



1. General

Descriptions

P4248 is a Hall-effect sensor integrated circuit of omni-polar switch type. It includes a hall plate, an amplifier with dynamic offset cancellation, a voltage regulator for operation with supply voltage from 1.8V to 5.5V, a sleep/awake control logic for low power consumption, schmitt trigger comparator, and a push-pull output. The offset cancellation reduces the offset voltage normally caused by device over molding, temperature dependencies, and thermal stress. The device is a temperature stable, stress-resistant sensor

P4248 detects magnetic field which is perpendicular to the package in an arbitrary direction. When the magnetic increases higher than B_{OP} , the voltage of OUT goes low; when the magnetic decreases lower than B_{RP} , OUT becomes high. When combined with a magnet, it becomes a non-contact switch with low current consumption, high sensitivity and reliability.

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. The device is also delivered in small size SOT553 which package size is $1.6\text{mm} \times 1.2\text{mm} \times 0.6\text{mm}$. All packages are RoHS compliant and Halogen Free.

Features

- High sensitivity: $B_{OP} = \pm 30$ Gauss, $B_{RP} = \pm 20$ Gauss
- 1.8~5.5V operating supply voltage
- 5uA operating current at 1.8V
- Ambient temp range: $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$
- >4KV ESD capability
- Push-pull output
- RoHS compliant 2011/65/EU and Halogen Free
- Package: SOT23-3L/TO92S/SOT553

Typical Applications

- Solid-state switch
- Position detection
- Speed detection
- Proximity detection

Package and Pin Description

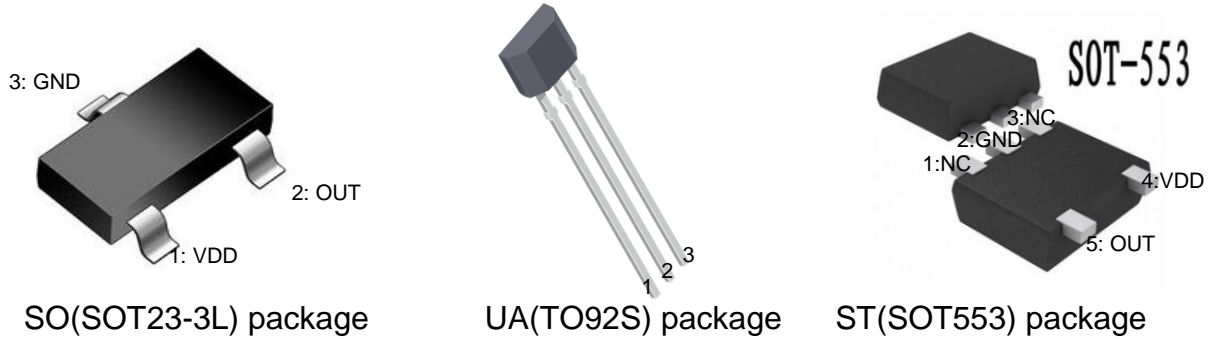


Figure1. Package figure (not to scale)

Table 1(a): SOT23 Pin Description

SOT23 pin No.	Name	Description
1	VDD	Power supply
2	OUT	Output
3	GND	Ground

Table 1(b): TO92S Pin Description

TO92S PIN NO.	Name	Description
1	VDD	Power supply
3	OUT	Output
2	GND	Ground

Table 1(C): DFN6L Pin Description

SOT553 PIN NO.	Name	Description
1	NC	Floating
2	GND	Ground
3	NC	Floating
4	VDD	Power supply
5	OUT	Output

Note: The NC pins can be floating or connected to GND

2. Ordering information

Table 2: Ordering information

No.	1	2	3	4	5	6~7
ON	P	4	2	4	8	- ST
Description	Part No.					Deliver type
						UA: TO92S SO: SOT23-3L ST: SOT553

2. Block Diagram

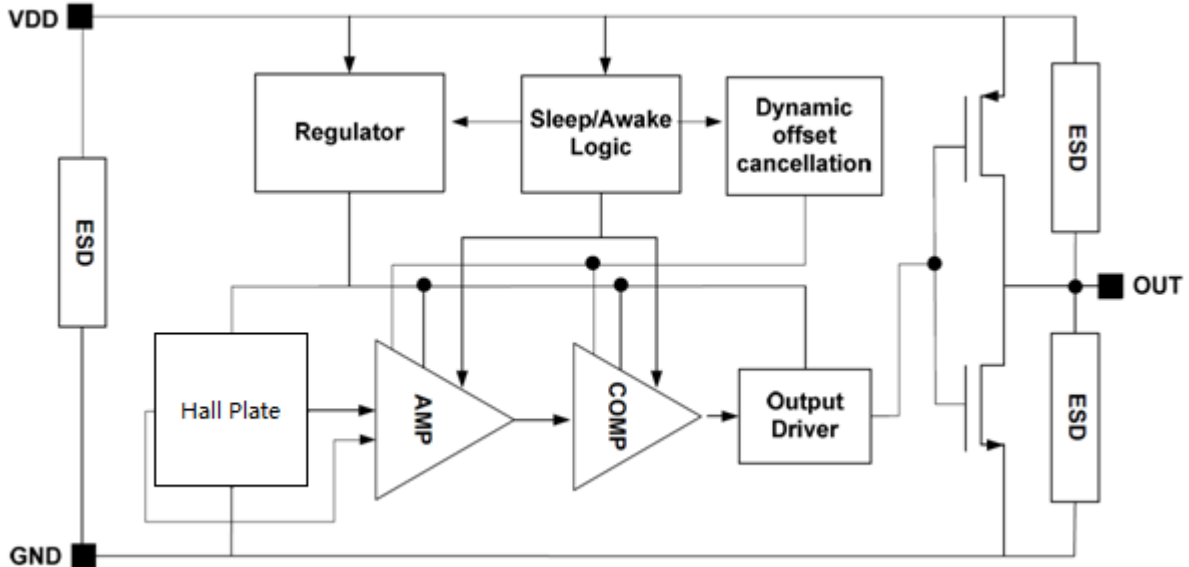


Figure 2: Functional Block Diagram

3. Function Description and Diagram of Operating

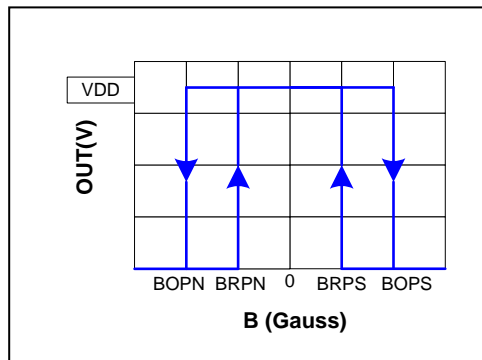


Figure 3: OUT VS Magnetic Field

Diagram of operating to detect the magnetic

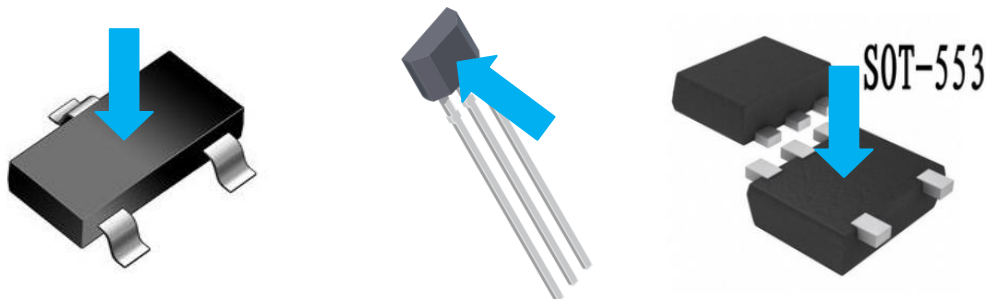


Figure 4: Magnetic detection diagram

4. Absolute Maximum Rating (Note1)

Table3: Absolute maximum rating (Ta=25°C)

Symbol	Parameter	Min	Max	Unit
V _{dd}	Supply Voltage	-0.3	6.5	V
I _{dd}	Supply Current	-	50	mA
V _{out}	Output Voltage	-0.3	6.5	V
I _{out}	Output Current	-	1	mA
B	Magnetic Flux Density	Not limited		Gauss
T _s	Storage Temp	-40	125	°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 4: Electrical Characteristics (VDD=1.8V, Ta=25°C unless otherwise specified)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V _{dd}	Supply voltage		1.8		5.5	V
T _a	Ambient temperature range		-40		85	°C
I _{dd}	Operating current		-	5.0	10.0	uA
V _{ol}	Output low voltage	B > B _{op} , I _{out} =0.5mA	-	-	0.2	V
V _{oh}	Output high voltage	B < B _{rp} , I _{out} =0.5mA	VDD-0.2	-	-	V
I _{off}	Output leakage current	VDD=5.5V, B < B _{rp}	-	0.1	10	uA
T _{PO}	Power on time				100	uS
ESD		HBM		4		KV
R _{th}	Thermal resistance	SOT23-3L package		301		°C/W
T _{aw}	Awake time			40	80	uS
T _{sl}	Sleep time			40	80	mS
D.C.	Duty cycle			0.1		%

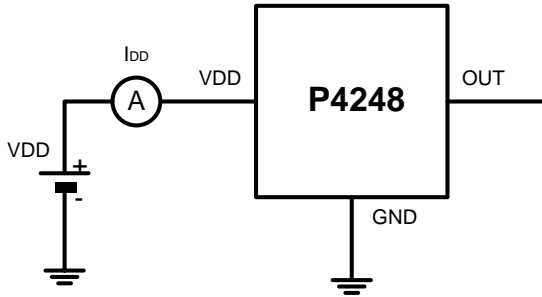
6. Magnetic Characteristic

Table5: Magnetic Characteristic (VDD=1.8V)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
B _{op}	Operating point	Ta=25°C	+/-20	+/-30	+/-50	Gauss
B _{rp}	Release point		+/-10	+/-20	+/-40	Gauss
B _{hy}	Hysteresis, B _{op} -B _{rp}		-	10	-	Gauss

7. Test Diagram

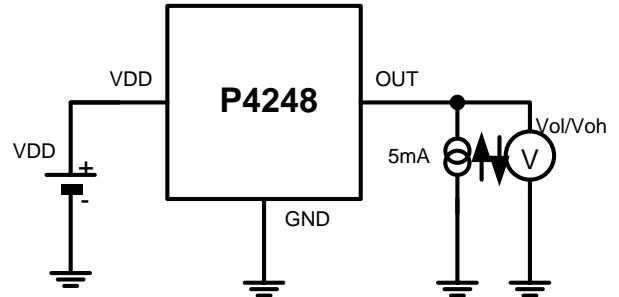
Supply Current



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

Figure 5: Test diagram of I_{DD}

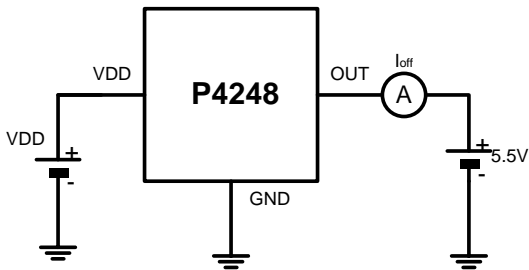
Output Saturation Voltage



Note1- V_{ol} , $|B| > 30\text{Gauss}$, 0.5mA I_{out} is pushed into OUT pin.
Note2- V_{oh} , $|B| = 0\text{Gauss}$, 0.5mA I_{out} is pulled from OUT pin

Figure 6: Test diagram of V_{ol}/V_{oh}

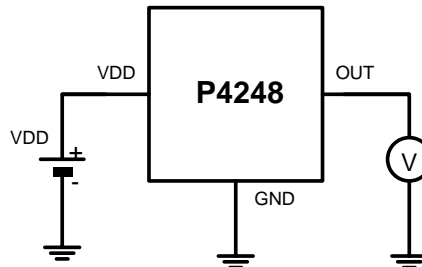
Output Leakage Current



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

Figure 7: 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 8: Test diagram of magnetic thresholds

8. Typical Application

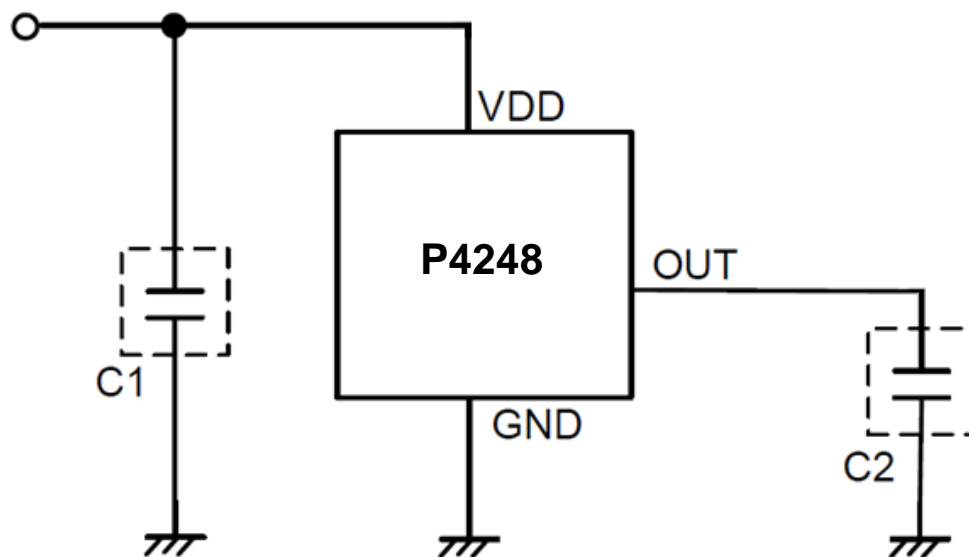


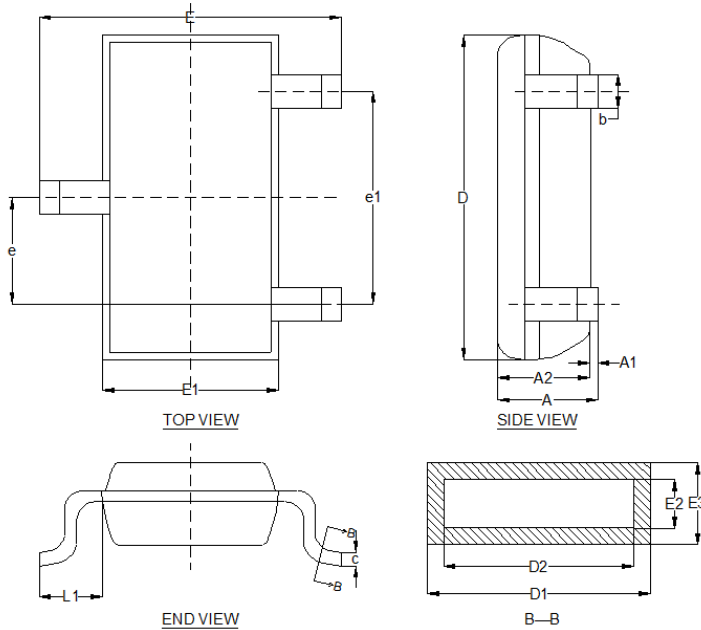
Figure 9: Typical Application Circuit

Note:

1. C1 is optional. Recommended value is 100nF to 1uF.
2. C2 is optional. Recommended value is 1nF to 100nF.

10. Package Information

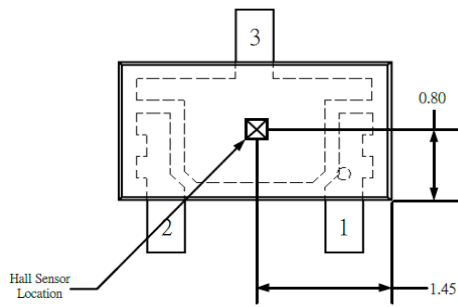
10.1 SOT23-3L(SO) Package size



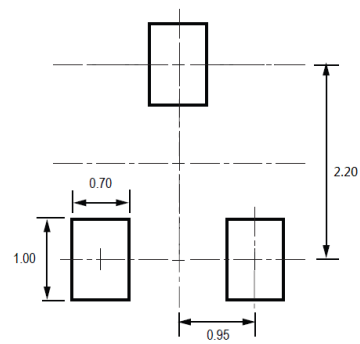
Symbol	millimeters		
	Min	Typ	Max
A	-	-	1.100
A1	0.025	0.075	0.100
A2	0.850	0.880	0.900
c	0.080	-	0.200
D	0.290BSC		
D1	0.300	-	0.450
D2	0.250	0.350	0.400
E	2.780BSC		
E1	1.600BSC		
E2	0.120	0.127	0.150
E3	0.150	-	0.200
e	0.950BSC		
e1	1.900BSC		
L1	0.600REF		
b	0.300	-	0.450

Note: 1. Dimensions are not to scale

Figure 10: Package size of SO package



Hall device location of SO package



PCB Layout Reference View

Recommended PCB layout information

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

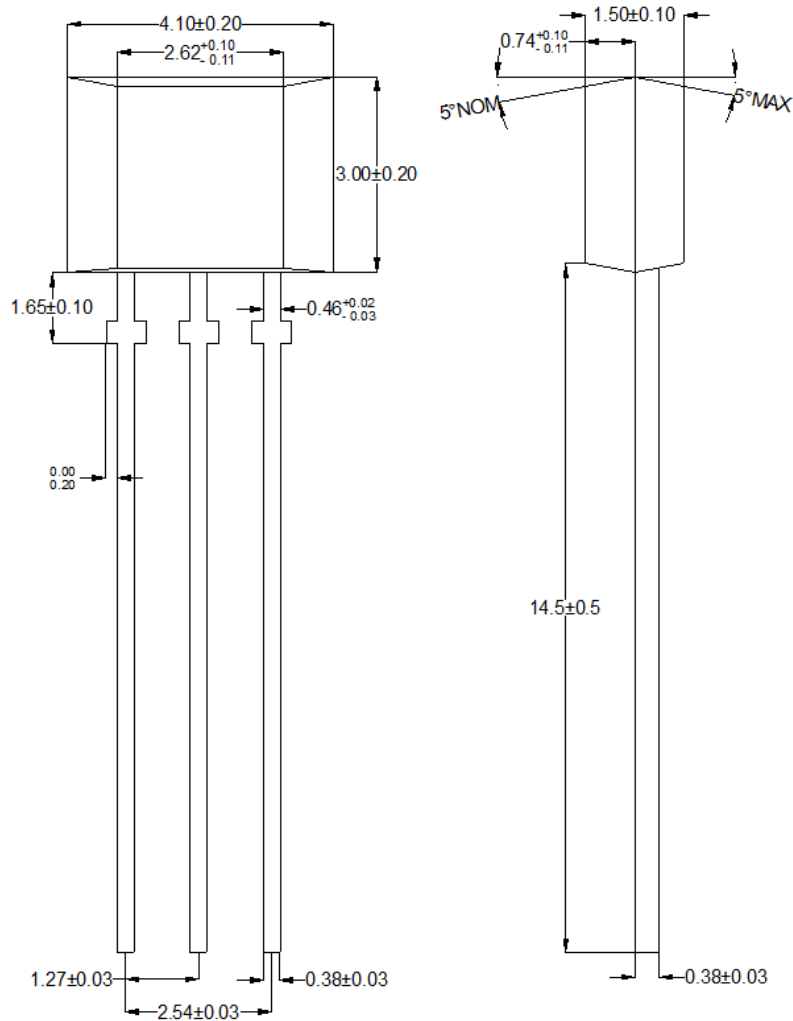


Figure 11: Package size of UA package

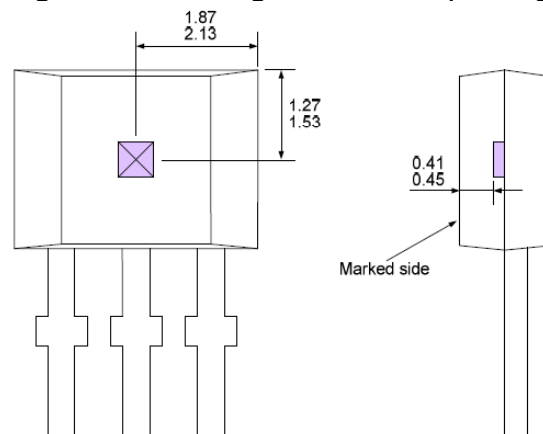
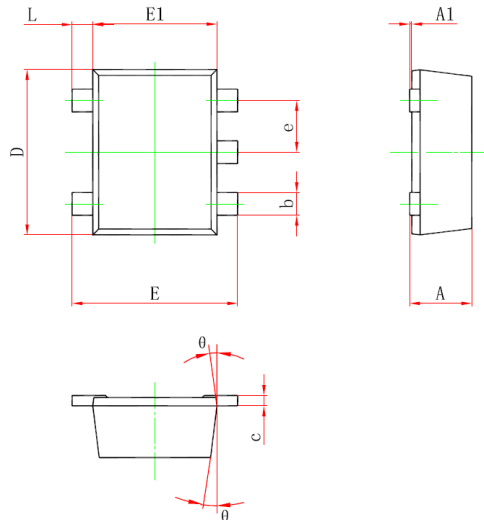


Figure 12: Hall device location of UA package

10.3 SOT553 (ST) Package size(Unit: mm)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.525	0.600	0.021	0.024
A1	0.000	0.050	0.000	0.002
e	0.450	0.550	0.018	0.022
c	0.090	0.160	0.004	0.006
D	1.500	1.700	0.059	0.067
b	0.170	0.270	0.007	0.011
E1	1.100	1.300	0.043	0.051
E	1.500	1.700	0.059	0.067
L	0.100	0.300	0.004	0.012
θ	7 °REF.		7 °REF.	

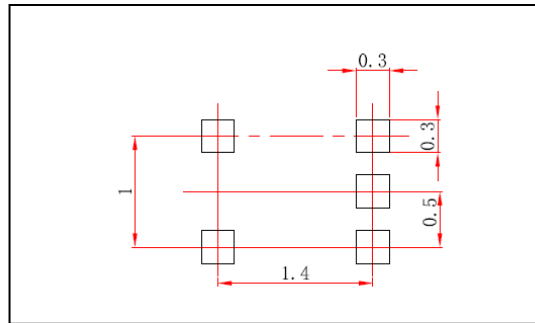


Figure 13: Package size of ST package

Sensor location

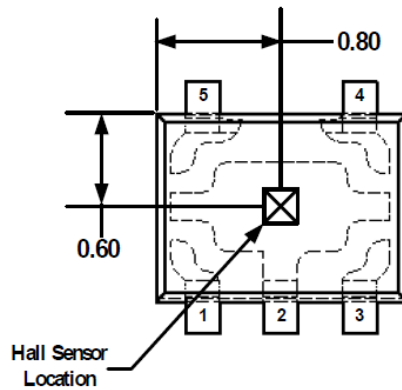


Figure 14: ST sensor location

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