

# SMOKE SENSOR KIT

HARDWARE MANUAL REV 1.0

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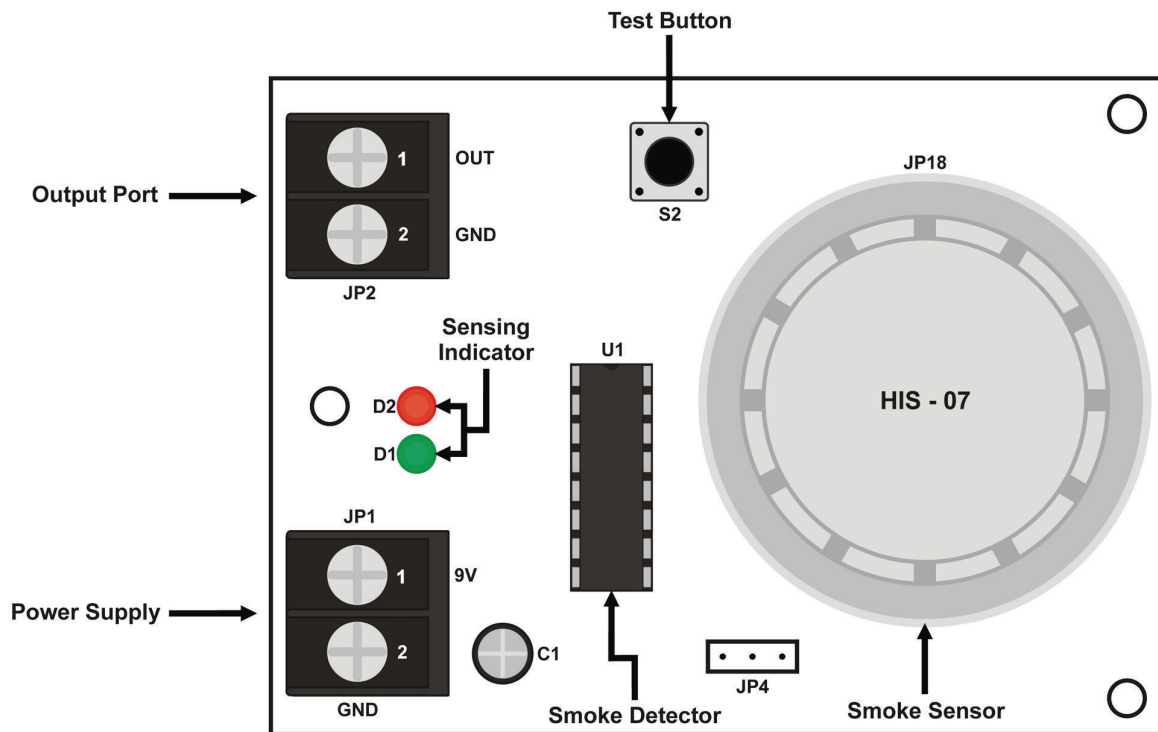


e-Gizmo smoke sensor detects the presence of smoke by measuring the drop in current in the ionization detector (HIS-07). The ionization detector uses Americium as a source of ionizing radiation for ionizing oxygen and nitrogen in the air that normally generates a small continuous electric current but when smoke enters the chamber of the detector the smoke particles attach itself to the ions and neutralizes them, resulting dropping of current in the detector. Ionization type smoke sensor with MCU compatible digital output. Uses HIS-07 as the active sensing element. Digital output is activated when smoke enters the HIS-07 chamber.

## SPECIFICATIONS

- Sensor Type: HIS-07 - Ionization type smoke sensor
- Supply Voltage: 9V
- Supply current: 50 mA
- Sensitivity:  $0.6 \pm 0.1$  V at 2%/foot of smoke, adjustable sensitivity

## MAJOR COMPONENTS PRESENTATION



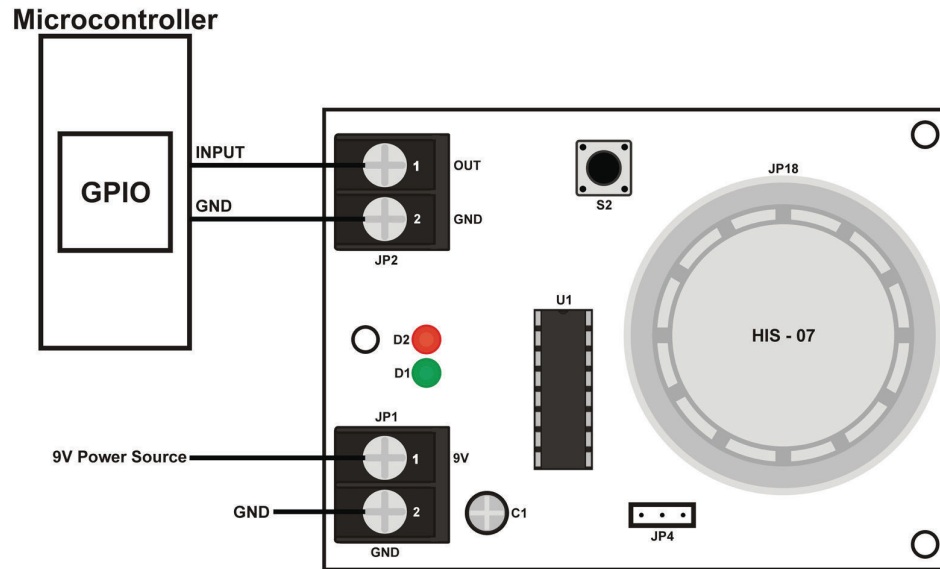
**Figure 1.** Smoke Sensor Kit Major parts illustration and Pin Assignments

## PIN ASSIGNMENTS

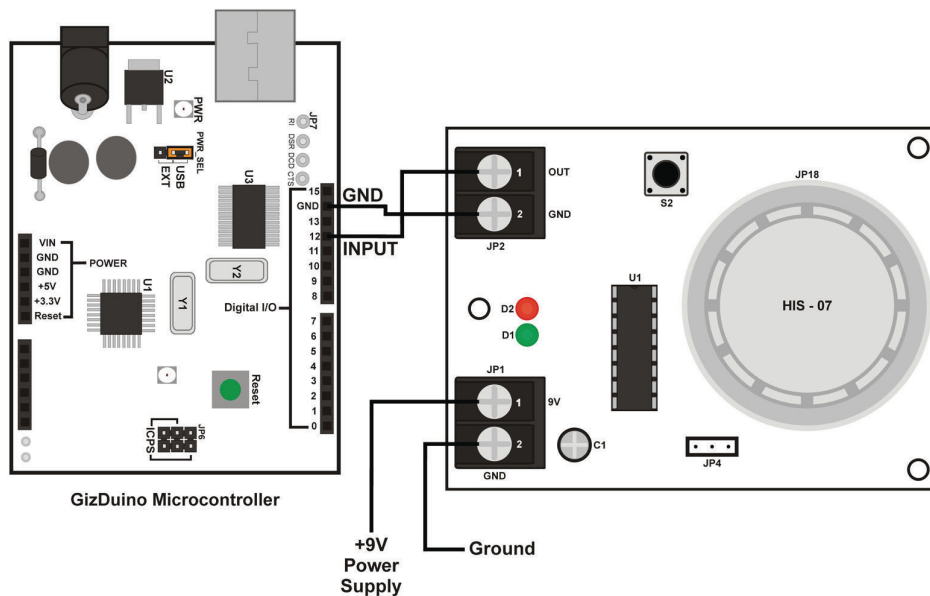
**Table 1.** 'JP1' and 'JP2' Pin assignments and details.

PIN NO.	I.D.	FUNCTION
JP1		
1	GND	Ground
2	Vcc	9V DC Power Input
JP2		
1	GND	Ground
2	Output	Normally open/ Smoke detected Output Logic Low

## MICROCONTROLLER CONNECTION EXAMPLE



**Figure 2.** The Smoke Sensor connects directly to your MCU GPIO port. Only the MCU INPUT pin is used for the transfer of headings data, leaving the OUTPUT pin available for other uses.

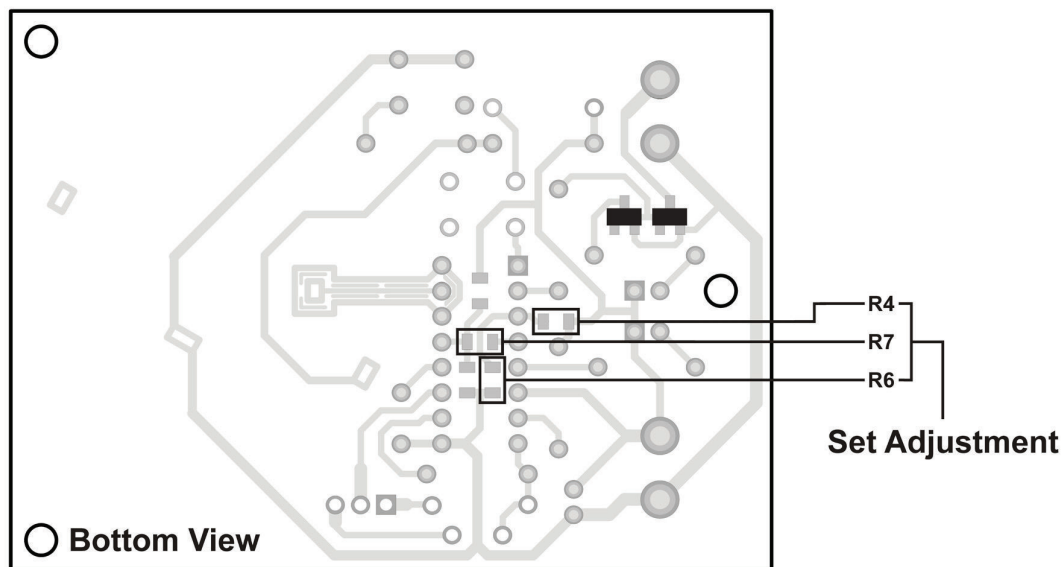


**Figure 3.** The Smoke Sensor connects directly to your gizduino microcontroller.

## OPERATION

HIS-07 have an ionization chamber and a source of ionizing radiation. The source of ionizing radiation is a minute quantity of the element Americium (Americium-241), which is a source of alpha particles (helium nuclei). The ionization chamber consists of two plates separated by about a centimeter. The power supply applies a 9V to the plates, charging one plate positive and the other plate negative. Alpha particles constantly released by the americium knock electrons off of the atoms in the air, ionizing the oxygen and nitrogen atoms in the chamber. The positively-charged oxygen and nitrogen atoms are attracted to the negative plate and the electrons are attracted to the positive plate, generating a small, continuous electric current. When smoke enters the ionization chamber, the smoke particles attach itself to the ions and neutralizes them, so they do not reach the plate. The drop in current between the plates is detected by A5368CA.

The internal oscillator and timing circuitry keeps standby power to a minimum by powering down the device for 1.66 seconds and sensing smoke for only 10 ms. If smoke is detected, the oscillator period changes to 40 ms and the horn is enabled. The horn output is typically 0.5 s ON, 0.5 s OFF, 0.5 s ON, 0.5 s OFF, 0.5 s ON, 1.5 s OFF (temporal horn pattern). During the OFF time, smoke is checked and will inhibit further alarm output if smoke is not sensed. During smoke conditions the low battery alarm is inhibited and the LED(green) is driven at a 1 Hz rate and the sensing indicator D2(red) is turned on indicating that low logic voltage is being inputted in the GPIO IO port triggering the alarm.

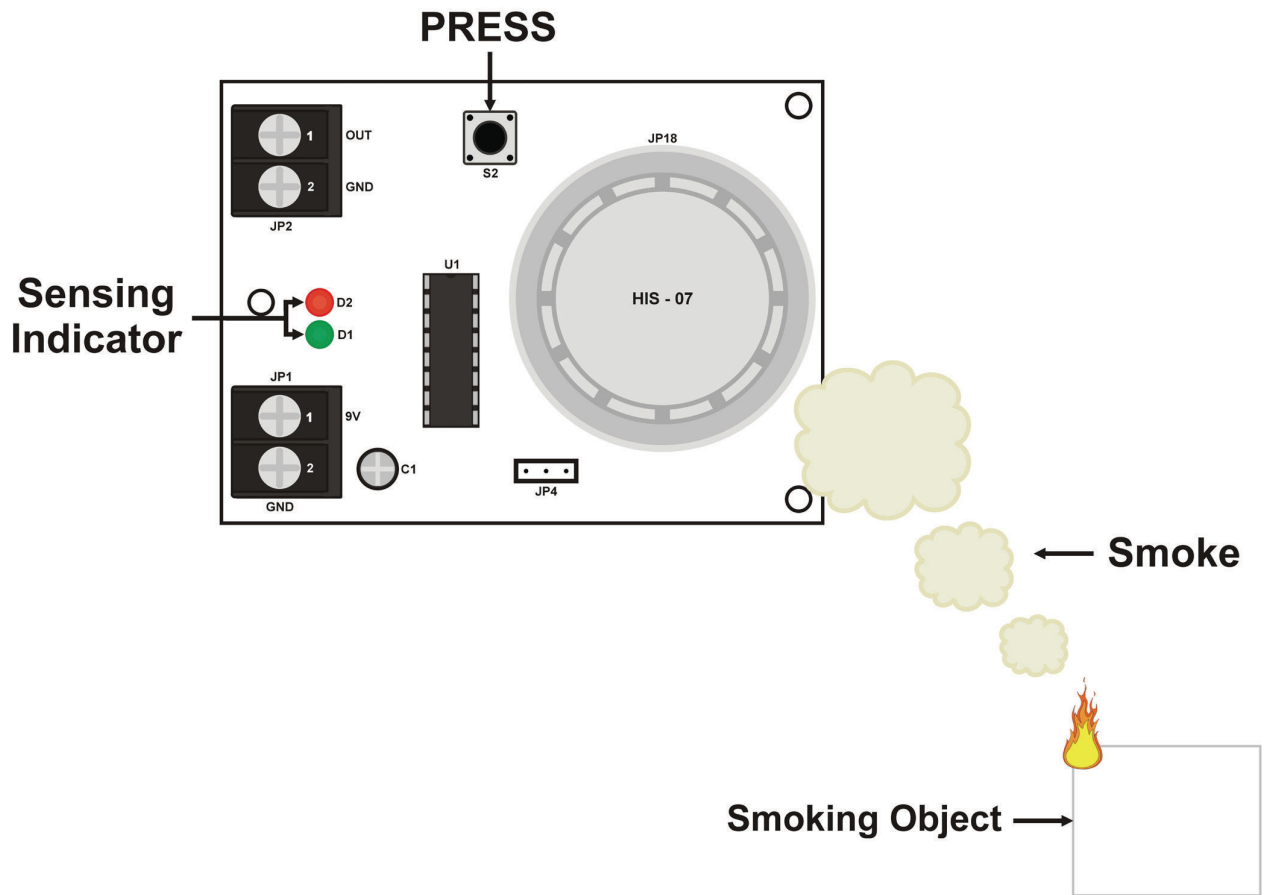


**Figure 4.** (R4,R6,R7) Set Adjustment location

The smoke sensor sensitivity can be adjust for a particular smoke chamber by mounting a resistor R7 SMD size 0805 at the back of the circuit board between PIN 13 and 4 of the A4368CA reducing its sensitivity during timer mode. Sensitivity is based on the resistance value of R7.

The low battery threshold can also be adjusted, threshold can be increase by increase by connecting a resistor R4 between PIN 3 and 9V power source it can also be decrease by connecting a resistor between R6 PIN 3 and ground.

## TESTING

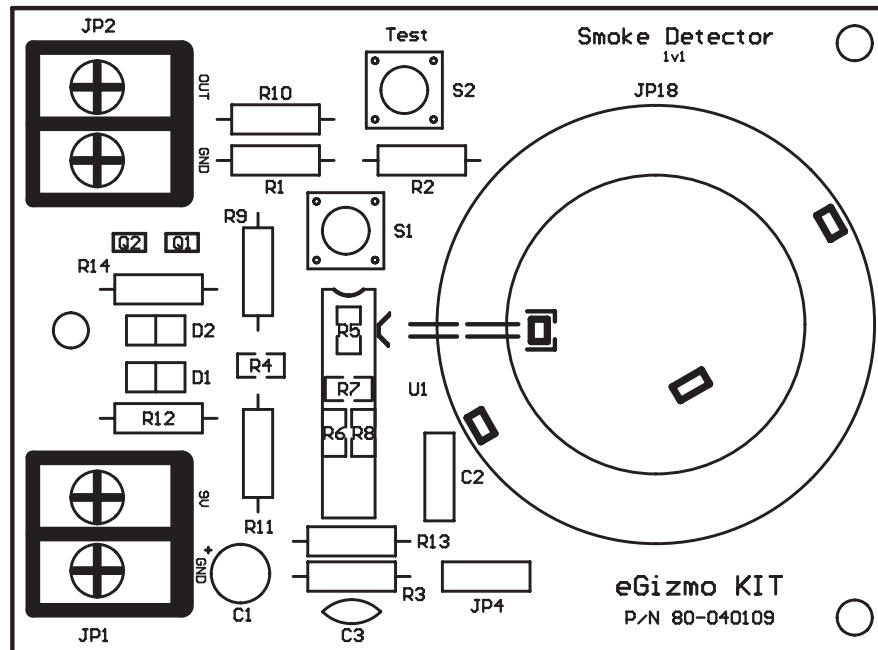


**Figure 5.** Smoke sensing example illustration

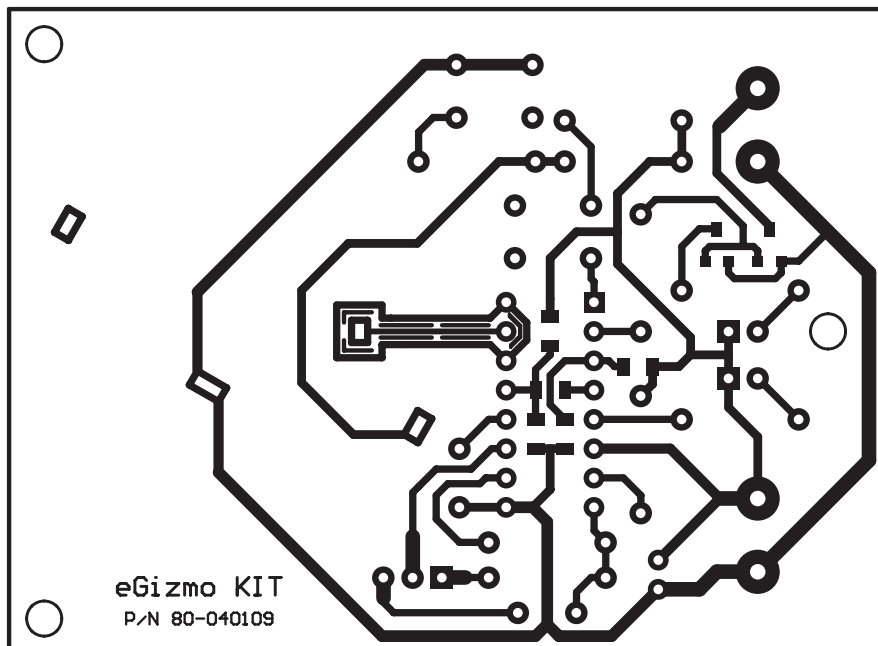
Test the sensor by clicking and holding S2, the green LED should start blinking following it after a few seconds the red LED should be turned on as long as you hold S2, both LED will be turned off after releasing S2, now bring a smoking object close to the sensor, the green LED should start to blink, after a few seconds the red LED is turned on, and Both LED will be turned off once the smoking object is withdrawn.



## PCB BOARD PRESENTATION



**Figure 7.** Smoke Sensor Kit PCB  
(silkscreen layout)



**Figure 8.** Smoke Sensor Kit PCB Copper  
Pattern