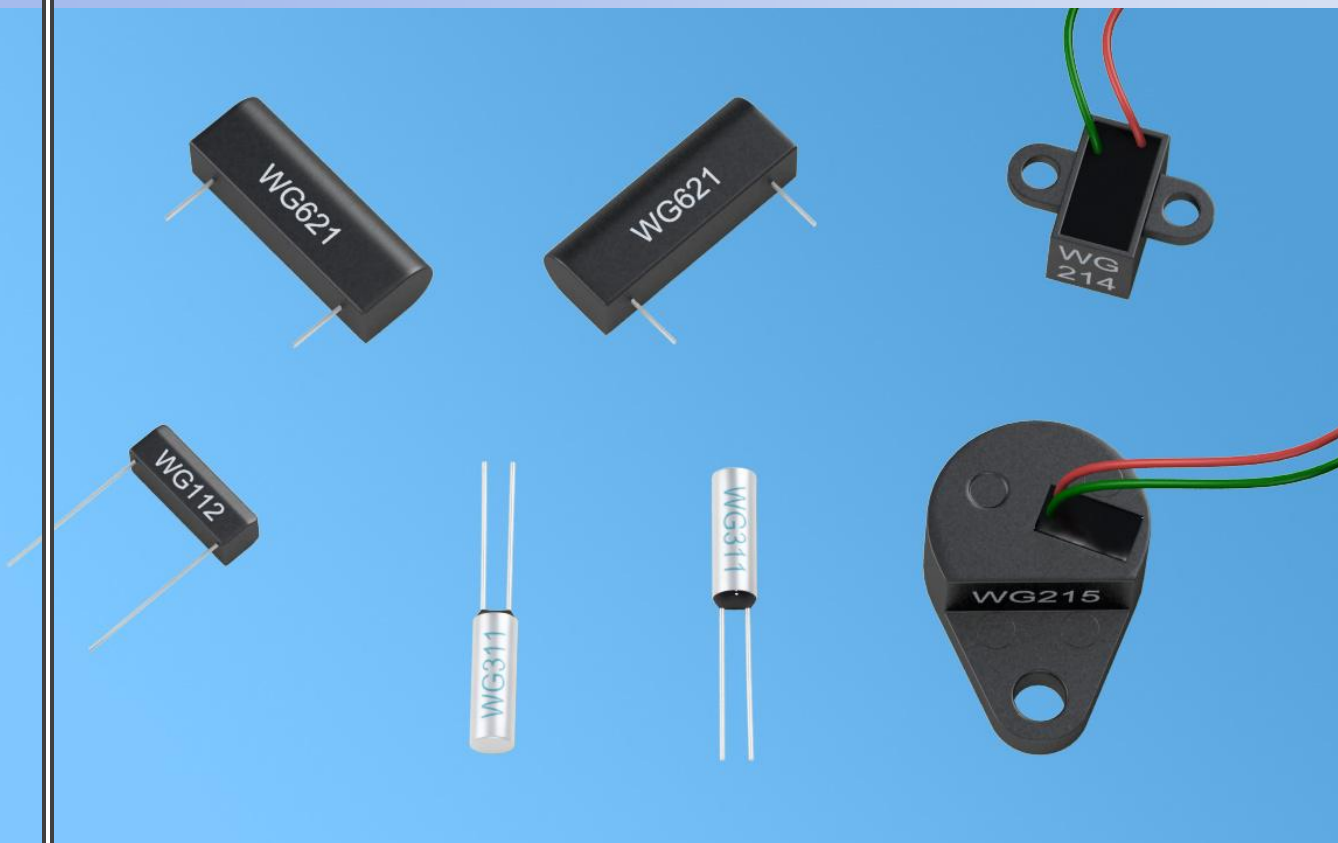


Zero Power Consumption Sensor WG641S



Atiny
Nanjing AH

◆ Features

▶ Operating without external power supply.

▶ Bipolar excitation operation mode

The sensor outputs a pair of positive and negative electric pulse signals when the polarity of the external triggered magnetic field changes for a circle.

▶ Non-contact electromagnetic acquisition

It is an intrinsically safe device without mechanical contact or electric sparks between the magnetic field induction device and the triggered magnetic field.

▶ Constant pulse energy

The value of the pulse energy output from the sensor is independent of the frequency of magnetic field variations and remains constant even the frequency of magnetic field variations are at very low level. At high frequency of magnetic field variations, higher energy values are generated due to additional inductive effects.

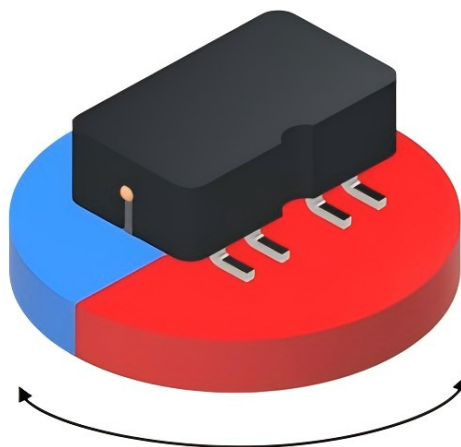
▶ Stable operating performance

Only when the external magnetic field polarity changes, and magnetic induction intensity reaches the excitation threshold, the sensor will outputs a pulse signal, so the vibration won't happen. Pulse output energy still stays constant even after million times of polarity transitions.

▶ LAN management

The output signal can be transmitted remotely by the signal lines, so it's suitable for LAN management.

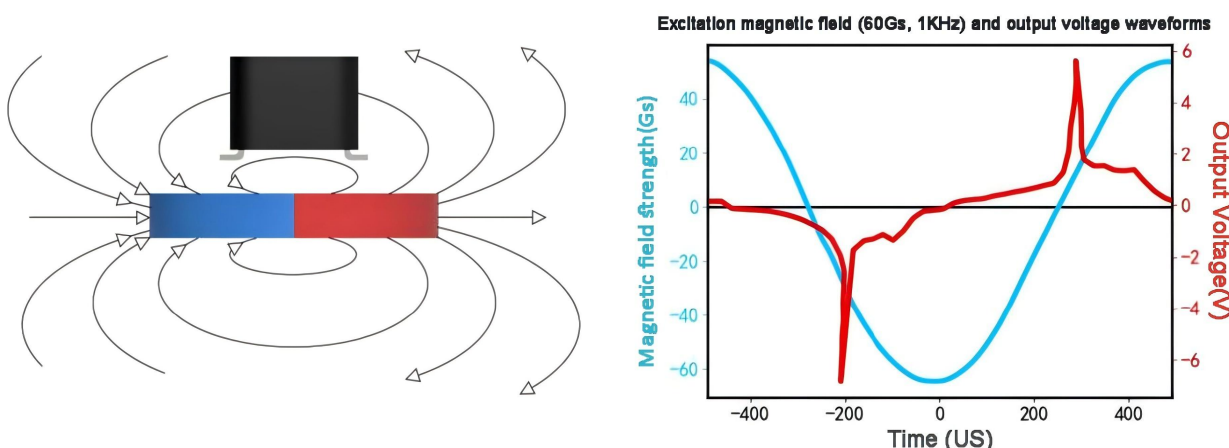
▶ Wide operating temperature range, strong environmental adaptability.



◆ Principle Description

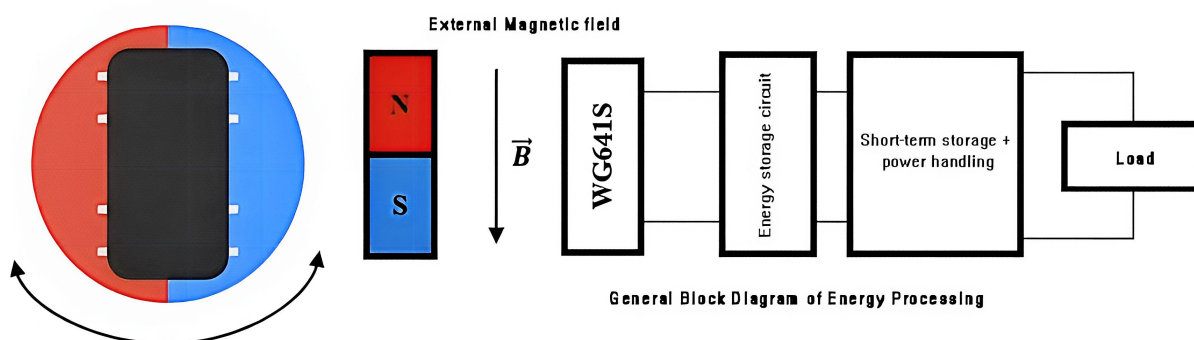
Zero-power consumption sensor is developed based on Wiegand effect theory, that is, after appropriate treatment, the metallurgical phase of the alloy wire will change, its outer shell coercivity is much larger than the inner shell coercivity, relying on this magnetism difference and a certain condition of external applied magnetic field, it can make the magnetization directions of inner core and the outer shell the same or opposite, and a determined external magnetic field can repeat the change of magnetism, this phenomenon is known as the Wiegand effect. Sensors developed based on this effect are generally known as Wiegand sensors, that is zero-power magnetic sensors.

Manufactured on the basis of the Wiegand effect, it can actively generate energy, and it can generate sharp voltage pulse signal without the external power supply, that is, when the polarity of the external magnetic field alternately changes once, it will output a positive or negative pulse. The pulses generated can not only be used as a self-powered pulse signal generator, but also provide energy for ultra-low power devices. It makes zero-power magnetic sensors own unique advantage in low-power and energy-saving applications.

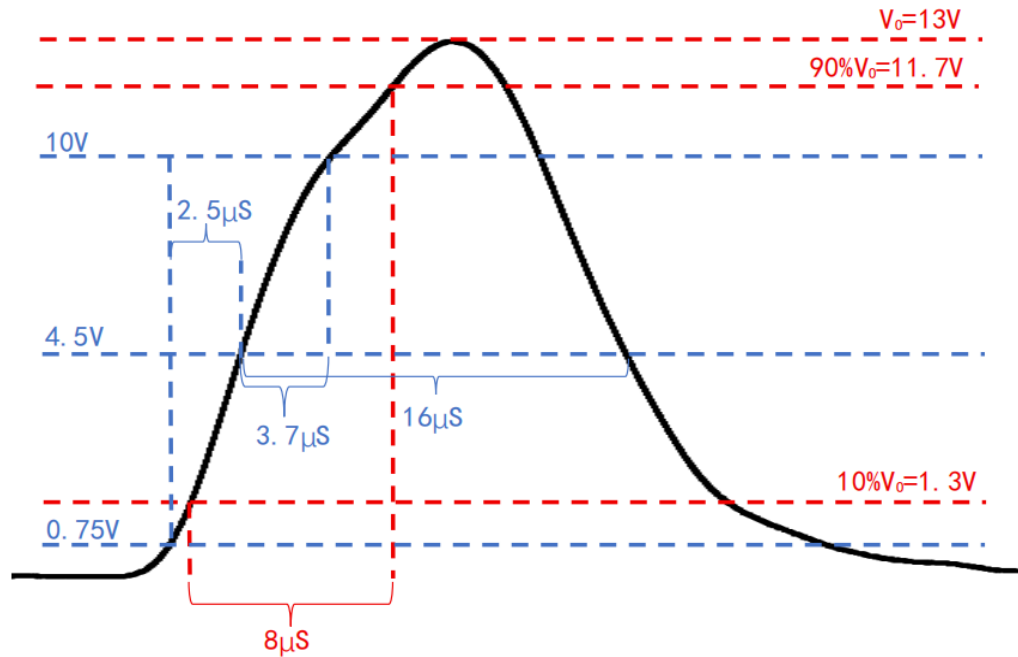


◆ Application

Power-type zero-power magnetic sensors can not only be used as passive pulse signal generators, the generated pulse energy can also be used as a power supply for electronic components. The continuously generated pulse energy can provide the required energy compensation for the circuit. The specialized ultra-low-power chips can ensure that the energy of a single pulse meets the system's triggering or intermittent operating requirements. Such as, multi-turn encoders based on mechanical energy harvesting, medical percutaneous devices based on wireless power transmission, and self-powered IoT sensors.



◆ Typical Waveform



$$①SR_0 = ((11.7 - 1.3) / 8) \text{ V} / \mu\text{S} \approx 1.3 \text{ V} / \mu\text{S}$$

No-load test output waveform

Test frequency: 1 ~ 3KHz.

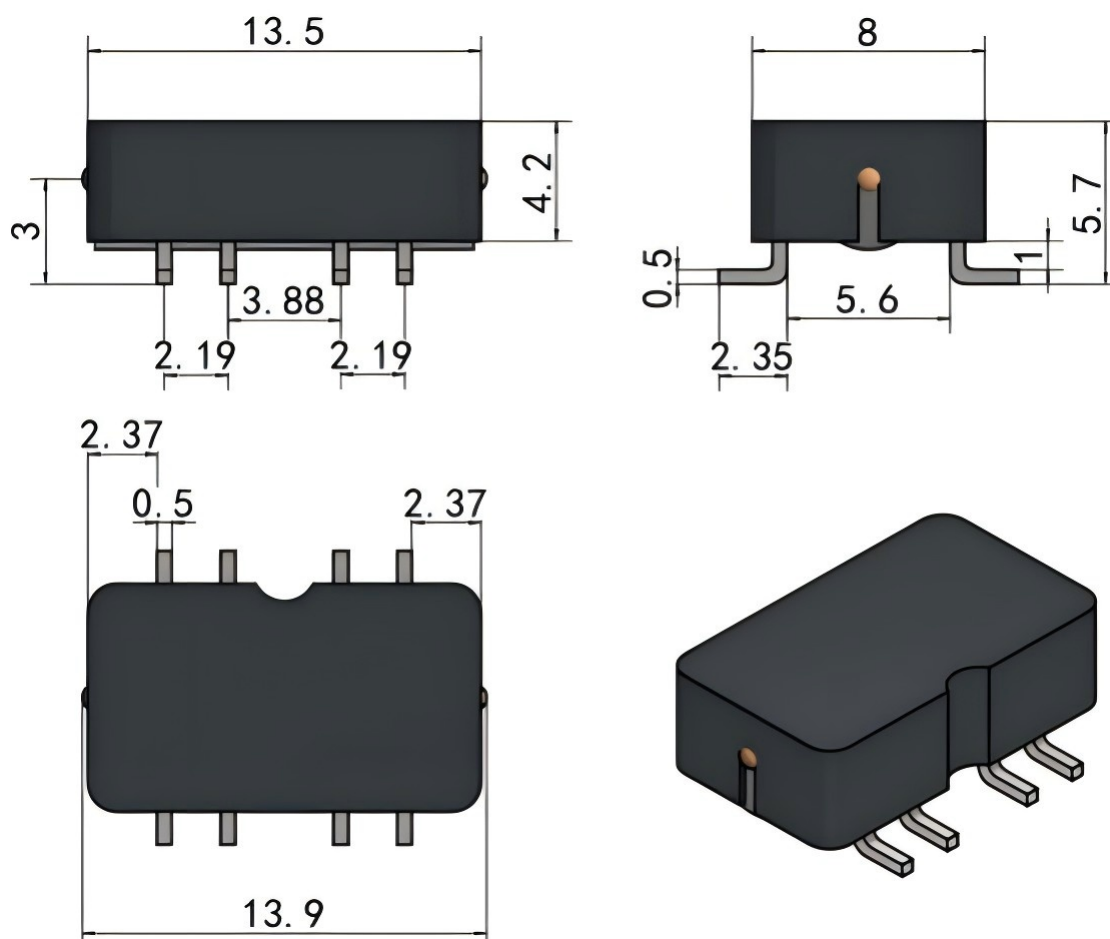
SR_0 : No-load test output waveform slew rate.

(Slew rate) $SR = (V_p[90\%] - V_p[10\%]) / tr$, tr : rise time [$V_p[10\%] \sim 90\%$].

◆ Parameter

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Excitation magnetic field	B	5.5	8	12	mT	(Can be customized according to customer requirements.)
Pulse signal amplitude	V_o	5.5	10	—	V	No-load test(The minimum pulse signal amplitude can be customized according to customer requirements.)
Pulse width	τ	10	—	30	μs	No-load test
Slew rate	SR_o	0.2	—	—	$V/\mu s$	No-load test
DC Internal resistance	R	180	—	240	Ω	—
Inductance	L	19.5	—	24.5	mH	3KHz、1V
Operating frequency	f	—	3	—	KHz	—
Operating temperature	T_o	-40	—	125		(Can be customized according to customer requirements.)
Storage temperature	T_s	-40	—	125		—
Operating humidity	RH_o	—	—	90%	—	—
Storage humidity	RH_s	—	—	90%	—	—

◆ Dimension



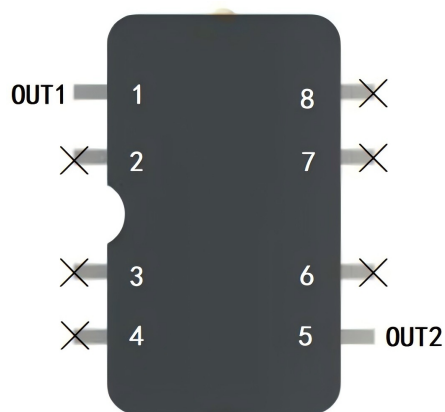
Unit: mm

Tolerance: ± 0.05 ;

Vertical distance from the sensing wire to the bottom pin plane: 3 ± 0.15 ;

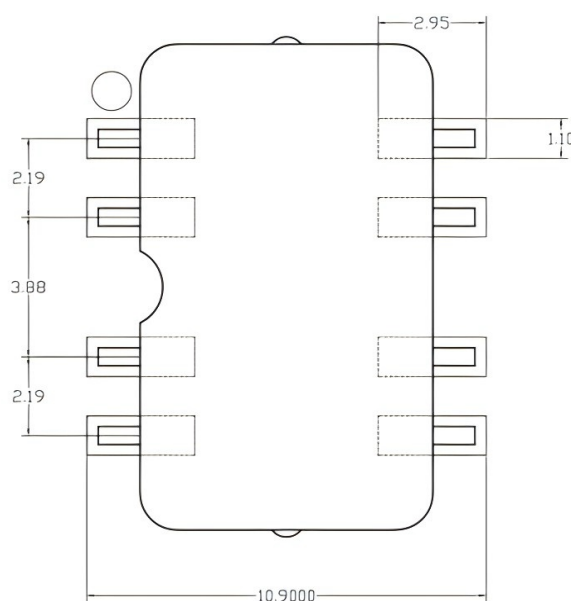
Dimensions and packaging specifications are customizable according to customer requirements.

◆ Pin Description



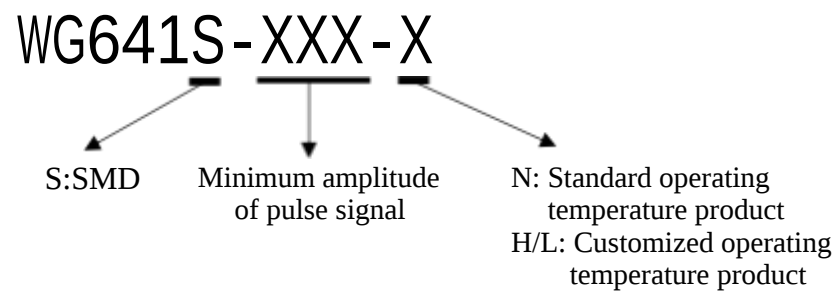
Note: OUT1, OUT2 are output pins.

◆ Packaging Size for Reference



Unit: mm
Tolerance: ± 0.05

◆ Product Model Description



For example, WG641S-055-N: Product Model WG641, surface mount packaging,
minimum amplitude of pulse signal:5.5 V, operating temperature: -40°C~125°C.