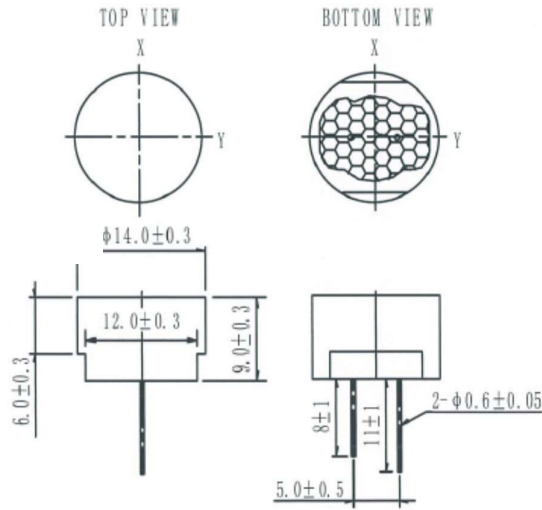


TC0033-002 Piezo Ultrasonic Sensor

Part Number: TC0033-002

Model Number: T/R40-14C0Z-01

Appearance and Dimensions, Unit: mm



Electrical Specifications:

1	Center frequency (KHz)	40 ± 1.0
2	Echo Sensitivity (mV)	≥ 150 (Fig. 1 Simulation Test Circuit)
3	Decay Time (ms)	≤ 1.2 (Fig. 1 Simulation Test Circuit)
4	Directivity (deg) X-axis	120 ± 15 (Fig. 2 Simulation Test Circuit)
5	Directivity (deg) Y-axis	60 ± 15 (Fig. 2 Simulation Test Circuit)
6	Capacitance (pF)	$1800 \pm 15\%$ (at 25°C, 1KHz)
7	Allowable Maximum Input Voltage (Vp-p)	140Vp-p (40KHz) Pulse width 0.5ms, interval 20ms
8	Mean Time To Failure (h)	50,000
9	Operating Temperature (°C)	-40~+80
10	Storage temperature (°C)	-40~+85

Note: All materials are RoHS except for Piezo which is exempt.

TENTATIVE RELEASE:

This specification is based on design objectives and is strictly Preliminary and subject to change. Test data may exist, but this specification is subject to change based on the results of additional testing and evaluation. Application specific specifications will be produced for approval prior to production product being released.

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Fig. 1: Simulation Test Circuit

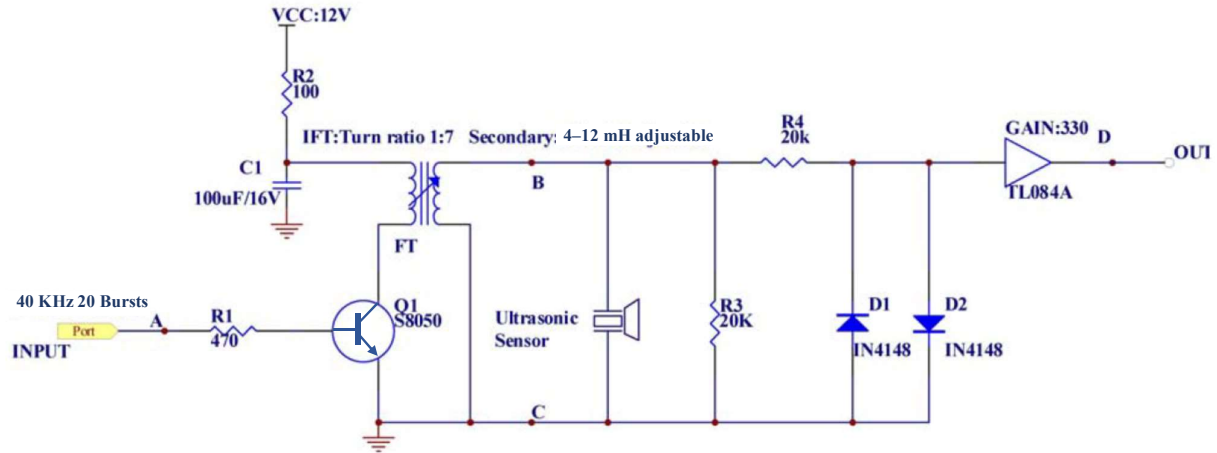
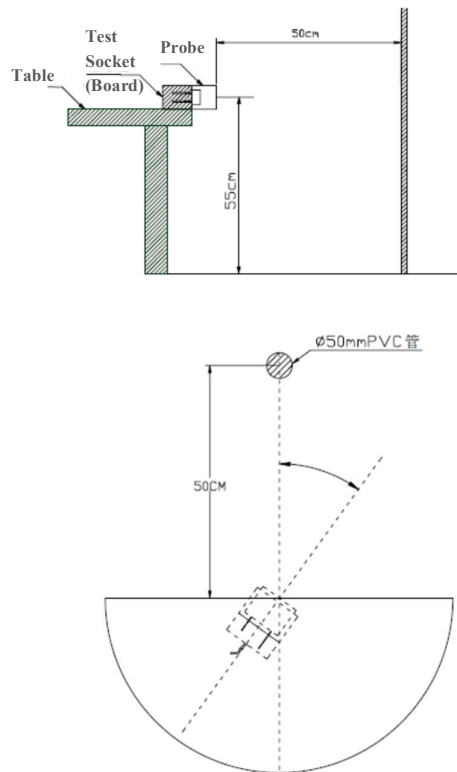


Fig. 2: Directivity Test



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Environmental Testing

Testing items	Testing Equipment/Methods/Conditions	Criteria
Shock Test	Acceleration: 980m/s ² (100G); Direction: 3 directions; Shock time: 3 times / direction	The variation of the echo sensitivity at 40kHz within 30% compared with initial figures at 25°C
Drop Test	Height: 1 meter onto concrete floor; 10 times	
Vibration Test	Vibration frequency: 10Hz to 55Hz; Amplitude: 1.5mm; Sweep Period: 1 minute; Direction: 3 directions; 3 hours/direction	
High-Temp. Storage	Temperature: +85 ± 3°C; Time: 96h followed by normalization period of 25°C for 24h	
Low-Temp. Storage	Temperature: -40 ± 3°C; Time: 96h followed by a normalization period at 25°C for 24h	
Humidity Resistance	Temperature: +85 ± 3°C, Humidity: 85% R.H; Time: 96h followed by a normalization period at 25°C for 24h	
Temperature Shock	Temperature: -40°C ± 3°C for 0.5h, then up to +85 ±3°C within 5 minutes for 0.5h Cycles: 200 cycles followed by a normalization period at 25°C for 24h	
NOTES: Standard Test Condition: T=25±3°C, H=45~65% R.H. And every test must be more than 5 pcs for test.		

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Testing Instrument and Condition List

No.	Testing item	Testing Equipment/Methods	Testing conditions
1	Resonant Frequency	Piezoelectric Transducer Resistance Testing System II	Testing temperature :25±2°C
2	Echo Sensitivity	According to Fig. 1 Test Circuit	Distance to obstacle: 1 meter Obstacle: organic glass board (20x20x1.0cm) 1. Inductance: 8mH, Qm Value: 60-80, 20 Pulses 2. Minimum detect distance ≥ 35cm 3. Acoustic system without coupling
3	Ring Time	According to Fig. 1 Test Circuit	The sensor surface is covered by 100mm thickness of sponge 1. The inductance :8mH, Qm Value: 60-80, Max Pulses ≤ 20 2. The Minimum detect distance ≥ 35cm 3. The acoustic system without coupling
4	Directivity	According to Fig. 1 Test Circuit	At room temperature, Distance to the ground: 55cm Distance to the obstacle: 50cm Obstacle diameter: 50mm (PVC pipe) Obstacle height: 1 meter Note: No other obstacle within a circumference of 1 meter
3	Capacitance	Digital LC ZL5	Testing temperature: 25±2°C
6	Maximum Input Voltage (V p-p)	According to Fig.1 Test Circuit Oscilloscope: Tektronix TDS1002	Pulse Width: 0.333mS, Interval :20mS
7	Mean Time to Failure	Aging Equipment AWHY001	Testing temperature: 25±2°C
8	Operating Temperature (°C)	High-Low alternating temperature Cabinet	In normal room temperature, according to the Fig. 4 test circuit
9	Storage Temperature (°C)	High-Low alternating temperature Cabinet	In normal room temperature, according to the Fig. 4 test circuit

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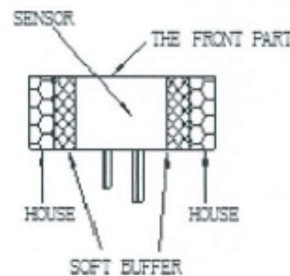
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NOTE:

1. Design Restrictions / Precautions

- This sensor is designed for use in air environment. Do not use it in liquid.
- In the case where secondary accidents due to operation failure or malfunctions can be anticipated, a fail-safe function should be incorporated into the design.
- In the case where this sensor is to be enclosed in an outer housing, a soft buffer material should be used between sensor and housing. The front convex part of this sensor vibrates with a large range. If this part is enclosed in an outer housing, its characteristics will vary. The top must be free to vibrate.



2. Usage Restrictions / Precautions

- To prevent sensor malfunctions, operational failure or any deterioration of its characteristics, do not use this sensor in the following, or similar conditions.
 - a) In strong shock or vibration.
 - b) In high temperature and humidity for a long time.
 - c) In corrosive gases or sea breeze.
 - d) In an atmosphere of organic solvents.
 - e) In dirty and dusty environments that may contaminate the sensor front.
 - f) Over specified allowable input voltage (Vp-p)
- Do not solder adding stress on outer lead , also do not apply stress like spin or pressure just after soldering.
- The leads must be supported firmly if formed.

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