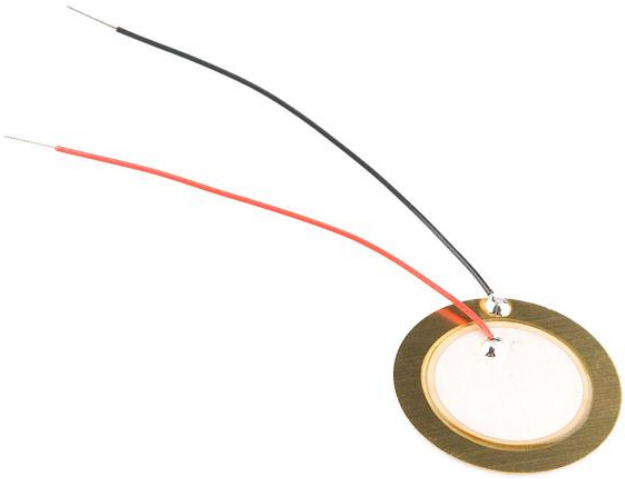
Handson Technology

Data Specs

Piezo Ceramic Element Diameter Ø35mm

A **piezo** is an electronic device that generates a voltage when it's physically deformed by a vibration, sound wave, or mechanical strain. Similarly, when you put a voltage across a piezo, it vibrates and creates a tone. Piezos can be used both to play tones and to detect tones.



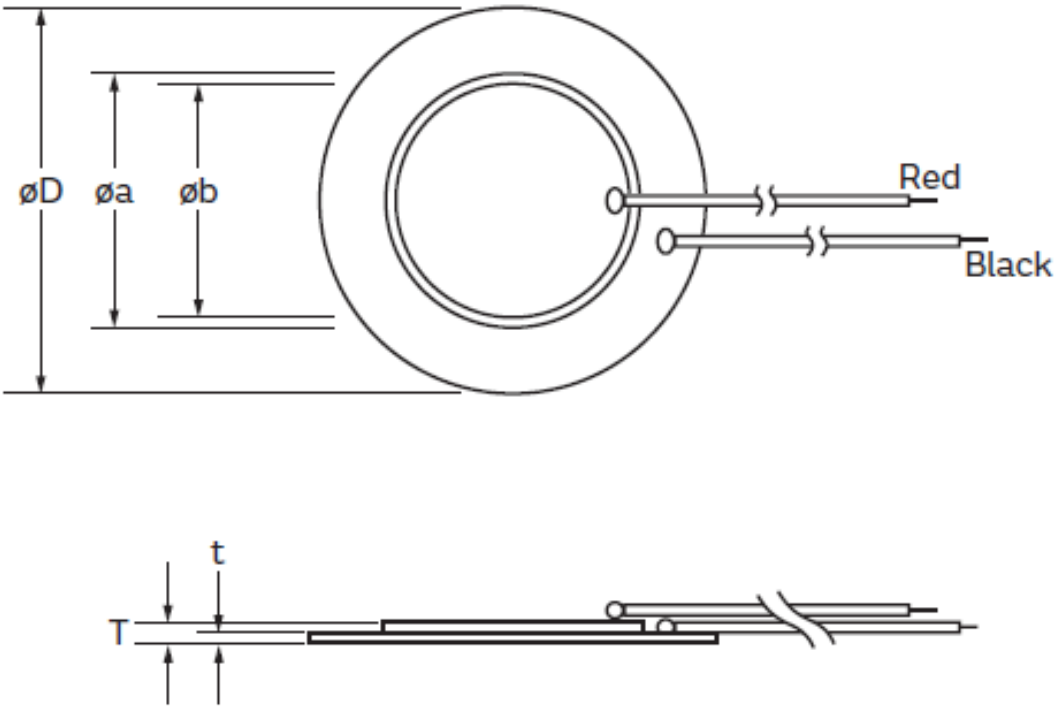
SKU: PAX1169

Brief Data:

- Diameter: Ø35mm.
- Lead Length: 55mm.
- Operating Voltage: 1 to 30Vp-p
- Resonant Frequency: 2,800 ±500Hz
- Resonant Impedance: ⩾ 200 Ω
- Capacitance at 120Hz: 25,000 ±30%pF
- Plate Material: Brass
- Operating Temperature: -20°C to +60°C
- Storage Temperature: -30°C to +70°C
- Lead Wire: 30AWG

Mechanical Dimension:

Unit: mm



Resonant Frequency kHz	Resonant Impedance Ω	Static Capacitance pF	Metal Disc ØD mm	Ceramic Disc Øa mm	Electrode Øb mm	Total Thickness T mm	Metal Disc Material
2.8	200	25,000	35	25	24	0.40	Brass

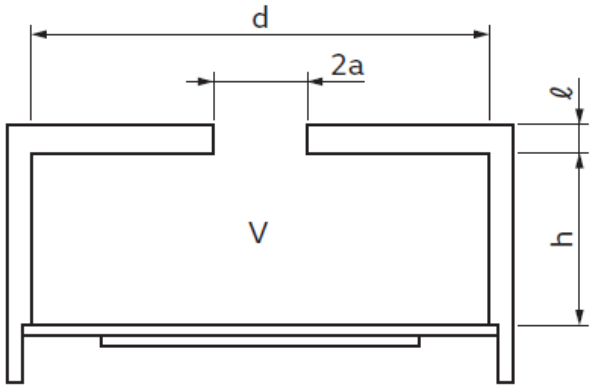
Application Circuits for Self-Drive Oscillation Buzzer:

The piezo effect works both ways: if you apply a voltage the piezo stretches, but also if it stretches it creates a voltage. This principle is used to create a feedback signal which drives the oscillator.

The advantage of the self-drive is that it will auto-magically work at its resonance frequency, where it produces the loudest sound. In 2-wire circuits the oscillator's frequency is independent of the piezo's resonance frequency, and it's the designer who has to make that they're close to resonance frequency.

Method above figure shows a typical application of the self-drive method. The piezoelectric diaphragm provided with feedback electrode shown in figure is involved in the closed loop of a Hartley types oscillation circuit. When the frequency is closed to the resonant frequency, the circuit satisfies oscillating conditions, and the piezoelectric diaphragm is driven with the oscillating frequency. Figure shows a simple oscillating circuit consisting of one transistor and three resistors. Proper resonance of the piezoelectric diaphragm by the node support provides stable oscillation with high mechanical Qm of vibration but also a single high pressure tone.

In general, the piezoelectric diaphragm is installed in a cavity to produce high sound pressure as in Fig.1 below:



$$fcav = \frac{C}{2}\sqrt{\frac{a^2}{V(\ell + 1.3a)}} = \frac{C}{2}\sqrt{\frac{4a^2}{d^2 h(\ell + 1.3a)}} \quad \cdots\cdots\cdots\cdots\cdots\cdots (1)$$

fcav : Resonant freq. of a cavity (Hz)
c : Speed of sound (cm/sec)
Ref) approx. 347 x 10^2cm/sec at 25°C
a : Radius of sound emitting hole (cm)
d : Diameter of a supporting rim (cm)
h : Depth of a cavity (cm)
ℓ : Wall thickness of a cavity (cm)

Fig. 1 Sectional View of a Cavity

Drive Method:

Fig. 2 shows examples of the circuit to which the external drive method is applied:

1. Fig-2. represent a circuit driven by output signals of the unstable multivibrator.
2. Fig-3. represent a circuit using 2 NAND gates, which is oscillated or stopped by ON/OFF operations of the input signal.
3. Fig-4. represent a circuit driven by output signals of CMOS LSI i.e. micro-controller.

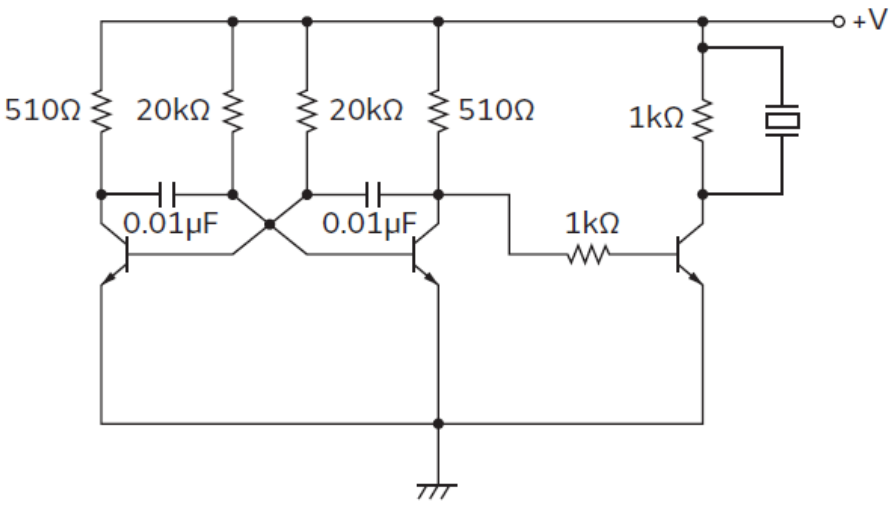


Fig.2

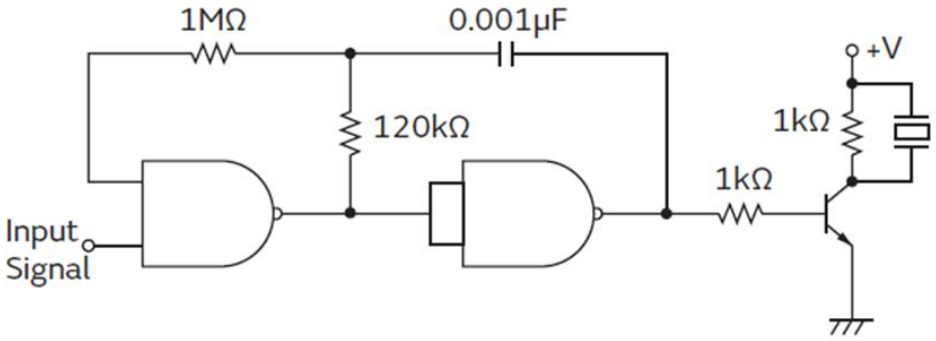

1MΩ
0.001μF
+V
120kΩ
1kΩ
1kΩ
Input
Signal

Fig.3

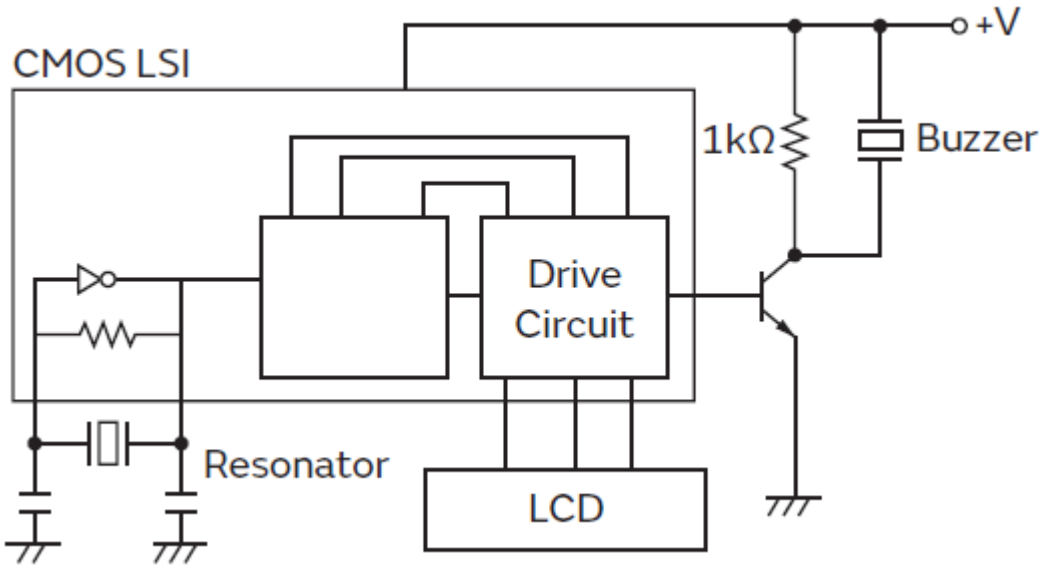

CMOS LSI
+V
1kΩ
Buzzer
Drive
Circuit
Resonator
LCD

Fig-4.

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