



DLP PROJECTOR

SERVICE MANUAL

MODEL : PE8700

CAUTION

BEFORE SERVICING THE PROJECTOR,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



Contents

1. Safety Precautions	2
2. Servicing Precautions	2
3. Engineering Specification	3
4. Spare Parts List	23
5. Block Diagram	24
6. Packing Description	25
7. Appearance Description	26
8. Alignment Procedure	28
9. Trouble Shooting Guide	39
10. Factory OSD Operation	49
11. Firmware upgrade procedure	56
12. RS232 Codes	58
13. Schematics	69

1. Safety Precautions

1. Be sure to read this manual before servicing and save it for future reference.
2. The lamp becomes extremely hot during operation. Allow the projector to cool for approximately 45 minutes prior to removing the lamp assembly for replacement. Do not operate lamps beyond the rated lamp life. Excessive operation of lamps beyond the rated life could cause them to explode on rare occasions.
3. Never replace the lamp assembly or any electronic components unless the projector is unplugged.
4. To reduce the risk of electric shock, do not disassemble this appliance. Take it to a qualified technician when service or repair is required. Incorrect re-assembly can cause electric shock when the appliance is subsequently used.
5. Do not place this product on an unstable cart, stand, or table. The product may fail, sustaining serious damage.

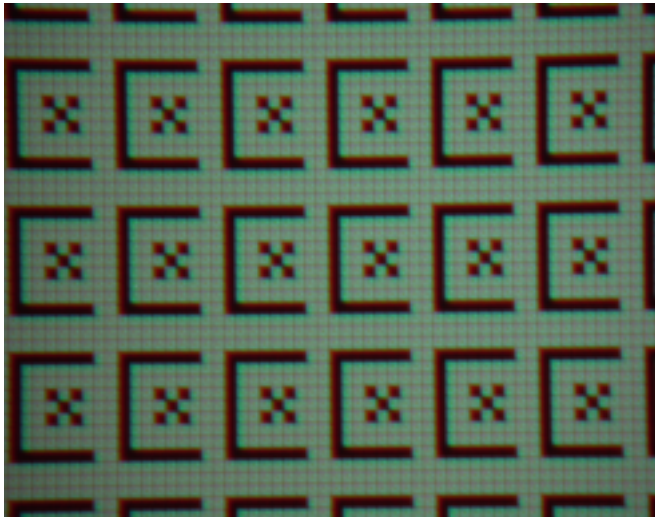
2. Servicing Precautions

1. When replace the lamp, be sure to avoid burns your fingers because the lamp becomes too hot.
2. Never touch the lamp bulb with a finger or anything else. Never drop it or give it a shock. They may cause bursting of the bulb.
3. This projector is provided with a high voltage circuit for the lamp. Do not touch the electric parts of power unit when turn on the projector.
4. Do not touch the exhaust fan during operation.

3. Engineering Specification

Superscripts indicate the method in Appendix B used for a given measurement, unless otherwise noted.

1.0 Image Quality	All tests must adhere to the assumptions in Appendix A	
1.1 Brightness	(In 'optical test' mode)	
1.1.1 Typical	660 ANSI Lumens	
1.1.2 Minimum	450 ANSI Lumens	
1.2 Brightness Uniformity	(In 'optical test' mode)	
1.2.1 Typical	73 %	
1.2.2 Minimum	60 %	
1.3 Contrast Ratio	(In 'optical test' mode)	
1.3.1 Peak Contrast	1400:1 (Minimum)	
1.4 Light Leakage		
1.4.1 Blue Edge	Procedure: Test @ distance 3m with 100% white pattern Criteria: Color coordinate x, y 0.015 (compared with the center)	
1.4.2 Light Leakage out of Active Area	< 1 lux @ diagonal 60"	
1.4.3 Reflective Edge	Condition: distance 3m or image of 100" wide Test Pattern: without connecting any source to projector Criteria: No horizontal and vertical lines outside of the image	
1.4.4 Blemish / Dust	Test Pattern: Blue 90 with linear de-gamma / Gray 6 Criteria: Follow HD2 DMD image quality specifications	
1.5 Color	All Color Measurements must adhere to the assumptions in Appendix A TBD --PPR final	
	X	Y
1.5.1 100% Gray (White)	.274 ± .04	.318 ± .04
1.5.4 Red	.647 ± .04	.341 ± .04
1.5.5 Green	.304 ± .04	.566 ± .04
1.5.6 Blue	.129 ± .04	.080 ± .04
1.6 Color Uniformity ²⁰	x	y
1.6.1 100% Gray (White)		
1.6.2.1 L1->L9	±.04	±.04
1.6.2.2 E10->E13	±.04	±.04
1.7 Mirror Defects / Dot Defects	Dark pixels ≤ 2, bright pixels = 0 (See Appendix D)	
1.8 Image Distortion	Pincushion	1.0%

	Keystone	1.0%
1.9 Descriptive Image Quality	There should be no streaks or jitter, good saturated colors, and crisp resolution. Must adhere to Appendix E	
1.10 Lateral Color	1 Pixel	
1.11 Screen Size for Testing	1). 52" Diagonal for OPT test; 2). Distance 3.0m for Focus test. (Tele @ the same Throw Distance.) Criteria: Pixel clear (same as test chart)	
2.0 Optical		
2.1 Optical Structure	Single Chip 0.8" 12° tilt DMD (HD2) from Texas Instruments (HD2 Front Projection Image Quality Specification described in Appendix D)	
2.2 Projection Lens	Manual Zoom & Focus	
2.2.2 F/#	2.8	
2.2.3 Throw Ratio	100" Diagonal at 3m (Wide)	
2.2.4 Zoom Ratio	1.2 : 1	
2.2.5 Focus and flare	As following chart: 	
2.3 Lamp		
2.3.1 Maker	Ushio	
2.3.2 Model	NSH 210 MD	
2.3.3 Type	DC lamp	
2.3.4 Lamp Wattage	210 watts	
2.3.5 Lamp life	1000 Hours (Typical)	
2.4 Focus Distance	1.5 – 5m	
2.5 Keystone Correction		
2.5.1 Electronic	± 12°	
2.6 Colors	24-bit color	
2.7 Native Resolution		

2.7.1 PC Mode	1280 x 720 pixels
2.7.2 Video Mode	1280 x 720 pixels
3.0 Mechanical & Cosmetic	
3.1 Dimensions	400L x 347W x 116H
3.2 Weight	16.7 lbs (7581 g)
3.3 Security Slot	Kensington compatible slot 150N break away force
3.4 Feet	4 adjustable feet
3.5 Lamp Replace Position	Front
4.0 Compatibility	Supporting timing: see appendix E
4.1 RGB	PC Compatible VGA, SVGA, XGA
4.2 Video Signal	Composite, S-Video, Y/C _B /C _R
4.3 HDTV	DTV Y/P _B /P _R , DTV RGBHV ,DTV DVI-I (480P, 1080i, 720P, 576P, 540P)
4.4 Image Inversion	Mirror, Upside-down, Mirror Upside-down
4.5 Scaling	Scaling from other resolutions to native by O-plus™ scaling chip
4.6 Aspect ratio	ANAMORPHIC, 4x3, LETTER BOX, VIRTUAL WIDE.
5.0 Interface Connectors	
5.1 RGB Input	DVI x 1 (include 5.2.5)
5.2 Video Input	
5.2.1 Composite	RCA x 1
5.2.2 S-Video	S-Video x 1
5.2.3 Component	RCA x 3
5.2.4 Progressive component and DTV RGBHV	BNC x 5
5.2.5 Digital Video	DVI x 1 with HDCP
5.3 RS232C Input	Telephone jack
6.0 Electrical	
6.1 RGB	
6.1.1 Input	
6.1.1.1 Amplitude	0.7 ± 0.1 VPP at 75Ω termination, positive bright
6.1.1.2 Input Impedance	75Ω
6.1.1.3 Synch	TTL compatible
6.1.2 Computer Compatibility	The unit should be compatible with normal computer formats ranging from VGA to XGA.
6.1.3 Video Compatibility	Don't use BUBUKAU DVD for test equipment.

6.2 Control	
6.2.1 IR Receivers	
6.2.1.1 Location	2receiver, located on the front and rear of this projector
6.2.1.2 Range	8m (front) / 5m (rear) with 30 degree horizontal Angle and 15 degree vertical angle
7.0 Power Requirements	
7.1 Power Supply	VAC 100 – 240 Full range switch (50/60Hz), 3 Wire Grounded
7.2 Power Consumption	310W max.
7.3 Power Connector	IEC
8.0 Audible Noise Level	34 dB (Max) @ 25 sea level
9.0 Thermal	
9.1 Surface Metal	60°C
9.2 Surface Plastic	65°C
9.3 Exhaust Air	80°C
9.4 Screws, Terminals	70°C
10.0 Contamination	
10.1 Prevention	Optical system is closed
10.2 Dust in Optical Path	No noticeable dust
11.0 Included Accessories	
11.1 Cables	Power Cord Set (US, UK, Euro) x 1, VGA Cable (1.8m) x 1, Projector Common Cable x 1
11.2 Printed Matter	User's manual
11.3 Remote Control	IR Remote x 1, AAA Batteries x 2
12.0 User Interface	
12.0 Backlight	NO
12.1 Operator Panel	YES
12.2 Indicators	Power Status LED, Lamp Status LED
12.3 Remote Control	Front IR receiver , Rear IR receiver
12.4 Onscreen Menu	Should be in 3 languages (English, French, Spanish)
12.8 User's Manual	Should be in 3 languages (English, French, Spanish)
13.0 Reliability	
13.1 General Failure Def.	See Appendix B
13.2 MTBF	20000 hours except for DMD chip , lamp , fans and color wheel.
14.0 Environmental	
14.1 Operating	10 – 35°C, 20 – 90%RH, without condensation
14.2 Storage	-10 – 70°C, 20 – 90%RH, without condensation
14.3 Altitude	0 – 6000 feet above sea level, ambient 30
14.4 Shock	

14.4.1 Straight Drop	50mm
14.4.2 Tilt Over	Should be able to fall over from tilting without taking any damage. Must Adhere to Appendix B
14.5 Gas	No corrosive, toxic, or combustible gas should be emitted
14.6 Electrostatic Discharge	comply to the acceptance criteria as specified in EN 61000-4-2/1995
15.0 Regulatory	UL, CE, FCC Class B. Must Adhere to Appendix B Section 10.0
15.1 Safety Requirements	<p>UL compliance: UL6500 (2th Version)</p> <p>CSA compliance: E60065-00</p> <p>TUV compliance: IEC60065:2001</p> <p>CCC: GB8898; GB13837; GB17625.1: 1998</p>
15.1 EMI Requirements	<p>1. CE Mark compliance: EMC: 89/336/EEC</p> <p>EN 55013:1990+A12 :1994+A13 :1996+A14 :1999</p> <p>EN 61000-3-2:1995+A1 :1998+A2 :1998+A14 :2000</p> <p>EN 61000-3-3:1995+A1 :2001</p> <p>EN 55020:1994+A1 :1996+A12/A13/A14 :1999</p> <p>IEC 61000-4-2/2001</p> <p>IEC 61000-4-3/2001</p> <p>IEC 61000-4-4/1995+A1:2000+A2:2001</p> <p>2. FCC</p> <p>FCC Part 15B</p> <p>3. C-Tick</p> <p>ASIN2S 1053:1996</p> <p>4. VCCI</p> <p>VCCI/2002(15th Edition)</p>
16.0 Packaging	
16.1 Packaging Form	Must adhere to attached file
16.1.1 Dimensions	537 x 520 x 260 mm
16.1.2 Weight	TBD
16.1.3 Palletization	1140 x 1050 x 120 mm
16.1.4 Carton Labeling	Must adhere to attached file
16.2 Vibration	Must adhere to Appendix B
16.3 Drop Test	Must adhere to Appendix B

Appendix A Optical Measurement

This part of the Optical Test Instruction describes those measurements to be executed during the production of the optical engines.

Content:

- A1 BRIGHTNESS
- A2 BRIGHTNESS UNIFORMITY
- A3 BRIGHTNESS DIFFERENCE
- A4 ANSI CONTRAST
- A5 PEAK CONTRAST
- A6 LIGHT LEAKAGE
- A7 IMAGE DISTORTION
- A8 THROW RATIO
- A9 ZOOM RATIO
- A10 FOCUS RANGE
- A11 COLOR
- A12 COLOR UNIFORMITY
- A13 OPTICAL KEYSTONE (FIXED)

● **General requirements**

1. The unit shall be allowed to stabilize without further adjustment for a minimum of 10 minutes, at nominal ambient room temperature of 25°C, before making measurements.
2. Measurements shall take place in a light proof room, where the only source of illumination is the projector. Less than 1% of the light on the screen shall be from any source other than the projector.
3. All measurements shall be made on flat screens that do not provide any advantage to the performance of the unit
4. All measurements shall be made at standard color temperature setting, 100% white image (per ANSI IT7.228-1997), except where noted

- **Practical consideration**

1. When measuring contrast manually, operators should not wear white clothing since light reflected from white clothing can influence the measurement.
2. Unless otherwise specified the projection lens is set in the widest zoom position since zoom function can influence the measurement.
3. Measurement should be performed with Minolta Chromameter, Model CL-100, or equivalent.

- **A1. BRIGHTNESS**

Unit: Lumen

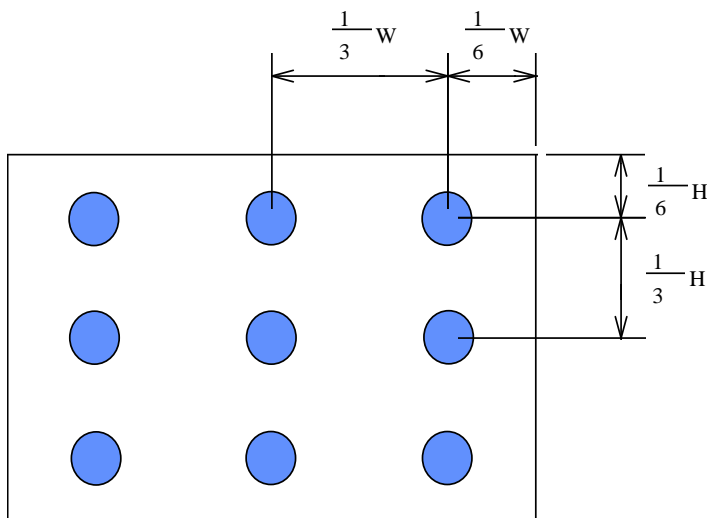
Brightness: Default

Contrast: Default

W: width of projected image; H: height of projected image

A (Area) = W * H (in meters)

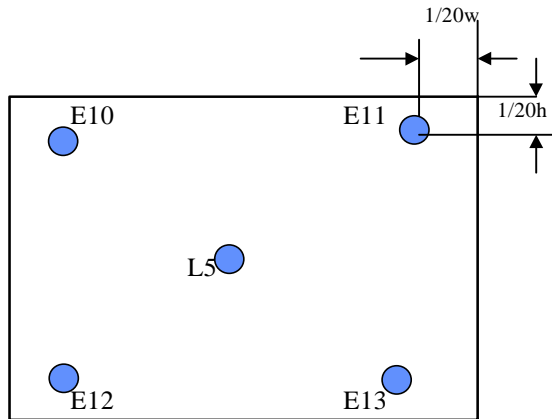
$$\text{ANSI Lumens} = \frac{L1 + L2 + L3 + L4 + L5 + L6 + L7 + L8 + L9}{9} (\text{lux}) * A(\text{m}^2)$$



- **A2. BRIGHTNESS UNIFORMITY**

Unit: %
 Brightness: Default
 Contrast: Default

$$\text{Uniformity} = \frac{\text{MIN}(E10, E11, E12, E13)}{\frac{L1 + L2 + L3 + L4 + L5 + L6 + L7 + L8 + L9}{9}}$$



- **A3. BRIGHTNESS DIFFERENCE**

Unit: %
 Brightness: Default
 Contrast: Default
 Brightness Difference=

$$\text{Brightness Difference} = \frac{(\text{MAX}(E10, E11, E12, E13) - \text{MIN}(E10, E11, E12, E13))}{\frac{L1 + L2 + L3 + L4 + L5 + L6 + L7 + L8 + L9}{9}}$$

- **A4. ANSI CONTRAST**

Unit: Contrast : 1
 Brightness: Default
 Contrast: Default

Contrast Ratio shall be determined from illuminance values obtained from a black-and-white "chessboard" pattern consisting of 16 equal rectangles. The white rectangles shall be at 100% gray and the black rectangles at 0% gray. Illuminance measurements shall be made at the center of each of the rectangles.

Contrast Ratio = Average lux value of the white rectangles / Average lux value of the black rectangles

- **A5. PEAK CONTRAST**

Unit: Contrast : 1

Brightness: Default

Contrast: Default

Contrast Ratio = Lux value at the center of a solid white screen/the lux value of a solid black screen

- **A6. LIGHT LEAKAGE**

Unit: Lux

Brightness: Default

Contrast: Default

Leakage = The maximum light leakage of a solid black screen outside the projected image

- **A7. IMAGE DISTORTION**

Unit: %

Brightness: Default

Contrast: Default

Measurement procedure:



Measure the dimensions H1, H2 and H3, with H3 at the half image width, as shown above for both zoom settings. For each the distortion is defined as:

$$TV - dist = \frac{H1 + H2 - 2 * H3}{2 * H3} * 100\%$$

All should be within the absolute specification tolerance.

- **A8. THROW RATIO**

Unit: Ratio : 1

Brightness: Default

Contrast: Default

Throw ratio = projection distance / the width of the projected image

- **A9. ZOOM RATIO**

Unit: Ratio : 1

Brightness: Default

Contrast: Default

Zoom ratio = maximum / minimum image diagonal size at a fixed projection distance.

- **A10. FOCUS RANGE**

Unit: m (Max~Min)

Brightness: Default

Contrast: Default

The minimum/maximum focus distance is the minimum/maximum projection distance (front side projection lens and the image lane), expressed in meter, at which the image is still at its best for focus.

- **A11. COLOR**

Unit: x, y

Measurements at the center (except in the case of color uniformity measurements) of a screen which is entirely of the color being measured and at default brightness and contrast settings.

- **A12. COLOR UNIFORMITY**

Unit: x, y

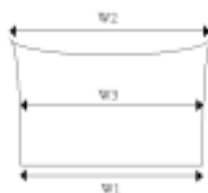
Difference between any two points out of Lx and Ex should not exceed the specification for the given color.

- **A13. OPTICAL KEYSTONE (FIXED)**

Unit: %

Brightness: Default

Contrast: Default



Measure the dimensions W1, W2 and W3 at the half image height, as shown above. The distortion is defined as:

$$TV - dist = \frac{W1 - W3}{W3} * 100\% \quad \& \quad TV - dist = \frac{W2 - W3}{W3} * 100\%$$

Appendix B Design Verification Test Procedure

1. Purpose

This standard establishes the environmental specification for projector related products, which defines the level of product performance and reliability in the field. It is not necessary the intent of these specification to simulate a typical user environment, but rather to provide for a level of product robustness that when applied over a wide range of manufacturing variability and environmental usage conditions.

2. Test Summary

Dynamic Testing	Specification
Package Drop	76cm, 1 drop per orientation, all 6 primary surfaces, plus a selected corners, and three selected edges, total of 10 drops
Package Vibration	Random , 0.01g ² /Hz, 5~100Hz, all primary axis, 20 min per orientation, total of 60min Sine , 0.5g, 5~200Hz, 1 octave/min, 15 min dwell on each resonant frequency, all primary axis, one sweep (30min minimum) per orientation, total of 90+min
Shock, non-operating	50g, 20ms half-sine, all primary axis, 1 shock per orientation, total of 3 shocks
Security Lock	150N break away force
Fragility	Shock , 50g, 20ms half-sine, all primary axis, 1 shock per orientation, total of 3 shocks Accelerate Life Test (operating) , 65 °C, 72hr Thermal shock(bare board) , -65~125 °C, 48hr Input Voltage , 90~264V Input RGB signal , 0.7V±0.1
Atmospherics	
Temperature/Humidity, operating	10~35°C/10~80RH, 48hr
Temperature/Humidity, non-operating	-10~70°C/10~80RH, 48hr
Altitude, operation	0~6000ft@30°C, 4hr
Safety/EMC	
UL/cUL	
TUV Rheinland	
Fcc/CE/C-Tick	

3. Definition

3.1 Failure Criteria:

The product is expected to perform to its full potential without loss of function, performance, critical parametric changes, and other undesirable anomalies, over the applied boundaries of this specification. The following product failure are not allowed within the boundaries defined in this specification:

1. Failure including permanent damage, critical parametric changes (optical performance defined in Appendix A), and latent defects.
2. Failure requiring operator intervention.
3. Failure violating external laws, regulatory agency standards, and government directives.
4. Failure resulting in a safety, potential safety, issue.

3.2 EUT: Equipment under Test

3.3 Q: Peak Acceleration Response divided by acceleration input peak

4. Test Order

Atmospherics, Dynamic, and Safety test sets require separate units and can be processed in parallel. EUT testing shall be performed serially within each set.

Set 1 (3 units)

Dynamics:

Package Drop

Package Vibration

Shock

Bench Drop

Set 2 (3 units)

Atmospherics:

Temperature/Humidity, Operating

Temperature/Humidity,

Non-operating

Altitude, Operating

Aging

Set 3

Safety/EMC:

EFT

ESD

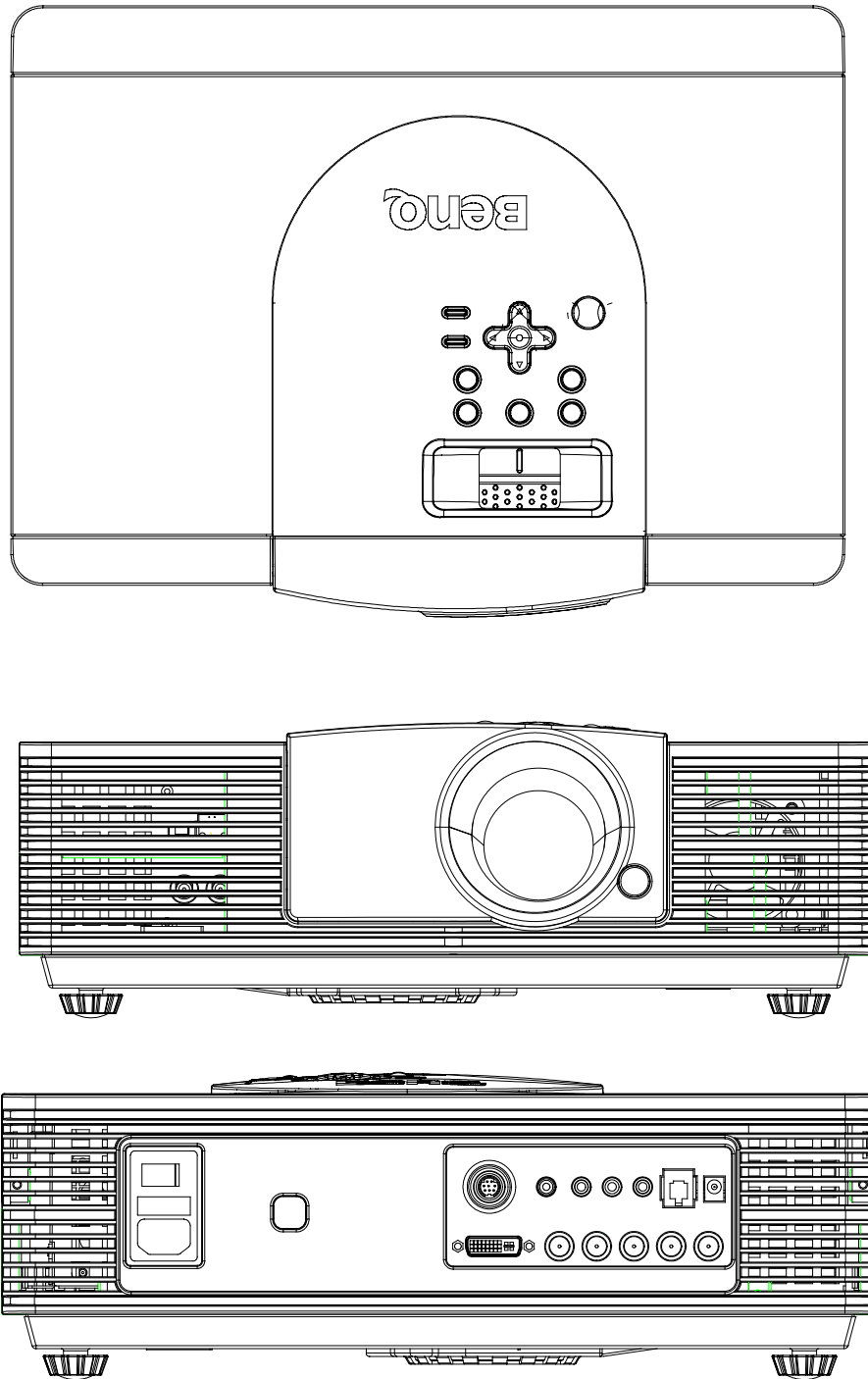
EMI-Radiated

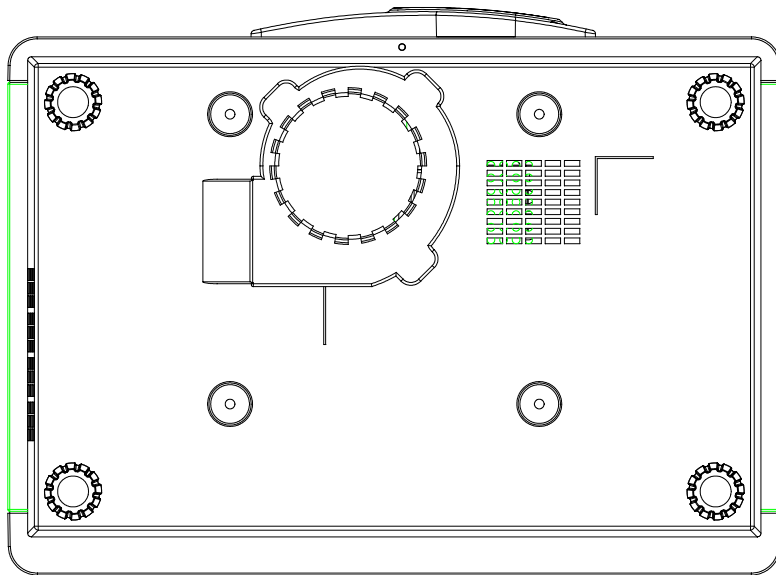
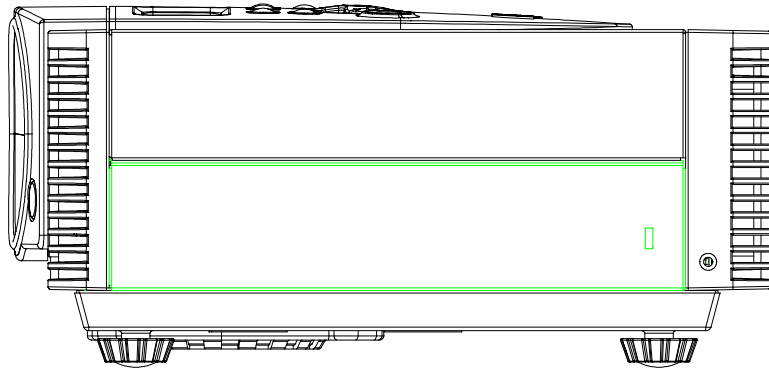
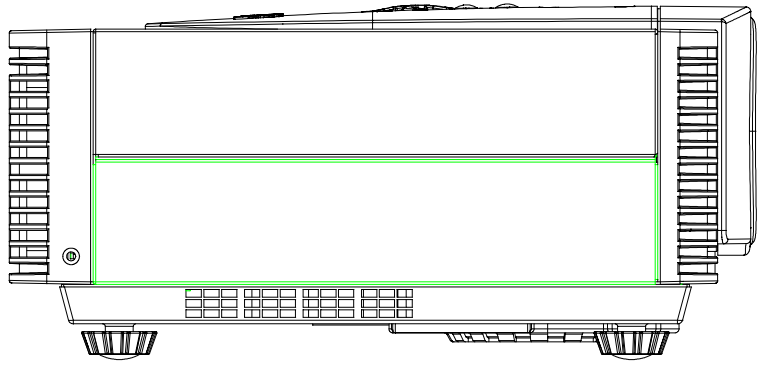
EMI-Conducted

EMI-Susceptibility

Appendix C Drawings and Attachments

Drawing 1: Top view of BENQ PE8700 video projector





Appendix D HD2 Front Projection Image Quality Specification

1. SCOPE

This document specifies the image quality requirements applicable to the HD2 Component Set for Front Projection image display. The HD2 Component Set provides digital imaging functionality based on Digital Micromirror Device (DMD) technology.

2. DEFINITIONS

2.1 Blemish

A blemish is an obstruction (dark blemish), reflection, or refraction of light (light blemish) that is visible, but out of focus in the projected image under specified conditions of inspection (see Table 1). It is caused by a particle, scratch, or other artifact located in the image illumination path.

2.2 Dark pixel

A dark pixel is a single pixel or mirror that is non-functional (stuck) in the OFF position.

2.3 Bright pixel

A bright pixel is a single pixel or mirror that is non-functional (stuck) in the ON position.

2.4 Unstable pixel

An unstable pixel is a single pixel or mirror that does not operate in sequence with parameters loaded into memory. The unstable pixel appears to be flickering asynchronously with the image.

2.5 Adjacent pixels

Adjacent pixels are defined as sharing a common border or common point.

2.6 Border defects

Border defects are bright blemishes (see 2.1) or bright pixel defects (see 2.3) in the non-active area that may be visible in front projection mode.

2.7 Blue test screen

This screen is used to test for major dark blemishes and dark pixels. All areas of the screen are colored at a specific blue level, based on MS Paint 0-255 RGB scale:

	Major Dark Blemish
Blue Value	90
Red Value	0
Green Value	0

2.8 Gray 6 test screen

This screen is used to test light blemishes and bright pixels. All areas of the screen are colored at a specific gray level, based on MS Paint 0-255 RGB scale:

	Major Light Blemish
Blue Value	6
Red Value	6
Green Value	6

2.9 Gray 10 test screen

This screen is used to test light blemishes and bright pixels. All areas of the screen are colored at a specific gray level, based on MS Paint 0-255 RGB scale:

	Major Light Blemish
Blue Value	10
Red Value	10
Green Value	10

2.10 White test screen

This screen is used to test light border blemishes and bright pixels. All areas of the active area are colored at a specific gray level, based on MS Paint 0-255 RGB scale:

	Major Dark Blemish
Blue Value	255
Red Value	255
Green Value	255

2.11 black test screen

This screen is used to test light border blemishes and bright pixels. All areas of the active area are colored at a specific gray level, based on MS Paint 0-255 RGB scale:

	Major Dark Blemish
Blue Value	0
Red Value	0
Green Value	0

2.12 Red Ramp test screen

This screen is used to test light border blemishes and bright pixels. All areas of the active area are colored at a specific gray level, based on MS Paint 0-255 RGB scale:

	Major Dark Blemish
Blue Value	0
Red Value	Start 0,end 255
Green Value	0

3. ACCEPTANCE REQUIREMENTS

3.1 Test Conditions (as tested in OEM projector)

- Projector degamma correction shall be linear. Using HD Control “Curtain” Mode is equivalent.
- Image noise reduction algorithms “Blue Noise STM” and “Boundary Dispersion” shall be set to “off”.
- Projector shall be used in front projection mode using a customer-specified screen, and OEM optical system.
- The diagonal size of the projected image shall be 52 inches (132cm).
- The projected image shall be inspected from a 60 inches (1.52 meter) minimum viewing distance.
- Projector will be properly focused on the DMD array as shown on the screen.
- Testing time is limited to 20seconds per screen.
- **Refer to Table 1 for acceptance criteria, in specified order:**

TEST ORDER	TEST	SCREEN	ACCEPTANCE CRITERIA
1	Major Dark Blemish	Blue 90	No dark blemishes visible on Blue 90
2	Dark Pixel	Blue 90 Zoned Screen (see below figure 1)	0 dark pixels allowed in Zone A <=2 dark pixels allowed in Zone B No adjacent dark pixels
3	Border Defects	Gray 10	No border defects visible
4	Major Light Blemish	Gray 6	No light blemishes visible on Gray 6

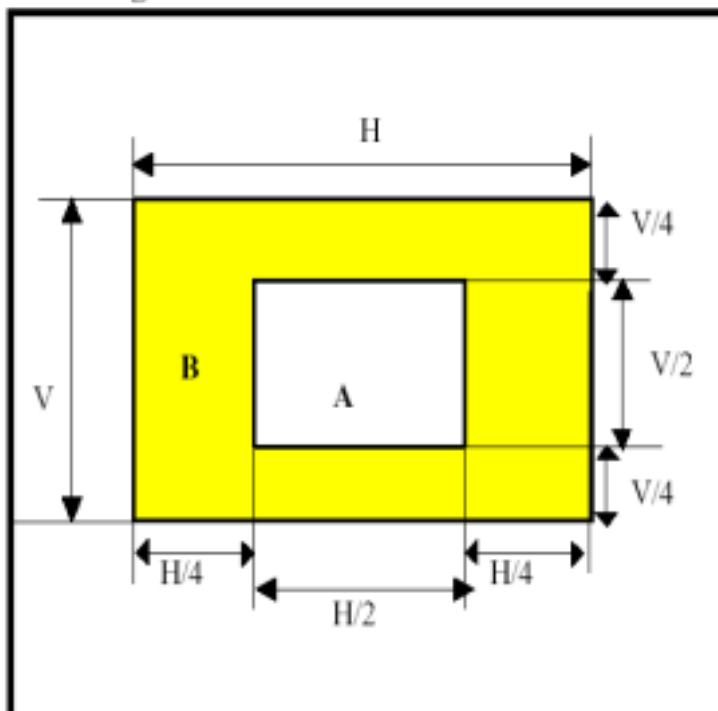
5	Light Pixel	Gray 6	No light pixels visible on Gray 6
6	Minor Blemishes	White or Black	Total of Dark and Light Blemishes 4 (See Test 4 , 5)
7	Unstable Pixel	Red Ramp Screen(or any other	No unstable pixels

TABLE 1. Image Quality Specification

Notes:

1. The acceptance basis for all cosmetic DMD defects will be the projected image tests referenced in Table 1.
2. Projected blemish numbers include the shadow of the artifact in addition to the artifact itself.(Count=4)
4. The projected image shall not contain any blemish more than 15 cm long, measured on a 1.32m diagonal screen.

Figure 1: Dark Pixel Defect Zoned Screen



NOTE: Zone A (x,y) coordinate definition is specified. Pixel defects on the zone A definition- line count

Appendix E Supporting Timings

Table 1: Support Timings by DVI-I Input (Analog or Digital PC signals)

		Resolution	Vert. Freq (Hz)	Hori. Freq (kHz)	Pixel freq (MHz)	Digital (D)/ Analog (A)	Polarity
1	VGA	640 x 400	70.089	31.470	25.167	D/A	-/+
2	VGA	640 x 480	59.590	31.470	25.167	D/A	-/-
3	VGA	640 x 480	85.008	43.269	36.0	D/A	-/-
4	SVGA	800 x 600	60.317	37.879	40.0	D/A	+/+
5	SVGA	800 x 600	75.000	46.875	49.5	D/A	+/+
6	SVGA	800 x 600	85.061	53.674	56.25	D/A	+/+
7	XGA	1024 x 768	60.004	48.363	65.0	D/A	-/-
8	XGA	1024 x 768	75.029	60.023	78.75	D/A	+/+
9	XGA	1024 x 768	84.997	68.677	94.5	D/A	+/+

Table 2: Support Timing by DVI-I Input

Index	Format name	Line Rate (kHz)	Pixel Rate (MHz)	Frame Rate (HZ)	Line active (pixel)	Line total (pixel)	Frame active (line)	Frame total (line)	H back porch (pixel)	H sync width (pixel)	V back porch (line)	V sync width (line)
1	480p59	31.469	27	59.94	720	858	480	525	59	63	30	6
2	576p50	31.25	27	50	720	864	576	625	68	64	39	5
3	720p50	37.5	74.25	50	1280	1980	720	750	260	40	20	5
4	720p59	44.955	74.176	59.94	1280	1650	720	750	260	40	20	5
5	720p60	45	74.25	60	1280	1650	720	750	260	40	20	5
6	1080i25	28.125	74.25	25	1920	2640	1080	1125	148	44	15	5
7	1080i29	33.716	74.176	29.97	1920	2200	1080	1125	192	44	15	5
8	1080i30	33.75	74.25	30	1920	2200	1080	1125	192	44	15	5

Table 3: EDTV and HDTV Timing supported by component (YPBPR) and RGBHV Input

Index	Format name	Line Rate (kHz)	Pixel Rate (MHz)	Frame Rate (HZ)	Line active (pixel)	Line total (pixel)	Frame active (line)	Frame total (line)	H back porch (pixel)	H sync width (pixel)	V back porch (line)	V sync width (line)
1	480i	15.734	13.5	59.94	720	858	480	525	59	63	30	6
2	576i	15.625	13.5	50	720	864	576	625	68	64	39	5
3	480p	31.469	27	59.94	720	858	480	525	59	63	30	6
4	576p	31.25	27	50	720	864	576	625	68	64	39	5
5	720p50	37.5	74.25	50	1280	1980	720	750	260	40	20	5
6	720p59	44.955	74.176	59.94	1280	1650	720	750	260	40	20	5
7	720p60	45	74.25	60	1280	1650	720	750	260	40	20	5
8	1080i25	28.125	74.25	25	1920	2640	1080	1125	148	44	15	5
9	1080i29	33.716	74.176	29.97	1920	2200	1080	1125	192	44	15	5
10	1080i30	33.75	74.25	30	1920	2200	1080	1125	192	44	15	5

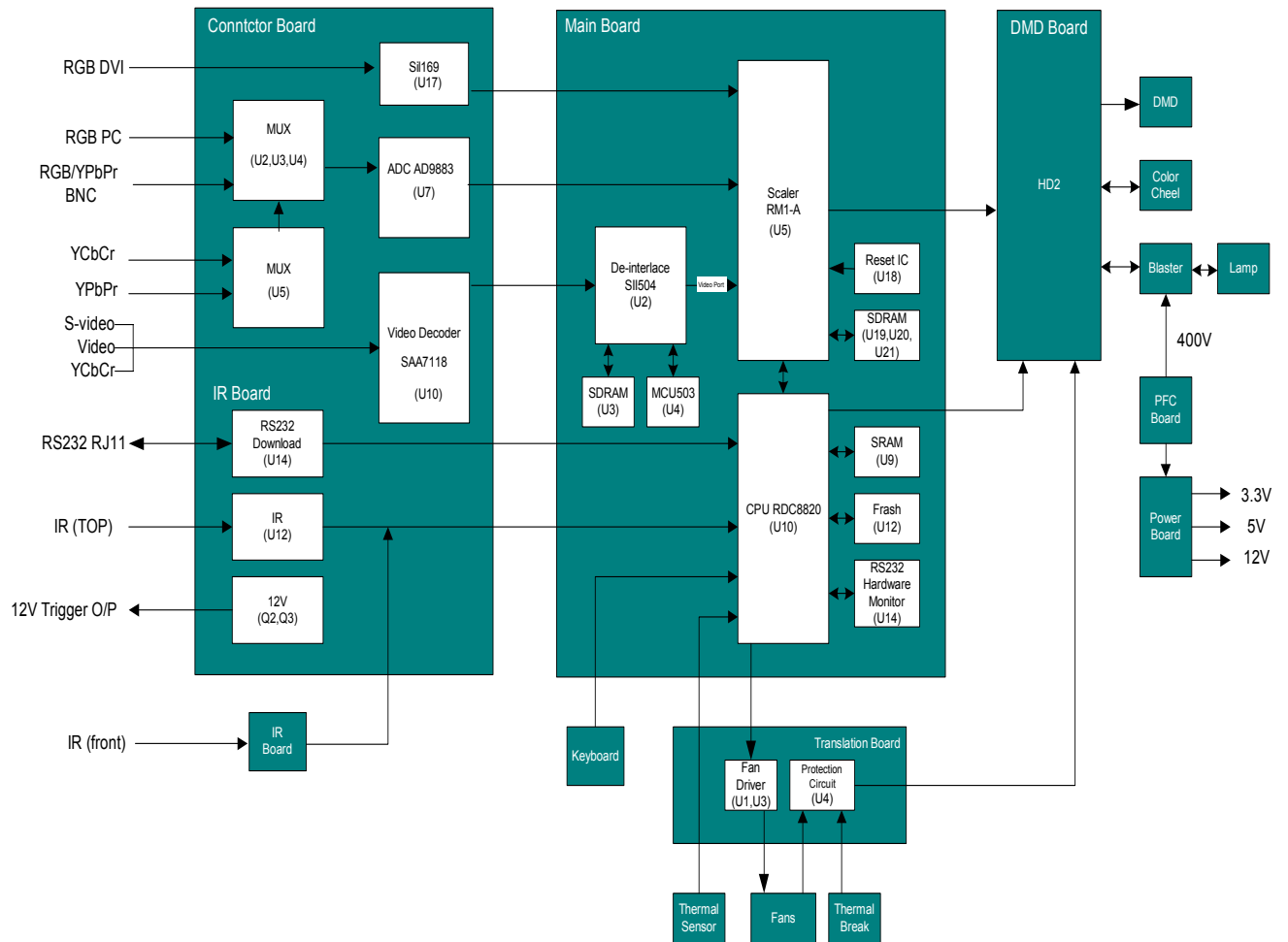
Chapter 4 Spare Parts List

Projector PE8700

99.J5877.B21

NO	Parts NO	Description
1	55.J2003.001	IR BD HT480W MI
2	55.J5801.011	PCBA MAIN/BD FOR BENQ
3	55.J5824.001	PCBA DMD BOTTOM/BD HT720G
4	55.J1313.001	PCB 1L SENSOR-B BD SL700 X MI
5	65.J2004.001	COLOR WHEEL SIX SEGMENT UNAXI
6	55.J5802.001	PCBA DMD/BD HT720G
7	65.J5801.001	ASSY LENS ZOOM HT720G PROT
8	71.00HD2.A00	IC MUSTANG DMD PREMIUM CLGA
9	65.J3403.001	ASSY BALLAST210W/USHIO DX660
10	55.J2006.010	PCBA KEYPAD/BD HT720G BENQ
11	55.J5817.001	PCBA TRANSLATION/BD HT720G
12	60.J2020.021	ASSY CVR BASE HT720W/BENQ
13	60.J2023.022	ASSY L/C HT720W/BENQ
14	60.J2037.011	ASSY CVR FRONT HT720W/BENQ
15	60.J2038.011	ASSY CVR BACK CONTOR HT720W
16	60.J2112.001	ASSY CVR LENS HT720W BENQ
17	55.J2013.001	PCBA THERMAL SENSOR/B HT480W
18	55.J2021.001	PCB FPC/BD FOR HT480W
19	55.J5810.011	PCBA CONNECTOR/BD FOR BENQ
20	55.J2005.001	PCBA POWER BD HT480W MI
21	55.J5811.001	PCBA PFC/BD HT720G
22	44.J2003.021	CTN AB 455X500X228 HT720G/BEN
23	47.J2008.001	CUSHION FRONT EPE HT480W
24	47.J5804.001	CUSHION REAR EPE HT720G BENQ
25	50.J2103.501	CABLE RGA/DVI-A (WHDDC) 1.8M
26	50.L2508.501	SIGNAL/C DUAL DVI-D/DVI-D 200
27	60.J2028.R01	ASSY AV CABLE RUNCO CL-500
28	98.J2032.B01	HT480W BENQ REMOTE CONTROL
29	60.J2104.CG1	ASSY CSD LAMP MODULE PE8700

5. Black Diagram



6. Packaging Description

CTN LBL PRINTING:

Model Name:

BenQ PE8700

Resolution :

1280x720

Made in Taiwan

ISSUE:XXX

S/N: 99J5877B21YWXXXXXH

UPC CODE
(840046003234)

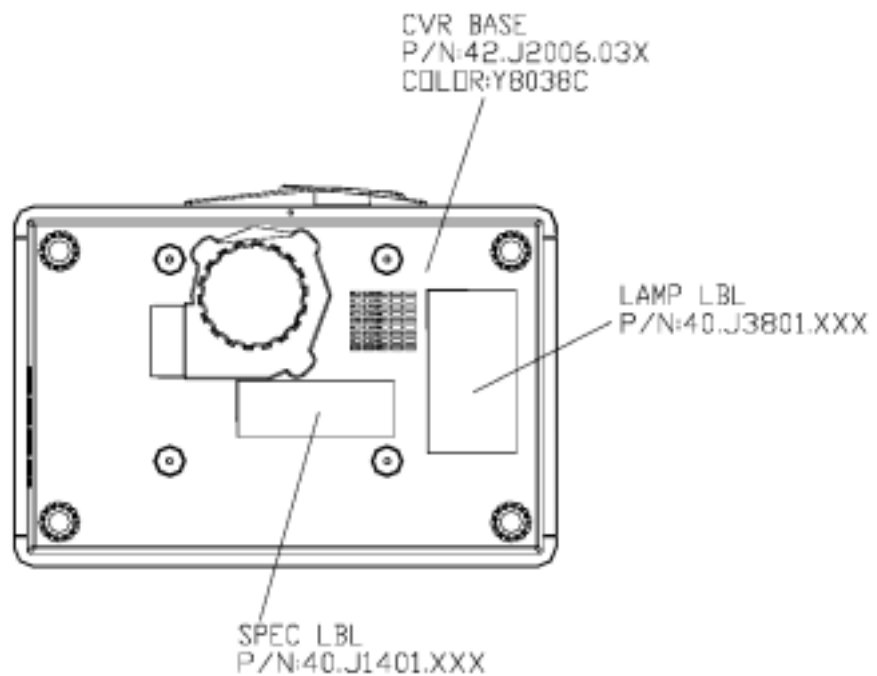
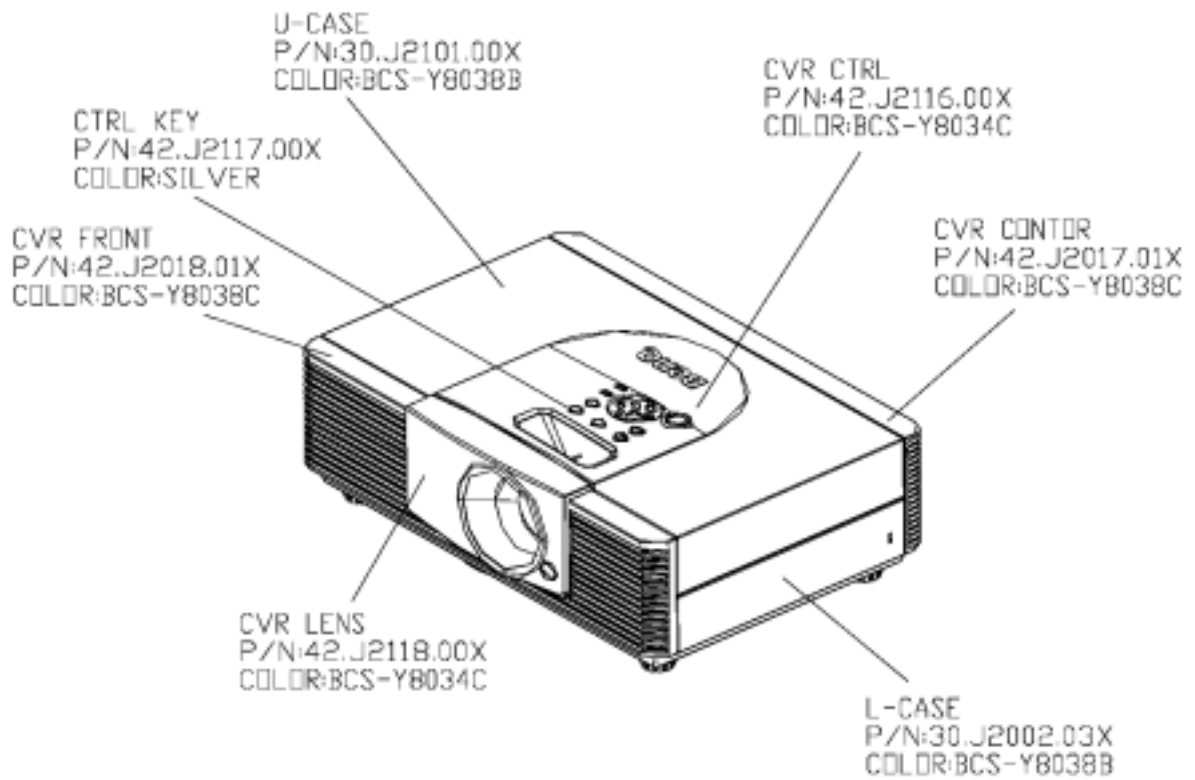
EAN CODE
(4718755152283)

BAR CODE 39

TEXT TYPE:
GillSans

P/N:45.L2701.001

7. Appearance Description



1. SPEC LBL PRINTING



P/N:40.J1401.132



3. LAMP LBL PRINTING



P/N:40.J3801.031

8. Alignment Procedure

1. DMD Bias Voltage Alignment

Equipment:

- None

Procedure:

1. Watch DMD chip Label
2. Switch the DIP switch on DMD board according to the character on the DMD chip

	B	C	D	E
1 of SW H1	1	0	1	0
2 of SW H2	1	1	0	0

0: Left; 1:Right

2. Color Wheel Delay Alignment

Equipment:

- Battery Biased Silicon PIN Detector
- Oscilloscope
- Probe

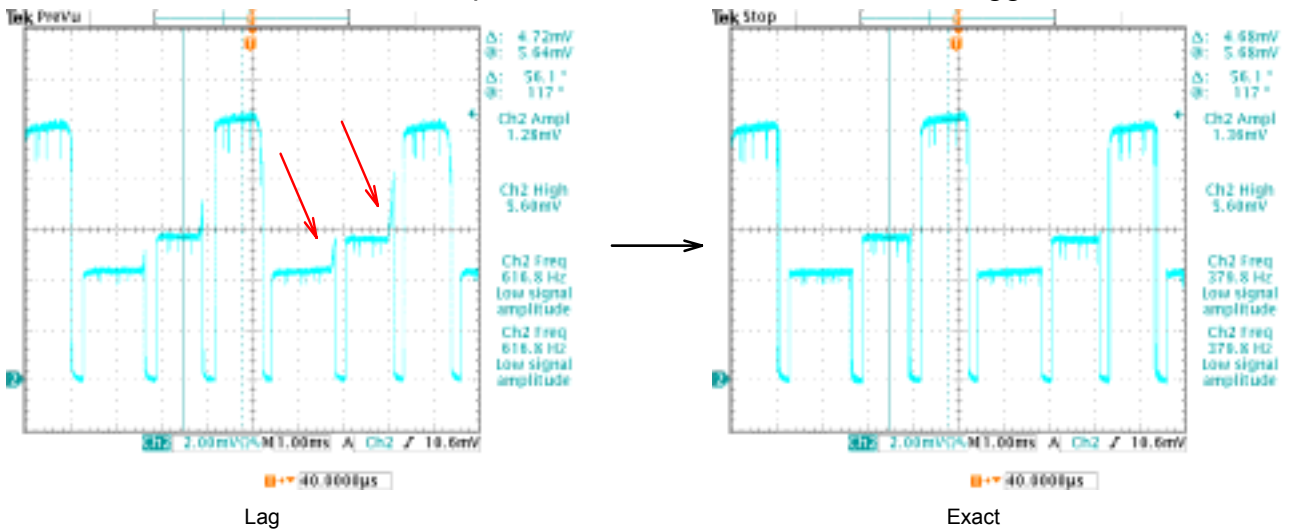
OSD Default value used for color delay alignment

Item	Value	Item	Value
USER>DVI-A>		Factory>DLP>	
Brightness	0	Brightness	0
Contrast	30	Contrast	49
Color	60	CW delay	20
Tint	15	User>Setup>Whit	
Sharpness	0	Red Gamma	66
Filter	2	Green Gamma	66
Color Temp	0	Blue Gamma	66
		R gain	512
		G gain	512
		B gain	512
		R Offset	0
		G Offset	0
		B Offset	0

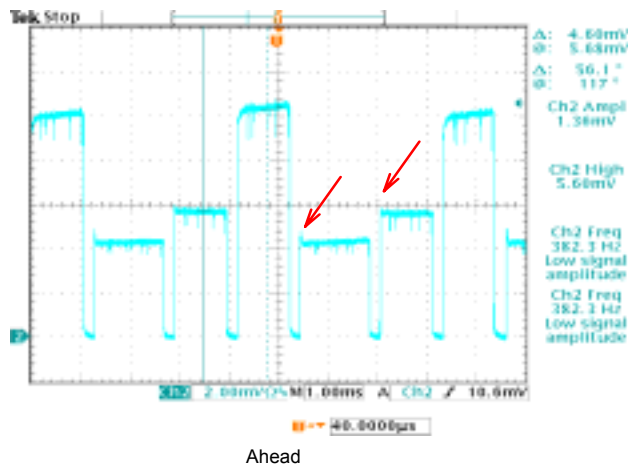
The default values let optical engine to get maximum contrast and brightness.

Procedure:

1. Probe impedance matches 50 ohm
2. Change Timing and pattern of pattern generator :
Timing : 800x600@60Hz (H:37.879Khz,V:60.317Hz)
pattern : full white
3. Adjust user & factory OSD values to default.
4. Open Factory OSD, and select color wheel delay item.
5. The image will become white.
6. Put the detector on the screen that white image was projected.
7. Watch the oscilloscope and notice the square waveform
8. Use the “→” and “←” key to increment or decrement the color wheel delay value
9. No matter the waveform is square or not, let the waveform was lagged first



10. Then increment or decrement the value to let the waveform to be square
11. Do not adjust too much, let the signal get ahead, if it happens, go back to step 7 and do it again.



12. Select “Save Setting” at “Factory OSD>Factory>”.

3. DVI-Analog Color Alignment Procedure

Default valve(User menu)

	contrast	color	Sharpness
Video	17	23	3
S-Video	17	23	1
Comp	17	30	0
Comp-HD	17	30	3
RGBHV	17	30	3
DVI-I	17	30	1

The Gamma(RED ,GREEN,BLUE) is 66 for temperature 0,1,2,3,4.

Equipment:

- Pattern generator (Chroma 2250)
- Lux meter (CL-100)

OSD Default value used for DVI-Analog color alignment

Item	Value	Item	Value
USER>Picture>		Factory>HDADJ>RG	
Brightness	30	R offset	55
Contrast	17	G offset	63
Color	30	B offset	62
Tint	15	R Gain	89
Sharpness	1	G Gain	89
Filter	1	B Gain	89
Color Temp	2		
		Factory>DLP	
		Brightness	0
		Contrast	49
		User>Setup>White	
		Gamma Red, Green,	66
		Gamma Red, Green,	0

Procedure:

A. Black Level Adjustment: (DLP brightness)

1. Change pattern of pattern generator :
Pattern : Black (Gray 0)
2. Adjust DLP Brightness to let the black picture to just distinguish.

B. White Level Adjustment: (AD contrast---R,G,B gain)

1. Change pattern of pattern generator :
pattern : White (100% Gray)
2. Use Lux meter to measure the white level. Adjust the contrast value of AD9883 (RGB) to let the light output to **just max**.
3. Change to **32-gray (0 ~ 100%)** pattern. All steps must appear,

C. Offset adjustment at low brightness (AD R, G, B offset)

1. Change Timing and pattern of pattern generator :
pattern : 10% Gray
2. Set user color temp to 6500K.
3. Adjust AD9883 Red and Blue Offset to meet 6500K color spec.

D. Color Temperature at high brightness (Scalar Gamma R, G, B Gain)

1. Change Timing and pattern of pattern generator :
Timing : 800x600@60Hz (H:37.879Khz,V:60.317Hz)
Pattern : 80% gray
2. Color temperature spec: CIE 1976 u', v' chromaticity)

Color temperature	5400°K	6500°K	7500°K
$x = \frac{27u'}{18u' - 48v' + 36}$	0.333	0.312	0.296
$y = \frac{12v'}{18u' - 48v' + 36}$	0.333	0.329	0.316
$u' = \frac{4x}{-2x + 12y + 3}$	0.210	0.197	0.190
$v' = \frac{9y}{-2x + 12y + 3}$	0.473	0.468	0.459
Deviation: $u'v' = \sqrt{(\Delta u')^2 + (\Delta v')^2}$	<=0.010	<=0.010	<=0.010

Color Temp 4 = color temp is the same as that of 6500K

3 The variance of color coordinate via R,G,B gains:

	x	Y
R ↓	X ↓	-
G ↓	-	y ↓
B ↓	X ↑	y ↑

4. Adjust 6500K temperature color by changing Gamma-Rgain, Ggain, and Bgain.

5. Open Factory OSD and set the factory default value :

user>setup>white	C0	C1(5400k)	C2(6500k)	C3(7500k)
Gamma-Rgain	512	512	512	512
Gamma-Ggain	512	412	467	479
Gamma-Bgain	512	398	452	490

User the lux meter and adjust Gamma-Rgain, Gamma-Ggain, & Gamma-Bgain to meet the spec.

6. Press “Save Graphics Color Temp” to save current setting into memory.

7. Select “Save Setting” at “Factory OSD>Factory>”.

8. Change pattern to **10% gray pattern** and measure the color temp. If 6500K color spec is not met, repeat all procedures in C and D.

9. Follow step 1 to 8 to adjust 5400K, 7500K color temperature.

10. For auto-alignment, use Command Y31/Y32/Y33 to save 5400K/6500K/7500K temperature

11. For auto alignment, use Command to reset Temp4 color temp to 6500K

4. YPBPR Color Alignment

(A) YPbPr Component:

Equipment:

- Pattern generator (VG-828)
- Lux meter (CL-100)

OSD Default value used for YPBPR color alignment

Item	Value	Item	Value
USER>Picture>			
Brightness	30		
Contrast	17		
Color	30		
Tint	15	Factory>HD ADJ>YPbPr>	
Sharpness	3	Brightness	60

Filter	1	Contrast	76
Color Temp	2	Saturation	49
		Pb offset	60
		Pr offset	60

Procedure:

(a). PBPR Offset adjustment: (AD PB, PR Offset)

1. The variance of color coordinate via Pb offset and Pr offset:

	x	y
Pb offset ↓	x ↓	y ↓
Pb offset ↑	x ↑	y ↑
Pr offset ↓	x ↑	y ↓
Pr offset ↑	x ↓	y ↑

If we line the x and y, then the Pb offset is the shift action and the Pr offset is the rotational action.

2. Connect power, **YPbPr** Video into projector.
3. Change Timing and pattern of pattern generator :
Timing : 480P(H:31.54 KHz,V:60.08 Hz)
pattern : 10gray Pattern
4. Turn on projector
5. Set user OSD values to default.
6. Enter factory mode.
7. Set Factory values to default.
8. Follow the Pb, Pr offset adjustment flow chart to adjust color temperature to 6500K

b). Gray Level: (AD YPBPR Contrast, Brightness)

1. Change Timing and pattern of pattern generator :
Timing : 480P(H:31.54 KHz,V:60.08 Hz)
pattern : gray 32(or gray16 only for overscan)
2. Adjust the Brightness of AD9883 (RGB) to let the black level of the gray 32 to just distinguish. Use Lux meter to measure the white level of the gray 32. Adjust the contrast value of AD9883 (RGB) to let the light output to just max.
3. Check the 32 levels of gray. All steps must appear,

(c). Saturation Level: (Scalar)

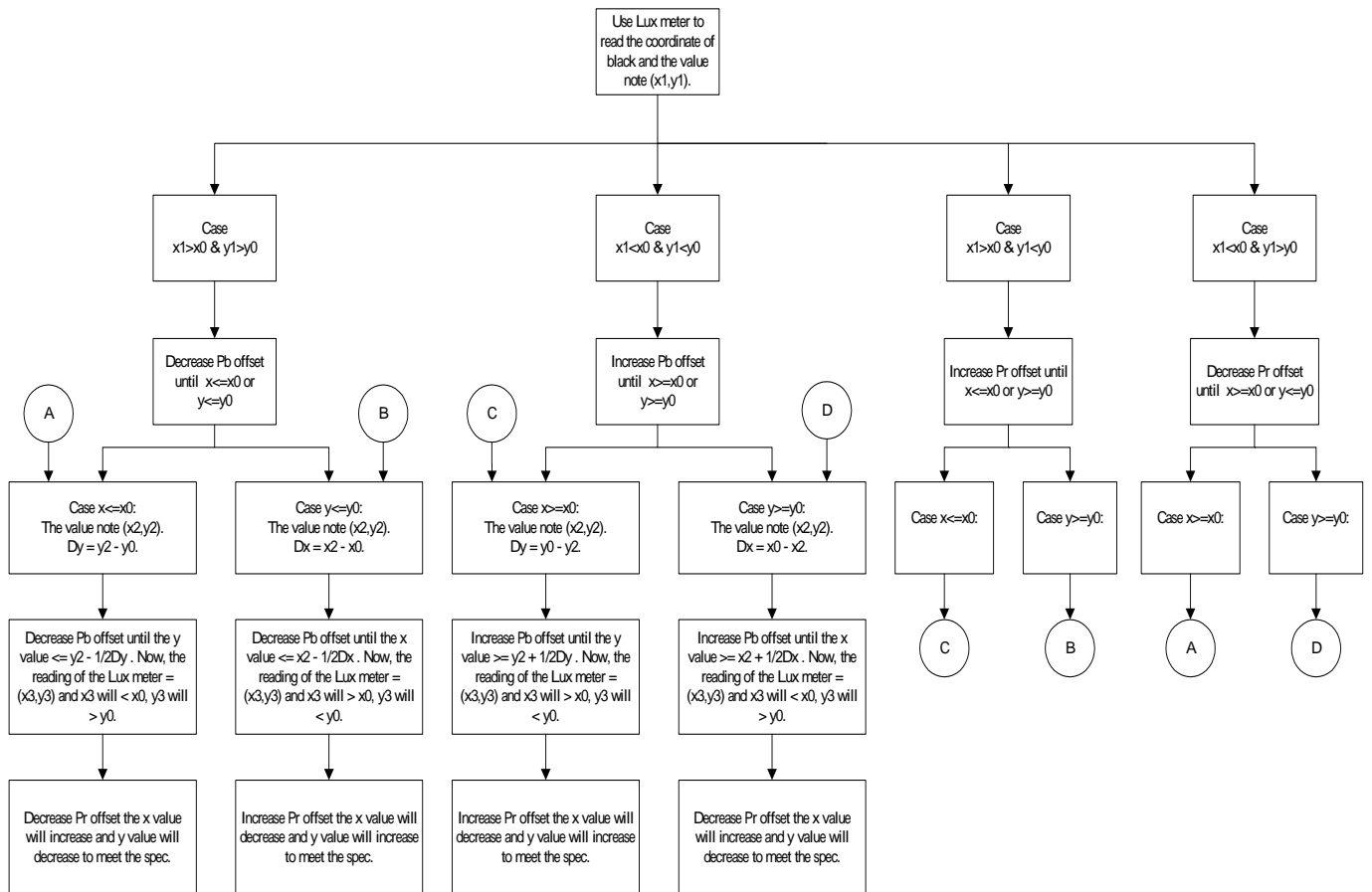
1. Change Timing and pattern of pattern generator :

Timing : 480P(H:31.54 KHz,V:60.08 Hz)

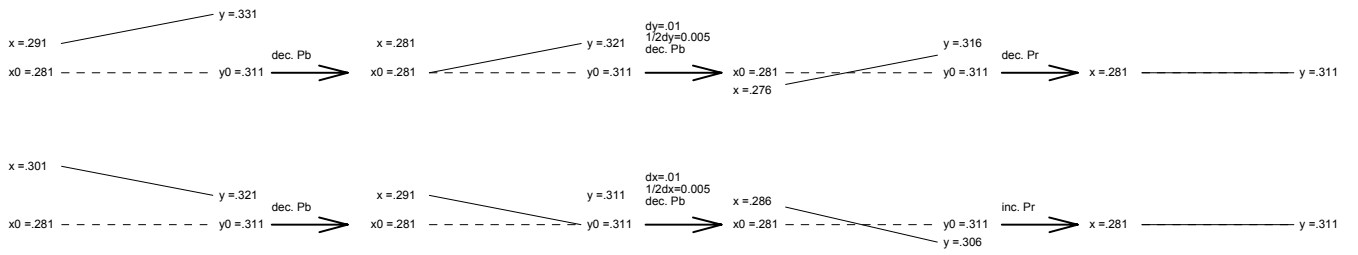
pattern : 100% blue

2. Adjust saturation and use lux meter to measure to let the light output just max.

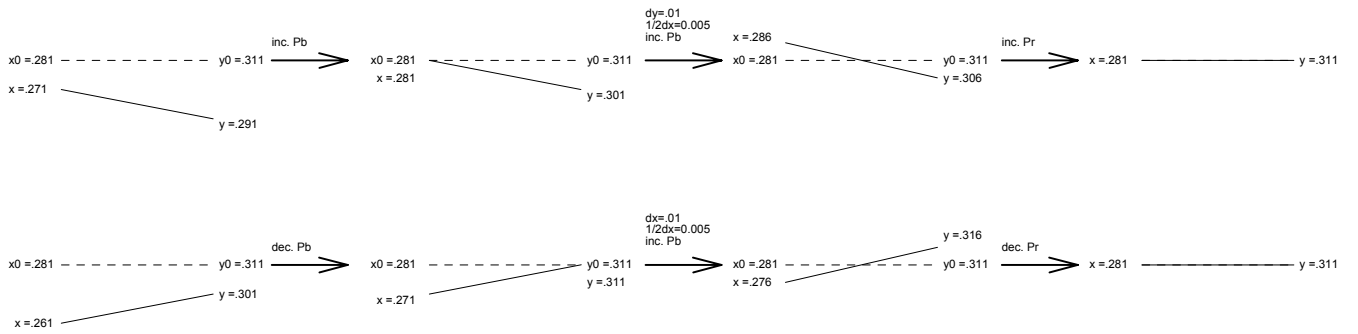
3. **Select "Save Setting" at "Factory OSD>Factory>".**



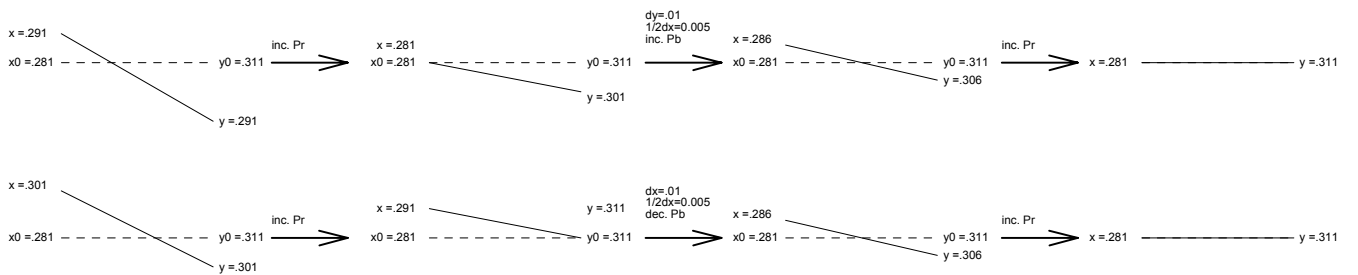
Case $x_1 > x_0$ & $y_1 > y_0$:



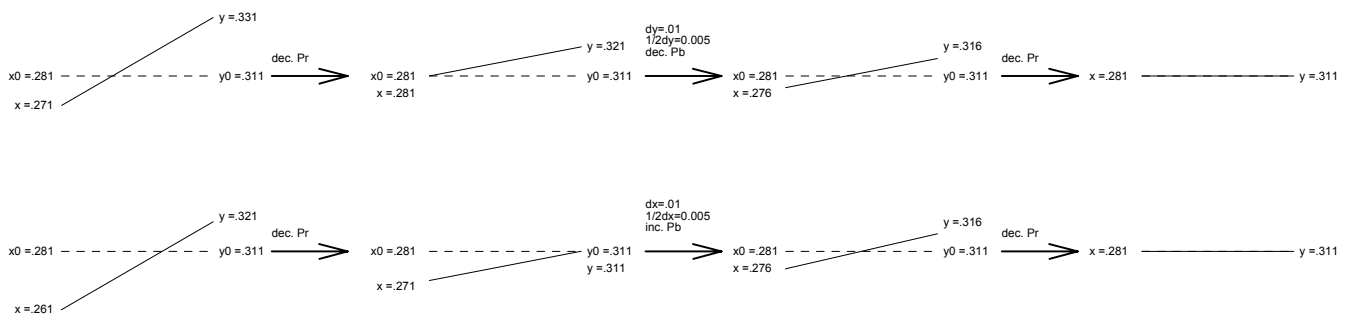
Case $x_1 < x_0$ & $y_1 < y_0$:



Case $x_1 > x_0$ & $y_1 < y_0$:



Case $x_1 < x_0$ & $y_1 > y_0$



5. TV Color Alignment Procedure

5.1 TV Color Temp Alignment

Equipment:

- Pattern generator (VG-828)
- Lux meter (CL-100)

OSD Default value used for YCBCR color temp alignment

Item	Value	Item	Value
USER>Picture>			
Brightness	30		
Contrast	17		
Color	30		
Tint	15	Factory>SD	
Sharpness	0	Brightness	180
Filter	3	Contrast	92
Color Temp	2	Saturation	90
		User>Setup>White	
		Gamma Red, Green,	66
		Gamma Red, Green,	0

1. Connect the signal to YCBCR component connector, and change Timing and pattern of pattern generator :

Timing : NTSC(H:15.73 KHz,V:29.96 Hz)

pattern : 80% Gray

2. Color temperature spec:
Color temp. 4 is the same as that of 6500K
3. The variance of color coordinate via R,G,B gains:
4. Adjust 5400K / 6500K / 7500K temperature color.
5. Open Factory OSD and set the factory default value :

User>setup>white	C0	C1(5700k	C2(6500k	C3(9300k
Gamma-Rgain	512	512	512	512
Gamma-Ggain	512	416	467	490
Gamma-Bgain	512	408	460	508

6. Use the lux meter and adjust Gamma-Rgain, Gamma-Ggain, & Gamma-Bgain to meet the spec.
7. Press "Save Color Temp. Videos > AS Color Temp 5400" to save into memory.
8. Repeat 6~7 to perform the 6500K and 7500K color temperature.
9. Select "Save Setting" at "Factory OSD>Factory>".
10. For auto-alignment, use Command Y80/Y81/Y82 to save 5700K/6500K/9300K temperature.

5.2 Gray Level for YCBCR Component

Procedure:

(a). Gray Level:

1. Connect power, YCbCr Video into projector.
2. Change Timing and pattern of pattern generator :
Timing : NTSC(H:15.73 KHz,V:29.96 Hz)
pattern : gray 32(or gray16 only for overscan)
3. Light on projector
4. Set user OSD values to default.
5. Enter factory mode.
6. Set Factory values to default.
7. Adjust the Brightness and Contrast to let the black level to just distinguish, and the light output of white level to just max.
8. Check the 32 levels of gray. All steps must appear,

(b). Saturation Level:

9. Change Timing and pattern of pattern generator :
Timing : NTSC(H:15.73 KHz,V:29.96 Hz)
pattern : 100% blue
10. Adjust saturation and use the Lux meter to measure to let the light output just max.
11. Select "Save Setting" at "Factory OSD>Factory>".

5.3 Gray Level for Composite Video & S-Video

Equipment:

- Pattern generator (VG-828)
- Lux meter (CL-100)

OSD Default value:

Item	Value	Item	Value
USER>Picture>			
Brightness	30	Factory>SD	
Contrast	17	Brightness	158
Color	23	Contrast	75
Tint	15	Saturation	91
Sharpness	3	Hue	0
Filter	3		
Color Temp	2		

Procedure:

(a) Gray Level

1. Connect power, Composite video or S-Video, into projector.
2. Change Timing and pattern of pattern generator :
 Timing : NTSC(H:15.73 KHz,V:29.96 Hz)
 pattern : gray 32(or gray16 only for overscan)
3. Light on projector
4. Set user OSD values to default.
5. Enter factory mode.
6. Set Factory values to default.
7. Adjust the Brightness and Contrast to let the black level to just distinguish, and the light output of white level to just max.
8. Check the 32 levels of gray. All steps must appear,

(b). Saturation Level:

9. Change Timing and pattern of pattern generator :
 Timing : NTSC(H:15.73 KHz,V:29.96 Hz)
 pattern : 100% blue
10. Adjust saturation and use lux meter to measure to let the light output just max.

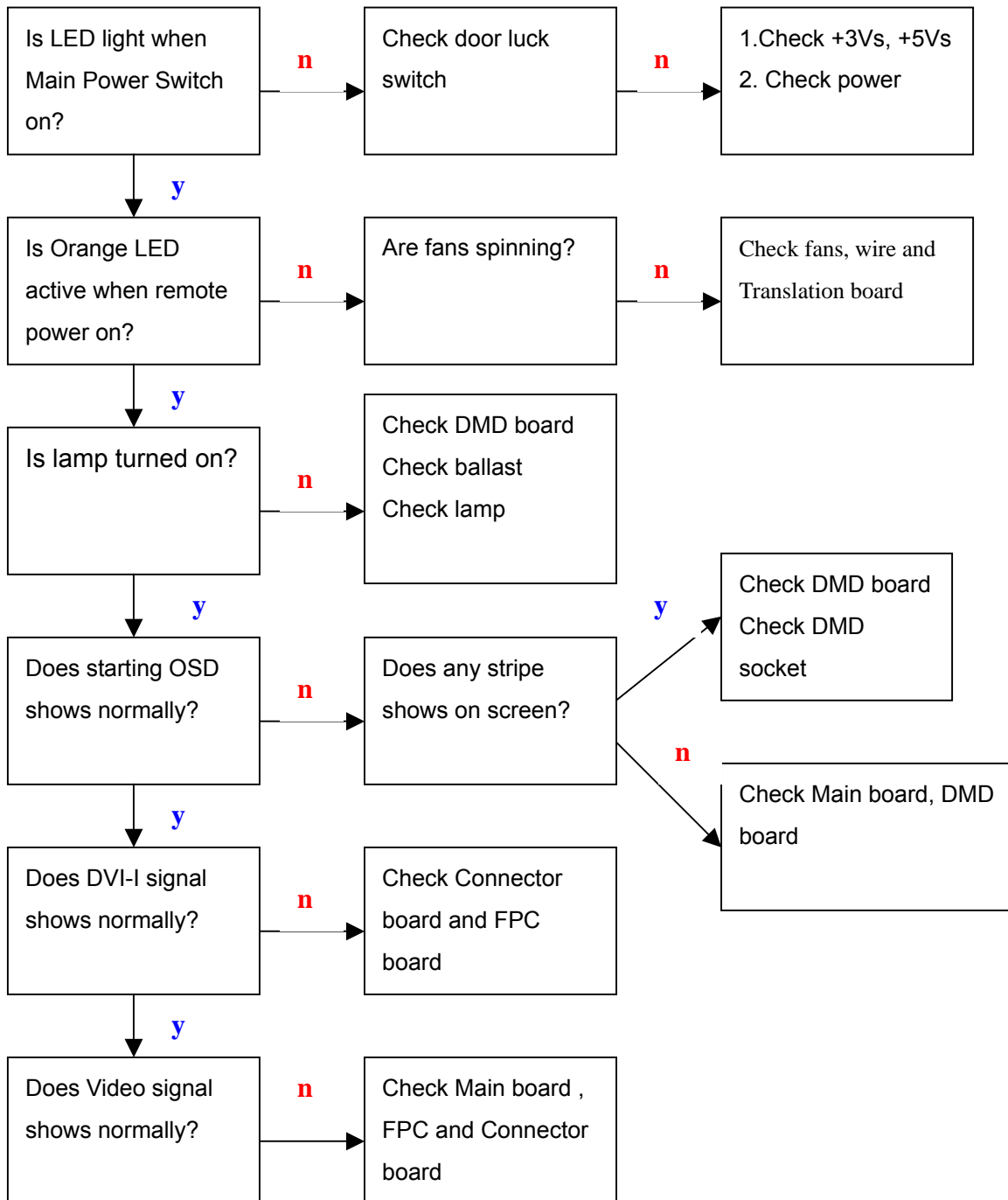
11. Select "Save Setting" at "Factory OSD>Factory>".

6. Additional Patterns used for color final check

- (a). Pattern 1: 0 ~ 14% gray, 2% change per step, (For DVI-A, YPBPR inputs)
 Criteria: All gray bars should have the same color. Brightness change should be linear.
- (b) Pattern 2: 16-gray (0 ~ 100%), For all input sources
 Criteria: All gray bars should have the same color. Brightness change should be linear.

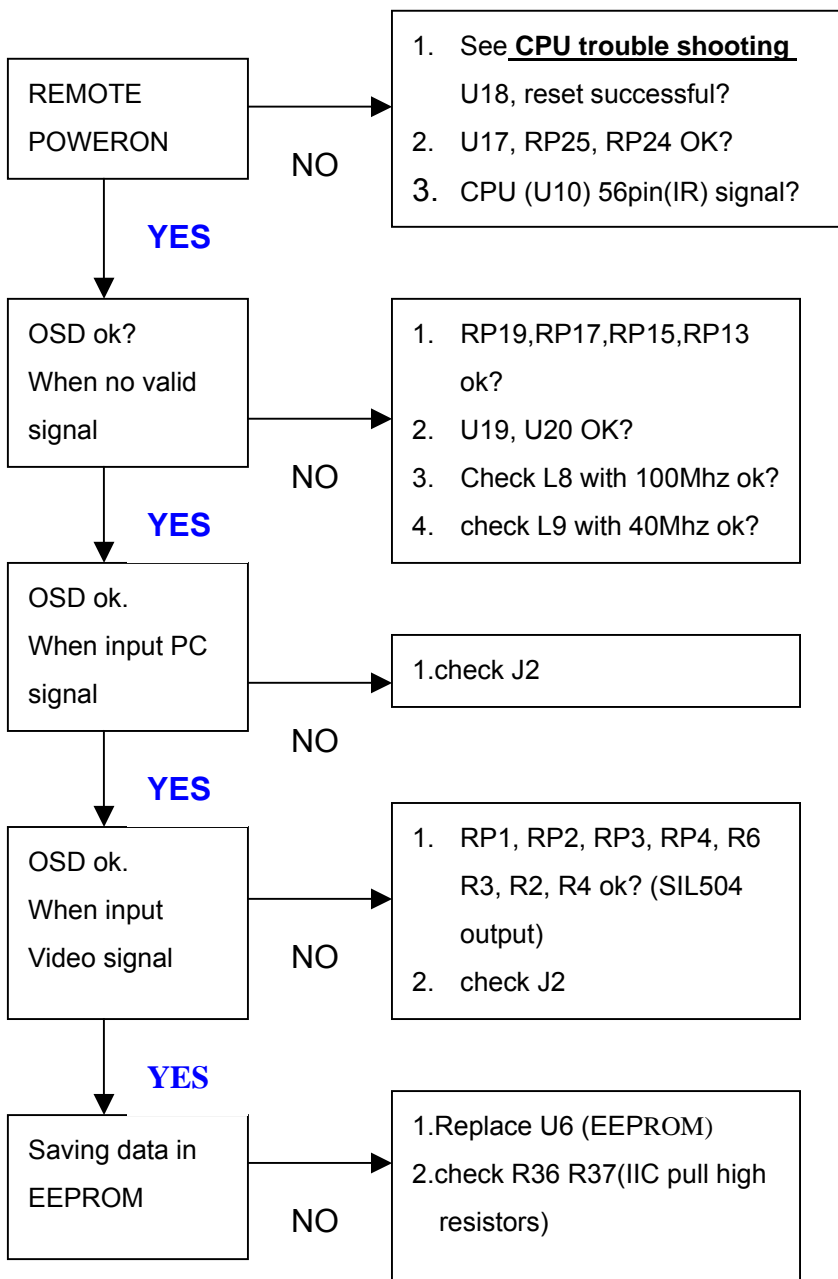
9. Trouble Shooting Guide

1. System trouble shooting :

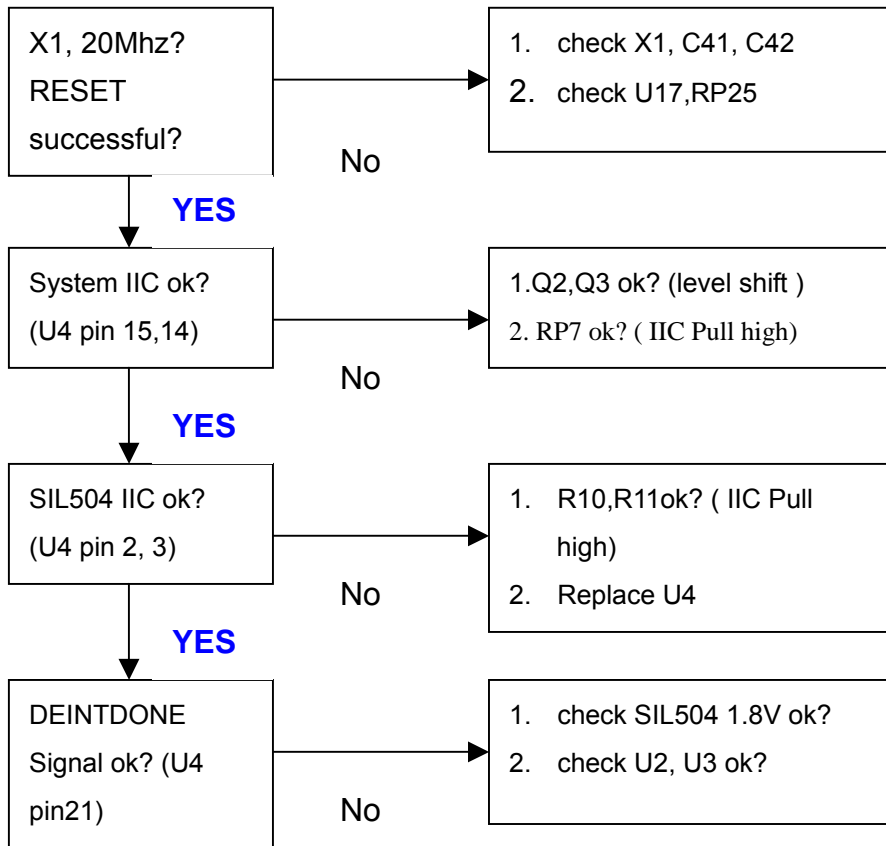


2. Main board trouble shooting:

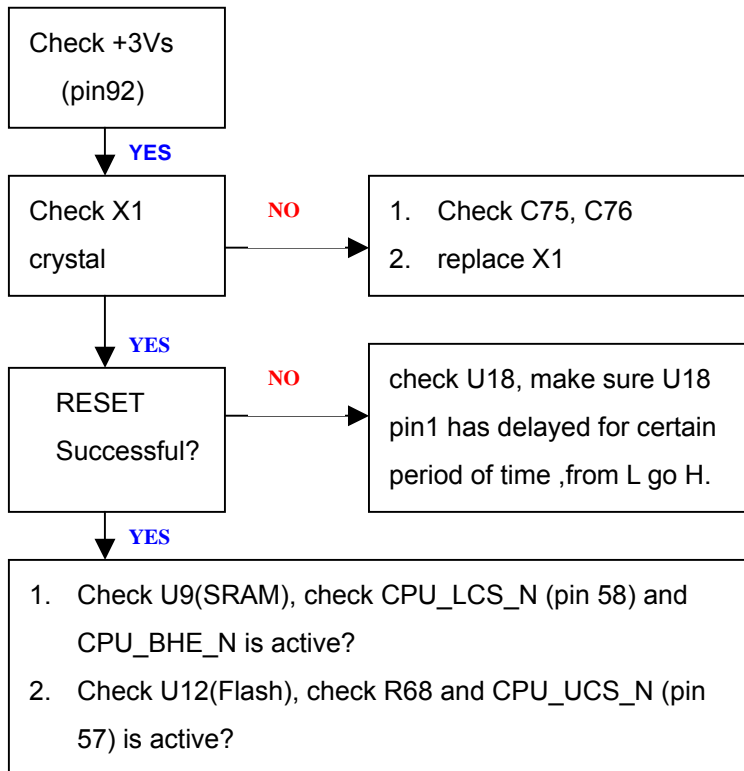
(1) Main:



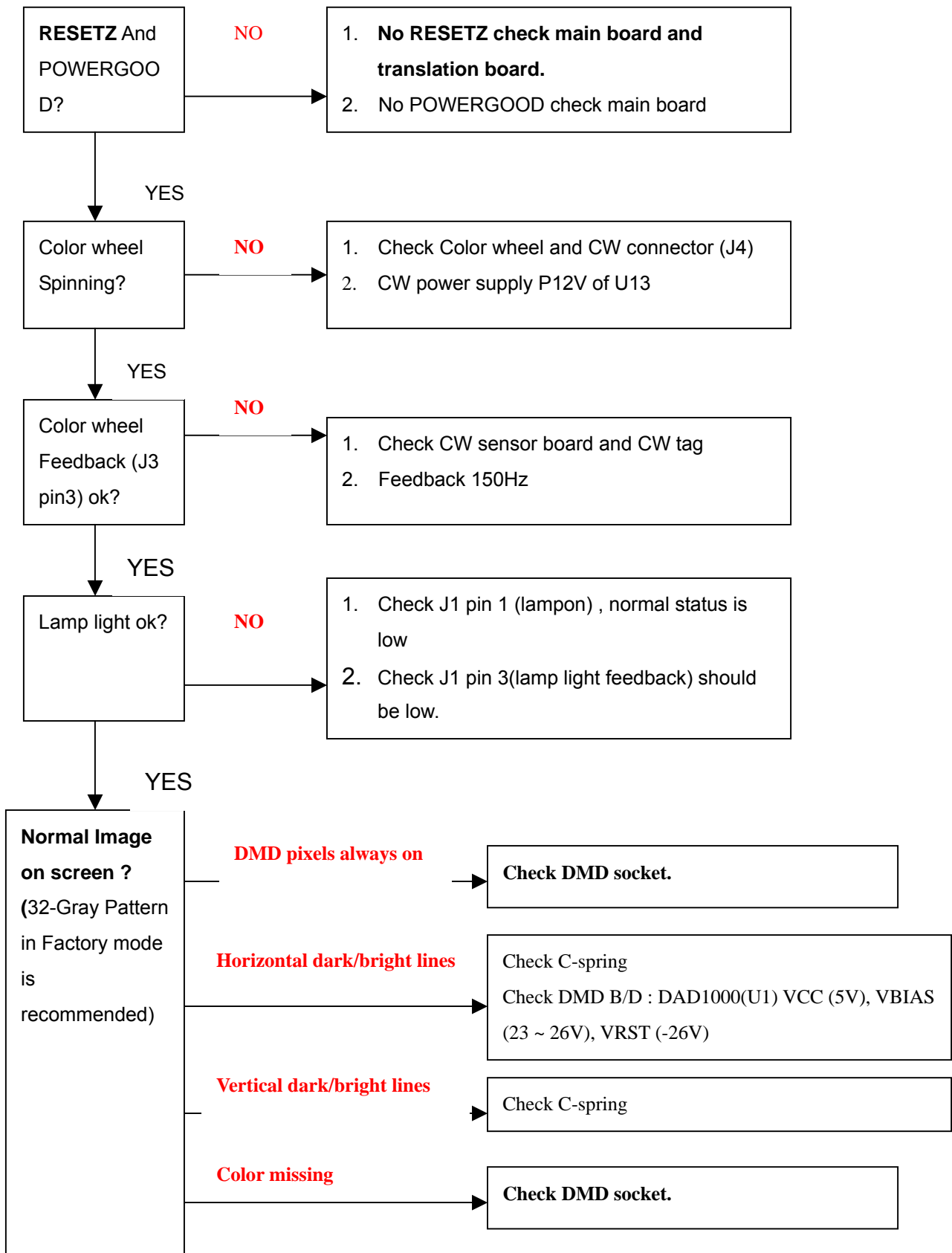
(2) SIL504 trouble shooting: (U4, U2)



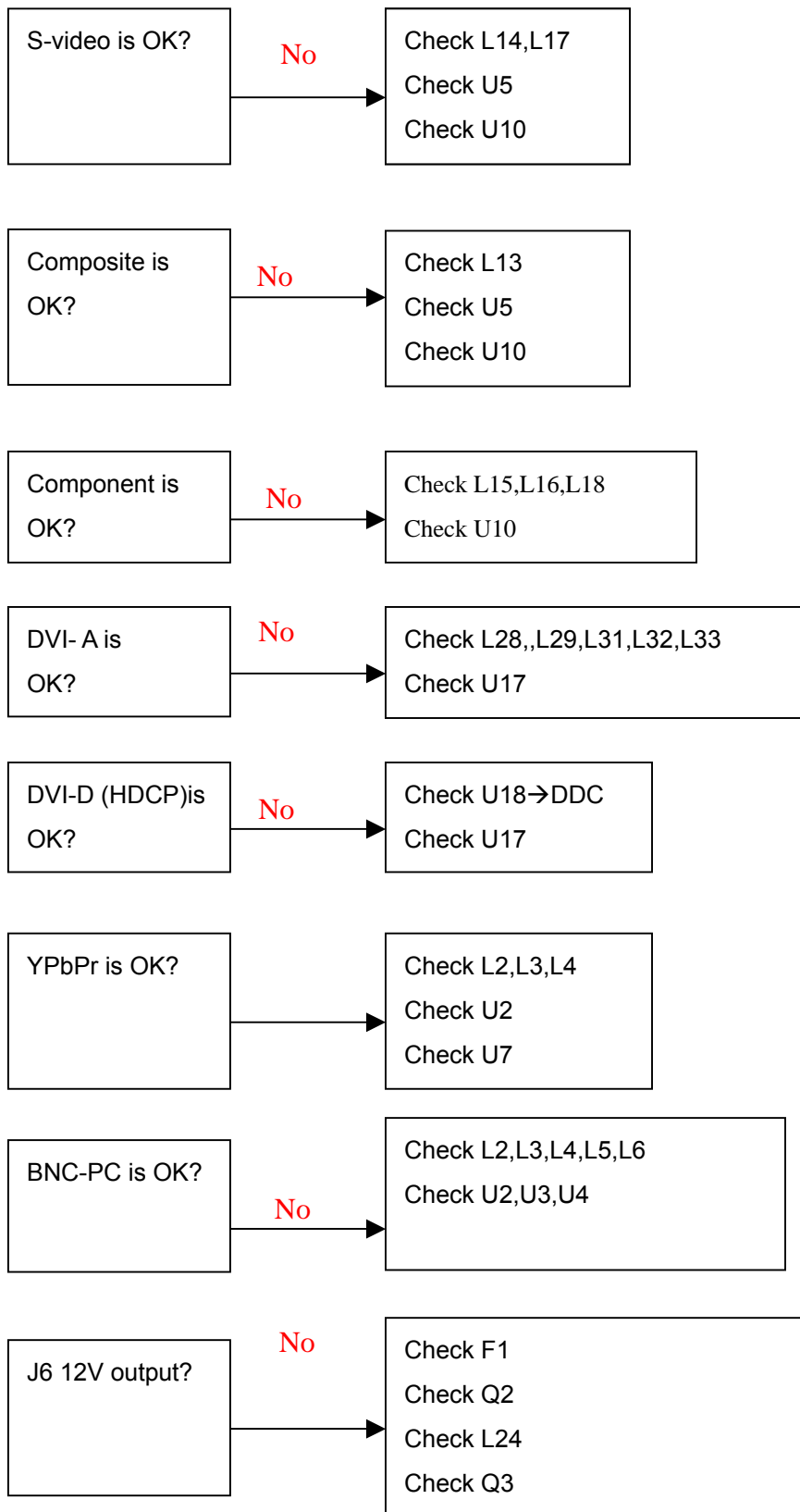
(3) CPU (U10) trouble shooting guide :

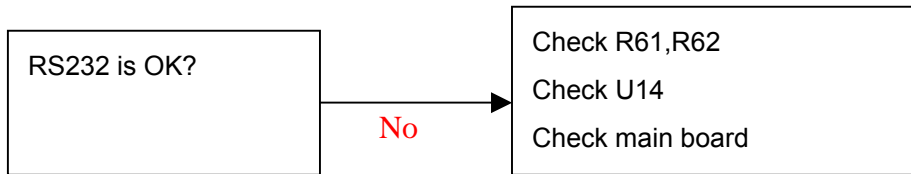


3. DMD board trouble shooting guide.

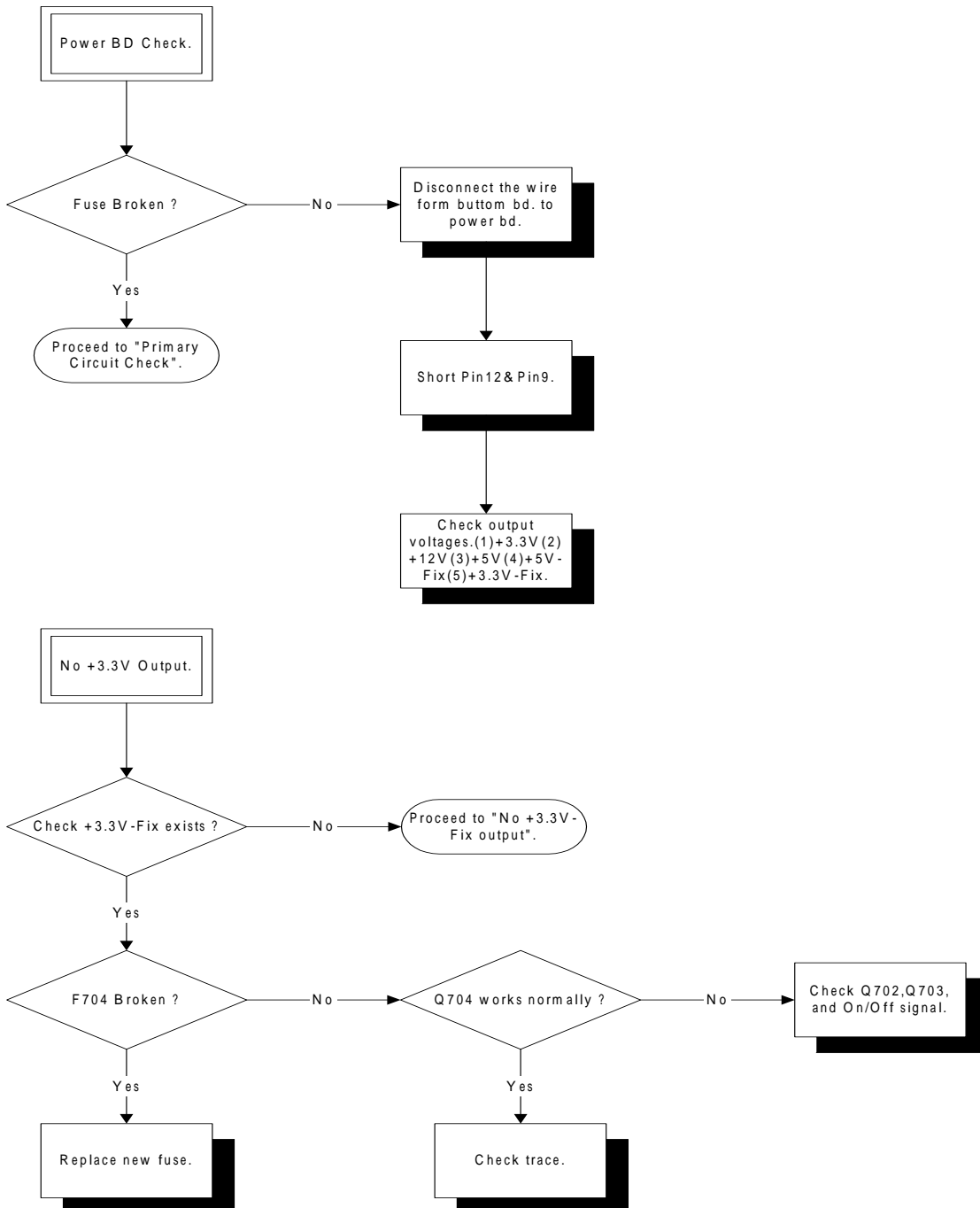


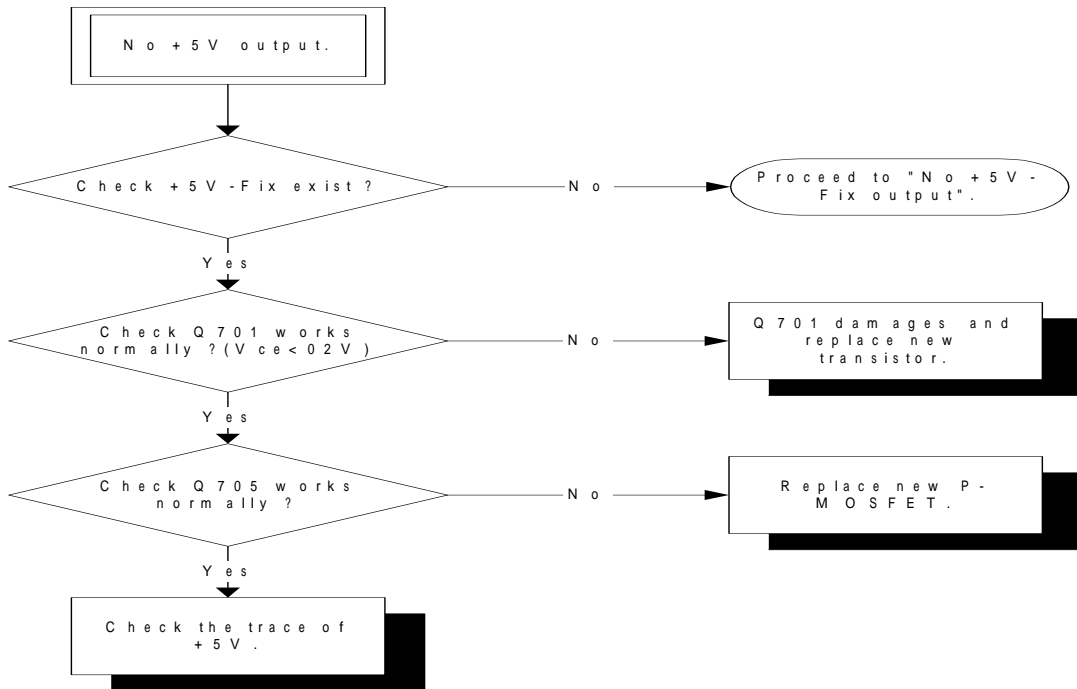
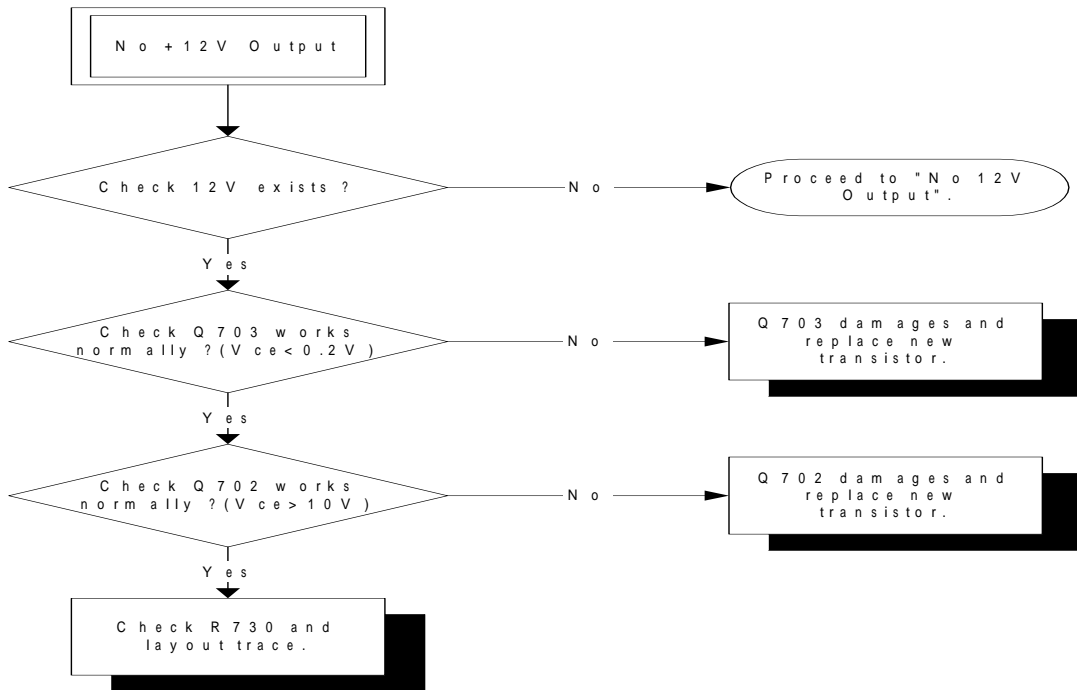
4. Connector board trouble shooting guide.

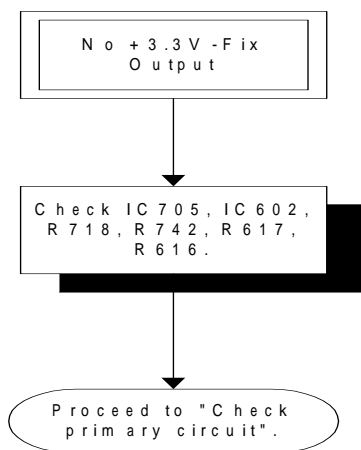
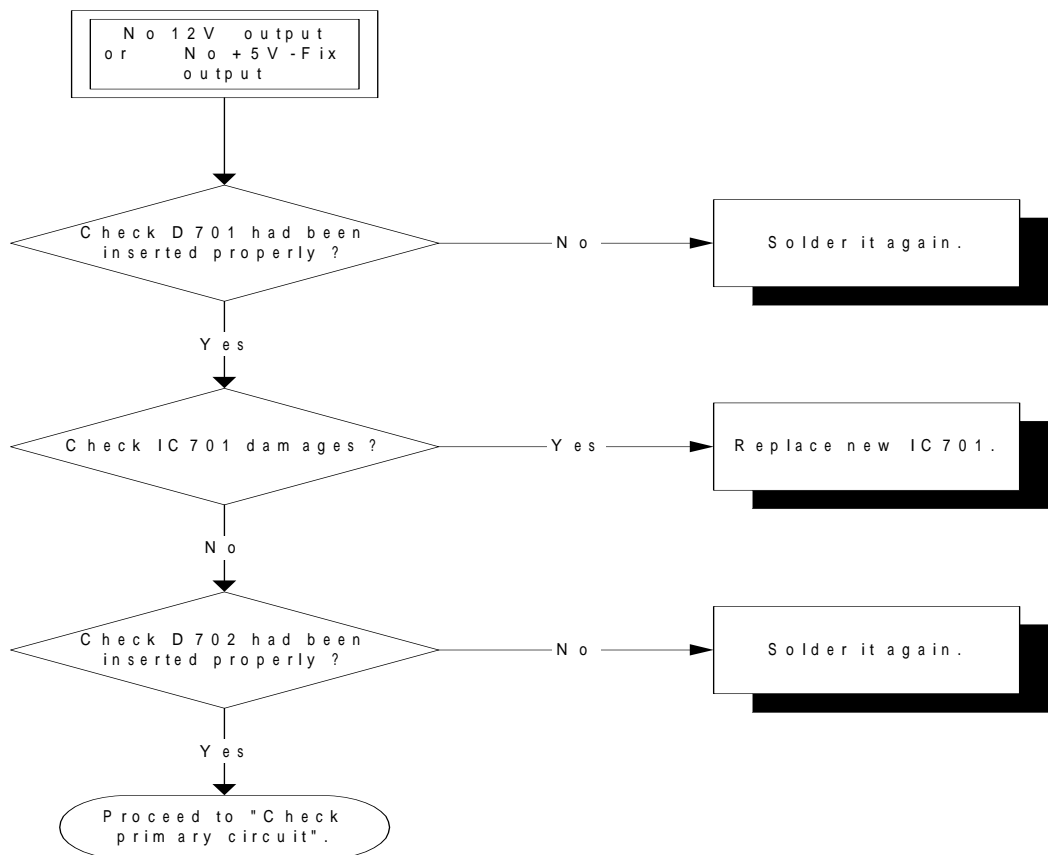


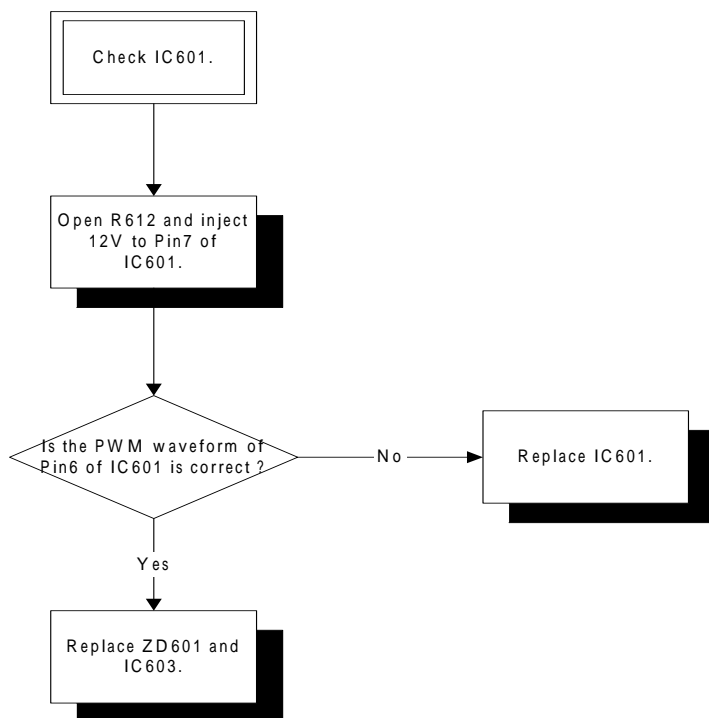
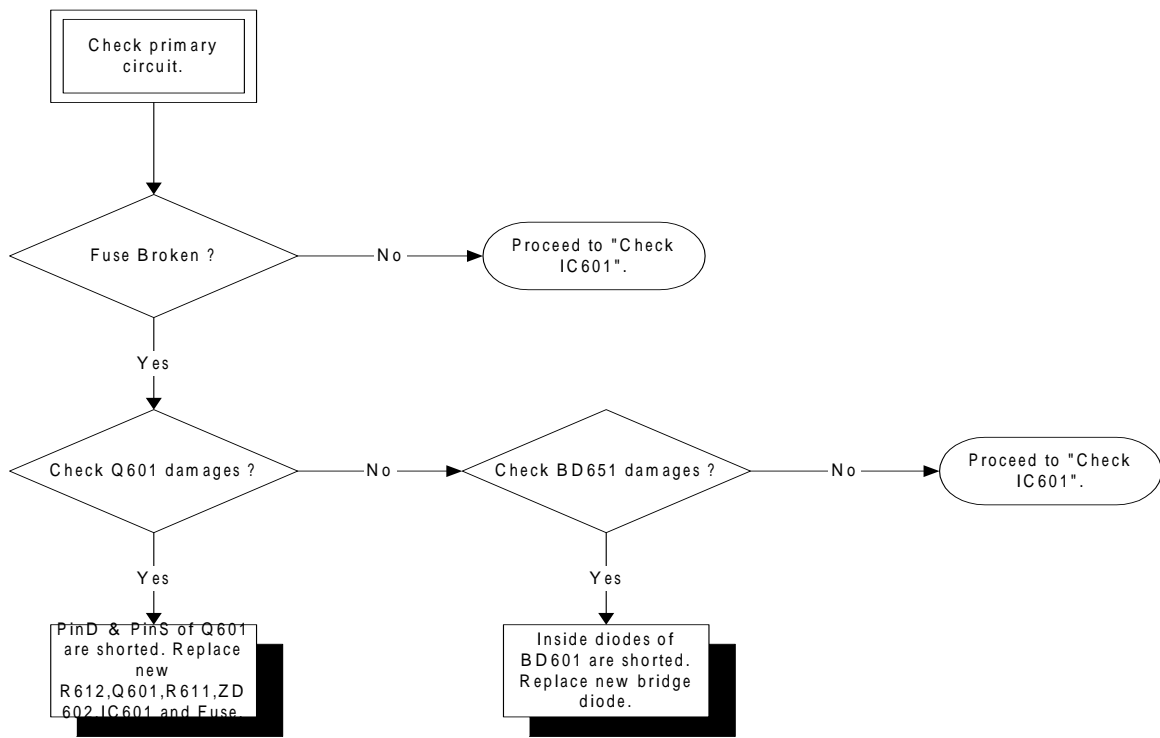


5. Power board trouble shooting guide.









10. Factory OSD Operation

There are 10 pages in this OSD, the ways to enter factory OSD are open user OSD, then press power on button. If you have to return user OSD, open factory OSD and press power on button again.

Go to \User OSD\Environment\lamp hours\minutes, then press Right, Left, Right, Left, Enter in a row to switch to factory OSD.

1. **Factory**

This page is mostly for our factory to use.

Page	Items	Comment
Factory	Return User OSD	Quit Factory OSD and return user OSD
	Save Settings	Save current settings of factory OSD to EEPROM
	Load Saved Settings	Load previous saved settings from EEPROM
	Load Factory Default	Load factory default
	Load All User Default	Restore all settings of user OSD and PC/HD timing parameters
	Burn In Mode	Burn-In mode On/Off
	Burn In Timer Setup hours	Set burn-in hours
	Burn In Timer Running hours & minutes	Running hours of burn-in mode
	RS232 Baudrate	Set baudrate of RS232 9600 or 115200
	OSD Timer	OSD automatic off time
	Usage Hour	Record total usage hours of this projector
	Software version	Software version

2. HD Adj

This page is the settings of A/D converter. There are 2 sections, one is for RGBHV format signal (DVI-A input and RGB-HD input), the other is for YPbPr format signal (Comp-HD input).

Page	Items	Comment	Range
RGBHV format	Red Offset	A/D converter red offset	0~127
	Green Offset	A/D converter green offset	0~127
	Blue Offset	A/D converter blue offset	0~127
	Red Gain	A/D converter red gain	0~255
	Green Gain	A/D converter green gain	0~255
	Blue Gain	A/D converter blue gain	0~255

Page	Items	Comment	Range
YPbPr format	Brightness	A/D converter green offset	0~127
	Contrast	A/D converter green gain	0~255
	Saturation	A/D converter red and blue gain	0~255
	Pb-Offset	A/D converter blue offset	0~127
	Pr-Offset	A/D converter red offset	0~127

3. STD Adj

This page is the settings of video decoder. There are 2 sections, one is for Video and S-Video input, the other is for component input.

Page	Items	Comment	Range
Video & S-Video	Brightness	V/D brightness	0~255
	Contrast	V/D contrast	-128~127
	Saturation	V/D saturation	-128~127
	Hue	V/D hue	-128~127

Page	Items	Comment	Range
Component	Brightness	V/D brightness	0~255
	Contrast	V/D contrast	-128~127
	Saturation	V/D saturation	-128~127

4. Color Balance

For color temperature settings, they are the combination of gamma gain and gamma offset. This page allows operator to adjust gamma correction to fit the expected color temperature, and save these settings as one of the color temperature settings. And this page also provides the function to restore color temperature setting to default gamma combination.

Page	Items	Comment	Range
Gamma	Red	Adjust the shape of RM-1A gamma curve	0~128
	Green	Adjust the shape of RM-1A gamma curve	0~128
	Blue	Adjust the shape of RM-1A gamma curve	0~128

Page	Items	Comment	Range
Gamma Gain	Red	Multiply gamma curve by a gain (gain= settings/512)	1~512
	Green	Multiply gamma curve by a gain (gain= settings/512)	1~512
	Blue	Multiply gamma curve by a gain (gain= settings/512)	1~512

Page	Items	Comment	Range
Gamma Offset	Red	Add an offset value to gamma curve	0~90
	Green	Add an offset value to gamma curve	0~90
	Blue	Add an offset value to gamma curve	0~90

Page	Items	Comment
Save Data Temp.	Save gamma gain and gamm offset as color temp 9300K	For data input (Component >= 480p signal, DVI-A, and DVI-D)
	Save gamma gain and gamm offset as color temp 6500K	For data input (Component >= 480p signal, DVI-A, and DVI-D)
	Save gamma gain and gamm offset as color temp 5700K	For data input (Component >= 480p signal, DVI-A, and DVI-D)
	Restore combination	Restore default value of gamma correction

Page	Items	Comment
Save Video Temp.	Save gamma gain and gamm offset as color temp 9300K	For video input (Component < 480p signal, Video, and S-Video)
	Save gamma gain and gamm offset as color temp 6500K	For video input (Component < 480p signal, Video, and S-Video)
	Save gamma gain and gamm offset as color temp 5700K	For video input (Component < 480p signal, Video, and S-Video)
	Restore combination	Restore default value of gamma correction

5. Filter Bypass

Page	Items	Comment
Filter Bypass	V-in	On/Off status of RM-1A's video input filter
	V-out	On/Off status of RM-1A's video output filter
	G-in	On/Off status of RM-1A's graphics input filter

6. DLP

This page allows user to change DLP settings.

Page	Items	Comment	Range
DLP	Brightness	DLP brightness	-64~64
	Contrast	DLP contrast	0~100
	CW delay	DLP color wheel delay	0~1023
	Degamma Table	DLP degamma table	0~6

7. Pattern1

This page allows user to call up DLP present curtains and RM-1A patterns.

Page	Items	Comment
Patterns 1	Red Curtain	DLP present curtain. For CW delay measurement
	Green Curtain	DLP present curtain. For CW delay measurement
	Blue Curtain	DLP present curtain. For CW delay measurement
	Black Curtain	DLP present curtain. For optical experiment.
	Color Bar	RM-1A pattern. For checking gray scale.
	Checker Board	RM-1A pattern. For optical contrast measurement.
	13-Points	RM-1A pattern. For optical experiment.
	Reflective Edge	RM-1A pattern. For optical light leakage experiment

8.Pattern2

This page allows user to call up DLP DDP1010 series present patterns.

Page	Items	Comment
Patterns 2	Solid Field - Yellow	DLP DDP1010 present pattern. For checking color.
	Solid Field - Cyan	DLP DDP1010 present pattern. For checking color.
	Solid Field - Magenta	DLP DDP1010 present pattern. For checking color.
	Horizontal Ramp	DLP DDP1010 present pattern. Monochrome pattern, for checking gray scale.
	Vertical Ramp	DLP DDP1010 present pattern. Monochrome pattern, for checking gray scale.
	Horizontal Lines	DLP DDP1010 present pattern. Monochrome pattern.
	Diagonal Lines	DLP DDP1010 present pattern. Monochrome pattern.
	Vertical Lines	DLP DDP1010 present pattern. Monochrome pattern.
	Grid	DLP DDP1010 present pattern. Monochrome pattern.
Checker Board	DLP DDP1010 present pattern. Monochrome pattern.	

9.Pattern3

This page allows user to call up DLP DDP1010 series present patterns, the major goal of this page is for DMD inspection.

Page	Items	Comment
Patterns 3	Blue 90	DLP DDP1010 present pattern. For inspection of 'major dark blemish' and 'dark pixel' on DMD chip.
	Gray 10	DLP DDP1010 present pattern. For inspection of 'border defects' on DMD chip.
	Gray 6	DLP DDP1010 present pattern. For inspection of 'major light blemish' and 'light pixel' on DMD chip.

White Full	DLP DDP1010 present pattern. For inspection of 'minor blemishes' on DMD chip.
Black Full	DLP DDP1010 present pattern. For inspection of 'minor blemishes' on DMD chip.
Red Ramp	DLP DDP1010 present pattern. For inspection of 'unstable pixel' on DMD chip.

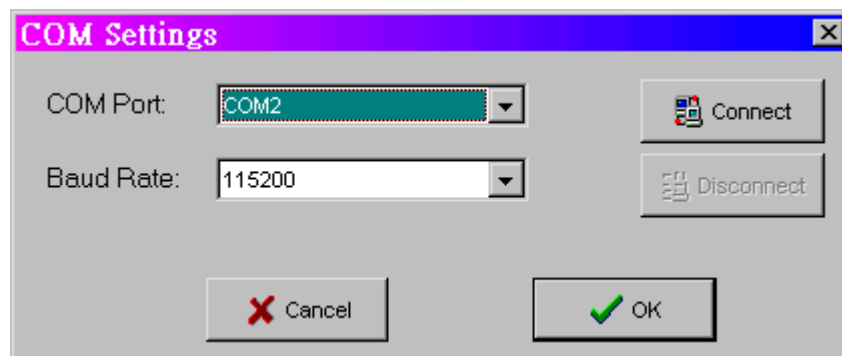
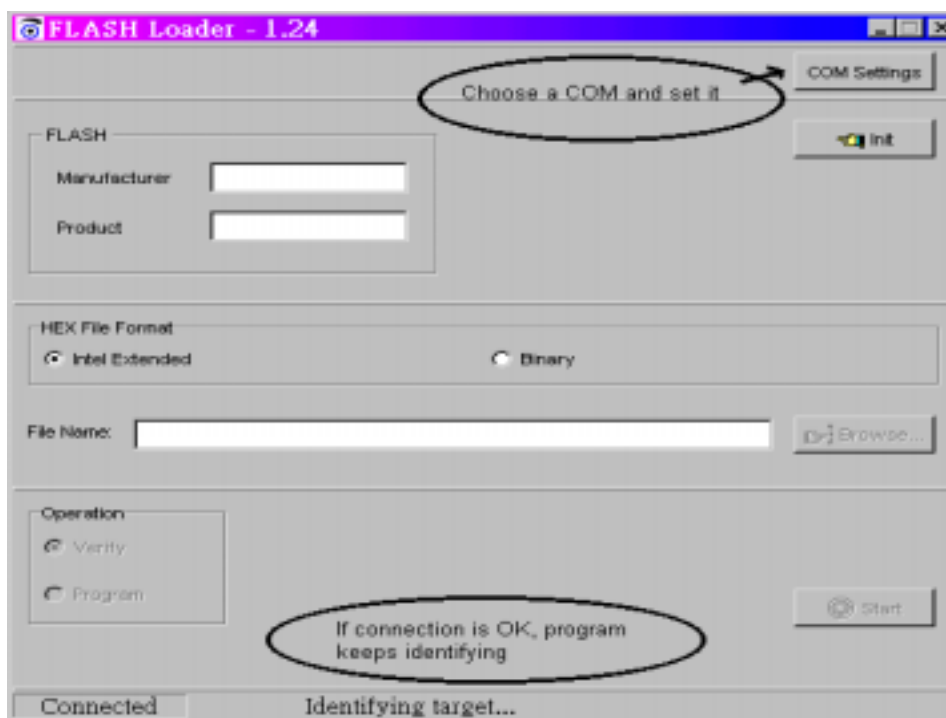
10 . Test Mode

For different situation, we need different settings. Here we define 5 kinds of settings in 'Picture Adjust' page to fit some situations.

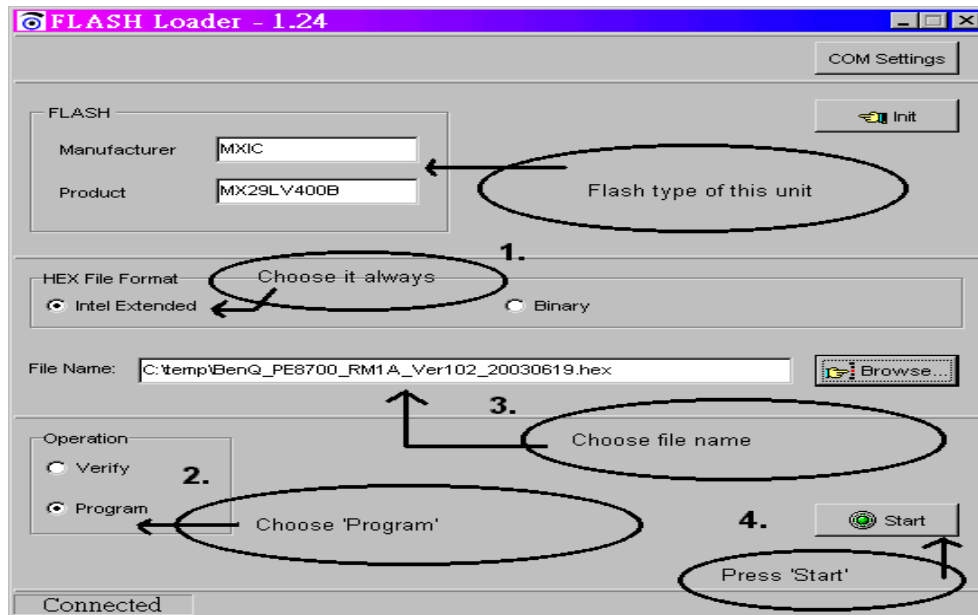
Page	Items	Comment
Test Mode	Optical Test	High brightness, high contrast, high saturation
	Middle Value	All settings in the middle value
	Play DVD	Optimal settings for watching DVD
	Color Wheel Delay	Low brightness, high contrast, high saturation
	Blue Filter	Only 'blue' is left, for 'color' and 'tint' adjustment

11. Firmware Upgrade Procedure

1. Connect specific download cable to RS232 (RJ-11) connector. Remember to turn the AC switch off.
2. Execute the 'Flash Loader' program. If the 'COM Settings' item is ready, you can see 'Identifying target...' at the bottom of flash loader. If not, open 'COM Settings' item. Choose the 'COM Port' you use, always set the baud rate 115200, then press 'Connect' and 'OK' button. The program returns to its main page, and 'Connected' and 'Identifying target' are supposed to be displayed at the bottom of the flash loader.



- Turn the AC switch on. In 3 seconds, 'flash loader' will identify the flash ROM of this unit. Choose 'Hex File Format' as 'Intel Extended', 'Operation' as 'Program', and 'Browse' the 'File Name'. After that, press the 'Start' button. 'Flash Loader' starts to load program to Flash ROM.



- After download procedure finished, remove download cable and turn the AC switch off. Then the user can operate this machine in normal condition.
- The hex file to be loaded, the format of its name is

BenQ_PE8700_RM1A_Ver102_20030619.hex

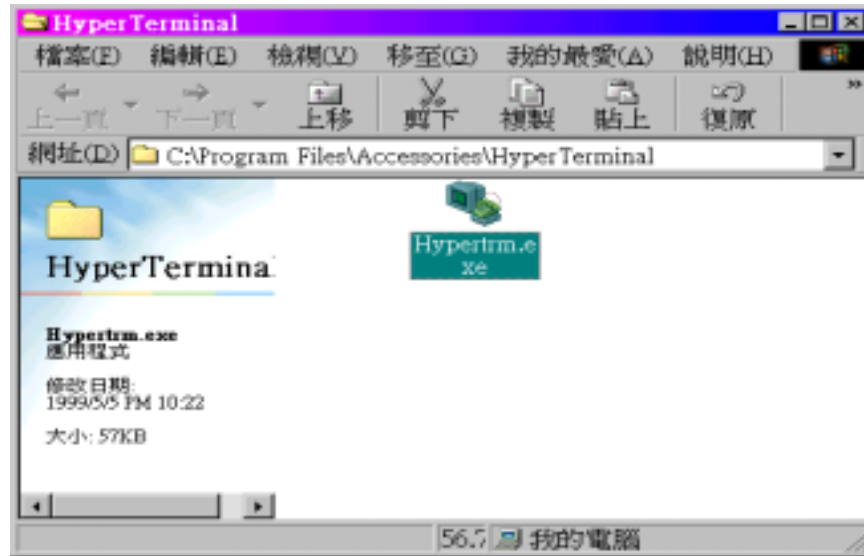
I. II. III. IV. V.

- Brand name
- Model name
- Scaler type
- Version of SW
- Released date

12. RS232 Codes

1. Set up peripherals

BenQ PE8700 provides an RJ-11 connector for RS232 serial communication control. The user can use the 'Hyper Terminal' program of Microsoft Windows to control this unit.



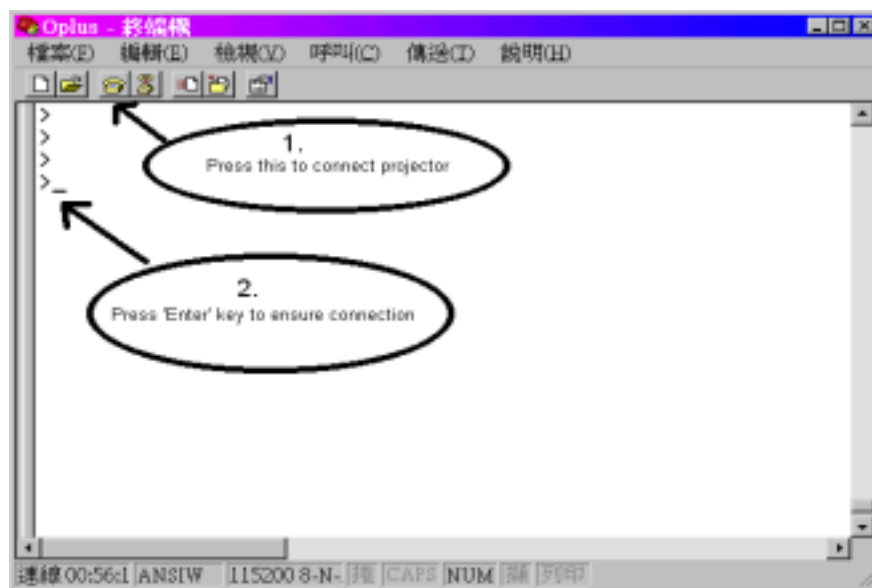
To set the settings of serial port first is necessary. Choose which COM port you want to connect, and set its settings as below:

Baud Rate:	115200 or 9600
Parity:	None
Data bits:	8
Stop bits:	1
Flow Control:	None

For baud rate setting, it depends on the settings in our \Factory OSD\FACTORY\RS232 BAUDRATE\ 9600 or 115200.



After settling down, connect our specific RS232 cable and press the 'call' icon of 'Hyper Terminal' program. After this, press 'Enter' key, if an '>' symbol come up, that means the unit is ready to accept commands for computer.



2. Commands list

There are 3 kinds of serial commands, X-group, Y-group and Z-group.

For X-group, these functions are public. Any end-user can control the unit by these commands, as long as they set correct RS232 communication. Following table is the codes list of X-group command.

Code	Function
X00	Must be Reversed , no function
X01	Power On
X02	Power Off
X03	Message On
X04	Message Off
X05	Lamp hours reset
X06	Load all user OSD default value
X07	Save current active source settings
X08	Change active OSD
X10	Menu
X11	Enter
X12	Exit
X13	Up(arrow key)
X14	Down(arrow key)
X15	Left(arrow key)
X16	Right(arrow key)
X20	Switch to Composite input
X21	Switch to S-Video input
X22	Switch to Component input
X23	Switch to Dsub_PC input
X24	Switch to YPbPr input
X25	Switch to BNC_PC input
X26	Switch to DVI input
X27	Switch to DVI_I input
X30	4:3 screen
X31	16:9 screen
X35	Aspect - Anamorphic

X36	Aspect - Standard (4:3)
X37	Aspect - Letter box
X38	Aspect - Virtual wide
X39	Aspect - Through
X40	Load memory 1 settings
X41	Load memory 2 settings
X42	Load memory 3 settings
X43	Load 'optical test' mode settings
X44	Load 'middle' mode settings
X45	Load 'CW delay adjustment' mode settings
X46	Load default of current source
X47	Save memory 1 settings
X48	Save memory 2 settings
X49	Save memory 3 settings
X50	Scale up
X51	Scale down
X55	Switch active source
X56	Picture in picture display
X57	Picture by picture display
X60	Switch language 1
X61	Switch language 2
X62	Switch language 3
X63	Switch language 4
X64	Switch language 5
X65	Switch language 6
X66	Switch language 7
X67	Switch language 8
X85	PC input - auto

X90	Image orientation - floor front
X91	Image orientation - ceiling front
X92	Image orientation - floor rear
X93	Image orientation - ceiling rear
X94	Back light board On
X95	Back light Board Off
X99	On line help

When an user sends a command, he must follow the command format in the list. After he sends a command, program will acknowledge 2 pieces of information. This information, we call it 'ACK' in the following content.

The format of first ACK is XnX

The length is 3, first and last characters are always be X. And the number 'n' is 0, 1 or

2. The explanation of n is

0: Right command format and function

1: Illegal format

2: Illegal function

So, if the user presses XA85, this one is wrong format, ACK will be X1X.

And if the user presses X98, because this function is not included in our command table, ACK will be X2X.

For above situation, program sends the user an ACK, then waiting for a new command.

If the user presses correct command, take an example, X35, first ACK, X0X will send to the user. That tells the user it's a right command. Then program starts to deal with this command, and changes the aspect ratio to 'anamorphic' mode. When finish, the user will receive 2nd ACK. The format is Xn_ccX

The length is 6. First and last characters are X, second character is the ACK, followed by a '_' character. 'cc' is the function number. So, in this case, the 2nd ACK is X0_35X. And the user can continue to send next command.

For Y-group, this one is for our factory, not public. When our operators send commands to the unit, the ACK format is identical as X-group, difference is only 'Y' instead of 'X'.

Following is the list of Y-group:

Code	Function
Y01	Save current factory settings
Y02	Load saved factory settings
Y03	Load factory default
Y04	Load all user default
Y05	Burn-In mode on
Y06	Burn-In mode off
Y07	Set RS232 baudrate as 9600
Y08	Set RS232 baudrate as 115200
Y10	Save as data color temperature 1
Y11	Save as data color temperature 2
Y12	Save as data color temperature 3
Y20	Save as video color temperature 1
Y21	Save as video color temperature 2
Y22	Save as video color temperature 3
Y30	Restore data color temperature to default
Y31	Restore video color temperature to default
Y32	Restore white balance settings to default
Y40	DMD -- Degamma table 0
Y41	DMD -- Degamma table 1
Y42	DMD -- Degamma table 2
Y43	DMD -- Degamma table 3
Y44	DMD -- Degamma table 4

Y52	Red Curtain
Y53	Green Curtain
Y54	Blue Curtain
Y55	Black Curtain
Y57	Color Bar
Y58	Chess Board
Y59	Optical 13-point
Y60	Reflective Edge
Y61	Grid
Y62	Blue 90 Curtain
Y63	Gray 10 Curtain
Y64	Gray 6 Curtain
Y65	Full White Curtain
Y66	Full Black Curtain
Y67	Red Ramp Curtain
Y68	Gray 20 Curtain
Y70	Load 'optical test' mode settings
Y71	Load 'middle value' mode settings
Y72	Load 'Play DVD' mode settings
Y73	Load 'CW delay adjustment' mode settings
Y74	Load 'Blue filter' mode for color and tint adjustment
Y80	Load default for factory auto alignment procedure
Y81	Save corresponding settings after auto alignment
Y98	Display version
Y99	On line help

Example:

1. Command = Y89893 (Enter)
ACK = Y1Y (Illegal format, wrong length)
2. Command = Y98 (Enter)
ACK = Y2Y (Illegal function)
3. Command = Y52 (Enter)
1st ACK = Y0Y
2nd ACK = Y0_52Y

For Z-group, this one is for 'auto-alignment' procedure in our factory. This one allows engineers to read or write the unit settings without OSD operation, it will save time to set the value. Following is the table of Z-group.

Code	Function
Z001	Brightness adjustment
Z002	Contrast adjustment
Z003	Color adjustment
Z004	Sharpness adjustment
Z005	Tint adjustment
Z006	Color temperature adjustment
Z007	Filters adjustment
Z008	Independent color control - Red adjustment
Z009	Independent color control - Green adjustment
Z010	Independent color control - Blue adjustment
Z011	Independent color control - Yellow adjustment
Z012	DMD white peaking adjustment
Z020	Frequency adjustment
Z021	Phase adjustment
Z022	H - Position adjustment
Z023	V - Position adjustment

Z030	Keystone adjustment
Z034	RGBHV input -- Red offset
Z035	RGBHV input -- Green offset
Z036	RGBHV input -- Blue offset
Z037	RGBHV input -- Red gain
Z038	RGBHV input -- Green gain
Z039	RGBHV input -- Blue gain
Z042	YPbPr input -- Brightness
Z043	YPbPr input -- Contrast
Z044	YPbPr input -- Saturation
Z045	YPbPr input -- Pb Offset
Z046	YPbPr input -- Pr Offset
Z050	CVBS & S-Video -- Brightness
Z051	CVBS & S-Video -- Contrast
Z052	CVBS & S-Video -- Saturation
Z053	CVBS & S-Video -- Hue
Z054	Component -- Brightness
Z055	Component -- Contrast
Z056	Component -- Saturation
Z060	Gamma--Index
Z061	Gamma--Red
Z062	Gamma--Green
Z063	Gamma--Blue
Z064	Gamma gain -- Red
Z065	Gamma gain -- Green
Z066	Gamma gain -- Blue
Z067	Gamma offset -- Red
Z068	Gamma offset -- Green

Z069	Gamma offset -- Blue
Z070	DMD -- Brightness
Z071	DMD -- Contrast
Z072	DMD -- Color Wheel Delay
Z073	DMD -- Degamma table
Z080	Burn-in hours
Z099	On line help

The length of the command must be 11. The format, take an example, to read DMD color wheel delay:

Z072RxxxxxZ, where

Byte 1: must be 'Z' or 'z'

Byte 2~4: function code

Byte 5: action, must be 'r' or 'R'

Byte 6~10: Don't care

Byte 11: must be 'Z' or 'z'

In contrast, if write DMD color wheel delay:

Z072W+0025Z, where

Byte 1: must be 'Z' or 'z'

Byte 2~4: function code

Byte 5: action, must be 'w' or 'W'

Byte 6: sign byte, must be '-' or '+'

Byte 7~10: the value to be written

Byte 11: must be 'Z' or 'z'

And the length of ACK must be 12, and format is

Z0_072+0025Z

Byte 1: Always 'Z'

Byte 2: ACK

Byte 3: Always '_'

Byte 4~6: function code

Byte 7: sign byte, '+' or '-'

Byte 8~11: the current value after writing

Byte 12: Always 'Z'

And 'ACK' value is

0: Right command and function

1: Illegal Format

2: Illegal Function

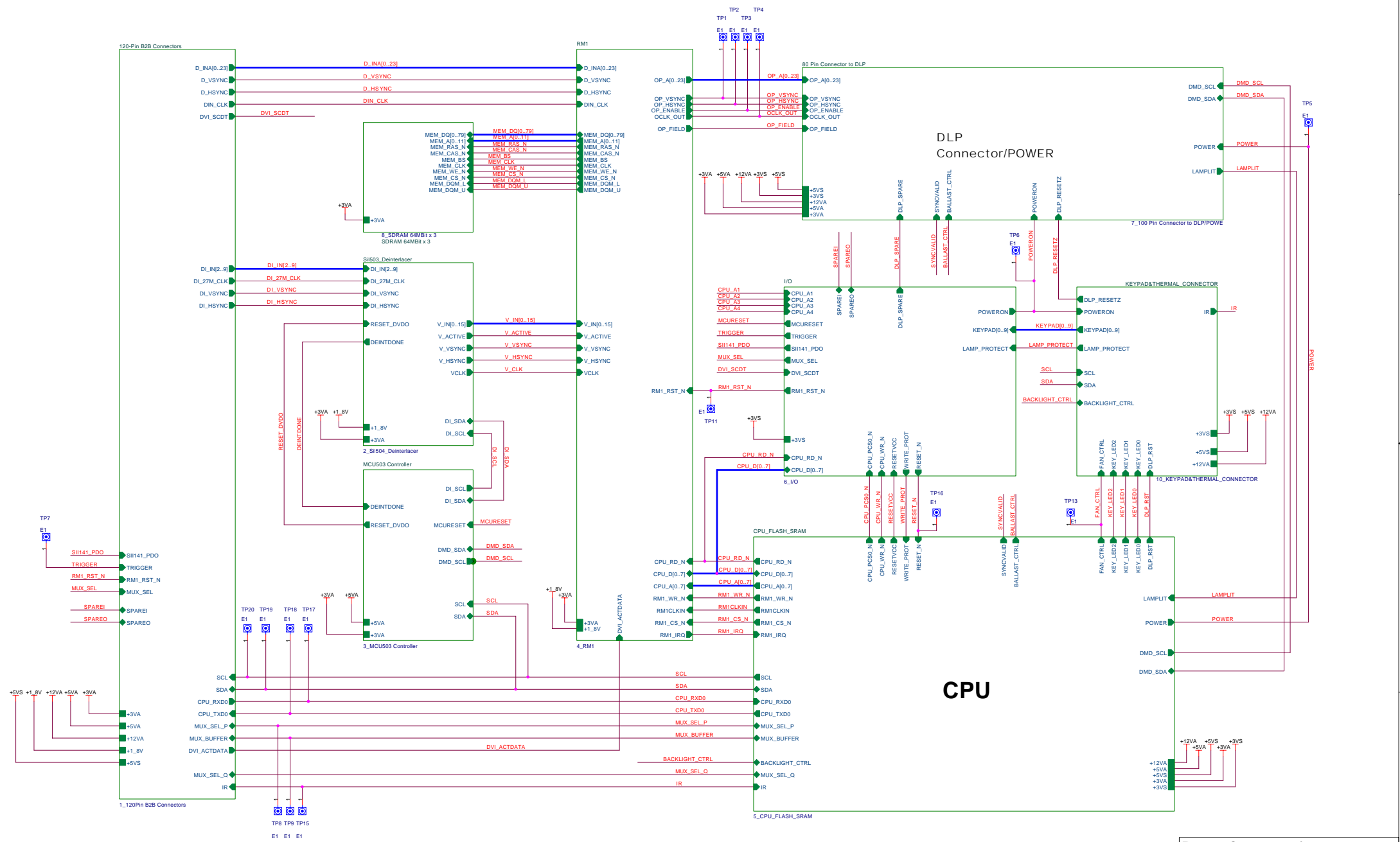
3: Illegal Action,

4: Illegal Adjusted Situation,

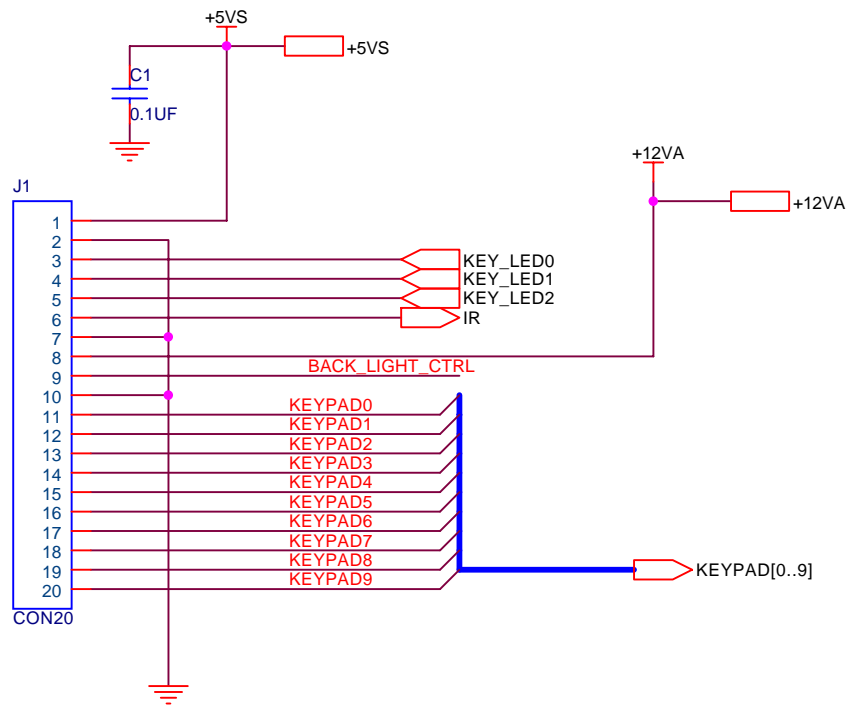
5. Written value is over up limit,

6. Written value is over down limit

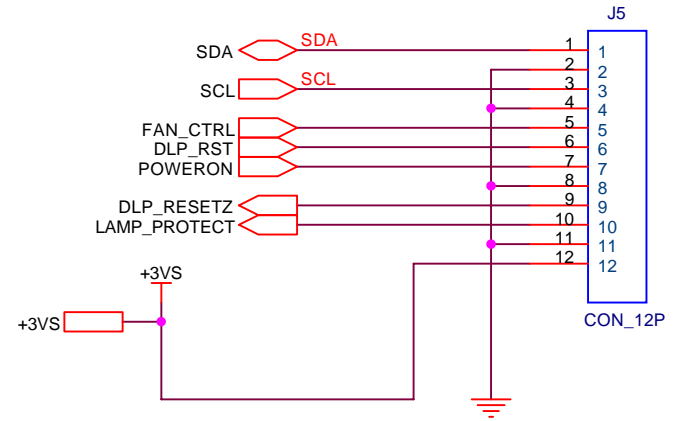
If the ACK is 0, 5, 6, program will deal this command. If ACK = 5, program writes the legal maximum value to the setting. If ACK = 6, writes the legal minimum value to the setting.



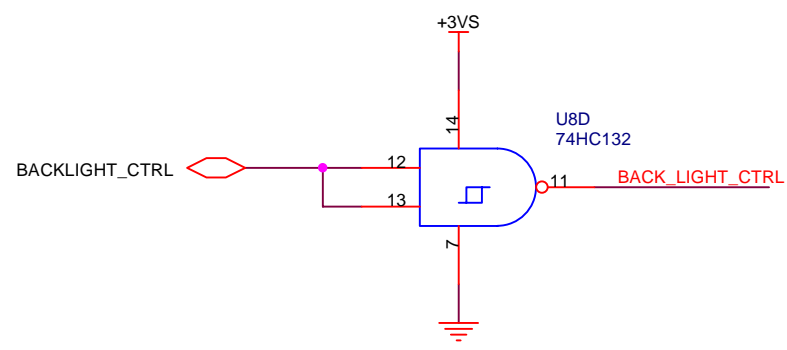
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Project Code	Model Name	OEM/ODM Model Name	
99_J5877.001	HT720G	NA	
Title: MAIN BOARD			
Size	PCB P/N	PCB Rev.	Document Number
<Size>	48_J5801.S02	S02	99_J5877.R22-C3-304-001
Rev.	0	Sheet	1 of 10
Date:	Thursday, January 16, 2003	Prepared By:	Reviewed By:
	ANGEL HU	COLIN CHANG	BEN CHEN



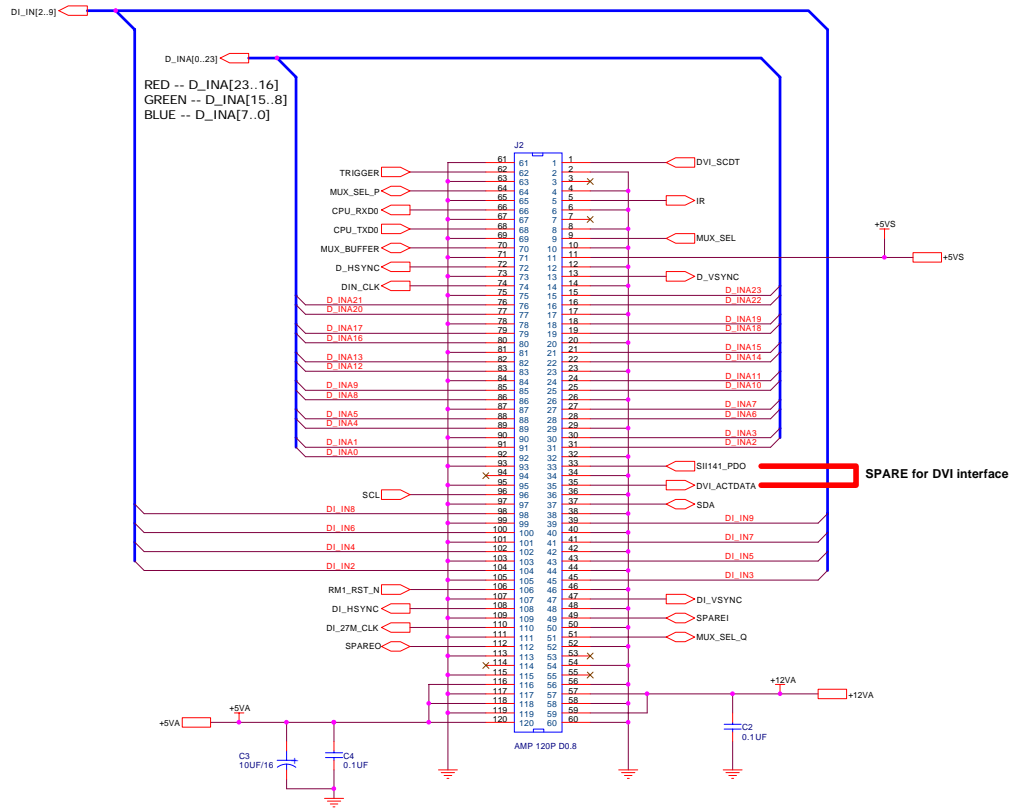
KEYPAD CONNECTOR



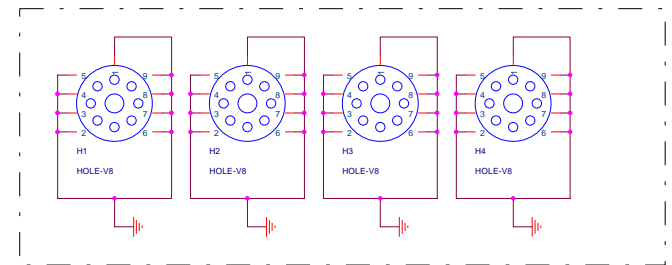
THERMAL CONNECTOR



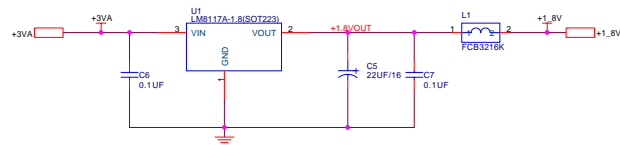
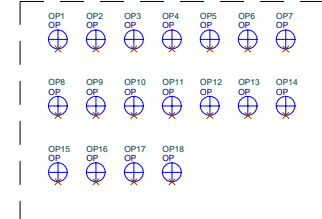
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	48.J5801.S02	S02	99.J5877.R22-C3-304-001	0
Date: Thursday, January 16, 2003		Sheet 2 of 10		
Prepared By		Reviewed By		Approved By
ANGEL HU		COLIN CHANG		BEN CHEN



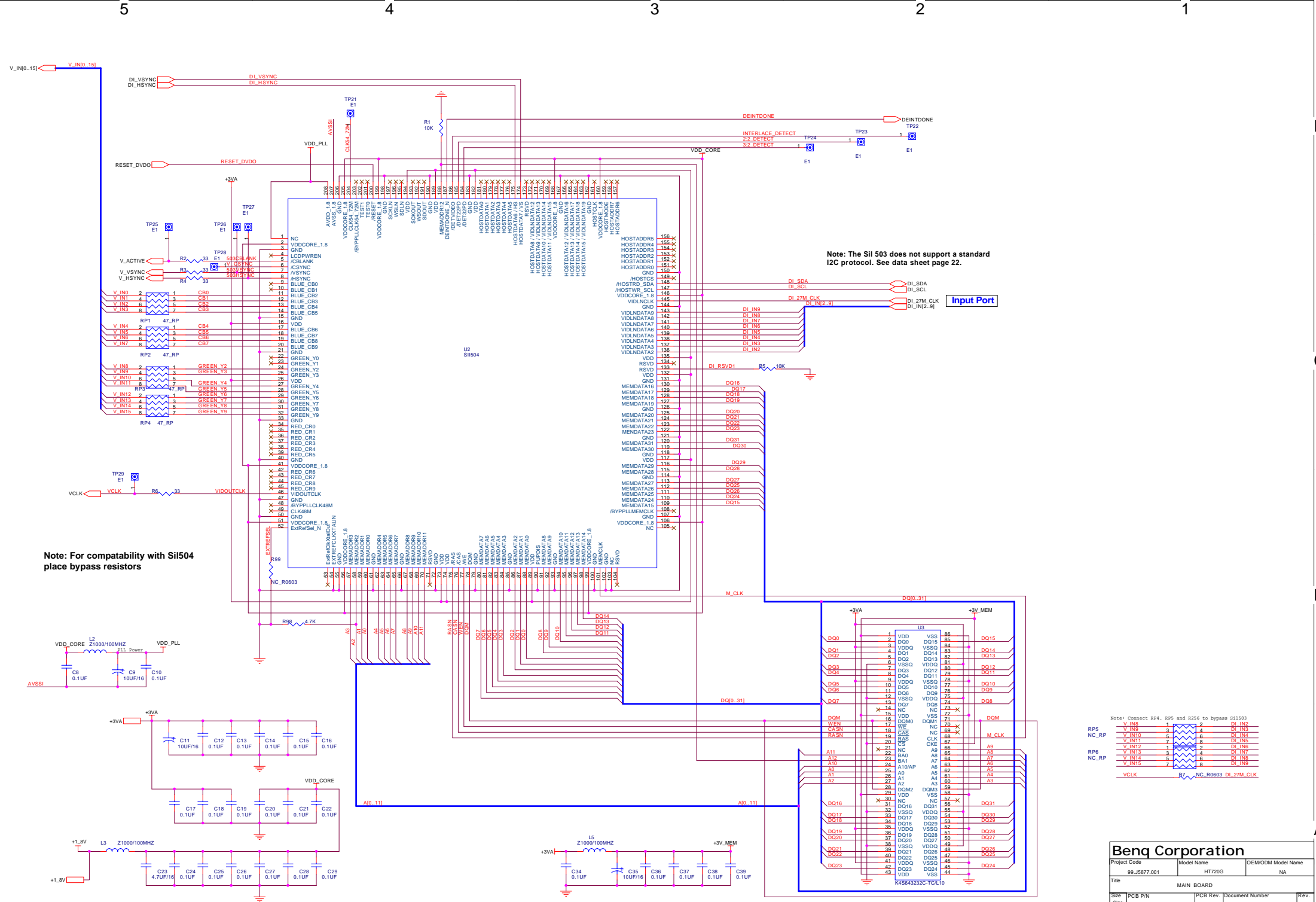
Screw Holes



Optical Points



Beng Corporation			
Project Code 99_J5877.001	Model Name HT720G	OEM/ODM Model Name NA	
Title MAIN BOARD			
Size <Size> 48_J5801.S02	PCB P/N S02	Document Number 99_J5877.R22-C3-304-001	Rev. 0
Date Thursday, January 16, 2003	Prepared By ANGEL HU	Reviewed By COLIN CHANG	Sheet 3 of 10 Approved By BEN CHEN



Note: The Si503 does not support a standard I2C protocol. See data sheet page 22.

Input Port

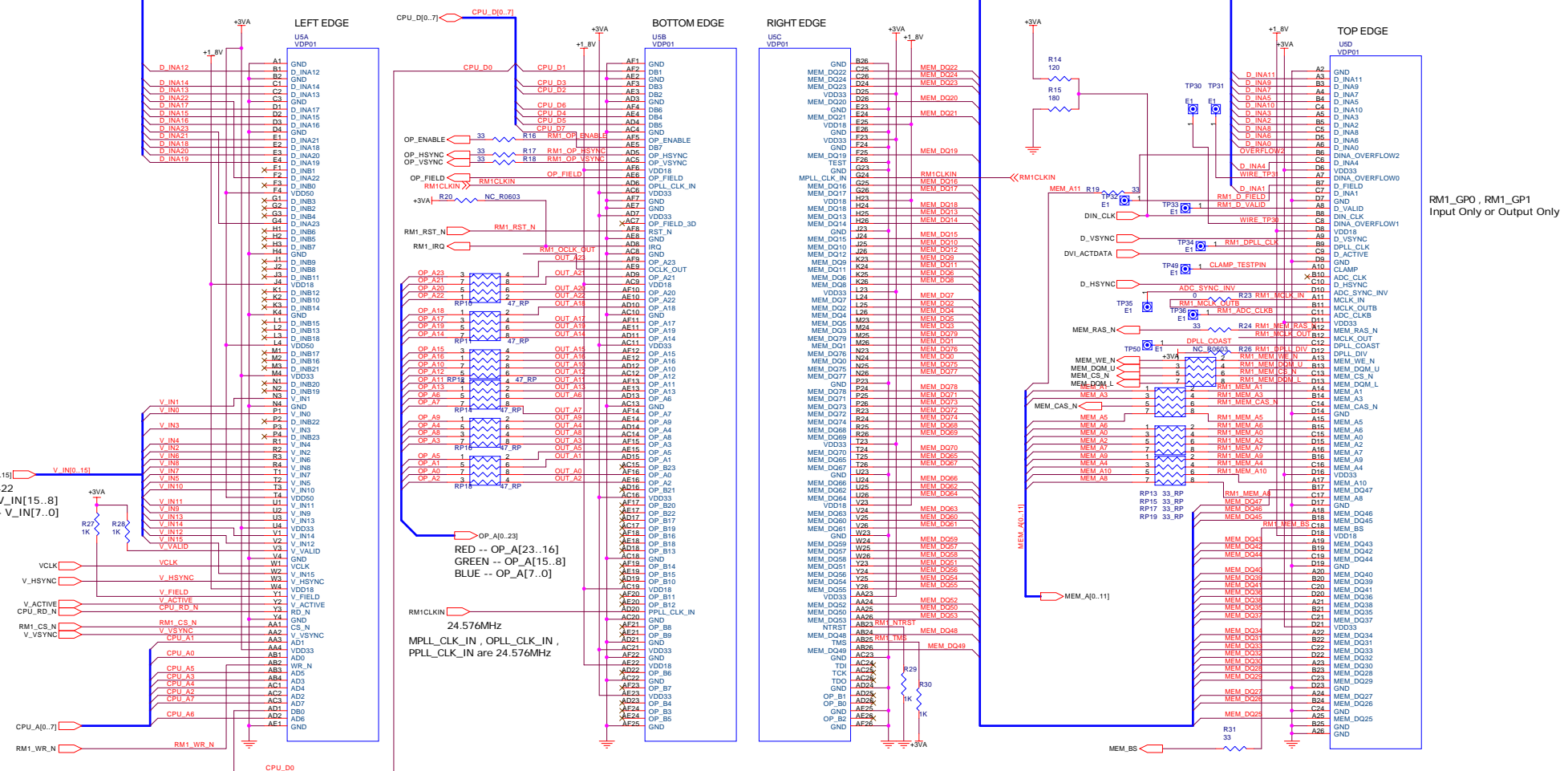
Note: For compatibility with Si1504 place bypass resistors

Note: Connect RP4, RP5 and R256 to bypass Si1503

Beng Corporation				
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Title: MAIN BOARD				
Size	PCB P/N	PCB Rev.	Document Number	Rev.
<Size>	46_J5801_S02	S02	99_J5877_R22-C3-304-001	0
Date:	Thursday, January 16, 2003	Sheet	4	of 10
Prepared By:	ANGEL HU	Reviewed By:	COLIN CHANG	Approved By:
				BEN CHEN

RED -- D_INA[23..16]
 GREEN -- D_INA[15..8]
 BLUE -- D_INA[7..0]

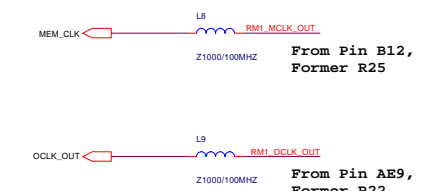
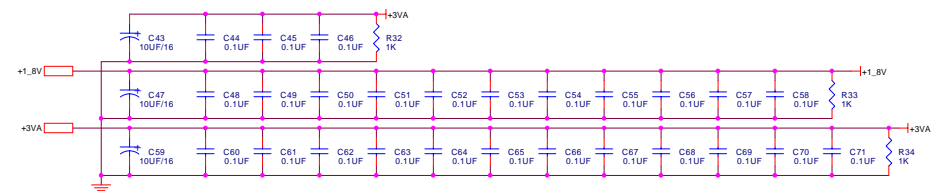
Place the resistors as close to the RM1 pins as possible.



RM1_GPO, RM1_GP1
 Input Only or Output Only

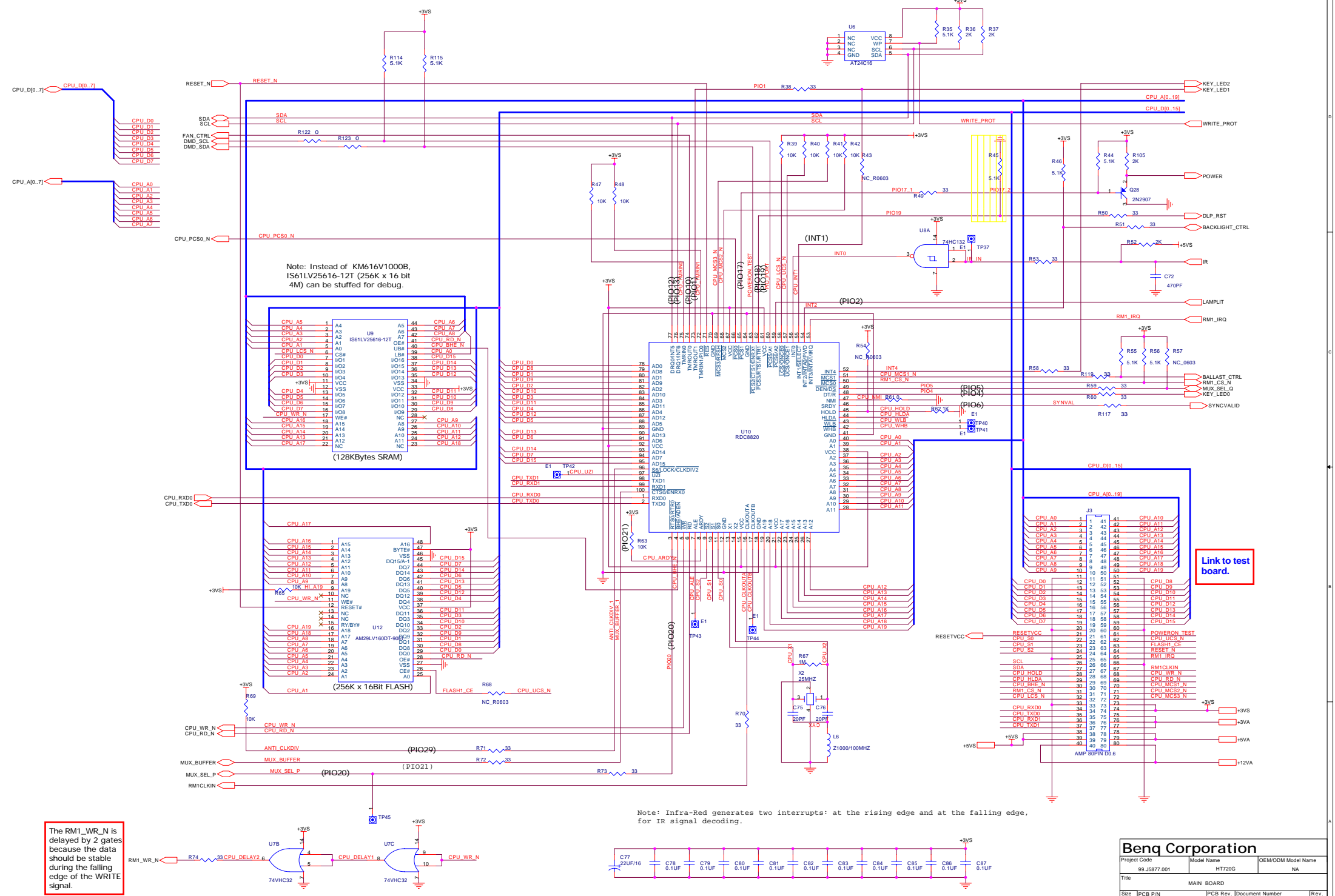
RED -- OP_A[23..16]
 GREEN -- OP_A[15..8]
 BLUE -- OP_A[7..0]

24.576MHz
 MPLL_CLK_IN, OPPLL_CLK_IN,
 PPLL_CLK_IN are 24.576MHz



modify this area

Beng Corporation			
Project Code	Model Name	OEM/ODM Model Name	
99_J5877.001	HT720G	NA	
Title MAIN BOARD			
Size	PCB P/N	PCB Rev.	Document Number
<Size>	48_J5801.S02	S02	99_J5877.R22-C3-304-001
Rev.			0
Date:	Thursday, January 16, 2003	Sheet	6 of 10
Prepared By:	ANGEL HU	Reviewed By:	COLIN CHANG
Approved By:		Approved By:	BEN CHEN



Note: Instead of KM616V1000B, IS61LV25616-12T (256K x 16 bit 4M) can be stuffed for debug.

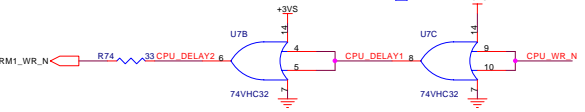
(128KBytes SRAM)

CPU A5	1	A4	44	CPU A6
CPU A4	2	A3	43	CPU A5
CPU A3	3	A2	42	CPU A4
CPU A2	4	A1	41	CPU RD_N
CPU A1	5	A0	40	CPU WR_N
CPU LCS_N	6	CS#	39	CPU A0
CPU D5	7	LD#	38	CPU D15
CPU D1	8	IO#	37	CPU D14
CPU D2	9	IO#	36	CPU D13
CPU D3	10	IO#	35	CPU D12
CPU D4	11	VSS	34	
CPU D4	12	VCC	32	CPU D11
CPU D5	13	VCC	31	CPU D10
CPU D6	14	IO#	30	CPU D9
CPU D7	15	IO#	29	CPU D8
CPU WR_N	16	IO#	28	X
CPU A16	17	WE#	NC	CPU A9
CPU A15	18	A14	A8	CPU A10
CPU A14	19	A13	A9	CPU A11
CPU A13	20	A12	A10	CPU A12
CPU A12	21	A11	A11	CPU A12
CPU A11	22	NC	A12	CPU A18

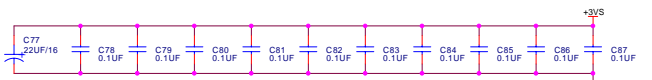
(256K x 16Bit FLASH)

CPU A17	1	A16	48	CPU D15
CPU A15	2	A14	47	CPU D14
CPU A14	3	A13	46	
CPU A13	4	A12	45	CPU D7
CPU A12	5	A11	44	CPU D6
CPU A11	6	A10	43	CPU D5
CPU A10	7	A9	42	CPU D4
CPU A9	8	A8	41	CPU D13
CPU A8	9	A7	40	CPU D12
CPU WR_N	10	A19	DO5	CPU D4
CPU WR_N	11	WE#	DO4	CPU D4
CPU WR_N	12	NC	DO3	CPU D11
CPU WR_N	13	NC	DO2	CPU D10
CPU WR_N	14	NC	DO1	CPU D9
CPU WR_N	15	NC	DO0	CPU D8
CPU A18	16	A18	DO2	CPU D5
CPU A17	17	A17	DO1	CPU D4
CPU A16	18	A16	DO0	CPU D3
CPU A15	19	A15	DO0	CPU D2
CPU A14	20	A14	DO0	CPU D1
CPU A13	21	A13	DO0	CPU D0
CPU A12	22	A12	DO0	CPU RD_N
CPU A11	23	A11	DO0	CPU RD_N
CPU A10	24	A10	DO0	CPU RD_N

The RM1_WR_N is delayed by 2 gates during the falling edge of the WRITE signal.

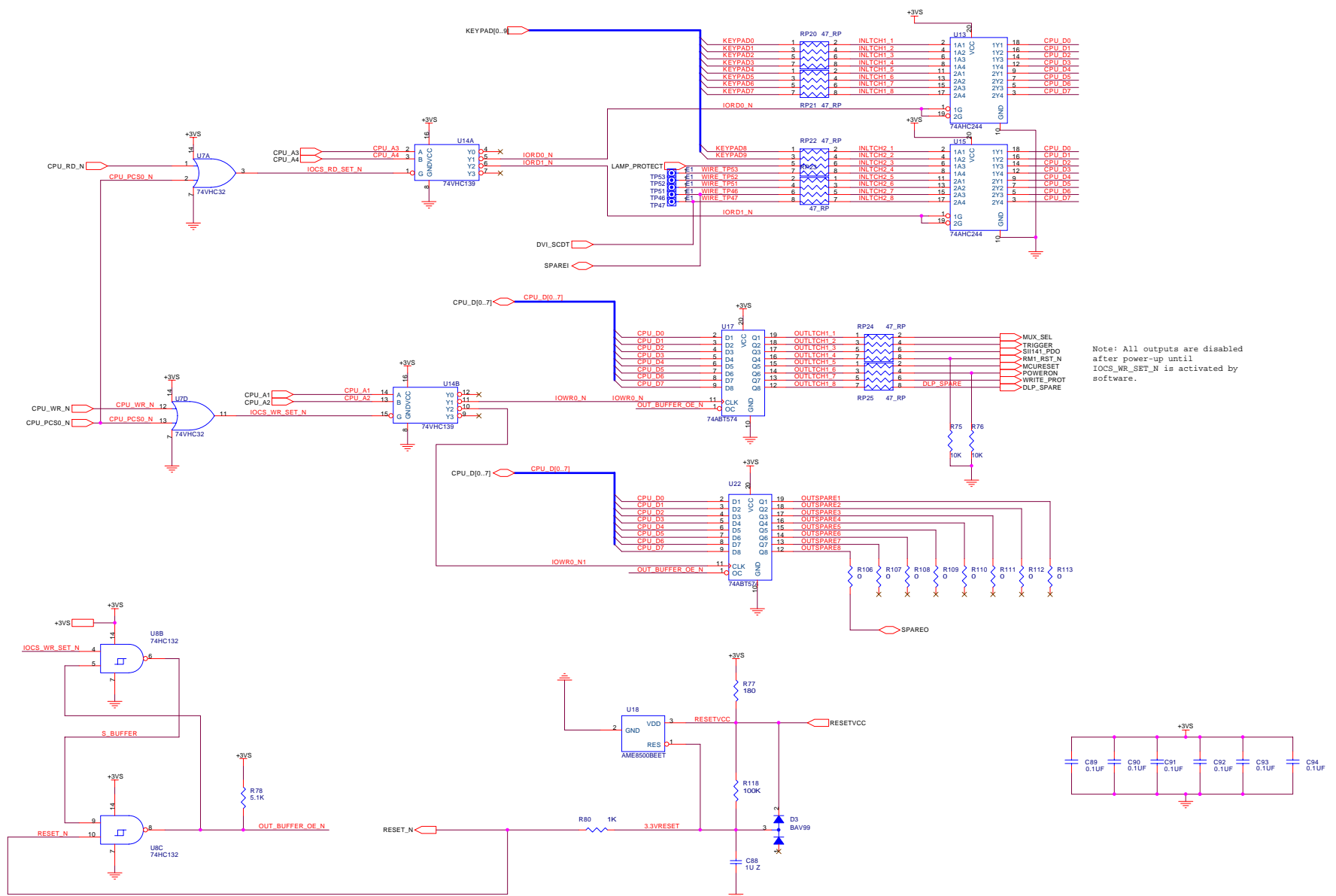


Note: Infra-Red generates two interrupts: at the rising edge and at the falling edge, for IR signal decoding.



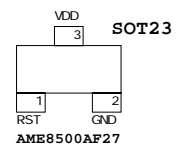
Link to test board.

Beng Corporation			
Project Code	Model Name	OEM/ODM Model Name	
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Title			
MAIN BOARD			
Size	PCB P/N	PCB Rev.	Document Number
<Size>	48_J5801.S02	S02	99_J5877.R22-C3-304-001
Rev.			0
Date:	Thursday, January 16, 2003	Sheet	7 of 10
Prepared By:	ANGEL HU	Reviewed By:	COLIN CHANG
		Approved By:	BEN CHEN

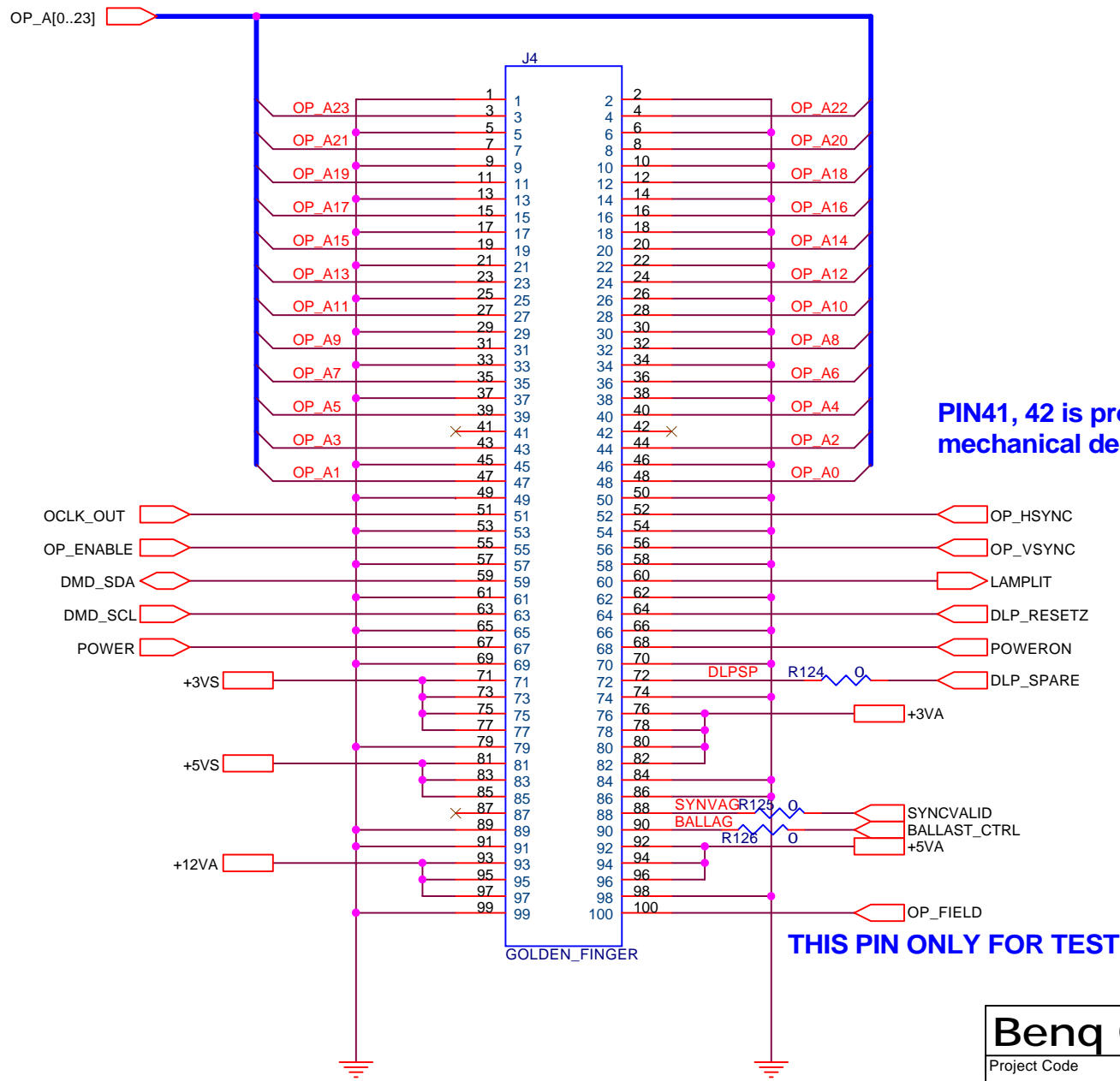


Note: All outputs are disabled after power-up until IOCS_WR_SET_N is activated by software.

**** Generate Harward RESET Singnal ****



Beng Corporation			
Project Code	Model Name	OEM/ODM Model Name	
99_J5877.001	HT720G	NA	
Title MAIN BOARD			
Size	PCB P/N	PCB Rev.	Document Number
<Size>	48_J5801.S02	S02	99_J5877.R22-C3-304-001
Rev.			0
Date:	Thursday, January 16, 2003	Sheet	8 of 10
Prepared By:	ANGEL HU	Reviewed By:	COLIN CHANG
Approved By:		Approved By:	BEN CHEN



PIN41, 42 is prohibited by mechanical design,

THIS PIN ONLY FOR TEST

Beng Corporation

Project Code 99.J5877.001	Model Name HT720G	OEM/ODM Model Name NA
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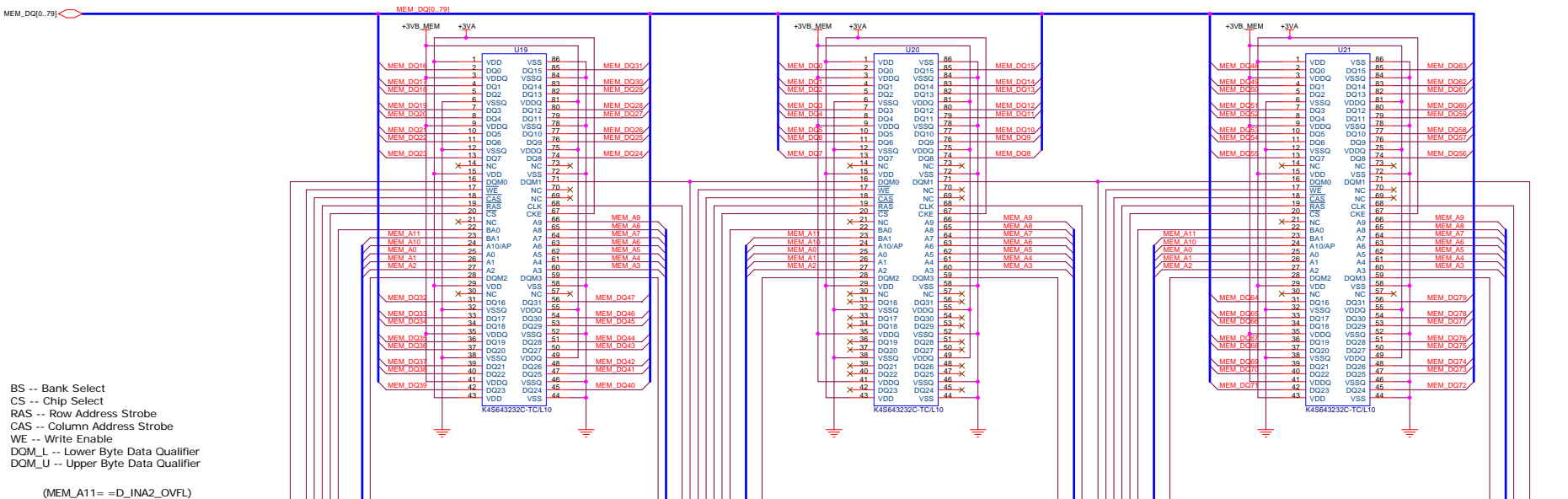
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Size <Size>	PCB P/N 48.J5801.S02	PCB Rev. S02	Document Number 99.J5877.R22-C3-304-001	Rev. 0
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Date: Thursday, January 16, 2003 Sheet 9 of 10

Prepared By ANGEL HU	Reviewed By COLIN CHANG	Approved By BEN CHEN
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MEM_DQ[0..79]



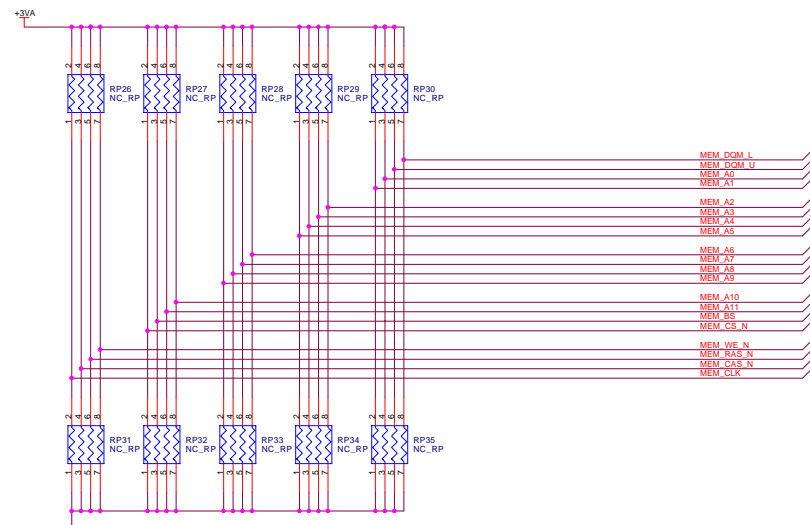
BS -- Bank Select
 CS -- Chip Select
 RAS -- Row Address Strobe
 CAS -- Column Address Strobe
 WE -- Write Enable
 DOM_L -- Lower Byte Data Qualifier
 DOM_U -- Upper Byte Data Qualifier

(MEM_A11 = =D_INA2_OVFL)

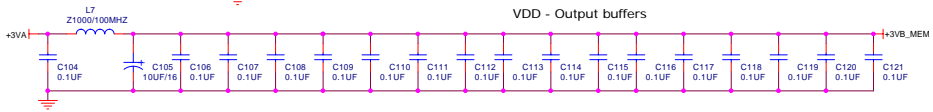
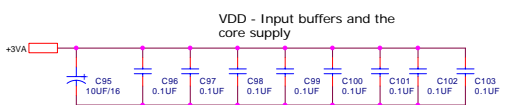
MEM_A0_111
 MEM_DQM_L
 MEM_WE_N
 MEM_CAS_N
 MEM_RAS_N
 MEM_CS_N
 MEM_CLK
 MEM_BS

MEM_A11 -- Higher Bank Select (BA1)
 MEM_BS -- Lower Bank Select (BA0)

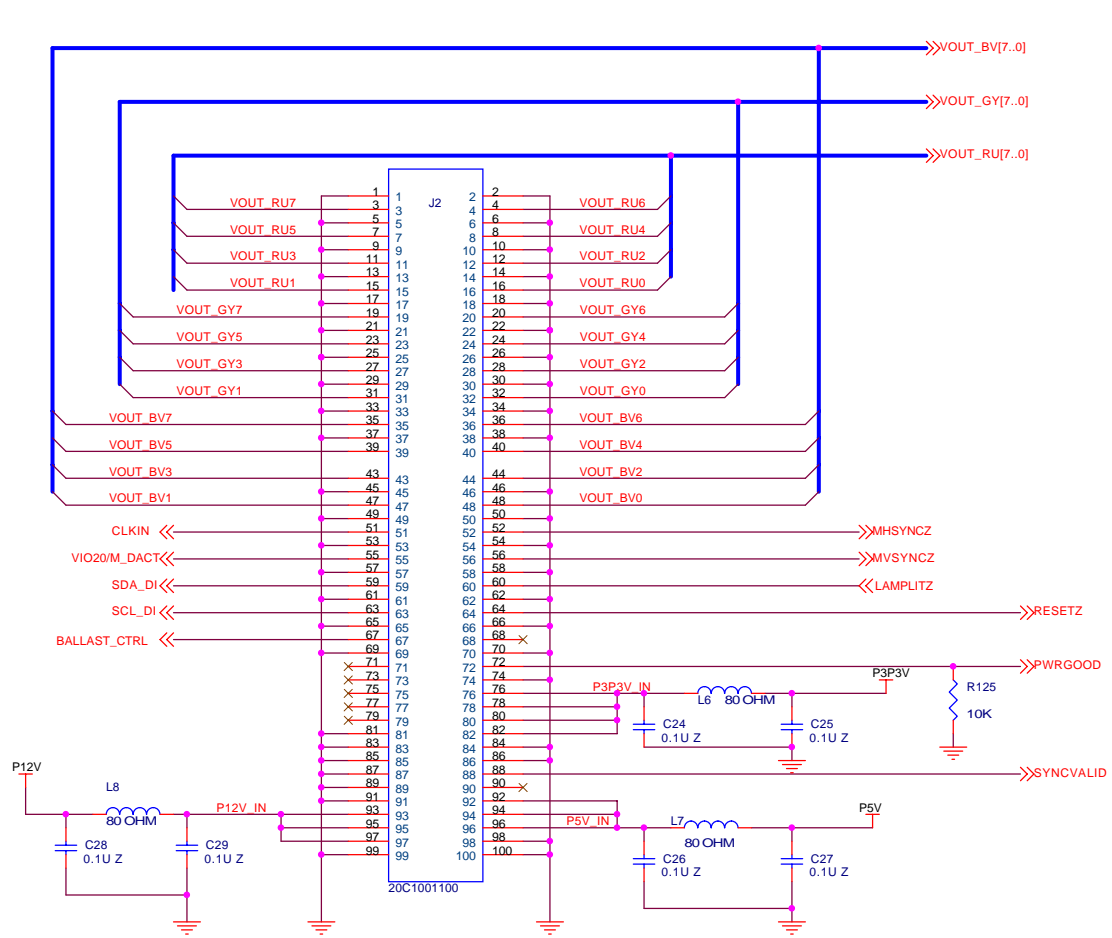
(Address and Control bus)



Test parts and resistors are located at the end of bus chain.
 All address and control signals must be routed in a daisy chain, with the same trace length from RM1 to each SDRAM.
 Termination resistors values = (traces impedance) x 2

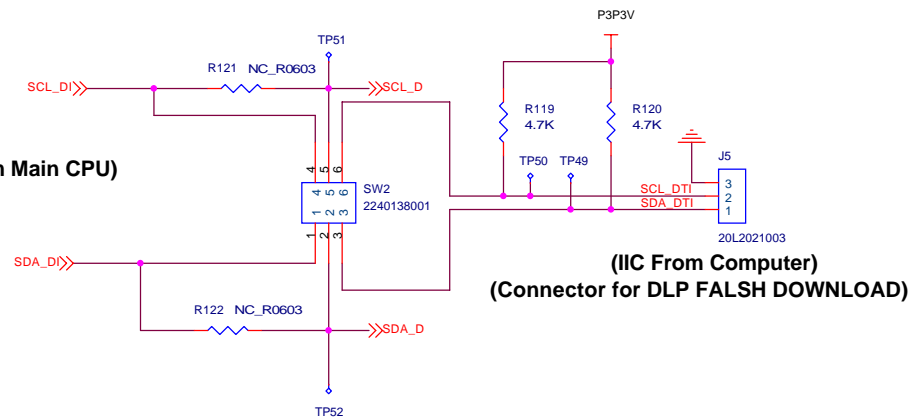


Beng Corporation		
Project Code	Model Name	OEM/ODM Model Name
99.J5877.001	HT720G	NA
MAIN BOARD		
Size	PCB P/N	PCB Rev.
<Size>	48.J5801.S02	S02
Document Number	Rev.	
99.J5877.R22-C3-304-001	0	
Date:	Thursday, January 16, 2003	Sheet 10 of 10
Prepared By:	Reviewed By:	Approved By:
ANGEL HU	COLIN CHANG	BEN CHEN

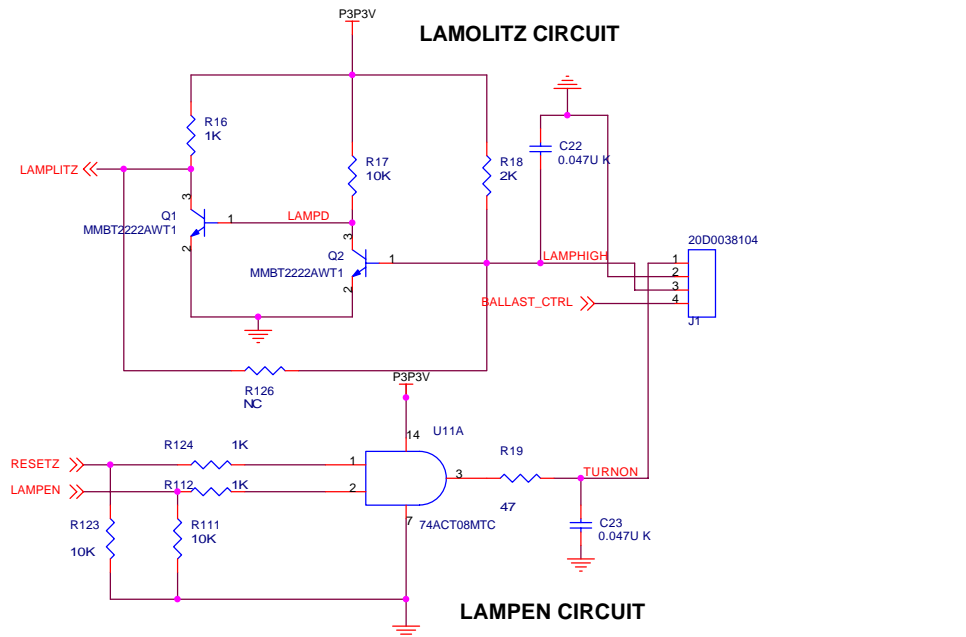


INPUT SIGNALS FROM MAIN BOARD

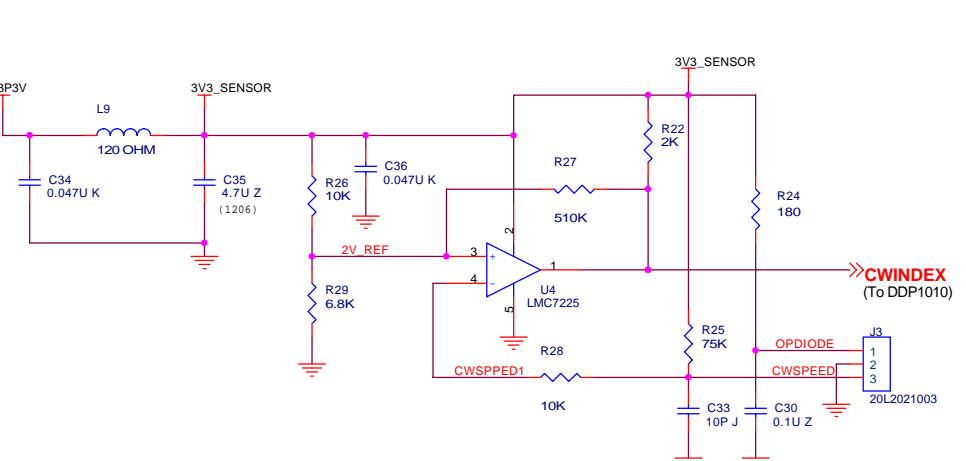
(IIC From Main CPU)



**(IIC From Computer)
(Connector for DLP FALSH DOWNLOAD)**



LAMPLITZ CIRCUIT

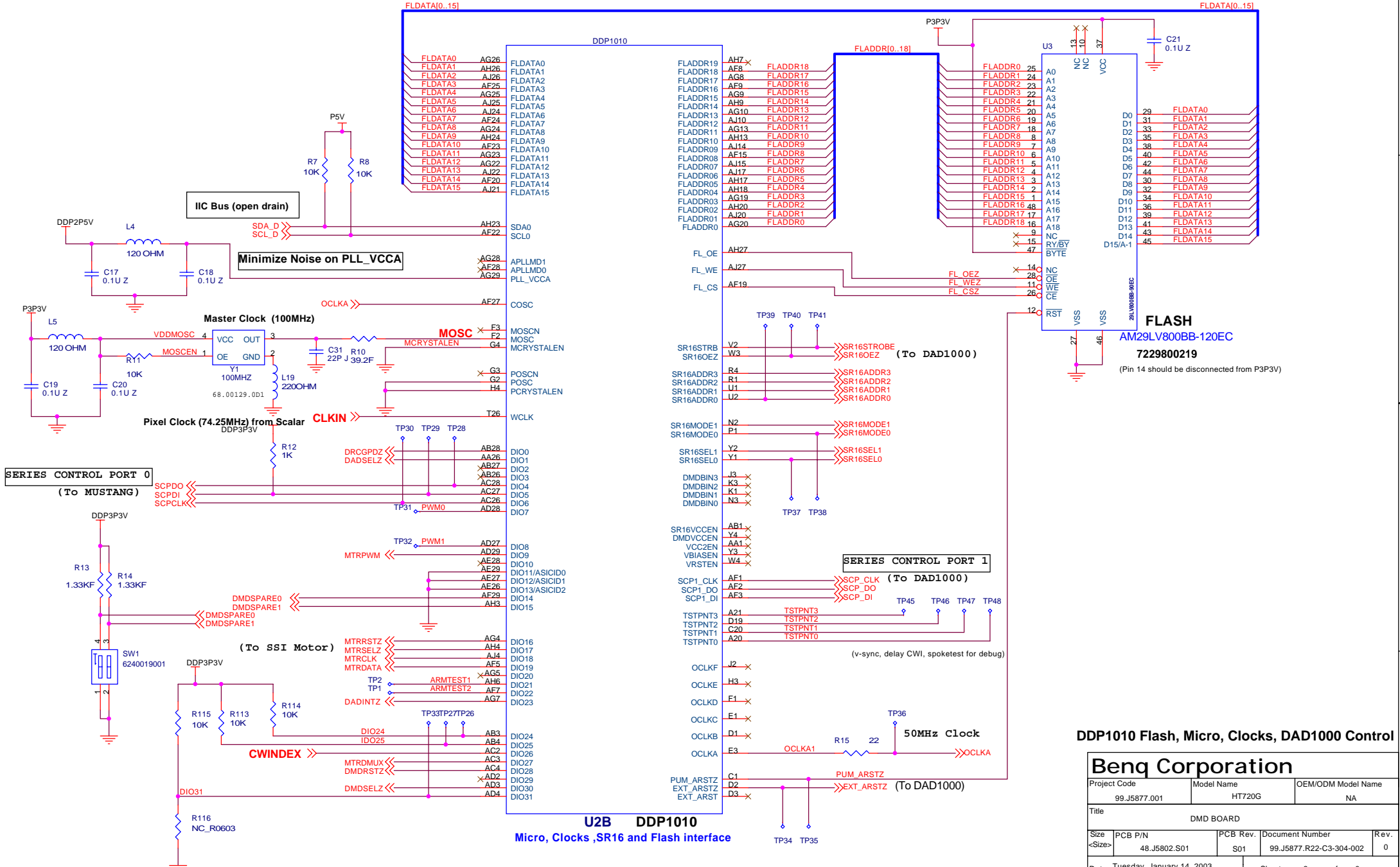


LAMPEN CIRCUIT

CWINDEX CIRCUIT

INPUTS, LAMPEN, LAMPLIZ, CWINDEX

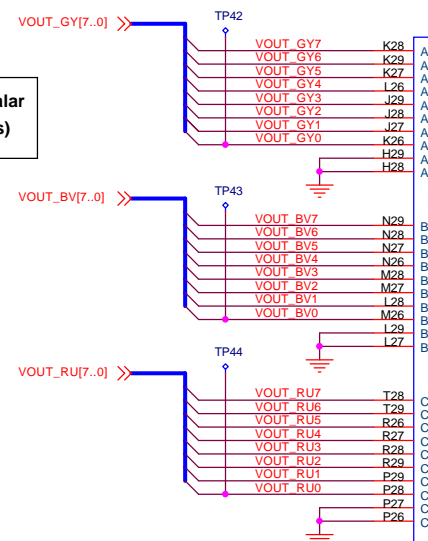
Benq Corporation			
Project Code	Model Name	OEM/ODM Model Name	
99.J5877.001	HT720G	NA	
Title			
DMD BOARD			
Size	PCB P/N	PCB Rev.	Document Number
<Size>	48.J5802.S01	S01	99.J5877.R22-C3-304-002
Date:	Tuesday, January 14, 2003	Sheet	1 of 8
Prepared By	Reviewed By	Approved By	
ANGEL HU	ALEX HY TSENG	BEN CHEN	



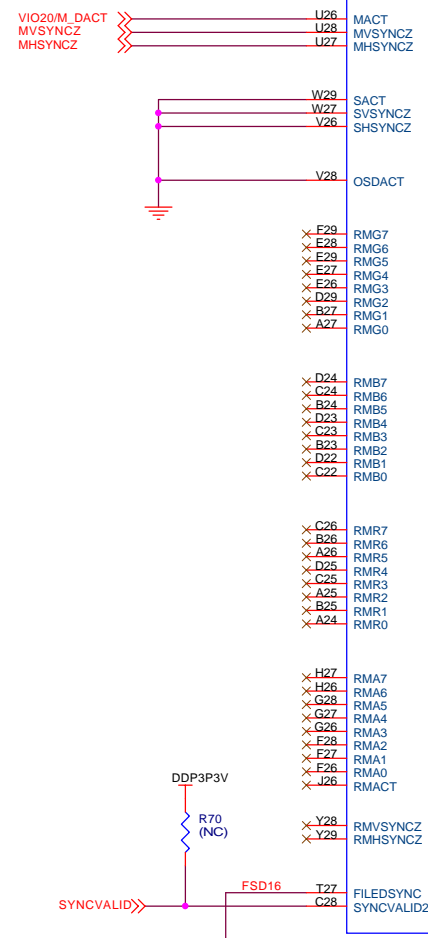
DDP1010 Flash, Micro, Clocks, DAD1000 Control

Beng Corporation			
Project Code	Model Name	OEM/ODM Model Name	
99.J5877.001	HT720G	NA	
Title			
DMD BOARD			
Size	PCB P/N	Document Number	Rev.
<Size>	48.J5802.S01	S01	99.J5877.R22-C3-304-002
Date:	Tuesday, January 14, 2003	Sheet	2 of 8
Prepared By	Reviewed By	Approved By	
ANGEL HU	ALEX HY TSENG	BEN CHEN	

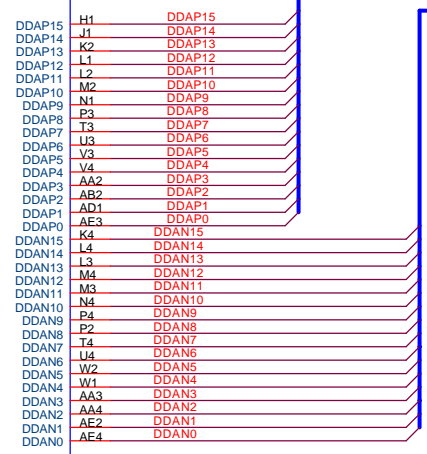
**Video Inputs From Scalar
RGB 888 Format (24bits)**



Video Syncs From Scalar

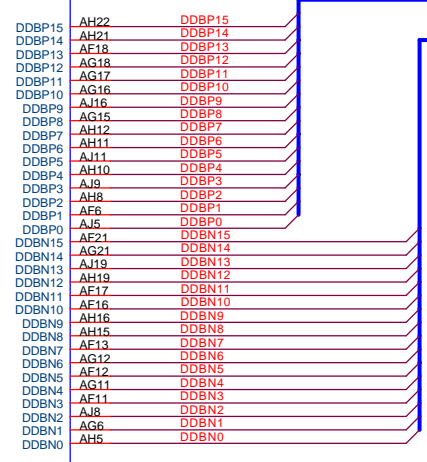


U2C DDP1010



**LVDS Differential DataBus DDA
(To Mustang DMD)**

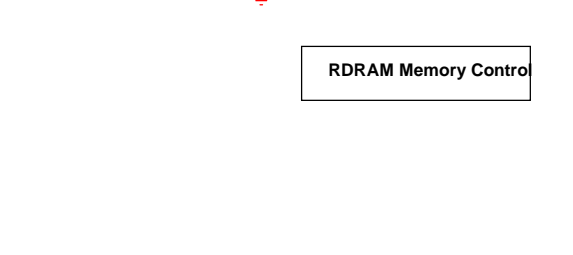
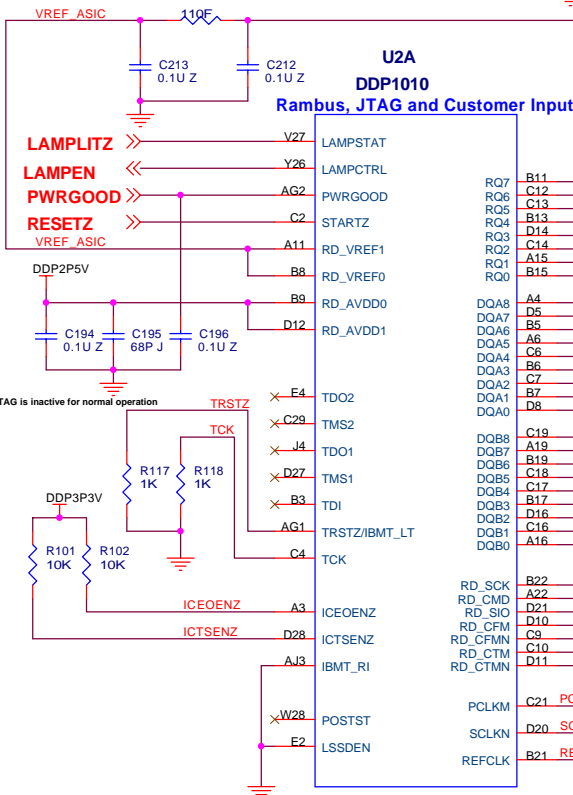
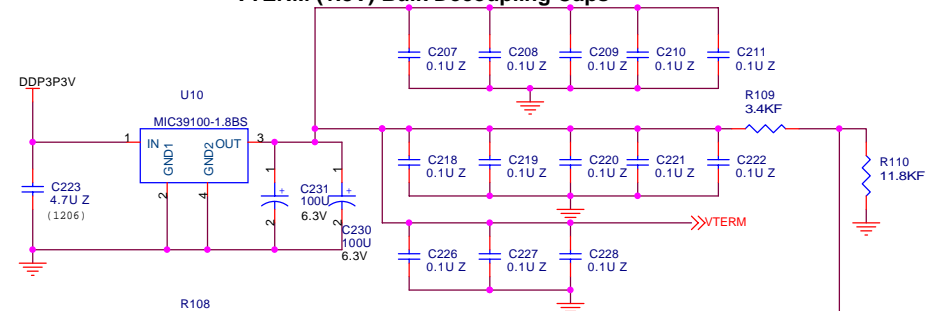
**LVDS Differential DataBus DDB
(To Mustang DMD)**



DDP1010 Video Input and DMD Output

Benq Corporation			
Project Code	Model Name	OEM/ODM Model Name	
99.J5877.001	HT720G	NA	
Title			
DMD BOARD			
Size	PCB P/N	PCB Rev.	Document Number
<Size>	48.J5802.S01	S01	99.J5877.R22-C3-304-002
Date:	Tuesday, January 14, 2003	Sheet	3 of 8
Prepared By	Reviewed By	Approved By	
ANGEL HU	ALEX HY TSENG	BEN CHEN	

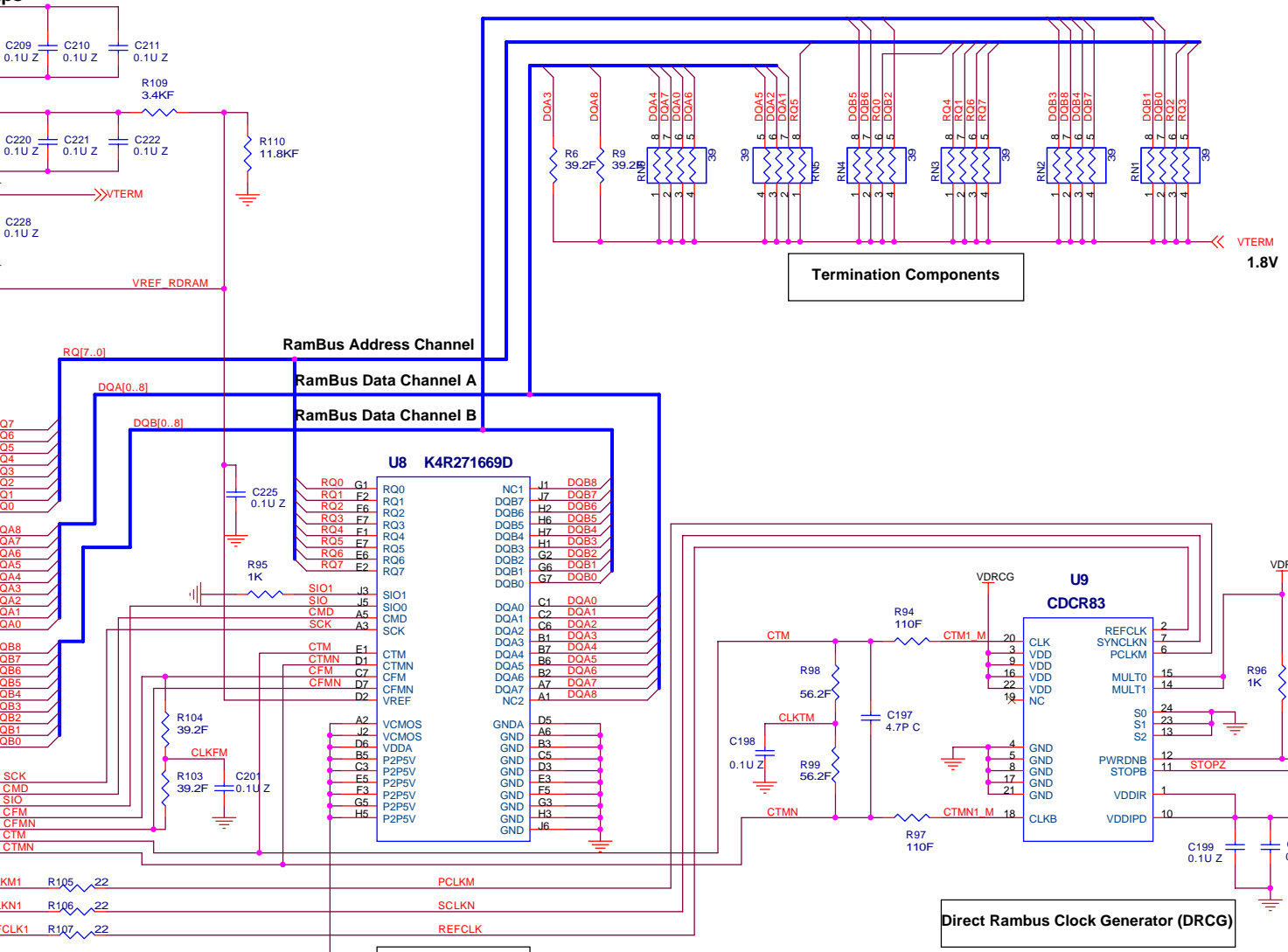
VTERM (1.8V) Bulk Decoupling Caps



RamBus Address Channel

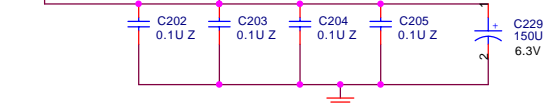
RamBus Data Channel A

RamBus Data Channel B



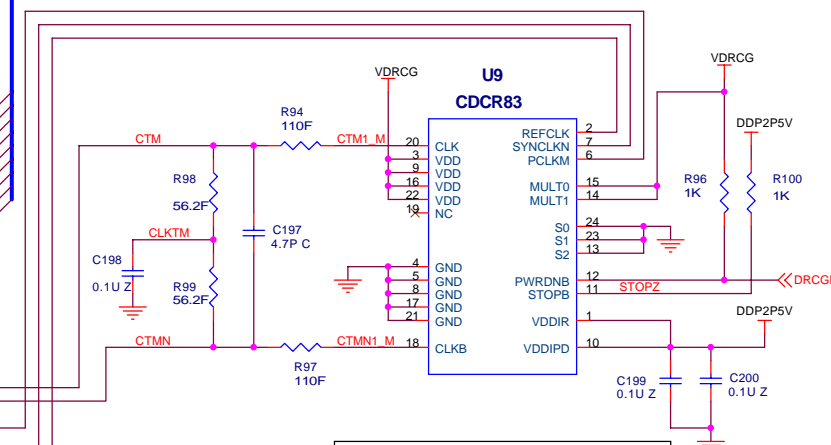
RDRAM

RDRAM VDD (2.5V) DECOUPLING CAPS

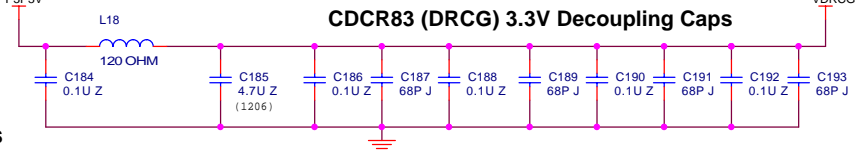


Termination Components

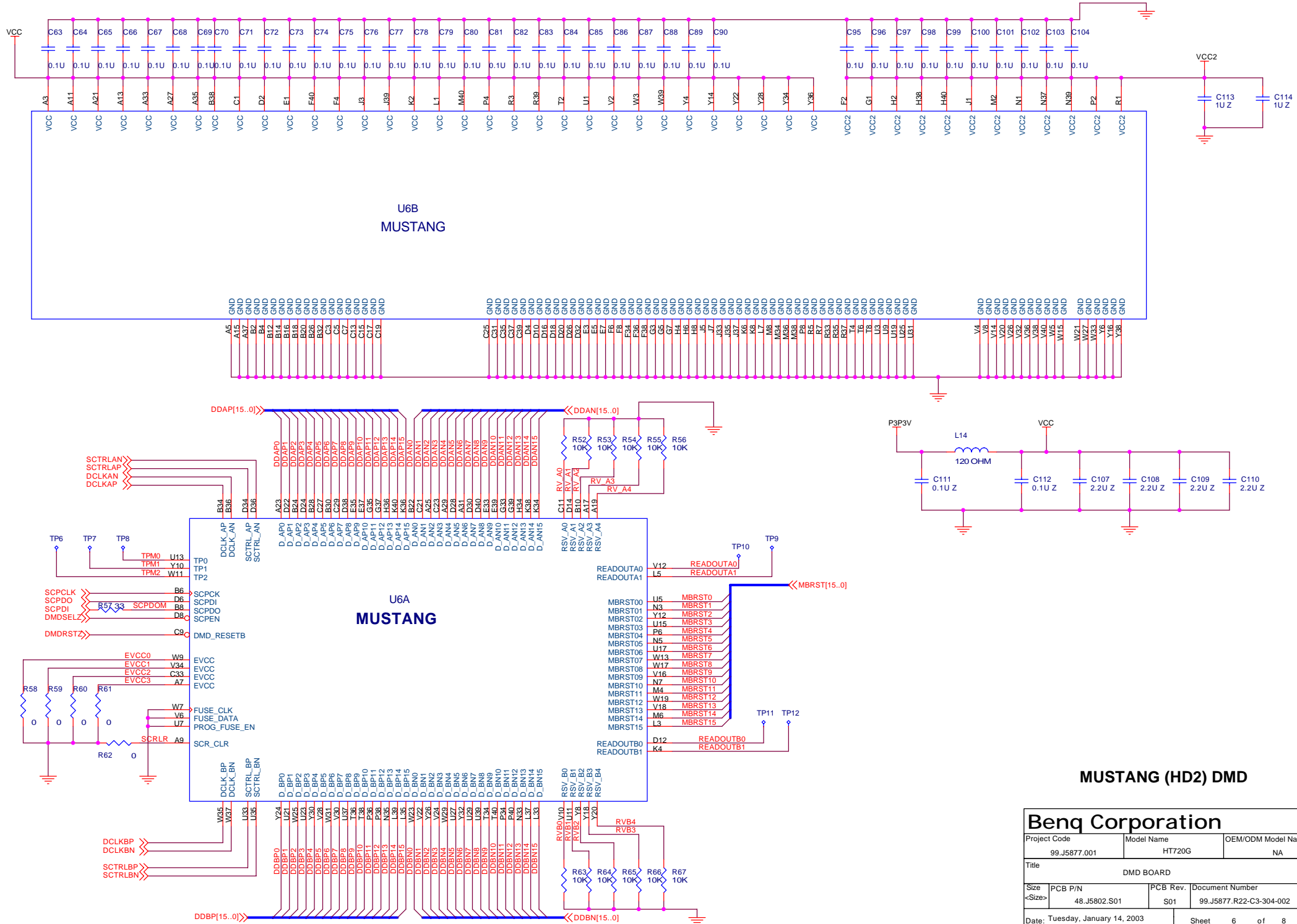
Direct Rambus Clock Generator (DRCG)



CDCR83 (DRCG) 3.3V Decoupling Caps

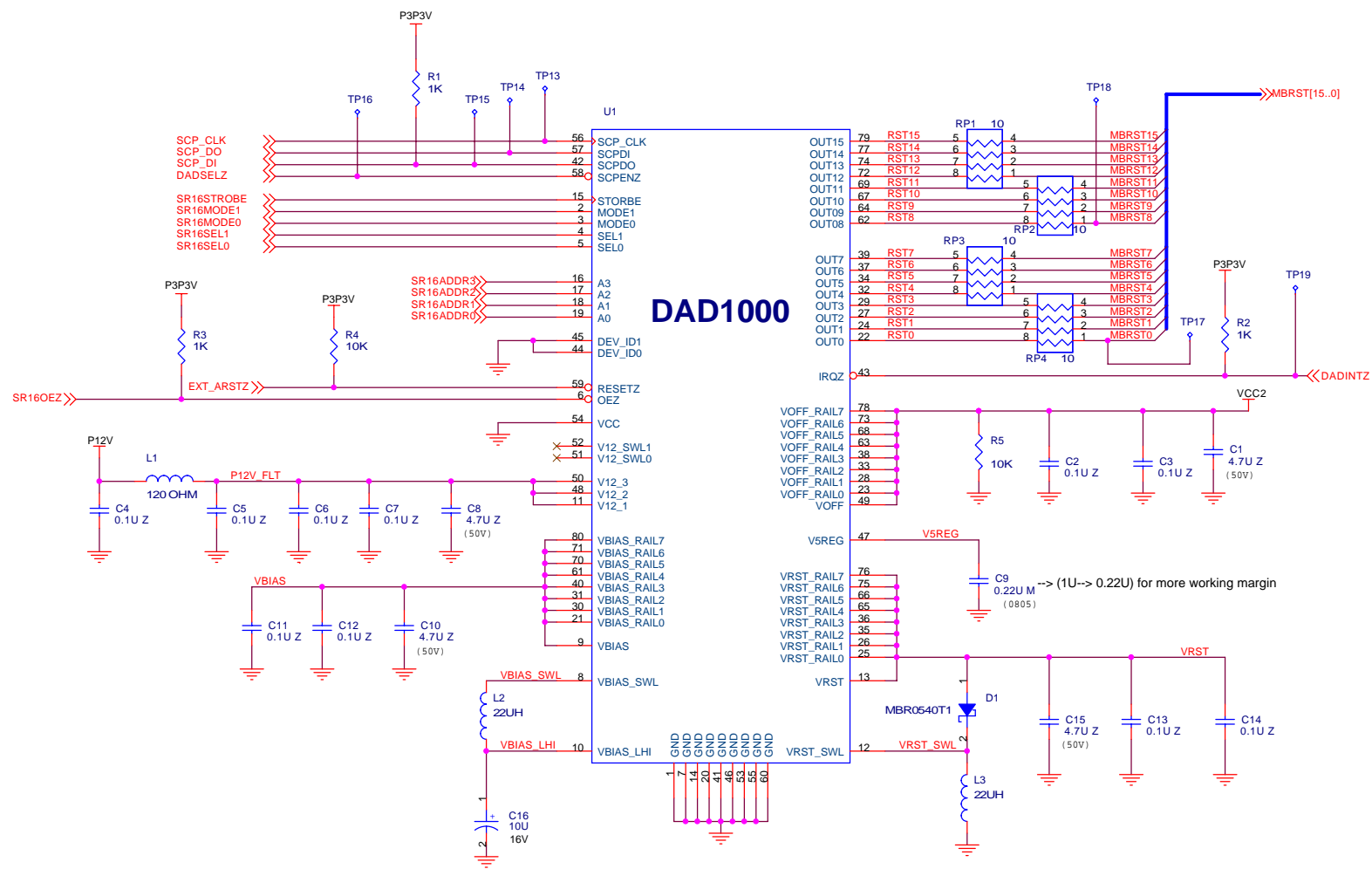


Benq Corporation			
Project Code	Model Name	OEM/ODM Model Name	
99.J5877.001	HT720G	NA	
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DMD BOARD			
Size	PCB P/N	Document Number	Rev.
<Size>	48.J5802.S01	S01	99.J5877.R22-C3-304-002
Date:	Tuesday, January 14, 2003	Sheet	4 of 8
Prepared By	Reviewed By	Approved By	
ANGEL HU	ALEX HY TSENG	BEN CHEN	



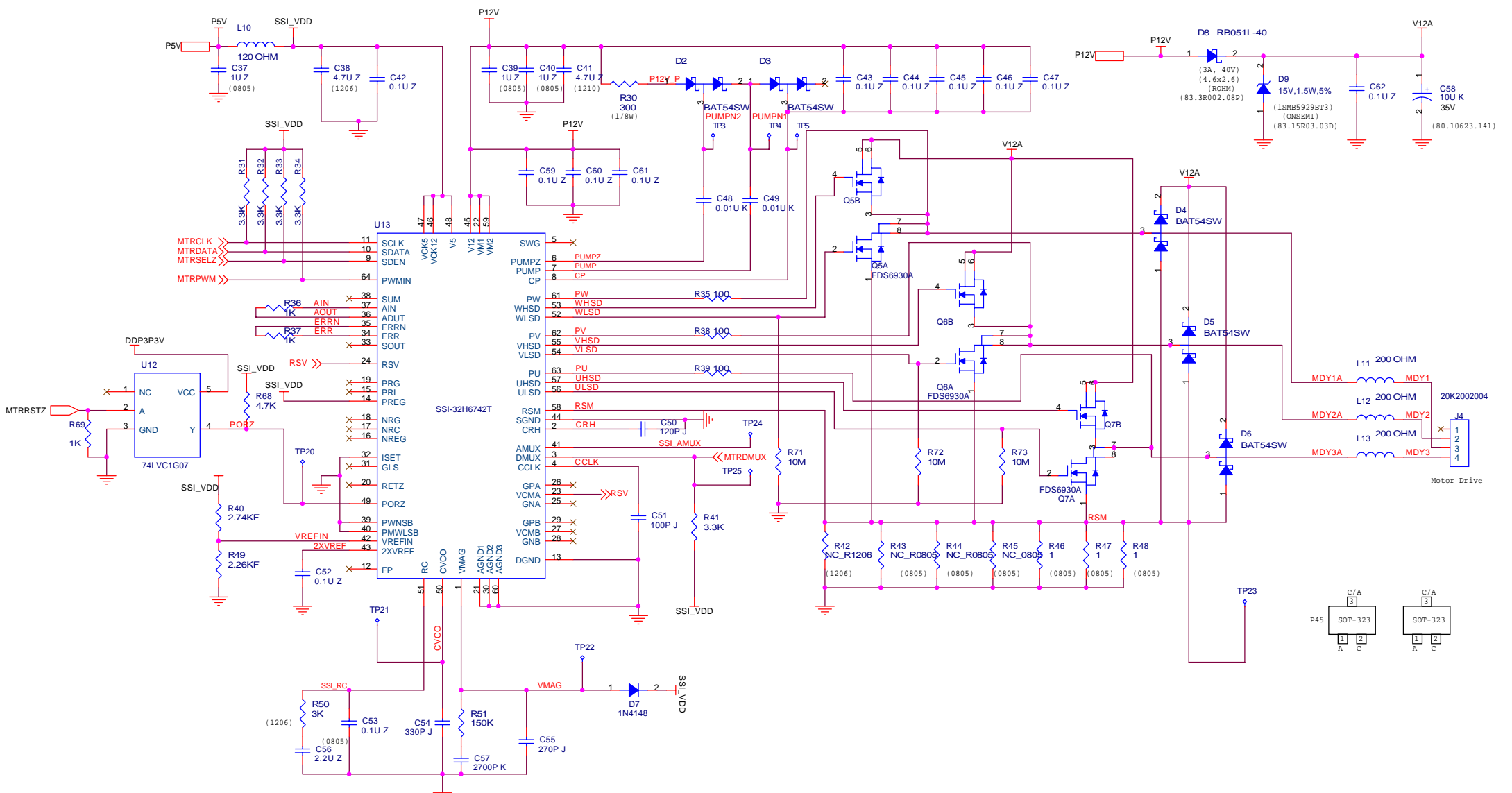
MUSTANG (HD2) DMD

Beng Corporation			
Project Code	Model Name	OEM/ODM Model Name	
99.J5877.001	HT720G	NA	
Title			
DMD BOARD			
Size	PCB P/N	Document Number	Rev.
<Size>	48.J5802.S01	S01	99.J5877.R22-C3-304-002
Date: Tuesday, January 14, 2003		Sheet	6 of 8
Prepared By	Reviewed By	Approved By	
ANGEL HU	ALEX HY TSENG	BEN CHEN	



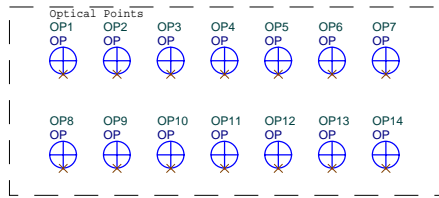
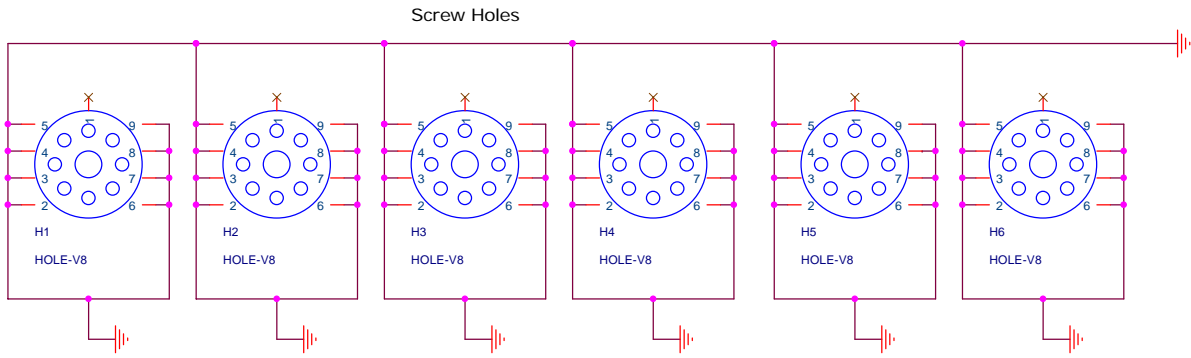
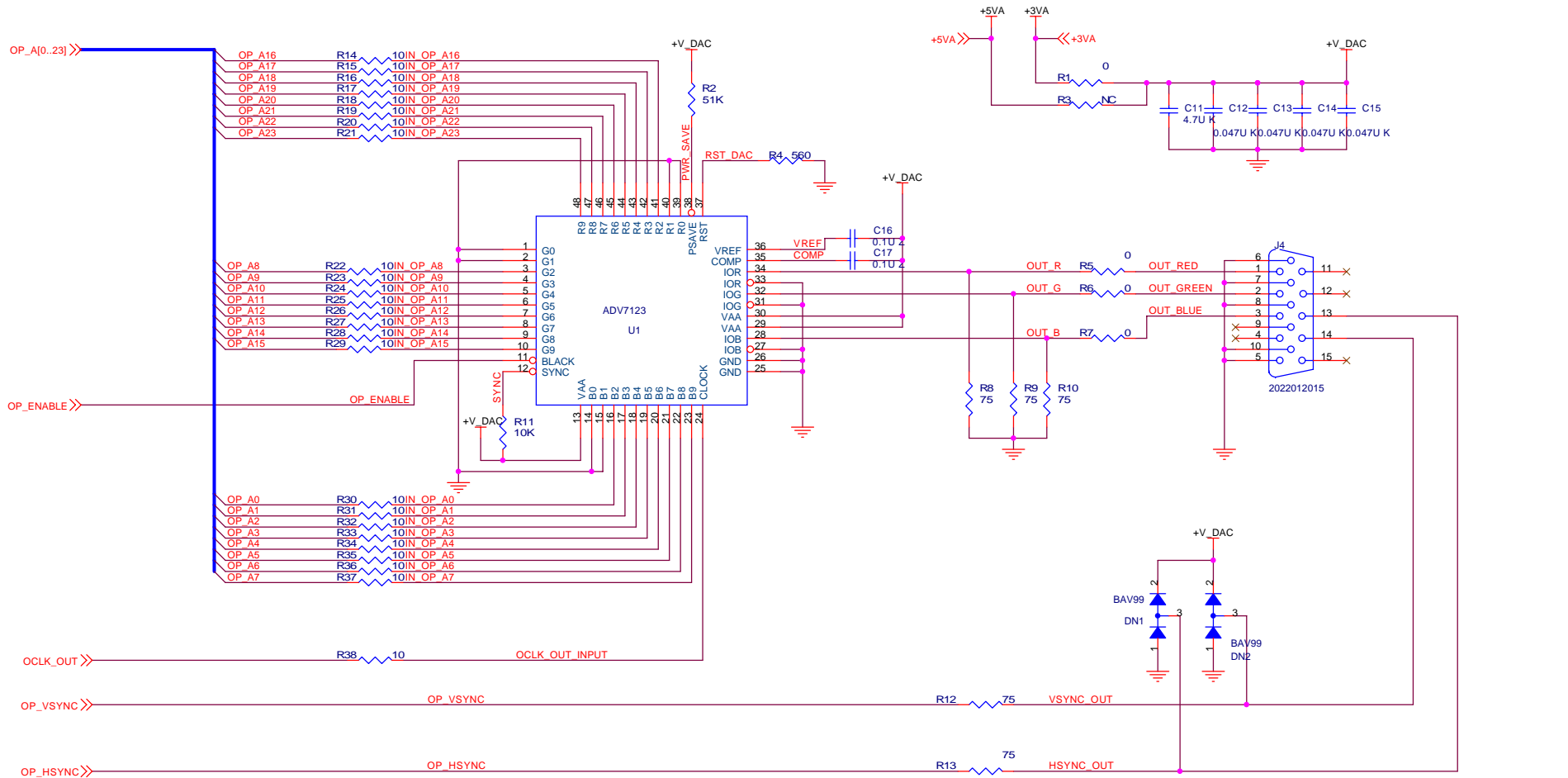
DAD1000

Benq Corporation			
Project Code	Model Name	OEM/ODM Model Name	
99.J5877.001	HT720G	NA	
Title			
DMD BOARD			
Size	PCB P/N	PCB Rev.	Document Number
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Date:	Tuesday, January 14, 2003	Sheet	7 of 8
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ANGEL HU	ALEX HY TSENG	BEN CHEN	

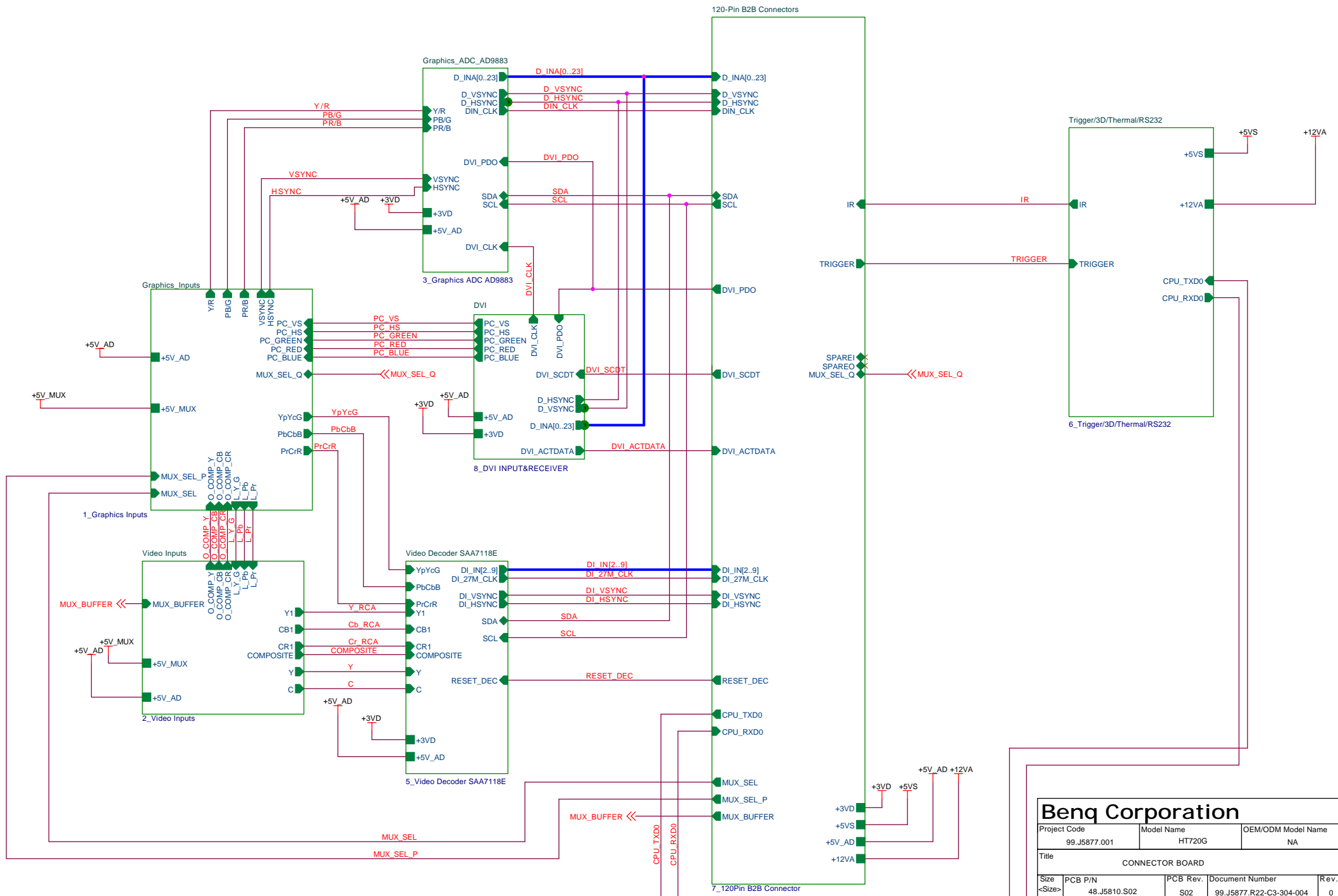


SSI COLOR WHEEL DRIVE CIRCUIT

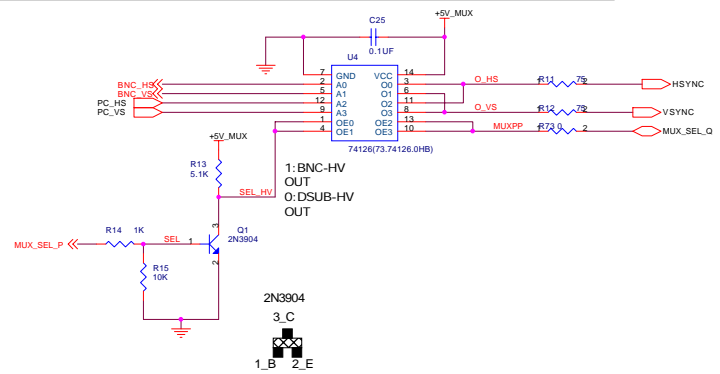
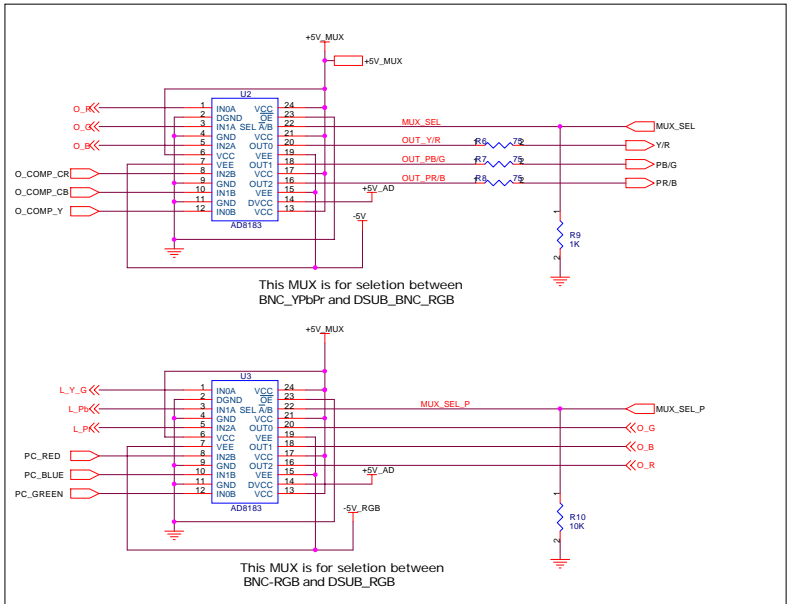
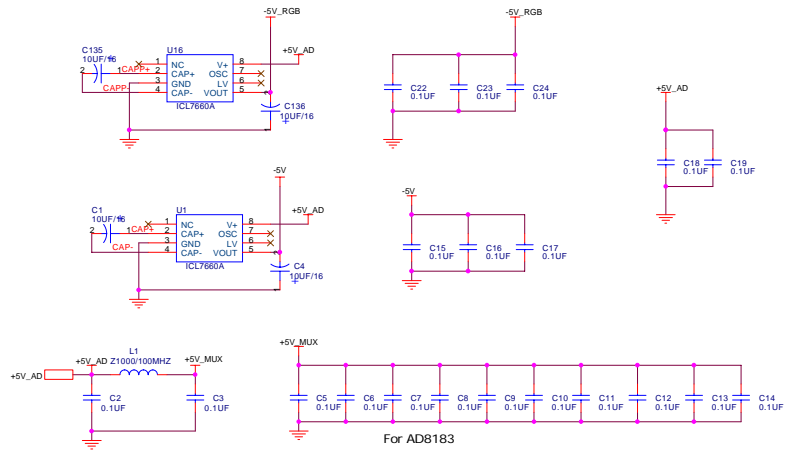
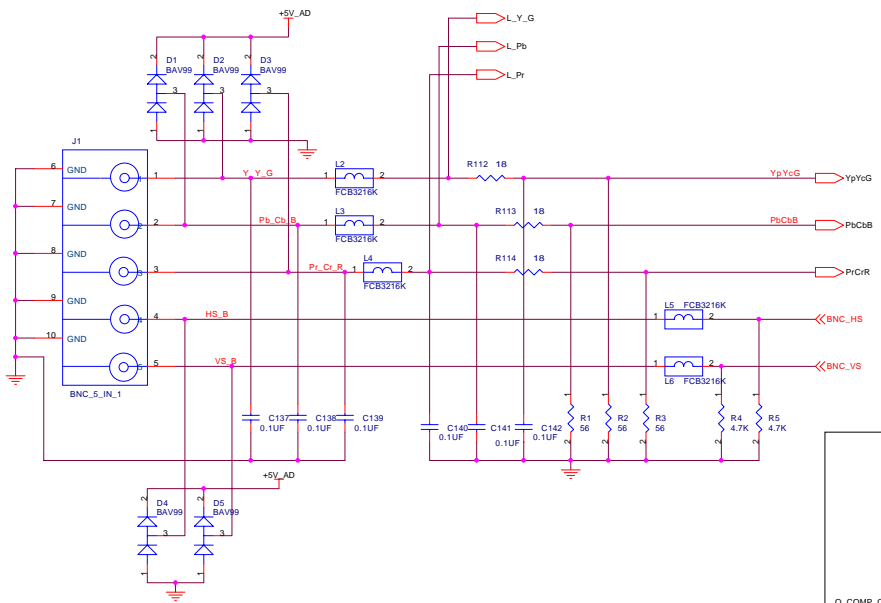
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Size <Size>	PCB P/N 48.J5802.S01	PCB Rev. S01	Document Number 99.J5877.R22-C3-304-002
			Rev. 0
Date: Tuesday, January 14, 2003	Sheet 8 of 8		
Prepared By ANGEL HU	Reviewed By ALEX HY TSENG	Approved By BEN CHEN	



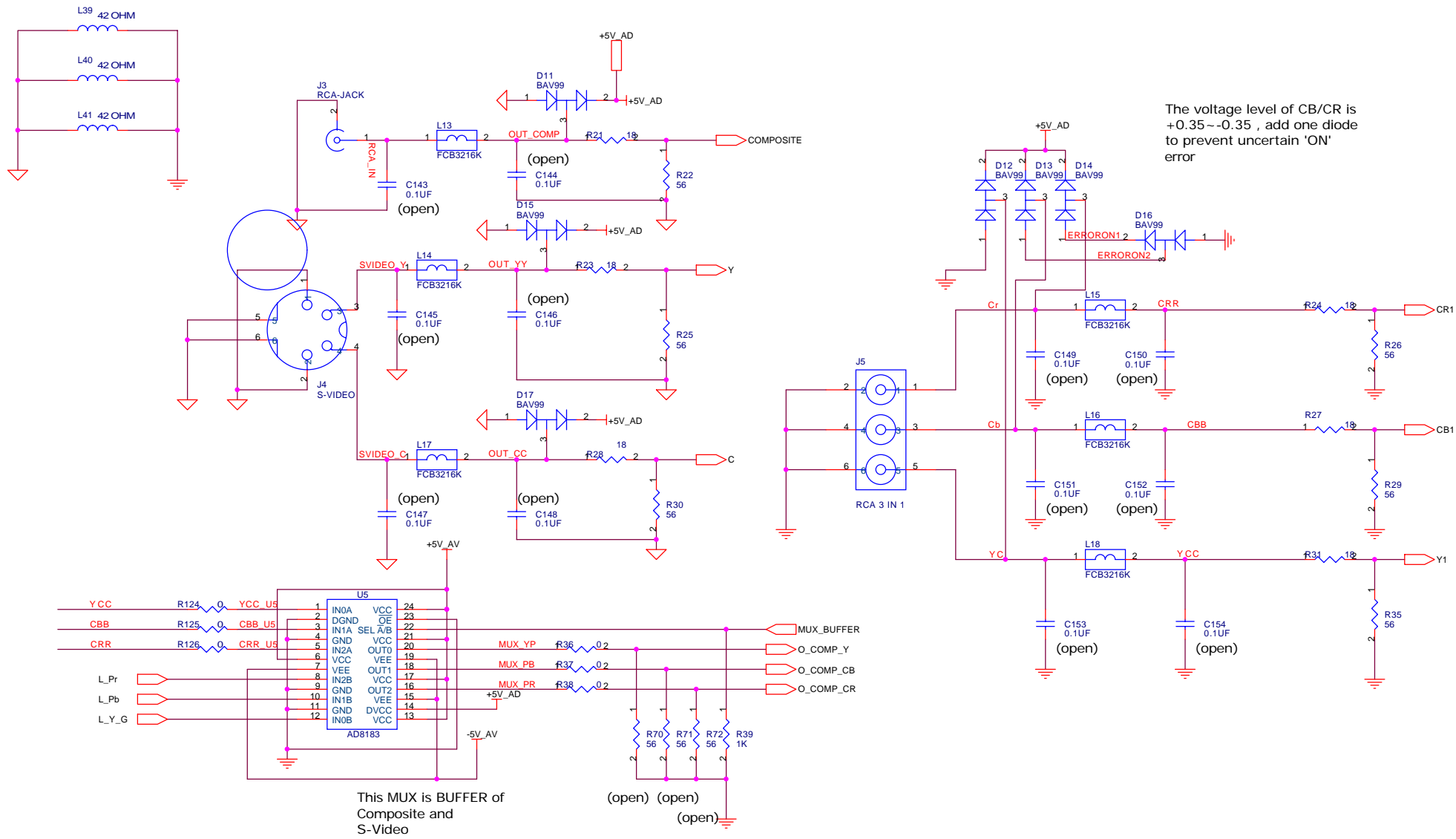
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Date: Wednesday, January 15, 2003	Sheet 1	of 2
Prepared By ANGEL HU	Reviewed By ALEX HY TSENG	Approved By BEN CHEN



Beng Corporation			
Project Code	Model Name	OEM/ODM Model Name	
99.J5877.001	HT720G	NA	
Title			
CONNECTOR BOARD			
Size	PCB P/N	PCB Rev.	Document Number
<Size>	48.J5810.S02	S02	99.J5877.R22-C3-304-004
Rev.			0
Date:	Monday, February 17, 2003	Sheet	1 of 8
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ANGEL HU	ALEX HY TSENG	BEN CHEN	



Benq Corporation			
Project Code	Model Name	GEM/ODM Model Name	
99_J5877.001	HT720G	NA	
Title			
CONNECTOR BOARD			
Size	PCB P/N	PCB Rev.	Document Number
<Size>	48_J5810.S02	S02	99_J5877.R22-C3-304-004
Date:	Monday, February 17, 2003	Sheet	2 of 8
Prepared By	ANGEL HU	Reviewed By	ALEX HY TSENG
		Approved By	BEN CHEN

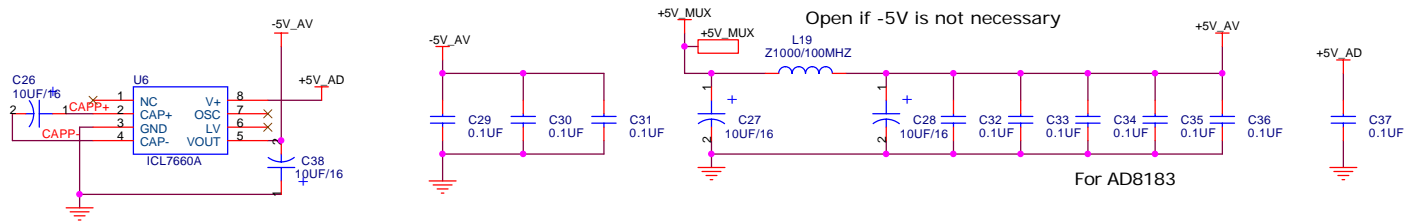


The voltage level of CB/CR is +0.35~-0.35, add one diode to prevent uncertain 'ON' error

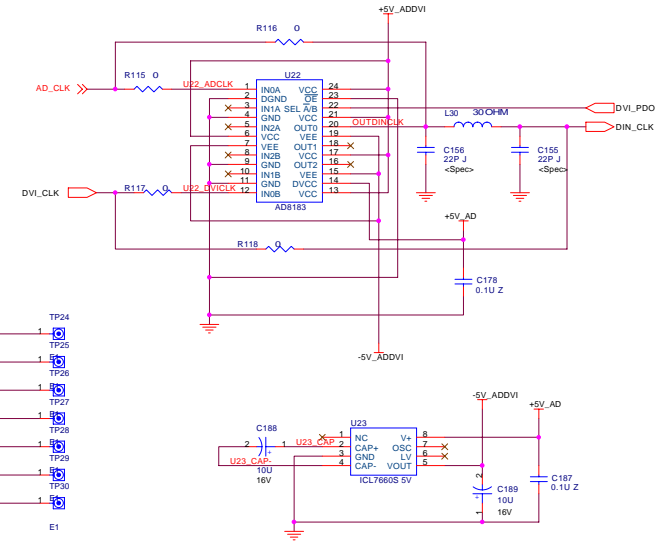
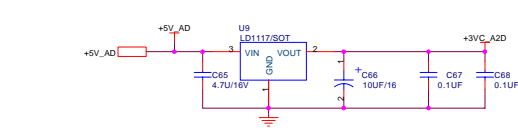
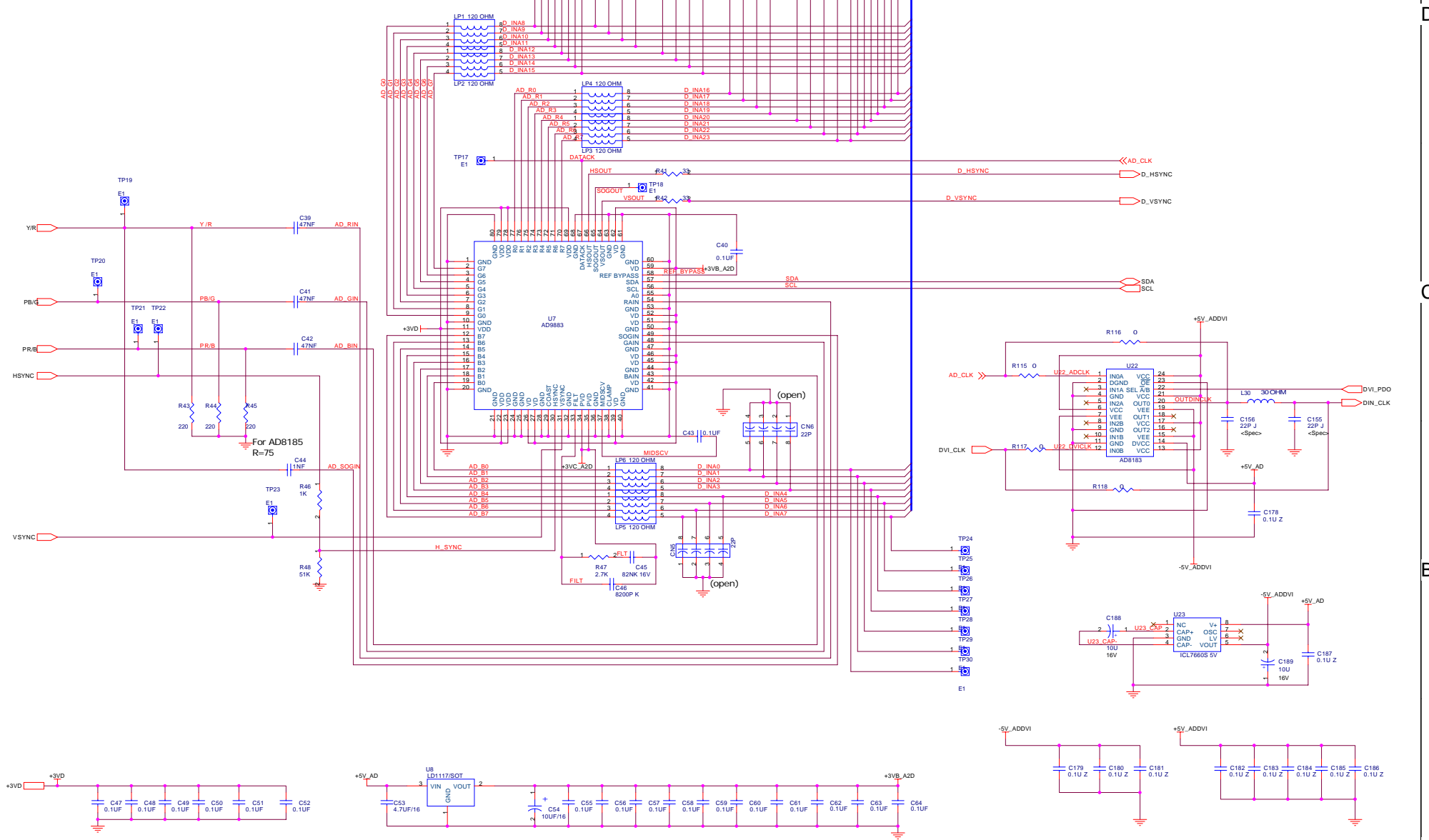
This MUX is BUFFER of Composite and S-Video

Open if -5V is not necessary

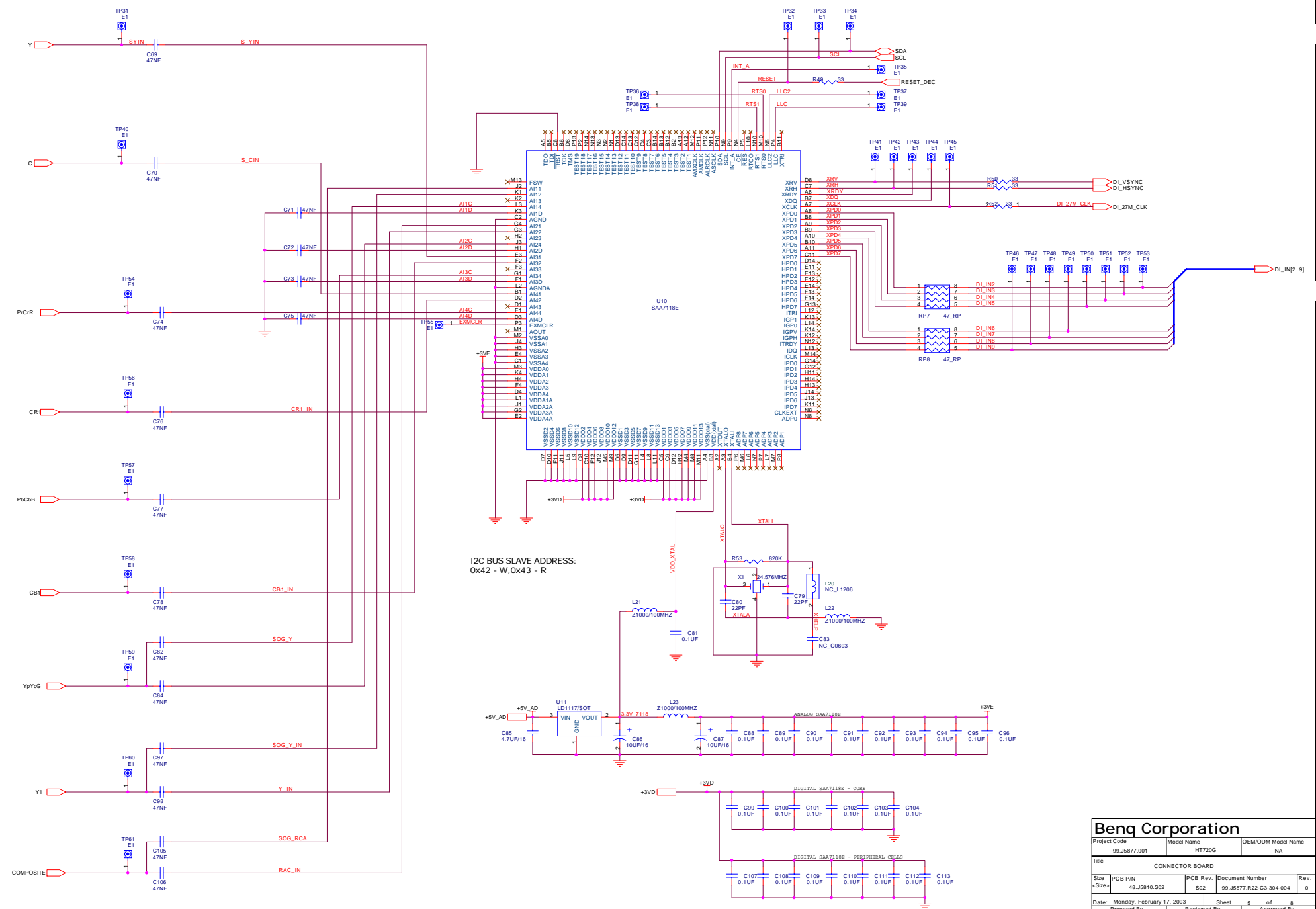
For AD8183



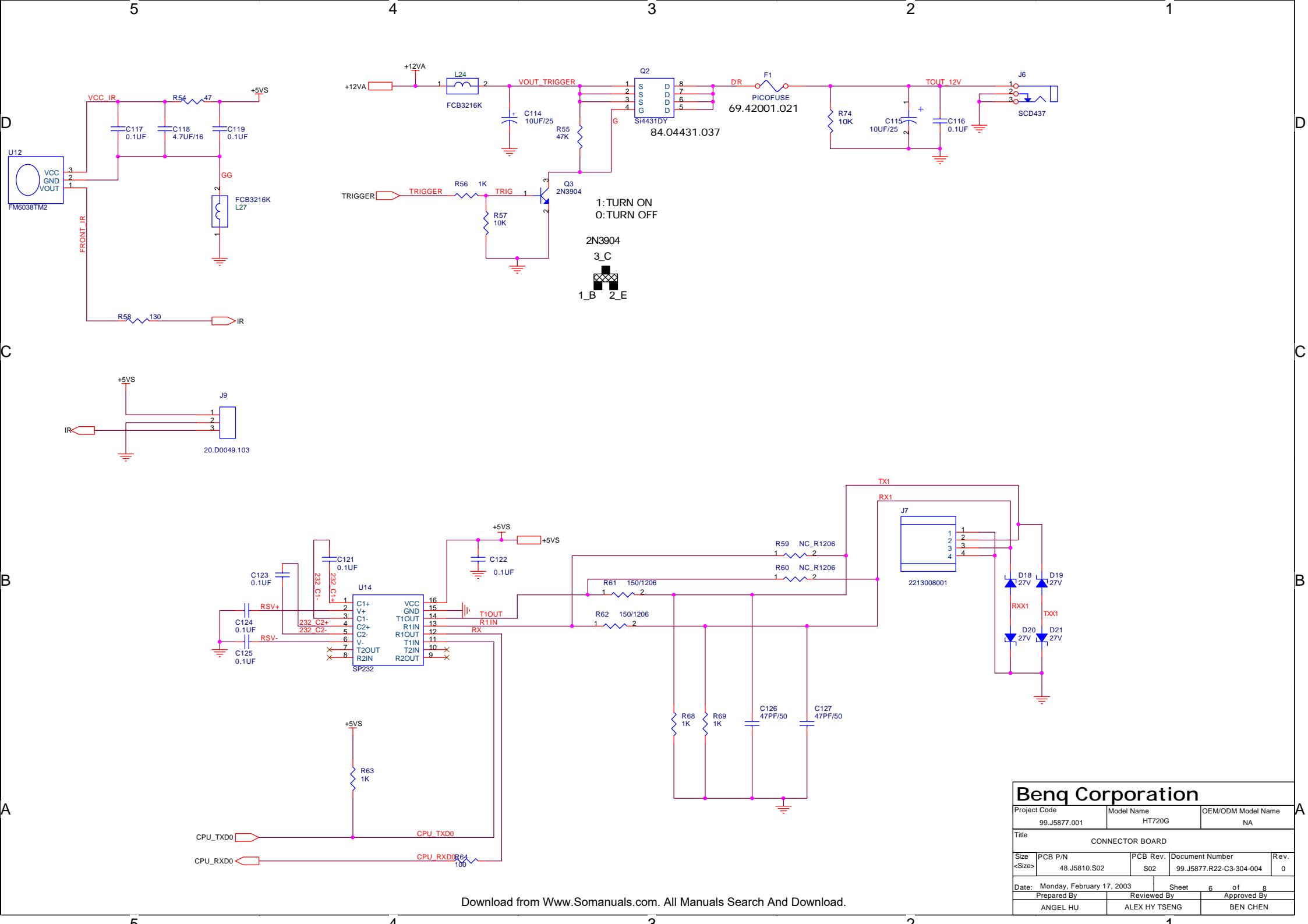
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Size <Size> PCB P/N 48.J5810.S02	PCB Rev. S02	Document Number 99.J5877.R22-C3-304-004	Rev. 0
Date: Monday, February 17, 2003	Sheet 3 of 8		
Prepared By ANGEL HU	Reviewed By ALEX HY TSENG	Approved By BEN CHEN	



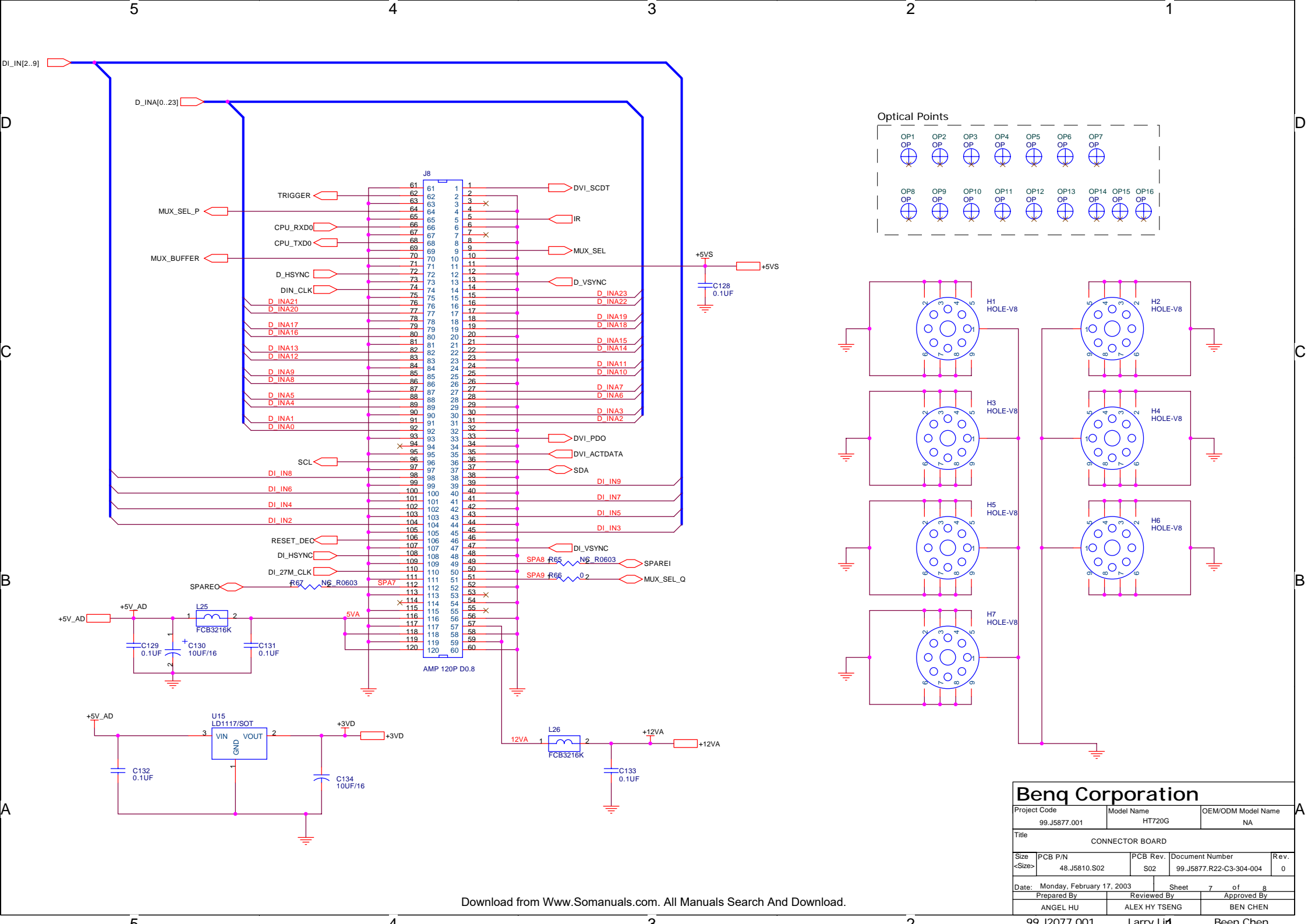
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Size	PCB P/N	PCB Rev.	Document Number
<Size>	48.J5810.S02	S02	99.J5877.R22-C3-304-004
Date:	Monday, February 17, 2003	Sheet	4 of 8
Prepared By	Reviewed By	Approved By	
ANGEL HU	ALEX HY TSENG	BEN CHEN	



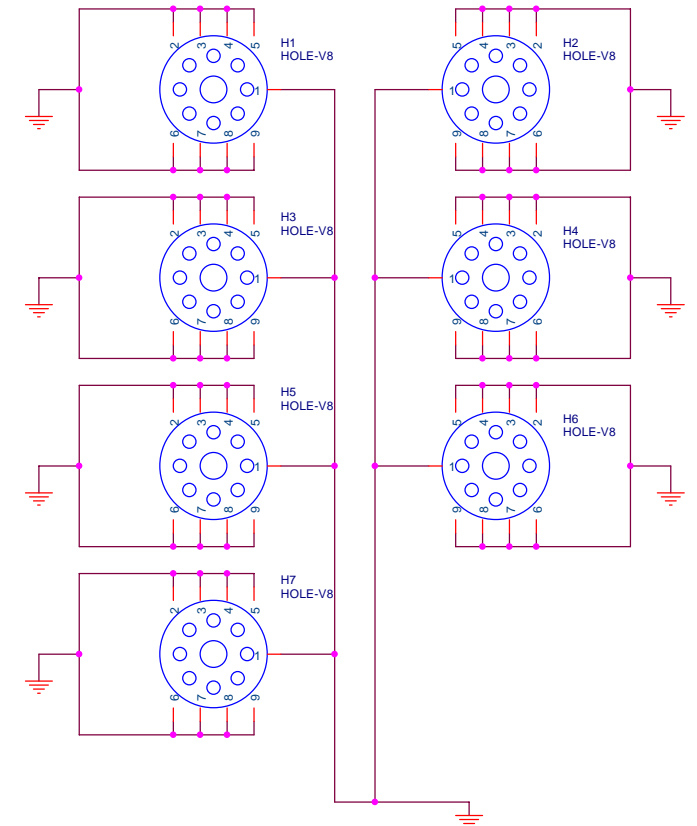
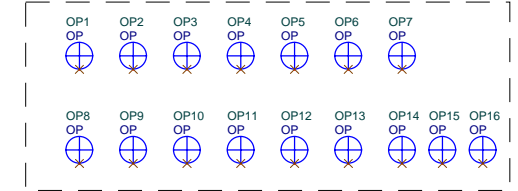
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<Size>	48.J5810.S02	S02	99.J5877.R22-C3-304-004
Rev.			0
Date: Monday, February 17, 2003			
Prepared By	Reviewed By	Approved By	
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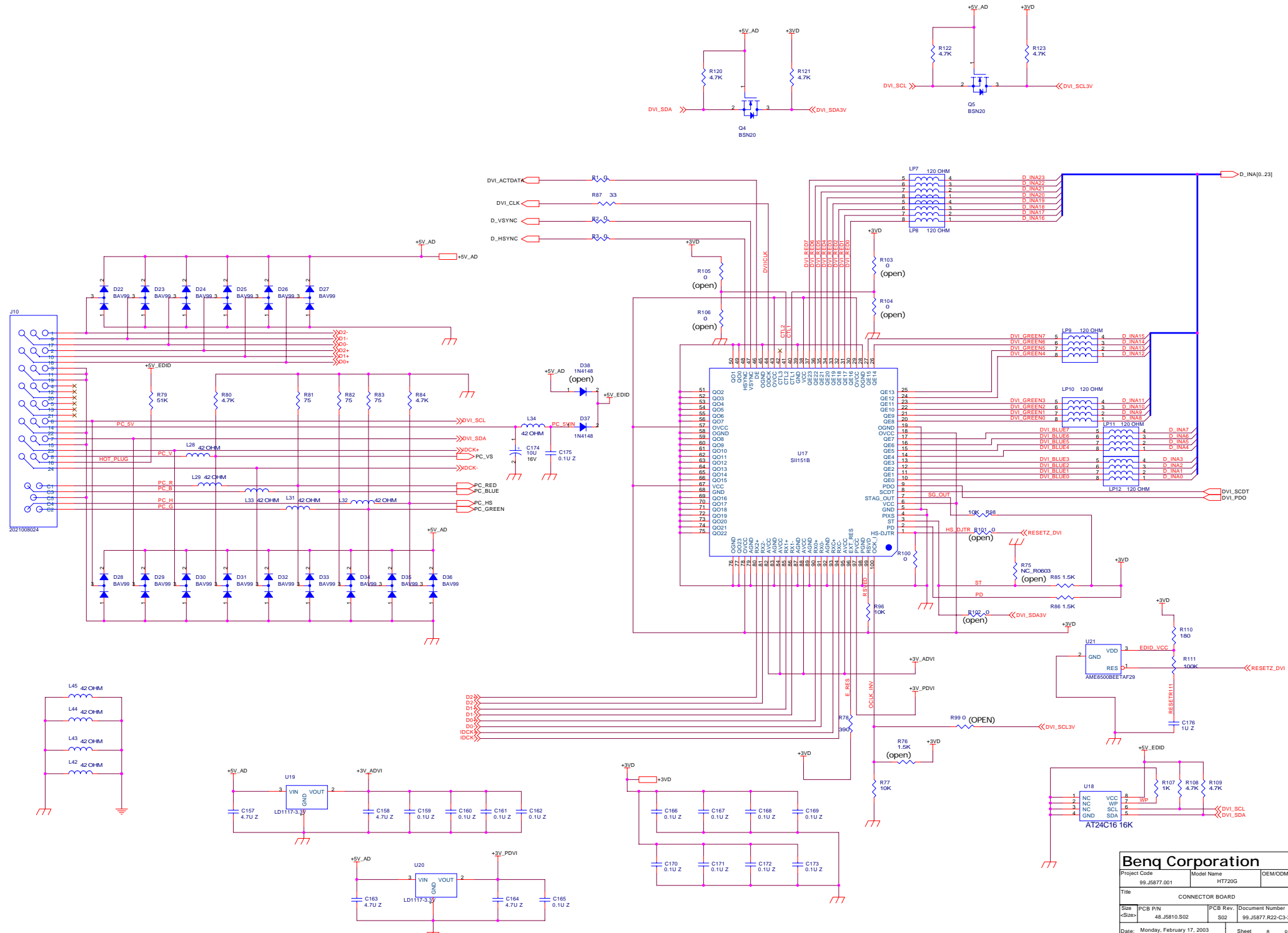
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Title CONNECTOR BOARD				
Size	PCB P/N	PCB Rev.	Document Number	Rev.
<Size>	48.J5810.S02	S02	99_J5877.R22-C3-304-004	0
Date:	Monday, February 17, 2003	Sheet	6	of 8
Prepared By		Reviewed By	Approved By	
ANGEL HU		ALEX HY TSENG	BEN CHEN	



Optical Points



Benq Corporation			
Project Code	Model Name	OEM/ODM Model Name	
99_J5877.001	HT720G	NA	
Title CONNECTOR BOARD			
Size	PCB P/N	PCB Rev.	Document Number
<Size>	48_J5810.S02	S02	99_J5877.R22-C3-304-004
Date:	Monday, February 17, 2003	Sheet	7 of 8
Prepared By	ANGEL HU	Reviewed By	ALEX HY TSENG
		Approved By	BEN CHEN
99_12077_001		Larry Li	



Benq Corporation			
Project Code	Model Name	GEM/ODM Model Name	
99_J5877.001	HTT20G	NA	
CONNECTOR BOARD			
Size	PCB P/N	PCB Rev.	Document Number
48_J5810.S02	502	99_J5877.R22-C3-304-004	Rev. 0
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Approved By:		Approved By:	BEN CHEN

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