Executive Summary: 3D Television Sets Research Report

Background

There are several existing industry test procedures for measuring TV power consumption with 2D content, but little is known of the impact 3D content has on power consumption. 3D TVs have seen a steady growth in shipments since 2009, spurred curiosity over the power consumption associated with these products.

The impact of 3D on TV power consumption has been investigated previous to this research by different agencies since 2010. Both CNET and the US Department of Energy (DOE) conducted testing on 3D TV power consumption, with the conclusion that 3D could have a large impact on TV power. Additionally, the Consumer Electronics Association (CEA) conducted an analysis of DOE's data, proposing that the change in power from 2D to 3D was due to a change in screen brightness.

The goal of this research was to evaluate the power consumption demands of 3D TVs and to expand upon previous work by determining the impact of different variables on 3D TV power consumption. Twelve 3D TVs were selected for testing based on technology characteristics in order to include different combinations of TV variables. During testing, different configuration and usage variables were explored for their impact on 3D TV power.

Methodology

This research consisted of two parts. The first part, evaluation of usage variables, investigated aspects of TV operation that could affect power consumption and should be controlled when evaluating the impact of 3D power. For the second part, the power consumption analysis, 3D stabilization time and 3D TV power consumption were measured to determine the effects of TV screen size, screen technology, and active/passive 3D on power consumption both in 2D and 3D. In addition, screen luminance and standby-passive mode power consumption were evaluated during this testing.

Results and Conclusions

After controlling for the usage variables, it was found that the percent difference in power consumption between 2D and 3D ranged from a decrease of 19% to an increase of 72%. While in some cases power consumption decreased, ten out of twelve TVs tested exhibited an increase in power consumption from 2D to 3D. The degree to which the TV increased in power was widely dependent on the screen size and screen technology of the TV. Contrary to CEA's previous conclusion, this research does not find luminance to be the major factor affecting overall 3D TV power consumption.

Additionally, the research finds that the 3D technology of the TV, active or passive 3D, has little to no impact on the differences in power consumption between 2D and 3D.

Future Work

While there are currently no standard test procedures for measuring 3D power consumption, existing industry procedures for 2D TVs can serve as guidelines in 3D testing. This analysis identified areas where 3D testing may require further specification compared to a 2D test procedure.

This report also highlights trends that can be further investigated by testing a larger sample size of TVs focusing on a specific technology, such as LED. In addition, there exist new technologies not covered by this report that could have an effect on 3D TV power consumption. These technologies include glasses-free 3D and organic light-emitting diode (OLED) displays.

To investigate the impact of 3D on regional power consumption, the results from this report could be supplemented with market research analyzing 3D usage profiles as well as shipment trends of 3D TV technologies. This data could provide a valuable context for the conclusions of this research as the viewership and market of 3D TVs changes.