



**PB143**

High Sensitivity Hall Latch

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**Data Sheet Rev. 1.0**

## 1. General

### Descriptions

PB143 is a high voltage high sensitivity hall-effect latch designed in mixed-signal technology. The device integrates a voltage regulator, a Hall sensor with dynamic offset cancellation system, a Schmitt trigger and an open-drain output driver, all in a single package.

As to its wide operating voltage range and extended choice of temperature range, it is quite suitable for use in automotive, industry and consumer applications. It also includes an anti-reverse bias block to prevent from reverse bias condition.

The device is delivered in a Small Outline Transistor (SOT23-3L) for surface mount process and in a Plastic Single In Line (TO92S) for through hole mount. Both 3-lead packages are RoHS compliant.

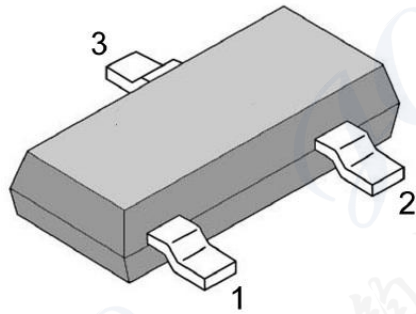
### Features

- 3.5~24V supply voltage
- 1.5mA operating current
- Chopper-stabilized amplifier stage
- Ambient temp range:-40C~125C
- Open drain output
- Reverse bias protection

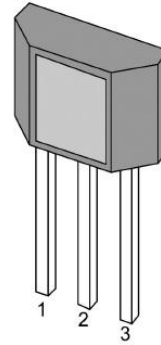
### Typical Applications

- Solid-state switch
- Position detection
- Angular position detection
- Proximity detection

**Package and Pin Description**



SOT23 package



TO92S package

Figure1. Package figure (not to scale)

Table 1(a): SOT23 Pin Description

SOT23 pin No.	Name	Description
1	VDD	Power supply
2	OUT	Open drain output
3	GND	Ground

Table 1(b): TO92S Pin Description

TO92S PIN NO.	Name	Description
1	VDD	Power supply
3	OUT	Open drain output
2	GND	Ground

## 2. Functional Diagram

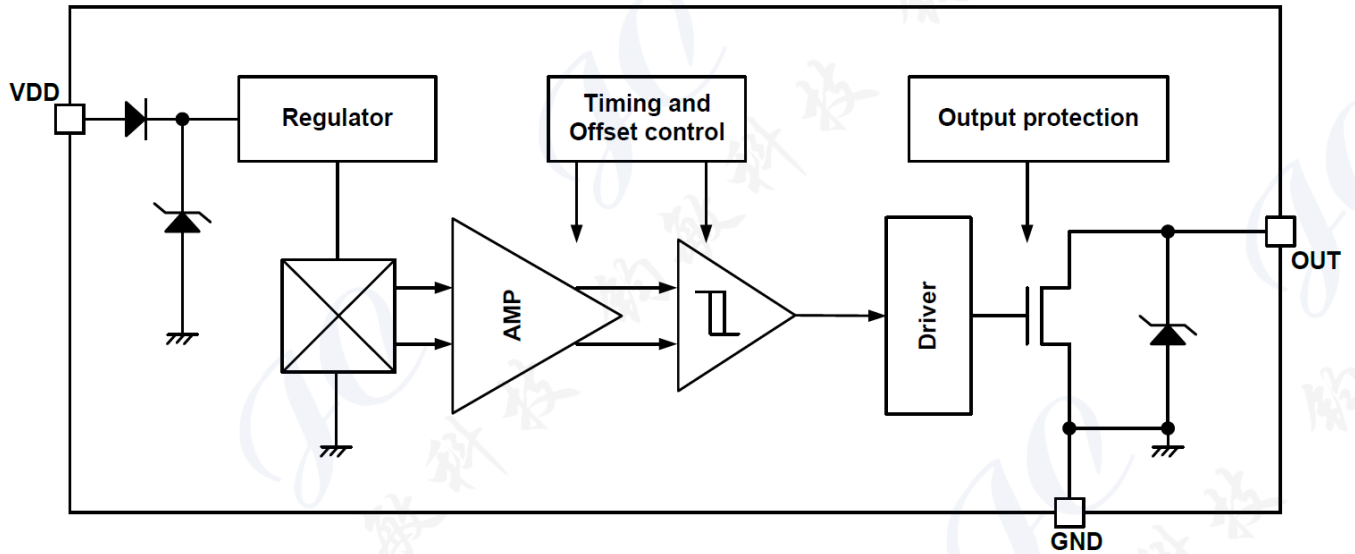


Figure 2: Functional Diagram

## 3. Transfer Characteristic

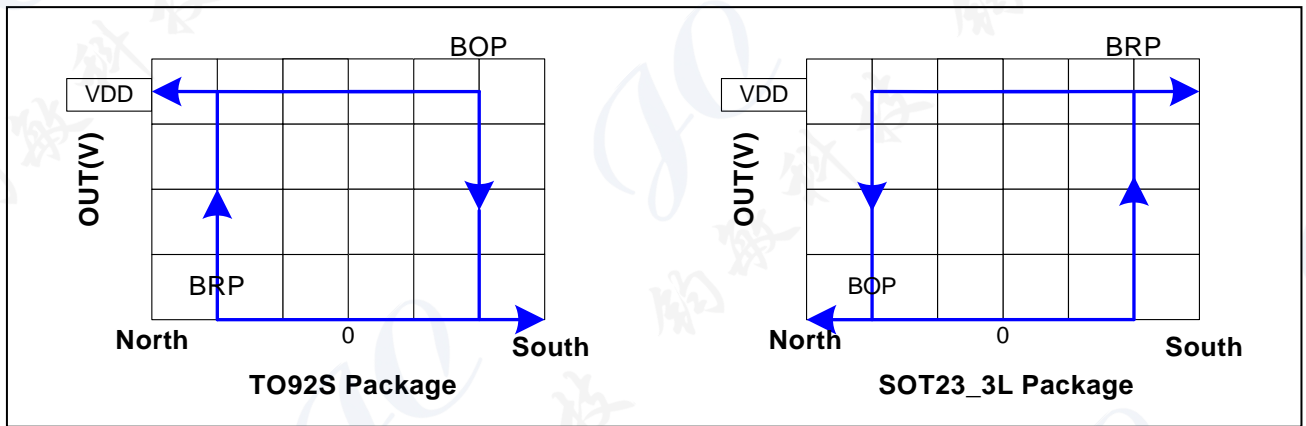


Figure 3: OUT VS Magnetic Field

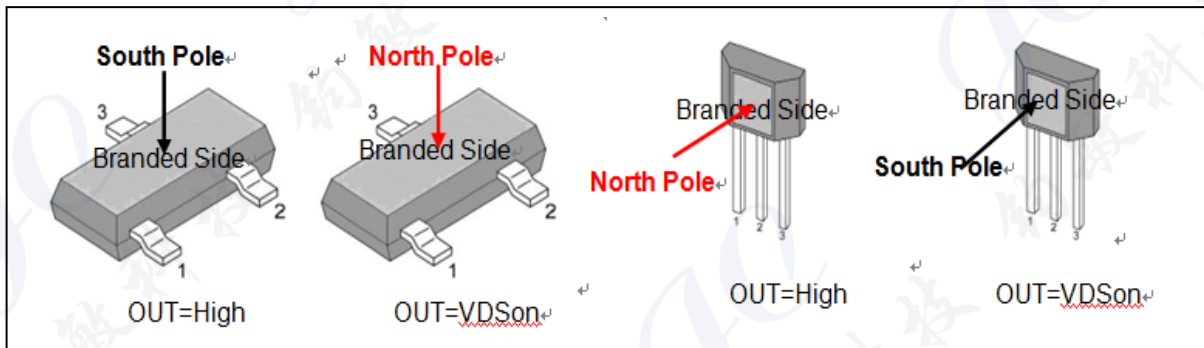


Figure 4: Switching point of SE package

Figure 5: Switching point of UA package

## 4. Absolute Maximum Rating (Note1)

Table2: Absolute maximum rating (Ta=25C)

Symbol	Parameter	Value	Unit
VDD	Supply Voltage	30	V
VDDR	Reverse Bias Supply Voltage	-20	V
IDD	Supply Current	50	mA
VOUT	Output Voltage	28	V
IOUT	Output Current	100	mA
B	Magnetic Flux Density	Un-limited	
Ts	Storage Temp	-65~150	°C
TJ	Maximum Junction Temp	150	°C

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. "Absolute Maximum Ratings" for extended period may affect device reliability.

## 5. Electrical Characteristics

Table 3: Electrical Characteristics (VDD=3.5~24V, Ta=25C unless otherwise specified)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
VDD	Supply voltage		3.5		24	V
Idd	Operating Current	B<Brp	-	1.5	2.5	mA
Vsat	Output saturation voltage	B>Bop, Iout=10mA	-	0.2	0.3	V
Ioff	Output Leakage current	Vout=24V	-	0.1	10	uA
Tr	Output rise time	RL=1KOhm, CL=20pF	-	1	-	uS
Tf	Output fall time	RL=1KOhm, CL=20pF	-	0.3	1	uS

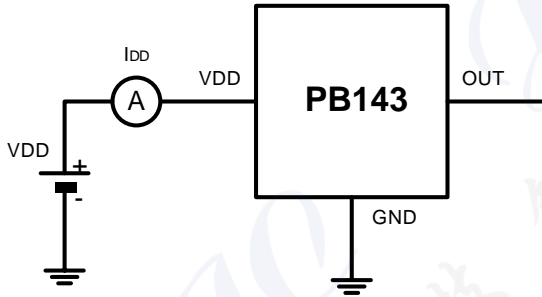
## 6. Magnetic Characteristic

Table4: Magnetic Characteristic (VDD=3.5~24V)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Bop	Operating point	Ta=25C	1.5		6.0	mT
Brp	Release point		-6.0		-1.5	mT
Bhy	Hysteresis, Bop-Brp		4.0	6.0	8.0	mT

## 7. Test Diagram

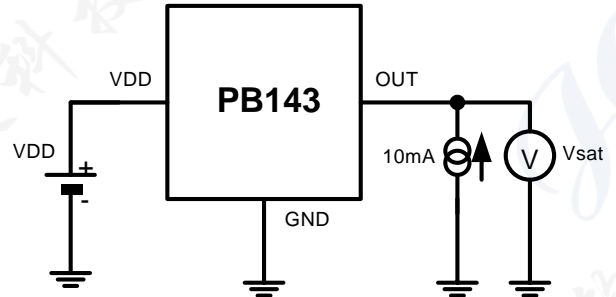
### Supply Current



Note1- The supply current  $I_{DD}$  represents the static supply current. Out is left open when measurement

Figure 6: Test diagram of  $I_{DD}$

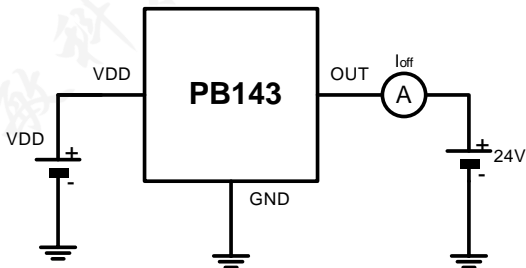
### Output Saturation Voltage



Note1- The output saturation voltage  $V_{sat}$  is measured.  
Note2- The device is put under magnetic field with  $B > B_{op}$

Figure 7: Test diagram of  $V_{sat}$

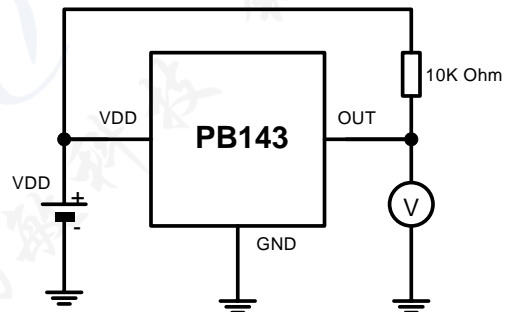
### Output Leakage Current



Note1- The device is put under magnetic field with  $B < B_{rp}$

Figure 8: Test diagram of  $I_{off}$

### Magnetic Thresholds



Note1-  $B_{op}$  is determined by putting the device under magnetic field swept from  $B_{rpmin}$  up to  $B_{opmax}$  until the output is switch on  
Note2-  $B_{rp}$  is determined by putting the device under magnetic field swept from  $B_{opmax}$  down to  $B_{rpmin}$  until the output is switch off

Figure 9: Test diagram of magnetic thresholds

### 8. Typical Application

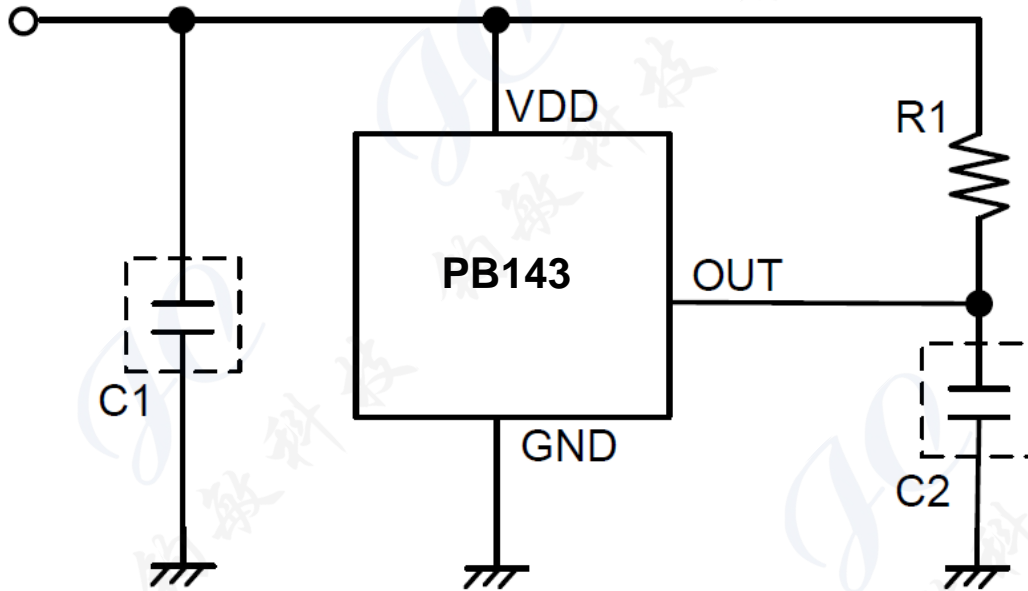


Figure 10: Typical Application Circuit

Note:

1. Pull up resistor value: 1K to 10K is recommended.
2. C1 is optional. Recommended value is 100nF to 1uF.
3. C2 is optional. Recommended value is 1nF to 100nF.

## 9. Ordering information

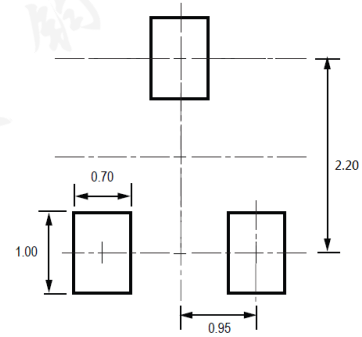
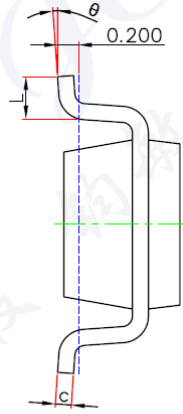
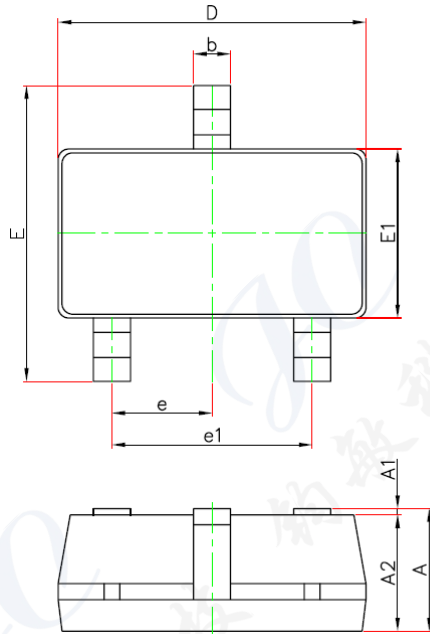
Table 5: Ordering information

No.	1	2	3	4	5	6	7	8	9~10
ON	P	B	1	4	3	A	H	I	UA
Description	Part No.					Version A~Z	Fixed	Temp Code	Deliver type
								I: -40~85C E: -40~125C	UA: TO92S SE: SOT23-3L



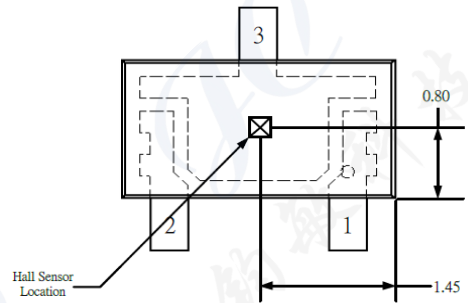
## 10. Package Information

### 10.1 SOT23-3L(SE) Package size



PCB Layout Reference View

PCB layout information



Hall device location of SE package

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
$\theta$	0°	8°	0°	8°

Figure 11: Package size of SE package



**10.2 TO92S (UA) Package size(Unit: mm)**

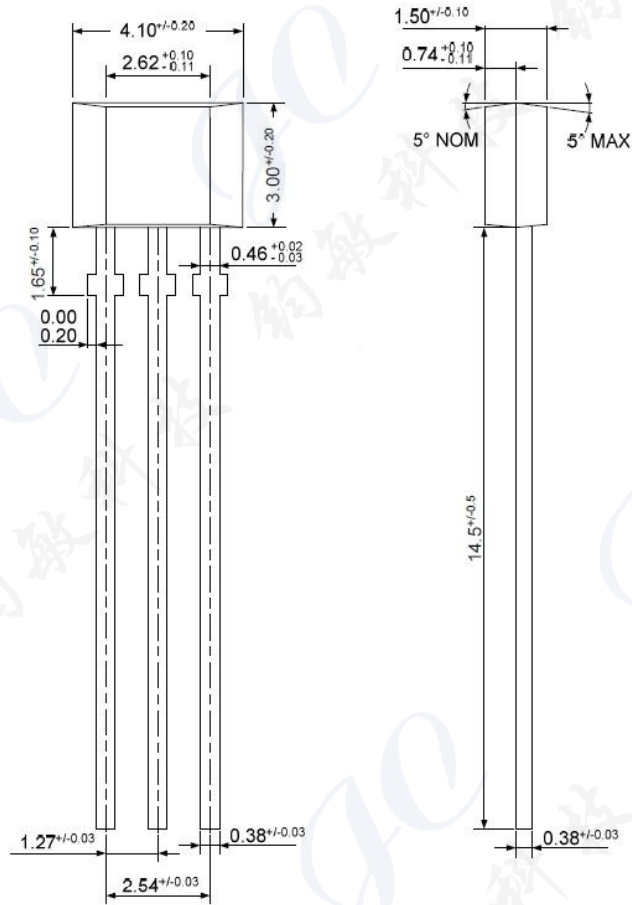


Figure 12: Package size of UA package

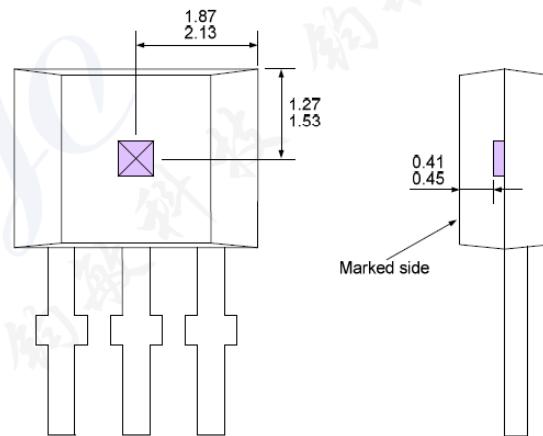


Figure 13: Hall device location of UA package

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