晶丰明源半导体

BPH921

High Sensitivity CMOS Hall-Effect Switch

General Description

The BPH921 is a Hall-effect latch designed in mixed signal CMOS technology. It is quite suitable for use in automotive, industrial and consumer applications.

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. The device integrates a voltage regulator, Hall-voltage generator, small-signal amplifier, chopper stabilization, Schmitt trigger, and is directly drivable by the output.

An integrated voltage regulator permits operation with supply voltage from 3.5V to 24V.

The BPH921 is available in TO-92S-3 and SOT-23-3 packages, which are optimized for most applications.

Features

- Wide Operating Voltage Range from 3.5 to 24V
- Symmetrical Switch Points
- Superior Temperature Stability
- Chopper-stabilized Amplifier Stage
- Compact Size
- Built-in Pull-up Resistor
- ESD Rating: 3500V (Human Body Model)

Application

- Brushless DC Motor Commutation
- Speed Detection
- Revolution Counting
- Solid-state Switch

Typical Application

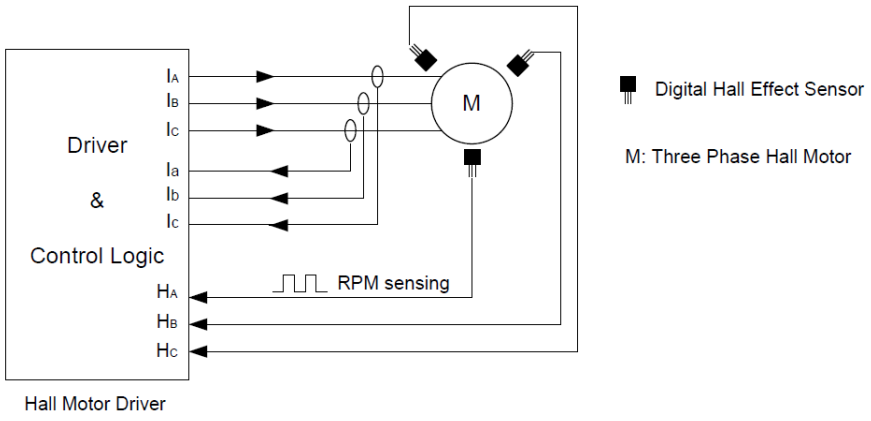


Figure 1. Typical Application Circuit

Ordering Information

Part Number	Package	Operating Temperature	Packing Type	Marking
BPH921T	TO-92S-3	-40 ℃ to 125 ℃	Bulk 1000pcs/Bag	921
BPH921S	SOT-23-3	-40 ℃ to 125 ℃	Tape & Reel 3,000pcs/Reel	GS6

Pin Configuration and Marking Information

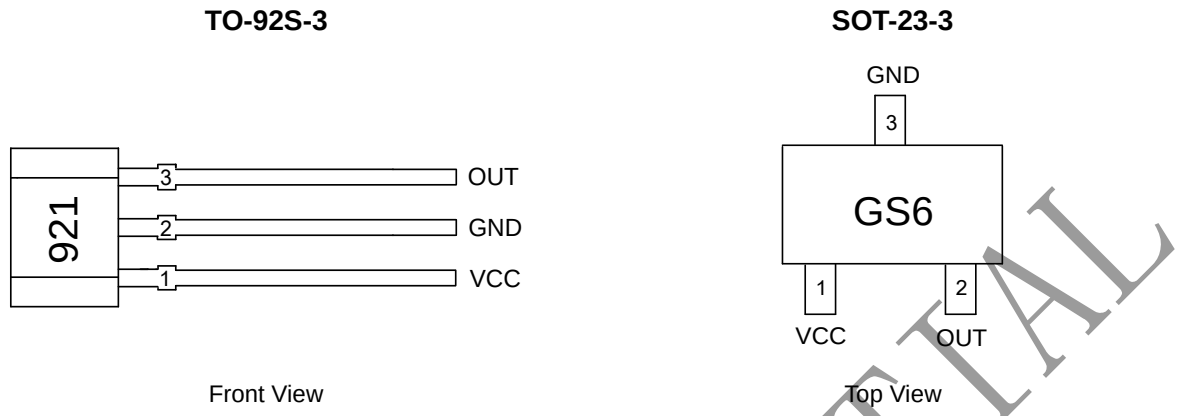


Figure 2. Pin Configuration

Pin Definition

Pin Number		Name	Description
TO-92S	SOT-23-3		
1	1	VCC	Supply voltage
2	3	GND	Ground pin
3	2	OUT	Output Pin

Absolute Maximum Rating (note 1) (Unless otherwise specified, T_A=25℃)

Symbol	Parameter	Value		Unit
V_{CC}	Supply Voltage	28		V
V_{OUT}	Output Voltage	28		V
I_{CC}	Supply Current	5		mA
I_{OUT}	Output Current (Continuous)	25		mA
P_D	Power Dissipation	TO-92S-3	400	mW
		SOT-23-3	230	
T_{STG}	Storage Temperature	-50 to 150		℃
T_J (Max)	Maximum Junction Temperature	165		℃
ESD	ESD (Human Body Model)	3500		V

Note 1: *Stress beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. Under "recommended operating conditions" the device operation is assured, but some particular parameter may not be achieved. The electrical characteristics table defines the operation range of the device, the electrical characteristics is assured on DC and AC voltage by the test program. For the parameters without minimum and maximum value in the EC table, the typical value defines the operation range, the accuracy is not guaranteed by spec.*

Recommended Operating Conditions

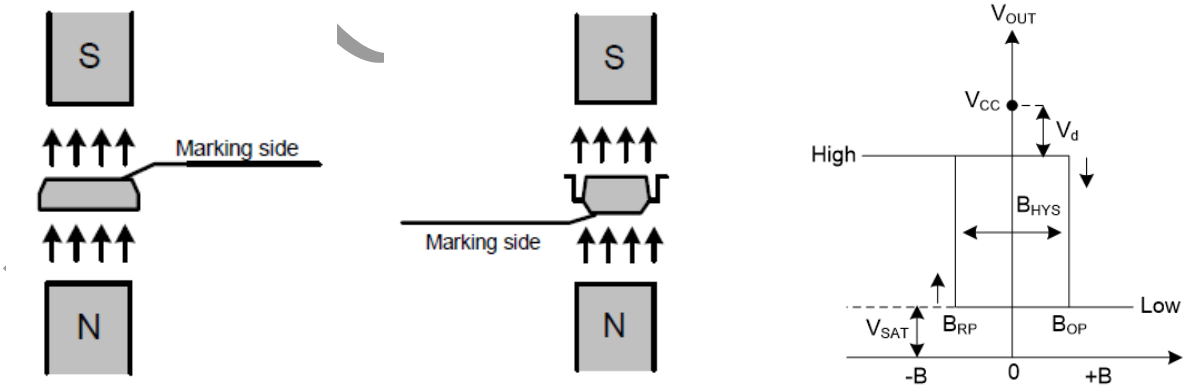
Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	3.5	24	V
T_A	Operating Temperature	-40	125	℃

Electrical Characteristics（V_{CC} =12V, TA=25 ℃, unless otherwise specified）

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	Operating	3.5	12	24	V
I_{CC}	Supply Current	V_{CC}=12V, B<B_{RP}		3.0	5.0	mA
		V_{CC}=12V, B>B_{OP}		3.0	5.0	mA
V_{SAT}	Saturation Voltage	I_{OUT}=20mA, B>B_{OP}		185	500	mV
$I_{LEAKAGE}$	Output Leakage Current	V_{CC}=V_{OUT}=24V, B<B_{RP}		0.1	10	μA
t_{RISING}	Output Rising Time	C_L=20pF		0.4	2	μs
$t_{FALLING}$	Output Falling Time	C_L=20pF		0.4	2	μs

Magnetic Characteristics（V_{CC} =12V, TA=25 ℃, unless otherwise specified）

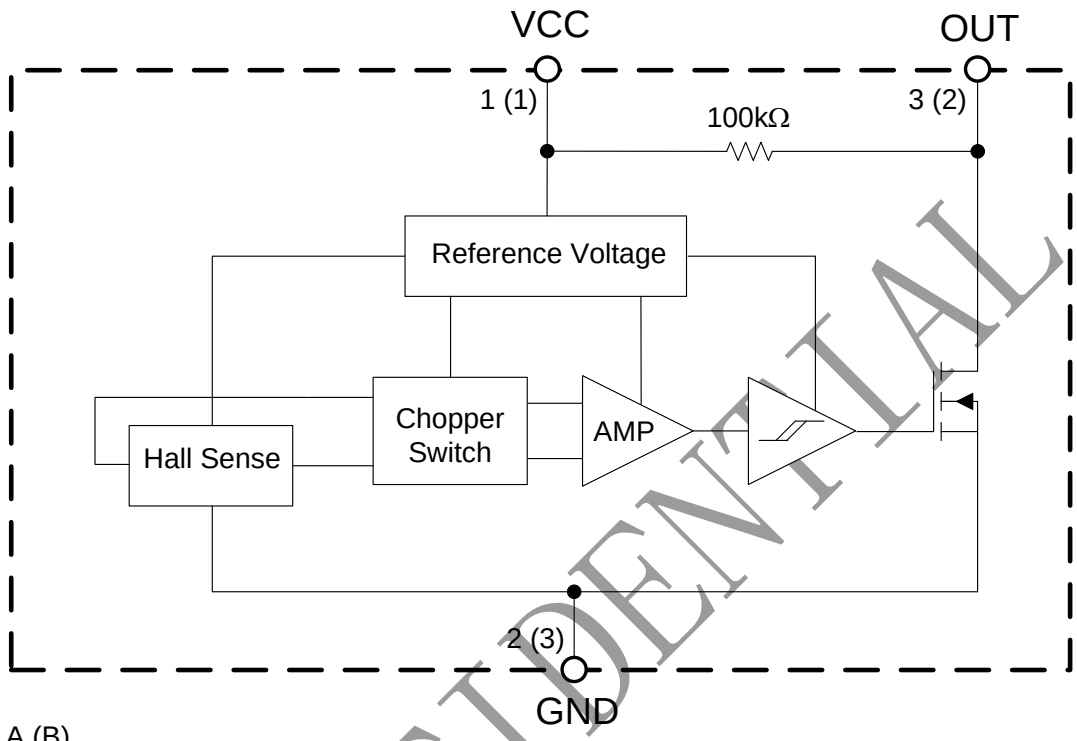
Symbol	Parameter	Min	Typ	Max	Unit
B_{OP}	Operating Point	5	25	50	Gauss
B_{RP}	Releasing Point	-50	-25	-5	Gauss
B_{HYS}	Hysteresis		50		Gauss



For TO-92S-3　　For SOT-23-3

Figure 3. Magnetic Flux Density of BPH921

Functional Block Diagram



A (B)
A for TO-92S-3
B for SOT-23-3

Figure 4. Functional Block Diagram of BPH921

Typical Performance Characteristics

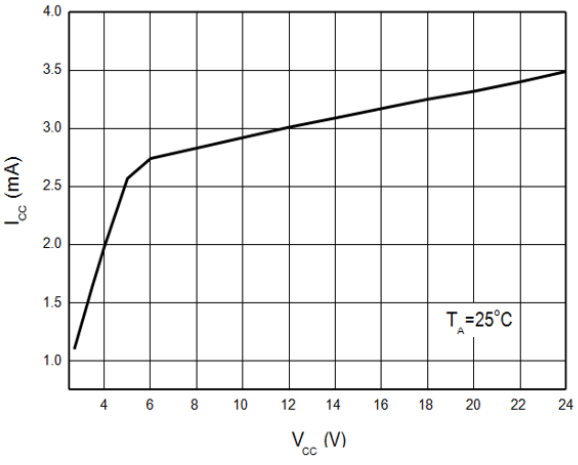


Figure 5. I_{CC} vs. V_{CC}

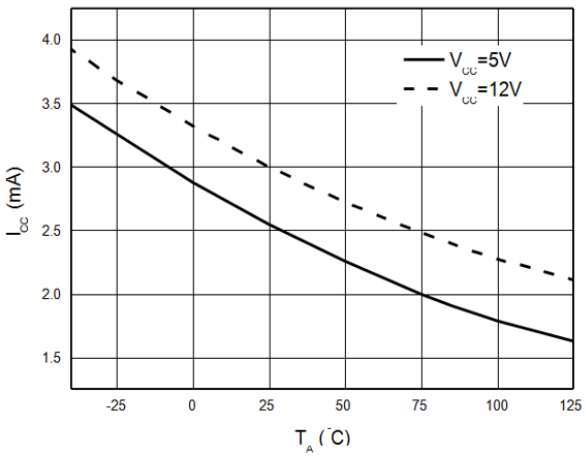


Figure 6. I_{CC} vs. T_A

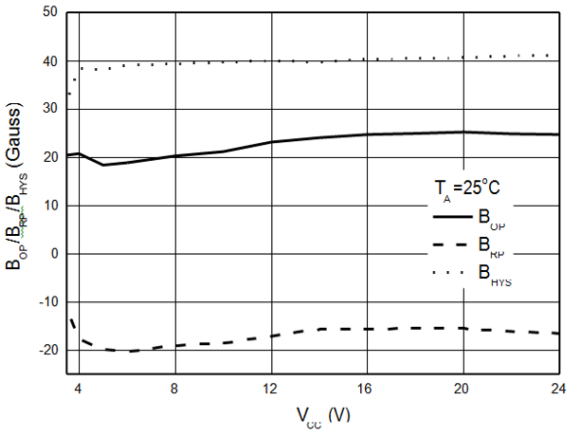


Figure 7. $B_{OP}/B_{RP}/B_{HYS}$ vs. V_{CC}

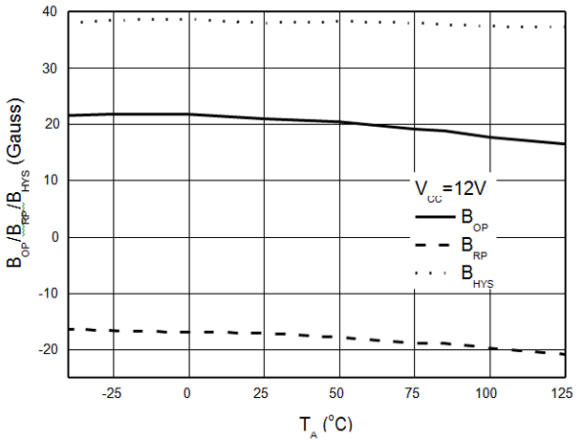


Figure 8. $B_{OP}/B_{RP}/B_{HYS}$ vs. T_A

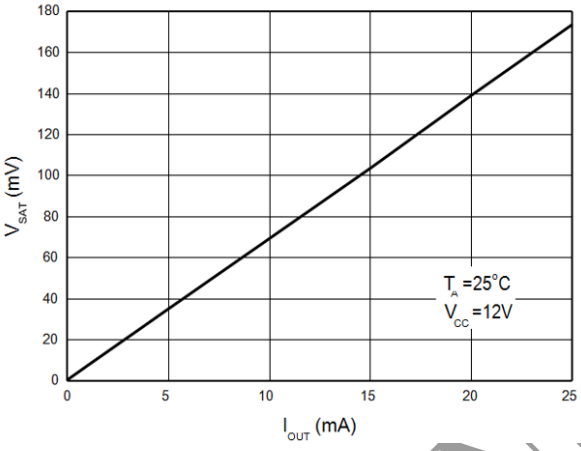


Figure 9. V_{SAT} vs. I_{OUT}

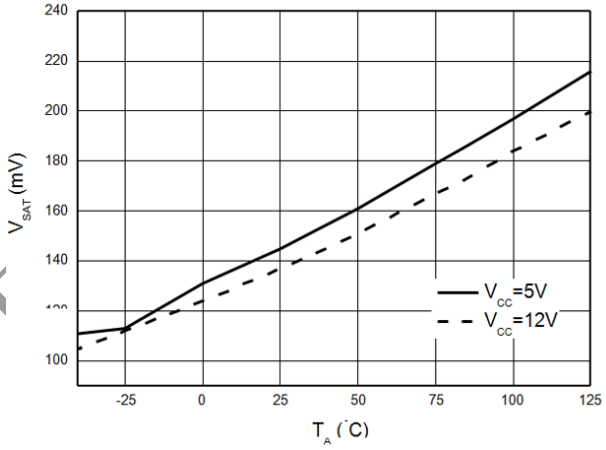


Figure 10. V_{SAT} vs. T_A

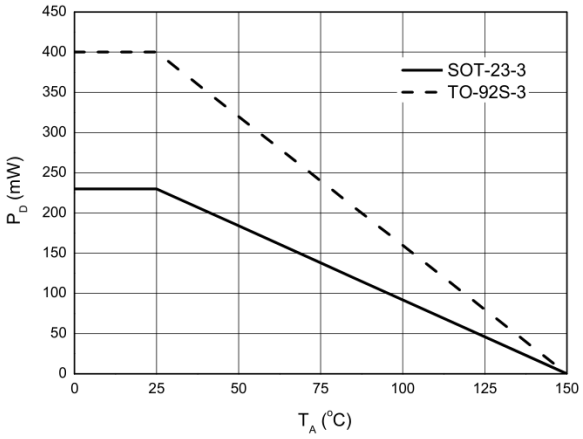
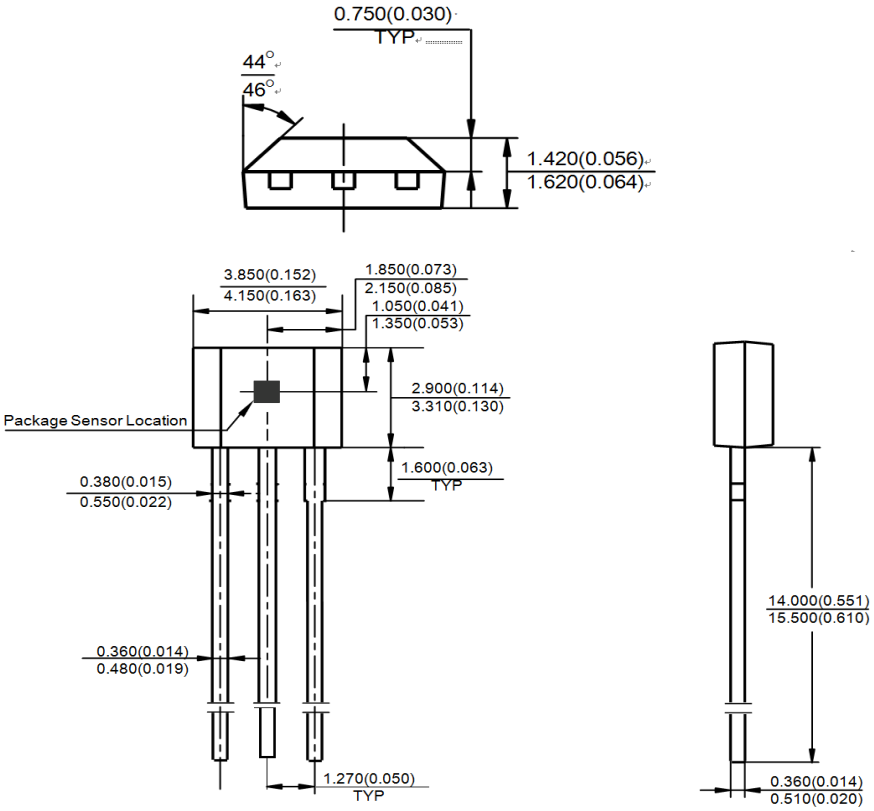


Figure 11. P_D vs. T_A

Physical Dimensions

TO-92S-3 Unit: mm (inch)



SOT-23-3 Unit: mm (inch)