

SECTION 1

SUMMARY

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NEW FUNCTIONS OF HDD/DVD-RECORDER

• HDMI

HDMI IS THE SPECIFICATION FOR THE HIGH-DEFINITION MULTIMEDIA INTERFACE. HDMI IS PROVIDED FOR TRANSMITTING DIGITAL TELEVISION AUDIOVISUAL SIGNALS FROM HDD-DVD RECORDER TO TELEVISION SETS, OTHER VIDEO DISPLAYS. HDMI CAN CARRY HIGH QUALITY MULTI-CHANNEL AUDIO DATA AND CAN CARRY ALL STANDARD AND HIGH DEFINITION CONSUMER ELECTRONICS VIDEO FORMATS. CONTENT PROTECTION TECHNOLOGY IS AVAILABLE. HDMI CAN ALSO CARRY CONTROL AND STATUS INFORMATION IN BOTH DIRECTIONS.

<< OPERATING >>

AUDIO, VIDEO AND AUXILIARY DATA IS TRANSMITTED ACROSS THE THREE TMDS DATA CHANNELS. THE VIDEO PIXEL CLOCK IS TRANSMITTED ON THE TMDS CLOCK CHANNEL AND IS USED BY THE RECEIVER AS A FREQUENCY REFERENCE FOR DATA RECOVERY ON THE THREE TMDS DATA CHANNELS.

VIDEO DATA IS CARRIED AS A SERIES OF 24-BIT PIXELS ON THE THREE TMDS DATA CHANNELS. TMDS ENCODING CONVERTS THE 8BIT PER CHANNEL INTO THE 10BIT DC-BALANCED.

VIDEO PIXEL RATES CAN RANGE FROM 25MHZ TO 165MHZ. THE VIDEO PIXELS CAN BE ENCODED IN EITHER RGB, YCBCR 4:4:4 OR YCBCR 4:2:2 FORMATS. IN ALL THREE CASES, UP TO 24 BITS PER PIXEL CAN BE TRANSFERRED.

FAST DUBBING

DUBBING MEANS A COPYING FUNCTION BETWEEN HDD TO DVD DISCS.

COPYING BETWEEN HDD TO DVD IS A COMPLETELY DIGITAL PROCESS AND THEREFORE INVOLVES NO LOSS OF QUALITY IN THE AUDIO OR VIDEO. SO THIS MEANS THAT COPYING CAN BE CARRIED OUT AT THE MAXIMUM SPEED POSSIBLE.

<< DUBBING SPEED RATE >>

NORMAL DUBBING : SPEED RATE MAX X1

FAST DUBBING : SPEED RATE MAX X4

WHEN FAST DUBBING FROM HDD TO DVD , THE SPEED OF COPYING DEPENDS ON THE RECORDING MODE AND THE KIND OF USING THE DVD DISC, AND THIS MODE IS NOT AVAILABLE FOR EDITED VIDEO TITLE IN HDD.

WHEN FAST DUBBING FROM DVD TO HDD , ONLY AVAILABLE WHEN COPYING VR MODE DISC(DVD-RW) TO HDD , AND ONLY NORMAL DUBBING AVAILABLE WHEN COPYING VIDEO MODE DISC (DVD+R/RW, DVD-R) TO HDD

PRODUCT SAFETY SERVICING GUIDELINES FOR VIDEO PRODUCTS

IMPORTANT SAFETY NOTICE

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

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

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

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

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

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

GRAPHIC SYMBOLS



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



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



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

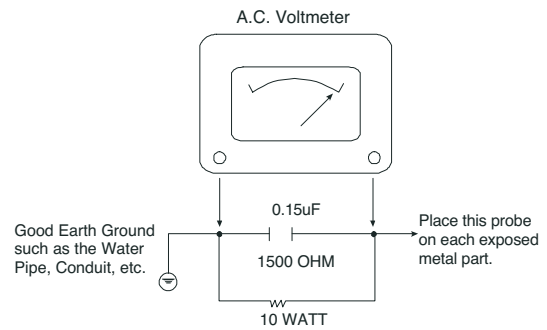
CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ALL FUSES WITH THE SAME TYPE AND RATING AS MARKED NEAR EACH FUSE.

SERVICE INFORMATION

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

FIRE AND SHOCK HAZARD

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



TIPS ON PROPER INSTALLATION

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

SERVICING PRECAUTIONS

CAUTION : Before servicing the HDD/DVD Recorder covered by this service data and its supplements and addends, read and follow the SAFETY PRECAUTIONS. **NOTE** : if unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions in this publications, always follow the safety precautions.

Remembers Safety First:

General Servicing Precautions

1. Always unplug the HDD/DVD Recorder AC power cord from the AC power source before:
 - (1) Removing or reinstalling any component, circuit board, module, or any other assembly.
 - (2) Disconnection or reconnecting any internal electrical plug or other electrical connection.
 - (3) Connecting a test substitute in parallel with an electrolytic capacitor.
Caution : A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.
2. Do not spray chemicals on or near this HDD/DVD Recorder or any of its assemblies.
3. Unless specified otherwise in this service data, clean electrical contacts by applying an appropriate contact cleaning solution to the contacts with a pipe cleaner, cotton-tipped swab, or comparable soft applicator. Unless specified otherwise in this service data, lubrication of contacts is not required.
4. Do not defeat any plug/socket B+ voltage interlocks with which instruments covered by this service manual might be equipped.
5. Do not apply AC power to this HDD/DVD Recorder and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
6. Always connect test instrument ground lead to the appropriate ground before connection the test instrument positive lead. Always remove the test instrument ground lead last.

Insulation Checking Procedure

Disconnect the attachment plug from the AC outlet and turn the power on. Connect an insulation resistance meter(500V) to the blades of the attachment plug. The insulation resistance between each blade of the attachment plug and accessible conductive parts (Note 1) should be more than 1M-ohm.

Note 1 : Accessible Conductive Parts including Metal panels, Input terminals, Earphone jacks, etc.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field effect transistors and semiconductor chip components.

The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

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

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

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

SPECIFICATIONS

• GENERAL

Power requirements	AC 110-240V, 50/60 Hz
Power consumption	45W
Dimensions (approx.)	430 X 49 X 350 mm (w x h x d) without foot
Mass (approx.)	4.6 kg
Operating temperature	5°C to 35°C
Operating humidity	5 % to 90 %

Recording format	PAL
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• RECORDING

Recording format	DVD Video Recording, DVD-VIDEO
Recordable media	HDD (80GB), DVD-ReWritable, DVD-Recordable, DVD+ReWritable, DVD+Recordable, DVD+Recordable (Double Layer)
Recordable time	DVD (4.7GB): Approx. 1 hour (HQ mode), 2 hours (SQ mode), 4 hours (LQ mode), 6 hours (EQ mode) DVD+R DL (8.5GB): Approx. 3 hour (HQ mode), 3 hours 40 minutes (SQ mode), 7 hours 10 minutes (LQ mode), 11 hours 30 minutes (EQ mode) HDD (80GB): Approx. 20 hour (HQ mode), 40 hours (SQ mode), 74 hours (LQ mode), 111 hours (EQ mode)

Video recording format

Sampling frequency	27MHz
Compression format	MPEG 2 (VBR support)

Audio recording format

Sampling frequency	48kHz
Compression format	Dolby Digital

• PLAYBACK

Frequency response	DVD (PCM 48 kHz): 8 Hz to 20 kHz, CD: 8 Hz to 20 kHz DVD (PCM 96 kHz): 8 Hz to 44 kHz
Signal-to-noise ratio	More than 100 dB (AUDIO OUT connector)
Harmonic distortion	Less than 0.008% (AUDIO OUT connector)
Dynamic range	More than 95 dB (AUDIO OUT connector)

• INPUTS

AERIAL IN	Aerial input, 75 ohms
VIDEO IN	1.0 Vp-p 75 ohms, sync negative, RCA jack x 2 / SCART x 2
AUDIO IN	0 dBm more than 47 kohms, RCA jack (L, R) x 2 / SCART x 2
DV IN	4 pin (IEEE 1394 standard)

• OUTPUTS

VIDEO OUT	1 Vp-p 75 Ω , sync negative, RCA jack x 1 / SCART x 2
COMPONENT VIDEO OUT	(Y) 1.0 V (p-p), 75 Ω , negative sync, RCA jack x 1 (Pb)/(Pr) 0.7 V (p-p), 75 Ω , RCA jack x 2
Audio output (digital audio)	0.5 V (p-p), 75 Ω , RCA jack x 1
Audio output (optical audio)	3 V (p-p), 75 Ω , Optical connector x 1
Audio output (analog audio)	2.0 Vrms (1 KHz, 0 dB), 600 Ω , RCA jack (L, R) x 1 / SCART x 2

SECTION 2
CABINET & MAIN CHASSIS

CONTENTS

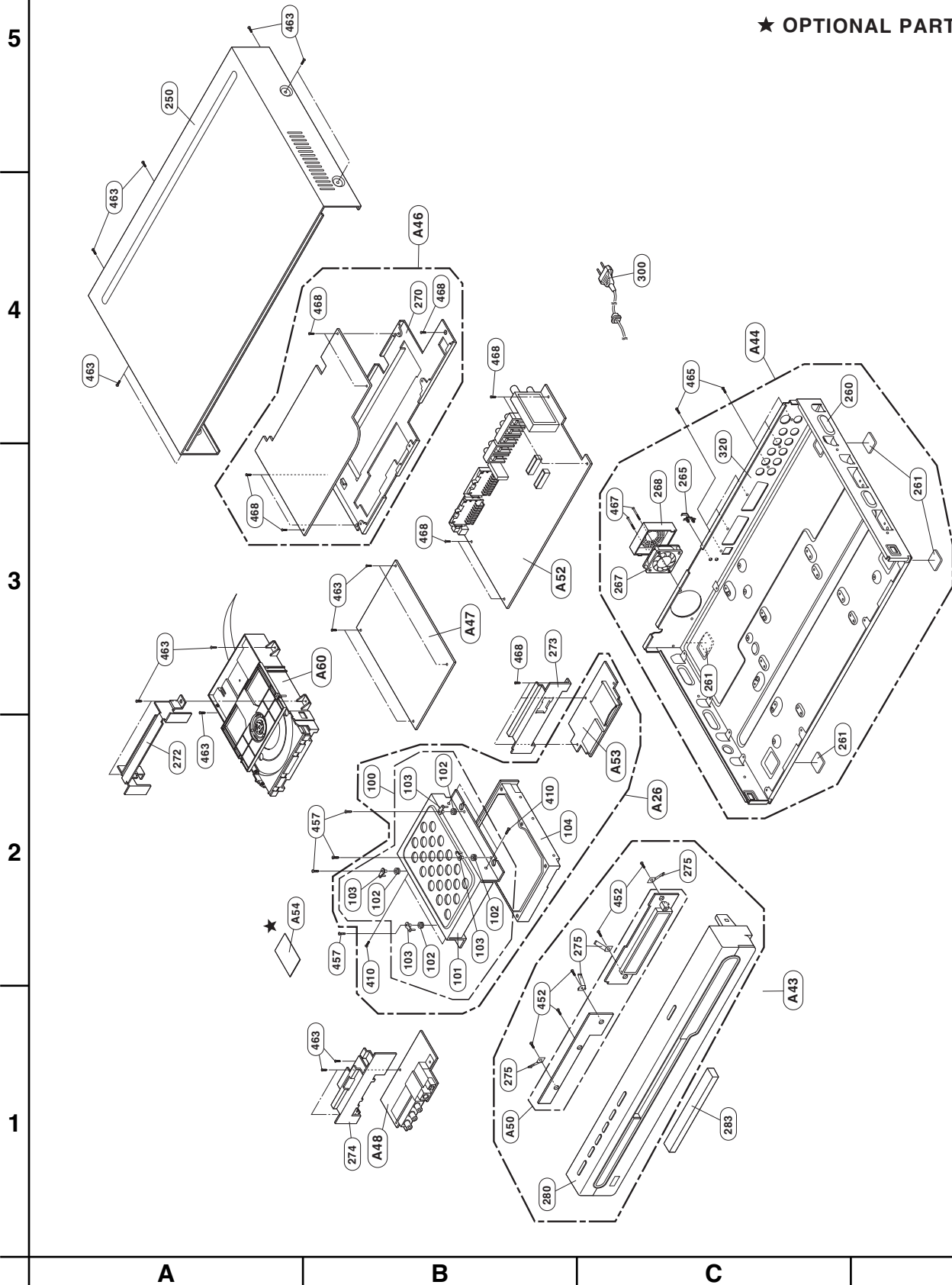
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- 3. Packing Accessory Section2-4**

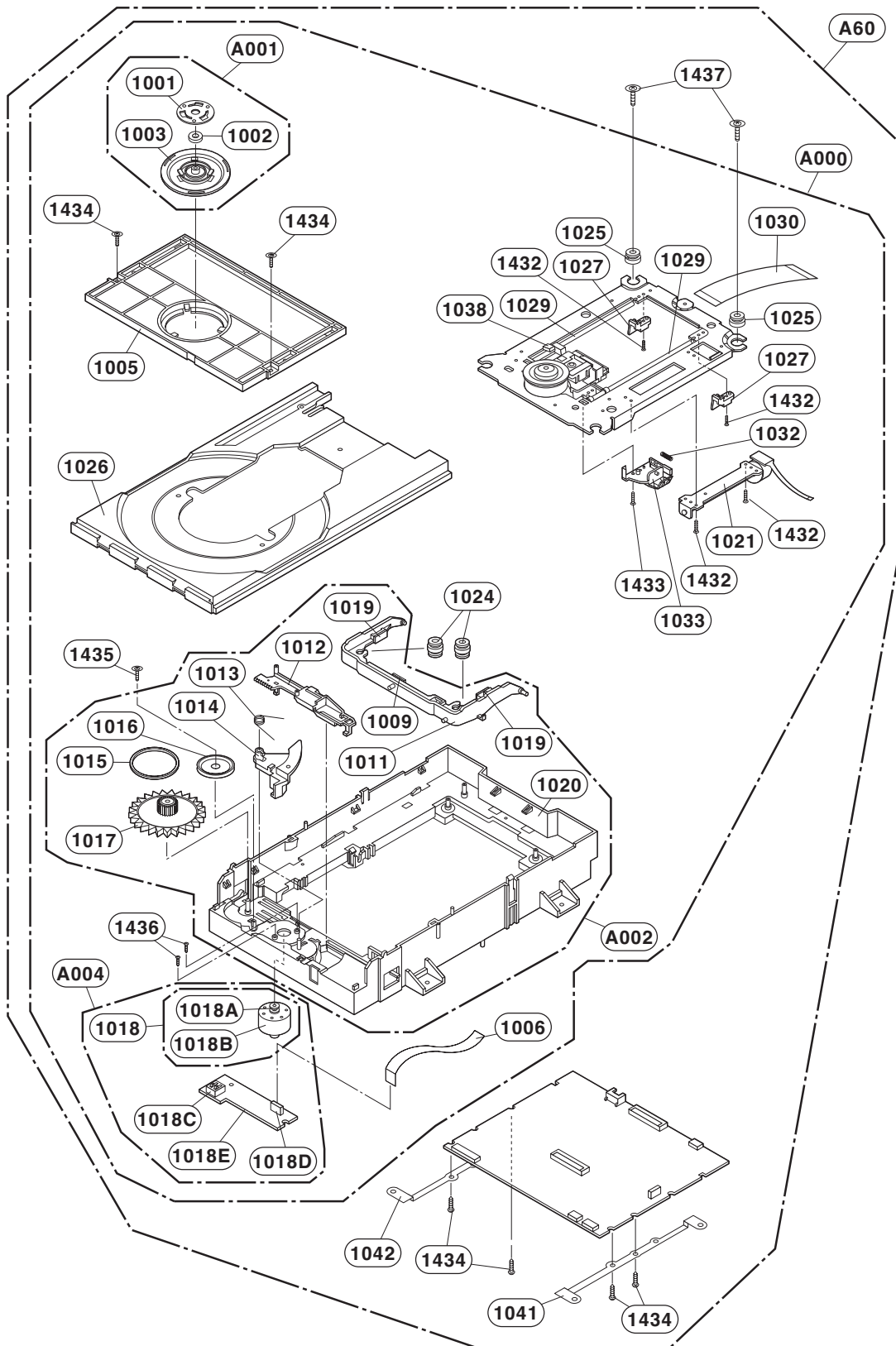
EXPLODED VIEWS

1. Cabinet and Main Frame Section

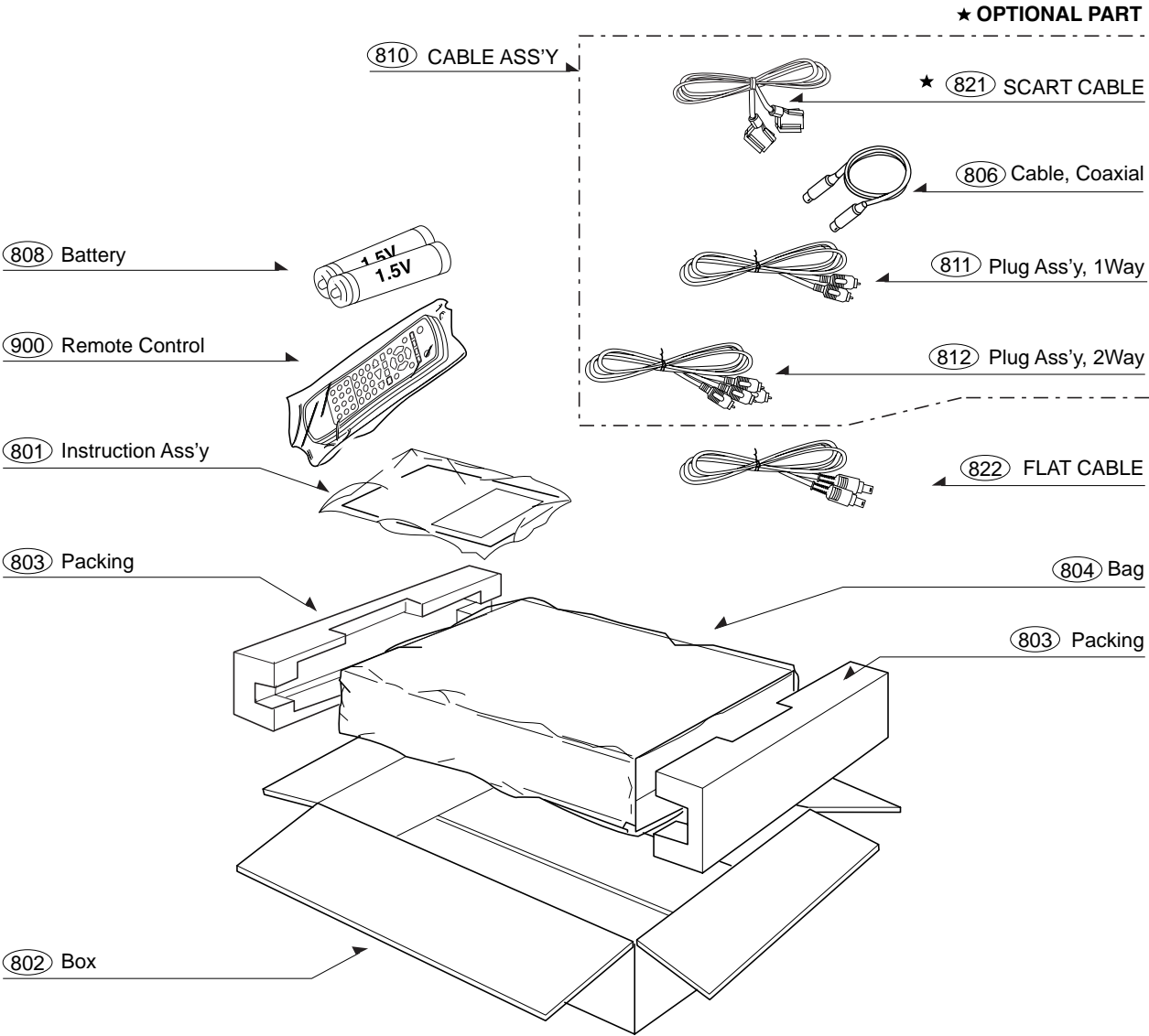
★ OPTIONAL PART



2. DECK MECHANISM SECTION(RL-05S)



3. Packing Accessory Section



SECTION 3 ELECTRICAL CONTENTS

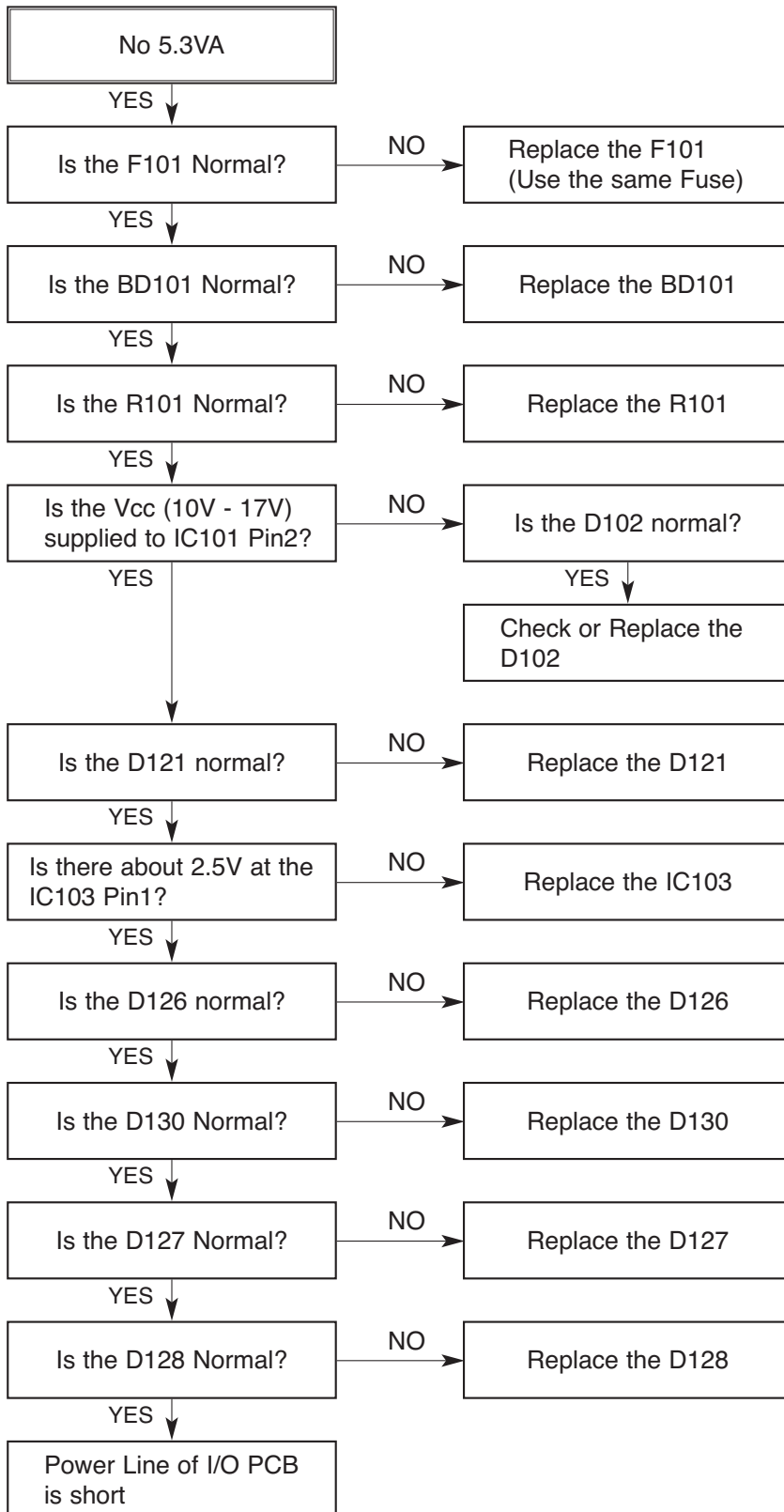
HDR PART

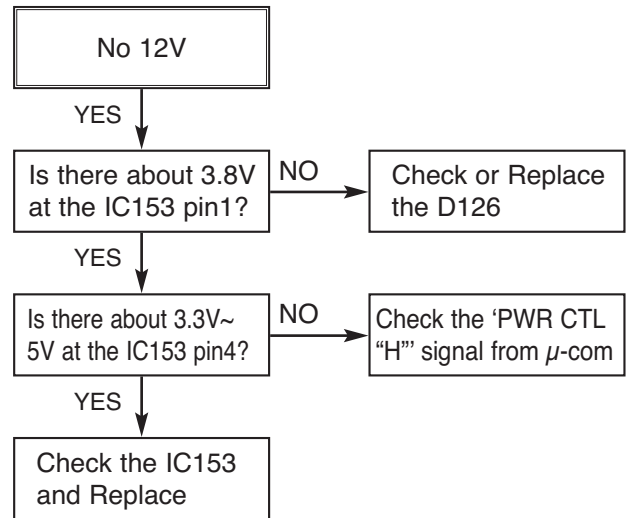
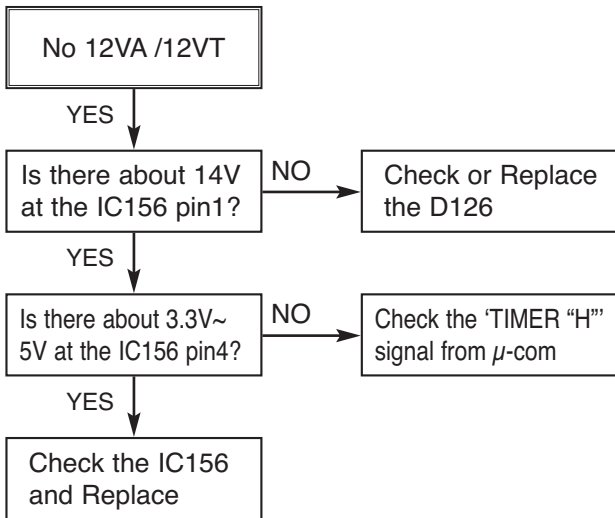
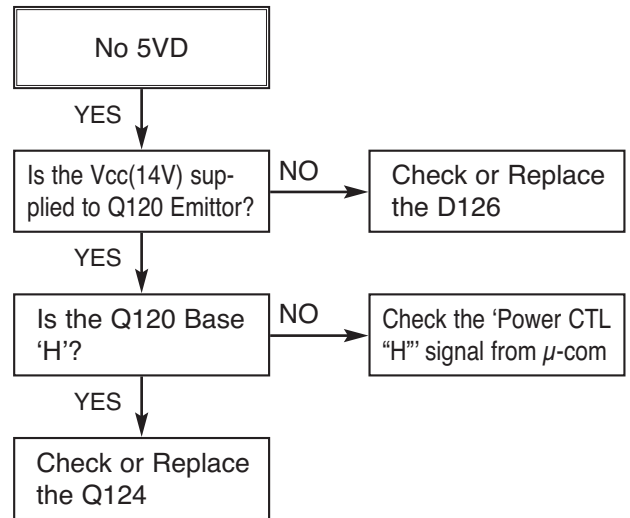
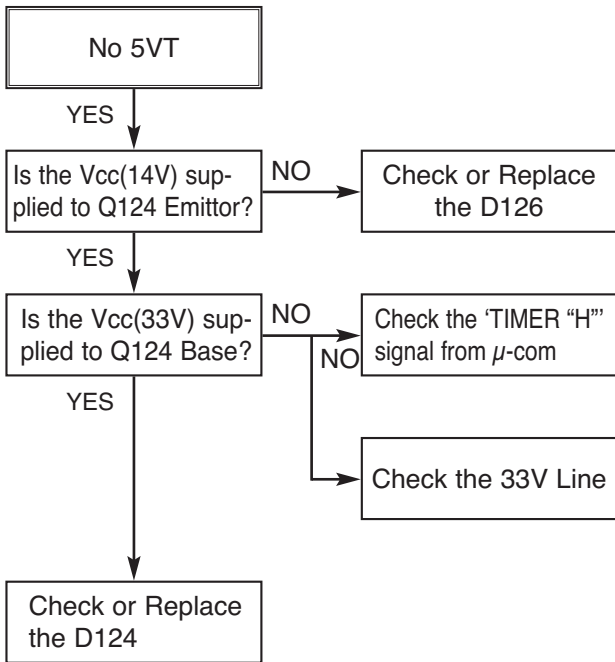
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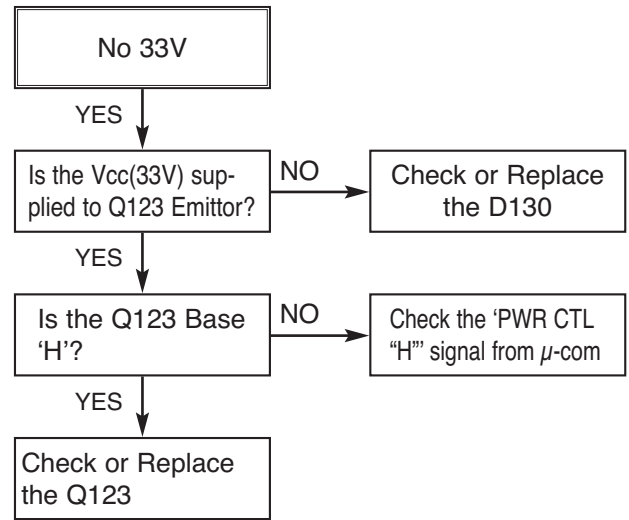
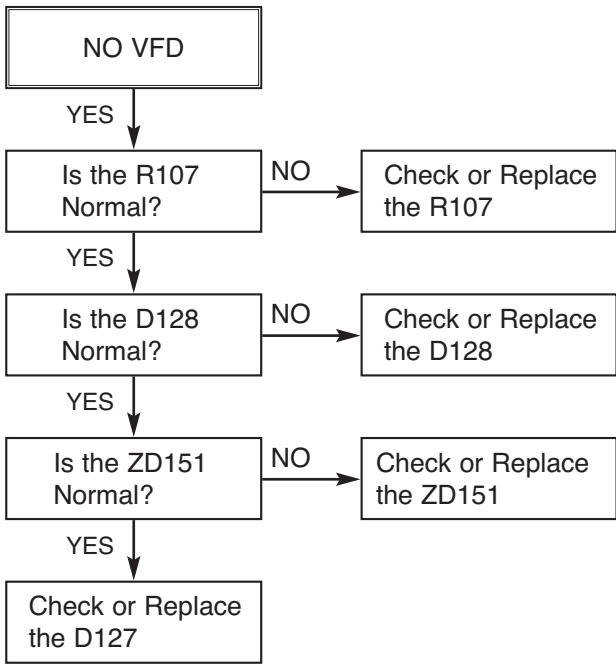
HDR PART

ELECTRICAL TROUBLESHOOTING GUIDE

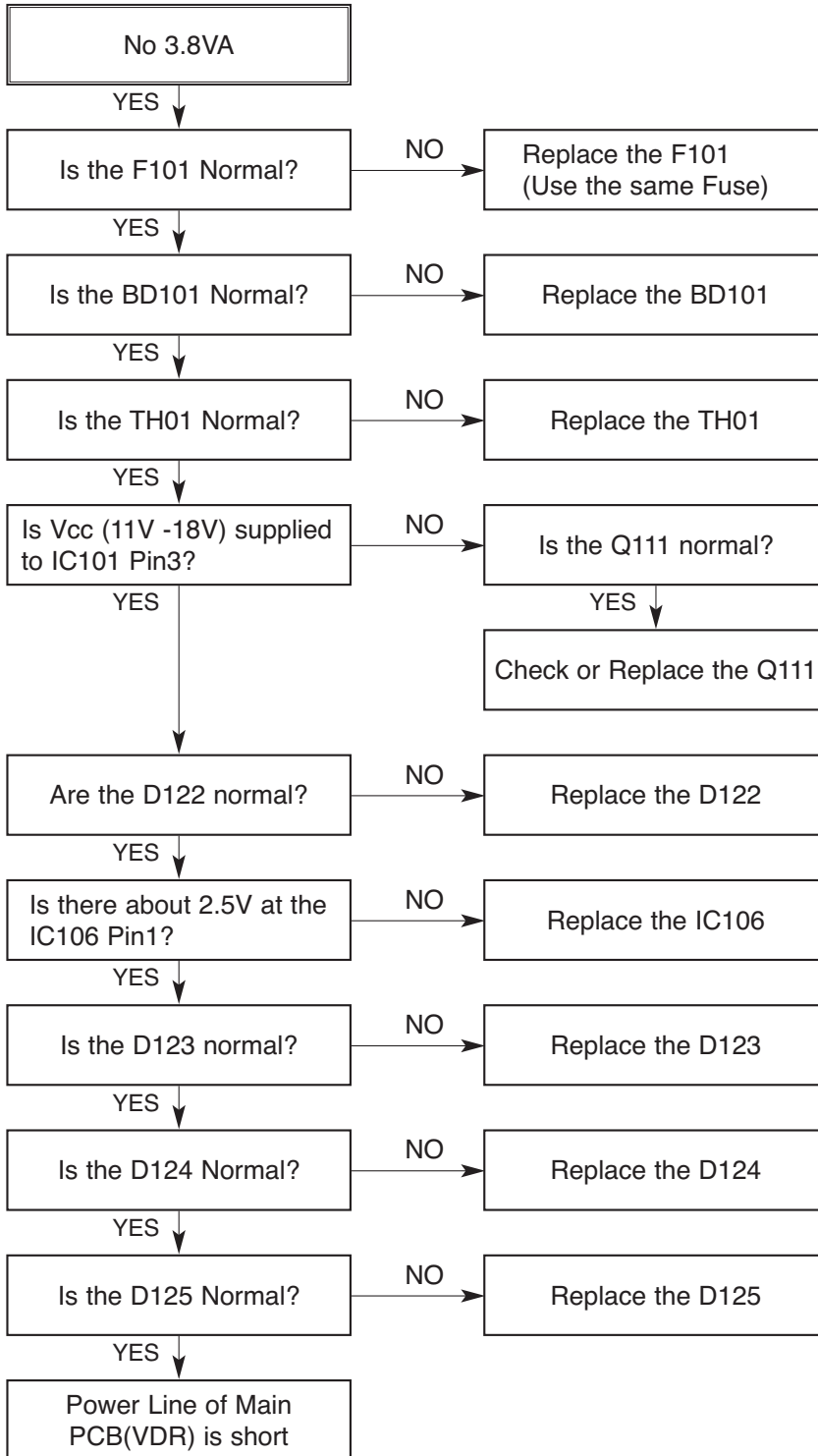
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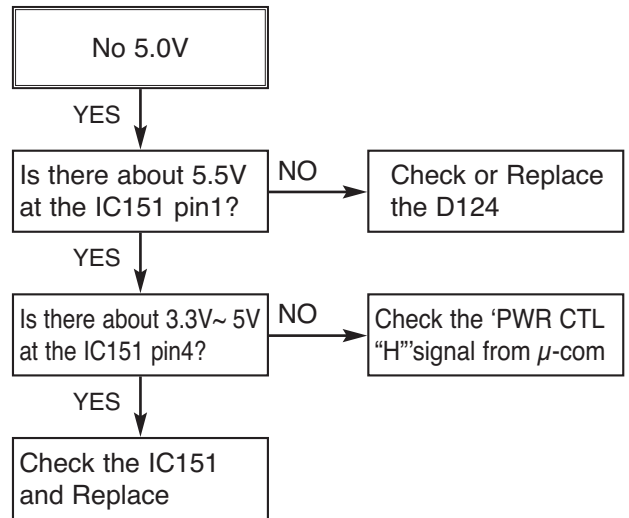
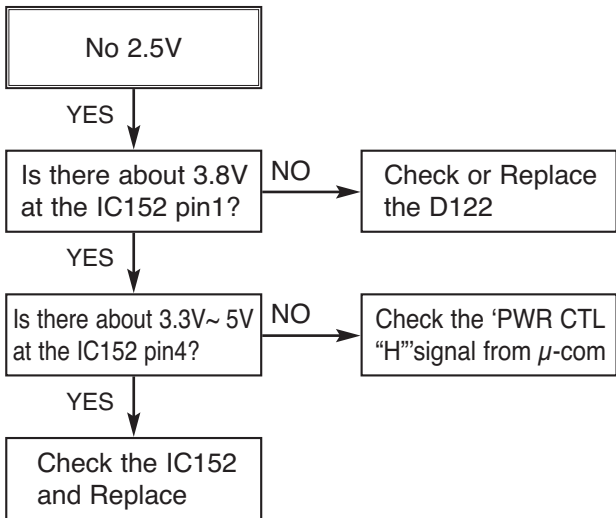
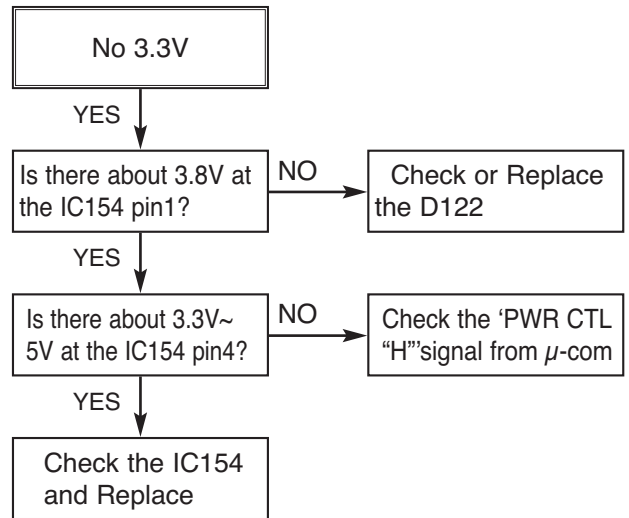
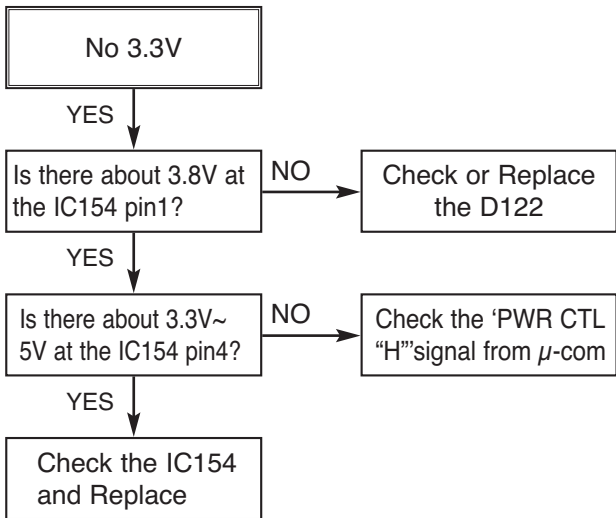


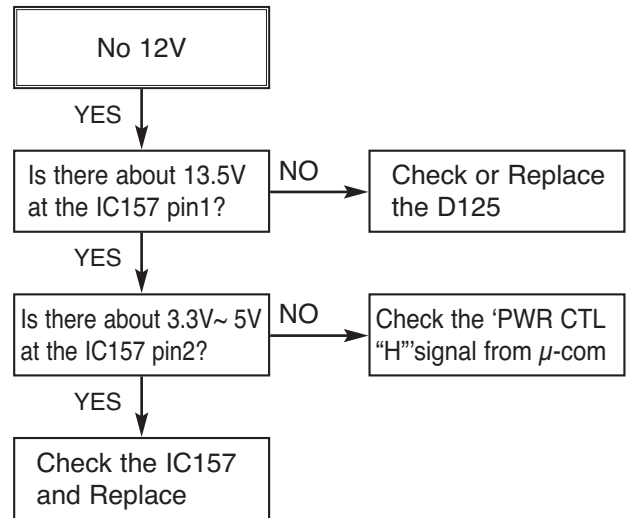
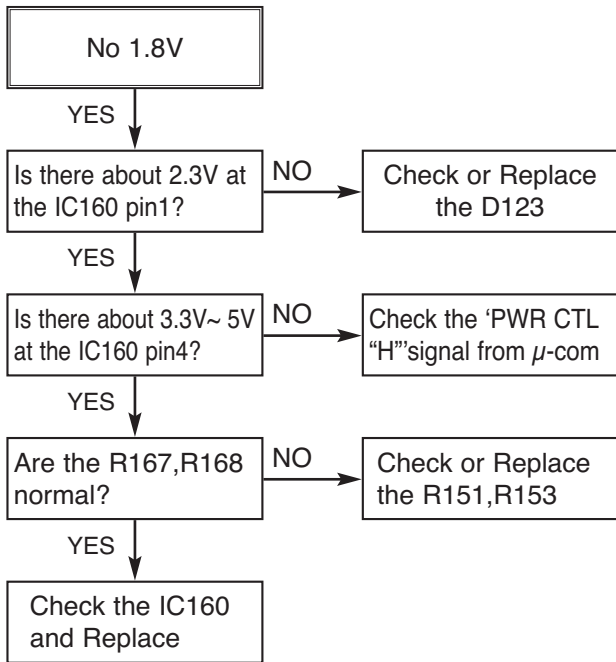




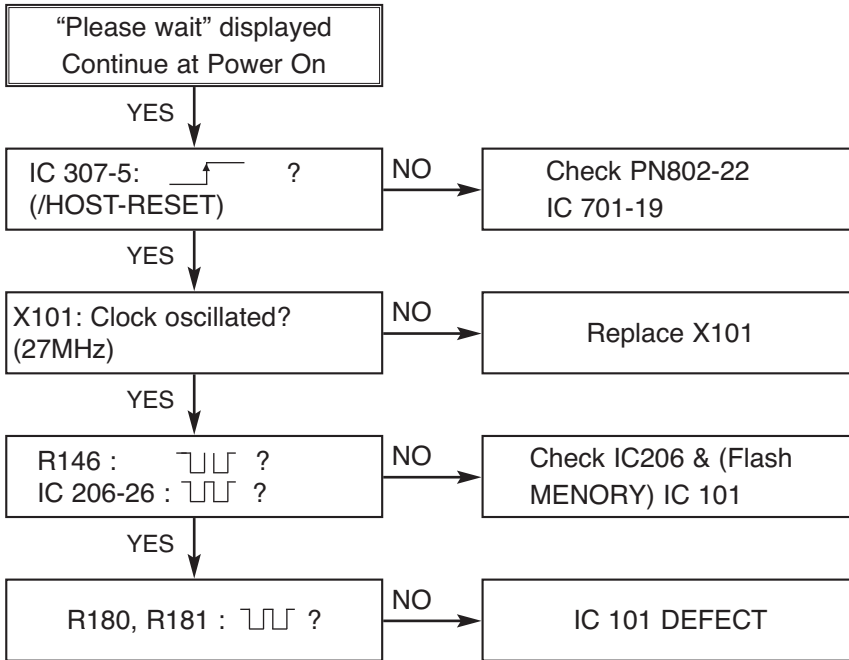
2. SMPS DVD/HDD PART



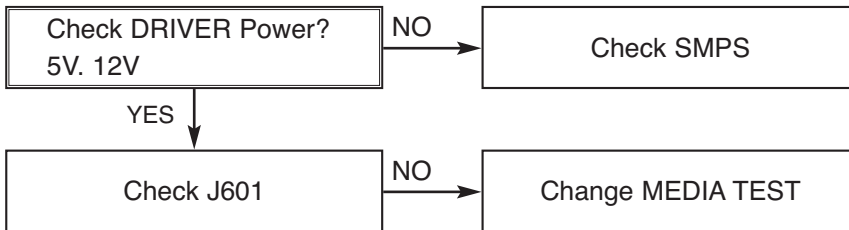




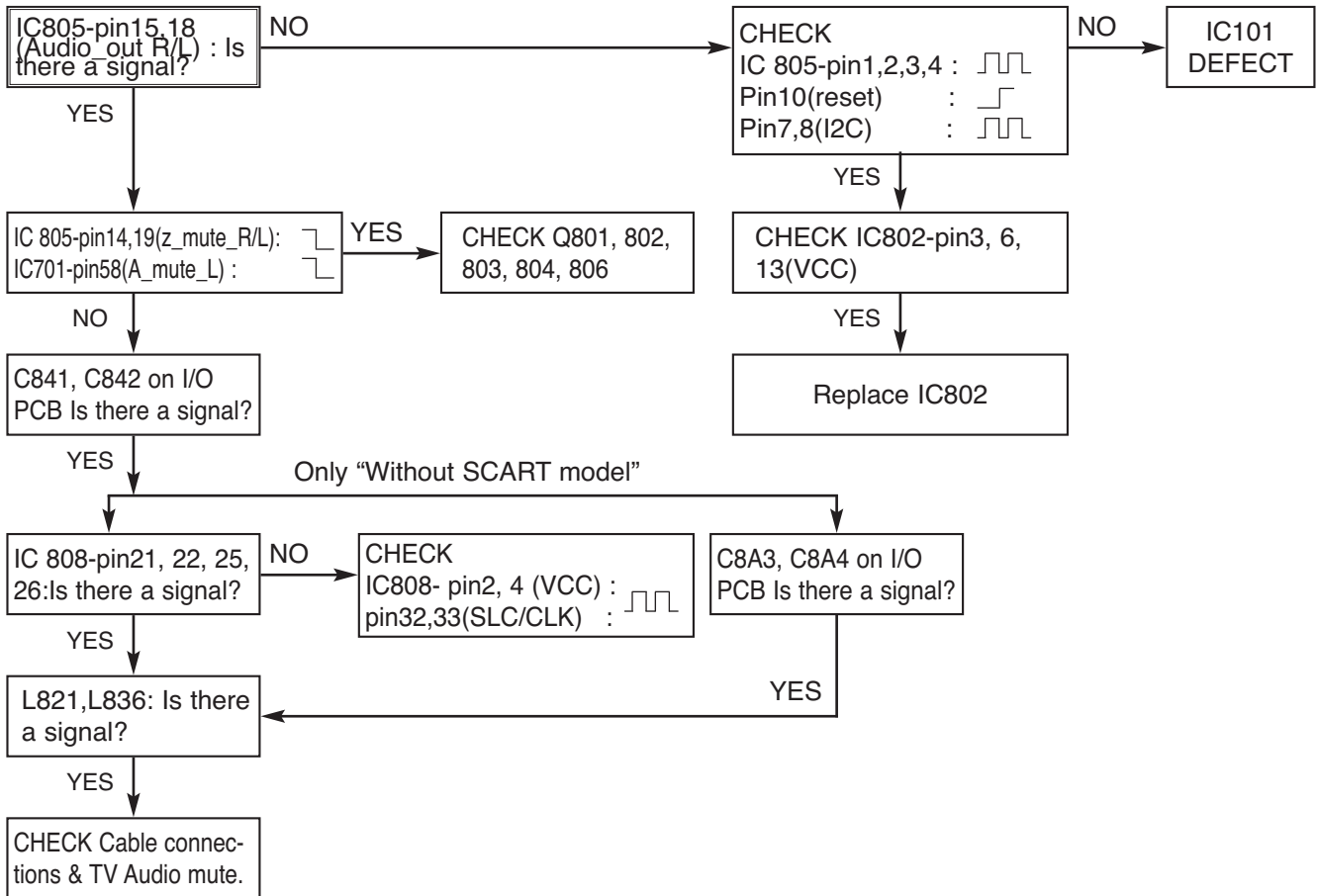
3. SYSTEM Circuit PART



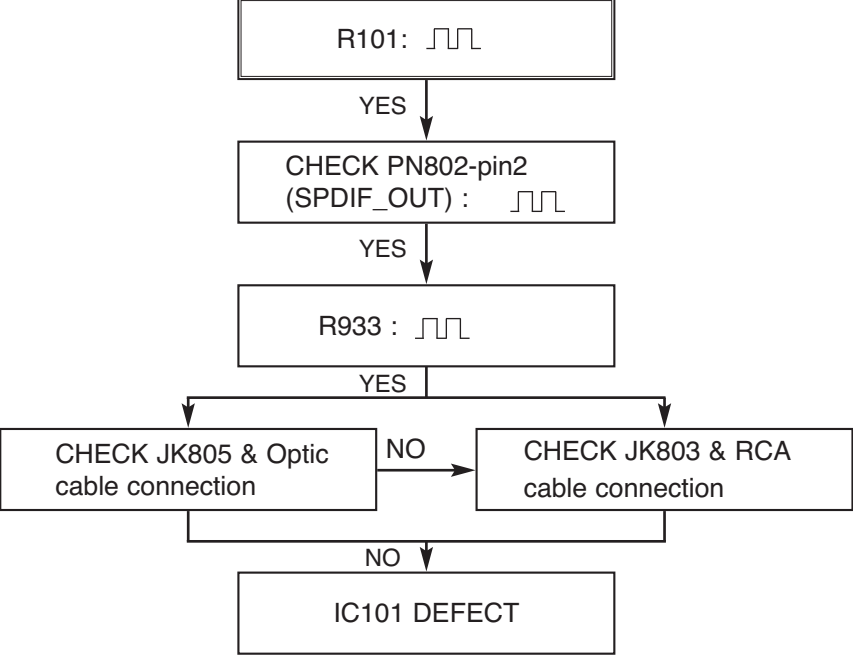
4. DISC not recognized



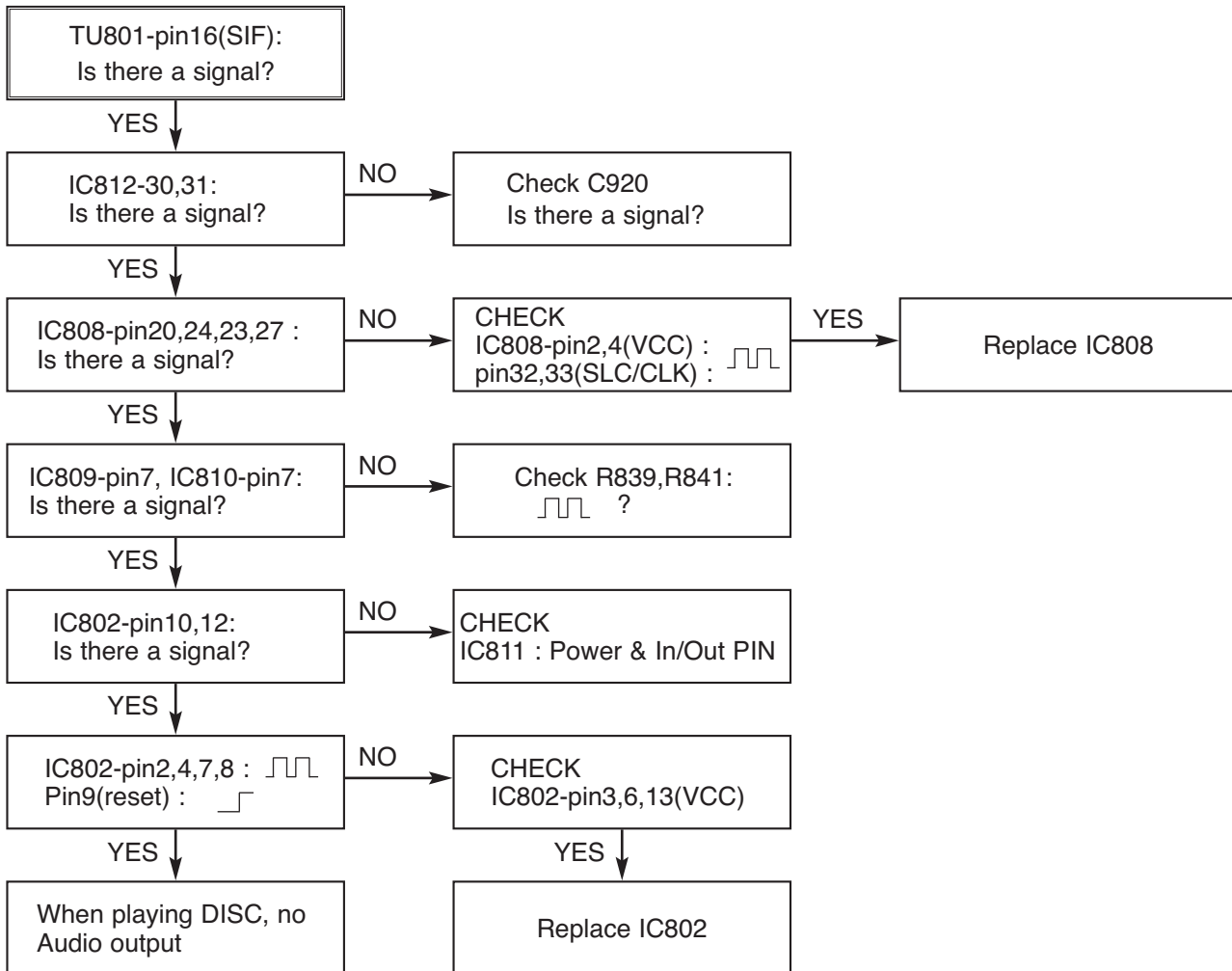
5. When playing DISC, no Audio output



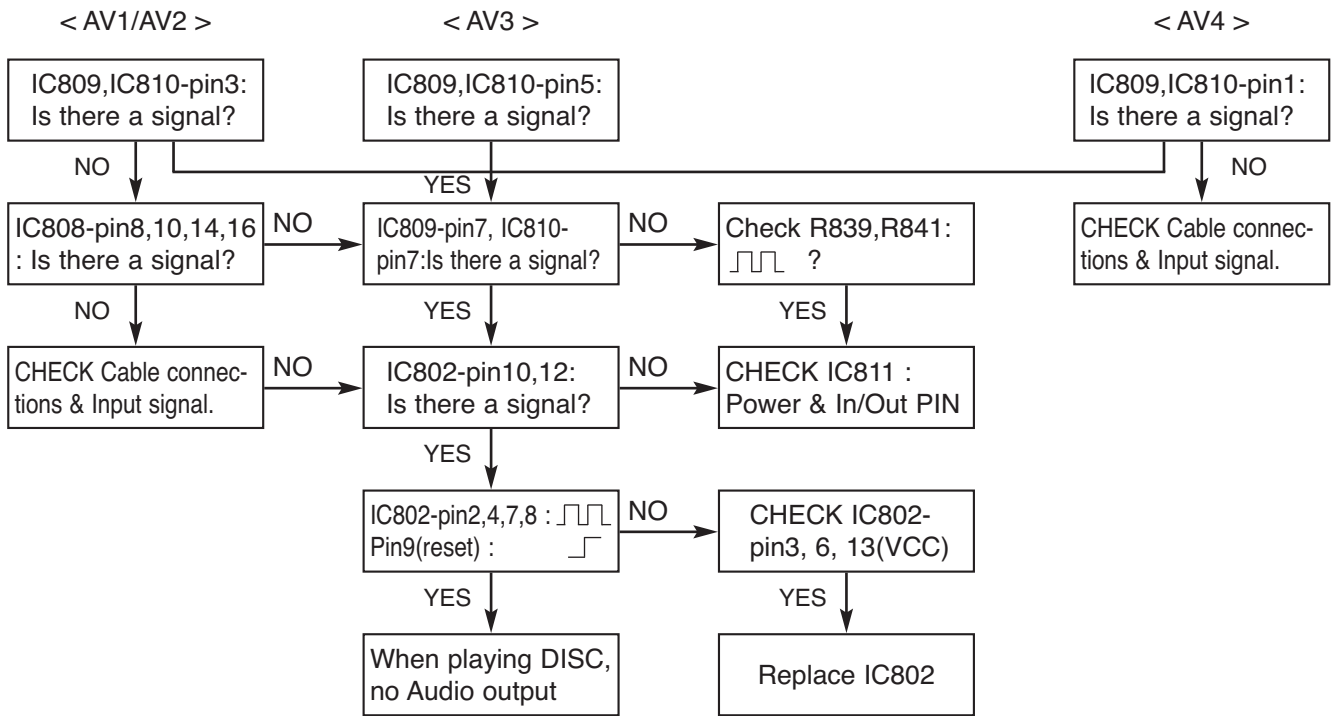
6. No OPTICAL/DIGITAL Output



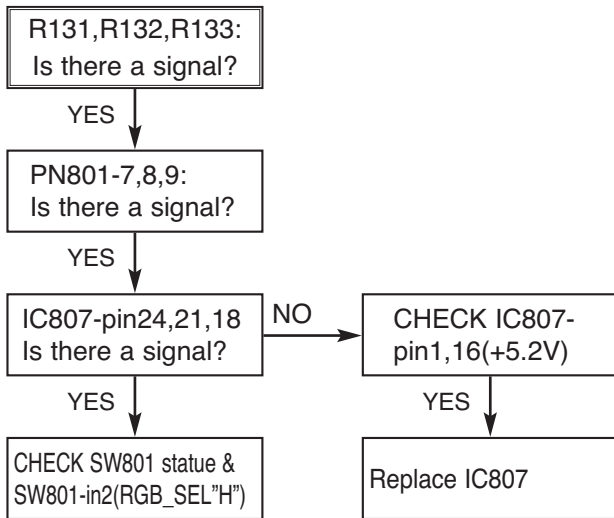
7. No TUNER Audio Output



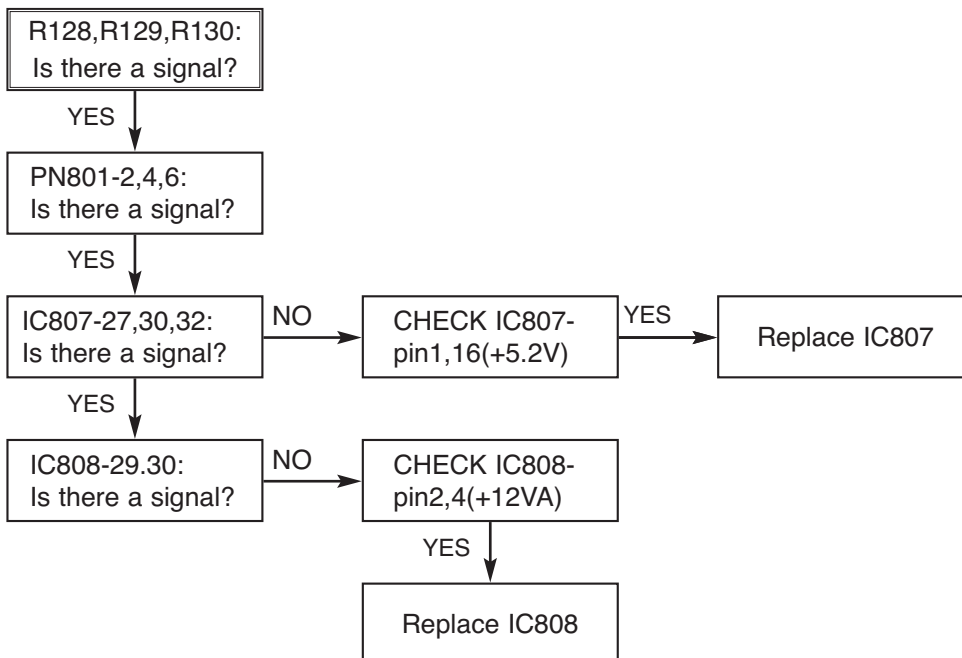
8. No External input Audio



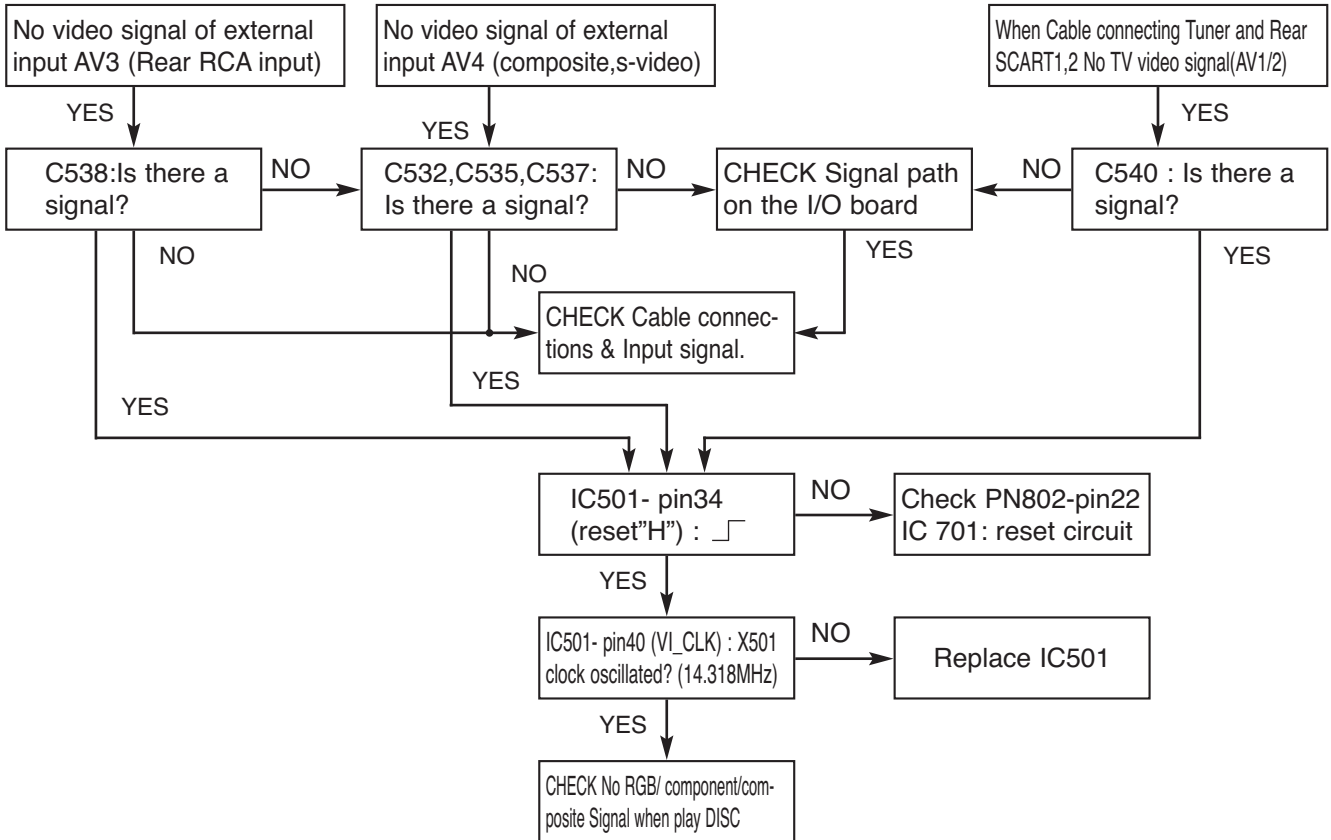
9. No RGB/Component Video signal when play DISC



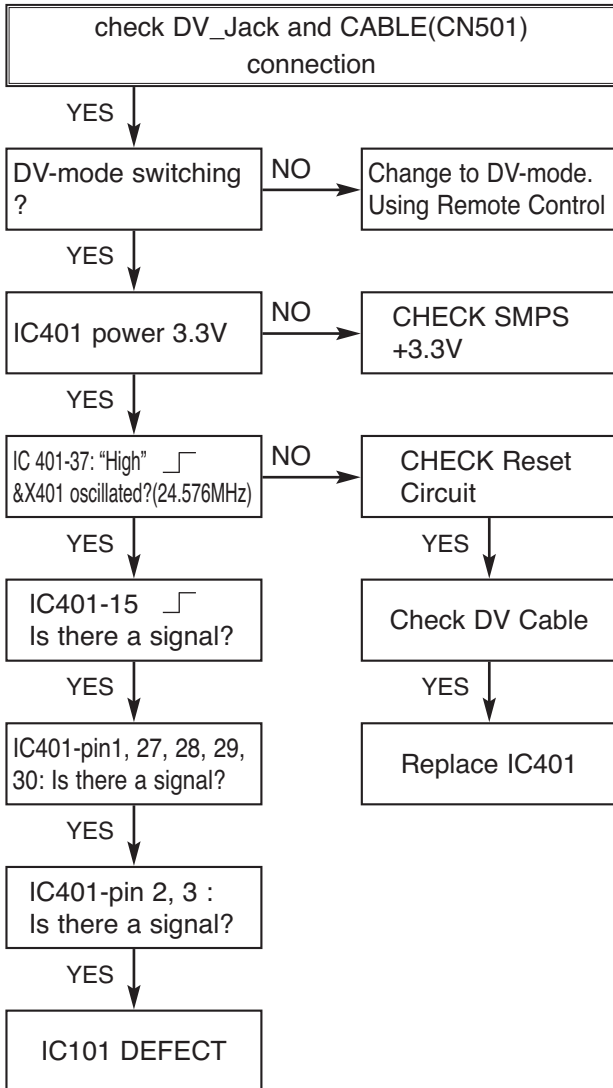
10. No composite/s-video Signal when play DISC



11. No TV, External input Video signal

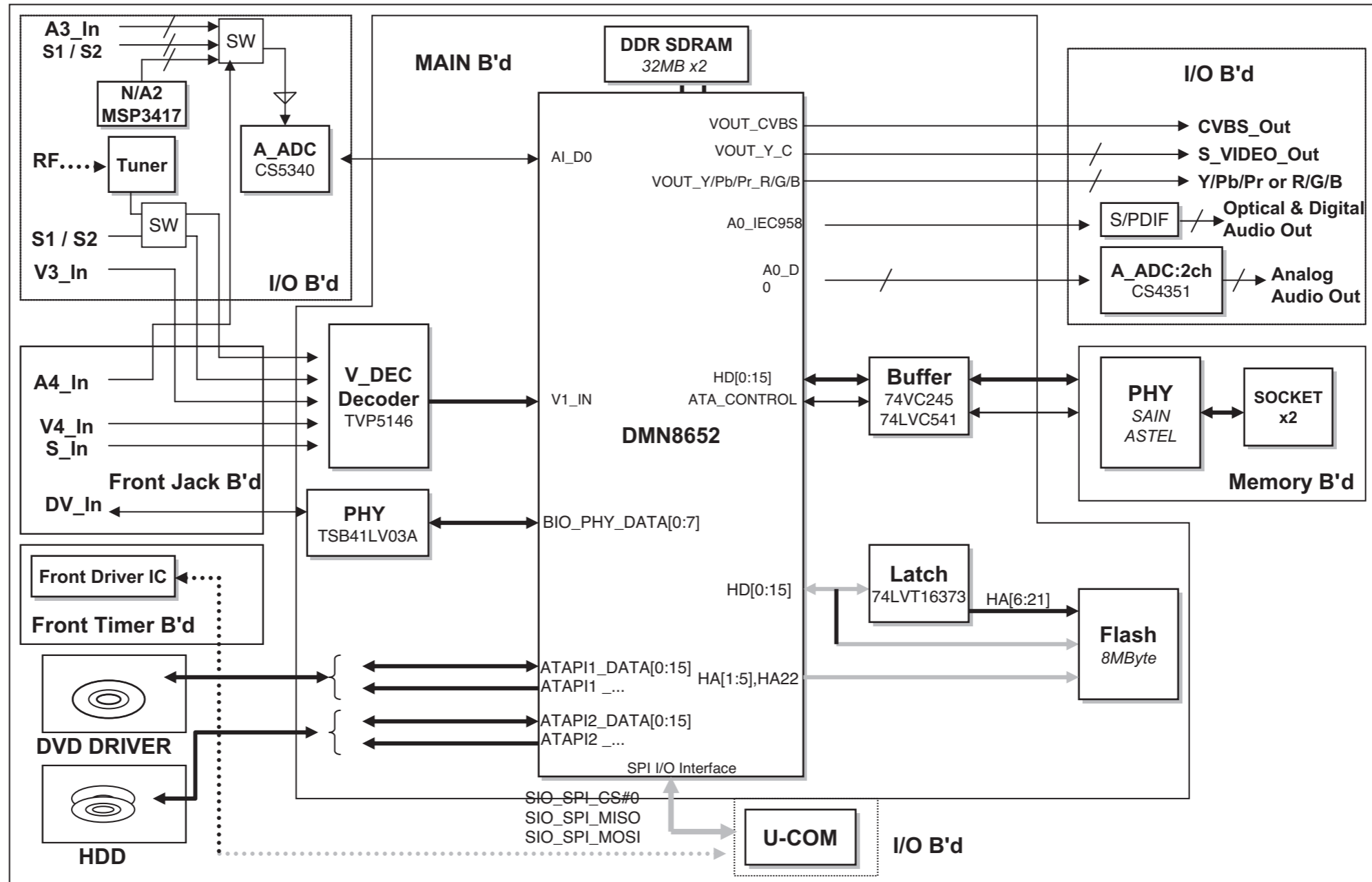


12. No DV(IEEE 1394)input(Video/Audio) signal

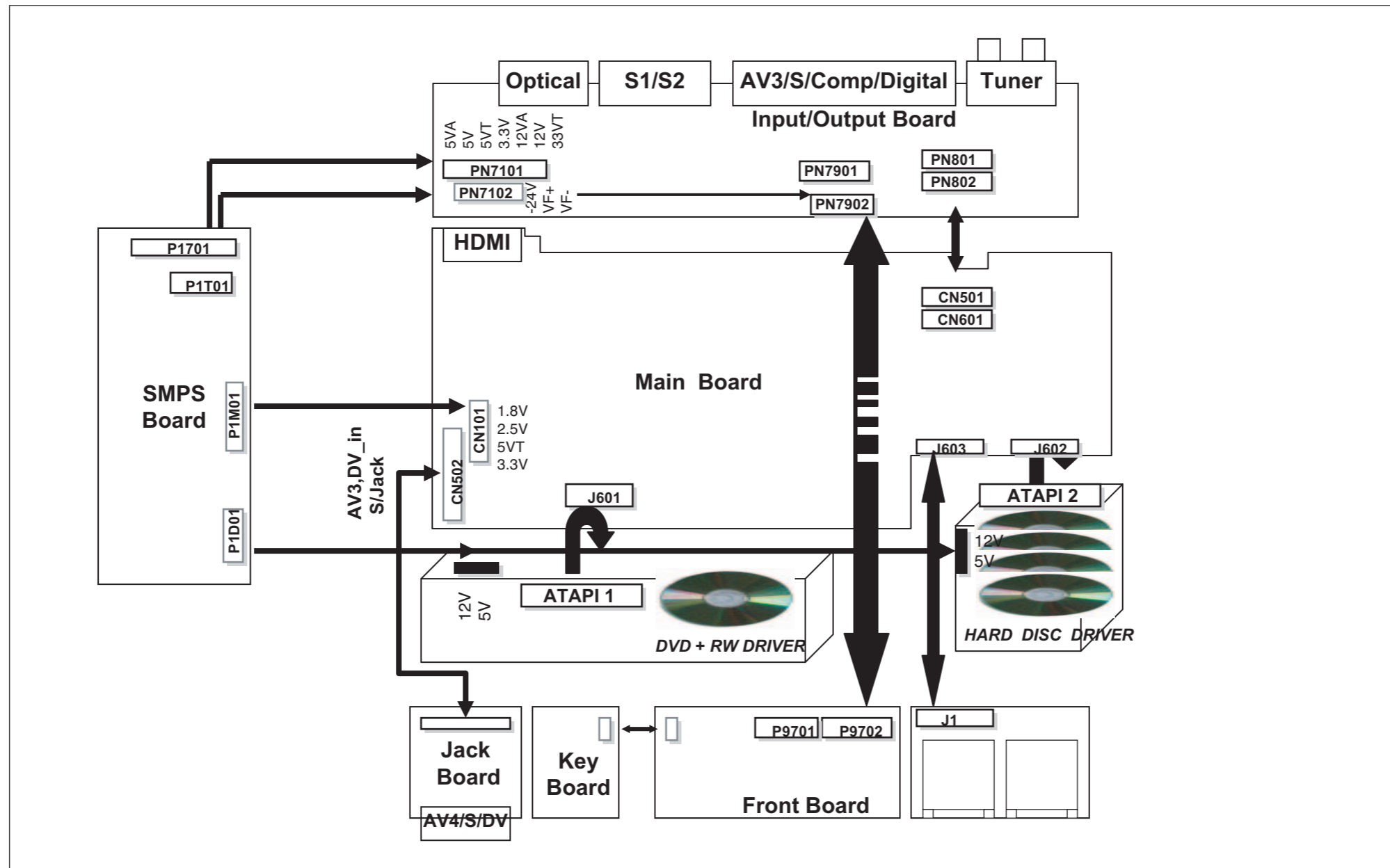


BLOCK DIAGRAMS

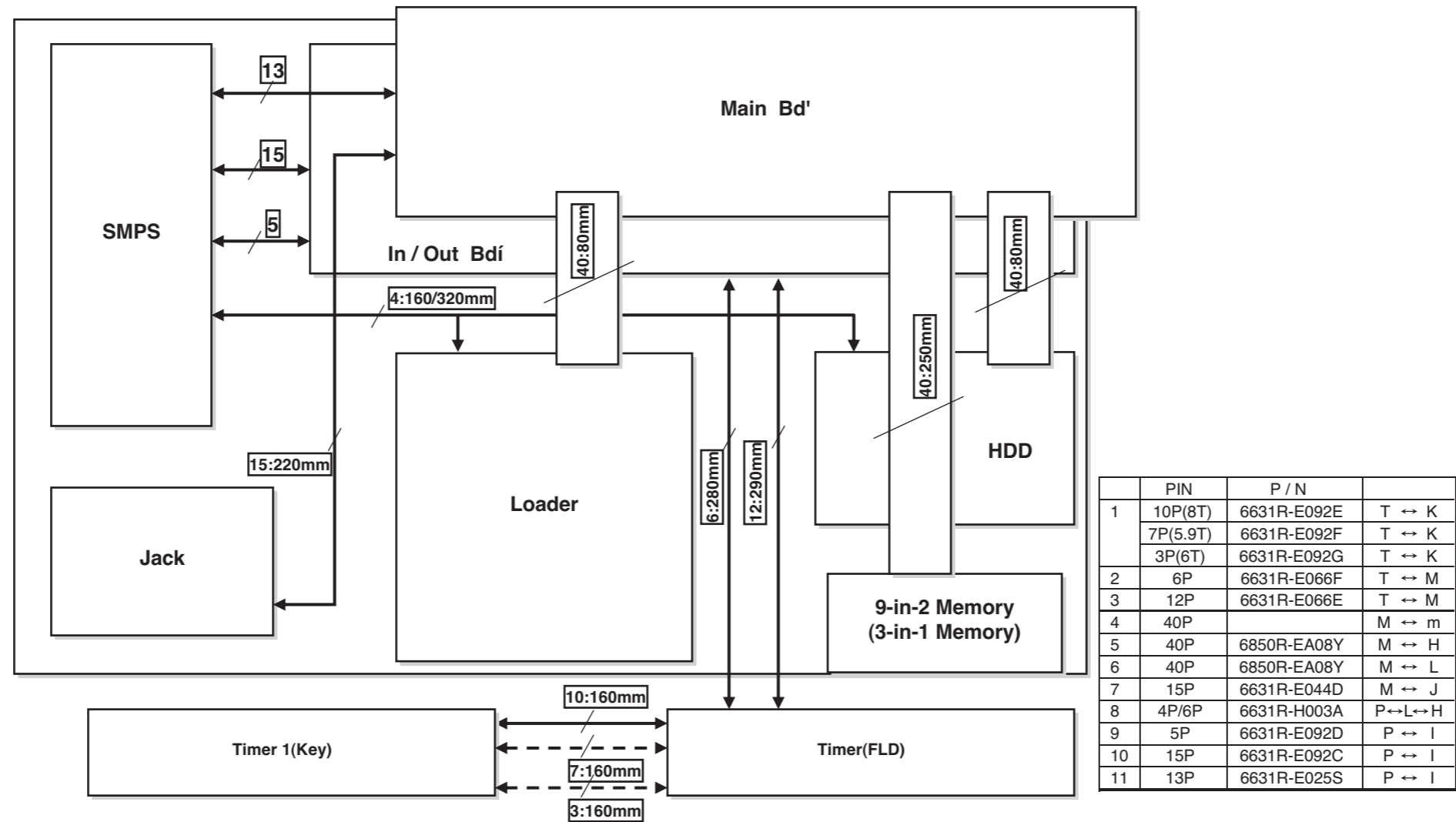
1. Overall Block Diagram



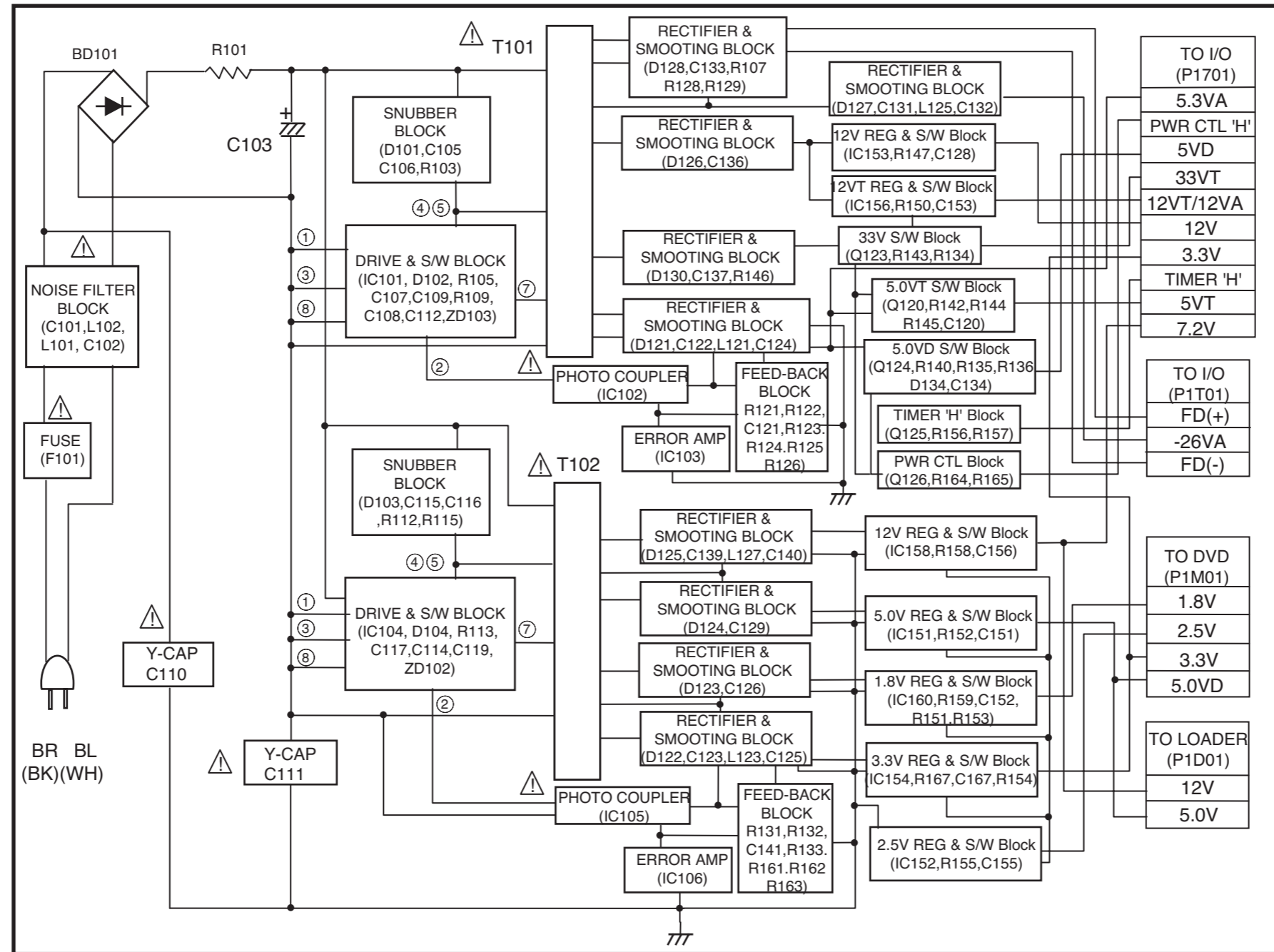
2. Layout Connection Block Diagram_1



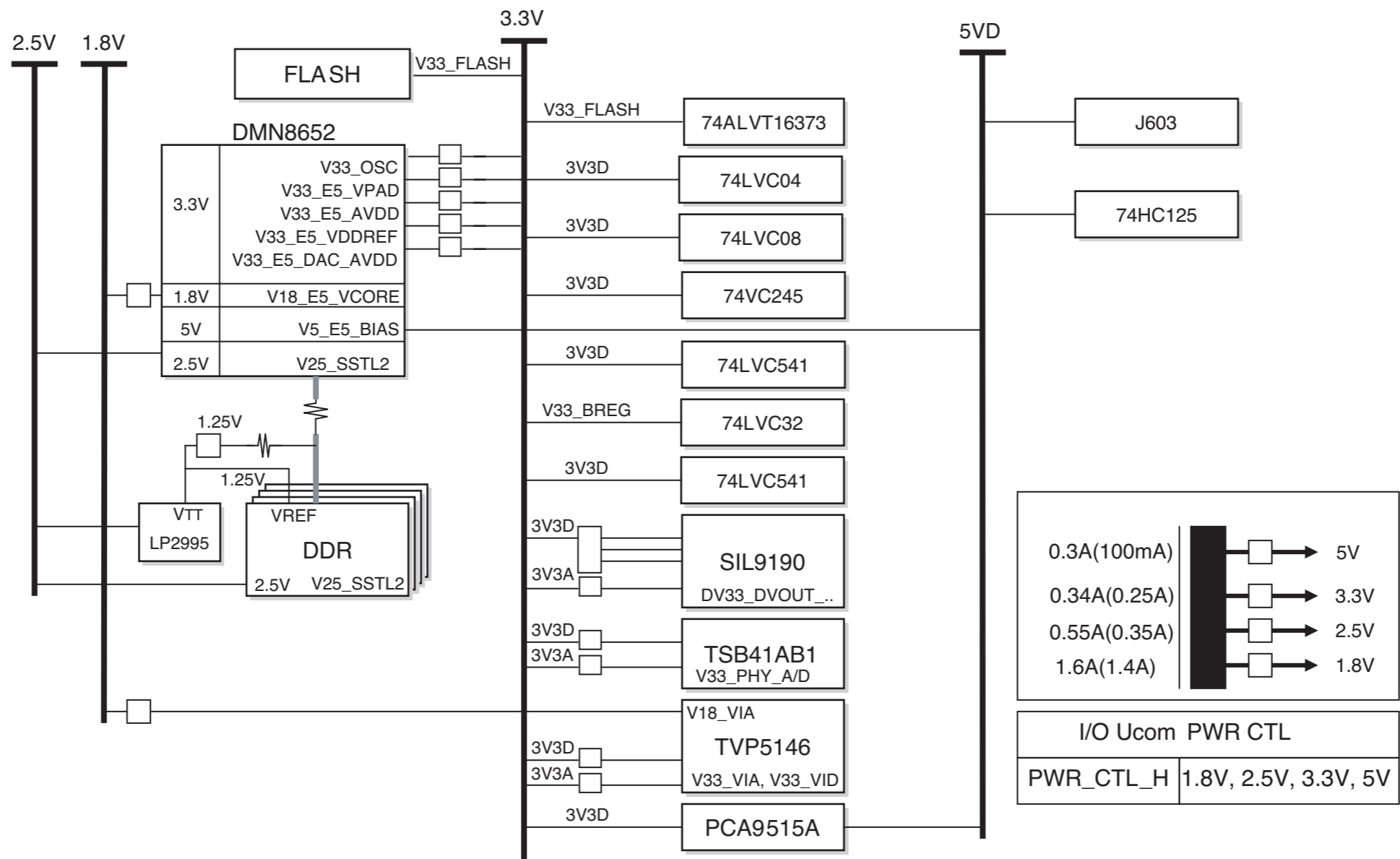
3. Layout Connection Block Diagram_2



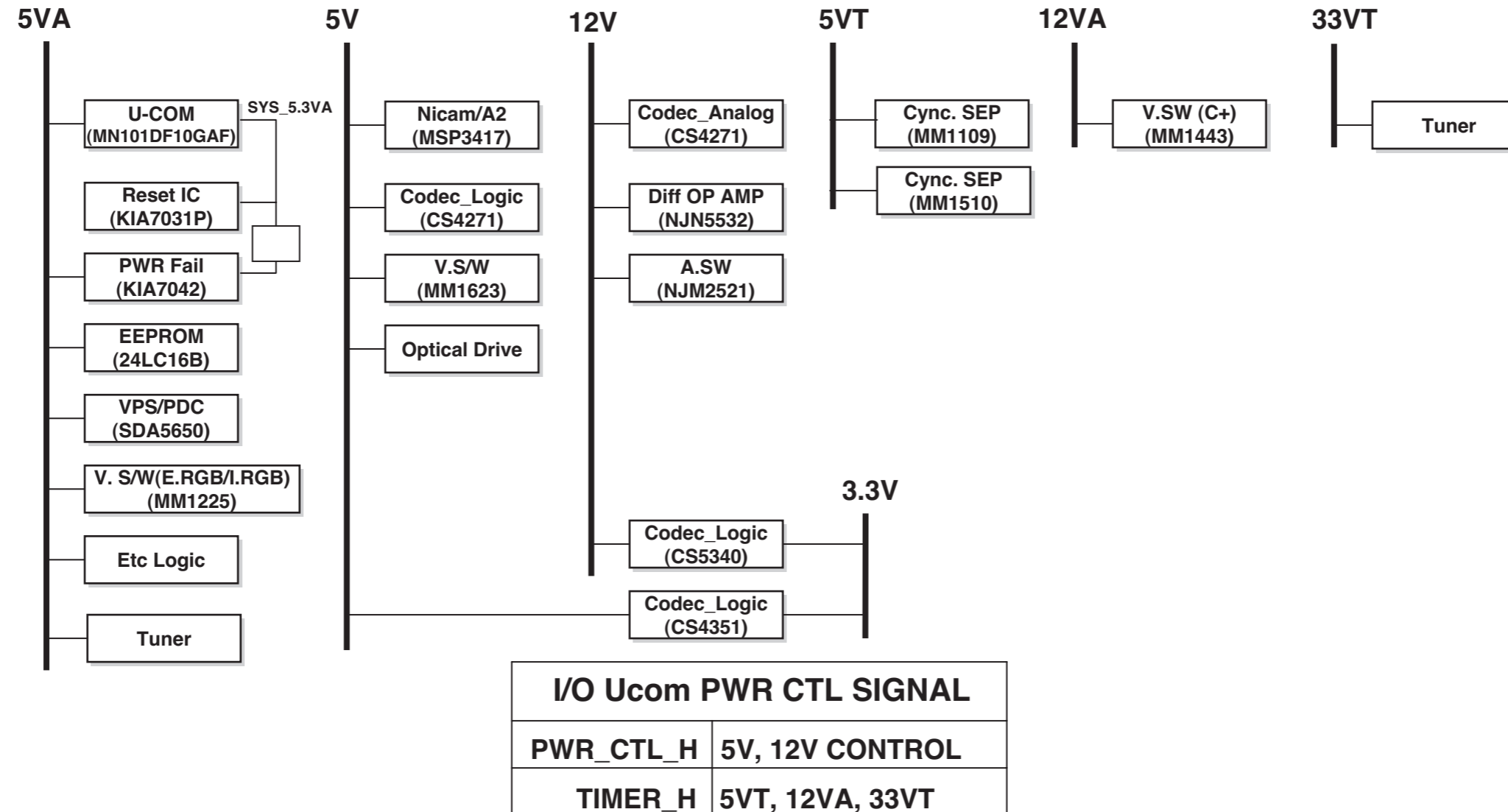
4. SMPS Block Diagram



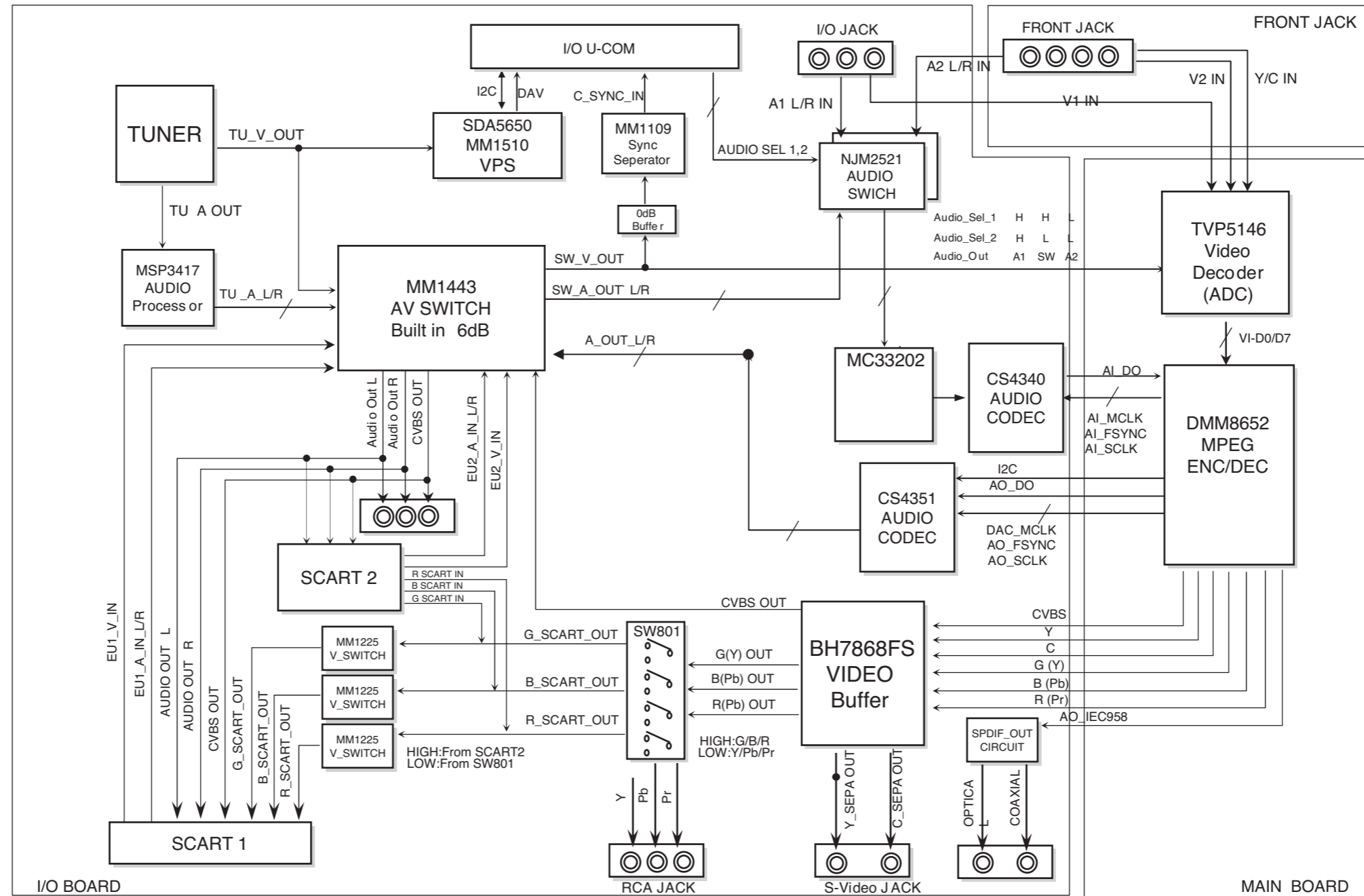
5. Power : Main Board Block Diagram



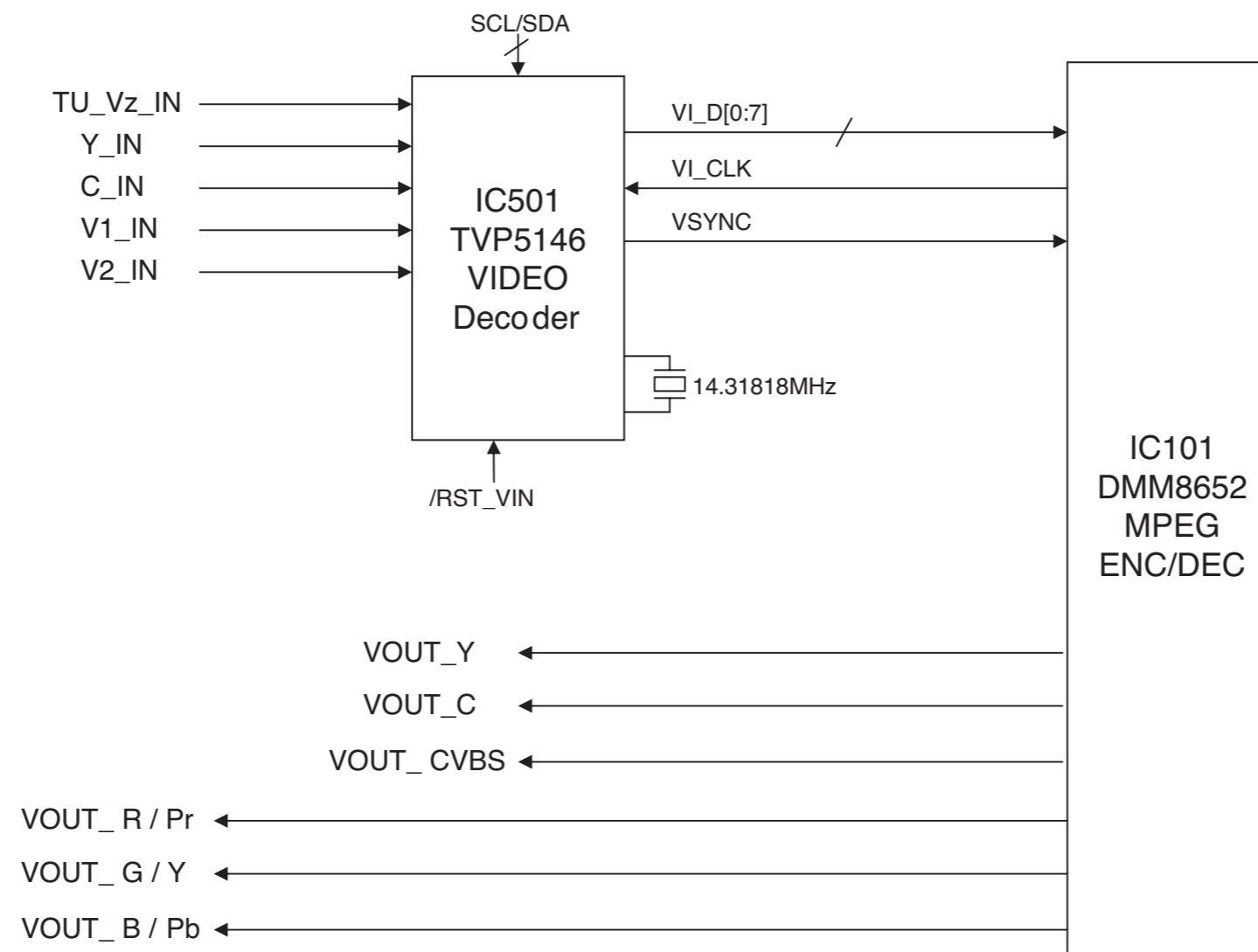
6. Power : I/O Board Block Diagram



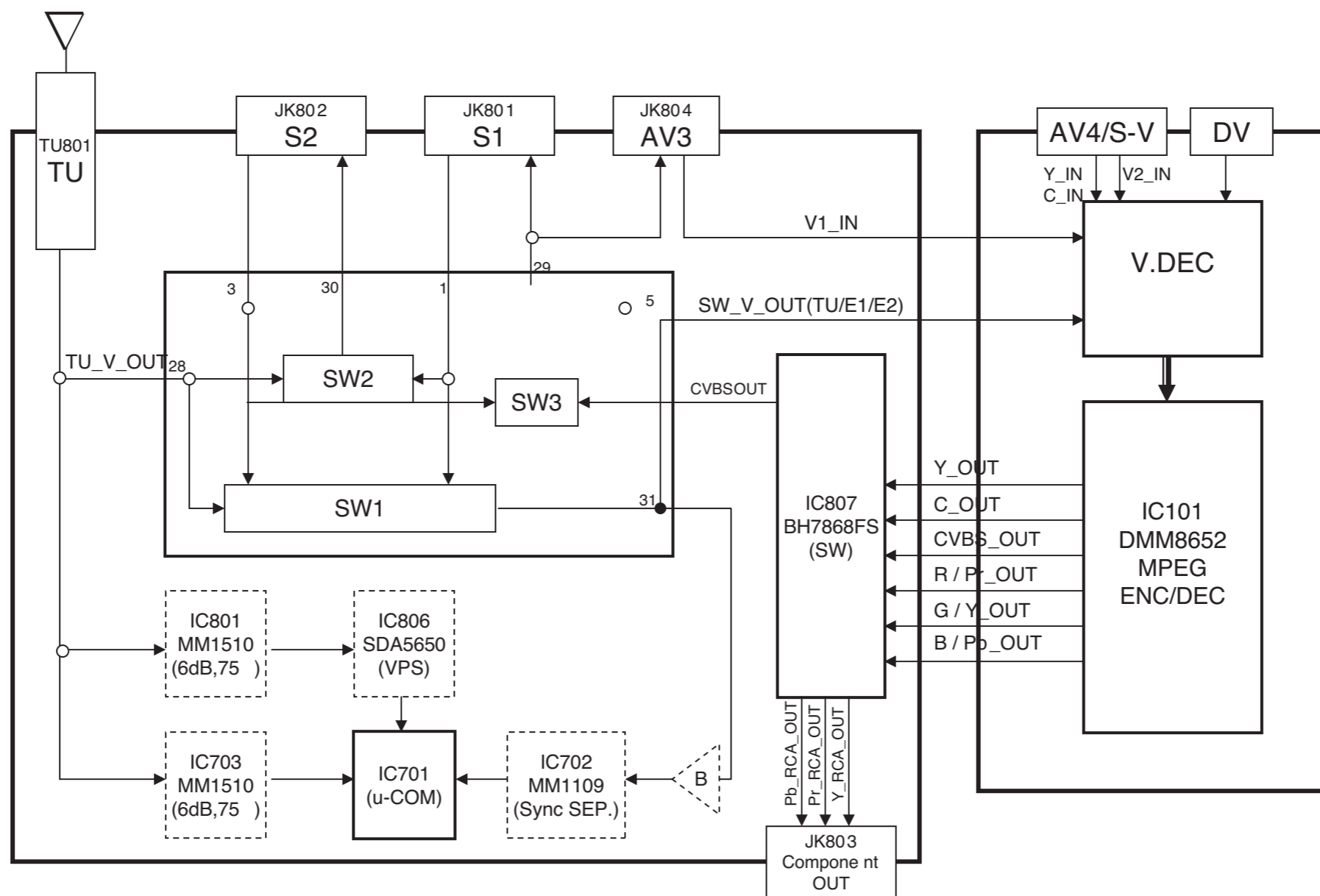
7. In/Out Block Diagram



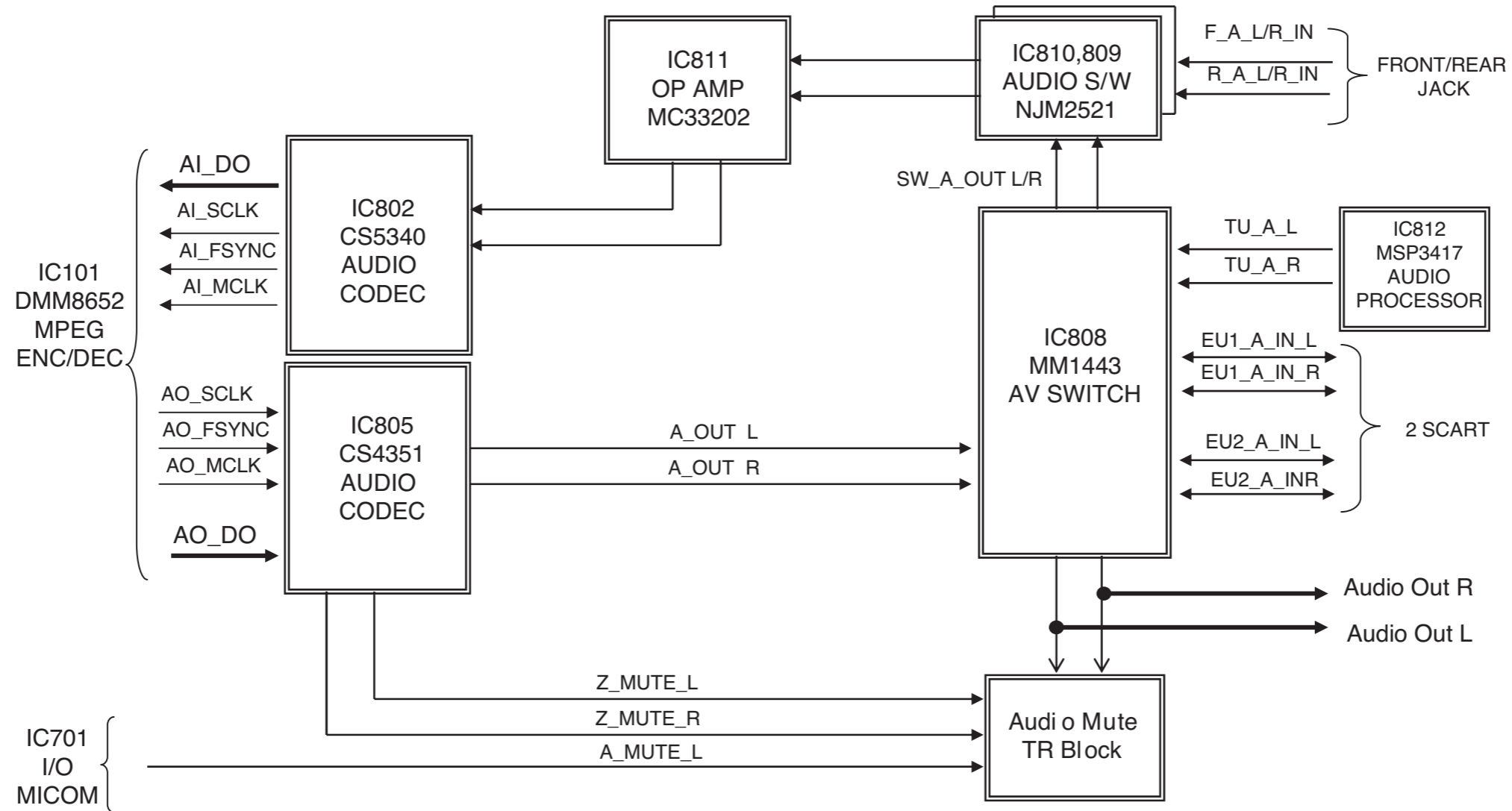
8. Video Block Diagram



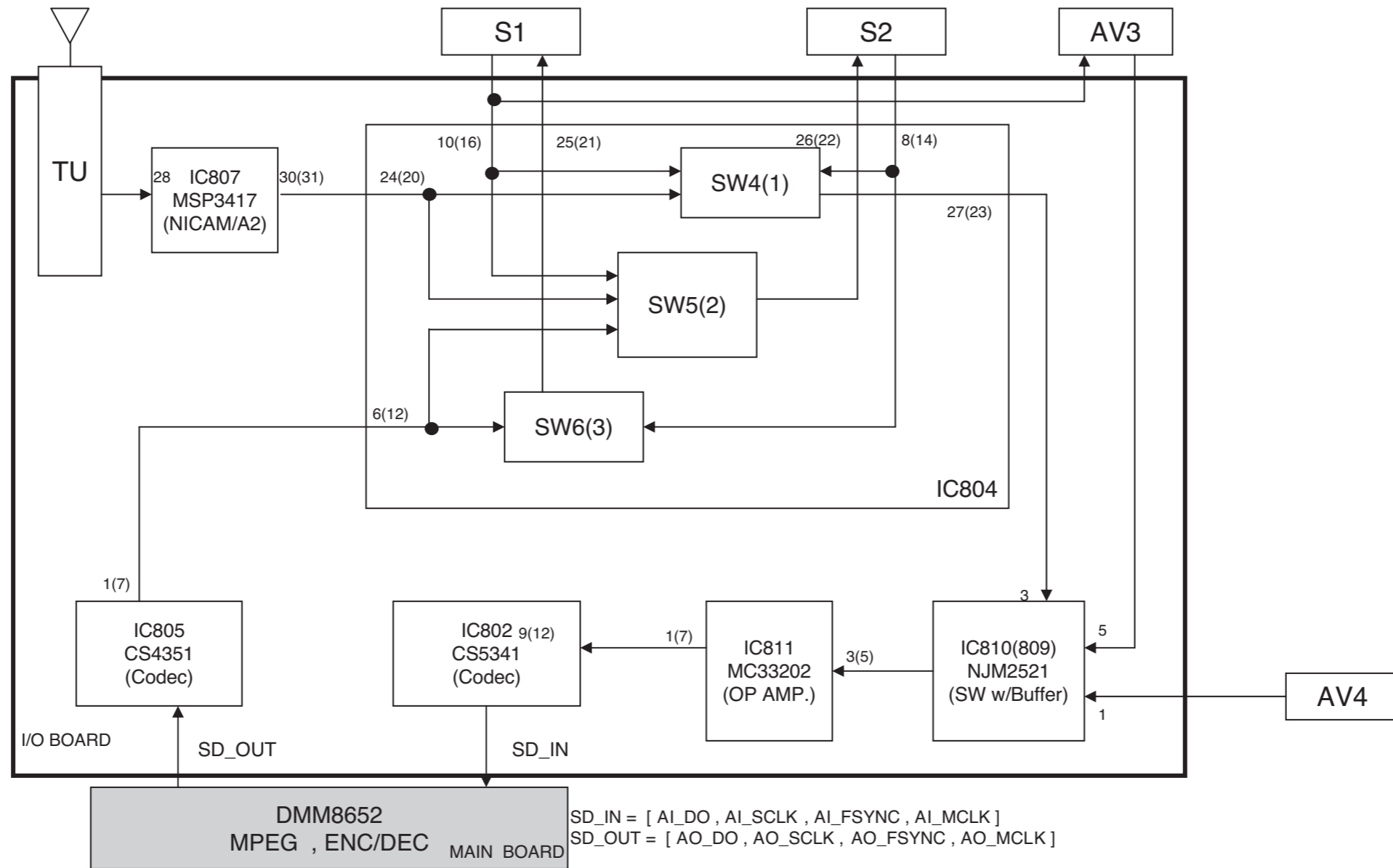
9. Video SW Path Block Diagram



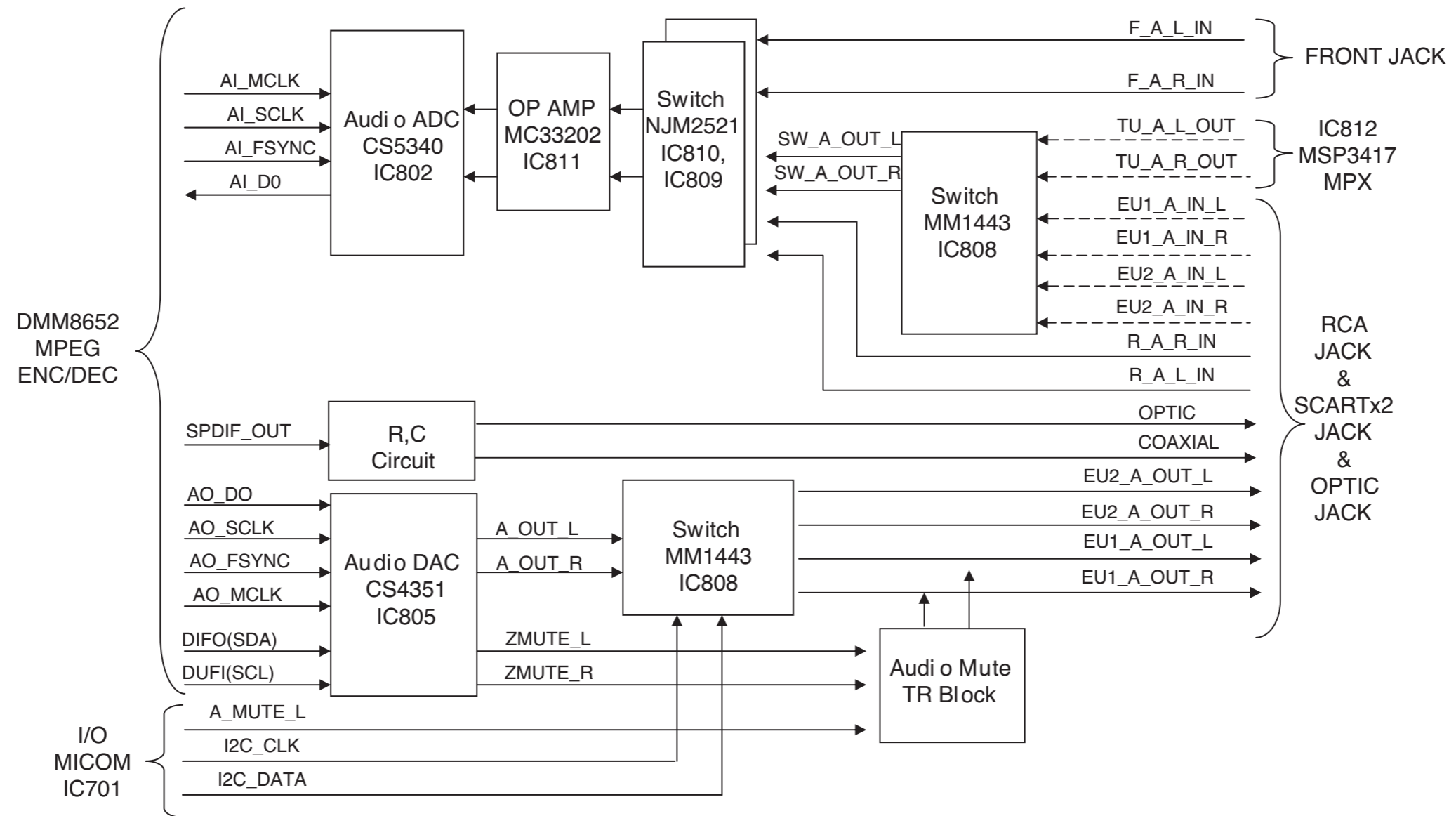
10. Audio Block Diagram



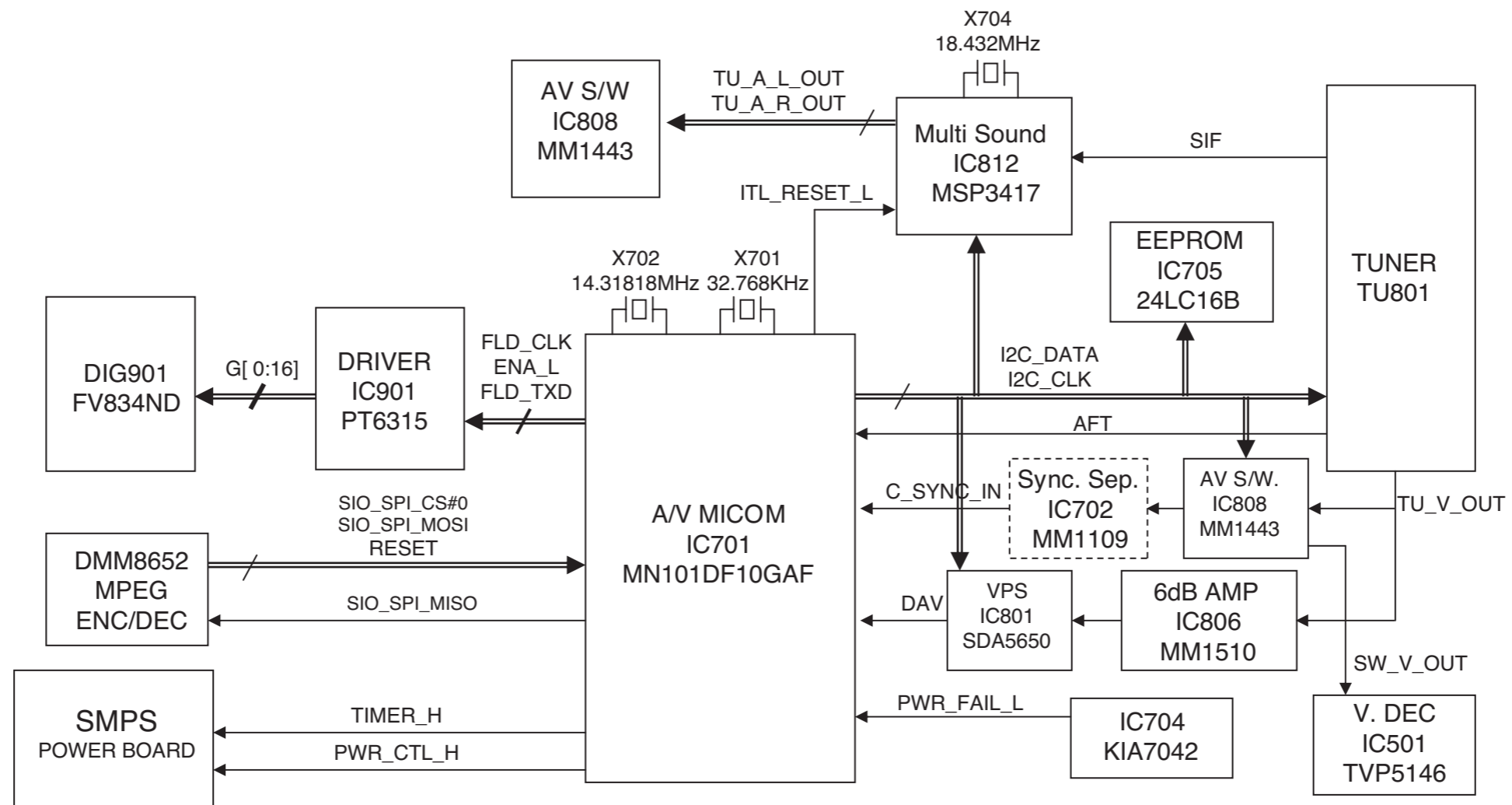
11. Audio SW Path Block Diagram



12. AUDIO IN / OUT Block Diagram

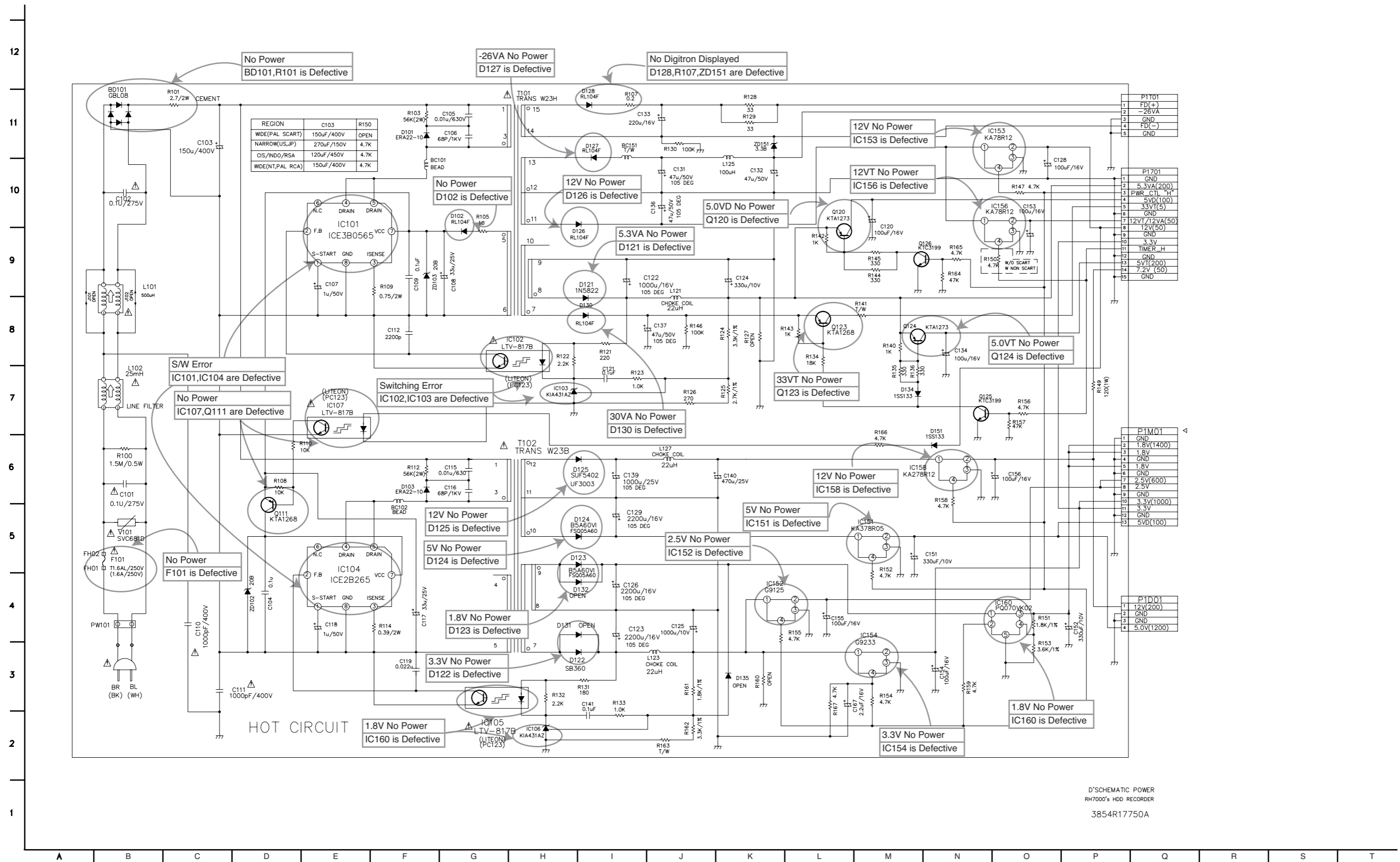


13. FLD / μ -COM / TUNER Block Diagram

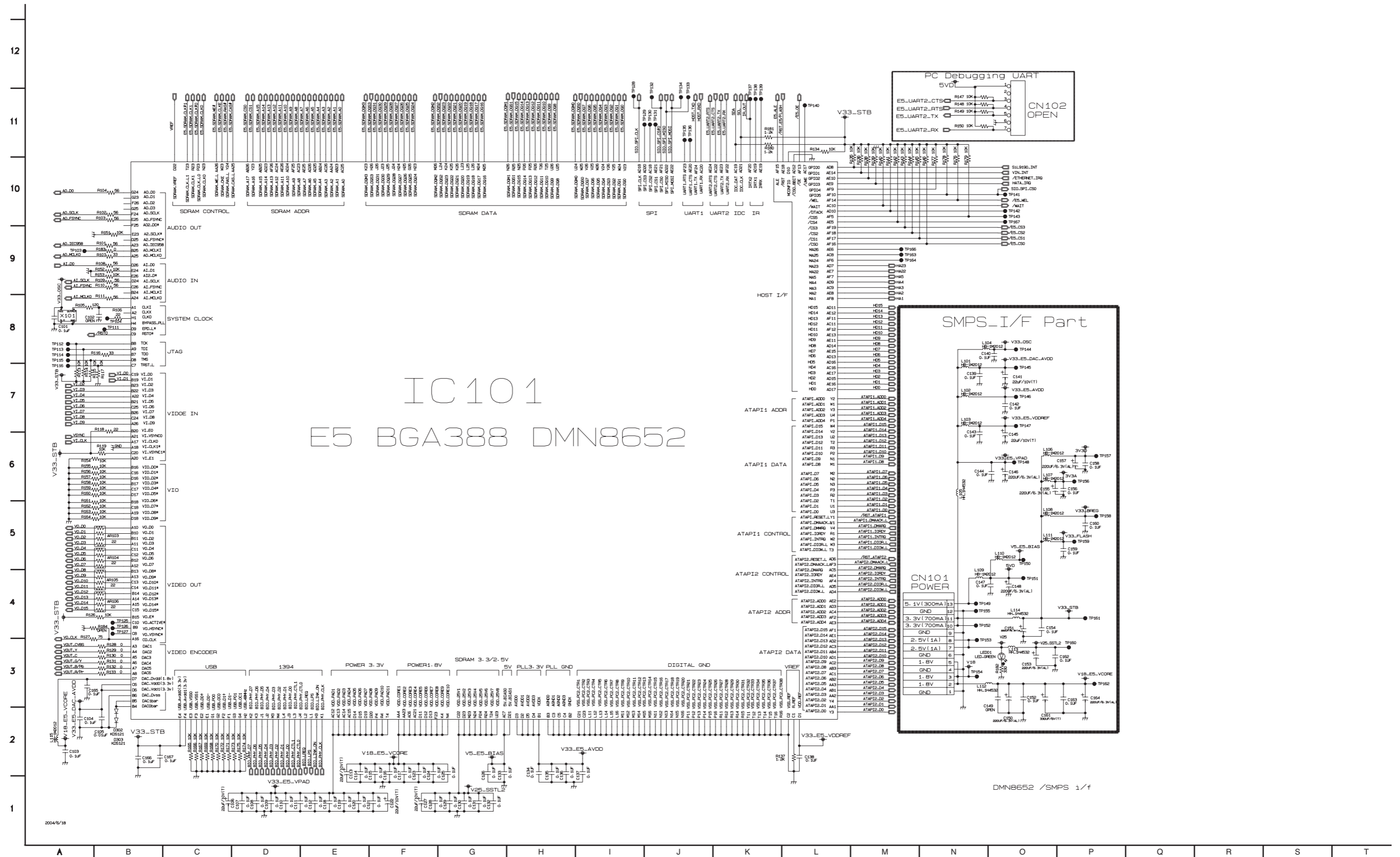


CIRCUIT DIAGRAMS

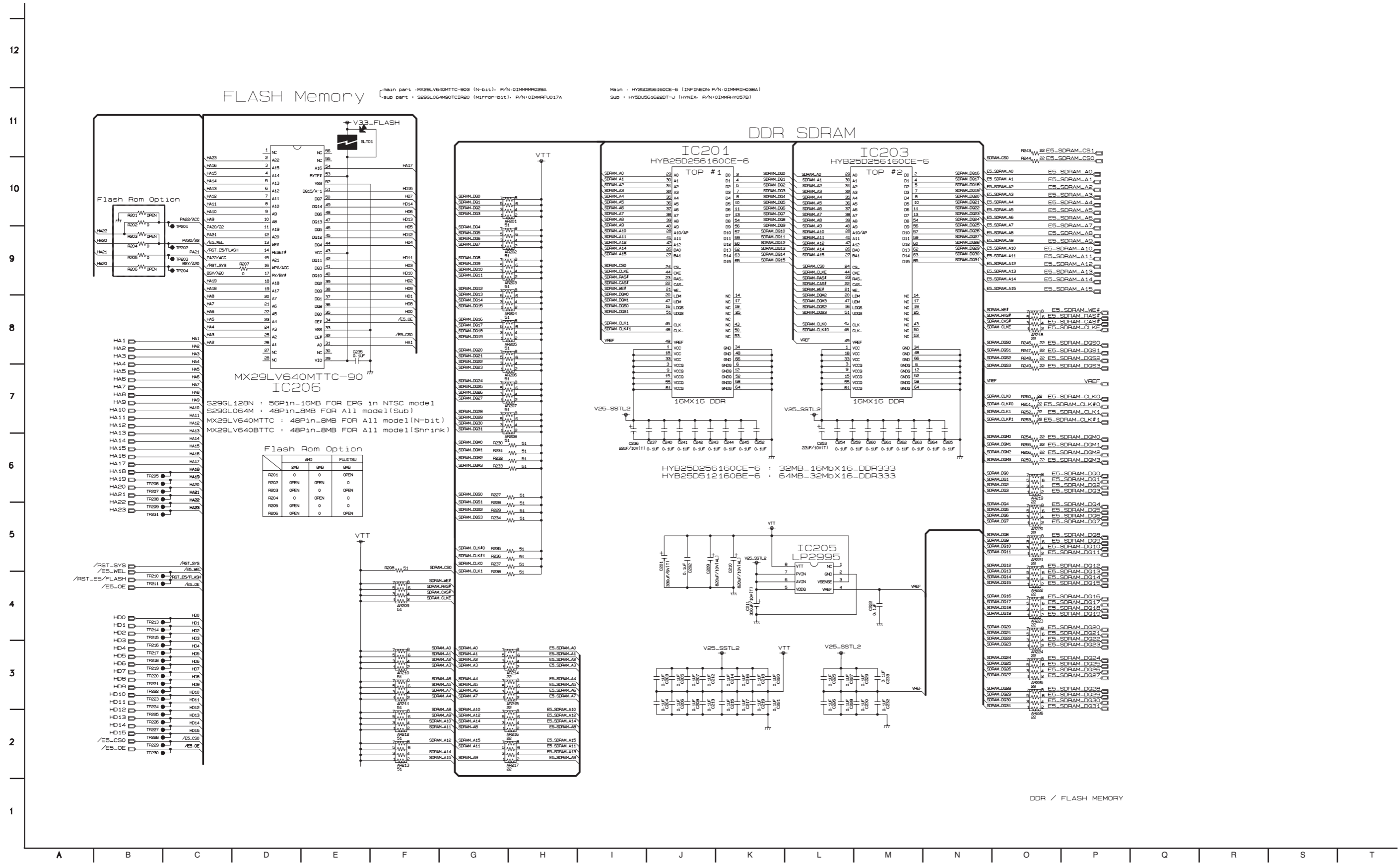
1. POWER CIRCUIT DIAGRAM



2. E5 BGA, POWER, UART2 CIRCUIT DIAGRAM

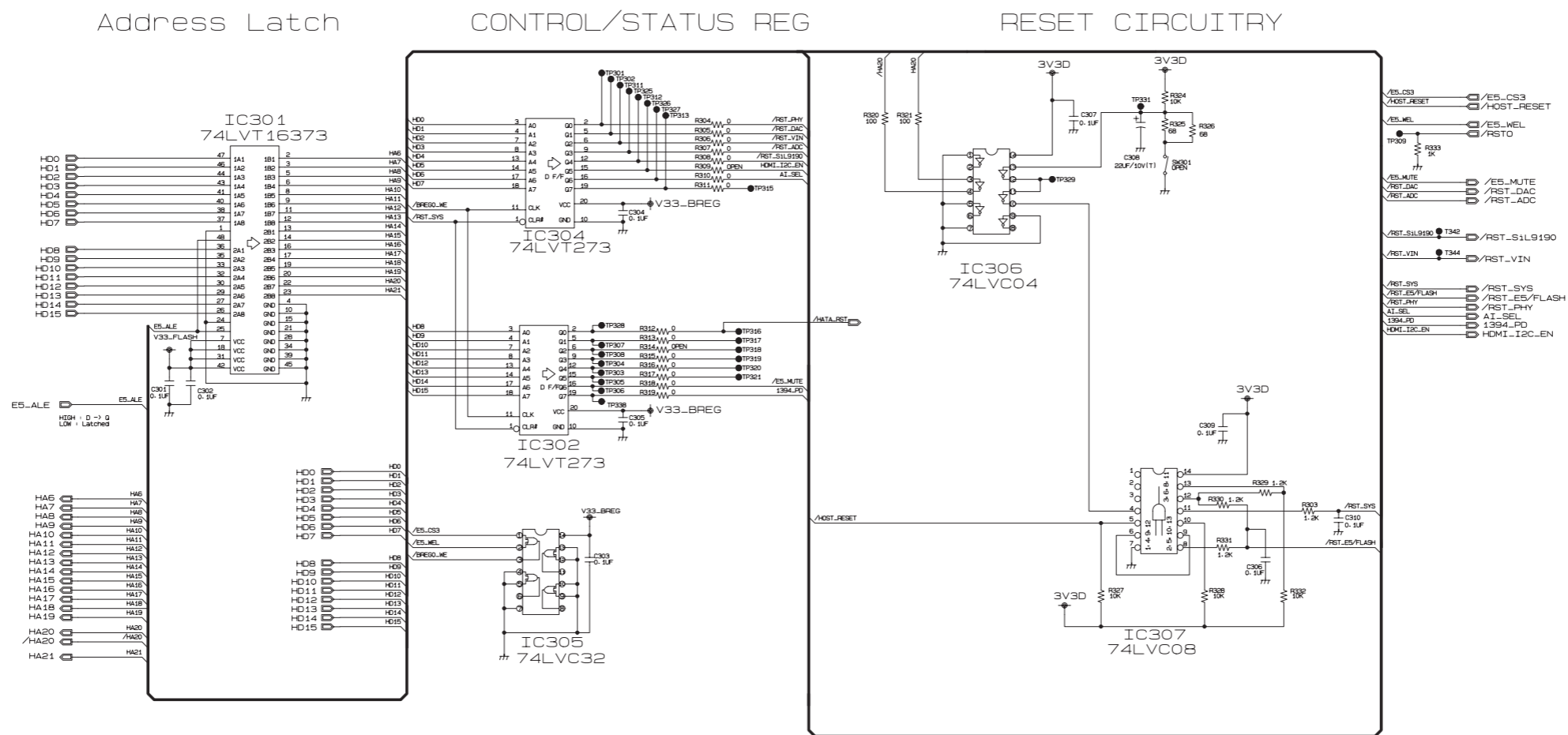


3. DDR SDRAM, FLASH CIRCUIT DIAGRAM



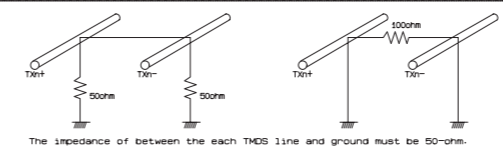
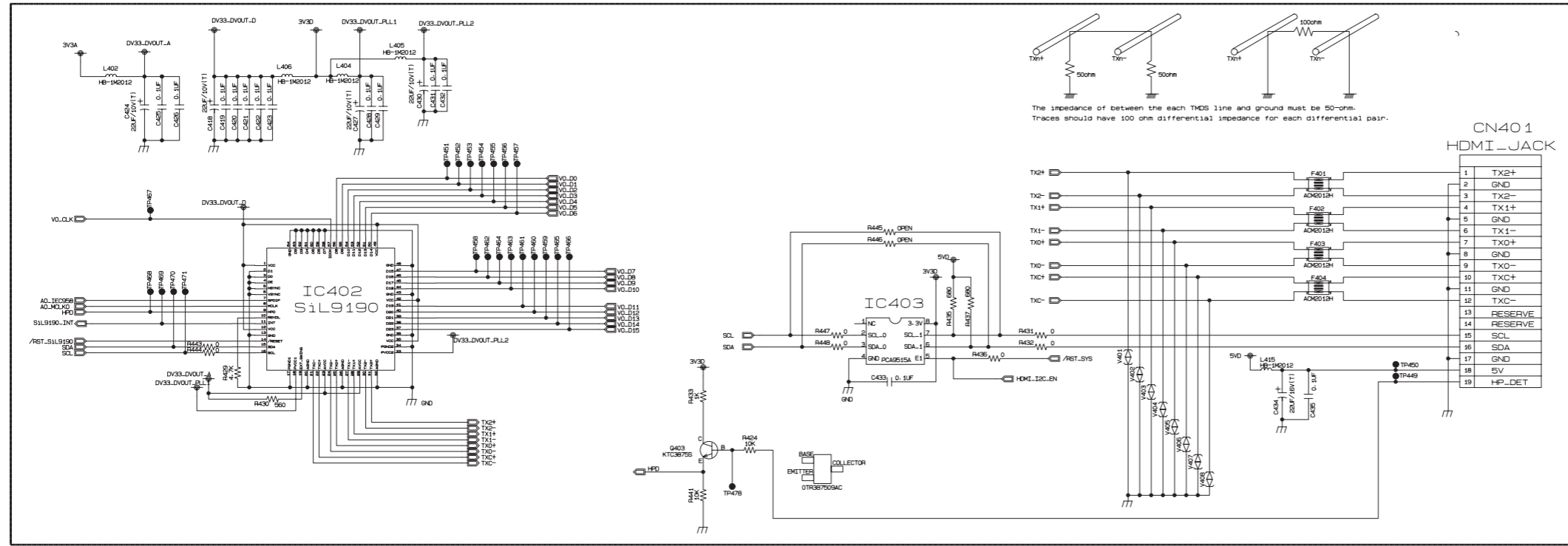
4. RST, CONTROL/STATUS REG, ADDRESS LATCH CIRCUIT DIAGRAM

74LVT16373 : 3-3LVT 16bit Transparent D-type Latch
 74LVT273 : 3-3LVT Octal D-FF
 74LVC32 : Quad 2-input OR-Gate
 74LVC04 : Hexa Inverter
 74LVC08 : Quad 2-input AND-Gate



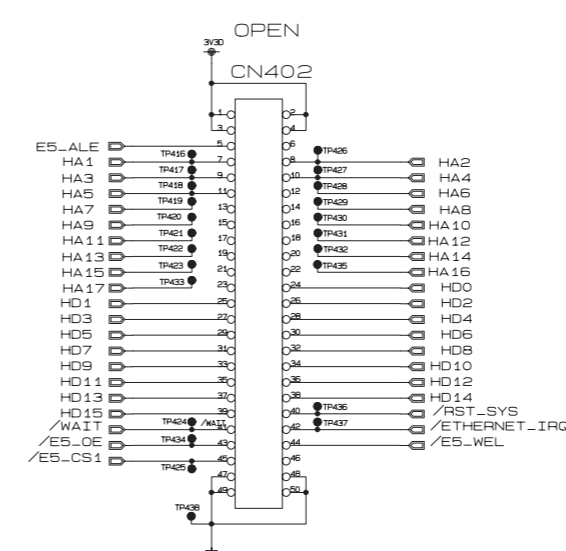
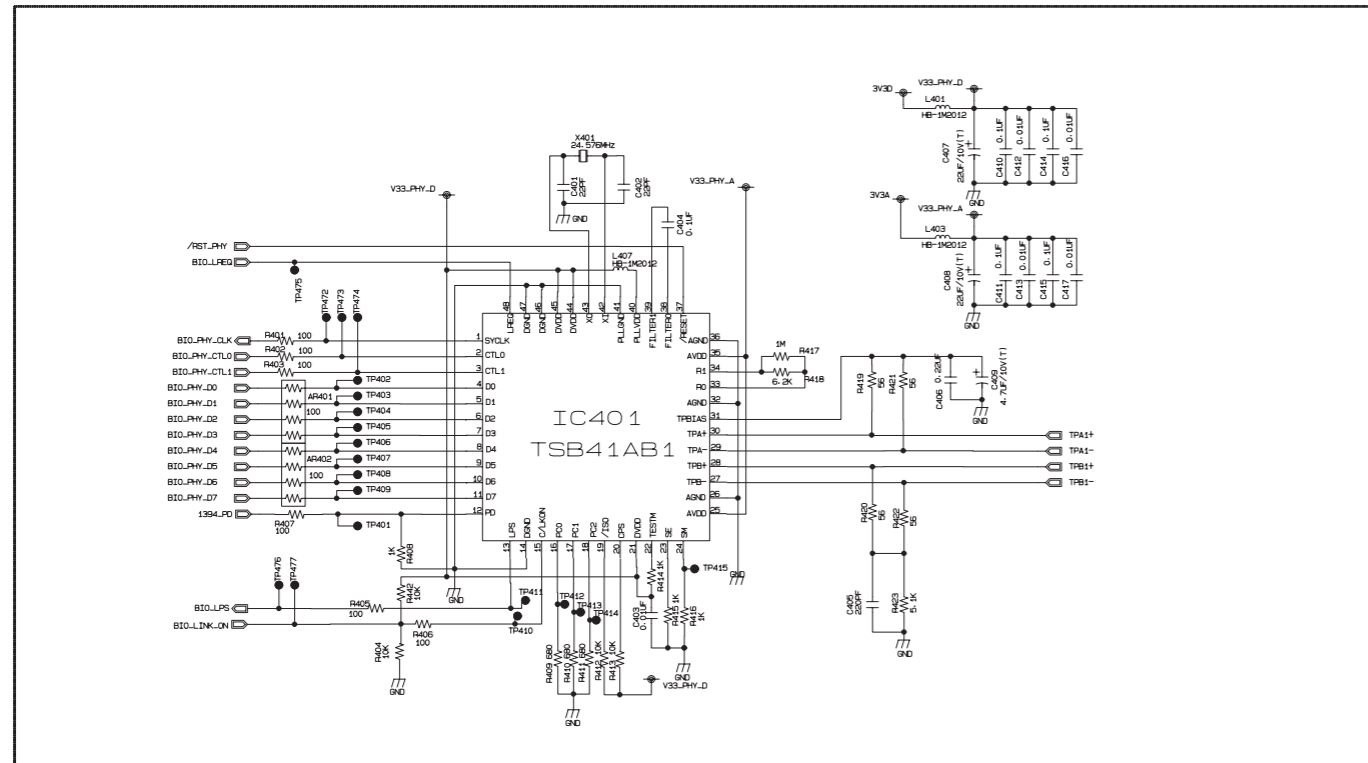
RESET / ADDRESS LATCH

5. HDMI TX / IEEE1394 CIRCUIT DIAGRAM



CN401
HDMI_JACK

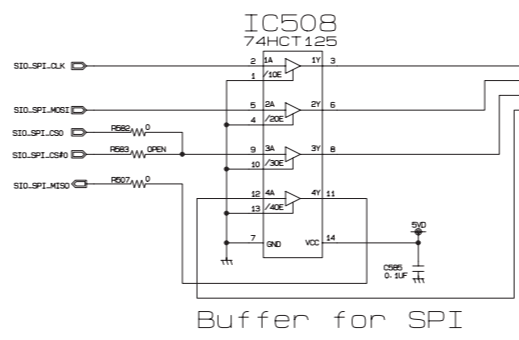
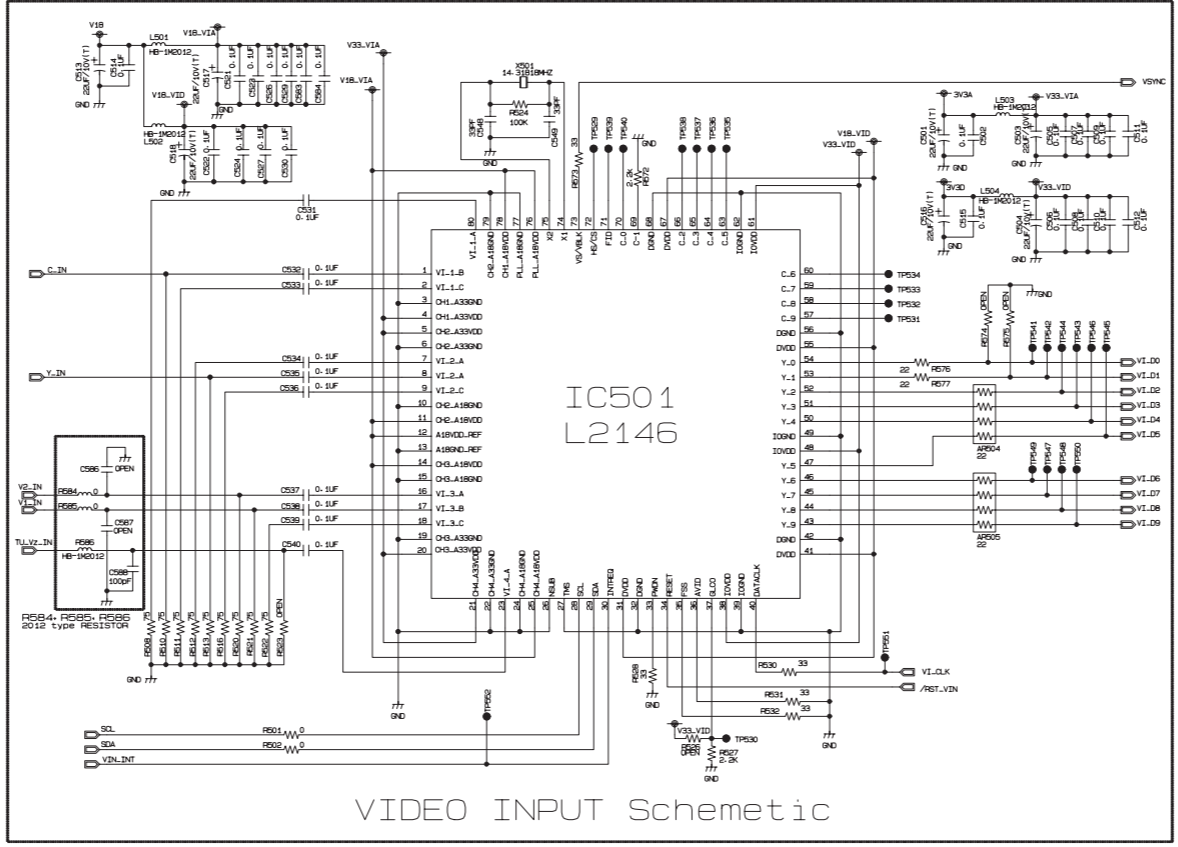
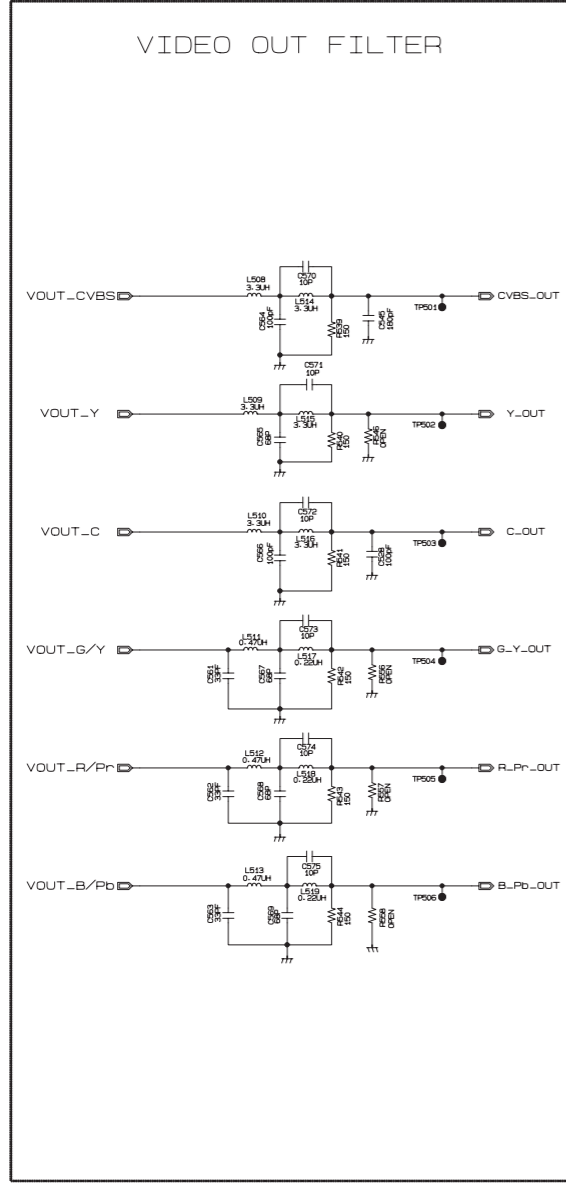
1	TX2+
2	GND
3	TX2-
4	TX1+
5	GND
6	TX1-
7	TX0+
8	GND
9	TX0-
10	TXC+
11	GND
12	TXC-
13	RESERVE
14	RESERVE
15	SCL
16	SDA
17	GND
18	5V
19	HP_DET



HDMI TX / IEEE1394

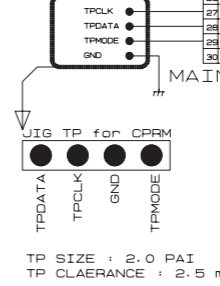
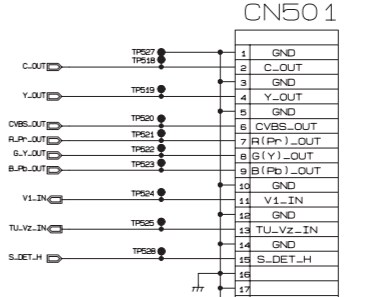
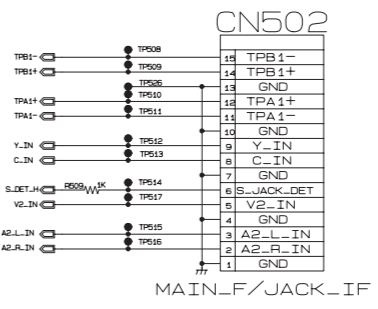
6. VIDEO IN/OUT CIRCUIT DIAGRAM

12
11
10
9
8
7
6
5
4
3
2
1



FUNCTION TABLE

INPUT	OUTPUT
/OE nA	Y
L H	H
L L	L
H X	Z



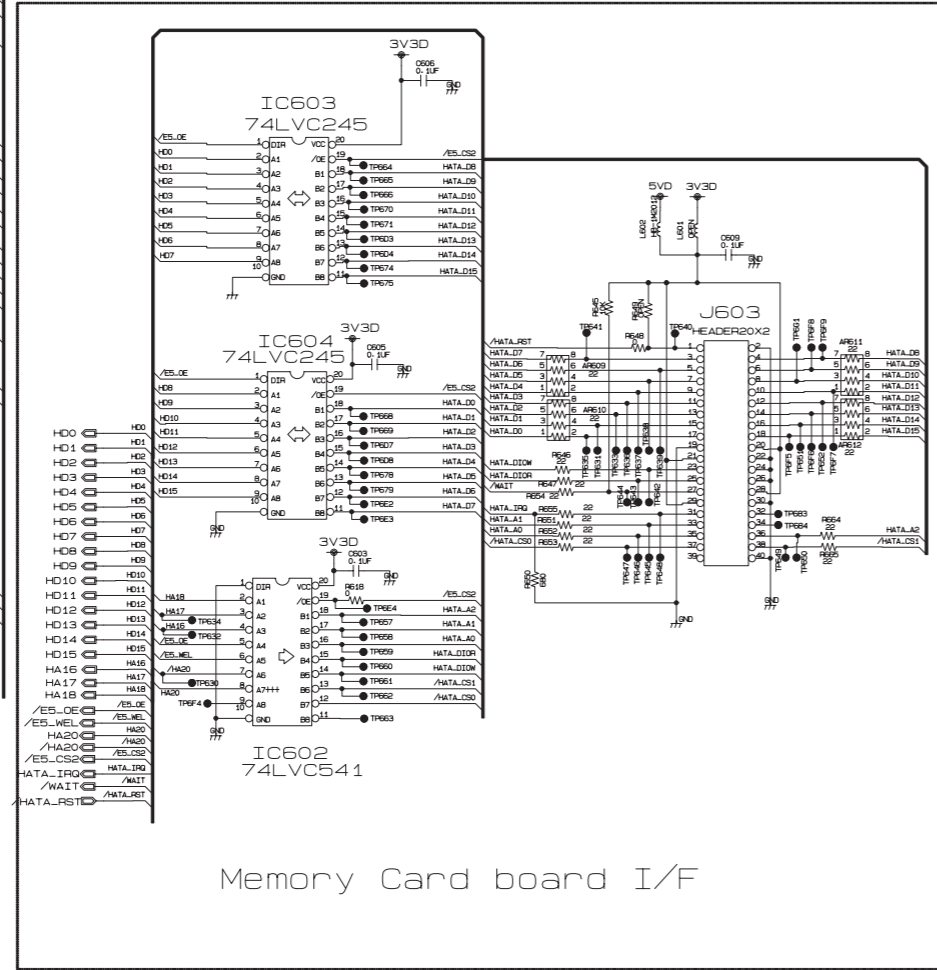
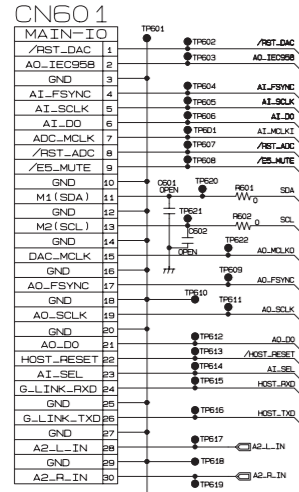
VIDEO DECODER

A B C D E F G H I J K L M N O P Q R S T

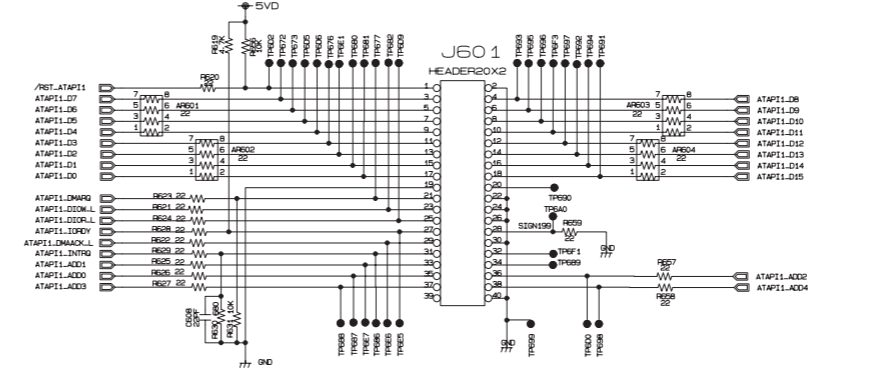
7. MEMORY, ATAPI, I/O CIRCUIT DIAGRAM

12
11
10
9
8
7
6
5
4
3
2
1

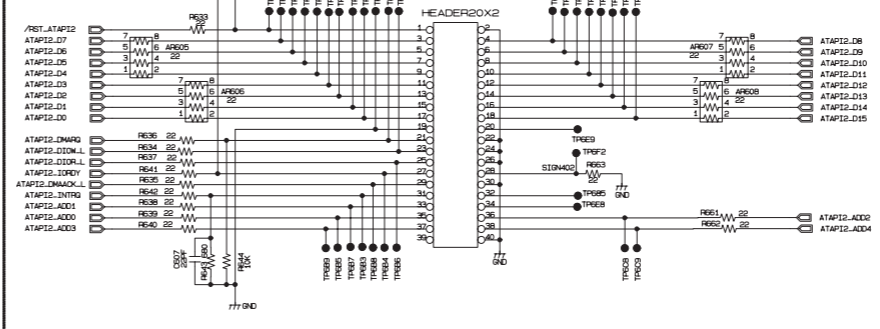
IO BOARD I/F



LOADER I/F



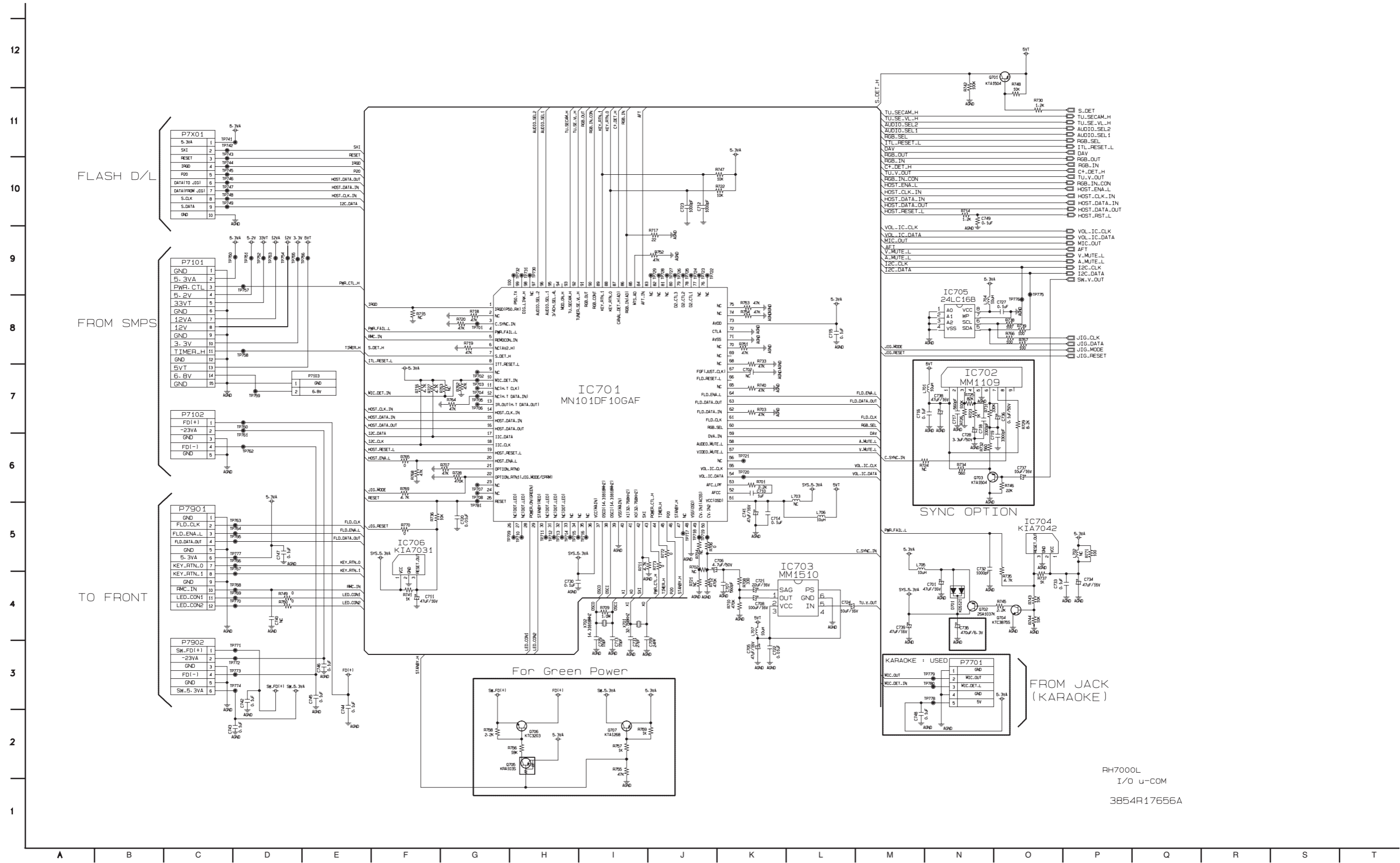
HDD I/F



—PCB Information—
 PCB Size : Width=218, Height=159.00
 Total net count=768
 Total component=643
 Total pad=3195
 Total none pin=465-74=391
 Number of duplicate pin=22
 Number of designed pin=377
 PIN defined rate=49.1

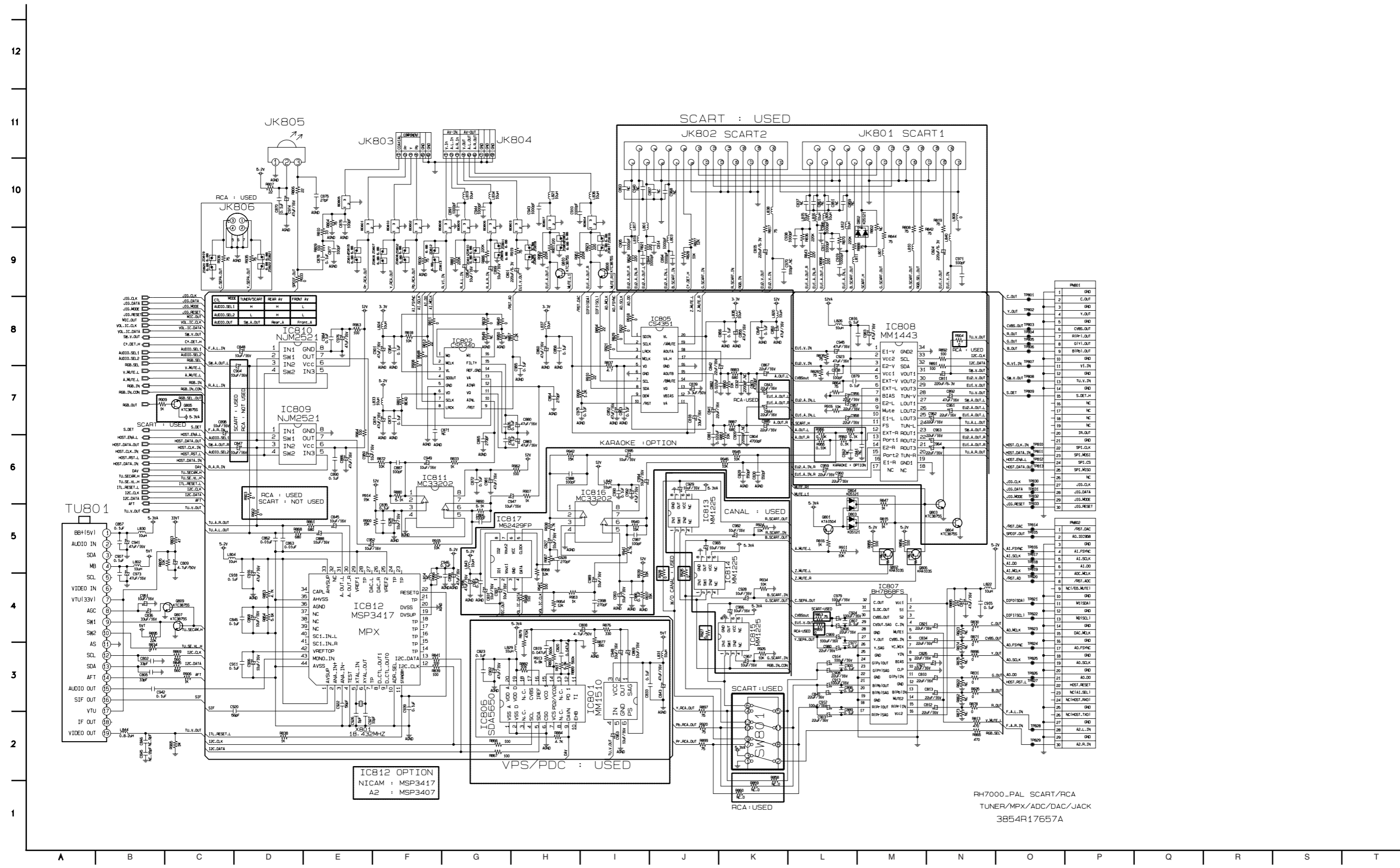
A B C D E F G H I J K L M N O P Q R S T

8. I/O MICOM CIRCUIT DIAGRAM

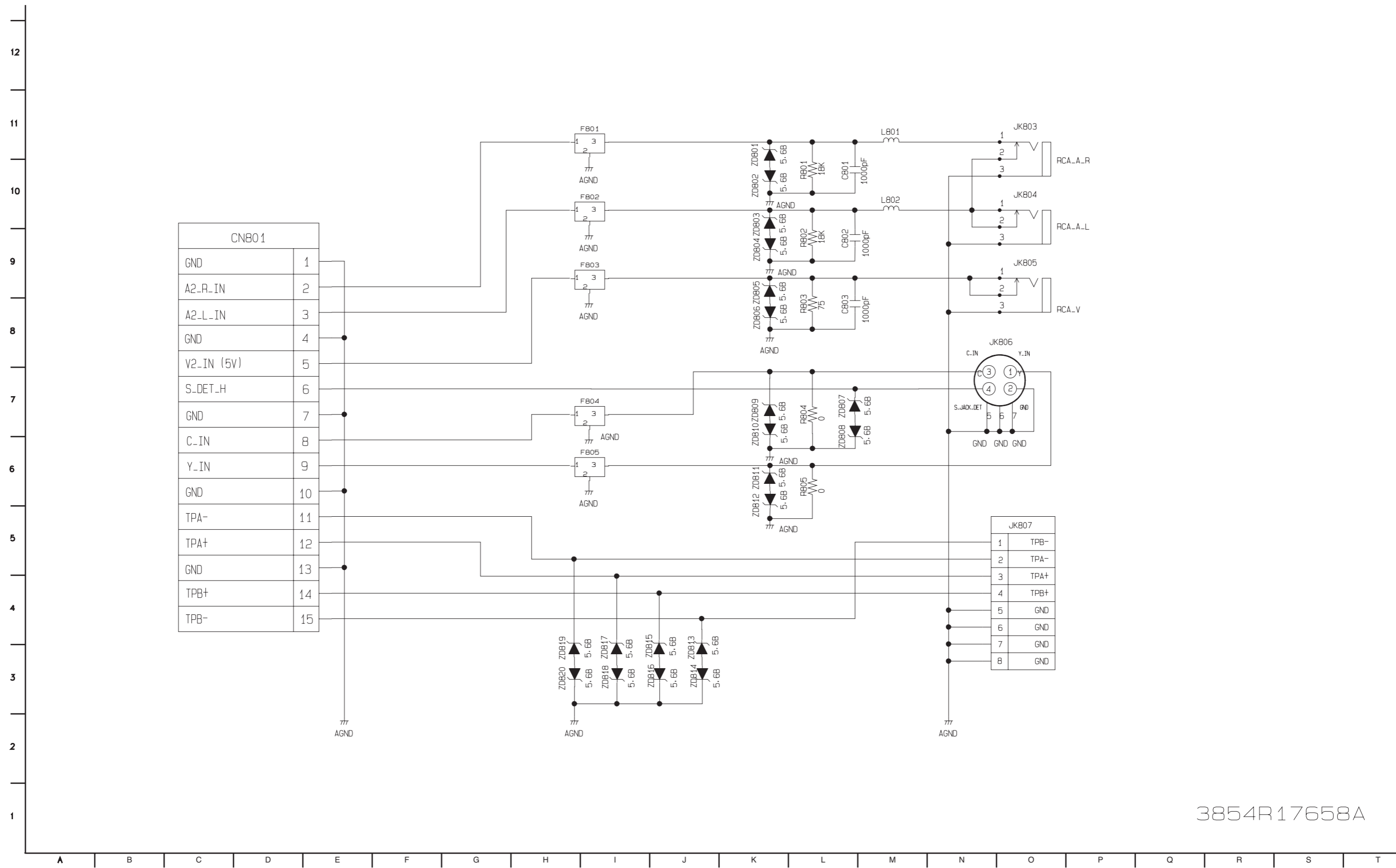


RH7000L
I/O u-COM
3854R17656A

9. TUNER, MPX, ADC, DAC, JACK CIRCUIT DIAGRAM

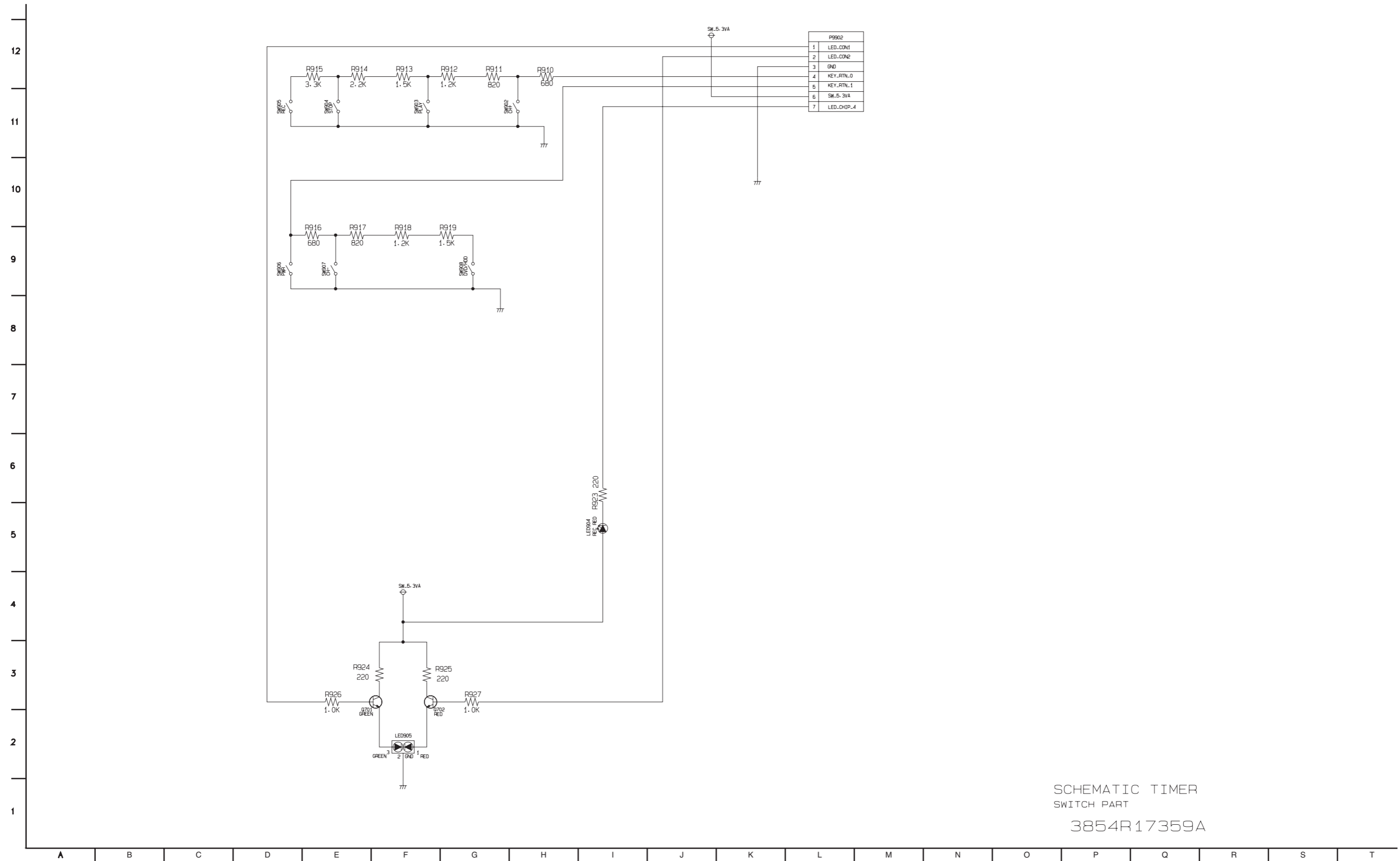


10. JACK CIRCUIT DIAGRAM



3854R17658A

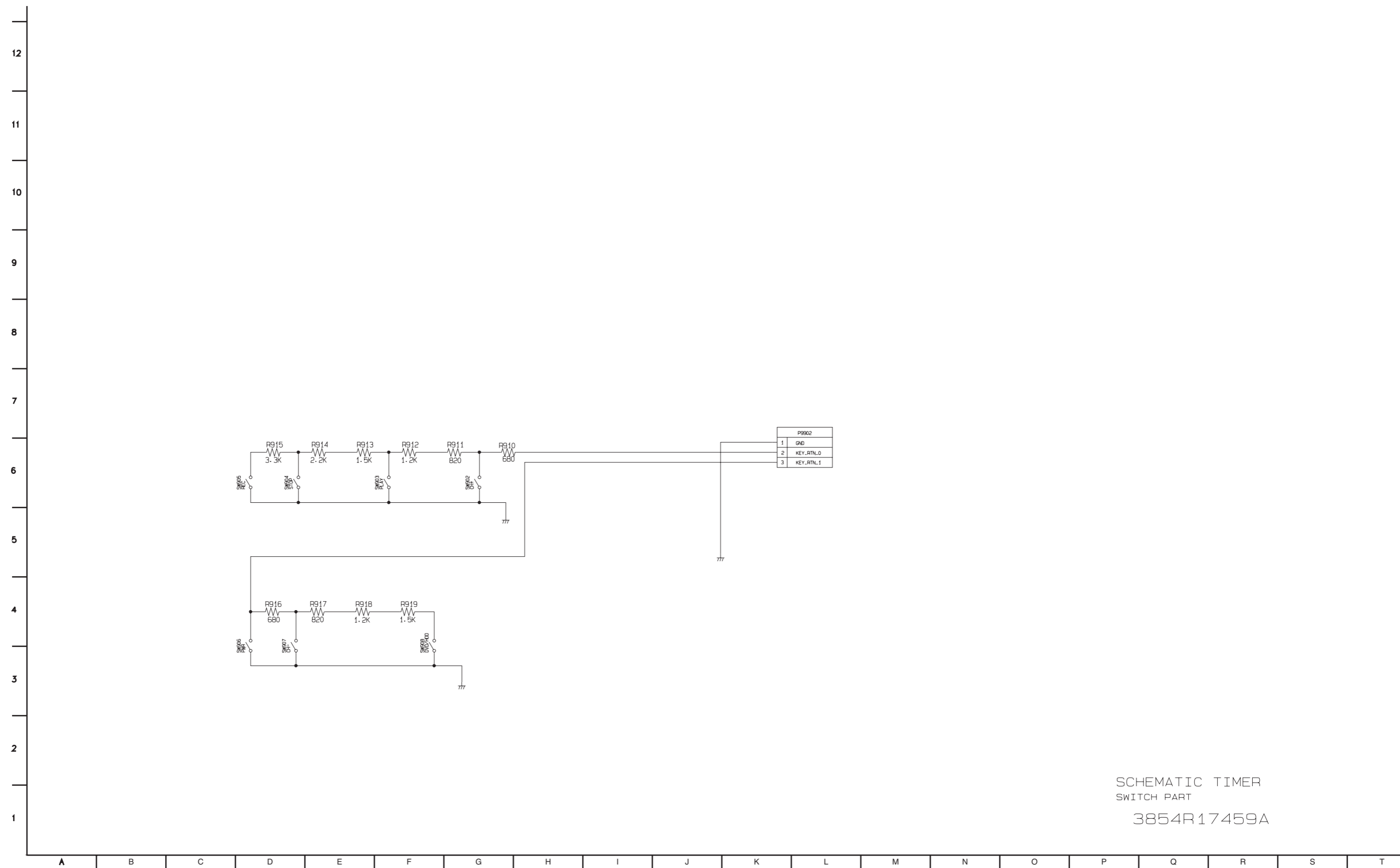
11. KEY CIRCUIT DIAGRAM (5 TOOL ONLY)



P9902	
1	LED_CON1
2	LED_CON2
3	GND
4	KEY_RTN_0
5	KEY_RTN_1
6	SW_5_3VA
7	LED_CHIP_4

SCHEMATIC TIMER
 SWITCH PART
 3854R17359A

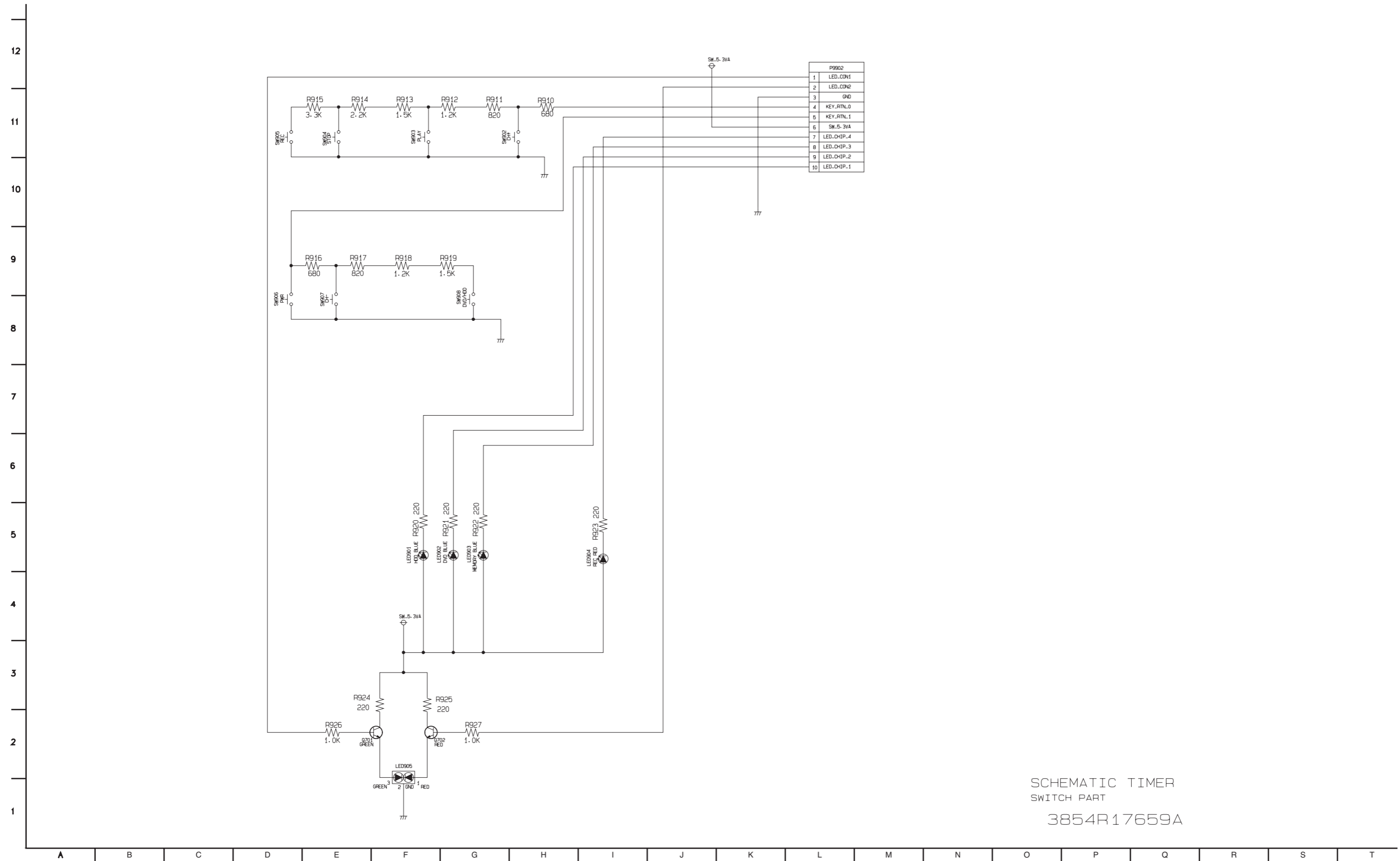
12. KEY CIRCUIT DIAGRAM (6 TOOL ONLY)



SCHEMATIC TIMER
SWITCH PART

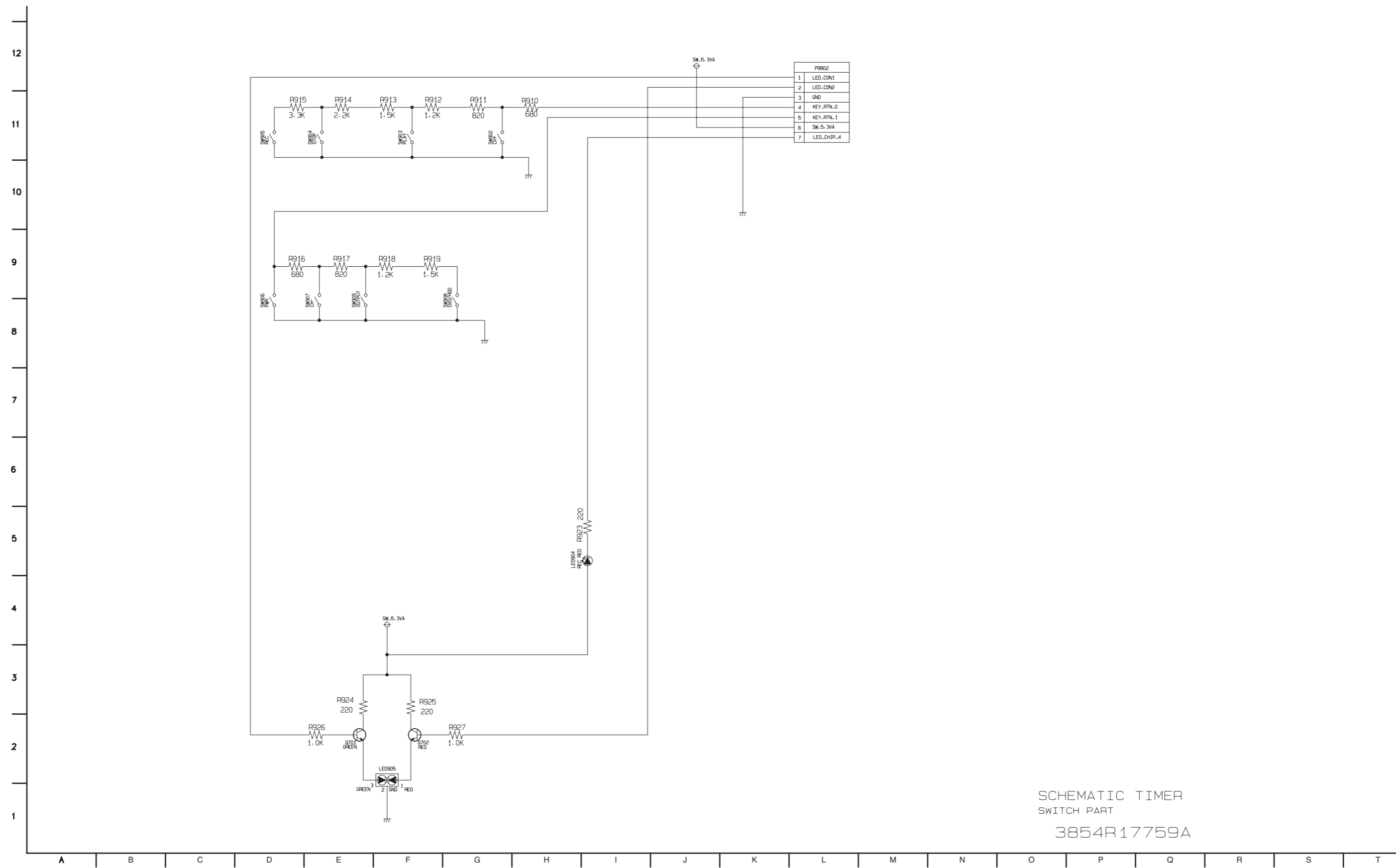
3854R17459A

13. KEY CIRCUIT DIAGRAM (8 TOOL ONLY)



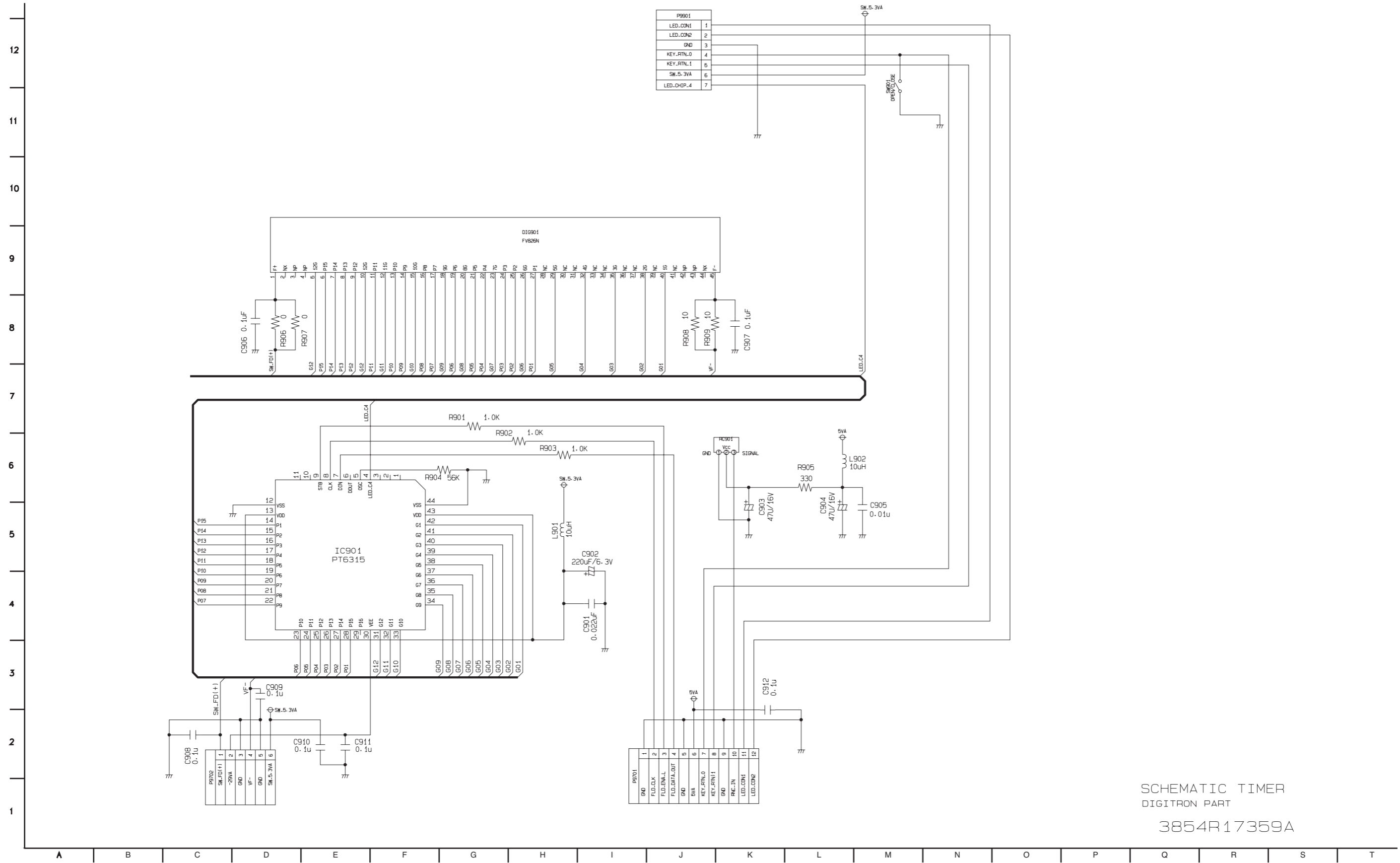
SCHMATIC TIMER
SWITCH PART
3854R17659A

14. KEY CIRCUIT DIAGRAM (9 TOOL ONLY)



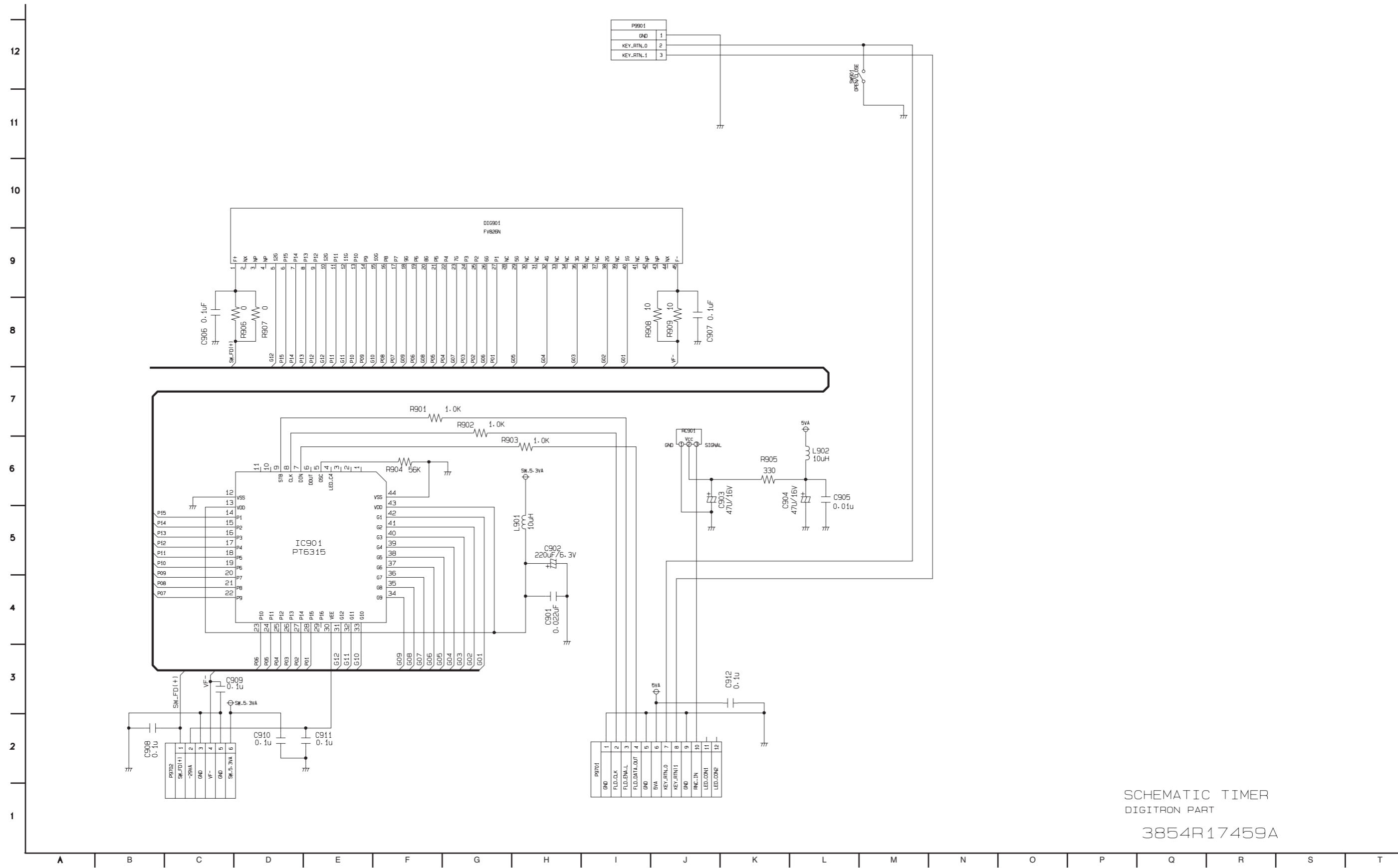
SCHEMATIC TIMER
SWITCH PART
3854R17759A

15. TIMER CIRCUIT DIAGRAM (5 TOOL ONLY)



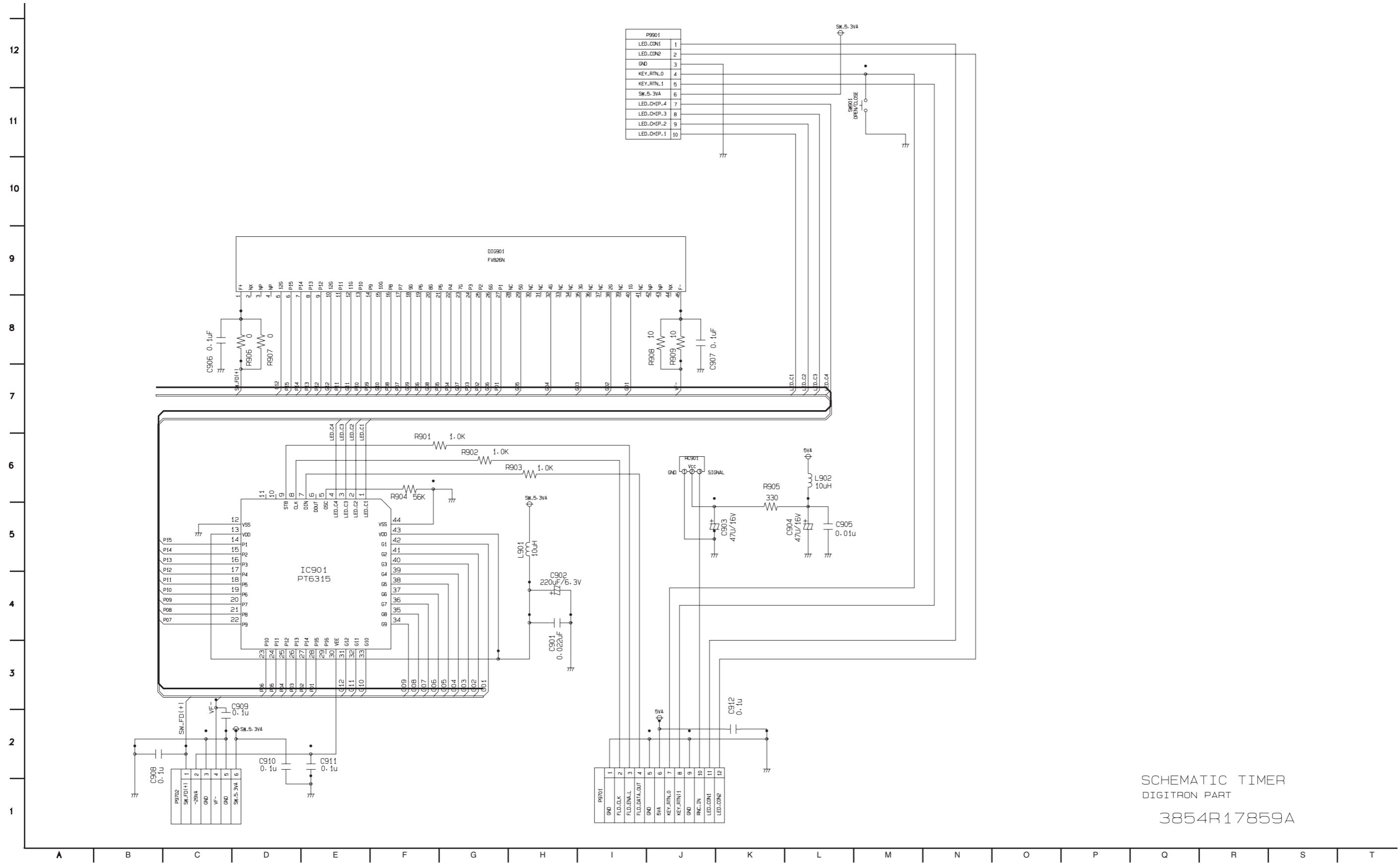
SCHEMATIC TIMER
DIGITRON PART
3854R17359A

16. TIMER CIRCUIT DIAGRAM (6 TOOL ONLY)



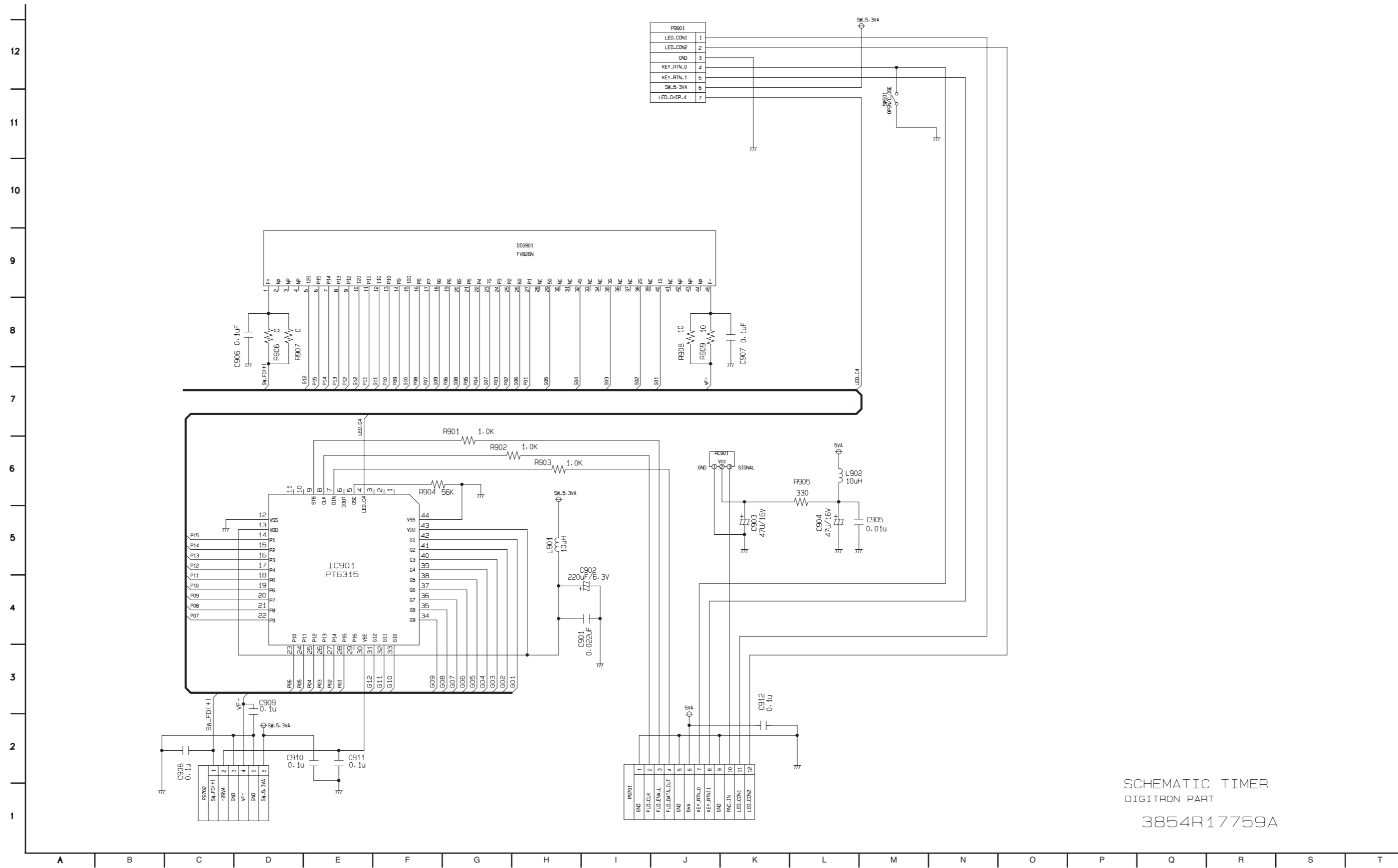
SCHEMATIC TIMER
DIGITRON PART
3854R17459A

17. TIMER CIRCUIT DIAGRAM (8 TOOL ONLY)



SCHMATIC TIMER
 DIGITRON PART
 3854R17859A

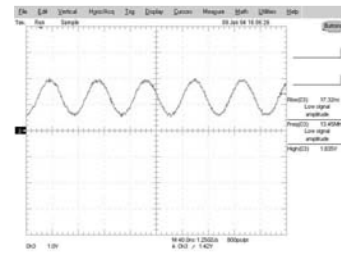
18. TIMER CIRCUIT DIAGRAM (9 TOOL ONLY)



SCHMATIC TIMER
 DIGITRON PART
 3854R17759A

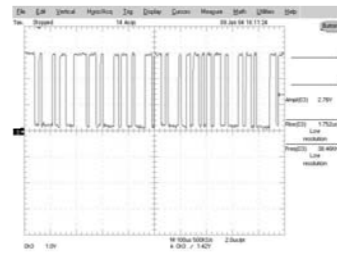
• WAVEFORMS

①



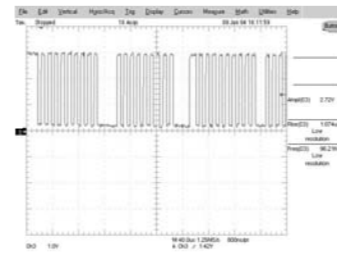
X101
27MHz

②



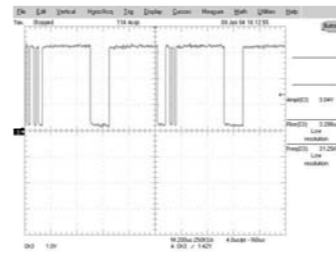
IC403
PIN3
SDA

③



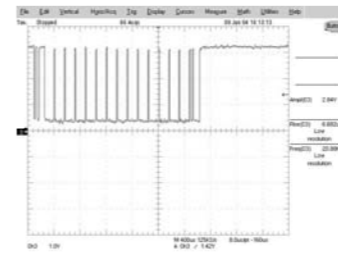
IC403
PIN2
SCL

④



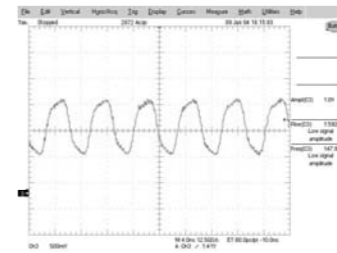
CN601
PIN24
HOST_RXD

⑤



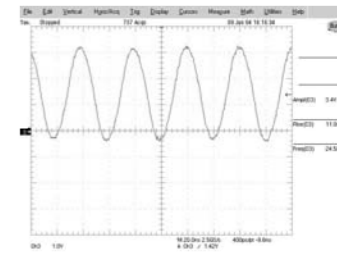
CN601
PIN26
HOST_TXD

⑥



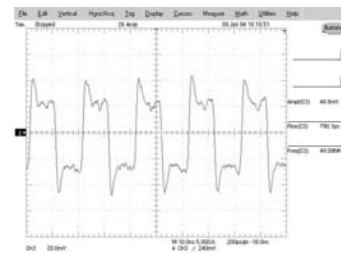
IC203
PIN45
SDRAM_CLK0

⑦



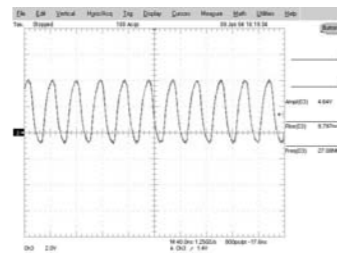
IC401
PIN43
24.576MHz

⑧



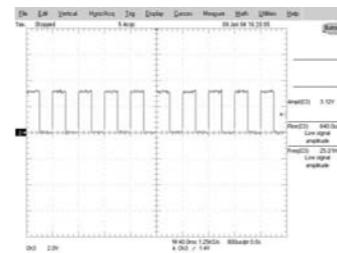
IC401
PIN1
BIO_PHY_CLK

⑨



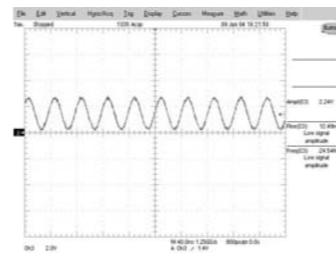
IC501
PIN40
VI_CLK

⑩



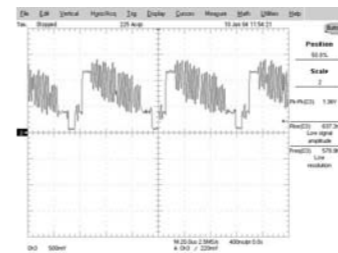
IC501
PIN73
VSYNC

⑪



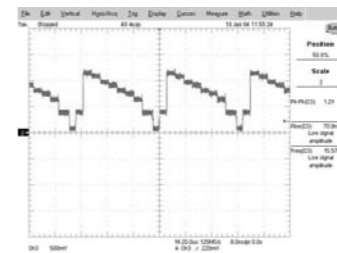
IC501
PIN75
14.31818MHz

⑫



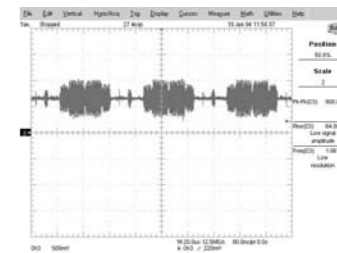
CN501
PIN6
CVBS_OUT

⑬



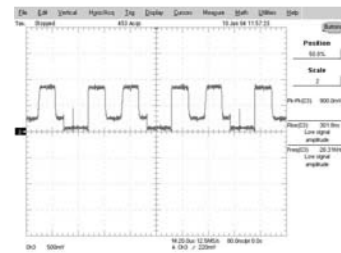
CN501
PIN4
Y_OUT

⑭



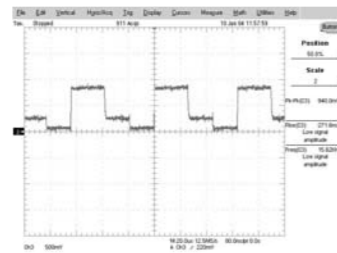
CN502
PIN2
C_OUT

⑭



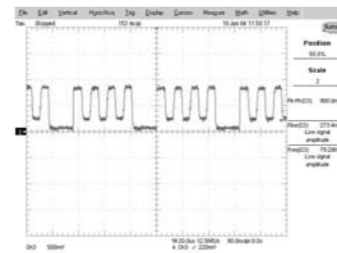
CN501
PIN7
R_Pr_OUT

⑯



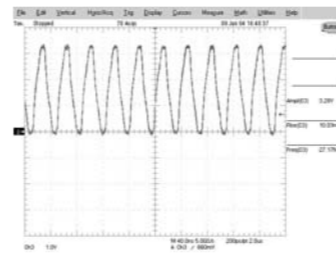
CN501
PIN8
G_Y_OUT

⑰



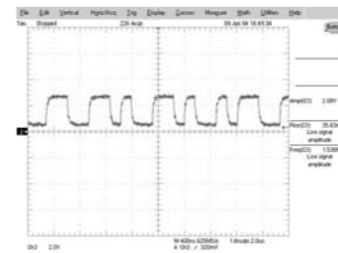
CN501
PIN9
B_Pb_OUT

⑱



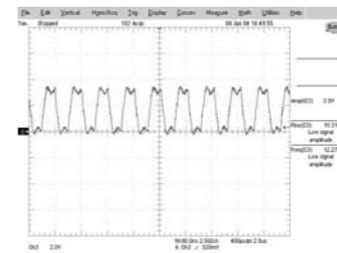
IC402
PIN52
VO_CLK

⑲



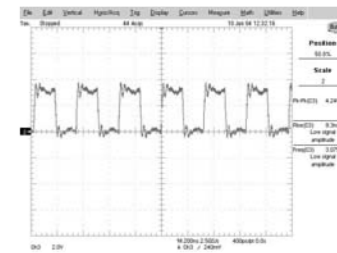
CN601
PIN2
AO_IEC958

⑳



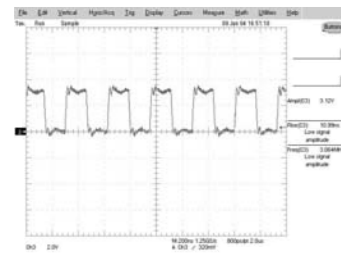
CN601
PIN15
AO_MCLK0

㉑



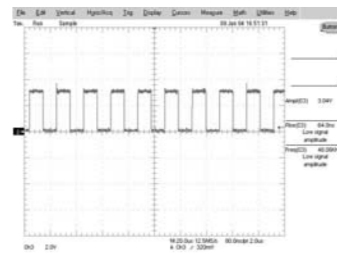
CN601
PIN5
AI_SCLK

㉒



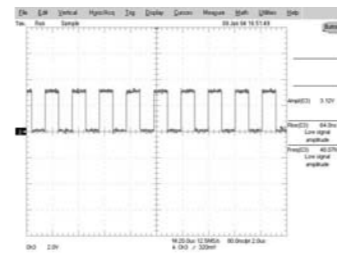
CN601
PIN19
AO_SCLK

㉓



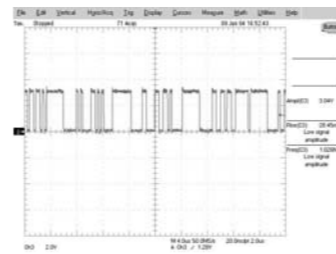
CN601
PIN4
AI_FSYNC

㉔



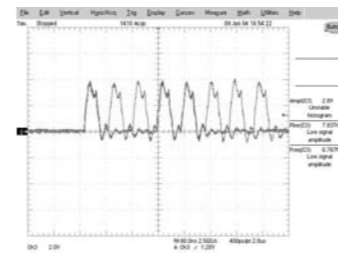
CN601
PIN17
AO_FSYNC

㉕



CN601
PIN21
AO_D0

㉖



IC501
PIN54
VI_D0

• CIRCUIT VOLTAGE CHART

MODE PIN NO.	EE	MODE PIN NO.	EE	MODE PIN NO.	EE	MODE PIN NO.	EE	MODE PIN NO.	EE	MODE PIN NO.	EE	MODE PIN NO.	EE
IC101													
A1	1.66	C1	1.29	E2	0.23	L3		P25		W23		AC24	
A2	-	C2	0.00	E3	0.23	L4		P26		W24	1.12	AC25	
A3	0.55	C3	0.00	E4	3.35	L11	0.00			W25	1.22	AC26	
A4	0.55	C4	0.00	E23	1.68	L12	0.00	R1		W26			AF1
A5	0.67	C5	0.00	E24	0.00	L13	0.00	R2		Y1		AD1	
A6	0.54	C6	3.33	E25	1.68	L14	0.00	R3		Y2		AD2	
A7	0.66	C7	0.00	E26	0.00	L15	0.00	R4	3.35	Y3		AD3	
A8	0.67	C8	3.31			L16	0.00	R11	0.00	Y4		AD4	
A9	2.67	C9	0.00	F1	0.23	L23	1.14	R12	0.00	Y23	-	AD5	
A10	1.18	C10	2.57	F2	0.23	L24	1.21	R13	0.00	Y24		AD6	3.35
A11	1.32	C11	1.55	F3	0.23	L25	1.14	R14	0.00	Y25	1.16	AD7	
A12	1.82	C12	0.84	F4	3.35	L26	1.16	R15	0.00	Y26	1.17	AD8	0.00
A13	1.11	C13	1.24	F23	1.83			R16	0.00			AD9	
A14	0.83	C14	1.28	F24	1.69	M1	3.30	R23	1.34			AD10	3.34
A15	1.08	C15	2.20	F25	-	M2	2.20	R24	2.50	AA1		AD11	
A16	1.70	C16	0.00	F26	-	M3		R25		AA2		AD12	0.00
A17	1.56	C17	1.20			M4		R26		AA3		AD13	
A18	0.00	C18	0.82	G1	0.00	M11	0.00			AA4	1.83	AD14	
A19	1.07	C19	1.43	G2	0.00	M12	0.00	T1		AA23	1.83	AD15	
A20	0.00	C20	3.34	G3	0.00	M13	0.00	T2		AA24		AD16	
A21	3.28	C21	0.00	G4	0.00	M14	0.00	T3		AA25		AD17	
A22	1.41	C22	2.50	G23	-	M15	0.00	T4	3.35	AA26		AD18	
A23	1.70	C23	0.00	G24	1.68	M16	0.00	T11	0.00			AD19	
A24	1.72	C24	1.24	G25	-	M23	2.50	T12	0.00	AB1		AD20	
A25	1.73	C25	1.40	G26	1.14	M24	1.17	T13	0.00	AB2		AD21	
A26	1.60	C26	1.67			M25	1.13	T14	0.00	AB3		AD22	
				H1	1.71	M26		T15	0.00	AB4		AD23	
B1	3.34	D1	3.34	H2	0.00			T16	0.00	AB23		AD24	
B2	0.00	D2	3.34	H3		N1		T23	1.30	AB24	1.22	AD25	1.23
B3	0.00	D3	3.34	H4	0.00	N2		T24	2.50	AB25		AD26	1.22
B4	0.79	D4	3.34	H23	1.13	N3		T25	1.14	AB26			
B5	0.79	D5	3.34	H24	1.12	N4	1.83	T26	1.12				
B6	0.00	D6	3.33	H25	1.11	N11	0.00			AC1		AE1	
B7	2.32	D7	1.83	H26	1.23	N12	0.00	U1		AC2		AE2	
B8	2.66	D8	2.67			N13	0.00	U2		AC3		AE3	
B9	2.95	D9	?	J1		N14	0.00	U3		AC4		AE4	
B10	1.12	D10	3.34	J2		N15	0.00	U4		AC5		AE5	
B11	1.11	D11	1.83	J3		N16	0.00	U23	2.50	AC6	1.83	AE6	
B12	1.08	D12	1.83	J4		N23	1.34	U24	0.25	AC7	D21	AE7	0.00
B13	1.21	D13	1.83	J23	1.10	N24	2.50	U25	1.13	AC8		AE8	
B14	1.15	D14	3.35	J24	1.21	N25		U26	1.16	AC9		AE9	
B15	3.35	D15	3.35	J25	1.07	N26				AC10	3.87	AE10	3.34
B16	0.00	D16	1.23	J26	1.17			V1		AC11		AE11	
B17	1.11	D17	1.29			P1		V2		AC12	3.35	AE12	
B18	1.52	D18	1.82	K1		P2		V3		AC13	3.35	AE13	
B19	1.60	D19	3.35	K2		P3		V4		AC14	3.35	AE14	
B20	3.34	D20	3.35	K3		P4	3.35	V23	1.13	AC15	3.35	AE15	
B21	1.68	D21	5.02	K4	1.83	P11	0.00	V24		AC16		AE16	
B22	1.44	D22	1.24	K23		P12	0.00	V25		AC17		AE17	
B23	1.61	D23	2.50	K24	1.16	P13	0.00	V26		AC18		AE18	
B24	-	D24	1.69	K25	1.13	P14	0.00			AC19		AE19	
B25	2.35	D25	-	K26	1.10	P15	0.00	W1		AC20	2.27	AE20	
B26	1.05	D26	1.27			P16	0.00	W2		AC21	1.83	AE21	
				L1		P23	1.31	W3		AC22		AE22	
		E1	0.23	L2		P24	2.50	W4		AC23		AE23	
												AE24	

MODE PIN NO.	EE	PB	REC	MODE PIN NO.	EE	PB	REC	MODE PIN NO.	EE	PB	REC
IC202											
1	2.51	2.49	2.48	55	2.49	2.49	2.48	43	0.00	0.00	0.00
2	1.13	1.11	1.15	56	1.14	1.11	1.15	44	1.99	1.99	1.99
3	2.50	2.49	2.48	57	1.14	1.11	1.18	45	1.26	1.26	1.27
4	1.13	1.13	1.14	58	0.00	0.00	0.00	46	1.26	1.26	1.26
5	1.16	1.14	1.18	59	1.15	1.11	1.22	47	0.53	0.53	0.52
6	0.00	0.00	0.00	60	1.15	1.14	1.13	48	0.00	0.00	0.00
7	1.18	1.15	1.26	61	2.49	2.49	2.48	49	1.25	1.24	1.24
8	1.14	1.15	1.14	62	1.15	1.20	1.05	50	0.00	0.00	0.00
9	2.50	2.49	2.49	63	1.15	1.15	1.12	51	1.21	1.19	1.19
10	1.12	1.08	1.01	64	0.00	0.00	0.00	52	0.00	0.00	0.00
11	1.14	1.14	1.12	65	1.14	1.05	1.17	53	0.00	0.00	0.00
12	0.00	0.00	0.00	66	0.00	0.00	0.00	54	1.13	1.10	1.15
13	1.16	1.06	1.17	IC203				55	2.49	2.49	2.48
14	0.00	0.00	0.00	1	2.49	2.49	2.48	56	1.14	1.10	1.15
15	2.50	2.49	2.48	2	1.15	1.11	1.15	57	1.12	1.07	1.17
16	1.22	1.21	1.21	3	2.49	2.49	2.48	58	0.00	0.00	0.00
17	0.00	0.00	0.00	4	1.14	1.14	1.15	59	1.14	1.08	1.22
18	2.50	2.49	2.49	5	1.16	1.15	1.22	60	1.19	1.19	1.17
19	0.00	0.00	0.00	6	0.00	0.00	0.00	61	2.49	2.49	2.48
20	0.54	0.54	0.52	7	1.17	1.11	1.21	62	1.09	1.04	1.01
21	1.27	1.27	1.33	8	1.14	1.14	1.14	63	1.12	1.10	1.11
22	1.22	1.20	1.14	9	2.49	2.49	2.48	64	0.00	0.00	0.00
23	1.26	1.28	1.33	10	1.12	1.11	1.06	65	1.16	1.09	1.18
24	1.80	1.75	1.62	11	1.13	1.12	1.14	66	0.00	0.00	0.00
25	0.00	0.00	0.00	12	0.00	0.00	0.00	IC205			
26	1.24	1.23	1.23	13	1.15	1.10	1.17	1	2.49	2.49	2.48
27	1.25	1.25	1.24	14	0.00	0.00	0.00	2	2.49	2.49	2.48
28	1.17	1.14	1.09	15	2.49	2.49	2.48	3	2.49	2.49	2.48
29	1.16	1.13	1.09	16	1.21	1.20	1.19	4	1.24	1.23	1.23
30	1.17	1.14	1.13	17	0.00	0.00	0.00	5	0.00	0.00	0.00
31	1.19	1.17	1.15	18	2.49	2.49	2.48	6	0.00	0.00	0.00
32	1.22	1.21	1.21	19	0.00	0.00	0.00	7	1.24	1.23	1.23
33	2.50	2.49	2.48	20	0.54	0.54	0.52	8	1.25	1.24	1.24
34	0.00	0.00	0.00	21	1.26	1.27	1.33	IC206			
35	1.22	1.21	1.21	22	1.22	1.21	1.15	1	0.00	0.00	0.00
36	1.23	1.22	1.22	23	1.26	1.28	1.33	2	0.00	0.00	0.00
37	1.22	1.22	1.22	24	1.80	1.75	1.64	3	0.04	0.04	0.78
38	1.22	1.21	1.22	25	0.00	0.00	0.00	4	0.04	0.04	0.04
39	1.23	1.22	1.22	26	1.23	1.23	1.24	5	0.04	0.04	0.04
40	1.16	1.14	1.08	27	1.24	1.25	1.24	6	0.04	0.04	0.04
41	1.16	1.14	1.08	28	1.17	1.14	1.08	7	0.04	0.04	0.04
42	1.17	1.14	1.08	29	1.16	1.13	1.08	8	0.04	0.04	0.04
43	0.00	0.00	0.00	30	1.17	1.14	1.13	9	0.04	0.04	0.04
44	1.99	1.99	1.98	31	1.19	1.17	1.15	10	0.04	0.04	0.04
45	1.27	1.26	1.26	32	1.22	1.21	1.21	11	3.35	3.35	3.35
46	1.26	1.26	1.25	33	2.49	2.49	2.48	12	0.04	0.04	0.04
47	0.53	0.53	0.52	34	0.00	0.00	0.00	13	3.35	3.35	3.35
48	0.00	0.00	0.00	35	1.22	1.22	1.21	14	3.35	3.35	3.35
49	1.25	1.24	1.24	36	1.23	1.22	1.21	15	0.00	0.00	0.00
50	0.00	0.00	0.00	37	1.22	1.22	1.22	16	3.35	3.35	3.35
51	1.21	1.21	1.20	38	1.22	1.21	1.22	17	0.02	0.04	0.04
52	0.00	0.00	0.00	39	1.23	1.22	1.22	18	0.04	0.04	0.04
53	0.00	0.00	0.00	40	1.16	1.14	1.08	19	3.35	3.35	3.35
54	1.14	1.12	1.15	41	1.17	1.15	1.08	20	0.04	0.04	0.04
				42	1.17	1.14	1.09	21	0.04	0.04	0.04

MODE PIN NO.	EE	PB	REC
22	0.04	0.04	0.04
23	0.00	0.00	0.00
24	0.00	0.00	0.00
25	0.00	0.00	0.00
26	0.00	0.00	0.00
27	0.00	0.00	0.00
28	0.00	0.00	0.00
29	3.35	3.35	3.35
30	0.00	0.00	0.00
31	0.00	0.00	0.00
32	3.35	3.35	3.35
33	0.00	0.00	0.00
34	3.35	3.35	3.35
35	0.00	0.00	0.00
36	3.30	2.96	3.26
37	0.00	0.00	0.00
38	0.00	0.00	0.00
39	0.00	0.00	0.00
40	0.00	0.00	0.00
41	0.00	0.00	0.00
42	0.00	0.00	0.00
43	3.35	3.35	3.35
44	0.00	0.00	0.00
45	3.33	2.96	2.98
46	0.00	0.00	0.00
47	0.00	0.00	0.00
48	0.00	0.00	0.00
49	3.35	2.94	2.95
50	0.00	0.00	0.00
51	0.00	0.00	0.00
52	0.00	0.00	0.00
53	3.35	3.35	3.35
54	3.35	3.35	3.35
55	0.00	0.00	0.00
56	0.00	0.00	0.00
IC301			
1	0.00	0.00	0.00
2	0.04	0.04	0.04
3	0.04	0.04	0.04
4	0.00	0.00	0.00
5	0.04	0.04	0.04
6	0.04	0.04	0.04
7	3.35	3.35	3.35
8	0.04	0.04	0.04
9	0.04	0.04	0.04
10	0.00	0.00	0.00
11	0.04	0.04	0.04
12	0.04	0.04	0.04
13	0.04	0.04	0.04
14	0.04	0.04	0.04
15	0.00	0.00	0.00
16	0.04	0.04	0.04
17	3.35	3.35	3.35
18	3.35	3.35	3.35
19	3.35	3.35	3.35

MODE PIN NO.	EE	PB	REC
20	0.04	0.04	0.04
21	0.00	0.00	0.00
22	3.35	3.35	3.35
23	0.04	0.04	0.04
24	0.00	0.00	0.00
25	0.00	0.00	0.00
26	0.00	0.00	0.00
27	2.98	3.25	3.30
28	0.00	0.00	0.00
29	0.00	0.00	0.00
30	3.29	3.25	3.11
31	3.35	3.35	3.35
32	0.00	0.00	0.00
33	0.00	0.00	0.00
34	0.00	0.00	0.00
35	0.00	0.00	0.00
36	2.99	2.98	2.99
37	0.00	0.00	0.00
38	0.00	0.00	0.00
39	0.00	0.00	0.00
40	0.00	0.00	0.00
41	0.00	0.00	0.00
42	3.35	3.35	3.35
43	0.00	0.00	0.00
44	0.00	0.00	0.00
45	0.00	0.00	0.00
46	0.00	0.00	0.00
47	0.00	0.00	0.00
48	0.00	0.00	0.00
IC302			
1	3.35	3.35	3.35
2	3.35	3.35	3.35
3	2.99	2.99	3.00
4	0.00	0.00	0.00
5	0.00	0.00	0.00
6	3.35	3.35	3.35
7	0.00	0.00	0.00
8	0.00	0.00	0.00
9	3.35	3.35	3.35
10	0.00	0.00	0.00
11	3.35	3.35	3.35
12	0.00	0.00	0.00
13	2.99	2.95	2.99
14	0.00	0.00	0.00
15	0.00	0.00	0.00
16	0.00	0.00	0.00
17	2.99	2.98	2.96
18	0.00	0.00	0.00
19	0.00	0.00	0.00
20	3.35	3.35	3.35
IC304			
1	3.35	3.35	3.35
2	3.35	3.35	3.35
3	0.00	0.00	0.00
4	0.00	0.00	0.00

MODE PIN NO.	EE	PB	REC
5	3.35	3.35	3.35
6	3.35	3.35	3.35
7	0.00	0.00	0.00
8	0.00	0.00	0.00
9	3.35	3.35	3.35
10	0.00	0.00	0.00
11	3.35	3.35	3.35
12	3.35	3.35	3.35
13	0.00	0.00	0.00
14	0.00	0.00	0.00
15	3.35	3.35	3.35
16	0.00	0.00	0.00
17	0.00	0.00	0.00
18	0.00	0.00	0.00
19	0.00	0.00	0.00
20	3.35	3.35	3.35
IC305			
1	3.35	3.35	3.35
2	3.35	3.35	3.35
3	3.35	3.35	3.35
4	0.00	0.00	0.00
5	0.00	0.00	0.00
6	0.00	0.00	0.00
7	0.00	0.00	0.00
8	0.00	0.00	0.00
9	0.00	0.00	0.00
10	0.00	0.00	0.00
11	0.00	0.00	0.00
12	0.00	0.00	0.00
13	0.00	0.00	0.00
14	3.35	3.35	3.35
IC306			
1	0.00	0.00	0.00
2	3.35	3.35	3.34
3	3.35	3.35	3.35
4	0.00	0.00	0.00
5	0.00	0.00	0.00
6	3.35	3.35	3.35
7	0.00	0.00	0.00
8	3.35	3.35	3.34
9	0.00	0.00	0.00
10	3.35	3.35	3.34
11	0.00	0.00	0.00
12	0.00	0.00	0.00
13	3.34	3.34	3.33
14	3.34	3.35	3.34
IC307			
1	0.00	0.00	0.00
2	0.00	0.00	0.00
3	0.00	0.00	0.00
4	3.35	3.35	3.34
5	5.11	5.11	5.11
6	3.35	3.35	3.34
7	0.00	0.00	0.00
8	3.35	3.35	3.34

MODE PIN NO.	EE	PB	REC
9	3.35	3.35	3.34
10	3.35	3.35	3.34
11	3.35	3.35	3.34
12	3.35	3.35	3.34
13	3.35	3.35	3.34
14	3.35	3.35	3.34
IC501			
1	0.00	0.00	0.00
2	0.00	0.00	0.00
3	0.00	0.00	0.00
4	3.35	3.35	3.35
5	3.35	3.35	3.35
6	0.00	0.00	0.00
7	0.00	0.00	0.00
8	0.00	0.00	0.00
9	0.00	0.00	0.00
10	0.00	0.00	0.00
11	1.84	1.84	1.84
12	1.84	1.84	1.84
13	0.00	0.00	0.00
14	1.84	1.84	1.84
15	0.00	0.00	0.00
16	0.00	0.00	0.00
17	0.00	0.00	0.00
18	0.00	0.00	0.00
19	0.00	0.00	0.00
20	3.35	3.35	3.35
21	3.35	3.35	3.35
22	0.00	0.00	0.00
23	0.60	0.61	0.61
24	0.00	0.00	0.00
25	1.84	1.84	1.83
26	0.00	0.00	0.00
27	0.00	0.00	0.00
28	3.35	3.35	3.35
29	3.35	3.35	3.35
30	3.35	3.35	3.35
31	1.84	1.84	1.84
32	0.00	0.00	0.00
33	0.00	0.00	0.00
34	3.35	3.35	3.35
35	0.00	0.00	0.00
36	0.00	0.00	0.00
37	2.89	2.89	2.89
38	3.35	3.35	3.35
39	0.00	0.00	0.00
40	1.57	1.56	1.56
41	1.84	1.84	1.84
42	0.00	0.00	0.00
43	1.58	1.63	1.64
44	1.29	1.28	1.26
45	1.06	1.05	1.05
46	1.36	1.35	1.30
47	1.78	1.75	1.73
48	3.35	3.35	3.35

MODE PIN NO.	EE	PB	REC
49	0.00	0.00	0.00
50	1.58	1.55	1.54
51	1.37	1.37	1.35
52	1.61	1.61	1.61
53	1.61	1.61	1.61
54	1.43	1.43	1.43
55	1.84	1.84	1.84
56	0.00	0.00	0.00
57	1.64	1.69	1.78
58	1.67	1.67	0.89
59	1.67	1.67	1.08
60	1.67	1.68	0.58
61	3.34	3.34	3.34
62	0.00	0.00	0.00
63	1.67	1.67	0.93
64	1.67	1.68	1.12
65	1.67	1.68	1.04
66	1.68	1.68	0.95
67	1.84	1.84	1.84
68	0.00	0.00	0.00
69	0.00	0.00	0.00
70	1.66	1.67	0.95
71	1.67	1.67	0.72
72	1.65	1.67	0.68
73	3.31	3.31	3.31
74	0.87	0.86	0.86
75	0.70	0.70	0.70
76	1.84	1.84	1.83
77	0.00	0.00	0.00
78	1.84	1.84	1.83
79	0.00	0.00	0.00
80	0.00	0.00	0.00
IC508			
1	0.00	0.00	0.00
2	3.18	3.21	3.22
3	4.77	4.81	4.82
4	0.00	0.00	0.00
5	0.00	0.00	0.00
6	0.00	0.00	0.00
7	0.00	0.00	0.00
8	5.02	5.02	5.02
9	3.35	3.35	3.35
10	0.00	0.00	0.00
11	0.00	0.00	0.00
12	0.00	0.00	0.00
13	0.00	0.00	0.00
14	5.02	5.02	5.02
IC602			
1	0.00	0.00	0.00
2	3.35	3.35	3.35
3	3.35	3.35	3.35
4	0.00	0.00	0.00
5	3.35	3.35	3.35
6	3.35	3.35	3.35
7	0.00	0.00	0.00

MODE PIN NO.	EE	PB	REC
8	3.35	3.35	3.35
9	1.62	1.62	1.62
10	0.00	0.00	0.00
11	0.00	0.00	0.00
12	3.27	3.27	3.27
13	3.27	3.27	3.27
14	3.27	3.27	3.27
15	3.27	3.27	3.27
16	3.27	3.27	3.27
17	3.27	3.27	3.27
18	3.27	3.27	3.27
19	3.35	3.35	3.35
20	3.35	3.35	3.35
IC603			
1	3.35	3.35	3.35
2	0.00	0.00	0.00
3	0.00	0.00	0.00
4	0.00	0.00	0.00
5	0.00	0.00	0.00
6	0.00	0.00	0.00
7	0.00	0.00	0.00
8	0.00	0.00	0.00
9	0.00	0.00	0.00
10	0.00	0.00	0.00
11	3.27	3.27	3.27
12	3.27	3.27	3.27
13	3.27	3.27	3.27
14	3.27	3.27	3.27
15	3.27	3.26	3.26
16	3.26	3.26	3.26
17	3.26	3.26	3.26
18	3.26	3.26	3.26
19	3.35	3.35	3.35
20	3.35		

MODE PIN NO.	EE	PB	REC
55	5.23	5.23	5.23
56	0.00	0.00	0.00
57	5.01	5.01	5.01
58	5.01	5.01	5.01
59	0.64-5.01	0.64-5.02	5.27
60	0.00	0.00	0.00
61	4.95	4.95	4.95
62	0.00	0.00	0.00
63	0.80	0.74	0.74
64	4.86	4.86	4.86
65	0.00	0.00	0.00
66	0.00	0.00	0.00
67	0.00	0.00	0.00
68	0.00	0.00	0.00
69	0.00	0.00	0.00
70	0.00	0.00	0.00
71	0.00	0.00	0.00
72	0.00	0.00	0.00
73	5.28	5.28	5.28
74	0.00	0.00	0.00
75	0.00	0.00	0.00
76	0.00	0.00	0.00
77	0.00	0.00	0.00
78	0.00	0.00	0.00
79	0.00	0.00	0.00
80	0.00	0.00	0.00
81	0.00	0.00	0.00
82	0.00	0.00	0.00
83	0.00	0.00	0.00
84	2.05	2.05	2.05
85	0.00	0.00	0.00
86	0.00	0.00	0.00
87	0.00	0.00	0.00
88	5.28	5.28	5.28
89	5.28	5.28	5.28
90	0.00	0.00	0.00
91	0.00	0.00	0.00
92	0.00	0.00	0.00
93	0.00	0.00	0.00
94	0.00	0.00	0.00
95	0.00	0.00	0.00
96	5.10	5.10	5.10
97	0.00	0.00	0.00
98	0.00	0.00	0.00
99	0.00	0.00	0.00
100	5.17	5.17	5.17
IC807			
1	5.18	5.18	5.18
2	0.08	0.05	0.05
3	0.08	0.05	0.05
4	2.25	2.26	2.26
5	5.01	5.01	5.01
6	1.74	1.70	1.75
7	5.13	5.13	5.13
8	1.72	1.72	1.74

MODE PIN NO.	EE	PB	REC
9	2.26	2.26	2.26
10	0.00	0.00	0.00
11	1.72	1.71	1.74
12	0.00	0.00	0.00
13	2.26	2.26	2.27
14	5.02	5.01	5.01
15	2.26	2.25	2.26
16	5.18	5.18	5.18
17	2.33	2.24	2.33
18	2.35	2.35	2.35
19	0.00	0.00	0.00
20	2.35	2.34	2.35
21	2.37	2.37	2.37
22	0.00	0.00	0.00
23	1.74	1.71	1.76
24	2.09	2.05	2.10
25	0.00	0.00	0.00
26	1.77	1.74	1.78
27	2.13	2.09	2.14
28	0.00	0.00	0.00
29	1.79	1.76	1.80
30	2.15	2.11	2.17
31	0.06	0.06	0.06
32	2.38	2.38	2.38
IC808			
1	2.79	2.80	2.80
2	12.03	12.03	12.03
3	2.79	2.80	2.80
4	12.03	12.04	12.04
5	3.23	3.04	3.23
6	5.65	5.67	5.66
7	5.71	5.71	5.71
8	5.64	5.64	5.64
9	0.00	0.00	0.00
10	5.63	5.63	5.63
11	11.41	11.41	11.41
12	5.67	5.65	5.65
13	0.00	0.00	0.00
14	5.64	5.64	5.64
15	0.00	0.00	0.00
16	5.64	5.64	5.64
17	0.00	0.00	0.00
18	0.00	0.00	0.00
19	0.00	0.00	0.00
20	5.63	5.63	5.42
21	5.72	5.73	5.69
22	5.72	5.73	5.71
23	5.66	5.65	5.65
24	5.64	5.64	5.63
25	5.73	5.73	5.71
26	5.74	5.72	5.72
27	5.65	5.64	5.64
28	3.28	3.29	3.28
29	2.37	1.99	2.37
30	2.35	1.98	2.37

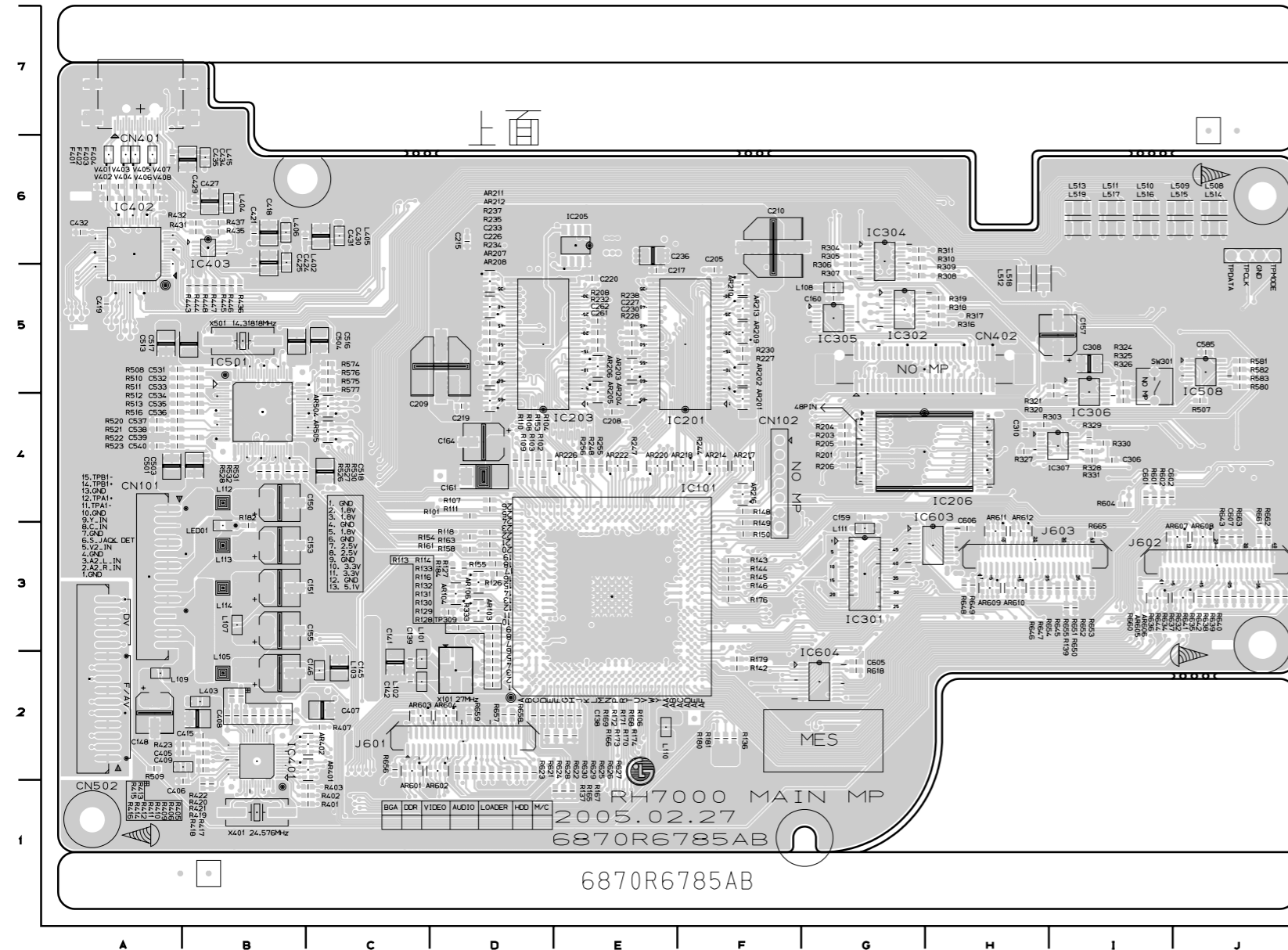
MODE PIN NO.	EE	PB	REC
31	1.85	1.86	1.86
32	5.05	5.05	5.05
33	5.05	5.05	5.05
34	0.00	0.00	0.00
IC805			
1	1.68	1.68	1.68
2	1.70	1.69	1.69
3	1.68	1.68	1.68
4	1.74	1.75	1.75
5	3.27	3.27	3.27
6	0.00	0.00	0.00
7	3.35	3.35	3.35
8	3.35	3.35	3.35
9	3.36	3.36	3.36
10	3.35	3.35	3.35
11	3.35	3.35	3.35
12	1.34	1.34	1.34
13	4.11	4.11	4.12
14	12.08	12.07	12.07
15	4.19	4.19	4.20
16	0.00	0.00	0.00
17	12.09	12.08	12.08
18	4.20	4.19	4.19
19	12.08	12.07	12.07
20	3.36	3.36	3.36
IC809			
1	7.39	7.39	7.39
2	5.11	5.11	5.11
3	7.23	7.22	7.22
4	0.00	0.00	0.00
5	7.40	7.38	7.39
6	10.97	10.95	10.95
7	6.56	6.54	6.54
8	0.00	0.00	0.00
IC810			
1	7.40	7.39	7.39
2	5.11	5.11	5.11
3	7.27	7.25	7.26
4	0.00	0.00	0.00
5	7.41	7.39	7.40
6	10.96	10.94	10.95
7	6.62	6.59	6.60
8	0.00	0.00	0.00
IC811			
1	6.02	6.02	6.02
2	6.02	6.02	6.02
3	6.02	6.02	6.02
4	0.00	0.00	0.00
5	6.02	6.02	6.02
6	6.02	6.02	6.02
7	6.02	6.02	6.02
8	11.94	11.94	11.94
IC802			
1	3.36	3.36	3.36
2	1.74	1.75	1.75

MODE PIN NO.	EE	PB	REC
3	3.36	3.36	3.36
4	1.26	1.26	1.26
5	0.00	0.00	0.00
6	5.12	5.12	5.12
7	1.69	1.69	1.69
8	1.68	1.68	1.68
9	3.36	3.35	3.35
10	2.57	2.57	2.57
11	2.59	2.59	2.59
12	2.57	2.57	2.57
13	5.19	5.19	5.19
14	0.00	0.00	0.00
15	5.12	5.14	5.14
16	3.36	3.36	3.36
IC812			
1	5.19	5.19	5.19
2	1.53	1.53	1.53
3	1.52	1.52	1.52
4	0.00	0.00	0.00
5	2.50	2.50	2.50
6	2.34	2.34	2.34
7	0.00	0.00	0.64
8	0.00	0.00	0.64
9	0.00	0.00	0.64
10	0.00	0.00	0.00
11	5.16	5.16	5.16
12	5.08	5.06	5.06
13	5.08	5.08	5.08
14	0.00	0.00	0.47
15	0.00	0.00	0.47
16	0.00	0.00	0.47
17	0.00	0.00	0.47
18	0.00	0.00	0.47
19	5.20	5.20	5.20
20	0.00	0.00	0.00
21	0.00	0.00	0.47
22	5.16	5.16	5.16
23	0.00	0.00	0.00
24	0.00	0.00	0.00
25	0.00	0.00	0.00
26	0.00	0.00	0.00
27	0.00	0.00	0.00
28	0.00	0.00	0.00
29	0.00	0.00	0.00
30	2.85	2.84	2.84
31	2.85	2.84	2.84
32	0.00	0.00	0.00
33	5.20	5.19	5.19
34	4.25	4.24	4.24
35	0.00	0.00	0.00
36	2.86	2.85	2.85
37	0.00	0.00	0.00
38	0.00	0.00	0.00
39	0.00	0.00	0.00
40	2.84	2.84	2.84

MODE PIN NO.	EE	PB	REC
41	2.85	2.84	2.84
42	2.62	2.62	2.62
43	2.85	2.84	2.84
44	0.00	0.00	0.00
IC806			
1	0.00	0.00	0.00
2	0.00	0.00	0.00
3	0.00	0.00	0.00
4	5.09	5.10	5.09
5	5.09	5.02	5.04
6	0.00	0.00	0.00
7	0.42	0.43	0.43
8	0.00	0.00	0.00
9	0.64-5.01	0.64-5.01	0.64-5.02
10	2.58	2.52	2.60
11	0.00	0.00	0.00
12	2.55	2.54	2.54
13	0.00	0.00	0.00
14	2.51	2.51	2.51
15	2.55	2.54	2.54
16	1.57	1.57	1.57
17	1.51	1.52	1.52
18	0.00	0.00	0.00
19	5.28	5.28	5.28
20	5.27	5.27	5.27
IC703			
1	2.19	2.18	2.18
2	2.30	2.30	2.30
3	5.24	5.24	5.24
4	1.85	1.85	1.85
5	0.00	0.00	0.00
6	5.24	5.24	5.24
IC704			
1	5.24	5.24	5.24
2	0.00	0.00	0.00
3	4.83	4.83	4.83
IC705			
1	0.00	0.00	0.00
2	0.00	0.00	0.00
3	0.00	0.00	0.00
4	0.00	0.00	0.00
5	5.02	5.02	5.02
6	5.04	5.10	5.10
7	0.00	0.00	0.00
8	5.28	5.28	5.28
IC801			
1	2.18	2.18	2.18
2	2.30	2.30	2.30
3	5.21	5.21	5.21
4	1.84	1.84	1.84
5	0.00	0.00	0.00
6	5.21	5.21	5.21

PRINTED CIRCUIT DIAGRAMS

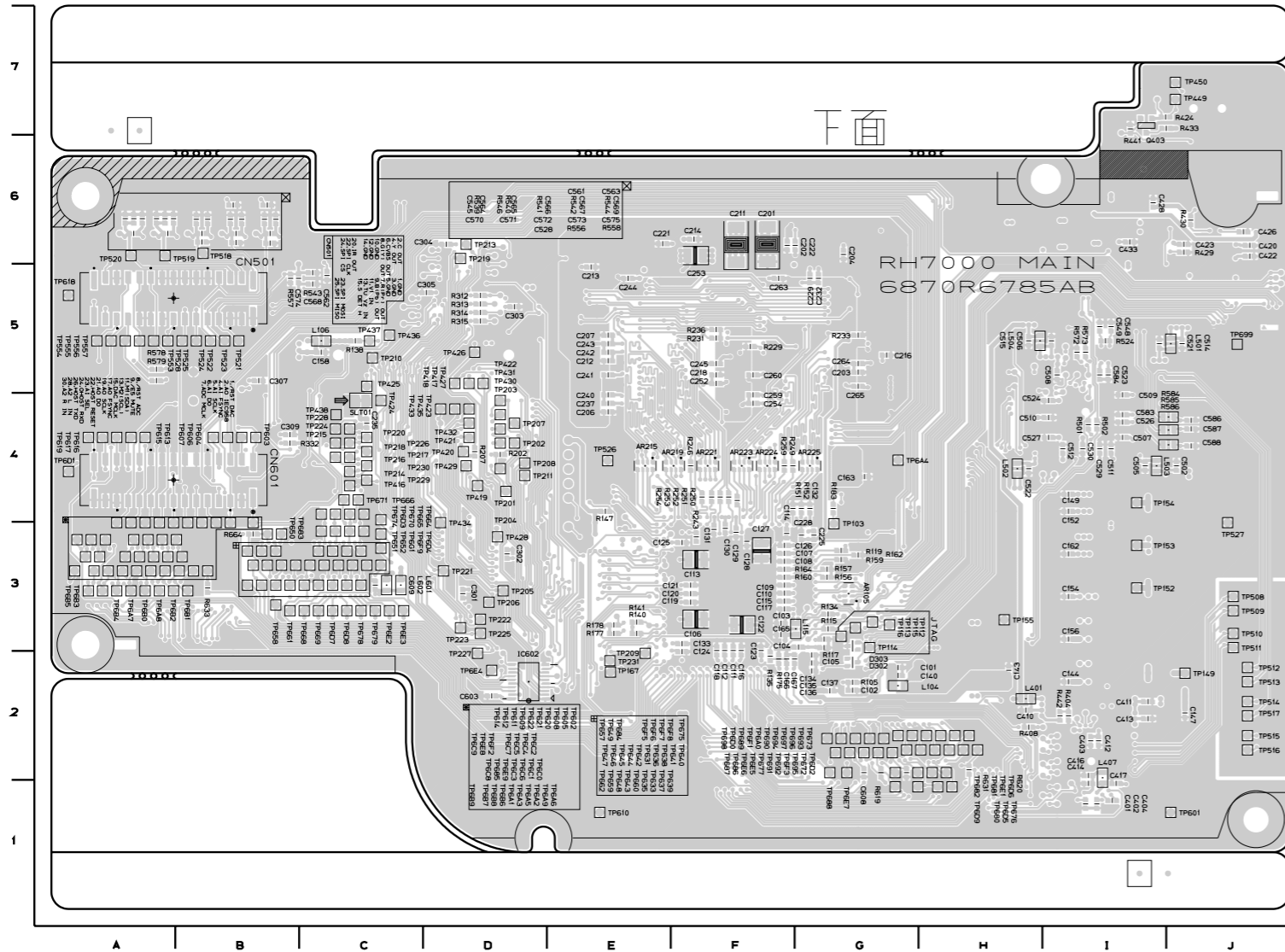
1. MAIN P.C.BOARD(TOP SIDE)



LOCATION GUIDE

AR103	D3	C159	G4	C535	B4	L111	G3	R145	F3	R308	G5	R507	J4	R644	J3	TP331	I5
AR104	D3	C160	G5	C536	B4	L112	B4	R146	F3	R309	G5	R508	A5	R645	I3	TP411	B2
AR106	D3	C161	D4	C537	A4	L113	B3	R148	F4	R310	G6	R509	A2	R646	H3	TP415	B2
AR201	F4	C164	D4	C538	A4	L114	B3	R149	F3	R311	G6	R510	A5	R647	H3	TP451	A5
AR202	F5	C205	F5	C539	B4	L402	B6	R150	F3	R316	H5	R511	A5	R648	H3	TP452	A5
AR203	E5	C208	E4	C540	A4	L403	B2	R153	D4	R317	H5	R512	A4	R649	H3	TP453	A5
AR204	E4	C209	D5	C585	J5	L404	B6	R154	D3	R318	H5	R513	A4	R650	I3	TP454	A5
AR205	E5	C210	F6	C601	I4	L405	C6	R155	D3	R319	H5	R516	A4	R651	I3	TP455	A5
AR206	E5	C215	D6	C602	I4	L406	B6	R158	D3	R320	I4	R520	A4	R652	I3	TP456	A5
AR207	D5	C217	E5	C605	G2	L415	B6	R161	D3	R321	I5	R521	A4	R653	I3	TP457	A5
AR208	D4	C219	D4	C606	H3	L508	J6	R163	D3	R324	I5	R522	A4	R654	I3	TP458	A5
AR209	F5	C220	E5	C607	J3	L509	J6	R165	E1	R325	I5	R523	A4	R655	I3	TP459	A5
AR210	F5	C226	D5	CN101	A3	L510	I6	R166	D2	R326	I4	R526	B4	R656	C2	TP460	A5
AR211	D5	C227	E5	CN102	F4	L511	I6	R167	E1	R327	H4	R527	B4	R657	D2	TP465	A5
AR212	D5	C230	E5	CN401	A7	L512	H5	R168	E2	R328	I4	R528	B4	R658	D2	TP466	A5
AR213	F5	C233	D5	CN402	G5	L513	I6	R169	D2	R329	I4	R530	B4	R659	D2	TP467	A5
AR214	F4	C236	E6	CN502	A2	L514	J6	R170	E2	R330	I4	R531	B4	R660	I3	TP469	B5
AR216	F4	C261	E5	F401	A6	L515	J6	R171	E2	R331	I4	R532	B4	R661	J3	TP476	B2
AR217	F4	C262	E5	F402	A6	L516	I6	R172	D2	R333	D3	R574	C5	R662	J3	TP477	B2
AR218	F4	C306	I4	F403	A6	L517	I6	R173	E2	R401	C1	R575	C5	R663	J3	TP537	B5
AR220	E4	C308	I5	F404	A6	L518	H5	R174	E2	R402	C1	R576	C5	R665	I3	TP543	C4
AR222	E4	C310	H4	GND	J6	L519	I6	R176	F3	R403	C1	R577	C5	SW301	I5	TP544	C4
AR226	E4	C405	B2	IC101	E3	LED01	B3	R179	F2	R405	B2	R580	J5	T342	H5	TP545	C4
AR401	C2	C406	B1	IC201	F5	R101	D4	R180	F2	R406	B2	R581	J5	T344	G5	TP546	C4
AR402	C2	C407	C2	IC203	D5	R102	D4	R181	F2	R407	C2	R582	J5	TP126	D3	TP547	C4
AR504	C4	C408	B2	IC205	E6	R103	D4	R182	B3	R409	B2	R583	J5	TP132	F3	TP548	C4
AR505	C4	C409	B2	IC206	G4	R104	D4	R184	D3	R410	B2	R601	I4	TP134	F3	TP549	C4
AR601	C2	C415	B2	IC301	G3	R106	E2	R201	G4	R411	B2	R602	I4	TP137	F3	TP550	C4
AR602	D2	C418	B6	IC302	G5	R107	D4	R203	G4	R412	B2	R604	I4	TP143	F2	TP552	B4
AR603	C2	C419	A5	IC304	G6	R108	D4	R204	G4	R413	B2	R618	G2	TP144	D3	TP625	I4
AR604	D2	C421	B6	IC305	G5	R109	D4	R205	G4	R414	B2	R621	D2	TP145	C3	TPCLK	J6
AR605	I3	C424	B6	IC306	I5	R110	D4	R206	G4	R415	B2	R622	D2	TP146	C2	TPDATA	J6
AR606	J3	C425	B5	IC307	I4	R111	D4	R208	E5	R416	B2	R623	D2	TP148	C2	TPMODE	J6
AR607	J3	C427	B6	IC401	B2	R113	D3	R227	F5	R417	B1	R624	D2	TP150	F2	V401	A6
AR608	J3	C429	B6	IC402	A6	R114	D3	R228	E5	R418	B1	R625	D2	TP151	A2	V402	A6
AR609	H3	C430	C6	IC403	B6	R116	D3	R230	F5	R419	B2	R626	D2	TP156	A4	V403	A6
AR610	H3	C431	B6	IC501	B4	R118	D3	R232	E5	R420	B2	R627	D2	TP158	G5	V404	A6
AR611	H3	C432	A6	IC508	J5	R126	D3	R234	D5	R421	B2	R628	D2	TP159	G4	V405	A6
AR612	H3	C434	B6	IC603	H3	R127	D3	R235	D5	R422	B2	R629	D2	TP160	B3	V406	A6
C138	D2	C435	A6	IC604	G2	R128	D2	R237	D5	R423	B2	R630	D2	TP161	B3	V407	A6
C139	C2	C501	A4	J601	D2	R129	D2	R238	E5	R431	B6	R632	J3	TP162	B4	V408	A6
C141	C2	C503	B4	J602	J3	R130	D2	R244	F4	R432	B6	R634	J3	TP164	F3	X101	D2
C142	C2	C504	B5	J603	H3	R131	D2	R247	E4	R435	B6	R635	J3	TP166	F3	X401	B1
C145	C2	C513	A5	L101	C2	R132	D2	R248	E4	R436	B5	R636	J3	TP304	G5	X501	B5
C146	B2	C516	C5	L102	C2	R133	D3	R255	E4	R437	B6	R637	J3	TP307	G5		
C148	A2	C517	B5	L103	C2	R136	F2	R256	E4	R443	B5	R638	J3	TP308	G5		
C150	B4	C518	C4	L105	B2	R137	E1	R303	H4	R444	B5	R639	J3	TP309	D3		
C151	B3	C531	B5	L107	B3	R139	I3	R304	G6	R445	B5	R640	J3	TP315	H6		
C153	B3	C532	B5	L108	G5	R142	F2	R305	G6	R446	B5	R641	J3	TP320	H5		
C155	B3	C533	B5	L109	A2	R143	F3	R306	G5	R447	B5	R642	J3	TP321	H5		
C157	I5	C534	B4	L110	E2	R144	F3	R307	G5	R448	B5	R643	J3	TP328	G5		

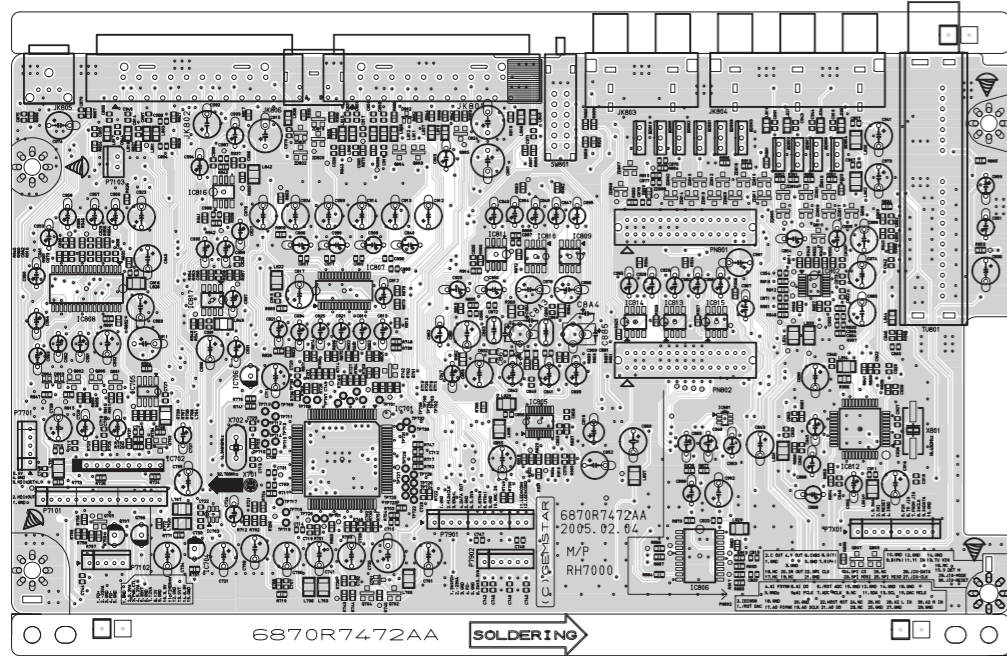
2. MAIN P.C.BOARD(BOTTOM SIDE)



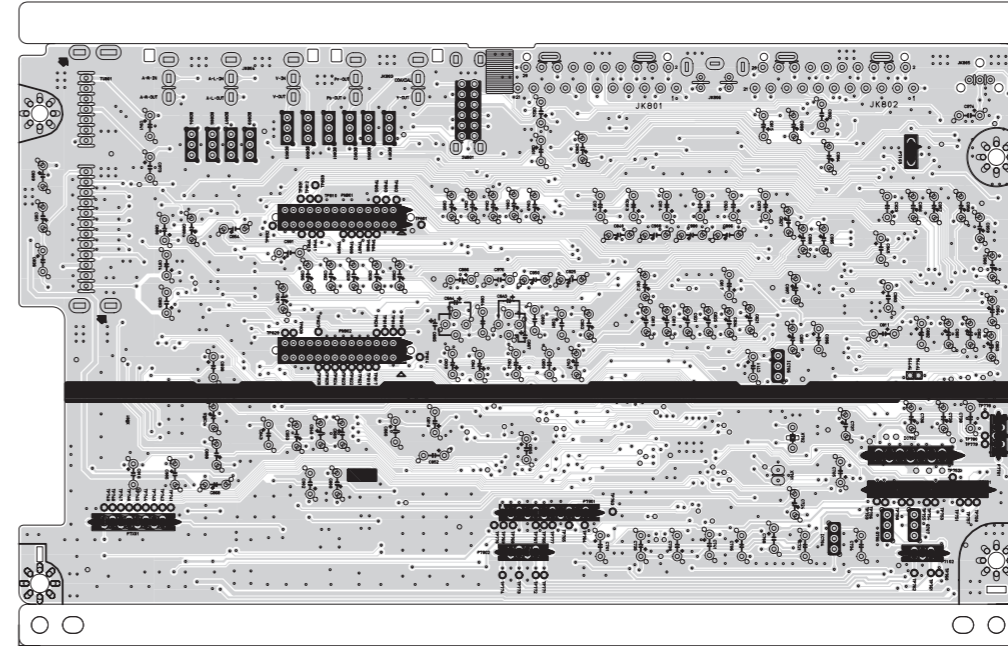
LOCATION GUIDE

AR105	G3	C162	I3	C413	I2	C603	D2	R252	F4	TP128	E3	TP303	C5	TP461	J5	TP553	A5	TP660	C3	TP6B4	A3
AR215	E4	C163	G4	C414	I1	C608	G2	R253	F4	TP129	E3	TP305	C5	TP462	J5	TP554	A5	TP661	B3	TP6B5	A3
AR219	F4	C165	F3	C416	I2	C609	C3	R254	F4	TP130	E3	TP306	C5	TP463	J5	TP555	A5	TP662	B3	TP6B6	A3
AR221	F4	C166	F2	C417	I1	CN501	A5	R259	F4	TP131	E3	TP311	D5	TP464	J5	TP556	A5	TP663	D2	TP6B7	A3
AR224	F4	C167	F2	C420	J6	CN601	A4	R312	D5	TP133	E3	TP312	D5	TP468	I7	TP557	A5	TP664	C4	TP6B8	A3
AR225	G4	C201	F6	C422	J6	D302	G2	R313	D5	TP135	E4	TP313	D6	TP470	I5	TP601	J1	TP665	C4	TP6B9	A3
C101	G2	C203	G5	C426	J6	D303	G3	R314	D5	TP136	E3	TP316	D5	TP471	I5	TP602	B3	TP666	C4	TP6C0	B3
C102	G2	C204	G6	C428	I6	IC602	D2	R315	D5	TP138	E3	TP317	D5	TP472	I1	TP603	B4	TP668	C3	TP6C1	A3
C103	F3	C206	E4	C433	I6	L106	C5	R332	B4	TP139	E3	TP318	D5	TP473	I1	TP604	B4	TP669	C3	TP6C2	B3
C104	G3	C207	E5	C502	J4	L115	G3	R404	I2	TP140	E3	TP319	D5	TP474	I1	TP605	B3	TP670	C4	TP6C3	A3
C105	G3	C211	F6	C505	I4	L401	H2	R408	H2	TP141	E3	TP325	D5	TP475	I1	TP606	B4	TP671	C4	TP6C4	A3
C106	F3	C212	E5	C506	I5	L407	I2	R424	J6	TP142	E3	TP326	D5	TP478	I7	TP607	B4	TP672	H2	TP6C5	A3
C107	F3	C213	E5	C507	I4	L501	J5	R430	J6	TP147	H2	TP327	D6	TP501	A6	TP608	B3	TP673	H2	TP6C6	A3
C108	F3	C214	F6	C508	I5	L502	H4	R433	I7	TP149	J2	TP329	B5	TP502	A6	TP609	A3	TP674	C4	TP6C7	A3
C109	F3	C216	G5	C509	I4	L503	I4	R433	I7	TP152	I3	TP338	C5	TP503	B6	TP610	E1	TP675	C3	TP6C8	A3
C110	F3	C218	F5	C510	I4	L503	I4	R441	I7	TP153	I3	TP401	I2	TP504	B6	TP611	A3	TP676	H1	TP6C9	A3
C111	F2	C221	E6	C511	I4	L504	H5	R442	I2	TP154	I4	TP402	I2	TP505	B5	TP612	A3	TP677	G2	TP6D0	G2
C112	F2	C222	G6	C512	I4	L601	C3	R501	I4	TP155	H3	TP403	I2	TP506	B6	TP613	A4	TP678	C3	TP6D1	A4
C113	F3	C225	G3	C514	J5	L602	C3	R502	I4	TP157	C5	TP404	I2	TP508	J3	TP614	A3	TP679	C3	TP6D2	H2
C114	F3	C228	G3	C515	H5	Q403	I7	R524	I5	TP163	E3	TP405	I2	TP509	J3	TP615	A4	TP680	G1	TP6D3	C4
C115	F3	C229	G5	C521	I5	R105	G2	R539	A6	TP167	E2	TP406	I2	TP510	J3	TP616	A4	TP681	G2	TP6D4	C3
C116	F2	C232	G5	C522	H4	R115	G3	R540	A6	TP201	D4	TP407	I2	TP511	J3	TP617	A4	TP682	G2	TP6D5	H1
C117	F3	C235	C4	C523	I5	R117	G3	R541	B6	TP202	D4	TP408	I2	TP512	J2	TP618	A5	TP683	B3	TP6D6	H2
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C119	F3	C240	E4	C526	I4	R134	G3	R543	C5	TP204	D4	TP410	I2	TP514	J2	TP620	B3	TP685	A3	TP6D8	C3
C120	F3	C241	E5	C527	I4	R135	F2	R544	B6	TP205	D3	TP412	I2	TP515	J2	TP621	B3	TP686	G2	TP6D9	G1
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C122	F3	C243	E5	C529	I4	R140	E3	R556	B6	TP207	D4	TP414	I2	TP517	J2	TP630	E2	TP688	G2	TP6E2	C3
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C124	F2	C245	F5	C545	A6	R147	F4	R558	B6	TP209	E2	TP417	D5	TP519	A6	TP632	E2	TP690	G2	TP6E4	D2
C125	F3	C252	F5	C548	I5	R151	F4	R572	I5	TP210	C5	TP418	D5	TP520	A6	TP633	C3	TP691	G2	TP6E5	G2
C126	F3	C253	F6	C549	I5	R152	G4	R573	I5	TP211	D4	TP419	D4	TP521	B5	TP634	D4	TP692	H2	TP6E6	G2
C127	F3	C254	F4	C561	B6	R156	G3	R578	A5	TP212	D6	TP420	D4	TP522	B5	TP635	C3	TP693	H2	TP6E7	G2
C128	F3	C259	F4	C562	C5	R157	G3	R579	A5	TP214	C4	TP421	D4	TP523	B5	TP636	C3	TP694	G2	TP6E8	A3
C129	F3	C260	F5	C563	B6	R158	G3	R584	J4	TP215	C4	TP422	D4	TP524	B5	TP637	C3	TP695	H2	TP6E9	A3
C130	F3	C263	F5	C564	A6	R160	F3	R585	J4	TP216	C4	TP423	D4	TP525	B5	TP638	C3	TP696	H2	TP6F1	G2
C131	F3	C264	G5	C565	A6	R162	G3	R586	J4	TP217	C4	TP424	C4	TP526	E4	TP639	C3	TP697	H2	TP6F2	A3
C132	G4	C265	G5	C566	B6	R175	F2	R616	G2	TP218	C4	TP425	C5	TP527	J3	TP640	C3	TP698	G2	TP6F3	H2
C133	F3	C301	D3	C567	B6	R175	F2	R620	H2	TP219	D6	TP426	D5	TP528	A5	TP641	C3	TP699	J5	TP6F4	E2
C134	G2	C302	D3	C568	C5	R177	E3	R631	G2	TP220	C4	TP427	D5	TP529	I4	TP642	C3	TP700	G2	TP6F5	C3
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C140	G2	C307	B5	C572	B6	R207	D4	R207	D4	TP103	G3	TP224	C7	TP533	I5	TP646	B3	TP704	G4	TP6F9	C3
C143	H2	C309	B4	C573	B6	R229	F5	R229	F5	TP104	F2	TP225	D3	TP534	H5	TP647	B3	TP705	A3	TP6G1	C3
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C158	C5	C412	I2	C588	J4	R250	F4	R250	F4	TP125	G3	TP301	D6	TP542	H5	TP658	B3	TP712	A3		
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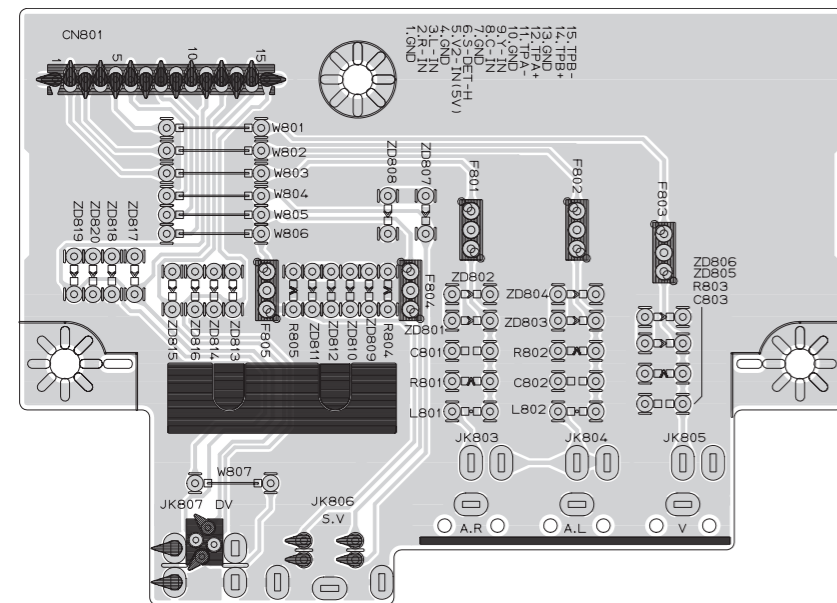
3. I/O P.C.BOARD (TOP VIEW)



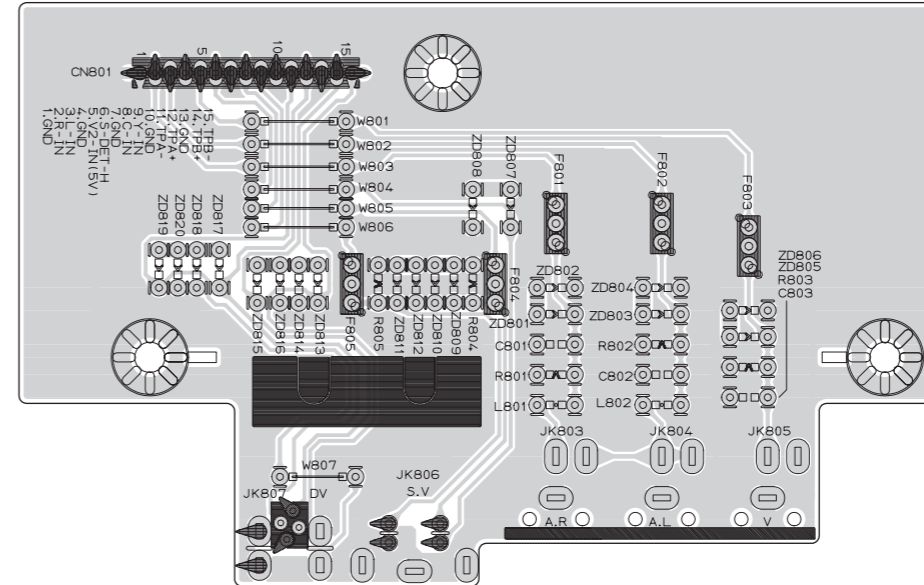
(BOTTOM VIEW)



4. JACK P.C.BOARD (5, 6 TOOL)

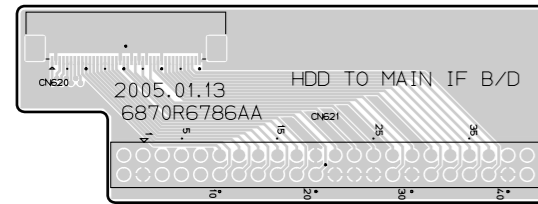


(8, 9 TOOL)

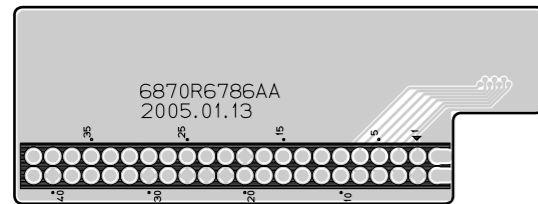


5. HDD P.C.BOARD

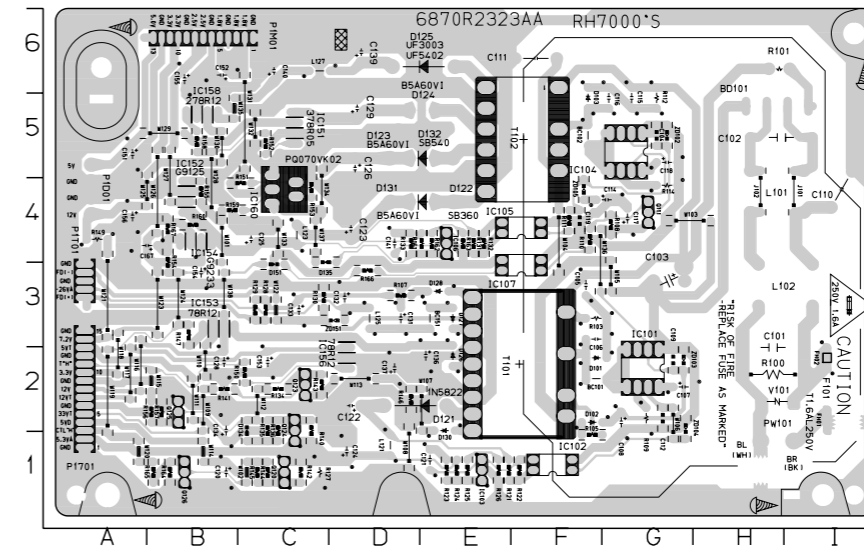
(TOP VIEW)



(BOTTOM VIEW)



6. POWER P.C.BOARD



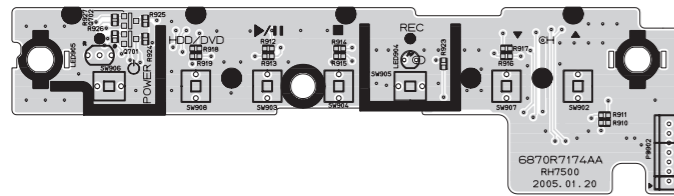
LOCATION GUIDE

BC101	F2	C133	C3	IC101	G2	R100	H2	R146	D2
BC102	F5	C134	B2	IC102	F1	R101	H6	R147	B3
BC151	E3	C136	E2	IC103	E1	R103	F8	R149	A4
BD101	H5	C137	D2	IC104	G5	R105	F1	R150	C2
C101	H2	C139	D6	IC105	E4	R107	D3	R151	C4
C102	H5	C140	C6	IC106	E4	R108	G4	R152	C5
C103	G3	C141	D4	IC107	E3	R109	G2	R153	C4
C104	G5	C151	A5	IC151	C5	R110	F4	R154	B4
C105	F3	C152	B6	IC152	B4	R111	F4	R155	B4
C106	F3	C153	C2	IC153	B3	R112	G5	R156	B2
C107	G2	C154	B3	IC154	B4	R114	G4	R157	B2
C108	G2	C155	B6	IC156	D2	R121	E1	R158	B5
C109	G2	C156	A4	IC158	B5	R122	F1	R159	B4
C110	I4	C167	B4	IC160	C4	R123	E1	R160	B4
C111	F6	D101	F2	J101	I4	R124	E1	R161	E4
C112	G2	D102	F2	J102	H4	R125	E1	R162	E4
C114	G4	D103	F5	L101	H4	R126	E1	R163	E4
C115	G5	D121	D2	L102	I3	R127	C1	R164	B1
C116	G5	D122	E4	L121	D1	R128	C3	R165	B1
C117	G4	D123	E5	L123	C4	R129	C3	R166	D3
C118	G5	D124	E5	L125	D3	R130	C3	R167	B4
C119	F4	D125	E6	L127	C8	R131	E4	R168	F2
C120	B1	D126	E2	P1701	A1	R132	E4	T102	F5
C121	E1	D127	E3	P1001	A4	R133	DL	V101	H2
C122	D2	D128	E3	P1M01	C6	R134	C3	ZD102	G5
C123	D4	D130	E2	P1T01	A3	R135	C3	ZD103	G2
C124	D1	D131	E4	PW101	H1	R136	C2	ZD104	G2
C125	CL	D132	E5	Q111	G4	R140	C3	ZD105	F4
C126	D5	D134	C2	Q120	C1	R141	B3	ZD151	D3
C128	B2	D135	C3	Q123	C2	R142	C1		
C129	D5	D151	C3	Q124	C2	R143	C3		
C131	D3	FH01	I2	Q125	B2	R144	C1		
C132	D3	FH02	I2	Q126	B1	R145	C1		

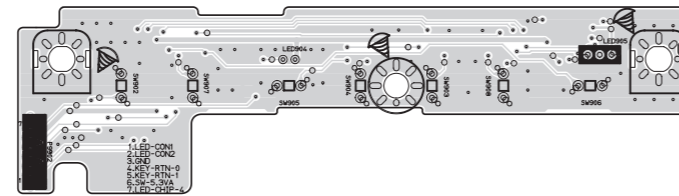
7. KEY P.C.BOARD

(5TOOL ONLY)

(TOP VIEW)

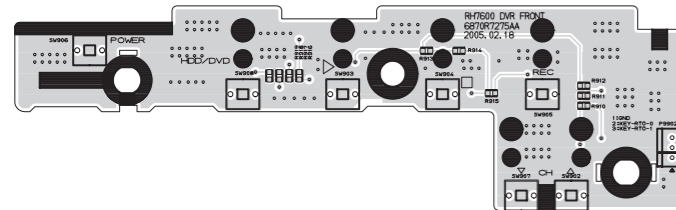


(BOTTOM VIEW)

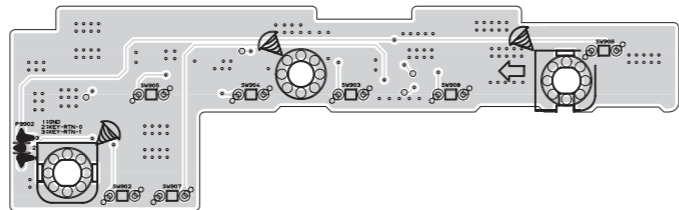


(6TOOL ONLY)

(TOP VIEW)

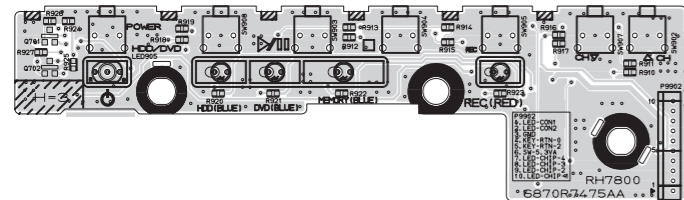


(BOTTOM VIEW)

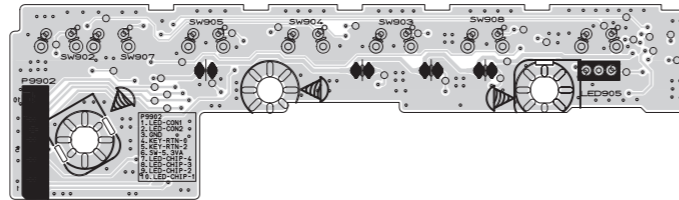


(8TOOL ONLY)

(TOP VIEW)

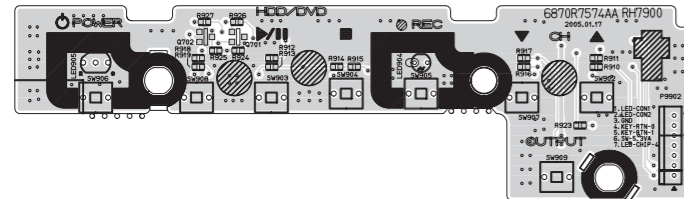


(BOTTOM VIEW)

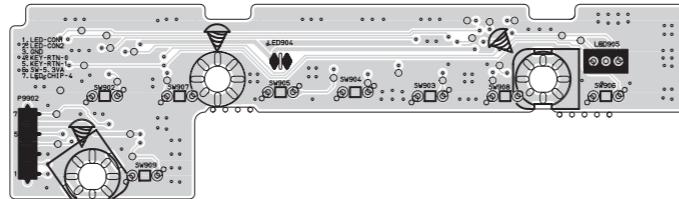


(9TOOL ONLY)

(TOP VIEW)



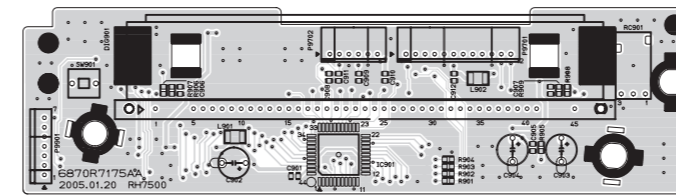
(BOTTOM VIEW)



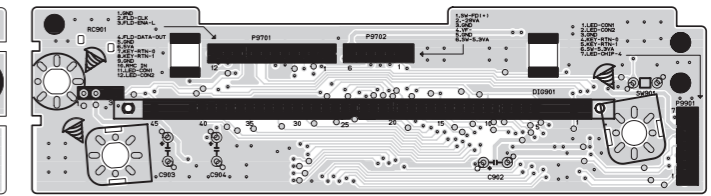
8. TIMER(LED) P.C.BOARD

(5TOOL ONLY)

(TOP VIEW)

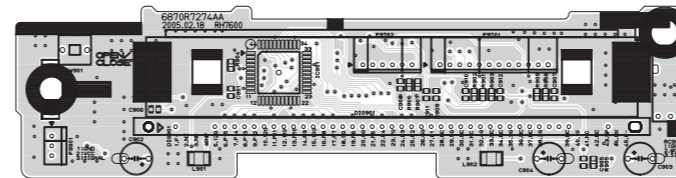


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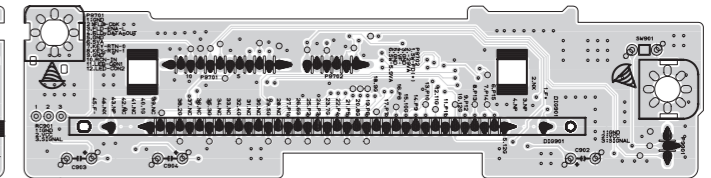


(6TOOL ONLY)

(TOP VIEW)

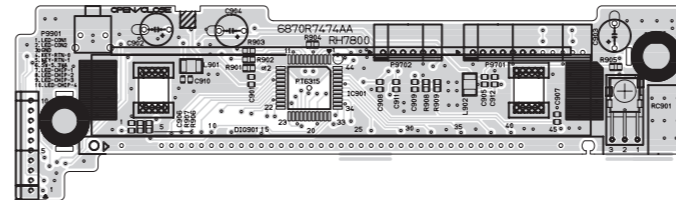


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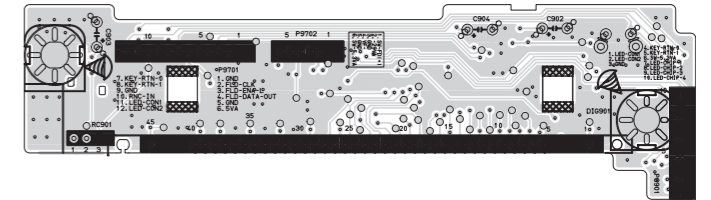


(8TOOL ONLY)

(TOP VIEW)

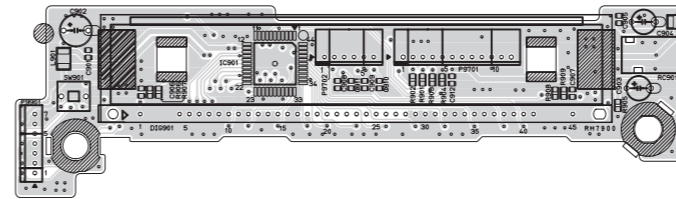


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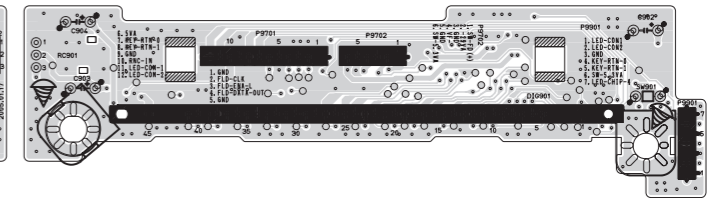


(9TOOL ONLY)

(TOP VIEW)



(BOTTOM VIEW)



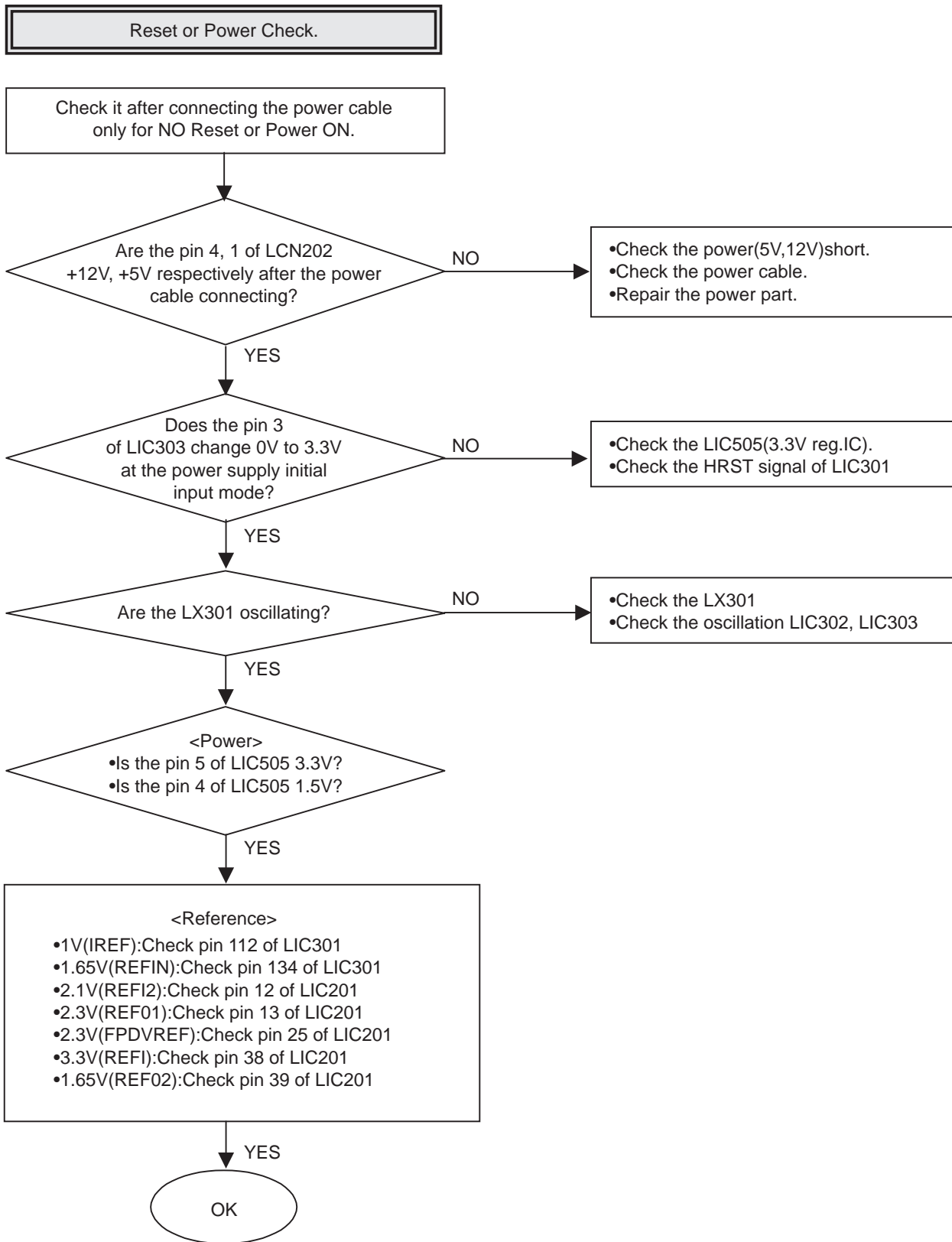
SECTION 4

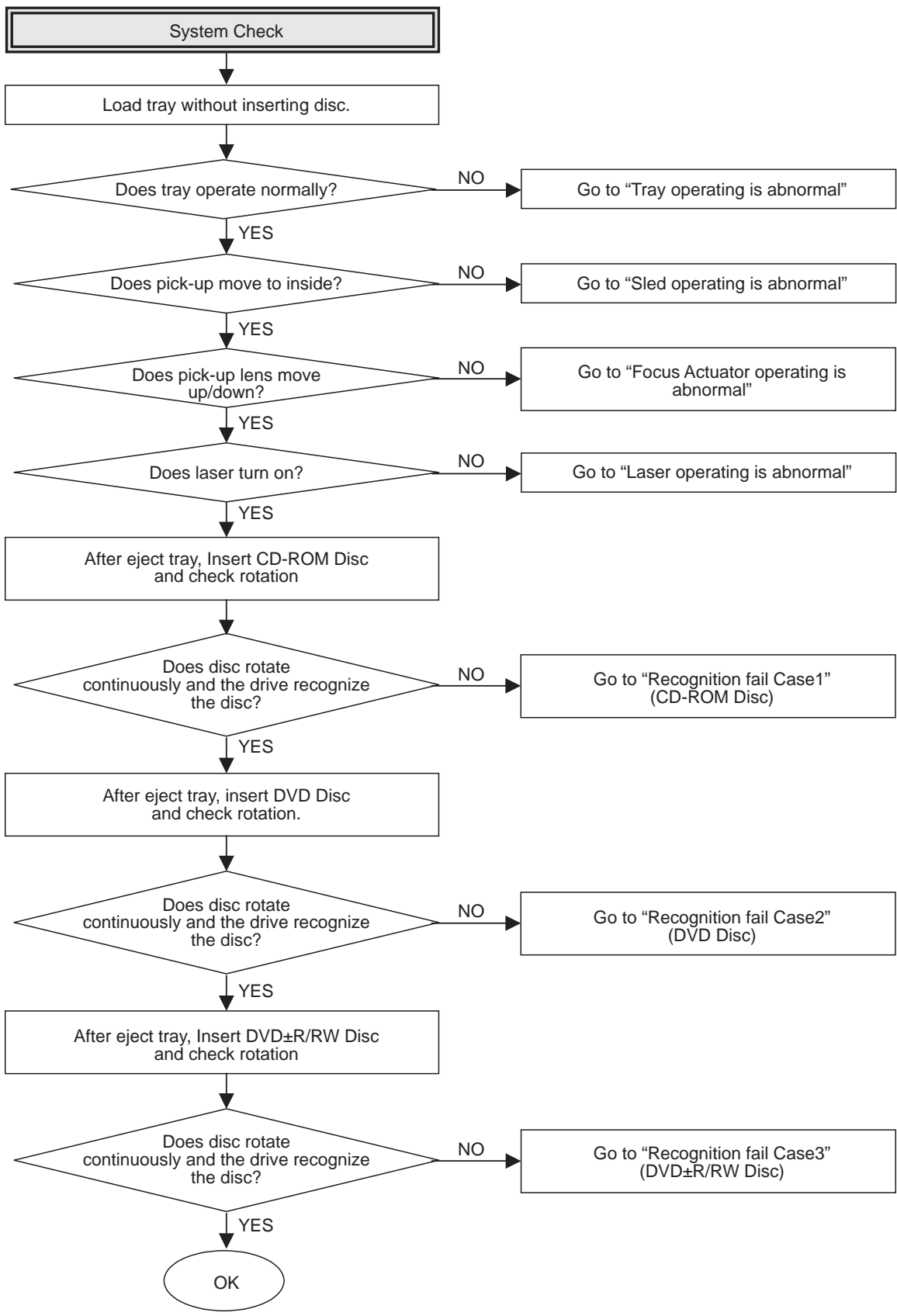
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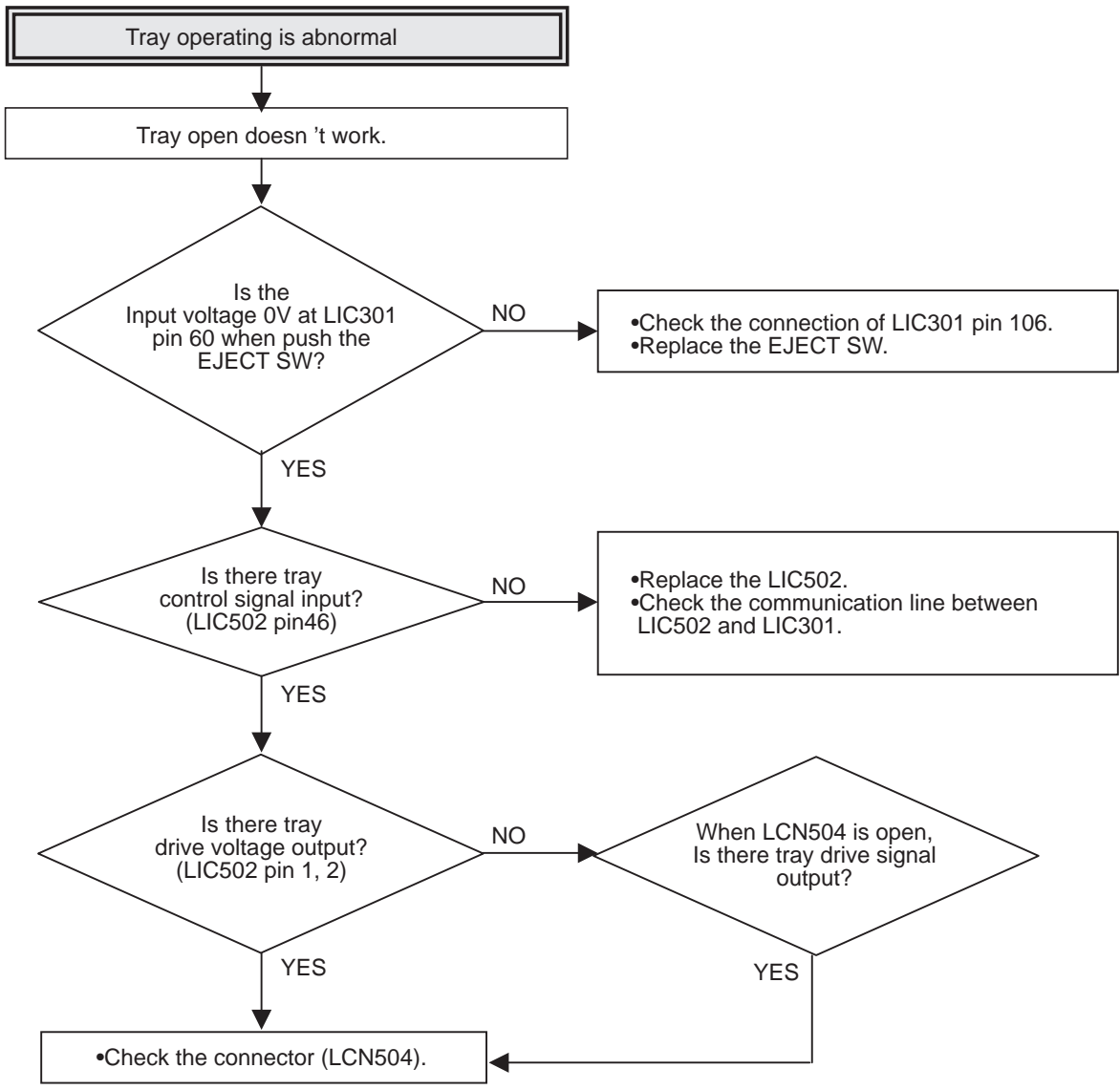
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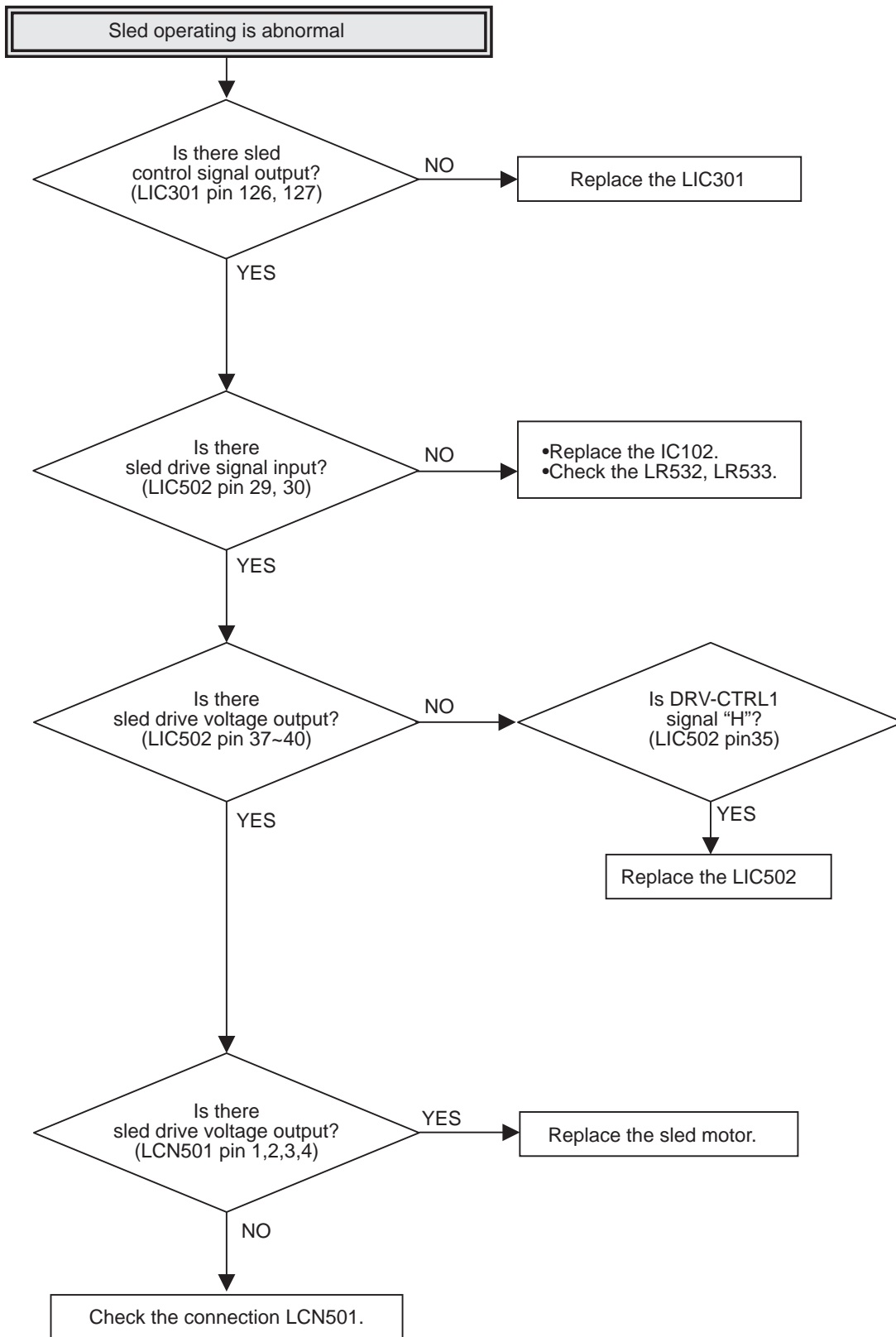
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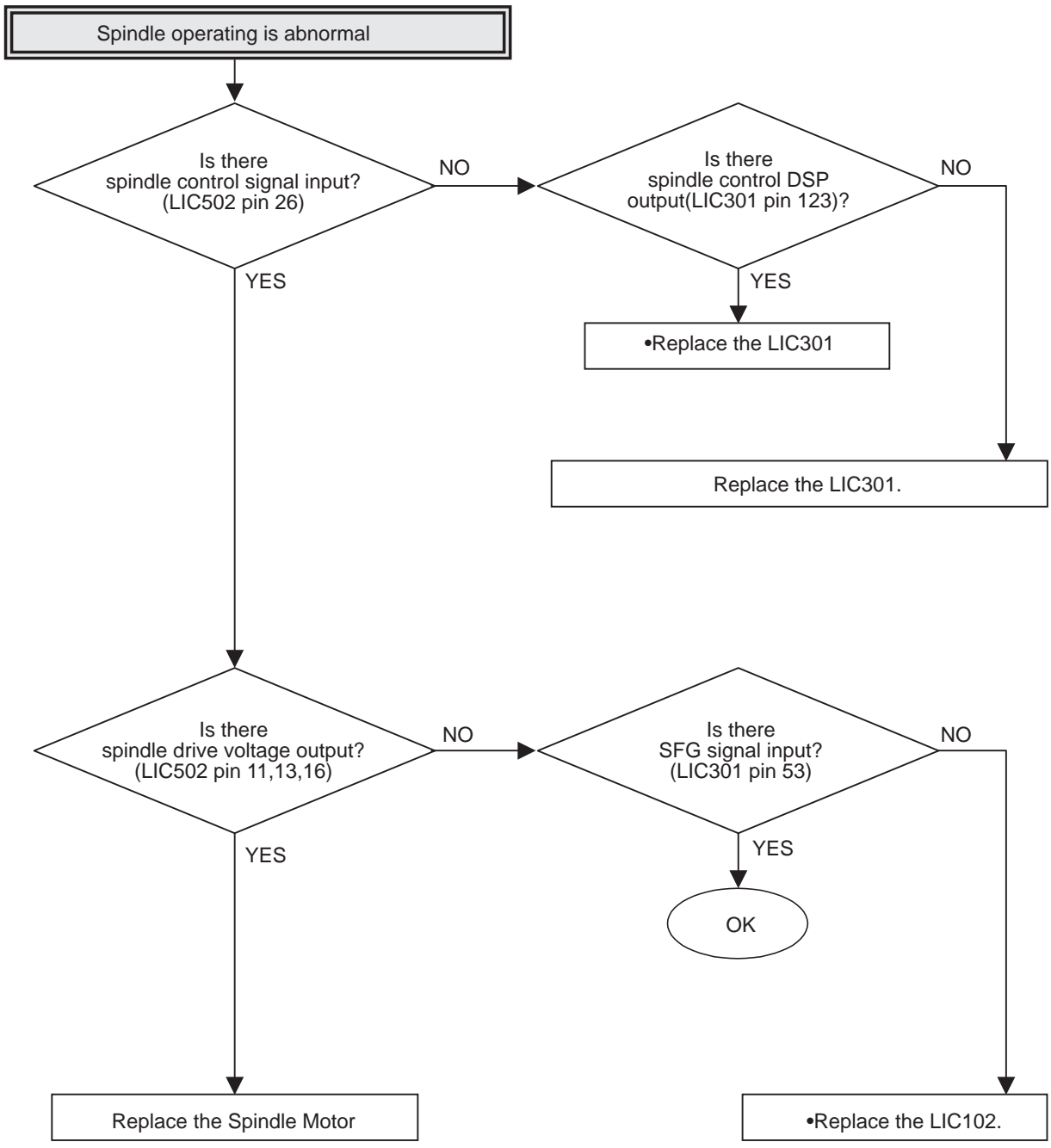
ELECTRICAL TROUBLESHOOTING GUIDE

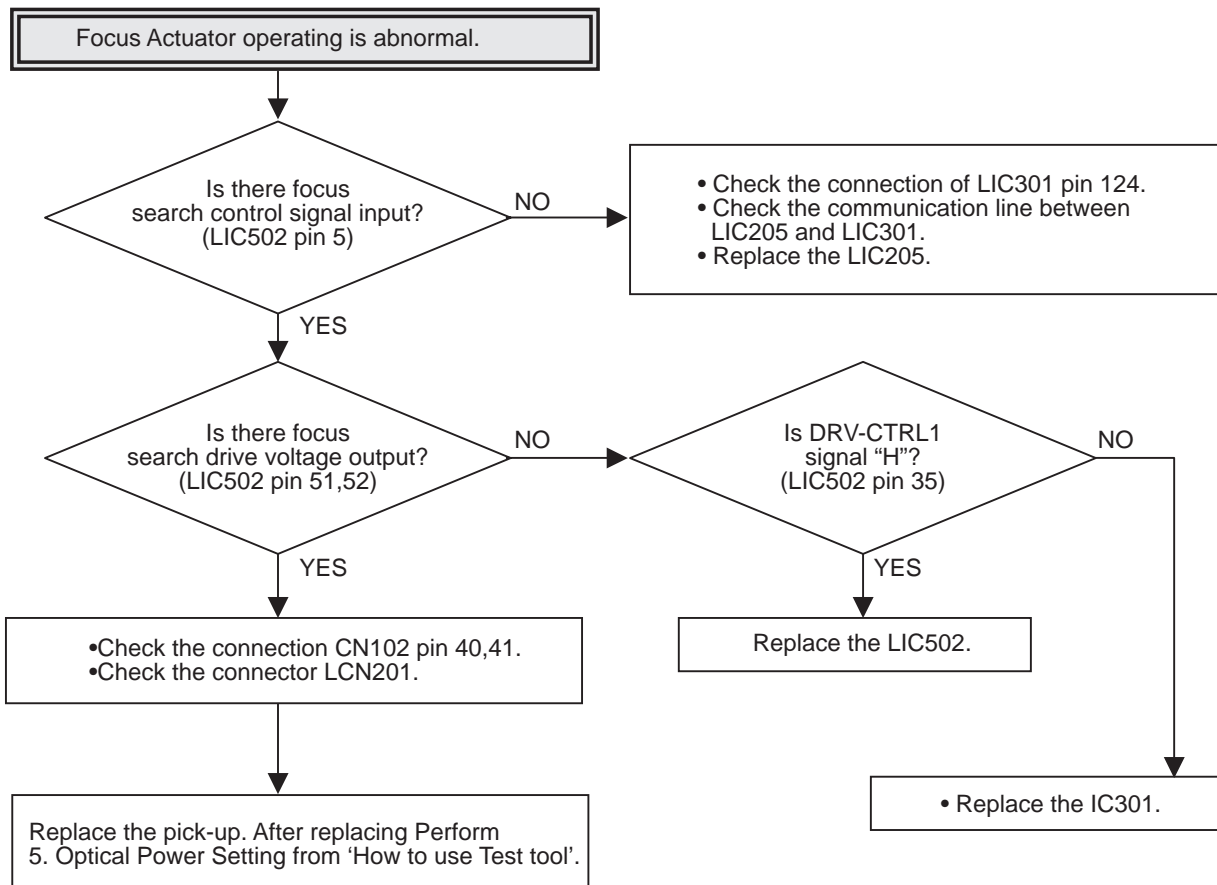
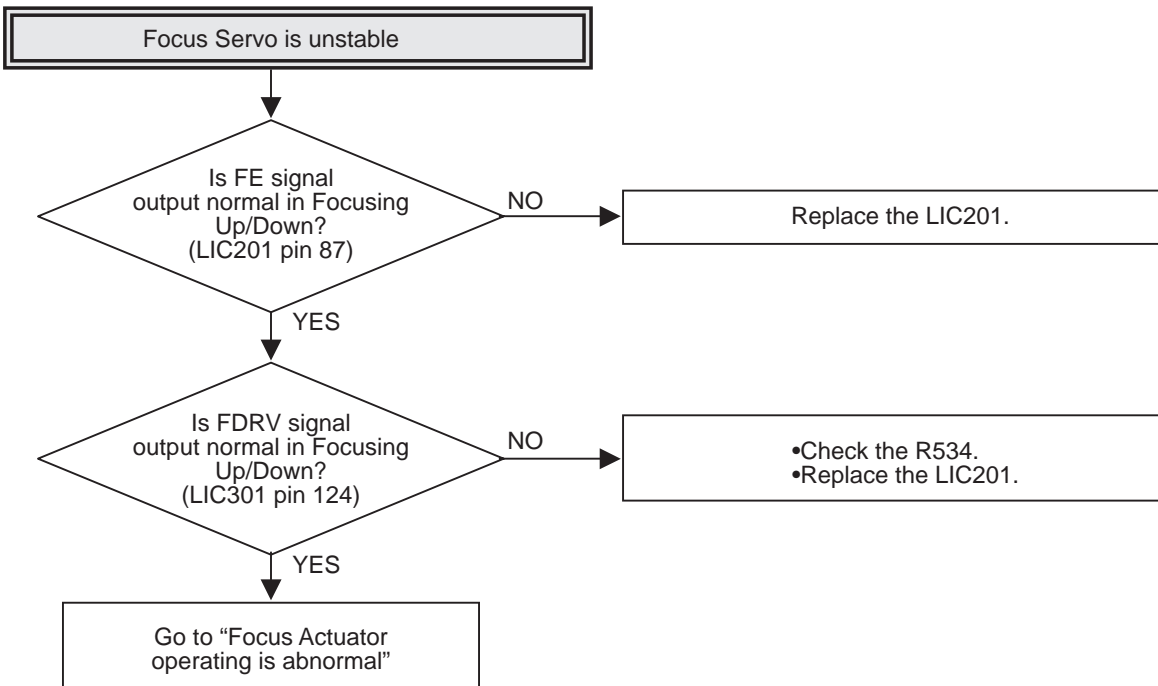


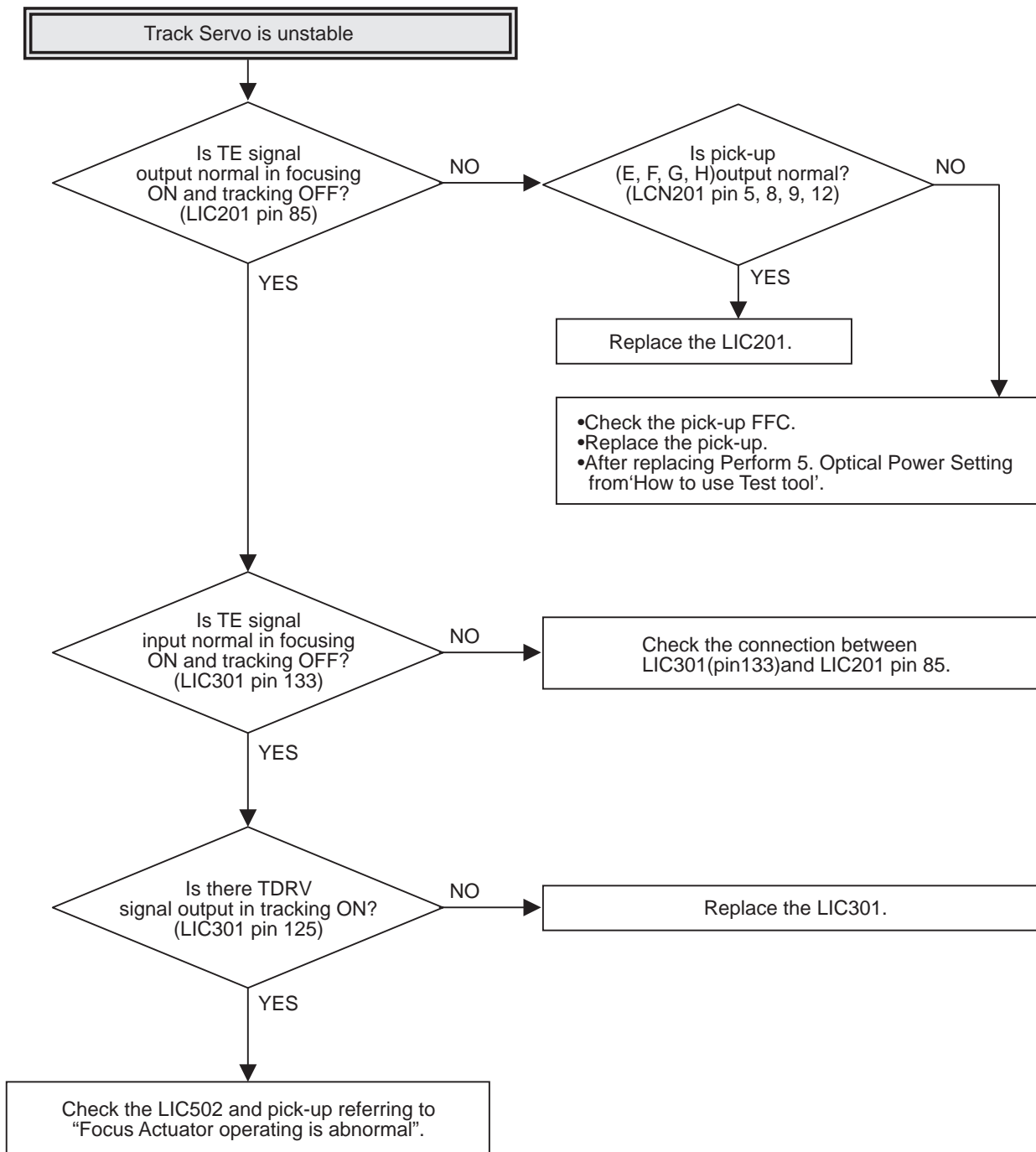


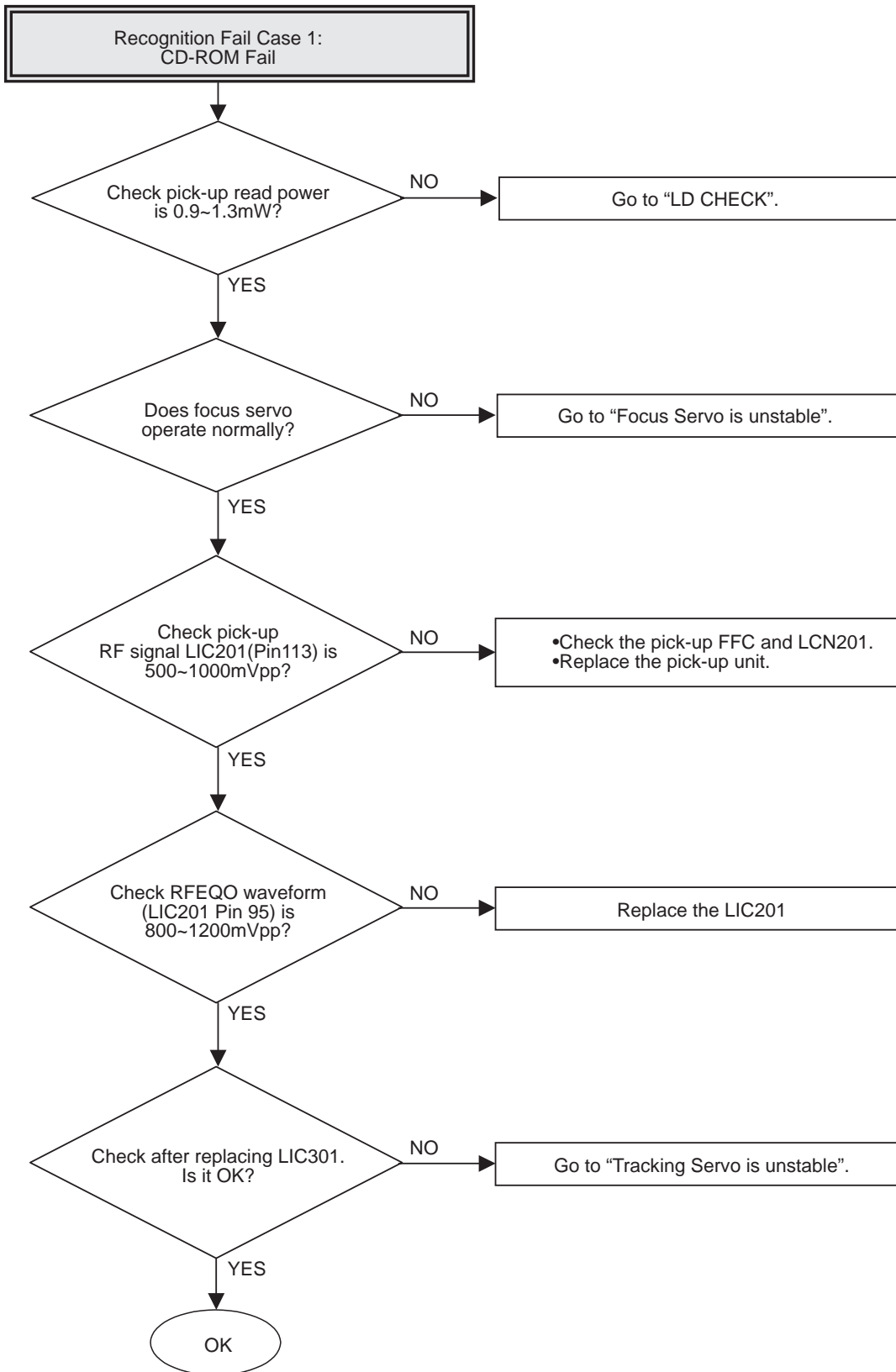


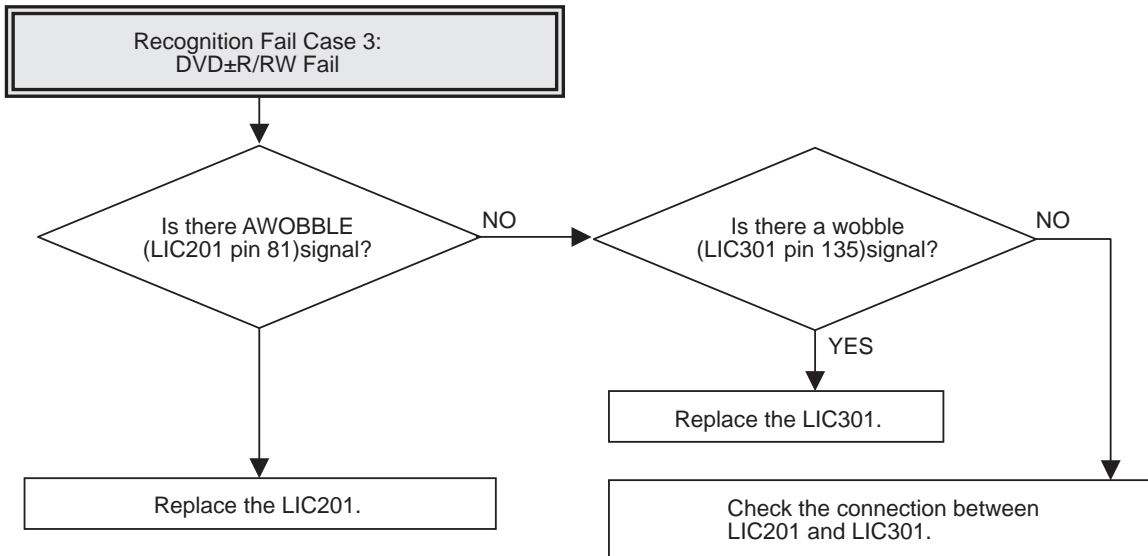
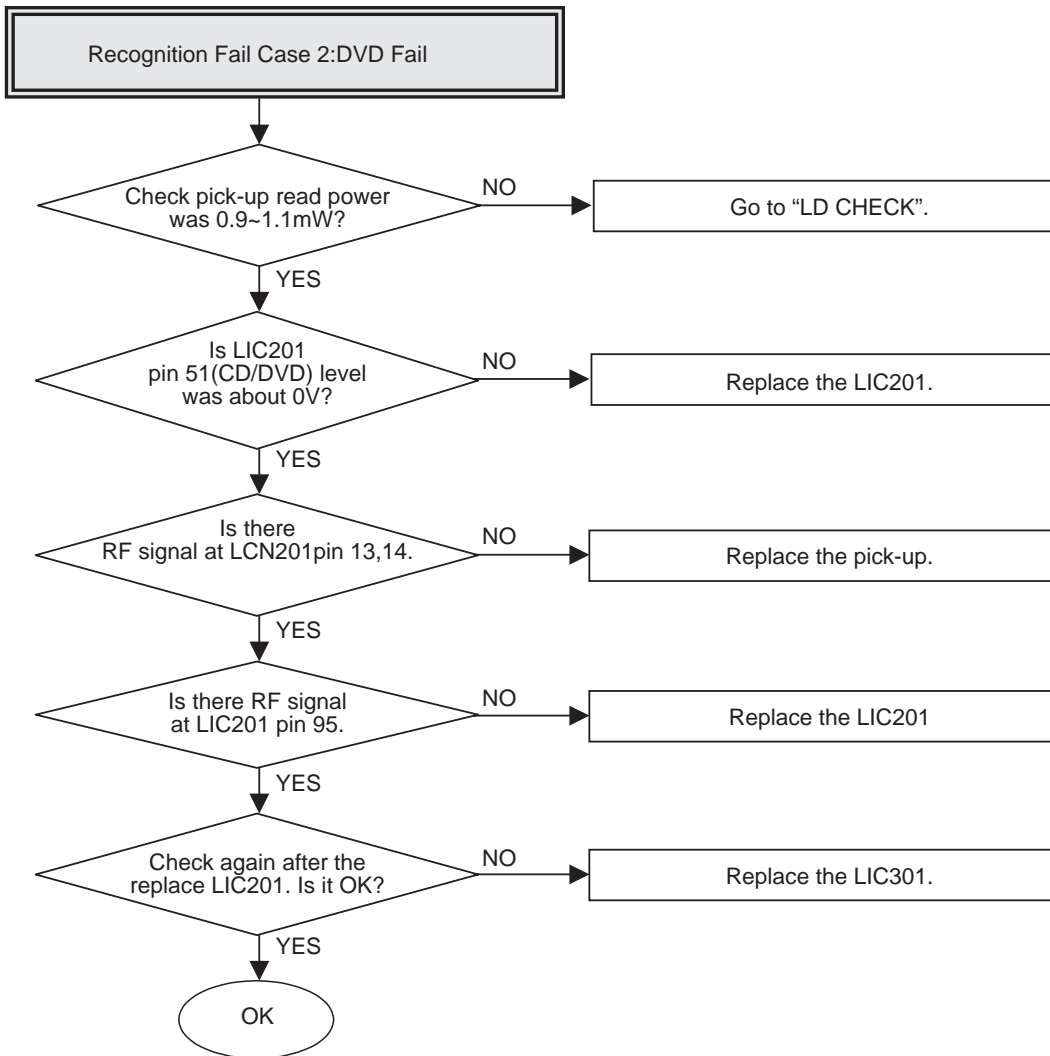


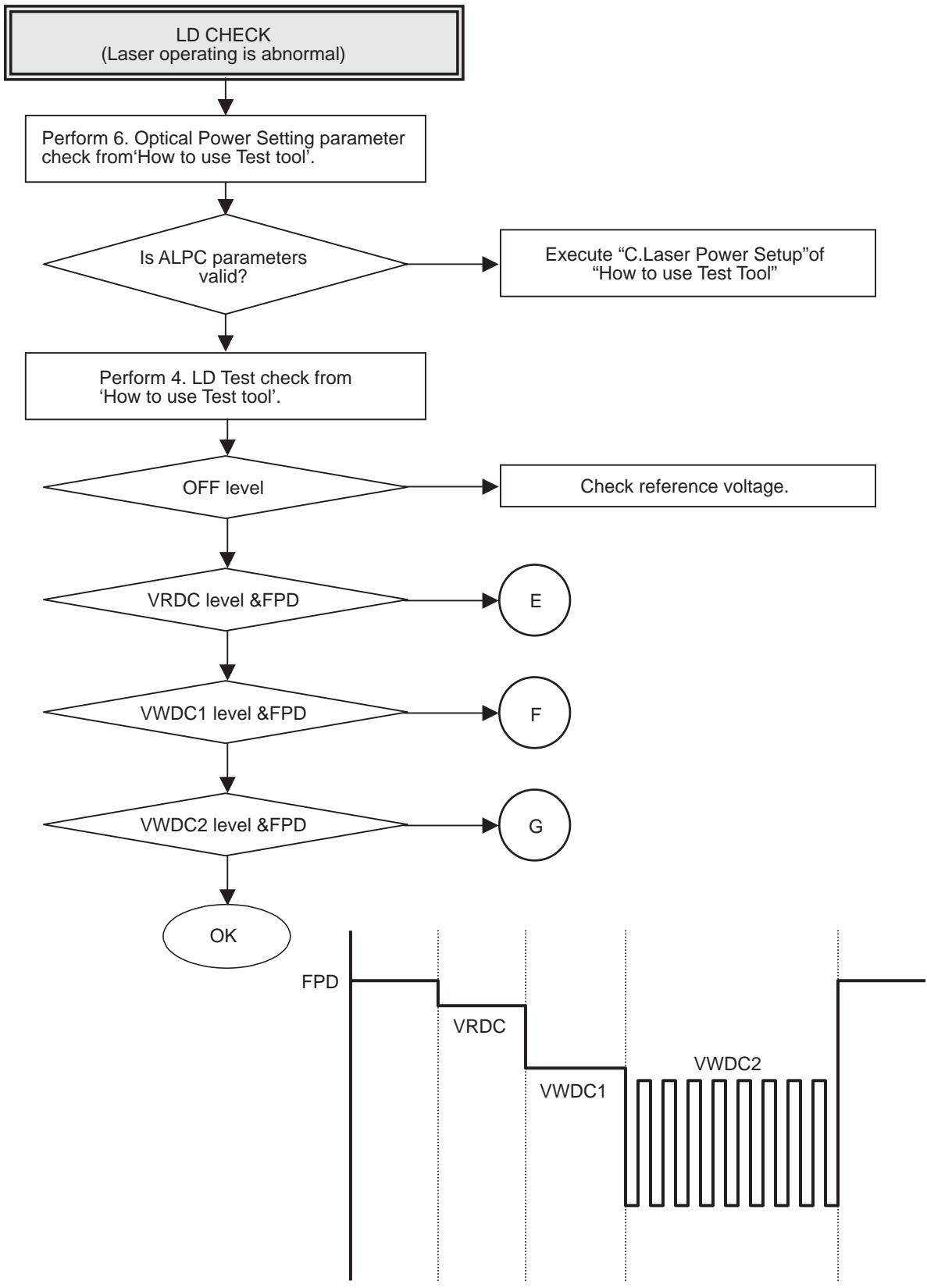


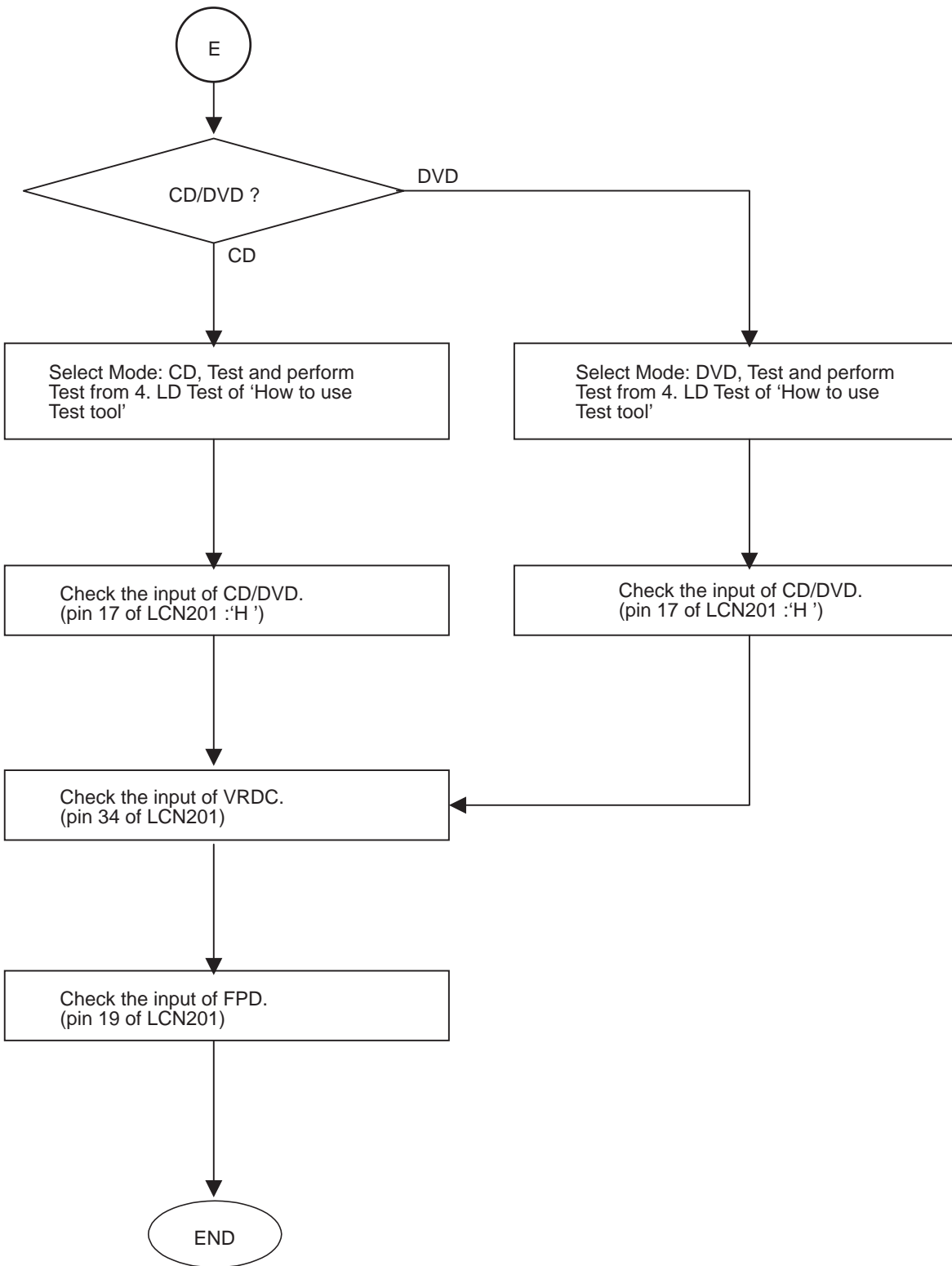


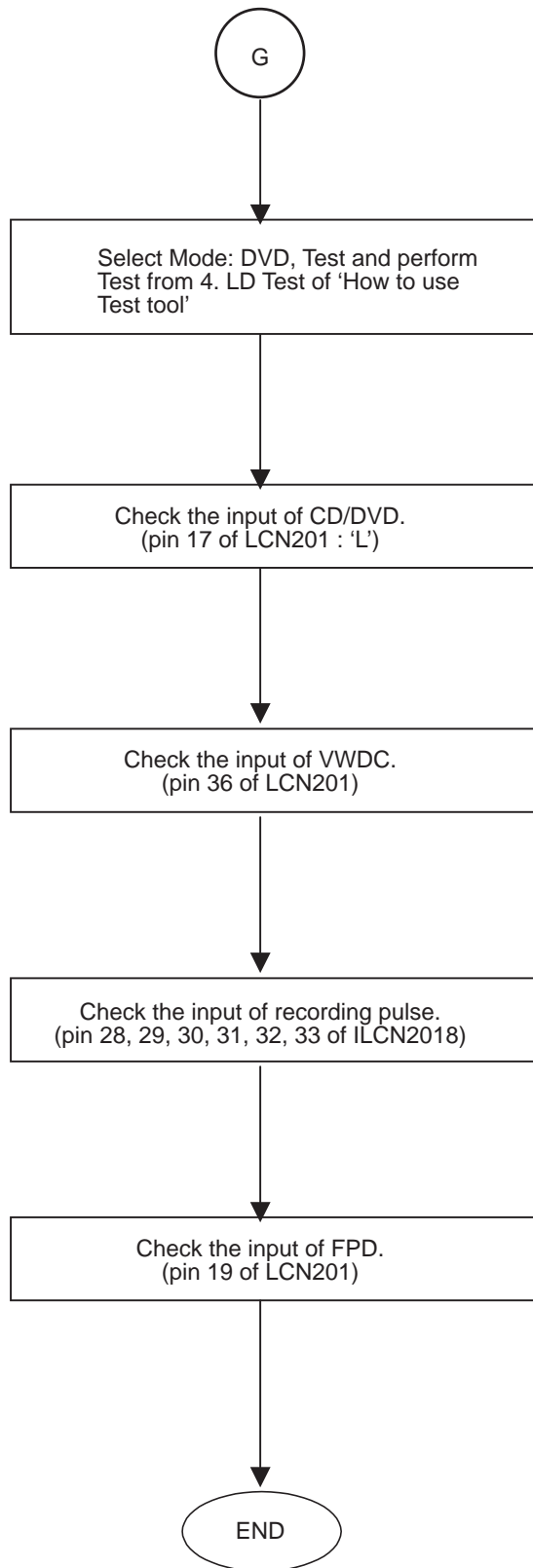
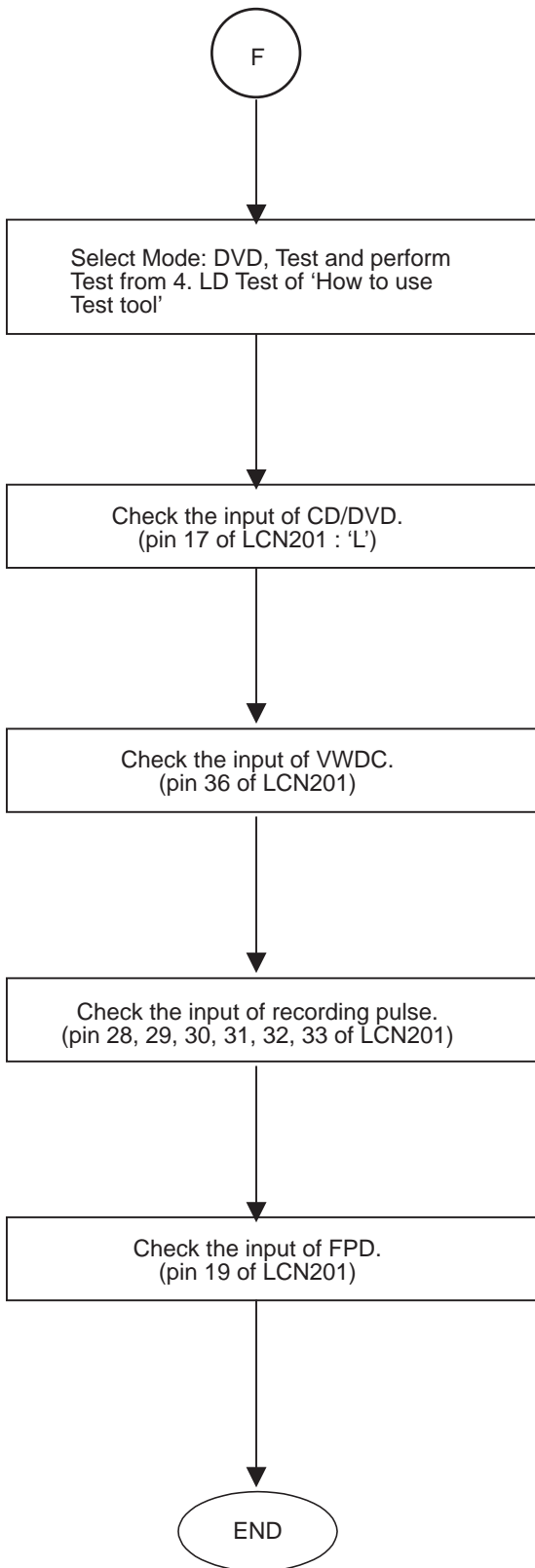


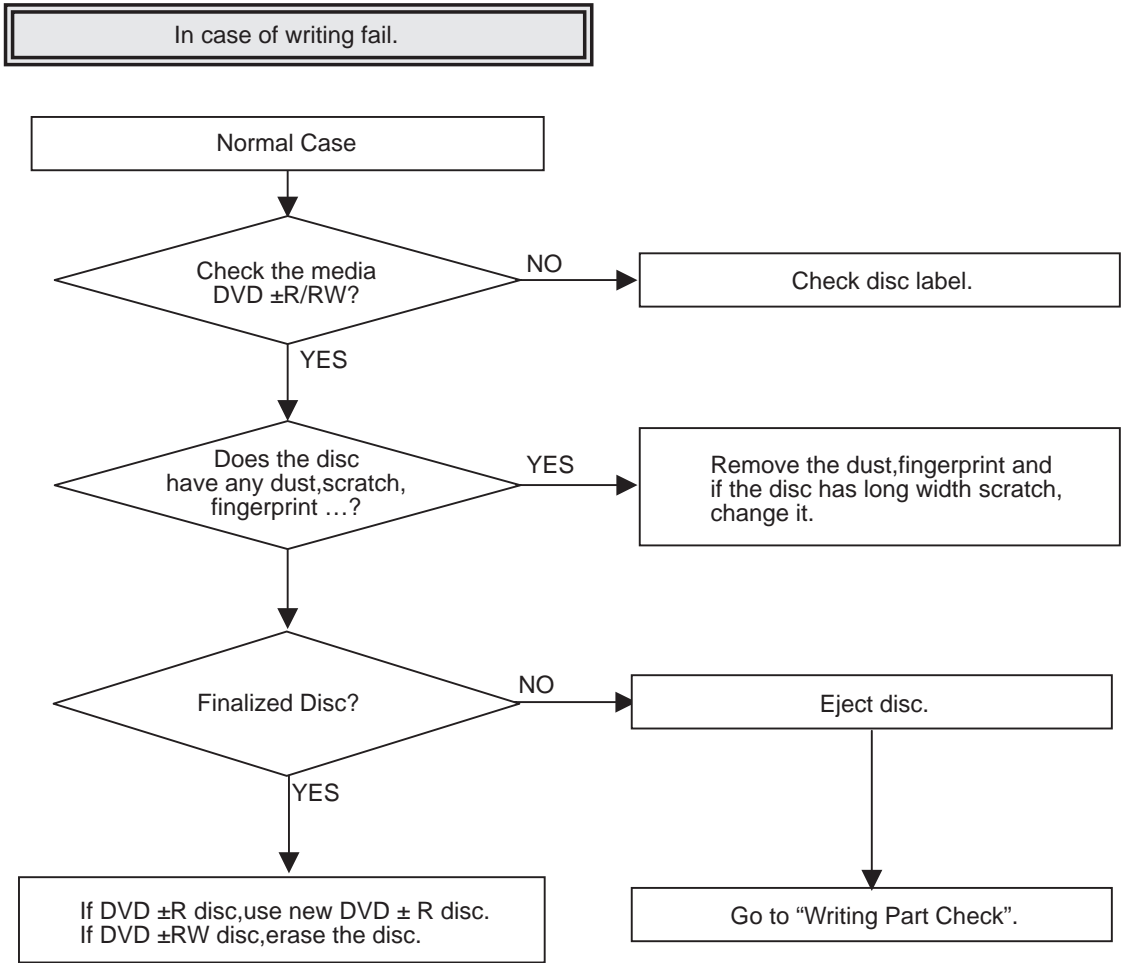


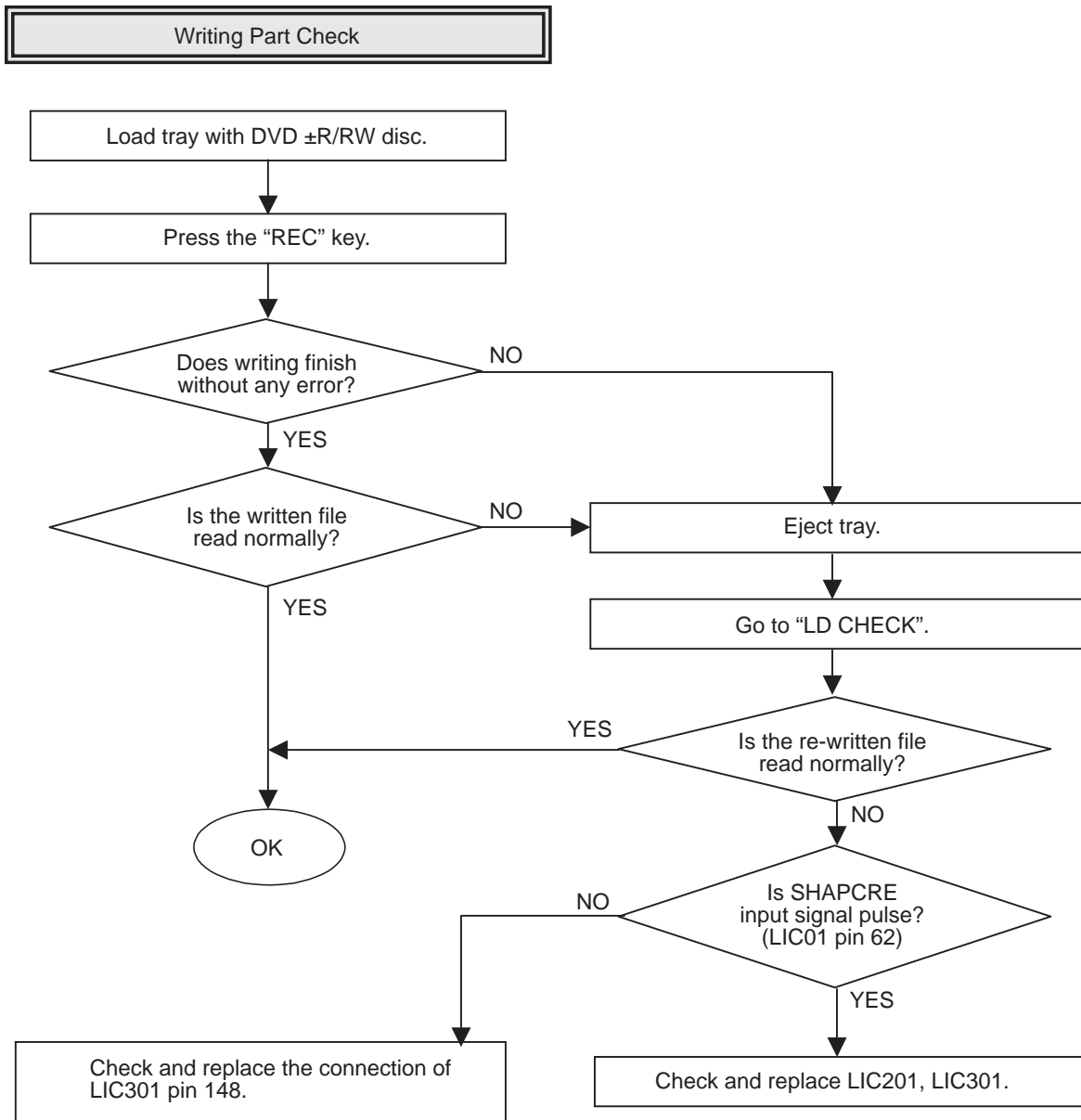






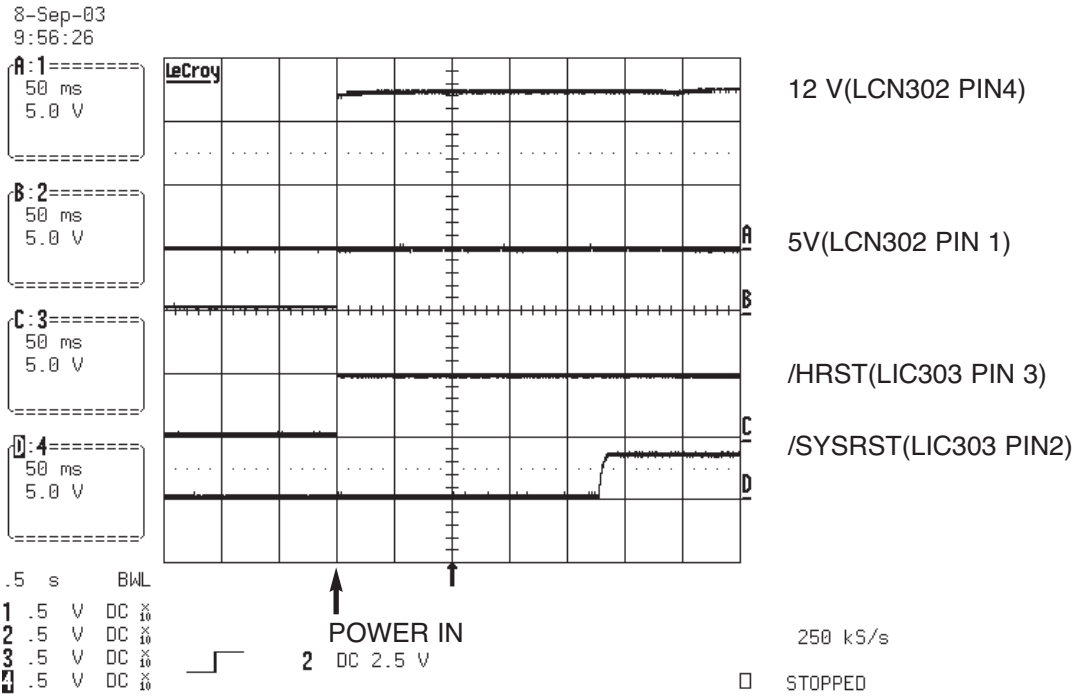




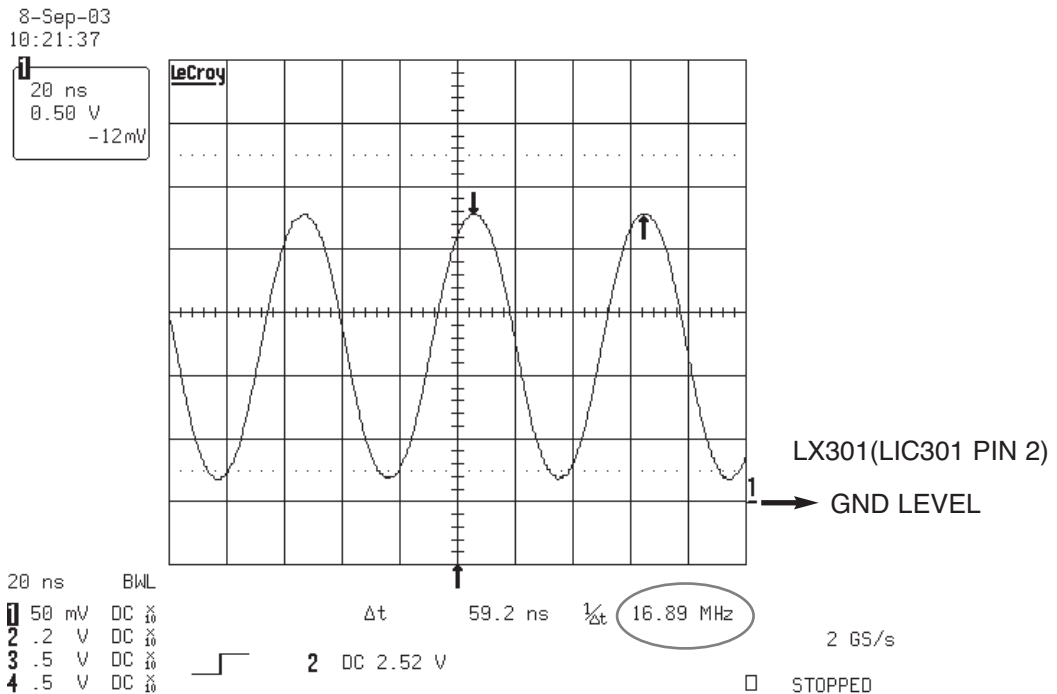


WAVEFORMS

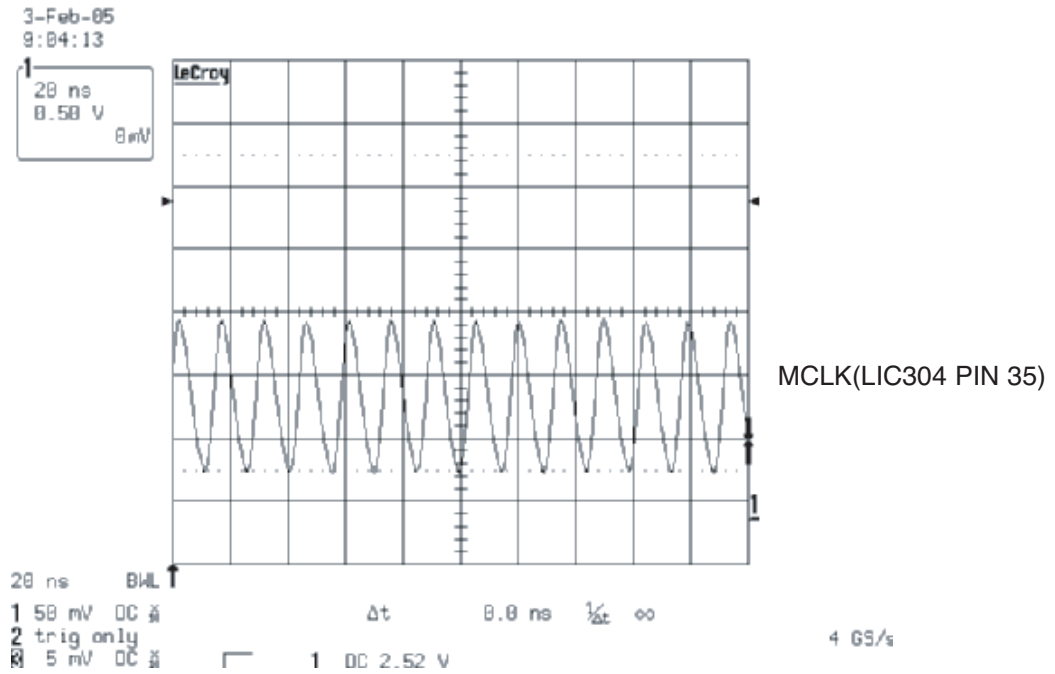
1. POWER & RESET Signal



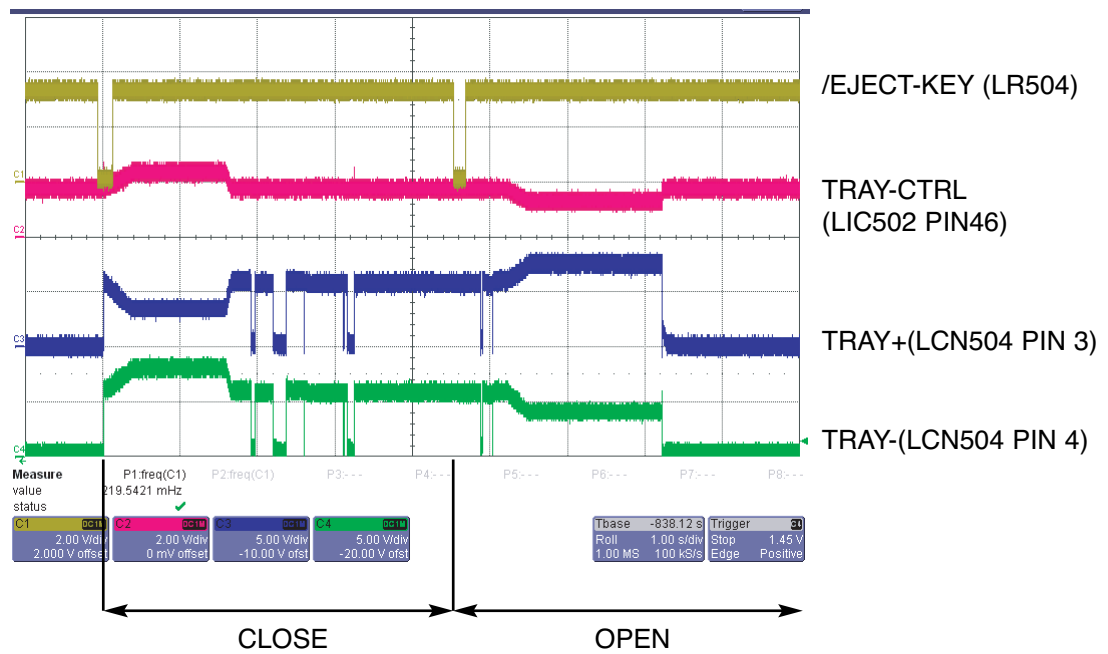
2. Main Clock1 for IC202 (16.9MHz)



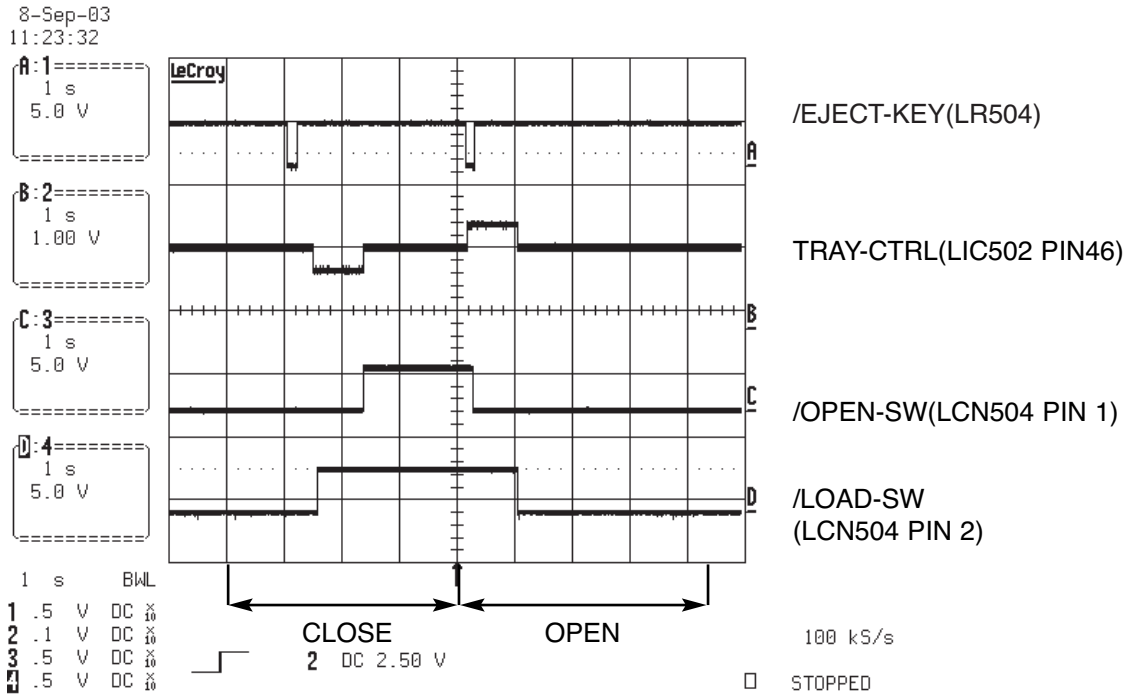
3. SDRAM Clock



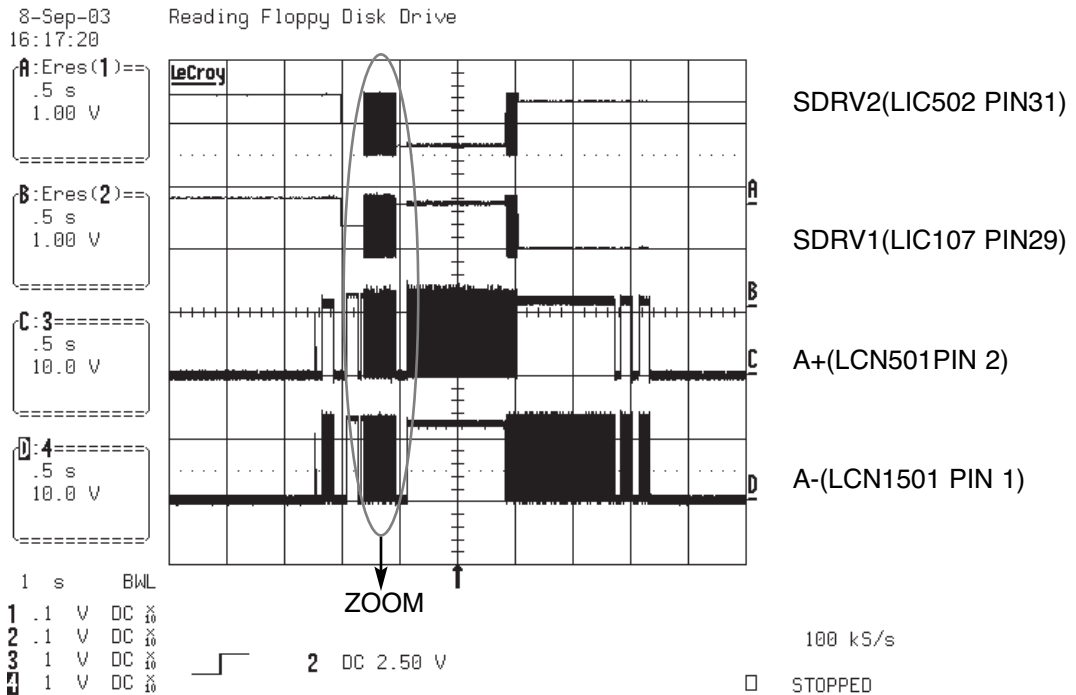
4. TRAY OPEN/CLOSE SIGNAL 1



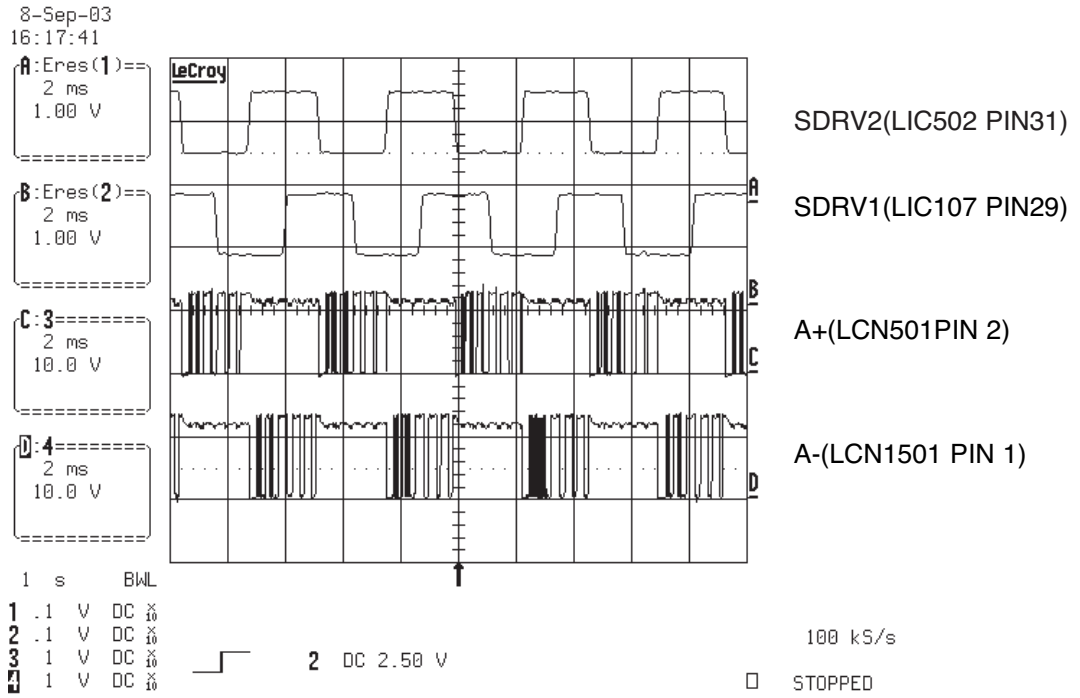
5. TRAY OPEN/CLOSE SIGNAL 2



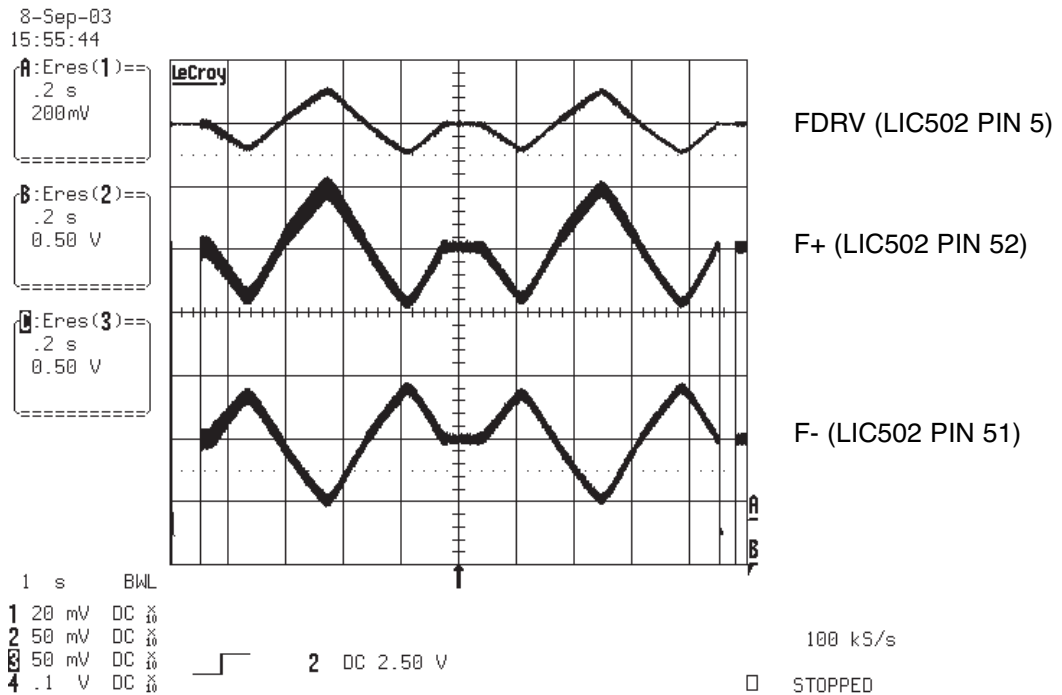
6. SLED MOVE SIGNAL 1



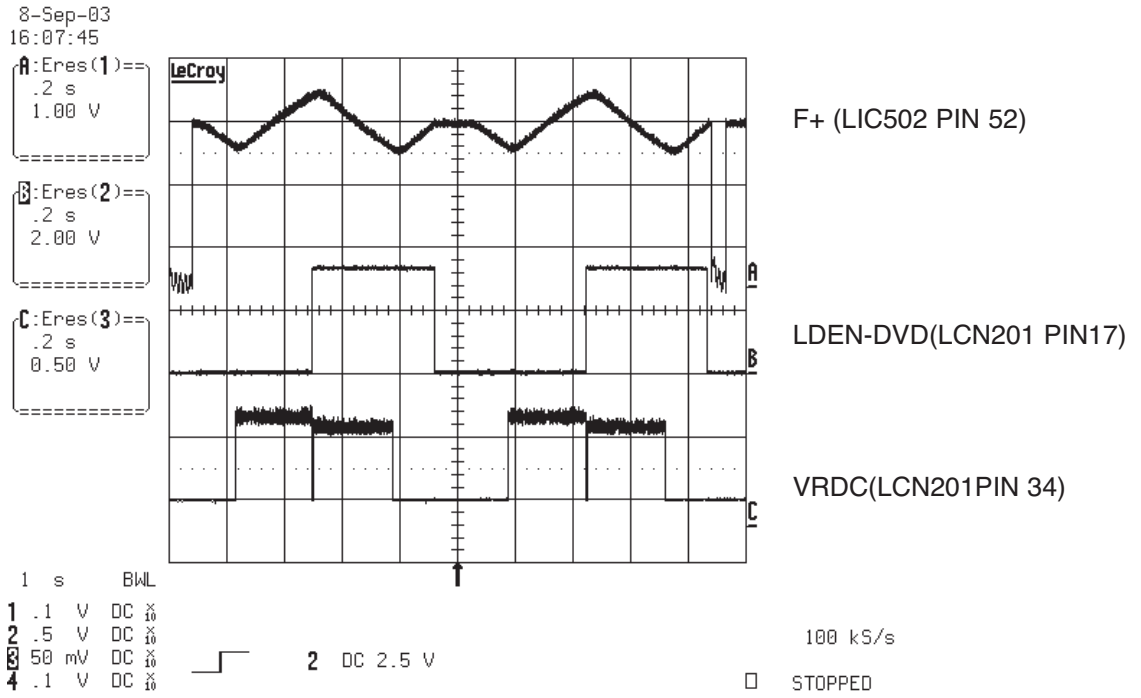
7. SLED MOVE SIGNAL 2



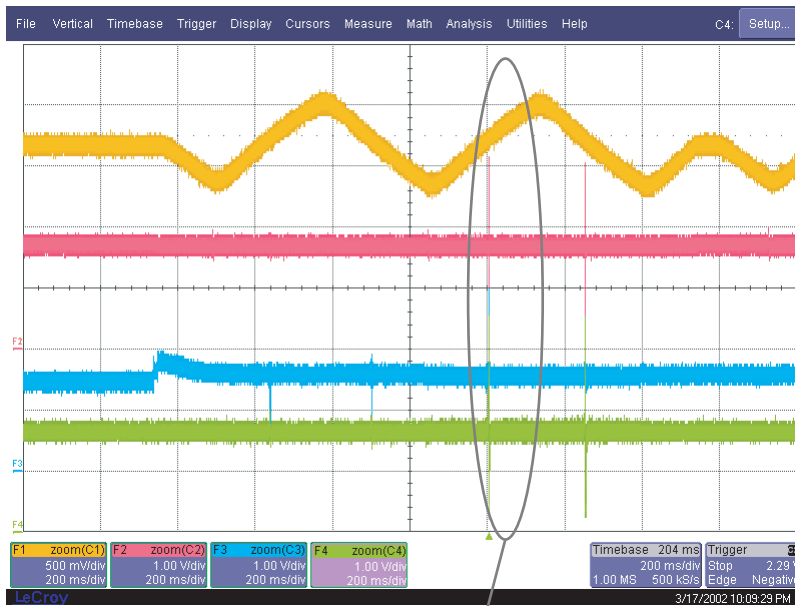
8. FOCUS SEARCH SIGNAL



9. LASER TURN ON SIGNAL



10. DISC TYPE JUDGEMENT WAVEFORM (CD SERIES)



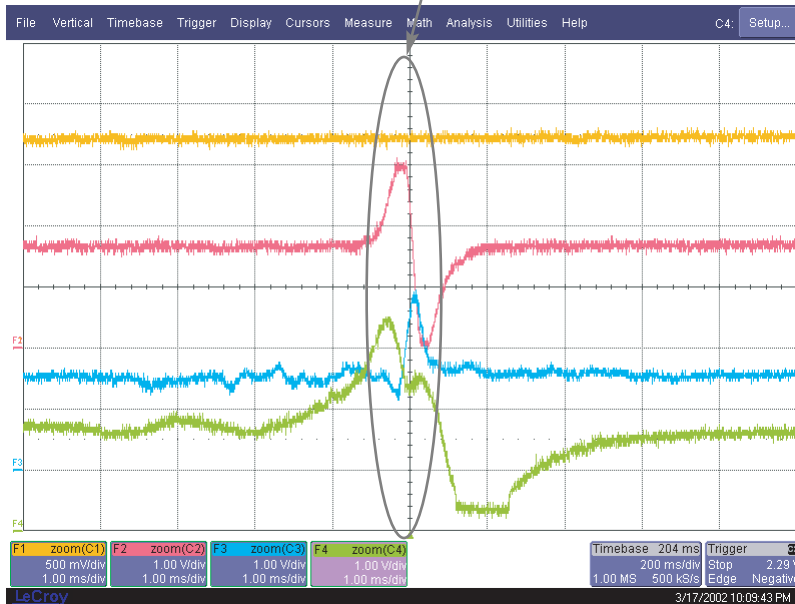
FDRV(LIC502 PIN 5)

FE(LIC201 PIN87)

TE(LIC201 PIN85)

RF(LIC201 PIN 113)

11. DISC TYPE JUDGEMENT WAVEFORM (CD&CD-R)



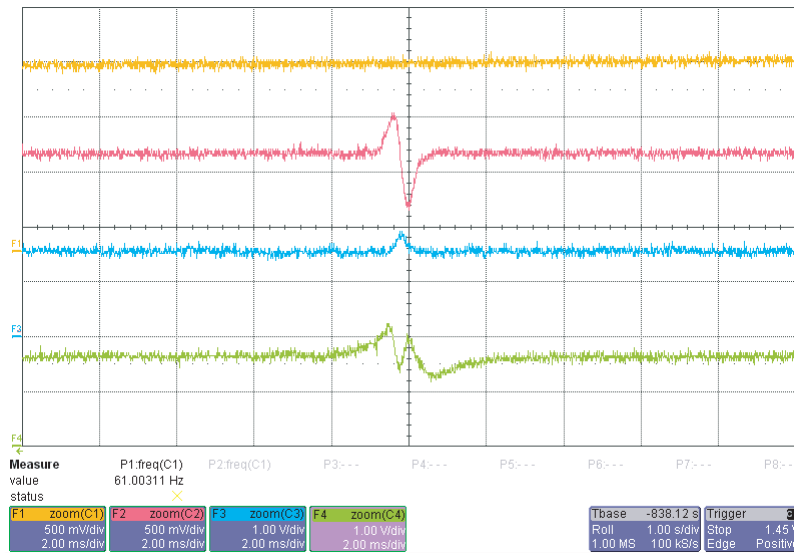
FDRV(LIC502 PIN 5)

FE(LIC201 PIN87)

TE(LIC201 PIN85)

RF(LIC201 PIN 113)

12. DISC TYPE JUDGEMENT WAVEFORM (CD-RW)



FDRV(LIC502 PIN 5)

FE(LIC201 PIN87)

TE(LIC201 PIN85)

RF(LIC201PIN 113)

13. DISC TYPE JUDGEMENT WAVEFORM (DVD SERIES)



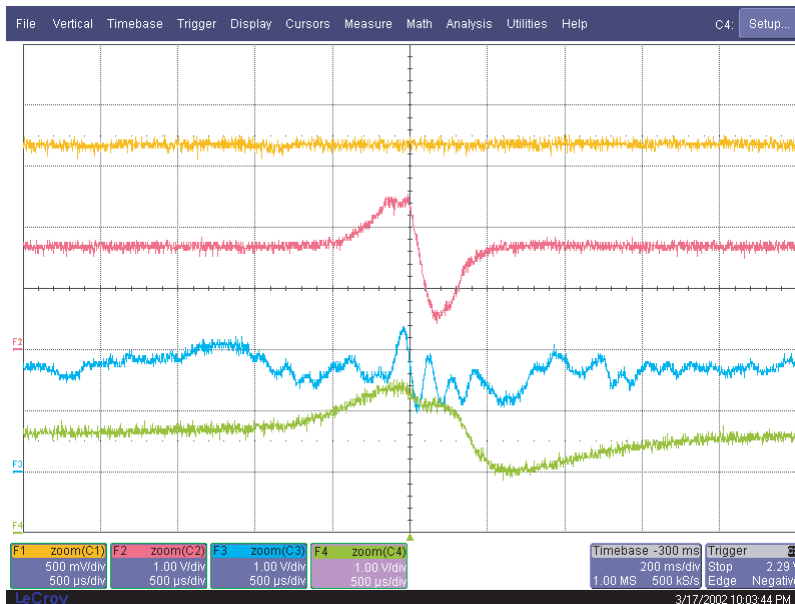
FDRV(LIC502 PIN 5)

FE(LIC201 PIN87)

TE(LIC201 PIN85)

RF(LIC201PIN 113)

14. DISC TYPE JUDGEMENT WAVEFORM (DVD_SINGLE&R)



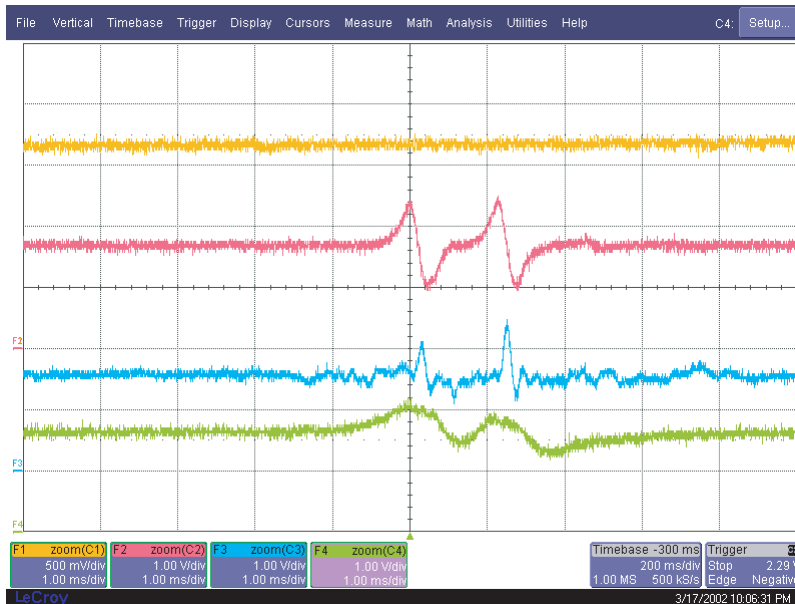
FDRV(LIC502 PIN 5)

FE(LIC201 PIN87)

TE(LIC201 PIN85)

RF(LIC201PIN 113)

15. DISC TYPE JUDGEMENT WAVEFORM (DVD_DUAL)



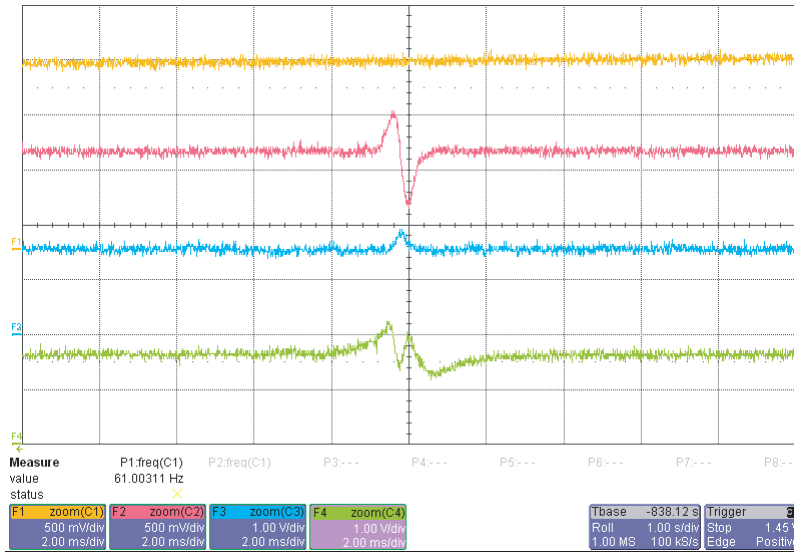
FDRV(LIC502 PIN 5)

FE(LIC201 PIN87)

TE(LIC201 PIN85)

RF(LIC201PIN 113)

16. DISC TYPE JUDGEMENT WAVEFORM (DVDRW)



FDRV(LIC502 PIN 5)

FE(LIC201 PIN87)

TE(LIC201 PIN85)

RF(LIC201PIN 113)

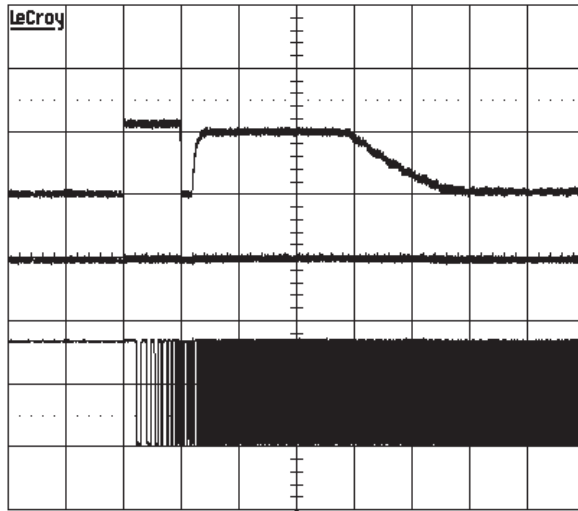
17. SPINDLE WAVEFORM1

8-Sep-03
16:58:06

A: Eres(1) ==
.2 s
1.00 V

B: Eres(2) ==
.2 s
1.00 V

C: Eres(3) ==
.2 s
2.00 V



MDRV (LIC502 PIN 26)

REFOUT (LIC502 PIN 42)

SFG((LIC502 PIN43)

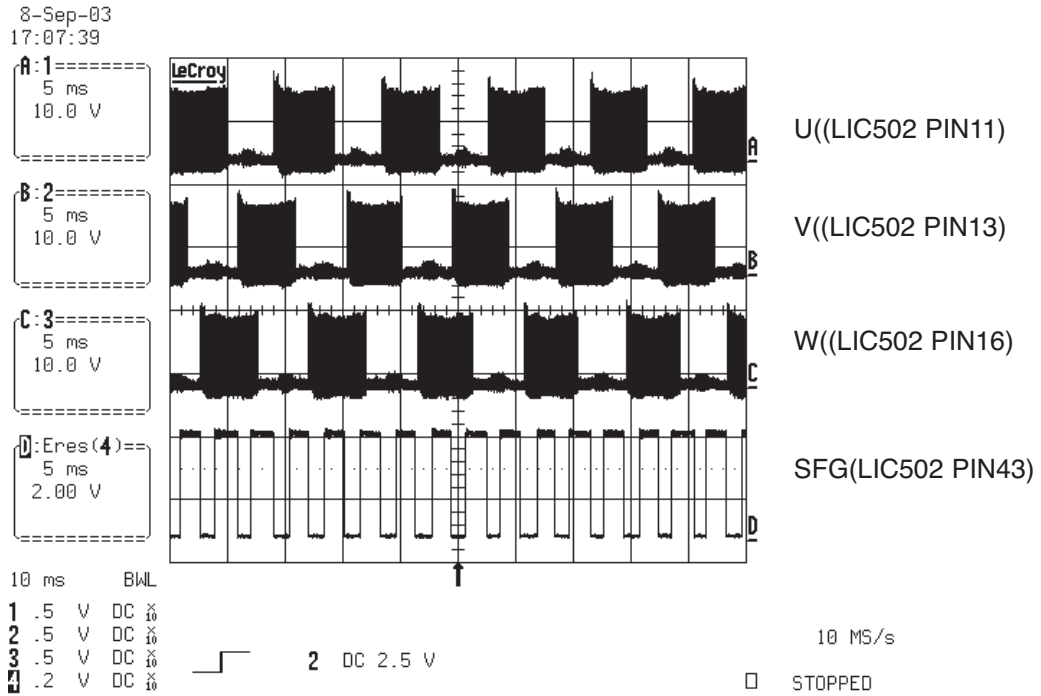
1 s BWL
1 .1 V DC $\frac{\infty}{10}$
2 .1 V DC $\frac{\infty}{10}$
3 .2 V DC $\frac{\infty}{10}$
4 .5 V DC $\frac{\infty}{10}$

2 DC 2.50 V

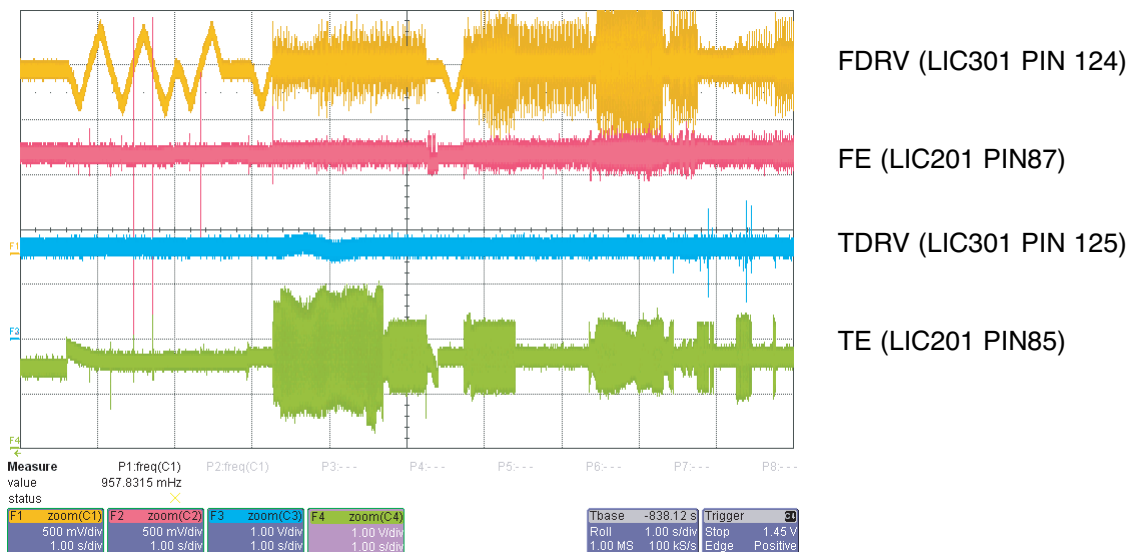
100 kS/s

STOPPED

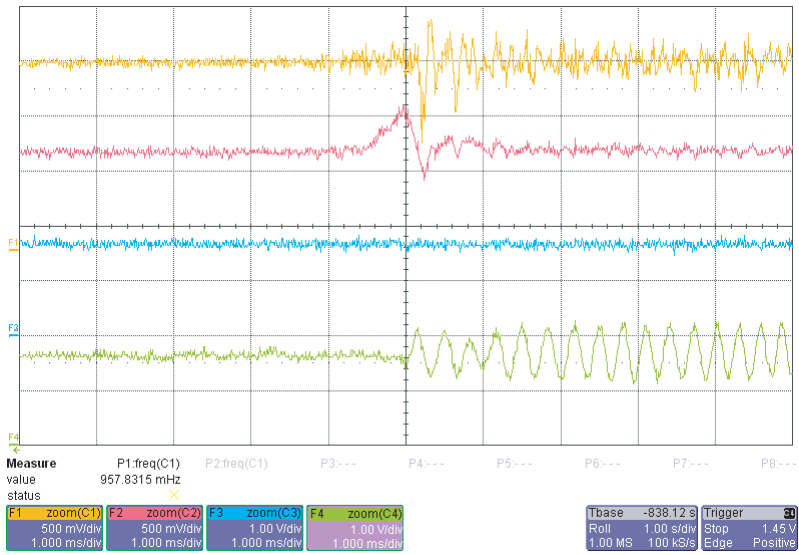
18. SPINDLE WAVEFORM2



19. FOCUS ON SIGNAL(CD)



20. FOCUS ON SIGNAL(CD)



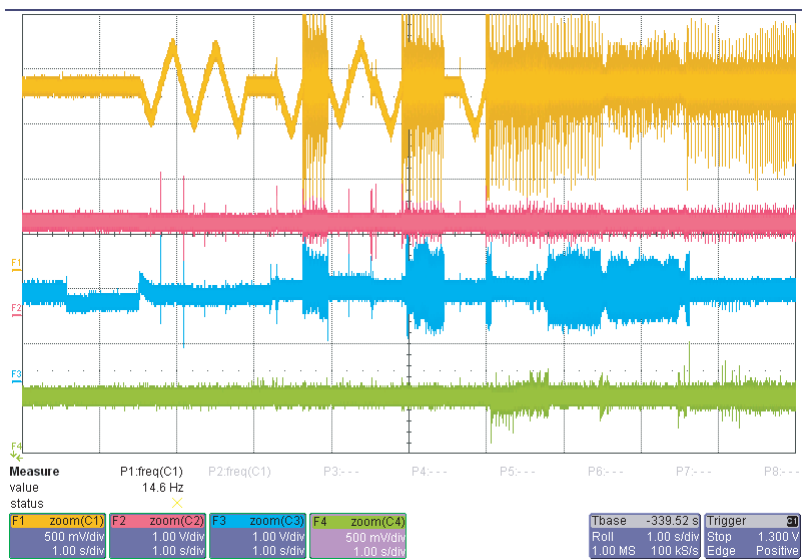
FDRV (LIC301 PIN 124)

FE (LIC201 PIN87)

TDRV (LIC301 PIN 125)

TE (LIC201 PIN85)

21. FOCUS ON SIGNAL(DVD)



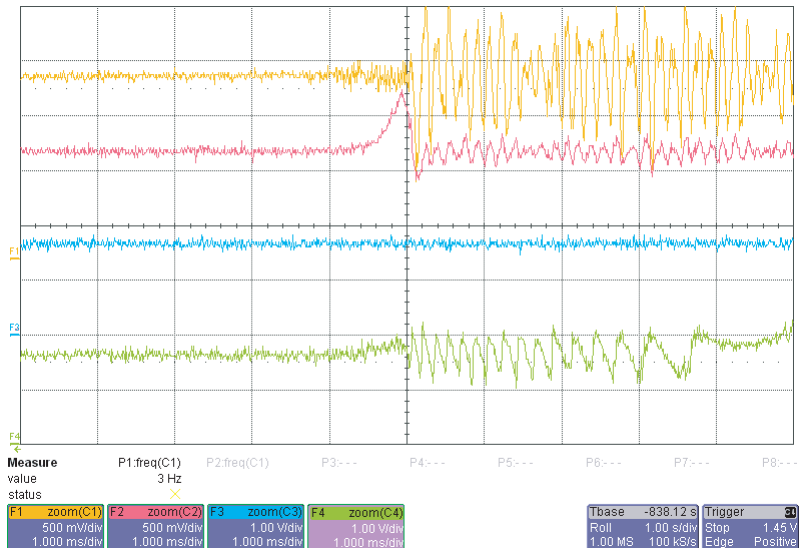
FDRV (LIC301 PIN 124)

FE (LIC201 PIN87)

TDRV (LIC301 PIN 125)

TE (LIC201 PIN85)

22. FOCUS ON SIGNAL (DVD)



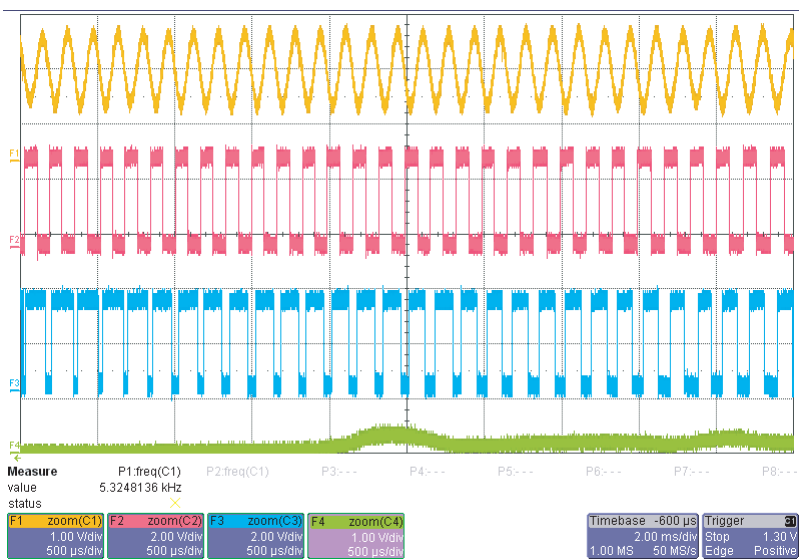
FDRV (LIC301 PIN 124)

FE (LIC201 PIN87)

TDRV (LIC301 PIN 125)

TE (LIC201 PIN85)

23. TRACK OFF SIGNAL(CD)

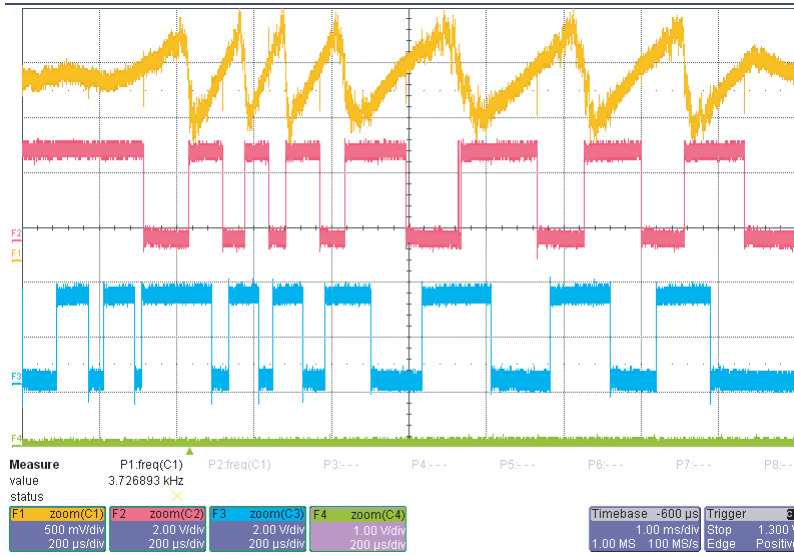


TE (LIC106 PIN85)

TZC(LIC106 PIN74)

MIRRBCA(LIC106 PIN77)

24. TRACK OFF SIGNAL(DVD)

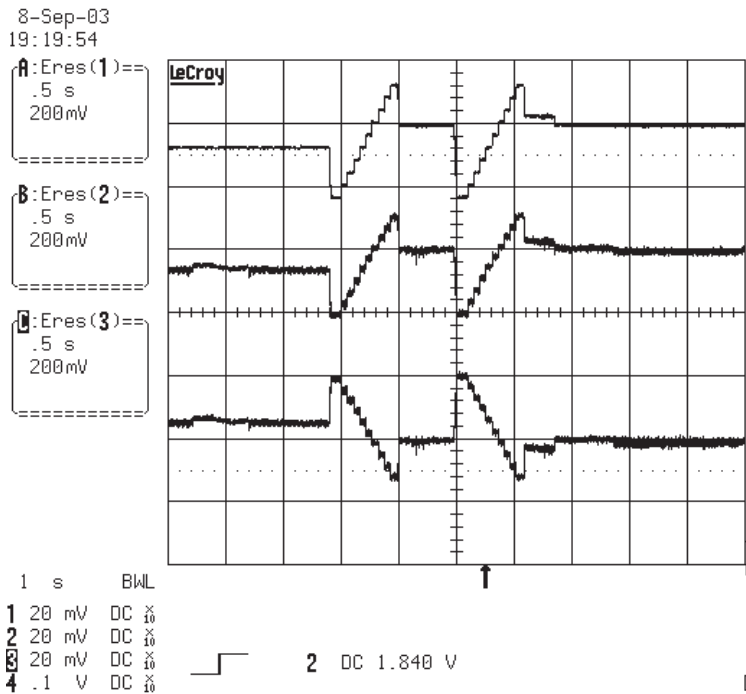


TE (LIC106 PIN85)

TZC(LIC106 PIN74)

MIRRBCA(LIC106 PIN77)

25. Tilt Driver signal(Disc reading)

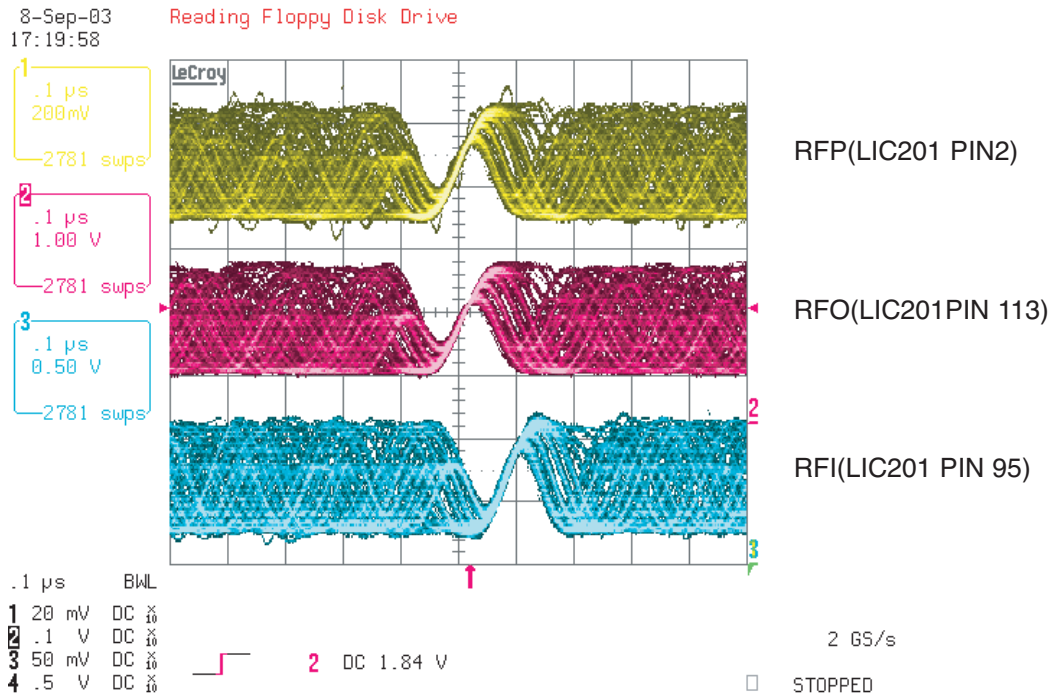


TILTDRV(LIC502 PIN47)

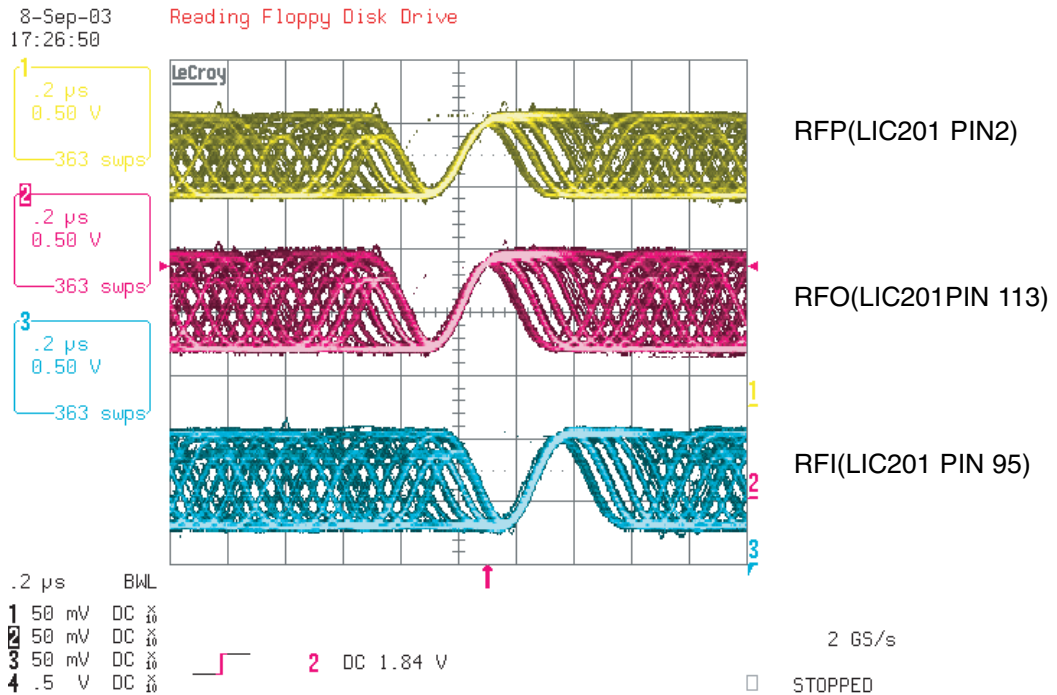
TILT+(LIC502 PIN50)

TILT-(LIC502 PIN49)

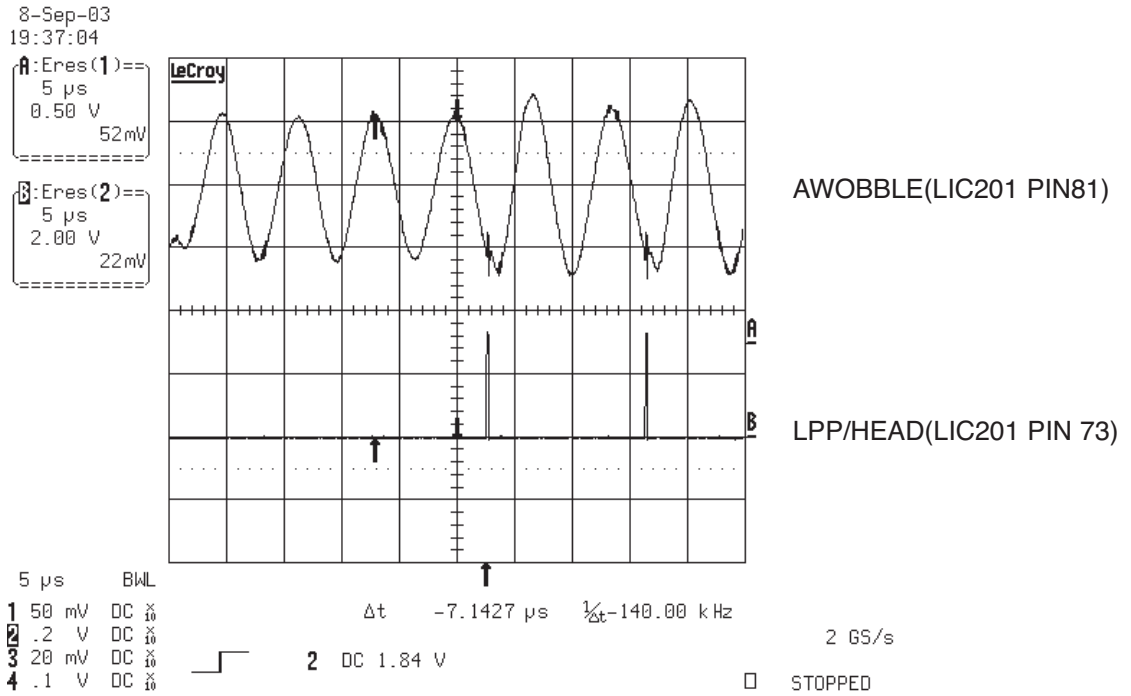
26. RF WAVEFORM(DVD)



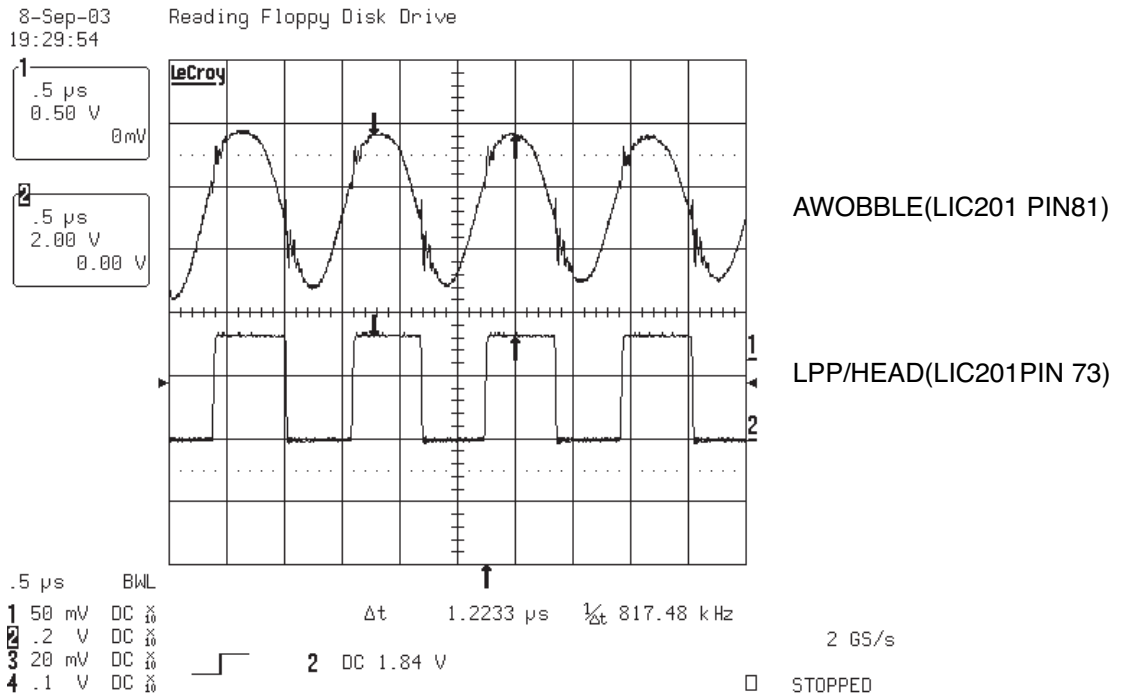
27. RF WAVEFORM(CD)



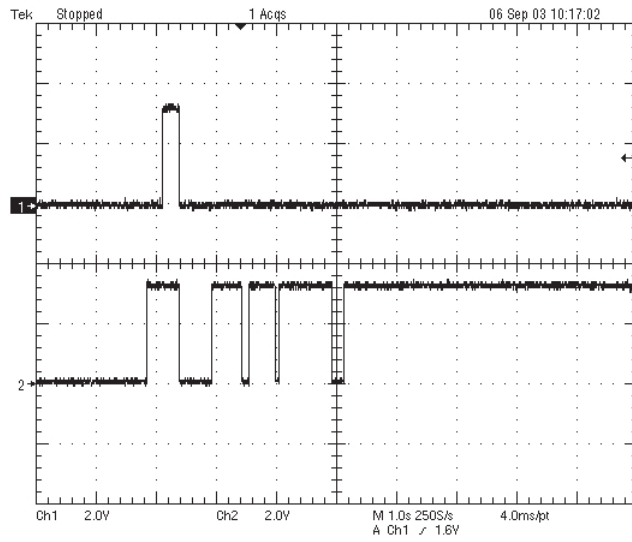
28. WOBBLE(DVD-R/RW)_READING



29. WOBBLE(DVD+R/RW)_READING& WRITING => X1 SPEED



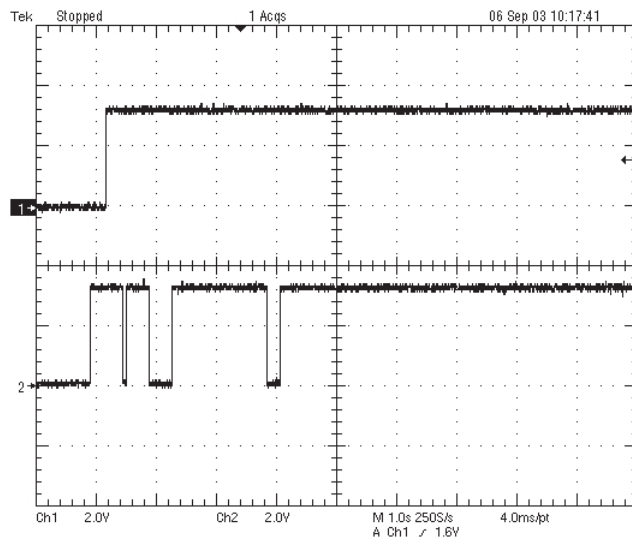
30. LD Enable(DVD)



CD/DVD(LCN201 PIN 17)

LDEN(LCN PIN 38)

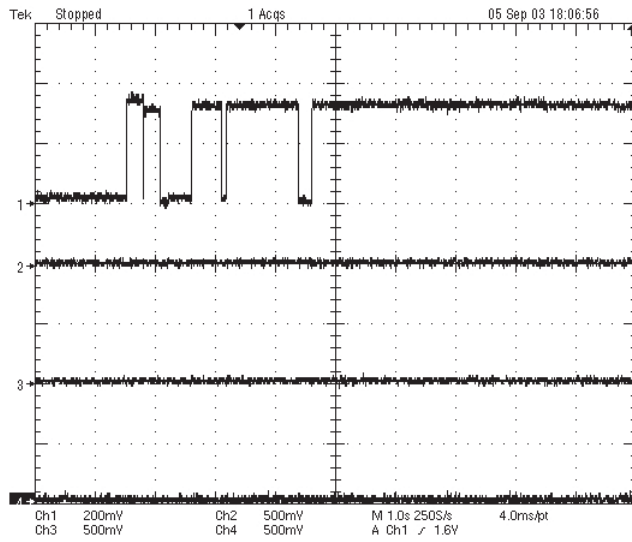
31. LD Enable(CD)



CD/DVD(LCN201 PIN 17)

LDEN(LCN102 PIN 38)

32. Laser Power(reading) _ DVD+RW



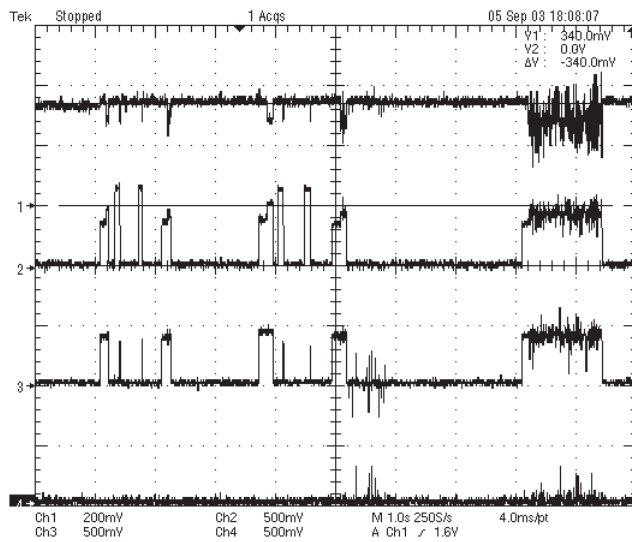
VRDC(LCN201 PIN 34)

VWDC(LCN201 PIN 36)

VWDC2(LCN201 PIN 35)

OPCTRG(LIC301 PIN 151)

33. Laser Power(Erase) _ DVD+RW



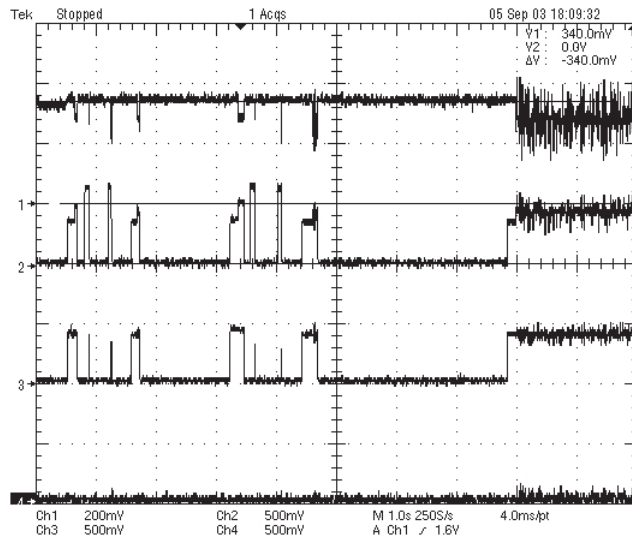
VRDC(LCN201 PIN 34)

VWDC(LCN201 PIN 36)

VWDC2(LCN201 PIN 35)

OPCTRG(LIC301 PIN 151)

34. Laser Power(Writing) _ initial state



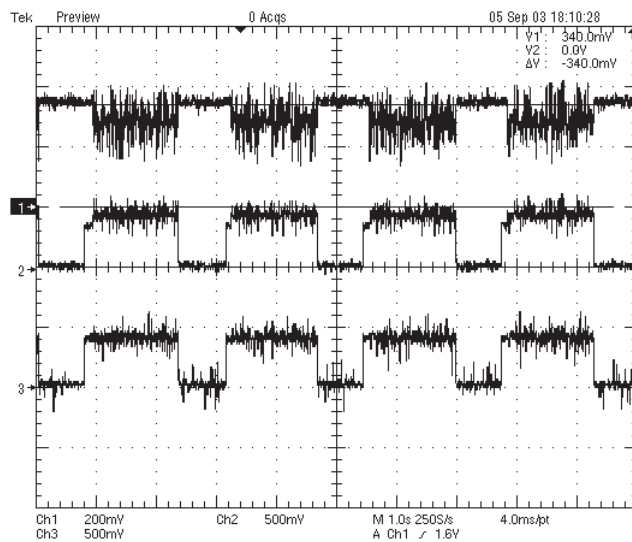
VRDC(LCN201 PIN 34)

VWDC(LCN201 PIN 36)

VWDC2(LCN102 PIN 35)

OPCTRG(LIC301 PIN 151)

35.Laser Power(Writing)_Processing



VRDC(LCN201 PIN 34)

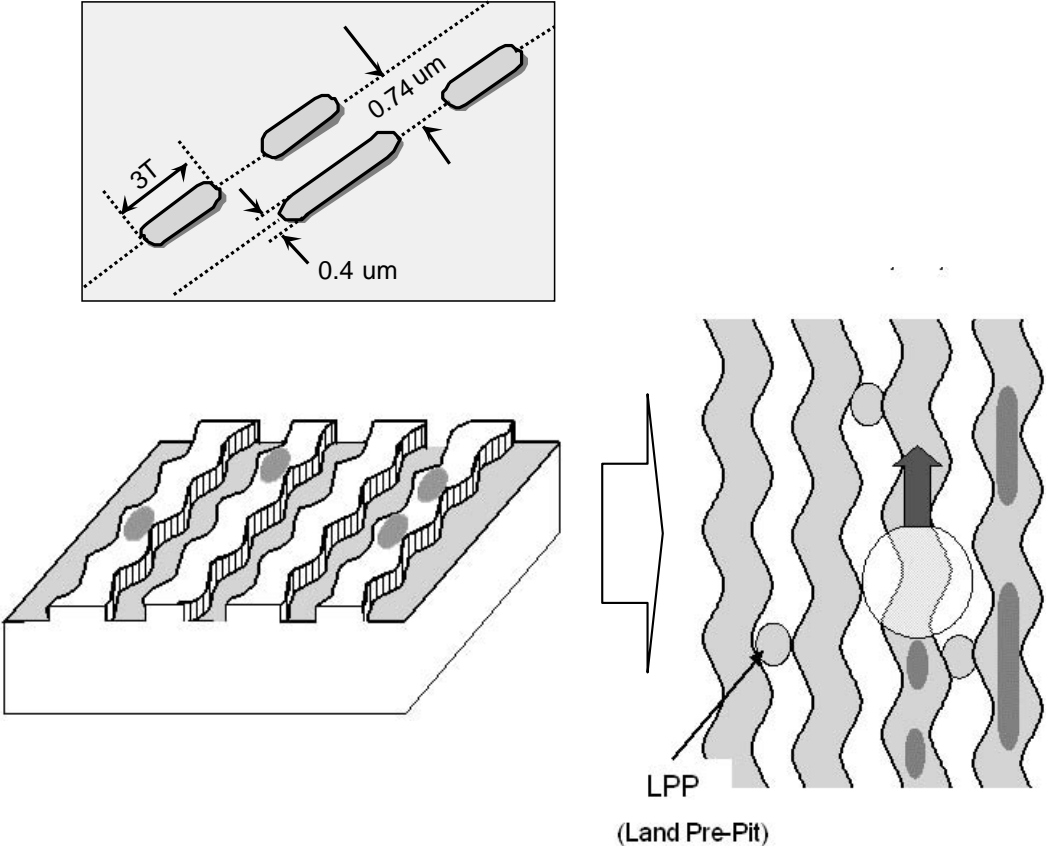
VWDC(LCN201 PIN 36)

VWDC2(LCN201 PIN 35)

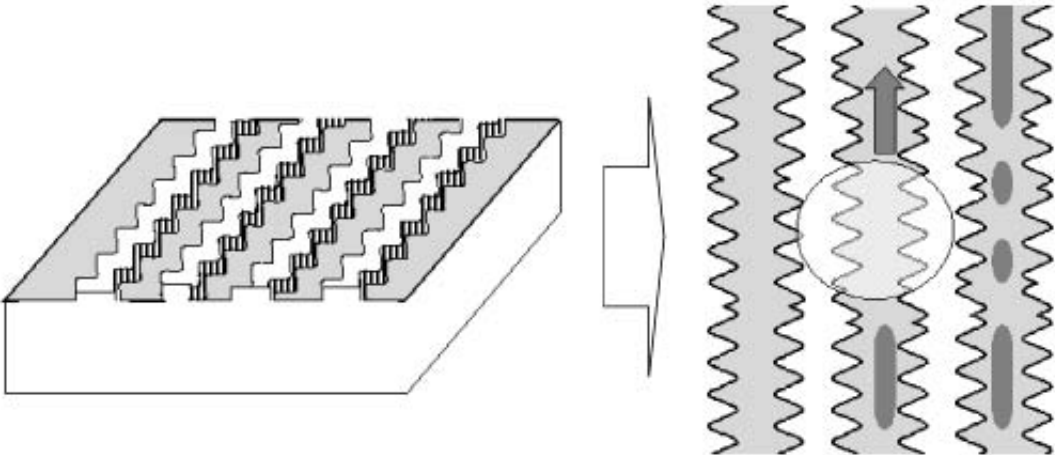
The difference of DVD-R/RW, DVD+R/RW discs and DVD-ROM

1. Recording Layer

- DVD-ROM (Read Only Disc)



- DVD+R/RW Disc

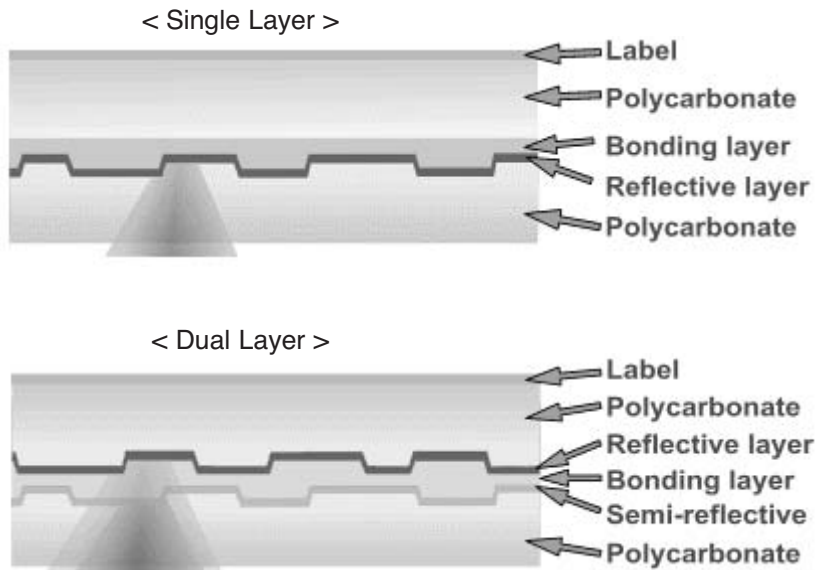


2. Disc Specification

	DVD-ROM		DVD-R	DVD-RW	DVD+R	DVD+RW
	Single-Layer	Dual-Layer				
Media Type	Read Only	Read Only	Dye	Phase change	Dye	Phase change
User data capacity	4.7GB	8.54GB	4.7GB	4.7GB	4.7GB	4.7GB
Wavelength	650nm	650nm	650nm	650nm	650nm	650nm
Reflectivity	45~85%	18~30%	45~85%	18~30%	45~85%	18~30%
Track pitch	0.74 μ m	0.74 μ m	0.74 μ m	0.74 μ m	0.74 μ m	0.74 μ m
Minimum pit length	0.4 μ m	0.4 μ m	0.4 μ m	0.4 μ m	0.4 μ m	0.4 μ m
Modulation	>0.6	>0.6	>0.6	>0.6	>0.6	>0.6
Channel bit-rate	26.16MHz	26.16MHz	26.16MHz	26.16MHz	26.16MHz	26.16MHz
Wobble Frequency	–	–	140KHz	140KHz	817.4KHz	817.4KHz
Addressing	26.16MHz	26.16MHz	Wobble & LPP	Wobble & LPP	Wobble(ADIP)	Wobble(ADIP)
Read Power (mW)					0.7 \pm 0.1	0.7 \pm 0.1
Write Power (mW)	–					
Jitter	<8%	<8%	<8%	<8%	<9%	<9%

3. Disc Materials

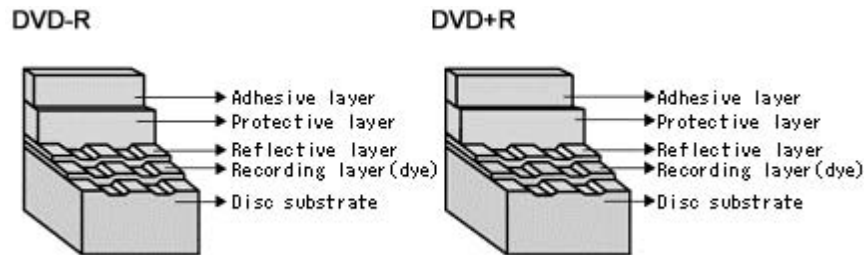
1) DVD-ROM



2) Recording format using organic dye material (DVD-R / DVD+R)

The format that records data through the creation of recorded marks by changing the organic dye material with a laser beam.

► Disc structure



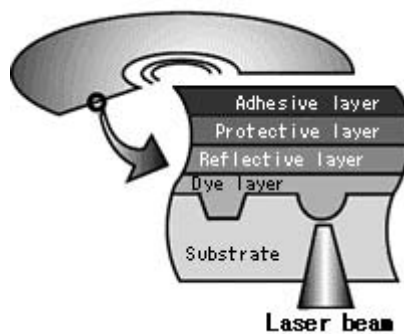
► Recording principles

[Recording]

Recording is done by changing the organic dye layer and the substrate with a laser. When a strong laser is applied to a disc, the temperature of the organic dye material goes up, the dye is decomposed and the substrate changes at the same time. At this time, a durable bit is created as is the case with a CD-ROM.

[Playback]

Signals are read with the differences of the reflection of a laser from pits.

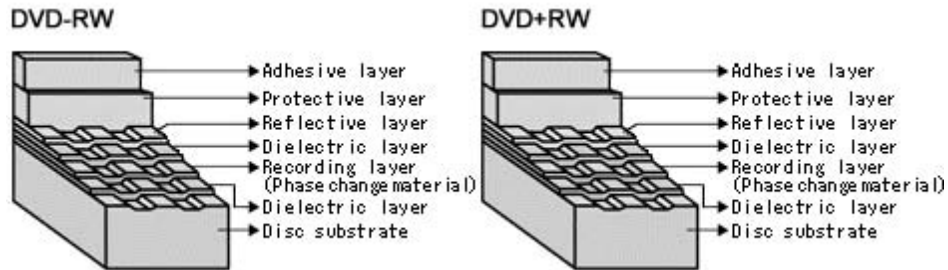


3) Recording format using phase-change recording material (DVD-RW / DVD+RW)

- Data is recorded by changing the recording layer from the amorphous status to the crystalline status, and played back by reading the difference of the reflection coefficient.

Amorphous: Non-crystalline.

► Disc structure



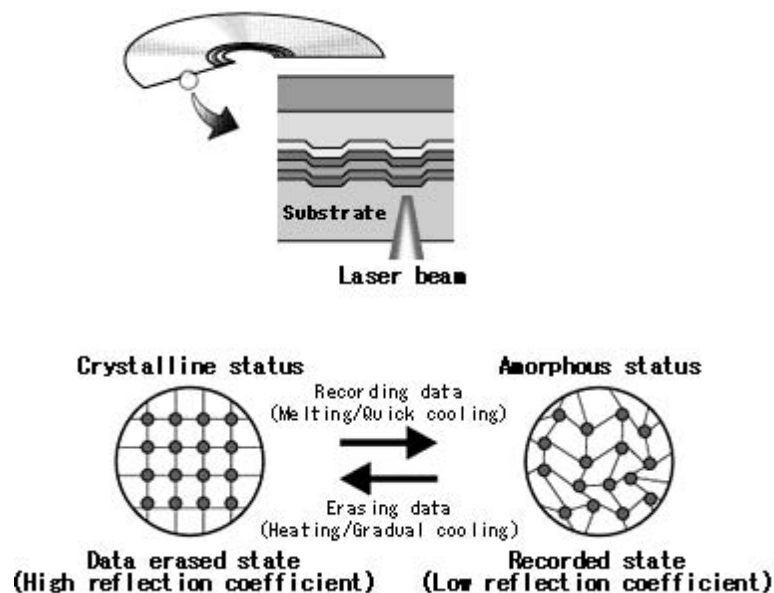
► Recording principles

[Recording]

When a high-power laser is applied to the recording material, it melts and then becomes amorphous with a low reflection coefficient when it quickly cools off. When a mid-power laser is applied to heat gradually the recording material and then gradually cools it off, it becomes crystal with a high reflection coefficient.

[Playback]

A low-power laser is used for playback. The amount of reflected light depends on the status (amorphous or crystalline) of the recording material. This is detected by an optical sensor.

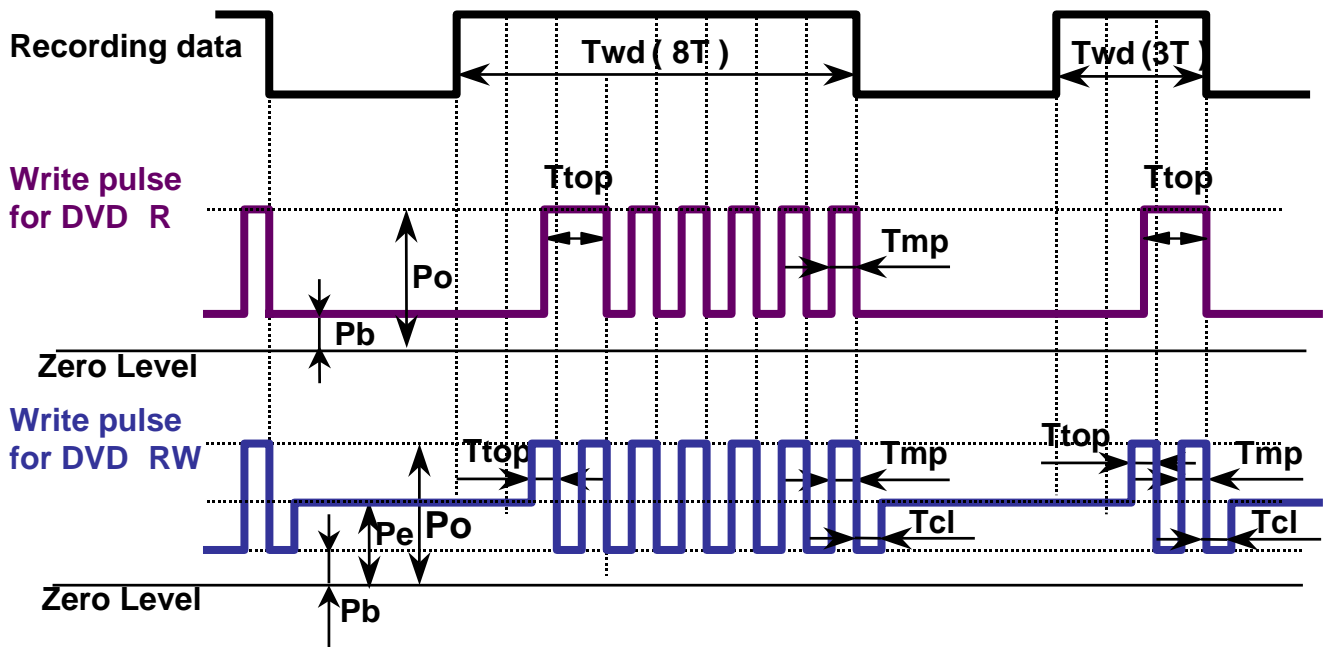


To make recordings, it is necessary to modulate the write pulse, which is called "Write Strategy".

There can be many types in Write Strategy. Typically Write Strategy for DVD \pm R has NMP(Non Multi-Pulse) type and MP(Multi-Pulse) type. In NMP type each single mark is created by subsequent separated short pulses. In MP type each single mark is created by one continuous pulse.

Write Strategy for DVD \pm RW has Type 1 and Type2. In Type 1 the mark with nT width is created by one top pulse and $(n-2)$ multi-pulses. Thus mark $3T$ is made by one top pulse and one multi-pulse. In Type 2 the mark with nT width is created by one top pulse and $(n-3)$ multi-pulses. Thus mark $3T$ is made by one top pulse only.

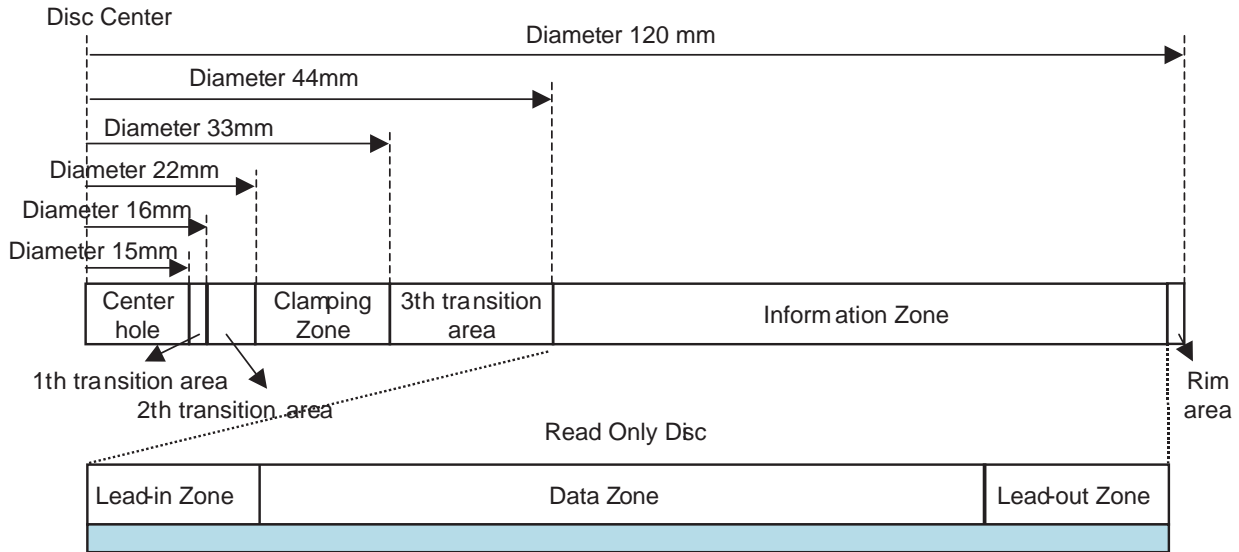
RL-02A uses MP type Write Strategy for DVD \pm R and Type 1 for DVD \pm RW as shown below.



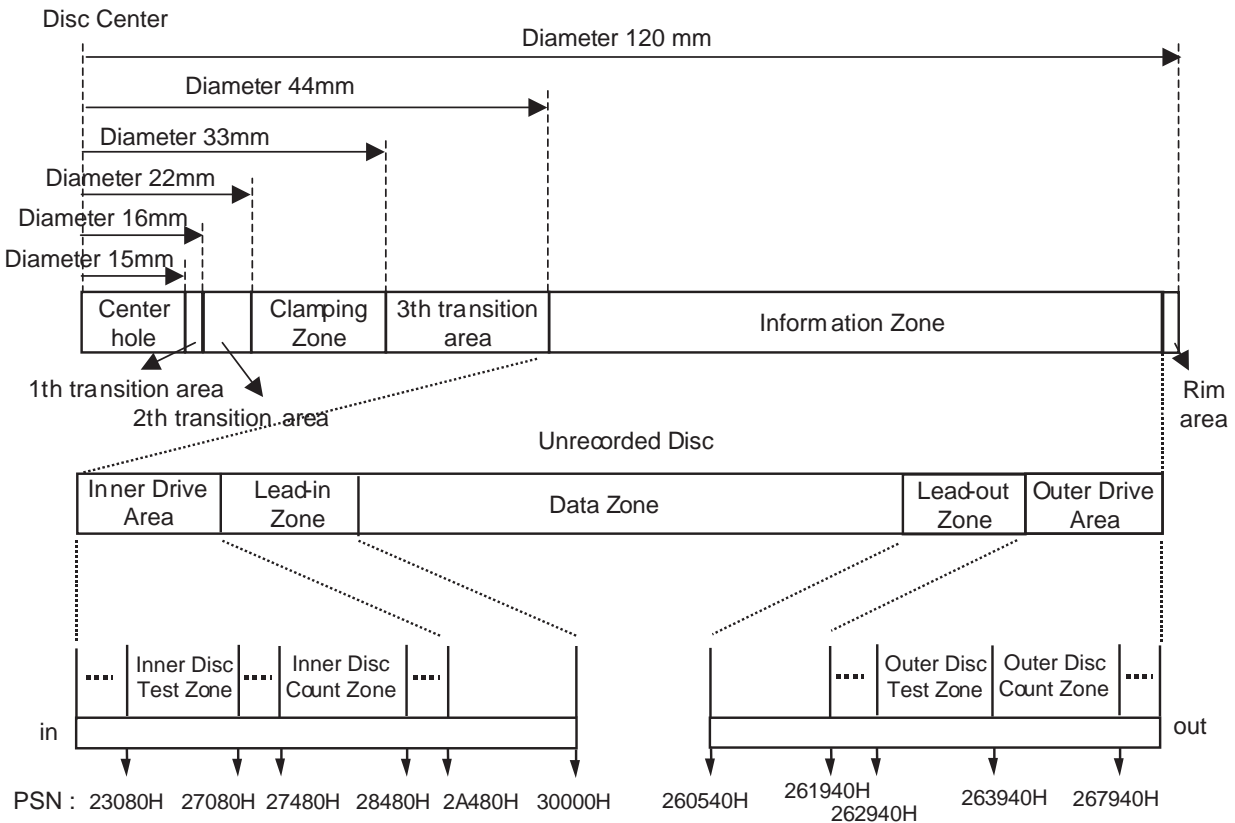
Po :Write Power (Peak Power)
 Pe :Erase Power
 Pb :Bias Power

4. Organization of the Inner Drive Area, Outer Drive Area, Lead-in Zone and Lead-out Zone

1) Layout of DVD-ROM disc



2) Layout of DVD+R disc



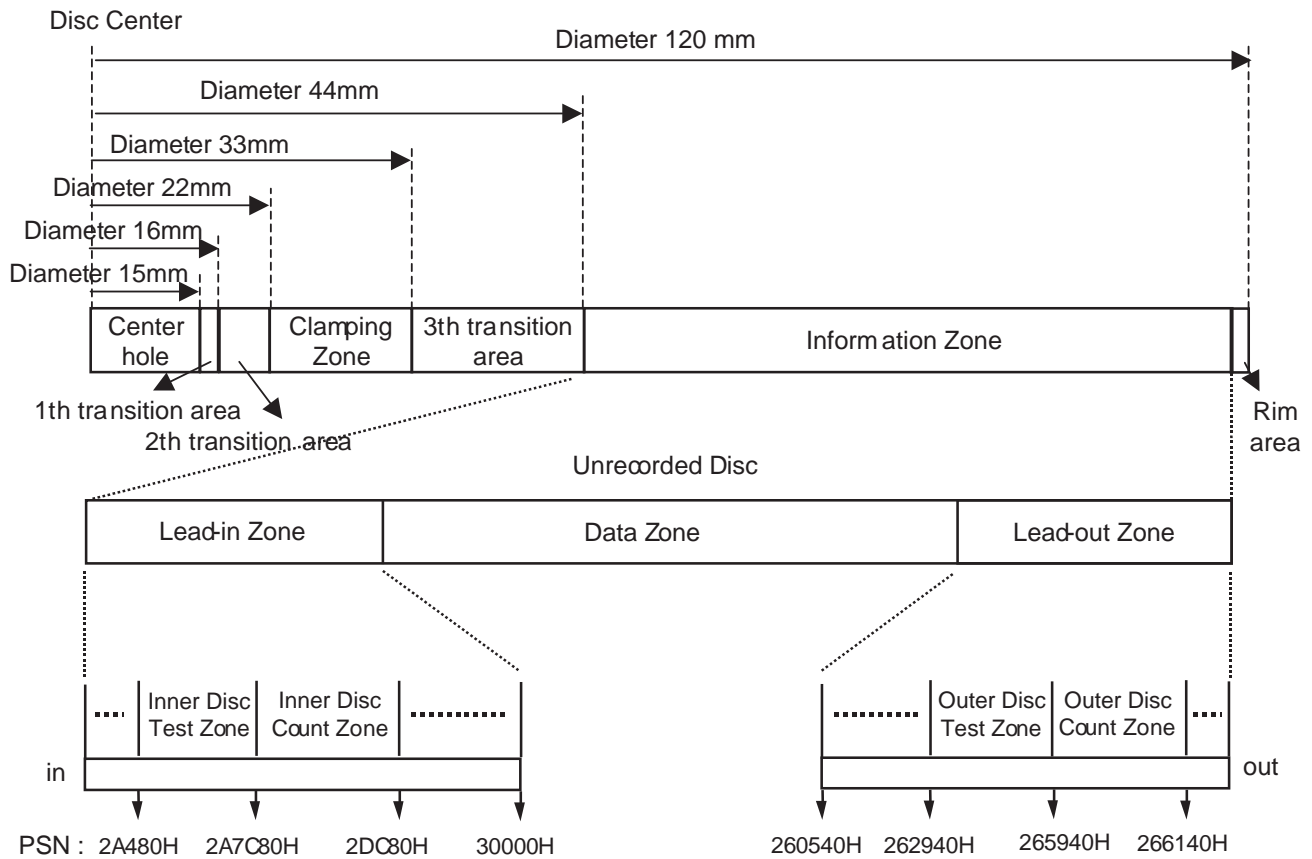
Inner Disc Test Zone : for performing OPC procedures.

Inner Disc Count Zone : For counting the number of OPC algorithm performed in IDT Zone.

Outer Disc Test Zone : for performing OPC procedures.

Outer Disc Count Zone : For counting the number of OPC algorithm performed in IDT Zone.

3) Layout of DVD+RW disc



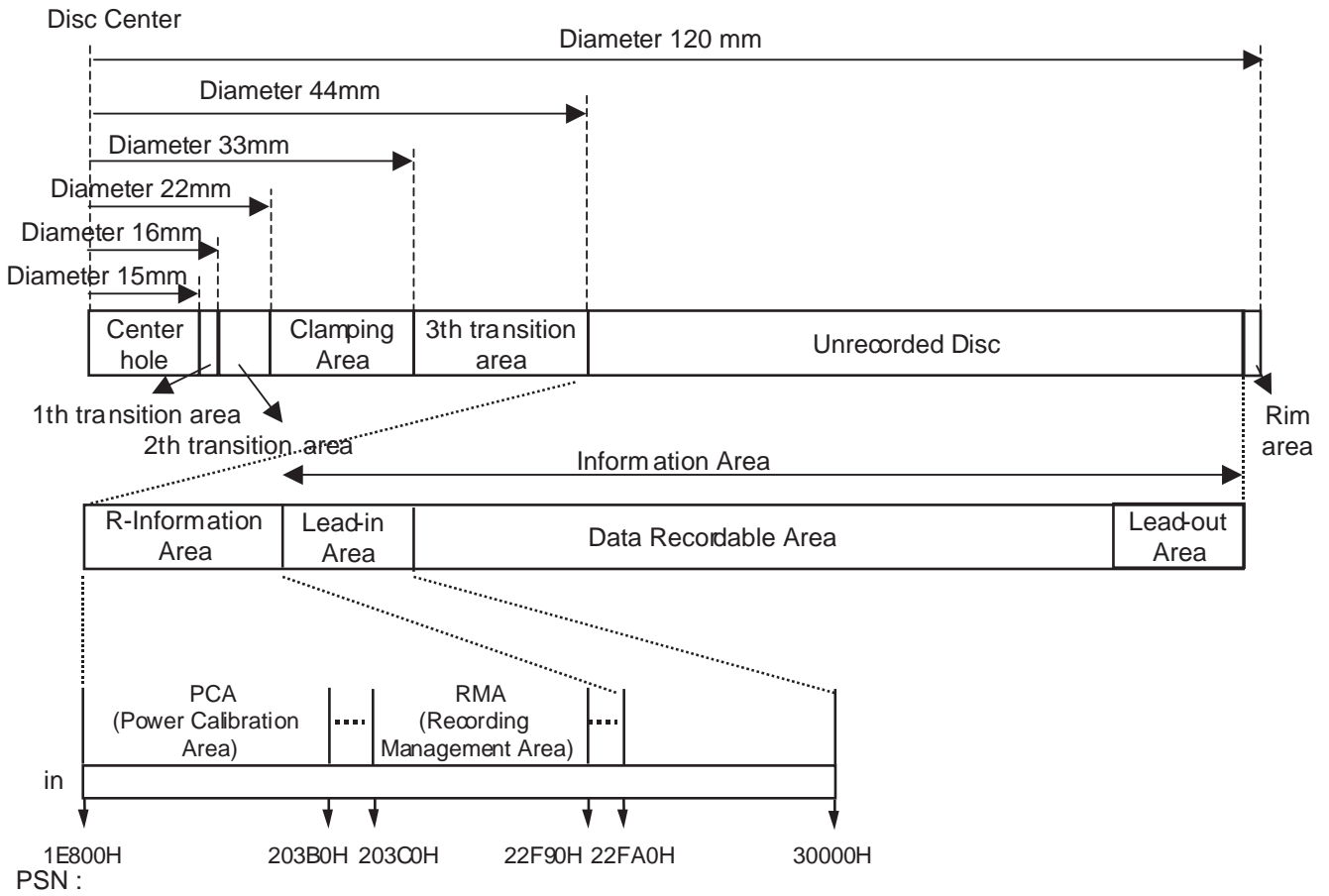
Inner Disc Test Zone : for performing OPC procedures.

Inner Disc Count Zone : For counting the number of OPC algorithm performed in IDT Zone.

Outer Disc Test Zone : for performing OPC procedures.

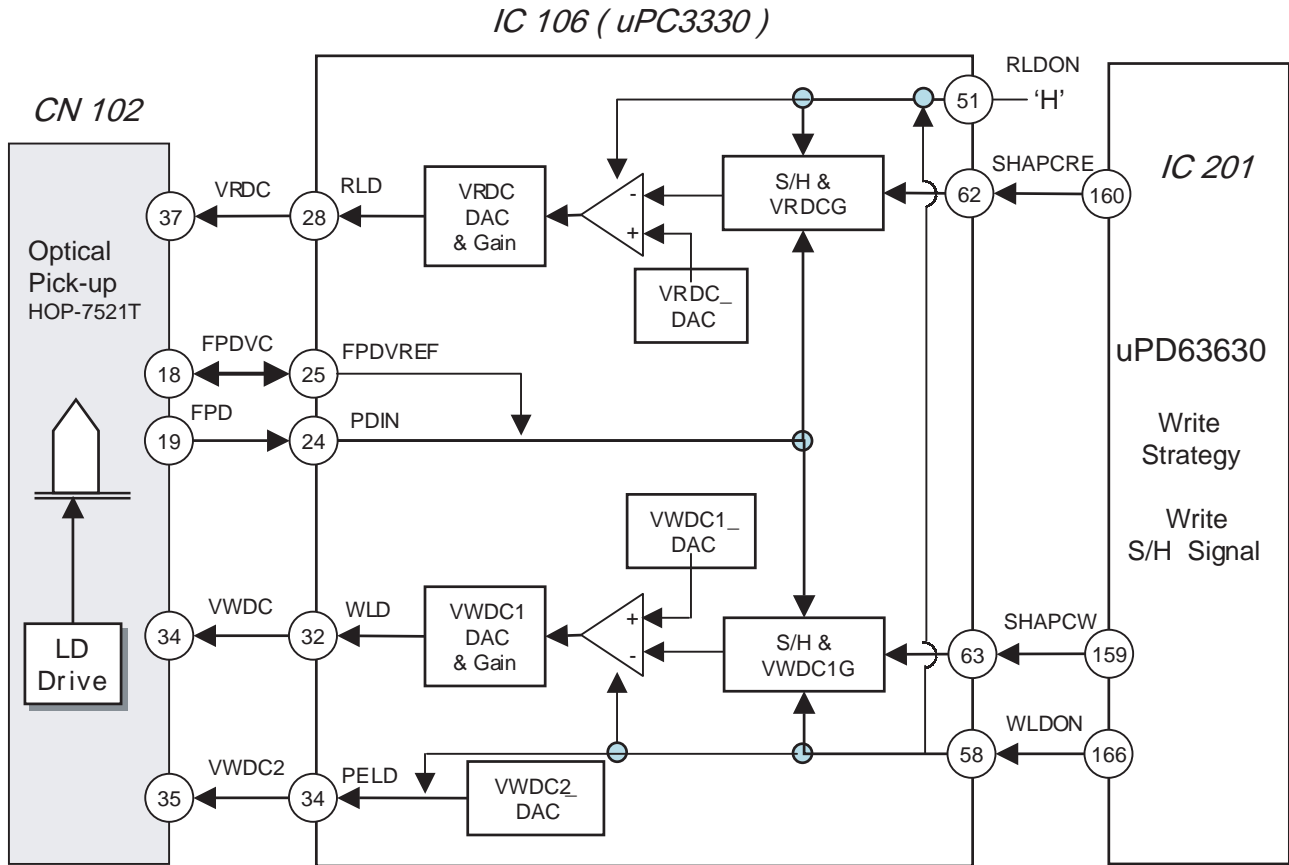
Outer Disc Count Zone : For counting the number of OPC algorithm performed in IDT Zone.

4) Layout of DVD-R/RW disc



5. ALPC(Automatic Laser Power Control) Circuit

1) Block Diagram



2) ALPC(Automatic Laser Power Control) Circuit Operation

ALPC function in CD-R/RW,DVD+R/RW analog front-end is for constant power level control purpose.

Based on the accurate power sensor(FPD) in OPU, ALPC feedback loop maintains constant power level against laser diode's temperature variation.

There are two power control loops in uPC3330, which are used with different combination for different applications. Generally, the first ALPC loop is used for read-power control. The 2nd ALPC loop is used for write(erase) power control for CD-R/RW and DVD+R/RW disc.

Owing to the small signal level in read-power control mode, the first ALPC loop amplifies the FPD signal to enhance the accuracy of read power control. The built-in 10-bit DAC(VRDC_DAC) is used to set the read power level.

Moreover, the 2nd ALPC loop is used for high power control. The built-in 10-bit DAC(VWDC1_DAC) is used to set the wanted power level.

And the register VWDC1G is employed to adjust the gain of FPD signal.

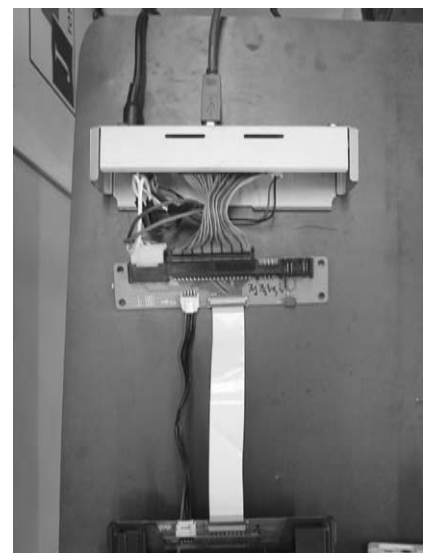
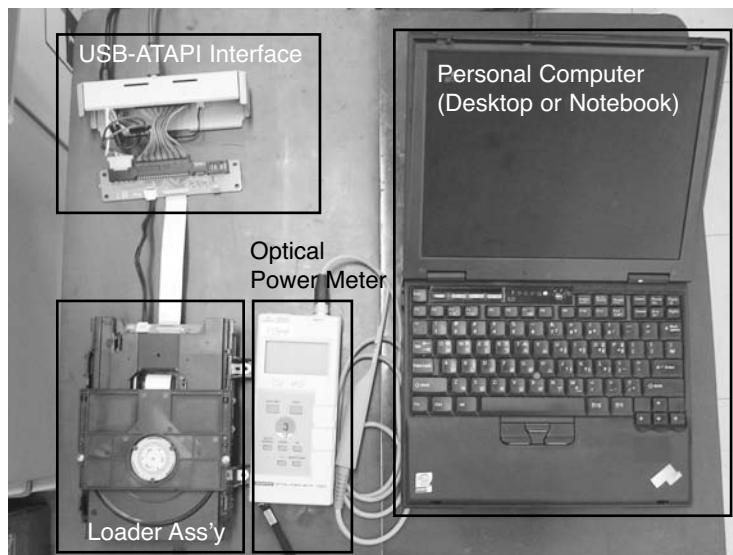
The following potentiometers(VRDC_DAC, VWDC1_DAC, and VWDC2_DAC) and amplifiers (VRDCG and VWDC1G) are used to set the wanted levels of the output pins RLD, WLD, and PELD

How to use test tool

1. ALPC Measurement System Configuration

In order to measure and adjust DVD RW optical power, The following measurement equipments are needed.

- ◆ Compulsory equipment
 - ① Optical Power meter & Sensor (ADVANTEST, TQ8210/Q82017A or equivalent)
 - ② Personal Computer (Pentium 3, 500MHz Above, , RAM:64M Above, Win98 Above)
 - ③ Adjustment Program (Dragon or ALPC) for SVC, ALPC Program recommended
- ◆ FI optional equipment
 - ① USB-ATAPI Interface (needed when using USB Port from the laptop computer without ATAPI interface or a desktop computer)
 - ② Connector-ATAPI Interface Board (Part Mo:6881R-7677A) (needed when ATAPI is not attached to Loader)



2. ALPC Program Configuration

ALPC Program consists of total 4 files.

ALPC.exe
LgBada.dll
modelnm.txt
WNASPI32.DLL

These 4 files should be located in one directory.
ALPC.exe is a program execution file.
modelnm.txt is a configuration file.

Determine how to connect

The following contents are included when you open "modelnm.txt" file.

The following contents are included when you open LGE connect=0

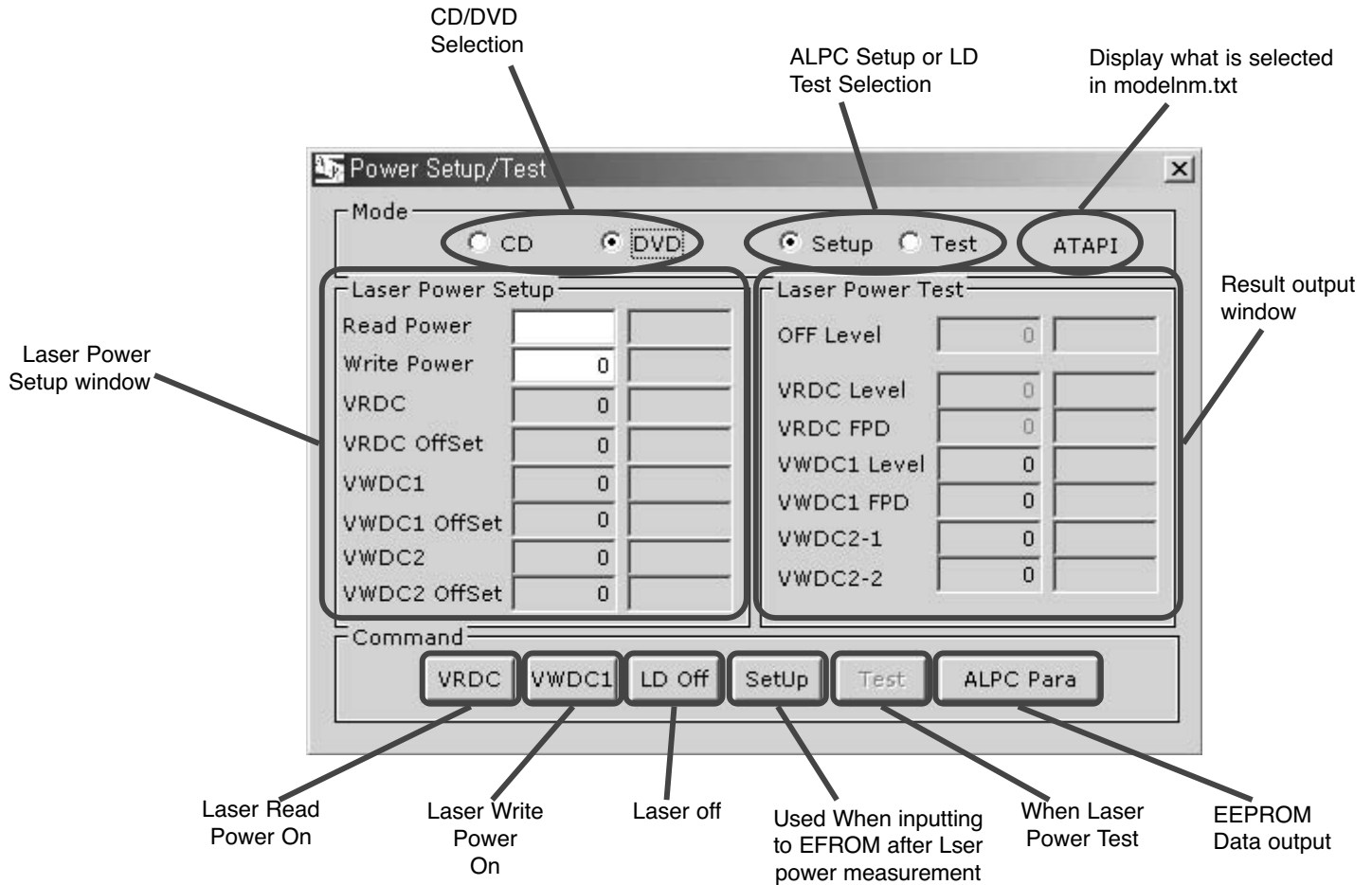
connect=0 is the item which you can determine whether you use Serial or ATAPI.

0 : ATAPI
1 : Serial

Thus, select connect=0 to use ATAPI, or select connect=1 to use Serial, then save the file.
(For SVC, ATAPI setting is recommended.)

3. Running ALPC Program

When running ALPC.exe file, the following screen appears.



4 LD Test

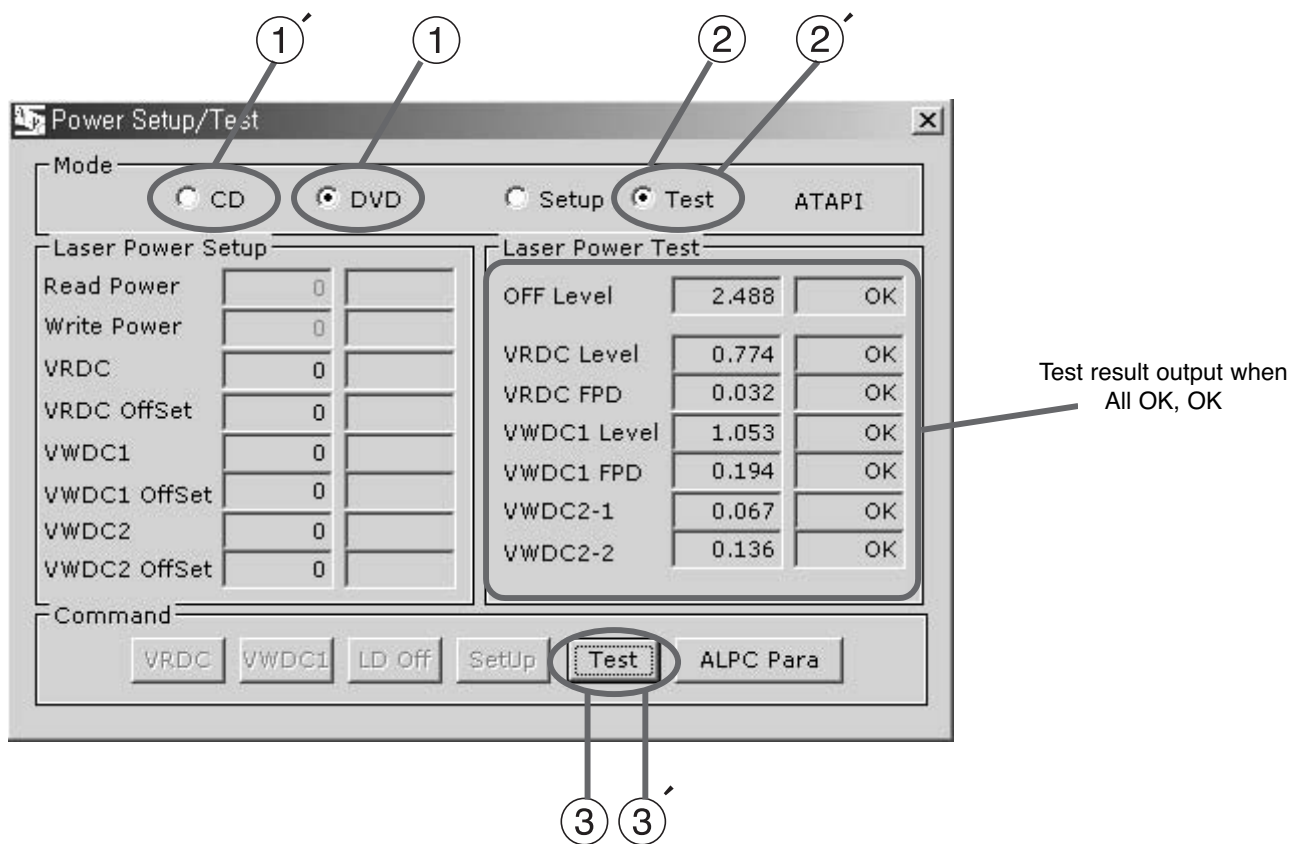
* Test DVD LD

- ① Select DVD mode
- ② Select Test mode
- ③ Click

* Test DVD CD

- ① Select CD mode
- ② Select Test mode
- ③ Click

Section	Off	VRDC	VR_FPD	VWDC1	VW_FPD	VW2-1	VW2-2
CD	2.4±0.08	0.53±0.22	0.02±0.01				
DVD	2.4±0.08	0.7±0.2	0.04±0.01	0.43±0.05	0.2±0.02	0.08±0.02	0.2±0.03



Specification can be changed according to pick-up type, circuit, program, and chipset.
 If specification is changed, program can be sent by supervisor.
 Specification above is temporary reference.

5. Optical Power Setting

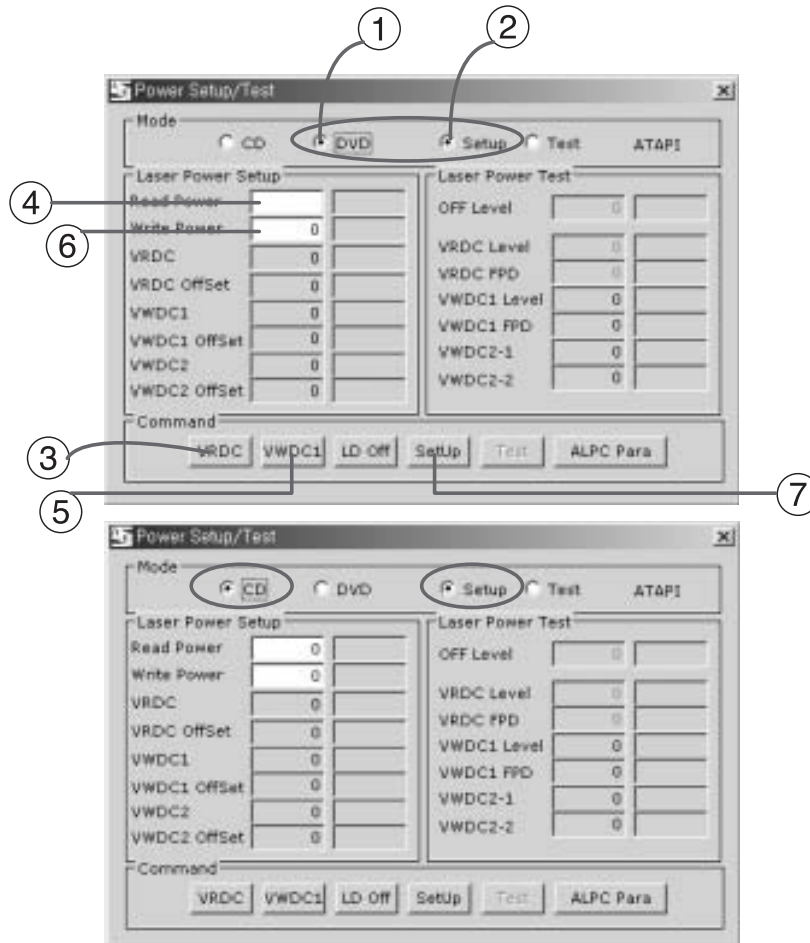
When replacing Travers ass'y including Pick-up or Loader PCB, Optical Power Setting should be performed for Pick-up and Loading PCB's matching.

① DVD LD optical Power Setting

- Select DVD and Setup mode
- Push **VRDC**. (Read Power On. Strong Red light can be seen from pick up optical lens.)
- Measure optical power.
- Write measurement value in Read Power.
- Push **VWDC1**. (Write power On.) (Caution) Light is very strong. Never look at the light directly.
- Measure optical power
- Write measurement value in Read Power and push LD off **LD OFF**.
- Push **Setup**. (Measurement value is inputted to EEPROM)

② DVD LD optical Power Setting

- Select CD and Setup mode
- Push **VRDC**. (Read Power On. Weak Red light can be seen from pick up optical lens.)
- Measure optical power.
- Write measurement value in Read Power.
- Push **VWDC1**. (Write power On. Weak Red light can be seen.)
- Measure optical power and push LD off **LD OFF**.
- Write measurement value in Read Power.
- Push **Setup**. (Measurement value is inputted to EEPROM)



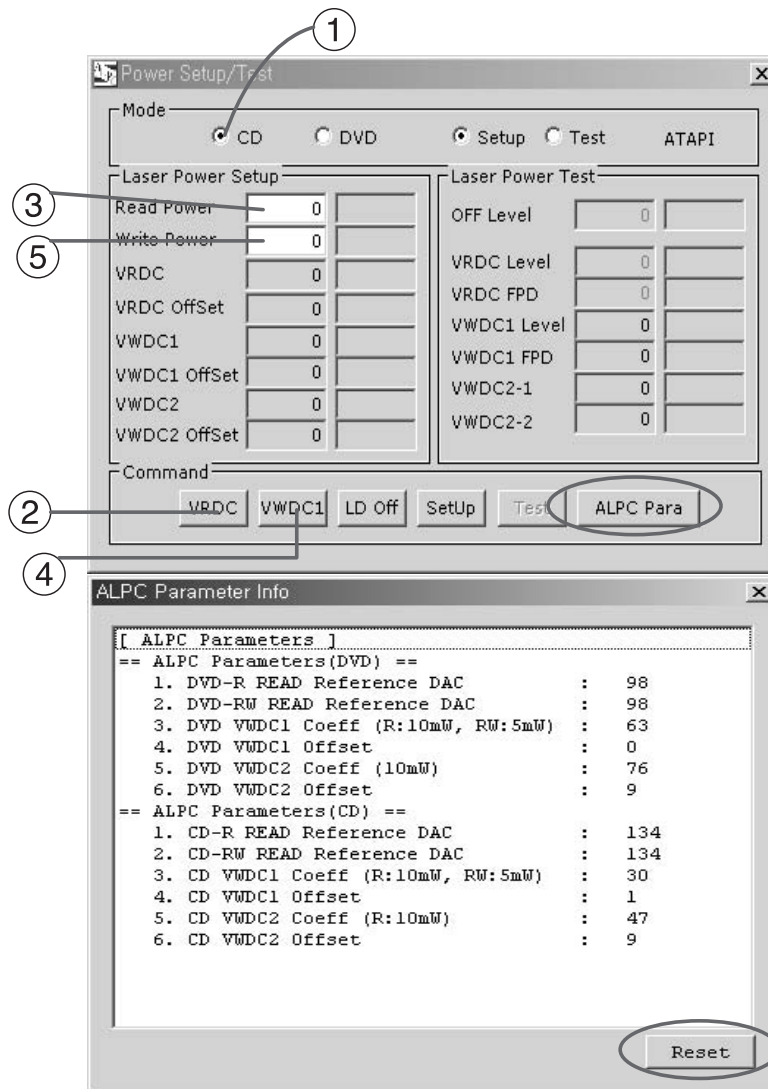
6. Optical Power Setting Parameter Check

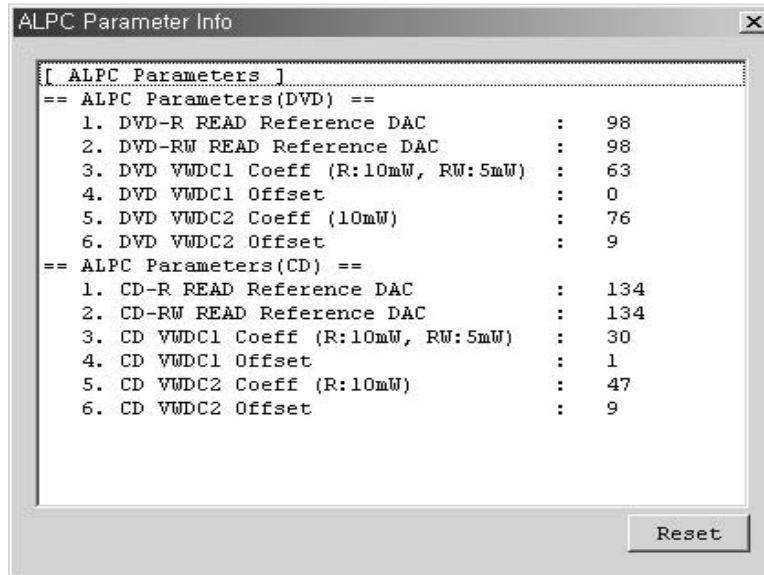
Use when defective happens even though LD test result is normal.

When defective can be found but power test result is OK, You need to check current settings whether they are proper or not. In this case, Pressing **ALPC Para** will display ALPC Parameter Info window and show current optical power settings recorded in EEPROM(IC302).

Write down these settings on the paper, perform optical power setting and press **ALPC Para** again, then new optical power settings will appear. Compare these two parameters. If there is a big difference, optical power setting may have been wrong at first or pick-up optical output may have been changed. If pick-up is normal, problem can be solved by resetting optical power without replacing pick-up.

In order to remove previous ALPC Parameter from ALPC Parameter Info, press **Reset** at the bottom of ALPC Parameter Info window.





[VALID ALPC Parameters]

<CD>

- 1) CD-R READ Reference DAC : 70 ~ 100
- 2) CD-RW READ Reference DAC : 70 ~ 100

<DVD>

- 1) DVD-R READ Reference DAC : 42 ~ 107
- 2) DVD-RW READ Reference DAC : 42 ~ 107
- 3) VWDC1 : 35 ~ 65
- 4) VWDC1 Offset : 0 ~ 6
- 5) VWDC2 : 20 ~ 43
- 6) VWDC2 Offset : 0 ~ 10

Appendix. How to measure optical power

Optical power measurement is measuring actual optical power coming out from an object lens with LD turned on. thus, In order to measure optical power, LD should be turned on and environment need to be dark enough.

If necessary, Cover the top side of the sensor with black paper or hand when measuring.

Generally, fluorescent light is about $50 \mu\text{W}$, sun light is about 100 mW . so, If this is ignored, optical power setting may not be set correctly.

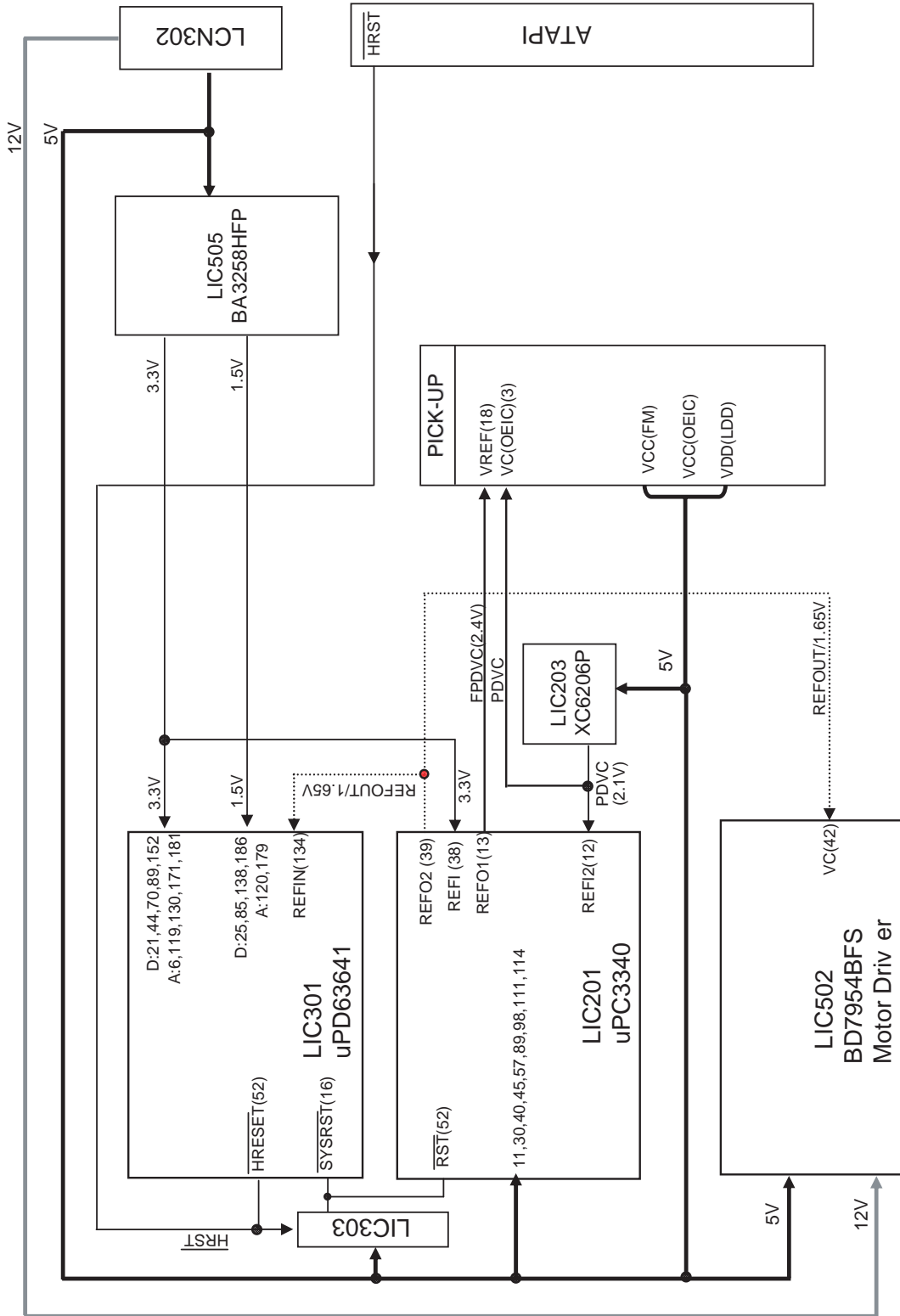
Optical power measurement procedure

1. Adjust optical power meter's λ (wave length) to DVD. (Generally 660 nm)
2. Turn DVD LD on.
3. Place sensor less than 3mm apart from pick-up object lens, perpendicular to lens.
Adjust position so that the center of object lens match to \square mark on the sensor.
4. Read monitor's value. (Read Maximum value as moving position slightly)
(Check working unit. Unit should be mW . When LD is dead, μW or nW unit may not be read correctly.)
5. Multiply monitor's value by 100, round off to the nearest integer, then write constant part.
6. Adjust optical power meter's λ (wave length) to CD. (Generally 780 nm)
7. Turn CD LD on.
8. Repeat step 3~5 above.

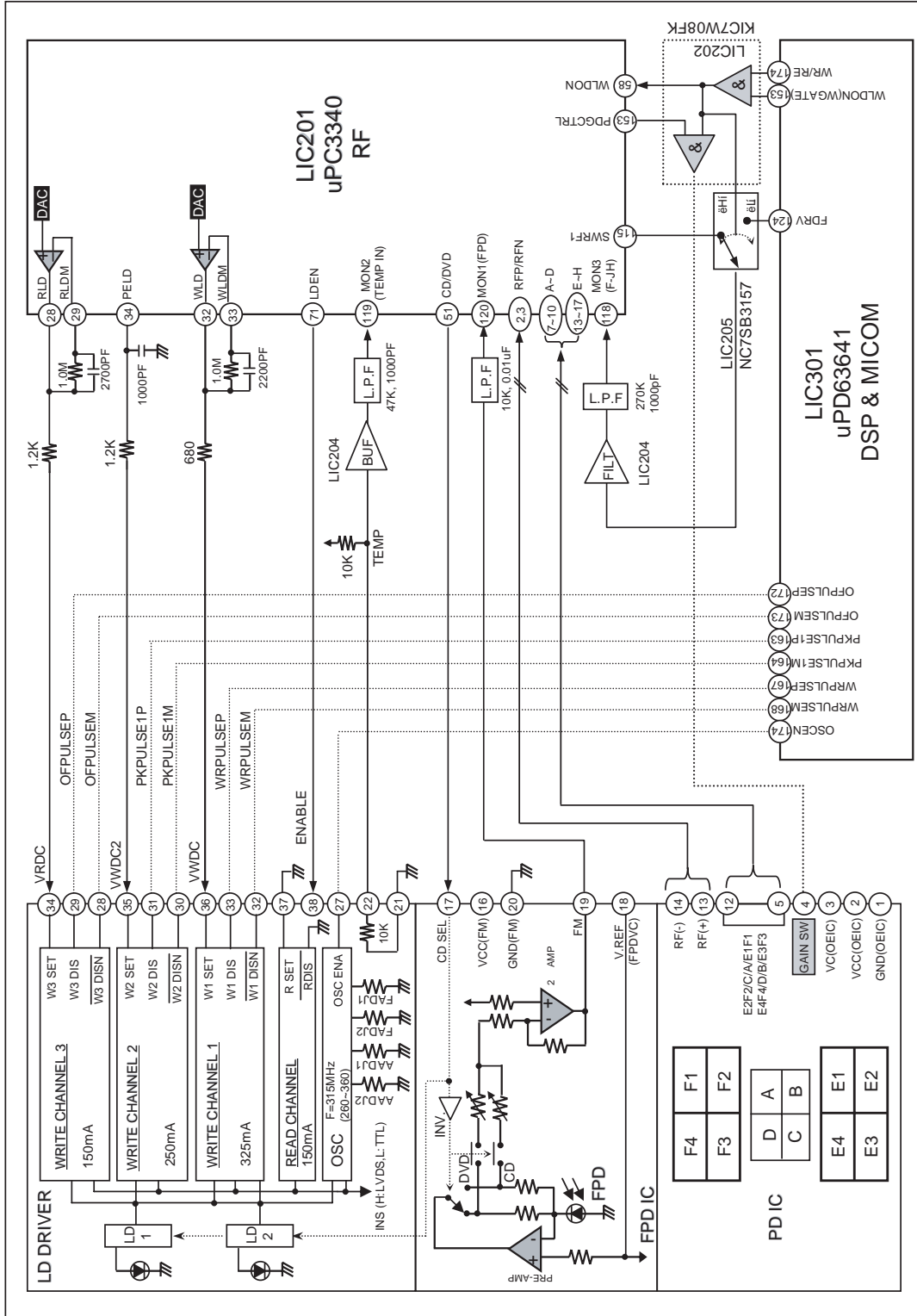


BLOCK DIAGRAMS

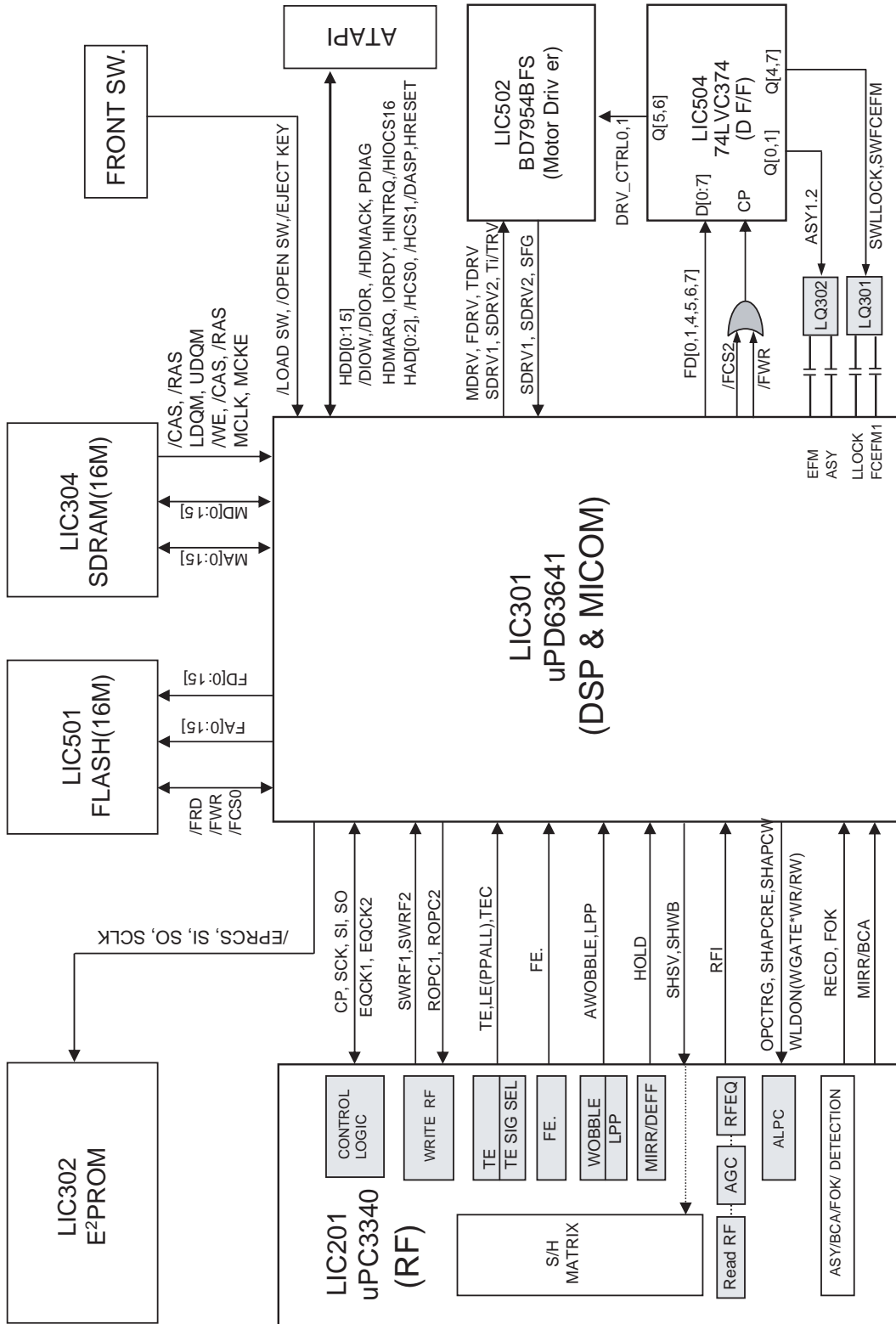
1. OVERALL BLOCK DIAGRAM



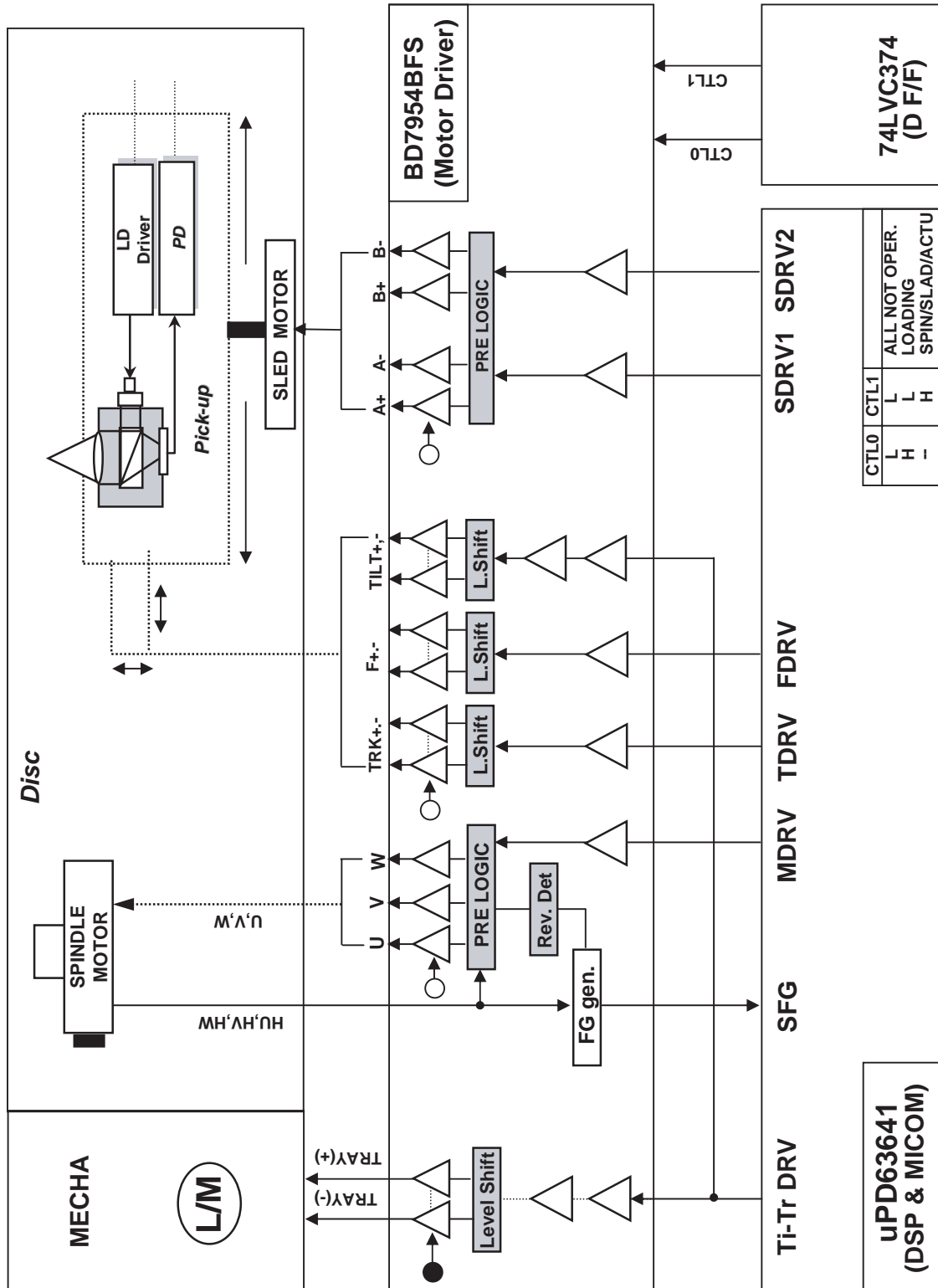
2. DSP BLOCK DIAGRAM



3. μ -COM BLOCK DIAGRAM

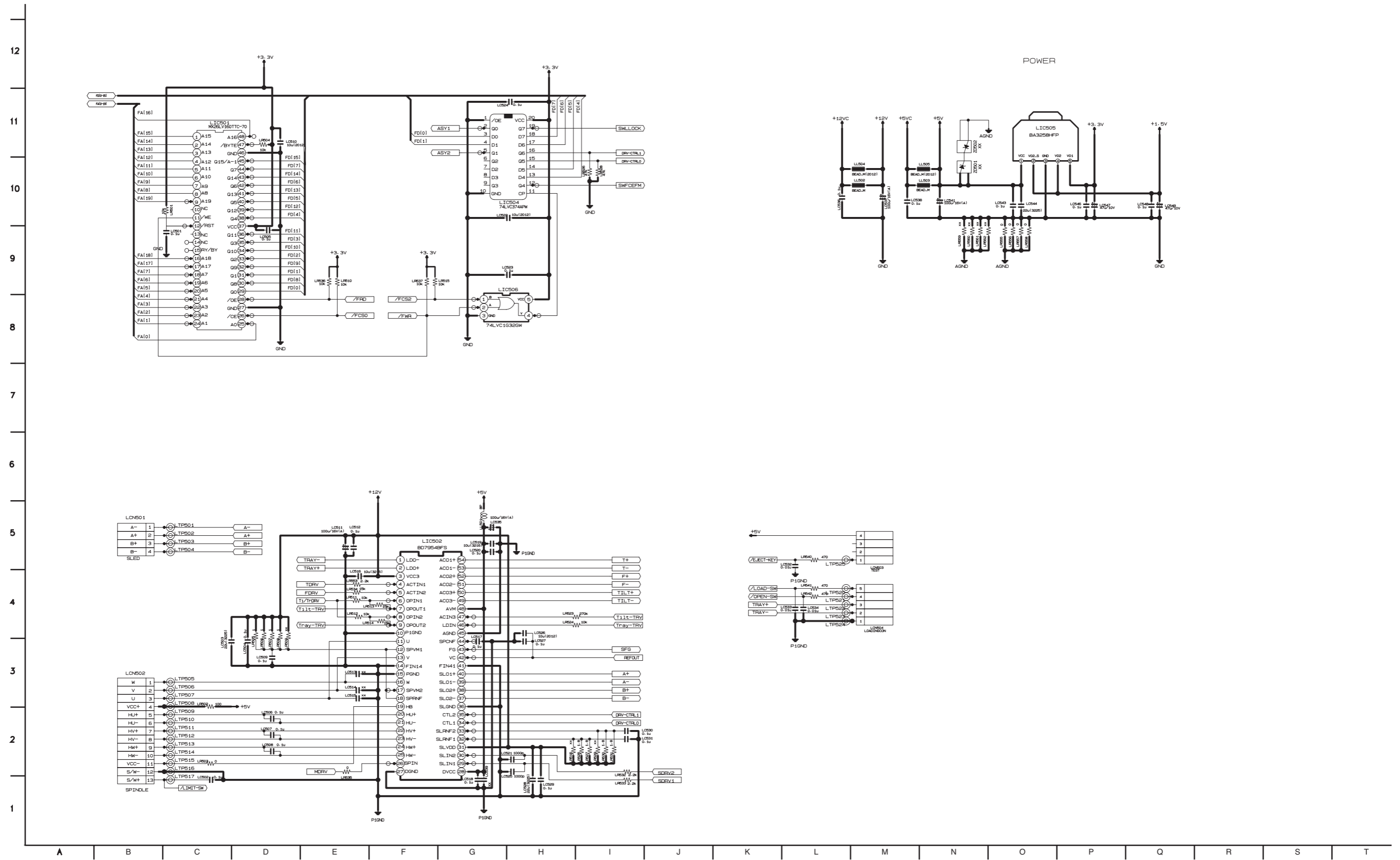


4. RF BLOCK DIAGRAM

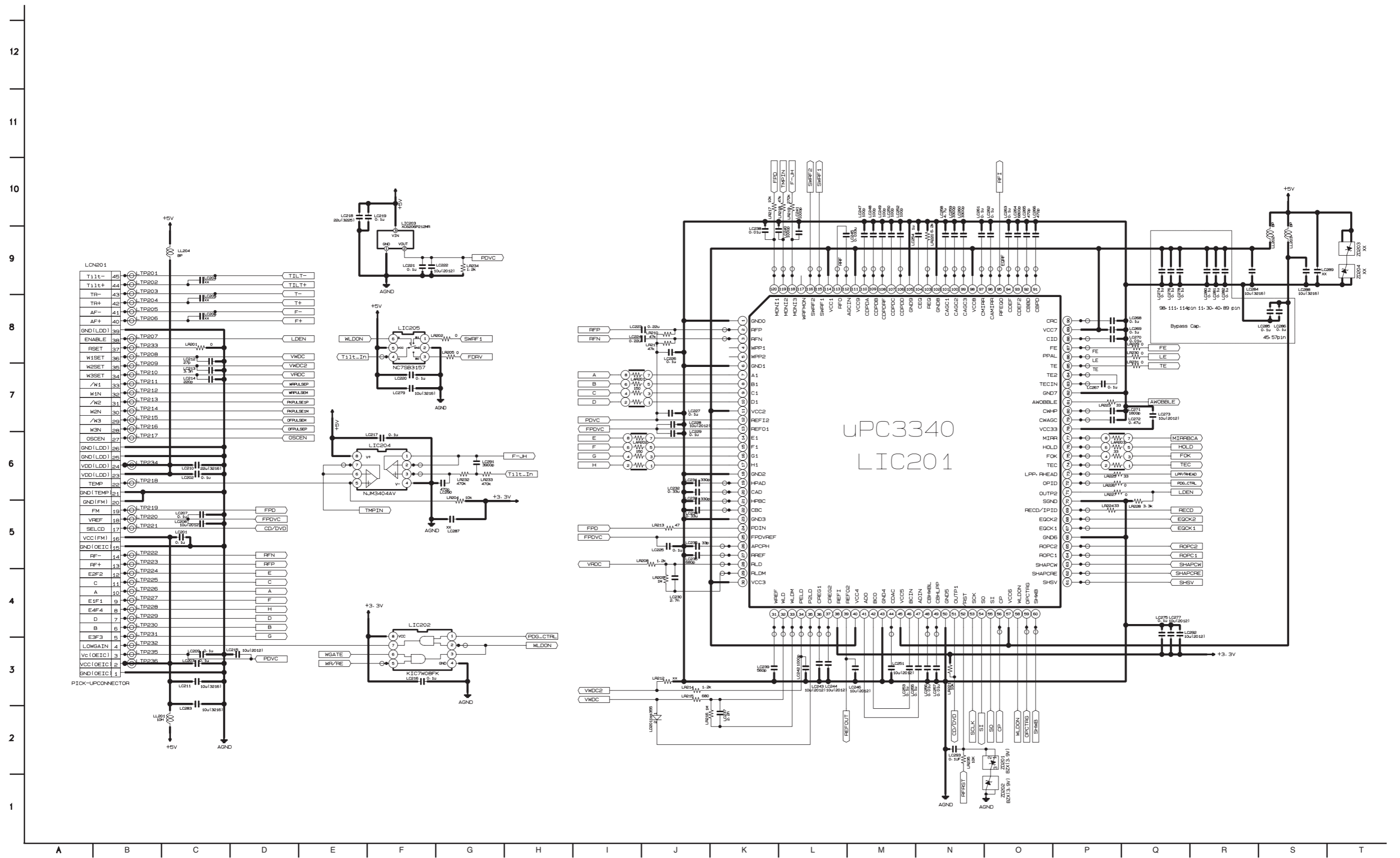


CIRCUIT DIAGRAMS

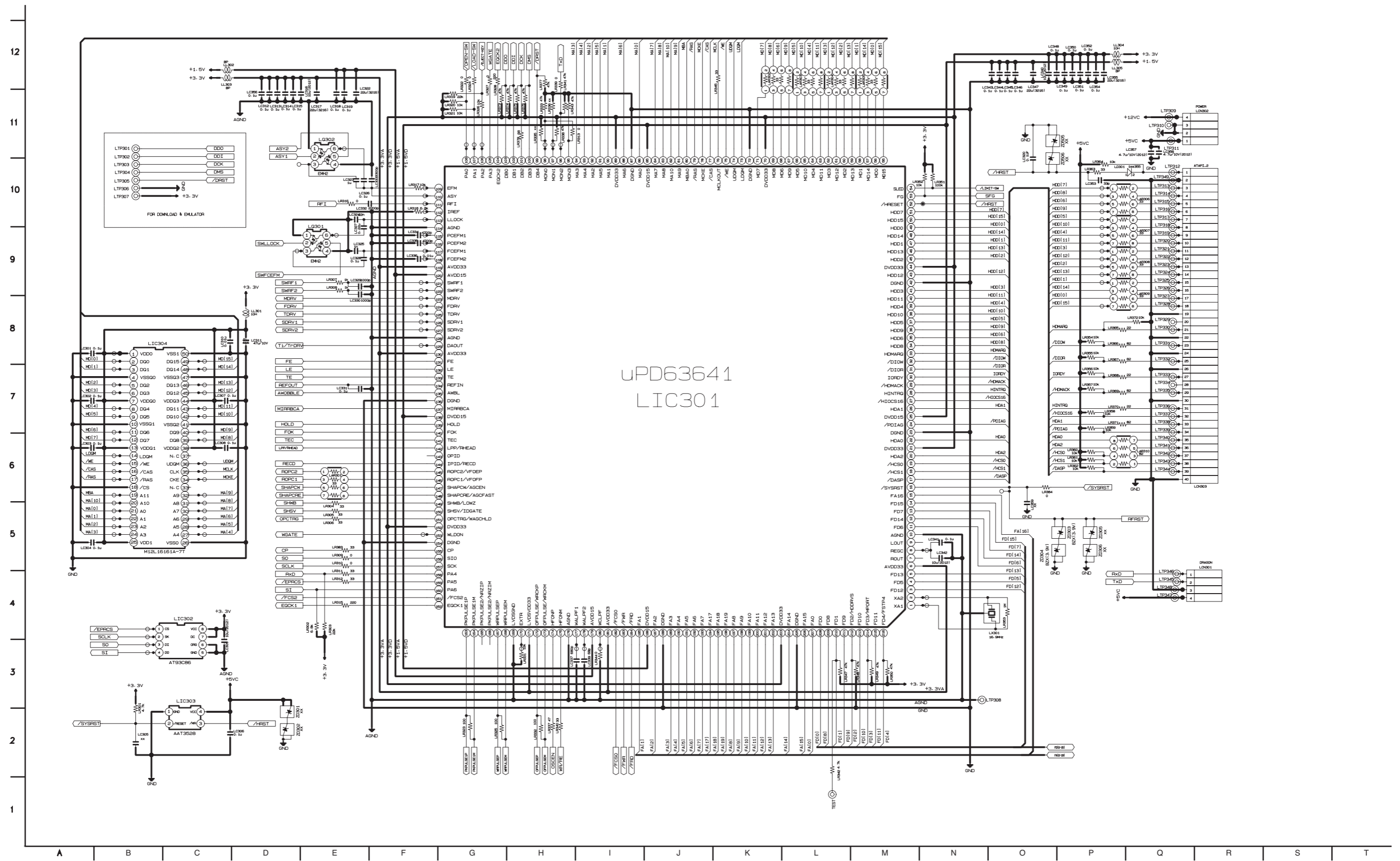
1. RF CIRCUIT DIAGRAM



2. DSP CIRCUIT DIAGRAM

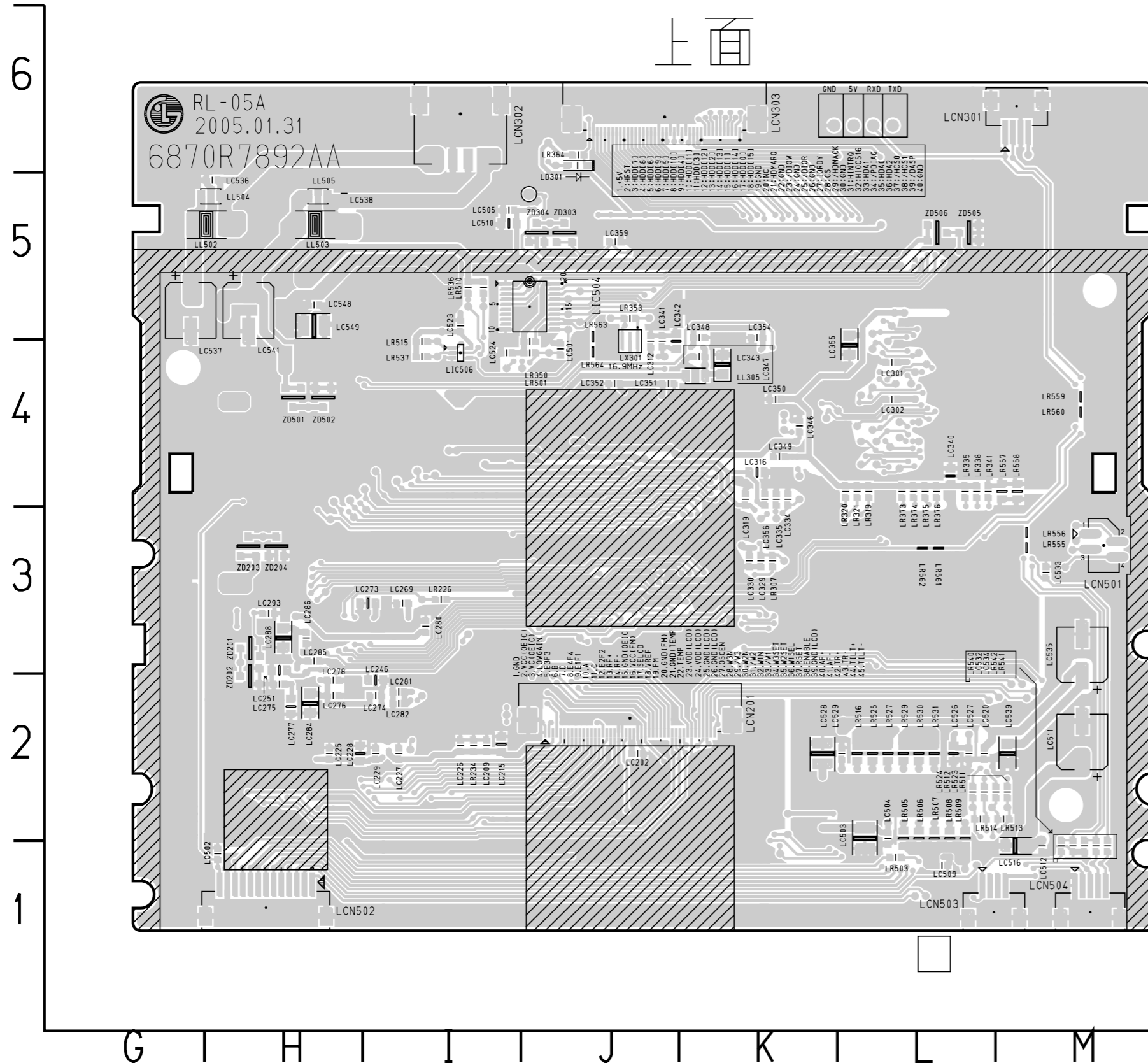


3. μ -COM CIRCUIT DIAGRAM



PRINTED CIRCUIT DIAGRAMS

1. MAIN P.C.BOARD



LOCATION GUIDE

LC202	J2	LC343	K4	LC541	H5	LICT318L4	LICT559L2	LR513	M2	
LC209	I2	LC346	K4	LC548	H5	LICT319L4	LICT561L2	LR514	L2	
LC215	I2	LC347	K4	LC549	H5	LICT321L4	LICT563L2	LR515	I4	
LC225	H2	LC348	K5	LCN201	J2	LICT324L4	LICT566I4	LR516	L2	
LC226	I2	LC349	K4	LCN301	M6	LICT325L4	LICT567I4	LR523	M2	
LC227	I2	LC350	K4	LCN302	I6	LICT328L4	LICT568J5	LR524	L2	
LC228	H2	LC351	J4	LCN303	J6	LICT329L4	LL305	K4	LR525	L2
LC229	I2	LC352	J4	LCN501	M3	LICT330K4	LL502	H5	LR527	L2
LC246	I2	LC354	K5	LCN502	H1	LICT331K4	LL503	H5	LR529	L2
LC251	H3	LC355	L4	LCN503	L1	LICT332L4	LL504	H5	LR530	L2
LC269	I3	LC356	K4	LCN504	M1	LICT333L4	LL505	H5	LR531	L2
LC273	I3	LC359	J5	LD301	J6	LICT335K4	LR226	I3	LR536	I5
LC274	I2	LC501	J4	LIC504	J5	LICT336L4	LR234	I2	LR537	I4
LC275	H2	LC502	H1	LIC506	I4	LICT337K1	LR307	K3	LR540	M1
LC276	H2	LC503	L2	LICT202J3		LICT339K2	LR319	L4	LR541	M1
LC277	H2	LC504	L2	LICT203I2		LICT353K3	LR320	L4	LR542	M1
LC278	H2	LC505	I5	LICT211 I2		LICT354K3	LR321	L4	LR555	M3
LC280	I3	LC509	L1	LICT238H3		LICT361K4	LR335	L4	LR556	M3
LC281	I2	LC510	I5	LICT247I3		LICT362K3	LR338	L4	LR557	M4
LC282	I2	LC511	M2	LICT265I3		LICT364K3	LR341	L4	LR558	M4
LC284	H2	LC512	M1	LICT277H3		LICT370J4	LR350	J4	LR559	M4
LC285	H3	LC516	M1	LICT301L4		LICT374J5	LR353	J5	LR560	M4
LC286	H3	LC520	L2	LICT302L5		LICT378J5	LR364	J6	LR561	L3
LC288	H3	LC523	I5	LICT303L5		LICT383J5	LR373	L4	LR562	L3
LC293	H3	LC524	I4	LICT304L4		LICT501J4	LR374	L4	LR563	J5
LC301	L4	LC526	L2	LICT305L4		LICT502I4	LR375	L4	LR564	J4
LC302	L4	LC527	L2	LICT306L4		LICT505L1	LR376	L4	LX301	J4
LC312	J4	LC528	K2	LICT307L4		LICT516L2	LR501	J4	ZD201	H3
LC316	K4	LC529	L2	LICT308L4		LICT517L2	LR503	L1	ZD202	H2
LC319	K4	LC532	M1	LICT309L4		LICT526J4	LR505	L2	ZD203	H3
LC329	K3	LC533	M3	LICT310L4		LICT539J5	LR506	L2	ZD204	H3
LC330	K3	LC534	M1	LICT311K4		LICT541J5	LR507	L2	ZD303	J5
LC334	K4	LC535	M3	LICT312L4		LICT543J5	LR508	L2	ZD304	J5
LC335	K4	LC536	H5	LICT313L4		LICT545J5	LR509	L2	ZD501	H4
LC340	L4	LC537	G5	LICT314L4		LICT554I5	LR510	I5	ZD502	H4
LC341	J4	LC538	H5	LICT315L4		LICT555I5	LR511	M2	ZD505	L5
LC342	J4	LC539	M2	LICT316L4		LICT558M2	LR512	L2	ZD506	L5

