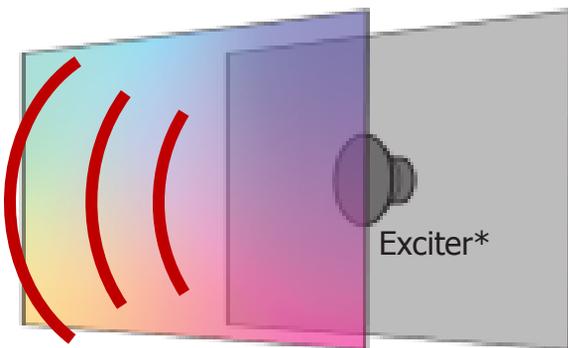


A study on the optimal speaker position for improving sound quality of flat panel display

This “OLED Panel Speaker” was developed by attaching exciters on the back of OLED panels, which do not have backlights. Synchronizing the video and sound on screen, OLED Panel Speaker delivers clear voice and immersive sound. This technology which only can be applied to OLED, is already adopted by some TV makers and receiving great reviews and evaluations .

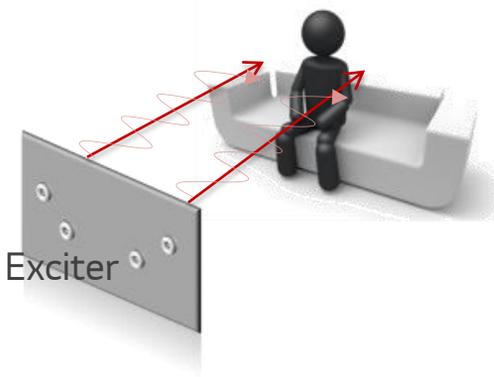
Screen creates sound



* Exciter : invisibly vibrates the screen to create sound-waves

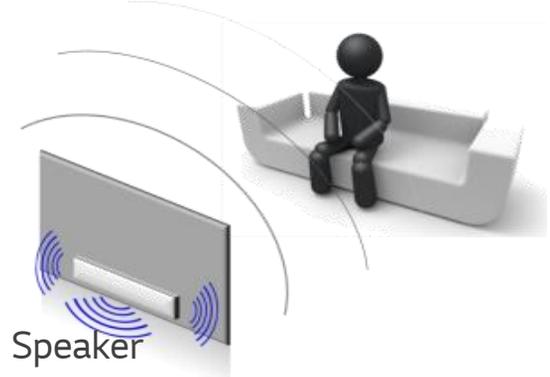
Direct sound

OLED Panel Speaker



“Front Firing” Sound

Conventional



“Down Firing” Sound

A study on the optimal speaker position for improving sound quality of flat panel display

Sungtae Lee, owenlee@lgdisplay.com

Kwanho Park, khpark12@lgdisplay.com

Hyungwoo Park, pphw@ssu.ac.kr

Myungjin Bae, mjbae@ssu.ac.kr

37-8, LCD-ro 8beon-gil, Wollong-myeon Paju-si, Gyeonggi-do, Korea (the Republic of)

With the continuous development of display industry and progress of IT technology, the display is gradually becoming more advanced.

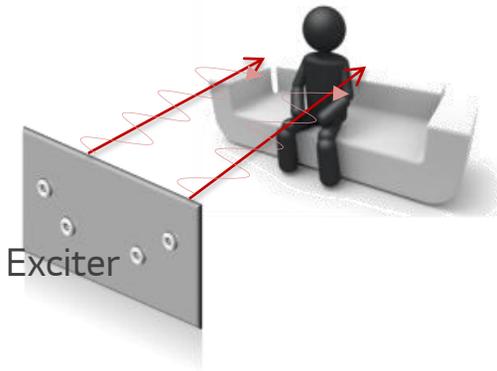
Throughout the development in display technology followed by CRT to LCD and OLED, TVs have evolved to offer much better picture quality.

The remarkable development of picture quality has enabled to receive positive market reactions.

In the mean time, relatively bulky speaker was hidden behind the panel to make TVs thin.

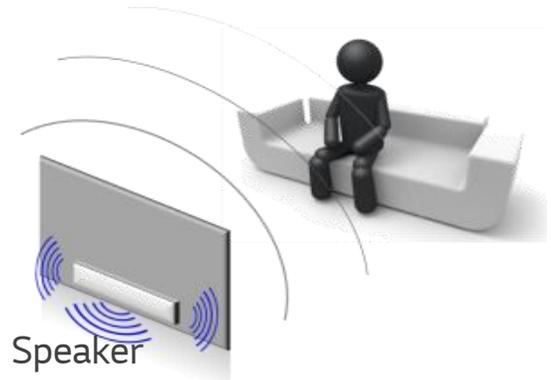
TV sound could not keep up with the progress of the picture quality, until LG Display developed Flat Panel Speaker using the merit of OLED panel thickness, less than 1mm.

OLED Panel Speaker



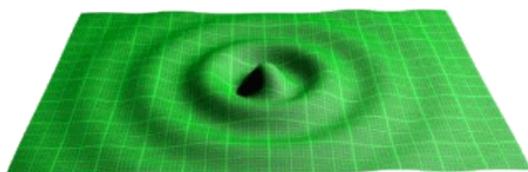
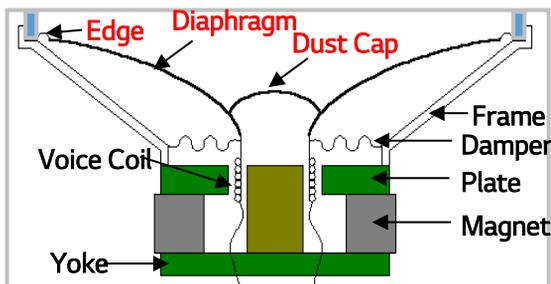
“Front Firing” Sound

Conventional

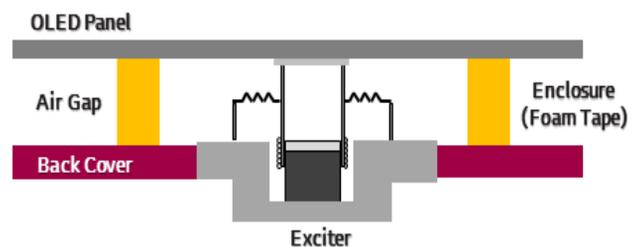


“Down Firing” Sound

To realize the technology, we developed an exciter that simplifies the normal speaker structure. Specially-designed exciters are positioned at the back of the panel, invisibly vibrate the screen to create sound.



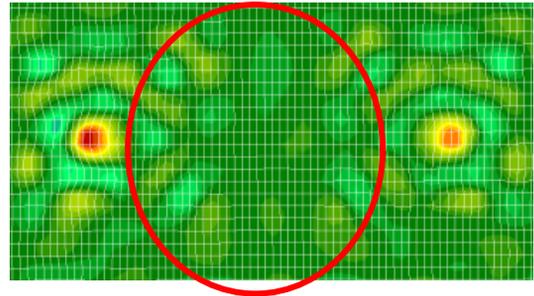
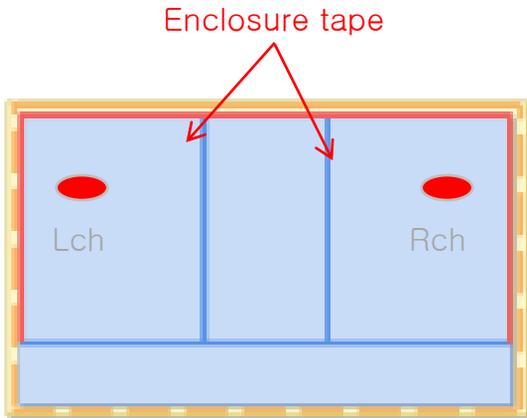
Normal Speaker



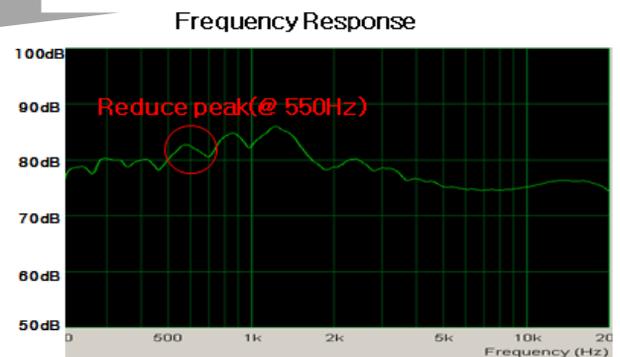
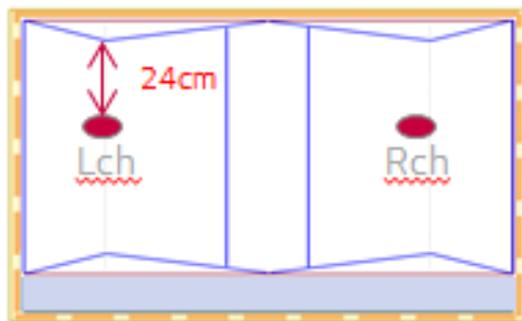
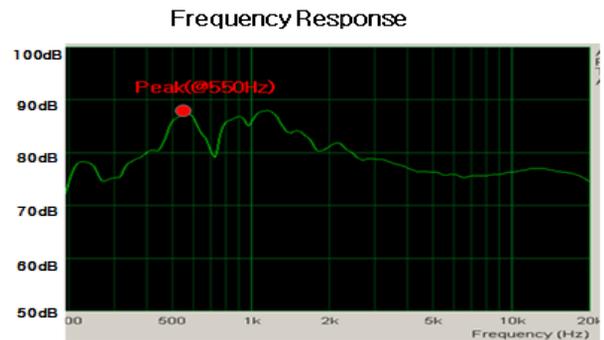
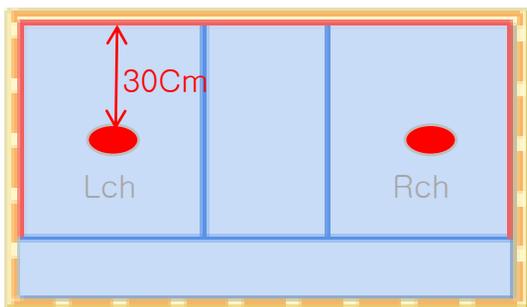
Exciter

A study on the optimal speaker position for improving sound quality of flat panel display

We developed and applied an enclosure structure in order to realize "stereo sound" on one sheet of OLED panel and found positive results through vibrational mode analysis.



Depending on the shape of enclosure tape, there are Peak/Dip at a certain frequency created by standing wave. Changing the shape of peak and dip frequencies to $1/3 \lambda$, the peak is improved by 37% from 8dB to 5 dB.



When this technology applied, the sound image moves to the center of the screen, maximizing the immersive experience and enabling the realistic sound.

