

Next Generation Media - Today!



Blu-ray
HD DVD

www.verbatim-europe.com

 **Verbatim**®

Why Verbatim?

Verbatim offers the complete solution for all your needs. From optical media and memory cards to printable photo paper and batteries, Verbatim is the right choice for future technology, today.

Verbatim aims to ensure that all of our products carrying the Verbatim brand meet the exact high quality standards that our customers have come to expect.

Our research and development teams are continually creating new products and enhancements on current products. This results in early launches of new products like Blu-ray and HD DVD-R plus latest speed generations in DVD, whilst improving printable surfaces and establishing features like Hard Coat.

Our business model and dedicated employees have earned us our sought after leadership position and the top market share in Europe for recordable CD and DVD media. It is a position we have worked hard to achieve, and we will work even harder to maintain it.

About Verbatim

Verbatim is a subsidiary of Mitsubishi Kagaku Media, based in Japan. Mitsubishi Kagaku Media's wide-range of operations makes it one of the leading chemical companies in the world.



Yokohama Research Centre

Mitsubishi Kagaku Media's pioneering strength is visible in its products, for which the research and development is carried out in the Yokohama Research Centre. The company also has strong relationships with the major hardware manufacturers in the market. These two strengths benefit Verbatim by ensuring not only the latest technologies and products first to market, but also that optical discs bearing our brand are the standard that many hardware companies test their recorders on, making our discs superbly compatible.



Features and Benefits

- Mitsubishi Kagaku Media, Verbatim's parent company, have perfected the Blu-ray and HD DVD technologies with on-going research and development to assure offering the best products on the market.



- Verbatim's BD-R discs have a newly developed inorganic recording layer called MABL, whilst our BD-RE use the DVD proven SERL technology, enhanced to the new Blu-ray standards. These patented technologies ensure superb quality recording with the blue laser resulting in long archival lifetime and excellent "playback" performance.



- Verbatim's Hard Coat ScratchGuard (0,002mm) layer of the Verbatim Blu-ray disc protects the discs from damage from scratches, fingerprints, dust and fluids. Verbatim Hard Coat is steel-wool tested and offers the ultimate protection against damage and contamination from day to day handling.



- Verbatim's research in HD DVD-R resulted in a new generation of the proven AZO dye. With its golden colour it stands for reliability and perfect recording. This ensures that each Verbatim HD DVD-R enjoys excellent playback performance and long archival stability.
- Verbatim's proven production technology and experience ensures perfect recording on every Blu-ray or HD DVD disc supplied to our customers. Therefore Verbatim offers the same lifetime warranty for Blu-ray and HD DVD that it offers to each of its CD and DVD discs.

What is Blu-ray?



Blue Laser

Blu-ray discs (BD) get their name from a combination of the words blue and optical ray. The format was developed by the Blu-ray Discs Association (BDA), which is made up of a group of leading consumer electronics, major film studios and PC companies, including our parent company, Mitsubishi Kagaku Media. Verbatim, as a subsidiary of MKM, has therefore, first hand access to the latest in Blu-ray technology.

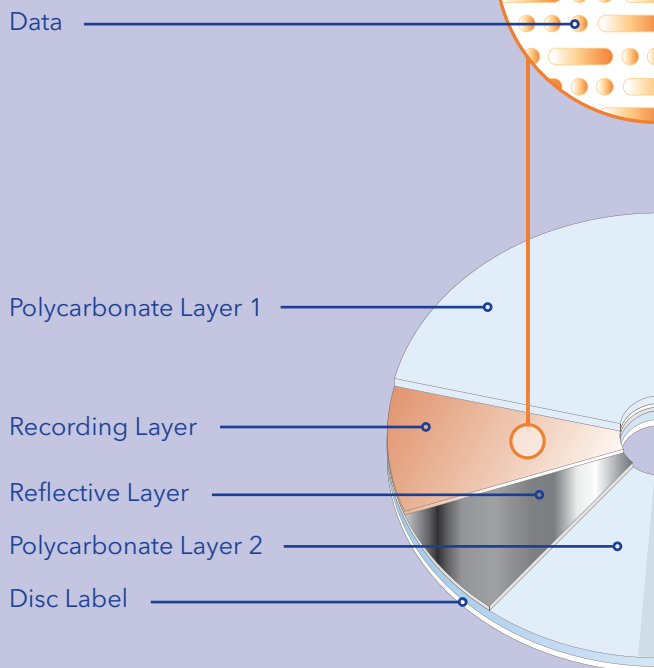


The Blu-ray disc's higher storage capacity is enabled by a blue laser that has a shorter wavelength than the standard red laser used in CD (780nm) and DVD (650nm) technology. Blu-ray disc utilizes a blue laser with a wavelength of only 405nm combined with a strong lens system with a numerical aperture of 0.85. This results in a ultra-small laser spot which allows writing smaller data pits which increases the amount of data on the disc. Due to the small data entry spot on the disc surface hard coating is needed on Blu-ray discs.



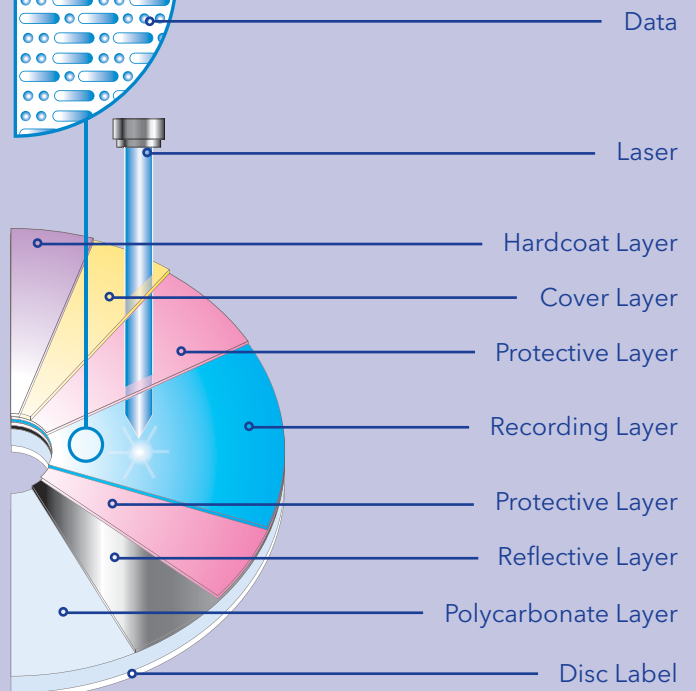
How a BD Disc Works

Red Laser (DVD) technology



Minimum pit length = 0.4 μ m Track pitch = 0.74 μ m Capacity = 4.7GB

Blu-ray (BD-R/RE) technology



Minimum pit length = 0.15 μ m Track pitch = 0.32 μ m Capacity = 25GB

What is HD DVD?



High Density

HD DVD stands for 'High-Density Digital Versatile Disc'. It is promoted by Toshiba, NEC and others and is supported by four major film studios. Our parent company, Mitsubishi Kagaku Media, is a member of the HD DVD development technology group which means that Verbatim has access to the latest in HD DVD technology.

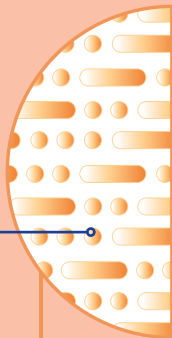
The HD DVD disc, like the Blu-ray disc has a higher storage capacity using the same blue laser of 405nm wavelength compared to the standard red laser used in CD (780nm) and DVD (650nm) technology. However, HD DVD uses a lens system with a numerical aperture of 0.65 resulting in a slightly bigger laser spot. This makes the laser and disc less susceptible to scratches and fingerprints so that HD DVD requires no hard coating on the disc surface.



How a HD DVD Disc Works

Red Laser (DVD) technology

Data



Polycarbonate Layer 1

Recording Layer

Reflective Layer

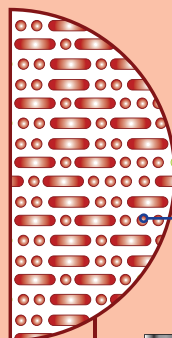
Polycarbonate Layer 2

Disc Label

Minimum pit length = 0.4 μ m Track pitch = 0.74 μ m Capacity = 4.7GB

Blue Laser (HD DVD) technology

Data



Laser

Polycarbonate Layer 1

Recording Layer

Reflective Layer

Polycarbonate Layer 2

Disc Label

Minimum pit length = 0.173 μ m Track pitch = 0.40 μ m Capacity = 15GB

High Definition Media Facts

Experience it with Verbatim.

With less than 10 years since the debut of the DVD format, the 'Next Generation' of optical media is already on the production line and the demand for the new revolution in home entertainment - High Definition (HD) is on the rise.

High Definition Television provides an unsurpassed picture quality and a remarkable high-end surround sound. With the superb resolution, dynamic contrast, vivid colours and remarkably clear sound effects, high definition brings an additional dimension to your visual entertainment.

Since the 1950s, Hollywood has been using 70mm film to achieve widescreen shots, sharp pictures and most importantly, high quality sound. Since our television systems during the past 50 have had a lower resolution than these films, reproduction was of a lesser quality.

Nowadays, with the development of High Definition Media, the same Hollywood quality can be viewed on the new High Definition televisions which are now on the market (HDTV).

With the expected growth of HDTV, there is a consequent growth in the recording of the HD television programming. Today, recording 2 hours of standard definition television in high quality requires a full 4.7GB DVD disc. High Definition content - with its increased resolution and digital sound tracks requires an ever greater amount of storage capacity. What does this mean? For consumers who want to record High Definition content, a higher capacity DVD is needed that can store this content with increased resolution and digital sound tracks.

Verbatim has recognised this need and to meet the demands of the market, we are offering the two current formats on the market: Blu-ray Discs and HD DVDs.



Specifications

Blu-ray Specifications

Disc Type	BD-R (Write-once)		BD-RE (Re-writable)	
	Single layer	Dual layer	Single layer	Dual layer
Recording Layer	Single layer	Dual layer	Single layer	Dual layer
Recording capacity	25GB	50GB	25GB	50GB
Recording layer	Inorganic material		Phase-change material	
Laser wavelength	405 nm		405 nm	
Lens numerical aperture (NA)	0.85		0.85	
Standard data transfer rate	36 Mbps		36 Mbps	
Disc diameter	120 mm		120 mm	
Disc thickness	1.2 mm		1.2 mm	
Cover Layer	0.1mm		0.1mm	
Tracking	Groove recording		Groove recording	
Track pitch	0.32 µm		0.32 µm	
Shortest mark length	0.149 µm		0.149 µm	

HD DVD Specifications

Disc Type	HD DVD-R (Write-once)		HD DVD-RW* (Re-writable)	
	Single layer	Dual layer	Single layer	Dual layer
Recording Layer	Single layer	Dual layer	Single layer	Dual layer
Recording capacity	15GB	30GB	15GB	30GB
Recording layer	Organic dye material		Phase-change material	
Laser wavelength	405 nm		405 nm	
Lens numerical aperture (NA)	0.65		0.65	
Standard data transfer rate	36.55 Mbps		36.55 Mbps	
Disc diameter	120 mm		120 mm	
Disc thickness	1.2 mm (0.6mm + 0.6mm)		1.2 mm (0.6mm + 0.6mm)	
Tracking	Groove recording		Groove recording	
Track pitch	0.40 µm		0.40 µm	
Shortest mark length	0.204 µm		0.204 µm	

* Specifications of HD DVD-RW have yet to be finalised

Roadmap

	Q1 2007	Q2 2007	Q3 2007	Q4 2007	2008	2009
BD-R 25GB	2x			4x	6x	8x
BD-RE 25GB	2x				4x	
BD-R 50GB			2x		4x	6x
BD-RE 50GB					2x	4x
BD-R/RE 8cm			2x			
HD DVD-R 15GB	1x			2x	4x	6x
HD DVD-R 30GB		1x				
HD DVD-RW 15GB				2x		