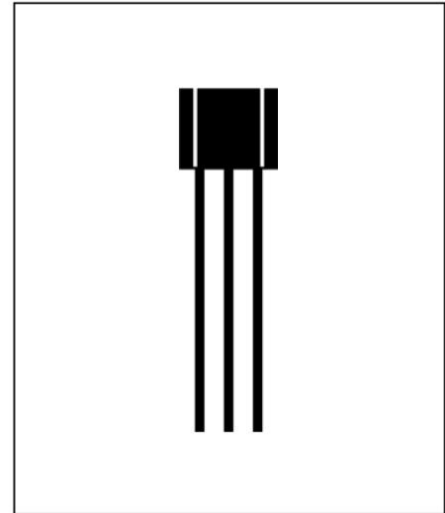


Features

- High sensitivity
- Digital output signal
- Zero speed detection
- Short circuit protection
- Insensitive to orientation
- Wide voltage working range
- Self-adjusting magnetic range
- On-chip 12 bit A/D converter
- High speed operation
- No chopper delay applications
- RoHS compliant



SIP-3

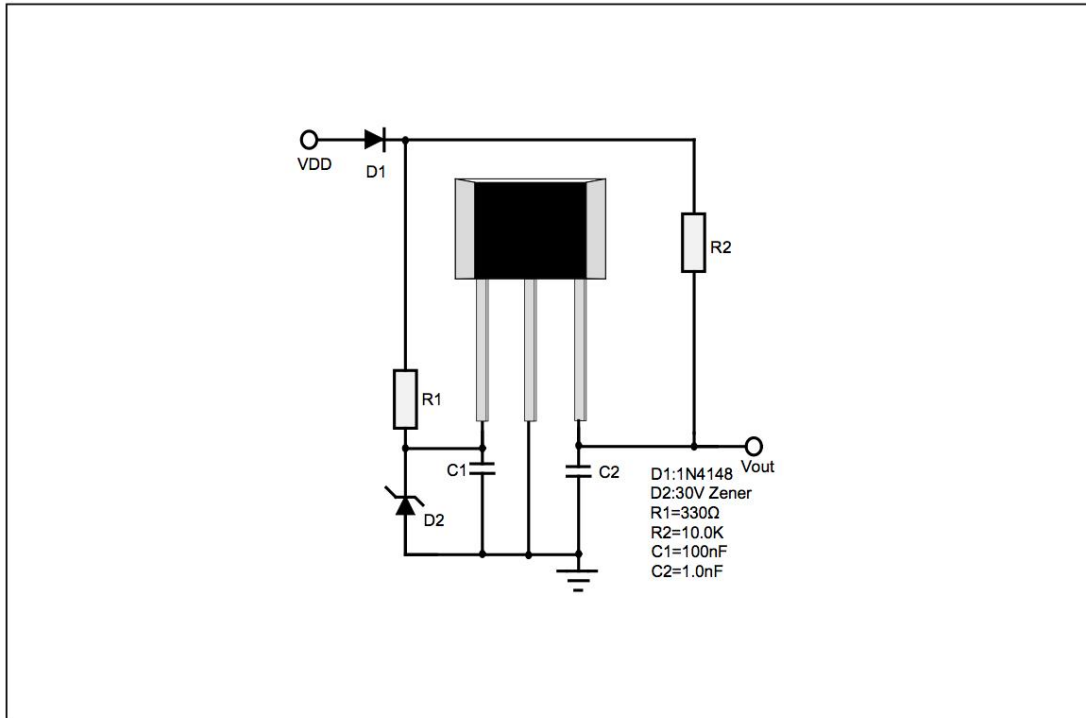
Application

- Camshaft sensor
- Gear tooth sensor
- Speed sensor
- Direction detection

The HAL90217 is a sophisticated IC featuring an on-chip 12-bit A/D Converter and logic that acts as a digital sample and hold circuit. A separate 6-bit D/A converter provides a fixed hysteresis. The HAL90217 does not have a chopper delay. The HAL90217 uses a single Hall plate which is immune to rotary alignment problems. The bias magnet can be from 1000GS to 4000Gs. As the signal is sampled, the logic recognizes an increasing or decreasing flux density.

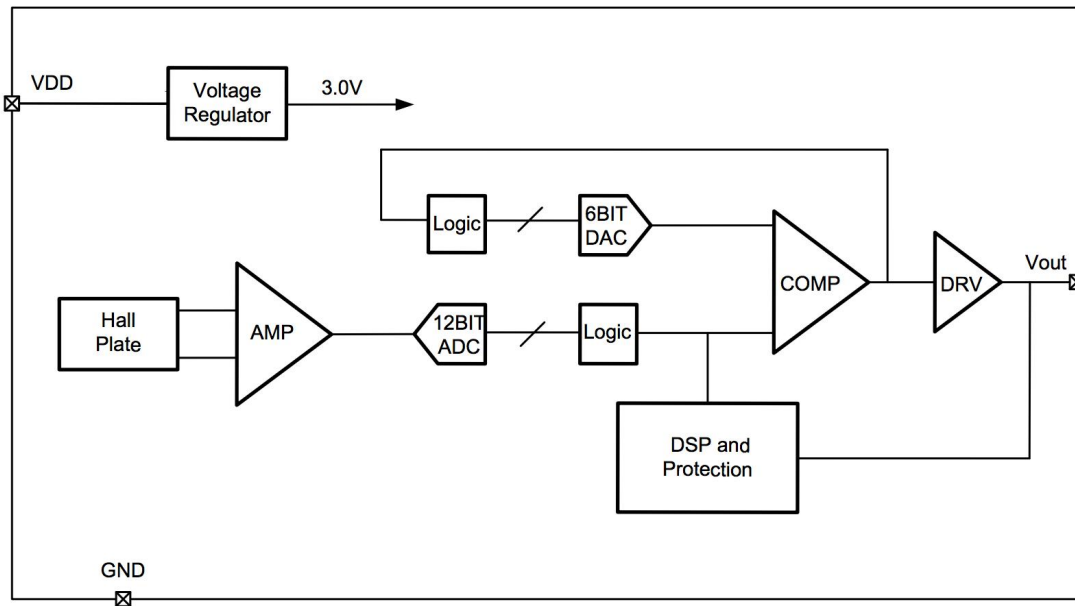
The output will turn on (BOP) after the flux has reached its peak and decreased by an amount equal to the hysteresis. Similarly the output will turn off (BRP) after the flux has reached its minimum value and increased by an amount equal to the hysteresis.

Application Circuit and Pin Configuration



Number	Name	Function
1	VDD	Connects power supply to chip
2	GND	Ground terminal
3	Vout	Signal Output

Block Diagram



Absolute Maximum Rating

Parameter	Limit Values	
	Min.	Max.
Supply Voltage (Operating), V_{DD}	-0.3V	30V
Output Voltage, V_O	-0.3V	30V
Supply Current (Fault), I_{DD}	--	50mA
Output Current (Fault), I_{OUT}	--	30mA
Output Current (Fault), I_{fault}	--	200mA
Junction temperature, T_J (5000h)	--	150°C
Junction temperature, T_J (2000h)	--	160°C
Junction temperature, T_J (1000h)	--	170°C
Junction temperature, T_J (100h)	--	180°C
Operating Temperature Range, T_A	- 40°C	150°C
Storage Temperature Range, T_s	- 65°C	150°C

ESD Protection

Human Body Model (HBM) tests

Parameter	Symbol	Max.	Unit	Note
ESD	V_{ESD}	8	kV	According to standard EIA/JESD22-A114-B HBM

Electrical Specifications

DC Operating Parameters TA = -40°C to 150°C, VDD = 4.0V to 30V (unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage	V _{DD}	Operating	4.0	12	30	V
Supply Current	I _{DD}	V _{DD} = 12V	1.5	3.0	4.5	mA
Power-Up State	POS	V _{DD} > V _{DD(min)}	H	H	H	
Supply Current	I _{DD}	V _{DD} = 4.0V to 30V	1.0	--	6.0	mA
Leakage Current	I _{LEAK}	V _{OUT} = 4.0V to 30V	--	--	10	μA
Output Current	I _{OUT}	Operating	--	--	25	mA
Output Saturation Voltage	V _{SAT}	V _{DD} = 12V, I _{OUT} = 25 mA	--	--	600	mV
Output Current Limit	I _{Limit}	V _{DD} = 12V	50	100	150	mA
Output Short Circuit Shutdown	T _{FAULT}	Fault	10		20	μS
Clock Frequency	F _{clk}	Operating	400	500	600	KHz
Output Rise Time	T _r	V _{DD} =12V, R1 = 1.0K, Cload=10pF	--	--	400	nS
Output Fall Time	T _f	V _{DD} =12V R1 = 1.0K, Cload=10pF	--	--	400	nS
Bandwidth	BW	Operating	--	--	15	KHz
Thermal Resistance	RTH	Operating	--	--	200	°C/Watt

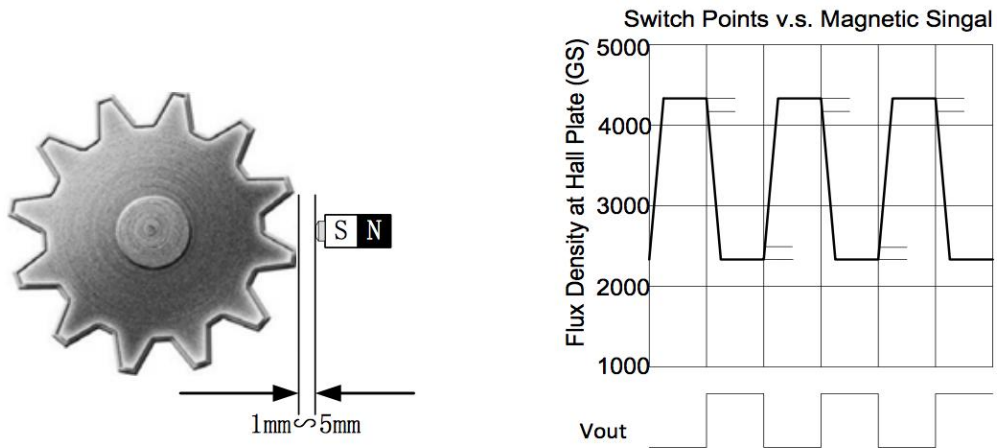
Magnetic Specifications

DC Operating Parameters TA = -40°C to 150°C, VDD = 4.0V to 30V (unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Back Bias Range	B _{BIAS}	Operating	-30	--	4000	Gs
Linear Region		V _{DD} = 12V	500	--	5000	Gs
Hysteresis	B _{hys}		10	--	80	Gs

10Gs=1mT

Gear Tooth Sensing

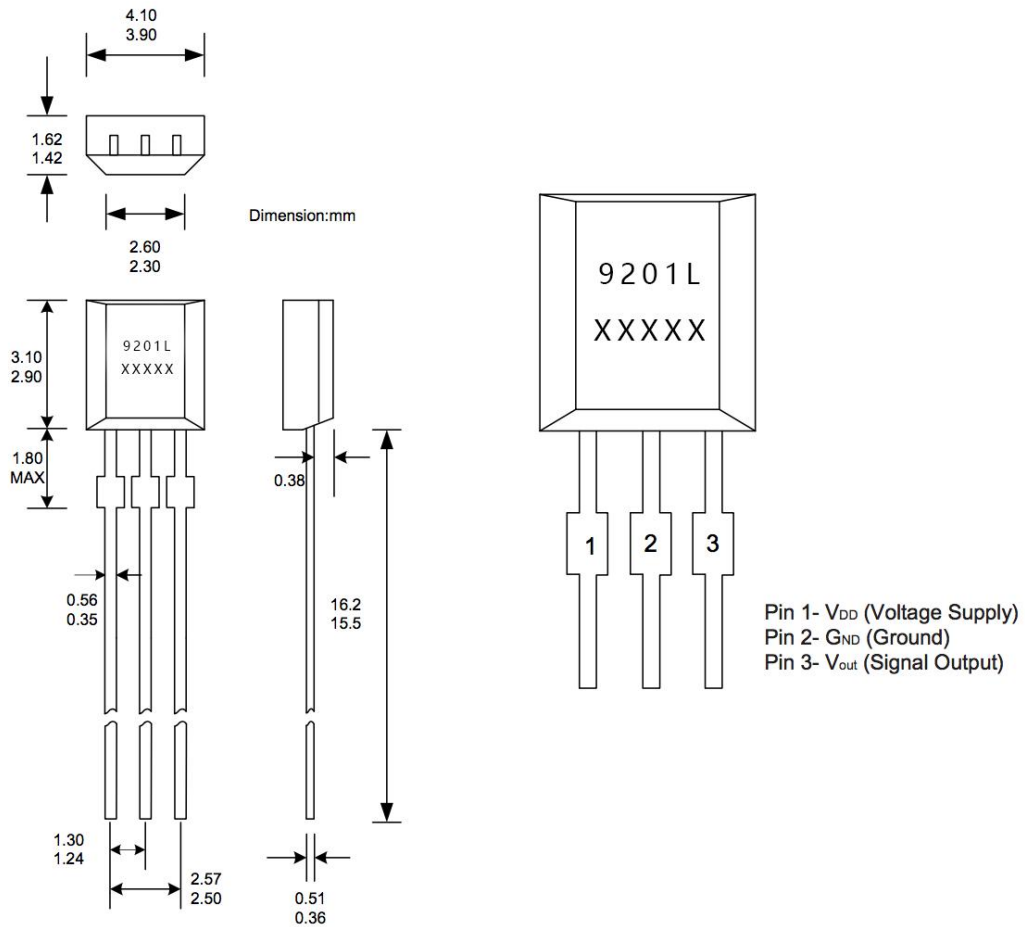


In the case of Ferromagnetic toothed wheel application the IC has to be biased by the south pole of a permanent magnet (Maximum 4000Gs). When assemble the sensor system, suggest choose a magnet as back bias flux from 1000Gs to 4000Gs. Normally the South pole of magnet faces the unbranded side of the IC and be glued to the back surface (non branded side) of the IC using a adhesive or suitable epoxy. Duo to the HAL90217 is “Self adjusting” over a wide range of back bias flux eliminating the need for any trimming in the application.

At the chip power on state, the output is reset to the high state whatever the field is. The output only changes after the first min is detected. The reset state holds no information about the field. If the supply of the chip is raised slowly, the reset state is not stable; the output maybe can't set to the high state. The maximum air gap depends on

- the magnetic field strength (magnet used; pre-induction) and I_{SEP}
- the toothed wheel that is used (dimensions, material, ect.) It is strongly recommended that an external ceramic bypass capacitor in the range 10nF to 1uF be connected between the supply and ground of the device to reduce external noise. The series resistor in combination with the bypass capacitor creates a filter for EMC pulse. The pull-up resistor should be chosen to limit the current though the output transistor; do not exceed the maximum continuous output current of the device. I_{SEP}

Physical Characteristics



Notes:

- 1.Exact body and lead configuration at vendor's option within limits shown.
- 2.Height does not include mold gate flash.
- 3.Where no tolerance is specified, dimension is nominal.