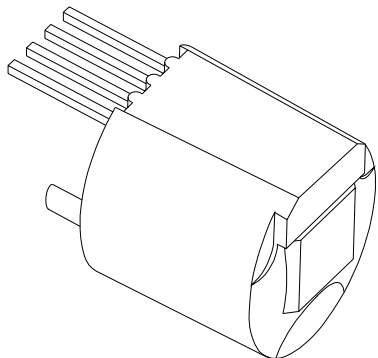


## 610 THRU 640 HALL-EFFECT SUBASSEMBLIES



Dwg. AH-006-5

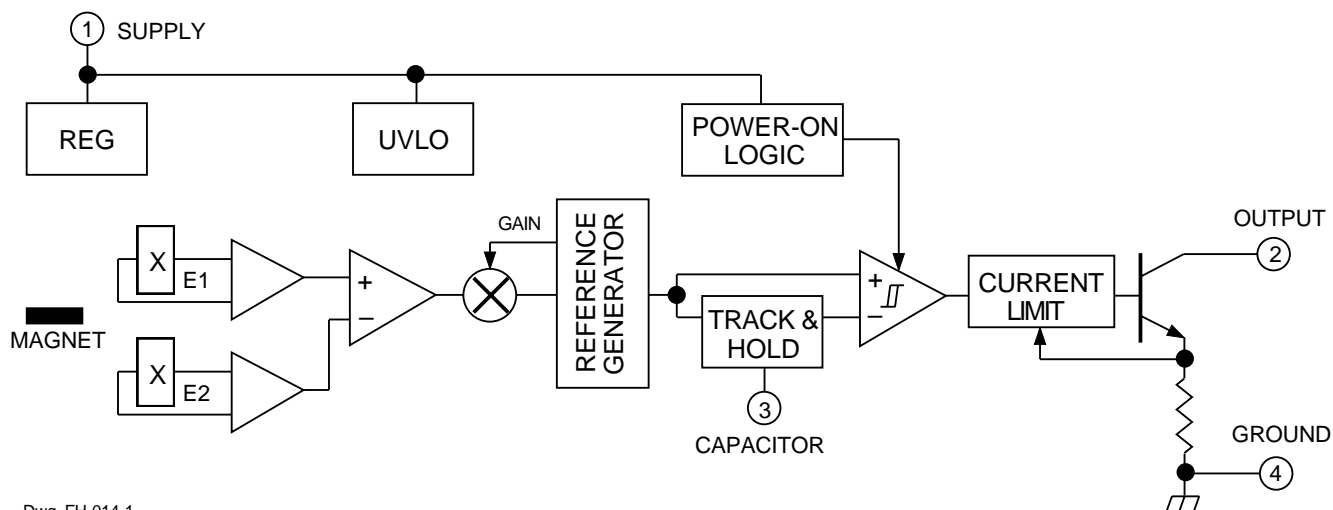
The ATS610 through ATS640 series of devices are optimized Hall-effect IC/magnet combinations that provide complex sensing functions in small packages. See page 11 for a complete listing of devices.

Also, go to [www.allegromicro.com/techpub/tipsats.pdf](http://www.allegromicro.com/techpub/tipsats.pdf) for *Application Notes for the ATS63x Subassembly Line*.

### Typical Features

- Single-Chip Sensing IC for High Reliability
- Optimized Magnetic Circuit
- Small Mechanical Size
- Wide Operating Voltage Range

### Typical Functional Block Diagram (ATS612JSB shown)



Dwg. FH-014-1



# HALL-EFFECT SENSORS

## 3056 THRU 3060 HALL-EFFECT GEARTOOTH (DUAL ELEMENT) SENSORS

Part Numbers	Max Operate	Min Release*	Hysteresis	Features
A3056EU A3056LU	150 G	-150 G	15-90 G	zero speed
A3058EU A3058LU	250 G	-250 G	150-250 G	zero speed
UGN3059KA UGS3059KA	100 G	-100 G	typ 130 G	
UGN3060KA UGS3060KA	35 G	-35 G	typ 30 G	

### Benefits

- Large Effective Air Gap
- Wide Operating Temperature Range
- Operation from Unregulated 4.5 V to 24 V Supply
- High-Speed Operation
- Output Compatible With All Logic Families
- Reverse Battery Protection
- Resistant to Physical Stress

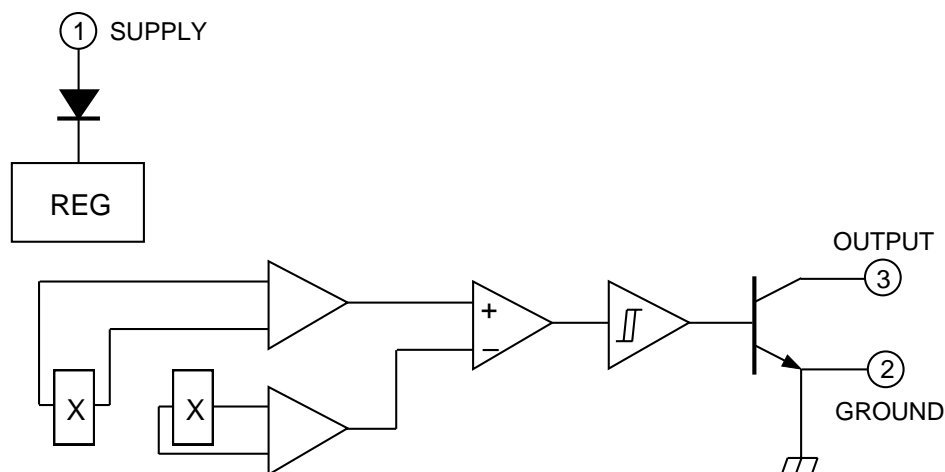
Magnetic characteristics are at  $T_A = +25^\circ\text{C}$ .

\* Algebraic convention, where -150 G is less than 0 G.

Also, see 3421 and 3422 Hall-effect direction detection sensors.

### Typical Functional Block Diagram

A3056EU



Dwg. FH-010

# HALL-EFFECT SENSORS

## 3121 THRU 3123 AND OTHER HALL-EFFECT SWITCHES

Part Number	Max Operate	Min Release	Hysteresis	Supply Voltage	Reverse Protection	Output Current	Features
A3121x	450 G	125 G	70-140 G	4.5-24 V	yes	20 mA	
A3122x	400 G	140 G	70-140 G	4.5-24 V	yes	20 mA	
A3123x	440 G	180 G	70-140 G	4.5-24 V	yes	20 mA	
A3141x	160 G	10 G	20-80 G	4.5-24 V	yes	20 mA	
A3142x	230 G	75 G	30-80 G	4.5-24 V	yes	20 mA	
A3143x	340 G	165 G	30-80 G	4.5-24 V	yes	20 mA	
A3144x	350 G	50 G	min 20 G	4.5-24 V	yes	20 mA	
A3161x	160 G	30 G	min 5 G	3.5-25 V	yes	3.5/15 mA	2-wire
UGN3235K	175 G	25 G	15-100 G	4.5-24 V	no	20 mA	2 outputs
	-175 G	-25 G	15-100 G	4.5-24 V	no	20 mA	
A3240x	50 G	5 G	typ 10 G	4.2-24 V	yes	20 mA	stabilized
A3361x	125 G	40 G	5-30 G	3.5-24 V	no	6.5/14.5 mA	2-wire stabilized inverted 3362
A3362x	125 G	40 G	5-30 G	3.5-24 V	no	6.5/14.5 mA	2-wire stabilized

Magnetic characteristics are at  $T_A = +25^\circ\text{C}$ .

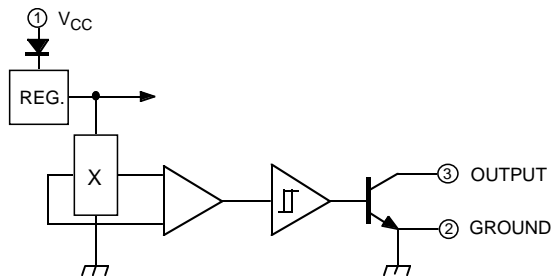
"x" is additional characters to indicate operating temperature range and package style.

\* Algebraic convention, where -50 G is less than 0 G.

See also, 3150 programmable, chopper-stabilized Hall-effect switch,  
3209 and 3210 micropower, ultra-sensitive Hall-effect switches, and  
5140 protected, PowerHall® sensor.

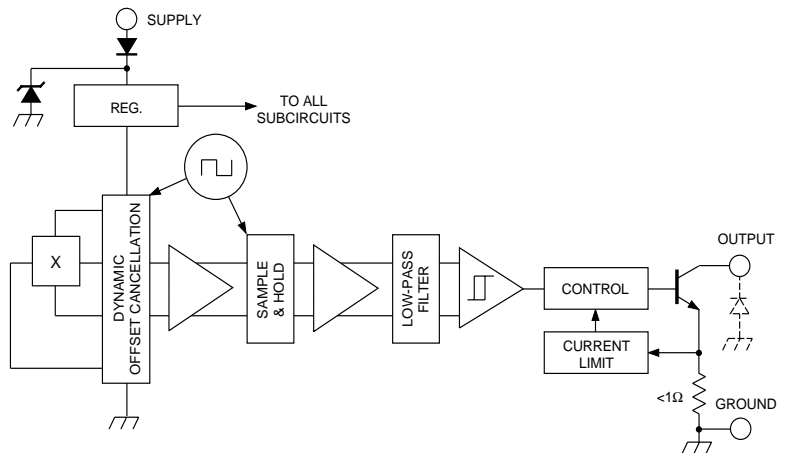
### Typical Functional Block Diagrams

A3121ELL



Dwg. FH-005-2

A3240ELH



Dwg. FH-020-1

# HALL-EFFECT SENSORS

## 3132 THRU 3134 AND OTHER HALL-EFFECT LATCHES & BIPOLAR SWITCHES

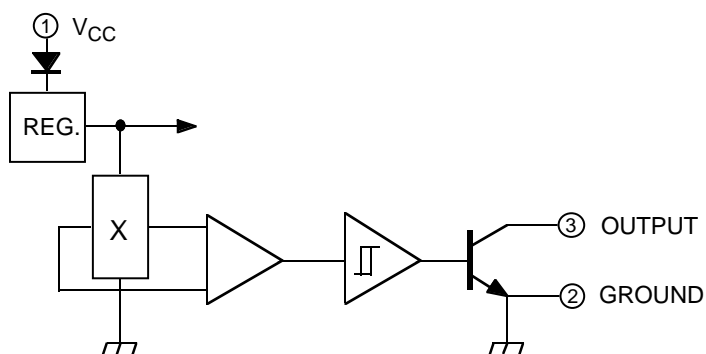
Part Number	Max Operate	Min Release*	Hysteresis	Supply Voltage	Reverse Protection	Output Current	Features
UGx3132x	95 G	-95 G†	min 30 G	4.5-24 V	yes	20 mA	bipolar
UGx3133x	75 G	-75 G†	min 30 G	4.5-24 V	yes	20 mA	bipolar
A3134x	50 G	-50 G*	10-50 G	3.8-24 V	yes	20 mA	bipolar
UGN3175x	170 G	-170 G	min 100 G	4.5-18 V	yes	10 mA	
UGN3177x	150 G	-150 G	min 100 G	4.5-18 V	yes	10 mA	
A3185x	270 G	-270 G	340-540 G	3.8-24 V	yes	20 mA	
A3187x	150 G	-150 G	100-300 G	3.8-24 V	yes	20 mA	
A3188x	180 G	-180 G	200-360 G	3.8-24 V	yes	20 mA	
A3189x	230 G	-230 G	100-460 G	3.8-24 V	yes	20 mA	
A3195x	160 G	-160 G	min 130 G	3.8-26 V	yes	-20 to +5 mA	protected
A3197x	160 G	-160 G	min 130 G	4.5-26 V	yes	30 mA	protected
A3260x	30 G	-30 G	typ 20 G	3.5-24 V	yes	6.5/14.5 mA	bipolar, 2-wire stabilized
UGN3275K	250 G	-250 G	min 100 G	4.5-24 V	no	20 mA	complementary outputs
A3280x	40 G	-40 G	typ 45 G	4.2-24 V	yes	20 mA	stabilized
A3281x	90 G	-90 G	typ 100 G	4.2-24 V	yes	20 mA	stabilized
A3283x	180 G	-180 G	typ 300 G	4.2-24 V	yes	20 mA	stabilized

Magnetic characteristics are at  $T_A = +25^\circ\text{C}$ .

"x" is additional character(s) to indicate package style and/or operating temperature range.

\*Algebraic convention, where -150 G is less than 0 G.

**Typical Functional Block Diagram**  
(UGN3175UA shown)



Dwg. FH-005-2

Latches will not switch on removal of the magnetic field; bipolar switches may switch on removal of the magnetic field but require field reversal for reliable operation over the operating temperature range.

This page intentionally left blank

# HALL-EFFECT SENSORS

## 3209, 3210, AND 3212 MICROPOWER, ULTRA-SENSITIVE HALL-EFFECT SWITCHES



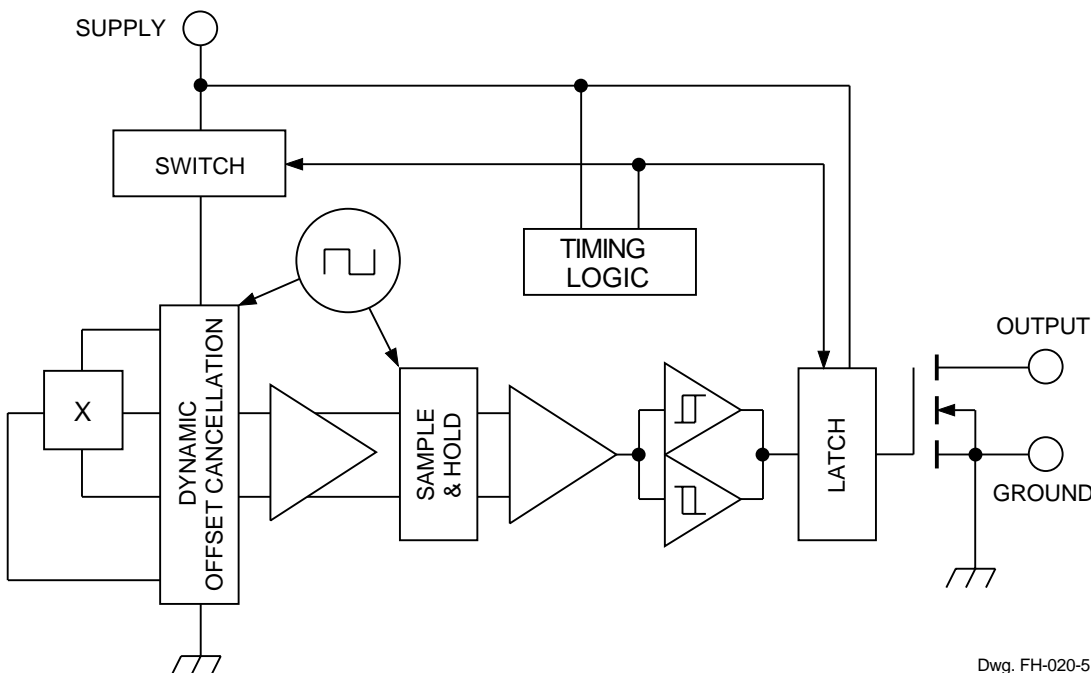
### Features

- Micropower Operation
- Operate with North or South Pole
- 2.5 V to 3.5 V Battery Operation
- Chopper Stabilized  
Superior Temperature Stability  
Extremely Low Switch-Point Drift  
Insensitive to Physical Stress
- Solid-State Reliability
- Small Size
- Easily Manufacturable with  
Magnet Pole Independence

**Part Numbers:** A3209ELH, A3209EUA,  
A3210ELH, A3210EUA, A3212ELH, A3212EUA,  
A3212LLH, and A3212LUA

These Hall-effect switches are ultra-sensitive, pole independent, Hall-effect switches with a latched digital output. They are especially suited for operation in battery-operated, hand-held equipment such as cellular and cordless telephones, pagers, and palmtop computers. 2.5 to 3.5 volt operation and a unique clocking scheme reduce the average operating power requirements to typically 15  $\mu\text{W}$  for the A3212, 25  $\mu\text{W}$  for the A3210, or 400  $\mu\text{W}$  for the A3209!

Unlike other Hall-effect switches, either a north or south pole of sufficient strength will turn the output on; in the absence of a magnetic field, the output is off. The polarity independence and minimal power requirement allows these devices to easily replace reed switches for superior reliability and ease of manufacturing, while eliminating the requirement for signal conditioning.



Dwg. FH-020-5

## 3421 AND 3422 HALL-EFFECT DIRECTION-DETECTION SENSORS

These monolithic integrated circuits contain two independent Hall-effect latches whose digital outputs are internally coupled to CMOS logic circuitry that decodes signal speed and direction. Extremely low-drift BiCMOS circuitry is used for the amplifiers to ensure symmetry between the two latches so that signal quadrature can be maintained. An on-chip voltage regulator allows the use of these devices from a 4.5 V to 18 V supply. These highly sensitive, temperature-stable, magnetic transducers are ideal for use in digital-encoder systems in the harsh environments of automotive or industrial applications. The A3421xKA is a high-hysteresis device designed for low-resolution pulse counting while the A3422xKA is a high-sensitivity device optimized for use with high-density magnets. Both devices have standard open-collector outputs; the logic operation of both devices is the same.

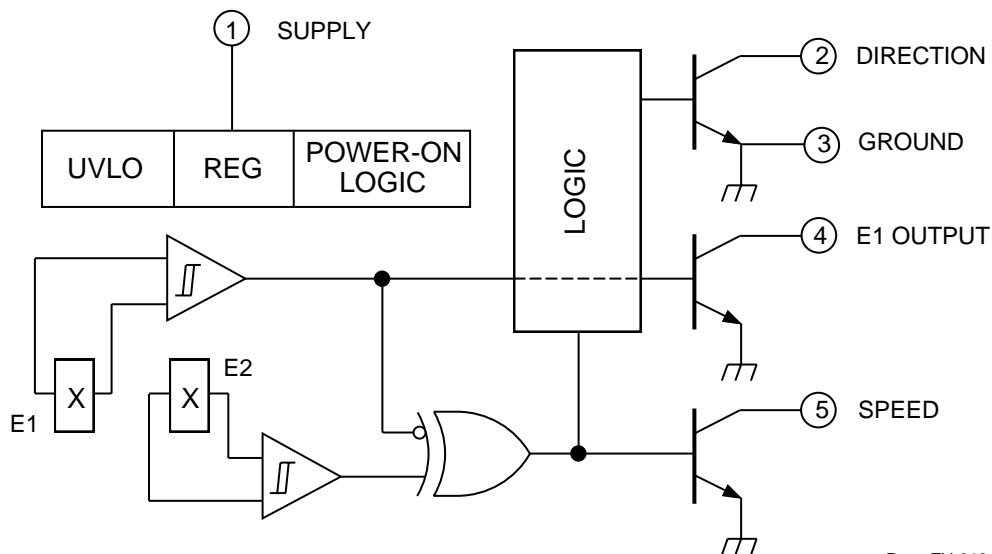
### Features

- Internal Direction-Decoding Circuitry
- Two Matched Hall Latches On A Single Substrate
- Superior Temperature Stability
- 4.5 V to 18 V Operation
- Electrically Defined Power-On State
- Under-Voltage Lockout

Part Numbers	Max Operate	Min Release*	Hysteresis
A3421EKA A3421LKA	280 G	-280 G	min 260 G
A3422EKA A3422LKA	75 G	-75 G	min 10 G

\*Algebraic convention, where -75 G is less than 0 G.

### Functional Block Diagram





# HALL-EFFECT SENSORS

## 3503 THRU 3518 RATIOMETRIC, LINEAR HALL-EFFECT SENSORS

Part Number	Sensitivity mV/G	Supply Voltage	Features
UGN3503x	1.3	4.5-6 V	-20°C to +85°C
A3515x	5.0	4.5-5.5 V	-40°C to +150°C, chopper stabilized, improved stability
A3516x	2.5	4.5-5.5 V	-40°C to +150°C, chopper stabilized, improved stability
A3517x	5.0	4.5-5.5 V	-40°C to +150°C, chopper stabilized
A3518x	2.5	4.5-5.5 V	-40°C to +150°C, chopper stabilized

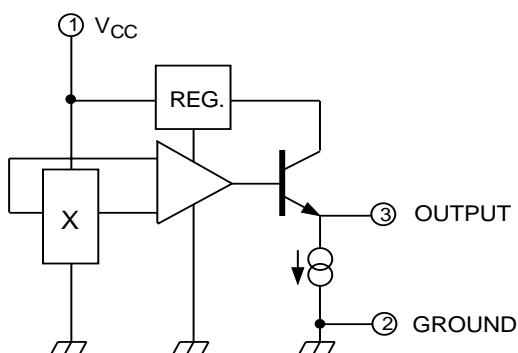
Magnetic characteristics are at  $T_A = +25^\circ\text{C}$ .

“x” is additional character(s) to indicate package style and/or operating temperature range.

Ratiometric, linear Hall-effect sensors do not include internal voltage regulators. See low dropout regulators at power conversion/power management.

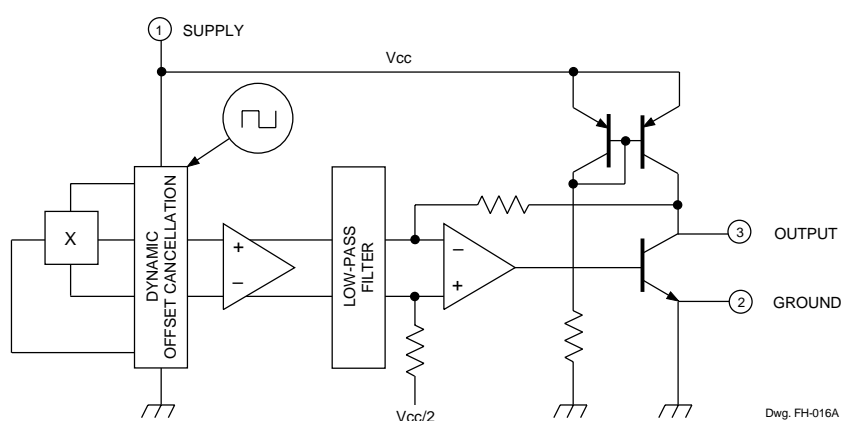
### Functional Block Diagrams

UGN3503LT and UGN3503UA



Dwg. FH-007

A3515LUA thru A3518LUA



Dwg. FH-016A

## ***PROTECTED POWERHALL<sup>®</sup> SENSOR – LAMP/SOLENOID DRIVER***

### **Features**

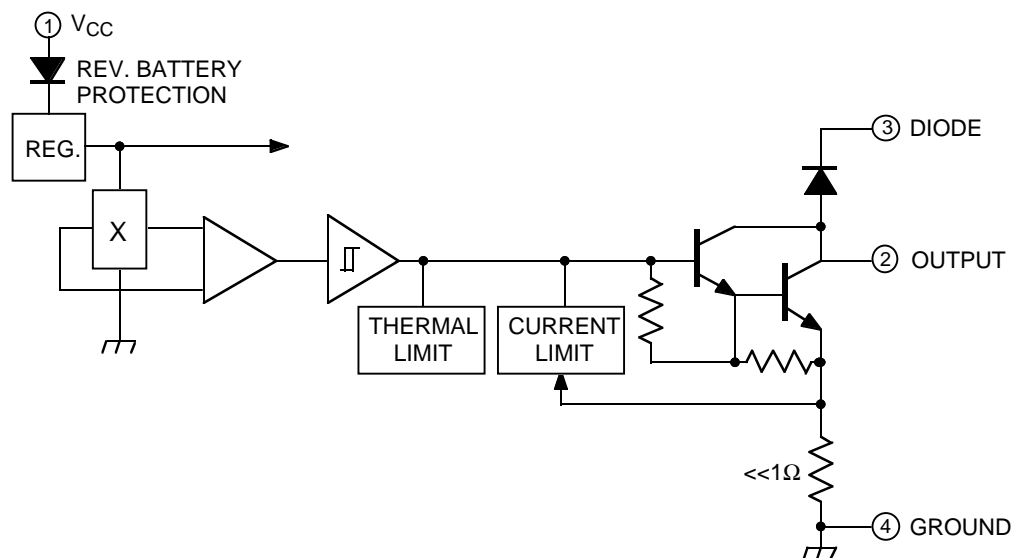
- Magnetically Actuated Power Switch
- Temperature-Compensated Switch Points
- High Current-Sink Capability  
300 mA Continuous  
900 mA Peak Current Limit
- Output Short-Circuit Protection
- 4.5 V to 24 V Operation
- Low Quiescent Standby Current
- Linear Thermal Limiting
- Automotive Temperature Range  
-40°C to +85°C, Operating
- Internal Inductive Flyback/Clamp Diode Protection
- Reverse Battery Protection
- Low-Profile 4-Pin Mini-SIP

**Part Number:** UGQ5140K

This unipolar Hall effect switch is a monolithic integrated circuit designed for magnetic actuation of low-power incandescent lamps or inductive loads such as relays or solenoids. Included on chip is a Darlington power output that is capable of continuously sinking in excess of 300 mA. Internal protection circuitry limits surge (lamp turn-ON) or fault currents to approximately 900 mA. A sensitive magnetic threshold allows the device to be used in conjunction with inexpensive magnets or in applications that require relatively large operating distances.

Each sensor/driver includes a magnetic sensing Hall voltage generator, operational amplifier, Schmitt trigger, voltage regulator, and an open-collector, high-gain Darlington power output stage. The regulator allows use of the device with supply voltages of 4.5 V to 28 V. On-chip compensation circuitry stabilizes switch-point performance over temperature.

### **Functional Block Diagram**



Dwg. FH-001