



NEW PRODUCT HIGHLIGHT

ULTRASONIC TRANSDUCERS

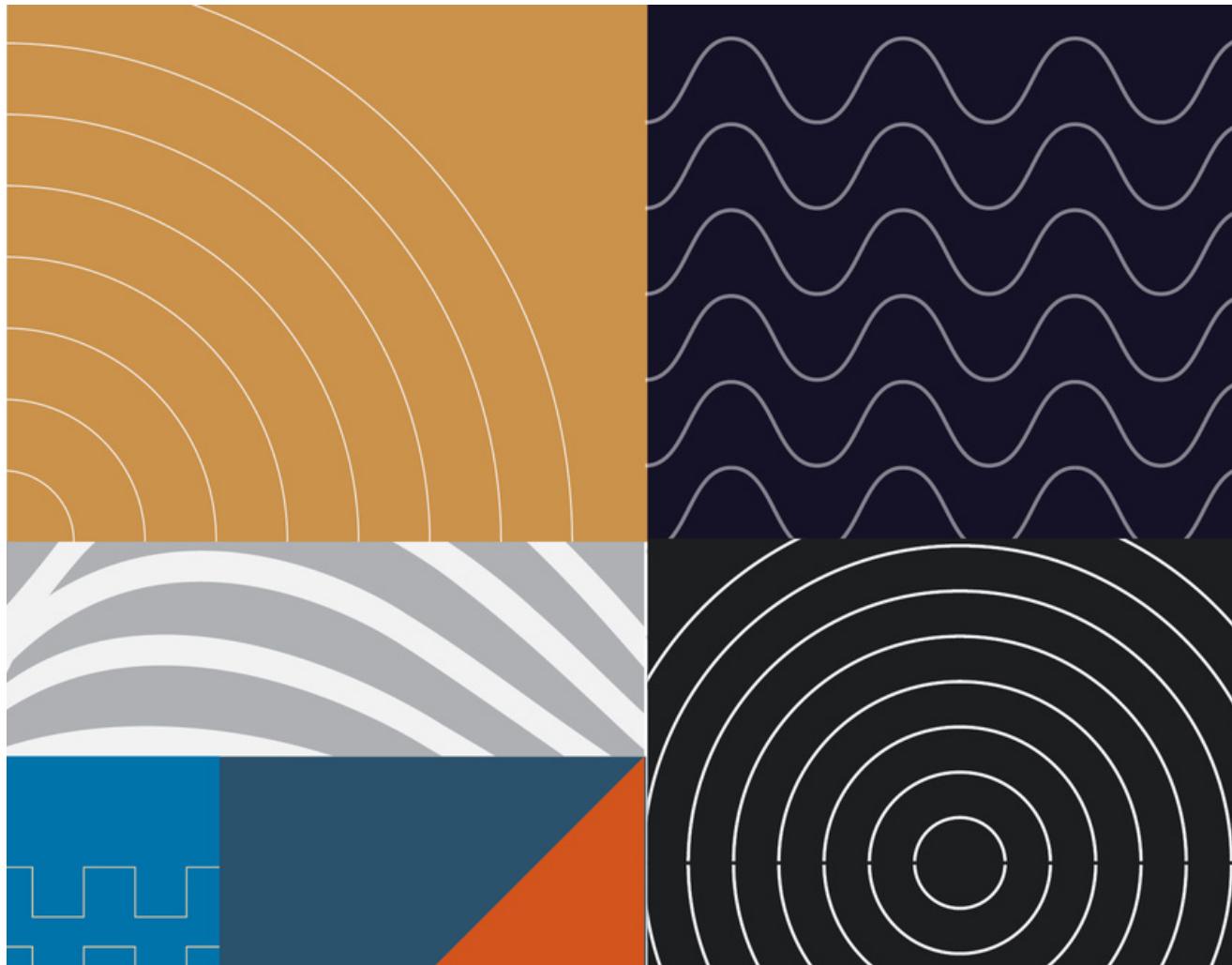


Table of Contents

New Part Numbers	2
Overview	3
Concept & Construction	4
How to drive an Ultrasonic Transducer	5

New Ultrasonic Part Numbers



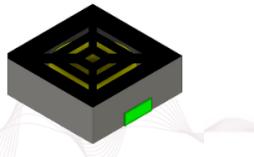
.....

SURFACE MOUNT TRANSMITTER & RECEIVER

SMUTR-1040K-TT

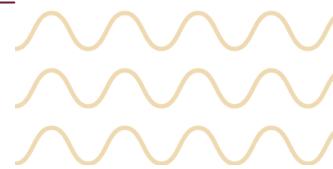
Maximum Input Voltage: 30 Vrms
 Capacitance @ 1kHz: $10,000 \pm 25\%$ pF
 Nominal Frequency: 40 ± 0.7 kHz
 Directivity: $80^\circ \pm 40^\circ$
 Transmitting Sensitivity: 115 ± 3 dBA
 Receiving Sensitivity: -65 ± 3 dBA
 Detectable Range: 0.2 – 1.5 m
 Operating Temperature: $-30 \sim +80$ °C

In addition to the dual mode configuration, we also have this part available just as a transmitter SMUT-1040K-T and a receiver SMUR-1040K-TT



.....

www.puiaudio.com



.....

HIGH FREQUENCY ULTRASONIC TRANSDUCERS

UTR-16295K-TT

KEY FEATURES

- Primarily for short range detection application
- Innovative acoustic material
- High precision
- Good directivity
- Excellent consistency

Frequency: 295 ± 15 kHz
 Sensitivity: $2750 \text{ mVp-p} \sim 750 \text{ mVp-p}$ (First echo)
 $2600 \text{ mVp-p} \sim 900 \text{ mVp-p}$ (Second echo)
 Directivity: 12° (typical)
 Capacitance: $1300 \text{ pF} \pm 20\%$
 Max Driving Voltage: 12 Vp-p continuous square wave
 120 Vp-p max number of pulse: 96, pulse interval: 30ms
 Operating temperature: $-20^\circ\text{C} \sim +70^\circ\text{C}$



.....

www.puiaudio.com



.....

HIGH FREQUENCY ULTRASONIC TRANSDUCERS

UTR-18225K-TT

KEY FEATURES

- Primarily for gas flow measurement application
- Innovative acoustic material
- Stable and reliable
- Good consistency

Frequency: 225 ± 15 kHz
 Overall Sensitivity: $140 \sim 240 \text{ mVp-p}$
 Beam Angle: 15° (Typical)
 Capacitance: $2200 \pm 20\%$ pF
 Operating Temperature: $-25 \sim +70^\circ\text{C}$
 Max. Driving Voltage: 12 Vp-p continuous square wave
 100 Vp-p max number of pulse: 96, pulse interval: 30ms



.....

www.puiaudio.com

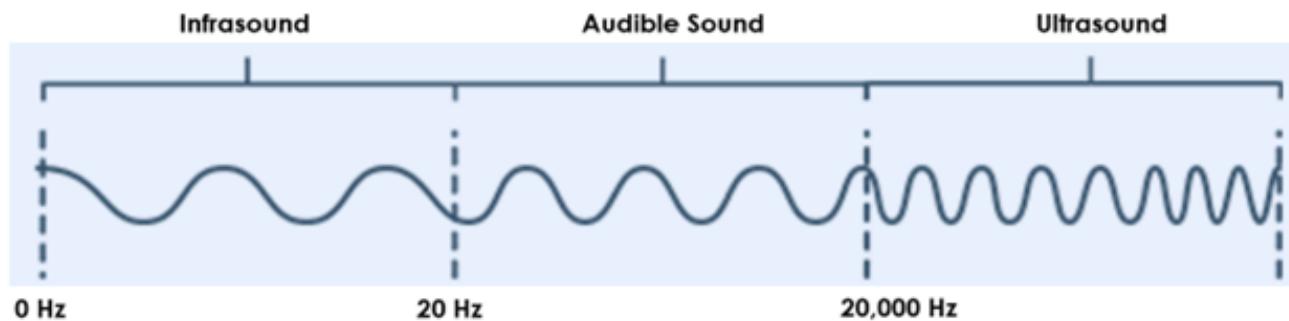
Additional ultrasonic products at

[www.puiaudio.com/products/
category/ultrasonics](http://www.puiaudio.com/products/category/ultrasonics)



Overview

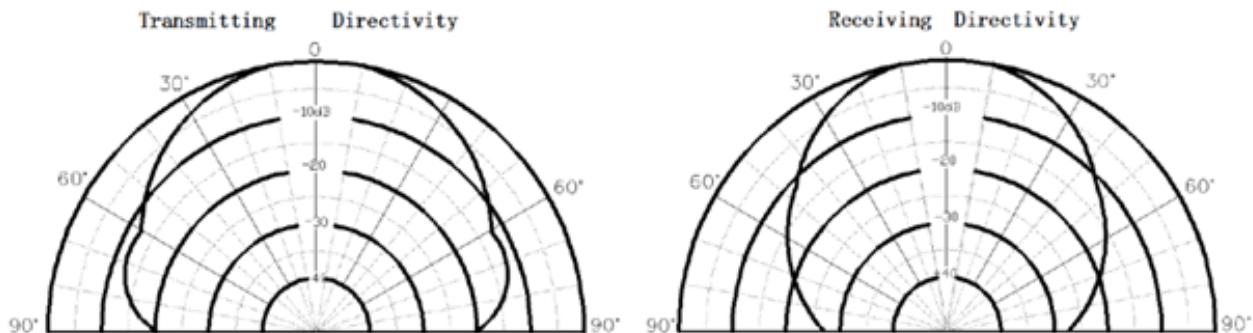
PUI Audio is excited to announce new surface mount ultrasonic transducers in a smaller package and new high frequency ultrasonic transducers up to 300KHz at a very competitive price. The high frequency sensor has utilized an innovative acoustic material to enhance the transmission ability of ultrasonic signals in the gas medium and for the short-range precision detection.



With COVID 19, there is a tremendous need for touchless/non-contact applications and these new ultrasonic transducers can be very beneficial for object detection, obstacle avoidance, level measurement, flow measurement, robotics, and automation control.

We are excited to launch these new ultrasonic transducers acting as transmitter and receiver providing accurate and reliable measurements in a variety of environments

The transmit pattern and the receiving pattern is shown as an example in the beam angle diagram below. The resonant frequency should be noted for each part number as the sensor may not work, be active, or will have bad accuracy results at other frequencies since the transmit SPL will become too low.



Concept

The principle of ultrasonics is based on a very simple concept, it calculates the distance based on the time required for sound waves to emit and reflect off from the object. The speed of sound varies by medium in which it travels so you have to consider the temperature and humidity environmental conditions.

The high frequency sensors with 225Khz and 295KHz can be used for accurate liquid and gas flow rate. For example, in a typical flow application, with the help of the two sensors, flow rate can be calculated given the distance and the transit time that it takes for sound to travel between the two transducers in both directions. This difference in time is directly proportional to the velocity of the liquid in the pipe.

Anything that gets in the way, such as dust or water, can inhibit performance. In certain applications, special; designed transducers are used to minimize detection of unwanted targets beyond the beam angle. The outer diameter of the transducer body can be used as a retention lip. Only the front/top area of the transducer is used to function. It would also be fine to use silicone to seal the parts.

Construction

There are two configurations available – Open Type and enclosed. Surface mount part numbers noted are open type structure and cannot be used in outdoor applications without considering protection scheme.

In general, these transducers consist of piezoelectric ceramics, metal plate, resonator, and resin case. Resonator has a funnel shape to transmit ultrasonic waves which is generated by vibration of resonator to the air efficiently (or to concentrate ultrasonic waves from the air on the center of resonance). Sound pressure level (S.P.L.) is the most important characteristic for ultrasonic transducers. For example, in measuring distance application, high S.P.L. transducer enables to detect the further distance.

The high frequency sensor with 225Khz is perfect as gas flow sensor and 295Khz for short range precision detection application.

How to drive an Ultrasonic Transducer

Transducers require a sinusoidal or square wave voltage driver to properly excite the transducer for oscillation at the specified resonant frequency.

There are two ways to drive a transducer: in transformer mode typically for closed-top transducers configurations or in direct drive mode (Half-bridge or full bridge). This is determined based on the maximum drive voltage of the selected transducer. PUI Audio has evaluated PGA460 from The Texas Instruments which is an ultrasonic sensor signal conditioner that acts as the driving source and receiving amplifier for the accompanying ultrasonic transducer. Although direct drive is the lower-cost technique, it is typically intended for short range, open-top applications. Transformer drive maximizes closed-top transducer requirements (beyond 100 Vpp), but it also requires additional calibration at mass production due to potential performance losses associated with each component.

Source: Texas Instrument

PUI Audio can also provide a specialized circuit for reference, given the application requirement as shown in Fig below.

