

High-Precision inductive proximity switch IC

◆ General Description

The SL5355 is an application-integrated circuit developed for inductive proximity switching applications. It can be used in a wide range of proximity sensors or proximity control systems, as well as in a variety of inductive instrumentation. Induction tachometer, etc.

The SL5355 consists of an oscillator, a switching circuit, and an amplifying output circuit. The basic working principle is to use an external inductor and capacitor to form an LC high-frequency resonant circuit and generate an alternating magnetic field in the resonant loop. When the detected metal target approaches the magnetic field and reaches the sensing distance, an eddy current is generated in the detected metal target and the energy of the oscillator is taken up, so that the amplitude of the oscillator is attenuated or stopped. The oscillation and oscillation of the oscillator are processed by the post-amplifier circuit and converted into a switching signal to trigger the drive control device, thereby achieving the purpose of non-contact detection.

The SL5355 has the characteristics of high integration, wide working voltage, large output current, adjustable control distance, few peripheral circuits, convenient application and

stable and reliable operation. Compared with the inductive proximity switch scheme composed of general discrete components, the SL5355 integrated chip solution has better consistency and stability, so it is especially suitable for high reliability and high reliability.

SL5355 provides SOP8(DFN-8L,DFN-14L) package.

◆ Applications

- Inductive proximity switch
- Contactless switch
- Position control
- Isolation detection
- Speed measurement

◆ Features

- Wide supply voltage: 4.0~40V
- Low current consumption: <0.7mA
- Low saturation pressure drop
- Built-in temperature compensation
- High sensitivity and low inductance requirements
- Hysteresis is not related to temperature, voltage and distance
- Output tube switching frequency is high
- Output tube drive current >70mA
- Temperature range-25~+85℃

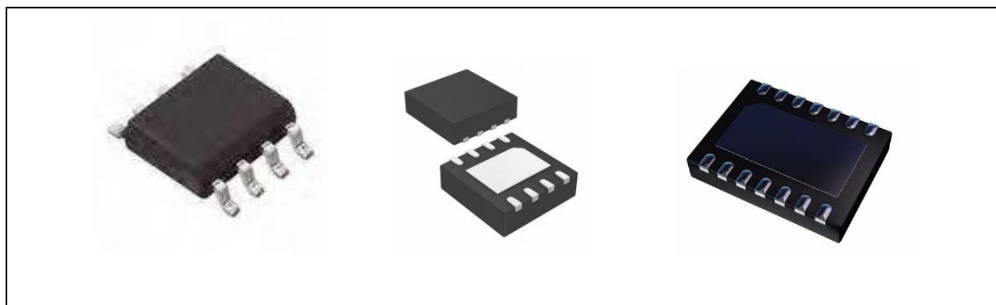


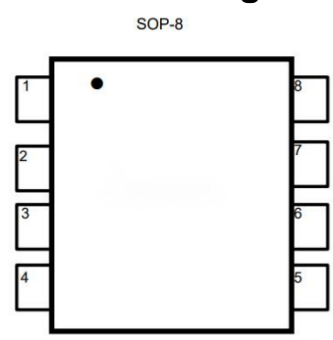
Figure 1. Package of SL5355

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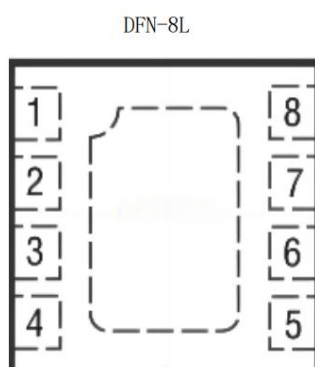
Product Selection

Product	Package	Packing Type	Quantity
SL5355P	SOP-8L	Tape and reel	4000
SL5355D8	DFN3*3-8L	Tape and reel	5000
SL5355D14	DFN3*3-14L	Tape and reel	5000

Pin Configuration

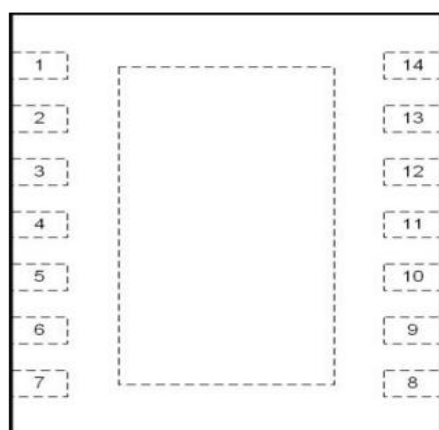


Pin Number	Pin Name	Function
1	GND	Ground
2	R _{Di}	Distance setting resistor
3	C _I	Integral capacitor
4	Q2	Output2
5	Q1	Output1
6	V _{CC}	Voltage
7	LC	Oscillator
8	R _{HY}	Backlash setting resistor



Pin Number	Pin Name	Function
1	R _{Di}	Distance setting resistor
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14-Pin 0.40 mm pitch DFN



Pin Number	Pin Name	Function
1	R _{Di}	Distance setting resistor
2	N. C.	
3	R _{HY}	Backlash setting resistor
4	N.C.	
5	C _I	Integral capacitor
6	N.C.	
7	GND	Ground
8	Q2	Output2
9	N.C.	
10	Q1	Output1
11	N.C.	
12	V _{CC}	Voltage
13	N.C.	
14	LC	Oscillator

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◆ Function Block Diagram

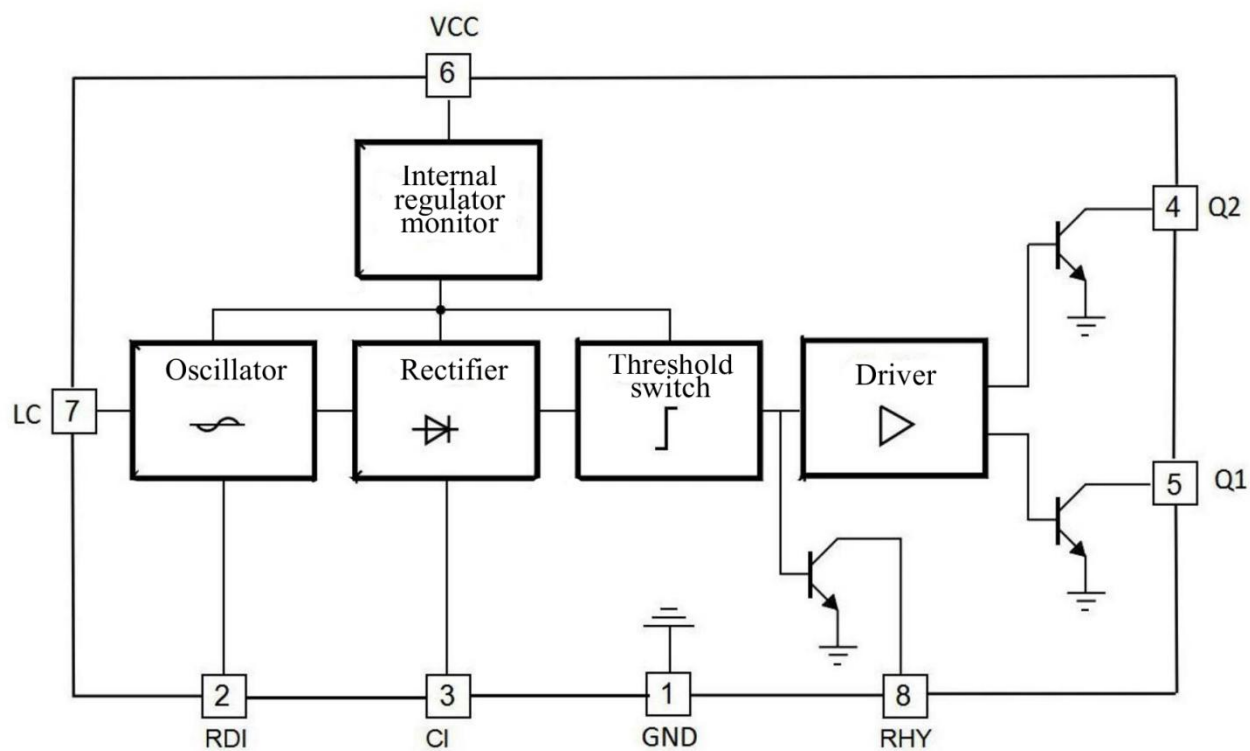


Figure 2. Block Diagram of SL5355

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◆ Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	-0.3~+50	V
Output voltage	$V_{OUT(OFF)}$	-1~+45	V
Output low level current	$I_{OUT(SINK)}$	70	mA
R_{DI} pin current	$-I_{RDI}$	2	mA
R_{HYS} pin current	I_{RHYS}	2	mA
Maximum junction temperature	$T_{j(max)}$	+150	°C
Storage temperature	T_{ST}	-55~+160	°C

◆ Recommended working conditions

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	4.0~40	V
Operating Temperature	T_{OP}	-25~+85	°C

◆ Electrical Characteristics($T_A=25^{\circ}C$, $V_{CC}=4\sim40V$, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Minimum Starting Voltage	V_{TON}	Output start action	--	3.64	4	V
Shutdown Voltage	V_{TOFF}	Output to no action	3.0	3.6	--	V
Hysteresis	ΔV_{Hy}		--	0.04	--	V
Quiescent Current	I_{CC}		--	0.55	0.70	mA
Oscillating frequency	f_{OSC}		--	--	3	MHz
Oscillation amplitude	A_{OSC}		--	0.8	--	V_{PP}
C_I pin threshold	V_{CI}		--	2	--	V
C_I pin hysteresis	V_{HyCI}		--	0.8	--	V
C_I pin sink current	I_{CI}		--	7	--	uA
C_I pin pull current	$-I_{CI}$		--	6	--	uA
On-off level frequency	f_S	$C_I < 50pF$, $L = 70 \mu H$	--	5	--	kHz
Switch tube conduction voltage drop	V_{QR}	$I_Q = 5mA$	--	0.10	0.14	V
Switch tube conduction voltage drop	V_{QR}	$I_Q = 70mA$	--	0.50	0.99	V

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◆ Working principle

The LC oscillator produces an alternating magnetic field. When the metal target approaches this magnetic field and reaches the sensing distance, eddy currents are generated in the metal target, causing the oscillation to decay and even stop. The oscillation and oscillation of the oscillator are processed by the post-amplifier circuit and converted into a switching signal to trigger the drive control device to achieve the non-contact detection purpose. The SL5355 works only by externally connected inductor L and resonant capacitor C to generate oscillations and generate alternating magnetic fields. The other peripheral components are shown in Figure 2. Two resistors, R_{Di} and R_{Hy} , are used to set the sensing distance and hysteresis. In addition, the integrating capacitor C_I is connected to pin 3 for internal signal sampling.

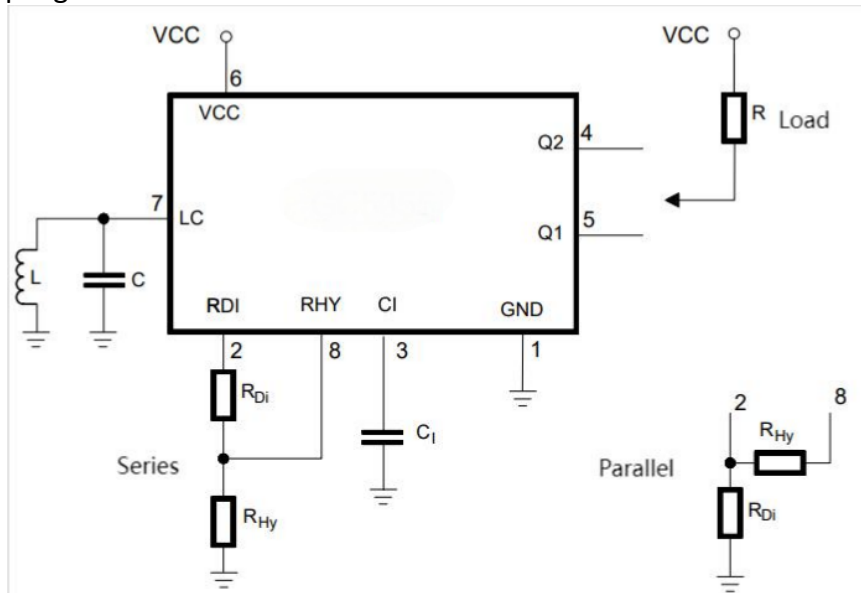


Figure 3. Working principle diagram of SL5355

◆ Typical Application

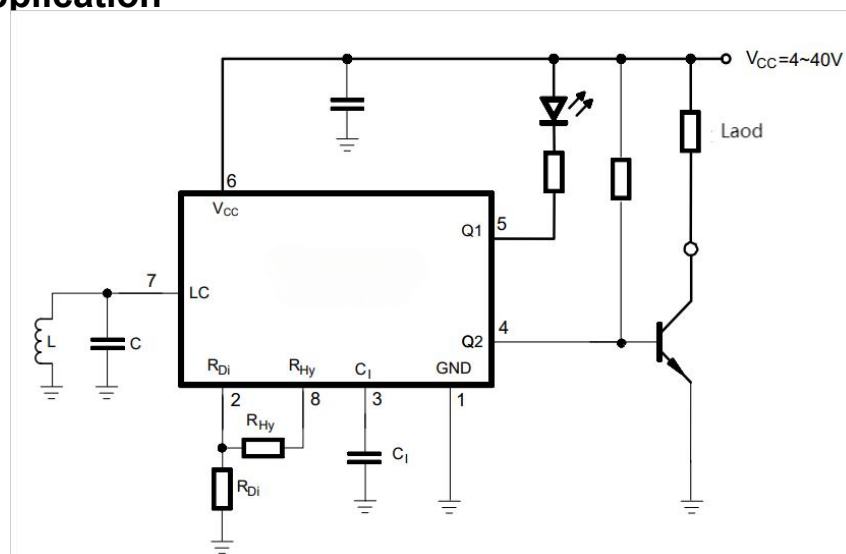
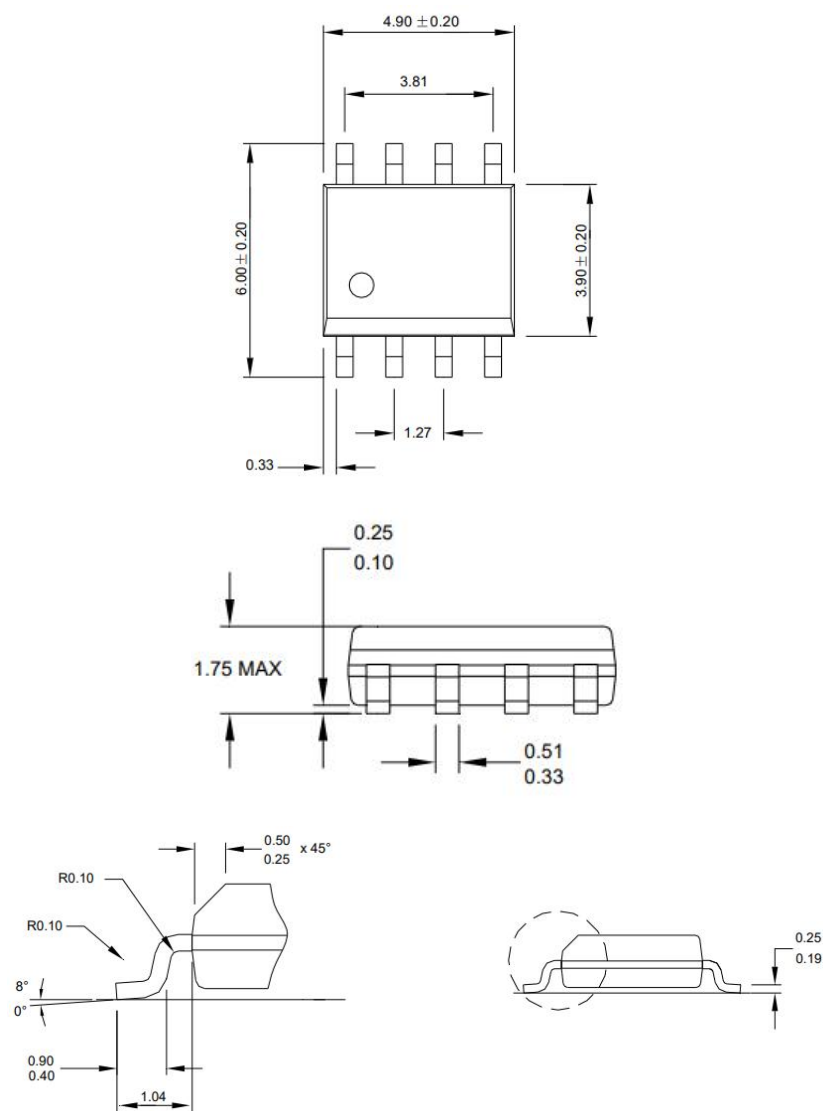


Figure 4. Three-wire NPN normally open application circuit diagram

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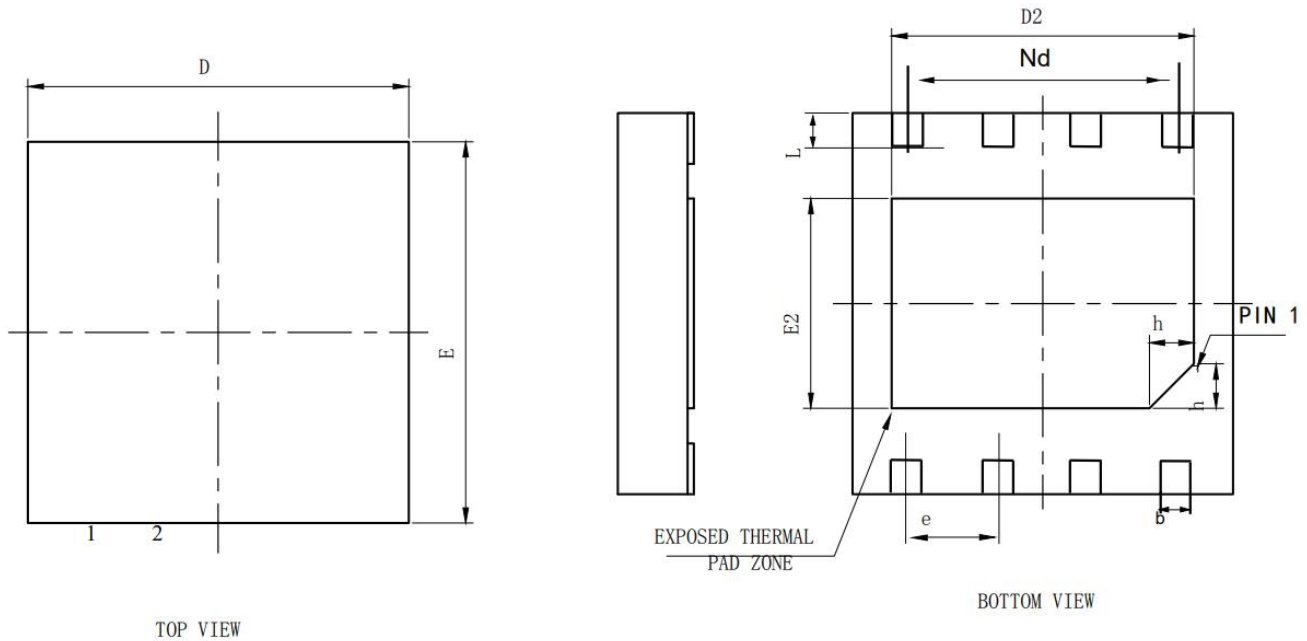
◆ Package Information

(1)SOP8 Unit:mm

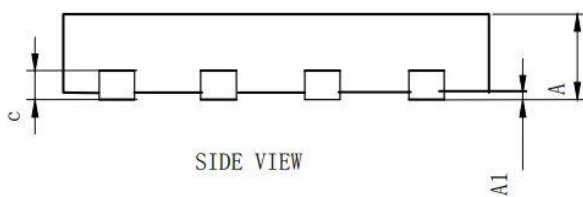


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(2)DFN-8L Unit:mm



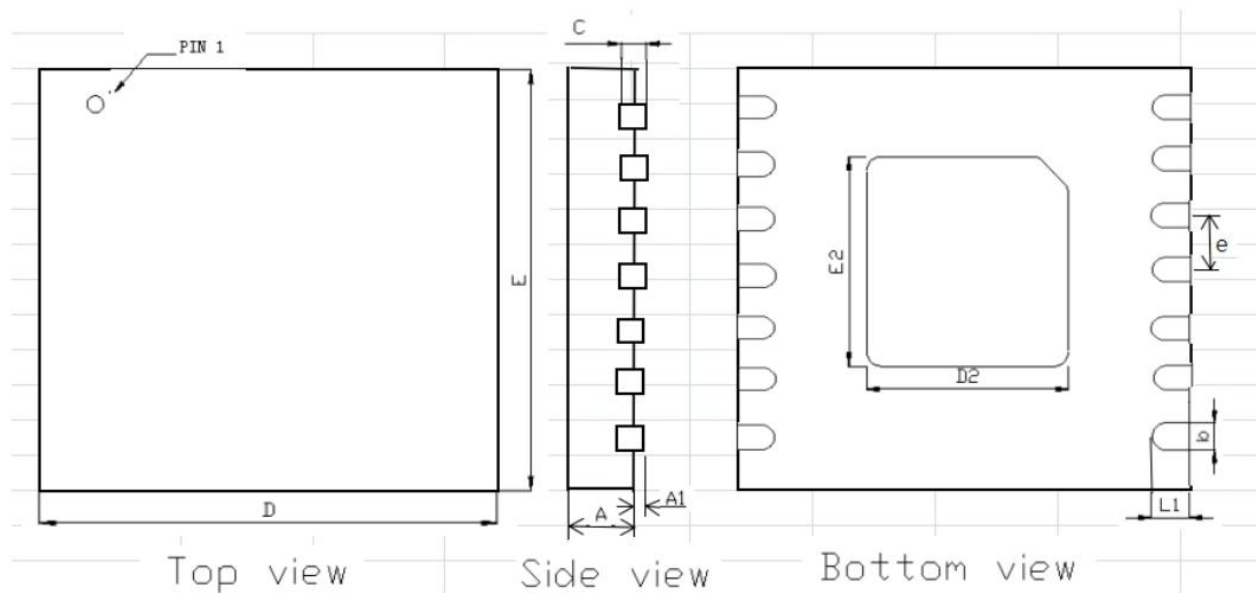
COMMON DIMENSIONS



SYMBOL	MILLIMETER		
	MIN 0	MID	MAX
A	. 70	0.75	0. 80
A1	—	0.02	0. 05
b	0. 20	0.25	0. 30
c	0. 18	0.20	0. 25
D	2. 90	3. 00	3. 10
D2	2. 20	2. 30	2. 40
e	0. 65BSC		
E	2. 90	3. 00	3. 10
E2	1. 40	1. 50	1. 60
L	0. 20	0.25	0. 30
h	0. 30	0. 35	0. 40

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(3)DFN-14L Unit:mm



Symbol	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	<0.05			<0.002		
b	0.21	0.23	0.25	0.008	0.009	0.010
C	0.20			0.008		
D	2.90	3.00	3.10	0.116	0.120	0.124
D2	1.55	1.60	1.65	0.062	0.064	0.066
E	2.90	3.00	3.10	0.116	0.120	0.124
E2	1.55	1.60	1.65	0.062	0.064	0.066
e	0.40 BSC			0.016		
L1	0.25	0.30	0.35	0.010	0.012	0.014