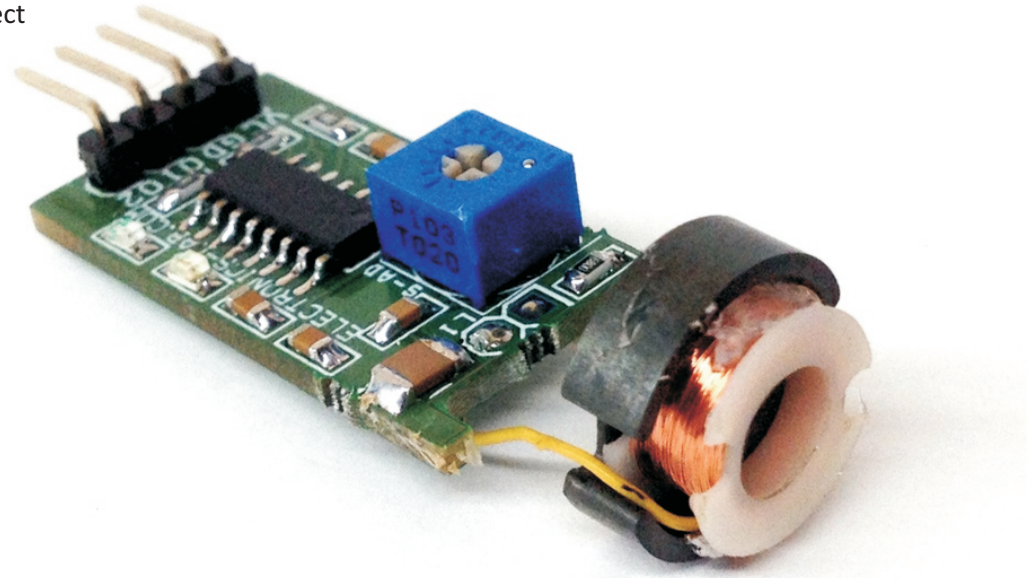
Inductive Proximity Sensor

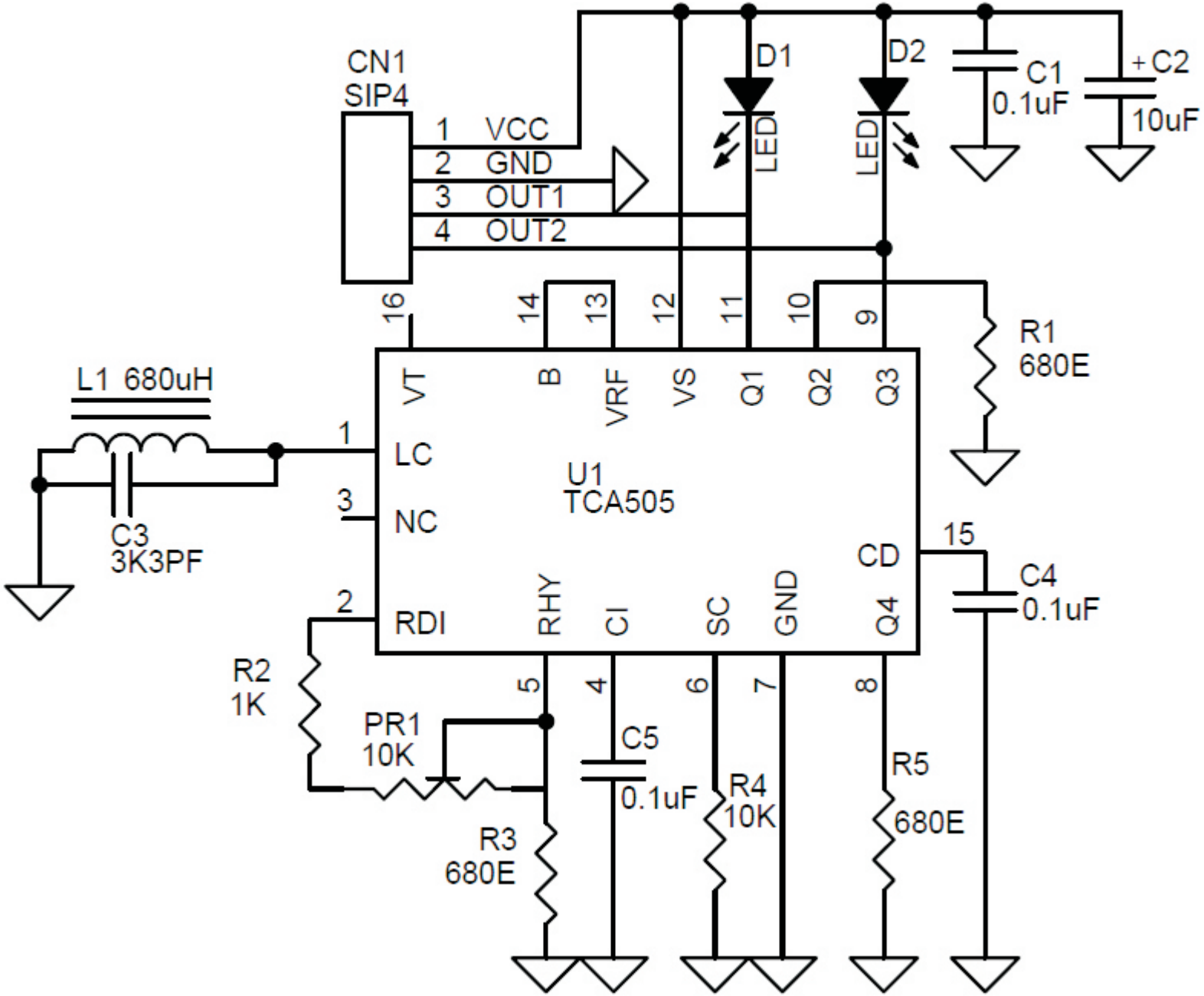
The circuit publish here is a Inductive proximity sensors are used for non-contact detection of metallic objects. The circuit can be used as detection on metal object or as positioning sensor. , This circuit is used to design inductive proximity switches which can detect metal object from 5-10mm range. The resonant circuit of the LC oscillator is implemented with an open half-pot ferrite and a capacitor in parallel (pin LC). If a metallic target is moved closer to the open side of the half-pot ferrite, energy is drawn from the resonant circuit and the amplitude of the oscillation is reduced accordingly. This change in amplitude is transmitted to a threshold switch by means of a demodulator and triggers the outputs. I have tested the circuit with 12V DC however the circuit can also work with high supply up to 42V with few components value change, refer data sheet for more info. Normally D2 LED is on, when the coil detects the metal object D2-LED goes off and D1 LED turns on, so normally Out-2 provides low output and Out-1 provides High output when metal object detected Q3 Output goes high and Q1 goes Low, both output are open collector. PR1 Trimmer potentiometer helps to adjust the sensor distance sensitivity. Output of each transistor directly can drive small relay as each output has capacity of handling 50mA current.

Note : Sensor Coil Can be made using half part of 14MM Pot iron Core, inductance has to be 540uH to 640uH

Features

- Supply 12V DC
- Dual Output (Both Open Collector)
- Detection Range 5-10MM
- Dual LED for operation
- D2-LED ON Normally Goes OFF When Sensor Detects the Object
- D1-LED OFF Normally Goes ON When Sensor Detects the Object
- PR1 – Sensitivity Adjust
- Both Outputs are Short Circuit Protected
- High Noise Immunity
- PCB Dimensions 30.77mm x 15.54mm




CN1
SIP4
1 VCC
2 GND
3 OUT1
4 OUT2
D1
LED
D2
LED
C1
0.1uF
+C2
10uF
R1
680E
L1 680uH
C3
3K3PF
U1
TCA505
VT
B
VRF
VS
Q1
Q2
Q3
LC
NC
RDI
RHY
CI
SC
GND
Q4
CD
C4
0.1uF
R2
1K
PR1
10K
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R3
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R4
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R5
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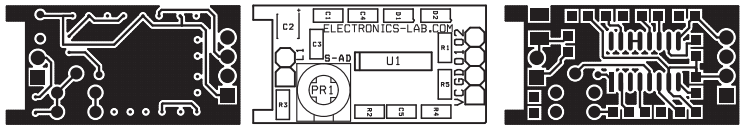
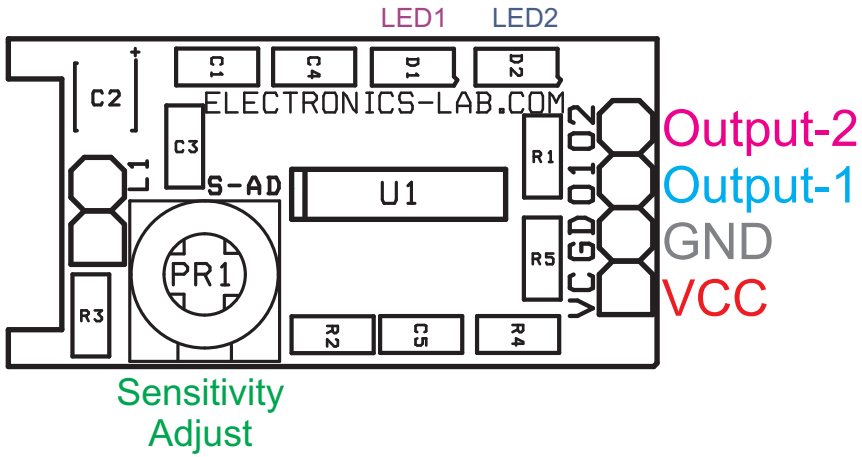


PCB Dimensions 30.77MM X 15.54MM



BOM			
SR.	*QNTY.*	*REF*	*DESC*
1	1	CN1	4 PIN MALE HEADER CONNECTOR
2	3	C1,C4,C5	0.1uF SMD 0805
3	1	C2	10uF SMD 1210
4	1	C3	3.3KPF SMD 0805
5	2	D1,D2	GREEN & RED LED SMD 0805
6	1	L1	680uH Read Note 1
7	2	PR1	10K Trimer Pot
8	3	R1,R3,R5	680E SMD 0805
9	1	R2	1K SMD 0805
10	1	U1	TCA505 SMD INFINION
11	1	R4	10K SMD 0805