MQ-2 Gas Sensor

The **MQ-2** gas sensor is a widely used electronic component designed to detect **combustible gases** in the air. It is particularly sensitive to **LPG (liquefied petroleum gas), methane, propane, hydrogen, alcohol, smoke, and carbon monoxide (CO)**. This makes it useful in gas leak detectors, smoke alarms, and other safety systems.

How Does the MQ-2 Sensor Work?

The MQ-2 sensor consists of a **metal oxide semiconductor (SnO_2 - tin dioxide)** that changes its electrical resistance in the presence of gases. The sensor has an internal **heating element** that allows gas molecules to interact with the tin dioxide surface. When gases are detected, the sensor's resistance changes, producing an output voltage that corresponds to the gas concentration.

MQ-2 Sensor Pins & Their Functions

The MQ-2 module typically has **four** pins:

1. **VCC (Power Pin):**
    - Connect to **5V** (some versions support **3.3V**).
    - Powers the sensor and internal heater.
2. **GND (Ground Pin):**
    - Connect to the **ground (GND)** of the microcontroller.
3. **A0 (Analog Output Pin):**
    - Provides a continuous **analog voltage output** based on the detected gas concentration.
    - This value ranges between **0-1023** when using an **Arduino (10-bit ADC)**.
    - The **higher the gas concentration, the higher the voltage output**.
    - Use this for **precise gas level readings**.
4. **D0 (Digital Output Pin):**
    - Outputs either **HIGH (1)** or **LOW (0)** depending on whether the gas level **exceeds a set threshold**.
    - The threshold is adjustable using the **potentiometer (trimpot)** on the module.
    - Use this pin for **simple gas detection** (e.g., triggering an alarm when gas levels are too high).

Analog (A0) vs. Digital (D0) Output: Key Differences

Feature	A0 (Analog Output)	D0 (Digital Output)
Output Type	Variable voltage (0-5V)	HIGH (1) or LOW (0)
Use Case	Measuring exact gas concentration	Simple gas leak detection
Threshold	No preset threshold	Adjustable via potentiometer
Sensitivity	High (good for monitoring trends)	Lower (binary response)

Example Use Cases

- **A0 (Analog Output)** → Use for detailed gas concentration monitoring.
- **D0 (Digital Output)** → Use for setting up an alarm/buzzer that triggers when gas exceeds a certain level.

MQ Family Of MOS Gas Sensors

MQ-2 Smoke/LPG/CO Gas Sensor Module

Arduino And MQ2 Gas Sensor

How MQ2 Gas/Smoke Sensor Works? & Interface it with Arduino

【FIGARO】How do MOS type gas sensors detect gas?

Gas Sensors | What is the Working Principle of Gas Sensors? | Pincore Communal

Basics of Gas Detection

Tips, Tricks and Traps for Successful Development of Gas Detectors using MOS type Gas Sensors

How to calibrate an MQ-2 gas sensor || Arduino tutorial