

Projectors & Screens Buying Guide



Buying Basics

Get Informed Before You Buy

Enjoy watching movies and TV like never before. Adding a projector and screen to your home entertainment center, will make your favorites shows more engaging and exciting. This guide will discuss some options you should learn about before making your buying decision.



Giving you a better way to buy

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At A Glance



Getting Started

Watching movies on a giant screen is amazing. Anything you can view on your TV, you can also enjoy (only bigger) with a projector. Favorite TV shows and sports are more engaging and exciting in larger-than-life HD, and video games really come to life when they are projected! Connect your projector to an internet-enabled device to access a variety of online content: streaming movies from Netflix (subscriptions required), YouTube videos, family movies on Facebook, and more.

Primary considerations for a home theater projector include:

1. **Resolution** — 480p (minimum for standard-definition sources like DVD), 720p (minimum for HDTV) or 1080p (minimum for optimal performance from Blu-ray, PlayStation, Xbox 360 and other high-resolution devices).
2. **Contrast ratio** — High contrast ratios are essential for picture detail and vibrant, accurate color.
3. **Throw ratio (and screen size, if applicable)** — The proper throw ratio is essential to clearly generate an image that's sized appropriately for your space.
4. **Connectivity** — Most importantly, you'll need at least one (and preferably several) HDMI inputs to connect high-definition sources like cable and satellite boxes, Blu-ray players and gaming consoles. Some home theater projectors will also include a variety of other inputs like component video, VGA (for PCs) and USB.

You'll also want to pay attention to brightness (especially if you want to project the image very large, which dissipates the light output). But as a rule, contrast ratio is more important than brightness to the home theater viewer since movies and games are usually viewed in a more light-controlled environment.



Terms & Specifications

First, you'll want to gain an understanding of the various terms and specifications used to describe a projector's performance attributes:

Lumens

Lumens (or ANSI lumens, named for the standards body that defined it) is a standard for measuring image brightness: The higher the lumens, the brighter the image can be at a given distance from the projector. Generally, you'll want at least 1,000–1200 lumens for a light-controlled home theater environment (with lights off and minimal ambient light); 1,500–2000 lumens for rooms with limited ambient light; and 2,000–2500 lumens for rooms with bright ambient light (think a living room with open windows on a sunny day, or a conference room in an office).

Lumen count is one of the most important considerations for business projectors because they are often used in brighter ambient-light settings. Since movies and games are typically viewed in low-lighting conditions for full effect, high lumen counts are generally less critical for home theater projectors.

Contrast ratio

Contrast ratio represents the relative difference in light output between a projector's brightest and darkest pixels when displayed at the same time. A high contrast ratio facilitates fine picture detail and is critical for movies, TV broadcasts and gaming. For data projection, high contrast ratios are generally less important than high lumen count.

Resolution

Resolution is a measure of the projector's pixel count, expressed as the number of pixels counted horizontally by vertically to form a rectangular grid. The more pixels, the clearer, crisper and more detailed the image will look. Higher resolutions also allow viewers to sit closer to the screen while still experiencing a seamless image.

There are two distinct specifications representing resolution: native and maximum. Native resolution is the true resolution of a projector (the actual pixel count of its image-processing chip(s)). Projectors also support resolutions that are lesser or greater than the native resolution by digitally expanding or compressing the native pixels. This process (known as scaling) can introduce distortions and visual artifacts, and although higher-quality scaling processors usually do a pretty good job, it's worth bearing in mind that the larger an image is projected, the more apparent picture distortions can become. The highest resolution a projector will support is called its maximum resolution.

For best results, choose a projector whose native resolution matches the video source you will use most often — whether it be an HDTV signal, DVD or Blu-ray player, or (in the case of business users) a laptop computer or other mobile device. For example, a 720p projector will work adequately for HDTV, but you'll need a 1080p projector to enjoy Blu-ray movies at their best.

Image format

The following are image formats commonly found in projectors, along with their corresponding native resolutions:

Widescreen (16:9) formats

- WXGA (1280 x 800) — recommended for widescreen and standard-definition video, photography and graphics
- HD 720p (1280 x 720) — recommended for home theater use where the main viewing material is 720p HDTV
- HD 1080p (1920 x 1080) — recommended for home theater use where the main viewing material is 1080p HDTV or Blu-ray Disc

Standard (4:3) formats

- VGA (640 x 480 pixels) — suitable for basic PowerPoint presentations, but largely obsolete
- SVGA (800 x 600 pixels) — suitable for basic PowerPoint presentations
- XGA (1024 x 768 pixels) — suitable for spreadsheets and advanced PowerPoint presentations
- SXGA+ (1400 x 1050 pixels) — suitable for detailed photography and data graphics

As a general rule, 4:3 projectors are primarily intended for business use (although widescreen WXGA business projectors are also available, and recommended since virtually all laptops now feature widescreen output). For home theater applications, a 16:9 widescreen projector is essential.

Light engine

A term commonly used to denote the technology used to create a projected image. 3LCD (Liquid Crystal Display) and DLP (Digital Light Processing) are the two dominant projection technologies.

Keystone correction

If you have an oddly shaped room, choose to place the projector in an off-center location for aesthetic reasons, or if for any other reason your projection screen cannot be placed perfectly perpendicular to your projector, the projected image's intended rectangular form may be distorted (becoming trapezoidal). Keystone correction allows you to compensate for this.

There are two types of keystone correction. **Manual keystone correction** provides limited vertical (and sometimes horizontal) angle adjustment to correct for misalignment. **Digital keystone correction**, on the other hand, works by digitally compressing and regenerating pixels to restore rectangular image dimensions when projected on an off-axis surface. Most digital systems can correct both vertical and horizontal distortions, with degrees of correction up to 35%; however, the more digital correction is applied, the more digital image distortions can result.

Terms & Specifications Con't

Lens shift

Similar to keystone correction in that it helps to compensate for geometric distortions in the projected image that results from off-axis projector placement. However, with lens shift, horizontal compensation is accomplished mechanically by physically moving the lens side-to-side or adjusting its orientation. Lens shift is a preferable means of compensation because it bypasses the unwanted processing artifacts that can sometimes result from digital keystone correction.

Throw ratio

A projector's throw ratio indicates how wide the projected image will be when the projector is positioned at a certain distance from the screen. It is typically expressed in terms of throw distance per foot of image width. For example, a throw ratio of 1.8:1 would represent 1.8 feet of throw distance per foot of screen width. Thus, to get an image 60" (or 5 feet) wide, you would need to place the projector 9 feet (5 feet x 1.8 feet) from the screen.

Throw ratio is key to selecting the right location for a home theater projector, and it's very important that you carefully calculate your expected results before permanently mounting your projector and screen. Here's the basic formula:

(desired image width x throw ratio = required throw distance)

To make things easier, most (but not all) projectors offer a limited amount of "zoom" for a range of throw ratios. This allows you to make minor adjustments after mounting to adjust the image to fit your screen.

Now What about the Screen?

It's possible to project images onto a white wall or other flat surface, and many people find the results satisfactory for their needs.

However, adding a projection screen to your setup will greatly enhance your experience and is strongly recommended.

Projection screens are designed using specialized materials with optimal reflective properties that maximize image brightness and really make colors pop.

There are four basic physical types of screens available for different needs and applications:

1. Tripod
2. Manual pull-down,
3. Electric (motorized)
4. Fixed-frame.



Technology

The two dominant technologies used in today's projectors are **3LCD (Liquid Crystal Display)** and **DLP (Digital Light Processing)**.

3LCD advantages

- Greater brightness and color saturation for better results in rooms with ample ambient light
- Sharper images for data applications (spreadsheets, printed word, static graphics)
- Require less electricity
- Generate less heat
- Slightly quieter than DLP due to fewer moving parts

3LCD disadvantages

- Pixel separation is much more apparent; produces "screen door" effect on certain images
- Physically larger and heavier than comparably featured DLP projectors
- Blacks may be more "washed out" than with DLP
- Lower overall contrast



DLP advantages

- Superior frame rates for smoother motion video
- More compact and lighter weight than similarly featured LCD projectors
- More "filmlike" picture from DVD, Blu-ray and HDTV sources
- Deeper, truer blacks than LCD
- Higher overall contrast

DLP disadvantages

- "Rainbow effect" is only visible to some viewers, but may be bothersome
- More moving parts and higher energy consumption than LCD
- Color filter wheel used in the light engine may generate a soft but audible whine
- Inferior color saturation to LCD, especially with reds and yellows at full illumination
- In substantial ambient light, requires approximately 30% higher lumens to achieve color richness that competes with LCD



Additional Features / Types of Projectors to Consider

Pico projectors

Pico pocket projectors take on-the-go projection to the next level. A palm-sized pico is ideal for mobile business presentations or sharing entertainment with friends. Pico projectors can be battery- or AC-powered and are easy to connect to a wide range of popular devices — laptops, mobile phones, even iPods (may require additional cables not included with the projector). They can project widescreen images up to 70" diagonal with bright colors when used in low light. The LED light source can last over 20,000 hours (five times longer than those in a typical LCD projector), so you won't have to worry about bulb replacement.

3D projectors

Some new projectors allow you to enjoy the emerging world of 3D content (which also requires a 3D-compatible source device and special glasses). 3D-ready projectors, like 3D-ready HDTVs, are typically high-end models with a bevy of other advanced features, and are thus excellent choices for viewing conventional "2D" content as well.

LED illumination

Some of the latest projectors feature illumination via red, blue and green LED lamps that replace the conventional light sources used in most projectors. Benefits of LED illumination include:

- Deep, saturated colors — Some LED projectors deliver up to 140% of the NTSC Color Gamut (as opposed to conventional LCD systems which produce a maximum of about 92%)
- Excellent dynamic contrast — LEDs can be pulsed on and off with great precision, creating deeper blacks and a wider overall range of brightness levels
- Enhanced reliability — Aside from cooling fans, there are no color wheels or moving parts

Additionally, LED-illuminated projectors offer lamp life that is four to five times longer than that of a typical projector. That means, for practical purposes, LED lamps will never need to be replaced. This can add up to significant savings over the long term, since conventional projector lamps can run up to \$300 or more. LED lamps also consume up to 30% less energy than conventional bulbs, yet they produce comparable light output. Plus, LED lamps are 100% mercury-free, and with no bulb to discard, an LED-illuminated projector is friendly to the environment.

Pico projector



3D projector



LED illumination

