Ambilight – light to enhance TV

Press Back grounder
July 2013

TP VISION
Ambilight: Light to enhance TV

In 2004, the world’s first Philips TV featuring Ambilight came to market. Since then, this unique feature has developed step by step: from two-sided to three-sided to four-sided Ambilight. From providing a small halo on the wall behind the TV to a large one. From requiring a bulky component to using a slim string of LEDs. From being a high-end feature to being a mass-market one.

Users value Ambilight’s contribution to their advanced TV viewing experience highly. It creates a cinema like atmosphere, reduces eye strain and enhances the 3D-TV experience. So it is hardly surprising that 95% of Philips TV owners might repurchase an Ambilight-enabled Philips TV and 81% are sure that they would.

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Introduction
Ambilight is a feature that is unique to Philips TVs. The patented Philips technology projects a soft ambient glow from the rear of the TV onto the wall behind the set. The colour of the halo automatically and dynamically adjusts to match the TV picture. In addition, Ambilight can be adapted to the wall colour behind the set. To illustrate the Ambilight effect on Philips TVs a simulation at www.ambilightplayer.philips.com emulates Ambilight on virtual Philips TVs.

Ambilight has many remarkable aspects. It makes the TV screen seem wider and the viewing experience more immersive. In addition, Ambilight can help to reduce eye strain while watching TV and helps to reduce a consumer’s ecological footprint.

History of Ambilight
It all started with a short note written on a Post-it saying “Light to enhance TV”. The note was created during a brainstorming session by researchers from Philips Lighting and Consumer Electronics1 in 2002. “We were looking at how light could add value to people’s everyday lives,” said Elmo Diederiks, who was a member of the initial research project.

Only a year and a half later, in 2004, the first two-sided Ambilight TV hit the market. It was realised by CCFL (cold-cathode fluorescent lamps) tubes at the TV’s rear. They reproduced the average screen colour of the on-screen picture. In 2007, the first Philips TVs with Ambilight using LEDs as light sources were available. LEDs have several advantages over CCFL: they are much smaller, radiate bold colours, and allow several colours per side to be projected (pixelation) to create a halo that matches the on-screen colours in more detail.

The history of Ambilight

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>2002</td>
<td>Ambilight idea born at Philips Research and Lighting.</td>
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<td>2003</td>
<td>First Ambilight demo on a Philips TV.</td>
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<tr>
<td>2004</td>
<td>First commercial two-sided Ambilight TV. It used CCFL (cold-cathode fluorescent) lamps at the TV’s rear to produce the same colour on the left and right side, which adapts to the on screen content.</td>
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<tr>
<td>2005</td>
<td>First commercial two-sided Ambilight TV with stereo Ambilight effect displaying different colours at left and right.</td>
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<td>2006</td>
<td>Philips sold the 1,000,000th Ambilight TV.</td>
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<tr>
<td>2007</td>
<td>First commercial four-sided Philips Aurea TV. Ambilight Spectra uses LEDs as Ambilight light source. It is the first Ambilight system featuring pixelation (multi-colour/intensity on each side of TV set).</td>
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<td>2008</td>
<td>More two- and three-sided LED Ambilight TVs hit the market.</td>
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<tr>
<td>2008</td>
<td>All LED-based Ambilight TVs now feature pixelation.</td>
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<tr>
<td>2010</td>
<td>Introduction of Wall Adaptive Ambilight.</td>
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<tr>
<td>2011</td>
<td>Ambilight Spectra XL creates an extra-large halo around the TV.</td>
</tr>
<tr>
<td>2013</td>
<td>Relaunch of four-sided Ambilight.</td>
</tr>
</tbody>
</table>

1 see Elmo Diederiks talking about Ambilight at http://vimeo.com/groups/thishappenedutrecht/videos/7391102
How Ambilight works

Only a small part of a human eye's retina, known as the macula, actually sees a sharp image. An even smaller portion, the fovea, is responsible for producing the even-sharper vision needed to watch television or read. For the rest of the retina, the image is blurred. The brain then works efficiently to combine all the information into a coherent picture. Ambilight helps to enlarge this picture through an innovative technology that can ‘read the screen’ to produce the surrounding colour. It works by analysing the input video signal in real time and extracting the relevant colour and brightness information from the content. It then adapts colours to users' preferences and the screen settings while making sure the experience is smooth over time.

Reducing eye strain

In a dark room, the TV is the main source of light. Therefore, when the picture on the screen changes, there’s a big fluctuation on the light level in the room which causes the viewers’ pupils to dilate or contract in response. TV images change rapidly, so the muscles controlling the pupils have to work hard to keep up, leading to eye fatigue. Ambilight evens out the changes in the ambient light levels, so the pupils have to work less hard and therefore eyes feel less tired, as is shown in numerous independent studies:

In 2005, Professor Begemann of the Technical University in Eindhoven, the Netherlands, showed that Ambilight can reduce eye strain in 60-90% of people under normal ‘home theatre room lighting’ conditions. In 2006, John Bullough and colleagues at the Rensselaer Polytechnic Institute in New York (USA) found a beneficial effect on visual discomfort, fatigue and eye strain.

A 2007 report by Dr. med. Herbert Plischke and colleagues from the Ludwig-Maximilians-University in Munich (Germany) and a team at the Vorarlberg University of Applied Sciences in Dornbirn (Austria) led by Prof. Dr. Guido Kempter said that Ambilight significantly reduces the brain’s mental workload and improves the emotional activation.

In another survey, conducted by GN Research in February 2008, 85% of those using a Philips TV with Ambilight said that they find viewing TV pleasant and relaxing for their eyes. By contrast, only 13% of viewers of a TV without Ambilight said the same.

Improving 3D-TV viewing experience

A research paper, posted for the Society for Information Display SID, reports on the effect of Ambilight on stereoscopic 3D TV

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2 “A visionary experience”; Stuart Cherry in Password (Feb 2008), published by Philips Research


4 John Bullough et al, Journal of Applied Sciences 6(8), 1664, 2006


6 Ambilight Spectra validation test, conducted by GN Research, February 2008
experiences7. Researchers from the University Brussels explored whether Ambilight has an effect on the viewing experience while watching 3D TV based on active shutter glasses technology. The scientists concluded that the usage of “Ambilight without additional lighting can be recommended as the most suited condition for watching 3D”.

The research was conducted with 30 participants who had to watch 3D TV in various light conditions: with and without additional lighting and with and without Ambilight. Overall they favoured the conditions of ‘Ambilight on plus light off’ and ‘Ambilight on plus light on’ over those without Ambilight. Willaert’s and de Meulenaere’s conclusion: “Both Ambilight and ambient lighting do impact different parameters of the viewing experience. Both switching Ambilight on and light off are beneficial in terms of overall viewing experience. Furthermore the specific combination of ‘Ambilight on and light off’ seems to lead to the highest levels of visual comfort.”

Users recommend Ambilight
Ambilight is one of the most important purchase decision criteria for a high-end Philips TV8. In fact, owners of a Philips TV featuring Ambilight are highly satisfied with the light application: 97% rated Ambilight as good, very good or even excellent and would recommend Ambilight to others9. Nearly all would repurchase a TV with Ambilight: 95% of owners of a Philips TV featuring Ambilight might repurchase an Ambilight-enabled Philips TV, 81% are sure that they would do so.

Energy saving potential of Ambilight
Ambilight on Philips TVs is largely seen as a concept for an advanced viewing experience in a pleasant ambience. But it also contributes to the improved ecological footprint of users by creating net energy savings at home. According to an independent study carried out by Blauw research agency, 87% of consumers usually change their room lighting conditions when watching TV with Ambilight on – most often by switching off all lights (36%), dimming the lights (32%) or switching off a few lights (31%).

| LED lamp | 7W |
| CF lamp | 7.9W |
| Halogen lamp | 28-40W |
| Incandescent light bulb | 40W – 100W |
| Ambilight 3-sided XL on 60” TV when watching TV | on average 3W |
| Ambilight 2-sided on 46” TV when watching TV | on average 1.5W |

Table: Comparison of energy consumption

Expanded Ambilight experience through integration of Philips Hue
To further expand the Ambilight experience into the whole living room, TP Vision

7 Willaert, De Meulenaere, “3DTV Viewing Experience: the Combination of Stereoscopic 3D Ambilight and Environmental Light”, Vrije Universiteit Brussel, Belgium
8 Internal Philips customer survey among 37,849 buyers
9 Philips online survey with 2,589 owners of Ambilight TVs from eight European countries, Dec. 2009
connected the Philips Hue wireless personal LED lighting system to Ambilight.

An app – available for Android and iOS based smartphones - brings Ambilight's lighting effects to Philips Hue LED bulbs, making the TV experience more immersive.

With Ambilight + hue users can add up to 50 Hue bulbs to the Ambilight system. Each of the lamps can be controlled separately.

Connecting Ambilight with Hue is easy. The Ambilight+hue app offers an intuitive graphical user interface that guides users through the set-up procedure.

The app makes use of the colour information from Ambilight and adapts the dynamic lighting scheme in respect to the bulbs’ positions. The larger the distance between a Hue bulb and the TV, the slower the frequency of colour changes. The same goes for Hue lamps, which are located behind the users. This ensures a smooth sensation and reduces eye strain.

The Ambilight+hue app is supported by Ambilight enabled Philips TVs manufactured from 2011 onwards.

Philips TVs featuring Ambilight
Ambilight started as a high-end feature. However, in keeping with TP Vision’s ambition to make sought-after high-end features available for as many as possible TV series, the 2013 Philips PFL5008 series now features 2-sided Ambilight for the first time. In other words, all new Philips TV series from 5000 and up have Ambilight on board today and support Ambilight + hue app.

You can also watch our Ambilight video at http://youtu.be/ScVAUJ3_UPY
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**About TP Vision**

TP Vision is a dedicated TV player in the world of visual digital entertainment. TP Vision concentrates on developing, manufacturing and marketing Philips branded TV sets in Europe, Russia, Middle East, Brazil, Argentina, Uruguay, Paraguay and selected countries in Asia-Pacific. We do this by combining our design expertise and innovative Philips TV heritage with the operational excellence, flexibility and speed of TPV Technology. With these combined strengths, we bring high-quality TV sets to the market: smart and easy to use with sophisticated styling i.e. new materials and slim design. We believe in creating products that offer a superior TV experience for consumers. With Philips TVs, TP Vision is a global leader in the hospitality market. Based in Amsterdam, the Netherlands, TP Vision is the exclusive brand licensee of Philips TV for the above listed countries. The TV Company is 70% owned by TPV and 30% by Royal Philips, headquartered in the Netherlands. TP Vision employs close to 3,100 people in several locations around the globe.

*Publishing date: 4th July, 2013*