



High-Sensitive Unipolar Hall Effect Switch CYD508

Applications

- Automotive brake pedal position detection
- Proximity detection
- Speed measurement
- Weak magnetic field applications
- Solid state switches etc.

Features

- 2.7V to 30V operation voltage
- Overvoltage protection capability up to 40 V
- High accuracy unipolar switch
- Built-in dynamic offset cancellation
- Open drain output
- Low thermal drift of magnetic sensing
- Qualified according to AEC-Q100 test standard

Order Information

- CYD508-PA
Package (PA): UA, LH

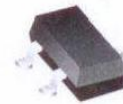
Package Type

P/N: CYD508-XX

TO92S (UA)



SOT23-3L (LH)



Specifications

Absolute Maximum Ratings ($T_A=25^\circ\text{C}$)

| Parameter | Symbol | Conditions | Rating | Unit |
|------------------------|-------------|------------|----------|------------------|
| Maximum supply voltage | V_{DDMAX} | | 30 | V |
| Operating temperature | T_A | | -40~+150 | $^\circ\text{C}$ |
| Storage temperature | T_S | | -40~+165 | $^\circ\text{C}$ |
| Maximum output current | I_{OMAX} | | 25 | mA |

Electrical Characteristics ($T_A=25^\circ\text{C}$, $V_{DD}=12\text{VDC}$)

| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|--------------------------|--------------|--|------|------|------|---------------|
| Supply voltage | V_{DD} | | 2.7 | | 30 | V |
| Supply current | I_{DD} | Output open | | 2.5 | 3.2 | mA |
| Low output voltage | $V_{OL(ON)}$ | @ $I_{OUT} = 20\text{mA}$ | | 130 | 400 | mV |
| Output leakage current | I_{OH} | Output switch off | | | 0.1 | μA |
| Output voltage | V_{OUT} | | | | 30 | V |
| Output voltage fall time | t_f | $V_{DD}=12\text{V}$; $R_L=820\Omega$; $C_L=20\text{pF}$ | | | 1 | μs |
| Output voltage rise time | t_r | | | | 1 | μs |
| Delay time | t_d | | | 18 | | μs |

Magnetic Characteristics ($T_A=25^\circ\text{C}$, $V_{DD}=12\text{VDC}$)

| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|----------------------------|-----------|---|------|-------|------|-----------------------|
| Operating point (On point) | B_{OP} | Pullup resistor $R_L=1\text{k}\Omega$, Load capacitor $C_L=20\text{pF}$ | | -5.5 | | mT |
| Release point (Off point) | B_{RP} | | | -3.5 | | mT |
| Hysteresis | B_{HYS} | | | 2.0 | | mT |
| Temperature coefficient | T_C | | | -1000 | | ppm/ $^\circ\text{C}$ |



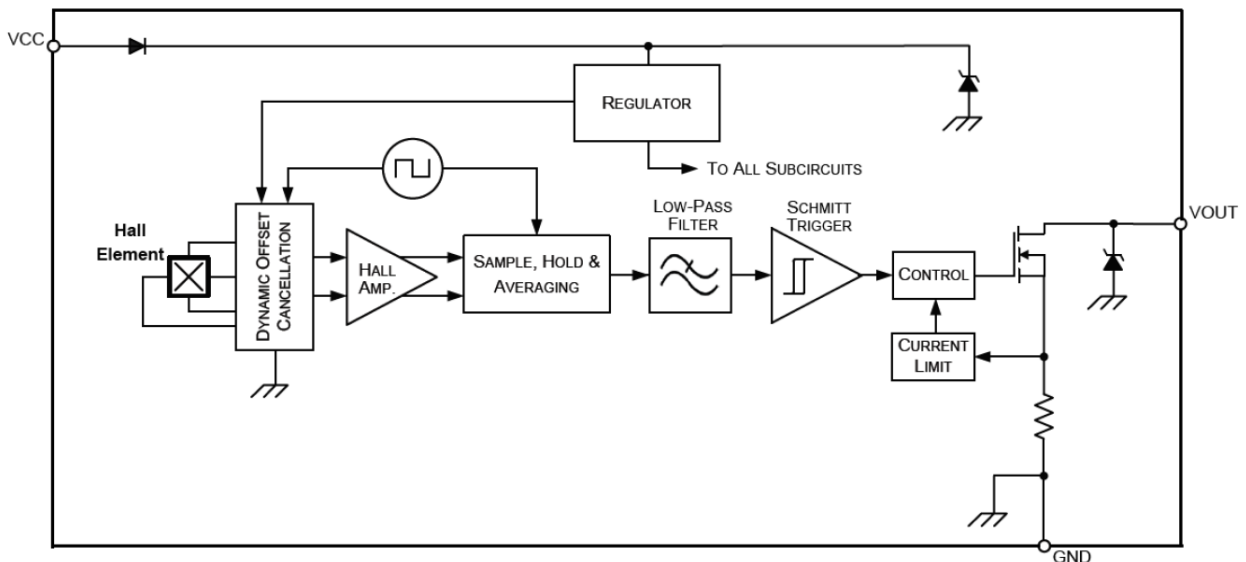
General Specifications

CYD508 Hall Effect Switch is a monolithic integrated circuit which switches in response to magnetic field. If a magnetic field with flux lines perpendicular to the sensitive area is applied to the sensor, the biased Hall plate forces a Hall voltage proportional to this field. The Hall voltage is compared with the actual threshold level in the comparator. If the magnetic field exceeds the threshold levels, the output stage is switched to the appropriate state. The built-in hysteresis eliminates oscillation and provides switching behavior of output without bouncing.

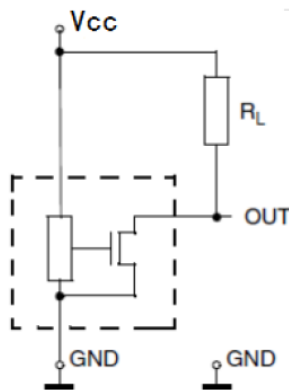
Magnetic offset caused by mechanical stress is compensated by using the chopping offset compensation technique. A series resistor or diode on the supply line is not required thanks to the built-in reverse voltage protection.

The open drain output is forced to a safe, high-impedance state (tri-state), in any of the following fault conditions: overtemperature, and undervoltage. In addition, the output current is limited (short-circuit protection).

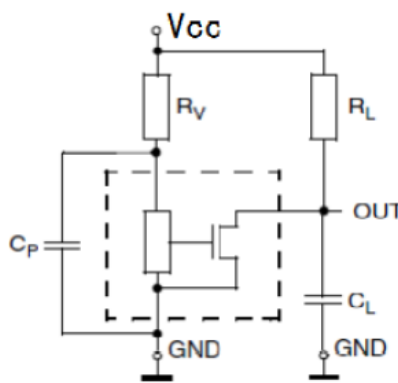
The device is able to withstand a maximum supply voltage of 28 V for unlimited time and features overvoltage capability (40V load dump). The architecture block diagram is shown in the following Fig.



Application Circuits



Circuit 1



Circuit 2

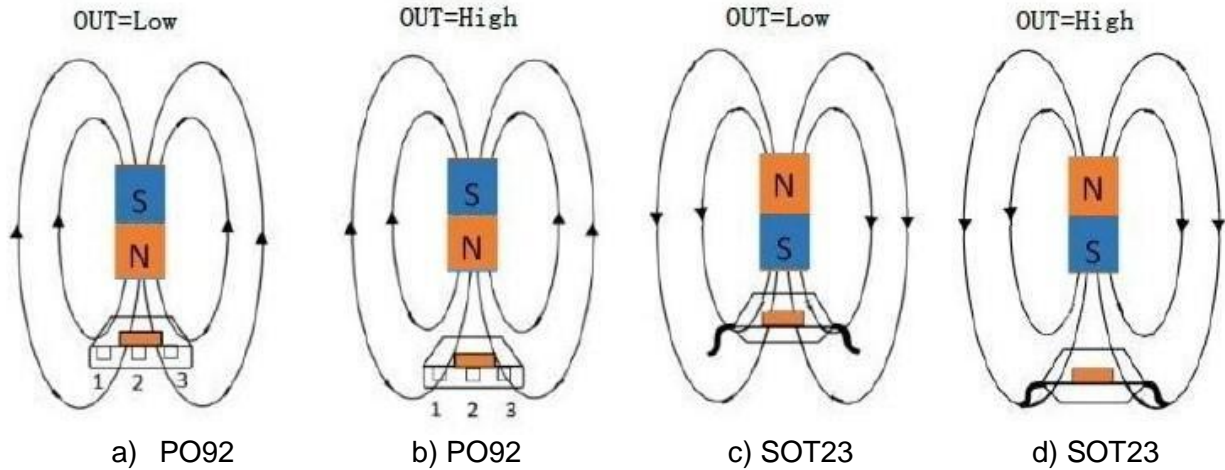
For applications with disturbances on the supply line or radiated disturbances, a series resistor R_V and two capacitors C_P and C_L , all placed close to the sensor, are recommended.

For example:
 $R_V = 100\Omega$
 $C_P = 4.7 \text{ nF}$
 $C_L = 1 \text{ nF}$
 $R_L = 1\text{k} \sim 10\text{k} \Omega$

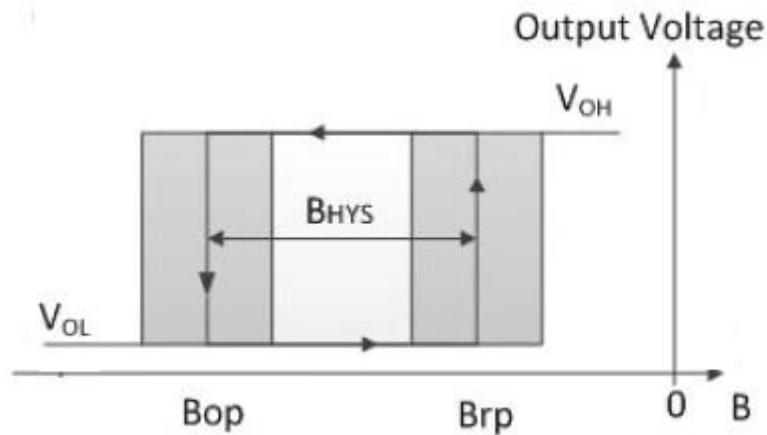


Application Example

A positive magnetic field is defined as a South Pole near to the marked side of the TO92S package. For the SOT23 package the positive magnetic field is defined as a North Pole near to the marked side.



Output is low at a small sensing distance between magnet and sensor, for case a) and c)
Output is high at a large sensing distance between magnet and sensor, for case b) and d)



Output behavior of CYD508

ESD Test

The output pin has to be in tri-state (high impedance) for ESD measurements

| Symbol | Parameter | Min | Max | Unit |
|-----------|--|-----|-----|------|
| V_{HBM} | Human body model (according to AEC Q100-002) | -12 | 12 | kV |

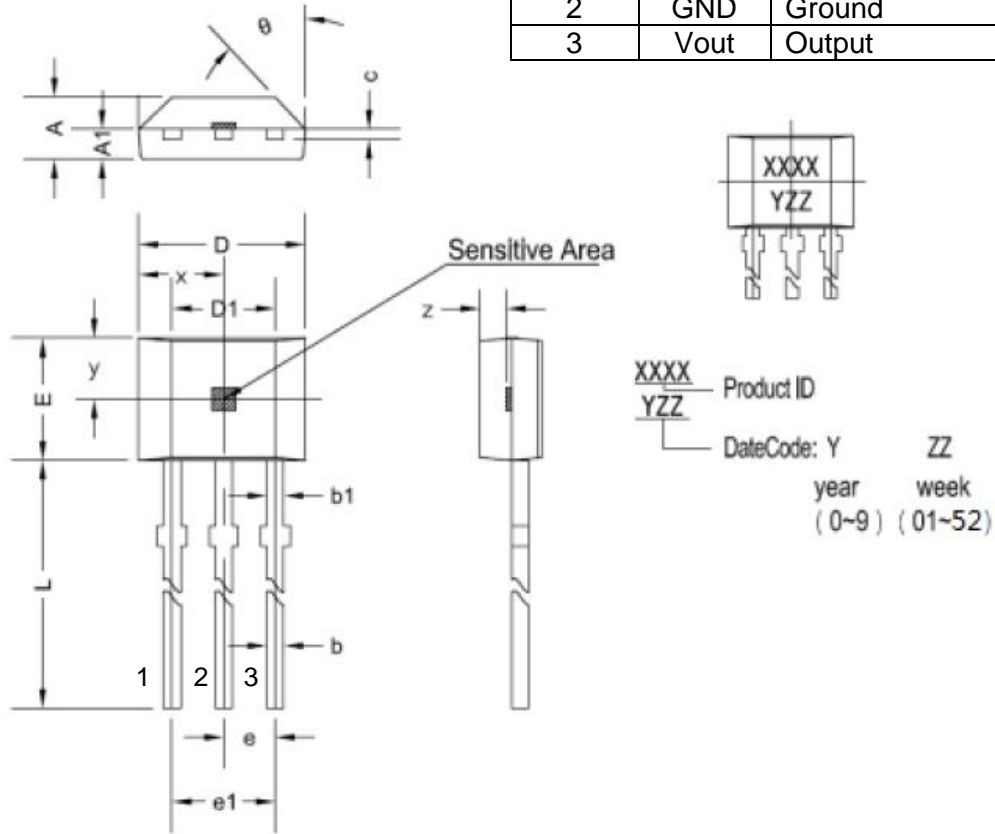


Package Outline
T092S (UA)

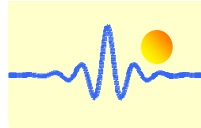
(Packing: bulk, 1000pcs/bag)

Pin Assignment

| Pin No. | Name | Function |
|---------|------|--------------|
| 1 | Vcc | Power supply |
| 2 | GND | Ground |
| 3 | Vout | Output |



| Symbol | Size (mm) | | Size (inches) | |
|--------|-----------|------|---------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 1.42 | 1.67 | 0.056 | 0.066 |
| A1 | 0.66 | 0.86 | 0.026 | 0.034 |
| b | 0.35 | 0.56 | 0.014 | 0.022 |
| b1 | 0.40 | 0.55 | 0.016 | 0.022 |
| C | 0.36 | 0.51 | 0.014 | 0.020 |
| D | 3.90 | 4.20 | 0.154 | 0.165 |
| D1 | 2.97 | 3.27 | 0.117 | 0.129 |
| E | 2.90 | 3.28 | 0.114 | 0.129 |
| e | 1.27 typ. | | 0.050 typ. | |
| e1 | 2.44 | 2.64 | 0.096 | 0.104 |
| L | 13.5 | 15.5 | 0.531 | 0.610 |
| x | 2.03 typ. | | 0.080 typ. | |
| y | 1.55 typ. | | 0.061 typ. | |
| z | 0.50 typ. | | 0.020 typ. | |
| theta | 45° typ. | | 45° typ. | |

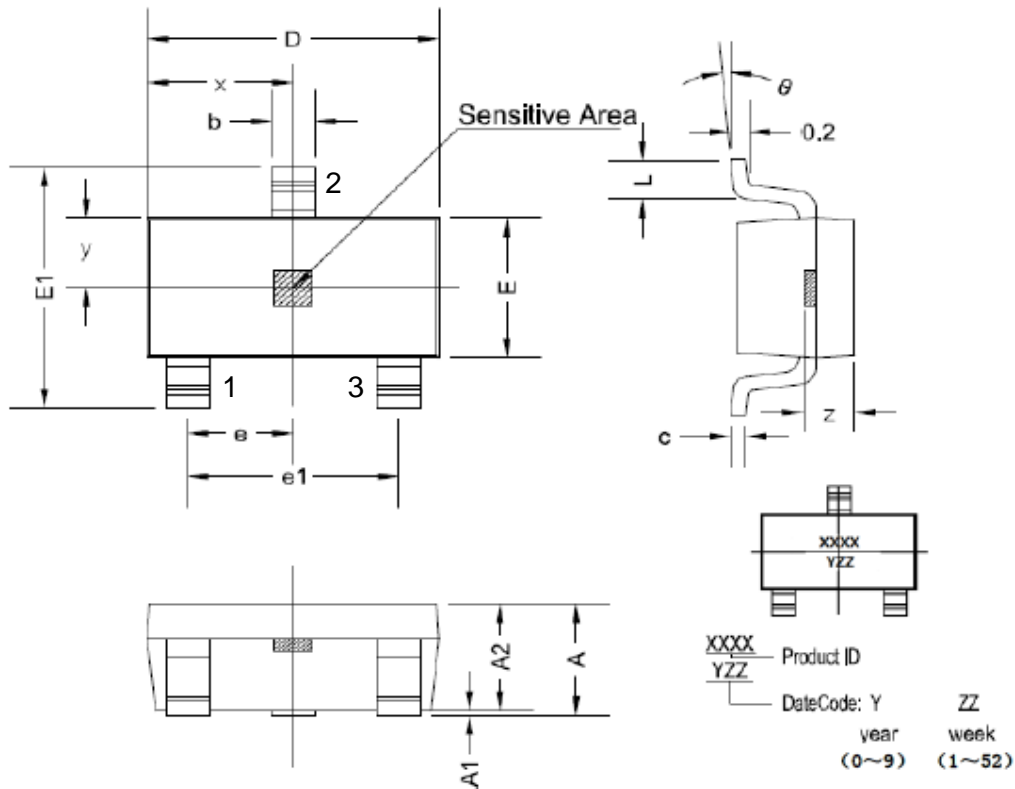


Package Outline
SOT23-3L(LH)

(Packing: Tape&Reel, 3000pcs/reel)

Pin Assignment

| Pin No. | Name | Function |
|---------|------|--------------|
| 1 | Vcc | Power supply |
| 2 | GND | Ground |
| 3 | Vout | Output |



| Symbol | Size (mm) | | Size (in inches) | |
|--------|-----------|------|------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 1.05 | 1.25 | 0.041 | 0.049 |
| A1 | 0 | 0.10 | 0 | 0.004 |
| A2 | 1.05 | 1.15 | 0.041 | 0.045 |
| b | 0.30 | 0.50 | 0.012 | 0.020 |
| c | 0.10 | 0.20 | 0.004 | 0.008 |
| D | 2.82 | 3.02 | 0.111 | 0.119 |
| E | 1.50 | 1.70 | 0.059 | 0.067 |
| E1 | 2.65 | 2.95 | 0.104 | 0.116 |
| e | 0.95 typ. | | 0.037 typ. | |
| e1 | 1.80 | 2.00 | 0.071 | 0.079 |
| L | 0.30 | 0.60 | 0.012 | 0.024 |
| x | 1.46 typ. | | 0.057 typ. | |
| y | 0.80 typ. | | 0.032 typ. | |
| z | 0.60 typ. | | 0.024 typ. | |
| θ | 0° | 8° | 0° | 8° |