ITE391XX

Hall Effect Switches

Features

- Reverse-supply protection up to -20V
- Open-drain output with current limit
- Low jitter
- High ESD performance of ±10 kV (HBM)
- Background dynamic offset compensation suppressing package stress and lifetime drift
- Wide supply range 3.3V to 24V
- Stable switching points over temperature range: -40℃ to 150℃
- AEC-Q100 automotive qualified

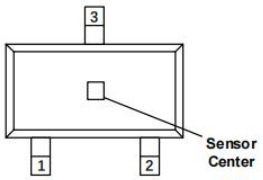
Applications

- Revolutions related counting: window lifter, sunroof
- Brush less DC motors for commutation
- Position detection: gear shifter lever, electrical parking brake
- Magnetic encoders

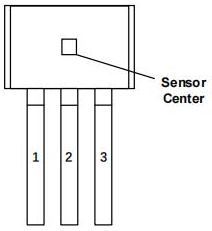
Description

The ITE391XX are series of Hall-effect sensor ICs that feature with temperature stable Hall signal conditioning chains with background dynamic offset compensation, a comparator, configurable voltage references and an open-drain output stage.

The on-chip Hall sensor converts the magnetic flux through the chip to Hall signal voltage. The internal comparator compares the voltage with the predefined reference voltage. The open-drain output transistor is then switched on and off accordingly.



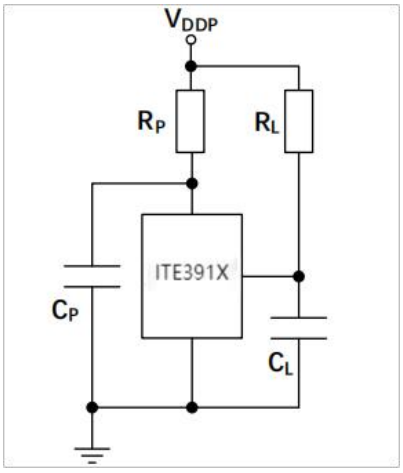
SOT23-3L



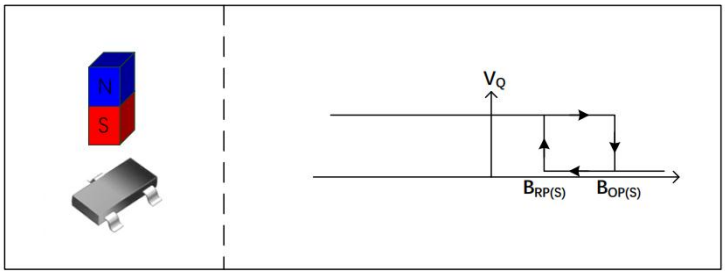
TO-92

Package Type: SOT23-3L, TO-92

Typical Application



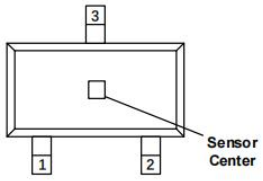
Field Direction Definition



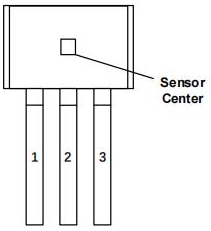
B_{OP}: Operating point of magnetic field
B_{RP}: Returning point of magnetic field

* Positive magnetic fields are defined with the south pole facing the branded side

Pin Description



SOT23-3L
ITE391XXA3L



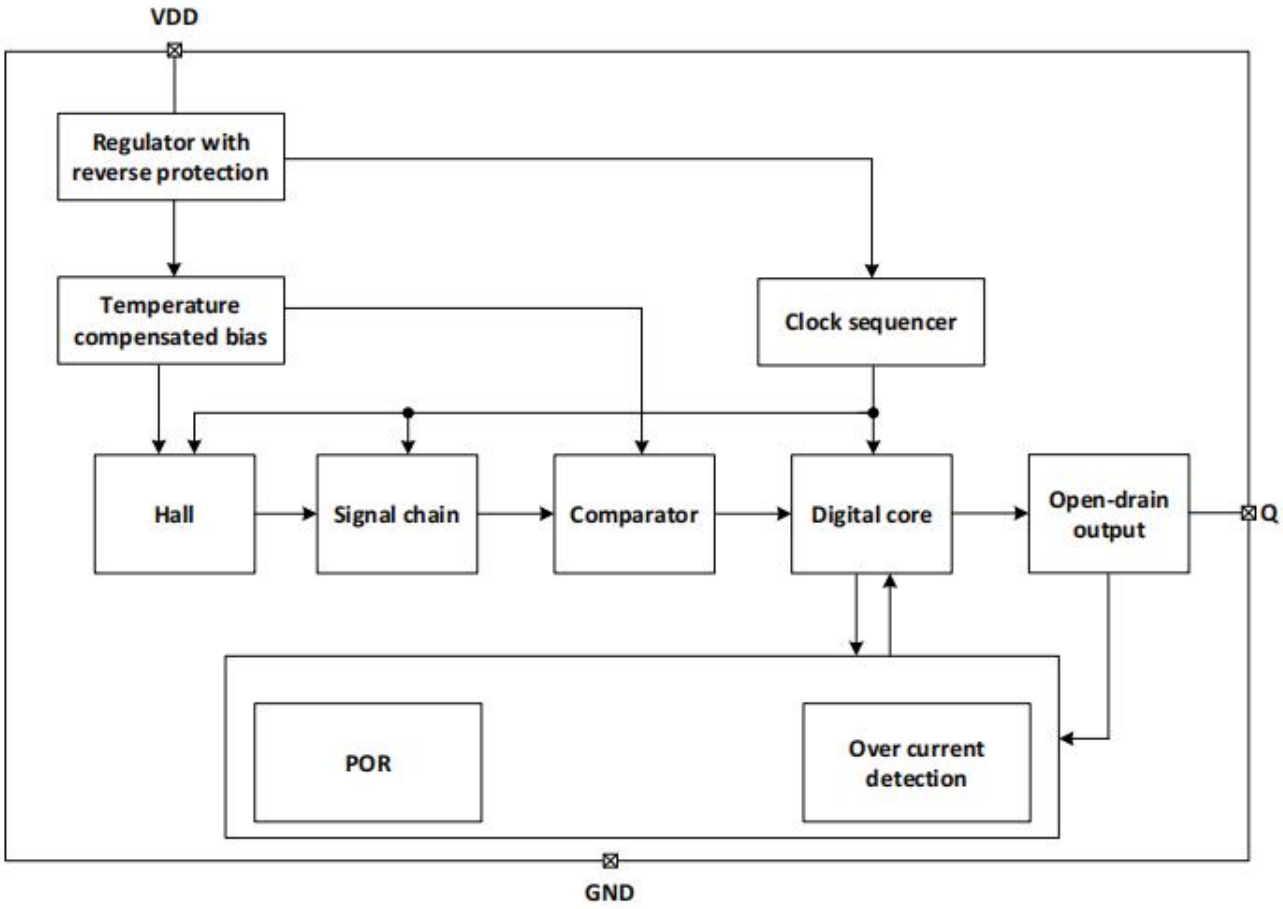
TO-92
ITE391XXA3T

PIN No.		Name	Description
ITE391XXA3L	ITE391XXA3T		
1	1	VIN	Supply voltage
3	2	GND	IC Ground
2	3	Q	Output

Parameter	Operating point			Release point			Hysteresis			Unit
T_J	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
ITE3911S										
25℃	-	5	-	-	3	-	_	2	_	mT
ITE3912S										
25℃	-	19	-	-	17.5	-	_	1.5	_	mT
ITE3913S										
25℃	-	28	-	-	24	-	-	4	-	mT
ITE3914S										
25℃	-	12	-	-	7	-	-	5	-	mT
ITE3915S										
25°C	-	14.5	-	-	11.5	-	-	3	-	mT
ITE3916S										
25°C	-	15.7	-	-	12.7	-	-	3	-	mT
ITE3917S										
25°C	-	17.5	-	-	14	-	-	3.5	-	mT
ITE3918S										
25°C	-	32	-	-	27	-	-	5	-	mT
ITE3919S										
25°C	-	35	-	-	30	-	-	5	-	mT
ITE3911N										
25°C	-	-6	-	-	-3.5	-	-	2.5	-	mT
ITE3912N										

25°C	-	-3	-	-	-2	-	-	1	-	mT
ITE3914N										
25°C	-	-6.8	-	-	-5.2	-	-	1.6	-	mT
ITE3915N										
25°C	-	-10	-	-	-7	-	-	3	-	mT
ITE3916N										
25°C	-	-11	-	-	-10	-	-	1	-	mT
ITE3918N										
25°C	-	-16	-	-	-10.5	-	-	5.5	-	mT
ITE3919N										
25°C	-	-35	-	-	-30	-	-	5	-	mT

Functional Block Diagram



Absolute Maximum Ratings

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_{IN}	Supply Voltage	-20	38	V
V_Q	Output Voltage	-0.6	38	V
I_O	Output Current		70	mA
T_J	Junction temperature	-	150	°C
T_S	Storage temperature	-55	150	°C
R_{thJA}	Thermal resistance junction ambient	-	300	K/W
R_{thJL}	Thermal resistance junction lead	-	100	K/W

Recommended Operating Conditions

All voltages are absolute voltages referenced to GND-potential unless otherwise specified. (T_A=25℃)

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_{IN}	Supply Voltage	3.3	24	V
V_Q	Output Voltage	-0.6	24	V
I_Q	Output Current		25	mA
T_J	Junction Temperature Range	-40	150	°C

ESD

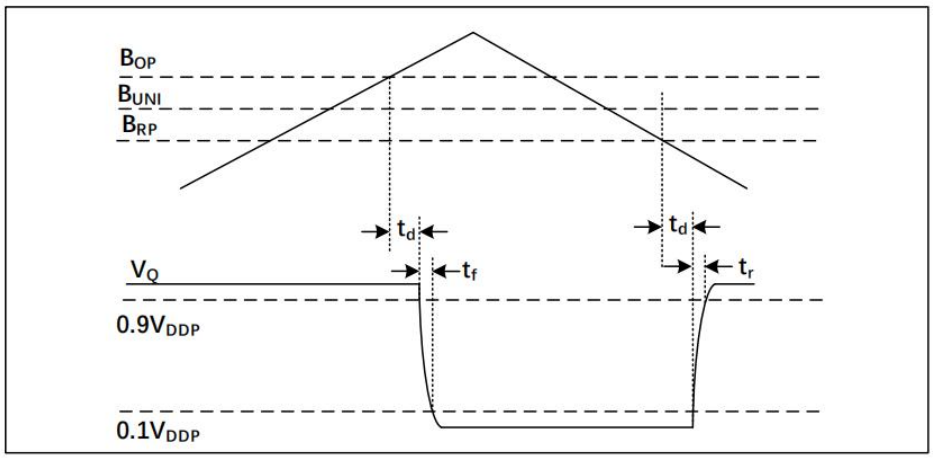
SYMBOL	DEFINITION	VALUE	UNIT
V_{ESD}	Electrostatic discharge-Human body model (HBM)	6	kV
	Electrostatic discharge-Charged device model (CDM)	2	kV
I_{LU}	Latch-up current, JESD78F.02-2023, (125°C)	200	mA

Electrical Characteristics

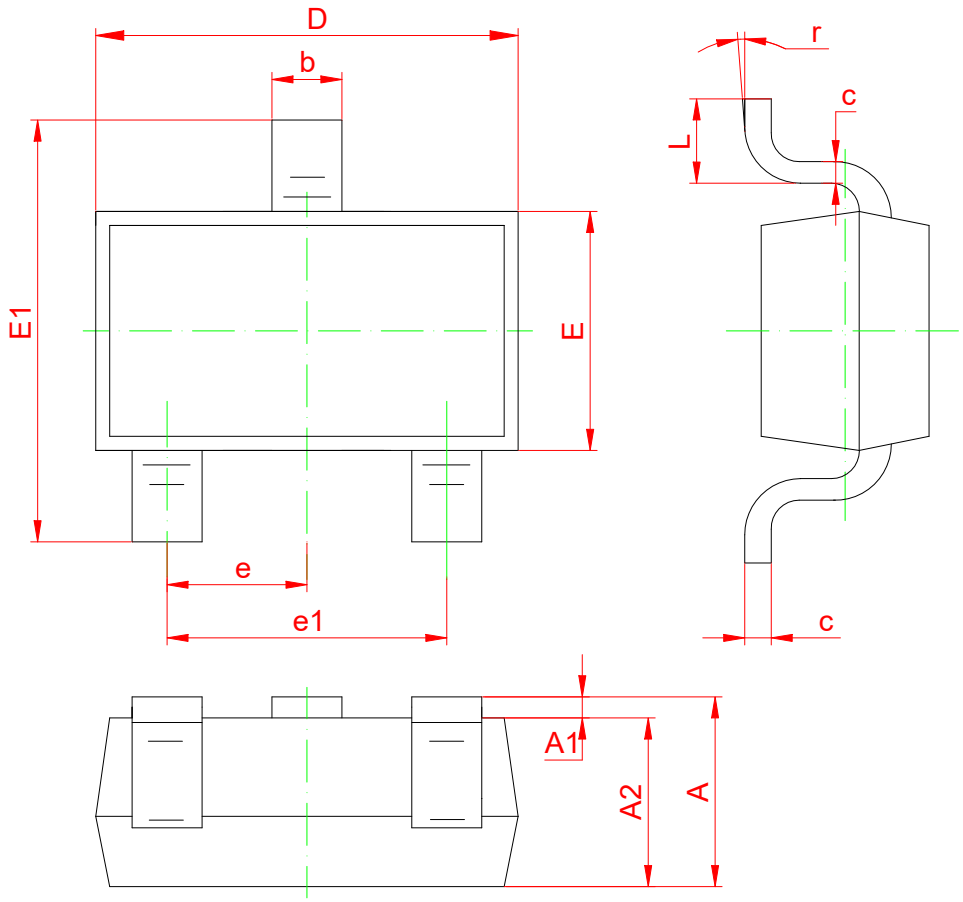
V_{IN}=12V, all voltages are absolute voltages referenced to GND-potential, T_A=25℃, (unless otherwise specified).

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage						
I_S	Supply Current			1.9		mA
I_{SR}	Reverse Current	V_{IN} =-20V			1	mA
V_{UV}	Undervoltage Threshold		1.80		2.60	V
Output Voltage						
V_{QSAT}	Output Saturation Voltage	I_Q=12mA		0.13	0.2	V
I_{QLEAK}	Output leakage Current				1	μA
T_F	Output Fall Time	R_L =0.82kΩ,C_L=20pF,1）	-	-	1	μS
T_R	Output Rise Time		-	-	1	μS
T_D	Delay	1）	-	11	15	μS
T_{EN}	Enable Time Of Output After Exceeding Of Vuv	B≤BRP-2mT, or B≥BOP+2mT	26	36	48	μS
T_{CHP}	Output Refresh Period		1.88	2.5	3.40	μS
T_{CHP}	Chopping Frequency	Internal Chopping Frequency	300	400	530	KHz

1）：When the magnetic field ramps up and down, the Q output toggles according to the pre-defined magnetic field threshold (As shown in the following figure).

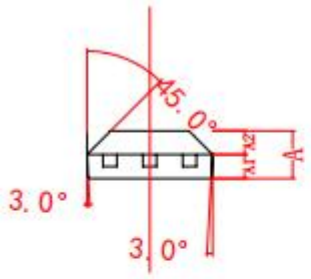


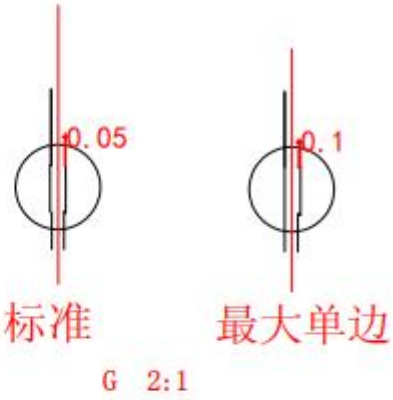
Package : SOT23-3L

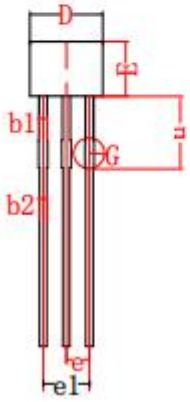


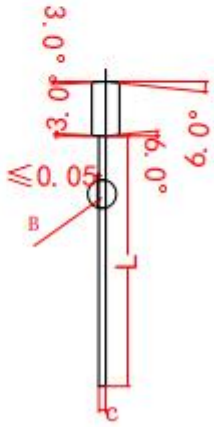
Symbol	Dimensions In Millimeters	
	Min	Max
A1	0. 02	0. 1
A2	1. 0Typ	
b	0. 4Typ	
c	0. 1Typ	
D	2. 70	3. 10
E	1. 10	1. 50
E1	2. 20	2. 60
e1	1. 80	2. 00
L	0. 35	0. 48

Package : TO-92









	COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER			
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

- The information described herein is subject to change without notice.
- CHIPLINK Technology is not responsible for any problems caused by circuits or diagrams described herein whose related industrial properties, patents, or other rights belong to third parties. The application circuit examples explain typical applications of the products, and do not guarantee the success of any specific mass-production design.
- When the products described herein are regulated products subject to the Wassenaar Arrangement or other agreements, they may not be exported without authorization from the appropriate governmental authority.
- Use of the information described herein for other purposes and/or reproduction or copying without the express permission of CHIPLINK Technology is strictly prohibited.
- The products described herein cannot be used as part of any device or equipment affecting the human body, such as exercise equipment, medical equipment, security systems, gas equipment, or any apparatus installed in airplanes and other vehicles, without prior written permission of CHIPLINK Technology
- Although CHIPLINK Technology exerts the greatest possible effort to ensure high quality and reliability, the failure or malfunction of semiconductor products may occur. The user of these products should therefore give thorough consideration to safety design, including redundancy, fire-prevention measures, and malfunction prevention, to prevent any accidents, fires, or community damage that may ensue.