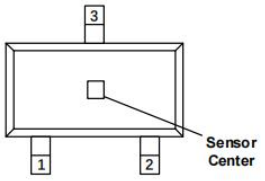
ITE290X
Hall Effect Switches

Features
- Reverse-supply protection up to -20V
- Open-drain output with current limit
- Low jitter
- High ESD performance of ±4 kV (HBM)
- Background dynamic offset compensation suppressing package stress and lifetime drift
- Wide supply range 3.3V to 24V
- AEC-Q100 automotive qualified
- Stable switching points over temperature range: -40˚C to 150˚C

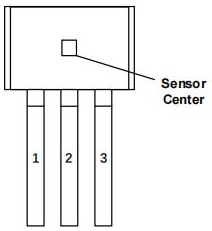
Applications
- Revolutions related counting: window lifter, sunroof
- Brush less DC motors for commutation
- Position detection: gear shifter lever, electrical parking brake
- Magnetic encoders

Description
The ITE290X 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.



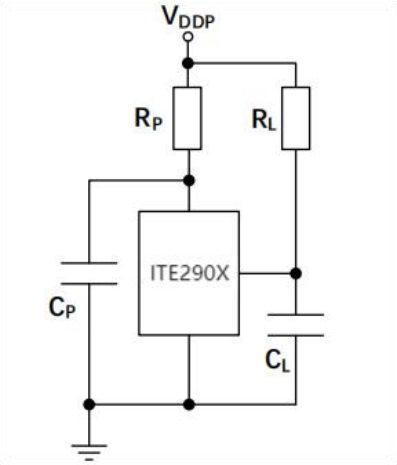
SOT23-3L



TO-92

Package Type: SOT23-3L, TO-92

Typical Application



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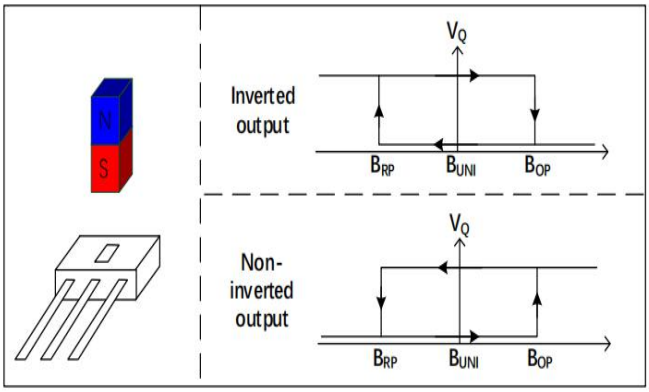
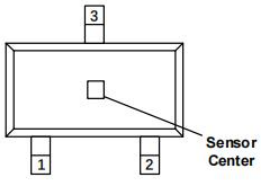
Field Direction Definition

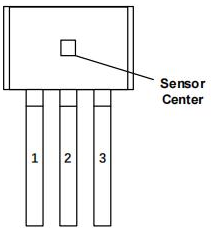


* For hash applications with supply disturbance, a low-pass Rp and Cp placed close to the IC is recommended (1).
RP = 100Ω, CP = 10nF, RL = 1.2kΩ, and CL = 4.7nF.

Pin Description



SOT23-3L
ITE290XA3L

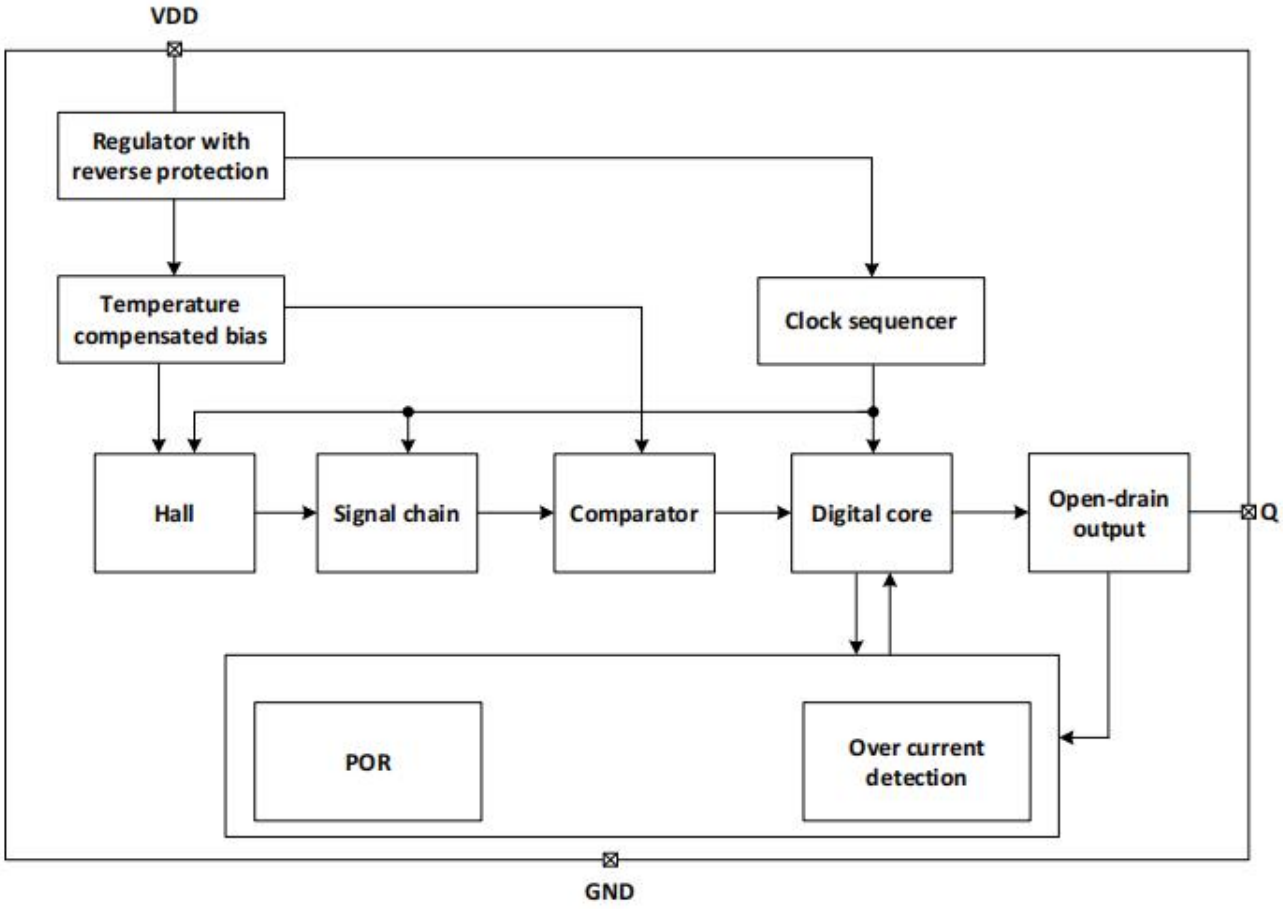


TO-92
ITE290XA3T

PIN NO.		NAME	DESCRIPTION
ITE290XA3L	ITE290XA3T		
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.	
ITE2901										
25℃	2.5	4.5	6.5	-6.5	-4.5	-2.5	-	9	-	mT
ITE2902										
25℃	0.5	2	3.5	-3.5	-2	-0.5	-	4	-	mT
ITE2903										
25℃	3	6	9	-9	-6	-3	-	12	-	mT
ITE2904										
25℃	-	9	-	-	-9	-	-	18	-	mT
ITE2905										
25℃	-	5	-	-	-5	-	-	10	-	mT
ITE2906										
25℃	-	6	-	-	-6	-	-	12	-	mT
ITE2907										
25℃	-	7	-	-	-7	-	-	14	-	mT
ITE2908										
25℃	-	8	-	-	-8	-	-	16	-	mT
ITE2909										
25℃	-	14	-	-	-14	-	-	28	-	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_Q	Output Current		70	mA
T_J	Junction temperature	-	150	℃
T_S	Storage Temperature	-55	150	℃
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	MIN	MAX	UNIT
V_{IN}	Supply Voltage	3.0	24	V
V_Q	Output Voltage	-0.6	24	V
I_Q	Output Current		25	mA
T_J	Junction Temperature Range	-40	150	℃

ESD Ratings

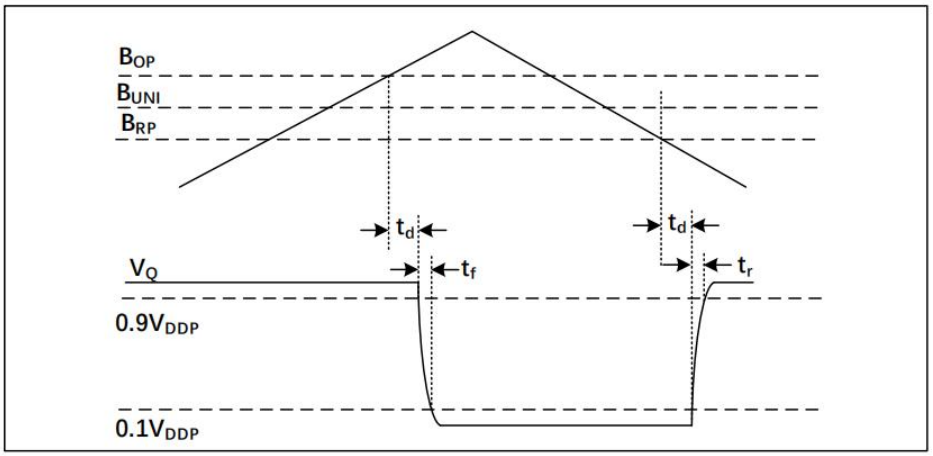
SYMBOL	DEFINITION	VALUE	UNIT
V_{HBM}	Electrostatic discharge-Human body model (HBM), JS-001-2017	±4	KV
V_{CDM}	Electrostatic discharge- Charged Device Model (CDM), JS-002-2018	±1	kV
I_{LU}	Latch-up current, JESD78F.02-2023, TA=125℃	±200	mA

Electrical Characteristics

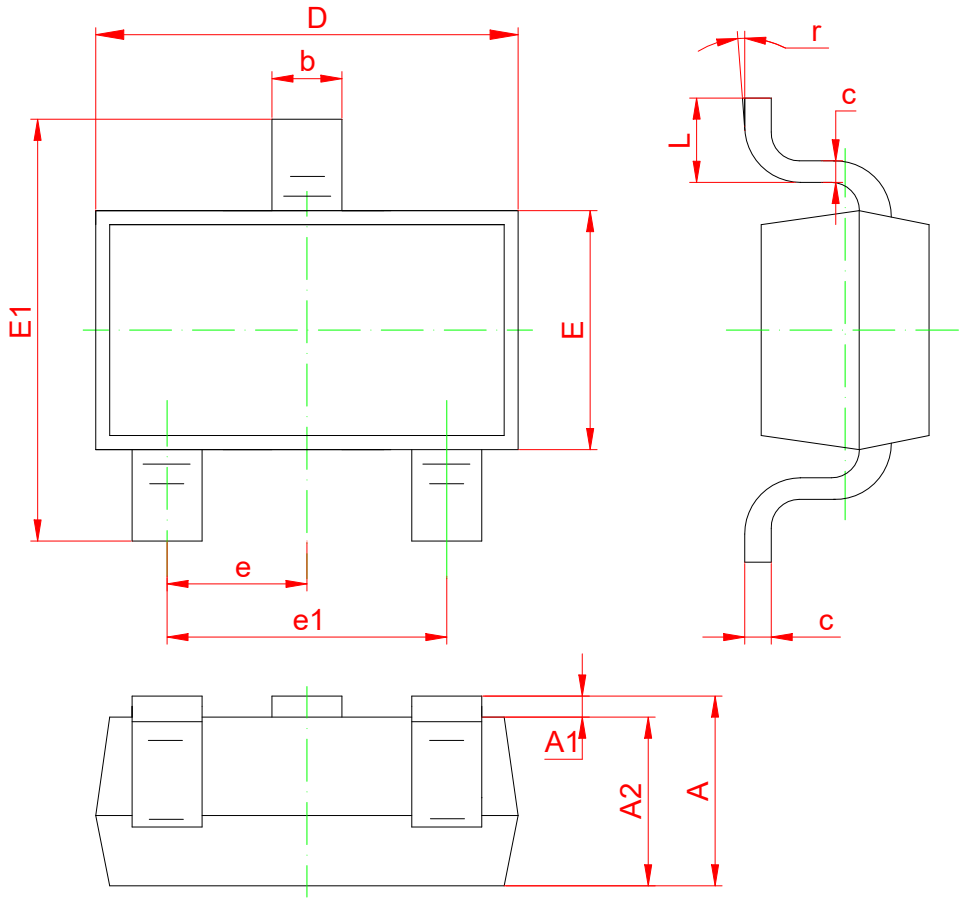
V_{IN}=12V, all voltages are absolute voltages referenced to GND-potential, T_A=25℃, (unless otherwise specified).

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage						
I_S	Supply Current			1.85		mA
I_{SR}	Reverse Current	V_{IN} =-20V			1	mA
V_{UV}	Undervoltage Threshold		1.86		2.60	V
Output Voltage						
V_{QSAT}	Output Saturation Voltage	I_Q=12mA		0.15	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		μS
T_{EN}	Enable Time Of Output After Exceeding Of Vuv	B≤BRP-2mT, or B≥BOP+2mT		36		μS
T_{CHP}	Output Refresh Period		1.90	2.5	3.30	μS
F_{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).

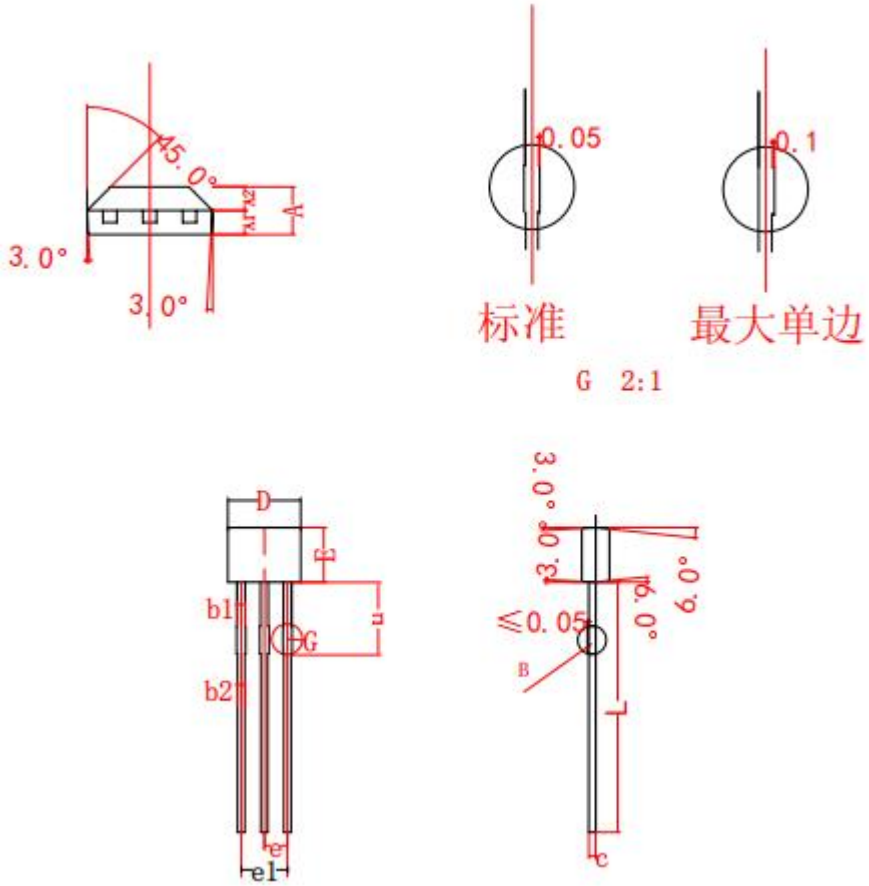


Package : SOT23-3L



Symbol	Dimensions In Millimeters		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 : TO-92



	COMMON DIMENSIONS UNITS 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

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