Applicable Country & Regions:

All Regions

Product Service Manual – Level 2

Service Manual for BenQ:

Projector / MP611

< 9J.J2C77.000 >

Notice:

For RO to input specific “Legal Requirement” in specific NS regarding to responsibility and liability statements.

Please check BenQ’s eSupport web site, http://esupport.benq.com, to ensure that you have the most recent version of this manual.

First Edition (August, 2006)

Content Index

Abbreviations & Acronyms

A	
A/D	Analog to Digital
B	
BenQ	BenQ Corporation
D	
DLP	Digital Light Processing
DMD	Digital Micromirror Device
DVI	Digital Video Interface
DVI-I	Digital Video Interface-Integrated
P	
POM	Pond of Mirrors
R	
RS232	Interface Between Data Terminal Equipment and Data Communications Equipment Employing Serial Binary Data Interchange
S	
SVGA	Super Video Graphics Array. A screen resolution of 800 x 600 pixels.
SXGA	Super XGA. A screen resolution of 1280x1024 pixels.
V	
VGA	Video Graphics Array. A screen resolution of 640 x 480 resolution.
X	
XGA	A screen resolution of 1024 x 768 pixels.

About This Manual

This manual contains information about maintenance and service of BenQ products. Use this manual to perform diagnostics tests, troubleshoot problems, and align the BenQ product.

Important

Only trained service personnel who are familiar with this BenQ Product shall perform service or maintenance to it. Before performing any maintenance or service, the engineer MUST read the "Important Safety Information".

Trademark

The following terms are trademarks of BenQ Corporation:

BenQ

Other companies, products, or service names may be the trademarks of their respective companies.

Introduction

This section contains general service information, please read through carefully. It should be stored for easy access place.

Important Service Information

RoHS (2002/95/EC) Requirements – Applied to all countries require RoHS.

The RoHS (Restriction of Hazardous Substance in Electrical and Electronic Equipment Directive) is a legal requirement by EU (European Union) for the global electronics industry which sold in EU and some counties also require this requirement. Any electrical and electronics products launched in the market after June 2006 should meet this RoHS requirements. Products launched in the market before June 2006 are not required to compliant with RoHS parts. If the original parts are not RoHS complaints, the replacement parts can be non ROHS complaints, but if the original parts are RoHS compliant, the replacement parts MUST be RoHS complaints. If the product service or maintenance require replacing any parts, please confirming the RoHS requirement before replace them.

Safety Notice

1. Make sure your working environment is dry and clean, and meets all government safety requirements.
2. Ensure that other persons are safe while you are servicing the product.
3. DO NOT perform any action that may cause a hazard to the customer or make the product unsafe.
4. Use proper safety devices to ensure your personal safety.
5. Always use approved tools and test equipment for servicing.
6. Never assume the product's power is disconnected from the mains power supply. Check that it is disconnected before opening the product's cabinet.
7. Modules containing electrical components are sensitive to electrostatic discharge (ESD). Follow ESD safety procedures while handling these parts.
8. Some products contain more than one battery. Do not disassemble any battery, or expose it to high temperatures such as throwing into fire, or it may explode.
9. Refer to government requirements for battery recycling or disposal.

Compliance Statement

1. Caution: This Optical Storage Product contains a Laser device. Refer to the product specifications and your local Laser Safety Compliance Requirements.

General Descriptions

This Service Manual contains general information. There are 3 levels of service:
Level 1: Cosmetic / Appearance / Alignment Service
Level 2: Circuit Board or Standard Parts Replacement
Level 3: Component Repair to Circuit Boards

Related Service Information

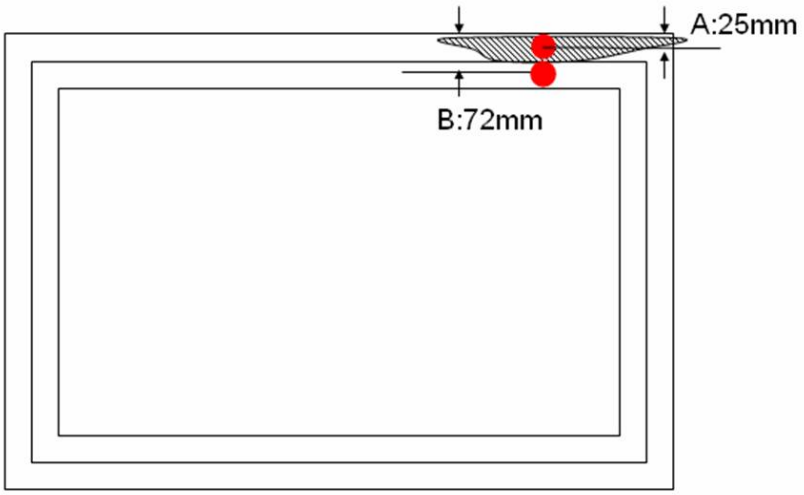
BenQ Global Service Website:http://support.benq.com/front/benqmain.asp
eSupport Website:http://bqpgsr.benq.corp.com/customize/asplogin.asp

Product Overview

Specifications

1.0 Optical Performance	Tested under 60” (diagonal) image size with Wide projection lens position unless other specified. Measurement Details refer to Appendix A. Reference meter : BENQ Factory T10 meter (SN:M040000850)	
1.1 ANSI Brightness	Minimum 1920 Lumens	
1.2 Brightness Uniformity		
1.2.1 ANSI Uniformity	Minimum 50%	
1.2.2 Upper-Down unbalance	0.5~2	
1.2.3 Left-Right unbalance	0.6~1.67	
1.3 Contrast Ratio		
1.3.1 ANSI Contrast	Minimum 150:1	
1.3.2 FOFO Contrast	Minimum 1200:1	
1.4 Light Leakage		
1.4.1 Light Leakage in Active Area	<0.5 lux compared to center point within 60” (Diagonal at 2.2m, Wide) image size. Note: This light leakage in Active area is only described as the spot light with obvious shape. It is not included the uniformity difference of the projector for black pattern.	
1.4.2 Light Leakage out of Active Area	<0.5 lux between of 54” (Diagonal at 2m, Tele) image size and 60” (Diagonal at 2.2m, Wide) image size.	
1.5 Color	Reference meter: BenQ YM5A/Measurement Center Integral sphere	
	X	Y
1.5.1 White	0.315±0.04	0.344±0.04
1.5.2 Red	0.630±0.04	0.353±0.04
1.5.3 Green	0.353±0.04	0.535±0.04
1.5.4 Blue	0.139±0.04	0.096±0.04
1.6 Color Uniformity	X	Y
1.6.1 White	0.040	0.040
1.6.2 Red	0.040	0.040
1.6.3 Green	0.040	0.040
1.6.4 Blue	0.040	0.040
2.0 Image Quality		

2.1 Throw Ratio	54”±5% Diagonal at 2m, Wide		
2.2 Zoom Ratio (tolerance applied)	> 1.10 : 1		
2.3 Distortion			
2.3.1 Keystone Distortion	<1.0%		
2.3.2 Vertical TV Distortion	<1.0%		
2.3.3 Screen distorsion	l W2-W1 l <6mm , l H2 –H1 l <6 mm		
2.4 Projection Offset	120% ±5%		
2.5 Focus Range			
2.5.1 Visible Range	1~8 m		
2.5.2 Clearly Focus Range	1.5~6 m(Spec. defined as item 2.6)		
2.6 Focus			
2.6.1 ☒ Pattern	(1)If pattern can be uniformly focused, pass! (2)If not, check 2.6.2		
2.6.2 Defocus and Flare	Defocus: R<=3.0; G<=2.5; B<=2.5 pixel Flare: R<=4.0; G<=3.5; B<=3.5 pixel Slight flare is not counted as flare.		
2.6.3 Focus unbalance	Adjust focus from near to far until one corner clear, difference less than 70 cm		
2.7 Lateral Color		Center of 49”diagonal area	All other area
	R-G	<2/3	<1
	G-B	<2/3	<1
	R-B	<1	<1
2.8 Image Quality			
2.8.1 DMD Image Quality	See Appendix D		
2.8.2 Image Imperfection	See Appendix D Blemish		
2.8.3 Image Shadow or Blur	Procedure: 1. 53” (Diagonal at 2m, Wide) image size. 2. Default preset mode “ Dynamic” 3. Full white pattern to check the image. Let the projector on the desk (don’t move it up/down or left/ right) and just inspect the pattern. It is OK If the shadow or blur can not be observed obviously. 4. If there is blur obviously, Measure brightness of point **A** and brightness of point **B**. A/B must larger than 80%.detail description see Appendix A21		

			
3.0 Mechanical Specification			
3.1 Dimensions	278 x 219.5 x 94 mm (L x W x H)		
3.2 Weight	2500g ± 100g		
3.3 Security Slot	Kensington compatible slot 150N break away force		
3.5 Lens Cover	Detached Lens Cover		
3.6 Feet	Fast adjustable foot in front, Adjustable foot and Fixed foot in rear. foot Tilt:0-6° ,right/left: +2.2° /-0.5°		
4.0 Packaging	Detail refer to C309 (Packing Description)		
4.1 Outside Dimensions	365 x 230 x 325mm (L x W x H)		
4.2 Weight	<5.5 Kg (Including Accessories, Projector).		
4.3 Palletization	A type 24,B type 36 by Air; 2016 / 40' container, or 1008/20' container by sea		
5.0 Thermal Specification	Mechanical component temperature at ambience 0~40℃		
5.1 Surface held or touched for short periods	Normal surface: Metal < 60°C; Plastic<85°C Bottom surface: @ 25° C Metal < 55°C; Plastic<70°C		
5.2 Surface which may be touched	Metal	Plastic	
	<70°C	<95°C	
5.3 Exhaust Air	<95°C		
6.0 Environmental	Adhere to Appendix B		
6.1 Temperature	Operating	0~40°C, without condensation	
	Storage	-20~60°C, without condensation	
6.2 Humidity	Operating	10~90%RH, without condensation	
	Storage	10~90%RH, without condensation	

6.3 Audible Noise Level	Typical	Normal mode: 31dBA @ 25°C Eco mode: 26dBA @ 25°C	
	Maximum	Normal mode: 32dBA @ 25°C Eco mode: 27dBA @ 25°C	
6.4 Altitude	Operating: Without high altitude mode 0°C~35°C @ 0~1499m above sea level With high altitude mode 0°C~30°C @ 1500~3000m above sea level Non-operating: 30℃@0~12,200m above sea level		
6.5 Shock	Non-operating, 20 ms /50 G		
6.6 Drop	91cm, 1 selected corners, 3 selected edges and 6 primary surfaces. 1 drop per orientation, and total of 10 drops		
6.7 Vibration	Sine	5~200Hz, 1.5G, 1 octave/min,15 min dwell on each resonant frequency, all primary axis, one sweep (30 min minimum) per orientation, total of 90+ min.	
	Random	5~100 Hz, 0dB/Oct, 0.015 (g2/Hz); 100~200 Hz, -6dB/Oct, N/A; 200Hz, N/A, 0.0038 (g2/Hz). Equivalent to 1.47 Grms, All primary axis, 20 min per orientation, total 60min.	
7.0 Regulatory	Safety	cCSAus, TUV-GS, CCC, CB Report, PSE, GOST-R, PSB, SASO	
	EMC	FCC Class B requirements, C-Tick, VCCI, MIC	
	CE Marks	Directive 73/23/EEC; Directive 89/336/EEC	
	ESD	BENQ ESD Specification	
8.0 Reliability			
8.1 MTBF	20000 hours except DMD chip, Color wheel, Lamp and Fan		
8.2 Lamp Lifetime	Normal : 1500 hours (50% brightness maintenance) Eco: 2500 hours		
9.0 Power Requirements	Adhere to Appendix F		
9.1 Power Supply (Normal)	VAC 100 – 240 (50/60Hz),		VAC 90 – 264 (50/60Hz),
9.2 Power consumption	Typical	285W Max.	305W Max.
	Standby	5W Max.	5W Max.

9.3 Power Connector	IEC-06
10.0 Panel Specification	
10.1 Type	Single Chip 0.55" SVGA 12° tilt DDR DMD
10.2 Pixels	H: 800 X V: 600
10.3 Color Depth	24 Bits (16770000 colors)
11.0 Compatibility	Appendix E3
11.1 PC	PC Compatible 640X480 → 1024X768, compressed 1280X1024; Composite-Sync; Sync-on-Green; Interlace Mode (8514A);
11.2 Video	NTSC/ NTSC4.43/ PAL (Including PAL-M, PAL-N)/ SECAM/ PAL60/
11.3 YpbPr	NTSC (480i)/ 480p/ PAL (576i)/ 576p, HDTV (720p/ 1080i)
11.4 DDC	DDC 2B
12.0 Image Interface	Adhere to Appendix E.2
12.1 Analog RGB Input	15 pin D-Sub (Female) x 1 G(Y): Video amplitude 0.7/1.0 Vp-p : Impedance 75 RB(CbCr): Video amplitude 0.7 Vp-p : Impedance 75 HD/VD/CS: TTL Level
12.2 Video Input	RCA jack (Yellow) Video amplitude 1.0 V_{p-p} : Impedance 75Ω
12.3 S-Video Input	4 pin Mini-Din (Female) Y: Luminance amplitude 1.0 V_{p-p} : Impedance 75Ω C: Chroma amplitude 0.268 V_{p-p} : Impedance 75Ω
12.4 YPbPr Input	15 pin D-Sub (Female) x 1 Y: Luminance amplitude 1.0 V_{p-p}: Impedance 75Ω PbPr/C_bC_r: Chroma amplitude 0.7 V_{p-p} : Impedance 75Ω
12.5 Analog RGB Output	15 pin D-Sub (Female) x 1 G(Y): Video amplitude 0.7/1.0 Vp-p : Impedance 75 RB(CbCr): Video amplitude 0.7 Vp-p : Impedance 75 HD/VD/CS: TTL Level
13.0 Control Interface	
13.1 IR Receiver	IR Receiver x2 (Front, Rear) Angle: ±15° Distance 0~8m
13.2 Serial Connector	RS232 8pin Mini DIN
13.3 USB Connector	B Type USB Terminal for page up/down
14.0 User Interface	Adhere to Appendix E.3
14.1 Operator Keypad	9 Keys: Power ; Source ; Auto ; Blank/Q? ; Preset ; Left; Right ; Up ; Down(Menu) ; Mode

14.2 Indicators	3 LEDs: Power On/Off Status; Lamp Status; Temperature Status
14.3 Electric Keystone	vertical keystone and adjustable range ±7°
15.0 Audio	
15.1 Audio Input	Φ3.5mm stereo mini jack 350mVrms 10 KΩ or more
15.2 Speaker	8Ω 2W X 1

Appendix A Optical Measurement

1. Scope:

This document describes critical optical related test definitions and Instructions for data or video projectors. The other general terminologies are specified in ANSI IT7.228-1997.

2. General Requirements

1. The unit under test should be allowed to stabilize without further adjustment for a minimum of 5 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 lux 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

3. Practical Requirements

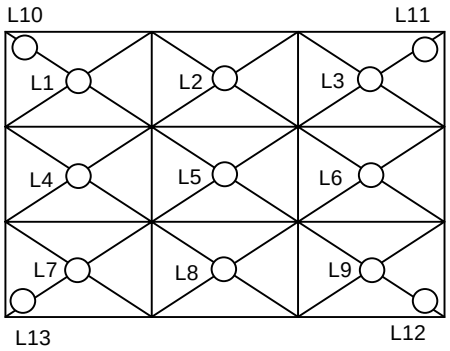
1. When measuring contrast manually, operators should not wear white clothing since light reflected from white clothing can influence the measurement.
2. Unless otherwise specified, the projection lens is set in the widest zoom position since zoom function can influence the measurement.
3. Measurement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

A1. ANSI BRIGHTNESS

ANSI Lumens = (L1+L2+L3+L4+L5+L6+L7+L8+L9)/9 (lux) x A (m^2)

A (Area) = W * H (m^2)

W: width of projected image (m)
H: height of projected image (m)



Note: L10, L11, L12, L13 are located at 10% of the distance from corner itself to L5

A2. ANSI UNIFORMITY

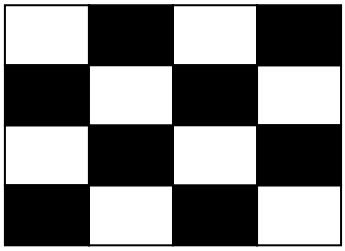
ANSI +Uniformity= [Maximum (L1~13)-Average (L1~9)]/ Average (L1~9)%
ANSI -Uniformity= [Minimum (L1~13)-Average (L1~9)]/ Average (L1~9)%

A3. JBMA UNIFORMITY

JBMA Uniformity = Average (L1, L3, L7, L9)/ L5

A4. ANSI CONTRAST

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



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.

A5. FOFO CONTRAST

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

A6. JBMA CONTRAST

JBMA Contrast = Average (L1,L2,L3,L4,L5,L6,L7,L8,L9) under solid white / Average (L1,L2,L3,L4,L5,L6,L7,L8,L9) under solid black

A7. LIGHT LEAKAGE

Leakage = The maximum light leakage under a solid black pattern in or outside of the projected image

A8. IMAGE DISTORTION

Keystone = (W2-W1)/ (W1+W2) x 100%

Vertical TV dist = (H1+H2-2xH3)/2H2 x100%

Horizontal TV dist = (W1+W2-2xW3)/2W1 x100%

W1: image width at image bottom

W2: image width at image top

W3: image width at the half image height.

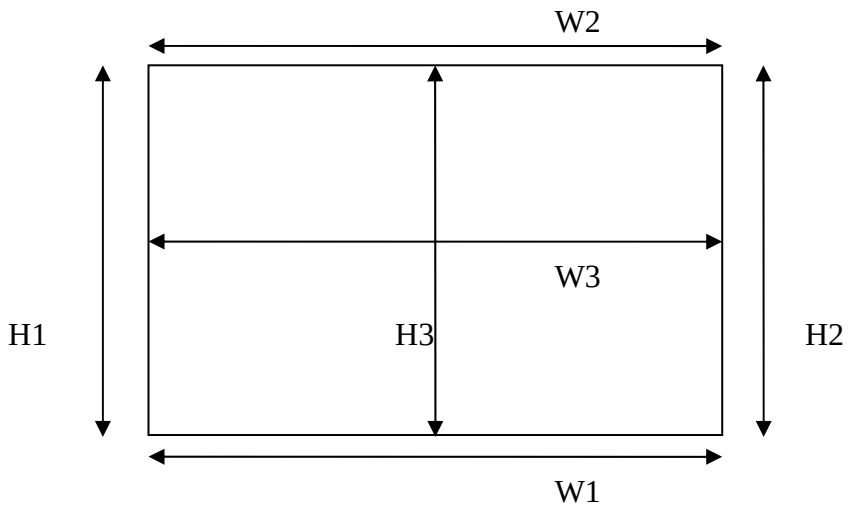
H1: image height at image left

H2: image height at image right

H3: image height at half image

Note:

1. Keystone and Vertical TV Distortion are recommended for Front Projection Display
2. Vertical and Horizontal TV Distortion are recommended for Rear Projection Display



A9. THROW RATIO

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

A10. ZOOM RATIO

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

A11. FOCUS RANGE

The minimum/maximum focus distance is the minimum/maximum projection distance (The distance between the outermost element of projection lens and screen), expressed in meter, at which the image is still at its acceptable focus level.(acceptable focus level is specified by FOCUS LIMIT SAMPLE approved by customer)

A12. COLOR

Color is expressed as (x, y) in 1931CIE chromaticity values

Note: Color is measured at the center of the screen that is entirely the measured color under default brightness and contrast settings

A13. ANSI COLOR

ANSI Color is expressed as (u, v) in 1976 CIE chromaticity values

Note: Color is measured at the center of the screen that is entirely the measured color under default brightness and contrast settings.

A14. COLOR UNIFORMITY

Color Uniformity is the maximum color difference (△x, △y) between any two points out of L1~L13

A15. ANSI COLOR UNIFORMITY

ANSI Color Uniformity: △u'v'= [(u'1-u'0)^2+(v'1-v'0)^2]^1/2

(u'0,v'0): the average color of L1~L13

(u'1,v'1): the spot with maximum deviation from (u'0,v'0)

A16. PROJECTION OFFSET

Projection Offset= Center of image above projection lens optical axis / Half image height x 100%

Note: Optical engine should be kept horizontal attitude

A17. Defocus and Flare Test Procedure

Procedure:

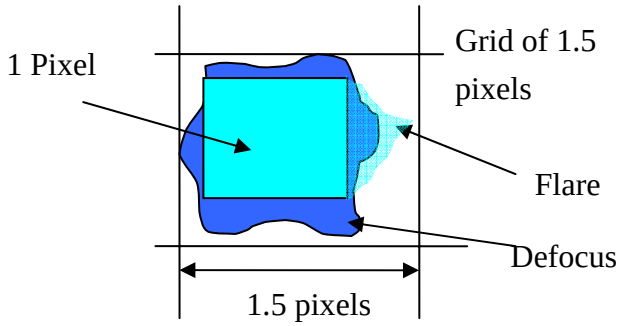
Step 1: Get best focus at Screen Center with **Pattern1**

Step 2: Check specified screen sizes and zoom positions

Step 3: Use **Chart1** to measure Defocus and Flare for whole screen of R,G,B color at **Pattern 2,3,4** and record the maximum number

Example of 1.5 pixel flare:

i.



A18. Lateral Color Test Procedure

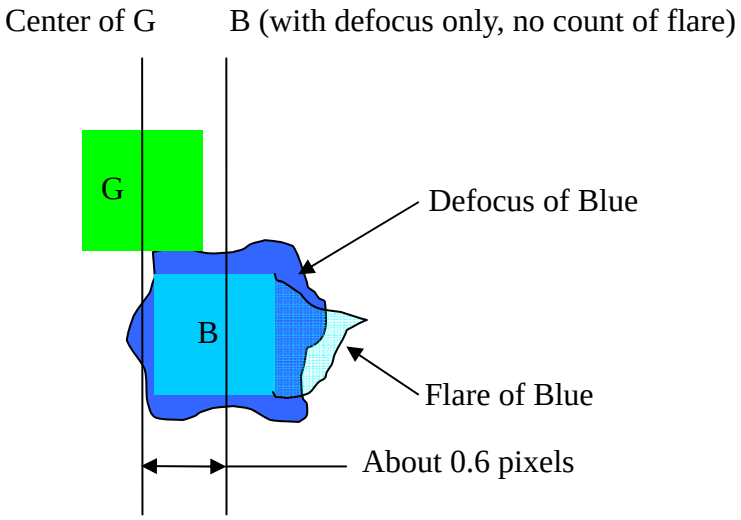
Procedure:

Step 1: Get best focus at Screen Center with **Pattern 1**

Step 2: Check specified screen sizes and zoom positions

Step 3: Use **Chart1** to measure Lateral Color for whole screen with **Pattern 5** and record the maximum number

a. Example if 0.6 pixel lateral color:

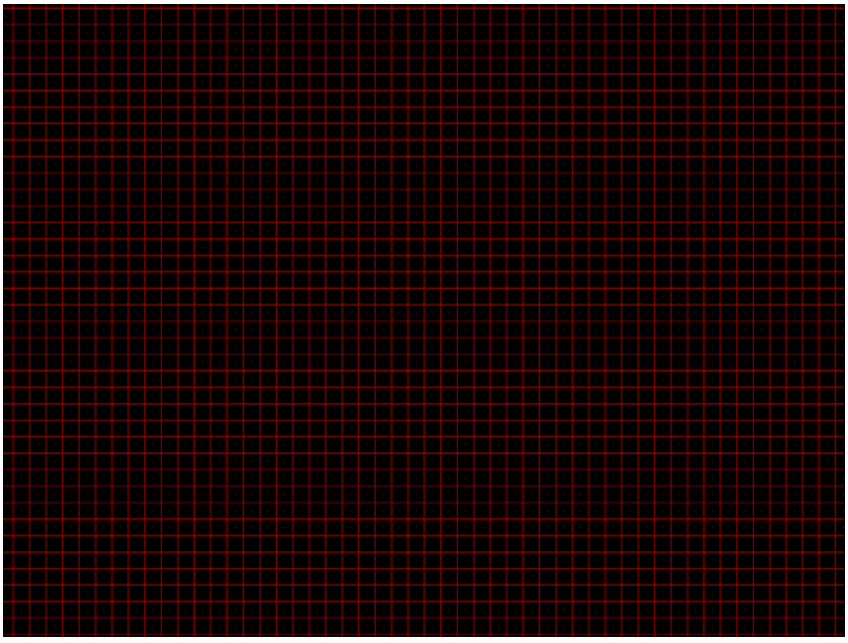


A19. Lamp Lifetime Test Procedure

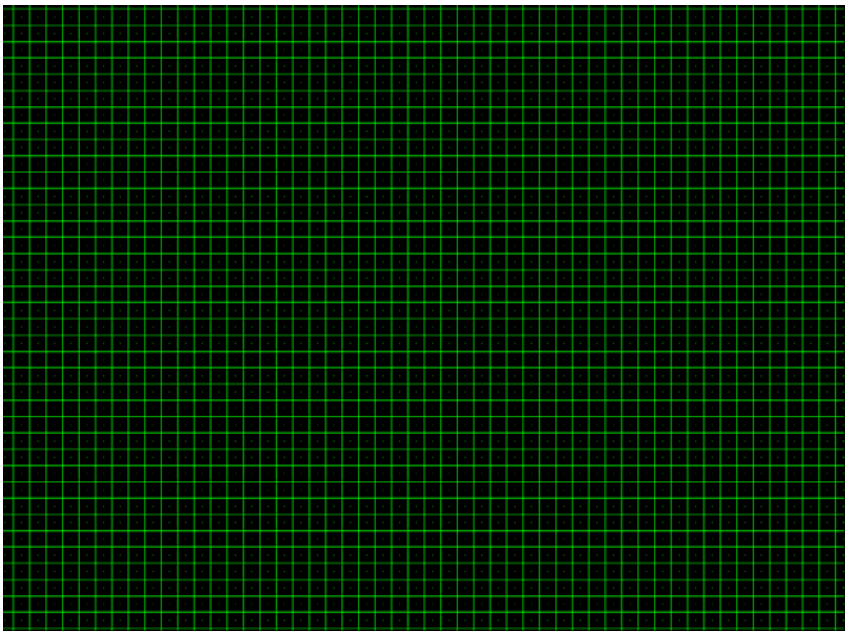
50% lamp brightness maintenance under 3.5hr ON, 0.5hr OFF cycling test

Pattern 1 (Please contact BenQ RD for file with correct resolution)

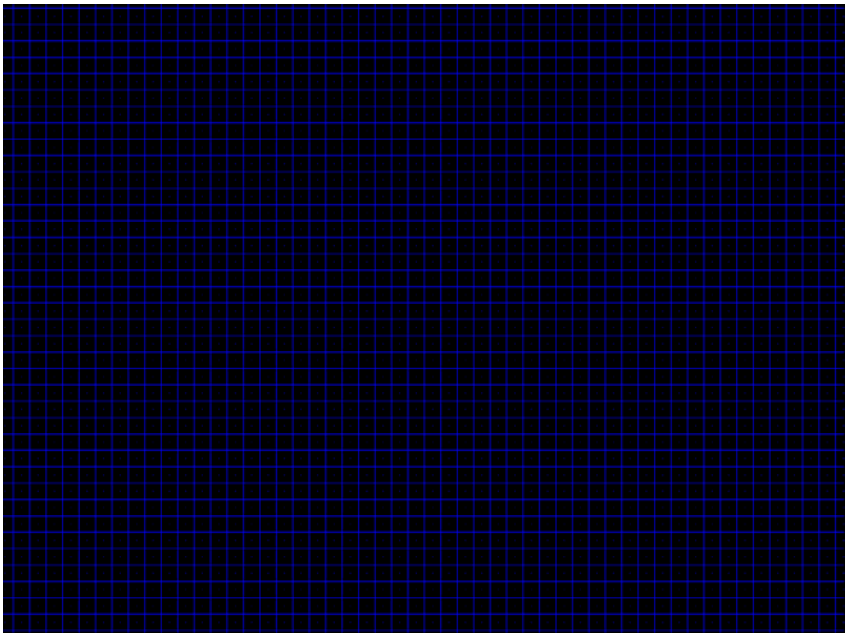
Pattern 2 (Please contact BenQ RD for file with correct resolution)



Pattern 3 (Please contact BenQ RD for file with correct resolution)



Pattern 4 (Please contact BenQ RD for file with correct resolution)



Pattern 5 (Please contact BenQ RD for file with correct resolution)

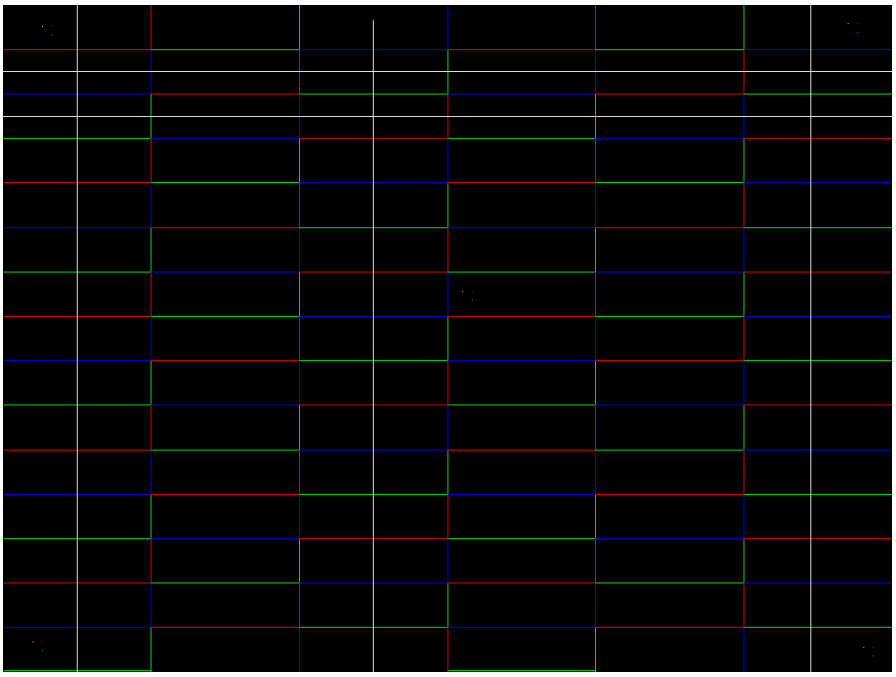
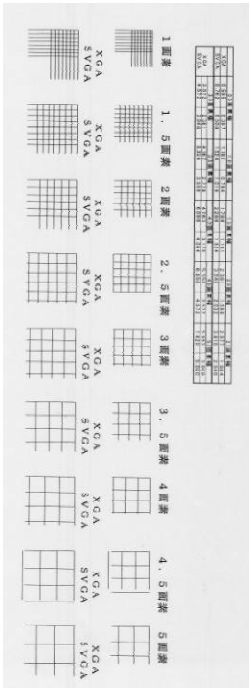


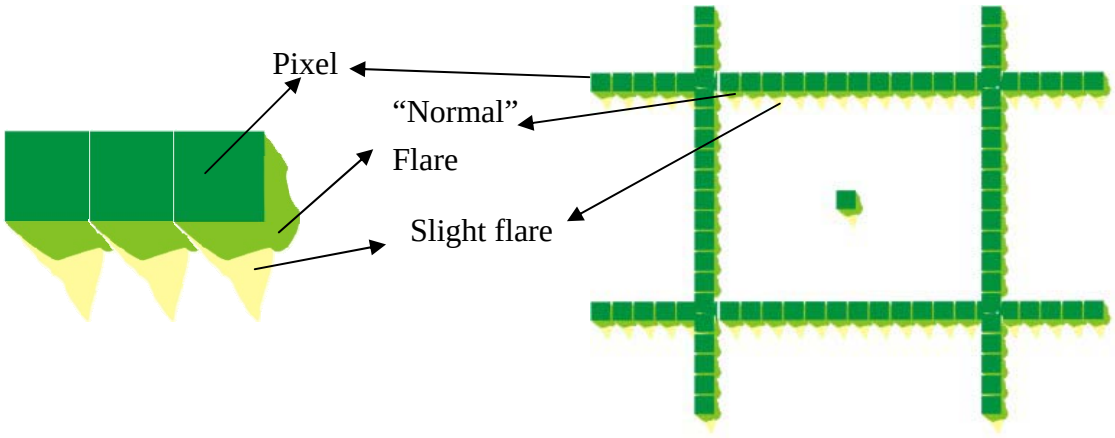
Chart 1 Example of Pixel Testing Pattern (60” screen size)
(Please contact BenQ RD for file with correct size)



A20. Definition of "Slight flare"

Slight flare is observed with following steps:

1. Slight flare is measured with the "Line" in pattern "Cross hatch with dots"
2. A slight flare is defined as flare with very faint brightness compares to "Normal Flare" in "Line". Please refer to the drawing below:

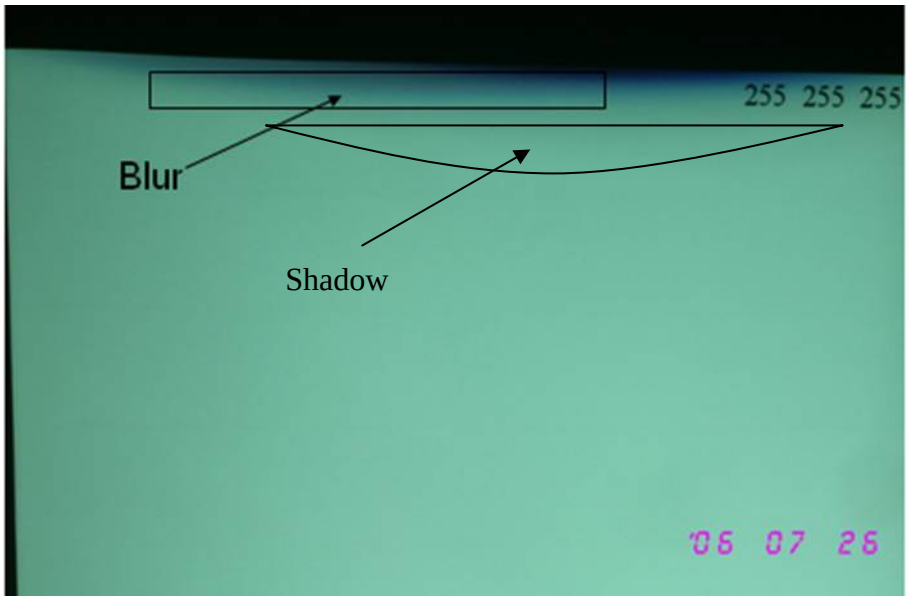


A21. Blur and Shadow description

Blur: looks deep blue color and has edge obviously.

Shadow: looks slightly gray.

If image has shadow but without blur, it will pass image shadow and blur definition (>80%)



Appendix B Design Verification Test Procedure

B1. 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, which is recommended for product assurance testing reference.

B2. Test Summary

<table>
<tr><th>B2.1 Dynamic Test</th><th>Specification</th></tr>
<tr><td>Package Drop</td><td>
Drop test with packing gross weight and falling height relationship
<table>
<tr><td>Gross Weight</td><td colspan="3">Falling Height (cm) spec.</td></tr>
<tr><td>(Kg)</td><td>C3/C4/C5</td><td>MP</td><td>Remark</td></tr>
<tr><td>0.0<W<4.5</td><td>>106</td><td>106</td><td></td></tr>
<tr><td>4.5≦W<11.0</td><td>106</td><td>91</td><td></td></tr>
<tr><td>11.0≦W<20.5</td><td>91</td><td>76</td><td></td></tr>
<tr><td>20.5≦W<34.0</td><td>76</td><td>61</td><td></td></tr>
<tr><td>34.0≦W<45.5</td><td>61</td><td>46</td><td></td></tr>
<tr><td>45.5≦W<79.4</td><td>46</td><td>31</td><td></td></tr>
</table>
Test Orientation: 1 corner, 3 edges, 6 Faces.
After drop test, no abnormality on function /appearance.
</td></tr>
<tr><td>Package Vibration</td><td>
Test condition :
1. Sine wave:
5~200Hz 1.5G, 1 octave/min, 15 min dwell on each resonant frequency, all primary axis, one sweep 30 minutes/Min. per orientation, total of 90+ min.
2. Random wave:
5-100Hz, 0dB/Oct. 0.015(g^2/Hz);
100-200Hz, -6dB/Oct. N/A
200Hz, N/A 0.0038(g^2/Hz)
Equivalent to 1.47 Grms, all primary axes, 20 min per-orientation, total of 60 min.
Note: Perform random vibration test before, the Sine-wave
</td></tr>
</table>

	vibration should be done first.
Un-package Vibration (Non-operating)	Sine-wave, 5~200Hz, 1.5G, all primary axis, one sweep (5 minutes) per orientation, total of 15 min.
Un-package Shock (Non-operating)	Waveform: Half sine Faces: 6 sides/per orientation, 3 shocks Duration: < 20 ms Velocity accelerate: 50 G
Bench Drop	1. Pivot, 90 degree, sitting on right and left side, 1 drop per orientation, total of 2 drops. 2. Bottom and opposite, 1 drop per orientation, drop height 5 cm, totally 2 drops.
Security Lock	150N break away force
B2.2 Atmospherics Test	
Temperature/Humidity, (Operating)	Test condition: 0℃~ 40℃, 10%~90%, no condensation Test procedure: 25℃/90%, 2hrs → 40℃/90%, 6hrs → 0℃, 6hrs → 40℃/10%, 6hrs → 25℃/90%, 2hrs; (2 Cycles)
Storage High Temperature / Humidity (Non-operating, with package)	Test condition: (-20°C ~ 60°C, 10% ~ 90% R.H.) 1. Storage high temperature / humidity exposure test: 25℃/60%, 1hrs → 60℃/90%, 24hrs → 25℃/60%, 1hrs 2. Storage transportation test: 25℃/60%, 1hrs → -20℃, 24hrs → 25℃/60%, 1hrs → 60℃/90%, 24hrs → 25℃/60%, 1 hrs Criteria Inspection: 1. The products should be operated normally at specified lower and higher temperature environment. 2. The carton no crash and broken issue.
Altitude	Operating: Without high altitude mode 0°C~35°C @ 0~1499m above sea level With high altitude mode 0°C~30°C @ 1500~3000m above sea level Non-operating:

	30℃@0~12,200m above sea level
Start	Turn On @ 0℃ and 40℃, AC90~264V, 47~63Hz
B2.3 Regulatory	
EMC	Test condition: FCC part 15J class B, EN55022 class B, under 3 dBuv
ESD	1. Air discharge to set surface: 15KV 2. Contact discharge to set surface and metal: 8KV 3. Contact discharge to Vert./Horiztl coupling plane: 8KV 4. Contact discharge to D-sub/S-video input pins: 4KV
Surge	1KV line to line, 2KV line to ground on input power lines.
Safety	Please refer to UL1950 for details

B3. 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 is not allowed within the boundaries defined in this specification:

1. Failure including permanent damage, critical paramedics 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.

B4. Test Sequence

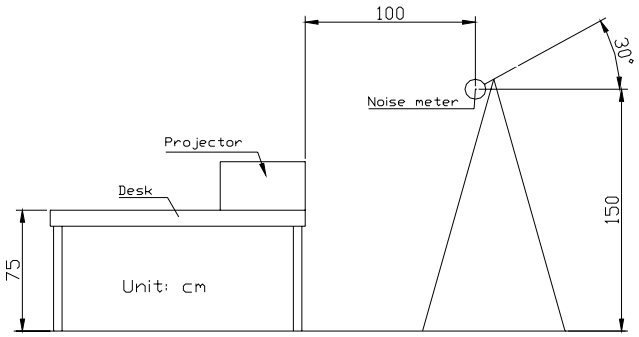
Atmospherics, Dynamic, and Regulatory test sets require separate units and can be processed in parallel. EUT testing shall be performed serially within each set.

	Set 1 (2 units)	Set 2 (2 units)	Set 3
	Dynamics:	**Atmospherics:**	**Safety/EMC:**
1	Package Vibration	Temperature / Humidity, Operating	EMC
2	Package Drop	Storage High Temperature / Humidity, Non-operating	ESD
3	Un-Package Vibration	Altitude, Operating	Surge
4	Un-Package Shock	Start	Safety
5	Bench Drop		

Appendix C Thermal and Noise Test Procedure

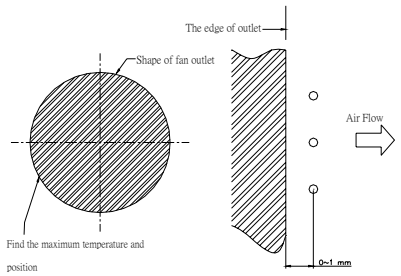
Ⅰ、Noise Testing Standard Based on *B Shown as follows,

(1) Desk high: 75 cm
(2) Projector Position: On the edge of desk
(3) Microphone Position: Distance from projector 100cm; Height 150 cm; Title 30 degree
(4) Measured four surfaces and calculated the noise value by log average.
(5) Background noise: <19dBA



Ⅱ Exhausted Air Test Procedure

Exhausted Air<95 ºC, measurement position shown as follows



Position of measurement

Ⅲ、Temperature of System Level：

Before measurement temperature, we can use IR camera to make sure the position of hot spot.

We defined maximum temperature and measurement position as following：

Area	Define	Spec. Maximum	
		metal℃	plastic℃
Maybe touch	All surface	70	95
Touch for short period only	Key pad, Adjustment foot/lens, side surface	60	85
Bottom	Lamp cover	55	70
Outlet	Mesh surface	70	95

Appendix D DMD Image Quality

1. SCOPE

This document specifies the image quality requirements applicable to the DLP™.7XGA Value Component Set. The Component Set provides the DLP™.7XGA Value Projector with digital imaging functionality based on Digital Micromirror Device (DMD) technology.

2. Definitions

2.1 Blemish

A blemish is an obstruction, reflection, or refraction of light 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 single pixel or mirror that is stuck in the OFF position and is visibly darker than the surrounding pixels.

2.3 Bright pixel

A single pixel or mirror that is stuck in the ON position and is visibly brighter than the surrounding pixels.

2.4 Unstable pixel

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 pixel

Two or more stuck pixels sharing a common border or common point, also referred to as a cluster.

2.6 Reset Boundary Artifact

The reset boundary artifact is a single row of pixels on the reset group boundaries that are visibly darker or lighter than the neighboring rows of pixels.

2.7 Pond of mirrors (POM)

POM is a rectangular array of off-state mirrors surrounding the active area.

2.8 Eyecatcher

Eyecatcher's are blemishes appearing in the area outside of the Active Area. These are due to particles and various DMD window or window aperture “defects” including: digs, voids, and scratches.

2.9 Border Artifacts

Border artifacts are a general category of image artifacts that may show up on screen in the area outside of the active array. Border artifacts include: Exposed Bond Wires, Exposed Metal 2, and Reflective Edge.

2.9.1 Bond Wires

Bond Wires are the electrical connections between the die and the DMD ceramic package. If visible, they will appear as short light parallel lines outside of the Pond of Mirrors (POM).

2.9.2 Exposed Metal 2

Exposed Metal 2 is due to a shift in positioning of either the die or the window aperture, which may allow light to be reflected off of the layer of metal 2 that is below the super structure (mirrors). This defect is located outside of the POM.

2.9.3 Reflective Edge

Reflective Edge is light that may reflect from the edge of the DMD window aperture onto the projection screen. It will appear as a thin diffuse line outside of the POM.

2.10 Blue 60 Screen

The Blue 60 screen is used to test for major dark blemishes. All areas of the screen are colored a Microsoft Paintbrush blue 60 (green and red set at 0, blue set at 60).
NOTE: If linear degamma is not used then the Microsoft Paintbrush values must be adjusted to match the degamma table being used in order to generate an equivalent blue

level on the test screen image.

2.11 Gray 10 Screen

The Gray 10 screen is used to test for major light blemishes. All areas of the screen are colored a Microsoft Paintbrush gray 10 (green, red, and blue set at 10).
NOTE: If linear degamma is not used then the Microsoft Paintbrush values must be adjusted to match the degamma table being used in order to generate an equivalent gray level on the test screen image.

2.12 Gray 30 Screen

The Gray 30 screen is used to test for the reset boundary artifact. All areas of the screen are colored a Microsoft Paintbrush gray 30 (green, red, and blue set at 30).
NOTE: If linear degamma is not used then the Microsoft Paintbrush values must be adjusted to match the degamma table being used in order to generate an equivalent gray level on the test screen image.

3. ACCEPTANCE REQUIREMENTS

3.1 Conditions of Acceptance

All DMD image quality defects must be determined under the following projected image test conditions:

a. Test Set degamma shall be linear.
b. Test Set brightness and contrast settings shall be set to nominal.
c. The diagonal size of the projected image shall be a minimum of 60 inches.
d. The projection screen shall be 1X gain.
e. The projected image shall be inspected from an 8 feet minimum viewing distance.
f. The image shall be in focus during all Table 1 tests.

3.2 Test Sequence

Tests shall be run in the sequence listed in Table 1.

TABLE 1. Image Quality Specification

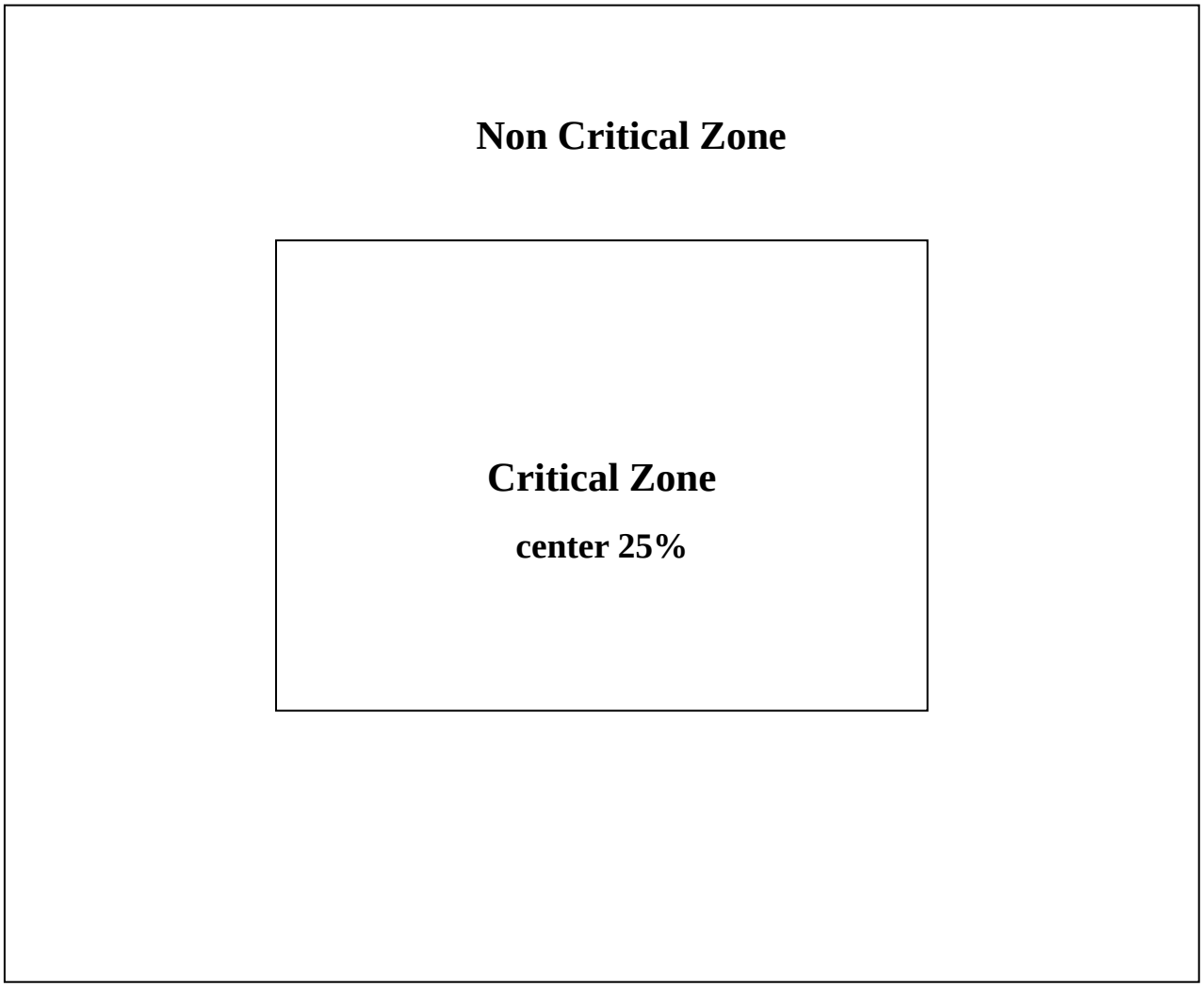
SEQ #	TEST	SCREEN	ACCEPTANCE CRITERIA
1	Major Dark Blemish	Blue 60	1. ≦ 4 visible dark blemishes are allowed in the active area

			2. No blemish will be > 1” long/diameter
2	Major Light Blemish	Gray 10	1. ≦ 4 visible light blemishes are allowed in the active area 2. No blemish will be > 1” long/diameter
3	Reset Boundary Artifact	Gray 30	1. No reset boundary artifacts allowed
4	Eyecatchers Border Artifacts	Any screen	1. Eyecatcher and border artifacts are allowed
5	Projected Images	Any screen	1. No adjacent pixels 2. No bright pixels in Active Area 3. No unstable pixels in Active Area 4. ≦ 1 bright pixel in the POM 5. ≦ 4 dark pixels in the Active Area 6. No DMD window aperture shadowing on the Active Area 7. Minor blemishes are allowed

Notes:

1. Projected blemish numbers include the count for the shadow of the window artifact in addition to the artifact itself.
2. During all Table 1 tests, projected images shall be inspected in accordance with the conditions of inspection specified in Section 3.
3. The rejection basis for all cosmetic DMD defects (scratches, nicks, particles) will be the projected image tests referenced in Table 1.
4. Devices that meet this image quality specification but are deemed undesirable by the customer may not be returned to TI without prior approval by TI.
5. Screens < Gray10 shall not be used as a basis for rejecting a DMD for image quality.

Figure 1. Major Blemish Two Zone Screen



Appendix E Electrical Specification

1. Timing Table

The Default timing is as following:

Resolution	Mode	Refresh rate (Hz)	H-frequency (kHz)	Clock (MHz)
720 x 400	720x400_70	70.087	31.469	28.3221
640 x 480	VGA_60	59.940	31.469	25.175
	VGA_72	72.809	37.861	31.500
	VGA_75	75.000	37.500	31.500
	VGA_85	85.008	43.269	36.000
800 x 600	SVGA_60	60.317	37.879	40.000
	SVGA_72	72.188	48.077	50.000
	SVGA_75	75.000	46.875	49.500
	SVGA_85	85.061	53.674	56.250
1024 x 768	XGA_60	60.004	48.363	65.000
	XGA_70	70.069	56.476	75.000
	XGA_75	75.029	60.023	78.750
	XGA_85	84.997	68.667	94.500
1280 x 1024	SXGA3_60	60.020	63.981	108.000
1280 x 768	SXGA_60	60.09	47.77	80.768
1280 x 800	SXGA_60	59.96	49.65	83.458

YPbPr support timing is as following:

Signal format	fh(kHz)	fv(Hz)
480i(525i)@60Hz	15.73	59.94
480p(525p)@60Hz	31.47	59.94
576i(625i)@50Hz	15.63	50.00
576p(625p)@50Hz	31.25	50.00
720p(750p)@60Hz	45.00	60.00
720p(750p)@50Hz	37.50	50.00
1080i(1125i)@60Hz	33.75	60.00
1080i(1125i)@50Hz	28.13	50.00

Video, S-Video support timing is as following:

Video mode	fh(kHz)	fv(Hz)	fsc(MHz)
NTSC	15.73	60	3.58
PAL	15.63	50	4.43
SECAM	15.63	50	4.25 or 4.41
PAL-M	15.73	60	3.58
PAL-N	15.63	50	3.58
PAL-60	15.73	60	4.43
NTSC4.43	15.73	60	4.43

2. Characteristics of inputs/outputs

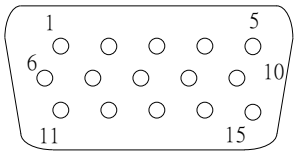
Signal	Parameter	Min	Type	Max	
RDATA GDATA BDATA	Impedance		75		Ohm
	Amplitude		0.7		Volts peak-to-peak
	Black pedestal		0		Volts
	Pixel Clock		110		M Hz
GDATA_SOG	Impedance		75		Ohm
	Amplitude		1		Volts peak-to-peak
	Video amplitude		0.7		Volts peak-to-peak
	Sync amplitude		0.3		Volts peak-to-peak
	Black pedestal		0		Volts
	Pixel Clock		110		M Hz
HDATA	Impedance		1		K ohm
	Amplitude, low level	0		0.8	volt
	Amplitude, high level	2.5		5	Volt
	Frequency	31		82	K Hz
VDATA	Impedance		1		K ohm
	Amplitude, low level	0		0.8	volt
	Amplitude, high level	2.5		5	Volt
	Frequency	48		85	Hz
SDADATA	Amplitude, low level	0		0.8	volt
	Amplitude, high level	2.5		5	Volt
SCLDATA	Amplitude, low level	0		0.8	volt
	Amplitude, high level	2.5		5	Volt
RXD	Amplitude	-25		25	Volt
TXD	Amplitude	-25		25	Volt
CVBS Luminance	Amplitude, total (video+ sync)		1		Volts peak to peak
	Amplitude, video		0.7		Volts peak to peak
	Amplitude, sync		0.3		Volts peak to peak
	Impedance		75		ohm
CVBS Chroma	Amplitude		300		m Volts peak to peak
	Impedance		75		ohm
Audio	Impedance (audio in)		10		Kohm
	Amplitude (audio in)	0		0.30	Volts rms
	Bandwidth	300Hz		16kHz	

	S/N Ratio		40		%
	Total Harmonic Distortion			10	%

3. Electrical Interface Character

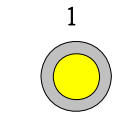
Interface Definition

15 pin definition of the mini D-sub male for DDC2B protocol



Pin	Definition	Pin	Definition	Pin	Definition	Pin	Definition
1	Red video	2	Green Video	3	Blue Video	4	NC
5	NC	6	Red Video Return	7	Green Video Return	8	Blue Video Return
9	NC	10	Sync . Return	11	Monitor ID bit 0	12	Bi-directional data (SDA)
13	Horizontal Sync	14	Vertical Sync	15	Data clock (SCL)		

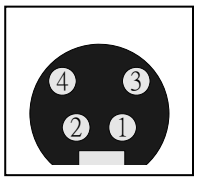
- Video & Component Input



Composite input

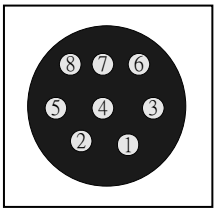
Pin	Definition
1	Composite video input

- S-Video input



Pin	Description
1	GND
2	GND
3	Luminance
4	Chroma

- Control Port



Pin	Description	Pin	Description
1	DSR	2	CTS
3	RD	4	GND
5	RTS	6	NC
7	TX	8	NC

Local Keyboard Description (Detailed description refer to SW Specification)

Key Name	Detailed Description
Power	Use this button to turn your Data Projector on and off (standby mode).
Source	To select input sources as Computer, Video, S-Video, YpbPr
Auto	Toggle auto-tracking image function
Blank/Q?	Press “Blank” key first to blank the screen;Press key for 3 seconds, Q function will start
Mode	Change Different presentation mode
Right	(1) Move next page (2) OSD increment & move next sub-item (3) Keystone+.
Left	(1) Move previous page (2) OSD decrement & move previous sub-item (3) Keystone-.
Up	(1) Move item bar. (2) Move to page level
Down	(1) Move item bar (2) Menu

Remote Control Keys Description (Detailed description refer to SW Specification)

IR-Key Name	Detailed Description
Power	Use this button to turn your Data Projector on and off (standby mode).
Source	To select input sources as Computer, YPbPr , Video, S-Video
Menu	(1) OSD pop-up. (2) Move next item
▶	(1) Move next page (2) OSD increment & move next sub-item.
◀	(1) Move previous page (2) OSD decrement & move previous sub-item.
▲	(1) Close OSD. (2) Move to page level
▼	(1) Move item bar
Auto	Toggle auto-tracking image function
Mode	Change different Preset mode
Freeze	This button will freeze a picture. Press again to resume motion.
Blank	Press “Blank” key first to blank the screen.
Q?	Displays and closes the “Question?”, which shows basic solutions if a problem occurs.
Timer	Call out the “Presentation Timer” setup OSD and user can set timer to remind presenter.
	Keystone+
	Keystone-

External Status indicator

LED Name	Detailed Description
Power LED	Display the power on/off sequence status
Lamp Status LED	Display the Lamp status (Lamp fail, Lamp spoil etc.)
Temperature Status LED	Display the Thermal status (Fan Fail, Over Temperature, etc.)

4. Functionality

The Following functionality will be supported: (Detailed description refer to SW Specification)

Functionality	Data (Computer)	Video/S-Video	YPbPr/YCbCr
Volume	YES	YES	YES
Mute	YES	YES	YES
Preset Mode	YES	YES	YES
Brightness	YES	YES	YES
Contrast	YES	YES	YES
Color	NO	YES	YES
Tint	NO	YES	YES
Sharpness	NO	YES	NO
Color Temp	YES	YES	YES
H. Position	YES	NO	YES
V. Position	YES	NO	YES
H. Phase	YES	NO	YES
H. Size	YES	NO	YES
Keystone	YES	YES	YES
Language	YES	YES	YES
Auto	YES	YES	YES
Image Ratio	YES	YES	YES
Auto Off	YES	YES	YES
Mirror	YES	YES	YES
Source	YES	YES	YES

Freeze	YES	YES	YES
Blank	YES	YES	YES
Lamp Reset	YES	YES	YES
OSD Timer	YES	YES	YES
Source Scan	YES	YES	YES
Keystone Hold	YES	YES	YES
Mirror Hold	YES	YES	YES
Blank Time	YES	YES	YES
Information	YES	YES	YES
Reset	YES	YES	YES

External Message indicator (Detailed description refer to SW Specification)

Message	Occasion
PC/Composite Video /S-Video /Analog YPbPr Searching	The system does not detect the signal
Out of range	The signal is over the specification
Lamp Warning! The Power Will Turn Off After 4000 Hours	Lamp Hour is over 3000 hours
Change The Lamp! The Power Will Turn Off After 4000 Hours	Lamp Hour is over 3950 hours
Change The Lamp!	Lamp Hour is over 4000 hours.

Appendix F Power Supply Specification

1. Input Power Specification

Specification	Description
Input Voltage Range	The unit shall meet all the operating requirements with the range 100 ~ 240 VAC
Frequency Range	The unit shall meet all the operating requirements with an input frequency range 50 Hz ~ 60 Hz
Power Consumption	Normal operation: 285 W (Max) standby mode: < 5W
Regulation Efficiency	80 % (typical) measuring at 115Vac and full load

2. Output Power Requirement

The power supply can provide DC output as below：

NO.	Voltage	Regulation	Load Current Range	Ripple & Noise
1	+5 V	±5 %	0.06A ~ 2 A	100 mV
2	+2.5 V	±5 %	0.3 A ~ 2 A	100 mV
3	+12 V	±10 %	0.04 A ~ 1A	300 mV

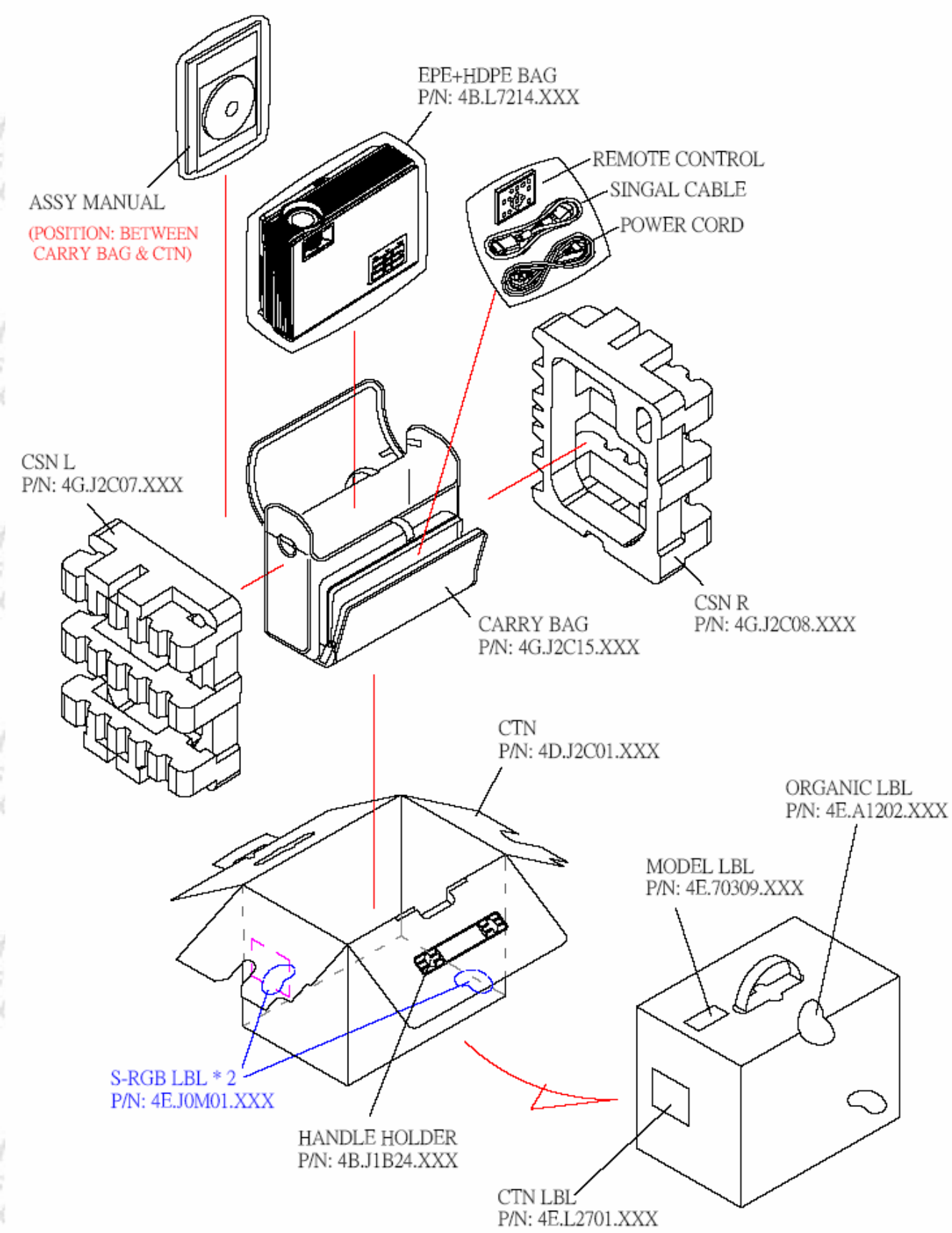
3. Lamp Power specifications

Specification	Description
Applicable Lamp	200W, AC operation
Starting pulse from Ignitor	Pulse voltage 7KV max.

4. Others

Item	Description
Power good signal	Active high after 5 Volt reach 95% of its rating and goes to logic low at least 0.5ms before power falls to 90% of its rating
High voltage and high temperature protection	To avoid user from the dangerous of HV and high temperature, when front door of lamp case is opened whether intentionally or accidentally, the power should be disconnected immediately. When the door is closed again, the igniter restart sequence should be compliant to that is described previously

Packing


EPE+HDPE BAG
P/N: 4B.L7214.XXX
ASSY MANUAL
(POSITION: BETWEEN
CARRY BAG & CTN)
REMOTE CONTROL
SINGAL CABLE
POWER CORD
CSN L
P/N: 4G.J2C07.XXX
CSN R
P/N: 4G.J2C08.XXX
CARRY BAG
P/N: 4G.J2C15.XXX
CTN
P/N: 4D.J2C01.XXX
ORGANIC LBL
P/N: 4E.A1202.XXX
MODEL LBL
P/N: 4E.70309.XXX
S-RGB LBL * 2
P/N: 4E.J0M01.XXX
HANDLE HOLDER
P/N: 4B.J1B24.XXX
CTN LBL
P/N: 4E.L2701.XXX

Customer Acceptance

5.3.1. SCOPE

This document establishes the general workmanship standards and functional acceptance criteria for PROJECTOR produced by BENQ.

5.3.2. PURPOSE

The purpose of this publication is to define a procedure for inspection of the PROJECTOR by means of a customer acceptance test, the method of evaluation of defects and rules for specifying acceptance levels.

5.3.3. APPLICATION

The "Customer Acceptance Criteria" is applicable to the inspection of the PROJECTOR, completely packed and ready for dispatch to customers. Unless otherwise specified, the customer acceptance inspection should be conducted at manufacturer's site.

5.3.4. DEFINITION

The "Customer Acceptance Criteria" is the document defining the process of examining, testing or otherwise comparing the product with a given set of specified technical, esthetic and workmanship requirements leading to an evaluation of the "degree of fitness for use", including possible personal injury or property damage for the use of the product.

5.3.5. CLASSIFICATION OF DEFECTS

The defects are grouped into the following classes:

5.3.5.1. Critical defect

A critical defect is a defect which judgment and experience indicate that there is likely to result in hazardous or unsafe conditions for individuals using product.

5.3.5.2 Major defect

A major defect is a defect, other than critical one, is likely to result in failure, or to reduce materially the usability of the product for its intended purpose.

5.3.5.3 Minor defect

A minor defect is a defect that is not likely to reduce materially the usability of its intended purpose, or is a departure from established standards having little bearing on the effective use of operation of the product.

Note: If BenQ defect undefined failure, and it judged that is reduce the merchandisebility, BenQ CM Inform this defect. After that parties make communication and decide how to solve.

5.3.6. EXPRESSION OF DEFECTIVES

$$\text{Percent of defects} = \frac{\text{Number of defects}}{\text{Number of products inspected}} \times 100\%$$

5.3.7. INSPECTION STANDARD

Unless otherwise specified, the inspection standard will be defined by MIL-STD-105E, NORMAL INSPECTION LEVEL Ⅱ, SINGLE SAMPLING PLAN. Level Ⅱ is in use all the time, inspection levels are normal, reduce and tighten.

5.3.7.1 Acceptance Quality Level

5.3.7.1.1. Critical Defect:

When a critical defect is found, this must be reported immediately upon detection, the lot or batch shall be rejected and further shipments shall be held up pending instructions from the responsible person in relevant department.

5.3.7.1.2 under normal sampling

Critical	Defective : 0% AQL
Major	Defective : 0.65% AQL
Minor	Defective : 2.5% AQL

5.3.7.1.3 under special sampling

Critical	Defective : 0% AQL
Major	Defective : 1.0% AQL
Minor	Defective : 4.0% AQL

5.3.8. GENERAL RULES

1) The inspection must be carried out by trained inspectors who have good knowledge about the product.
2) The inspection must be based upon the documents concerning the completely assembled and packed product.
3) When more defects appear with the same unit only the most serious defect has to be taken into account.
4) Defects found in accessory packed with the product such as Cable, Connector,

Manual, CD and the like, and being inspected as a part of the complete product, must be included in the evaluation.

5) The evaluation must be within the limits of the product specification and, for not specified characteristics, refer to the sample machine or the judgment of BENQ QA Engineer. But any kind of proposals or judgments must be reasonable and acceptable by both sides.
6) Faults must be able to be repeatedly demonstrated.

5.3.9. TEST CONDITIONS

Unless other prescription, the test conditions are as followings:

Nominal voltage: refer to operation manual
Environmental illumination:
Variable from 300 to 700 Lux (For appearance inspection)
Variable from 0 to 7 Lux (For functional inspection)
Temperature: 25±5℃
Warm up time: at least more than 10 minutes
Visual inspection shall be done with the distance from eyes to the sample 50 cm.
Display mode: refer to operation manual

5.3.10. TEST EQUIPMENTS

Dark room
PC
Pattern Generator: Chroma 2327
Minolta color analyzer (CL-100)
BS tuner (Sharp TU-HD1/ Panasonic TU-BHD300, or equivalent)
DVD player
Power supply (100~240 VAC) with consumption meter
Measuring tape

5.3.11. PART Ⅰ VISUAL INSPECTION CRITERIA

5.3.11.1. Inspection zone definition and inspection distance

A-side: Up case - Up case surfaces except right / left / behind side's surface.
Front cover - Front cover surface

B-side: Side - right/left sides surfaces
Back cover - Back cover surfaces

C-side: Low cause - bottom surfaces

~For spot inspection distance is 45 cm on A/B/C-side. And inspection time is 10~15 sec.
~For scratch inspection distance is 45 cm on A/B/C-side. And inspection time is 10~15 sec.

5.3.11.1.1 Appearance Inspection Criteria

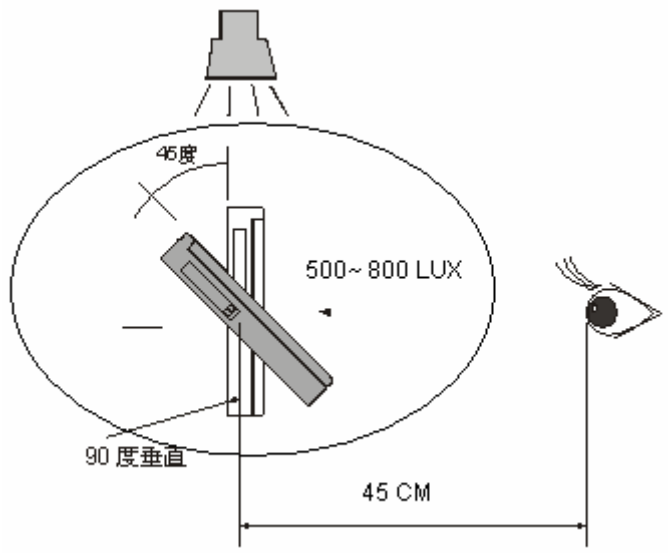
5.3.11.1.1.1. Environment Condition

5.3.11.1.1.1.1 Lighting intensity

All appearance quality shall be inspected with the lighting condition as 500~800Lux (natural lighting or white fluorescent light).

5.3.11.1.1.1.2. Inspection angle and distance to object or target

All part inspection must be done under direct overhead lighting. Viewing angle and distance are dependent on surface classification. In all cases, parts must be held in such that the light reflection does not disturb the inspector's eye.



Picture 1

Classification	Area A	Area B	Area C
Lighting positioning	Above of inspected part		
Inspection position relative to part	90°	90°	90°
Inspection distance	45 cm	45 cm	45 cm

Chart 1

5.3.11.1.1.1.3. Inspection interval (time)
Inspection interval is a function of surface area.
Time for visual inspection: 10sec.

Parts Size	"A" surface	"B" surface	"C" surface
Time	10 sec	10 sec	10 sec

Chart 2

TABLE 1. (General Product of plastic outlook of dot, blemish, and others spec inspection standard)

	Spec (Area m^2)	A surface (Number of defect)				B surface (Number of defect)				C surface (Number of defect)			
		20*20	50*50	70*70	100*100	20*20	50*50	70*70	100*100	20*20	50*50	70*70	100*100
Particle Blemish | Color spot	P < 0.1 mm^2 Distance 2cm	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore
	≦P< 0.2mm^2 Distance 4cm	2	3	4	5	2	3	4	5	4	4	5	6
	0.2≦P <0.3mm^2 Distance 4cm	0	0	0	0	2	3	4	5	3	4	5	6
Particle | Spot with same color	P<0.1 mm^2 Distance 2cm	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore
	0.1≦P<0.2mm^2 Distance 4cm	4	4	5	6	5	5	6	7	6	6	7	8
	≦P <0.3mm^2 Distance 4cm	3	4	4	5	4	5	5	6	6	7	7	8
	≦P< 0.5mm^2 Distanc 5cm	2	2	3	4	3	3	4	5	4	4	5	6
	Total	4	4	5	6	5	5	6	7	6	6	7	8

Note:

1. Use the 20*20 criteria to the area less than 20*20; 50*50 inspection criteria to the area 20*20≦A<50*50; etc.

(Particle/Blemish/Color Spot)

1.1 Definition of surface A, B, C refer to 6.2

1.2 Blemish around the logo must be equal or smaller than 0.05 mm^2

1.3 Bubble on the surface is to be reject.

TABLE 2 :(General Product of plastic outlook inspection standard)

No	Appearance	Spec
1	Shrinkage	A region: No Shrink. With gloves, no feeling of sink when touching the surface B/C region: not obvious
2	Run, Texture, Gloss	No obvious non-uniformity
3	Welding Line/Knit Line	When scratching on it, there's no feeling of obstruction. Also, there should not be obvious difference in gloss nearby it.
4	Ejector Mark	Reject
5	Label/screws shortage	Reject
6	Material shortage	Material shortage is not allowed to impact structure strength and surface
7	Chromatic aberration	(Painting): △E<=2; L<=1.5 ; △ A,B <= 0.6 (Paint, aluminum). △E<=2 L<=1.0; △ A, B <= 0.6 (Paint, non-aluminum) (Raw material) : △L,A,B<=0.6 , △E<=0.75
8	Printing	Printing must not have incomplete printing, break off, overlap, uneven thickness, excessive ink, printing misalignment (1mm), printing slanting & crooked (<0.3mm) Printing color must be comparable to color chip and sample.
9	Logo of panel sticker	Printing must not have incomplete printing, break off, overlap, uneven thickness, excessive ink, printing misalignment (1mm), printing slanting & crooked (<0.4mm) Printing color must be comparable to color chip and sample.
10	Scratch/Nicks	Side A: (W < 0.1mm , L < 3mm): Only 1 this kind of scratch is accepted W < 0.1mm , L < 3-5mm No this kind of scratch is accepted Side B: W < 0.15mm, L< 3mm Only less than 2 this kind of scratch is accepted W < 0.15mm , L < 3-5mm Only 1 this kind of scratch is accepted Side C: W < 0.2mm , L < 1mm Only 4 this kind of scratch is accepted

		W < 0.2mm , L < 3mm Only 3 this kind of scratch is accepted W < 0.2mm , L < 3-5mm Only 2 this kind of scratch is accepted Note: Severe scratch which disclose the Natural Each scratch should be 5cm more far away from each other

1.1 Gap (refer to C321 document)

ITEMS	Specification
Cap between UC and LC； step between UC and LC	Gap ≦ 0.5mm，step≦0.3mm
Cap between Autio and RC	Gap ≦ 0.5mm
Cap between UC and upper side of RC	0.2(+0.3/-0.2)mm
Cap between UC and both sides of RC	0.1(+0.3/-0.1)mm
Cap between Video and RC	0.85(+0.6/-0.6)mm
Cap between LC and RC	0.1(+0.3/-0.1)mm
Cap between USB and RC	0.5(+0.3/-0.3)mm
Cap between RC and D-sub out	1.2(+0.8/-0.8)mm
Cap between IR LENS and RC	0.15(+0.2/-0.1)mm
Cap between AC socket and RC	0.25(+0.25/-0.25)mm
Cap between RC and D-sub in	1.2(+0.8/-0.8)mm
Cap between FC and Ring-FC	0.1(+0.1/-0.05)mm
Cap between IR LENS and FC	0.15(+0.2/-0.1)mm
Cap between LENS and Ring-FC	1.5(+0.1/-0.1)mm
Cap between UC and FC	0.1(+0.3/-0.1)mm
Cap between PUSH-BTN and LC	0.3(+0.2/-0.2)mm
Step between FC and UC	0（+0.3/-0.3）mm
Cap between LED LENS and UC	0.1（+0.2/-0.1）mm
Cap between KEYFUN and UC	0.1（+0.2/-0.1）mm
Cap between Door and LC； step between Door and LC	Gap ≦ 0.6mm，step≦0.8mm

1.2 Packing and marking

Item	Description	Class
1	Inner packing material broken.	Minor
2	Carton damaged with hole over 1.5 cm in diameter.	Minor
3	Carton crashed with dent over 5 cm in diameter.	Minor
4	Printing of carton is illegible.	Minor
5	Broken packing bag	Minor
6	Spec. label's serial number not the same as carton labels.	Major
7	Packing models not the same as carton.	Major
8	Marking missing/wrong.	Major
9	Projector missing (found none in carton).	Major
10	Label on box missing or damaged.	Major

11	Strange objects in the box.	Major

1.3 Accessories

Item	Description	Class
1	Missing accessory parts	Major
2	Wrong Accessory parts	Major

1.4 Appearance on visible parts

Item	Description	Class
1	Damage or deviation when viewed at a distance of 50 cm.	Minor
2	Cover/case is dirty. (Removable).	Minor
3	Cover/case exists black spot. (Irremovable).	Minor
4	Poor printing on panel sticker. (Segment broken illegible).	Minor
5	Cover/case is scratched. (refer to attachment 1)	Minor
6	Spec Label reverses rugged illegible printing.	Minor
7	LED sink over 1 mm.	Minor
8	Label/screws shortage or missing.	Major
9	Wrong logo of panel sticker.	Major
10	Wrong spec. label printing.	Major
11	Label on product wrong or missing.	Major

1.5 AC power and signal cable

Item	Description	Class
1	AC power or connector not correct or damaged, not safe	Critical
2	AC power or connector not correct or damaged, but safe	Major
3	Signal cable contact pin dirty	Major
4	Signal cable plug dirty or surface damaged, but safe	Minor
5	Cable crack	Major
6	Cable scratch (wire not exposed), or dirty	Major
7	AC-DC adapter no function	Minor
8	Signal cable contact pin dirty	Major

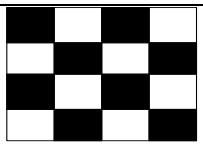
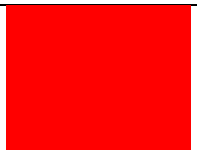
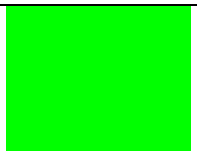
1.6 Interior of the product

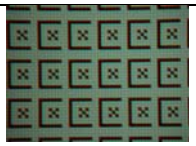
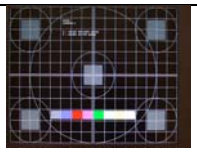
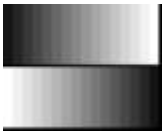
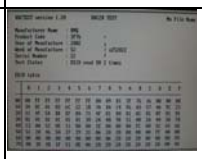
Item	Description	Class

1	Use Non-QVL (Qualify vendor list)component	Major
2	Wrong parts, broken component, but safe	Major
3	Foreign material	
	Conductive (Has potential to short circuit)	Critical
	Non-conductive (Moveable)	Major
4	Missing hardware, component or screw, stripped screw	Major
5	Loose hardware/screw or insufficient torque	Major
6	Poor wire routing, which is no concerned on EMI	Minor
7	Cold soldering/loose connections (Electrical)	Major
8	Wires and mechanical structure do not meet UL/CSA or TUV	Critical
9	Wrong parts, broken component, not safe	Critical
10	Component burn	Critical

5.3.12. PART II. OPERATIONAL INSPECTION CRITERIA

5.3.12.1. TEST PATTERN

PATTERN	PATTERN	TEST ITEM
Full white		ANSI Brightness、Bright Uniformity、FOFO Contrast Ratio、CIE white coordinate、Throw Ratio、Zoom Ratio、Distortion
Chessboard		ANSI Contrast
Full Dark		FOFO Contrast Ratio
Full Red		Impurity、CIE coordinate
Full Green		Impurity、CIE coordinate

Full Blue		Impurity、CIE coordinate
Chromo 800x600		Focus Range
256 COLORS		Color and Gray Check
General-1 pattern		Performance/ Timing check/ function check
256/32/16 Gray	 	Gray Check
DDC check		Check the DDC information, Including S/N, model, manufacturer name, product code.

5.3.12.2. TEST CONTENT:

	Test Condition	TEST ITEM	Input	Equipment
PC Mode	Chroma pattern 1024x768 / 800x600	Focus/ Focus range	D-SUB	Chroma
	Timing VESA1024 / 256 gray scale	Gray scale check		
	Timing ICL-406 / Gen 1	Picture quality		
	FULL W , R , G , B	Impurity, CIE coordinate, pixel fail		

	At random	PC sound check	Audio	CD-ROM
KEY	Test Condition	TEST ITEM	Input	Equipment
HDTV	NTSC (480i)/ 480p/ PAL (625i)/ 720p, HDTV (1080i)	Picture performance	YPbPr	Chroma / BS Tuner
DVD picture	NTSC disk → Output = NTSC 3.58MHz/ 60Hz	Picture quality	Video S-video	DVD player
	PAL disk → Output = PAL 4.43MHz / 50 Hz	Picture quality	Video S-video	

SPECIFICATION :

Item	Spec.	Condition	Pattern
ANSI Brightness	Minimum 1600 Lumens	Contrast: Preset Brightness: Preset	Full white
Bright Uniformity	Minimum -50%	Contrast: Preset Brightness: Preset	Full white
ANSI Contrast	Minimum 150:1	Contrast: Preset Brightness: Preset	Chessboard
FOFO Contrast Ratio	Minimum1200:1	Contrast: Preset Brightness: Preset	Full white and Full dark
Light Leakage (In Active Area)	<0.5 lux compared to center point within 60” (Diagonal at 2.2m,wide) image size.	Contrast: Preset Brightness: Preset	Full dark
Light Leakage (Out of Active Area)	<0.5 lux between of 54” (Diagonal at 2m,Tele) image size and 60” (Diagonal at 2.2m, wide) image size	Contrast: Preset Brightness: Preset	Full dark
CIE white coordinate	x=0.315+0.04 y=0.344+0.04	Contrast: Preset Brightness: Preset	Full white
CIE red coordinate	x=0.630+0.04 y=0.353+0.04	Contrast: Preset Brightness: Preset	Full Red
CIE green coordinate	x=0.353+0.04 y=0.535+0.04	Contrast: Preset Brightness: Preset	Full Green
CIE blue coordinate	x=0.139+0.04 y=0.096+0.04	Contrast: Preset Brightness: Preset	Full Blue

Throw Ratio	54”±5% Diagonal @ 2M (Wide)	Contrast: Preset Brightness: Preset	Full white
Zoom Ratio	>1.10:1	Contrast: Preset Brightness: Preset	Full white
Keystone Distortion	(W2-W1) / (W1+W2) <1.0%	Contrast: Preset Brightness: Preset	Full white
Vertical TV Distortion	(H1+H2-2×H3)/2H2 <1.0%	Contrast: Preset Brightness: Preset	Full white
Visible Range	1~8m	Contrast: Preset Brightness: Preset	Chromo 84 X pattern
Clearly Focus Range	Pixel clear and uniform at 1.5~6m	Contrast: Preset Brightness: Preset	Chromo 84 X pattern
Color and Gray Check	Should be clear and bright	Brightness: Preset Contrast: Preset	Chromo 256 gray pattern
DMD Image Quality	See Defect Classification	See Defect Classification	See Defect Classification
Item	Spec.	Condition	Pattern
PC	640X400→ 800X600, compressed 1280X1024; Composite-Sync; Sync-on-Green; Interlace Mode (8514A);	Contrast: Preset Brightness: Preset	Chromo Test pattern
Video	NTSC/NTSC4.43/PAL(Including PAL-M, PAL-n) /SECAM/PAL60	Contrast: Preset Brightness: Preset	VG828 Test pattern
YPbPr	NTSC (480i)/ 480p/ PAL (625i)/720p,HDTV (720P/1080i)	Contrast: Preset Brightness: Preset	VG828 Test pattern

5.3.12.2.1. POWER CONSUMPTION:

Mode	Condition	Power Consumption	LED Color
Standby power	-	< 15 W	Red
Normal	-	< 285 W	Green

5.3.12.3. OPERATIONAL INSPECTION CRITERIA:

No	Description	Class
1	Noise	
1.1	When power on or power off, fan or color wheel get abnormal noise.	Major
1.2	When normal operation, noise exceed noise level (refer to C201 document)	Major
2	Display Quality (include input: Video, S-video, YPbPr, and D-sub or RGB)	
2.1	Focus range out of specification	Major
2.2	Focus fail (focus not clear or flare/ defocus/ lateral color out of specification)	Major
2.3	Brightness & Uniformity --- out of specification.	Major
2.4	Contrast ratio --- out of specification	Major
2.5	Color coordinates --- out of specification.	Major
2.6	Light leakage out of specification (active area or out of active area)	Major
2.7	Throw ratio out of specification	Major
2.8	Room ratio out of specification	Major
2.9	Picture distortion out of specification	Major
2.10	DMD image out of specification	Major
2.11	Picture dust or other image quality out of specification	Major
2.12	Gray stage check --- Missing stage	Major
2.13	Video noise --- If video noise presented	Major
2.14	DDC data error / incorrect	Major
2.15	Mode detection error	Major
2.16	OSD Malfunction	Major
3	Audio Quality	
3.1	Audio malfunction	Major
3.2	Speaker no function	Major
3.4	Volume mute malfunction	Major
4	Remote control malfunction	Major
4.1	Receiver range: 0~7 m Receiver angle: ± 30 degree (vertical and horizontal)	Major

5.3.13. PART III INSPECTION CRITERIA

5.3.13.1. IMAGE QUALITY SPECIFICATION:

SEQ #	TEST	SCREEN	ACCEPTANCE CRITERIA
1	Major Dark Blemish	Two Zone Blue 60	1. No blemish will be darker than Microsoft Blue 60 in the critical zone ≦2 blemish in the Non-critical zone No blemish will be ＞ 1/2" long/ diameter
2	Major Light Blemish	Two Zone Gray 10	1. No blemish will be lighter than Microsoft Gray 10 in the critical zone 2. ≦2 blemishes in the Non-critical zone 3. No blemish will be ＞ 1/2" long/ diameter
3	Eyecatcher	Gray 10	No Eyecatcher will be lighter than Microsoft Gray 10
4	Streaks	Blue 60 Gray 10 White	No streaks.
5	Projected Images	Any screen	No adjacent pixels No bright pixels in Active Area No unstable pixels in Active Area ≦1 bright pixel in the SOM ≦4 dark pixels ≦6 minor blemishes No DMD window aperture shadowing on the Active Area

Notes:

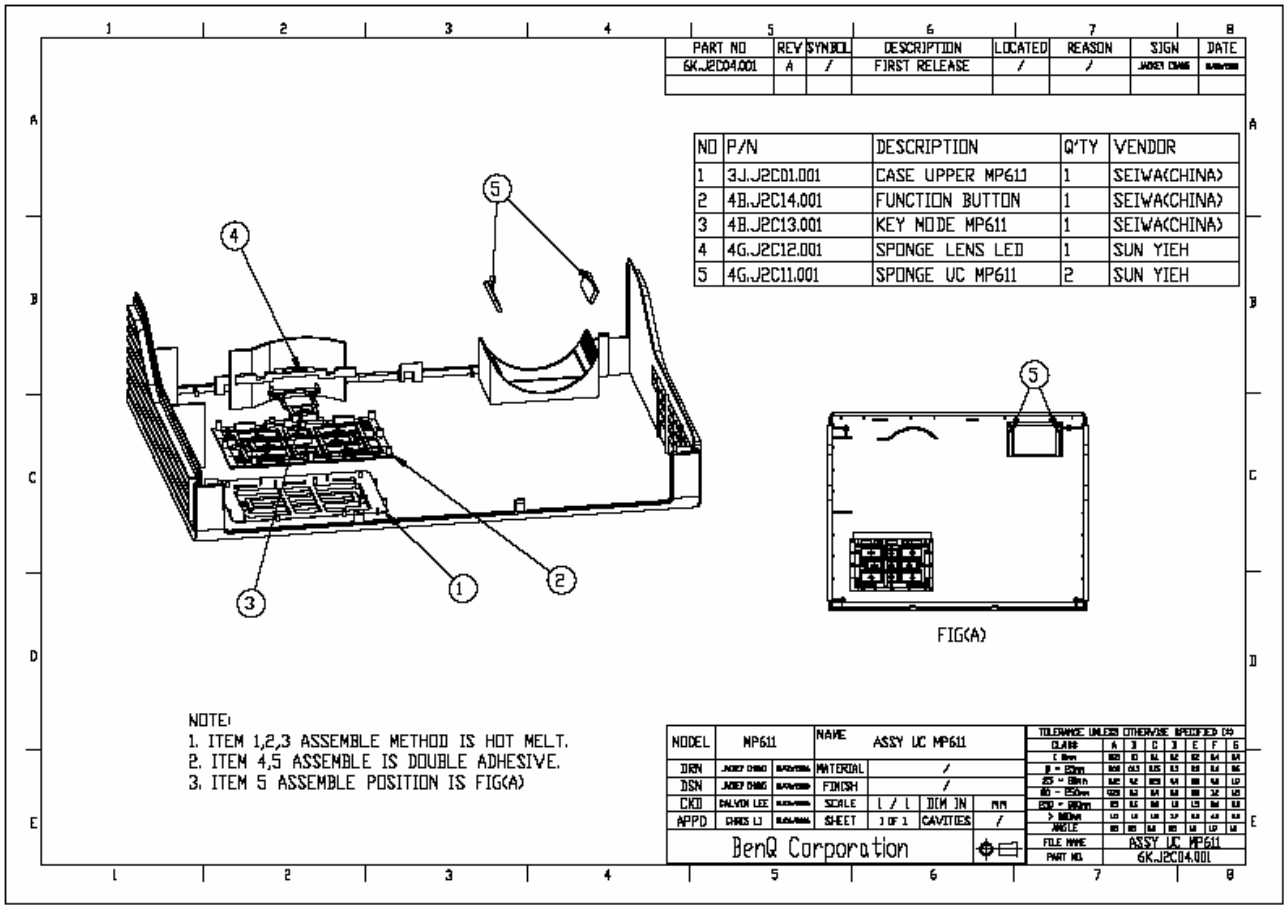
1. Projected blemish numbers include the count for the shadow of the artifact in addition to the artifact itself, so that the count usually represents a single artifact on the window.
2. No blemish shall be more than 5 inches long or have a total area of more than 5 square inches on a 60 inch diagonal projected image. (<= 1/2 inch for Major Blemish tests)
3. During all Table 1 tests, projected images shall be inspected in accordance with the conditions of inspection specified in Section 3.
4. The rejection basis for all cosmetic DMD defects (scratches, nicks, particles) will be the projected image tests referenced in Table 1.
5. Any other image quality issue not specifically defined in this document shall be acceptable.
6. Black screen shall not be used as a basis for rejecting DMD for image quality.

5.3.13.2. APPEARANCE INSPECTION SPECIFICATION:

Judge area	Judge item	Inspection specification	Judge criterion	
			Major	Minor
A/B/C side	Spot, Scratch, Gap,	Refer to Part I 1.Appearance Inspection Criteria	○	
	Color variance			○
Carton	Broken	No allow	○	
	Deformed		○	
	Print mistake		○	
	Cushion damaged		○	
Label	No label	No allow	○	
	Invert label			○
	Broken			○
	Dirt	Word can be read.		○
	Not clear			○
	Word out of shape		○	
	Mistake	No allow	○	
	Position	Be attached on right position	○	
Solder	Appearance	Can't see the abnormal color, shape, hurt, dirt (fused goods, etc.). If it is necessary, please prepare sample.	○	
Screw	Missing	No	○	
	Loose	No	○	
	Screw stripe damaged	Can be screwed up		○

Disassembly/Assembly

Exploded View



PART NO	REV	SYMBOL	DESCRIPTION	LOCATED	REASON	SIGN	DATE
6K.J2C04.001	A	/	FIRST RELEASE	/	/	JACKY CHAO	

NO	P/N	DESCRIPTION	Q'TY	VENDOR
1	3J.J2C01.001	CASE UPPER MP611	1	SEIWA(CHINA)
2	4B.J2C14.001	FUNCTION BUTTON	1	SEIWA(CHINA)
3	4B.J2C13.001	KEY MODE MP611	1	SEIWA(CHINA)
4	4G.J2C12.001	SPONGE LENS LED	1	SUN YIEH
5	4G.J2C11.001	SPONGE UC MP611	2	SUN YIEH

FIG(A)

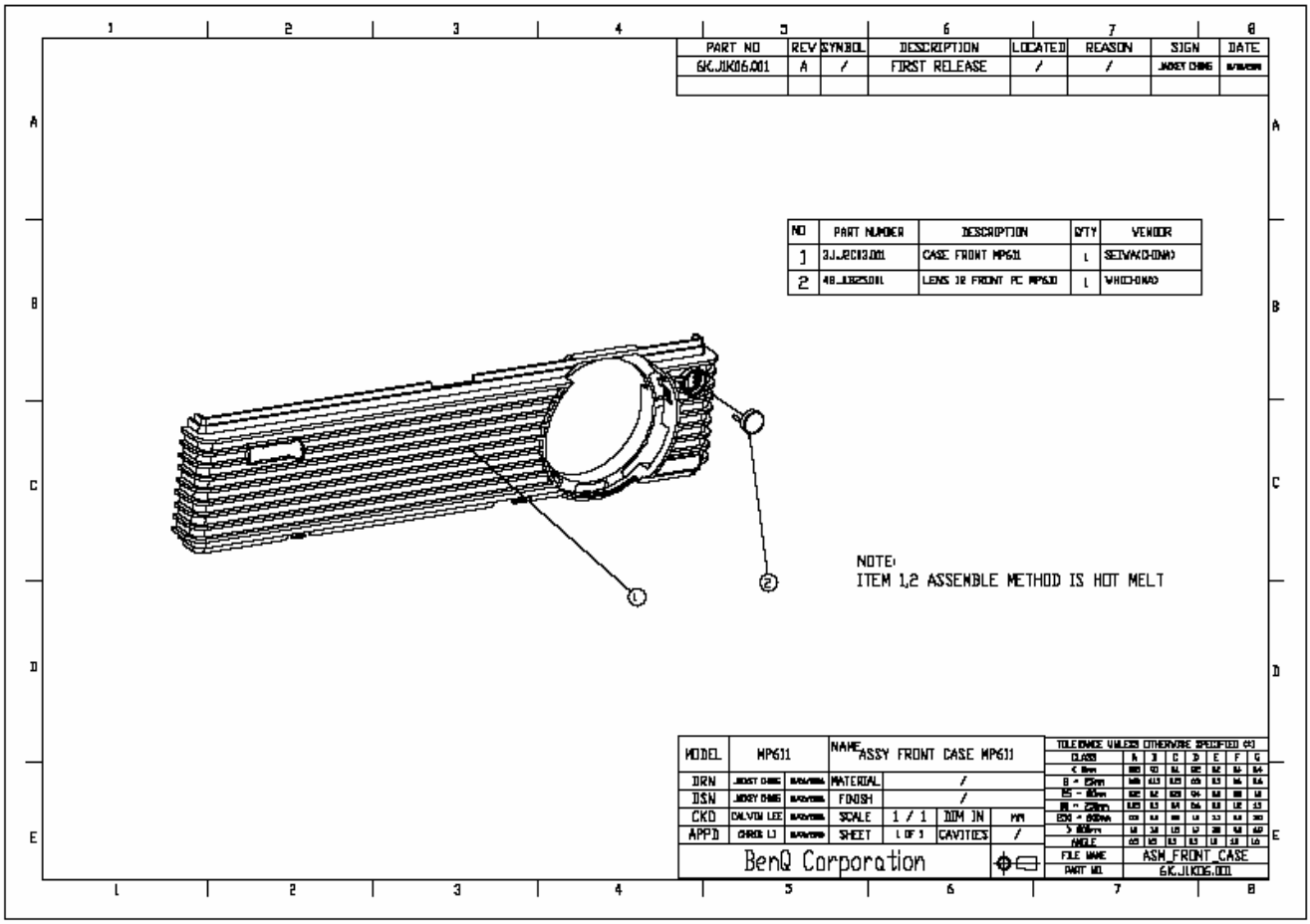
NOTE:
1. ITEM 1,2,3 ASSEMBLE METHOD IS HOT MELT.
2. ITEM 4,5 ASSEMBLE IS DOUBLE ADHESIVE.
3. ITEM 5 ASSEMBLE POSITION IS FIG(A)

MODEL	MP611	NAME	ASSY UC MP611
DRN	JACKY CHAO	MATERIAL	/
DSN	JACKY CHAO	FINISH	/
CKD	CALVIN LEE	SCALE	1 / 1
APPD	CHRIS LI	SHEET	1 OF 1

DIM IN: MM
CAVITIES: /

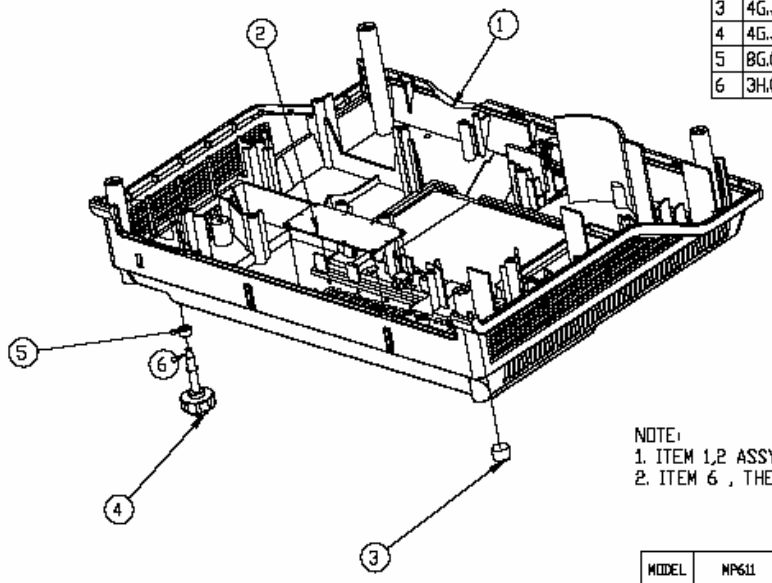
BenQ Corporation

TOLERANCE UNLESS OTHERWISE SPECIFIED (JIS)						
CLASS	A	B	C	D	E	F
FILE NAME	ASSY UC MP611					
PART NO.	6K.J2C04.001					



PART NO	REV	SYMBOL	DESCRIPTION	LOCATED	REASON	SIGN	DATE
6K.J2C12.001	A	/	FIRST RELEASE	/	/	JACKY CHAO	

NO	P/N	DESC.	Q'TY	VENDOR
1	3J.J2C02.001	CASE LOWER MP611	1	SEIWA
2	3D.J2C23.001	MESH SPCC MP611	1	CHI LI
3	4G.J1B02.001	PAD REAR FOOT	1	PMP
4	4G.J1B03.001	FOOT REAR ADJ	1	PMP
5	8G.00020.423	NUT HEX+WASHER	1	HNS
6	3H.01076.001	GLUE BB3005	0.002	SUNNICO

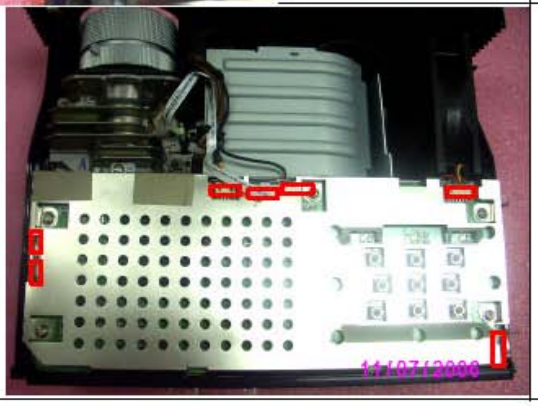


NOTE:
1. ITEM 1,2 ASSY METHOD IS HOT MELT.
2. ITEM 6 , THE ARROW DIRECTION IS GLUE(BB-3005) POSITION

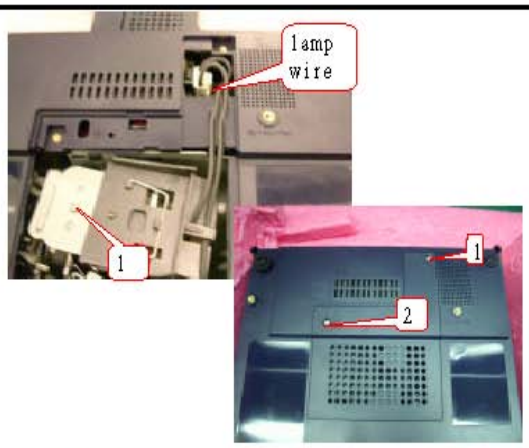
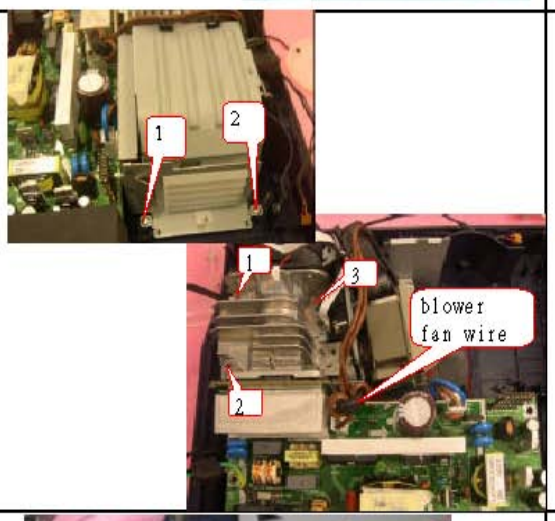
MODEL	MP611		NAME	ASSY LC MP611		
DRN	JACKY CHAO		MATERIAL	/		
DSN	JACKY CHAO		FINISH	/		
DKD	CALVIN LEE		SCALE	1 / 1	DIM IN	mm
APPD	CHRIS LI		SHEET	1 OF 1	CAVITIES	/
BenQ Corporation						

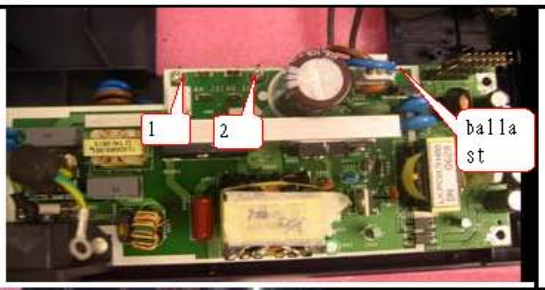
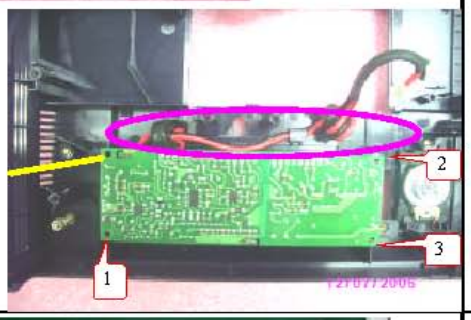
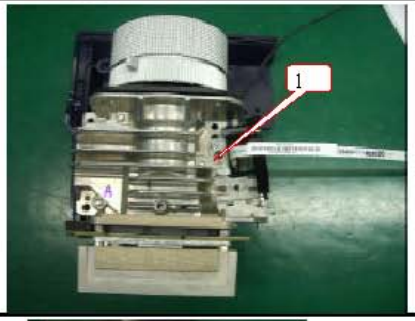
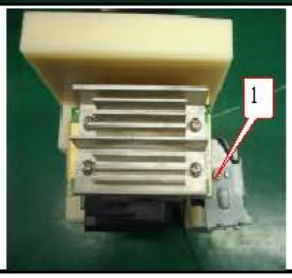
TOLERANCE UNLESS OTHERWISE SPECIFIED =>						
CLASS	A	B	C	D	E	F	G
FILE NAME	ASSY LC MP611						
PART NO.	6K.J2C12.001						

Disassembly / Assembly

MP611 Dismantle SOP				
Item	Operation	Tool	Picture	Note
1	unlock rear case screw*8	screw driver		
2	unlock upcase screw*4 and take off the upcase and the rear case	screw driver		
3	disassembly the IR wire and front case			
4	disassembly the 7 pcs wire			

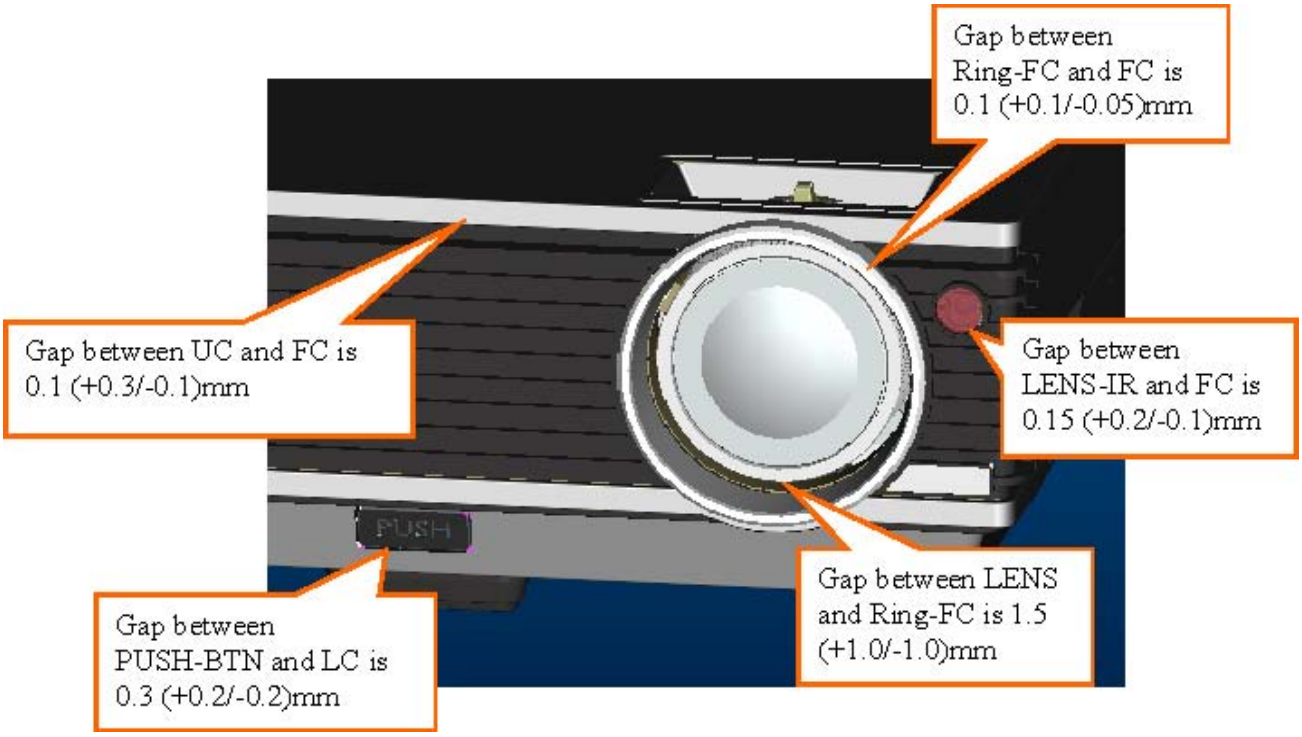
5	unlock screw*5 and take off main B/D shielding	screw driver		
6	take off the main B/D			
7	unlock the power B/D shielding screw*6 and take off the power B/D shielding	screw driver		
8	take off the double fan			

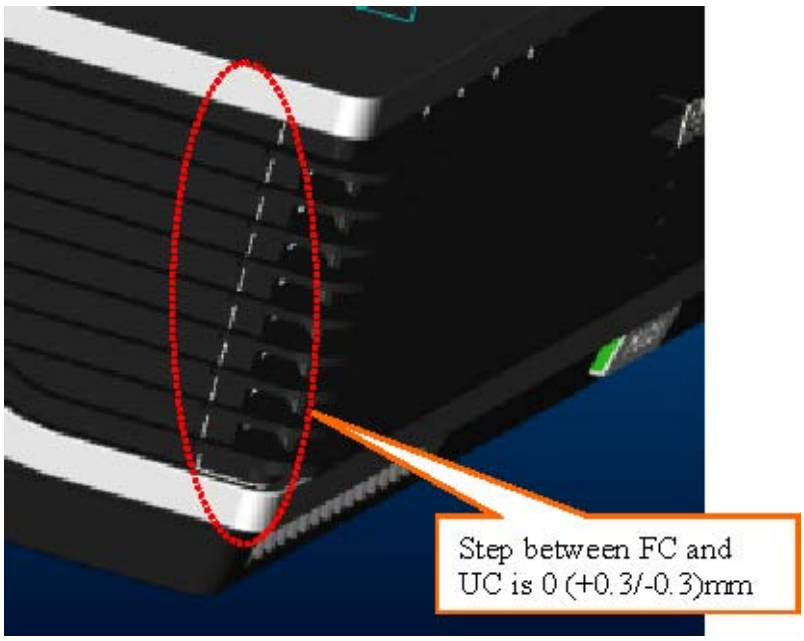
9	disassembly the screw*2 and take off the lamp door,disassembly the screw*1 and the lamp wire,take off the lamp moudle	screw driver		
10	disassembly the screw*2 and take off the lamp box,disassembly the screw*3,take off the optical engine module.And disassembly the blower fan wire.	screw driver		
11	disassembly the screw*2 and take off the blower fan and the small sheet iron .	screw driver		

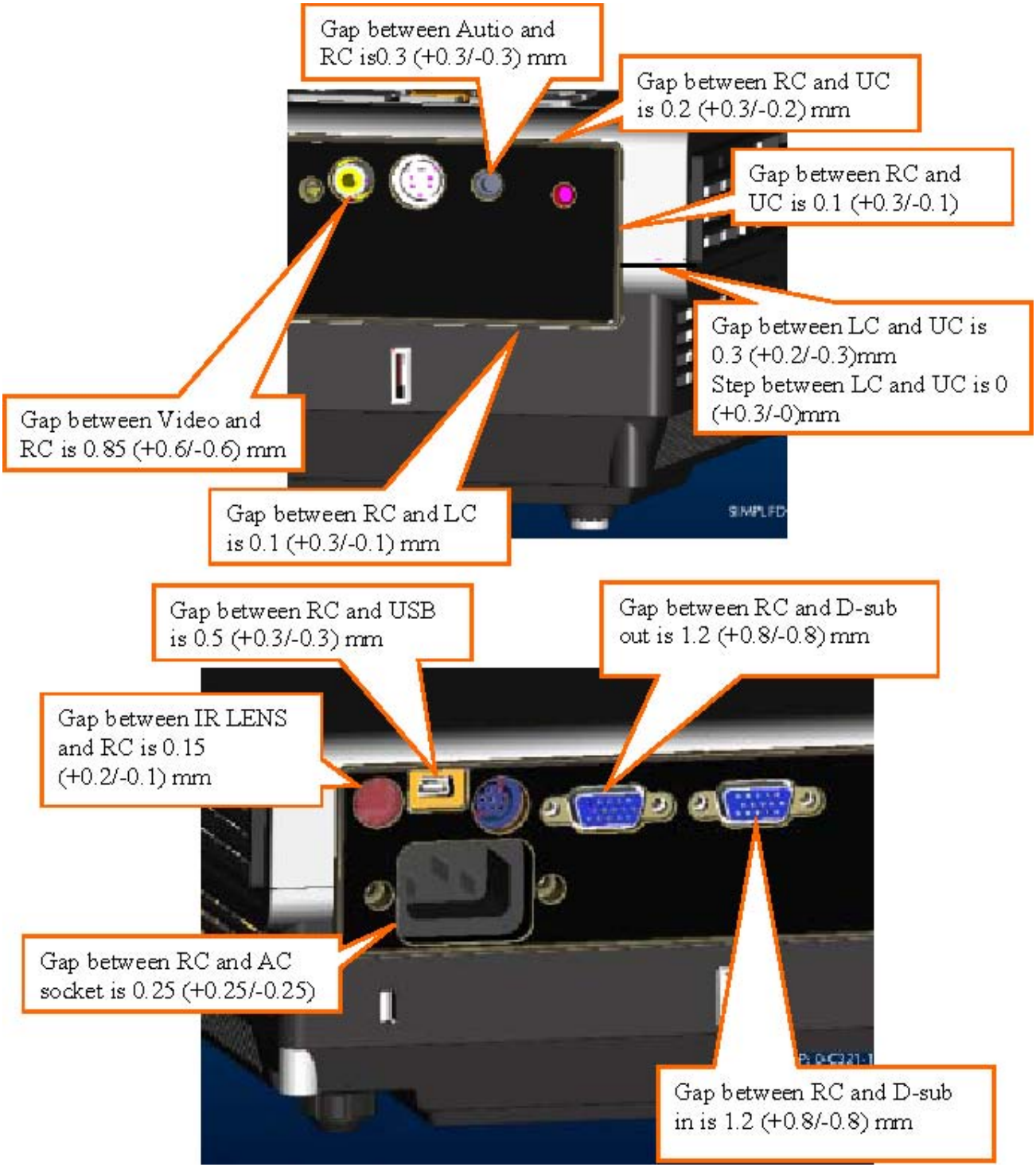
12	disassembly the screw*2 and the ballast wire and take off the power B/D.	screw driver		
13	disassembly the ballast mylar.Disassembly the screw*3 and take off the ballast	screw driver	 	
14	disassembly the screw*1 and take off the C/W module.	screw driver		
15	disassembly the screw*1 and take off the C/W shielding.	screw driver		

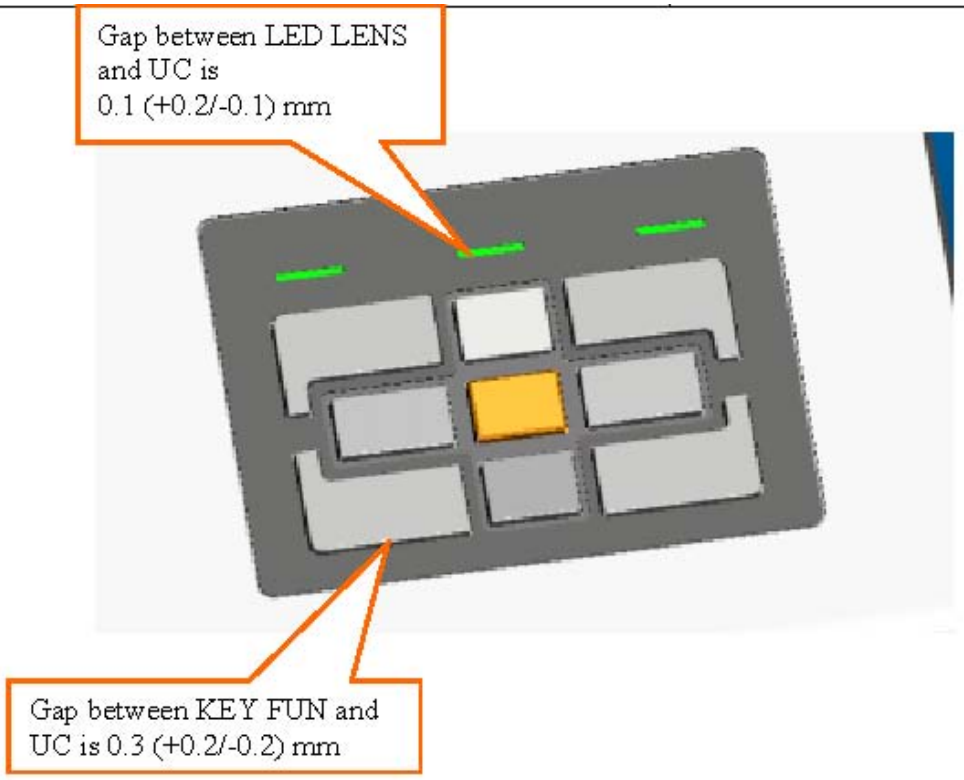
Level 1 Cosmetic / Appearance / Alignment Service

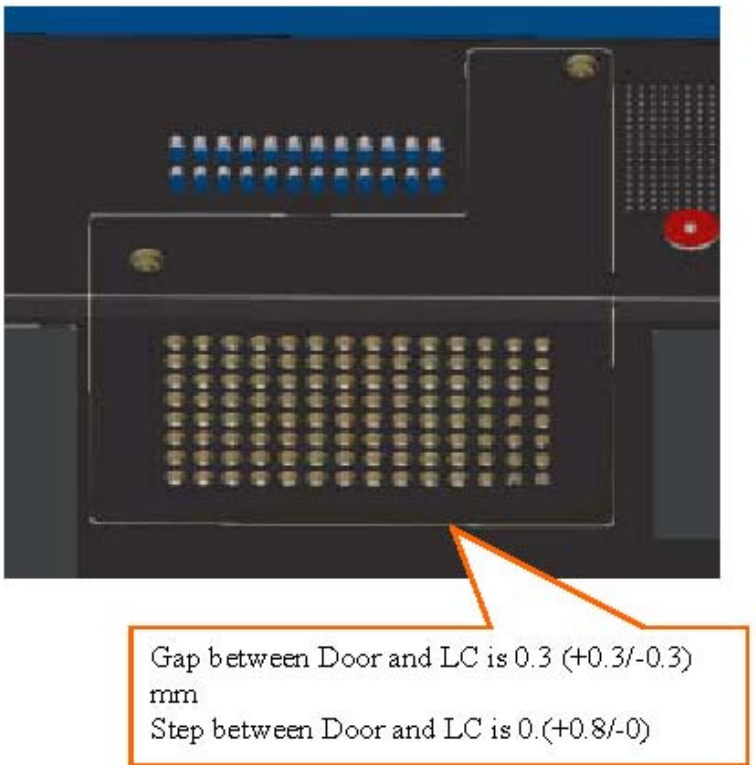
Appearance




Step between FC and
UC is 0 (+0.3/-0.3)mm


Gap between Autio and RC is0.3 (+0.3/-0.3) mm
Gap between RC and UC is 0.2 (+0.3/-0.2) mm
Gap between RC and UC is 0.1 (+0.3/-0.1)
Gap between LC and UC is 0.3 (+0.2/-0.3)mm
Step between LC and UC is 0 (+0.3/-0)mm
Gap between Video and RC is 0.85 (+0.6/-0.6) mm
Gap between RC and LC is 0.1 (+0.3/-0.1) mm
Gap between RC and USB is 0.5 (+0.3/-0.3) mm
Gap between RC and D-sub out is 1.2 (+0.8/-0.8) mm
Gap between IR LENS and RC is 0.15 (+0.2/-0.1) mm
Gap between RC and AC socket is 0.25 (+0.25/-0.25)
Gap between RC and D-sub in is 1.2 (+0.8/-0.8) mm


Gap between LED LENS and UC is 0.1 (+0.2/-0.1) mm
Gap between KEY FUN and UC is 0.3 (+0.2/-0.2) mm


Gap between Door and LC is 0.3 (+0.3/-0.3) mm
Step between Door and LC is 0.(+0.8/-0)

Software/Firmware Upgrade Process

How to Download and How to enter Factory mode

How to download

Hardware required

1 Standard USB Download cable (P/N 50.73213.501)

2 Personal computer or laptop computer

Software required

1 DDP2000 Composer lite

2 New version FW

DDP2000 Composer lite install procedure

Installation Location

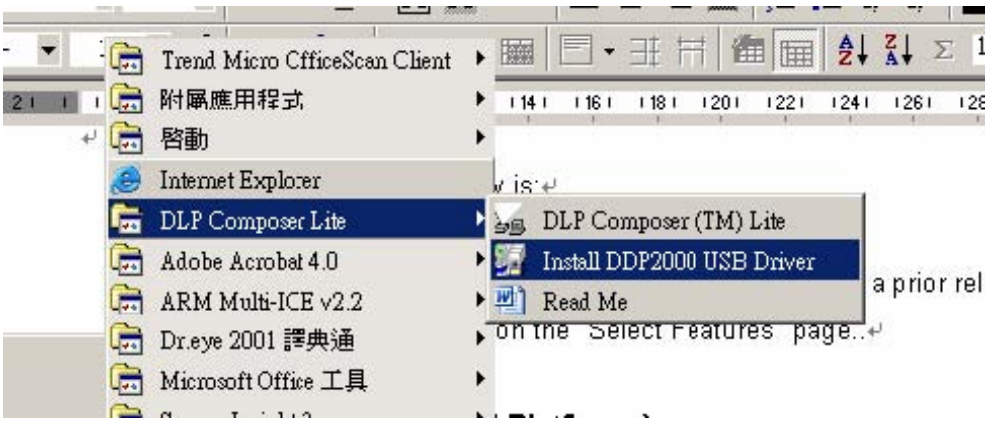
The default installation directory is:

C:\Program Files\DLP Composer Lite

If you want to install to a different directory (perhaps alongside a prior release of DLP Composer™ Lite), click the "Browse" button on the "Select Features" page..

USB Support - Installation (All Platforms)

This release includes support for a USB communications interface to DDP2000-based projectors. The setup program includes the files needed to install USB support (for Win98/WinMe/Win2K/WinXP only -- Win95 and WinNT are *not supported*). After DLP Composer™ Lite is installed, to install the USB support, choose the "Install DDP2000 USB Driver" icon under "DLP Composer™ Lite" in your ***Start*** menu.



USB Support - Win98/WinMe Only Installation on Windows 98 or Windows Me may prompt "Please insert the disk labeled 'DLP Composer Installation Directory', and then click OK". This message may be safely ignored by **clicking the OK button**. Another prompt will then appear: "The file 'windrvr6.sys' on DLP Composer Installation Directory cannot be found". Again, **click OK** and the installation proceeds without further problems.

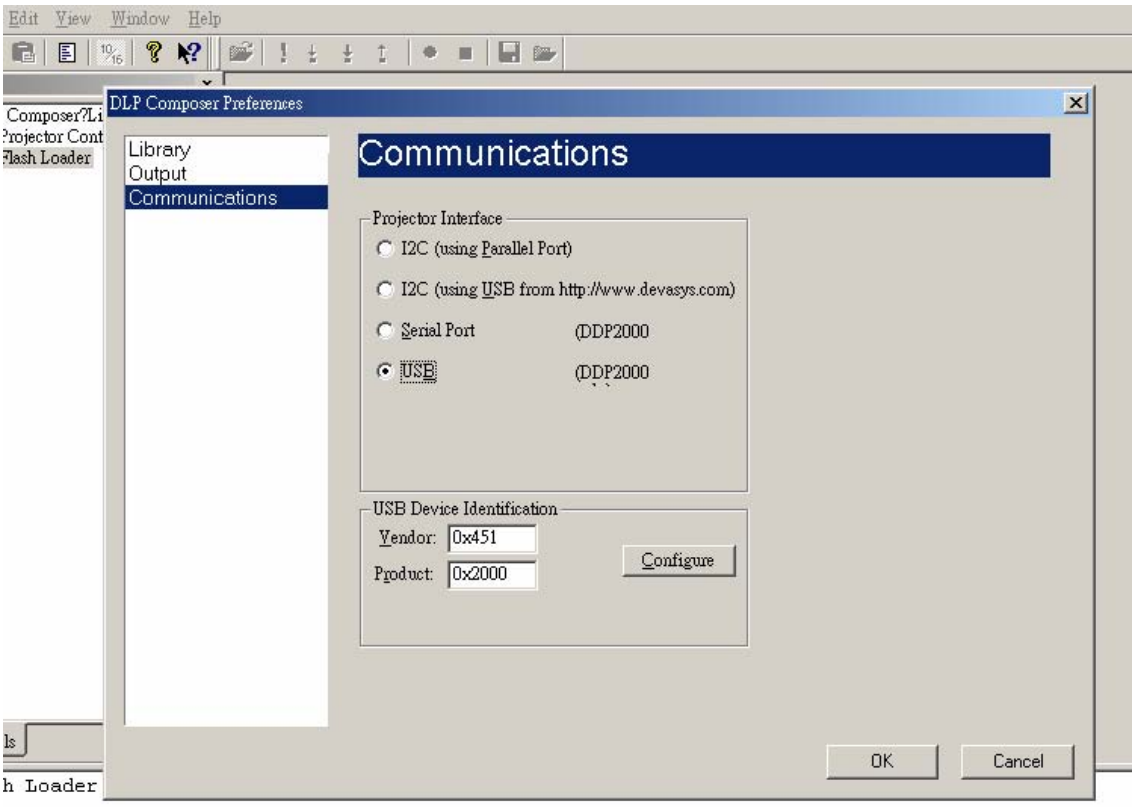
USB Support - Using a projector for the first time

After installation is complete, and you plug a DDP2000-based projector into USB for the first time, Windows will run the "*New Hardware Wizard*". When the wizard prompts to find the necessary drivers, accept the recommended choice (let the system find the driver for you) and click "Next" to complete the installation.

Note: The Windows 98/Me "New Hardware Wizard" may not automatically find the driver. You should use the "Advanced" option, and enter the directory where the DLP Composer™ Lite Tool Suite was installed (normally "C:\Program Files\DLP Composer Lite"). The wizard will find the file "DDP2000.inf" and complete the installation.

USB Support - Choosing the USB interface

To select the USB communications interface, choose "Preferences" from the "Edit" menu, click the "Communications" page and choose "USB (DDP2000 Only)". You can now use DLP Composer™ Lite to communicate with a DDP2000-based projector via USB using the Flash Loader tool.



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Download procedure

1 Click on Flash Loader and browse the image file (new version firmware)

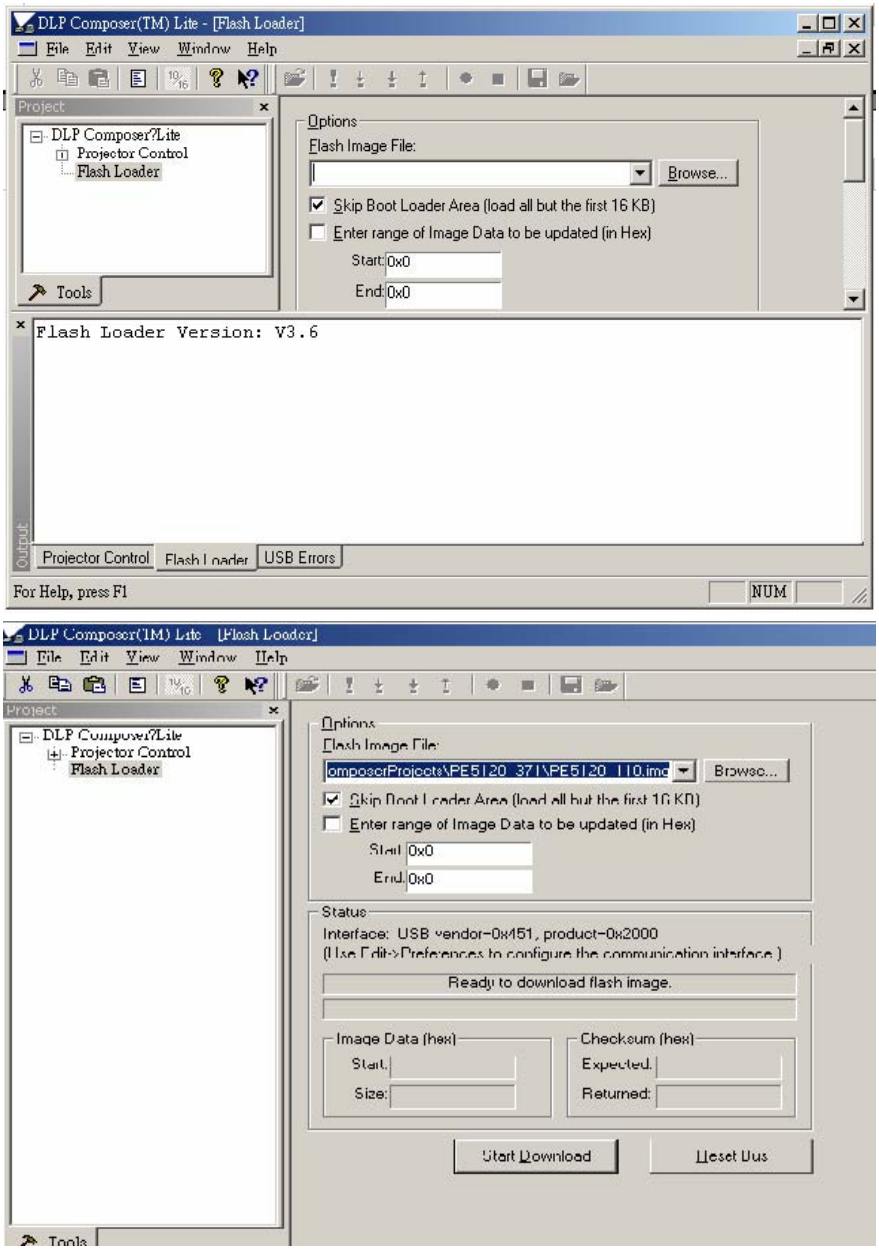
2 Make sure to check “Skip Boot loader area (load all but the first 16KB)”

3 Plug power cord into projector

4 Press “**UP+SOURCE+AUTO**” simultaneously on keypad, the projector LAMP LED would lite on

5 Plug in USB cable between computer and projector side

6 Press start download to begin update new firmware



1 Wait till composer lit notice upgrade completed

2 Download is completed. The factory settings should be restored.

How to enter Factory mode

1 Press “up key” until lamp information appear.

2 Press “Source key” and “Blank key”simultaneously , then enter the Factory area.

Adjustment / Alignment Procedure

1. DMD Bias Voltage Alignment

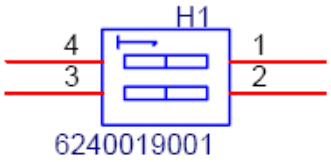
Equipment:

-None

Procedure:

1 Watch DMD chip Label (Example: 9477000 0234B)

2 Switch the DIP switch on DMD board according to the red character on the DMD chip



BINSEL1	BINSEL0	DMD Bin	Direction
0	0	B	
0	1	C	
1	0	D	
1	1	E	

2. Color Wheel Delay Alignment

Equipment: -Battery Biased Silicon PIN Detector -Oscilloscope (Vertical scale set to 10mV) -Probe

Procedure:

1 Probe impedance matches 50 ohm

2 Open Factory OSD, and select color wheel delay item

3 Leave the image pure blue (DMD blue curtain)

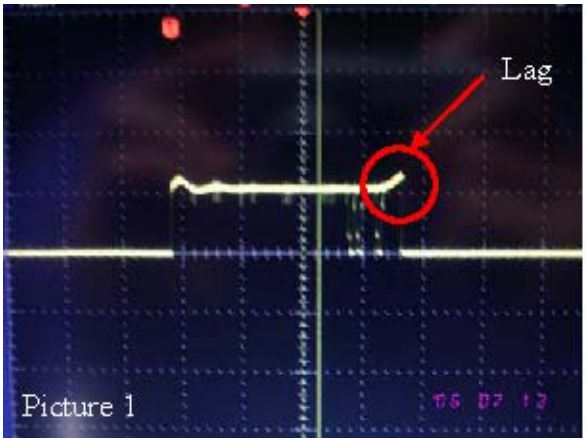
4 Put the detector on the screen that blue image was projected.

5 Watch the oscilloscope and notice the square waveform

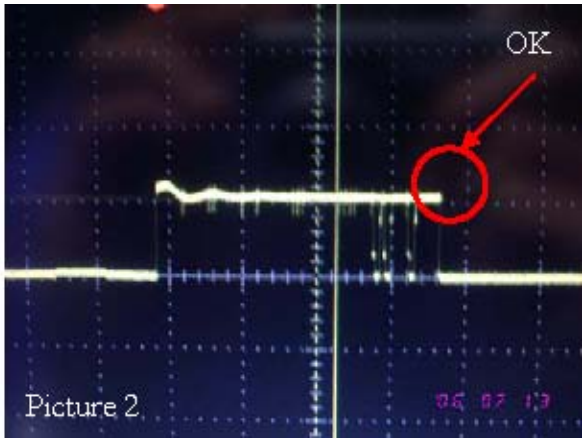
6 Use the “ ” and “ ” key to increment or decrement the color wheel delay value

7 No matter the waveform is square or not, let the waveform was lagged first.(see picture 1)

8 Then increment or decrement the value to let the waveform just to be square.(see picture 2)

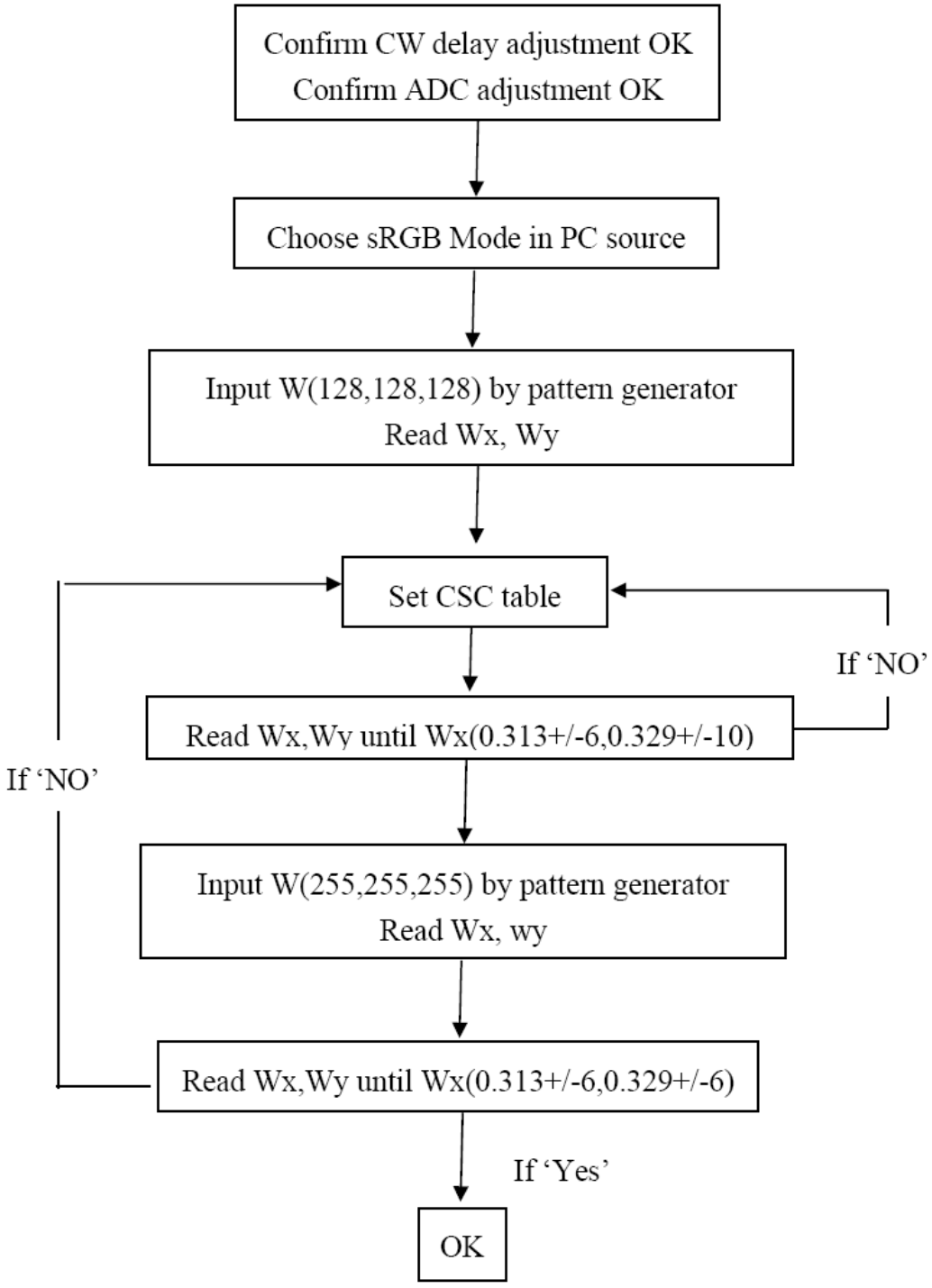


Picture 1



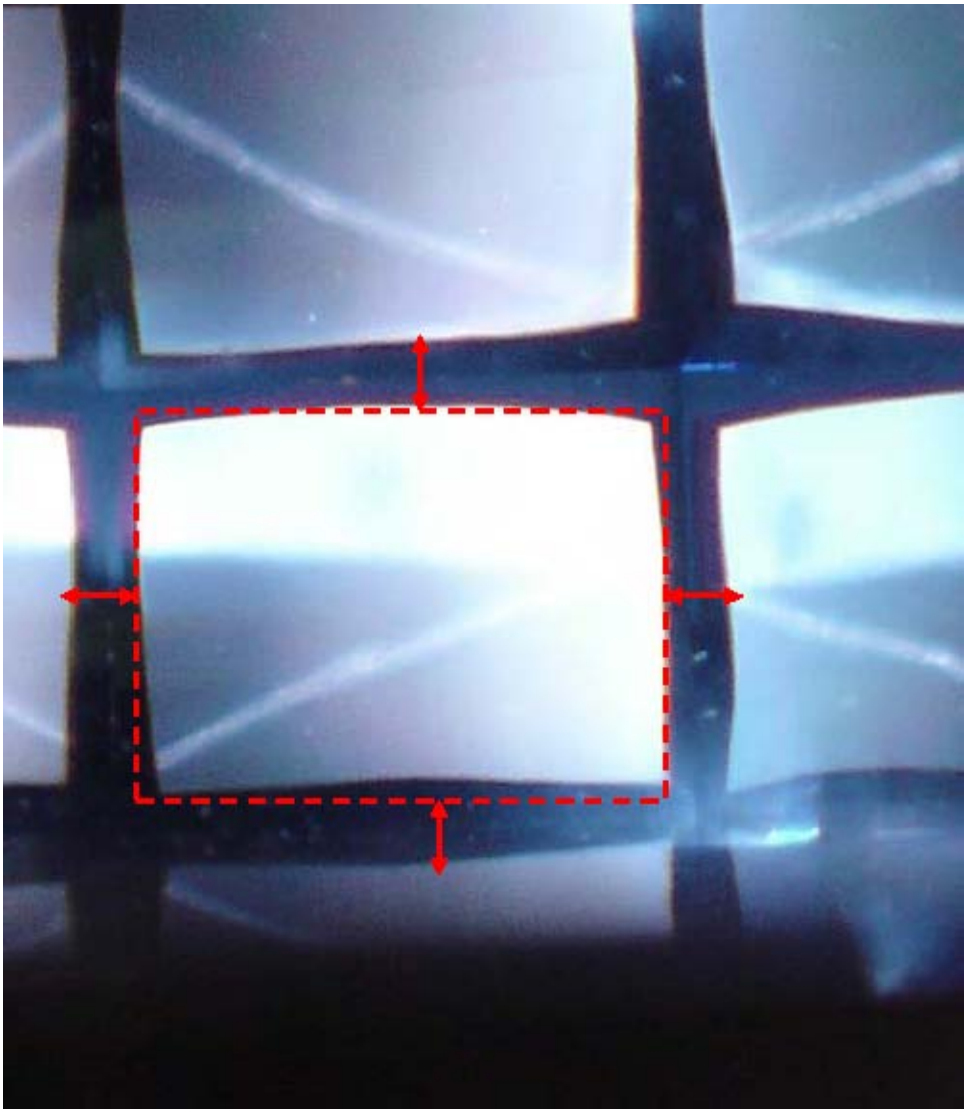
Picture 2

3.sRGB Mode alignment procedure,Overfill adjustment And Burn-In setting



Overfill adjustment

As the picture below, adjust light pipe to keep overfill image center.



Burn-In setting

Burn-In On Minute 210

Burn-In Off Minute 30

4. Formatter board check procedure

Equipment:

-Pattern

generator

Procedure:

1 Connect power, D-sub, into projector.

2 Light on projector.

3. Testing below patterns and resolution is 1024*768@60Hz (XGA); 800*600@60Hz (SVGA)

(1) General-1 pattern. (Pattern 1)

(2) 32 grays pattern. (Pattern 48)

(3) White pattern. (Pattern 41)

(4) SMPTE pattern. (Pattern 5)

3 The formatter board would be note fail if above three image-quality is not good.

4 Test the connection between formatter board to keypad board and IR board.

5 The formatter board would be note fail if there are some wires is broken in formatter board.

5. DMD Panel Alignment

Equipment: -Pattern Generator

Procedure:

1 Connect power, Video signal into projector.

2 Light on projector

3 Change pattern generator to full white pattern.

4 Watch the image if any pixel lost

5 Change pattern to full black.

6 Watch the image if any pixel lost

7 Change pattern from full black to full white.

8 Watch the image if any pixel can not return

9 Change pattern from full black to full white.

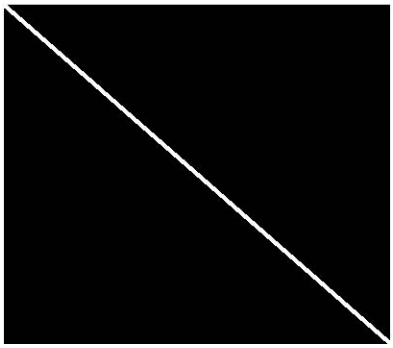
10 Watch the image if any pixel can not return

11 If above 8 step has some pixel lost or can not return, it's DMD chip has pixel defect

12 Change to the Slid Line pattern

13 Watch the image if any pixel lost

14. If above step has some pixel lost, it's conductive socket has defect or assembly loosed.



6. Optical Engine Assembly Procedure

1. Assembly Lamp module:

1.1 Baffle Lamp , Fin and Mesh Assembly

I. Assemble “Baffle lamp” with Lamp holder and alight screw holes with holder first. (Figure 1-1)。

II. Assemble “assembly of Fin_Mesh” on Baffle first and fasten the screw (Figure 1-2) 。

III. Hook “Mesh” on the Lamp Holder first and fasten the screw (Figure 1-3)。

IV. To make sure that “Assembly of Fin_Mesh” on the left side when you face to the Baffle (Figure 1-4) 。

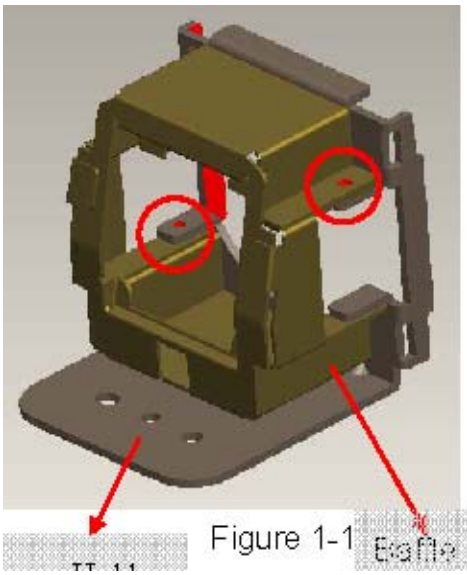


Figure 1-1

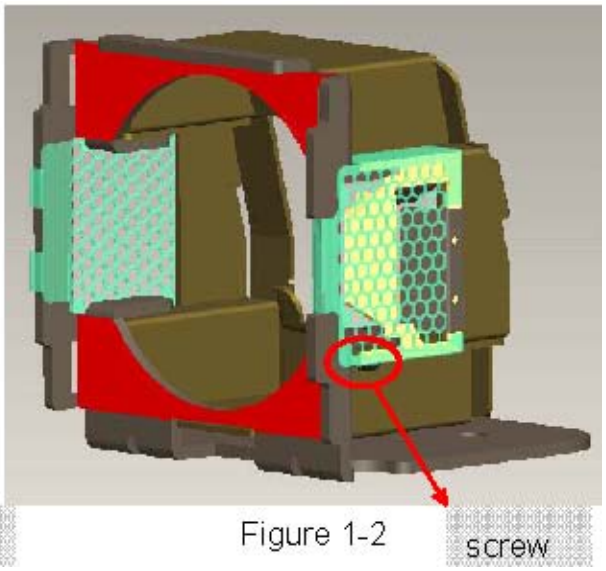


Figure 1-2

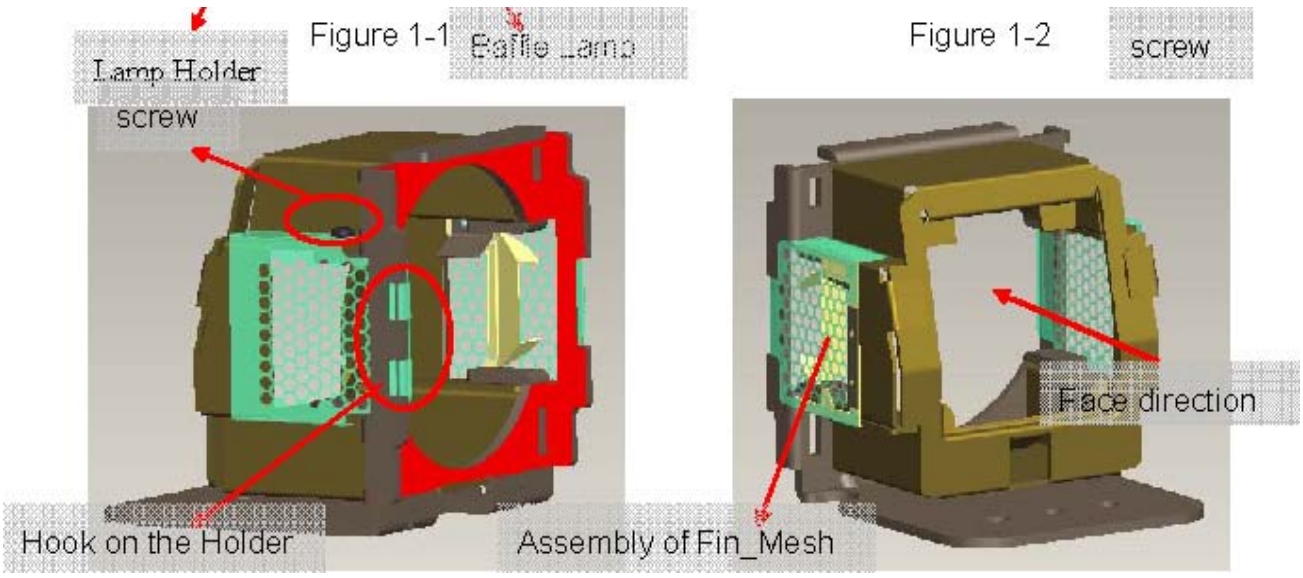


Figure 1-1 Figure 1-2

Figure 1-3 Figure 1-4

1.2 Front Glass Assembly.

i. Front Glass UV coated surface (marked) must face to Lamp. (Figure 1-5)

ii. F/G must be placed on datum surfaces well. (Figure 1-6)

iii. To make sure F/G Clip hooked well with Lamp Sleeve. (Figure 1-7)

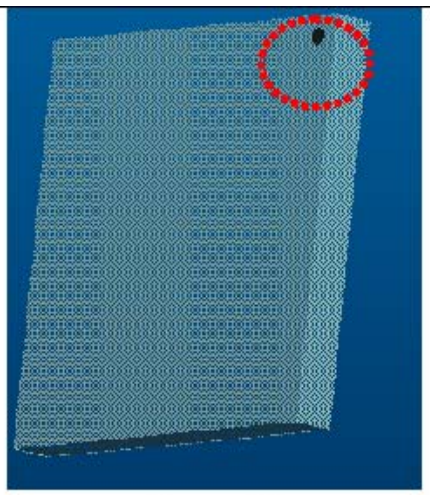


Figure 1-5

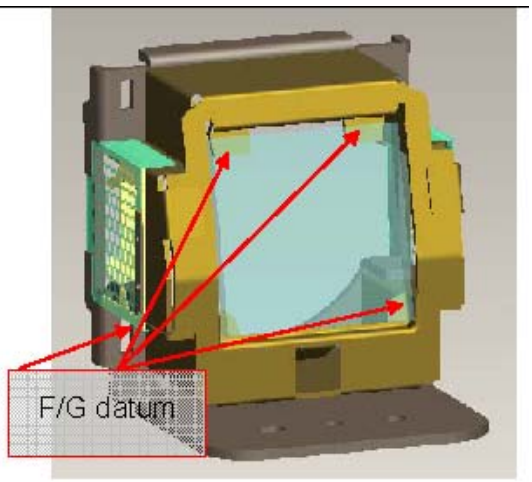


Figure 1-6

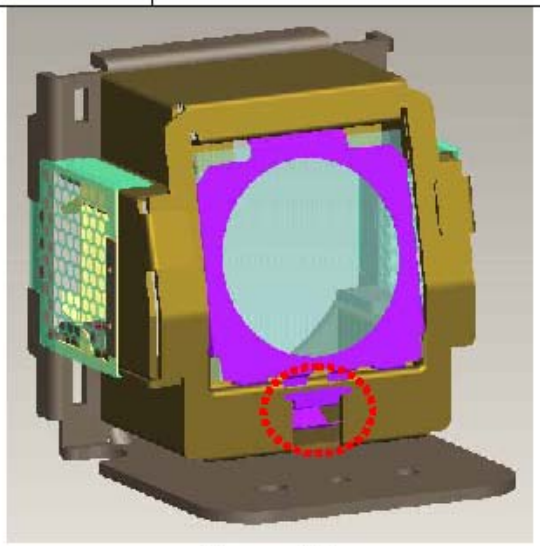


Figure 1-7

1.3 Lamp Assembly.

i. Insert Lamp into Lamp Holder and make three datum contact with the lamp (Figure1-8)

ii. Hook “Clip_UP” on the Lamp Holder first. (Figure 1-9)

iii.Hook “Clip_DOWN” on the Lamp Holder second. (Figure 1-10)

iv. Check assembly again and make sure the three datum contact with the lamp.

v. Assemble Lamp Wire to Lamp

vi. Assemble “Lamp_Plate” on the Holder and fasten the screw (Figure 1-11)

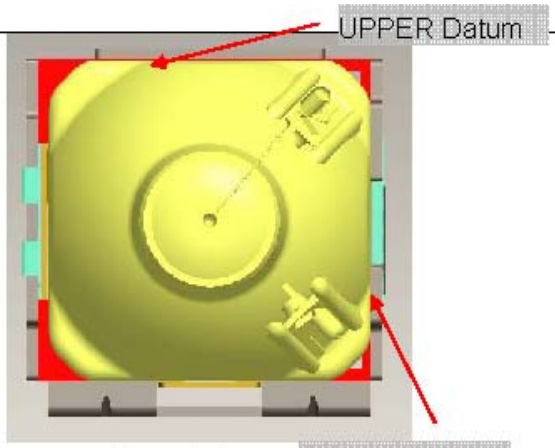


Figure1-8

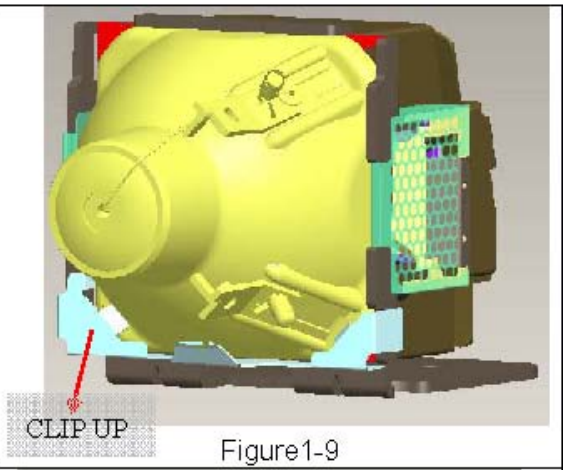


Figure1-9

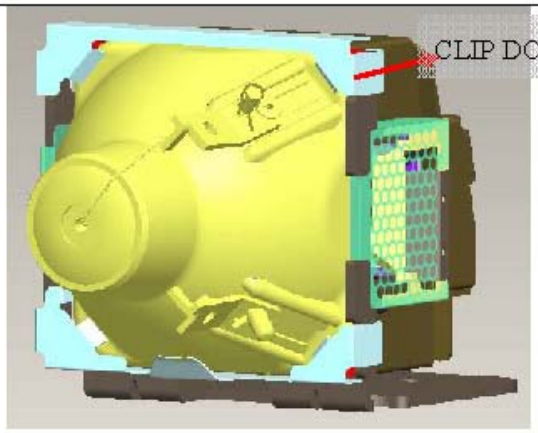


Figure1-10

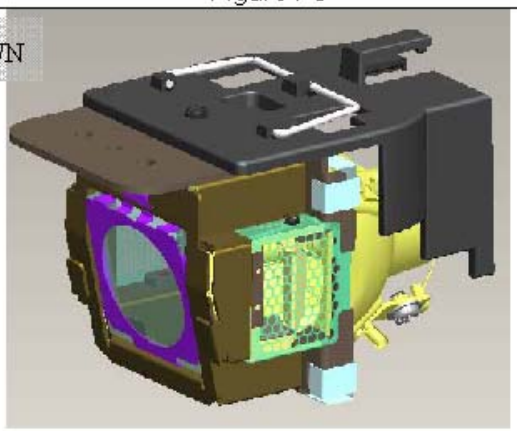


Figure1-11

1.4 Lamp Wire Arrangement The Lamp Wire arrangement have to look like the picture as blow (Figure 1-12&13)。

I. The under wire go through the wire saddle directly

II. The upper Wire have to detour the wall of Lamp_Plate first then go through wire saddle

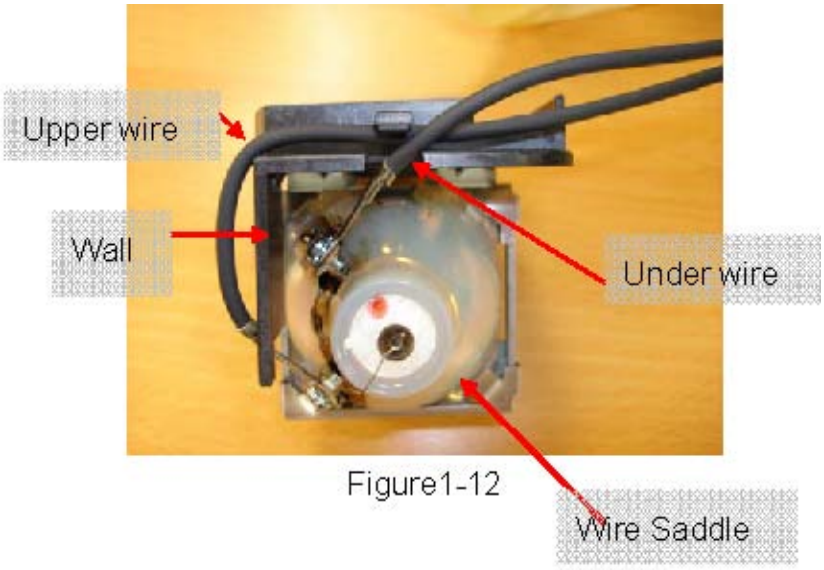


Figure1-12

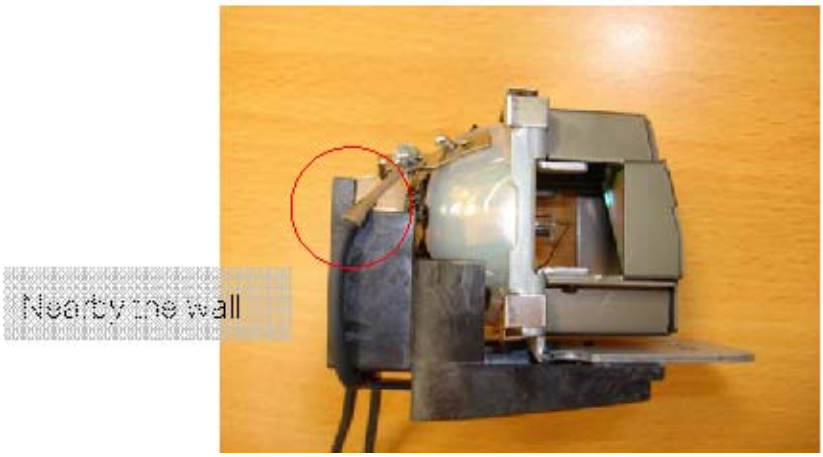
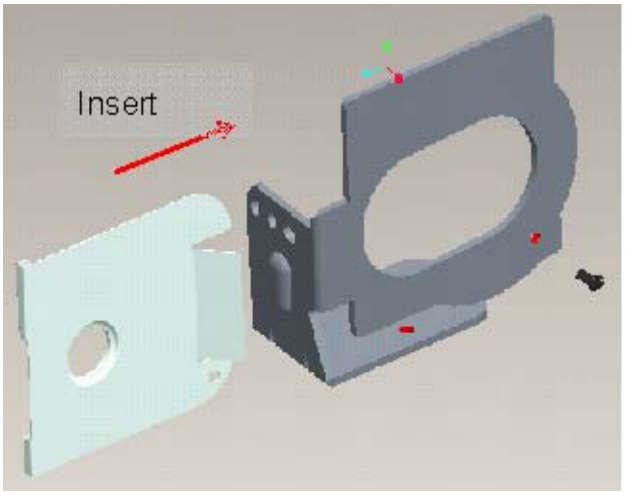


Figure1-13

2. BKT LINK Lamp and CW Shield Assembly

Insert CW Shield to BKT LINK Lamp and fasten screw (Figure 2-1,2-2)



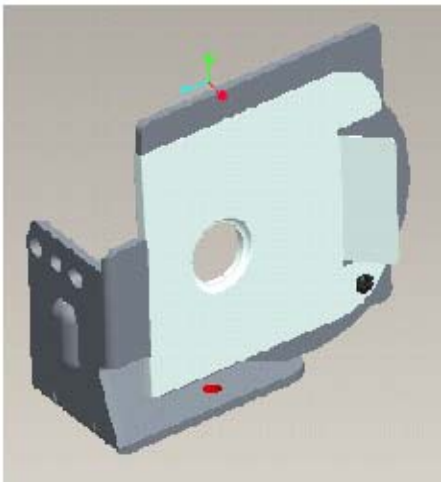
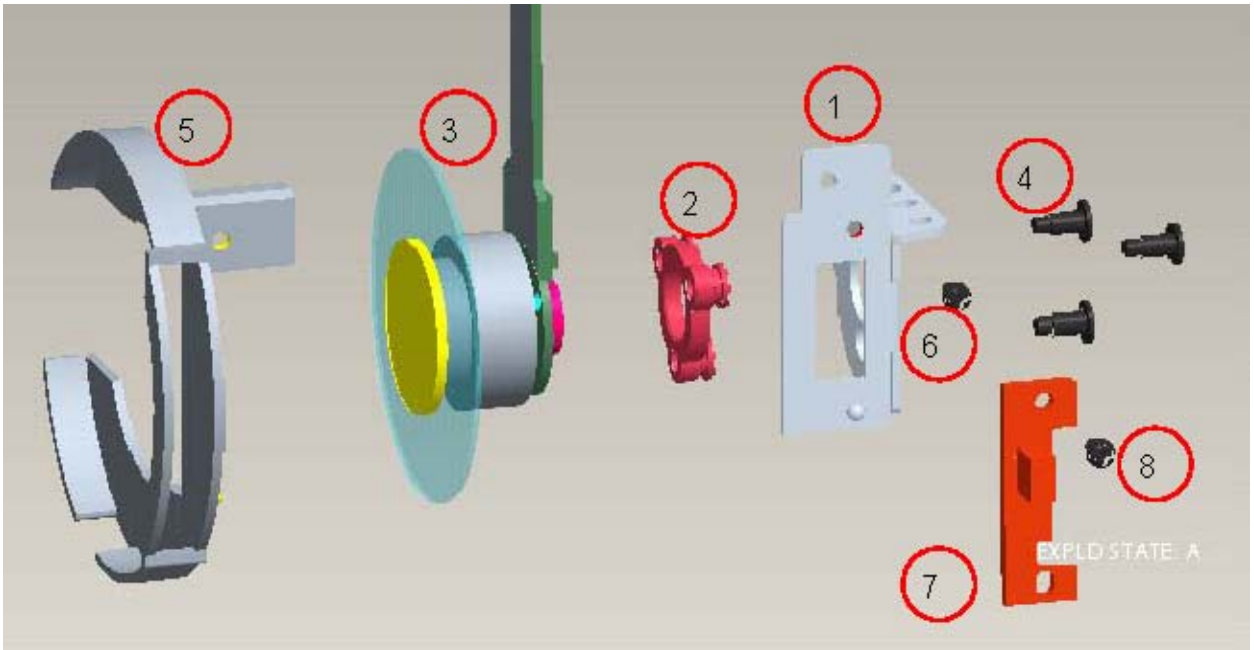


Figure 2-1 Figure 2-2

3.Assembly CW Module

2.1 CW Module Assembly Sequence as blow (Fig3-1):

(1) BKT CW (2) Damper CW (3)CW (4) Fixed screw (5) CVR CW
(6) M2 Screw (7)Sensor Board (8)M2 Screw



BenQ Corporation

Fig3-1

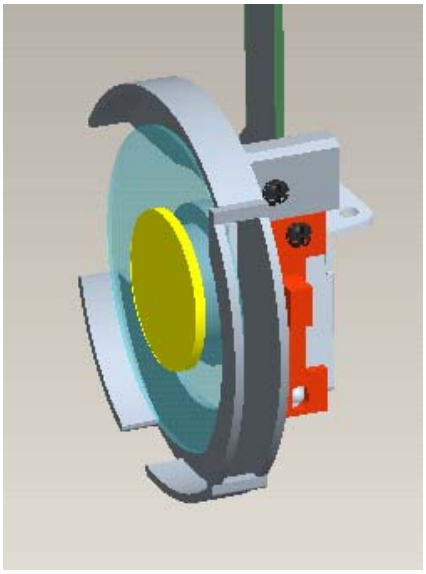


Fig3-2

4. Assembly LP Module

4.1 LP must datum well with “BKT_LP” show as Figure 4-1

4.2 Referring to Figure 4-2,there must be visible clearance between “BKT_LP” and ”LP opening” after assembly。

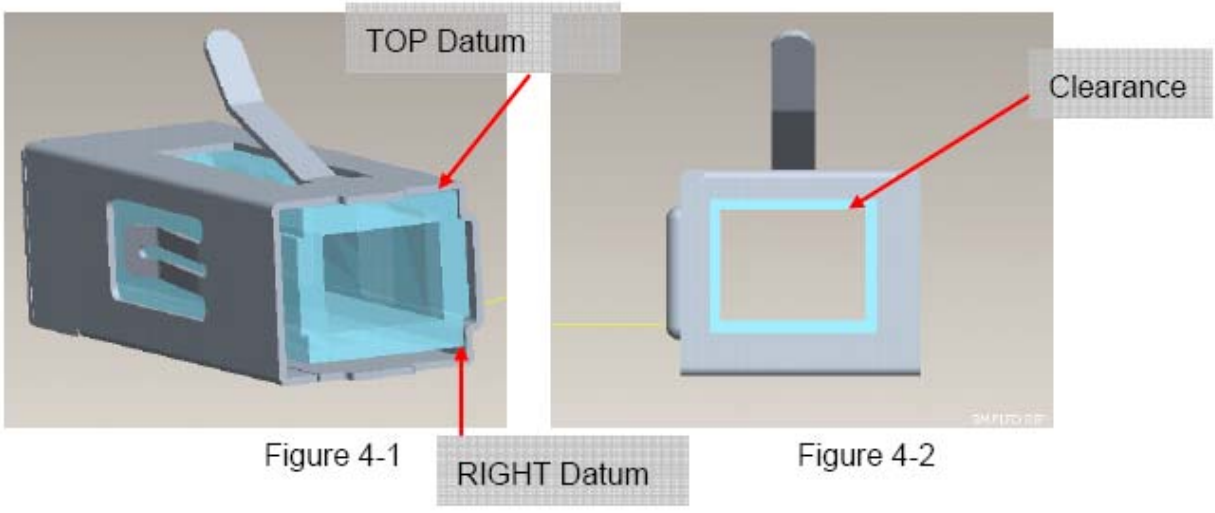


Figure 4-1 Figure 4-2

4.3 Glue “LP” and “BKT_LP” with “”UV5503 Glue” at two opening of “BKT_LP” show in Figure 4-3。

4.4 UV-5503 Glue curing process and concerns:

vii. The UV-glue must fill up the whole opening area (shown in Figure 4-3) to contact well with LP surfaces and BKT_LP.

viii. Exposed to visible light at 350 ~ 420nm(at least 100mW/cm2) wavelength for 20 seconds.

ix. After curing, the height of UV-glue should not exceed BKT_LP for more than 0.6mm

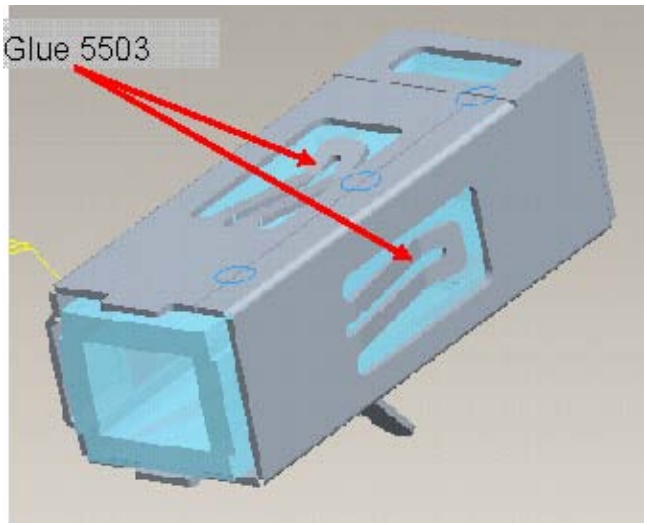


Figure 4-3

4.5 Assembly LP Module to HSG DMD

i. Assembly two Overfill adjustment screw (8F.1A752.8R0) to HSG DMD(Figure4-4) 。** Adjustment criteria refer to item 4.6.

ii. Insert CLIP of BKT_LP into the hole

iii. Placed LP Module on LP datum and adjustment screw well, shown (Figure 4-6) 。

iv. Assembly “Clip_LP” first (Figure 4-7)and make sure it hooks HSG DMD well

(Figure 4-9)。

v. Assembly “Baffle_LP” second (Figure 4-8)and make sure it hooks HSG DMD well。

~ Assembly Criteria was shown in Figure 4-8-2.

vi. Push two hook places to make sure that Baffle_LP touches “BKT_LP “well, don’t push the middle place of “Baffle_LP”。

4.6 Overfill Adjustment @ LP Module Overfill Adjustment Criteria:

For Overfill Re-adjustment:

1 Those 2 Adjustment Screws must be released closely to the “Pre-assembly” positions first. (defined in 4.6-i)

2 Follow adjustment steps shown in Item 4.6-ii.

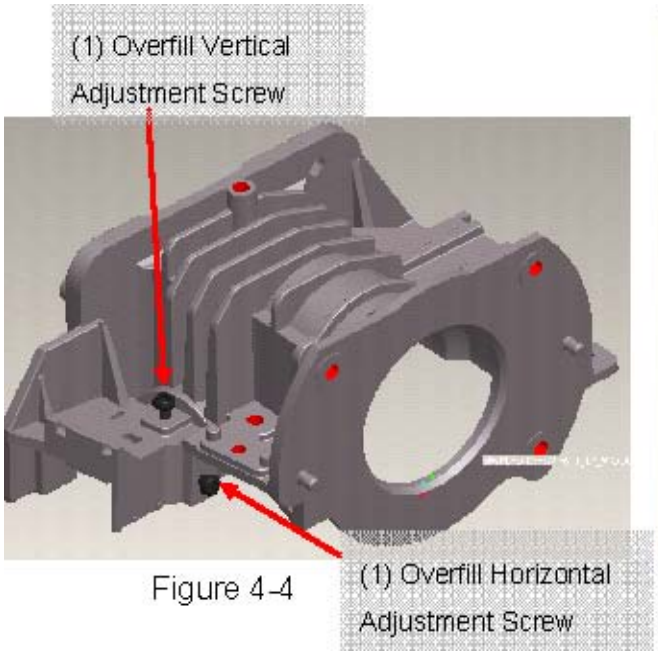


Figure 4-4

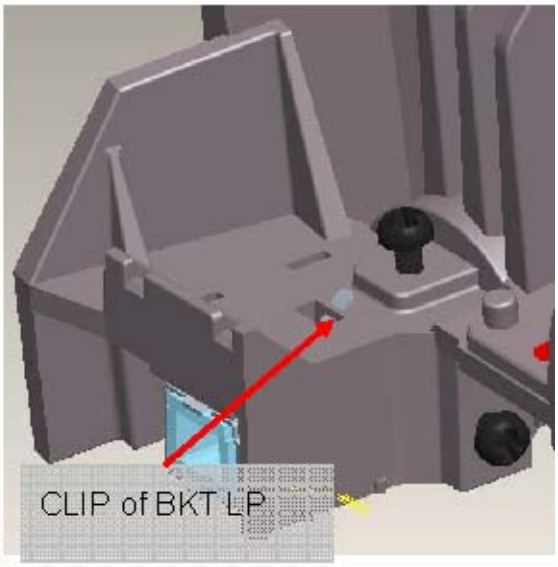


Figure 4-5

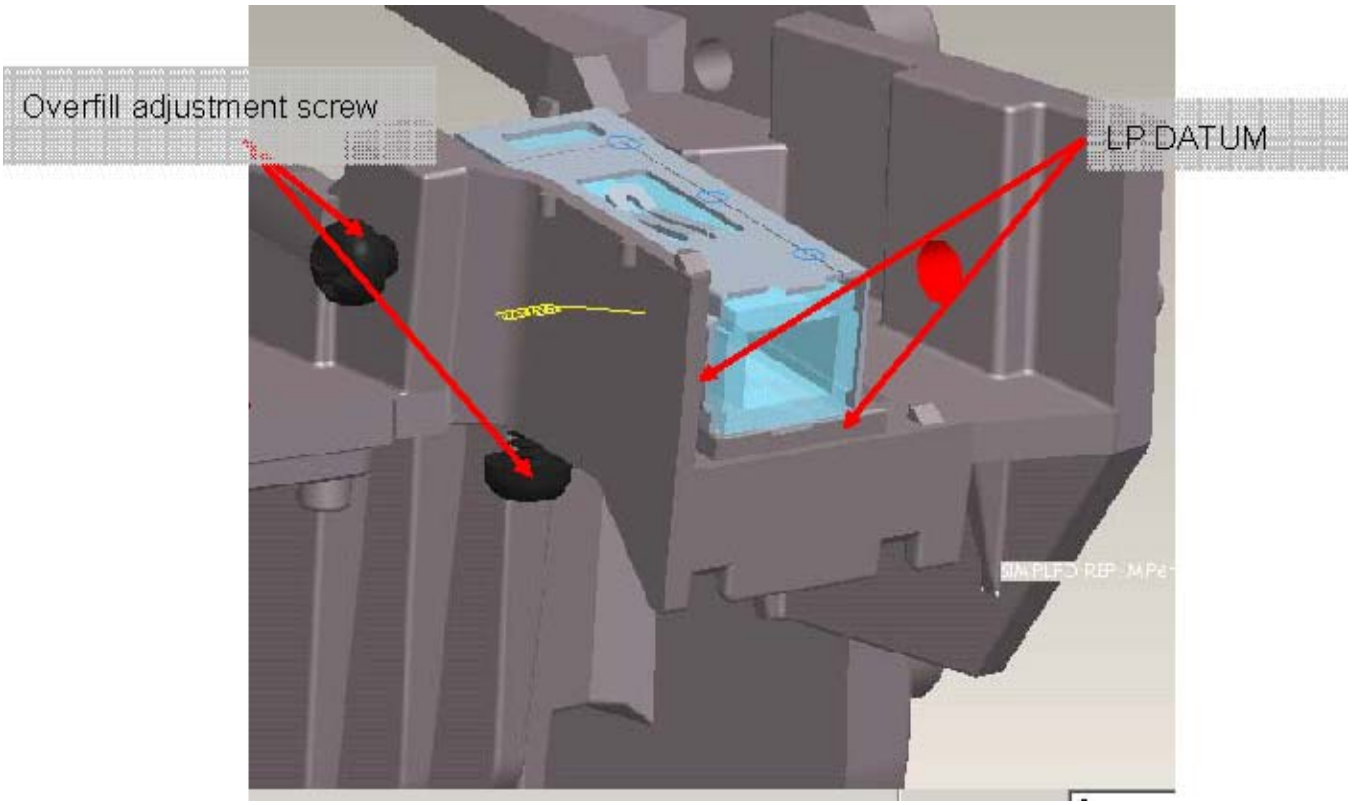


Figure 4-6 Figure 4-9

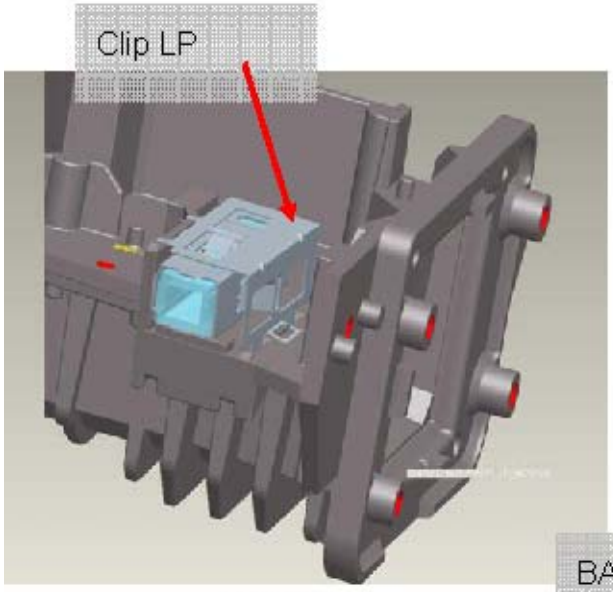


Figure 4-7

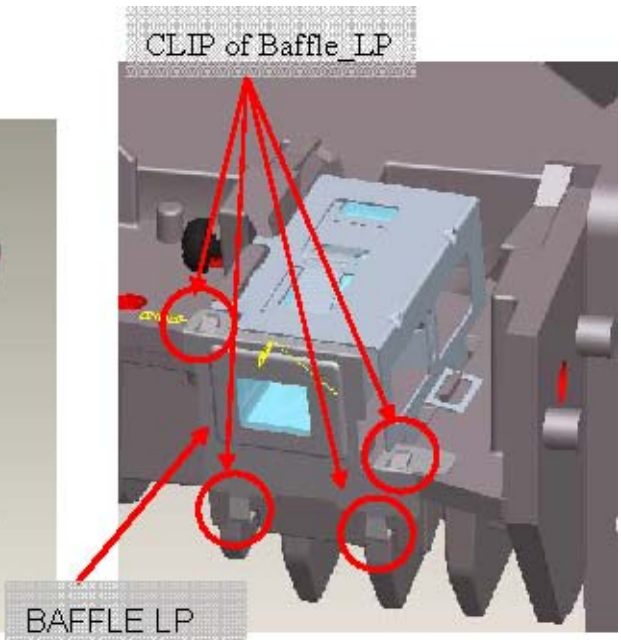


Figure 4-8(1)

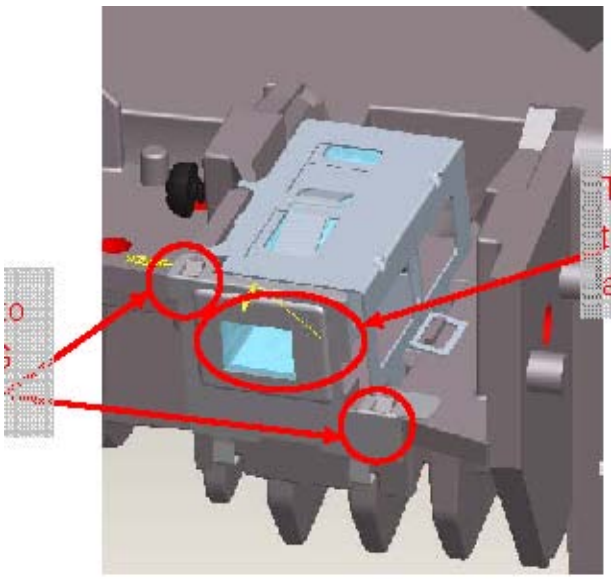


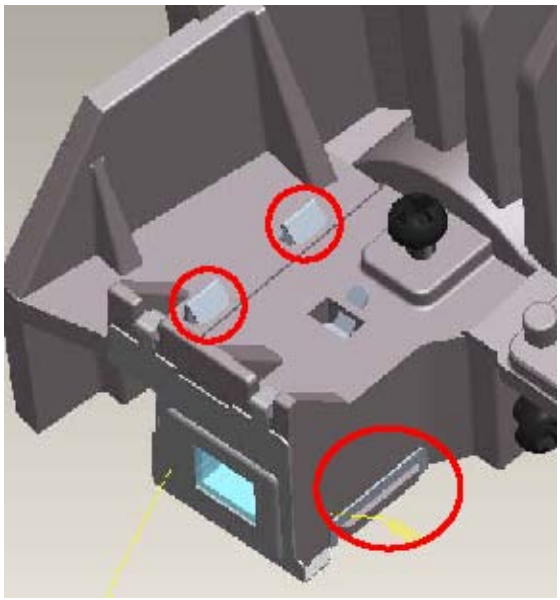
Figure 4-8(2)

This area is not allowed to be pressed while assembling Baffle LP.

This area is not allowed to be pressed while assembling Baffle LP.

Press on these areas to ensure clip hooks HSG DMD well.

Press on these areas to ensure clip hooks HSG DMD well.



(1) Overfill Horizontal Adjustment Screw

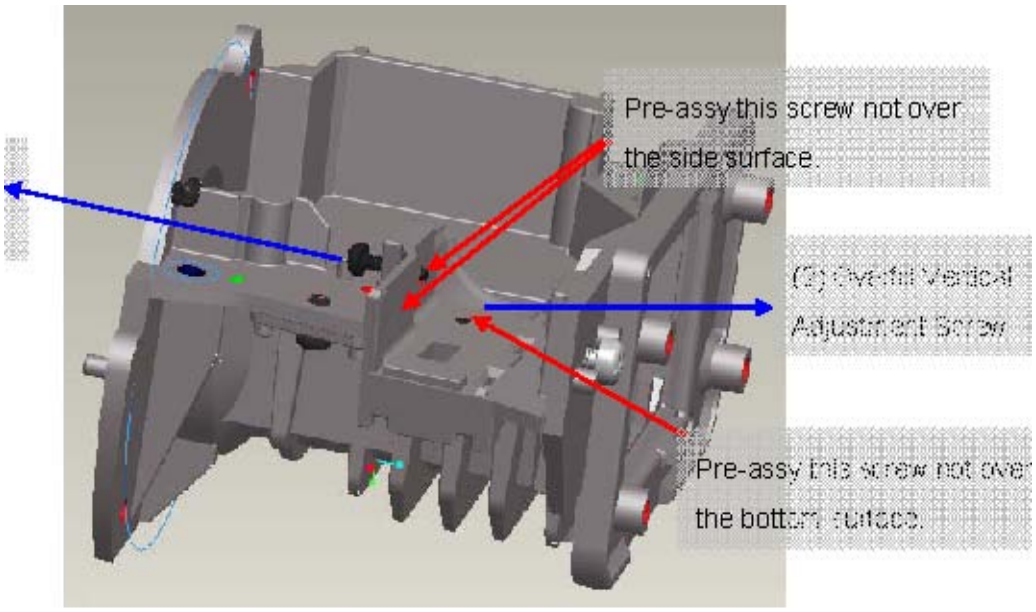
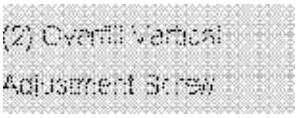
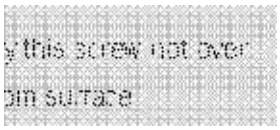


Figure 4-10





5. Assembly HSG ILL Module

5.1 FM1 Assembly

I. FM1 must be placed on datum surfaces well and breach of FM1 must be face to inside(Fig 5-1)。

II. Insert the" CLIP of FM1" into the hole on the HSG ILL and make sure " CLIP of FM1" hook on the HSG ILL well (Fig 5-2)。

5.2 CM Assembly

III. Assemble CM to HSG ILL and to make CM contact three datums on the HSG ILL well(Fig 5-3)。

IV. Assemble "CLIP of CM" to the HSG ILL (Fig 5-4) 。

V. To check and make sure “ CLIP of CM” hook the HSG ILL very Well (Fig 5-5)。

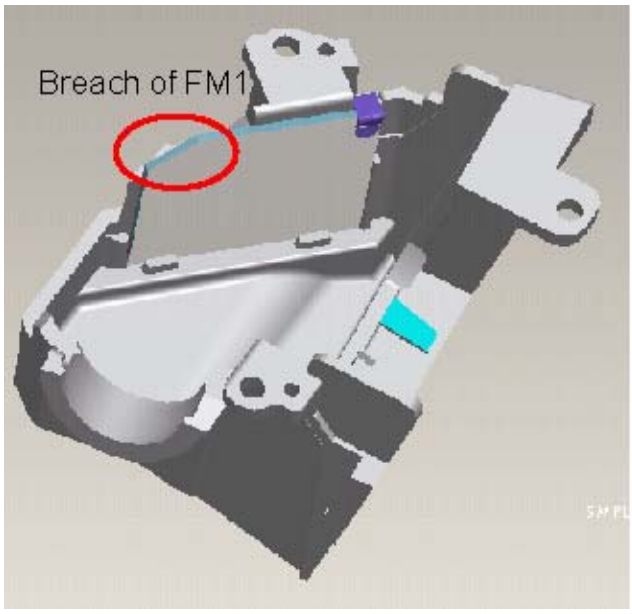


Fig 5-1

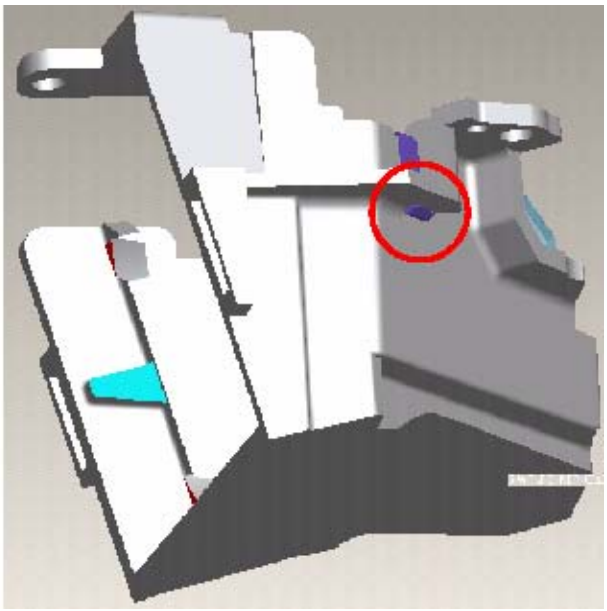
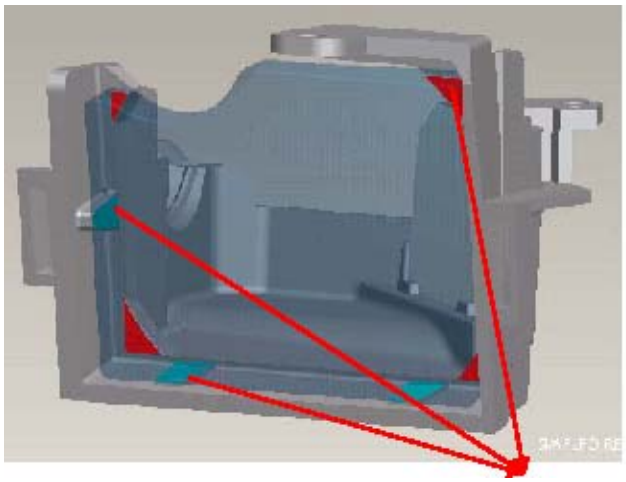


Fig 5-2



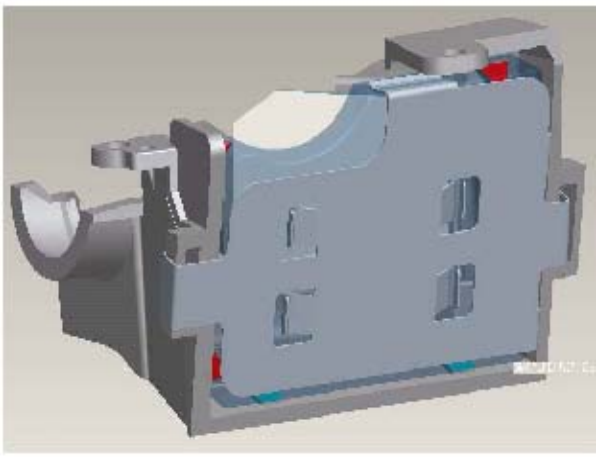


Fig 5-3

Fig 5-4

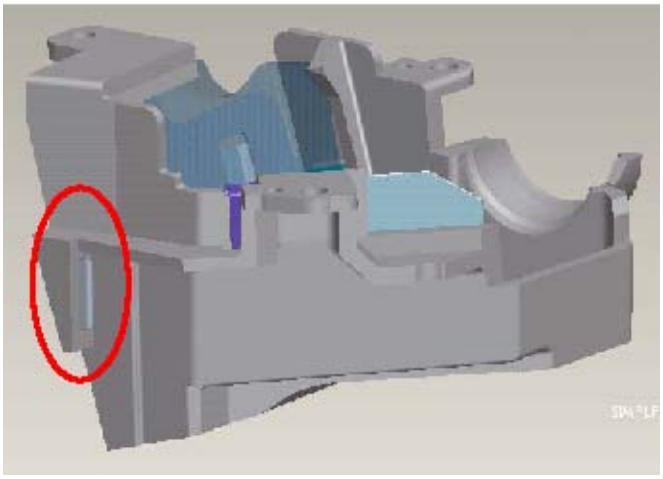


Fig 5-5

6. AL , HSG ILL and HSG DMD Assembly:

6.1 Placed “AL” on the HSG DMD .The “raised surface” of “AL” shall toward “DMD direction” (Fig 6-1)

6.2 Assemble ” HSG ILL Module” to HSG DMD and cover over on “AL”(Fig 6-2)

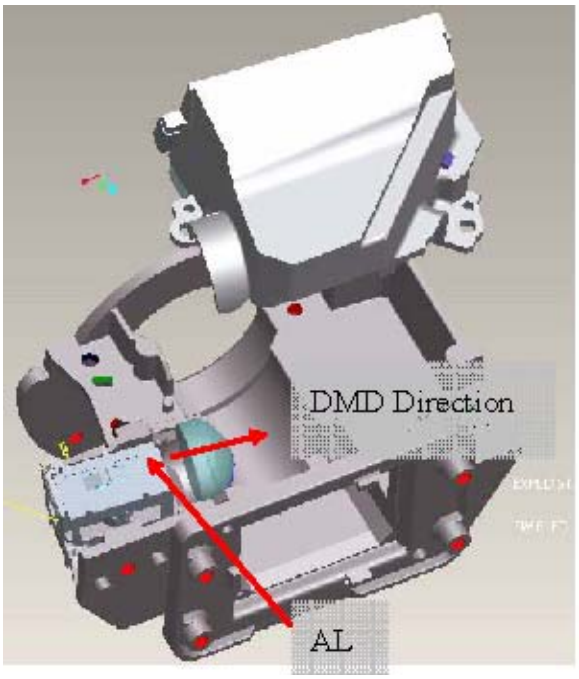


Figure 6-1

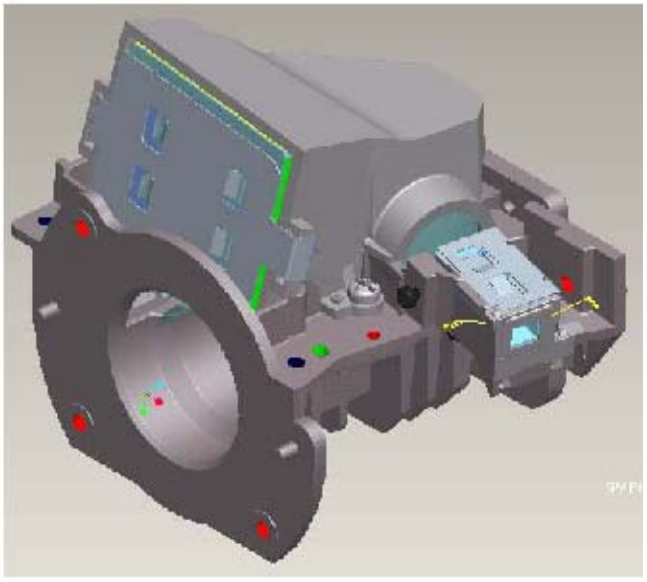


Figure 6-2

7. HSINK & DMD SOCKET Assembly

7.1.Assemly Baffle_DMD:

I. There are two breach on the Baffle_DMD. One is “circle” and the other is “Long hole” (Fig 7-1)

II. The circle of Baffle_DMD have to match with the circle on HSG DMD and the Long hole is the same(Fig 7-2)

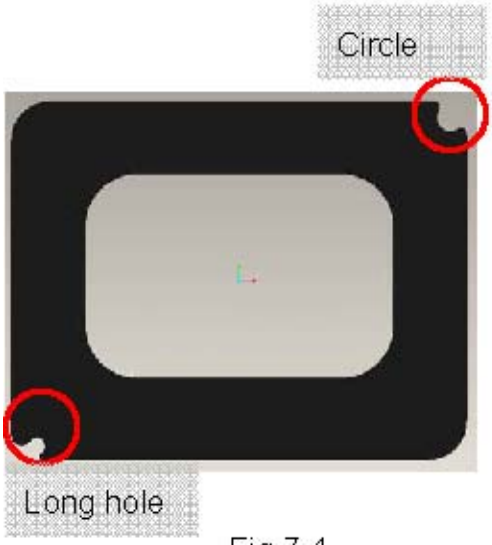


Fig 7-1

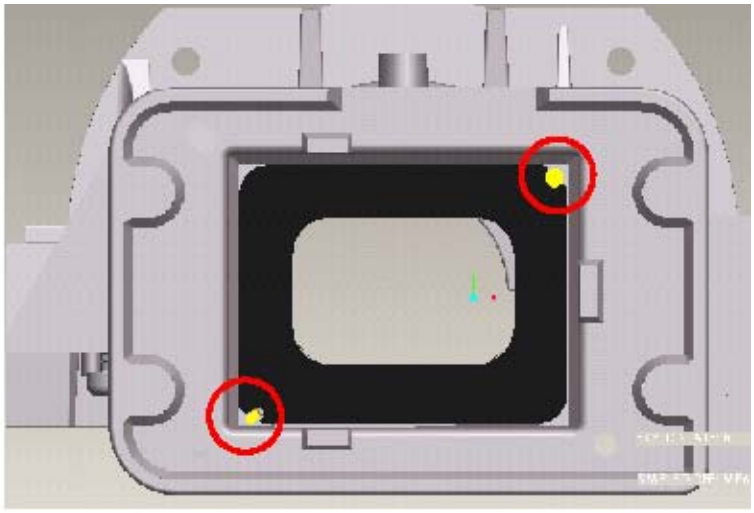


Fig 7-2

7.2 As shown in Figure 6-3:

i. Pre-fastening Sequence: [1] - [2] - [3] - [4]

ii. Fastening Sequence [2] - [1] - [4] - [3]

iii. Screw Torque must be confirmed to be 6 kg-cm.

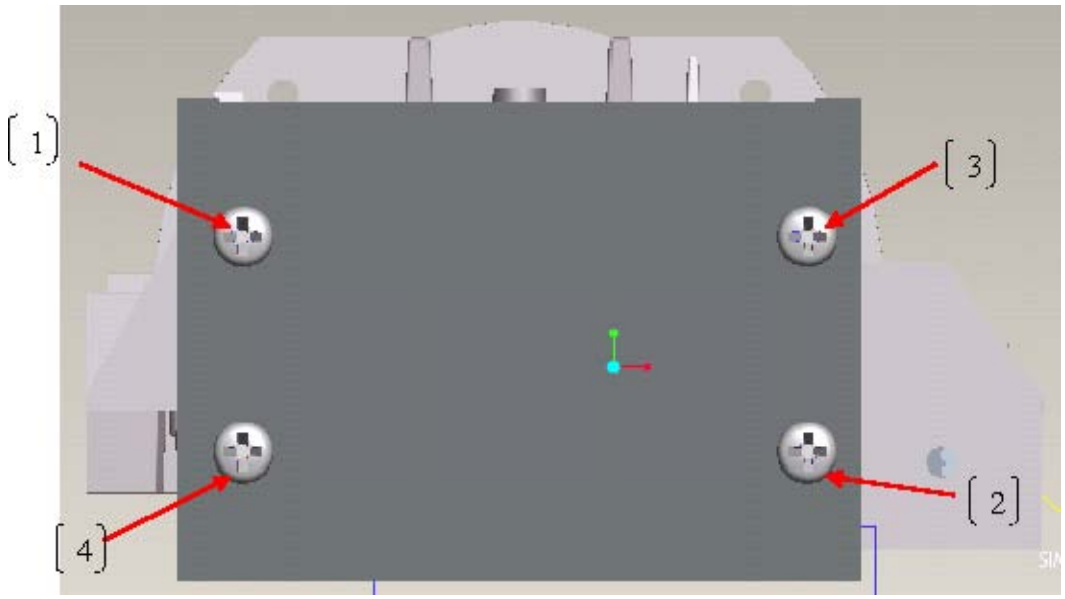


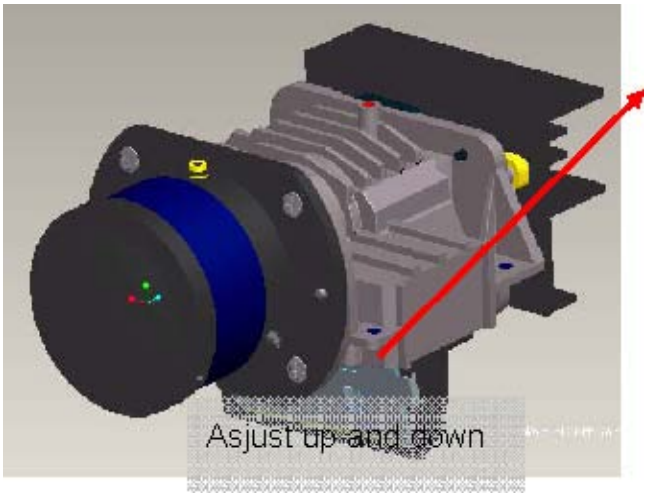
Figure 7-3

8. PL Module Assembly

1 Assemble PL to HSG DMD and fasten screw to fix PL first (Fig 8-1) 。

2 Assemble “Ring Zoom” second and fasten screw (Fig 8-2) 。

3 Insert “Ring Focus” third(Fig 8-3) 。



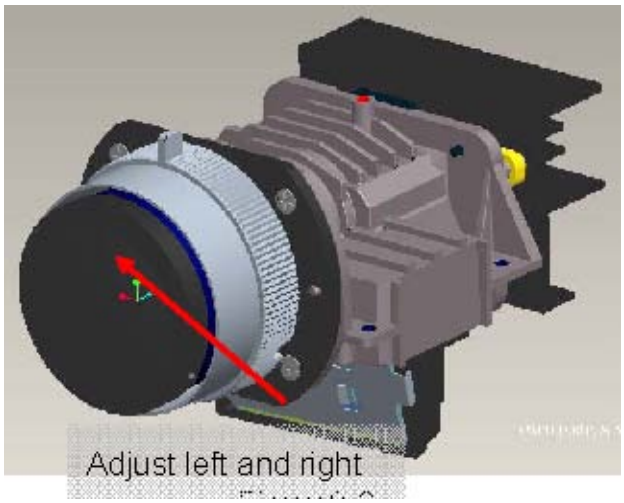


Figure 8-1

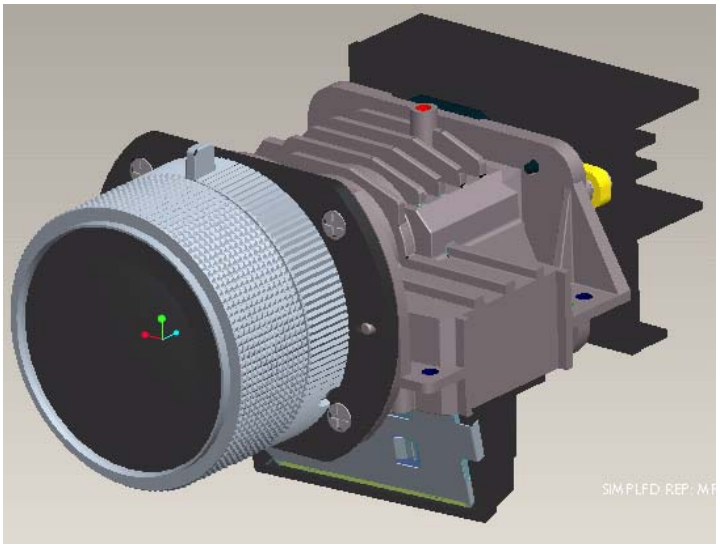


Figure8-3

9. OPTICAL ENGINE Assembly

I. Assemble CW Module to HSG DMD (Figure9-1 ,9-2)

II. Assemble BKT Link Lamp, Shield CW to HSG DMD and fasten the screw (Figure9-3 ,9-4)

III. Assemble Lamp Module to HSG DMD (Figure9-5 ,9-6)

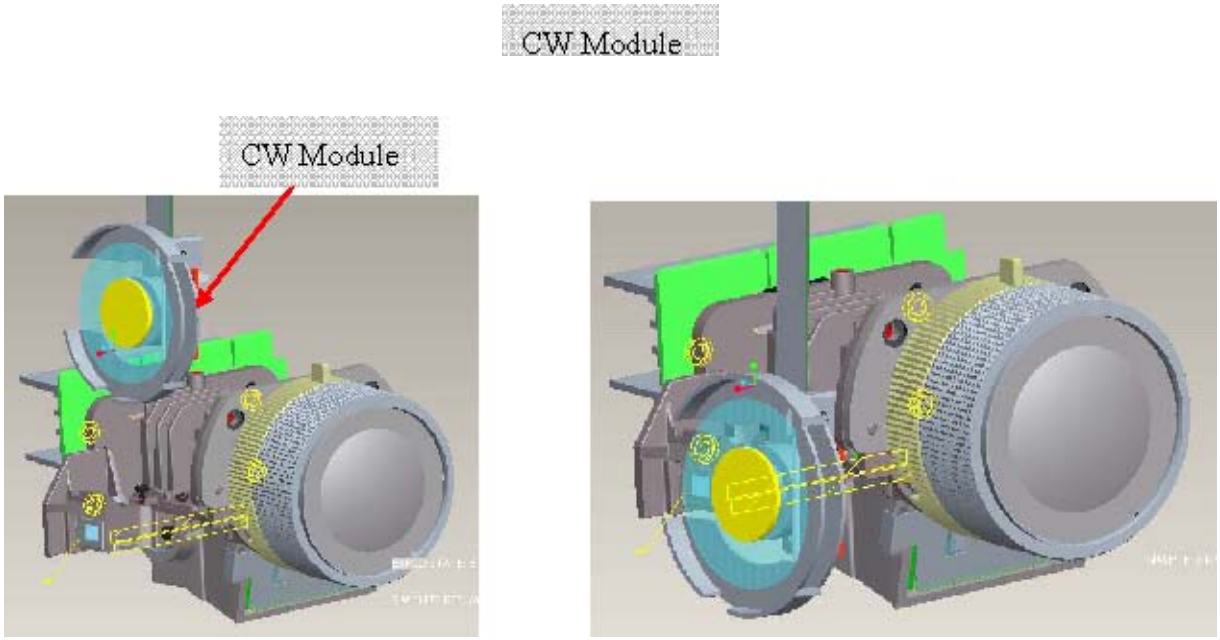
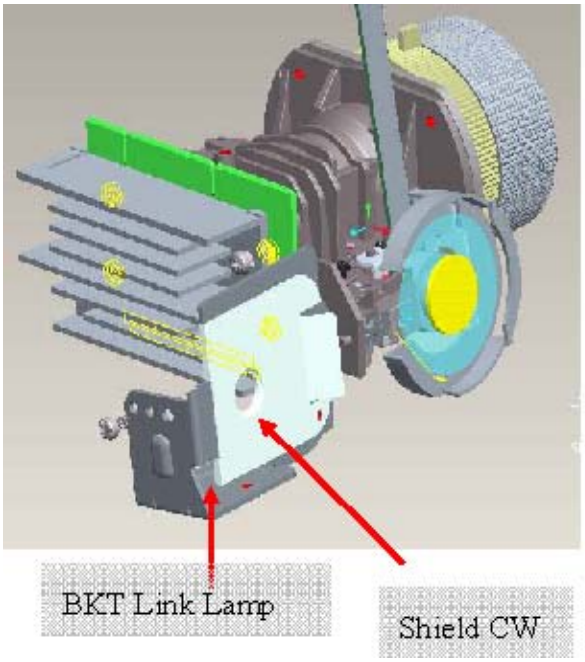
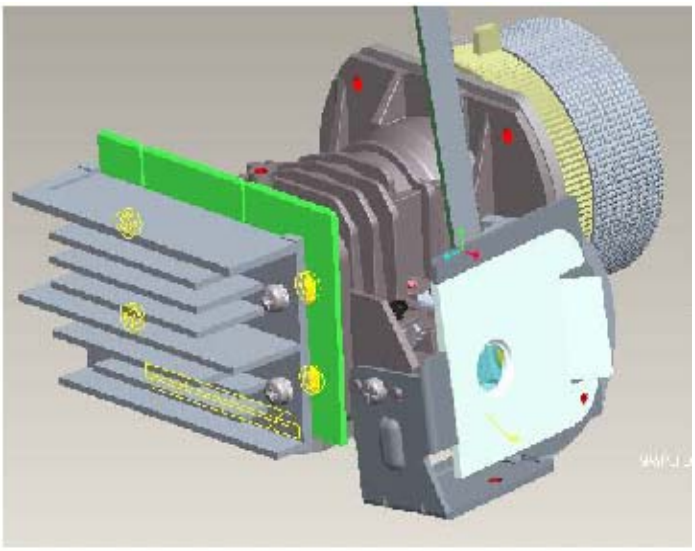


Figure9-1 ,

Figure 9-2





BKT Link Lamp

Shield CW

Figure9-3 ,

Figure9-4 ,

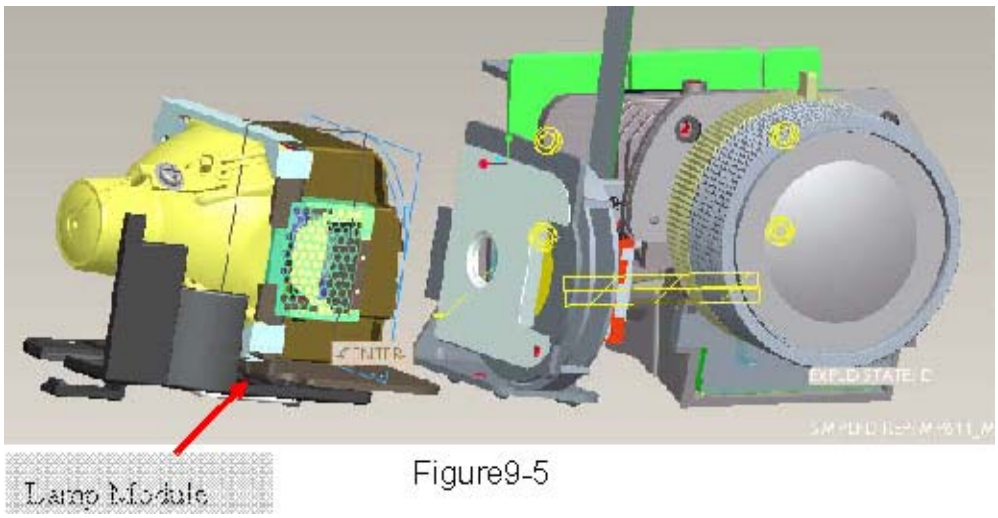


Figure9-5

Lamp Module

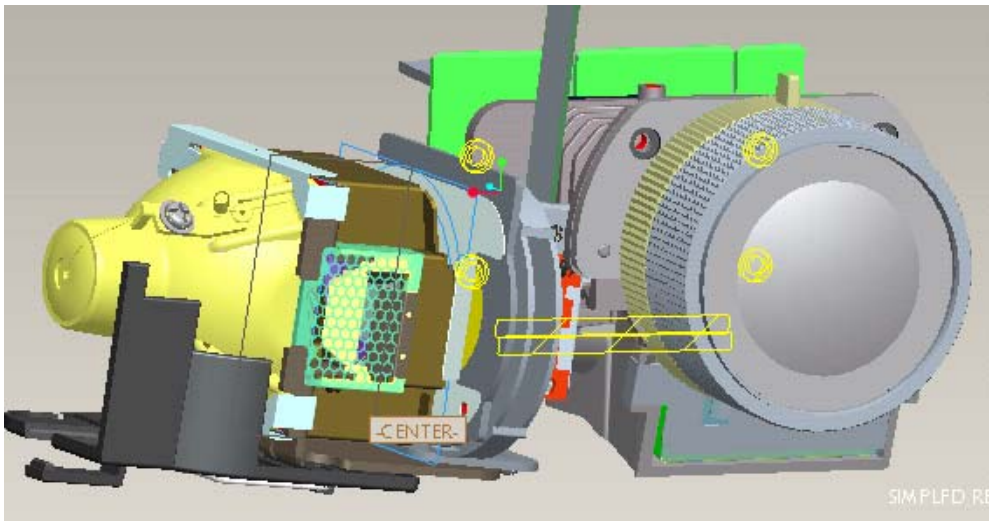


Figure9-6

7. PC Alignment Procedure

Equipment:

-Pattern generator (Chroma-2250)

OSD Default value:

Item	Value
Cal R Offset	127
Cal G Offset	127
Cal B Offset	127
Cal R Gain	127
Cal G Gain	127
Cal B Gain	127
YPbPr R Offset	122
YPbPr B Offset	122
AutoKeystone Cal	
TiltRatio Flat	0
TiltRatio Flat	0

Procedure:

Gray Level:

1 Connect power, D-sub, into projector.
2 Change Timing and pattern of pattern generator:
3 Timing: 1024*768 @60Hz (XGA)
4 Pattern: As Figure1 {A near white color (240,240,240) and a near black color(16,16,16)}
5 Light on projector
6 Set user OSD values to default.
7 Enter factory mode.
8 Set Factory values to default.
9 Press “Calbration RGB” to let the black level to just distinguish, and the light output of white level to just max.
10 Check the 32 levels of gray. All steps must appear.

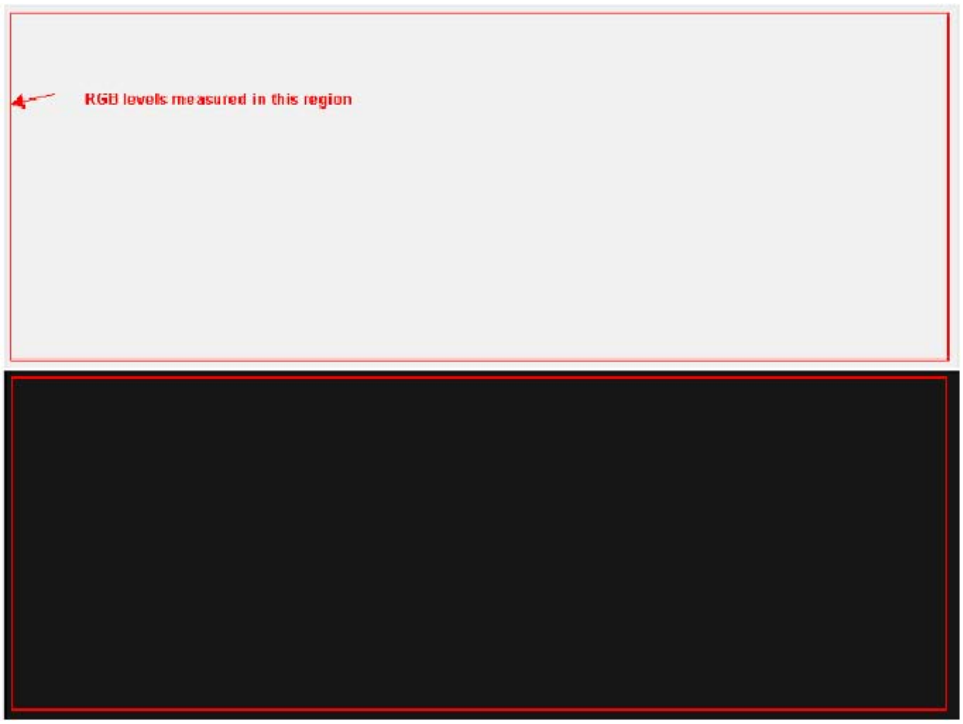


Figure1

8. YUV Alignment Procedure

Equipment: -Pattern generator (VG-828) OSD Default value:

Item	Value
Cal R Offset	127
Cal G Offset	127
Cal B Offset	127
Cal R Gain	127
Cal G Gain	127
Cal B Gain	127
YPbPr R Offset	122
YPbPr B Offset	122
AutoKeystone Cal	
TiltRatio Flat	0
TiltRatio Flat	0

Procedure:

1 Connect power,YpbPr cable, into projector.

2. Change Timing and pattern of pattern generator:

Timing: 480i

Pattern: As Figure2

2 Light on projector
3 Adjust user OSD values to default.
4 Enter factory mode.
5 Adjust Factory values to default.
6 Press “Calibration YpbPr” to calibrate the mid level offset.

9. How to change Model name

Equipment:

-PC and RS232 cable

Procedure:

1 Plug in power core and RS232 cable
2 use RS232 command to set model name, command format please refer below

	Read Packet
BYTE 0	Cmd1
BYTE 1	0x14
BYTE 2	0x00
BYTE 3	LSB
BYTE 4	MSB

Set Model name
0x06
0x14
0x00
0x06
0x00

BYTE 5	0x34	0x34
BYTE 6	Cmd2	0x0c
BYTE 7	Cmd3	0x0a
BYTE 8	data0	
BYTE 9	data1	
BYTE 10	data2	
BYTE 11	data3	
BYTE 12	data4	
BYTE 13	data5	use ASCII to set each character of model name from data0, and add a # after the last character of model name.
BYTE 14	data6	
BYTE 15	data7	
BYTE 16	data8	
BYTE 17	data9	The maximum character number of model name is 16 (include #)
BYTE 18	data10	
BYTE 19	data11	
BYTE 20	data12	
BYTE 21	data13	
BYTE 22	data14	
BYTE 23	data15	
BYTE 24	checksum	BYTE1+…+BYTE23

3 Example:

Example: MP616 SVGA	Example: MP616p SVGA	Example: MP726 XGA
0x06	0x06	0x06
0x14	0x14	0x14
0x00	0x00	0x00
0xf	0x10	0x0e
0x00	0x00	0x00
0x34	0x34	0x34
0x0c	0x0c	0x0c
0x0a	0x0a	0x0a
0x4d (M)	0x4d (M)	0x4d (M)
0x50 (P)	0x50 (P)	0x50 (P)
0x36 (6)	0x36 (6)	0x37 (7)
0x31 (1)	0x31 (1)	0x32 (2)
0x36 (6)	0x36 (6)	0x36 (6)
0x20 (space)	0x70 (p)	0x20 (space)
0x20 (space)	0x20 (space)	0x20 (space)
0x53 (S)	0x20 (space)	0x58 (X)
0x56 (V)	0x53 (S)	0x47 (G)
0x47 (G)	0x56 (V)	0x41 (A)
0x41 (A)	0x47 (G)	0x23 (#)
0x23 (#)	0x41 (A)	checksum
checksum	0x23 (#)	
	checksum	

10.Mechanical Assembly Concerns

1. Grounding wire alignment

The grounding wire is come out from the middle-opening area of the BKT L-frame, see figure 1-1. Figure 1-2 is the final assembly of this wire.

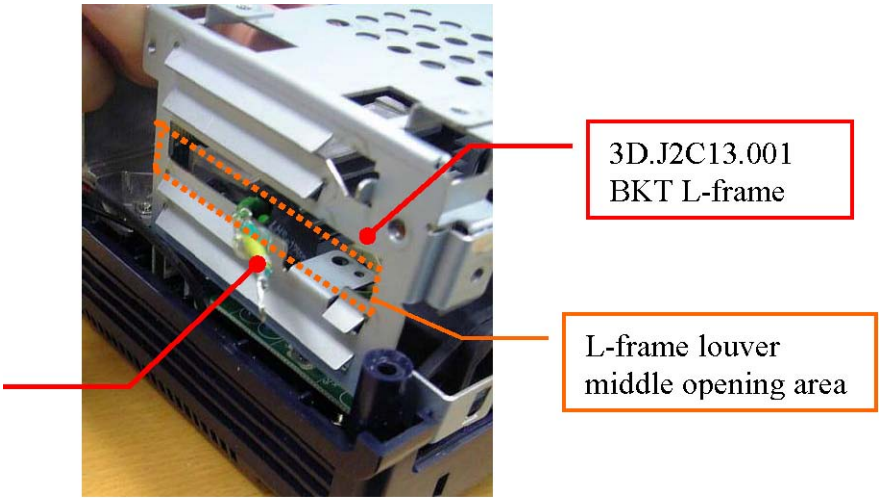


Figure 1-1. Grounding wire alignment –I.

3D.J2C13.001 BKT L-frame
Grounding wire with EMI cord

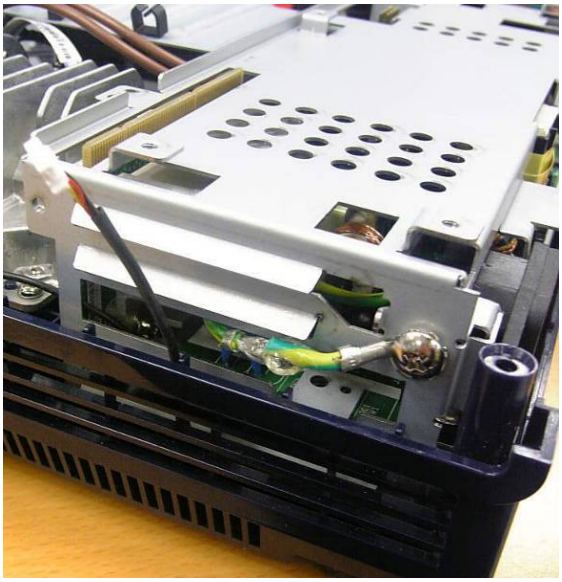


Figure 1-2. Grounding wire alignment –II.

2. Speaker wire alignment

Speaker wire is aligned between Lower case rib and Lower case boss before assembling Main board, see figure 2-1. After assembling main board, put speaker wire between Lower case rib and BKT L-frame, see figure 2-2.

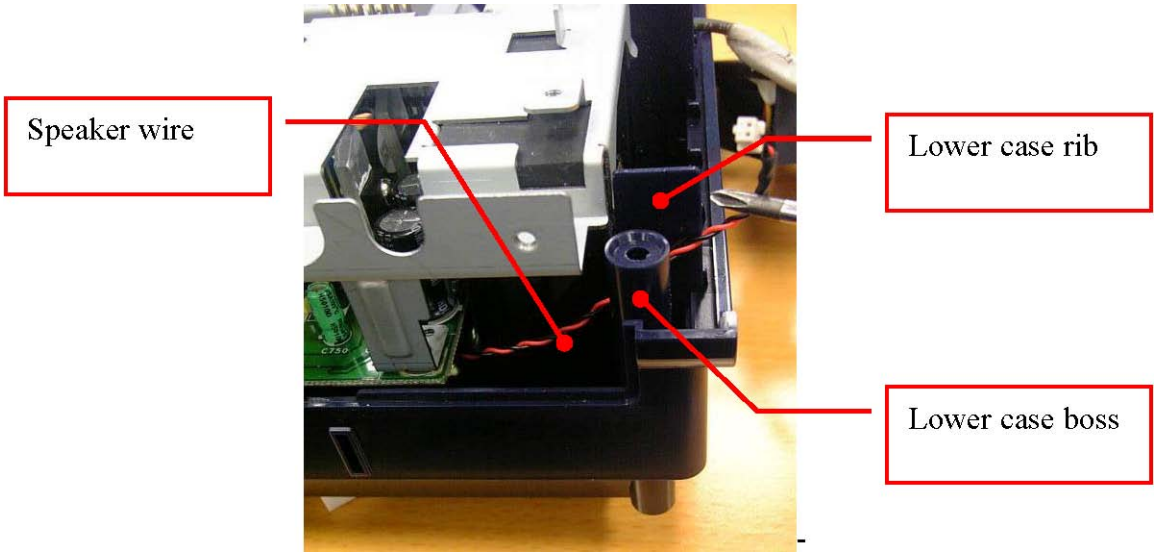


Figure 2-1. Speaker wire alignment –I.

3D.J2C13.001 BKT L-frame

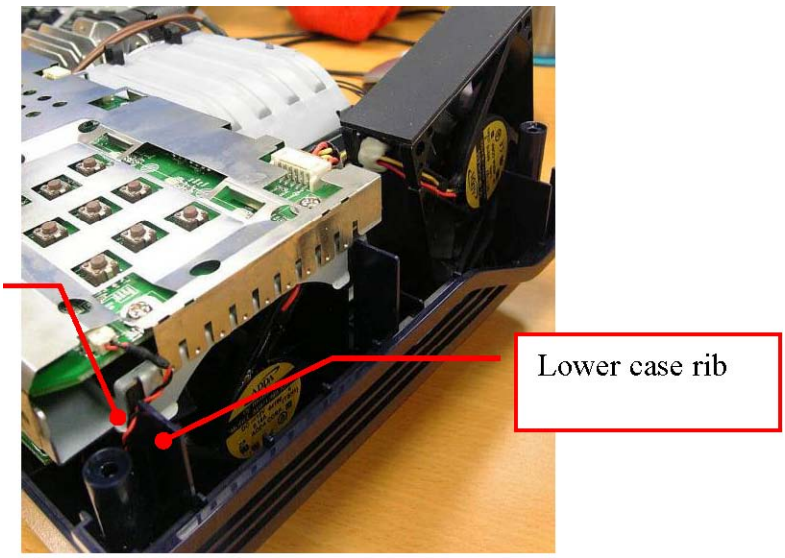


Figure 2-2. Speaker wire alignment –II.

3. CW FPC, CW sensor wire and blower wire alignment

CW FPC wire is constrained by two Wire-saddle clips, see figure 3-1. CW FPC wire has to be crossed above Thermal breaker wire and **keep the redundant wire above lamp box.**

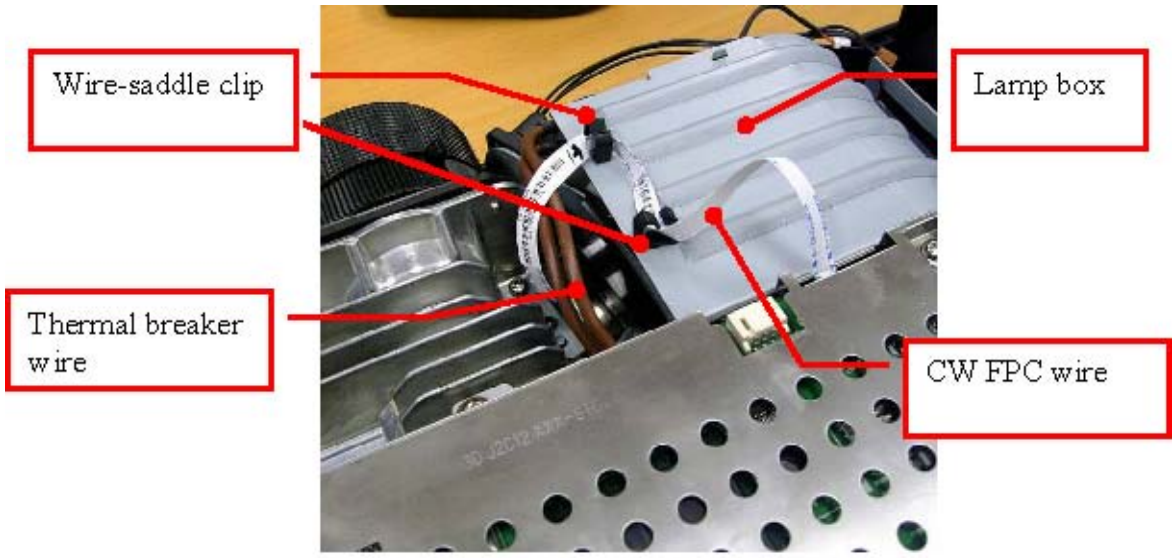
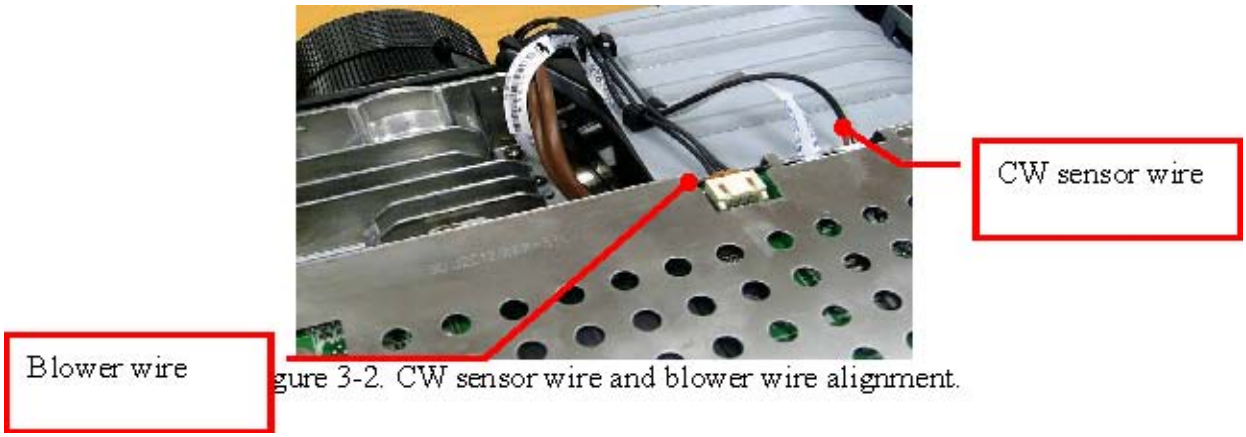


Figure 3-1. CW FPC wire alignment.

Blower wire and CW sensor wire are constrained by the Wire-saddle clips too. They are assembled after CW FPR wire, see figure 3-2.



gure 3-2. CW sensor wire and blower wire alignment.

4. Thermal breaker wire and blower wire alignment

After put CW sensor, CW FPC and blower wires in the wire saddle clips, put thermal breaker wire in

the second clip finally, see figure 4-1.

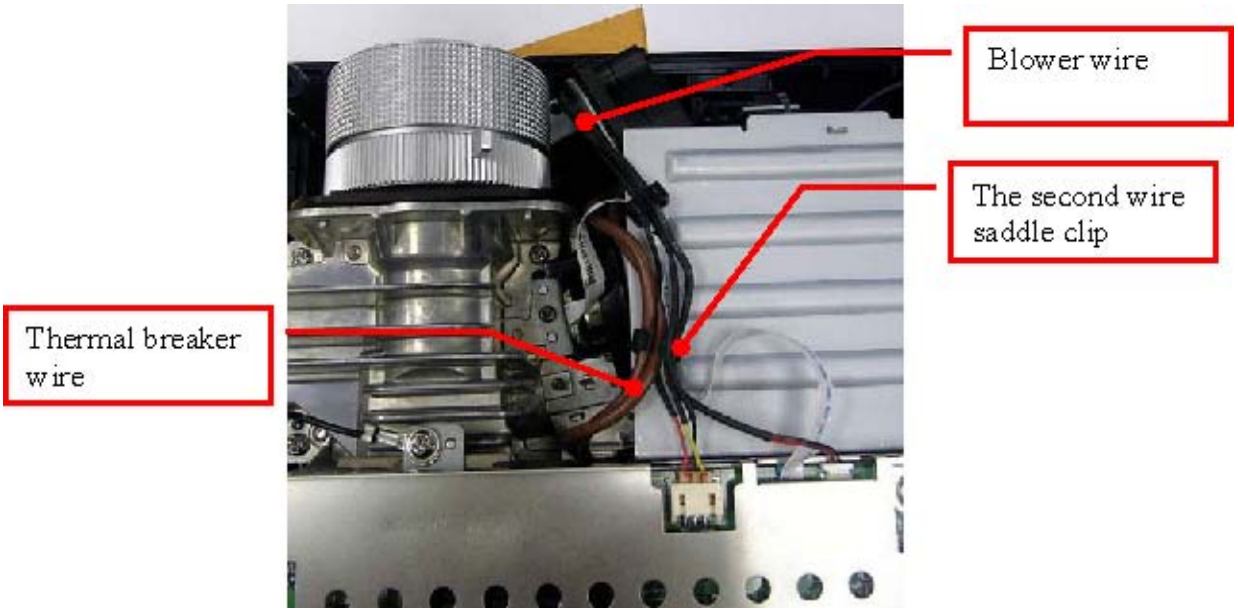


Figure 4-1. Thermal breaker wire alignment.

Blower wire alignment Old Blower part number, 2C.J10102.031, the wire goes through the gap between lens and blower and be constrained by clip no. 2 only, see figure 4-2. The wire has to keep straight between blower and clip 2 and leave redundant wire between clip 2 and connector.

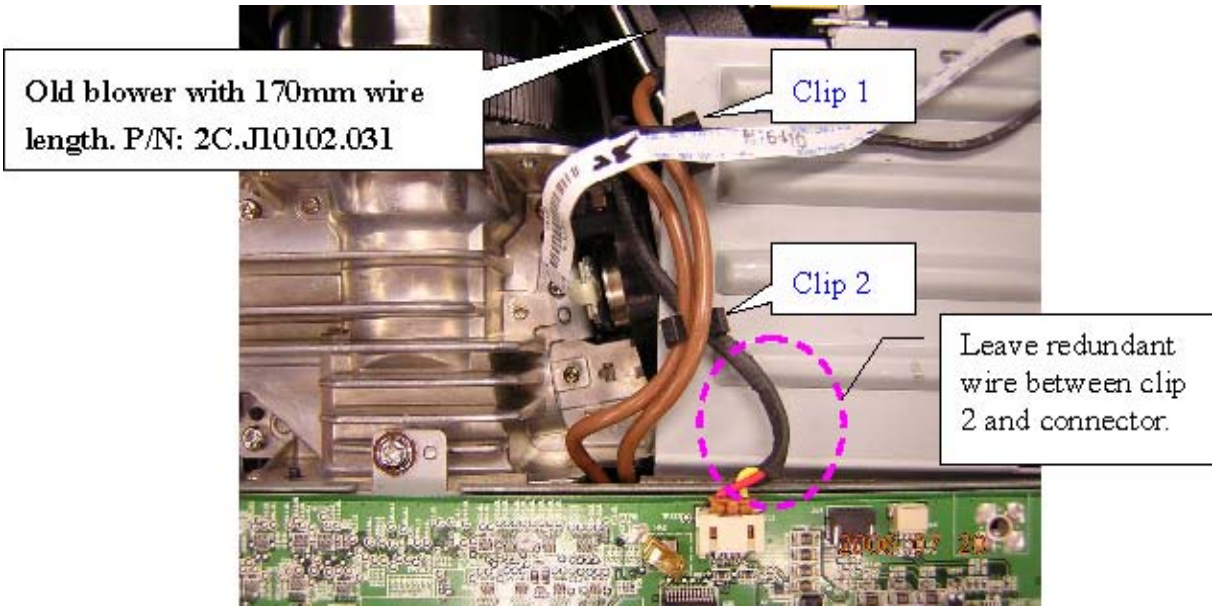


Figure 4-2. Old blower, 2C.J10102.031 (wire length 170mm) wire alignment.

New Blower part number, 2C.J10102.051, the wire goes above the blower itself and be constrained by clip no.1 and 2, see figure 4-3. The wire has to keep straight between blower and clip 2 and leave redundant wire between clip 2 and connector.

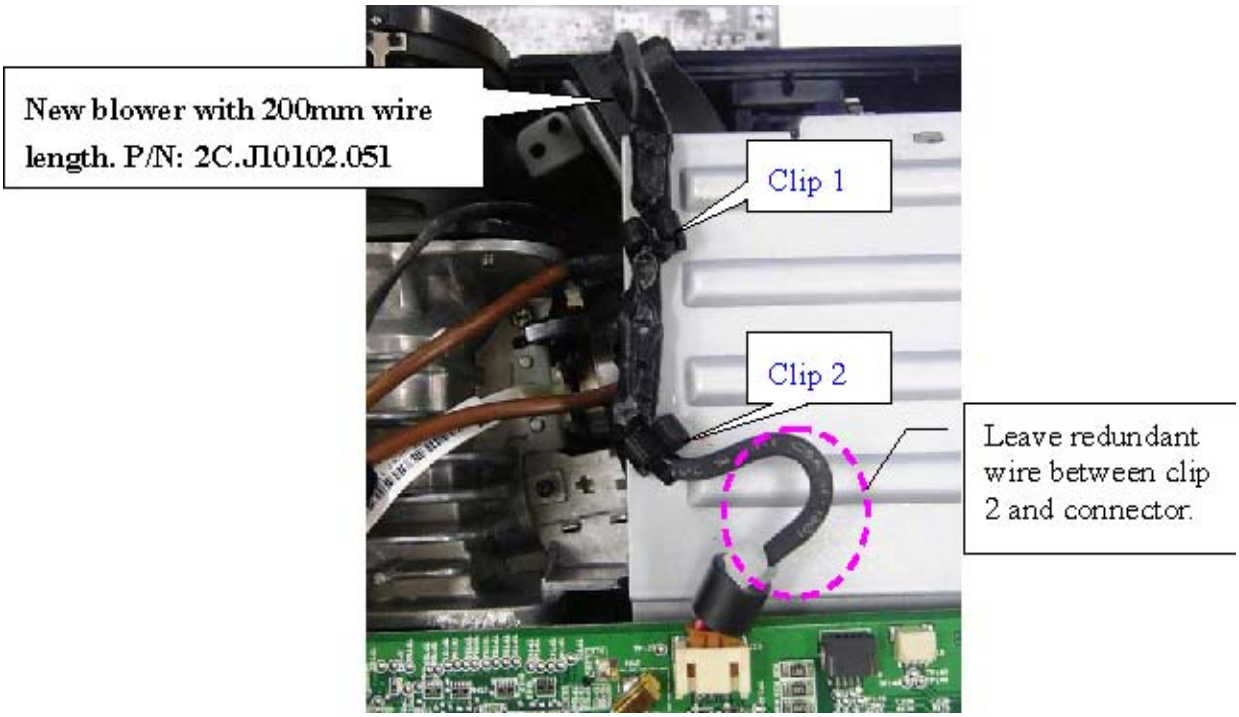
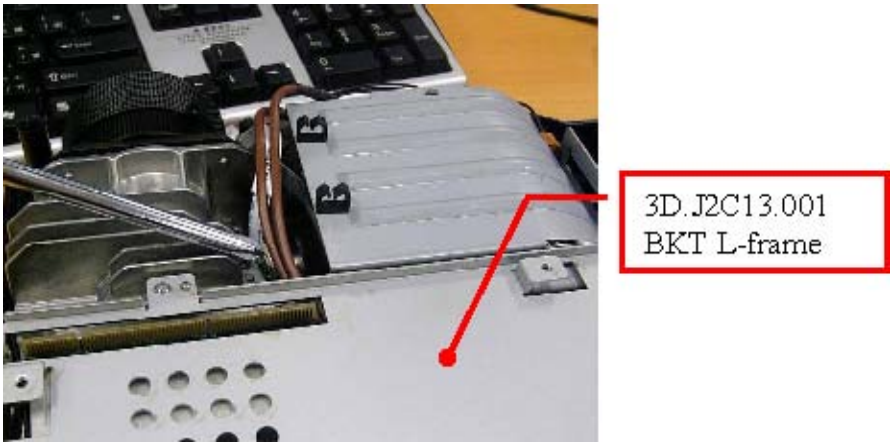


Figure 4-3. New blower, 2C.J10102.051 (wire length 200mm) wire alignment.

NOTE: Please check thermal breaker wire is connected to power board indeed before assembling BKT L-frame.



5. Fan 8025 wire assembly concern

After assembling BKT U-frame, connect fan connector to Main board before put Fan body in Lower case.

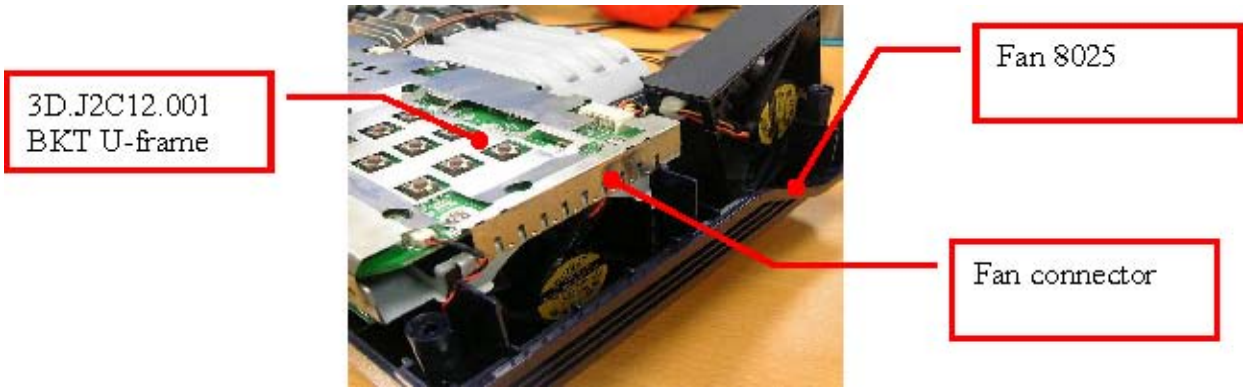


Figure 5-1. Fan 8025 assembly concern--before.

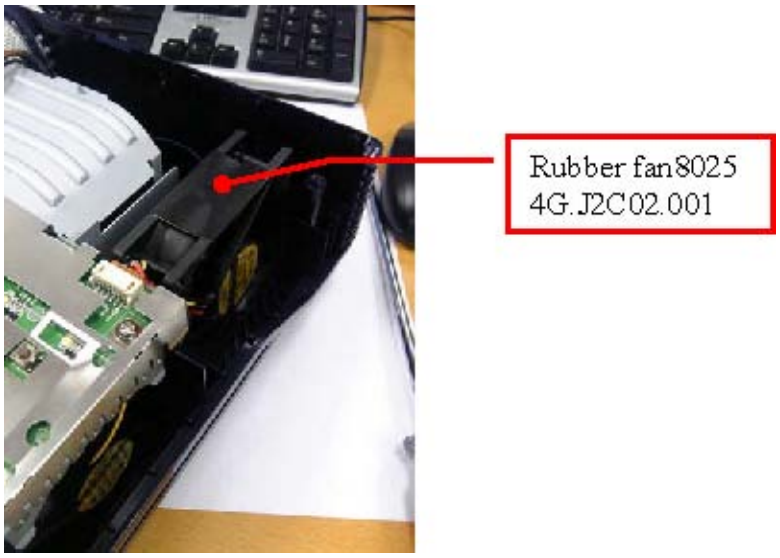


Figure 5-2. Fan 8025 assembly concern--after.

6. Front IR wire assembly concern Make sure IR wire is aligned between Optical engine housing and Lower case, see figure 6-1.

IR wire

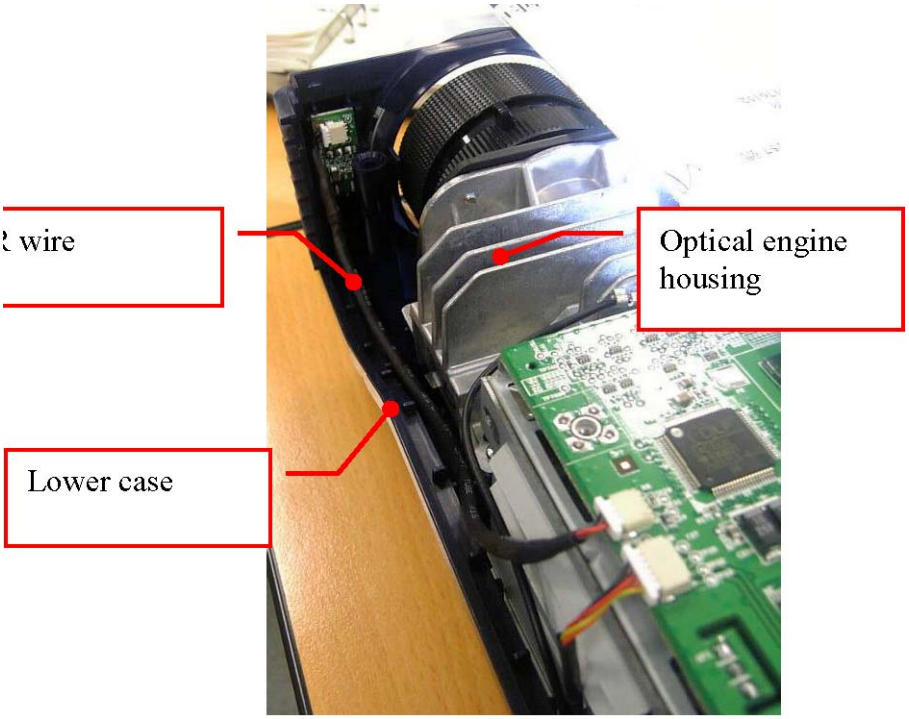
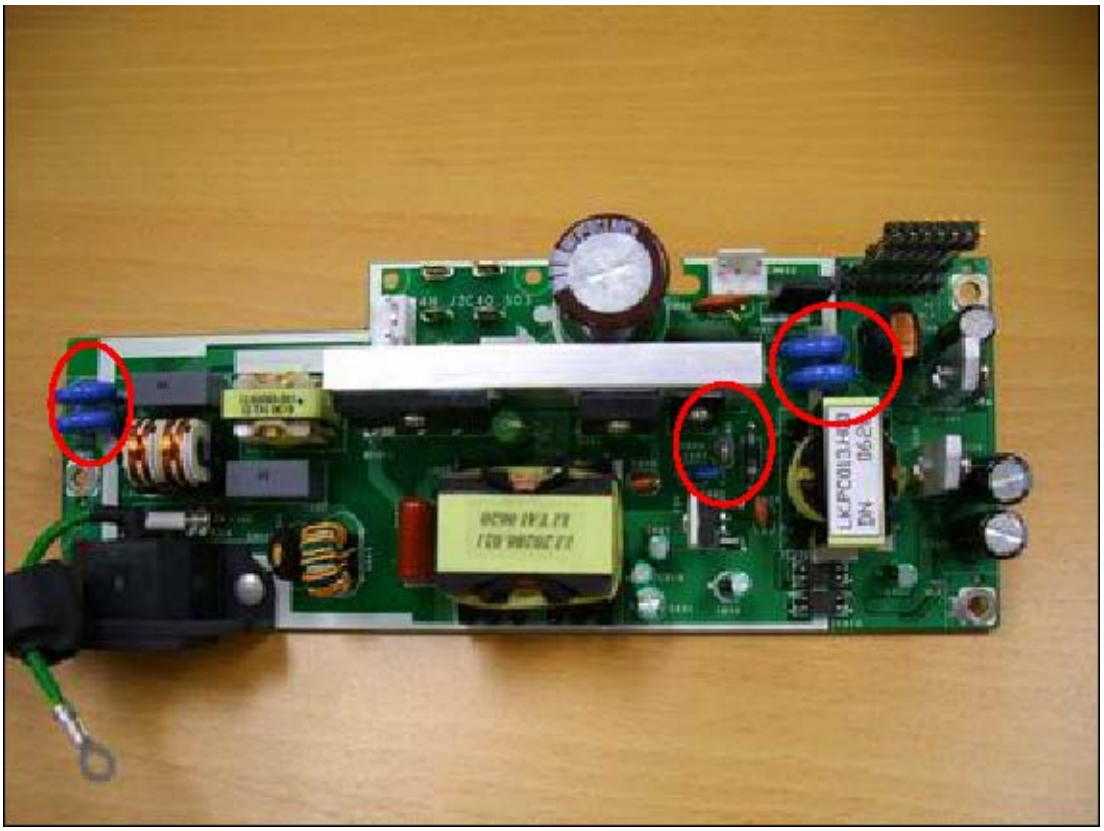


Figure 6-1. Front IR wire alignment.

11.Power Assembly Concerns

1. Power board component add GP glue



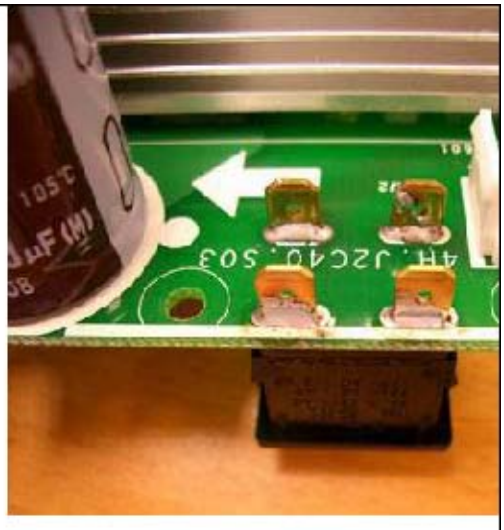
1.1 CY604 CY605 add glue.

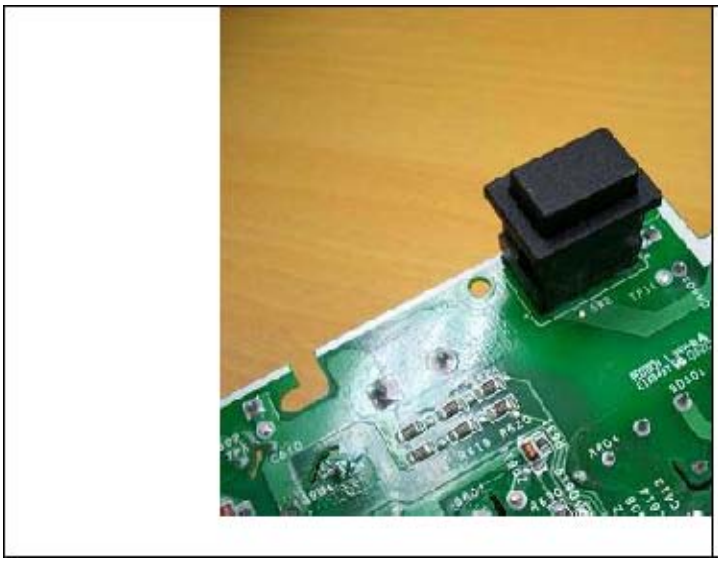
1.2 CY625 CY612 add glue.

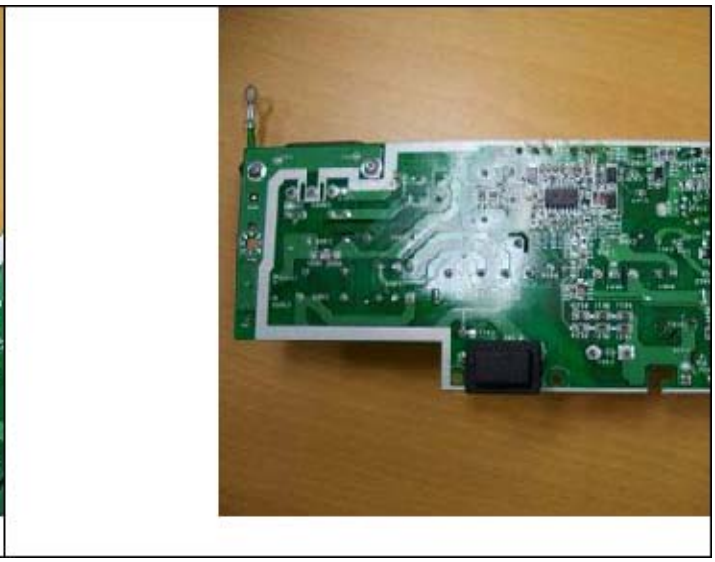

LK.PC013.H00
DN 0620
CN602
C610
C601
D651

1.3 C651 R651 add glue

2. SW2 solder by operator.

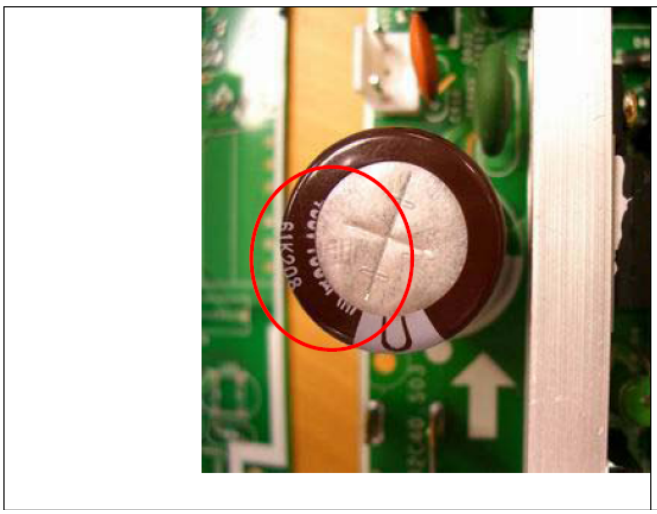


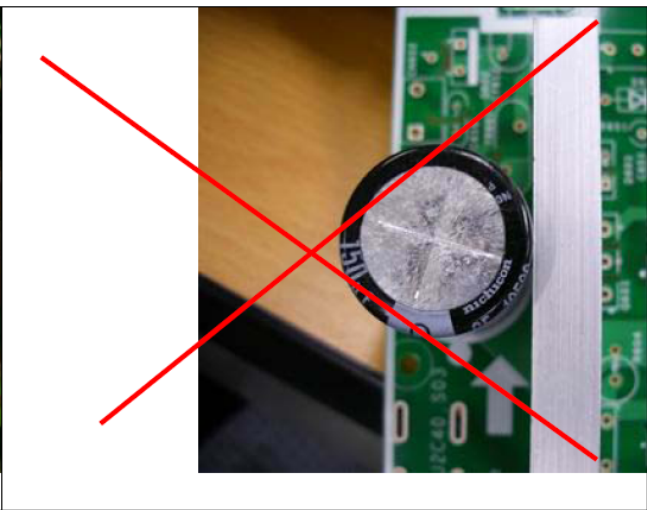




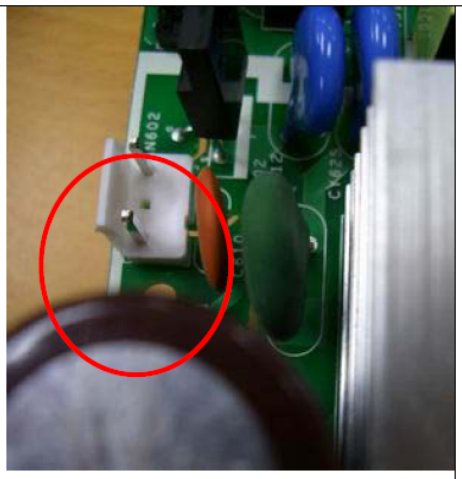
3. Power board top side check list.

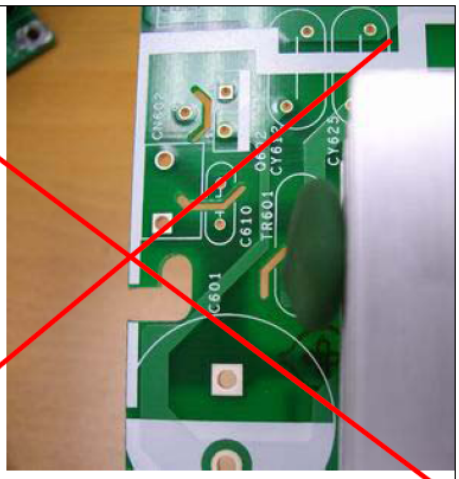
3.1 C601 and HS1 can’t be touched each other.



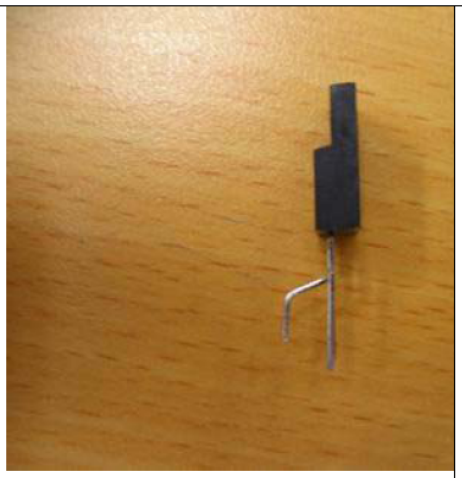


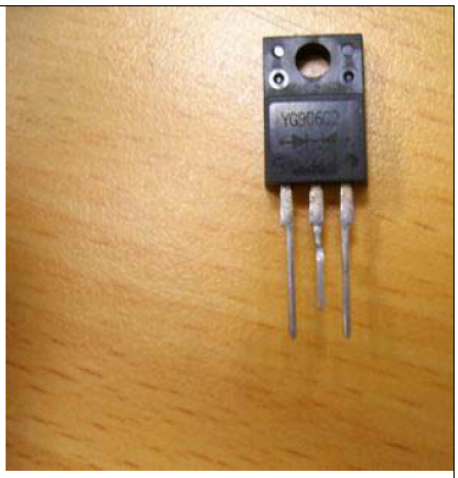
3.2 TR601 and HS1 can’t be touched each other.





4. Process Q602

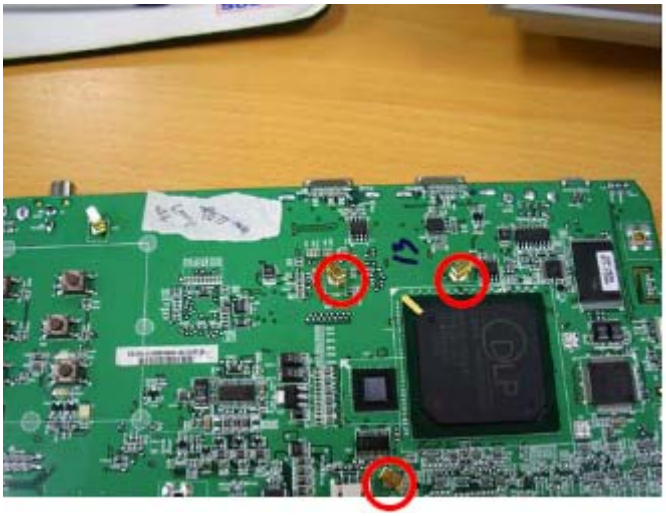
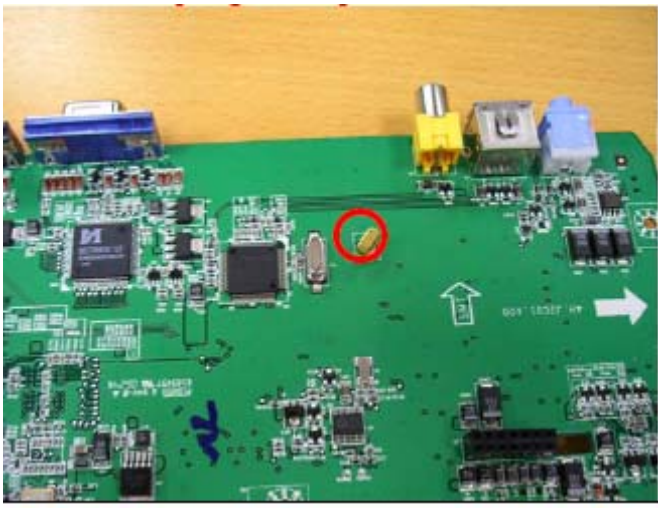


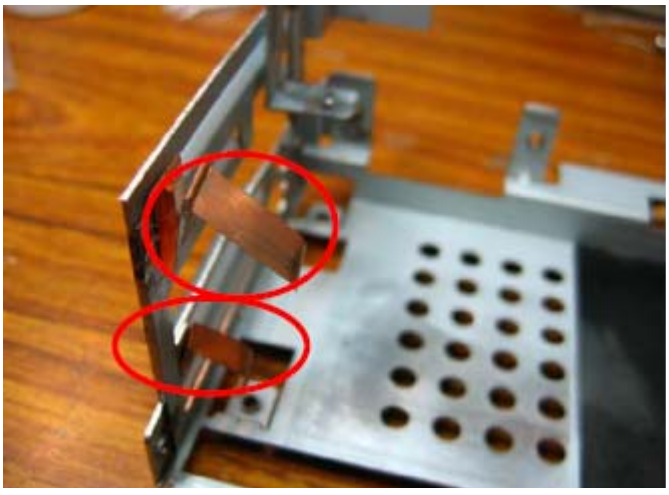


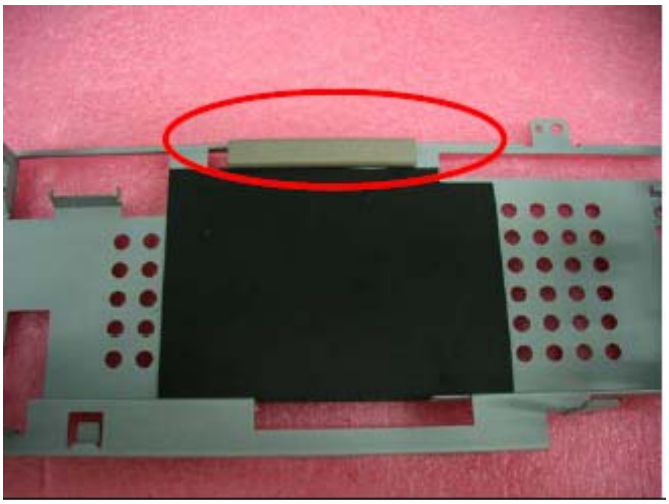
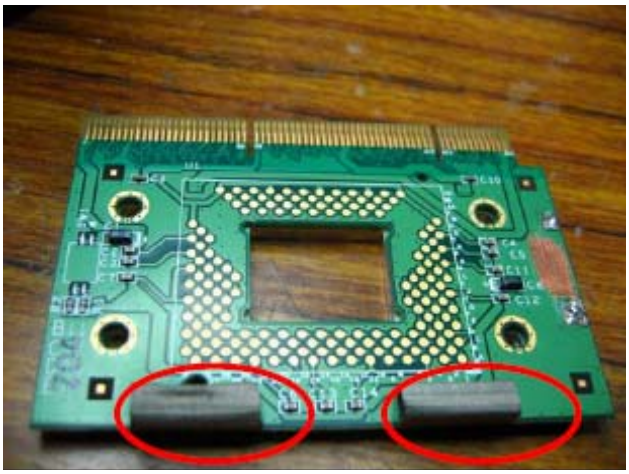
12.EMI Parts Assembly Concerns

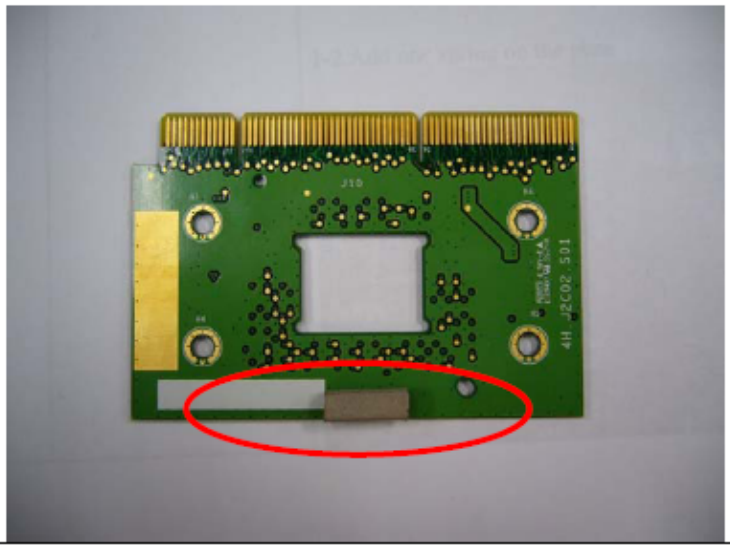
- All contact fact with conduct fabric isn't any paint or non-conduct article

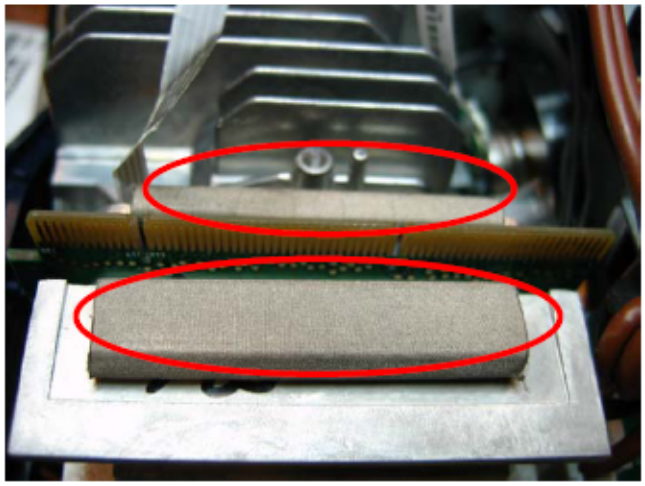
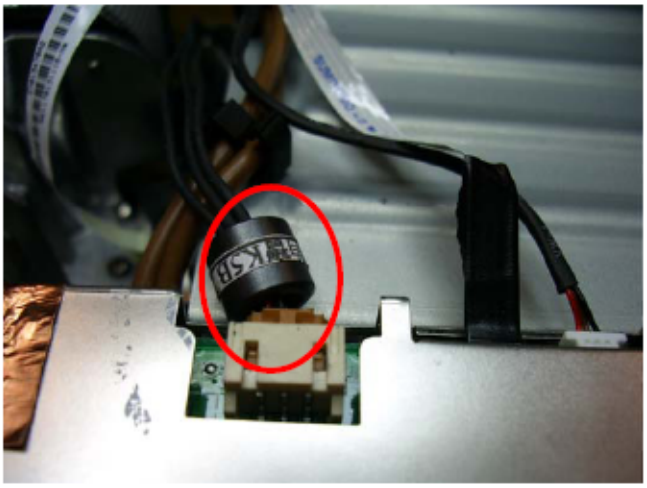
Item	Frequenc	Solution

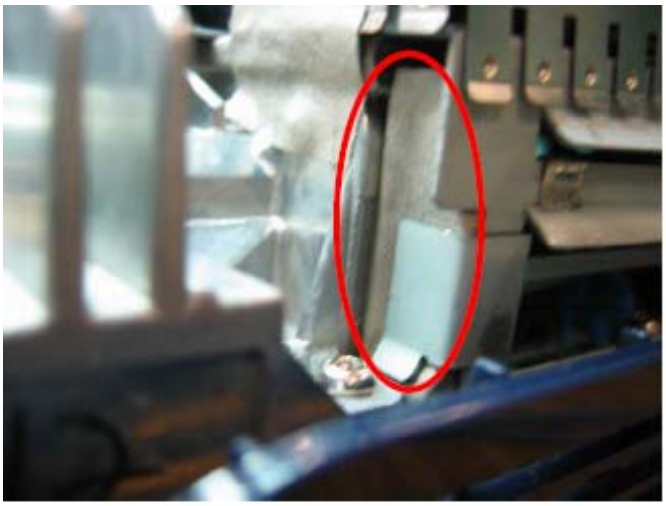
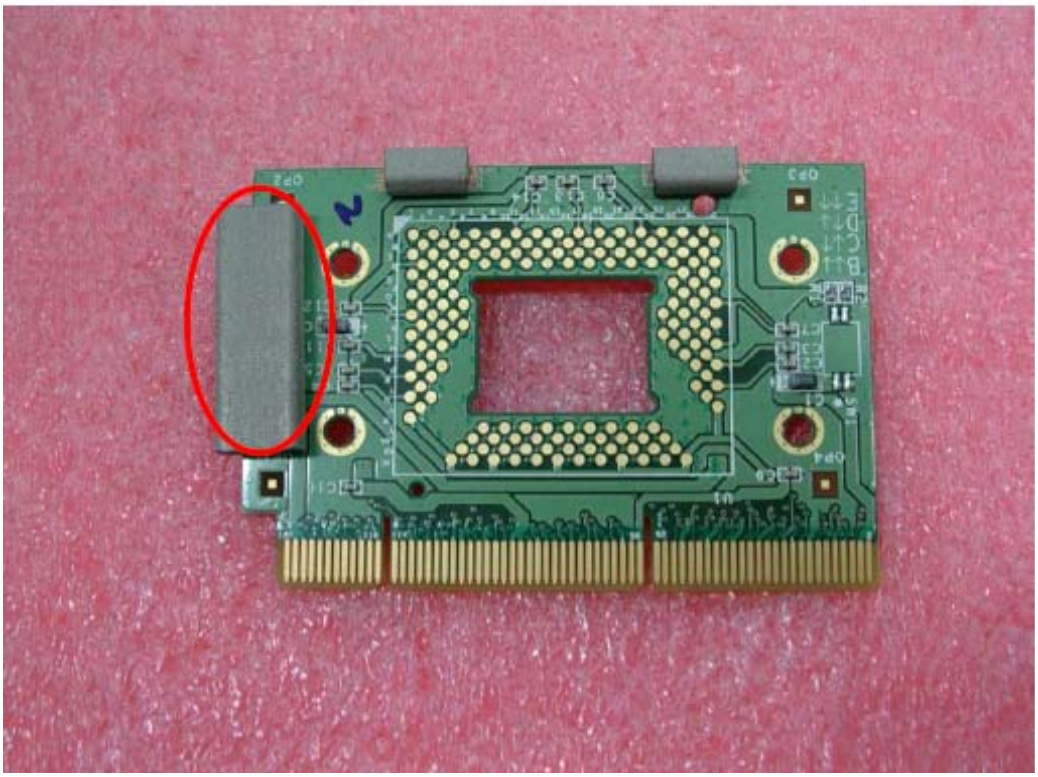
1	180MHz 300MHz	1-1. Add three springs on the plate  1-2. 1-2.Add one spring on the plate 

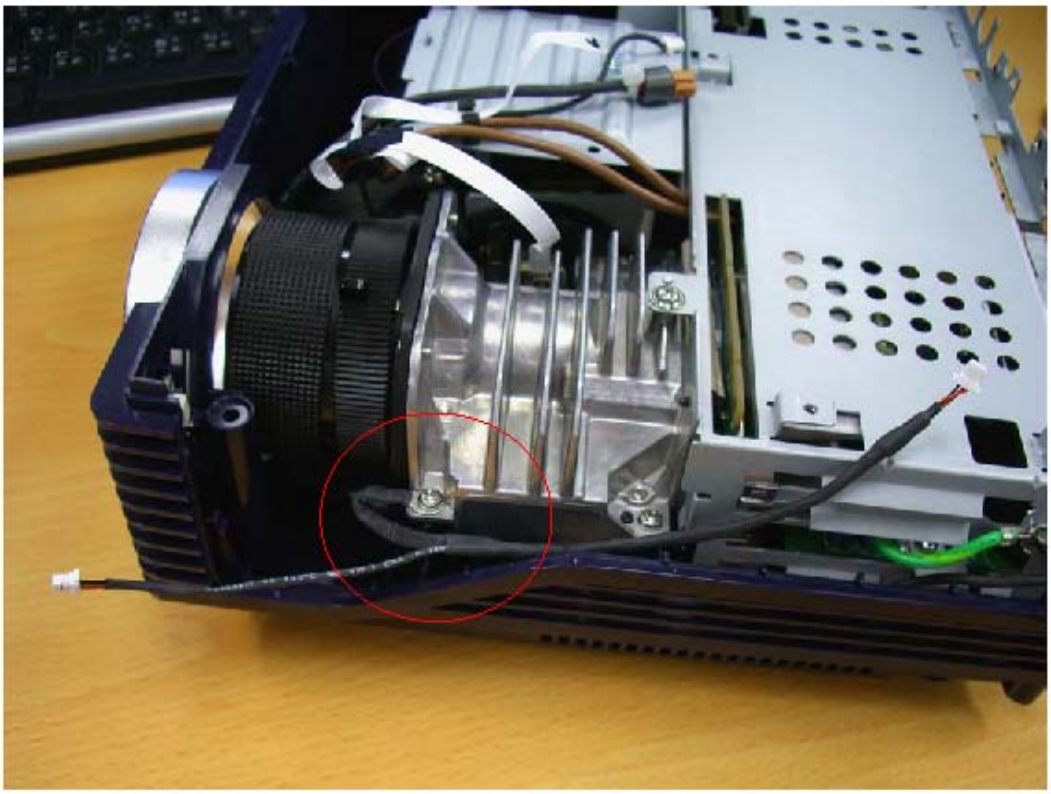
2	300MHZ 420MHZ	2.Add two springs on the plate 

3	640MHZ	3. Add a Gasket on the lamp box 
4	720MHZ	4. Add a Gasket on the DMD Board to Engine 

5	300MHz 180MHz	5.Add a Gasket (4G.J1B17.001) between DMD Board to heat-sink 
6	180MHZ 300MHZ	6.Add 導電布 between heat-sink and DMD-HSG 

7.	720MHZ 840MHZ	7.Add two Gaskets on heat-sink and Engine 
8	600MHZ	8.add core in blower fan 

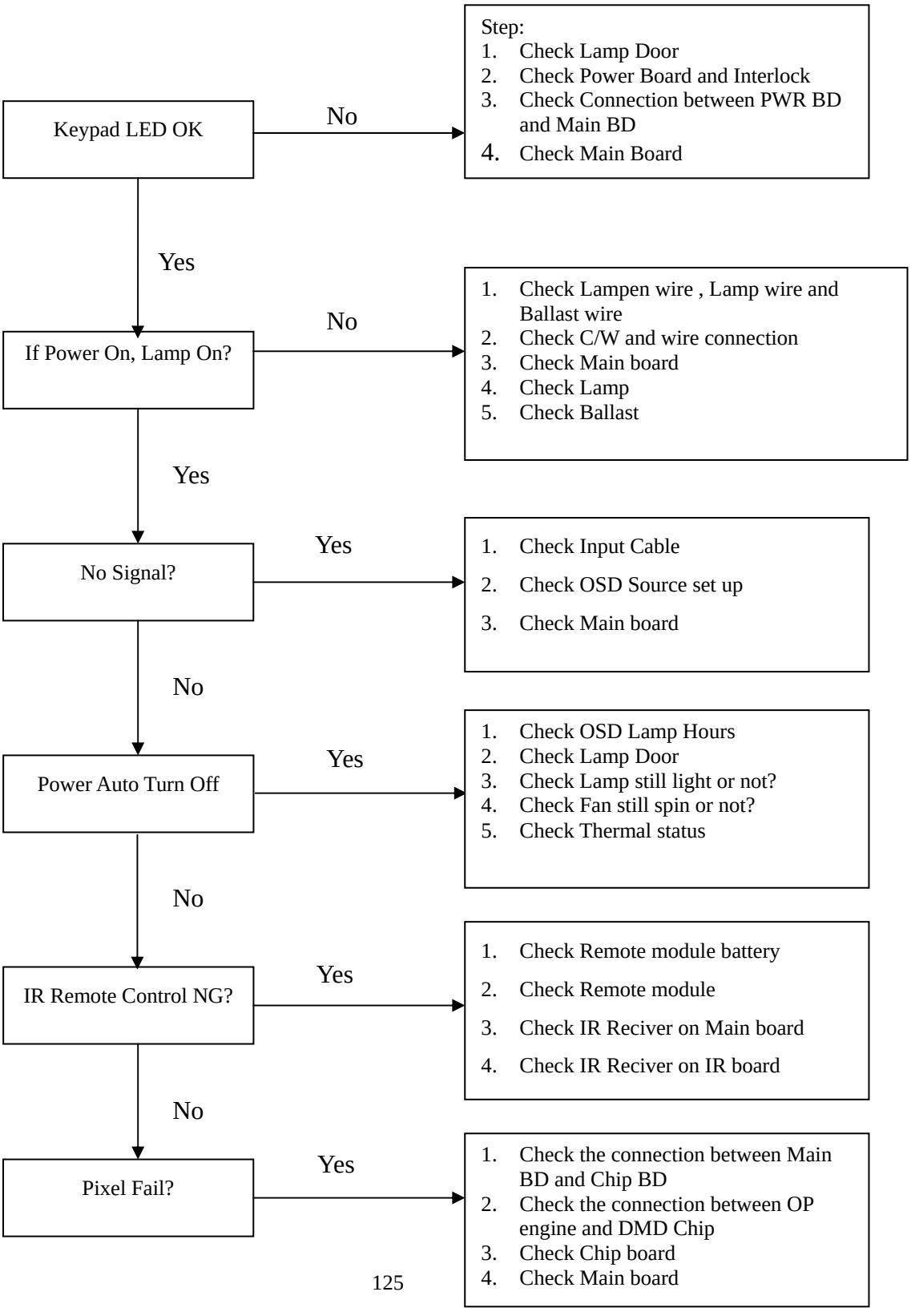
9.	180MHz	9.add gasket(**4G..J0C38.001**)between iron plate and DMD Board  
10	180MHz	10. add grounding wire of IR wire(5K.J2J01.001) on the optical engine

Level 2 Circuit Board and Standard Parts Replacement

Troubleshooting

Chapter 1 System Analysis



Chapter 2 Optical & Optical Engine Trouble Shooting Guide

No.	Item	Trouble Shooting Guide
1	Brightness	1. Change lamp
2	Uniformity	1. Change lamp
3	FOFO Contrast	1. Check ADC calibration 2. Check user's menu brightness & contrast are default 3. Clean DMD 4. Clean PL 5. Check ILL stop assy
4	ANSI Contrast	1. Clean PL 2. Clean DMD 3. Change PL
5	Color	1. Check color wheel delay 2. Check CW 50% point. Replace CW if necessary
6	Color Uniformity	1. Change lamp
7	Blue Edge	1. Refer to Item#2-1 (attached below) 2. Change CM 3. Change SUB HSG
8	Blue/Purple Border	1. Refer to Item#2-1(attached below) 2. Change CM 3. Change SUB HSG
9	Focus	1. Change Projection Lens 2. Check PL datum and DMD parallel
10	Dust	Clean DMD
11	Horizontal/Vertical Strips	1. Check connector between chipBD and MainBD 2. Re-install DMD with chipBD 3. Check if any pin of C-Spring is missing, damaged or dirty 4. Change new ChipBD/C-Spring 5. Change new DMD
12	Pixel Fail	Change new DMD

2-1. "Blue Edge" Trouble Shooting:

I. Re-adjust "Overfill" first.
For Overfill Re-adjustment:

i. Those 2 Adjustment Screws must be released for around 2 mm first.

ii. Alignment Sequence:

a. To adjust “Horizontal Adjustment Screw” firstly, then “Vertical Adjustment Screw”.

b. Refer to Figure 2-1..

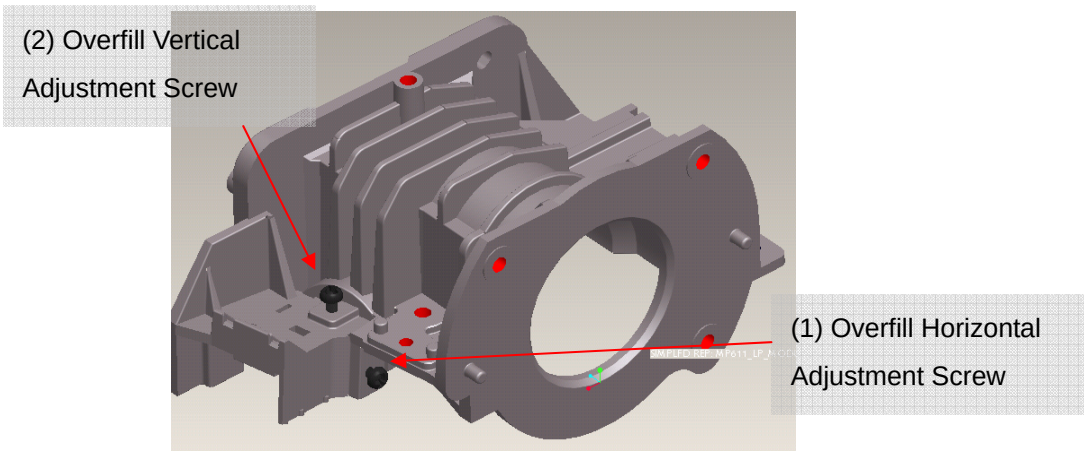
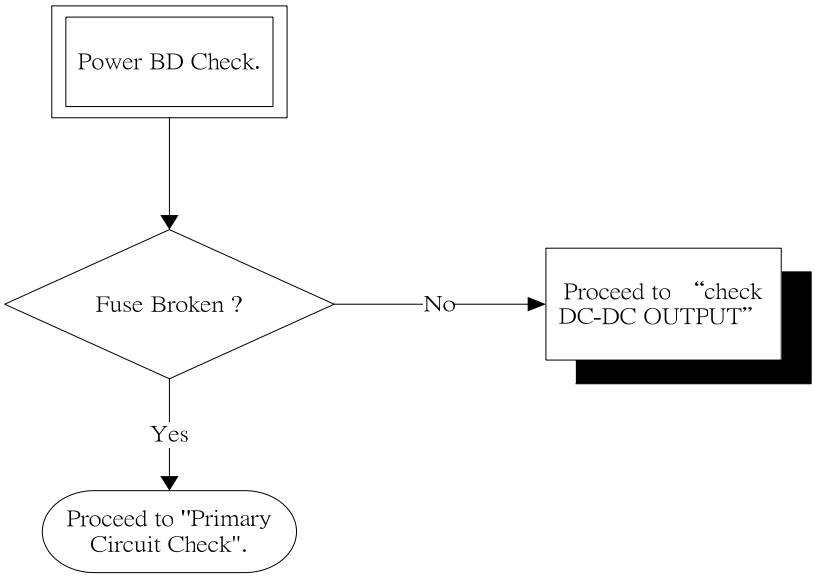


Fig. 2-1

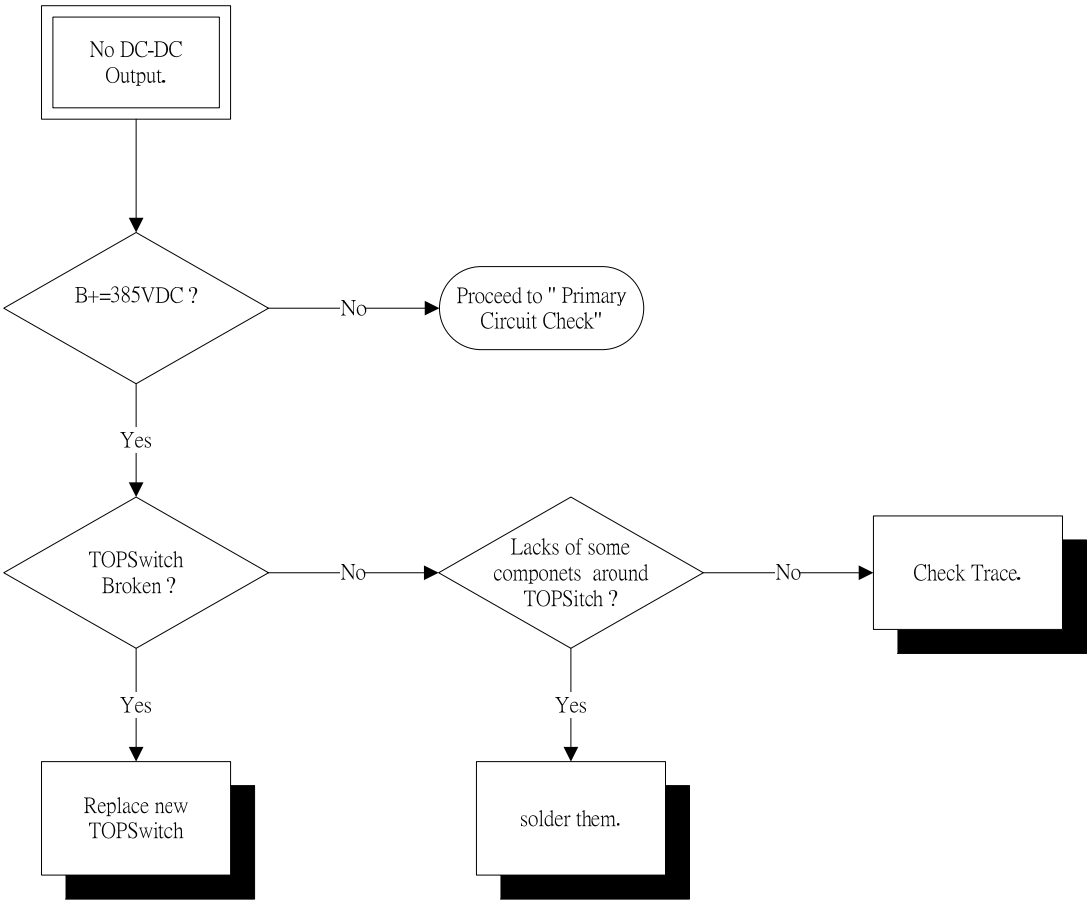
II. Re-assemble LP module—include LP, LP Baffle, LP clip.

Chapter 3 Power Supply Trouble Shooting Guide

1.



2.



Chapter 4 LED Messages Definition

Power	Temp	Lamp	Status	Note
O	-	-	Stand-by	
G	-	-	Powering up	
G	-	-	Normal operation	
O	-	-	Normal power-down cooling	
O	-	-	First Lamp-Lit error cooling	
Lamp Error Messages				
O	-	R	Second Lamp-Lit error	
-	-	R	Lamp error in normal operation	
Thermal Error Messages				
-	R	-	Fan 1 error (the actual fan speed is ±20% outside the desired speed.)	Lamp Fan
-	R	R	Fan 2 error (the actual fan speed is ±20% outside the desired speed.)	Ballast Fan
-	R	G	Fan 3 error (the actual fan speed is ±20% outside the desired speed.)	Blower Fan
	R	O	Fan 4 error (the actual fan speed is ±20% outside the desired speed.)	
R	R	R	Thermal Sensor 1 open error (the remote diode has an open-circuit condition.)	DMD sensor
R	R	G	Thermal Sensor 2 open error (the remote diode has an open-circuit condition.)	
R	R	O	Thermal Sensor 3 open error (the remote diode has an open-circuit condition.)	
G	R	R	Thermal Sensor 1 short error (the remote diode has an short-circuit condition.)	DMD sensor
G	R	G	Thermal Sensor 2 short error (the remote diode has an short-circuit condition.)	
G	R	O	Thermal Sensor 3 short error (the remote diode has an short-circuit condition.)	
O	R	R	Temperature 1 error (over limited temperature)	DMD sensor
O	R	G	Temperature 2 error (over limited temperature)	
O	R	O	Temperature 3 error (over limited temperature)	
-	G	R	Fan IC #1 I2C Connection error	GMT 793
-	G	G	Fan IC #2 I2C Connection error	

Chapter 5 Error Count Messages Definition

Error Count	Definition	Specification
LAMP FAIL COUNT	LAMP OFF	DETECT LAMPLIT
LAMP FAN ERROR COUNT	LAMP FAN SPEED ERROR	SPEED OVER ± 20%
BALLAST FAN ERROR COUNT	BALLAST FAN SPEED ERROR	SPEED OVER ± 20%
BLOWER ERROR COUNT	BLOWER FAN SPEED ERROR	SPEED OVER ± 20%
DIODE1 ERROR COUNT	LAMP BOX SENSOR ERROR	DETECT DIODE1
DIODE2 ERROR COUNT	FRONT SENSOR ERROR	DETECT DIODE2
DIODE3 ERROR COUNT	MCU WATCHDOG RESET	DETECT WTD
LAMP BOX SENSOR OVER TEMPERATURE COUNT	LAMP BOX TEMPERATURE ERROR	TEMPERATURE OVER 65 ℃
FRONT SENSOR OVER TEMPERATURE COUNT	N/A	N/A
FAN IC I2C ERROR	N/A	N/A

Level 3 - Component Repair to Curcuit Boards

Theory of Circuit Operation

Chapter 1 System Operation Theory

1.1 Overview

The Projector system consists of display function, cooling function, lighting function, safety protection function, and User interface control function and power control function. An ARM processor embedded in the DDP ASIC is used to execute system firmware. The ARM processor serves as the master controller of the projector and provides the link between the display screen and end-user controls such as a keypad and IR remote control. These inputs can be processed in the ARM

processor by system firmware so that commands can be issued to configure the DDP ASIC, the analog interface device, the video decoder, the cooling device, and other system peripheral devices. Please see figure 2.

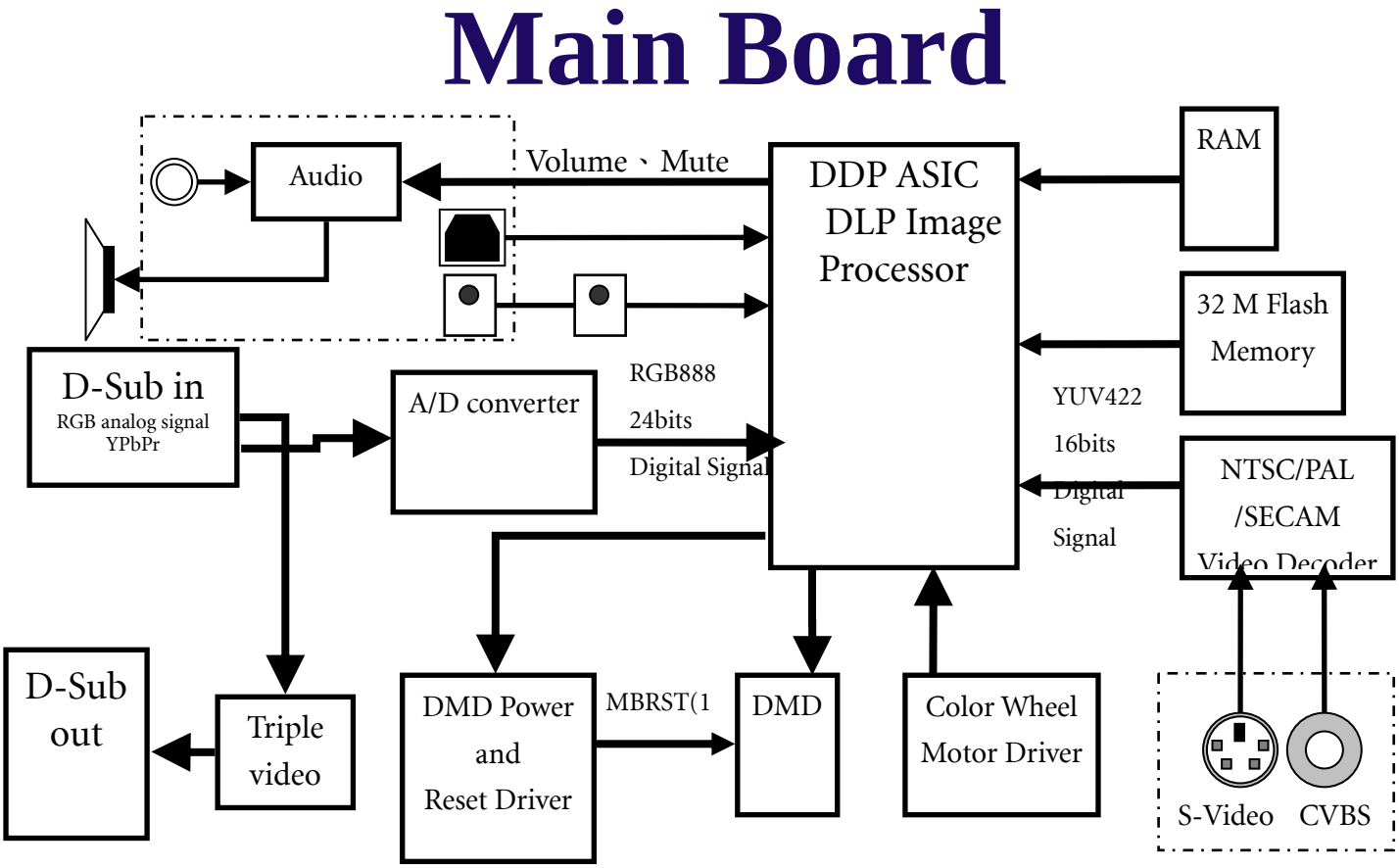


Figure 2 Main board & Input board BLOCK DIAGRAM

1.2 User Interface Function

(1) Keypad function: There are 9 keypads on top case. Please see Figure 3. MCU does polling on these signals [KEY8:0] to detect the key pressing action. Each key pressing action will request MCU to execute the specified program.

(2) Indicator LED function: There are 3 twice color LED on top case. MCU releases the status of program indication by setting LED signal LED[6:0]. It will show the power status, lamp status, and temperature status.

(3) IR remote function: There are two IR receivers, one is at the front side, and the other one is at back side. The receiver sensor has 3 legs, pin1 is output, pin2 is ground, and pin3 is VCC (5V). The output pin is pulled high, and will sink to low when it receives infrared signal coming from remote controller. MCU will decode the signal and execute related program.

(4) USB function: There is a B type USD terminal for mouse port at back side. MCU supports the universal serial bus version 1.1 in a slave mode only.

(5) OSD function: DDP ASIC generates the On-Screen Display. Please refer to C212 Software Specification.

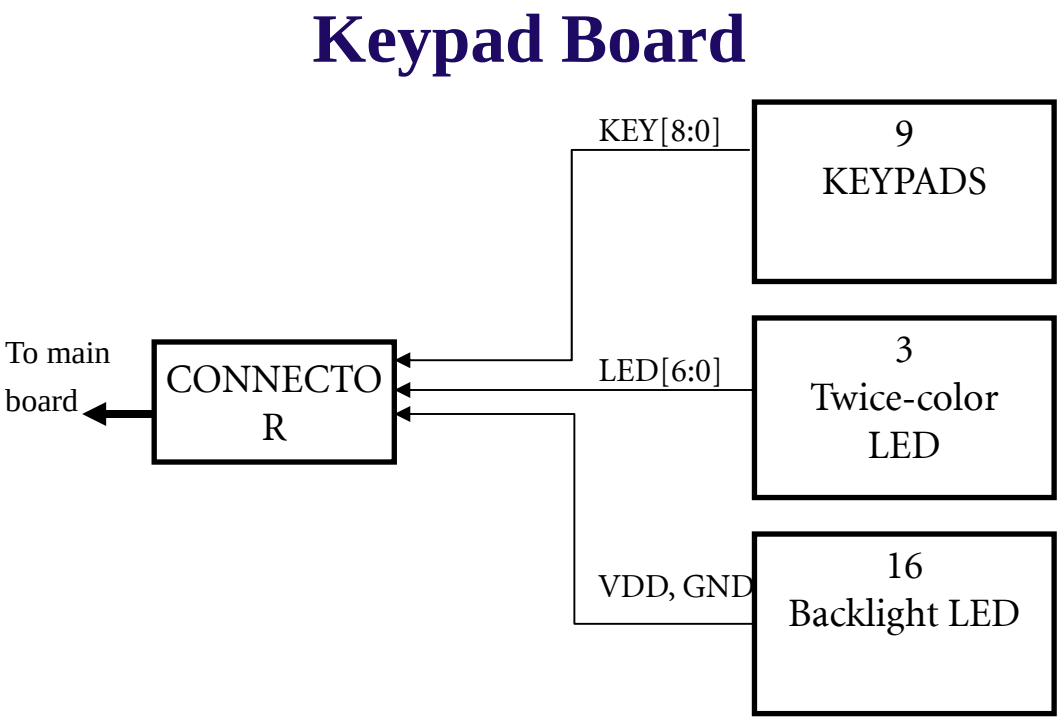


Figure 3 Keypad board BLOCK DIAGRAM

1.3 Turn On/ Turn Off Function

(1) Turn On function: User can touch "Power" key, or use remote controller to turn on the projector. When MCU receives the command, it will start the power up sequence for DDP ASIC. Color wheel motor will spin up first, and then Lamp enable signal will be sent to Ballast board. After Lamp was ignited, LAMPLIT signal will be fed back to DDP ASIC. It will reset itself and start to send the formatting data to DMD chip. At the mean time MCU reset the cooling circuit and let it working. Then the whole system is warming up.

(20 Turn Off function: User can touch "Power" key, or use remote controller to turn off the projector. When MCU receives the command, it will start the power down sequence. DDP ASIC will be reset off, and then Lamp enable signal will be turn off. The Lamp will be turned off. MCU will remain the cooling circuit operation for two minute in order to cool down the lamp module. After the cooling procedure is end, then the whole system goes to standby mode.

1.4 System Protection Function

(1) Lamp Door Open Protection: There is a Door interlock switch built at bottom case. When lamp door is opened, the switch will turn off the AC line power. Then the whole system will be shutdown immediately.

(2) Lamp Box Thermal Break Protection: There is a thermal break built around the lamp box. If the temperature of lamp box goes too high, the thermal break will send out an alarm signal to hardware protection circuit. Then the lamp will be turned off immediately.

(3) Ballast Over Heat Protection: There is an over heat protection circuit built on ballast board. When it alarm, the ballast will shut down the lamp.

(4) Fan Spinning Abnormal Protection: There are 3 fans built on this system. MCU will do polling the fan spinning status. If the speed of fan is abnormal, MCU will shut down the whole system.

(5) System Temperature Over Heat Protection: There are 3 temperature sensor built in the system. MCU will do polling the temperature status. If the system temperature is over heat, MCU will shut down the whole system.

Chapter 2 DLP Operation Theory

2.1 Overview

The DLP is the abbreviation of Digital Light Processing technology. The DLP consists of DMD data formatting, Color light sequencing processing, and the core component DMD chip. Please sees figure 4.

DMD data formatting circuit converts the digital image data to the format of DMD requested. The color light sequencing processing controls the color light switching sequence and phase. The DMD controls light valve control of each pixel.

The color wheel may have 4 color filter segments, 5 color filter segments, or 6 color filter segments. These filters will modulate the light source output to the specific color of particular filter coating. Please see figure 5. When color wheel spins around, those colors will be shining on the DMD chip reflective surface. So DMD just controls displaying the right image color at the exact time sequence with color wheel motor. Then fine picture will be displayed out.

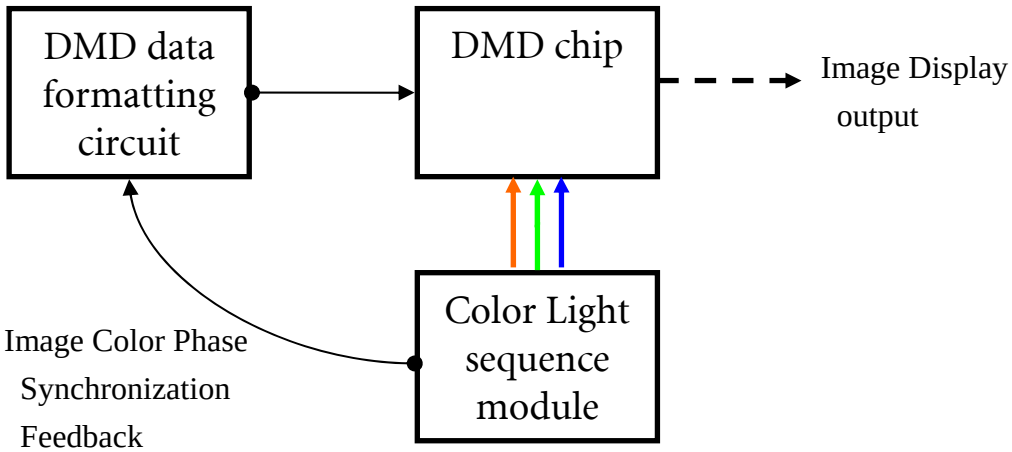


Figure 4 DMD image display concept

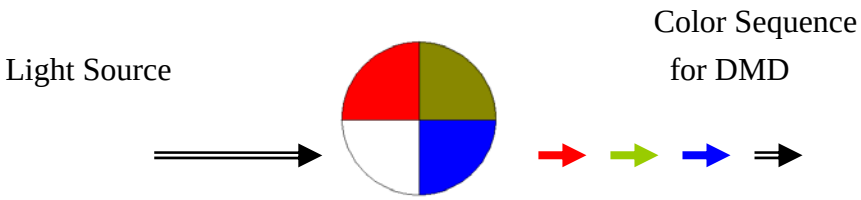


Figure 5 Color modulation concept

2.2 DMD Data Formatting

DMD data formatting circuit consists of DDP ASIC, DAD1000, RAM and FLASH. Please see figure 6.

(1) The DDP ASIC combines the DLP ™ data processing functions and high performance DLP ™ front-end image processing in the same device. The ASIC includes the front-end functions of Auto Lock, Motion-Adaptive De-Interlacing, Spatial-Temporal Noise Reduction Filters, Edge-Preserving Scaling, Keystone Adjustment and On-Screen Display.

(2) The DAD1000 analog ASIC creates the 16 reset lines that control the pixels on the DMD. The DAD1000 and the support circuitry establish the 3 voltage levels that comprise the reset waveform. The DDP ASIC supplies the timing information to the DAD1000 via the STROBE signal, and controls which of the 16 individual reset signals will be output via the SR16ADDR (3:0) lines. The SR16SEL(1:0) signals select the correct voltage level (bias, offset or reset) for the current transition.

(3) The RAM is used with the DDP ASIC for bit-plane storage and as an extensive workspace for de-interlacing, noise reduction filters, and Auto Lock. Unlike other front-end ICs, no additional external RAM is needed for supporting de-interlacing.

(4) The FLASH memory is used for program storage of both the TI generated APIs and drivers and the Application code written by the project engineering staff.

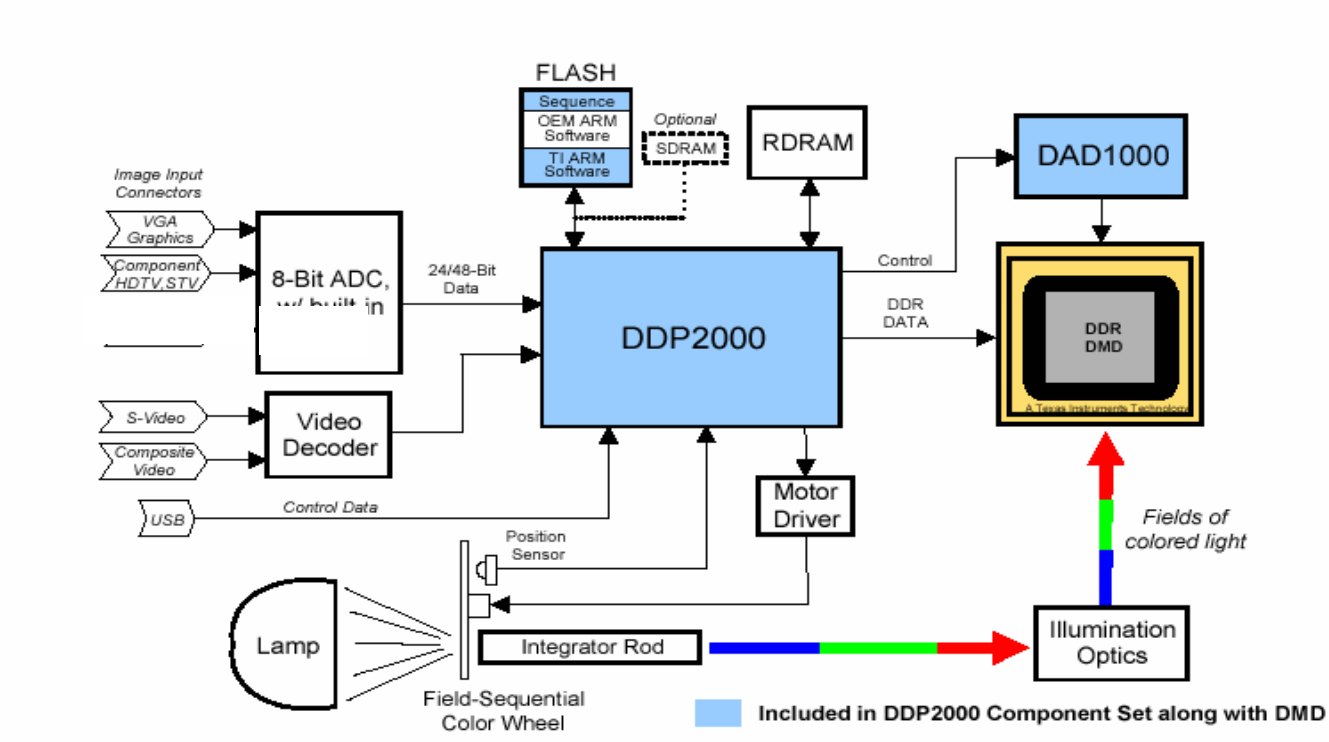


Figure 6 DLP Block diagram

2.3 Color Light Sequencing Processing

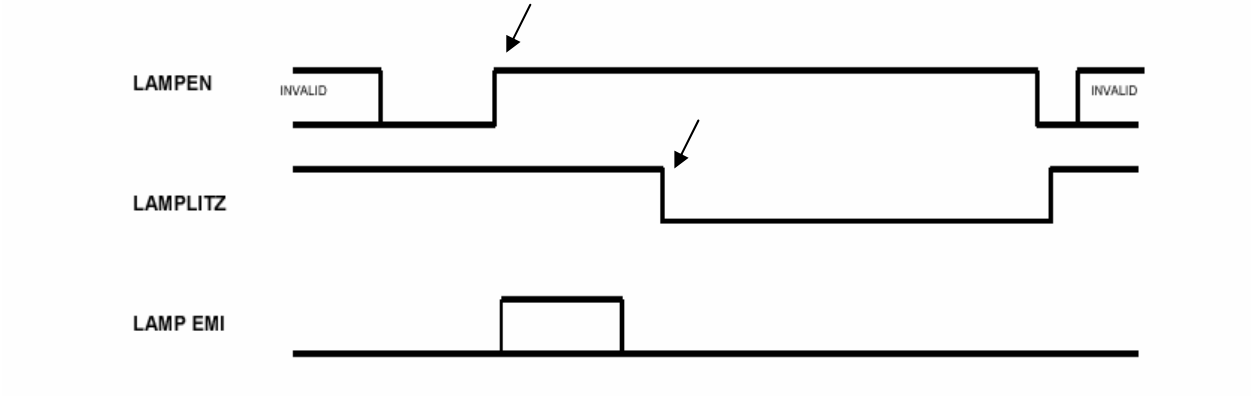
Color light sequencing processing circuit consists of Motor driver, Motor phase synchronization, Light source control and synchronization.

(1) Motor driver drives the color wheel motor. The motor is three phase, 8, 12 or 16 pole, Y configuration, brushless DC motor.

(2) Motor phase synchronization circuit uses the CWINDEX to phase and frequency lock the color wheel to a multiple of Vertical sync (Vsync). Sequences are typically designed for the clock to run at 1.5X, 2X, 2.5X and 3X the Vsync rate. The DDP ASIC electronics phases the display of the data on the DMD based on the CWINDEX signal. The CWINDEX typically indicates the beginning of the red light on the DMD device. The DDP ASIC electronics can be configured to delay the CWINDEX. This is useful for electronic alignment of the color wheel. The CWINDEX signal is generated by color wheel sensor board that was attached around the motor hub.

(3) Light source control and synchronization circuit provides a lamp enable (LAMPEN) signal to control the projector lamp and ballast. The LAMPEN is used for on/off control as well as synchronization of AC lamps. The LAMPLITZ signal shall be asserted to the DDP ASIC circuits after successful ignition of the lamp. See Figure 7 for detailed timing on the LAMPLITZ during power up. Note there is strong EMI noise when igniting the lamp, at that period system should not execute any action.

Figure 7 Lamp control Timing



2.4 DMD Chip Operation

The DDP ASIC provides the 64 data lines and the control signals to the DMD. These signals control the loading of data into the DMD memory cells. The DDP ASIC is responsible for the proper timing between the memory load operation and the Reset operation for DMD chip.

Chapter 3 Input Signal Processing Theory

3.1 Overview

The Projector signal input terminals consist of PC VGA (Component) input, PC VGA output, S-Video input, Video input, and PC Audio input.

3.2 Graphics Signal Processing

PC VGA (Component) Input: The PC VGA (Component) Inputs consist of PC analog RGB signal, PC HSYNC signal, PC VSYNC signal, PC EDID/DDC signal, and Component YPBPR signal. RGB signal will be converted to digital 24 bits format and feed for DDP ASIC by an Analog to Digital convert device built on main board. The HSYNC and VSYNC will be rectified by a high speed Schmitt trigger inverter, and is fed to ADC device. PC DDC signal will link to an EEPROM built on main board. The EDID function setting data please refer to C212 Software Specification. Component signal is plugged in by a VGA to RCA convert cable. This signal will be also converted to digital data by ADC device. Please refer figure 2.

ADC device consists of Analog interface, Sync processing, and Digital interface. The ADC device is the key component for graphics signal processing. It is a fully integrated solution for capturing analog RGB signals and digitizing them for display on projector. Please see Figure 8.

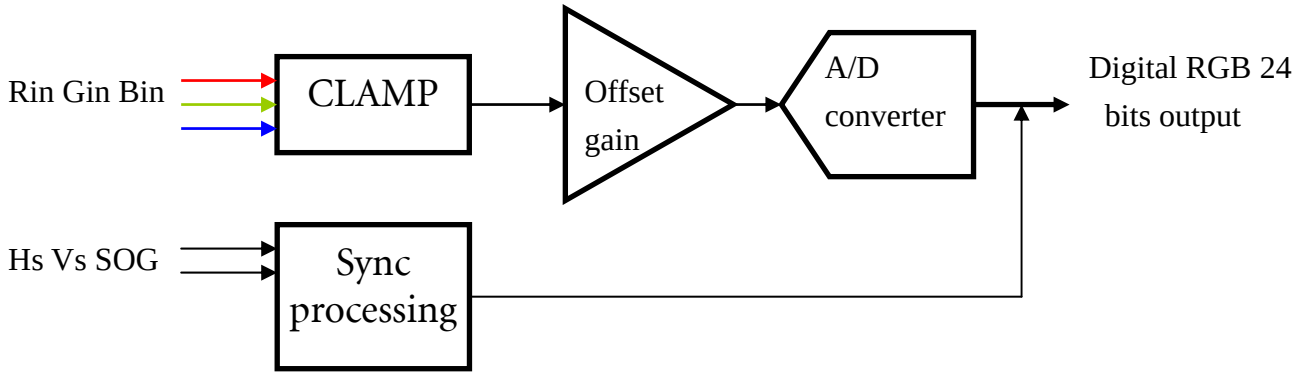


Figure 8 ADC device operation concept

3.3 Videos Signal Processing

Video and S-Video input: The Video and S-video signal will be fed to a Video Decoder (VDC) device built on main board. The video decoder accepts NTSC/PAL/SECAM composite and s-video inputs. The output is formatted as YCrCb and routed to the DDP2000.

The VDC device is the key component of video signal processing. It is an integrated device that consists of A/D interface, Sync processing, Luma/Chroma decoding and processing, and Digital output interface. Please see Figure 9.

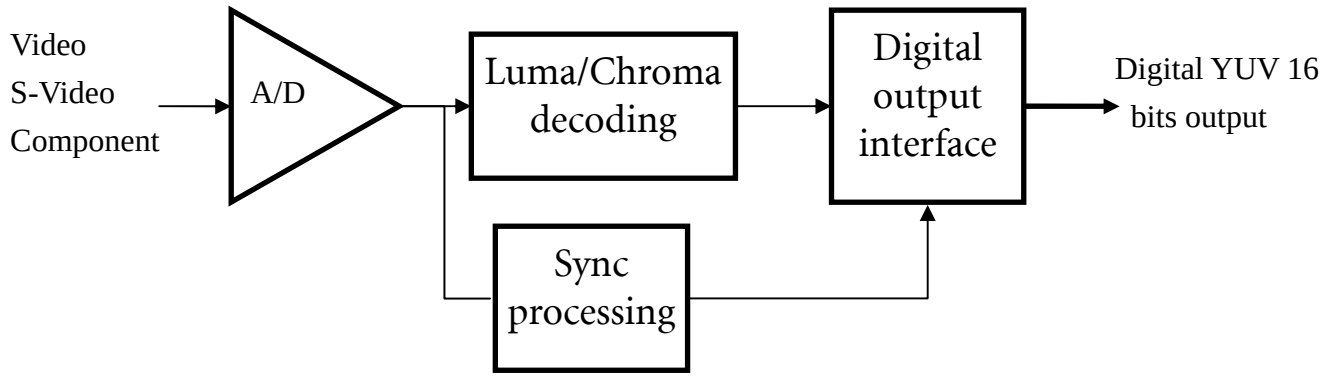


Figure 9 VDC device operation concept

3.4 Audio Signal Processing

The PC Audio signal input to source board. There is an audio amplifier built on it. It supplies the mute control and volume control. The output audio power is 2 watts.

Chapter 4 Cooling Circuit Operation Theory

4.1 Overview

The Projector cooling circuits consist of Fan driver devices, Fans, and Thermal sensors. The cooling purpose is for protecting System Elements from over heat damage. Please see figure 8. The particular hot spot points are Lamp Tip, Lamp Burner, DMD Heat-sink, and Lamp Box. There are three fans, blower fan, main fan 1, and main fan 2 for driving airflow to cool down the system and hot spot point temperature.

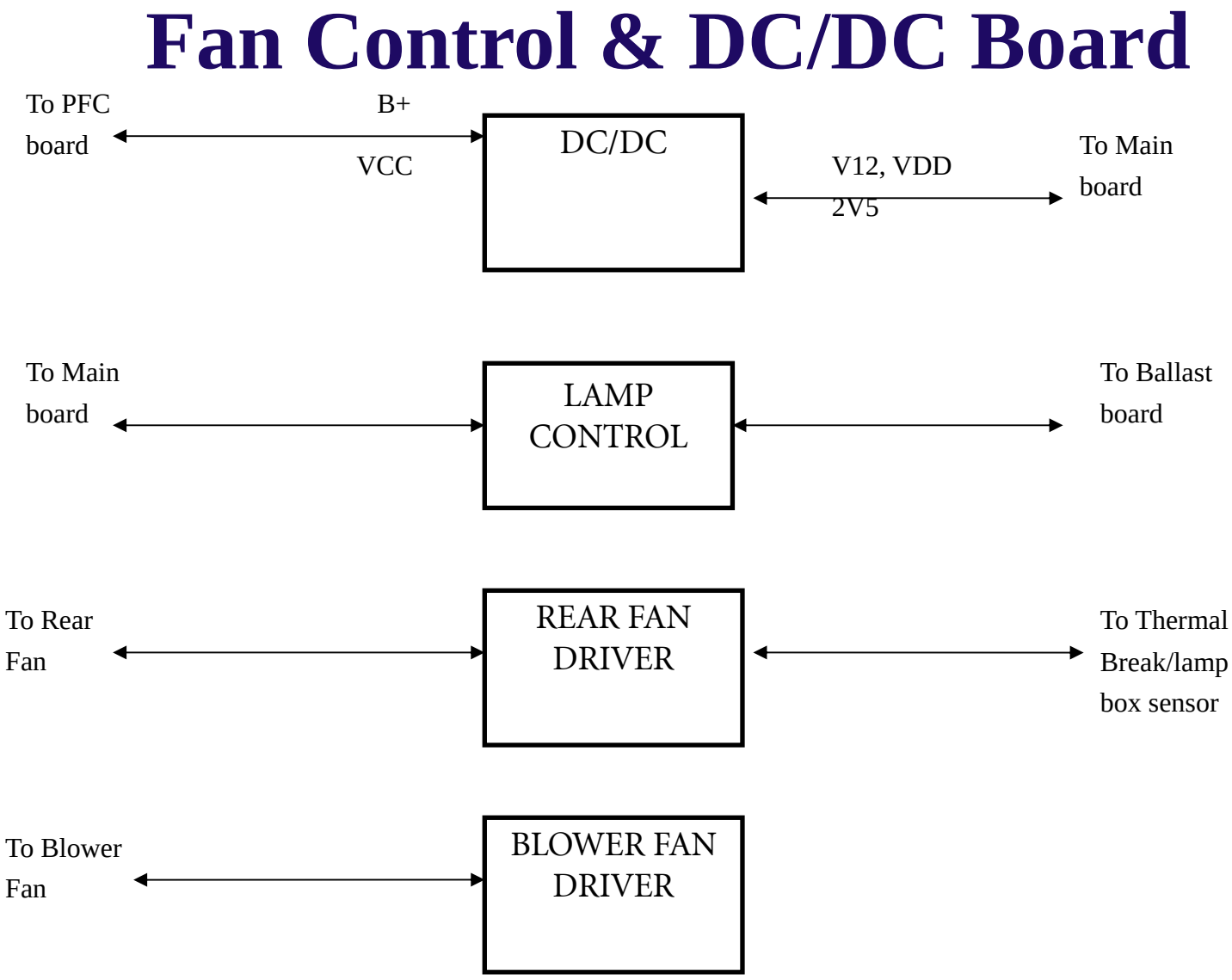


Figure 10 Fan Control & DC/DC board BLOCK DIAGRAM

4.2 Blower Fan

Blower fan is designed for cooling the lamp tip and lamp burner. The speed of blower fan is controlled and monitoring by MCU.

4.3 Rear Fan

Rear fan is designed for cooling the whole system except tip and burner of lamp. The speed of rear fan is controlled and monitoring by MCU.

4.4 Temperature Sensor

There are three temperature sensors built on the system. One is seated at fresh air intake area. One is seated on DMD heat-sink. And the other one is near by the Lamp Box. The sensor is binary junction diode, and there is chopping bias current on it. MCU will do polling for each sensor and fan speed, and execute cooling V-T curve control program in order to feed the environment situation changing requirement.

4.5 Fan Controller

The fan driver device consists of I2C interface, thermal sensor interface, fan current output interface, and the tachometer interface. MCU access fan driver device by I2C interface. Thermal sensor interface is analog small sensitive signal. The temperature measurement principle is calculating the biasing current of diode to figure out the temperature parameter of the diode.

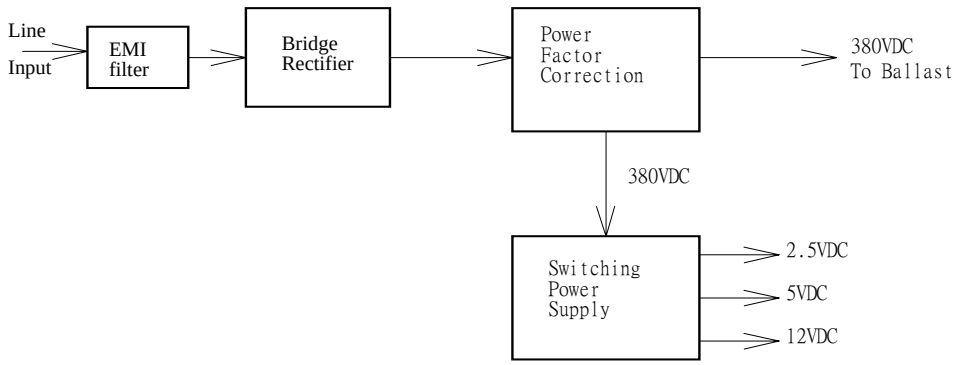
Chapter 5 Power Supply Circuit Operation Theory

5.1 Overview

The power supply unit includes EMI board, PFC board, DC/DC board (built on Fan board), and Ballast board.

The EMI board has EMI filter circuit to reduce EMC noise coupling to AC line. The PFC board circuit supply AC line power factor correction function. DC/DC board converts primary voltage to secondary DC low level voltage for system using. And Ballast board generates the lamp ignition high voltage to ignite the lamp, maintains the stable power consumption of lamp, and synchronizes the lamp sequence with DLP color index sequence.

Block Diagram



5.2 General Specification

Input voltage : AC 90~264V

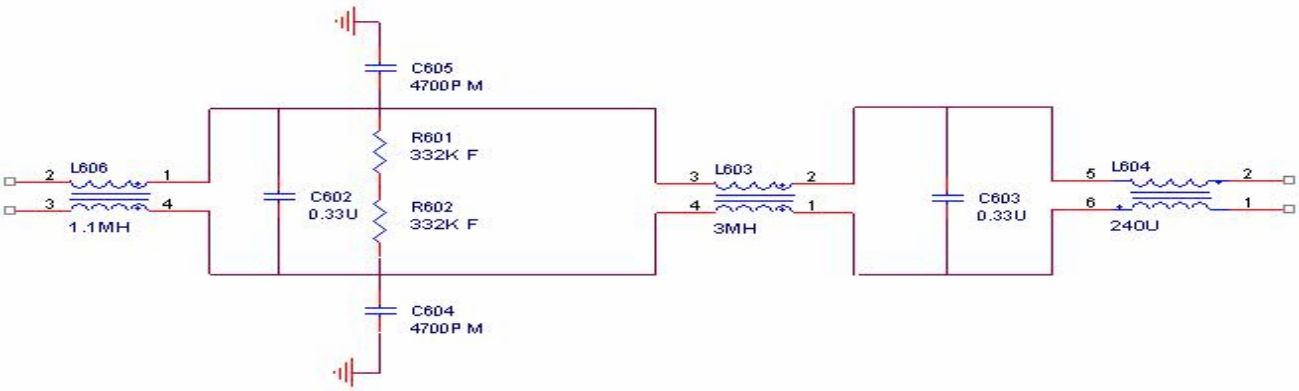
Input Frequency: 47~63Hz

Input power: 300W max

The power circuit shall supply DC power outputs as followings:

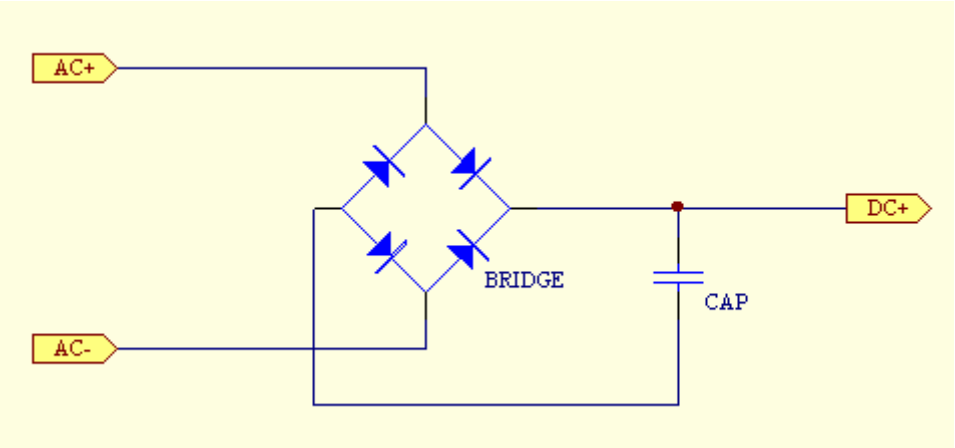
	Output Voltage	Typical load current
1	380V	0.58A
2	2.5V	1.4A
3	5V	1.4A
4	12V	0.5A

5.3 EMI filter



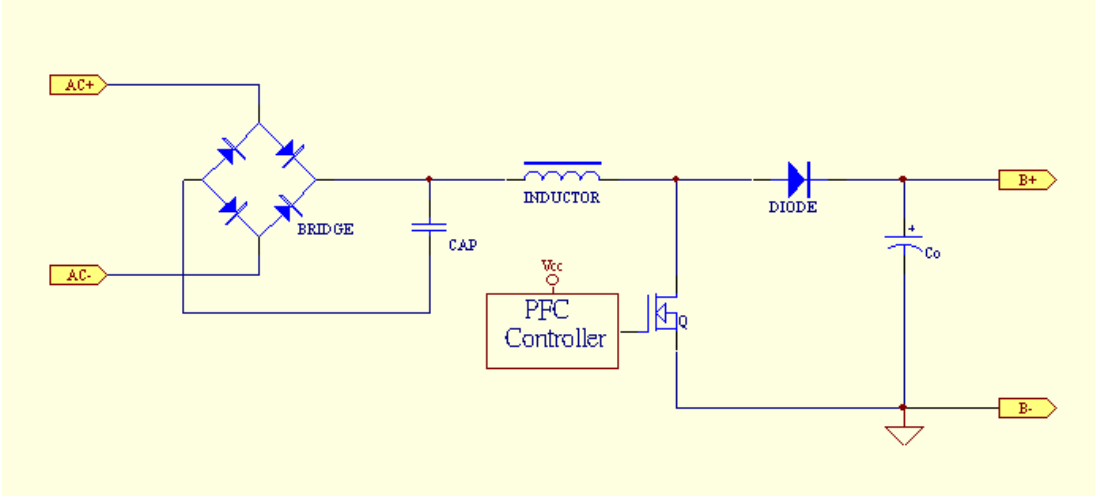
EMI components include common choke L606.L603, X Capacitor C602.C603, Y Capacitor C604.C605. and differential choke L604.and discharge resistor R651A, R651B, This circuit designed to inhibit electric and magnetic interference for meet FCC class B and CISPR class B standard requirements.

5.4 Bridge rectifier and filter



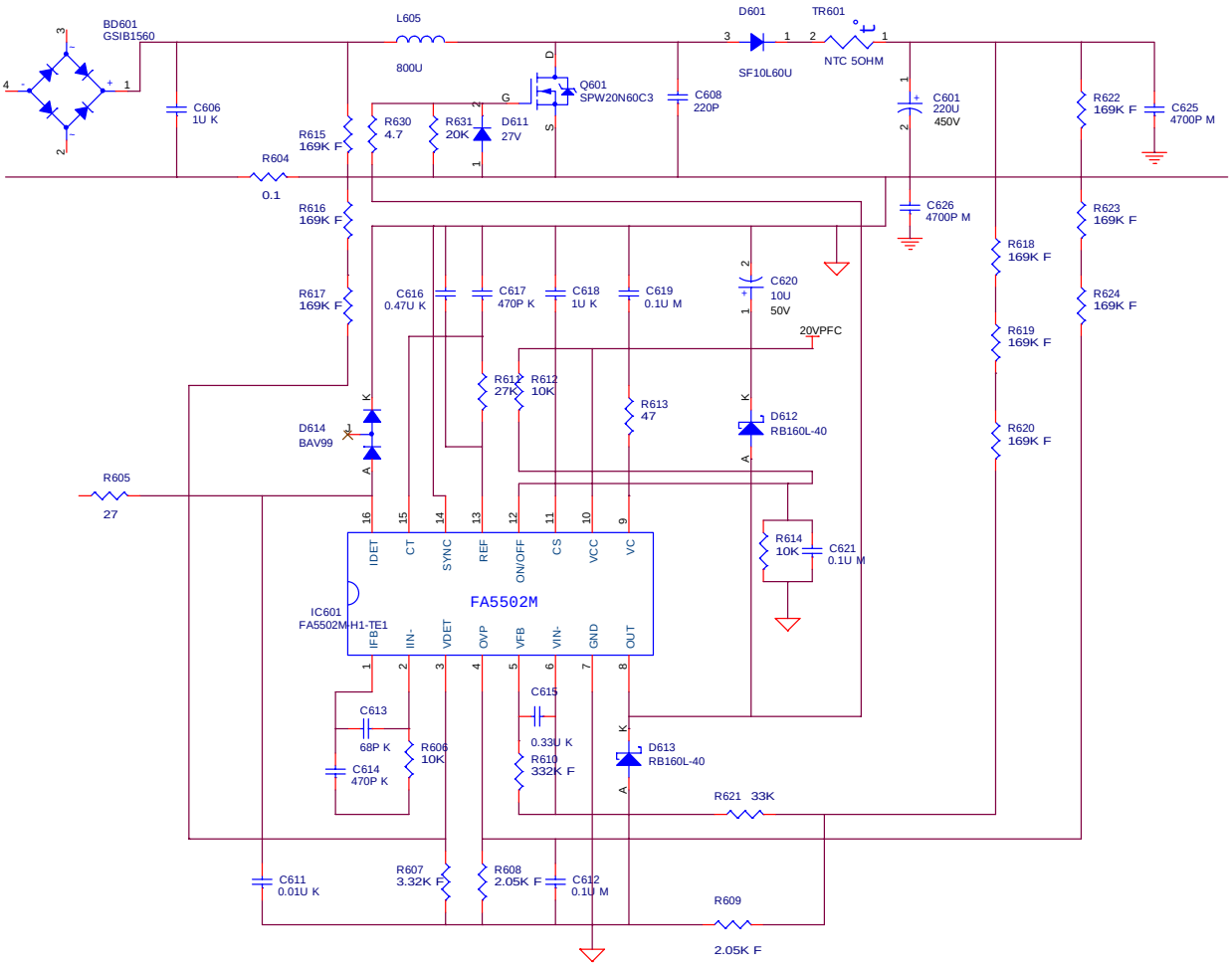
Bridge converts the AC input into DC output, and the CAP is AC filter.

5.5 Power Factor Correction

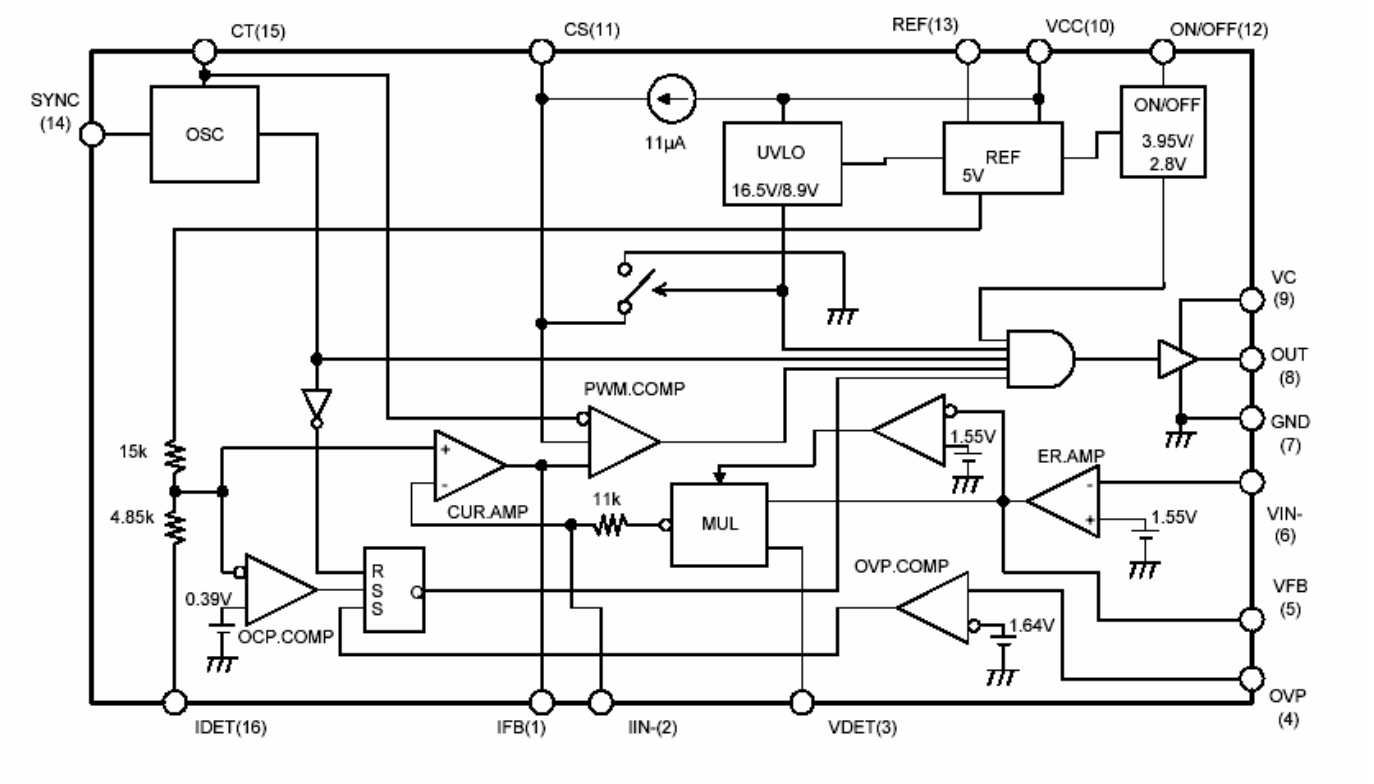


The Power Factor Correction (PFC) like a Boost converter . The AC mains voltage is rectified by a bridge and the rectified voltage delivered the the boost converter . This using a switching technique ,boost the recdtified input voltage to a regulated DC output voltage Vo . The boost converter consists of a boost inductor (L) , a controlled power switch (Q) , a catch diode (D) , an output capacitor (Co) ,and a PFC controller . PFC's goal id to shape the input current in a sinsoidal fashion , in-phase with the input sinusoidal voltage .

PFC schematic:



FA5502 Block Diagram:



Description:

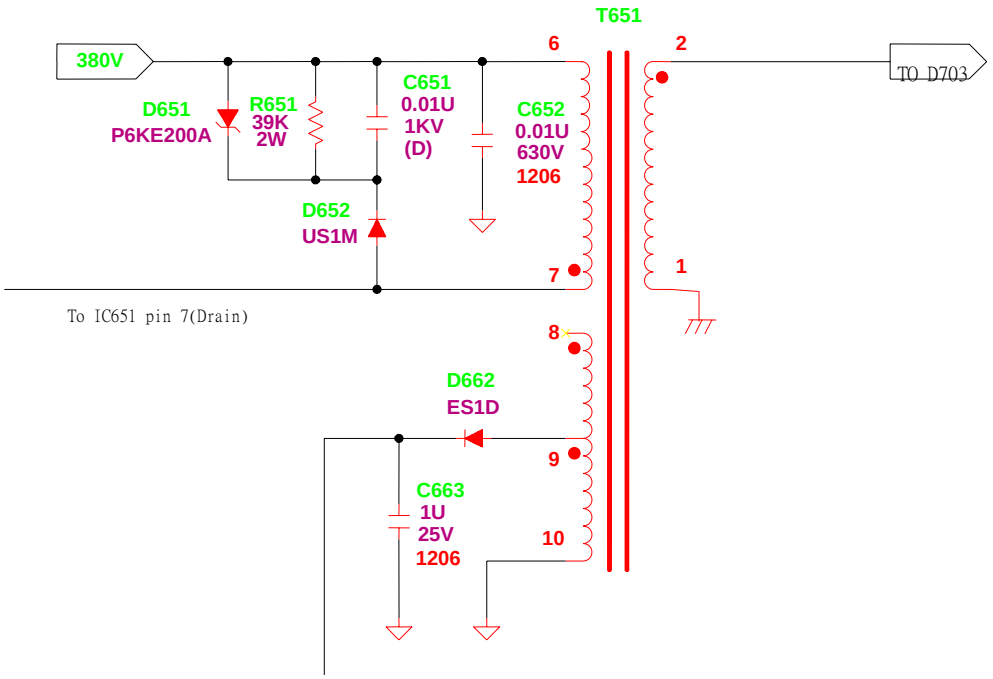
The FA5502 is a control IC for a power factor correction system. This IC use the average current control system to en sure stable operation. With this system , a power factor of 99％ or better can be achieved.

Pin assignment:

1. IFB: current error amplifier output（output of current error amplifier to connect compensation network）
2. IIN: Inverting input to current error amplifier(Inverting input to current error amplifier to connect compensation network)
3. VDET: Multiplier input (input of multiplier to detect sinusoidal waveform)
4. OVP: overvoltage protection inpution(overvoltage protection circuit)
5. VFB: voltage error amplifier output(It's connect compensation network)
6. VIN－: Inverting input to voltage erroramplifier(It's detect PFC output voltage)
7. GND: Ground
8. OUT: output(output for direct driving a power MOSFET)
9. VC: power supply to output circuit
10. VCC: power supply to IC
11. CS: soft-start(connect capacitor for soft-start)
12. ON/OFF: output on off control input(IC output on off control circuit)
13. REF: reference voltage

14. SYNC: oscillator synchronization input(input of synchronization signal)
15. CT: oscillator timing capacitor and resistor(to set oscillation frequency)
16. IDET: Non-inverting input to current error amplifier(input of inductor current signal)

5.6 Transformer and snubber circuit of Sub Power Board

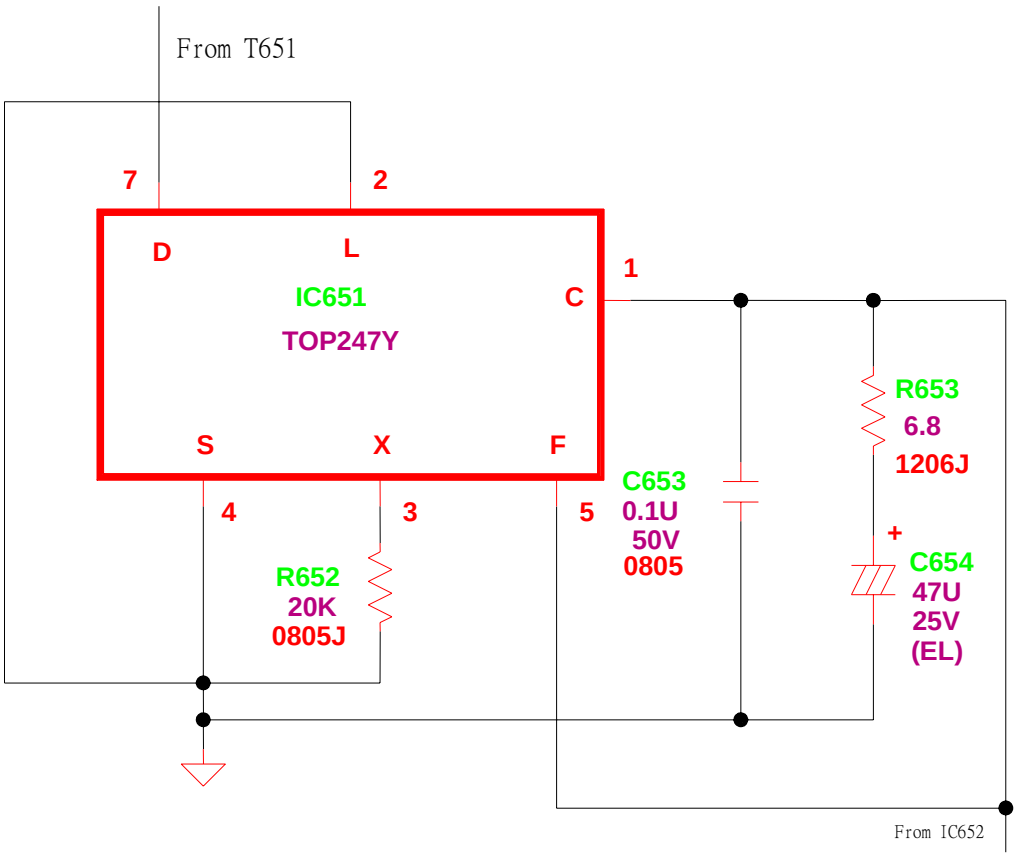


In a flyback converter operated in the discontinuous mode, the energy stored in the flyback transformer must be zero at the beginning and end of each switching period . During the on-time

energy is stored in the transformer and energy taken from the transformer when the switching transistor turn-off, the stored energy is all delivered to the output .The flyback transformer is T651,

IC651 is the power module IC, it include PWM IC and MOSFET . R651,C651,D651, D652 are the snubber circuit, which is reduce the spike voltage.

5.7 Power module IC



The Power module IC is TOP247Y , The function of each pins described as follow.

pin 1 : Control pin

pin 2 : Line-sense pin

pin 3 : External current limit pin

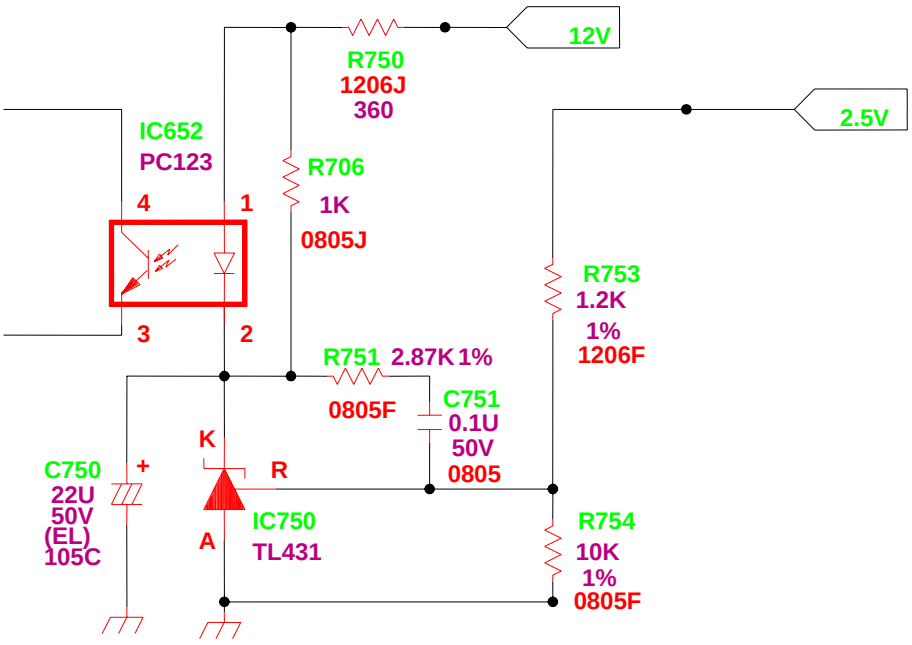
pin 4 : Source pin

pin 5 : Frequency pin

pin 6 : NA

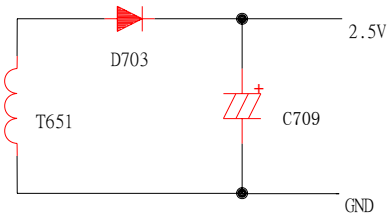
pin 7 : Drain pin

5.8 Feedback circuit and photo coupler



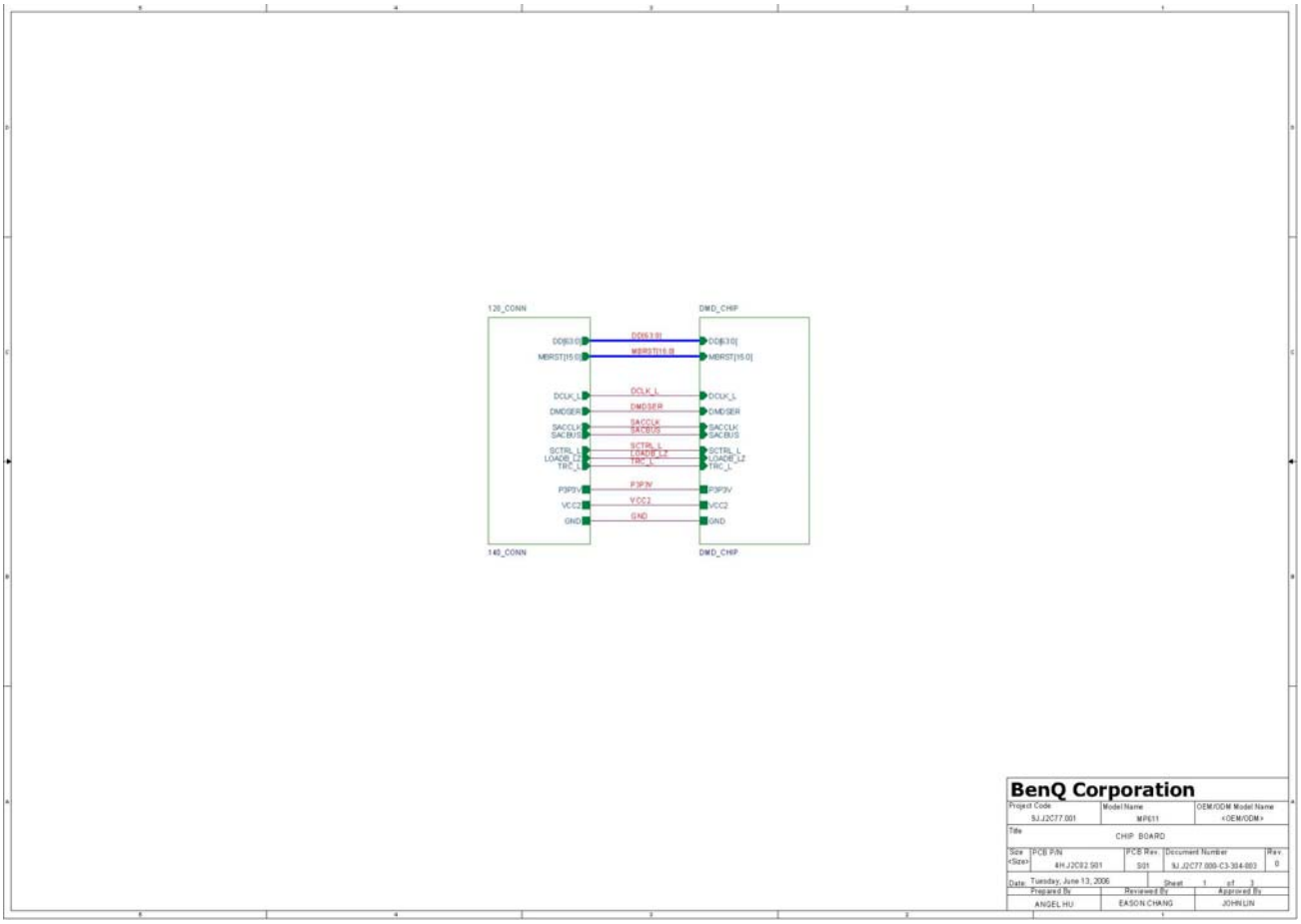
The power supply adapt a single feedback circuit of 12V. It used IC750 for voltage regulation and IC652 for primary-secondary isolation. The output voltage will be controlled by IC750 pin 1 (feedback) ,the duty cycle of MOSFET will be decided to control the output voltage.

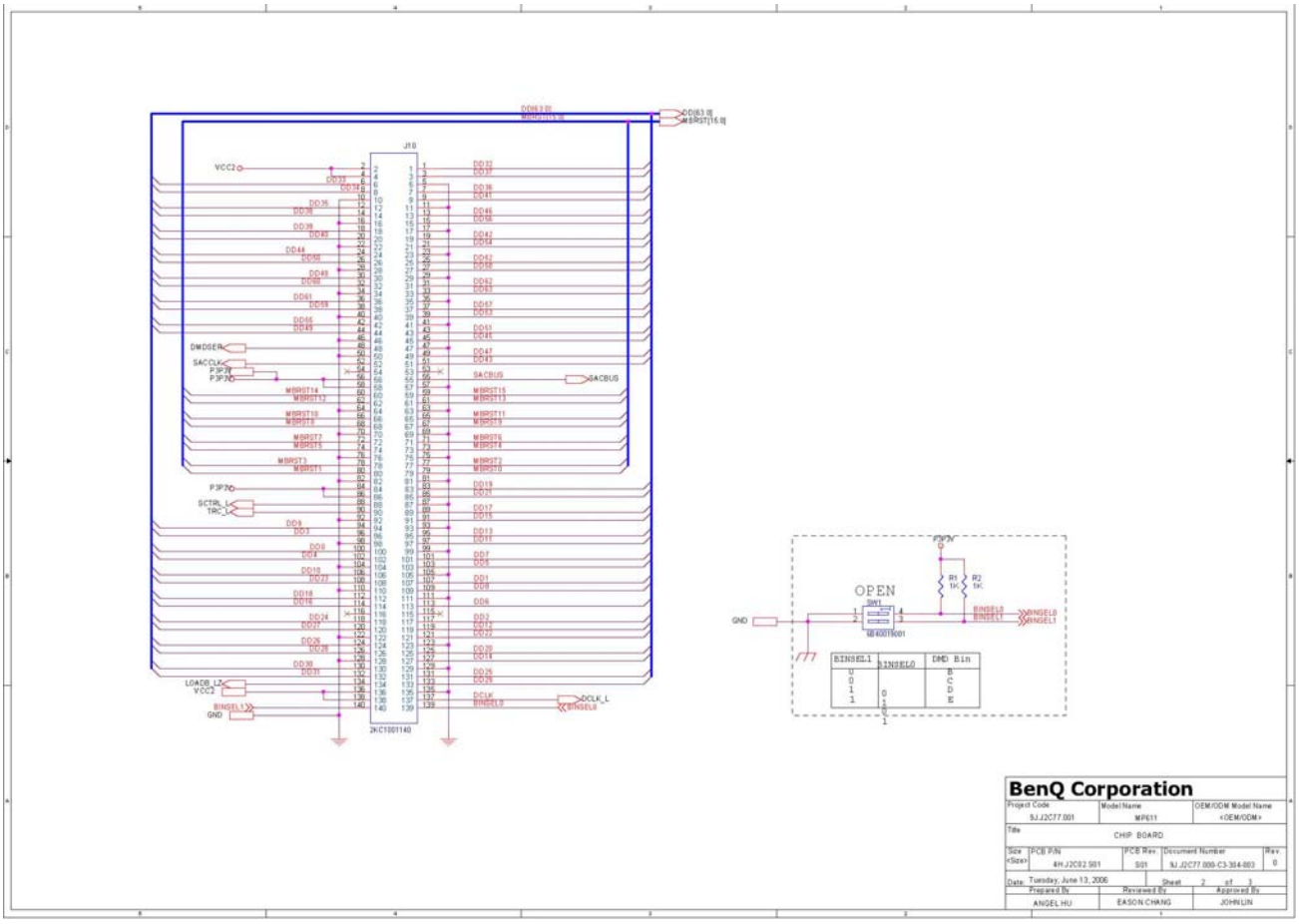
5.9 Secondary rectifier and filter



Since the transformer T651 acts as a storing energy inductance , Diode D703 is rectifier and capacitor C709 is to reduce the output ripple and noise.

Circuit Schematics

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R1
1K
R2
1K
BINSEL1
BINSEL0
DMD Bin
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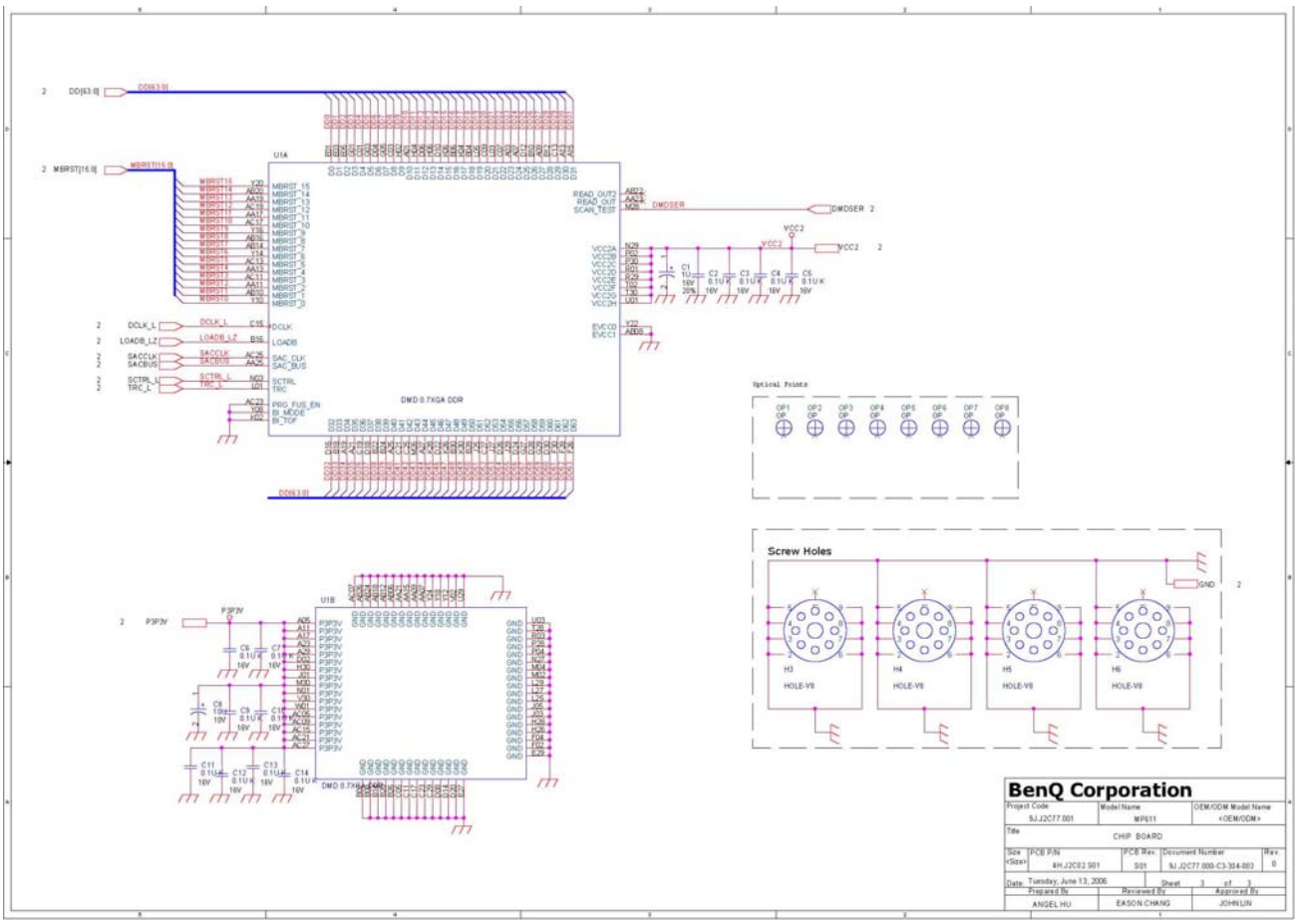
PCB Rev.
S01
Document Number
SJ.J2C77.009-C3-304-003
Rev.
0
Date: Tuesday, June 13, 2006
Sheet 2 of 3
Prepared By
ANGEL HU
Reviewed By
EASON CHANG
Approved By
JOHN LIN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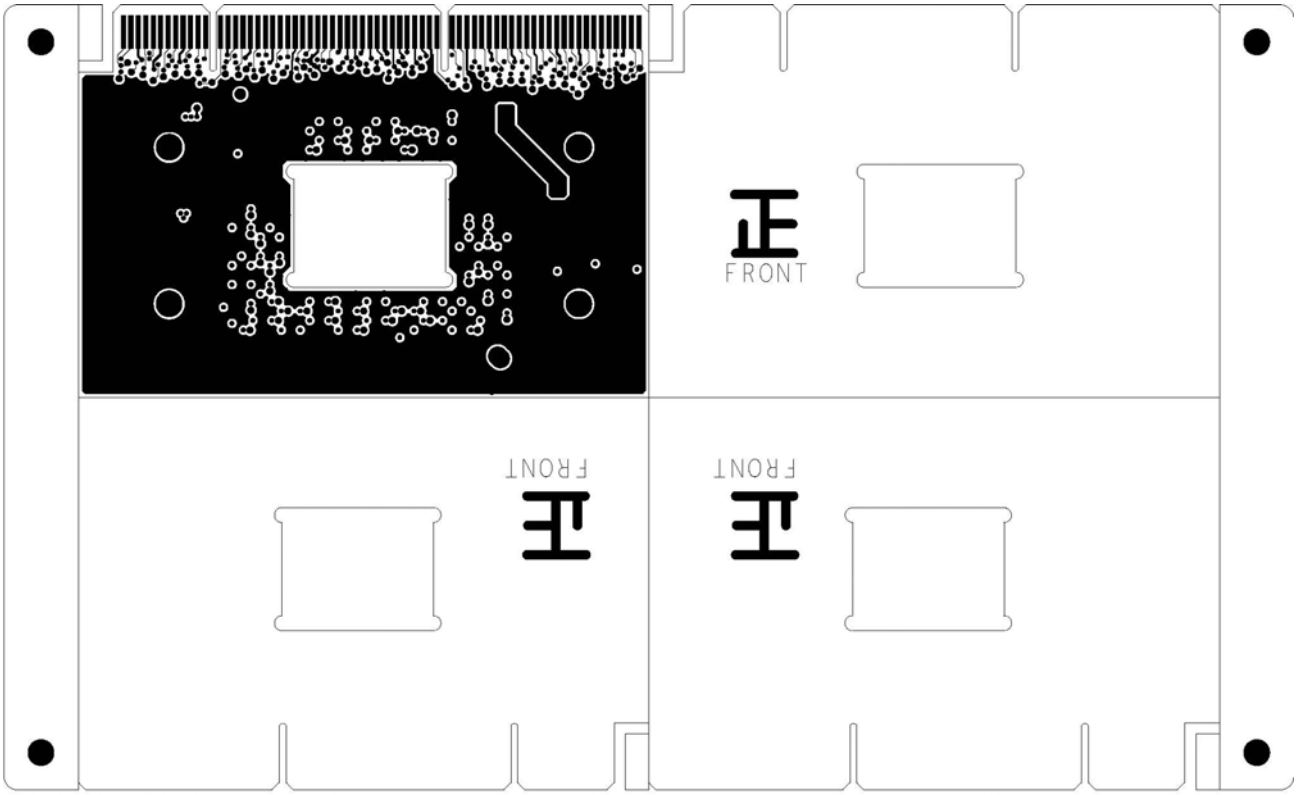
PCB P/N
4H.J2C02.S01
PCB Rev
S01
Document Number
SJ.J2C77.009-C3-304-003
Rev
0
Date: Tuesday, June 13, 2006
Sheet 3 of 3
Prepared By
ANGEL HU
Reviewed By
EASON CHANG
Approved By
JOHN LIN

PCB Artwork



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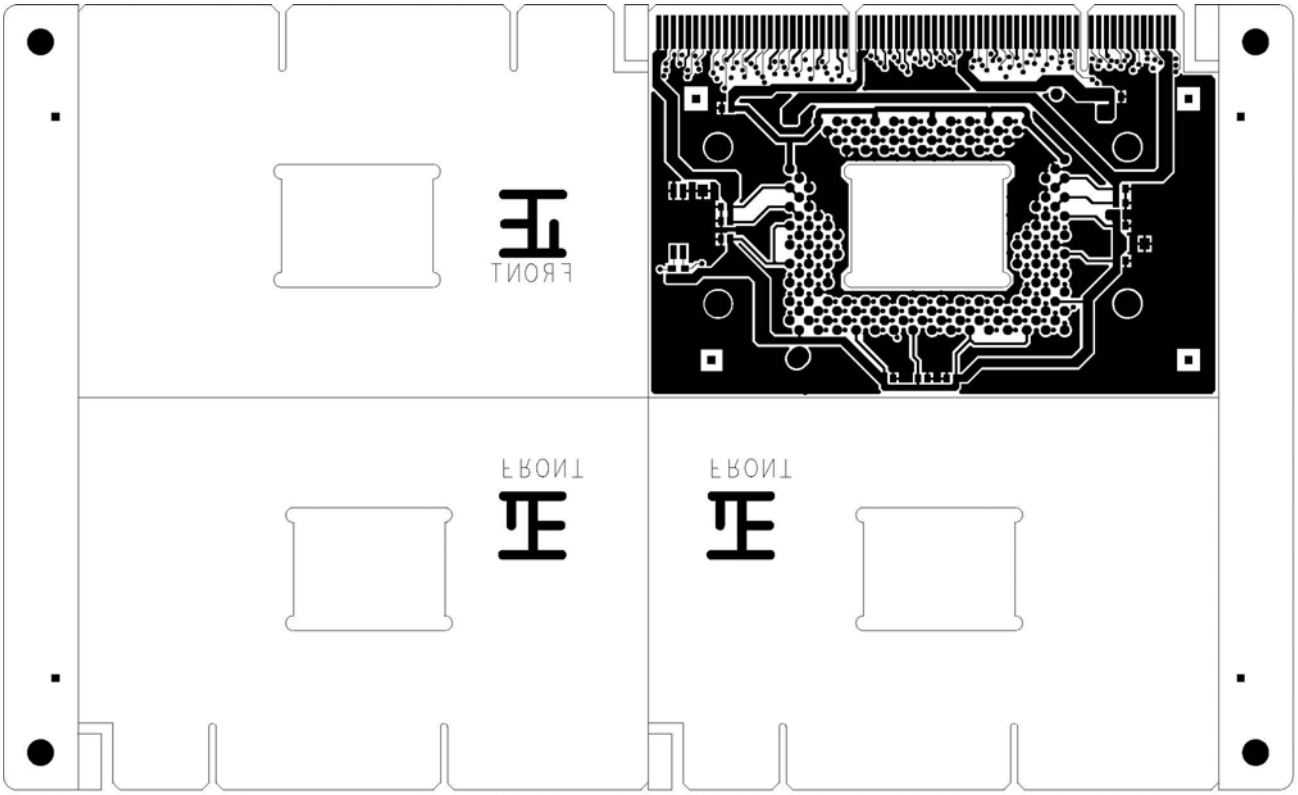
	Model No.: MP611	Sheet 1 of 10	
	Doc. No.: 9J.J2C77.000-C3-305-003		

L1:COMP
L2:INT1
L3:INT2
L4:BOTTOM

PCS:52.6X76.4mm
PNL:105.2X172.8 +-0.127mm
V_CUTx4,ROUTERx4
4PCS/1PNL
THICKNESS:1.6mm
MATERIAL:IMG



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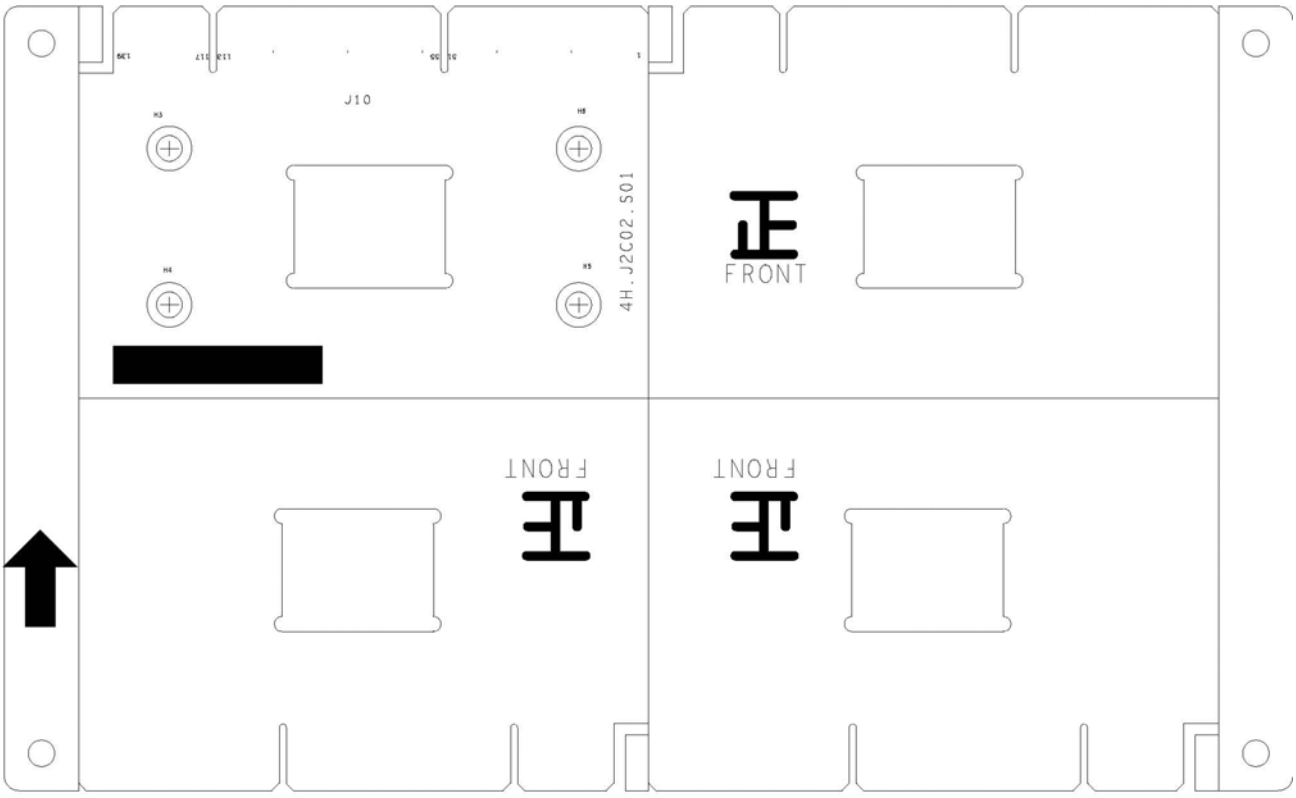
	Model No.: MP611	Sheet 2 of 10
	Doc. No.: 91.J2C77.000-C3-305-003	

L1:COMP
L2:INT1
L3:INT2
L4:BOTTOM

PCS:52.6X76.4mm
PNL:105.2X172.8 +-0.127mm
V_CUTx4;ROUTERx4
4PCS\1PNL
THICKNESS:1.6mm
MATERIAL:IMG



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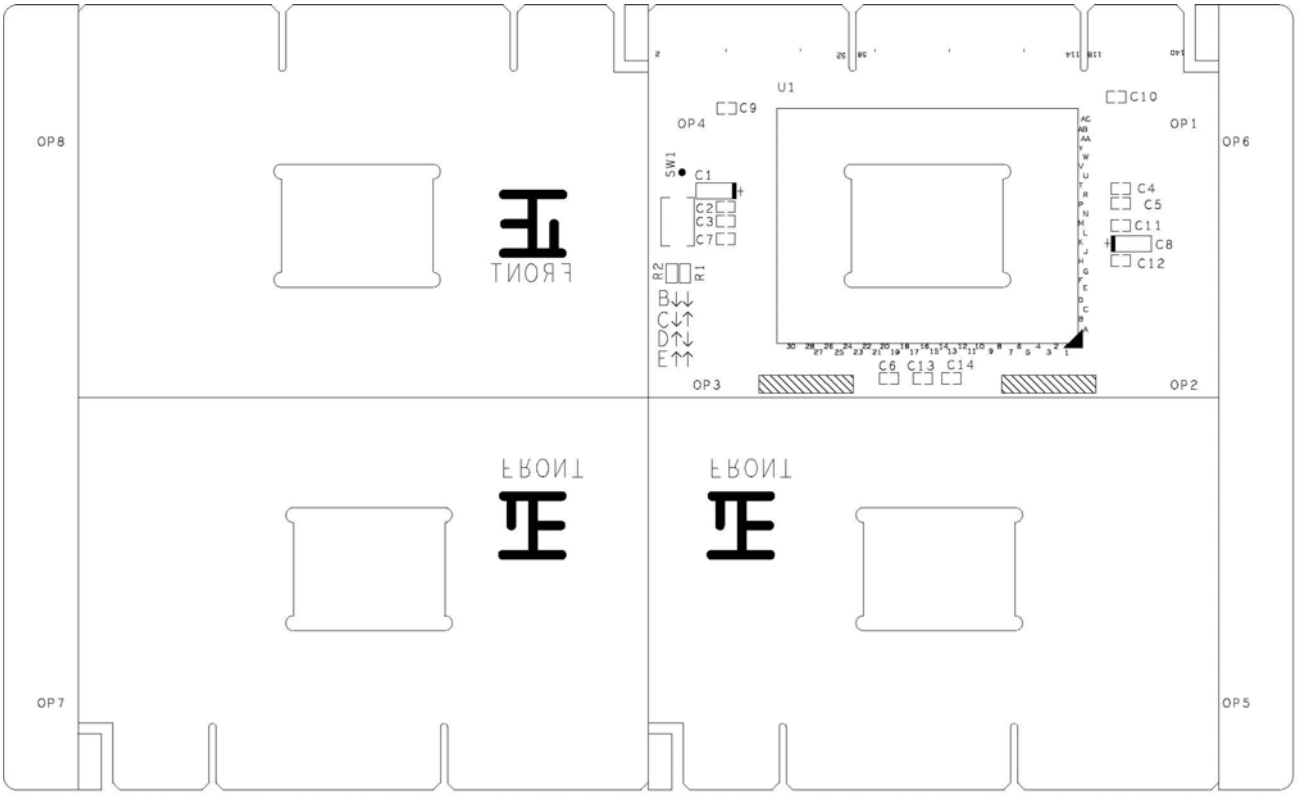
	Doc. No.: 9J.J2C77.000-C3-305-003		

L1:COMP
L2:INT1
L3:INT2
L4:BOTTOM

PCS:52.6X76.4mm
PNL:105.2X172.8 +-0.127mm
V_CUTx4,ROUTERx4
4PCS/1PNL
THICKNESS:1.6mm
MATERIAL:IMG



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L2:INT1
L3:INT2
L4:BOTTOM

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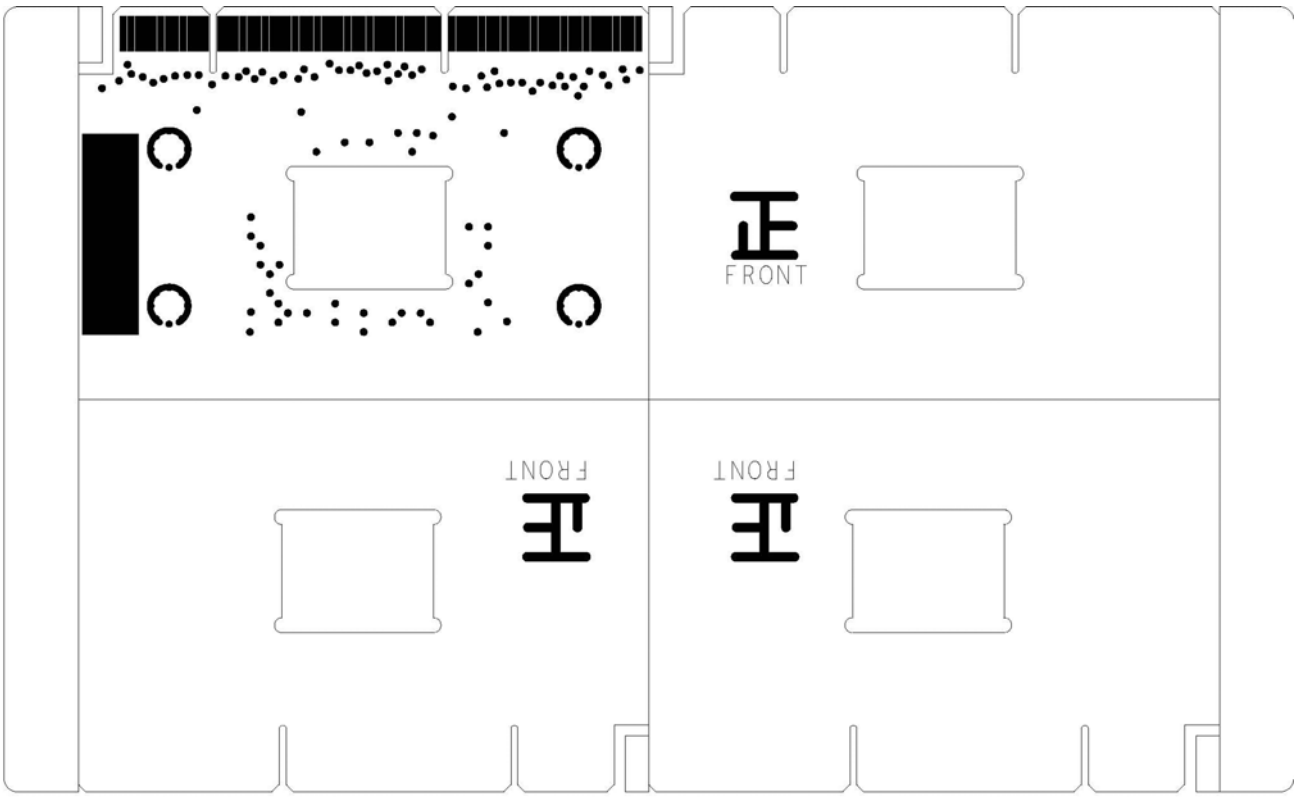
V_CUTx4+ROUTERx4
4PCS\1PNL
THICKNESS:1.6mm
MATERIAL:IMG



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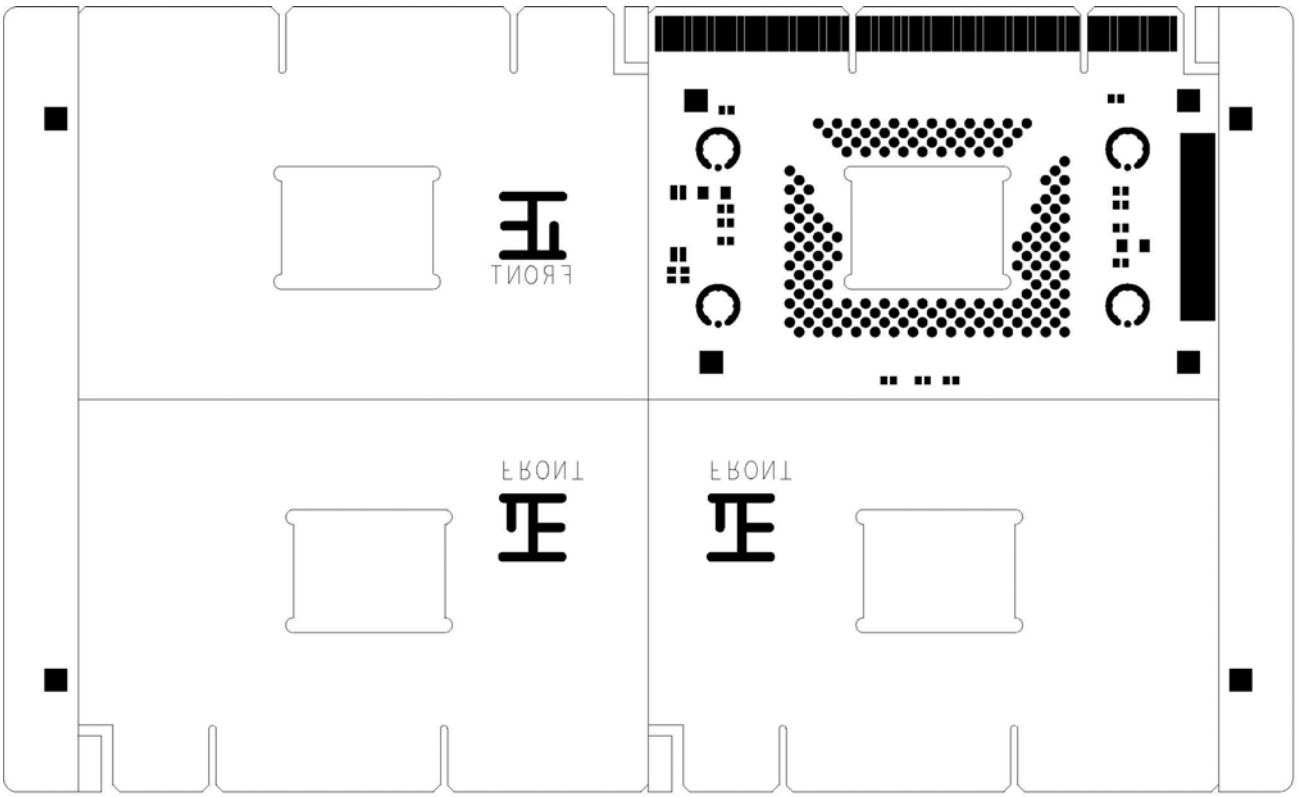
L2:INT1
L3:INT2
L4:BOTTOM

PCS:52.6X76.4mm
PNL:105.2X172.8 +-0.127mm
V_CUTx4,ROUTERx4
4PCS/1PNL
THICKNESS:1.6mm
MATERIAL:IMG



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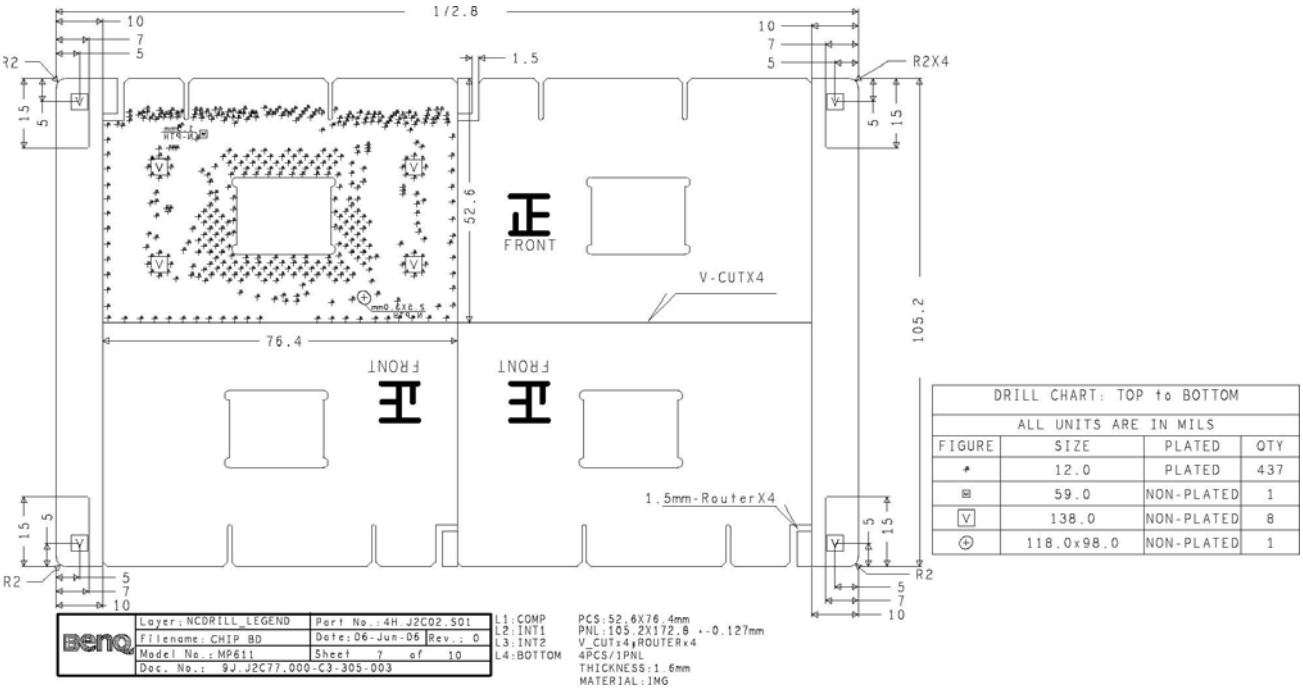
	Model No.: MP611	Sheet 6 of 10
	Doc. No.: 9J.J2C77.000-C3-305-003	

L1:COMP
L2:INT1
L3:INT2
L4:BOTTOM

PCS:52.6X76.4mm
PNL:105.2X172.8 +-0.127mm
V_CUTx4;ROUTERx4
4PCS/1PNL
THICKNESS:1.6mm
MATERIAL:IMG



DRILL CHART: TOP to BOTTOM			
ALL UNITS ARE IN MILS			
FIGURE	SIZE	PLATED	QTY
*	12.0	PLATED	437
⊠	59.0	NON-PLATED	1
V	138.0	NON-PLATED	8
⊕	118.0x98.0	NON-PLATED	1

BenQ	Layer:NCDRILL_LEGEND	Part No.:4H.J2C02.S01
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	Model No.: MP611	Sheet 7 of 10
	Doc. No.: 9J.J2C77.000-C3-305-003	

L1:COMP
L2:INT1
L3:INT2
L4:BOTTOM

PCS:52.6X76.4mm
PNL:105.2X172.8 +-0.127mm
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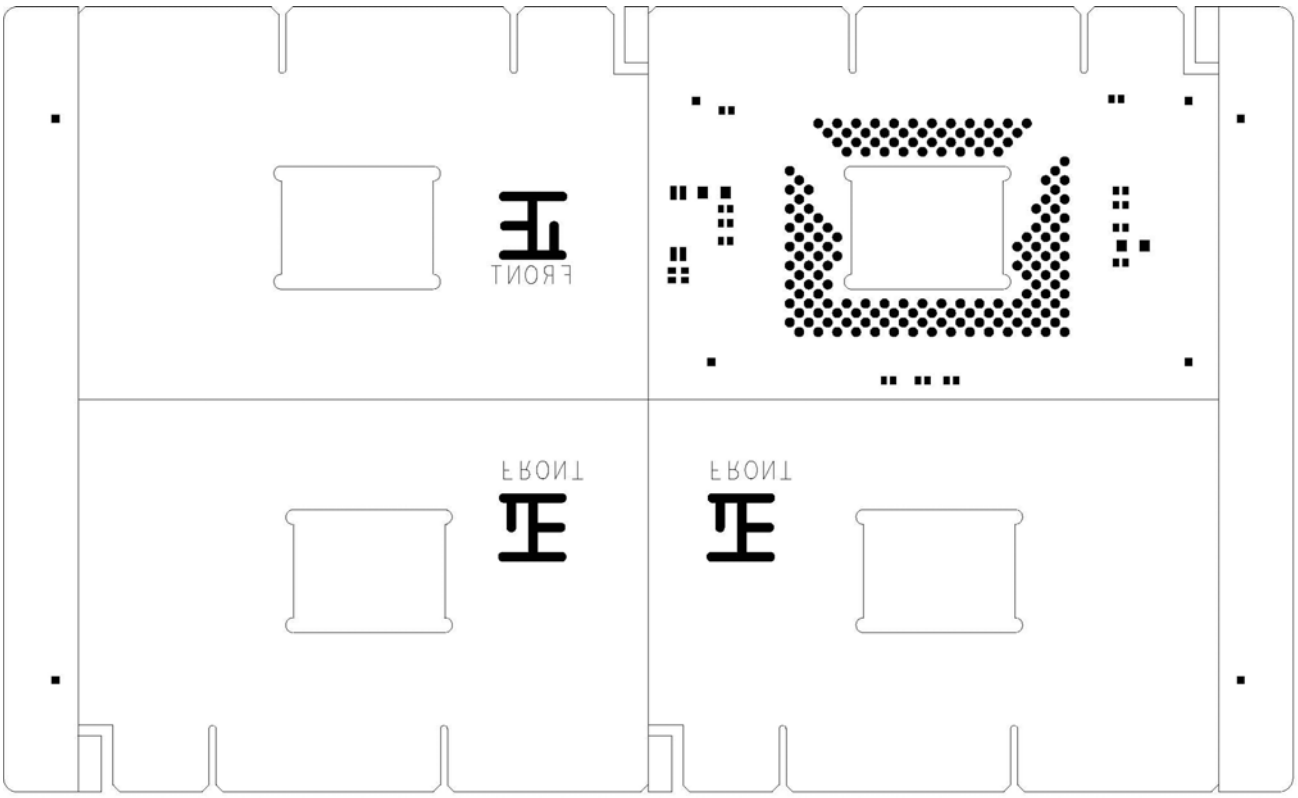
4PCS/1PNL
THICKNESS:1.6mm
MATERIAL:IMG



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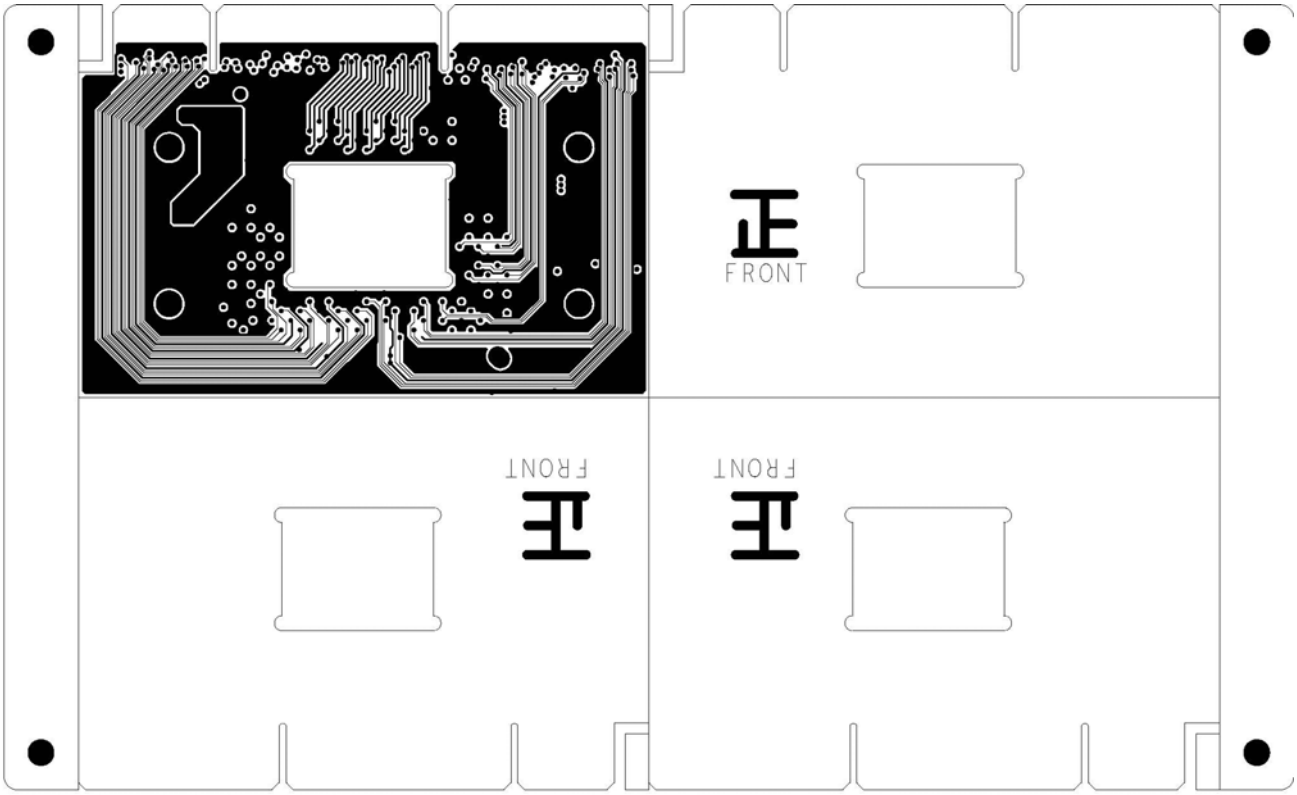
	Model No.: MP611	Sheet 8 of 10
	Doc. No.: 91.J2C77.000-C3-305-003	

L1:COMP
L2:INT1
L3:INT2
L4:BOTTOM

PCS:52.6X76.4mm
PNL:105.2X172.8 +-0.127mm
V_CUTx4;ROUTERx4
4PCS\1PNL
THICKNESS:1.6mm
MATERIAL:IMG



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	Doc. No.: 9J.J2C77.000-C3-305-003		

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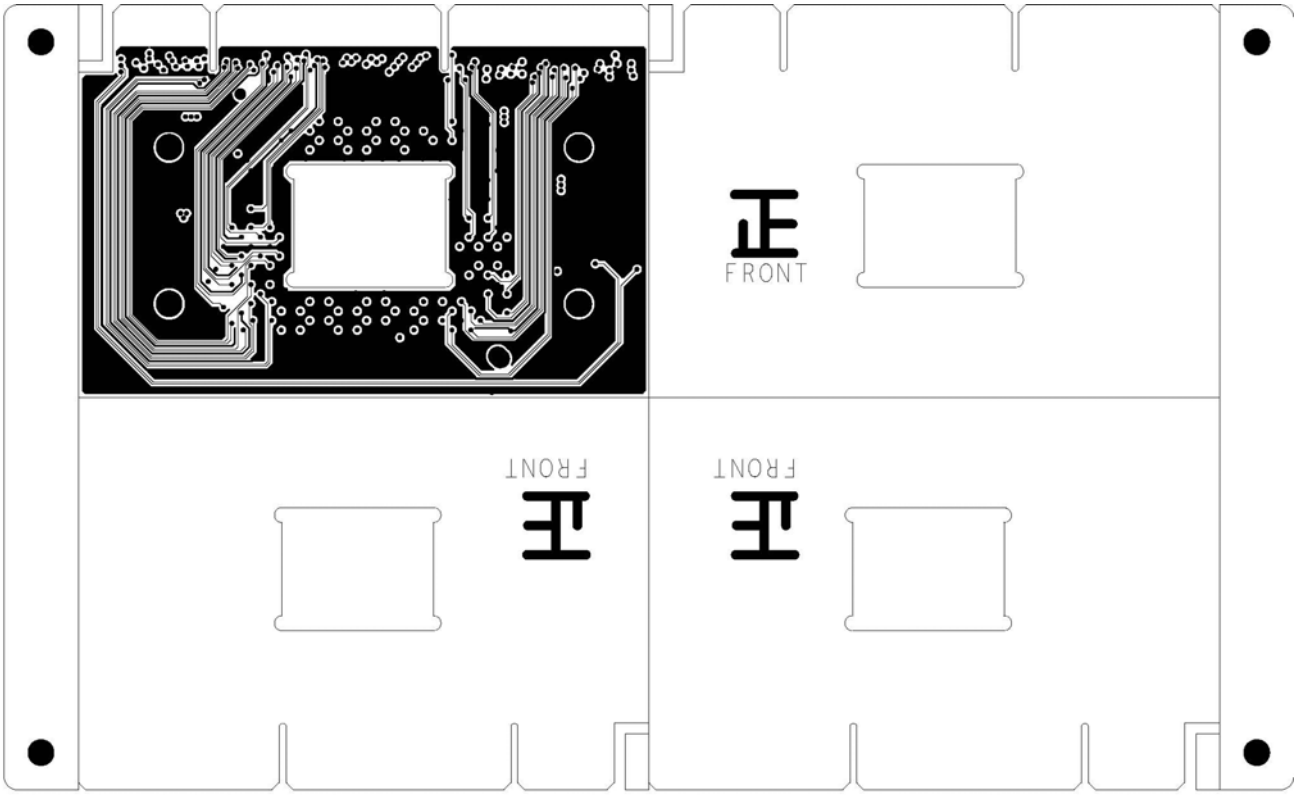
L2:INT1
L3:INT2
L4:BOTTOM

PCS:52.6X76.4mm
PNL:105.2X172.8 +-0.127mm
V_CUTx4,ROUTERx4
4PCS/1PNL
THICKNESS:1.6mm
MATERIAL:IMG



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	Doc. No.: 9J.J2C77.000-C3-305-003		

L1:COMP
L2:INT1
L3:INT2
L4:BOTTOM

PCS:52.6X76.4mm
PNL:105.2X172.8 +-0.127mm
V_CUTx4,ROUTERx4
4PCS/1PNL
THICKNESS:1.6mm
MATERIAL:IMG

Appendix 1 – Screw List /Torque

Model name :MP611 (MD)									
	No.	Screw P/N	Description				Torque	Where use	Q'ty
			Type	Head	Length	Surface	(kgf-cm)		
M2	1	8F.1A522.6R0	MACH	PH	6	NI	2~3	FIXBLOCK==HOLDER	1
	2	8F.HA722.5R0	TAP(DELTA	PH	5	NI	2~3	GEAR ==FIXBLOCK	1
M3	3	8F.VA564.8R0	TAP(DELTA)	PH	8	NI	6~7	BKT MB==LC	3
								POWER==LC	2
								LAMP BOX==LC	2
								BALLAST==LC	3
								BLOWER==LC	2
	4	8F.VA564.100	TAP(DELTA)	PH	10	NI	5~8	UC==LC	4
								ENGINE==LC	3
	5	8F.1G524.6R0	MACH	PAN	6	NI	4~5	MB==MB SHIELDING	5
								MB BRACKET==ENGINE	1
								BKT BLOWER==NOZZLE	1
	6	8F.1A524.8R0	MACH	PAN	8	NI	4~5	ASSY DOOR	2
#4-40	7	8F.00480.120	MACH	HEX	8	NI	3~5	MB=REAR COVER	4
M4	8	8F.00010.161	MACH	PAN	8	NI	6~7	GROUNDING==MB BKT	1

Appendix 2 – Code List: IR/RS232

1. IR Code CUSTOMER CODE DATA CODE FUNCTION

CUSTOMER CODE	DATA CODE	FUNCTION
0030	02	POWER
0030	03	II/▶
0030	04	SOURCE
0030	05	PAGE UP
0030	06	PAGE DOWN
0030	07	BLANK
0030	08	AUTO
0030	09	KEY STONE
0030	0A	KEY STONE
0030	0B	▲
0030	0C	▼
0030	0D	◀
0030	0E	▶
0030	0F	MENU
0030	10	MODE

2. RS232 command format 1

Power	Write	Turn on	0x06 0x14 0x00 0x03 0x00 0x34 0x11 0x00 0x5C
		Turn off	0x06 0x14 0x00 0x03 0x00 0x34 0x11 0x01 0x5D
	Read	Power status(on/off/cool down)	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x11 0x00 0x5E
Reset	Excute		0x06 0x14 0x00 0x03 0x00 0x34 0x11 0x02 0x5E
Mirror	Write	Normal	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x00 0x00 0x5E
		H Inverse	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x00 0x01 0x5F
		V Inverse	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x00 0x03 0x61
		H&V Inverse	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x00 0x02 0x60
	Read	Mirror status	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x12 0x00 0x5F
Contrast	Write	Contrast decrease	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x02 0x00 0x60
		Contrast increase	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x02 0x01 0x61
	Read	Contrast ratio	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x12 0x02 0x61
Brightness	Write	Brightness decrease	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x03 0x00 0x61
		Brightness increase	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x03 0x01 0x62
	Read	Brightness	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x12 0x03 0x62
Aspect ratio	Write	Aspect ratio 4:3	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x04 0x00 0x62
		Aspect ratio 16:9	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x04 0x01 0x63
	Read	Aspect ratio	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x12 0x04 0x63
Auto Adjust	Excute		0x06 0x14 0x00 0x03 0x00 0x34 0x12 0x05 0x62
Horizontal position	Write	Horizontal position shift right	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x06 0x01 0x65
		Horizontal position shift left	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x06 0x00 0x64
	Read	Horizontal position	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x12 0x06 0x65
Vertical position	Write	Vertical position shift up	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x07 0x00 0x65
		Vertical position shift down	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x07 0x01 0x66
	Read	read Vertical position	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x12 0x07 0x66
Color temperature	Write	color temperature T1	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x08 0x00 0x66
		color temperature T2	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x08 0x01 0x67
		color temperature T3	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x08 0x02 0x68
		color temperature T4	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x08 0x03 0x69
	Read	color temperature status	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x12 0x08 0x67
Blank	Write	Blank on	0x06 0x14 0x00 0x03 0x00 0x34 0x12 0x09 0x66
		Blank off	
	Read	Blank status	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x12 0x09 0x68
Keystone-Vertical	Write	Decrease	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x0A 0x00 0x68
		Increase	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x0A 0x01 0x69
	Read	Keystone status	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x12 0x0A 0x69

Application Mode	Write	mode 0	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x0B 0x00 0x69
		mode 1	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x0B 0x01 0x6A
		mode 2	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x0B 0x02 0x6B
		mode 3	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x0B 0x03 0x6C
		mode 4 (only VGA)	0x06 0x14 0x00 0x04 0x00 0x34 0x12 0x0B 0x04 0x6D
	Read	Preset mode status	0x6A 0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x12 0x0B
Freeze	Write	Freeze on	0x06 0x14 0x00 0x03 0x00 0x34 0x13 0x00 0x5E
		Freeze off	
	Read	Freeze status	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x13 0x00 0x60
Source input	Write	Input source VGA	0x06 0x14 0x00 0x04 0x00 0x34 0x13 0x01 0x00 0x60
		Input source DVI	0x06 0x14 0x00 0x04 0x00 0x34 0x13 0x01 0x01 0x61
		Input source HDTV	0x06 0x14 0x00 0x04 0x00 0x34 0x13 0x01 0x02 0x62
		Input source YPbPr	0x06 0x14 0x00 0x04 0x00 0x34 0x13 0x01 0x03 0x63
		Input source Composite	0x06 0x14 0x00 0x04 0x00 0x34 0x13 0x01 0x04 0x64
		Input source SVIDEO	0x06 0x14 0x00 0x04 0x00 0x34 0x13 0x01 0x05 0x65
		Input source YCbCr	0x06 0x14 0x00 0x04 0x00 0x34 0x13 0x01 0x06 0x66
		Input source HDTV2(W100)	0x06 0x14 0x00 0x04 0x00 0x34 0x13 0x01 0x07 0x67
		Input source YPbPr2(W100)	0x06 0x14 0x00 0x04 0x00 0x34 0x13 0x01 0x08 0x68
		Input source YCbCr2(W100)	0x06 0x14 0x00 0x04 0x00 0x34 0x13 0x01 0x09 0x69
	Read	Source	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x13 0x01 0x61
Source scan	Write	Source scan on	0x06 0x14 0x00 0x04 0x00 0x34 0x13 0x02 0x01 0x62
		Source scan off	0x06 0x14 0x00 0x04 0x00 0x34 0x13 0x02 0x00 0x61
	Read	Source scan status	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x13 0x02 0x62
Mute	Write	Mute on	0x06 0x14 0x00 0x04 0x00 0x34 0x14 0x00 0x01 0x61
		Mute off	0x06 0x14 0x00 0x04 0x00 0x34 0x14 0x00 0x00 0x60
	Read	Mute status	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x14 0x00 0x61
Volume	Write	Increse Volume	0x06 0x14 0x00 0x03 0x00 0x34 0x14 0x01 0x60
		Decrese Volume	0x06 0x14 0x00 0x03 0x00 0x34 0x14 0x02 0x61
	Read	Volume	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x14 0x03 0x64
Language	Write	English	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x00 0x61
		Français	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x01 0x62
		Deutsch	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x02 0x63
		Italiano	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x03 0x64
		Español	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x04 0x65
			0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x05 0x66
		繁體中文	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x06 0x67

		简体中文	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x07 0x68
		日本語	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x08 0x69
		한국어	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x09 0x6A
		Swidish	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x0A 0x6B
		Dutch	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x0B 0x6C
		Turkish	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x0C 0x6D
		Czech	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x0D 0x6E
		Portugese	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x0E 0x6F
		Thai	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x0F 0x70
		Polish	0x06 0x14 0x00 0x04 0x00 0x34 0x15 0x00 0x10 0x71
	Read	Language Reset Lamp usuage	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x15 0x00 0x62
	Write	hour	0x06 0x14 0x00 0x03 0x00 0x34 0x15 0x01 0x61
Lamp Time error	Read	Lamp usuage hour	0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x15 0x01 0x63
status	read		0x07 0x14 0x00 0x05 0x00 0x34 0x00 0x00 0x15 0x02 0x64

3. RS232 command format 2

CMD	ACTION	ASCII
Power	on	*pow=on#
	off	*pow=off#
	tatus(on/off/cool down)	*pow=?#
Reset	OSD Reset	*rst#
Mirror	Normal	*mir=nor#
	H Inverse	*mir=hinv#
	V Inverse	*mir=vinv#
	H&V Inverse	*mir=vhinv#
	Mirror status	*mir=?#
Contrast	Contrast decrease	*con=-#
	Contrast increase	*con=+#
	Contrast ratio	*con=?#
Brightness	Brightness decrease	*bri=-#
	Brightness increase	*bri=+#
	Brightness	*bri=?#
Aspect ratio	Aspect ratio 4:3	*asp=4:3#
	Aspect ratio 16:9	*asp=16:9#
	Aspect ratio	*asp=?#

Auto Adjust	Auto Adjust	*auto#
Horizontal position	Horizontal position shift right	*hpos=left#
	Horizontal position shift left	*hpos=right#
	Horizontal position	*hpos=?#
Vertical position	Vertical position shift up	*vpos=up#
	Vertical position shift down	*vpos=down#
	read Vertical position	*vpos=?#
Color temperature	color temperature low	*ctmp=T3#
	color temperature standard	*ctmp=T2#
	color temperature high	*ctmp=T1#
	color temperature status	*ctmp=?#
Blank	Blank on/off	*blank#
	Blank status	*blank=?#
Keystone-Vertical	Decrease	*keyst=-#
	Increase	*keyst=+#
	Keystone status	*keyst=?#
Preset mode	Preset mode presentation(PC)	*appmod=preset#
	preset mode brightness	*appmod=bright#
	preset mode srgb	*appmod=srgb#
	Preset mode gaming	*appmod=game#
	Preset mode video	*appmod=video#
	preset mode movie	*appmod=mov#
	Preset mode cinema	*appmod=cine#
	Preset mode game	*appmod=game#
	Preset modephoto	*appmod=phot#
	Preset mode status	*appmod=?#
Freeze	Freeze on/off	*freeze#
	Freeze status	*freeze=?#
Source input	Input source VGA	*sour=vga#
	Input source DVI	*sour=dvi#
	Input source HDTV	*sour=hdtv#
	Input source YPbPr	*sour=YPbr#
	Input source Composite	*sour=comp#
	Input source SVIDEO	*sour=svid#

	Input source YCbCr	*sour=YCbr#
	Status	*sour=?#
Source scan	Source scan on	*scan=on#
	Source scan off	*scan=off#
	Source scan status	*scan=?#
Mute	Mute on	*mute=on#
	Mute off	*mute=off#
	Mute status	*mute=?#
Volume	Increse Volume	*vol=-#
	Decrese Volume	*vol=+#
	Volume	*vol=?#
Language	English	*lang=eng#
	FRE(Français)	*lang=fre#
	Deutsch	*lang=ger#
	Italiano	*lang=ita#
	Español	*lang=spa#
		*lang=pro#
	繁體中文	*lang=cht#
	简体中文	*lang=chs#
	日本語	*lang=jap#
	korean(한국어)	*lang=kor#
	swidish	*lang=swd#
	dutch	*lang=dut#
	turkish	*lang=turk#
	czech	*lang=czech#
	portugese	*lang=portug#
	thai	*lang=thai#
	polish	*lang=pol#
	Language	*lang=?#
Lamp Time	Reset Lamp usuage hour	*ltim=rst#
	Lamp usuage hour	*ltim=?#
Error status		*err#