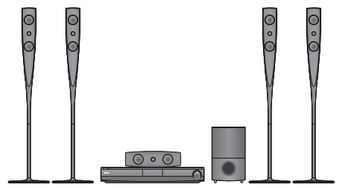
Internal Use Only
Website http://biz.lgservice.com

5.1Ch Blu-ray Receiver System

SERVICE MANUAL

MODEL : HB954TB
(HB954TB-AD / SB94TB-C/F/S/W)

CAUTION
BEFORE SERVICING THE UNIT, READ THE “SAFETY PRECAUTIONS” IN THIS MANUAL.



P/NO : AFN73178944

JUNE, 2009

SERVICE MANUAL

MODEL : HB954TB (HB954TB-AD / SB94TB-C/F/S/W)

CONTENTS

SECTION 1 ..... SUMMARY
SECTION 2 ..... ELECTRICAL
SECTION 3 ..... CABINET & MAIN CHASSIS
SECTION 4 ..... HL-04P LOADER PART
SECTION 5 ..... REPLACEMENT PARTS LIST

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

SECTION 1

SUMMARY

CONTENTS

PRODUCT SAFETY SERVICING GUIDELINES FOR BLU-RAY DISC PLAYER PRODUCTS 1-3

SERVICING PRECAUTIONS 1-4
- GENERAL SERVICING PRECAUTIONS
- INSULATION CHECKING PRODEDURE
- ELECTROSTATICALLY SENSITIVE (ES) DEVICES

SERVICE INFORMATION FOR EEPROM 1-5
1. DVD PART
2. MICOM PART

SOFTWARE UPGRADE 1-7

SPECIFICATIONS 1-8

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

PRODUCT SAFETY SERVICING GUIDELINES FOR BLU-RAY DISC PLAYER PRODUCTS

IMPORTANT SAFETY NOTICE

This manual was prepared for use only by properly trained audio-video service technicians.

When servicing this product, under no circumstances should the original design be modified or altered without permission from LG Corporation. All components should be replaced only with types identical to those in the original circuit and their physical location, wiring and lead dress must conform to original layout upon completion of repairs.

Special components are also used to prevent x-radiation, shock and fire hazard. These components are indicated by the letter "x" included in their component designators and are required to maintain safe performance. No deviations are allowed without prior approval by LG Corporation.

Circuit diagrams may occasionally differ from the actual circuit used. This way, implementation of the latest safety and performance improvement changes into the set is not delayed until the new service literature is printed.

CAUTION : Do not attempt to modify this product in any way. Never perform customized installations without manufacturer's approval. Unauthorized modifications will not only void the warranty, but may lead to property damage or user injury.

Service work should be performed only after you are thoroughly familiar with these safety checks and servicing guidelines.

GRAPHIC SYMBOLS

The exclamation point within an equilateral triangle is intended to alert the service personnel to important safety information in the service literature.

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the service personnel to the presence of noninsulated "dangerous voltage" that may be of sufficient magnitude to constitute a risk of electric shock.

The pictorial representation of a fuse and its rating within an equilateral triangle is intended to convey to the service personnel the following fuse replacement caution notice:

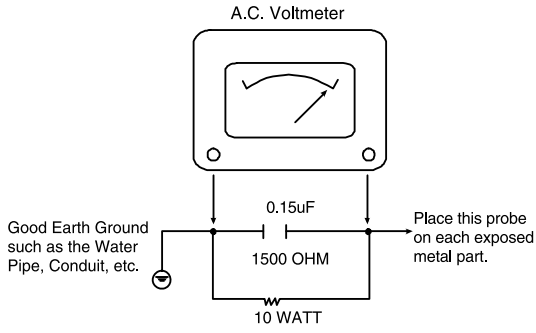
CAUTION : FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ALL FUSES WITH THE SAME TYPE AND RATING AS MARKED NEAR EACH FUSE.

SERVICE INFORMATION

While servicing, use an isolation transformer for protection from AC line shock. After the original service problem has been corrected, make a check of the following:

FIRE AND SHOCK HAZARD

1. Be sure that all components are positioned to avoid a possibility of adjacent component shorts. This is especially important on items trans-ported to and from the repair shop.
2. Verify that all protective devices such as insulators, barriers, covers, shields, strain reliefs, power supply cords, and other hardware have been reinstalled per the original design. Be sure that the safety purpose of the polarized line plug has not been defeated.
3. Soldering must be inspected to discover possible cold solder joints, solder splashes, or sharp solder points. Be certain to remove all loose foreign particles.
4. Check for physical evidence of damage or deterioration to parts and components, for frayed leads or damaged insulation (including the AC cord), and replace if necessary.
5. No lead or component should touch a high current device or a resistor rated at 1 watt or more. Lead tension around protruding metal surfaces must be avoided.
6. After reassembly of the set, always perform an AC leakage test on all exposed metallic parts of the cabinet (the channel selector knobs, antenna terminals, handle and screws) to be sure that set is safe to operate without danger of electrical shock. DO NOT USE A LINE ISOLATION TRANSFORMER DURING THIS TEST. Use an AC voltmeter having 5000 ohms per volt or more sensitivity in the following manner: Connect a 1500 ohm, 10 watt resistor, paralleled by a .15 mfd 150V AC type capacitor between a known good earth ground water pipe, conduit, etc.) and the exposed metallic parts, one at a time. Measure the AC voltage across the combination of 1500 ohm resistor and .15 mfd capacitor. Reverse the AC plug by using a non-polarized adaptor and repeat AC voltage measurements for each exposed metallic part. Voltage measured must not exceed 0.75 volts RMS. This corresponds to 0.5 milliamp AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.



TIPS ON PROPER INSTALLATION

1. Never install any receiver in a closed-in recess, cubbyhole, or closely fitting shelf space over, or close to, a heat duct, or in the path of heated air flow.
2. Avoid conditions of high humidity such as: outdoor patio installations where dew is a factor, near steam radiators where steam leakage is a factor, etc.
3. Avoid placement where draperies may obstruct venting. The customer should also avoid the use of decorative scarves or other coverings that might obstruct ventilation.
4. Wall- and shelf-mounted installations using a commercial mounting kit must follow the factory-approved mounting instructions. A product mounted to a shelf or platform must retain its original feet (or the equivalent thickness in spacers) to provide adequate air flow across the bottom. Bolts or screws used for fasteners must not touch any parts or wiring. Perform leakage tests on customized installations.
5. Caution customers against mounting a product on a sloping shelf or in a tilted position, unless the receiver is properly secured.
6. A product on a roll-about cart should be stable in its mounting to the cart. Caution the customer on the hazards of trying to roll a cart with small casters across thresholds or deep pile carpets.
7. Caution customers against using extension cords. Explain that a forest of extensions, sprouting from a single outlet, can lead to disastrous consequences to home and family.

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

SERVICING PRECAUTIONS

CAUTION: Before servicing the BLU-RAY DISC PLAYER covered by this service data and its supplements and addends, read and follow the SAFETY PRECAUTIONS. NOTE: if unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions in this publications, always follow the safety precautions.
Remember Safety First :

General Servicing Precautions

1. Always unplug the BLU-RAY DISC PLAYER AC power cord from the AC power source before:
   (1) Removing or reinstalling any component, circuit board, module, or any other assembly.
   (2) Disconnecting or reconnecting any internal electrical plug or other electrical connection.
   (3) Connecting a test substitute in parallel with an electrolytic capacitor.
   Caution : A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

2. Do not spray chemicals on or near this BLU-RAY DISC PLAYER or any of its assemblies.

3. Unless specified otherwise in this service data, clean electrical contacts by applying an appropriate contact cleaning solution to the contacts with a pipe cleaner, cotton-tipped swab, or comparable soft applicator.
   Unless specified otherwise in this service data, lubrication of contacts is not required.

4. Do not defeat any plug/socket B+ voltage interlocks with whitch instruments covered by this service manual might be equipped.

5. Do not apply AC power to this BLU-RAY DISC PLAYER and / or any of its electrical assemblies unless all solidstate device heat sinks are correctly installed.

6. Always connect the test instrument ground lead to an appropriate ground before connecting the test instrument positive lead. Always remove the test instrument ground lead last.

Insulation Checking Procedure

Disconnect the attachment plug from the AC outlet and turn the power on. Connect an insulation resistance meter (500V) to the blades of the attachment plug. The insulation resistance between each blade of the attachment plug and accessible conductive parts (Note 1) should be more than 1Mohm.
Note 1 : Accessible Conductive Parts include Metal panels, Input terminals, Earphone jacks,etc.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES 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 ES 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 ES 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 ES devices.

5. Do not use freon-propelled chemicals. These can generate an electrical charge sufficient to damage ES devices.

6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil,or comparable conductive material).

7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

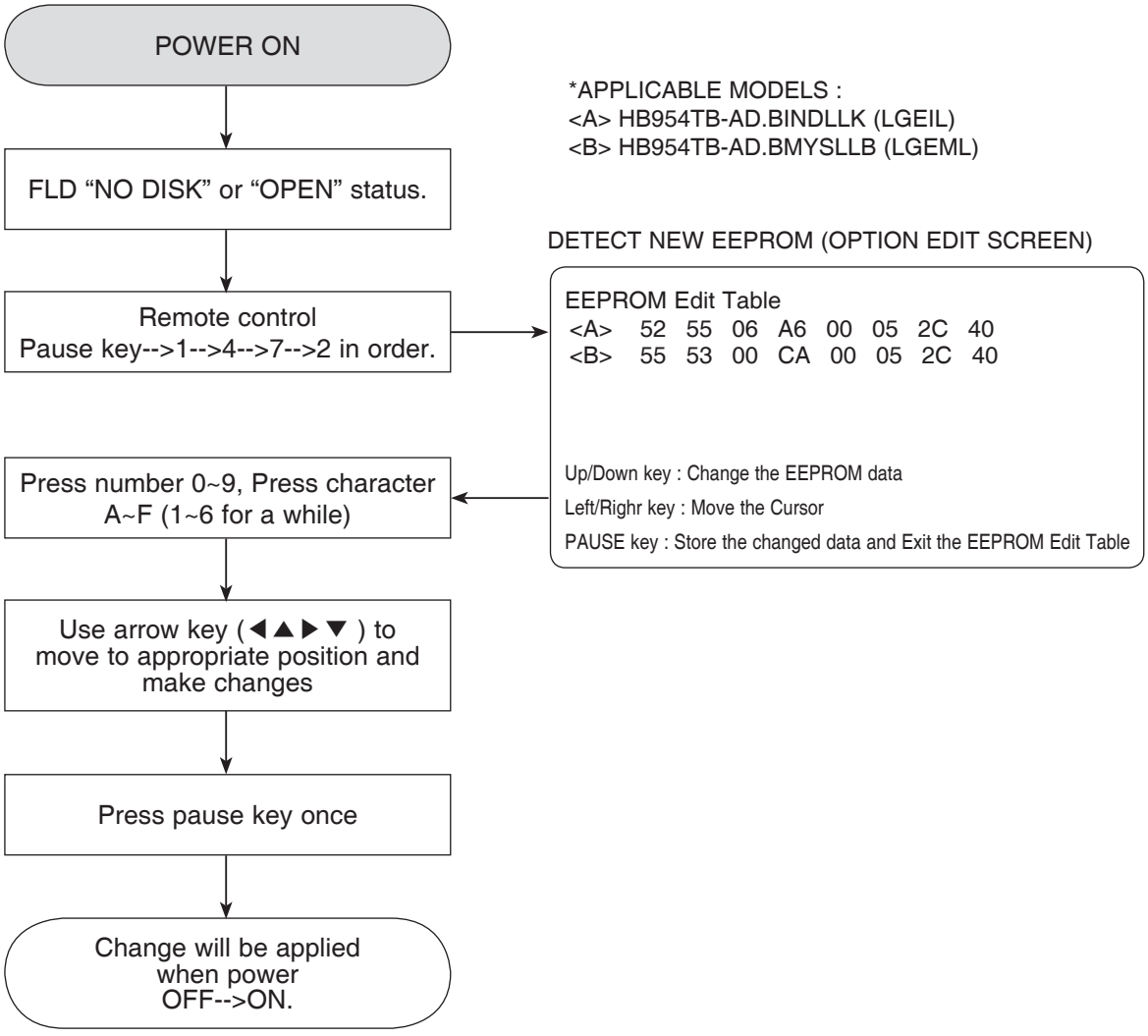
   Caution: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

8. Minimize bodily motions when handling unpackaged replacement ES devices. (Normally 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 ES device.)

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

SERVICE INFORMATION FOR EEPROM

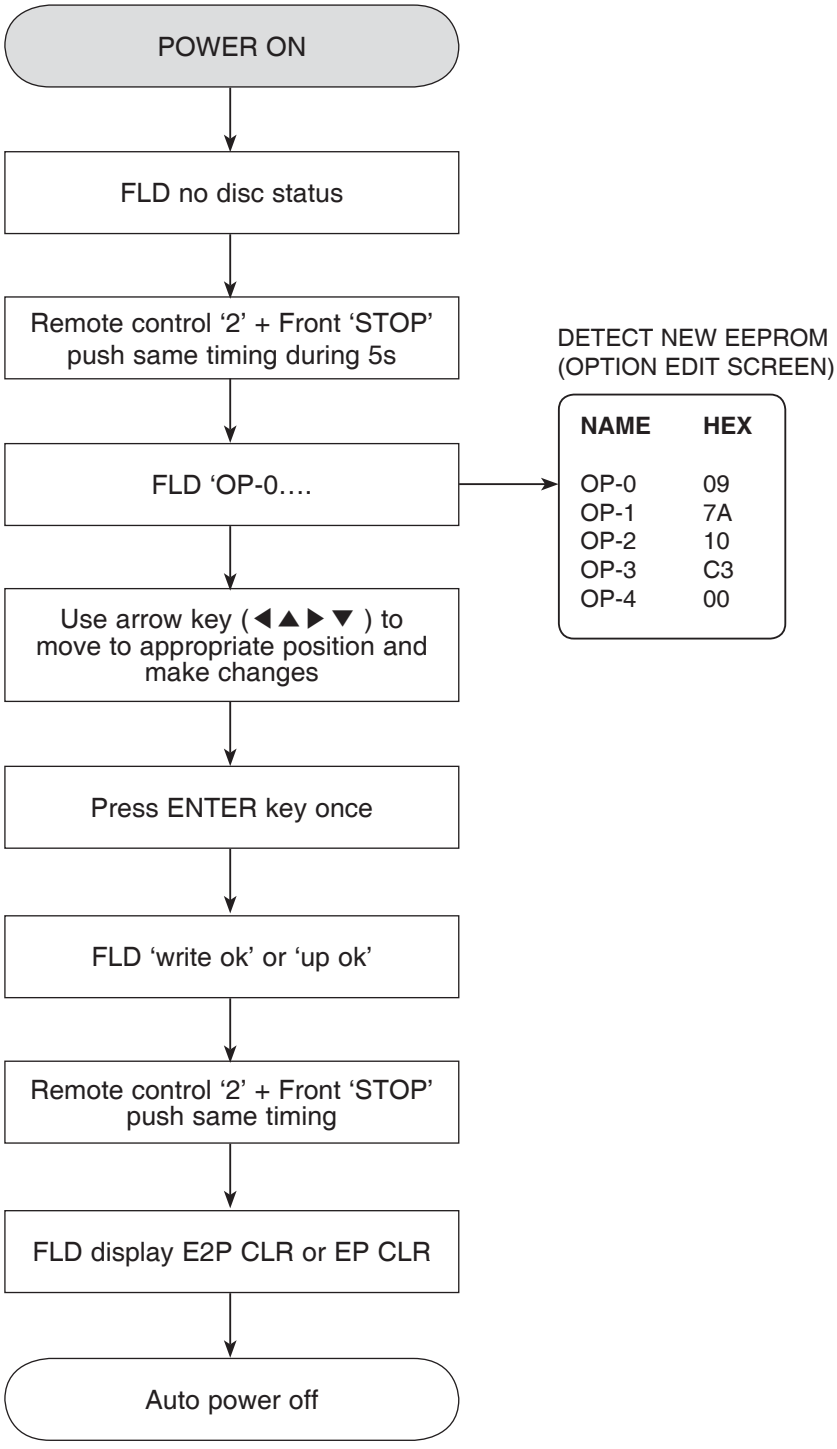
1. DVD PART



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

2. MICOM PART



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

SOFTWARE UPGRADE

1. Copy D/L program to USB Memory.

- file name

: Backend program => LG_--.ROM	ex) LG_HB_LV421BP.ROM
MICOM program => MICOM_--.HEX	ex) MICOM_HB954.HEX / MICOM_HB354.HEX
TOUCH program => TOUCH_--.HEX	ex) TOUCH_HB954.HEX / TOUCH_HB354.HEX
DSP program => DSP_--.HEX	ex) DSP_HB954.HEX / DSP_HB354.HEX

2. Insert USB Memory. (at No disc status)

- If USB indicate normally, screen display pop up.
  (Pop up message is “Do you want to update?”)

3. Press “ENTER” key.

- Program D/L start.
- Screen display popup message (“Updating….”).
- VFD display order

Backend program : 0 EXTRACT -> _PREPARE -> 0_INSTALL -> VERIFY-> FINALIZE -> UPDATE DONE ->POWEROFF
(download time : 2m 30s)
MICOM program : M-UPDATE
(download time : 40s~50s)
TOUCH program : T-UPDATE
(download time : 20s~30s)
DSP program : D-UPDATE
(download time : 13m)

4. SET auto power off.

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

SPECIFICATIONS

• GENERAL

Power requirements:	Refer to main label .
Power consumption:	130W
Dimensions (W x H x D):	Approx. 430 x 76 x 379mm without foot
Net Weight (Approx.):	4.8kg
Operating temperature:	41°F to 95°F (5°C to 35°C)
Operating humidity:	5% to 90%

• INPUTS/OUTPUTS

VIDEO OUT:	1.0V (p-p), 75Ω, sync negative, RCA jack x 1
COMPONENT VIDEO OUT:	(Y) 1.0V (p-p), 75Ω, sync negative, RCA jack x 1 (Pb)/(Pr) 0.7V (p-p), 75Ω, RCA jack x 2
HDMI OUT (video/audio):	19 pin (HDMI standard, Type A)
HDMI IN (video/audio):	19 pin (HDMI standard, Type A)
ANALOG AUDIO IN:	2.0Vrms (1kHz, 0dB), 600Ω, RCA jack (L, R) x 1
DIGITAL IN (COAXIAL):	0.5V (p-p), 75Ω, RCA jack x 1
DIGITAL IN (OPTICAL):	3V (p-p), Optical jack x 1
PORT. IN:	0.5Vrms (3.5ø stereo jack)

• TUNER FM/AM

FM Tuning Range:	87.5 ~ 108.0MHz
AM Tuning Range:	520 ~ 1.710kHz

• AMPLIFIER

Stereo mode:	155W + 155W (4Ω at 1kHz, THD 10%)
Surround mode:	Left+Right: 155W + 155W (THD 10%) Center: 155W Surround: 155W + 155W (4Ω at 1kHz, THD 10%) Subwoofer: 225W (3Ω at 30Hz, THD 10%)

• SYSTEM

Laser:	Semiconductor laser, wavelength: 405nm / 650nm
Signal system:	Standard PAL/NTSC color TV system
Frequency response:	20Hz to 20kHz (48kHz, 96kHz, 192kHz sampling)
Signal-to-noise ratio:	More than 100dB (ANALOG OUT connectors only)
Harmonic distortion:	Less than 0.008%
Dynamic range:	More than 95dB
LAN port:	Ethernet jack x 1, 10BASE-T/100BASE-TX

• SPEAKERS

	Front Speaker SB94TB-F	**Rear Speaker SB94TB-S**	**Center Speaker SB94TB-C**	**Passive Subwoofer SB94TB-W**
Type	2 Way 3 speaker	2 Way 2 speaker	2 Way 3 speaker	1 Way 1 speaker
Impedance	4Ω	4Ω	4Ω	3Ω
Rated Input Power	155W	155W	155W	225W
Max. Input power	310W	310W	310W	450W
Net Dimensions (W x H x D)	330 x 1265 x 300mm	330 x 1265 x 300mm	350 x 105 x 88mm	216 x 405 x 360mm
Net Weight	5.0kg	4.7kg	1.0kg	7.3kg

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

SECTION 2

ELECTRICAL

CONTENTS

TRAINING MASTER FOR BLU-RAY (BD) 2-2
1. DISTORTED PICTURE 2-2
2. NO PICTURE 2-7
3. PICTURE COLOR 2-12
4. NOISE/AUDIO PROBLEMS 2-14
5. MISCELLANEOUS 2-17
6. BLU-RAY PLAYER 2-26
7. YouTube 2-28

ELECTRICAL TROUBLESHOOTING GUIDE 2-30
1. SMPS PART CHECK 2-30
2. AMP PROTECTION 2-31
3. POWER KEY OPERATION 2-32
4. FRONT BLOCK 2-33
5. TOUCH KEY BLOCK 2-34
6. NO AUDIO CHECK 2-35
7. NO VIDEO CHECK 2-37
8. HDMI NO AUDIO/VIDEO CHECK (with HDMI IN) 2-39
9. HDMI NO AUDIO/VIDEO CHECK (without HDMI IN) 2-41

WAVEFORMS 2-42
1. SYSTEM PART-1 2-42
2. SYSTEM PART-2 (SYSTEM MEMORY) 2-43
3. VIDEO PART-1 (100% FULL COLOR-BAR) 2-44
4. VIDEO PART-2 (100% FULL COLOR-BAR) 2-45
5. HDMI PART 2-46
6. MICOM AND MPEG I/F PART 2-47

WIRING DIAGRAM 2-49

BLOCK DIAGRAM 2-51

CIRCUIT DIAGRAMS 2-53
1. SMPS CIRCUIT DIAGRAM 2-53
2. CPU BCM7440-1 CIRCUIT DIAGRAM 2-55
3. CPU BCM7440-2 CIRCUIT DIAGRAM 2-57
4. DDR FLASH, CP CIRCUIT DIAGRAM 2-59
5. MICOM CIRCUIT DIAGRAM 2-61
6. HDMI CIRCUIT DIAGRAM 2-63
7. CPLD CIRCUIT DIAGRAM 2-65
8. ADC/DIR CIRCUIT DIAGRAM 2-67
9. DSP CIRCUIT DIAGRAM 2-69
10. POWER INTERFACE CIRCUIT DIAGRAM 2-71
11. IO INTERFACE CIRCUIT DIAGRAM 2-73
12. PWM CIRCUIT DIAGRAM 2-75
13. AMP CIRCUIT DIAGRAM 2-77
14. FRONT CIRCUIT DIAGRAM 2-79
15. POWER JUNCTION CIRCUIT DIAGRAM 2-81
16. POWER KEY CIRCUIT DIAGRAM 2-83
17. IPOD CIRCUIT DIAGRAM 2-85
18. TOUCH CIRCUIT DIAGRAM 2-87

CIRCUIT VOLTAGE CHART 2-89

PRINTED CIRCUIT BOARD DIAGRAMS 3-93
1. MAIN P.C.BOARD 2-93
2. SMPS P.C.BOARD 2-97
3. AMP P.C.BOARD 2-101
4. FRONT P.C.BOARD 2-103
5. IPOD P.C.BOARD 2-103
6. TOUCH PAD P.C.BOARD 2-103

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

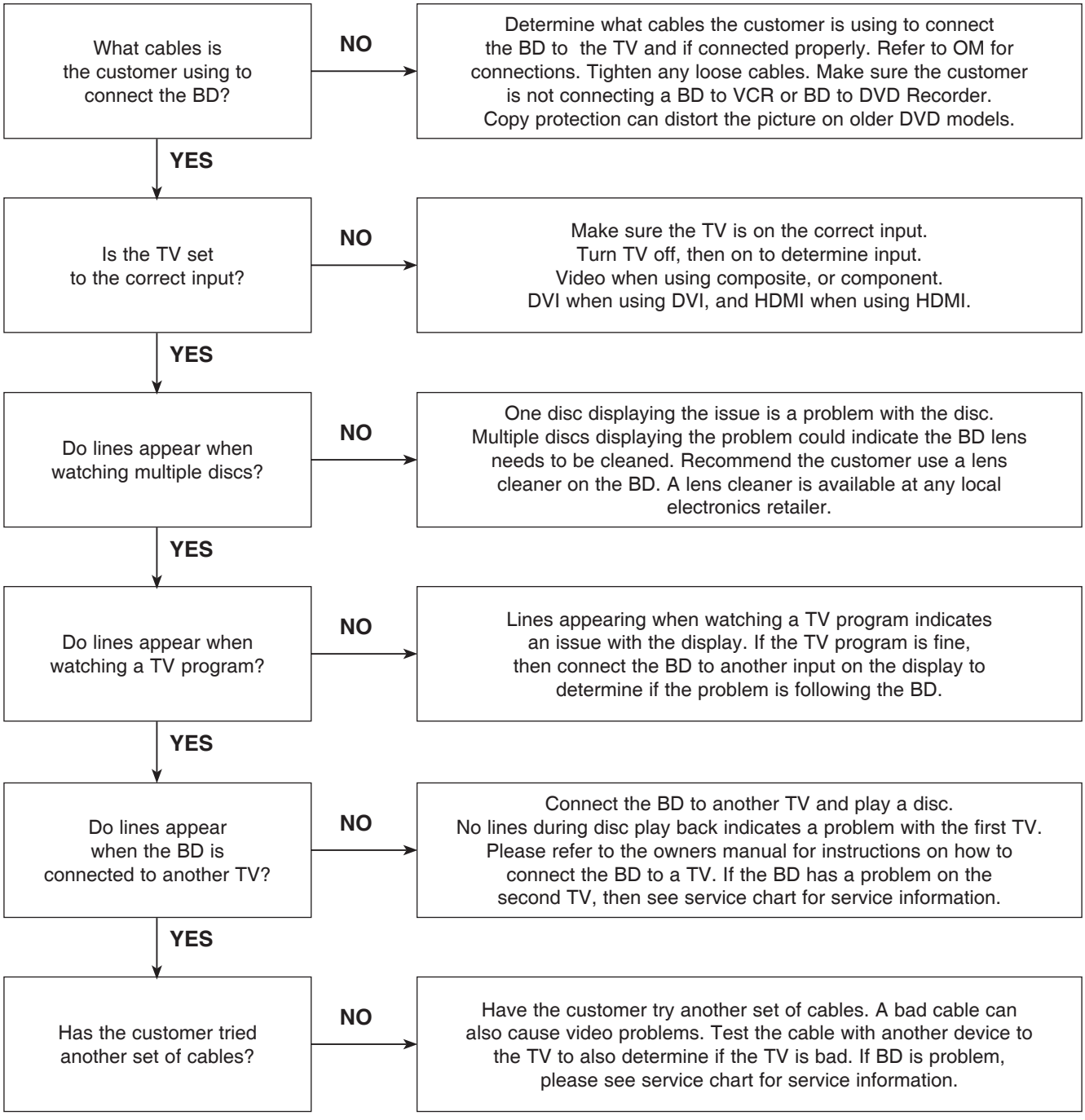
TRAINING MASTER FOR BLU-RAY (BD)

Objective: To provide clear and concise guidelines for customer service agents to handle calls on box goods calls.

1. DISTORTED PICTURE

1-1. Lines on Picture

Distorted picture refers to the customer getting video, but there is a problem with the video.

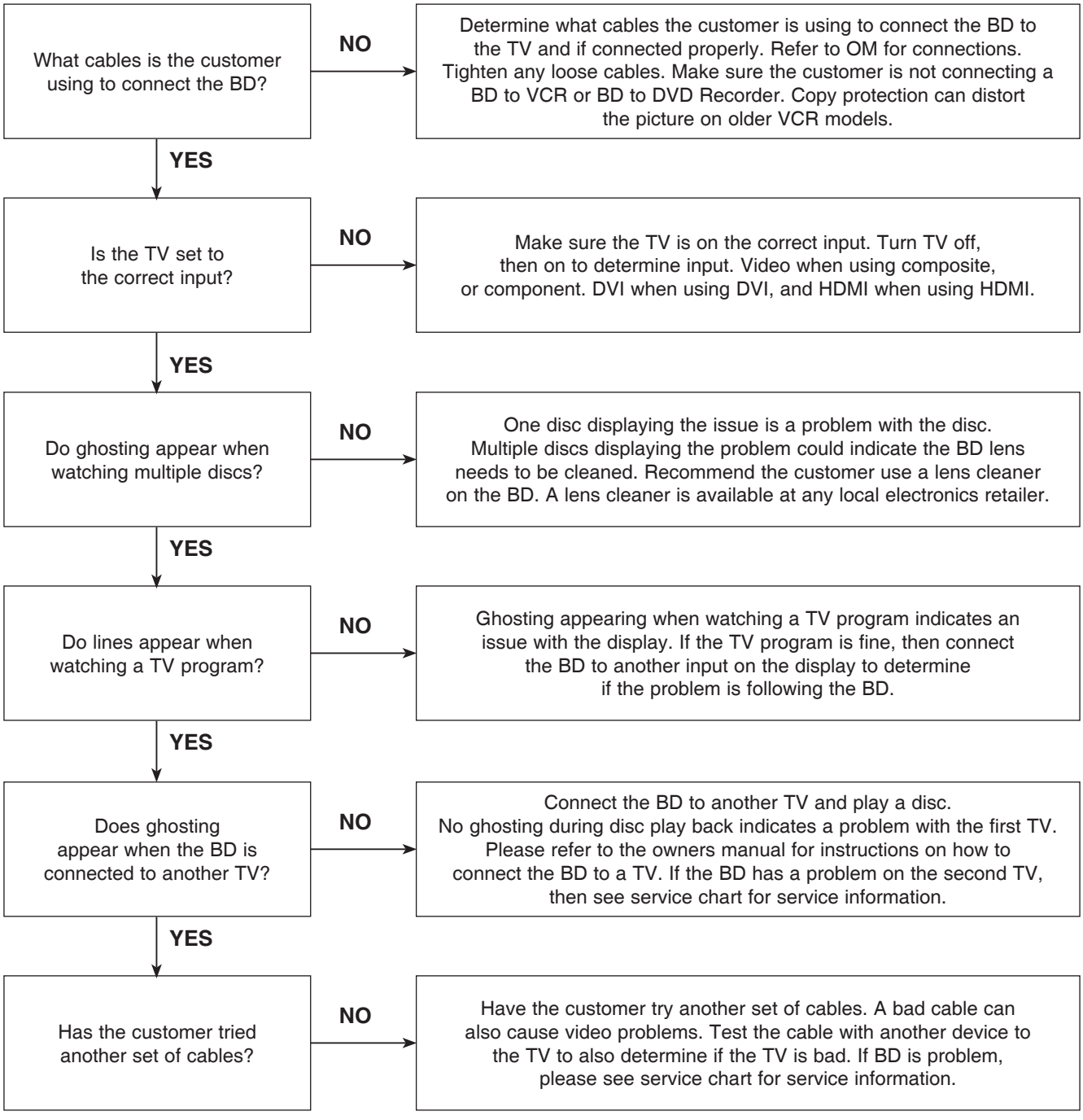


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

TRAINING MASTER FOR BLU-RAY (BD)

1-2. Ghost Picture

Distorted picture refers to the customer getting video, but there is a problem with the video.



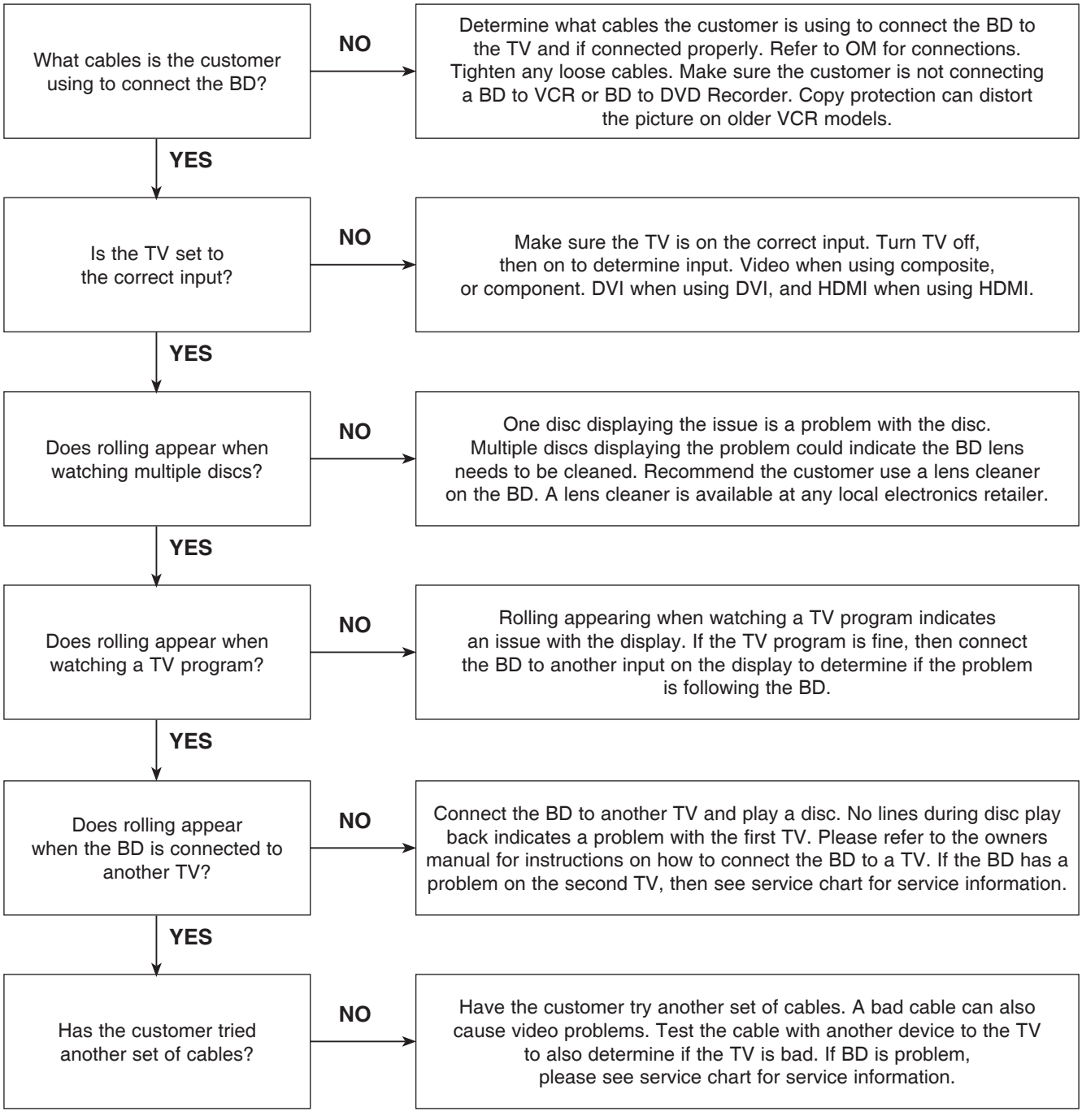
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

TRAINING MASTER FOR BLU-RAY (BD)

1-3. Rolling Picture

Distorted picture refers to the customer getting video, but there is a problem with the video.

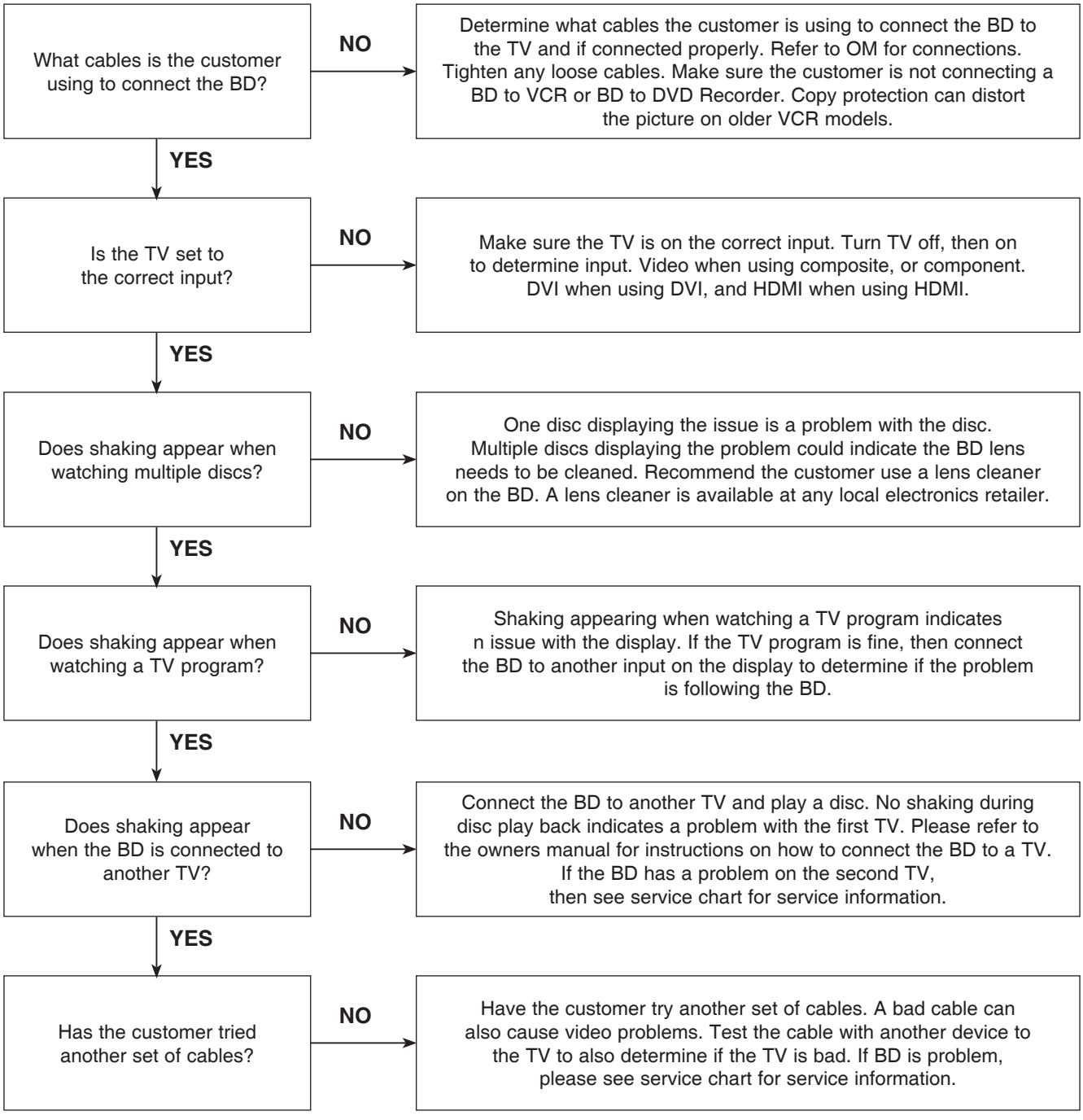


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

TRAINING MASTER FOR BLU-RAY (BD)

1-4. Shaky Picture

Distorted picture refers to the customer getting video, but there is a problem with the video.



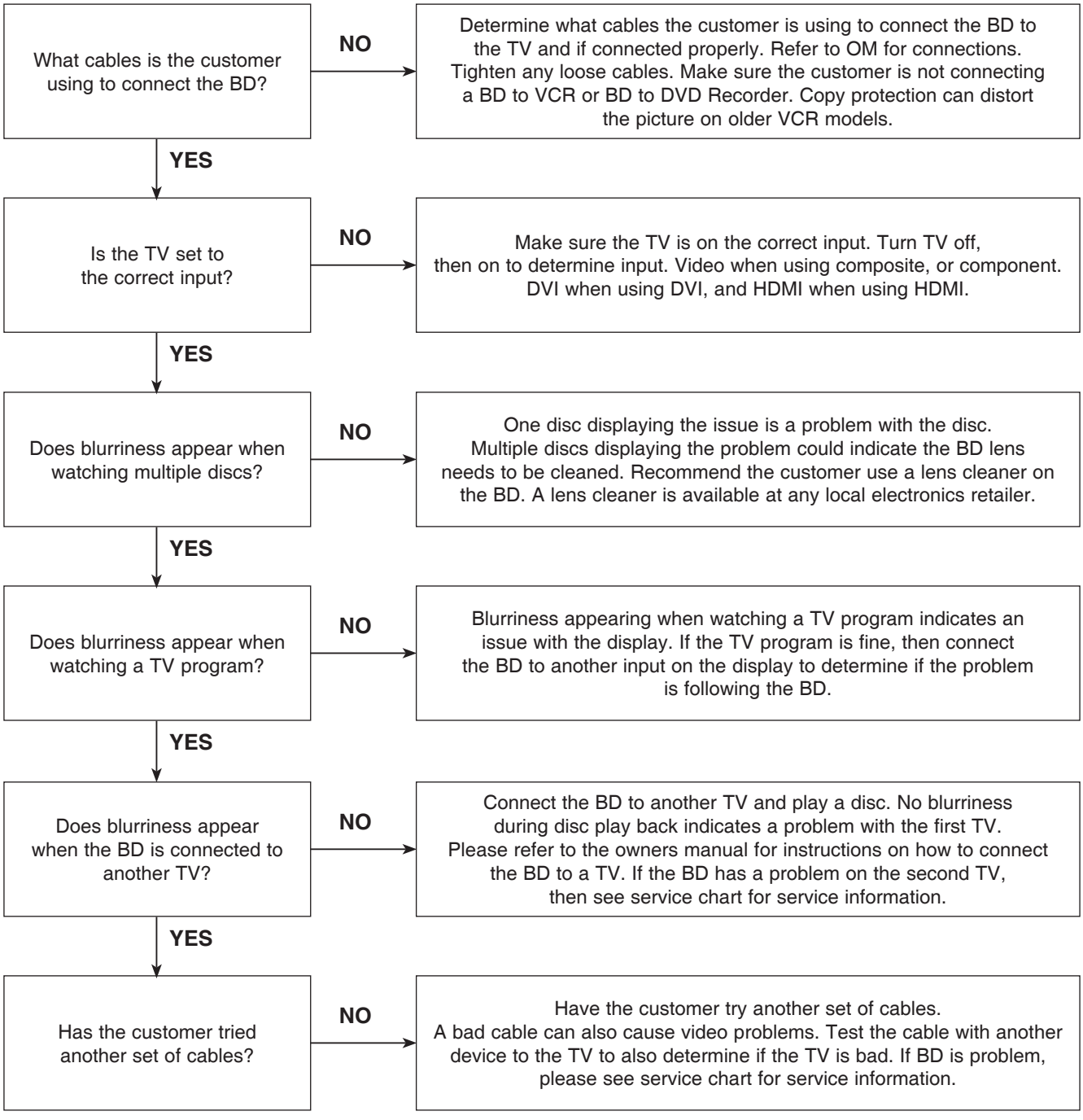
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

TRAINING MASTER FOR BLU-RAY (BD)

1-5. Blurry Picture

Distorted picture refers to the customer getting video, but there is a problem with the video.

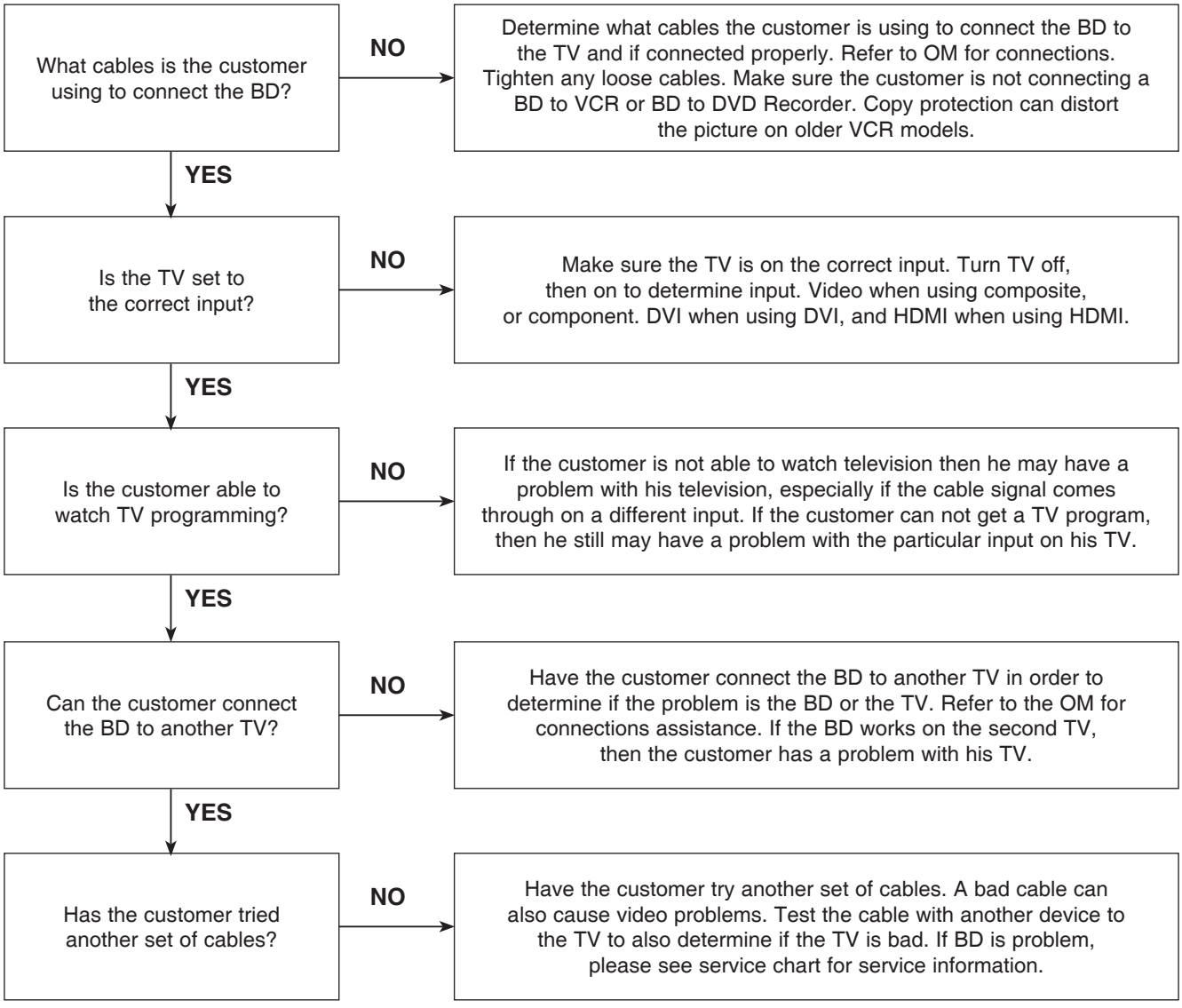


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

2. NO PICTURE

2-1. Black Screen

The entire screen is black.

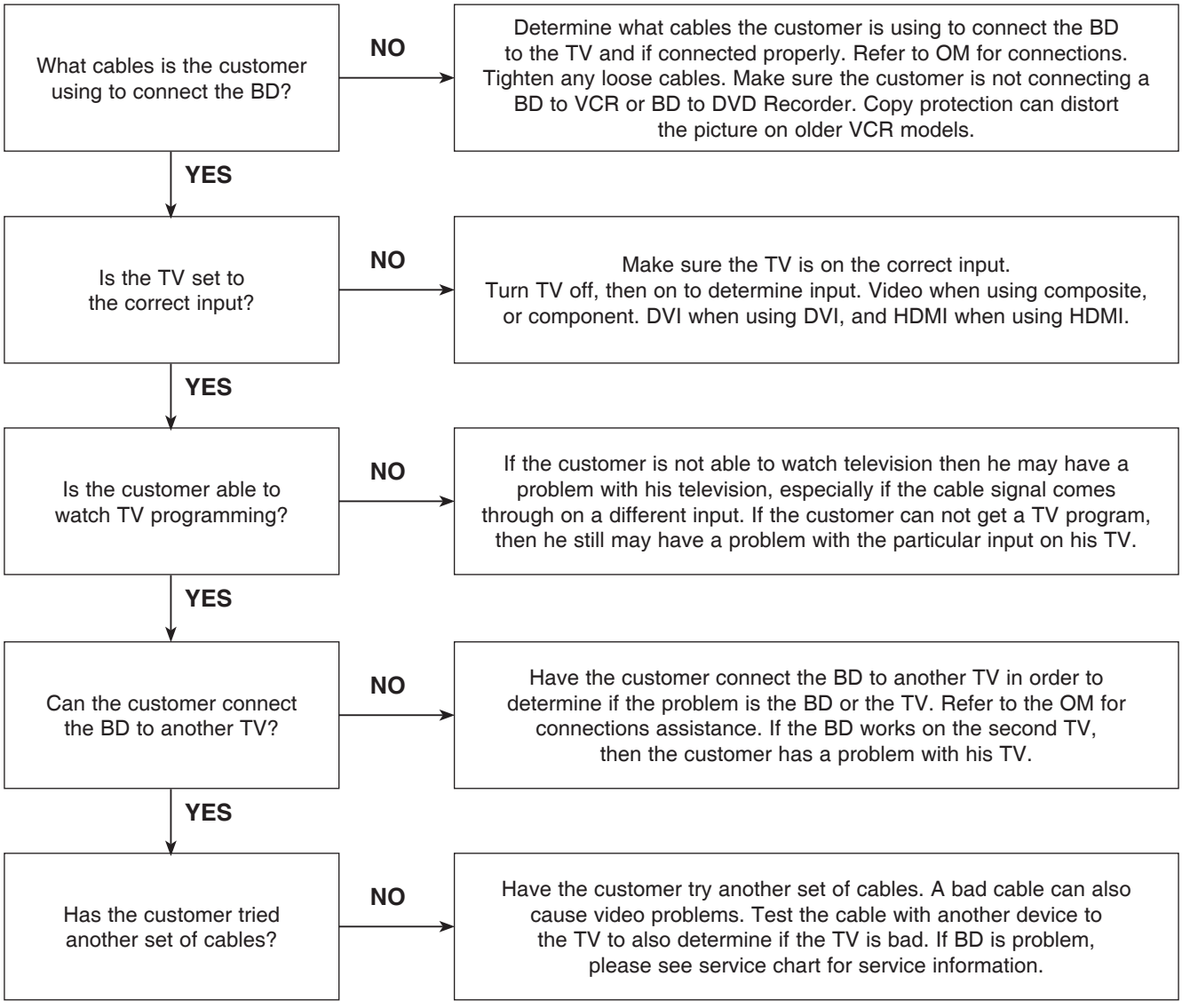


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

2-2. Blue Screen

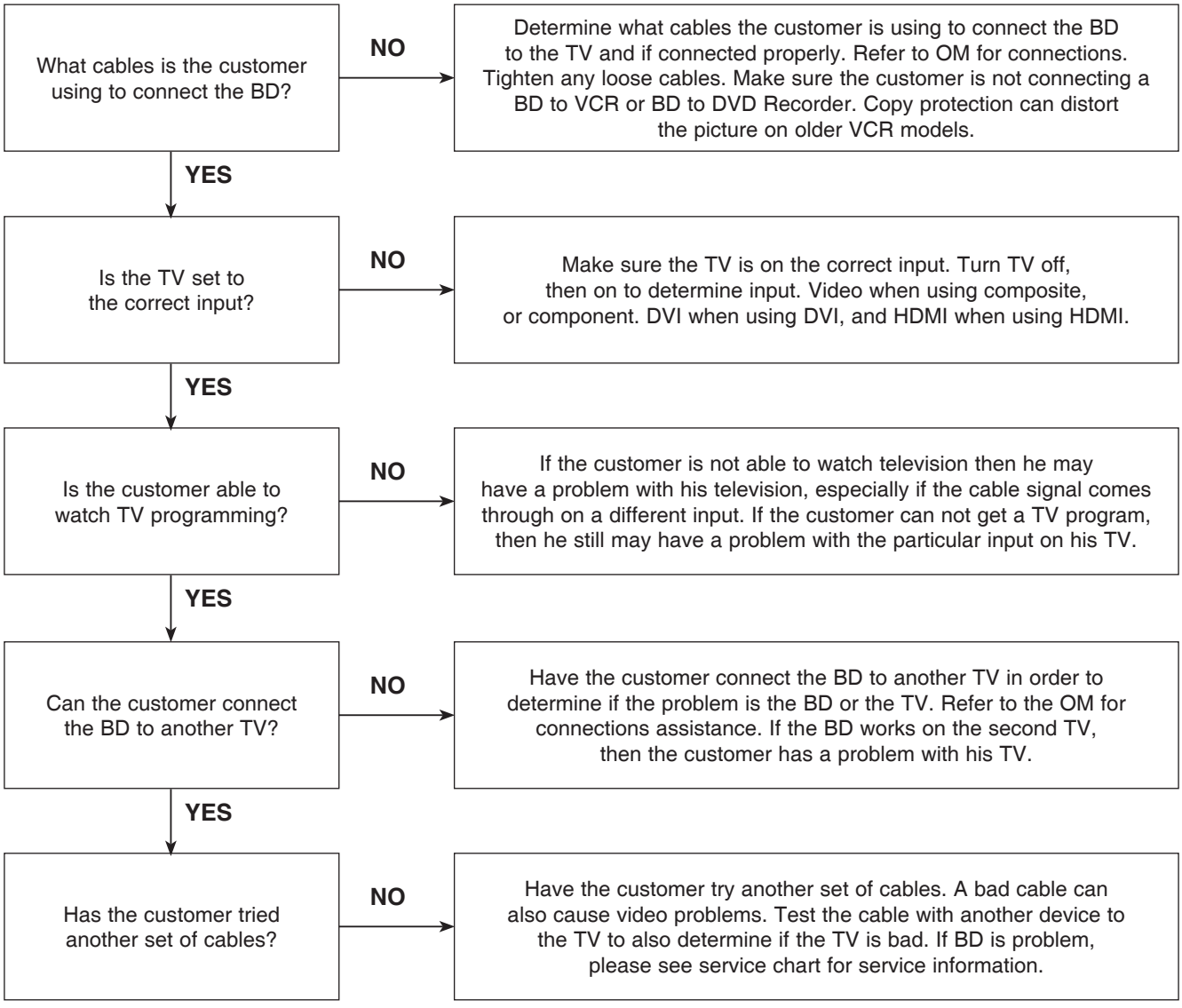
The entire screen is a solid blue color.



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

2-3. Snowy Screen

A snowy picture is when black and white dots are all over the screen.

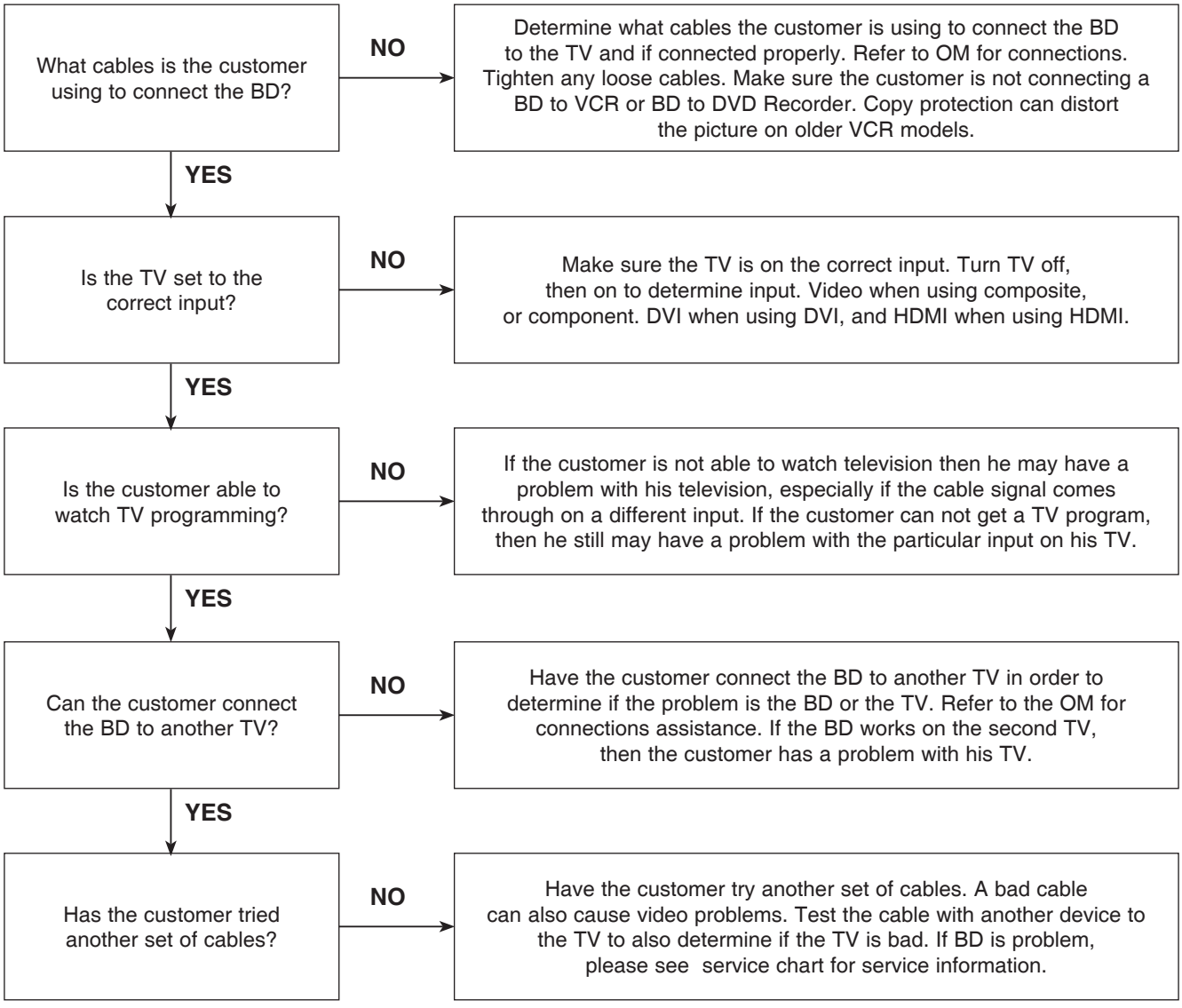


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

2-4. No Signal

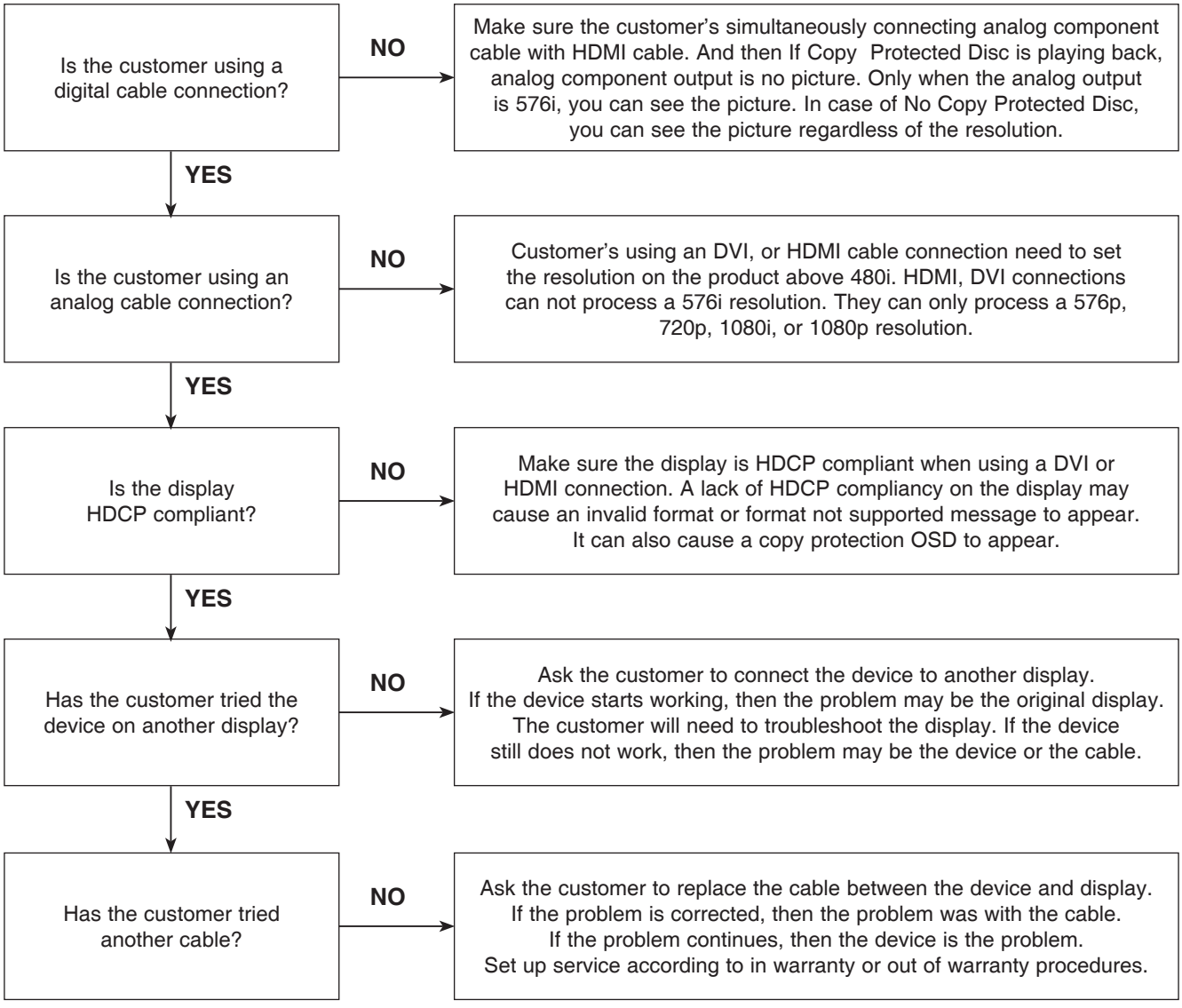
A “no signal” message appears on the screen of the display.



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

TRAINING MASTER FOR BLU-RAY (BD)

2-5. Invalid Format or Format Not Supported



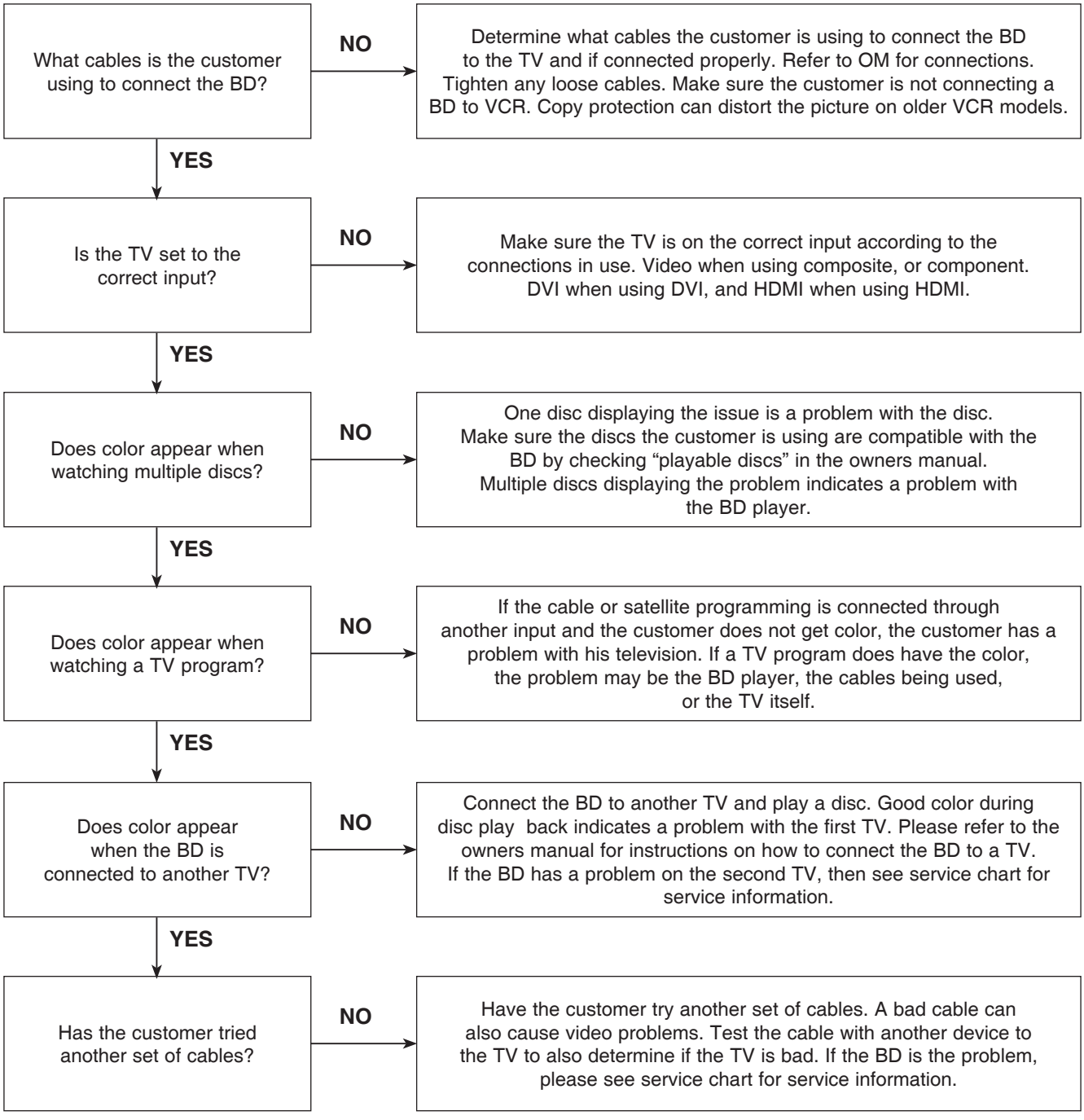
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

3. PICTURE COLOR

3-1. No Color

The video displays no color and only shows in black and white.

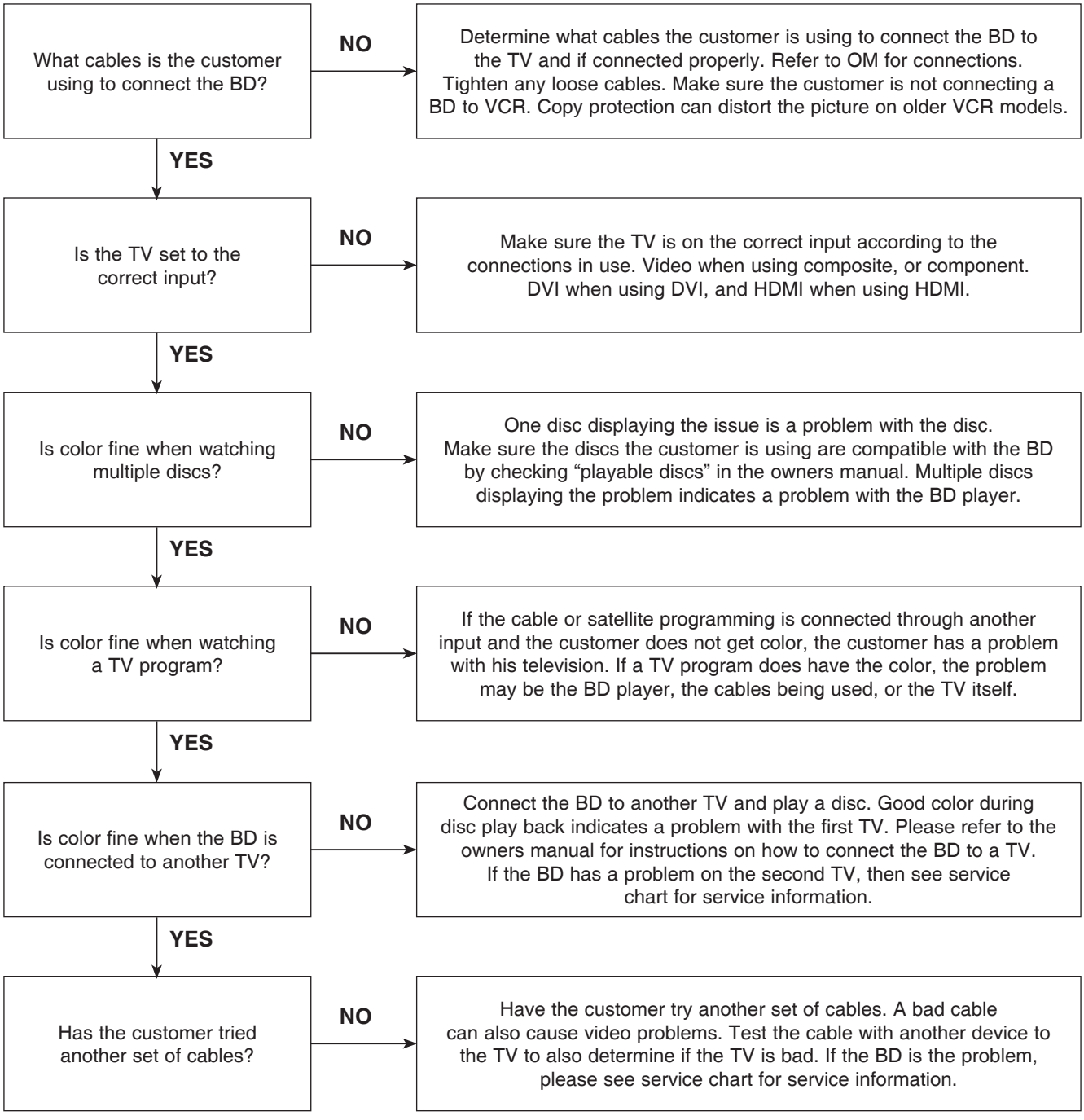


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

TRAINING MASTER FOR BLU-RAY (BD)

3-2. Poor Color

The color is poor. Examples would be washed out colors, colors bleeding into one another, or a solid tint to a screen.



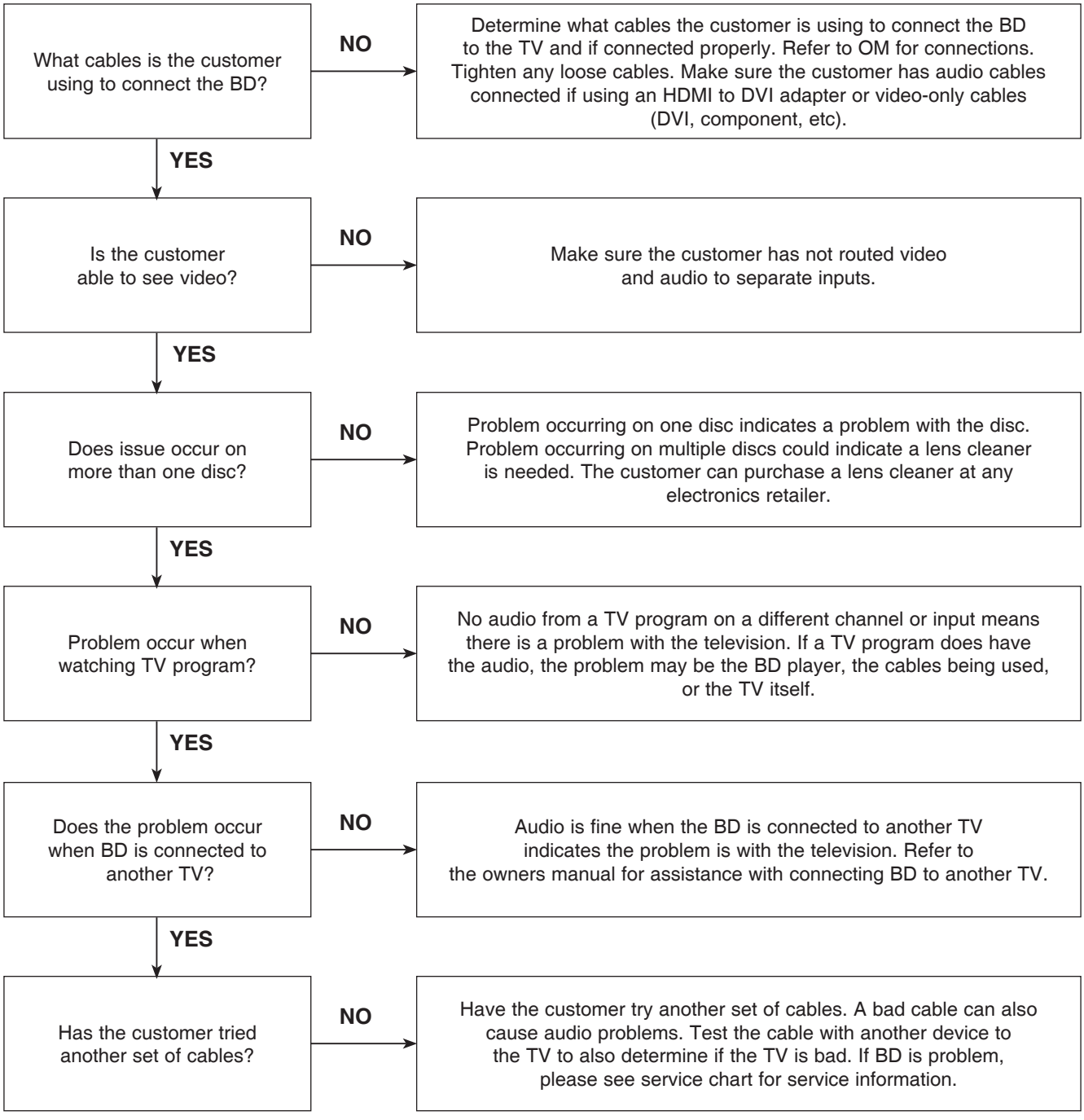
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

4. NOISE/AUDIO PROBLEMS

4-1. No Audio

The customer is not able to get audio.

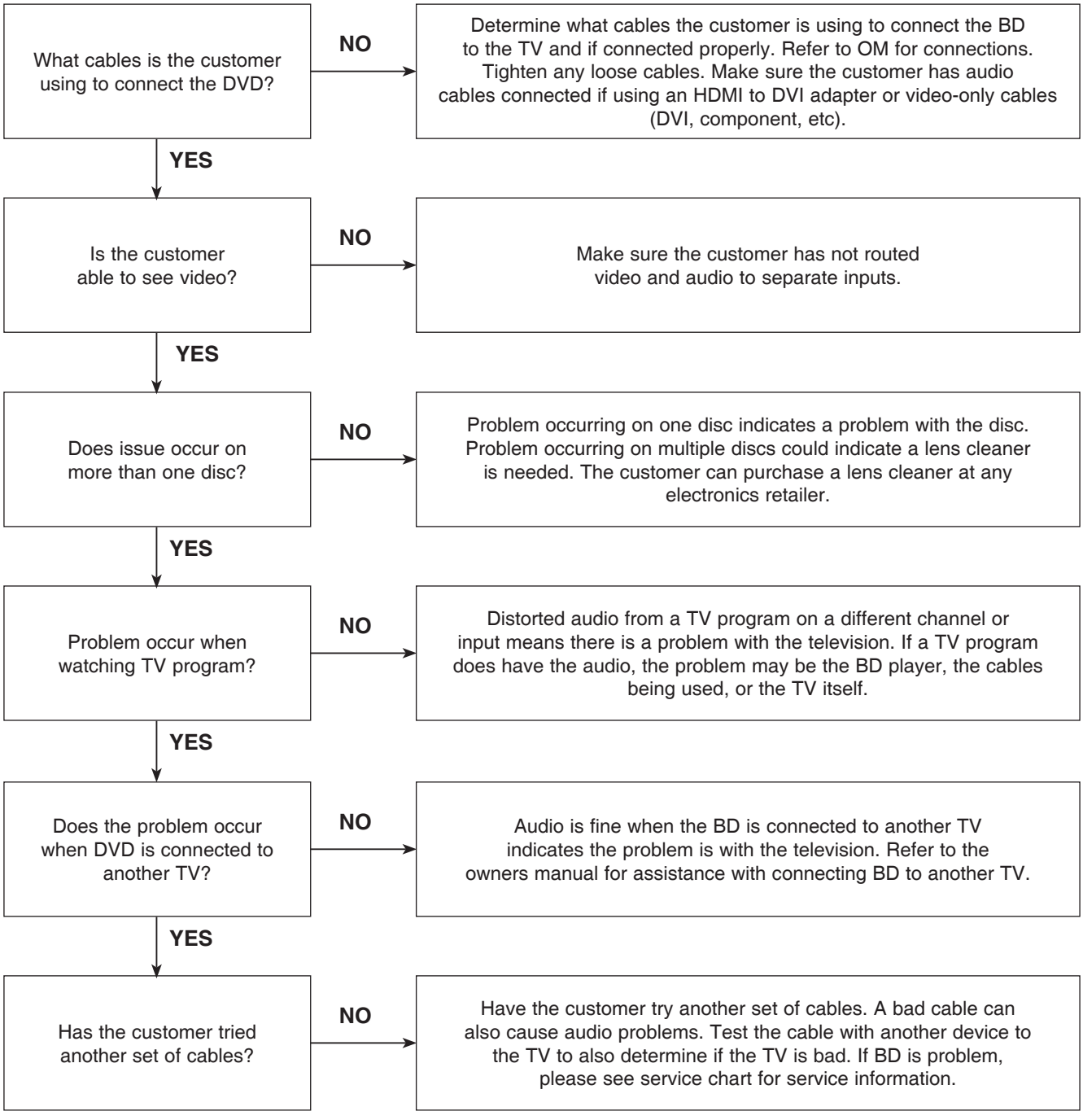


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

TRAINING MASTER FOR BLU-RAY (BD)

4-2. Distorted Audio

The audio sounds muffled, scratchy, or the audio skips.



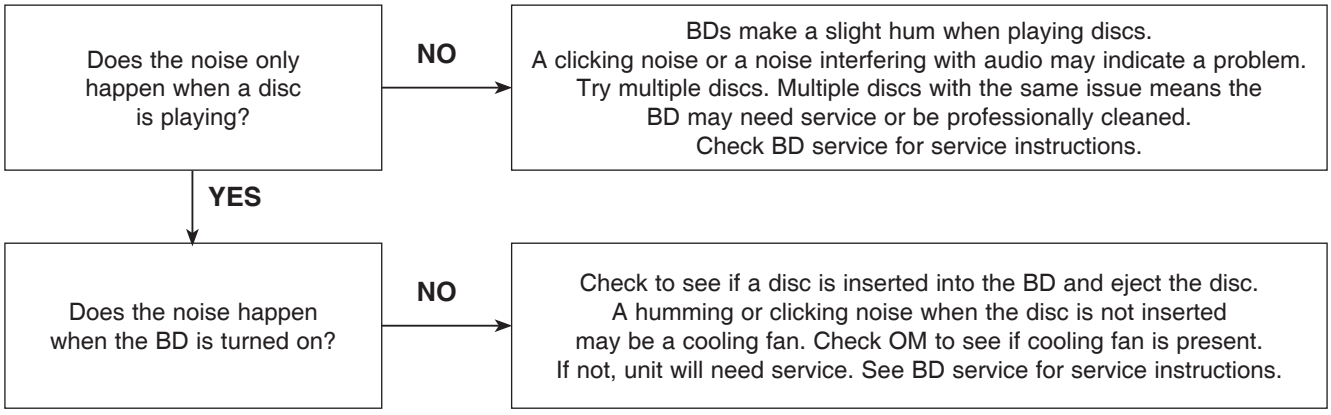
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

TRAINING MASTER FOR BLU-RAY (BD)

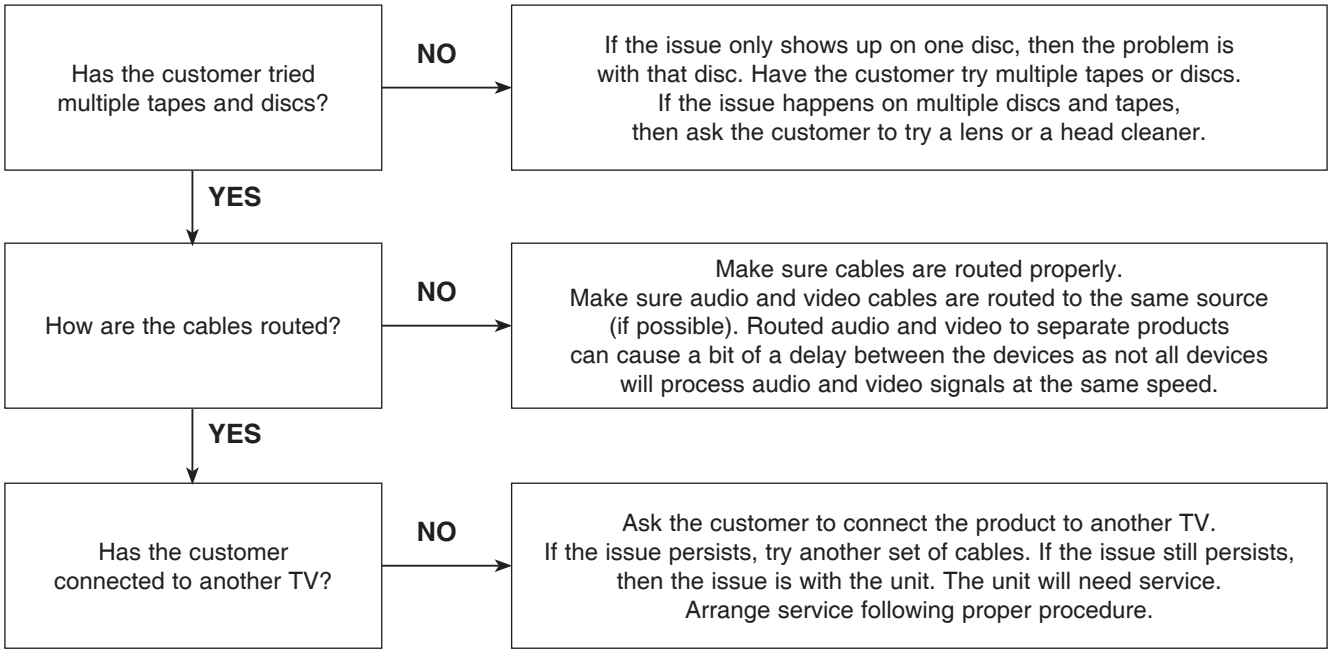
4-3. Humming/Clicking Noise

The unit is making a humming noise or a clicking noise.



4-4. Audio/Video Out of Synch

The audio and video do not match up. People look to be talking, but their voices are delayed by a few seconds.



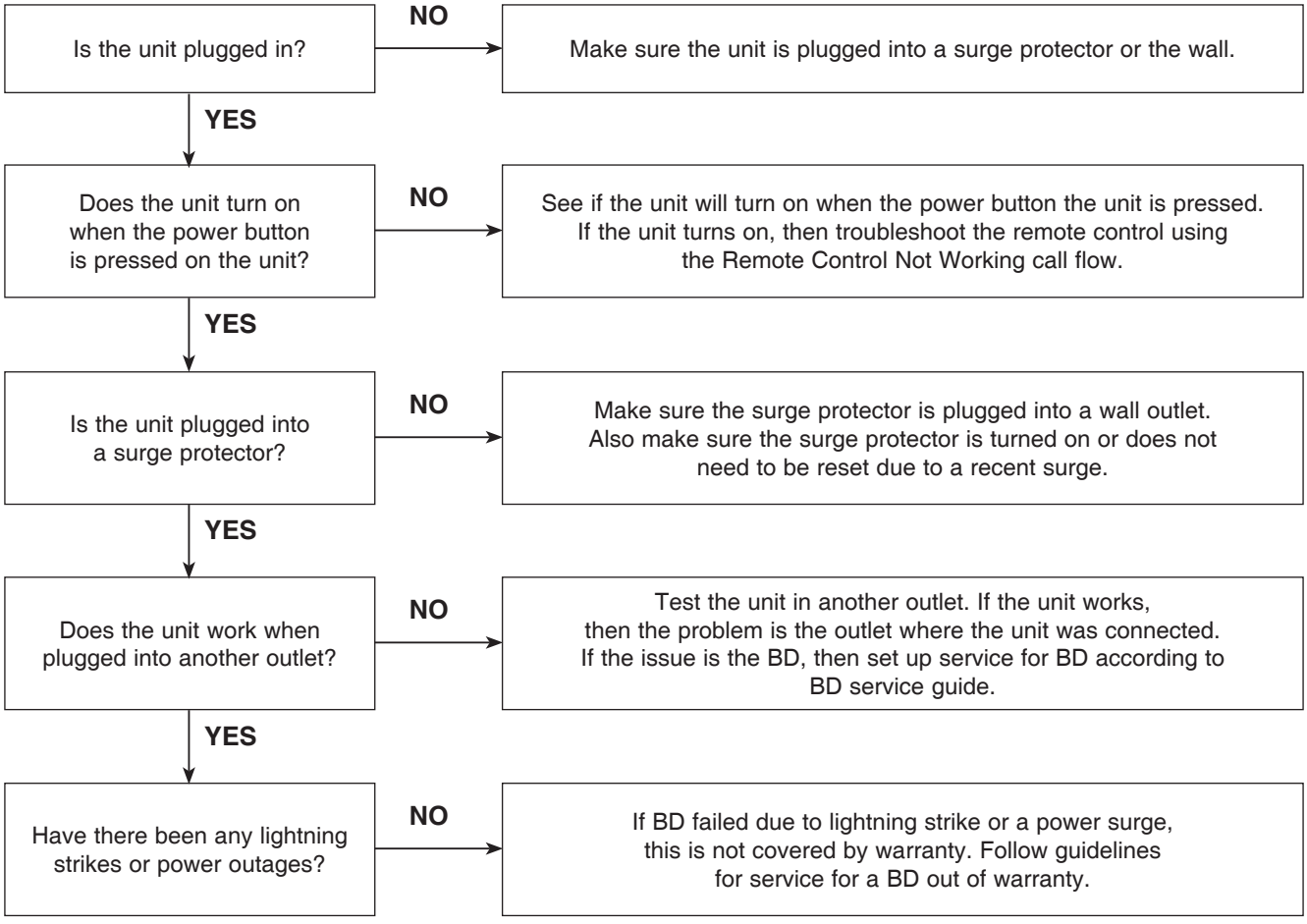
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

TRAINING MASTER FOR BLU-RAY (BD)

5. MISCELLANEOUS

5-1. No Power

The unit will not turn on.

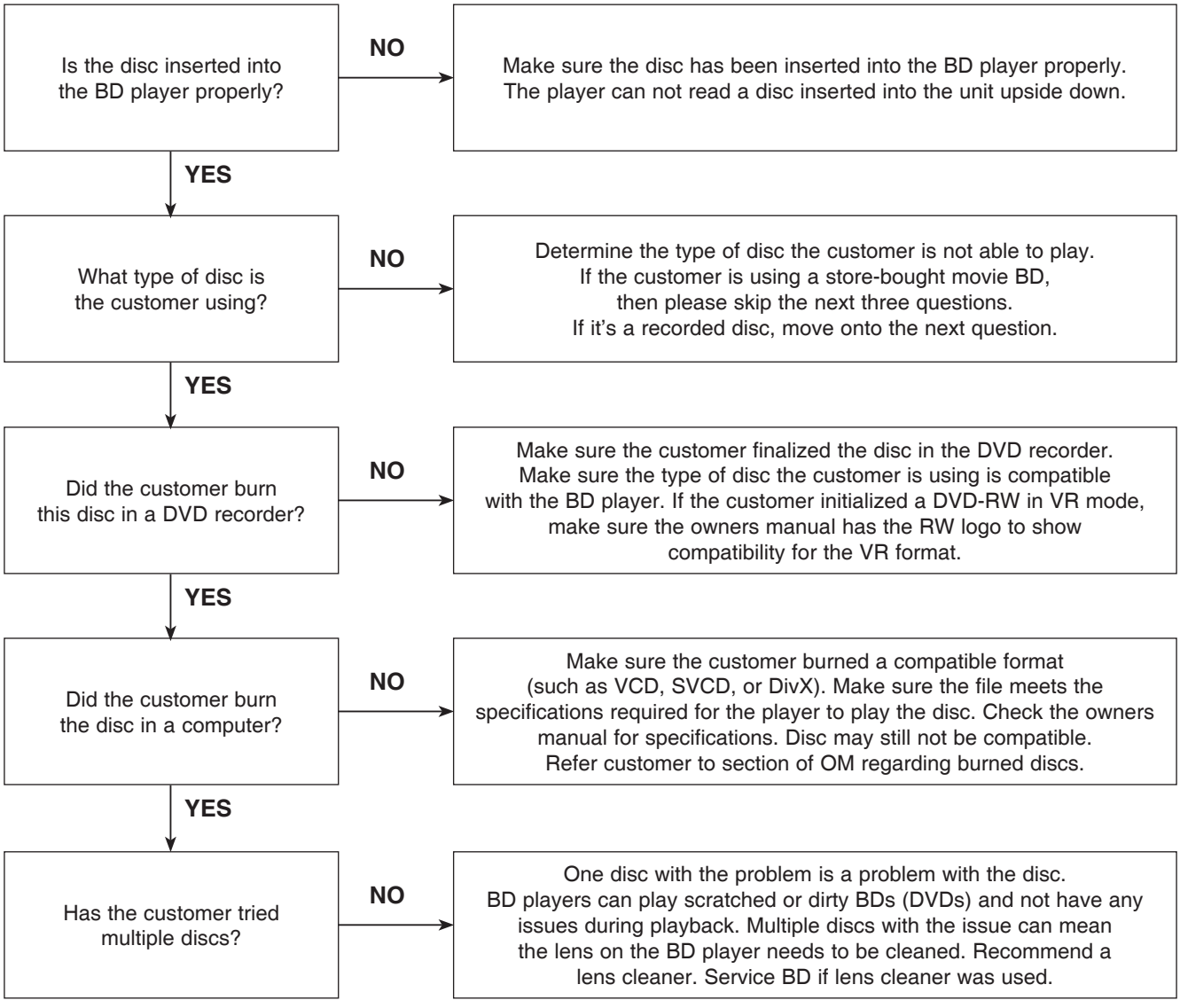


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

5-2. Disc Error

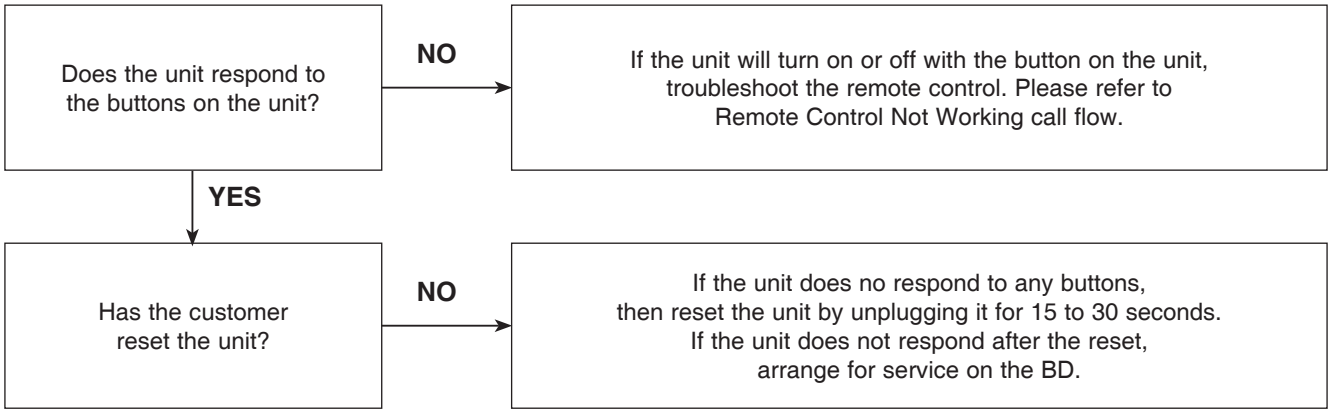
The unit displays “disc error” when a disc is inserted into the BD player.



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

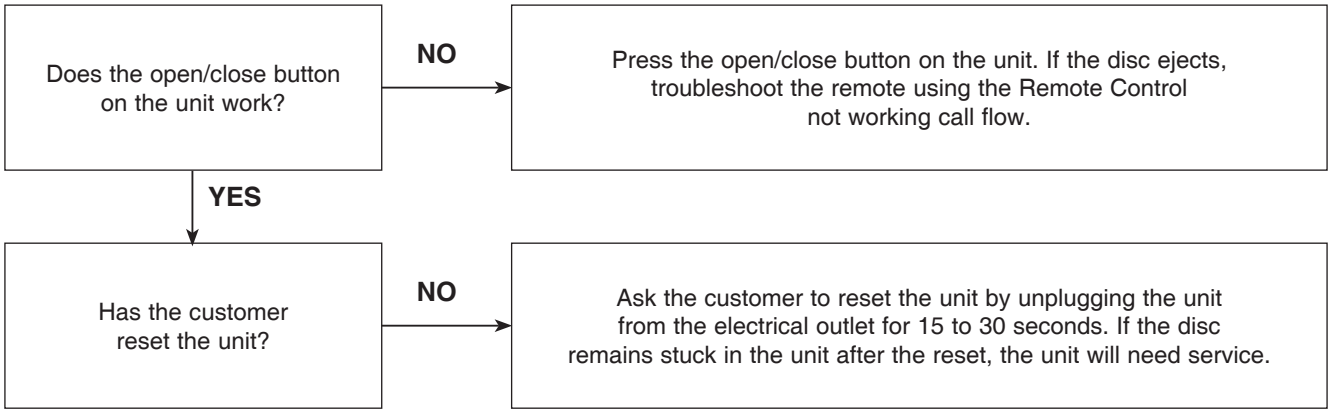
5-3. Unit Locks Up

Unit does not respond to any commands.



5-4. Disc Stuck

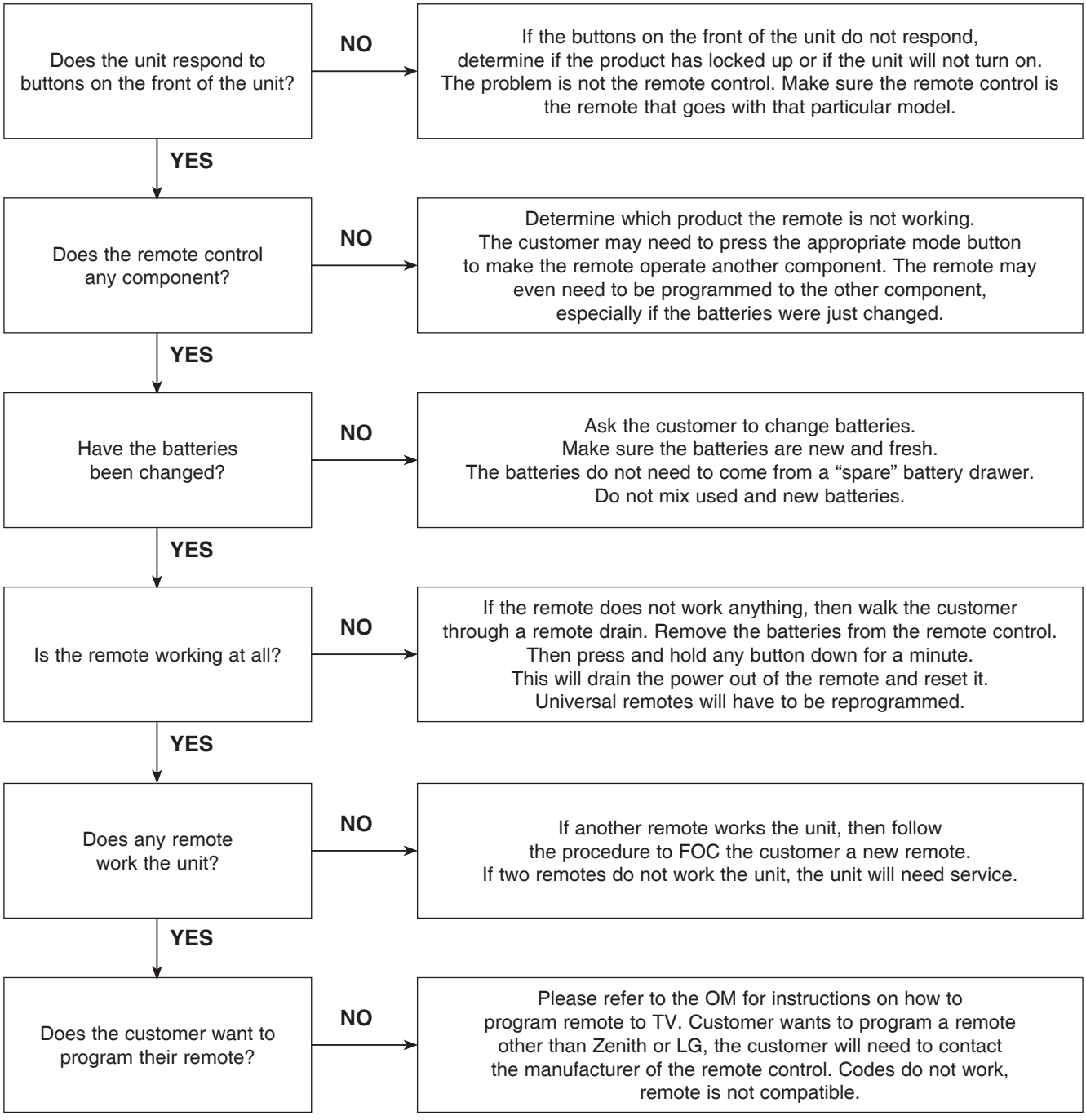
A BD disc is stuck in the unit.



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

5-5. Remote Control Not Working

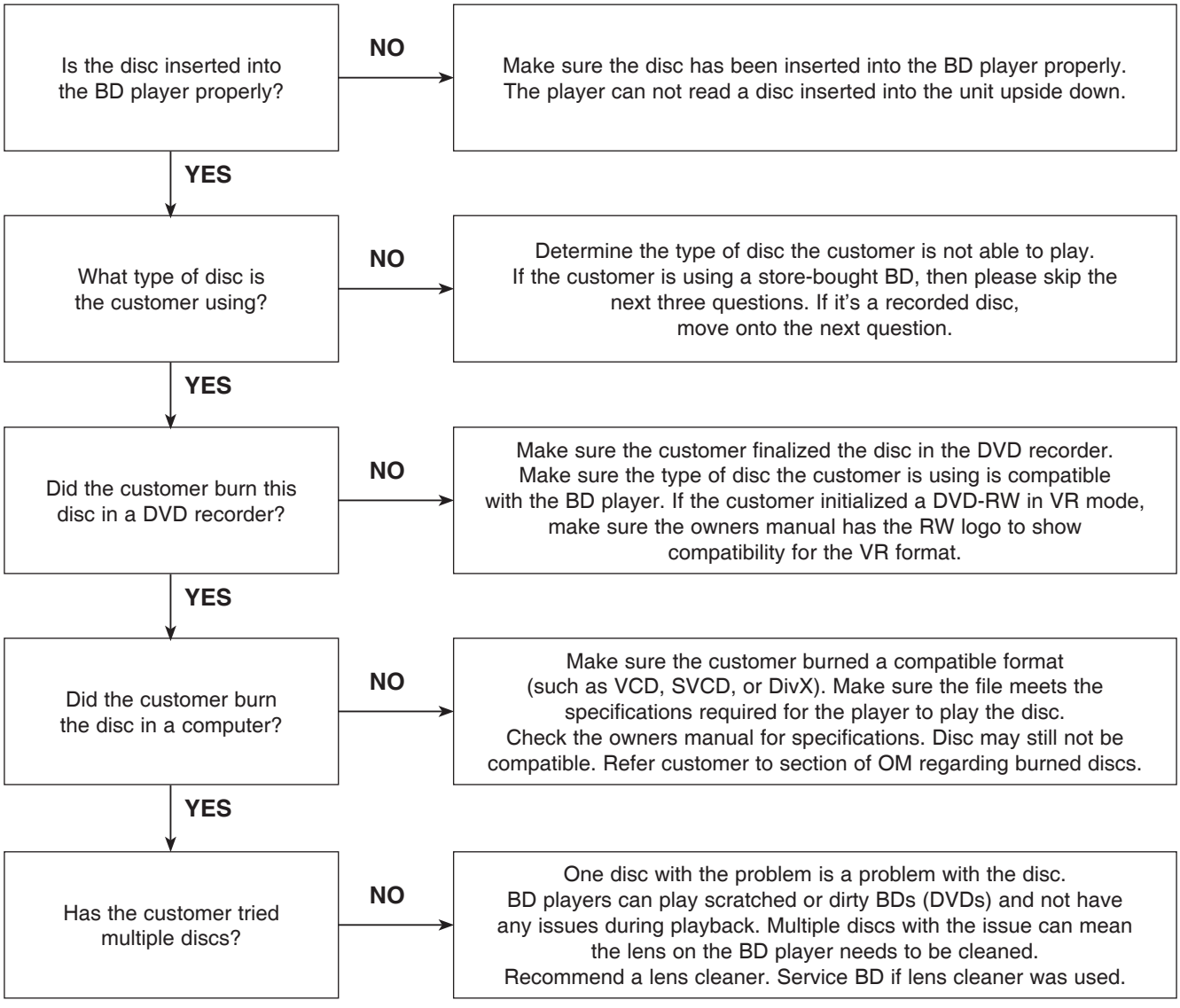


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

TRAINING MASTER FOR BLU-RAY (BD)

5-6. Will Not Play Disc

The unit will not play a disc when a disc is inserted into the player.

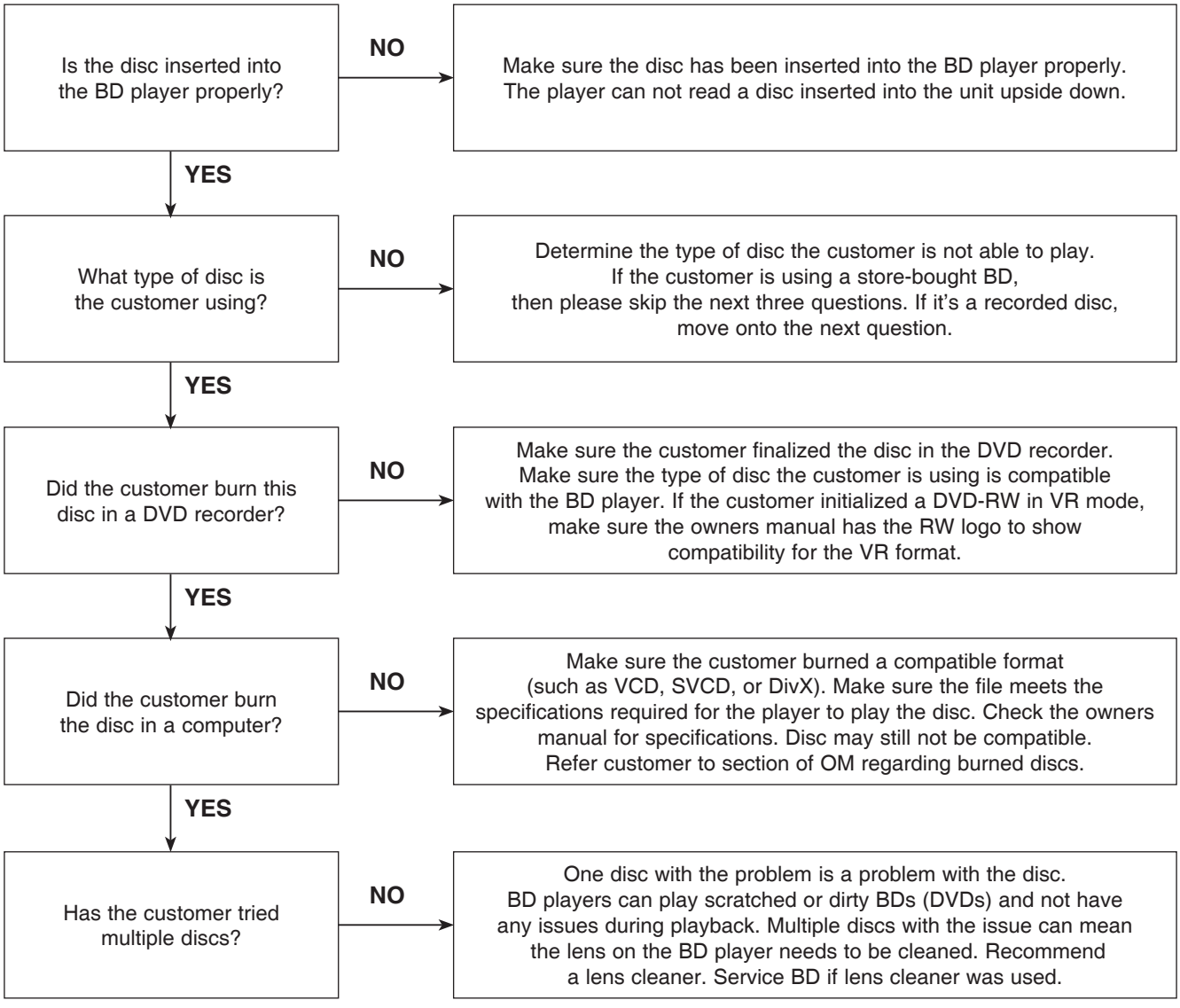


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

5-7. Disc Freezes or Skips

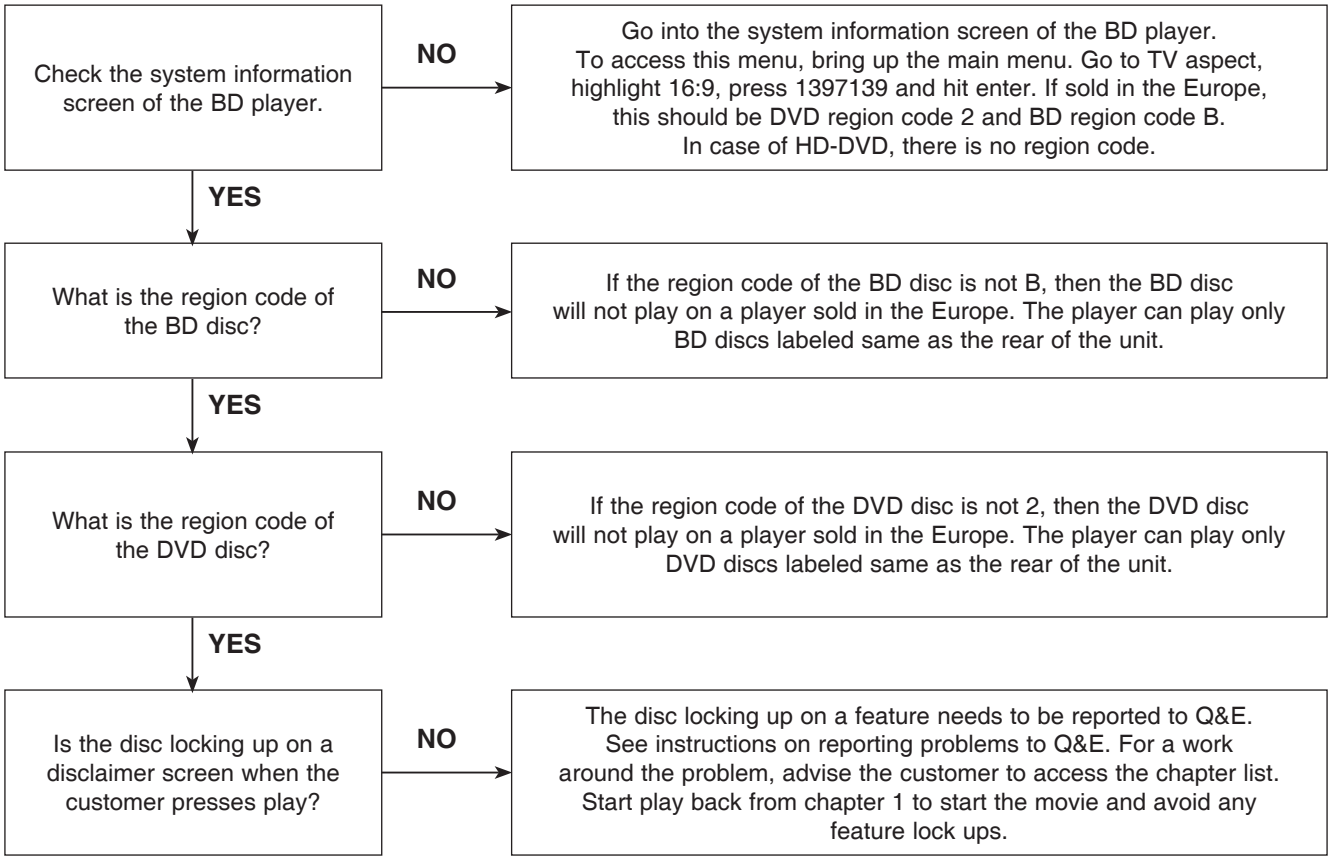
The audio and video freeze and skip during play back of a BD or DVD disc.



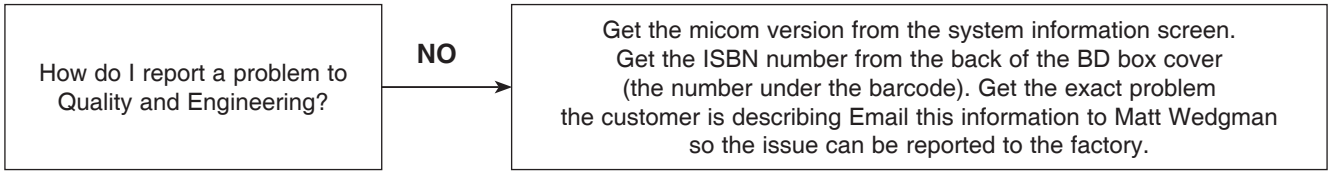
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

TRAINING MASTER FOR BLU-RAY (BD)

5-8. Can Access Menu, but Not Play a Movie
The disc menu is displayed but the disc will not play.



5-9. Reporting a problem to Quality & Engineering
Reporting a problem that may require a firmware update to fix.

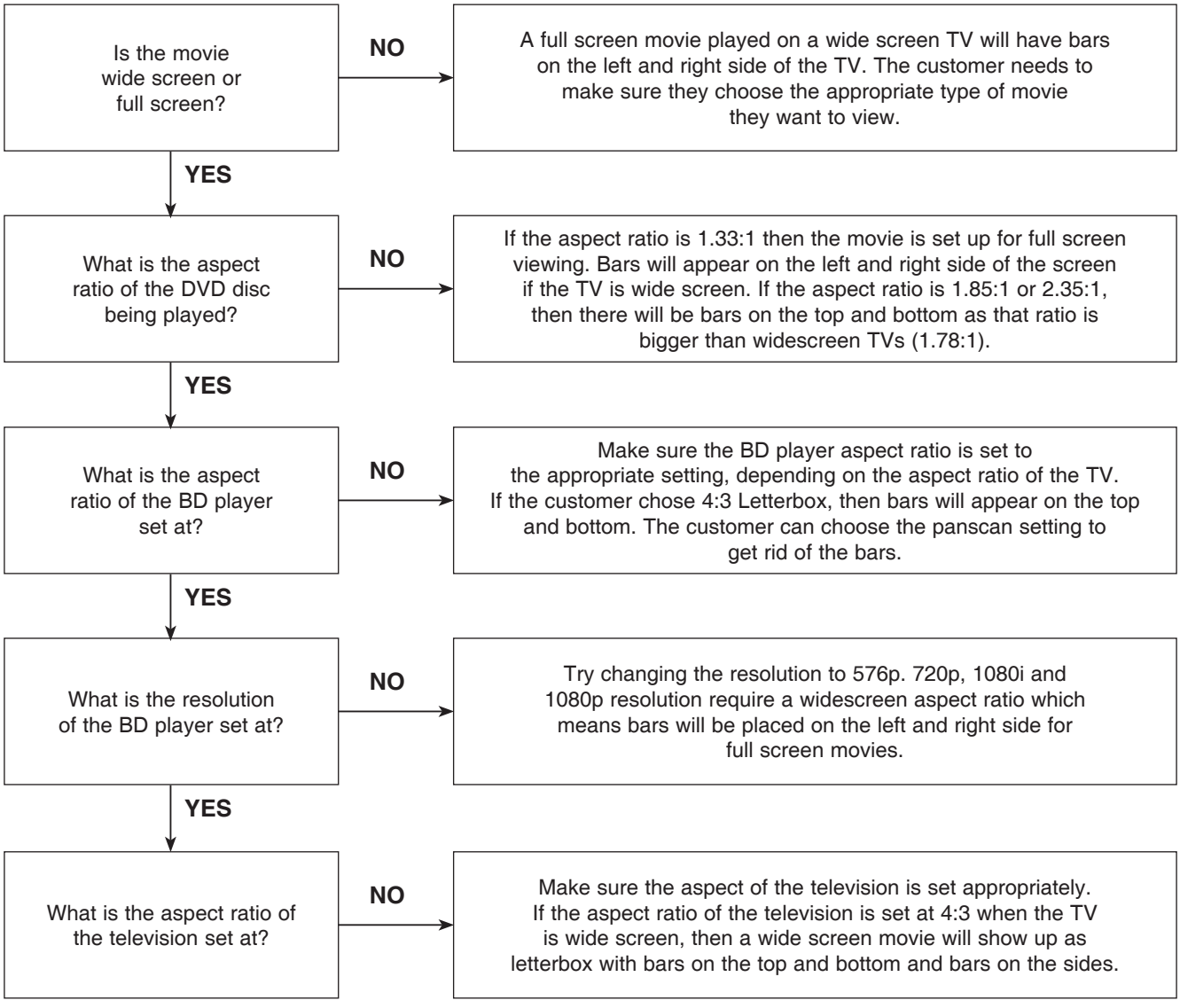


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

5-10. Aspect Ratio

The customer has bars on the top and bottom of the screen, the left and right of the screen, or both.

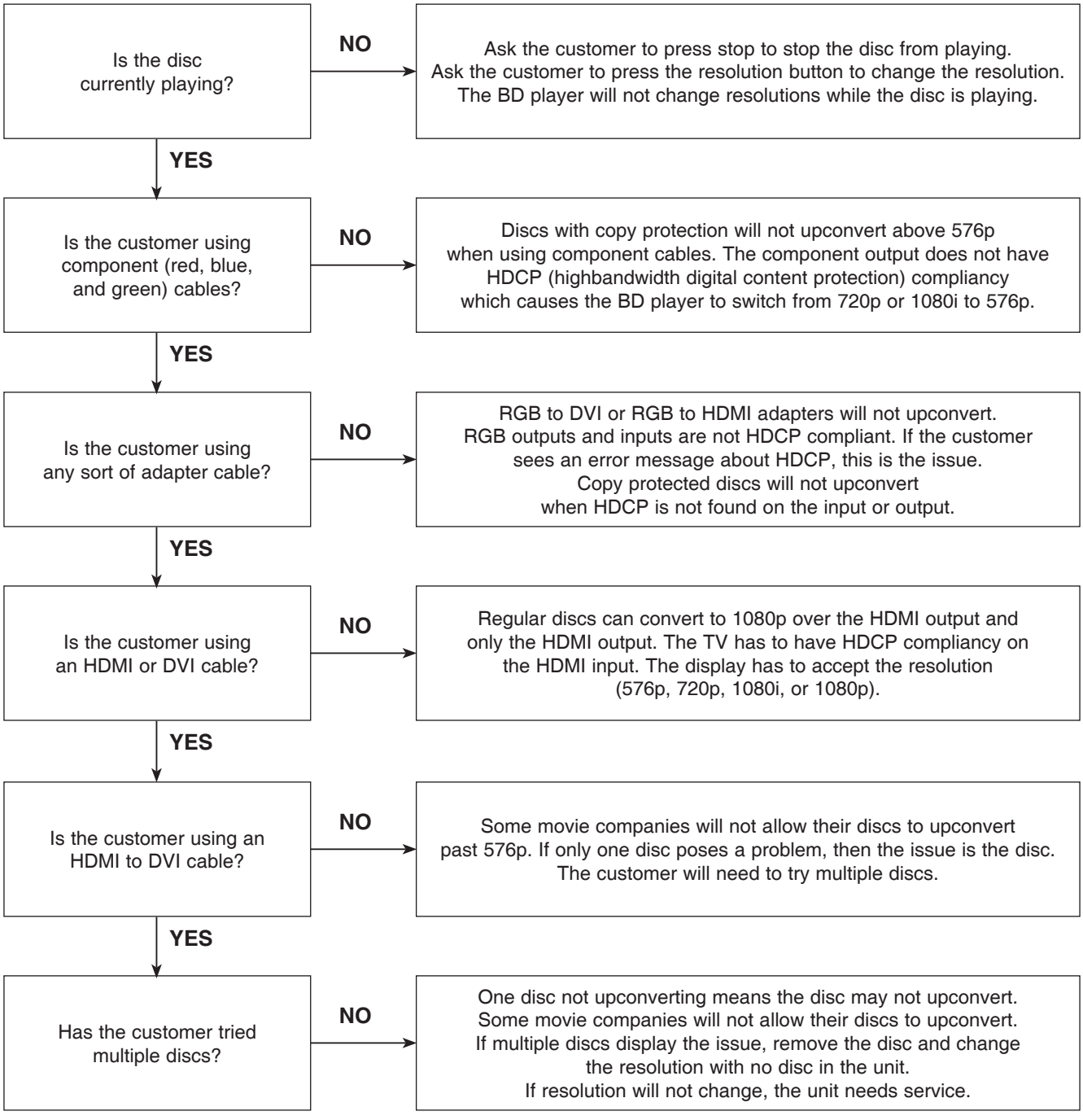


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

TRAINING MASTER FOR BLU-RAY (BD)

5-11. My Unit Won't Upconvert

The customer has a problem with getting the unit to change resolutions to 576p, 720p, 1080i, or 1080p.



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

TRAINING MASTER FOR BLU-RAY (BD)

6. BLU-RAY PLAYER

6-1. Slow Loading Times for BDs

Why does it take so long to load my BDs?	NO →	The loading times for a blu-ray disc is 30 seconds. When a customer switches from one disc to another, the lens will change which is what causes the delay. Blu Ray require different lasers to read the discs.

6-2. Booting Times

Why does it take so long to boot my BD?	NO →	The booting times for the BD is 20 seconds. When the set is booted, it takes a little long time to loading the OS program.

6-3. YouTube Service

Check network cable?	NO →	Make sure the customer doesn't connect the LAN cable. If they don't ,The monitor is displaying "Check network cable" expression.
How do I operate the YouTube?	NO →	First, you have to check the configuration of the Network. Second, you must activate the YouTube. It is necessary to refer to Owner's Manual. This Service is not for free.

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

6-4. Ethernet Port

The purpose of the ethernet port on the unit.

What is the purpose of the ethernet port on the unit?	NO →	This is used for the unit to access a network dealing with interactive BD movie menu. Unit can support BD2.0 so that network function is active in the BD disc. Also, unit can support UCC service such as YouTube.
Why is not the item downloaded through the network?	NO →	Make sure the customer insert the LAN cable into the Ethernet jack. Make sure the network is active. If it is active, the disc may have a problem. If not active, see the network section of OM.

6-5. Firmware Update Availability

Is there a firmware update available for the unit?	NO →	Yes, firmware updates are available at http://us.lgservice.com that address some playback issues with movies. Go to device drivers and click on DVD&VIDEO&SET-TOP. The unit firmware updates are available there. Advise the customer to download the firmware and unzip the file. Also, firmware updates are done by network. Select Home Menu -> Setup -> Others -> Software update menu.

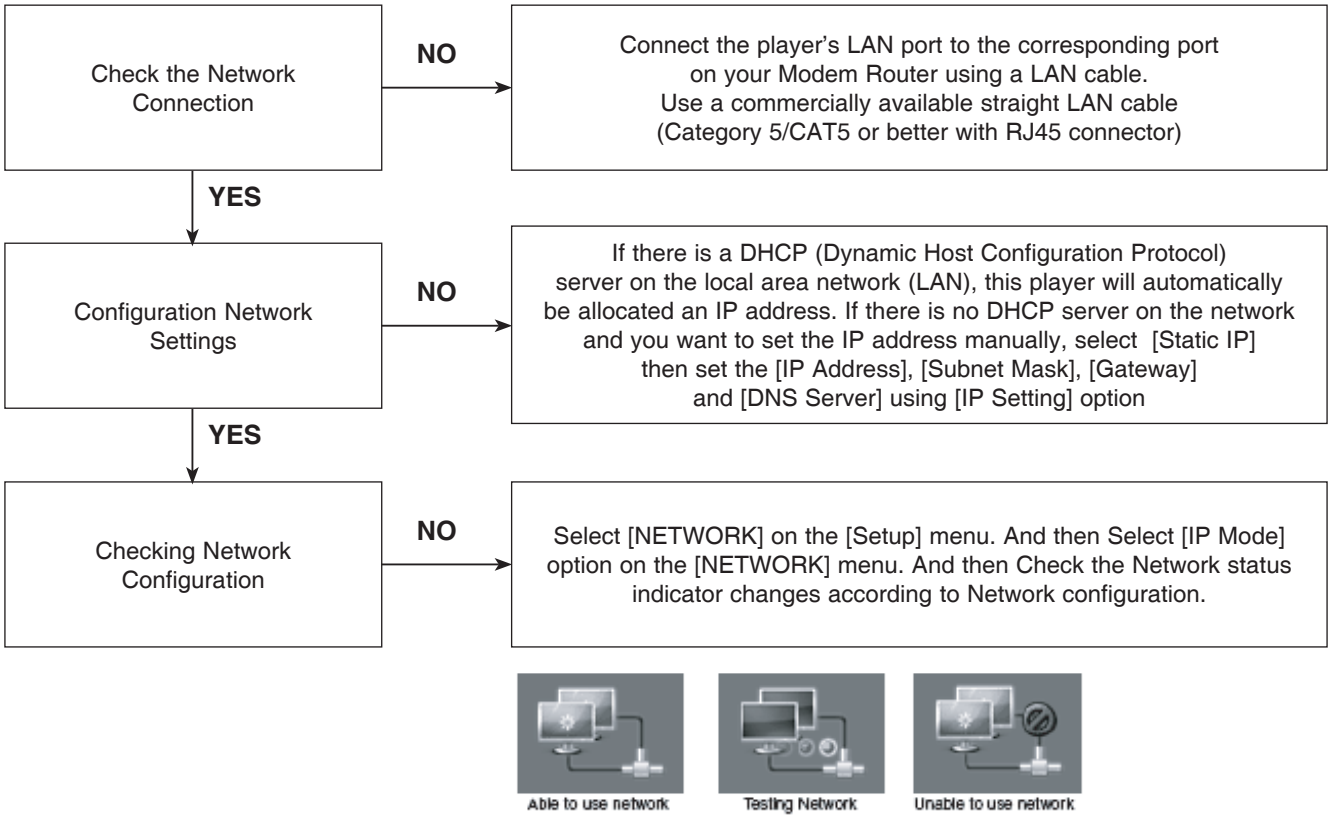
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

7. YouTube

7-1. Network Setup

By connecting the unit to broadband Internet, you can use YouTube function

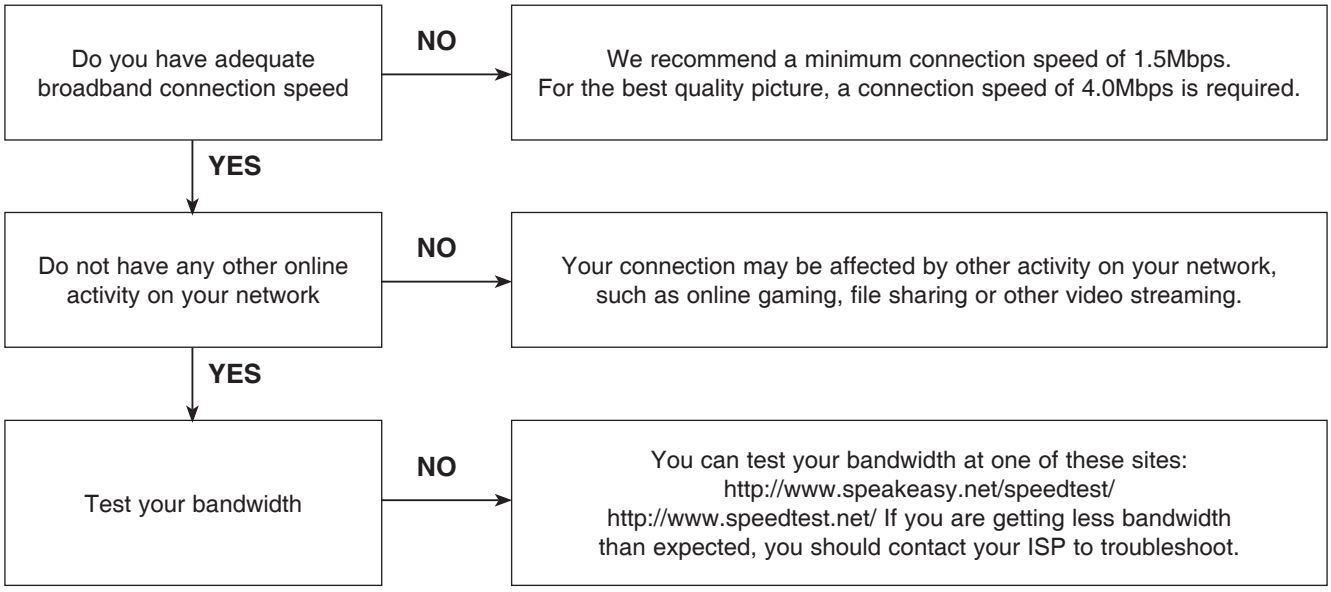


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

7-2. Less Bandwidth and less resolution movie than expected

The Quality indicator during movie retrieval corresponds to the following bandwidth requirements:

- 1 dot is 0.5 Mbps
- 2 dots is 1.0 Mbps
- 3 dots is 1.6 Mbps
- 4 dots is 2.2 Mbps

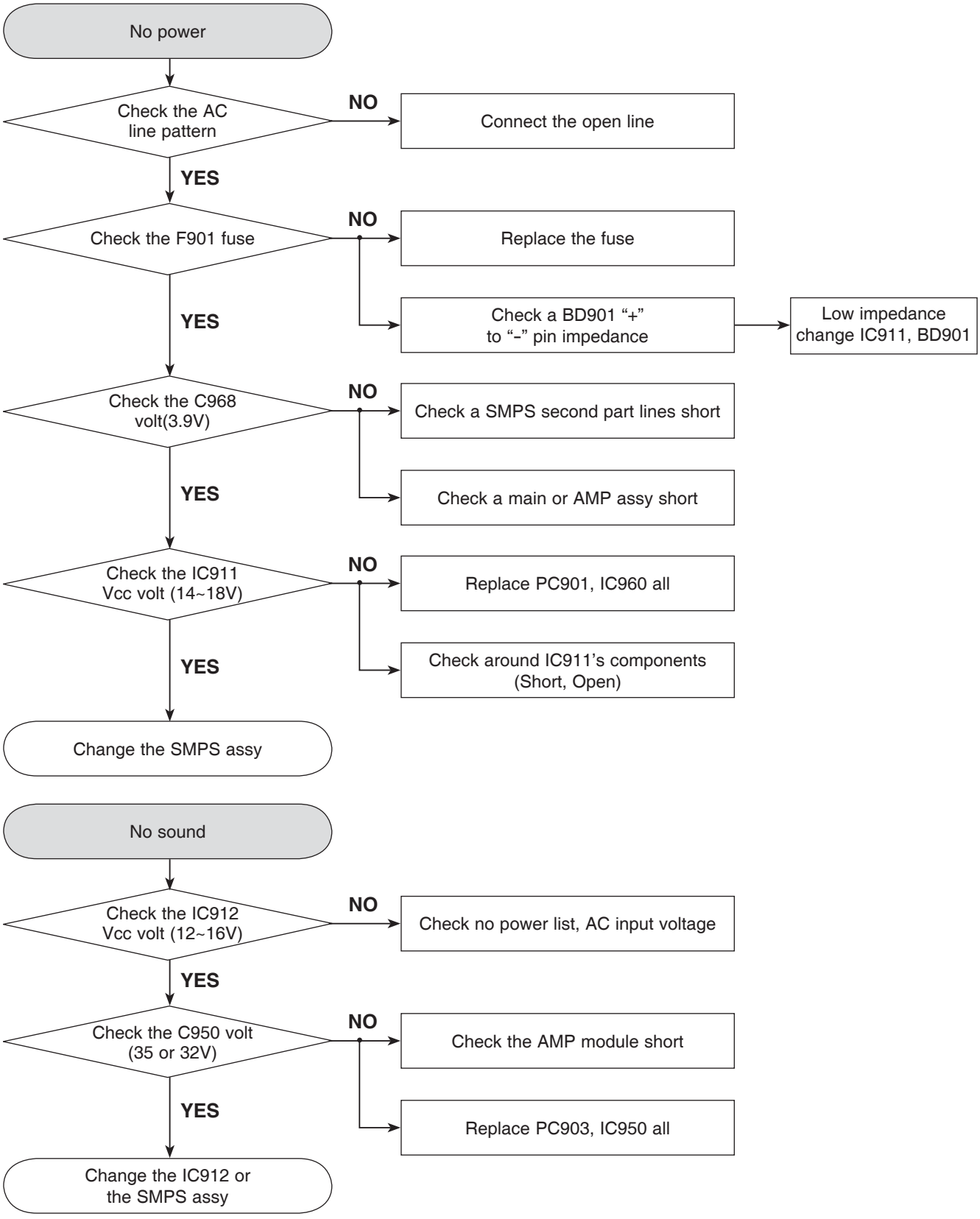


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

ELECTRICAL TROUBLESHOOTING GUIDE

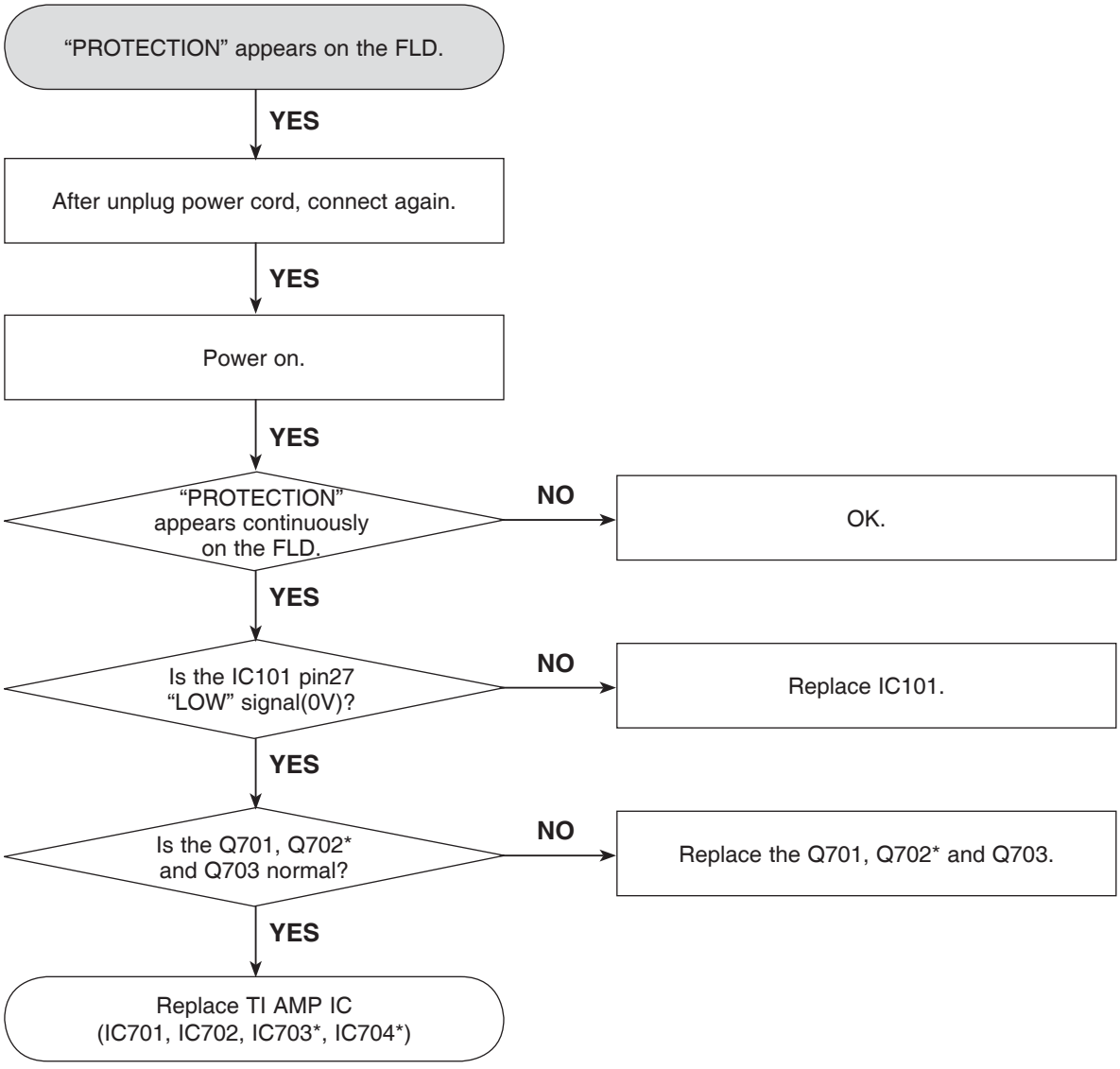
1. SMPS PART CHECK



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

ELECTRICAL TROUBLESHOOTING GUIDE

2. AMP PROTECTION



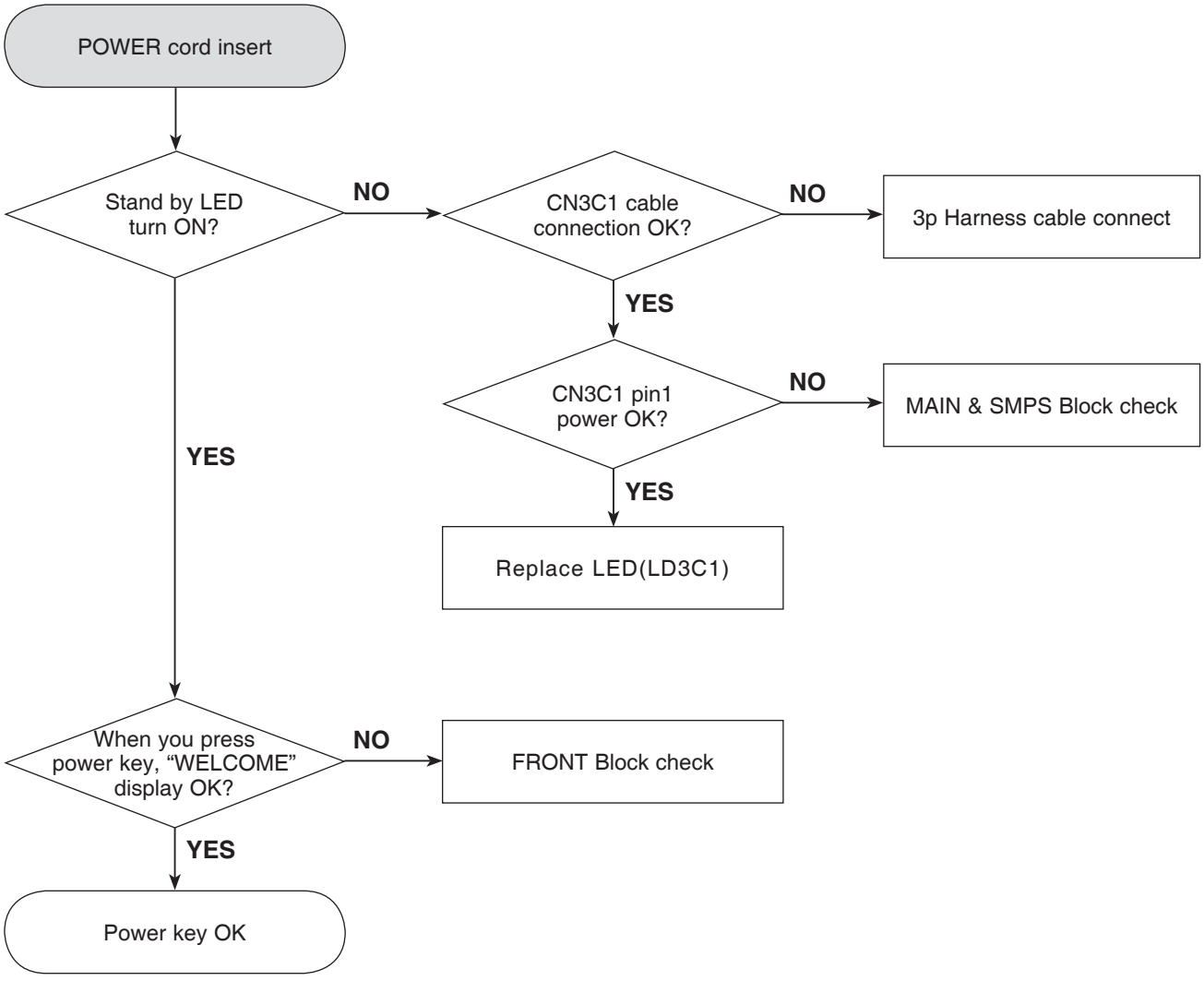
*** 5.1Ch Option**

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

ELECTRICAL TROUBLESHOOTING GUIDE

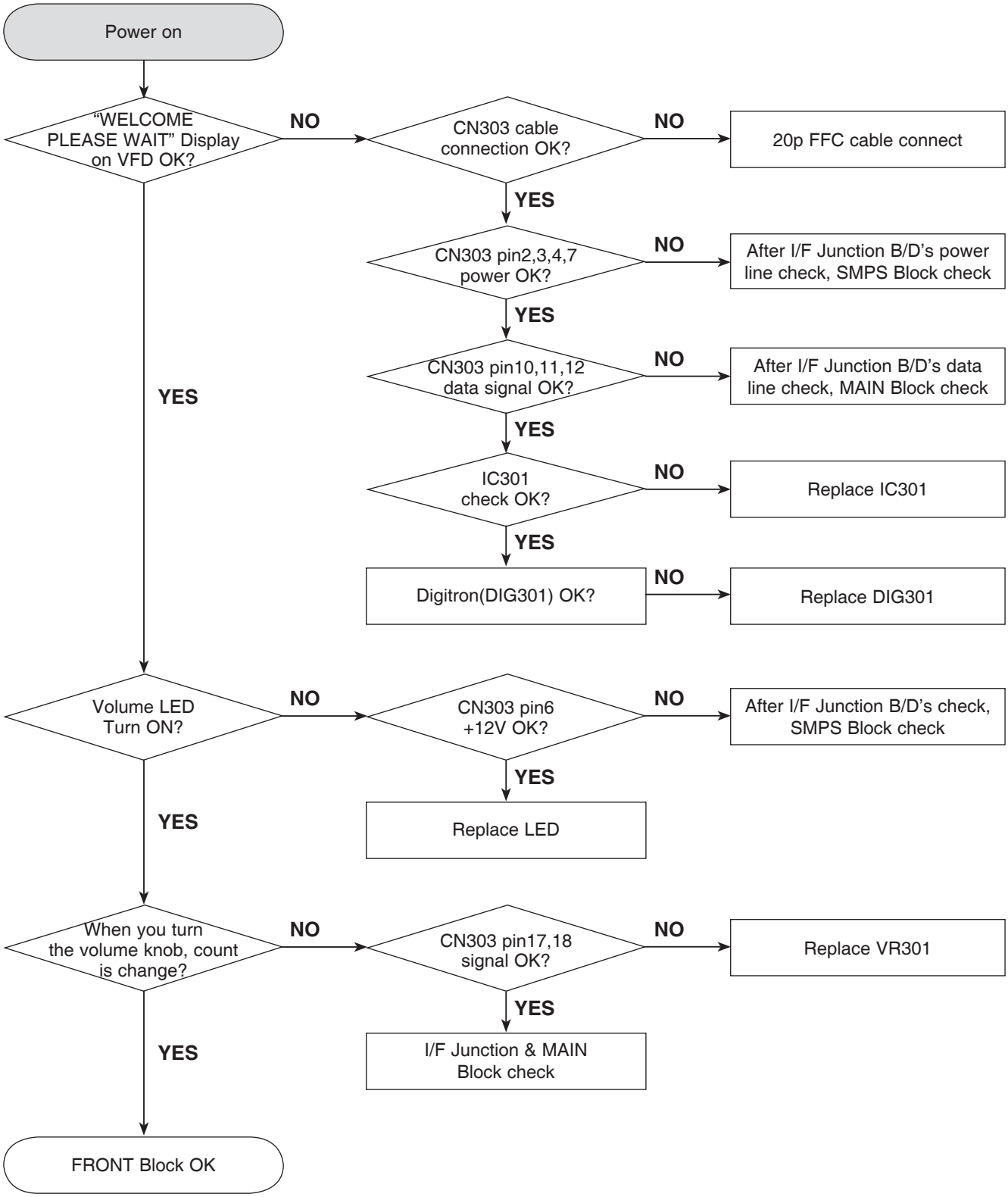
3. POWER KEY OPERATION



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

ELECTRICAL TROUBLESHOOTING GUIDE

4. FRONT BLOCK

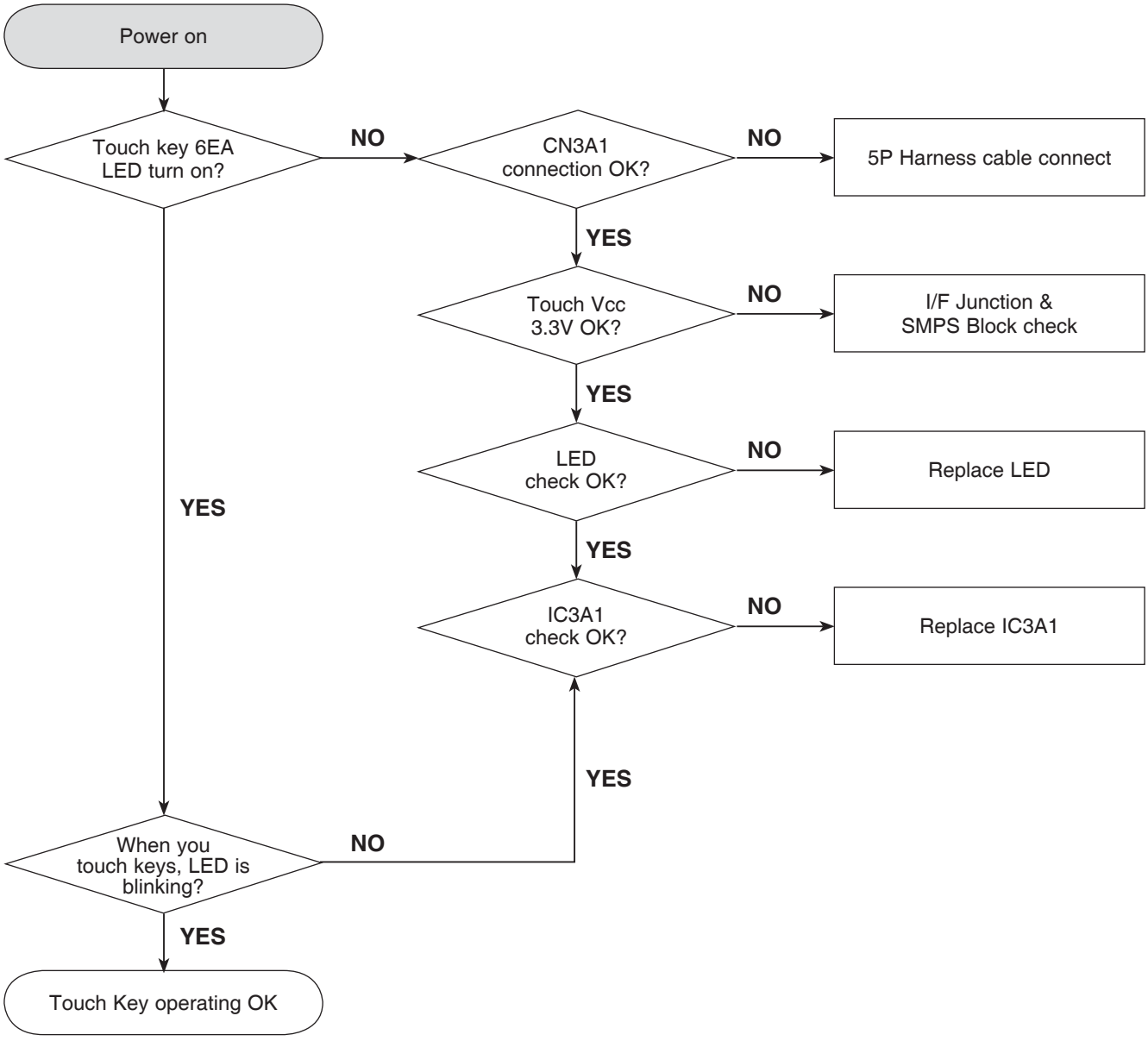


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

ELECTRICAL TROUBLESHOOTING GUIDE

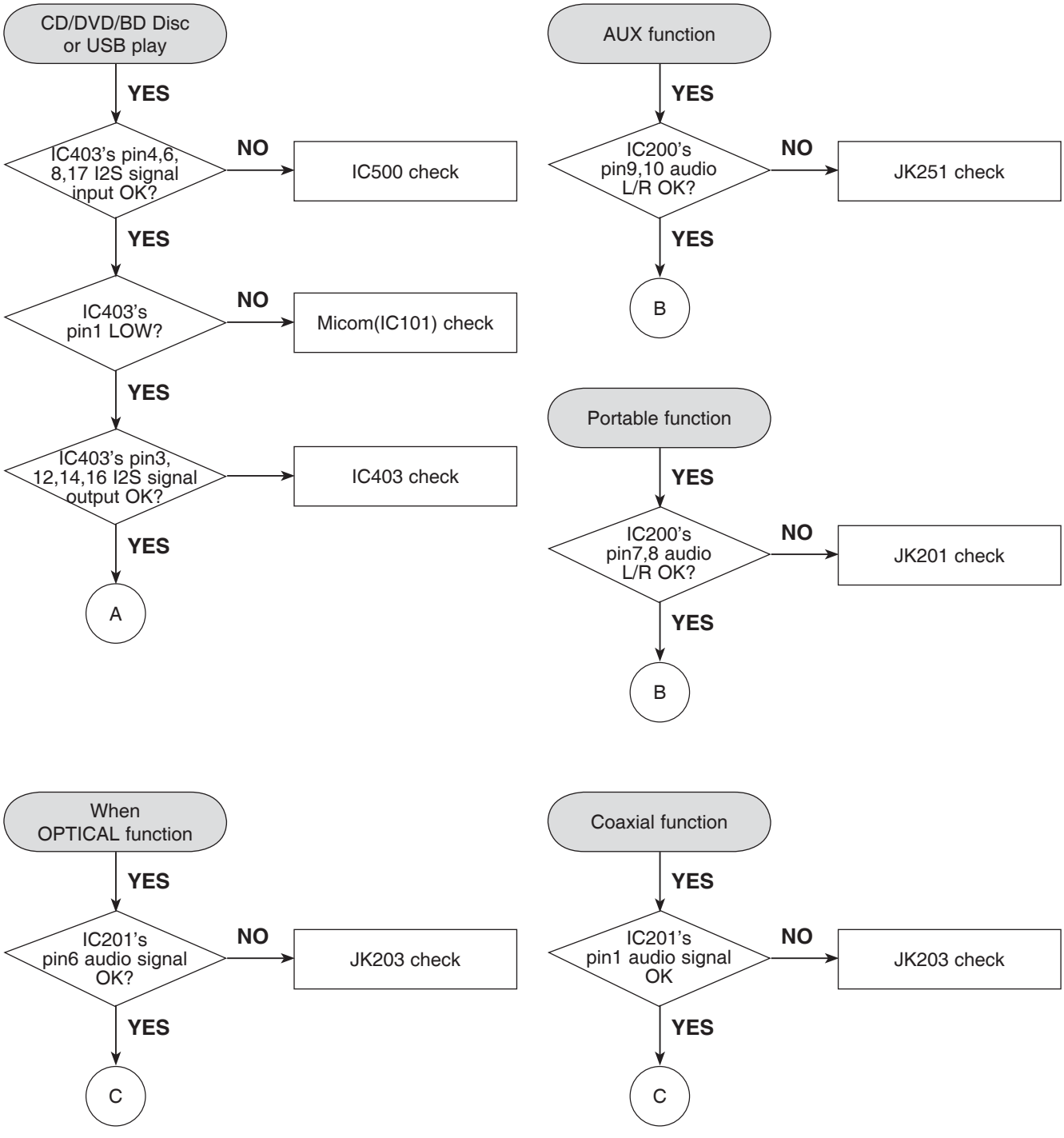
5. TOUCH KEY BLOCK



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

ELECTRICAL TROUBLESHOOTING GUIDE

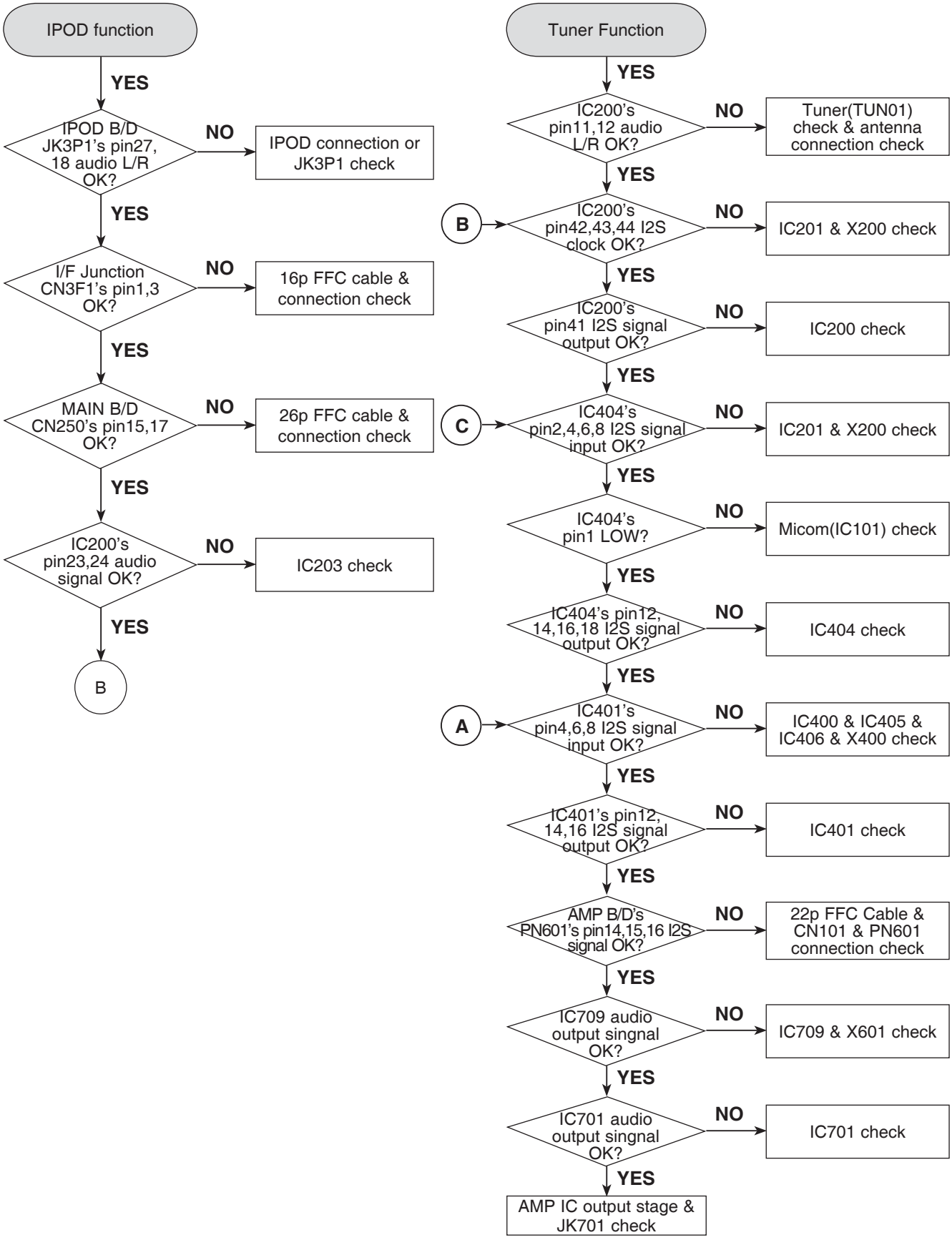
6. NO AUDIO CHECK



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

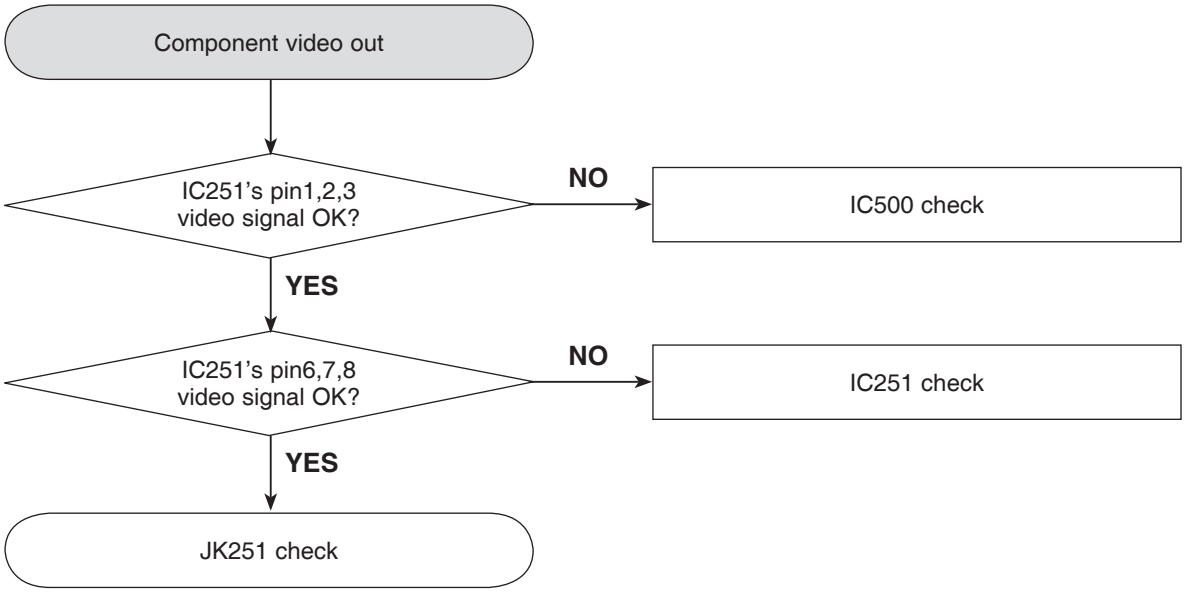
ELECTRICAL TROUBLESHOOTING GUIDE

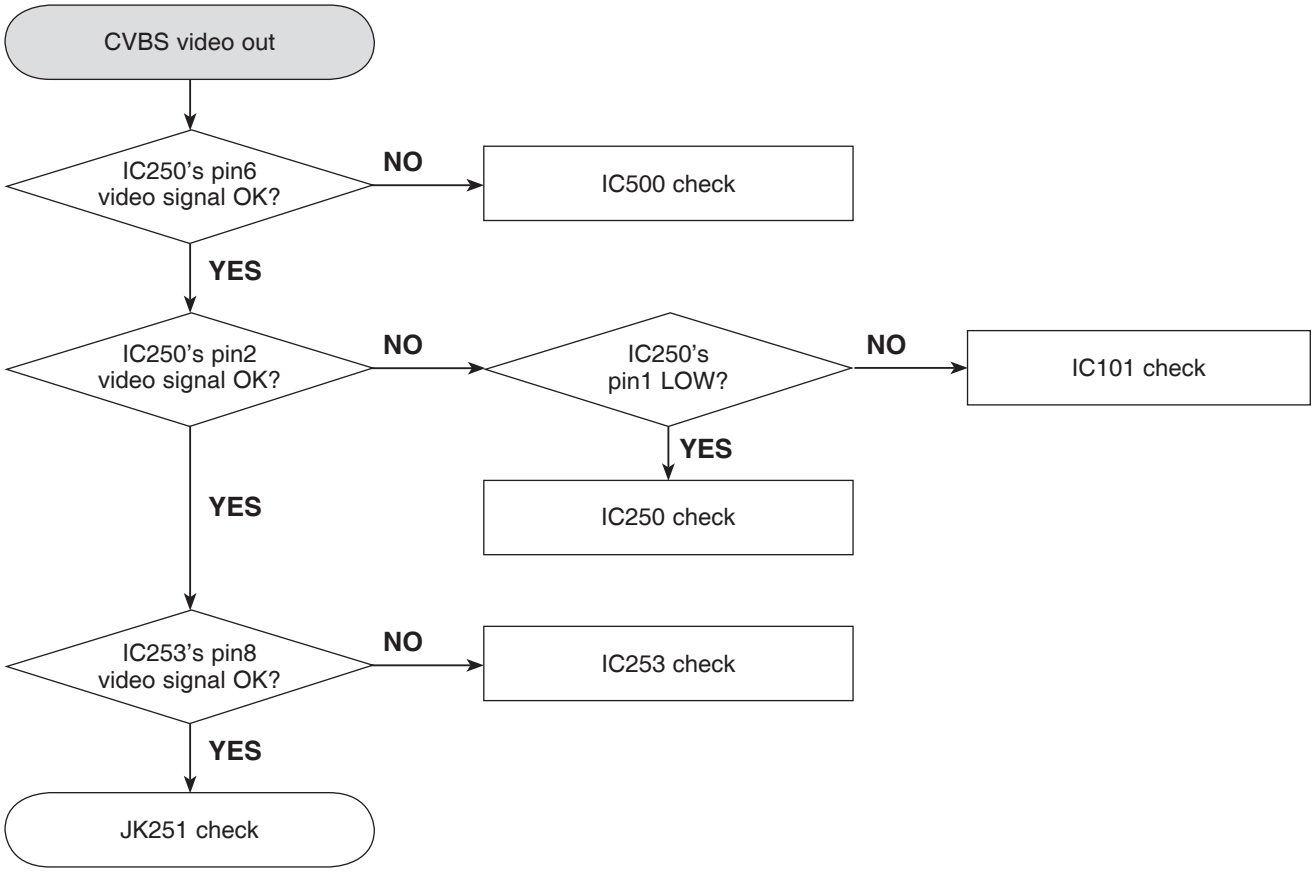


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

ELECTRICAL TROUBLESHOOTING GUIDE

7. NO VIDEO CHECK

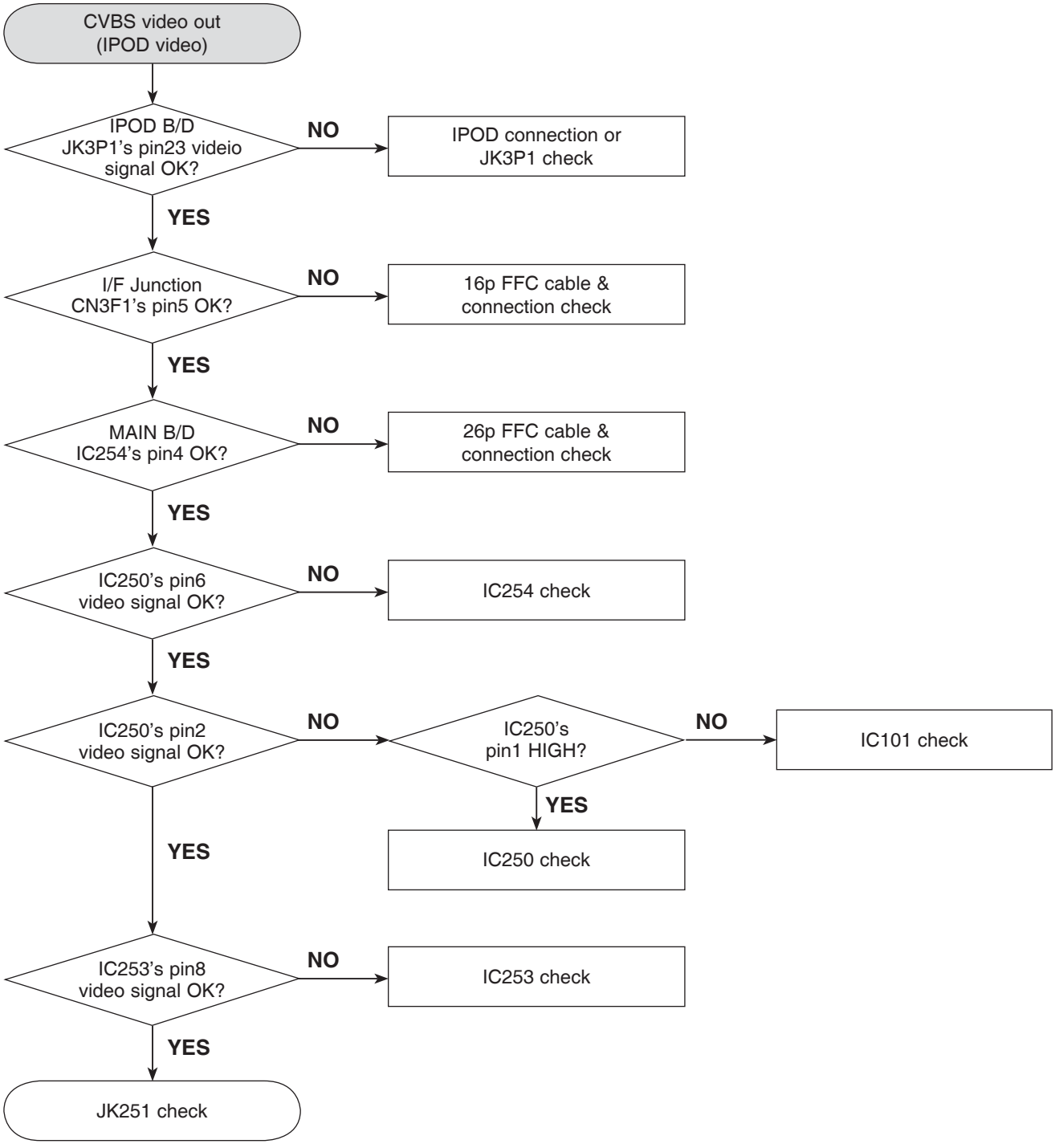




Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

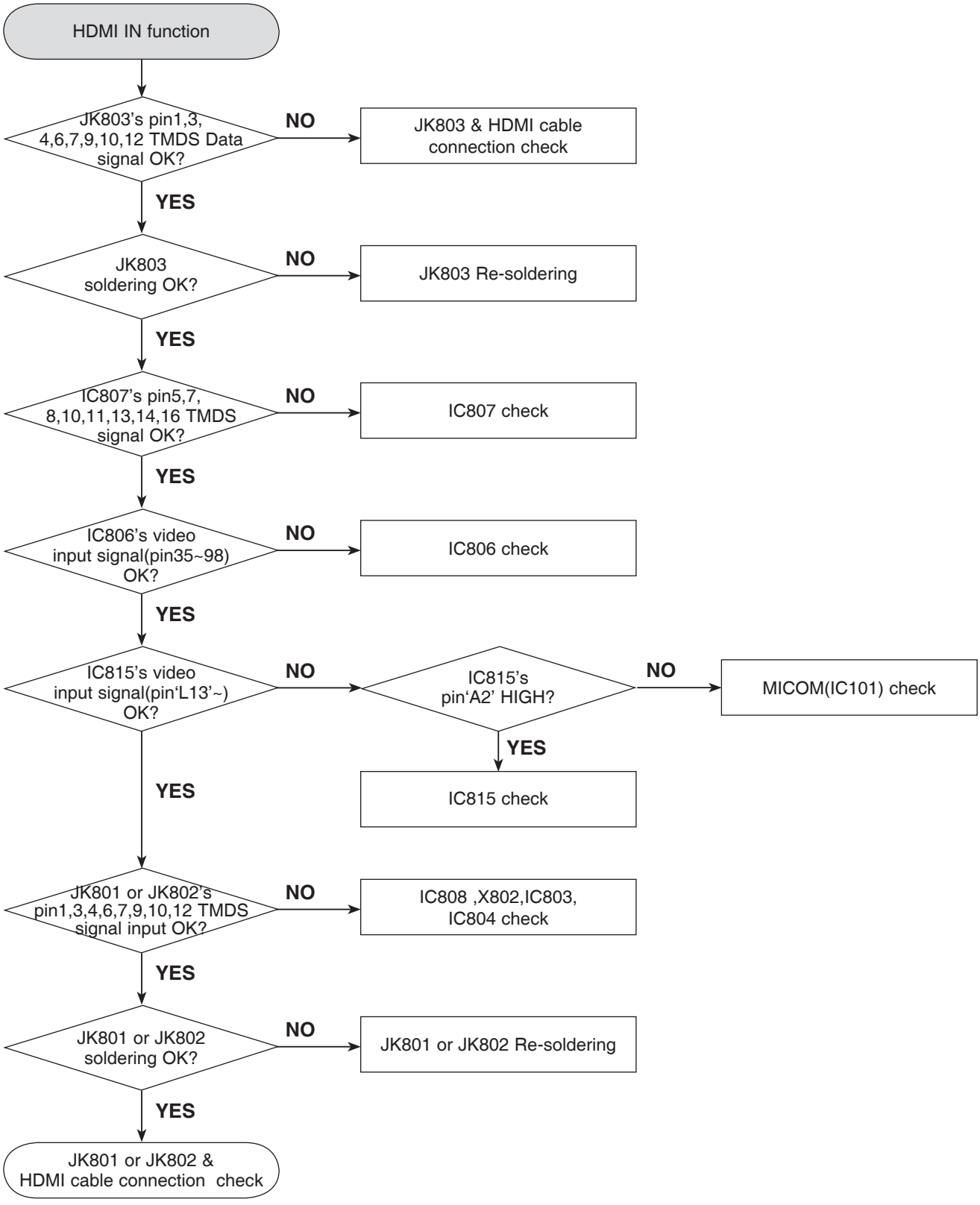
ELECTRICAL TROUBLESHOOTING GUIDE



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

ELECTRICAL TROUBLESHOOTING GUIDE

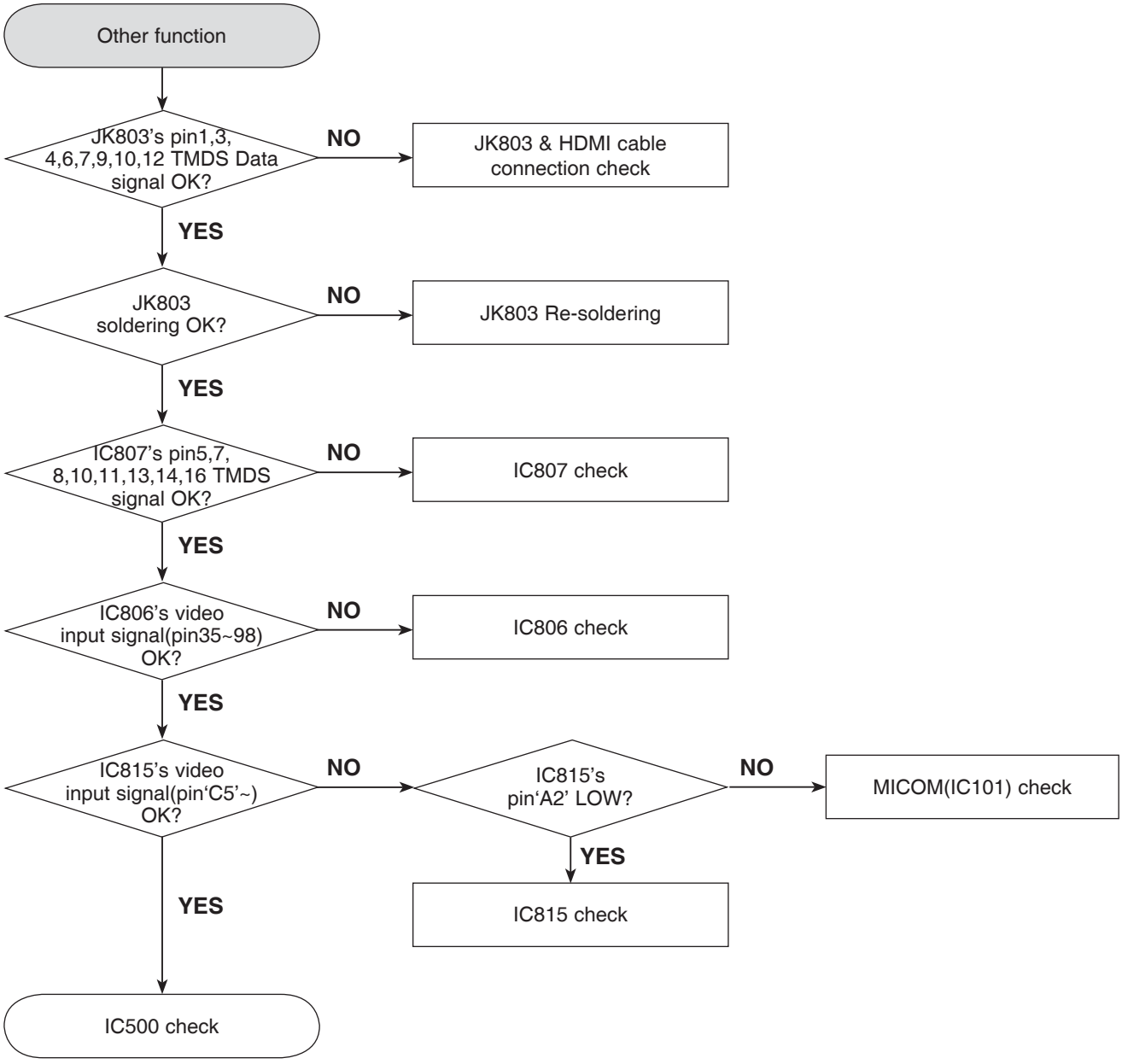
8. HDMI NO AUDIO/VIDEO CHECK (with HDMI IN)



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

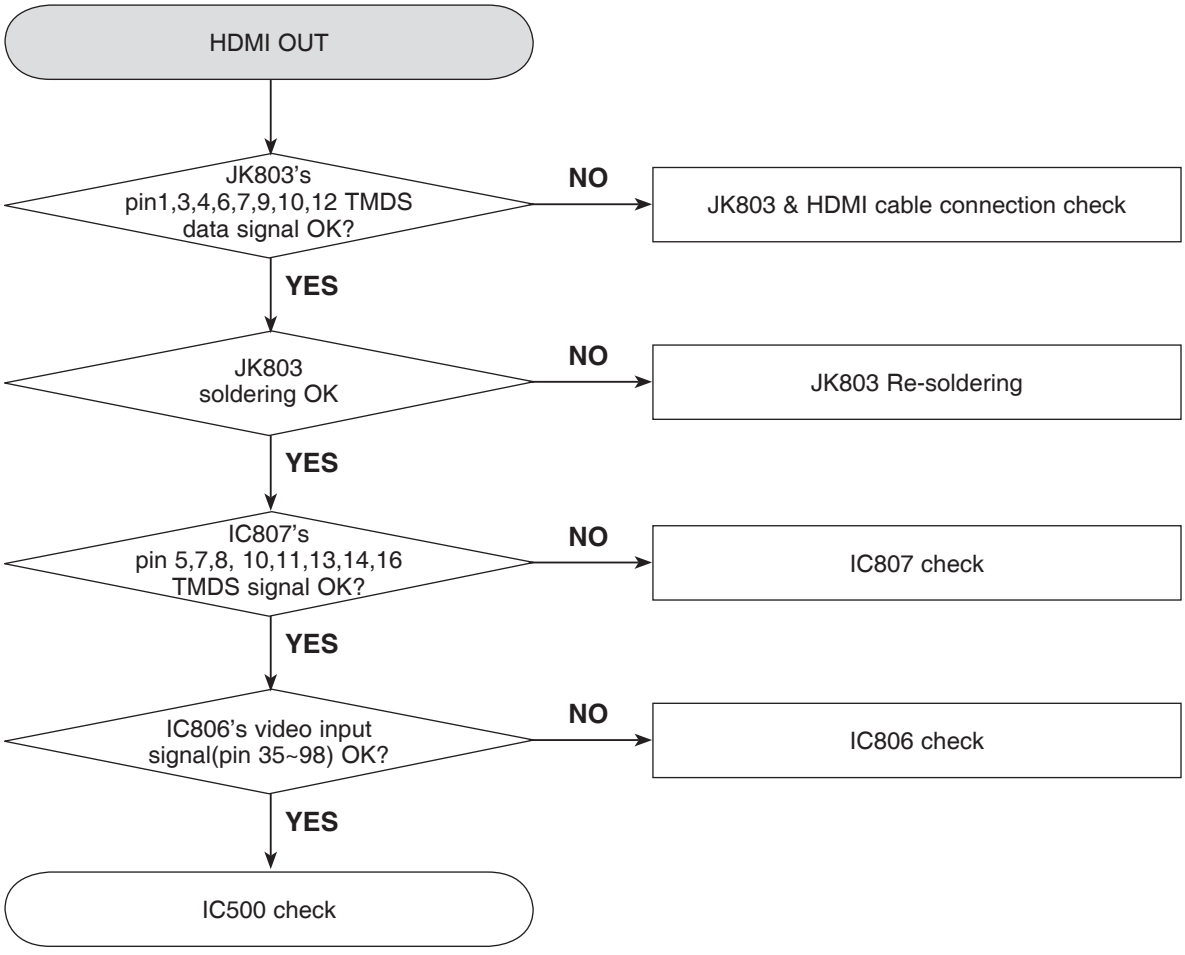
ELECTRICAL TROUBLESHOOTING GUIDE



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

ELECTRICAL TROUBLESHOOTING GUIDE

9. HDMI NO AUDIO/VIDEO CHECK (without HDMI IN)



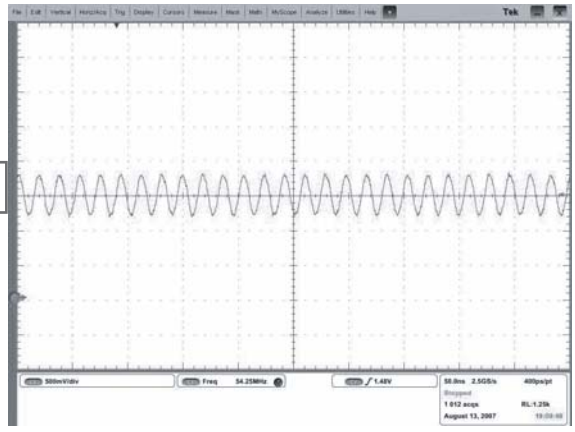
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

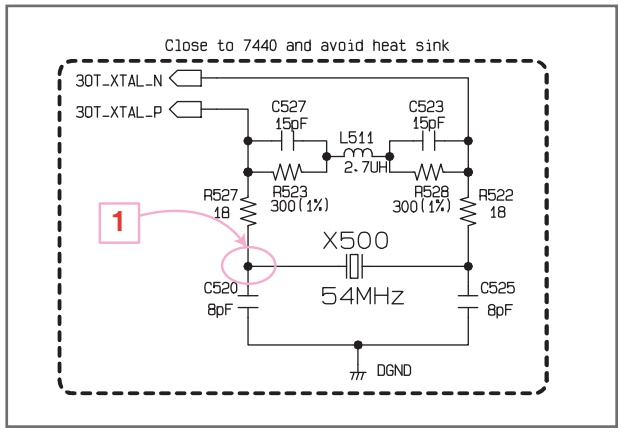
WAVEFORMS

1. SYSTEM PART-1

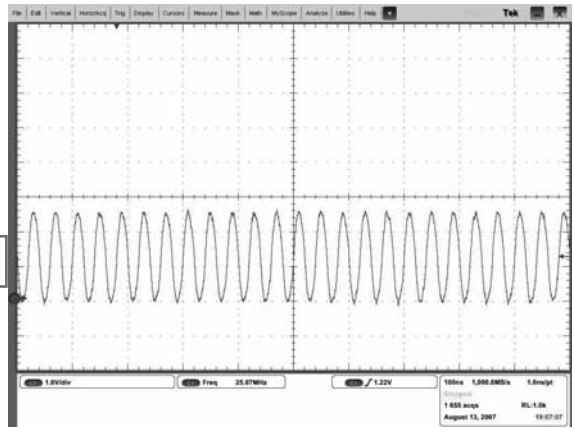
1



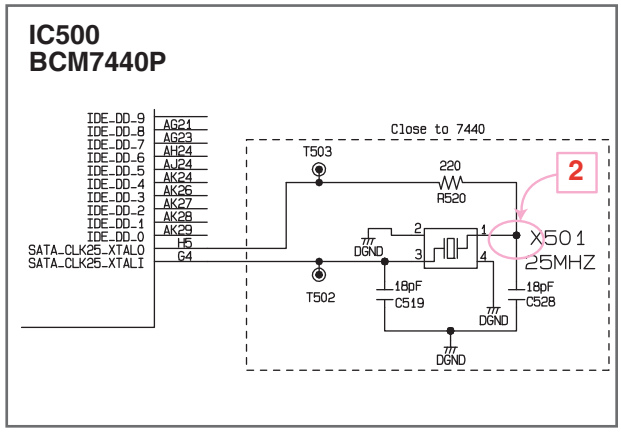
X500 27MHz



2



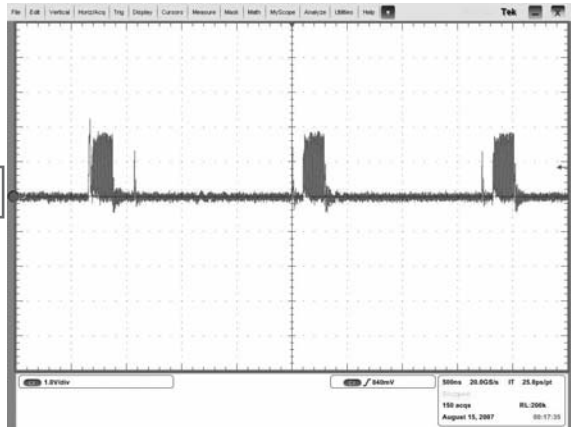
X501 25MHz



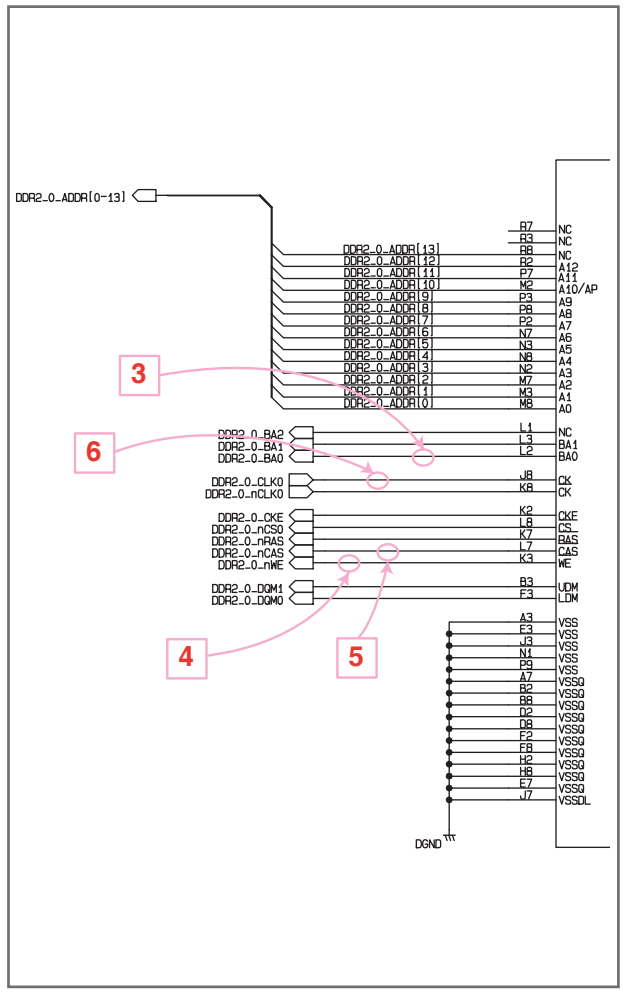
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

2. SYSTEM PART-2 (SYSTEM MEMORY)

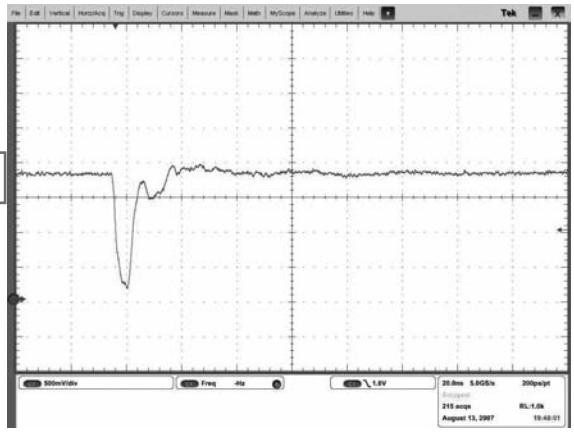
3



IC502 DDR2_0_BA0

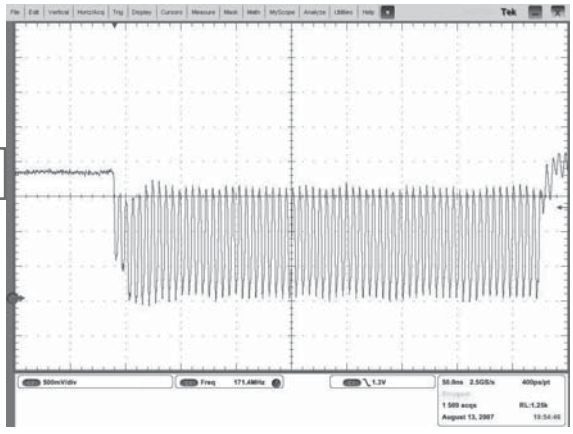


4



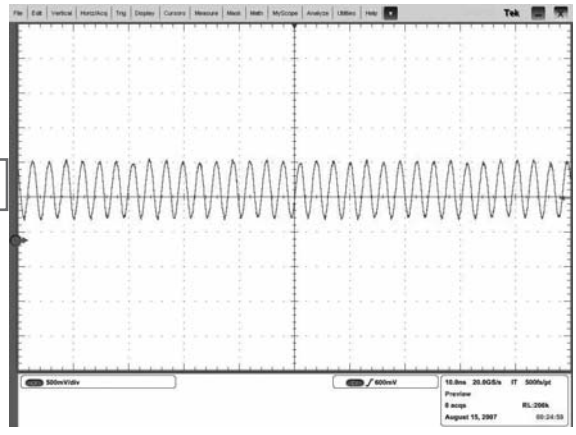
IC502 DDR2_0_nWE

5



IC502 DDR2_0_nCAS

6

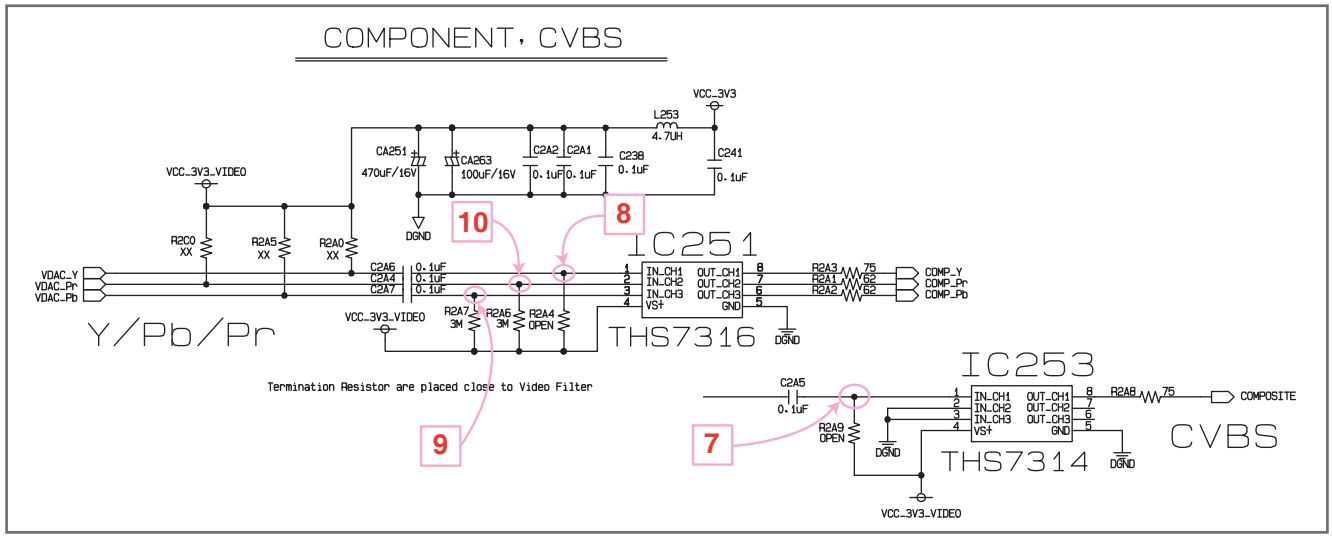


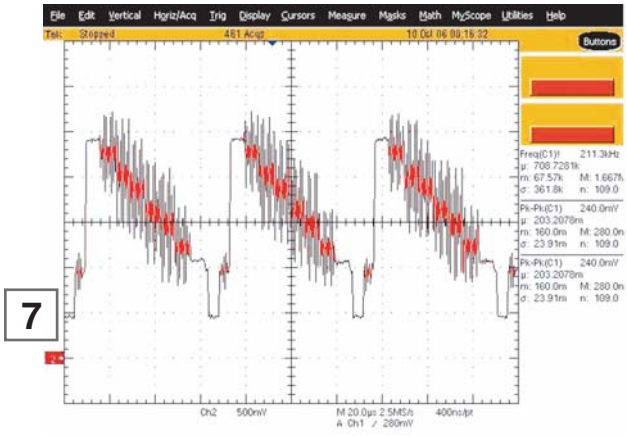
IC502 DDR2_0_CLK0

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

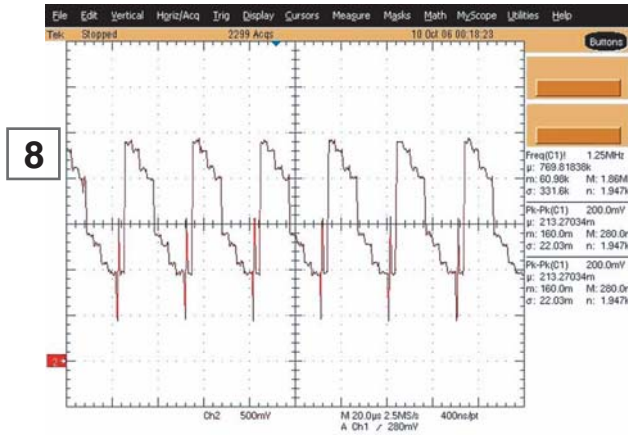
LGE Internal Use Only

3. VIDEO PART-1 (100% FULL COLOR-BAR)

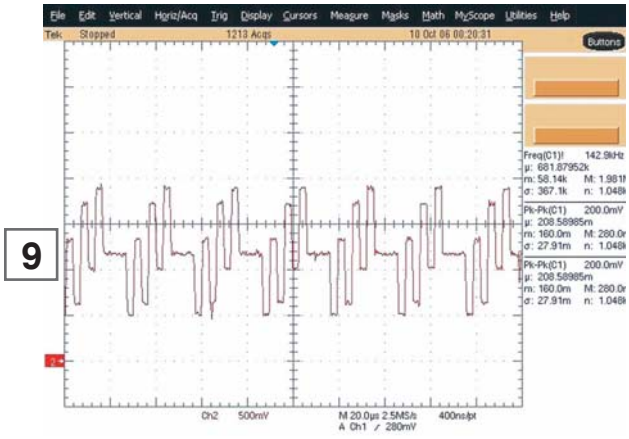




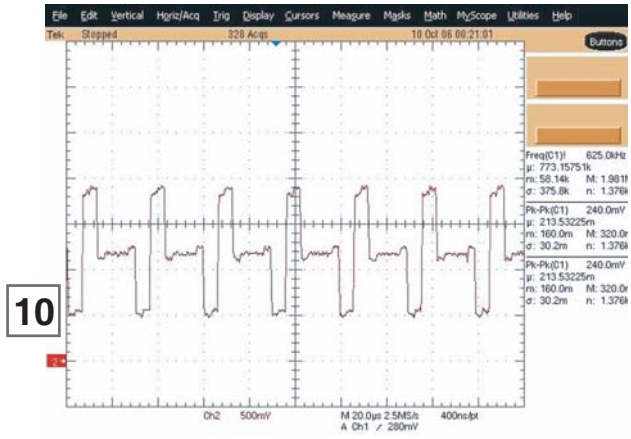
CVBS_I



Y



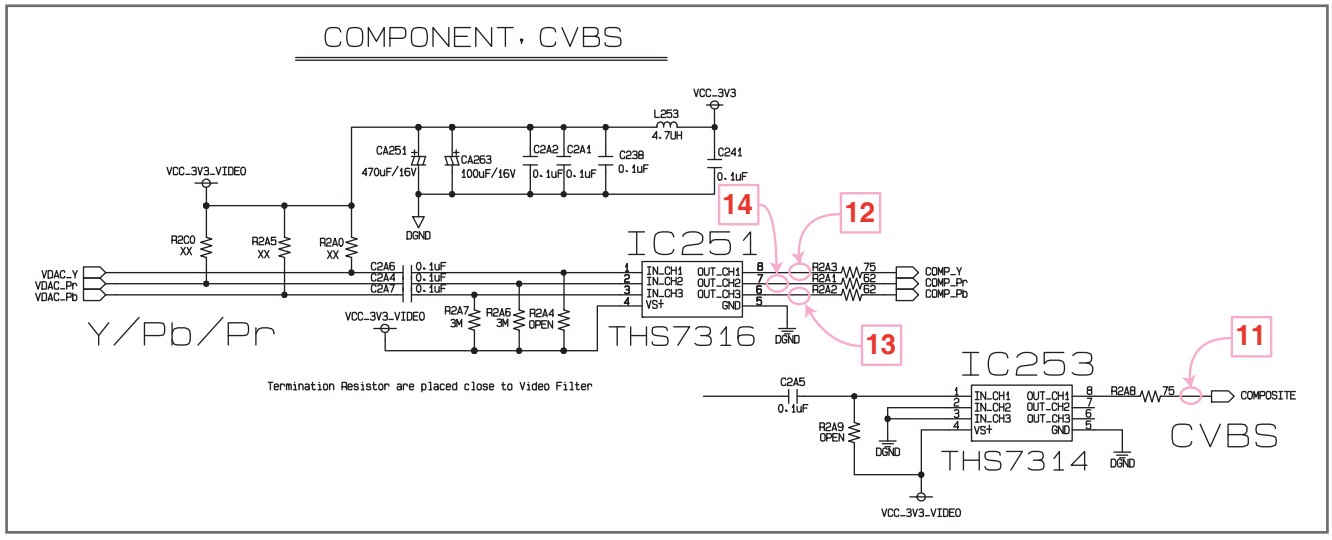
Pb

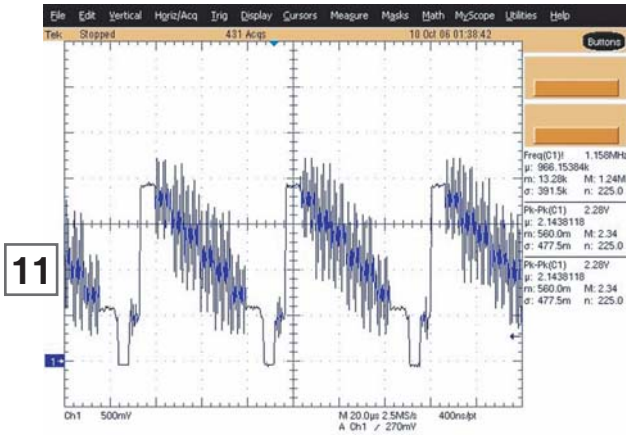


Pr

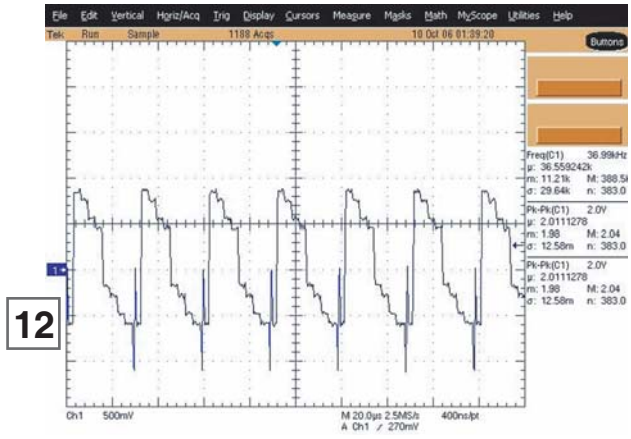
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

4. VIDEO PART-2 (100% FULL COLOR-BAR)

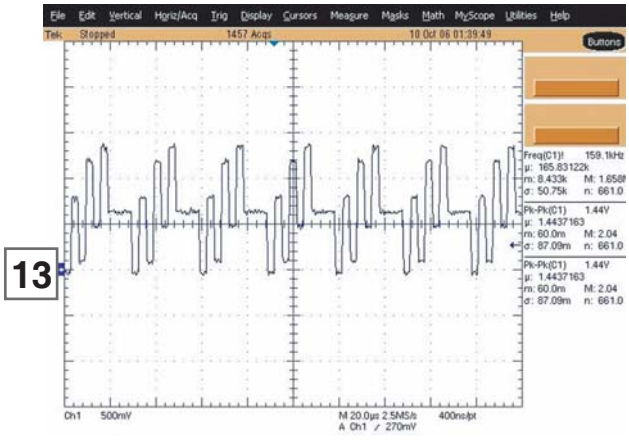




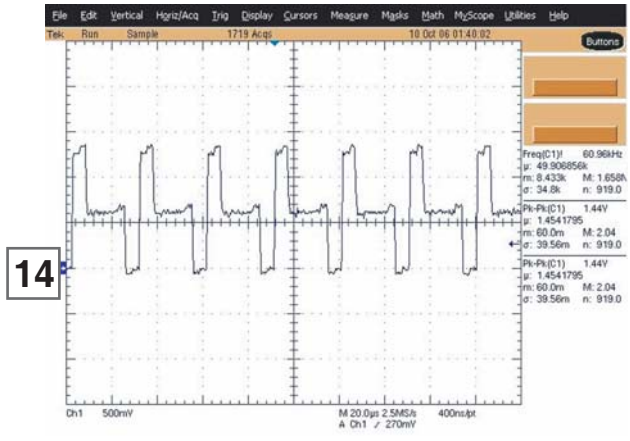
CVBS



COMP_Y



COMP_Pb

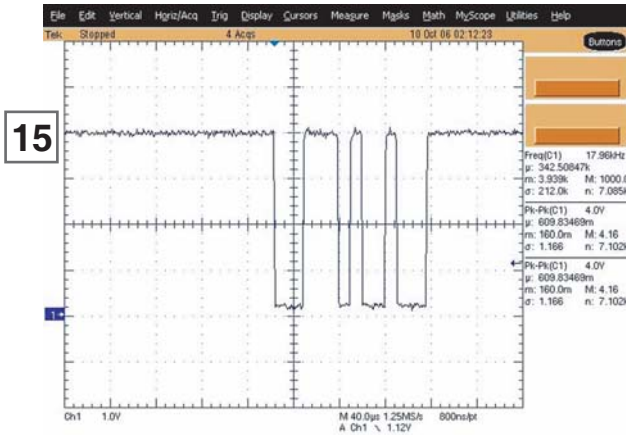


COMP_Pr

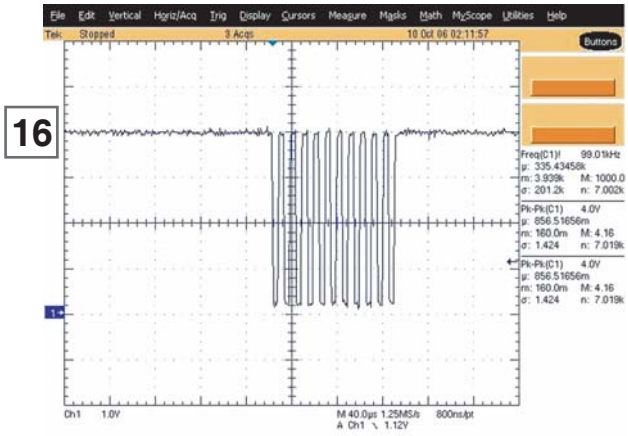
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

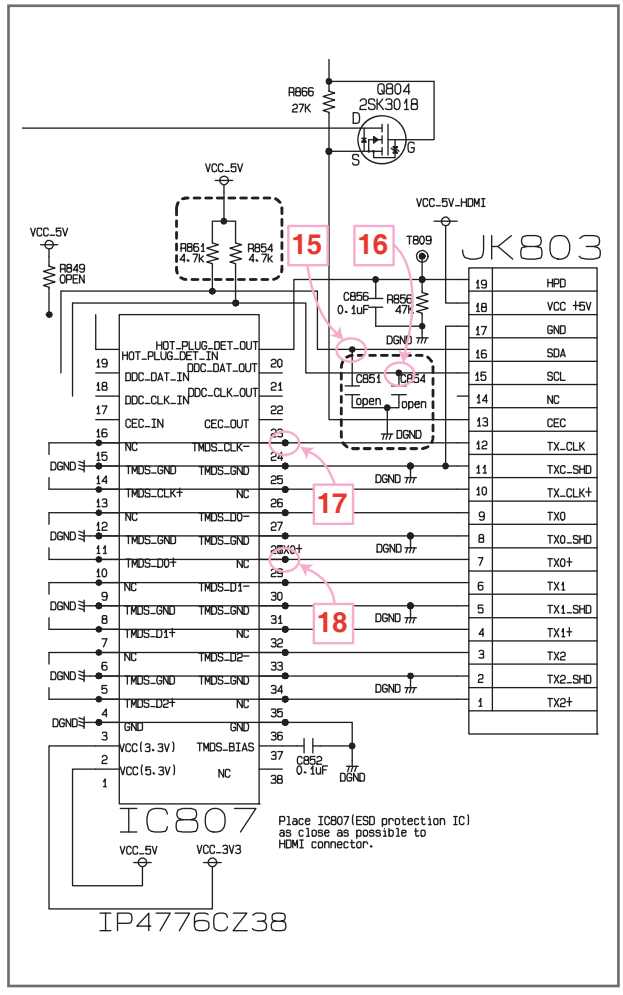
5. HDMI PART

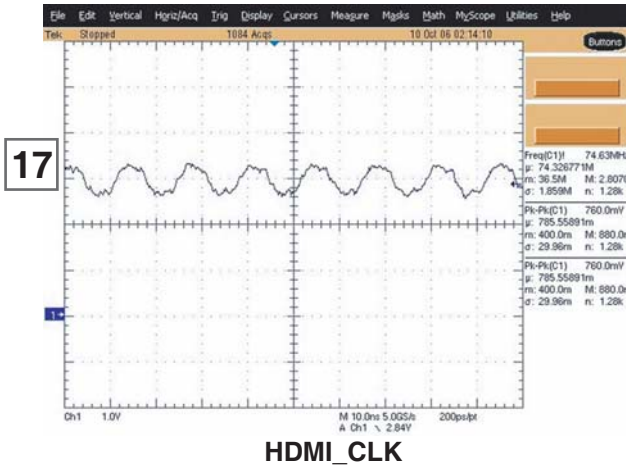


HDMI_SDA

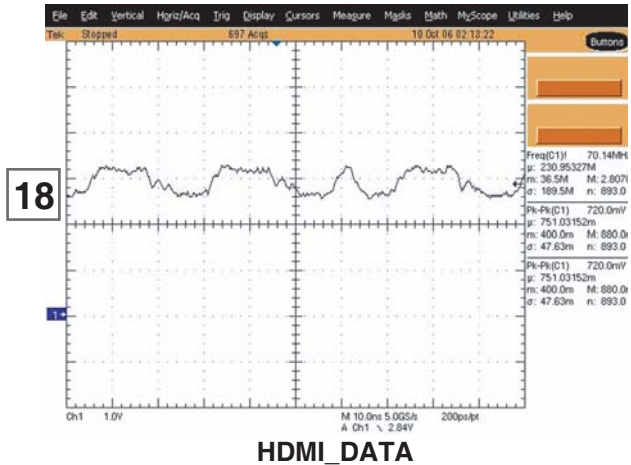


HDMI_SCL





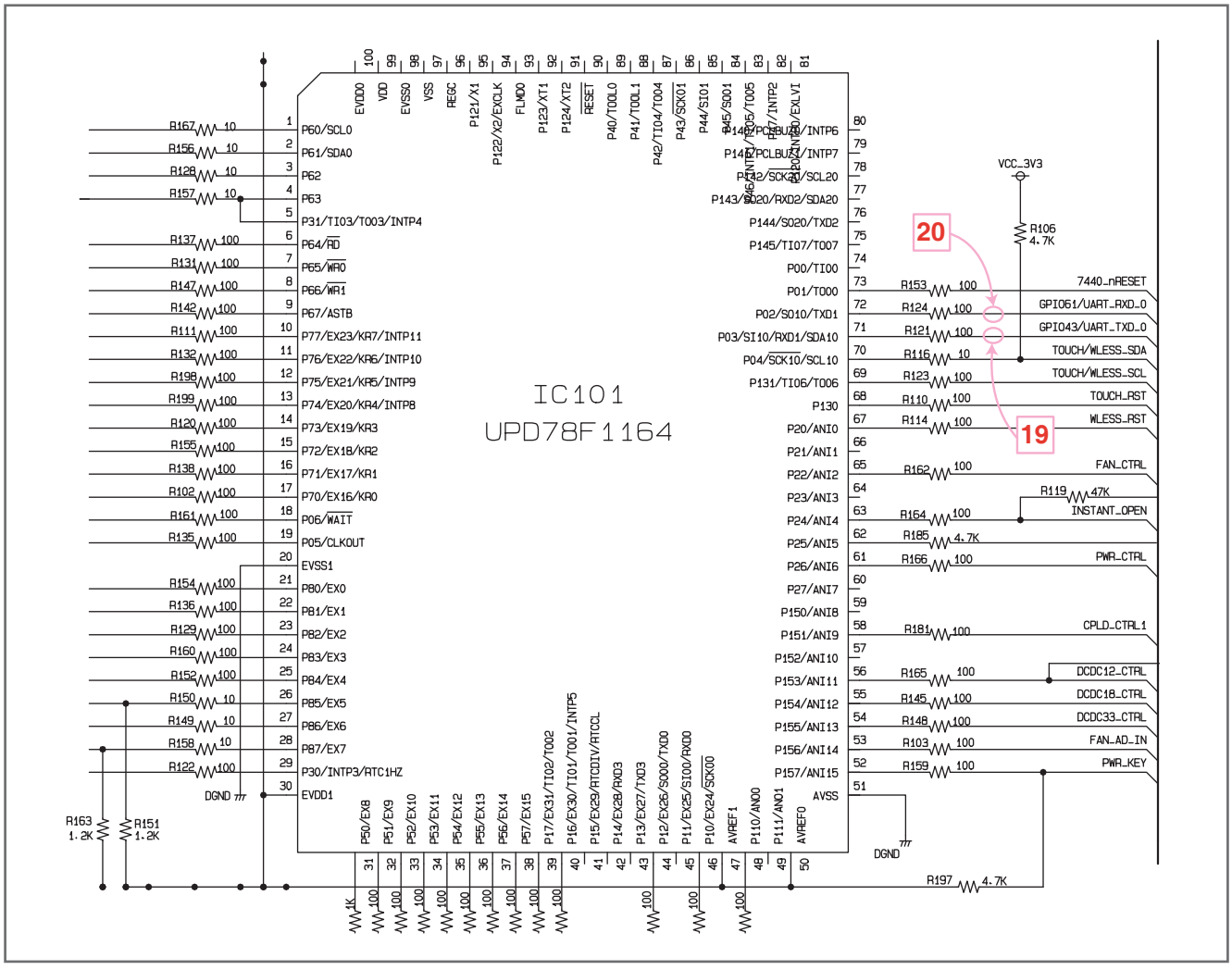
HDMI_CLK

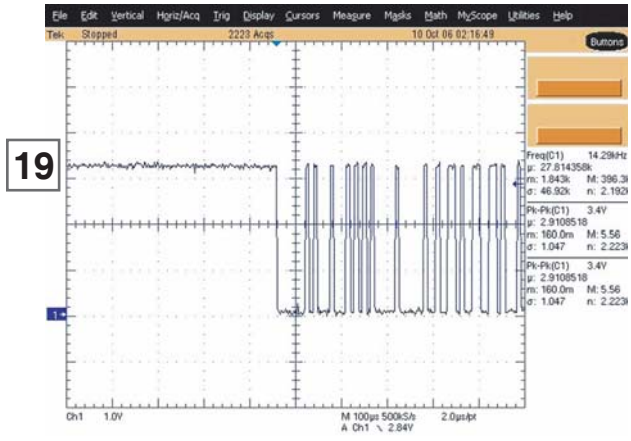


HDMI_DATA

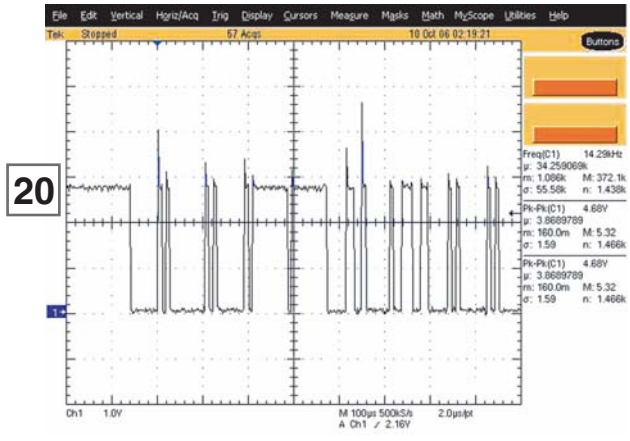
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

6. MICOM AND MPEG I/F PART





T_TX



R_RX

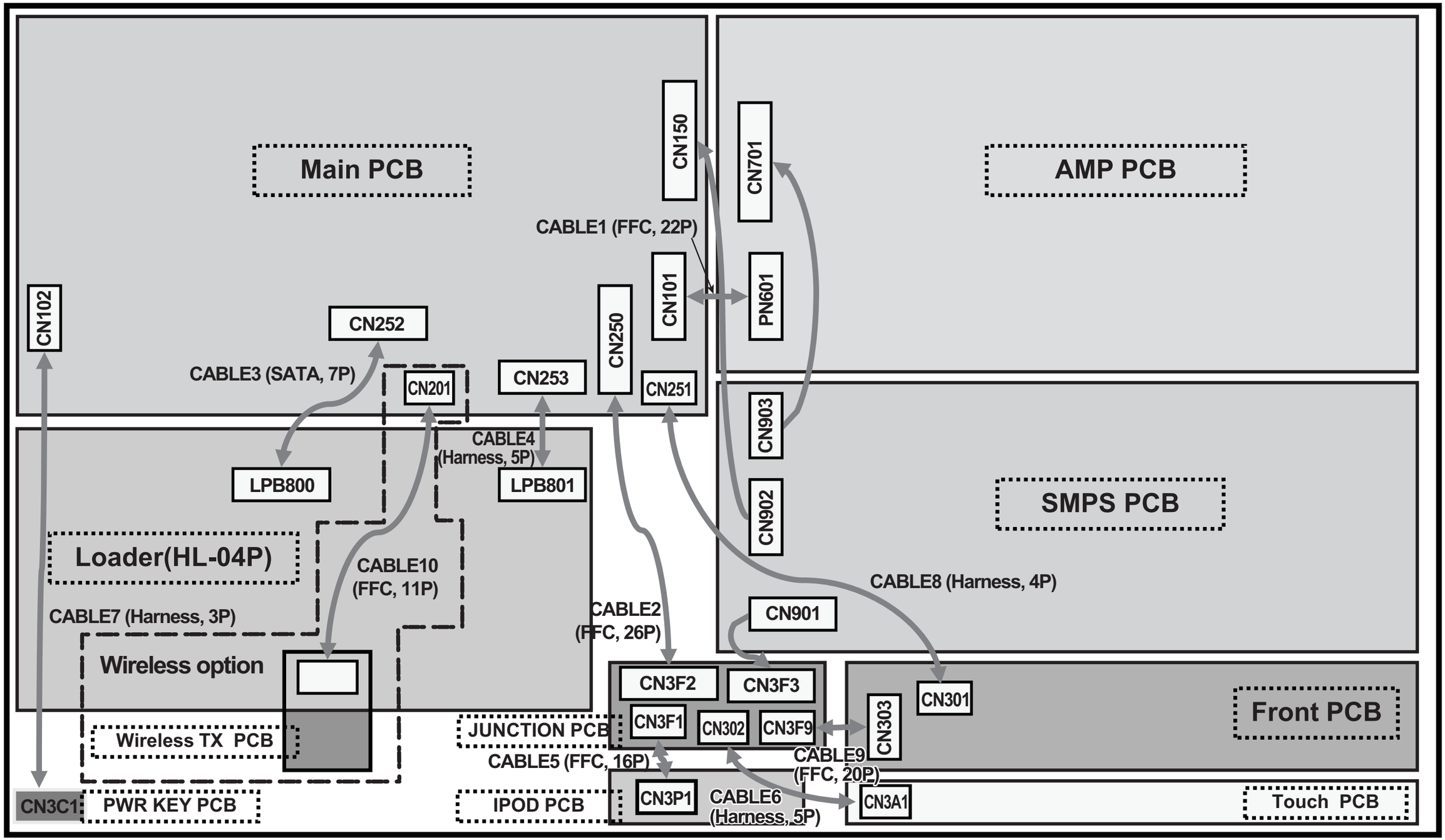
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

MEMO

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

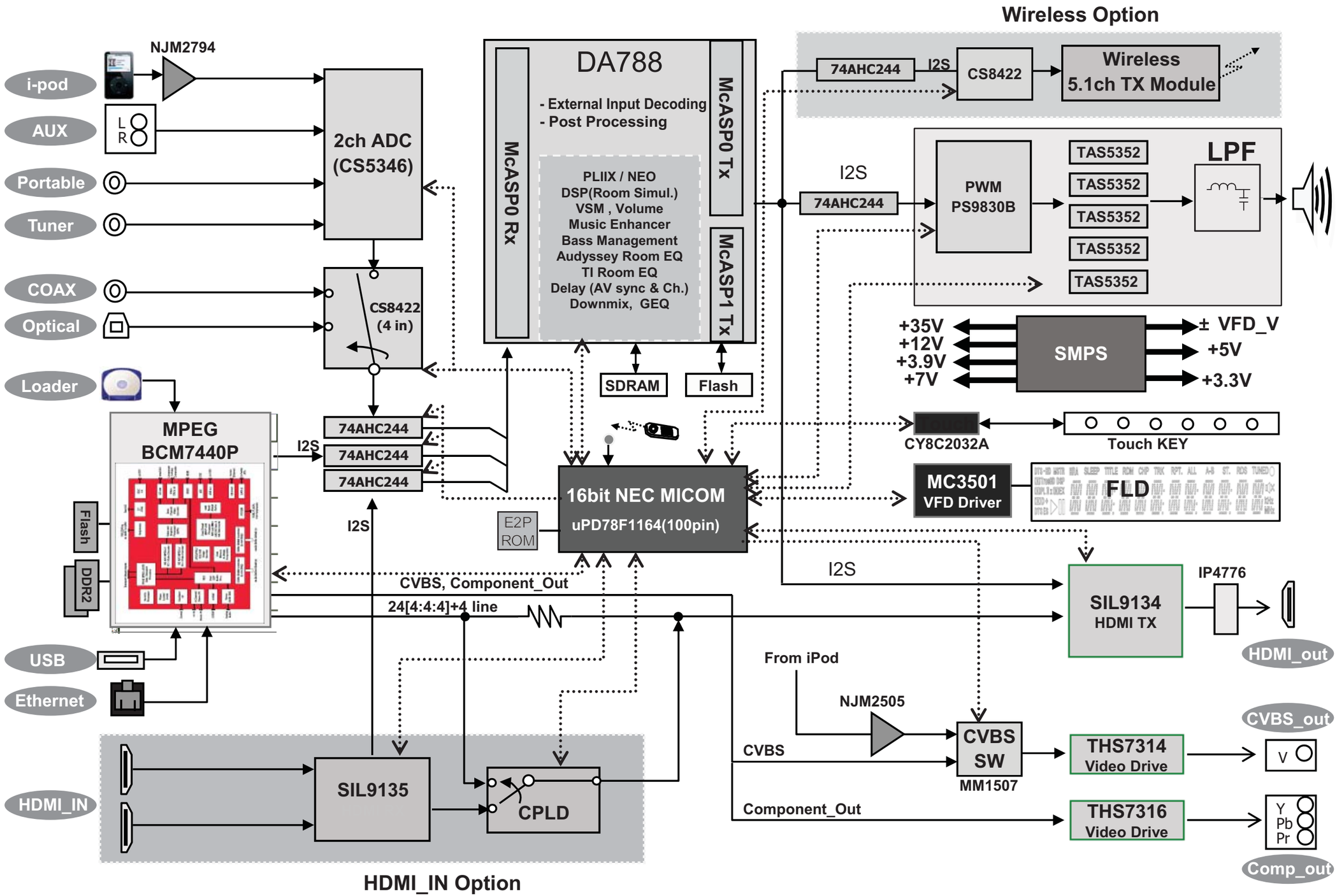
WIRING DIAGRAM



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

BLOCK DIAGRAM



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

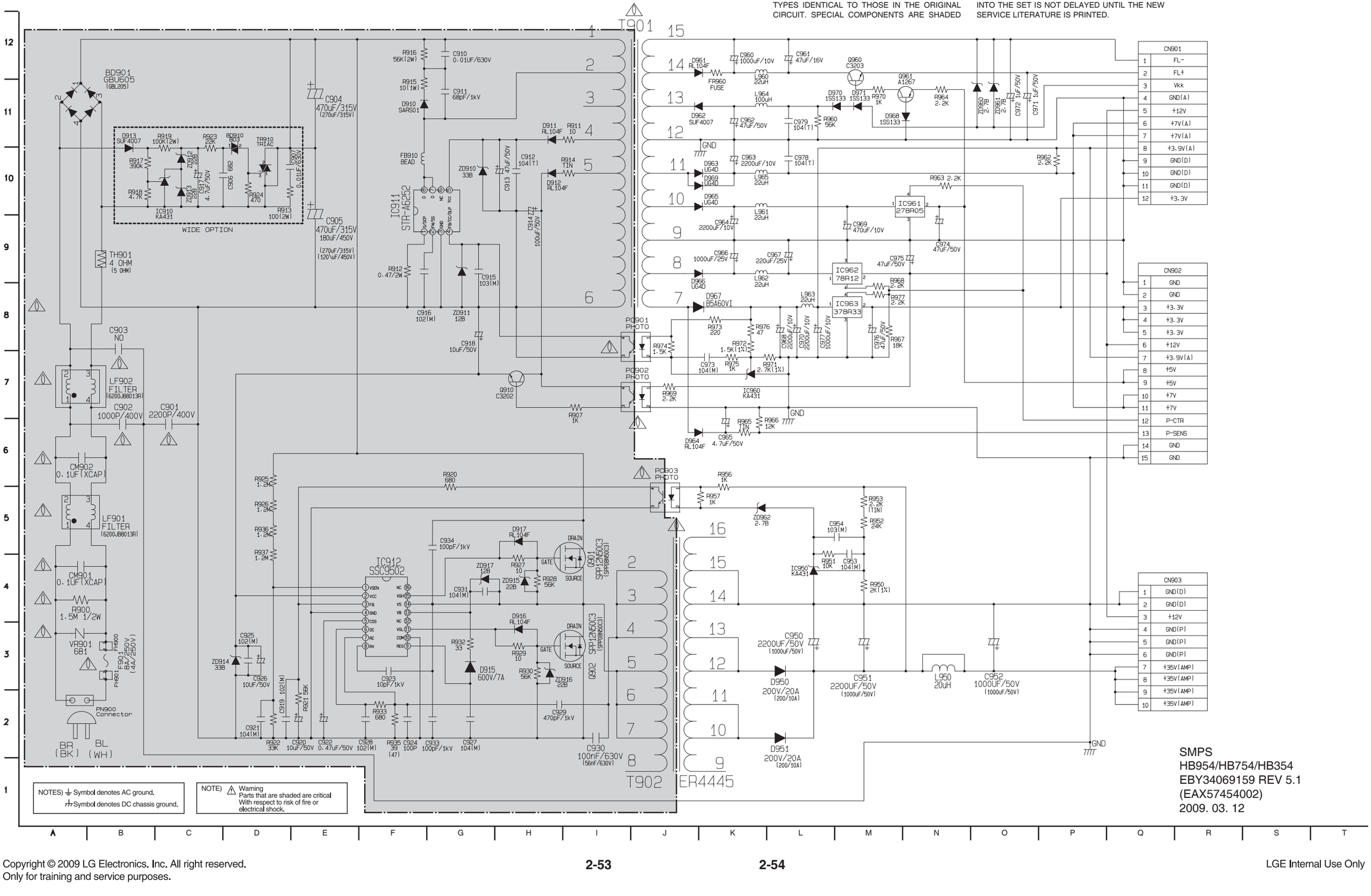
CIRCUIT DIAGRAMS
1. SMPS CIRCUIT DIAGRAM

IMPORTANT SAFETY

WHEN SERVICING THIS CHASSIS, UNDER NO CIRCUMSTANCES SHOULD THE ORIGINAL DESIGN BE MODIFIED OR ALTERED WITHOUT PERMISSION FROM THE LG CORPORATION. ALL COMPONENTS SHOULD BE REPLACED ONLY WITH TYPES IDENTICAL TO THOSE IN THE ORIGINAL CIRCUIT. SPECIAL COMPONENTS ARE SHADED ON THE SCHEMATIC FOR EASY IDENTIFICATION. THIS CIRCUIT DIAGRAM MAY OCCASIONALLY DIFFER FROM THE ACTUAL CIRCUIT USED. THIS WAY, IMPLEMENTATION OF THE LATEST SAFETY AND PERFORMANCE IMPROVEMENT CHANGES INTO THE SET IS NOT DELAYED UNTIL THE NEW SERVICE LITERATURE IS PRINTED.

NOTE :

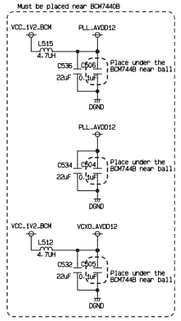
1. Shaded(■) parts are critical for safety. Replace only with specified part number.
2. Voltages are DC-measured with a digital voltmeter during Play mode.

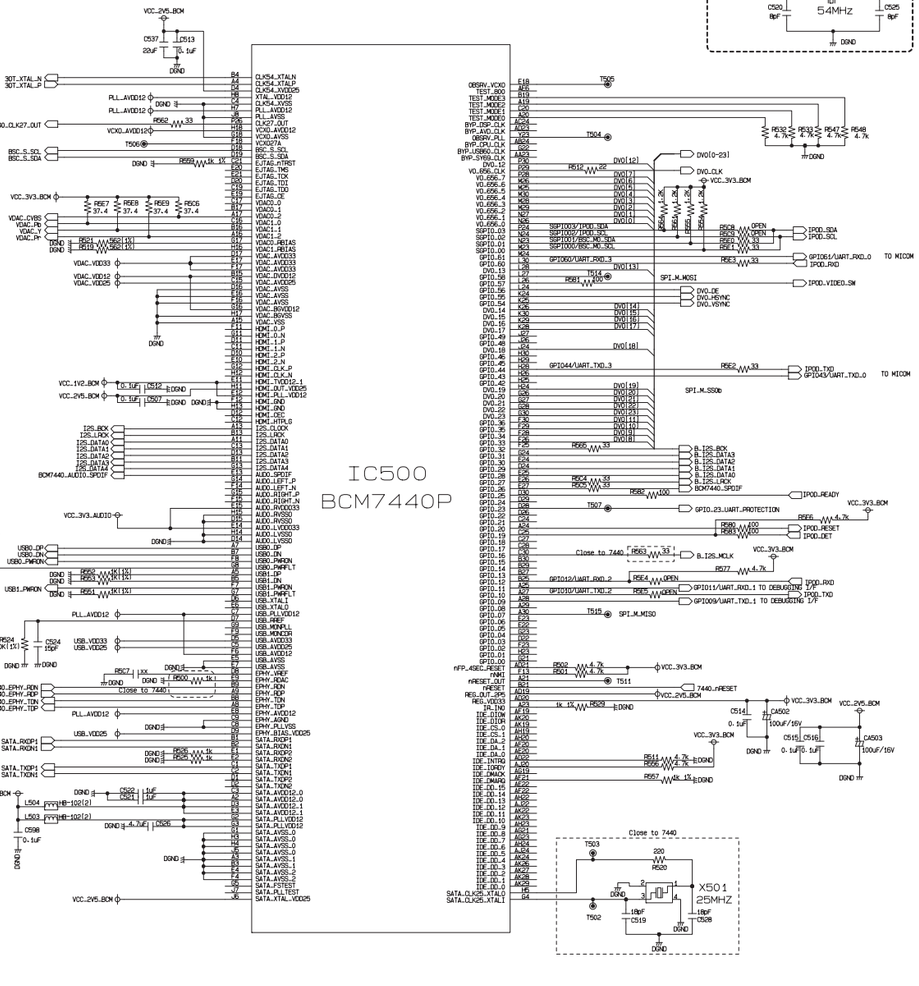


SMPS
HB954/HB754/HB354
EBY34069159 REV 5.1
(EAX57454002)
2009. 03. 12

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

2. CPU BCM7440-1 CIRCUIT DIAGRAM





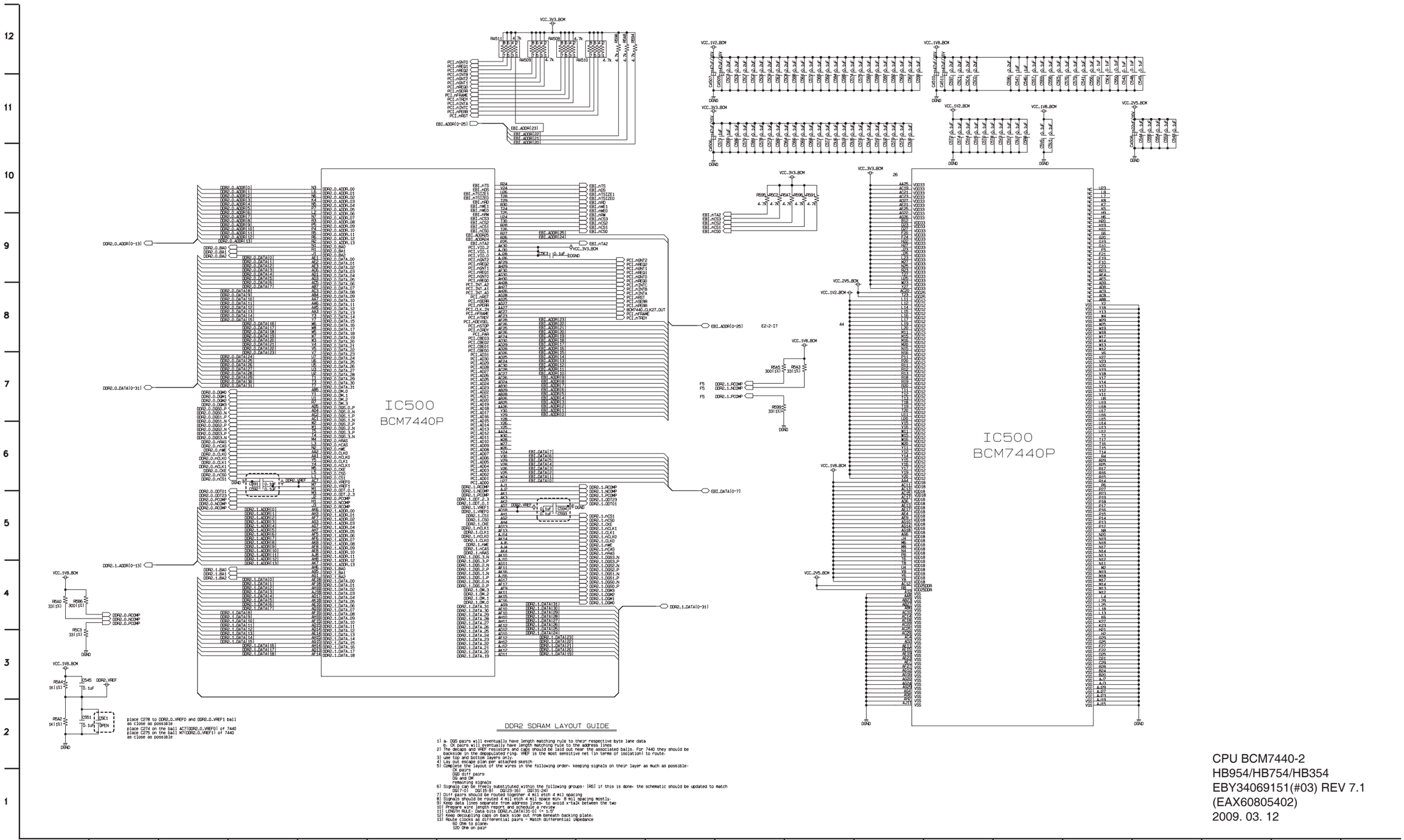
BCM7440C0 STRAP OPTIONS

Strap Name	Strap Bit	Description	Pin	Value	Comments
Invert_EBI_Addr	strap_invert_addr	0:Do Not Invert 1:Invert Upper Bits	EBI_nAD	0 1	1:invert upper bits of EBI addr 0:Do not invert EBI addr
Flash Type	strap_nand_flash	0:External NOR Flash 1:External NAND Flash	EBI_nWE1	1	NAND booting
NMI_H_Active	strap_NMI_polarity	0:Low-active interrupt 1:High-active interrupt	EBI_nTS	0	Per System Configuration
CS_swap	strap_ebi_cs_swap	0: No swap 1: Swap CS_0 and CS_1	EBI_nDS	0	NAND booting
	strap_reset_ext_mode		DVO_00	0	Per System Configuration
	strap_test_debug_en_1 strap_test_debug_en_0	TBD	DVO_02 DVO_01	00	7440B2: DVO_02=1,DVO_01=1 7440C0: 00
SDRAM_0_size	strap_ddr2_0_size_1 strap_ddr2_0_size_0	0:DDR2 bank 0=64 MB 1:DDR2 bank 0=128 MB 2:DDR2 bank 0=256/512 MB 3:DDR2 Controller Manual Initialization	DVO_04 DVO_03	11	Per Memory Configuration
SDRAM_1_size	strap_ddr2_1_size_1 strap_ddr2_1_size_0	0:DDR2 bank 1=64 MB 1:DDR2 bank 1=128 MB 2:DDR2 bank 1=256/512 MB 3:DDR2 Controller Manual Initialization	DVO_06 DVO_05	11	Per Memory Configuration
SDRAM_1_speed SDRAM_0_speed	strap_ddr2_mhz_1 strap_ddr2_mhz_0	0:DDR2 Banks=200/400 MHz 1:DDR2 Banks=266/533 MHz 2:DDR2 Banks=333/667 MHz 3:DDR2 Banks=400/800 MHz	DVO_CLK DVO_07	10	Per Memory Configuration
FLASH_dbus_size	strap_ebi_boot_memory	0:Boot Flash=8 bit 1:Boot Flash=16 bit	I2S_CLOCK	0	NAND booting
system_endian	strap_system_big_endian	0:system is LITTLE endian 1:system is BIG endian	I2S_LRCK	0	Per System Configuration
PCI_mode	strap_pci_client	0:PCI bridge (master) mode 1:PCI client (slave) mode	I2S_DATA0	0	Per Memory Configuration
	strap_pci_memwin2_en	0:PCI memwin 2 disable 1:PCI memwin 2 enable	I2S_DATA2	0	Per Memory Configuration
	strap_pci_memwin1_en	0:PCI memwin 1 disable 1:PCI memwin 1 enable	I2S_DATA1	0	Per Memory Configuration
PCI_window_size	strap_pci_memwin_size_1 strap_pci_memwin_size_0	0:32 Mbyte window 1:64 Mbyte window 2:128 Mbyte window 3:256 Mbyte window	I2S_DATA4 I2S_DATA3	00	Per Memory Configuration
PCI_speed	strap_33_27_MHZ_clock	0:27MHz clock output 1:33MHz clock output	EBI_nWE0	1	Per System Configuration
	strap_reset_outb_def_value		EBI_nRW	0	
PCI_From_BSC_slave	strap_spi_slave_enable	0:BSC slave port 1:SPI slave port	DVO[12]	0	Internal Fix
Xtal_bias[3:0]	strap_xtal_adj_3 strap_xtal_adj_2 strap_xtal_adj_1 strap_xtal_adj_0	Adjust the 54MHz Osc. bias current	EBI_ADDR[25] USB1_PWRON USB0_PWRON AUDO_SPDIF	1010	
Flash/ROM_size [1:0]	strap_ebi_rom_size1 strap_ebi_rom_size0	0:disable ECC for block0 1:disable ECC for block0 2:enable ECC for block0 3:enable ECC for block0	EBI_nTSIZE1 EBI_nTSIZE0	10	For NAND, EBI_nTSIZE1=1 :enable ECC for read from Block0

CPU BCM7440-1
HB954/HB754/HB354
EBY34069151(#02) REV 7.1
(EAX60805402)
2009. 03. 12

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

3. CPU BCM7440-2 CIRCUIT DIAGRAM

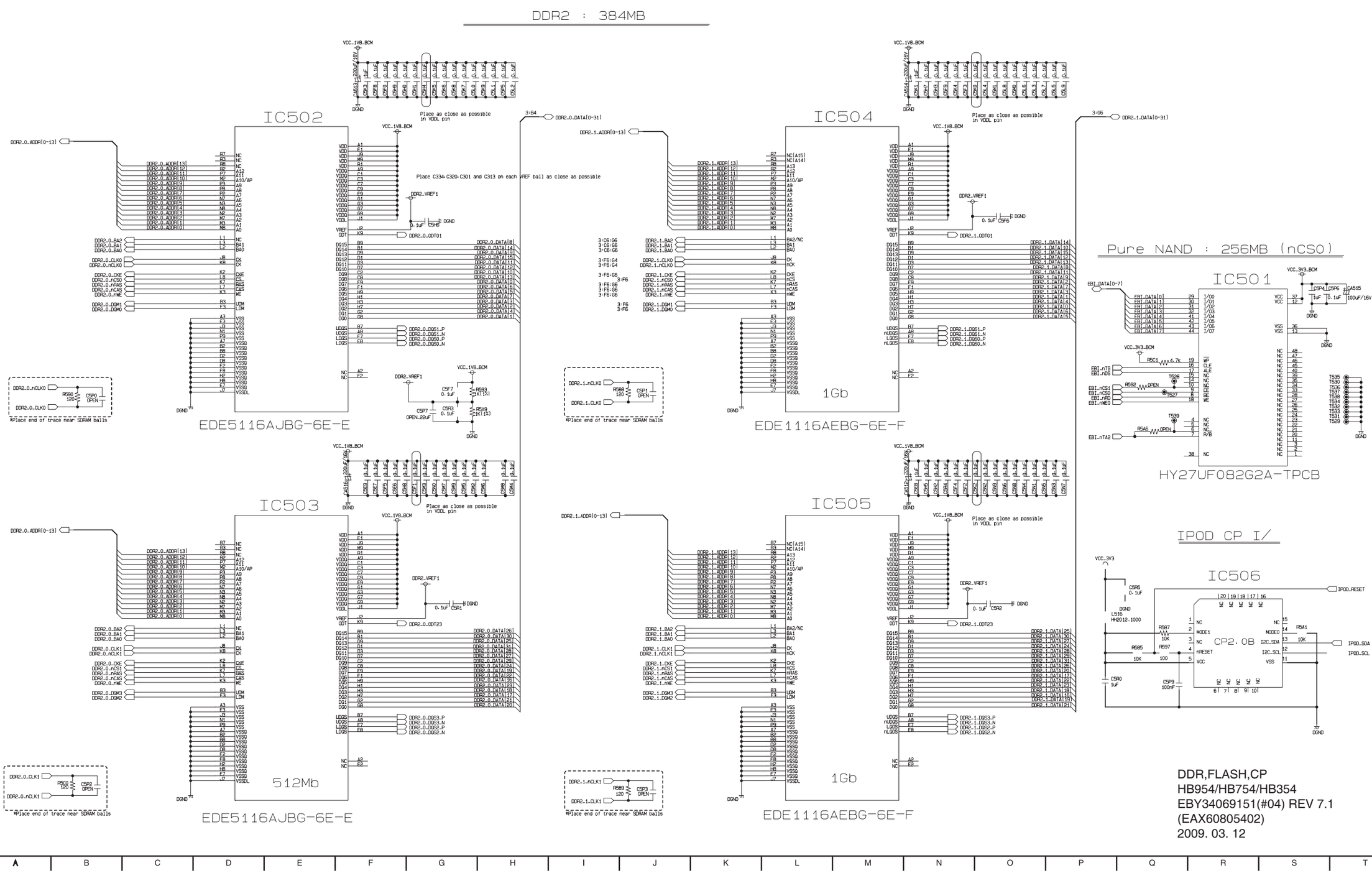


CPU BCM7440-2
HB954/HB754/HB354
EBY34069151(#03) REV 7.1
(EAX60805402)
2009. 03. 12

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

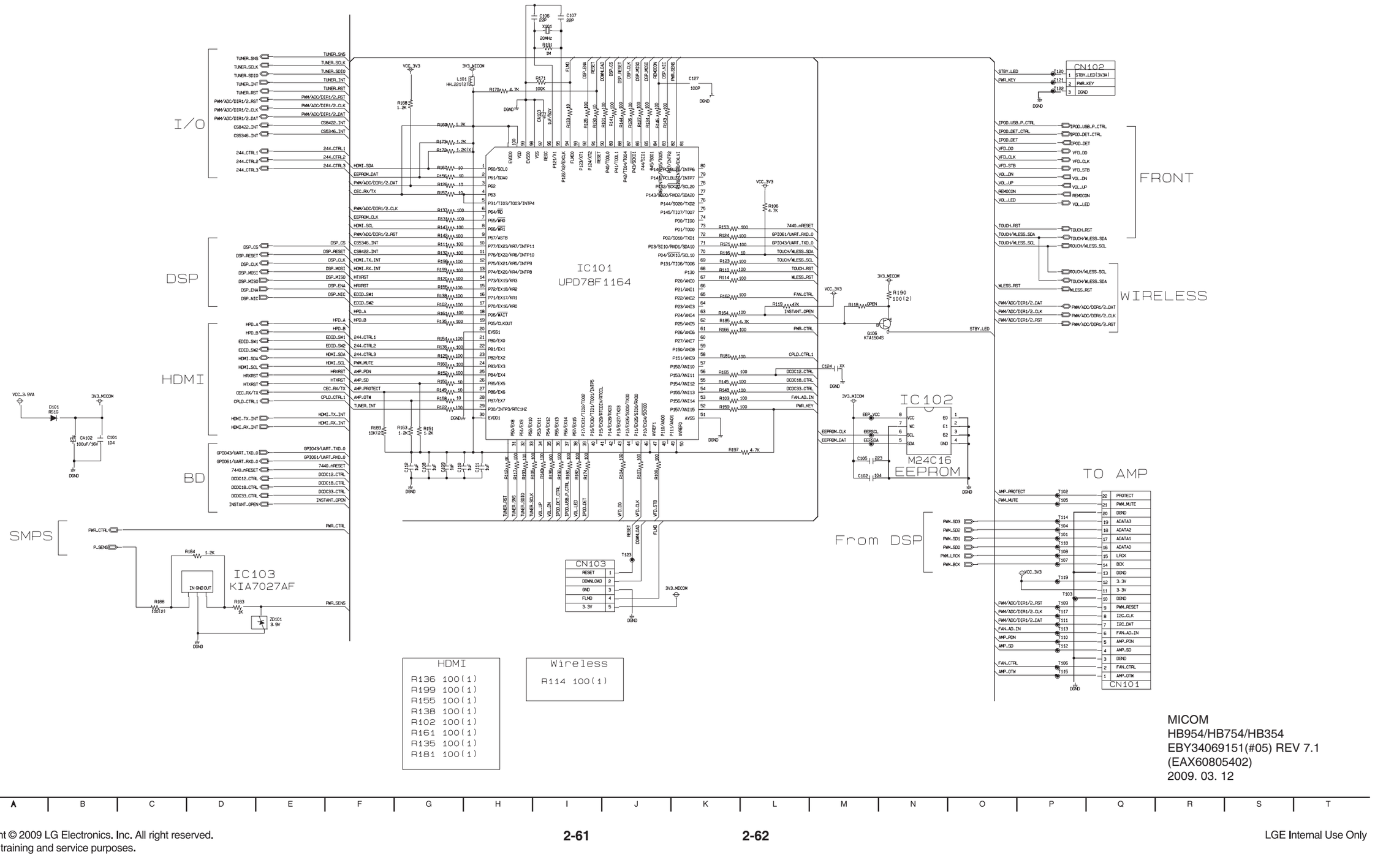
LGE Internal Use Only

4. DDR FLASH, CP CIRCUIT DIAGRAM



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

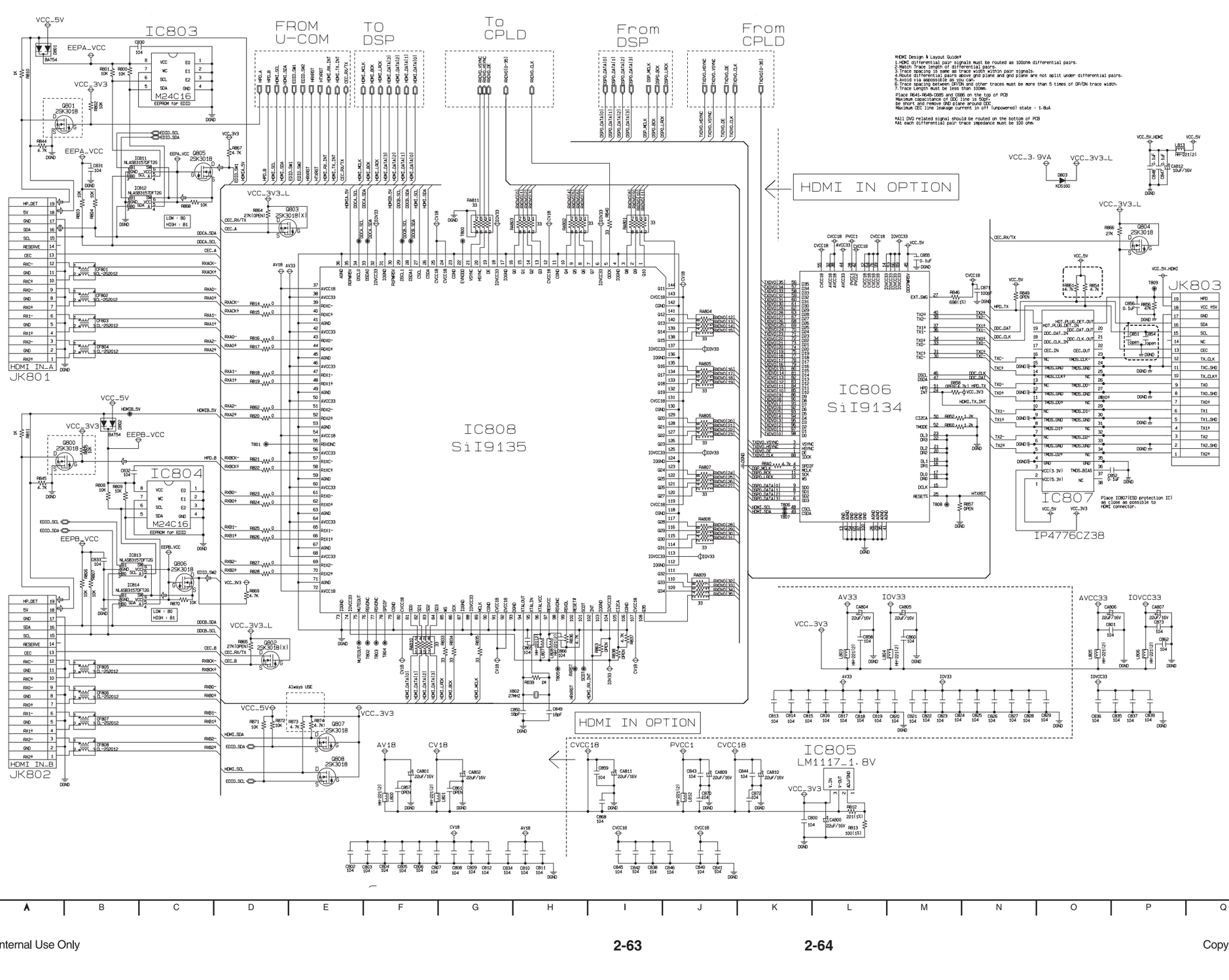
5. MICOM CIRCUIT DIAGRAM



MICOM
HB954/HB754/HB354
EBY34069151(#05) REV 7.1
(EAX60805402)
2009. 03. 12

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

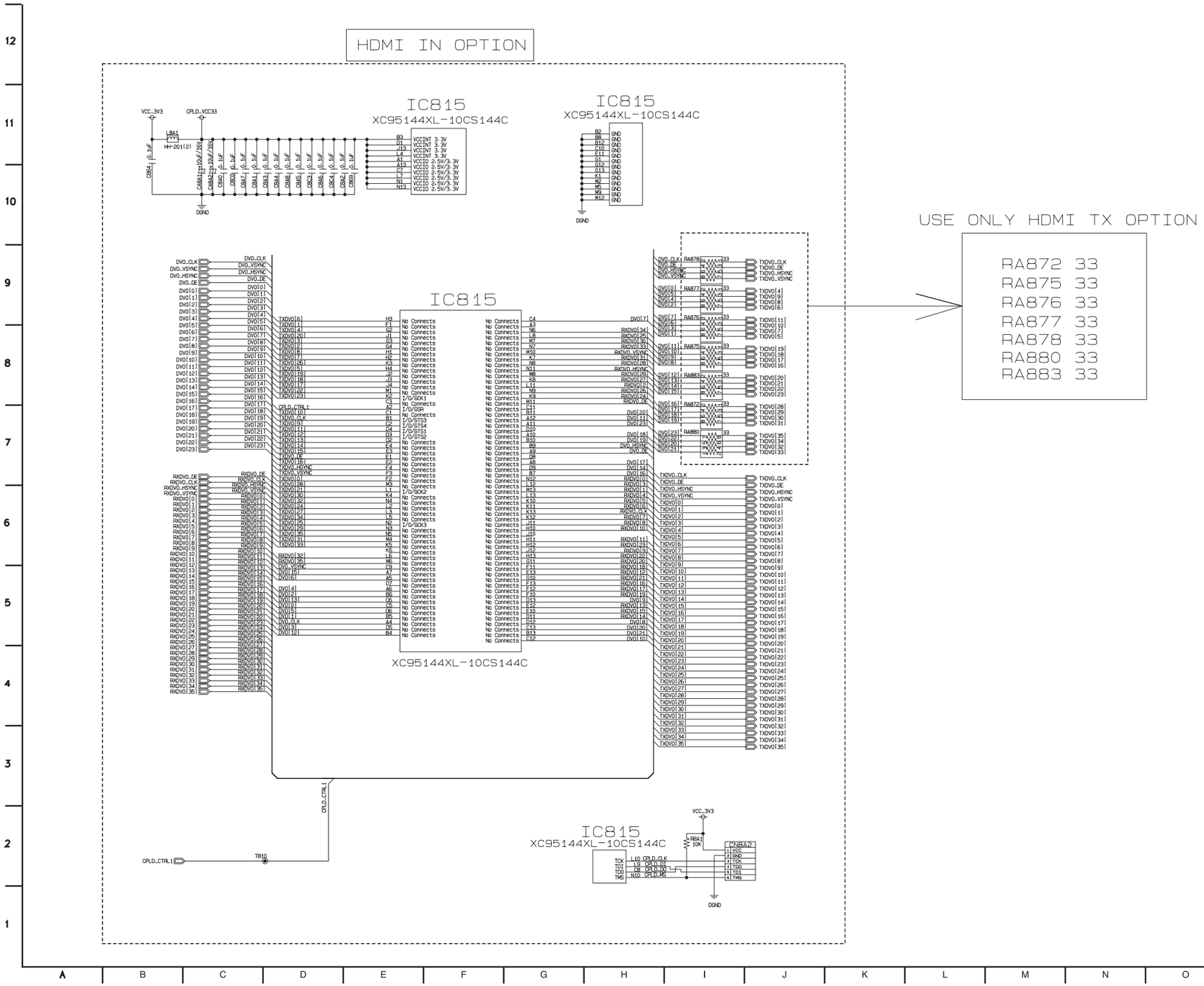
6. HDMI CIRCUIT DIAGRAM



HDMI
HB954/HB754/HB354
EBY34069151(#06) REV 7.1
(EAX60805402)
2009. 03. 12

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

7. CPLD CIRCUIT DIAGRAM

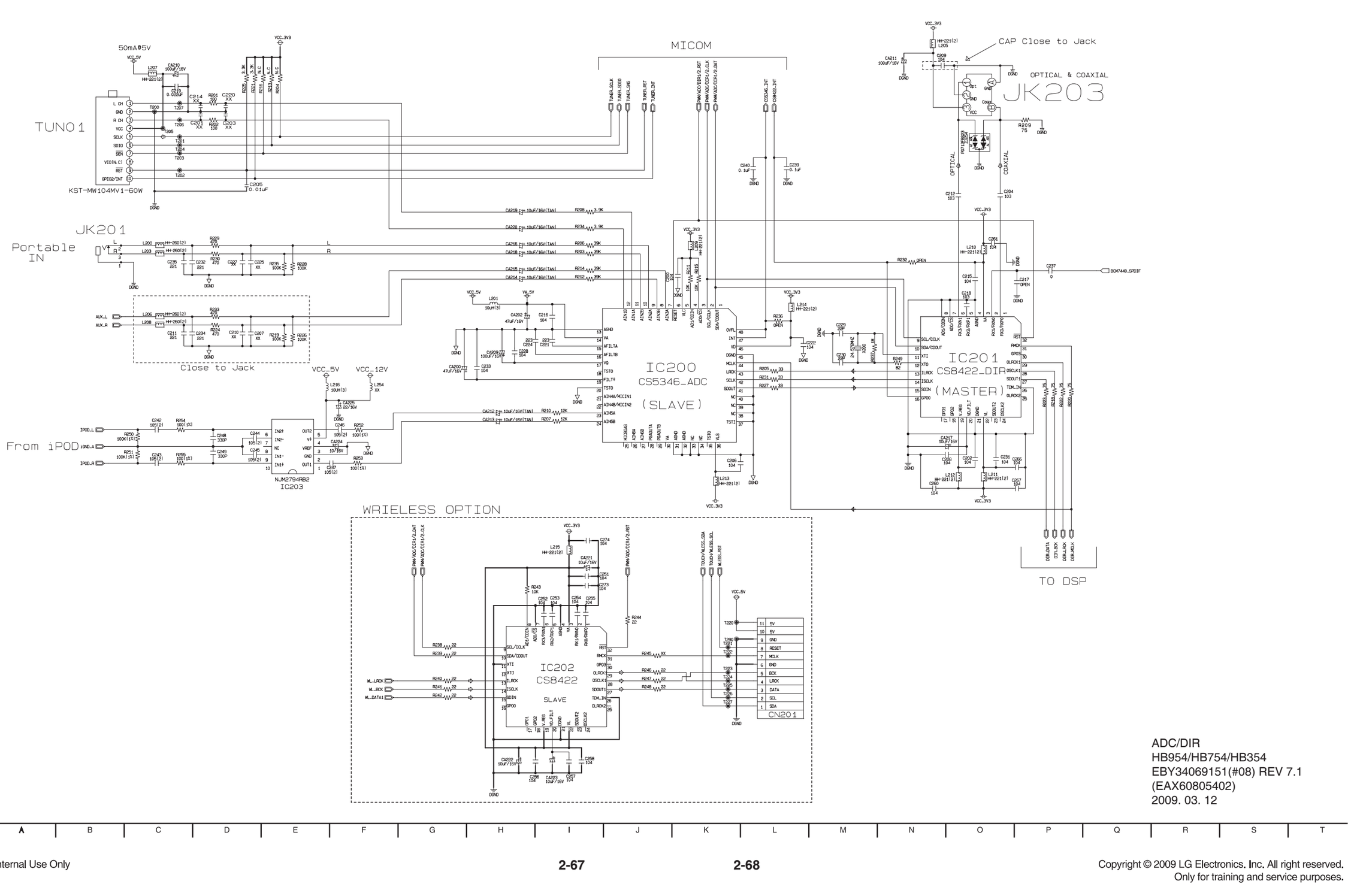


CPLD
HB954/HB754/HB354
EBY34069151(#07) REV 7.1
(EAX60805402)
2009. 03. 12

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

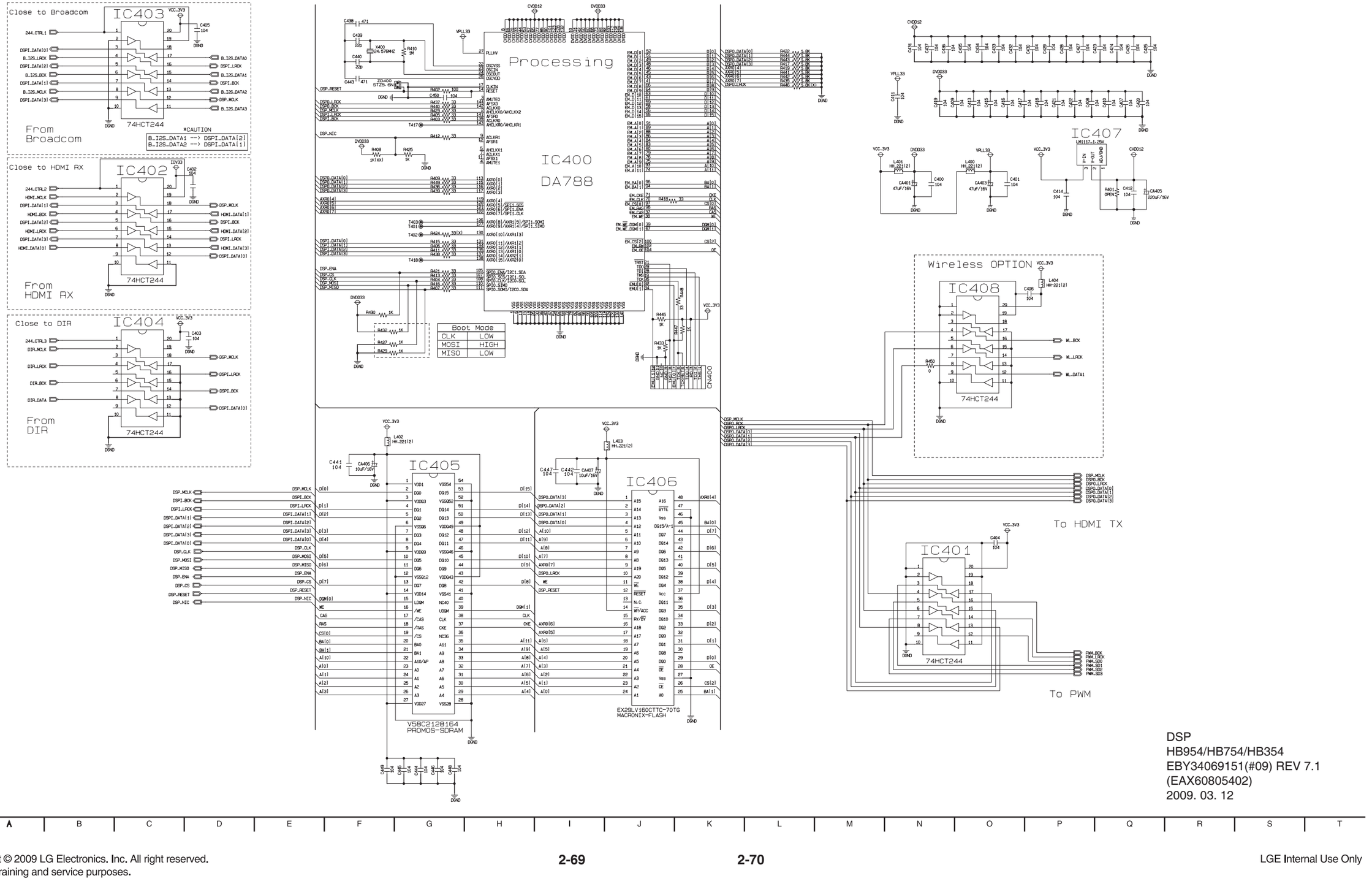
8. ADC/DIR CIRCUIT DIAGRAM



ADC/DIR
HB954/HB754/HB354
EBY34069151(#08) REV 7.1
(EAX60805402)
2009. 03. 12

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

9. DSP CIRCUIT DIAGRAM

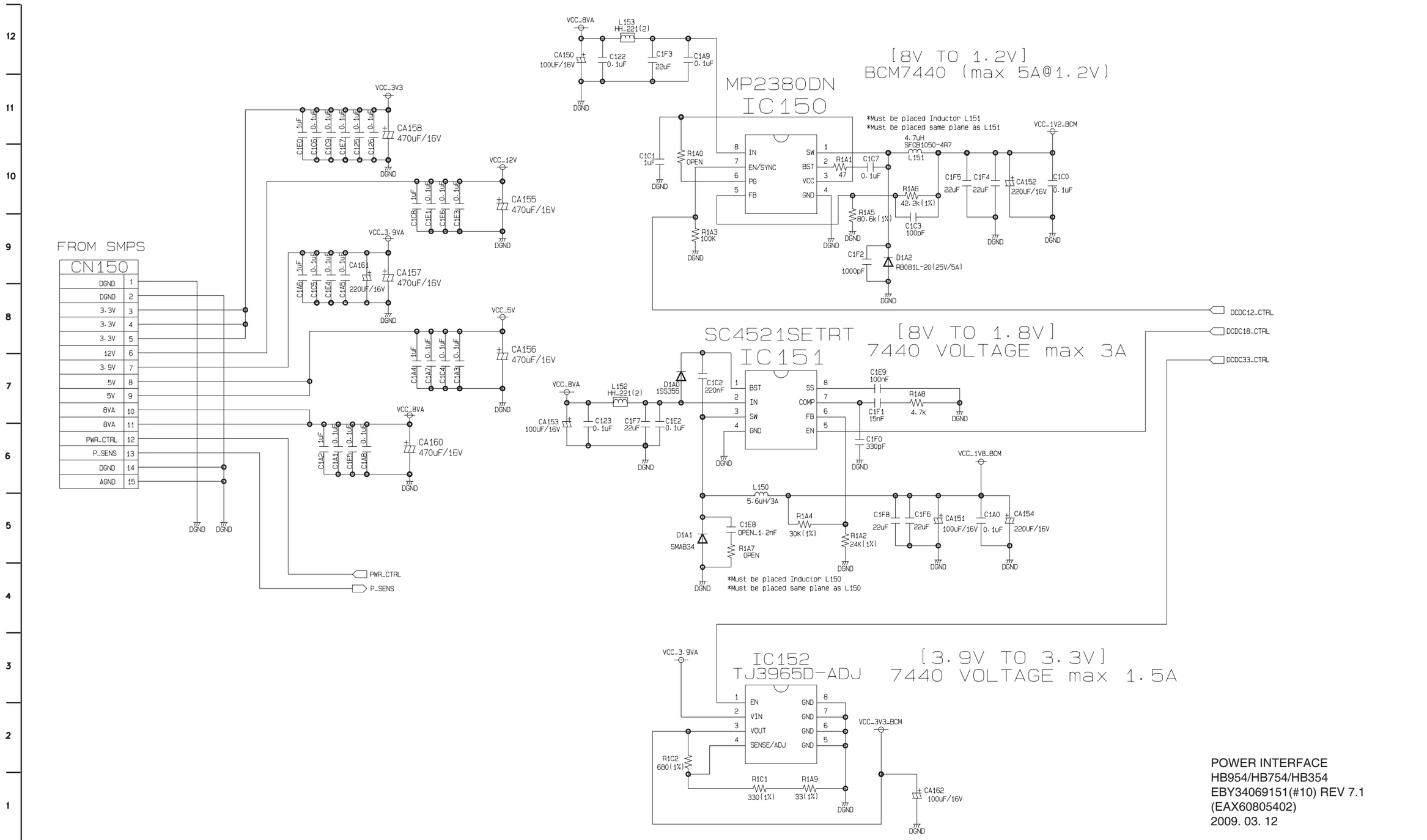


DSP
HB954/HB754/HB354
EBY34069151(#09) REV 7.1
(EAX60805402)
2009. 03. 12

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

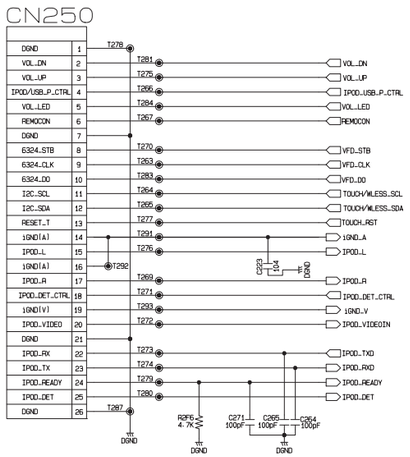
10. POWER INTERFACE CIRCUIT DIAGRAM



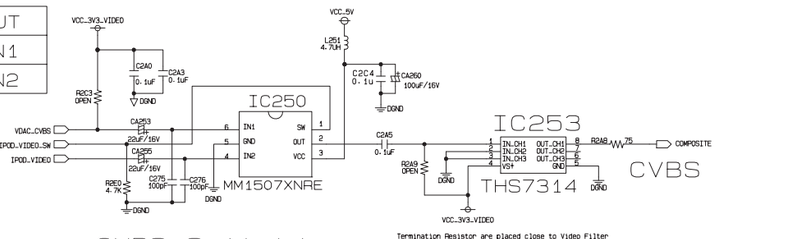
POWER INTERFACE
HB954/HB754/HB354
EBY34069151(#10) REV 7.1
(EAX60805402)
2009. 03. 12

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

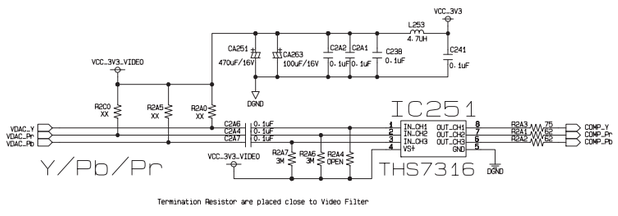
11. I/O INTERFACE CIRCUIT DIAGRAM



SW	OUT
L	IN1
H	IN2

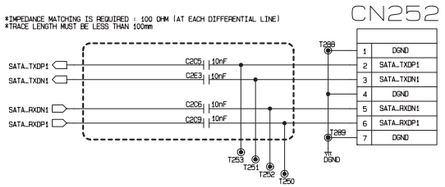


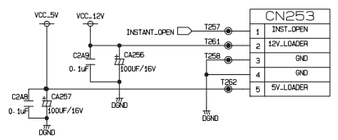
Audio & Video Signal Layout Guide
1. Component & CVBS signal traces must be routed using signal to signal spacing is more than 0.25mm.
2. Place R101-R107 VDAC_BIAS resistors close to 7440

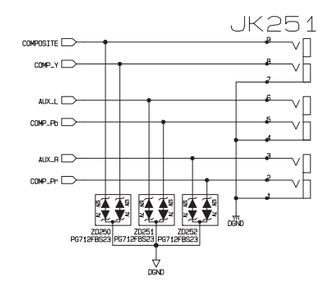


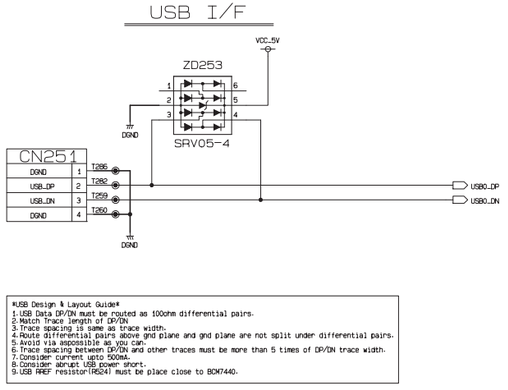
Termination Resistor are placed close to Video Filter

SATA Design & Layout Guide
1.SATA Data DP/DN must be routed as 100ohm differential pairs.
2.Match Trace length of DP/DN
3.Trace spacing is same as trace width.
4.Route differential pairs above gnd plane and gnd plane are not split under differential pairs.
5.Avoid via aspossible as you can.
6.Trace spacing between DP/DN and other traces must be more than 5 times of DP/DN trace width.
7.SATA Xtal1X[02] must be place close to BCM7440.
8.Trace Length must be less than 100mm.
9.Place ac-coupling capacitor(C2C5-2E3-2C6-2C9) close to Connector

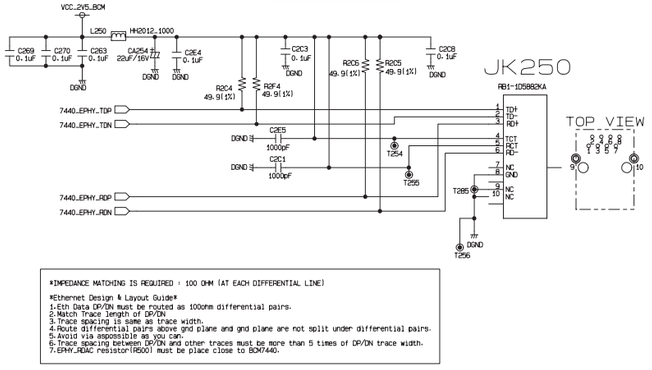








USB Design & Layout Guide
1.USB Data DP/DN must be routed as 100ohm differential pairs.
2.Match Trace length of DP/DN
3.Trace spacing is same as trace width.
4.Route differential pairs above gnd plane and gnd plane are not split under differential pairs.
5.Avoid via aspossible as you can.
6.Trace spacing between DP/DN and other traces must be more than 5 times of DP/DN trace width.
7.Consider current upto 500mA.
8.Consider abrupt USB power short.
9.USB RREF resistor(R624) must be place close to BCM7440.



*IMPEDANCE MATCHING IS REQUIRED : 100 OHM (AT EACH DIFFERENTIAL LINE)

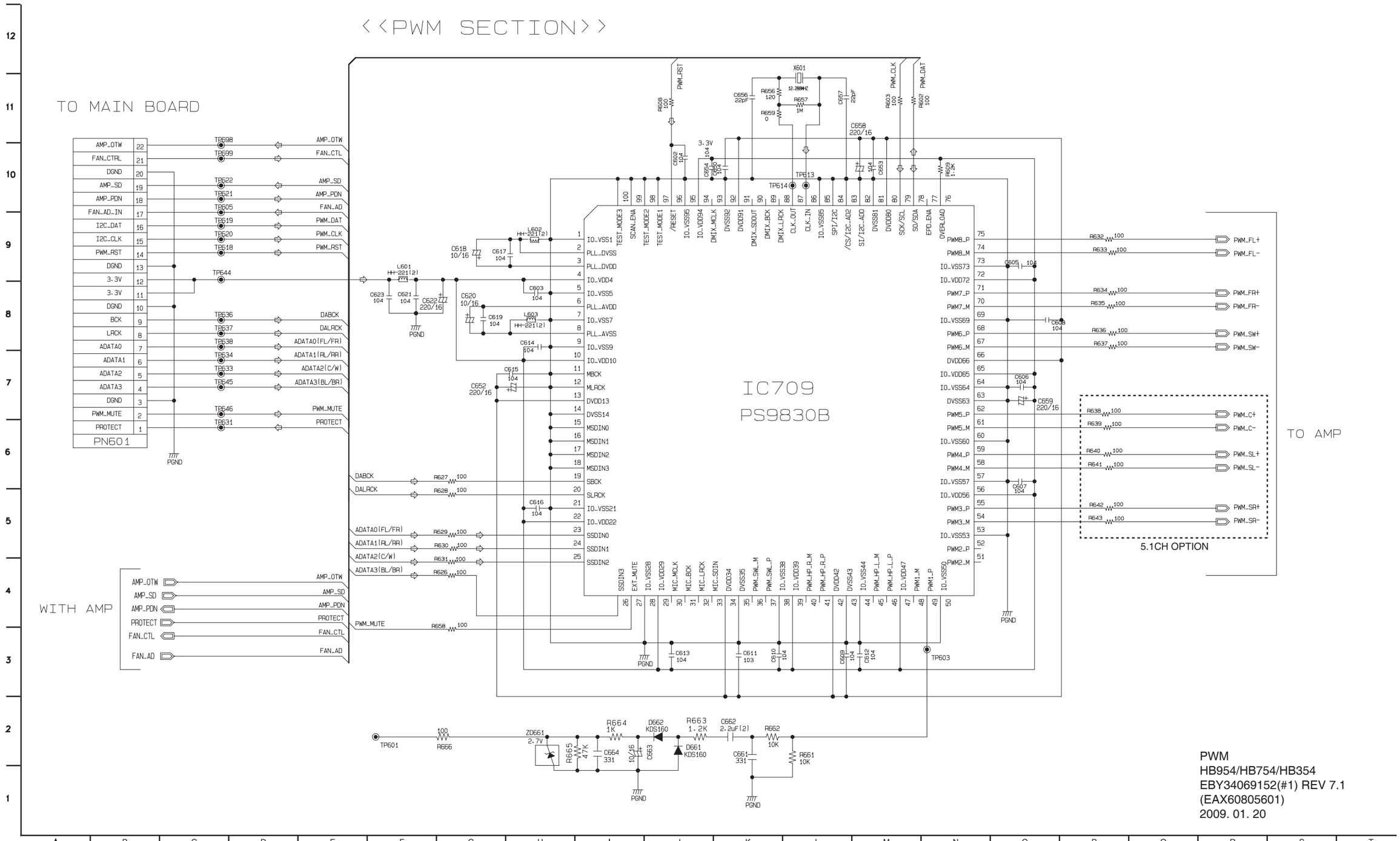
Ethernet Design & Layout Guide
1.Eth Data DP/DN must be routed as 100ohm differential pairs.
2.Match Trace length of DP/DN
3.Trace spacing is same as trace width.
4.Route differential pairs above gnd plane and gnd plane are not split under differential pairs.
5.Avoid via aspossible as you can.
6.Trace spacing between DP/DN and other traces must be more than 5 times of DP/DN trace width.
7.EPHY_RDAC resistor(R500) must be place close to BCM7440.

I/O INTERFACE
HB954/HB754/HB354
EBY34069151(#11) REV 7.1
(EAX60805402)
2009. 03. 12

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

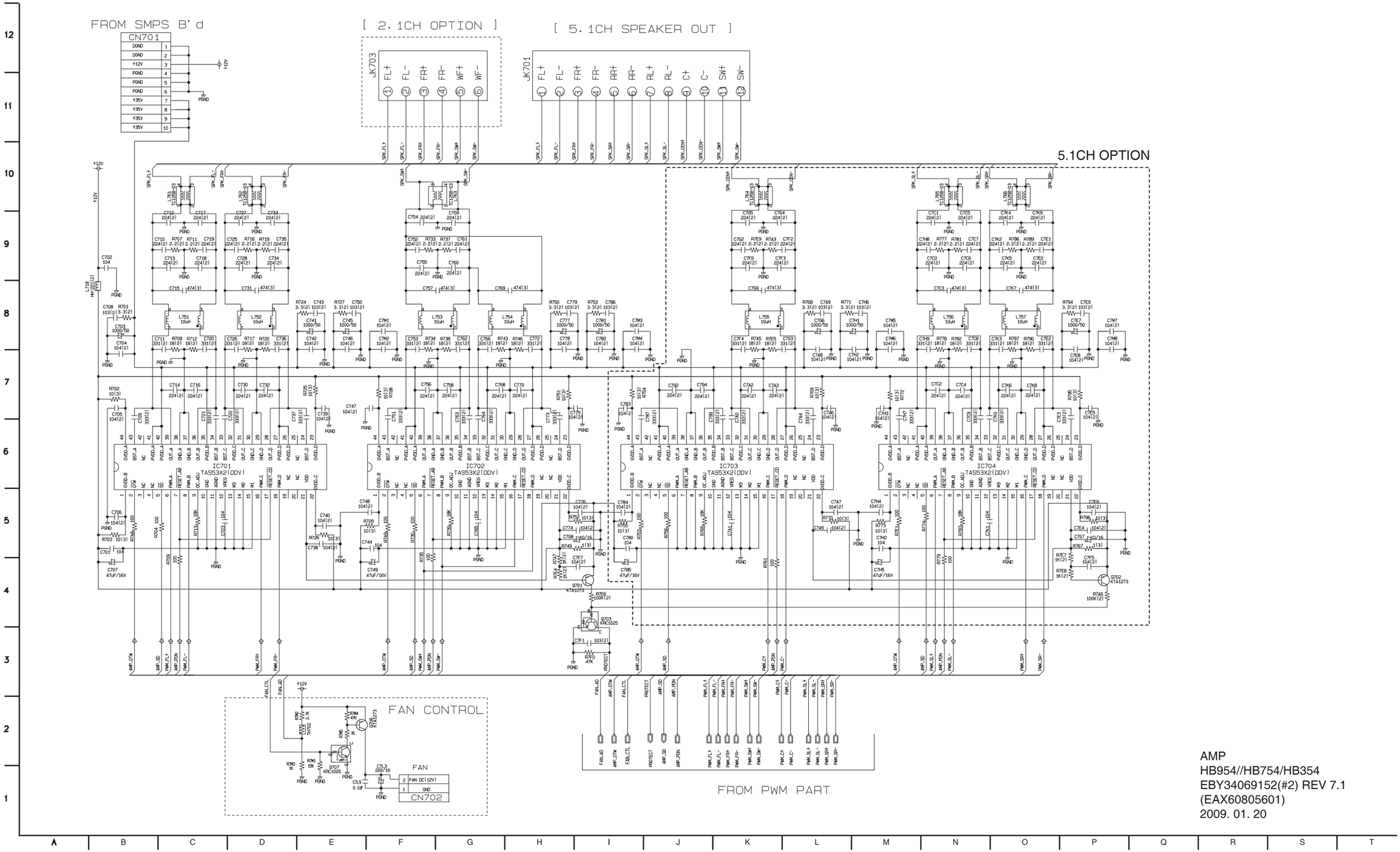
LGE Internal Use Only

12. PWM CIRCUIT DIAGRAM



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

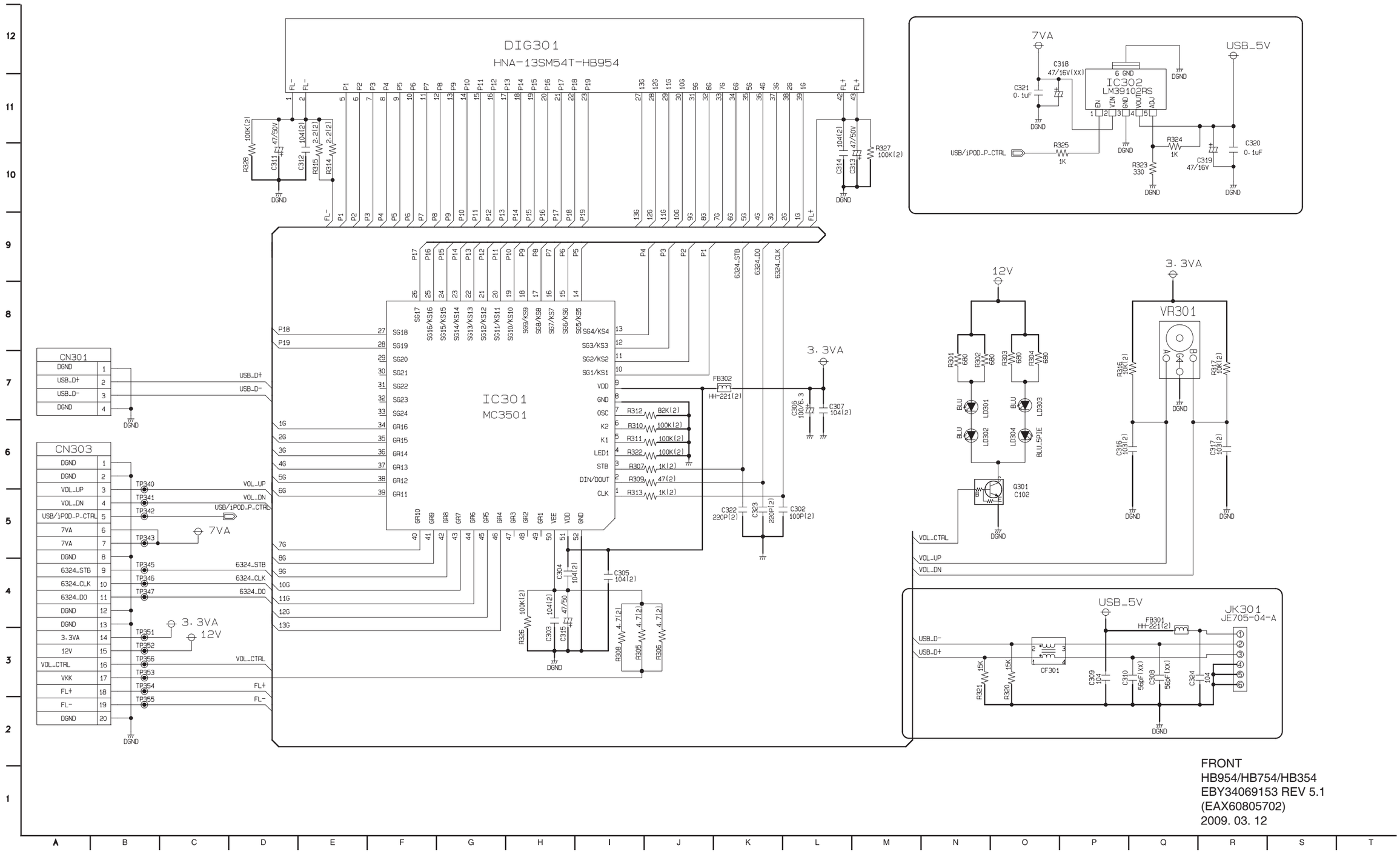
13. AMP CIRCUIT DIAGRAM



AMP
HB954//HB754/HB354
EBY34069152(#2) REV 7.1
(EAX60805601)
2009. 01. 20

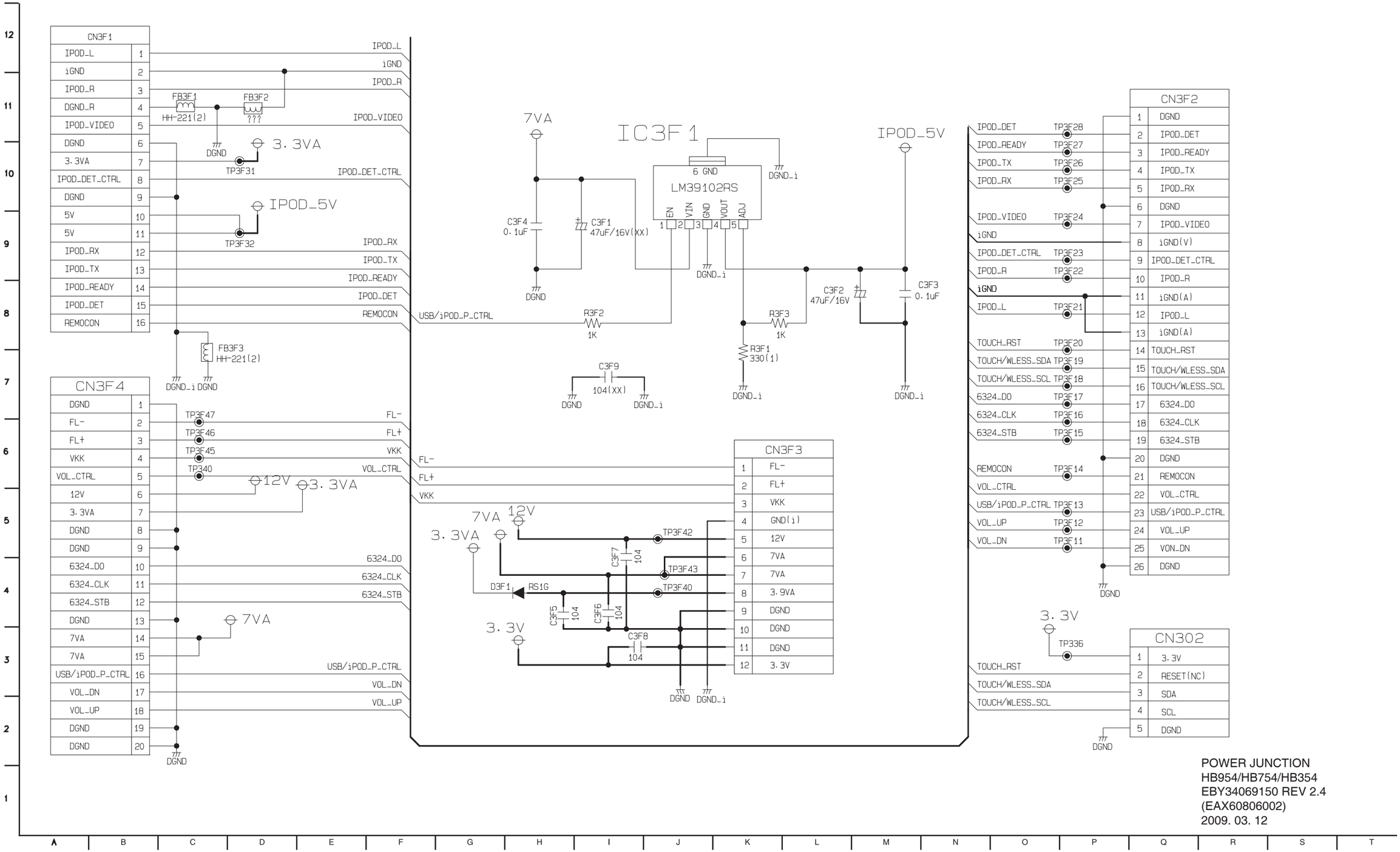
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

14. FRONT CIRCUIT DIAGRAM



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

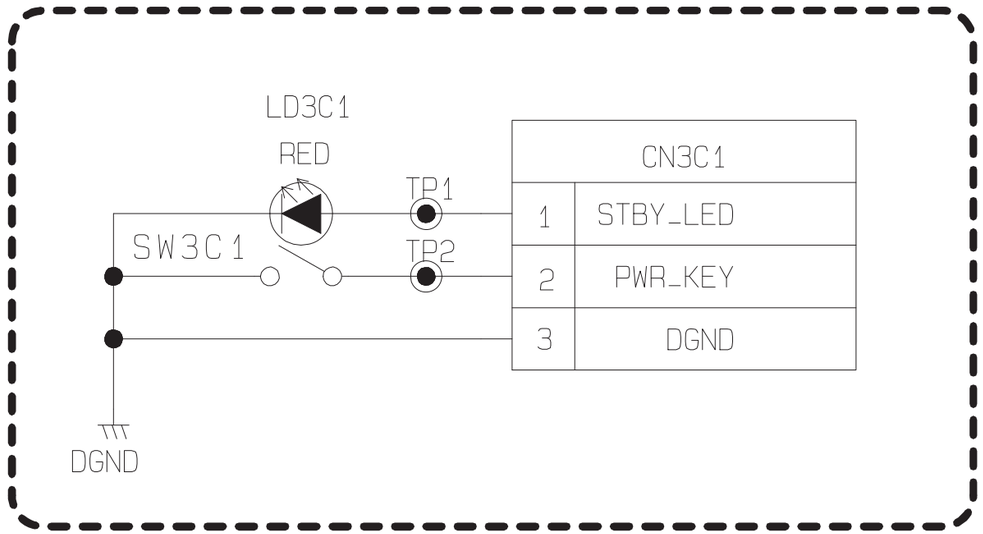
15. POWER JUNCTION CIRCUIT DIAGRAM



POWER JUNCTION
HB954/HB754/HB354
EBY34069150 REV 2.4
(EAX60806002)
2009. 03. 12

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

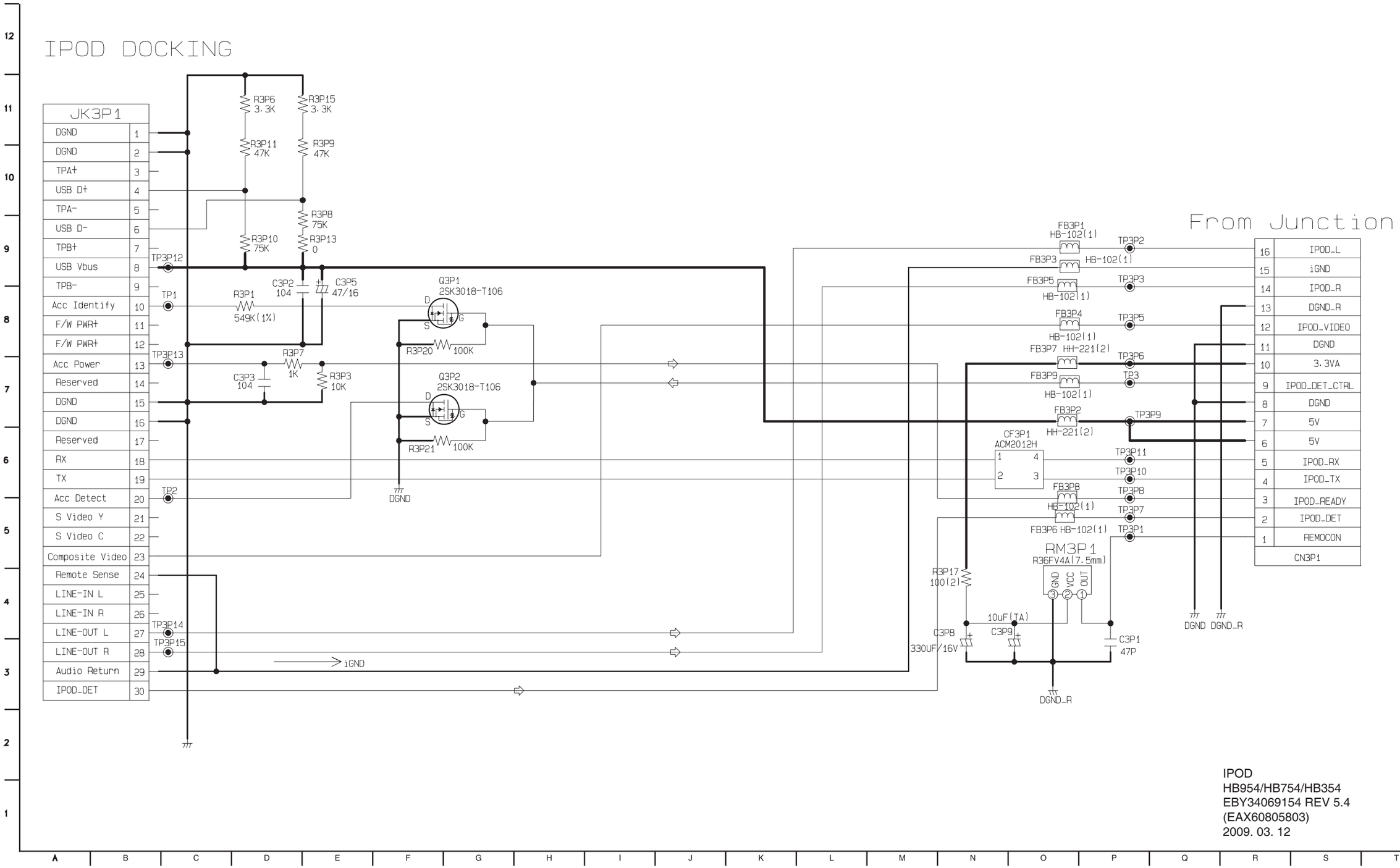
16. POWER KEY CIRCUIT DIAGRAM



PWR KEY
HB954/HB754/HB354
EBY34069158 REV 1.10
(EAX60806102)
2009. 03. 12

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

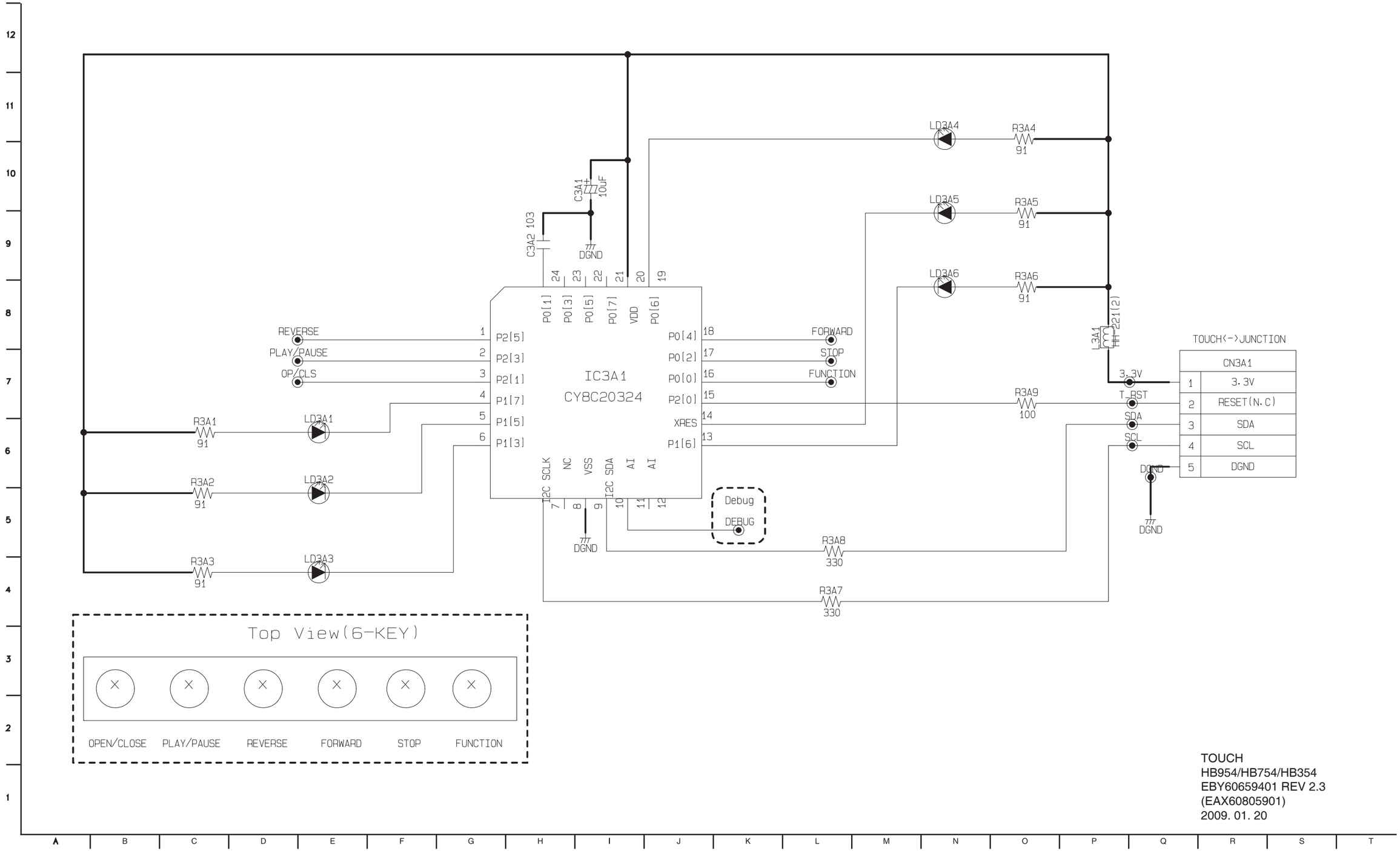
17. IPOD CIRCUIT DIAGRAM



IPOD
HB954/HB754/HB354
EBY34069154 REV 5.4
(EAX60805803)
2009. 03. 12

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

18. TOUCH CIRCUIT DIAGRAM



TOUCH
HB954/HB754/HB354
EBY60659401 REV 2.3
(EAX60805901)
2009. 01. 20

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

CIRCUIT VOLTAGE CHART

1. MAIN BOARD

Type	Pin	Vcc/Vdd	
		Spec	ACTUAL measurement
IC101 MICOM			
LPD78F1164 TYPE: 100P LQFP VENDER: NEC	VDD: 99,100,30	VDD: +2.7~ +4.0V	VDD: +3.242
IC102, IC803, IC804 EEPROM			
M24C16 TYPE: 8P SO-8 VENDER: STM	VCC: 8	VCC: +1.8 ~ +5.5V	VCC: +3.226, +4.48, +4.48
IC200 ADC			
CS5346 TYPE: 48P LQFP VENDER: CIRRUS LOGIC	VA: 14 VD: 46 VLS: 36 VLC: 5	VA: +3.1 ~ +5.25V VD: +3.1 ~ VA+0.25 or +5.25V VLS: +1.71 ~ +5.25V VLC: +1.71 ~ +5.25V	VA: +5.03 VD: +3.27 VLS: +3.27 VLC: +3.27
IC201 DIR			
CS8422 TYPE: 32P VENDER: CIRRUS LOGIC	VA: 3 VL,V_REG: 22,19	VA: +1.71 ~ +5.25V VL,V_REG: +3.135 ~ +3.465V	VA: +3.269 VL,V_REG: +3.269
IC250 SW IC			
MM1225 TYPE: 8P SOP VENDER: MITSUMI	VCC: 6	VCC: +4.7V~ +13V	VCC: +5.03
IC251 Video Amplifier			
THS7316 TYPE: 8P SOIC VENDER: TEXAS INS.	VCC: 4	VCC: +3 ~ +5V	VCC: +3.25
IC253 Video Amplifier			
THS7314 TYPE: 8P SOIC VENDER: TEXAS INS.	VCC: 4	VCC: +3 ~ +5V	VCC: +3.25
IC400 DSP			
DA788 TYPE: 144P TQFP VENDER: TEXAS INS.	CVDD: 8,16,20 etc. DVDD: 10,31,42 etc.	CVDD: +1.14 ~ +1.32V DVDD: +3.13 ~ +3.47V	CVDD: +1.249 DVDD: +3.272
IC405 SDRAM			
V54C3128164 TYPE: 54P TSOP VENDER: PROMOS	VCC: 1,3,9,14,27	VCC: +3.0 ~ +3.6V	VCC: +3.272
IC406 NOR FLASH			
MX29LV160C TYPE: 48P TSOP VENDER: Macronix	VCC: 37	VCC: +2.7~ +3.6V	VCC: 3.272
IC407, IC805 LDO IC			
LM1117 TYPE: 3P TO252 VENDER: TAEJIN	VIN: 3	VIN: ~ +15V	VIN: +3.271
IC150 DC-DC			
MP2380 TYPE: 8P SOIC VENDER: MPS	VIN: 8	VIN: +4.5 ~ +25V	VIN: +6.72
IC151 DC-DC			
SC4521 TYPE: 8P SO-8 VENDER: SEMTECH	VCC: 2	VIN: ~ +24V	VIN: +6.73

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

Type	Pin	Vcc/Vdd	
		Spec	ACTUAL measurement
IC152 LDO IC			
TJ3965 TYPE: 8P SOP8 VENDER: TAEJIN	VIN: 2	VIN: ~ +6.5V	VIN: +3.805
IC500 MPEG			
BCM7440P TYPE: 720P BGA VENDER: Braodcom	VDD33: AA25 etc. VDD25: AC20 etc. VDD12: L11 etc. VDD18: AA4 etc. PLLVDD: C7 etc. AVDD25: C15 VDD33: D17 etc. XVDD25: D4 etc. XVDD12: H8	VDD33: +3.135 ~ +3.465V A/X/VDD25: +1.375~+2.75V X/VDD12: +1.14 ~ +1.26V VDD18: +1.7 ~ +1.9V PLLVDD: +1.14 ~ +1.26V AVDD33: +2.97 ~ +3.63V	VDD33: +3.298 A/X/VDD25: +2.599 X/VDD12: +1.21 VDD18: +1.807 PLLVDD: +1.22 AVDD33: +3.2962
IC501 NAND FLASH			
HY27UF082G2A TYPE: 48P TSOP VENDER: Hynix	VCC: 12,37	VCC: +2.7 ~ +3.6V	VCC: +3.302
IC502, IC503 DDR2			
HYB18TC512 TYPE: 84P TFBGA VENDER: QIMONDA	VDD: A1 etc. VDDQ: A9 etc. VDDL: J1	VDD: +1.7 ~ +1.9V VDDQ: +1.7 ~ +1.9V VDDL: +1.7 ~ +1.9V	VDD: +1.808 VDDQ: +1.808 VDDL: +1.808
IC504, IC505 DDR2			
HYB18TC1G TYPE: 84P TFBGA VENDER: QIMONDA	VDD: A1 etc. VDDQ: A9 etc. VDDL: J1	VDD: +1.7 ~ +1.9V VDDQ: +1.7 ~ +1.9V VDDL: +1.7 ~ +1.9V	VDD: +1.808 VDDQ: +1.808 VDDL: +1.808
IC506 iPod CP			
CP2.0B TYPE: VENDER: RENESAS	VCC: 5	VCC: +2.2 ~ +3.6V	VCC: +3.27
IC806 HDMI TX			
Sil9134 TYPE: 100P TQFP VENDER: Silicon image	IOVCC33: 14,53,66,89 PVCC: 28,42 VCC18: 12,32 etc. AVCC33: 44	IOVCC33: +2.97~+3.63V PVCC: +1.62 ~ +1.98V VCC18: +1.62 ~ +1.98V AVCC33: +2.97~+3.63V	IOVCC33: +3.271 PVCC: +1.829 VCC18: +1.829 AVCC33: +3.271
IC807 ESD IC			
IP4776CZ38 TYPE: 38P TSSOP VENDER: NXP	VCC3V3: 2 VCC5V0: 1	VCC3V3: ~ +5.5V VCC5V0: ~ +5.5V	VCC3V3: +3.271 VCC5V0: +5.03
IC808 HDMI RX			
Sil9135 TYPE: 144P TQFP VENDER: Silicon image	IOVCC33: 6,18 etc. AVCC33: 38,42 etc. VCC18: 12,37,92 etc. XVCC: 96	IOVCC33: +3.15~+3.45V AVCC33: +3.0 ~ +3.6V VCC18: +1.62 ~ +1.98V XVCC: +3.0 ~ +3.6V	IOVCC33: +3.270 AVCC33: +3.271 VCC18: +1.829 XVCC: +3.270
TUN01 TUNER			
MW104MV1 TYPE: DIP Module	VCC: 4	VCC:	Tuner Mode: VCC: +5.02
IC815 CPLD			
XC95144XL TYPE: 144P BGA VENDER: XILLINX	VCC: B3 etc.	VCC: +2.2 ~ +3.6V	VCC: +3.271

LGE Internal Use Only

2. AMP BOARD

Type	Pin	Vcc/Vdd	
		Spec	ACTUAL measurement
IC701, IC702, IC703, IC704 AMP IC			
TAS5352 TYPE: 44P HTSSOP VENDER: TEXAS INS.	VDD: 21 GVDD: 1,22,23,44 PVDD: 40,41,32,26,27	VDD: +10.8 ~ +13.2V GVDD: +10.8 ~ +13.2V PVDD: ~ +37V	VDD: +12.17 GVDD: +12.10 PVDD: +34.87
IC709 PWM IC			
PS9830B TYPE: 100P TQFP VENDER: PULSUS	IO_VDD: 4,10,22,29, 39,47,56,65,72,94 DVDD: 13,34,42,66, 80,91	IO_VDD: +2.97~3.63V DVDD: -0.3 ~ 5.5V	IO_VDD: +3.24 DVDD: +1.91

3. FRONT BOARD

Type	Pin	Vcc/Vdd	
		Spec	ACTUAL measurement
IC301 VFD IC			
MC3501 TYPE: 48P LQFP VENDER: ABOV	VDD: 9,51	VDD: +2.7 ~ +5.5V	VDD: +3.18
IC302, IC3F1 LDO			
LM39102 TYPE: 5P TO-252 VENDER: TAEJIN	VIN: 2	VIN: +2.25 ~ +16V	VIN: +6.82
IC3P1 NOISE Isolation IC			
NJM2794 TYPE: 10P SSOP14 VENDER: NJRC	VCC: 4	VCC: +4.3 ~ +13V	VCC: +12.16
IC3A1 TOUCH IC			
80C52 TYPE: 20P SOIC VENDER: CORERIVER	VDD: 20	VDD: +1.6 ~ +5.5V	VDD: +3.27

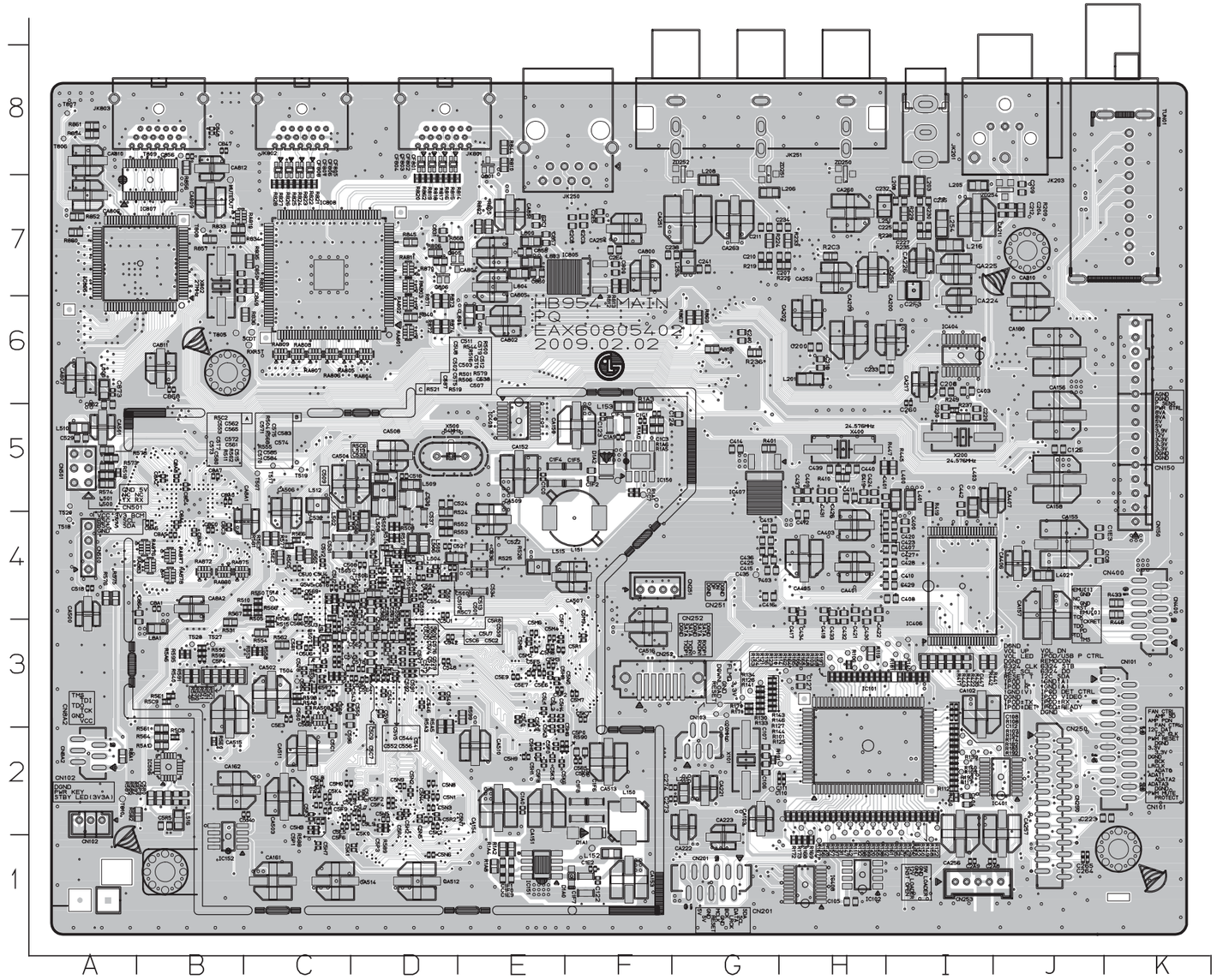
MEMO

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

PRINTED CIRCUIT BOARD DIAGRAMS

1. MAIN P.C.BOARD

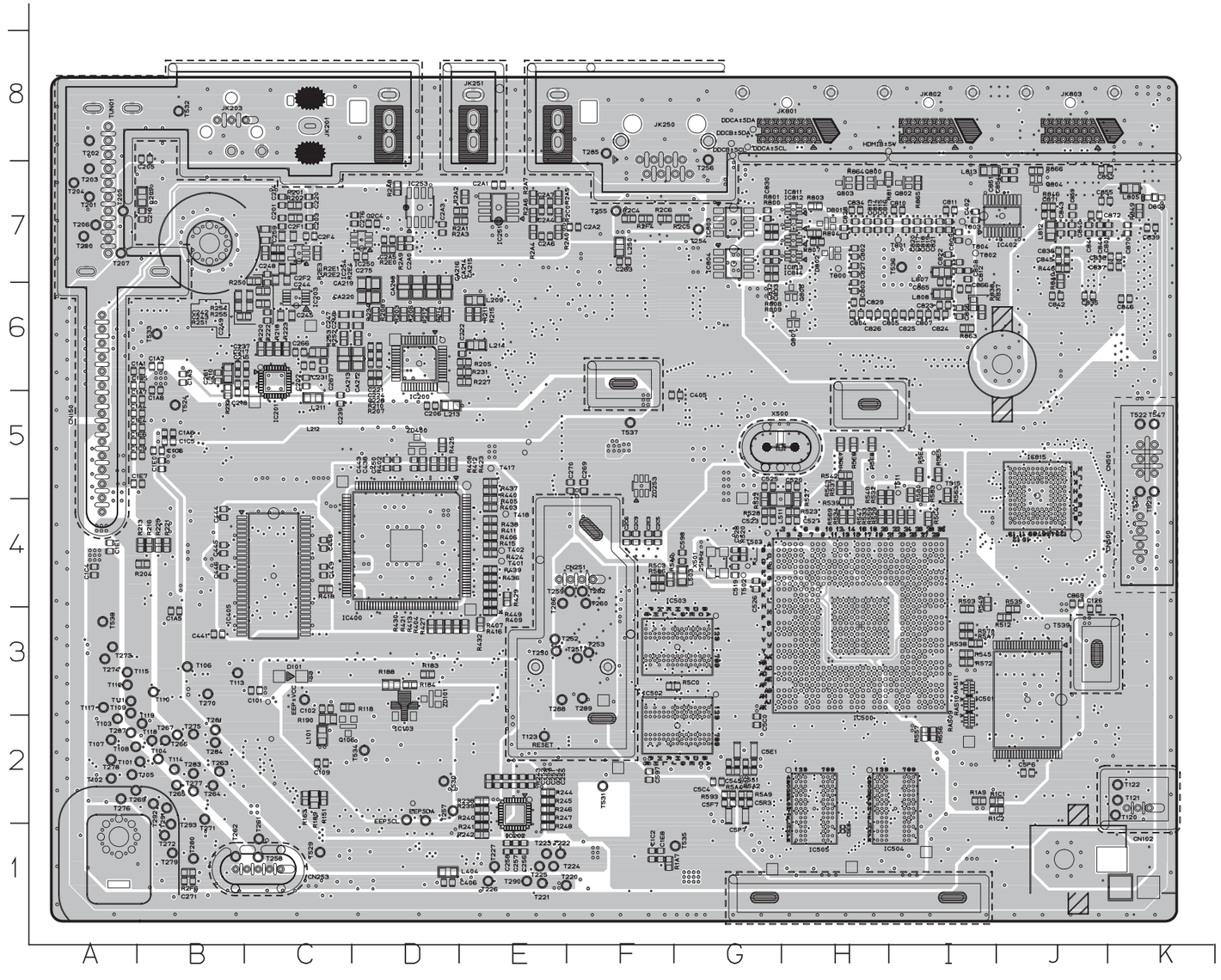
(TOP VIEW)



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

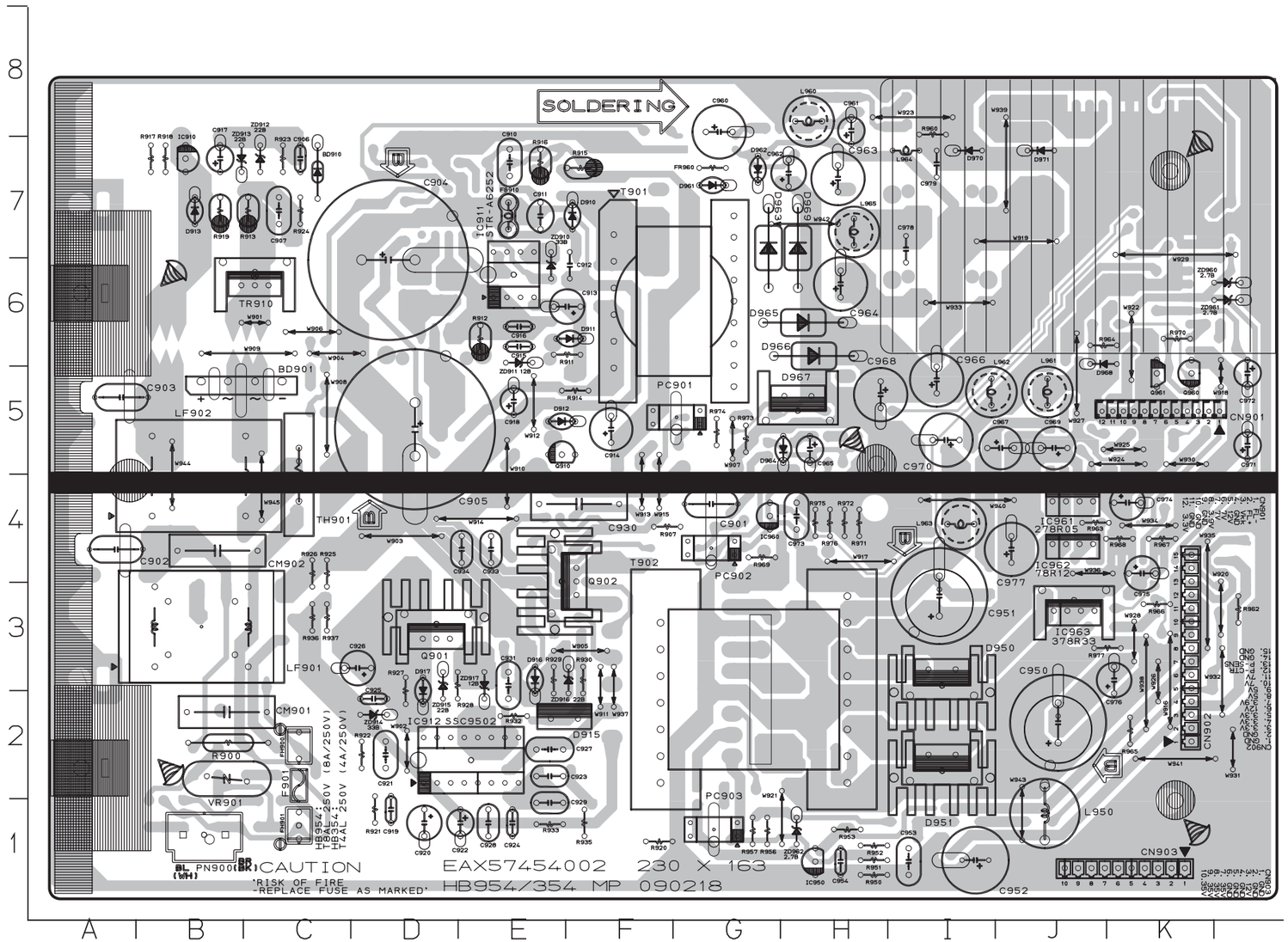
LGE Internal Use Only

MAIN P.C.BOARD
(BOTTOM VIEW)



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

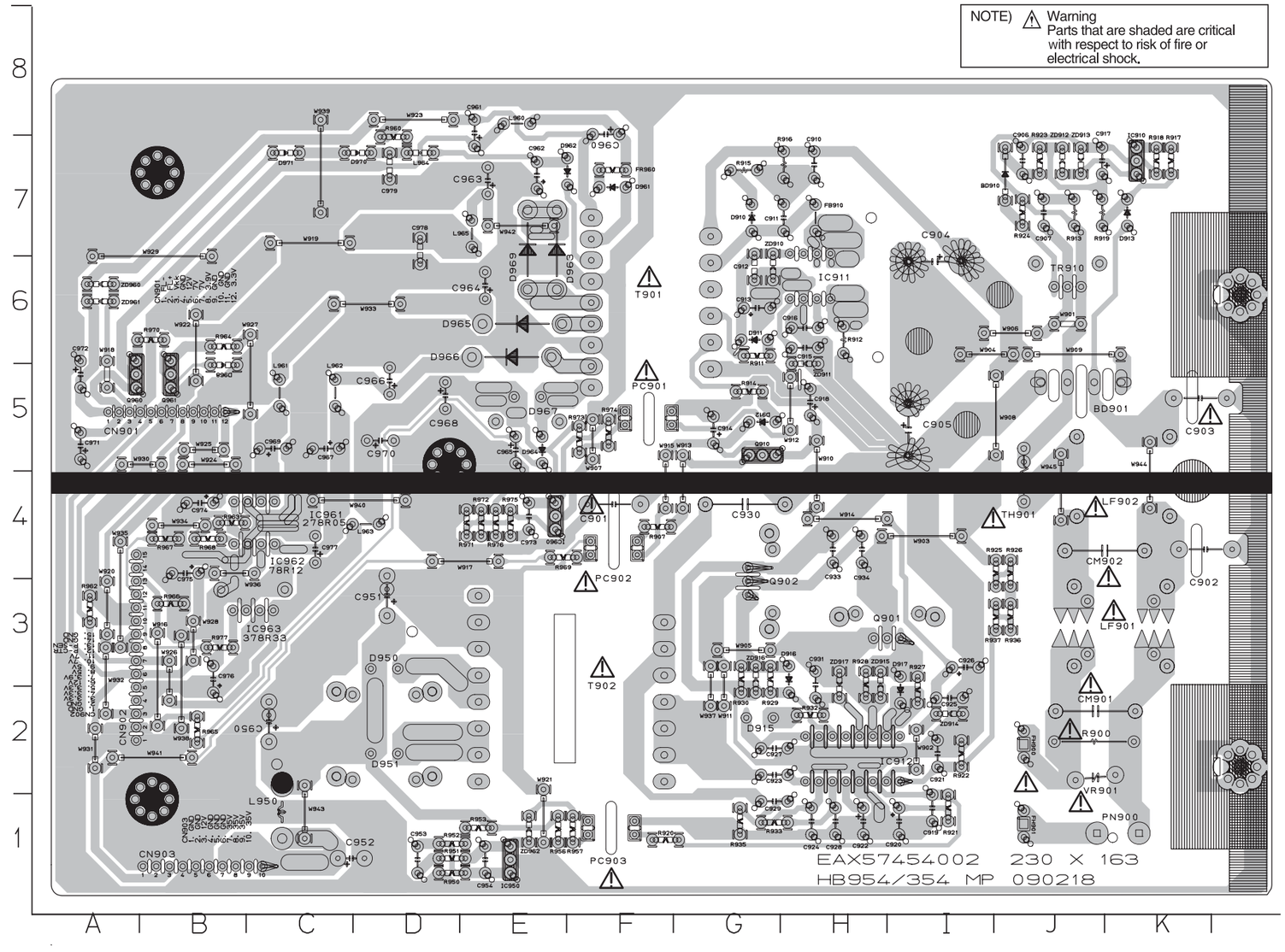
2. SMPS P.C.BOARD
(TOP VIEW)



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

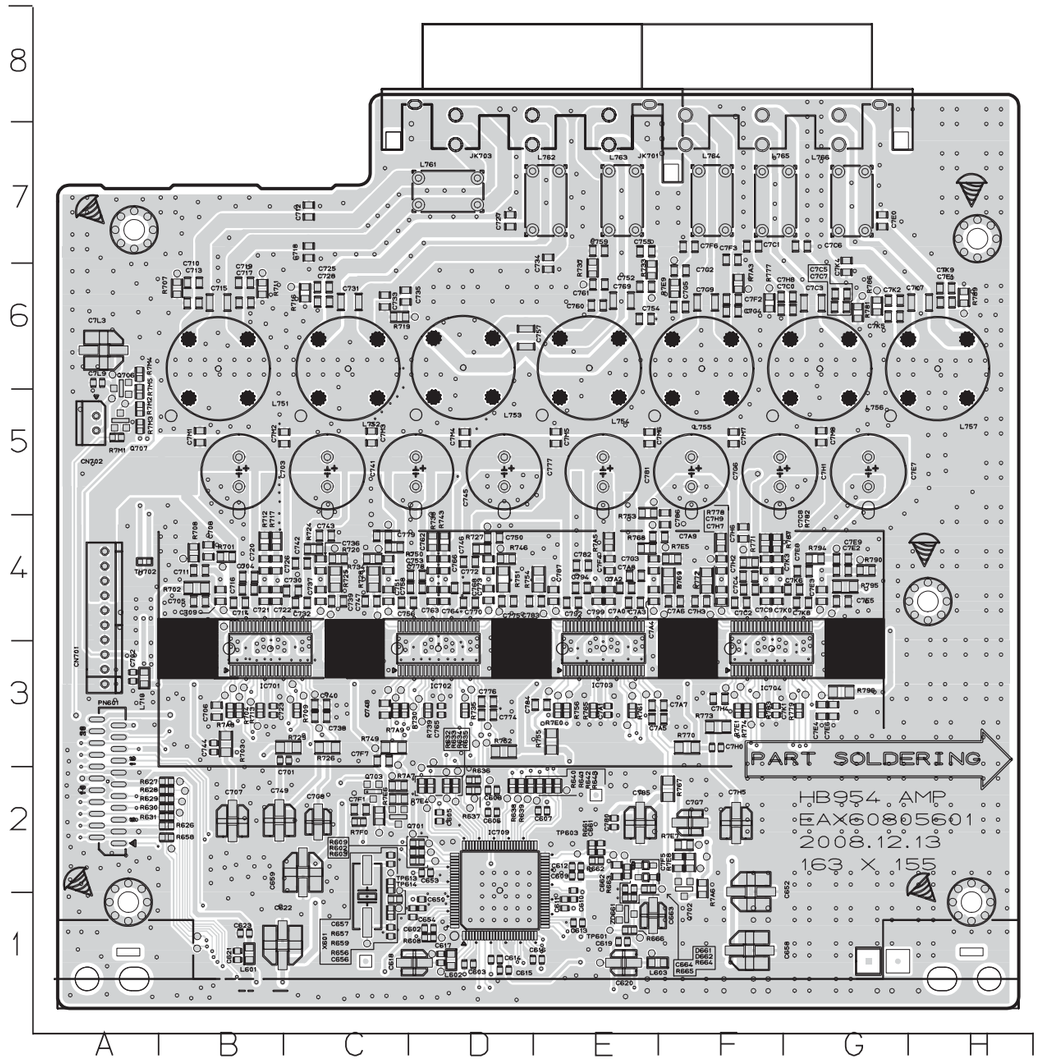
LGE Internal Use Only

SMPS P.C.BOARD
(BOTTOM VIEW)

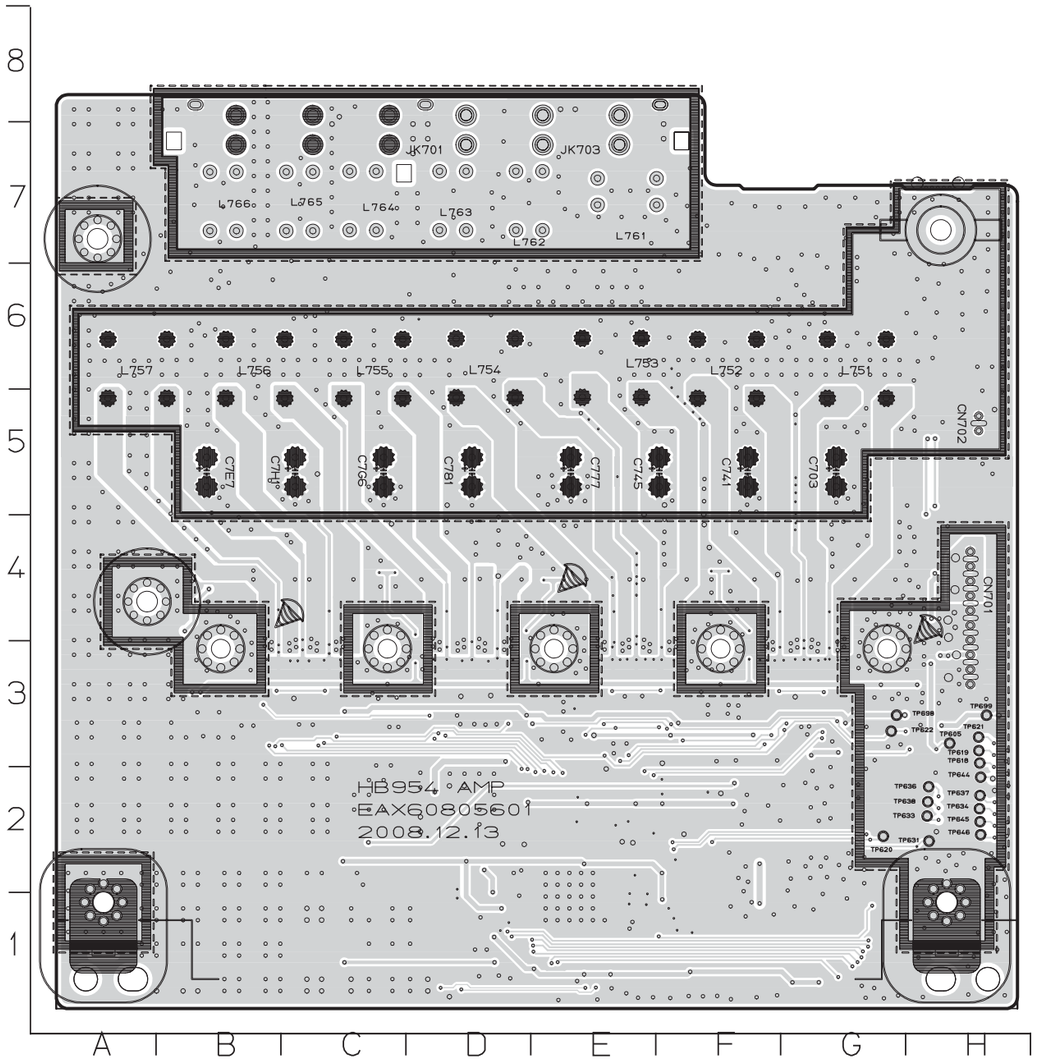


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

3. AMP P.C.BOARD
(TOP VIEW)



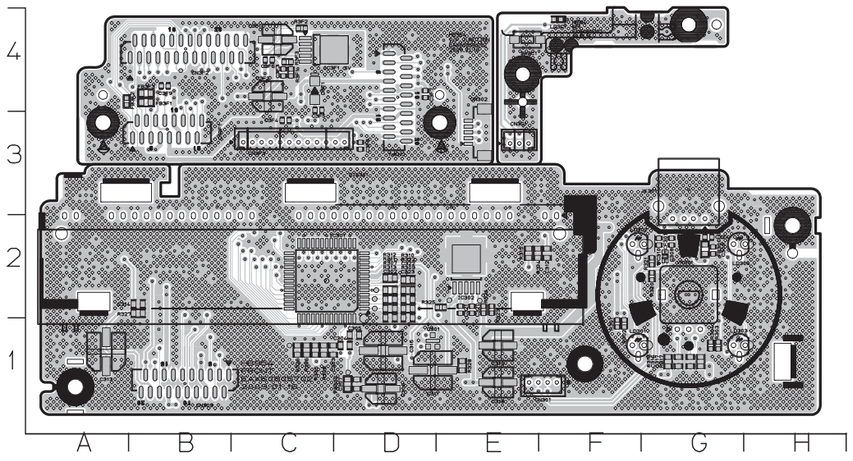
(BOTTOM VIEW)



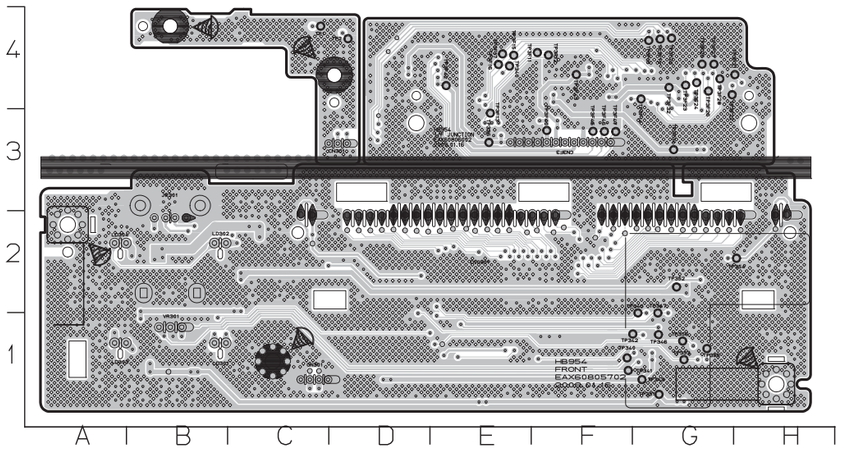
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

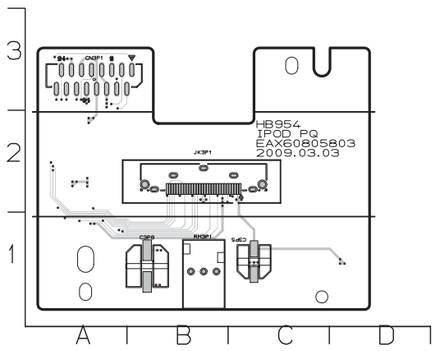
4. FRONT P.C.BOARD
(TOP VIEW)



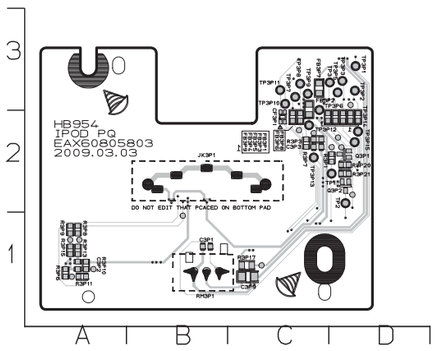
(BOTTOM VIEW)



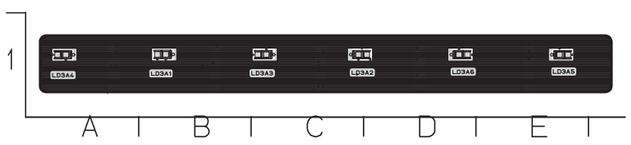
5. IPOD P.C.BOARD
(TOP VIEW)



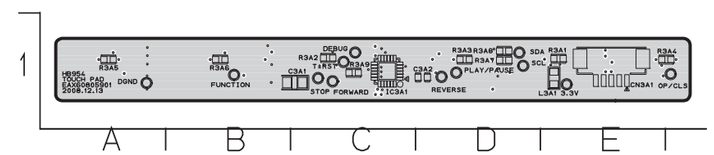
(BOTTOM VIEW)



6. TOUCH PAD P.C.BOARD
(TOP VIEW)



(BOTTOM VIEW)



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

SECTION 3

CABINET & MAIN CHASSIS

CONTENTS

EXPLODED VIEWS 3-3
1. CABINET AND MAIN FRAME SECTION 3-3
2. DECK MECHANISM SECTION (HL-04P) 3-5
3. PACKING ACCESSORY SECTION 3-7
4. SPEAKER SECTION 3-8

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

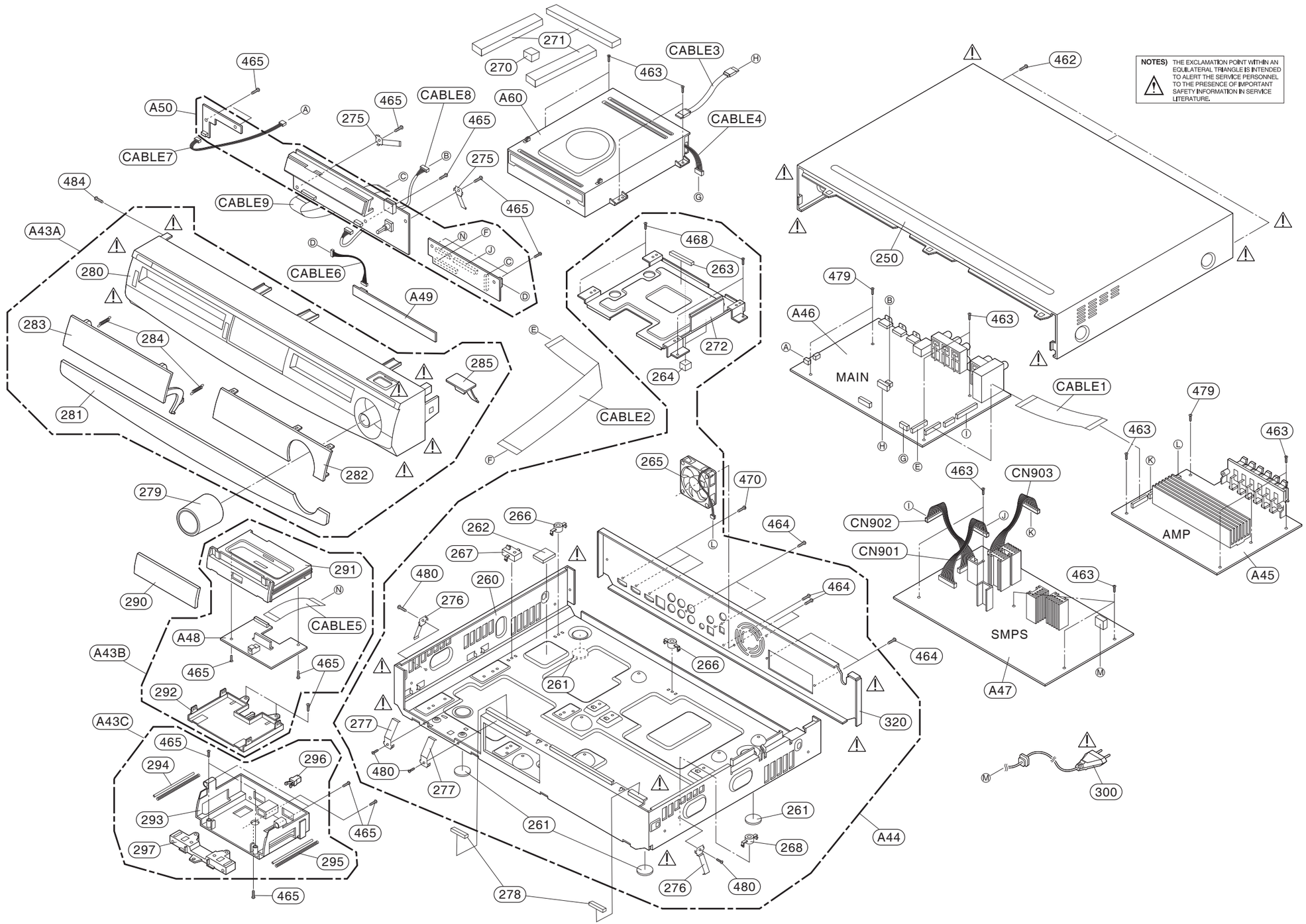
LGE Internal Use Only

MEMO

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

EXPLODED VIEWS

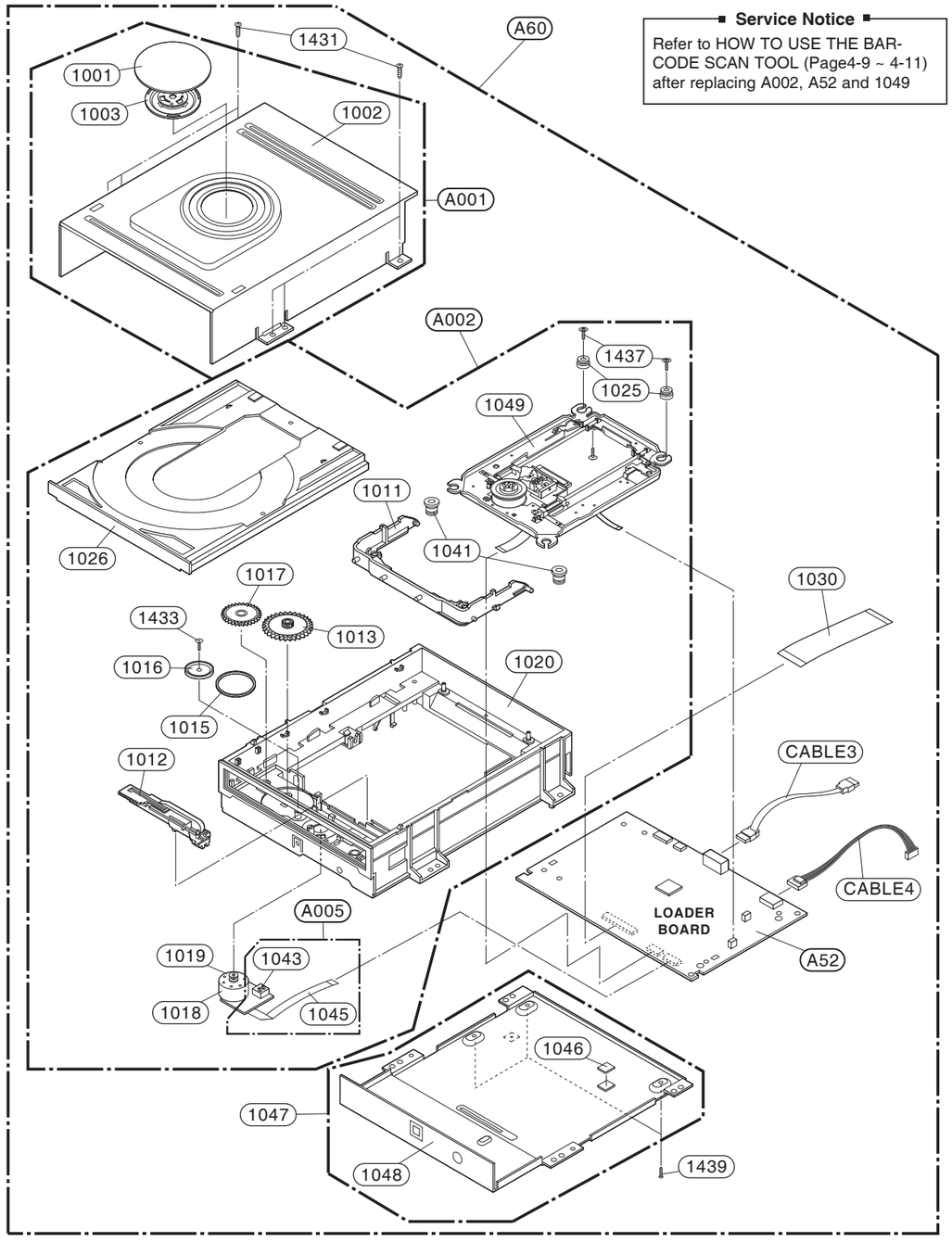
1. CABINET AND MAIN FRAME SECTION



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

2. DECK MECHANISM SECTION (HL-04P)



Service Notice

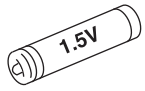
Refer to HOW TO USE THE BAR-CODE SCAN TOOL (Page4-9 ~ 4-11) after replacing A002, A52 and 1049

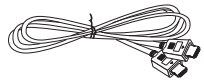
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

3. PACKING ACCESSORY SECTION

★ OPTIONAL PART

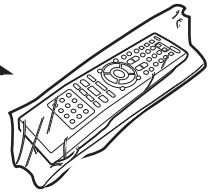
808 BATTERY

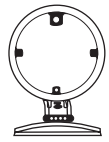




823 HDMI Cable

900 REMOTE CONTROL





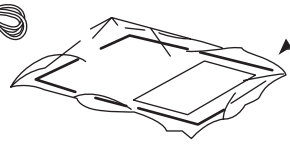
824 AM LOOP ANTENNA

811 RCA CABLE, VIDEO (1WAY)

825 FM WIRE ANTENNA

★ 818 PORTABLE IN CABLE

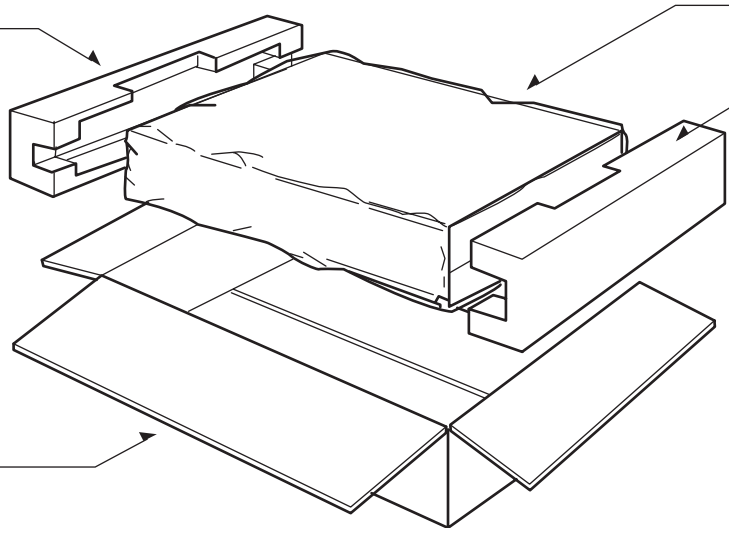
801 OWNER'S MANUAL



804 BAG

803 PACKING, CASING

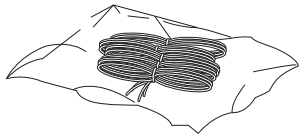
803 PACKING, CASING



802 BOX

SPEAKER CABLE

WIRE80	Front Left 3M
WIRE81	Front Right 3M
WIRE70	Center 3M
WIRE90	Subwoofer 3M
WIRE60	Rear Left 10M
WIRE61	Rear Right 10M

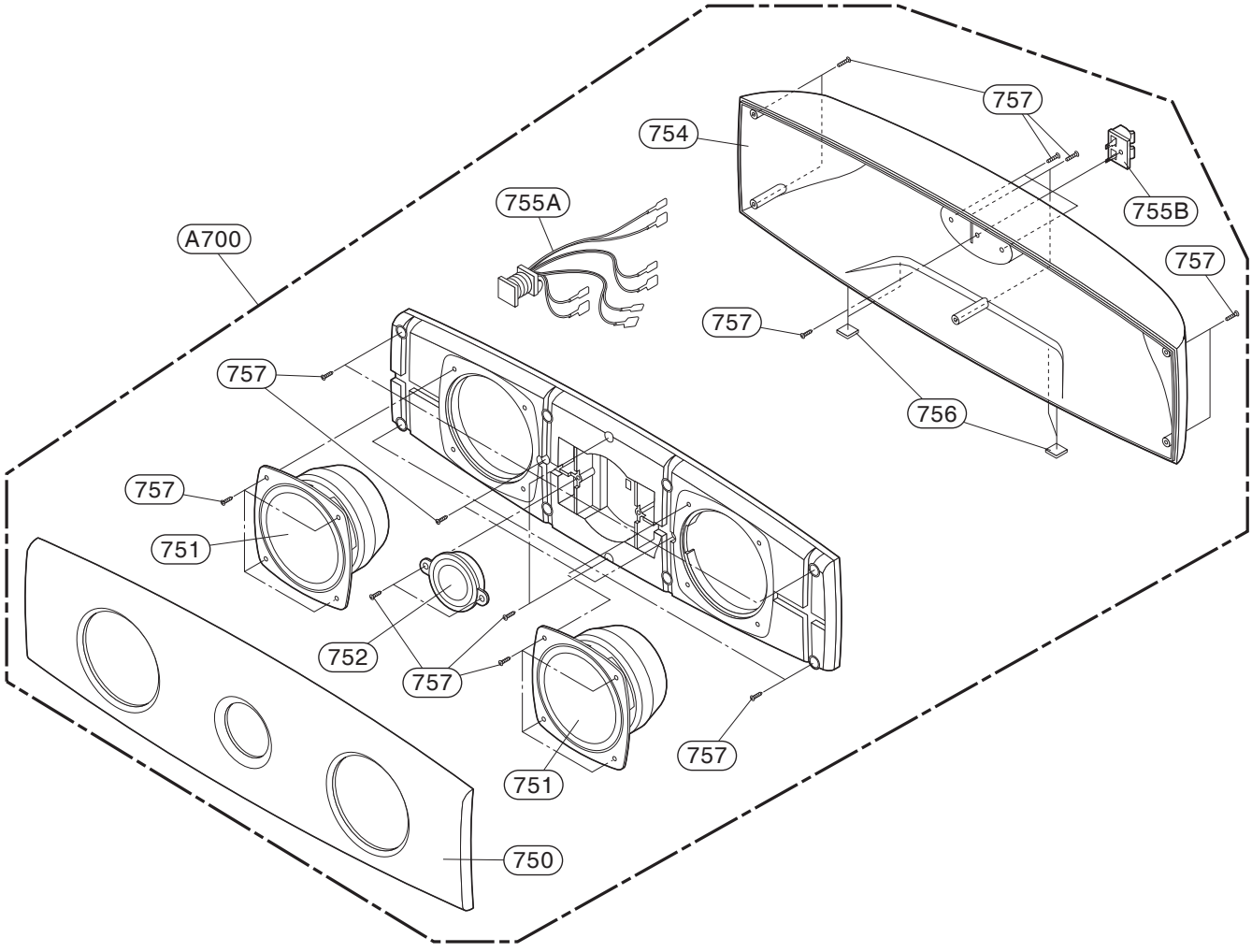


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

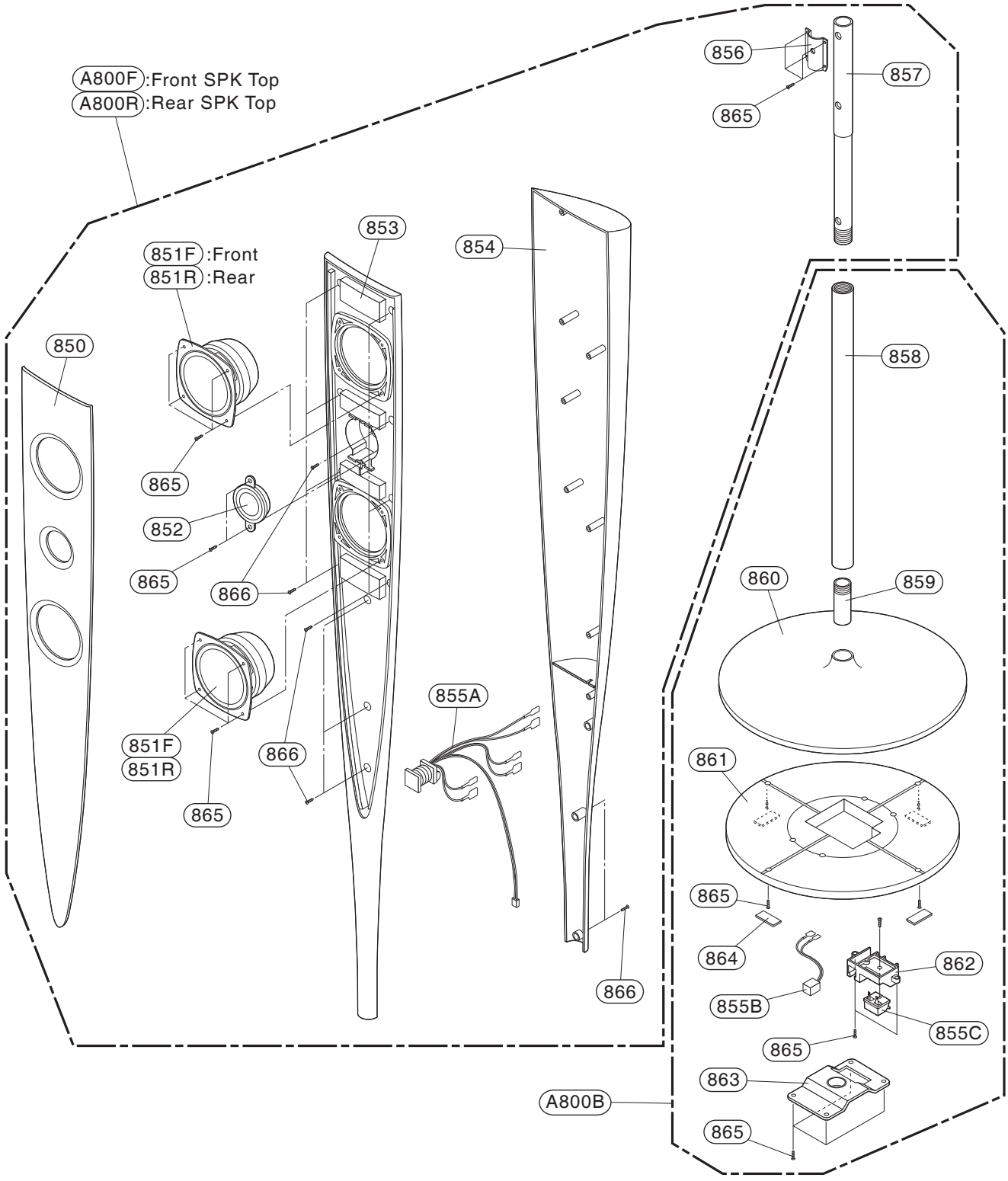
4. SPEAKER SECTION

4-1. CENTER SPEAKER (SB94TB-C)



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

4-2. FRONT/REAR SPEAKER (SB94TB-F/S)

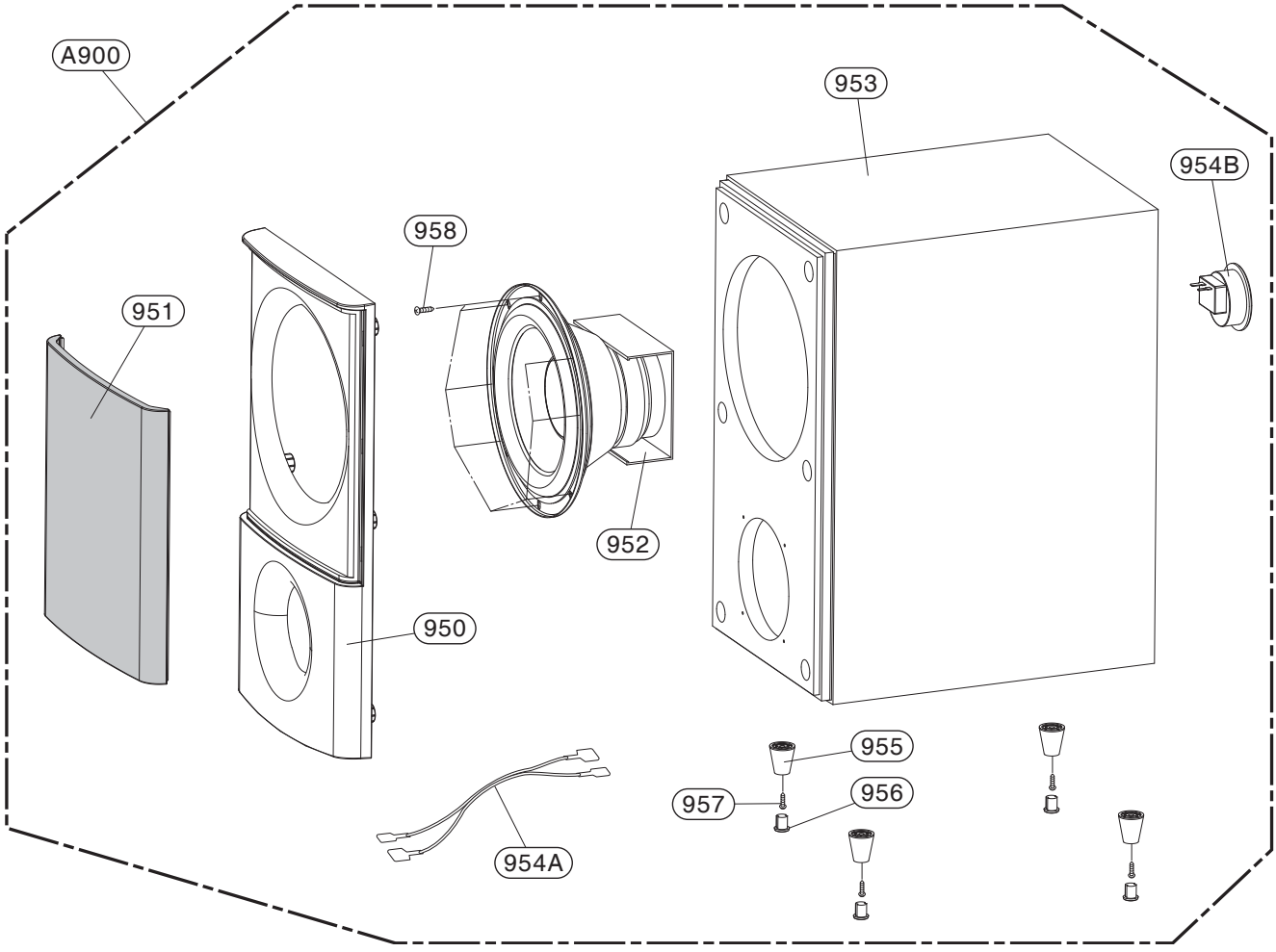


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

4-3. PASSIVE SUBWOOFER (SB94TB-W)



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

MEMO

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

SECTION 4

HL-04P LOADER PART

CONTENTS

ELECTRICAL TROUBLESHOOTING GUIDE 4-2
1. RESET OR POWER CHECK 4-2
2. SYSTEM CHECK 4-3
3. TRAY OPERATING IS ABNORMAL 4-4
4. SLED OPERATING IS ABNORMAL 4-5
5. SPINDLE OPERATING IS ABNORMAL 4-6
6. FOCUS ACTUATOR OPERATING IS ABNORMAL 4-7
7. LASER OPERATING IS ABNORMAL 4-8

HOW TO USE THE BAR-CODE SCAN TOOL 4-9
1. BAR-CODE SCAN SYSTEM CONFIGURATION 4-9
2. PICK-UP BAR-CODE SCAN TOOL CONFIGURATION. 4-9
3. RUNNING BAR-CODE SCAN TOOL 4-10
4. BAR-CODE SCAN PROCEDURE 4-11

INTERNAL STRUCTURE OF THE PICK-UP 4-12
1. OPTICAL LAYOUT 4-12
2. SF-BD411 PDIC COMPOSITION 4-13
3. PICK-UP CONNECTOR TERMINAL PIN ASSIGNMENTS 4-14

MAJOR IC INTERNAL BLOCK DIAGRAM AND PIN DESCRIPTION 4-15
1. LIC501 (MT8575) : BLU-RAY SIGNAL PROCESSOR SINGLE CHIP 4-15
2. LIC201 (R2A30232SP) : SPINDLE MOTOR AND 6CH ACTUATOR DRIVER 4-20

CIRCUIT DIAGRAM 4-23

CIRCUIT VOLTAGE CHART 4-25

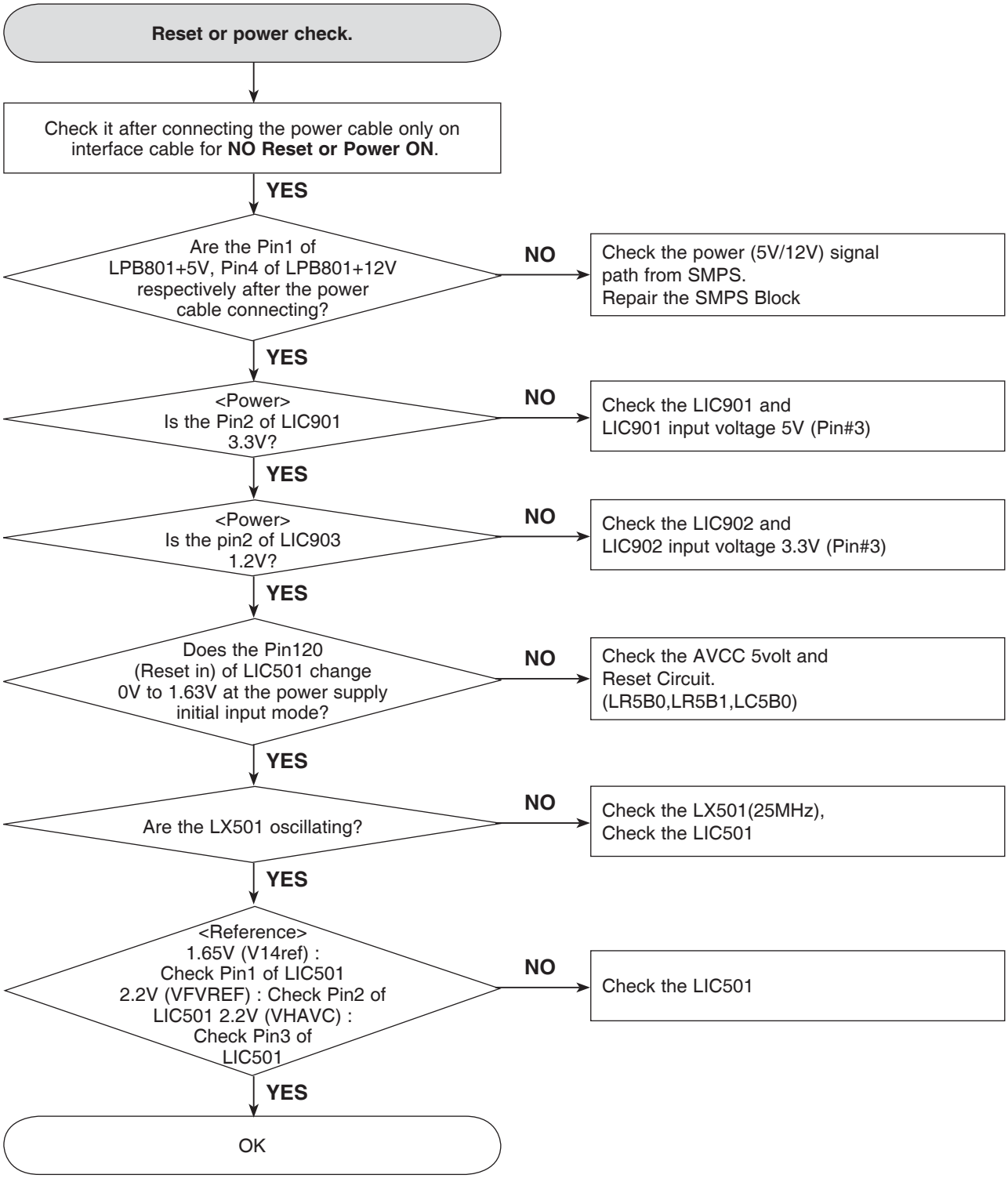
PRINTED CIRCUIT BOARD DIAGRAMS 4-27

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

ELECTRICAL TROUBLESHOOTING GUIDE

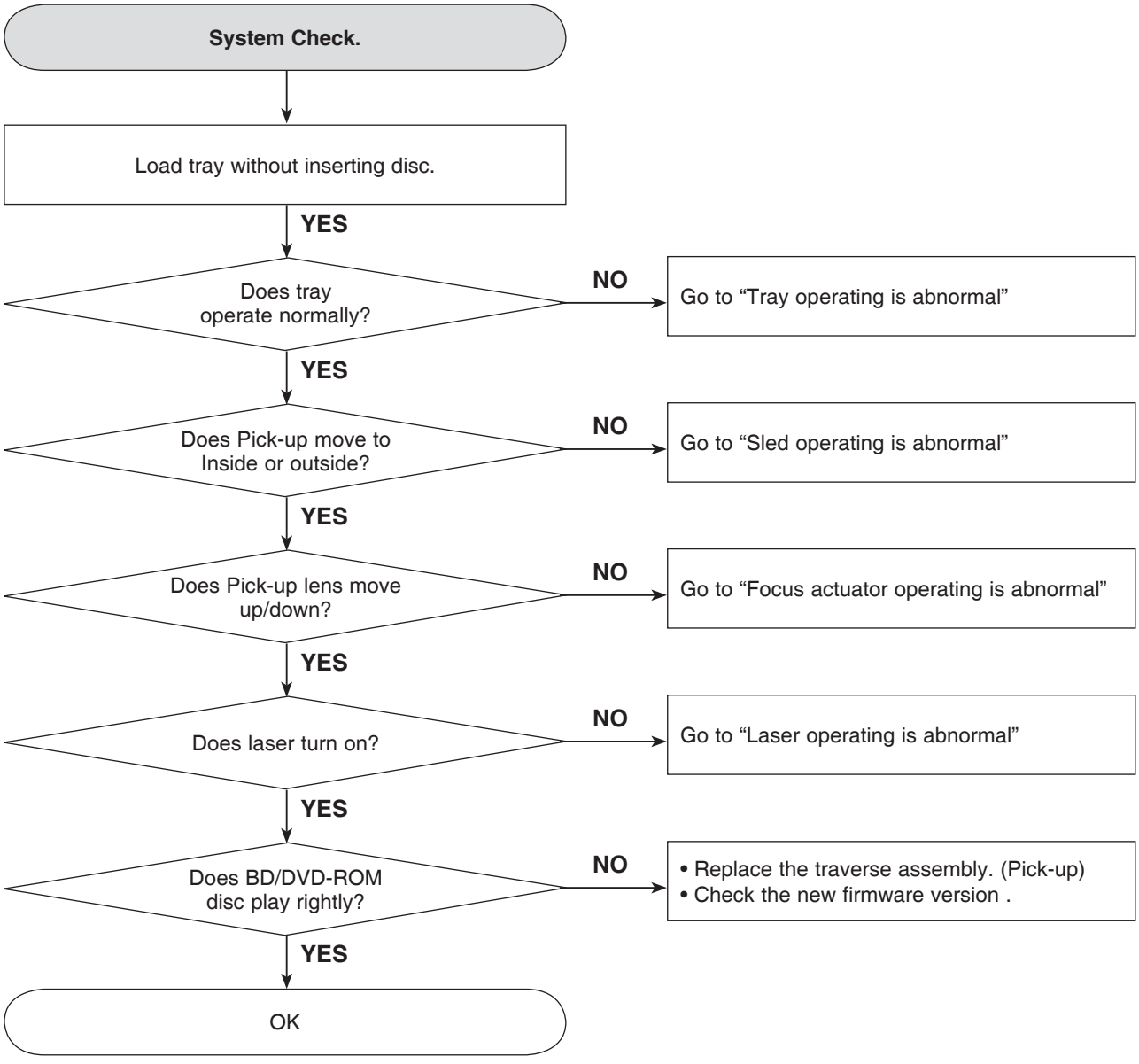
1. RESET OR POWER CHECK



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

ELECTRICAL TROUBLESHOOTING GUIDE

2. SYSTEM CHECK

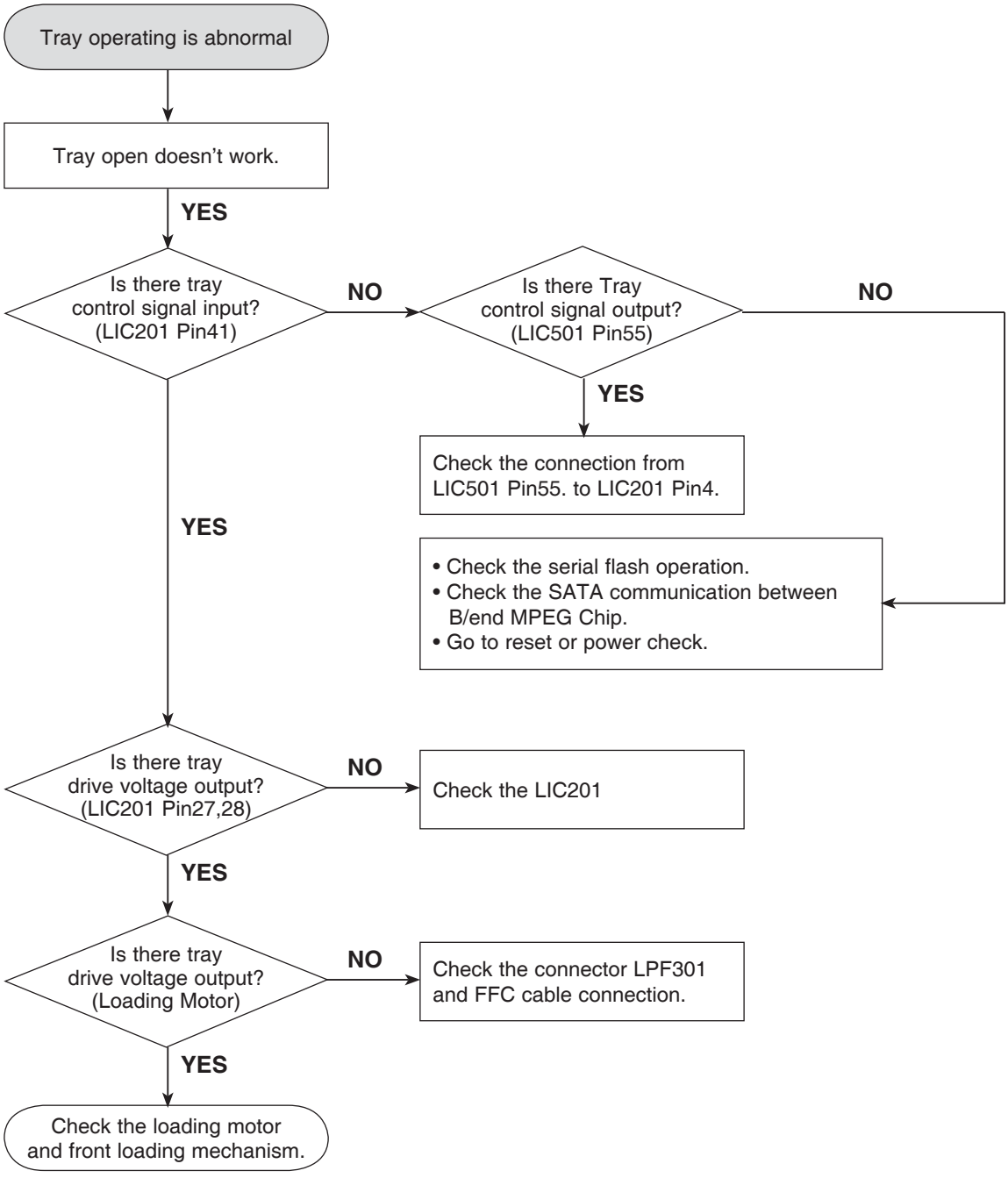


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

ELECTRICAL TROUBLESHOOTING GUIDE

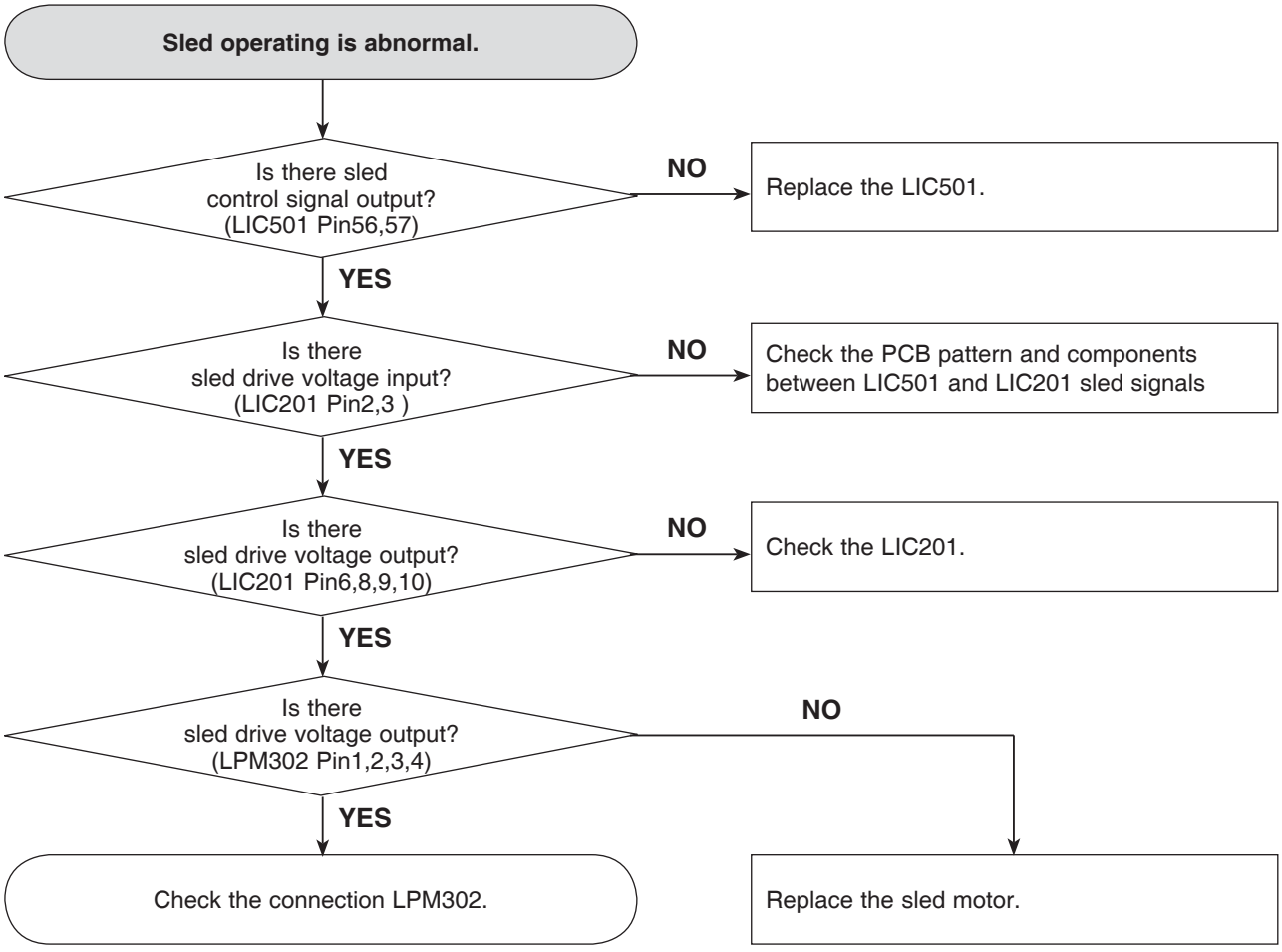
3. TRAY OPERATING IS ABNORMAL



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

ELECTRICAL TROUBLESHOOTING GUIDE

4. SLED OPERATING IS ABNORMAL

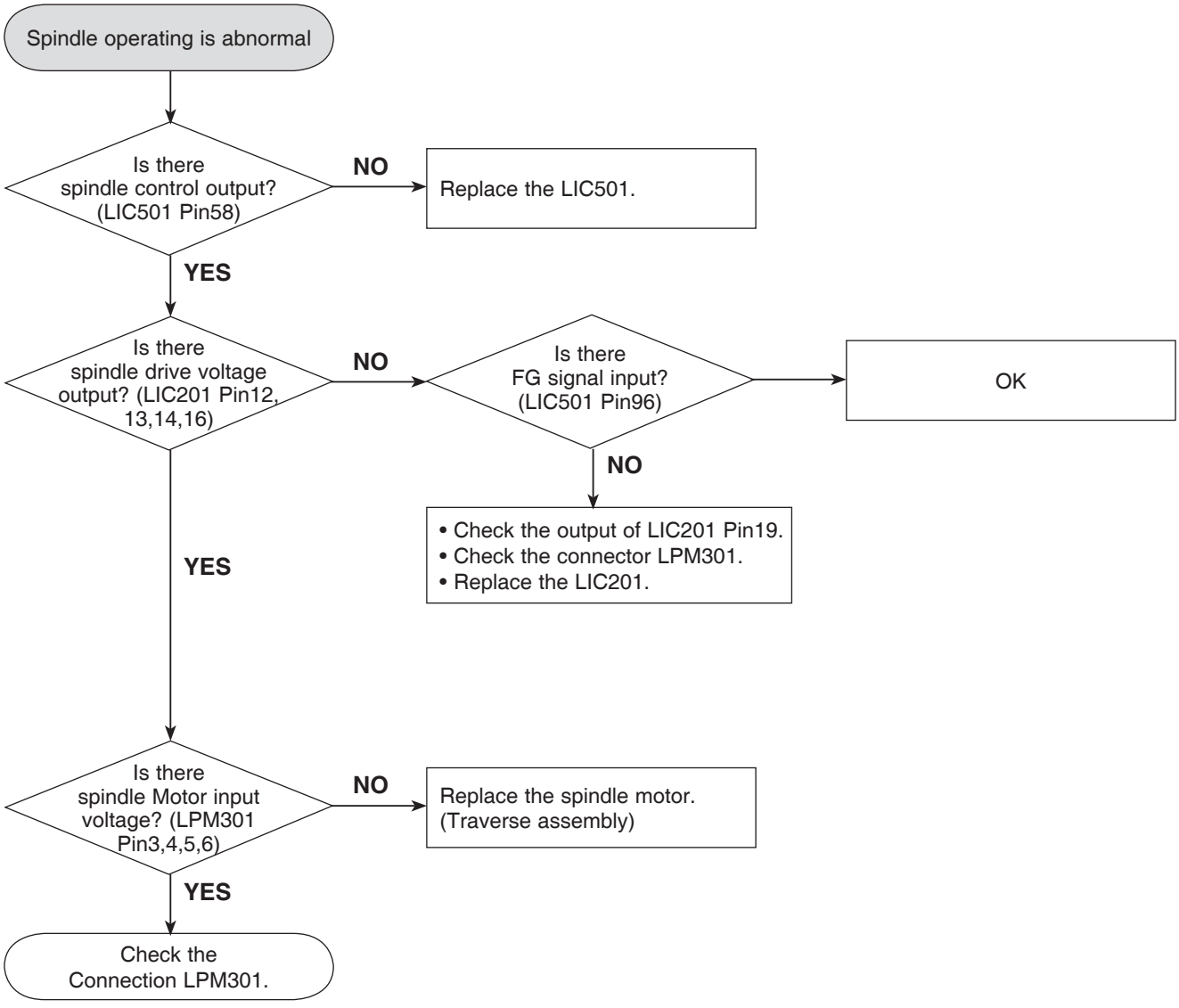


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

ELECTRICAL TROUBLESHOOTING GUIDE

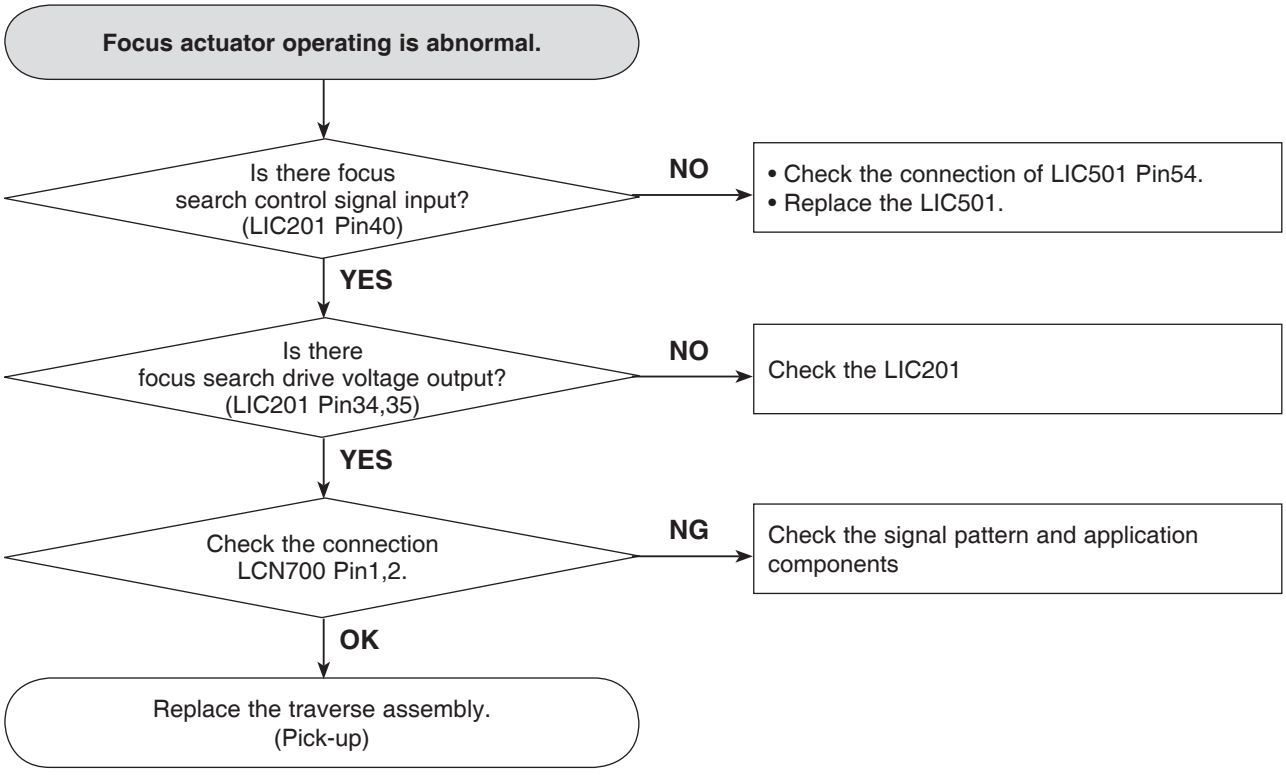
5. SPINDLE OPERATING IS ABNORMAL



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

ELECTRICAL TROUBLESHOOTING GUIDE

6. FOCUS ACTUATOR OPERATING IS ABNORMAL

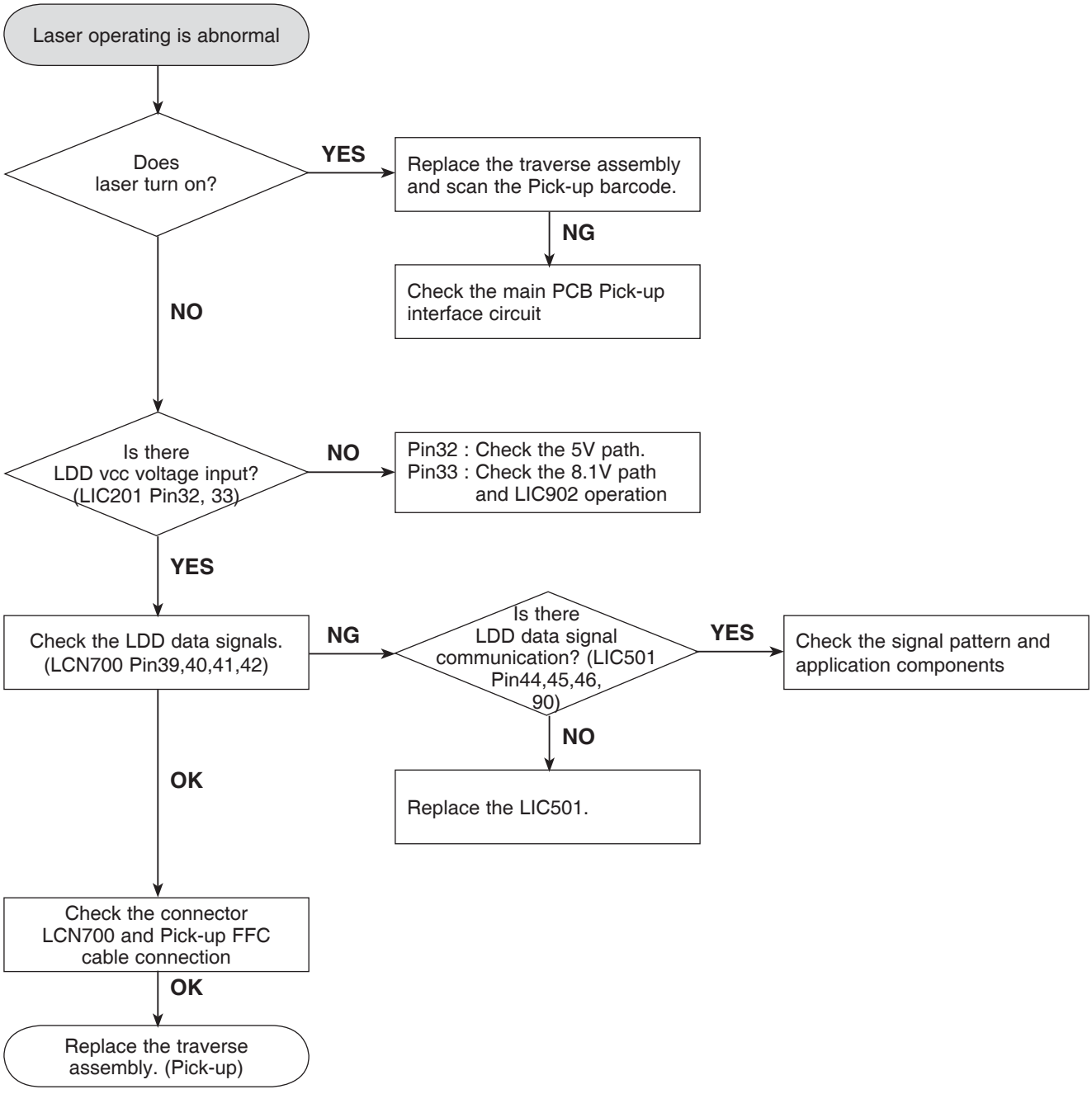


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

ELECTRICAL TROUBLESHOOTING GUIDE

7. LASER OPERATING IS ABNORMAL



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

HOW TO USE THE BAR-CODE SCAN TOOL

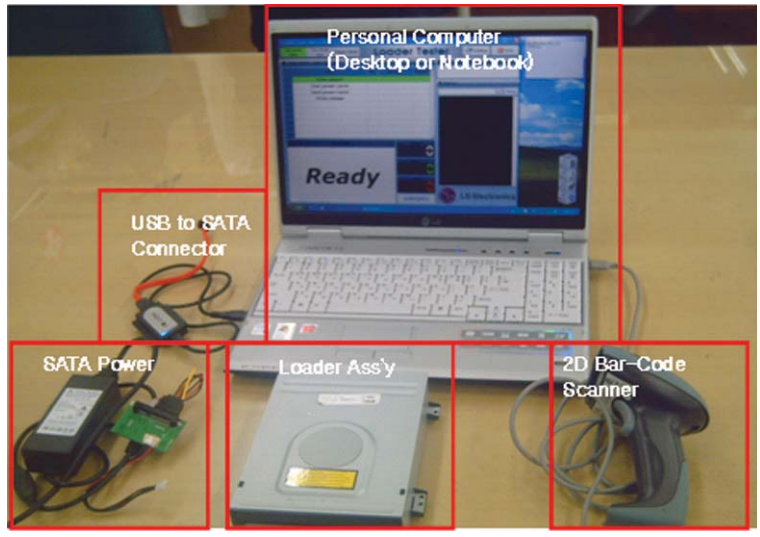
Bar-Code Scan Tool inserts the Bar-code values (including Skew, Read power, HFM, LD power and so on) to the Flash-ROM in the Loader Main Board. So, In case of changing the Traverse assembly or Loader main board, It is required to pick-up Bar-code scan procedure.

1. BAR-CODE SCAN SYSTEM CONFIGURATION

In order to insert Bar-code values (including Skew, Read power, HFM, LD power and so on), the following equipments are needed.

Compulsory equipments

1) Personal Computer
2) Bar-Code Scan Tool (Loader Tester)
3) 2D Bar-Code Scanner
4) Target Loader Ass'y
5) USB to SATA Connector
6) Power Supply



2. PICK-UP BAR-CODE SCAN TOOL CONFIGURATION.

The Loader Tester is the Application Tool for FA Test and also Bar-Code Scan.

The Bar-Code Scan is the one of functions in the Loader Tester.
Therefore the Bar-Code scan Users should check "only Bar Code" up in the Loader Tester.
Loader Tester Program consists of total 2 files.

Setup.exe
Setup.exe.txt

Setup.exe file is the installation file.
After you install the Loader Tester program, the **LoaderTest.exe** file will appear in the wallpaper(background) of Windows.
LoaderTester.exe is a program execution file.
Setup.exe.txt is the install Report file.

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

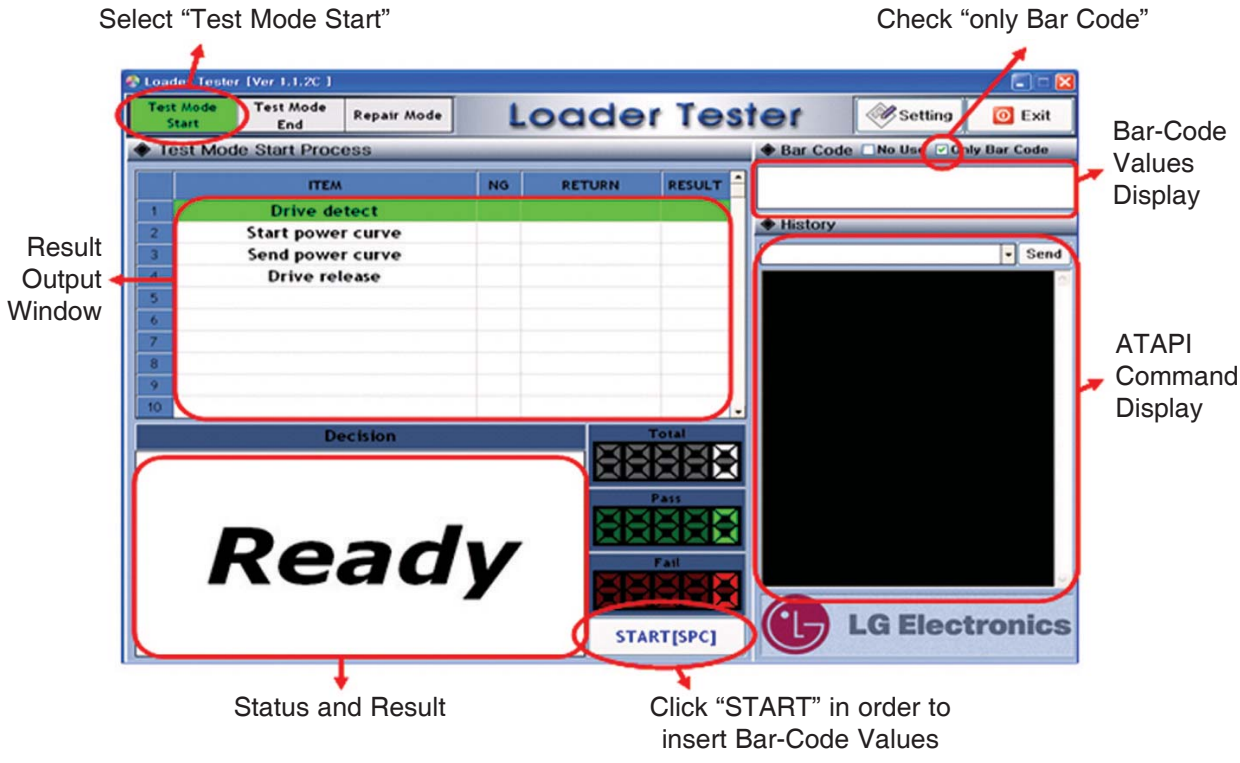
3. RUNNING BAR-CODE SCAN TOOL

When running “LoaderTester.exe” file in the wallpaper(background) of Windows, the following screen appears.
Before you start to click “Start” button, remind these.

1) “Test Mode Start” should be selected.

2) Check “only Bar Code”

3) Click “START” START[SPC]



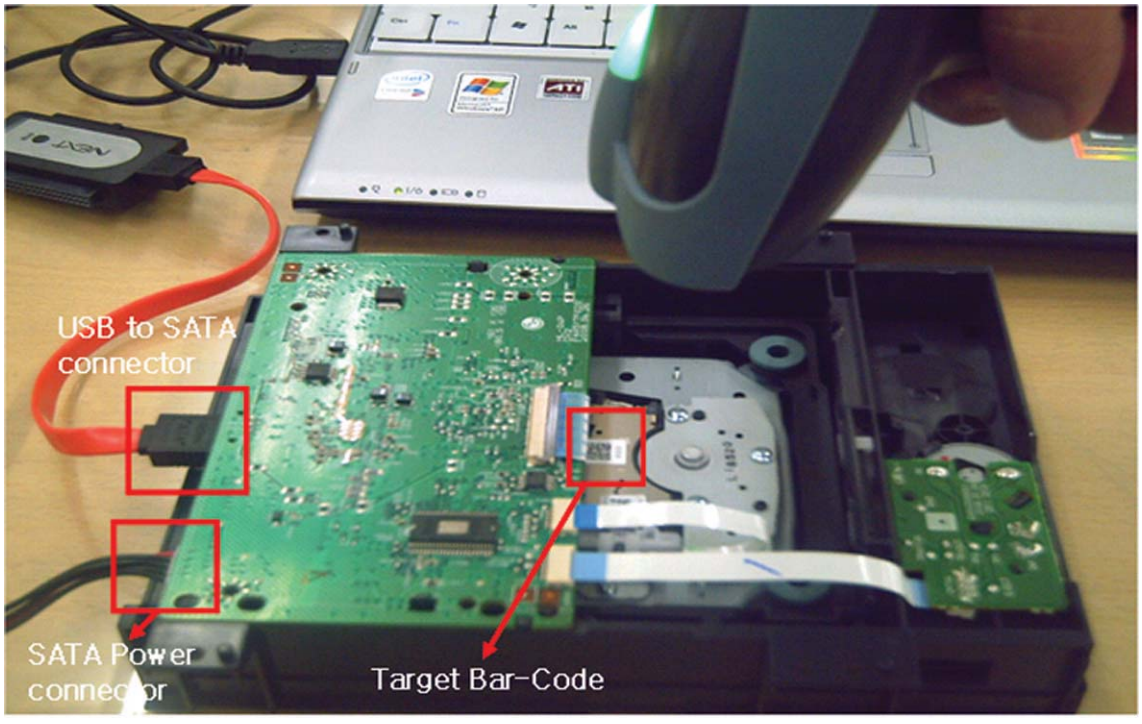
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

4. BAR-CODE SCAN PROCEDURE

1) Untie the screw of Loader.
2) Connect the “USB to SATA connector” and “SATA Power” to the Loader.
3) Connect the “USB to SATA connector” to the PC.
4) Connect the “Bar-Code Scanner” to the PC.
5) Run the Bar-Code Scan Tool (Loader Tester).
6) Click “Start” Button START[SPC]

   (Tip. If Drive can not be detected, please plug off and on again the “USB to SATA connector” to the PC and wait for 15 seconds.)

7) Sled will move the innermost.
8) Focus on the target of Bar-Code and Pull the trigger of Bar-Code scanner until Bar-Code can be scanned to the Bar-Code scan Tool (Loader Tester)
9) If Bar-Code scan succeeds, “ OK” will display in the result windows.
   However, Bar-Code scan fails, “NG” will display in the result windows.
   In case you got “ NG” result, please check procedure up from 2 to 8. then try it again.

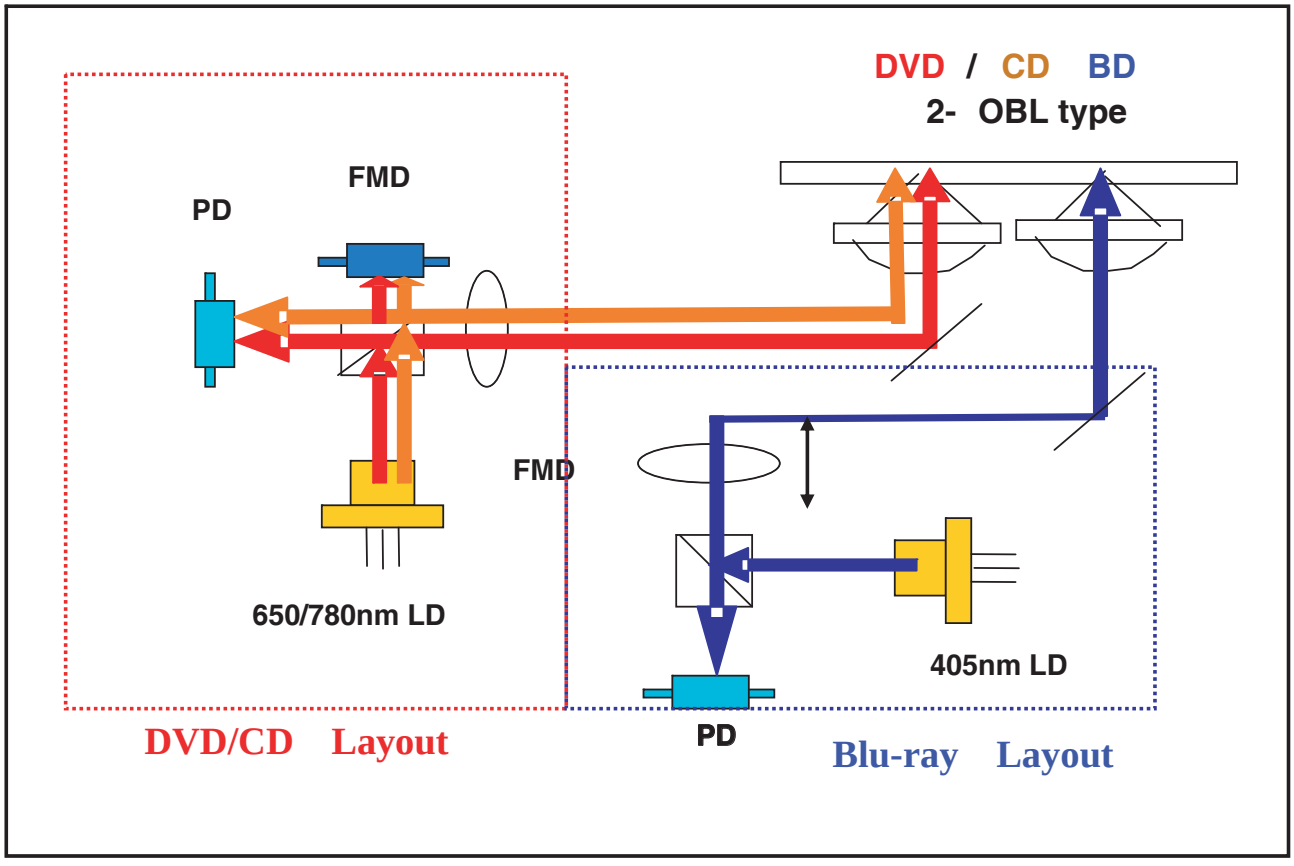


Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

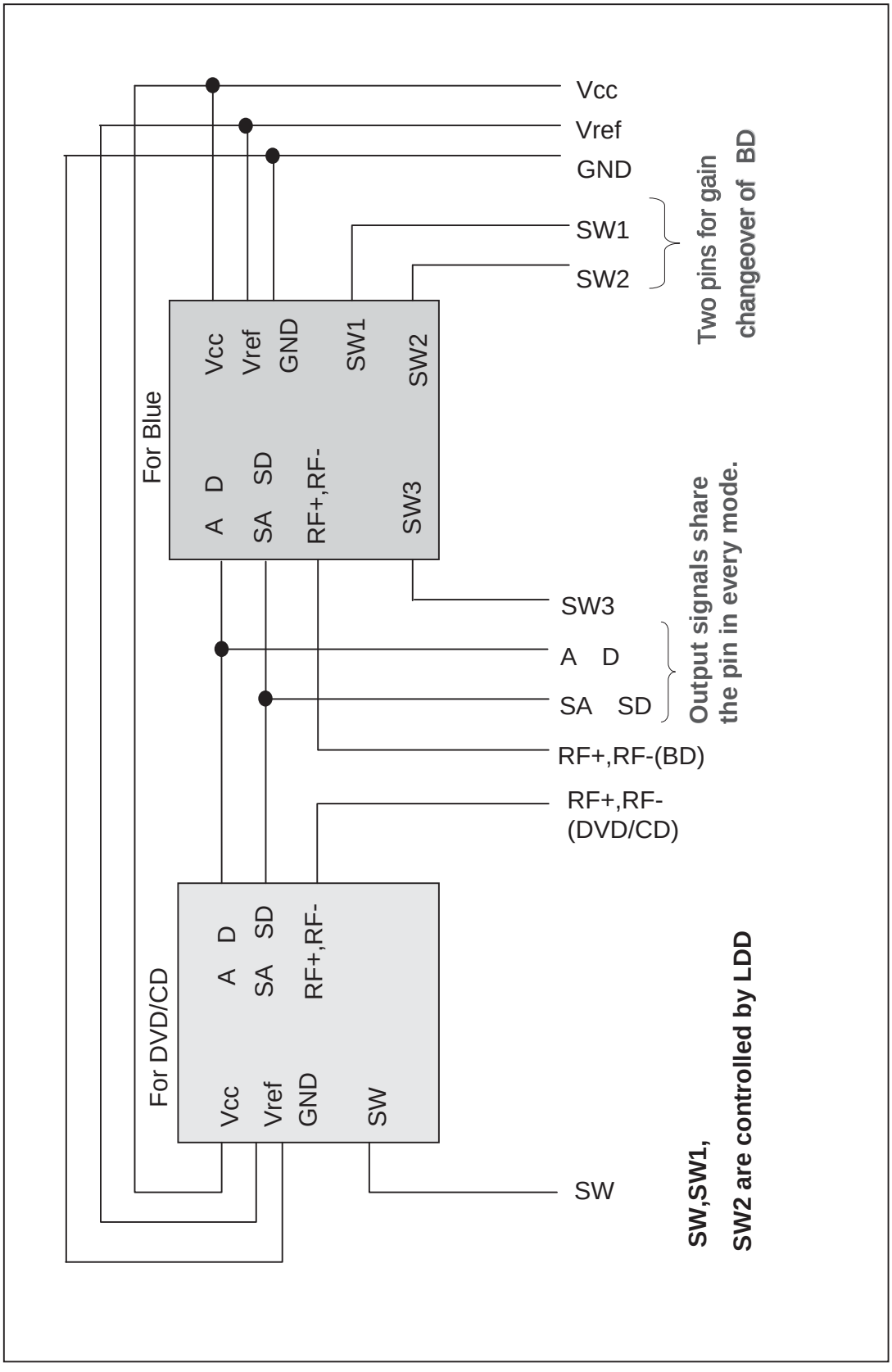
INTERNAL STRUCTURE OF THE PICK-UP

1. OPTICAL LAYOUT



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

2. SF-BD411 PDIC COMPOSITION



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

3. PICK-UP CONNECTOR TERMINAL PIN ASSIGNMENTS

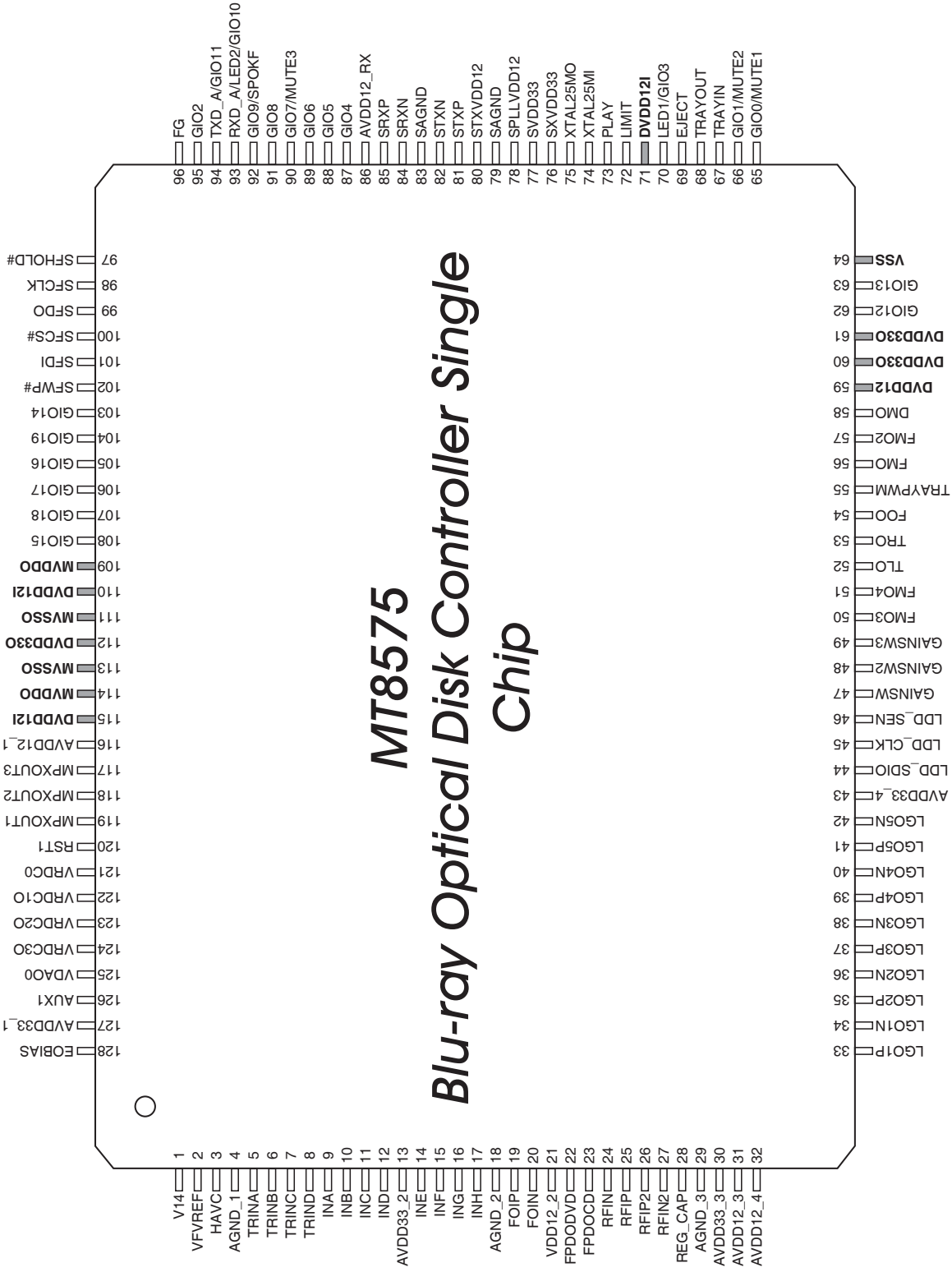
PIN NO	PIN NAME		DESCRIPTION
1	FCS2+	ACT	FOCUSING2+
2	FCS2-		FOCUSING2-
3	TRK+		TRACKING+
4	FCS1+		FOCUSING1+
5	TRK-		TRACKING-
6	FCS1-		FOCUSING1-
7	A-	CL SHIFTER	Stepping Motor A- Terminal
8	B-		Stepping Motor B- Terminal
9	A+		Stepping Motor A+ Terminal
10	B+		Stepping Motor B+ Terminal
11	VCC_CLSFT		Sensor Power Supply 3.3V
12	SIG_PO		Output signal from the reference position sensor of BD COL SHIFTER
13	GND_CLSFT		GND for CL SHIFTER
14	A	PDIC	A output
15	B		B output
16	C		C output
17	D		D output
18	SA		SA output
19	SB		SB output
20	SC		SC output
21	SD		SD output
22	SW3		PDIC BD Sub Output Switch Port
23	RF+(BD)		RF(+) output for BD
24	RF-(BD)		RF(-) output for BD
25	RF+(DVDCD)		RF(+) output for DVDCD
26	RF-(DVDCD)		RF(-) output for DVDCD
27	VREF_PD		PDIC Reference Supply Terminal 2.1V
28	VCC_+5PD		PDIC Power Terminal 5V
29	NC		NC
30	GND_PD		GND for PDIC
31	NC(SW)		2-Wavelength PDIC DVD/CD/Sleep Changeover SW
32	VCC_LDR	LDD	LDD 5V-Power Supply for LD,DVD and CD
33	VCC_LDB		LDD 9V-Power Supply for LD,BD
34	NC		NC
35	GND1_LDD		LDD GND Terminal
36	GND1_LDD		LDD GND Terminal
37	VMON		Monitor Voltage Output Terminal
38	VCC		LDD 5V-Power Supply for Logic
39	LDEN		LD Enable Input Terminal
40	SEN		Serial Resistor Chip Select Input Terminal
41	SCLK		Serial Clock Input Terminal
42	SDIO		Serial Resistor Data Input/Output Terminal
43	XRST		Serial Resistor RESET Input Terminal
44	GND1_LDD		LDD GND Terminal
45	TEMP		Thermistor

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

MAJOR IC INTERNAL BLOCK DIAGRAM AND PIN DESCRIPTION

1. LIC501 (MT8575) : Blu-ray SIGNAL PROCESSOR SINGLE CHIP

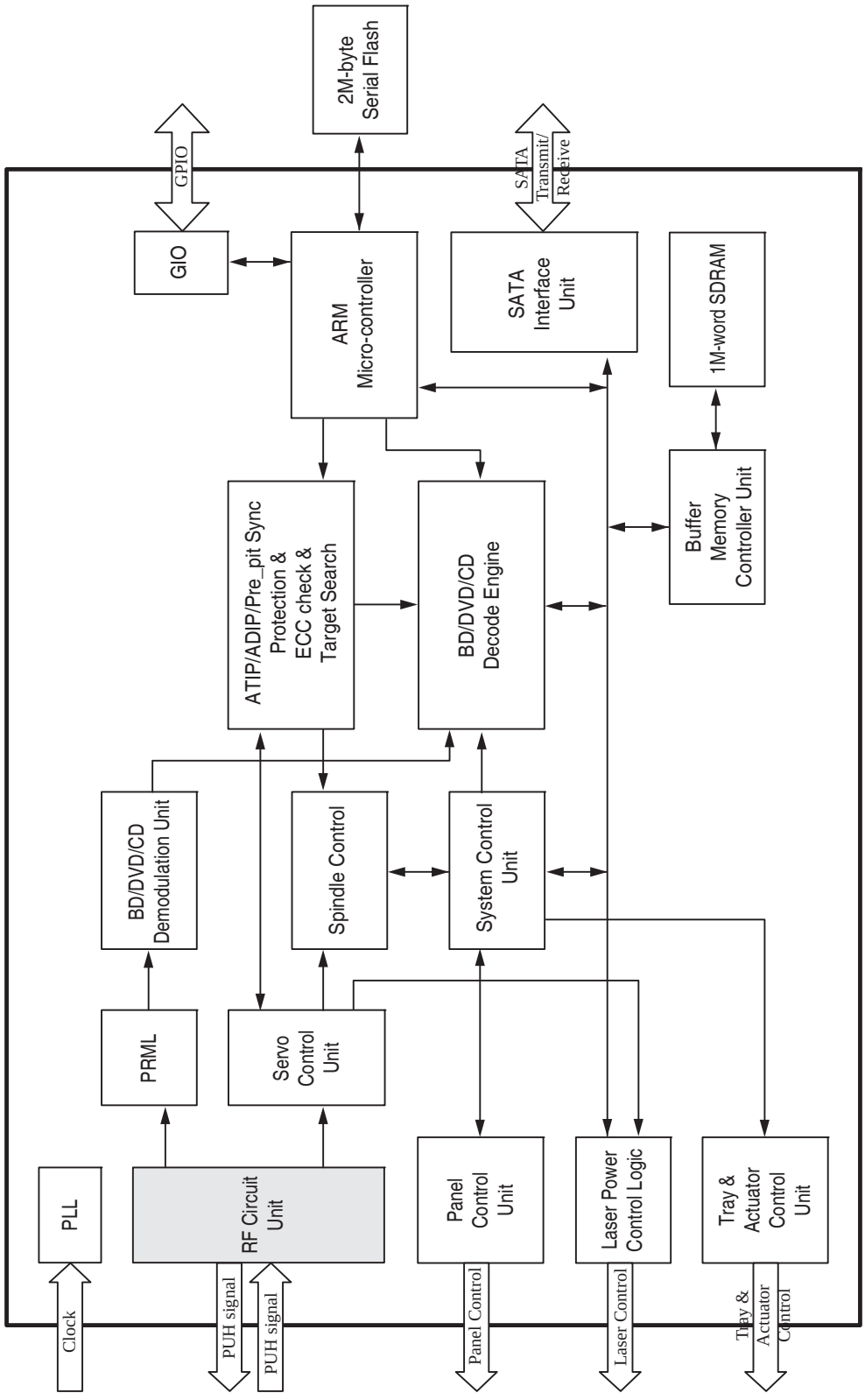
1-1. Pin Assignment



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

1-2. Block Diagram



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

1-3. Pin Function

PIN NO	PIN NAME	TYPE	DESCRIPTION
RF Signals & S/H Control Pulses (21)			
5	TRINA	Analog Input	Input of Tracking Signal (A)
6	TRINB	Analog Input	Input of Tracking Signal (B)
7	TRINC	Analog Input	Input of Tracking Signal (C)
8	TRIND	Analog Input	Input of Tracking Signal (D)
9	INA	Analog Input	Input of Main Beam Signal (A)
10	INB	Analog Input	Input of Main Beam Signal (B)
11	INC	Analog Input	Input of Main Beam Signal (C)
12	IND	Analog Input	Input of Main Beam Signal (D)
14	INE	Analog Input	Input of Sub-Beam Signal (E)
15	INF	Analog Input	Input of Sub-Beam Signal (F)
16	ING	Analog Input	Input of Sub-Beam Signal (G)
17	INH	Analog Input	Input of Sub-Beam Signal (H)
19	FOIP/RRFSUM	Analog Input	Input of Focusing Signal (Positive) Alternative Function : Read RF sum
20	FOIN	Analog Input	Input of Focusing Signal (Negative)
24	RFIN	Analog Input	Differential Input of AC Coupling RF SUM Signal (Negative)
25	RFIP	Analog Input	Differential Input of AC Coupling RF SUM Signal (Positive)
26	RFIP2	Analog Input	Differential Input of AC Coupling RF SUM Signal (Positive)
27	RFIN2	Analog Input	Differential Input of AC Coupling RF SUM Signal (Negative)
47	GAINSW	Analog Output	Read gain switch. 1
48	GAINSW2	Analog Output	Read gain switch 2.
49	GAINSW3	Analog Output	Read gain switch 3.
EQRF Circuits (1)			
128	EQBIAS	Analog Output	External Bias Connection for Circuits in EQRF Block & SATA Block. The external resistor need meet the precision for SATA requirement. (23.1K, 1%)
APC (Auto Power Control for Laser) (6)			
22	FPDODVD	Analog Input	Laser Power Monitor Input for DVD APC / Differential positive input
23	FPDOCD	Analog Input	Laser Power Monitor Input for CD APC / Differential negative input
121	VRDCO	Analog Output	Output Voltage of Laser Diode Control in Read APC
122	VRDC1O	Analog Output	Output Voltage 1 of Laser Diode Control in Read APC
123	VRDC2O	Analog Output	Output Voltage 2 of Laser Diode Control in Read APC
124	VRDC3O	Analog Output	Output Voltage 3 of Laser Diode Control in Read APC
Reference Voltages & DACs (5)			
1	V14	Analog Output	Output of Voltage Reference (1.4V)
2	VFVREF	Analog Output	Output of Voltage Reference
3	HAVC	Analog Output	Decoupling Pin for Reference Voltage of Main and Sub Beams
28	REG_CAP	Analog Output	Output of Voltage Reference
125	VDAC0	Analog Output	Output of General DAC
MPXOUT (Multiplexer Circuit for Various Signals) and Testing Interface (4)			
117	MPXOUT3/MON/GO	Analog Output	Multiplexer Output 3 for Signal Monitoring. Alternate function : Internal monitored signal output / General output.
118	MPXOUT2/MON/GO	Analog Output	Multiplexer Output 2 for Signal Monitoring. Alternate function : Internal monitored signal output / General output.
119	MPXOUT1/MON/GO	Analog Output	Multiplexer Output 1 for Signal Monitoring. Alternate function : Internal monitored signal output / General output
126	AUX1	Analog I/O	Auxiliary Input.Alternative Function : Signal Monitoring
RF Power Supplies (11)			
4	AGND_1	Analog Ground	Ground Pin
13	AVDD33_2	Analog Power(3.3V)	Power Pin
18	AGND_2	Analog Ground	Ground Pin
21	AVDD12_2	Analog Power(1.2V)	Power Pin
29	AGND_3	Analog Ground	Ground Pin
30	AVDD33_3	Analog Power(3.3V)	Power Pin

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

PIN NO	PIN NAME	TYPE	DESCRIPTION
31	AVDD12_3	Analog Power(1.2V)	Power Pin
32	AVDD12_4	Analog Power(1.2V)	Power Pin
43	AVDD33_4	Analog Power(3.3V)	Power Pin
116	AVDD12_1	Analog Power(1.2V)	Power Pin
127	AVDD33_1	Analog Power(3.3V)	Power Pin
Low-Speed General Output (10)			
33	LGO1P	Analog Output	Lowspeed General Output 1P
34	LGO1N	Analog Output	Lowspeed General Output 1N
35	LGO2P	Analog Output	Lowspeed General Output 2P
36	LGO2N	Analog Output	Lowspeed General Output 2N
37	LGO3P	Analog Output	Lowspeed General Output 3P
38	LGO3N	Analog Output	Lowspeed General Output 3N
39	LGO4P	Analog Output	Lowspeed General Output 4P
40	LGO4N	Analog Output	Lowspeed General Output 4N
41	LGO5P	Analog Output	Lowspeed General Output 5P Alternative Function : Read gain switch 4
42	LGO5N	Analog Output	Lowspeed General Output 5N Alternative Function : Read gain switch 5
MOTOR (10)			
50	FMO3	Analog I/O	Feed motor 3 control. PWM output. Alternative Function : Auxiliary servo input
51	FMO4	Analog I/O	Feed motor 4 control. PWM output. Alternative Function : Auxiliary servo input
52	TLO	Analog Output	Tilt servo output
53	TRO	Analog Output	Tracking servo output. PDM output of tracking servo compensator.
54	FOO	Analog Output	Focus servo output. PDM output of focus servo compensator.
55	TRAYPWM	Analog Output	Tray PWM control output. Controlled by µ P.
56	FMO	Analog Output	Feed motor control. PWM output.
57	FMO2	Analog Output	Feed motor 2 control. PWM output.
58	DMO	Analog Output	Disk motor control output. PWM output.
96	FG	3.3V LVTTL I/O, 5V-tolerance,1 2mA PDR, 75K pull-up.	Motor Hall sensor input. The pin is spike-free at power-on stage.
SATA Interface (10)			
77	SVDD33	Analog Power(3.3V)	Power supply for SATA 3.3V circuitry
78	SPLLVDD12	Analog Power(1.2V)	Power supply for SATA circuitry
79	SAGND	Analog Ground	Ground Pin for SATA circuitry
80	STXVDD12	Analog Power(1.2V)	Power supply for SATA transmit circuitry
81	STXP	Analog Output	Differential serial output transmit signal of SATA
82	STXN	Analog Output	Differential serial output transmit signal of SATA
83	SAGND	Analog Ground	Ground Pin for SATA circuitry
84	SRXN	Analog Input	Differential input receive signal of SATA
85	SRXP	Analog Input	Differential input receive signal of SATA
86	AVDD12_RX	Analog Power(1.2V)	Power supply for SATA circuitry
Crystal Interface (3)			
74	XTAL25MI	Input	X`tal input. The working frequency is 25MHz.
75	XTAL25MO	Output	X`tal output.
76	SXVDD33	Analog Power(3.3V)	Power supply for X`ftal circuitry
Serial Flash (6)			
97	SFHOLD#	3.3V LVTTL I/O, 5V-tolerance, 4,8,12,16mA PDR, 75K pull-up	Hold in normal serial flash mode but in quad I/O, as serial data input/data output
98	SFCLK		serial flashÅfs clock output
99	SFDO		serial data outputrial
100	SFCS#		chip select output
101	SFDI		serial data input
102	SFWP#		Write protection in normal serial flash mode but in quad I/O, as serial data input/data output

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

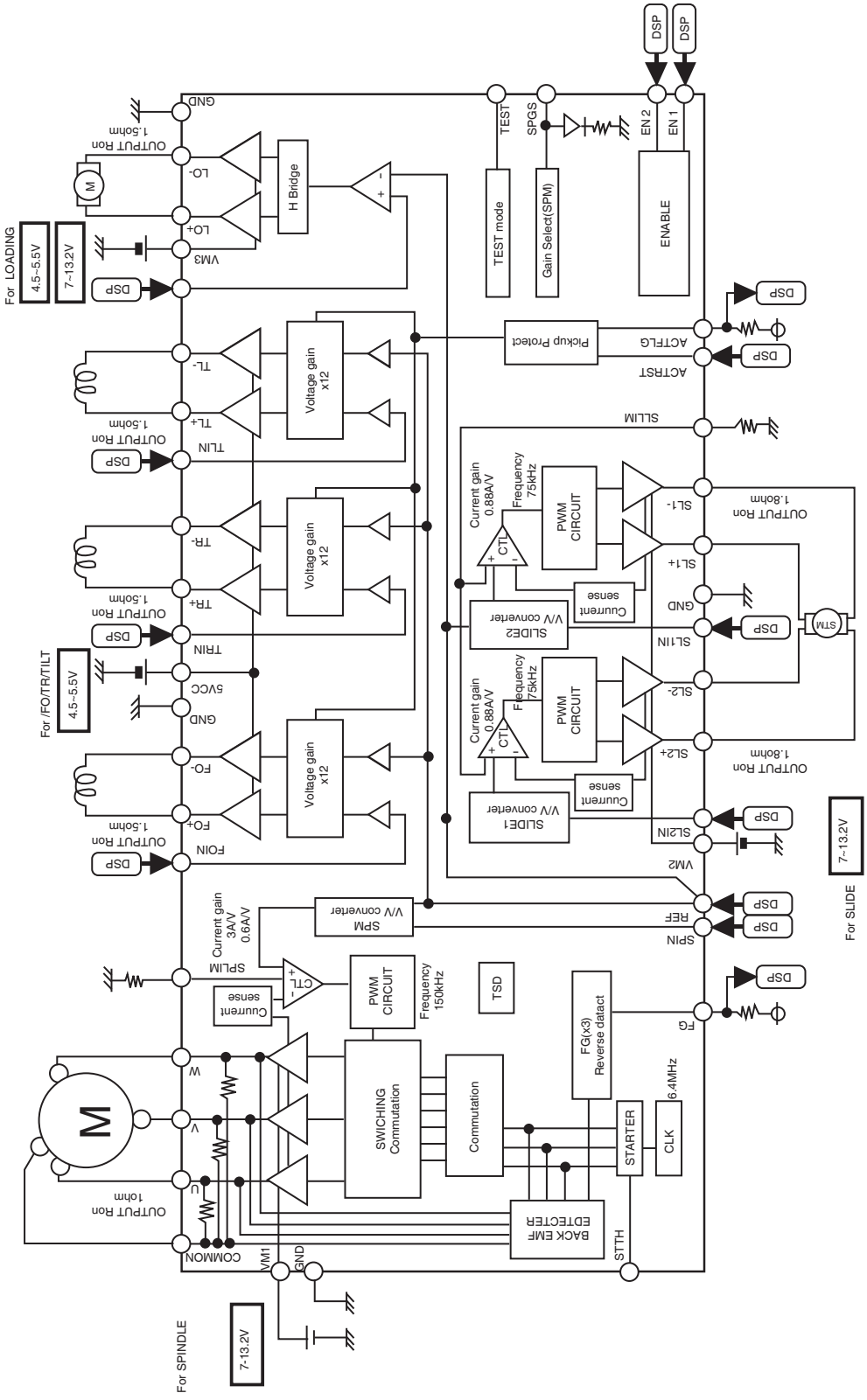
PIN NO	PIN NAME	TYPE	DESCRIPTION
LDD serial interface (3)			
44	LDD_SDIO	3.3V LVTTL I/O, 5V-tolerance, 2,4,6,8mA PDR, 75K pull-up	LDD serial interface data. The pin is spike-free at power-on stage.
45	LDD_CLK		LDD serial interface CLK. The pin is spike-free at power-on stage.
46	LDD_SEN		LDD serial interface command enable. The pin is spike-free at power-on stage.
Panel & sense key (5)			
67	TRAYIN	3.3V LVTTL I/O, 5V-tolerance, 12mA,75K pull-up	Tray_is_in Input, A Logical Low Indicates the Tray is IN. Feedback Flag is from Tray Connector. The pin is spike-free at power-on stage.
68	TRAYOUT		Tray_is_out Input. A Logical Low Indicates the Tray is OUT. Feedback Flag is from Tray Connector. The pin is spike-free at power-on stage.
69	EJECT		Eject/stop key input, active low. The pin is spike-free at power-on stage.
72	LIMIT		Sledge Inner Limit Input, Active Low. The pin is spike-free at power-on stage. Alternate function : 1. Internal monitored signal output
73	PLAY		Play/pause key input, active low. The pin is spike-free at power-on stage.
MISC & GIO function (21)			
120	RSTI	Analog Input	Internal power on reset detection input.
62	GIO12	3.3V LVTTL I/O, 5V-tolerance, 4,8,12,16mA PDR, 75K pull-up	General IO
63	GIO13		General IO.
65	GIO0/MUTE1		General IO
66	GIO1/MUTE2	3.3V LVTTL I/O, 5V-tolerance, 4,8,12,16mA PDR, 75K pull-down	General IO
70	LED1/GIO3		LED Control Output. Initial 0 Output. The pin is spike-free at power-on stage. Alternate function : General I/O
87	GIO4	3.3V LVTTL I/O	General IO.
88	GIO5	3.3V LVTTL I/O	General IO.
89	GIO6	3.3V LVTTL I/O	General IO.
90	GIO7/MUTE3	3.3V LVTTL I/O, 5V-tolerance, 4,8,12,16mA PDR, 75K pull-down	General IO. The pin is spike-free at power-on stage.
91	GIO8		General IO.
92	GIO9/SPOKE		General IO.The pin is spike-free at power-on stage. The pin is not allowed to pull-up in circuit layout. Alternate function : Spoke input.
93	RXD_A/ LED2/GIO10		PC RS232 serial receive data. The pin is spike-free at power-on stage. Alternate function : 1. LED Control Output. Initial “0” Output 2. General IO.
94	TXD_A/GIO11		PC RS232 serial transmit data. The pin is spike-free at power-on stage. Alternate function : 1. LED Control Output. Initial “0” Output 2. General IO.
95	GIO2		General IO
103	GIO14		General IO
104	GIO19		General IO
105	GIO16		General IO
106	GIO17		General IO
107	GIO18		General IO
108	GIO15		General IO The pin is not allowed to pull-up in circuit layout.
Digital Power Pins (11)			
60,61,112	DVDD33O	Digital Power (3.3V)	VDD for digital pad.
109,114	MVDDQ	DRAM Power (3.3V)	VDD for pad output buffer of DRAM die.
111,113	MVSSQ	DRAM Ground	VSS for pad output buffer of DRAM die.
59,71, 110,115	DVDD12I	Digital Power (1.2V)	VDD for internal circuit.
64	VSS	Digital Ground	VSS for digital pad

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

2. LIC201 (R2A30232SP) : SPINDLE MOTOR AND 6CH ACTUATOR DRIVER

2-1. Block Diagram



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

2-2. Pin Function

PIN NO	SYMBOL	FUNCTION
1	SPIN	Spindle control voltage input
2	SL1IN	Slide control voltage input 1
3	SL2IN	Slide control voltage input ÇQ
4	SPLIM	Input terminal for spindle current limit
5	VM2	Motor Power Supply ÇQ(for Slide)
6	SL2+	Slide non-inverted output 2
7	GND	GND
8	SL2-	Slide inverted output 2
9	SL1+	Slide non-inverted output 1
10	SL1-	Slide inverted output 1
11	GND	GND
12	U	Motor drive output U
13	V	Motor drive output V
14	W	Motor drive output W
15	ACTFLG	Pickup protect flag output
16	COMMON	Motor common
17	TEST	Test
18	SLLIM	Input terminal for slide current limit
19	FG	Frequency generator output
20	EN1	Input terminal for enable 1
21	EN2	Input terminal for enable 2
22	VM1	Motor Power Supply 1(for Spindle)
23	SPGS	Input terminal for gain select SPM
24	STTH	Reference voltage for spindle start up
25	ACTRST	Pickup protect Reset
26	VM3	Power Supply3(for Loading)
27	LO+	Loading non-inverted output
28	LO-	Loading inverted output
29	GND	GND
30	TO-	Tracking inverted output
31	TO+	Tracking non-inverted output
32	5VCC	5V Power Supply (for FS,TS,TL)
33	GND	GND
34	FO+	Focus non-inverted output
35	FO-	Focus inverted output
36	TL+	Tilt non-inverted output
37	TL-	Tilt inverted output
38	TLIN	Tilt control voltage input
39	TOIN	Tracking control voltage input
40	FOIN	Focus control voltage input
41	LOIN	Loading control input
42	REF	Reference voltage input

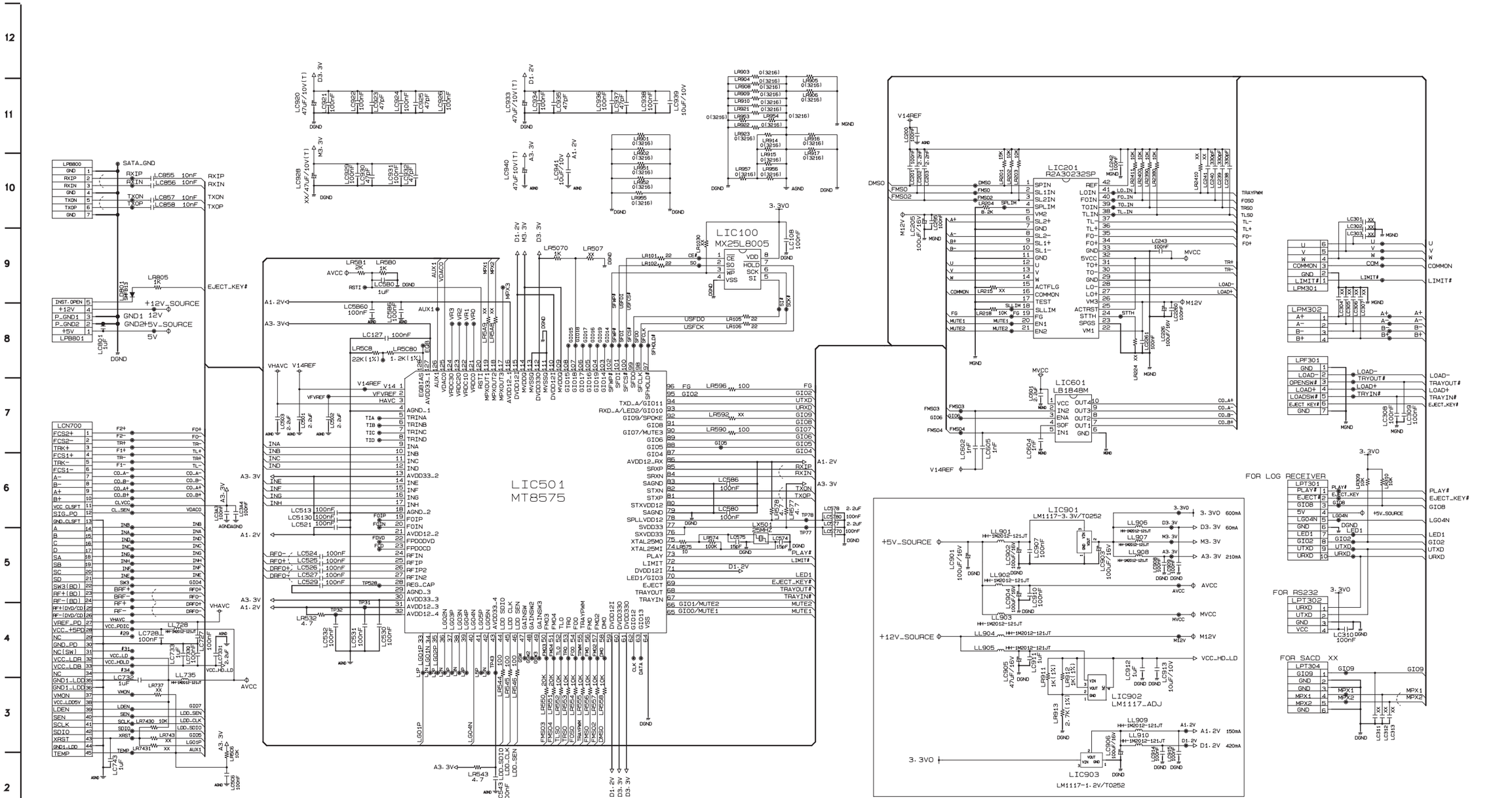
Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

MEMO

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

CIRCUIT DIAGRAM



LOADER (HL-04P)
EBY51750301 REV. 6.1
2009. 01. 20

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

CIRCUIT VOLTAGE CHART

PIN NO.	VOLTAGE
LIC100	
1	0.00
2	PULSE
3	3.30
4	0.00
5	0.00
6	0.00
7	3.30
8	3.30
LIC201	
1	1.41
2	1.41
3	1.41
4	0.00
5	12.19
6	PULSE
7	0.00
8	PULSE
9	PULSE
10	PULSE
11	0.00
12	5.80
13	5.80
14	5.80
15	0.90
16	3.29
17	0.00
18	0.00
19	3.59
20	0.00
21	0.00
22	12.19
23	0.00
24	0.00
25	5.06
26	12.19
27	1.07
28	1.07
29	0.00
30	1.23
31	1.23
32	5.06
33	0.00
34	1.25
35	1.25
36	0.98
37	0.98
38	1.41
39	1.41
40	1.41
41	1.41
42	1.41

PIN NO.	VOLTAGE
LIC501	
1	1.41
2	1.01
3	2.10
4	0.00
5	1.05
6	1.15
7	0.92
8	1.70
9	2.49
10	2.48
11	2.40
12	2.50
13	3.28
14	2.30
15	2.40
16	2.32
17	2.38
18	0.00
19	1.19
20	0.00
21	0.00
22	0.00
23	0.00
24	0.00
25	0.00
26	0.00
27	0.00
28	0.00
29	0.00
30	3.28
31	1.19
32	1.16
33	0.00
34	0.00
35	0.00
36	0.00
37	0.00
38	0.00
39	0.00
40	0.00
41	0.00
42	0.00
43	0.00
44	3.29
45	0.00
46	0.00
47	0.00
48	0.00
49	0.00
50	1.39
51	1.32

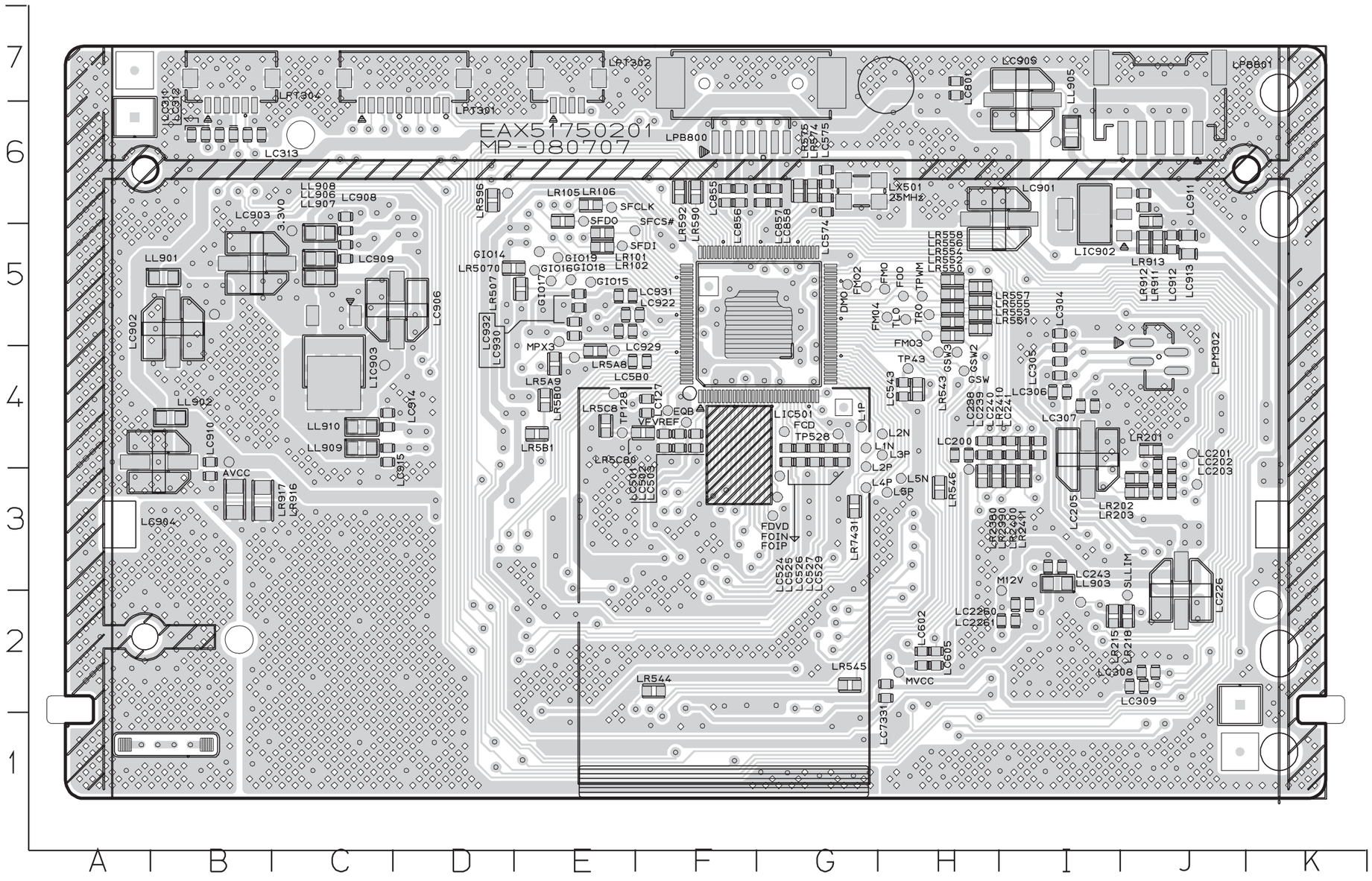
PIN NO.	VOLTAGE
52	1.34
53	1.34
54	1.35
55	2.57
56	1.33
57	1.33
58	1.33
59	1.19
60	3.28
61	3.28
62	0.00
63	0.00
64	0.00
65	0.00
66	0.00
67	3.30
68	3.30
69	3.30
70	0.00
71	1.19
72	3.30
73	3.30
74	3.22
75	3.24
76	3.24
77	1.17
78	0.00
79	1.19
80	1.20
81	1.19
82	1.19
83	0.00
84	1.19
85	1.19
86	1.19
87	0.00
88	0.00
89	0.00
90	0.00
91	0.00
92	0.00
93	3.30
94	3.30
95	0.00
96	3.29
97	3.30
98	0.00
99	0.00
100	0.00
101	PULSE
102	3.30
103	3.30

PIN NO.	VOLTAGE
104	3.30
105	3.30
106	3.30
107	3.30
108	3.30
109	3.30
110	1.19
111	0.00
112	3.30
113	0.00
114	3.30
115	1.19
116	1.19
117	1.12
118	1.12
119	3.29
120	1.67
121	0.00
122	0.00
123	0.00
124	1.67
125	1.67
126	1.16
127	3.30
128	1.39
LIC601	
1	5.07
2	1.19
3	0.00
4	4.50
5	1.19
6	0.00
7	PULSE
8	PULSE
9	PULSE
10	PULSE
LIC901	
1	0.00
2	3.30
3	5.05
LIC902	
1	6.93
2	8.18
3	12.19
LIC903	
1	0.00
2	1.20
3	3.30

Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

PRINTED CIRCUIT BOARD DIAGRAMS

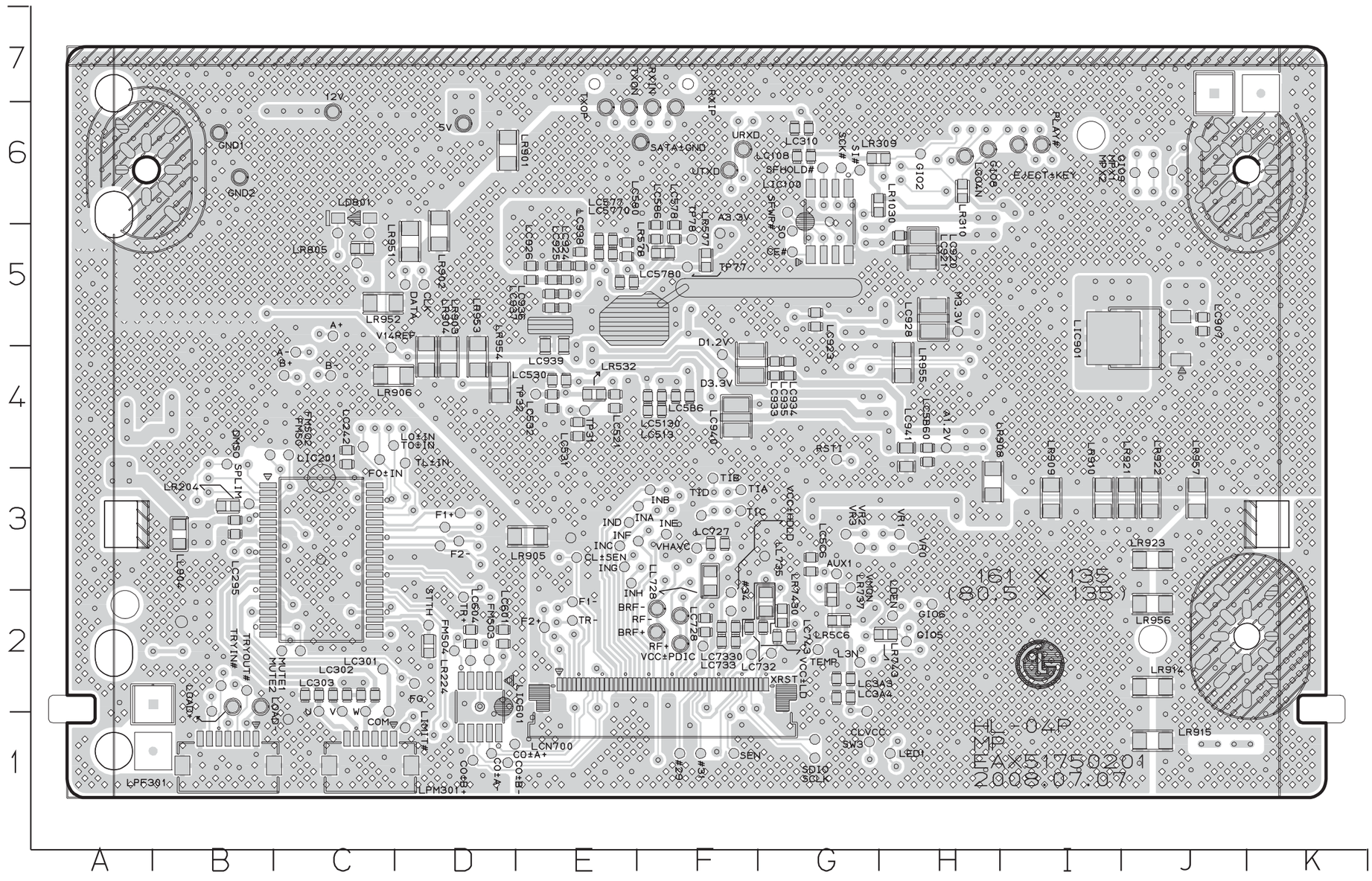
(TOP VIEW)



Copyright © 2009 LG Electronics. Inc. All right reserved.
Only for training and service purposes.

LGE Internal Use Only

(BOTTOM VIEW)


12V
GND1
GND2
5V
LR901
LD801
LR805
LR951
LR902
LR903
LR904
LR953
LR954
LR952
V14REF
DATA
CLK
A+
A-
B+
B-
LR906
LC530
LC939
LR532
LC592
LC591
LC593
LC521
LC5130
LC5113
LC5B6
LC940
D3.3V
D1.2V
LC933
LC934
LC935
LC936
LC937
LC926
LC924
LC925
LC938
LC577
LC770
LC560
LC586
LC578
LC576
LR577
LR578
TP78
A3.3V
SFWR#
SO
CE#
TP77
LC5780
TXOP
TXON
RXIN
RXIP
SATA+GND
URXD
UTXD
LC310
LC108
SFHOLD#
LIC100
SCK#
SI#
LR309
GIO2
LR1030
GIO6
LGOUT
LR310
LC322
LC320
LC321
PLAY#
EJECT+KEY
GIO10
MPX1
MPX2
M3.3V
LC928
LR955
LC923
LIC901
LC907
LC941
LC5B60
LR908
LR909
LR910
LR921
LR922
LR957
LR923
LR956
LR914
LR915
LR916
LR917
LR918
LR919
LR920
LR924
LR925
LR926
LR927
LR928
LR929
LR930
LR931
LR932
LR933
LR934
LR935
LR936
LR937
LR938
LR939
LR940
LR941
LR942
LR943
LR944
LR945
LR946
LR947
LR948
LR949
LR950
LR951
LR952
LR953
LR954
LR955
LR956
LR957
LR958
LR959
LR960
LR961
LR962
LR963