



FREQUENTLY ASKED QUESTIONS ABOUT

RECORDABLE DVD



What is DVD?

DVD stands for Digital Versatile Disc. It is the next-generation optical media successor to the CD that has taken the world by storm, becoming the fastest-growing video format ever. By increasing the amount of storage available on a single disc the size of a standard CD and providing the means for both PCs and consumer electronics devices to read it, a person is able to enjoy higher quality audio, video, and more data storage than ever before. And just as with the compact disc (CD) and CD-R/RW formats, Sony has been instrumental in leading the charge into bringing DVD viewing and recording to the masses.



How does a DVD work?

A DVD works in much the same basic way that a CD works: a laser in the drive reads small pits on a single-layer optical disc and translates that into data. However, a DVD drive uses a tighter laser with a more precise beam and a shorter wavelength than a typical CD drive in order to take advantage of the DVD's smaller pits (.4 micrometers versus .8 micrometers for CD—approximately 1/10 the size of a strand of hair) and narrower tracks. The result? The increased data density provides more room to store information and quicker access to what is on the disc.

How does the drive burn a recordable DVD?

Burning a writable DVD is similar to burning a blank CD. In essence, a blank DVD contains a series of organic dyes inside. When a laser heats up the dyes, a chemical reaction occurs and this layer is enabled to absorb the laser. The laser is then free to "burn" small data pits in the disc according to the data sent.

A rewritable DVD uses a different layer, one that uses a phase change process to alter the reflective state of the disc to a light-absorbing state. This is reversible, and thus the disc can be rewritten again and again—up to 1,000 times. Three different laser intensities are used in this process: one to read (does not alter disc), a stronger one to erase (to reflect the laser and not allow data to be written), and the strongest to write (which changes the recording layer to absorb the laser and allow writing). CD-RW works in a similar way, but using a different laser and larger data pits and wider tracks.

What is the capacity of a DVD?

The current crop of recordable DVD discs holds approximately 4.7 GB*. To understand why some may state a capacity of 4.4 GB, we must look at a variation in math used to determine the capacity.

For ease in remembering numbers and doing mental calculations, many people assume that one million bytes equals 1 megabyte (MB). This is close, but not quite true. In reality, 1 MB actually equals 1,024 kilobytes (KB), not 1,000 KB. So if you do the math using 1 MB = 1,000,000 bytes, you will find that using 1 GB = 1000 MB will return a capacity of 4.7 GB (4700000000 bytes divided by 1000 divided by 1000 divided by 1000). However, if you use the truer 1 MB = 1,024,000 bytes, it will return a figure of approximately 4.4 GB (4700000000 bytes divided by 1024 divided by 1024 divided by 1024). This greatly increased capacity over CD gives you the power to put your creative and organizational desires on the fast track to success.

A DVD disc holds the equivalent of:

- 6½ CD-Rs, or
- 440 ZIP 100 MB discs, or
- approximately 3200 floppy discs.

What can I do with DVD?

You can use recordable DVD media for data storage and audio/video recording.

STORAGE:

- Recordable DVD media provide 4.7 GB* of storage, enabling you to back up large amounts of data.
- The large capacity of a recordable DVD can contain high-quality video, better-than-CD quality audio, and still have room for special features and multimedia applications.
- Unlike your computer's hard disk drive where you have to delete files to make room for more, once a DVD is filled up, simply replace it with another and continue recording.

VIDEO:

- Recordable DVD allows you to watch personal home movies you have created and edited for playback in many DVD players. You can fit anywhere from 1-4 hours of video on a single disc, depending on the encoding.
- Because DVDs are digital, you will not experience generational loss. This means that every time a DVD is copied, the copy offers the same pristine quality as the original DVD.
- DVD offers some great advantages over videotape, such as:
 - Vastly superior detail and picture quality.
 - No need to forward or rewind a tape to find a particular point.
 - Higher quality audio, even better than a typical CD.
 - No signal degradation because no reader mechanism touches the media.
 - Ability to duplicate a DVD many times without losing quality.
 - Creative and interactive menu systems.

How much video can a DVD hold?

Size versus quality is a regular tradeoff in the video world and is an inexact science. Due to the size of video files reflecting much of the content of the video, there is no fixed number for recording a video of a certain size with a particular format—all sizes are approximate and vary.

Example: If you filmed a 10-minute nightly news segment and a 10-minute clip of the Superbowl with the same camcorder and encoded both videos with the same compression, would the file sizes differ? Yes, because the news anchor and picture in picture graphic over her shoulder change very little in comparison to the constant action of the football game and its changing shapes, colors, moving players and thousands of excited fans in the background. The Superbowl file size is visibly larger due to the increase in content that was filmed.



That being said, it can be assumed that a DVD may hold roughly 4 hours of MPEG-1 video, about 2 hours of MPEG-2 (4 Mbps) video, and about 1 hour of MPEG-2 (8 Mbps) video. Remember, video content alters the size of the video file to a large degree, as does the type of video compression.

What is MPEG?

Standards from MPEG (Moving Picture Experts Group), of which Sony is an active participant, apply to compression used with multimedia files, such as MPEG-1 (video CD and MP3) and MPEG-2 (DVD and digital TV boxes), among others. In order to present audio and video files uniformly across multiple platforms at accessible speeds and qualities via compression, MPEG standards were invented. You can think of MPEG-1 video as a viewable quality akin to VHS or TV. A DVD holds approximately 4 hours worth of MPEG-1 video. MPEG-2 is a higher quality compression that results in the stunning picture seen on DVD movies and on digital television signals, and provides anywhere from 1-2 hours of video on a DVD. Because it holds more information than MPEG-1 and can commonly be decoded at either 4 Mbps or 8 Mbps, the resulting file sizes are larger.



A Sony recordable DVD drive is the perfect way to watch digital family home videos, store large work projects, and back up personal or work files on a spacious 4.7 GB* DVD disc.

Can I burn CDs on a recordable DVD drive?

Certainly! The DVD has many similarities to the CD (120mm in diameter and 1.2mm thick) and both types of disc fit in the same drive. This is a major reason to look forward not only to the future of optical disc storage via DVD but to also maintain compatibility with past and current CD usage. CD recording speeds found in these drives are fast, but will not be as fast as current separate CD-RW drives. Different software may be required to record CDs and DVDs.

Are there different types of DVDs?

Yes. DVD can be divided into DVD-Audio, DVD-Video, and DVD-ROM. Both DVD-Audio and DVD-Video are based on DVD-ROM, but add specialized application layers.

PC DVD drives and most consumer electronics DVD players use DVD-R for General media, intended for general home use, whereas professional development uses DVD-R for Authoring media for authoring DVDs, with some technical differences. Both of these can be read on most standard DVD players and drives, but are not compatible with each other.

Specialized industries may use different DVD media that utilize additional recording layers or sides of the disc. An example of this is the Hollywood film industry, which many times uses special dual-sided discs to hold large amounts of movie content. The recordable DVDs discussed in this FAQ are single-sided, single-layered DVD-R for General media. This is the most common type of recordable DVD media and the one that you will find most available for home and corporate use.

Can I copy a DVD movie?

Your DVD recorder cannot enable copies to be made from commercial DVDs. Commercial DVDs use various methods of encryption (such as Macrovision) to protect the copyright interests of the artists, creators, and others involved in the content creation. In addition, the dual-sided, higher-capacity media available to Hollywood remains unavailable to the average consumer.

However, should one wish to make copies of a personal DVD containing home video footage or data, one may do so, as a DVD recorder will not provide encryption.



How fast are recordable DVD drives?

Optical disc write speeds are measured with an “x” speed rating. With a CD, 1x = .15 MB/s; for a DVD, 1x = 1.4 MB/s. A good rule of thumb for determining speed is to assume that 1x DVD = 9x CD speeds. Thus, a 2x DVD would record at close to 18x CD speed (2.8 MB/s) and a 4x DVD would record at almost 36x CD speed (5.6 MB/s).

How long does it take to burn a DVD?

At a 2x DVD burn speed, it will take approximately 30 minutes to fill a 4.7 GB* disc. At 4x, one can finish a DVD in almost 15 minutes. (Keep in mind that any capturing, editing, and encoding video to make a DVD may add time to the process.)

How long does a DVD last?

Though the duration varies by manufacturer, a typical DVD has an estimated life expectancy of 30-100 years. This is a huge benefit of DVD, as video/data tapes biodegrade over time and have a lower life expectancy of approximately 10 years. In addition, DVD does not suffer from the generational loss of video tape transfer nor does it shorten its life through repeated contact with mechanical parts.

What is the cost for recordable DVD media?

The price of recordable DVD discs has fallen greatly over the last year. DVD-R/RW discs are usually less expensive than the DVD+R/RW discs, but this should all even out as the public dives into DVD recording as a whole. Pricing current as of this writing show that the range in price for a single-write DVD are \$2-\$3 per disc, with the rewritable discs being slightly higher.

What are the different DVD standards?

Sony is currently supporting both DVD-RW and DVD+RW formats. Because there are no true standards in the computer industry and Sony is striving to deliver DVD recording via various means to its customers, DVD-RW drives are used in the VAIO® desktop line and DVD+RW internal and external drives are being sold to the public as well. There also exists another format, DVD-RAM, though incompatibility issues and slow adoption have made this format a distant third.

Please see page 5 for a comparison of DVD-RW and DVD+RW formats.

What kinds of Sony recordable DVD drives are available?

Sony offers three drive choices for you:

- DVD+RW
- DVD-RW
- DVD-RW/DVD+RW combination

Sony VAIO® notebook and desktop PC lines offer an internal DVD-RW drive that allows great compatibility with DVD players. In fact, the availability of a DVD-RW on a notebook was first brought to the public on VAIO® notebooks. Sony offers many configurations to enable you to build your own dream VAIO® desktop or notebook PC.

For consumers who may wish to add a DVD+RW drive to an existing computer, Sony has two drive options: internal and external. The DRU-120L external drive is powered by the i.LINK® interface, Sony’s high-speed IEEE 1394 serial bus (400 Mbps) while the DRU-120A is an internal drive.

Sony’s DRU-500 Dual RW series recordable DVD drives offer the best of both worlds. For the first time ever, a drive is capable of recording both DVD-R/RW and DVD+R/RW formats! Record DVD-R discs at 4x speed and DVD-RW at 2x or DVD+R/RW discs at 2.4x. Available as either an internal (DRU-500A) or external drive with dual i.LINK® and USB 2.0 interfaces (DRU-500L), the DRU-500 is a Sony exclusive.



DVD-RW has the backing of Sony, Pioneer, Hitachi, Samsung, and Apple, among others in the DVD Forum. It can burn CD-R and CD-RW discs as well as DVD-RW and DVD-R and boasts a high level of compatibility with existing DVD players and drives.

DVD-RW advantages include:

- It was the first combination DVD and CD recorder on the market and was released over a year before DVD+RW.
- More DVD-RW drives in use than DVD+RW at this time.
- The most inexpensive DVD writable media in the market today (DVD-R).
- An impressive level of compatibility with existing DVD drives and players via its write-once format, DVD-R. This format currently has the edge on compatibility.
- DVD-RW is a rewritable format capable of being reused up to 1,000 times and claims compatibility with DVD-Video and DVD-ROM standards.

DVD-R provides a 4.7 GB* single-write solution at 2x speed (2.8 MB/s), roughly 18x CD speed, and a rewrite solution at 1x speed (1.4 MB/s). With Sony's DRU-500 series, you can record a DVD-R at 4x speed (5.6 MB/s) and DVD-RW at 2x speed, effectively doubling previous speeds. It has great compatibility with existing drives and players and has enjoyed an earlier release and adoption rate. This format must use 2x-rated and 4x-rated media to support the 2x- and 4x- write speeds.

DVD-RW

DVD+RW

Backed by Sony, Philips, Hewlett-Packard, Dell, Microsoft, and others companies of the DVD+RW Alliance, the DVD+RW format is based upon existing CD-R/RW technology and records DVD+RW and DVD+R as well as CD-R and CD-RW discs. Its goal is to provide consumer electronic and PC compatibility, and is a rewritable format providing full compatibility with existing DVD players and DVD-ROM drives.

DVD+RW advantages include:

- Writes and rewrites at the same 2.4x speed. This makes it possible to burn an hour's worth of video in under half an hour at a throughput of 3.3 MB/s (equivalent to 20-22x CD recorder).
- Quicker background formatting within seconds, with faster lead-in and finish times than DVD-RW. This happens invisibly in the background and allows for instant recording.
- DVD+RW discs can be used for data and video files regardless of speed rating.
- "Lossless linking," which means that the drive can stop recording at any time and then resume later without error by editing directly on the disc. You can replace parts of a DVD+RW recording without having to erase the disc and start over.

DVD+R is a single-write, dye-based medium based on DVD+RW that offers great compatibility. It is capable of storing 4.7 GB* of information and can use any DVD+R disc without needing the media to qualify for a particular write speed.

Will recordable DVD grow in popularity?

Absolutely! The DVD format has taken the world by storm and will continue to see stellar growth in the future. Take a quick look at these DVD facts:

- According to figures by Ernest & Young on behalf of the DVD Entertainment Group (DEG), the one billionth DVD software unit entered retail in July, 2002.
- The DEG also noted that DVD player penetration in the United States will most likely hit 40 million homes by the end of 2002, approximately half of the homes in the country.

As noted above, it is obvious that DVD is universal and poised for tremendous growth throughout the future. People everywhere are tuning in to the advantages of DVD. However, the DVD experience does not have to end with simple observation—it can be extended to creative interaction. People want to be able to create and use DVD for their own uses, and recordable DVD is the answer.

- Gartner reported that 628,000 recordable DVD drives shipped in 2001. That number is expected to double in 2002 and to increase to close to 4 million in 2003 and 14.3 million in 2004.

Clearly there is a strong demand for recordable DVD. Sony's DVD-RW and DVD+RW solutions allow full interaction with DVDs from massive storage to high-quality video—almost anything you can imagine. Now shipping on select VAIO® PCs as well as available as external and internal drives, Sony brings the highest quality and design at an affordable price to the masses. Recordable DVD is here and now—and built for the future!

* 1 GB = 1000 MB. GB means one billion bytes when referring to DVD disc capacity. Accessible capacity may vary.

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