

# harman kardon

## Model DVD 22

### DVD/CD/CD-R/CD-RW/VCD MP3 Player

# Service Manual



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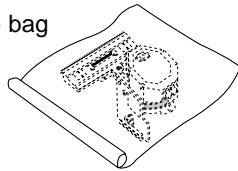
# SERVICING PRECAUTIONS

## NOTES REGARDING HANDLING OF THE PICK-UP

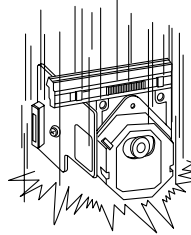
### 1. Notes for transport and storage

- 1) The pick-up should always be left in its conductive bag until immediately prior to use.
- 2) The pick-up should never be subjected to external pressure or impact.

Storage in conductive bag

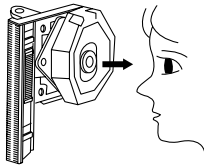


Drop impact



### 2. Repair notes

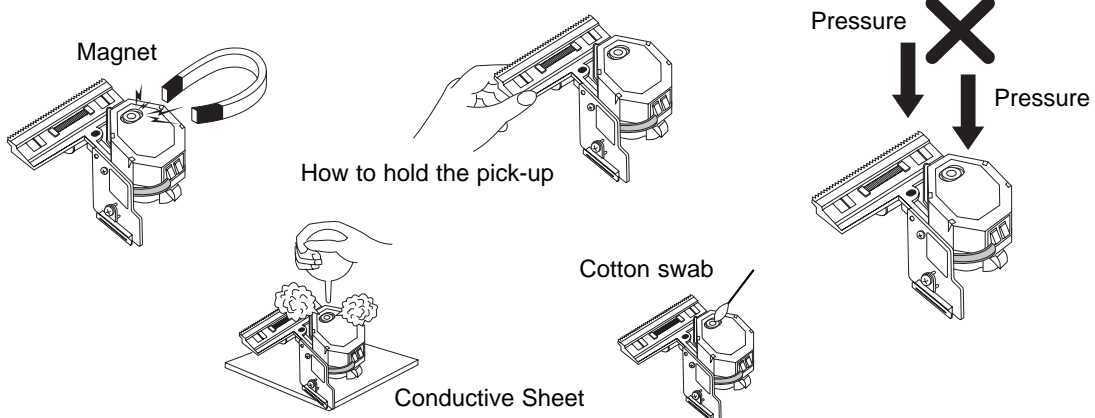
- 1) The pick-up incorporates a strong magnet, and so should never be brought close to magnetic materials.
- 2) The pick-up should always be handled correctly and carefully, taking care to avoid external pressure and impact. If it is subjected to strong pressure or impact, the result may be an operational malfunction and/or damage to the printed-circuit board.
- 3) Each and every pick-up is already individually adjusted to a high degree of precision, and for that reason the adjustment point and installation screws should absolutely never be touched.
- 4) Laser beams may damage the eyes!  
Absolutely never permit laser beams to enter the eyes!  
Also NEVER switch ON the power to the laser output part (lens, etc.) of the pick-up if it is damaged.



NEVER look directly at the laser beam, and don't let contact fingers or other exposed skin.

### 5) Cleaning the lens surface

If there is dust on the lens surface, the dust should be cleaned away by using an air bush (such as used for camera lens). The lens is held by a delicate spring. When cleaning the lens surface, therefore, a cotton swab should be used, taking care not to distort this.



### 6) Never attempt to disassemble the pick-up.

Spring by excess pressure. If the lens is extremely dirty, apply isopropyl alcohol to the cotton swab. (Do not use any other liquid cleaners, because they will damage the lens.) Take care not to use too much of this alcohol on the swab, and do not allow the alcohol to get inside the pick-up.

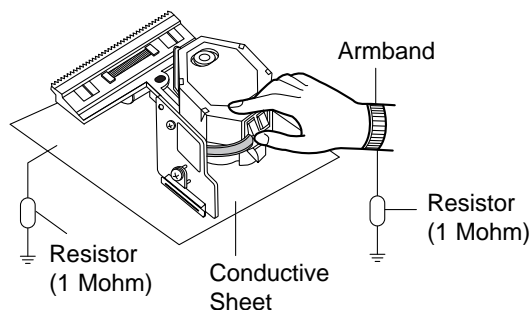
# NOTES REGARDING COMPACT DISC PLAYER REPAIRS

## 1. Preparations

- 1) Compact disc players incorporate a great many ICs as well as the pick-up (laser diode). These components are sensitive to, and easily affected by, static electricity. If such static electricity is high voltage, components can be damaged, and for that reason components should be handled with care.
- 2) The pick-up is composed of many optical components and other high-precision components. Care must be taken, therefore, to avoid repair or storage where the temperature of humidity is high, where strong magnetism is present, or where there is excessive dust.

## 2. Notes for repair

- 1) Before replacing a component part, first disconnect the power supply lead wire from the unit
- 2) All equipment, measuring instruments and tools must be grounded.
- 3) The workbench should be covered with a conductive sheet and grounded.  
When removing the laser pick-up from its conductive bag, do not place the pick-up on the bag. (This is because there is the possibility of damage by static electricity.)
- 4) To prevent AC leakage, the metal part of the soldering iron should be grounded.
- 5) Workers should be grounded by an armband (1M $\Omega$ )
- 6) Care should be taken not to permit the laser pick-up to come in contact with clothing, in order to prevent static electricity changes in the clothing to escape from the armband.
- 7) The laser beam from the pick-up should NEVER be directly facing the eyes or bare skin.



# ESD PRECAUTIONS

## Electrostatically Sensitive Devices (ESD)

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive Devices (ESD). Examples of typical ESD devices are integrated circuits and some field-effect transistors and semiconductor chip components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ESD devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ESD devices.
4. Use only an anti-static solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ESD devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ESD devices.
6. Do not remove a replacement ESD device from its protective package until immediately before you are ready to install it. (Most replacement ESD devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive materials).
7. Immediately before removing the protective material from the leads of a replacement ESD device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

**CAUTION : BE SURE NO POWER IS APPLIED TO THE CHASSIS OR CIRCUIT, AND OBSERVE ALL OTHER SAFETY PRECAUTIONS.**

8. Minimize bodily motions when handling unpackaged replacement ESD devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ESD device).

## DVD 22 TECHNICAL SPECIFICATIONS

<b>Applicable Disc:</b>	Disc formats: 5-inch (12cm) or 3-inch (8cm) DVD-Movie, Standard conforming DVD-R, DVD+R, DVD-RW, DVD+RW, VCD, CD, CD-R, MP3 or CD-RW discs Region code: DVD Movie disc with Code 1 or 0 only DVD-Layers: Single Side/Single Layer, Single Side/Dual Layer, Dual Side/Dual Layer Audio formats: Linear PCM, MPEG, Windows Media 9, Dolby Digital or DTS Audio Discs Still image format: JPEG
<b>Video Signal System:</b>	NTSC
<b>Composite Video Output:</b>	1V p-p/75 ohms, sync negative polarity
<b>S-Video Output:</b>	Y/Luminance: 1V p-p/75 ohms, sync negative polarity C/Chrominance: 0.286V p-p
<b>Component Video Output:</b>	Y: 1V p-p/75 ohms, sync negative polarity Pr: 0.7V p-p/75 ohms Pb: 0.7V p-p/75 ohms
<b>Analog Audio Output:</b>	2V rms max
<b>Frequency Response:</b>	DVD (Linear PCM): 2Hz – 22kHz +0/–0.5dB (48kHz sampling) 2Hz – 44kHz +0/–0.5dB (96kHz sampling) CD: 2Hz – 20kHz +0/–0.5dB
<b>Signal/Noise Ratio (SNR):</b>	105dB (A-weighted)
<b>Dynamic Range:</b>	DVD: 100dB (18-bit)/105dB (20-bit) CD/DVD: 96dB (16-bit)
<b>THD/1kHz:</b>	DVD/CD: 0.0025%
<b>Wow &amp; Flutter:</b>	Below Measurable Limits
<b>AC Power:</b>	110–240VAC/50–60Hz
<b>Power Consumption:</b>	2 Watts (On/Standby)/20 Watts (Max)
<b>Dimensions (W x H x D):</b>	17-3/10" x 1-15/16" x 12" (440mm x 49mm x 330mm)
<b>Weight:</b>	7.3 lb (3.3kg)

Depth measurement includes knobs and connectors.

Height measurement includes feet and chassis.

All specifications subject to change without notice.

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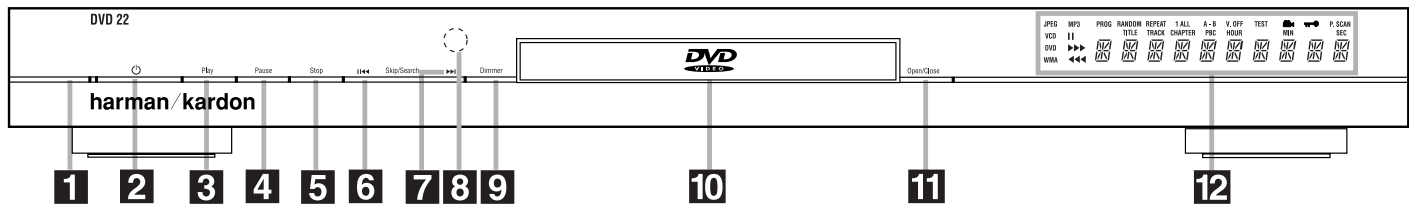
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## FRONT-PANEL CONTROLS



**NOTE:** To make it easier to follow the instructions that refer to the controls and connectors in this illustration, a larger copy may be downloaded from the Product Support section for this product at [www.harmankardon.com](http://www.harmankardon.com).

- 1** Power Indicator
- 2** Power On/Off (Standby)
- 3** Play
- 4** Pause

- 5** Stop
- 6** Skip/Search Reverse
- 7** Skip/Search Forward
- 8** Remote Sensor

- 9** Display
- 10** Disc Drawer
- 11** Open/Close
- 12** Information Display

**1 Power Indicator:** This indicator lights amber when the unit is connected to an AC power source, but is not turned on. When the unit is on, the indicator lights blue.

**2 Power On/Off (Standby):** Press the button once to turn the DVD 22 on. Press it again to put the unit in the Standby mode. Note that in order for this switch to operate, the **Main Power Switch 1** must be pressed in so that it is in the ON position.

**3 Play:** Press to initiate playback or to resume playback after the **Pause Button 5** **13** has been pressed.

**4 Pause:** Press this button to momentarily pause playback. To resume playback, press the button again. If a DVD is playing, action will freeze and a still picture will be displayed when the button is pressed.

**5 Stop:** Press this button once to place the disc in the Resume mode, which means that playback will stop, but as long as the tray is not opened or the disc changed, DVD playback will continue from the same point on the disc when the **Play Button 3** **17** is pressed again. Resume will also work if the unit was turned off. To stop a disc and have play start from the beginning, press the button twice.

**6 Skip/Search Reverse:** Press this button once to return to the start of the current chapter for a DVD or track for a CD. Subsequent individual presses will skip backwards through the available chapters or tracks. Press and hold the button to play the disc in the fast reverse mode at the speed indicated in the on-screen display and by the **Playback Mode Indicators K**.

**7 Skip/Search Forward:** Press this button once to move to the start of the next chapter for a DVD or track for a CD. Subsequent presses will skip forward through the available chapters or tracks. Press and hold the button to play the disc in the Fast Play mode at the speed indicated in the on-screen display and by the **Playback Mode Indicators K**.

**8 Remote Sensor:** The sensor that receives commands from the remote control is behind the front panel in this area. To ensure proper operation of the player with the remote, it is important that this area not be covered. In the event that the player is enclosed in a cabinet or if the remote sensor is covered, you may extend the remote sensor by connecting an optional, external remote sensor to the **Remote Control Input**

**8** on the rear panel (see page 11). When optional, external IR "blasters" are used for system control, they should be positioned so that they point at this area.

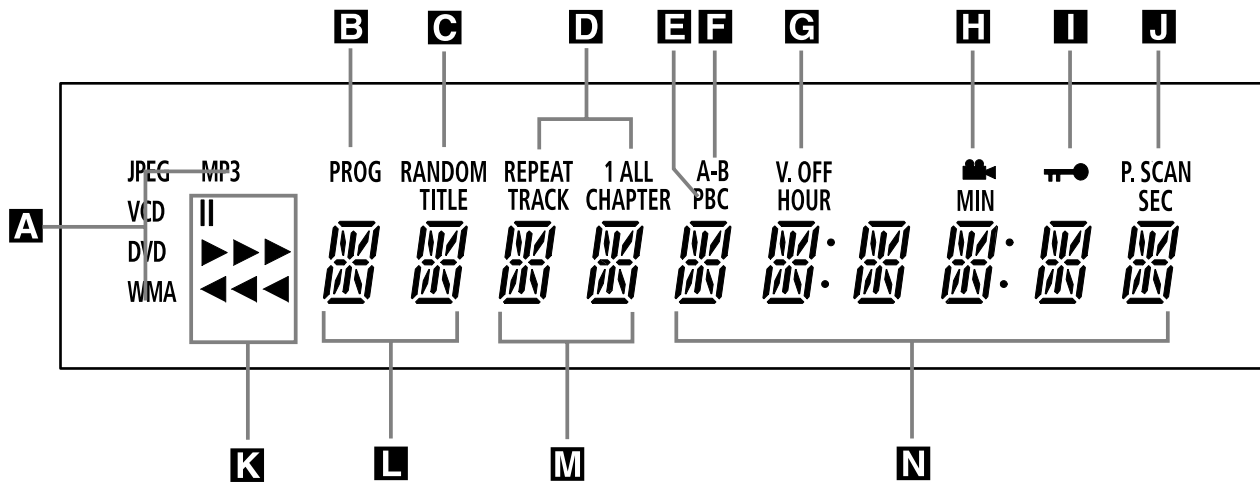
**9 Display:** Press this button to reduce the brightness of the Information Display by 50% or to turn the display off completely in the following order: FULL BRIGHTNESS → HALF BRIGHTNESS → OFF → FULL BRIGHTNESS.

**10 Disc Drawer:** This drawer is used to hold the discs played in the unit. Be certain to seat all discs carefully within the recess in the drawer. Do not press down on the drawer when it is open, to avoid damage to the player.

**11 Open/Close:** Press this button to open or close the disc tray.

**12 Information Display:** The Information Display provides status information on the player and the disc being played through a series of specific indicators and messages that appear in the dot matrix display. See page xx for more information on the display.

## FRONT-PANEL INFORMATION DISPLAY



**NOTE:** To make it easier to follow the instructions that refer to the controls and connectors in this illustration, a larger copy may be downloaded from the Product Support section for this product at [www.harmankardon.com](http://www.harmankardon.com).

- A** Disc-Type Indicators
- B** Program Indicator
- C** Random Indicator
- D** Repeat Indicators
- E** VCD Playback Control Indicator

- F** A-B Repeat Indicator
- G** V-OFF Indicator
- H** Angle Indicator
- I** Parental Lock Indicator
- J** Progressive Indicator

- K** Playback-Mode Indicator
- L** Title Indicators
- M** Chapter/Track Number Indicators
- N** Time Indicators

**A Disc Type Indicators:** The DVD, CD, VCD, MP3, WMA or JPEG indicator will light to show the type of disc currently being played.

**B Program Indicator:** This indicator lights when the programming functions are in use.

**C Random Indicator:** This indicator lights when the unit is in the Random Play mode.

**D Repeat Indicators:** These indicators light when any of the Repeat functions are in use.

**E VCD Playback Control Indicator:** This indicator lights when the playback control function is turned on with VCDs.

**F A-B Repeat Indicator:** This indicator lights when a specific passage for repeat playback has been selected.

**G V-OFF Indicator:** This indicator lights in red when the unit's video output has been turned off by pressing the V-OFF button on the remote control.

**H Angle Indicator:** This indicator blinks when alternative viewing angles are available on the DVD currently playing.

**I Parental Lock Indicator:** This indicator lights when the parental-lock system is engaged in order to prevent anyone from changing the rating level without a code.

**J Progressive Scan Indicator:** This indicator lights when the unit sends out a progressive scan signal.

**K Playback-Mode Indicators:** These indicators light to show the current playback mode:

▶ Lights when a disc is playing in the normal mode.

▶▶▶ When the DVD 22 is in the Fast Search play mode, two or three of these indicators will light to show that the unit is in a Fast Play mode, depending on the speed.

|| Lights when the disc is paused.

◀◀ Lights when the disc is in the Fast Search Reverse mode.

**L Title Indicators:** These two positions in the display will show the current title number when a DVD disc is playing.

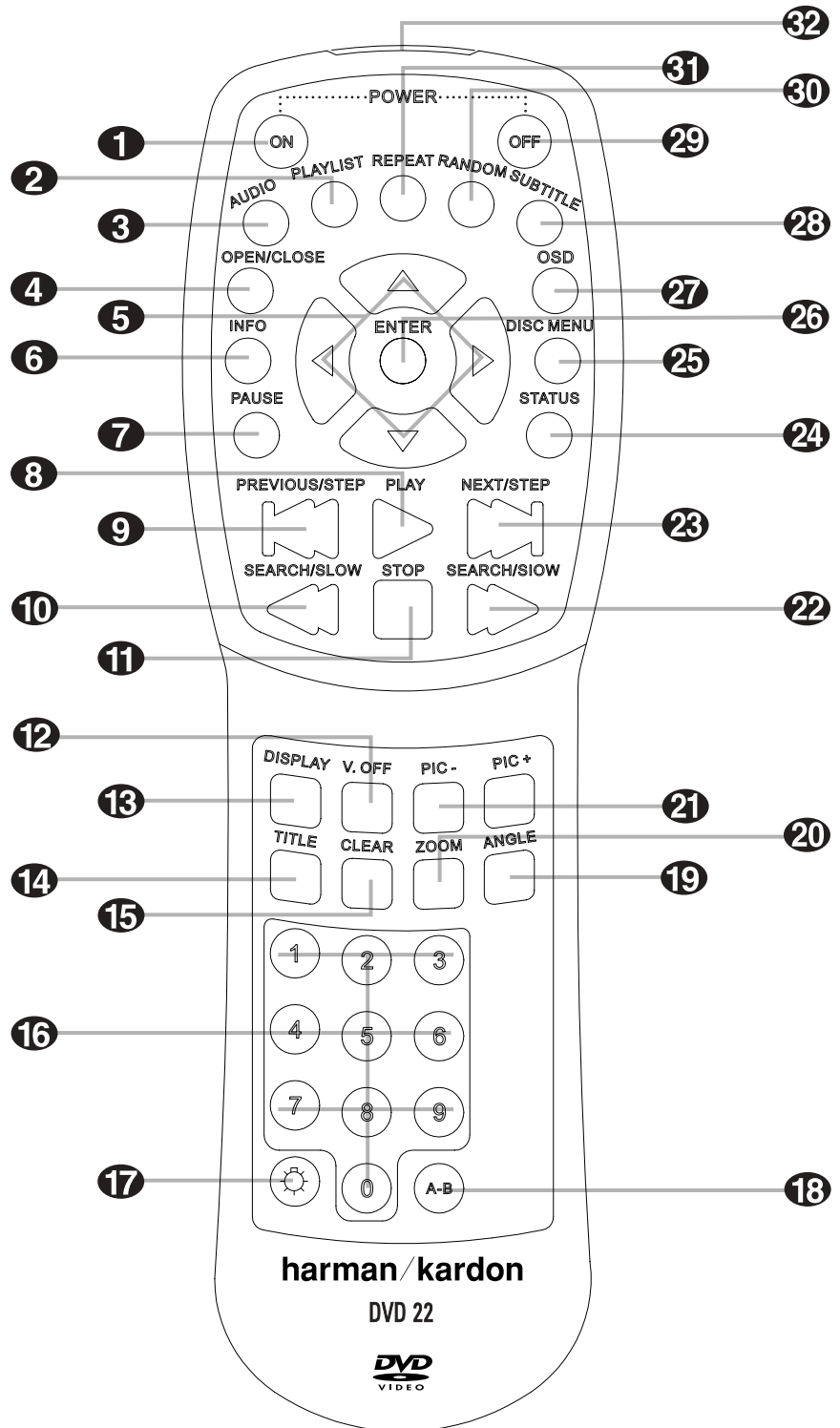
**M Chapter/Track Number Indicators:** When a DVD disc is playing, these two positions in the display will show the current chapter. When a CD disc is playing they will show the current track number.

**N Time Indicators:** These positions in the indicator will show the running time of a DVD in play. When a CD is playing, these indicators will show the current track time, time remaining in the current track, or the total remaining time on the disc.

**NOTE:** The indicators **LMN** will also display text messages about the DVD's status, including Reading when a disc is loading, Standby when the unit is turned off, and Disc Error when a disc not compatible with the DVD is put into the play position.

# REMOTE CONTROL FUNCTIONS

- 1 Power On
- 2 Playlist
- 3 Audio Select
- 4 Open/Close
- 5 ▲/▼/◀/▶ Navigation Buttons
- 6 Info
- 7 Pause
- 8 Play
- 9 Previous Step/Skip
- 10 Search/Slow Reverse
- 11 Stop
- 12 Video Off
- 13 Display
- 14 Title
- 15 Clear
- 16 Numeric Keys
- 17 Light
- 18 A-B Repeat
- 19 Angle
- 20 Zoom
- 21 Picture -/+
- 22 Search/Slow Forward
- 23 Next Step/Skip
- 24 Status
- 25 Disc Menu
- 26 Enter
- 27 OSD
- 28 Subtitle
- 29 Off
- 30 Random
- 31 Repeat
- 32 IR Emitter



**NOTE:** To make it easier to follow the instructions that refer to the controls and connectors in this illustration, a larger copy may be downloaded from the Product Support section for this product at [www.harmankardon.com](http://www.harmankardon.com).



# REMOTE CONTROL FUNCTIONS

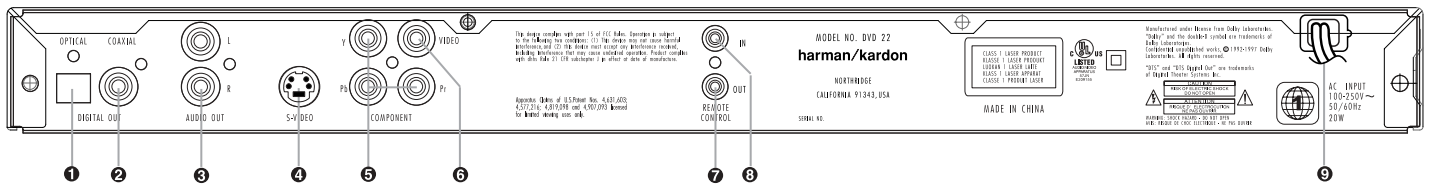
- 1 Power On:** Turns on the player when it is in Standby mode (Harman Kardon logo appears on-screen).
- 2 Playlist:** Press this button to change the order in which tracks are played on a CD or chapters are played on a DVD. (See page 28 for more information on creating and playing playlists.)
- 3 Audio Select:** Press to access various audio languages on a DVD (If the DVD contains multiple audio streams).
- 4 Open/Close:** Press to open or close the disc tray.
- 5 ◀▶▲▼ Navigation Buttons:** Use to move the cursor in the OSD.
- 6 Info:** Press once for detailed informations on the disc playing (Video/Audio Bit rate, Movie aspect ratio and others). Press again to remove information from screen.
- 7 Pause:** Press this button to pause the disc and freeze the picture during DVD or VCD playback, or to pause the playback of a CD. To play a DVD in the fast, slow or forward mode, first press this button and then press either the **Search/Slow Forward** **22** or **Reverse** **10** button.
- 8 Play:** Press this button to begin the playback of a disc, or to resume the playback when a disc has been paused.
- 9 Previous Step/Skip:** Press this button once to skip back to the beginning of the current chapter on a DVD or track on a CD. Press it again to continue to skip back through the remaining chapters or tracks. After first pressing the **Pause** button **7**, press this button to step backwards through a DVD as a series of still image frames. Press it again to continue to skip back through the remaining previous chapters.
- 10 Search/Slow Reverse:** This button initiates fast or slow play in the reverse mode. For fast reverse play, each press of the button when playing DVD discs changes the speed as indicated by the number of left-facing arrows appearing in the upper right corner of the screen and in the **Playback Mode Indicators** **K**. For slow reverse play, first press the **Pause** button **7** and the each subsequent press of this button will change the slow play speed as indicated by the number of left-facing arrows appearing in the upper right corner of the screen and in the **Playback Mode Indicators** **K**.
- 11 Stop:** When a DVD is playing, press this button once to place the disc in the Resume mode, which means that playback will stop. However, as long as the disc drawer is not opened DVD playback will continue from the point where the disc was stopped when the **Play** button **8 3** is pressed again.

Pressing the button twice will stop the disc and play will start from the beginning of the disc when the **Play** button **8 3** is pressed again. During CD playback press this button to stop playback.

- 12 Video Off:** Press this button to turn off the video output for improved audio performance when playing CDs. Press it again to view the on-screen menus.
- 13 Display:** Press to change the brightness of the front panel display or to turn the display off completely in the following order: **FULL BRIGHTNESS** → **HALF BRIGHTNESS** → **OFF** → **FULL BRIGHTNESS**
- 14 Title:** When a DVD is playing, press this button to go back to the main title menu for the disc being played.
- 15 Clear:** Press this button to remove on-screen menus or banners from the display screen.
- 16 Numeric Keys:** Press these buttons to enter a number.
- 17 Light:** Press to illuminate remote controller.
- 18 A-B Repeat:** Press this button to enter the starting point of a sequence on a disc you wish to repeat. The second press enters the end of the selection to be repeated. Once the "A" (start) and "B" (end) points have been entered the player will repeat the selection until the **Play** button **8 3** is pressed or the disc is stopped.
- 19 Angle:** Press this button to change the angle on discs programmed for multiple angle views.
- 20 Zoom:** Press this button to zoom in on the image from a DVD, VCD or JPEG image. The image may be expanded by a factor of x2, x3, x4 or x5. Once the on-screen indication of the zoom ratio leaves the screen you may use the **Navigation** buttons **5** to move the picture across the screen.
- 21 Picture -/+:** Press these buttons to move to the next (+) or previous (-) image when playing a disc with JPEG images.
- 22 Search/Slow Forward:** This button initiates fast or slow play in the forward mode. For fast forward play, each press of the button when playing DVD discs changes the speed as indicated by the number of right-facing arrows appearing in the upper right corner of the screen and in the **Playback Mode Indicators** **K**. For slow forward play, first press the **Pause** button **7** and the each subsequent press of this button will change the slow play speed as indicated by the number of right-facing arrows appearing in the upper right corner of the screen and in the **Playback Mode Indicators** **K**.

- 23 Next Step/Skip:** Press this button once to advance to the beginning of the next chapter on a DVD or track on a CD. Press it again to continue to advance through the available chapters or tracks. After first pressing the **Pause** button **7**, press this button to step through a DVD as a series of still image frames.
- 24 Status:** Press while a disc is playing to view banner display. Use the **Navigation** buttons **5** to move through the different features in the Banner Display. When a symbol is highlighted, press **ENTER** **26** on the remote to select it.
- 25 Disc Menu:** While a DVD is playing, press this button to view the disc's main navigation menu.
- 26 Enter:** Press this button to enter a setting to the player's menu or to confirm a menu selection choice on a disc's on-screen menu.
- 27 OSD:** Press this button to use the on-screen menu system to adjust the player's configuration settings or to build a playlist.
- 28 Subtitle:** When a DVD is playing, press to select a subtitle language or to turn subtitles off.
- 29 Off:** Turns off the player to standby mode.
- 30 Random:** Press this button to play the tracks on a CD, MP3, WMA or JPEG disc in random order.
- 31 Repeat:** Press this button to view the Repeat Menu that allows you to change the playback mode to repeat a chapter or track or the entire disc.
- 32 IR Emitter:** This small, clear button-like device sends the IR commands from the remote control to the DVD 22. To ensure proper performance of the remote control, be sure to point it toward the unit and do not cover it with your fingers when sending remote commands.

## REAR-PANEL CONNECTIONS



**NOTE:** To make it easier to follow the instructions that refer to the controls and connectors in this illustration, a larger copy may be downloaded from the Product Support section for this product at [www.harmankardon.com](http://www.harmankardon.com).

- ❶ Optical Digital Output
- ❷ Coaxial Digital Output
- ❸ Analog Audio Outputs

- ❹ S-Video Output
- ❺ Component Video Outputs
- ❻ Composite Video Output

- ❼ Remote Control Output
- ❽ Remote Control Input
- ❾ AC Power Cord

**❶ Optical Digital Output:** Connect this jack to the optical digital input of an A/V receiver or surround processor for Dolby Digital, DTS or PCM audio playback.

**❷ Coaxial Digital Output:** Connect this jack to the coaxial digital input of an A/V receiver or surround processor for Dolby Digital, DTS or PCM audio playback.

**NOTE:** The coaxial digital output should only be connected to a digital input. Even though it is the same RCA-type connector as standard analog audio connections, DO NOT connect it to a conventional analog input jack.

**❸ Analog Audio Outputs:** Connect these jacks to an audio input on an A/V receiver or surround processor for analog audio playback.

**❹ S-Video Output:** Connect this jack to the S-Video input on a television or video projector, or to an S-Video input on an A/V receiver or processor if you are using that type of device for S-Video input switching.

**❺ Component Video Outputs:** These outputs carry the component video signals for connection to display monitors with component video inputs. For standard analog TVs or projectors with inputs marked Y/Pr/Pb or Y/Cr/Cb, connect these outputs to the corresponding inputs. If you have a high-definition television or projector that is compatible with high-scan-rate progressive video, connect these jacks to the HD component inputs. If you are using a progressive scan display device, **PROGRESSIVE** must be selected in the Video menu in order to take advantage of the progressive scan circuitry. See "Scan Type" section on page 20 for more information on progressive scan video.

**IMPORTANT:** These jacks should NOT be connected to standard composite video inputs.

**❻ Composite Video Output:** Connect this jack to the video input on a television or video projector, or to a video input on an A/V receiver or processor if you are using that type of device for video input switching.

**❼ Remote Control Output:** Connect this jack to the infrared (IR) input jack of another compatible Harman Kardon remote-controlled product to have the built-in Remote Sensor on the DVD 22 provide IR signals to other compatible products.

**❽ Remote Control Input:** Connect the output of a remote infrared sensor, or the remote control output of another compatible Harman Kardon product, to this jack. This will enable the remote control to operate even when the front-panel Remote Sensor on the DVD 22 is blocked. This jack may also be used with compatible IR remote control-based automation systems.

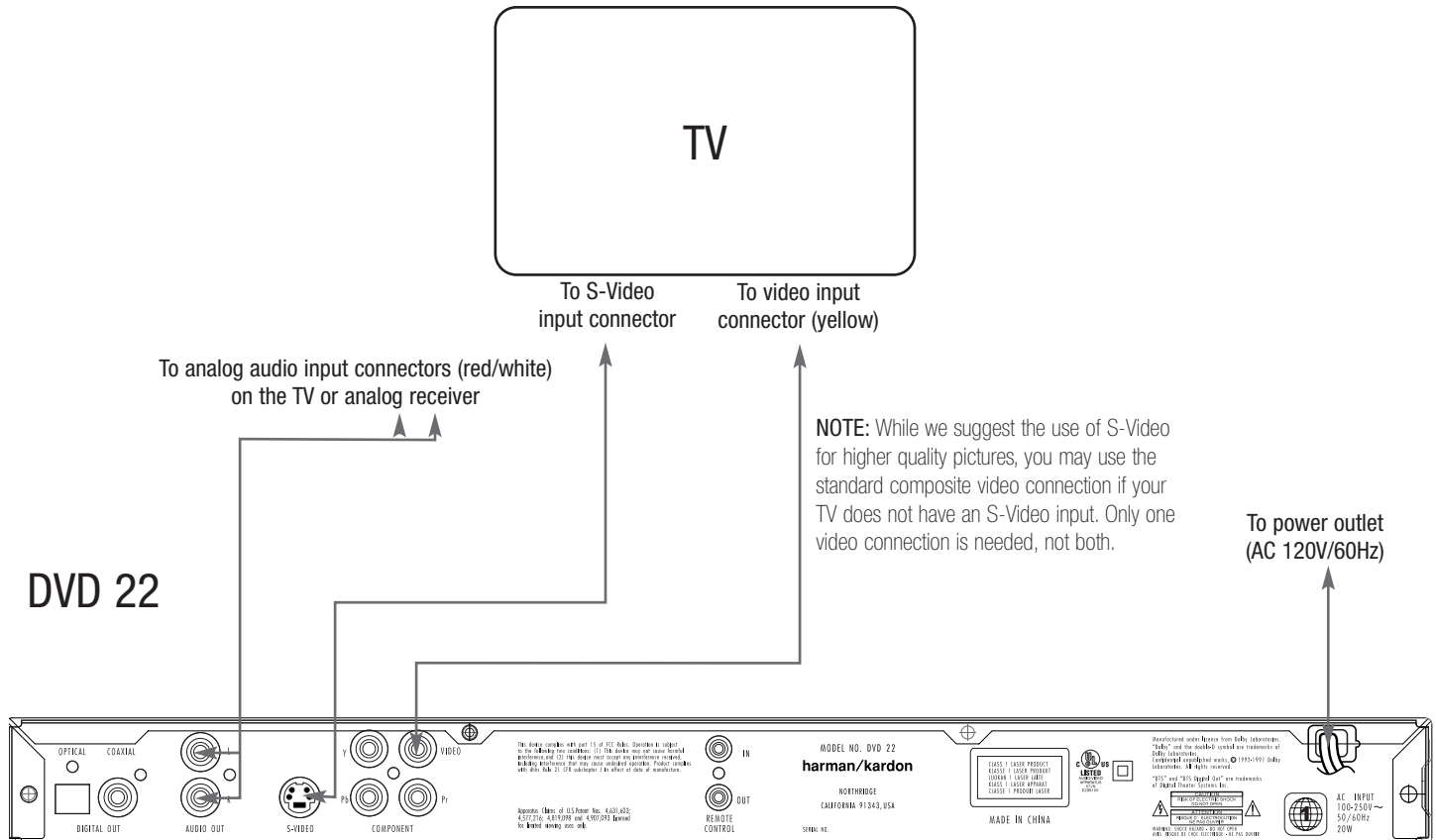
**❾ AC Power Cord:** Connect this plug to an AC outlet. If the outlet is controlled by a switch, make certain that it is in the ON position.

**NOTE:** You'll find more details about all audio/video connections under Setup and Connections on the following pages.

# SETUP AND CONNECTIONS

- Ensure that the power switch of this unit (and of other equipment to be connected) is set to "Off" before commencing connection.
- Do not block the ventilation holes of any of the equipment and arrange them so that air can circulate freely.
- Read through the instructions before connecting other equipment.
- Ensure that you observe the color-coding when connecting audio and video cables.

## Connecting to a TV and Analog Receiver



### NOTES:

- The video output (yellow) combines the complete video signal (composite) and sends it to the TV (or to the A/V receiver) by one cable only. Use the video output when your TV set is equipped with a video input jack only.
- The S-Video output connector separates the color (C) and luminance (Y) signals before transmitting them to the TV set in order to achieve a sharper picture. Use

the S-Video cable when connecting the player to a TV equipped with an S-Video input for improved picture clarity. Never connect both outputs, video and S-Video, to your TV or A/V receiver; use only one of them.

- When the audio signal is to be fed to an analog receiver rather than to the TV, connect the audio out jacks to any analog audio input on your amplifier/decoder/receiver. The DVD 22 will "downmix"

Dolby Digital recordings to Pro Logic.\* For more information see the IMPORTANT NOTE on next page.

# SETUP AND CONNECTIONS

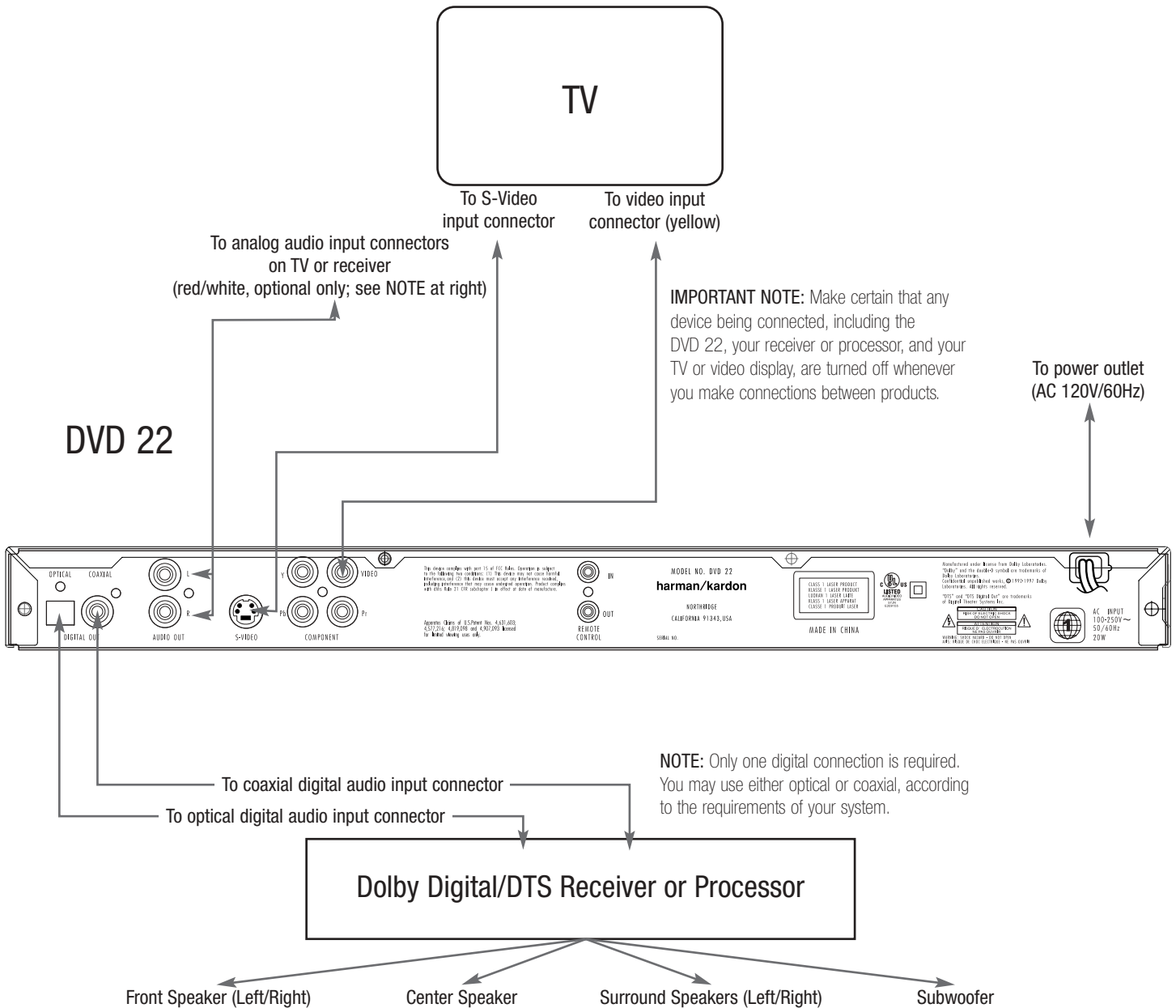
## Audio Connections

• One of the major advantages of the DVD format is its ability to use a variety of digital audio formats for the ultimate in sonic performance. However, in order to enjoy the benefits of digital audio, you must use a receiver or processor that has digital audio decoding capabilities and make an optical or coaxial digital audio connection between the DVD 22 and your home theater system. This simple connection is made as shown below with an optional coax or optical cable. Note that only one of these connections is required, and the choice is determined by personal preferences, as well as the number of

inputs available on your receiver or processor as compared to the number of digital audio sources it must accommodate.

- When your receiver or processor does not have digital audio capability, connect the left/right audio outputs (red/white colored jacks) to an available left/right audio input on your receiver or processor. You may also connect these outputs directly to the left/right audio inputs on a television or video display when an analog stereo or multichannel receiver is not used.

• Even when making a digital audio connection, we recommend that you also connect the left/right analog audio outputs of the DVD 22 to your receiver or processor. While your primary listening will be done using multichannel audio that is decoded from the digital audio input, some receivers and processors also require an analog connection for use with multizone systems or recording outputs. This optional connection is shown below.



# SETUP AND CONNECTIONS

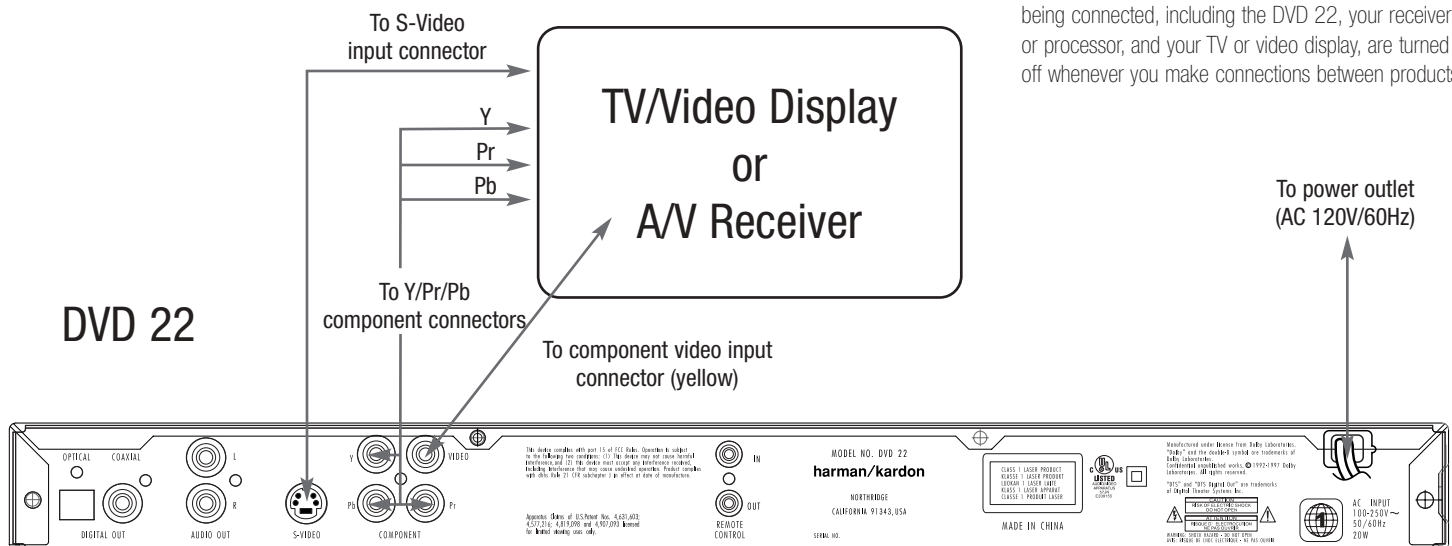
## Video Display Connections

- If your television, monitor, projector or video display has standard composite and S-Video connections only, connect one or the other (but not both) either to the matching video inputs on your receiver or processor, or directly to the inputs on your television or other video display.
- When both composite (yellow) and S-Video jacks (but not component inputs) are available on the video display, we recommend using the S-Video connection for higher video quality.
- If your receiver or processor has video switching capability, we recommend that the composite or S-Video outputs of the DVD 22 be connected to the receiver or processor, along with the output of other video sources in your system, such as a VCR and cable or satellite receiver. This simplifies the operation of your system since the receiver or processor will switch multiple sources and feed the selected output to the display.
- If your television, monitor, projector or video display has component video inputs, we strongly recommend that you connect the Y/Pr/Pb (green/red/blue) video output jacks on the DVD 22 to the matching video inputs on your receiver or processor, or directly to the inputs on your television or other video display.
- If your receiver or processor has component video switching capability, we recommend that the video outputs of the DVD 22 be connected to the receiver or processor, along with the output of other component video sources in your system, such as an HDTV tuner or cable or satellite receiver. This simplifies the operation of your system since the receiver or processor will switch multiple sources and feed the selected output to the display.
- If your video display is compatible with high-resolution video signals, be certain that the

connections are made to the input jacks on the display marked "HD Component," if available.

- If your video display is compatible with high-resolution video signals, you may need to configure the input settings on the display for use with "480P" input signals.
- If you use the component video outputs with a video display that is compatible with high-resolution video signals, the DVD 22's video output should be changed from Interlaced to Progressive, as shown on page 20.
- When the component video outputs are used, we recommend that you also connect the standard composite or S-Video outputs to your receiver or processor so that standard-rate video signals are available for use with the multizone or record outputs, where applicable.

**IMPORTANT NOTE:** Make certain that any device being connected, including the DVD 22, your receiver or processor, and your TV or video display, are turned off whenever you make connections between products.



### NOTES:

- If an S-Video or composite video connection is made either as your primary video connection or in addition to a component video connection for use in feeding a multizone system or recorder, note that you may make either type of connection, but not both. Only one type is needed.
- When video connections are made to an A/V receiver, surround processor or other device that switches the video signals, make the connections between that device and your video display in accordance with the instructions for that product. Depending on the capabilities of the receiver, processor or other switcher, you may need to make both composite or S-Video and component video connections.

# DIGITAL AUDIO CONNECTIONS

## Optical Digital Audio Connection Notes

- Remove the dust protection cap from the optical digital audio output and connect the cable firmly so that the configurations of both the cable and the connector match.
- Keep the dust protection cap and always reduce the cap when not using the connector.

## Audio Output From the Unit's Optical/Coaxial Digital Audio Output Connector

Disc:	Sound recording format:	Optical/coaxial digital audio output:
DVD	Dolby Digital	Dolby Digital bitstream (2-5.1ch) or PCM (2ch, 48kHz, 16-bit) <sup>††</sup>
	Linear PCM (48/96kHz, 16/20/24-bit)	Linear PCM (2ch) (48/96kHz, 16/20/24-bit)
	DTS	Bitstream or no output <sup>††</sup>
CD	Linear PCM	Linear PCM (44.1kHz sampling)

<sup>††</sup> Digital format must be selected as "Original" or "PCM" in Digital Output menu (see "Digital Output" section on page 19).

## For Your Reference:

- Dolby Digital is a digital sound compression technique developed by the Dolby Laboratories Licensing Corporation. Supporting 5.1- or 7.1-channel surround sound depending on the specific disc, as well as stereo (2-channel) sound, this technique enables a large quantity of sound data to be efficiently recorded on a disc.
- DTS is another digital audio technology developed by Digital Theater Systems, Inc. It supports 5.1 and 6.1 surround sound, depending on the specific disc, thanks to a sophisticated encoding system.
- Linear PCM is a signal recording format used in CDs. While CDs are recorded in 44.1kHz/16-bit, DVDs are recorded in 48kHz/16-bit up to 96kHz/24-bit.
- If you have a Dolby Pro Logic Surround decoder connected to the DVD 22's analog audio out connectors, thanks to the "Downmix" function of the DVD 22 you will obtain the full benefit of Pro Logic from the same DVD movies that provide full 5.1-channel Dolby Digital soundtracks, as well as from titles encoded with Dolby Surround.
- The DVD 22 is designed to digitally output 96kHz PCM audio with a 96kHz sampling rate. The 96kHz indicator will light in the display. However, some 96kHz DVDs may include copy protection codes that do not permit digital output. For full 96kHz fidelity from these discs, use the analog outputs of the DVD 22. If your surround processor converter does not support 96kHz PCM audio, you must use the DVD 22 analog outputs for full 96kHz fidelity with these discs.
- When connecting a receiver or surround processor with a digital input but which does not contain a Dolby Digital or DTS decoder, be sure to select PCM as the initial setting in the Digital Output menu (see page 18). Otherwise, any attempt to play DVDs may cause such a high level of noise that it may be harmful to your ears and damage your speakers.
- CDs can be played as they would in a conventional CD player.

## Dolby Digital and DTS




Both Dolby Digital and DTS are audio formats used to record 5.1-channel audio signals onto the digital track of film. Both of these formats provide six separate channels: left, right, center, left rear, right rear, and common subwoofer.

Remember that Dolby Digital or DTS will only play 5.1-channel sound if you've connected the optical or coaxial output of the DVD 22 to a DTS or Dolby Digital receiver or decoder (see page 13) and if the disc was recorded in the Dolby Digital or DTS format.

**NOTE:** Some first-generation DTS decoders that do not support DVD-DTS interface may not work properly with the DVD/CD player.

## TROUBLESHOOTING GUIDE

## TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Unit does not turn on	<ul style="list-style-type: none"> <li>No AC power</li> </ul>	<ul style="list-style-type: none"> <li>Check AC power plug and make certain any switched outlet is turned on.</li> </ul>
Disc does not play	<ul style="list-style-type: none"> <li>Disc loaded improperly</li> <li>Incorrect disc type</li> <li>Invalid Region Code</li> <li>Rating is above parental preset</li> </ul>	<ul style="list-style-type: none"> <li>Load disc label-side up; align the disc with the guides and place it in its proper position.</li> <li>Check to see that disc is CD, CD-R, CD-RW, VCD, MP3-CD, DVD-R and DVD-RW (standard conforming) or DVD-Movie; other types will not play.</li> <li>Use Region 1 disc only.</li> <li>Enter password to override or change rating settings (see page 18).</li> </ul>
No picture	<ul style="list-style-type: none"> <li>Intermittent connections</li> <li>Wrong input</li> <li>Progressive Scan output selected</li> <li>Video Off feature active</li> </ul>	<ul style="list-style-type: none"> <li>Check all video connections.</li> <li>Check input selection of TV or receiver.</li> <li>Use Progressive Scan mode only with compatible TV.</li> <li>Press <b>Video Off Button</b>  to reactivate video circuitry (see page 20).</li> </ul>
No sound	<ul style="list-style-type: none"> <li>Intermittent connections</li> <li>Incorrect digital audio selection</li> <li>DVD disc is in fast or slow mode</li> <li>Surround receiver not compatible with 96kHz PCM audio</li> </ul>	<ul style="list-style-type: none"> <li>Check all audio connections.</li> <li>Check digital audio settings.</li> <li>There is no audio playback on DVD discs during fast or slow modes.</li> <li>Use analog audio outputs.</li> </ul>
Picture is distorted or jumps during fast forward or reverse play	<ul style="list-style-type: none"> <li>MPEG-2 decoding</li> </ul>	<ul style="list-style-type: none"> <li>It is a normal artifact of DVD playback for pictures to jump or show some distortion during rapid play.</li> </ul>
Some remote buttons do not operate during DVD play; prohibited symbol  appears (see below)	<ul style="list-style-type: none"> <li>Function not permitted at this time</li> </ul>	<ul style="list-style-type: none"> <li>With most DVDs, some functions are not permitted at certain times (e.g., Track Skip) or at all (e.g., direct audio track selection).</li> </ul>
The OSD menu is in a foreign language	<ul style="list-style-type: none"> <li>Incorrect OSD language</li> </ul>	<ul style="list-style-type: none"> <li>Change the display language selection (see page 18).</li> </ul>
The  symbol appears	<ul style="list-style-type: none"> <li>Requested function not available at this time</li> </ul>	<ul style="list-style-type: none"> <li>Certain functions may be disabled by the DVD itself during passages of a disc.</li> </ul>
Picture is displayed in the wrong aspect ratio	<ul style="list-style-type: none"> <li>Incorrect match of aspect ratio settings to disc</li> </ul>	<ul style="list-style-type: none"> <li>Change aspect ratio settings (see page 19).</li> </ul>
Remote control inoperative	<ul style="list-style-type: none"> <li>Weak batteries</li> <li>Sensor is blocked</li> </ul>	<ul style="list-style-type: none"> <li>Change both batteries.</li> <li>Clear path to sensor or use optional outboard remote sensor.</li> </ul>
Disc will not copy to VCR	<ul style="list-style-type: none"> <li>Macrovision protection</li> </ul>	<ul style="list-style-type: none"> <li>Many DVDs are encoded with Macrovision to prevent copying to VCR.</li> </ul>

## 1) To Cancel a Parental Control Password or Cancel Progressive Scan:

- Press and hold CLEAR button for 5 seconds while the player is on.

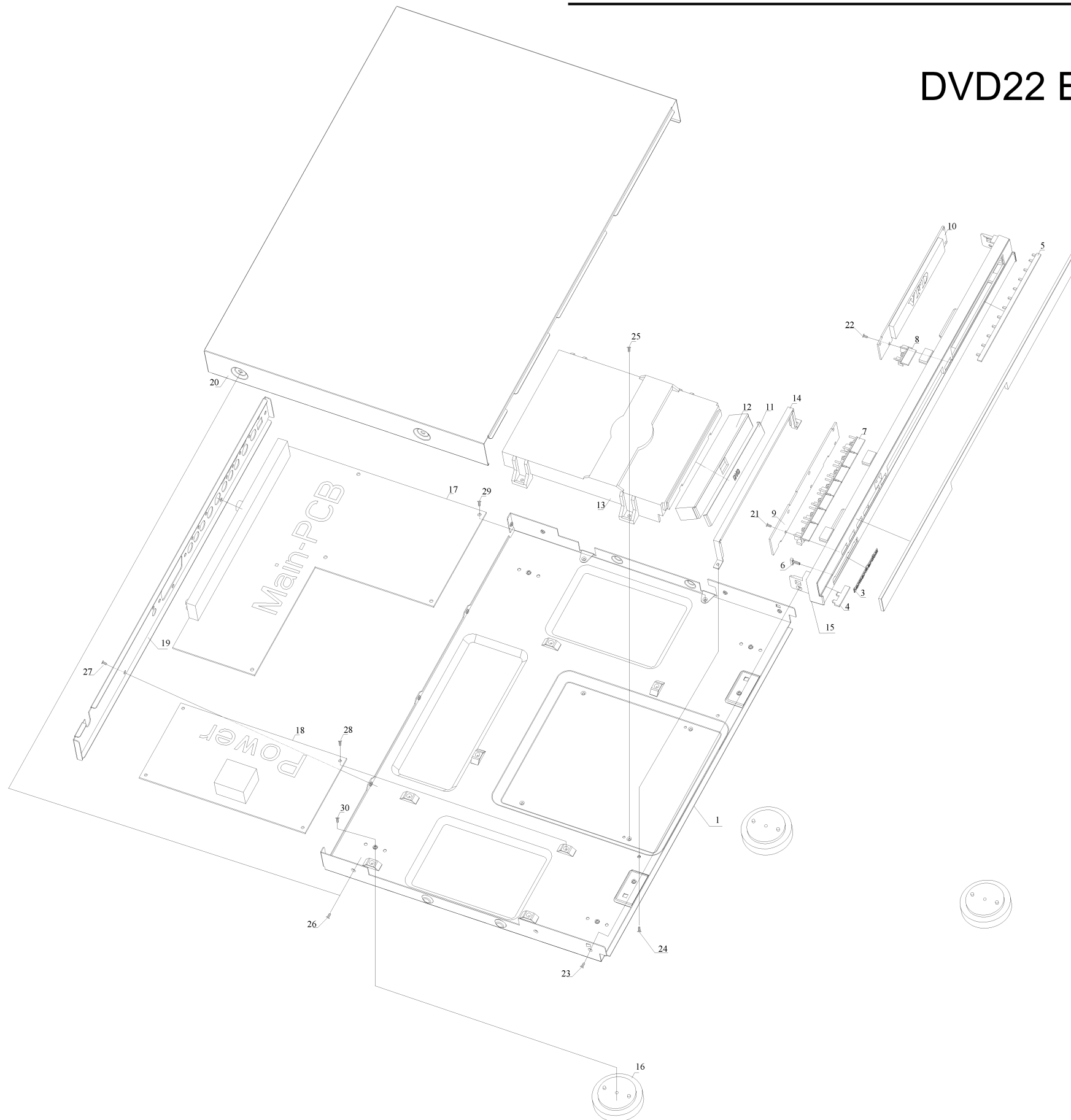
## 2) To Cancel all user settings back to factory default settings:

- Step One: Press "OSD", press "Right Arrow", and then press "Down Arrow".
- Step Two: Enter "1-2-1-1" using the numeric buttons on the remote.
- Step Three: Press "Down Arrow" as many times as required to reach the "Restore Default Setting" line.
- Step Four: Press "Enter" twice to activate the reset process.

All the user settings have been now reset back to the factory default.



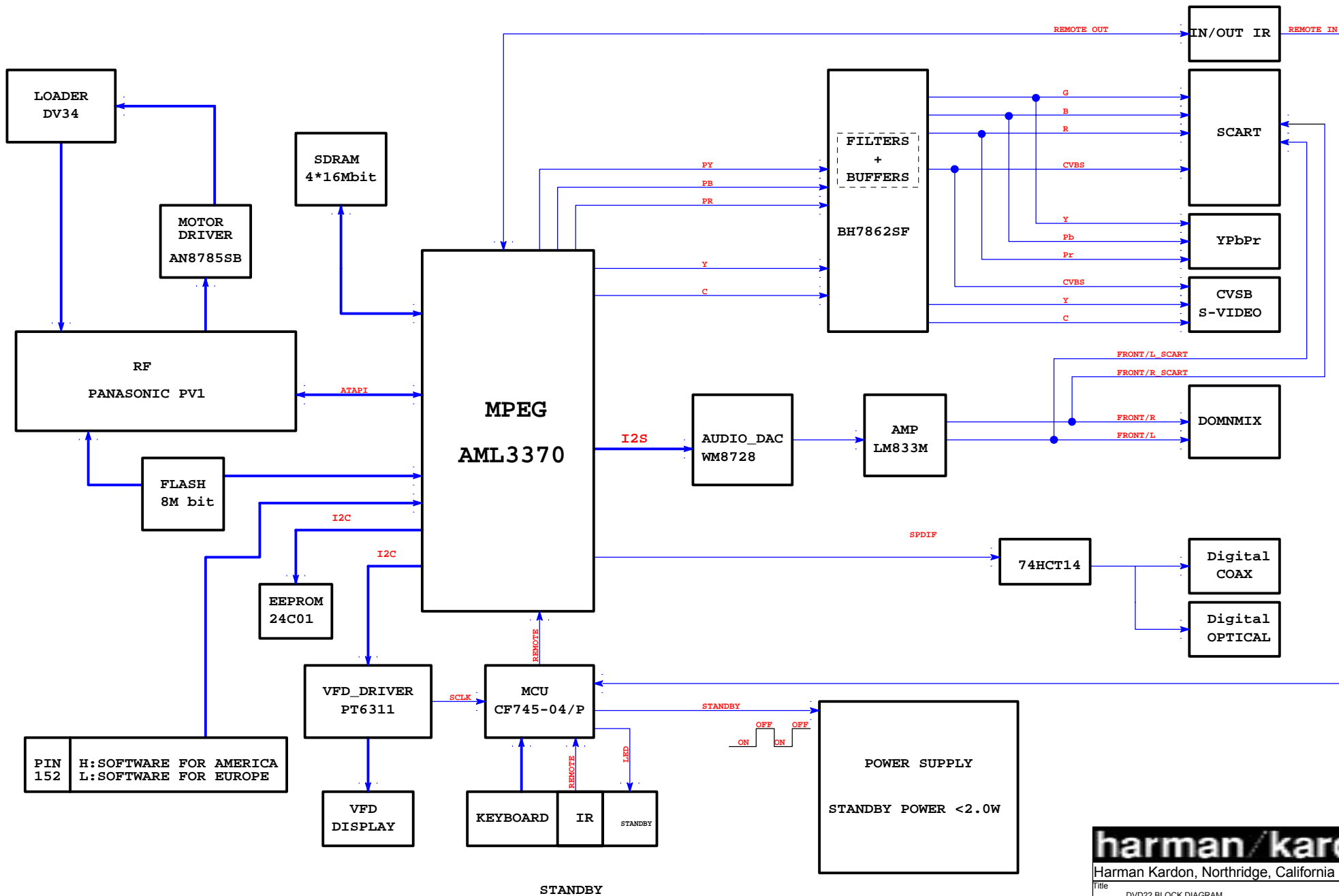
# DVD22 EXPLODED VIEW



Ref. Number	Description	Part Number
1	Bottom Chassis	380-B22PT001-8000
2	Front Panel Lens	331-81ZPRE01-8000
3	h/k Logo	600-0000005-6920
4	Short Strip	330-71ZPRE05-8000
5	Long Strip	330-71ZPRE06-8000
6	VFD filter	331-91185165-9000
7	Multi-Button Row	331-11ZPRE03-8000
8	Single Button	331-11ZPRE04-8000
9	Front Panel PCB	300-D01298CA-0002
10	VFD PCB	300-D01298CB-0002
11	Door Cap	385-VD31ZPA2-5000
12	Front Door	330-21ZPRE07-8000
13	Loader	206-0000DV34-2202
14	Top Cover Stiffener bracket	332-300DVD22-0000
15	Front Panel	330-12ZPRE02-8000
16	Foot	331-400DVD22-4000
17	MAIN PCB	300-C0221297-U002
18	POWER PCB	300-A001254C-0001
19	Rear Panel	380-C00DVD22-0510
20	Top Cover	380-A22PT002-8500
21	Screw (front panel-front PCB)	
22	Screw (VFD PCB-front panel)	
23	Screw (front panel-chassis)	
24	Screw (stiffener-chassis)	
25	Screw (loader-chassis)	
26	Screw (top cover-chassis)	
27	Screw (rear panel-chassis)	
28	Screw (power PCB-chassis)	
29	Screw (main PCB-chassis)	
30	Screw (foot screw)	



DVD22 BLOCK DIAGRAM



# harman/kardon

# Service Bulletin

Service bulletin # HK2004-03 October 2004

Warranty labor rate: MINOR repair

To: All harman/kardon Service Centers

Model: DVD22

Subject: Locked in POWER ON

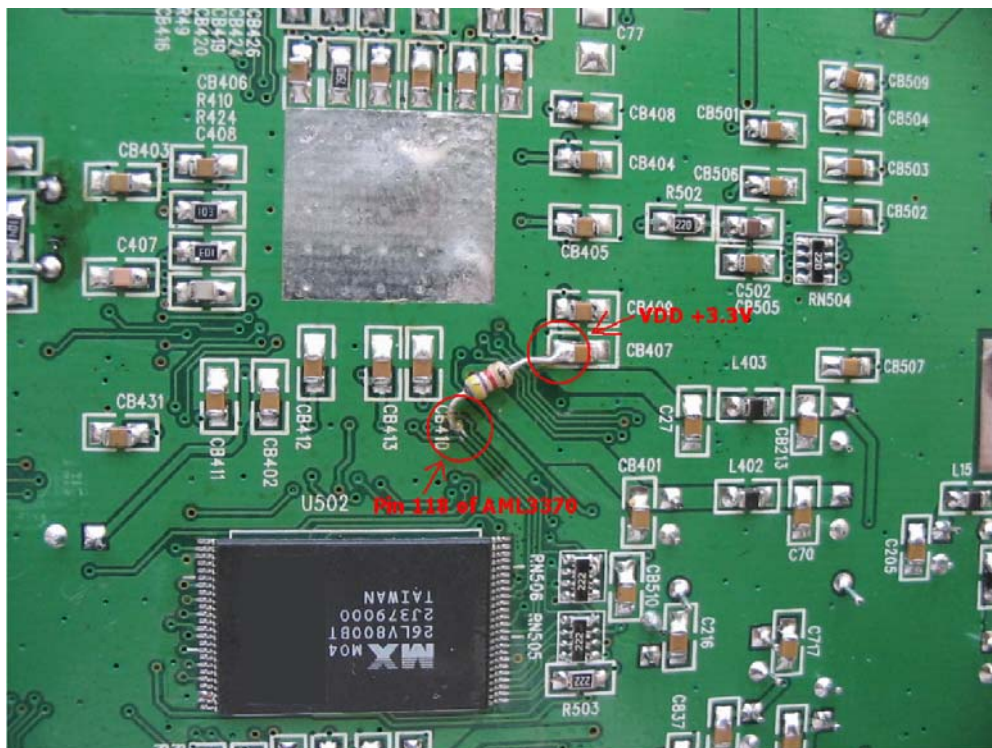
**In the event you receive a DVD22 with the complaint: "The unit will turn ON with "POWER ON" in the display, but the unit is locked up and will not read a disc, nor will pressing any button accomplish anything, even the Power button", follow the instructions below.**

(Behavior is intermittent; unplugging the AC power cord and replugging the unit in will sometimes reset it.)

**Synopsis: Add a 4.7K ohm resistor to the indicated area on the bottom of the Main PCB.**

**CAUTION: The DVD22 is an electrostatically sensitive unit and can be damaged by careless handling; you must follow proper static control procedures to prevent damage to the DVD player.**

- 1) Remove the eight plated screws holding the top cover to the unit; remove the top cover.
- 2) Remove the four moxex connectors and one small FFC cable from the Main PCB.
- 3) Remove the five plated machine screws (top) and the five black screws (rear panel) from the Main PCB.
- 4) Remove the Main PCB from the unit.
- 5) On the reverse side (bottom), solder a 4.7K $\Omega$  1/8W resistor (h/k part#299-4.7K or WLD5.630.472) to the indicated area. (Attach one end of the 4.7K $\Omega$  resistor to one end of CB407, the other side, to a small through-hole pad near the silkscreen label "CB410").
- 6) Replace the Main PCB and assemble the unit in reverse order.
- 7) Test the unit.



<b>Model</b>	<b>Serial Number</b>	<b>Status</b>	<b>Action</b>
DVD22 (120v)	WA0007-01000 to WA0007-10449	Unit may lock up after Powering ON	Add 4.7K ohm resistor
DVD22 (120v)	WA0007-10450 and above	Modified by Factory	None Required
DVD22 (230v)	WA0008-01000 to WA0008-26827	Unit may lock up after Powering ON	Add 4.7K ohm resistor
DVD22 (230v)	WA0008-26828 and above	Modified by Factory	None Required
DVD22BK (230v)	WA0012--01000 to WA0012-05020	Unit may lock up after Powering ON	Add 4.7K ohm resistor
DVD22BK (230v)	WA0012-05021 and above	Modified by Factory	None Required

# harman/kardon

# Service Bulletin

Service bulletin # HK2005-02 January 2005

Warranty labor rate: MINOR repair

To: All harman/kardon Service Centers

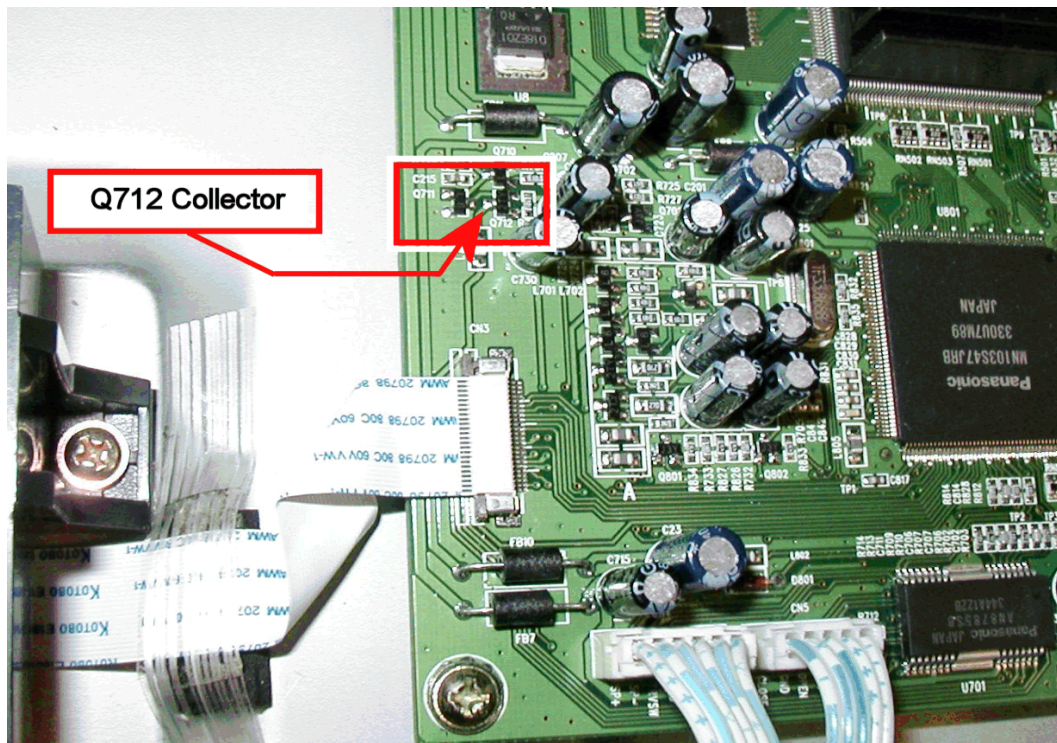
Model: DVD22

Subject: Will Not Read Disc

**In the event you receive a DVD22 with the complaint: "the unit will not read a disc," perform the following modification. This procedure should be followed for every unit that has to be serviced, for any reason (after checking serial number range below).**

Synopsis: Replace one or possibly two SMD transistors.

- 1) Remove the eight plated screws holding the top cover to the unit; remove the top cover
- 2) Locate Q711 and Q712 near the edge of the MAIN PCB (see image below).
- 3) Power on the unit, load a disc and press play.
- 4) Measure Q712: if you do **NOT** measure approx. +4.9V on Q712 collector, exchange Q711 (9014) with h/k part# 121-00009014-T000.
- 5) Either way: Replace Q712 (8550) with DTA114EKA SMD transistor, h/k part# 121-DTA114EK-A400.
- 6) Remove and discard R752.
- 7) Replace the cover and test the unit for general functionality.



MODEL	SERIAL NUMBER	STATUS	ACTION
DVD22 (120v)	WA0007-01001 to WA0007-18461	Q712 may overheat and fail, affecting Q711	Replace Q712, Remove R752, Replace Q711 only if defective
DVD22 (120v)	WA0009-18462 and above	Modified by Factory	None Required

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**harman/kardon****TECH TIPS**

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**Troubleshooting tips and solutions to common service problems****For models: DVD22****TIP# HKTT2005-01**

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**Complaint:** Will Not Read Disc; Other Functions May Be Disabled

See h/k service bulletins HK2004-03 and HK2005-02, as the issues covered there involve similar symptoms.

**Probable Cause:**

EC19 and EC20 (1000 $\mu$ f 16v capacitors) may be defective in the power supply. This can be checked by measuring the +3.3v and +5v voltages that are associated with EC19, 20 to see if they are low (more than 0.1v low).

The SPMS output voltages are marked on the PCB adjacent to the large 13 pin header. While there is only one 3.3v pin, there are several +5v pins, and care should be taken to measure the correct one(s), which are either two +5v pins approximately in the center of the header.

The h/k part # of EC19, EC20 is 647-UVZ1C102MPH.

Ordinarily, the entire power supply module in the DVD22 (h/k part# 300-A001254C-0001) can be replaced in the warranty period without repair to component level.

Replacement of entire PCB assemblies or entire DVD22 loader is recommended.

Electrical parts list is for reference only.

DVD22 Electrical Parts List				
Part Number	Qty	Reference designator	Description	
<b>MAIN PCB - 300-C0221297-U002</b>				
<i>Resistors</i>				
131-A0C022JT-0000	2	R730 R731	RESISTOR, CHIP	2.2Ω 1/10W 0603 5%
131-A00022JT-0000	2	R38 R725	RESISTOR, CHIP	22Ω 1/10W 0603 5%
131-A00033JT-0000	4	R818 R822 R504 R823	RESISTOR, CHIP	33Ω 1/10W 0603 5%
131-A00056JT-0000	2	R732 R733	RESISTOR, CHIP	56Ω 1/10W 0603 5%
131-A00075FT-4000	15	R2 R3 R4 R5 R6 R11 R12 R13 R14 R15 R16 R50 R51 R52 R407	RESISTOR, CHIP	75Ω 1/10W 0603 1%
131-A00082FT-4000	3	R815 R816 R820	RESISTOR, CHIP	82Ω 1/10W 0603 5%
131-A00091FT-4000	1	R17	RESISTOR, CHIP	91Ω 1/10W 0603 1%
131-A01010JT-0000	2	R43 R835	RESISTOR, CHIP	100Ω 1/10W 0603 5%
131-A01011JT-0000	1	R37	RESISTOR, CHIP	110Ω 1/10W 0603 5%
131-A01015JT-0000	1	R36	RESISTOR, CHIP	150Ω 1/10W 0603 5%
131-A00187FT-4000	2	R405 R406	RESISTOR, CHIP	187Ω 1/10W 0603 1%
131-A01022JT-0000	1	R39	RESISTOR, CHIP	220Ω 1/10W 0603 5%
131-A01027JT-0000	1	2R13	RESISTOR, CHIP	270Ω 1/10W 0603 5%
131-A01033JT-0000	2	R31 R32	RESISTOR, CHIP	330Ω 1/10W 0603 5%
131-A01039JT-0000	1	2R12	RESISTOR, CHIP	390Ω 1/10W 0603 5%
131-A01047JT-0000	4	R826 R827 R833 R834	RESISTOR, CHIP	470Ω 1/10W 0603 5%
131-A01068JT-0000	2	R21 R29	RESISTOR, CHIP	680Ω 1/10W 0603 5%
131-A02010JT-0000	2	R44 R828	RESISTOR, CHIP	1KΩ 1/10W 0603 5%
131-A02012JT-0000	1	R727	RESISTOR, CHIP	1.2KΩ 1/10W 0603 5%
131-A01178FT-4000	2	R24 R33	RESISTOR, CHIP	1.78KΩ 1/10W 0603 1%
131-A02022JT-0000	3	R501 R507 R45	RESISTOR, CHIP	2.2KΩ 1/10W 0603 5%
131-A02027JT-0000	11	R1 R9 R56 R114 R115 R116 R411 R412 R413 R414 R420	RESISTOR, CHIP	2.7KΩ 1/10W 0603 5%
131-A02033JT-0000	5	2R4 2R5 2R6 2R7 2R8	RESISTOR, CHIP	3.3KΩ 1/10W 0603 5%
131-A02047JT-0000	2	2R1 2R11	RESISTOR, CHIP	4.7KΩ 1/10W 0603 5%
131-A02047JT-0000	1	R432 <input type="checkbox"/> US Version <input type="checkbox"/> R433 <input type="checkbox"/> EU Version <input type="checkbox"/>	RESISTOR, CHIP	4.7KΩ 1/10W 0603 5%
131-A01475FT-4000	4	R19 R26 R27 R35	RESISTOR, CHIP	4.75KΩ 1/10W 0603 1%
131-A02056JT-0000	2	R712 R831	RESISTOR, CHIP	5.6KΩ 1/10W 0603 5%
131-A02062JT-0000	1	R707	RESISTOR, CHIP	6.2KΩ 1/10W 0603 5%
131-A02075JT-0000	4	R705 R710 R713 R830	RESISTOR, CHIP	7.5KΩ 1/10W 0603 5%
131-A02075FT-4000	2	R25 R34	RESISTOR, CHIP	7.5KΩ 1/10W 0603 1%
131-A03010JT-0000	27	R18 R20 R23 R28 R41 R42 R46 R417 R416 R428 R709 R714 R734 R735 R736 R737 R738 R741 R742 R749	RESISTOR, CHIP	10KΩ 1/10W 0603 5%
		R752 R755 R810 R812 R821 2R2 2R3		
131-A03015JT-0000	2	R40 R702	RESISTOR, CHIP	15KΩ 1/10W 0603 5%
131-A03018JT-0000	2	R703 R726	RESISTOR, CHIP	18KΩ 1/10W 0603 5%
131-A03027JT-0000	1	R724	RESISTOR, CHIP	27KΩ 1/10W 0603 5%
131-A03033JT-0000	1	R706	RESISTOR, CHIP	33KΩ 1/10W 0603 5%
131-A03068JT-0000	1	R814	RESISTOR, CHIP	68KΩ 1/10W 0603 5%

Replacement of entire PCB assemblies or entire DVD22 loader is recommended.

Electrical parts list is for reference only.

Part Number	Qty	Reference designator	Description		
<b>MAIN PCB - 300-C0221297-U002</b>					
131-A05010JT-0000	1	R832	RESISTOR, CHIP	1M $\Omega$	1/10W 0603 5%
130-T41015JT-0000	1	2R15	FIXED CARBON FILM	150 $\Omega$	1/4W 5%
130-T42010JT-0000	2	2R10 2R14	FIXED CARBON FILM	1K $\Omega$	1/4W 5%
132-0008010J-T100	1	RN571	RESISTOR, THICK FILM CHIP NETWORK	10 $\Omega$	1/16W 5%
132-0008022J-T100	1	RN504	RESISTOR, THICK FILM CHIP NETWORK	22 $\Omega$	1/16W 5%
132-0008033J-T100	4	RN801 RN803 RN804 RN805	RESISTOR, THICK FILM CHIP NETWORK	33 $\Omega$	1/16W 5%
132-0008082J-T100	1	RN806	RESISTOR, THICK FILM CHIP NETWORK	82 $\Omega$	1/16W 5%
132-0008222J-T100	5	RN501 RN502 RN503 RN505 RN506	RESISTOR, THICK FILM CHIP NETWORK	2.2K $\Omega$	1/16W 5%
132-0008310J-T100	1	RN401	RESISTOR, THICK FILM CHIP NETWORK	10K $\Omega$	1/16W 5%
132-0008347J-T100	1	RN802	RESISTOR, THICK FILM CHIP NETWORK	47K $\Omega$	1/16W 5%
131-B00000JT-0000	2	R8 R10	RESISTOR, CHIP	0 $\Omega$	1/8W 0805 5%
131-B00001JT-0000	2	3R6 3R9	RESISTOR, CHIP	1 $\Omega$	1/8W 0805 5%
131-B00022JT-0000	1	R502	RESISTOR, CHIP	22 $\Omega$	1/8W 0805 5%
131-B00027JT-0000	2	R728 R729	RESISTOR, CHIP	27 $\Omega$	1/8W 0805 5%
131-B00033JT-0000	2	R817 R819	RESISTOR, CHIP	33 $\Omega$	1/8W 0805 5%
131-B00075JT-4000	5	R49 R408 R409 R529 R530	RESISTOR, CHIP	75 $\Omega$	1/8W 0805 1%
131-B01010JT-0000	2	3R14 3R15	RESISTOR, CHIP	100 $\Omega$	1/8W 0805 5%
131-B01033JT-0000	2	R22 R30	RESISTOR, CHIP	330 $\Omega$	1/8W 0805 5%
131-B02010JT-0000	3	R55 R824 R825	RESISTOR, CHIP	1K $\Omega$	1/8W 0805 5%
131-B02020JT-0000	2	R47 R48	RESISTOR, CHIP	2K $\Omega$	1/8W 0805 5%
131-B02022JT-0000	2	R503 3R17	RESISTOR, CHIP	2.2K $\Omega$	1/8W 0805 5%
131-B02027JT-0000	1	R431	RESISTOR, CHIP	2.7K $\Omega$	1/8W 0805 5%
131-B02039JT-0000	1	R829	RESISTOR, CHIP	3.9K $\Omega$	1/8W 0805 5%
131-B02047JT-0000	3	R4A R5B R7	RESISTOR, CHIP	4.7K $\Omega$	1/8W 0805 5%
131-B03010JT-0000	16	R410 R424 R425 R426 R427 R802 R803 R804 R805 R806	RESISTOR, CHIP	10K $\Omega$	1/8W 0805 5%
		R807 R808 R809 3R10 3R11 3R12			
131-B03015JT-0000	2	R813 R53	RESISTOR, CHIP	15K $\Omega$	1/8W 0805 5%
131-B03018JT-0000	1	R720	RESISTOR, CHIP	18K $\Omega$	1/8W 0805 5%
131-B04010JT-0000	3	R418 R708 3R13	RESISTOR, CHIP	100K $\Omega$	1/8W 0805 5%
<i>Capacitors</i>					
141-C0A020PH-KT00	12	C15 C16 C17 C18 C19 C32 2C7 2C8 2C9 2C10 2C11 2C12	CAPACITOR, MULTILAYER CERAMIC (CHIP)	20PF	50V Z NPO 0603
141-C0A033PH-KT00	1	C828	CAPACITOR, MULTILAYER CERAMIC (CHIP)	33PF	50V Z NPO 0603
141-C0A120PH-KT00	2	C706 C711	CAPACITOR, MULTILAYER CERAMIC (CHIP)	200PF	50V Z NPO 0603
141-C0A156PH-KT00	2	C702 C707	CAPACITOR, MULTILAYER CERAMIC (CHIP)	560PF	50V Z NPO 0603
141-C0A168PH-KT00	2	2C5 2C6	CAPACITOR, MULTILAYER CERAMIC (CHIP)	680PF	50V Z NPO 0603
141-C0A122PH-KT00	1	C814	CAPACITOR, MULTILAYER CERAMIC (CHIP)	220PF	50V Z NPO 0603

Replacement of entire PCB assemblies or entire DVD22 loader is recommended.  
Electrical parts list is for reference only.

Part Number	Qty	Reference designator	Description		
<b>MAIN PCB - 300-C0221297-U002</b>					
141-C0A110PH-KT00	2	C52 C53	CAPACITOR,MULTILAYER CERAMIC (CHIP)	100PF 50V Z NPO 0603	
141-C0A310PH-KT00	1	C842	CAPACITOR,MULTILAYER CERAMIC (CHIP)	0.01UF 50V Z X7R 0603	
141-C0A318PH-KT00	1	C831	CAPACITOR,MULTILAYER CERAMIC (CHIP)	0.018UF 50V Z X7R 0603	
141-C0A410PH-KT00	33	C69 C215 C714 C807 C808 C810 C817 C824 C829 C830 C841 CB1 CB2 CB3 CB4 CB5 CB6 CB7 CB8 CB9 CB18 CB19 CB204 CB414 CB421 CB422 CB423 CB425 CB430 CB432 2C2 2C3 2C4	CAPACITOR,MULTILAYER CERAMIC (CHIP)	0.1UF 50V Z X7R 0603	
141-C0B110PH-JT00	2	C44 C46	CAPACITOR,MULTILAYER CERAMIC (CHIP)	100PF 50V J NPO 0805	
141-C0B168PH-JT00	2	C48 C51	CAPACITOR,MULTILAYER CERAMIC (CHIP)	680PF 50V J NPO 0805	
141-C0B210PH-JT00	2	C45 C50	CAPACITOR,MULTILAYER CERAMIC (CHIP)	1000PF 50V J NPO 0805	
141-C0BC68PH-KT00	1	C502	CAPACITOR,MULTILAYER CERAMIC (CHIP)	6.8PF 50V Z NPO 0805	
141-C0B010PH-KT00	4	C408 C823 C837 C839	CAPACITOR,MULTILAYER CERAMIC (CHIP)	10PF 50V Z NPO 0805	
141-C0B022PH-KT00	3	C22 C410 C411	CAPACITOR,MULTILAYER CERAMIC (CHIP)	22PF 50V Z NPO 0805	
141-C0B047PH-KT00	2	C407 C821	CAPACITOR,MULTILAYER CERAMIC (CHIP)	47PF 50V Z NPO 0805	
141-C0B050PH-KT00	2	C20 C21	CAPACITOR,MULTILAYER CERAMIC (CHIP)	51PF 50V Z NPO 0805	
141-C0B210PH-KT00	2	CB15 C813	CAPACITOR,MULTILAYER CERAMIC (CHIP)	1000PF 50V Z NPO 0805	
141-C0B215PH-KT00	1	C815	CAPACITOR,MULTILAYER CERAMIC (CHIP)	1500PF 50V Z NPO 0805	
141-C0B256PH-KT00	1	C822	CAPACITOR,MULTILAYER CERAMIC (CHIP)	5600PF 50V Z NPO 0805	
141-C0A310PH-KT00	3	C820 C836 3CB5	CAPACITOR,MULTILAYER CERAMIC (CHIP)	0.01UF 50V Z X7R 0805	
141-C0B333PH-KT00	1	C818	CAPACITOR,MULTILAYER CERAMIC (CHIP)	0.033UF 50V Z X7R 0805	
141-C0B410PH-KT00	87	C27 C39 C42 C47 C49 C54 C55 C56 C57 C58 C64 C65 C70 C71 C72 C73 C74 C75 C205 C208 C216 C703 C704 C712 C713 C716 C717 C724 C728 C729 C731 C802 C803 C805 C806 C809 C812 C819 C827 C832 C835 C838 CB10 CB11 CB12 CB13 CB14 CB16 CB20 CB21 CB63 CB205 CB213 CB401 CB402 CB403	CAPACITOR,MULTILAYER CERAMIC (CHIP)	0.1UF 50V Z X7R 0805	



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Electrical parts list is for reference only.

Part Number	Qty	Reference designator	Description		
<b>MAIN PCB - 300-C0221297-U002</b>					
141-C0B410PH-KT00		CB404 CB405 CB406 CB407 CB408 CB409 CB410 CB411	CAPACITOR,MULTILAYER CERAMIC (CHIP)	0.1UF 50V Z X7R 0805	
		CB412 CB413 CB415 CB416 CB417 CB418 CB419 CB420			
		CB424 CB426 CB427 CB428 CB429 CB431 CB501 CB502			
		CB503 CB504 CB505 CB506 CB507 CB509 CB510			
141-C0B510PH-KT00	4	C816 C833 C834 3CB8	CAPACITOR,MULTILAYER CERAMIC (CHIP)	1UF 50V Z X7R 0805	
140-DCA001UH -0A00	2	C4 C5	CAPACITOR,AL.ELECTROLYTIC	1µF 50V 20%	
140-DCAC47UH -0A00	2	C825 C826	CAPACITOR,AL.ELECTROLYTIC	4.7µF 50V 20%	
140-DCA010UF -0A00	3	C35 C59 C723	CAPACITOR,AL.ELECTROLYTIC	10µF 25V 20%	
140-DCA022UE -0A00	3	C7 C9 C14	CAPACITOR,AL.ELECTROLYTIC	22µF 16V 20%	
140-DCA047UE -0A00	11	C8 C13 C33 C34 C36 C37 C66 C67 C718 C719 2C1	CAPACITOR,AL.ELECTROLYTIC	47µF 16V 20%	
140-DCA047UH -0A00	10	3C1 3C2 3C3 3C4 3C5 3C7 3C9 3C13 3C15 3C16	CAPACITOR,AL.ELECTROLYTIC	47µF 50V 20%	
140-DCA110UD -0A00	7	C6 C12 C62 C76 C402 C404 C501	CAPACITOR,AL.ELECTROLYTIC	100µF 10V 20%	
140-DCA110UE -0A00	5	C63 C207 C715 C720 C730	CAPACITOR,AL.ELECTROLYTIC	100µF 16V 20%	
140-DCA110UF -0A00	4	C29 C38 C30 C31	CAPACITOR,AL.ELECTROLYTIC	100µF 25V 20%	
140-DCA110UH -0A00	2	C60 C61	CAPACITOR,AL.ELECTROLYTIC	100µF 50V 20%	
140-DCA122UD -0A00	4	C3 C26 C28 C210	CAPACITOR,AL.ELECTROLYTIC	220µF 10V 20%	
140-DCA122UE -0A00	9	C2 C23 C25 C201 C209 C403 C405 C406 C409	CAPACITOR,AL.ELECTROLYTIC	220µF 16V 20%	
140-DCA047UD -0A00	4	C1 C10 C11 C40	CAPACITOR,AL.ELECTROLYTIC	330µF 10V 20%	
140-DCA047UD -0A00	2	C24 C68	CAPACITOR,AL.ELECTROLYTIC	470µF 10V 20%	
217-03386003-2200	1	Y801	FUNDAMENTAL.OSCILLATOR	33.868MHZ, DIP	
217-02700003-2200	1	Y401	FUNDAMENTAL.OSCILLATOR	27.0MHz, DIP	
<i>Semiconductors</i>					
110-B0IN4148-0A00	8	D9 D10 D11 D12 D13 D17 2D1 D801	DIODE	1N4148, DIP	DIP
111-B0IN4148-0A00	8	3D1 3D2 3D3 3D4 3D5 3D9 3D7 3D8	DIODE	1N4148, SMD	SMD
110-B0IN5953-0A00	3	D14 D15 D16	DIODE	1N5393, DIP	DIP
111-D000C061-0T00	1	3DZ1	Zener Diode	Zener Diode, 6.1V, DIP	DIP
121-00008050-T400	5	Q701 Q801 Q802 Q5 Q6	TRANSISTOR	8050, SMD	SMD
121-00008550-T300	7	Q3 Q4 Q702 Q703 Q704 Q712 2Q1	TRANSISTOR	8550, SMD	SMD
121-00009014-T000	7	Q705 Q706 Q707 Q708 Q709 Q710 Q711	TRANSISTOR	9014, SMD	SMD
121-DTC343TK-T400	5	Q1 Q2 2Q2 2Q3 2Q4	TRANSISTOR □ ROHM	DTC343TK, SMD	SMD
102-00LM833M-6000	1	U3	IC, NS, Pre-amp	LM833M, 8P, MSOP	SMD
102-0AML3370-1000	1	U401	IC, Amlogic, decoder	AML3370, 208P, PQFP	SMD
102-0AT24C01-6000	1	U15	IC, Atmel, EEPROM	AT24C01, 8P, SOP	SMD
102-074HCT14-6000	1	U6	IC, Philips, Hex inverting Schmitt trigger	74HCT14, 14P, SO14	SMD
101-29LV800BA-8400	1	U502	IC, Fujitsu, Flash	29LV800BA-70,48P, TSOP48	SMD
105-00078L05-8000	1	U7	IC, NS, Voltage Regulator	78L05, 3P, TO-92	SMD

Replacement of entire PCB assemblies or entire DVD22 loader is recommended.

Electrical parts list is for reference only.

Part Number	Qty	Reference designator	Description		
<b>MAIN PCB - 300-C0221297-U002</b>					
102-AN8785SB-6000	1	U701	IC, Panasonic, Motor Driver	AN8785SB, HSOP042	SMD
101-HY57V641-8800	1	U501	IC, Hyundai, SDRAM	HY57V641620HG, 54P, TSOP54	SMD
100-MN103S47-3000	1	U801	IC, Panasonic, Servo	MN103S47JRB, 176P	SMD
105-SHAPC817-1000	1	2U1	IC, Sharp, Photoelectric Coupler	PC817, 4P, DIP	DIP
102-S018EZ01-0000	1	U8	IC, Sharp, Voltage Regulator	O18EZ01, PQ025	SMD
102-00WM8728-7000	1	U5	IC, Wolfson, Audio DAC	WM8728, 20P, SSOP20	SMD
102-BH7862FS-7000	1	U2	IC, Rohm, Video Buffer	BH7862FS, 32P, SSOP-A32	SMD
105-00078L12-8000	1	U1	IC, NS, Voltage Regulator	78L12, 3P, TO-92	TO-92
105-00079L12-8000	1	U4	IC, NS, Voltage Regulator	79L12, 3P, TO-92	TO-92
102-00LM9022-7000	1	3U3	IC, NS, Vacuum Fluor Display Filament Driver	LM9022, 8P, SO8	SMD
<i>Miscellaneous</i>					
151-3B0B39K1-A000	1	L3	INDUCTOR, MULTILAYER CERAMIC (CHIP)	0.39µH HDW0805UC3R9JGT, 0805	SMD
151-3B0B68K1-A000	2	L1 L2	INDUCTOR, MULTILAYER CERAMIC (CHIP)	0.68µH HDW0805UC6R8JGT, 0805	SMD
152-1B205001-A000	18	L5 L401 L402 L403 L404 L405 L406 L407 L701 L702 L703 L801 L802 L803 L804 L805 L14 L15	BEAD,CHIP	IMPEDANCE IS 50Ω, 0805	SMD
153-RH356008-1000	9	L4 L13 FB6 FB7 FB8 FB9 FB10 FB11 FB14	BEAD,LEADED FIXED	IMPEDANCE IS 50Ω, DIP	DIP
152-1A211201-A000	20	FB1 FB2 FB3 FB4 FB5 FB16 FB17 2FB1 2FB2 2FB3 2FB4 2FB5 2FB6 2FB7 2FB8 L8 L9 L10 L11 L12	BEAD,CHIP	IMPEDANCE IS 120Ω, 0603	
180-0000PH5A-5100	1	CN5	CONNECTOR	PH-5A, 5P, DIP	
180-0000PH6A-5100	1	CN4	CONNECTOR	PH-6A, 6P, DIP	
180-000PH13A-5100	1	CN6	CONNECTOR	PH-13A, 13P, DIP	
180-000PH13A-5100	1	CN1	CONNECTOR	PH-13A, 13P, DIP	
181-00050241-0100	1	CN3	CONNECTOR	24pin 0.5mm connector, SMD	
187-00000000-0940	1	J1	JACK, BeiBaiXiang (□□□□), IR in/out jack	SCJ351P00XS0B00 (BLACK), DIP	BLACK
187-00000000-0740	1	J2	JACK, QiangSheng (□□), SCART output jack	SCART, DIP	Europe
187-0000DSW6-0360	1	J5	JACK, YuanChang (□□), S-video output jack	DSW-6, DIP	Gilded Antiflamin
186-0AV2841G-1300	1	J6	JACK, YuanChang (□□), Audio output jack	AV2-8.4-1G, DIP	DOWN RED&UP WHITE
186-0AV1846G-1300	1	J7	JACK, YuanChang (□□), Coaxial output jack	AV1-8.4-6G, DIP	ORANGE
186-00AV4845-1300	1	J3	JACK, YuanChang (□□), Video output jack	AV4-8.4-5□DIP	
187-1FA550TZ-0540	1	J8	JACK, Sharp, Fiber optic output jack	GP1FA550TZ, DIP	
<b>Power Supply Board (1254C) - 300-A001254C-0001</b>					
<i>Resistors</i>					
130-0RNTC5D9-0000	1	NTC	NTC THERMISTOR	NTC-5D-9	

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Part Number	Qty	Reference designator	Description		
<b>Power Supply Board (1254C) - 300-A001254C-0001</b>					
130-M10D471K-0000	1	RV1	ZINC OXIDE VARISTOR	MYG10K471	
130-T45010JT-0000	1	R1	FIXED CARBON FILM	1MΩ 1/4W 5%	
130-T63068JT-0000	1	R2	FIXED CARBON FILM	68KΩ 1W 5%	
130-T64036JT-0000	1	R3	FIXED CARBON FILM	360KΩ 1W 5%	
130-T42022JT-0000	3	R17 R18 R22	FIXED CARBON FILM	2.2KΩ 1/4W 5%	
130-T42051JT-0000	3	R23 R24 R25	FIXED CARBON FILM	5.1KΩ 1/4W 5%	
130-T43010JT-0000	1	R15	FIXED CARBON FILM	10KΩ 1/4W 5%	
130-T40010JT-0000	2	R4 R6	FIXED CARBON FILM	10Ω 1/4W 5%	
130-T43047JT-0000	1	R5	FIXED CARBON FILM	47KΩ 1/4W 5%	
130-T40047JT-0000	1	R21	FIXED CARBON FILM	47Ω 1/4W 5%	
130-T41010JT-0000	1	R16	FIXED CARBON FILM	100Ω 1/4W 5%	
130-T41022JT-0000	3	R13 R19 R20	FIXED CARBON FILM	220Ω 1/4W 5%	
130-T41068JT-0000	1	R14	FIXED CARBON FILM	680Ω 1/4W 5%	
130-T42010JT-0000	1	R26	FIXED CARBON FILM	1KΩ 1/4W 5%	
<i>Capacitors</i>					
140-CGA310PO-0A00	1	CX1	HIGH-VOLTAGE POLYESTER FILM METALIZED	0.1uF 275V 20%	X-type
140-CGA147PQ-0A00	2	CY1 CY2	HIGH-VOLTAGE POLYESTER FILM METALIZED	470PF 400V 20%	Y1-type
140-CGA210PQ-0A00	1	CY3	HIGH-VOLTAGE POLYESTER FILM METALIZED	1000PF 400V 20%	Y1-type
140-CGA310PW-0A00	1	C1	HIGH-VOLTAGE POLYESTER FILM METALIZED	0.01uF 1KV 20%	
140-CHB347PF-JA00	2	C2 C13	RADIAL LEADS MLCC	0.047uF 50V 20%	
140-CHB368PF-JA00	1	C3	RADIAL LEADS MLCC	0.068uF 50V 20%	
140-CHB410PF-JA00	6	C10 C11 C12 C14 C15 C16	RADIAL LEADS MLCC	0.1uF 25V 20%	
140-DCAC22UM-0A00	1	EC3	CAPACITOR,AL.ELECTROLYTIC	4.7uF 160V 20%	
140-DCAC22UF-0A00	1	EC22	CAPACITOR,AL.ELECTROLYTIC	2.2uF 25V 20%	
140-DCA047UH-0A00	1	EC2	CAPACITOR,AL.ELECTROLYTIC	47uF 50V 20%	
140-DCF047UQ-0A00	1	EC1	CAPACITOR,AL.ELECTROLYTIC	47uF 400V 105°C 20%	18x21mm, 105°C
140-DCA047UF-0A00	2	EC17 EC18	CAPACITOR,AL.ELECTROLYTIC	47uF 25V 20%	
140-DCA110UF-0A00	2	EC11 EC12	CAPACITOR,AL.ELECTROLYTIC	100uF 25V 105°C 20%	
140-DCA122UE-0A00	4	EC5 EC6 EC16 EC21	CAPACITOR,AL.ELECTROLYTIC	220uF 16V 105°C 20%	
140-DCA122UF-0A00	4	EC9 EC10 EC14 EC15	CAPACITOR,AL.ELECTROLYTIC	220uF 25V 105°C 20%	
140-DCA147UE-0A00	1	EC4	CAPACITOR,AL.ELECTROLYTIC	470uF 16V 105°C 20%	
647-UVZ1C102MPH	2	EC19 EC20	CAPACITOR,AL.ELECTROLYTIC	1000uF 16V 105°C 20%	
<i>Semiconductors</i>					
110-B0IN4001-0A00	1	D17	DIODE	1N4001, DIP	
110-B0IN4007-0A00	4	D1 D2 D3 D4	DIODE	1N4007, DIP	
110-B00FR104-0A00	5	D6 D8 D10 D11 D13	DIODE	FR104, DIP	
110-B00FR107-0A00	1	D7	DIODE	FR107, DIP	
110-B0IN4148-0A00	3	D14 D16 D18	DIODE	1N4148, DIP	

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Electrical parts list is for reference only.

Part Number	Qty	Reference designator	Description		
<b>Power Supply Board (1254C) - 300-A001254C-0001</b>					
110-B021DQ10-0A00	1	D12	DIODE	21DQ10, DIP	
110-B031DQ06-0A00	1	D15	DIODE	31DQ06, DIP	
110-B0001U08-0A00	1	D5	DIODE	1U08, DIP	
110-D000C160-0A00	1	ZD1	DIODE, Zener Diode	16V 1/2W, DIP	
110-D000C180-0A00	1	ZD2	DIODE, Zener Diode	18V 1/2W, DIP	
110-0MCR1006-0A00	1	SC1	DIODE	MCR100-6, DIP	
120-002N5551-A000	1	Q1	TRANSISTOR	2N5551, 3P, TO-92	
120-000C8550-A400	1	Q3	TRANSISTOR	C8550, 3P, TO-92	
120-00009014-A000	1	Q2	TRANSISTOR	9014, 3P, TO-92	
105-KA5I0365-1000	1	IC1	IC,Fairchild, Power Switch	KA5L0365RN, 8P, DIP	
105-000KA431-8000	1	IC2	IC,Fairchild, Precision Adjustable Voltage Regulator	KA431, 3P, DIP	
105-00BA033T-8000	1	IC6	IC, Rohm, Voltage Regulator	BA033T, 3P, DIP	
105-000LM317-8000	1	IC5	IC, NS, Voltage Regulator	LM317, 3P, DIP	
105-00LM7805-8000	1	IC3	IC, NS, Voltage Regulator	LM7805,3P, DIP	
105-000PC817-1000	1	PH1	IC, Sharp, Photoelectric Coupler	PC817, 4P, DIP	
<i>Miscellaneous</i>					
154-0L630010-0000	1	L7	Filter inductor	L630-10uH	
154-B0810020-0000	1	L6	Filter inductor	0810-20UH	
154-B0608020-0000	4	L3 L4 L5 L8	Filter inductor	0608-20uH	
154-BLCLE650-0000	1	LF1	Filter inductor	LCL ET20-50mH	
180-000VH03A-3100	1	JP1	JACK	Vertical VH three holes two pins(white)	Antiflaming
180-000VH03A-3110	1	JP2	JACK	Vertical VH three holes two pins(orange)	Antiflaming
180-0TJC303A-5100	1	CN1	JACK	TJC3-3A	
180-0TJC303A-5100	1	CN2	JACK	TJC3-13A	
	1	FU1	Fuse Holder	Fuse Holder	Antiflaming
210-01000250-2000	1	FU1	FUSE	T1AL/250V	
150-BBCKEC28-0020	1	TR1	Transformer	BCK-EC2802	
<b>Front Panel - 300-D01298CA-0002</b>					
<i>Resistors</i>					
131-B01015JT-0000	1	3R3	RESISTOR, CHIP	150Ω 1/8W 0805 5%	
131-B01047JT-0000	1	3R4	RESISTOR, CHIP	470Ω 1/8W 0805 5%	
131-B02010JT-0000	1	3R8	RESISTOR, CHIP	1KΩ 1/8W 0805 5%	
131-B02047JT-0000	11	3R2 3R5 3R7 3R16 3R20 3R21 3R22 3R23 3R24 3R25 3R28	RESISTOR, CHIP	4.7KΩ 1/8W 0805 5%	
131-B03010JT-0000	1	3R1	RESISTOR, CHIP	10KΩ 1/8W 0805 5%	
131-B03033JT-0000	1	3R18	RESISTOR, CHIP	33KΩ 1/8W 0805 5%	
131-B03047JT-0000	1	3R19	RESISTOR, CHIP	47KΩ 1/8W 0805 5%	

Replacement of entire PCB assemblies or entire DVD22 loader is recommended.

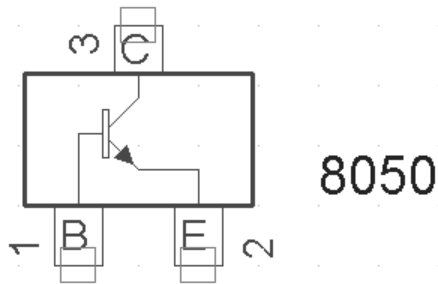
Electrical parts list is for reference only.

Part Number	Qty	Reference designator	Description	
<b>Front Panel - 300-D01298CA-0002</b>				
<i>Capacitors</i>				
141-C0B022PH-0000	2	3C8 3C10	CAPACITOR,MULTILAYER CERAMIC (CHIP)	22PF 50V Z Y5V 0805
141-C0B047PH-0000	2	3CB6 3CB9	CAPACITOR,MULTILAYER CERAMIC (CHIP)	47PF 50V Z Y5V 0805
141-C0B022PH-0000	5	3CB1 3CB2 3CB3 3CB4	CAPACITOR,MULTILAYER CERAMIC (CHIP)	0.1µF 50V Z Y5V 0805
140-DCA047UD-0A00	1	3C6	CAPACITOR,AL.ELECTROLYTIC	47µF 10V 20%
140-DCA010UD-0A00	1	3C14	CAPACITOR,AL.ELECTROLYTIC	100µF 10V 20%
140-DCA022UD-0A00	1	3C12	CAPACITOR,AL.ELECTROLYTIC	220µF 10V 20%
<i>Semiconductors</i>				
111-B01N4148-0A00	1	3D6	DIODE	1N4148, DIP
110-FHFT503C-AA00	1	3LD1	DIODE, color: blue&amber	HFT503CPBOΦ3, 3P, DIP
121-00008550-T300	1	3Q2 3Q3	TRANSISTOR	8550 SMD
121-00008050-T400	1	3Q1	TRANSISTOR	8050 SMD
103-CF74504P-1240	1	3U1	IC, Microchip, MCU	CF745-04/P
102-00PT6311-1000	1	3U2	IC, Princeton Technology Corp., VFD DRIV	PT6311 SMD
<i>Miscellaneous</i>				
105-0HL38B17-1000	1	3U4	IR RECEIVER	HL38B17, 3P, DIP
190-000DVD22-0120	1	3U6	VFD	VFD22 1101
217-00400003-2200	1	3Y1	FUNDAMENTAL.OSCILLATOR	4.000MHz, DIP
170-C0000004-0000	8	3K2 3K3 3K4 3K5 3K6 3K7 3K8 3K9	TOUCH SWITCH	6×6
<b>Mechanical</b>				
380-B22PT001-8000	1	chassis	DVD22-PT001	
380-A22PT002-8500	1	top cover		
380-C00DVD22-0500	1	back panel	Europe revision	
380-C00DVD22-0510	1		America revision	
600-00000005-6920	1	harman/kardon brand		
385-VD31ZPA2-5000	1	disc tray with aluminum ally wrap		
385-000DVD22-5200	1	heat sink	DVD31ZP-A2	
332-300DVD22-0000	1	Top cover support	for IC U401, 28mm×28mm×10mm	
330-12ZPRE02-8000	1	Plastic Panel	DVD22ZP-RE02	
331-81ZPRE01-8000	1	Panel lens	DVD31ZP-RE01	
330-21ZPRE07-8000	1	Disc tray	DVD31ZP-RE07	
331-11ZPRE04-8000	1	Single key button	DVD31ZP-RE04	
331-11ZPRE03-8000	1	More key button	DVD31ZP-RE03	

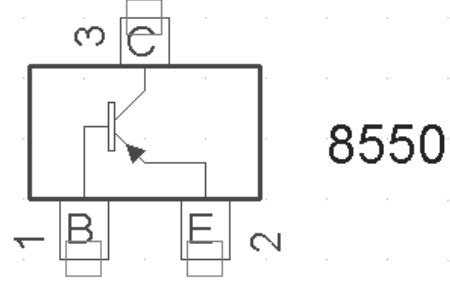
Replacement of entire PCB assemblies or entire DVD22 loader is recommended.  
Electrical parts list is for reference only.

Part Number	Qty	Reference designator	Description		
<b>Mechanical</b>					
330-71ZPRE05-8000	1	short decorate strip	DVD31ZP-RE05		
330-71ZPRE06-8000	1	long decorate strip	DVD31ZP-RE06		
332-41ZPRE08-8000	1	Power Indicator Cover	DVD31ZP-RE08		
331-400DVD22-4000	4	Pedestal	bronzing □ same as DVD 25 □ gray/golden □		
350-000DVD22-0200	4	Pedestal underlay	same as DVD25		
332-200SZ003-0200	1	IR receiver head frame	SZ003 □ 5.5mm		
350-000DVD22-0200	2	VFD soft pad	20mm×10mm×3.5mm		
331-7C035040-0010	2	aluminium fastener 01	3.5mm×40mm		
331-70000000-0000	2	plastic fastener 02	fasten the power cord		
332-40000000-0000	4	screw map			
500-02000000-0030	1	lead nip 03			
500-09150085-0000	1	insulated piece for power board	stick on chassis □ 150×85mm		
500-09170100-0000	1	insulated piece for power board	stick on top cover □ 170×100mm		
331-91185165-9000	1	VFD filter	118.5×16.5mm		
500-07130010-0000	1	insulated piece for VFD	130×10mm		
313-AGDVD220-0001	1	Laser precaution mark	stick on loader		
313-AGDVD220-0002	1	Laser precaution guide	stick on loader		
500-0923040-0000	1	insulated piece for mainboard	stick on chassis □ 230×40mm		
332-200SZ036-0000	2	PCB plastic frame	Φ8×10mm		
160-E0130170-DA00	1	13 pin, long 170mm, ono end with connector, 2.0mm space	connect front panel board and mainboard		
160-E0130160-DA00	1	13 pin, long 160mm, ono end with 2.0mm connector, one end with 2.54mm space □ same direction	connect power supplier board and mainboard		
162-A0VH0300-0000	1	Power cord with 300mm fixture	Europe/America		
160-E0030300-3A00	1	3 pin, long 300mm, single end with connector, 2.54mm space	connect power supplier board and front panel board		
160-E0050280-0A00	1	5 pin, long 280mm, two end with connector, 2.0mm space	for loader		
160-E0060150-0A00	1	6 chip, long 150mm □ two end with connector, 2.0mm space	for loader		
160-E0070240-0A00	1	7 pin, long 240mm □ two end dipped stannum, 2.0mm space	connect two pieces front panel board		
161-24160050-0000	1	24 pin, long 160mm □ 0.5mm space, flat cable	for loader		

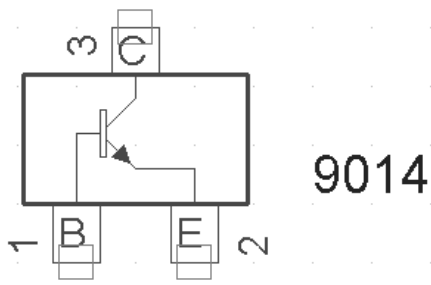
8050, NPN Transistor, SMD



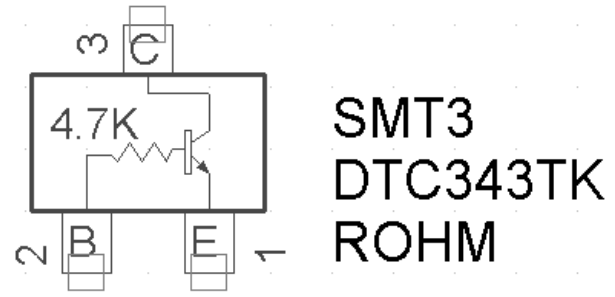
8550, NPN Transistor, SMD



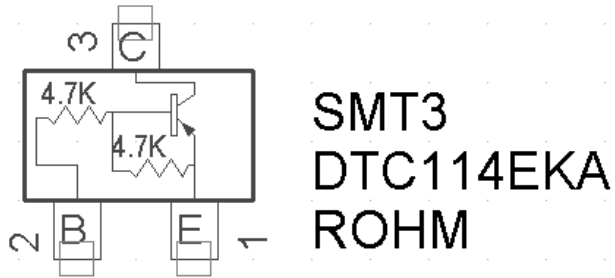
9014, NPN Transistor, SMD



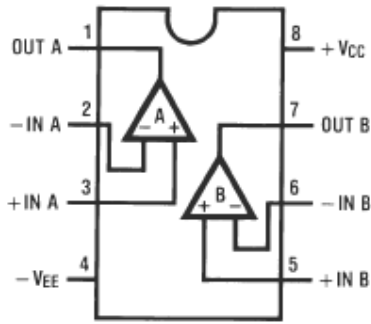
DTC343TK, NPN Transistor, SMD



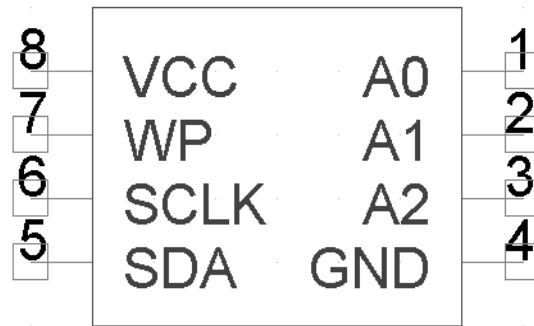
DTC114EKA, PNP Transistor, SMD



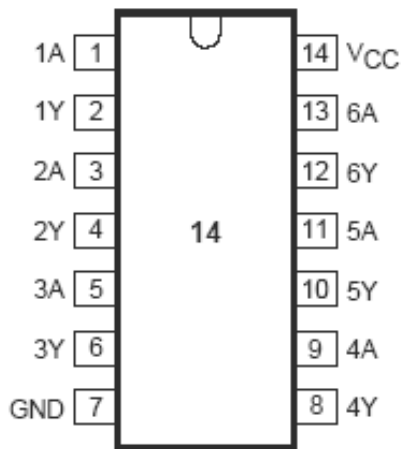
LM833M, pre-amp, SMD



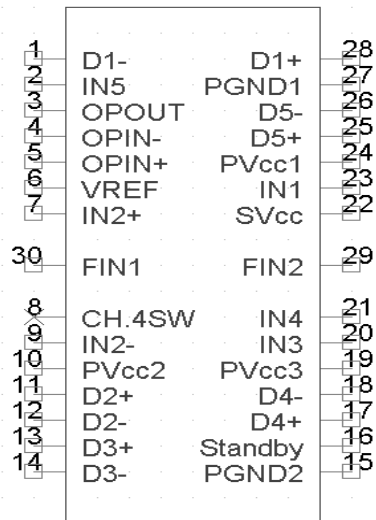
AT24C01, EEPROM, SMD



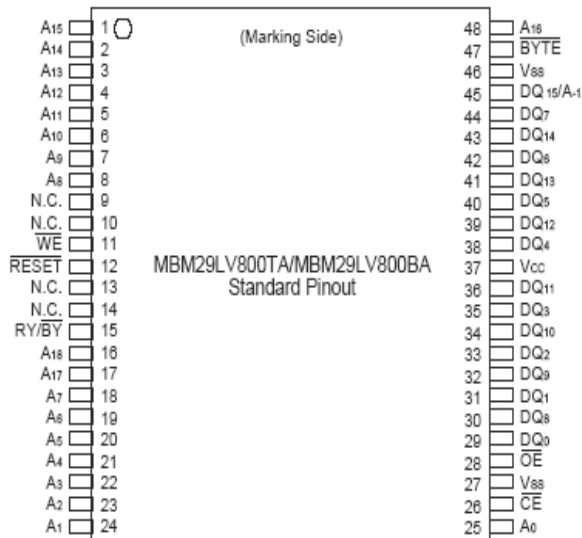
74HCT14, Hex inverting Schmitt trigger, SMD



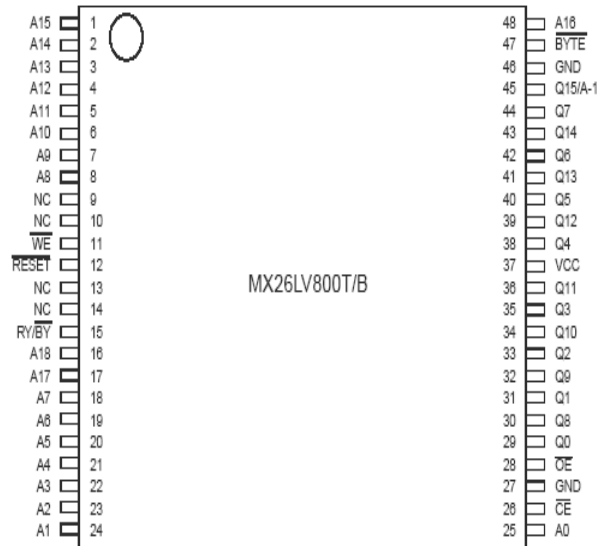
AN8785SB, motor driver, SMD



MBM29LV800BA-70, flash, SMD

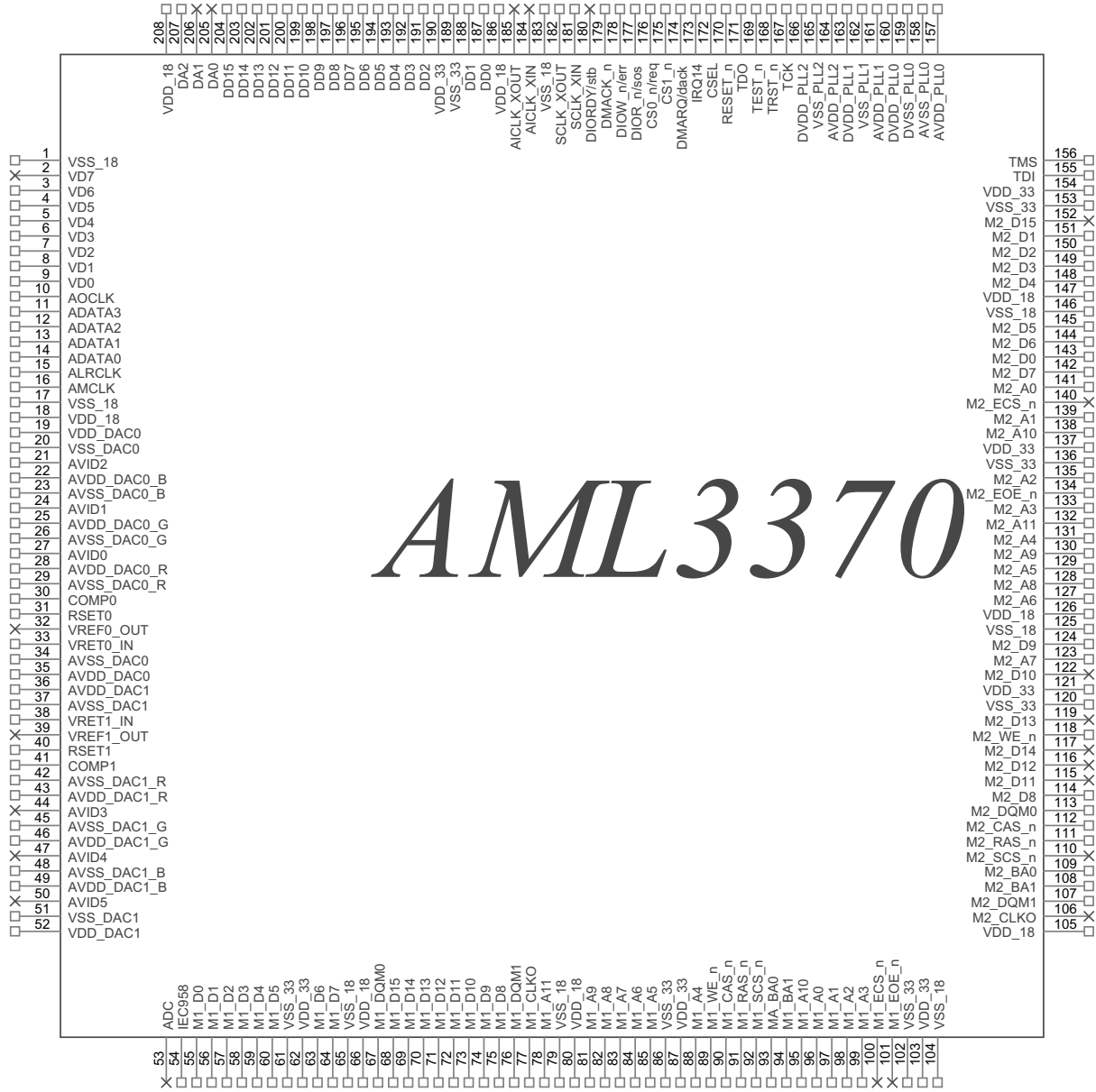


MX26LV800BTC-55, flash, SMD





AML3370, decoder, SMD



78L05, Voltage Regulator, TO-92



1. Output 2. GND 3. Input

78L12, Voltage Regulator, TO-92



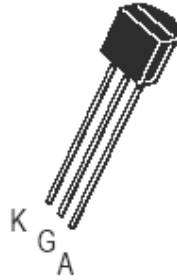
1. Output 2. GND 3. Input

79L12, Voltage Regulator, TO-92



1. GND 2. Input 3. Output

MCR100-6, Silicon controlled rectifiers, TO-92



2N5551, NPN, TO-92



8550, PNP, TO-92



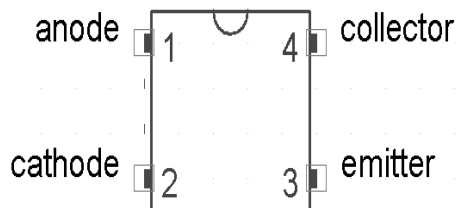
8050, NPN, TO-92



9014, NPN, TO-92



PC817, Photoelectric Coupler, DIP

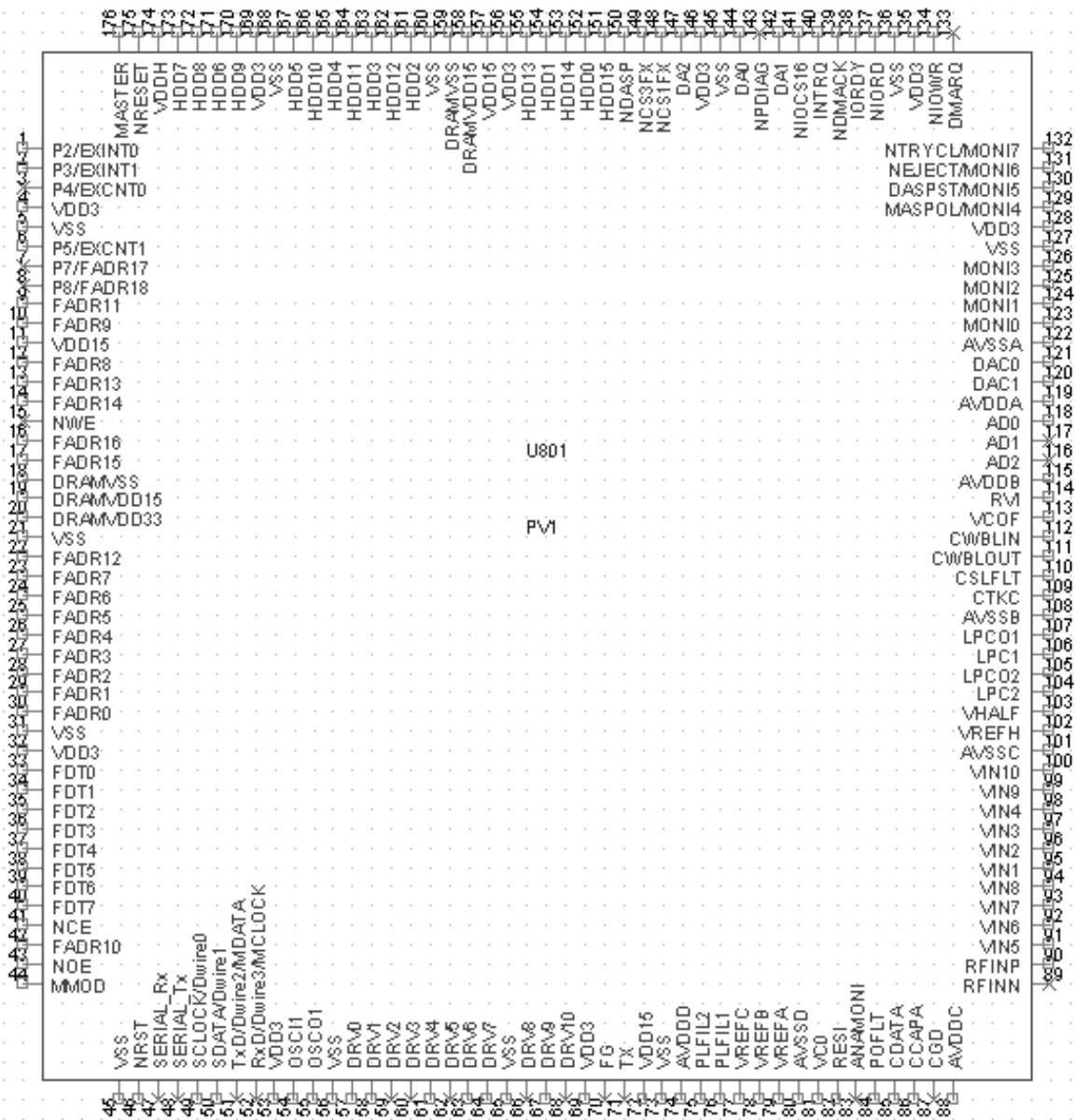


KA431, Precision Adjustable Voltage Regulator, TO-92

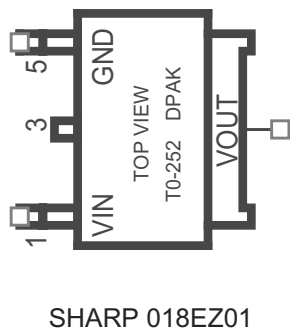


1. Ref 2. Anode 3. Cathode

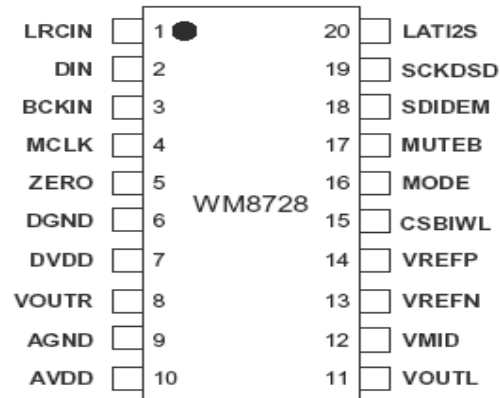
MN103S47JRB, servo, SMD



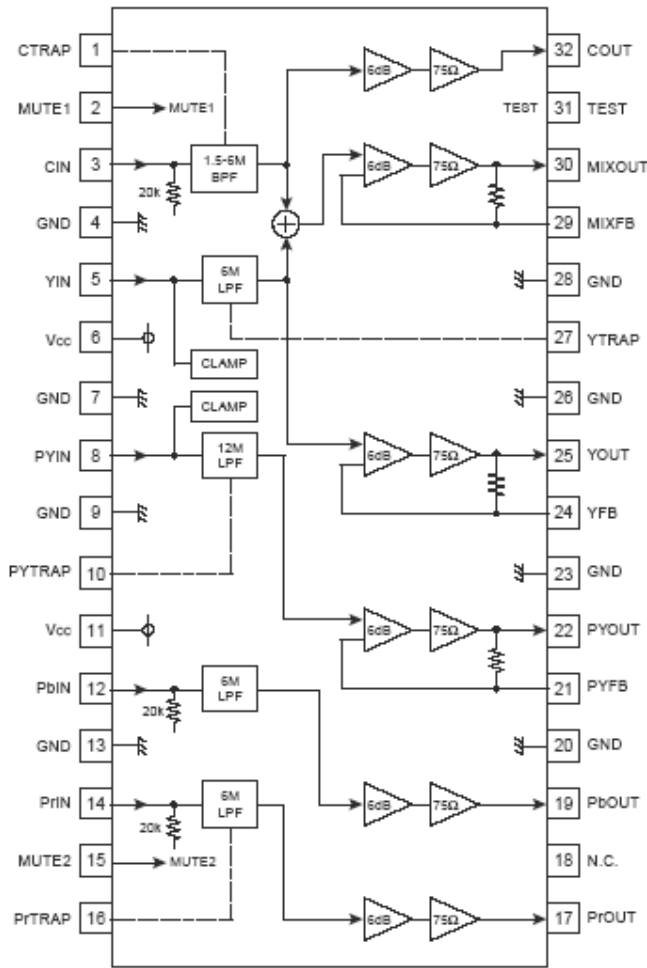
O18EZ01, Voltage Regulator, SMD



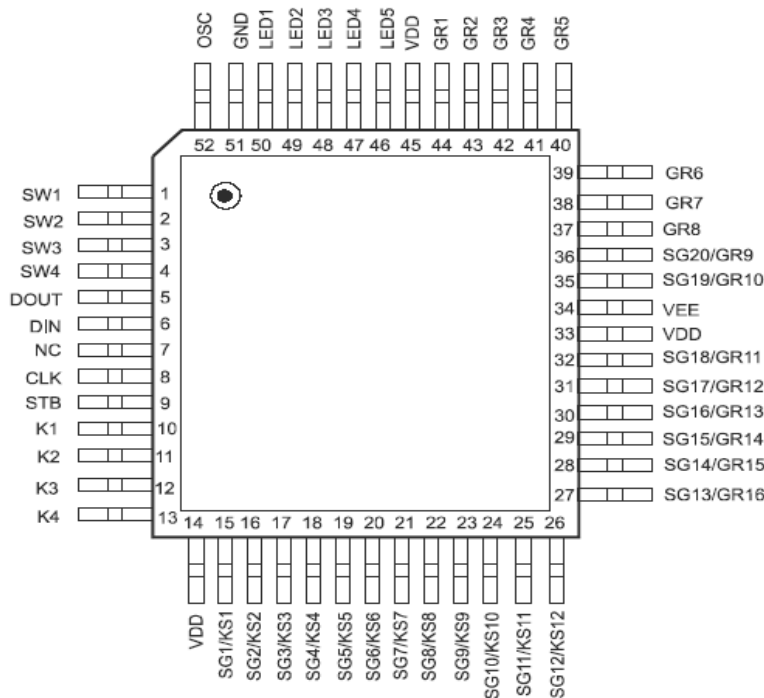
WM8728, Audio DAC, SMD



BH7862FS, Video Buffer, SMD



PT6311, VFD driver, SMD



KA5L0365RN, Power Switch, DIP



1.6.7.8 Drain 2.GND 3.Vcc 4.FB 5.NC

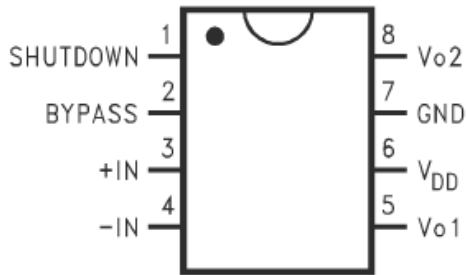
KA5M02659RN, Power Switch, DIP



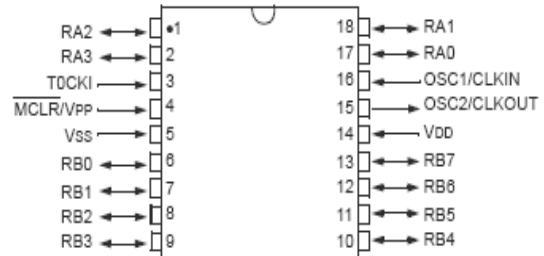
1.6.7.8 Drain 2.GND 3.Vcc 4.FB 5.NC

LM9022, SMD

Vacuum Fluorescent Display Filament Driver



CF745-04/P, MCU, DIP



LM317, Voltage Regulator, TO-220



1. Adj 2. Output 3. Input

LM7805, Voltage Regulator, TO-220



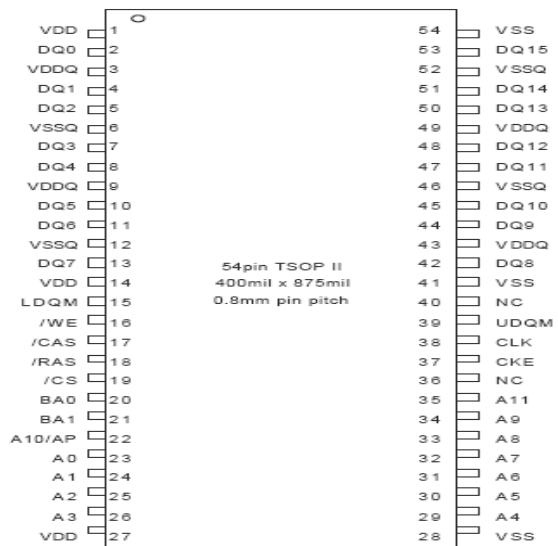
1. Input 2. GND 3. Output

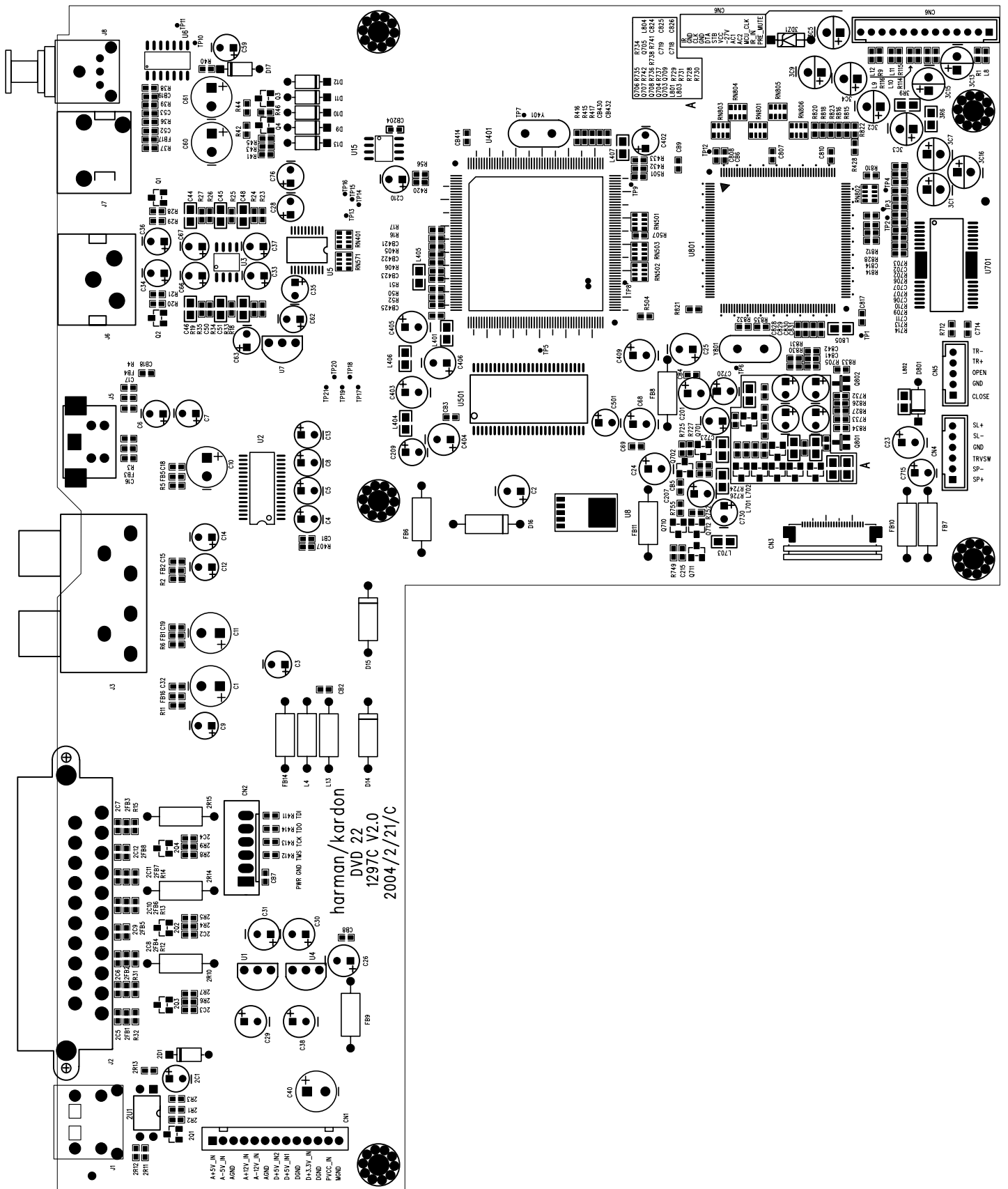
BA033T, Voltage Regulator, TO-220

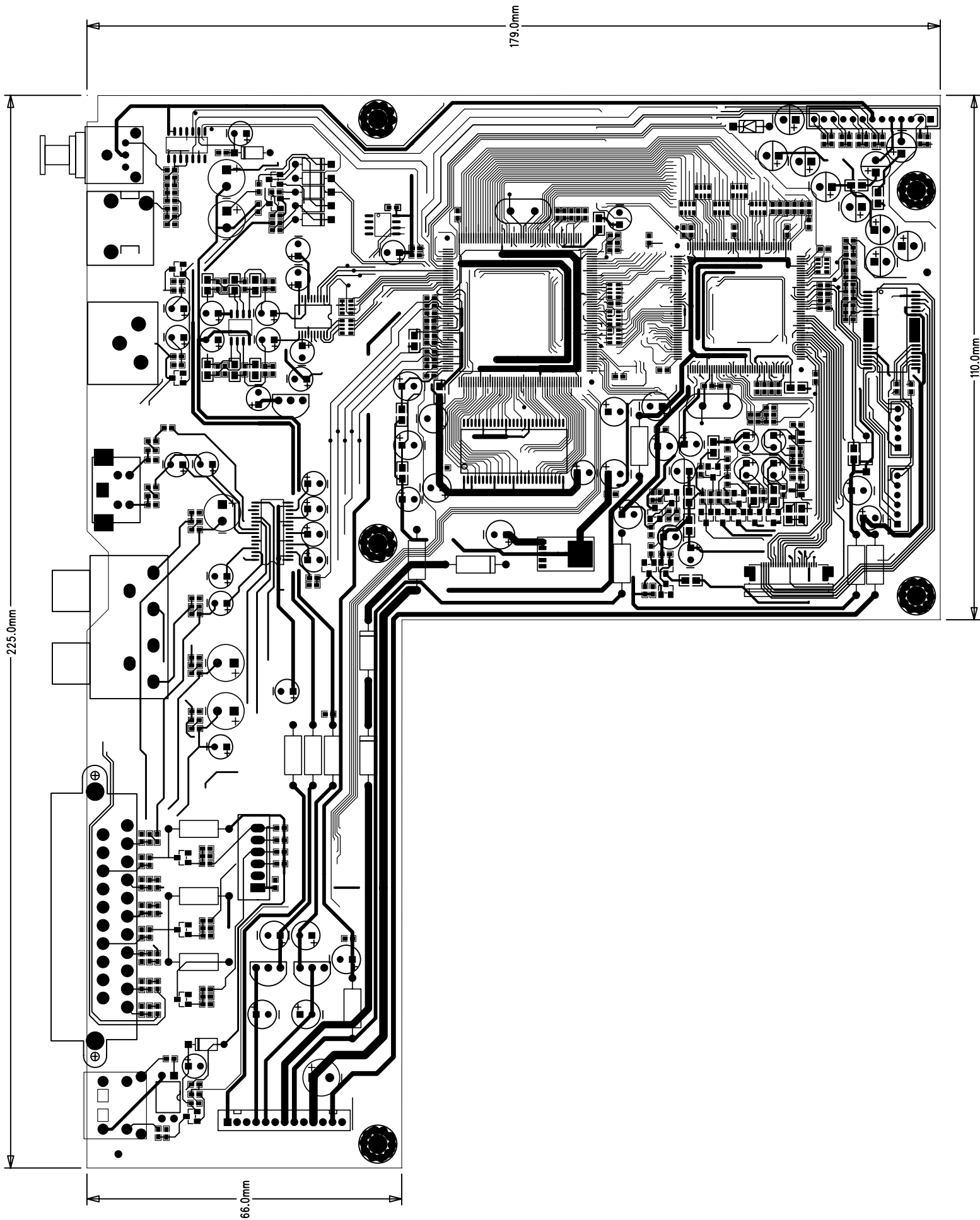


1. Input 2. GND 3. Output

HY57V641620HG, SDRAM, SMD

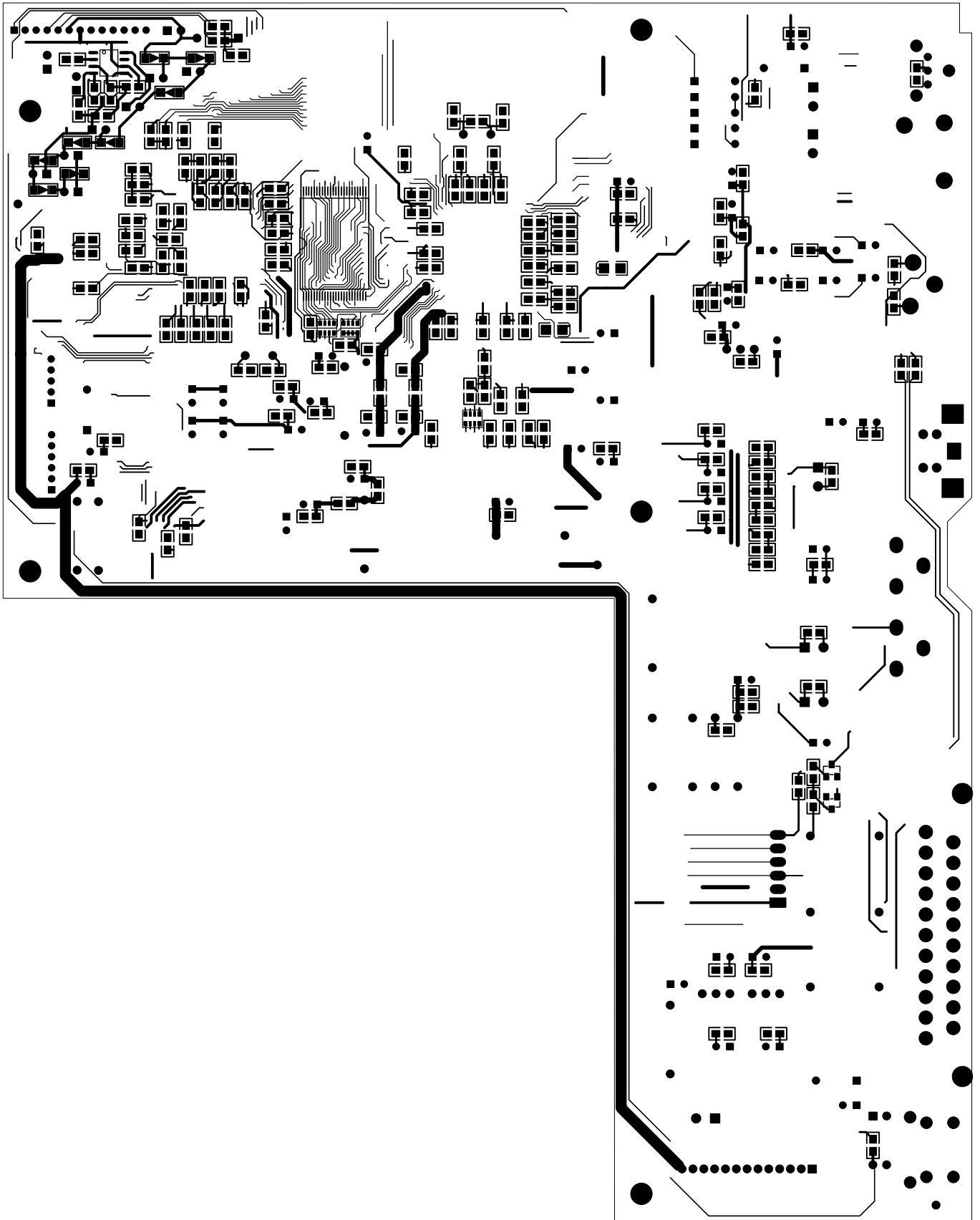


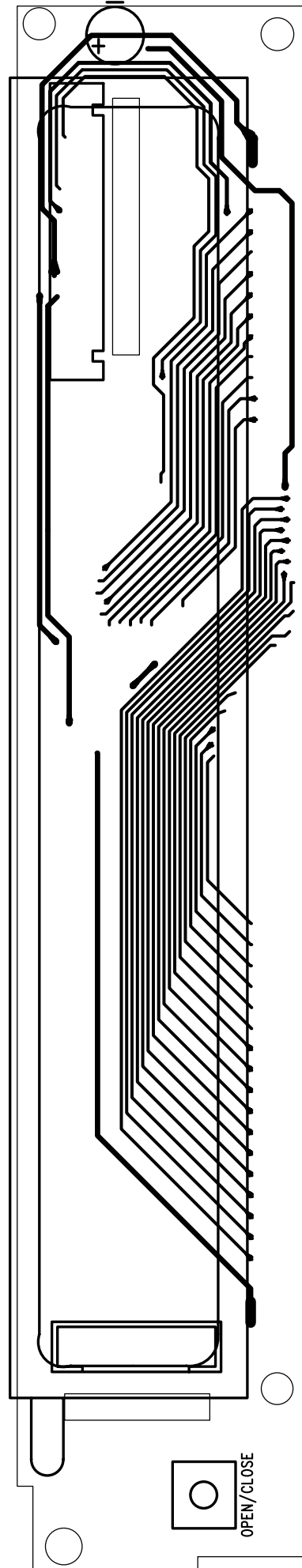
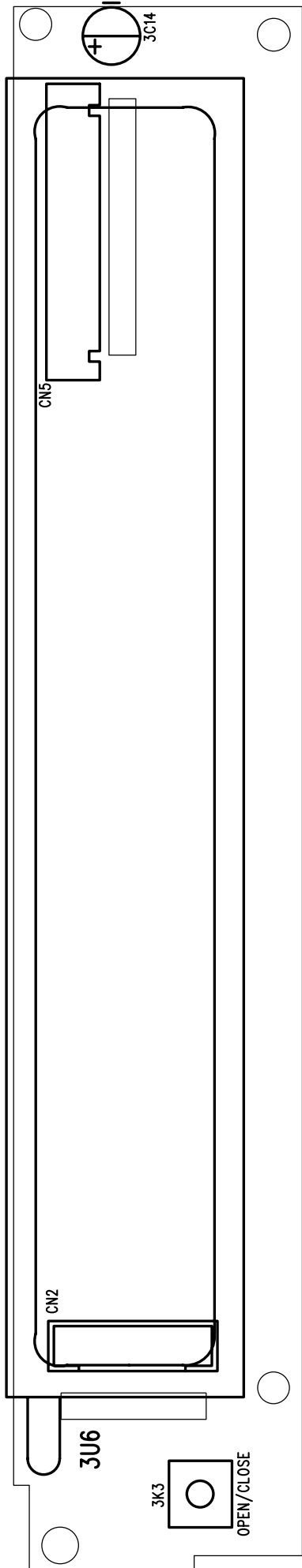


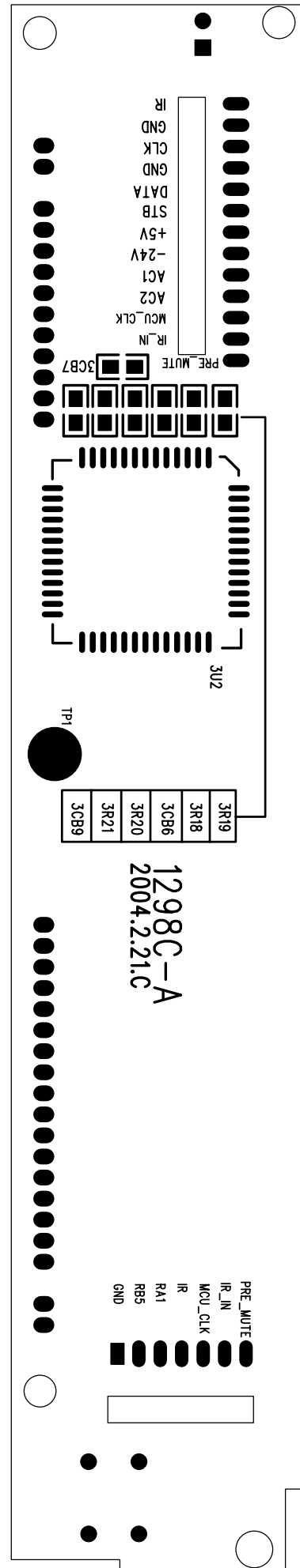
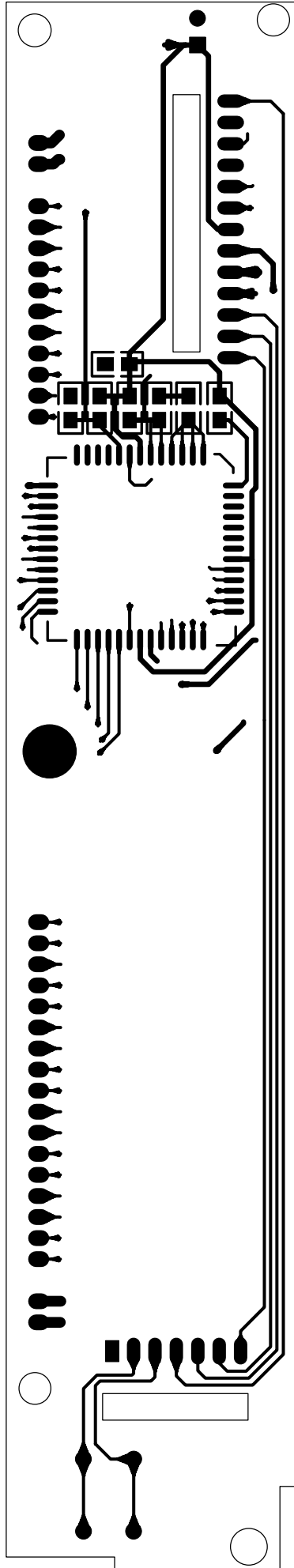


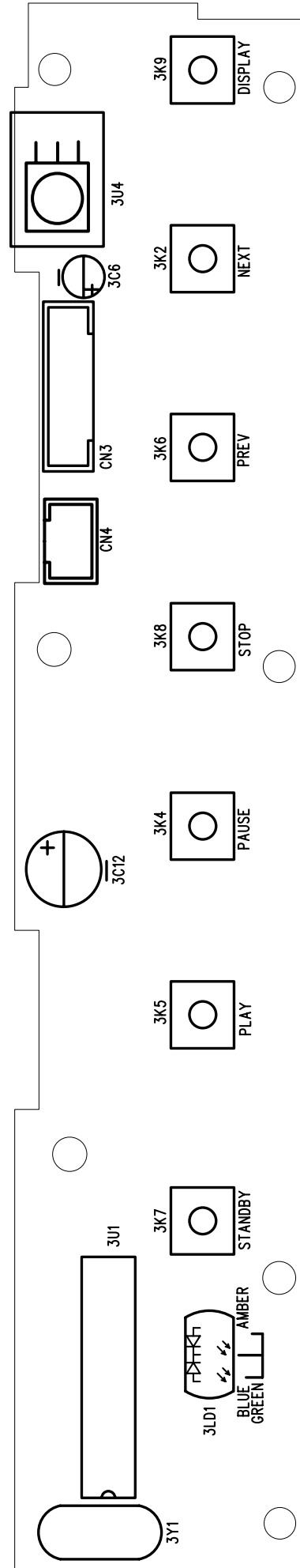
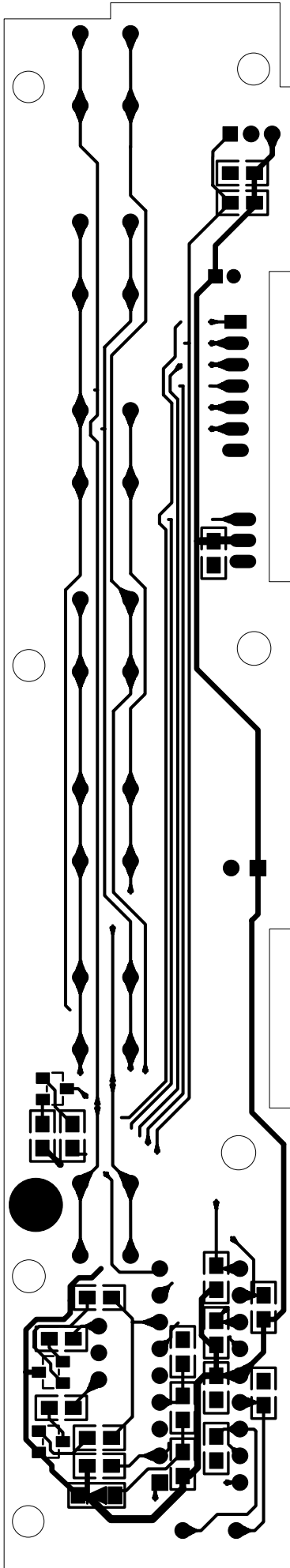












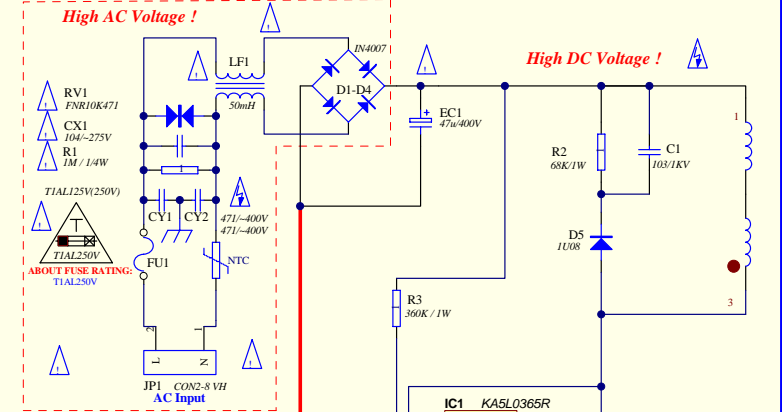
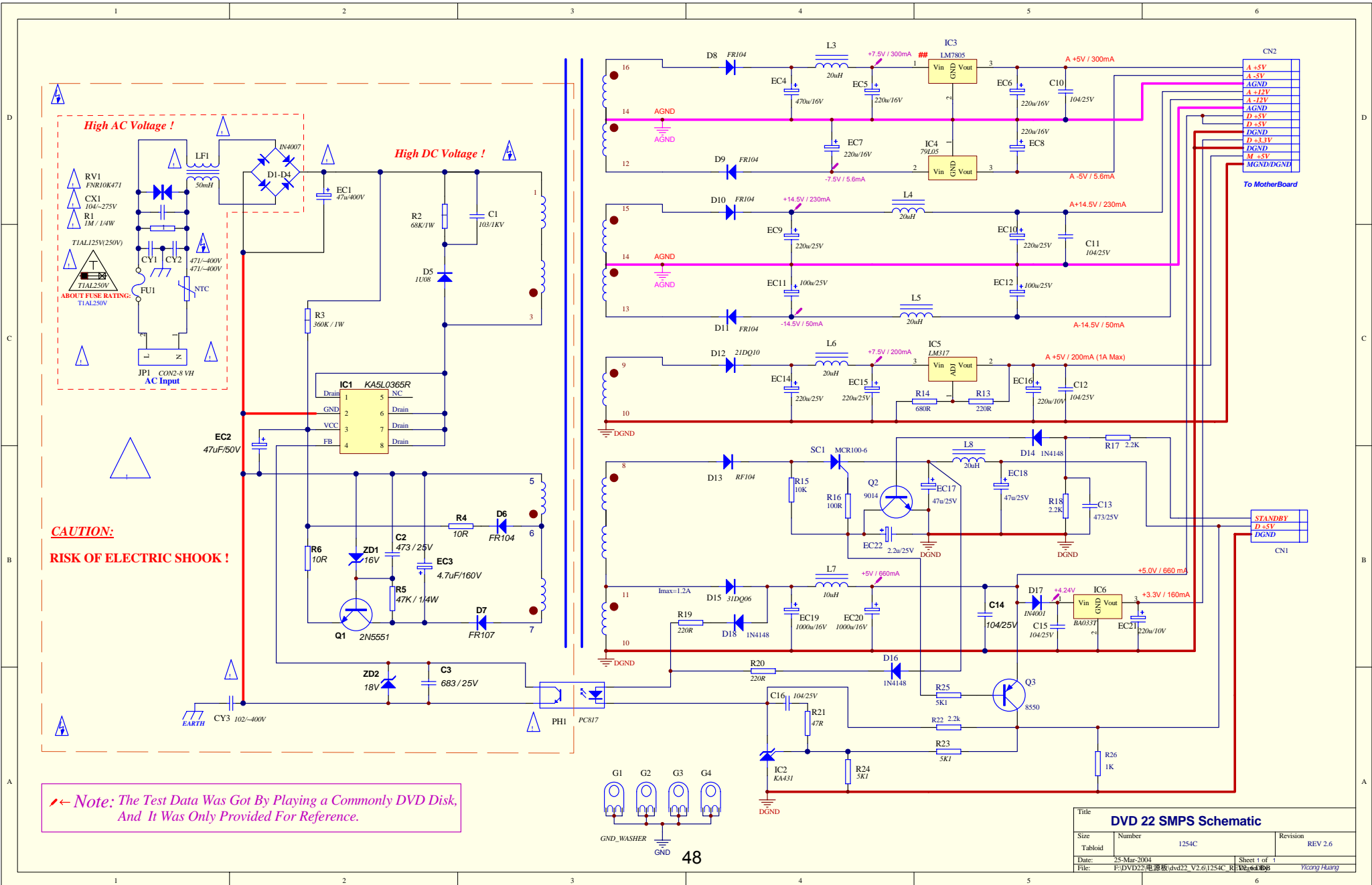




# SYSTEM CONFIGURATION

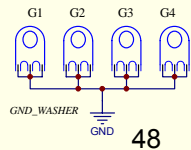
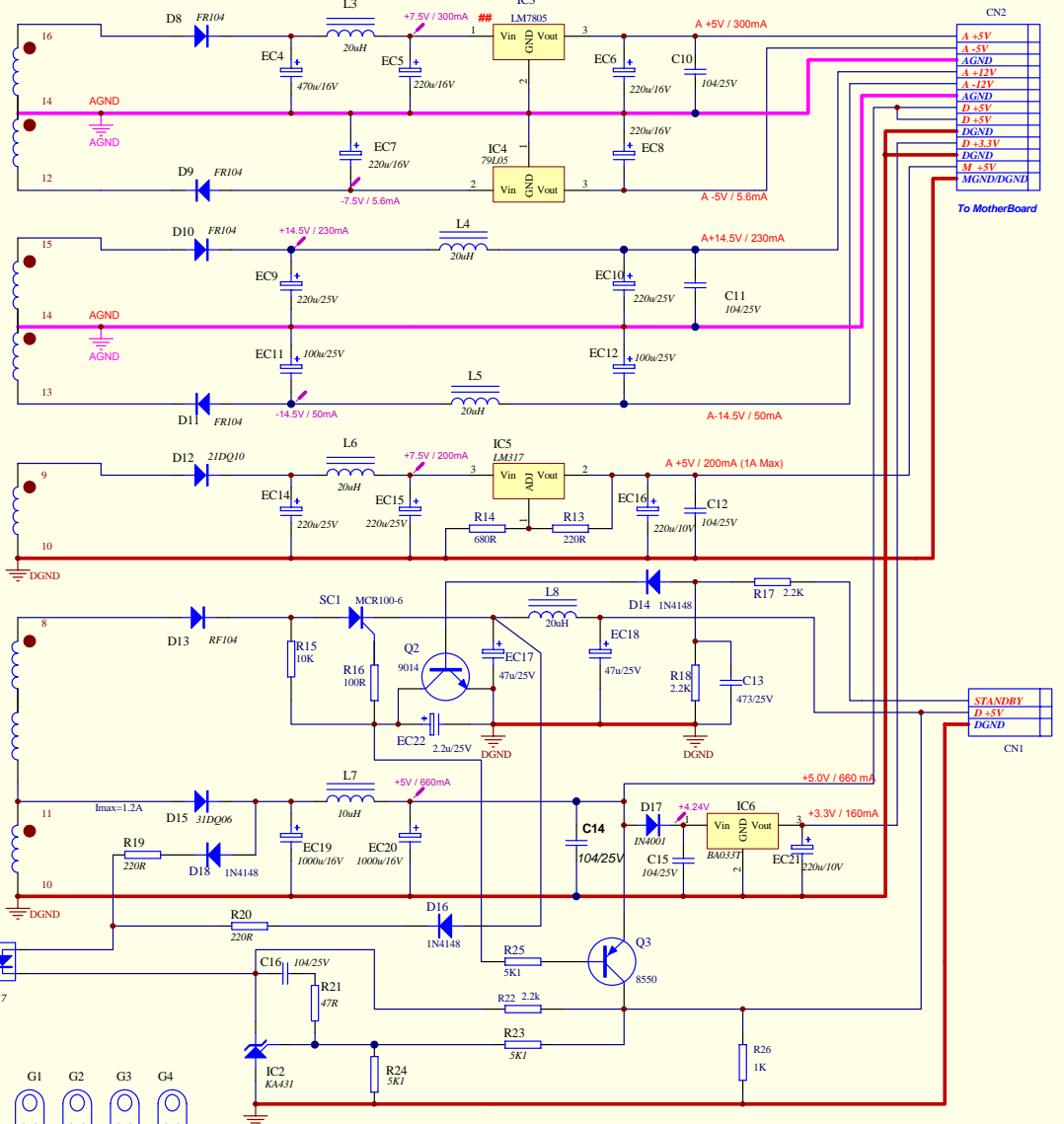
Module	Configuration	Description
<b>AUDIO</b>	2 channel	DAC : WM8728 OPAMP : LM833
	Electrical SPDIF Optical SPDIF	Connector on board Connector on board
<b>VIDEO</b>	CVBS and S-Video / Selection by software RGB and YCrCb	Video Buffer : Bh7862
<b>SDRAM</b>	64Mbit (x 16 Bits Wide)	HY57V641620HG-7 OR Equivalent for Mpeg
<b>FLASH</b>	8 Mbit (x 8 Bits Wide)	29LV800(or Equivalent)
<b>LOADER</b>	Sanyo DV34	Panasonic Chipset(PV 1)

Replacement of entire PCB assemblies or entire DVD22 loader is recommended. Schematics are for reference only.



**CAUTION:**  
**RISK OF ELECTRIC SHOCK !**

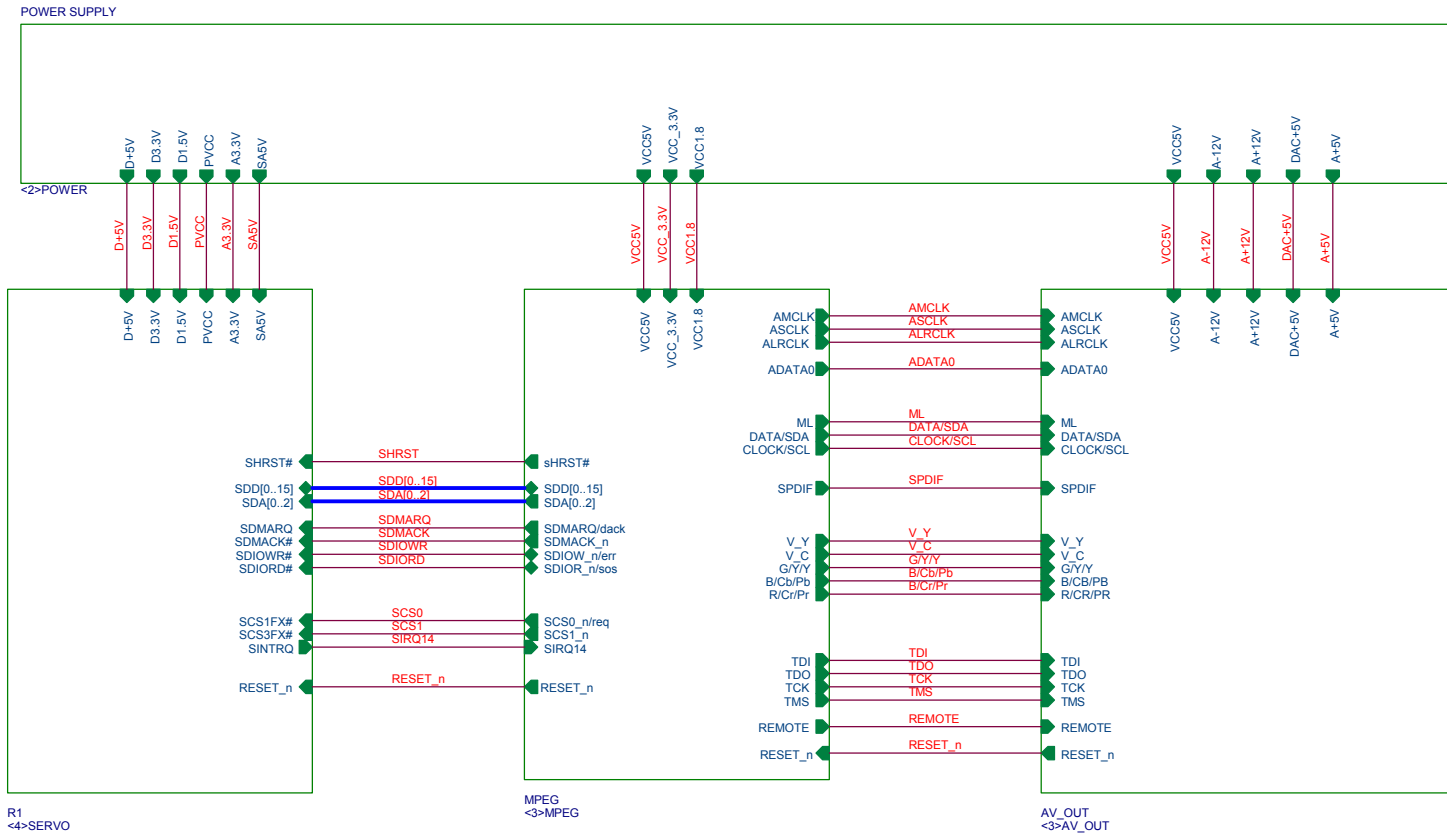
*Note: The Test Data Was Got By Playing a Commonly DVD Disk, And It Was Only Provided For Reference.*



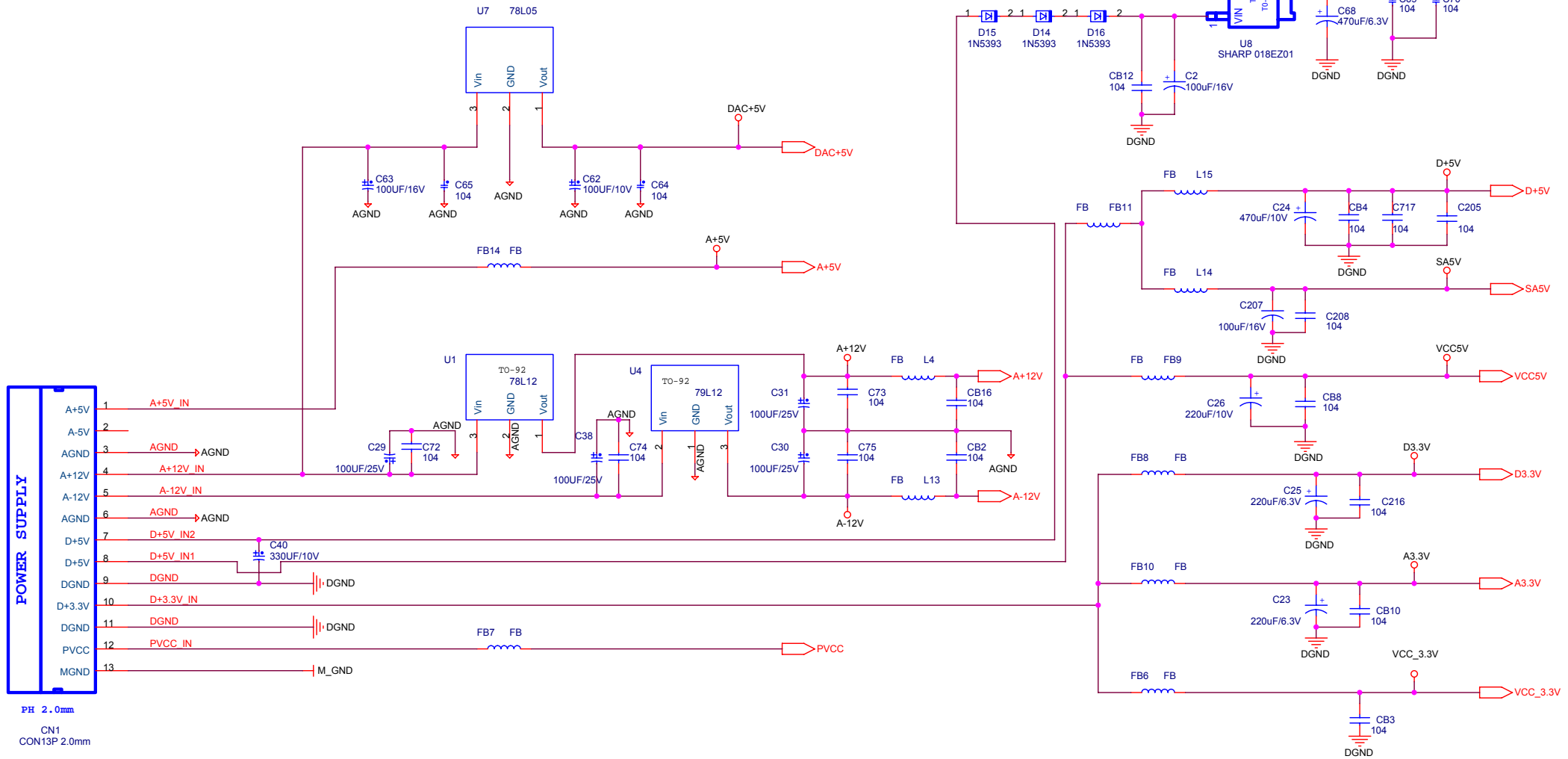
Title <b>DVD 22 SMPS Schematic</b>			
Size Tabloid	Number 1254C	Revision	REV 2.6
Date: 25-Mar-2004	Sheet 1 of 1		
File: F:\DVD22\电源板(dvd22_V2.6\1254C_REV2.6\1254C)	REV 2.6		Yicong Huang



Replacement of entire PCB assemblies or entire DVD22 loader is recommended. Schematics are for reference only.



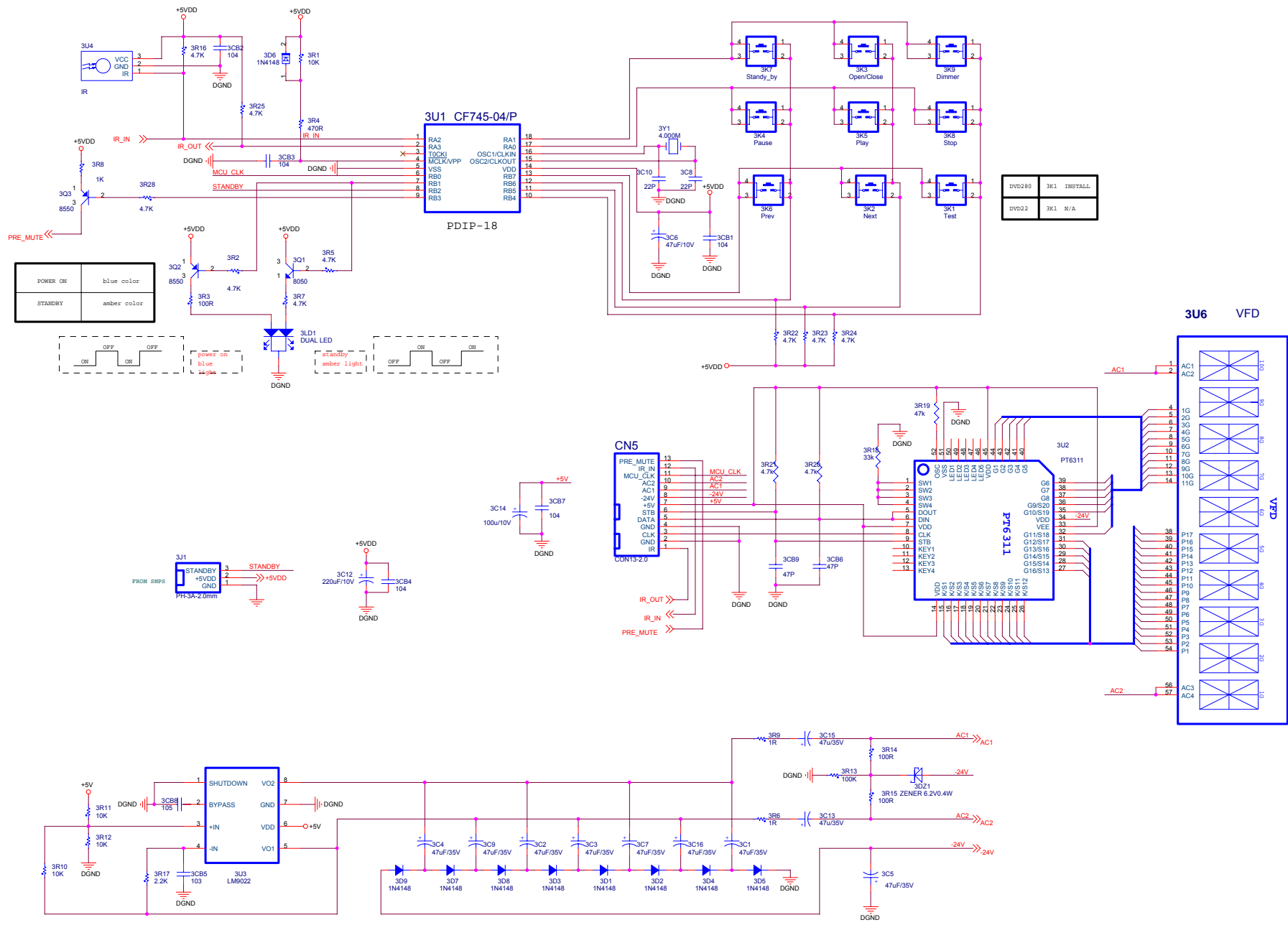
Replacement of entire PCB assemblies or entire DVD22 loader is recommended. Schematics are for reference only.



**harman/kardon**  
 Harman Kardon, Northridge, California 91329, USA

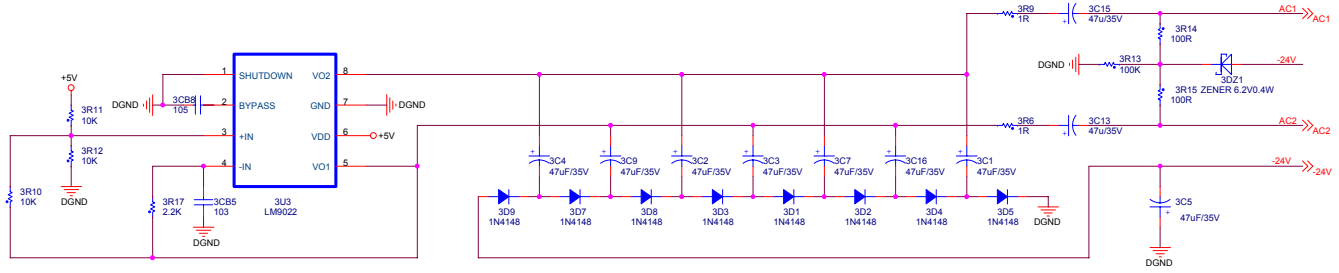
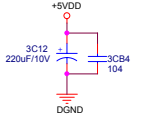
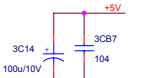
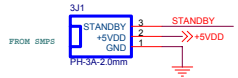
Title DVD22 POWER SUPPLY	
Size B	Document Number 1297c
Date: Thursday, March 25, 2004	Rev 2.0
Sheet 4 of 14	

Replacement of entire PCB assemblies or entire DVD22 loader is recommended. Schematics are for reference only.



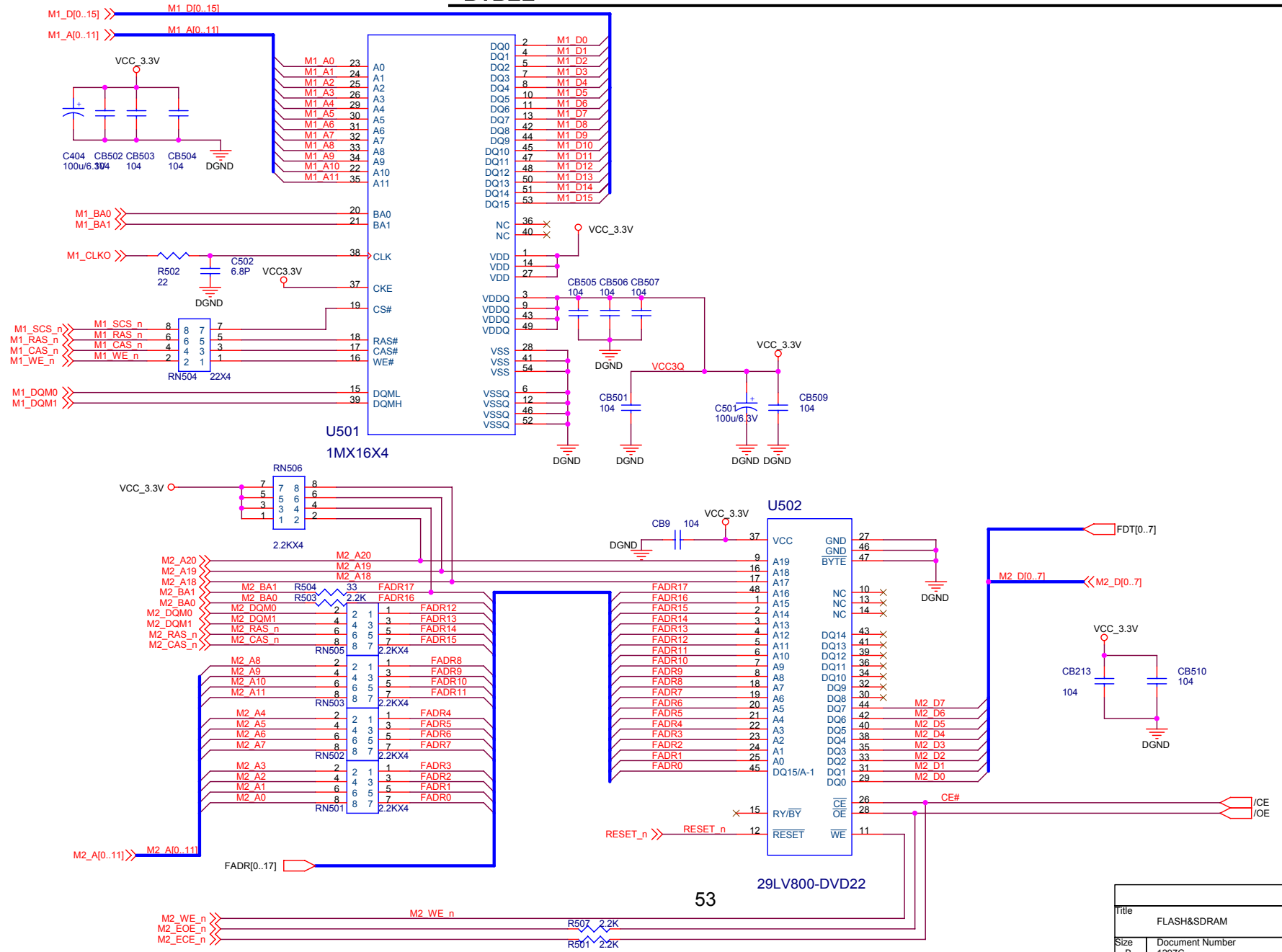
POWER ON	blue color
STANDBY	amber color

DVD280	3K1 INSTALL
DVD22	3K1 N/A



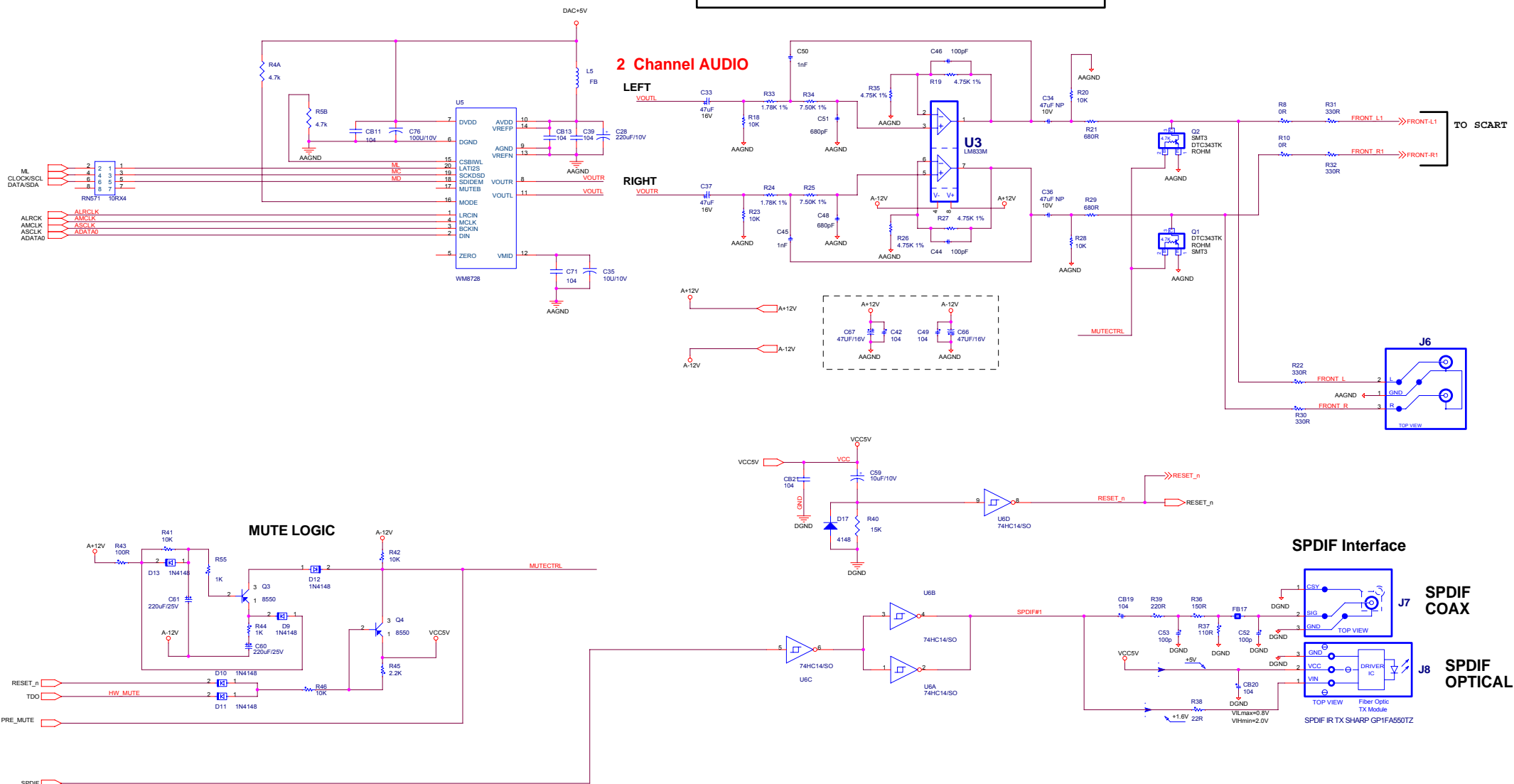


DVD22



Replacement of entire PCB assemblies or entire DVD22 loader is recommended. Schematics are for reference only.

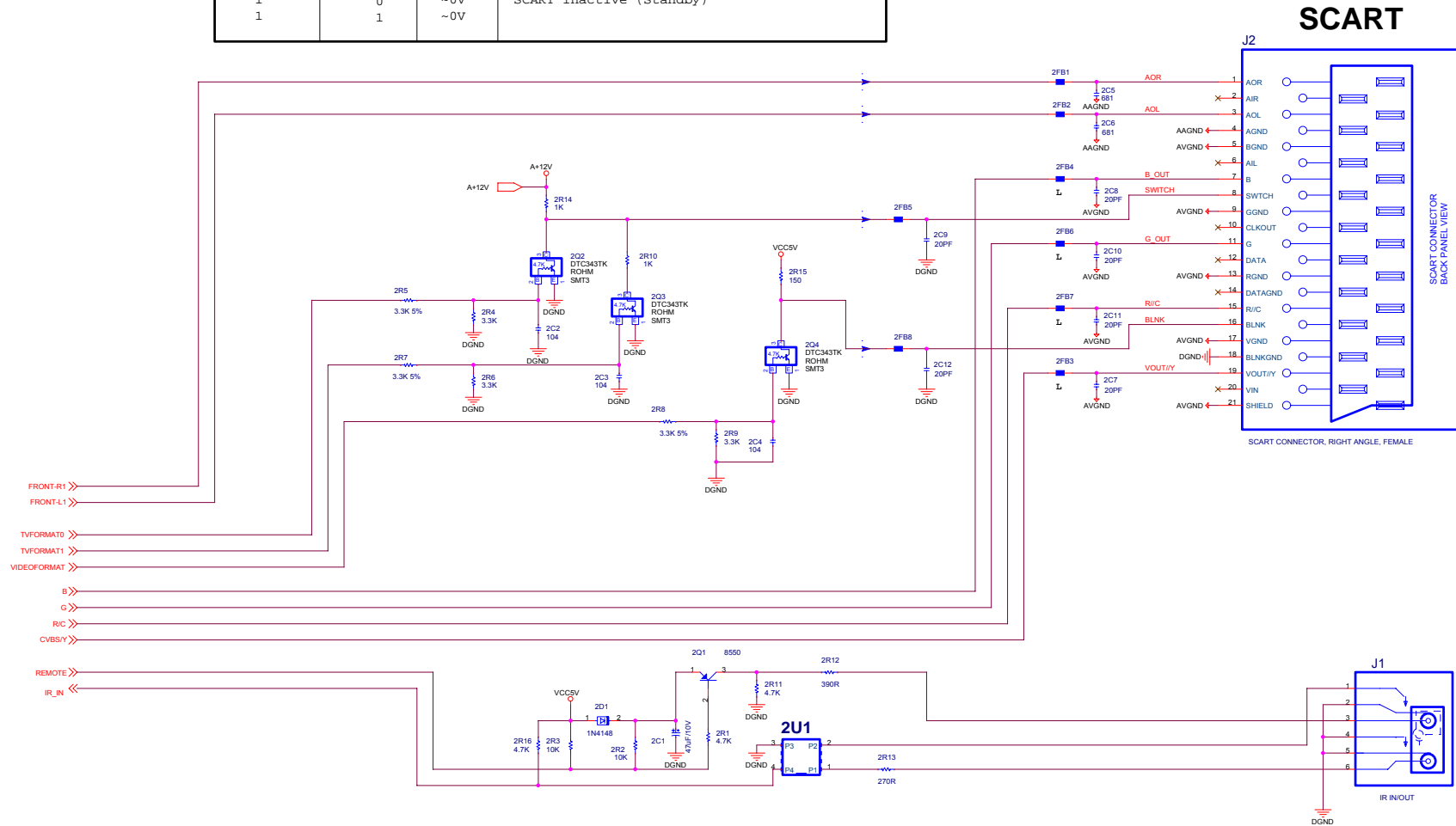
0805 NPO capacitance: C44 C45 C46 C48 C50 C51





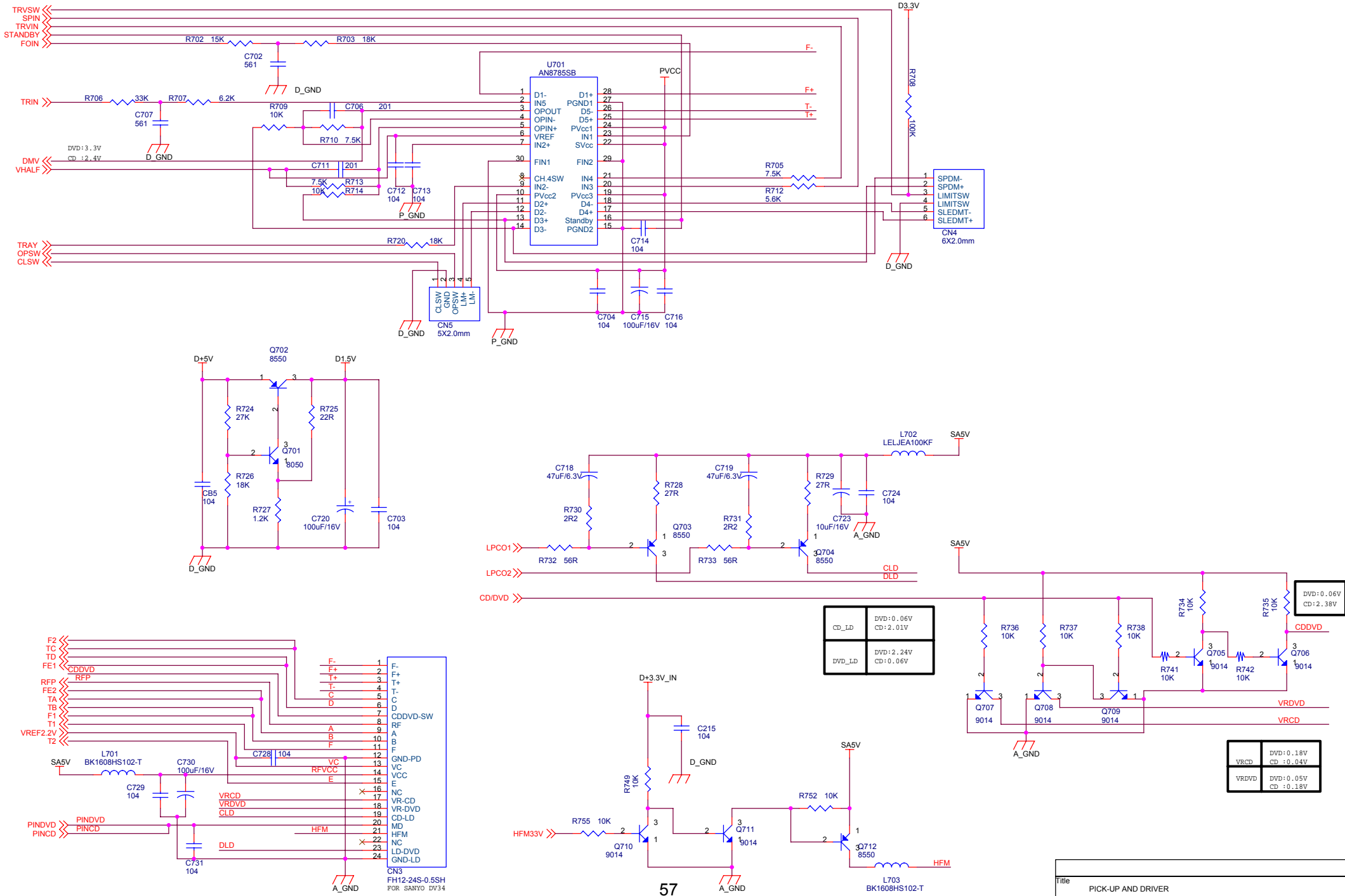
Replacement of entire PCB assemblies or entire DVD22 loader is recommended. Schematics are for reference only.

TVFORMAT0	TVFORMAT1	CONTROL VOLTAGE	TV FUNCTION
0	1	~6V	SCART Active Auto Switch to 16:9 Aspect Ratio
0	0	~12V	SCART Active Auto Switch to 4:3 Aspect Ratio
1	0	~0V	SCART Inactive (Standby)
1	1	~0V	SCART Inactive (Standby)





Replacement of entire PCB assemblies or entire DVD22 loader is recommended. Schematics are for reference only.

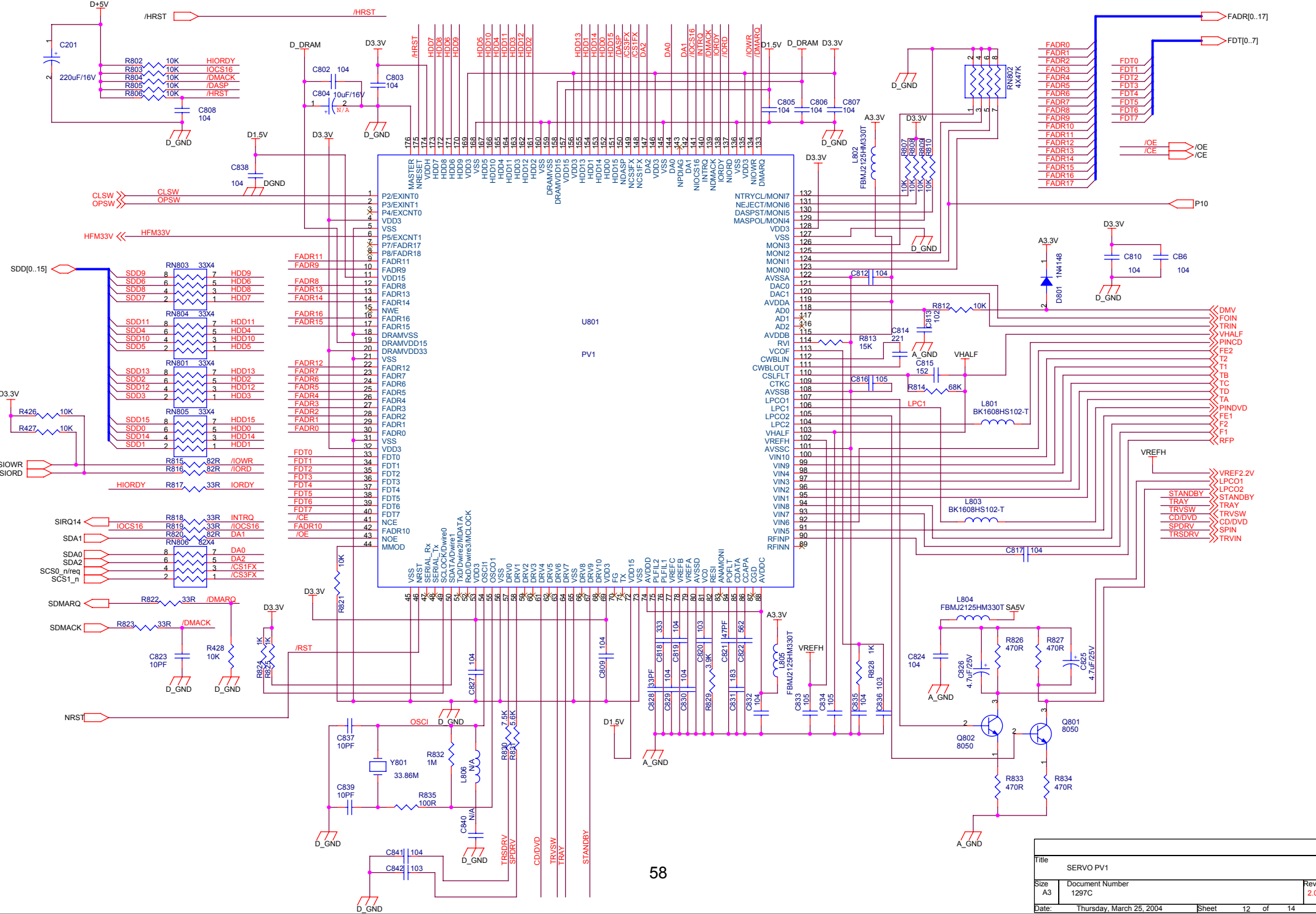


CD_LD	DVD:0.06V CD:2.01V
DVD_LD	DVD:2.24V CD:0.06V

VRCD	DVD:0.18V CD:0.04V
VRDVD	DVD:0.05V CD:0.18V

Title PICK-UP AND DRIVER		
Size A3	Document Number 1297C	Rev 2.0
Date: Thursday, March 25, 2004	Sheet 11	of 14

Replacement of entire PCB assemblies or entire DVD22 loader is recommended. Schematics are for reference only.



Title			SERVO PV1
Size	Document Number	1297C	
A3		Rev	2.0
Date:	Thursday, March 25, 2004	Sheet	12 of 14

Code	Rev Date	REV	Revision History
1	June 18, 2003	1.00	Initial Release
2	July 10, 2003	1.10	separate ground again, modify some errors, move the 3370 so that short the video&audio path ,
3	July 20, 2003	1.20	connect the AGND&DGND of the dac with R7, change the footprint of C44 C45 C46 C48 C50 C51, add R407 R408 R409 R529 R530 for VIDEO, swap the pin1&2 of U2, add R505 R506 R508 R431,change the value of R504 upgrade page 1, add front panel page, remove +12V&-12V from SMPS to MAIN BOARD, delete NET-LED to front panel, add R433(America) or R432(Europe) to set software dynatron BC858 was changed by 8550 in mutellogic add BLOCK DIAGRAM page
4	Aug 9, 2003	1.30	modify the schematic according to outstanding issues list Amlogic_03_08_06
5	Sep 1, 2003	1.40	debug the front panel and modify SCHEMATIC&PCB remove the LM9022 from front panel to main board change R431 from 10K to 2.7K,R46 from 33K to 82K,2R15 from 1K to 150 changed DAC PCM1742KE by WM8728 add +12V/-12V regulator (TO-92 type) on mainboard change R728 R729 from 0603 type to 0805 change R829 from 22K to 3.9K,C831 from 22p to 183.it help to improve read CD ability.

**harman / kardon**  
Harman Kardon, Northridge, California 91329, USA

Title		DVD22 REVISION HISTORY	
Size	Document Number	Date:	Rev
A4		Thursday, March 25, 2004	2.0
Sheet		13 of 14	

Code	Rev Date	REV	Revision History
6	Sep 20, 2003	1.5	<ol style="list-style-type: none"> <li>1. frontpanel:3CB5 104--&gt;103,3R10 3R11 3R12 100K--&gt;10K,3CB8 104--&gt;105</li> <li>2. change some VCC net on server circuit.</li> <li>3. change the IR IN/OUT circuit.</li> <li>4. VFD driver PT6311 NO.51 PIN no connect to GND,it will cause VFD flicker anomaly,correct it.</li> <li>5. change L3 from 0.68uH--&gt;0.39uH, C22 51p--&gt;22p</li> <li>6. change MCU 16C56A to CF745-04/P on frontpanel.</li> </ol>
7	Oct 15, 2003	1.6	<ol style="list-style-type: none"> <li>1. delete R505,R508</li> <li>2. modify the -24V circuit,it can supply -24V/-27V by optional.</li> <li>3. add D14 for 1.8V supply circiut.</li> <li>4. modify the SPDIF output level to 500mV,improve the jitter.</li> <li>5. add R508 0603-0R in 27MHz OSC OUT.</li> </ol>
8	Oct 27, 2003	1.7	<ol style="list-style-type: none"> <li>1. DAC be change to software mode.</li> <li>2. increase the area for U701&amp;U8 to emit heat.</li> <li>3. add L16-L24 Ferrite Beat for EMI issue.</li> <li>4. change the polarity of C4,C5,C8,C13</li> </ol>
9	Nov 2, 2003	1.8	<ol style="list-style-type: none"> <li>1. add a control singal from MCU:CF745-04/P to mute circuit for power on plop issue.</li> <li>2. remove the STANDBY LED control singal from MCU NO.9 pin to NO.7 pin on frontpanel.</li> </ol>
10	Nov 21, 2003	1.9	<ol style="list-style-type: none"> <li>1. delete Zener diodes D1 D2 D3 D4 D5 D6 D20 D21 D22 D23 D24 D25</li> <li>2. delete the EMI FB L16--L24</li> <li>3. change C1 from 100uF to 330uF</li> <li>4. Delete R7、R47、R48、R49、3R27、R508</li> <li>5. Add C40 : 330UF-10V C47 : 104</li> <li>6. Add L6 : 0.68uH C41 : 51P</li> <li>7. Change 3R3 from 100R to 150R</li> </ol>
11	Dec 28, 2003	2.0	<ol style="list-style-type: none"> <li>1. add the circuit on page NO.9 for macrovision</li> <li>2. page4 has some error,update it: delete FB12,FB13,FB15(-5V), change U9 to U1, FB15 to L15, FB14 to L14</li> <li>3. add R49 on V-COMP output</li> </ol>

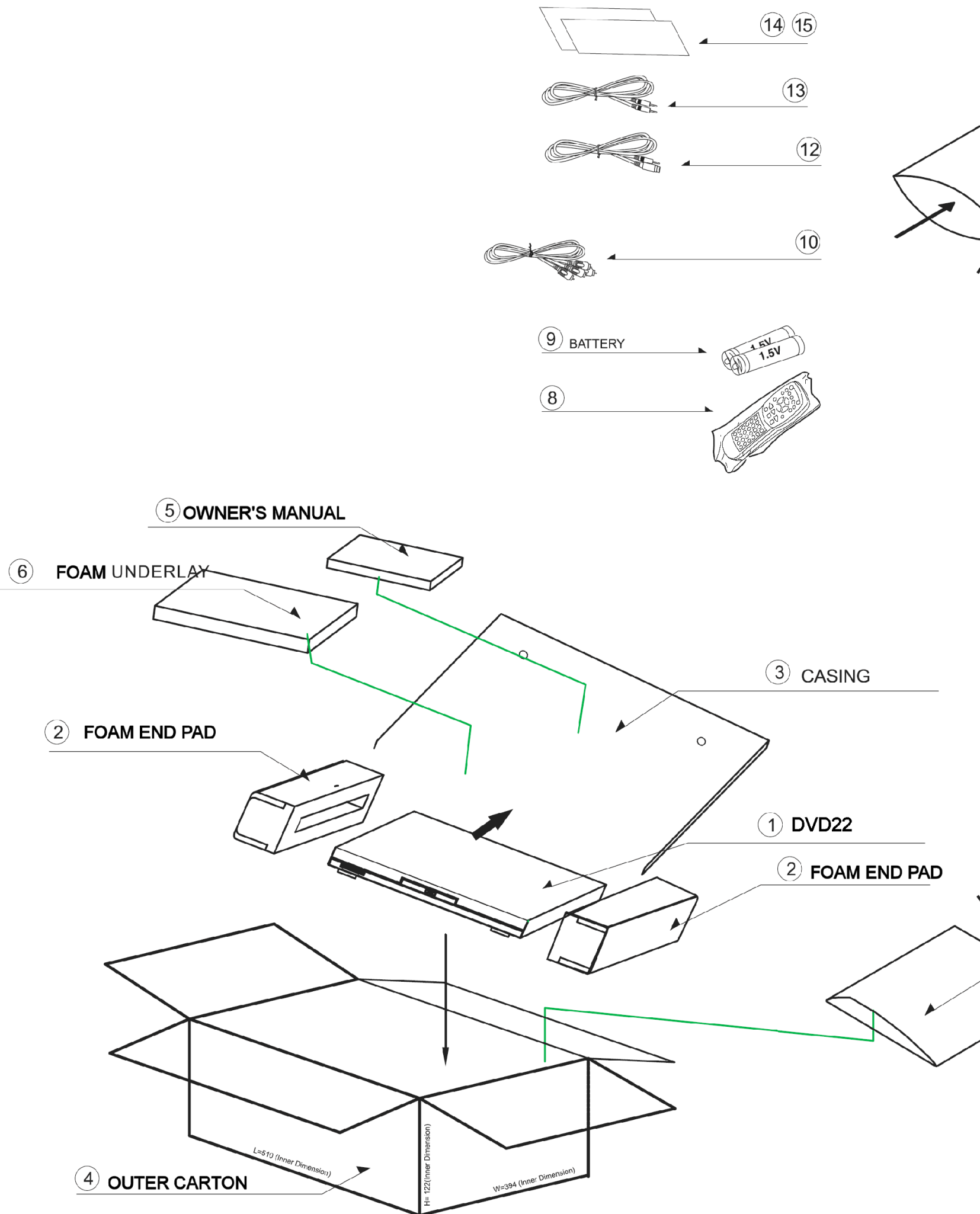
**harman / kardon**

Harman Kardon, Northridge, California 91329, USA

Title  
DVD22 REVISION HISTORY

Size A4	Document Number	Rev 2.0
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Date: Thursday, March 25, 2004 Sheet 14 of 14



Ref. #	Part Number	Description	Qty
1	DVD 22	DVD22 (120v)	1
	DVD22/230	DVD22 (230v)	
	DVD 22CP	DVD22 for CP systems	
2	309-00PM065-0000	Foam End Pads	1
3		Plastic Bag	1
4	310-000DVD22-0110	DVD22 Outer Carton (120v) USA	1
	310-000DVD22-0010	DVD22 Outer Carton (230v) EU	1
	310-00DVD22B-0110	DVD22B Outer Carton (120v) USA	1
	310-00DVD22B-0010	DVD22B Outer Carton (230v) EU	1
5	312-AB220000-0010	DVD22 Owner's Manual (120v)	1
	312-AB220000-0000	DVD22 Owner's Manual (230v)	1
	312-AB22B000-0010	DVD22B Owner's Manual (120v)	1
	312-AB22B000-0000	DVD22B Owner's Manual (230v)	1
6		Foam Padding	1
7	312-KBDVD220-0010	Warranty Card	1
		Plastic Bag	1
8	555-ADVD22RC-0010	DVD22 Remote Control	1
	555-AVD22BRC-0010	DVD22B Remote Control	1
9		AA 1.5v Batteries	2
10	162-B0001012-0000	A/V Signal Cable	1
11		Not Used	
12	162-C0001012-0000	S-Video Signal Cable	1
13	162-H0001012-0000	Remote IR Input/Output Cable	1
14		Warning Card	1
15		Safety Instruction	1

	Name	PACKING
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