

ACTION! projectiondesign

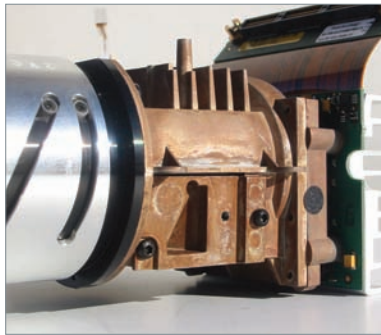
FEATURES AND BENEFITS

Whitepaper



Apochromatic projection lens design for optimal focus

Apochromatic means “free from chromatic and spherical aberration”, and is said especially of a lens in which rays of three or more colours (typically R, G and B) are brought to the same focus. As normal lenses focus different wavelengths of light (ie. the different colours in an image) differently, the Action! series uses apochromatic lenses to ensure all colours in the image are focused at the same plane. This again ensures perfect display of details, and perfectly focused images down to sub-pixel level – it is for instance easy to show single pixel mirrors in a focused image, with the hinge clearly showing in the middle. Apochromatic lens designs thus improve contrast and sharpness by not letting the light scatter around on the projection screen, and do not discolour projected images.



Sealed Optical Architecture (SOA)

In order to provide a maintenance free projector for the home, the Action! series is delivered with a Sealed Optical Architecture that does not allow any dust or smoke to enter the core optics, and interfere with the image quality. By preventing dust and smoke from entering the most delicate and highly accurate optics, a long and trouble free life of the projector is ensured. This is quite unlike for instance LCD projectors, where the LCDs need to be cooled individually, and where dust easily can be spotted as small or large pink dots in the projected image.

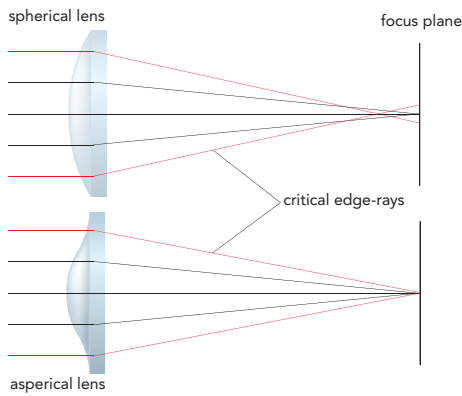
Filter free design for low maintenance

The Action! series does not incorporate air flow preventing filters in the cooling mechanism. This means that the fans do not have to run faster than needed in order to push more air through the system than necessary. Many other projectors contain several filters that require maintenance and filter changes regularly. When filters become clogged by dust, thermal stress of the projector increases, and operating noise levels increase dramatically, as most of the audible noise is not created by the fans themselves, but the turbulence of the air that is flowing through the projector. By preventing dust and smoke from entering the most delicate parts of the projector, and by optimising the air flow to such an extent that filters are not needed, there are none to replace in the Action! model one and model zero five. This is one of the main criteria for making the Action! as silently running as it is.



Optimum Light Recovery optical assembly

The Action! series features our own Optimum Light Recovery technology, to make sure as much as possible of the pristine light from the lamp enters into the optics and can reproduce an image as dynamic as possible. By using several proprietary designed lenses and optical components, light is collected and formatted for optimum usage in the system. This provides the most dynamic projected image available anywhere.

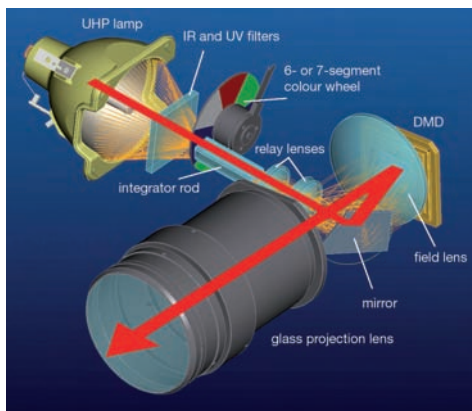


Aspherical contrast enhancing Field Lens architecture

Using grounded aspherical lenses ensure outstanding focusing quality over the entire image area. Aspherical lens elements are made so that the glass element itself is not a regular spherical shape, as in most commercially used lenses. The critical light rays around the edges and towards the corners of an image benefit greatly in focus quality by using aspherical lenses. They are then able to focus as well as the ones that pass through the centre of the lens. Aspherical lenses are used in professional grade photographic lenses for the best possible quality.

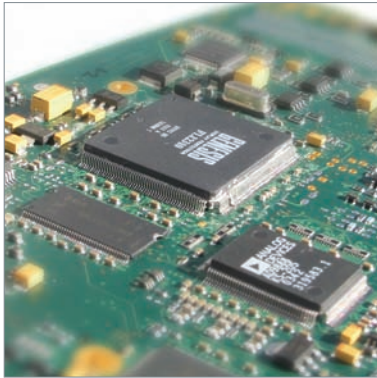
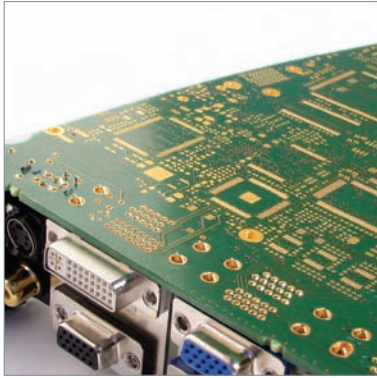
Field Lens architecture

The base optical design of a projection system to a large extent defines the maximum contrast available from the system. There are mainly two different optical designs available; a TIR (Total Internal Reflection) prism, and a Field Lens design. The prism design is the reference design as proposed by Texas Instruments®, and is used in most available Home Theatre projectors. projectiondesign uses a Field Lens design.



A TIR design's greatest drawback is that it will never achieve relatively high brightness and contrast simultaneously. This is because the prism itself is a contrast limiting device. With video contents, most scenes are of mixed exposure (both light and dark contents in the same scene). As the prism disperses light inside itself, it will introduce light spill and scatter into the darker parts of the scene, thereby reducing contrast. A typical prism based HD2+ projector at full power may output approximately 7-800 ANSI lumens, at a typical contrast level of 1200 – 1400 : 1. Because it is a prism design, it is a simple task to apply IRIS and aperture adjustments. This may increase the contrast ratio tremendously, but at the same time reduce the light output dramatically. Typical figures can read 250 ANSI lumens, and >3500 : 1 contrast levels. This is all fine on paper, but to fulfil for instance the SMPTE (Society of Motion Picture and Television Engineers) recommendation for viewing video in a darkened theatre, it is hardly enough, and just about to fill the area of a typical 70" diagonal screen!

The Field Lens design in the Action! projectors does not use a prism in the light path. This enhances the contrast available from the base optical design, and at the same time increases available brightness, thus creates a more dynamic image. With for instance the Action! model one mk III, using the HD2+ DC3™ DMD™ and a prism-less design, typical maximum output is 1000 ANSI lumens and 3000 : 1 at the same time, so up to 40% more brightness and 300% higher contrast.



Balanced impedance matched circuit topology

By using balanced electronic circuitries in the most delicate signal processing, we are able to cancel out noise that may be picked up in the extremely low voltage image signal. Balanced electronics are used in professional and high end audio just for this reason, and the Action! projectors benefit from the same technologies. Impedance matching also ensures that the signal is kept free from interference at all times.

Unique UniBoard video processing

All critical signal processing is handled on a single printed circuit board. A single board reduces electrical noise to a minimum, and ensures short signal paths, and no loss or electrical interference through the use of ordinary connector cables between boards. Many high end projectors use very high grade electrical components and boards, yet connect them with cheap multi lead cables, picking up noise and potentially ruining the image as a result. Our signal processing boards use gold plated signal paths and connectors for the purest connections.

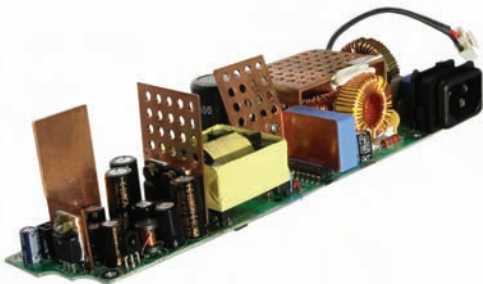
12 separately regulated power supplies

In order to electrically allow every signal processing circuit the best possible operating environments, the Action! projectors operate with multiple separately regulated power supplies. The front end input section alone uses three regulated stages, one for the video processor, and one each for the analogue and digital sections of the 10-bit /D converters. In addition, there are regulated power supplies for all video processing stages throughout, as well as for processing and colour wheel operation.

Fully decoupled acoustically noise-cancelling sub chassis

In order to reduce acoustical operating noise to a minimum, so as to enhancing the viewing and cinematic experience, all mechanically moving parts are fully decoupled from the main magnesium chassis. Using a visco-elastic rubber material (with properties of both a liquid – viscous solution – and a solid material – elastic) for optimum shock and vibration absorption, parts' movement is not interacting with the projector to create unwanted noise and resonances. Much like in a car's motor suspension, this is used to suspend all of the individually controlled fans, as well as the colour wheel, which spins at speeds up to 9000 rpm.

By doing this, we are able to control and reduce the resonance of any one component in motion inside the projector, resulting in the lowest operating noise possible.



Low distortion Power Factor Corrected (PFC) power supplies
 Ordinary power supplies vary their output as the input voltage varies. By using Power Factor Corrected power supplies, the power output is always the same, ensuring the projector will always perform similarly, no matter what the power conditions are. This means the working power of the lamp and the working conditions of the electronics always will be the same. By using PFC power supplies, the Action! projectors do not suffer from problems widely recognised in the audio/video industry, where for instance amplifiers' output vary with the input power.



Single chip DLP™ technology

All Action! projectors use single chip DLP™ (Digital Light Processing) technology from Texas Instruments®. Employing DarkChip3™ technology, the latest editions provide even higher contrast and better colour saturation than ever before, surpassing any other microdisplay for home cinema use. The main benefit with DLP™ technology is the unprecedented total combination of contrast, brightness and visual resolution, as well as colour uniformity that is perfect, as it uses only a single chip display. A totally colour uniform image is not possible with any 3-chip technology, such as for instance LCD, without sacrificing dynamics and contrast. In addition, DLP™ is a totally non organic display structure, which results in a device life time that far surpasses any other available technology, with the core technology expected to live at least 50000 hours, where competing LCD, for instance, can be expected to live a few thousand hours.



Faroudja® DCDi™ video processing

The award winning DCDi™ (Diagonal Correlational Deinterlacing) is placed at the heart of video processing in the Action! projectors. For the more information, please see <http://www.gnss.com/technology/articles/dcdi-overview.html>

3:2/2:2 pull down and film mode detection

These are features of the Faroudja™ progressive scan engine, please see <http://www.gnss.com/technology/articles/dcdi-overview.html> for more information.



HDMI compatible DVI-D digital interface with HDCP

HDMI - High Definition Multimedia Interface. A recently introduced standard for transferring digital audio and video over a single cable. The HDMI 1.0 standard supports up to 8 channels of high resolution 24-bit/192 kHz digital audio, as well as dual channel DVI for uncompressed digital HDTV content over the same cable. HDMI is primarily intended for connections between components in an A/V system, and is not needed for connecting to the projector, which will only utilise the DVI part of the signal. HDMI is fully backwards compatible with DVI and the Action! projectors. For more information, please see www.hdmi.org.



DVI – Digital Visual Interface.

DVI is an established standard for transferring video digitally, without loss of information, and with virtually no noise. With a DLP™ projector with a DVI input and a DVI equipped DVD-player, the signal is never converted from digital to analogue and back again, making it very low noise. What you get on the screen is exactly what is on the DVD itself. DVI-D is a digital only implementation of the interface. For this connection to work, both the display (projector) and the DVD-player (source) need to be HDCP compliant. Generally, when using a DVI setup, expect a cleaner, more precise result, with much lower video noise than when using analogue connections. For more information on DVI, please see www.ddwg.org.

HDCP – High-bandwidth Digital Content Protection.

Digital copy protection for the DVI interface, as a means to prevent its contents to be illegally copied. HDCP has been developed by Intel and Silicon Image, and is a widely adopted standard, most importantly embraced by the Hollywood film industry, and all of the large studios. All DVD-players supporting HDMI or DVI video outputs must comply with HDCP standards, in order to be sold legally. HDCP is fully transparent to the image contents, so does not impact image quality.

More interesting information about DVI / HDMI and HDCP can also be found at for instance <http://www2.dvigeart.com>

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