

How to Solve Two Screenless TV Design Challenges



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When TI DLP® Pico™ products released its first 4K chipset in 2017, content providers and streaming devices were just beginning to offer 4K options. The introduction of the 0.47-inch 4K digital micromirror device (DMD) enabled designers to develop extremely compact, stunning ultra-high definition [mobile smart TVs](#) and [laser TVs](#).

Now, that 4K content and hardware have become ubiquitous across the display market, the second generation of 4K display chipsets from DLP products will help make screenless TV setup easier and save cost, both for designers and consumers.

How Advanced Image Processing Simplifies Setups

Mobile smart TVs and laser TVs with ultra-short-throw (UST) optics are extremely convenient because they prevent consumers from having to mount the projector on a ceiling or place it far away from the screen. However, UST optics also make images more sensitive to the positioning of the projector and the flatness of the surface. Additionally, many UST projectors are sold with a screen, requiring an even more precise setup.

An automated screen-fit feature makes it possible to leverage a low-cost camera to quickly sense the edges, and then have software correct the image to fit the screen size ([Figure 1](#)). This eliminates one of the remaining barriers for ease of use, because consumers can spend less time on precise installations. Even without UST optics, autocorrection functions can be very useful if the projector moves or if the surface is not perfectly flat.

The image-processing capability needed to enable these features previously required external components, but such capability is now incorporated into the [DLPC6540](#) controller as part of its advanced warping engine and algorithms. Designers can use the [DLP471TP](#) chipset to more easily integrate features like automated screen fit, making their products more compelling.

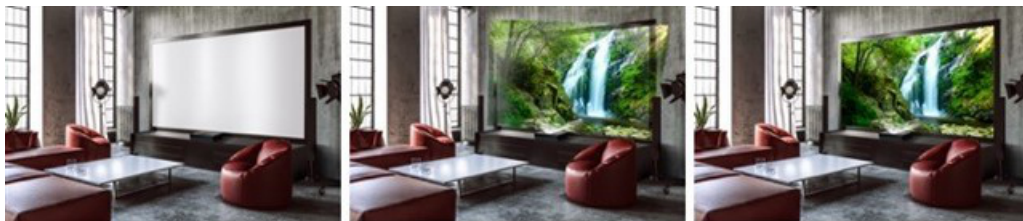


Figure 1. The Warping Engine Enables Easy Setup with Automatic Screen-fit Adjustment

Reducing System BOM Cost and Complexity

The DLP471TP chipset, shown in [Figure 2](#), includes the 0.47-inch DLP471TP DMD, the dedicated DLPC6540 display controller and the [DLPA3005](#) integrated power-management integrated circuit/LED illumination driver. The new DLPC6540 eliminates the need for a field-programmable gate array (FPGA) and external flash memory to interface with the DLP chipset. Not only does this aspect of the DLP471TP chipset simplify the design, but it can also lead to significant cost savings on the bill of materials.

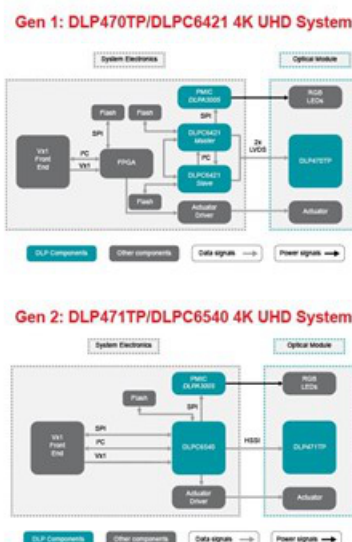


Figure 2. Reduced Complexity in the Second-generation 4K Chipset Block Diagram

Another way to reduce complexity is to use off-the-shelf optical modules. An optical module is a compact assembly that integrates a DMD, illumination source (red-green-blue LEDs in this case), optics and associated mechanics. TI collaborates with many optical manufacturers to offer developers a path to production-ready optical modules. This allows you to go to market faster by outsourcing the optical and mechanical development, rather than spending the time to design and manufacture a custom solution.

Conclusion

The second generation 4K chipsets reduce the number of components required while also adding more advanced image-processing capabilities. The portfolio includes the [DLP471TP](#) DMD and [DLPC6540](#) controller from DLP Pico products for small designs, while the [DLP471TE](#) DMD and [DLPC7540](#) controller from DLP standard chipsets are a good fit for designs above 1,500 lumens.

The DLP471TP chipset and DLP technology ecosystem help you deliver stunning ultra-high resolution displays to the market and take advantage of the rapid expansion in the availability of 4K content.

Additional Resources

- Download the [DLP471TP](#) DMD and [DLPC6540](#) controller data sheets.
- Develop with the [DLP LightCrafter: Display 471TP](#) evaluation module.
- Read the application note, “[TI DLP System Design: Brightness Requirements and Tradeoffs](#),” for more information about selecting the product capabilities for a given application.
- Explore our [standard chipset 4K offerings](#) to design above 1,500 lumens.
- Consult the DLP products [optical module search tool](#) to view off-the-shelf optical modules that reduce design time and help get products to market faster.

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