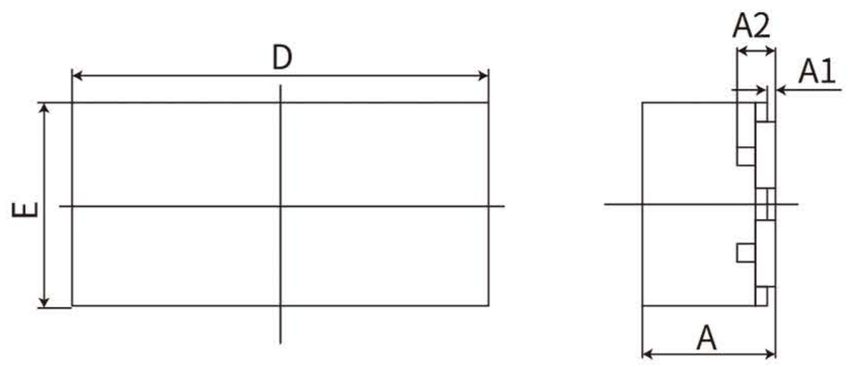
Flat TO-94



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.420	1.660	0.056	0.065
A1	0.660	0.860	0.026	0.034
b	0.350	0.480	0.014	0.019
b1	0.400	0.650	0.016	0.026
C	0.360	0.510	0.014	0.020
D	5.100	5.320	0.201	0.210
D1	4.100	4.300	0.161	0.169
E	3.550	3.750	0.140	0.147
e	1.267	1.273	0.050	0.050
e1	3.780	3.840	0.149	0.151
L	13.500	15.500	0.531	0.610
x	2.605TYP		0.103TYP	
y	1.825TYP		0.072TYP	
z	0.500TYP		0.020TYP	
θ	10°	12°	10°	12°

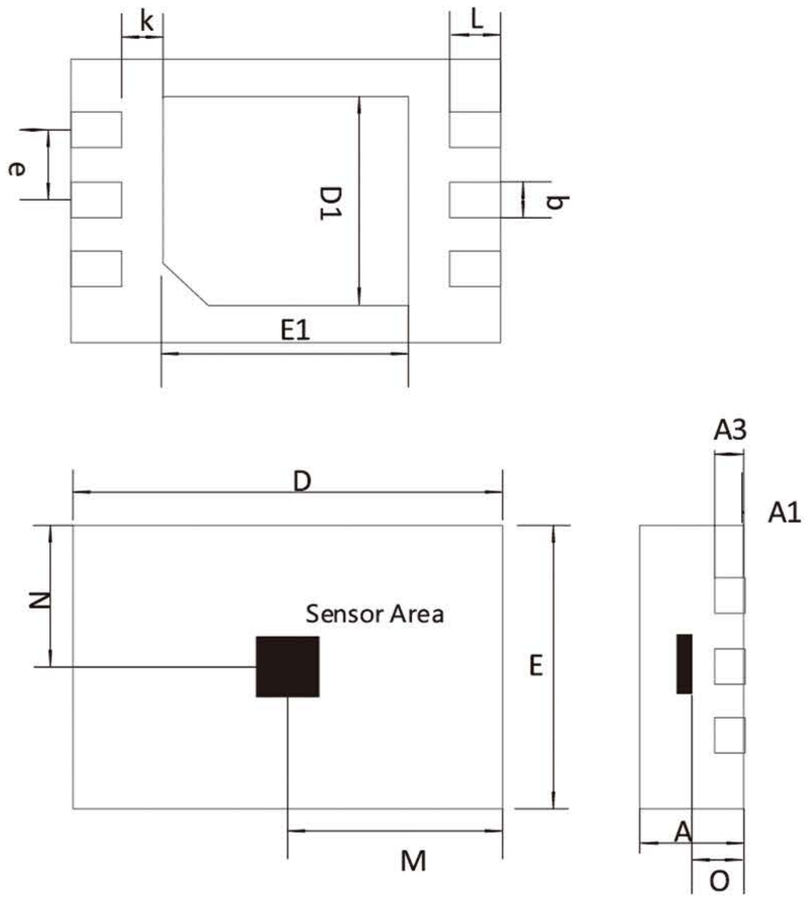
DFN1608





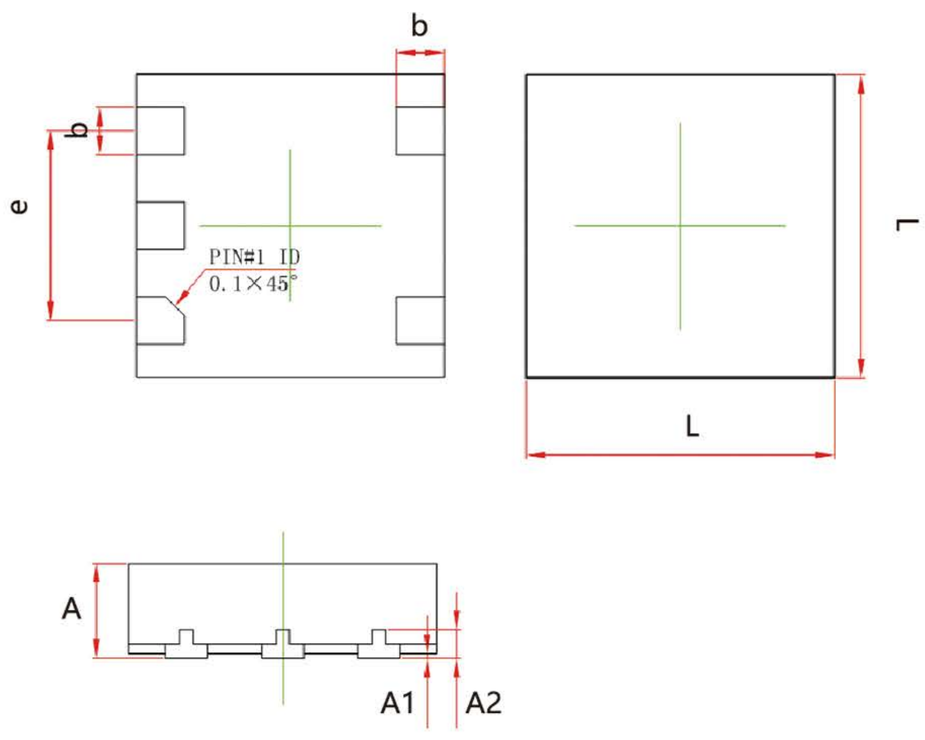
Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.450	0.550	0.018	0.022
A1	0.000	0.050	0.000	0.002
A2	0.150 REF		0.006 REF	
D	1.550	1.650	0.061	0.065
E	0.750	0.850	0.030	0.033
D1	0.580	0.680	0.023	0.027
E1	0.350	0.450	0.014	0.018
b	0.170	0.270	0.007	0.011
e	0.420 TYP		0.017 TYP	
L	0.185	0.285	0.007	0.011

DFN2*3

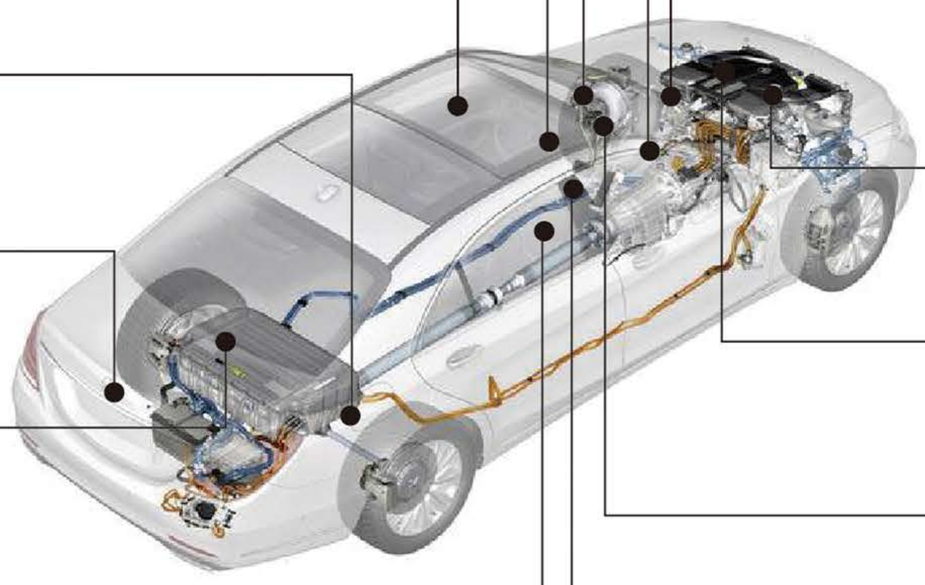


Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A3	0.203 REF		0.008 REF	
D	2.950	3.050	0.116	0.120
E	1.950	2.050	0.077	0.081
D1	1.400	1.600	0.055	0.063
E1	1.600	1.800	0.063	0.071
b	0.200	0.300	0.008	0.012
e	0.500 TYP		0.020 TYP	
k	0.200 MIN		0.008 MIN	
L	0.300	0.400	0.012	0.016
M	1.490 TYP		0.060 TYP	
N	0.800 TYP		0.032 TYP	
O	0.500 TYP		0.020 TYP	
Sensor Areea	0.660*0.660*0.120		0.026*0.026*0.005	

DFN1616



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.450	0.550	0.018	0.022
A1	0.000	0.050	0.000	0.002
A2	0.150 TYP		0.006 TYP	
L	1.550	1.650	0.061	0.065
b	0.200	0.300	0.008	0.012
e	1.000 TYP		0.039 TYP	



Accelerator
Anti-pinch window
Current sensor
Electric tailgate
Fuel tank level sensor
Electric seat
Odometer
Air Conditioning
Wiper
Egr Valve
Throttle
Steering Wheel
E-shifter

Rear motor (traditional) and speed sensor
Rear axle hook sensor
Wheel speed sensor
Torsion spring sensor
Cadence sensor/speed Sensor
Front motor (traditional) and speed sensor
Torque sensor
Mid motor (traditional) mid motor (servo)

Applications | Intelligent Manufacturing

Industrial servo system

machine tool

elevator door machine

automation equipment

Robot

service robot

drone

AGV (Automatic Guided Transport Vehicle)

Industrial position detection

cylinder

proximity switch

liquid level detection

Stepper motor and DC drive system

stage lighting

printer

DC motor

Applications | Smart Home

Hall
elevator
smart door lock

Living room
PTZ(Pan/Tilt/Zoom) camera
handheld gimbal
sweeping robot
Bluetooth earphone
massage chair
TV lift cabinet
electric tatami
game console
keyboard
PAD flip cover
smart toys

Bathroom
steam spray curler
das water heater
washing machine
smart toilet lid

Bedroom
wall-mounted air conditioner
electric curtain
lift desk

Kitchen
refrigerator
dishwasher
microwave oven
oven
rice cooker
coffee machine
electric juicer
lifting range hood

Balcony
smart doors and windows
electric clothes dryer
treadmill

Garden
garden power tools

Energy supply
smart water meter
smart electric meter
smart gas meter
air purifier

Retail market
electronic price tag
vending machine

MagnTek

Shanghai MagnTek Microelectronics Inc.

3F, Building 6, 99 Haike Road, Zhangjiang Hi-Tech Park, Pudong New Area, Shanghai, China

+86-21-20965129

+86-21-20965130

www.magntek.com.cn

info@magntek.com.cn

WeChat: MagnTek