# Metal Touch Sensor Module

The KY-036 Metal Touch Sensor Module features a KRS13 darlington NPN transistor, the signal of which is controlled by a circuit part of which integrated type LM393 inside which there are two comparators. When you touch the bare wire bent over the transistor, which is represented by the base of the transistor, the 50 Hz signal around us in a modern home or office is injected into a high gain amplifier.

The output of this amplifier is connected to a comparator, the sinusoidal AC signal is then converted to a square wave. Vein sensitivity adjustment by adjusting VR1 trimmer appropriately. If you look closely at the LED you will see a slight flicker, this is due to the output that is represented by a square wave of 50 Hz instead of constant value.

**Features**

| | |
|---|---|
| Power supply: | 3.3V or 5.5V |
| Sensitivity: | adjustable |
| Sensor Type: | analog and digital output |
| Packaging: | antistatic sealed bag |
| Form Dimensions | 34 x 16mm |

**Technical data / Short description**

Outputs a signal if the metal pike of the Sensor was touched. You can adjust the sensitivity of the sensor with the controller.

**Digital Out**: At the moment of contact detection, a signal will be outputted.

**Analog Out**: Direct measuring value of the sensor unit.

**LED1**: Shows that the sensor is supplied with voltage

**LED2**: Shows that the sensor detects a magnetic field

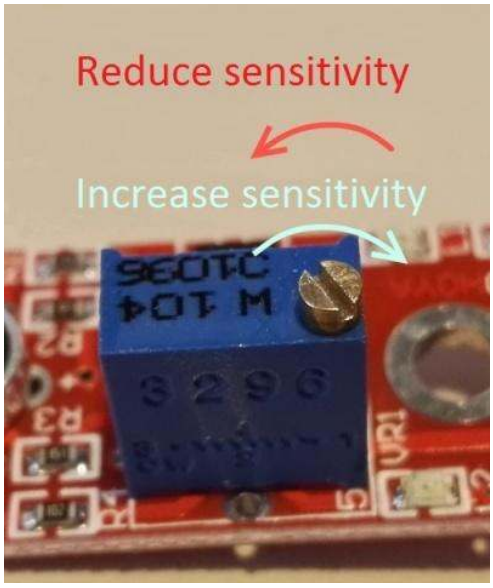
**Pinout**


**Functionality of the sensor**

The sensor has 3 main components on its circuit board. First, the sensor unit at the front of the module which measures the area physically and sends an analog signal to the second unit, the amplifier. The amplifier amplifies the signal, according to the resistant value of the potentiometer, and sends the signal to the analog output of the module.

The third component is a comparator which switches the digital out and the LED if the signal falls under a specific value.

You can control the sensitivity by adjusting the potentiometer. **Please notice**: The signal will be inverted; that means that if you measure a high value, it is shown as a low voltage value at the analog output.




This sensor doesn't show absolute values (like exact temperature in °C or magnetic field strength in mT).

It is a relative measurement: you define an extreme value to a given normal environment situation and a signal will be send if the measurement exceeds the extreme value.

**Electrical Circuit and PCB Module**

Analyzing the circuit, this is based on the first voltage comparator present in the LM393 integrator . At the inverted analog input comes the signal from the Darlington NPN type KSP13 transistor whose base is used as a "disturbance" element coming from the contact of our body and amplified by the transistor itself.

The same signal arrives at output A0 of the module. The non-inverting input is connected to the partition formed by the two resistors R2 and R6 (both of the 10kΩ value) that bring the input to the half of the VCC power supply voltage.

The comparator operation is determined by the following relationships:

If V +> V- → Vo = H

If V + <V-→ Vo = L

This is a circuit that connects the analog world (the two inputs) to the digital one (the output) as an ADC with 1 bit resolution.

When the voltage from the branch formed by the transistor is regulated by the 10kΩ trimmer VR1, it is greater than that on the pin 3 of the integrator IC1.1, a HIGH signal will be output on pin 1 of Ic1.1 and when the voltage is lower you will have a LOW level.

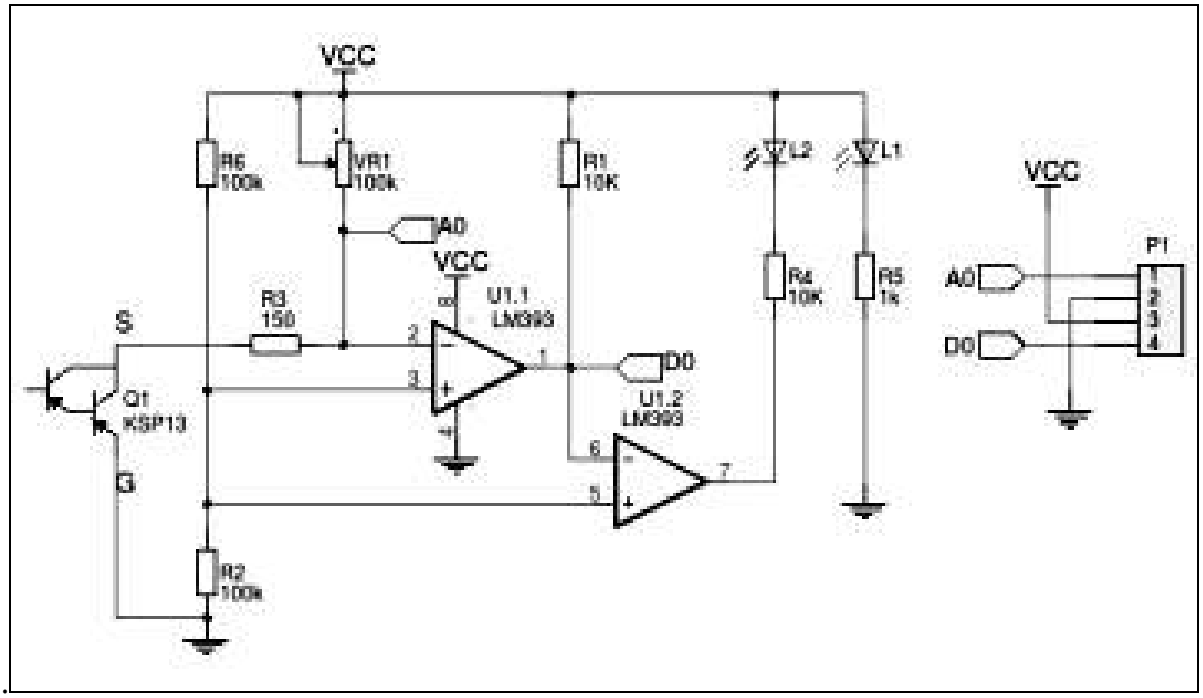
The second comparator in the LM393 integrator is used to control the ignition of the L2 LED , indicating that the sensor has "tapped".

Switching on the L1 LEDwill indicate the presence of the supply voltage, as it is connected to VCC and GND via the 1kΩ R5 resistor. As we have seen, the module has both an analog output and a digital output.

To obtain a digital signal, you must first act on the trimmer to get the HIGH signal only when the incoming signal exceeds the threshold we want to monitor.

The calibration is quite simple as it is facilitated by the presence of the L2 LED : it will have to act clockwise on the trimmer screw until the LED goes out.

You will then try to touch with your finger, the wire present above the transistor, and if the LED lights up, the sensor will recognize our touch and produce a HIGH output signal. If this does not happen you will have to try slowly adjusting the screw until you get the desired effect. The analog output signal, on the other hand, varies with the intensity of the signal transmitted by the transistor


VCC
R6
100k
VR1
100k
R1
10K
L2
L1
A0
VCC
U1.1
LM393
R3
150
S
Q1
KSP13
G
D0
U1.2
LM393
R4
10K
R5
1k
R2
100k
VCC
P1
A0
D0
1
2
3
4