ITE5911
Linear Hall Effect Sensor

Features

- Wide supply range 2.6 V to 5 V
- Zero magnetic field output level as low as 300 mV
- Operating current < 0.8 mA
- Wide temperature range: -40℃ to 85℃
- Magnetic Sensitivity Option:

	Quiescent Output	Sensitivity
ITE5911	V_{CC}-0.3V	1.6mV/Gs@V_{CC}=3.3V 2.3mV/Gs@V_{CC}=5V

Applications

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

SOT23-3L

TO-92

PART NUMBER	PACKAGE	BODY SIZE(NOM)
ITE5911A3T	TO-92	width:4mm
ITE5911A3L	SOT23-3L	width:2.92mm

Description

The ITE5911 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 0.7mA 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 ℃ to 85 ℃ , suitable for various consumer and industrial application environments.

Typical Application

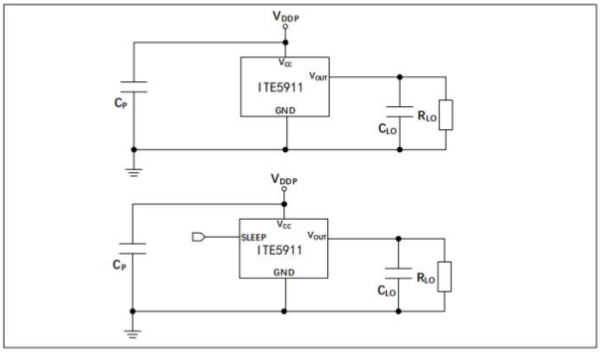


Fig.1 Recommended application circuit for ITE5911

For hash applications with supply disturbance, a Cp placed close to the IC is recommended (see Fig.1)., C_P=100nF, R_L =20kΩ, and C_L=1nF

Definition of Magnetic Field Direction

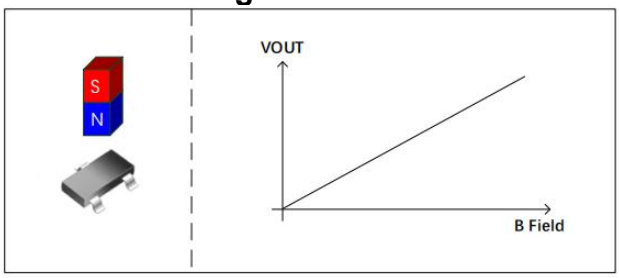
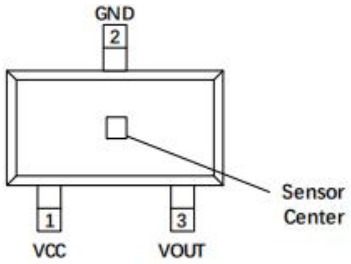


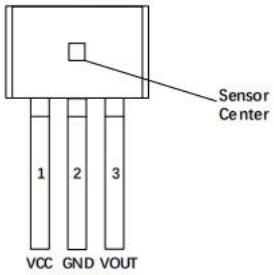
Fig.2 The relationship between magnetic field and output voltage of ITE5911

The output of the chip varies with the magnetic field as shown in Figure 2. 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 Configuration



SOT23-3L
ITE5911A3L



TO-92
ITE5911A3T

Pin Function

NAME	FUNCTION
VCC	Supply voltage
GND	Ground
VOUT	Output voltage

Functional Block Diagram

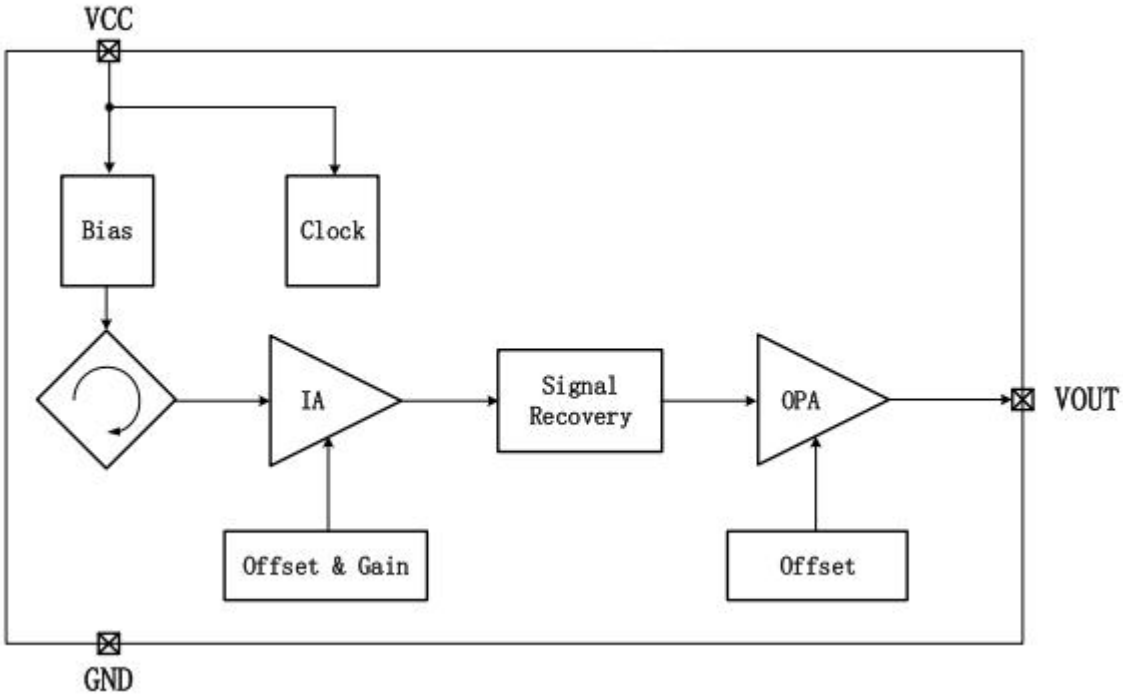


Fig.3 Functional Block Diagram ITE5911

The sensor IC is shown in Fig.3. 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

(TA=25℃)

PARAMETER	SYMBOL	VALUES		UNIT
		MIN	MAX	
Supply voltage	V_{CC}		9	V
Reverse supply voltage	V_{RCC}		-0.5	V
Output voltage	V_{OUT}		9	V
Output reverse voltage	V_{ROUT}		-0.5	V
Output current	I_O	-	1	mA
Junction temperature	T_J	-	150	℃
Storage temperature	T_S	-55	150	℃

Exceeding these ratings may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under recommended operating conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Operating Range

PARAMETER	SYMBOL	VALUES			UNIT
		MIN	TYP	MAX	
Supply voltage	VCC	2.6	3.3	5	V
Output current (1)	I_O	-	1	-	mA
Junction temperature range	T_J	-40	-	85	℃

Note:
(1) Sink or source

ESD and Latch-up

SYMBOL	DEFINITION	VALUE	UNIT
V_{HBM}	Electrostatic discharge-Human body model (HBM), JS-001-2017	±4	kV
V_{CDM}	Electrostatic discharge- Charged Device Model (CDM), JS-002-2018	±1	kV
I_{LU}	Latch-up current, JESD78F.02-2023	±150	mA

Electrical Characteristics

PARAMETER	SYMBOL	VALUES			UNIT	NOTE
		MIN	TYP	MAX		
Supply						
Supply current	I_{CC}	-	0.75	-	mA	V_{CC}=3.3V
Power-on time	T_{PO}	-	10	-	μs	
Output						
Output delay	t_D	-	15	-	μs	B=B(max step), CL=1nF
Output noise	V_{Noise}	-	4.7	-	mV_{rms}	TA=25℃, CL=1nF, SNST=2.3mV/Gs @VCC=5V
Nonlinearity	E_{LIN}	-1	-	1	%	B≤1000Gs
Bandwidth（2）	BW	-	20	-	kHz	-3dB, CL=1nF
Quiescent Output						
Zero magnetic field output voltage	V_{OQ1}	-	V_{CC}-0.3	-	V	customizable
Output voltage Temperature drift	V_{OQ_TC}	-20	-	20	mV	-40℃~ 85℃
Output saturation voltage	V_{SATH}	-	4.7	-	V	V_{CC}=5V
		-	3	-		V_{CC}=3.3V
	V_{SATL}	-	0.3	-	V	V_{OUT} to GND
Output load resistance	R_{LD}	4.7	-	-	kΩ	V_{OUT} to GND
Output load capacitance	C_L	-	-	1	nF	

Note:
(1)The parameter values are obtained under the corresponding test conditions mentioned above.

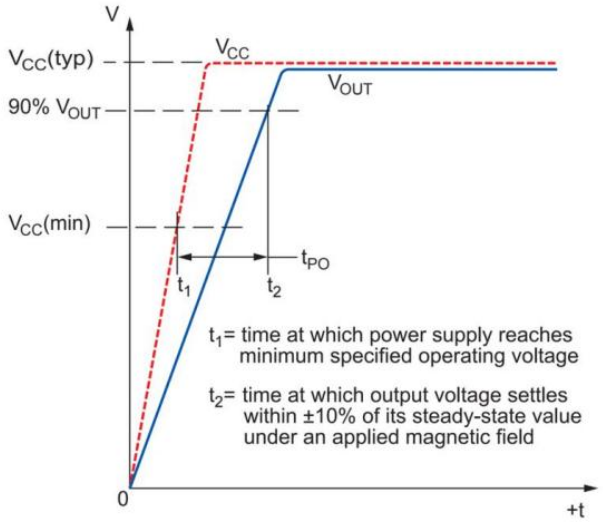
Magnetic Characteristics

PARAMETER	SYMBOL	VALUES			UNIT	NOTE
		MIN	TYP	MAX		
Sensitivity						
Sensitivity	S_1	1.3	1.6	1.9	mV/Gs	V_{CC}=3.3V, 25℃
		2	2.3	2.6	mV/Gs	V_{CC}=5V, 25℃
Sensitivity temperature coefficient	S_{TC0}	-	-1100	-	ppm/℃	Temperature coefficient is customizable
	S_{TC1}	-	0	-	ppm/℃	

Function Description

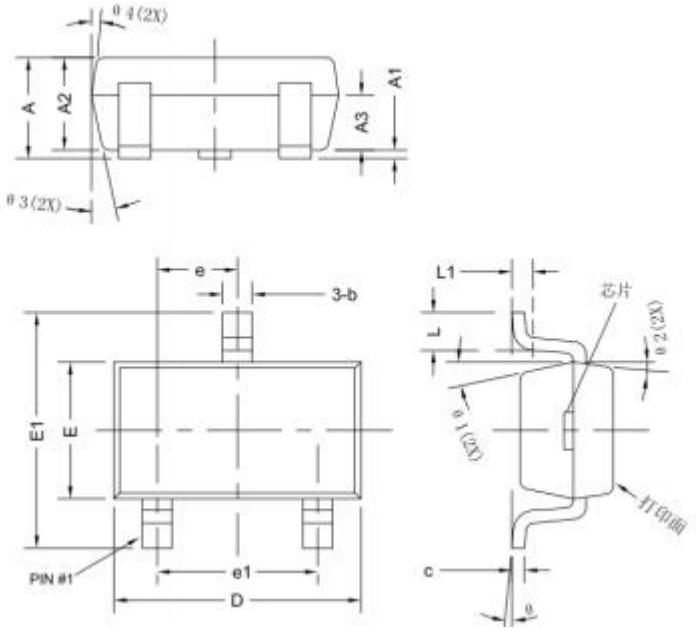
Power-on Time

Power-On Time (t PO) is defined as the time it takes for the output voltage to settle within ±10% of its steadystate value under an applied magnetic field after the power supply has reached its minimum specified operating voltage(VCC (min)) as shown in (1).



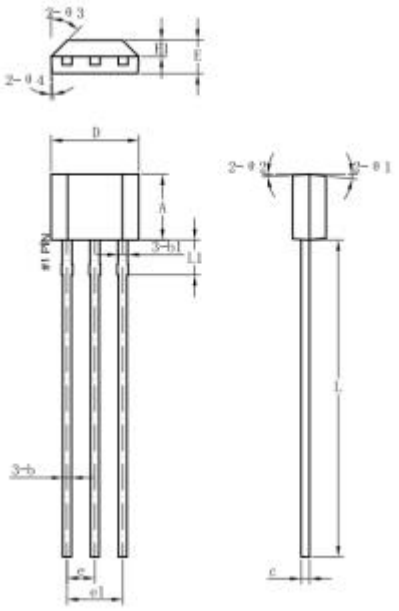
(1) Power-On Time Definition

Package Information: SOT23-3L



SYMBOL	DIMENSIONS IN MILLIMETERS		
	MIN	TYP	Max
A	-	-	1.35
A1	0	-	0.15
A2	1	1.1	1.2
A3	0.6	0.65	0.7
b	0.3	0.35	0.5
c	0.1	0.15	0.22
D	2.82	2.926	3.02
E	1.52	1.626	1.72
E1	2.6	2.85	3
e	-	0.95	-
E1	1.8	1.9	2.0
L	0.3	0.45	0.6
L1	-	0.25BSC	-
θ	0	-	8°
θ1	-	10°	-
θ2	-	9°	-
θ3	-	10°	-
θ4	-	9°	-

Package Information: TO-92



SYMBOL	DIMENSIONS IN MILLIMETERS	
	MIN	MAX
A	1.460	1.660
A1	0.660	0.860
b	0.350	0.560
b1	0.380	0.550
c	0.360	0.510
D	5.120	5.320
E	3.550	3.750
e	1.270TYP	
e1	3.710	3.910
L	14.000	15.000
L1	1.010	1.610
θ	11°TYP	
θ1	6°TYP	

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