

## Description

The DIODES™ AH49FQ is a small, versatile linear Hall effect device that is operated by the magnetic field from a permanent magnet or an electromagnet. The output voltage is set by the supply voltage and varies in proportion to the strength of the magnetic field.

The integrated circuitry features low-noise output, which makes it unnecessary to use external filtering components. It also includes precision resistors to provide increased temperature stability and accuracy. The operating temperature range of these linear Hall sensors is -40°C to +105°C, appropriate for automotive, commercial, consumer, and industrial environments.

The AH49FQ is available in SC59 package.

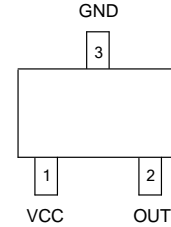
## Features

- Power Consumption of 3.0mA at  $V_{CC} = 5V$  for Energy Efficiency
- Single Current Sourcing Output
- Linear Voltage Output for Circuit Design Flexibility
- Low-Noise Output Virtually Eliminates the Need for Filtering
- A Stable and Accurate Output
- Temperature Range: -40°C to +105°C
- Responds to Either Positive or Negative Gauss
- The Maximum Instantaneous Supply Voltage up to 50V
- High ESD Rating: 3000V (Human Body Model)  
2000V (Charged Device Model)
- Small Low Profile SC59 Package
- AEC-Q100 Grade 2 Qualified
- **Totally Lead-free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The AH49FQ is suitable for automotive applications requiring specific change control; this part is AEC-Q100 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**  
<https://www.diodes.com/quality/product-definitions/>

Notes: 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.  
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.  
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

## Pin Assignments

(Top View)



**SC59**

## Applications

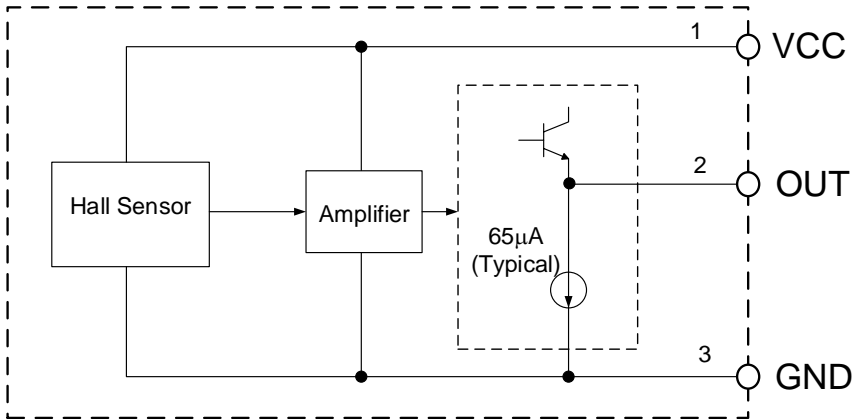
- Position sensing
- Liquid level sensing
- Weight sensing
- Ferrous metal detectors
- Vibration sensing
- Rotary encoders
- Magnetic code reading
- Motor controls
- Current sensing

**Pin Descriptions**

Package Type: SC59

Pin Number	Pin Name	Description
1	VCC	Power supply pin
2	OUT	Output pin
3	GND	Ground pin

**Functional Block Diagram**



## Absolute Maximum Ratings (Note 4)

Symbol	Parameter	Rating	Unit
V <sub>CC</sub>	Supply Voltage	10	V
V <sub>CC_INST</sub>	Instantaneous Supply Voltage	50	V
P <sub>D</sub>	Power Dissipation	230	mW
T <sub>A</sub>	Ambient Temperature	-40 to +125	°C
T <sub>STG</sub>	Storage Temperature	-50 to +150	°C
—	ESD (Human Body Model)	3000	V
—	ESD (Charged Device Model)	2000	V

Note: 4. Stresses greater than those listed under *Absolute Maximum Ratings* can cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to *Absolute Maximum Ratings* for extended periods can affect device reliability.

## Recommended Operating Conditions (@T<sub>A</sub> = +25°C)

Symbol	Parameter	Min	Max	Unit
V <sub>CC</sub>	Supply Voltage	3	8	V
T <sub>OP</sub>	Operating Temperature	-40	+105	°C

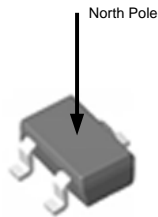
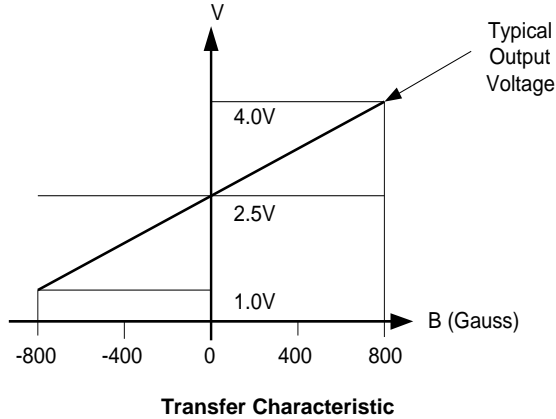
## Electrical Characteristics (@V<sub>CC</sub> = 5V, T<sub>A</sub> = +25°C, unless otherwise specified.)

Symbol	Parameters	Conditions	Min	Typ	Max	Unit
I <sub>CC</sub>	Supply Current	—	2	3	4	mA
		T <sub>A</sub> = -40°C to +105°C	—	3	6.5	
V <sub>NULL</sub>	Quiescent Output Voltage	B = 0 (Gauss)	2.25	2.5	2.75	V
		B = 0 (Gauss), T <sub>A</sub> = -40°C to +105°C	2.2	2.5	2.8	
V <sub>SEN</sub>	Output Voltage Sensitivity	B = 0 to ±600 (Gauss)	1.7	2.1	2.5	mV/Gauss
		B = 0 to ±600 (Gauss) T <sub>A</sub> = -40°C to +105°C	0.7	2.1	3.3	
V <sub>OUT_S</sub>	Output Voltage Span	—	1.0 to (V <sub>CC</sub> - 1.0)	0.8 to (V <sub>CC</sub> - 0.8)	—	V
R <sub>OUT</sub>	Output Resistor	—	—	60	120	Ω
B	Linear Magnetic Range	—	±500	±800	—	Gauss
—	Linearity of Span	—	—	0.7	—	%
—	Output Noise	Bandwidth = 410Hz to 10kHz	—	90	—	μV

**Transferring Characteristics (@V<sub>CC</sub> = 5V)**

When there is no external magnetic field (B=0Gauss), the quiescent output voltage is one-half the supply voltage in general.

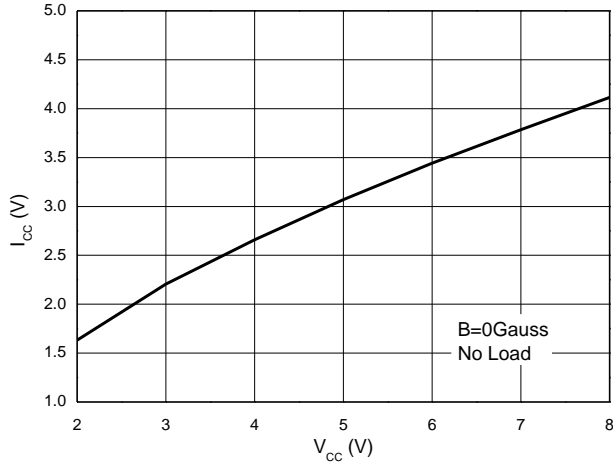
In the AH49FQ, the die is placed underneath the lead frame and therefore when a magnet pole approaches the SC59 part marking surface, the largest magnetic sensitivity is obtained with a supply voltage of 8V, but at the cost of increased supply current and a slight loss of output symmetry. So, it is not recommended to work in such condition unless the output voltage magnitude is a main issue. The output signal can be capacitively coupled to a next-level amplifier for further amplifying if the changing frequency of the magnetic field is high.



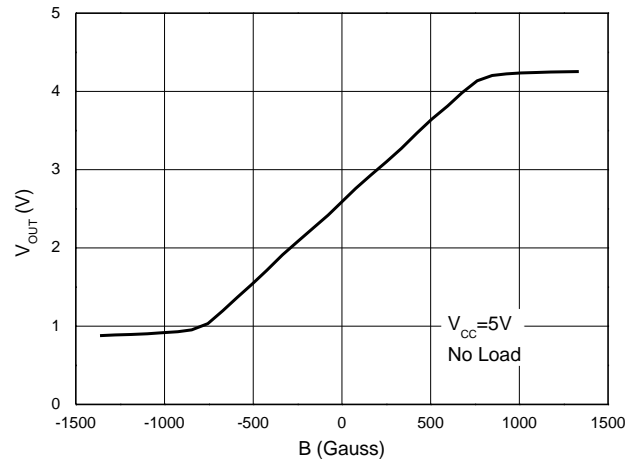
**Magnetic Characteristic For SC59**

**Performance Characteristics**

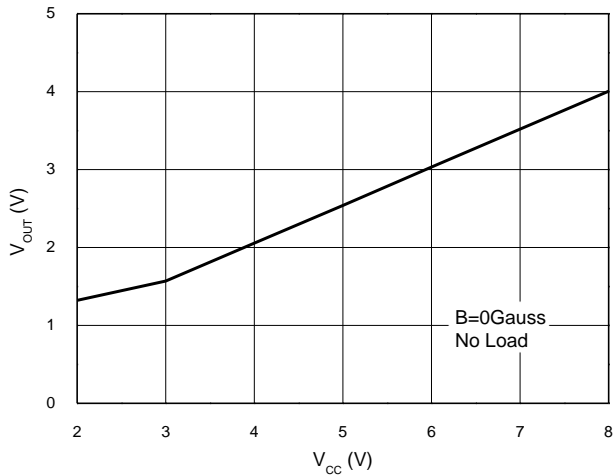
**Supply Current vs. Supply Voltage**



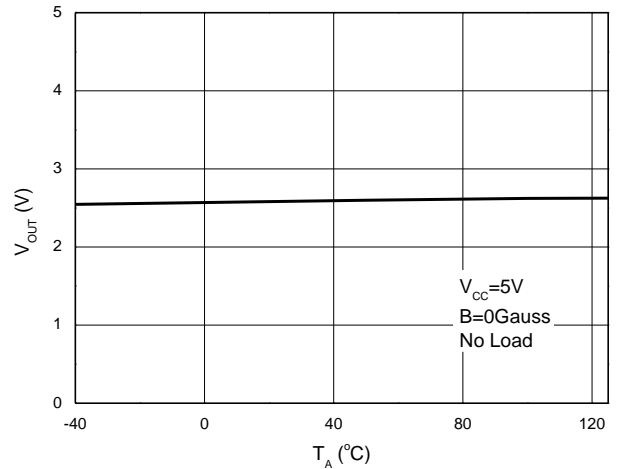
**Output Voltage vs. Magnetic Field**



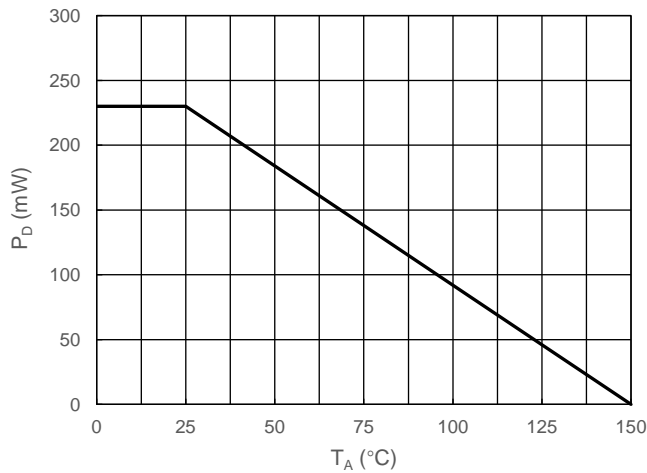
**Output Voltage vs. Supply Voltage**



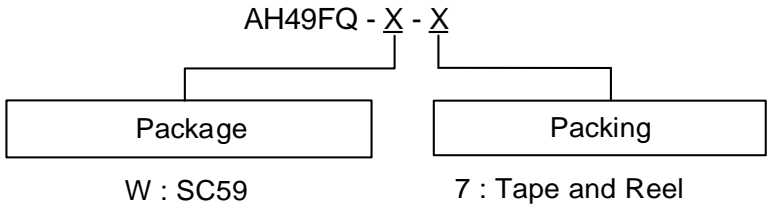
**Output Voltage vs. Ambient Temperature**



**Power Dissipation vs. Ambient Temperature**



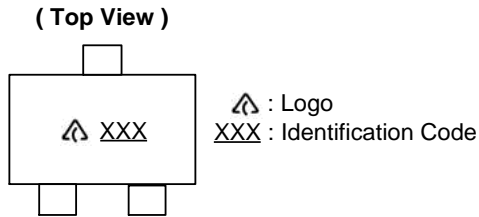
**Ordering Information**



Part Number	Temperature Range	Package	Identification Code	Packing	
				Qty.	Carrier
AH49FQ-W-7	-40°C to +105°C	SC59	VRQ	3000	7" Tape & Reel

**Marking Information**

Package Type: SC59

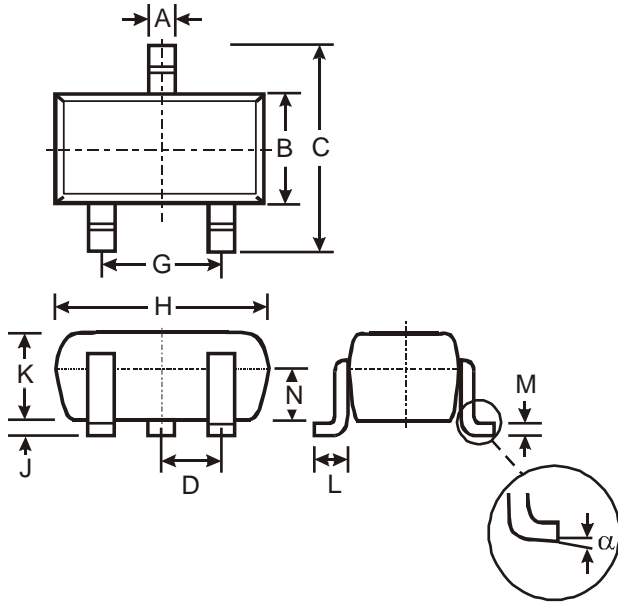


Part Number	Package	Identification Code
AH49FQ-W-7	SC59	VRQ

**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

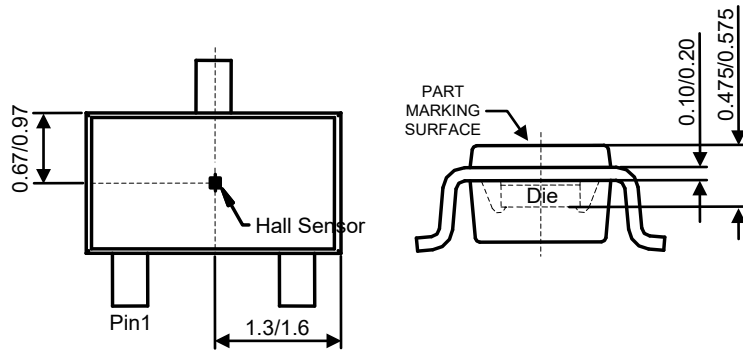
**SC59**



SC59			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
G	-	-	1.90
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	-

**All Dimensions in mm**

**Min/Max**

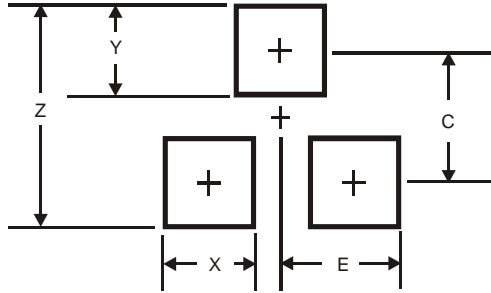


**Sensor Location**

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SC59



Dimensions	Value (in mm)
Z	3.4
X	0.8
Y	1.0
C	2.4
E	1.35

**Mechanical Data**

- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.0155 grams (Approximate)



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