



FILMSPEAKER is an ultra thin electrostatic speaker based on a PVDF film, which is both extremely spectacular and offers the possibility to apply any kind of visual display (paper, poster, picture etc..) so that you have a thin audio & visual communication tool.

Whether it is a simple computer speaker or other speaker applications, FILMSPEAKER brings various benefits compared to conventional speakers.

Not only does the FILMSPEAKER allow more creativity to existing speaker applications, but it also gives new opportunities to apply speaker and sound systems in areas where speakers were not even thought of.

- \* No magnetic field      Can be used near other electronic devices
- \* Thin and Light          FILMSPEAKER is almost as thin as paper and is very light weight
- \* Easy to customize      No magnetic or ceramic parts means that the film can be made in any shape and size
- \* Durable                    Protective plastic coating, gives superior durability, compared to the paper membrane of traditional speakers
- \* Cost effective            FILMSPEAKER is much more competitive than conventional speakers, when it comes to production cost
- \* Printable                 Color printing is possible, giving opportunities to use where both visual and audio effects are needed. E.g. advertisement applications

**Applications:** There are many applications for plastic-FILMSPEAKERS. They can be made transparent and placed in front of computer monitors or TV screens; they can even be made into banners or kites with graphics or text printed on them. The flexible plastic film can be shaped and molded as needed; for example, it can be formed into a cylinder with a very uniform radiation pattern, allowing it to be incorporated into a light scone and other architectural design elements.

### Applications of the product

- Information desk FILMSPEAKER
- Advertising (shelves, banners)

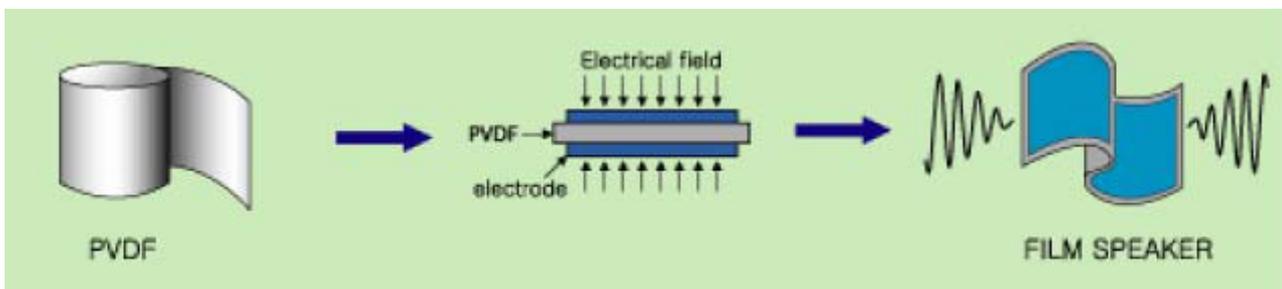
## Technical Information

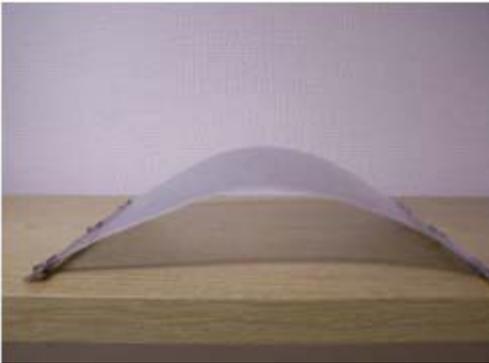


Conventional speaker transmits sound by changing it into electric signal to feed through electric wires or waves, and via a diaphragm the air vibrates reproducing sounds. This technology requires large space and rigid cone or oval shape.

The Core material of the Film speaker is poly-vinylidene fluoride (PVDF), which itself lacks conductive abilities. However, through a new high frequency surface modification technology, the surface can be transformed into hydrophilic or hydrophobic property, making it possible for us to form electrode on the PVDF surface, and thus Sheet thickness varies from  $40\mu \sim 150\mu$ . This should be compared to a normal A4 paper sheet, which has a thickness between  $80\mu \sim 100\mu$ . Film Speaker available at 40, 80, 110 and  $150\mu$ . Thicker sheets gives better low frequency performance.

Another factor which affects the sound quality, is the 3D shape of the speaker sheet. The Film Speaker requires a certain angle/radius in order to produce sufficient volume. Basically the sheet performs anywhere from 1 degree to 360 degrees, but the optimal angle/radius lies between 15 and 45 degrees.





As shown in the table below, the Film Speaker outperforms any conventional speaker (of comparable size) in every aspect. The only exception is the lower frequencies between 100 and 249Hz. This is compensated by using a separate sub woofer that covers the low frequencies. However, the only occasion where a sub woofer is applied, is when the Film Speaker is used for HiFi experiences, where bass frequencies plays a key role.

### Test conditions

Film thickness:	80µm
Conductivity Polymer Thickness:	1000Å
Size:	175 x 250mm
Input voltage:	150Vrms
Distance to microphone	1m

CLASSIFICATION	FILM-SPEAKER
PVDF Thickness	80µm
Conducting Polymer Thickness	1000Å
Power Consumption	6.5W (at 100V)
Power Source	110, 220V
Frequency	400Hz ~ 20kHz
Impedance	500Ω at 10kHz 2kΩ at 1kHz 15kΩ at 100 Hz
Dielectric Breakdown Strength	10k ~ 12kV / 40µm
Temperature	-40°C ~ 70°C
Diffusivity	360°
SPL	108dB at 3kHz