

New Concept Ultra Short Throw Projector for Consumer

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ABSTRACT

To suggest super bright large screen and powerful sound for small living room like Japan, we realized that we put both large screen and powerful sound to small box. Also by using ultra short throw device and wireless function, we realized easy installation. We suggest immersive entertainment experience in living room for customer by this kind of device which we named "Interior Theater".

1 INTRODUCTION

Flat panel TV gradually shifts to large screen size like 65" because the price of large screen TV goes down. However, our living space doesn't enlarge. So flat TV influences on interior design much more. To solve such kind of problems we suggested and introduced a new concept projector for consumer.

2 PRODUCTION TECHNOLOGY

2.1 Overview of structure

This product consists of light engine module, speaker module, PCB part and outer cabinet roughly. (Fig 2)



Figure 1. Overview of new concept projector

Mirror, lens, fan, color wheel, lamp and DLP devices are included in the light engine module.

Speaker module consists of 2 piece of 4W front squawkers, 2 piece of 4W side squawkers, 2 piece of passive radiators, 2 piece of 8W woofers and special customized speaker box.

PCB realizes the wireless function for example WiFi, Bluetooth, mirroring and DLNA function.

Outer cabinet has open/close mechanism cover, exhaust heat louver and fabric material.

All of these items are very special so we could realize such small projector with built-in high power speakers and suitable for living room design.

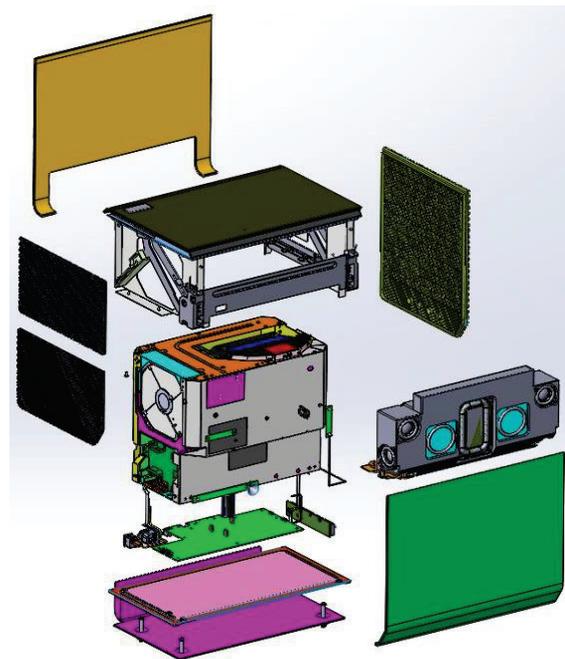


Figure 2. Internal mechanism

2.2 Realizing both bright image and impressive theater sound by one small box

To realize both bright image and high power sound, we need to solve vibration issue.

Ultra short throw projector is easily influenced by vibration. On the other hand, high power speaker usually

makes vibration. To avoid vibration issue, in speaker unit we put 2 passive radiators and 2 side squawkers symmetrically. Thanks to such placement, the vibration of speaker unit is reduced. (Fig 3)

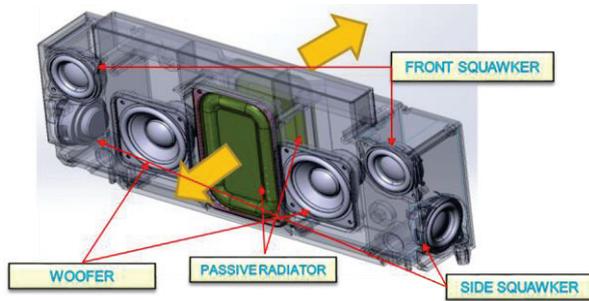


Figure 3. speaker unit

However, vibration of speaker unit is still remained. So to avoid the vibration transmit to light engine module, we completely split light engine module and speaker unit in the same box. Additionally, we attached 10 anti-vibration rubbers. So that vibration of speaker is not transmitted to light engine module. (Fig 4)

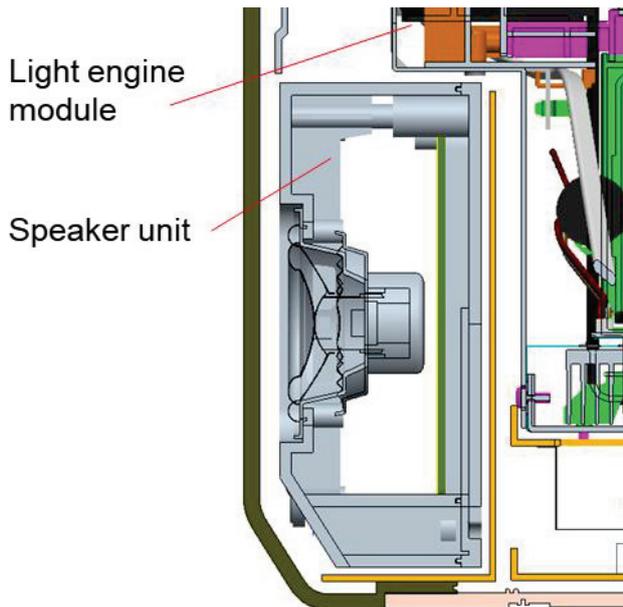


Figure 4. placement of speaker unit and light engine module

2.3 Refined design which matches with interior

Design is important for living projector. Especially we stick to 2 point. One is compact size. Another is to match with interior.

Regarding size, we aimed A4 size projector. To minimize the size, we customized the shape of speaker

unit without spoiling sound quality. (Fig 3)

Additionally, we avoid the interference between exhaust heat area and the hinge of cover with keeping the size of cover hinge. (Fig 5)

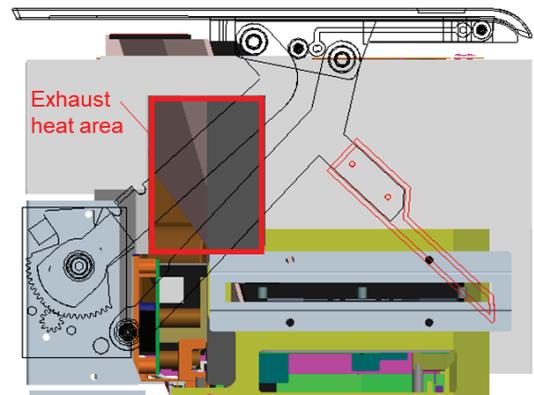


Figure 5. hinge of cover

To match with interior design, we adopted cover mechanism and fabric material cabinet.

Thanks to this cover, we can protect that customer sees direct light when customer uses it and we realized to match with interior and it doesn't look like projector when customer doesn't use it. (Fig 6)



Figure 6. open/close mechanism cover

Regarding fabric, we chose high quality and high aperture ratio material which can keep sound quality. Thanks to this fabric we realized invisible speaker.



Figure 7. Fabric material

2.4 Easy installation

In case of normal projector (Throw ratio > 1.0) customer need to put the projector on coffee table or it is necessary ceiling. When projector is put on coffee table, cable management should be problem. In case of ceiling projector, customer need construction. To enjoy immersive huge picture easily, we adopted ultra-short throw projector device. In case of ultra-short throw projector, customer can put the same position of TV so cable management becomes easier and they don't need construction.

Additionally, we introduced wireless function that is WiFi, Bluetooth, mirroring and DLNA.

By Bluetooth function, we suggested to use this projector as Bluetooth speaker when customer don't use it as a projector.

By WiFi, mirroring and DLNA, customer can use this projector in the room where there is no source device for example DVD player and cable TV set top box.

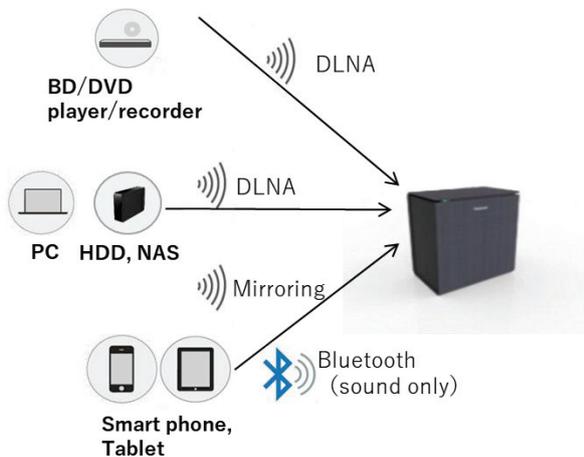


Figure 8. Wireless function

3 CONCLUSIONS

By these our effort we realized these three concept.

- 1) Enjoy both bright huge image and impressive theater sound by one box
- 2) Refined design which matches with interior
- 3) Easy installation

We believe that "Living projector" category expand and customer can enjoy immersive huge screen and powerful sound by such kind of one-device easily in living room.