ChenYang
Technologies GmbH & Co. KG

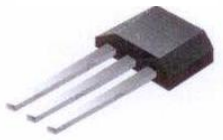
High-Sensitive Unipolar Hall Effect Switch CYD421

Applications

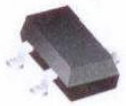
- Automotive brake pedal position detection
- Proximity detection
- Speed measurement
- Weak magnetic field applications
- Solid state switches etc.

Package Type
P/N: CYD421-XX

TO92S (UA)



SOT23 (LH)



Features

- 3.8V to 40V operation voltage
- Overvoltage protection capability up to 40 V
- High accuracy unipolar switch
- Built-in dynamic offset cancellation
- Open drain output
- Low thermal drift of magnetic sensing
- Qualified according to AEC-Q100 test standard

Order Information

- CYD421-PA
  Package (PA): UA, LH

Specifications

Absolute Maximum Ratings (T_A=25°C)

Parameter	Symbol	Conditions	Rating	Unit
Maximum supply voltage	V_{DDMAX}		60	V
Reverse voltage	$-V_{DDMAX}$		-60	V
Operating temperature	T_A		-40~+125	°C
Storage temperature	T_S		-40~+165	°C
Maximum output sink current	I_{OMAX}		40	mA

Electrical Characteristics (T_A=25°C, V_{DD}=5VDC)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Supply voltage	V_{DD}		3.8		40	V
Saturation voltage output	$V_{OL(ON)}$	@I_{OUT} = 20mA			0.4	V
Output leakage current	I_{OH}	Output switch off			10	µA
Supply current	I_{DD}	Output open		6	9	mA
Output voltage fall time	t_f	R_L=1kΩ; C_L=20pF			1.5	µs
Output voltage rise time	t_r				1	µs

Magnetic Characteristics (T_A=25°C, V_{DD}=5VDC)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operating point	B_{OP}	Pullup resistor R_L=1kΩ, Load capacitor C_L=20pF	30	60	80	G
Release point	B_{RP}		10	40	60	G
Hysteresis	B_{HYS}		10	20	40	G

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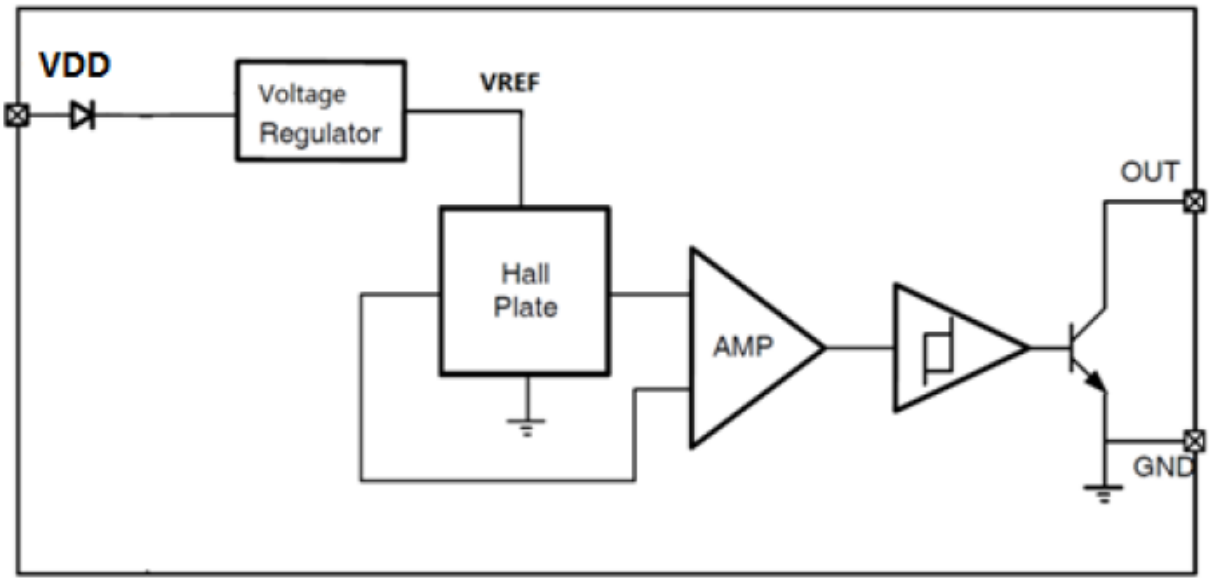
General Specifications

CYD421 is South Pole sensitive unipolar Hall Effect switch and includes on-chip Hall element voltage generator, a voltage regulator for operation with supply voltages of 3.8V to 40V, reverse voltage protection, temperature compensation circuitry, small-signal amplifier, Schmitt trigger and an open-collector output.

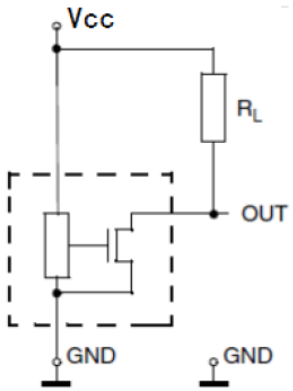
The sensor is designed to respond to South poles. While the magnetic flux density(B) is larger than operate point Bop, the output will be turned on with low output level. Then the output is held until the magnetic flux (B) is lower than release point Brp. The output will be turned off with high output level.

CYD421 offers a variety of packages, including TO92S, SOT23. All packages are RoHS compliant.

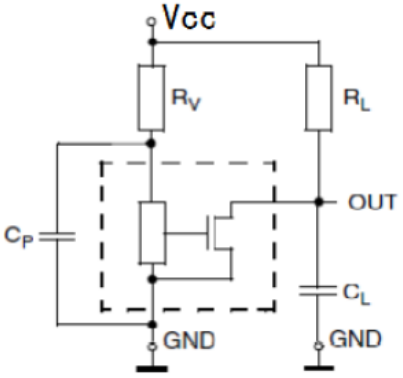
The architecture block diagram is shown in the following Fig.



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 =100Ω
C_P = 4.7 nF
C_L = 1 nF.
R_L= 1k~10k Ω

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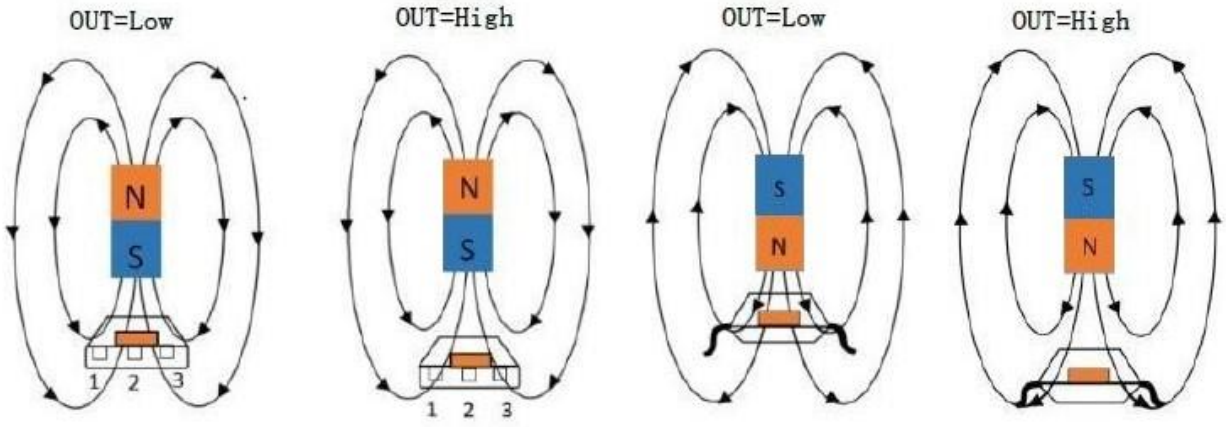
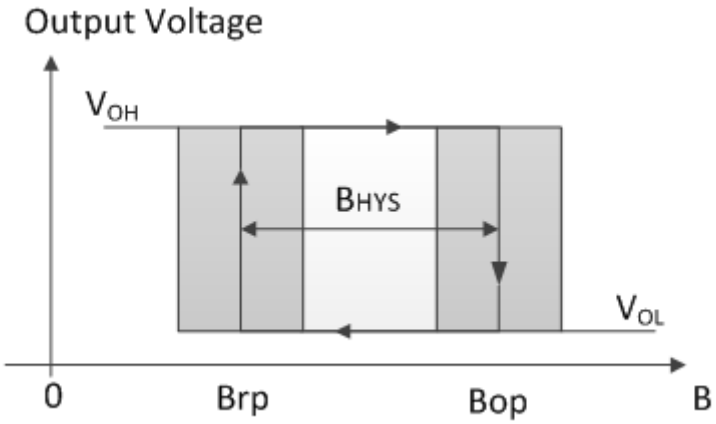
Application Example

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



a) PO92 b) PO92 c) SOT23 d) SOT23

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



Output behavior of CYD421

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)	-4	4	kV

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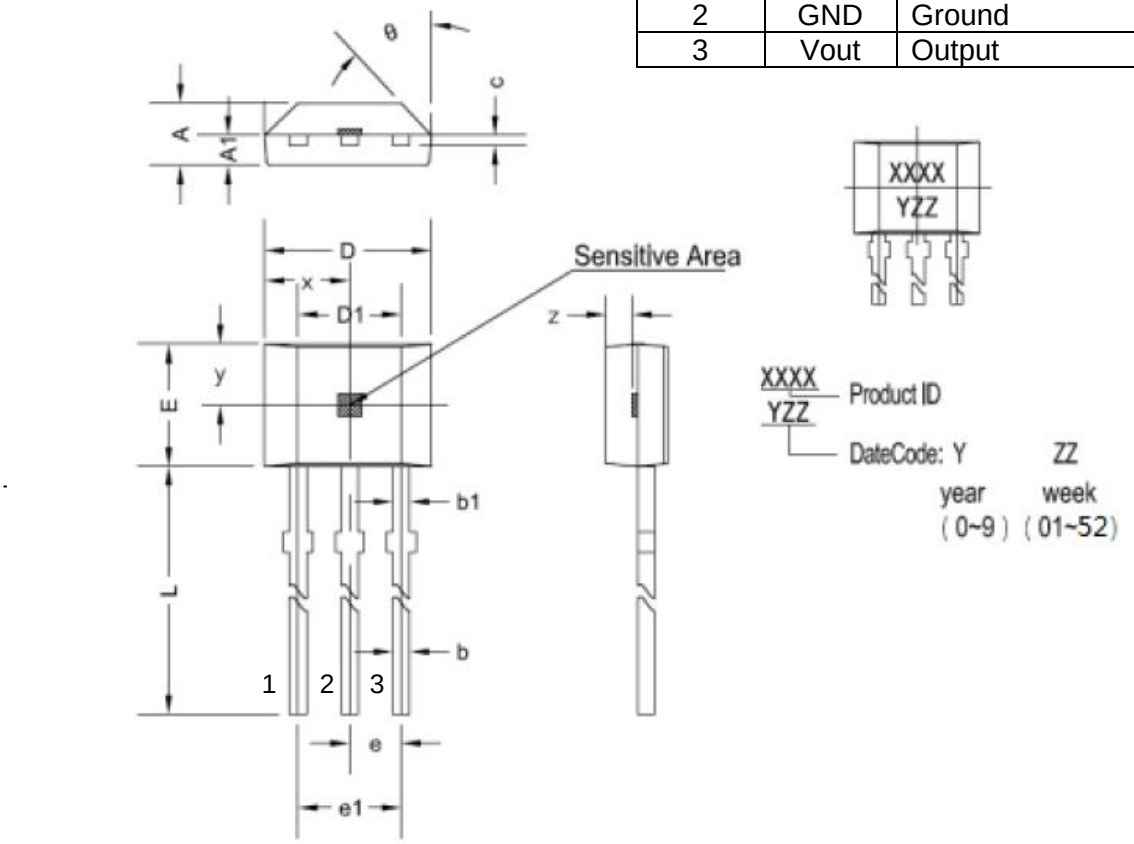
Package Outline
TO92S (UA)
(Packing: bulk, 1000pcs/bag)

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 typ.	
e1	2.44	2.64	0.096	0.104
L	13.5	15.5	0.531	0.610
x	2.03 typ.		0.080 typ.	
y	1.55 typ.		0.061 typ.	
z	0.50 typ.		0.020 typ.	
θ	45° typ.		45° typ.	

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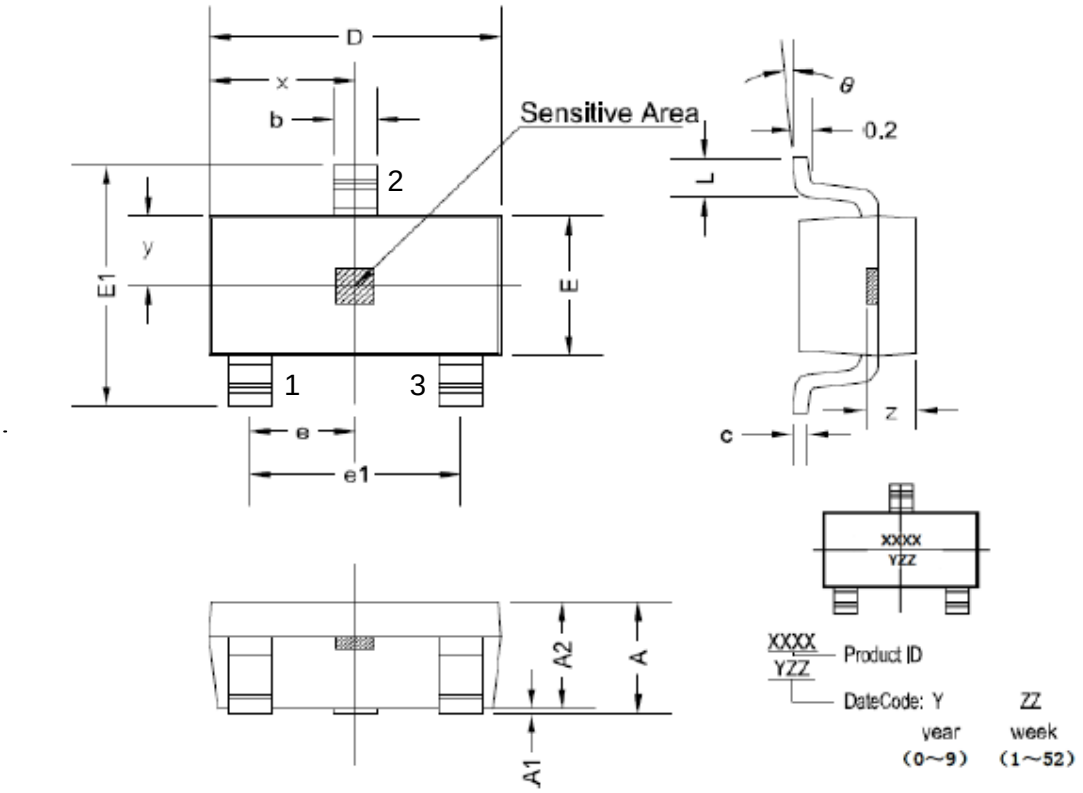
Package Outline
SOT23(LH)
(Packing: Tape&Reel, 3000pcs/reel)

Pin Assignment

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



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

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