ULTRASONIC SENSOR

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Ultrasonic Sensor

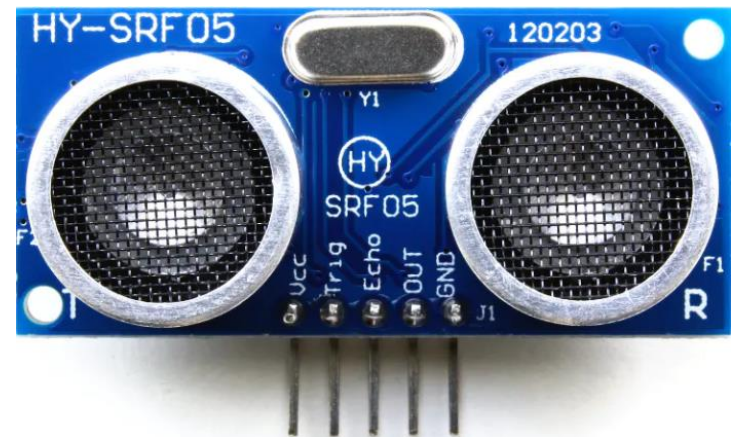# Ultrasonic Sensor

☐ HC-SR04 vs. HY-SRF05

	HC-SR04	HY-SRF05
Power supply	5V	5V
Static current	< 2mA	< 2mA
Sensor angle	< 15 degree	< 15 degree
Detection distance	2 cm ~ 450 cm	2 cm ~ 450 cm
Precision	**~ 3 mm**	**~ 2 mm**
Input trigger signal	10 μs pulse	10 μs pulse
Echo signal	PWL signal	PWL signal
Pins	**4 pins** (1.VCC, 2. trig, 3. echo, 4. GND)	**5 pins** (1.VCC, 2. trig, 3. echo, 4. OUT, 5, GND)

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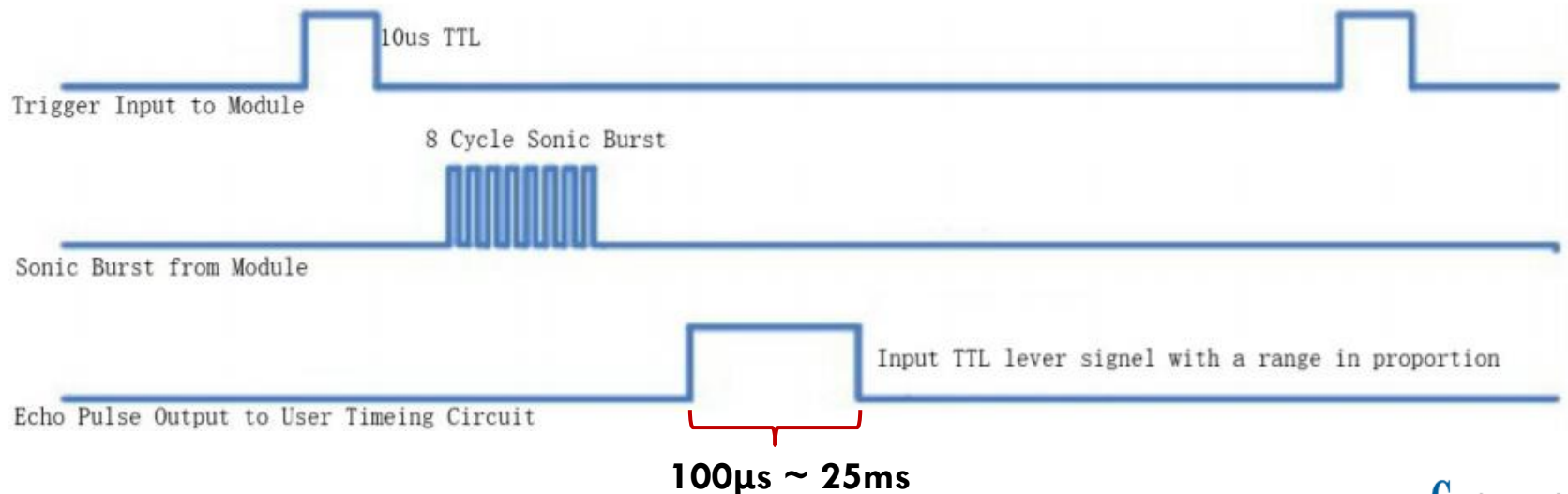
Ultrasonic Sensor

- HC-SR04 vs. HY-SRF05

Ultrasonic Sensor

- Operation
  - Send a pulse signal to TRIG which is **at least 10us** long
  - The ultrasonic module will automatically send eight 40khz square waves, and will automatically detect when there is a reflect signal;
  - When there is an reflect signal back, the ECHO will output a pulse in which the duration of the high-level is the time from untrasonic launch to return

Trigger Input to Module — 10us TTL

Sonic Burst from Module — 8 Cycle Sonic Burst

Echo Pulse Output to User Timeing Circuit — Input TTL lever signel with a range in proportion

100μs ~ 25ms

Ultrasonic Sensor

- How to measure the distance
  - The Echo is a pulse and **its width is proportional to the range.**
    - Formula:
      - Temperature and the speed of sound in the air
        - v = 331.3m/s + 0.606 * T m/s/C (for 0% humidity)
      - the range [m]= high level time [s] * velocity (340 m/s) / 2;
      - the range [cm] = high level time [us] * 0.017;
  - Suggest to use over 60 ms measurement cycle, in order to prevent trigger signal to the echo signal.
    - Usually around 10 measurements per second