

Catalogue

Bipolar Hall Effect Latching Switch ICs

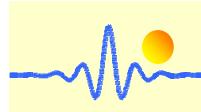
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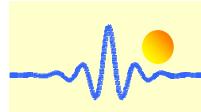
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CYD402F High-voltage bipolar latching/built-in pull-up resistor/high sensitivity Hall Switch

The CYD402F is a high-voltage bipolar latching switch IC. The chip consists of a voltage regulator unit, a Hall voltage generator, a differential amplification circuit, a temperature compensation circuit, and open collector output with a built-in pull-up resistor ($10\text{k}\Omega$) etc. The input is magnetic induction strength and the output is a digital voltage signal. It is resistant to high voltage shocks and has excellent noise resistance. Operating temperatures range is -40°C to 150°C and operating voltages from 3.8V to 60VDC, driving current up to 30mA. It is suitable for a variety of consumer electronics, automotive and industrial control and other fields. It is available in both TO92S and SOT23-3L packages, all of which are RoHS compliant.

Features

- Operating voltages range 3.8V~ 60V
- Oversupply protection capacity 80V
- ESD performance up to $\pm 4\text{kV}$
- Built-in pull-up resistor $10\text{k}\Omega$
- Operating temperature -40°C ~ 150°C
- Suitable for automotive and extreme industrial environments
- TO92S and SOT23-3L packages

Applications

- Brushless DC motors
- Speed measurement
- Counting
- Angle position detection
- Proximity detection
- Home applications
- Home safety etc.

Specifications

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

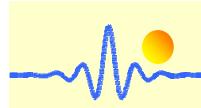
Parameter	Symbol	minimum	maximum	Unit
Maximum supply voltage	V_{DD}	-0.5	80	V
Output voltage	V_{OUT}	-0.5	80	V
Output current	I_{OUT}	0	40	mA
Operating temperature	T_A	-40	150	$^{\circ}\text{C}$
Storage temperature	T_S	-50	165	$^{\circ}\text{C}$

Electrical Characteristics ($T_A=25^{\circ}\text{C}$, $V_{SUP}=5\text{VDC}$)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Supply voltage	V_{DD}		3.8		60	V
Supply current	I_{DD}	Output open		4.8	8	mA
Output Leakage current	I_{OLEAK}				10	μA
Saturation output voltage	V_{SAT}	$I_{OUT}=20\text{mA}$			0.4	V
Output current	I_{OUT}				30	mA
Output rise time	T_r	$C_L=20\text{pF}$			1.0	μs
Output fall time	T_f	$C_L=20\text{pF}$			1.5	μs

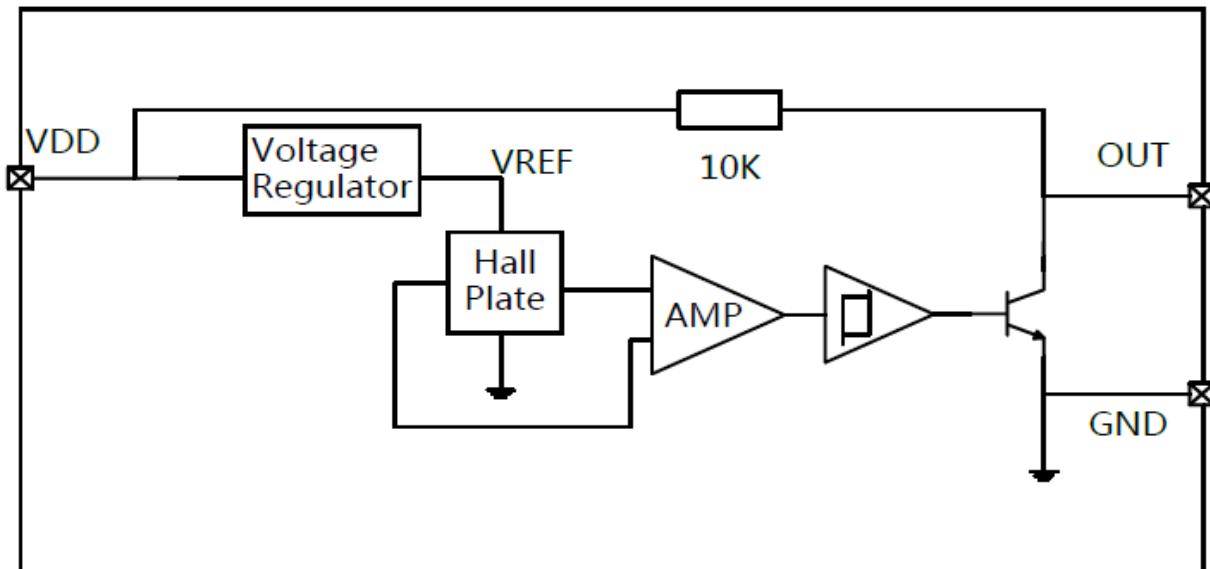
Magnetic Characteristics ($T_A=25^{\circ}\text{C}$, $V_{SUP}=5\text{VDC}$)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operating point	B_{OP}	$C_L=20\text{pF}$	10	25	40	G
Release point	B_{RP}	$C_L=20\text{pF}$	-40	-25	-10	G
Hysteresis	B_{HYS}			50		G

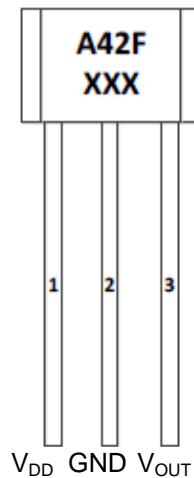


Functional Diagram

The magnetic sensor includes a voltage modulation circuit, a Hall plate, a signal amplification circuit, and a Schmitt trigger circuit. Among them, the voltage modulation circuit provides a reference voltage for the Hall plate, which senses a magnetic field perpendicular to the surface of the sensor to generate the Hall voltage, which is amplified and converted into an impulse output signal by the Schmitt trigger. Additionally a pull-up resistor is integrated inside the chip. The architecture block diagram is shown below.

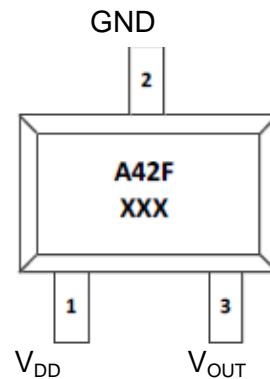


Pin Arrangement



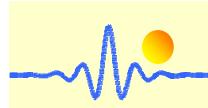
TO92S

XXX
year(0-9) week(01-52)



SOT23-3L

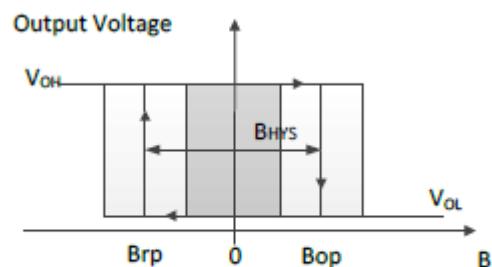
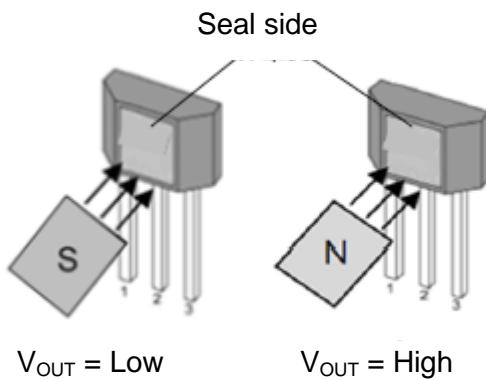
TO92S pin	SOT23-3L pin	Name	description
1	1	V _{DD}	Power supply
2	2	GND	Ground
3	3	V _{OUT}	Open collector output with a pull-up resistor 10kΩ



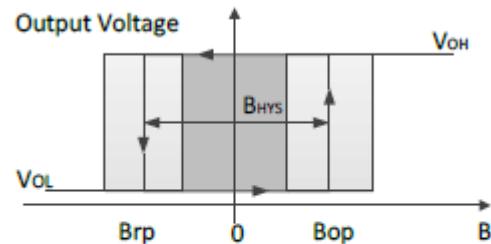
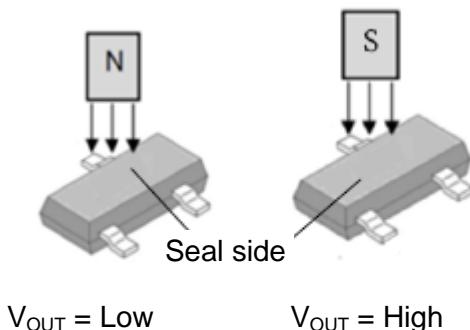
Magnetic conversion instructions

Applying a South Pole magnetic field greater than B_{op} (Antarctic proximity) to the seal side of the TO92S package, the output becomes low; while a North Pole field near to the seal side the output becomes high. When the IC is first powered on, if the magnetic field is between B_{op} and B_{rp} , the output state will be in an undefined state (high or low).

The magnetic field polarity of the SOT23-3L package is the opposite of that of the TO92S. See figure below.



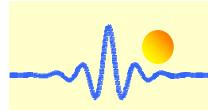
Output of TO92S package



Output of SOT23-3L package

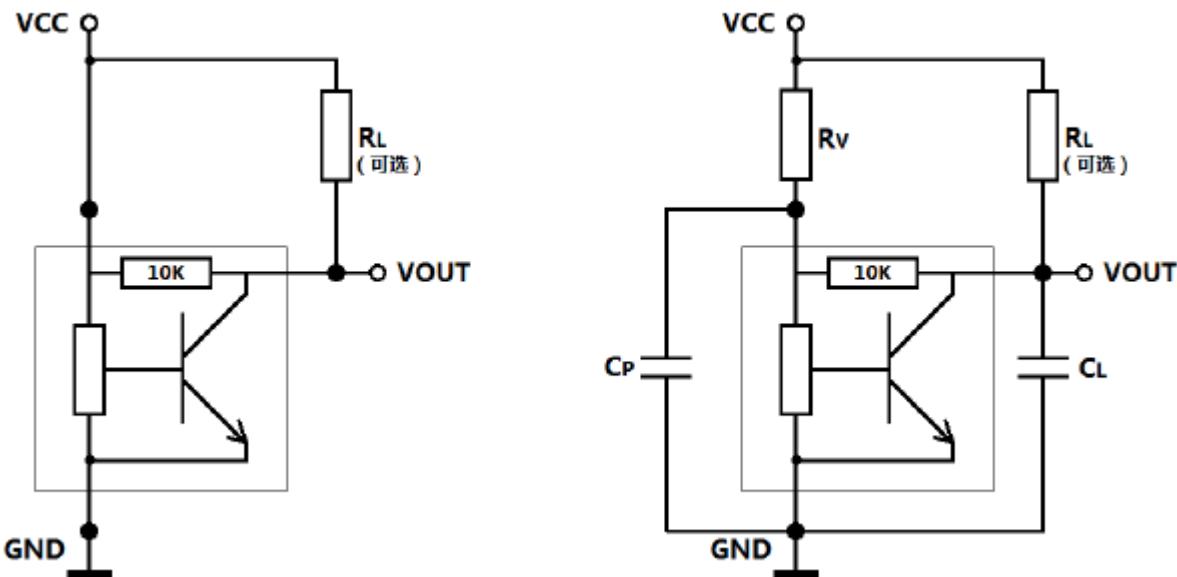
Note:

Hall switch IC is a sensitive device and should be used and stored with care for electrostatic protection. The mechanical stress applied to the device housing and leads should be minimized during installation and use. It is recommended that the welding temperature should not exceed 350°C and the duration should not exceed 5 seconds. In order to ensure the safety and stability of Hall IC, it is not recommended to use out of parameter range for a long time.



Application Circuits

Typical application circuits are shown in the following figures. For application circuit 1 R_L is optional. For applications with interference or radiation interference on the power supply line, build the series resistor R_V and the two capacitors C_P and C_L , which are placed as close to the sensor as possible, as shown in the figure below.

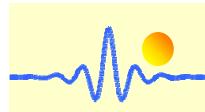


NOTE: Recommend values

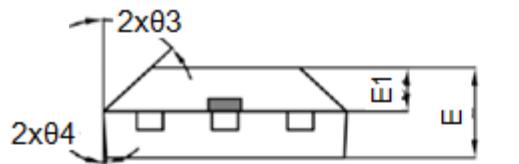
R_V : 100Ω
 C_P : 4.7nF
 C_L : 1nF
 R_L : optional

Order Information

Part number	Package	Packing	Working temperature
CYD402FUA	TO92S	1000pcs/bag	-40°C ~ 150°C
CYD402LH	SOT23-3L	3000pcs/reel	-40°C ~ 150°C

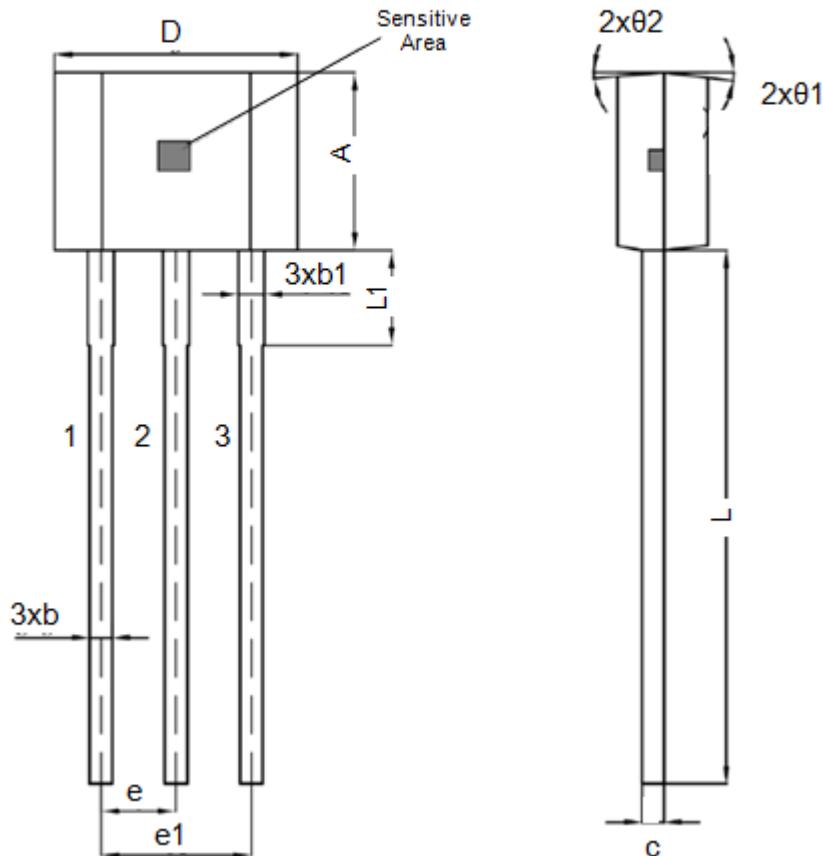


**Package Outline
TO92S (UA)**

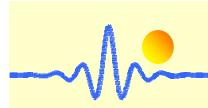


Pin Assignment

Pin No.	Name	Function
1	V _{SUP}	Power supply
2	GND	Ground
3	V _{OUT}	Output



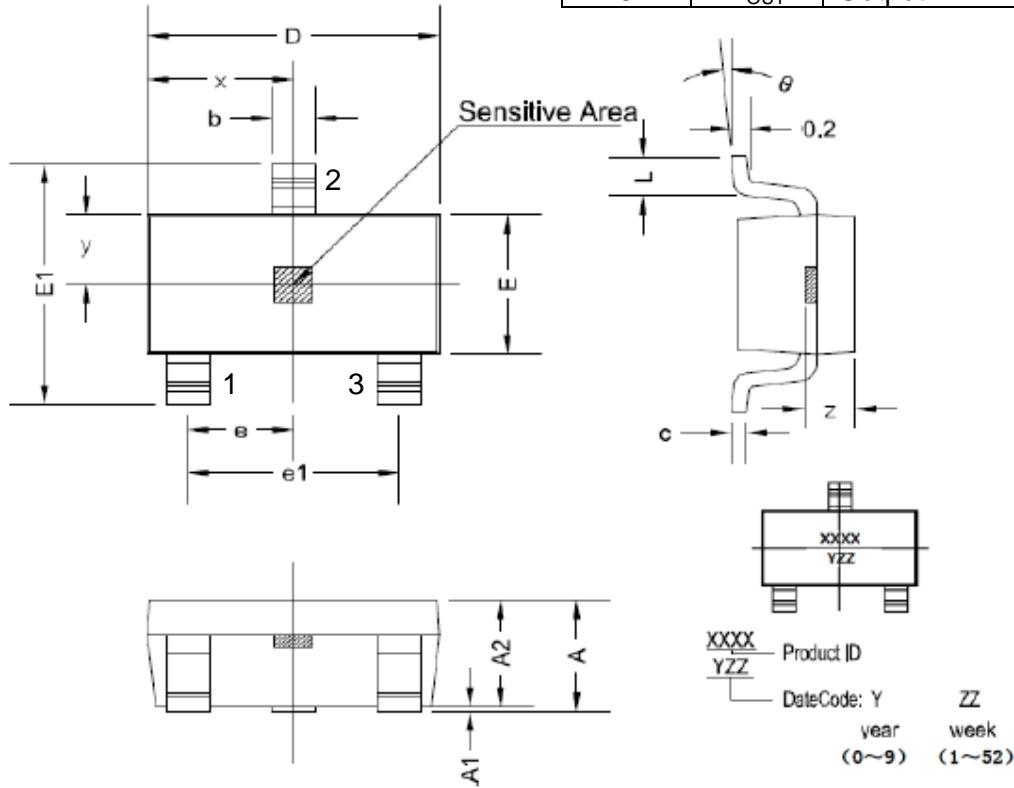
Symbol	Size (mm)			Size (in inches)		
	Min.	typ.	Max.	Min.	typ.	Max.
A	2.90	3.00	3.10	0.114	0.118	0.122
b	0.35	0.39	0.40	0.014	0.015	0.016
b1		0.44			0.017	
c	0.36	0.38	0.40	0.014	0.015	0.016
D	4.00	4.10	4.20	0.157	0.161	0.165
E	1.42	1.52	1.62	0.056	0.060	0.064
E1		0.75			0.030	
e		1.27			0.050	
e1		1.27			0.050	
L1		2.54			0.100	
L	13.5	14.5	15.5	0.531	0.571	0.610
θ1		6°			6°	
θ2		3°			3°	
θ3		45°			45°	
θ4		3°			3°	



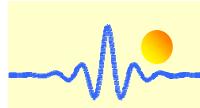
Package Outline SOT23-3L(LH)

Pin Assignment

Pin No.	Name	Function
1	Vcc	Power supply
2	GND	Ground
3	V _{OUT}	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 tpy.	
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°



CYD501 High-Sensitive Bipolar Hall Effect Switch

Applications

- Brushless DC motors
- Speed measurement
- Counting
- Angle position detection
- Proximity detection
- Home applications
- Home safety etc.

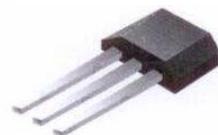
Features

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

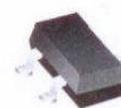
Package Type

P/N: CYD501-XX

TO92S (UA)



SOT23-3L (LH)



Order Information

- CYD501-PA
Package (PA): UA, LH

Specifications

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

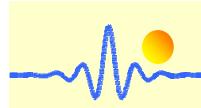
Parameter	Symbol	Conditions	Rating	Unit
Maximum supply voltage	V_{DDMAX}		30	V
Operating temperature	T_A		-40~+150	°C
Storage temperature	T_S		-40~+165	°C
Maximum output current	I_{OMAX}		25	mA

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	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	400	mV
Output leakage current	I_{OH}	Output switch off		0.1	0.1	μA
Output voltage	V_{OUT}			30	30	V
Output voltage fall time	t_f	$V_{DD}=12\text{V}; R_L=820\Omega;$		1	1	μs
Output voltage rise time	t_r	$C_L=20\text{pF}$		1	1	μs
Delay time	t_d			18	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	9	9	9	G
Release point (Off point)	B_{RP}	$R_L=1\text{k}\Omega,$	-9	-9	-9	G
Hysteresis	B_{HYS}	Load capacitor	18	18	18	G
Temperature coefficient	T_c	$C_L=20\text{pF}$	-1000	-1000	-1000	ppm/°C



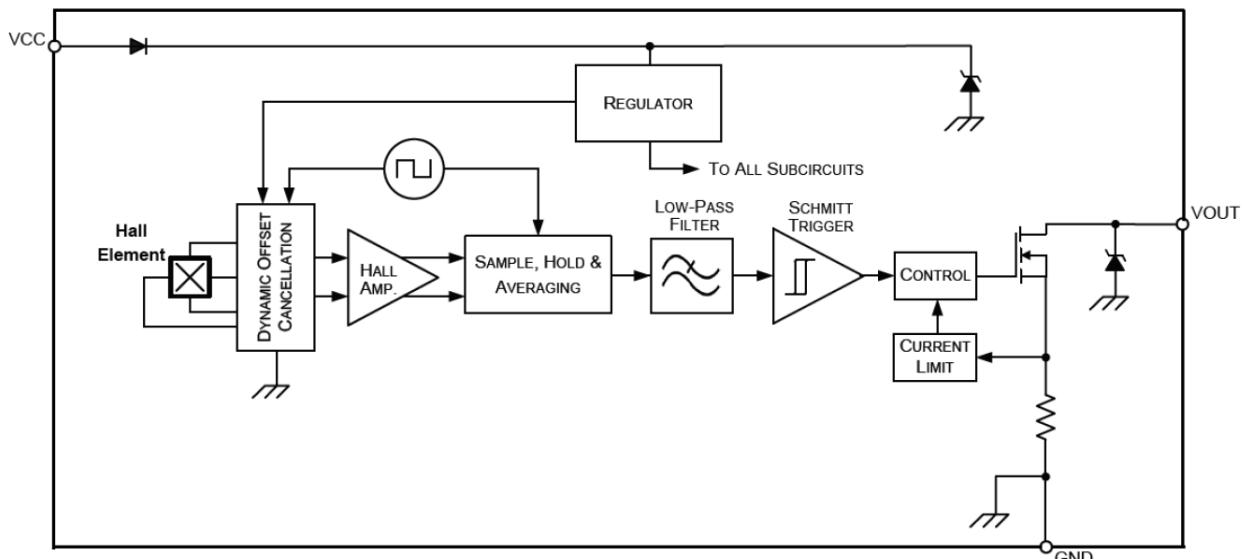
General Specifications

CYD501 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.

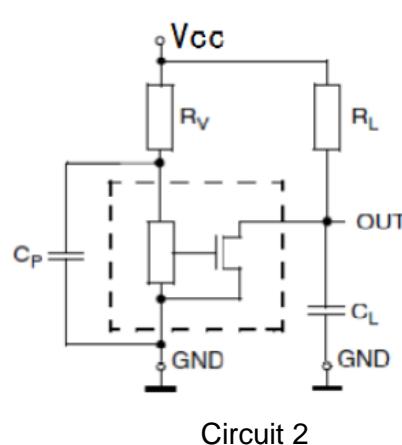
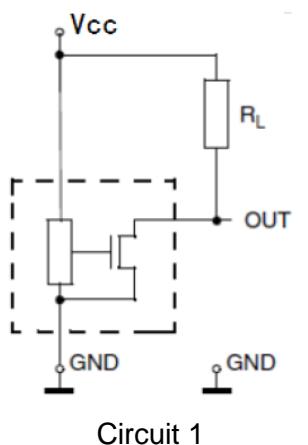
Magnetic offset caused by mechanical stress is compensated by using the chopping offset compensation technique. A serial resistor or diode on the supply line is not required thanks to the built-in reverse voltage protection.

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.

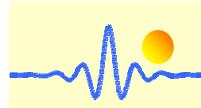


Application Circuits



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.

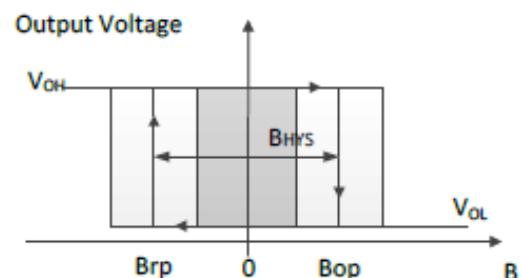
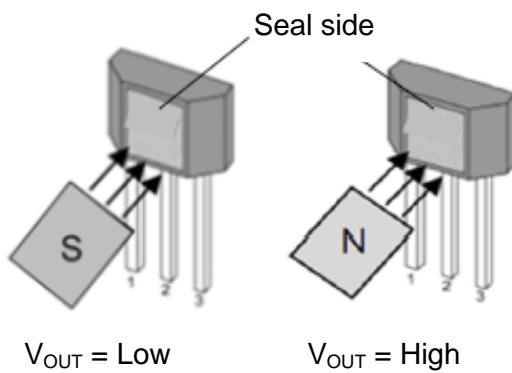
For example:
 $R_V = 100\Omega$
 $C_P = 4.7 \text{ nF}$
 $C_L = 1 \text{ nF}$.
 $R_L = 1k\text{--}10k \Omega$



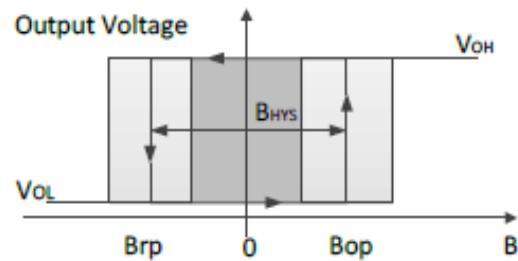
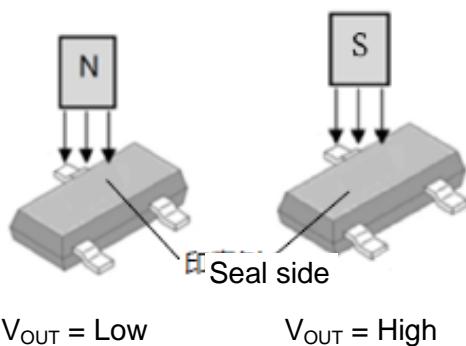
Magnetic conversion instructions

Applying a South Pole magnetic field greater than B_{op} (Antarctic proximity) to the seal side of the TO92S package, the output becomes low; while a North Pole field near to the seal side the output becomes high. When the IC is first powered on, if the magnetic field is between B_{op} and B_{rp} , the output state will be in an undefined state (high or low).

The magnetic field polarity of the SOT23-3L package is the opposite of that of the TO92S. See figure below.



Output of TO92S package



Output of SOT23-3L package

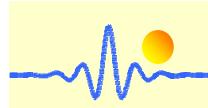
Note:

Hall switch IC is a sensitive device and should be used and stored with care for electrostatic protection. The mechanical stress applied to the device housing and leads should be minimized during installation and use. It is recommended that the welding temperature should not exceed 350°C and the duration should not exceed 5 seconds. In order to ensure the safety and stability of Hall IC, it is not recommended to use out of parameter range for a long time.

ESD Test

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

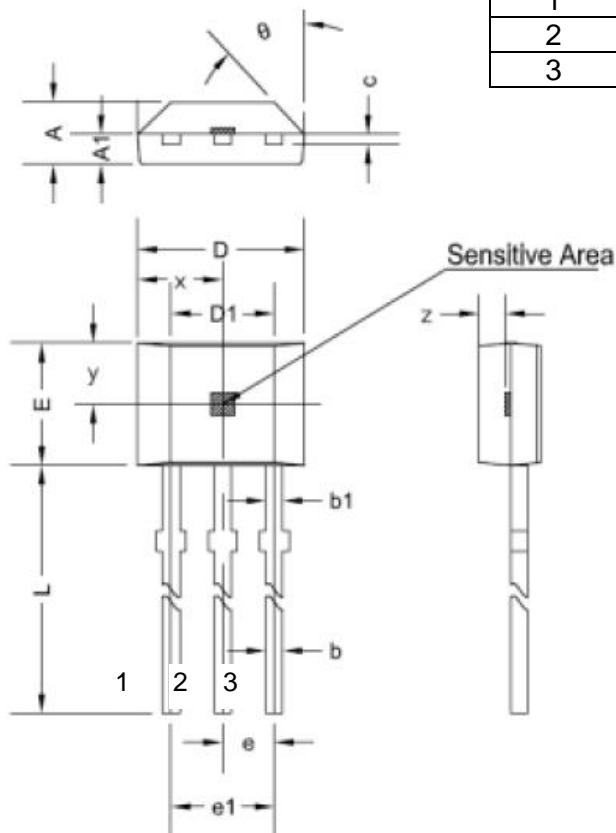
Symbol	Parameter	Min	Max	Unit
V_{HBM}	Human body model (according to AEC Q100-002)	-12	12	kV



Package Outline

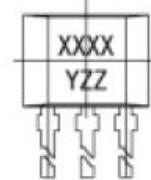
TO92S (UA)

(Packing: bulk, 1000pcs/bag)



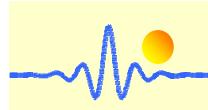
Pin Assignment

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



XXXX Product ID
YZZ DateCode: Y ZZ
year week
(0~9) (01~52)

Symbol	Size (mm)		Size (in 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 tpy.	
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.	
θ	45° typ.		45° typ.	



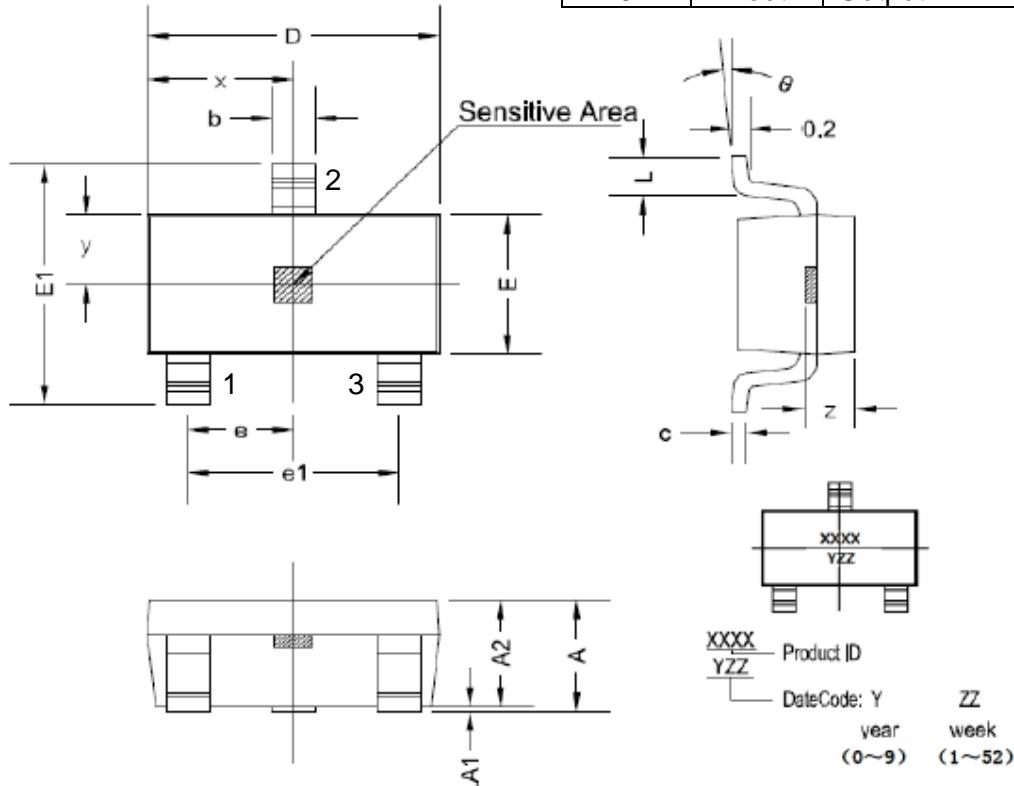
Package Outline

SOT23-3L(LH)

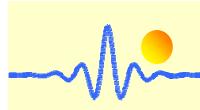
(Packing: Tape&Reel, 3000pcs/reel)

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 tpy.	
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.	
theta	0°	8°	0°	8°



CYD502 High-Sensitive Bipolar Latching Hall Effect Switch

Applications

- Brushless DC motors
- Speed measurement
- Counting
- Angle position detection
- Proximity detection
- Home applications
- Home safety etc.

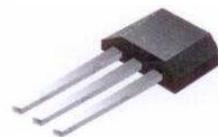
Features

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

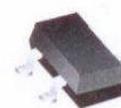
Package Type

P/N: CYD502-XX

TO92S (UA)



SOT23-3L (LH)



Order Information

- CYD502-PA
Package (PA): UA, LH

Specifications

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

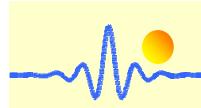
Parameter	Symbol	Conditions	Rating	Unit
Maximum supply voltage	V_{DDMAX}		30	V
Operating temperature	T_A		-40~+150	°C
Storage temperature	T_S		-40~+165	°C
Maximum output current	I_{OMAX}		25	mA

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	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	400	mV
Output leakage current	I_{OH}	Output switch off		0.1	0.1	μA
Output voltage	V_{OUT}			30	30	V
Output voltage fall time	t_f	$V_{DD}=12\text{V}; R_L=820\Omega;$			1	μs
Output voltage rise time	t_r	$C_L=20\text{pF}$			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	25			G
Release point (Off point)	B_{RP}	$R_L=1\text{k}\Omega,$	-25			G
Hysteresis	B_{HYS}	Load capacitor	50			G
Temperature coefficient	T_c	$C_L=20\text{pF}$	-1000			ppm/°C



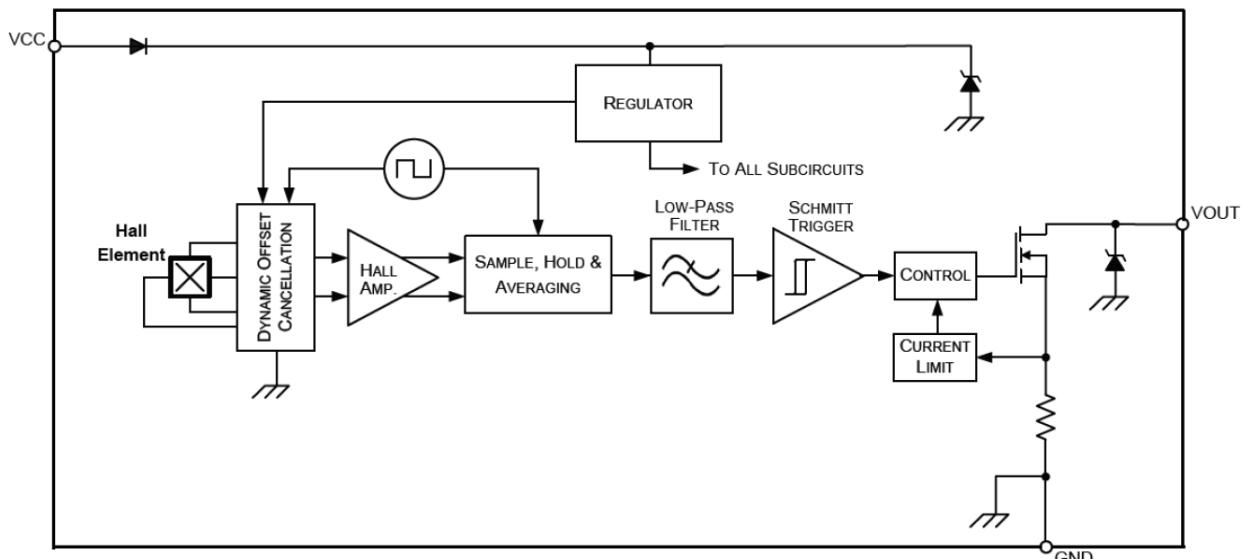
General Specifications

CYD502 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.

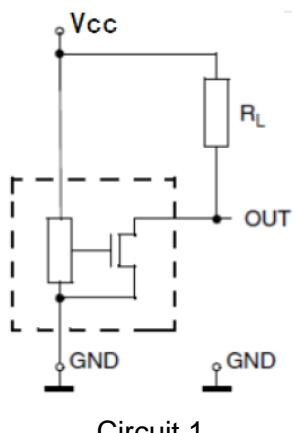
Magnetic offset caused by mechanical stress is compensated by using the chopping offset compensation technique. A serial resistor or diode on the supply line is not required thanks to the built-in reverse voltage protection.

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).

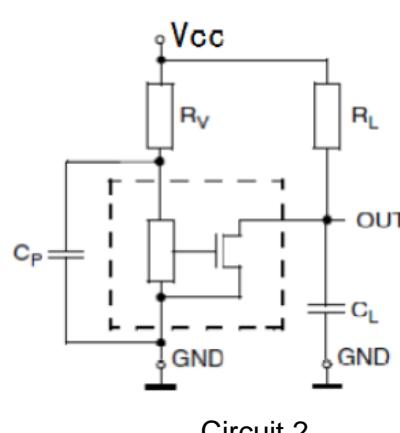
The device is able to withstand a maximum supply voltage of 28 V for unlimited time and features overvoltage capability (40V load dump). The architecture block diagram is shown in the following Fig.



Application Circuits



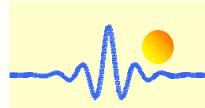
Circuit 1



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.

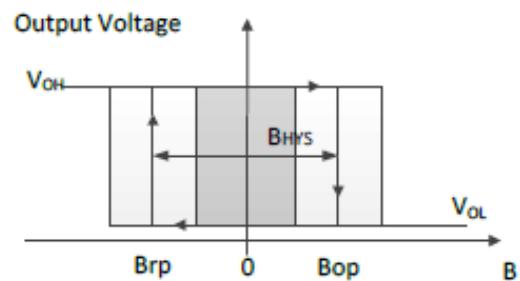
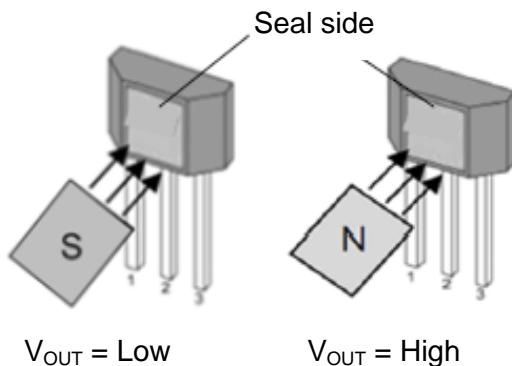
For example:
 $R_V = 100\Omega$
 $C_P = 4.7 \text{ nF}$
 $C_L = 1 \text{ nF}$.
 $R_L = 1k\text{--}10k \Omega$



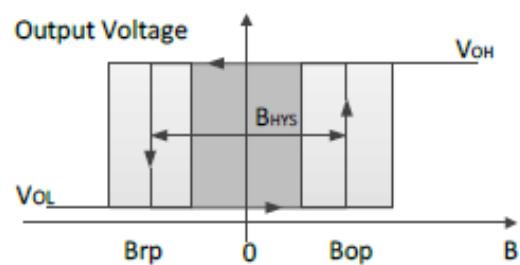
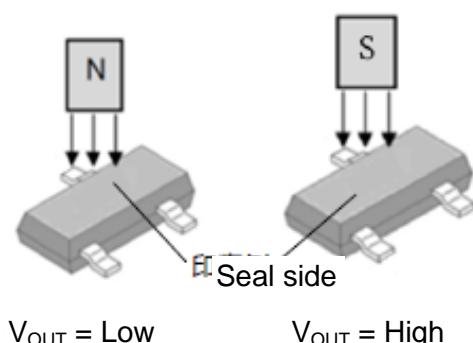
Magnetic conversion instructions

Applying a South Pole magnetic field greater than B_{op} (Antarctic proximity) to the seal side of the TO92S package, the output becomes low; while a North Pole field near to the seal side the output becomes high. The output does not change if the magnetic field is removed. For changing the output state, the opposite magnetic field polarity must be applied. When the IC is first powered on, if the magnetic field is between B_{op} and B_{rp} , the output state will be in an undefined state (high or low).

The magnetic field polarity of the SOT23-3L package is the opposite of that of the TO92S. See figure below.



Output of TO92S package



Output of SOT23-3L package

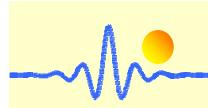
Note:

Hall switch IC is a sensitive device and should be used and stored with care for electrostatic protection. The mechanical stress applied to the device housing and leads should be minimized during installation and use. It is recommended that the welding temperature should not exceed 350°C and the duration should not exceed 5 seconds. In order to ensure the safety and stability of Hall IC, it is not recommended to use out of parameter range for a long time.

ESD Test

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

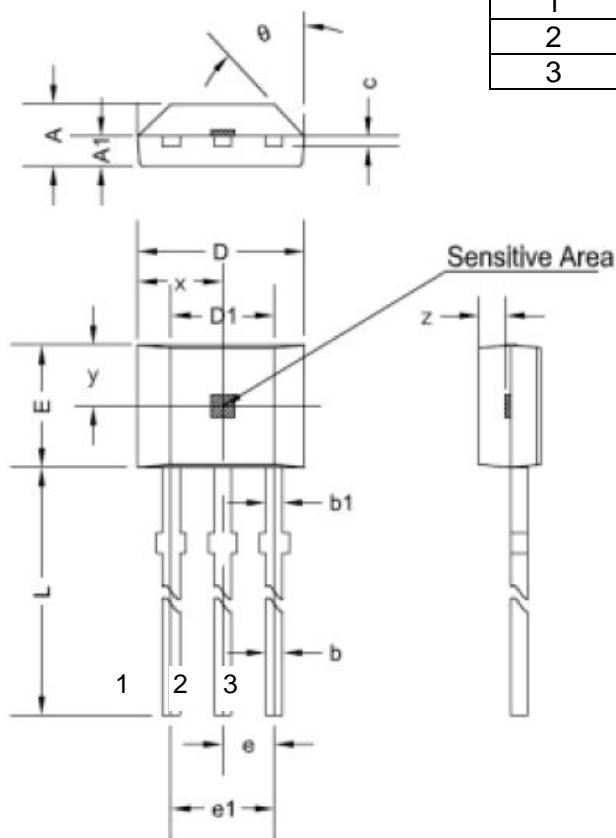
Symbol	Parameter	Min	Max	Unit
V_{HBM}	Human body model (according to AEC Q100-002)	-12	12	kV



Package Outline

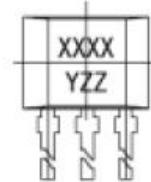
TO92S (UA)

(Packing: bulk, 1000pcs/bag)



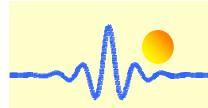
Pin Assignment

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



XXXX Product ID
YZZ DateCode: Y ZZ
year week
(0~9) (01~52)

Symbol	Size (mm)		Size (in 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 tpy.	
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.	
θ	45° typ.		45° typ.	



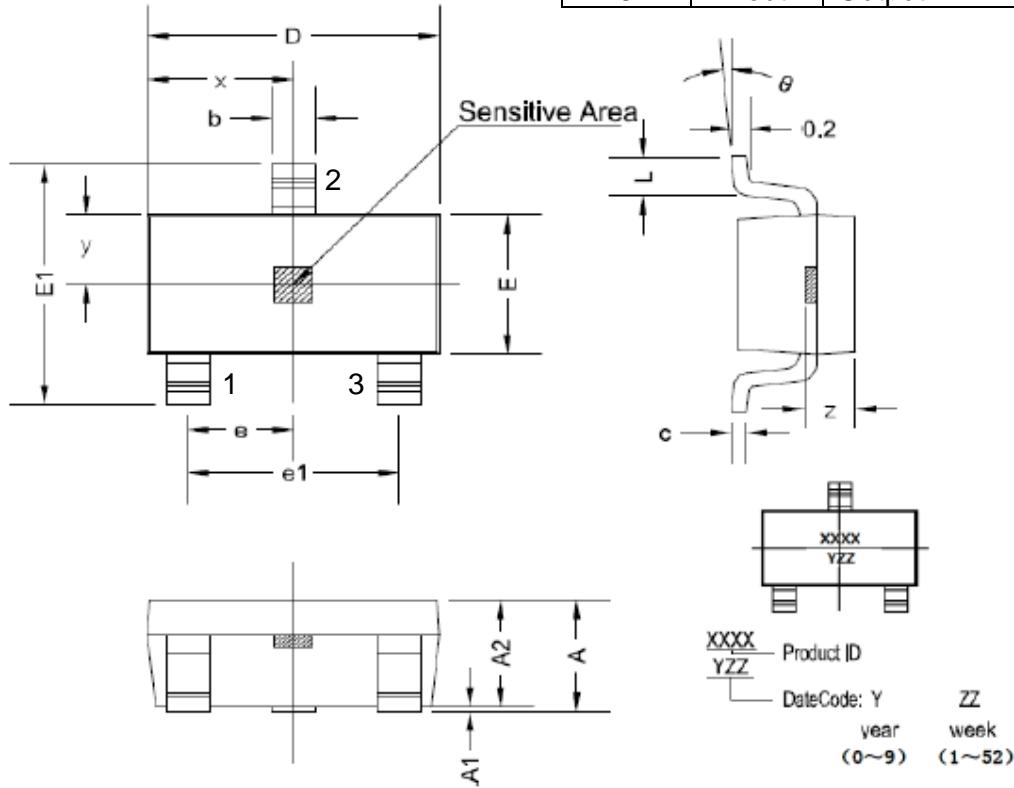
Package Outline

SOT23-3L(LH)

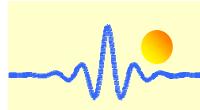
(Packing: Tape&Reel, 3000pcs/reel)

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 tpy.	
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.	
theta	0°	8°	0°	8°



CYD504 Bipolar Latching Hall Effect Switch

Applications

- Brushless DC motors
- Speed measurement
- Counting
- Angle position detection
- Proximity detection
- Home applications
- Home safety etc.

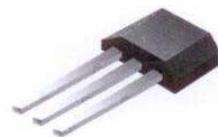
Features

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

Package Type

P/N: CYD504-XX

TO92S (UA)



SOT23-3L (LH)



Order Information

- CYD504-PA
Package (PA): UA, LH

Specifications

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

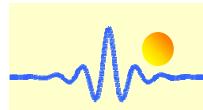
Parameter	Symbol	Conditions	Rating	Unit
Maximum supply voltage	V_{DDMAX}		30	V
Operating temperature	T_A		-40~+150	°C
Storage temperature	T_S		-40~+165	°C
Maximum output current	I_{OMAX}		25	mA

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	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	400	mV
Output leakage current	I_{OH}	Output switch off		0.1	0.1	μA
Output voltage	V_{OUT}			30	30	V
Output voltage fall time	t_f	$V_{DD}=12\text{V}; R_L=820\Omega;$			1	μs
Output voltage rise time	t_r	$C_L=20\text{pF}$			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		8		mT
Release point (Off point)	B_{RP}	$R_L=1\text{k}\Omega,$		-8		mT
Hysteresis	B_{HYS}	Load capacitor		16		mT
Temperature coefficient	T_c	$C_L=20\text{pF}$		-1000		ppm/°C



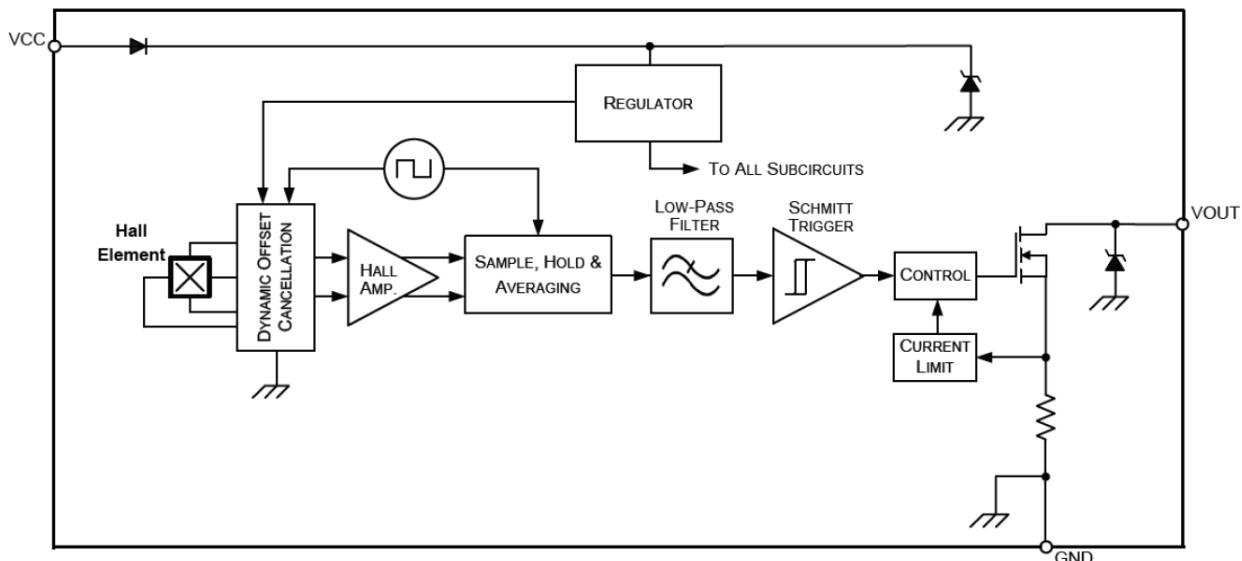
General Specifications

CYD504 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.

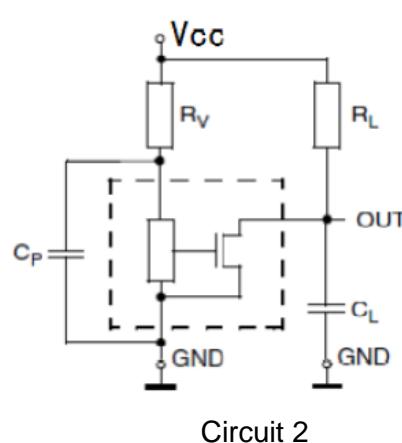
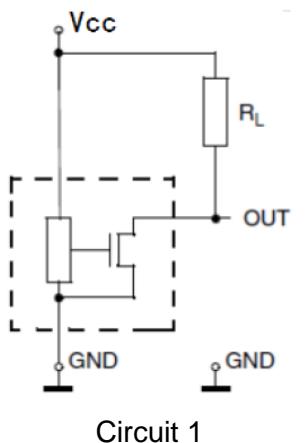
Magnetic offset caused by mechanical stress is compensated by using the chopping offset compensation technique. A serial resistor or diode on the supply line is not required thanks to the built-in reverse voltage protection.

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.

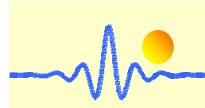


Application Circuits



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.

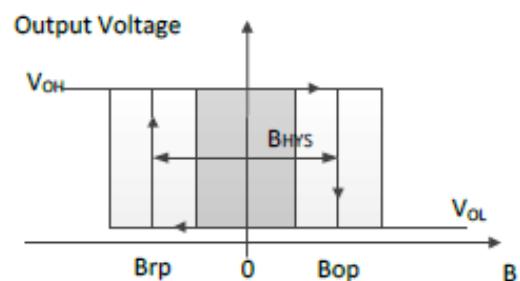
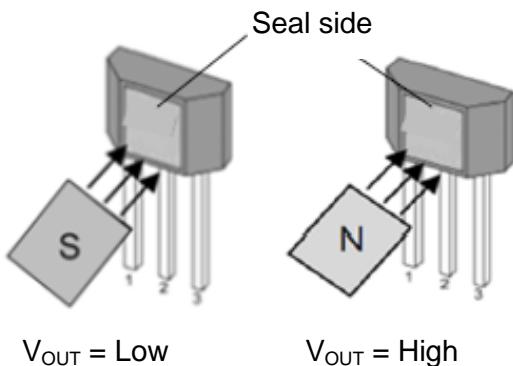
For example:
 $R_V = 100\Omega$
 $C_P = 4.7 \text{ nF}$
 $C_L = 1 \text{ nF}$
 $R_L = 1k\text{--}10k \Omega$



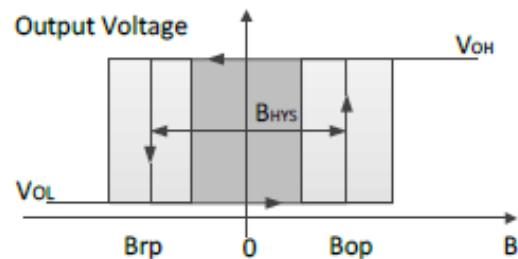
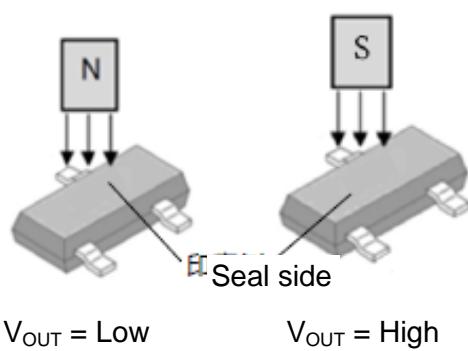
Magnetic conversion instructions

Applying a South Pole magnetic field greater than B_{op} (Antarctic proximity) to the seal side of the TO92S package, the output becomes low; while a North Pole field near to the seal side the output becomes high. The output does not change if the magnetic field is removed. For changing the output state, the opposite magnetic field polarity must be applied. When the IC is first powered on, if the magnetic field is between B_{rp} and B_{op} , the output state will be in an undefined state (high or low).

The magnetic field polarity of the SOT23-3L package is the opposite of that of the TO92S. See figure below.



Output of TO92S package



Output of SOT23-3L package

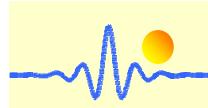
Note:

Hall switch IC is a sensitive device and should be used and stored with care for electrostatic protection. The mechanical stress applied to the device housing and leads should be minimized during installation and use. It is recommended that the welding temperature should not exceed 350°C and the duration should not exceed 5 seconds. In order to ensure the safety and stability of Hall IC, it is not recommended to use out of parameter range for a long time.

ESD Test

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

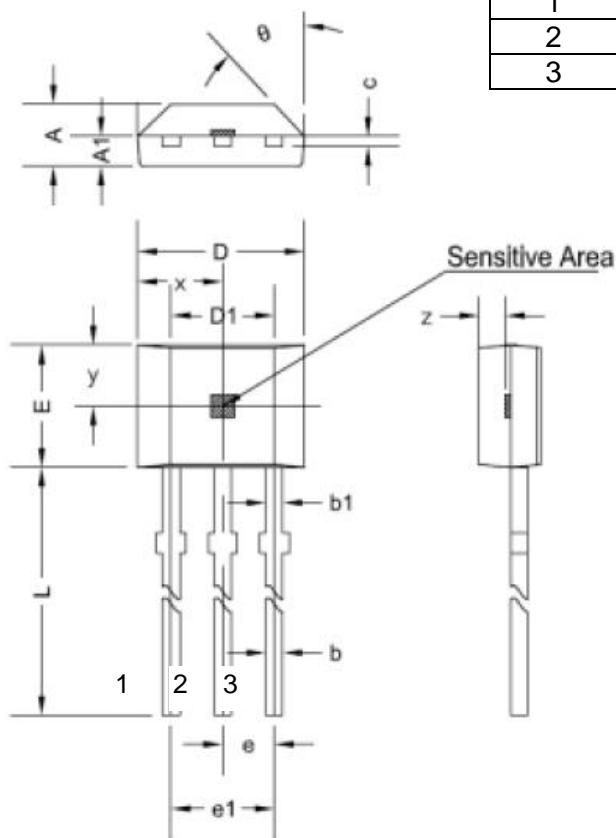
Symbol	Parameter	Min	Max	Unit
V_{HBM}	Human body model (according to AEC Q100-002)	-12	12	kV



Package Outline

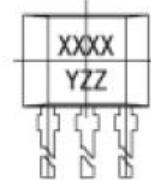
TO92S (UA)

(Packing: bulk, 1000pcs/bag)



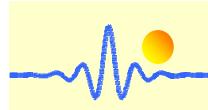
Pin Assignment

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



XXXX Product ID
YZZ DateCode: Y ZZ
year week
(0~9) (01~52)

Symbol	Size (mm)		Size (in 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 tpy.	
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.	
θ	45° typ.		45° typ.	



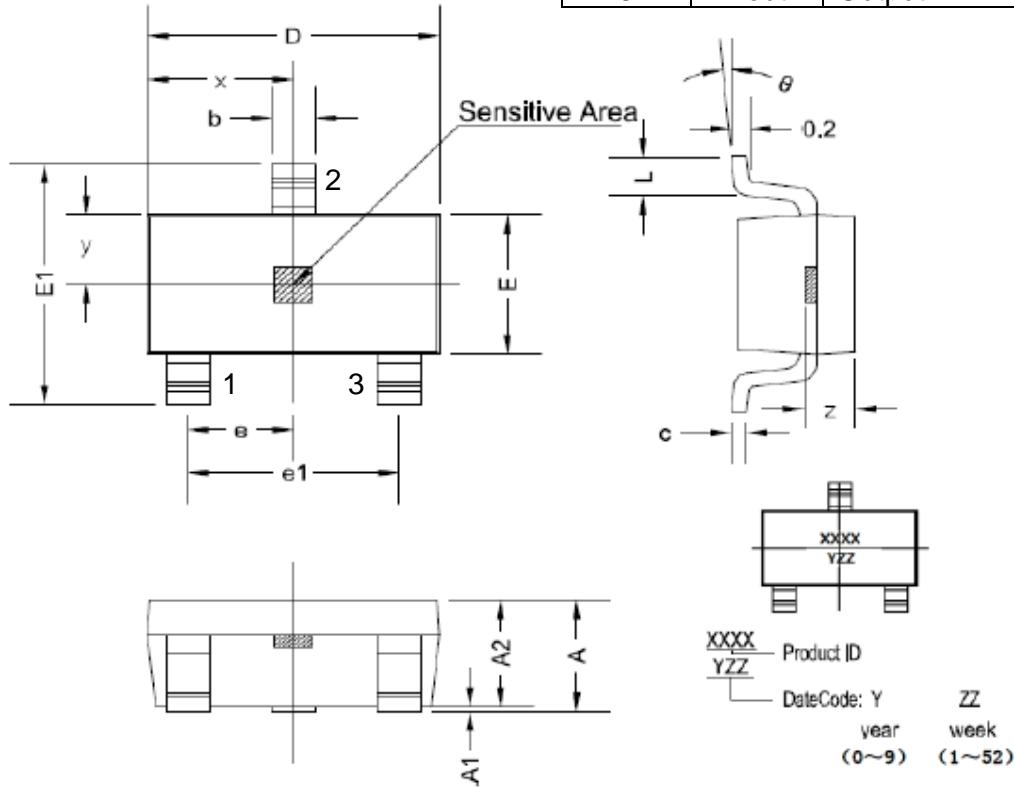
Package Outline

SOT23-3L(LH)

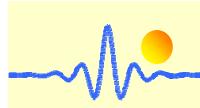
(Packing: Tape&Reel, 3000pcs/reel)

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 tpy.	
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.	
theta	0°	8°	0°	8°



CYD505 Bipolar Latching Hall Effect Switch

Applications

- Brushless DC motors
- Speed measurement
- Counting
- Angle position detection
- Proximity detection
- Home applications
- Home safety etc.

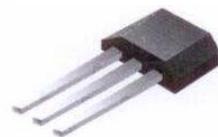
Features

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

Package Type

P/N: CYD505-XX

TO92S (UA)



SOT23-3L (LH)



Order Information

- CYD505-PA
Package (PA): UA, LH

Specifications

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

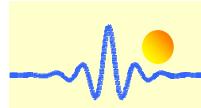
Parameter	Symbol	Conditions	Rating	Unit
Maximum supply voltage	V_{DDMAX}		30	V
Operating temperature	T_A		-40~+150	°C
Storage temperature	T_S		-40~+165	°C
Maximum output current	I_{OMAX}		25	mA

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	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	400	mV
Output leakage current	I_{OH}	Output switch off		0.1	0.1	μA
Output voltage	V_{OUT}			30	30	V
Output voltage fall time	t_f	$V_{DD}=12\text{V}; R_L=820\Omega; C_L=20\text{pF}$		1	1	μs
Output voltage rise time	t_r			1	1	μs
Delay time	t_d			18	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		13.5		mT
Release point (Off point)	B_{RP}	$R_L=1\text{k}\Omega,$		-13.5		mT
Hysteresis	B_{HYS}	Load capacitor		27		mT
Temperature coefficient	T_c	$C_L=20\text{pF}$		-1000		ppm/°C



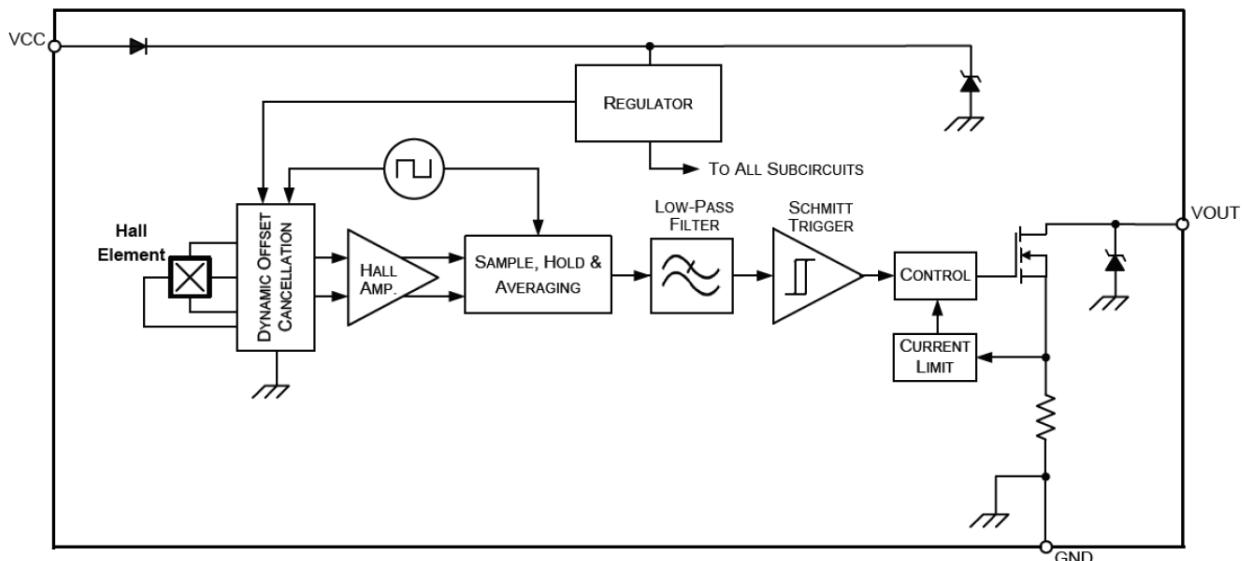
General Specifications

CYD505 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.

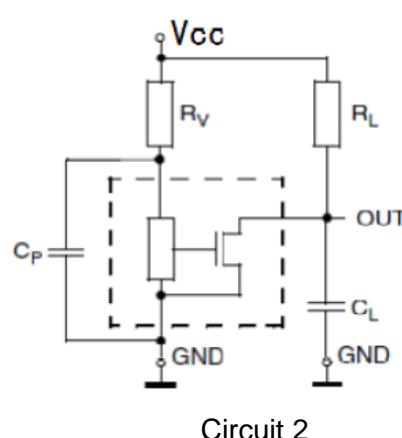
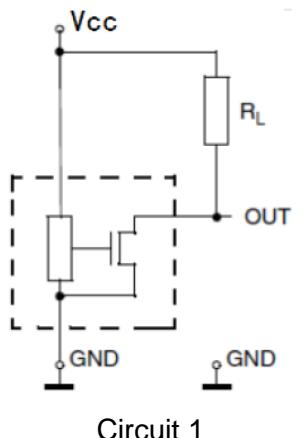
Magnetic offset caused by mechanical stress is compensated by using the chopping offset compensation technique. A serial resistor or diode on the supply line is not required thanks to the built-in reverse voltage protection.

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.

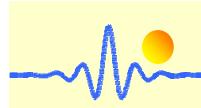


Application Circuits



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.

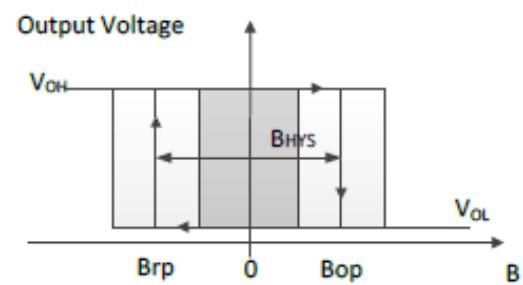
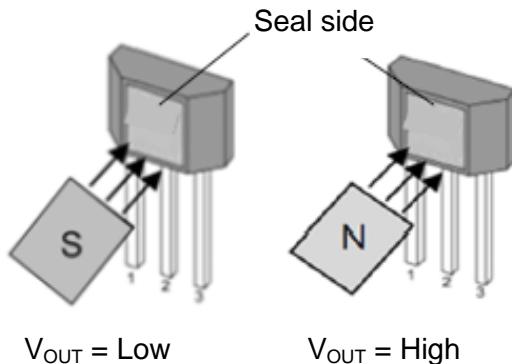
For example:
 $R_V = 100\Omega$
 $C_P = 4.7 \text{ nF}$
 $C_L = 1 \text{ nF}$
 $R_L = 1k\text{--}10k \Omega$



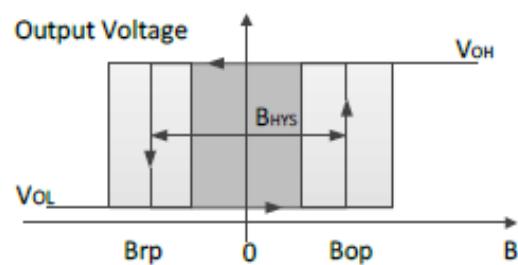
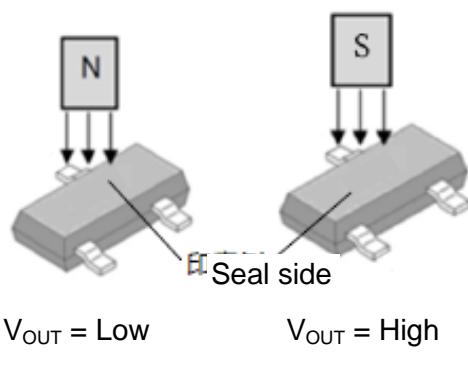
Magnetic conversion instructions

Applying a South Pole magnetic field greater than B_{op} (Antarctic proximity) to the seal side of the TO92S package, the output becomes low; while a North Pole field near to the seal side the output becomes high. The output does not change if the magnetic field is removed. For changing the output state, the opposite magnetic field polarity must be applied. When the IC is first powered on, if the magnetic field is between B_{op} and B_{rp} , the output state will be in an undefined state (high or low).

The magnetic field polarity of the SOT23-3L package is the opposite of that of the TO92S. See figure below.



Output of TO92S package



Output of SOT23-3L package

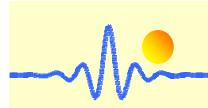
Note:

Hall switch IC is a sensitive device and should be used and stored with care for electrostatic protection. The mechanical stress applied to the device housing and leads should be minimized during installation and use. It is recommended that the welding temperature should not exceed 350°C and the duration should not exceed 5 seconds. In order to ensure the safety and stability of Hall IC, it is not recommended to use out of parameter range for a long time.

ESD Test

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

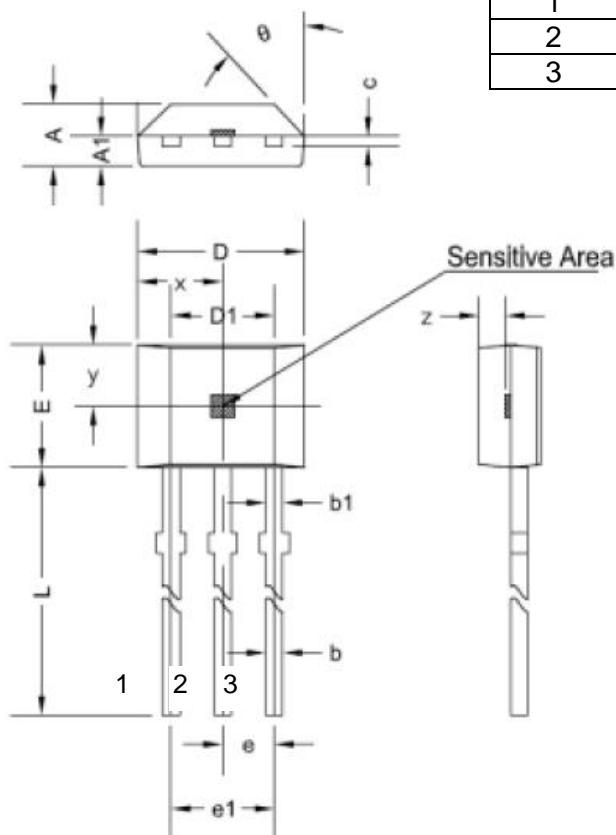
Symbol	Parameter	Min	Max	Unit
V_{HBM}	Human body model (according to AEC Q100-002)	-12	12	kV



Package Outline

TO92S (UA)

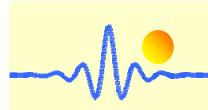
(Packing: bulk, 1000pcs/bag)



Pin Assignment

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

Symbol	Size (mm)		Size (in 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 tpy.	
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.	
θ	45° typ.		45° typ.	



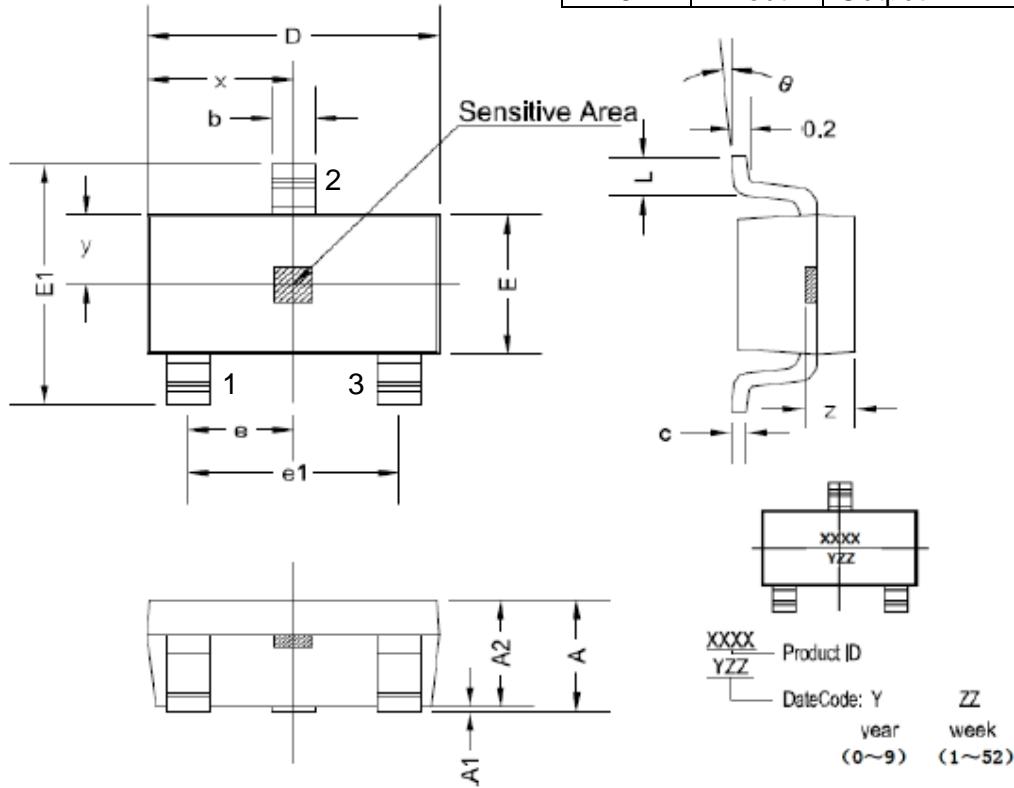
Package Outline

SOT23-3L(LH)

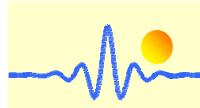
(Packing: Tape&Reel, 3000pcs/reel)

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 tpy.	
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.	
theta	0°	8°	0°	8°



CYD8945 High Reliability Hall Effect Bipolar Switch IC

The CYD8945 Hall-Effect switch, produced with ultra-high voltage bipolar technology, has been designed specifically for automotive and industrial applications etc. New considerations are given not only to protect the IC from the high voltage transients, but also achieving a high degree of noise immunity.

Each device includes a voltage regulator for operation with supply voltage of 3.8 to 60V volts, quadratic Hall-Voltage generator, temperature compensation circuitry, small-signal amplifier, Schmitt trigger, and an output driver to sink up to 60mA. Internal integrated output filter can improve the EMC capability.



FEATURES

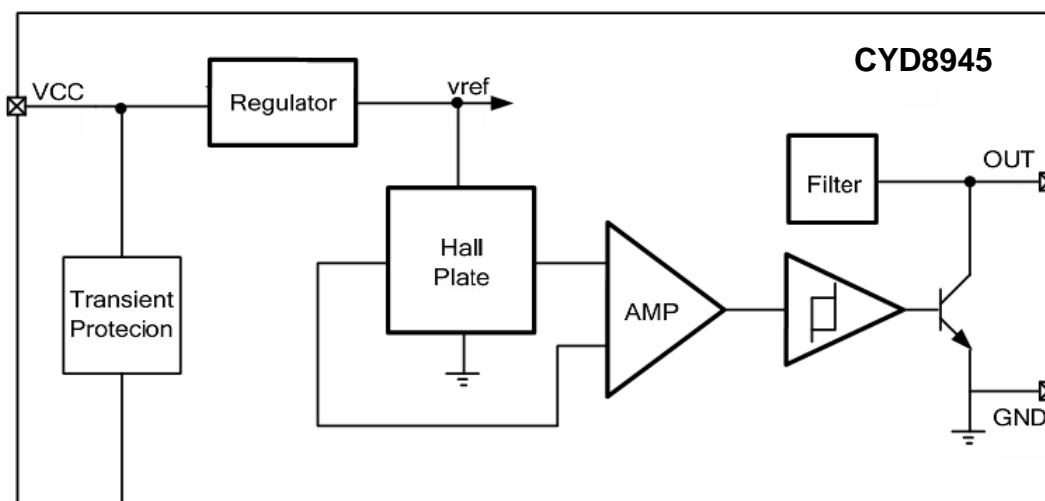
- ◆ High transient voltage protection
- ◆ Integrated output filter
- ◆ 60mA sinking capability
- ◆ High ESD rating
- ◆ RoHS compliant

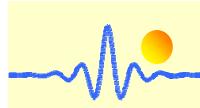
TYPICAL APPLICATION

- ◆ High Sensitive Non-contact Switch
- ◆ DC Brushless Motor
- ◆ DC Brushless Fan
- ◆ Auto-motive transmission position

Functional Description

The circuit includes Hall generator, amplifier and Schmitt-Trigger on one chip. The internal reference provides the supply voltage for the components. A magnetic field perpendicular to the chip surface induces a voltage at the Hall probe. This voltage is amplified and switches as a Schmitt-Trigger with output driver. The output is protected against electrical disturbances by using of the filter block which can remove the output voltage pulse.





ABSOLUTE MAXIMUM RATINGS

Over operating free-air temperature range (unless otherwise noted) ⁽¹⁾

Parameter	Symbol	Value		Unit
		Min	Max	
Supply Voltage	V _{CC}	-0.5	100	V
Output terminal voltage	V _{OUT}	-0.5	100	V
Output terminal current sink	I _{SINK}	0	60	mA
Operating Temperature Range	T _A	-50	150	°C
Maximum junction temperature	T _J	-55	165	°C
Storage Temperature Range	T _S	-65	175	°C

(1) Stresses above those listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

Over operating free-air temperature range (V_{CC} = 5V, unless otherwise noted)

Parameter	Test Condition	Symbol	Value			Unit
			Min	Typ	Max	
Supply Voltage ⁽¹⁾	T _J < T _J (Max.)	V _{CC}	3.8	-	60	V
Supply current	V _{CC} =3.8V ~ 60V open-collector	I _{CC}	-	4.0	10	mA
Output Low Voltage	I _Q =20mA, T _A =25°C	V _{OL}	0.1	0.15	0.2	V
Output Leakage Current	V _O =V _{CC} max, B≤B _{RP}	I _{OH}	-	-	1.0	µA
Output Rise time	V _{CC} =12V, R _L =820Ω	t _r	-	-	1.5	µs
Output Fall time	C _L =20pF	t _f	-	-	1.5	µs
Frequency Bandwidth		f _{BW}	-	-	100	kHz

Magnetic Characteristics (Unit: mT)

Parameter	Test condition	Value			Unit
		Min	Typ	Max	
Operate Point (B _{OP})	UA Package, TA=25°C	2.5	10	18.5	mT ⁽²⁾
Release Point (B _{RP})		-18.5	-10	-2.5	
Hysteresis (B _H)		-	20	-	

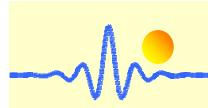
(1) Maximum voltage must be adjusted for power dissipation and junction temperature, see Thermal Characteristics

(2) 1mT=10Gs

ESD Protection

Human Body Model (HBM) tests according to: standard EIA/JESD22-A114-B HBM

Parameter	Symbol	Min.	Max.	Unit
ESD-Protection	V _{ESD}	-8	8	kV

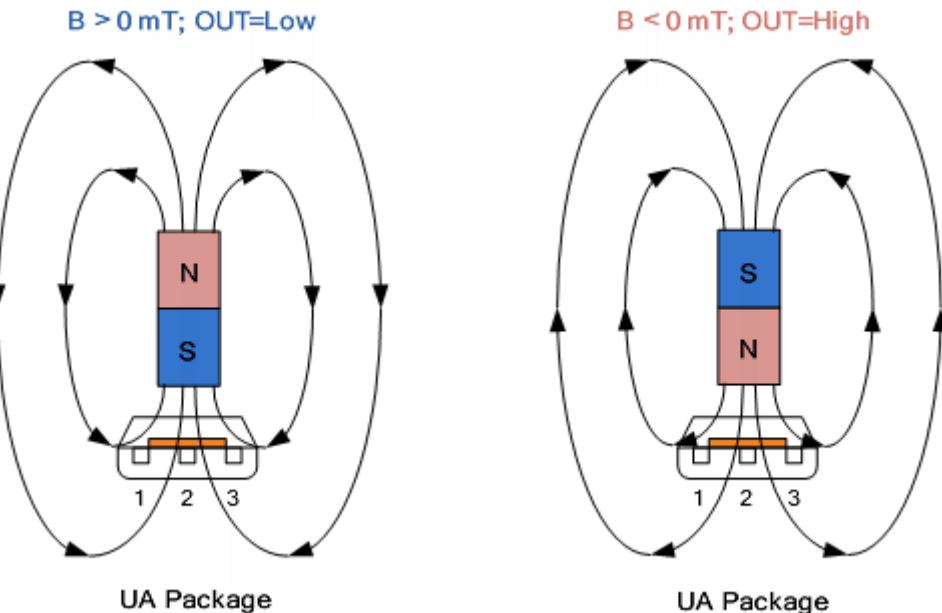


Thermal Characteristics

Parameter	Symbol	Test Conditions	Rating	Unit
UA Package thermal resistance	R_{QJA}	Single-layer PCB, with copper limited to solder pads	166	kV

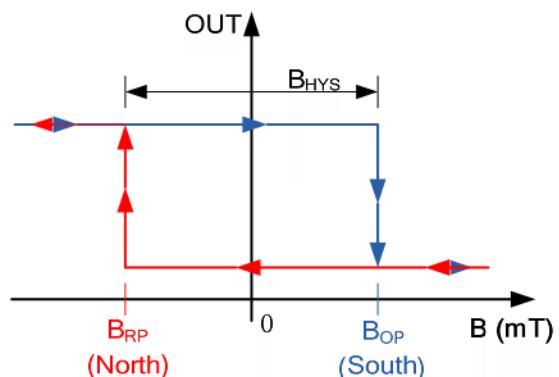
Field Direction Definition

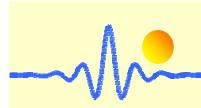
A positive magnetic field is defined as a South pole near the marked side of the package



Transfer Function

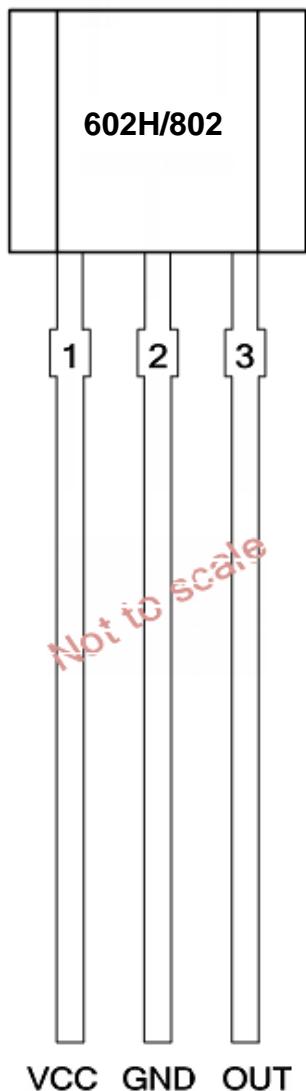
Powering-on the device in the hysteresis region, less than B_{OP} and higher than B_{RP} , allows an indeterminate output state. The correct state is attained after the first excursion beyond B_{OP} or B_{RP} . If the field strength is greater than B_{OP} , then the output is pulled low. If the field strength is less than B_{RP} , the output is released.



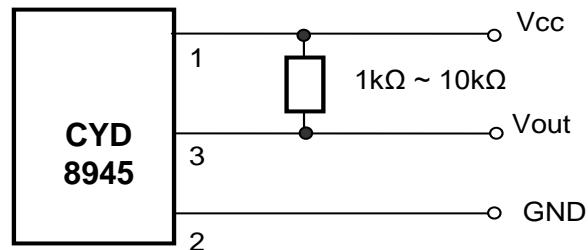


Pin Description and Sensor Connection

3-Terminal SIP
UA Package
(Top View)



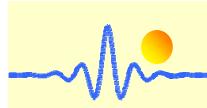
Sensor Connection



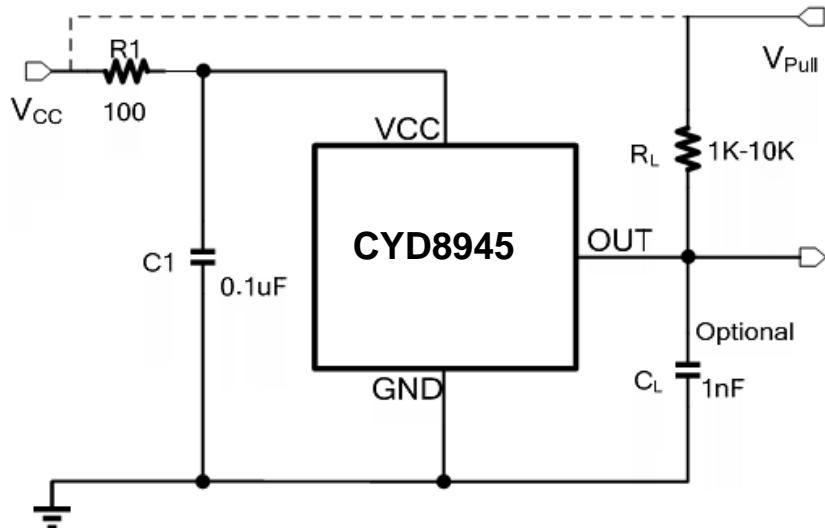
Cautions:

- 1) It is possible that outside mechanical stress affects the operating point and the release point of Hall-effect circuit, therefore, mechanical stress should be lessened as far as possible in the process of assembly;
- 2) Pay attention to the soldering temperature (<260°C) at the leads; keep it lower in a short time (<3s) to guarantee good soldering quality.

Pin number	Symbol	Type	Description
1	Vcc	Power	3.8 to 60 V power supply
2	GND	Ground	Ground terminal
3	OUT	Output	Open-collector output required a pull-up resistor



Typical Application



The CYD8945 contains an on-chip voltage regulator and can operate over a wide supply voltage range. In applications that operate the device from an unregulated power supply, transient protection must be added externally. For applications using a regulated line, EMI/RFI protection may still be required. R1 is for improved CI performance, and could be 100 or 200 Ω typically.

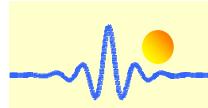
The CYD8945 device output stage uses an open-drain NPN transistor, and it is rated to sink up to 50mA of current. For proper operation, calculate the value of the pull-up resistor R_L is required. The size of R_L is a tradeoff between OUT rise time and the load capacity when OUT is pulled low. A lower current is generally better, however faster transitions and bandwidth require a smaller resistor for faster switching.

Select a value for C_L based on the system bandwidth specifications as:

$$2 \times f \text{ (Hz)} = 1 / (2\pi \times R \times C)$$

Most applications do not require this C_L filtering capacitor.

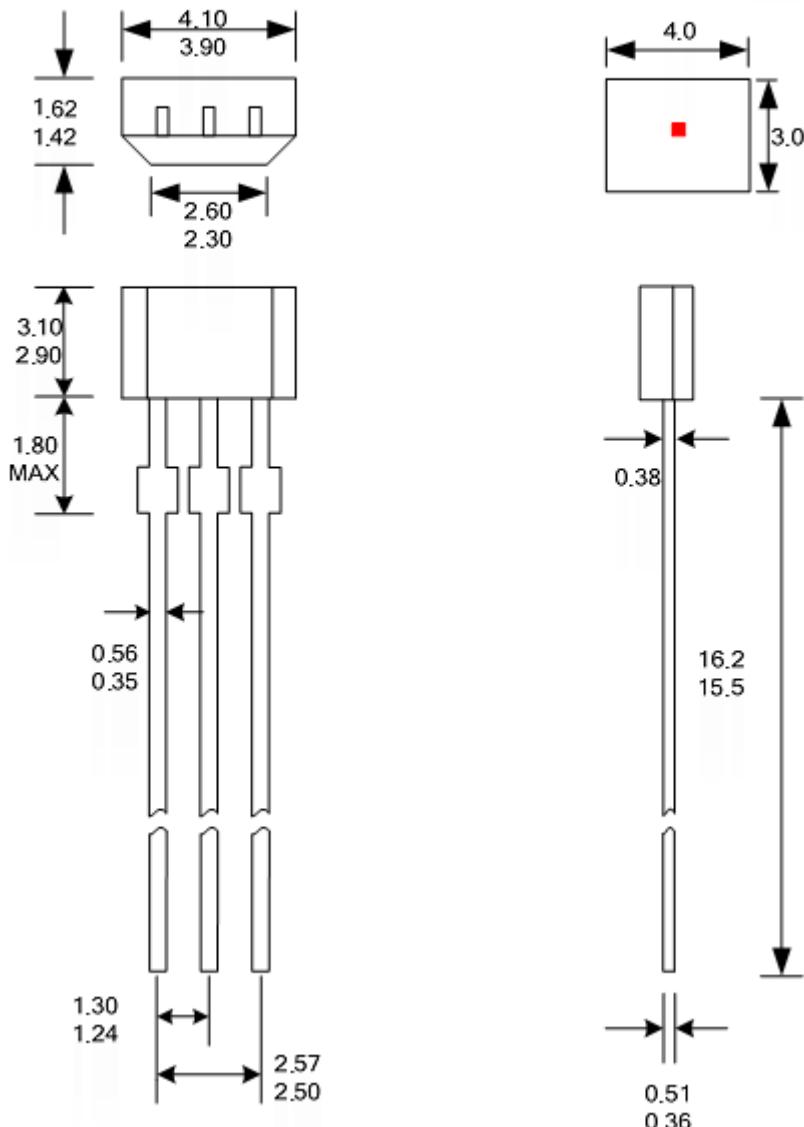
V_{PULL} is not restricted to V_{cc} , and could be connected to other voltage reference. The allowable voltage range of this terminal is specified in the Absolute Maximum Ratings.



Package Outline Drawing (Unit: mm)

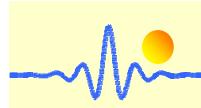
3-Terminal
UA Package

Dimension:mm



Notes

1. Exact body and lead configuration at vendor's option within limits shown.
2. Height doesn't include mold gate flash
Where no tolerance is specified, dimension is normal.



CYD9801A Hall Effect Bipolar Latching Switch

Applications

- DC brushless motors
- VCD/DVD loader, CD/DVD-Rom
- Cover detector
- Speed Measurement
- Home applications
- Home safety etc.

Features

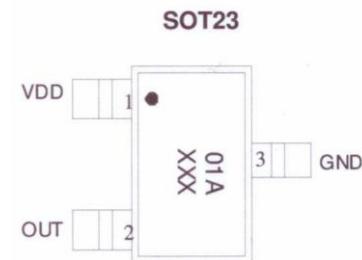
- 2.5V to 18V operation voltage
- Built-in dynamic offset cancellation
- Small size
- High balance and low thermal drift of magnetic sensing

Order Information

- CYD9801A-S/PKD:SOT23

Package Type

P/N: CYD9801A-S



1: VDD/DC power supply
2: OUT/output
3: GND/Ground

Specifications

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

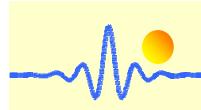
Parameter	Symbol	Conditions	Rating	Unit
Maximum supply voltage	V_{DDMAX}		18	V
Allowable power dissipation	P_D	SOT-23	300	mW
Operating temperature	T_A		-40~+125	°C
Storage temperature	T_S		-50~+150	°C
Maximum output current	I_{OMAX}		25	mA

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}		2.5	18		V
Output sink voltage	$V_{DS(ON)}$	@ $I_{OUT} = 15\text{mA}$		0.3	0.5	V
Output breakdown voltage	V_{BV}		18			V
Supply current	I_{DD}	Output open		6	8	mA

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operating point	B_{OP}		-	15	35	G
Release point	B_{RP}		-35	-15	-	G
Hysteresis	B_{HYS}		20	30	60	G



General Specifications

The CYD9801A is designed for magnetic actuating using a bipolar magnetic field. The built-in dynamic offset cancellation of pre-amplifier stage achieves optimal symmetrical magnetic sensing. This Hall Effect IC is suitable for DC brushless fan applications. The supply voltage range is from 2.5V to 18V and the maximum output current is 25mA. This Hall Effect switch IC integrates the sensor, pre-amplifier with dynamic offset cancellation and hysteresis comparator in single chip. The architecture block diagram is shown in Fig. 1.

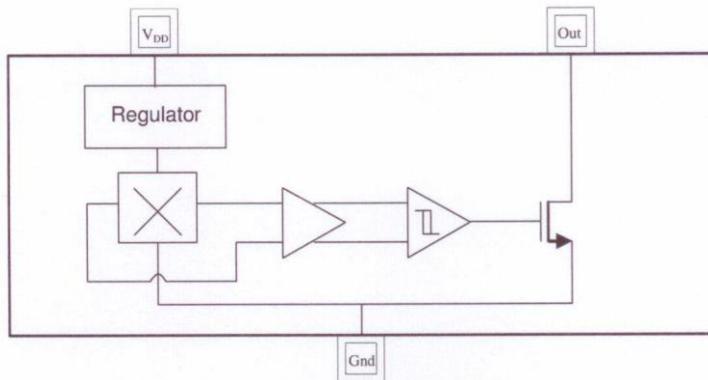
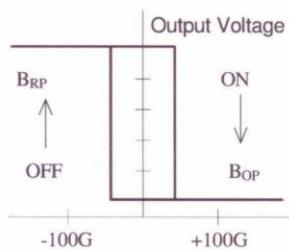
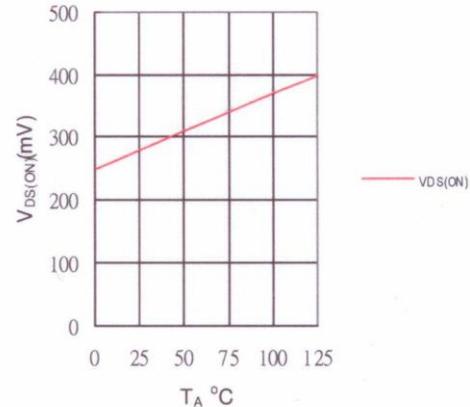


Fig. 1 Functional diagram

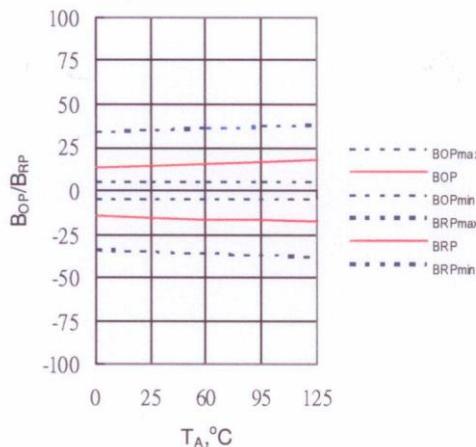
Magnetic Flux Density in



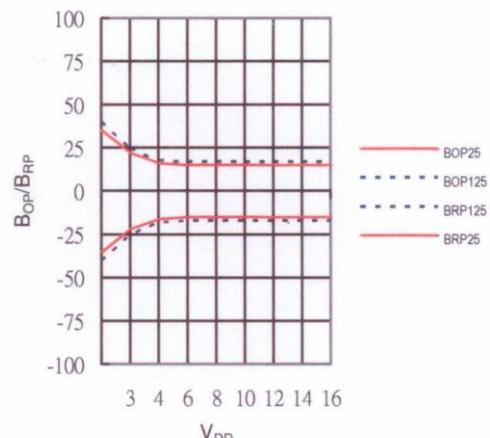
Output sink voltage versus temperature

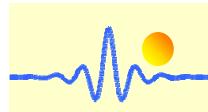


B_{OP} , B_{RP} versus temperature

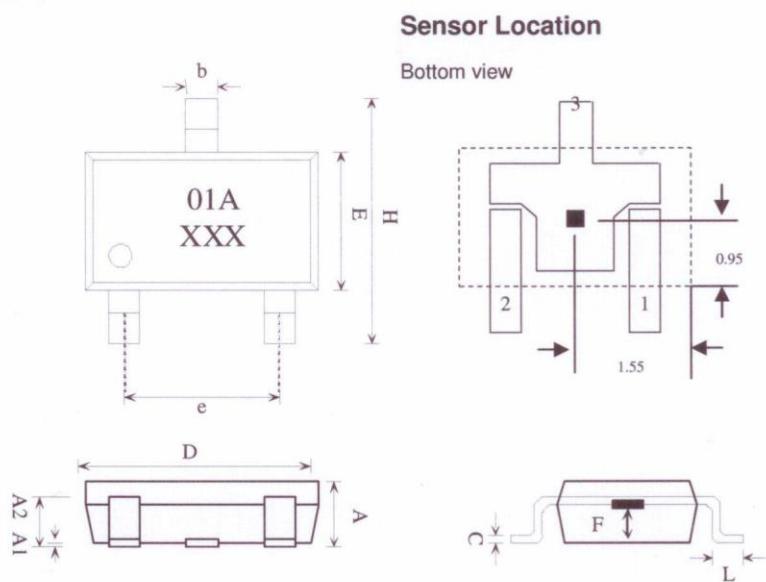


B_{OP} , B_{RP} versus supply voltage

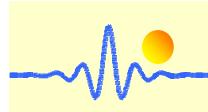




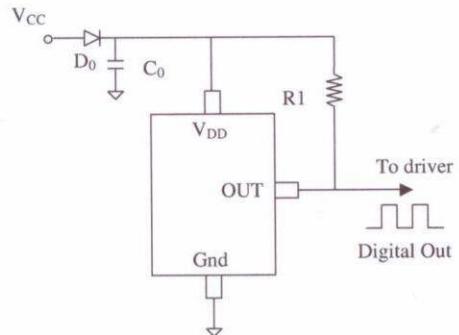
Package Outline



SYMBOLS	DIMENSIONS IN MILLIMETERS(mm)		
	MIN	NOM	MAX
A	1.00	1.10	1.30
A1	0.00	-	0.10
A2	0.70	0.80	0.90
b	0.35	0.40	0.50
C	0.10	0.15	0.25
D	2.70	2.90	3.10
E	1.40	1.80	2.00
F	0.35	0.50	0.65
H	2.60	2.8	3.00
e	1.7	1.9	2.1
L	0.20	-	-



Application Circuit

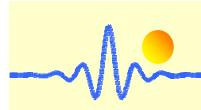


NOTE:

D0: general diode

C0: decoupling capacitor 1 μ F (recommended)

R1: 1k~10k Ω



CYD9802A General Purpose Hall Effect Latch

Applications

- DC brushless motors
- VCD/DVD loader, CD/DVD-Rom
- Cover detector
- Speed Measurement
- Home applications
- Home safety etc.

Features

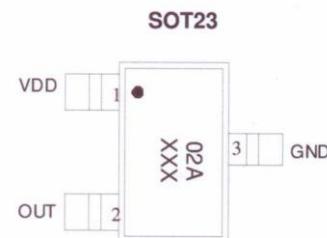
- 2.5V to 18V operation voltage
- Built-in dynamic offset cancellation
- Small size
- High balance and low thermal drift of magnetic sensing
- Output with pull-up resistor

Order Information

- CYD9802A-S/PKD:SOT23

Package Type

P/N: CYD9802A-S



1: VDD/DC power supply
2: OUT/output
3: GND/Ground

Specifications

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

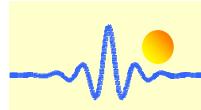
Parameter	Symbol	Conditions	Rating	Unit
Maximum supply voltage	V_{DDMAX}		18	V
Allowable power dissipation	P_D	SOT-23	300	mW
Operating temperature	T_A		-40~+125	°C
Storage temperature	T_S		-50~+150	°C
Maximum output current	I_{OMAX}		25	mA

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}		2.5	18	18	V
Output sink voltage	$V_{DS(ON)}$	@ $I_{OUT} = 15\text{mA}$		0.3	0.5	V
Output breakdown voltage	V_{BV}		18			V
Supply current	I_{DD}	Output open		6	8	mA
Internal Pull-up resistor	R_L		6		14	kΩ

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operating point	B_{OP}		-	15	35	G
Release point	B_{RP}		-35	-15	-	G
Hysteresis	B_{HYS}		20	30	60	G



General Specifications

The CYD9802A is designed for magnetic actuating using a bipolar magnetic field. The built-in dynamic offset cancellation of pre-amplifier stage achieves optimal symmetrical magnetic sensing. This Hall Effect IC is suitable for DC brushless fan applications. The supply voltage range is from 2.5V to 18V and the maximum output current is 25mA. This Hall Effect switch IC integrates the sensor, pre-amplifier with dynamic offset cancellation and hysteresis comparator in single chip. The architecture block diagram is shown in Fig. 1.

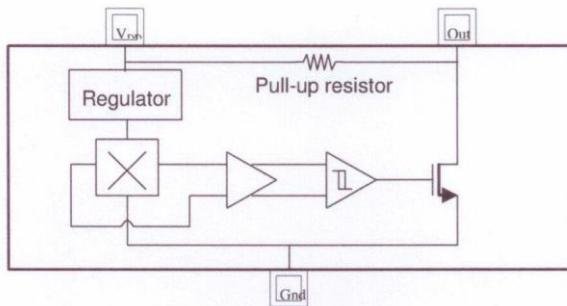
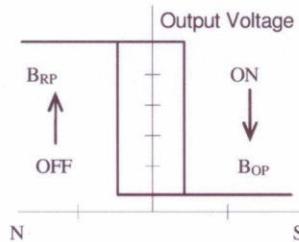
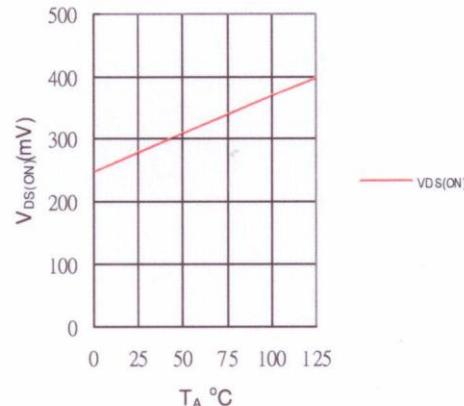


Fig. 1 Functional diagram

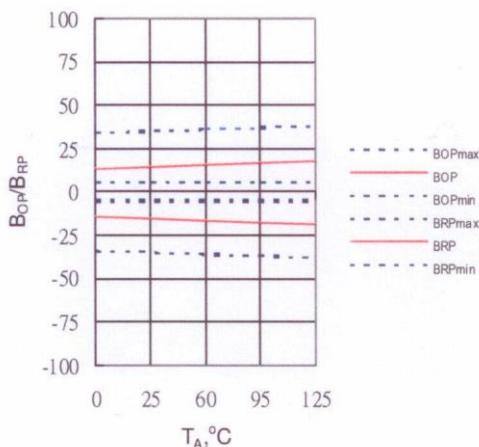
Magnetic Flux Density in Gauss



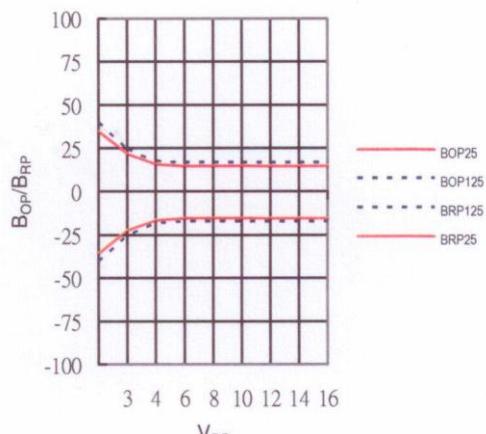
Output sink voltage versus temperature

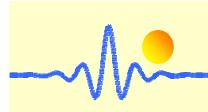


B_{OP}, B_{RP} versus temperature

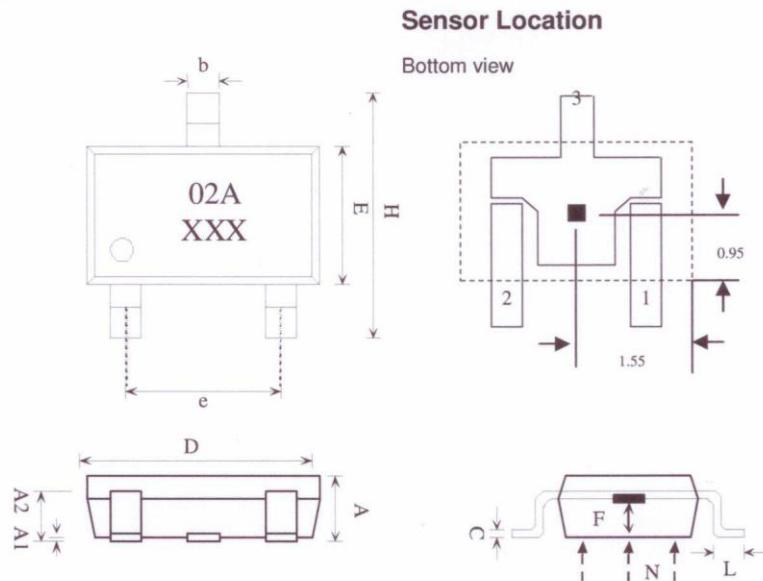


B_{OP}, B_{RP} versus supply voltage

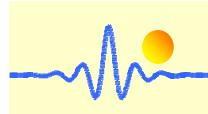




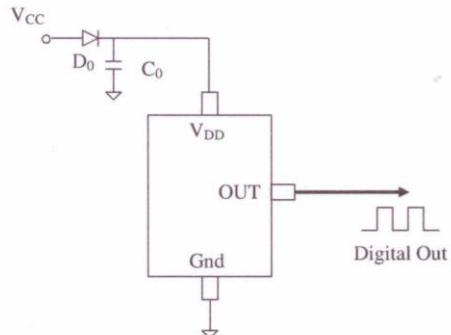
Package Outline



SYMBOLS	DIMENSIONS IN MILLIMETERS(mm)		
	MIN	NOM	MAX
A	1.00	1.10	1.30
A1	0.00	-	0.10
A2	0.70	0.80	0.90
b	0.35	0.40	0.50
C	0.10	0.15	0.25
D	2.70	2.90	3.10
E	1.40	1.80	2.00
F	0.35	0.50	0.65
H	2.60	2.8	3.00
e	1.7	1.9	2.1
L	0.20	-	-



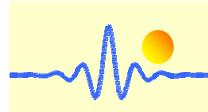
Application Circuit



NOTE:

D0: general diode

C0: decoupling capacitor 1μF (recommended)



CYD9611 High Sensitivity Hall Effect Latch

Applications

- DC brushless motors
- CAM shaft sensors
- Magnetic Encoders
- Rotating Speed Measurement
- Home applications
- Home safety etc.

Features

- 3.8V to 24V operation voltage
- High sensitivity
- Built-in dynamic offset cancellation
- Small size
- High balance and low thermal drift of magnetic sensing

Order Information

- CYD9611-PA-T
Package (PA): UA or LH or LT
Temperature (T): A or K

Package Type

TO92-3L (UA)



SOT23-3L (LH)



SOT89-3L (LT)



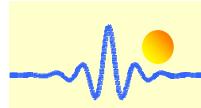
Specifications

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

Parameter	Symbol	Conditions	Rating	Unit
Maximum supply voltage	V_{DDMAX}		28	V
Allowable power dissipation	P_D	TO-92 (UA)	550*	mW
		SOT-23-3L(LH)	300*	mW
		SOT-89-3L(LT)	500*	mW
Operating temperature	T_A	Suffix 'A'	-40~+150	°C
		Suffix 'K'	-40~+125	°C
Storage temperature	T_S		-55~+150	°C
Maximum output current	I_{OMAX}		50	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}		3.8		24	V
Output sink voltage	$V_{OL(ON)}$	@ $I_{OUT} = 20\text{mA}$		130	280	mV
Output leakage current	I_{OH}	Output switch off			0.1	μA
Output breakdown voltage	V_{BV}			28	30	V
Supply current	I_{DD}	Output open		4	6	mA



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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operating point	B_{OP}		10	26	45	G
Release point	B_{RP}		-45	-26	-10	G
Hysteresis	B_{HYS}		45	52	70	G
Magnetic Characteristics ($T_A=-40^\circ\text{C} \sim +150^\circ\text{C}$, $V_{DD}=12\text{VDC}$)						
Operating point	B_{OP}		9		50	G
Release point	B_{RP}		-50		-9	G
Hysteresis	B_{HYS}		35		72	G

General Specifications

The CYD9611 is designed for magnetic actuating using a bipolar magnetic field. The built-in dynamic offset cancellation of pre-amplifier stage achieves optimal symmetrical magnetic sensing. This Hall Effect IC is suitable for DC brushless fan applications. The supply voltage range is from 3.8V to 24V and the maximum output current is 50mA. This Hall Effect switch IC integrates the sensor, pre-amplifier with dynamic offset cancellation and hysteresis comparator in single chip. The architecture block diagram is shown in Fig. 1.

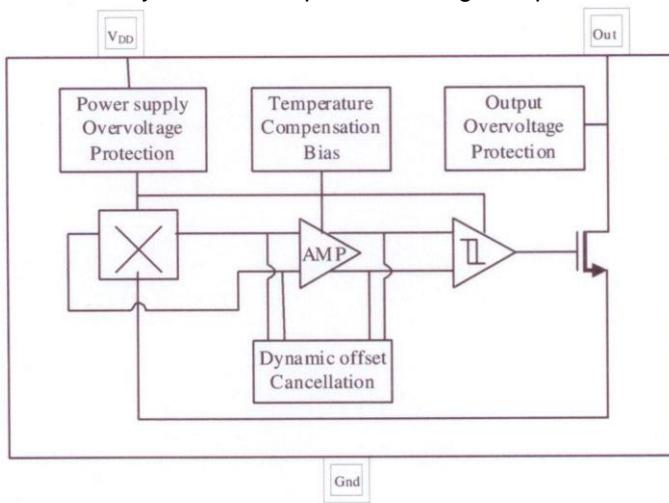
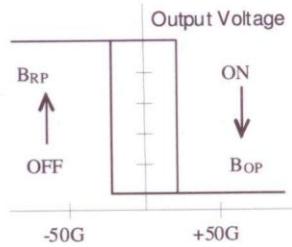
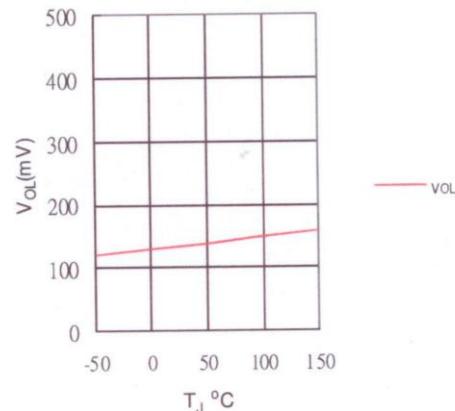


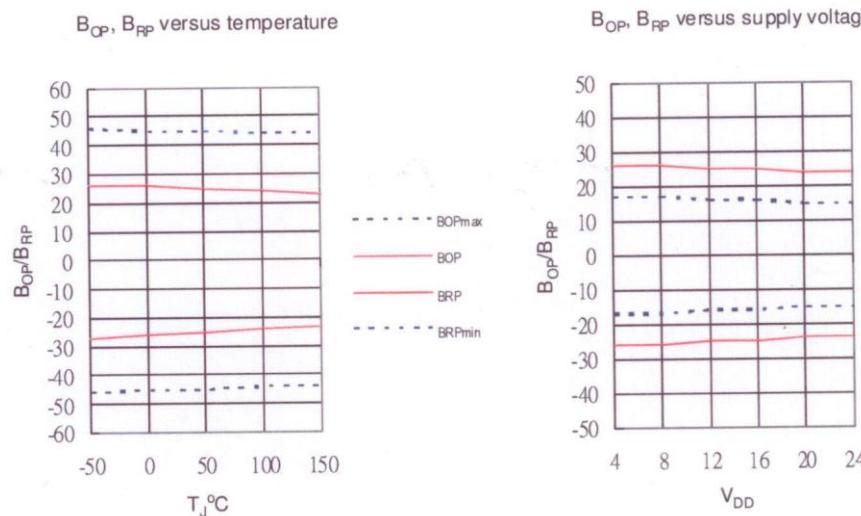
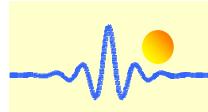
Fig. 1 Functional diagram

Magnetic Flux Density in

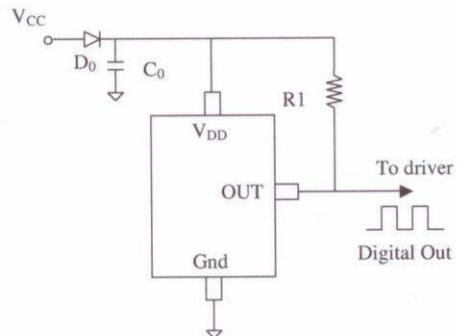


Output sink voltage versus temperature





Application Circuit

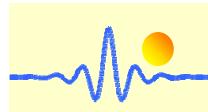


NOTE:

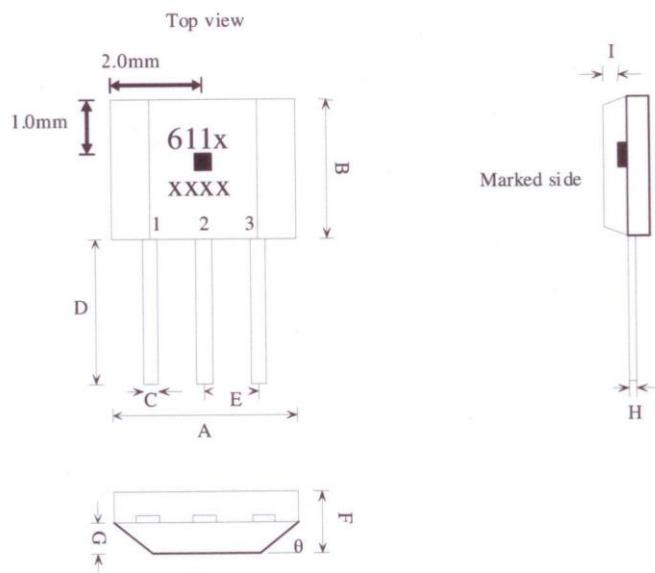
D0: general diode

C0: decoupling capacitor 1µF (recommended)

R1: 1k~10k Ω



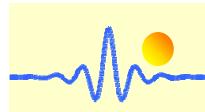
Package Outline TO-92(UA)



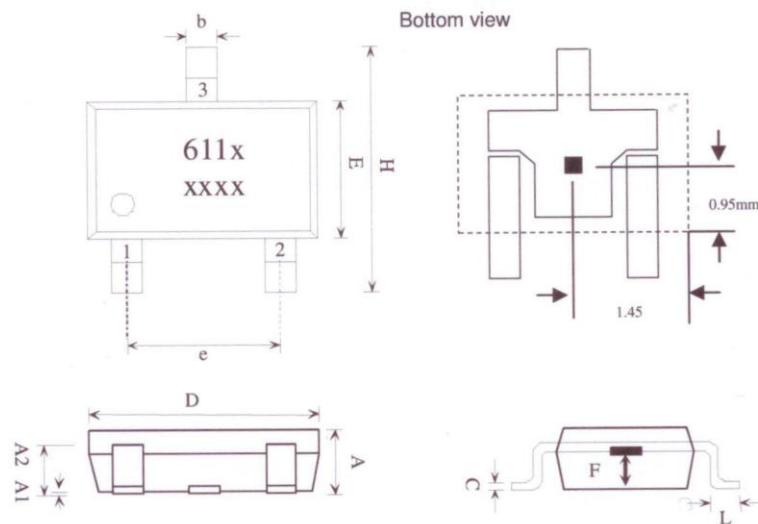
Marking:
Part Number : 611 Temperature code : x
Date Code : xx(Year) xx(Week)

1. VDD/DC power supply
2. GND/DC ground
3. OUT/output pin

SYMBOLS	DIMENSIONS IN MILLIMETERS(mm)		
	MIN	NOM	MAX
A	3.80	4.00	4.20
B	2.90	3.10	3.30
C	0.38	0.45	0.52
D	15.10	15.30	15.50
E	1.24	1.27	1.30
F	1.45	1.50	1.55
G	0.68	0.73	0.78
H	0.36	0.43	0.50
I	0.41	0.43	0.45
θ		45°	



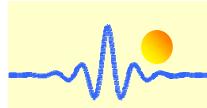
**Package Outline
SOT-23(LH)**



Marking:
Part Number : 611 Temperature code : x
Date Code : xx(Year) xx(Week)

1. VDD/DC power supply
2. OUT/output pin
3. GND/DC ground

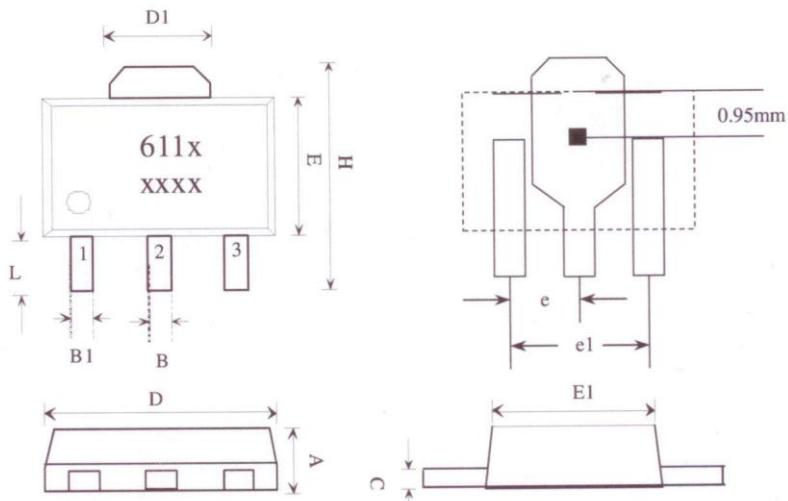
SYMBOLS	DIMENSIONS IN MILLIMETERS(mm)		
	MIN	NOM	MAX
A	1.00	1.10	1.30
A1	0.00	-	0.10
A2	0.70	0.80	0.90
b	0.35	0.40	0.50
C	0.10	0.15	0.25
D	2.70	2.90	3.10
E	1.40	1.80	2.00
F	0.35	0.50	0.65
H	2.60	2.8	3.00
e	1.7	1.9	2.1
L	0.20	-	-



Package Outline SOT-89(LT)

Sensor Location

Bottom view

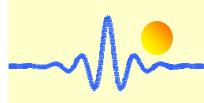


Marking:

Part Number : 611 Temperature code : x
Date Code : xx(Year) xx(Week)

1. VDD/DC power supply
2. GND/DC ground
3. OUT/output pin

SYMBOLS	DIMENSIONS IN MILLIMETERS(mm)		
	MIN	NOM	MAX
A	1.40	1.50	1.60
B	0.44	0.50	0.56
B1	0.36	0.42	0.48
C	0.35	0.40	0.44
D	4.40	4.50	4.60
D1	1.52	1.67	1.83
E	2.30	2.45	2.60
E1	2.13	2.21	2.29
e	-	1.50	-
e1	-	3.00	-
H	3.94	4.10	4.25
L	0.89	1.05	1.20



CYD3601 Hall Effect BIPOLAR LATCHING Switch IC

The CYD3601 is a bipolar Hall Effect switch with a latched digital output. The built-in dynamic offset cancellation of pre-amplifier stage achieves optimal symmetrical magnetic sensing. This Hall Effect IC is optimal for DC brushless fan applications. The supply voltage range is from 2.5V to 18V and maximum output current is 25mA.

FEATURES

- 2.5V to 18V power supply
- Built-in dynamic offset cancellation
- Small size, convenient installing
- High balance and low thermal drift
- magnetic sensing
- ROHS Compliant

TYPICAL APPLICATIONS

- Brushless DC motor
- VCD/DVD loader, CD/DVD-ROM
- Contactless switch
- Cover detector
- Speed measurement
- Home applications
- Home safety

Ordering Information

Package	Ordering no.	Mark	Packing	Temperature range
SOT23-3L	CYD3601S	601	3000/reel	-40°C ~ +125°C
TO92-3L	CYD3601T	601	500-1000units/pack	-40°C ~ +125°C

Absolute Maximum Rating

Parameter	Symbol	Value	Unit
Supply voltage	V_{CC}	20	V
Max. power consumption	P_D	TO92-3L(T)=550, SOT23-3L(S)=300	mW
Operating temperature range	T_A	-40 ~ +125	°C
Storage temperature range	T_S	-50 ~ +150	°C
Max. Output current	I_{omax}	25	mA

ELECTRICAL CHARACTERISTICS

$T_A=25^\circ C$, $V_{DD}=12V$

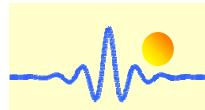
Parameter	Symbol	Test conditions	min	typical	max	Unit
Supply voltage	V_{CC}		2.5	-	18	V
Output sink voltage	V_{OL}	$I_{out}=15mA$	-	0.3	0.5	V
Output Breakdown voltage	V_{BV}		18	22	30	V
Supply current	I_{DD}	Output open@12V	-	6	8	mA

MAGNET CHARACTERISTICS

($V_{DD}=12V$ DC, $T_A=+25^\circ C$)

Parameter	Symbol	Min (CYD3601/CYD3601A)	Typ CYD3601/CYD3601A)	Max CYD3601/CYD3601A)	Unit
Operating point	B_{CP}	-	30 / 15	60 / 35	Gauss
Release point	B_{RP}	-60 / -35	-30 / -15	-	Gauss
Hysteresis	B_H	20	60 / 30	100 / 60	Gauss

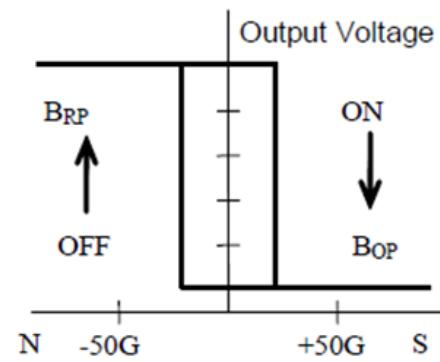
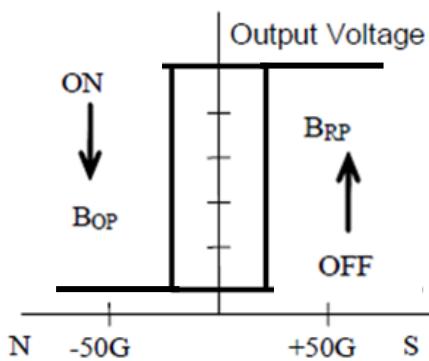
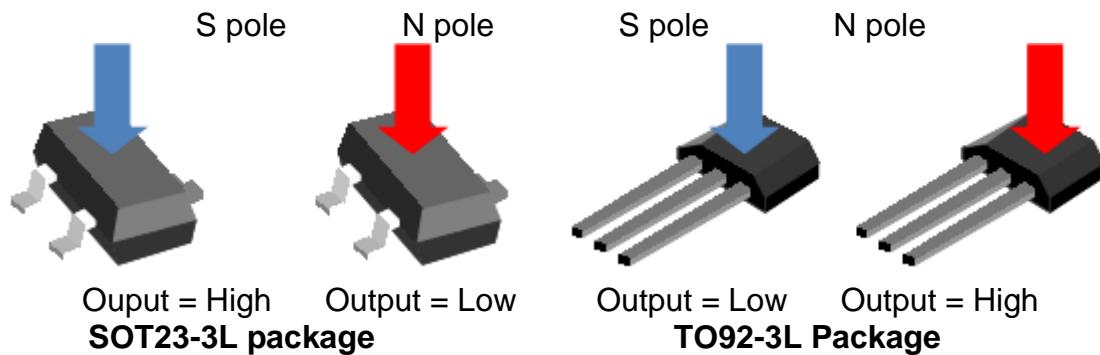
NOTE: Need a serial resistor for 24V application, 1mT=10GS



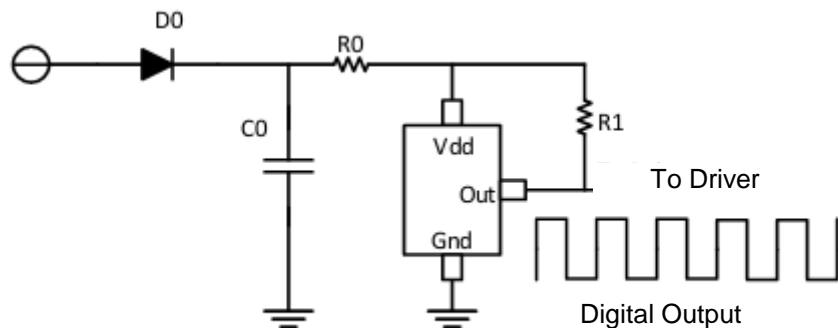
Relation between output and applied magnetic field B

($T_A = -40^\circ\text{C} \sim 125^\circ\text{C}$, $VDD = 2.5 \sim 18\text{VDC}$)

Part number	CYD3601S (SOT23-3L)		CYD3601T (TO92-3L)	
Parameter	Condition	Output	Condition	Output
S pole	$B < B_{RP}$	High	$B > B_{OP}$	Low
N pole	$B > B_{OP}$	Low	$B < B_{RP}$	High

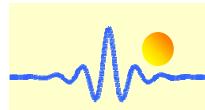


Application circuit

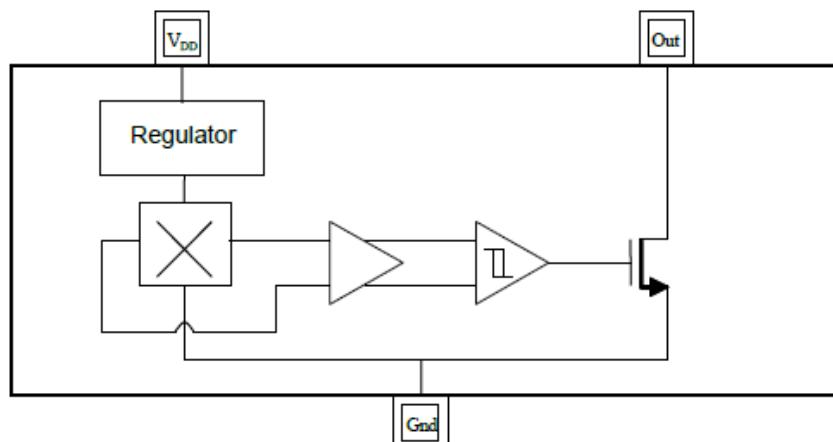


NOTE:

- D1: general diode
- C0: decoupling capacitor 1µF (recommended)
- R0: 1kΩ, 0.5W for power supply +24VDC, 0Ω for power supply 5V, 12V and 15VDC
- R1: 0k Ω (recommended)

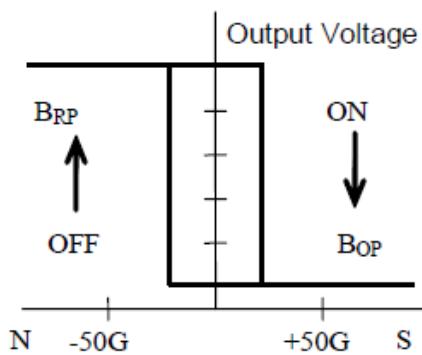


BLOCK DIAGRAM



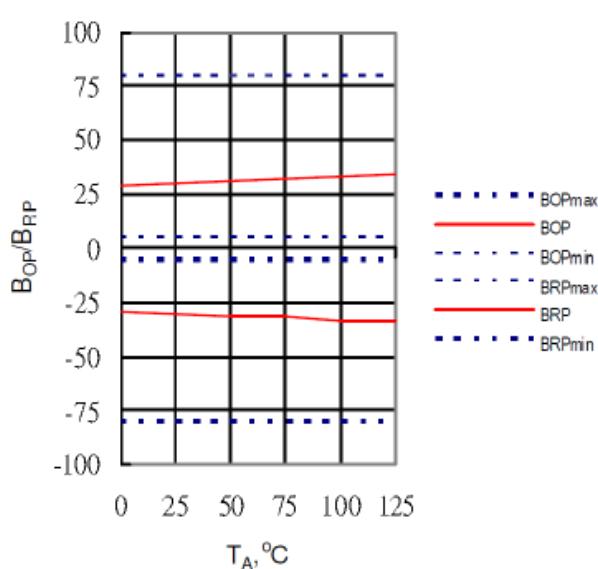
This Hall Effect Switch IC integrates the sensor, Pre-amplifier with dynamic offset cancellation and hysteresis comparator in single chip.

Magnetic-electrical transfer characteristics temperature

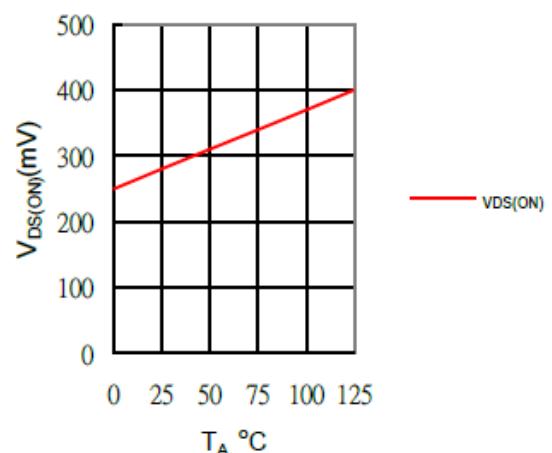


For TO92-3L Package

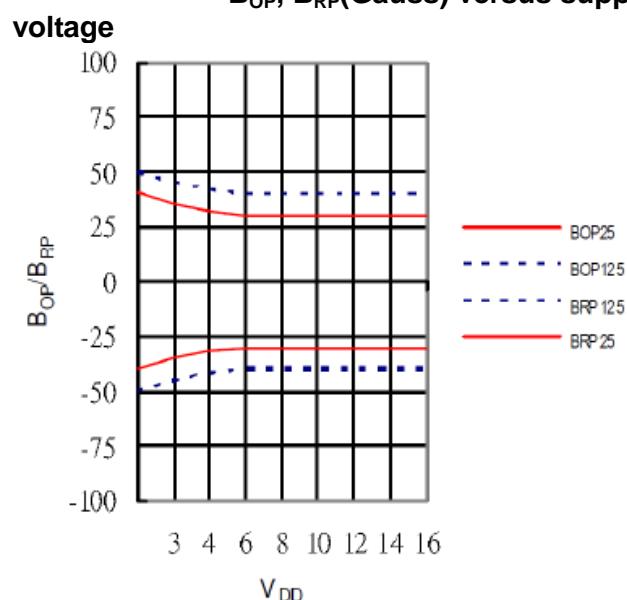
B_{OP} , B_{RP} (Gauss)versus Temperature

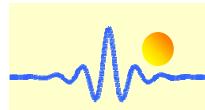


Output sink voltage versus

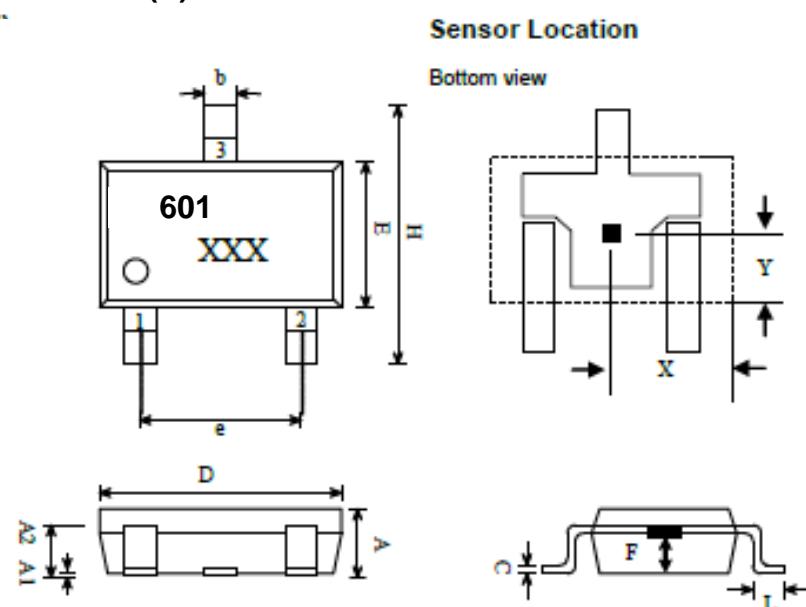


B_{OP} , B_{RP} (Gauss) versus supply





Package Outline SOT23-3L(S)



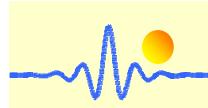
Marking:

Part Number: 601

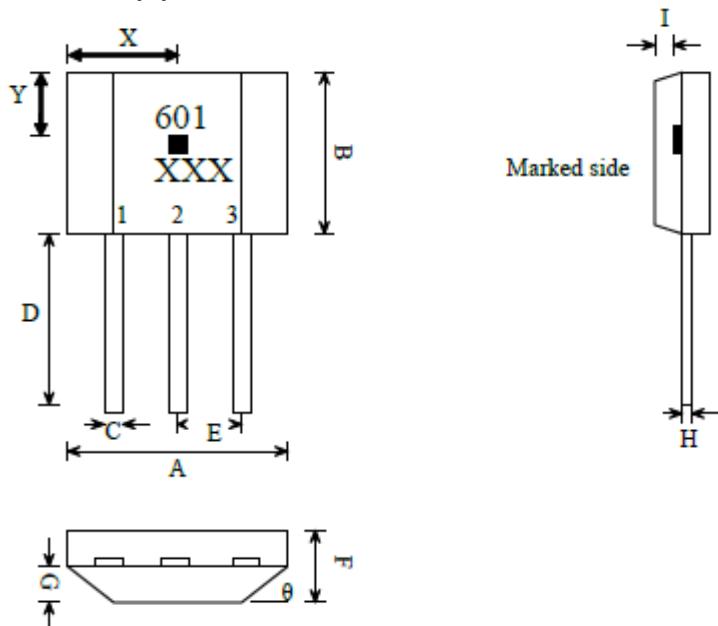
Date Code: X(year) XX(Week)

1. VDD/DC power supply
2. OUT/output pin
3. GND/DC ground

SYMBOLS	DIMENSIONS IN MILLIMETERS(mm)		
	MIN	NOM	MAX
A	1.00	1.10	1.30
A1	0.00	-	0.10
A2	0.70	0.80	0.90
b	0.35	0.40	0.50
C	0.10	0.15	0.25
D	2.70	2.90	3.10
E	1.40	1.80	2.00
H	2.60	2.8	3.00
e	1.7	1.9	2.1
L	0.20	-	-
Sensor Location			
X	1.35	1.45	1.55
Y	0.85	0.95	1.05
F	0.35	0.50	0.65



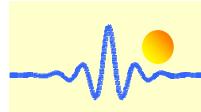
Package Outline TO92-3L(T)



Marking:
Part Number : 601
Date Code : X(Year) XX(Week)

1. VDD/DC power supply
2. GND/DC ground
3. OUT/output pin

SYMBOLS	DIMENSIONS IN MILLIMETERS(mm)		
	MIN	NOM	MAX
A	3.80	4.00	4.20
B	2.90	3.10	3.30
C	0.38	0.45	0.52
D	14.40	14.60	14.80
E	1.24	1.27	1.30
F	1.45	1.50	1.55
G	0.68	0.73	0.78
H	0.36	0.43	0.50
I	0.41	0.43	0.45
θ		45°	
Sensor Location			
X	1.90	2.00	2.10
Y	0.90	1.00	1.10



CYD513 Hall Effect Bipolar IC Switches (ROHS compliant)

These Hall-effect switches are monolithic integrated circuit consisting of a voltage regulator, Hall-voltage generator, differential amplifier, Schmitt trigger, temperature compensation circuit and open-collector output stage. Its input is a magnetic flux density signal and output is a digital voltage signal.



ABSOLUTE MAXIMUM RATING

Features

- Wide supply voltage range
- Fast response time
- Wide frequency and temperature range
- Long operating life
- Small size, convenient installing
- Output compatible with all digital logic families
- Bipolar sensor
- **ROHS compliant**

Typical Applications

- Contactless switch
- Position control
- Speed measurement
- Revolution detection
- Isolation measurement
- Brushless dc motor
- Automotive igniters

Parameter	Symbol	Value	Unit
Supply voltage	V _{cc}	24	V
Magnetic flux density	B	Unlimited	mT
Output OFF voltage	V _{ce}	50	mV
Continuous output current	I _{OL}	50	mA
Operating temperature range	T _A	-40~150	°C
Storage temperature range	T _S	-55~150	°C

ELECTRICAL CHARACTERISTICS

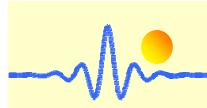
T_A=25°C

Parameter	Symbol	Test conditions	Type and Value			Unit
			min	type	max	
Supply voltage	V _{cc}		4.5	-	24	V
Output saturation voltage	V _{OL}	I _{out} =20mA B>B _{OP}	-	200	400	mV
Output leakage current	I _{OH}	V _{out} =24V B<B _{RP}	-	0.1	10	µA
Supply current	I _{cc}	V _{cc} =Output open	-	-	10	mA
Output rise time	t _r	R _L =820Ω C _L =20PF	-	0.12	-	µS
Output fall time	t _f	R _L =820Ω C _L =20PF	-	0.18	-	µS

MAGNET CHARACTERISTICS

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Tel.: +49 (0)8121-2574100
Fax: +49 (0)8121-2574101
Email: info@chenyang-gmbh.com
<http://www.chenyang-gmbh.com>



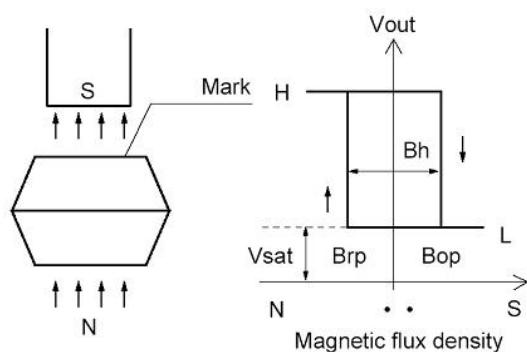
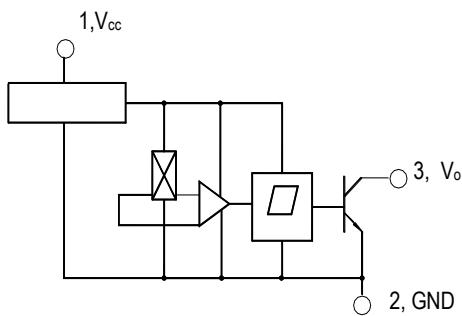
$V_{CC}=4.5 \sim 24V$

Parameter	Symbol	Type and Value			Unit
		min	typ	max	
Operate point	B_{Op}		4	6	mT
Release point	B_{Rp}	-6	-4		mT
Hysteresis	B_h		8	-	mT

NOTE: 1mT=10GS

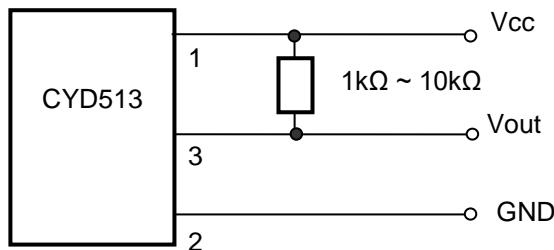
BLOCK DIAGRAM

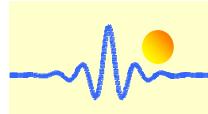
MAGNETID-ELECTRICAL TRANSFER CHARACTERISTICS



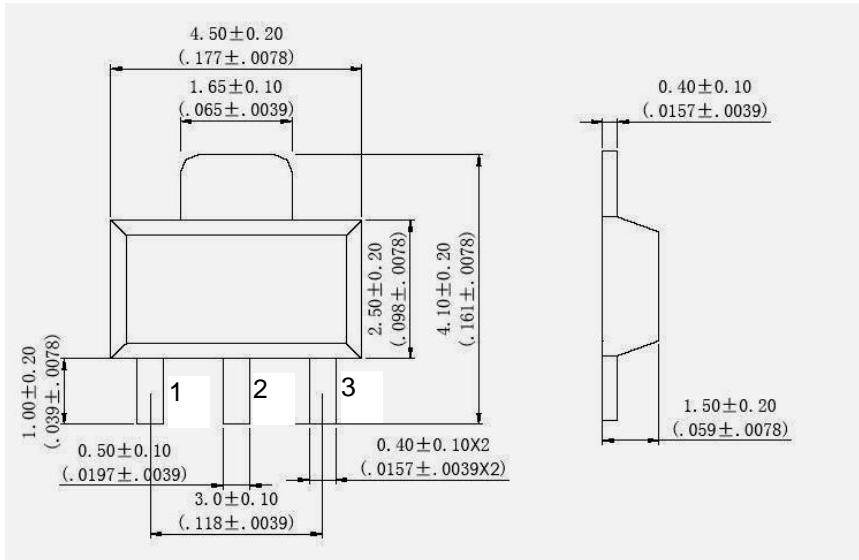
Connection

This sensor has an OC (NPN) output voltage. Therefore it is necessary to connect a pull-up resistor in value from $1k\Omega$ to $10k\Omega$ between the power supply V_{CC} and output pins.





DIMENSIONS (in: mm)

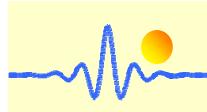


1. V_{cc} 2. GND 3. Output

SOT-89 Package

Cautions

1. When install, should as full as possible decrease the mechanical stress acting on the Hall IC, to avoid the influence of the operate point and release point.
2. On the premise of ensuring welding quality, use as possible as low welding temperature as short time.



CYD3172X HALL-EFFECT SWITCH IC

CYD3172X Hall effect latch IC is composed of a reverse protector, voltage regulator, Hall voltage generator, differential amplifier, Schmitt trigger and an open-collector output on a single silicon chip. ICs can convert the changeable magnetic field signal into digital voltage output.

FEATURES

- High Sensitivity
- Resistant to Physical Stress
- Wide Supply Voltage Range
- Interfacing with all Kinds of Logic Circuits Directly

TYPICAL APPLICATION

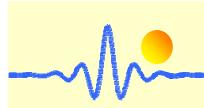
- High Sensitive Non-contact Switch
- DC Brushless Motor
- DC Brushless Fan

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value		Unit
		Min	Max	
Supply Voltage	V _{cc}	4.5V ~ 24V		V
Magnetic Flux Density	B	unlimited	unlimited	mT
Output Current	I _o	-	25	mA
Operating Temperature Range	T _A	-40	85	°C
Storage Temperature Range	T _S	-65	170	°C

ELECTRICAL CHARACTERISTICS

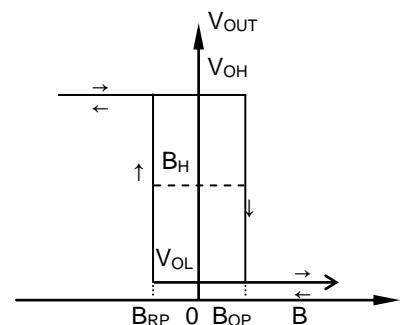
Parameter	Test Conditions	Symbol	Value			Unit
			Min	Typ	Max	
Supply Voltage	V _{cc} =4.5V ~ 24V	V _{cc}	4.5	-	24.0	V
Output Low Voltage	V _{cc} =4.5V R _L =960Ω	V _{OL}	-	0.2	0.4	V
Output Leakage Current	V _O =V _{ccmax} B≤B _{RP}	I _{OH}	-	1.0	10.0	μA
Supply Current	V _{cc} =V _{ccmax} open-collector output	I _{cc}		-	12.0	mA
Output Rise time	V _{cc} =12V R _L =820Ω C _L =20pF	t _r	-	1.0	2.0	μS
Output Fall time		t _f	-	1.0	2.0	μS



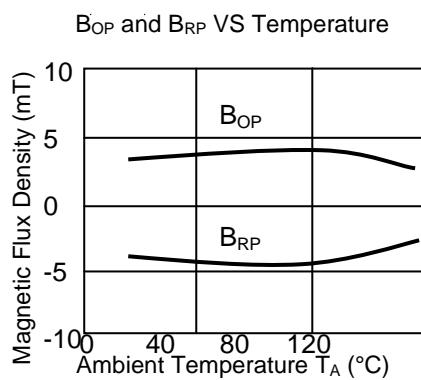
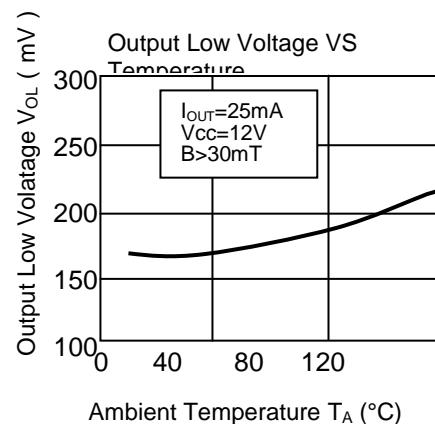
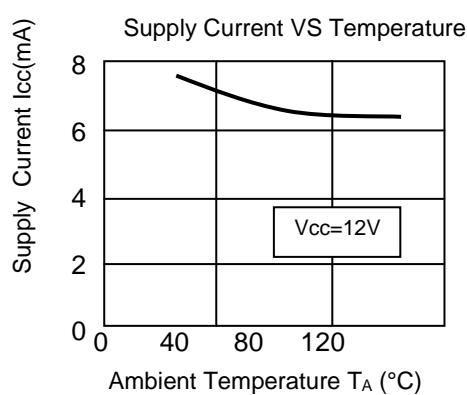
Magnetic Characteristics (Unit: mT)

Parameter	Value			Unit
	Min	Typ	Max	
Operate Point (B_{OP})	1	-	7	mT
Release Point (B_{RP})	-7	-	-1	
Hysteresis (B_H)	4	-	-	

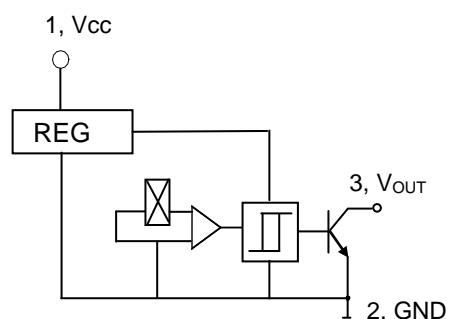
Magnetic-Electrical Transfer Characteristics

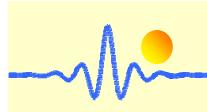


Characteristic Curves

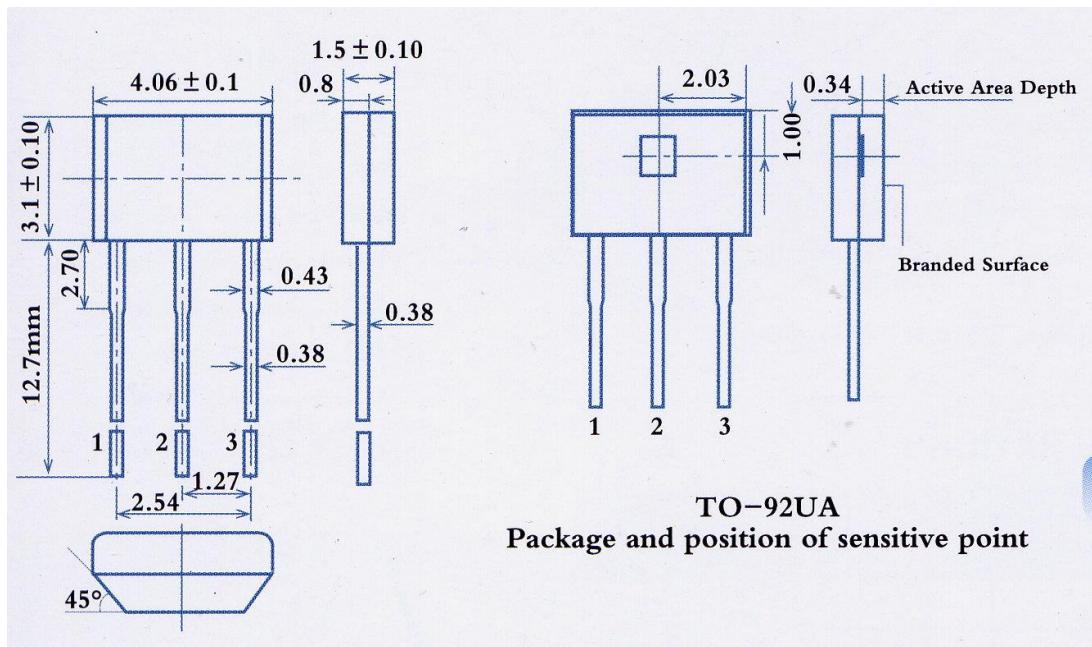


FUNCTIONAL BLOCK DIAGRAM





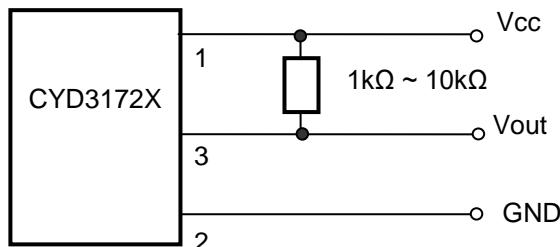
Package Outline Drawing (Unit: mm)



Pin Notes: 1. Power Supply 2. Ground 3. Output

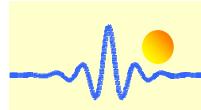
Connection

This sensor has an OC (NPN) output voltage. Therefore it is necessary to connect a pull-up resistor in value from $1\text{k}\Omega$ to $10\text{k}\Omega$ between the power supply Vcc and output pins.



Cautions:

- 1) It is possible that outside mechanical stress affects the operating point and the release point of Hall-effect circuit, therefore, mechanical stress should be lessened as far as possible in the process of assembly;
- 2) Pay attention to the soldering temperature at the leads; keep it lower in a short time to guarantee good soldering quality.



CYD512 Latching Hall-Effect Switch IC

CYD512 Hall Effect latch ICs are composed of a reverse protector, voltage regulator, Hall voltage generator, differential amplifier, Schmitt trigger and an open-collector output (bipolar latch) on a single silicon chip. ICs can convert the changeable magnetic field signal into digital voltage output.

FEATURES

- High Sensitivity
- Resistant to Physical Stress
- Wide Supply Voltage Range
- Interfacing with All Kinds of Logic Circuits Directly

TYPICAL APPLICATION

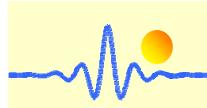
- High Sensitive Non-contact Switch
- DC Brushless Motor
- DC Brushless Fan

ABSOLUTE MAXIMUM RATINGS

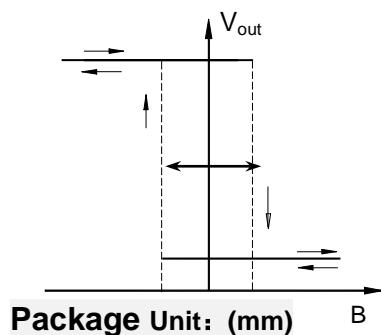
	Symbol	Value		Unit
		Min	Max	
Supply Voltage	V _{CC}	4.5	18	
Output Current	I _O	-	15	mA
Operating Temperature Range	T _A	-40	150	°C
Storage Temperature Range	T _S	-50	150	°C

ELECTRICAL & MAGNETIC CHARACTERISTICS

Parameter	Test Condition	Symbol	Value			Unit
			Min	Typ	Max	
Supply Voltage		V _{CC}	4.5	-	18	V
Output Low Voltage	V _{CC} = 4.5 V~18V	V _{OL}	-	0.2	0.4	V
Supply Current	V _{CC} = 18V	I _{CC}	-	-	8	mA
Operate Point	V _{CC} = 4.5 V~18V	B _{OP}	1	-	6	mT
Release Point	V _{CC} = 4.5 V~18V	B _{RP}	-6	-	-1	mT
Hysteresis	V _{CC} = 4.5 V~18V	B _H	2	-	7	mT
Internal Load Resistance		R _L	7		13	KΩ

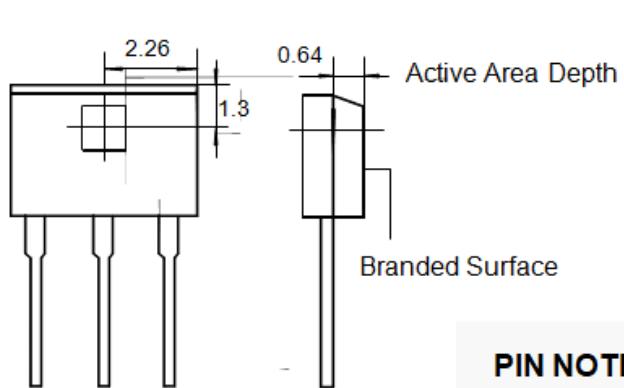
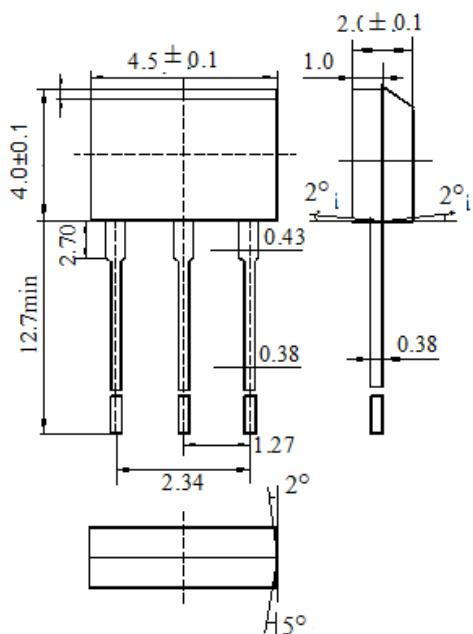
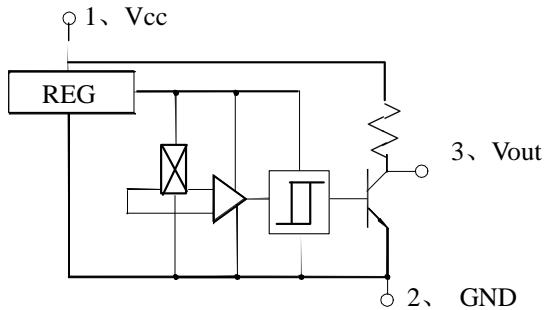


Magnetic Electrical Transfer Characteristics



Package Unit: (mm) B

FUNCTIONAL BLOCK DIAGRAM



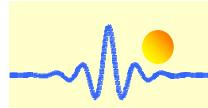
PIN NOTES

1. Power Supply
2. Ground
3. Output

TO-92T Package and position of sensitive point

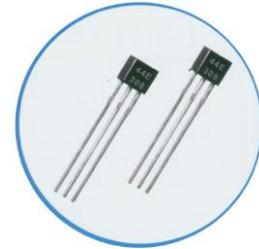
Cautions:

1. It is possible that outside mechanical stress affects the operating point and the release point of Hall-effect circuit, therefore, mechanical stress should be lessened as far as possible in the process of assembly;
2. Pay attention to the soldering temperature at the leads, and keep it lower in a short time to guarantee good soldering quality.



CYD41 High Sensitive Hall Effect Switch IC for high temperature

CYD41 Series high sensitive Hall Effect switch IC is composed of a reverse protector, voltage regulator, Hall voltage generator, differential amplifier, Schmitt trigger and an open-collector output on a single silicon chip. ICs can convert the changeable magnetic field signal into digital voltage output.



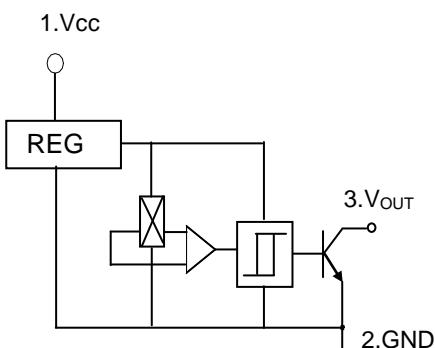
FEATURES

- ◆ High Sensitivity
- ◆ Resistant to Physical Stress
- ◆ Wide Supply Voltage Range
- ◆ Interfacing with All Kinds of Logic Circuits Directly

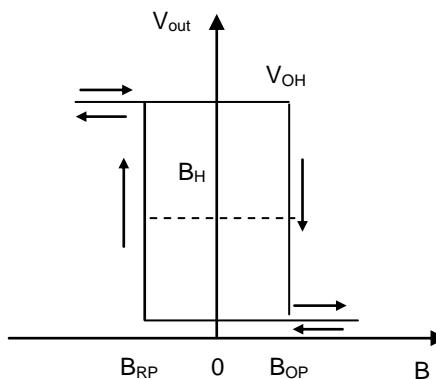
TYPICAL APPLICATION

- ◆ High Sensitive Non-contact Switch
- ◆ DC Brushless Motor
- ◆ DC Brushless Fan

FUNCTIONAL BLOCK DIAGRAM

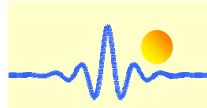


MAGNETIC-ELECTRICAL TRANSFER CHARACTERISTICS



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value		Unit
		Min	Max	
Supply Voltage	Vcc	4.5V ~ 24V		V
Magnetic Flux Density	B	unlimited	unlimited	mT
Output Current	Io	-	25	mA
Operating Temperature Range	T _A	-40	150	°C
Storage Temperature Range	T _S	-55	150	°C



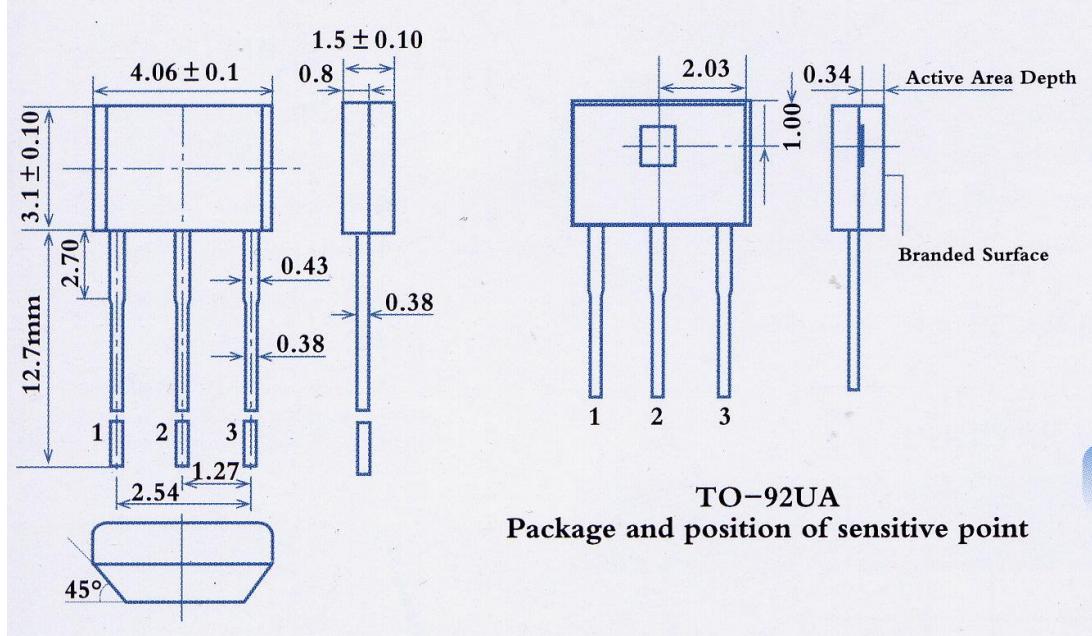
ELECTRICAL CHARACTERISTICS

Parameter	Test Condition	Symbol	Value			Unit
			Min	Typ	Max	
Supply Voltage	V _{CC} =4.5V ~ 24V	V _{CC}	4.5	-	24.0	V
Output Low Voltage	V _{CC} =4.5V, R _L =960Ω B≥B _{OP}	V _{OL}	-	0.2	0.4	V
Output Leakage Current	V _O =V _{CC} max, B≤B _{RP}	I _{OH}	-	1.0	10.0	μA
Supply Current	V _{CC} =V _{CC} max open-collector output	I _{CC}	-	4.0	8.0	mA
Output Rise time	V _{CC} =12V, R _L =820Ω C _L =20pF	t _r	-	1.5	-	μS
Output Fall time		t _f	-	1.0	-	μS

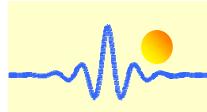
Magnetic Characteristics (Unit: mT)

Parameter	Test condition	Value			Unit
		Min	Typ	Max	
Operate Point (B _{OP})	-20°C < TA < +90°C	1	4	7	mT
Release Point (B _{RP})	-20°C < TA < +90°C	-7	-4	-1	
Hysteresis (B _H)	-20°C < TA < +90°C	4	8		

Package Outline Drawing (Unit: mm)

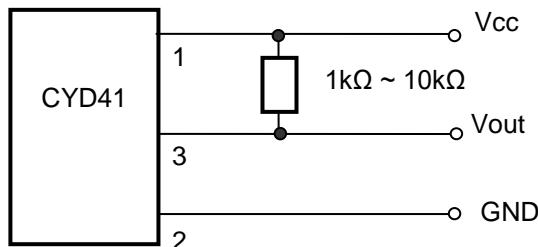


Pin Notes: 1. Power Supply 2. Ground 3. Output



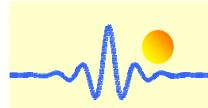
Connection

This sensor has an OC (NPN) output voltage. Therefore it is necessary to connect a pull-up resistor in value from $1\text{k}\Omega$ to $10\text{k}\Omega$ between the power supply Vcc and output pins.



Cautions:

- 1) It is possible that outside mechanical stress affects the operating point and the release point of Hall-effect circuit, therefore, mechanical stress should be lessened as far as possible in the process of assembly;
- 2) Pay attention to the soldering temperature at the leads; keep it lower in a short time to guarantee good soldering quality.



CYDF41 Bipolar Hall Effect Switch

The CYDF41 is an integrated Hall Effect latched sensor designed for electronic commutation of brush-less DC motor applications. The device includes an on-chip Hall voltage generator for magnetic sensing, a comparator that amplifies the Hall voltage, and a Schmitt trigger to provide switching hysteresis for noise rejection, and open-collector output. An internal band gap regulator is used to provide temperature compensated supply voltage for internal circuits and allows a wide operating supply range. A north pole of sufficient strength will turn the output ON. In the absence of a magnetic field, the output is OFF.

Features

• Wide operating voltage range: 3.0V to 28V	• Reverse polarity protection
• Maximum output sink current	• Package : SIP-3L
• Open-Collector pre-driver	

Block Diagram

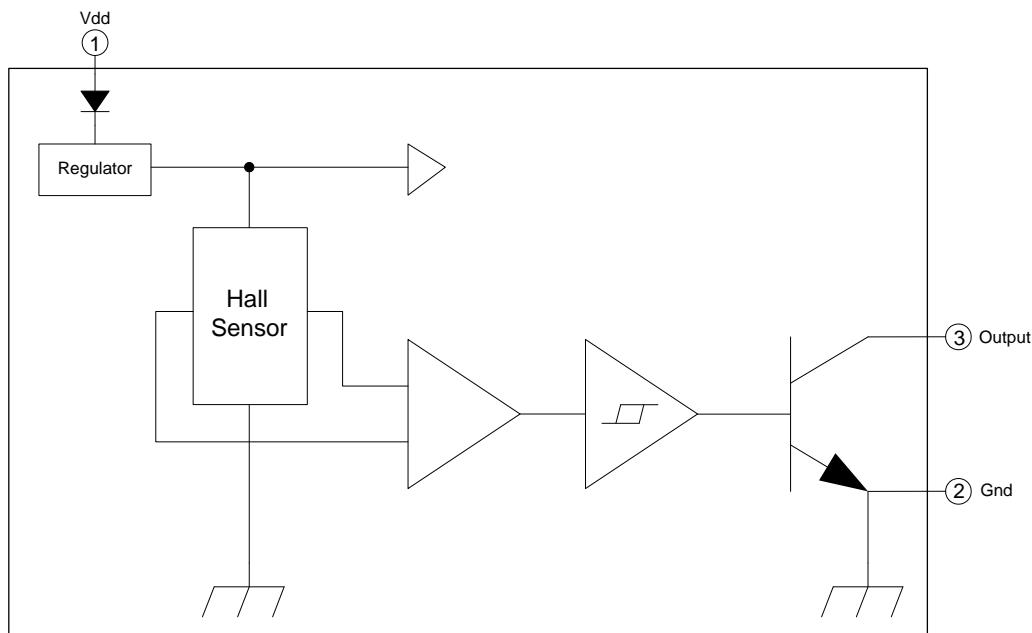
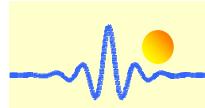


Figure 1

Recommended Operating Conditions

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Supply Voltage	V _{DD}	-	3.0		28	V
Operating Temperature Range	T _A	-	-40		125	°C



Electrical Characteristics $V_{DD}=12.0V$, $T_A=25^\circ C$ (unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Average Supply Current(no load)	I_{DD}	-		3.5	10	mA
Output Saturation Voltage	V_{SAT}	$I_{out}= 20mA$		165	200	mV
Output Rise time	t_r	$RL=500\Omega$, $CL=20pF$ (Figure 7)	0.2	-	0.75	μs
Output Fall time	t_f	$RL=500\Omega$, $CL=20pF$ (Figure 7)	20	-	150	ns

Magnetic Characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Operate Points	B_{OP}		+60	-	+80	G
Release Points	B_{RP}		-80	-	-60	G
Hysteresis	B_{HYST}		30	-	120	G

Hysteresis Characteristics

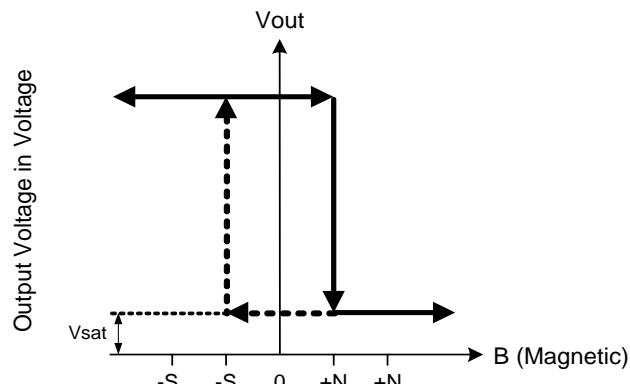


Figure 2

Absolute Maximum Ratings

Magnetic Flux Density in Gauss

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Operating Temperature	T_{OP}	-	-40		125	°C
Storage Temperature	T_{ST}	-	-65		150	°C
DC Supply Voltage	V_{DD}	-	3.0		28	V
Supply Current	I_{DD}	-			10	mA
Continuous Current	$I_{O(CONT)}$				50	mA
Junction temperature	T_J				160	°C
Power Dissipation	P_D	SIP-3L			500	mW
Thermal Resistance	θ_{JC}	SIP-3L		0.27		°C/mW
Lead Temperature		10sec			260	°C

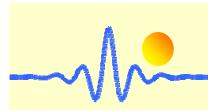


Figure 3

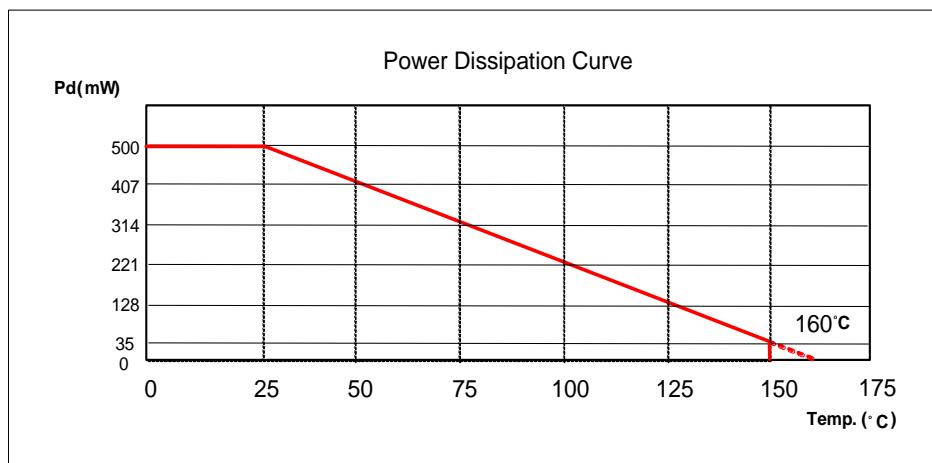
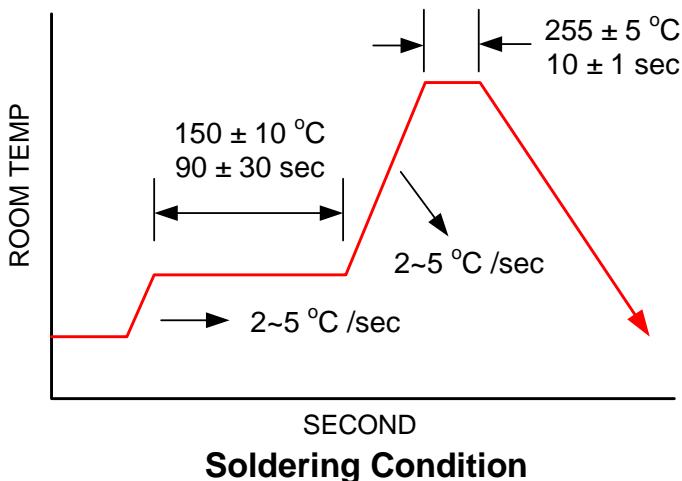


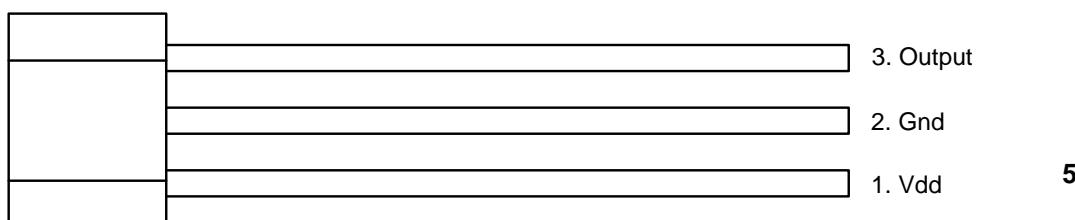
Figure 4



Pin Connection

[Top View]

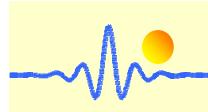
Figure



Pin Descriptions

Name	I/O	Pin No.	Description
Vdd	P	1	Positive power supply
Gnd	G	2	Ground
Output	O	3	Driver output

Legend: I=input, O=output, I/O=input/output, P=power supply, G=ground



Marking Information

[Top View]

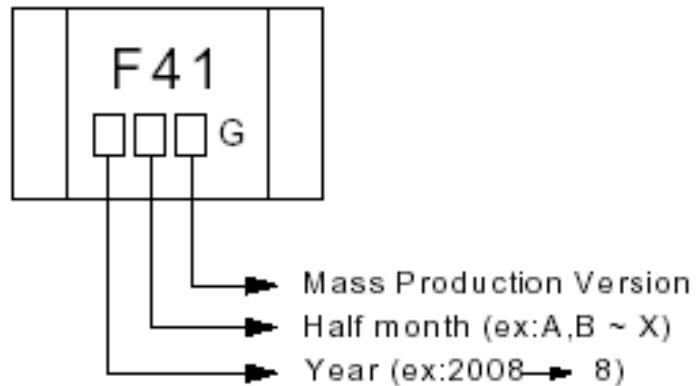
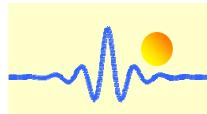


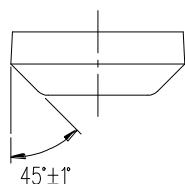
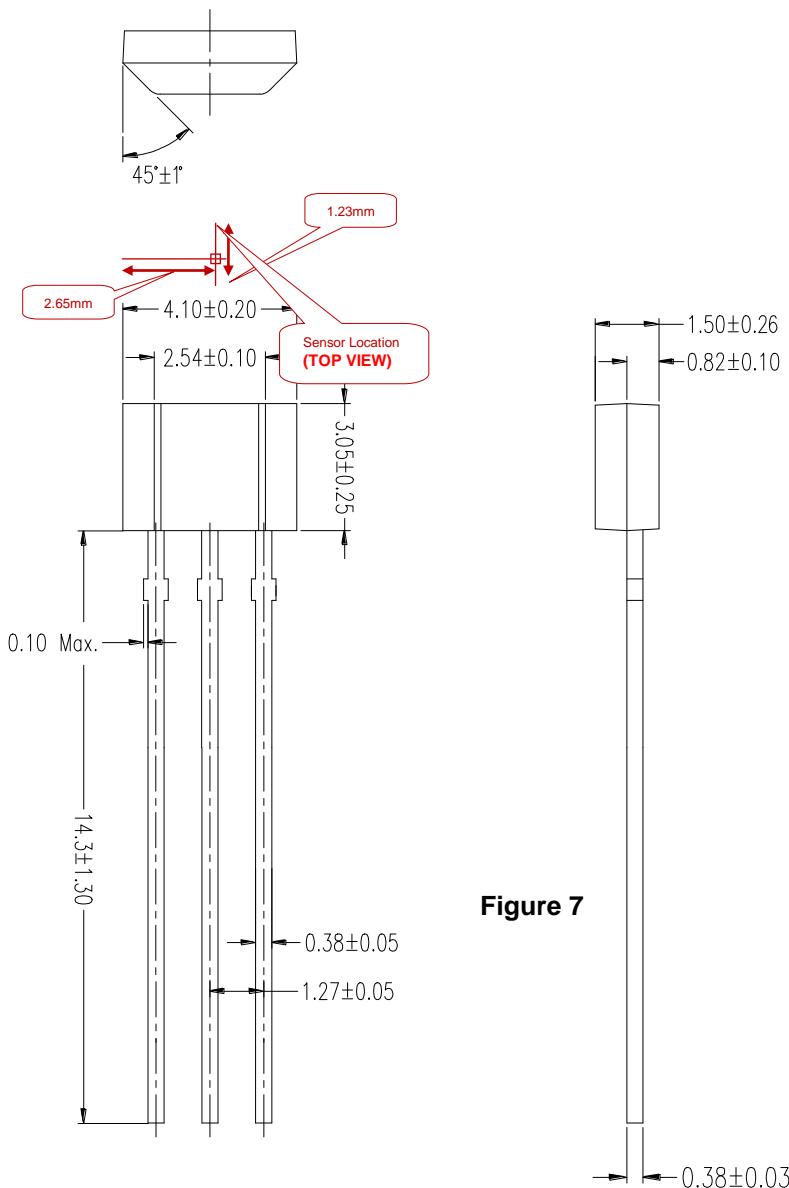
Figure 6

Order Information

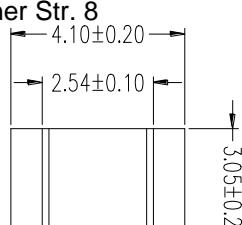
Part Number	Operating Temperature	Package	MOQ
CYDF41	-40 °C to +125 °C	SIP-3L	1000ea



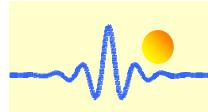
Package Dimension (Unit: mm)
SIP-3L (Pb Free)



Markt Schwabener Str. 8
85464 Finsing
Germany



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Fax: +49 (0)8121-2574101
Email: info@chenyang-gmbh.com
<http://www.chenyang-gmbh.com>



Test Circuit

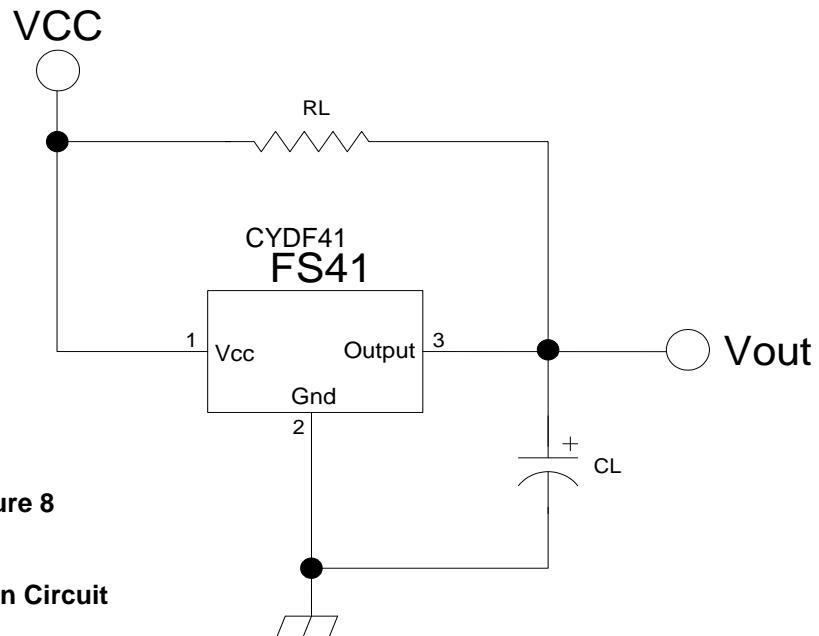


Figure 8

Functional Application Circuit

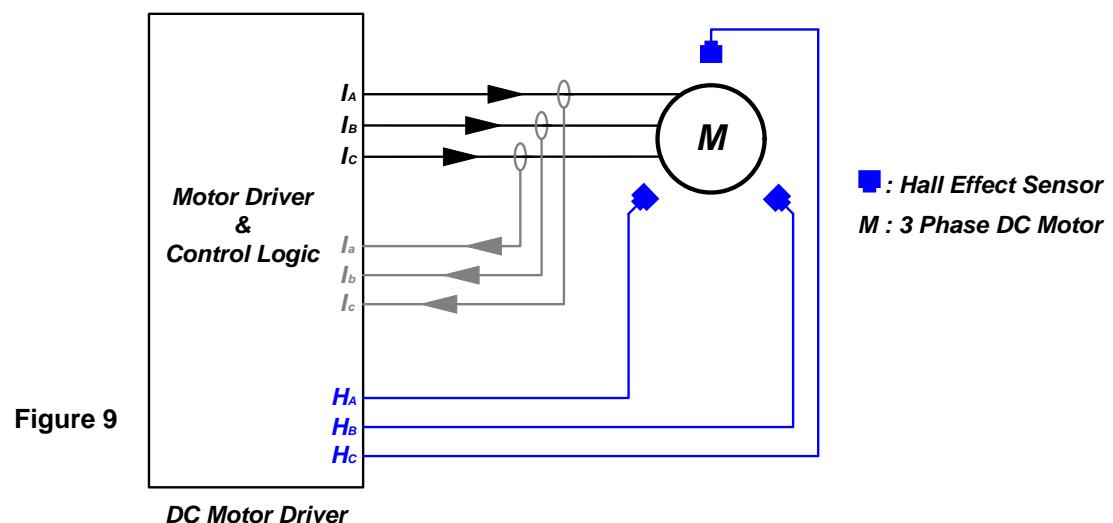
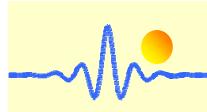


Figure 9

DC Motor Driver



CYD72X Bipolar Hall Effect Switch

CYD72X is a Hall sensor with latched digital output. It's suitable for electronic commutation of brushless DC motor applications. The CYD72X uses a chopper amplifier for magnetic signal amplification, which can achieve a low offset. Thus it provides precise magnetic switching thresholds.

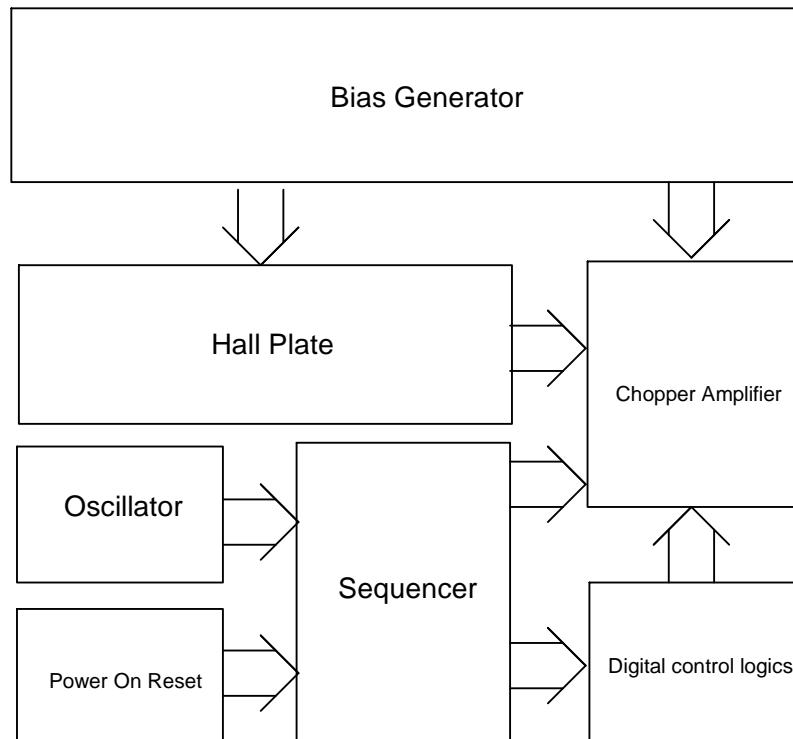
If a magnetic flux density larger than threshold B_{op} , NO is turned on(low). The output state is held until a magnetic flux density reversal falls below B_{rp} causing NO to be turned off (high)

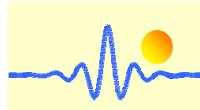
Features

• Maximum output sink current 50mA	• Reverse polarity protection
• Open collector pre-driver	• Package : SIP-3L

Block Diagram

Figure 1





Functional Descriptions

Refer to the block diagram (Figure.1), CYD72X is composed of the following building blocks:

•+ Bias generator

The bias generator provides precise, temperature- and process-insensitive bias references for the analog blocks. These references guarantee proper operation of the chip under all conditions specified in this specification.

•+ Oscillator + Sequencer

The built-in oscillator provides the clock signal, which is taken by the sequencer to generate the sequential signals necessary for both the Hall sensor and the digital control logics

•+ Power on Reset

It is used to detect the power-up ramp and reset the digital circuits to attain correct operation as soon as the power is ready.

•+ Chopper Amplifier

To achieve a higher magnetic sensitivity the chopper amplifier structure is adopted in this design. Use of this structure dynamically removes both the offset and flicker noise at the same time.

•+ Digital control logics

It generates controlling signals for the Hall sensor.

Recommended Operating Conditions

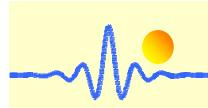
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Supply Voltage	V _{DD}	-	2.4		16	V
Operating Temperature Range	T _A	-	-20		105	°C

Electrical Characteristics V_{DD}=12.0V, T_A=25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Average Supply Current(no load)	I _{DD}	-		3.0	10	mA
Output Saturation Voltage	V _{SAT}	I _{out} = 50mA		0.5	0.8	V
Output leakage current	I _{LEAK}	V _{OUT} =12V			20	µA
On resistance	R _{ON}			10		Ω

Magnetic Characteristics

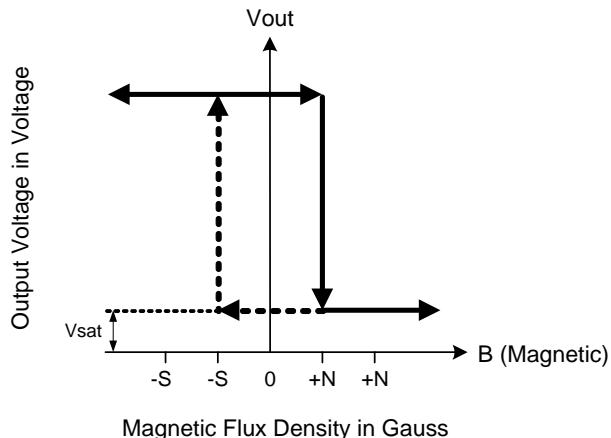
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Operate Points	B _{OP}			+25		G
Release Points	B _{RP}			-25		G
Hysteresis	B _{HYST}			50		G



Hysteresis Characteristics

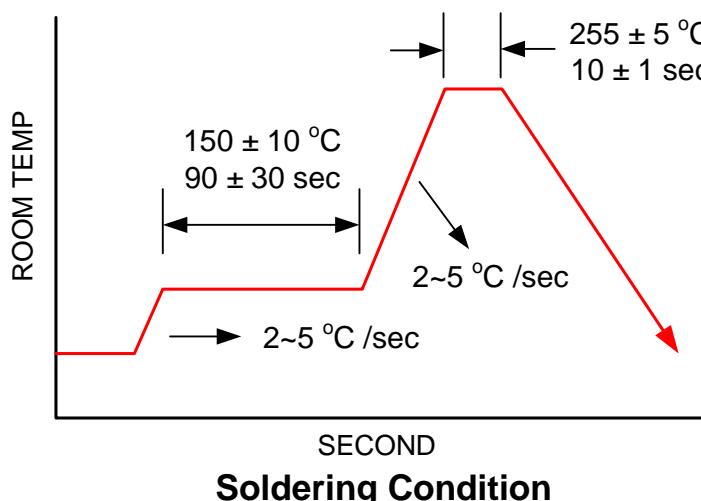
Figure 2

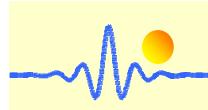
Absolute Maximum Ratings



Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Operating Temperature	T _{OP}	-	-20		105	°C
Storage Temperature	T _{ST}	-	-40		150	°C
DC Supply Voltage	V _{DD}	-	2.4		16	V
Supply Current	I _{DD}	-			10	mA
Continuous Current	I _{O(CONT)}				50	mA
Junction temperature	T _J				150	°C
Lead Temperature		10sec			260	°C

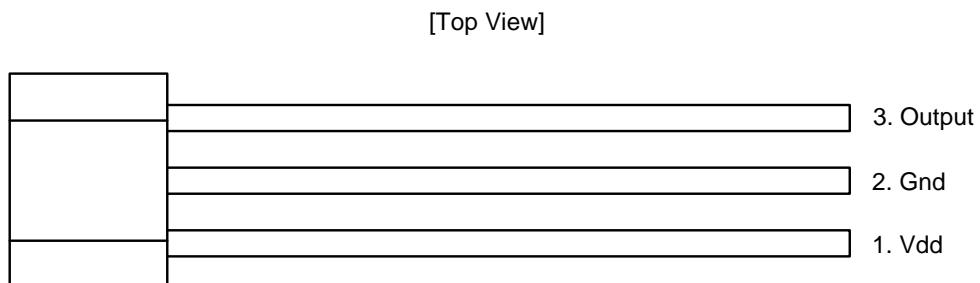
Figure 3





Pin Connection

Figure 4



Pin Descriptions

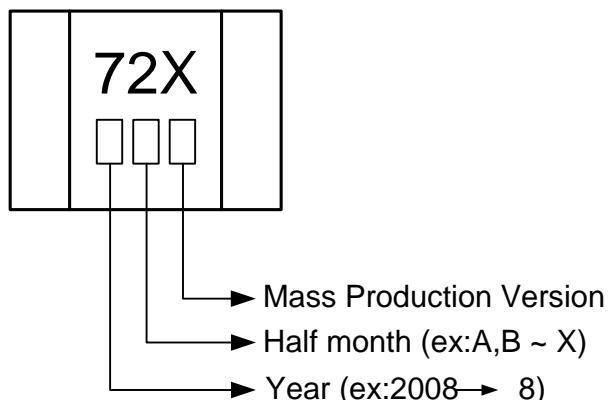
Name	I/O	Pin No.	Description
Vdd	P	1	Positive power supply
Gnd	G	2	Ground
Output	O	3	Driver output

Legend: I=input, O=output, I/O=input/output, P=power supply, G=ground

Marking Information

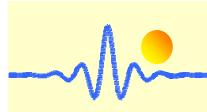
[Top View]

Figure 5



Order Information

Part Number	Operating Temperature	Package	MOQ
CYD72X	-20 °C to +105 °C	SIP-3L	1000ea



Package Dimension (Unit: mm)
SIP-3L(Pb Free)

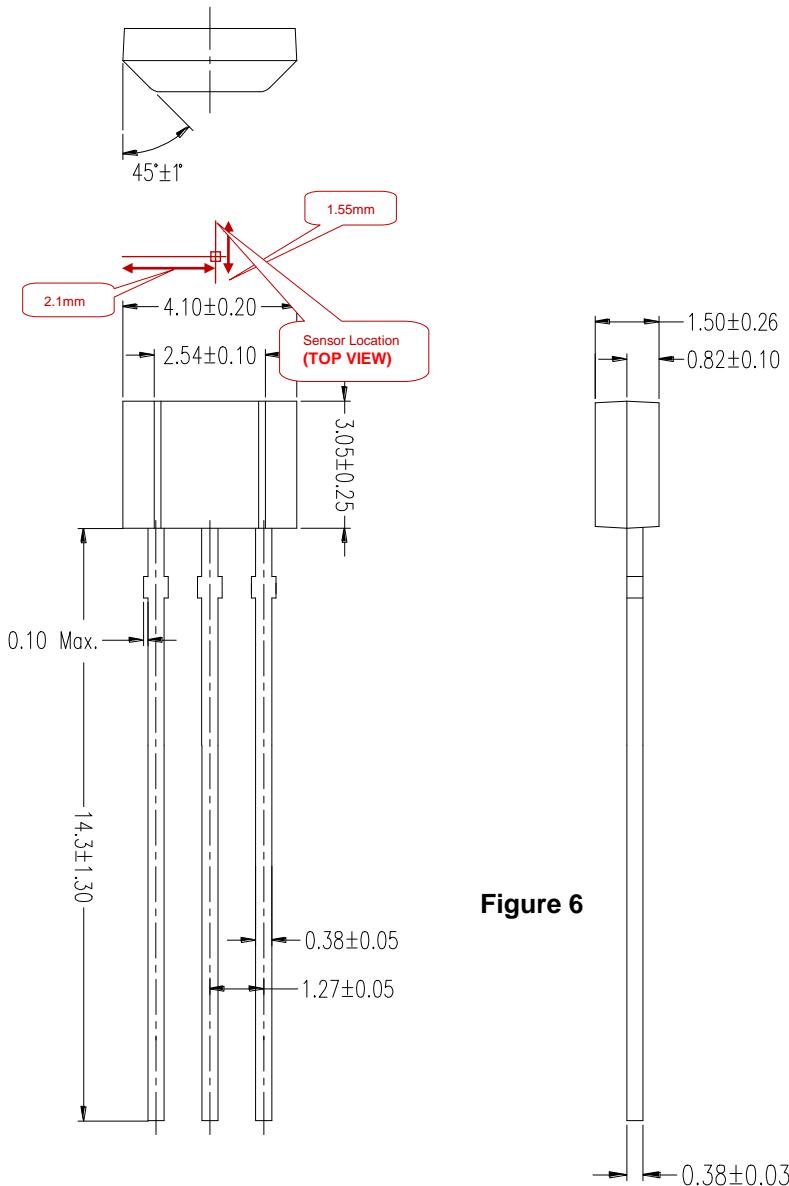
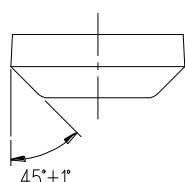
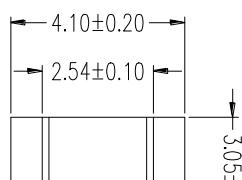


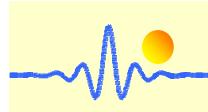
Figure 6



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Germany



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Email: info@chenyang-gmbh.com
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Application Circuit Reference

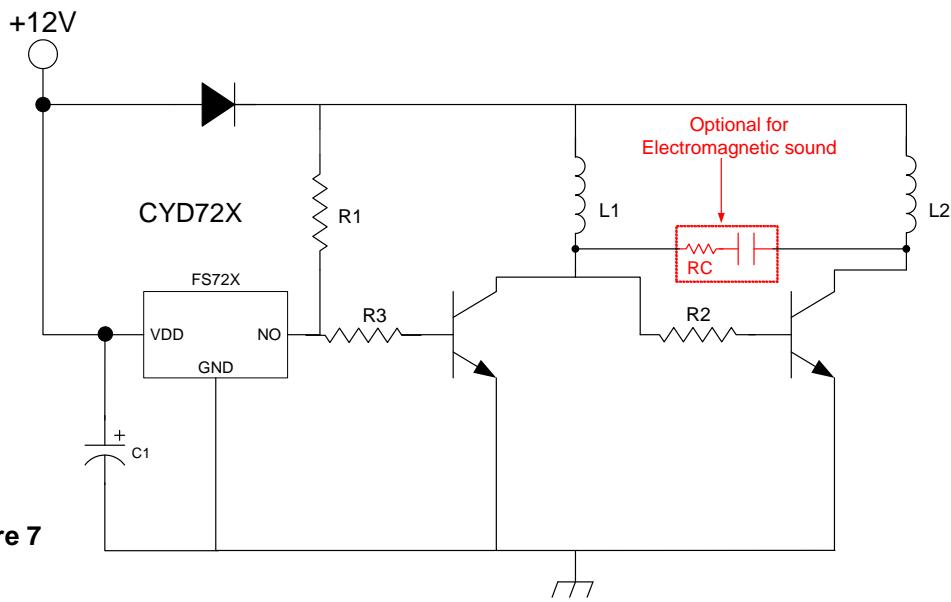
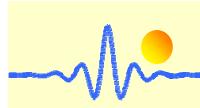


Figure 7

Note. Detail information please check

Suggestion value: R1=1K application note.
Brushless DC Fan ohm, R3=330 ohm, R=30 ohm, C=2.2uF,
C1>0.1uF



CYD277 Hall Effect Switch IC with complementary outputs

CYD277 series Hall-effect switch IC is a kind of one-chip semiconductor integrated circuit, which is composed of a reverse voltage protector, a precise voltage regulator, Hall voltage generator, a differential amplifier, Schmitt trigger, a temperature compensator and two open-collector output on a single silicon chip. The main characteristics are wide operating voltage range, high sensitivity to magnetic field, good load-carrying and reverse protection abilities. It is the best component for brushless fan, because its load-carrying ability is up to 400mA with complementary output.

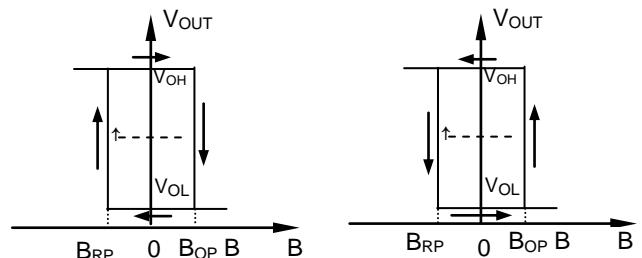
FEATURES

- Smart and Single Chip Integrated
- Temperature Compensation and Wide Operating Temperature Range
- Good Capability of Load
- Reverse Protection
- Open Collector Complementary Outputs
- Low Price , 4 Pin Epoxy Package
- Soldering Temperature can be Lowered Because of Alloy Tin Electroplating
- High Reliability

TYPICAL APPLICATION

- High Sensitive Non-contact Switch
- DC Brushless Motor
- DC Brushless Fan

Magnetic-Electrical Transfer Characteristics

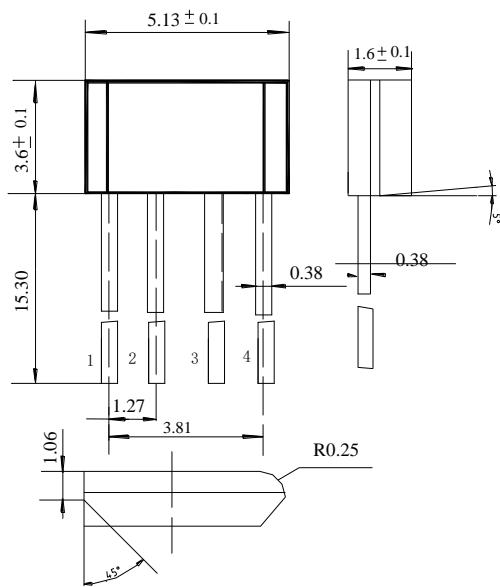
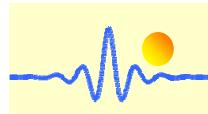


ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value		Unit
		Min	Max	
Supply Voltage	V _{CC}	4.5	20	V
Magnetic Flux Density	B	unlimited	unlimited	mT
Output current	I _O	-	400	mA
Operating Temperature Range	T _A	-20	85	°C
Storage Temperature Range	T _S	-55	150	°C

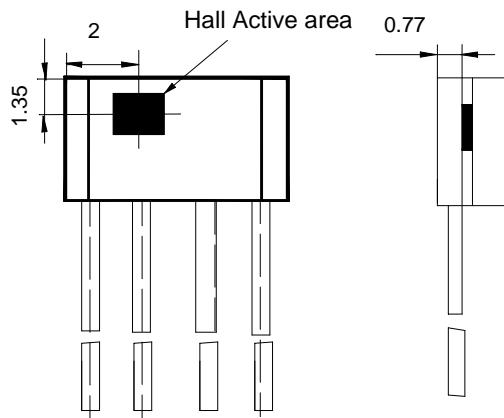
ELECTRICAL CHARACTERISTICS (T_A=12°C~+85°C)

Package (Unit: mm)	Test Conditions	Symbol	Value			Unit
			Min	Typ	Max	
Supply Voltage		V _{CC}	4.5	-	20.0	V
Output Low Voltage	V _{CC} = 4.5V ~ 20V, B=20mT, I _O =300mA	V _{OL}	-	0.2	0.6	V
Output Leakage Current	V _O =V _{CC} max, V _{CC} open-collector output	I _{OH}	-	0.1	10.0	μA
Supply Current	V _{CC} =V _{CC} max, V _O open-collector output	I _{CC}	-	17.0	30.0	mA
Output Rise time	V _{CC} =12V, R _L =820Ω, C _L =20pF	t _r	-	0.3	1.5	μS
Output Fall time	V _{CC} =12V, R _L =820Ω, C _L =20pF	t _f	-	0.3	1.5	μS



Parameter	Type	Value			Unit
		Min	Typ	Max	
Operate Point (B_{OP})	A	-	-	5	mT
	B	-	-	8	
	C	-	-	12	
Release Point (B_{RP})	A	-5	-	-	
	B	-8	-	-	
	C	-12	-	-	
Hysteresis(B_H)		4	8	-	

Position of Sensitive Area

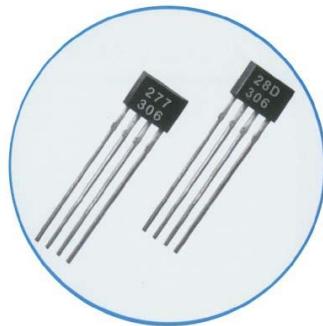
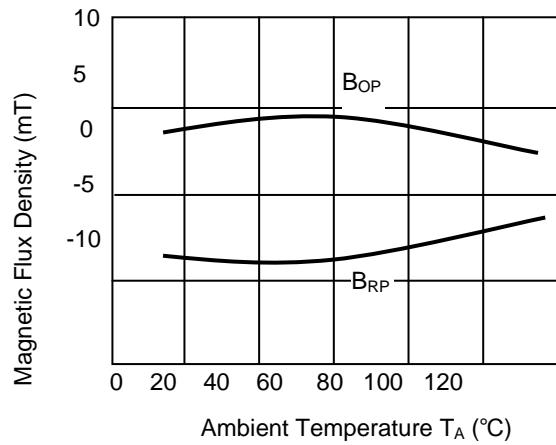


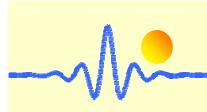
PIN NOTES:

1. Vcc
2. Output 1
3. Output 2
4. GND

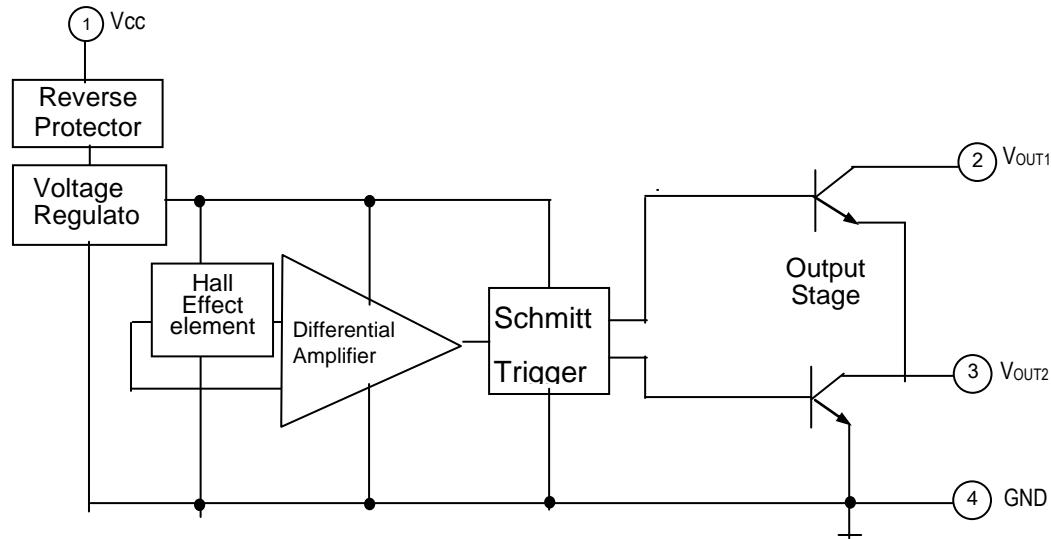
Characteristics Curves

Temperature Characteristics of B_{op} , B_{RP}



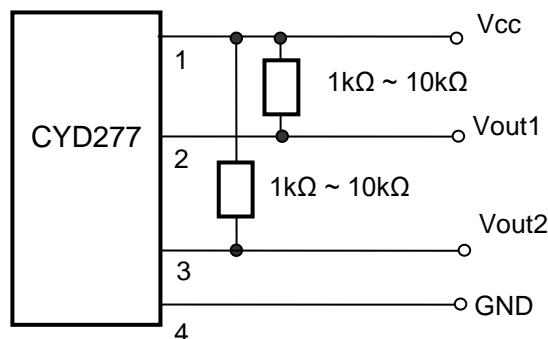


Functional Block Diagram



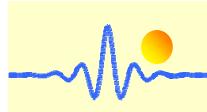
Connection

This sensor has OC (NPN) output voltages. Therefore it is necessary to connect a pull-up resistor in value from $1\text{k}\Omega$ to $10\text{k}\Omega$ between the power supply Vcc and output pins.



NOTES:

- Voltage Regulator : The output is stable when supply voltage varies from 4.5V to 20V.
Reverse Protector : When supply voltage is opposed or interfered by reverse pulse voltage in usage, It protects circuit and protective voltage is up to 30V.
Hall Effect Voltage Generator : It transfers the magnetic signal to the corresponding electric signal.
Differential Amplifier : It can amplify the weak voltage signal from Hall voltage generator output.



- Schmitt Trigger : It transfers analogy signal from differential amplifier output to digital signal.
- Temperature Compensator : It ensures that the Hall-effect ICs over the temperature range of -20°C to +85°C.
- Complementary Follower : Output current can drive two windings of brushless fan directly. Turning on the brushless fan, and the output stage V_{OUT1} & V_{OUT2} will change when the Hall voltage generator is forced by alternating magnetic, the fan can operate because the direction of load current(winding of the fan) is changed.