

**Pioneer** *sound.vision.soul*

# Service Manual



DVR-104

ORDER NO.  
**RRV2590**

DVD-R/RW CD-R/RW WRITER

# DVR-104 DVR-A04

**THIS MANUAL IS APPLICABLE TO THE FOLLOWING MODEL(S) AND TYPE(S).**

Model	Type	Power Requirement	Remarks
DVR-104	KBXV/2	DC Power supply from other system	
DVR-104	KB/2	DC Power supply from other system	
DVR-104	KB	DC Power supply from other system	
DVR-A04	KBXV	DC Power supply from other system	
DVR-A04	KB	DC Power supply from other system	



For details, refer to "Important symbols for good services" on the next page.

# SAFTY INFORMATION



This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual. Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

## WARNING

This product contains lead in solder and certain electrical parts contain chemicals which are known to the state of California to cause cancer, birth defects or other reproductive harm.

Health & Safety Code Section 25249.6 – Proposition 65

### IMPORTANT

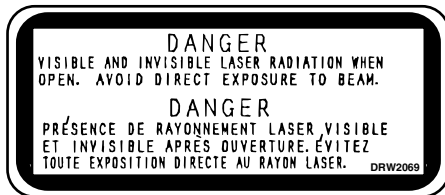
THIS PIONEER APPARATUS CONTAINS LASER OF CLASS 1. SERVICING OPERATION OF THE APPARATUS SHOULD BE DONE BY A SPECIALLY INSTRUCTED PERSON.

### LASER DIODE CHARACTERISTICS

MAXIMUM OUTPUT POWER: 7 mw  
WAVELENGTH: 650 nm (DVD) , 780 nm (CD-ROM)

DVR-104/KB, DVR-104/KB/2 and DVR-A04/KB only

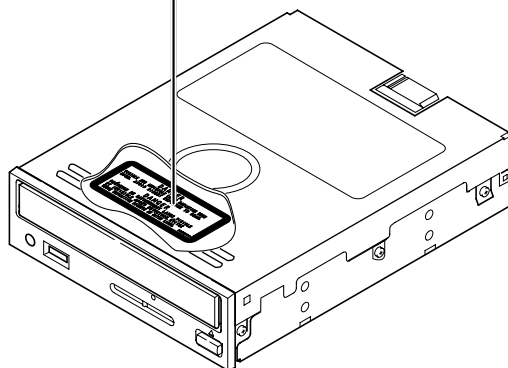
DVR-104/KBXV/2 and DVR-A04/KBXV only



(DRW2069)



(DRW2080)



### Additional Laser Caution

1. The ON/OFF (ON: low level, OFF: high level) status of the CLAMP signals for detecting the loading state are detected by the drive CPUs, and the design prevents laser diode oscillation when the CLAMP signal turns OFF. In normal operation, if no disc is clamped, the laser diode oscillation is disabled. However, the interlock does not always operate in the test mode. \*
2. When the cover is opened, close viewing of the objective lens with the naked eye will cause exposure to a Class 3A laser beam.

\* Refer to pages 38.

**[ Important symbols for good services ]**

In this manual, the symbols shown-below indicate that adjustments, settings or cleaning should be made securely. When you find the procedures bearing any of the symbols, be sure to fulfill them:

**1. Product safety**

You should conform to the regulations governing the product (safety, radio and noise, and other regulations), and should keep the safety during servicing by following the safety instructions described in this manual.

**2. Adjustments**

To keep the original performances of the product, optimum adjustments or specification confirmation is indispensable. In accordance with the procedures or instructions described in this manual, adjustments should be performed.

**3. Cleaning**

For optical pickups, tape-deck heads, lenses and mirrors used in projection monitors, and other parts requiring cleaning, proper cleaning should be performed to restore their performances.

**4. Shipping mode and shipping screws**

To protect the product from damages or failures that may be caused during transit, the shipping mode should be set or the shipping screws should be installed before shipping out in accordance with this manual, if necessary.

**5. Lubricants, glues, and replacement parts**

Appropriately applying grease or glue can maintain the product performances. But improper lubrication or applying glue may lead to failures or troubles in the product. By following the instructions in this manual, be sure to apply the prescribed grease or glue to proper portions by the appropriate amount. For replacement parts or tools, the prescribed ones should be used.

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# 1. SPECIFICATIONS

## [DVR-104 and DVR-A04]

### [Setting]

This drive is Horizontal and Vertical Use.

### [Disc Size]

- 12 cm (4.72") / 8 cm (3.15")\*
- \*8 cm (3.15") discs cannot be used at upright position.

### [Data Transfer Rate]

Data Read (Sustained)

DVD Max. 8,100 KBytes/sec.

CD Max. 3,600 KBytes/sec. (10.3 – 24X CAV Mode over 16 block transfer)

Data Write (Sustained)

DVD Max. 2,700 KBytes/sec. (2X DVD-R)

CD Max. 1,200 KBytes/sec. (8X CD-R)

Host Interface specification

PIO Mode 4, Multi word DMA Mode 2 16.6 Mbytes/sec.

Ultra DMA mode 2 33.3 MBytes/sec.

- The data transfer rate may not be output due to disc conditions (scratches, etc.).

### [Access Time/ Seek Time]

Access time (Random average)

DVD-ROM 200 ms CD-ROM 180 ms

Seek time (Random average)

DVD-ROM 150 ms CD-ROM 130 ms

### [Audio Characteristic]

Line Out  $0.7 \pm 0.5$  Vrms (at 10 k $\Omega$  load)

Headphone Out  $0.6 \pm 0.5$  Vrms (at 32  $\Omega$  load)

### [Others]

Power Supply .....	DC +12 V, 0.7 A DC +5 V, 1.4 A
Dimensions .....	148 (W) x 42.3 (H) x 197.7 (D) mm (including front panel) .....
	5-27/32 (W) x 1-11/16 (H) x 7-25/32 (D) in.
Weight .....	1.2 kg (2.65 lb)
Operation temperature .....	+5°C to +45°C (41°F to 113°F)
Operation humidity .....	5% to 85% (no condensation)
Storage temperature .....	- 40°C to +60°C (- 40°F to 140°F)
Storage humidity .....	5% to 90% (no condensation)

### [Accessories] (DVR-A04 only)

Push Rod .....	x1
Short-circuit socket .....	x2
Audio cable .....	x1
Mounting screw .....	x4
Operating instructions .....	x1

### NOTE:

- Specifications and design subject to possible modifications without notice, due to improvements.

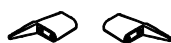
### Accessories

#### (DVR-A04 only)

Push Rod  
(DEX1008)



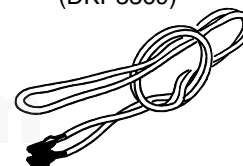
Short-circuit socket x2  
(DKX1042)





Mounting screw x4  
(AMZ30P060FMC)



Audio cable x1  
(DKP3369)

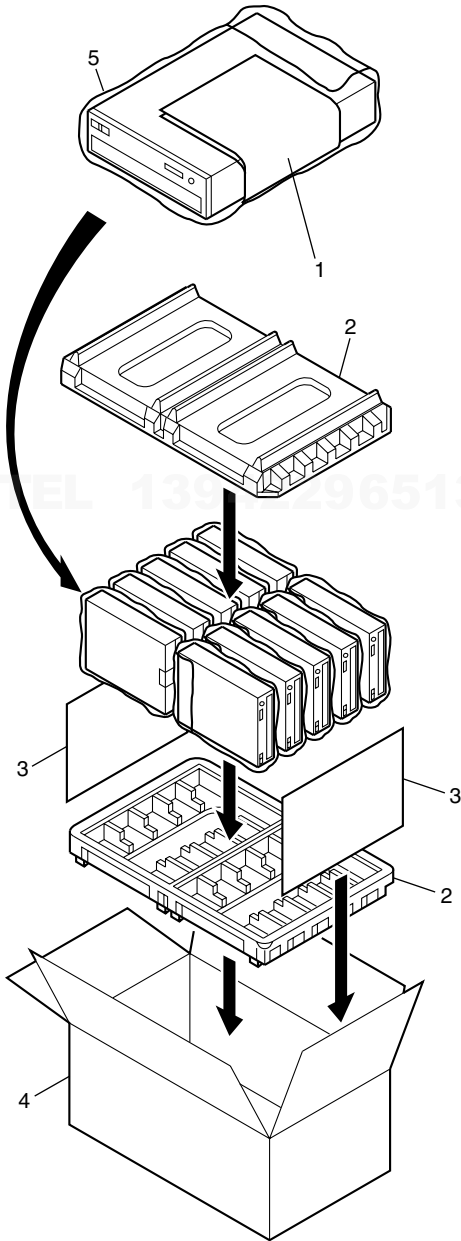


## 2. EXPLODED VIEWS AND PARTS LIST

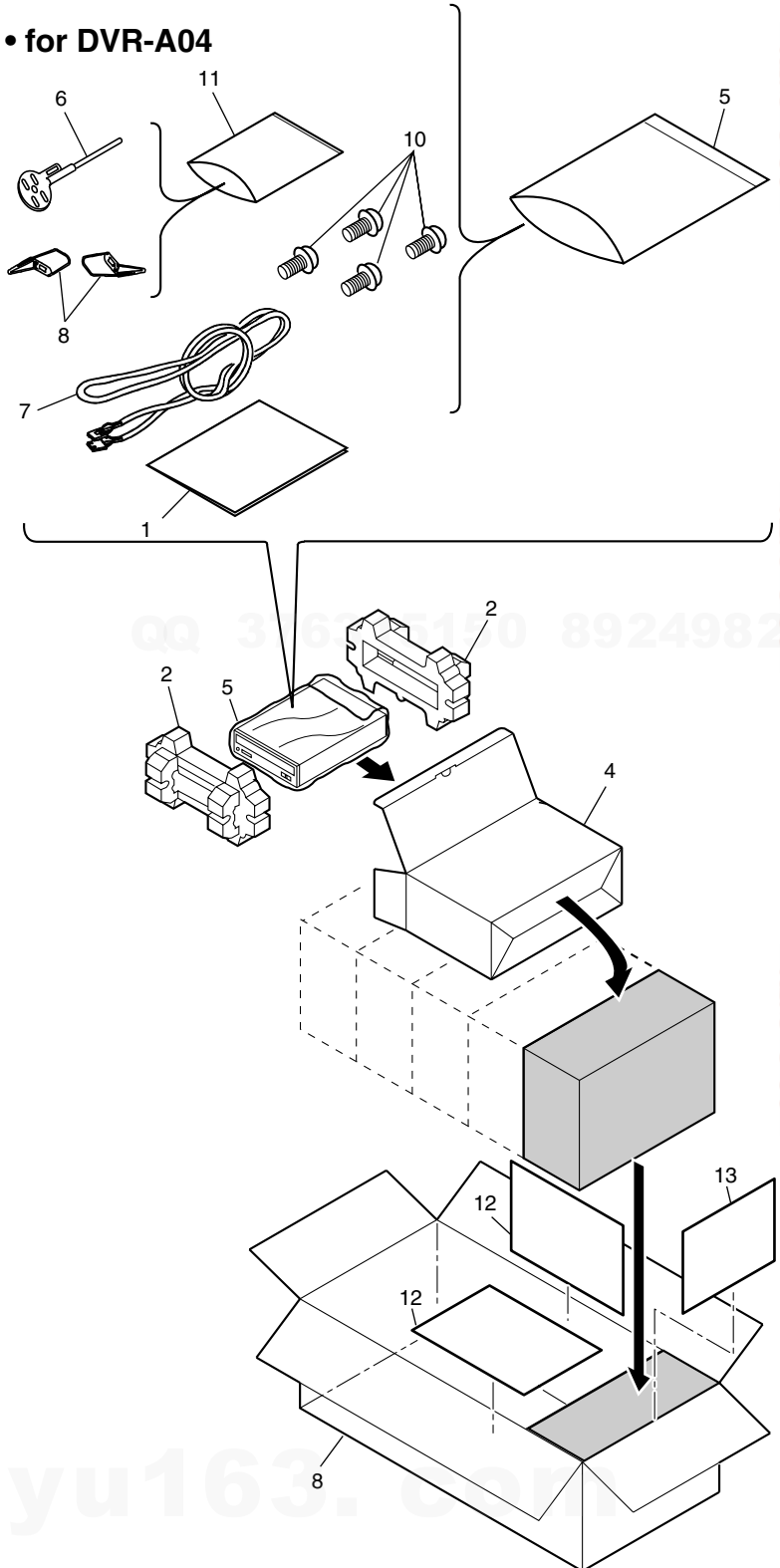
- NOTES:**
- Parts marked by "NSP" are generally unavailable because they are not in our Master Spare Parts List.
  - The  mark found on some component parts indicates the importance of the safety factor of the part.
  - Therefore, when replacing, be sure to use parts of identical designation.
  - Screws adjacent to  mark on product are used for disassembly.
  - For the applying amount of lubricants or glue, follow the instructions in this manual.  
(In the case of no amount instructions, apply as you think it appropriate.)

### 2.1 PACKING

● for DVR-104



● for DVR-A04



**PACKING parts List**

<u>Mark No.</u>	<u>Description</u>	<u>Part No.</u>	<u>Mark No.</u>	<u>Description</u>	<u>Part No.</u>
1	Operating Instructions	See Contrast table (2)	6	Push Rod	See Contrast table (2)
2	Pad	See Contrast table (2)	7	Audio Cable	See Contrast table (2)
3	Support Board	See Contrast table (2)	8	Short-circuit Socket	See Contrast table (2)
4	Packing Case	See Contrast table (2)	9	Master Carton A04	See Contrast table (2)
NSP 5	Polyethylene Bag	See Contrast table (2)	10	Mounting Screw	See Contrast table (2)
			NSP 11	Polyethylene Bag	See Contrast table (2)
			12	Spacer1	See Contrast table (2)
			13	Spacer2	See Contrast table (2)

**(2) CONTRAST TABLE**

DVR-104/KB/2, DVR-104/KB, DVR-A04/KBXV, DVR-A04/KB and DVR-104/KBXV2 are constructed the same except for the following.

Mark	NO	Symbol and Description	DVR-104/KBXV/2	DVR-104/KB/2	DVR-104/KB	DVR-A04/KBXV	DVR-A04/KB
	1	Operating Instructions R4 (English/French/German)	DRC1177	DRC1169	DRC1169	Not used	Not used
	1	Operating Instructions R4 (English/French/German/Italian/Dutch/ Spanish/Japanese)	Not used	Not used	Not used	DRC1180	DRC1174
	2	Pad R4XCN	DHA1539	Not used	Not used	Not used	Not used
	2	Pad R4	Not used	DHA1532	DHA1532	Not used	Not used
	2	Pad A04	Not used	DHA1532	DHA1532	DHA1545	DHA1450
	3	Support Board	DHG2144	DHG2141	DHG2141	Not used	Not used
	4	Packing Case XV/2	DHG2233	Not used	Not used	Not used	Not used
	4	Packing Case R4/2	Not used	DHG2243	Not used	Not used	Not used
	4	Packing Case R4	Not used	Not used	DHG2178	Not used	Not used
	4	Packing Case A04	Not used	Not used	Not used	DHG2217	DHG2202
NSP	5	Polyethylene Bag	DHL1119	Not used	Not used	DHL1119	Not used
NSP	5	Polyethylene Bag (235 x 320 x 0.03)	Not used	Z21-018	Z21-018	Not used	Z21-018
	6	Push Rod	Not used	Not used	Not used	DEX1008	DEX1008
	7	Audio Cable	Not used	Not used	Not used	DKP3369	DKP3369
	8	Short-circuit Socket	Not used	Not used	Not used	DKX1042	DKX1042
	9	Master Carton A04	Not used	Not used	Not used	DHG2218	DHG2203
	10	Mounting Screw	Not used	Not used	Not used	AMZ30P060FMC	AMZ30P060FMC
NSP	11	Polyethylene Bag	Not used	Not used	Not used	DHL1120	DHL1089
	12	Spacer 1	Not used	Not used	Not used	Not used	DHG2275
	13	Spacer 2	Not used	Not used	Not used	Not used	DHG2276

## 2.2 EXTERIOR (1/2) SECTION

A

B

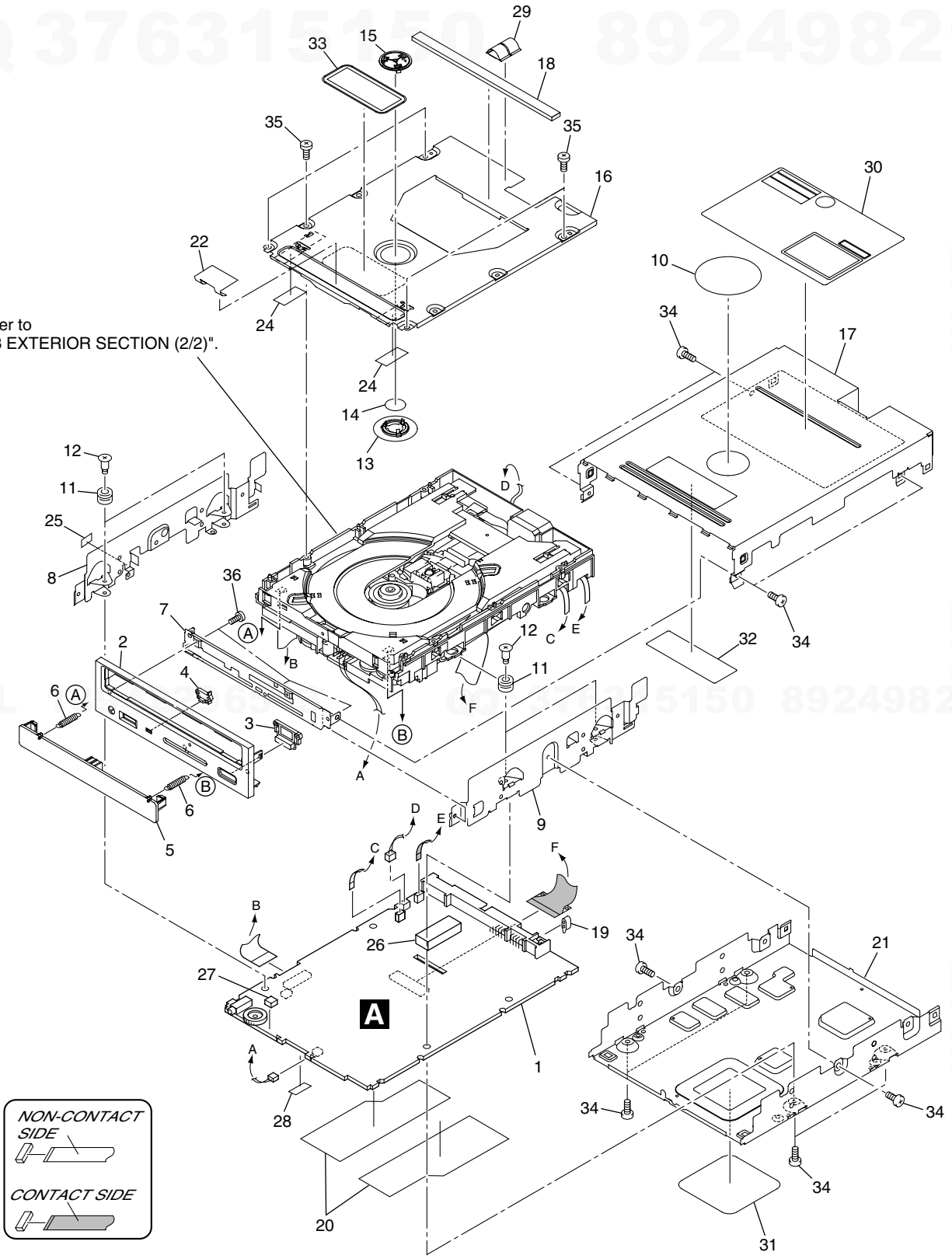
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Refer to "2.3 EXTERIOR SECTION (2/2)".





**EXTERIOR (1/2) SECTION parts List**

Mark No.	Description	Part No.	Mark No.	Description	Part No.
1	DVR R4 MAIN Assy	DWX2187	20	Heatsink Sheet R4	DEB1513
2	Front Vessel R4	See Contrast table (2)	21	Base Chassis R4	See Contrast table (2)
3	Eject Key R4	See Contrast table (2)	22	Protect Sheet A R4	DEC2458
4	Lens R4	See Contrast table (2)	23	•••••	
5	Escutcheon	See Contrast table (2)	24	Protect Sheet C R4	DEC2479
6	TE Spring	DBH1489	25	Flame Sheet R4	DEB1530
7	Shield Plate R4	See Contrast table (2)	26	Cushion (30 x 8)	DEB1534
8	Flame L4	See Contrast table (2)	27	LED Cushion R4	DEB1526
9	Flame R4	See Contrast table (2)	28	Lead Tape R4	DEB1529
10	CL Protect Sheet	DEC2452	29	Stick Finger	DNB1092
11	Float Rubber R4	DEB1500	NSP 30	Label R4	DRW2096
12	Float Screw	DBA1148	NSP 31	Label	DRW2101
13	Clamper R4	DNK3942	32	65 Label	ARW7050
14	Clamper Yoke (R4)	DNH2500	NSP 33	Caution Label	See Contrast table (2)
15	Upper Clamper (R4)	DNK3943	34	Screw	BMZ26P050FMC
16	Clamper Holder R4	See Contrast table (2)	35	Screw	BPZ26P060FZK
NSP 17	Bonnet R4	See Contrast table (2)	36	Screw	DBA1154
18	Air Packing	DEB1474			
19	Short-Circuit Socket	DKX1042			

**(2) CONTRAST TABLE**

DVR-104/KB/2, DVR-104/KB, DVR-A04/KBXV, DVR-A04/KB and DVR-104/KBXV2 are constructed the same except for the following.

Mark	NO	Symbol and Description	DVR-104/KBXV/2	DVR-104/KB/2	DVR-104/KB	DVR-A04/KBXV	DVR-A04/KB
	2	Front Vessel R4	DAH2063	DAH2036	DAH2036	DAH2063	DAH2036
	3	Eject Key R4	DAC2025	DAC2000	DAC2000	DAC2025	DAC2000
	4	Lens R4	DAC2032	DAC2001	DAC2001	DAC2032	DAC2001
	5	Escutcheon	DAH2068	DAH2037	DAH2037	DAH2115	DAH2084
	7	Shield Plate R4	DNE1413	DNE1408	DNE1408	DNE1413	DNE1408
	8	Flame L4	DNB1105	DNB1113	DNB1113	DNB1105	DNB1113
	9	Flame R4	DNB1106	DNB1095	DNB1095	DNB1106	DNB1095
	16	Clamper Holder R4	DNC1621	DNC1620	DNC1620	DNC1621	DNC1620
NSP	17	Bonnet R4	DNC1598	DNC1584	DNC1584	DNC1598	DNC1584
	21	Base Chassis R4	DNC1596	DNC1583	DNC1583	DNC1596	DNC1583
NSP	33	Laser Caution Label XCN	DRW2080	Not used	Not used	DRW2080	Not used
NSP	33	Caution Label	Not used	DRW2069	DRW2069	Not used	DRW2069

### 2.3 EXTERIOR (2/2) SECTION

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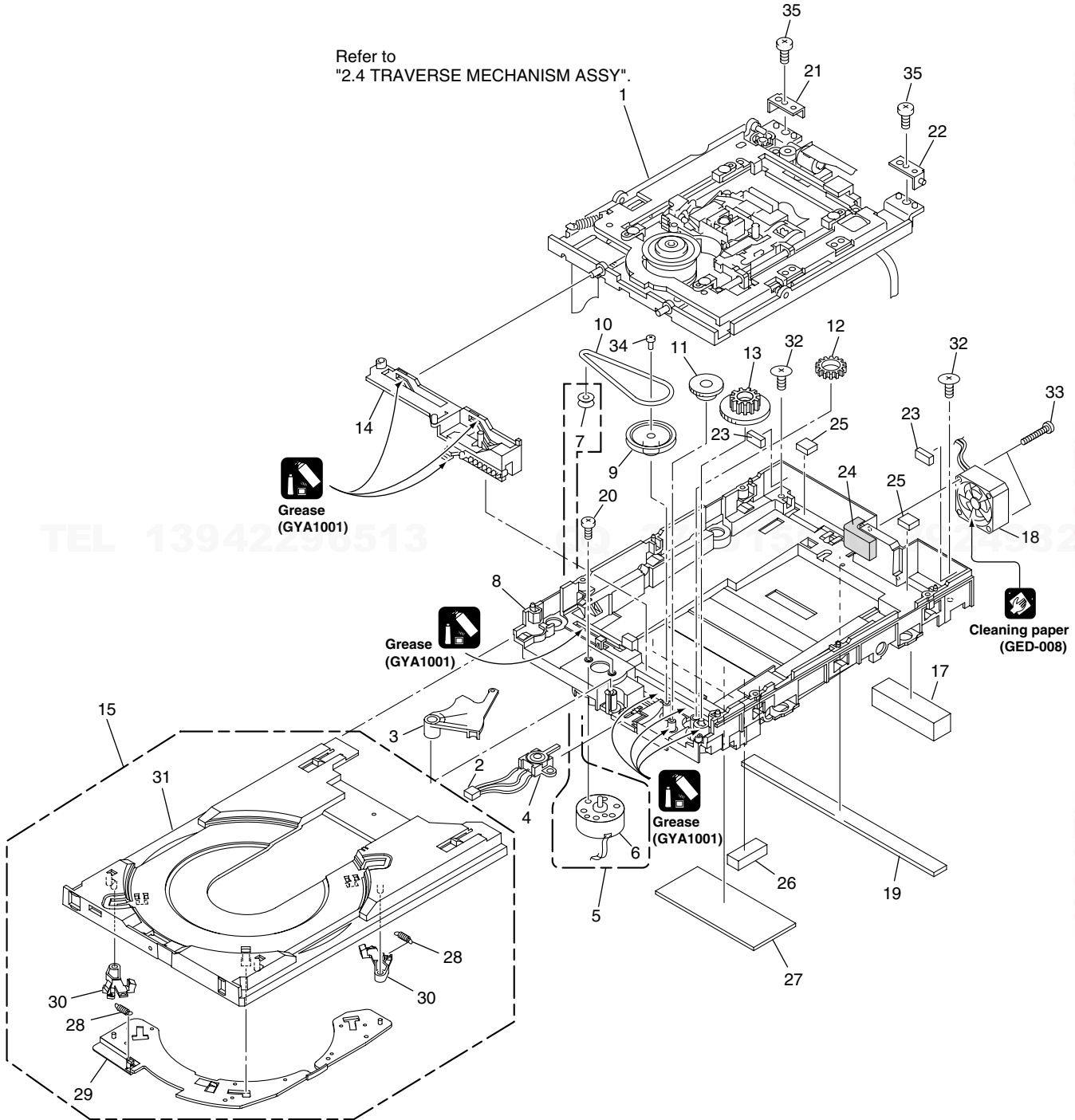
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Refer to "2.4 TRAVERSE MECHANISM ASSY".



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**EXTERIOR (2/2) SECTION parts List**

Mark No.	Description	Part No.	Mark No.	Description	Part No.
1	Traverse Mechanism Assy-S	See Contrast table (2)	19	Air Packing	DEB1474
2	Connector Assy (3P)	DKP3544	20	Screw	JGZ17P030FMC
3	Eject Lever R4	DNK3932	21	Joint L	See Contrast table (2)
4	Lever Switch	DSK1001	22	Joint R	See Contrast table (2)
5	Loading Motor Assy	DXX2503	23	Tray Cushion	DEB1512
NSP 6	Loading Motor R4	DXM1168	24	Air Cushion S2	DEB1533
7	Motor Pulley	PNW1634	25	Cushion	DEB1525
NSP 8	Loading Base R4	See Contrast table (2)	26	Cushion (30 x 8)	DEB1534
9	R4 Gear Pulley	DNK3972	27	Heatsink Sheet R4	DEB1514
10	Rubber Belt R4	DEB1523	28	Lock Spring	DBH1490
11	R4 Gear A	DNK3935	NSP 29	Link Plate	DNK3937
12	R4 Gear C	DNK3933	NSP 30	Disc Hook	DNK3938
13	R4 Gear B	DNK3934	NSP 31	Tray R4	DNK4050
14	Clamp Cam R4	DNK4034	32	Screw	DBA1165
15	Tray Assy	See Contrast table (2)	33	Screw (2.6 x 15)	DBA1168
16	.....		34	Screw (1.7P)	DBA1167
17	Spacer	DEB1482	35	Screw	BMZ26P050FM
18	Fan Motor R4	DXM1169			

**(2) CONTRAST TABLE**

DVR-104/KB/2, DVR-104/KB, DVR-A04/KBXV, DVR-A04/KB and DVR-104/KBXV2 are constructed the same except for the following.

Mark	NO	Symbol and Description	DVR-104/KBXV/2	DVR-104/KB/2	DVR-104/KB	DVR-A04/KBXV	DVR-A04/KB
NSP	1	Traverse Mechanism Assy-S	DXX2511	DXX2511	DXX2504	DXX2511	DXX2504
	8	Loading Base R4	DNK3979	DNK3930	DNK3930	DNK3979	DNK3930
	15	Tray Assy	DXA1940	DXA1932	DXA1932	DXA1940	DXA1932
	21	Joint L	DNB1116	DNB1114	DNB1114	DNB1116	DNB1114
	22	Joint R	DNB1117	DNB1115	DNB1115	DNB1117	DNB1115

### 2.4 TRAVERSE MECHANISM ASSY-S

A

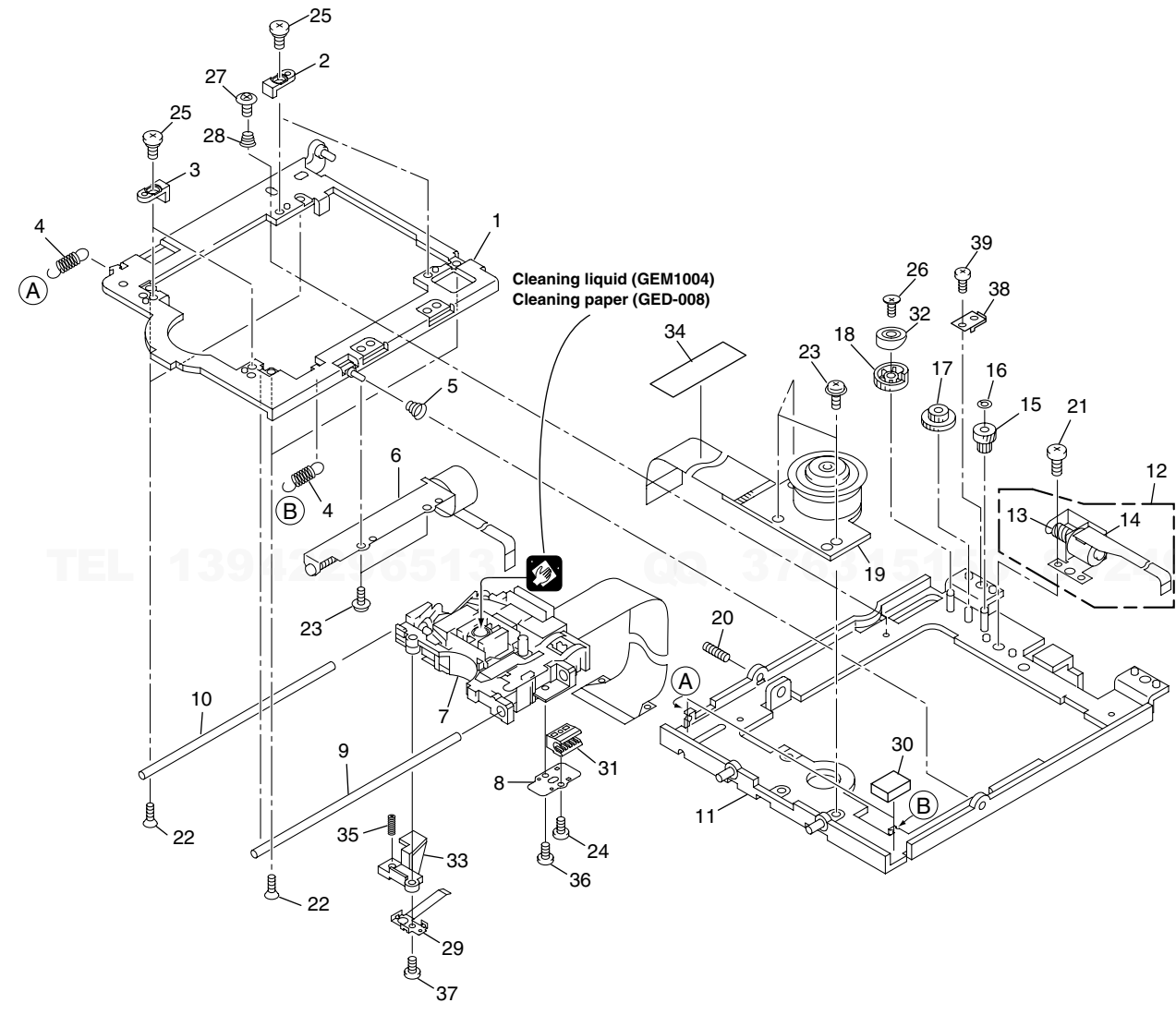
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**TRAVERSE MECHANISM ASSY-S parts List**

Mark No.	Description	Part No.	Mark No.	Description	Part No.
1	Tilt Base	See Contrast table (2)	21	Screw	BMZ26P040FMC
2	Stopper R (R4)	DEB1502	22	Screw	CMZ20P050FMC
3	Stopper F (R4)	DEB1501	23	Screw	PMA20P040FMC
4	Tilt Spring Y	DBH1479	24	Screw	DBA1121
5	Tilt Spring X	DBH1478	25	Screw	DBA1149
6	Stepping Motor	DXM1151	26	Tilt Screw	DBA1163
NSP 7	PICKUP Assy	See Contrast table (2)	27	Screw	DBA1158
8	Joint Spring (R4)	DBK1214	28	Tilt Spring Z	DBH1482
9	Main Shaft	DLA1921	29	Guide Spring (R4)	See Contrast table (2)
10	Sub Shaft	DLA1923	30	Cushion	DEB1484
11	Mechanism Base	See Contrast table (2)	31	Guide Blade (R4)	DNK3940
12	Tilt Motor Assy	DXX2492	32	Cam Cover	See Contrast table (2)
13	Warm	See Contrast table (2)	33	Sub Guide (R4)	DNS1220
14	Tilt Motor	DXM1152	NSP 34	Tape (R4)	DEC2471
15	Tilt Gear A	See Contrast table (2)	35	TAN Screw	VNL1761
16	Washer	WT21D040D050	36	Screw	PBZ20P040FMC
17	Tilt Gear B	See Contrast table (2)	37	Screw	PBZ20P080FMC
18	Tilt Cam	See Contrast table (2)	38	Hold Spring (R4)	See Contrast table (2)
19	Spindle Motor (R4)	DXM1165	39	Stopper Screw	DBA1164
20	Screw	ZMR30H080FZK			

**(2) CONTRAST TABLE**

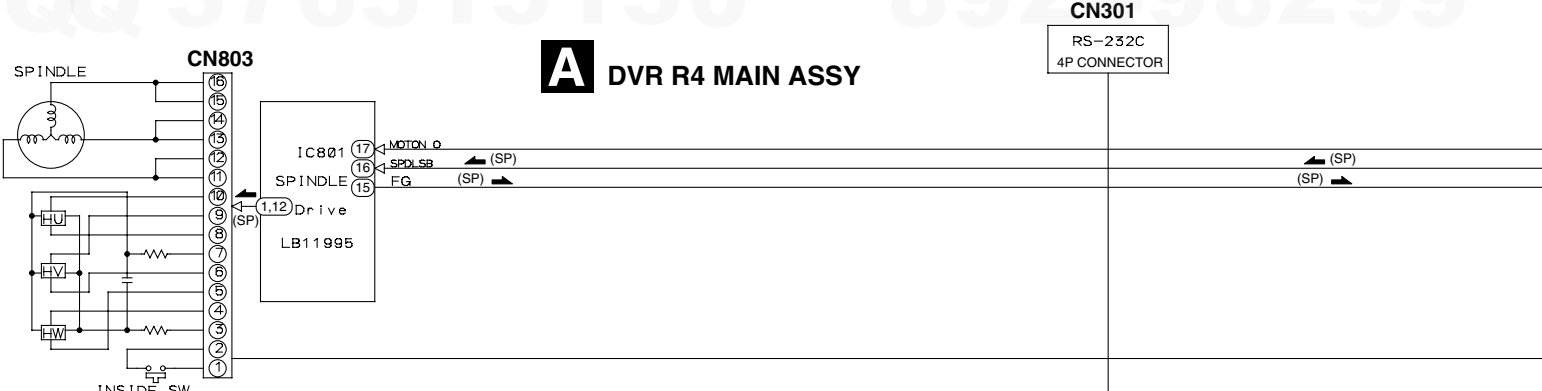
TRAVERSE MECHANISM ASSY-S (DXX2504) and (DXX2511) are constructed the same except for the following.

Mark	NO	Symbol and Description	DXX2511	DXX2504
NSP	1	Tilt Base	DNH2485	DNH2466
	7	PICKUP Assy	OWY8016	OWY8001
	11	Mechanism Base	DNH2509	DNH2501
	13	Warm	DNK3899	DNK3825
	15	Tilt Gear A	DNK3900	DNK3826
	17	Tilt Gear B	DNK3901	DNK3827
	18	Tilt Cam	DNK3902	DNK3828
	29	Guide Spring (R4)	DBK1218	DBK1215
	32	Cam Cover	DNK3903	DNK3863
	38	Hold Spring (R4)	DBK1217	DBK1213

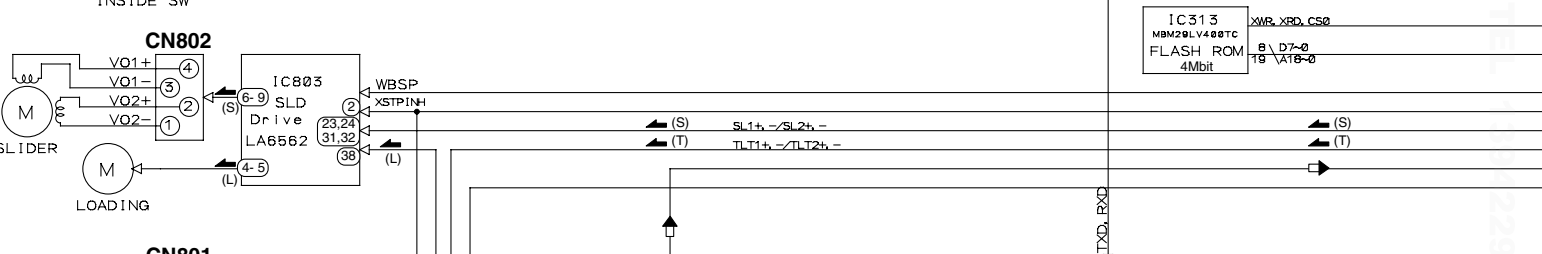
# 3. BLOCK DIAGRAM AND SCHEMATIC DIAGRAM

## 3.1 BLOCK DIAGRAM

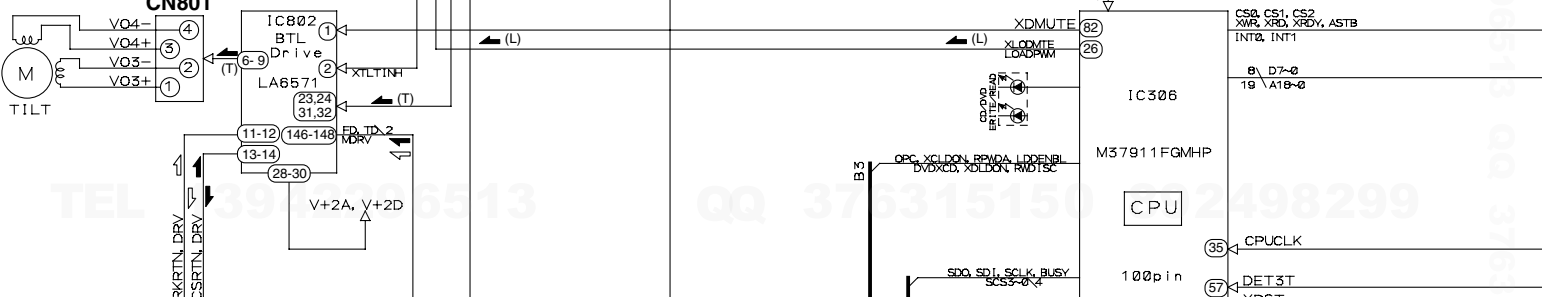
A



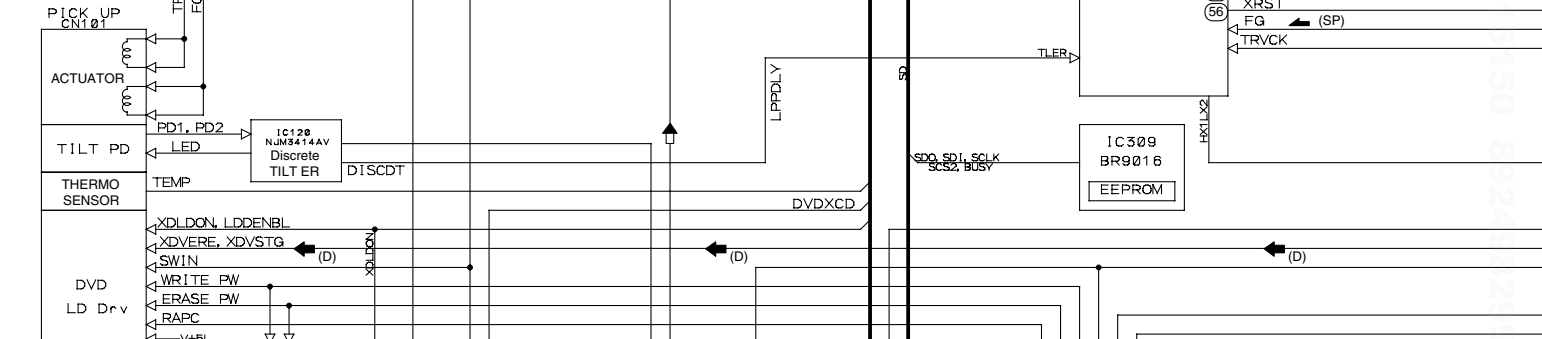
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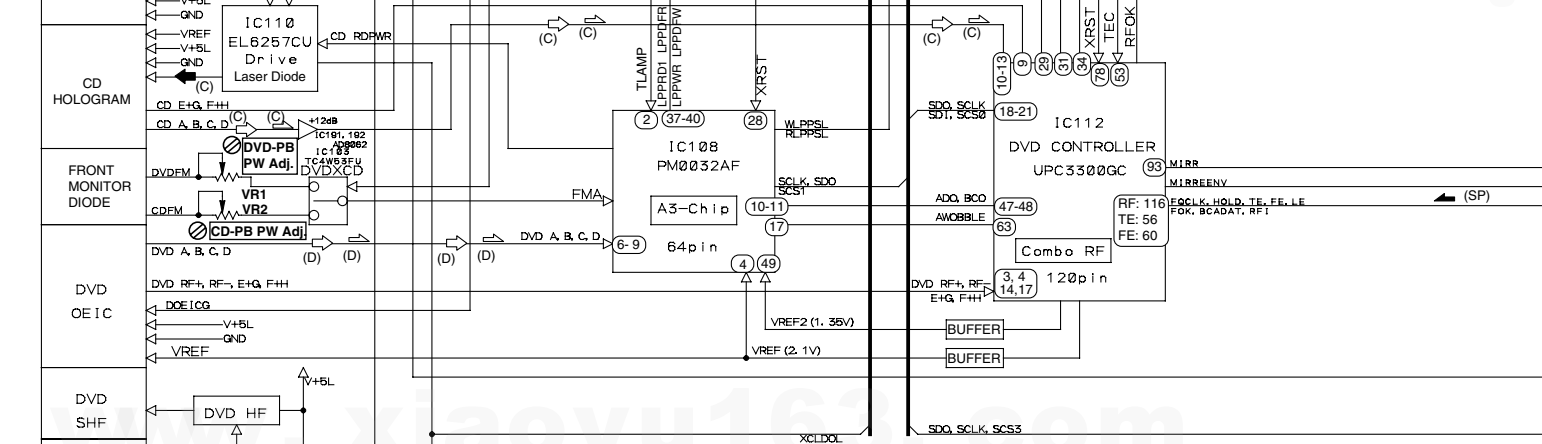
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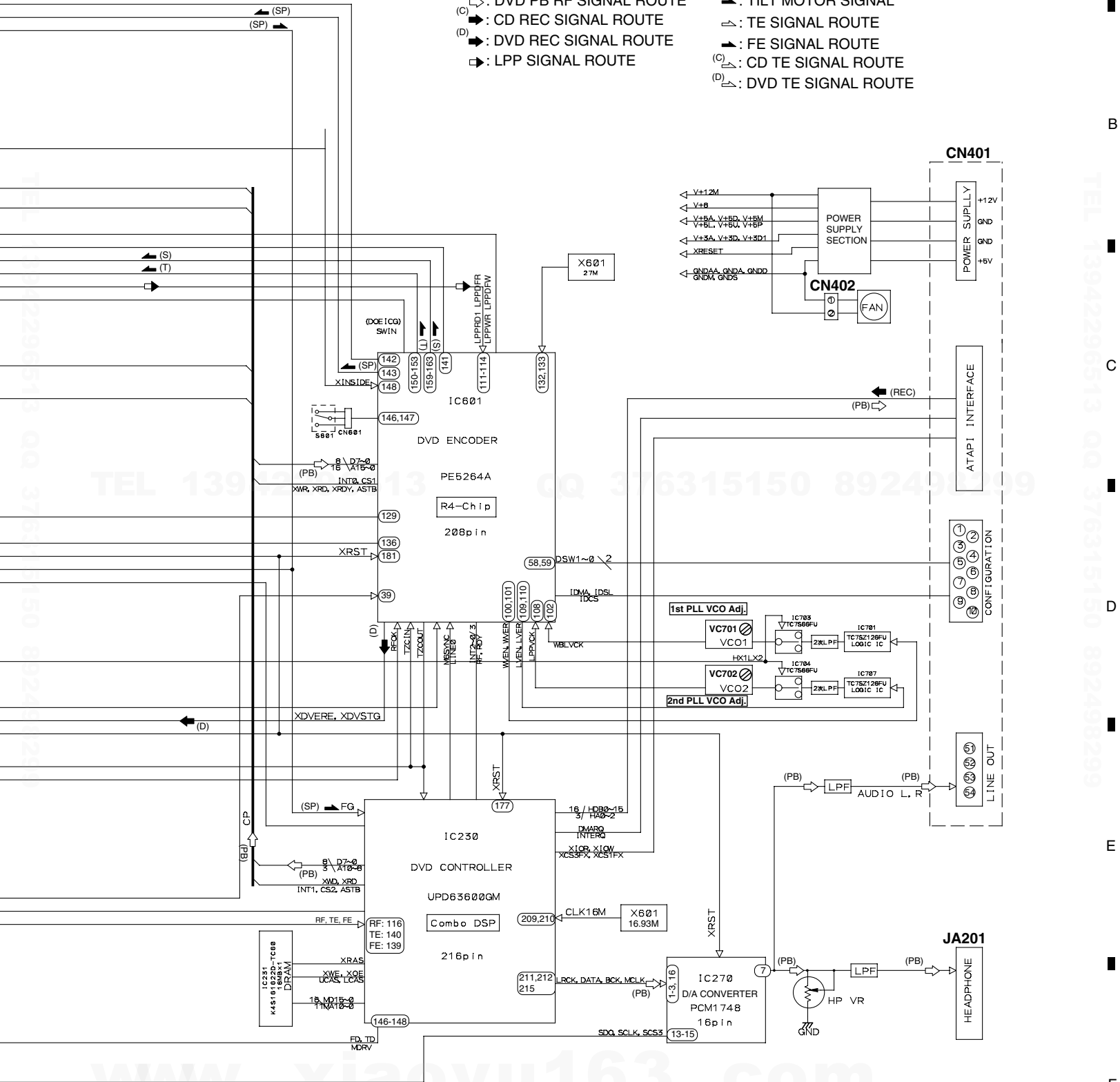
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- (PB) ⇨ : PB SIGNAL ROUTE
- (C) ⇨ : CD PB RF SIGNAL ROUTE
- (D) ⇨ : DVD PB RF SIGNAL ROUTE
- (D) ⇨ : CD REC SIGNAL ROUTE
- (D) ⇨ : DVD REC SIGNAL ROUTE
- ⇨ : LPP SIGNAL ROUTE
- (SP) ⇨ : SPINDLE MOTOR SIGNAL
- (S) ⇨ : SLIDER MOTOR SIGNAL
- (T) ⇨ : TILT MOTOR SIGNAL
- ⇨ : TE SIGNAL ROUTE
- ⇨ : FE SIGNAL ROUTE
- (C) ⇨ : CD TE SIGNAL ROUTE
- (D) ⇨ : DVD TE SIGNAL ROUTE



### 3.2 OVERALL WIRING DIAGRAM

A

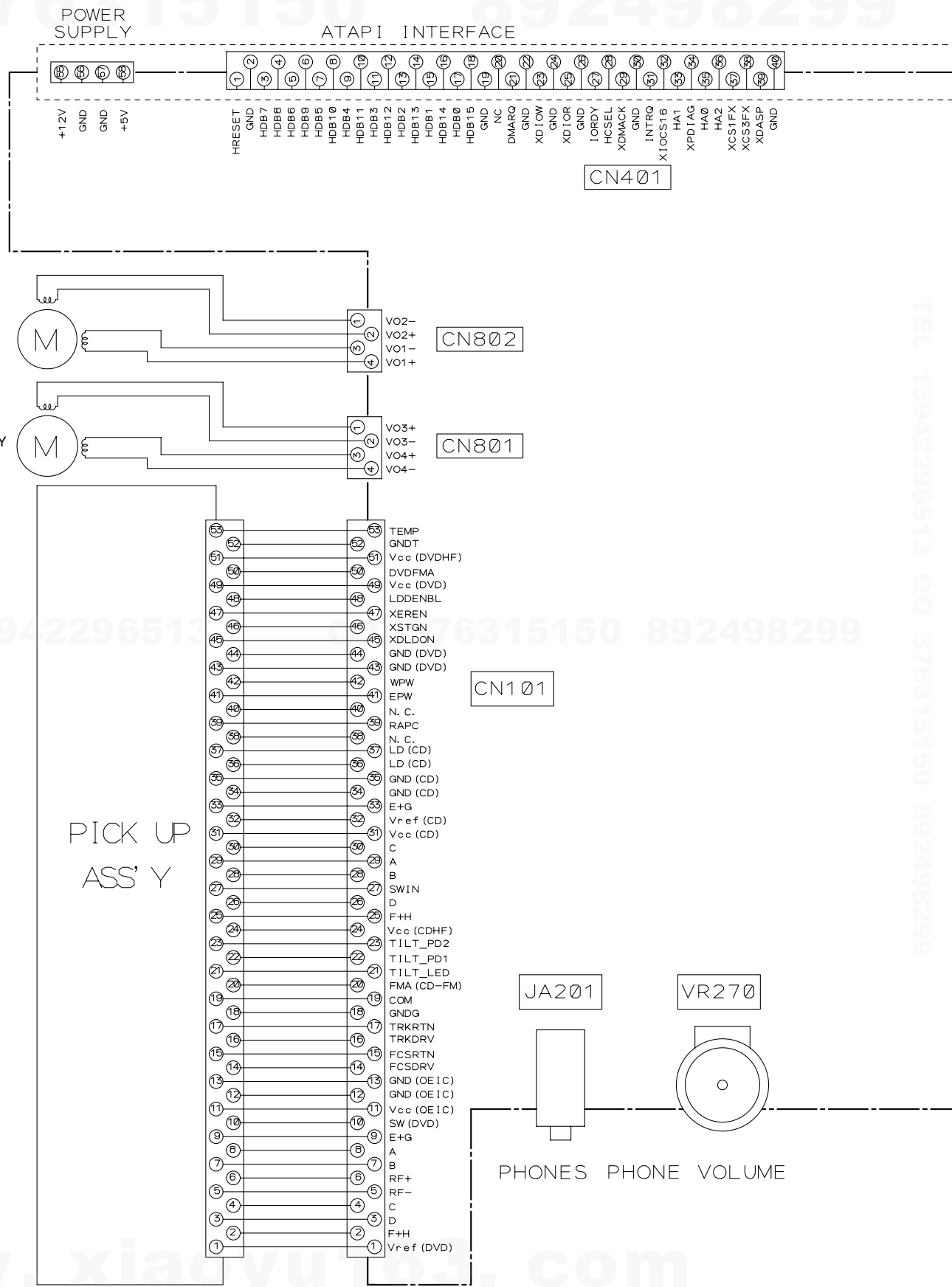
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C

D

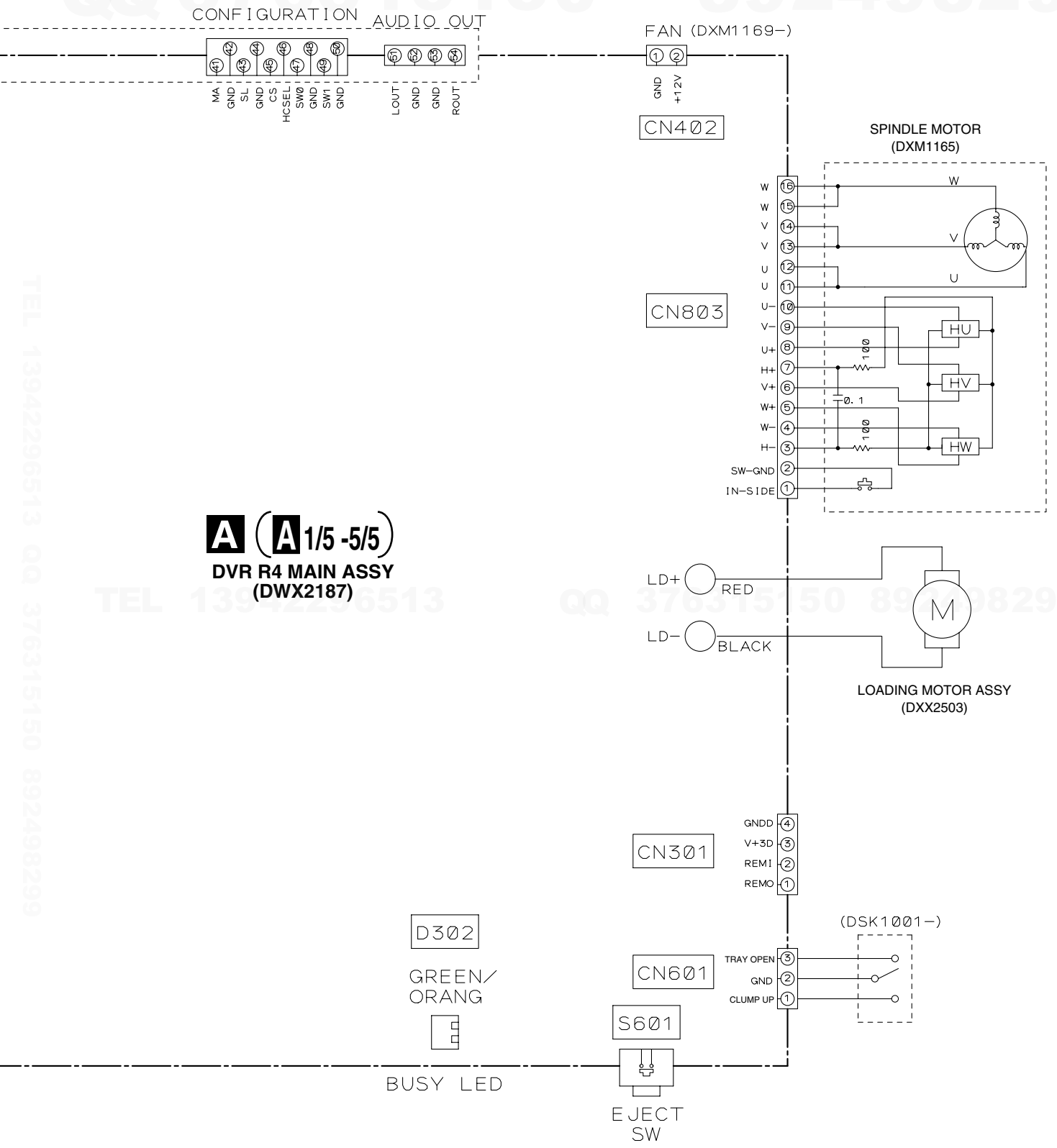
E

F





QQ 376315150 892498299



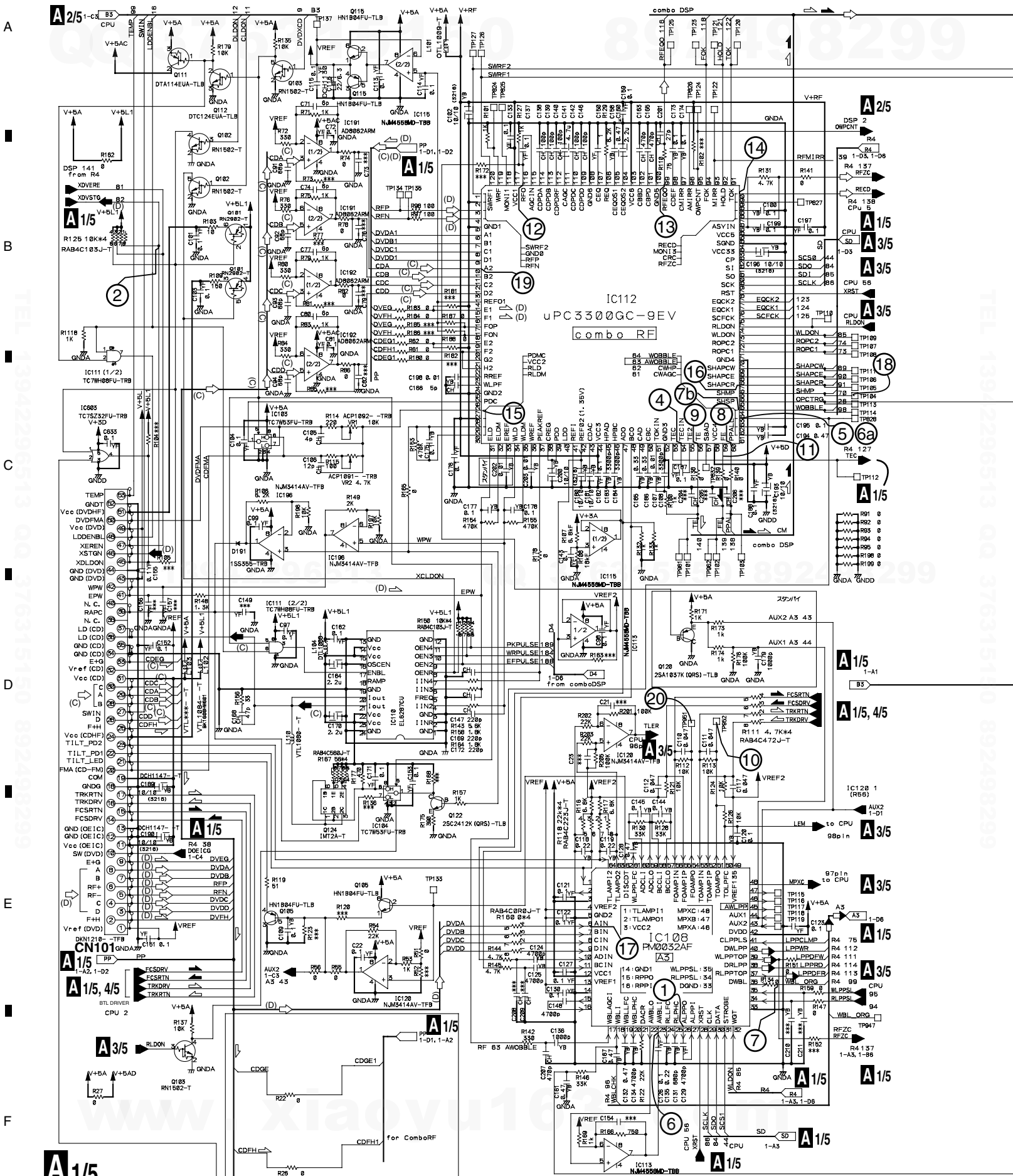
**A (A1/5-5/5)**  
**DVR R4 MAIN ASSY**  
**(DWX2187)**

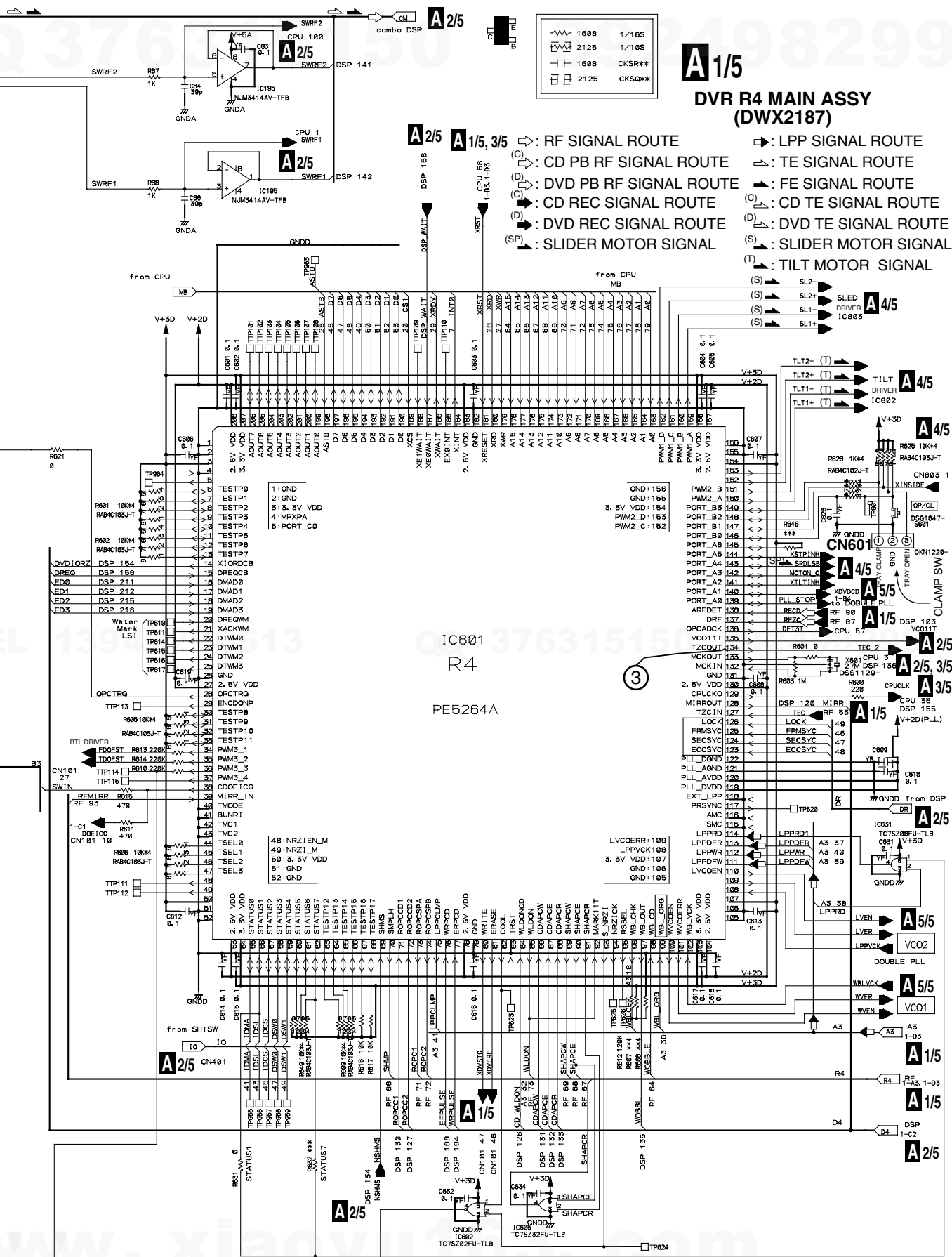
TEL 13942296513 QQ 376315150 892498299

TEL 13942296513 QQ 376315150 892498299

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### 3.3 DVR R4 MAIN ASSY (1/5)



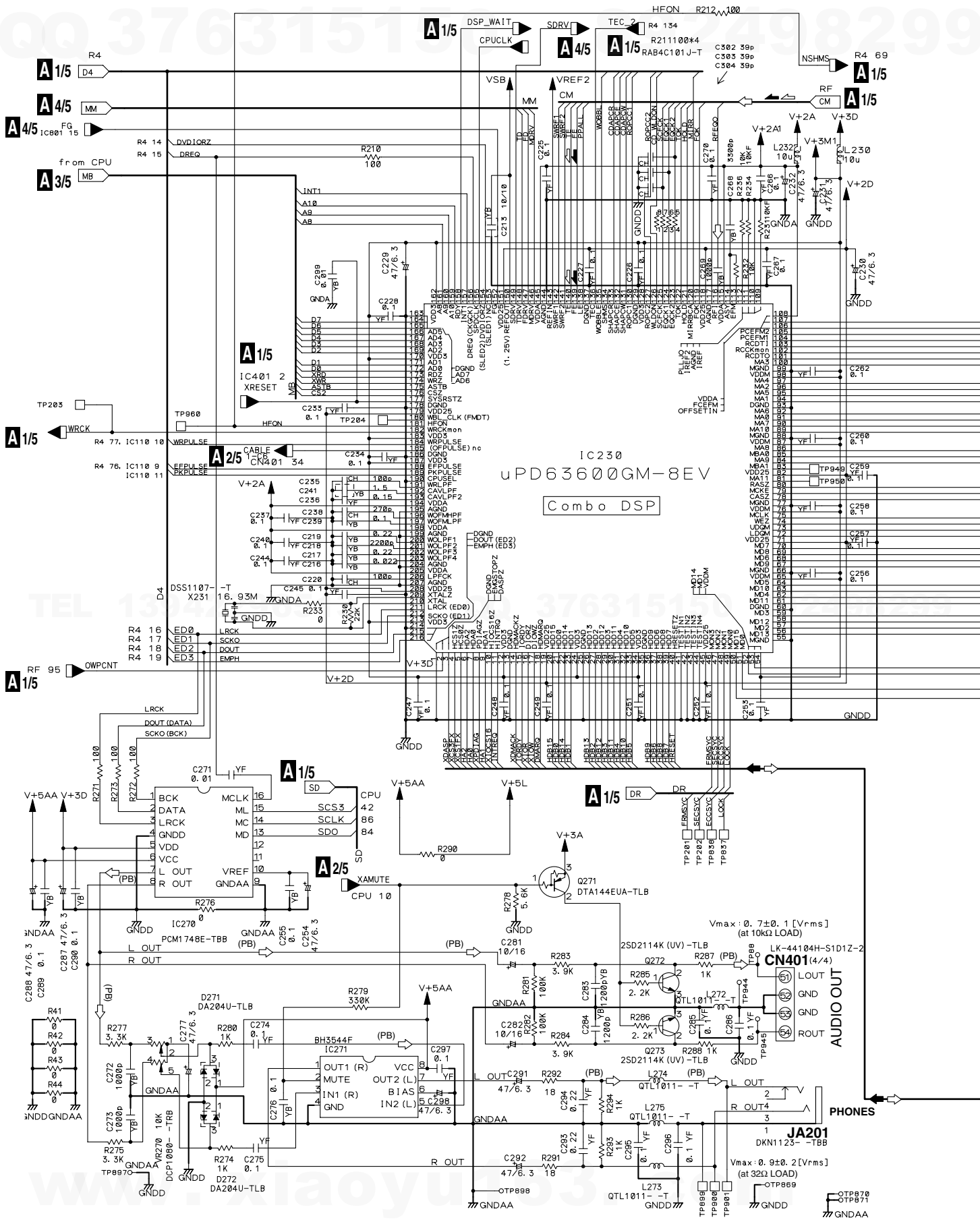


**A 1/5**  
**DVR R4 MAIN ASSY**  
**(DWX2187)**

- ⤴ : RF SIGNAL ROUTE
- ⤵ : LPP SIGNAL ROUTE
- ⤶ : CD PB RF SIGNAL ROUTE
- ⤷ : TE SIGNAL ROUTE
- ⤸ : DVD PB RF SIGNAL ROUTE
- ⤹ : FE SIGNAL ROUTE
- ⤺ : CD REC SIGNAL ROUTE
- ⤻ : CD TE SIGNAL ROUTE
- ⤼ : DVD REC SIGNAL ROUTE
- ⤽ : DVD TE SIGNAL ROUTE
- ⤾ : SLIDER MOTOR SIGNAL
- ⤿ : SLIDER MOTOR SIGNAL
- ⥀ : TILT MOTOR SIGNAL

### 3.4 DVR R4 MAIN ASSY (2/5)

A  
B  
C  
D  
E  
F



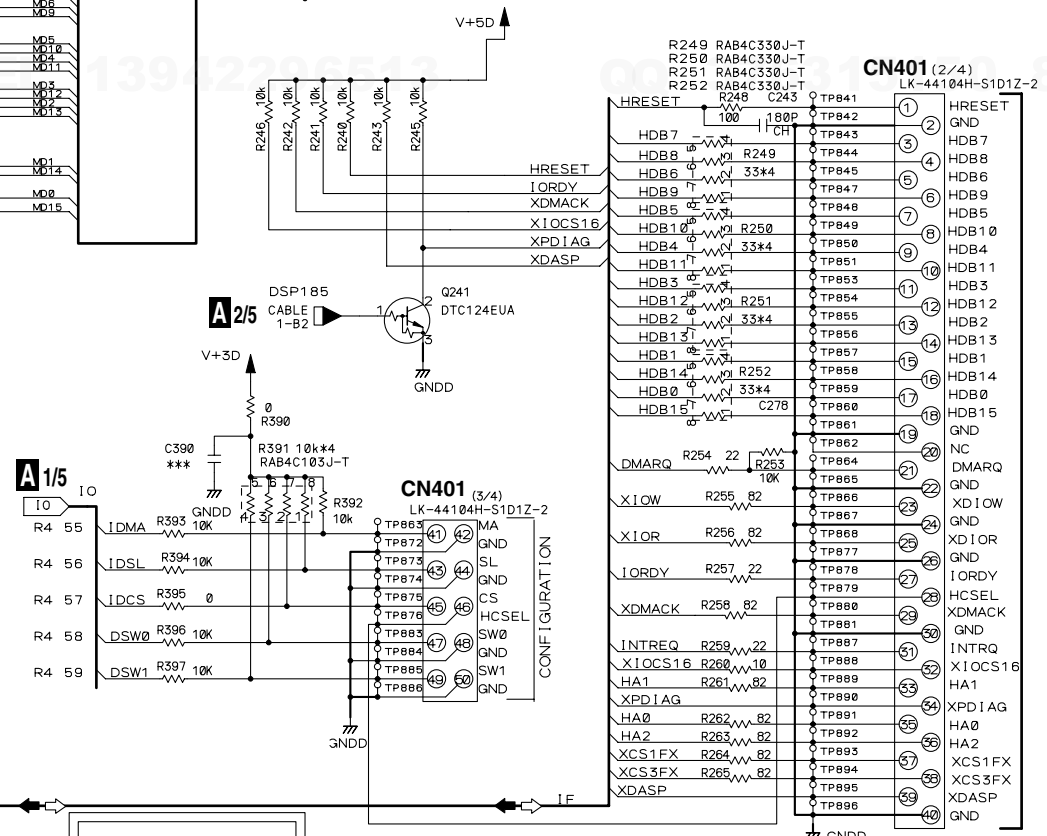
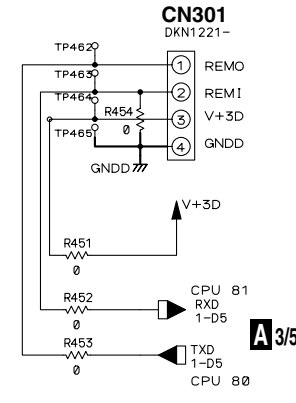
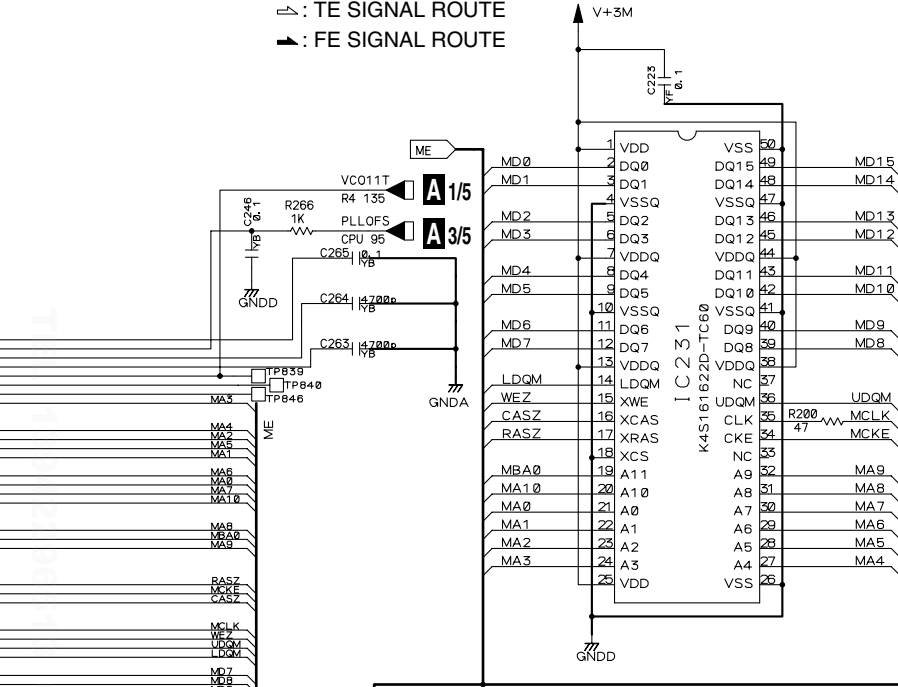
A/2/5

DVR-104

A 2/5

DVR R4 MAIN ASSY (DWX2187)

- ⇨: RF SIGNAL ROUTE
- ⇨: REC SIGNAL ROUTE
- (PB) ⇨: PB SIGNAL ROUTE
- ⇨: TE SIGNAL ROUTE
- ⇨: FE SIGNAL ROUTE



ATAPI INTERFACE

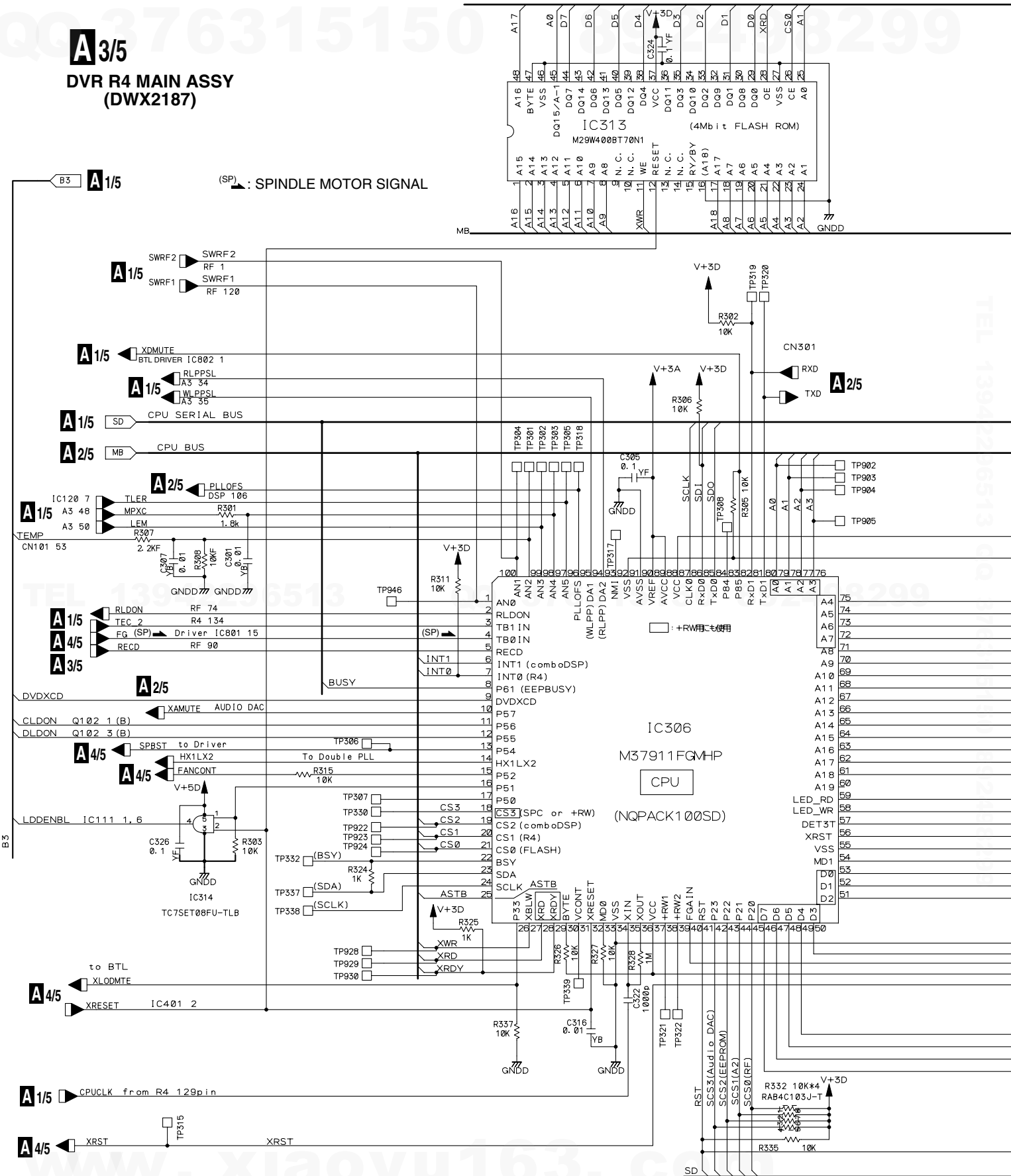
	1608	1/16S
	2125	1/10S
	1608	CKSR**
	2125	CKSQ**

A 2/5

### 3.5 DVR R4 MAIN ASSY (3/5)

# A3/5

## DVR R4 MAIN ASSY (DWX2187)



# A3/5

QQ 376315150 892498299

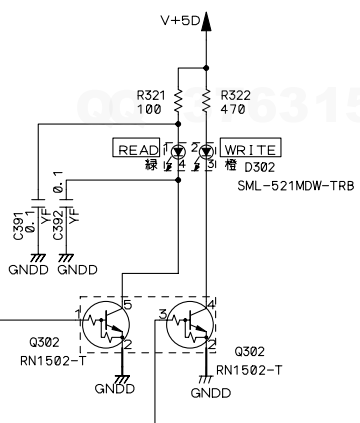
MB

	1608	1/16S
	2125	1/10S
	1608	CKSR**
	2125	CKSQ**

TEL 13942296513

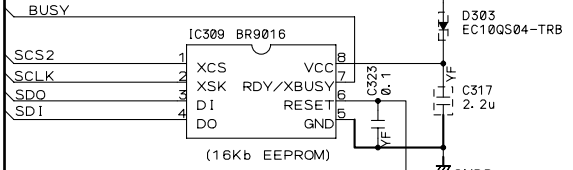
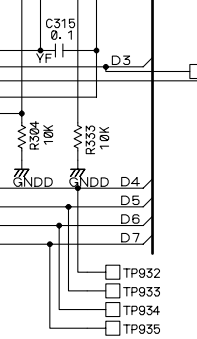
TEL 13942296513

TEL 13942296513



A 1/5

FGAIN IC802 A 4/5

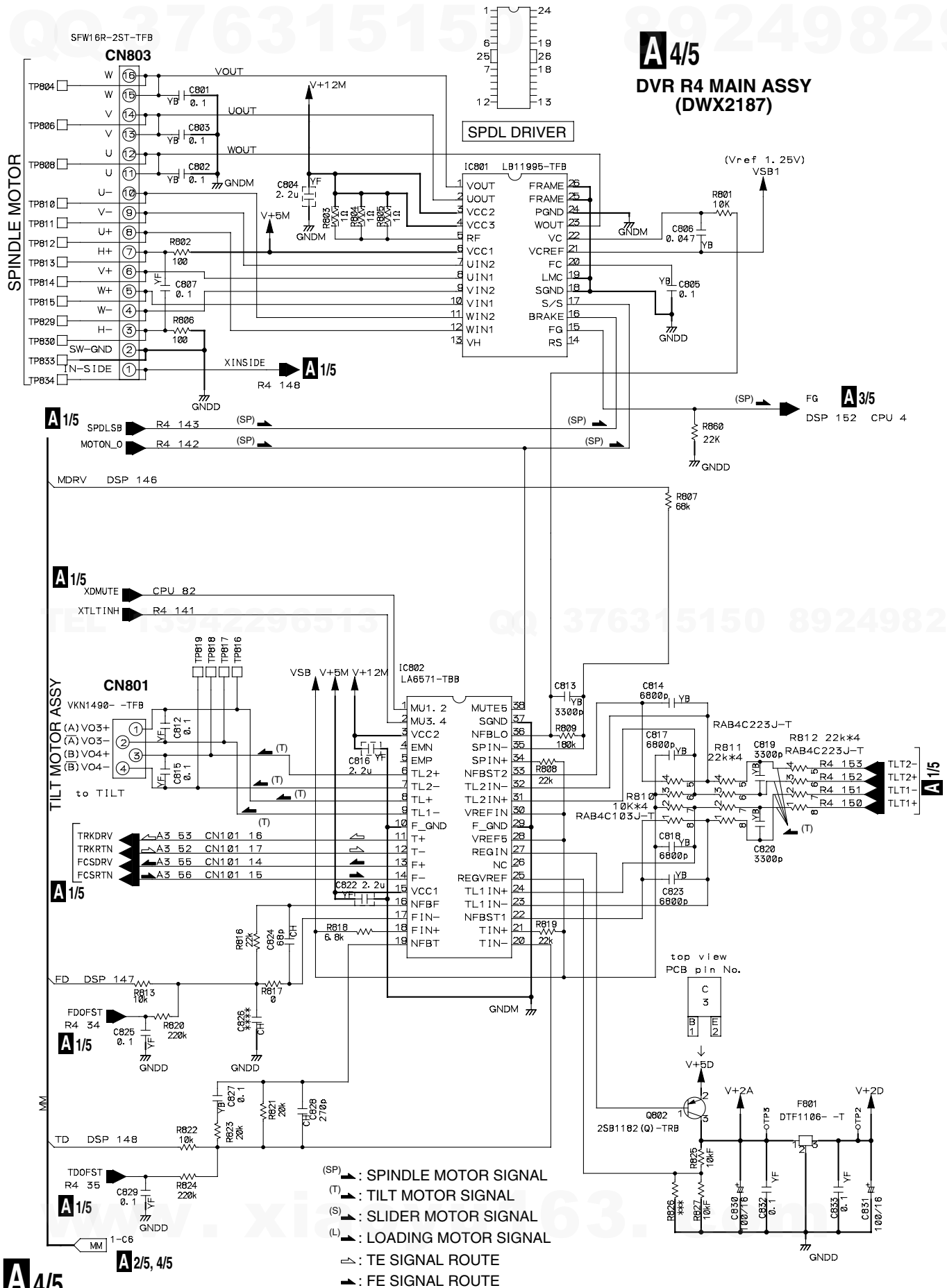


A 3/5

A B C D E F

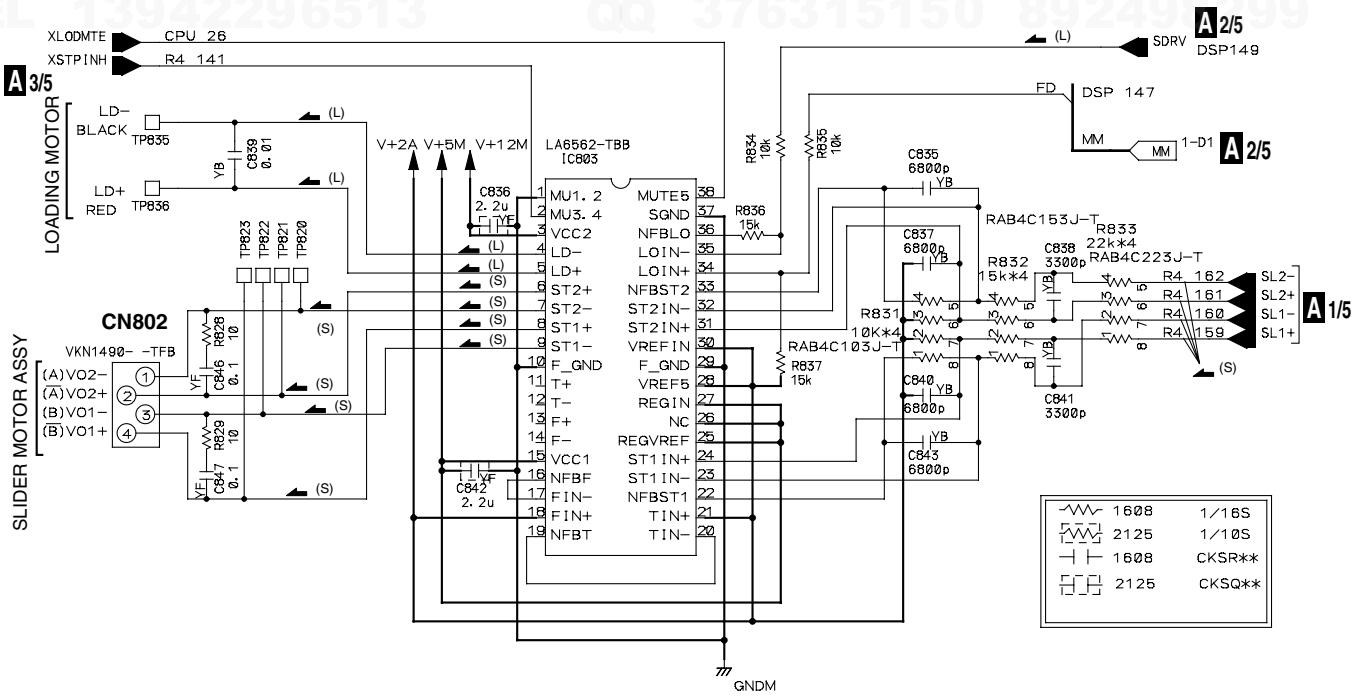
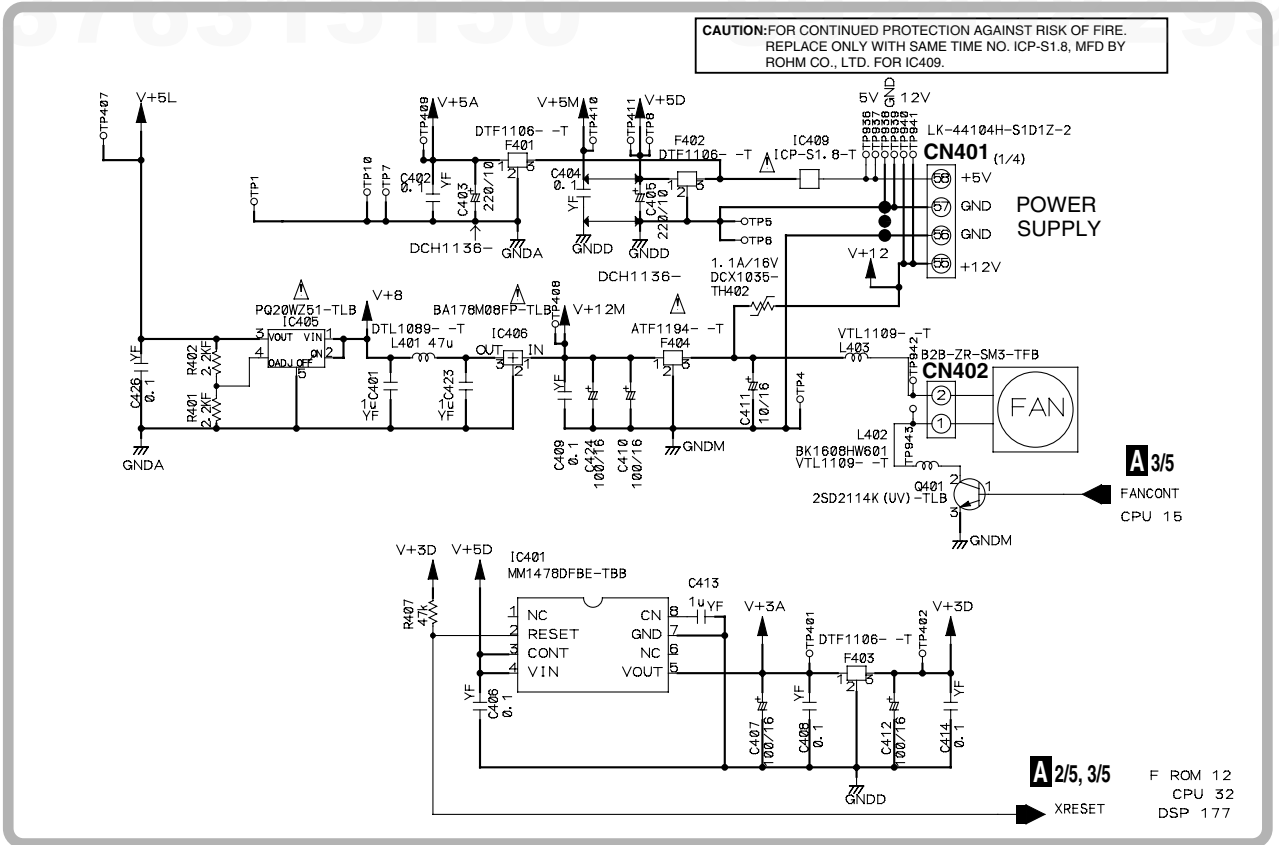
### 3.6 DVR R4 MAIN ASSY (4/5)

A  
B  
C  
D  
E  
F





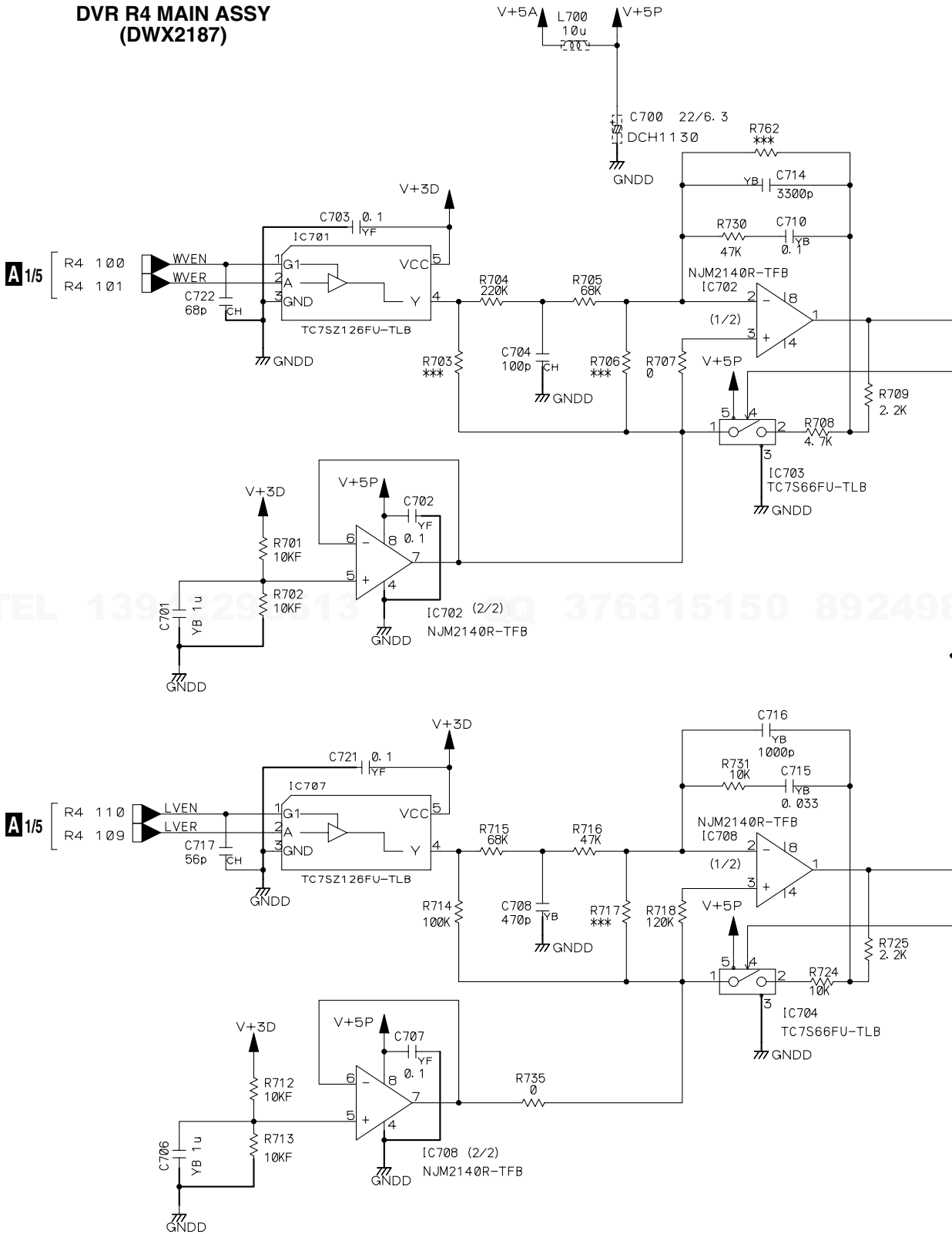
The power supply is shown with the marked box.



### 3.7 DVR R4 MAIN ASSY (5/5)

# A 5/5

## DVR R4 MAIN ASSY (DWX2187)



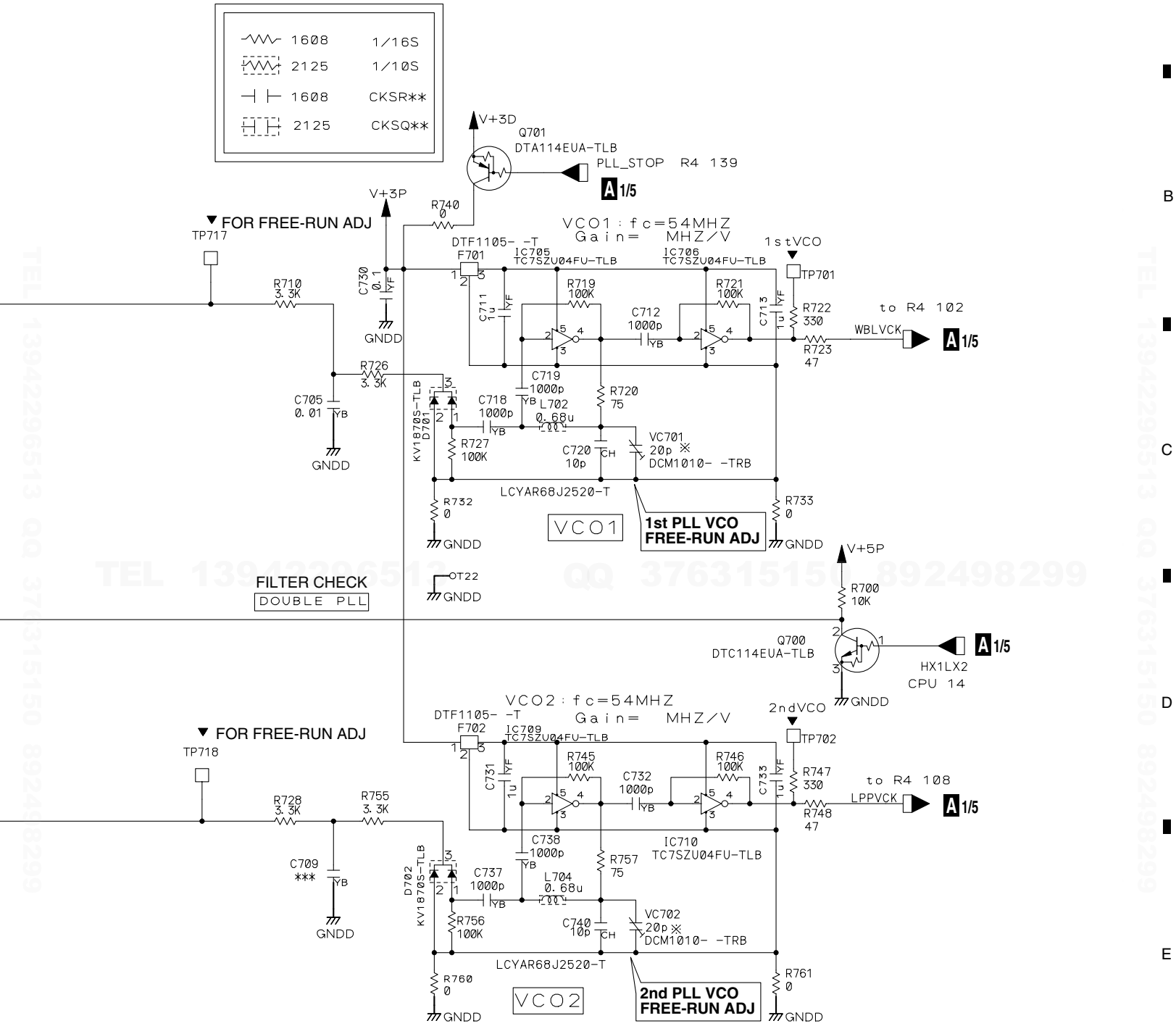
A 1/5

A 1/5

A 5/5

QQ 376315150 892498299

	1608	1/16S
	2125	1/10S
	1608	CKSR**
	2125	CKSQ**



FILTER CHECK  
DOUBLE PLL

1st PLL VCO  
FREE-RUN ADJ

2nd PLL VCO  
FREE-RUN ADJ

TEL 13942296513 QQ 376315150 892498299

TEL 13942296513 QQ 376315150 892498299

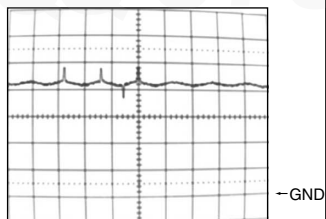
TEL 13942296513 QQ 376315150 892498299

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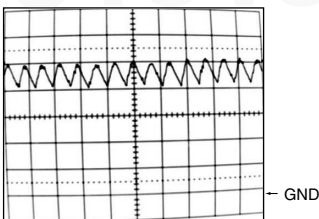
● Waveforms (1/3) Note: The circled numbers denote measuring point in the schematic diagram. (Refer to pages 18 and 19)

A

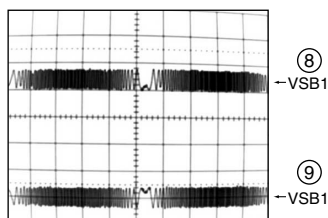
① IC108-Pin 26 (ALPPO)  
V : 500mV/div. H : 5μsec/div.  
(Disc: DVD-R x1 speed)



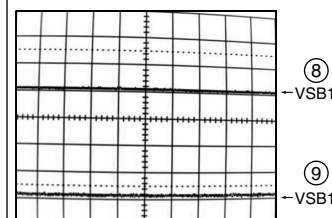
⑤ IC112-Pin 63 (AWOBBLE)  
V : 500mV/div. H : 5μsec/div.  
(Disc: DVD-R x2 speed)  
(Wobble before BPF)



⑧ IC112-Pin 60 (PPALL)  
⑨ IC112-Pin 56 (TE)  
V : 2V/div. H : 2msec/div.  
(Disc: DVD-R Trk open)

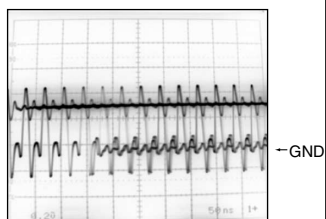


⑧ IC112-Pin 60 (PPALL)  
⑨ IC112-Pin 56 (TE)  
V : 2V/div. H : 2msec/div.  
(Disc: CD-R Trk close)

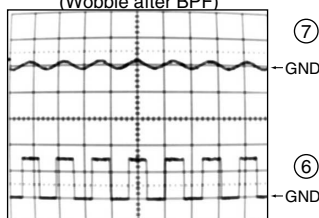


B

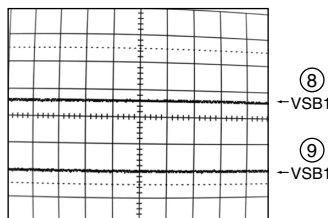
② R125 (XDVSTG)  
V : 2V/div. H : 50nsec/div.  
(Disc: DVD-R x1 speed)



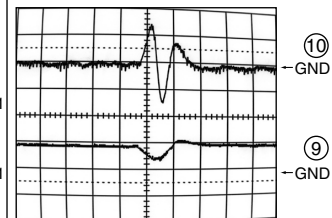
⑥ IC108-Pin 23 (AWBLI)  
⑦ R134 (DWBL)  
V : 2V/div. H : 5μsec/div.  
(Disc: DVD-R x1 speed)  
(Wobble after BPF)



⑧ IC112-Pin 60 (PPALL)  
⑨ IC112-Pin 56 (TE)  
V : 2V/div. H : 2msec/div.  
(Disc: DVD-R Trk close)



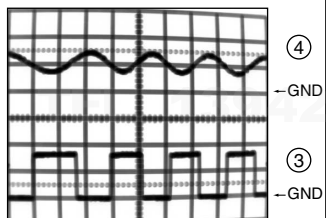
⑨ IC112-Pin 56 (TE)  
⑩ TP952 (TD\_MON)  
V : 500mV/div. H : 200μsec/div.  
(Disc: DVD-R 1Trk Jump Forward)



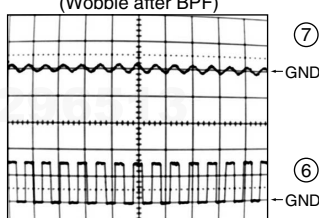
C

③ IC601-pin 134 (TZCOUT)

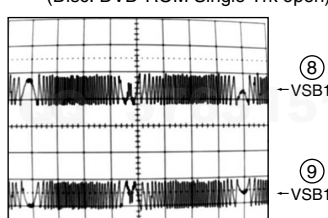
④ IC112-pin 54 (TECIN)  
V : 2V/div. H : 200μsec/div.  
(Disc: CD-ROM Trk open)



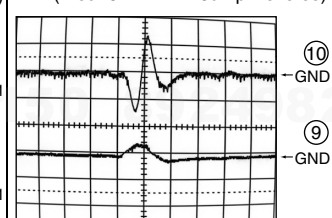
⑥ IC108-Pin 23 (AWBLI)  
⑦ R134 (DWBL)  
V : 2V/div. H : 5μsec/div.  
(Disc: DVD-R x2 speed)  
(Wobble after BPF)



⑧ IC112-Pin 60 (PPALL)  
⑨ IC112-Pin 56 (TE)  
V : 2V/div. H : 2msec/div.  
(Disc: DVD-ROM Single Trk open)



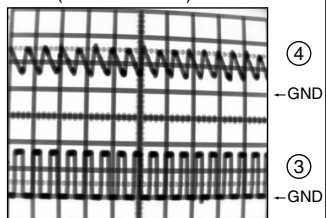
⑨ IC112-Pin 56 (TE)  
⑩ TP952 (TD\_MON)  
V : 500mV/div. H : 200μsec/div.  
(Disc: CD-R 1Trk Jump Reverse)



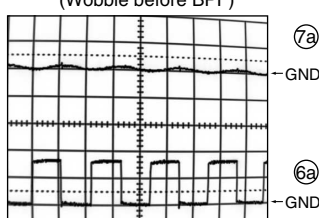
D

③ IC601-pin 134 (TZCOUT)

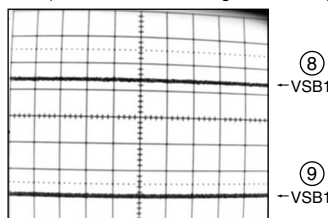
④ IC112-pin 54 (TECIN)  
V : 2V/div. H : 200μsec/div.  
(Disc: CD-ROM)



⑥a IC112-Pin 63 (AWOBBLE)  
⑦b IC112-Pin 64 (WOBBLE)  
V : 2V/div. H : 5μsec/div.  
(Disc: CD-R x4 speed)  
(Wobble before BPF)



⑧ IC112-Pin 60 (PPALL)  
⑨ IC112-Pin 56 (TE)  
V : 2V/div. H : 2msec/div.  
(Disc: DVD-ROM Single Trk close)

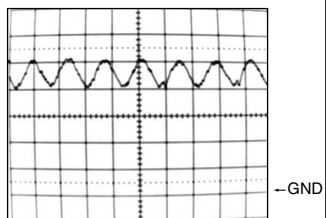


⑨ IC112-Pin 56 (TE)  
⑩ TP952 (TD\_MON)  
V : 500mV/div. H : 200μsec/div.  
(Disc: DVD-R 1Trk Jump Forward)

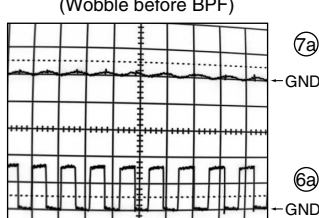


E

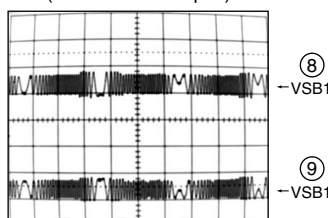
⑤ IC112-Pin 63 (AWOBBLE)  
V : 500mV/div. H : 5μsec/div.  
(Disc: DVD-R x1 speed)  
(Wobble before BPF)



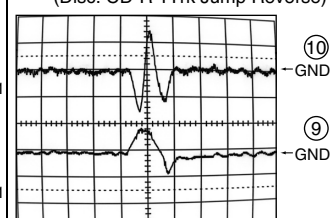
⑥a IC112-Pin 63 (AWOBBLE)  
⑦b IC112-Pin 64 (WOBBLE)  
V : 2V/div. H : 5μsec/div.  
(Disc: CD-R x8 speed)  
(Wobble before BPF)



⑧ IC112-Pin 60 (PPALL)  
⑨ IC112-Pin 56 (TE)  
V : 2V/div. H : 2msec/div.  
(Disc: CD-R Trk open)

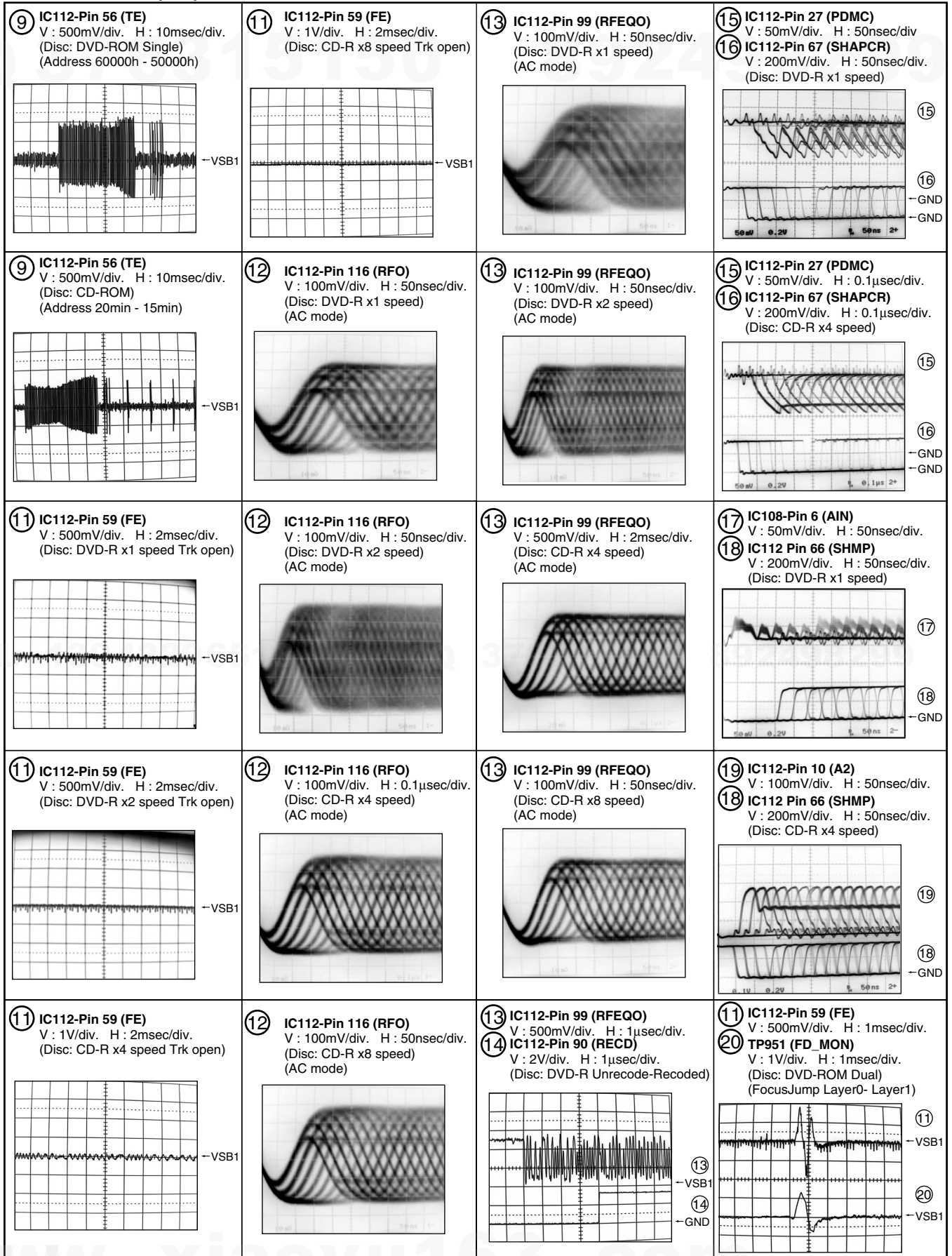


⑨ IC112-Pin 56 (TE)  
⑩ TP952 (TD\_MON)  
V : 500mV/div. H : 200μsec/div.  
(Disc: CD-R 1Trk Jump Reverse)



F

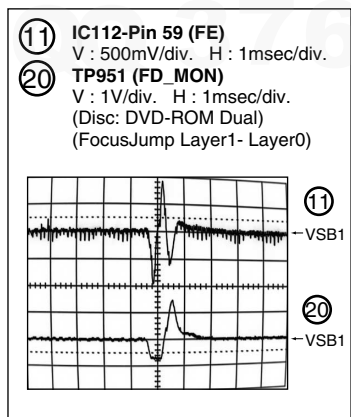
● Waveforms (2/3) Note: The encircled numbers denote measuring point in the schematic diagram. (Refer to pages 18 and 19)



### ● Waveforms (3/3)

Note: The encircled numbers denote measuring point in the schematic diagram. (Refer to pages 18 and 19)

A



B

C

D


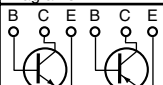

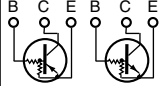

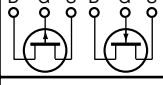

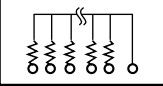

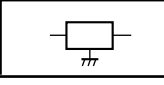
E

F

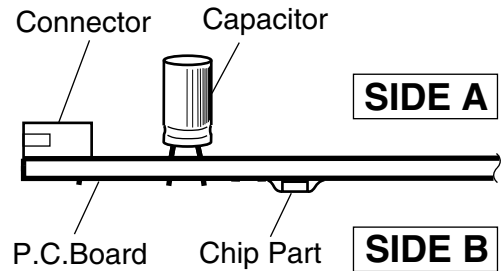
## 4. PCB CONNECTION DIAGRAM

### NOTE FOR PCB DIAGRAMS :

1. Part numbers in PCB diagrams match those in the schematic diagrams.
2. A comparison between the main parts of PCB and schematic diagrams is shown below.

Symbol In PCB Diagrams	Symbol In Schematic Diagrams	Part Name
		Transistor
		Transistor with resistor
		Field effect transistor
		Resistor array
		3-terminal regulator

3. The parts mounted on this PCB include all necessary parts for several destinations.  
For further information for respective destinations, be sure to check with the schematic diagram.
4. View point of PCB diagrams.



# 4.1 DVR R4 MAIN ASSY

**SIDE A**

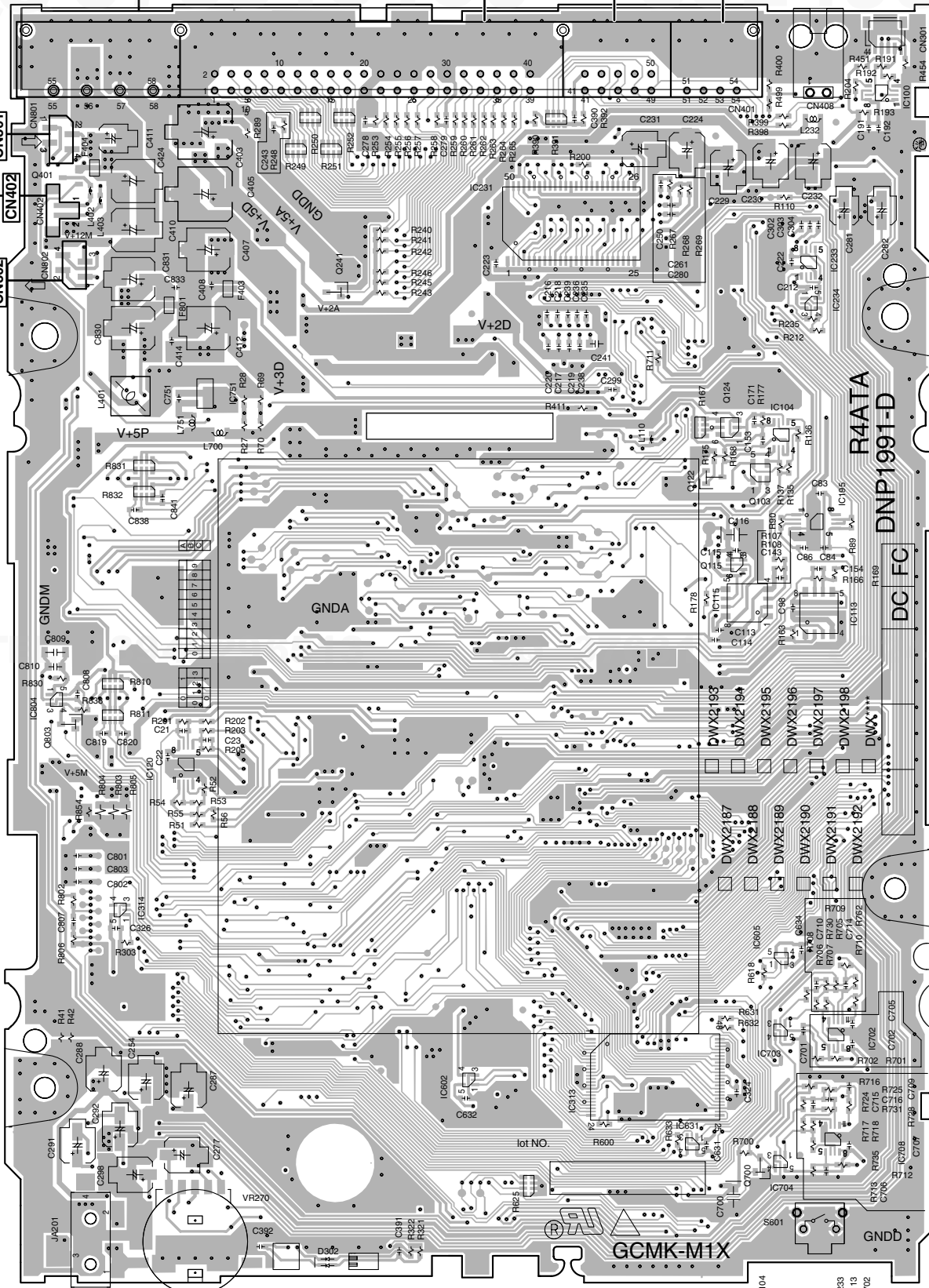
**A DVR R4 MAIN ASSY**

ATAPI INTERFACE

AUDIO OUT

POWER SUPPLY

SLIDER MOTOR  
FAN TILT MOTOR  
FAN MOTOR



(DNP191-D)

IC804 IC803 IC314 IC120 IC751 IC602 IC231 IC313 IC681 IC115 IC703 IC605 IC104 IC704 IC195 IC234 IC233 IC702 IC708 IC100

Q401 Q803 Q241 Q115 Q122 Q124 Q700 Q103

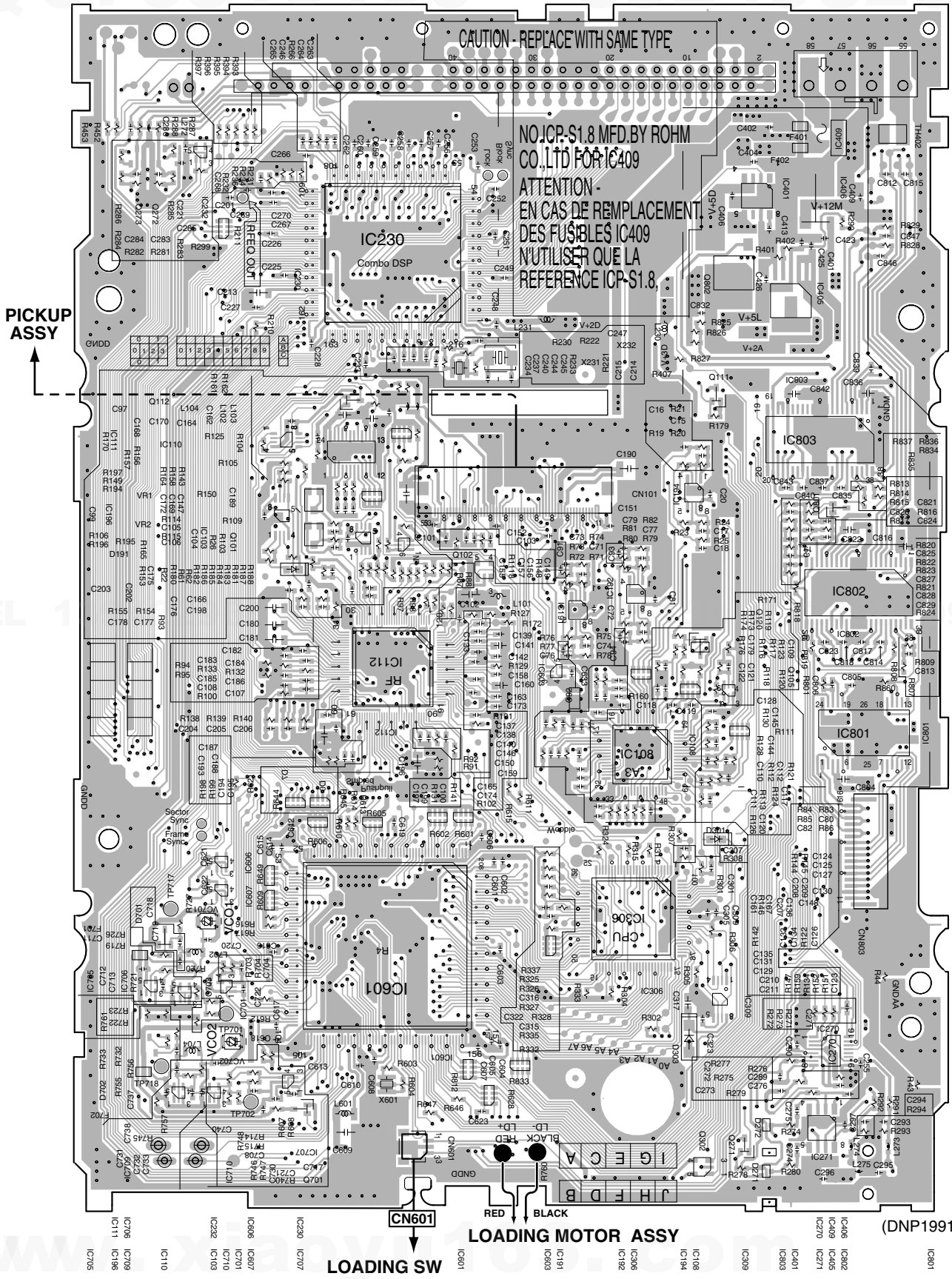
**A**

DVR-104



# A DVR R4 MAIN ASSY

SIDE B



PICKUP ASSY

CAUTION - REPLACE WITH SAME TYPE

NO.ICP-S1.8 MFD.BY ROHM  
 CO.LTD FOR IC409  
 ATTENTION -  
 EN CAS DE REMPLACEMENT  
 DES FUSIBLES IC409  
 N'UTILISER QUE LA  
 REFERENCE ICP-S1.8.

IC230  
Combo DSP

IC803

IC802

IC801

IC112

IC306  
CPU

IC601

IC602

LOADING SW

LOADING MOTOR ASSY

(DNP1991-D)

DVR-104

- IC705
- IC706
- IC707
- IC708
- IC709
- IC710
- IC711
- IC712
- IC713
- IC714
- IC715
- IC716
- IC717
- IC718
- IC719
- IC720
- IC721
- IC722
- IC723
- IC724
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- IC737
- IC738
- IC739
- IC740
- IC741
- IC742
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- IC744
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- IC761
- IC762
- IC763
- IC764
- IC765
- IC766
- IC767
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- IC780
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- IC810
- IC811
- IC812
- IC813
- IC814
- IC815
- IC816
- IC817
- IC818
- IC819
- IC820
- IC821
- IC822
- IC823
- IC824
- IC825
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- IC828
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- IC830
- IC831
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- IC833
- IC834
- IC835
- IC836
- IC837
- IC838
- IC839
- IC840
- IC841
- IC842
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- IC844
- IC845
- IC846
- IC847
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- IC849
- IC850
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- IC866
- IC867
- IC868
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- IC879
- IC880
- IC881
- IC882
- IC883
- IC884
- IC885
- IC886
- IC887
- IC888
- IC889
- IC890
- IC891
- IC892
- IC893
- IC894
- IC895
- IC896
- IC897
- IC898
- IC899
- IC900

A

## 5. PCB PARTS LIST

NOTES: ● Parts marked by "NSP" are generally unavailable because they are not in our Master Spare Parts List.

● The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

● When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex.1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).

560  $\Omega$   $\rightarrow$  56  $\times 10^1$   $\rightarrow$  561 ..... RD1/4PU  $\overline{561} J$

47k  $\Omega$   $\rightarrow$  47  $\times 10^3$   $\rightarrow$  473 ..... RD1/4PU  $\overline{473} J$

0.5  $\Omega$   $\rightarrow$  R50 ..... RN2H  $\overline{R50} K$

1  $\Omega$   $\rightarrow$  1R0 ..... RS1P  $\overline{1R0} K$

Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62k  $\Omega$   $\rightarrow$  562  $\times 10^1$   $\rightarrow$  5621 ..... RN1/4PC  $\overline{5621} F$

### Mark No. Description Part No.

#### LIST OF ASSEMBLIES

1..DVR R4 MAIN ASSY DWX2187

### Mark No. Description Part No.

#### **A** DVR R4 MAIN ASSY

#### SEMICONDUCTORS

IC191, IC192	AD8062ARM
IC406	BA178M08FP
IC271	BH3544F
IC309	BR9016RFV
IC110	EL6287CU
IC409 (1.8A)	ICP- S1.8
IC231	K4S161622D-TC60
IC803	LA6562
IC802	LA6571
IC801	LB11995
IC313	M29W400BT70N1
IC306	M37911FGMHP
IC401	MM1478DFBE
IC702, IC708	NJM2140R
IC120, IC195, IC196	NJM3414AV

IC113, IC115	NJM4558MD
IC270	PCM1748E
IC601	PE5264A
IC108	PM0032AF
IC405	PQ20WZ51
IC703, IC704	TC7S66FU
IC314	TC7SET08FU
IC602	TC7SZ02FU
IC631	TC7SZ08FU
IC701, IC707	TC7SZ126FU
IC603, IC605	TC7SZ32FU
IC705, IC706, IC709, IC710	TC7SZU04FU
IC103, IC104	TC7W53FU
IC111	TC7WH08FU
IC112	UPC3300GC-9EV

IC230	UPD63600GM-8EV
Q802	2SB1182
Q122	2SC2412K
Q272, Q273, Q401	2SD2114K
Q111, Q701	DTA114EUA
Q271	DTA144EUA

### Mark No. Description Part No.

Q700	DTC114EUA
Q112, Q241	DTC124EUA
Q105, Q115	HN1B04FU
Q124	IMT2A

Q102, Q103, Q302	RN1502
Q101	RN2902
D191	1SS355
D303	EC10QS04
D701, D702	KV1870S

D302	SML- 521MDW
TH402	DCX1035

#### COILS AND FILTERS

F404	ATF1194
F701, F702	DTF1105
F401- F403, F801	DTF1106
L104	DTL1088
L401	DTL1089
L230, L232, L700	LCYA100J2520
L702, L704	LCYAR68J2520
L101	OTL1009
L272- L275	QTL1011
L110	VTL1080
L102	VTL1084
L402, L403	VTL1109

#### SWITCHES

S601	DSG1047
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#### CAPACITORS

C720, C740	CCSRCH100D50
C138- C140, C142, C146, C220	CCSRCH101J50
C235, C704	CCSRCH101J50
C106	CCSRCH120J50
C243	CCSRCH181J50
C147, C169, C172	CCSRCH221J50
C201	CCSRCH270J50
C238, C828	CCSRCH271J50
C302- C304, C84, C86	CCSRCH390J50
C168	CCSRCH470J50
C163, C165, C207, C708	CCSRCH471J50
C105	CCSRCH4R0C50
C717	CCSRCH560J50
C166	CCSRCH5R0C50
C722, C824, C91- C94	CCSRCH680J50
C71, C74, C77, C80	CCSRCH6R0D50
C281, C282, C411	CEV100M16
C407, C410, C412, C424	CEV101M16

<u>Mark No.</u>	<u>Description</u>	<u>Part No.</u>	<u>Mark No.</u>	<u>Description</u>	<u>Part No.</u>
C830, C831 C229- C232, C254, C277		CEV101M16 CEV470M6R3	C403, C405 (220/10V) C102, C180, C181, C189, C190 (10/10V)		DCH1136 DCH1148
C287, C288, C291, C292, C298 C241 C160, C164, C170, C317, C804 C816, C822, C836, C842 C141		CEV470M6R3 CKSQYF155Z16 CKSQYF225Z16 CKSQYF225Z16 CKSQYF475Z10	C193, C196, C200, C213 (10/10V) VC701, VC702N (20p)		DCH1148 DCM1010
			<b>RESISTORS</b>		
C136, C269, C272, C273, C322 C712, C716, C718, C719, C732 C737, C738 C107, C198, C203, C271, C299 C301, C307, C316, C705, C839		CKSRYB102K50 CKSRYB102K50 CKSRYB102K50 CKSRYB103K50 CKSRYB103K50	R160 R211 R628 R125, R150, R332, R391 R601, R602, R605, R606, R609		RAB4C0R0J RAB4C101J RAB4C102J RAB4C103J RAB4C103J
C100, C109, C120, C126 C144, C145, C173- C175 C177, C178, C195, C199, C239 C246, C255, C265, C276 C289, C290, C710, C801- C803		CKSRYB104K25 CKSRYB104K25 CKSRYB104K25 CKSRYB104K25 CKSRYB104K25	R625, R649, R810, R831 R832 R118, R811, R812, R833 R249- R252 R111		RAB4C103J RAB4C153J RAB4C223J RAB4C330J RAB4C472J
C805, C827 C701, C706 C283, C284 C236 C218		CKSRYB104K25 CKSRYB105K6R3 CKSRYB122K50 CKSRYB154K10 CKSRYB222K50	R167 R803- R805 R231, R234, R308, R701, R702 R712, R713, R825, R827 R108		RAB4C560J RS1/10S1R0J RS1/16S1002F RS1/16S1002F RS1/16S1802F
C216 C118, C119, C135, C217, C219 C108, C183, C184, C268, C714 C813, C819, C820, C838, C841 C715		CKSRYB223K50 CKSRYB224K10 CKSRYB332K50 CKSRYB332K50 CKSRYB333K16	R307, R401, R402 R107 VR2 (4.7K) VR1 (4.7K) VR270 (10k)		RS1/16S2201F RS1/16S6801F ACP1091 ACP1092 DCP1080
C185, C186 C124, C125, C129, C134, C148 C263, C264 C806 C110- C112, C117		CKSRYB334K10 CKSRYB472K50 CKSRYB472K50 CKSRYB473K16 CKSRYB473K50	Other Resistors		RS1/16S ### J
			<b>OTHERS</b>		
C128, C132, C158, C161, C167 C194 C131 C814, C817, C818, C823, C835 C837, C840, C843		CKSRYB474K10 CKSRYB474K10 CKSRYB681K50 CKSRYB682K50 CKSRYB682K50	CN402 (CONNECTOR 2P) JA201 (MINI JACK) CN101 (53P CONNECTOR) CN601 (3P CONNECTOR) CN301 (4P CONNECTOR)		B2B-ZR-SM3 DKN1123 DKN1210 DKN1220 DKN1221
C101, C103, C104, C113- C115 C121- C123, C127, C130, C133 C137, C143, C151- C153, C155 C159, C162, C171, C176, C182 C187, C188, C197, C22, C223		CKSRYF104Z25 CKSRYF104Z25 CKSRYF104Z25 CKSRYF104Z25 CKSRYF104Z25	X231 (16.93MHz) X601 (27MHz) CN401 (LK CONNECTOR) CN803 (16P CONNECTOR) CN801, CN802 (4P CONNECTOR)		DSS1107 DSS1129 LK- 44104H-S1D1Z-2 SFW16R-2ST VKN1490
C225- C228, C233, C234, C237 C240, C244, C245, C247- C249 C251- C253, C256- C260, C262 C266, C267, C270, C274, C275 C285, C286, C295- C297, C305		CKSRYF104Z25 CKSRYF104Z25 CKSRYF104Z25 CKSRYF104Z25 CKSRYF104Z25			
C309, C315, C323, C324, C326 C391, C392, C402, C404, C406 C408, C409, C414, C426 C601- C608, C610, C612- C619 C623, C631- C634, C702, C703		CKSRYF104Z25 CKSRYF104Z25 CKSRYF104Z25 CKSRYF104Z25 CKSRYF104Z25			
C707, C72, C721, C730, C807 C81, C812, C815, C825, C829 C83, C832, C833, C846, C847 C97- C99 C150, C401, C413, C423, C711		CKSRYF104Z25 CKSRYF104Z25 CKSRYF104Z25 CKSRYF104Z25 CKSRYF105Z10			
C713, C731, C733 C293, C294 C116, C700 (22/6.3V)		CKSRYF105Z10 CKSRYF224Z16 DCH1130			

## 6. ADJUSTMENT

### ● Adjustment Items

Perform the adjustment of this model in the order as shown below.

### Adjustment and confirmation of the main unit

#### 6.2 Adjustment

##### Initial Setting

##### 6.2.1 VCO Free-running Adjustment

[1st PLL Adjustment]

[2nd PLL Adjustment]

##### 6.2.2 BPF Center frequency Adjustment / Wobull Delay Adjustment

##### 6.2.3 Power Adjustment

###### (1) DVD Power Adjustment

###### (1.1) Playback Power Adjustment

###### (1.2) Recording Power Adjustment

[Write Power Low Adjustment]

[Write Power High Adjustment]

[Erase Power Low Adjustment]

[Erase Power High Adjustment]

###### (2) CD Power Adjustment

###### (2.1) Playback Power Adjustment

###### (2.2) Recording Power Adjustment

[Write Power Low Adjustment]

[Write Power High Adjustment]

[Erase Power Low Adjustment]

[Erase Power High Adjustment]

[Erase Power APC Low Adjustment]

[Erase Power APC High Adjustment]

[Peak Power Low Adjustment]

[Peak Power High Adjustment]

##### 6.2.4 Radial Tilt Circuit Adjustment

##### 6.2.5 Focus Position Adjustment

[DVD-ROM (Single) Adjustment]

[DVD-ROM (Dual) Adjustment]

[Focus Position Adjustment of Layer 0]

[Focus Position Adjustment of Layer 1]

##### 6.2.6 Playback Ability Confirmation

##### 6.2.7 Recording Ability Confirmation

Note:

When Traverse Mechanism Assy-S is replaced, adjustment of the mechanism section is not required because of it's

### ● Measuring Instruments and Tools Use disc

- DVD-ROM (Single) disc ..... (GGV1035)
- DVD-ROM (Dual) disc ..... (GGV1036)
- New DVD-R disc. .... (GGV1049)
- New DVD-RW disc ..... (GGV1050)
- CD-ROM and CD-DA disc ..... (GGV1054)
- New CD-R disc ..... (GGX1011)
- New CD-RW disc ..... (GGV1053)
- Recorded DVD-R disc ..... (GGV1064)
- Recorded DVD-RW disc ..... (GGV1044)
- Recorded CD-R disc ..... (GGV1067)
- Recorded CD-RW disc ..... (GGV1066)

### Measuring instruments

- Digital multimeter
- Oscilloscope (with monitor output)
- Light power meter ..... TQ8210 or equivalent
- Jitter meter ..... KJM6765S or equivalent

### Control

- DOS-V Personal computer  
(for command transmission : RS-232C port)
- General-purpose communication software
- communication jig board ..... (GGF1354)

### Others

- Adjustment screwdriver

● Adjustment Points and Their Names

- VC701 : 1st PLL adjustment
- VC702 : 2nd PLL adjustment
- VR1: DVD playback power adjustment
- VR2: CD playback power adjustment

**A** DVR R4 MAIN ASSY

**SIDE B**

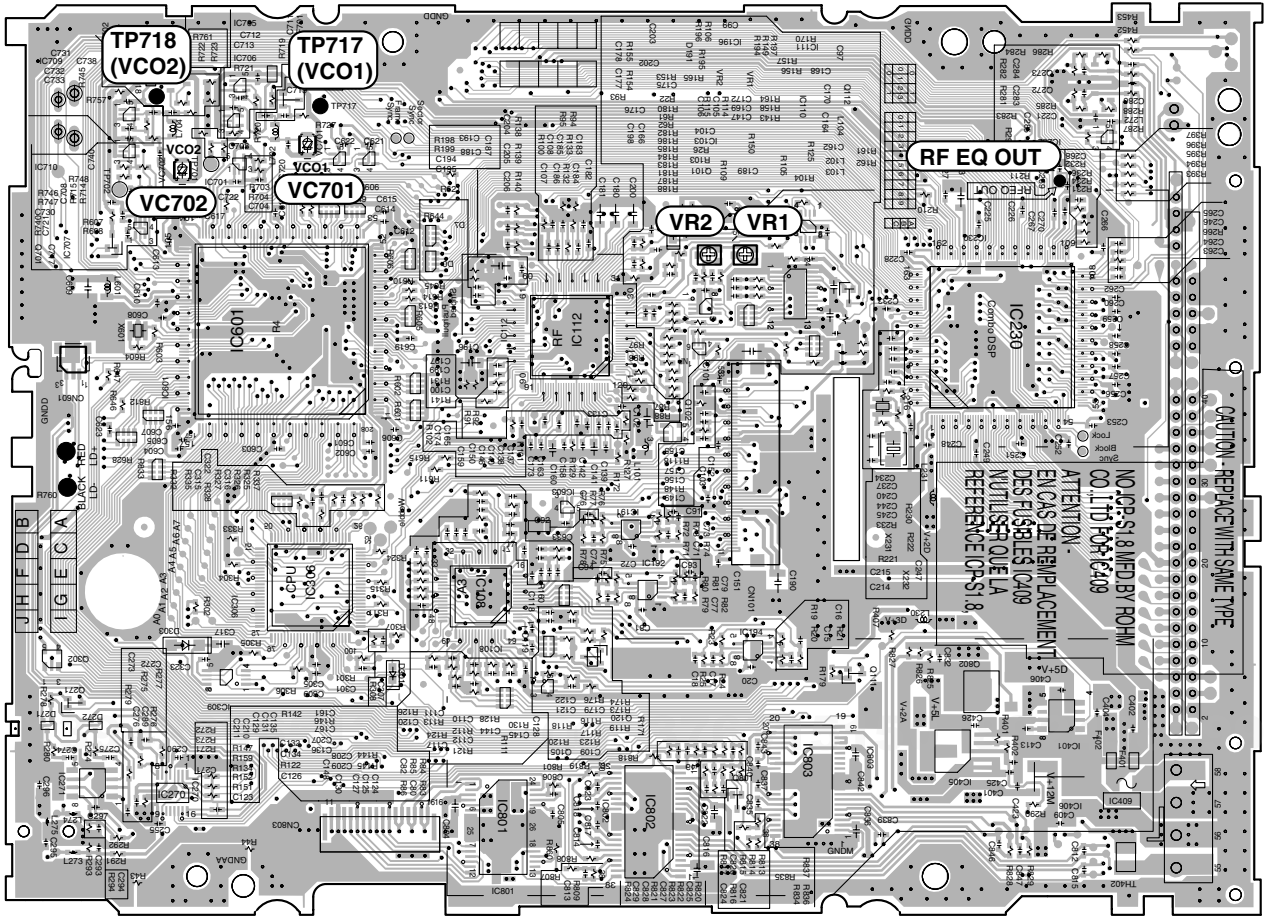


Fig.1 Adjustment point

● NECESSARY ADJUSTMENT POINTS

When

Adjustment Points

■ EXCHANGE TRAVERSE MECHA ASSY

Exchange  
TRAVERSE MECHANISM  
ASSY-S



<b>Mechanical point</b>	_____
<b>Electric point</b>	Adjustment and confirmation of the main unit

■ EXCHANGE PCB ASSY

Exchange board  
DVR R4 MAIN ASSY



<b>Mechanical point</b>	_____
<b>Electric point</b>	Adjustment and confirmation of the main unit

## 6.1 TEST MODE

### 6.1.1 Sending Test Mode Commands

To operate this unit directly in Test mode, connect the COM port of the personal computer with CN301 in the DVR R4 MAIN Assy via interface.

To send commands, use RS-232C general-purpose communication software (e.g. WTERM, CCT). Communication protocols are as follows:

Baud rate : 38400 (fixed)  
 Character length : 8 bit  
 Stop bit : 1 bit  
 Parity : none  
 Flow control : none  
 Others : LSB 1st

#### A R4 MAIN ASSY

SIDE B

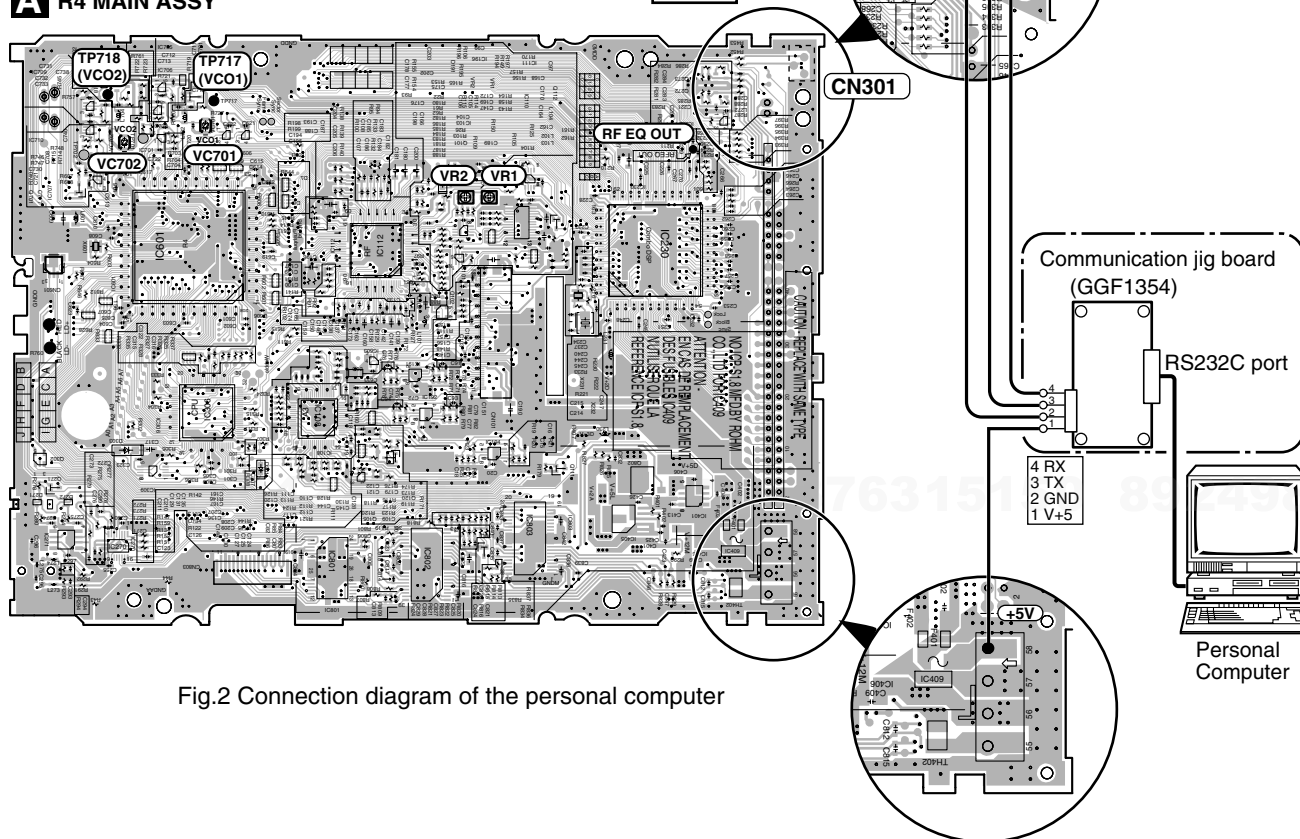


Fig.2 Connection diagram of the personal computer

### 6.1.2 Disc Selection

To set the 4.7GB DVR mode, enter the code "5DT" from the communication software.

This operation calls as "Selects 4.7R mode".

It becomes each disc mode when entering the following codes.

Enter code	Mode
"0DT"	: "Selects CD-ROM mode"
"1DT"	: "Selects CD-R mode"
"2DT"	: "Selects CD-RW mode"
"3DT"	: "Selects DVD-ROM (Single) mode"
"4DT"	: "Selects DVD-ROM (Dual) mode"
"7DT"	: "Selects DVD-RWmode"

## 6.2 ADJUSTMENT



### Initial Setting

Short-circuit with jumper pin at the second (MA and SL) from the right side of the short-pin while looking from the rear side. (Test mode)

Enter code "9AJ". (Taking in command of adjustment initial value.)

**Note:** This command does not need to issue it once again if issued it once. However, perform the Power Adjustment surely afterwards when issued this command.

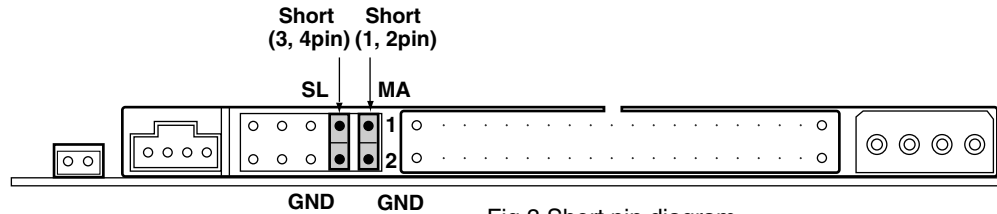


Fig.3 Short pin diagram

### 6.2.1 VCO Free-running Adjustment

<b>Objective</b>	_____		
<b>Symptom when out of adjustment</b>	_____		
<b>Measurement Instrument connections</b>	Connect the digital multimeter to TP717 and TP718.	<b>Player state</b>	POWER ON
<b>Adjustment standard value</b>	[1st PLL adjustment] : $2.5V \pm 0.05V$ [2nd PLL adjustment] : $2.5V \pm 0.05V$	<b>Adjustment location</b>	VC701 and VC702
		<b>Disc</b>	None needed
<b>[Procedure]</b>			
Enter the RS-232C command.			
"5DT" (Selects 4.7R mode)			
"1MS"			
"+124+AS"			
"+0E+DW" (Enter the VCO free-running adjustment mode)			
<b>[1st PLL Adjustment]</b>			
Adjust VC701 so that the voltage of TP717 (periphery of IC602 R3 chip) becomes $2.5V \pm 0.05V$ .			
<b>[2nd PLL Adjustment]</b>			
Adjust VC702 so that the voltage of TP718 becomes $2.5V \pm 0.05V$ .			
"+00+DW" (It escapes from VCO free-running adjustment mode)			

### 6.2.2 BPF Center frequency Adjustment / Wobull Dely Adjustment

<b>Objective</b>	_____		
<b>Symptom when out of adjustment</b>	_____		
<b>Measurement Instrument connections</b>	_____	<b>Player state</b>	POWER ON
<b>Adjustment standard value</b>	_____	<b>Adjustment location</b>	Set the value with the command
		<b>Disc</b>	None needed
<b>[Procedure]</b>			
It is automatic adjustment of only a command without setting a disc.			
"5DT" (Selects 4.7R mode)			
"1XS" (1x Setup)			
"+99200000+FR"			
"2XS" (2x Setup)			
"+99200000+FR"			

## 6.2.3 Power Adjustment

Before adjustment, turn VR1 and VR2 (periphery of CN101) fully counterclockwise to set their laser power output to minimum.

### (1) DVD Power Adjustment

- Set the wavelength of the light power meter to 660 nm, and shine the sensor to the objective lens.

#### (1.1) Playback Power Adjustment

<b>Objective</b>	To optimize the playback power of laser diode (LD).		
<b>Symptom when out of adjustment</b>	When a gap is terrible : Player does not playback, track search is impossible When a gap is light : RF waveform is dirty.		
<b>Measurement Instrument connections</b>	Shine the light emitted from the objective lens on the light power meter sensor. Wavelength 660nm Ave. mode	<b>Player state</b>	STOP
<b>Adjustment standard value</b>	Wavelength 660nm, 1.03 ± 0.03mW (Ave.)	<b>Adjustment location</b>	VR1
		<b>Disc</b>	None needed
<b>[Procedure]</b> "5DT" (Selects 4.7R mode) "LD" (LD ON) Adjust VR1 so that the indication of light power meter becomes 1.03 ± 0.03mW. "LD" (LD OFF) <b>Note:</b> When confirm the output power once again after the Playback Power Adjustment, if indication of the light power meter is limit of 1.03 ± 0.06mW, there is not a problem.			

#### (1.2) Recording Power Adjustment

<b>Objective</b>	To optimize the Recording power of laser diode (LD).		
<b>Symptom when out of adjustment</b>	When a gap is terrible : Player does not playback, track search is impossible When a gap is light : RF waveform is dirty.		
<b>Measurement Instrument connections</b>	Shine the light emitted from the objective lens on the light power meter sensor. Wavelength 660nm Ave. mode	<b>Player state</b>	STOP
<b>Adjustment standard value</b>		<b>Adjustment location</b>	Set the value with the command
		<b>Disc</b>	None needed
<b>[Procedure]</b> <b>[Write Power Low Adjustment]</b> "1AW" Adjust with UP/DN command so that the indication of light power meter becomes 5.34 ± 0.2mW. (When enters the "5UP/5DN", it can send every 5 step.) "EE" (Store the adjustment value in the nonvolatile memory)			



**[Write Power High Adjustment]**

"0AW"

Adjust with UP/DN command so that the indication of light power meter becomes  $10.19 \pm 0.1\text{mW}$ .

"EE" (Store the adjustment value in the nonvolatile memory)

**[Erase Power Low Adjustment]**

"3AW"

Adjust with UP/DN command so that the indication of light power meter becomes  $3.74 \pm 0.1\text{mW}$ .

"EE" (Store the adjustment value in the nonvolatile memory)

**[Erase Power High Adjustment]**

"2AW"

Adjust with UP/DN command so that the indication of light power meter becomes  $6.97 \pm 0.1\text{mW}$ .

"EE" (Store the adjustment value in the nonvolatile memory)

About the following adjustment items, a microcomputer performs automatic adjustment.

**[Write Power Low PD Gain Adjustment]****[Write Power High PD Gain Adjustment]****[Erase Power Low PD Gain Adjustment]****[Erase Power High PD Gain Adjustment]****(2) CD Power Adjustment**

- Set the wavelength of the light power meter to 780 nm, and shine the sensor to the objective lens.

**(2.1) Playback Power Adjustment**

<b>Objective</b>	To optimize the playback power of laser diode (LD).		
<b>Symptom when out of adjustment</b>	When a gap is terrible : Player does not playback, track search is impossible When a gap is light : RF waveform is dirty.		
<b>Measurement Instrument connections</b>	Shine the light emitted from the objective lens on the light power meter sensor. Wavelength 780nm Ave. mode	<b>Player state</b>	STOP
<b>Adjustment standard value</b>	Wavelength 780nm, $1.44 \pm 0.03\text{mW}$ (Ave.)	<b>Adjustment location</b>	VR2
		<b>Disc</b>	None needed

**[Procedure]**

"0DT" (Selects CD-ROM mode)

"LD" (LD ON)

Adjust VR2 so that the indication of light power meter becomes  $1.44 \pm 0.03\text{mW}$ .

"LD" (LD FF)

Note: When confirm the output power once again after the Playback Power Adjustment, if indication of the light power meter is limit of  $1.44 \pm 0.06\text{mW}$ , there is not a problem.

**(2.2) Recording Power Adjustment**

<b>Objective</b>	To optimize the Recording power of laser diode (LD).		
<b>Symptom when out of adjustment</b>	When a gap is terrible : Player does not Recording, track search is impossible When a gap is light : RF waveform is dirty.		
<b>Measurement Instrument connections</b>	Shine the light emitted from the objective lens on the light power meter sensor. Wavelength 780nm Ave. mode	<b>Player state</b>	STOP
<b>Adjustment standard value</b>		<b>Adjustment location</b>	Set the value with the command
		<b>Disc</b>	None needed
<b>[Procedure]</b>			
<b>[Write Power Low Adjustment]</b>			
"ODT" (Selects CD-ROM mode)			
"1AW"			
Adjust with UP/DN command so that the indication of light power meter becomes $7.47 \pm 0.1\text{mW}$ .			
"EE" (Store the adjustment value in the nonvolatile memory)			
<b>[Write Power High Adjustment]</b>			
"0AW"			
Adjust with UP/DN command so that the indication of light power meter becomes $14.22 \pm 0.1\text{mW}$ .			
"EE" (Store the adjustment value in the nonvolatile memory)			
<b>[Erase Power Low Adjustment]</b>			
"3AW"			
Adjust with UP/DN command so that the indication of light power meter becomes $5.22 \pm 0.1\text{mW}$ .			
"EE" (Store the adjustment value in the nonvolatile memory)			
<b>[Erase Power High Adjustment]</b>			
"2AW"			
Adjust with UP/DN command so that the indication of light power meter becomes $9.72 \pm 0.1\text{mW}$ .			
"EE" (Store the adjustment value in the nonvolatile memory)			
<b>[Peak Power Low Adjustment]</b>			
"5AW"			
Adjust with UP/DN command so that the indication of light power meter becomes $8.82 \pm 0.1\text{mW}$ .			
"EE" (Store the adjustment value in the nonvolatile memory)			
<b>[Peak Power High Adjustment]</b>			
"4AW"			
Adjust with UP/DN command so that the indication of light power meter becomes $10.17 \pm 0.1\text{mW}$ .			
"EE" (Store the adjustment value in the nonvolatile memory)			
About the following adjustment items, a microcomputer performs automatic adjustment.			
<b>[Write Power Low PD Gain Adjustment]</b>			
<b>[Write Power High PD Gain Adjustment]</b>			
<b>[Erase Power Low PD Gain Adjustment]</b>			
<b>[Erase Power High PD Gain Adjustment]</b>			

## 6.2.4 Radial Tilt Circuit Adjustment

<b>Objective</b>	To adjust the target value of tilt servo so that pickup and disc become to be level relatively.		
<b>Symptom when out of adjustment</b>	Playback RF waveform is dirty (Playback jitter is defective).		
<b>Measurement Instrument connections</b>	Connect the total T-jitter meter to RFEQOUT terminal. The equalizer of jitter meter is turned ON. Jitter meter setup DVD: 1 x , CD: 4 x	<b>Player state</b> <b>Adjustment location</b> <b>Disc</b>	PLAY, Tilt servo ON Set the tilt error value with the command input. New DVD-RW disc (GGV1050) Recorded CD-R disc (GGV1067) DVD-ROM (Single) disc (GGV1035) DVD-ROM (Dual) disc (GGV1036)
<b>Adjustment standard value</b>	Playback jitter is minimum.		
<b>[Procedure]</b>			
<b>(1) DVD</b>			
"3TL" (Initialize the tilt)			
<ul style="list-style-type: none"> <li>• Enters code "4TL" in the state that does not clamp a disc.</li> <li>• Calmp the unrecorded DVD-RW disc and enters code "5TL".</li> <li>• Calmp the DVD-ROM (Dual) disc and enters code "6TL".</li> <li>• Calmp the DVD-ROM (Single) disc.</li> </ul>			
"3DT" (Selects DVD-ROM (Single) mode)			
"1XN" (Set the CLV normal speed)			
"+100000+PL" (Search for address 100000h)			
<ul style="list-style-type: none"> <li>• Connect the jitter meter to RFEQOUT.</li> </ul>			
"1TL" (Tilt UP) / "2TL" (Tilt Down). Jitter of T edge looks for the point which becomes the minimum.			
"7TL" (Obtain the TILT TARGET)			
"RJ" (REJECT)			
<ul style="list-style-type: none"> <li>• Clamp the recorded DVD-ROM (Single) disc.</li> </ul>			
"3DT" (Selects DVD-ROM (Single) mode)			
"1XN" (Set the CLV 1th speed)			
"+100000+PL" (Search for address 100000h)			
<ul style="list-style-type: none"> <li>• Connect the jitter meter to RFEQOUT.</li> </ul>			
"1TL" (Tilt UP) / "2TL" (Tilt Down). Jitter of T edge looks for the point which becomes the minimum.			
"7TL" (Obtain the TILT TARGET)			
"RJ" (REJECT)			
<b>(2) CD</b>			
<ul style="list-style-type: none"> <li>• Clamp the Recorded CD-R disc.</li> </ul>			
"1DT" (Selects CD-R mode)			
"+200000+PL" (Search for 20 minutes)			
"2000XN" (Set the 2000RPM_CAV mode)			
"+99400000+FR" (Tilt automatic adjustment.)			
if it ends ("R" is returned)			
"RJ" (REJECT)			

## 6.2.5 Focus Position Adjustment

<b>Objective</b>  <b>Symptom when out of adjustment</b>	To optimize the playback characteristic of the RF signal.  Playback RF waveform is dirty (Playback jitter is defective). REC/PLAY RF waveform is dirty (REC/PLAY jitter is defective).																						
<b>Measurement Instrument connections</b>     <b>Adjustment standard value</b>	Connect the total T-jitter meter to RFEQOUT terminal.  The equalizer of jitter meter is turned OFF.  Jitter meter setup DVD: 1 x , CD: 4 x	<b>Player state</b>  <b>Adjustment location</b>  <b>Disc</b>	PLAY, Tilt servo ON  Set the DAC value with the command input.  CD-ROM and CD-DA disc (GGV1054) Recorded CD-R disc (GGV1067) Recorded CD-RW disc (GGV1066) DVD-ROM (Dual) disc (GGV1036) DVD-ROM (Single) disc (GGV1035) Recorded DVD-R disc (GGV1064) Recorded DVD-RW disc (GGV1044)																				
<p><b>[Procedure]</b></p> <p><b>[DVD-ROM (Single) Adjustment]</b></p> <ul style="list-style-type: none"> <li>Clamp the DVD-ROM (Single) disc.            "3DT" (Selects DVD-ROM (Single) mode)            "#+99070000+FR " (ACT sensitivity adjustment)            Note: Issue the DVD-ROM (Single) disc only.            "1XN" (Set the CLV normal speed)            "+100000+PL" (Search for address 100000h)</li> <li>Connect the jitter meter to RFEQOUT and adjust "+F014 * * 00+FR" command so that the jitter of the both total-T edges become minimum, and focus position will be changed.</li> </ul> <table border="0" data-bbox="105 987 828 1144"> <tr> <td>* * Value to input into</td> <td>Maximum value</td> <td>3f</td> <td>(+63)</td> <td>+33%</td> </tr> <tr> <td></td> <td>Center value</td> <td>01</td> <td>( 1)</td> <td>0%</td> </tr> <tr> <td></td> <td></td> <td>7f</td> <td>( -1)</td> <td></td> </tr> <tr> <td></td> <td>Minimum value</td> <td>40</td> <td>(-64)</td> <td>-33%</td> </tr> </table> <p>"+F0180000+FR" (Store the adjustment value in the nonvolatile memory)          "RJ" (REJECT)          "RS" (RESET)</p> <p><b>[DVD-ROM (Dual) Adjustment]</b>          Adjust the layer 0 and layer 1 of DVD-ROM (Dual) disc together.</p> <p><b>[Focus Position Adjustment of layer 0]</b>          "4DT" (DVD-ROM Dual mode)          "1XN" (Set the CLV normal speed)          "+100000+PL" (Search for address 100000h)          &lt;adjustment &gt;</p> <p><b>[Focus Position Adjustment of layer 1]</b>          "2FC" (Focus Jump UP (layer 0 to layer 1) )          &lt;adjustment &gt;</p> <ul style="list-style-type: none"> <li>Perform the Focus Position Adjustment as same step as in the recorded DVD-R and DVD-RW discs</li> </ul> <p><b>[CD System Adjustment]</b>          "0DT" (CD-ROM mode)          "+99070000+FR" (ACT sensitivity adjustment)          Note: Issue the CD-ROM disc only.          "+200000+PL" (Search for 20 minutes)          "2000XN" (Set the 2000RPM_CAV mode)          "99300000+FR" (Focus Position automatic adjustment )          if it ends ("R" is returned)          "RJ" (REJECT) <li>Perform the Focus Position Adjustment as same step as in the recorded CD-R and CD-RW discs</li> </p>				* * Value to input into	Maximum value	3f	(+63)	+33%		Center value	01	( 1)	0%			7f	( -1)			Minimum value	40	(-64)	-33%
* * Value to input into	Maximum value	3f	(+63)	+33%																			
	Center value	01	( 1)	0%																			
		7f	( -1)																				
	Minimum value	40	(-64)	-33%																			

## 6.2.6 Playback Ability Confirmation

<b>Objective</b>	Confirm that the adjustment was done correctly.		
<b>Measurement Instrument connections</b>	Connect the total T-jitter meter to RFEQOUT terminal.  The equalizer of jitter meter is turned OFF.	<b>Player state</b>	PLAY
<b>Adjustment standard value</b>	jitter is less than 12%.	<b>Adjustment location</b>	None
		<b>Disc</b>	Recorded DVD-R disc (GGV1064) Recorded CD-R disc (GGV1067)

### [Procedure]

#### (1) DVD System

- Clamp the recorded DVD-R disc.
- "5DT" (Selects 4.7R mode)
- "1XN" (Set the CLV normal speed)
- "PL" (PLAY)

Connect the jitter meter to RFEQOUT and measure the jitter of both total-T edges. Confirm that jitter is less than 12%.

- "RJ" (REJECT)
- "RS" (RESET)

#### (2) CD System

- Clamp the recorded CD-R disc.
- "1DT" (Selects CD-R mode)
- "4XN" (Set the CLV 4th speed)
- "PL" (PLAY)
- "+20000000+FR" (TOC information readout, etc.)

Connect the jitter meter to RFEQOUT and measure the jitter of both total-T edges. Confirm that jitter is less than 12%.

- "RJ" (REJECT)
- "RS" (RESET)

## 6.2.7 Recording Ability Confirmation

<b>Objective</b>	Confirm that the adjustment was done correctly.		
<b>Measurement Instrument connections</b>	_____	<b>Player state</b>	PLAY
<b>Adjustment standard value</b>	jitter is less than 12%.	<b>Adjustment location</b>	None
		<b>Disc</b>	New DVD-R disc (GGV1049) New CD-R disc (GGV1011)
<p><b>[Procedure]</b></p> <p><b>(1) DVD System</b></p> <ul style="list-style-type: none"> <li>Clamp the New DVD-R disc.</li> <li>"5DT" (Selects 4.7R mode)</li> <li>"1XN" (Set the CLV normal speed)</li> <li>"PL" (PLAY)</li> <li>"+20000000+FR" (LPP information readout, etc.)</li> <li>"OE" (OPC END SEEK)</li> </ul> <p>Address of result of OPC END SEEK calls as "***** h". Following OW and OR commands enter the address which subtracted 1 from the above address. "11000M" (The initial power which OPC is set as 11mW)</p> <p><b>[A]</b> [ UNDER POWER ERROR :13000M OVER POWER ERROR : 9000M is value set up. ]</p> <p>"+*****+OW" (Perform OPC from the address "***** h") "+*****+OR" (Outputs the OPC result from the address "***** h") If a result is under power error or over power error, it carries out again from "OE" by setup of <b>[A]</b>.</p> <p>"+E00+LN" (Test write the E00h block) "+*****+WR" (Test write. "***** h" is start address and set the physical address.) "RJ" (REJECT)</p> <p>"+*****+PL" (Measure the self recording/playback jitter and confirm that jitter is less than 12%). "RJ" (REJECT) "RS" (RESET)</p> <p><b>(2) CD System</b></p> <ul style="list-style-type: none"> <li>Clamp the New CD-R disc.</li> <li>"1DT" (Selects CD-R mode)</li> <li>"4XN" (Set the CLV 4th speed)</li> <li>"PL" (PLAY)</li> <li>"+20000000+FR" (TOC information readout, etc.)</li> <li>"OE" (OPC END SEEK)</li> </ul> <p>Address of result of OPC END SEEK calls as "***** h" (MSF). Meaning of MSF is minute, second and frame. Following OW and OR commands enter the address which subtracted 5 from the above address. "5LN" (Perform OPC of 5 frames) "10000M" (The initial power which OPC is set as 10mW)</p> <p><b>[B]</b> [ UNDER POWER ERROR :12000M OVER POWER ERROR :8000M is value set up. ]</p> <p>"+*****+OW" (Perform OPC from the address "***** h") "+*****+OR" (Outputs the OPC result from the address "***** h") If a result is under power error or over power error, it carries out again from "OE" by setup of <b>[B]</b>.</p> <p>"+F00+LN" (Test write the F00h frame) "+*****+WR" (Test write. "***** h" is start address and set the MSF.) "RJ" (REJECT)</p> <p>"+*****+PL" (Measure the self recording/playback jitter and confirm that jitter is less than 12%). "RJ" (REJECT)</p>			

## 6.3 Release the Test mode

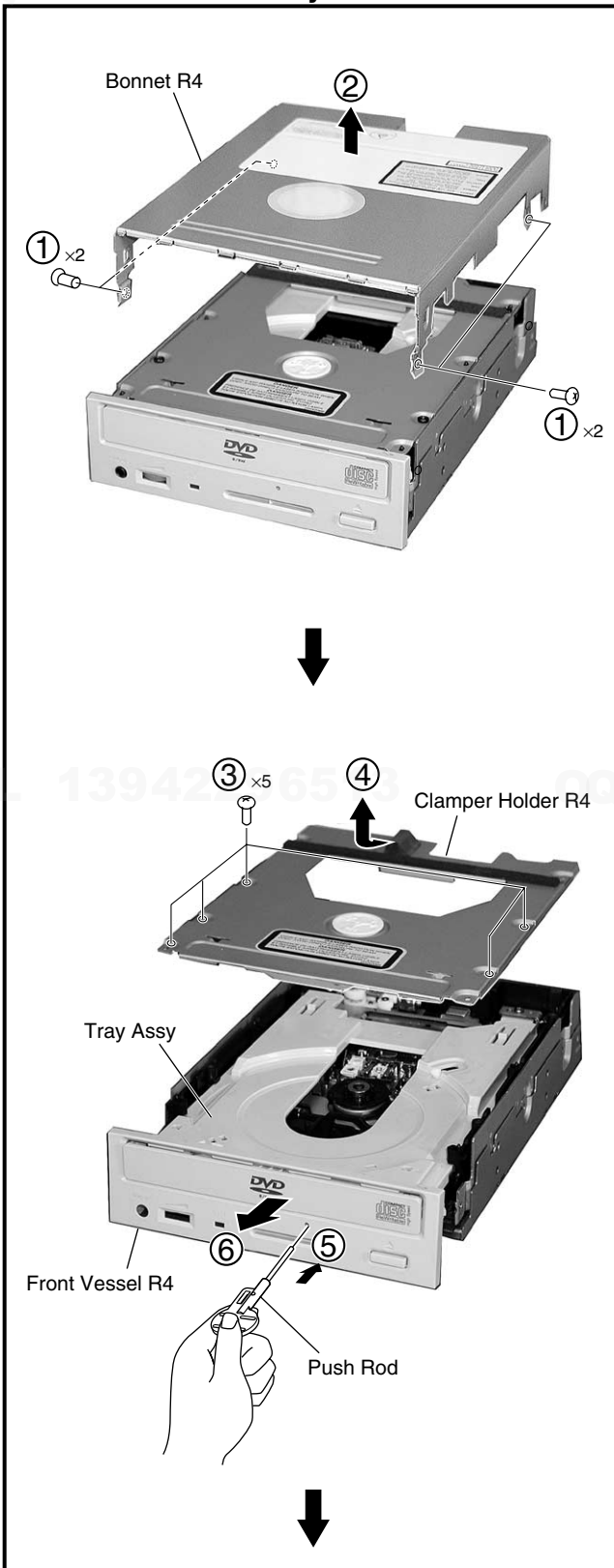
Remove the short-pin which short-circuited in the initial setting, and release the Test mode.

## 7. GENERAL INFORMATION

### 7.1 DIAGNOSIS

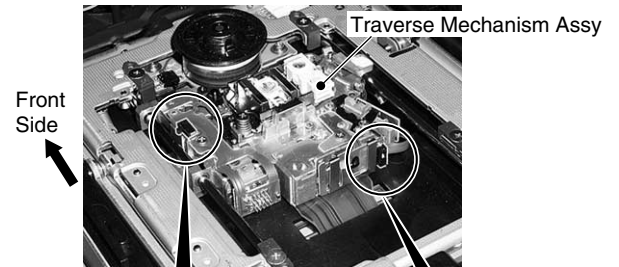
#### 7.1.1 DISASSEMBLY

##### ■ DVR R4 MAIN Assy

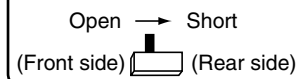


#### Caution:

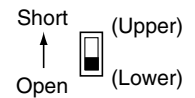
Be sure to turn the CD and DVD short switches to the Short side when you remove the flexible pickup cable.



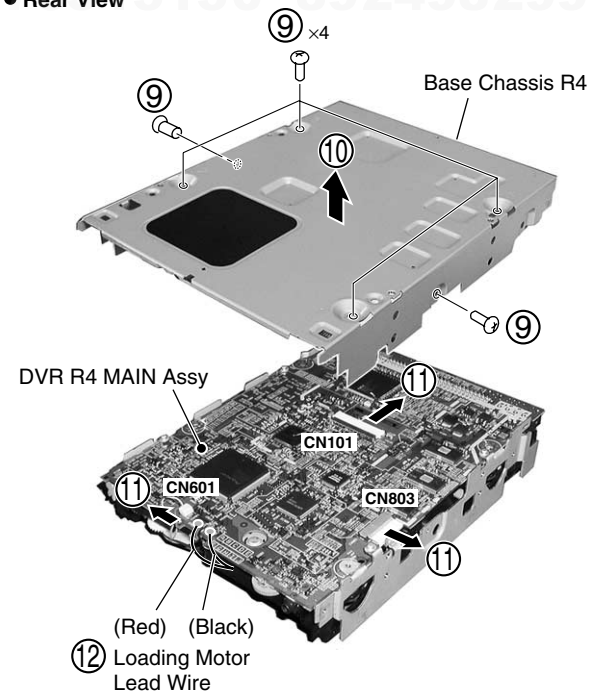
⑦ Turns the CD short SW to Short side.



⑧ Turns the DVD short SW to Short side.

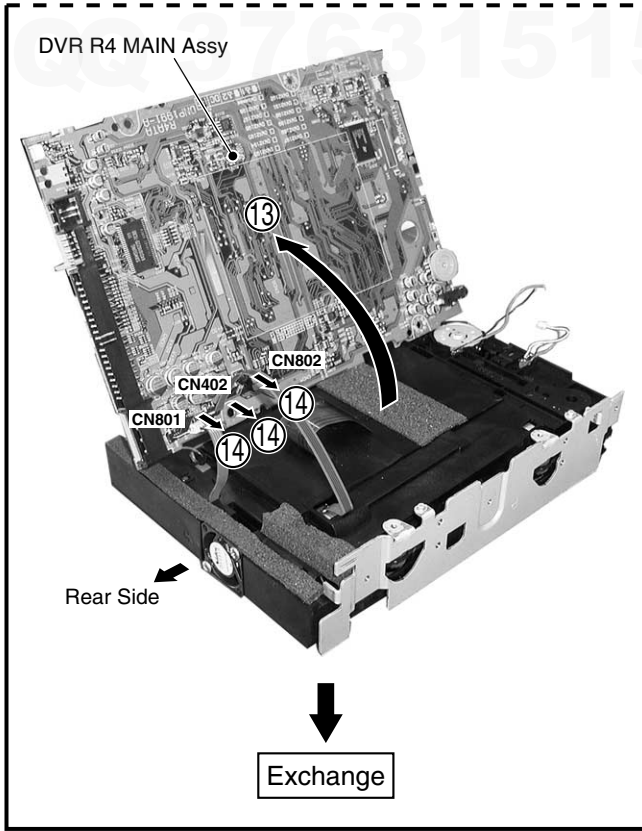
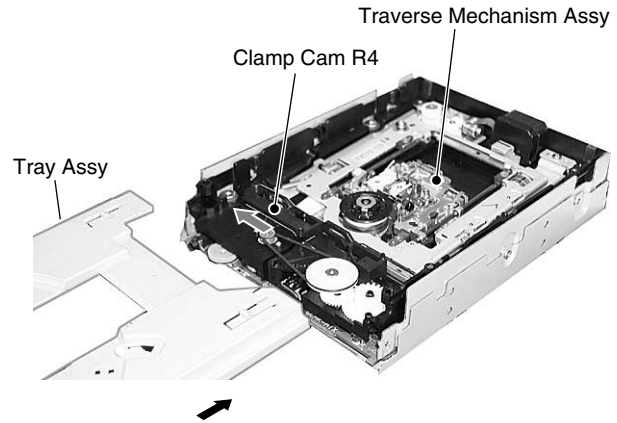


#### ● Rear View

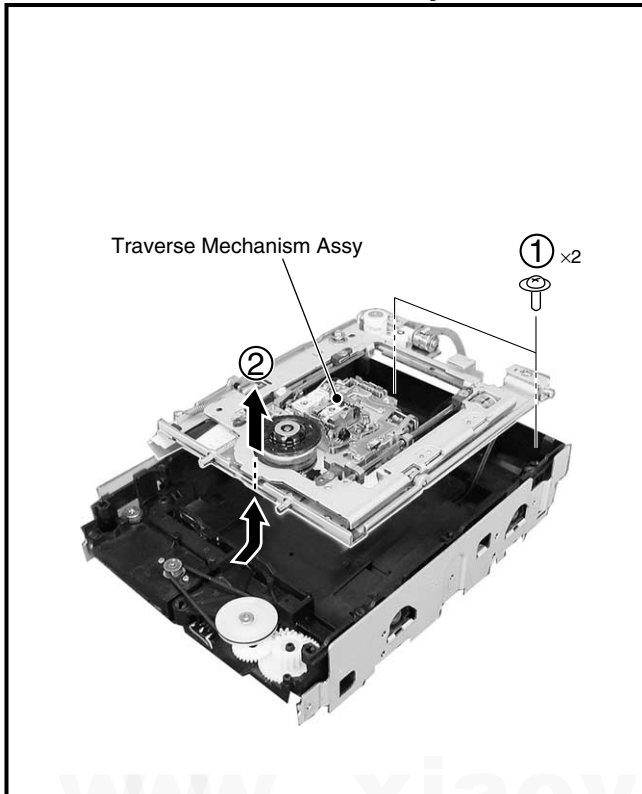


### Caution When Installing the Tray Assy

Confirm the position of Clamp Cam R4 there is in the arrow direction.



### Traverse Mechanism Assy

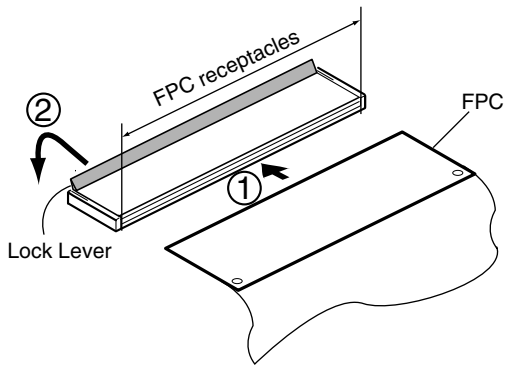




## Caution of the Pickup Flexible Cable

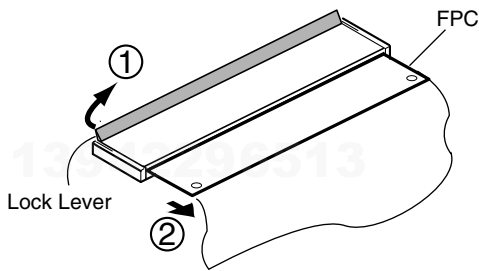
### Connecting

1. Insert the FPC with the conductor side upward. Properly insert it to the slot until it stops.
2. Push down both sides of the Lock Lever until they stop. It cannot be locked with one side only. Imperfection of pushing down may cause unlocking.

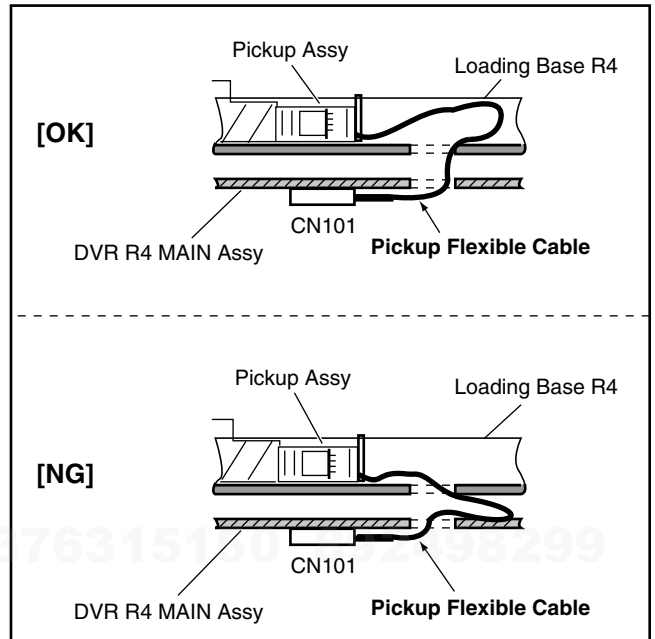
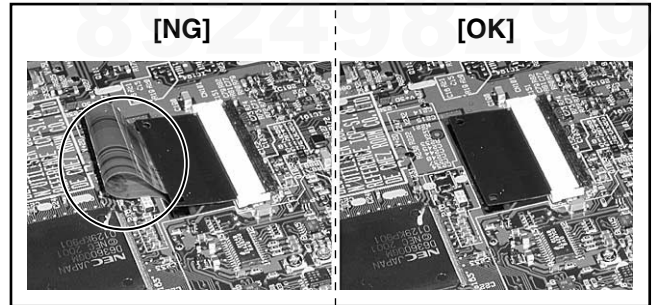


### Disconnecting

1. Pull up the Lock Lever upward.
2. After unlocking, pull out the FPC.



### Styling



## 7.1.2 CLEANING

### [ NOTES ON SERVICING ]

#### CLEARNING

Before shipping out the product, be sure to clean the following positions by using the prescribed cleaning tools:

Position to be cleaned	Cleaning tools
Pickup lenses	Cleaning liquid : GEM1004 Cleaning paper : GED-008

Position to be cleaned	Cleaning tools
Fans	Cleaning paper : GED-008

## 7.2 PARTS

### 7.2.1 IC

The information shown in the list is basic information and may not correspond exactly to that shown in the schematic diagrams.

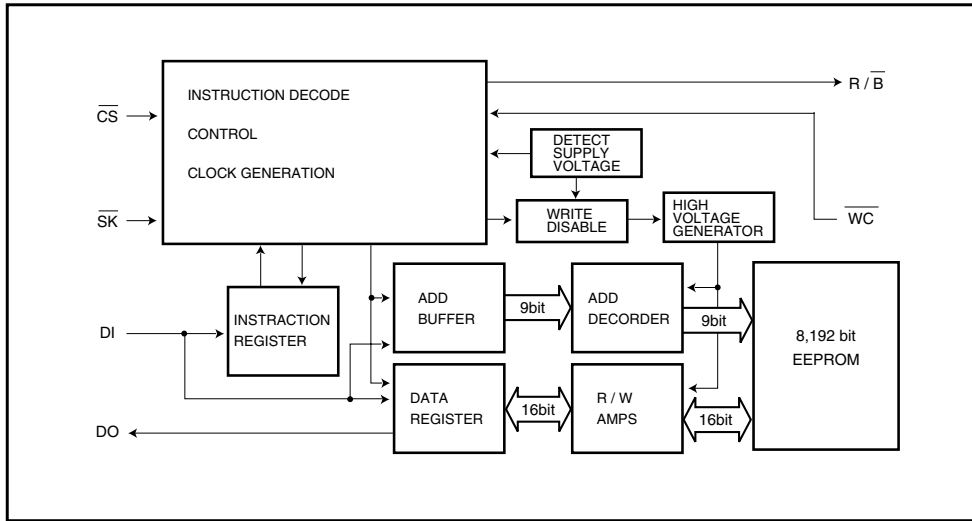
#### List of IC

BR9016RFV, AD8062ARM, PCM1748E, K4S161622D-TC60, M29W400BT70N1, PM0032AF, PE5264A, UPC3300GC-9EV, UPD63600GH-8EV

### BR9016RFV (DVR R4 MAIN ASSY : IC309)

#### EEPROM

#### Block Diagram



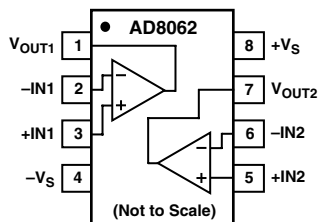
#### Pin Function

Pin No.	Pin name	Function
1	R / $\bar{B}$	READY / BUSY Output
2	V <sub>CC</sub>	Power supply
3	$\bar{CS}$	Chip Select Control
4	$\bar{SK}$	Serial Data Clock Input
5	DI	Op code, address, Serial Data Input
6	DO	Serial Data Output
7	GND	Ground 0V
8	$\bar{WC}$	Write Control Input

### AD8062ARM (DVR R4 MAIN ASSY : IC191, IC192)

#### Dual OP-Amp

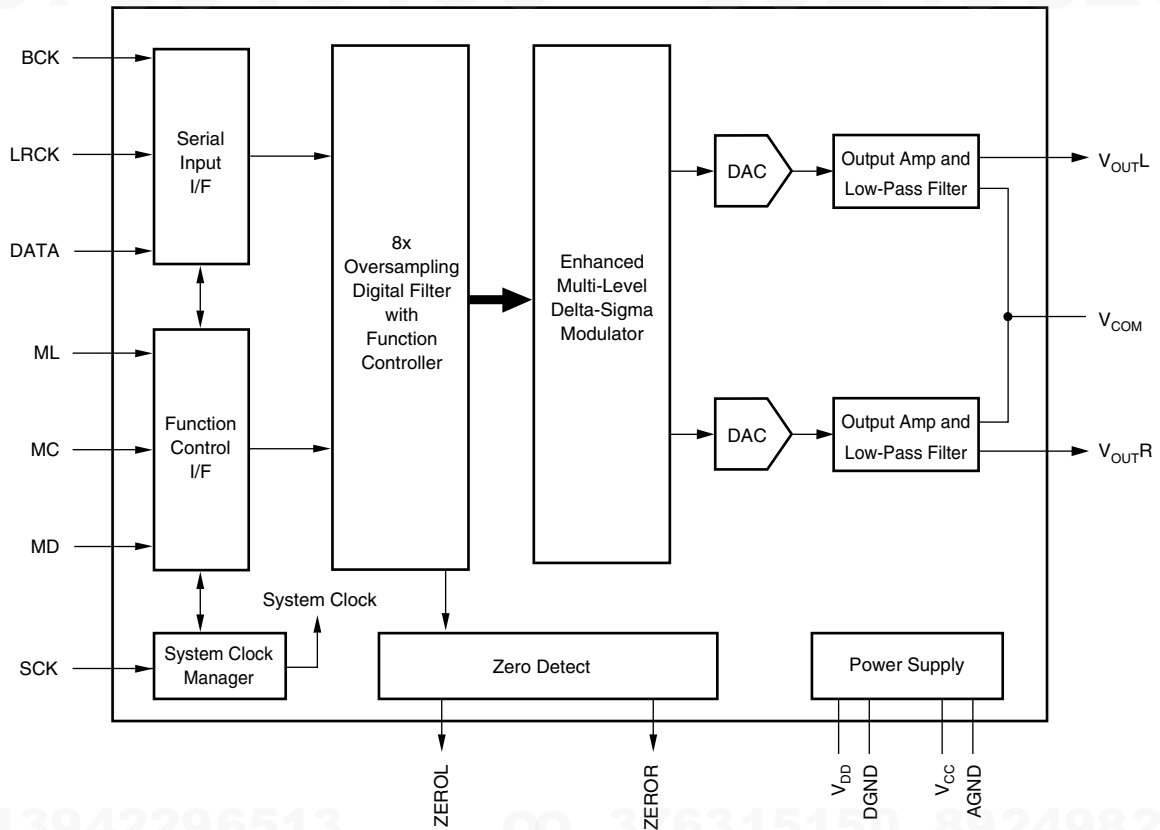
#### Block Diagram



## PCM1748E (DVR R4 MAIN ASSY : IC270)

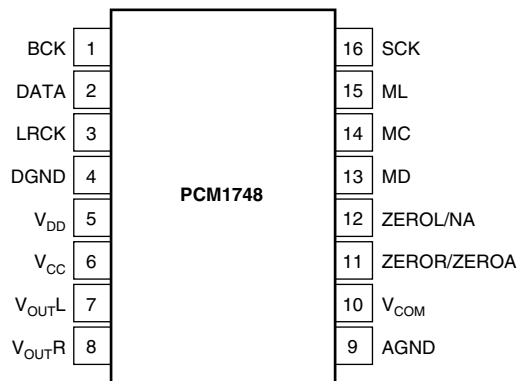
### D/A Converter IC

#### ● Block Diagram



#### ● Pin Assignment

(TOP VIEW)



#### ● Pin Function

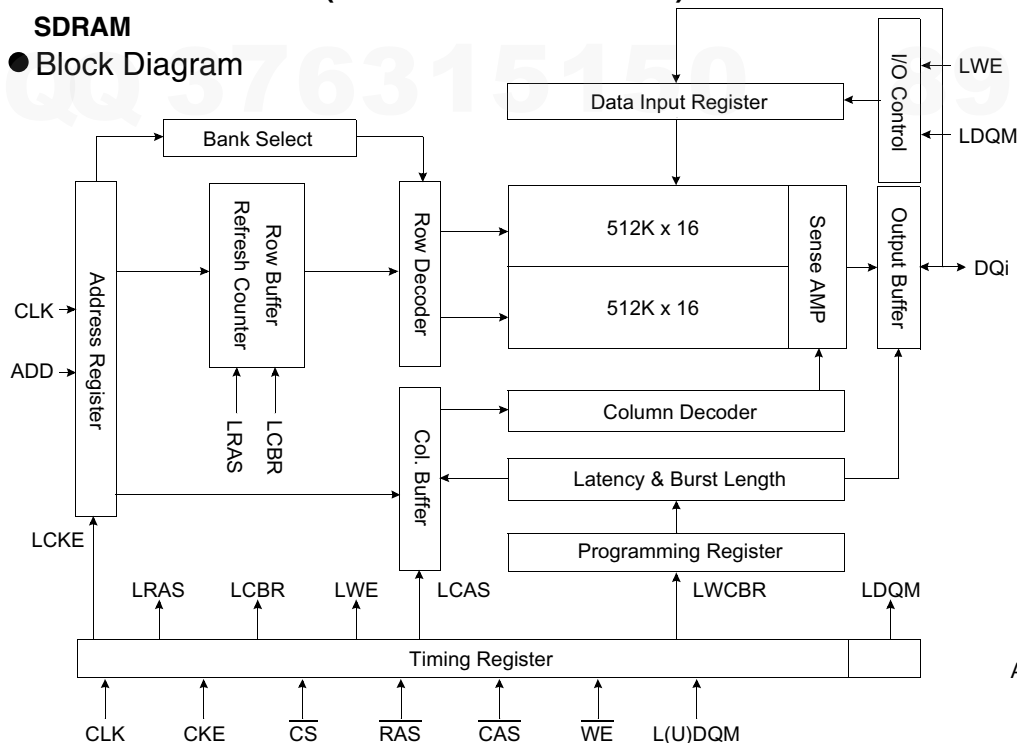
PIN	NAME	TYPE	FUNCTION
1	BCK	IN	Audio Data Bit Clock Input. <sup>(1)</sup>
2	DATA	IN	Audio Data Digital Input. <sup>(1)</sup>
3	LRCK	IN	L-Channel and R-Channel Audio Data Latch Enable Input. <sup>(1)</sup>
4	DGND	-	Digital Ground
5	V <sub>DD</sub>	-	Digital Power Supply, +3.3V
6	V <sub>CC</sub>	-	Analog Power Supply, +5V
7	V <sub>OUTL</sub>	OUT	Analog Output for L-Channel.
8	V <sub>OUTR</sub>	OUT	Analog Output for R-Channel.
9	AGND	-	Analog Ground
10	V <sub>COM</sub>	-	Common Voltage Decoupling.
11	ZEROR/ ZEROA	OUT	Zero Flag Output for R-Channel/Zero Flag Output for L/R-Channel.
12	ZEROL/NA	OUT	Zero Flag Output for L-Channel/No Assign.
13	MD	IN	Mode Control Data Input. <sup>(2)</sup>
14	MC	IN	Mode Control Clock Input. <sup>(2)</sup>
15	ML	IN	Mode Control Latch Input. <sup>(2)</sup>
16	SCK	IN	System Clock Input.

NOTES: (1) Schmitt-trigger input, 5V tolerant. (2) Schmitt-trigger with internal pull-down, 5V tolerant.

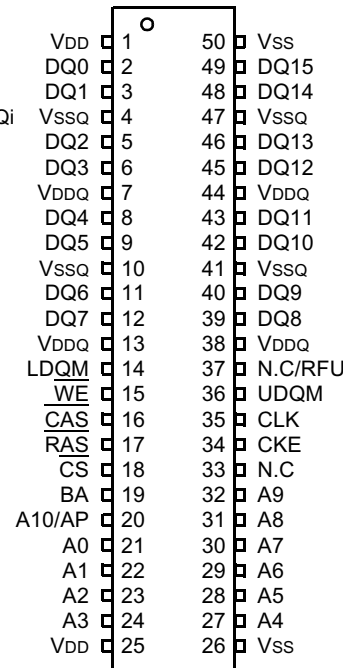
### ■ K4S161622D-TC60 (R4 MAIN ASSY : IC231)

#### SDRAM

#### ● Block Diagram



#### ● Pin Assignment (TOP VIEW)



\* Samsung Electronics reserves the right to change products or specification without notice.

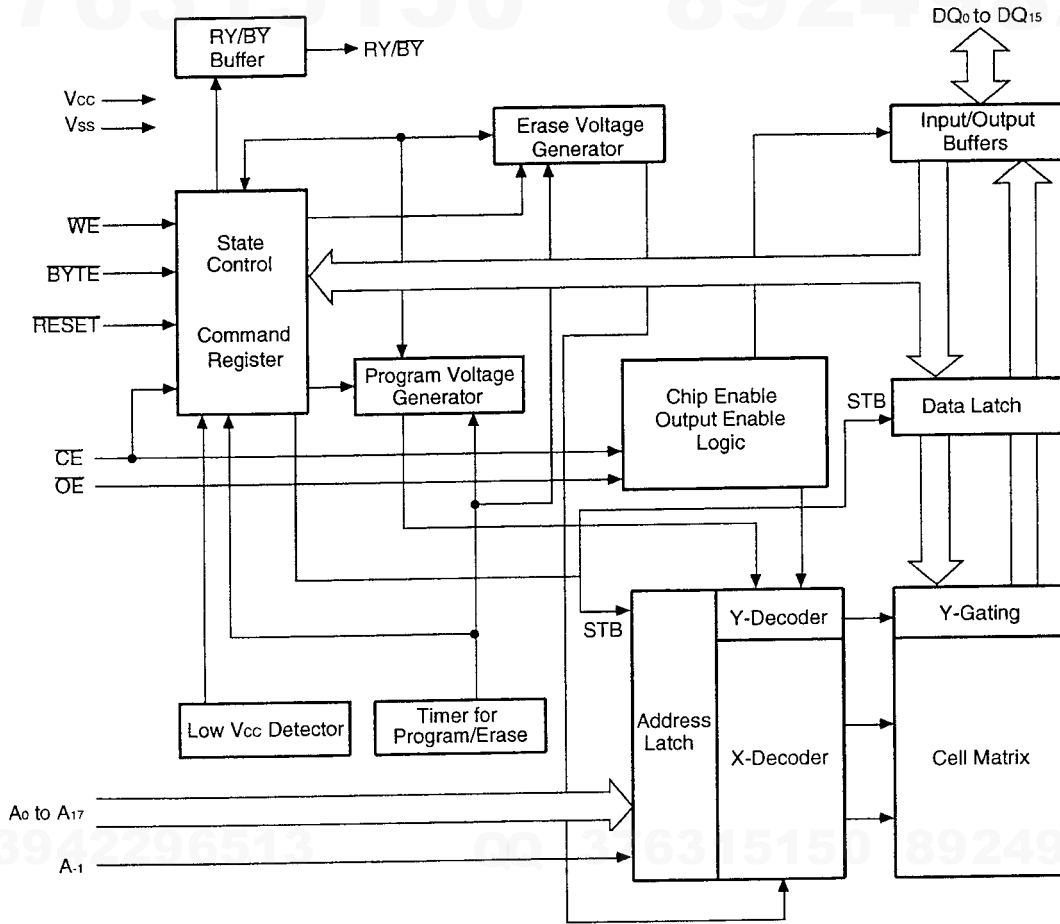
#### ● Pin Function

Pin	Name	Input Function
CLK	System Clock	Active on the positive going edge to sample all inputs.
$\overline{\text{CS}}$	Chip Select	Disables or enables device operation by masking or enabling all inputs except CLK, CKE and L(U)DQM
CKE	Clock Enable	Masks system clock to freeze operation from the next clock cycle. CKE should be enabled at least one cycle prior to new command. Disable input buffers for power down in standby.
A <sub>0</sub> ~ A <sub>10/AP</sub>	Address	Row / column addresses are multiplexed on the same pins. Row address : RA <sub>0</sub> ~ RA <sub>10</sub> , column address : CA <sub>0</sub> ~ CA <sub>7</sub>
BA	Bank Select Address	Selects bank to be activated during row address latch time. Selects bank for read/write during column address latch time.
$\overline{\text{RAS}}$	Row Address Strobe	Latches row addresses on the positive going edge of the CLK with $\overline{\text{RAS}}$ low. Enables row access & precharge.
$\overline{\text{CAS}}$	Column Address Strobe	Latches column addresses on the positive going edge of the CLK with $\overline{\text{CAS}}$ low. Enables column access.
$\overline{\text{WE}}$	Write Enable	Enables write operation and row precharge. Latches data in starting from $\overline{\text{CAS}}$ , $\overline{\text{WE}}$ active.
L(U)DQM	Data Input/Output Mask	Makes data output Hi-Z, tshz after the clock and masks the output. Blocks data input when L(U)DQM active.
DQ <sub>0</sub> ~ 15	Data Input/Output	Data inputs/outputs are multiplexed on the same pins.
VDD/VSS	Power Supply/Ground	Power and ground for the input buffers and the core logic.
VDDQ/VSSQ	Data Output Power/Ground	Isolated power supply and ground for the output buffers to provide improved noise immunity.
N.C/RFU	No Connection/ Reserved for Future Use	This pin is recommended to be left No Connection on the device.

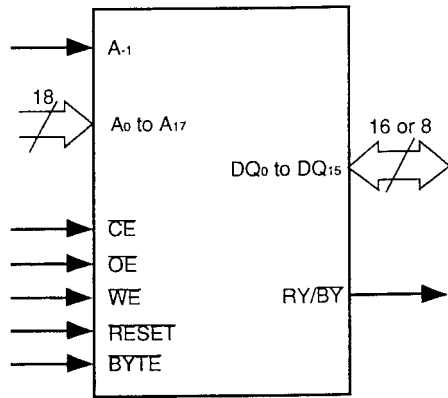
■ M29W400BT70N1 (DVR R4 MAIN ASSY : IC303)

SDRAM

● Block Diagram



● Pin Function

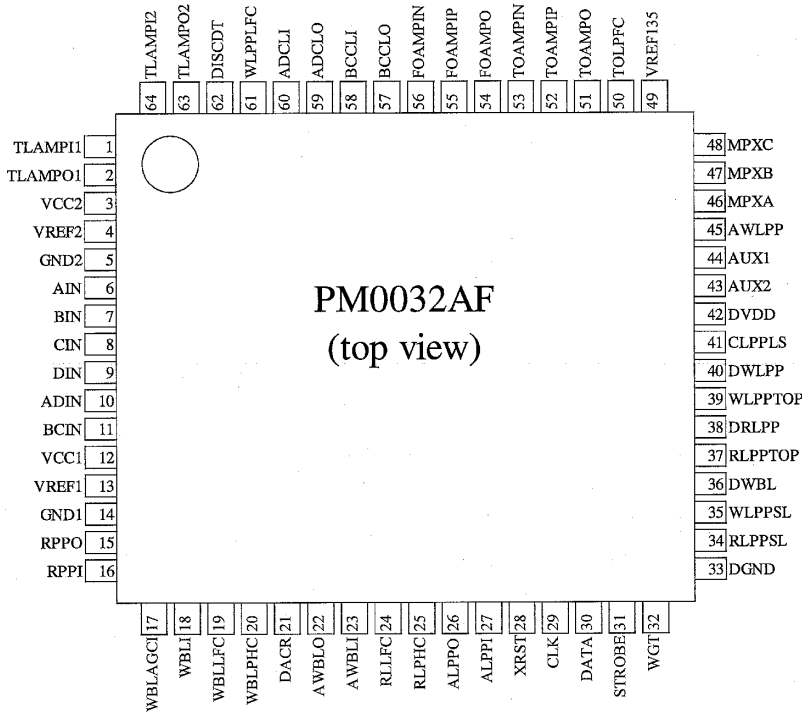


Pin	Function
A-1, A0 to A17	Address Inputs
DQ0 to DQ15	Data Inputs/Outputs
CE	Chip Enable
OE	Output Enable
WE	Write Enable
RY/BY	Ready-Busy Output
RESET	Hardware Reset Pin/ Temporary Sector Unprotection
BYTE	Selects 8-bit or 16-bit mode
N.C.	No Internal Connection
Vss	Device Ground
Vcc	Device Power Supply

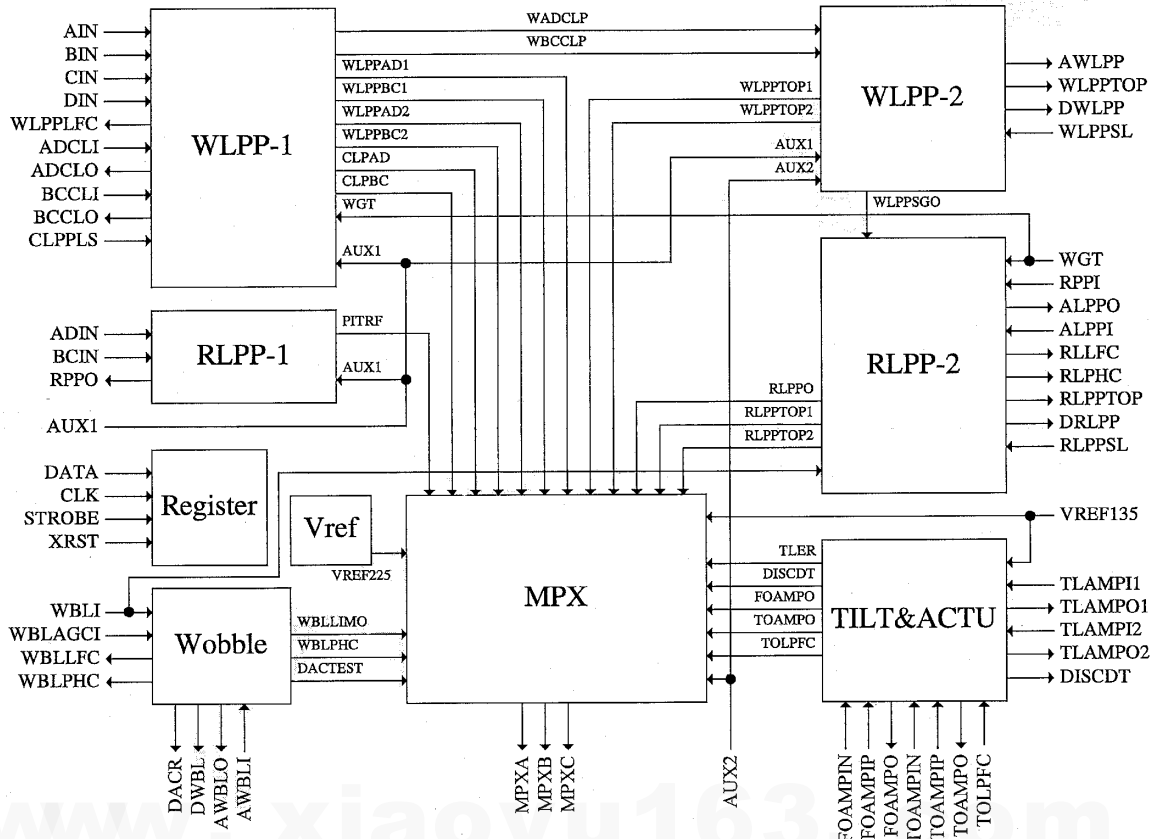
# PM0032AF (DVR R4 MAIN ASSY : IC108)

## A3 Chip

### Pin Assignment (TOP VIEW)



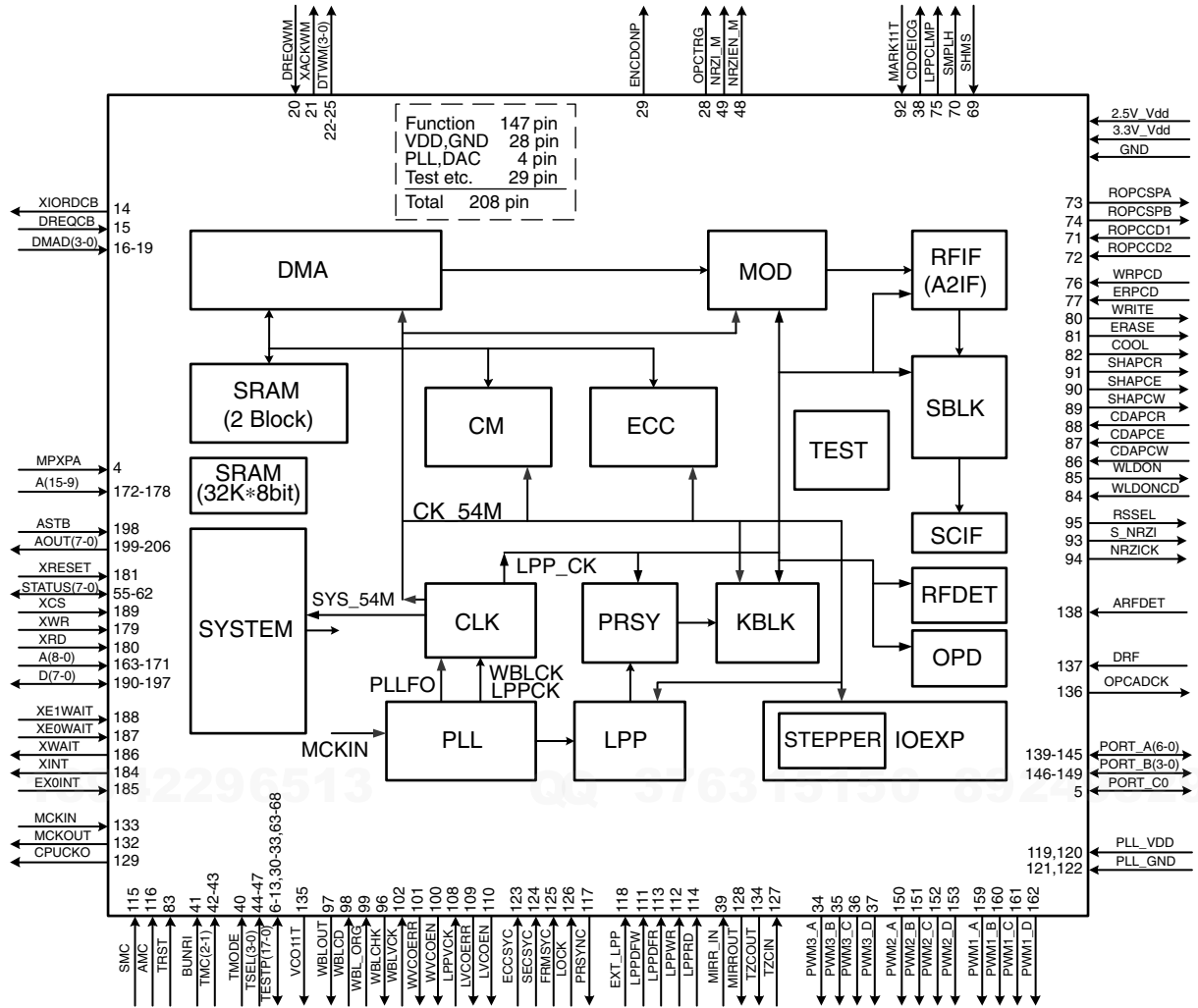
### Block Diagram



# PE5264A (DVR R4 MAIN ASSY: IC601)

• DVD Encoder

## • Block Diagram



## ● Pin Function

No.	Pin Name	I/O	Pin Function
1	GND	–	GND
2	GND	–	GND
3	3.3V Vdd	–	+3.3V
4	MPXPA	I	Multiplex/Parallel bus select signal "H": Multiplex
5	PORT_C0	I/O	General-purpose I/O port (port C0)
6	TESTP0	I/O	Test pin (bit 0)
7	TESTP1	I/O	Test pin (bit 1)
8	TESTP2	I/O	Test pin (bit 2)
9	TESTP3	I/O	Test pin (bit 3)
10	TESTP4	I/O	Test pin (bit 4)
11	TESTP5	I/O	Test pin (bit 5)
12	TESTP6	I/O	Test pin (bit 6)
13	TESTP7	I/O	Test pin (bit 7)
14	XIORDCB	O	IORD signal between R4 and Combo DSP
15	DREQCB	I	DMA data request signal between R4 and Combo DSP
16	DMAD0	I/O	DMA data bus (bit 0) for Combo DSP
17	DMAD1	I/O	DMA data bus (bit 1) for Combo DSP
18	DMAD2	I/O	DMA data bus (bit 2) for Combo DSP
19	DMAD3	I/O	DMA data bus (bit 3) for Combo DSP
20	DREQWM	I	DMA data request signal between R4 and WM chip
21	XACKWM	O	DMA data acknowledge signal between R4 and WM chip
22	DTWM0	I/O	DMA data bus (bit 0) for WM Chip
23	DTWM1	I/O	DMA data bus (bit 1) for WM Chip
24	DTWM2	I/O	DMA data bus (bit 2) for WM Chip
25	DTWM3	I/O	DMA data bus (bit 3) for WM Chip
26	GND	–	GND
27	2.5V Vdd	–	+2.5V
28	OPCTRG	O	Trigger signal output for OPC power switch
29	ENCDONP	O	ECC encode end pulse
30	TESTP8	I/O	Test pin (bit 8)
31	TESTP9	I/O	Test pin (bit 9)
32	TESTP10	I/O	Test pin (bit 10)
33	TESTP11	I/O	Test pin (bit 11)
34	PWM3_A	O	PWM3 output 1
35	PWM3_B	O	PWM3 output 2
36	PWM3_C	O	PWM3 output 3
37	PWM3_D	O	PWM3 output 4
38	CDOEICG	I/O	Gain switching signal of OEIC for CD
39	MIRR_IN	I/O	MIRR input signal
40	TMODE	I	Test mode switching pin Connect to "GND" normally.
41	BUNRI	I	Chip test pin Connect to "GND" normally.
42	TMC1	I	Chip test pin Connect to "GND" normally.
43	TMC2	I	Chip test pin Connect to "GND" normally.
44	TSEL0	I	Mode setting pin at the test mode Set the mode (15:0) at TSEL (3:0) pin.
45	TSEL1	I	Mode setting pin at the test mode Set the mode (15:0) at TSEL (3:0) pin.
46	TSEL2	I	Mode setting pin at the test mode Set the mode (15:0) at TSEL (3:0) pin.
47	TSEL3	I	Mode setting pin at the test mode Set the mode (15:0) at TSEL (3:0) pin.
48	NRZIEN_M	O	NRZI EN output (MOD output)
49	NRZI_M	O	NRZI output (MOD output)
50	3.3V Vdd	–	+3.3V
51	GND	–	GND
52	GND	–	GND



No.	Pin Name	I/O	Pin Function
53	2.5V Vdd	–	+2.5V
54	3.3V Vdd	–	+3.3V
55	STATUS0	I/O	Status out monitor pin (bit 0) Read the SW setting (SCSI or ATAPI) at reset.
56	STATUS1	I/O	Status out monitor pin (bit 1) Read the SW setting (SCSI or ATAPI) at reset.
57	STATUS2	I/O	Status out monitor pin (bit 2) Read the SW setting (SCSI or ATAPI) at reset.
58	STATUS3	I/O	Status out monitor pin (bit 3) Read the SW setting (SCSI or ATAPI) at reset.
59	STATUS4	I/O	Status out monitor pin (bit 4) Read the SW setting (SCSI or ATAPI) at reset.
60	STATUS5	I/O	Status out monitor pin (bit 5) Read the SW setting (SCSI or ATAPI) at reset.
61	STATUS6	I/O	Status out monitor pin (bit 6) Read the SW setting (SCSI or ATAPI) at reset.
62	STATUS7	I/O	Status out monitor pin (bit 7) Read the SW setting (SCSI or ATAPI) at reset.
63	TESTP12	I/O	Test pin (bit 12)
64	TESTP13	I/O	Test pin (bit 13)
65	TESTP14	I/O	Test pin (bit 14)
66	TESTP15	I/O	Test pin (bit 15)
67	TESTP16	I/O	Test pin (bit 16)
68	TESTP17	I/O	Test pin (bit 17)
69	SHMS	I	Sample and hold pulse input for CD servo
70	SMPLH	I/O	Sample and hold pulse for servo
71	ROPCCD1	I	Sample and hold pulse input 1 of CD running OPC
72	ROPCCD2	I	Sample and hold pulse input 2 of CD running OPC
73	ROPSPA	I/O	Sample pulse output A of running OPC
74	ROPSPB	I/O	Sample pulse output B of running OPC
75	LPPCLMP	I/O	LPP clamp pulse
76	WRPCD	I	CD write pulse input
77	ERPCD	I	CD erase pulse input
78	2.5V Vdd	–	+2.5V
79	GND	–	GND
80	WRITE	O	Write pulse
81	ERASE	O	Erase pulse
82	COOL	O	Cool pulse
83	TRST	I	Memory test pin of chip inside Connect to "GND" normally.
84	WLDONCD	I	CD write gate (strategy EN) signal input
85	WLDON	O	Write gate (strategy EN) output
86	CDAPCW	I	Sample and hold signal input of CD write APC
87	CDAPCE	I	Sample and hold signal input of CD erase APC
88	CDAPCR	I	Sample and hold signal input of CD read APC
89	SHAPCW	O	Sample and hold pulse output of write APC
90	SHAPCE	O	Sample and hold pulse output of erase APC
91	SHAPCR	O	Sample and hold pulse output of read APC
92	MARK11T	I/O	11T mark signal input of CD system
93	S_NRZI	O	NRZI MON (SBLK OUT)
94	NRZICK	O	NRZI CLK output
95	RSSEL	O	Read sample select R/RW change
96	WBLCHK	I/O	WBL output for WBL delay quantity measurement
97	WBLOUT	O	Binarization WBL output
98	WBLCD	I/O	Binarization WBL input (CD)
99	WBL_ORG	I/O	Binarization WBL input (DVD)
100	WVCOEN	O	WBL VCO ERR EN output
101	WVCOERR	O	WBL VCO ERR output
102	WBLVCK	I	WBL VCO CLK input
103	3.3V Vdd	–	+3.3V
104	2.5V Vdd	–	+2.5V

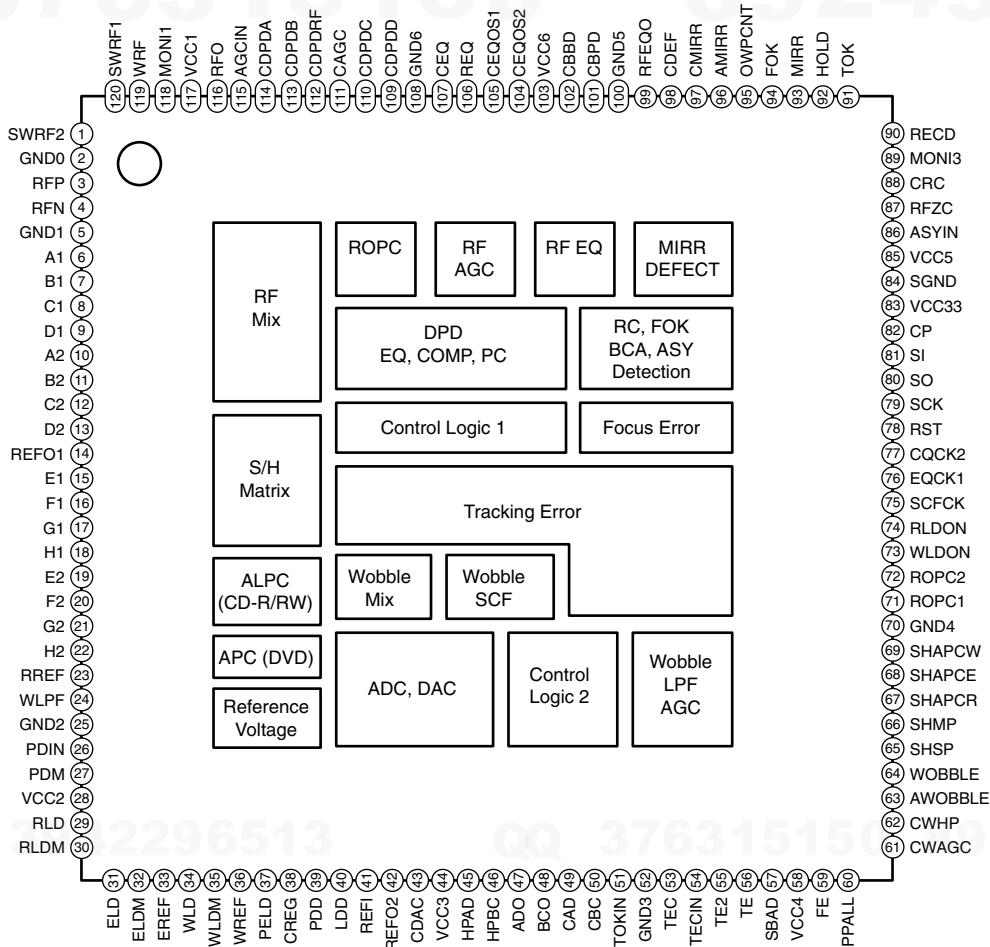
No.	Pin Name	I/O	Pin Function
105	GND	–	GND
106	GND	–	GND
107	3.3V Vdd	–	+3.3V
108	LPPVCK	I	LPP VCO CLK input
109	LVCOERR	O	LPP VCO ERR output
110	LVCOEN	O	LPP VCO ERR EN output
111	LPPDFW	I	Differential signal of LPPWR signal
112	LPPWR	I	Binarization LPP of write power section during the record
113	LPPDFR	I	Differential signal of LPPRD signal
114	LPPRD	I	Binarization LPP during the playback (including read power section during the record)
115	SMC	I	Test mode control pin of scan pass
116	AMC	I	ATG mode control pin
117	PRSYNC	I/O	Input/output pin of ECC block sync signal
118	EXT_LPP	I	External direct LPP input pin for phase modulation section
119	PLL_DVDD	–	VDD for multiply PLL (+2.5V)
120	PLL_AVDD	–	VDD for multiply PLL (+2.5V)
121	PLL_AGND	–	GND for multiply PLL
122	PLL_DGND	–	GND for multiply PLL
123	ECCSYC	I/O	ECC block sync signal input of RF system
124	SECSYC	I/O	Sector sync signal input of RF system
125	FRMSYC	I/O	Frame sync signal input of RF system
126	LOCK	I/O	PLL lock detecting signal input of RF system
127	TZCIN	I/O	TE zerocross signal input
128	MIRROUT	I/O	Mirror signal output
129	CPUCKO	O	CLK output for CPU (27MHz)
130	2.5V Vdd	–	+2.5V
131	GND	–	GND
132	MCKOUT	O	Output pin for master clock (27MHz)
133	MCKIN	I	Input pin for master clock (27MHz)
134	TZCOUT	I/O	TE zerocross signal output
135	VCO11T	I/O	Pulse for frequency settlement at free-running (11T+11T output)
136	OPCADCK	I/O	Taking in pulse of AD for OPC
137	DRF	I	Binarization RF input
138	ARFDET	I	RFDET input
139	PORT_A0	I/O	General-purpose I/O port (port A0)
140	PORT_A1	I/O	General-purpose I/O port (port A1)
141	PORT_A2	I/O	General-purpose I/O port (port A2)
142	PORT_A3	I/O	General-purpose I/O port (port A3)
143	PORT_A4	I/O	General-purpose I/O port (port A4)
144	PORT_A5	I/O	General-purpose I/O port (port A5)
145	PORT_A6	I/O	General-purpose I/O port (port A6)
146	PORT_B0	I/O	General-purpose I/O port (port B0)
147	PORT_B1	I/O	General-purpose I/O port (port B1)
148	PORT_B2	I/O	General-purpose I/O port (port B2)
149	PORT_B3	I/O	General-purpose I/O port (port B3)
150	PWM2_A	O	PWM output (port2_A)
151	PWM2_B	O	PWM output (port2_B)
152	PWM2_C	O	PWM output (port2_C)
153	PWM2_D	O	PWM output (port2_D)
154	3.3V Vdd	–	+3.3V
155	GND	–	GND
156	GND	–	GND

No.	Pin Name	I/O	Pin Function
157	2.5V Vdd	–	+2.5V
158	3.3V Vdd	–	+3.3V
159	PWM1_A	I/O	PWM output (port1_A)
160	PWM1_B	I/O	PWM output (port1_B)
161	PWM1_C	I/O	PWM output (port1_C)
162	PWM1_D	I/O	PWM output (port1_D)
163	A0	I	CPU address bus (bit 0)
164	A1	I	CPU address bus (bit 1)
165	A2	I	CPU address bus (bit 2)
166	A3	I	CPU address bus (bit 3)
167	A4	I	CPU address bus (bit 4)
168	A5	I	CPU address bus (bit 5)
169	A6	I	CPU address bus (bit 6)
170	A7	I	CPU address bus (bit 7)
171	A8	I	CPU address bus (bit 8)
172	A9	I	CPU address bus (bit 9)
173	A10	I	CPU address bus (bit 10)
174	A11	I	CPU address bus (bit 11)
175	A12	I	CPU address bus (bit 12)
176	A13	I	CPU address bus (bit 13)
177	A14	I	CPU address bus (bit 14)
178	A15	I	CPU address bus (bit 15)
179	XWR	I	CPU write signal
180	XRD	I	CPU read signal
181	XRESET	I	System reset input
182	GND	–	GND
183	2.5V Vdd	–	+2.5V
184	XINT	O.D	Interrupt signal output
185	EX0INT	I	INT signal input pin of external IC output (Reserve)
186	XWAIT	O.D	Wait signal output
187	XE0WAIT	I	WAIT signal input pin of external IC output (Combo DSP output)
188	XE1WAIT	I	WAIT signal input pin of external IC output (Reserve)
189	XCS	I	Chip select signal input
190	D0	I/O	CPU data bus (bit 0)
191	D1	I/O	CPU data bus (bit 1)
192	D2	I/O	CPU data bus (bit 2)
193	D3	I/O	CPU data bus (bit 3)
194	D4	I/O	CPU data bus (bit 4)
195	D5	I/O	CPU data bus (bit 5)
196	D6	I/O	CPU data bus (bit 6)
197	D7	I/O	CPU data bus (bit 7)
198	ASTB	I	Address strobe signal
199	AOUT0	I/O	ASTB latch address bus (bit 0) General-purpose I/O port at parallel bus mode (port D0)
200	AOUT1	I/O	ASTB latch address bus (bit 1) General-purpose I/O port at parallel bus mode (port D1)
201	AOUT2	I/O	ASTB latch address bus (bit 2) General-purpose I/O port at parallel bus mode (port D2)
202	AOUT3	I/O	ASTB latch address bus (bit 3) General-purpose I/O port at parallel bus mode (port D3)
203	AOUT4	I/O	ASTB latch address bus (bit 4) General-purpose I/O port at parallel bus mode (port D4)
204	AOUT5	I/O	ASTB latch address bus (bit 5) General-purpose I/O port at parallel bus mode (port D5)
205	AOUT6	I/O	ASTB latch address bus (bit 6) General-purpose I/O port at parallel bus mode (port D6)
206	AOUT7	I/O	ASTB latch address bus (bit 7) General-purpose I/O port at parallel bus mode (port D7)
207	3.3V Vdd	–	+3.3V
208	2.5V Vdd	–	+2.5V

■ **UPC3300GC-9EV (DVR R4 MAIN ASSY: IC112)**

• Combo-RF

● **Block Diagram**



● **Pin Function**

No.	Pin Name	I/O	Pin Function
1	SWRF2	O	Sample and hold signal output of WRF signal
2	GND0	-	Analog GND
3	RFP	I	RF differential signal (+) input
4	RFN	I	RF differential signal (-) input
5	GND1	-	Analog GND
6	A1	I	Main beam signal (A1) input
7	B1	I	Main beam signal (B1) input
8	C1	I	Main beam signal (C1) input
9	D1	I	Main beam signal (D1) input
10	A2	I	Main beam signal (A2) input
11	B2	I	Main beam signal (B2) input
12	C2	I	Main beam signal (C2) input
13	D2	I	Main beam signal (D2) input
14	REFO1	O	Pickup / internal reference voltage output (at REFI pin is 2.5V: 2.25V output)
15	E1	I	Sub beam signal (E1) input
16	F1	I	Sub beam signal (F1) input
17	G1	I	Sub beam signal (G1) input
18	H1	I	Sub beam signal (H1) input
19	E2	I	Sub beam signal (E2) input
20	F2	I	Sub beam signal (F2) input

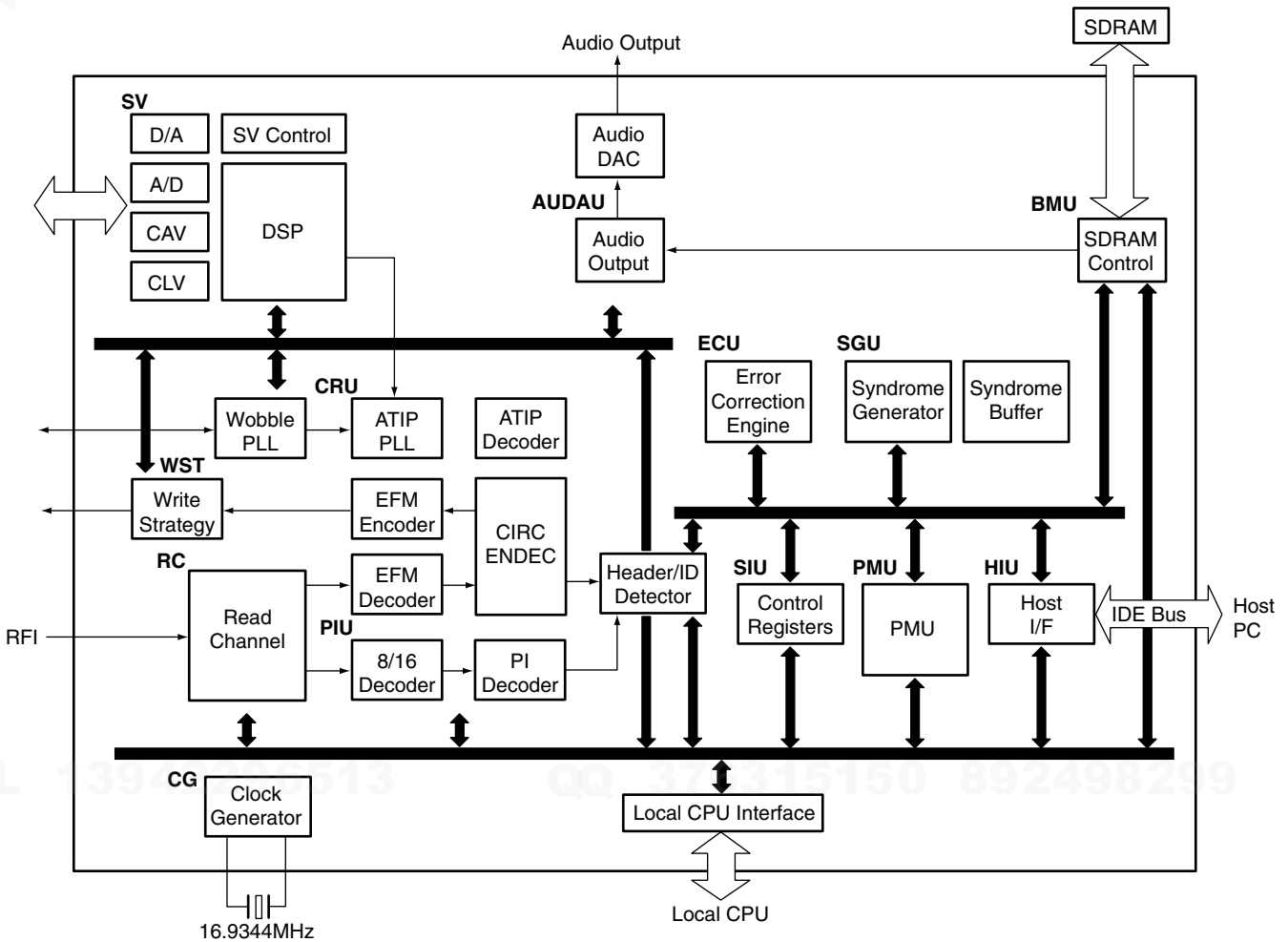
No.	Pin Name	I/O	Pin Function
21	G2	I	Sub beam signal (G2) input
22	H2	I	Sub beam signal (H2) input
23	RREF	-	ALPC smoothing capacitor connection pin for Read
24	WLPF	-	ALPC LPF capacitor connection pin for Write/Erase
25	GND2	-	Analog GND
26	PDIN	I	Laser monitor current input pin for CD-R/RW
27	PDM	I	Laser monitor current (-) input pin for CD-R/RW
28	VCC2	-	Analog power supply
29	RLD	O	Laser driver control output for Read
30	RLDM	I	Laser driver control amp. (-) for Read
31	ELD	O	Laser driver control output for Erase
32	ELDM	I	Laser driver control amp. (-) for Erase
33	EREF	-	ALPC smoothing capacitor connection pin for Erase
34	WLD	O	Laser driver control output for Write
35	WLDM	I	Laser driver control amp. (-) for Write
36	WREF	-	ALPC smoothing capacitor connection pin for Write
37	PELD	O	Peak power output pin
38	CREG	O	Regulator voltage (2.5V) output pin (for monitor)
39	PDD	I	Laser monitor voltage input for DVD
40	LDD	O	Laser driver control output for DVD
41	REFI	I	DSP power supply voltage input (2.5V)
42	REFO2	O	Reference voltage output for DSP (at REFI pin is 2.5V: 1.5V output)
43	CDAC	O	DAC reference voltage output (for monitor)
44	VCC3	-	Analog power supply
45	HPAD	-	Capacitor connection pin for WOBBLE circuit and HPF bandpass setting
46	HPBC	-	Capacitor connection pin for WOBBLE circuit and HPF bandpass setting
47	ADO	O	(A+D) signal output
48	BCO	O	(B+C) signal output
49	CAD	-	Capacitor connection pin for WOBBLE circuit and AGC response speed setting
50	CBC	-	Capacitor connection pin for WOBBLE circuit and AGC response speed setting
51	TOKIN	I	TOK and OWP detecting signal input
52	GND3	-	Analog GND
53	TEC	O	Tracking zerocross signal output
54	TECIN	I	Tracking zerocross comparator signal input
55	TE2	O	Tracking error signal output (bandpass variable)
56	TE	O	Tracking error signal output (fc=50kHz (Typ.) fixed)
57	SBAD	O	Sub-beam signal total output ( (E+F+G+H) signal)
58	VCC4	-	Digital power supply
59	FE	O	Focus error signal output
60	PPALL	O	Main side push-pull signal output ( (A+D-B-C) + (F+H-E-G) signal)
61	CWAGC	-	Capacitor connection pin for WOBBLE circuit and AGC response speed setting
62	CWHP	-	Capacitor connection pin for WOBBLE circuit and HPF bandpass setting
63	AWOBBLE	O	WOBBLE signal output (analog signal)
64	WOBBLE	O	WOBBLE signal output (digital signal)
65	SHSP	I	Sample and hold pulse input for sub-beam signal
66	SHMP	I	Sample and hold pulse input for main-beam signal
67	SHAPCR	I	Sample and hold pulse input for Read ALPC
68	SHAPCE	I	Sample and hold pulse input for Erase ALPC
69	SHAPCW	I	Sample and hold pulse input for Write ALPC
70	GND4	-	Digital GND

No.	Pin Name	I/O	Pin Function
71	ROPC1	I	Sample and hold pulse input 1 of WRF signal
72	ROPC2	I	Sample and hold pulse input 2 of WRF signal
73	WLDON	I	ALPC control signal input for Write
74	RLDON	I	ALPC control signal input for Read
75	SCFCK	I	SCF clock input
76	EQCK1	I	Fixed clock input
77	EQCK2	I	Clock input for equalizer automatic tracking
78	RST	I	Register reset input
79	SCK	I	Clock input for register setting
80	SO	O	Serial data output (open drain output)
81	SI	I	Serial data input
82	CP	I	Command (address) / data (parameter) discrimination signal input
83	VCC33	O	3.3V output (for monitor)
84	SGND	-	GND for Substrate
85	VCC5	-	Analog power supply
86	ASYIN	I	Asymmetry circuit input
87	RFZC	O	Comparator output of RF signal
88	CRC	-	Capacitor connection pin for radial contrast
89	MONI3	O	Internal signal monitor pin
90	RECD	O	Detection signal output of unrecorded section
91	TOK	O	Off track signal output
92	HOLD	O	Defect detecting signal output
93	MIRR	O	Mirror detection / BCA signal output
94	FOK	O	Focus OK signal output
95	OWPCNT	O	Over Write Protection signal output
96	AMIRR	O	Analog mirror detecting signal output for monitor
97	CMIRR	-	Capacitor connection pin for mirror circuit
98	CDEF	-	Capacitor connection pin for defect circuit
99	RFEQO	O	Equalizer output
100	GND5	-	Analog GND
101	CBPD	-	Capacitor connection pin for $\beta$ and $\gamma$ detection (peak)
102	CBBB	-	Capacitor connection pin for $\beta$ and $\gamma$ detection (bottom)
103	VCC6	-	Analog power supply
104	CEQOS2	-	Capacitor connection pin for equalizer
105	CEQOS1	-	Capacitor connection pin for equalizer
106	REQ	-	Resistor connection pin for equalizer current setting
107	CEQ	-	Capacitor connection pin for equalizer fc auto-adjust circuit
108	GND6	-	Analog GND
109	CDPDD	-	Capacitor connection pin for HPF bandpass setting of DPD (D signal)
110	CDPDC	-	Capacitor connection pin for HPF bandpass setting of DPD (C signal)
111	CAGC	-	Capacitor connection pin for RFAGC
112	CDPDRF	-	Capacitor connection pin for HPF bandpass setting of DPD (RF signal)
113	CDPDB	-	Capacitor connection pin for HPF bandpass setting of DPD (B signal)
114	CDPDA	-	Capacitor connection pin for HPF bandpass setting of DPD (A signal)
115	AGCIN	I	AGC input
116	RFO	O	Read RF signal output
117	VCC1	-	Analog power supply
118	MONI1	O	Internal signal monitor pin
119	WRF	O	Write RF signal output
120	SWRF1	O	Sample and hold signal output of WRF signal

## ■ UPD63600GH-8EV (DVR R4 MAIN ASSY: IC230)

• Combo-DSP

### ● Block Diagram



### ● Pin Function

No.	Pin Name	I/O	Pin Function
1	DGND	-	Digital GND
2	EMGSTOP	I	Writing control signal at abnormality
3	DASP	I/O	Drive active and slave present signal (open drain)
4	HCS1	I	Chip select input of host interface
5	HCS0	I	Chip select input of host interface
6	HDA2	I	Address signal input of host interface
7	HDA0	I	Address signal input of host interface
8	PDIAG	I/O	Diagnostic signal (open drain)
9	HDAI	I	Address signal input of host interface
10	HIOCS16	O	16 bit I/O signal (open drain) It becomes 3-state pin during Ultra DMA burst
11	HINTRQ	O	Interrupt signal output to the host (3-state, open drain)
12	DVDD33	-	3.3V positive power supply for digital
13	DGND	-	Digital GND
14	HDMACK	I/O	DMA acknowledge signal
15	IORDY	O	I/O channel ready (open drain) It becomes DDMARDY: DSTROBE signal and 3-state pin during Ultra DMA burst.
16	DIOR	I/O	Read input signal of host interface It becomes HDMARDY: HSTROBE signal during Ultra DMA burst.

No.	Pin Name	I/O	Pin Function
17	DIOW	I/O	Write input signal of host interface It becomes STOP signal during Ultra DMA burst.
18	HDMARQ	O	DMA request signal (3-state)
19	DVDD25	-	2.5V positive power supply for digital
20	HDD15	I/O	Data bus for host interface
21	HDD0	I/O	Data bus for host interface
22	HDD14	I/O	Data bus for host interface
23	HDD1	I/O	Data bus for host interface
24	DVDD33	-	3.3V positive power supply for digital
25	DGND	-	Digital GND
26	HDD13	I/O	Data bus for host interface
27	HDD2	I/O	Data bus for host interface
28	HDD12	I/O	Data bus for host interface
29	HDD3	I/O	Data bus for host interface
30	HDD11	I/O	Data bus for host interface
31	HDD4	I/O	Data bus for host interface
32	HDD10	I/O	Data bus for host interface
33	HDD5	I/O	Data bus for host interface
34	DVDD33	-	3.3V positive power supply for digital
35	DGND	-	Digital GND
36	HDD9	I/O	Data bus for host interface
37	HDD6	I/O	Data bus for host interface
38	HDD8	I/O	Data bus for host interface
39	HDD7	I/O	Data bus for host interface
40	HRESET	I	Host reset input
41	TCK	I	Test pin Be sure to connect to GND.
42	TMS	I	Test pin Be sure to connect to GND.
43	TAPCLK	I	Test pin Be sure to connect to GND.
44	TESTSE	I	Test pin Be sure to connect to GND.
45	DVDD25	-	2.5V positive power supply for digital
46	MON3	O	For monitor the test signal
47	MON2	O	For monitor the test signal
48	MON1	O	For monitor the test signal
49	MON0	O	For monitor the test signal
50	MD15	I/O	Data bus of buffer memory interface
51	MD0	I/O	Data bus of buffer memory interface
52	MD14	I/O	Data bus of buffer memory interface
53	MD1	I/O	Data bus of buffer memory interface
54	DVDD33	-	3.3V positive power supply for digital (buffer memory block)
55	DGND	-	Digital GND (buffer memory block)
56	MD13	I/O	Data bus of buffer memory interface
57	MD2	I/O	Data bus of buffer memory interface
58	MD12	I/O	Data bus of buffer memory interface
59	MD3	I/O	Data bus of buffer memory interface
60	DGND	-	Digital GND
61	MD11	I/O	Data bus of buffer memory interface
62	MD4	I/O	Data bus of buffer memory interface
63	MD10	I/O	Data bus of buffer memory interface
64	MD5	I/O	Data bus of buffer memory interface
65	DVDD33	-	3.3V positive power supply for digital (buffer memory block)
66	DGND	-	Digital GND (buffer memory block)



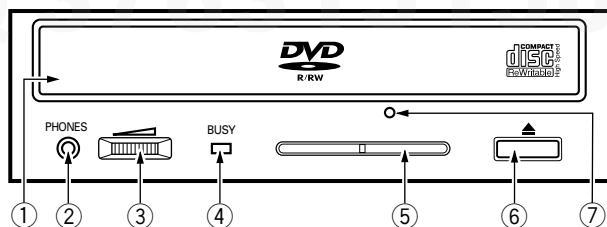
No.	Pin Name	I/O	Pin Function
67	MD9	I/O	Data bus of buffer memory interface
68	MD6	I/O	Data bus of buffer memory interface
69	MD8	I/O	Data bus of buffer memory interface
70	MD7	I/O	Data bus of buffer memory interface
71	DVDD25	–	2.5V positive power supply for digital
72	LDQM	O	I/O mask control signal of lower byte data
73	UDQM	O	I/O mask control signal of upper byte data
74	$\overline{\text{WE}}$	O	Write enable signal of buffer memory interface
75	MCLK	O	Clock output for SDRAM
76	DVDD33	–	3.3V positive power supply for digital (buffer memory block)
77	DGND	–	Digital GND (buffer memory block)
78	$\overline{\text{CAS}}$	O	Column address strobe control signal of buffer memory interface
79	MCKE	O	Clock enable control signal for SDRAM
80	$\overline{\text{RAS}}$	O	Row address strobe control signal of buffer memory interface
81	MA11	O	Address bus of buffer memory interface
82	DVDD25	–	2.5V positive power supply for digital
83	MBA1	O	Bank address signal of buffer memory interface
84	MA9	O	Address bus of buffer memory interface
85	MBA0	O	Bank address signal of buffer memory interface
86	MA8	O	Address bus of buffer memory interface
87	DVDD33	–	3.3V positive power supply for digital (buffer memory block)
88	DGND	–	Digital GND (buffer memory block)
89	MA10	O	Address bus of buffer memory interface
90	MA7	O	Address bus of buffer memory interface
91	MA0	O	Address bus of buffer memory interface
92	MA6	O	Address bus of buffer memory interface
93	DGND	–	Digital GND
94	MA1	O	Address bus of buffer memory interface
95	MA5	O	Address bus of buffer memory interface
96	MA2	O	Address bus of buffer memory interface
97	MA4	O	Address bus of buffer memory interface
98	DVDD33	–	3.3V positive power supply for digital (buffer memory block)
99	DGND	–	Digital GND (buffer memory block)
100	MA3	O	Address bus of buffer memory interface
101	PCUPDN	O	Phase comparator output of read channel
102	RCCK	I/O	Read channel clock output
103	RCDT	I/O	Read channel data output
104	PCEFM1	–	Capacitor connection pin of read channel phase comparator
105	PCEFM2	–	Capacitor connection pin of read channel phase comparator
106	OFFSETIN	I	Pin for charge pump adjustment of read channel phase comparator
107	FCEFM	–	Capacitor connection pin of read channel frequency comparator
108	AVDD	–	2.5V positive power supply for digital (EFM-PLL block)
109	IREF	I	Analog reference current input pin of read channel
110	AGND	–	Analog GND (EFM-PLL block)
111	RCCKOUT	O	Read channel clock output
112	PLLJO	O	Jitter detection result output
113	EFM	O	EFM comparator output
114	ASY	I	Asymmetry adjustment voltage input of EFM comparator
115	AVDD	–	2.5V positive power supply for analog (EFM comparator block)
116	RFI	I	RF signal input to EFM comparator

No.	Pin Name	I/O	Pin Function
117	AGND	-	Analog GND (EFM comparator block)
118	DVDD25	-	2.5V positive power supply for digital
119	FOK	I	FOK signal input
120	MIRRBCA	I	Mirror signal or BCA signal input
121	HOLD	I	HOLD control signal input
122	TOK	I	TOK signal input
123	EQCK2	O	Clock output for auto tracking of RF equalizer of RF amp. UPC3300
124	EQCK1	O	Fixed clock output for RF equalizer of RF amp. UPC3300
125	SCFCK	O	Clock output for auto adjustment of RF equalizer of RF amp. UPC3300
126	WLDON	O	Write laser control signal of laser driver
127	ROPC2	O	Sample and hold signal for running OPC
128	DVDD33	-	3.3V positive power supply for digital
129	DGND	-	Digital GND
130	ROPC1	O	Sample and hold signal for running OPC
131	SHAPCW	O	Sample and hold signal for APC write
132	SHAPCE	O	Sample and hold signal for APC erase
133	SHAPCR	O	Sample and hold signal for APC read
134	SHMS	O	Sample and hold signal for main and sub push-pull
135	WOBBLE	I	Wobble signal (binarization signal) input
136	TEC	I	Tracking zerocross signal input
137	DGND	-	Digital GND
138	LE	I	Lens error signal input (A/D converter input)
139	FE	I	Focus error signal input (A/D converter input)
140	TE	I	Tracking error signal input (A/D converter input)
141	SWRF2	I	WRF sample and hold signal input (A/D converter input) (combined use with $\beta$ and $\gamma$ detecting signal input)
142	SWRF1	I	WRF sample and hold signal input (A/D converter input) (combined use with $\beta$ and $\gamma$ detecting signal input)
143	REFIN	I	Reference voltage signal input (A/D converter input)
144	AGND	-	Analog GND (A/D and D/A blocks for servo)
145	AVDD	-	2.5V positive power supply for analog (A/D and D/A blocks for servo)
146	MDRV	O	Spindle drive output (D/A converter)
147	FDRV	O	Focus drive output (D/A converter)
148	TDRV	O	Tracking drive output (D/A converter)
149	SDRV	O	Sled drive output (D/A converter)
150	REFOUT	O	Reference voltage output
151	DVDD25	-	2.5V positive power supply for digital
152	FG	I	FG signal input
153	SLED1	I	Sled position sensor input
154	SLED2	I	Sled position sensor input
155	TCLKIN	I	Reference clock input for spindle control
156	CKGCK	O	Clock generator output
157	INT	O	Interruption request signal output to Local CPU (open drain)
158	RDY	O	Access wait control signal from Local CPU to SDRAM (open drain)
159	A10	I	Address bus of Local CPU
160	A9	I	Address bus of Local CPU
161	A8	I	Address bus of Local CPU
162	DVDD33	-	3.3V positive power supply for digital
163	DGND	-	Digital GND
164	AD7	I/O	Address/data multiplex bus of Local CPU
165	AD6	I/O	Address/data multiplex bus of Local CPU
166	AD5	I/O	Address/data multiplex bus of Local CPU

No.	Pin Name	I/O	Pin Function
167	AD4	I/O	Address/data multiplex bus of Local CPU
168	AD3	I/O	Address/data multiplex bus of Local CPU
169	AD2	I/O	Address/data multiplex bus of Local CPU
170	DVDD33	-	3.3V positive power supply for digital
171	AD1	I/O	Address/data multiplex bus of Local CPU
172	AD0	I/O	Address/data multiplex bus of Local CPU
173	$\overline{RD}$	I	Reading strobe signal input from Local CPU
174	$\overline{WR}$	I	Writing strobe signal input from Local CPU
175	ASTB	I	Strobe signal input of address
176	$\overline{CS}$	I	Chip select input from Local CPU
177	$\overline{SYSRST}$	I	Reset input
178	DGND	-	Digital GND
179	DVDD25	-	2.5V positive power supply for digital
180	FMDT	I/O	Wobble FM demodulation data output
181	HFON	O	High frequency add control signal of laser driver
182	WRCK	O	Write clock
183	DVDD33	-	3.3V positive power supply for digital
184	WRPULSE	O	Write pulse (laser driver control signal for write)
185	OPULSE	O	Write pulse (laser driver control signal for write)
186	DGND	-	Digital GND
187	DVDD33	-	3.3V positive power supply for digital
188	EFPULSE	O	Off pulse output (laser driver control signal for write)
189	PKPULSE	O	Peak pulse output (laser driver control signal for write)
190	CPUSEL	I	Local CPU select signal ("L": Intel Type, "H": Motorola Type)
191	WRLPF	-	Capacitor connection pin for CAV Write PLL
192	CAVLPF1	-	Capacitor connection pin for CAV Write PLL
193	CAVLPF2	-	Capacitor connection pin for CAV Write PLL
194	AVDD	-	2.5V positive power supply for analog (CAV-PLL block)
195	AGND	-	Analog GND (CAV-PLL block)
196	WOFMHPF	-	Capacitor connection pin for Wobble PLL FM data demodulation
197	WOFMLPF	-	Capacitor connection pin for Wobble PLL FM data demodulation
198	AVDD	-	2.5V positive power supply for analog (Wobble-PLL block)
199	AGND	-	Analog GND (Wobble-PLL block)
200	WOLPF1	-	Capacitor connection pin for Wobble PLL 1
201	WOLPF2	-	Capacitor connection pin for Wobble PLL 1
202	WOLPF3	-	Capacitor connection pin for Wobble PLL 2
203	WOLPF4	-	Capacitor connection pin for Wobble PLL 2
204	AGND	-	Analog GND (multiply PLL block)
205	AVDD	-	2.5V positive power supply for analog (multiply PLL block)
206	LPFCK	-	Test pin Connect to AGND.
207	AGND	-	Analog GND (multiply PLL block)
208	DVDD25	-	2.5V positive power supply for digital
209	$\overline{XTAL}$	I/O	Crystal resonator connection pin
210	XTAL	I	Crystal resonator connection pin
211	LRCK	O	L/R discrimination signal of DOUT serial audio data R- output when using the internal DAC.
212	SCKO	O	Synchronous clock output pin for serial audio data R+ output when using the internal DAC.
213	DVDD33	-	3.3V positive power supply for digital
214	DGND	-	Digital GND
215	DOUT	O	Serial audio data output pin L- output when using the internal DAC.
216	EMPH	O	Emphasis discrimination signal L+ output when using the internal DAC.

## 8. PANEL FACILITIES

[Front View]



### ① Disc Tray

Open the loading tray by pressing the eject button, then place a CD or DVD disc into the slit with the label facing up. Press the eject button or push the front part of tray to load the tray with the disc. Do not attempt to pull out the disc tray forcibly.

### ② Headphone Jack (PHONES)

Stereo mini jack for head-phone.

Set "Volume Control Knob" minimum position before inserting headphone jack.

The audio output of rear panel is active even when a jack is inserted into the headphone plug.

### ③ Volume Control Knob

This is the volume control knob for adjusting sound level on the headphone.

When the knob is turned to the right, the headphone volume goes up, when turned to the left, the volume goes down.

### ④ BUSY Indicator

Operation status is indicated as follows.

During reading	Lights green
During writing	Lights orange
When an error occurs	Blinks orange
• Abnormal rise of internal temp.	• Blinks with a certain period.
• Lens or disc dirty	• Blinks with 2x of the period.
• Other error	• Blinks with 3x of the period.

### ⑤ Ventilation Holes

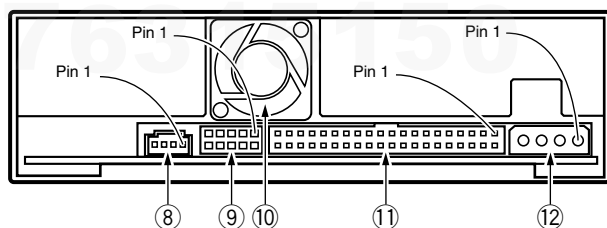
Do not block this part.

### ⑥ Eject Button (▲)

To unload /load the disc, press the button.

### ⑦ Forced Ejection Hole

Insert a stiff rod into the hole and push to eject the tray when the tray doesn't unload by pressing the Eject button. In the normal operation, the eject button should be used to unload the tray. Make sure the power of the drive is turned off and wait more than one minute till the disc rotation is stopped when access the eject hole.

**[Rear View]****⑧ Audio Output**

This is a connector for output of analog audio.

This connector is compatible with `Molex 70553`, choose a suitable connection cable.

Pin	Name	Function
1	L	Left channel audio output.
2	G	Ground.
3	G	Ground.
4	R	Right channel audio output.

**⑨ Device Configuration Jumper**

Switch becomes ON when short socket is put.

Make sure the power of the drive is off before changing jumper setting.

Pin # 1 is ON at the time of shipping from the plant.

Pin	Name	Function
1	MA	on The drive is used in master mode.
2	SL	on The drive is used in slave mode.
3	CS	on Using Cable Select function.
4		Reserved.
5		Reserved.

**⑩ Cooling fan**

This is a fan for cooling the drive.

Do not block the fan by other objects.

Drive Status	Fan
No disc is loaded, stand-by	Stop
Idle, Read, Write, Seek	Rotate

**⑪ Host IDE Interface**

This is a 40 pin I/O connector according to the ATA specifications.

**⑫ DC Input**

Pin	Name	Function
1	+12	Power supply input for DC +12 V.
2	G	Ground.
3	G	Ground.
4	+5	Power supply input for DC +5 V.

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