

## LCP for Diaphragm 「SARAS」

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Now that products are becoming more sophisticated, there is a demand for higher performance in audio equipment.

In a word, the true nature of sound is the vibration of air. The vibration of air is received by the eardrum of the ear, converted into nerve signals, and transmitted to the brain, which is recognized as "sound."

The diaphragm, which is a key part of the speaker, has the role of radiating mechanical vibration into the space as an acoustic signal. It requires high Young's modulus, high internal loss, low density and durability.

To put it simply, a material that is light and hard to bend is a good material.

Until now, paper has been the mainstream for diaphragms, but recently it has evolved into new materials other than paper. In the movement to find an ideal material to replace paper, there is no new polymer material with acoustic characteristics that exceeds the LCP of super engineering plastics, which has excellent high-frequency electrical characteristics as a speaker diaphragm material.

A microphone is a machine that receives physical signals "ultrasonic waves" and converts them into electrical signals. A speaker is a machine that produces sound by converting electrical signals into physical signals "ultrasonic waves". High elastic modulus, light weight, and high vibration loss are the main characteristics required for the diaphragm material, which is the main material for such audio components. In other words, the conversion efficiency is good and the natural vibration "resonance / sound distortion" is small.

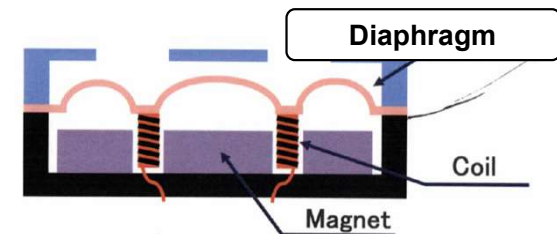
The performance required for an ideal speaker is that it is faithful to the original sound and has no distortion, and that it emits sound with the same sound pressure and the same sound quality in all directions. The shape and size of the diaphragm have been devised to achieve these goals. The mainstream diaphragm shapes are cone-shaped for bass and cone-shaped and dome-shaped for treble. The human audible range is about 20Hz to 15kHz. Therefore, it is necessary to ideally vibrate one type of diaphragm over a wide frequency range to achieve distortion-free acoustic characteristics.

"Example of diaphragm material"

Paper : bass

Polymer : Bass to midrange

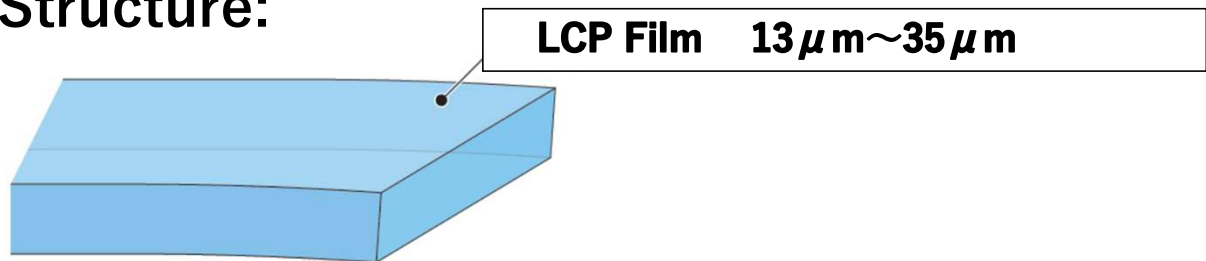
Metal : treble



# Specification

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## Structure:



## Sizes:

Products	Thickness(μm)	Color	Standard Roll Size
SAR 13	13	Brown	300mm x 20M
SAR 20	20		
SAR 25	25		
SAR 30	30		
SAR 35	35		



\*Please inquire for more different thickness and width



## LCP for Diaphragm 「SARAS」

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KGK LCP「SARAS」 is a harmony film which has the feature that “stiffness like metal and softness like rubber”. As a speaker diaphragm material, it produces delicate and high sound, moreover, makes the sound sensitive and low distortion.



# KGK VS Other Film Comparison Data

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- ① LCP is superior to PET in the sounds expression which is hard to resonate, sensitive, and delicate.
- ② LCP is superior to PEEK in the sounds expression which is able to suppress the higher harmonic and hard to resonate.

## LCP characteristic test

### 1, Evaluation samples and points

Samples LCP film thickness: 0.025mm  
 PET film thickness: 0.025mm  
 PEEK film thickness: 0.029mm

Points Viscoelastic characteristic confirmation  
 examination by the change of extension  
 vibration load frequency.  
 measurement condition  
 storage modulus· loss modulus between 1Hz and  
 100Hz.

### 2, Performance evaluation test

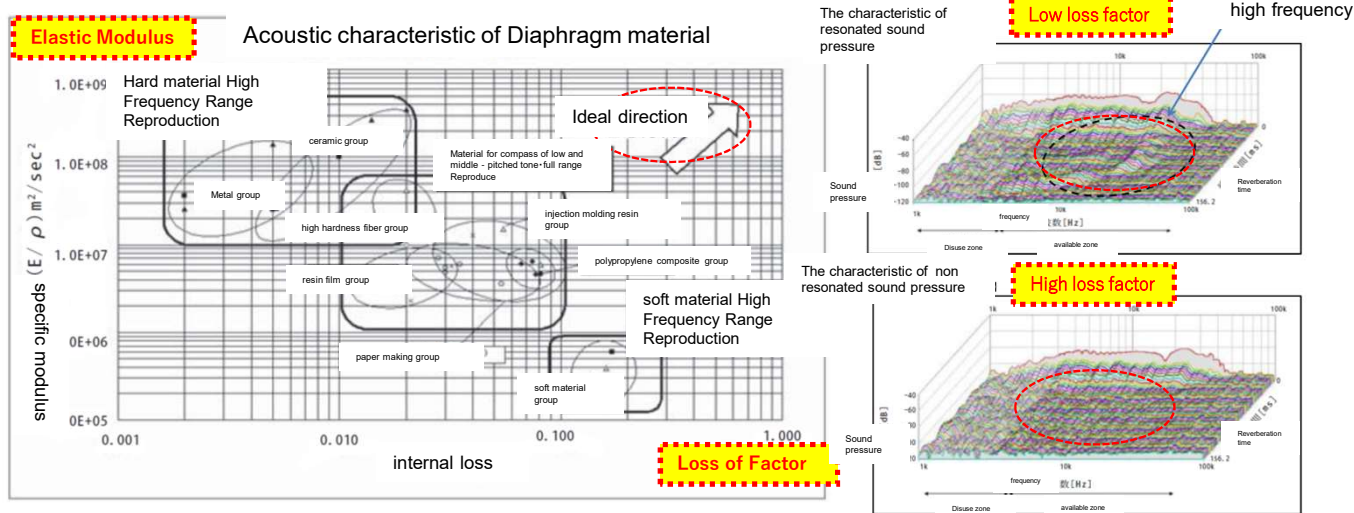
(2-1) test conditions

measuring instrument A and D  
 Sensor stretching vibration  
 Load 400gf  
 Frequency 1Hz~100Hz

## Test results

	Density	Density	Poisson's ratio	Elastic mod MPa	Elastic mod Pa	Ela mod dyne/cm2	sonic speed cm/sec	sonic speed m/sec	Loss factor
	g/cm3	kg/m3							
LCP	1.4	1400	0.39	2.9E+03	2.9E+09	2.9E+10	203273.7	2033	0.042
PET	1.39	1390	0.39	2.5E+03	2.5E+09	2.5E+10	189412.6	1894	0.025
PEEK	1.33	1330	0.39	4.2E+03	4.2E+09	4.2E+10	251282.0	2513	0.007
magnesium	1.7	1700		22000	2.2E+10			5140	0.005
aluminum	2.7	2700		6860	6.9E+09			5130	0.002

sonic speed A large value can express a delicate sound  
 loss coefficient A low value is easy to make resonance at specific frequency



# Frequency characteristics, THD Data

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Test Conditions

Test Sample

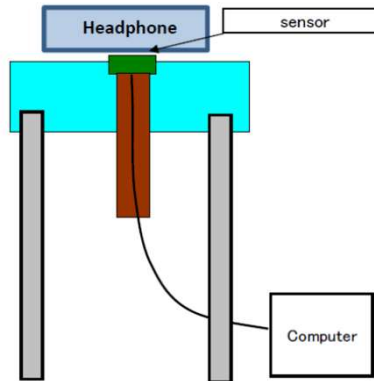
Headphone used LCP-film  
Headphone used PEEK-film



## Conclusion

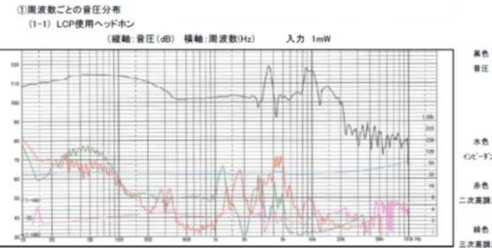
The head phone that used LCP-film has superiority as follow.

Has bass sound  
Less noise at high sound

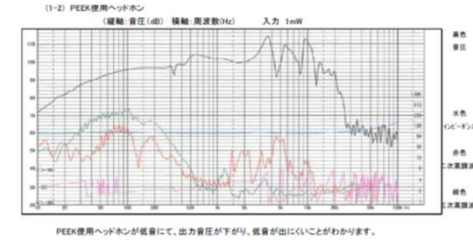


## ① Sound pressure level(SPL) for various frequency

### LCP Headphone

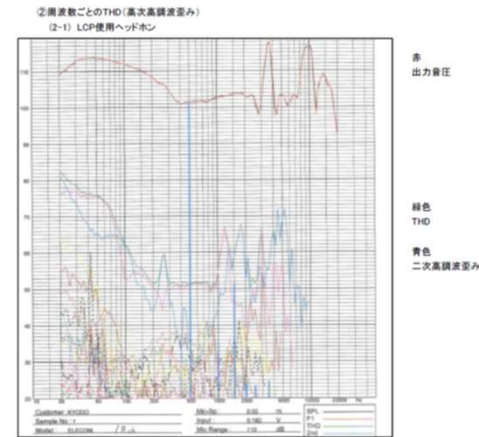


### PEEK Headphone

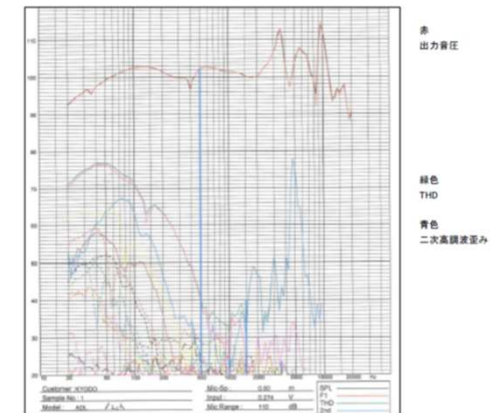


## ② THD properties

### LCP Headphone



### PEEK Headphone



# End of presentation

User is responsible for determining whether the KGK product is fit for a particular purpose and suitable for user's method of application. Please remember that many factors can affect the use and performance of a KGK product in a particular application. The materials to be bonded with the product, the surface preparation of those materials, the product selected for use, the conditions in which the product is used, and the time and environmental conditions in which the product is expected to perform are among the many factors that can affect the use and performance of a KGK product. Given the variety of factors that can affect the use and performance of a KGK product, some of which are uniquely within the user's knowledge and control, It is essential that the user evaluate the KGK product to determine whether it is fit for a particular purpose and suitable for the user's method of application. KGK make no warranties on above data.

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