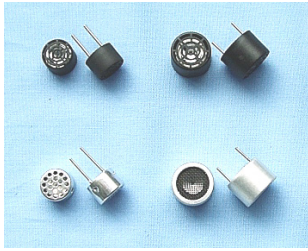


Air Transmission



Ultrasonic Sensor



NIPPON CERAMIC Co., Ltd.
15-2 Nan-ei-cho, Tottori-shi 689-1193 JAPAN
TEL 81-857- 53-5741 FAX 81-857-53-3675
E-mail ut-sales@nicera.co.jp
URL <http://www.nicera.co.jp>

Features

Air transmission ultrasonic sensors using piezo ceramic elements transmit or receive ultrasonic sound in air. They have wide application in measurement and communications. Nippon Ceramic can offer a wide range of standard products or can provide optimal solutions to your specific requirements.

Type

• OPEN APERTURE TYPE

High sound pressure, high sensitivity sensor with unimorph and radial cone construction. Open aperture is especially for air medium application.

Low reverberation type is also available for pulsed driving.

Standard housing size : $\Phi 10$, $\Phi 12$, $\Phi 16$ [mm]

Standard frequency : 25, 32, 40[kHz]

• CLOSED APERTURE TYPE

Water drip proof, dust proof outdoor model. All the components are enclosed in metal housing. Metal surface treatment is available for severe ambient condition.

Standard housing size : $\Phi 14$, $\Phi 15$, $\Phi 18$ [mm]

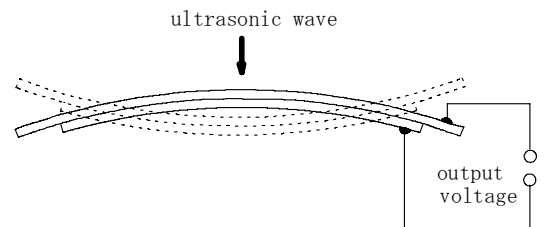
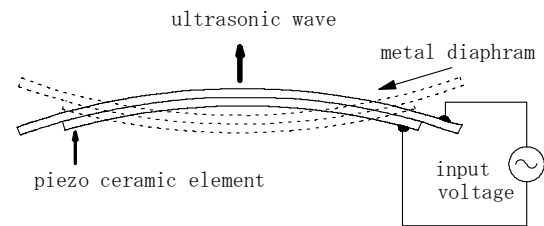
Standard frequency : 40~60[kHz]

Application

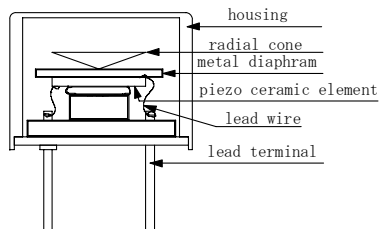
No.	Application	Method
1	Car alarm system	Doppler
2	Lighting control	"
3	Parking aid sensor	Pulse burst
4	Automatic door control	"
5	Liquid level measurement	"
6	Distance measurement	"
7	Traffic signal control	"
8	Robot	"

Principle of operation

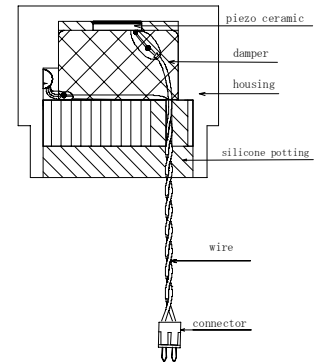
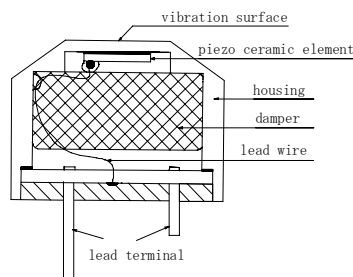
When driven from an alternating voltage source of suitable frequency, the polarized piezoelectric element mechanically distorts in proportion to the applied voltage generating a sound field. Conversely an element subjected to such a sound field will generate a voltage proportional to its intensity. The effect can be enhanced by gluing the element to a metal diaphragm, which is known as unimorph structure. When signal voltage is applied to this unimorph vibrator it creates a bending vibration. When the signal frequency meets the mechanical resonance frequency the vibrator transmits ultrasound most efficiently. This operation is used as a transmitter. When incoming ultrasound vibrates the vibrator at resonance frequency the mechanical bending vibration efficiently generates electric voltage between the vibrator electrodes. This operation is used as a receiver.



Open Aperture Type



Closed Aperture Type



◆ Model code description ◆

(example) (P) (T) (40) - (18)

※1 ※2 ※3 ※4

※ 1 : P : Closed Aperture

※ 2 : T : Transmitter

R : Receiver

C : Common

※ 3 : Center frequency [KHz]

※ 4 : Housing diameter [mm]

Specifications

◆ Open Aperture Type ◆

Item		Center Frequency (kHz)	Sound Pressure (dB)	Sensitivity (dB)	-6dB Directivity Typical (deg)	Equivalent Circuit				Appearance
						Cb (pF)	R (Ω)	L (mH)	Ca (pF)	
Type	Model									
Transmitter / Receiver	T/R2516A1	25	> 110	> -65	80	Ⓢ 2000	100 0	130	130	C
						Ⓢ 2400	100 0			
	T/R4010A1 ※3	40	122±3	-62.5±3	100	2700	700	80	200	A
	T/R4012A1		> 112	> -70	85	2100	100 0	80	100	B
	T/R4016A2		> 115	> -67	55	2100	800	130	130	C
T/R4016A1	> 115		> -67	55	2100	800	130	130	D	
Common use	C4016A1	-	-	※1 > -58	55	2200	170 0	140	100	C

※1 : Reflected sensitivity

※2 : All products Maximum input voltage 20Vrms

(10Vrms is exceptionally applied to the 10mm diameter products)

※3 : 3 colors are available; Black, Beige, Gray

◆ Appearance I ◆

A	B
C	D

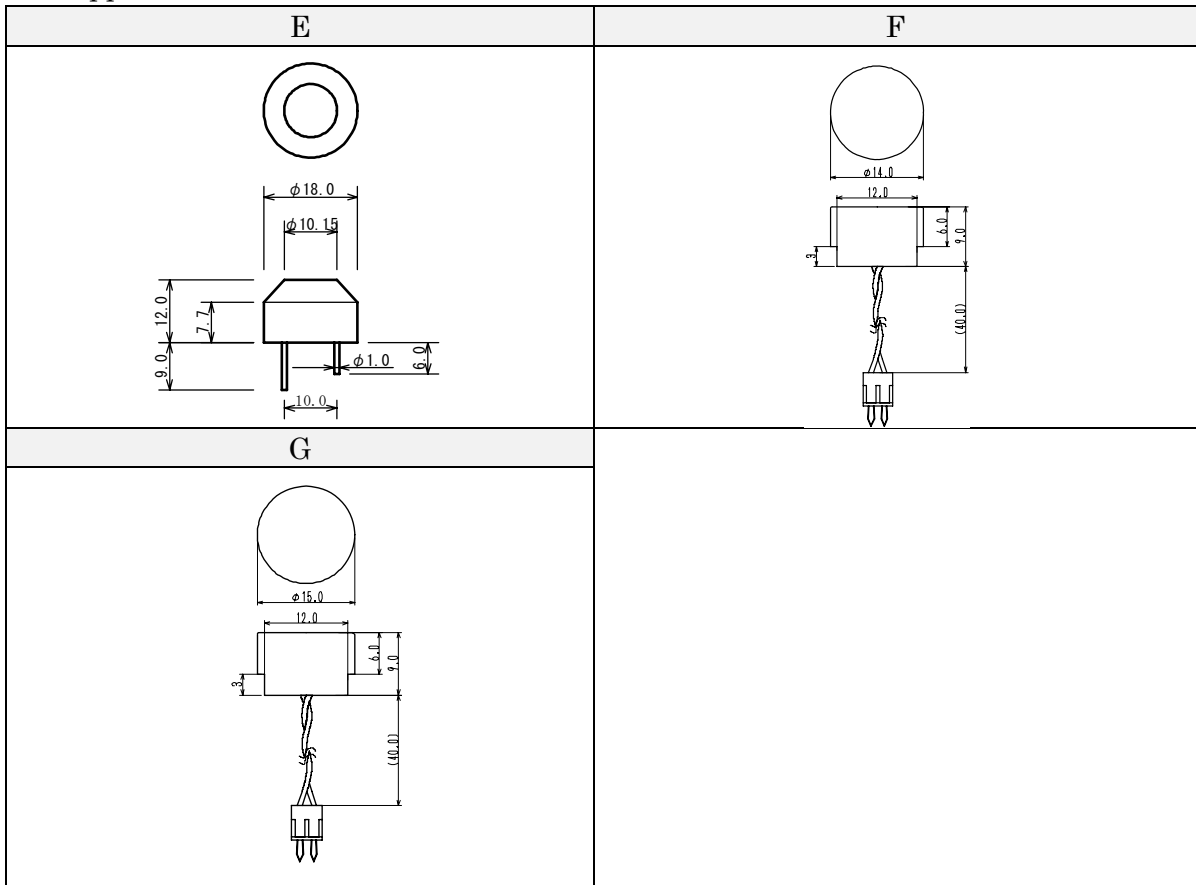
※Designs and specifications are subject to change without notice.

◆ Closed Aperture Type ◆

Item		Center Frequency (kHz)	Sound Pressure (dB)	Sensitivity (dB)	- 6dB Directivity Typical (deg)	Equivalent Circuit				Appearance
						Cb (pF)	R (Ω)	L (mH)	Ca (pF)	
Type	Model									
Conical	PC40-18S	40	>100	- 80	80	2200	400	130	130	E

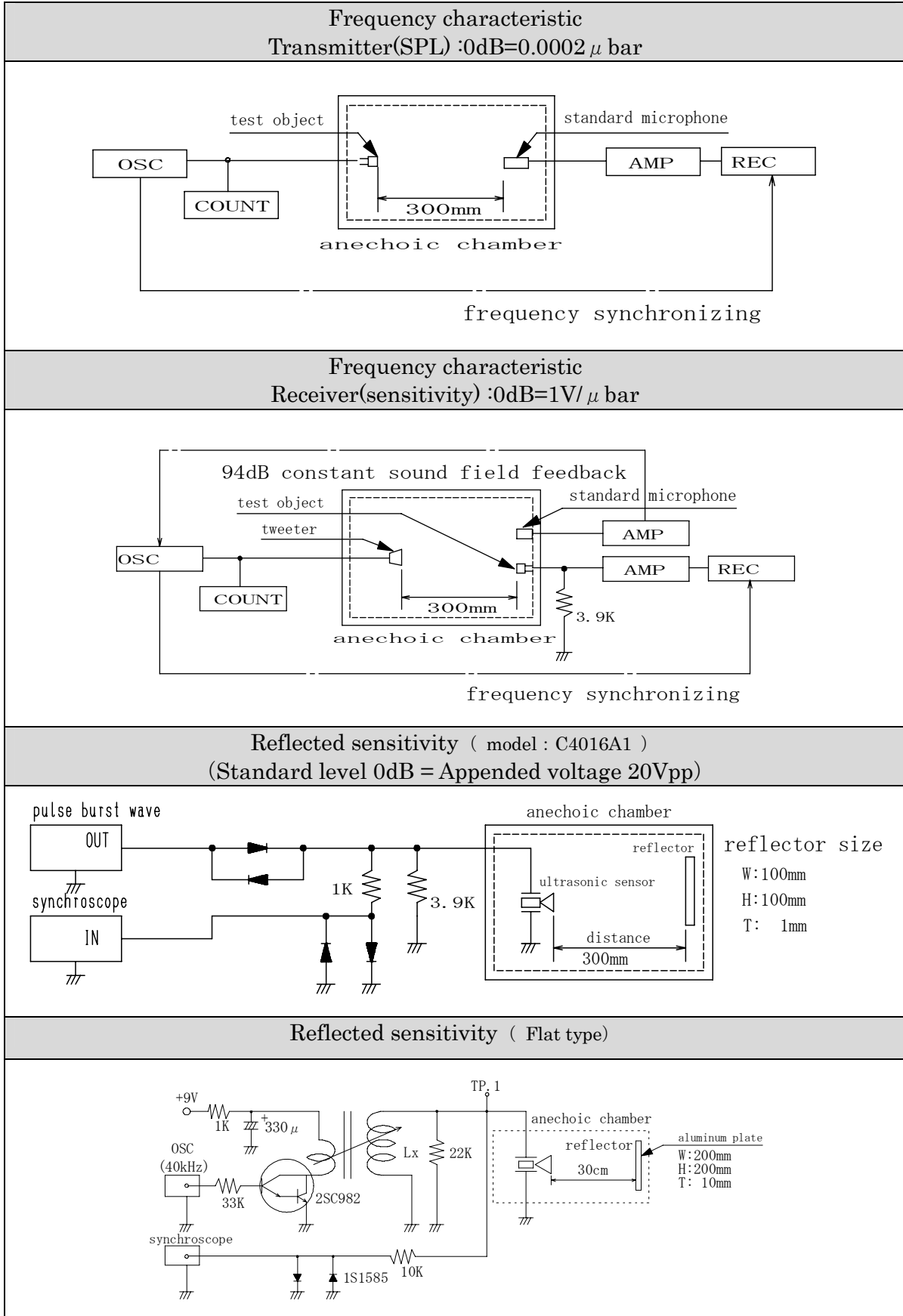
Item		Center Frequency (kHz)	Decay Time (msec)	Reflected Sensitivity (mVp-p)	- 6dB Directivity (deg)		Equivalent Circuit				Appearance
					Horizontal	Vertical	Cb (pF)	R (Ω)	L (mH)	Ca (pF)	
Type	Model										
Flat	PC40S14A1	40	1.5>	>1	115	52	3190	460	74	209	F
	PC40S15A1		1.5>	>1	110	50	1650	1700	110	150	G

◆ Appearance II ◆

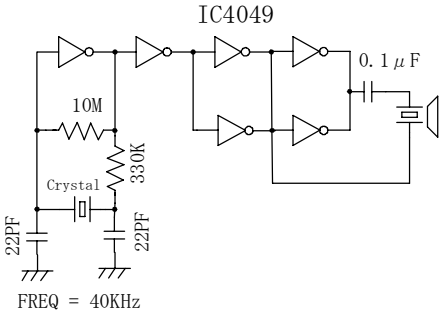
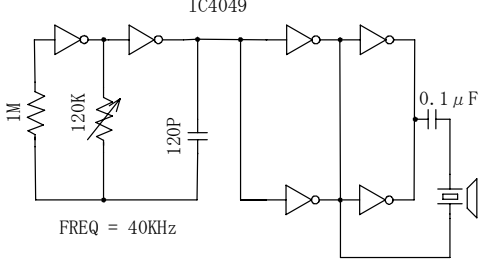
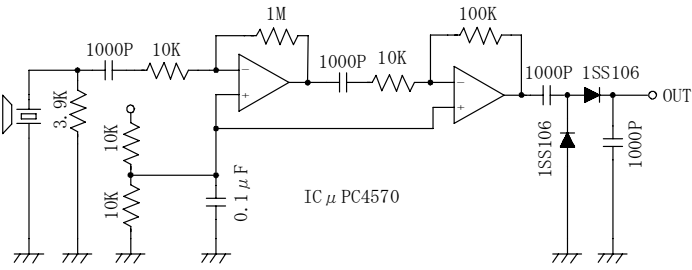
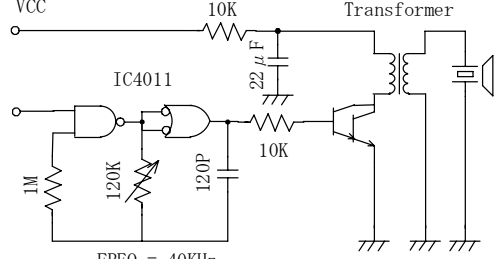
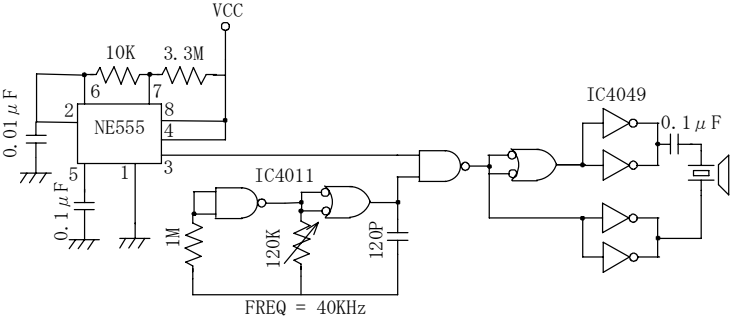
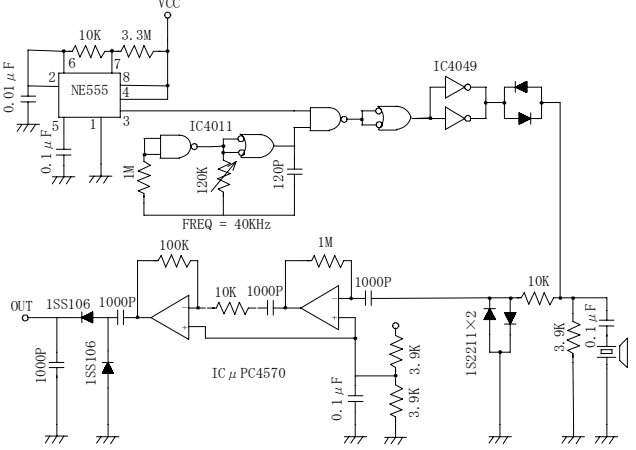


※Designs and specifications are subject to change without notice.

Test circuit



Reference circuit

1. Crystal-oscillating circuit	2. C&R-oscillating circuit
 <p>IC4049</p> <p>FREQ = 40KHz</p>	 <p>IC4049</p> <p>FREQ = 40KHz</p>
3. Receiver circuit	4. Voltage multiplier circuit
 <p>IC μ PC4570</p> <p>FREQ = 40KHz</p>	 <p>IC4011</p> <p>FREQ = 40KHz</p>
5. Pulse transmitter circuit	
 <p>FREQ = 40KHz</p>	
6. Transmitter/ receiver circuit	※ Precaution to be taken in use ※
 <p>FREQ = 40KHz</p>	<ol style="list-style-type: none"> 1. Locate sensor paying attention to the direction of radiation. 2. Do not apply DC voltage to avoid insulation resistance deterioration. 3. Sensor is designed for air transmission, not water. 4. Hold the sensor housing with soft material like sponger rubber to avoid noise upon impact.