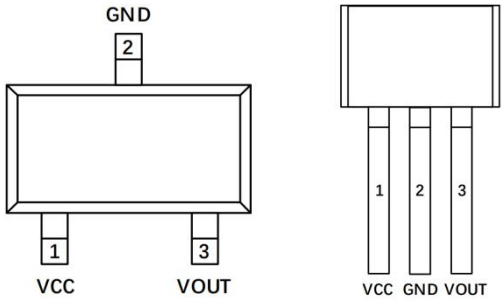
ITE5901
Hall Effect Switches

Features
- Wide supply range 1.8V to 5V
- Zero magnetic field output level as low as 300mV
- Operating current < 1.2mA
- Wide temperature range: -40℃ to 125℃

Applications
- Magnetic axis keyboard
- Game pad
- Position sensing
- Human computer interaction



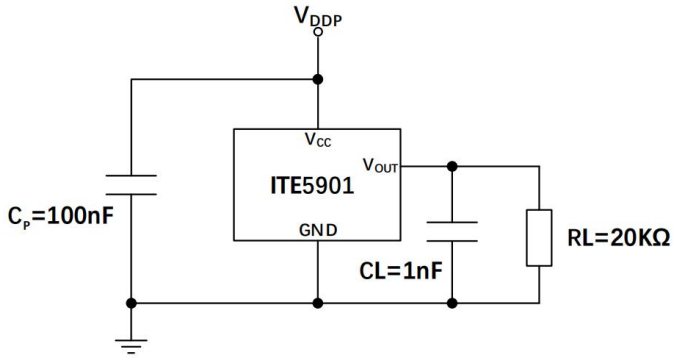
SOT23-3L TO-92S

Package Type: SOT23-3L, TO-92S

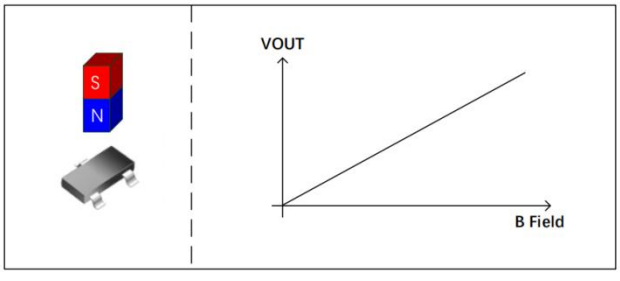
Description
The ITE5901 is a linear Hall-effect sensor IC with on-chip Hall and signal conditioning circuit. It integrates onchip customized Hall devices to ensure low power consumption and high sensitivity performance of the chip. Simultaneously, high-precision signal conditioning circuits ensure parameter consistency and drift across the entire temperature range. The on-chip Hall sensor converts the magnetic flux passing through the chip into Hall signal voltage, and the internal signal conditioning circuit further amplifies the weak Hall signal voltage to the chip output. The S pole is defined as the positive pole. When the S pole of a magnet appears on the chip marking surface, the output voltage will increase as the distance between the magnet and the marking surface decreases (magnetic field increases).

The sensing chip consumes a working current of 1.2mA during operation, and the output level of zero magnetic field can be customized according to the application, with a minimum of 300mV, which can maximize the magnetic field detection range and output voltage swing. The operating temperature range is -40°C to 125°C, suitable for various consumer and industrial application environments.

Typical Application

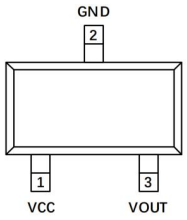


Field Direction Definition

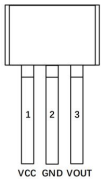


The output of the chip varies with the magnetic field as shown in Figure. When the N pole of the magnet is facing the SOT23-3L packaging chip screen printing surface, the output VOUT voltage increases as the distance between the magnet and the chip screen printing surface decreases. The voltage of VOUT at zero magnetic field can be customized as needed, with a minimum of 0.2V.

Pin Description



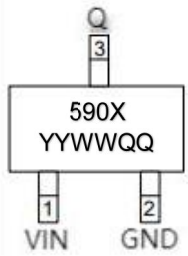
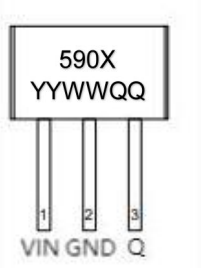
SOT23-3L
ITE590XA3L



TO-92S
ITE590XA3T

PIN NO.		NAME	DESCRIPTION
ITE590XA3T	ITE590XA3L		
1	1	VCC	Supply voltage
2	3	GND	IC Ground
3	2	VOUT	Output voltage

Marking Information

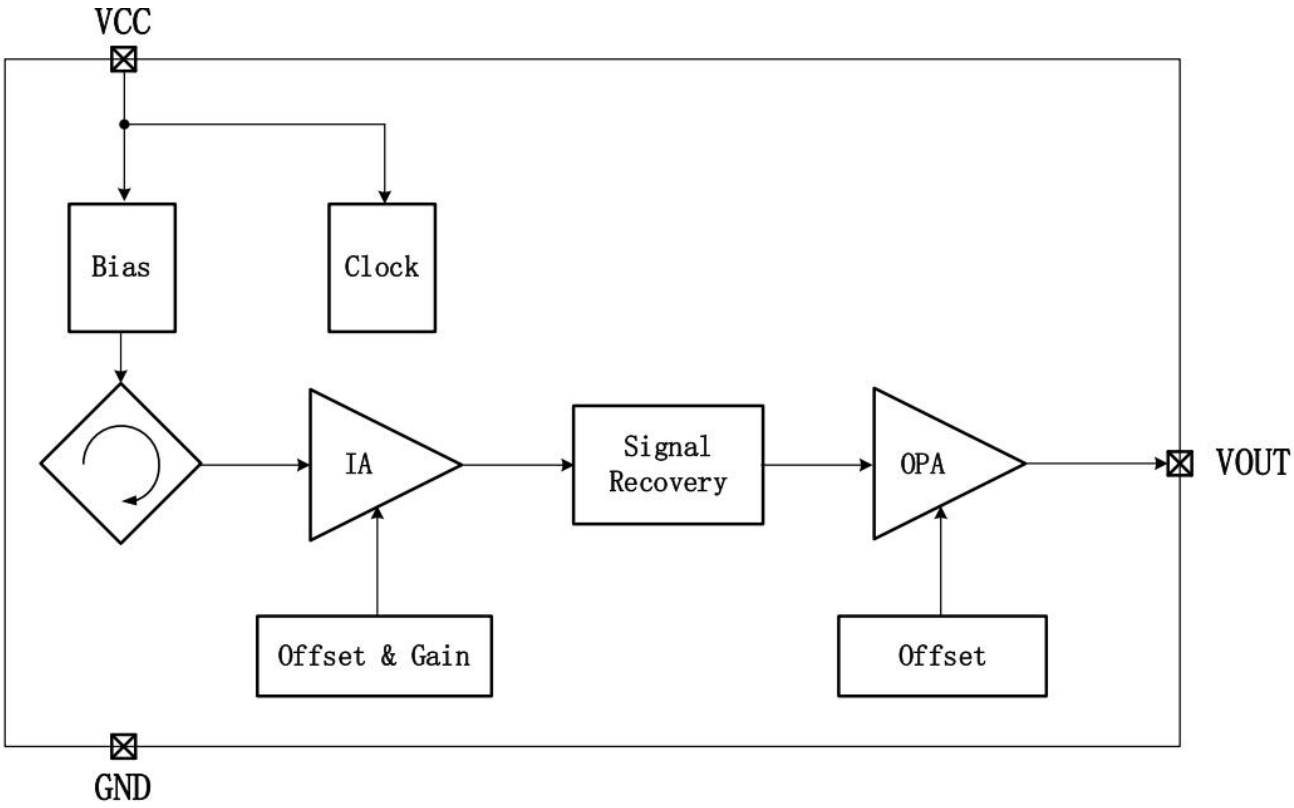
	As shown in the left figure: First row: 5901: Model code XX: Series and Version Second row: YYWWQQ: Production cycle and batch number
	As shown in the left figure: First row: 5901: Model code XX: Series and Version Second row: YYWWQQ: Production cycle and batch number

Universal Naming Convention

ITE 5901 A 3L
① ② ③ ④

①: Abbreviation of product company name
②: Series model
③: Version
④: Package code (3L: SOT23-3L 3T: TO-92S)

Functional Block Diagram



The sensor IC is shown in Fig. The main path comprises a Hall probe, signal chain with instrumentation amplifier (IA), signal recovery circuit and operational amplifier (OPA). The background dynamic offset compensation circuits in signal chain and Hall probe continuously null out the Hall offset and circuits offset. The on-chip temperature and VCC sensors ensure the IC accuracy.

Absolute Maximum Ratings

SYMBOL	PARAMETER	MIN	MAX	UNIT	NOTE
V_{CC}	Supply Voltage		5.5	V	t < 96h
V_{RCC}	Reverse Supply Voltage		-0.5	V	
V_{OUT}	Output Voltage		5.5	V	t < 96h
V_{ROUT}	Output Reverse Voltage		-0.5	V	
I_O	Output Current	-	1	mA	
T_A	Junction Temperature Range	-40	190	°C	t < 96h
R_{THJA}	Thermal Resistance Junction Ambient	-	300	K/W	
R_{THJL}	Thermal Resistance Junction Lead	-	100	K/W	

Recommended Operating Conditions (Note 4)

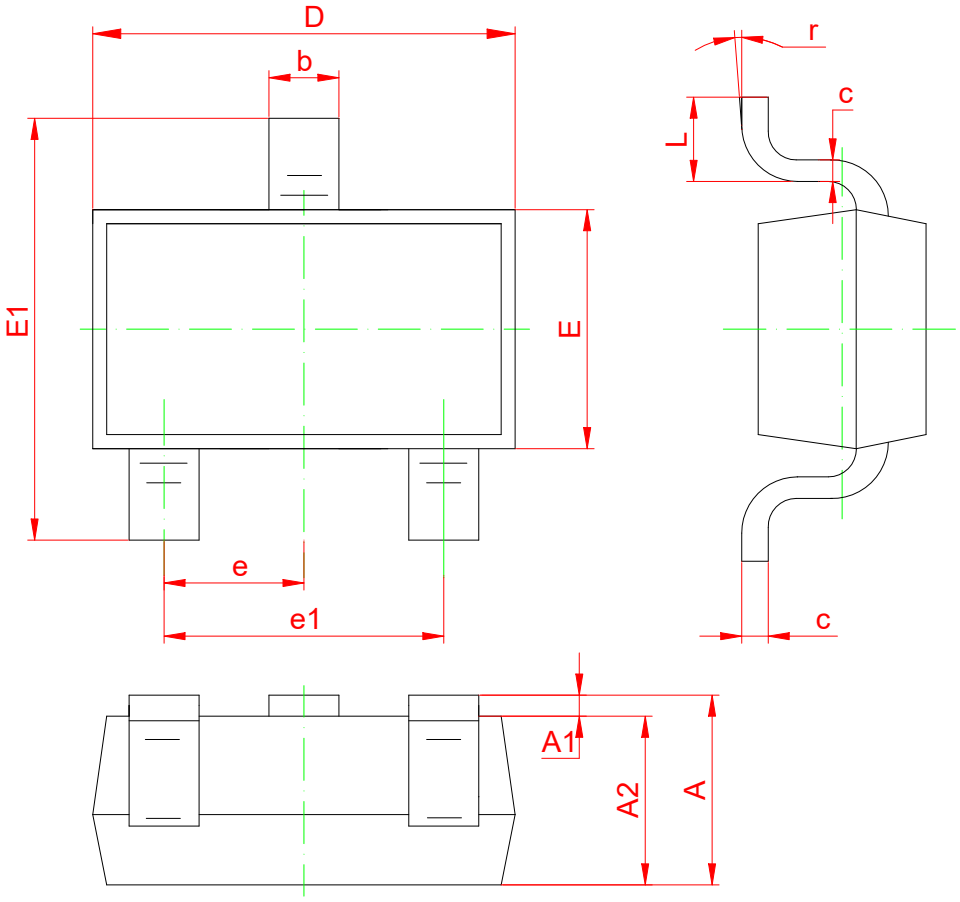
SYMBOL	PARAMETER	VALUES			UNIT	NOTE
		MIN	TYP	MAX		
V_{CC}	Supply Voltage	1.8	3.3	5	V	
I_Q	Output Current	-	1	-	mA	Sink or source
T_J	Junction Temperature Range	-40	-	170	°C	t<1000h

PARAMETER	SYMBOL	VALUES			UNIT	NOTE
		MIN	TYP	MAX		
Sensitivity						
Default sensitivity	S1	-	2	-	mV/Gs	
Sensitivity error	S_{ERR}	-3.0		3.0	%	25°C
Sensitivity temperature coefficient	S_{TC0}	-	-1100	-	ppm/°C	Temperature coefficient can be customized
	S_{TC1}	-	0	-	ppm/°C	

Electrical Characteristics

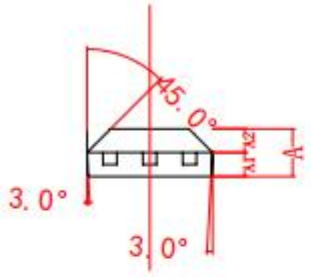
SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage						
I_S	Supply Current		-	1.2	1.6	mA
T_{PO}	Power-on Time			20		μs
Output						
T_D	Output Delay	B=B(max step), CL=1nF	-	10	-	μS
V_{Noise}	Output Noise	TA =25°C, CL=1nF, SNST=2 mV/Gs	-	6.6	-	mV_{pp}
			-	1	-	mV_{rms}
E_{LIN}	Nonlinearity	B≤1000Gs	-1	-	1	%
		B≤2000Gs	-1.5	-	1.5	%
BW	Bandwidth	-3dB, CL=1nF		20		kHz
Quiescent Output						
V_{OQ0}	Zero Magnetic Field Output Voltage	customizable	-	$0.5V_{CC}$	-	V
V_{OQ1}			-	V_{CC}-0.3	-	V
V_{OQ_TC}	Output Voltage Temperature Drift	-40°C ~ 125°C	-20	-	20	mV
V_{SATH}	Output Saturation Voltage	VCC=5V	-	4.8	-	V
		VCC=1.8V	-	1.5	-	
V_{SATL}		VOUT to GND	-	0.3	-	V
R_{LU}	Output Load Resistance	VOUT to VCC	15	-	-	kΩ
R_{LD}		VOUT to GND	15	-	-	kΩ
C_L	Output Load Capacitance		-	-	1	nF

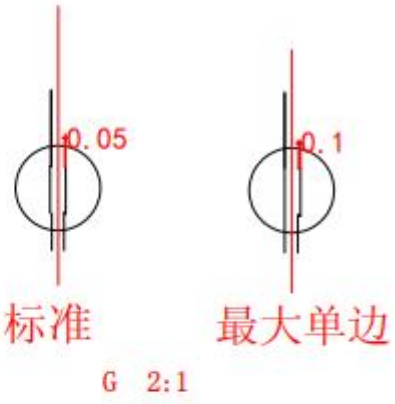
Package Information: SOT23-3L

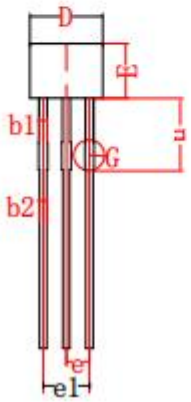


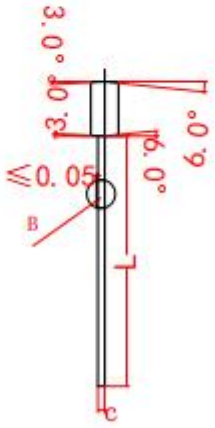
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 (BSC)		0.037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

Package Information: TO-92S









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SYMBOL	PACKAGE	MIN	MID	MAX
A	TO-92S	1.40	1.50	1.60
	SIP3	1.42	1.52	1.62
	TO-M	1.44	1.54	1.64
A1	ALL	0.70	0.77	0.85
A2	TO-92S	0.63	0.73	0.83
	SIP3	0.65	0.75	0.85
	TO-M	0.67	0.77	0.87
b1	ALL	0.43	0.47	0.51
b2	ALL	0.40	0.44	0.48
c	ALL	0.36	0.38	0.40
D	TO-92S	3.95	4.05	4.15
	SIP3	3.80	3.90	4.00
	TO-M	3.98	4.08	4.18
e	ALL	-	1.27TYP	-
e1	ALL	2.44	2.54	2.64
E	TO-92S	2.90	3.00	3.10
	SIP3	2.90	3.00	3.10
	TO-M	3.10	3.20	3.30
L	ALL	14.0	14.5	15.0
L1	TO-92S	1.50	1.60	1.70
	SIP3	1.50	1.60	1.70
	TO-M	1.43	1.53	1.63

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