

High voltage high sensitivity unipolar hall chip

1. Introduction

SL3144 is a high-voltage, high-sensitivity unipolar Hall switch chip, designed using bipolar semiconductor technology. The chip incorporates a voltage regulator unit, Hall voltage generator, differential amplification circuit, temperature compensation circuit, and open-collector output circuit. It operates by converting magnetic induction strength into a digital voltage signal. It is available in TO92S through-hole and SOT23-3L surface-mount packages, both compliant with RoHS standards.



2. Features

- Microstructure
- Open collector output
- ESD performance up to: $\pm 4\text{kv}$
- High sensitivity: 120/80 gs (typical)
- Wide voltage range: 3.5v~40v
- Operating temperature range: $-40^{\circ}\text{C} \sim 125^{\circ}\text{C}$

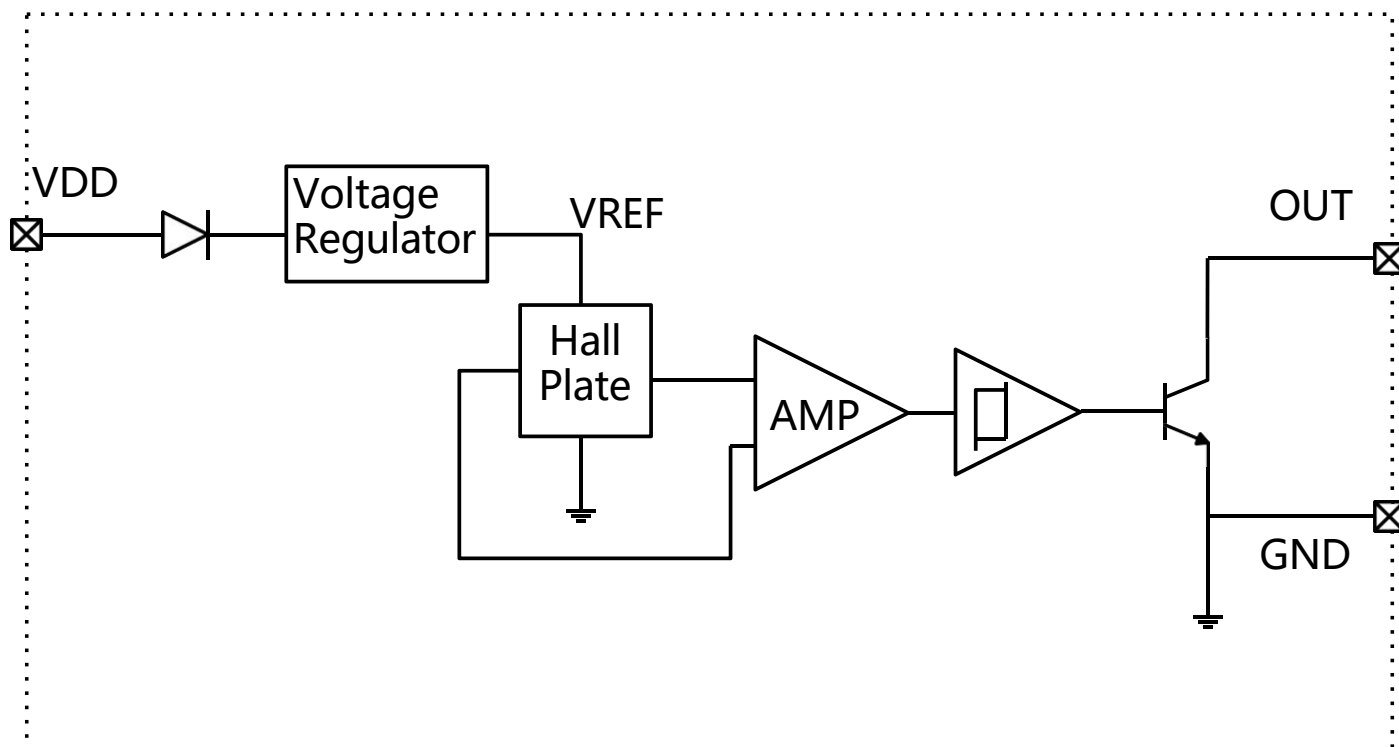
3. Fields of application

- Brushless motor commutation
- Flow sensors
- Position sensor
- Speed sensor
- Distance sensor

4. Product packaging

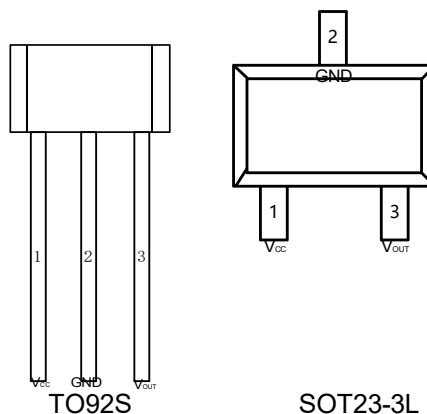
Partnumber	Package	Ambient, TA	Packing
SL3144-9	TO92S	$-40^{\circ}\text{C} \sim 125^{\circ}\text{C}$	1000 pieces/bag
SL3144-3	SOT23-3L	$-40^{\circ}\text{C} \sim 125^{\circ}\text{C}$	3000 pieces/reel

5. Function block diagram

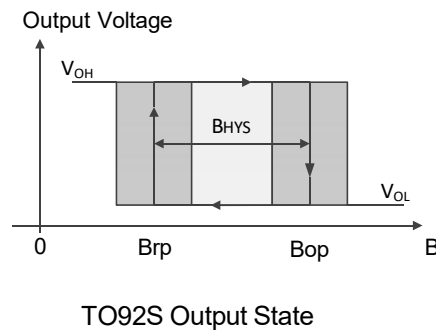
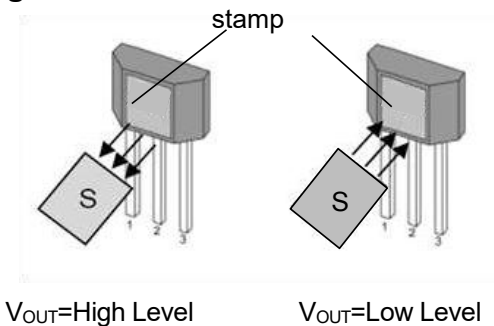


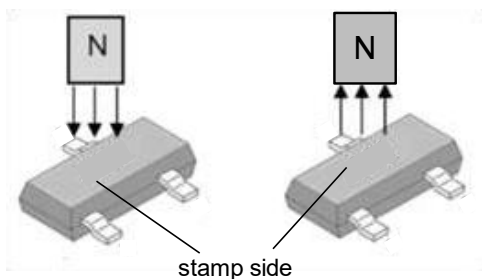
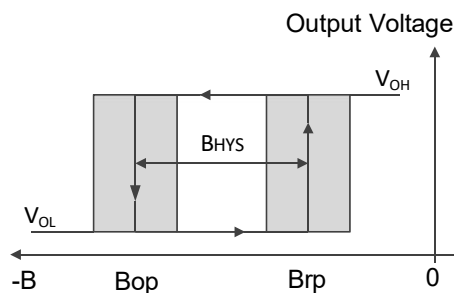
6. Pin description

Number	Name	Description
1	V _{CC}	power supply
2	GND	ground
3	V _{OUT}	export



7. Magnetolectric conversion characteristics




 $V_{OUT} = \text{High Level}$
 $V_{OUT} = \text{Low Level}$

SOT23-3L Output State

8. Limit parameter

Parameters	Symbol	Min	Max	Units
power supply voltage	V_{CC}	-0.3	60	V
output voltage	V_{OUT}	-0.5	60	V
output current sink	I_{OUT}	0	40	mA
operating ambient temperature	T_J	-40	125	$^{\circ}\text{C}$
storage temperature	T_{STG}	-50	165	$^{\circ}\text{C}$

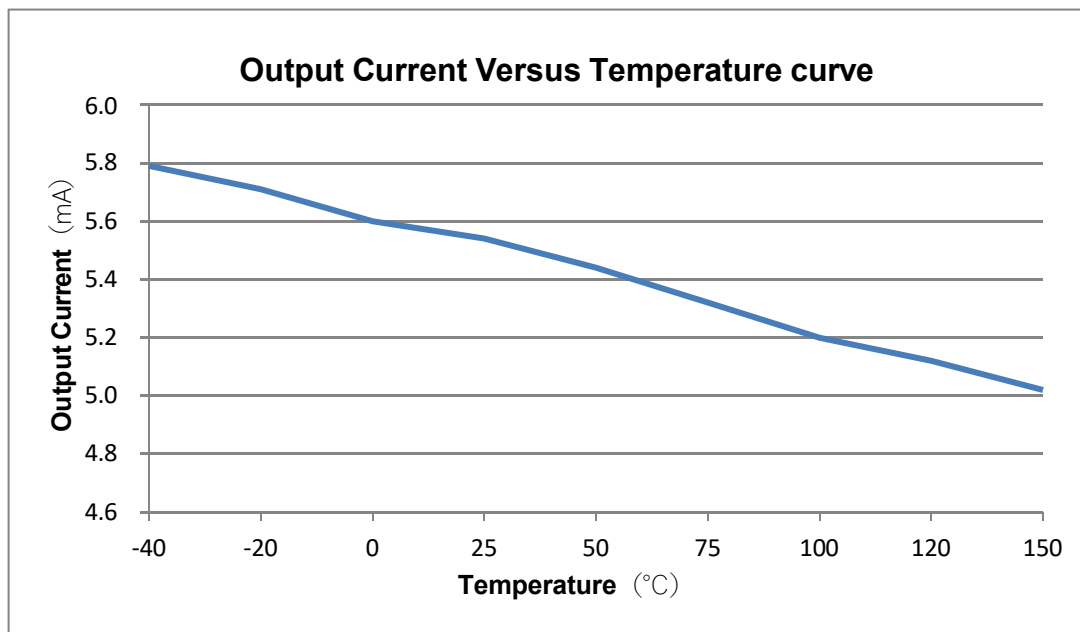
The absolute maximum rating is the limit that the chip can withstand, exceeding which may result in permanent damage to the chip.

9. Electrical and magnetic characteristics ($T_A=25^{\circ}\text{C}$, $V_{CC}=5\text{V}$)

Parameters	Symbol	Test conditions	Min.	Typ.	Max.	Units
Electrical characteristic						
supply voltage	V_{CC}		3.5		40	V
operating current	I_{CC}	$V_{CC}=5\text{V}$		6	9	mA
output leakage current	I_{le}				10	μA
output voltages	V_{SAT}	$I_{OUT}=20\text{mA}$, conduction state			0.4	V
Output current sink	I_{SINK}				30	mA
output rise time	T_R	$C_L=20\text{pF}$			1.0	μs
output fall time	T_F	$C_L=20\text{pF}$			1.5	μs
Magnetic characteristics						
operate point	B_{op}	$C_L=20\text{pF}$	70	120	170	Gs
release point	B_{rp}		30	80	130	Gs
return differential	B_{HYS}			40		Gs

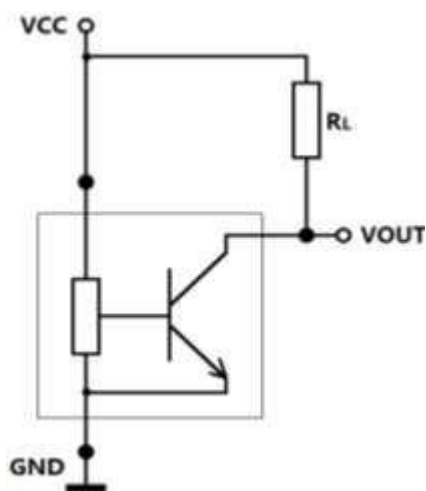
10. Temperature characteristics

Curve of chip operating current versus temperature at $V_{CC}=5V$.

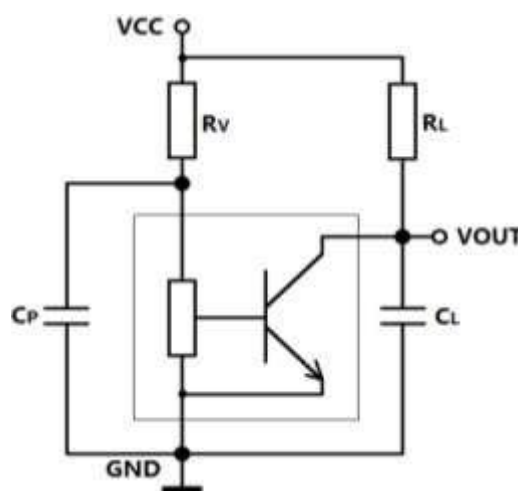


11. Application circuit

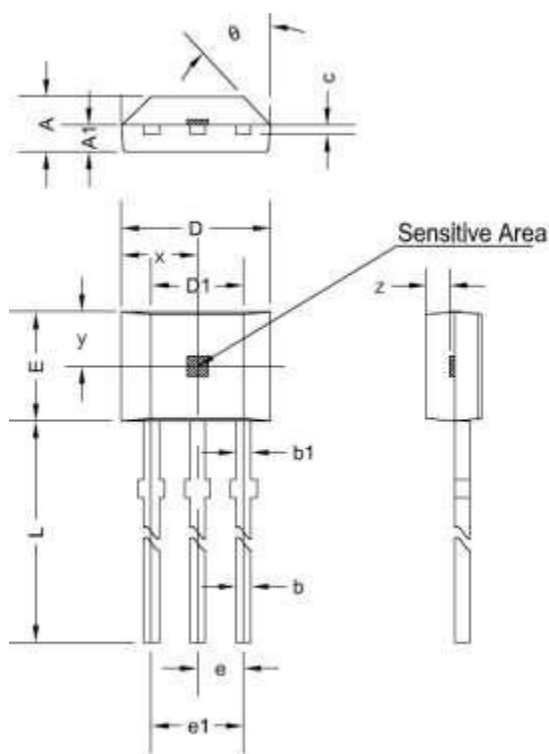
Typical application circuits are shown in the diagram below: Application circuit 1, where $R_L = 4.7k\Omega$, is suitable for most circuits. Application circuit 2, where $R_V = 100\Omega$, $C_P = 4.7nF$, $R_L = 4.7k\Omega$, $C_L = 1nF$, is used in circuits susceptible to interference or radiated disturbances on power lines. It is recommended to place resistor R_V and capacitors C_P , C_L in series in the circuit, with these components positioned as close to the chip as possible.



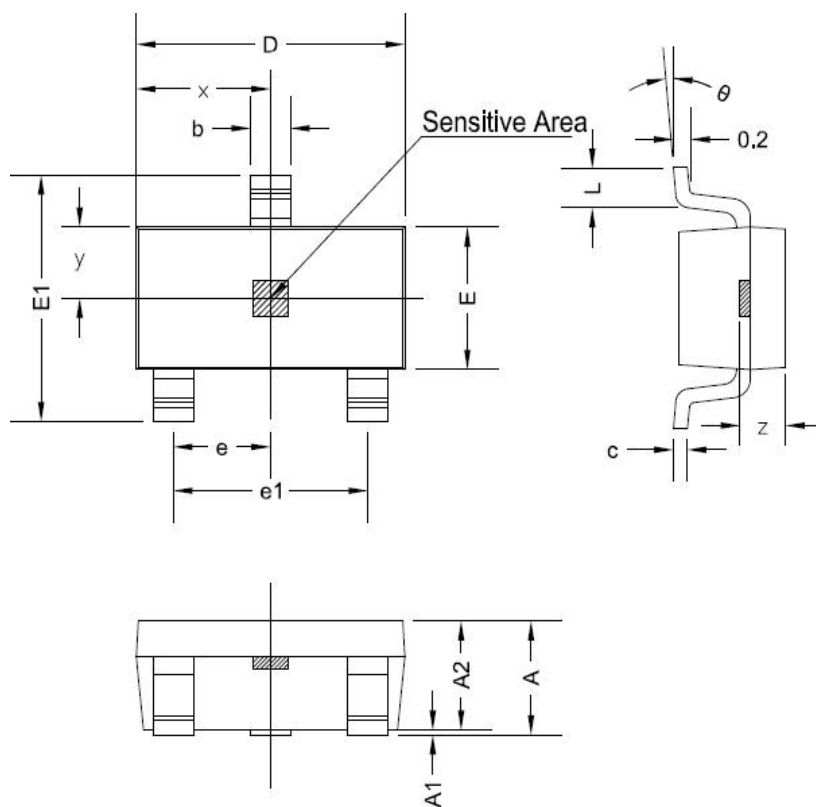
Application Circuit 1



Application Circuit 2

12. Package information
T092S Outline Dimensions


Symbol	Size (mm)		Size (in inches)	
	minimum	maximum	minimum	maximum
A	1.420	1.670	0.056	0.066
A1	0.660	0.860	0.026	0.034
b	0.350	0.560	0.014	0.022
b1	0.400	0.550	0.016	0.022
C	0.360	0.510	0.014	0.020
D	3.900	4.200	0.154	0.165
D1	2.970	3.270	0.117	0.129
E	2.900	3.280	0.114	0.129
e	1.270TYP		0.050TYP	
e1	2.440	2.640	0.096	0.104
L	13.500	15.500	0.531	0.610
x	2.025TYP		0.080TYP	
y	1.545TYP		0.061TYP	
z	0.500TYP		0.020TYP	
θ	45°TYP		45°TYP	

SOT23-3L Outline Dimensions


Symbol	Size (mm)		Size (in inches)	
	minimum	maximum	minimum	maximum
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	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
x	1.460TYP		0.057TYP	
y	0.800TYP		0.032TYP	
z	0.600TYP		0.024TYP	
θ	0°	8°	0°	8°