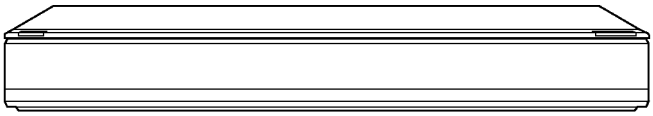
ORDER NO.DSD1205009CE

Service Manual

HDD Recorder



The illustration shows the image of DMR-HW220EB.

When replacing HDD or AV Out P.C.B., HDD must be formatted.
After that, **programme in the HDD will be lost**.
In detail, please refer to Service Navigation in this Service Manual.

Model No. DMR-HW120EB
DMR-HW220EB

Colour
(K).....Black Type

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⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

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1 Safety Precautions

1.1. General guidelines

1. When servicing, observe the original lead dress. If a short circuit is found, replace all parts which have been overheated or damaged by the short circuit.
2. After servicing, see to it that all the protective devices such as insulation barriers, insulation papers shields are properly installed.
3. After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

1.1.1. Leakage current cold check

1. Unplug the AC cord and connect a jumper between the two prongs on the plug.
2. Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metallic cabinet part on the equipment such as screwheads, connectors, control shafts, etc. When the exposed metallic part has a return path to the chassis, the reading should be between 1MΩ and 5.2MΩ.
   When the exposed metal does not have a return path to the chassis, the reading must be ∞ .

1.1.2. Leakage current hot check (See Figure 1.)

1. Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.
2. Connect a 1.5kΩ, 10 watts resistor, in parallel with a 0.15μF capacitors, between each exposed metallic part on the set and a good earth ground such as a water pipe, as shown in Figure 1.
3. Use an AC voltmeter, with 1000 ohms/volt or more sensitivity, to measure the potential across the resistor.
4. Check each exposed metallic part, and measure the voltage at each point.
5. Reverse the AC plug in the AC outlet and repeat each of the above measurements.
6. The potential at any point should not exceed 0.75 volts RMS. A leakage current tester (Simpson Model 229 or equivalent) may be used to make the hot checks, leakage current must not exceed 1/2 milliampere. In case a measurement is outside of the limits specified, there is a possibility of a shock hazard, and the equipment should be repaired and rechecked before it is returned to the customer.

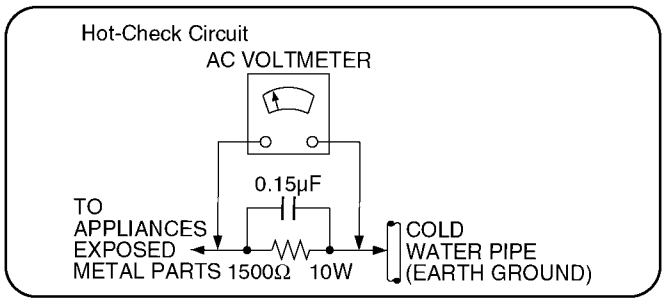


Figure 1

2 Warning

2.1. Prevention of Electrostatic Discharge (ESD) to Electrostatic Sensitive (ES) Devices

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

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any ESD on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging ESD wrist strap, 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 (ESD protected)" can generate electrical charge sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges 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. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device).

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety.
These parts are marked by ⚠ in the schematic diagrams, Exploded Views and replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards. Do not modify the original design without permission of manufacturer.

2.2. Service caution based on legal restrictions

2.2.1. General description about Lead Free Solder (PbF)

The lead free solder has been used in the mounting process of all electrical components on the printed circuit boards used for this equipment in considering the globally environmental conservation.

The normal solder is the alloy of tin (Sn) and lead (Pb). On the other hand, the lead free solder is the alloy mainly consists of tin (Sn), silver (Ag) and Copper (Cu), and the melting point of the lead free solder is higher approx.30 degrees C (86°F) more than that of the normal solder.

Definition of PCB Lead Free Solder being used

The letter of "PbF" is printed either foil side or components side on the PCB using the lead free solder. (See right figure)	PbF

Service caution for repair work using Lead Free Solder (PbF)

- The lead free solder has to be used when repairing the equipment for which the lead free solder is used. (Definition: The letter of "PbF" is printed on the PCB using the lead free solder.)
- To put lead free solder, it should be well molten and mixed with the original lead free solder.
- Remove the remaining lead free solder on the PCB cleanly for soldering of the new IC.
- Since the melting point of the lead free solder is higher than that of the normal lead solder, it takes the longer time to melt the lead free solder.
- Use the soldering iron (more than 70W) equipped with the temperature control after setting the temperature at 350±30 degrees C (662±86°F).

Recommended Lead Free Solder (Service Parts Route.)

- The following 3 types of lead free solder are available through the service parts route.
  RFKZ03D01KS----------(0.3mm 100g Reel)
  RFKZ06D01KS----------(0.6mm 100g Reel)
  RFKZ10D01KS----------(1.0mm 100g Reel)

Note

* Ingredient: tin (Sn), 96.5%, silver (Ag) 3.0%, Copper (Cu) 0.5%, Cobalt (Co) / Germanium (Ge) 0.1 to 0.3%

3 Service Navigation

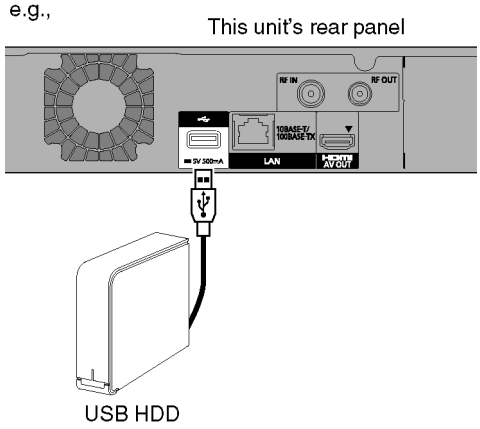
3.1. External HDD (USB-HDD)

Please use a confirmed USB-HDD.
For the latest information on confirmed USB-HDDs, please check the following website.
http://panasonic.jp/support/global/cs/

- Certain non-confirmed USB-HDDs cannot be used with this unit.
- If a problem occurs with the USB-HDD, please contact the manufacturer of the device.

3.1.1. Connecting the USB-HDD

e.g.,



Connect this unit with optional USB-HDD.
- Only one USB-HDD can be connected at the same time.
- Do not connect additional HDDs using a USB hub.
- For details about connection method, refer to the instructions supplied with the USB-HDD.

3.1.2. Disconnecting the USB-HDD

Please use the following procedure to disconnect.
Disconnecting without following this procedure may result in the loss of recorded content from the USB-HDD or the internal HDD.

1. Press [SETUP].
2. Select "Settings for USB-HDD" in "HDD/ USB-HDD", then press [OK].
3. Select "USB HDD Disconnection", then press [OK].
4. Select "Yes", then press [OK].
5. Disconnect the USB-HDD from this unit.

3.1.3. Registering the USB-HDD

3.1.3.1. Registering the USB-HDD

- If you use a USB-HDD with this unit, the USB-HDD must first be registered on this unit.
  - Registering of a USB-HDD will format the USB-HDD and all the content already recorded will be deleted.
  - Up to eight USB-HDDs can be registered on this unit.
  - Registered USB-HDDs cannot be used with devices other than this unit.

- If the registering screen appears when connecting the USB-HDD, go to step 4.

1. Press [SETUP].
2. Select "Settings for USB-HDD" in "HDD/ USB-HDD", then press [OK].
3. Select "USB-HDD Registration", then press [OK].
4. Select "Yes", then press [OK].
   - If you have already registered eight USB-HDDs, it will be necessary to delete one or more of them before registering a new USB-HDD.
   The message screen appears:
   1. Select "Yes", then press [OK].
   2. Select the USB-HDD to cancell, then press [OK]. The confirmation screen appears.
   3. Select "Yes", then press [OK].
5. When the registering is complete, message screen appears.
   Press [OK].
6. The confirmation screen appears.
   Press [OK].

3.1.3.2. Settings for USB-HDD

Delete all titles

Delete all titles on the USB-HDD.

- Delete does not work if one or more titles are protected.

1. Press [SET UP].
2. Select "Settings for USB-HDD" in "HDD/ USB-HDD", then press [OK].
3. Select "USB-HDD Management", then press and hold [OK] for 3 seconds.
4. Select "Delete all titles", then press [OK].
5. Select "Yes" and press [OK].
6. Select "Start" and press [OK].
7. The confirmation screen appears.
   Press [OK].

Format USB-HDD

Formatting deletes all contents, and they cannot be restored.
Check carefully before proceeding.

1. Press [SET UP].
2. Select "Settings for USB-HDD" in "HDD/ USB-HDD", then press [OK].
3. Select "USB-HDD Management", then press and hold [OK] for 3 seconds.
4. Select "Format USB-HDD", then press [OK].
5. Select "Yes" and press [OK].
6. Select "Start" and press [OK]. Then formatting starts.
7. Press [OK] after formatting completed.

3.1.3.3. To cancell all USB-HDD registrations

- If you register a USB-HDD, all the content already recorded on the USB-HDD will be deleted.
- It is not possible to play back the content on the USB-HDD whose registration has been cancelled.
- You can check the registration number of the USB-HDD on the DIRECT NAVIGATOR.

Cancellation of all USB-HDD Registrations

This function cancells the registrations of all the USB-HDDs registered on this unit.
Only do this if you are going to dispose of this unit.

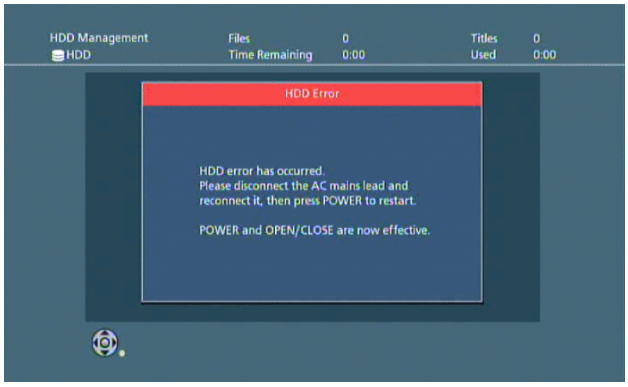
- Before operation, perform "3.1.2. Disconnecting the USB-HDD" and remove the USB-HDD.
- It is not possible to play back the content from a USB-HDD whose registration has been cancelled.

1. Press [SET UP].
2. Select "Settings for USB-HDD" in "HDD/ USB-HDD", then press [OK].
3. Select "Cancellation of all USB-HDD Registrations", then press and hold [OK] for 3 seconds.
4. Select "Yes", then press [OK].
5. The confirmation screen appears.
   Select "Yes", and press [OK].
6. When the cancellation is complete, message screen appears.
   Press [OK].

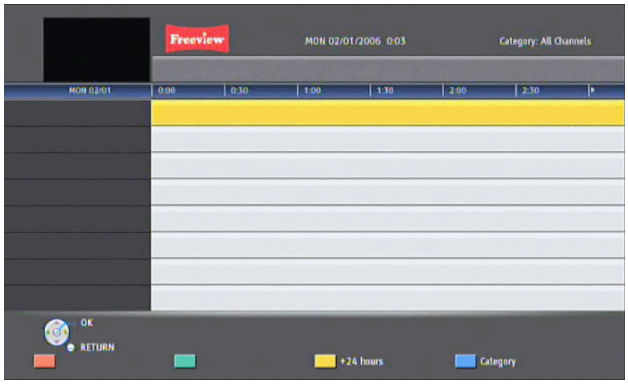
3.2. How to format for HDD when replacement of HDD or Main P.C.B.

3.2.1. How to escape " HDD Error " indication on GUI display.

1. When exchange HDD or Main P.C.B., the " HDD Error " screen is displayed, but, according to a following procedure, please format HDD.



2. Press power button to turn off the power first, then turn on the power with the [GUIDE] button on remote-control. (Shown in Reference screen 1)



(Reference screen 1)

3. Press [RETURN] button to move to the normal display.

3.2.2. Procedure of the " HDD format ".

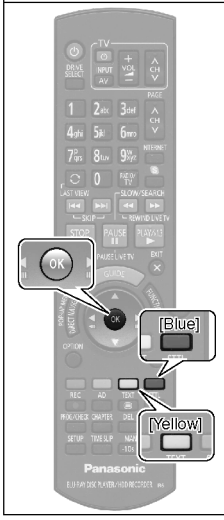
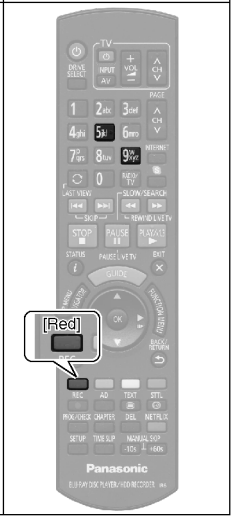
1. Press [SETUP].
2. Select "HDD/ USB HDD" and press [OK].
3. Select "HDD Management" and press [OK] for 3 seconds.
4. Select "Format HDD" and press [OK].
5. Select "Yes" and press [OK].
6. Select "Start" and press [OK]. Then formatting starts.
7. Press [OK] after formatting completed.
8. Press [RETURN] to exit setting mode.

3.3. Combination of Multiple Pressing on the Remote Control

Press multi-buttons (in combination) on the remote control simultaneously for operations, such as initialization or service mode, etc.
There are no multiple pressing functions on the previous remote controls, thus, please be sure to use the supplied remote control.

3.4. Entering Special Modes with Combination of Multiple Pressing on the Remote Control

Enter the following special modes by multiple pressing functions on the supplied remote control.
After entering each mode, switch to the desired menus for operation.

Disclosure mode	Nondisclosure mode
[OK] [Blue] [Yellow]	[5] [9] [Red]
	

◆ **Menu switch: ⬇ mark.**
Right cursor (remote control)
or
[Power] (main unit)

◆ **Operating menu:**
[OK] (remote control)

※ Release from special modes automatically after the operation.

◆ **Release from special modes:**
- Press other buttons in no connection with the above operations.
- No operation for over 2 minutes.
- Press and hold [Power] on main unit (forced to turn off).

3.4.1. Disclosure mode (Combination of multiple pressing: [OK] [Blue] [Yellow])

Press and hold [OK] [Blue] [Yellow] on the remote control simultaneously for 5 sec., then "00 RET" is displayed on FL display window.

Power	FL display	Key operation	Function	Remarks
ON	00 RET	No	No	
	↓ 01 OID	OK (Press and hold)	Owner ID display	Displayed Owner ID on TV monitor.
	↓ 03 VL	OK	Release from BD/DVD video play restriction	Release from the aging restriction on BD video and DVD video play. Press and hold [Stop] (not [OK])(on the remote control or main unit) to switch to "02 OII" (Owner ID initialization).
	↓ 04 PRG	OK (Press and hold)	Progressive initialization	Initialize the progressive settings, and switch to the interlaced display.
	↓ 05 P/N	OK (Press and hold)	Switch the TV System	Switch the TV system to another one. If the current TV system is PAL, NTSC is switched to, and vice versa.
	↓ 07 DC	OK (Press and hold)	Deep Color initialization	Initialize Deep Color.
	↓ 09 CHI	OK	ATP Re-execution	Re-execute the channel Plan, Clock and TV Guide setting.
	02 OII	OK	Owner ID initialization	When "03 VL" is displayed, press and hold [Stop] (on the remote control or main unit) to switch to other displays. Press [OK] to initialize Owner ID.

3.4.2. Nondisclosure mode (Combination of multiple pressing: [5] [9] [Red])

Press and hold [5] [9] [Red] on the remote control simultaneously for about 5 sec., then "70 RET" is displayed on FL display window.

Power	FL display	Key operation	Function	Remarks
OFF	70 RET	No	No	
	↓ 80 SRV	OK	Switch to service mode	Press [OK], then "HELLO" is displayed, and wait about 20 sec. until "SERV" is displayed.
	↓ 83 SDI	OK	CD/SD Diag	Do not apply in normal service.
	↓ 91 SPD	OK	Special display	Do not apply in normal service.
	↓ 92 F99	OK	F99 Validate/Invalidate switch	Do not apply in normal service.
ON	70 RET	No	No	
	↓ 81 AIG	OK	Switch to aging mode	No Use
	↓ 82 TSR	OK	Switch to tuner service mode	
	↓ 83 SDI	OK	CD/SD Diag	Do not apply in normal service.
	↓ 91 SPD	OK	Special display	Do not apply in normal service.
	↓ 92 F99	OK	F99 Validate/Invalidate switch	Do not apply in normal service.

3.5. Service Information

This service manual contains technical information which will allow service personnel's to understand and service this model.
Please place orders using the parts list and not the drawing reference numbers.

3.6. Caution for DivX

"Warning for Customers Who Use DivX Video-on-Demand content" when replacing the FLASH ROM or EEPROM or P.C.B.
First, copy the Last part of this page for the customers who continue to use DivX Video-on-Demand service.

Appendix:

* Parts that memorize user's information are only EEPROM.
* The registration of Registration Code is possible for half a year up to 6 recorders up to 10 recorders a year.
  Replacement of EEPROM or P.C.B. including EEPROM spends one of this.

Registration Code is memorized in EEPROM (RFKFxxxxxx).
If exchange above P.C.B. or EEPROM, new registration Code differ from previous Registration Code will be generated.
In this case if your customer uses DivX Video-on-Demand service, he/she will no longer be able to play any content that he/she purchased under that same registration code.
Therefore your customer will need to obtain and register the new registration code.

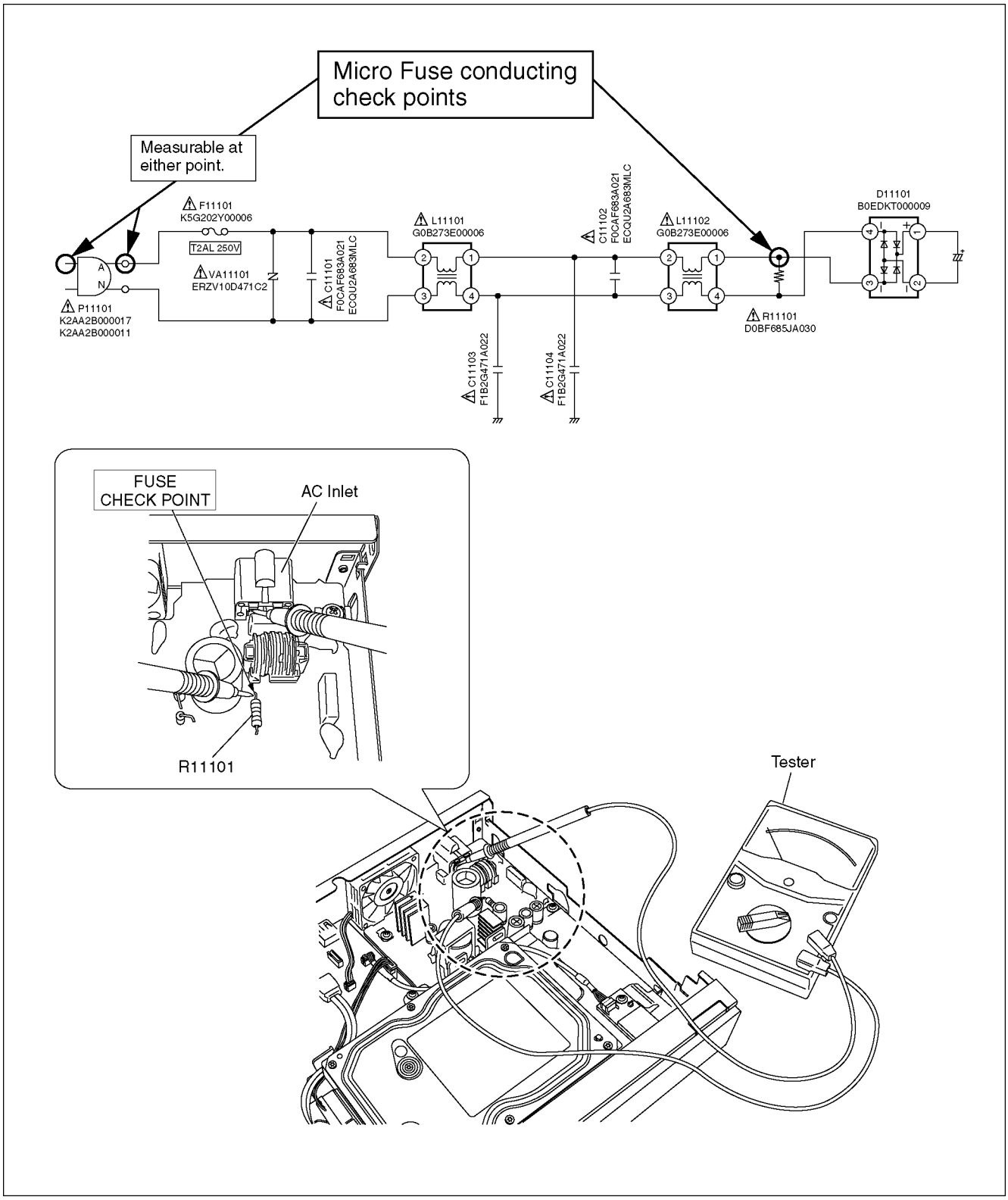
*Copy this page and cut on the dotted line and give the lower half to your customer.

Warning for Customers who use the DivX Video-on-Demand content.

1. The registration code has been changed for the repair of the product or the product exchange.
2. Obtain and register a new registration code, otherwise you will no longer be able to play DivX Video-on-Demand content.
3. Follow the procedure on the DivX Video-on-Demand web site to register at
   http://vod.divx.com/
   * If you do not use the DivX Video-on-Demand content, please ignore this warning.

3.7. Micro Fuse conducting check

This unit uses the Micro Fuse.
Check the Micro Fuse conducting using the Tester at the check points below.

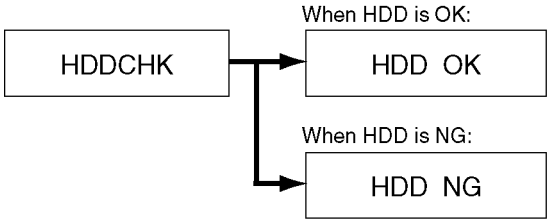


3.8. (HDD) Service Navigation

3.8.1. HDD Malfunction check (Simplified Method)

Perform simple quality judgement process of HDD according to the following operations.

1. Execute Service Mode
   1) Turn the power off.
   2) Press the [5] [9] and [RED] button simultaneously for 5 seconds, then "70 RET" is displayed on FL.
   3) Press the [▶] button to select until "80 SRV" is displayed on FL.
   4) Press the [OK] button.
   5) It is displayed on FL as "HELLO-->SERV".: It is shown to have entered the service mode.
2. Press [3] [8] of remote control keys in service mode.
3. Judge the quality on FL display.



※ If the current date or the date when the error occurred is wrong, correct judgement may not be made.

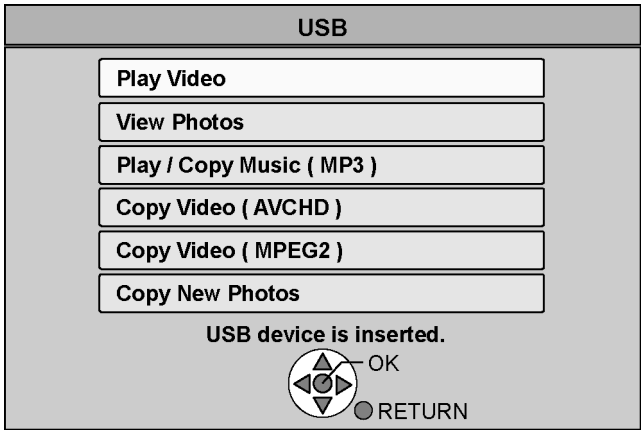
3.9. Operation check when a USB device is connected

You can check the operation status (normal or abnormal) of the USB connection part of this unit easily as shown below.

Connect each device to the USB terminal on the front panel and check the operation status on the TV monitor.

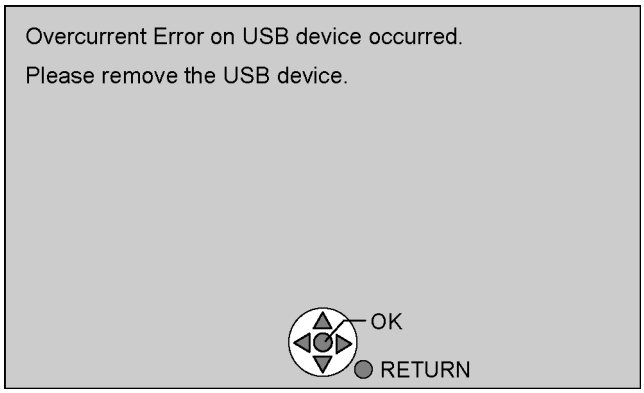
Normal operation:

Automatically displayed when the USB connection is made to a digital camera, etc.
(Example below: When DivX materials have been recorded)
(*Displayed items differ depending on the recorded contents.)



Abnormal operation (Example 1):

Warning is displayed automatically if overcurrent is detected when a USB device is connected.
(*When a USB device or this unit's USB terminal shorts out or the power supply type of USB device is connected)



Abnormal operation (Example 2):

When the terminal of USB device is damaged or open, there is no display on the TV monitor.

3.10. Wi-Fi Module (Internal) Malfunction Check (Simplified Method) (HW220EB)

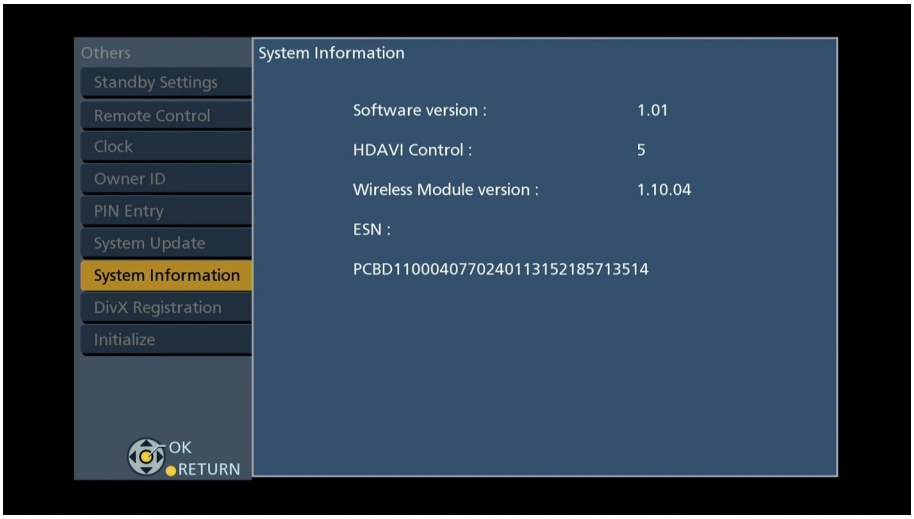
3.10.1. Procedure of the Wi-Fi Module (Internal) Malfunction Check

3.10.1.1. Method of Wireless LAN Setting

1. Press [SETUP].
2. Select "Network Settings" in "Network", then press [OK].
3. Select "Wireless" in "LAN Connection Mode".
4. Press [OK]. The following "Wireless Setting screen (example)" is displayed.

3.10.1.2. Method of displaying Wireless LAN Module Version

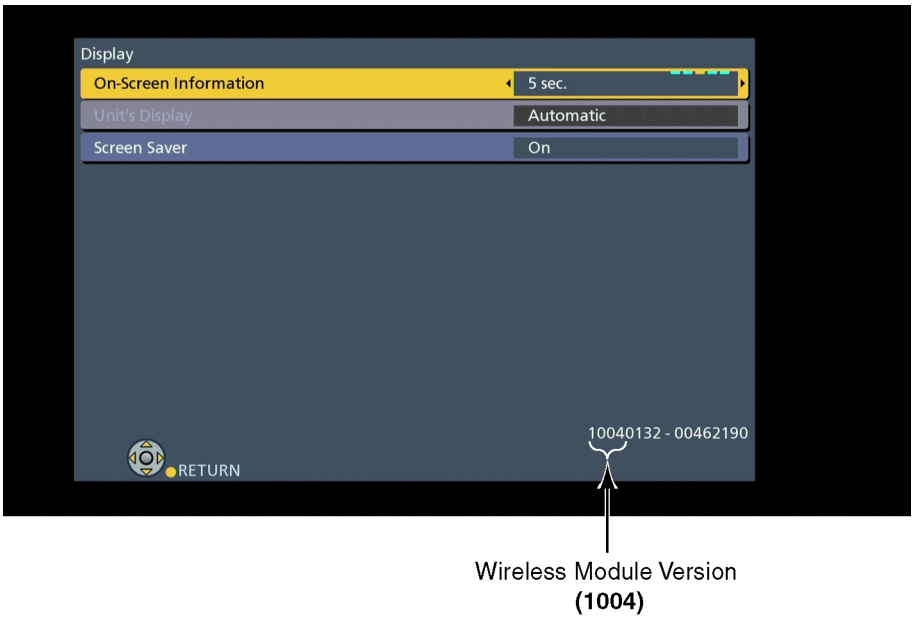
1. Press [SETUP].
2. Select "System Information" in "Others".
3. Press [OK]. The following "System Information screen (example)" is displayed.



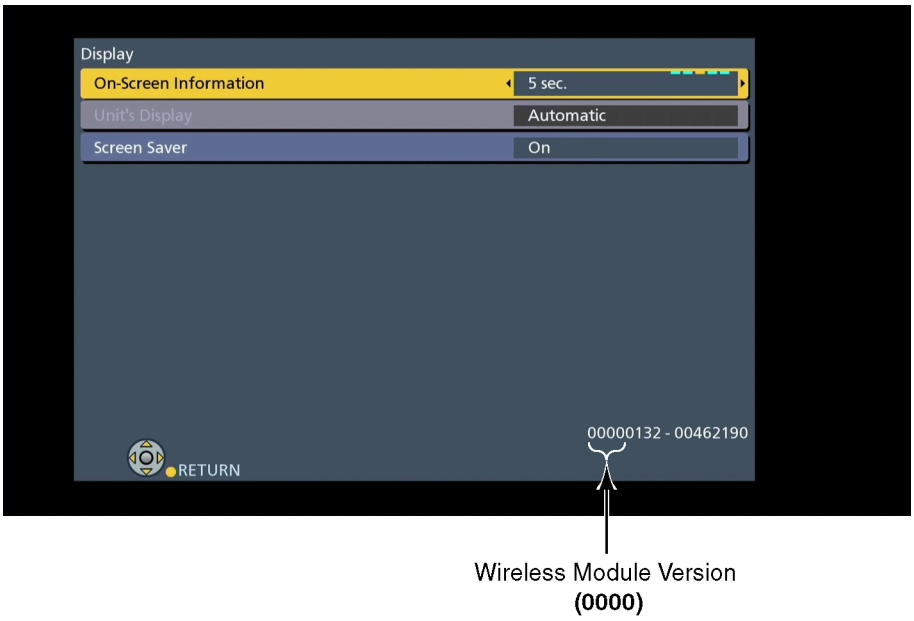
3.10.1.3. Confirm method of Wireless LAN Module invalidity/effective

1. Press [SETUP].
2. Select "Display" and press [OK].
3. Press [STATUS] more than 5 seconds. The following "Display screen (example)" is displayed.

   In case of Wireless LAN Module effective.



   In case of Wireless LAN Module invalid.



4. In case of Wireless LAN Module effective, Wireless LAN Module or Wireless LAN Module connection cable may be the source of problem.
5. Please finally check the operation of the fact.

3.11. Check with Tuner Service Mode

Inspect the inside components using the application for inspections by service personnel.

Main functions

N0	Function Name	Contents
01	Hard Test	Perform Access Test for each hard device and display the result.
02	User Setting Information Backup	Backup/ Restore User Setting Item (The Initial Setting) to the SD Card.
03	Time xxxxxxx Count yyyyyyy	Length of Power ON time/ Count of power ON time

1. Execute Tuner Service Mode
   1) Turn the power on to receive digital broadcasting (HD broadcasting).
   2) Press the [5] [9] and [RED] button simultaneously for 5 seconds, then "70 RET" is displayed on FL.
   3) Press the [▶] button to select until "82 TSR" is displayed on FL.
   4) Press the [OK] button.
   5) It is shown to have entered the tuner service mode.
   6) The command is transmitted by attached remote control.
2. Finishing Tuner Service Mode
   Method 1: After turning the unit "OFF", pull out the AC cord.
   Method 2: Repeat turning ON and OFF twice: P-OFF → P-ON → P-OFF → P-ON.

SRV-TOOL	
Device TEST	
Backup Data to SD-card:	Restore Data from SD-card:
	Time 00000:00 Count 0000000

3.11.1. Hard Test (Device Test)

Perform Access Test for each hard device and display the result.

SRV-TOOL	
Device TEST	
Backup Data to SD-card:	Restore Data from SD-card:
	Time 00000:00 Count 0000000

```
+--------------------------+
| -- Hard Test Result --   |
+--------------------------+
| <1> EEPROM [READ]  (Result)|
+--------------------------+
| <2> EEPROM [WRITE] (Result)|
+--------------------------+
| <3> TUNER 1        (Result)|
+--------------------------+
| <4> TUNER 2        (Result)|
+--------------------------+
| <5> LAN            (Result)|
+--------------------------+
| <6> -----                  |
+--------------------------+
| <7> -----                  |
+--------------------------+
| <8> -----                  |
+--------------------------+
| <9> -----                  |
+--------------------------+
```

<Function>

<1> : EEPROM [READ] : Read Test (AV Out P.C.B.: IC3701)
<2> : EEPROM [WRITE] : Write Test (AV Out P.C.B.: IC3701)
<3> : TUNER 1(T/T2 Tuner):I2C_Bus Check (T/T2 Tuner P.C.B.:TU8701)
<4> : TUNER 2(T/T2 Tuner):I2C_Bus Check (T/T2 Tuner P.C.B.:TU8701)
<5> : LAN:Register Access Test (Digital P.C.B.: IC59020)
<6> : (None)
<7> : (None)
<8> : (None)
<9> : (None)

<Display>

<1> : EEPROM [READ]	ＯＫ	: Normality
	ＮＧ	: EEPROM Read Error
<2> : EEPROM [WRITE]	ＯＫ	: Normality
	ＮＧ	: EEPROM Write Error
<3> : TUNER 1	ＯＫ	: Normality
	ＮＧ	: TUNER (T/T2 Tuner) I2C_Bus. Error
<4> : TUNER 2	ＯＫ	: Normality
	ＮＧ	: TUNER (T/T2 Tuner) I2C_Bus. Error
<5> : LAN	ＯＫ	: Normality
	ＮＧ	: LAN Register Access Error

Note:

Hard test result does not guarantee that problems do not exist even if the result is OK.
The result is used as reference when any trouble occurs.

3.11.2. Use times and number of times of Power ON/OFF

Display accumulated time of Power ON and display number of times of Power ON/OFF.

SRV-TOOL	
Device TEST	
Backup Data to SD-card:	Restore Data from SD-card:
	Time 00000:00(*1)Count 0000000(*2)

*1 : Display accumulated time of Power ON
Display on a 15-minute basis
Example: 00123:15 → 123 hour 15 minute

*2 : Display number of times of Power ON/OFF
Example: 0000123 →123

3.11.3. User Setting Information Backup

Purpose

After the recorder is repaired, the restored setting information is not default, but the information before repaired.

Operation summary

Before starting repair, import the data on memory of the unit to export the data to SD card on Tuner Service Mode display.
After the repair is finished, import the data on SD card to export the data to the memory on the unit by operating on Tuner Service Mode display again.

• Data to be backed up

Each setting item that a user can set at "SET UP" (*1) and "DVB TUNING" (FUNCTION MENU → OTHERS → SET UP, DVB TUNING, and "Program timer setting", "History information" etc.

* The following data cannot be backed up.
- Program chart data
- Dedicated areas for Internet site service providers (unique information for each company), broadcast mail, two-way communication list, board, or favorite page
- Status saving systems (last channel except for UHF, etc.)

etc.

Note:

Of user setting information, only items selected and set on the initial Setup display can be backed up and restored.

*1: Of user setting information, except items selected and set on the initial Setup display.

Operation procedure

Preparation:

Prepare a SD card to export data stored in this unit.

Create the following directory on the SD card.

¥EEPBAKSD

Boot:

1. On Tuner Service Mode display
   Using Remote Control, move the cursor to user's setting information backup display position (Refer to below) on Tuner Service Mode display.
2. Press [OK].
   After "Try → OK" is displayed, the data is exported to SD card.
   (Refer to below)

SRV-TOOL	
Device TEST	
Backup Data to SD-card: OK	Restore Data from SD-card:
	Time 00000:00 Count 0000000

   When OK(***) is displayed, the data is successfully exported.
   Note:
   If the backup file already exists in the SD card, the data is overwritten and "OK" is displayed.
3. Remove the SD card from the unit.
4. Turn the unit OFF to finish Tuner Service Mode.

Restoring the backup data to the unit

1. Turn the unit ON.
   Perform the following: Function MENU - To Others - Setup - Others - Initialize - Shipping Condition.
2. Start Tuner Service Mode.
3. Insert the SD Card in save data to the unit.
4. Using Remote Control, move the cursor to user's setting information backup display position (Refer to below) on Tuner Service Mode display.

SRV-TOOL	
Device TEST	
Backup Data to SD-card: OK	Restore Data from SD-card:
	Time 00000:00 Count 0000000

5. Press [ENTER].
   After "Try → OK" is displayed, the data is restored to SD card.
   (Refer to below)

SRV-TOOL	
Device TEST	
Backup Data to SD-card: OK	Restore Data from SD-card: OK(***)
	Time 00000:00 Count 0000000

   When OK(***) is displayed, the data is successfully exported.
6. Remove the SD card from the unit.
7. Turn the unit OFF to finish Tuner Service Mode.

4 Specifications

General	
Power supply:	AC 220 - 240V 50Hz
Power consumption:	Approx. 25W (HW220EB), 24W (HW120EB)
Power consumption in standby mode:	"Power Save in Standby" is activated and "RF OUT (Aerial Signal)" is set to "OFF" Approx. 0.2W "Power Save in Standby" is not activated Approx. 3.0W
Operating temperature:	5°C - 40°C
Operating humidity range:	10% - 80% RH (no condensation)

Television system	
Tuner system:	DVB-T/T2
Country:	UK
Channel Coverage:	UHF: 21~68

Video	
Video system:	PAL/NTSC
Recording system:	MPEG2 (Hybrid VBR)/MPEG-4 AVC/H.264

Audio	
Recording system:	Dolby Digital (DR mode: Max 5.1 ch) Dolby Digital Plus (DR mode: Max 5.1 ch) MPEG 2ch (DR mode) HE-AAC 2ch (DR mode (DVB-T/T2))
Audio out:	Audio Out L/R (pin jack)
Output level:	Full scale: 2.0 Vrms at 1 kHz
Output impedance:	Less than 1k ohm
Digital audio out:	Optical terminal (PCM, Dolby Digital, MPEG) HDMI terminal (PCM, Dolby Digital, MPEG, Dolby Digital Plus)

HDMI Output

19 pin type A: 1 pc
- This unit supports "HDAVI Control 5" function.

Internal HDD Capacity

1TB (HW220EB), 500GB(HW120EB)

Other terminals	
USB Port:	Type A: 2 pcs
SD Card Slot:	1 pc
LAN (Ethernet) Port:	10BASE-T/100BASE-TX

Recording time

Approx.

Recording Mode	HDD (1TB) (HW220EB)	HDD (500GB) (HW120EB)
DR(*1)(HD: 8Mbps)	259 hours	129 hours
DR(*1)(SD: 4Mbps)	518 hours	258 hours

*1: Recording time of DR mode may vary depending on bit rate of broadcasting.

SD Card

- SD Card Slot: SD Memory Card slot; 1 pc
- Compatible media: SD Memory Card (*2)
- Format: FAT12, FAT16, FAT32 (*3)
  exFAT (In case of SDXC Memory Card)
- Data that can be played: JPEG, MPO, AVCHD format, MPEG-2, MP4

*2: Includes SDHC, SDXC Card
Includes miniSD™ Cards. (need a miniSD™ Adaptor.)
Includes microSD™/microSDHC™/microSDXC™ Cards. (need a microSD™ Adaptor.)
*3: Long file name is unsupported

USB device

- standard: USB 2.0 High Speed
- Format: FAT12, FAT16, FAT32
- Data that can be played: MP3, JPEG, MPO, DivX, MKV, MP4, MPEG-2

MP3	
Playable media:	HDD, USB device
Compression rate:	32 kbps - 320 kbps
File format:	• MP3 files must have the extension ".mp3" or ".MP3".
Sampling rate:	16 kHz, 22.05 kHz, 24 kHz, 32 kHz, 44.1 kHz, 48 kHz
Number of folders:	Maximum number of folders recognizable (USB device): 300 folders (including the root folder)
Number of files: (tracks)	Maximum number of files recognizable (USB device): 3000 files, HDD: 40000 files

JPEG/MPO	
Playable media:	HDD, SD Card, USB device
File format:	JPEG conforming DCF (Design rule for Camera File system) MPO conforming MPF (Multi Picture Format) • JPEG files must have the extension ".jpg" or ".JPG". • MPO files must have the extension ".mpo" or ".MPO".
Compatible pixels:	Between 34 × 34 and 8192 × 8192 pixels Sub sampling is 4:2:2 or 4:2:0
Number of folders:	Maximum number of folders recognizable (except for folders: HDD): 500 folders (including the root folder)
Number of files:	SD Card, USB device: Maximum number of files recognizable: 10000 files HDD: Maximum number of files recognizable: 20000 files
MOTION JPEG, PROGRESSIVE JPEG:	Not supported

DivX	
Playable media:	USB device
File format:	DivX files must have the extension ".DIVX" or ".divx", ".AVI" or ".avi".
Number of folders:	Maximum number of folders recognizable: 300 folders (including the root folder)
Number of files:	Maximum number of files recognizable: 200 files
Support version:	Picture resolution Up to 1920 × 1080 pixels Video • Number of stream: Up to 1 • Codec: DIV3, DIV4, DIVX, DV50, DIV6 • FPS (Frame Per Second): Up to 60fps Audio • Number of stream: Up to 8 • Format: MP3, MPEG, Dolby Digital • Multi channel: Dolby Digital is possible. MPEG multi is 2ch conversion.

DivX® is a digital video format created by DivX, LLC, a subsidiary of Rovi Corporation. This is an official DivX Certified® device that plays DivX video.
Visit divx.com for more information and software tools to convert your files into DivX videos.
DivX®, DivX Certified®, and associated logos are trademarks of Rovi Corporation or its subsidiaries and are used under license.

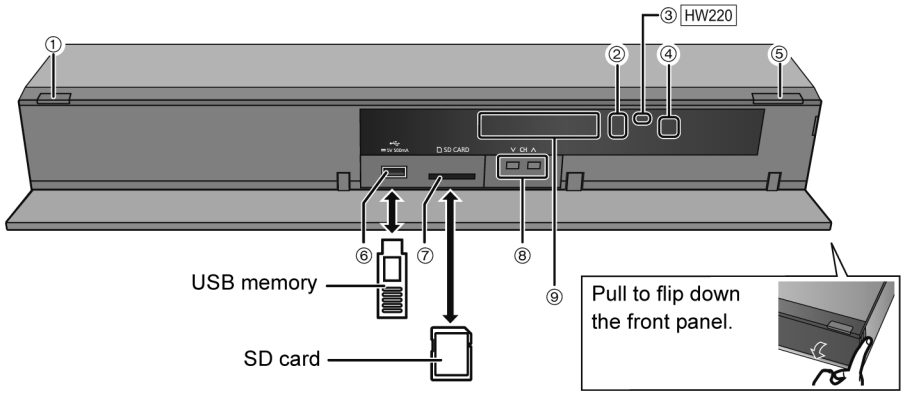
MKV		
	Playable media:	USB device MPEG-4 AVC (H.264) profile is up to HIGH Profile, Level 4. AAC-LC, MP3, Dolby Digital audio, PCM, Vorbis and FLAC can be decoded.
	File format:	• MKV files must have the extension ".MKV" or ".mkv".
	Number of folders:	Maximum number of folders: 300 folders (including the root folder)
	Number of files:	Maximum number of files: 200 files
SD (Standard Definition)-Video		
	Playable media:	SD Card (*4), USB device (*5)
	Codec:	MPEG2
	File format:	SD-Video format (*6) used on Standard Definition Camera (Panasonic and some other's)
	*4: Video Recording conversion and transfer is possible from SD card to HDD. After Video Recording conversion and transfer to HDD is completed, playback becomes possible. *5: Video Recording conversion and transfer is possible from USB device to HDD. After Video Recording conversion and transfer to HDD is completed, playback becomes possible. *6: SD-Video Entertainment Video Profile.	
HD (High Definition)-Video		
	Playable media:	SD Card, USB device (*7)
	Codec:	MPEG-4 AVC/H.264
	File format:	AVCHD format conforming
	*7: Video Recording conversion and transfer is possible from USB device to HDD. After Video Recording conversion and transfer to HDD is completed, playback becomes possible.	
WLAN (HW220EB)		
	Standard compliance:	IEEE802.11n / IEEE802.11g / IEEE802.11b
	Frequency Range:	2.4 GHz band
	Security (*8):	WPA2™-PSK (TKIP/AES) / WPA™-PSK (TKIP/AES) / WEP (64bit/128bit)
	*8: This unit supports WPA and WPA2 encryption.	
Dimensions		
430 mm (W) × 59 mm (H) × 238 mm (D) (excluding the projecting parts) 430 mm (W) × 59 mm (H) × 249 mm (D) (including the projecting parts)		
Mass		
Approx. 2.5 kg		
Solder		
These models use lead free solder (PbF)		

Note:

Specifications are subject to change without notice.

5 Location of Controls and Components

Main unit



① **Standby/on switch (⏻/I)**
Press to switch the unit from on to standby mode or vice versa. In standby mode, the unit is still consuming a small amount of power.

② Recording indicator
- The indicator will light up while recording.
- The indicator will blink while recording is paused and before recording starts.

③ HW220 CALL LED
- The LED will light up when this unit receives incoming call etc. of the video communication.

④ Remote control signal sensor
- Angle: Approx. 20° up and down, 30° left and right
- Distance: Within approx. 7 m in front of the unit

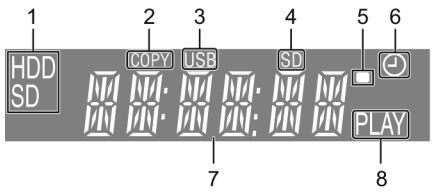
⑤ Start PAUSE LIVE TV

⑥ USB port

⑦ SD card slot
- When removing the SD card, press on the centre of the card and pull it straight out.

⑧ Channel select

⑨ Display



1 Drive (HDD or SD) indicator
2 Copying indicator
3 USB port indicator
4 SD card slot indicator
5 Remote control signal indicator
6 Timer recording indicator
- This indicator lights up when the timer recording standby is activated.

7 Main display section indicator
- Current time
- Playback counter
- Various messages

8 Playback indicator

- While writing to/reading from the media, do not switch the unit to standby mode or remove the media. Such action may result in loss of the media contents.
- When inserting the media, ensure that it is facing the right way up.

Remote control

① Transmit the remote control signal
- Point it at remote control signal sensor on this unit.

② Switch the unit from on to standby mode or vice versa

③ Select drive (HDD, SD or USB)

④ Select channels and title numbers, etc./Enter numbers or characters

⑤ Switch to the previously watched channel

⑥ Basic operations for recording and play, REWIND LIVE TV/PAUSE LIVE TV

⑦ Show Information

⑧ Selection/OK, Frame-by-frame

⑨ Show DIRECT NAVIGATOR

⑩ Show OPTION menu

⑪ Colour buttons (red, green, yellow, blue) (Use in accordance with instruction on the screen.)

⑫ Start recording

⑬ Listen to Audio Description

⑭ Show the Timer Recording screen

⑮ Create chapter

⑯ Show Setup menu

⑰ Skip the specified time

⑱ TV operation buttons

⑲ Channel select/Change pages in the DIRECT NAVIGATOR screen etc.

⑳ Show the VIERA Connect screen

㉑ Switching to the radio channel list

㉒ HW220 Start up a video communication

㉓ Exit the menu screen

㉔ Show the TV Guide screen

㉕ Show the FUNCTION MENU screen

㉖ Return to previous screen

㉗ Show subtitles

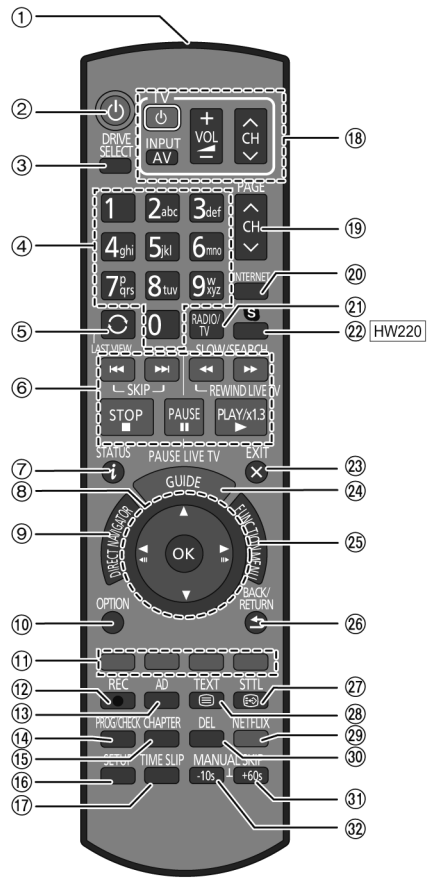
㉘ Show Digital teletext

㉙ Show NETFLIX screen

㉚ To delete unwanted recorded titles, timer programmes, photos or music

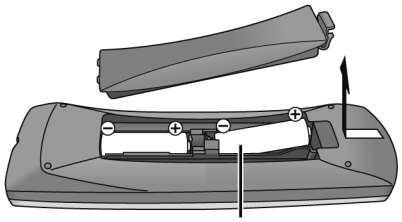
㉛ Skip approx. 1 minute forward

㉜ Skip approx. 10 seconds backward



Insert batteries

Insert so the poles (+ and −) match those in the remote control.



R6/LR6, AA
(Alkaline or manganese batteries)

6 Service Mode

6.1. Self-Diagnosis and Special Mode Setting

6.1.1. Self-Diagnosis Functions

Self-Diagnosis Function provides information for errors to service personnel by "Self-Diagnosis Display" when any error has occurred.

U, H** and F** are stored in memory and held.**

You can check latest error code by transmitting [0] [1] of Remote Control in Service Mode.

Automatic Display on FL will be cancelled when the power is turned off or AC input is turned off during self-diagnosis display is ON.

Remote Control:

[R] = [RED]

[Y] = [YELLOW]

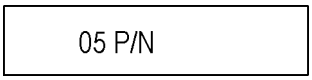
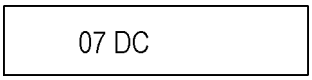
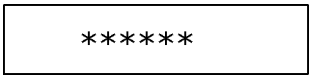
[B] = [BLUE]

Error Code	Diagnosis contents	Description	Monitor Display	Automatic FL display
U59	Abnormal inner temperature detected	Display appears when internal temperature of deck reaches limit temperature. The power is turned off forcibly. For 30 minutes after this, all key entries are disabled. (Fan motor operates at the highest speed for the first 5 minutes. For the remaining 25 minutes, fan motor is also stopped.) The event is saved in memory as well.	No display	U59 U59 is displayed for 30 minutes.
U61	The unit is carrying out its recovery process.	• A malfunction has occurred. The unit is trying to restore to the normal operation. Once the message disappears you can use the unit again. If it remains displayed, consult the dealer.	No display	U61
U76	HDMI connection error	HDMI cannot be output because you are connected to a model that does not support copyright protection.	No display	U76
U99	Hang-up	Displayed when communication error has occurred between Main microprocessor and Timer microprocessor.	No display	U99 Displayed is left until the [POWER] key is pressed.
H19 02	Inoperative fan motor	When inoperative fan motor is detected after powered on, the power is turned off automatically. The event is saved in memory.	No display	No display
F00	No error information	Initial setting for error code in memory (Error code Initialization is possible with error code initialization and main unit initialization.)	No display	No display
F34	Initialization error when main microprocessor is started up for program recording	When initialization error is detected after starting up main microprocessor for program recording, the power is turned off automatically. The event is saved in memory.	No display	No display
UNSUPPORT	Unsupported media error	*The data format is not supported, although the media type is supported. *Exceptionally in case of the media is dirty.	**"This media is incompatible."**	Display for 5 seconds. UNSUPPORT The character indication flows sideways.
PLEASE WAIT	Unit is in termination process	Unit is in termination process now. "BYE" is displayed and power will be turned off. In case "Quick Start" of setup menu is ON, it is displayed in restoration operation for AC off.	No display	PLEASE WAIT The character indication flows sideways.

Error Code	Diagnosis contents	Description	Monitor Display	Automatic FL display
IR ERR	IR communication error	[IR ERR] is displayed when communication between Timer microprocessor and IR microprocessor fails.	No display	IR ERR
HDD ERROR	[HDD ERR] is displayed when start up of HDD was failed. (Except error of setting of Power on Stand-by)	a) When normal start up was failed. b) When start up at HDD boot was failed. c) When start up from state of P-OFF was failed. d) When start up from state of HDD SLEEP was failed. [HDD ERR] is displayed when above each start up of HDD was failed.	No display	HDDERR
HDD NG	Power on Stand-by setting error	[HDD NG] is displayed when power on Stand-by setting of HDD is NG or when HDD which power on Stand-by is not set to is used. Please try to replace HDD with genuine HDD as service parts.	No display	HDD NG
PROG FULL	Timer programmes are full	There are already 32 timer programmes. Delete unnecessary timer programmes.	No display	PROG FULL

6.1.2. Special Modes Setting

Item		FL display	Key operation
Mode name	Description		Front Key
Service Mode	Setting every kind of modes for servicing. *Details are described in **"6.1.3. Service Mode at a glance"**.	2. 70 RET 3. 80 SRV 4. HELLO -- SERV	1. Turn the power off. 2. Press the [5] [9] and [R] button simultaneously for 5 seconds, then "70 RET" is displayed on FL. 3. Press the [▶] button to select until "80 SRV" is displayed on FL. 4. Press the [OK] button. *The command is transmitted by attached remote control.
Forced power-off	When the power button is not effective while power is ON, turn off the power forcibly. *When Timer REC is ON, execute "Forced Power-off" after releasing Timer REC.	Display that Power off cannot be executed.	Press [Power] key more than 4 seconds.
Child lock/unlock	Set or release "Child Lock".	X HOLD	Press and hold [OK] and [RETURN] by remote control simultaneously until "X-HOLD" is displayed/ disappeared.
Owner ID display	Displayed Owner ID on TV monitor.	1. 00 RET 2. 01 OID	1. While the unit is on, press and hold [OK], [B] and [Y] on the remote control at the same time for more than 5 seconds. - "00 RET" is displayed on the unit's display. 2. Repeatedly press [▶] on the remote control or [POWER] on the unit until "01 OID" is displayed on the unit's display. 3. Press [OK] on the remote control.
Owner ID initialization	The Owner ID setting is initialized.	1. 00 RET 2. 03 VL 3. 02 OII	1. When the power is on, press and hold [OK], [B] and [Y] on the remote control at the same time for more than 5 seconds. - "00 RET" is displayed on the unit's display. 2. Repeatedly press [▶] on the remote control or [POWER] on the unit until "03 VL" is displayed on the unit's display. 3. Press and hold [STOP] on the remote control unit "02 OII" is displayed on the unit's display. 4. Press [OK] on the remote control.
Progressive initialization	The progressive setting is initialized to Interlace.	1. 00 RET 2. 04 PRG	1. When the power is on, press and hold [OK], [B] and [Y] on the remote control at the same time for more than 5 seconds. - "00 RET" is displayed on the unit's display. 2. Repeatedly press [▶] on the remote control or [POWER] on the unit until "04 PRG" is displayed on the unit's display. 3. Press and hold [OK] on the remote control.

Item		FL display	Key operation
Mode name	Description		Front Key
Switch the TV system	Switch the TV system to another one.	1.  2.  	1. While the unit is on, press and hold [OK], [B] and [Y] on the remote control at the same time for more than 5 seconds. - "00 RET" is displayed on the unit's display. 2. Repeatedly press [▶] on the remote control or [POWER] on the unit until "05 P/N" is displayed on the unit's display. 3. Press [OK] on the remote control.
Deep Colour initialization	The Deep Colour setting is initialized.	1.  2.  	1. While the unit is on, press and hold [OK], [B] and [Y] on the remote control at the same time for more than 5 seconds. - "00 RET" is displayed on the unit's display. 2. Repeatedly press [▶] on the remote control or [POWER] on the unit until "07 DC" is displayed on the unit's display. 3. Press [OK] on the remote control.
ATP re-execution	Re-execute ATP.	1.  2.  3. Display at ATP executing.  	1. While the unit is on, press and hold [OK], [B] and [Y] on the remote control at the same time for more than 5 seconds. - "00 RET" is displayed on the unit's display. 2. Repeatedly press [▶] on the remote control or [POWER] on the unit until "09 CHI" is displayed on the unit's display. 3. Press [OK] on the remote control.

6.1.3. Service Modes at a glance

Information necessary for service can be displayed.

Service mode setting:

1. Turn the power off.
2. Press the [5] [9] and [R] button simultaneously for 5 seconds, then "70 RET" is displayed on FL.
3. Press the [▶] button to select until "80 SRV" is displayed on FL.
4. Press the [OK] button.
5. It is displayed on FL as "HELLO-->SERV".: It is shown to have entered the service mode.
6. The command is transmitted by attached remote control.

Remote Control:

[R] = [RED]

[Y] = [YELLOW]

[B] = [BLUE]

Method of making clear service mode: Press the power button (power off).

The display of information to each command is as follows.

Note:

Do not use it excluding the designated command.

Item		FL display	Key operation
Mode name	Description		(Remote control key)
Release Items	Item of Service Mode executing is cancelled.	SERV	Press [0] [0] in service mode.
Error Code Display	Last Error Code of U/H/F held by Timer is displayed on FL. *Details are described in **"6.1.1. Self-Diagnosis Functions"**.	♣□□ *♣ shows U/H/F. □□ shows number. If any error history does not exist, [F00] is displayed.	Press [0] [1] in service mode
ROM Version Display	1. Main firm version (displayed for 5 sec.) 2. Timer firm version (displayed for 5 sec.) 3. ROM correction version (displayed for 5 sec.) 4. B00T2 version (displayed for 5 sec.) 5. B00T3 version (displayed for 5 sec.) 6. CDDB version (displayed for 5 sec.) 7. Voice version (left displayed)	1. **** 2. ****** 3. *** 4. *** 5. *** 6. **** 7. ****** * are version displays.	Press [0] [2] in service mode

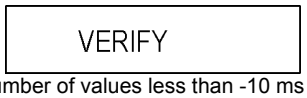
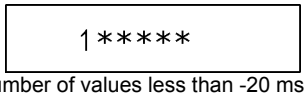
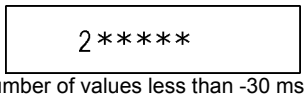
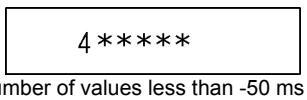
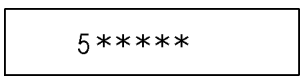
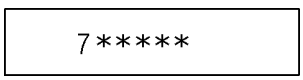
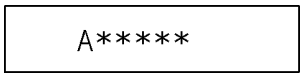
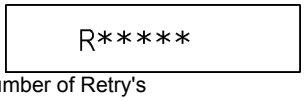
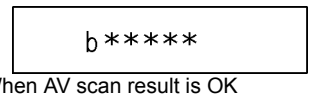
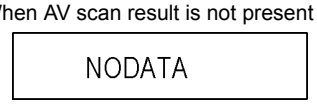
Item		FL display	Key operation
Mode name	Description		(Remote control key)
HDD READ SEEK Inspection	Inspecting seek time of HDD to inspect performance.	At start AVSCAN ↓ * 00 ↓ The [*] sign is added every approx. 10 seconds while inspecting. Two digits on the right side are the progress level of the inspection (The unit is %). Example on the way of inspection: *** 53 When HDD is OK after inspection: HDD OK (NG is displayed when error is excluding 0) (Transfer rate is calculated from the AV scanning result, and when it is less than 35Mbps, NG is displayed.) HDD$## $: [X] is displayed when seek time is over 270msec., there is error or transfer rate is NG. Position at $ is space when excluding those. ##: Number of data of over 100msec. and less than 270msec. When it is over 100, [99] is displayed. When the number is less than 5, we judge it normal.	Press [3] [1] in service mode. * When cancelling the inspection mode while executing, do "forced power-off". Method: Press [POWER] key on the main unit more than 4 seconds.

Item		FL display	Key operation
Mode name	Description		(Remote control key)
HDD READ VERIFY Inspection	Measure of access time in READ VERIFY MODE of HDD.	At start AVSCAN ↓ * 00 ↓ The [*] sign is added every approx. 10 seconds while inspecting. Two digits on the right side are the progress level of the inspection (The unit is %). Example on the way of inspection: *** 53 When HDD is OK after inspection: HDD OK (NG is displayed when error is excluding 0) (Transfer rate is calculated from the AV scanning result, and when it is less than 35Mbps, NG is displayed.) HDD$## $: [X] is displayed when seek time is over 270msec., there is error or transfer rate is NG. Position at $ is space when excluding those. ##: Number of data of over 100msec. and less than 270msec. When it is over 100, [99] is displayed. When the number is less than 5, we judge it normal.	Press [3] [2] in service mode. * When cancelling the inspection mode while executing, do "forced power-off". Method: Press [POWER] key on the main unit more than 4 seconds.
HDD Spin-up time	The accumulation value of the Spin-up time of HDD is displayed.	****** Spin-up time of HDD is displayed. (The unit of display is hour.)	Press [3] [3] in service mode.

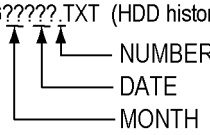
Item		FL display	Key operation
Mode name	Description		(Remote control key)
HDD Simple AV Scan Check	Simple AV scan check of HDD	AVSCAN ↓ STEP 1 ↓ STEP 9 ↓ * 00 ↓ The [*] sign is added every 10 seconds while inspecting. Two digits on the right side are the progress level of the inspection (The unit is %). Example on the way of inspection: *** 53 When HDD is OK after inspection: HDD OK When HDD is NG after inspection: HDD*** [*] is the number of data of NG.	Press [3] [6] in service mode. * When cancelling the inspection mode while executing, do "forced power-off". Method: Press [POWER] key on the main unit more than 4 seconds.
HDD Check	Simple quality judgement of HDD	HDDCHK ↓ When HDD is OK: HDD OK When HDD is NG: HDD NG	Press [3] [7] in service mode.

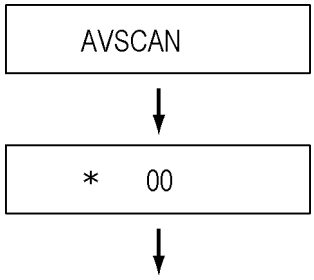
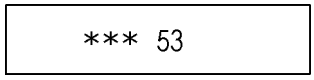
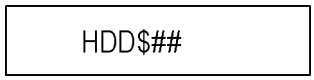
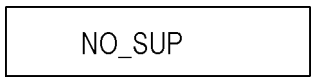
Item		FL display	Key operation
Mode name	Description		(Remote control key)
HDD Simple Check	Check if HDD Self-Diagnosis test was performed. * If the current date or the date when the error occurred is wrong, correct judgement may not be made.	HDD Self-Diagnosis test start. HDDCHK When HDD Self-Diagnosis test result is OK. HDD OK When HDD Self-Diagnosis test result is NG. HDD NG	Press [3][8] in service mode.
HDD High Speed Scan	High speed AV scan check of HDD Reduces time by increasing the time-cut of AV area compared to HDD standard speed AV scan.	AVSCAN ↓ STEP 1 ↓ STEP 9 ↓ * 00 ↓ The [*] sign is added every 10 seconds while inspecting. Two digits on the right side are the progress level of the inspection (The unit is %). Example on the way of inspection: *** 53 When HDD is OK after inspection: HDD OK When HDD is NG after inspection: HDD*** [*] is the number of data of NG.	Press [3] [9] in service mode. * When cancelling the inspection mode while executing, do "forced power-off". Method: Press [POWER] key on the main unit more than 4 seconds.

Item		FL display	Key operation
Mode name	Description		(Remote control key)
CEC (H) output	Check of the CEC terminal high output of HDMI.	When the check is OK. CECHOK When the check is NG. CECHNG	Press [5] [5] in service mode.
CEC (L) output	Check of the CEC terminal low output of HDMI.	When the check is OK. CECLOK When the check is NG. CECLNG	Press [5] [6] in service mode.
Production Date Display	Display the date when the unit was produced.	YYMMDD YY: Year MM: Month DD: Day	Press [6] [1] in service mode.
Factory default value	Displays values set at the factory.	Factory default value (0)(1)(4)(5)(6)(7)	Press [6] [2] in service mode.

Item		FL display	Key operation
Mode name	Description		(Remote control key)
Test progress management value	Displays AV scan result.	When AV scan result is present  Number of values less than -10 ms  Number of values less than -20 ms  Number of values less than -30 ms  Number of values less than -40 ms  Number of values less than -50 ms  Number of values less than -60 ms  Number of values less than -70 ms  Number of values less than -80 ms  Number of values less than -90 ms  Number of values less than -100 (or 150) ms  Number of values less than -100 (or 150) to 270 ms  Number of Seek error's  Number of Retry's  When AV scan result is OK  When AV scan result is NG  When AV scan result is not present  VERIFY, 1***** to b***** (displayed for 5 sec.) HDD OK or HDD NG remains displayed.	Press [6] [3] in service mode.

Item		FL display	Key operation
Mode name	Description		(Remote control key)
Display the Error History	Display the Error History stored on the unit. * If the current date or the date when the error occurred is wrong, correct judgement may not be made.	When HDD Self-Diagnosis test result is NG. HDD NG When HDD Self-Diagnosis test result is OK. HDD OK The Error History is not Data for HDD. OK The Error History is not Data. NODATA HDD Self-Diagnosis test in process. HDDCHK	Press [6] [5] in service mode.
Self-Diagnosis inspection history	Displays Self-Diagnosis inspection history.	Self-Diagnosis inspection history (0)(1)(2)(3)(4)(5)	Press [6] [7] in service mode.
Function inspection history	Displays functions inspection history.	Function inspection history (0)(1)(2)(3)(4)(5)	Press [6] [8] in service mode.

Item		FL display	Key operation
Mode name	Description		(Remote control key)
Saves malfunction history, user remote control operation history and HDD history collectively to SD card.	Writes malfunction history, user remote control operation history and HDD history collectively onto SD card.	When history information is not present NODATA When saving to SD card is not possible ERROR When SD card cannot recognize NOCARD When writing finishes FIN Note: Name of saved file is *FTREXXXX.TXT (malfunction history) *LOGSXXXX.TXT (user remote control operation history) (XXXX: software version number) *HDDHIST1.TXT (HDD history) *LOG?????.TXT (HDD history)  To obtain multiple pieces of deck information of the same software version in one SD card, move files already obtained or change the file names.	1. Prepare a SD card to export data from the unit. 2. Insert the SD card in the service mode. 3. Press [6] [9] in service mode.
Registration of additional USB-HDD	To register USB-HDD for inspection. (Special mode)	When USB-HDD is in Special mode (available for registered USB-HDD): EXTHDD When Special mode failure (USB-HDD registration impossible): EXT NG	Press [7] [4] in service mode. * When releasing this mode, press the [POWER] button of the unit or Remote Control. After releasing the special mode, registration in the special mode is cancelled. Details are described in "3.1.3.1. Registering the USB-HDD".

Item		FL display	Key operation
Mode name	Description		(Remote control key)
USB-HDD READ SEEK Inspection	Inspecting seek time of USB-HDD to inspect performance.	At start  The [*] sign is added every approx. 10 seconds while inspecting. Two digits on the right side are the progress level of the inspection (The unit is %). Example on the way of inspection:  When USB-HDD is OK after inspection:  (NG is displayed when error is excluding 0) (Transfer rate is calculated from the AV scanning result, and when it is less than 35Mbps, NG is displayed.)  $: [X] is displayed when seek time is over 270msec., there is error or transfer rate is NG. Position at $ is space when excluding those. ##: Number of data of over 100msec. and less than 270msec. When it is over 100, [99] is displayed. When the number is less than 5, we judge it normal. When the USB-HDD is not applicable.  	Press [7] [5] in service mode. * When cancelling the inspection mode while executing, do "forced power-off". Method: Press [POWER] key on the main unit more than 4 seconds.

Item		FL display	Key operation
Mode name	Description		(Remote control key)
USB-HDD READ VERIFY Inspection	Measure of access time in READ VERIFY MODE of USB-HDD.	At start AVSCAN ↓ * 00 ↓ The [*] sign is added every approx. 10 seconds while inspecting. Two digits on the right side are the progress level of the inspection (The unit is %). Example on the way of inspection: *** 53 When USB-HDD is OK after inspection: HDD OK (NG is displayed when error is excluding 0) (Transfer rate is calculated from the AV scanning result, and when it is less than 35Mbps, NG is displayed.) HDD$## $: [X] is displayed when seek time is over 270msec., there is error or transfer rate is NG. Position at $ is space when excluding those. ##: Number of data of over 100msec. and less than 270msec. When it is over 100, [99] is displayed. When the number is less than 5, we judge it normal. When the USB-HDD is not applicable. NO_SUP	Press [7] [6] in service mode. * When cancelling the inspection mode while executing, do "forced power-off". Method: Press [POWER] key on the main unit more than 4 seconds.

Item		FL display	Key operation
Mode name	Description		(Remote control key)
USB-HDD Simple AV Scan Check	Simple AV scan check of USB-HDD	AVSCAN ↓ STEP 1 ↓ STEP 9 ↓ * 00 ↓ The [*] sign is added every 10 seconds while inspecting. Two digits on the right side are the progress level of the inspection (The unit is %). Example on the way of inspection: *** 53 When USB-HDD is OK after inspection: HDD OK When USB-HDD is NG after inspection: HDD*** [*] is the number of data of NG.	Press [7] [7] in service mode. * When cancelling the inspection mode while executing, do "forced power-off". Method: Press [POWER] key on the main unit more than 4 seconds.
USB-HDD Check	Simple quality judgement of USB-HDD	HDDCHK ↓ When USB-HDD is OK: HDD OK When USB-HDD is NG: HDD NG	Press [7] [8] in service mode.
Delete the Error History	Delete Error History information stored on the unit.	CLR	Press [9] [7] in service mode.
Error code initialization	Initialization of the last error code held by timer (Write in F00)	CLR	Press [9] [8] in service mode.

Item		FL display	Key operation
Mode name	Description		(Remote control key)
Initialize Service	Error history and Error Codes stored on the unit are initialized to factory setting.	CLR	Press [9] [9] in service mode.
Finishing service mode	Release Service Mode.	Display in STOP (E-E) mode. ******	Press power button on the front panel or Remote control in service mode.

7 Service Fixture & Tools

Part Number	Description	Pcs	Compatibility
RFKZ0216	Extension Cable (Main P.C.B. - Digital P.C.B. / 23 Pin)	2	Same as PWT500EB Series
RFKZ0578	Extension Cable (Digital P.C.B. - HDD / 7 Pin)	1	Same as PWT500EB Series
RFKZ0577	Extension Cable (Digital P.C.B. - HDD / 15 Pin)	1	Same as PWT500EB Series
RFKZ03D01KS	Lead Free Solder (0.3mm/100g Reel)		Same as PWT500EB Series
RFKZ06D01KS	Lead Free Solder (0.6mm/100g Reel)		Same as PWT500EB Series
RFKZ10D01KS	Lead Free Solder (1.0mm/100g Reel)		Same as PWT500EB Series
RFKZ0316	Solder Remover (Lead free low temperature Solder/50g)		Same as PWT500EB Series
RFKZ0328	Flux		Same as PWT500EB Series

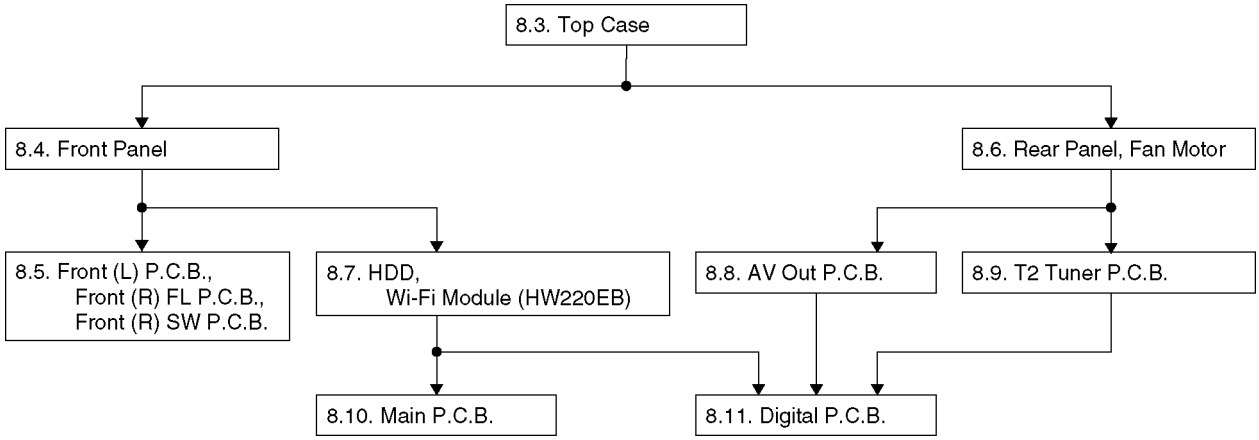
The above parts are supplied by AVC-CSC-SPC

8 Disassembly and Assembly Instructions

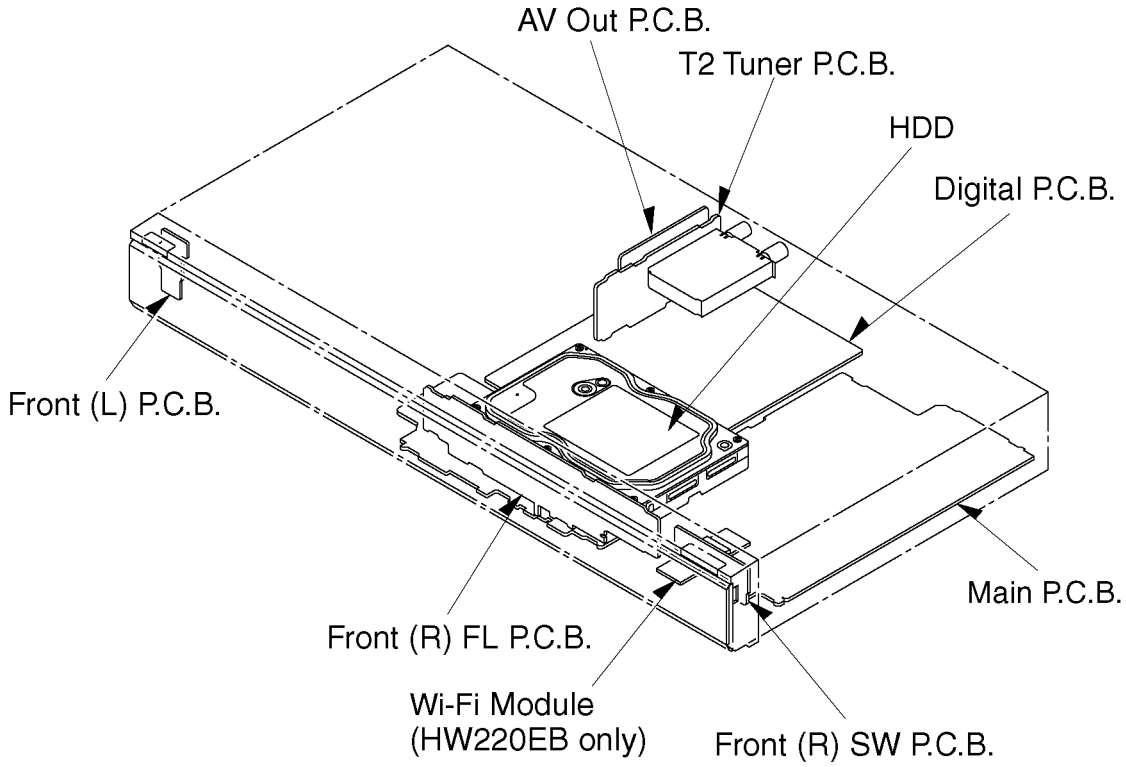
* The illustrations show the image of DMR-HW220EB.

8.1. Disassembly Flow Chart

The following chart is the procedure for disassembling the casing and inside parts for internal inspection when carrying out the servicing.
To assemble the unit, reverse the steps shown in the chart below.

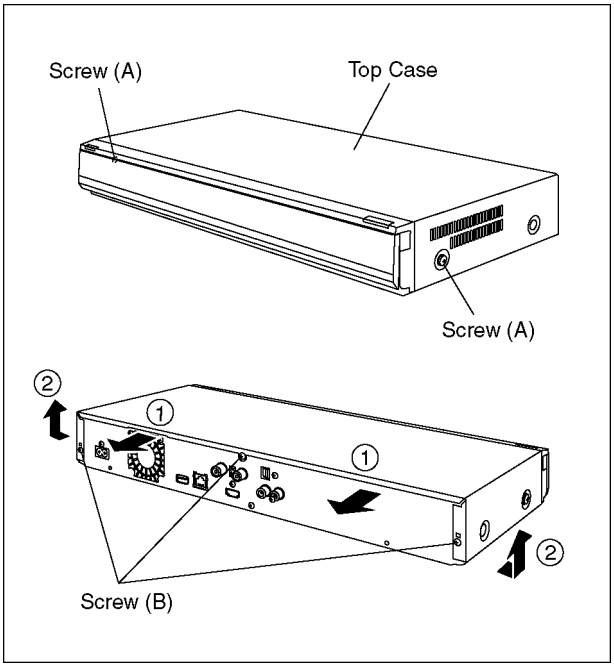


8.2. P.C.B. Positions



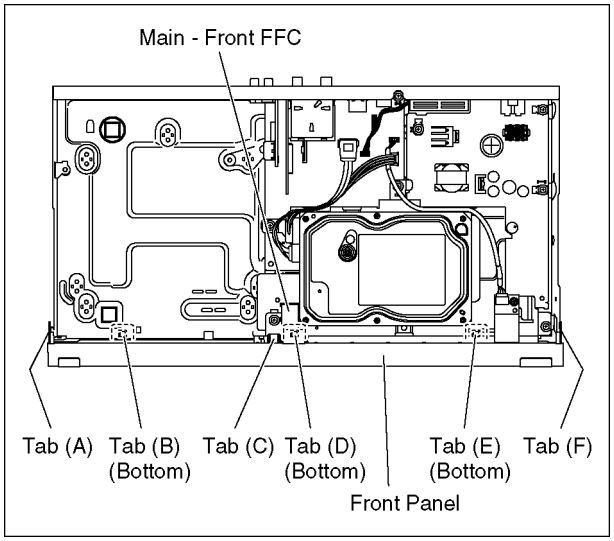
8.3. Top Case

1. Remove 2 Screws (A) and 3 Screws (B).
2. Slide the Top Case rearward and open the both ends at rear side of the Top Case a little and lift the Top Case in the direction of the arrows.

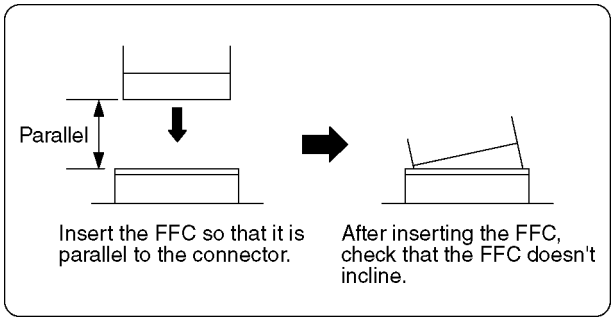


8.4. Front Panel

1. Remove the Main - Front FFC from the Main P.C.B.
2. Unlock 6 Tabs (A) - (F).
3. Pull the Front Panel in the direction of your side.

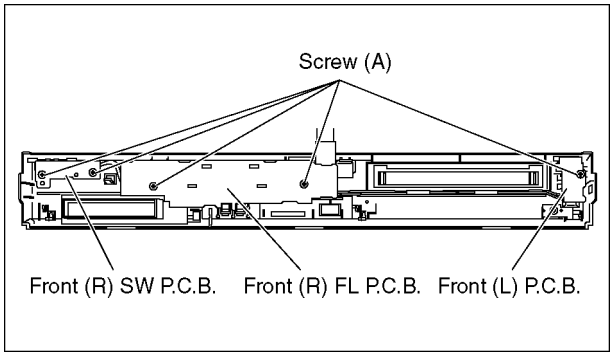


CAUTION:
When inserting the FFC, pay attention as below.



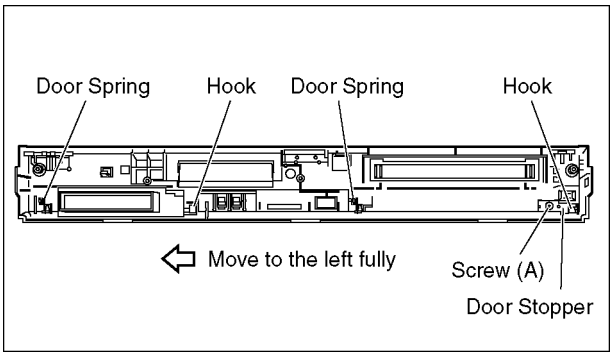
8.5. Front (L) P.C.B., Front (R) FL P.C.B. and Front (R) SW P.C.B.

1. Remove 5 Screws (A) to remove the Front (L), Front (R) FL P.C.B. and Front (R) SW P.C.B.



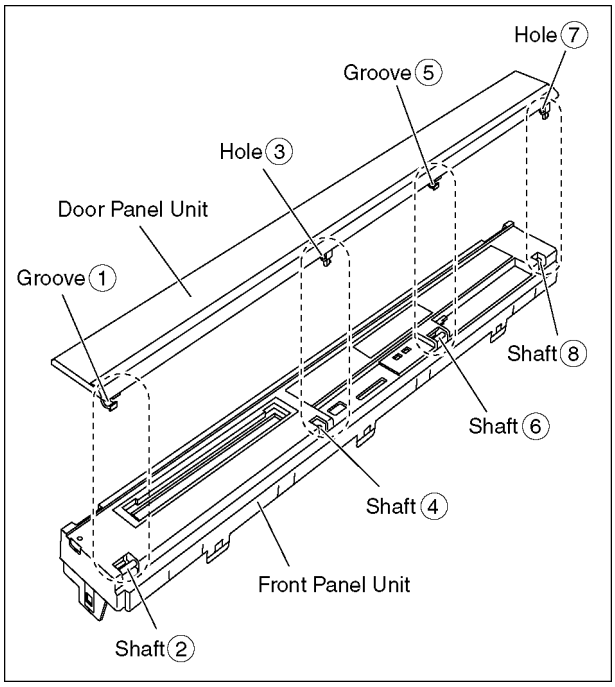
8.5.1. How to remove Door Panel Unit

1. Remove 1 Screw (A) to remove the Door Stopper.
2. Remove the 2 Door Springs and remove the Door Panel Unit with the left and right hooks up and moving the Door Panel Unit to the left fully.

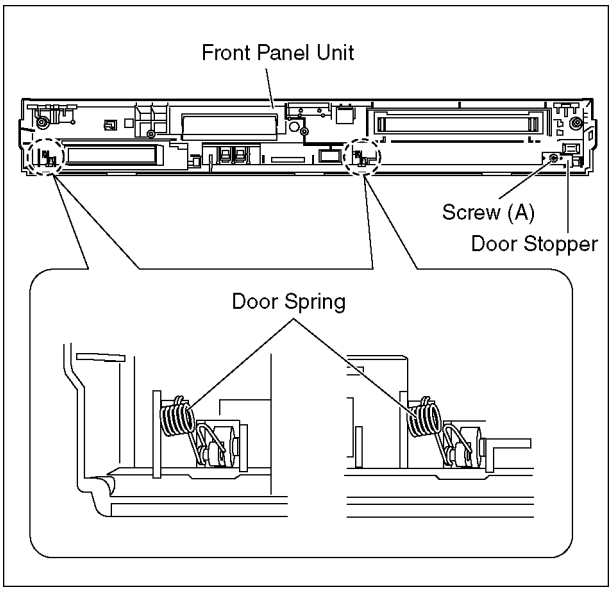


8.5.2. How to assemble Door Panel Unit

1. Install the Door Panel Unit as follows:
   - Insert the groove ① of Door Panel Unit to the shaft ② of Front Panel Unit.
   - Insert the hole ③ of Door Panel Unit into the shaft ④ of Front Panel Unit.
   - Insert the groove ⑤ of Door Panel Unit into the shaft ⑥ of Front Panel Unit.
   - Insert the hole ⑦ of Door Panel Unit into the shaft ⑧ of Front Panel Unit.
   - Be careful not to damage the Fulcrum part of the Door Panel Unit when inserting the Door Panel Unit.

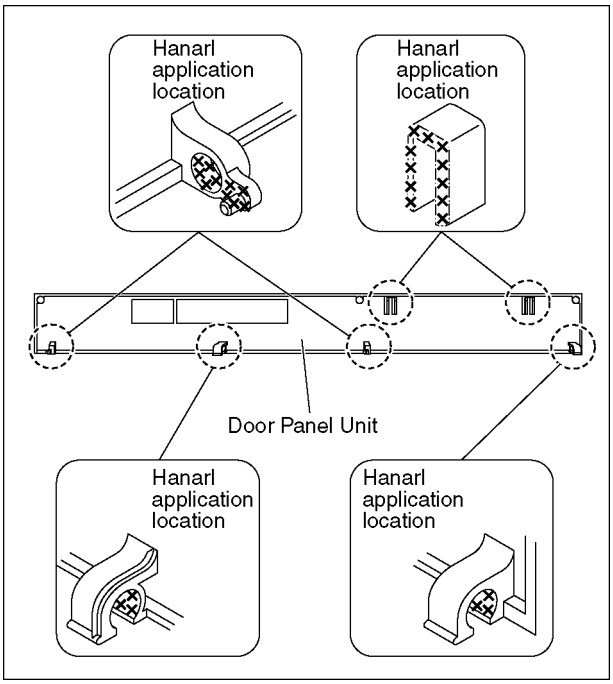


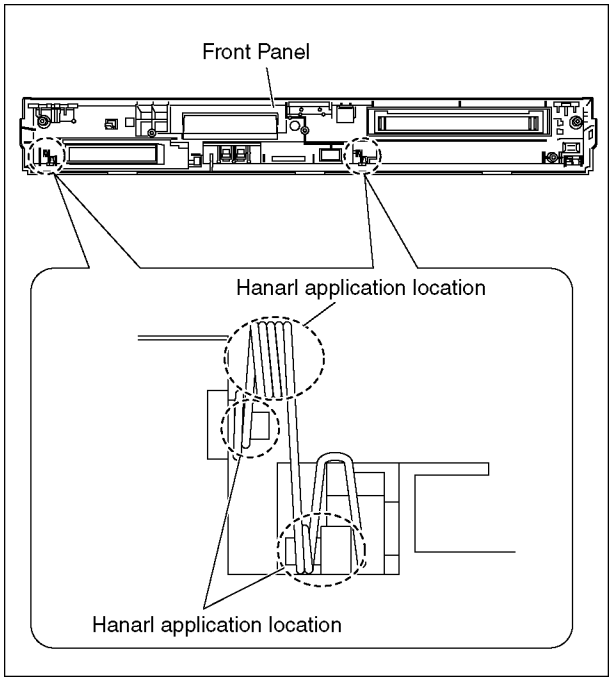
2. Install the 2 Door Springs as shown in the figure.
3. Install the Door Stopper with 1 Screw (A).



8.5.3. How to apply Hanarl to the Door Panel Unit

- Hanarl application locations for the Door Panel Unit.
- Hanarl is not applied to replacement parts.
- Apply adequate of the Hanarl to the designed locations (RFKXGUD24)
- Apply the Hanarl thinly using a toothpick.

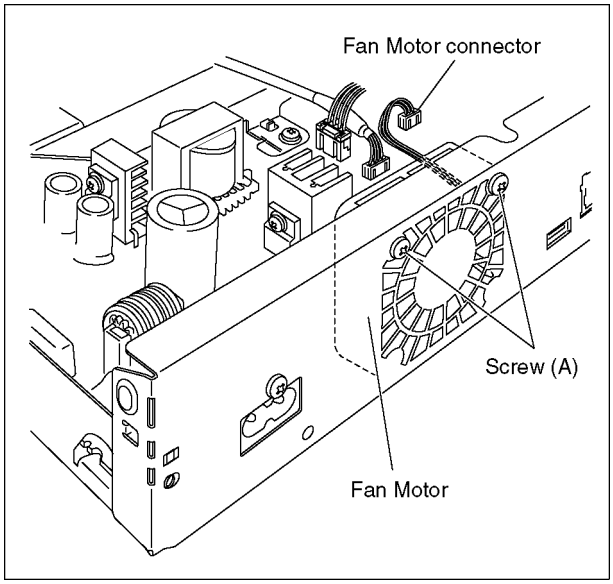




8.6. Rear Panel, Fan Motor

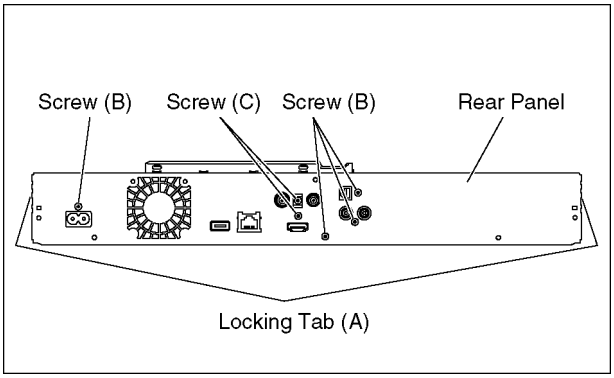
8.6.1. Only Fan Motor

1. Remove 2 Screws (A) and disconnect the Fan Motor connector.
2. Remove the Fan Motor.



8.6.2. Rear Panel with Fan Motor

1. Remove 4 Screws (B) and 2 Screws (C).
2. Disconnect the Fan Motor connector and unlock 2 Locking Tabs (A) to remove Rear Panel.



8.7. HDD, Wi-Fi Module (HW220EB)

Data of HDD:
Make sure to order the Part No., RFKV**HDK in Replacement Parts List when replacing the HDD.**
The following data has been written on RFKV**HDK.**
・Main Firm
・CD DB Data
・Other Data

Caution:
No use HDD (RFKV**HDK) of the capacity of the other model use.**

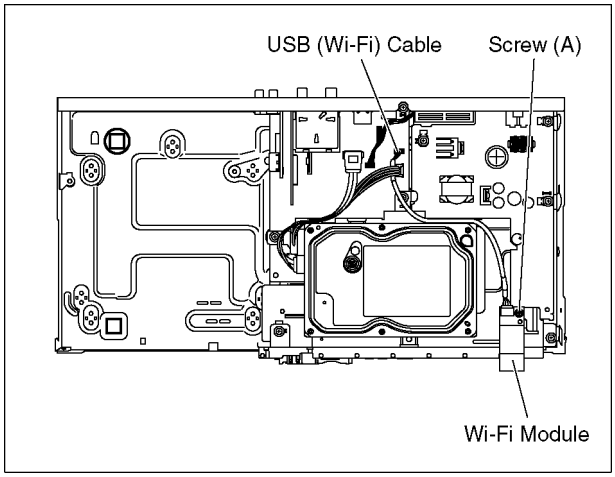
When replacing HDD, HDD must be formatted.

* How to format HDD
Please refer to Service Navigation, and format HDD.

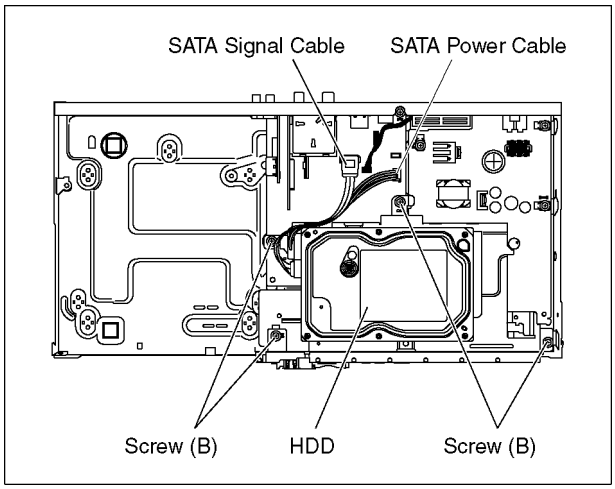
Handling of HDD
The following precautions should be taken when handling HDD.

a. Never give an impact to HDD. (Even a drop from 1cm height can be a cause of HDD failure.)
b. When placing HDD on a workbench, provide a mat on a bench for shock absorption and anti-static purposes.
c. When installing HDD, release it from your hands only after confirming that it is fully set on the chassis.
d. Avoid stacking up HDD.
e. HDD is unstable and easy to fall. Do not stand it on its side face.
f. When handling HDD, hold its side faces to avoid static hazard.
g. Do not place HDD on its wrapping bag after removal. (Prevention of static hazard)
h. Use a screwdriver with low impact and anti-static features.

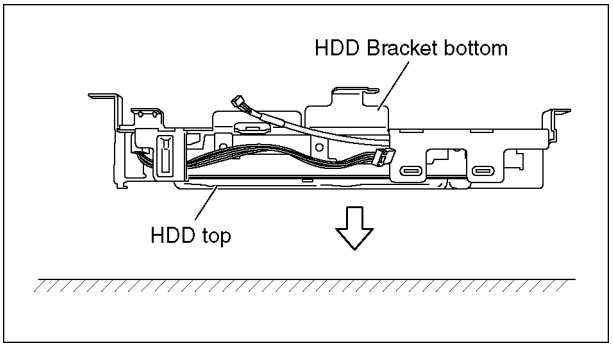
1. Disconnect USB (Wi-Fi) Cable, remove 1 Screw (A) to remove Wi-Fi Module. (HW220EB)



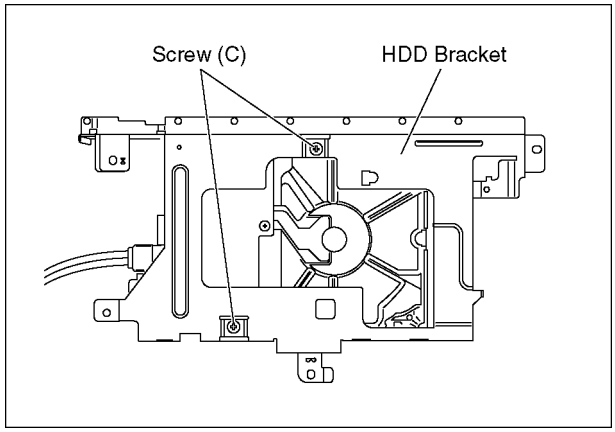
2. Remove 4 Screws (B), SATA Signal Cable and SATA Power Cable to remove HDD.



3. Put HDD upside down so as not to give a shock to HDD.

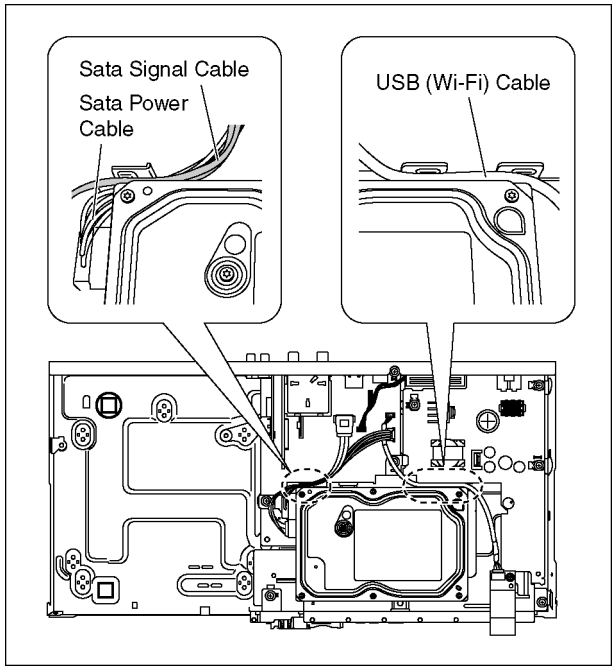


4. Remove 2 Screws (C) to remove HDD from HDD Bracket.



Note: (When attaching)

- When attaching the HDD, make sure the Sata Signal Cable, Sata Power Cable and USB (Wi-Fi) Cable (HW220EB) are routed as following figure.

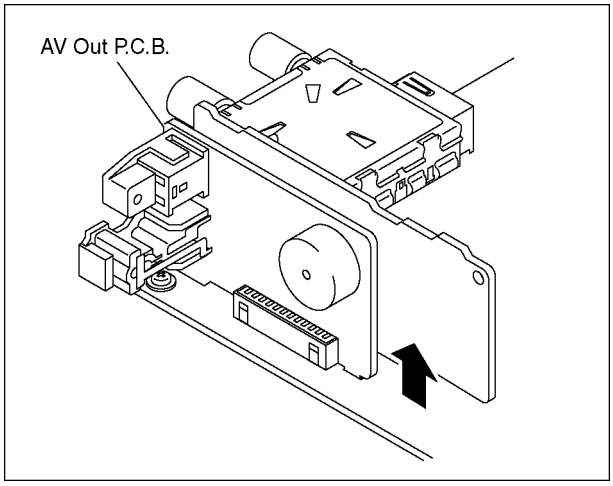


8.8. AV Out P.C.B.

When replacing AV Out P.C.B., HDD must be formatted.

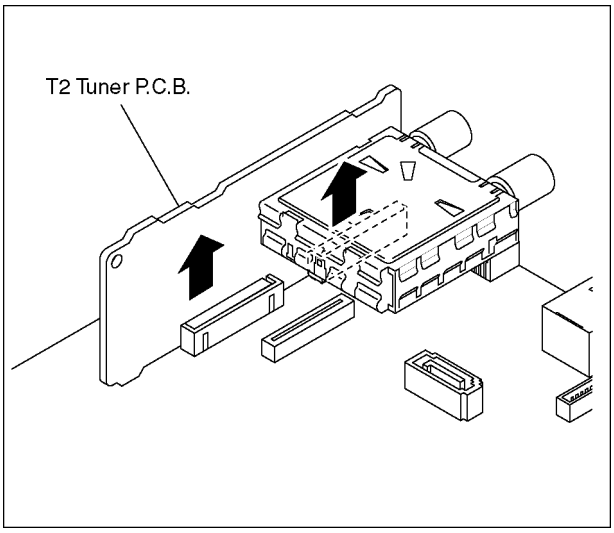
* How to format HDD
Please refer to Service Navigation, and format HDD.

1. Pull up the AV Out P.C.B. in the direction of the arrow.



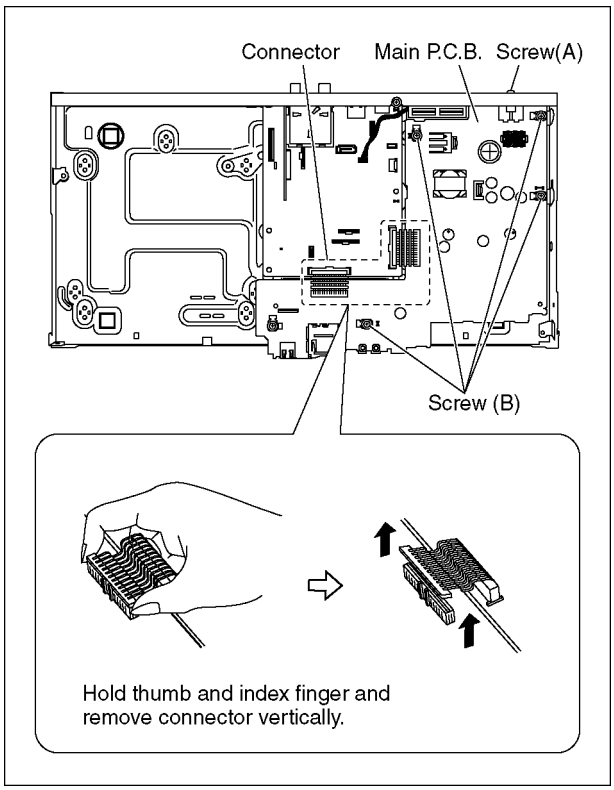
8.9. T2 Tuner P.C.B.

1. Pull up the T2 Tuner P.C.B. in the direction of the arrow.



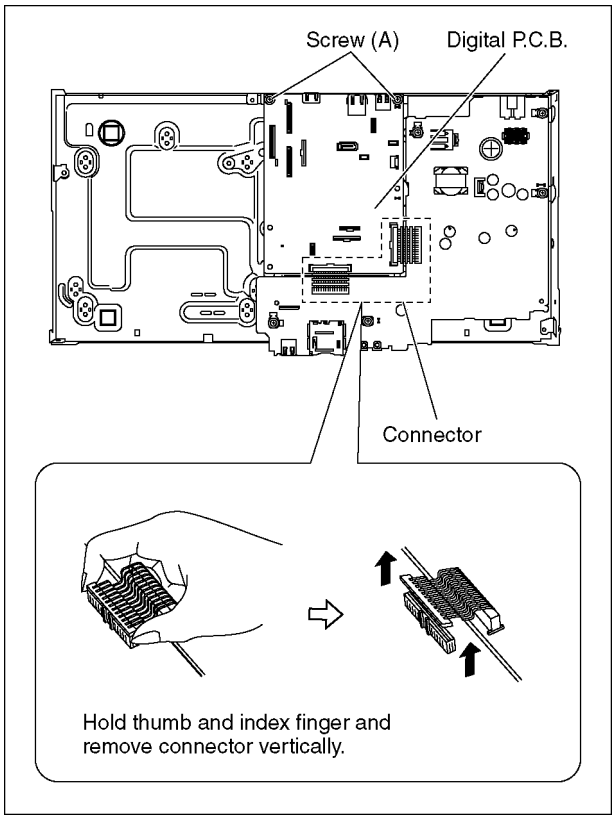
8.10. Main P.C.B.

1. Remove 1 Screw (A) on Rear Panel.
2. Disconnect 2 connectors.
3. Remove 4 Screws (B) to remove and Main P.C.B.



8.11. Digital P.C.B.

1. Disconnect 2 connectors.
2. Remove 2 Screws (A) to remove Digital P.C.B.



9 Measurements and Adjustments

9.1. Service Positions

Note:
For description of the disassembling procedure, see the section 8.

9.1.1. Checking and Repairing of Main P.C.B.

1. Top Case

- Remove 2 Screws (A) on side
- Remove 3 Screws (B) on rear
- Remove Top Case

2. Front Panel

- Disconnect Digital-Front FFC
- Unlock 1 Locking Tab on upper
- Unlock 2 Locking Tabs on side
- Unlock 3 Locking Tabs on bottom

3.HDD with HDD Bracket

- Disconnect USB (Wi-Fi) Cable from Digital P.C.B. (HW220EB)
- Remove 1 Screw (A) fixing Wi-Fi Module (HW220EB)
- Remove Wi-Fi Module (HW220EB)
- Disconnect SATA Signal Cable from Digital P.C.B.
- Disconnect SATA Power Cable from HDD
- Remove 4 Screws (B) from HDD Bracket
- Remove HDD with HDD Bracket

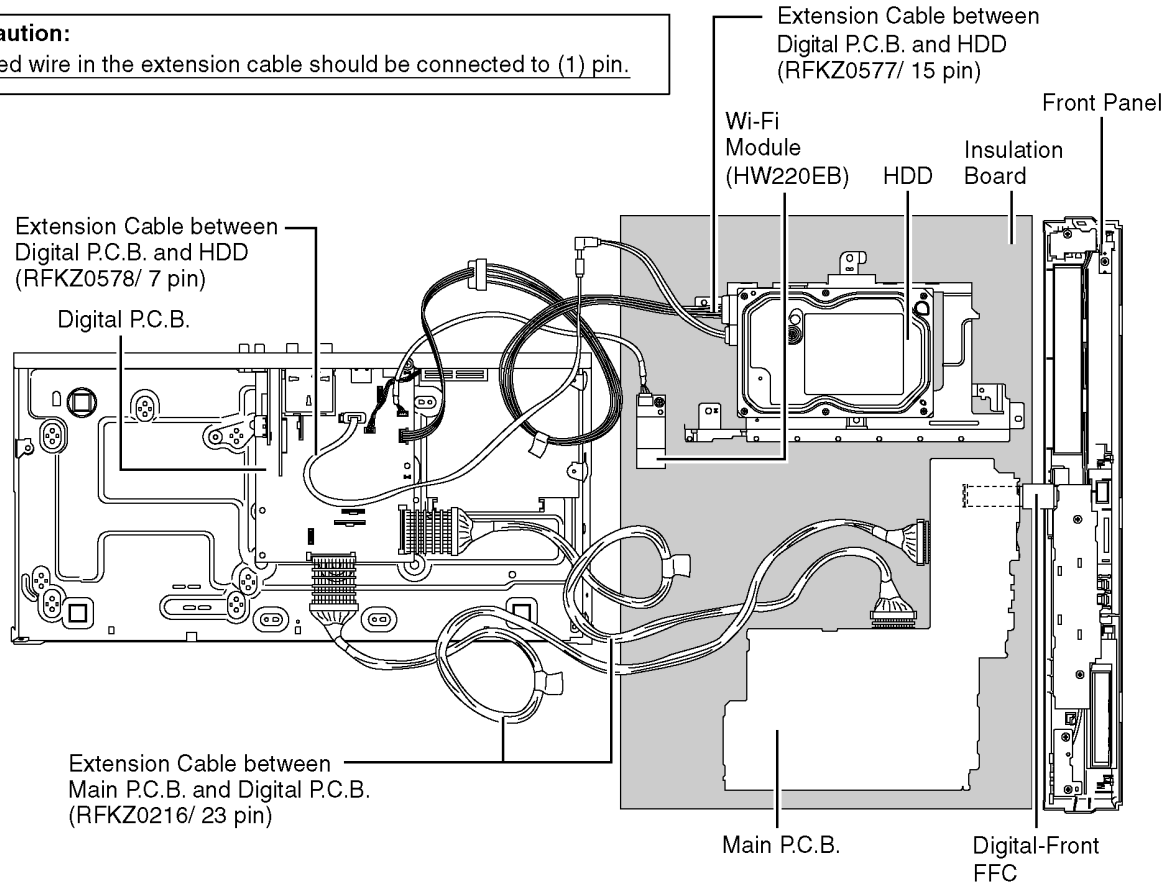
4. Main P.C.B.

- Remove 1 Screw (A) fixing AC Inlet
- Disconnect 2 connectors between Digital P.C.B. and Main P.C.B.
- Remove 4 Screws (B) fixing Main P.C.B.
- Put Main P.C.B. on Insulation Board so that the foil side faces upward.

  Connect Digital-Front FFC to Digital P.C.B.
  Connect USB (Wi-Fi) Cable to Digital P.C.B. (HW220EB)

  Connect Extension Cables;
  -between Digital P.C.B. and HDD (RFKZ0577, RFKZ0578)
  -between Digital P.C.B. and Main P.C.B. (RFKZ0216 × 2)

Caution:
Red wire in the extension cable should be connected to (1) pin.



9.1.2. Checking and Repairing of Digital P.C.B.

1. Top Case

- Remove 2 Screws (A) on side
- Remove 3 Screws (B) on rear
- Remove Top Case

2. Front Panel

- Disconnect Digital-Front FFC
- Unlock 1 Locking Tab on upper
- Unlock 2 Locking Tabs on side
- Unlock 3 Locking Tabs on bottom

3.HDD with HDD Bracket

- Disconnect USB (Wi-Fi) Cable from Digital P.C.B. (HW220EB)
- Remove 1 Screw (A) fixing Wi-Fi Module (HW220EB)
- Remove Wi-Fi Module (HW220EB)
- Disconnect SATA Signal Cable from Digital P.C.B.
- Disconnect SATA Power Cable from HDD
- Remove 4 Screws (B) from HDD Bracket
- Remove HDD with HDD Bracket

4. Rear Panel

- Remove 2 Screws (A), 4 Screws (B) and 2 Screws (C) fixing Rear Panel
- Unlock 2 Locking Tabs on side, and remove Rear Panel

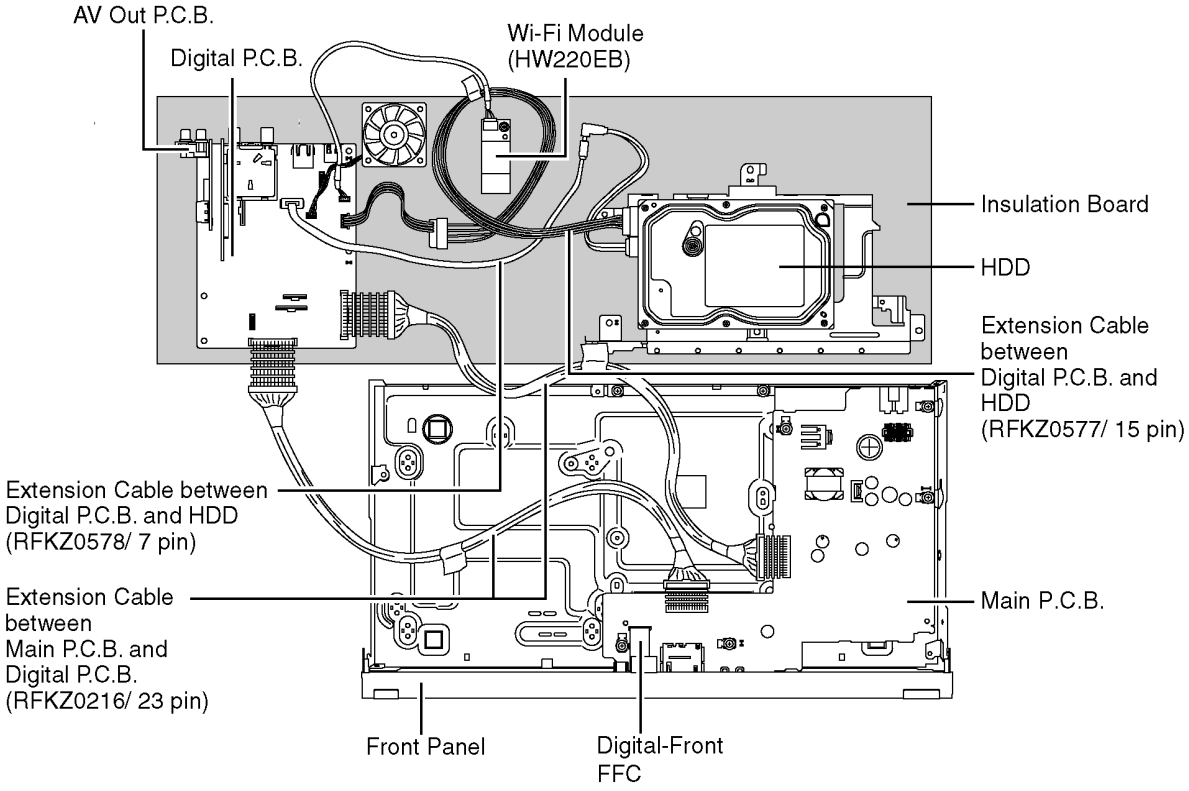
5. Digital P.C.B.

- Remove AV Out P.C.B.
- Remove 2 Screws (A) fixing Digital P.C.B.
- Disconnect 2 connectors between Digital P.C.B. and Main P.C.B.

Put Digital P.C.B. on Insulation Board
Attach AV Out P.C.B.
Install Front Panel
Connect USB (Wi-Fi) Cable to Digital P.C.B. (HW220EB)

Connect Extension Cables
-between Digital P.C.B. and Main P.C.B. (RFKZ0216 × 2)
-between Digital P.C.B. and HDD
(RFKZ0577, RFKZ0578)

Caution:
Red wire in the extension cable should be connected to (1) pin.



9.2. Caution for Replacing Parts

9.2.1. Items that should be done after replacing parts

√ :Necessary — :Unnecessary

Items that Should be done / Replacing Parts	Obtain and register a new registration code. **(*Note1)**	Main Firm update **(*Note2)**	HDD Format
Digital P.C.B.	—	√	—
AV Out P.C.B. (IC3701: EEPROM)	√	—	√
HDD	—	—	√

*** Note1:**
"Warning for Customers Who Use DivX Video-on-Demand content" when replacing the FLASH ROM or EEPROM or P.C.B.
First, copy the Last part of this page for the customers who continue to use DivX Video-on-Demand service.

Appendix:

* Parts that memorize user's information are only EEPROM.
* The registration of Registration Code is possible for half a year up to 6 recorders up to 10 recorders a year.
Replacement of EEPROM or P.C.B. including EEPROM spends one of this.

Registration Code is memorized in EEPROM (RFKFxxxxxx).
If exchange above P.C.B. or EEPROM, new registration Code differ from previous Registration Code will be generated.
In this case if your customer uses DivX Video-on-Demand service, he/she will no longer be able to play any content that he/she purchased under that same registration code.
Therefore your customer will need to obtain and register the new registration code.

*Copy this page and cut on the dotted line and give the lower half to your customer.

Warning for Customers who use the DivX Video-on-Demand content.

1. The registration code has been changed for the repair of the product or the product exchange.
2. Obtain and register a new registration code, otherwise you will no longer be able to play DivX Video-on-Demand content.
3. Follow the procedure on the DivX Video-on-Demand web site to register at
http://vod.divx.com/
* If you do not use the DivX Video-on-Demand content, please ignore this warning.

*** Note2:**
Download latest Firmware and burn it on SD card, and update Firmware.

9.2.2. Notice after replacing Digital P.C.B.

Formatting the HDD is unnecessary after replacing Digital P.C.B.
[TM AV1] is displayed, once power OFF, and power ON again.

9.3. Standard Inspection Specifications after Making Repairs

After making repairs, we recommend performing the following inspection, to check normal operation.

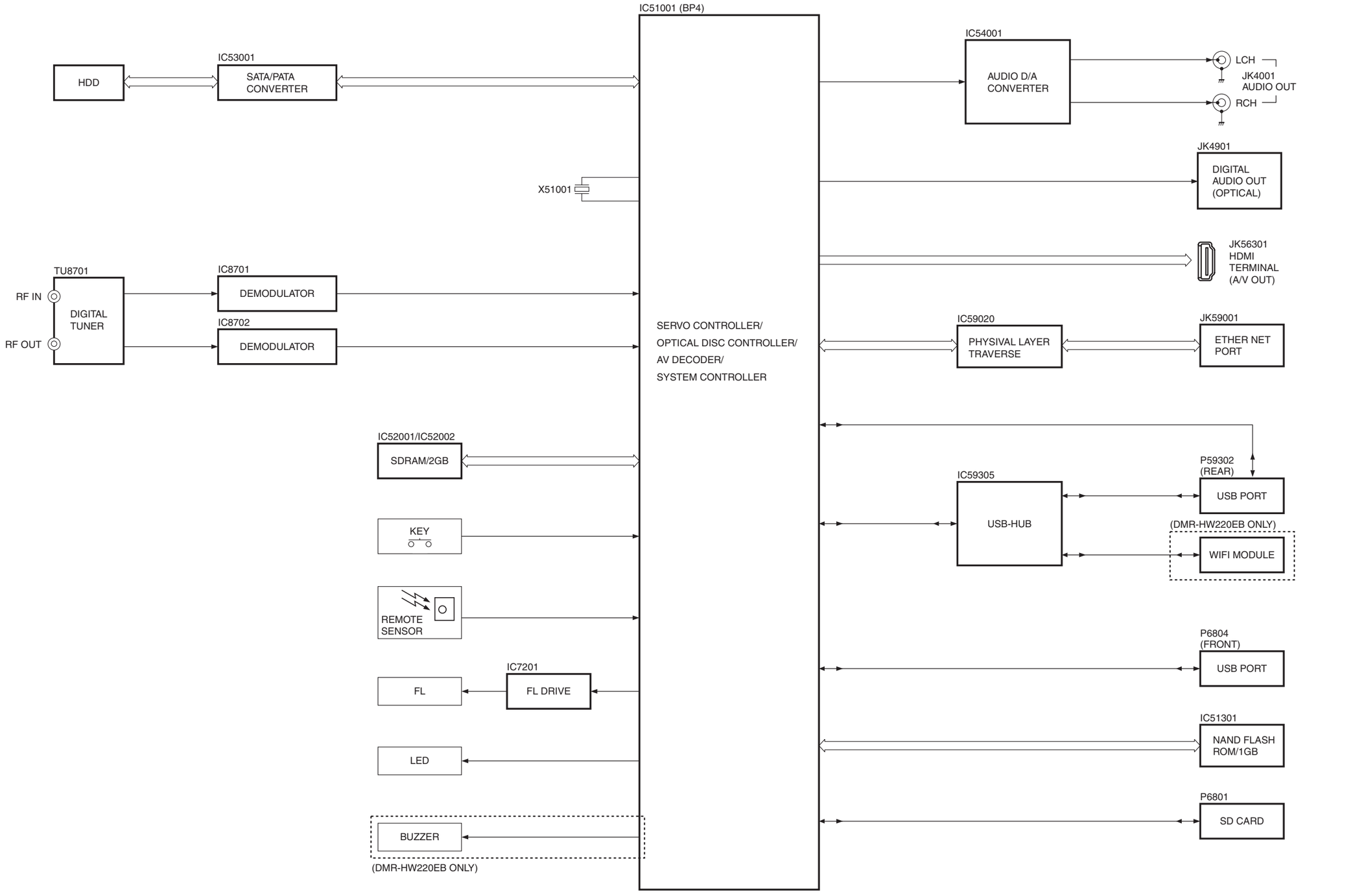
No.	Procedure	Item to Check
1	Turn on the power, and confirm items pointed out.	Items pointed out should reappear.
2	Enter the EE (TU IN / AV IN - AV OUT) mode.	No abnormality should be seen in the picture, sound or operation.
3	Model with the HDD: Perform self-recording and playback for one minute using the HDD.	No abnormality should be seen in the picture, sound or operation.
4	Models with SD Card Slot or USB Input Jack: In case of that the trouble is caused by SD card and / or USB terminal.	Models with SD Card Slot or USB Input Jack; 1) SD Card: Check to be able to display and copy the picture. 2) USB terminal: Check to be able to display and copy the picture.
5	After checking and making repairs, upgrade the firmware to the latest version.	Do not turn the power off until writing is complete (The tray automatically opens when writing is complete.). "NoUPDATE" message indicates that updating the version is not necessary since the version is the latest or the same one.
6	Transfer [9][9] in the service mode setting, and initialize the service settings (return various settings and error information to their default values. The laser time is not included in this initialization).	Make sure that [CLR] appears in the FL display. After checking it, turn the power off.

Use the following checklist to establish the judgement criteria for the picture and sound.

Item	Contents	Check	Item	Contents	Check
Picture	Block noise		Sound	Distorted sound	
	Crosscut noise			Noise (static, background noise, etc.)	
	Dot noise			The sound level is too low.	
	Picture disruption			The sound level is too high.	
	Not bright enough			The sound level changes.	
	Too bright				
	Flickering color				
	Color fading				

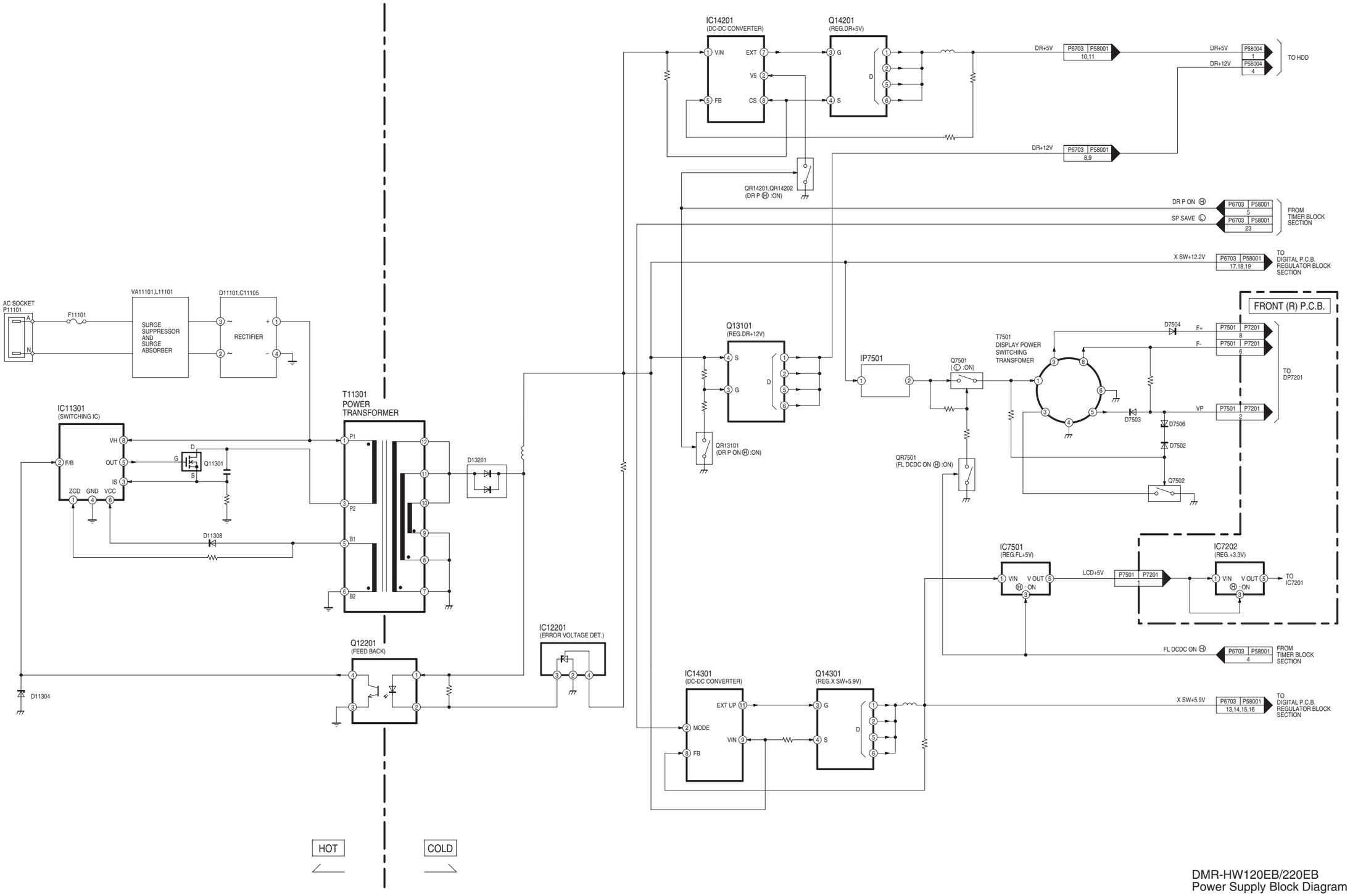
10 Block Diagram

10.1. Overall Block Diagram



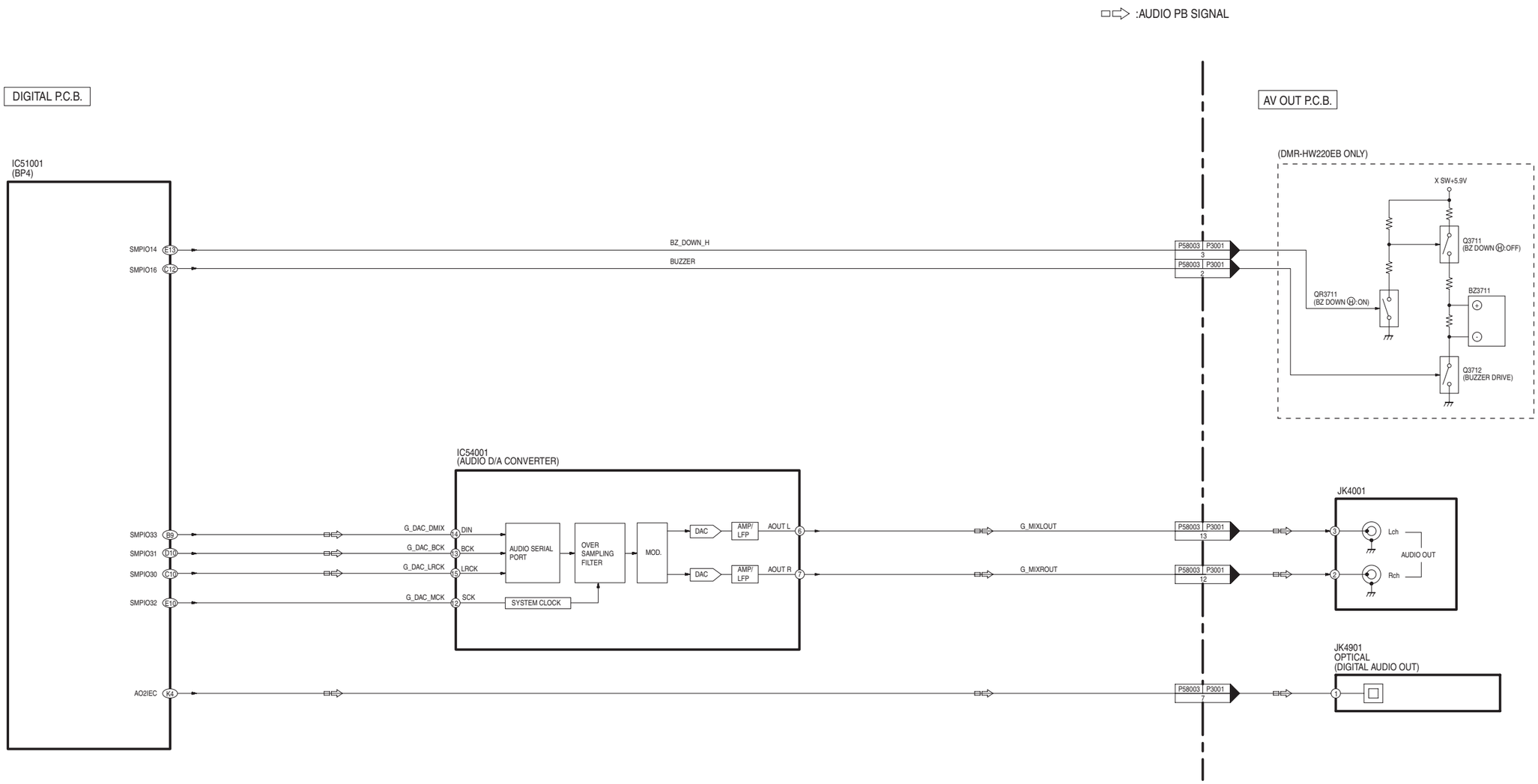
DMR-HW120EB/220EB
Overall Block Diagram

10.2. Power Supply Block Diagram



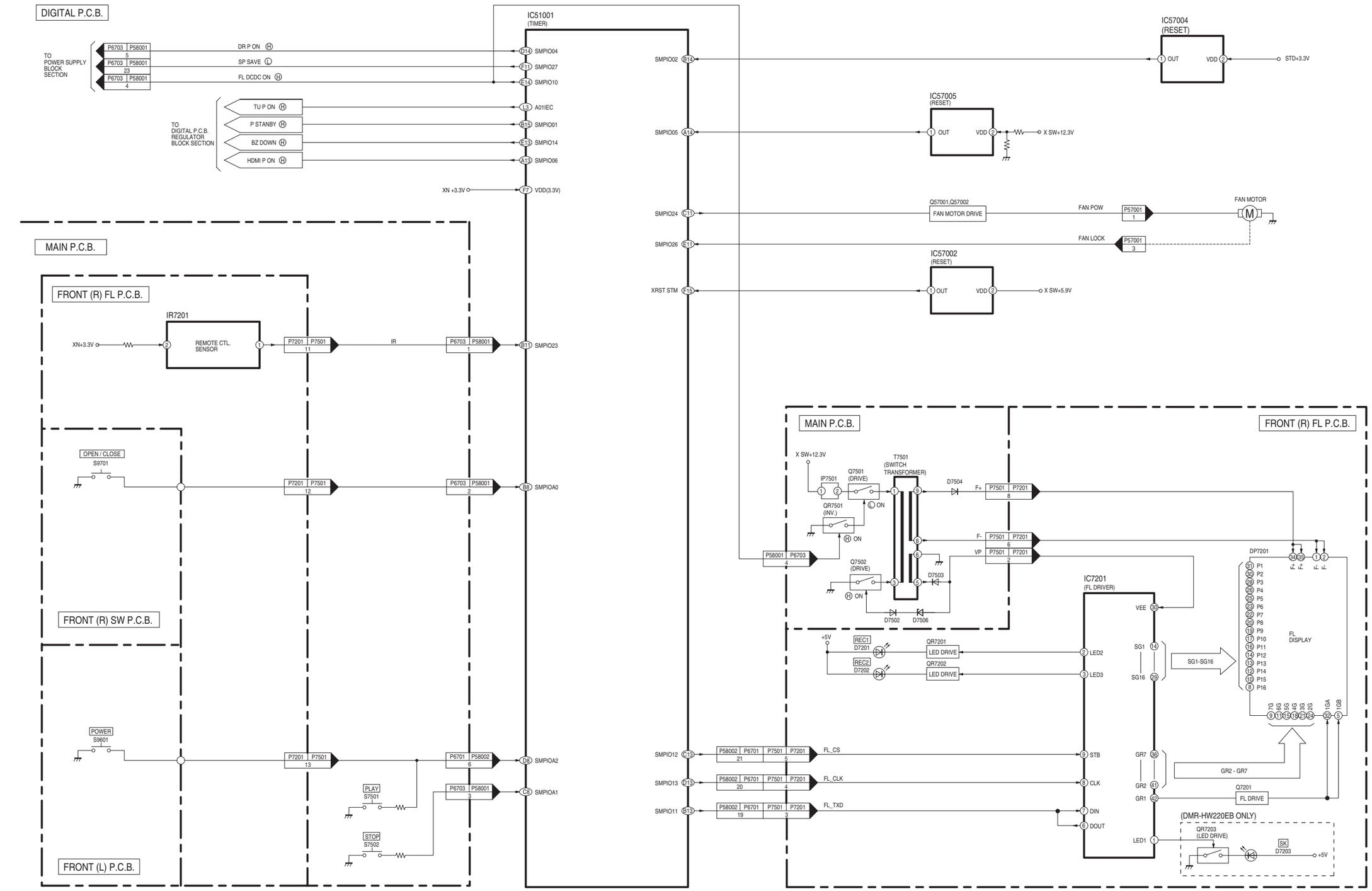
DMR-HW120EB/220EB
Power Supply Block Diagram

10.3. Analog Audio Block Diagram



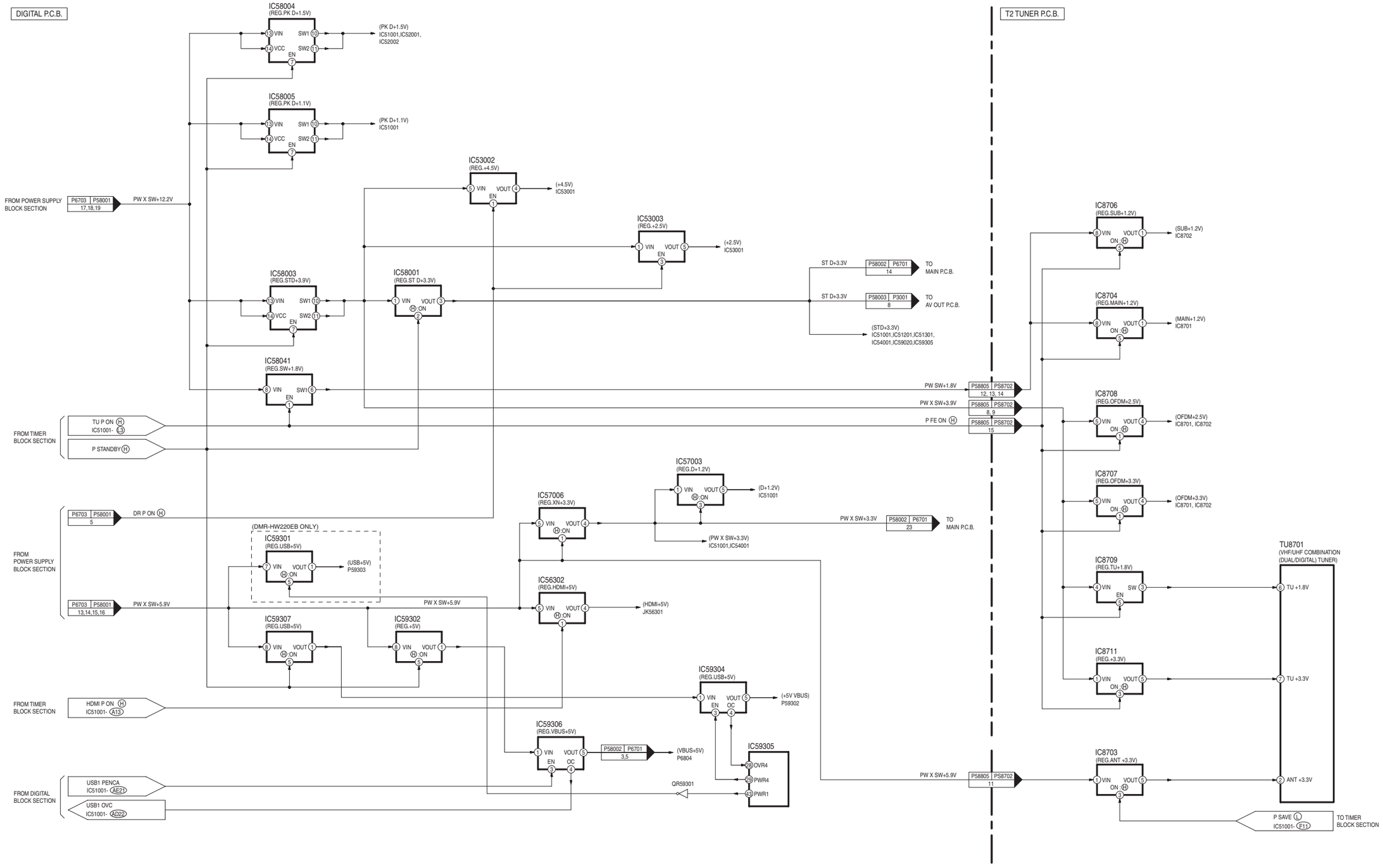
DMR-HW120EB/220EB
Analog Audio Block Diagram

10.4. Timer Block Diagram



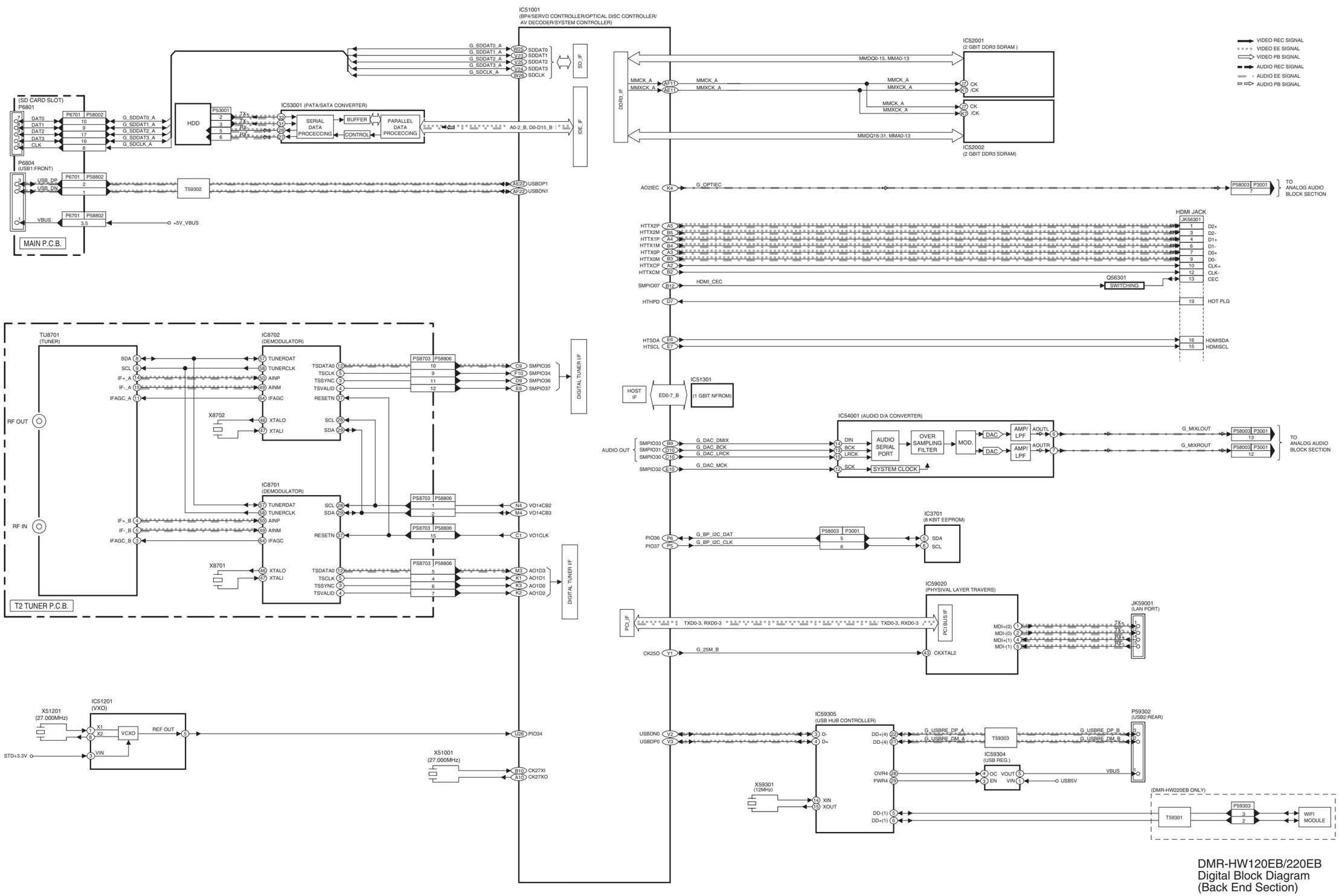
DMR-HW120EB/220EB
Timer Block Diagram

10.5. Digital P.C.B. Regulator Block Diagram



DMR-HW120EB/220EB
Digital P.C.B. Regulator
Block Diagram

10.6. Digital Block Diagram (Back End Section)



DMR-HW120EB/220EB
Digital Block Diagram
(Back End Section)

11 Wiring Connection Diagram

11.1. Interconnection Diagram

IMPORTANT SAFETY NOTICE:

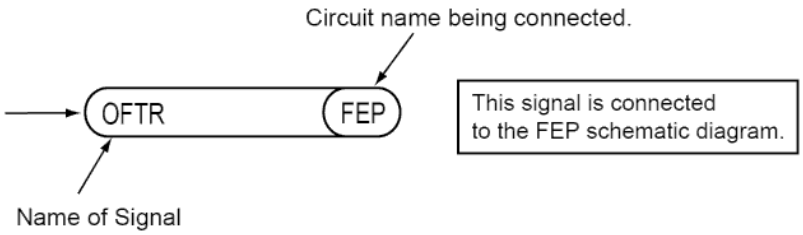
COMPONENTS IDENTIFIED WITH THE MARK ⚠ HAVE THE SPECIAL CHARACTERISTICS FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS USE ONLY THE SAME TYPE.

1.Although reference number of the parts is indicated on the P.C.B. drawing and/or schematic diagrams, it is NOT mounted on the P.C.B. when it is displayed with "$" mark.

2.It is only the "Test Round" and no terminal (Pin) is available on the P.C.B. when the TP (Test Point) indicated as "●" mark.

3.Use the parts number indicated on the Replacement Parts List .

4.Indication on Schematic diagrams:



5. It might be taking time for display and/or access of the Schematic Diagrams & P. C. B. having the heavy data volume.

6. The circuit is defined by HOT and COLD indications in the schematic Diagram. Please take note to prevent from electric shock.

Model No. : DMR-HW120EB/220EB Parts List Note

Note: 1.* Be sure to make your orders of replacement parts according to this list.

2. IMPORTANT SAFETY NOTICE
   Components identified with the mark ⚠ have the special characteristics for safety.
   When replacing any of these components, use only the same type.
3. Unless otherwise specified,
   All resistors are in OHMS, K=1,000 OHMS. All capacitors are in MICRO-FARADS (uf), P=uuF.
4. The marking (RTL) indicates the retention time is limited for this item. After the discontinuation of this assembly in production, it will no longer be available.

E.S.D. standards for Electrostatically Sensitive Devices, refer to "PREVENTION OF ELECTROSTATIC DISCHARGE (ESD) TO ELECTROSTATICALLY SENSITIVE (ES) DEVICES" section.

***Please exchange the P.C.B when IC is the P.C.B parts number.**

Definition of Parts supplier:

1. **Parts marked with [SPC] in the remarks column are supplied from AVC-CSC-SPC. Others are supplied from PAVCSK.**

Model No. : DMR-HW120EB/220EB Abbreviation

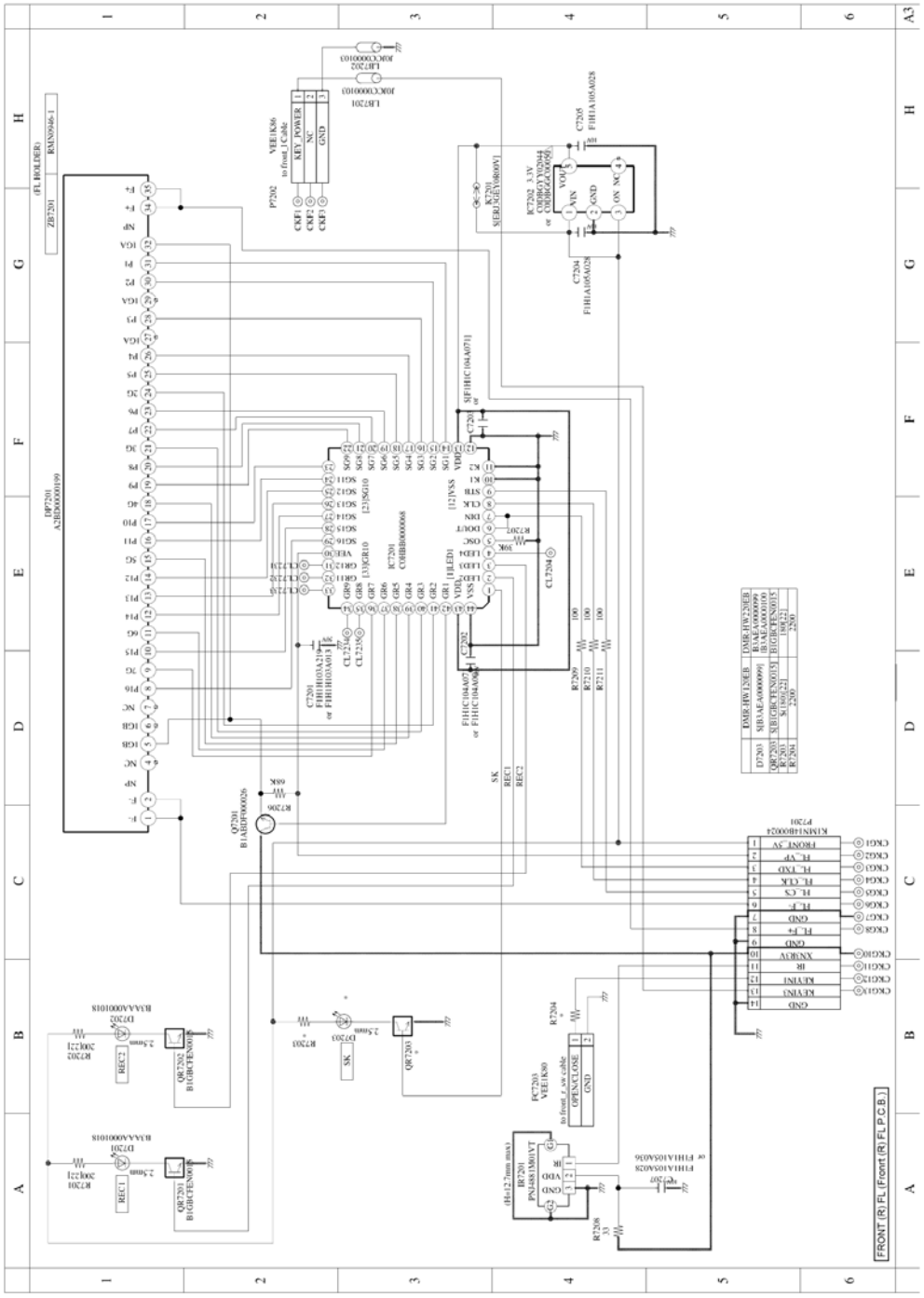
INITIAL/LOGO	ABBREVIATIONS
A A0~UP	ADDRESS
ACLK	AUDIO CLOCK
A00~UP	ADDRESS BUS
ADATA	AUDIO PES PACKET DATA
ALE	ADDRESS LATCH ENABLE
AMUTE	AUDIO MUTE
AREQ	AUDIO PES PACKET REQUEST
ARF	AUDIO RF
ASI	SERVO AMP INVERTED INPUT
ASO	SERVO AMP OUTPUT
ASYNC	AUDIO WORD DISTINCTION SYNC
B BCK	BIT CLOCK (PCM)
BCKIN	BIT CLOCK INPUT
BDO	BLACK DROP OUT
BLKCK	SUB CODE BLOCK CLOCK
BOTTOM	CAP. FOR BOTTOM HOLD
BYP	BYPATH
BYTCK	BYTE CLOCK
C CAV	CONSTANT ANGULAR VELOCITY
CBDO	CAP. BLACK DROP OUT
CD	COMPACT DISC
CDSCK	CD SERIAL DATA CLOCK
CDSRDATA	CD SERIAL DATA
CDRF	CD RF (EFM) SIGNAL
CDV	COMPACT DISC-VIDEO
CHNDATA	CHANNEL DATA
CKSL	SYSTEM CLOCK SELECT
CLV	CONSTANT LINEAR VELOCITY
COFTR	CAP. OFF TRACK
CPA	CPU ADDRESS
CPCS	CPU CHIP SELECT
CPDT	CPU DATA
CPH1~3	CLOCK PULSE SOURCE DRIVE
CPUADR	CPU ADDRESS LATCH
CPUADT	CPU ADDRESS DATA BUS
CPUIRQ	CPU INTERRUPT REQUEST
CPRD	CPU READ ENABLE
CPV	GATE DRIVER CLOCK PULSE
CPWR	CPU WRITE ENABLE
CS	CHIP SELECT
CSYNCIN	COMPOSITE SYNC IN
CSYNCOUT	COMPOSITE SYNC OUT
D DACCK	D/A CONVERTER CLOCK
DEEMP	DE-EMPHASIS BIT ON/OFF
DEMPH	DE-EMPHASIS SWITCHING
DIG0~UP	FL DIGIT OUTPUT
DIN	DATA INPUT
DMSRCK	DM SERIAL DATA READ CLOCK
DMUTE	DIGITAL MUTE CONTROL
DO	DROP OUT
DOUT0~UP	DATA OUTPUT
DRF	DATA SLICE RF (BIAS)
DRPOUT	DROP OUT SIGNAL
DREQ	DATA REQUEST
DRESP	DATA RESPONSE
DSC	DIGITAL SERVO CONTROLLER
DSLF	DATA SLICE LOOP FILTER
DVD	DIGITAL VIDEO DISC

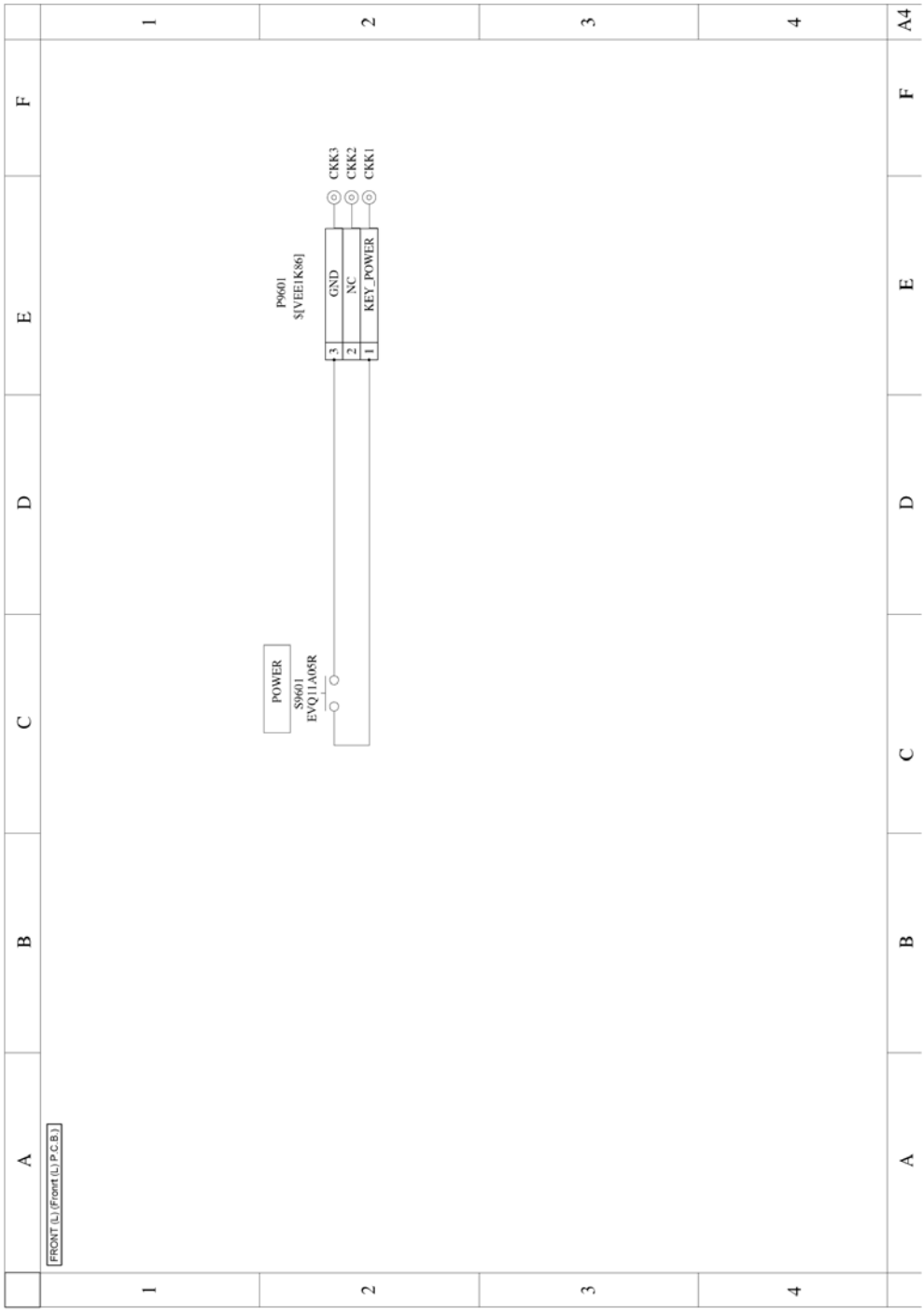
INITIAL/LOGO	ABBREVIATIONS
E EC	ERROR TORQUE CONTROL
ECR	ERROR TORQUE CONTROL REFERENCE
ENCSEL	ENCODER SELECT
ETMCLK	EXTERNAL M CLOCK (81MHz/40.5MHz)
ETSCLK	EXTERNAL S CLOCK (54MHz)
F FBAL	FOCUS BALANCE
FCLK	FRAME CLOCK
FE	FOCUS ERROR
FFI	FOCUS ERROR AMP INVERTED INPUT
FEO	FOCUS ERROR AMP OUTPUT
FG	FREQUENCY GENERATOR
FSC	FREQUENCY SUB CARRIER
FSCK	FS (384 OVER SAMPLING) CLOCK
G GND	COMMON GROUNDING (EARTH)
H HA0~UP	HOST ADDRESS
HD0~UP	HOST DATA
HINT	HOST INTERRUPT
HRXW	HOST READ/WRITE
I IECOUT	IEC958 FORMAT DATA OUTPUT
IPFRAG	INTERPOLATION FLAG
IREF	I (CURRENT) REFERENCE
ISEL	INTERFACE MODE SELECT
L LDON	LASER DIODE CONTROL
LPC	LASER POWER CONTROL
LRCK	L CH/R CH DISTINCTION CLOCK
M MA0~UP	MEMORY ADDRESS
MCK	MEMORY CLOCK
MCKI	MEMORY CLOCK INPUT
MCLK	MEMORY SERIAL COMMAND CLOCK
MDATA	MEMORY SERIAL COMMAND DATA
MDQ0~UP	MEMORY DATA INPUT/OUTPUT
MDQM	MEMORY DATA I/O MASK
MLD	MEMORY SERIAL COMMAND LOAD
MPEG	MOVING PICTURE EXPERTS GROUP
O ODC	OPTICAL DISC CONTROLLER
OEH	SOURCE DRIVER OUTPUT ENABLE
OEV1, 2	GATE DRIVER OUTPUT ENABLE
OFTR	OFF TRACKING
OSCI	OSCILLATOR INPUT
OSCO	OSCILLATOR OUTPUT
OSD	ON SCREEN DISPLAY
P P1~UP	PORT
PCD	CD TRACKING PHASE DIFFERENCE
PCK	PLL CLOCK
PDVD	DVD TRACKING PHASE DIFFERENCE
PEAK	CAP. FOR PEAK HOLD
PLLCLK	CHANNEL PLL CLOCK
PLLLCK	PLL LOCK
PWMCTL	PWM OUTPUT CONTROL
PWMDA	PULSE WAVE MOTOR DRIVE A
PWMOA_B	PULSE WAVE MOTOR OUT A, B
R RE	READ ENABLE
RFENV	RF ENVELOPE
RFO	RF PHASE DIFFERENCE OUTPUT
RS	(CD-ROM) REGISTER SELECT
RSEL	RF POLARITY SELECT
RST	RESET
RSV	RESERVE

INITIAL/LOGO	ABBREVIATIONS
S SBI0, 1	SERIAL DATA INPUT
SBO0	SERIAL DATA OUTPUT
SBT0, 1	SERIAL CLOCK
SCK	SERIAL DATA CLOCK
SCKR	AUDIO SERIAL CLOCK RECEIVER
SCL	SERIAL CLOCK
SCLK	SERIAL CLOCK
SDA	SERIAL DATA
SEG0~UP	FL SEGMENT OUTPUT
SELCLK	SELECT CLOCK
SEN	SERIAL PORT ENABLE
SIN1, 2	SERIAL DATA IN
SOUT1, 2	SERIAL DATA OUT
SPDI	SERIAL PORT DATA INPUT
SPDO	SERIAL PORT DATA OUTPUT
SPEN	SERIAL PORT R/W ENABLE
SPRCLK	SERIAL PORT READ CLOCK
SPWCLK	SERIAL PORT WRITE CLOCK
SQCK	SUB CODE Q CLOCK
SQCX	SUB CODE Q DATA READ CLOCK
SRDATA	SERIAL DATA
SRMADR	SRAM ADDRESS BUS
SRMDT0~7	SRAM DATA BUS 0~7
SS	START/STOP
STAT	STATUS
STCLK	STREAM DATA CLOCK
STD0~UP	STREAM DATA
STENABLE	STREAM DATA INPUT ENABLE
STH	SOURCE START PULSE
STSEL	STREAM DATA POLARITY SELECT
STV	GATE DRIVER SCAN START PULSE
STVALID	STREAM DATA VALIDITY
SUBC	SUB CODE SERIAL
SBCK	SUB CODE CLOCK
SUBQ	SUB CODE Q DATA
SYSCLK	SYSTEM CLOCK
T TE	TRACKING ERROR
TBAL	BALANCE CONTROL
TID	BALANCE OUTPUT 1
TIN	BALANCE INPUT
TIP	BALANCE INPUT
TIS	BALANCE OUTPUT 2
TPSN	OP AMP INPUT
TPSO	OP AMP OUTPUT
TPSP	OP AMP INVERTED INPUT
TRCRS	TRACK CROSS SIGNAL
TRON	TRACKING ON
TRSON	TRAVERSE SERVO ON
V VBLANK	V BLANKING
VCC	COLLECTOR POWER SUPPLY VOLTAGE
VCDCONT	VIDEO CD CONTROL (TRACKING BALANCE)
VDD	DRAIN POWER SUPPLY VOLTAGE
VFB	VIDEO FEED BACK
VREF	VOLTAGE REFERENCE
VSS	SOURCE POWER SUPPLY VOLTAGE
W WAIT	BUS CYCLE WAIT
WDCK	WORD CLOCK
WEH	WRITE ENABLE HIGH
WSR	WORD SELECT RECEIVER

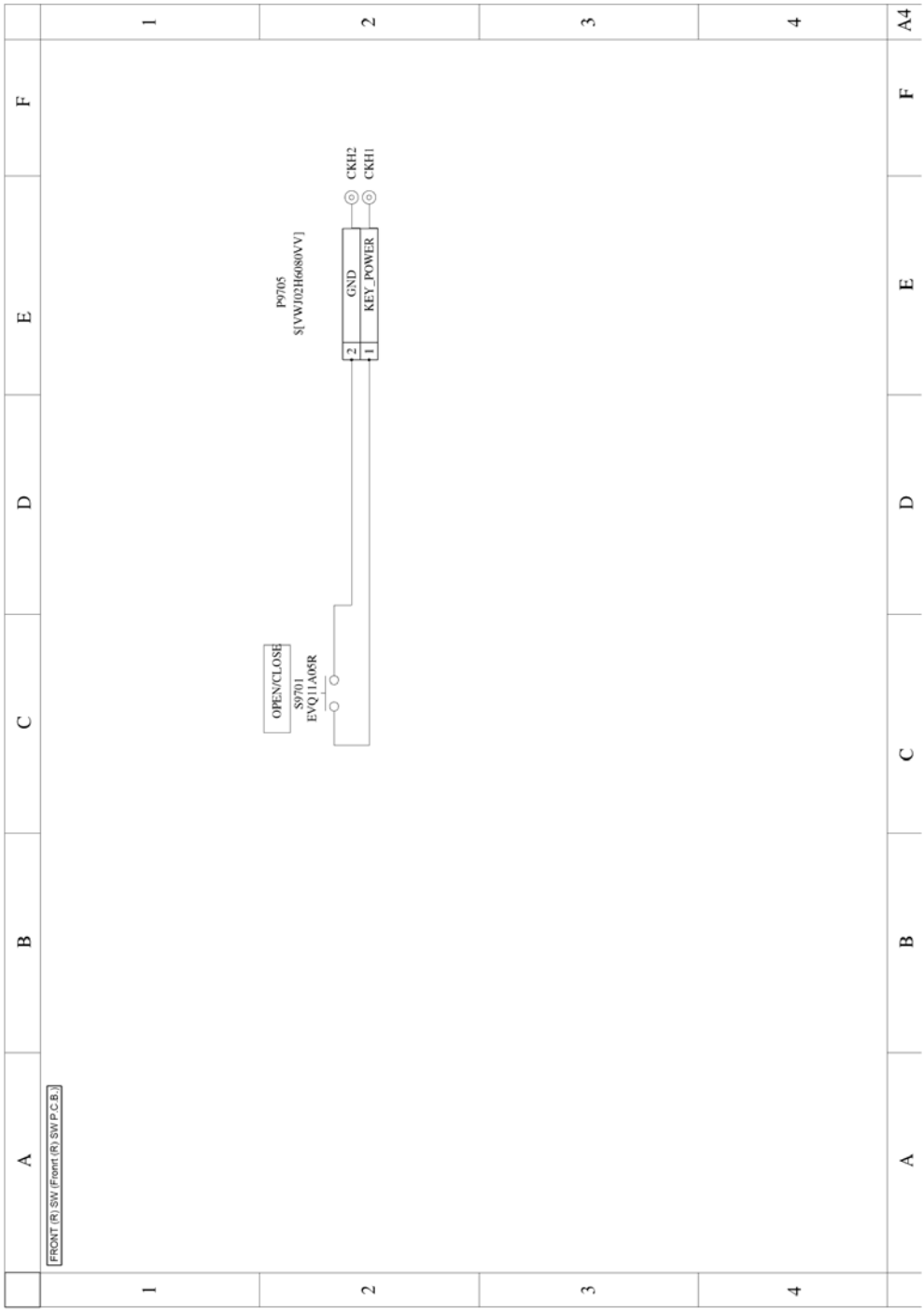
INITIAL/LOGO	ABBREVIATIONS
X X	X-TAL
XALE	X ADDRESS LATCH ENABLE
XAREQ	X AUDIO DATA REQUEST
XCDROM	X CD ROM CHIP SELECT
XCS	X CHIP SELECT
XCSYNC	X COMPOSITE SYNC
XDS	X DATA STROBE
XHSYNCO	X HORIZONTAL SYNC OUTPUT
XHINT	XH INTERRUPT REQUEST
XI	X TAL OSCILLATOR INPUT
XINT	X INTERRUPT
XMW	X MEMORY WRITE ENABLE
XO	X TAL OSCILLATOR OUTPUT
XRE	X READ ENABLE
XSRMCE	X SRAM CHIP ENABLE
XSRMOE	X SRAM OUTPUT ENABLE
XSRMWE	X SRAM WRITE ENABLE
XVCS	X V-DEC CHIP SELECT
XVDS	X V-DEC CONTROL BUS STROBE
XVSYNCO	X VERTICAL SYNC OUTPUT

Model No. : DMR-HW120EB/220EB Front (R) FL (Front (R) FL P.C.B.)

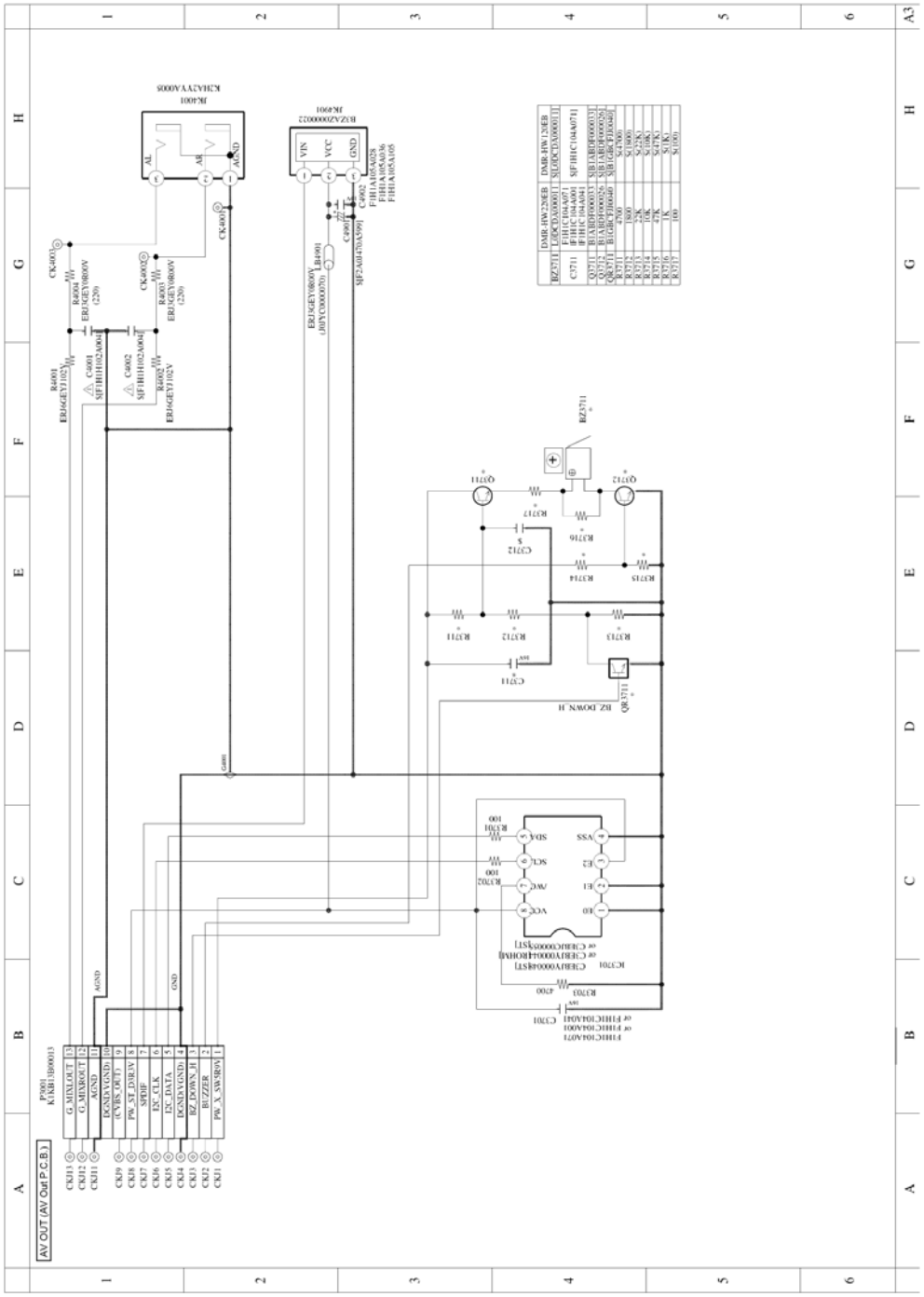



FRONT (L) (Front (L) P.C.B.)
P9601
S[VE1K86]
GND
NC
KEY_POWER
3
2
1
CKK3
CKK2
CKK1
POWER
S9601
EVQ11A05R

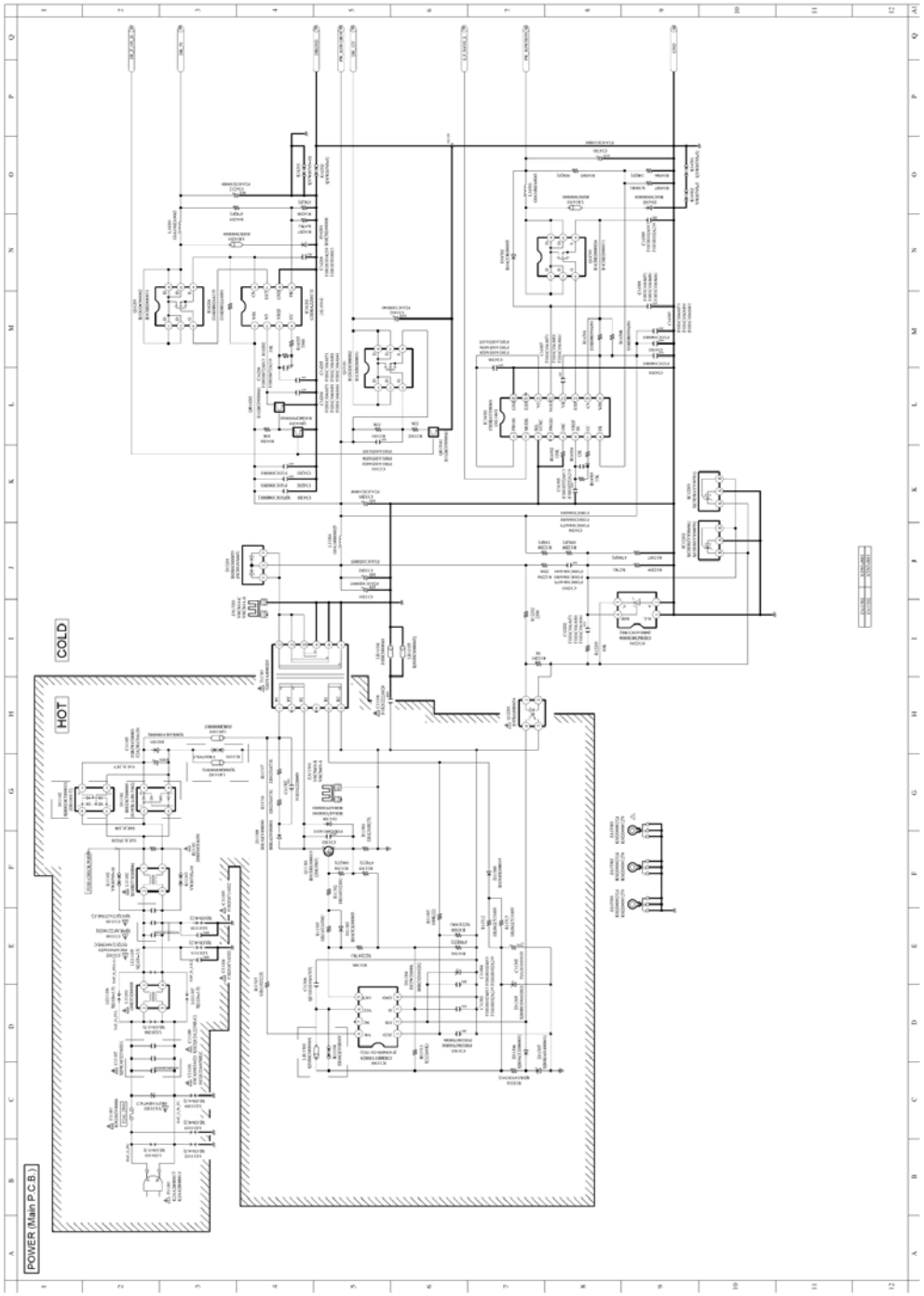
Model No. : DMR-HW120EB/220EB Front (R) SW (Front (R) SW P.C.B.)



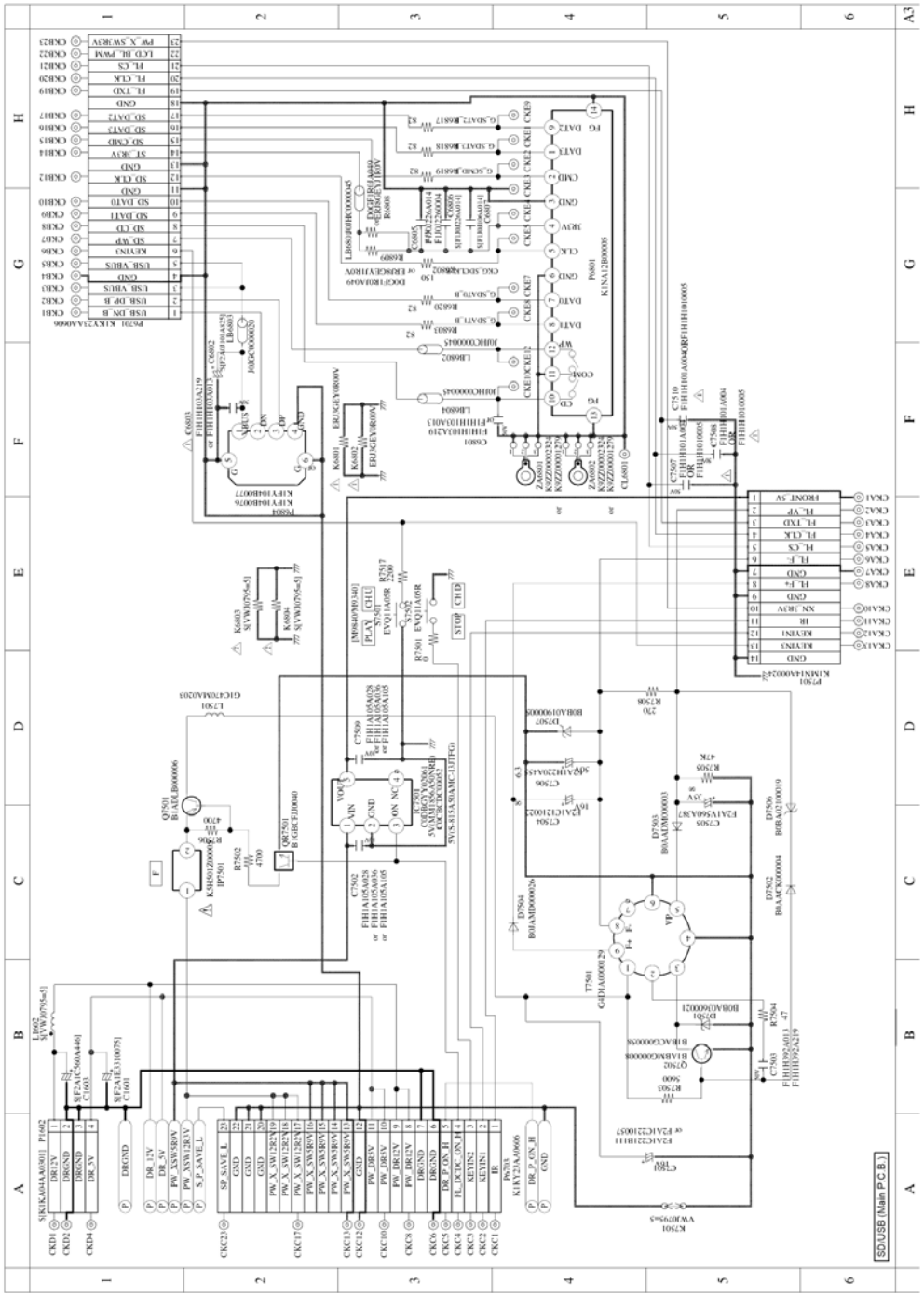
Model No. : DMR-HW120EB/220EB AV Out (AV Out P.C.B.)

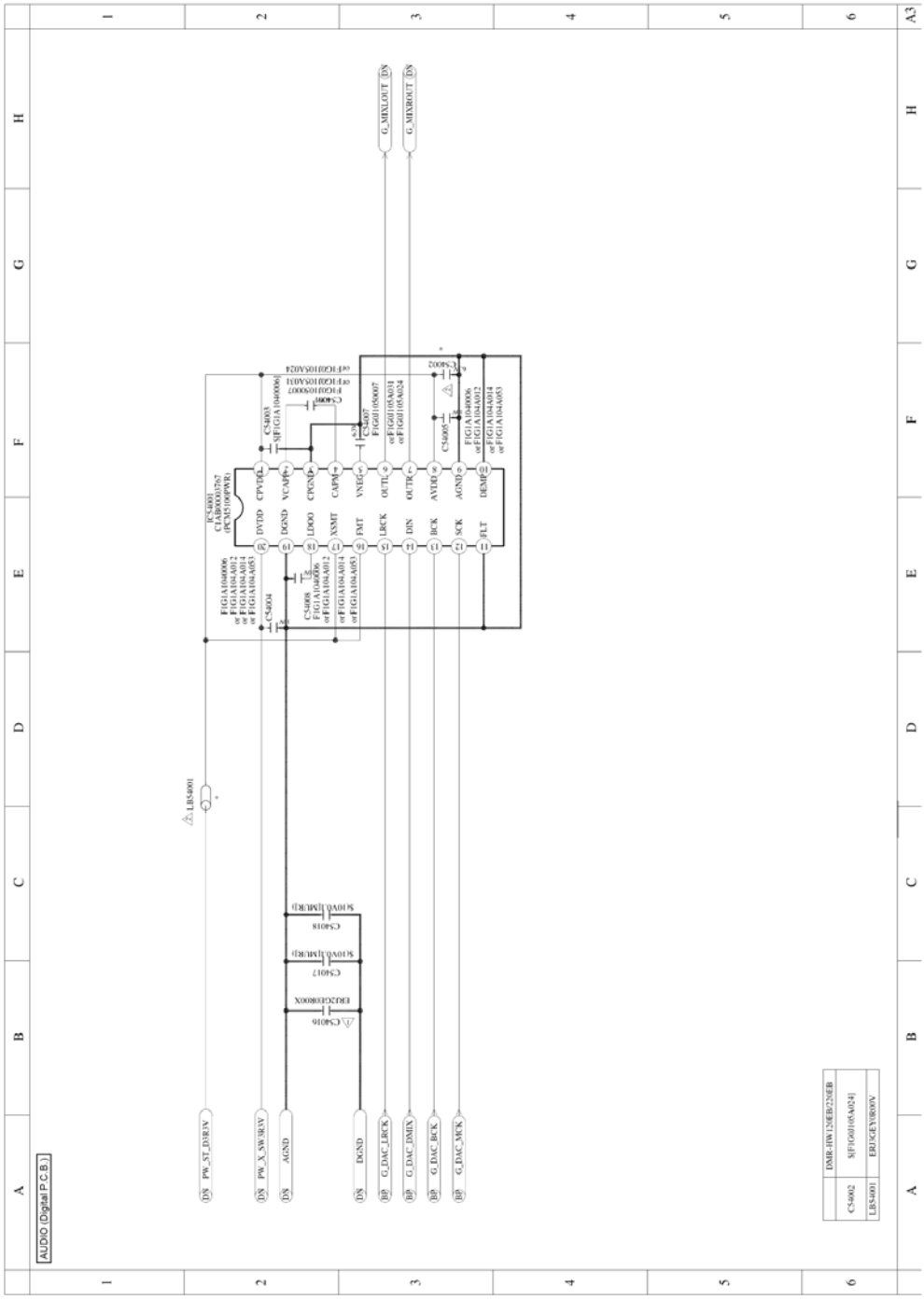


Model No. : DMR-HW120EB/220EB Power (P) (Main P.C.B.)

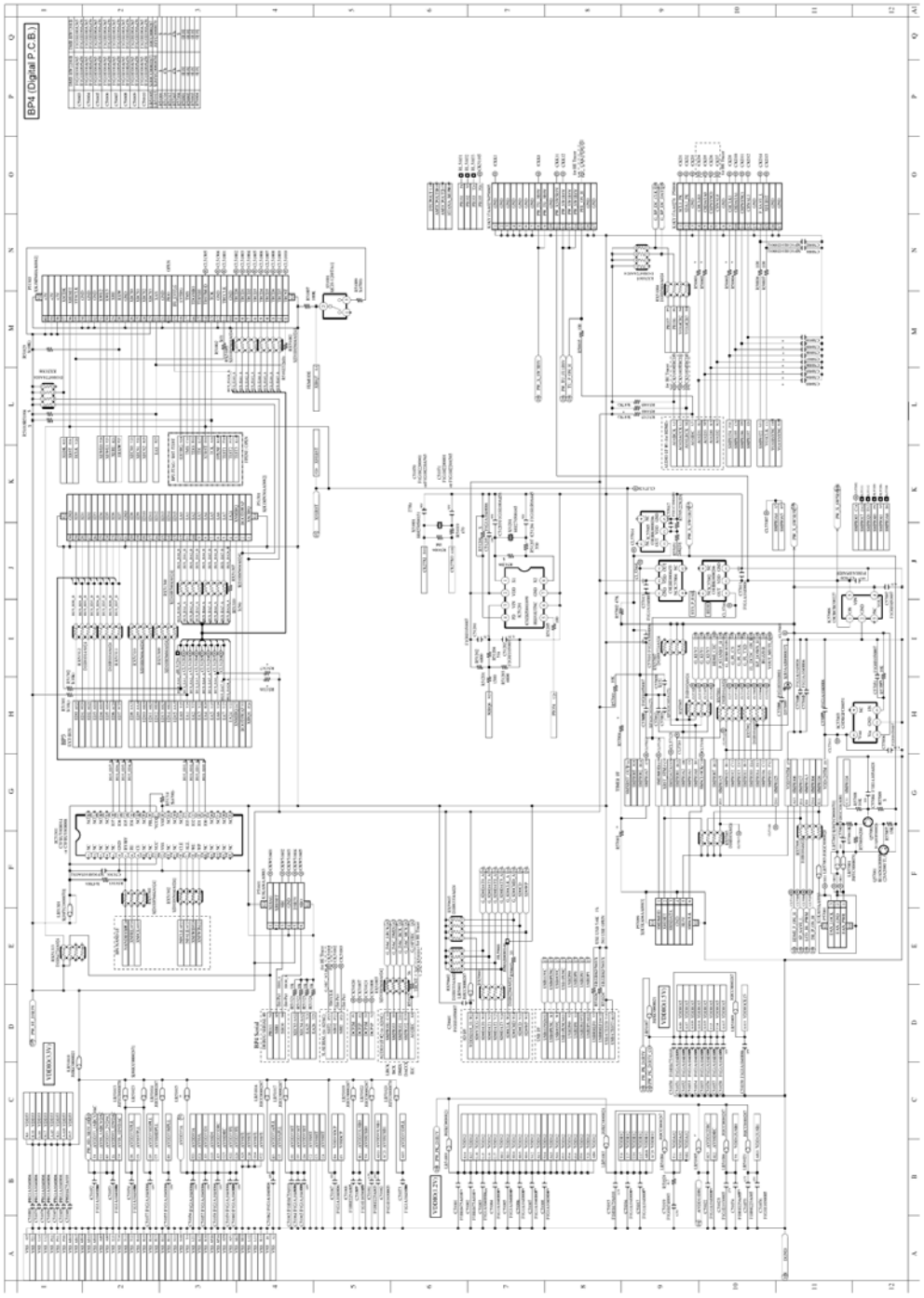


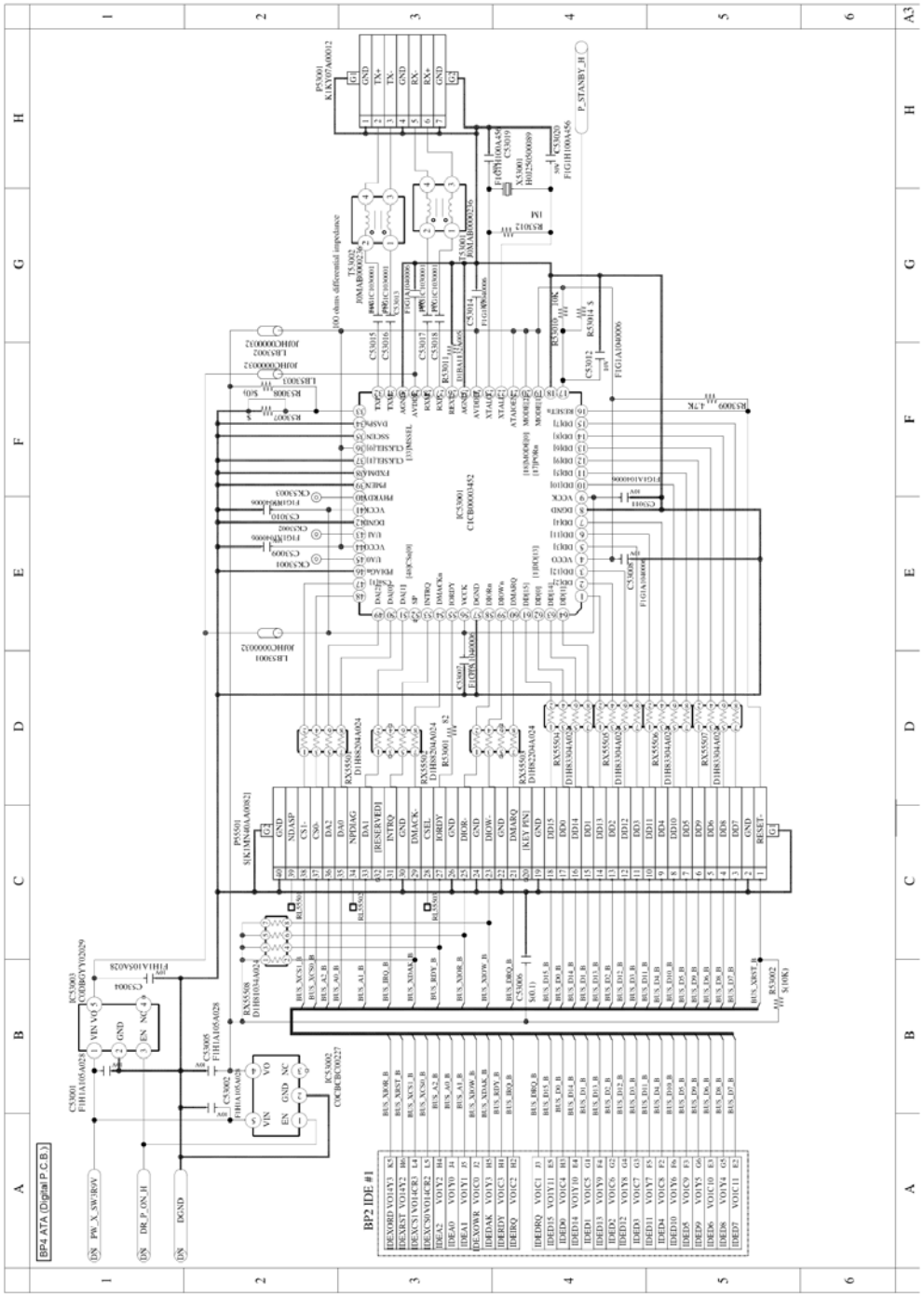
Model No. : DMR-HW120EB/220EB SD/USB (M) (Main P.C.B.)

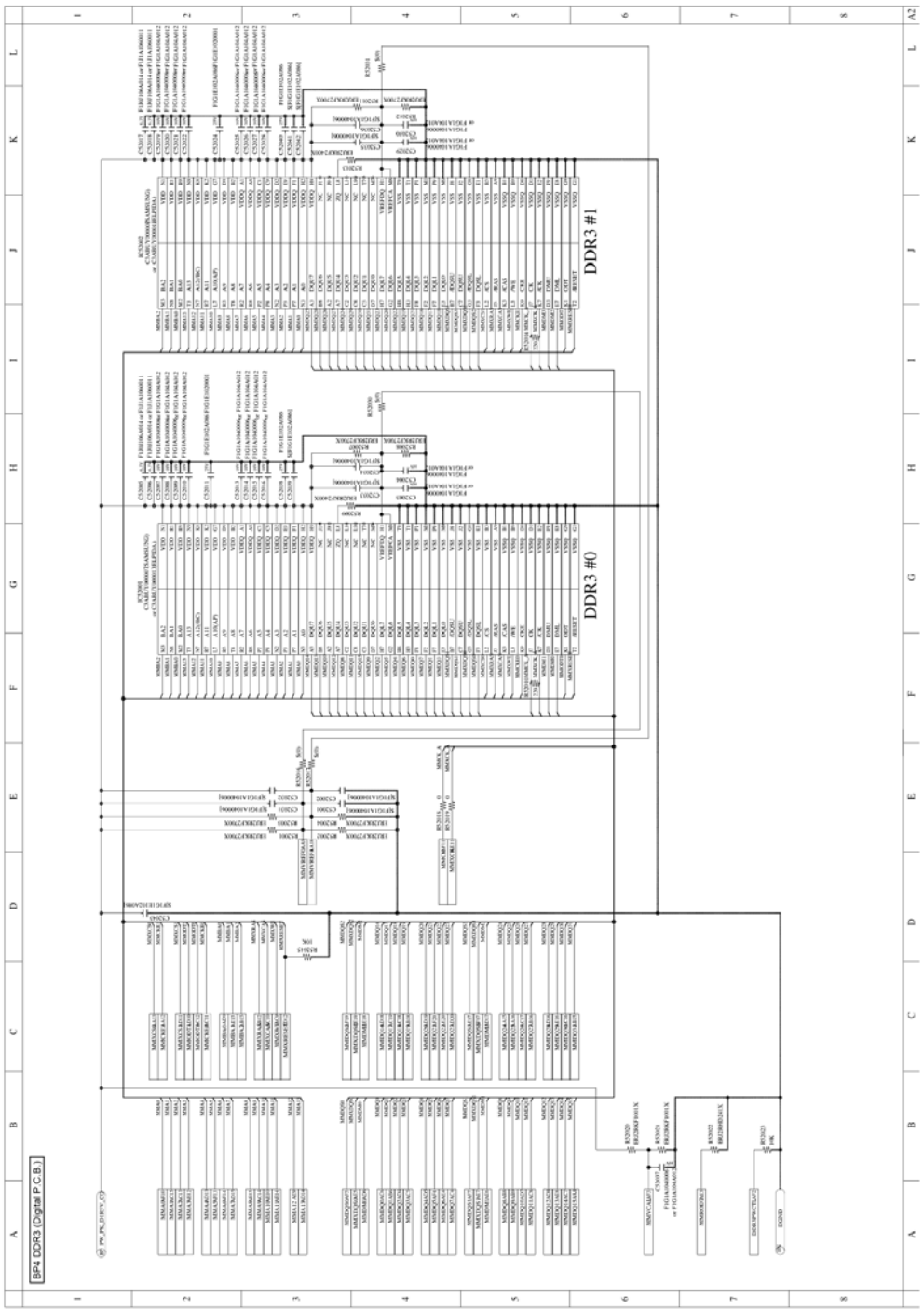


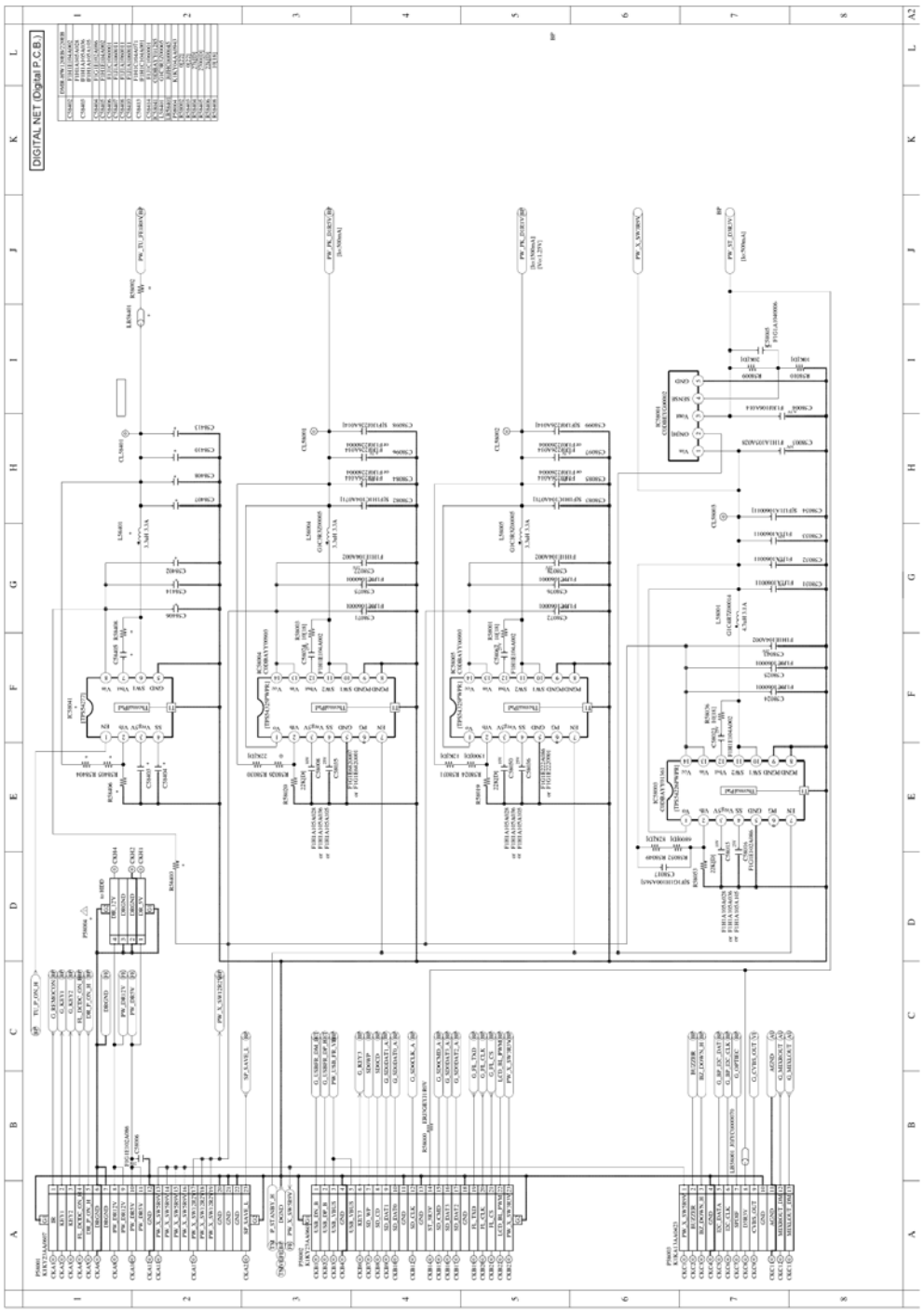

AUDIO (Digital P.C.B.)
G_MIXLOUT_DS
G_MIXROUT_DS
PW_ST_DS8.0V
PW_X_SW5.0V
AGND
DGND
G_DAC_LRCK
G_DAC_DMIX
G_DAC_BCK
G_DAC_MCK
DMR-HW120EB/220EB
CS4002 SIFIG0105A024
LBS4001 ERJXGEY0R00V

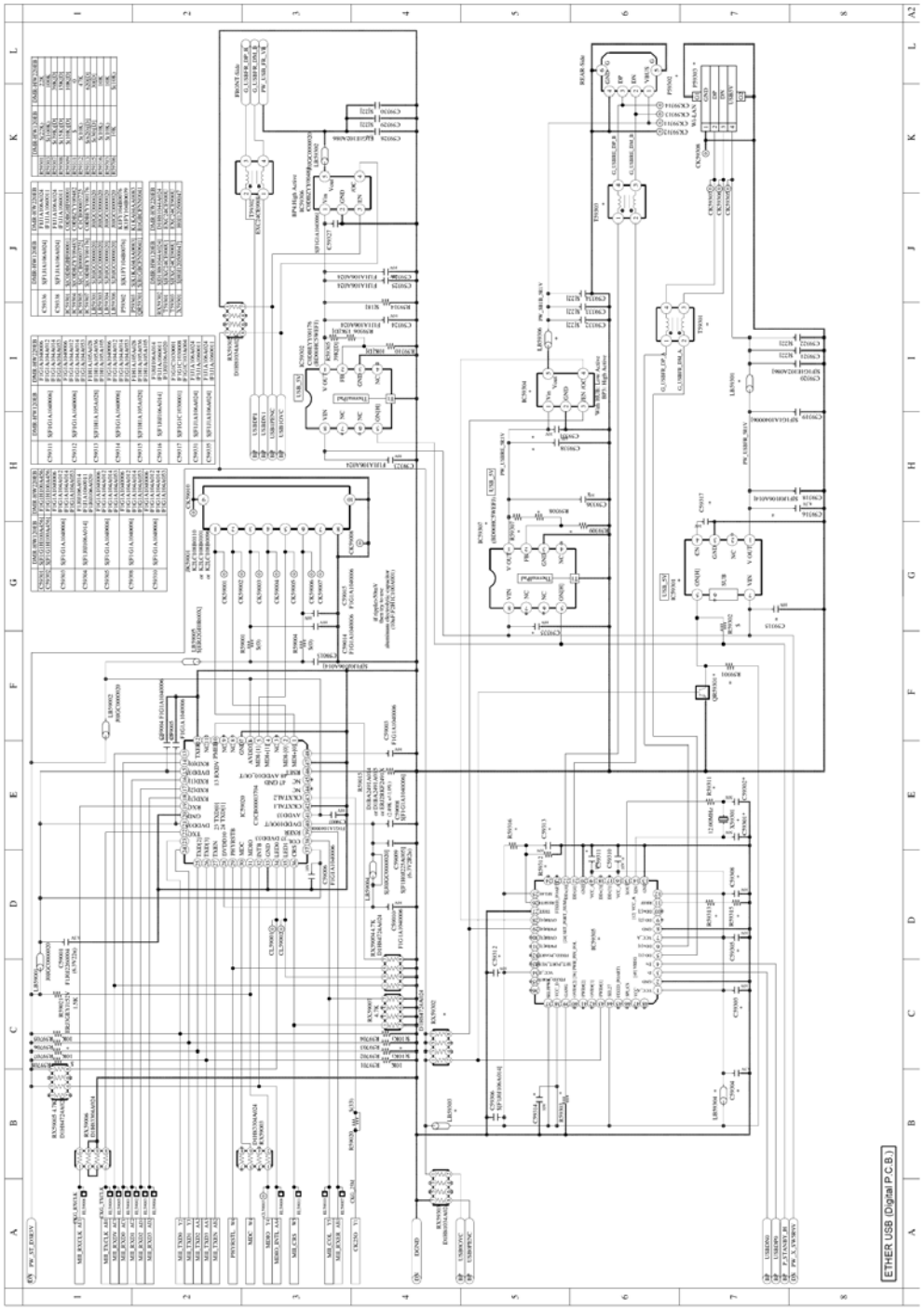
Model No. : DMR-HW120EB/220EB BP4 (BP) (Digital P.C.B.)



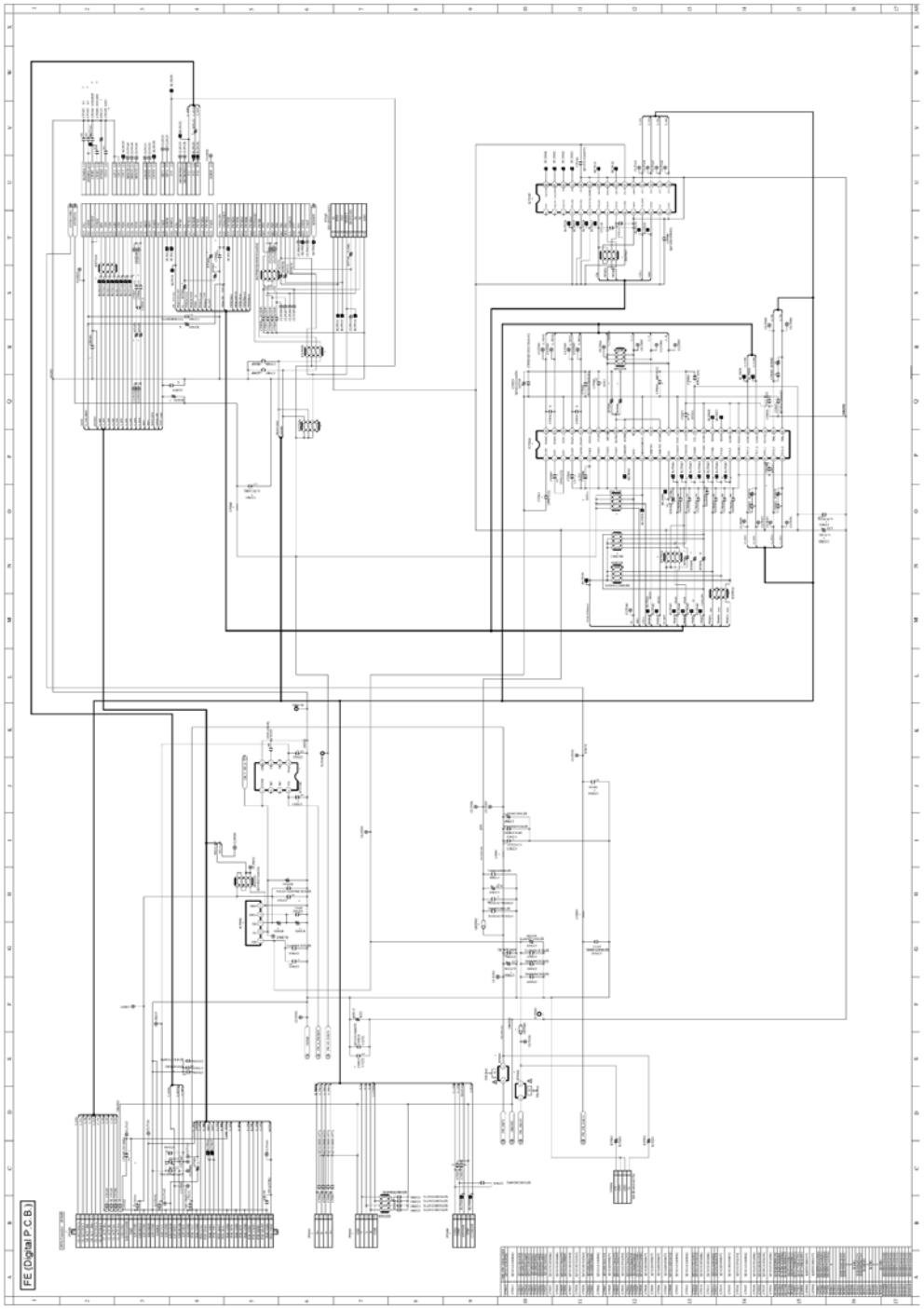

BP4 ATA (Digital P.C.B.)
BP2 IDE #1
P_STANBY_H
P_SW_X_SW3R0V
DR_P_ON_H
DGND


DDR3 #1
DDR3 #0
BP4 DDR3 (Digital P.C.B.)

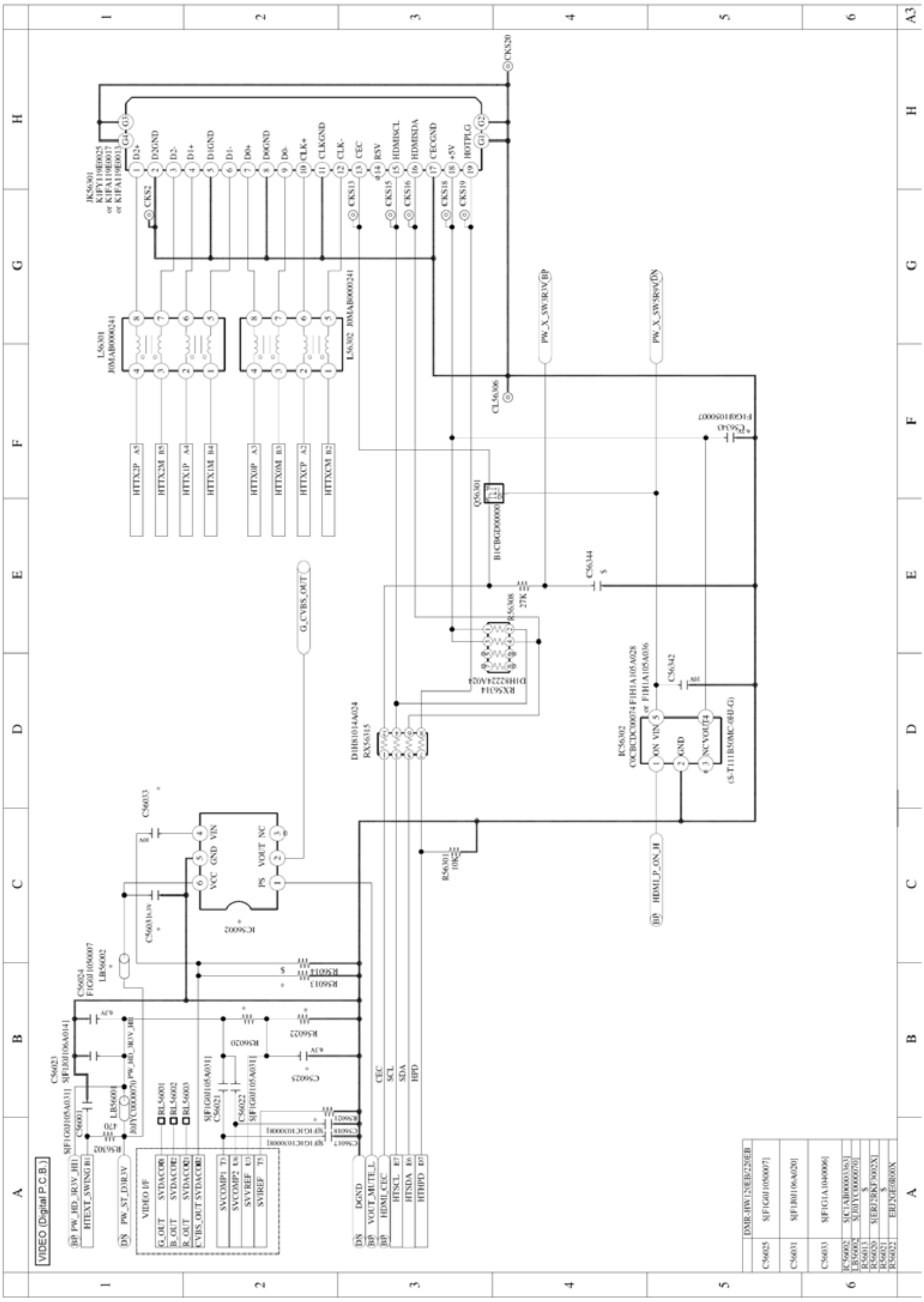

DIGITAL NET (Digital P.C.B.)


ETHER USB (Digital P.C.B.)

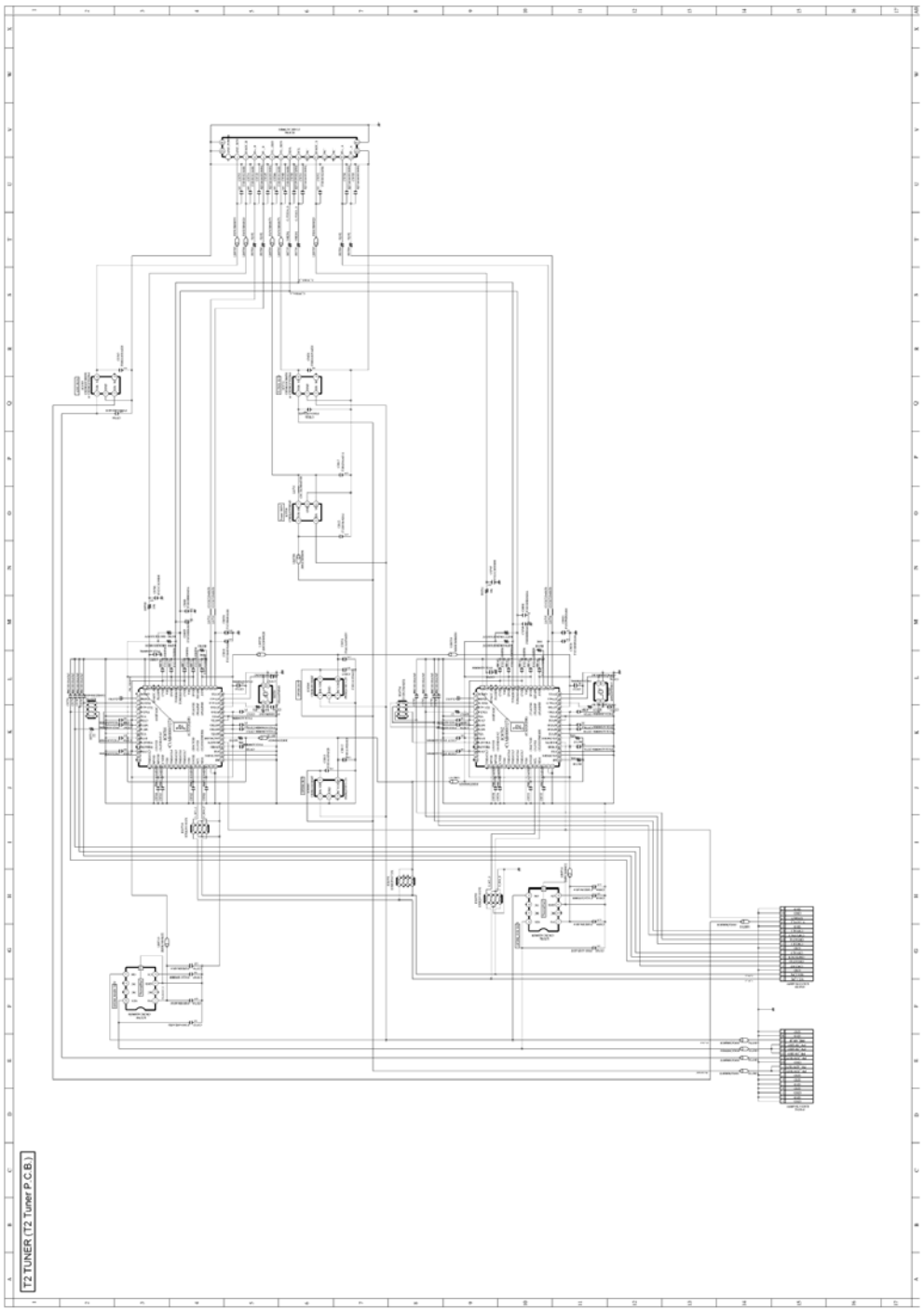
Model No. : DMR-HW120EB/220EB FE (FE) (Digital P.C.B.)



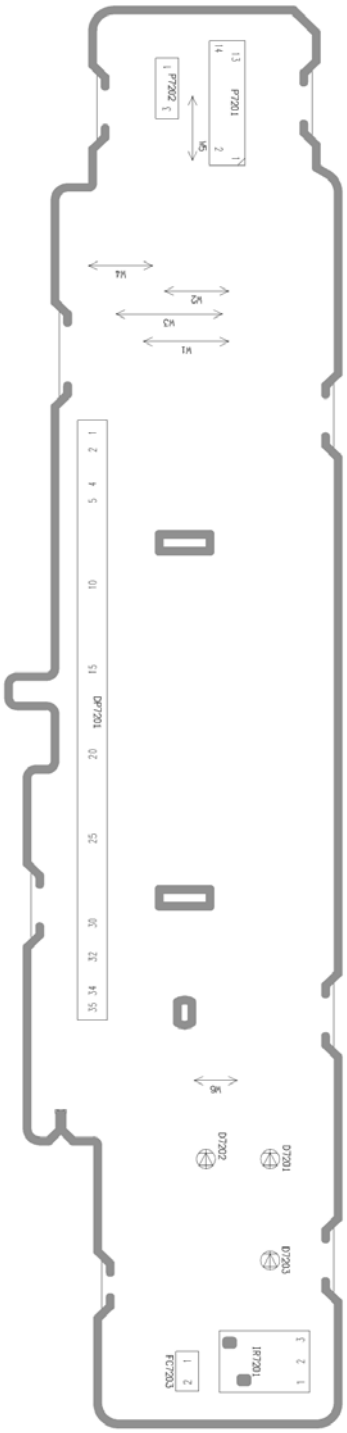
Model No. : DMR-HW120EB/220EB Video (HD) (Digital P.C.B.)



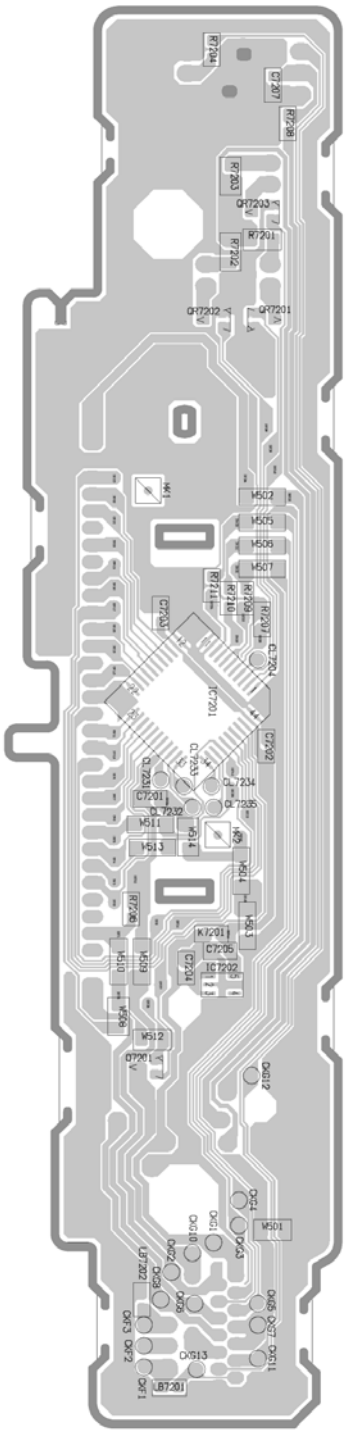
Model No. : DMR-HW120EB/220EB T2 Tuner (T2 Tuner P.C.B.)



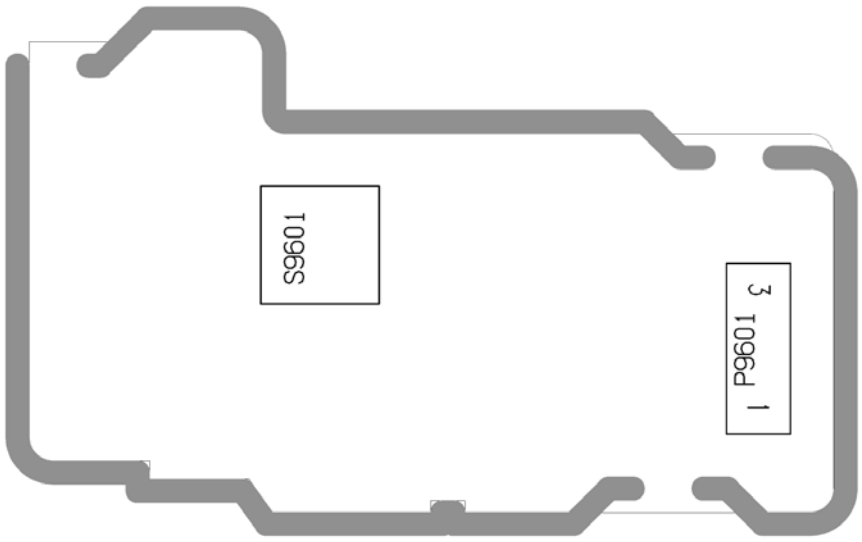
Model No. : DMR-HW120EB/220EB Front (R) FL PC.B. (Component Side)



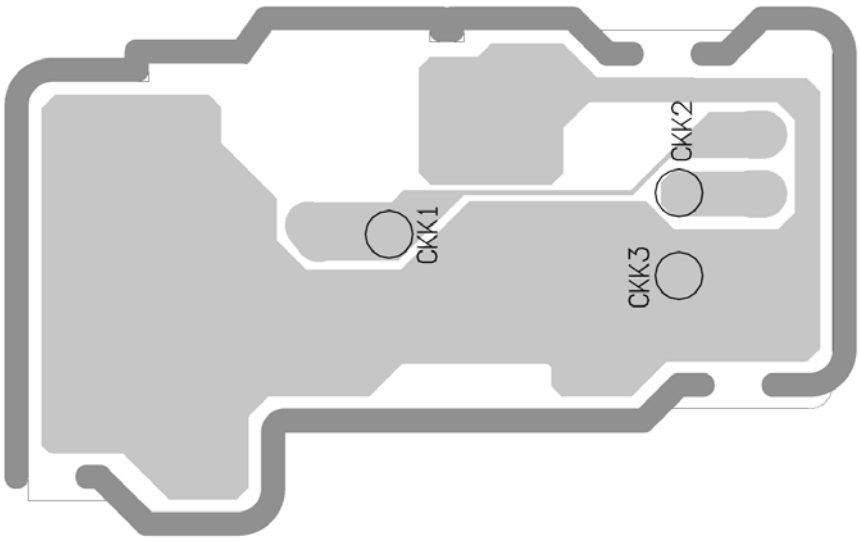
Model No. : DMR-HW120EB/220EB Front (R) FL PC.B. (Foil Side)



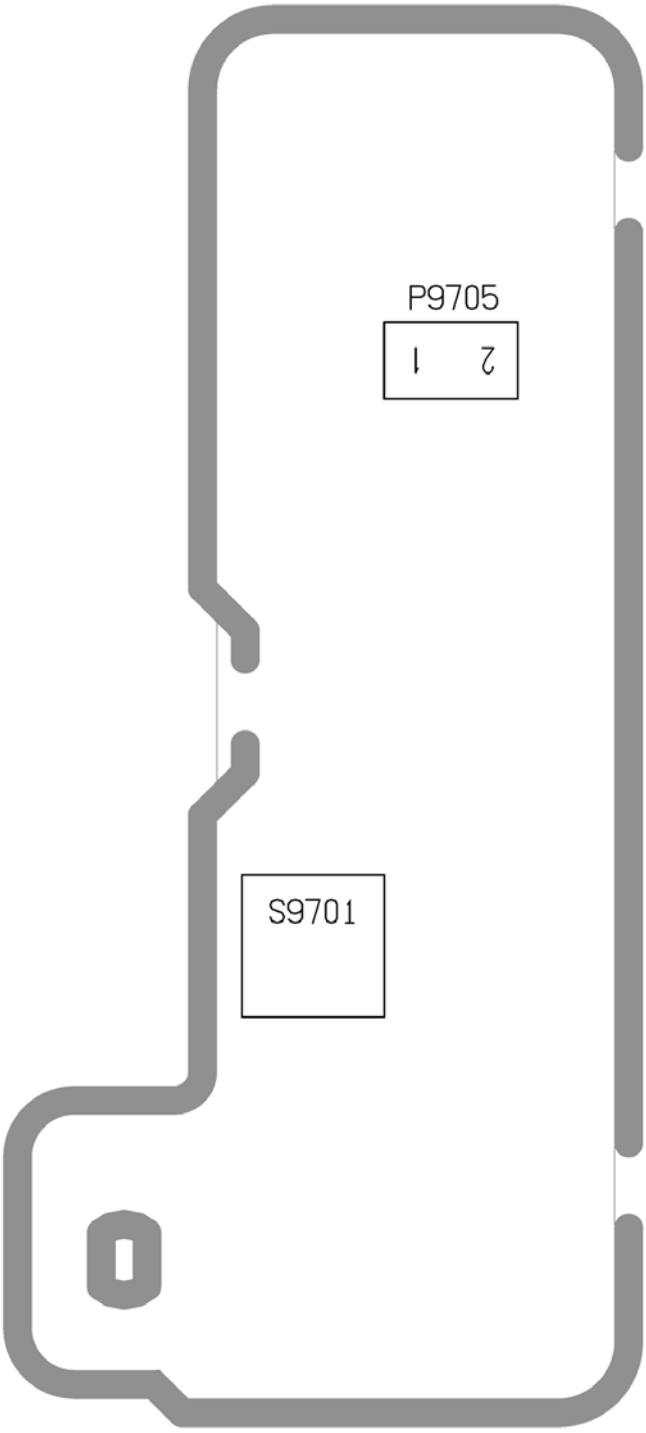
Model No. : DMR-HW120EB/220EB Front (L) P.C.B. (Component Side)



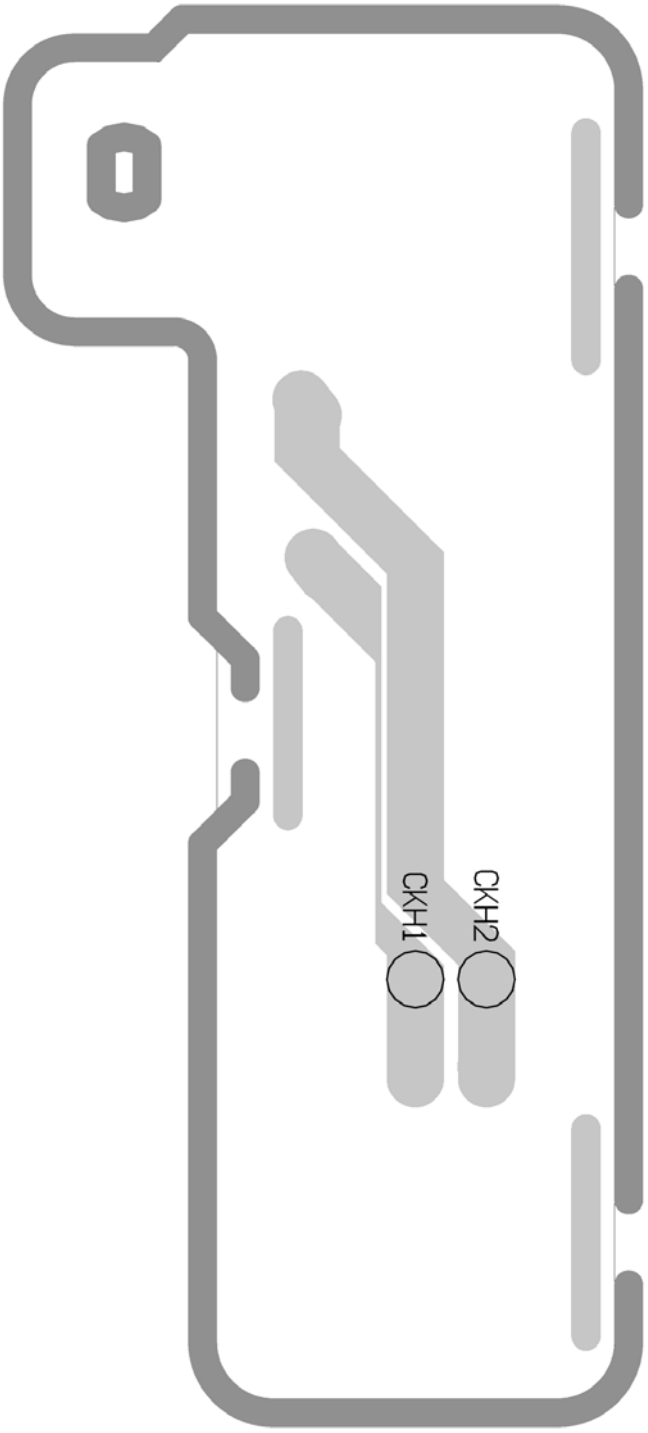
Model No. : DMR-HW120EB/220EB Front (L) P.C.B. (Foil Side)



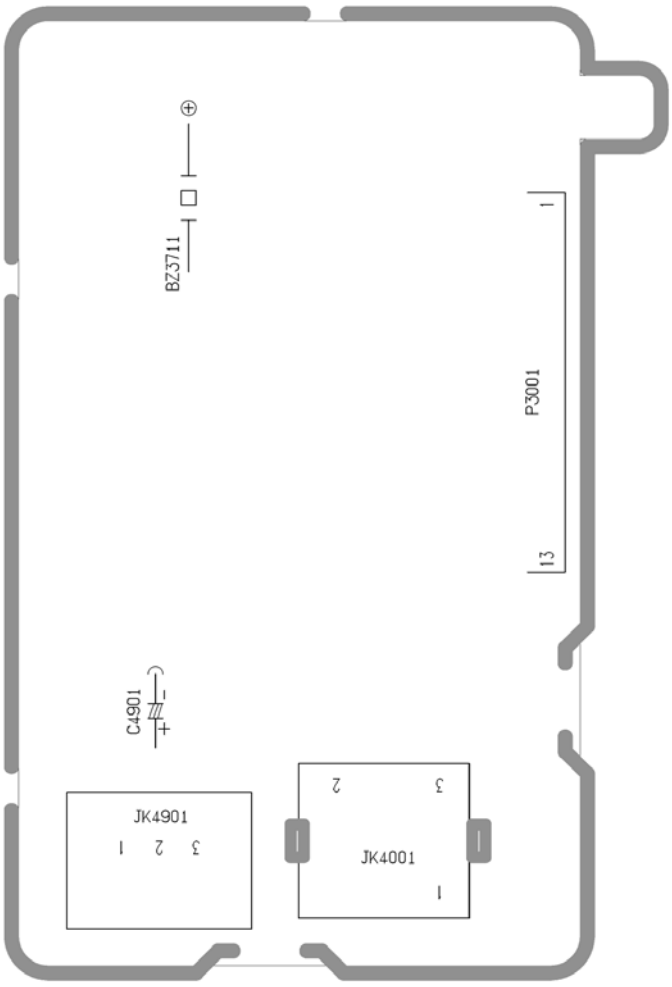
Model No. : DMR-HW120EB/220EB Front (R) SW P.C.B. (Component Side)



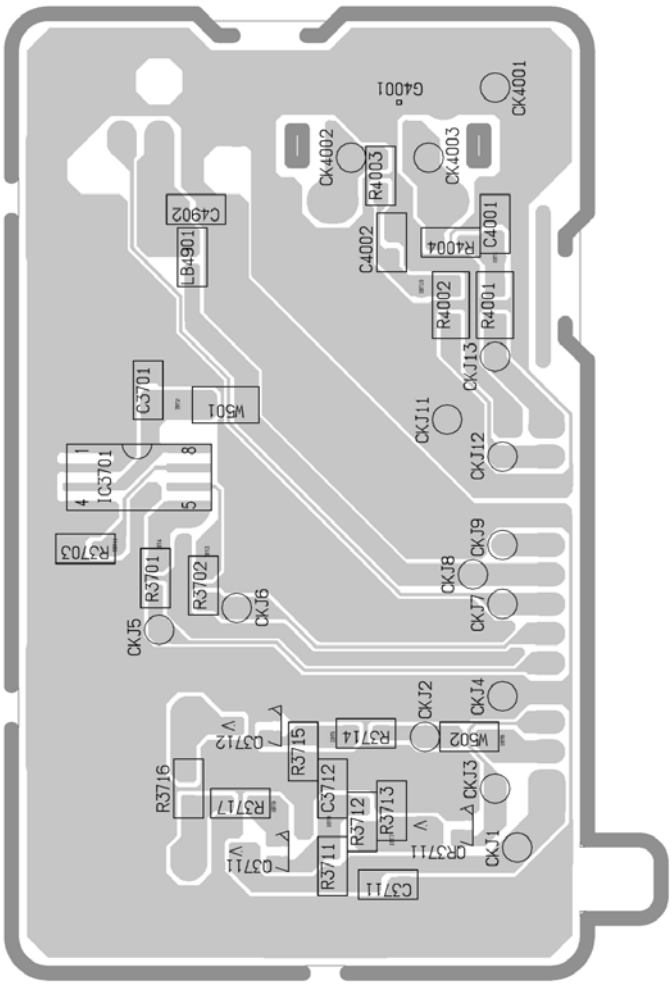
Model No. : DMR-HW120EB/220EB Front (R) SW P.C.B. (Foil Side)



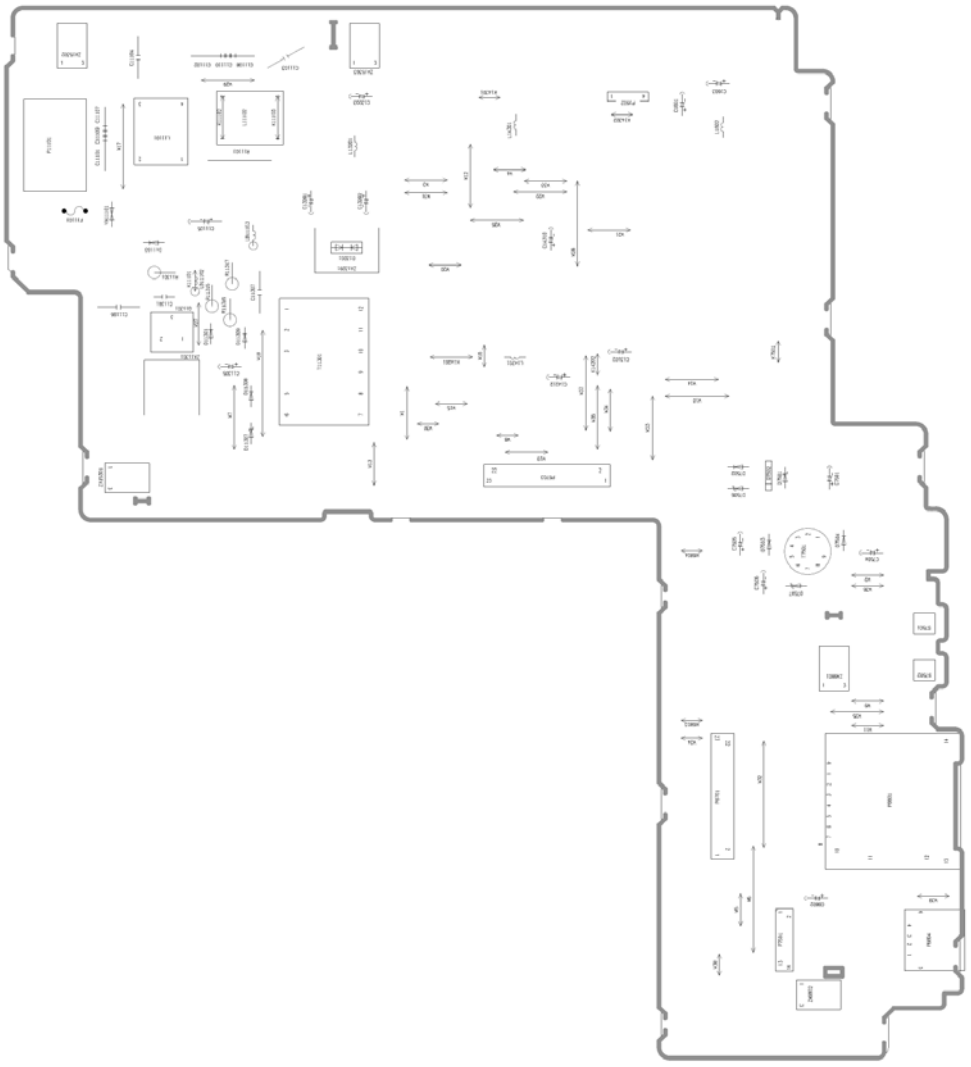
Model No. : DMR-HW120EB/220EB AV Out P.C.B. (Component Side)



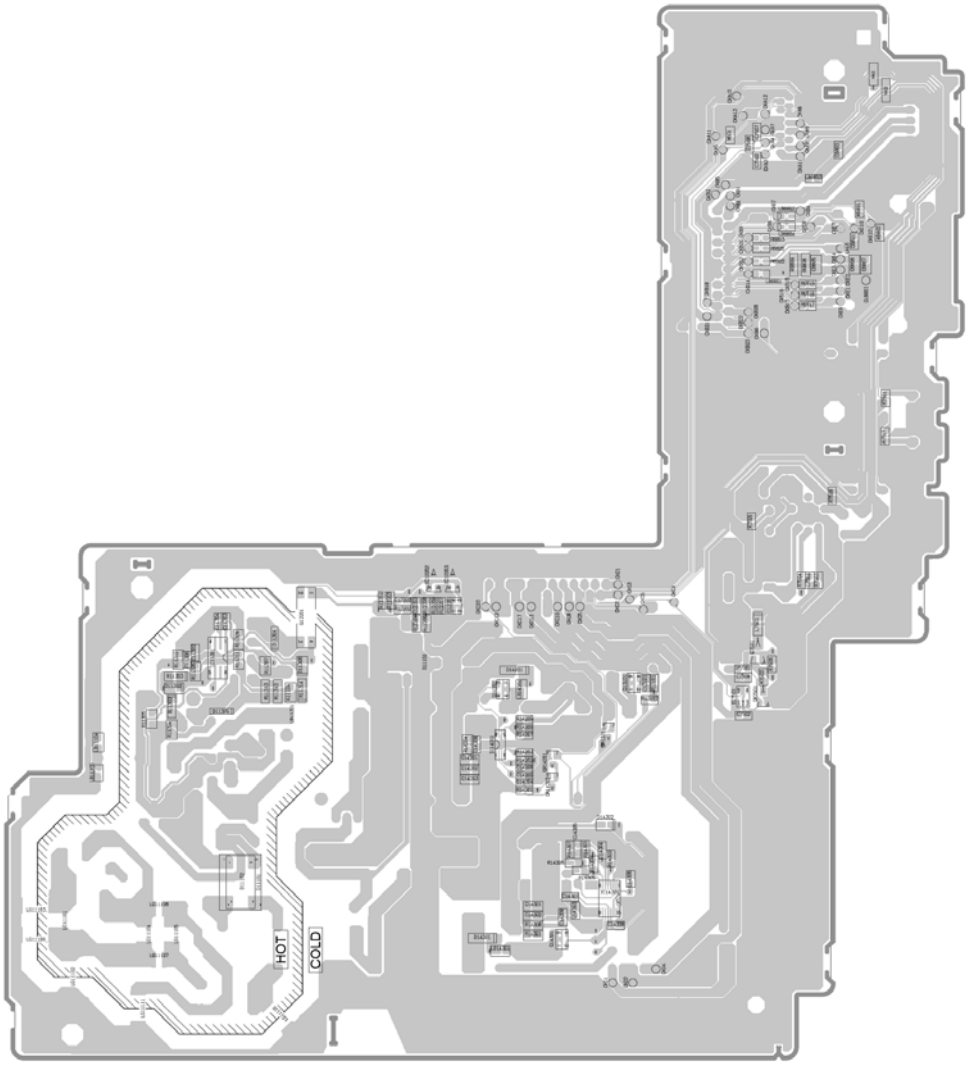
Model No. : DMR-HW120EB/220EB AV Out P.C.B. (Foil Side)



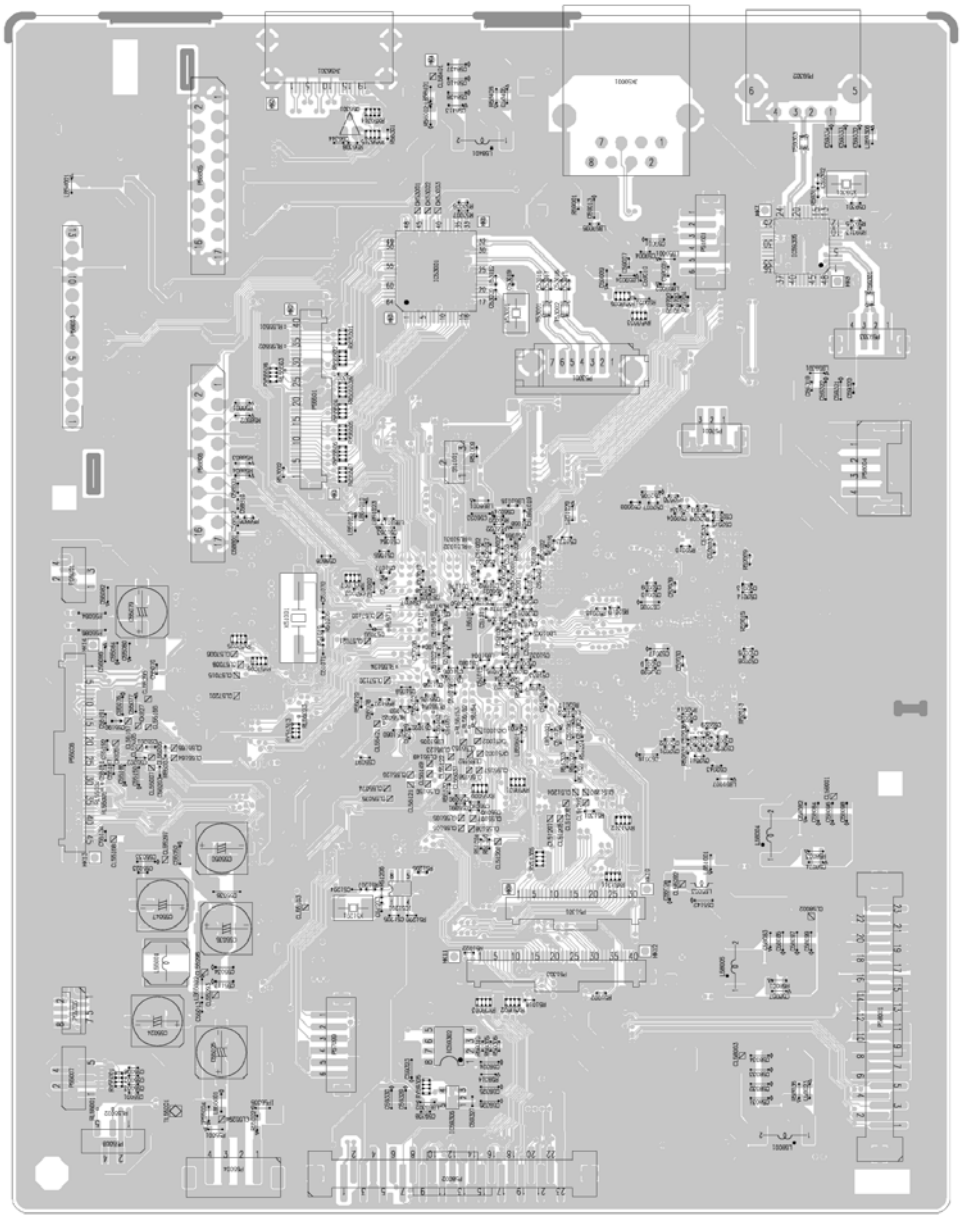
Model No. : DMR-HW120EB/220EB Main P.C.B. (Component Side)



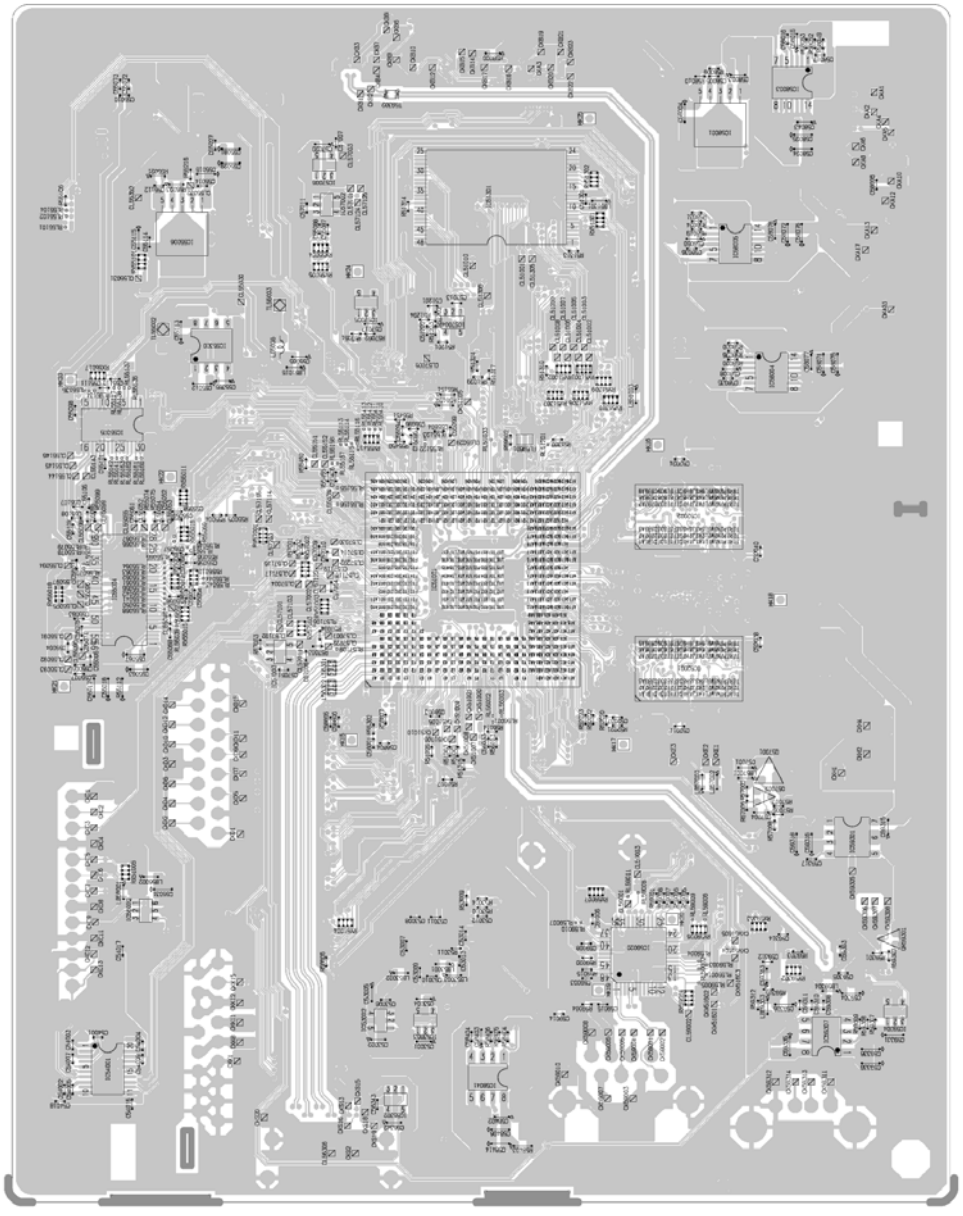
Model No. : DMR-HW120EB/220EB Main P.C.B. (Foil Side)



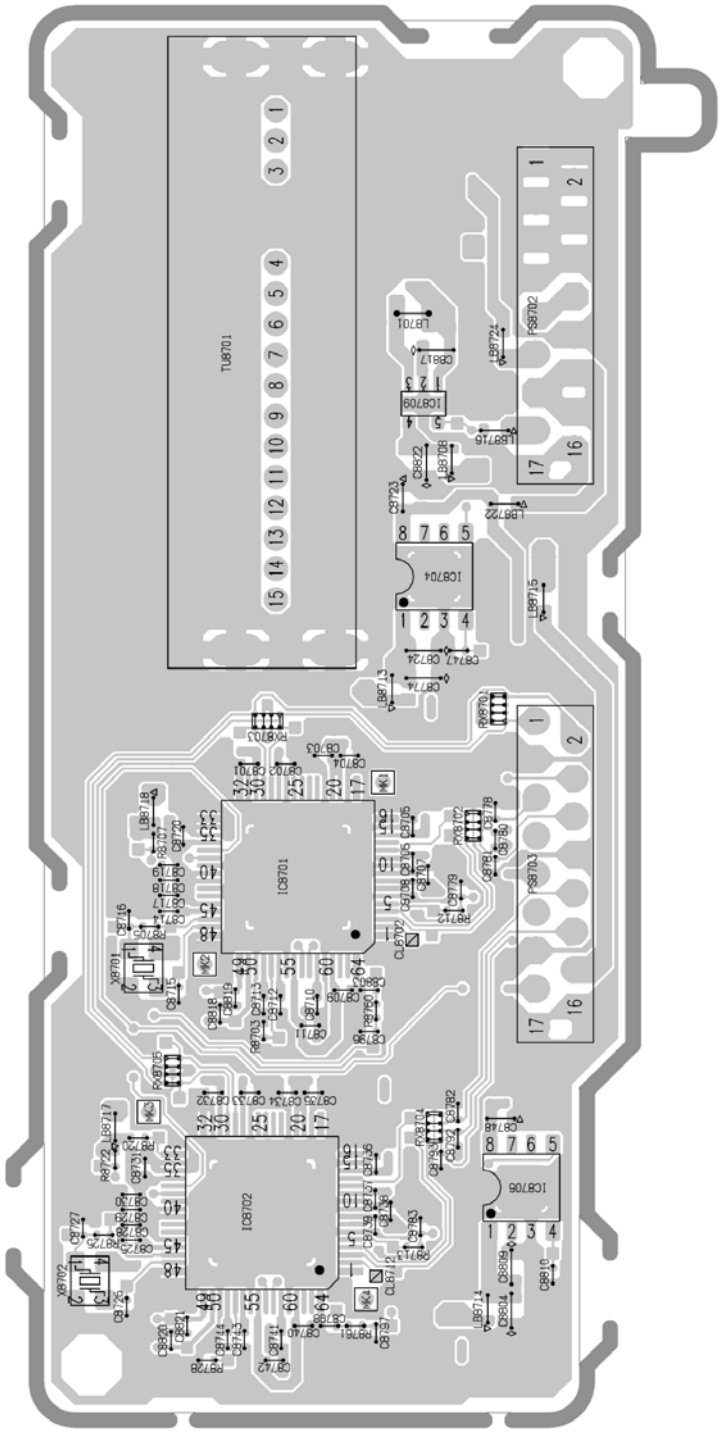
Model No. : DMR-HW120EB/220EB Digital P.C.B. (Component Side)



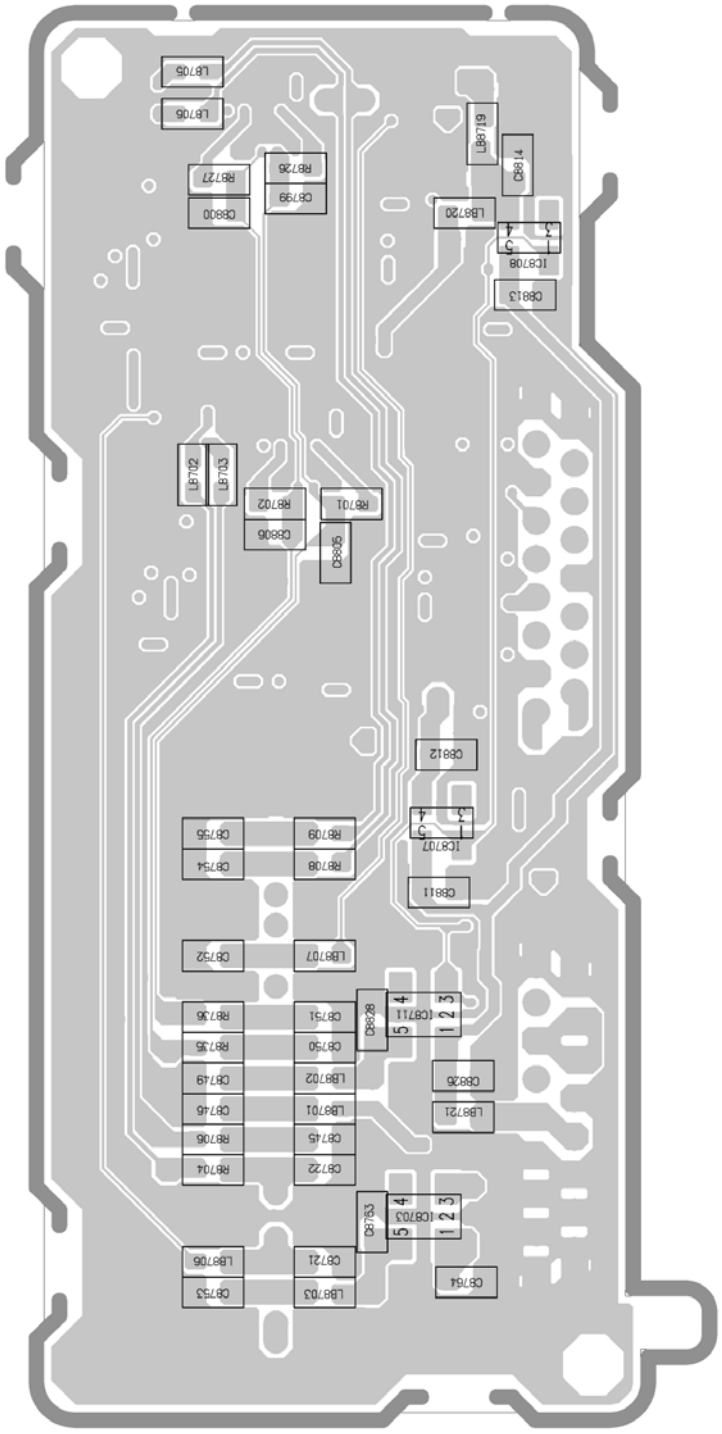
Model No. : DMR-HW120EB/220EB Digital P.C.B. (Foil Side)



Model No. : DMR-HW120EB/220EB T2 Tuner P.C.B. (Component Side)



Model No. : DMR-HW120EB/220EB T2 Tuner P.C.B. (Foil Side)



Model No. : DMR-HW120EB/220EB Parts List

Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		BZ3711	L0DCDA000011	BUZZER	1	HW220EBK
		C3701	F1H1C104A071	16V 0.1U	1	
		C3711	F1H1C104A071	16V 0.1U	1	HW220EBK
		C4902	F1H1A105A028	10V 1U	1	
		C6801	F1H1H103A219	50V 0.01U	1	
		C6803	F1H1H103A219	50V 0.01U	1	
		C6805	F1J0J226A014	6.3V 22U	1	
		C7201	F1H1H103A219	50V 0.01U	1	
		C7202	F1H1C104A071	16V 0.1U	1	
		C7204	F1H1A105A028	10V 1U	1	
		C7205	F1H1A105A028	10V 1U	1	
		C7207	F1H1A105A028	10V 1U	1	
		C7501	F2A1C221B111	16V 220U	1	
		C7502	F1H1A105A028	10V 1U	1	
		C7503	F1H1H392A013	50V 3900P	1	
		C7504	F2A1C1210022	16V 120P	1	
		C7505	F2A1V560A387	35V 56U	1	
		C7506	F2A1H220A455	50V 22U	1	
		C7507	F1H1H101A004	50V 100P	1	
		C7508	F1H1H101A004	50V 100P	1	
		C7509	F1H1A105A028	10V 1U	1	
		C7510	F1H1H101A004	50V 100P	1	
		C8701	F1G1A1040006	10V 0.1U	1	
		C8702	F1G1A1040006	10V 0.1U	1	
		C8703	F1G1A1040006	10V 0.1U	1	
		C8704	F1G1A1040006	10V 0.1U	1	
		C8705	F1G1A1040006	10V 0.1U	1	
		C8706	F1G1A1040006	10V 0.1U	1	
		C8707	F1G1A1040006	10V 0.1U	1	
		C8708	F1G1A1040006	10V 0.1U	1	
		C8709	F1G1A1040006	10V 0.1U	1	
		C8710	F1G1A1040006	10V 0.1U	1	
		C8711	F1G1A1040006	10V 0.1U	1	
		C8712	F1G1A1040006	10V 0.1U	1	
		C8713	F1G1A1040006	10V 0.1U	1	
		C8714	F1G1A1040006	10V 0.1U	1	
		C8715	F1G1H100A565	50V 10P	1	
		C8716	F1G1H100A565	50V 10P	1	
		C8717	F1G1A1040006	10V 0.1U	1	
		C8718	F1G1A1040006	10V 0.1U	1	
		C8719	F1G1A1040006	10V 0.1U	1	
		C8720	F1G1A1040006	10V 0.1U	1	
		C8721	F1H1H102A004	50V 1000P	1	
		C8723	F1H1A105A028	10V 1U	1	
		C8724	F1J0J106A014	6.3V 10U	1	
		C8725	F1G1A1040006	10V 0.1U	1	
		C8726	F1G1H100A565	50V 10P	1	
		C8727	F1G1H100A565	50V 10P	1	
		C8728	F1G1A1040006	10V 0.1U	1	
		C8729	F1G1A1040006	10V 0.1U	1	
		C8730	F1G1A1040006	10V 0.1U	1	
		C8731	F1G1A1040006	10V 0.1U	1	
		C8732	F1G1A1040006	10V 0.1U	1	
		C8733	F1G1A1040006	10V 0.1U	1	
		C8734	F1G1A1040006	10V 0.1U	1	
		C8735	F1G1A1040006	10V 0.1U	1	
		C8736	F1G1A1040006	10V 0.1U	1	
		C8737	F1G1A1040006	10V 0.1U	1	
		C8738	F1G1A1040006	10V 0.1U	1	
		C8739	F1G1A1040006	10V 0.1U	1	
		C8740	F1G1A1040006	10V 0.1U	1	
		C8741	F1G1A1040006	10V 0.1U	1	

Model No. : DMR-HW120EB/220EB Parts List

Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		C8742	F1G1A1040006	10V 0.1U	1	
		C8743	F1G1A1040006	10V 0.1U	1	
		C8744	F1G1A1040006	10V 0.1U	1	
		C8746	F1H1H102A004	50V 1000P	1	
		C8747	F1G1C1030008	16V 0.01U	1	
		C8748	F1H1A105A028	10V 1U	1	
		C8749	F1H1H102A004	50V 1000P	1	
		C8752	F1H1H102A004	50V 1000P	1	
		C8753	F1H1H102A004	50V 1000P	1	
		C8763	F1H1A105A028	10V 1U	1	
		C8764	F1H1A105A028	10V 1U	1	
		C8774	F1J0J106A014	6.3V 10U	1	
		C8778	F1G1H100A565	50V 10P	1	
		C8779	F1G1H100A565	50V 10P	1	
		C8780	F1G1H100A565	50V 10P	1	
		C8781	F1G1H100A565	50V 10P	1	
		C8782	F1G1H100A565	50V 10P	1	
		C8783	F1G1H100A565	50V 10P	1	
		C8792	F1G1H100A565	50V 10P	1	
		C8793	F1G1H100A565	50V 10P	1	
		C8796	F1G1C1030008	16V 0.01U	1	
		C8797	F1G1C1030008	16V 0.01U	1	
		C8798	F1G1A1040006	10V 0.1U	1	
		C8799	F1H1H8R0A016	50V 8P	1	
		C8800	F1H1H8R0A016	50V 8P	1	
		C8803	F1G1A1040006	10V 0.1U	1	
		C8804	F1J0J106A014	6.3V 10U	1	
		C8805	F1H1H8R0A016	50V 8P	1	
		C8806	F1H1H8R0A016	50V 8P	1	
		C8809	F1J0J106A014	6.3V 10U	1	
		C8810	F1G1C1030008	16V 0.01U	1	
		C8811	F1H1A105A028	10V 1U	1	
		C8812	F1H1A105A028	10V 1U	1	
		C8813	F1H1A105A028	10V 1U	1	
		C8814	F1H1A105A028	10V 1U	1	
		C8817	F1J0J106A014	6.3V 10U	1	
		C8818	F1G1H680A444	50V 68P	1	
		C8819	F1G1H680A444	50V 68P	1	
		C8820	F1G1H680A444	50V 68P	1	
		C8821	F1G1H680A444	50V 68P	1	
		C8822	F1J0J106A014	6.3V 10U	1	
		C8826	F1H1A105A028	10V 1U	1	
		C8828	F1H1A105A028	10V 1U	1	
	⚠	C11101	F0CAF683A021	100V 0.068P	1	
	⚠	C11102	F0CAF683A021	100V 0.068P	1	
	⚠	C11103	F1B2G471A022	400V 470P	1	
	⚠	C11104	F1B2G471A022	400V 470P	1	
		C11105	F2B2W4700003	450V 47U	1	
	⚠	C11106	F1B2G222A026	400V 2200P	1	
		C11301	F1B3D681A011	2000V 680P	1	
		C11302	F1H1H102A013	50V 1000P	1	
		C11303	F1H1H470A004	50V 47P	1	
		C11304	F1H1H102A013	50V 1000P	1	
		C11305	F2A1E1010103	25V 100U	1	
		C11307	F1B3A2220009	1000V 2200U	1	
		C12202	F1H1C104A071	16V 0.1U	1	
		C12203	F1H1C104A071	16V 0.1U	1	
		C13101	F1H1A105A028	10V 1U	1	
		C13102	F2A1C3300040	16V 33U	1	
		C13201	F2A1C1020095	16V 1000U	1	
		C13202	F2A1C1020095	16V 1000U	1	
		C13203	F2A1C8210008	16V 820U	1	

Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		C14202	F1J1C1060001	16V 10U	1	
		C14203	F1J1C1060001	16V 10U	1	
		C14204	F1H1C104A071	16V 0.1U	1	
		C14205	F1H1C104A071	16V 0.1U	1	
		C14206	F1H1H472A013	50V 4700P	1	
		C14209	F1H1H103A219	50V 0.01U	1	
		C14212	F2A1C8210008	16V 820U	1	
		C14301	F1J1C1060001	16V 10U	1	
		C14302	F1J1C1060001	16V 10U	1	
		C14303	F1H1C104A071	16V 0.1U	1	
		C14304	F1H1C104A071	16V 0.1U	1	
		C14305	F1H1H332A013	50V 3300P	1	
		C14306	F1H1A105A028	10V 1U	1	
		C14307	F1H1C104A071	16V 0.1U	1	
		C14308	F1H1C104A071	16V 0.1U	1	
		C14309	F1H1H102A013	50V 1000P	1	
		C14310	F2A1C8210008	16V 820U	1	
		C51001	F1H0J475A010	6.3V 4.7U	1	
		C51002	F1H0J475A010	6.3V 4.7U	1	
		C51003	F1G1A1040006	10V 0.1U	1	
		C51004	F1G1A1040006	10V 0.1U	1	
		C51005	F1G1A1040006	10V 0.1U	1	
		C51006	F1G1A1040006	10V 0.1U	1	
		C51007	F1G1A1040006	10V 0.1U	1	
		C51008	F1G1A1040006	10V 0.1U	1	
		C51015	F1H0J475A010	6.3V 4.7U	1	
		C51016	F1G1A1040006	10V 0.1U	1	
		C51017	F1G1A1040006	10V 0.1U	1	
		C51019	F1G0J4740003	6.3V 0.47U	1	
		C51022	F1G1A1040006	10V 0.1U	1	
		C51023	F1G1E1030005	25V 0.01U	1	
		C51030	F1H0J475A010	6.3V 4.7U	1	
		C51031	F1G1A1040006	10V 0.1U	1	
		C51032	F1G1A1040006	10V 0.1U	1	
		C51033	F1G1A1040006	10V 0.1U	1	
		C51034	F1G1A1040006	10V 0.1U	1	
		C51035	F1G1A1040006	10V 0.1U	1	
		C51036	F1G1A1040006	10V 0.1U	1	
		C51037	F1G1A1040006	10V 0.1U	1	
		C51038	F1G1A1040006	10V 0.1U	1	
		C51039	F1G1A1040006	10V 0.1U	1	
		C51046	F1H0J475A010	6.3V 4.7U	1	
		C51048	F1G1A1040006	10V 0.1U	1	
		C51049	F1G1A1040006	10V 0.1U	1	
		C51050	F1G1A1040006	10V 0.1U	1	
		C51052	F1G1A1040006	10V 0.1U	1	
		C51053	F1G1A1040006	10V 0.1U	1	
		C51054	F1G1A1040006	10V 0.1U	1	
		C51055	F1G1A1040006	10V 0.1U	1	
		C51056	F1G1A1040006	10V 0.1U	1	
		C51057	F1G1A1040006	10V 0.1U	1	
		C51058	F1G1A1040006	10V 0.1U	1	
		C51059	F1G1A1040006	10V 0.1U	1	
		C51060	F1G1A1040006	10V 0.1U	1	
		C51062	F1G1A1040006	10V 0.1U	1	
		C51063	F1H0J475A010	6.3V 4.7U	1	
		C51064	F1G1A1040006	10V 0.1U	1	
		C51065	F1G1A1040006	10V 0.1U	1	
		C51067	F1G1A1040006	10V 0.1U	1	
		C51068	F1H0J225A005	6.3V 2.2U	1	
		C51069	F1G1E1030005	25V 0.01U	1	
		C51070	F1G1H270A444	50V 27P	1	

Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		C51071	F1G1H180A444	50V 18P	1	
		C51073	F1G1A1040006	10V 0.1U	1	
		C51074	F1H0J225A005	6.3V 2.2U	1	
		C51075	F1H0J225A005	6.3V 2.2U	1	
		C51076	F1G1E1030005	25V 0.01U	1	
		C51077	F1G1A1040006	10V 0.1U	1	
		C51078	F1G1A1040006	10V 0.1U	1	
		C51079	F1G1A1040006	10V 0.1U	1	
		C51080	F1G1A1040006	10V 0.1U	1	
		C51081	F1H0J225A005	6.3V 2.2U	1	
		C51082	F1G1E1030005	25V 0.01U	1	
		C51201	F1G0J1050007	6.3V 1U	1	
		C51202	F1G0J1050007	6.3V 1U	1	
		C51203	F1G1H100A456	50V 10P	1	
		C51204	F1G1H1R0A445	50V 1P	1	
		C51205	F1G1A1040006	10V 0.1U	1	
		C52003	F1G1A1040006	10V 0.1U	1	
		C52004	F1G1A1040006	10V 0.1U	1	
		C52005	F1J0J1060024	6.3 10U	1	
		C52006	F1J0J1060024	6.3 10U	1	
		C52007	F1G1A1040006	10V 0.1U	1	
		C52008	F1G1A1040006	10V 0.1U	1	
		C52009	F1G1A1040006	10V 0.1U	1	
		C52010	F1G1A1040006	10V 0.1U	1	
		C52011	F1G1E102A086	25V 1000P	1	
		C52013	F1G1A1040006	10V 0.1U	1	
		C52014	F1G1A1040006	10V 0.1U	1	
		C52015	F1G1A1040006	10V 0.1U	1	
		C52016	F1G1A1040006	10V 0.1U	1	
		C52017	F1J0J1060024	6.3 10U	1	
		C52018	F1J0J1060024	6.3 10U	1	
		C52019	F1G1A1040006	10V 0.1U	1	
		C52020	F1G1A1040006	10V 0.1U	1	
		C52021	F1G1A1040006	10V 0.1U	1	
		C52022	F1G1A1040006	10V 0.1U	1	
		C52024	F1G1E102A086	25V 1000P	1	
		C52025	F1G1A1040006	10V 0.1U	1	
		C52026	F1G1A1040006	10V 0.1U	1	
		C52027	F1G1A1040006	10V 0.1U	1	
		C52028	F1G1A1040006	10V 0.1U	1	
		C52029	F1G1A1040006	10V 0.1U	1	
		C52030	F1G1A1040006	10V 0.1U	1	
		C52037	F1G1A1040006	10V 0.1U	1	
		C52038	F1G1E102A086	25V 1000P	1	
		C52040	F1G1E102A086	25V 1000P	1	
		C53001	F1H1A105A028	10V 1U	1	
		C53002	F1H1A105A028	10V 1U	1	
		C53004	F1H1A105A028	10V 1U	1	
		C53005	F1H1A105A028	10V 1U	1	
		C53007	F1G1A1040006	10V 0.1U	1	
		C53008	F1G1A1040006	10V 0.1U	1	
		C53009	F1G1A1040006	10V 0.1U	1	
		C53010	F1G1A1040006	10V 0.1U	1	
		C53011	F1G1A1040006	10V 0.1U	1	
		C53012	F1G1A1040006	10V 0.1U	1	
		C53013	F1G1A1040006	10V 0.1U	1	
		C53014	F1G1A1040006	10V 0.1U	1	
		C53015	F1G1C1030001	16V 0.01U	1	
		C53016	F1G1C1030001	16V 0.01U	1	
		C53017	F1G1C1030001	16V 0.01U	1	
		C53018	F1G1C1030001	16V 0.01U	1	
		C53019	F1G1H150A444	50V 15P	1	

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Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		C53020	F1G1H150A444	50V 15P	1	
		C54001	F1G0J1050007	6.3V 1U	1	
		C54004	F1G1A1040006	10V 0.1U	1	
		C54005	F1G1A1040006	10V 0.1U	1	
		C54007	F1G0J1050007	6.3V 1U	1	
		C54008	F1G1A1040006	10V 0.1U	1	
		C54016	ERJ2GE0R00X	1/16W 0	1	
		C56024	F1G0J1050007	6.3V 1U	1	
		C56342	F1H1A105A028	10V 1U	1	
		C56343	F1G0J1050007	6.3V 1U	1	
		C57001	F1H1C104A041	16V 0.1U	1	
		C57004	F1H1A105A028	10V 1U	1	
		C57005	F1G1A1040006	10V 0.1U	1	
		C57006	F1G0J1050007	6.3V 1U	1	
		C57007	F1G0J1050007	6.3V 1U	1	
		C57008	F1G0J1050007	6.3V 1U	1	
		C57010	F1G1A1040006	10V 0.1U	1	
		C57011	F1G1A1040006	10V 0.1U	1	
		C57012	F1G1A1040006	10V 0.1U	1	
		C57013	F1G1A1040006	10V 0.1U	1	
		C57014	F1G1H1010001	50V 100P	1	
		C57017	F1H1C104A041	16V 0.1U	1	
		C57020	F1H1A105A028	10V 1U	1	
		C57048	F1G1A1040006	10V 0.1U	1	
		C57051	F1G0J1050007	6.3V 1U	1	
		C58003	F1H1A105A028	10V 1U	1	
		C58004	F1J0J1060024	6.3V 10U	1	
		C58006	F1G1E102A086	25V 1000P	1	
		C58008	F1H1A105A028	10V 1U	1	
		C58015	F1H1A105A028	10V 1U	1	
		C58016	F1G1E102A086	25V 1000P	1	
		C58023	F1H1E104A002	25V 0.1U	1	
		C58024	F1J1C1060001	16V 10U	1	
		C58025	F1J1C1060001	16V 10U	1	
		C58031	F1J1A1060011	10V 10U	1	
		C58032	F1J1A1060011	10V 10U	1	
		C58033	F1J1A1060011	10V 10U	1	
		C58035	F1G1C1030001	16V 0.01U	1	
		C58036	F1G1E472A086	25V 4700P	1	
		C58043	F1H1E104A002	25V 0.1U	1	
		C58050	F1H1A105A028	10V 1U	1	
		C58067	F1H1E104A002	25V 0.1U	1	
		C58071	F1J1C1060001	16V 10U	1	
		C58072	F1J1C1060001	16V 10U	1	
		C58074	F1H1E104A002	25V 0.1U	1	
		C58075	F1J1C1060001	16V 10U	1	
		C58076	F1J1C1060001	16V 10U	1	
		C58077	F1H1E104A002	25V 0.1U	1	
		C58078	F1H1E104A002	25V 0.1U	1	
		C58084	F1J0J226A014	6.3V 22U	1	
		C58085	F1J0J226A014	6.3V 22U	1	
		C58096	F1J0J226A014	6.3V 22U	1	
		C58097	F1J0J226A014	6.3V 22U	1	
		C58402	F1H1E104A002	25V 0.1U	1	
		C58403	F1H1A105A028	10V 1U	1	
		C58404	F1G1E102A086	25V 1000P	1	
		C58405	F1H1E104A002	25V 0.1U	1	
		C58406	F1J1C1060001	16V 10U	1	
		C58407	F1J1A1060011	10V 10U	1	
		C58408	F1J1A1060011	10V 10U	1	
		C58410	F1J1A1060011	10V 10U	1	
		C58413	F1H1C104A071	16V 0.1U	1	

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Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		C58414	F1J1C1060001	16V 10U	1	
		C58803	F1G1H100A565	50V 10P	1	
		C58804	F1G1H100A565	50V 10P	1	
		C58805	F1G1H100A565	50V 10P	1	
		C58806	F1G1H100A565	50V 10P	1	
		C58807	F1G1H100A565	50V 10P	1	
		C58808	F1G1H100A565	50V 10P	1	
		C58809	F1G1H100A565	50V 10P	1	
		C58810	F1G1H100A565	50V 10P	1	
		C59001	F1J0J2260004	6.3V 22U	1	
		C59003	F1G1A1040006	10V 0.1U	1	
		C59004	F1G1A1040006	10V 0.1U	1	
		C59005	F1G1A1040006	10V 0.1U	1	
		C59006	F1G1A1040006	10V 0.1U	1	
		C59007	F1G1A1040006	10V 0.1U	1	
		C59010	F1G1A1040006	10V 0.1U	1	
		C59014	F1G1A1040006	10V 0.1U	1	
		C59015	F1G1A1040006	10V 0.1U	1	
		C59301	F1G1H120A444	50V 12P	1	
		C59302	F1G1H150A444	50V 15P	1	
		C59303	F1G1A1040006	10V 0.1U	1	
		C59304	F1J0J1060024	6.3V 10U	1	
		C59305	F1G1A1040006	10V 0.1U	1	
		C59308	F1G1A1040006	10V 0.1U	1	
		C59310	F1G1A1040006	10V 0.1U	1	
		C59311	F1G1A1040006	10V 0.1U	1	
		C59312	F1G1A1040006	10V 0.1U	1	
		C59313	F1H1A105A028	10V 1U	1	
		C59314	F1G1A1040006	10V 0.1U	1	
		C59315	F1H1A105A028	10V 1U	1	HW220EBK
		C59316	F1J1A106A024	10V 10U	1	HW220EBK
		C59317	F1G1C1030001	16V 0.01U	1	HW220EBK
		C59323	F1J1A106A024	10V 10U	1	
		C59324	F1J1A106A024	10V 10U	1	
		C59325	F1J1A106A024	10V 10U	1	
		C59326	F1J1A106A024	10V 10U	1	
		C59328	F1G1E102A086	25V 1000P	1	
		C59331	F1J1A106A024	10V 10U	1	
		C59335	F1J1A106A024	10V 10U	1	
		C59336	F1J1A106A024	10V 10U	1	
		C59338	F1J1A106A024	10V 10U	1	
		C59601	F1G0J1050007	6.3V 1U	1	
		D7201	B3AAA0001018	LED	1	E.S.D.
		D7202	B3AAA0001018	LED	1	E.S.D.
		D7203	B3AEA0000099	LED	1	HW220EBK E.S.D.
		D7501	B0BA03600021	DIODE	1	E.S.D.
		D7502	B0AACK000004	DIODE	1	E.S.D.
		D7503	B0AADM000003	DIODE	1	E.S.D.
		D7504	B0JAMD000026	DIODE	1	E.S.D.
		D7506	B0BA02100019	DIODE	1	E.S.D.
		D7507	B0BA01900005	DIODE	1	E.S.D.
		D11101	B0EDKT000009	DIODE	1	E.S.D.
		D11301	B0EAKV000090	DIODE	1	E.S.D.
		D11302	B0ACCK000005	DIODE	1	E.S.D.
		D11304	DZ2W22000L	DIODE	1	E.S.D.
		D11308	B0JAMK000019	DIODE	1	E.S.D.
		D11309	B0EAKV000090	DIODE	1	E.S.D.
		D13201	B0JBSG000053	DIODE	1	E.S.D.
		D14201	B0JCNE000008	DIODE	1	E.S.D.
		D14301	B0JCNE000008	DIODE	1	E.S.D.
		D14302	B0ACCK000005	DIODE	1	E.S.D.
		DP7201	A2BD00000199	FL DISPLAY	1	

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Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
	⚠	F11101	K5G202Y00006	FUSE	1	
		FC7203	VEE1K80	FRONT SW CABLE	1	
		FL59601	J0MAB0000146	FILTER	1	
		IC3701	RFKB73212CT	IC	1	HW120EBK E.S.D.
		IC3701	RFKB73212DT	IC	1	HW220EBK E.S.D.
		IC7201	C0HBB0000068	IC	1	E.S.D.
		IC7202	C0DBGYY02044	IC	1	E.S.D.
		IC7501	C0DBGYY02061	IC	1	E.S.D.
		IC8701	C1AB00003273	IC	1	E.S.D.
		IC8702	C1AB00003273	IC	1	E.S.D.
		IC8703	C0DBGGC00050	IC	1	E.S.D.
		IC8704	C0CBCAG00020	IC	1	E.S.D.
		IC8706	C0CBCAG00020	IC	1	E.S.D.
		IC8707	C0DBGGC00007	IC	1	E.S.D.
		IC8708	C0DBGFC00007	IC	1	E.S.D.
		IC8709	C0DBAFF00045	IC	1	E.S.D.
		IC8711	C0DBGGC00050	IC	1	E.S.D.
		IC11301	C0DBBYY00029	IC	1	E.S.D.
		IC12201	C0DBZMC00006	IC	1	E.S.D.
		IC14201	C0DBAZZ00132	IC	1	E.S.D.
		IC14301	C0DBAYY00801	IC	1	E.S.D.
		IC51001	RFKB79336D	DIGITAL P.C.B.	1	HW120EBK E.S.D. (JIG AND ADJ.)
		IC51001	RFKB79336E	DIGITAL P.C.B.	1	HW220EBK E.S.D. (JIG AND ADJ.)
		IC51201	C0ZBZ0001899	IC	1	E.S.D.
		IC51301	RFKB79336D	DIGITAL P.C.B.	1	HW120EBK E.S.D. (JIG AND ADJ.)
		IC51301	RFKB79336E	DIGITAL P.C.B.	1	HW220EBK E.S.D. (JIG AND ADJ.)
		IC52001	C3ABUY000007	IC	1	E.S.D.
		IC52002	C3ABUY000007	IC	1	E.S.D.
		IC53001	C1CB00003870	IC	1	E.S.D.
		IC53002	C0CBCBC00227	IC	1	E.S.D.
		IC53003	C0DBGYY02029	IC	1	E.S.D.
		IC54001	C1AB00003767	IC	1	E.S.D.
		IC56302	C0CBCDC00074	IC	1	E.S.D.
		IC57002	C0EBK0000206	IC	1	E.S.D.
		IC57003	C0DBGFC00051	IC	1	E.S.D.
		IC57004	C0EBE0000455	IC	1	E.S.D.
		IC57005	C0EBK0000206	IC	1	E.S.D.
		IC57006	C0CBCBC00227	IC	1	E.S.D.
		IC58001	C0DBEYG00002	IC	1	E.S.D.
		IC58003	C0DBAYY01361	IC	1	E.S.D.
		IC58004	C0DBAYY00903	IC	1	E.S.D.
		IC58005	C0DBAYY00903	IC	1	E.S.D.
		IC58041	C0DBAYY01285	IC	1	E.S.D.
		IC59020	C1CB00003704	IC	1	E.S.D.
		IC59301	C0DBGHF00001	IC	1	HW220EBK E.S.D.
		IC59302	C0DBEYY00176	IC	1	E.S.D.
		IC59304	C0DBZYY00482	IC	1	E.S.D.
		IC59305	C1CB00003725	IC	1	E.S.D.
		IC59306	C0DBZYY00483	IC	1	E.S.D.
		IC59307	C0DBEYY00176	IC	1	E.S.D.
	⚠	IP7501	K5H501Z00005	IC PROTECTOR	1	
		IR7201	PNJ4881M01VT	PHOTO DETECTOR	1	
		JK4001	K2HA2YYA0005	JACK, AUDIO OUT	1	
		JK4901	B3ZAZ0000022	JACK, OPTICAL	1	
		JK56301	K1FY119E0025	JACK, HDMI	1	
		JK59001	K2LC108B0113	JACK, LAN	1	
		K6801	ERJ3GEY0R00V	1/10W 0	1	
		K6802	ERJ3GEY0R00V	1/10W 0	1	
		K11104	ERJ6GEY0R00V	1/8W 0	1	
		L7501	G1C470MA0203	COIL	1	
		L8701	G1C2R2MA0388	COIL	1	
		L8702	G1CR22JA0020	COIL	1	

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Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		L8703	G1CR22JA0020	COIL	1	
		L8705	G1CR22JA0020	COIL	1	
		L8706	G1CR22JA0020	COIL	1	
	⚠	L11101	G0B353D00008	COIL	1	
		L13201	G0A100H00025	COIL 10UH	1	
		L14201	G0A100ZA0045	COIL 10UH	1	
		L14301	G0A100ZA0045	COIL 10UH	1	
		L56301	J0MAB0000241	COIL	1	
		L56302	J0MAB0000241	COIL	1	
		L58001	G1C4R7Z00014	COIL 4.7UH	1	
		L58004	G1C3R3Z00005	COIL 3.3UH	1	
		L58005	G1C3R3Z00005	COIL 3.3UH	1	
		L58401	G1C3R3Z00005	COIL 3.3UH	1	
		LB4901	ERJ3GEY0R00V	1/10W 0	1	
		LB6801	J0JHC0000045	COIL	1	
		LB6802	ERJ3GEYJ222V	1/10W 2.2K	1	
		LB6803	J0JGC0000020	COIL	1	
		LB6804	ERJ3GEYJ222V	1/10W 2.2K	1	
		LB7201	J0JCC0000103	COIL	1	
		LB7202	J0JCC0000103	COIL	1	
		LB8701	J0JYC0000070	COIL	1	
		LB8702	J0JYC0000070	COIL	1	
		LB8703	J0JYC0000070	COIL	1	
		LB8706	J0JGC0000020	COIL	1	
		LB8707	J0JGC0000020	COIL	1	
		LB8708	J0JGC0000058	COIL	1	
		LB8713	J0JHC0000032	COIL	1	
		LB8714	J0JHC0000032	COIL	1	
		LB8715	J0JGC0000020	COIL	1	
		LB8716	J0JGC0000020	COIL	1	
		LB8717	J0JGC0000020	COIL	1	
		LB8718	J0JGC0000020	COIL	1	
		LB8719	J0JGC0000020	COIL	1	
		LB8720	J0JGC0000020	COIL	1	
		LB8721	J0JGC0000058	COIL	1	
		LB8722	J0JGC0000058	COIL	1	
		LB8724	J0JGC0000058	COIL	1	
		LB11103	J0JKB0000003	COIL	1	
		LB11104	J0JHC0000048	COIL	1	
		LB14201	J0JHC0000048	COIL	1	
		LB14301	J0JHC0000048	COIL	1	
		LB51001	J0JKC0000021	COIL	1	
		LB51003	J0JKC0000021	COIL	1	
		LB51004	J0JCC0000287	COIL	1	
		LB51005	J0JCC0000287	COIL	1	
		LB51006	J0JCC0000287	COIL	1	
		LB51007	J0JKC0000021	COIL	1	
		LB51009	J0JCC0000287	COIL	1	
		LB51010	J0JKC0000021	COIL	1	
		LB51013	J0JYC0000070	COIL	1	
		LB51014	J0JCC0000287	COIL	1	
		LB51015	J0JYC0000070	COIL	1	
		LB51016	J0JCC0000287	COIL	1	
		LB51017	J0JCC0000287	COIL	1	
		LB51019	J0JCC0000287	COIL	1	
		LB51020	J0JYC0000070	COIL	1	
		LB51021	J0JCC0000287	COIL	1	
		LB51022	J0JCC0000287	COIL	1	
		LB53001	J0JHC0000032	COIL	1	
		LB53002	J0JHC0000032	COIL	1	
		LB53003	J0JHC0000032	COIL	1	
		LB54001	ERJ3GEY0R00V	1/10W 0	1	

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Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		LB56001	J0JYC0000070	COIL	1	
		LB57001	J0JYC0000070	COIL	1	
		LB57003	J0JGC0000020	COIL	1	
		LB58001	J0JYC0000070	COIL	1	
		LB58401	J0JHC0000045	COIL	1	
		LB59001	J0JGC0000020	COIL	1	
		LB59002	J0JGC0000020	COIL	1	
		LB59301	J0JGC0000020	COIL	1	HW220EBK
		LB59302	J0JGC0000020	COIL	1	
		LB59303	J0JGC0000020	COIL	1	
		LB59304	J0JGC0000020	COIL	1	
		LB59306	J0JGC0000020	COIL	1	
		LB59601	J0JCC0000287	COIL	1	
		P3001	K1KB13B00012	CONNECTOR(13P)	1	
		P6701	K1KY23AA0606	CONNECTOR(23P)	1	
		P6703	K1KY23AA0606	CONNECTOR(23P)	1	
		P6801	K1NA12B00005	JACK, SD CARD	1	
		P6804	K1FY104B0076	JACK, USB	1	
		P7201	K1MN14B00024	CONNECTOR(14P)	1	
		P7202	VEE1K86	FRONT POWER CABLE	1	
		P7501	K1MN14A00024	CONNECTOR(14P)	1	
	⚠	P11101	K2AA2B000017	AC INLET	1	
		P51601	K1KA06AA0083	CONNECTOR(6P)	1	
		P53001	K1KY07A00012	CONNECTOR(7P)	1	
		P57001	K1KA03AA0083	CONNECTOR(3P)	1	
		P58001	K1KY23AA0607	CONNECTOR(23P)	1	
		P58002	K1KY23AA0607	CONNECTOR(23P)	1	
		P58003	K1KA13AA0423	CONNECTOR(13P)	1	
		P58004	K1KY04AA0943	CONNECTOR(4P)	1	
		P58805	K1KY17AA0276	CONNECTOR(17P)	1	
		P58806	K1KY17AA0276	CONNECTOR(17P)	1	
		P59302	K1FY104B0076	JACK, USB	1	
		P59303	K1KA04AA0083	CONNECTOR(4P)	1	HW220EBK
		PS8702	K1KY17BA0099	CONNECTOR(17P)	1	
		PS8703	K1KY17BA0099	CONNECTOR(17P)	1	
		Q3711	B1ABDF000033	TRANSISTOR	1	HW220EBK E.S.D.
		Q3712	B1ABDF000026	TRANSISTOR	1	HW220EBK E.S.D.
		Q7201	B1ABDF000026	TRANSISTOR	1	E.S.D.
		Q7501	B1ADLB000006	TRANSISTOR	1	E.S.D.
		Q7502	B1ABMG000008	TRANSISTOR	1	E.S.D.
		Q11301	B1CERU000019	TRANSISTOR	1	E.S.D.
	⚠	Q12201	B3PBA0000454	TRANSISTOR	1	E.S.D.
		Q13101	B1DGDC000002	TRANSISTOR	1	E.S.D.
		Q14201	B1DGDC000002	TRANSISTOR	1	E.S.D.
		Q14301	B1CHRD000024	TRANSISTOR	1	E.S.D.
		Q56301	B1CBGD000001	TRANSISTOR	1	E.S.D.
		Q57001	B1ADRD000001	TRANSISTOR	1	E.S.D.
		Q57002	B1ABDF000026	TRANSISTOR	1	E.S.D.
		QR3711	B1GBCFJJ0040	TRANSISTOR	1	HW220EBK E.S.D.
		QR7201	B1GBCFEN0015	TRANSISTOR	1	E.S.D.
		QR7202	B1GBCFEN0015	TRANSISTOR	1	E.S.D.
		QR7203	B1GBCFEN0015	TRANSISTOR	1	HW220EBK E.S.D.
		QR7501	B1GBCFJJ0040	TRANSISTOR	1	E.S.D.
		QR13101	B1GBCFNN0041	TRANSISTOR	1	E.S.D.
		QR14201	B1GBCFNN0041	TRANSISTOR	1	E.S.D.
		QR14202	B1GBCFNN0041	TRANSISTOR	1	E.S.D.
		QR59301	B1GBCFNN0041	TRANSISTOR	1	HW220EBK E.S.D.
		R3701	ERJ3GEYJ101V	1/10W 100	1	
		R3702	ERJ3GEYJ101V	1/10W 100	1	
		R3703	ERJ3GEYJ472V	1/10W 4.7K	1	
		R3711	ERJ3GEYJ472V	1/10W 4.7K	1	HW220EBK
		R3712	ERJ3GEYJ182V	1/10W 1.8K	1	HW220EBK

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Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		R3713	ERJ3GEYJ223V	1/10W 22K	1	HW220EBK
		R3714	ERJ3GEYJ103V	1/10W 10K	1	HW220EBK
		R3715	ERJ3GEYJ473V	1/10W 47K	1	HW220EBK
		R3716	ERJ3GEYJ102V	1/10W 1K	1	HW220EBK
		R3717	ERJ3GEYJ101V	1/10W 100	1	HW220EBK
		R4001	ERJ6GEYJ102V	1/8W 1K	1	
		R4002	ERJ6GEYJ102V	1/8W 1K	1	
		R4003	ERJ3GEY0R00V	1/10W 0	1	
		R4004	ERJ3GEY0R00V	1/10W 0	1	
		R6802	ERJ3GEYJ151V	1/10W 150	1	
		R6803	ERJ3GEYJ820V	1/10W 82	1	
		R6808	D0GF1R0JA049	1/10W 1	1	
		R6809	D0GF1R0JA049	1/10W 1	1	
		R6817	ERJ3GEYJ820V	1/10W 82	1	
		R6818	ERJ3GEYJ820V	1/10W 82	1	
		R6819	ERJ3GEYJ820V	1/10W 82	1	
		R6820	ERJ3GEYJ820V	1/10W 82	1	
		R7201	ERJ6GEYJ201V	1/8W 200	1	
		R7202	ERJ6GEYJ201V	1/8W 200	1	
		R7203	ERJ6GEYJ181V	1/8W 180	1	HW220EBK
		R7204	ERJ3GEYJ222V	1/10W 2.2K	1	
		R7206	ERJ3GEYJ683V	1/10W 68K	1	
		R7207	ERJ3GEYJ393V	1/10W 39K	1	
		R7208	ERJ3GEYJ330V	1/10W 33	1	
		R7209	ERJ3GEYJ101V	1/10W 100	1	
		R7210	ERJ3GEYJ101V	1/10W 100	1	
		R7211	ERJ3GEYJ101V	1/10W 100	1	
		R7501	ERJ3GEY0R00V	1/10W 0	1	
		R7502	ERJ3GEYJ472V	1/10W 4.7K	1	
		R7503	ERJ3GEYJ562V	1/10W 5.6K	1	
		R7504	ERJ3GEYJ470V	1/10W 47	1	
		R7505	ERJ3GEYJ473V	1/10W 47K	1	
		R7506	ERJ3GEYJ472V	1/10W 4.7K	1	
		R7508	ERJ3GEYJ271V	1/10W 270	1	
		R7517	ERJ3GEYJ222V	1/10W 2.2K	1	
		R8701	ERJ3GEYJ103V	1/10W 10K	1	
		R8702	ERJ3GEYJ103V	1/10W 10K	1	
		R8703	ERJ2GEJ103X	1/16W 10K	1	
		R8704	ERJ3GEY0R00V	1/10W 0	1	
		R8705	ERJ2GEJ471X	1/16W 470	1	
		R8706	ERJ3GEY0R00V	1/10W 0	1	
		R8707	ERJ2GEJ103X	1/16W 10K	1	
		R8708	ERJ3GEY0R00V	1/10W 0	1	
		R8709	ERJ3GEY0R00V	1/10W 0	1	
		R8712	ERJ2GEJ220X	1/16W 22	1	
		R8713	ERJ2GEJ220X	1/16W 22	1	
		R8720	ERJ2GEJ103X	1/16W 10K	1	
		R8722	ERJ2GEJ103X	1/16W 10K	1	
		R8725	ERJ2GEJ471X	1/16W 470	1	
		R8726	ERJ3GEYJ103V	1/10W 10K	1	
		R8727	ERJ3GEYJ103V	1/10W 10K	1	
		R8728	ERJ2GEJ103X	1/16W 10K	1	
		R8735	ERJ3GEYJ101V	1/10W 100	1	
		R8736	ERJ3GEYJ101V	1/10W 100	1	
		R8760	ERJ2GEJ103X	1/16W 10K	1	
		R8761	ERJ2GEJ103X	1/16W 10K	1	
	⚠	R11101	D0BF685JA030	6.8M	1	
		R11301	ERX2SJR27E	2W 0.27	1	
		R11302	ERJ14YJ220U	1/4W 22	1	
		R11303	ERJ14YJ470U	1/4W 47	1	
		R11304	ERJ6GEYJ103V	1/8W 10K	1	
		R11305	ERJ6GEYJ471V	1/8W 470	1	

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Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		R11307	ERJ6GEYJ104V	1/8W 100K	1	
		R11310	ERJ6GEYJ472V	1/8W 4.7K	1	
		R11312	ERJ8GEYJ100V	1/4W 10	1	
		R11313	ERJ8GEYJ100V	1/4W 10	1	
		R11315	ERG1SJ222E	1W 2.2K	1	
		R11316	ERG2SJ473E	10W 47K	1	
		R11317	ERG2SJ473E	10W 47K	1	
		R12201	ERJ3GEYJ102V	1/10W 1K	1	
		R12202	ERJ3GEYJ222V	1/10W 2.2K	1	
		R12203	ERJ3GEYJ103V	1/10W 10K	1	
		R12204	ERJ3GEYJ222V	1/10W 2.2K	1	
		R12206	ERJ3GEYF331V	1/10W 330	1	
		R12207	ERJ3GEYF472V	1/10W 4.7K	1	
		R12208	ERJ3GEYF183V	1/10W 18K	1	
		R13101	ERJ3GEYJ223V	1/10W 22K	1	
		R13102	ERJ3GEYJ223V	1/10W 22K	1	
		R14201	ERJ3GEYJ103V	1/10W 10K	1	
		R14202	ERJ3GEYJ333V	1/10W 33K	1	
		R14203	ERJ3GEYJ332V	1/10W 3.3K	1	
		R14204	D1BDR024A135	1/3W 0.024	1	
		R14205	ERJ3GEYF473V	1/10W 47K	1	
		R14206	ERJ3GEYF153V	1/10W 15K	1	
		R14301	D1BDR039A091	1/3W 0.039	1	
		R14302	ERJ3GEYJ124V	1/10W 120K	1	
		R14303	ERJ3GEYJ333V	1/10W 33K	1	
		R14304	ERJ3GEYJ123V	1/10W 12K	1	
		R14305	ERJ3GEYF913V	1/10W 91K	1	
		R14306	ERJ3GEYF243V	1/10W 24K	1	
		R14308	D1BDR039A091	1/3W 0.039	1	
		R51002	ERJ2GE0R00X	1/16W 0	1	
		R51006	ERJ2GEJ105X	1/16W 1000K	1	
		R51007	ERJ2GEJ104X	1/16W 100K	1	
		R51019	ERJ2GEJ221X	1/16W 220	1	
		R51024	ERJ2RKF5601X	1/10W 5600	1	
		R51025	ERJ2GEJ560X	1/16W 56	1	
		R51026	ERJ2RKF5601X	1/10W 5600	1	
		R51028	ERJ2GEJ4R7X	1/16W 4.7	1	
		R51201	ERJ2GEJ152X	1/16W 1.5K	1	
		R51202	ERJ2GEJ682X	1/16W 6.8K	1	
		R51203	ERJ2GEJ682X	1/16W 6.8K	1	
		R51204	ERJ2GEJ513X	1/16W 51K	1	
		R51205	ERJ2GEJ101X	1/16W 100	1	
		R51207	ERJ2GEJ331X	1/16W 330	1	
		R51316	ERJ2GEJ473X	1/16W 47K	1	HW220EBK
		R51321	ERJ2GEJ103X	1/16W 10K	1	
		R51322	ERJ2GEJ103X	1/16W 10K	1	
		R51323	ERJ2GEJ103X	1/16W 10K	1	
		R51324	ERJ2GEJ103X	1/16W 10K	1	
		R52001	ERJ2RKF2700X	1/10W 270	1	
		R52002	ERJ2RKF2700X	1/10W 270	1	
		R52003	ERJ2RKF2700X	1/10W 270	1	
		R52004	ERJ2RKF2700X	1/10W 270	1	
		R52007	ERJ2RKF2700X	1/10W 270	1	
		R52008	ERJ2RKF2700X	1/10W 270	1	
		R52009	ERJ2RKF2400X	1/16W 240	1	
		R52010	ERJ2GEJ221X	1/16W 220	1	
		R52011	ERJ2RKF2700X	1/10W 270	1	
		R52012	ERJ2RKF2700X	1/10W 270	1	
		R52013	ERJ2RKF2400X	1/16W 240	1	
		R52014	ERJ2GEJ221X	1/16W 220	1	
		R52015	ERJ2GEJ103X	1/16W 10K	1	
		R52018	ERJ2GE0R00X	1/16W 0	1	

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Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		R52019	ERJ2GE0R00X	1/16W 0	1	
		R52020	ERJ2RKF1001X	1/16W 100	1	
		R52021	ERJ2RKF1001X	1/16W 100	1	
		R52022	ERJ2RHD241X	1/10W 240	1	
		R52023	ERJ2GEJ103X	1/16W 10K	1	
		R53001	ERJ2GEJ820X	1/16W 82	1	
		R53009	ERJ2GEJ472X	1/16W 4.7K	1	
		R53010	ERJ2GEJ103X	1/16W 10K	1	
		R53011	D1BA1132A005	2W 11.3k	1	
		R53012	ERJ2GEJ105X	1/16W 1000K	1	
		R55005	ERJ2GE0R00X	1/16W 0	1	
		R56022	ERJ2GE0R00X	1/16W 0	1	
		R56301	ERJ2GEJ103X	1/16W 10K	1	
		R56302	ERJ2GEJ471X	1/16W 470	1	
		R56308	ERJ2GEJ273X	1/16W 27K	1	
		R57001	ERJ2GEJ103X	1/16W 10K	1	
		R57002	ERJ2GEJ473X	1/16W 47K	1	
		R57003	ERJ2GEJ473X	1/16W 47K	1	
		R57005	ERJ2GEJ622X	1/16W 6.2K	1	
		R57006	ERJ2GEJ102X	1/16W 1K	1	
		R57007	ERJ2GEJ153X	1/16W 15K	1	
		R57008	ERJ2GEJ103X	1/16W 10K	1	
		R57051	ERJ2RHD243X	1/16W 24K	1	
		R57052	ERJ2RHD223X	1/16W 22K	1	
		R57053	ERJ2GEJ103X	1/16W 10K	1	
		R58000	ERJ3GEYJ1R0V	1/10W 1	1	
		R58001	ERJ3GEYJ100V	1/10W 10	1	
		R58002	ERJ6GEY0R00V	1/8W 0	1	
		R58003	ERJ3GEYJ100V	1/10W 10	1	
		R58009	ERJ2RHD203X	1/16W 20K	1	
		R58010	ERJ2RHD103X	1/16W 10K	1	
		R58019	ERJ2RHD223X	1/16W 22K	1	
		R58020	ERJ2RHD223X	1/16W 22K	1	
		R58024	ERJ2RHD152X	1/16W 1.5K	1	
		R58026	ERJ2GE0R00X	1/16W 0	1	
		R58030	ERJ2RHD223X	1/16W 22K	1	
		R58031	ERJ2RHD123X	1/16W 12K	1	
		R58036	ERJ3GEYJ100V	1/10W 10	1	
		R58049	ERJ2RHD823X	1/16W 82K	1	
		R58052	ERJ2RHD682X	1/16W 6.8K	1	
		R58053	ERJ2RHD223X	1/16W 22K	1	
		R58403	ERJ6GEY0R00V	1/8W 0	1	
		R58404	ERJ2RHD273X	1/16W 27K	1	
		R58405	ERJ2RHD272X	1/16W 2.7K	1	
		R58406	ERJ2RHD223X	1/16W 22K	1	
		R58408	ERJ3GEYJ100V	1/10W 10	1	
		R58801	ERJ3GEY0R00V	1/10W 0	1	
		R58802	ERJ3GEY0R00V	1/10W 0	1	
		R58803	ERJ3GEY0R00V	1/10W 0	1	
		R58804	ERJ3GEY0R00V	1/10W 0	1	
		R58805	ERJ2GEJ101X	1/16W 100	1	
		R58806	ERJ2GEJ101X	1/16W 100	1	
		R58807	ERJ2GEJ101X	1/16W 100	1	
		R59015	D1BA2491A015	2W 2.49	1	
		R59021	ERJ3GEYJ152V	1/10W 1.5K	1	
		R59301	ERJ2GEJ223X	1/16W 22K	1	HW220EBK
		R59303	ERJ2GEJ104X	1/16W 100K	1	
		R59305	ERJ2RHD153X	1/16W 15K	1	
		R59306	ERJ2RHD393X	1/16W 39K	1	
		R59307	ERJ2RHD393X	1/16W 39K	1	
		R59308	ERJ2RHD153X	1/16W 15K	1	
		R59309	ERJ2RHD103X	1/16W 10K	1	

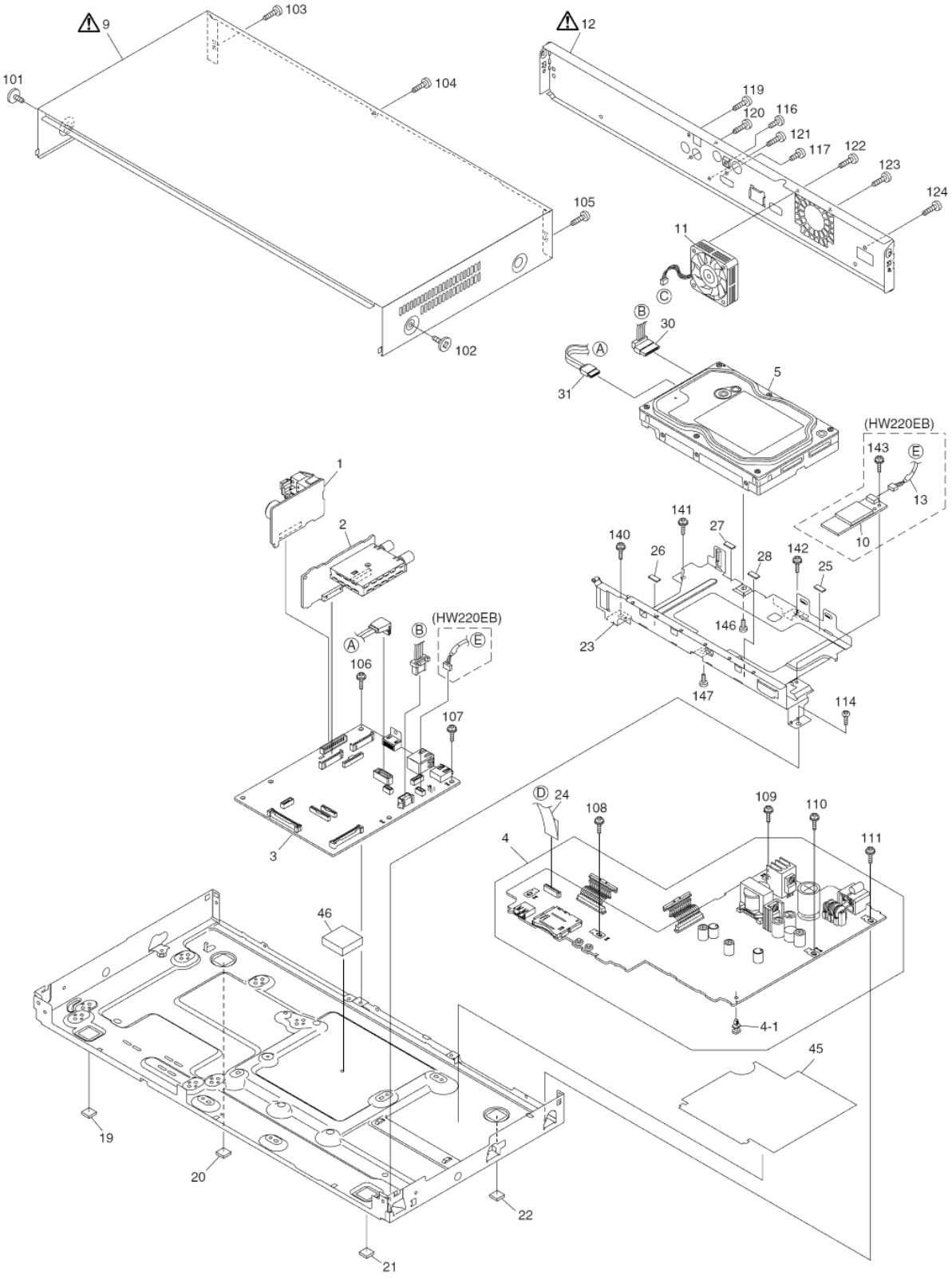
Model No. : DMR-HW120EB/220EB Parts List

Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		R59310	ERJ2RHD103X	1/16W 10K	1	
		R59311	ERJ2GE0R00X	1/16W 0	1	
		R59312	ERJ2GEJ473X	1/16W 47K	1	
		R59313	ERJ2RHD621X	1/16W 620	1	
		R59315	ERJ2RKD300X	1/16W 30	1	
		R59316	ERJ2GEJ103X	1/16W 10K	1	
		R59602	ERJ2GEJ101X	1/16W 100	1	
		R59701	ERJ2GEJ103X	1/16W 10K	1	
		R59703	ERJ2GEJ103X	1/16W 10K	1	
		R59705	ERJ2GEJ103X	1/16W 10K	1	
		R59707	ERJ2GEJ103X	1/16W 10K	1	
		RX8701	EXB28V472JX	RESISTOR-RESISTOR	1	
		RX8702	D1H82204A024	RESISTOR-RESISTOR	1	
		RX8703	EXB28V101JX	RESISTOR-RESISTOR	1	
		RX8704	D1H82204A024	RESISTOR-RESISTOR	1	
		RX8705	EXB28V101JX	RESISTOR-RESISTOR	1	
		RX51004	D1H85604A024	RESISTOR-RESISTOR	1	
		RX51005	D1H84724A024	RESISTOR-RESISTOR	1	
		RX51306	D1H84724A024	RESISTOR-RESISTOR	1	
		RX51311	D1H81014A024	RESISTOR-RESISTOR	1	
		RX51312	D1H81014A024	RESISTOR-RESISTOR	1	
		RX51313	D1H84724A024	RESISTOR-RESISTOR	1	
		RX55501	D1H88204A024	RESISTOR-RESISTOR	1	
		RX55502	D1H88204A024	RESISTOR-RESISTOR	1	
		RX55503	D1H82204A024	RESISTOR-RESISTOR	1	
		RX55504	D1H83304A024	RESISTOR-RESISTOR	1	
		RX55505	D1H83304A024	RESISTOR-RESISTOR	1	
		RX55506	D1H83304A024	RESISTOR-RESISTOR	1	
		RX55507	D1H83304A024	RESISTOR-RESISTOR	1	
		RX55508	D1H81034A024	RESISTOR-RESISTOR	1	
		RX56314	D1H82224A024	RESISTOR-RESISTOR	1	
		RX56315	D1H81014A024	RESISTOR-RESISTOR	1	
		RX57001	D1H81014A024	RESISTOR-RESISTOR	1	
		RX57002	D1H81014A024	RESISTOR-RESISTOR	1	
		RX57003	D1H81024A024	RESISTOR-RESISTOR	1	
		RX57005	D1H81034A024	RESISTOR-RESISTOR	1	
		RX57006	D1H81014A024	RESISTOR-RESISTOR	1	
		RX57007	D1H88224A024	RESISTOR-RESISTOR	1	
		RX59003	D1H83304A024	RESISTOR-RESISTOR	1	
		RX59004	D1H84724A024	RESISTOR-RESISTOR	1	
		RX59005	D1H84724A024	RESISTOR-RESISTOR	1	
		RX59006	D1H83304A024	RESISTOR-RESISTOR	1	
		RX59007	D1H84724A024	RESISTOR-RESISTOR	1	
		RX59302	D1H81044A024	RESISTOR-RESISTOR	1	
		RX59303	D1H81034A024	RESISTOR-RESISTOR	1	
		RX59305	D1H81034A024	RESISTOR-RESISTOR	1	
		RX59601	D1H81014A024	RESISTOR-RESISTOR	1	
		RX59602	D1H83334A024	RESISTOR-RESISTOR	1	
		RX59603	D1H83334A024	RESISTOR-RESISTOR	1	
		S7501	EVQ11A05R	SWITCH, CH UP	1	
		S7502	EVQ11A05R	SWITCH, CH DOWN	1	
		S9601	EVQ11A05R	SWITCH, POWER	1	
		S9701	EVQ11A05R	SWITCH, PAUSE LIVE TV	1	
		T7501	G4D1A0000129	TRANSFORMER	1	
	⚠	T11301	G4DYA0000205	TRANSFORMER	1	
		T53001	J0MAB0000236	TRANSFORMER	1	
		T53002	J0MAB0000236	TRANSFORMER	1	
		T59301	EXC24CE900U	TRANSFORMER	1	HW220EBK
		T59302	EXC24CE900U	TRANSFORMER	1	
		T59303	EXC24CE900U	TRANSFORMER	1	
		TU8701	J3ABCAC00001	DVB-T/T2 TUNER	1	
	⚠	VA11101	D4EAY471A127	VARISTOR	1	

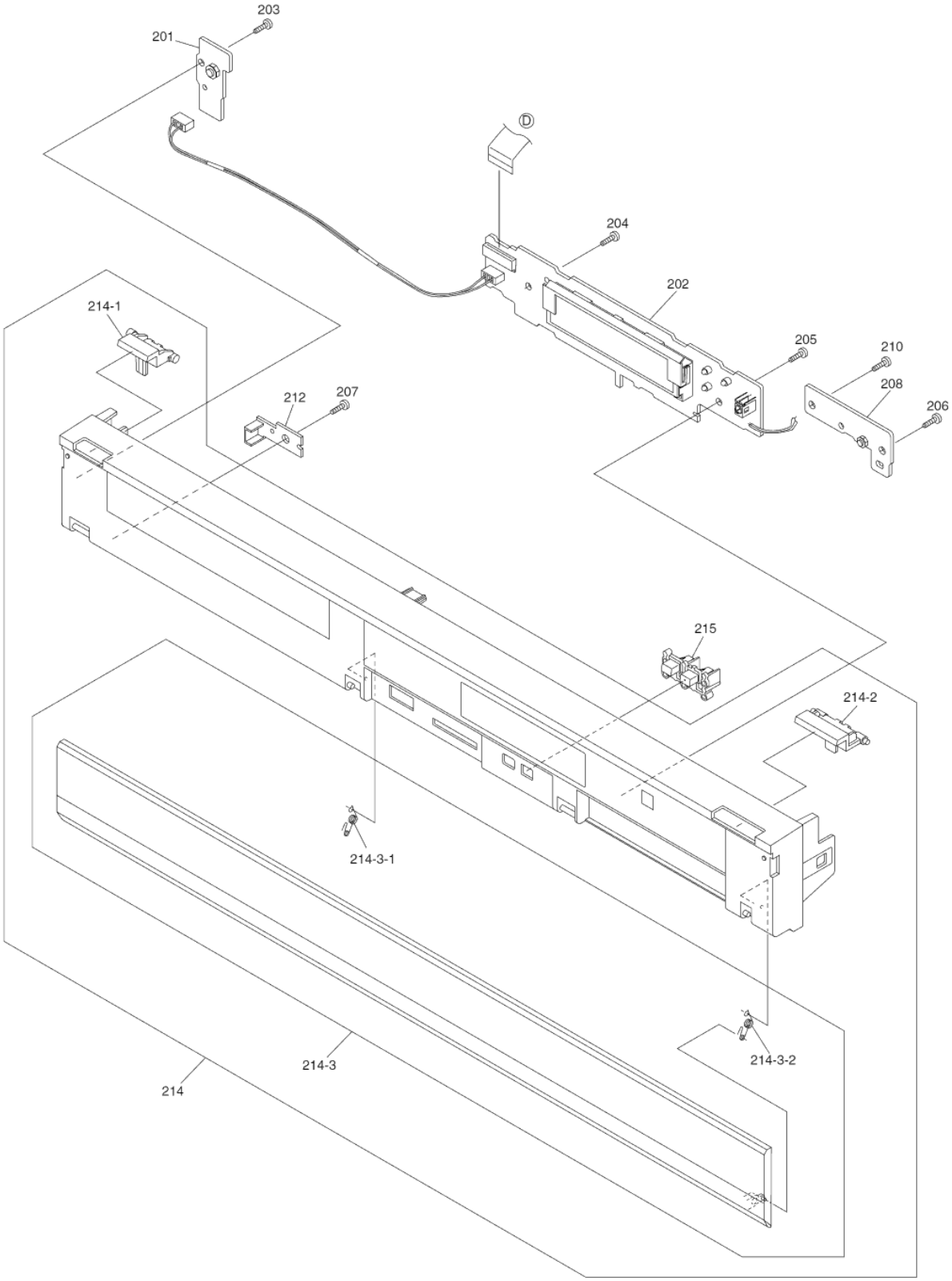
Model No. : DMR-HW120EB/220EB Parts List

Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		W40	ERJ8GEY0R00V	1/4W 0	1	
		W41	ERJ8GEY0R00V	1/4W 0	1	
		W501	ERJ3GEY0R00V	1/10W 0	1	(MAIN P.C.B.)
		W501	ERJ6GEY0R00V	1/8W 0	1	(FRONT (R) FL P.C.B.)
		W501	ERJ6GEY0R00V	1/8W 0	1	(AV OUT P.C.B.)
		W502	ERJ8GEY0R00V	1/4W 0	1	(FRONT (R) FL P.C.B.)
		W502	ERJ3GEY0R00V	1/10W 0	1	(AV OUT P.C.B.)
		W503	ERJ8GEY0R00V	1/4W 0	1	
		W504	ERJ8GEY0R00V	1/4W 0	1	
		W505	ERJ8GEY0R00V	1/4W 0	1	
		W506	ERJ8GEY0R00V	1/4W 0	1	
		W507	ERJ8GEY0R00V	1/4W 0	1	
		W508	ERJ6GEY0R00V	1/8W 0	1	
		W509	ERJ8GEY0R00V	1/4W 0	1	
		W510	ERJ8GEY0R00V	1/4W 0	1	
		W511	ERJ8GEY0R00V	1/4W 0	1	
		W512	ERJ6GEY0R00V	1/8W 0	1	
		W513	ERJ8GEY0R00V	1/4W 0	1	
		W514	ERJ6GEY0R00V	1/8W 0	1	
		X8701	H0J410500001	CRYSTAL OSCILLATOR	1	
		X8702	H0J410500001	CRYSTAL OSCILLATOR	1	
		X51001	H0J270500151	CRYSTAL OSCILLATOR	1	
		X51201	H0J270500165	CRYSTAL OSCILLATOR	1	
		X53001	H0J250500089	CRYSTAL OSCILLATOR	1	
		X59301	H0J120500047	CRYSTAL OSCILLATOR	1	
		ZA6801	K9ZZ00002324	EARTH ANGLE	1	
		ZA6802	K9ZZ00002324	EARTH ANGLE	1	
		ZA11301	VSC5603-B	HEAT SINK	1	
		ZA11302	XYN3+J8FJ	SCREW	1	
		ZA13201	VSC5614-C	HEAT SINK	1	
		ZA13202	XYN3+J8FJ	SCREW	1	
		ZA15301	K9ZZ00002324	EARTH ANGLE	1	
		ZA15302	K9ZZ00002324	EARTH ANGLE	1	
		ZA15303	K9ZZ00002324	EARTH ANGLE	1	
		ZB7201	RMN0946-1	FL HOLDER	1	

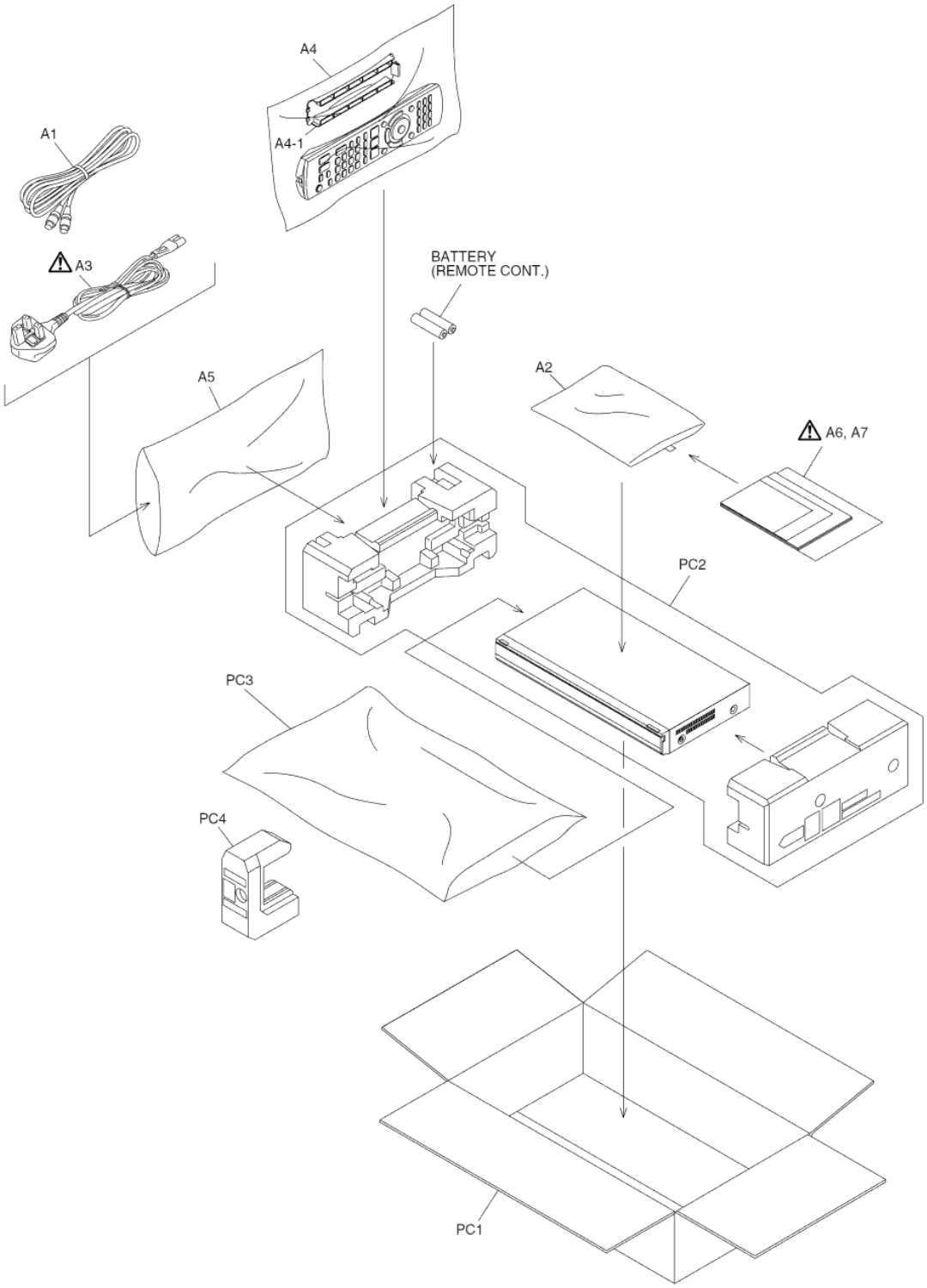
Model No. : DMR-HW120EB/220EB Frame and Casing Section (1)



Model No. : DMR-HW120EB/220EB Frame and Casing Section (2)



Model No. : DMR-HW120EB/220EB Packing Parts and Accessories Section



Model No. : DMR-HW120EB/220EB Parts List

Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		1	RFKB73212CT	AV OUT P.C.B.	1	HW120EBK E.S.D.
		1	RFKB73212DT	AV OUT P.C.B.	1	HW220EBK E.S.D.
		2	VEP77216A	T2 TUNER P.C.B.	1	(RTL)E.S.D.
		3	RFKB79336D	DIGITAL P.C.B.	1	HW120EBK E.S.D. (JIG AND ADJ.)
		3	RFKB79336E	DIGITAL P.C.B.	1	HW220EBK E.S.D. (JIG AND ADJ.)
		4	VEP79340C	MAIN P.C.B.	1	(RTL) HW120EBK E.S.D.
		4	VEP79340D	MAIN P.C.B.	1	(RTL) HW220EBK E.S.D.
		4-1	RMX0477	MINI CARD SPACER	1	
		5	RFKV0330HDKT	HDD (500GB)	1	HW120EBK
		5	RFKV0331HDKT	HDD (1TB)	1	HW220EBK
	⚠	9	RKM0616-K	TOP CASE	1	
		10	C5ZZZ0000061	Wi-Fi MODULE	1	HW220EBK
		11	L6FAYYYG0004	FAN MOTOR	1	
	⚠	12	RGR0433C-C1	REAR PANEL	1	HW120EBK
	⚠	12	RGR0433C-D1	REAR PANEL	1	HW220EBK
		13	VEE1L91	USB CABLE	1	HW220EBK
		19	RKA0144-K	FOOT RUBBER	1	
		20	RKA0144-K	FOOT RUBBER	1	
		21	RKA0144-K	FOOT RUBBER	1	
		22	RKA0144-K	FOOT RUBBER	1	
		23	RMA2369B	HDD BRACKET	1	
		24	VWJ2255	DIGITAL-FRONT FFC	1	
		25	RMG0742-K1	HDD SHEET	1	
		26	RMG0742-K1	HDD SHEET	1	
		27	RMG0742-K1	HDD SHEET	1	
		28	RMG0742-K1	HDD SHEET	1	
		30	VEE1L80	SATA POWER CABLE	1	
		31	VEE1K96	SATA SIGNAL CABLE	1	
		45	RMZ1111	BARRIER	1	
		46	RSC1060	RADIATOR SHEET	1	
		101	RHD30113-1K	SCREW	1	
		102	RHD30113-1K	SCREW	1	
		103	XTB3+8JFJ	SCREW	1	
		104	XTB3+8JFJ	SCREW	1	
		105	XTB3+8JFJ	SCREW	1	
		106	RHD30111-31	SCREW	1	
		107	RHD30111-31	SCREW	1	
		108	RHD30111-31	SCREW	1	
		109	RHD30111-31	SCREW	1	
		110	RHD30111-31	SCREW	1	
		111	RHD30111-31	SCREW	1	
		114	RHD30111-31	SCREW	1	
		116	XSN3+4FJ	SCREW	1	
		117	XSN3+4FJ	SCREW	1	
		119	XTB3+8JFJ	SCREW	1	
		120	XTB3+8JFJ	SCREW	1	
		121	XTB3+8JFJ	SCREW	1	
		122	XTB3+8JFJ	SCREW	1	
		123	XTB3+8JFJ	SCREW	1	
		124	XTB3+8JFJ	SCREW	1	
		140	RHD30111-31	SCREW	1	
		141	RHD30111-31	SCREW	1	
		142	RHD30111-31	SCREW	1	
		143	RHD30111-31	SCREW	1	HW220EBK
		146	RHD30161-1	HDD SCREW	1	
		147	RHD30161-1	HDD SCREW	1	
		201	VEP70543A	FRONT (L) P.C.B.	1	(RTL)E.S.D.
		202	VEP70542C	FRONT (R) FL P.C.B.	1	(RTL) HW120EBK E.S.D.
		202	VEP70542D	FRONT (R) FL P.C.B.	1	(RTL) HW220EBK E.S.D.
		203	RHD26045	SCREW	1	
		204	RHD26045	SCREW	1	
		205	RHD26045	SCREW	1	

Model No. : DMR-HW120EB/220EB Parts List

Change	Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
		206	RHD26045	SCREW	1	
		207	RHD26045	SCREW	1	
		208	VEP70544A	FRONT (R) SW P.C.B.	1	(RTL)E.S.D.
		210	RHD26045	SCREW	1	
		212	RMR2038-K	DOOR STOPPER	1	
		214	RYP1793-K	FRONT PANEL UNIT	1	HW120EBK
		214	RYP1802-K	FRONT PANEL UNIT	1	HW220EBK
		214-1	RGU2741-K	POWER BUTTON	1	
		214-2	RGU2742A-K	PAUSE LIVE TV BUTTON	1	
		214-3	RYF0940-K	DOOR PANEL UNIT	1	HW120EBK
		214-3	RYF0944-K	DOOR PANEL UNIT	1	HW220EBK
		214-3-1	RMB0926B-2	DOOR SPRING	1	
		214-3-2	RMB0926B-2	DOOR SPRING	1	
		215	RGU2743A-K	CH UP/DOWN BUTTON	1	
		A1	K1TWACC00003	RF CABLE	1	
		A2	RPF0557-1	ACCESSORY BAG	1	
	⚠	A3	K2CT2YY00003	POWER CORD	1	
		A4	N2QAYB000780	REMOTE CONTROLLER	1	HW120EBK
		A4	N2QAYB000764	REMOTE CONTROLLER	1	HW220EBK
		A4-1	100300037800	BATTERY COVER	1	HW120EBK
		A4-1	100300037800	BATTERY COVER	1	HW220EBK
		A5	RPF0501	POLYETHYLENE BAG	1	
	⚠	A6	VQT4E91	O/I BOOK	1	ENGLISH
		A7	RPQ2927	PAD	1	
		PC1	RPG0A09-1	PACKING CASE	1	HW120EBK
		PC1	RPG0A83-1	PACKING CASE	1	HW220EBK
		PC2	RPN2194-2	CUSHION SET	1	
		PC3	RPF0539-1	MIRAMAT BAG	1	
		PC4	RPN2195	FRONT PAD	1	