

14. Reference Information

14-1 Introduction to DVD

14-1-1 The Definition of DVD

DVD is the next generation medium and is the acronym of the Digital Versatile Disc or the Digital Video Disc, which maximizes the saving density of the disk surface using the MPEG-2 compression technology to enable the storage of 17G bytes of data on the same size CD.

1) 7 times the storage capacity of the conventional CD

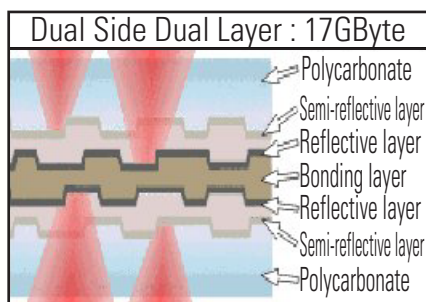
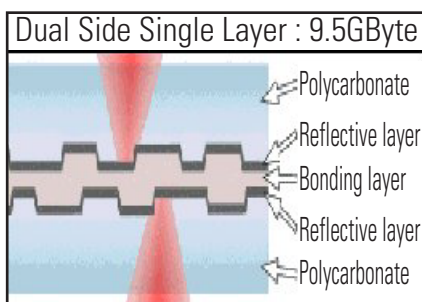
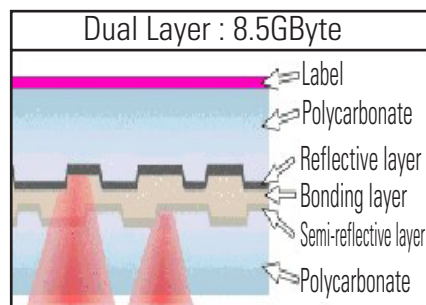
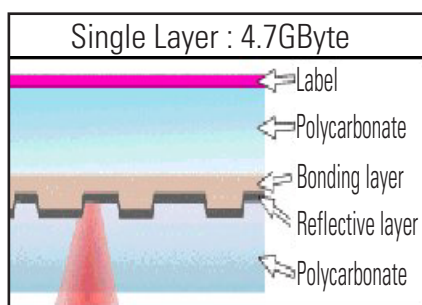
- Minimized the track pitch and pit size to 1/2 of conventional CD.
- Uses red laser with short-wavelength of 650nm (635nm).

• DVD Vs. CD-ROM

	CD-ROM	CD-R/RW	DVD-ROM	DVD-R/RW	DVD-RAM
Disc Thickness	1.2mm	1.2mm	0.6*2mm	0.6*2mm	0.6*2mm
Lens NA	0.45	0.45(0.5)	0.6	0.6	0.6
Laser wavelength	780um	780um	650um	650um	650um
Track pitch	1.6pm	1.6pm	0.74pm	0.74pm	0.615pm
Capacity	0.65GB	0.65GB	4.7GB	4.7GB	4.7GB
Track structure	Pit train	Groove	Pit train	Groove	Land/Groove

2) Disc Formats

DVD consists of two 0.6mm discs attached together, enabling access to the upper and lower side of the disk, and 4 sides could be used at maximum.



14-1-2 DVD Types

FORMAT	TYPE	APPLICATIONS
DVD-Video	Playback Only	High quality image and sound for movies and other video media.
DVD-ROM	Read Only	Multi-functional, multi-media software that requires large storage capacity.
DVD-Audio	Playback Only	High quality sound that exceeds the CD, multi-channel Audio.
DVD-R	1 Time Recording	As with CD-R, write only once
DVD-RW	Rewritable (About 1000times)	Similar to DVD-RAM except than its technology features a separated read-write access more like phonograph than a hard disk.

14-2 DVD-Video Format

14-2-1 Main Features

- 1) Able to store up to 160 minutes of Movie by utilizing the MPEG-2 compression technology. (Aver. 133min.)
- 2) Enables more than 500 lines of horizontal resolution. (Class corresponding to the Master Tapes used in broadcasting stations)
- 3) Provides Dolby Digital 5.1ch Surround 3D sound, which enables theater quality sound (NTSC area).
 - For PAL areas, 1 of either MPEG-2 Audio or Dolby Digital must be selected.
- 4) Multi-Language
 - Able to store up to 8 languages of dubbing.
 - Able to store up to 32 subtitle languages.
- 5) Multi-Aspect Ratio
3TV Mode alternatives ; 16:9 Wide Screen (DVD Basic)/4:3 Pan & Scan/Letter Box.
- 6) Multi-Story
Possible to implement Interactive Viewing which enables the user to select the scenario.
- 7) Multi-Angle
Able to view the camera angle you selected among the scenes recorded with multiple camera angles.

Note ; The above media features must have the DVD Title that contains the appropriate contents to function properly.

14-2-2 Audio & Video Specifications

Classification		DVD-Video		Video-CD	LD
VIDEO	Compression	MPEG-2		MPEG-1	Analog
	Pixel	720 x 480		352 x 240	
	Horizontal resolution	Max. 500 Lines		Max. 250 Lines	Max.420 Lines
	Compression rate	1/40		1/140	Analog
	Transmission speed	Max. 9.8Mbps (variable)		1.15Mbps (fixed)	
	TV aspect	16:9 / 4:3		4:3	4:3
AUDIO	Audio	Max. 8 streams		2CH stereo	<div>2 Analog CH. 2 Digital CH. (16Bit/44.1KHz)</div>
	Recording type	Dolby Digital	Linear PCM	MPEG-1 Layer 2	
	Transmission rate	448Kbps/stream	6.144Mbps/stream	224Kbps	<div>or</div> <div>1 Analog CH. 1 Stream of Dolby Digital 2 Digital CH. (16Bit/44.1KHz)</div>
	Channel	5.1CH/stream	8CH/stream	2CH	
	Sampling frequency	48KHz	16, 20, 24Bit/48, 96KHz	16Bit/44.1KHz	

14-2-3 Detailed Feature

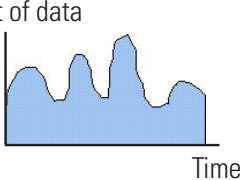
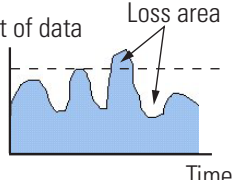
DVD-Video Feature 1	When Developing the DVD Software, various addition and modification is possible.
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As the storage capacity increases, the DVD-Video separates the main data and the additional data such as the Multi-Function into different data areas, enabling the control of time-data ratio to provide the format that enables the flexible Software development

- 1 Movie (3.5Mbps)
 - + Subtitle (1 Language)
 - + Surround Audio (1 Language)
 - = 160min storage (4.673Gbytes)
- 1 Movie (3.5Mbps)
 - + Subtitle (4 Language)
 - + Surround Audio (4 Language)
 - = 160min storage (4.680Gbytes)
- 1 Music Video (4Mbps)
 - + 2ch High quality Audio (96kHz / 24bit)
 - = 72min storage (4.648Gbytes)

DVD-Video Feature 2	Application of the MPEG-2 compression technology.
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DVD-Video uses the variable compression technology, the MPEG-2 to compress the moving image optimally, minimizing the Data loss to Provide a clear, natural screen while increasing the storage time.

DVD-Video	<ul style="list-style-type: none">• MPEG-2 (Variable compression : Max. 1 / 40)<ul style="list-style-type: none">• Field unit compression.• Compression rate change according to the amount of Data.• Differentiates the still image and the moving image compression rate, reducing Data loss and enables efficient compression. 
Video-CD	<ul style="list-style-type: none">• MPEG-1 (Fixed compression : Max. 1 / 140)<ul style="list-style-type: none">• Frame unit compression.• Compresses all data using the same ratio. <p>- Fast movements are jagged, and unnatural</p> 

DVD-Video Feature 3**High quality surround audio.**

DVD-Video can store the audio using the 5.1ch Dolby Digital compression or the advanced Linear PCM method, providing the better-than-CD quality and theater like audio quality.

- **DTS (Digital Theater System)**

Home theatre and music playback in the home, DTS provides high quality 5.1-channel surround sound with many extras not offered by other consumer formats. As well as handling DTS-branded releases from a growing number of music labels and consumer software producers, DTS provides enhanced 6.1 matrix and DTS 6.1 discrete decoding that envelopes the listener in sound. DTS technology is featured in a wide cross section of receiver/pre-amplifiers, DVD players and add-on components from leading consumer audio vendors

- **Dolby Digital (AC-3)**

- Unlike the traditional Dolby pro-Logic method, the Dolby Digital method separates all 5 main channels (Front L/R, Center, Surround (Rear) L/R) and the Sub woofer to provide live surround audio.
- Using the Down Mix method, the conventional Dolby Pro-Logic and Stereo are all compatible.
- Each separated channels are played back at CD quality sound. (Frequency band: 20Hz ~ 20KHz)

- **Linear PCM (Pulse Code Modulation)**

- Provides the high quality Digital sound without the audio data compression.
- Various Digital Recordings are possible as shown in the table to the right.

Sampling Frequency	Bit Rate
48KHz	16bit
	20bit
	24bit
96KHz	16bit
	20bit
	24bit

- **Dolby Digital compatible Audio Mode**

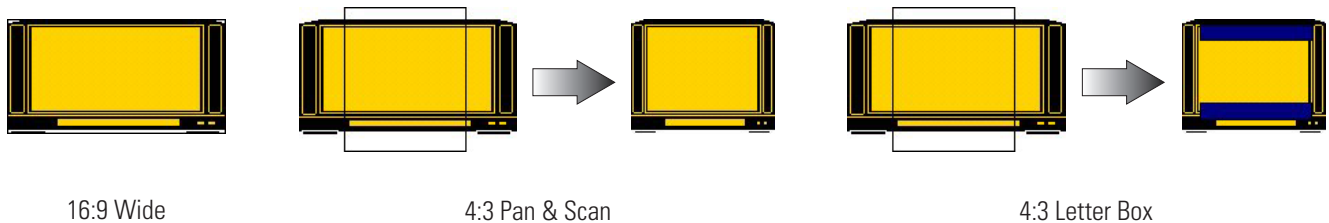
Audio Coding Mode	Channel Format					Remark
		Front		Surround (Rear)		
	L	C	R	L	R	
1/0		0				Mono
2/0	0		0			Stereo
3/0	0	0	0			Surround
2/1	0		0	Mono		
3/1	0	0	0	Mono		
2/2	0		0	0	0	
3/2	0	0	0	0	0	

DVD-Video Feature 4**Multi-Language**

- Audio Dubbing - Max. 8 Languages
- Subtitle - Max. 32 Languages. Capable of storing, and selectiong.
- Linear PCM (Pulse Code Modulation)

DVD-Video Feature 5**Multi-Aspect**

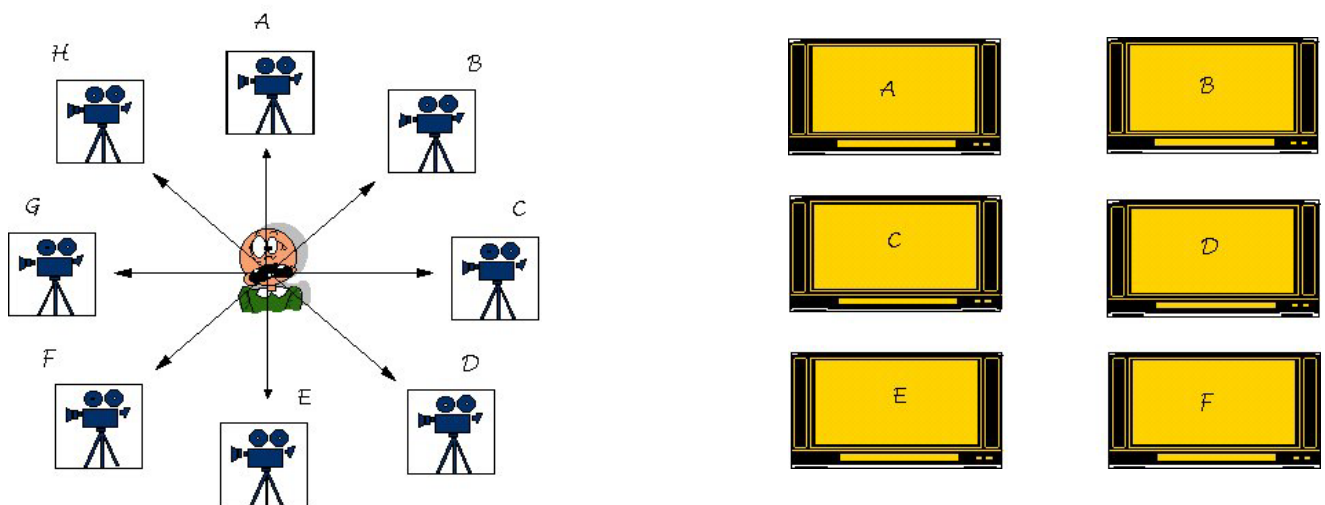
- Unlike the conventional VCD or LD, DVD-Video has the default of 16:9 Wide, and can be viewed using the conventional 4:3 TV, enabling the expansion of viewer selection capabilities.
- 16 : 9 TV : Wide Mode (16:9 Wide Full Screen)
- 4 : 3 TV : Letter Box Mode, Pan & Scan Mode



Note ; This function is disc-dependent, may not work on all DVDs.

DVD-Video Feature 6**Multi-Angle**

- Up to 9 angles of view may be stored, enabling the viewer to select a specific viewpoint at a given time.
--> Especially, for the Music Video and Sports Title, this provides a more lively image of the scene.



Note ; This function is disc-dependent, may not work on all DVDs.

DVD-Video Feature 7**Multi-Story**

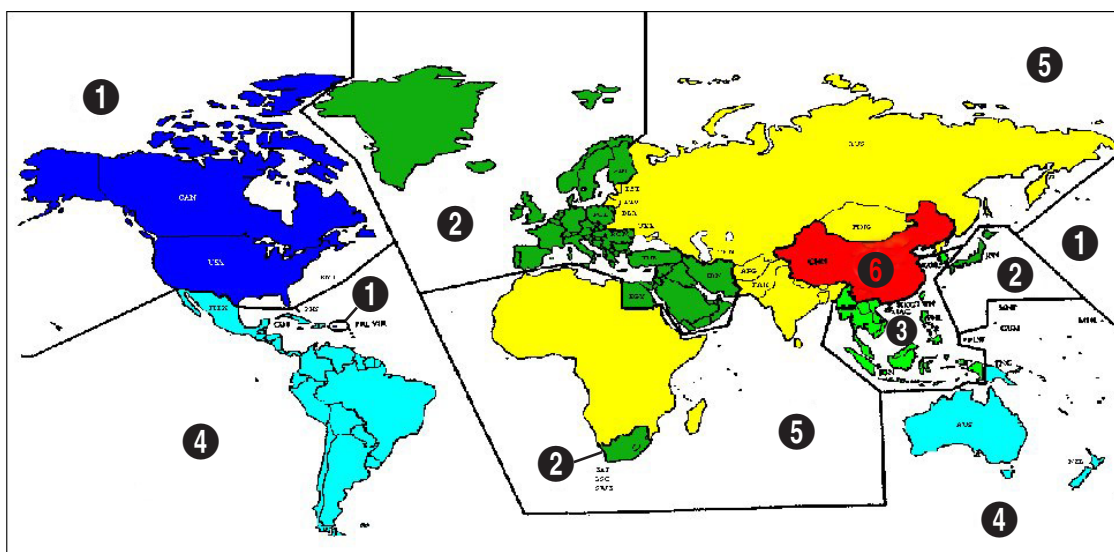
- DVD-Video provides the environment suitable for the bi-directional Software development, providing multiple scenarios. This feature enables the Multi-Story function.

OPTION**Parental Lock**

- For the titles that are not suitable for children viewing, Parental Locks are set, requesting user defined passwords for viewing
- Parental Locks may be set on specific frames of the Title, enabling the player to skip those frames during playback.

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- Classify the world into 6 regions, and if the DVD Title and the Player's "Regional Code" do not agree, playback is prohibited.
- **Regionnal Coding is optional for the Soft developers (Region 0 All Code), but the Hardware developers must adopt the appropriate regionnal code for sale.**
 - Region 1 : The United States and its territories, Canada.
 - Region 2 : Europe, Japan, Greenland, Egypt, South Africa, the Middle East.
 - Region 3 : Taiwan, Hongkong, Korea, South East Asia.
 - Region 4 : Mexico, South America, Australia, New Zealand.
 - Region 5 : Russia, Eastern Europe, India, Africa.
 - Region 6 : China.
 - Region 0 : Worldwide (All Code)



- Adoption of the Macrovision System disables the copying on to other media.

Remark	DVD-Video Authoring Process
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- The image quality of the DVD-Video may vary according to the quality of the Master and the Authoring Process
 - The image quality of the DVD-Video varies according to the Digital Mastering Source such as the conventional LD, VCD, or Original Film.
 - Different Authoring Process are used according to the Software developers, and this may affect the DVD image quality.

• **Authoring Process**

