Description

The DH2102 device is a chopper-stabilized Hall Effect Sensor that offers a magnetic sensing solution with superior sensitivity stability over temperature and integrated protection features.

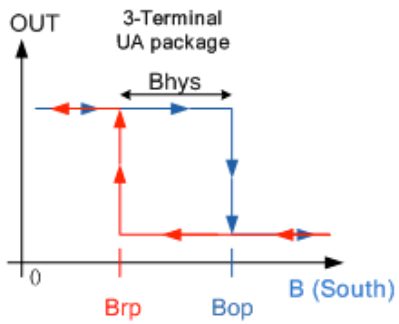
Superior high-temperature performance is made possible through dynamic offset cancellation, which reduces the residual offset voltage normally caused by device over molding, temperature dependencies, and thermal stress. Each device includes on a single silicon chip a voltage regulator, Hall-voltage generator, small-signal amplifier, chopper stabilization, Schmitt trigger, and a open-collector output to sink up to 20mA. The output turns low with the magnetic South Pole on the branded side of the package and turns high if the magnetic field is removed (for UA package).

An onboard regulator permits with supply voltages of 2.5V to 24V which makes the device suitable for a wide range of industrial applications

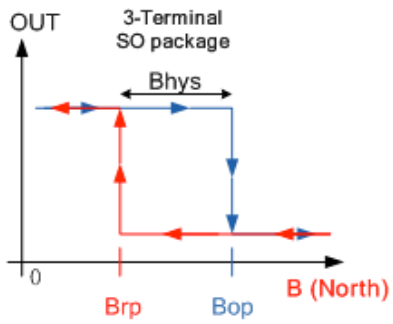
Features

- Digital Unipolar Hall Sensor
- Resistant to physical stress
- High chopping frequency
- High sensitivity (B_{OP} and B_{RP})
- Supports a wide voltage range (2.5 to 24V)
- Wide operating temperature range
- Solid-state reliability
- Small package sizes

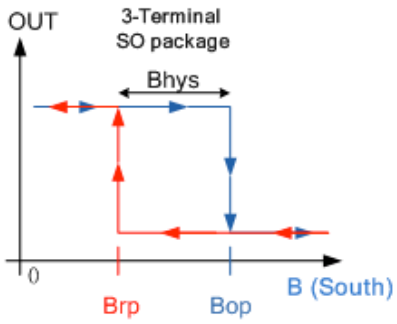
Output state



TO-92S Package



SOT23-3 Package



SOT23 Package

Terminal configuration and functions

Terminal				TYPE	DESCRIPTION
Name	Number				
	TO92-S	SOT23-3	SOT23		
VDD	1	1	1	PWR	2.5V to 24 V power supply
GND	2	3	3	Ground	Ground terminal
OUT	3	2	2	Output	Open-drain output. The open drain requires a pull-up resistor

Absolute Maximum Ratings

over operating free-air temperature range

		MIN	MAX	UNIT
Power supply voltage	VDD	-0.5	30	V
Output terminal voltage	OUT	-0.5	40	V
Output terminal current sink	I_{SINK}	0	30	mA
Operating junction temperature, T_J		-40	175	℃
Tstg		-65	150	℃
V_{ESD}	HBM ESD stress voltage	-4.0	4.0	kV
	MM ESD stress voltage	-400	400	V

Electrical Characteristics

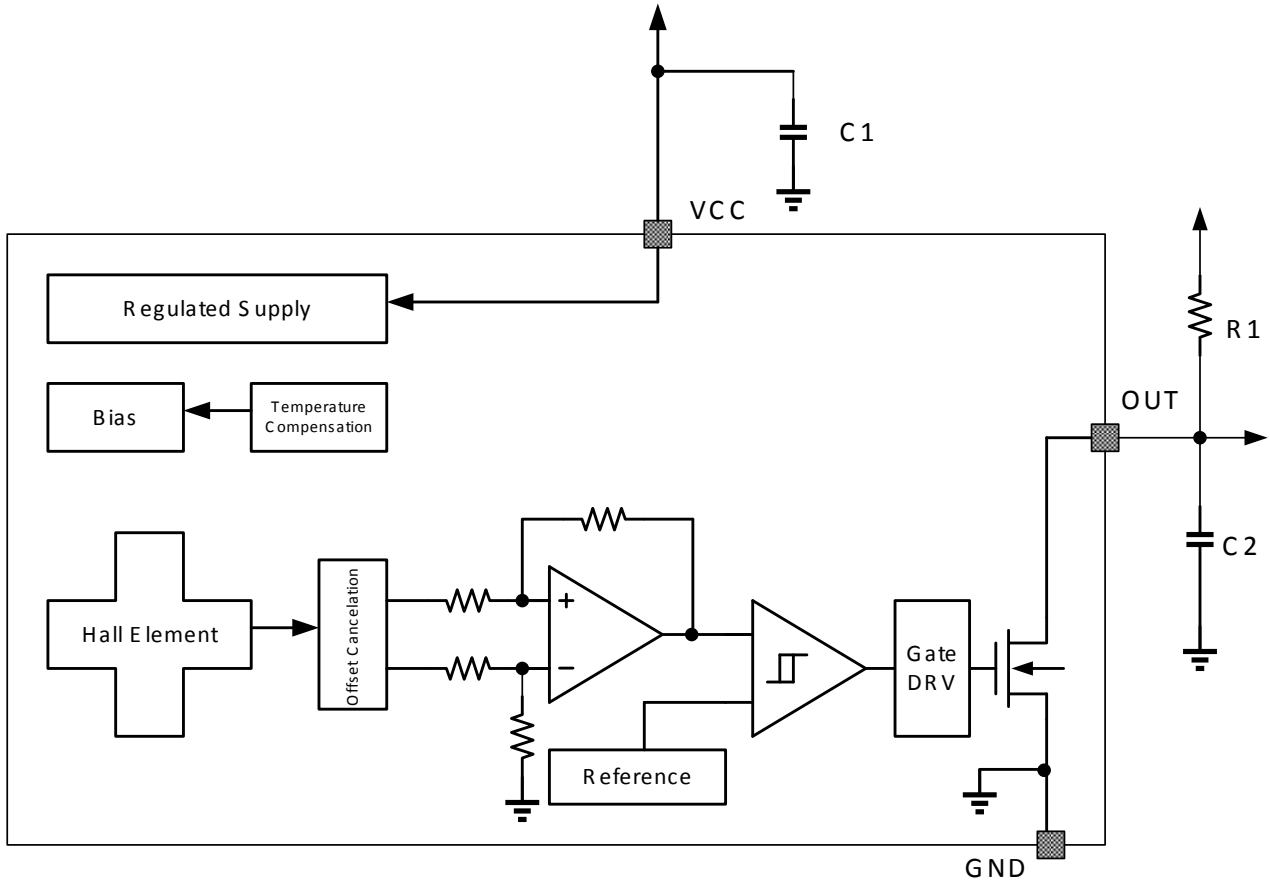
over operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{DD}	Operating voltage		2.5	--	24	V
I_{DD}	Operating supply current	V_{DD}=2.5V to 24 V	1	1.5	3.5	mA
t_{on}	Power-on time		--	35	50	μS
I_{lkg}	Off-state leakage current	Output Hi-Z	--	--	1	μA
$r_{DS(on)}$	FET on-resistance	V_{DD}=5V, I_O=10mA, T_A=25℃	--	20	--	Ω
t_d	Output delay time	B=0Gs to B_{OP} + 100Gs	--	13	25	μS
t_r	Output rise time	R1=1Kohm Co=50pF	--	--	0.5	μS
t_f	Output fall time	R1=1Kohm Co=50pF	--	--	0.2	μS
Magnetic Characteristics						
f_{BW}	Bandwidth		20	--	--	kHz
B_{OP}	Operated point	TO-92S Package	25	+40	65	Gs
B_{RP}	Release point		10	+25	40	Gs
B_{HYS}	Hysteresis		7	15	23	Gs
B_{OP}	Operated point	SOT23 Package	25	+40	65	Gs
B_{RP}	Release point		10	+25	40	Gs
B_{HYS}	Hysteresis		7	15	23	Gs
B_{OP}	Operated point	SOT23-3 Package	-65	-40	-25	Gs
B_{RP}	Release point		-40	-25	-10	Gs
B_{HYS}	Hysteresis		-23	-15	-7	Gs

Function Description Overview

The DH2102 device is a chopper-stabilized Hall sensor with a digital latched output for magnetic sensing applications. The output of the device switches low (turns on) when a magnetic field perpendicular to the Hall element exceeds the operate point threshold, B_{OP}. After turn-on, the output voltage is $V_{OUT(sat)}$. The output transistor is capable of sinking current up to 20mA. When the magnetic field is reduced below the release point, B_{RP}, the device output goes high (turns off). The difference in the magnetic operate and release points is the hysteresis, B_{HYS}, of the device. This built-in hysteresis allows clean switching of the output even in the presence of external mechanical vibration and electrical noise.

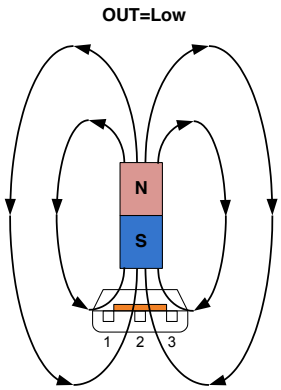
Functional Block Diagram



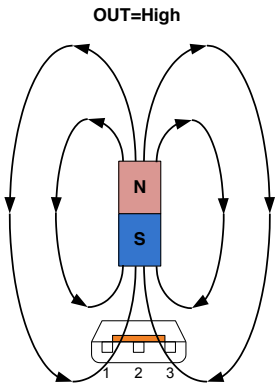
Field Direction Definition

A positive magnetic field is defined as a south pole near the marked side of the package.

TO-92S Package

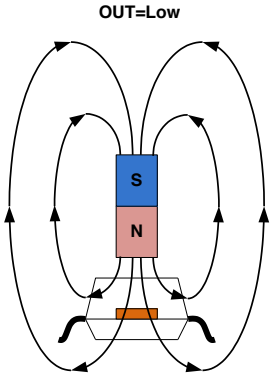


UA Package

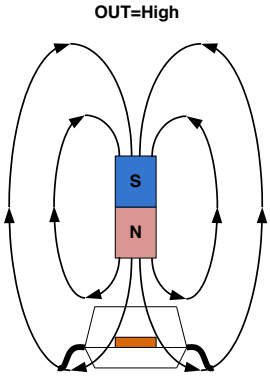


UA Package

SOT23-3 Package

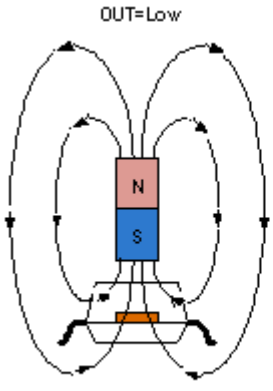


SO Package

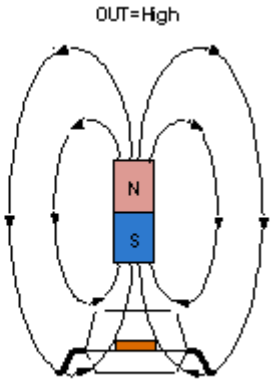


SO Package

SOT23 Package



SO Package



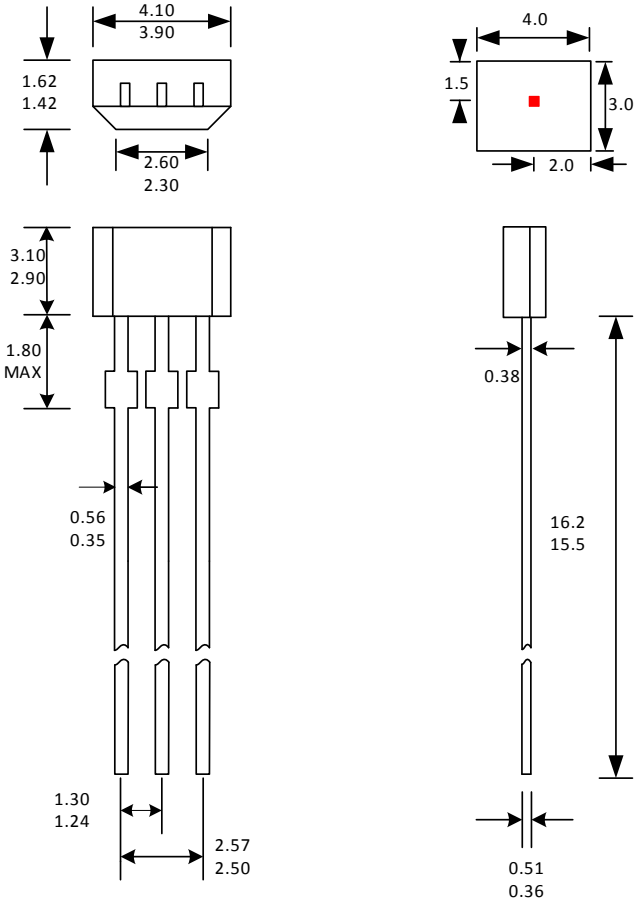
SO Package

If the device is powered on with a magnetic field strength between B_{RP} and B_{OP}, then the device output is determinate High. For UA package, if the field strength is greater than B_{OP}, then the output is pulled low. If the field strength is less than B_{RP}, the output is released. For SO package, however, if the field strength is less than B_{OP}, then the output is pulled low. If the field strength is greater than B_{RP}, the output is released.

Package Designator (TO-92S)

3-Terminal
UA Package

Dimension:mm



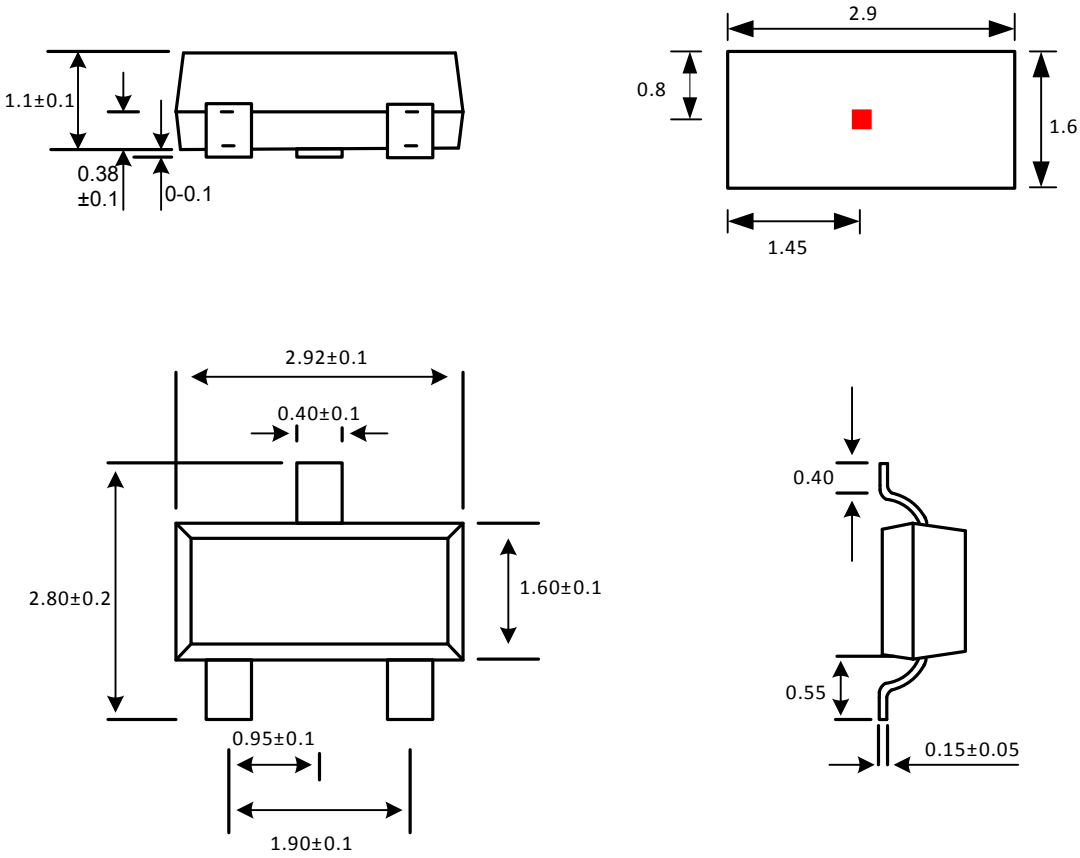
Notes:
1. Exact body and lead configuration at vendor's option within limits shown.
2. Height does not include mold gate flash.

Where no tolerance is specified, dimension is nominal.

Package Designator (SOT23-3)

3-Terminal
SO Package

Dimension:mm



Notes:

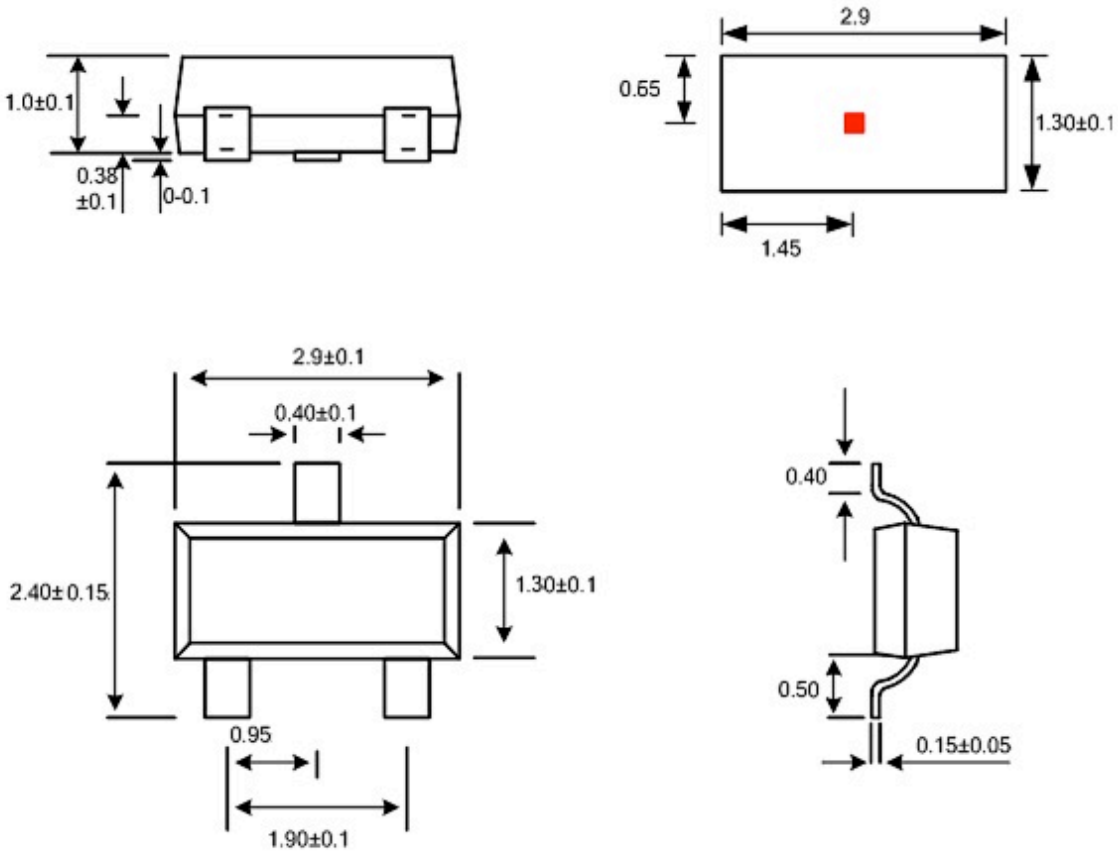
1. Exact body and lead configuration at vendor's option within limits shown.
2. Height does not include mold gate flash.

Where no tolerance is specified, dimension is nominal.

Package Designator (SOT23)

3-Terminal
SO Package

Dimension:mm



Notes:
1. Exact body and lead configuration at vendor's option within limits shown.
2. Height does not include mold gate flash.

Where no tolerance is specified, dimension is nominal.