

## INDUSTRIAL APPLICATIONS

## Application Note

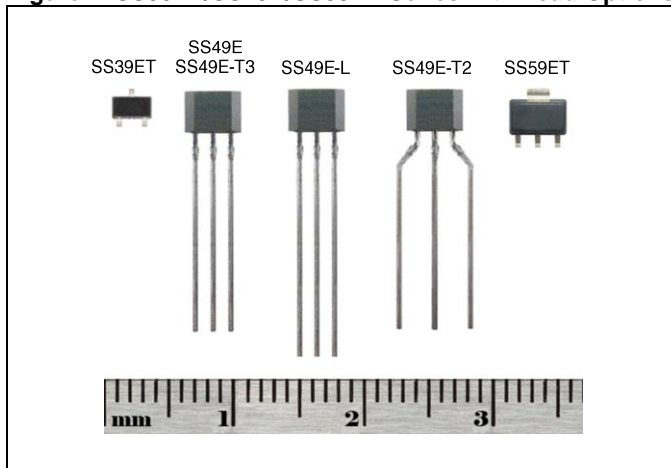
# SS39ET/SS49E/SS59ET Series Linear Magnetic Position Sensor ICs

### INTRODUCTION

SS39ET/SS49E/SS59ET series sensors are small, versatile linear Hall-effect devices that monitor the positive or negative pole on a permanent magnet or an electromagnet up to 1000 Gauss. They can be powered with voltages as low as 2.7 V and are available in three packages:

- **SS39ET:** subminiature SOT-23 surface mount package (tape and reel format)
- **SS49E:** leaded flat TO-92 style package (bulk packaging), SS49E-T2 (formed leads) and SS49E-T3 (straight leads) on tape in ammpack (fan-fold) format
- **SS59ET:** miniature SOT-89B surface-mount package (tape and reel format)

Figure 1. SS39ET/SS49E/SS59ET Series with Lead Options



### FEATURES AND BENEFITS

- **Miniature and subminiature construction:** Designed for compact designs with tight space requirements.
- **Energy efficient:** Low current consumption of 6 mA at 5 Vdc
- **Easy PC board interface:** Single current sourcing output for common electronic circuits
- **Circuit design flexibility:** Voltage range of 2.7 Vdc to 6.5 Vdc
- **Low noise output:** Virtually eliminates the need for filtering
- **Stable output:** Thin film resistors improve accuracy
- **Wide range of environments:** Temperature range of -40 °C to 100 °C [-40 °F to 212 °F]
- **Application flexibility:** Responds to either positive or negative Gauss

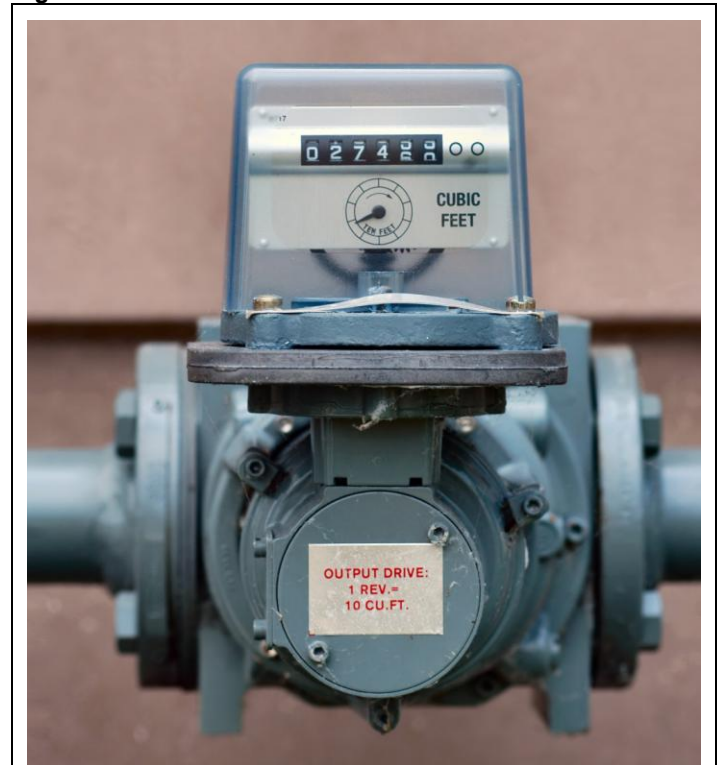
### POTENTIAL INDUSTRIAL & CONSUMER APPLICATIONS

Figures 2 through 6 show a variety of potential applications in which these products may be used.

#### Tamper-Prevention in Utility Meters

Thieves sometimes attempt to bypass the operation of an electric, gas or water meter by attaching a strong magnet to it. The utility usage is underestimated when the magnet saturates the current transformer or slows the spinning wheel.

Figure 2. Natural Gas Meter



Install linear Hall-effect sensors in multiple locations inside the meter to detect the abnormal presence of a magnetic field. Send an alarm to the utility company or record this fraudulent activity in memory for processing at a later date.

#### Customer Benefits

- **Small:** Subminiature sensors easily fit into tight spaces
- **Prevents false detection:** Monitors magnetic fields from a north or south pole up to 1000 Gauss
- **Energy efficient:** Low voltage capability down to 2.7 V
- **High volume use:** Low cost and taping option for automatic component placement make this product suitable for high-volume production

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## Building Security

A secure electronic lock can be designed using an array of linear magnetic sensors configured to detect a specific magnetic pattern. If a strong external magnet were brought in proximity to the array, it would be read as a random attempt and could trigger an alarm. The array of linear Hall-effect sensors could be used to unlock the system only if the magnetic field read by each sensor is of the correct polarity and within acceptable amplitude limits.

Figure 3. Electronic Locks



Without reproducing the exact magnetic flux pattern, it would be virtually impossible to unlock the system with a single, or even multiple, strong magnets. Tiny Honeywell SS39ET Surface-Mount Linear Hall-effect Sensor ICs would provide the needed sensitivity, output and very small size.

## Customer Benefits

- **Small:** Subminiature sensors easily fit into tight spaces
- **Flexible:** Surface-mounting allows for a low-profile array on a PC board
- **Energy efficient:** Low voltage capability down to 2.7 V
- **High volume use:** Low cost and taping option for automatic component placement make this product suitable for high-volume production

## Water Pump Control

A water pump is essentially a special application of an electric motor. These pumps are commonly manufactured for home appliances.

Figure 4. Washing Machine



A linear Hall-effect sensor generates an enhanced control signal for better resolution of the rotor position, which can improve the motor's efficiency.

A crude RPM measurement would verify that the pump is working properly. The output of the sensor may be used as an alarm or a shut-off signal to help prevent motor overload.



Figure 5. Aquarium Pump



A pump may use one or more valves, engage a clutch or gear to begin, or move a lever or piston a specified distance. The linear Hall-effect sensor IC can be used to verify that the valve, clutch, lever or piston is in the specified position.

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Figure 6. Dishwasher



SS39ET/SS49E/SS59ET Series sensors can monitor the current powering the electromagnets in the pump's motor. If the current is not within its normal range, the logic could also perform overload or motor malfunction detection.

## Customer Benefits

- **Small size:** SS39ET is suitable for systems with tight spacing constraints
- **Energy efficient:** Low voltage capability down to 2.7 V
- **High volume use:** Low cost and taping option for automatic component placement make this product suitable for high-volume production

## WARRANTY/REMEDY

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While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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