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AniBat™ Hagisonic's ultrasonic sensing technology provides a reliable and robust sensing solution that truly gives electronic devices the ability to detect and recognize obstacles and avoid them in effect.

HG-M40DAI Anisotropic Sensor with analog T/R circuit

The AniBat™ HG-M40DAI is an ultrasonic object detector and range finder that offers very short- to medium-range detection. The HG-M40DAI detects objects from 0 cm (0 inch) to 4 m (157 inches) and provides sonar range information from 35 cm (13 inches) out to 3~4 m (118~157 inches).The interface output format is positive TTL time signal.

The AniBat™, specialized for intelligent robots, can detect obstacles in any direction. The product has a beam directivity of 'Anisotropy' (or 'asymmetric') which enables a mobile robot to perceive obstacles, with only a sensor, in wide-open areas up to 200°, with only 60~70° vertical beam directivity.

Features

- Much wider horizontal beam pattern up to 200°
- Almost no blind space in front area of a mobile robot
- Extremely low 'click noise' of sensor
- Long range detection: 0 cm (0 inches) ~ 4 m (157 inches)
- Designed for protected indoor environments
- Object detection includes zero range objects (in the case of HG-M40TAI and HG-M40RAI combination only)
- Sensor operates at 40KHz
- Real-time signal acquisition

Benefits

- Extremely low cost (a firth or a tenth of conventional sensor is enough to detect the same space)
- No sensor dead zone
- Compact dimension: 30 mm(L) x 20 mm(D) x 20 mm(H)
- Transmitter and Receiver in a circuit
- Clear-cut signal acquisition by robust Transmitting Power Output (80Vp-p max)
  <- - Pulse Transformer Boosting
- A robust driving power (12V) good for industrial, automobile application and electronic appliances.

Specifications

- Interface: Positive TTL Time signal
- Sensor size: 16mm diameters
- Trigger Input Signal Waveform: Square Wave recommended (Even Triangle or Sinusoidal wave could operate)
- Trigger Input Signal Level: Over 1.5V
- Trigger Input Signal Duration: Over 2ms
- Trigger Input Signal Repetition Rate: 0~200 time/sec (10~50 time/sec recommended)

Frequency (KHz)	40±2
Input Pulse	TTL or Pulse (2 V ~ 10 V)
Repetition Rate of Input Pulse	10 Hz ~ 50 Hz
Input DC Power (Vdc)	9 V ~ 15 V
Driving Voltage for Sensor	60~80 Vpp at 12V Vdc
Output signal	5 V TTL
No. of Burst (Ea)	15 ~ 30
Available for a transmitter only, a receiver only or a dual type (both a transmitter and a receiver)	

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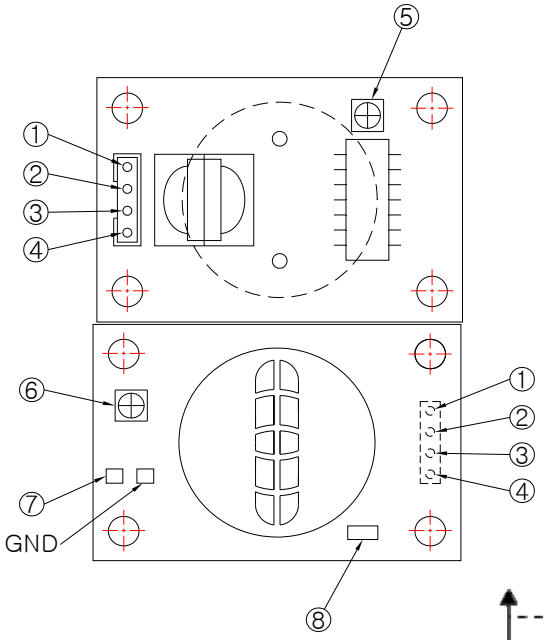
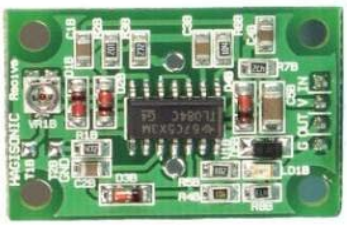
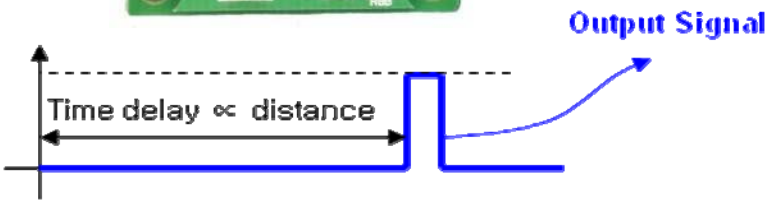
- Main frequency: 40KHz (plus minus 2KHz)
- Power supply: 9~15V (12V recommended)
- Driving level for sensor: 60~80Vpp (at 12V Power Supply)
- Receive Out Signal: 5V TTL (Special order for between 3.3V and 10V)







Terminals & Parts Description

① Pulse input terminal: The input voltage level of a pulse should be ranging from +2V to 10 V.
- The ultrasonic transmission part is driven at its rising edge whenever an input pulse is applied.
- The recommended period of input pulses ranges from 10 Hz to 50 Hz.
(Available from 0 to Max. 200 Hz)
- Available for several pulse shapes such as TTL signals, impulses, square waves, sinusoidal waves or triangular waves.

② DC input power terminal: The recommended voltage ranges from +DC 9 V to 15 V.
(Available from +DC 8 V to 18 V)

③ Signal output terminal: The square pulse is obtained in a receiver part and its level is 5 V.
- The time delay of the received signals is proportional to the distance between a sensor and an obstacle.
- The pulse width tends to be proportional to the size of an obstacle.
- The other output levels can be given by an order production. E.g.) 3.5V, 10V, etc.

④ GND terminal: Electrical ground level for signals and a power.

⑤ Frequency fine adjustment part: The frequency of driving signals can be finely adjusted in the range from 38 kHz to 42 kHz. (Recommendation: please do not fix it because it has been optimized when the module was delivered out of a factory.)

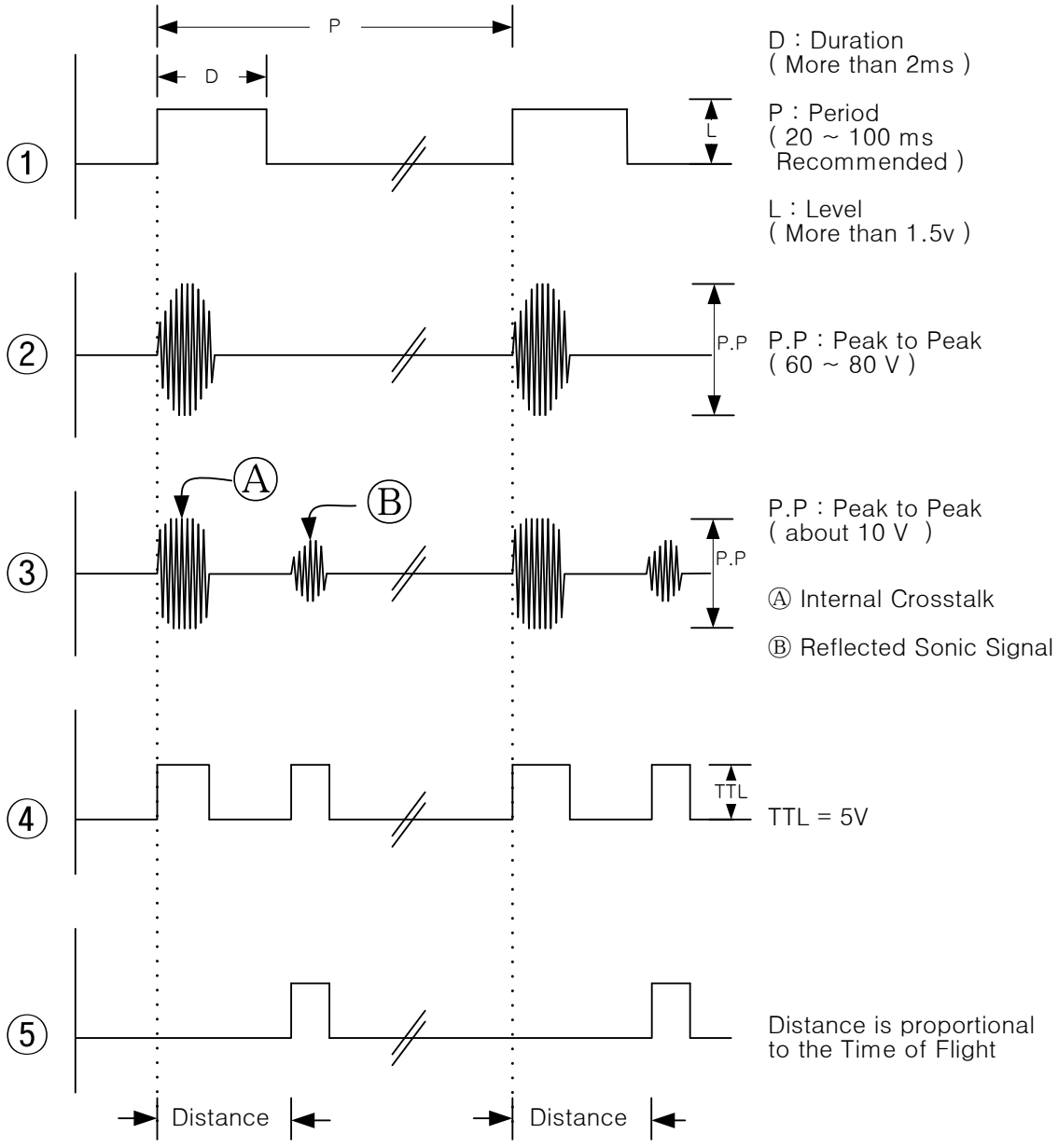
⑥ Receiver gain control part: Sensitivity (Gain) is controlled by fixing a trimmer.
The gain of analog amplifier ranges from 33 dB ~ 59 dB.

** Please note that on over-amplification of the receiver gain, interference noise signals might be shown by ultrasonic waves passing over directly from a transmitter to a receiver.*

⑦ Analog signal test point: At the point, analogue signals (full waveforms) can be observed.

⑧ Working Indicator: A red LED lights when a transmitter is driven or a receiver perceives a signal.

Timing Chart



D : Duration
(More than 2ms)

P : Period
(20 ~ 100 ms
Recommended)

L : Level
(More than 1.5v)

P.P : Peak to Peak
(60 ~ 80 V)

P.P : Peak to Peak
(about 10 V)

Ⓐ Internal Crosstalk

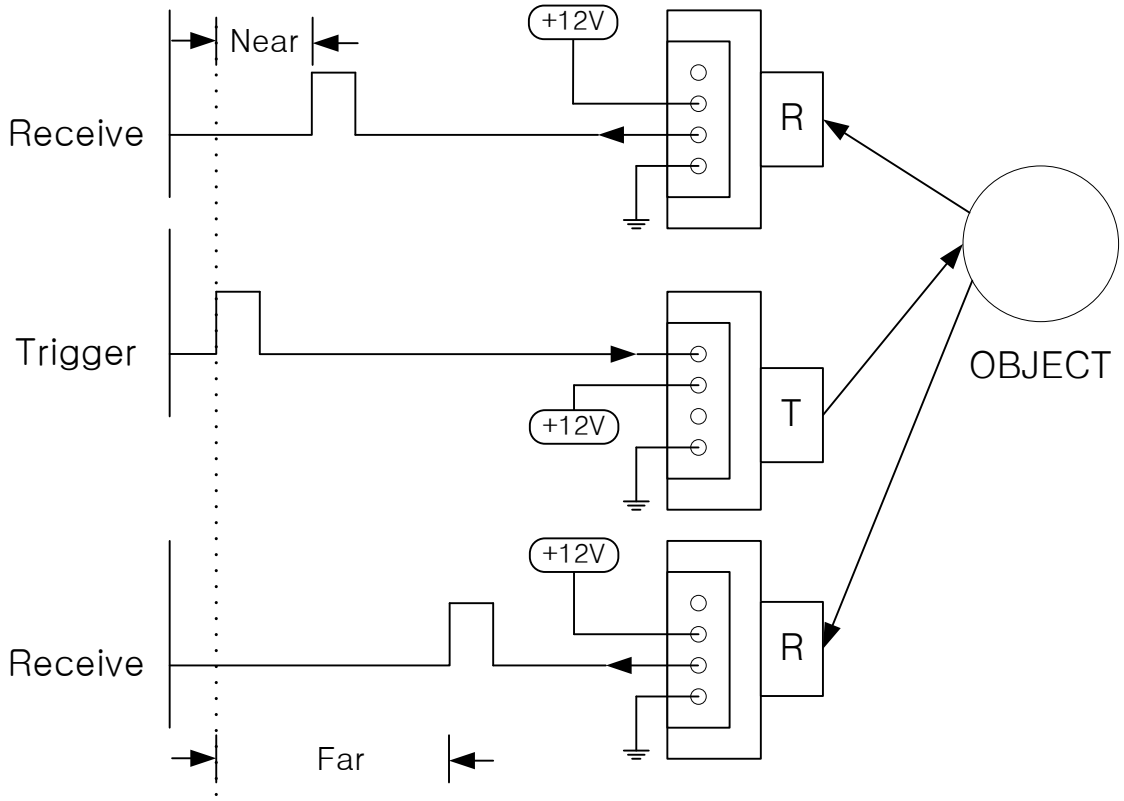
Ⓑ Reflected Sonic Signal

TTL = 5V

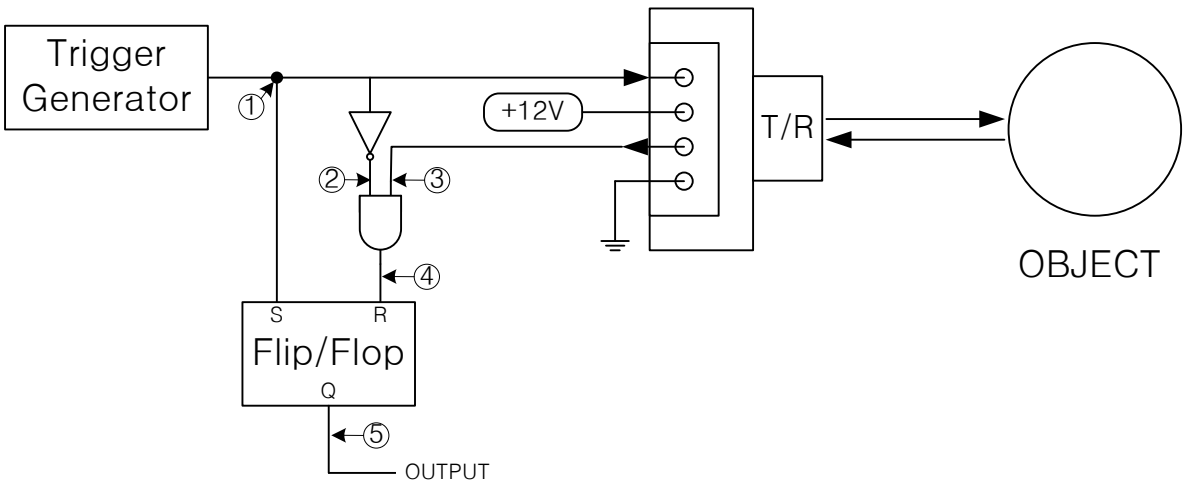
Distance is proportional
to the Time of Flight

① Trigger Pulse input waveform
② Transmit power output to sensor unit
③ Amplified signal in receiver circuit (at TP1)
④ Final output waveform in receiver circuit
⑤ Object detected signal excluding the
internal crosstalk

Application



Direction and distance finder for mobile robot



Range finder with only one module

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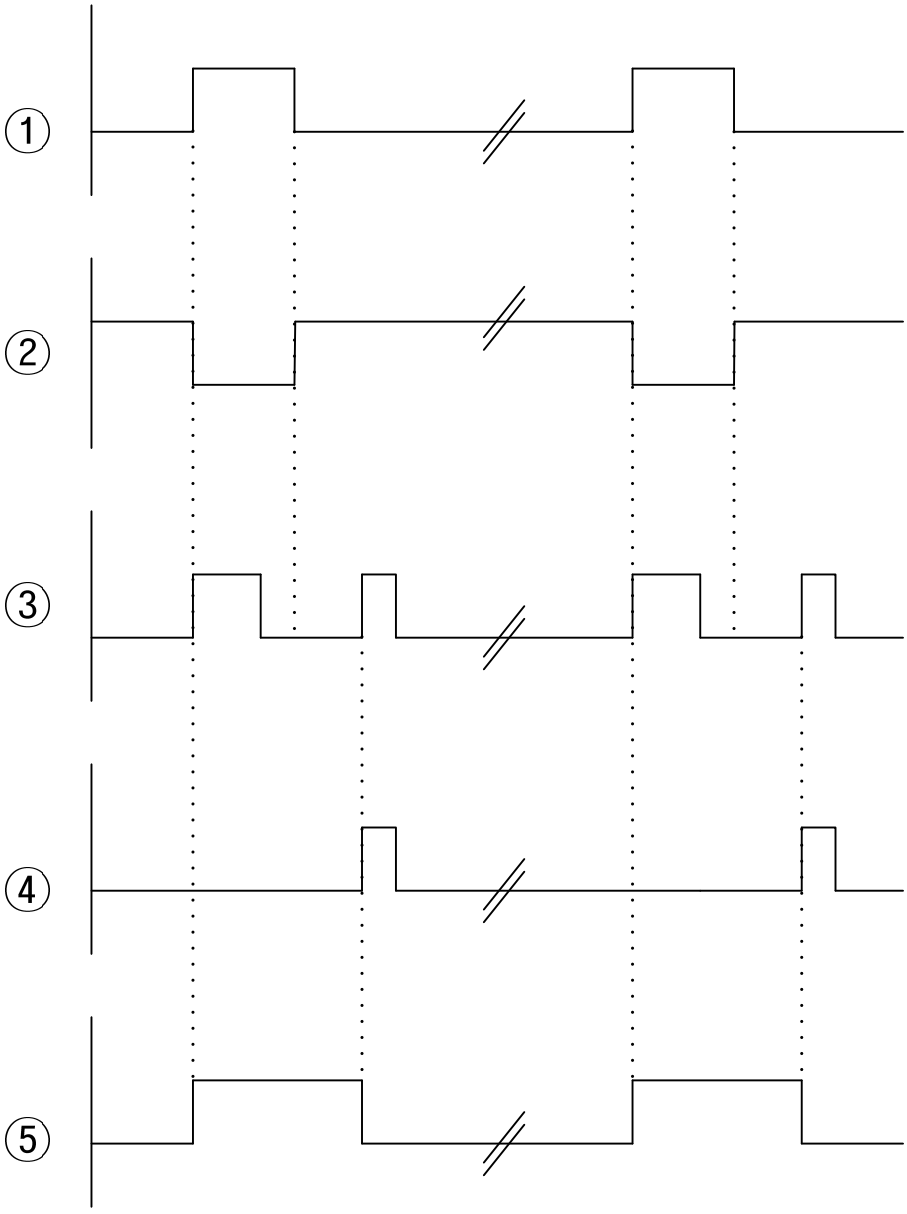
Timing Chart of Range Finder



① Trigger Pulse (The pulse width must be adjustable)
(1.5ms ~ 2.5ms)
② Inverted Waveform of ①
③ Receiver Output Signal
④ Actual Receive Signal (After excluding the internal crosstalk)
⑤ Distance Pulse Output
(The pulse width is proportional to the distance)