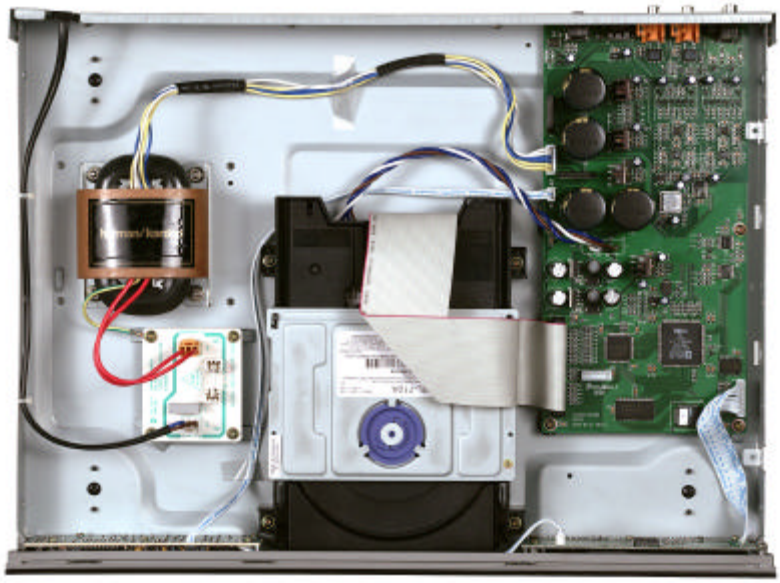
HD970 / HD970B CD Player

SERVICE MANUAL

harman/kardon®

Power for the Digital Revolution™



Technical Specifications

Signal Format

Sampling Frequency	44.1kHz
D/A Conversion	Multi-Level Delta-Sigma
Oversampling	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.

harman/kardon

A Harman International Company
250 Crossways Park Drive, Woodbury, New York 11797
www.harmankardon.com
Harman Consumer International:
2, route de Tours, 72500 Château-du-Loir, France

Part #3828SND043A

harman/kardon Download Procedure

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.

harman/kardon Download Procedure

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.

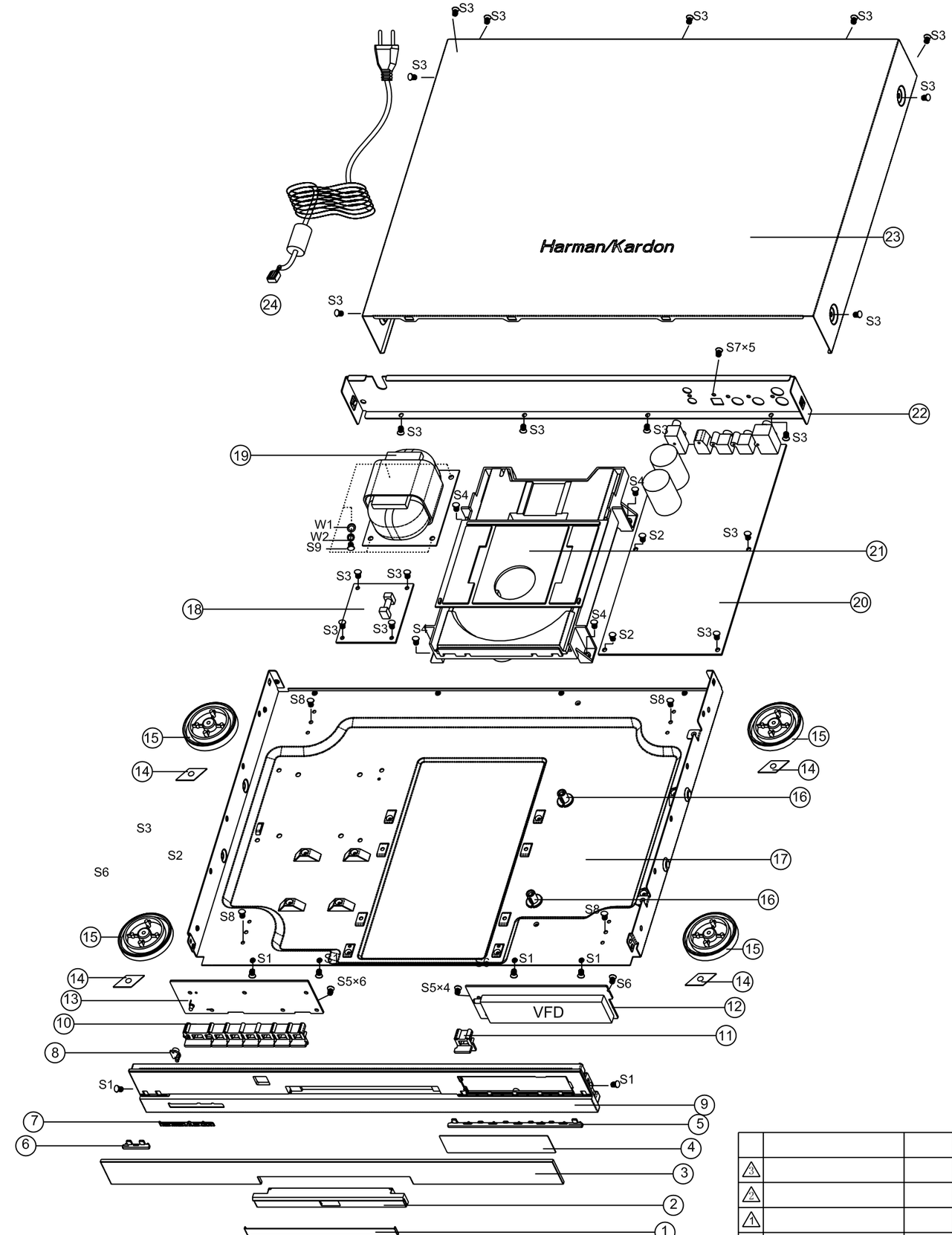
11. Switch the unit off (on the front panel).

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 PWMTTC M3×16
S3	381-00300614-1112	19	SCREW ST PWBTTNi M3×6
S4	381-00300814-1312	4	SCREW ST PWBTTC 3×8
S5	381-00300611-2302	10	SCREW ST PAHC M3×6
S6	381-00300611-1212	1	SCREW ST PWBTTO 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 PWMHNi 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
3			
2			
1			

TOLERANCE					
DIM/TOL.					
xx	±0.10	±0.15	±0.50	±1.00	±2.00
xx.X	±0.05	±0.10	±0.20	±0.50	±1.00
xx.XX	±0.02	±0.05	±0.10	±0.20	±0.50
ANGEL	TOL.				
xx	±1°				
xx.X	±0.5°				
xx.XX	±0.2°				

EXPLODE VIEW

MODEL	HD970 HD970B		
DWG. NO.			
PART NO.			
MATARIAL			
DWG. BY:		SCALE	1 : 1
CHECY BY:		FINISH	
APPR. BY:		PAGE 1 OF 1	

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

LOCA.NO.	DESCRIPTION	SPECIFICATION	Parts No.	Qty
3R9,3R6	Resistor, chip	0O 1/8W 0805 5%	131-B00000JT-0000	2
3R14,3R15	Resistor, chip	100O 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 3C8,3C11,3C12,3C17	CAPACITOR,AL.ELECTROLYTIC	47uF 50V 20%	140-DCA047UH-0A00	11
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 3D8,3D10,3D11	Diode	IN4148, 2P, In-line Package	110-B0IN4148-0A00	10
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 R120,R121,R122,R123,R124,R125,R126,R127,R128,R130 R131,R135,R136,R137	Resistor, chip	22O 1/4W 1206 5%	131-C00022JT-0000	24
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 R100,R101,R102,R109,R110,R132,R133,R134	Resistor, chip	100O 1/4W 1206 1% 50PPm	131-CF1010FT-4000	21
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, 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	Capacitor,multilayer ceramic, chip	0.1UF 50V Z Y5V 1206	141-C0C110NH-KT00	54

C3,C8,C10,C11,C12,C13,C14,C20,C38,C44,C48,C49,C55 C60,C67,C71	Capacitor, AL.electrolytic	47µF 25V 20% SG serie Samwha 85ºC(M)	140-DCA047UF-0A60	16
C62,C63,C69,C70	Capacitor, AL.electrolytic	470µF 35V 20% WB serie Samwha 105ºC(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

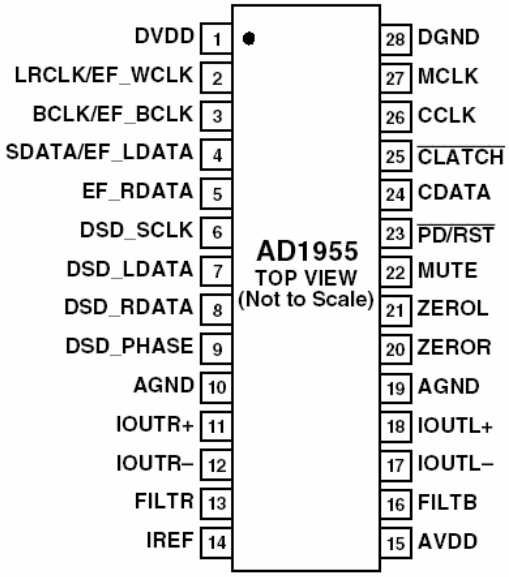
U1	IC, Sharp, Photoelectric Coupler	PC817, 4P, DIP	105-000PC817-1000	1
U3	IC, NS,Adjustable regulator	LM337T-ADJ TO220	103-00LM3370-9000	1
U5,U4	IC, TI,Dual opamp	OPA2134UA SOIC8	102-0OPA2134-B000	2
U6,U9	IC, NS,Adjustable regulator	LM317T-ADJ TO220	105-000LM317-9000	2
U7,U8	IC, ADI,Dual opamp	OP275GS 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 transmiter	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

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

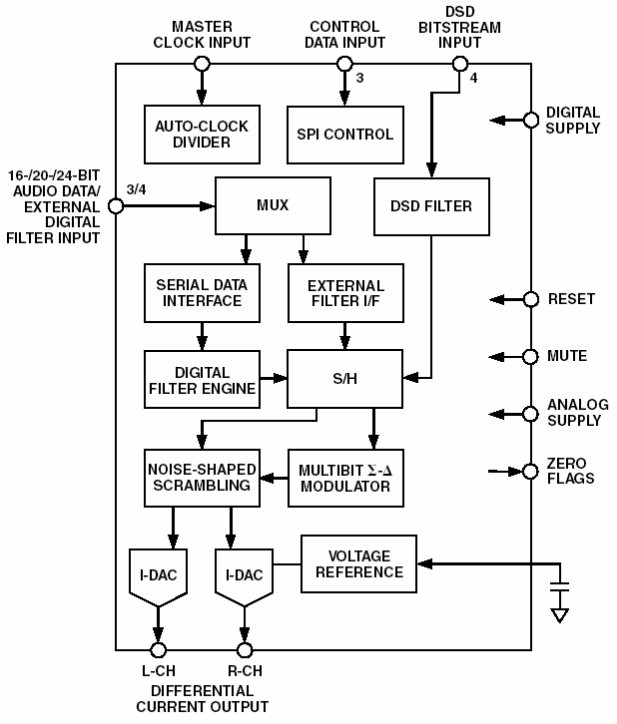
J5,J10	Connector	TJC3-6A , 6P, In-line Package	180-0TJC306A-5100	2
J6	Connector	PH-3A, 3P, In-line Package	180-0000PH3A-5100	1
J9	Connector	40PIN IDE socket IDE? ?	510-DA000DC3-0000	1
J11	Connector	PH-10A, 10P, In-line Package	180-000PH10A-5100	1
J1	Jack, , IR in/out jack	Package	187-SCJ351P0-0900	1
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 µF and 0.1 µF 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 µF and 0.1 µF 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

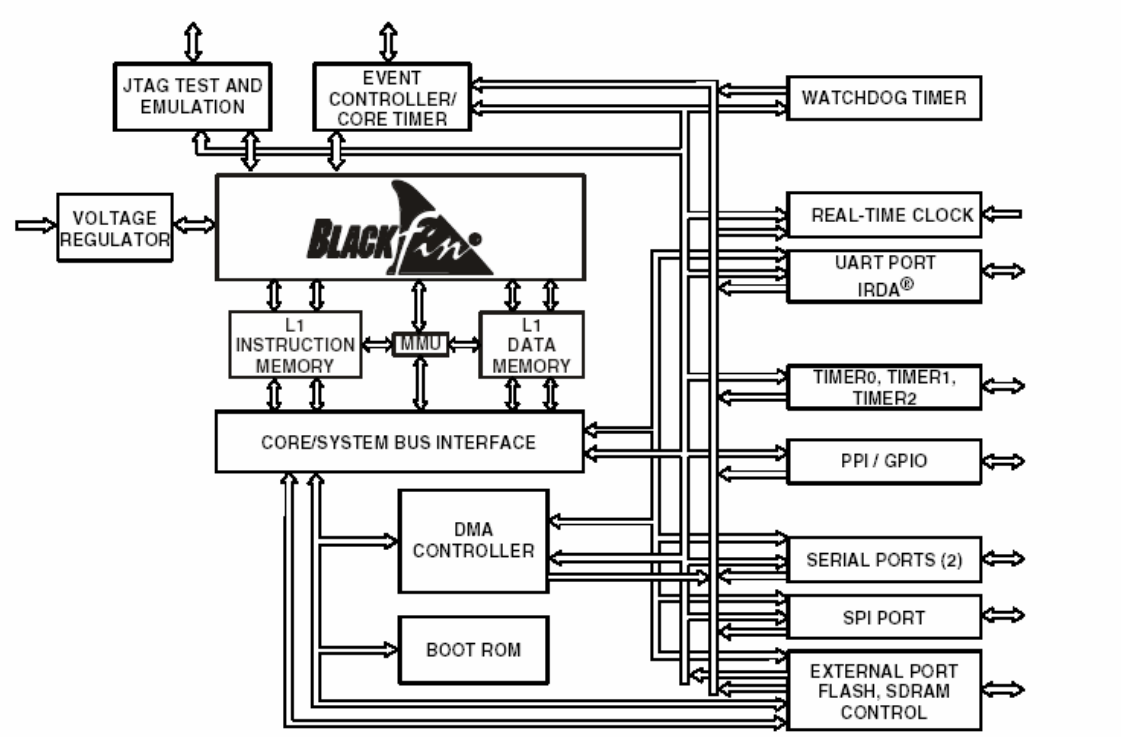
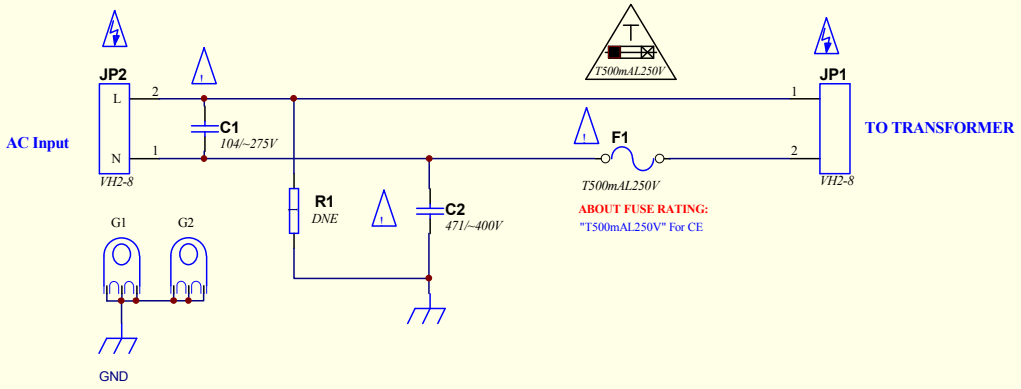


Figure 1. Functional Block Diagram

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	$\overline{\text{AMS0}}$
2	GND	42	GND	82	RX	122	ADDR18	162	ARDY
3	GND	43	GND	83	$\overline{\text{EMU}}$	123	ADDR17	163	$\overline{\text{BR}}$
4	VROUT2	44	GND	84	$\overline{\text{TRST}}$	124	ADDR16	164	SA10
5	VROUT1	45	VDDEXT	85	TMS	125	ADDR15	165	$\overline{\text{SWE}}$
6	VDDEXT	46	PF5	86	TDI	126	ADDR14	166	$\overline{\text{SCAS}}$
7	GND	47	PF4	87	TDO	127	ADDR13	167	$\overline{\text{SRAS}}$
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	$\overline{\text{SMS}}$
13	$\overline{\text{RESET}}$	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	$\overline{\text{ABE1}}$		
31	VDDEXT	71	VDDEXT	111	VDDINT	151	$\overline{\text{ABE0}}$		
32	PF12	72	TSCLK0	112	DATA4	152	$\overline{\text{AWE}}$		
33	PF11	73	DR0SEC	113	DATA3	153	$\overline{\text{ARE}}$		
34	PF10	74	DR0PRI	114	DATA2	154	$\overline{\text{AOE}}$		
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	$\overline{\text{AMS3}}$		
39	GND	79	TMR0	119	$\overline{\text{BG}}$	159	$\overline{\text{AMS2}}$		
40	GND	80	VDDINT	120	$\overline{\text{BGH}}$	160	$\overline{\text{AMS1}}$		



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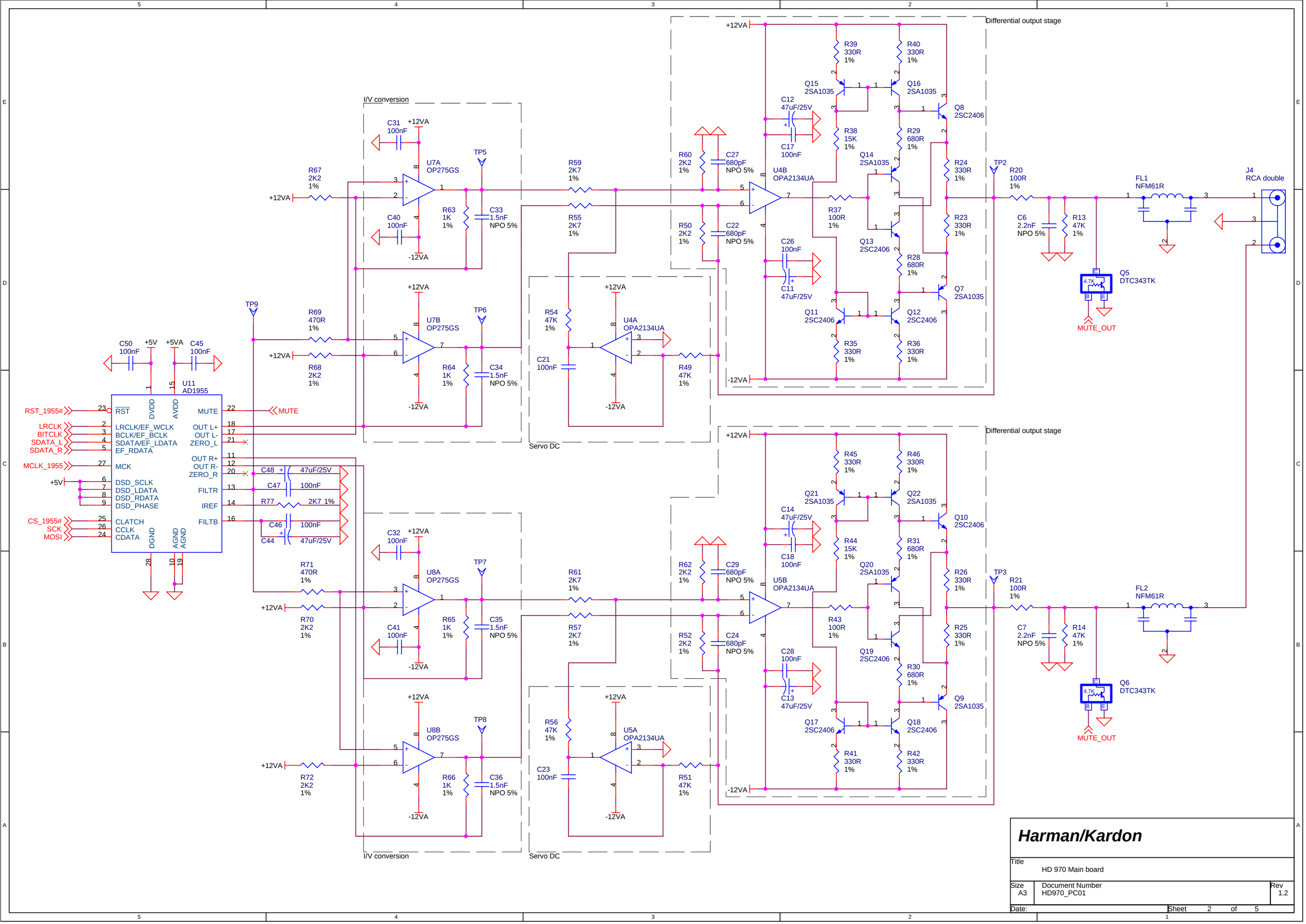
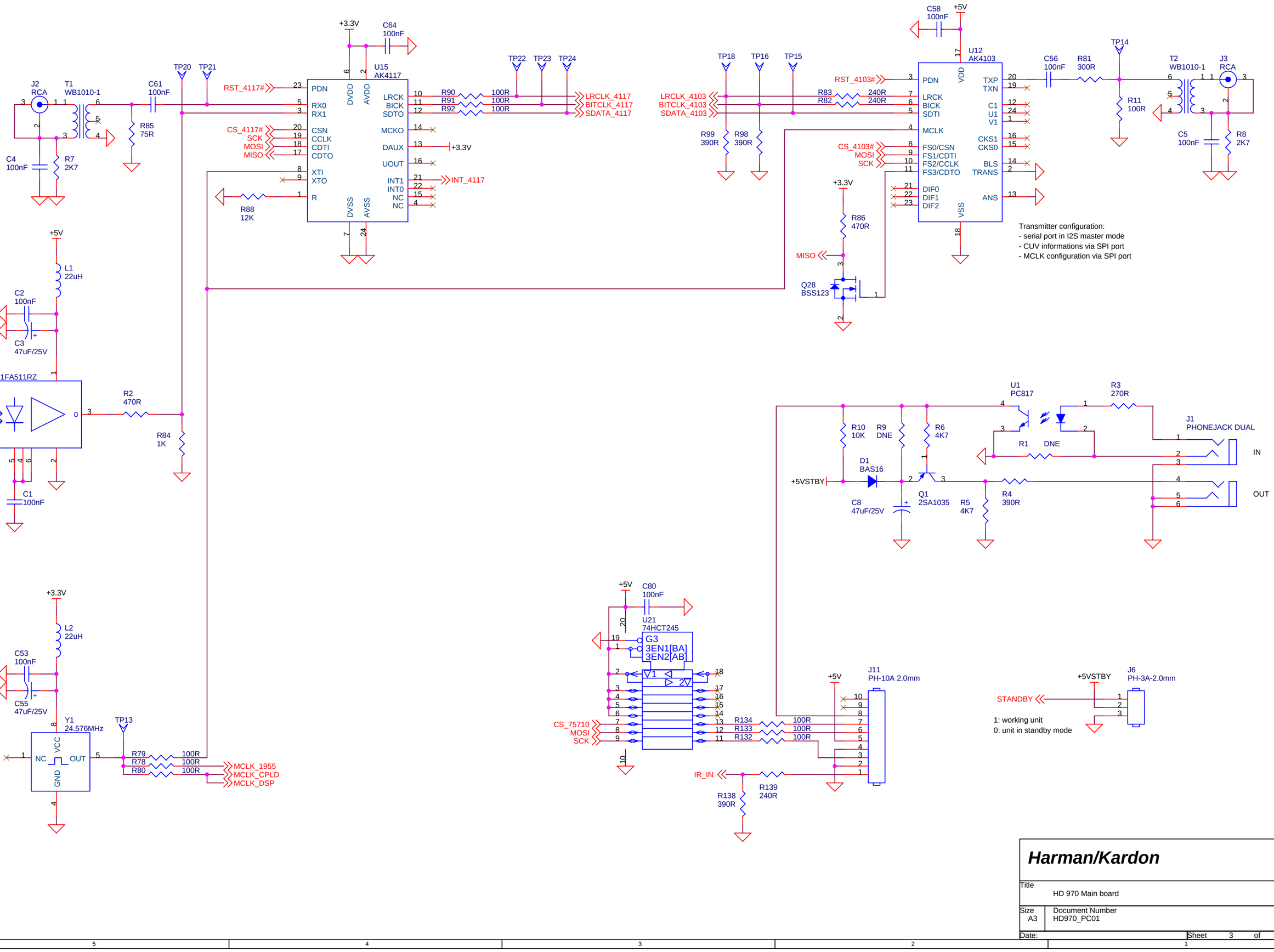
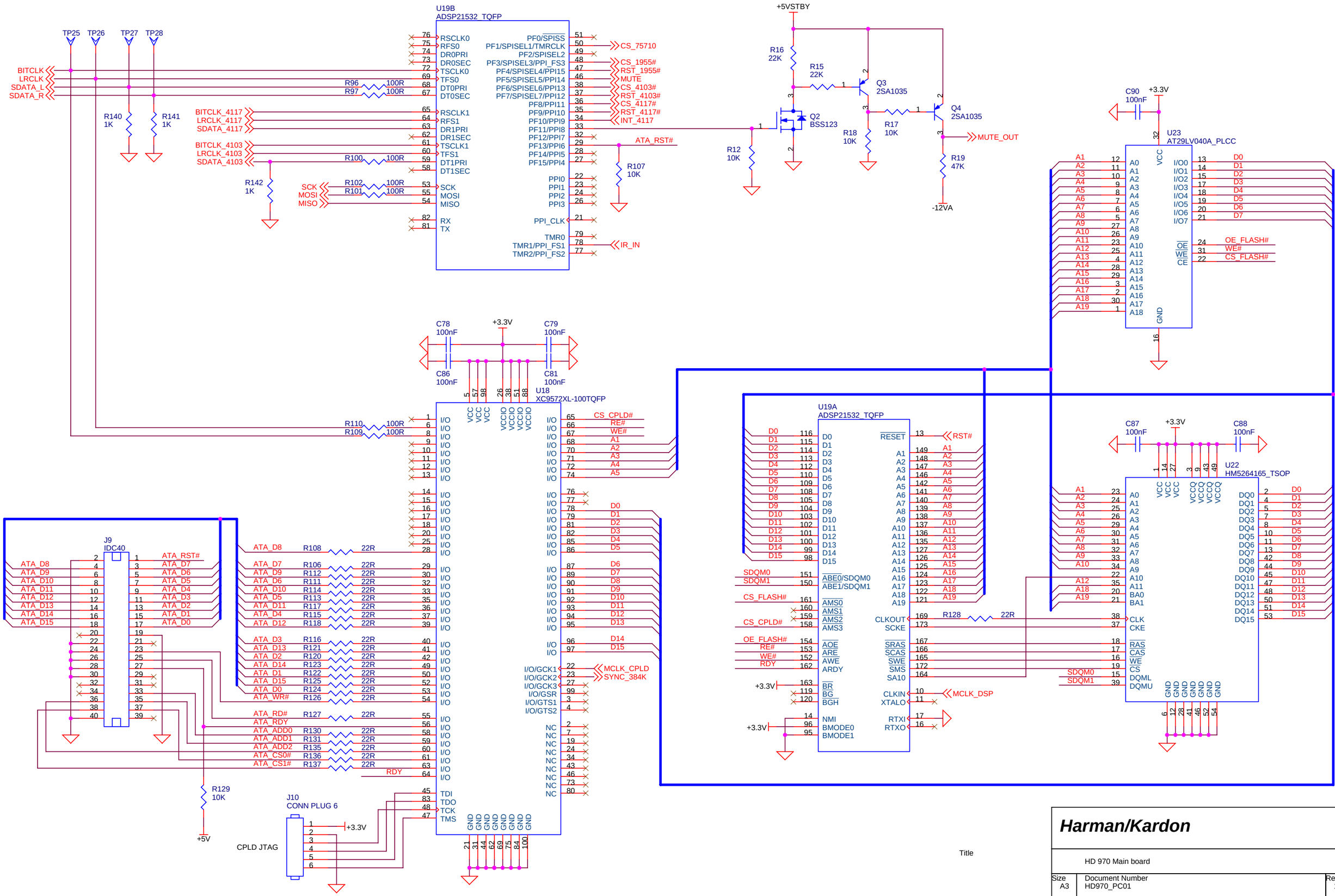
Date: 16-Apr-2005		Sheet of
File: 电源连接板		Drawn By:


I/V conversion
Servo DC
Differential output stage
U11
AD1955
RST_1955#
LRCLK
BITCLK
SDATA_L
SDATA_R
MCLK_1955
CS_1955#
SCK
MOSI
MUTE
MUTE_OUT
U7A
OP275GS
U7B
OP275GS
U8A
OP275GS
U8B
OP275GS
U4A
OPA2134UA
U4B
OPA2134UA
U5A
OPA2134UA
U5B
OPA2134UA
Q5
DTC343TK
Q6
DTC343TK
FL1
NFM61R
FL2
NFM61R
J4
RCA double
Harman/Kardon
HD 970 Main board
Document Number
HD970_PC01
Rev
1.2
Sheet 2 of 5


J2
RCA
T1
WB1010-1
C61
100nF
TP20
TP21
R85
75R
C4
100nF
R7
2K7
+3.3V
C64
100nF
U15
AK4117
RST_4117#
PDN
RX0
RX1
CS_4117#
SCK
MOSI
MISO
CSN
CCLK
CDTI
CDTO
XTI
XTO
R
DVDD
AVDD
DVSS
AVSS
LRCK
BICK
SDTO
MCKO
DAUX
UOUT
INT1
INT0
NC
NC
R88
12K
R90
R91
R92
100R
100R
100R
TP22
TP23
TP24
LRCLK_4117
BITCLK_4117
SDATA_4117
+3.3V
INT_4117
C58
100nF
+5V
U12
AK4103
TP18
TP16
TP15
LRCLK_4103
BITCLK_4103
SDATA_4103
R99
390R
R98
390R
R83
R82
240R
240R
RST_4103#
PDN
LRCK
BICK
SDTI
MCLK
FS0/CSN
FS1/CDTI
FS2/CCLK
FS3/CDTO
DIF0
DIF1
DIF2
VDD
VSS
TXP
TXN
C1
U1
V1
CKS1
CKS0
BLS
TRANS
ANS
C56
100nF
R81
300R
TP14
R11
100R
T2
WB1010-1
J3
RCA
C5
100nF
R8
2K7
CS_4103#
MOSI
SCK
+3.3V
R86
470R
MISO
Q28
BSS123
Transmitter configuration:
- serial port in I2S master mode
- CUV informations via SPI port
- MCLK configuration via SPI port
+5V
L1
22uH
C2
100nF
C3
47uF/25V
U2
GP1FA511RZ
R2
470R
R84
1K
C1
100nF
U1
PC817
R3
270R
R10
10K
R9
DNE
R6
4K7
D1
BAS16
+5VSTBY
C8
47uF/25V
Q1
2SA1035
R5
4K7
R4
390R
R1
DNE
J1
PHONEJACK DUAL
IN
OUT
+3.3V
L2
22uH
C53
100nF
C55
47uF/25V
Y1
24.576MHz
TP13
NC
VCC
GND
OUT
R79
R78
R80
100R
100R
100R
MCLK_1955
MCLK_CPLD
MCLK_DSP
+5V
C80
100nF
U21
74HCT245
G3
3EN1[BA]
3EN2[AB]
1
2
CS_75710
MOSI
SCK
R134
R133
R132
100R
100R
100R
IR_IN
R138
390R
R139
240R
+5V
J11
PH-10A 2.0mm
+5VSTBY
J6
PH-3A-2.0mm
STANDBY
1: working unit
0: unit in standby mode
Harman/Kardon
Title
HD 970 Main board
Size
A3
Document Number
HD970_PC01
Rev
1.2
Date:
Sheet 3 of 5



Title

Harman/Kardon

HD 970 Main board

Size	Document Number	Rev
A3	HD970_PC01	1.2

Date:

Sheet 4 of 5

Chassis screwed transformer

230V

0V

15V
2A

15V
300mA

15V
300mA

J5
CONN PLUG 6

D3
GBU8D

D2
GBU8D

TP31 C73
100pF
SYNC_384K

R105
1K

U14
LM2670T-12

C66
10nF

L3
47uH

D4
30BQ040

C62
470/35V
low-ESR

C63
470/35V
low-ESR

12V_ATAPI

TP17 TP30

J7
CONN PLUG 4

ATAPI PS

U20
DS1818

R119
1K

RST#

TP32

+3.3V

TP10
STANDBY

U16
LM2670T-5.0

C72
10nF

L4
47uH

D6
30BQ040

C69
470/35V
low-ESR

C70
470/35V
low-ESR

C51
4.7mF/35V

C52
4.7mF/35V

Coilcraft: RFB0810-470K
Sumida: RCH114-470K

+5V

U13
LM1117T-ADJ

C59
100nF

C65
100nF

R89
390R

R87
240R

C60
47uF/25V

+3.3V

TP19

D5
30BQ040

+1.2V

U17
LM1117MPX-ADJ

C68
100nF

C71
47uF/25V

TP29

U9
LM317T-ADJ

+5VSTBY

TP12

C37
100nF

R73
240R

C38
47uF/25V

C42
100nF

R74
720R

Samwha capacitors:
47uF/25V SG serie
470uF/35V RZ serie
4.7mF/35V HC serie

C25
4.7mF/35V

C19
100nF

U6
LM317T-ADJ

+12VA

TP4

U10
LM1117MPX-ADJ

+5VA

TP11

R53
240R

C20
47uF/25V

C39
100nF

R75
240R

C49
47uF/25V

C43
100nF

R76
720R

R48
22K

R47
10K

Q27
2SC2406

C30
100nF

R58
2K2

Q26
BSS123

STANDBY

Q25
2SA1035

R34
22K

C16
100nF

R27
2K2

Q24
BSS123

R32
10K

Q23
2SA1035

R33
22K

R22
240R

C10
47uF/25V

C15
4.7mF/35V

C9
100nF

U3
LM337T-ADJ

-12VA

TP1

MT4 MT3 MT2 MT1

C91 C89 C54 C57
100nF

HS1 HS2 HS3 HS4
SK470

U19C
ADSP21532_TQFP

C67 47uF/25V

C74 C77 C82 C85
100nF

VDDRTC
VDDEXT
VDDINT
VROUT
GND

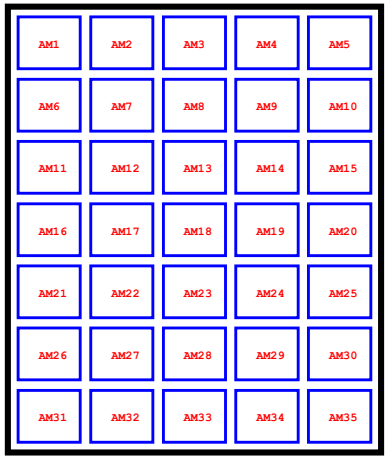
R95 R104 R94 R103
10K 10K 10K 4K7

TCK TDO TDI TMS TRST EMU

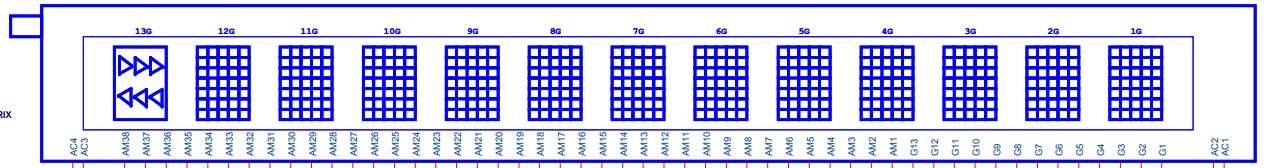
R93
10K

J8
CONN RECT 7x2

VFD 5*7 DOT MATRIX



3U5
VFD MATRIX



3U4
LC75710NE

LC75710NE

3JP1=OPEN
3C7=47uF/35

J3
RB5
RA1
GND
RI_IN
REMOTE
GND

3J2
RDX_OUT
CS_75710
MOSI
+5V
GND
SCK
GND
IR_IN

IR_PC817
FCS
SIN
+5V
GND
SCK
GND
IR_AM3370

PH-10A-2.0mm

3R16 4.7K N/A
3R18 4.7K N/A
3R19 4.7K N/A
3D10 1N4148
3R2 22K
3C18 2.2uF
LC75710NE RESET
3C21 47uF/10V
3CB5 104
3R3 3.3K
3CB7 104
3C9 47pF

3U3
LM9022
SHUTDOWN
BYPASS
+IN
-IN
VO2
GND
VDD
VO1

3R11 10K
3R12 10K
3R10 10K
3R17 2.2K
3C19 105
3C20 123
3C10 220uF/10V
3CB4 104

3C12 47u/35V
3R9 0R
3R15 100R
3R13 100K
3R14 100R
3DZ1 ZENER 6.2V0.4W
3C11 47u/35V
3R6 0R
3C8 47uF/35V

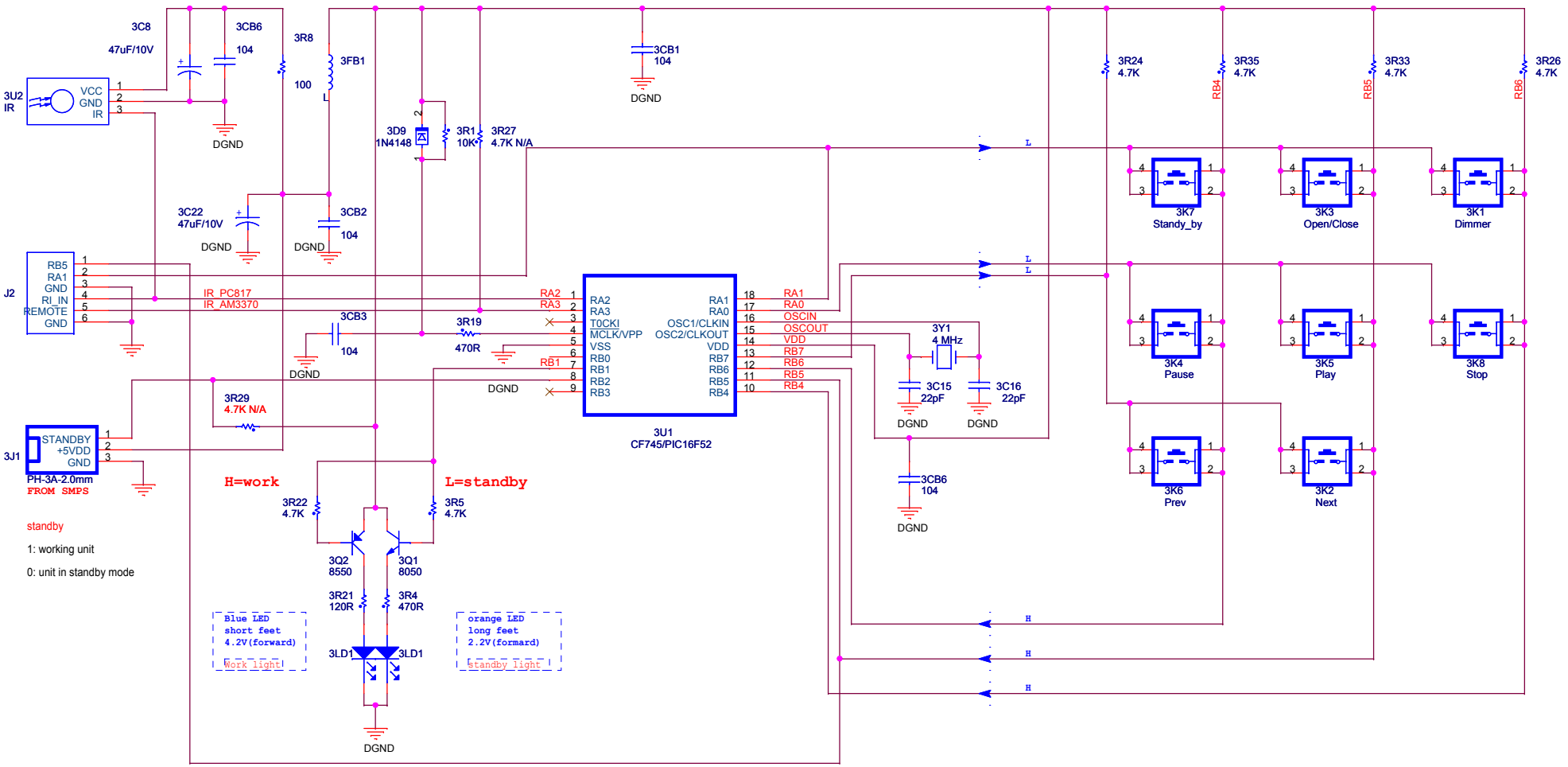
3C17 47uF/50V
3C7 47uF/50V
3C6 47uF/50V
3C5 47uF/50V
3C4 47uF/50V
3C3 47uF/50V
3C2 47uF/50V
3C1 47uF/50V

3D11 1N4148
3D8 1N4148
3D7 1N4148
3D6 1N4148
3D5 1N4148
3D4 1N4148
3D3 1N4148
3D2 1N4148
3D1 1N4148

DGND
AC1
AC2
-29V
-26V

harman/kardon®
Harman Kardon, Northridge, California 91329, USA

Title	CD_HD970	
Size C	Document Number 1763C	Rev 1.4
Date	Sheet 2 of 2	



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Harman Kardon, Northridge, California 91329, USA

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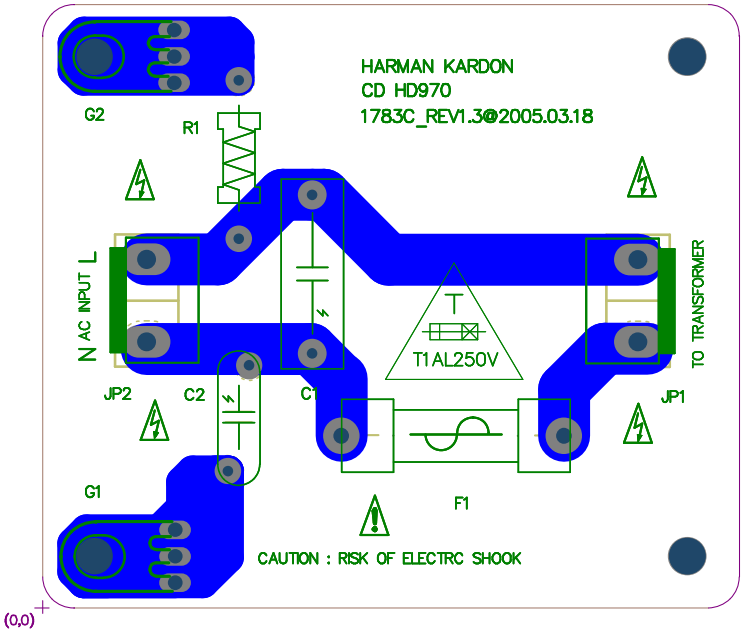
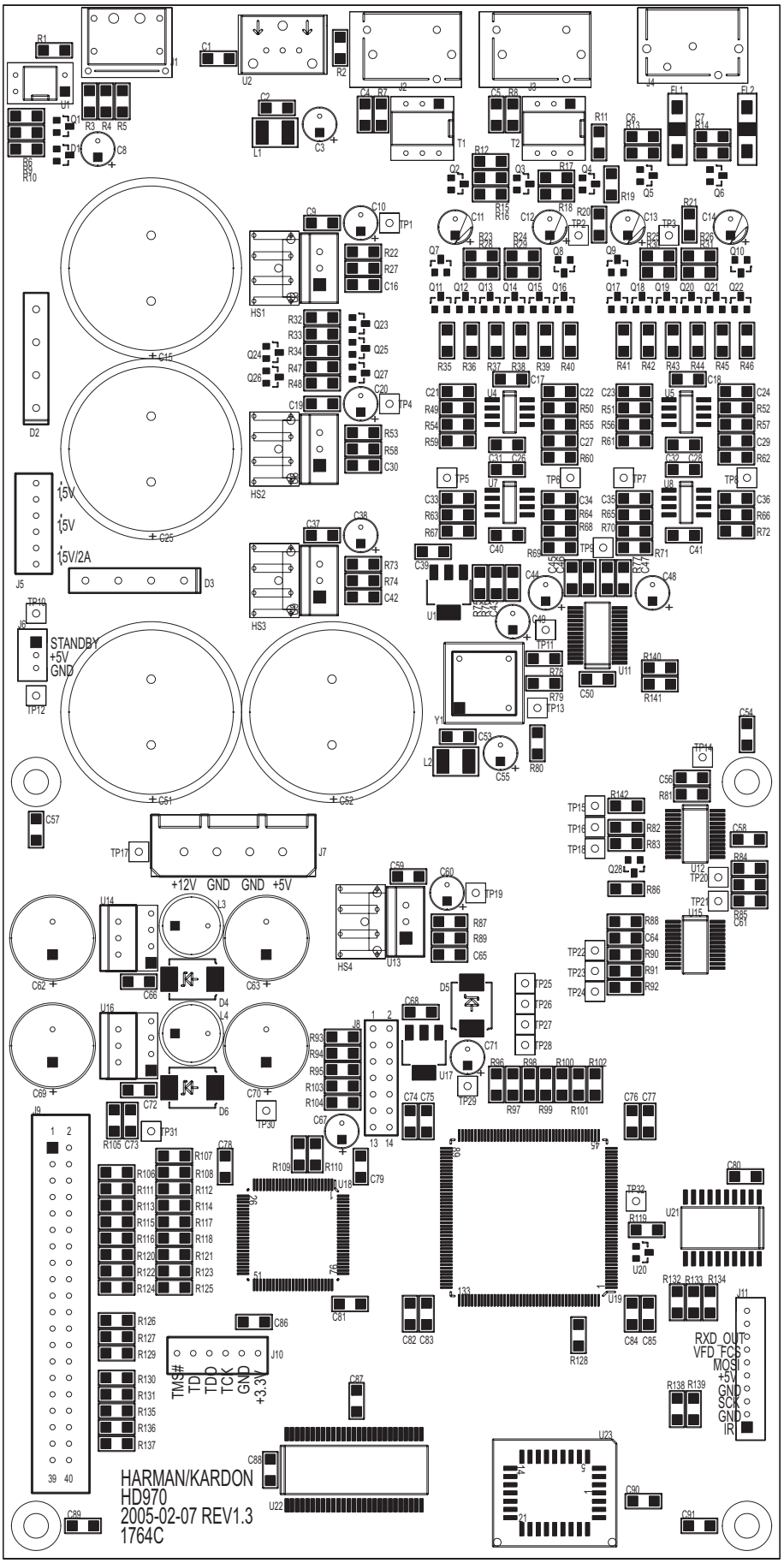
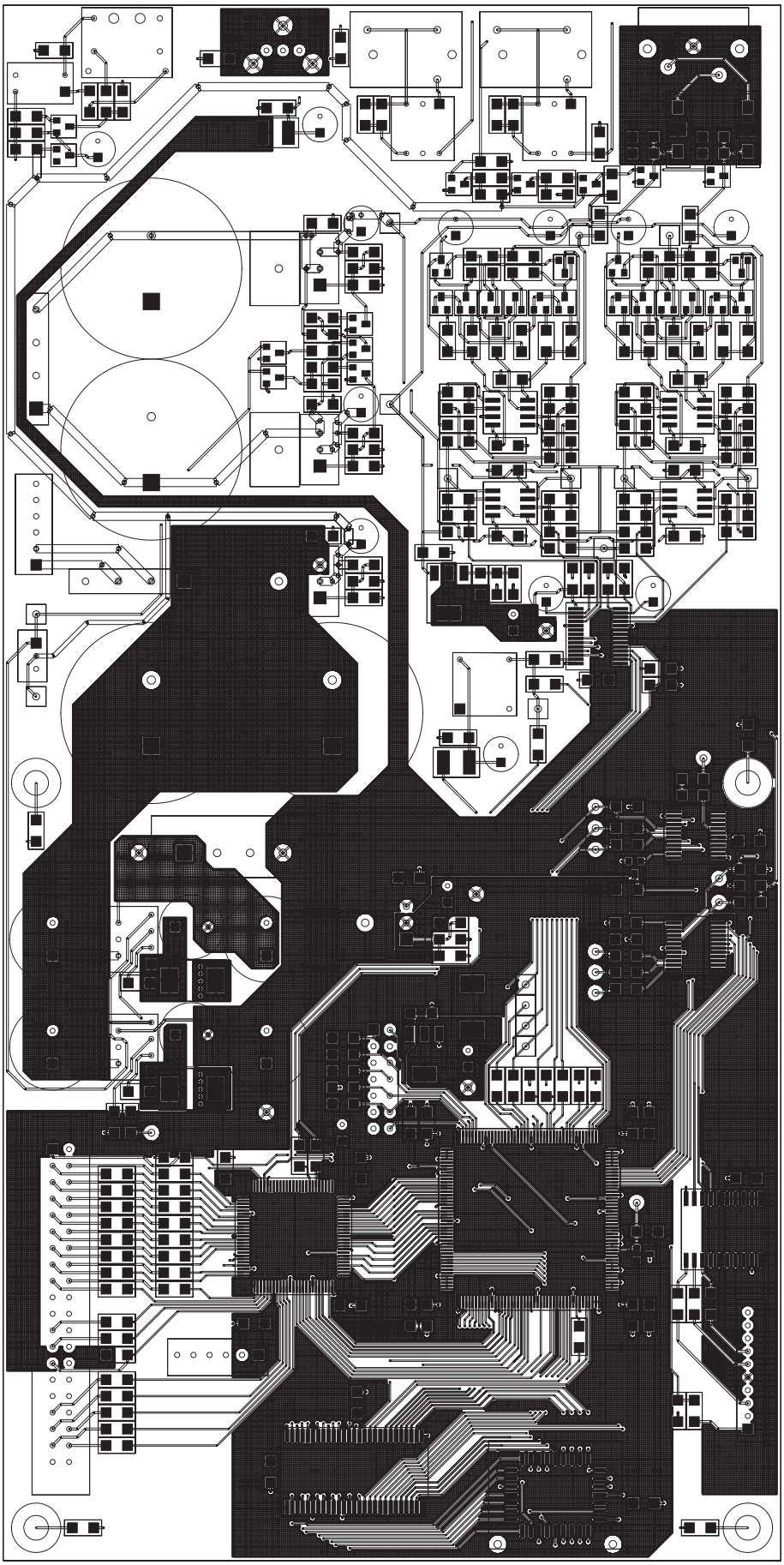
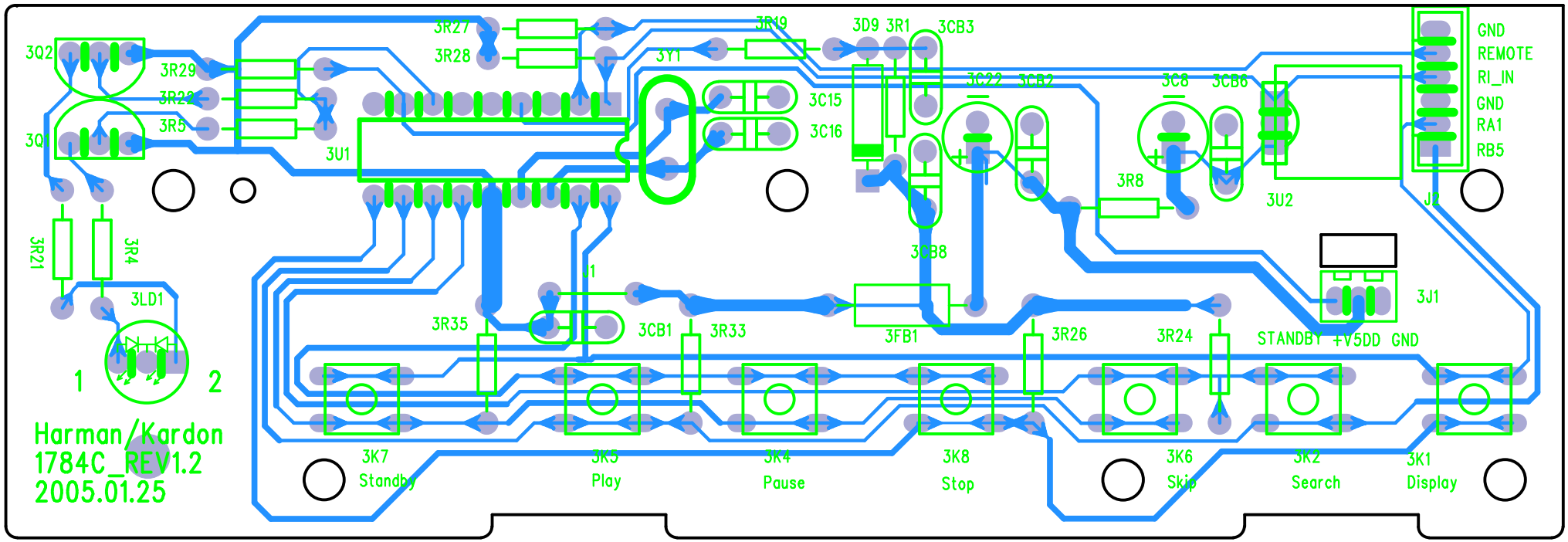
Date: Saturday, April 16, 2005	Sheet 1 of 2	


HARMAN KARDON
CD HD970
1783C_REV1.3@2005.03.18
G2
R1
N AC INPUT L
TO TRANSFORMER
T1AL250V
JP2
C2
C1
JP1
G1
F1
CAUTION : RISK OF ELECTRC SHOOK
(0,0)


15V
15V
15V/2A
STANDBY
+5V
GND
+12V GND GND +5V
TMS#
TDI
TDO
TCK
GND
+3.3V
RXD_OUT
VFD_FCS
MOSI
+5V
GND
SCK
GND
IR
HARMAN/KARDON
HD970
2005-02-07 REV1.3
1764C

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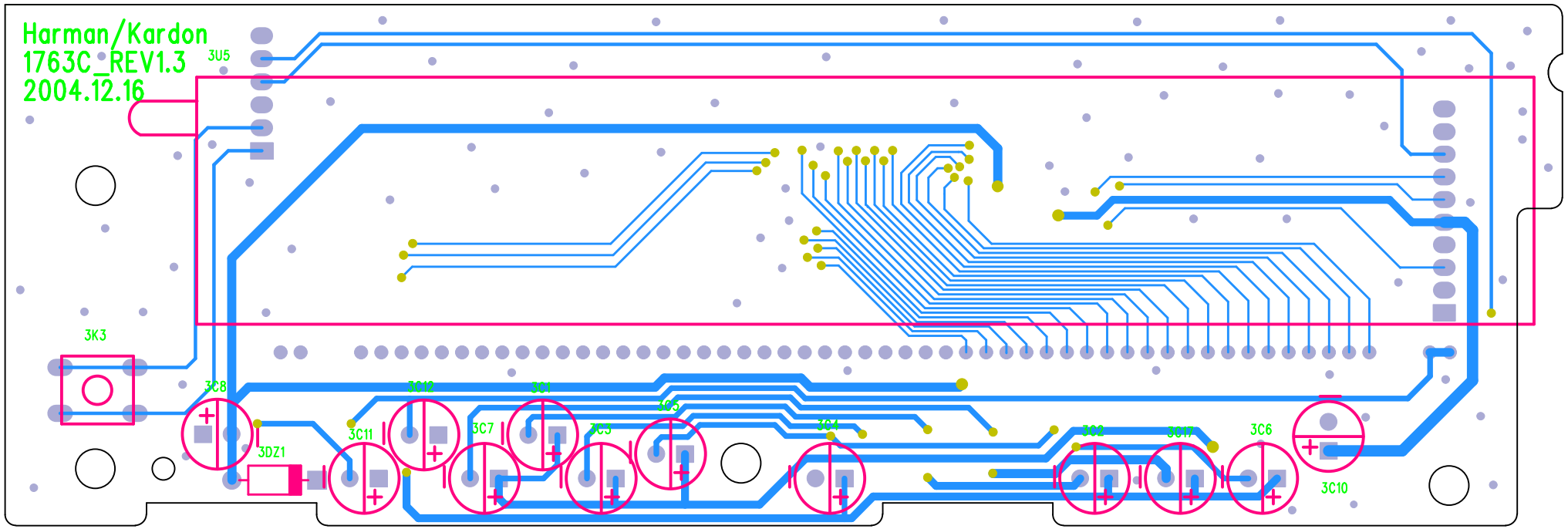
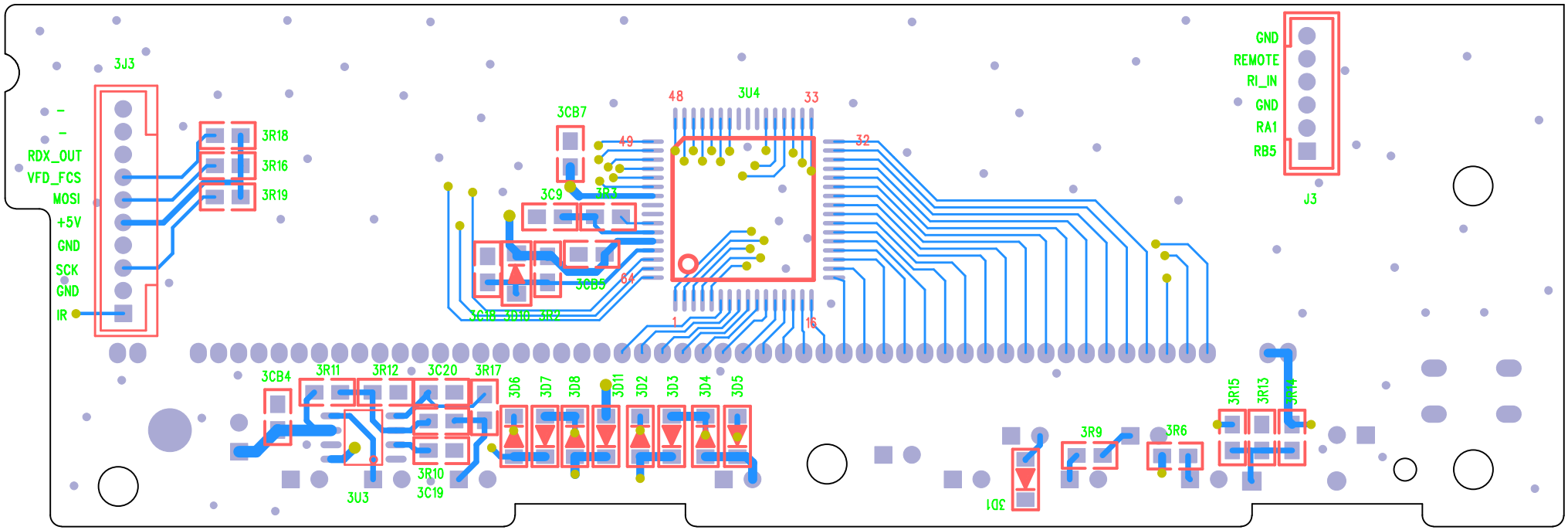
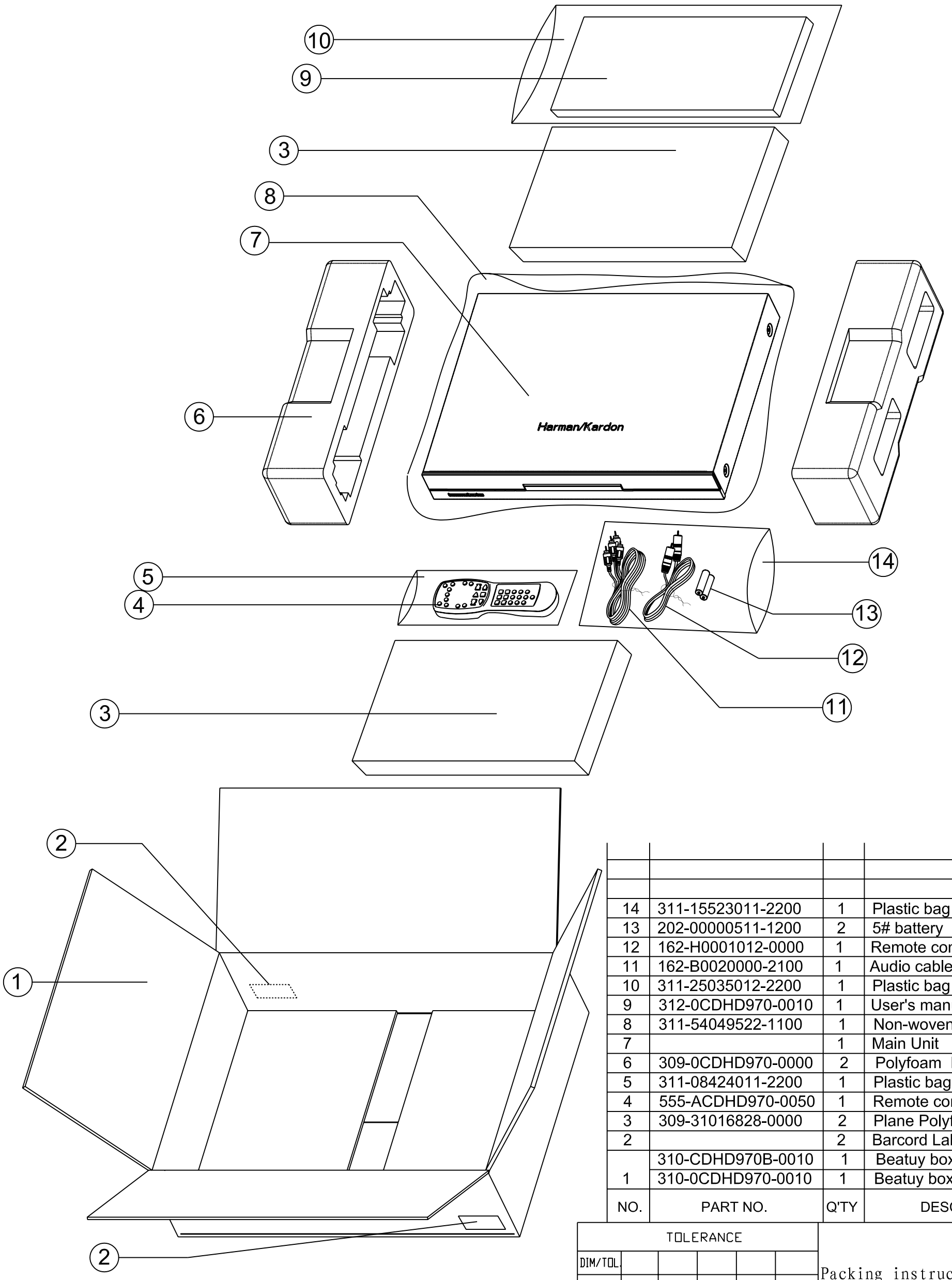
3Q
3R29
3R28
3R5
3U1
3R27
3R28
3Y1
3R19
3D9 3R1
3CB3
3C15
3C16
3C22 3CB2
3C8 3CB6
3R8
3U2
J2
GND
REMOTE
RI_IN
GND
RA1
RB5
3R21
3R4
3LD1
1
2
3CB8
J1
3R35
3CB1
3R33
3FB1
3R26
3R24
3J1
STANDBY +V5DD GND
Harman/Kardon
1784C_REV1.2
2005.01.25
3K7
Standby
3K5
Play
3K4
Pause
3K8
Stop
3K6
Skip
3K2
Search
3K1
Display


Harman/Kardon
1763C_REV1.3
2004.12.16
3U5
3K3
3C8
3DZ1
3C11
3C12
3C7
3C1
3C5
3C3
3C4
3C2
3C17
3C6
3C10


3J3
-
-
RDX_OUT
VFD_FCS
MOSI
+5V
GND
SCK
GND
IR
3R18
3R16
3R19
3CB7
3C9
3R3
3CB5
3U4
48
33
49
32
64
1
16
3CB8
3R10
3R2
3CB4
3R11
3R12
3C20
3R17
3D6
3D7
3D8
3D11
3D2
3D3
3D4
3D5
3U3
3R10
3C19
3D1
3R9
3R6
3R15
3R13
3R14
GND
REMOTE
RI_IN
GND
RA1
RB5
J3



14	311-15523011-2200	1	Plastic bag for AV cables
13	202-00000511-1200	2	5# battery
12	162-H0001012-0000	1	Remote control transmission cable
11	162-B0020000-2100	1	Audio cable
10	311-25035012-2200	1	Plastic bag for user's manual
9	312-0CDHD970-0010	1	User's manual HD970
8	311-54049522-1100	1	Non-woven bag for unit
7		1	Main Unit
6	309-0CDHD970-0000	2	Polyfoam HD970
5	311-08424011-2200	1	Plastic bag for remote control
4	555-ACDHD970-0050	1	Remote control HD970
3	309-31016828-0000	2	Plane Polyfoam
2		2	Barcord Label
1	310-CDHD970B-0010	1	Beatuy box for HD970B
	310-0CDHD970-0010	1	Beatuy box
NO.	PART NO.	Q'TY	DESCRIPTION

MARK	REVISION RECORD	DR.	DATE
3			
2			
1			

TOLERANCE					
DIM/TOL.					
xx	±0.10	±0.15	±0.50	±1.00	±2.00
xx.X	±0.05	±0.10	±0.20	±0.50	±1.00
xx.XX	±0.02	±0.05	±0.10	±0.20	±0.50
ANGEL	TOL.				
xx	±1°				
xx.X	±0.5°				
xx.XX	±0.2°				

Packing instruction		MODEL	HD970 HD970B
		DWG. NO.	
		PART NO.	
		MATARIAL	
DWG. BY:		SCALE	1 : 1
CHECY BY:		FINISH	
APPR. BY:		PAGE 1 OF 1	