

HD970 / HD970B CD Player

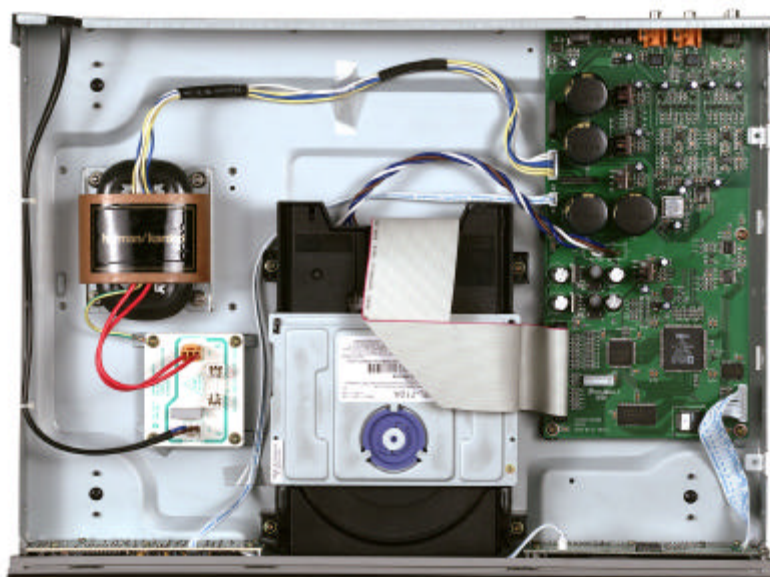
SERVICE MANUAL



harman/kardon®

Power for the Digital Revolution™

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Technical Specifications

Signal Format

Sampling Frequency	44.1kHz
D/A Conversion Oversampling	Multi-Level Delta-Sigma 8 Times (Digital Filter)

Discrete Analog Output Section

Error Correction	CIRC System
Frequency Response	20 Hz – 20 kHz +0/-1dB
Total Harmonic Distortion (THD)	<0.006% @1kHz
Dynamic Range	96 dB
Signal-to-Noise Ratio	98 dBA
Channel Separation	90 dB
Line-Output Level	1.0 V, 2.0 V with HDCD

General

Power Requirement	230V/50 Hz
Power Consumption	<10 Watts (On)
Dimensions	
Height	110mm (5.1")
Width	440mm (17.3")
Depth	325mm (15.2")
Weight	4.4 kg

Depth measurement includes knobs, buttons and connection jacks.
Height measurement includes feet and chassis.
All features and specifications are subject to change without notice.

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HD970

June 05

To: harman/kardon Service Centers

Models: HD970/230

Subject: FIRMWARE DOWNLOAD

Item needed: CD-R disc, writer program/CD-R writer and two files include a txt file and a BIN file
The BIN file contains the servo firmware and the txt help the unit to download the software.

1. Please add all the files to a blank CD-R as CD-ROM Mode 1 format.(standard)
Caution: If you make CD-R download disc as CD-ROM XA mode, new firmware will not be downloaded.
2. When your adding files to the blank CD-R, please do not change the file's name.
3. When you are ready to make a CD-R download disc, you should make CD-R session closed. That is, CD-R download disc must be a single session disc (finalized). Always write the CD-R in lowest speed possible.
4. Power HD970 on and make sure the unit is 100% functional before start any upgrade.
5. Eject the tray by OPEN /CLOSE and insert the CD-R
6. Close the tray with OPEN/CLOSE or pushing tray manually.
7. Wait until tray open itself. The display will show the status of the download.
8. Remove the disc.
9. Unplug the power cord
10. Plug the power cord, power HD970 on and ensure the units are working.
11. Upgrade done.

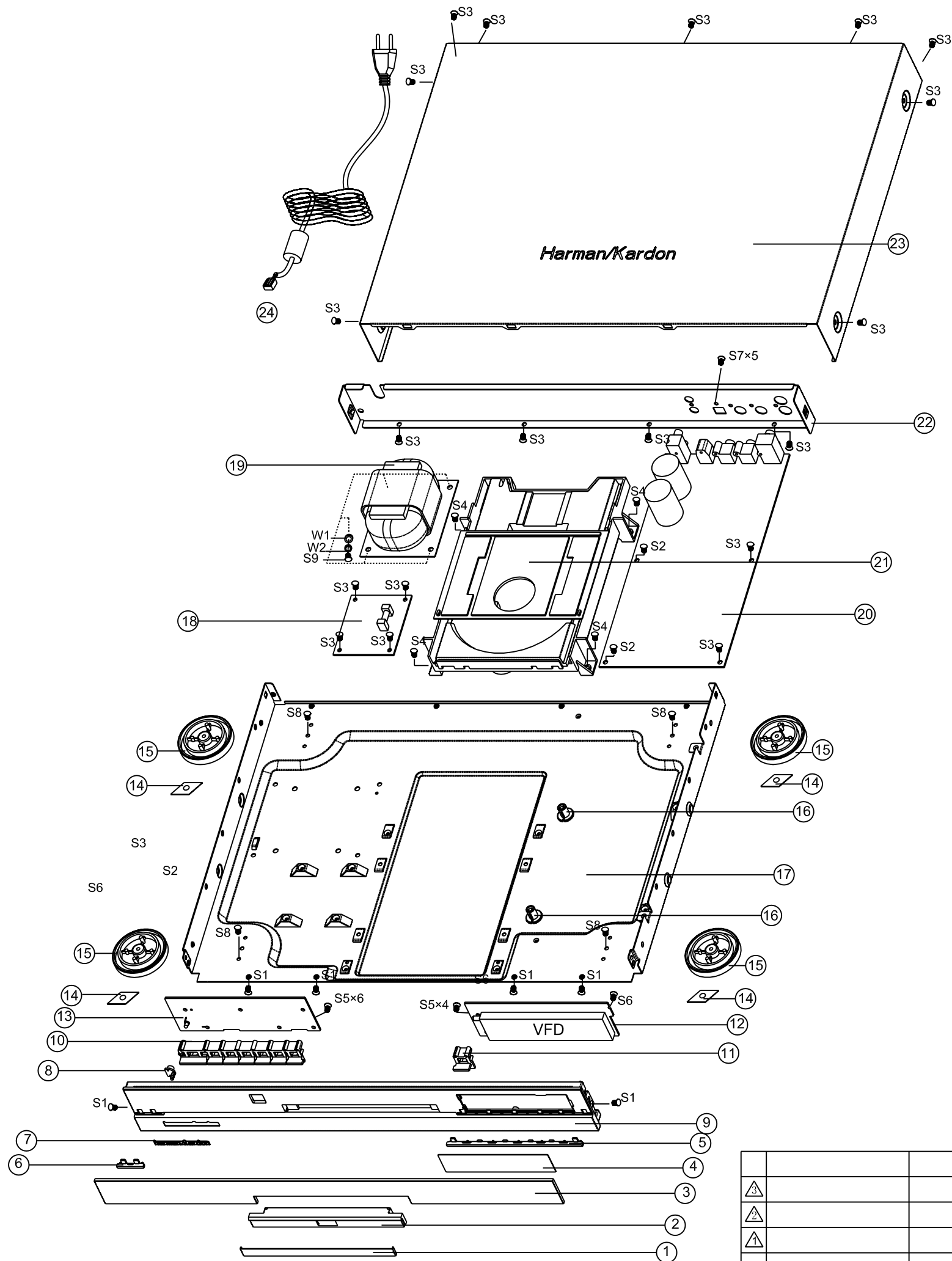
HD970

June 05

To: harman/kardon Service Centers
Models: HD970/230
Subject: SERVO FIRMWARE DOWNLOAD

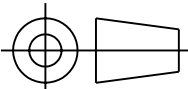
Item needed: CD-R disc, writer program/CD-R writer and two files include a txt file and a BIN file
The BIN file contains the servo firmware and the txt help the unit to download the software.

1. Please add all the files to a blank CD-R as CD-ROM Mode 1 format.(standard)
Caution: If you make CD-R download disc as CD-ROM XA mode, new firmware will not be downloaded.
2. Please type the volume name of the CD-R as "ATPLDR_DOWN" exactly.
Caution: you must type the volume name in capitals by all means.
3. When your adding files to the blank CD-R, please do not change the file's name.
4. Please add the BIN file with the 40Mbytes TXT dummy file.
Because attached file's data area is, sometimes, too small for servo to spin up.
5. When you are ready to make a CD-R download disc, you should make CD-R session closed. That is, CD-R download disc must be a single session disc. Always write the CD-R in lowest speed possible.
6. Power HD970 on and make sure the unit is 100% functional.
7. Eject the tray by OPEN /CLOSE and insert the CD-R
8. Close the tray with OPEN/CLOSE or pushing tray manually.
9. Wait until tray open itself with "READING" written in the display.
10. Remove the disc.
11. Switch the unit off (on the front panel).
12. Switch the unit on (on the front panel).
13. Unplug the power cord
14. Plug the power cord, power HD970 on and ensure the units are working.
15. Upgrade done.



NO.	PART NO.	Q'TY	DESCRIPTION
1	330-70970H02-0000	1	Aluminum ally wrap for disc tray
2	330-2970RE07-0000	1	Disc tray door
3	331-8000RE08-0300	1	Panel lens
	331-870BRE08-0300	1	Panel lens for HD970B
	330-7HD97000-0000	1	HD970 Thin metal for HD970B
4	331-91057243-0500	1	VFD filter 105.7×24.3mm
5	330-7970RE05-0000	1	Long decorate strip
6	330-71CDRE04-0000	1	Short decorate strip
7	600-00000005-6920	1	"Harman/Kardon" logo
	600-00000005-0920	1	"Harman/Kardon" logo for HD970B
8	332-4970RE06-0000	1	Power indicator cover
9	330-1970RE01-0000	1	Plastic panel
	330-170BRE01-0000	1	Plastic panel for HD970B
10	331-1970RE02-0000	1	Functional key button
11	331-1970RE03-0000	1	Open/Close button
12	300-D001763C-0002	1	1763C Front panel board ass'y
13	300-D001784C-0001	1	1784C Front panel board ass'y
14	350-0DSC1000-0000	4	Pedestal underlay
15	331-400DVD22-4000	4	Pedestal
16	332-20008010-0000	2	PCB plastic frame
17	380-B970PT01-8000	1	Chassis
18	300-A001783C-0001	1	1783C Power connect board ass'y
19	150-A0000015-0300	1	R type Transformer
20	300-C001764C-0002	1	1764C Mainboard
21	206-0DSL710A-0700	1	Loader DSL-710A
22	380-C970PT03-0500	1	Back panel
23	380-A970PT02-0500	1	Top cover
	380-A70BPT02-0500	1	Top cover for HD970B
24	162-A0000350-0000	1	Power cord with 350mm fixture
S1	381-00300611-2300	6	SCREW ST KBTTO M3×6
S2	381-00301614-1311	2	SCREW ST PWM TTC M3×16
S3	381-00300614-1112	19	SCREW ST PWBTTNi M3×6
S4	381-00300814-1312	4	SCREW ST PWB TTC 3×8
S5	381-00300611-2302	10	SCREW ST PAHC M3×6
S6	381-00300611-1212	1	SCREW ST PWB TTO M3×6
S7	381-00300811-2200	5	SCREW ST PAHO M3×8
S8	381-00400851-2200	4	SCREW ST RTHO M 4×8
S9	381-00400812-2200	4	SCREW PWMH Ni M4×8
N1	382-000000M4-1100	2	NUT M4
W1	383-M4000000-0200	4	WASHER PLAIN 4
W2	383-M4000000-0100	4	WASHER SPRING 4

MARK	REVISION RECORD	DR.	DATE

TOLERANCE						EXPLODE VIEW		MODEL	HD970 HD970B
DIM/TOL.								DWG. NO.	
xx	±0.10	±0.15	±0.50	±1.00	±2.00			PART NO.	
xx.X	±0.05	±0.10	±0.20	±0.50	±1.00			MATERIAL	
xx.XX	±0.02	±0.05	±0.10	±0.20	±0.50	DWG. BY:		SCALE	1 : 1
ANGEL	TOL.					CHECY BY:		FINISH	
xx	±1°					APPR. BY:		PAGE 1 OF 1	
xx.X	±0.5°								
xx.XX	±0.2°								

FRONT BOARD 1784C

Harman/Kardon

LOCA.NO.	DESCRIPTION	SPECIFICATION	Parts No.	Qty
3R8	FIXED CARBON FILM	100O 1/6W 10%	130-T31010KT-0000	1
3R21	FIXED CARBON FILM	120O 1/6W 10%	130-T31012KT-0000	1
3R19 3R4	FIXED CARBON FILM	470O 1/6W 10%	130-T31047KT-0000	2
3R5,3R22,3R24,3R263R29,3R33,3R35	FIXED CARBON FILM	4.7KO 1/6W 10%	130-T32047KT-0000	7
3R1	FIXED CARBON FILM	10KO 1/6W 10%	130-T33010KT-0000	1
3C16,3C15	RADIAL LEADS MLCC	22P 50V 20%	140-CHB022PH-0A00	2
3CB1,3CB2,3CB3,3CB8,3CB6	RADIAL LEADS MLCC	0.1uF 50V 20%	140-CHB410PH-0A00	5
3C22,3C8	CAPACITOR,AL.ELECTROLYTIC	47uF 10V 20%	140-CCA047PD-0A00	2
3FB1	Bead, leaded fixed	50O, In-line Package	152-0B0050K1-T000	1
3D9	Diode	IN4148, 2P, In-line Package	110-B0IN4148-0A00	1
LD1	Diode, color is blue&amber	HFT503CPBO , F 3, 3P, In-line Package	110-FHFT503C-AT00	1
3Q1	Transistor	8050, 3P, SMD	121-00008050-T400	1
3Q2	Transistor	8550, 3P, SMD	121-00008550-T300	1
3U1 firmware burn-in	IC, Microchip, MCU	CF745-04/P, 18P, DIP,	103-CF74504P-1226	1
3U2	IR receiver	HS0038B, 3P, In-line Package	219-0HS0038B-0100	1
3Y1	Oscillator	4M	217-00400003-2200	1
3K1,3K2,3K4~3K8	Touch switch	6×6	170-C0000004-0000	7

HD970/230

DISPLAY BOARD 1763C
Harman/Kardon

LOCA.NO.	DESCRIPTION	SPECIFICATION	Parts No.	Qty
3R9,3R6	Resistor, chip	00 1/8W 0805 5%	131-B00000JT-0000	2
3R14,3R15	Resistor, chip	1000 1/8W 0805 5%	131-B01010JT-0000	2
3R17	Resistor, chip	2.2KO 1/8W 0805 5%	131-B02022JT-0000	1
3R3	Resistor, chip	3.3KO 1/8W 0805 5%	131-B02033JT-0000	1
3R10,3R11,3R12	Resistor, chip	10KO 1/8W 0805 5%	131-B03010JT-0000	3
3R2	Resistor, chip	22KO 1/8W 0805 5%	131-B03022JT-0000	1
3R13	Resistor, chip	100KO 1/8W 0805 5%	131-B04010JT-0000	1
3C9	(CHIP)	47P 50V J NPO 0805	141-C0B047PH-KT00	1
3C20	(CHIP)	123 50V K X7R 0805	141-C0B312PH-KT00	1
3CB4,3CB5,3CB7	(CHIP)	0.1UF 50V Z Y5V 0805	141-C0B410PH-KT00	3
3C19	(CHIP)	1UF 50V Z X7R 0805	141-C0B510PH-KT00	1
3C18	(CHIP)	2.2UF 50V Z X7R 0805	KT00	1
3C1,3C2,3C3,3C4,3C5,3C6,3C7	CAPACITOR,AL.ELECTROLYTIC	47uF 50V 20%	140-DCA0470H-0A00	11
3C8,3C11,3C12,3C17				
3C10	CAPACITOR,AL.ELECTROLYTIC	220uF 10V 20%	0A00	1
3DZ1	Zener Diode	ZENER 6.2V 0.4W, In-line Package	110-D000C062-0T00	1
3D1,3D2,3D3,3D4,3D5,3D6, 3D7	Diode	IN4148, 2P, In-line Package	110-B0IN4148-0A00	10
3D8,3D10,3D11				
3U3	IC, NS, Display Filament Driver	LM9022, 8P, SO8	102-00LM9022-7000	1
3U4	IC, SANYO,VFD Driver	LC75710NE SMD	101-LC75710N-0000	1
J3	Connector	PH-6A-2.0mm	180-0000PH6A-5100	1
3U5	VFD	VFD22-1302F	190-VFD1302F-0000	1
3K3	Touch switch	6×6	170-C0000004-0000	1

LOCA.NO.	DESCRIPTION	SPECIFICATION	Parts No.	Qty
CX1	High-voltage metallized polyester film	0.1uF 275V 20%	140-CGA410PO-0A00	1
C2	High-voltage metallized polyester film	471 275V 20%	140-GGA147PQ-0A00	1
JP2	Connector	Vertical VH three holes two pins(white)	180-000VH02A-3100	1
JP1	Connector	Vertical VH three holes two pins(orange)	180-000VH02A-3110	1
F1	Fuse Holder	Fuse Holder	208-10C10000-0000	1
F1	Fuse	T1AL/250V	210-01000250-2000	1

LOCA.NO.	DESCRIPTION	SPECIFICATION	Parts No.	Qty
R106,R108,R111,R112,R113, R114,R115,R116,R117,R118	Resistor, chip	22O 1/4W 1206 5%	131-C00022JT-0000	24
R120,R121,R122,R123,R124,R125,R126,R127,R128,R130				
R131,R135,R136,R137				
R85	Resistor, chip	75O 1/4W 1206 5%	131-C00075JT-0000	1
R11,R20,R21,R37,R43,R78,R79,R80,R90,R91,R92,R96,R97	Resistor, chip	100O 1/4W 1206 1% 50PPm	131-CF1010FT-4000	21
R100,R101,R102,R109,R110,R132,R133,R134				
R22,R53,R73,R75,R82,R83,R87,R139	Resistor, chip	240O 1/4W 1206 5%	131-C01024JT-0000	8
R3	Resistor, chip	270O 1/4W 1206 5%	131-C01027JT-0000	1
R81	Resistor, chip	300O 1/4W 1206 5%	131-C01030JT-0000	1
R23,R24,R25,R26,R35,R36,R39,R40,R41,R42,R45,R46	Resistor, chip	330O 1/4W 1206 5%	131-CF1033JT-4000	12
R4,R89,R98,R99,R138	Resistor, chip	390O 1/4W 1206 5%	131-C01039JT-0000	5
R2,R69,R71,R86	Resistor, chip	470O 1/4W 1206 1% 50PPm	131-CF1047FT-4000	4
R28,R29,R30,R31	Resistor, chip	680O 1/4W 1206 1% 50PPm	131-CF1068FT-4000	4
R74,R76	Resistor, chip	720O 1/4W 1206 5%	131-C01072JT-0000	2
R63,R64,R65,R66,R84,R105,R119,R140,R141,R142	Resistor, chip	1KO 1/4W 1206 1% 50PPm	131-CF2010FT-4000	10
R27,R50,R52,R58,R60,R62,R67,R68,R70,R72	Resistor, chip	2.2KO 1/4W 1206 1% 50PPm	131-CF2022FT-4000	10
R7,R8,R55,R57,R59,R61,R77	Resistor, chip	2.7KO 1/4W 1206 5% 50PPm	131-CF2027FT-4000	7
R5,R6,R103	Resistor, chip	4.7KO 1/4W 1206 5%	131-C02047FT-0000	3
R10,R12,R17,R18,R32,R47,R93,R94,R95,R104,R107,R129	Resistor, chip	10KO 1/4W 1206 5%	131-C03010FT-0000	12
R88	Resistor, chip	12KO 1/4W 1206 5%	131-C03012FT-0000	1
R38,R44	Resistor, chip	15KO 1/4W 1206 1% 50PPm	131-CF3015FT-4000	2
R15,R16,R33,R34,R48	Resistor, chip	22KO 1/4W 1206 5%	131-C03022FT-0000	5
R13,R14,R19,	Resistor, chip	47KO 1/4W 1206 1% 50PPm	131-CF3047FT-4000	3
R49,R51,R54,R56	Resistor, chip	100KO 1/4W 1206 1% 50PPm	131-CF3047FT-4000	4
R1	Resistor, chip	4.7MO 1/4W 1206 5%	131-C05047FT-0000	1

C73	Capacitor,multilayer ceramic, chip	100PF 50V J NPO 1206	141-C0C110PH-KT00	1
C22,C24,C27,C29	Capacitor,multilayer ceramic, chip	470PF 50V J COG 1206	141-C0C147PH-JT10	4
C6,C7,C33,C34,C35,C36	Capacitor,multilayer ceramic, chip	152 50V J COG 1206	141-C0CC15NH-JT10	6
C66,C72	Capacitor,multilayer ceramic, chip	103 50V K X7R 1206	141-C0C010NH-KT00	2
C1,C2,C4,C5,C9,C16,C17,C18,C19,C21,C23,C26,C28,	Capacitor,multilayer ceramic, chip	0.1UF 50V Z Y5V 1206	141-C0C110NH-KT00	54
C30,C31,C32,C37,C39,C40,C41,C42,C43,C45,C46,C47,				
C50,C53,C54,C56,C57,C58,C59,C61,C64,C65,C68,C74,				
C75,C76,C77,C78,C79,C80,C81,C82,C83,C84,C85,C86,				
C87,C88,C89,C90,C91				

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Harman/Kardon

C3,C8,C10,C11,C12,C13,C14,C20,C38,C44,C48,C49,C55	Capacitor, AL.electrolytic	47µF 25V 20% SG serie Samwha 85°C(M)	140-DCA047UF-0A60	16
C60,C67,C71				
C62,C63,C69,C70	Capacitor, AL.electrolytic	470µF 35V 20% WB serie Samwha 105°C(M)	140-DCA147UG-0A40	4
C15,C25,C51,C52	Capacitor, AL.electrolytic	4700µF 35V 20% HC serie Samwha	140-DCA247UG-0A60	4

HS1,HS2,HS3,HS4	heat sink	7.5 x12 x30 mm	385-00751230-5200	4
T2, T1	Pulse transformer WB1010-1	DIP6 Coilcraft	150-0WB10101-0000	2
Y1	Oscillator	24.576MHz Oscillator 3.3V M3H 54FAD DIP4	217-02457603-2200	1

L1,L2	Inductor	Bourns	151-0F0022K1-T000	2
L4,L3	Inductor	47UH d10x12 Inductor 0810-470K CoilCraft	151-000047K1-T000	2
FL1,FL2	EMI filter NFE61PT101Z1H9L	2606 Murata	218-NFE61PT1-1000	2

D1	Transistor	BAS16, SOT23 Philips	111-000BAS16-0T40	1
D3,D2	Diode bridge	GBU8D ? ? ? General emiconductor	110-A00GBU8D-0T00	2
D4,D5,D6	Schottky diode 3A	30BQ040 Schottky diode	111-030BQ040-0T00	3
Q1,Q3,Q4,Q7,Q9,Q14,Q15,Q16,Q20,Q21,Q22,Q23, Q25	PNP low-noise bipolar	2SA1035 SOT23 Panasonic	121-02SA1035-T700	13
Q2,Q24,Q26,Q28	Fet	BSS123 Philips	121-00BSS123-T700	4
Q5,Q6	Transistor	DTC343TK SOT23 Rohm	121-DTC343TK-T700	2
Q8,Q10,Q11,Q12,Q13,Q17,Q18,Q19,Q27	NPN low-noise bipolar	2SC2406 SOT23 Panasonic	121-02SC2406-T700	9

U1	IC, Sharp, Photoelectric Coupler	PC817, 4P, DIP	105-000PC817-1000	1
U3	IC, NS,Adjustable regulator	LM337T-ADJ TO220	103-00LM3370-9000	1
U5,U4	IC, TI,Dual opamp	OPA2134UA SOIC8	102-0OPA2134-B000	2
U6,U9	IC, NS,Adjustable regulator	LM317T-ADJ TO220	105-000LM317-9000	2
U7,U8	IC, ADI,Dual opamp	OP275GS SOIC8	102-0OP275GS-B000	2
U10,U17	IC, NS,Adjustable regulator	LM1117MPX-ADJ SOT223	102-00LM1117-A000	2
U11	IC, ADI,DAC	AD1955 SSOP28	102-00AD1955-7000	1
U12	IC, AKM,192kHz audio transmitter	AK4103 VSOP24	102-00AK4103-0000	1
U13	IC, NS,Adjustable regulator	LM1117T-ADJ TO220	103-00LM1117-9000	1
U14	IC, Switching regulator +12V	LM2670T-12 TO220-7	103-02670T12-9000	1
U15	IC, AKM,192kHz audio receiver	AK4117 VSOP24	102-00AK4117-0000	1
U16	IC, NS,Switching regulator +5V	LM2670T-5.0 TO220-7	103-02670T50-9000	1
U18	IC, XILINX,CPLD	XC9572XL-100TQFP-10C TQFP100	102-XC9572XL-4000	1
U19	IC, ADI, Blackin DSP	ADSP-BF532SBST400-REV0.3 LQFP176	102-BF532SBS-0000	1

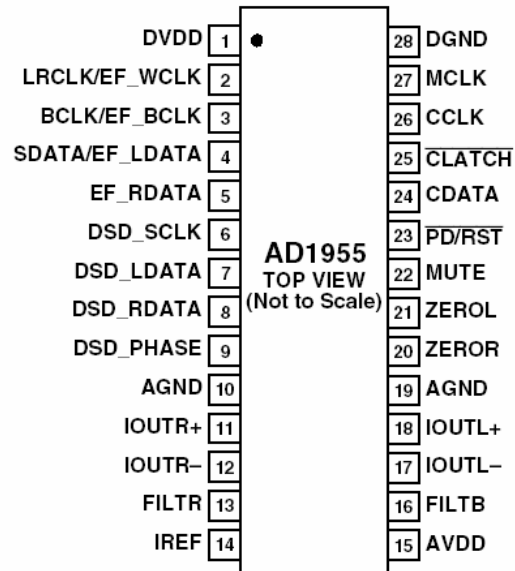
MAIN BOARD 1764C
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U20	IC,Dallas ,Reset monitor DS1818-5	DS1818 SOT23	102-00DS1818-0000	1
U21	IC,ST,TTL input buffer	74HCT245 SOIC20	101-74HCT245-B000	1
U22	IC,HYNIX,SDRAM	HY57V641620HG T-7 TSOP54	101-HY57V641-0000	1
U23	IC, MXIC,Flash Memory	MX29LV040QC-90 PLCC32	101-MX29LV04-C406	1

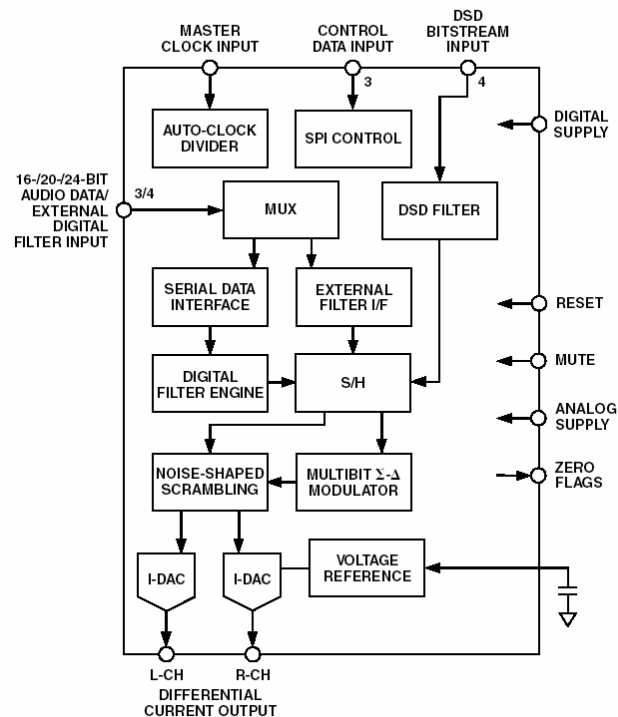
J5,J10	Connector	TJC3-6A , 6P, In-line Package	180-0TJC306A-5100	2
J6	Connector	PH-3A, 3P, In-line Package	180-0000PH3A-5100	1
J9	Connector	40PIN IDE socket IDE? ?	510-DA000DC3-0000	1
J11	Connector	PH-10A, 10P, In-line Package	180-000PH10A-5100	1
J1	Jack, , IR in/out jack	Package	187-SCJ351P0-0900	1
J4	Jack,, Audio output jack	AV2-8.4-1G, In-line Package	186-0AV1841G-1100	1
J2,J3	Jack, Coaxial output jack	AV1-8.4-6G, In-line Package	186-0AV1846G-1100	2
U2	shutter	GP1FA513RZ, In-line Package	187-1FA513RZ-0540	1

U11 AD1955 Digital to analog converter

PIN CONFIGURATION



FUNCTIONAL BLOCK DIAGRAM



PIN FUNCTION DESCRIPTIONS

Pin No.	I/O	Mnemonic	Description
1		DVDD	Digital Power Supply Connected to Digital 5 V Supply
2	Input	LRCLK/EF_WCLK	Left/Right Clock Input for Input Data in PCM Mode Word Clock in External Filter Mode
3	Input	BCLK/EF_BCLK	Bit Clock Input for Input Data in PCM Mode Bit Clock Input in External Filter Mode
4	Input	SDATA/EF_LDATA	MSB First, Twos Complement Serial Audio Data Two Channel (left and right), 16-Bit to 24-Bit Data in PCM Mode Left Channel Data in External Filter Mode
5	Input	EF_RDATA	Not used in PCM Mode Right channel data in External Filter Mode
6	I/O	DSD_SCLK	Serial Clock Input for DSD Data. This clock should be 64×44.1 kHz, 2.8224 MHz or 128×44.1 kHz, 5.6448 MHz in Normal Mode, 128×44.1 kHz, 5.6448 MHz or 256×44.1 kHz, 11.2896 MHz in Phase Mode.
7	Input	DSD_LDATA	DSD Left Channel Data Input
8	Input	DSD_RDATA	DSD Right Channel Data Input
9	I/O	DSD_PHASE	DSD Phase Reference Signal. This clock should be 64×44.1 kHz, 2.8224 MHz. If not used, this pin should be connected low.
10		AGND	Analog Ground
11	Output	IOUTR+	Right Channel Positive Analog Output
12	Output	IOUTR-	Right Channel Negative Analog Output
13	Output	FILTR	Voltage Reference Filter Capacitor Connection. Bypass and decouple the voltage reference with parallel 10 μ F and 0.1 μ F capacitors to AGND.
14		IREF	Connection Point for External Bias Resistor
15		AVDD	Analog Power Supply Connected to Analog 5 V Supply
16	Output	FILTB	Filter Capacitor Connection with Parallel 10 μ F and 0.1 μ F Capacitors to AGND
17	Output	IOUTL-	Left Channel Negative Analog Output
18	Output	IOUTL+	Left Channel Positive Analog Output
19		AGND	Analog Ground
20	Output	ZEROR	Right Channel Zero Flag Output. This pin goes high when the right channel has no signal input or the DSD mute pattern is detected.
21	Output	ZEROL	Left Channel Zero Flag Output. This pin goes high when the left channel has no signal input or the DSD mute pattern is detected.
22	Input	MUTE	Mute. Assert high to mute both stereo analog outputs. Deassert low for normal operation.
23	Input	$\overline{\text{PD/RST}}$	Power Down/Reset. The AD1955 is placed in a reset state and the digital circuitry is powered down when this pin is held low. The AD1955 is reset on the rising edge of this signal. The serial control port registers are reset to the default values. Connect high for normal operation.
24	Input	CDATA	Serial Control Input, MSB First, Containing 16 Bits of Unsigned Data. Used for specifying control information and channel-specific attenuation.
25	Input	$\overline{\text{CLATCH}}$	Latch Input for Control Data
26	Input	CCLK	Clock Input for Control Data. Control input data must be valid on the rising edge of CCLK. CCLK may be continuous or gated.
27	Input	MCLK	Master Clock Input. Connect to an external clock source.
28		DGND	Digital Ground

U19 ADSP21532 DSP

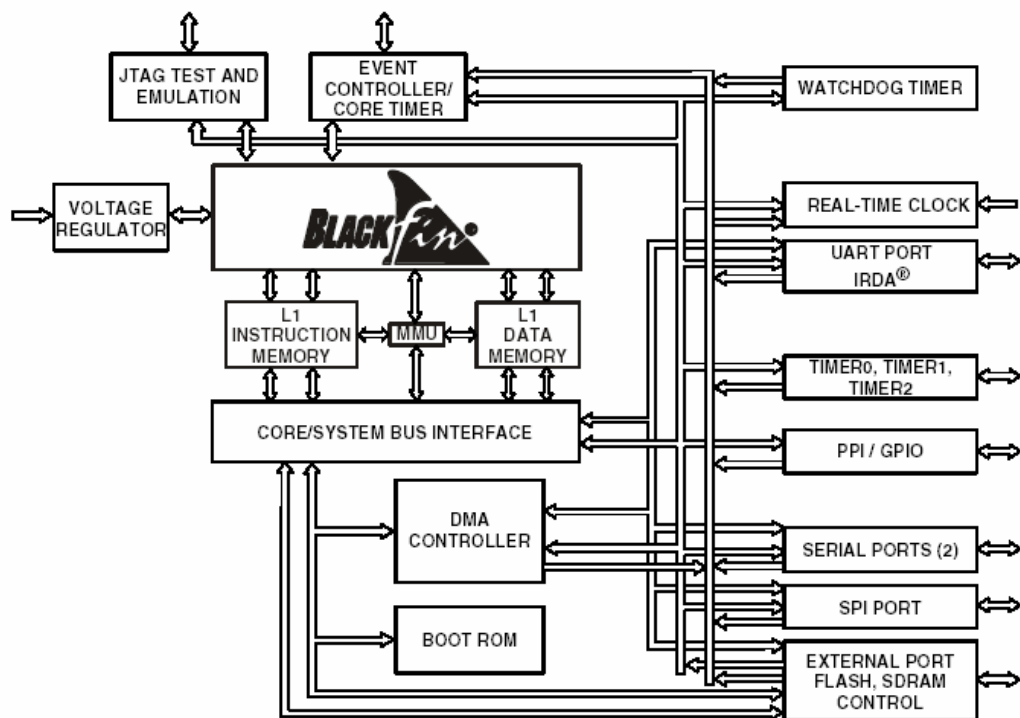
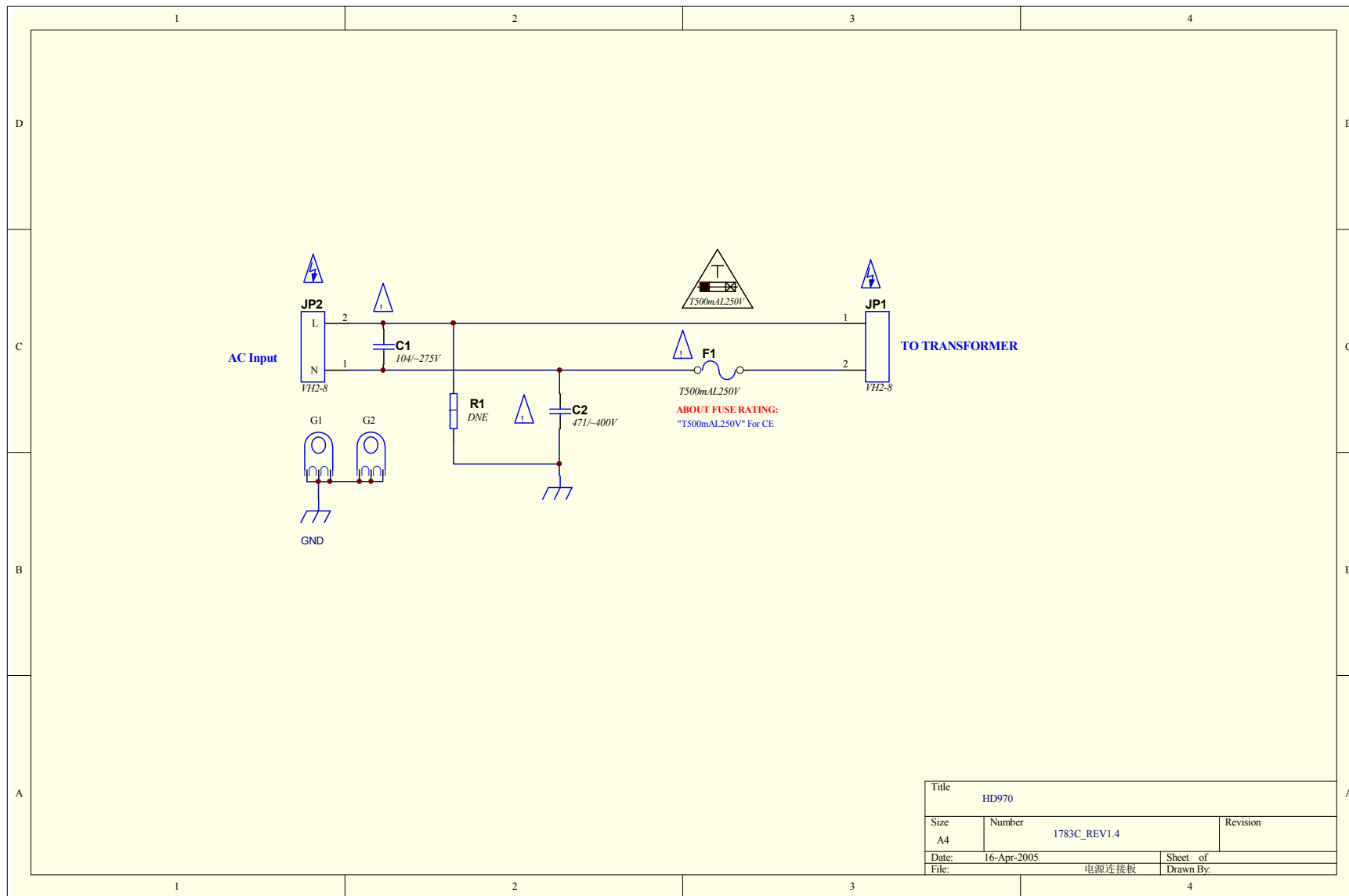


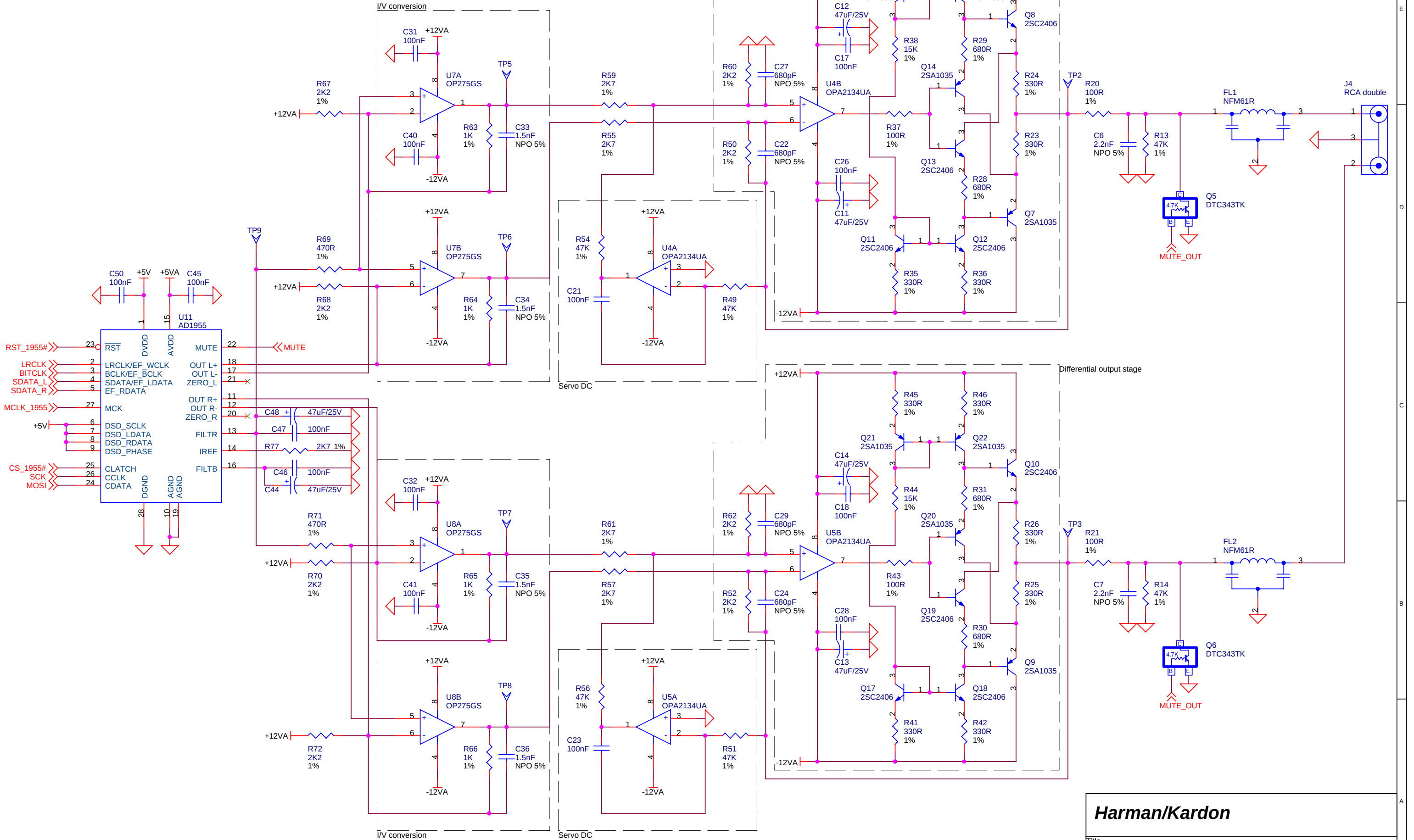
Figure 1. Functional Block Diagram

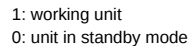
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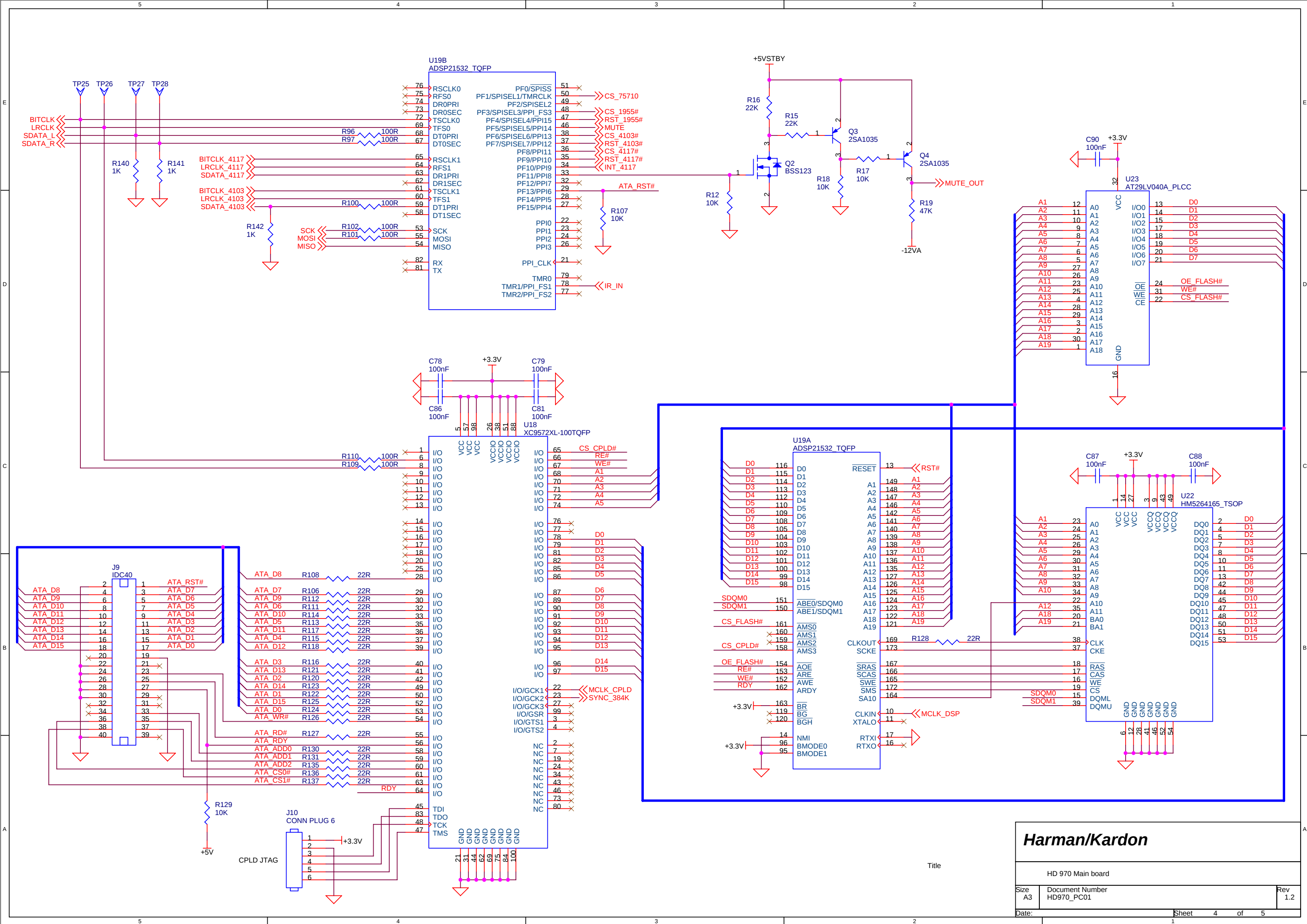
Table 39. 176-Lead LQFP Pin Assignment (Numerically by Lead Number)

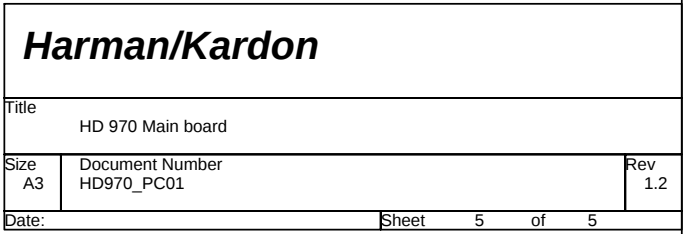
Lead No.	Signal	Lead No.	Signal	Lead No.	Signal	Lead No.	Signal	Lead No.	Signal
1	GND	41	GND	81	TX	121	ADDR19	161	AMS0
2	GND	42	GND	82	RX	122	ADDR18	162	ARDY
3	GND	43	GND	83	EMU	123	ADDR17	163	BR
4	VROUT2	44	GND	84	TRST	124	ADDR16	164	SA10
5	VROUT1	45	VDDEXT	85	TMS	125	ADDR15	165	SWE
6	VDDEXT	46	PF5	86	TDI	126	ADDR14	166	SCAS
7	GND	47	PF4	87	TDO	127	ADDR13	167	SRAS
8	GND	48	PF3	88	GND	128	GND	168	VDDINT
9	GND	49	PF2	89	GND	129	GND	169	CLKOUT
10	CLKIN	50	PF1	90	GND	130	GND	170	GND
11	XTAL	51	PF0	91	GND	131	GND	171	VDDEXT
12	VDDEXT	52	VDDINT	92	GND	132	GND	172	SMS
13	RESET	53	SCK	93	VDDEXT	133	GND	173	SCKE
14	NMI	54	MISO	94	TCK	134	VDDEXT	174	GND
15	GND	55	MOSI	95	BMODE1	135	ADDR12	175	GND
16	RTXO	56	GND	96	BMODE0	136	ADDR11	176	GND
17	RTXI	57	VDDEXT	97	GND	137	ADDR10		
18	VDDRTC	58	DT1SEC	98	DATA15	138	ADDR9		
19	GND	59	DT1PRI	99	DATA14	139	ADDR8		
20	VDDEXT	60	TFS1	100	DATA13	140	ADDR7		
21	PPI_CLK	61	TSCLK1	101	DATA12	141	ADDR6		
22	PPI0	62	DR1SEC	102	DATA11	142	ADDR5		
23	PPI1	63	DR1PRI	103	DATA10	143	VDDINT		
24	PPI2	64	RFS1	104	DATA9	144	GND		
25	VDDINT	65	RSCLK1	105	DATA8	145	VDDEXT		
26	PPI3	66	VDDINT	106	GND	146	ADDR4		
27	PF15	67	DT0SEC	107	VDDEXT	147	ADDR3		
28	PF14	68	DT0PRI	108	DATA7	148	ADDR2		
29	PF13	69	TFS0	109	DATA6	149	ADDR1		
30	GND	70	GND	110	DATA5	150	ABE1		
31	VDDEXT	71	VDDEXT	111	VDDINT	151	ABE0		
32	PF12	72	TSCLK0	112	DATA4	152	AWE		
33	PF11	73	DR0SEC	113	DATA3	153	ARE		
34	PF10	74	DR0PRI	114	DATA2	154	AOE		
35	PF9	75	RFS0	115	DATA1	155	GND		
36	PF8	76	RSCLK0	116	DATA0	156	VDDEXT		
37	PF7	77	TMR2	117	GND	157	VDDINT		
38	PF6	78	TMR1	118	VDDEXT	158	AMS3		
39	GND	79	TMR0	119	BG	159	AMS2		
40	GND	80	VDDINT	120	BGH	160	AMS1		

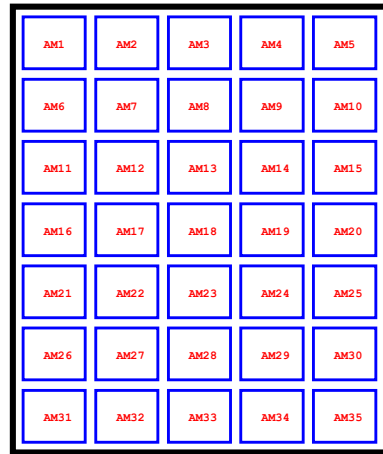






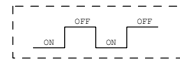
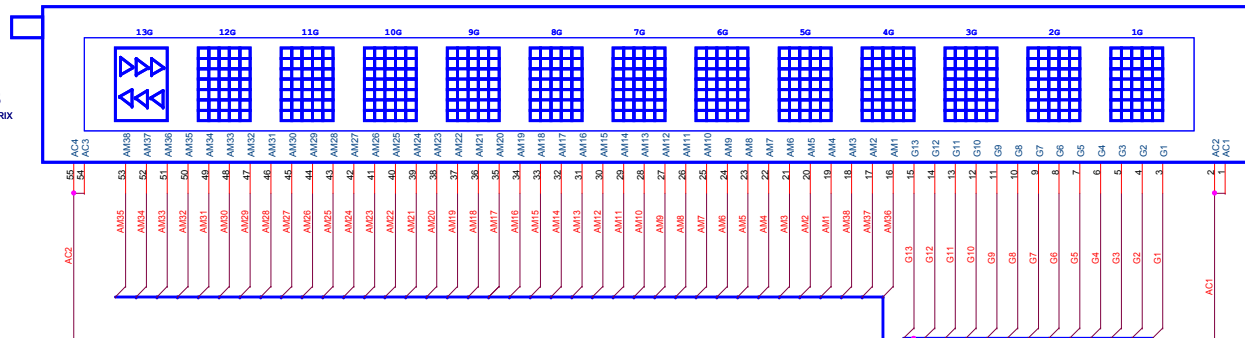




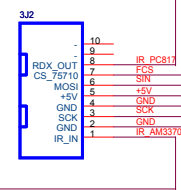


3U5
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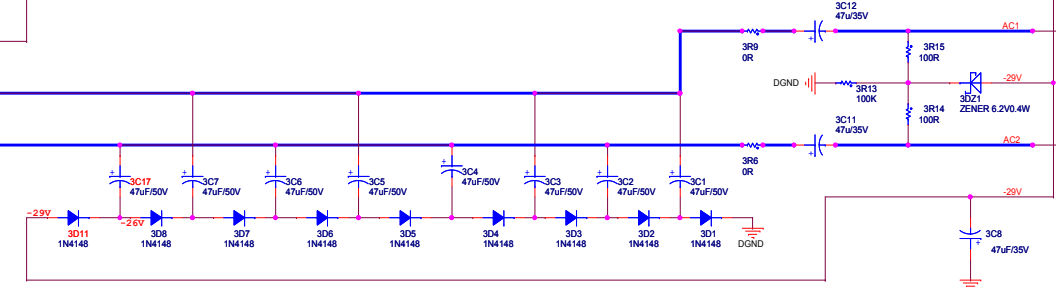
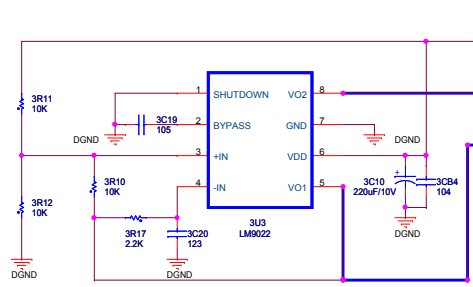
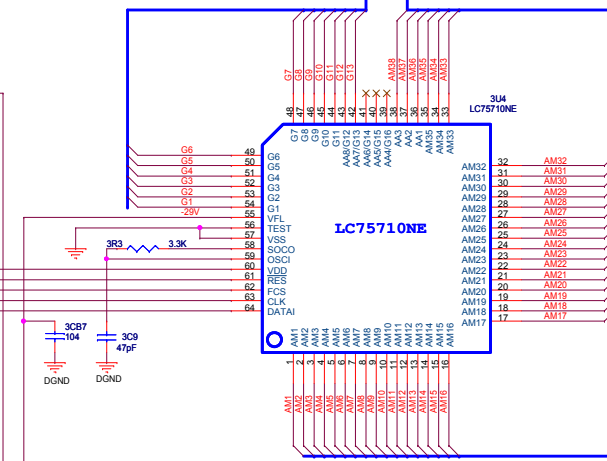
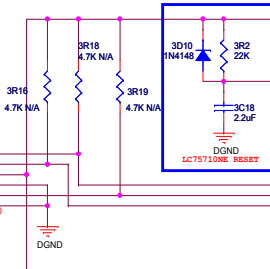
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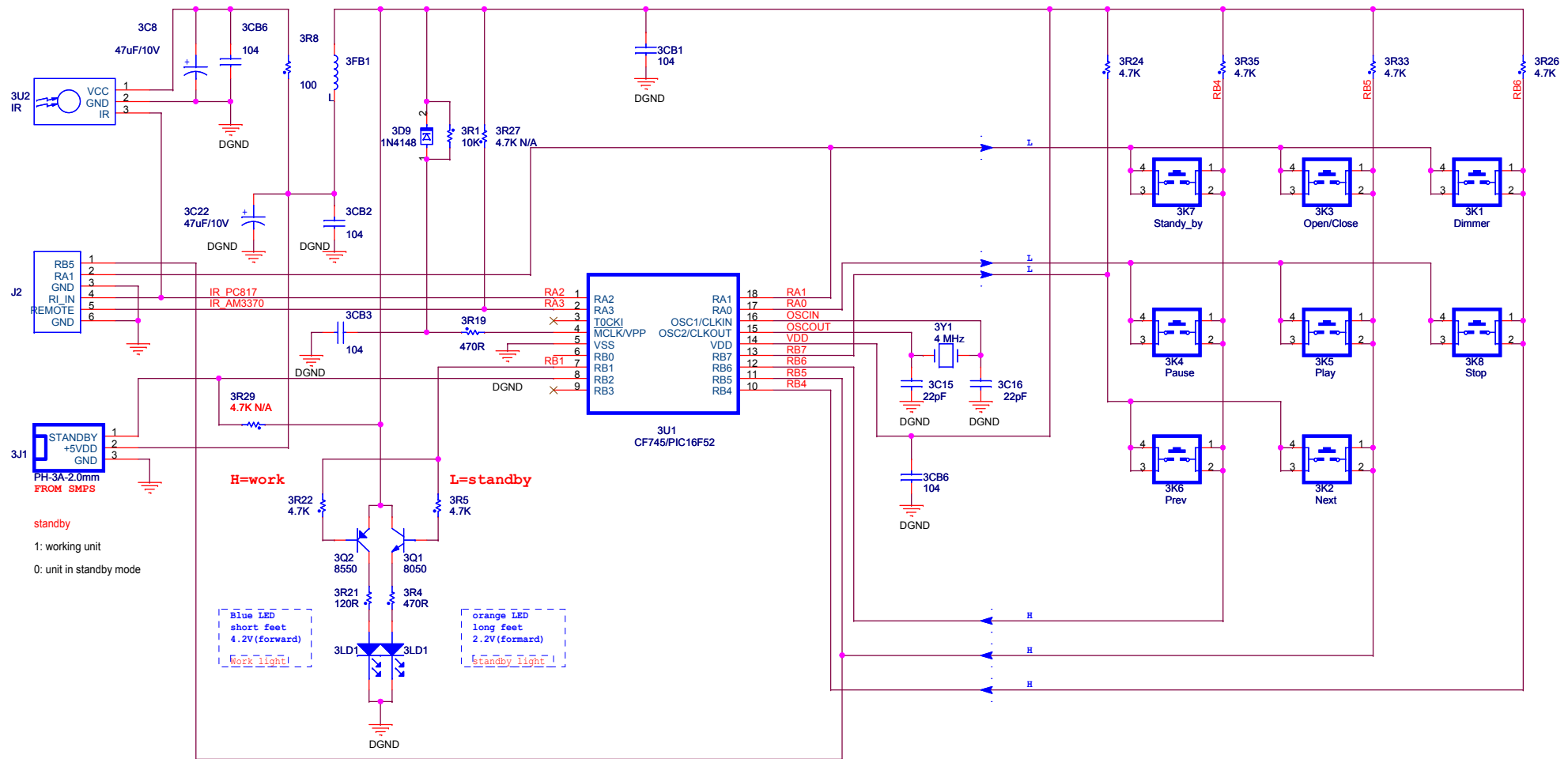


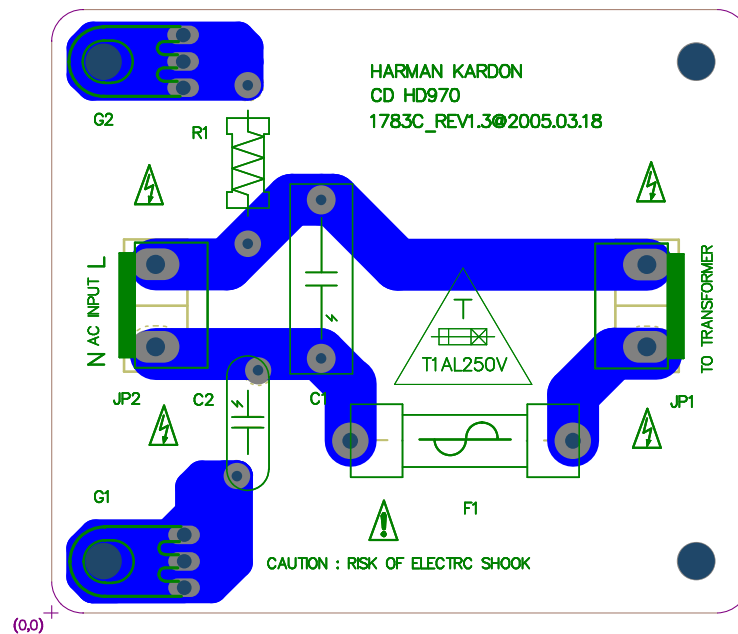
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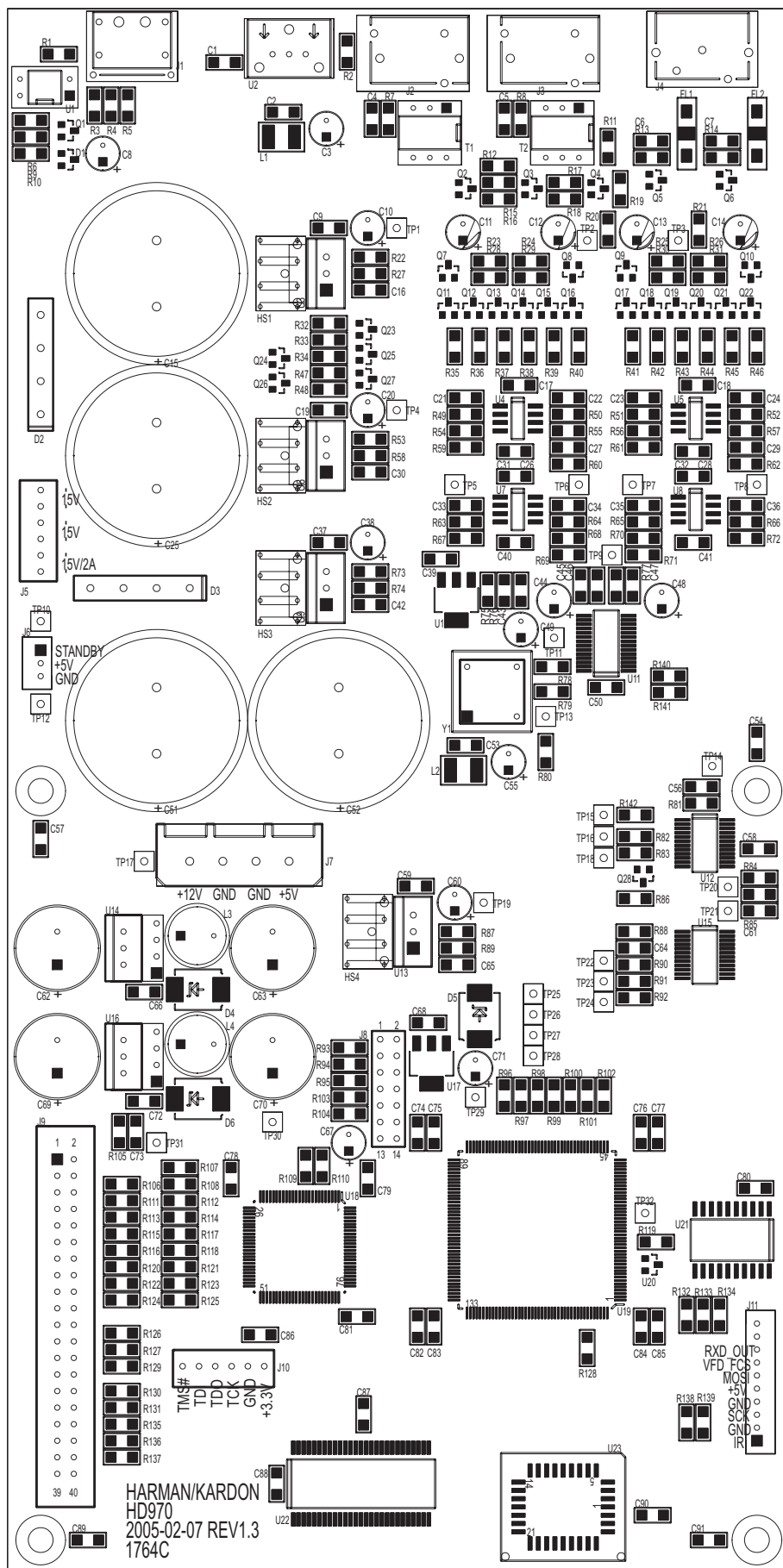


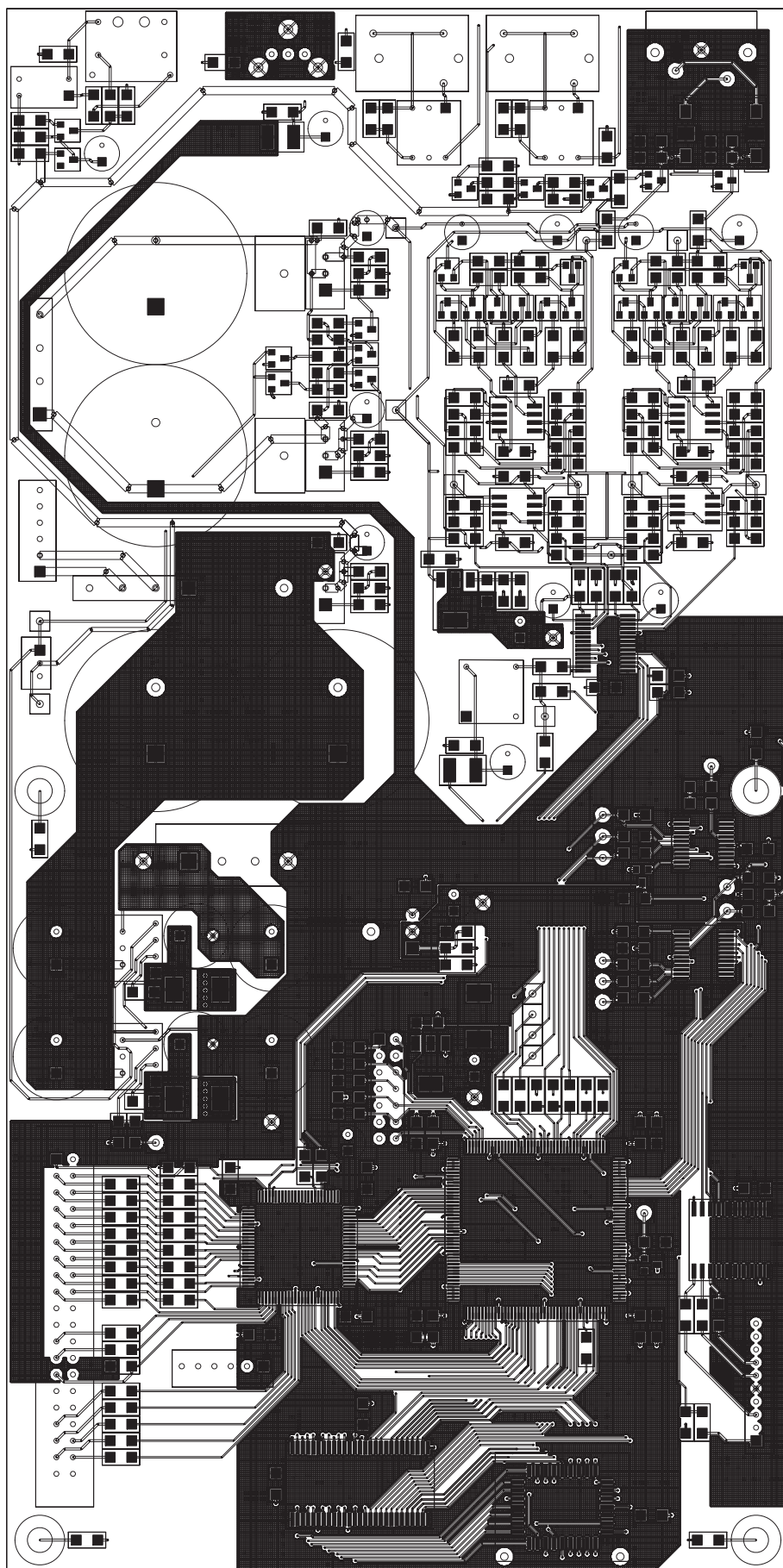
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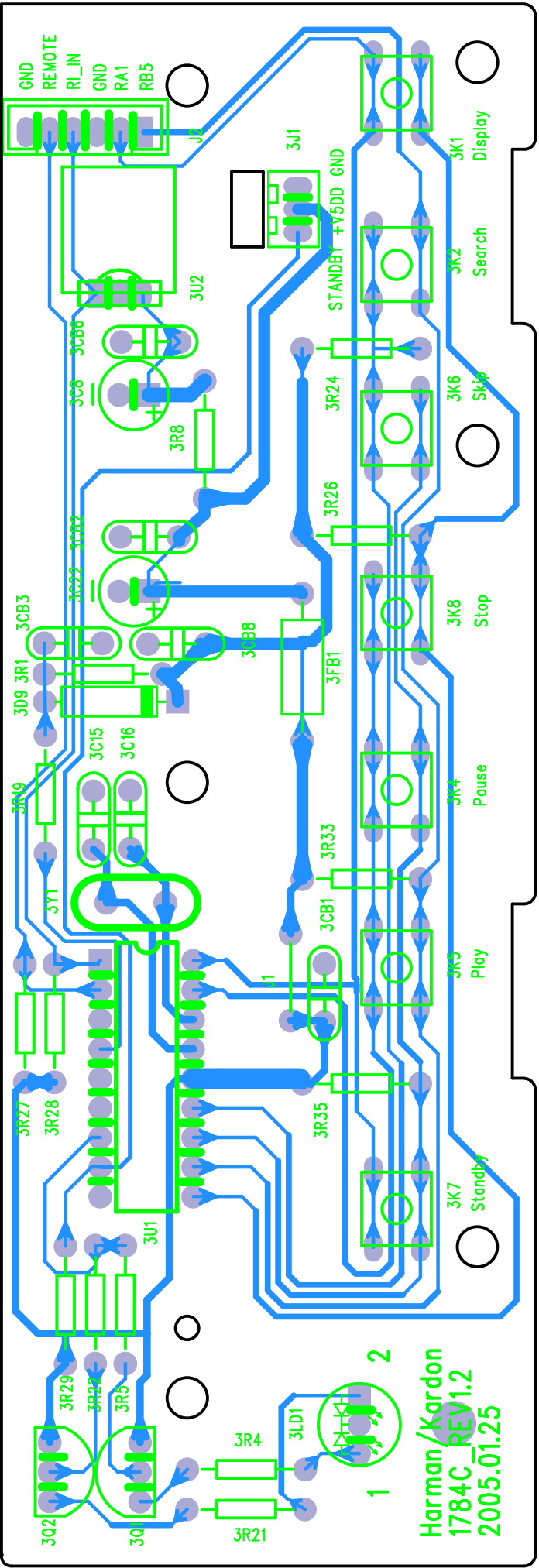












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3U5

3K3

3C8

3DZ1

3C11

3C12

3C7

3C1

3C3

3C5

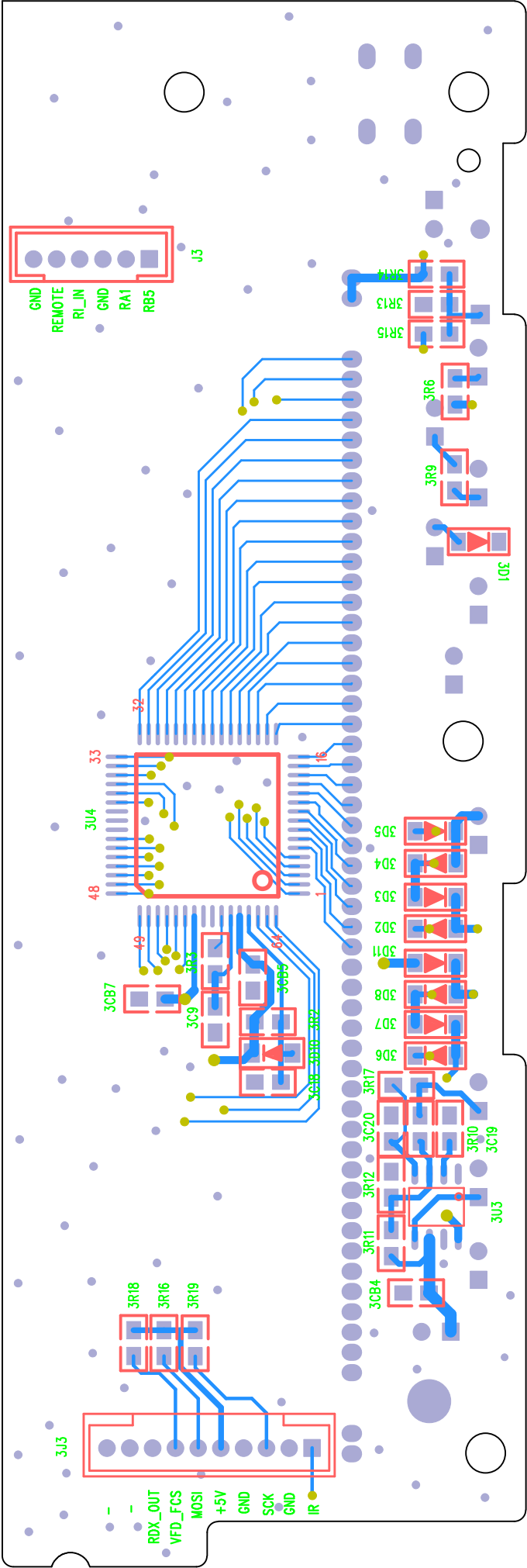
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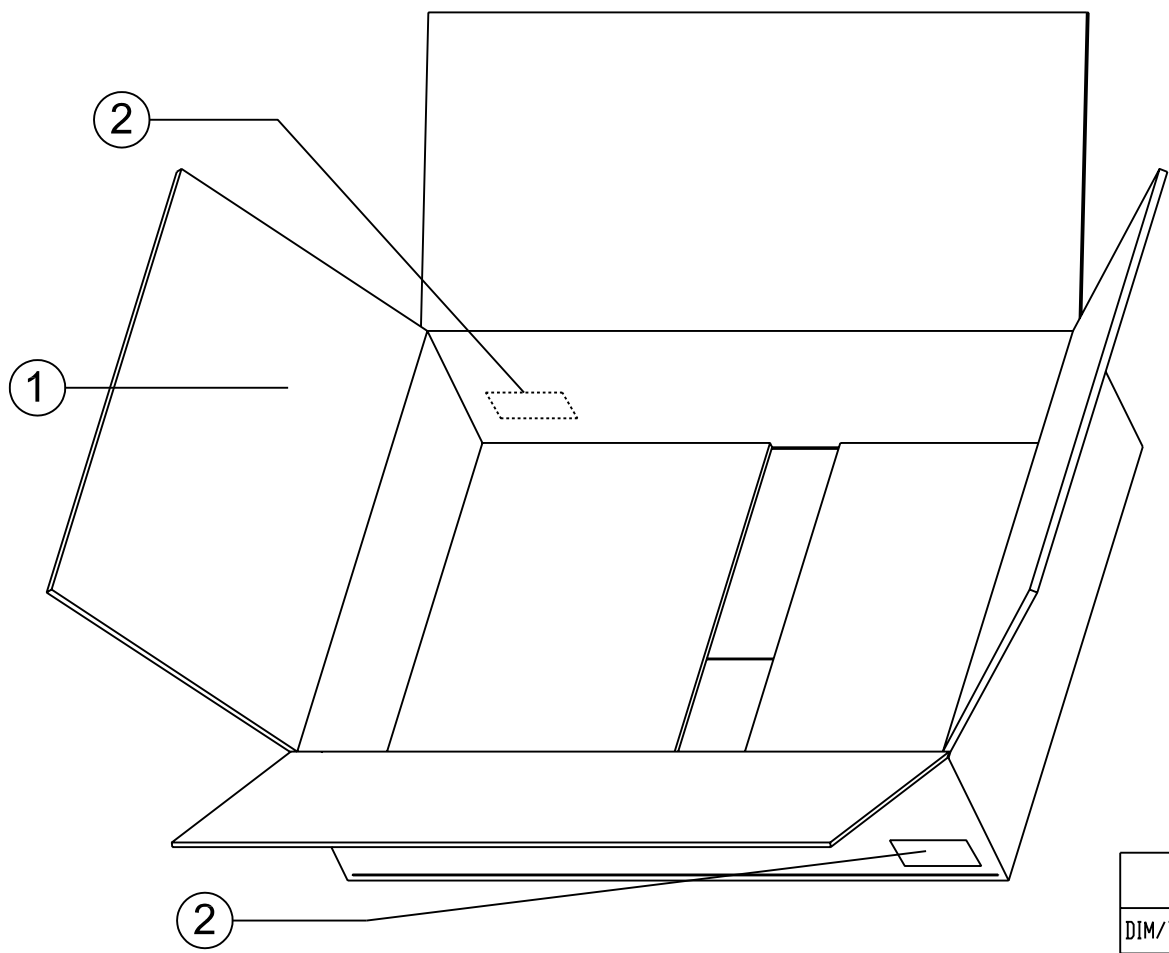
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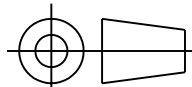
3C17

3C6

3C10





TOLERANCE						Packing instruction	MODEL		HD970 HD970B			
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xx, X	±0.05	±0.10	±0.20	±0.50	±1.00		MATARIAL					
xx, XX	±0.02	±0.05	±0.10	±0.20	±0.50		DWG. BY:					
ANGEL	TOL.					SCALE		1 : 1				
xx	±1°					CHECY BY:			FINISH			
xx, X	±0.5°					APPR. BY:			PAGE 1 OF 1			
xx, XX	±0.2°											

3			
2			
1			
MARK	REVISION RECORD	DR.	DATE