Smoke Sensor Kit

Technical Manual Rev 2r0

The e-Gizmo Smoke Sensor detects the presence of smoke by measuring the drop in current in the ioniztion detector **(HIS-07**). The ioniztion 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 the, 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.

GENERAL SPECIFICATION:

- **Sensor Type:** HIS-07 - Ionization type Sensor
- **Supply Voltage:** 9V
- **Supply current**: 50 mA

- **Sensitivity:** 0.6 +/- 0.1V at 2% foot of smoke adjustable sensitivity

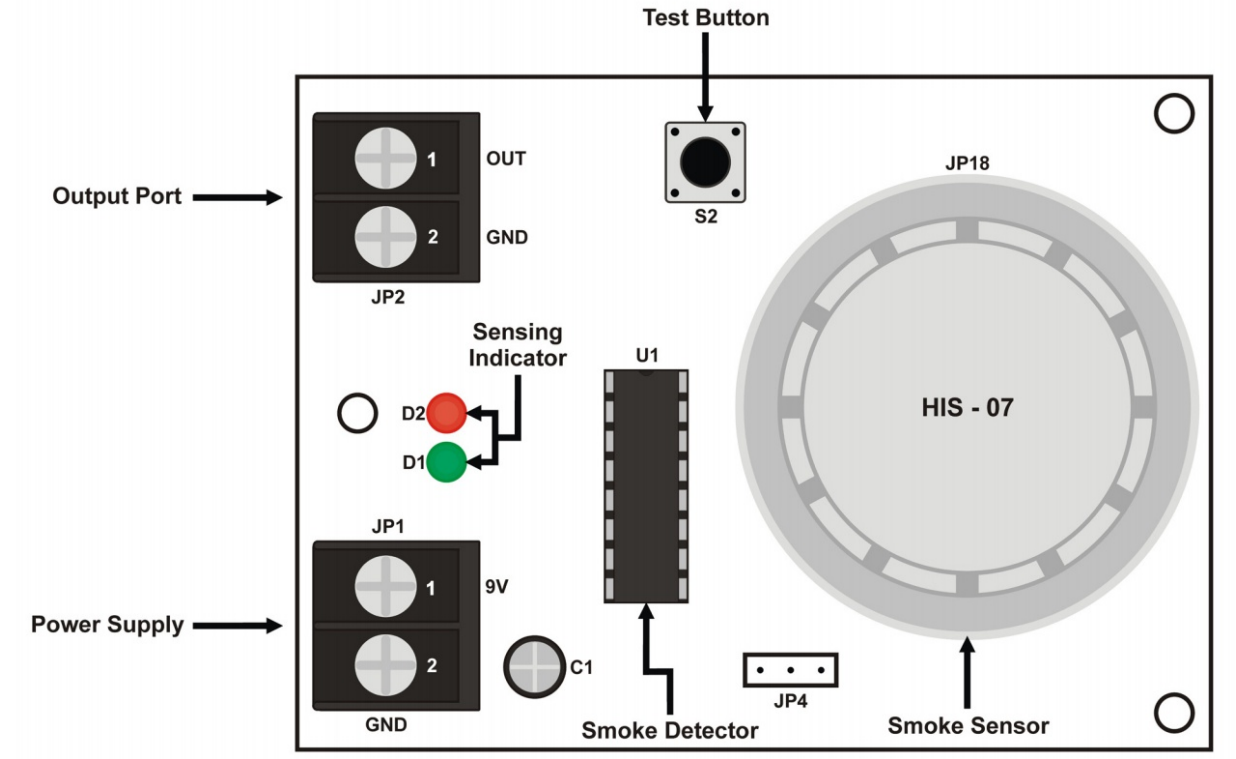

Figure 1. *Smoke Sensor Kit Major parts illustration and Pin Assignments*

PIN ASSIGNMENTS

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

PIN Number	I.D	Descriptions
JP1		
1	GND	Ground
2	VCC	9V DC Power Input
JP2		
1	GND	Ground
2	OUTPUT	Normal Status Output Logic *1 High* Smoke detected Output Logic ***0 Low****

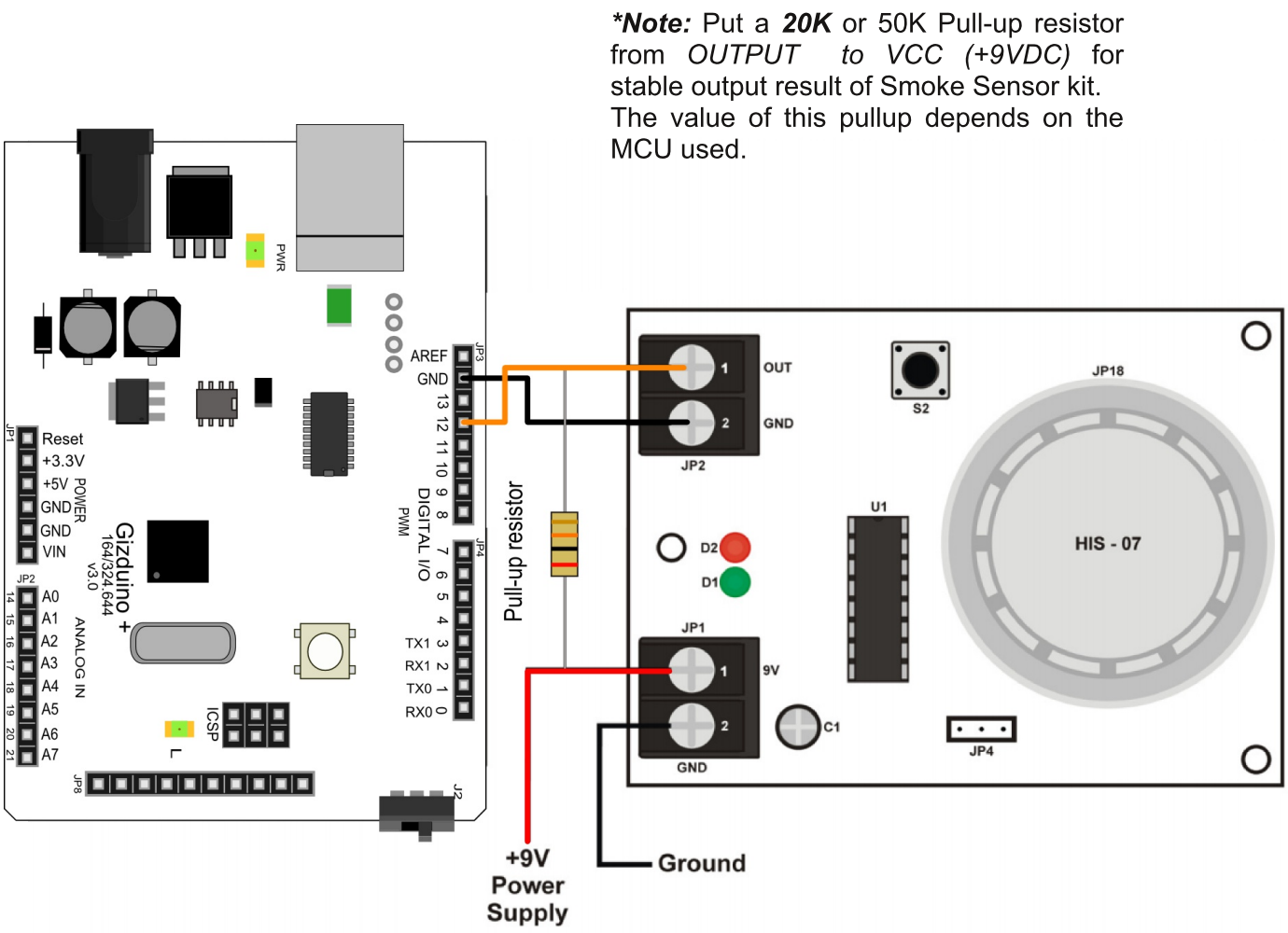

Figure 3. *The Smoke Sensor connects directly to your gizDuino microcontroller.*

HIS-07 have an ionization chamber and a source of ionizing radiation. The source of ionizing radiationis 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.

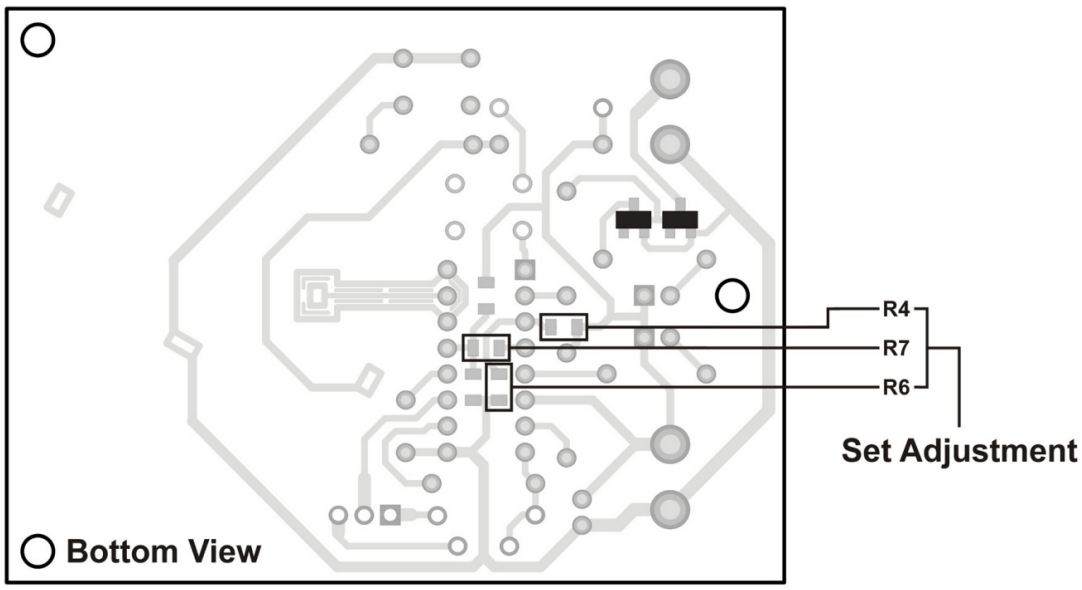

Figure 4. *(R4,R6,R7) Set Adjustment location*

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.

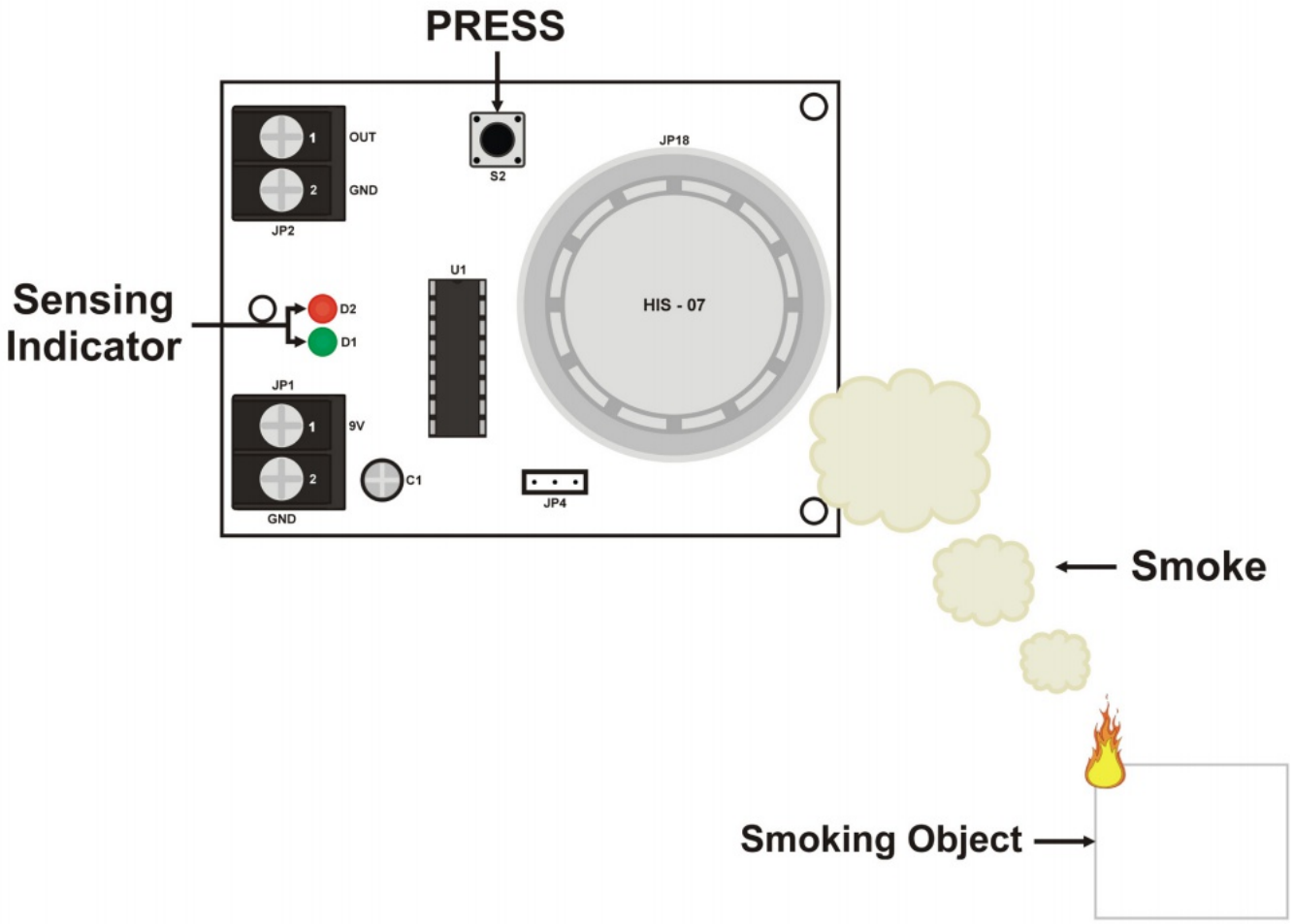

Figure 5. *Smoke sensing example illustration*

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 of 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.

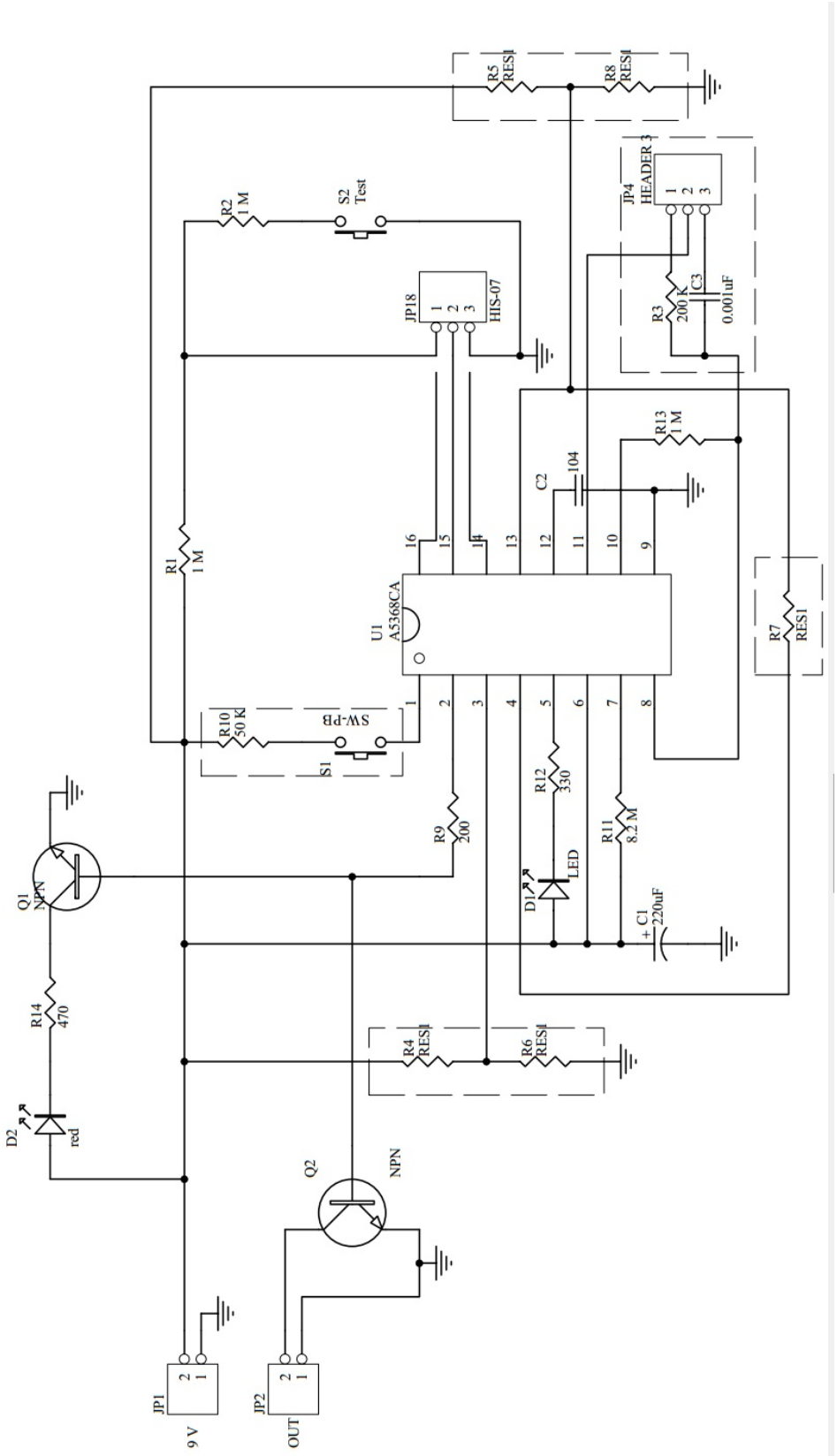

Figure 6. *Schematic Diagram of e-Gizmo Smoke Sensor Kit*

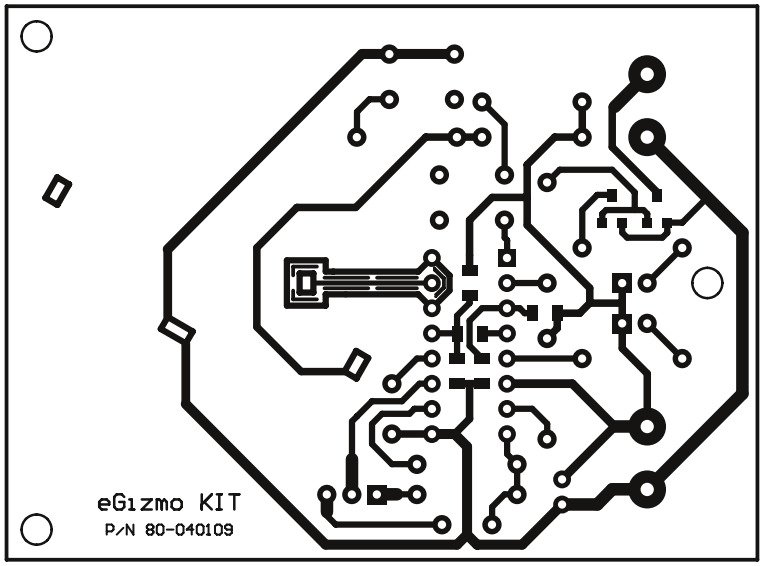

Figure 7. *Parts Placement*

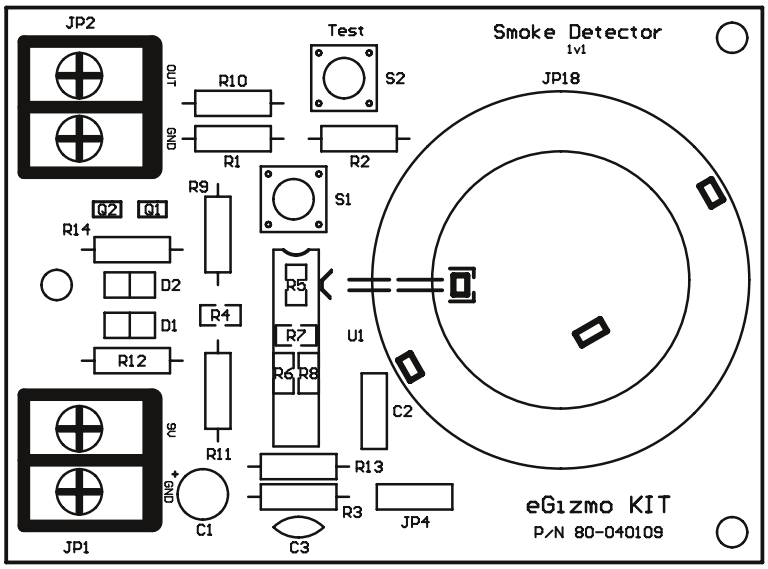

Figure 8. *BottomPCBGuide*