



Applicable Country & Regions:
[All Regions](#)

Product Service Manual – Level 2

Service Manual for BenQ:
[Projector/MW814ST](#)
[< 9H.J4S77.000>](#)



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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.

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1. Abbreviations & Acronyms

A	
A/D	Analog to Digital
B	
BenQ	BenQ Corporation
C	
C/W	Color Wheel
CM	Concave Mirror
D	
DLP	Digital Light Processing / Texas Instruments®
DMD	Digital Micro mirror Device
DVI	Digital Video Interface
DVI-I	Digital Video Interface-Integrated
P	
PL	Projection Lens
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 640x480 pixels.
X	
XGA	A screen resolution of 1024x768 pixels.

2. 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”

2.1 Trademark

The following terms are trademarks of BenQ Corporation:
BenQ

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

2.2 Introduction

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

2.3 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.

2.4 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.

2.5 Compliance Statement

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

2.6 General Descriptions

This Service Manual contains general information. There are 2 levels of service:

Level 1: Cosmetic / Appearance / Alignment Service

Level 2: Circuit Board or Standard Parts Replacement

2.7 Related Service Information

Service Web Site

BenQ Global Service Website: <http://www.benq.com/support/>

eSupport Website: <http://esupport.benq.com/v2>

3. Product Overview

The projector consists of DLP projector controller, Lamp controller, Power supply system, and System cooling controller. The DLP controller captures digital PC data and video data and then converts them into the DMD display device. The Lamp controller dominates the lamp's power and synchronizes its frequency with color display sequence. The Power supply unit controls the AC line power factor and converts primary voltage to secondary low voltages for digital board. The System cooling controller drives the airflow to quench the lamp's heat and electrical component's heat.

- **Specification Overview**

- 1.0 Panel Information
- 2.0 Projection Lens Specification
- 3.0 Optical Specification
- 4.0 Lamp Specification
- 5.0 Mechanical Specification
- 6.0 Packaging
- 7.0 Thermal Specification
- 8.0 Power Requirements
- 9.0 Compatibility
- 10.0 User Interface
- 11.0 Regulatory
- 12.0 Reliability
- 13.0 Other Feature

- **Input / Output Connectors**

- 1. Input Terminals
- 2. Output Terminals
- 3. Control Terminals and Interface

- **Accessories**

- **Environmental**

- **Electrical Specification**

- **Power Supply Specification**

- **UI Specification**

3.1 Specification Overview

● Specification Overview

MW814ST	Version: 01		
Item	Specification		
1.Panel Information			
1.1 Panel Type	0.65” WXGA 2xLVDS 450 DMD		
1.2 Package Type	450 series		
1.3 Size	0.65”		
1.4 Pixels	1280(H) x 800(V)		
1.5 Color Depth	30 Bits (1.07 Billion Colors)		
1.6 Driver Type	DDP 2431		
1.7 Panel Pixel Quality	Follow TI spec.		
1.8 Image Imperfection	Follow TI spec.		
2. Projection Lens Specification (For Reference)			
2.1 F/#	Wide	Tele	
	2.59	NA	
2.2 Zoom Ratio	Fixed		
2.3 Throw Ratio	0.49 (95"±3%@ 1m)		
2.4 True Zoom	NA		
2.5 Focal Length	Wide:	Tele:	
	6.95 mm	NA	
2.6 Offset	110%+/-5%		
2.7 Visible Focus Range	0.75 to 1.6m		
2.8 Clearly Focus Range	0.75 to 1.6m		
2.9 Keystone Distortion	<1%		
2.9 TV Distortion	<1%		
2.10 Screen Distortion	A <= 3.5 mm, B <= 3.5 mm, C <=3.5 mm @ 60”		
2.11 Zoom Ring Torque	N.A. (Follow Vendor Lens SPEC)		
2.12 Focus Ring Torque	250~450g (Follow Vendor Lens SPEC)		
2.13 Center Position Shift(W-T) (Video Projector only)	N.A.		
2.14 Zoom&Focus shaking level	Follow typical sample (When needed)		
2.15 Lens Shift Shaking Level	N.A.		
2.16 Lateral Color		Center @ 49”	All other area
	R-G	<2/3 pixel	<1.0 pixel
	B-G	<2/3 pixel	<1.0 pixel
	R-B	<1.0 pixel	<1.0 pixel
2.17 Color wheel segment	6-Seg. (RYWCBG), ‘10 CW W:60 C:30 B:75 G:85 R:80 Y:30		
2.18 Color wheel speed	2x		
3.Optical Specification			
Test under 70” (diagonal) image size with Wide projection lens position. Reference Meter: Vendor Factory CL-200 Meter (SN head:81531011, body:82521013)			
3.1 ANSI Brightness	Normal: Minimum 2000 lm (Typical 2250 lm, only for reference) ECO: Minimum 1545 lm (For reference)		
3.2 ANSI uniformity	Minimum 45%		
3.3 JBMA Uniformity	Minimum 65%		
3.4 ANSI Contrast	Minimum 150:1		
3.5 FOFO Contrast	Minimum 2400:1 (w/ WCE)		
3.7 FOFO Contrast with DB	N.A.		
3.8 Focus Quality			

3.8.1 ☒ Pattern	(1) If pattern can be uniformly focused – not worse than limit sample – then pass! Limit Sample: TBD (2) If it's difficult to judge, then check 3.8.2		
3.8.2	R	G	B
Defocus (Maximum)	3.0	3.0	3.0
Flare (Maximum)	4.0	4.0	4.0
3.9 Focus unbalance	Max. 60cm		
3.10 Color Coordinate (Confirm at PVT stage)	Color	x	y
	White	0.315±0.04	0.364±0.04
	Red	0.636±0.04	0.355±0.04
	Green	0.330±0.04	0.571±0.04
	Blue	0.145±0.03	0.073±0.03
3.11 Color Uniformity (Confirm at PVT stage)	Color	Δ_{uv} Δ_v	
	White	≤ 0.02	
	Red	≤ 0.03	
	Green	≤ 0.02	
	Blue	≤ 0.02	
3.12 Color Gamut(Compare to NTSC)	Typical 60%		
3.13 Light Leakage in AA	$\Delta \leq 0.5$ lux compared with center point @ full black pattern within 78” (Diagonal at 0.485m). This light-leakage is only described as the spot light with obvious shape. The uniformity difference of black pattern is not included.		
3.14 Light Leakage out of AA	≤ 0.5 lux, @ full black pattern with 78”~90”(Diagonal at 0.485m) (Except DMD Defect)		
3.15 Ghost	Ghost Contrast > (Confirm at EVT2 stage)		
3.16 Lens Shift Speed(sec) (only for motorized len shift)	N.A.		
3.17 Defect (Color Band, Dark Corner, Dark band)	Follow limited sample (When needed).		
3.18 Preset mode setting	Refer appendix E		
4.Lamp Specification			
4.1 Lamp	SHP220W		
4.2 Lamp Sync Type	DC Lamp		
4.3 Lamp Flick	Follow limited sample (When needed).		
4.4 Lamp Power	Normal Mode	220W	
	ECO Mode	170W	
5. Mechanical Specification			
5.1 Color & Texture specifications	Refer to ID document for details		
5.2 Physical Dimensions(Width X Depth X Height)	287.3 x 232.6 x 114.4 mm		
5.3 Gross Weight	2.7kg		
5.4 Security Slot	Kensington compatible slot 20Kg break away force		
5.5 Lens Cover	Detached lens cover		
5.6 Adjustment Feet	Fast adjustable foot in front, Adjustable foot in rear. Front/ Rear foot Tilt: 0-6° ,Right/Left: +2.2° /-0.5°		
5.7 Ceiling Mounting	Match BenQ’s ceiling mount required. Use the same mounting as current shipping projectors.		
5.8 Screws	All color of screws should similar with the plastic color which close it.		
5.9 During PVT stage, limited sample	N/A		

of color and texture should be approved by BenQ industrial designer and mechanical engineer.		
6. Packaging		
6.1 Box Dimension	Refer to packing description (internal :Refer to B405 document)	
6.2 Net Weight (Esti.)	≤ 2.7kg	
6.3 Gross Weight (Esti.)	< 3.5 kg (Including Accessories, Projector)	
6.4 Container Loading (40')	Refer to packing description (internal :Refer to B405 document)	
6.5 Container Loading (20')	Refer to packing description (internal :Refer to B405 document)	
6.6 Packaging Conceptual	Refer to packing description (internal :Refer to B405 document)	
6.7 Container Layout	Refer to packing description (internal :Refer to B405 document)	
6.8 Cushion Orientation	Refer to packing description (internal :Refer to B405 document)	
6.9 Cushion Material	EPE	
6.10 Box Compression Test	N/A	
6.11 Carton Artwork	Refer Packing Description and Appearance Description	
7. Thermal Specification		
Mechanical component temperature at ambience 0~40℃		
7.1 Surface held or touched for short periods	Normal surface: Metal< 60 ℃ Plastic< 85 ℃ Bottom surface @25℃ Metal< 55 ℃ Plastic< 70 ℃	
7.2 Surface which may be touched	Metal	Plastic
	< 70 ℃	< 95 ℃
7.3 Exhaust Air	< 95 ℃	
7.4 Audible Noise Level	Typical	Normal mode: 35dBA@ 25℃(table center) Eco mode: 29dBA @ 25℃(table center)
	Max.	Normal mode: 37dBA@ 25℃(table center) Eco mode: 31dBA @ 25℃(table center)
7.5 Fan Numbers	2	
8.0 Power Requirements		
8.1 Power Supply (Normal)		
8.2 Power consumption	Max.	335W
	Standby	1W Max. at 100 ~ 240VAC (disable loop through, LAN control, audio out)
	Normal	Typical 300W@110Vac
	ECO	Typical 239W@110Vac
8.3 Power Connector	IEC 60320 C14	
8.4 Power Switch	No	
9.0 Compatibility		
9.1 Data Compatibility		
9.1.1 RGB Digital	Refer to 2.1.4 HDMI/DVI Input	
	640x480 @60/72/75/85Hz	
	720x400 @70Hz	
	800x600 @60/72/75/85/120Hz	
	1024 x 576@60Hz	
	1024 x 600@65Hz	
	1024x768 @60/70/75/85/120Hz	
	1152x864@75Hz	
	1280x768@60Hz	
	1280 x 800@60/75/85/120Hz	
	1280 x 1024@60/75/85Hz	
	1280 x 960@60/85Hz	
	1360x768@60Hz	

	1440 x 900@60Hz
	1400X1050@60Hz
	1600x1200@60Hz
	1680x1050@60Hz
	1920x1200@60Hz
9.1.2 RGB Analog	Refer to 2.1.5 PC Input
	640x480 @60/72/75/85Hz
	720x400 @70Hz
	800x600 @60/72/75/85Hz/120Hz
	1024x768 @60/70/75/85Hz/120Hz
	1024 x 576@60Hz
	1024 x 600@65Hz
	1152x864@75Hz
	1280x768@60Hz
	1280 x 800@60/75/85/120Hz
	1280 x 1024@60/75/85Hz
	1280 x 960@60/85Hz
	1360x768@60Hz
	1440 x 900@60Hz
	1400X1050@60Hz
	1600x1200@60Hz
	1680x1050@60Hz
9.1.3 Macintosh	
	MAC 13/16/19/21
9.2 Video Compatibility	
9.2.1 SDTV	480i/576i
9.2.2 EDTV	480P/576P
9.2.3 HDTV	720@50P/60P,1080@50i/60i/50p/60p/24p/25p/30p
9.2.4 Video	NTSC/ NTSC4.43/ PAL (Including PAL-M, PAL-N)/ SECAM/ PAL60/
9.3 Frequency	
9.3.1 H-Sync	31~102KHz
9.3.2 V-Sync	23 ~ 120 Hz
9.4 DDC	EDID 1.3
10.0 User Interface	
10.1 Operator Keypad	10 Keys: Power ; Source ;Auto ; Blank ; Mode/Enter ; Menu/Exit ; Right/ Panel Key Lock ; Left/ Q? ; Up(Keystone+) ; Down(Keystone-)
10.2 LED Indicators	3 LEDs
10.2.1 Power On/Off Status	Refer to LED definition
10.2.2 Lamp Status	Refer to LED definition
10.2.3 Temperature Status	Refer to LED definition
10.3 Electric Keystone	Vertical keystone and adjustable range $\pm 30^\circ$ without digital zoom or 3D function activate.(It will be updated in EVT0 stage)
10.4 Remote Control	5F.26J1K.291 x 1
11.0 Regulatory	
11.1 Safety	Vendor: Refer to RFQ Internal: Refer to B106 document
11.2 EMC	Vendor: Refer to RFQ Internal: Refer to B106 document
11.3 ESD	Follow IEC 61000-4-2 and EN55024 regulation
11.4 GP	1.BenQ restriction of Hazardous Substance Guideline (SUP-QM-07-02) 2.Other GP control items please refer PRR
12.0 Reliability	

12.1 MTBF	40000 hours except DMD chip, Color wheel, Lamp and Fan, Ballast
12.2 Lamp Lifetime	1). Lamp hour = [Hour used in Eco. Mode] + [Lamp life of Eco. Mode]/[Lamp life of Normal Mode] * [Hour used in Normal Mode] 2). 50% of Projectors will have 50% Initial Minimum Brightness
12.2.1 Normal Mode	4500 hrs
12.2.2 ECO Mode	6000 hrs
13.0 Other Feature	
13.1 Color Temperature at Normal	5500/6500/7500/9300K
13.2 Digital Zoom	PC: max 2X, Video: max 1.8X
13.3 Aspect Ratio	Real / 4:3 / 16:9/ 16:10
13.4 Projection Methods	Floor Front/Ceiling Front/Floor Rear/Ceiling Rear
13.5 3D Display	Yes, support DLP 3D
13.6 LAN	
13.6.1 LAN-Crestron eControl	Yes
13.6.2 LAN-RoomView compatible	Yes
13.6.3 LAN-PJ Link compatible	Yes
13.6.4 LAN-AMX compatible	Yes
13.6.5 LAN-Display(1 to many) (4 to 1)	NA
13.7 Certificate	
13.7.1 SRS Certificate	No
13.7.2 Win7 Certificate	Yes

● Input / Output Connectors

1.Input Terminals	
1.1 Computer Input - 1	RGB DB-15 x 1 (Female Type)
1.2 Computer Input - 2	RGB DB-15x 1 (Female Type)
1.3 Video	Composite Video (RCA X 1)
1.4 S-Video	S-Video (Mini Din) X 1
1.5 Component - 1	RGB DB-15 x 1 (Female Type)
1.6 Component - 2	RGB DB-15 x 1 (Female Type)
1.7 DVI - 1	NA
1.8 DVI - 2	NA
1.9 HDMI Digital Video – 1	HDMI 1.3 x1 (HDCP)
1.9.1 Support Audio Input	YES
1.9.2 CEC control	NA
1.10 HDMI Digital Video – 2	NA
1.10.1 Support Audio Input	NA
1.10.2 CEC control	NA
1.11 Audio Input – 1 (Mini Jack)	Φ3.5mm Stereo Mini-Jack x 1
1.11.1 Related Source	Computer -1 / Component -1 audio input
1.11.2 Input Signal Level	500mVrms 10 KΩ
1.12 Audio Input – 2 (Mini Jack)	Φ3.5mm Stereo Mini-Jack x 1
1.12.1 Related Source	Computer -2 / Component -2 audio input
1.12.2 Input Signal Level	500mVrms 10 KΩ
1.13 Audio Input – 3 (RCA R &L)	RCA Audio Jack right and left
1.13.1 Related Source	Video/S-Video audio input
1.14 USB Input	NA
1.15 LAN Input	NA
2.Output Terminals	
2.1 Computer Output	RGB DB-15 x 1 (Female Type)
2.1.1 Signal Source	loop through Computer Input -1

2.2 Audio Output	Φ3.5mm Mono Mini-Jack x 1
2.2.1 Signal Source	Shared with all audio Input and Power on/off Ring Tone
2.3 Speaker	10W X 1
2.3.1 Amplifier	8W
3.Control Terminals and Interface	
3.1 IR Receiver	IR Receiver x2 (Front/Rear)
3.1.1 Angle	±30°
3.1.2 Distance	0~8m
3.2 USB	
3.2.1 FW Upgrade	Yes
3.2.2 Mouse Control	Page up/down
3.2.3 USB Display	No
3.3 RS-232	D-Sub 9 Pins x 1, male Type
3.3.1 FW Upgrade	Yes
3.3.2 Control Command	Yes
3.4 Lan Control	RJ-45 x 1. Follow IEEE802.3u
3.5 12V Trigger (Screen Control)	No
3.5.1 Driving Power	No
3.5.2 Overload Protection	No
3.6 Wired Remote Control	No

● Accessories

1.Accessory	
1. Power Cord 1.8m	X1
2. VGA Cable 1.8m	X1
3. CD x 1 (22 Language)	X 1
4. Quick-Start_Card (18Language)	X 1
5. Remote Control	5F.26J1K.291 x 1
6. Carry Case	N/A
7. Warranty Card	By SKU
8. Adapter	N/A

● Environmental

1.Environmental		
1.1 Temperature	Operating	0~40°C, without condensation
	Storage	-20~60°C, without condensation
1.2 Humidity	Operating	10~90%RH, without condensation
	Storage	10~90%RH, without condensation
1.3 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
	Storage	30°C @0~12,200m above sea level

● Electrical Specification

1.1 Electrical Interface Character

1.1.1 Composite Video Input

(1) Pin definition (RCA Jack)



(2) Signal Level:

Signal	Parameter	Min	Type	Max	
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

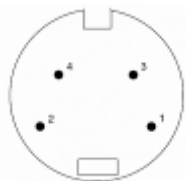
(3) Support Timings: (Version 01)

Video mode	Horizontal frequency (KHz)	Vertical frequency (Hz)	Sub-carrier Frequency (MHz)	User Manual Supported
NTSC*	15.73	60	3.58	Yes
PAL	15.63	50	4.43	Yes
SECAM	15.63	50	4.25 or 4.41	Yes
PAL-M	15.73	60	3.58	Yes
PAL-N	15.63	50	3.58	Yes
PAL-60	15.73	60	4.43	Yes
NTSC4.43	15.73	60	4.43	Yes

“*” It means the timing can support non-3D and 3D signal with field sequential format.

1.1.2 S-Video Input

(1) Pin definition (Mini Din)



4-pin Mini Din Connector

(2) Signal Level:

PIN	Signal	Parameter	Min	Type	Max	
1	GND					
2	GND					
3	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
4	CVBS Luminance	Amplitude (for NTSC)		286		m Volts peak to peak
		Amplitude (for PAL/SECAM)		300		m Volts peak to peak
		Impedance		75		ohm

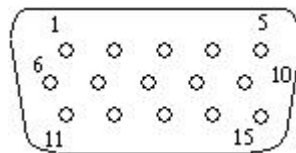
(3) Support Timings: (Version 01)

Video mode	Horizontal frequency (KHz)	Vertical frequency (Hz)	Sub-carrier Frequency (MHz)	User Manual Supported
NTSC*	15.73	60	3.58	Yes
PAL	15.63	50	4.43	Yes
SECAM	15.63	50	4.25 or 4.41	Yes
PAL-M	15.73	60	3.58	Yes
PAL-N	15.63	50	3.58	Yes
PAL-60	15.73	60	4.43	Yes
NTSC4.43	15.73	60	4.43	Yes

“*”It means the timing can support non-3D and 3D signal with field sequential format.

1.1.3 Component Video Input

(1) Pin definition { RGB DB-15 x 1 (Female Type) }



(2) Signal Level:

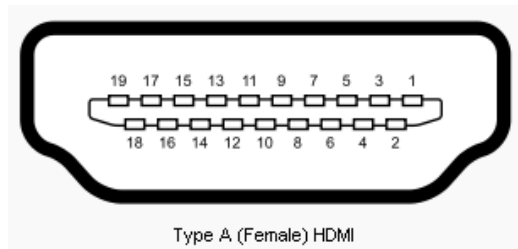
Pin	Signal	Parameter	Min	Type	Max	
1	Pr DATA	Impedance		75		Ohm
3	Pb DATA	Black pedestal		0		Volts
2	Y DATA_SOG	Impedance		75		Ohm
		Amplitude		1		Volts peak-to-peak
		Video amplitude		0.7		Volts peak-to-peak
		Sync amplitude		0.3		Volts peak-to-peak
		Black pedestal		0		Volts
6	Red GND					
7	Green GND					
8	Blue GND					

(3) Support Timings: (Version 01)

Resolution	Mode	Refresh rate (Hz)	H-frequency (kHz)	Clock (MHz)	User Manual Supported
720 x 480*	480i	59.94	15.73	13.5	Yes
720 x 480	480p	59.94	31.47	27	Yes
720 x 576	576i	50	15.63	13.5	Yes
720 x 576	576p	50	31.25	27	Yes
1280 x 720	720/50p	50	37.5	74.25	Yes
1280 x 720	720/60p	60	45.00	74.25	Yes
1920 x 1080	1080/24P	24	27	74.25	Yes
1920 x 1080	1080/25P	25	28.13	74.25	Yes
1920 x 1080	1080/30P	30	33.75	74.25	Yes
1920 x 1080	1080/50i	50	28.13	74.25	Yes
1920 x 1080	1080/60i	60	33.75	74.25	Yes
1920 x 1080	1080/50P	50	56.25	148.5	Yes
1920 x 1080	1080/60P	60	67.5	148.5	Yes

“*”It means the timing can support non-3D and 3D signal with field sequential format.

- 1.1.4 HDMI/DVI Input
- HDMI 1.3 Compliance
 - DVI 1.0 Compliance
 - HDCP 1.1 Compliance
- (1) Pin definition



Pin	Signal
1	TMDS Data2+
2	TMDS Data2 Shield
3	TMDS Data2–
4	TMDS Data1+
5	TMDS Data1 Shield
6	TMDS Data1–
7	TMDS Data0+
8	TMDS Data0 Shield
9	TMDS Data0–
10	TMDS Clock+
11	TMDS Clock Shield
12	TMDS Clock–
13	CEC
14	Reserved (N.C. on device)
15	SCL
16	SDA
17	DDC/CEC Ground
18	+5 V Power (max 50 mA)
19	Hot Plug Detect

(2) Support Video Timings: (Version 01)

Timing	Resolution	Vertical frequency (Hz)	H-frequency (kHz)	Dot Clock Frequency (MHz)	User Manual Supported
480i*	720(1440) x 480	59.94	15.73	27	Yes
480p	720 x 480	59.94	31.47	27	Yes
576i	720(1440) x 576	50	15.63	27	Yes
576p	720 x 576	50	31.25	27	Yes
720/50p	1280 x 720	50	37.5	74.25	Yes
720/60p	1280 x 720	60	45.00	74.25	Yes
1080/24P	1920 x 1080	24	27	74.25	Yes
1080/25P	1920 x 1080	25	28.13	74.25	Yes
1080/30P	1920 x 1080	30	33.75	74.25	Yes
1080/50i	1920 x 1080	50	28.13	74.25	Yes
1080/60i	1920 x 1080	60	33.75	74.25	Yes
1080/50P	1920 x 1080	50	56.25	148.5	Yes
1080/60P	1920 x 1080	60	67.5	148.5	Yes

“*” It means the timing can support non-3D and 3D signal with field sequential format.

(3) Support PC Timings: (Version 01)

Resolution	Mode	Refresh rate (Hz)	H-frequency (kHz)	Clock (MHz)	User Manual Supported
640 x 480	VGA_60	59.940	31.469	25.175	Yes
	VGA_72	72.809	37.861	31.500	Yes
	VGA_75	75.000	37.500	31.500	Yes
	VGA_85	85.008	43.269	36.000	Yes
720 x 400	720x400_70	70.087	31.469	28.3221	Yes
800 x 600	SVGA_60*	60.317	37.879	40.000	Yes
	SVGA_72	72.188	48.077	50.000	Yes
	SVGA_75	75.000	46.875	49.500	Yes
	SVGA_85	85.061	53.674	56.250	Yes
	SVGA_120** (Reduce Blanking)	119.854	77.425	83.000	Yes
1024 x 768	XGA_60*	60.004	48.363	65.000	Yes
	XGA_70	70.069	56.476	75.000	Yes
	XGA_75	75.029	60.023	78.750	Yes
	XGA_85	84.997	68.667	94.500	Yes
	XGA_120** (Reduce Blanking)	119.989	97.551	115.500	Yes
1152 x 864	1152 x 864_75	75.00	67.500	108.000	Yes
1024x576	BenQ Notebook Timing	60.00	35.820	46.996	Yes
1024x600	BenQ Notebook Timing	64.995	41.467	51.419	Yes
1280 x 768	1280 x 768_60* (Reduce Blanking)	60	47.396	68.25	No
	1280 x 768_60*	59.870	47.776	79.5	Yes
1280 x 800	WXGA_60*	59.810	49.702	83.500	Yes
	WXGA_75	74.934	62.795	106.500	Yes
	WXGA_85	84.880	71.554	122.500	Yes
	WXGA_120** (Reduce Blanking)	119.909	101.563	146.25	Yes
1280 x 1024	SXGA_60***	60.020	63.981	108.000	Yes
	SXGA_75	75.025	79.976	135.000	Yes
	SXGA_85	85.024	91.146	157.500	Yes
1280 x 960	1280 x 960_60***	60.000	60.000	108	Yes
	1280 x 960_85	85.002	85.938	148.500	Yes
1360 x 768	1360 x 768_60***	60.015	47.712	85.500	Yes
1440 x 900	WXGA+_60*** (Reduce Blanking)	60	55.469	88.75	No
	WXGA+_60***	59.887	55.935	106.500	Yes
1400X1050	SXGA+_60***	59.978	65.317	121.750	Yes
1600x1200	UXGA	60.000	75.000	162.000	Yes
1680x1050	1680x1050_60 (Reduce Blanking)	59.883	64.674	119.000	No
	1680x1050_60	59.954	65.290	146.250	Yes
1920 x 1200	1920x1200_60 (Reduce Blanking)	59.950	74.038	154.000	No
640x480@67Hz	MAC13	66.667	35.000	30.240	Yes
832x624@75Hz	MAC16	74.546	49.722	57.280	Yes
1024x768@75Hz	MAC19	75.020	60.241	80.000	Yes
1152x870@75Hz	MAC21	75.06	68.68	100.00	Yes

“*” It means the timing can support non-3D and 3D signal with frame sequential and over-under format.

“**” It means the timing can support non-3D and 3D signal with frame sequential format.

“***” It means the timing can support non-3D and 3D signal with over-under format.

There 3D timing showing depend the EDID file and VGA display card. It is possible that user cannot

choose the above 3D timings on VGA display card.

(4) Support Audio:

(a) HDMI Mode:

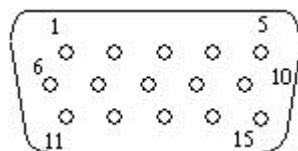
- Support LPCM, two audio channels
- Support audio sampling rate : 32kHz, 44.1kHz, 48kHz
- Support audio bit rate : 16 bits, 20 bits, 24 bits

(b) DVI Mode:

Analog audio is supported through PC audio input terminal.

1.1.5 PC Input

(1) Pin definition and Signal Level:



Pin	Signal	Parameter	Min	Type	Max	
1	RDATA	Impedance		75		Ohm
2	GDATA	Amplitude		0.7		Volts peak-to-peak
3	BDATA	Black pedestal		0		Volts
		Pixel Clock		170		M Hz
2	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		170		M Hz
13	HDATA	Impedance		1		K ohm
		Amplitude, low level	0		0.5	volt
		Amplitude, high level	2.5		5	Volt
		Frequency	31		102	K Hz
14	VDATA	Impedance		1		K ohm
		Amplitude, low level	0		0.8	volt
		Amplitude, high level	2.5		5	Volt
		Frequency	48		120	Hz
12	SDADATA	Amplitude, low level	0		0.8	volt
		Amplitude, high level	2.5		5	Volt
15	SCLDATA	Amplitude, low level	0		0.8	volt
		Amplitude, high level	2.5		5	Volt
4	NC					
5	NC					
6	Red GND					
7	Green GND					
8	Blue GND					
9	DDCP 5V			5		Volts
10	Sync. Return					
11	GND					
2	G DATA Share with Y	Amplitude (with sync)		1		Volts peak to peak
		Impedance		75		ohm
1	R DATA Share with Pr	Amplitude		0.7		Volts peak to peak
		Impedance		75		ohm
3	B DATA Share with Pb	Amplitude		0.7		Volts peak to peak
		Impedance		75		ohm

(2) Support PC Timings: (Version 01)

Resolution	Mode	Refresh rate (Hz)	H-frequency (kHz)	Clock (MHz)	User Manual Supported
720 x 400	720x400_70	70.087	31.469	28.3221	Yes
640 x 480	VGA_60	59.940	31.469	25.175	Yes
	VGA_72	72.809	37.861	31.500	Yes
	VGA_75	75.000	37.500	31.500	Yes
	VGA_85	85.008	43.269	36.000	Yes
	VGA_100	100.000	50.000	40.000	Yes
800 x 600	SVGA_56	56.250	35.156	36.000	Yes
	SVGA_60*	60.317	37.879	40.000	Yes
	SVGA_72	72.188	48.077	50.000	Yes
	SVGA_75	75.000	46.875	49.500	Yes
	SVGA_85	85.061	53.674	56.250	Yes
	SVGA_120** (Reduce Blanking)	119.854	77.425	83.000	Yes
1024 x 768	XGA_60*	60.004	48.363	65.000	Yes
	XGA_70	70.069	56.476	75.000	Yes
	XGA_75	75.029	60.023	78.750	Yes
	XGA_85	84.997	68.667	94.500	Yes
	XGA_120** (Reduce Blanking)	119.989	97.551	115.500	Yes
1152 x 864	1152 x 864_75	75.00	67.500	108.000	Yes
1024 x 576	BenQ Notebook Timing	60.0	35.820	46.966	Yes
1024 x 600	BenQ Notebook Timing	64.995	41.467	51.419	Yes
1280 x 768	1280 x 768_60* (Reduce Blanking)	60	47.396	68.25	No
	1280 x 768_60*	59.870	47.776	79.5	Yes
1280 x 800	WXGA_60*	59.810	49.702	83.500	Yes
	WXGA_75	74.934	62.795	106.500	Yes
	WXGA_85	84.880	71.554	122.500	Yes
	WXGA_120** (Reduce Blanking)	119.909	101.563	146.25	Yes
1280 x 1024	SXGA_60***	60.020	63.981	108.000	Yes
	SXGA_75	75.025	79.976	135.000	Yes
	SXGA_85	85.024	91.146	157.500	Yes
1280 x 960	1280 x 960_60***	60.000	60.000	108	Yes
	1280 x 960_85	85.002	85.938	148.500	Yes
1360 x 768	1360 x 768_60***	60.015	47.712	85.500	Yes
1440 x 900	WXGA+_60*** (Reduce Blanking)	60	55.469	88.75	No
	WXGA+_60***	59.887	55.935	106.500	Yes
1400x1050	SXGA+_60***	59.978	65.317	121.750	Yes
1600x1200	UXGA	60.000	75.000	162.000	Yes
1680 x 1050	1680x1050_60 (Reduce Blanking)	59.883	64.674	119.000	No
	1680x1050_60	59.954	65.290	146.250	Yes
640x480@67Hz	MAC13	66.667	35.000	30.240	Yes
832x624@75Hz	MAC16	74.546	49.722	57.280	Yes
1024x768@75Hz	MAC19	74.93	60.241	80.000	Yes
1152x870@75Hz	MAC21	75.06	68.68	100.00	Yes

“*” It means the timing can support non-3D and 3D signal with frame sequential and over-under format.

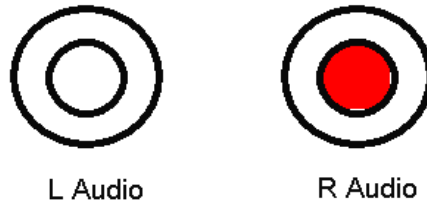
“**” It means the timing can support non-3D and 3D signal with frame sequential format.

“***” It means the timing can support non-3D and 3D signal with over-under format.

There 3D timing showing depend the EDID file and VGA display card. It is possible that user cannot choose the above 3D timings on VGA display card.

1.1.6 Audio Input (RCAx2)

(1) Pin definition :

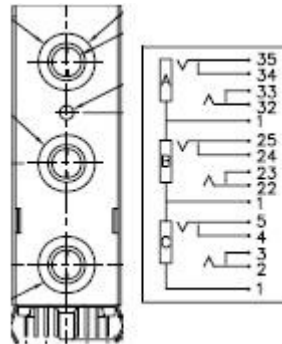


(2) Signal Level: N/A

PIN	Signal	Parameter	Min	Type	Max	
1	L Audio	Amplitude		0.5	2	VRMS
		Impedance	10			K Ω
2	R Audio	Amplitude		0.5	2	VRMS
		Impedance	10			K Ω

1.1.7 Audio Input (Mini-Jack ϕ 3.5mm)

(1) Pin definition

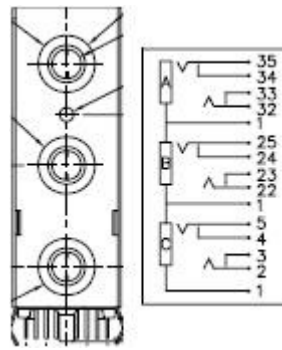


(2) Signal Level:

PIN	Signal	Parameter	Min	Type	Max	
1	GND					
2	Audio In Left	Amplitude		0.5	2	VRMS
		Impedance	10			K Ω
3	NC					
4	NC					
5	Audio In Right	Amplitude		0.5	2	VRMS
		Impedance	10			K Ω
22	Audio In Left	Amplitude		0.5	2	VRMS
		Impedance	10			K Ω
23	NC					
24	NC					
25	Audio In Right	Amplitude		0.5	2	VRMS
		Impedance	10			K Ω

1.1.8 Audio Headphone Output (Phone-Jack ϕ 3.5mm)

(1) Pin definition

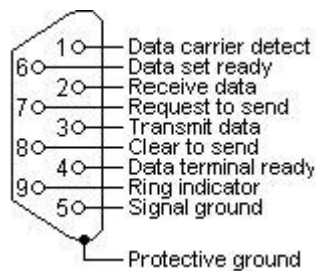


(2) Signal Level:

PIN	Signal	Parameter	Min	Type	Max	
32	Audio Out Left	Amplitude				mV
		Impedance		32		Ω
33	NC					
34	Audio out detect	Output ON			0.2	VDD
		Output Off	0.8			VDD
35	Audio Out Left	Amplitude				mV
		Impedance		32		Ω

1.1.9 RS232 Control Port

(1) Pin definition (D-Sub 9 Pin)

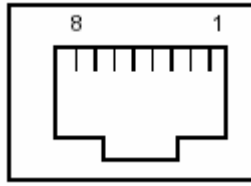


(2) Signal Level:

PIN	Signal	Parameter	Min	Type	Max	
1	NC					
2	RX	Amplitude (with sync)	-25		25	Volt
3	TX	Amplitude	-13.2		13.2	Volt
4	NC					
5	GND					
6	NC					
7	RTSZ					
8	CTS					
9	NC					

1.1.10 Lan Control Port (Follow IEEE 802.3)

(1) Pin definition(speed:10M/100M)



(2) Signal Level:

PIN	Signal
1	TD+
2	TD-
3	RD+
4	Common Mode Termination
5	Common Mode Termination
6	RD-
7	Common Mode Termination
8	Common Mode Termination

1.2 Speaker

Signal	Parameter	Min	Type	Max	
Audio	Impedance (audio in)		10		Kohm
	Amplitude (audio in)		500		mVolts rms
	Bandwidth	300Hz		16kHz	
	S/N Ratio	40			dB
	Total Harmonic Distortion			10	%

● Power Supply Specification

1.1 Input Power Specification

Specification	Description
Input Voltage Range	The unit shall meet all the operating requirements with the range 90 ~ 264 VAC
Frequency Range	The unit shall meet all the operating requirements with an input frequency range 47 Hz ~ 63 Hz
Regulation Efficiency	80 % (typical) measuring at 115Vac and full load

3.2 Varist Requirement

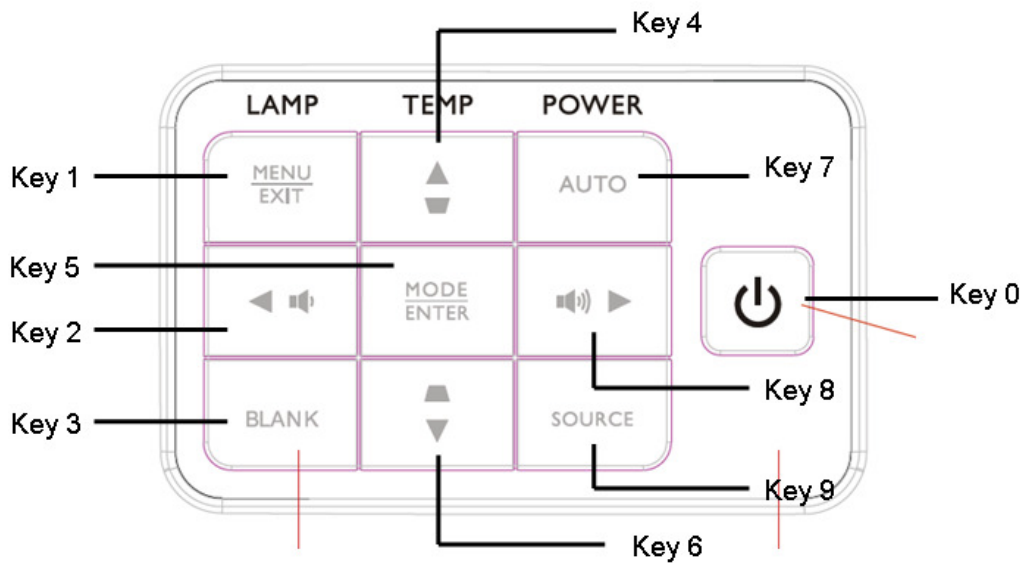
The power supply's varist component should stand 510V or higher power.



3.3 Lamp Power Requirement

Specification	Description
Starting pulse from Ignitor	2.1KV Min.

● UI Specification

Keypad Description



ID	Key Name	Detailed Description
Key 0	Power	Use this button to turn your Data Projector on and off (standby mode).
Key 9	Source	To select input sources as Computer, Video, S-Video, YPbPr
Key 7	Auto	Toggle auto-tracking image function
Key 3	Blank	Press “Blank” key first to blank the screen
Key 5	Mode/Enter	(1) When there is no OSD menu, this bottom is Mode hot key; user would press this bottom to choose one of preset modes (2) When there is confirm message, user could press this key to confirm
Key 1	Menu/Exit	Press this key to open/exit the OSD menu
Key 8	Right/ 	(1). When there is OSD menu, user can press this key to move to right item (2). By pressing “Volume +” button, the volume of the magnified sound will be increase gradually.
Key 2	Left/ 	(1). When there is OSD menu, user can press this key to move to the left item. (2). By pressing “Volume -” button, the volume of the magnified sound will be reduced gradually.
Key 4	Up	(1) Move item bar. (2) Move to page level. (3) Keystone+.
Key 6	Down	(1) Move item bar. (2) Move to page level. (3) Keystone-.

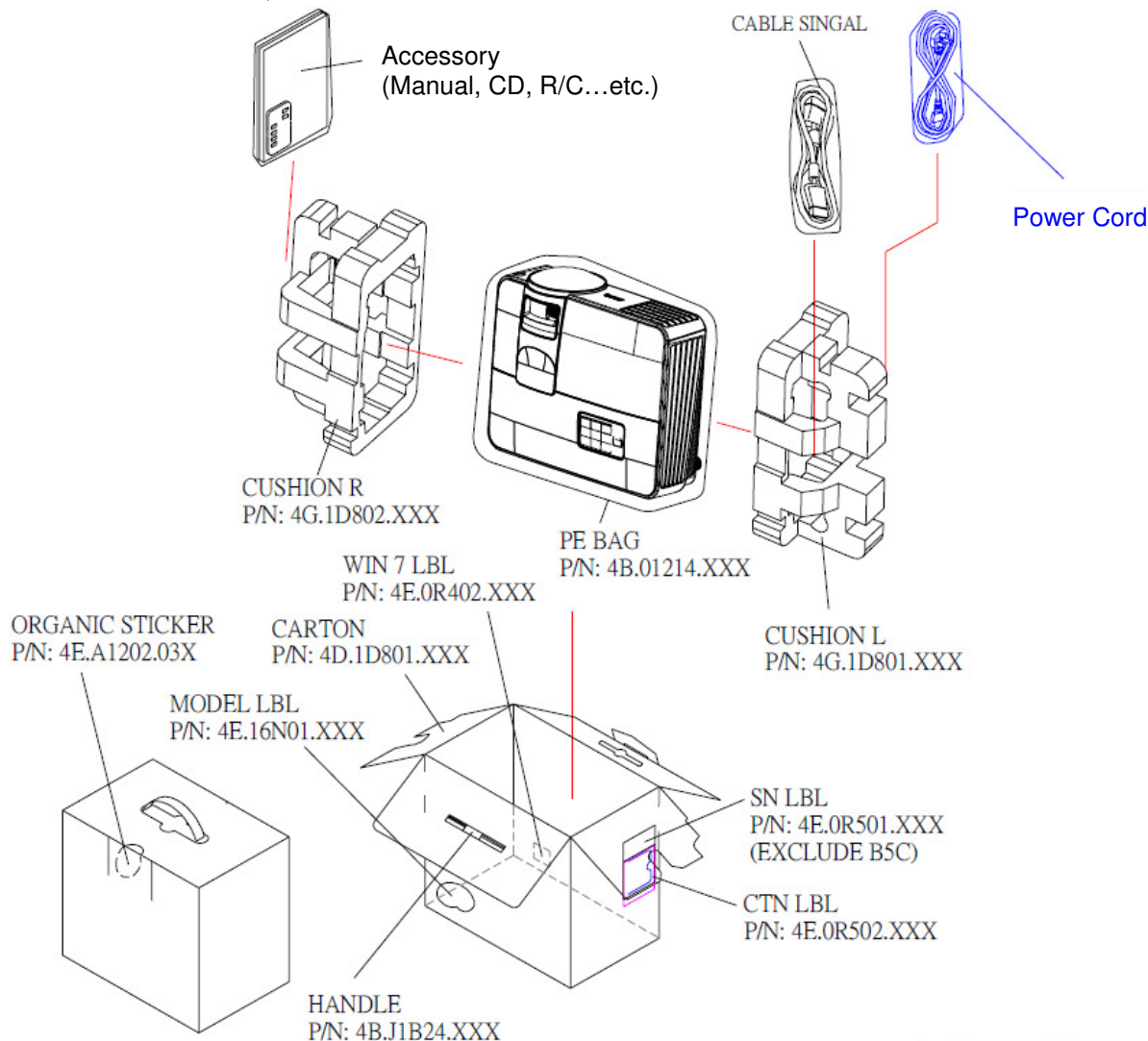
Remote Control Function and Key Code Definition
(Detail See Appendix2)



3.2 Packing

【NOTE】 The updated Service BOM is on SPO system. Please check it to order service parts.

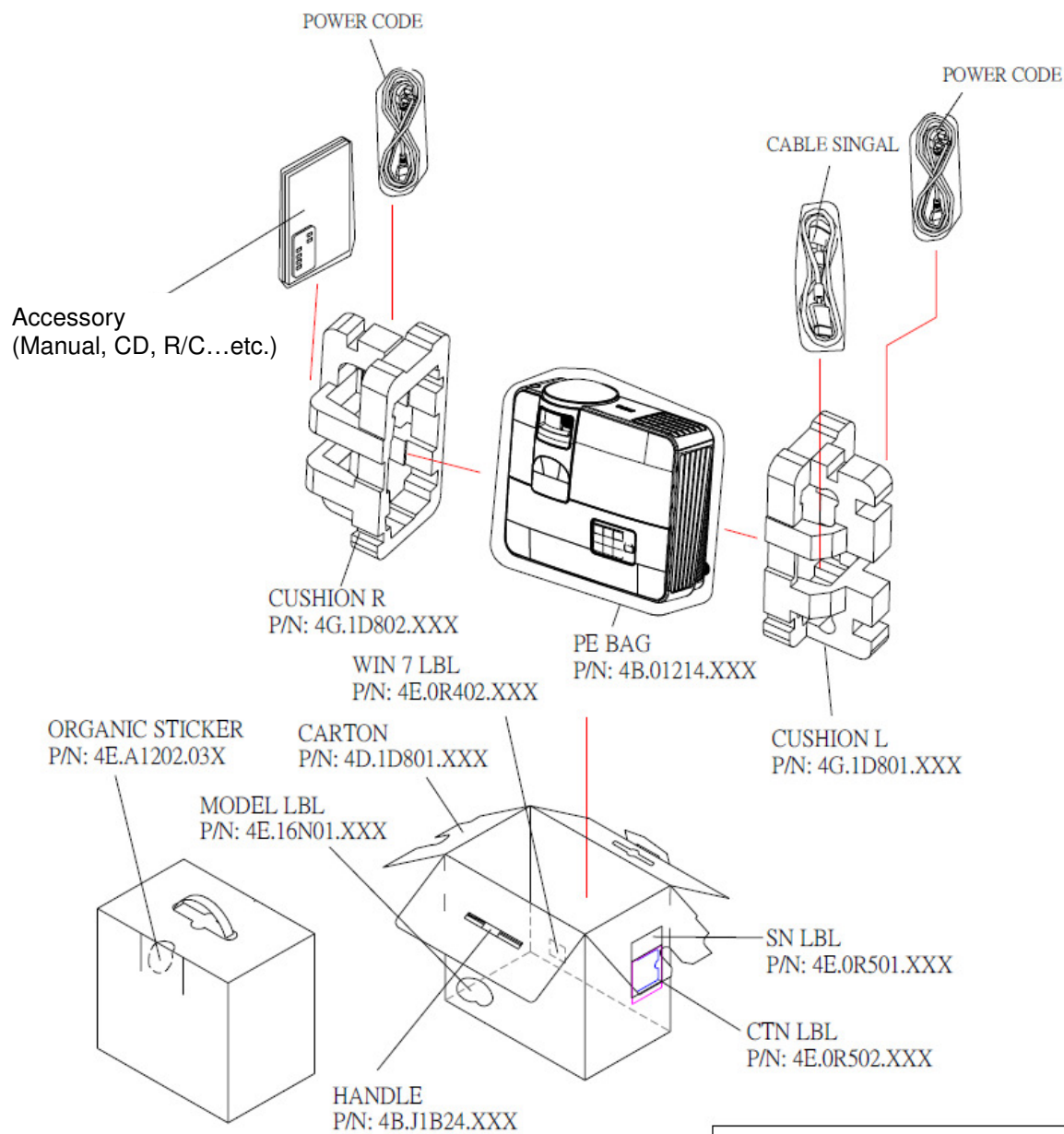
1. For 14A~14T, Exclude 14D/14F/14L :



After put in Power cord & Warranty card -> Seal the hole by tape -> Stick CTN label

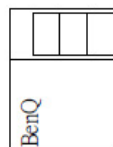


2. For 14L :

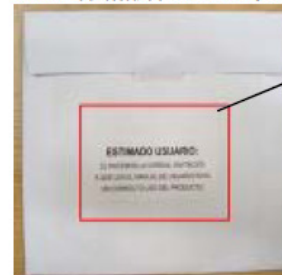


After put in Power cord & Warranty card -> Seal the hole by tape -> Stick CTN label

CTN LBL 和 SN LBL皆轉 90度：

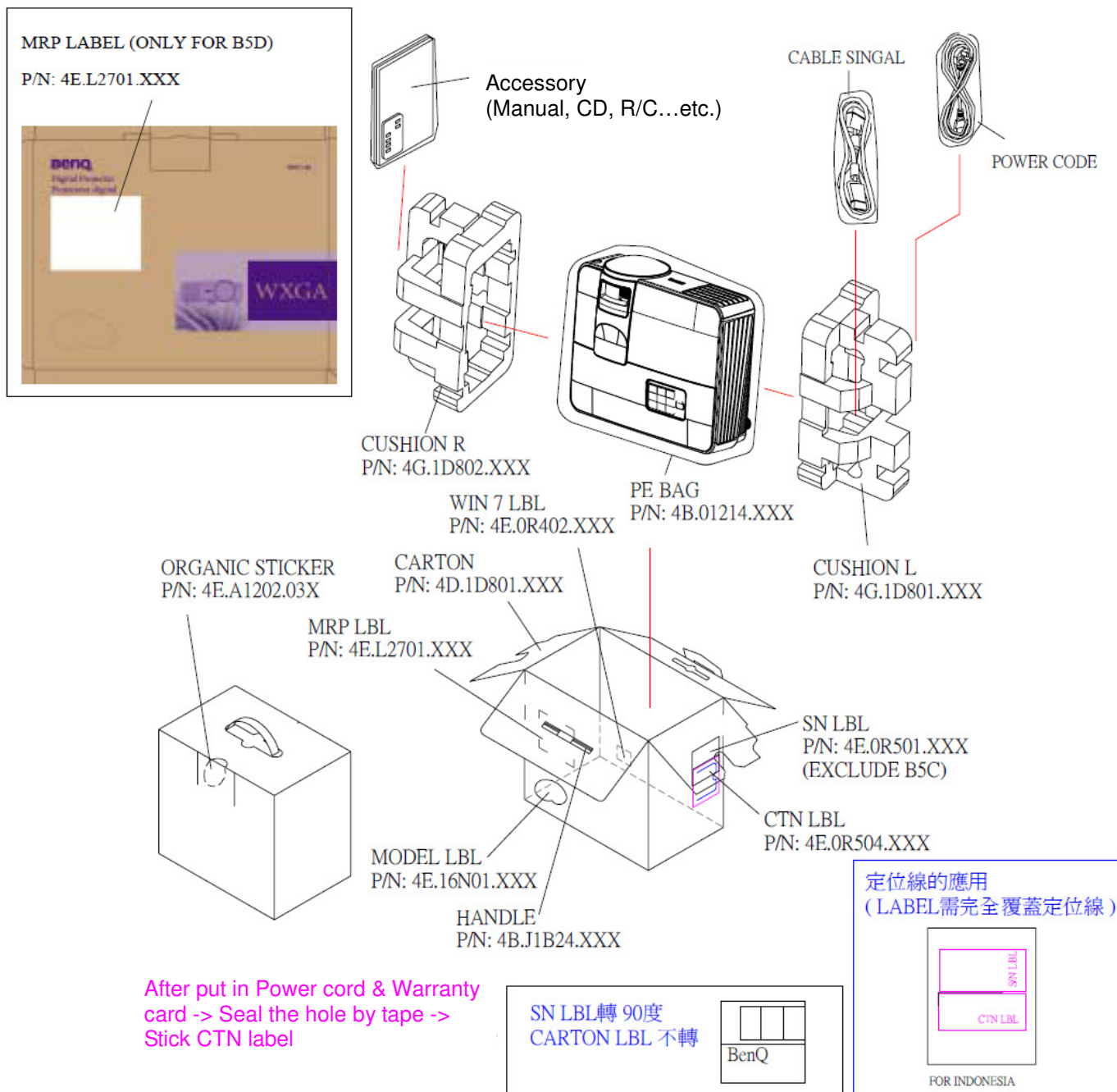


CD 封套加貼 LABEL, POSITION FOLLOW SOP



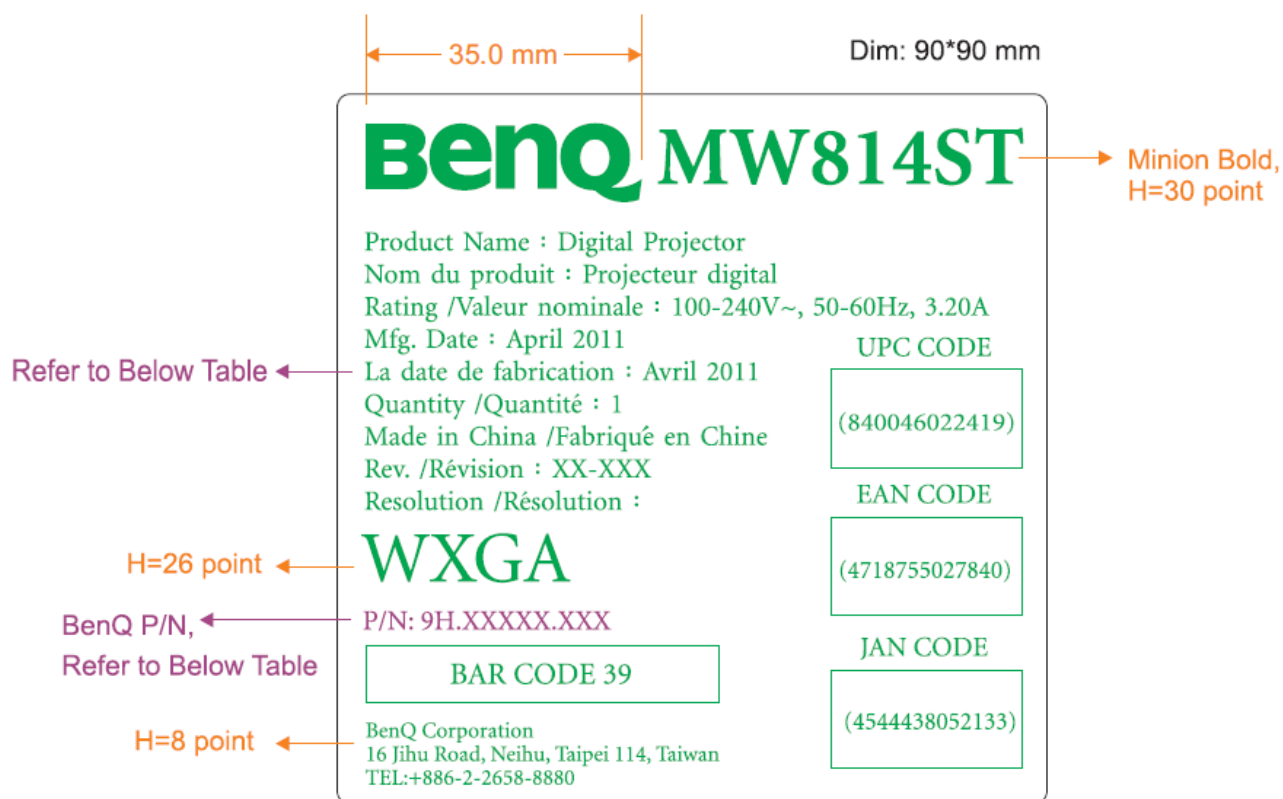
CD LABEL
P/N: 4E.1CW01.XXX

3. For 14D/14F :



CTN LBL PRINTING:

1. For 9H.J4S77.14A/L



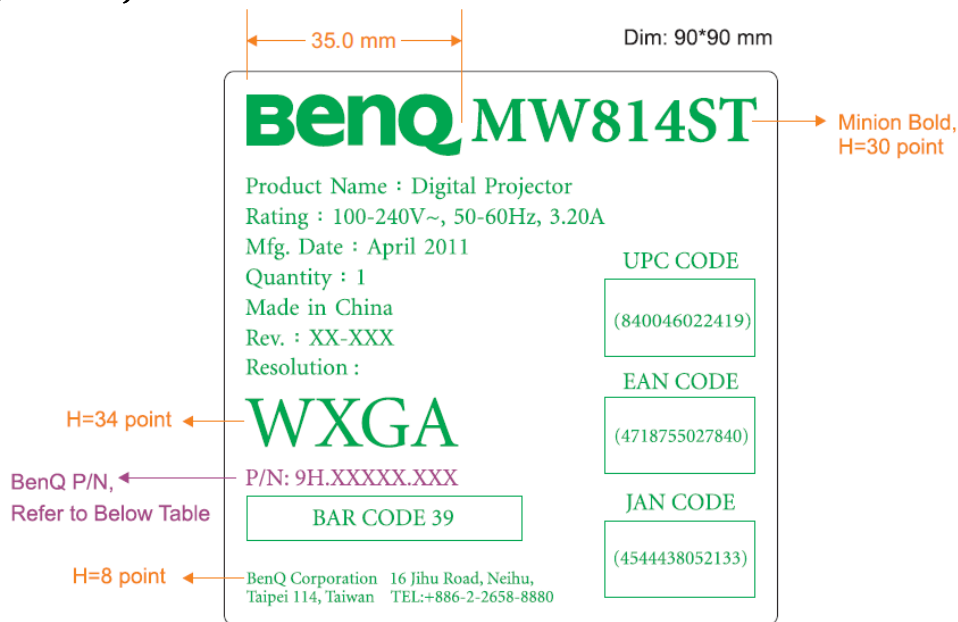
*** Besides Mark, English Font - Minion, H=10 point

*** Scale 1:1

English	French	English	French
January	Janvier	July	Juillet
February	Février	August	Août
March	Mars	September	Septembre
April	Avril	October	Octobre
May	Mai	November	Novembre
June	Juin	December	Décembre

Qisda P/N	BenQ P/N
9J.1D877.B5A	9H.J4S77.14A
9J.1D877.B5L	9H.J4S77.14L

2. For 9H.J4S77.14J/K



*** Besides Mark, English Font - Minion, H=11 point

*** Scale 1:1

Qisda P/N	BenQ P/N
9J.1D877.B5J	9H.J4S77.14J
9J.1D877.B5K	9H.J4S77.14K

3. For 9H.J4S77.14E/U

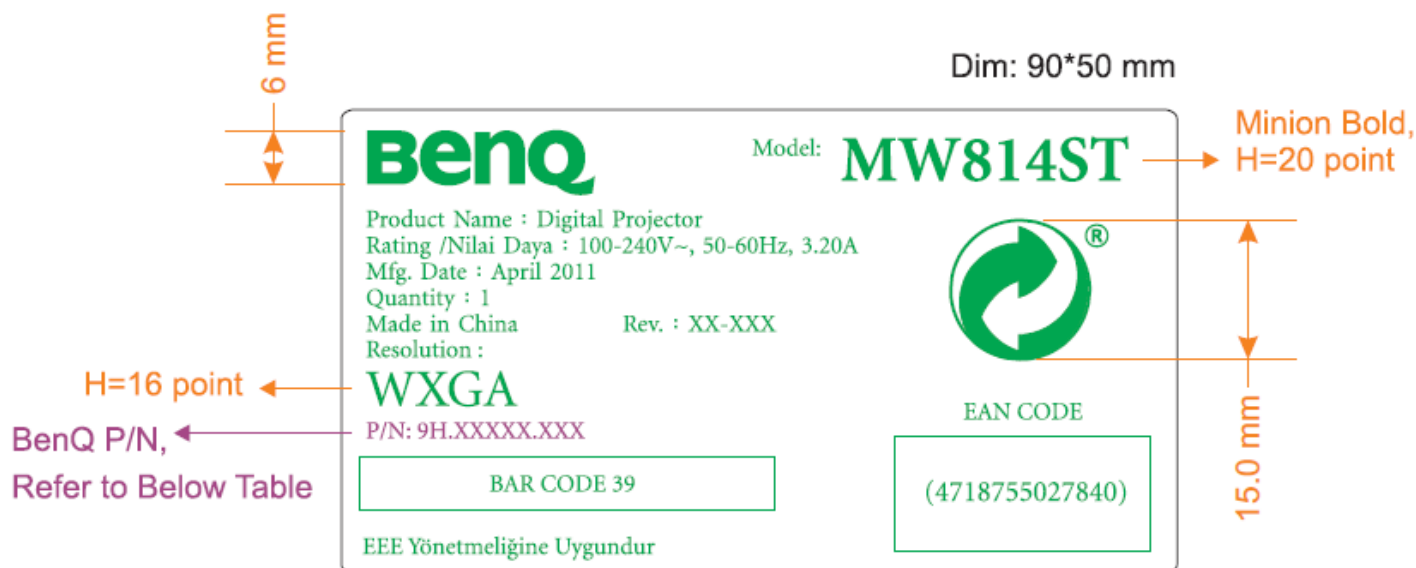


*** Besides Mark, English Font - Minion, H=11 point

*** Scale 1:1

Qisda P/N	BenQ P/N
9J.1D877.B5E	9H.J4S77.14E
9J.1D877.B5U	9H.J4S77.14U

4. For 9H.J4S77.14D/14F



*** Besides Mark, English Font - Minion, H=7.5 point

*** Scale 1:1

Qisda P/N	BenQ P/N
9J.1D877.B5D	9H.J4S77.14D
9J.1D877.B5L	9H.J4S77.14L

5. For 9H.J4S77.14P/S



*** Besides Mark, English Font - Minion, H=13 point

*** Scale 1:1

Qisda P/N	BenQ P/N
9J.1D877.B5P	9H.J4S77.14P
9J.1D877.B5S	9H.J4S77.14S

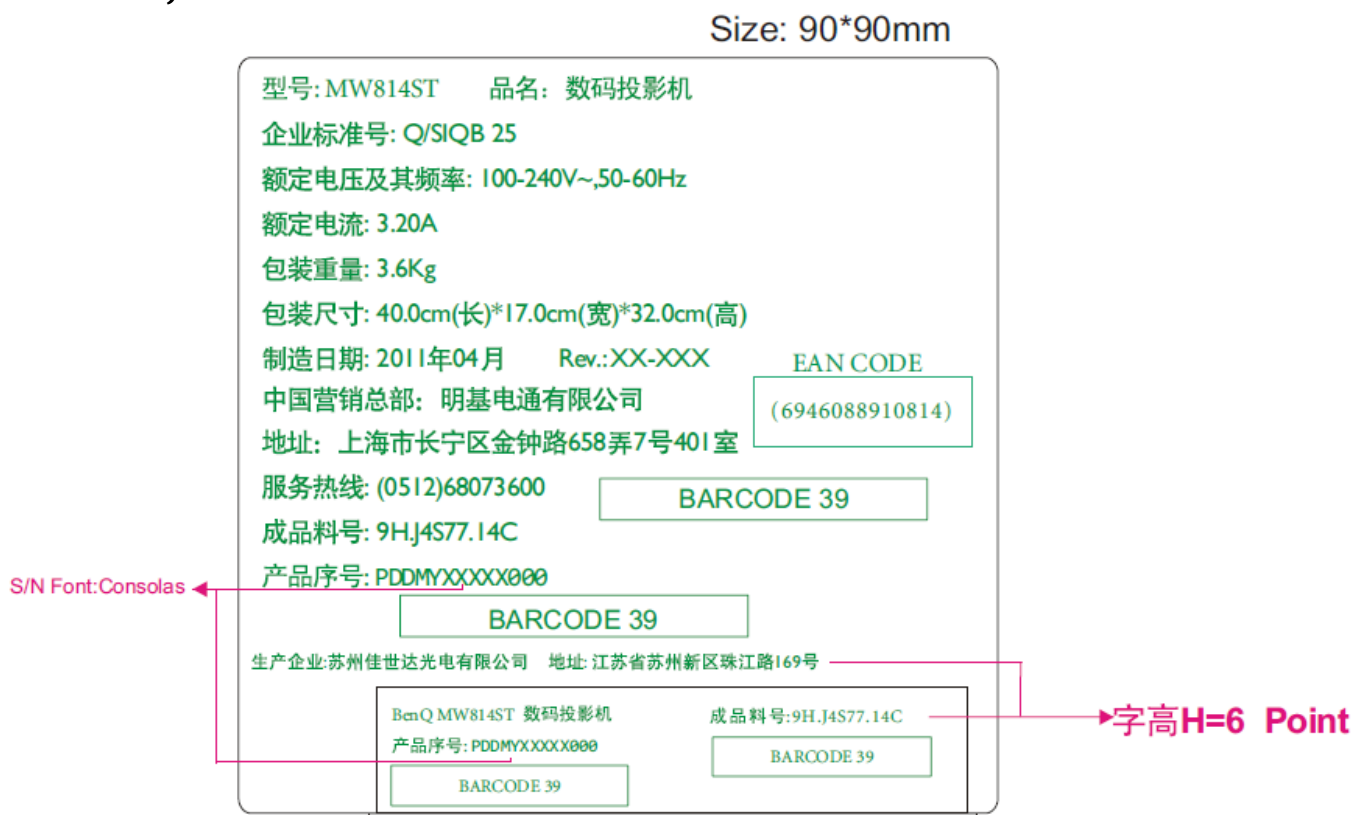
6. For 9H.J4S77.14T



*** Besides Mark, English Font - Minion, TC Font - 文鼎中黑, H=10 point

*** Scale 1:1

7. For 9H.J4S77.13C



注：除特别标示外打印的中文印字型为黑体，
 英文及数字的打印字型为Minion，字高是 9Point。

SPEC LBL PRINTING:

1. For 9H.J4S77.14A~U(Exclude 14C)

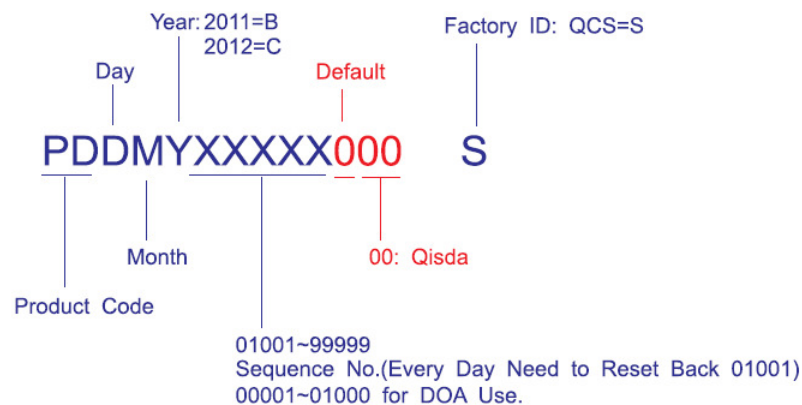
Dim: 95*55 mm



*** Besides Mark, English Font - Gill Sans, TC Font - 文鼎中黑, SC Font, H=6 point

*** P/N / 產品料號 : 9H.J4S77.14X, 最後一碼以 X 表示。

*** Scale 1:1



Day: 1~9, A=10, B=11, C=12, D=13, E=14, F=15, G=16, H=17, J=18, K=19, L=20, M=21, N=22, P=23, R=24, S=25, T=26, V=27, W=28, X=29, Y=30, Z=31 (don't use : 0, I, O, Q, U)

Month: 1=Jan, 2=Feb, 3=Mar, 4=Apr, 5=May, 6=Jun, 7=Jul, 8=Aug, 9=Sep, A=Oct., B=Nov, C=Dec

2. For 9H.J4S77.14C

S/N:font consolas

BenQ BenQ Corporation 16 jihu Road,Neihu, Taipei 114,Taiwan U.S.Patents 6,837,608;7,275,834; 7,181,318	品名: 数码投影机 企业标准号: Q/SIQB 25 产品料号: 9H.J4S77.14C 额定电压/ 频率/ 电流: 100-240V~,50-60Hz,3.20A 产品序号: PDDMYXXXXX000 S 制造日期: 2011年04月 制造产地: 中国 Rev:XX-XXX 中国营销总部: 明基电通有限公司 上海市长宁区金钟路658弄7号401室 服务热线: (0512)68073600 制造商: 明基电通股份有限公司 BenQ Corporation (16 jihu Road,Neihu,Taipei 114,Taiwan)	型号: MW814ST    
	BAR CODE 39(FO R SERIAL NO.)	

XX

Vendor code

*除了特殊规定外，中文打印字型为黑体7级，
英文数字打印字体为Gill Sans 7级；

S/N:

Year:2009=9
2010=A
2011=B
Default
Factory ID: QCS=S

PDDMYXXXXX000 S

Day
Month
Product Code
PD: DLP PJ
01001~99999
Sequence No.(Every Day Need to Reset Back 01001)
00001~01000 for DOA Use.

00: Qisda

Day: 1~9, A=10, B=11, C=12, D=13, E=14, F=15, G=16, H=17, J=18, K=19, L=20, M=21, N=22, P=23, R=24, S=25, T=26, V=27, W=28, X=29, Y=30, Z=31 (don't use :0,I,O,Q,U)

Month: 1=Jan, 2=Feb, 3=Mar, 4=Apr, 5=May, 6=Jun, 7=Jul, 8=Aug, 9=Sep, A=Oct., B=Nov, C=Dec

LAMP LBL PRINTING

Dim: 115*42 mm

<div data-bbox="199 342 432 394"> </div> <p>Lamp Unit: 5J.J4S05.001</p> <p>HIGH VOLTAGE / HIGH TEMPERATURE / HIGH PRESSURE</p> <p>DISCONNECT POWER AND LET LAMP COOL FOR 45 MINUTES. REFER TO USER'S INSTRUCTION FOR MORE INFORMATION. LAMP CONTAINS MERCURY. DISPOSAL ACCORDING TO LOCAL STATE OR THE ELECTRONIC INDUSTRIES ALLIANCE (WWW.EIAE.ORG). DO NOT OPEN. REFER SERVICING TO QUALIFIED PERSONNEL.</p> <hr/> <p>注意：高電圧/高温/高圧ランプ</p> <p>ランプの交換は、消灯より45分以上おいてから交換してください。 交換作業は取扱説明書に従ってください。このランプには、水銀が入 っています。ランプ廃棄またはリサイクルに関する情報については、 お住まいの地域の機関にお問い合わせください。サービスマン以外の 方は裏ぶたを開けないで下さい。</p>	<p>注意：高電圧/高温/高圧燈泡</p> <p>燈泡更換時，切斷電源並冷卻45分鐘左右，更換方式請參 照說明書。燈泡內含水銀，回收事宜請洽相關環保單位。 勿任意打開外殼，如需維修請與專業人員聯繫。</p> <hr/> <p>注意：高电压/高温/高压灯泡</p> <p>灯泡更換時，切斷電源并冷卻45分鐘左右，更換方式請參 照說明書。灯泡內含水銀，回收事宜請洽相關環保單位。 勿任意打開外殼，如需維修請與專業人員聯繫。</p> <hr/> <p>Lamp: Phoenix Type No.: SHP 220W/ I.0 E20.6 Max. Wattage: 220W Go to lamp.benq.com for a replacement lamp.</p> <div data-bbox="1337 658 1401 741"> </div>
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*** English Font - Gill Sans, H = 6 point

*** Scale 1:1

3.3 Customer Acceptance

1.0 SCOPE

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

2.0 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.

3.0 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.

4.0 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.

5.0 CLASSIFICATION OF DEFECTS

The defects are grouped into the following classes:

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.

5.2 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 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 merchandisability, BenQ CM Inform this defect. After that parties make communication and decide how to solve.

6.0 EXPRESSION OF DEFECTIVES

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

7.0 INSPECTION STANDARD

Unless otherwise specified, the inspection standard will be defined by MIL-STD-105E, NORMAL INSPECTION LEVEL II, SINGLE SAMPLING PLAN.

7.1 Acceptance Quality Level

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.

7.1.2 under normal sampling

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

8.0 GENERAL RULES

8.1 The inspection must be carried out by trained inspectors who have good knowledge about the product.

8.2 The inspection must be based upon the documents concerning the completely assembled and packed product.

- 8.3 When more defects appear with the same unit only the most serious defect has to be taken into account.
- 8.4 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.
- 8.5 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.
- 8.6 Faults must be able to be repeatedly demonstrated.

9.0 TEST CONDITIONS

Unless other prescription, the test conditions are as followings:

Nominal voltage: refer to operation manual

Environmental illumination:

Variable from 500 to 800 Lux (For appearance inspection)

Variable from 0 to 7 Lux (For functional inspection)

Temperature: $25 \pm 5^{\circ}\text{C}$

Visual inspection shall be done with the distance from eyes to the sample 40~50 cm.

Display mode: refer to operation manual

10.0 TEST EQUIPMENTS

Dark room

PC

Pattern Generator: Chroma or equivalent

DVD player

Power supply (100~240 VAC) with consumption meter

Measuring tape

4. Level 1 Cosmetic / Appearance / Alignment Service

4.1 Cosmetic / Appearance Inspection Criteria

TABLE 1. General Product of plastic outlook of dot, blemish, and others spec inspection standard (产品一般外观塑料件的黑点、杂质、凸点、砂粒缺陷检验标准)

	规格 Spec (面积 cm ²) (Area cm ²)	A 级面 A surface (允许数) (Number of defect)				B 级面 B surface (允许数) (Number of defect)				C 级面 C surface (允许数) (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
杂质 Particle 黑点 Blemish 异色点	P < 0.1 mm ² 点距 Distance 2cm	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore
	0.1 ≤ P < 0.2 mm ² 点距 Distance 4cm	2	3	4	5	2	3	4	5	4	4	5	6
	0.2 ≤ P < 0.3 mm ² 点距 Distance 4cm	0	0	0	0	2	3	4	5	3	4	5	6
凸点 砂粒 棉絮 毛屑 Particle 同色点 Spot with same color	P < 0.1 mm ² 点距 Distance 2cm	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore
	0.1 ≤ P < 0.2 mm ² 点距 Distance 4cm	4	4	5	6	5	5	6	7	6	6	7	8
	0.2 ≤ P < 0.3 mm ² 点距 Distance 4cm	3	4	4	5	4	5	5	6	6	7	7	8
	0.3 ≤ P < 0.5 mm ² 点距 Distance 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

备注 Note:

- 检测面积 A < 20*20 以 20*20 之规范检验之, 20*20 ≤ A < 50*50, 以 50*50 等级检验之, 以此类推.
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.

杂质/黑点/异色点(Particle/Blemish/Color Spot)

- 1.1 A、B、C 级面定义请参考 6.2 级面定义。

Definition of surface A, B, C refer to 6.2

- 1.2 LOGO 周边 2 cm 内不可有 0.05 mm² 以上之点, (0.05 mm² 以内之点不计)。

Blemish around the logo must be equal or smaller than 0.05 mm²

- 1.3 表面气泡——不可有。

Bubble on the surface is to be reject.

TABLE 2 :产品一般外观的塑料件检验标准(General Product of plastic outlook inspection standard)

NO	Appearance	Spec
1	缩水 Shrinkage	A 区: 不可有缩水, 以带手套检验, 手摸过去不可有凹陷的感觉 A region: No Shrink. With gloves, no feeling of sink when touching the surface B / C 区: 不能明显看出 B/C region: not obvious
2	流痕, 咬花, 光泽 Run, Texture, Gloss	不能有明显的深浅不均 No obvious non-uniformity
3	接合线 Welding Line/Knit Line	用指甲划过不会有停顿感,并附近无明显之光泽差异 When scratching on it, there's no feeling of obstruction. Also, there should not be obvious difference in gloss nearby it.
4	顶白 Ejector Mark	不可 Reject
5	Label/screws shortage	不允许 Reject
6	缺料 Material shortage	缺料不可影响机构强度和表面 Material shortage is not allowed to impact structure strength and surface
7	色差 Chromatic aberration	喷漆(Painting): $\Delta E \leq 2$; $L \leq 1.5$; $\Delta A, B \leq 0.6$ 银粉漆 (Paint, aluminum). $\Delta E \leq 2$ $L \leq 1.0$; $\Delta A, B \leq 0.6$ 非银粉漆(Paint, non-aluminum) 素材(Raw material): $\Delta L, A, B \leq 0.6$, $\Delta E \leq 0.75$
8	印刷 Printing	文字印刷不得有漏印、断线、重影、组细不均、溢墨、印偏(1mm)、印斜 (歪斜 <0.3 mm)。 Printing must not have incomplete printing, break off, overlap, uneven thickness, excessive ink, printing misalignment (1mm), printing slanting & crooked (<0.3 mm) 文字印刷颜色须确认是否正确。 Printing color must be comparable to color chip and sample.
9	Logo of panel sticker	文字印刷不得有漏印.断线.重影.组细不均.溢墨.印偏(1mm)印斜 (歪斜 <0.5 mm). Printing must not have incomplete printing, break off, overlap, uneven thickness, excessive ink, printing misalignment (1mm), printing slanting & crooked (<0.5 mm) 文字印刷颜色须确认是否正确. Printing color must be comparable to color chip and sample.
10	刮伤 Scratch/Nicks	<u>Side A:</u> ($W < 0.1$ mm , $L < 3$ mm): 容许 1 个 Only 1 this kind of scratch is accepted $W < 0.1$ mm , $L < 3-5$ mm 容许 0 个 No this kind of scratch is accepted <u>Side B:</u> $W < 0.15$ mm , $L < 3$ mm 容许 2 个 Only less than 2 this kind of scratch is accepted $W < 0.15$ mm , $L < 3-5$ mm 容许 1 个 Only 1 this kind of scratch is accepted <u>Side C:</u>


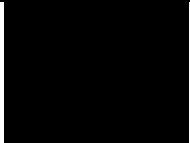
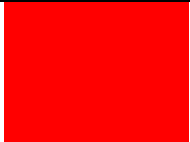

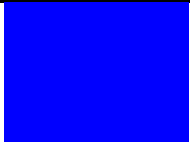
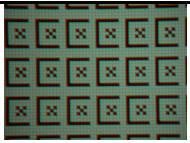
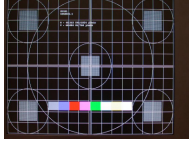

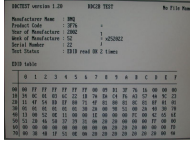
		<p>W < 0.2mm , L < 1mm 容许 4 个 Only 4 this kind of scratch is accepted</p> <p>W < 0.2mm , L < 3mm 容许 3 个 Only 3 this kind of scratch is accepted</p> <p>W < 0.2mm , L < 3-5mm 容许 2 个 Only 2 this kind of scratch is accepted</p> <p>Note:</p> <p>刮伤见底材者不允许 Severe scratch which disclose the Natural</p> <p>1. 刮擦伤两两需相距 5cm 以上 Each scratch should be 5cm more far away from each other</p>
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TABLE 3 产品镁铝合金制品之黑点、杂质、凸点、砂粒缺陷检验标准检验规范
(Magnesium-Aluminum Alloy Products that Dot, Blemish, and Others spec.)

	规格 Spec (面积 cm ²) (Area cm ²)	A 级面 A surface (允许数) (Number of defect)				B 级面 B surface (允许数) (Number of defect)				C 级面 C surface (允许数) (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
杂质 Particle 黑点 Blemish 异色点 Color spot	P < 0.1 mm ²	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore
	0.1 ≤ P < 0.3 mm ² 点距 7.5cm Distance	1	2	3	4	2	3	3	5	3	4	5	6
	0.3 ≤ P < 0.5 mm ² 点距 7.5cm Distance	0	0	0	0	2	2	3	4	2	3	4	5
	0.5 ≤ P < 0.7 mm ² 点距 7.5cm Distance	0	0	0	0	0	0	1	2	1	2	3	4
凸点 砂粒 棉絮 毛屑 Particle 同色点 Spot with same color	P < 0.1 mm ² 点距 7.5cm Distance	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore	不计 Ignore
	0.1 ≤ P < 0.3 mm ² 点距 7.5cm Distance	2	2	3	4	3	4	5	6	4	5	6	7
	0.3 ≤ P < 0.5 mm ² 点距 7.5cm Distance	1	1	2	3	2	2	3	4	2	3	3	4
	0.5 ≤ P < 0.7 mm ² 点距 7.5cm Distance	0	0	1	2	1	1	2	3	1	2	2	3
	Total	3	3	4	5	5	6	7	8	6	7	8	9

4.2 OPERATIONAL INSPECTION CRITERIA

1. TEST PATTERN

PATTERN	PATTERN	TEST ITEM
Full white		ANSI Brightness、Bright Uniformity、FOFO Contrast Ratio、CIE white coordinate、Throw Ratio、Zoom Ratio、Distortion
Full Dark		FOFO Contrast Ratio
Full Red		Impurity、CIE coordinate
Full Green		Impurity、CIE coordinate
Full Blue		Impurity、CIE coordinate
Chromo Pattern84		Focus Range
General-1 pattern		Performance/ Timing check/ function check
32 Gray		Gray Check
DDC check		Check the DDC information, Including S/N, model, manufacturer name, product code.

2. TEST CONTENT:

	Test Condition	TEST ITEM	Input	Equipment
PC Mode	Chroma pattern	Focus/ Focus range	D-SUB	Chroma
	FULL W , R , G , B	Impurity, CIE coordinate, pixel fail		
HDTV	NTSC	Picture performance	YPbPr	Chroma / BS Tuner
DVD picture	NTSC disk/ PAL disk	Picture quality	Video S-video	DVD player

3. SPECIFICATION:

Item	Spec.	Condition	Pattern
ANSI Brightness	Minimum 2000Lumens	Contrast: Preset Brightness: Preset	Full white
Bright Uniformity	Minimum 45%	Contrast: Preset Brightness: Preset	Full white
ANSI Contrast	Minimum 150:1	Contrast: Preset Brightness: Preset	Chessboard
FOFO Contrast Ratio	Minimum 2400:1(w/WCE)	Contrast: Preset Brightness: Preset	Full white and Full dark
Light Leakage (In Active Area)	$\triangle \leq 0.5$ lux compared with center point @ full black pattern within 78" (Diagonal at 0.485m).	Contrast: Preset Brightness: Preset	Full dark
Light Leakage (Out of Active Area)	≤ 0.5 lux, @ full black pattern with 78"~90" (Diagonal at 0.485m) (Except DMD Defect)	Contrast: Preset Brightness: Preset	Full dark
CIE white coordinate	$x=0.315 \pm 0.04$ $y=0.364 \pm 0.04$	Contrast: Preset Brightness: Preset	Full white
CIE red coordinate	$x=0.636 \pm 0.04$ $y=0.355 \pm 0.04$	Contrast: Preset Brightness: Preset	Full Red
CIE green coordinate	$x=0.330 \pm 0.04$ $y=0.571 \pm 0.04$	Contrast: Preset Brightness: Preset	Full Green
CIE blue coordinate	$x=0.145 \pm 0.03$ $y=0.073 \pm 0.03$	Contrast: Preset Brightness: Preset	Full Blue
Throw Ratio	0.49 (95" $\pm 3\%$ @ 1m)	Contrast: Preset Brightness: Preset	Full white
Keystone Distortion	$(W2-W1) / (W1+W2) < 1.0\%$	Contrast: Preset Brightness: Preset	Full white
Vertical TV Distortion	$(H1+H2-2 \times H3)/2H2 < 1.0\%$	Contrast: Preset Brightness: Preset	Full white
Clearly Focus Range	Pixel clear and uniform at 0.75~1.6m	Contrast: Preset Brightness: Preset	Chroma 84 X pattern
Gray Check	Should be clear and bright	Brightness: Preset Contrast: Preset	Chromo 32 gray pattern
DMD Image Quality	See Defect Classification	See Defect Classification	See Defect Classification
PC	640X480 \rightarrow 800x600, compressed 1600x1200;	Contrast: Preset Brightness: Preset	General-1 pattern
Video	NTSC/NTSC4.43/PAL(Including PAL-M, PAL-N) /SECAM/PAL60	Contrast: Preset Brightness: Preset	Color-bar pattern
YPbPr	NTSC (480i)/ 480p/ PAL (576i)/576p, HDTV (720P/1080i/p)	Contrast: Preset Brightness: Preset	Color-bar pattern

4. Power Consumption:

8.2 Power consumption	Max.	335W
	Standby	1W Max. at 100 ~ 240VAC (disable loop through, LAN control, audio out)
	Normal	Typical 300W@110Vac
	ECO	Typical 239W@110Vac

5. 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 Q201 document)	Major
2	Display Quality (include input: Video, S-video, YPbPr, HDMI, 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

6. IMAGE QUALITY SPECIFICATION:

SEQ#	Test	SCREEN	ACCEPTANCE CRITERIA
1	Major Dark Blemish	Blue 60	≤ 4 visible dark blemishes are allowed in the active area No blemish will be $> 1.5''$ long/diameter
2	Major Light Blemish	Gray 10	≤ 4 visible dark blemishes are allowed in the active area No blemish will be $> 1.5''$ long/diameter
3	Reset Boundary Artifact	Gray 30	No reset boundary artifacts allowed
4	Eyecatchers / Border Artifacts	Any screen	Eyecatcher and border artifacts are allowed
5	Projected Images	Any screen Gray 10 Any screen Gray 10 Whit Any screen Any screen	No adjacent pixels No bright pixels in Active Area No unstable Pixels in Active Area ≤ 1 right pixel in the POM ≤ 4 dark pixels in the Active Area No DMD window aperture shadowing on the Active Area Minor blemishes are allowed

4.3 Software/Firmware Upgrade Process

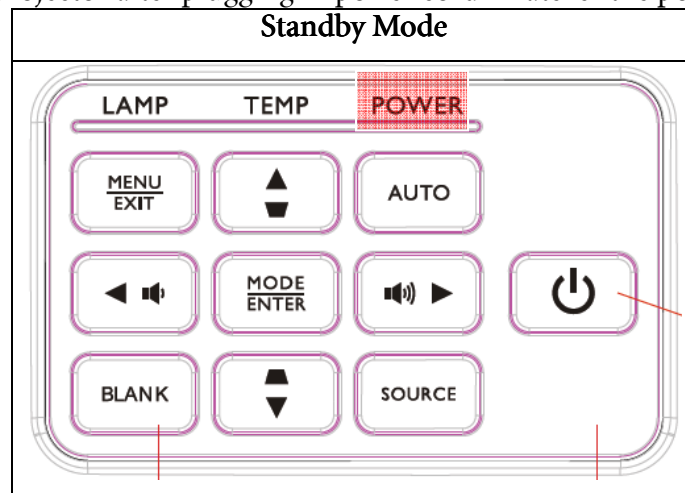
A. Basic Operating

(a) Standby Mode :

User can just plug in power cord, then projector will enter standby mode. Power LED will show Red for around 1 sec, then show Orange continuously as the figure shown below. When the power LED shows Red, it means system is not ready for standby. In another word, if the power LED shows Orange, it means system is in standby mode and the DLP system has no power support, except MCU and its related circuits.

When standby mode, system power consumption will be less than 1 Watt.

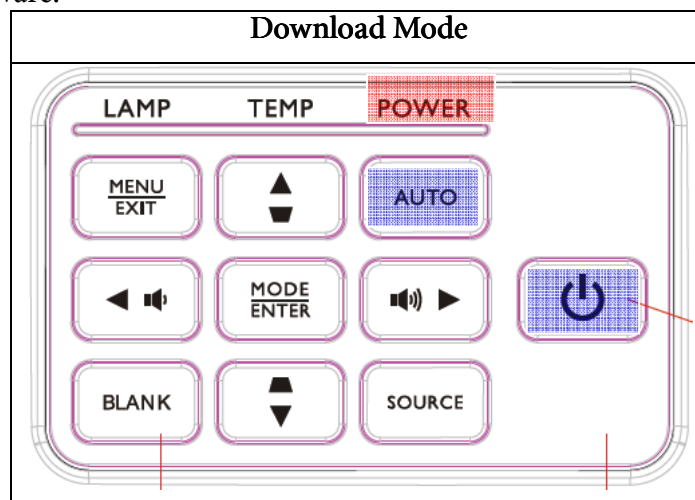
User can turn on projector after plugging in power cord whatever the power led is red or orange.



(b) Download Mode :

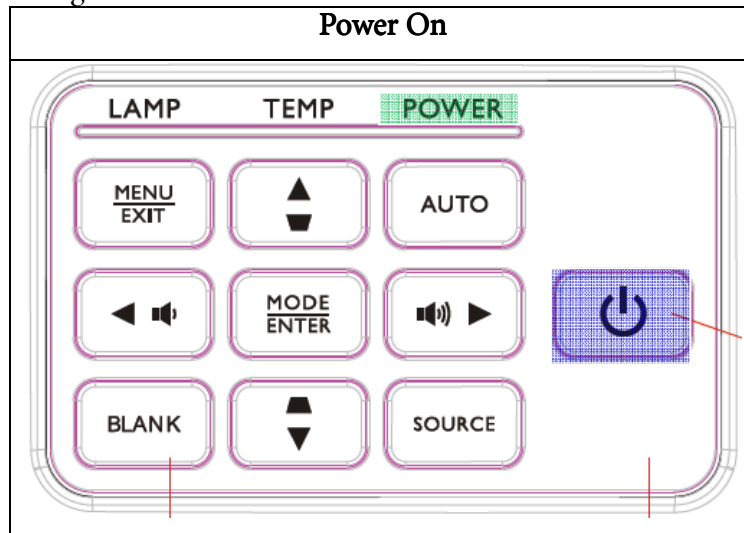
This mode is applied for firmware download.

If operator wants to enter this mode, he should press and hold both keypad-**POWER** and Keypad-**AUTO** at the same time, then plug in power cord. Power LED will show Green for around 1 sec, then show Red continuously as the figure shown below. In download mode, system will be supported by full power but will not turn on projector. Operator can use DLP composer to download new firmware.



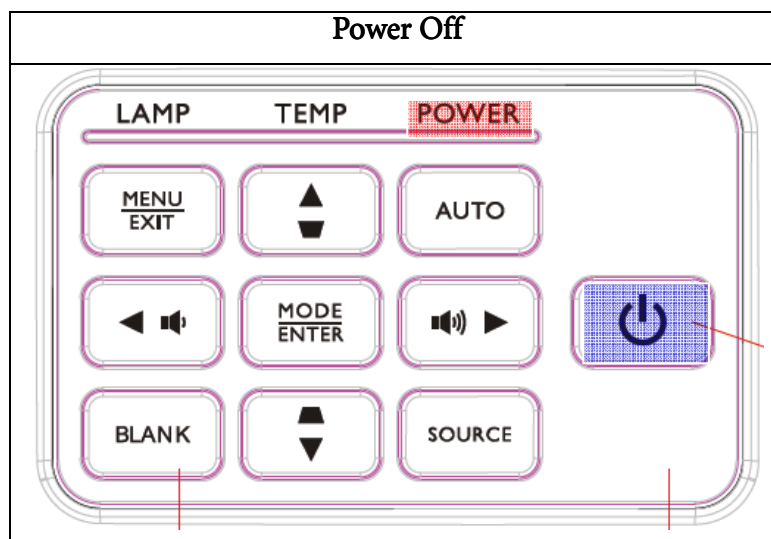
(c) Power On :

User can press Keypad Power to turn on projector. User can also use IR remote controller and RS-232 Command : <CR>*pow=on#<CR> to do this action. When system turning on, power LED will flash Green as the figure shown below.



(d) Power Off :

If user wants to turn off projector, user can double click keypad Power, use IR remote controller, or RS-232 Command : <CR>*pow=off#<CR>. Then, system will cool itself via fans for 3 seconds (quick cooling) or 90 seconds (normal). During cooling, Power LED will flash Orange. After cooling, system will return to standby mode and Power LED will become Orange as the figure shown below.



B. Download MCU Code and Firmware

(a) Auto MCU Code Download : (for Low-Power Standby)

Condition :

Auto Detect, download by MCU itself.

Situation 1 : MCU code is empty (The 1st time to plug in power cord)

Situation 2 : MCU version update

System Action :

System needs around 2 sec to download MCU itself automatically.

Downloading : Power LED will show Red and Lamp LED will show Green.



Download Fail : Power LED will show Orange and Lamp LED will show Red.



Download Success : System will go back standby mode and Power LED will show Orange.



Notice :

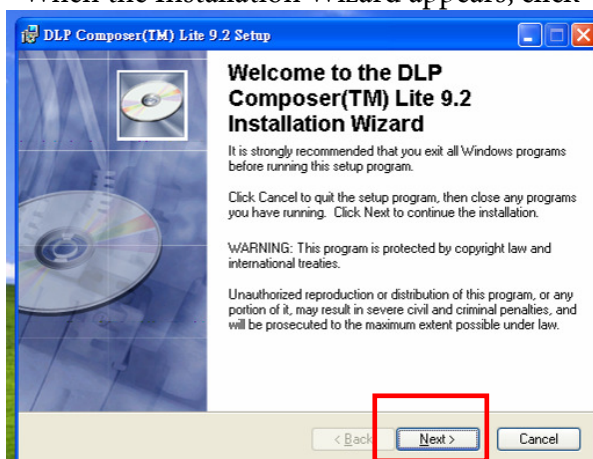
Do NOT interrupt power when downloading.

(b) Download Firmware

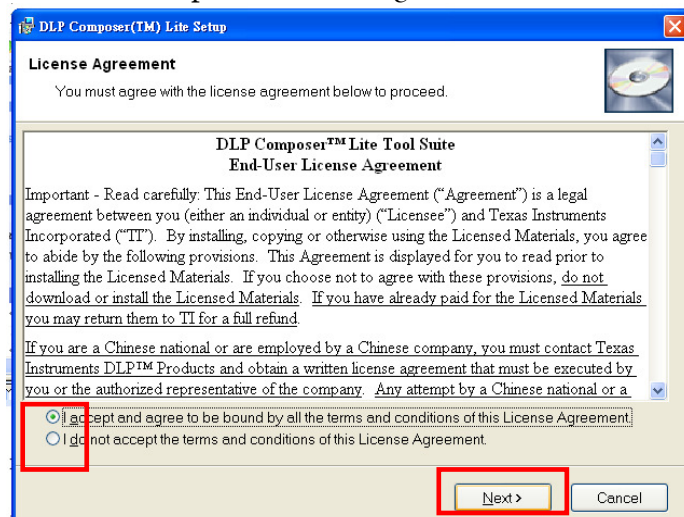
i. DLP Composer lite install procedure

(1) Installation

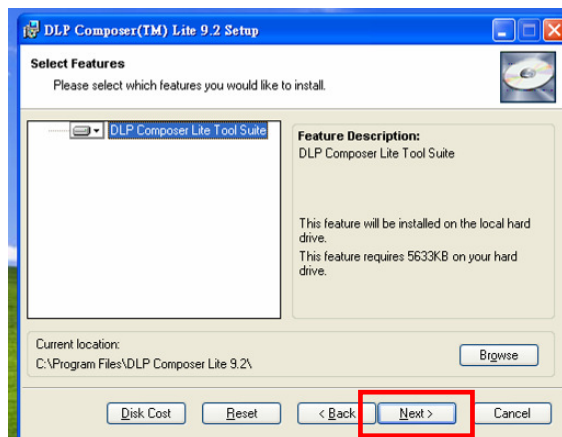
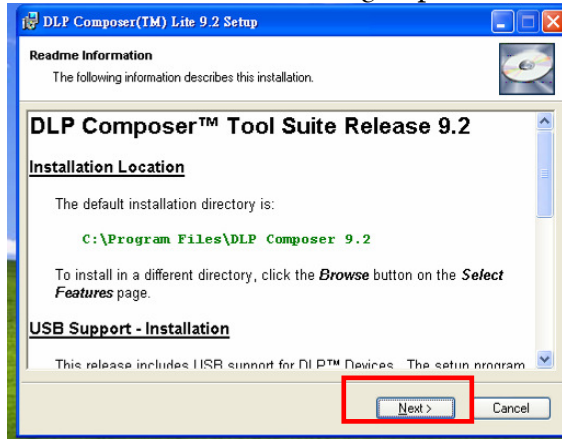
1. Double click the Setup file for DLP Composer Lite (use 9.2 or above version) to start to install program.
2. When the Installation Wizard appears, click “Next”.



3. Select to accept the License Agreement, than click “Next”



4. Click “Next” in the following steps to continue installation process.

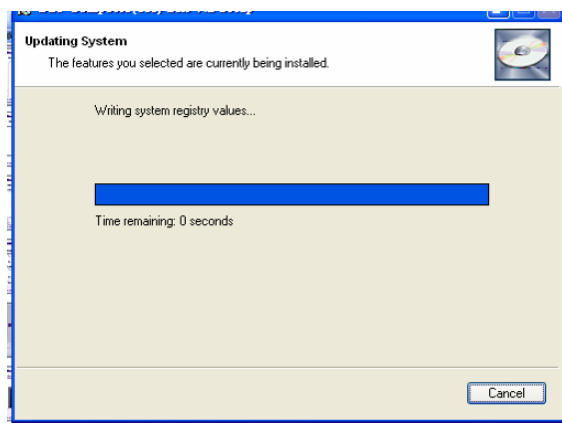
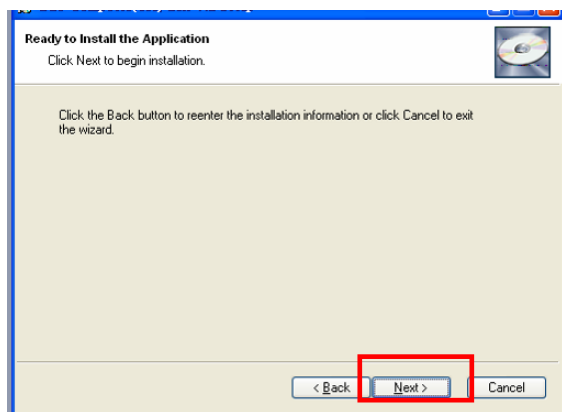


Note:

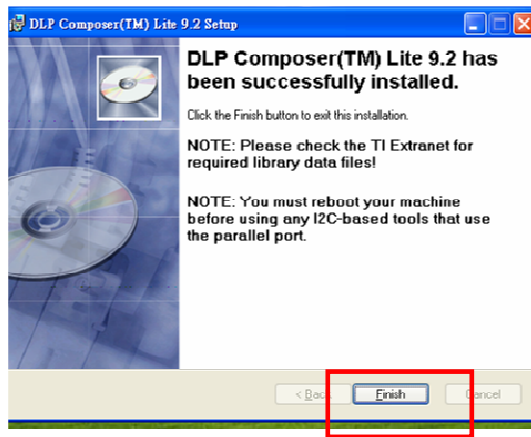
The default installation directory is:

C:\Program Files\DLP Composer Lite9.2

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.



5. When finishing installation, click “Finish”, and then restart your computer to complete the installation process.



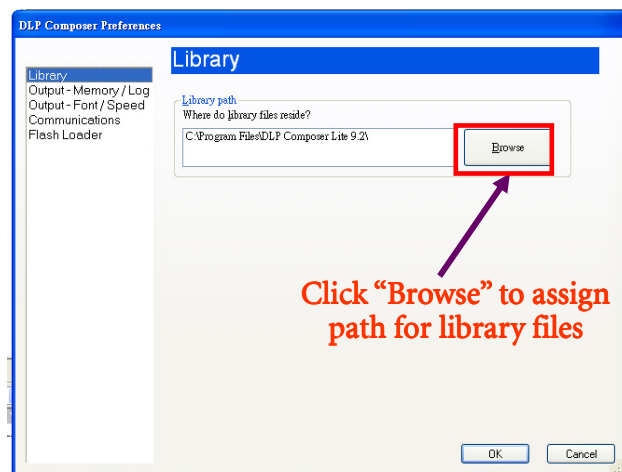
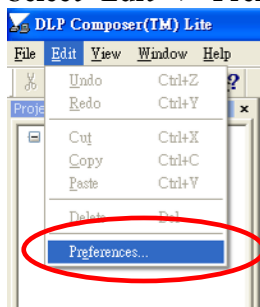
(2) Setting for your first use

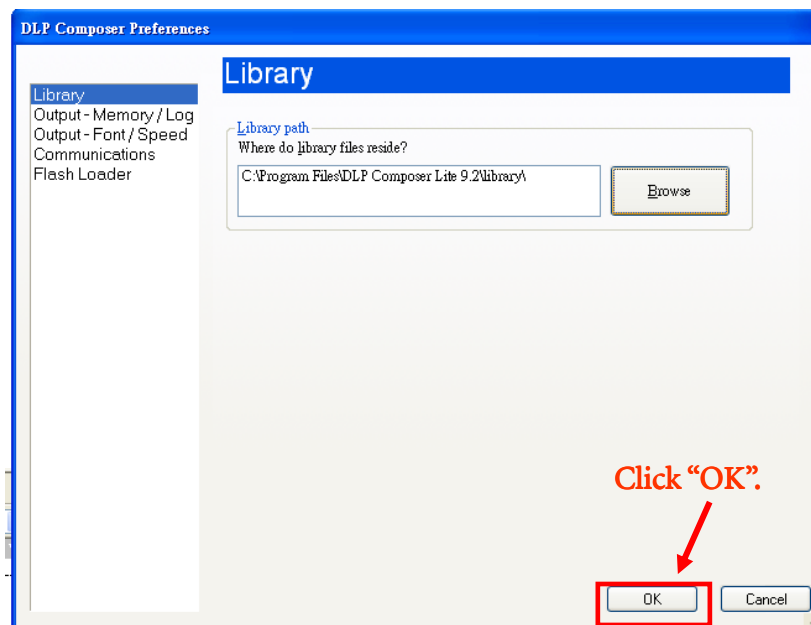
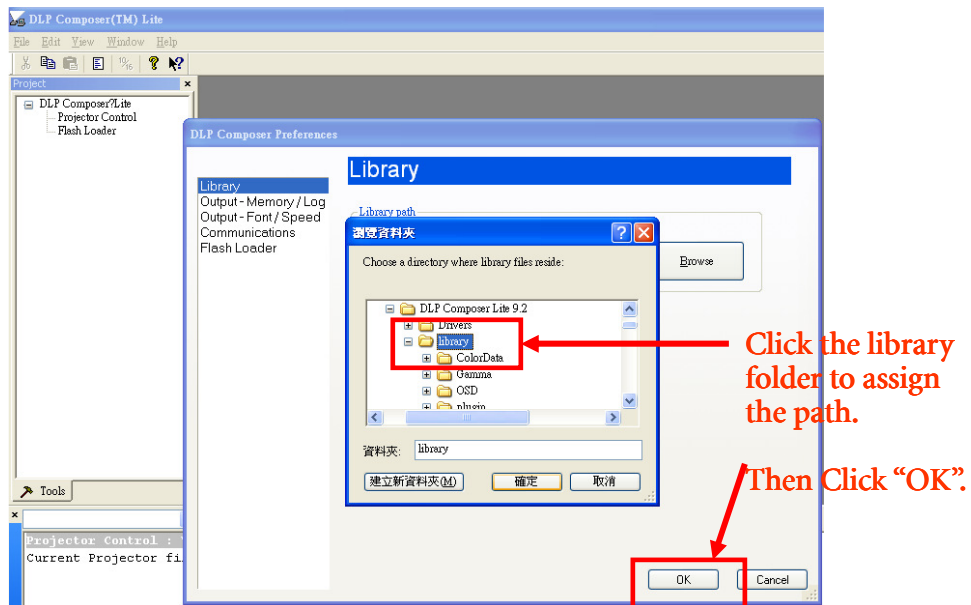
● Select Library:

1. Make sure the correct library file exist in your assigned path. If not, unzip the library from the installation file (“DDP243x_Download_Tool_Ver1.3.zip”, or later version), and save it into your assigned path.



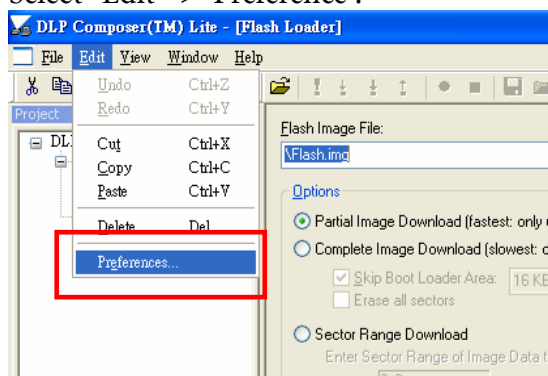
2. When start to use this program to download at first time, you need to assign correct Library path in DLP Composer Lite program.
Select “Edit”->”Preference”.



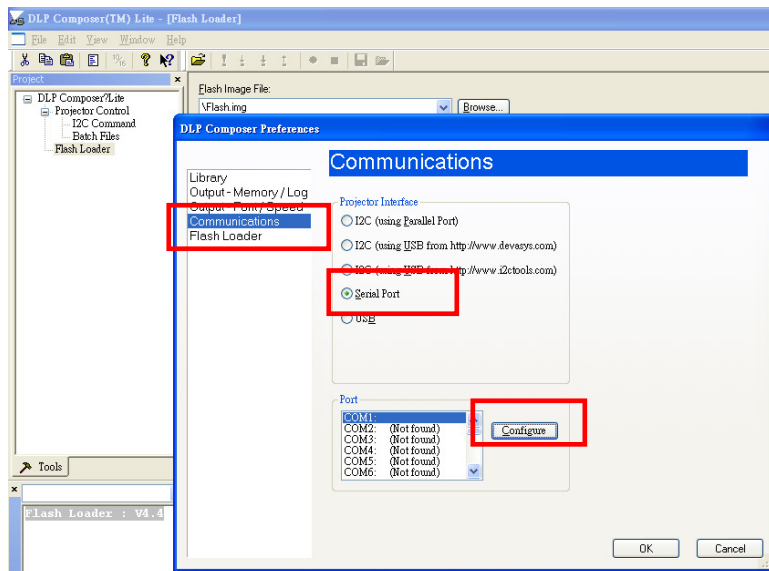


● **Set communication (for download by RS232):**

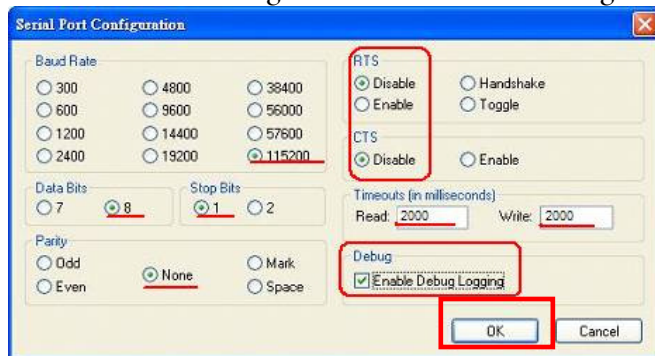
1. Select "Edit" -> "Preference".



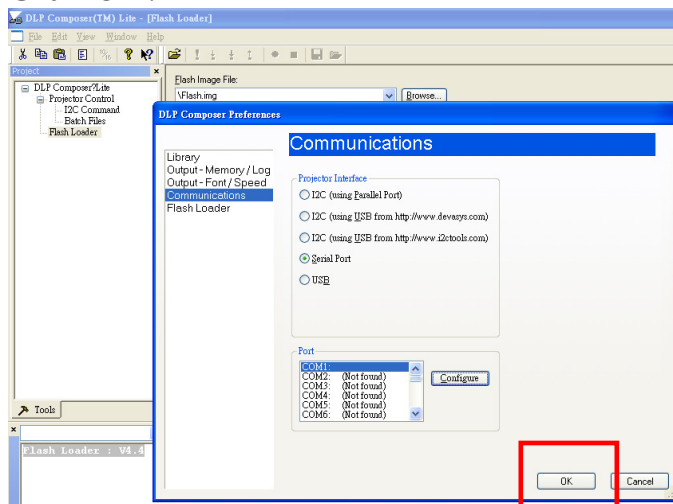
2. Select "Communications" -> "Serial Port" -> "Config".



3. Make sure the settings are the same as below figure-> Click "OK".



4. Click "OK".

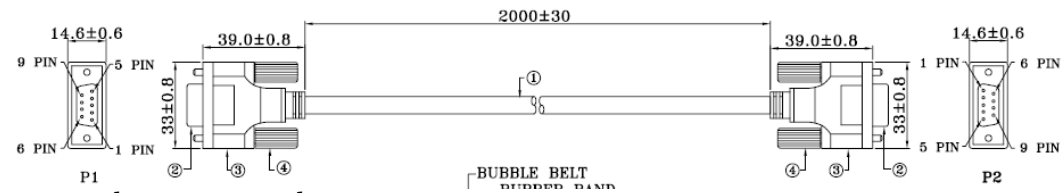


ii. Download Procedure

● How to download

Hardware required

1. Standard RS232 Download cable (SPEC as below)
D-sub 9-pin Female for Both terminals



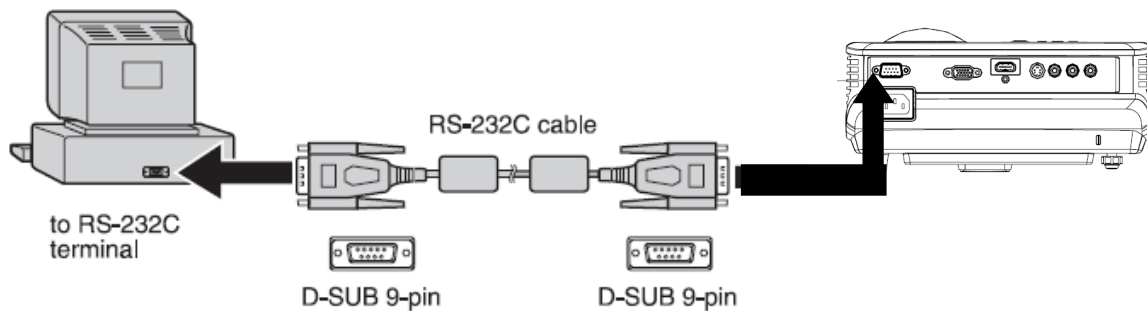
Personal computer or laptop computer

Software required

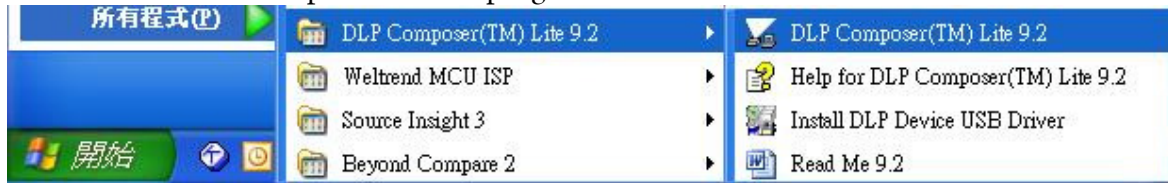
1. DLP Composer Lite program
2. New version FW

Download procedure

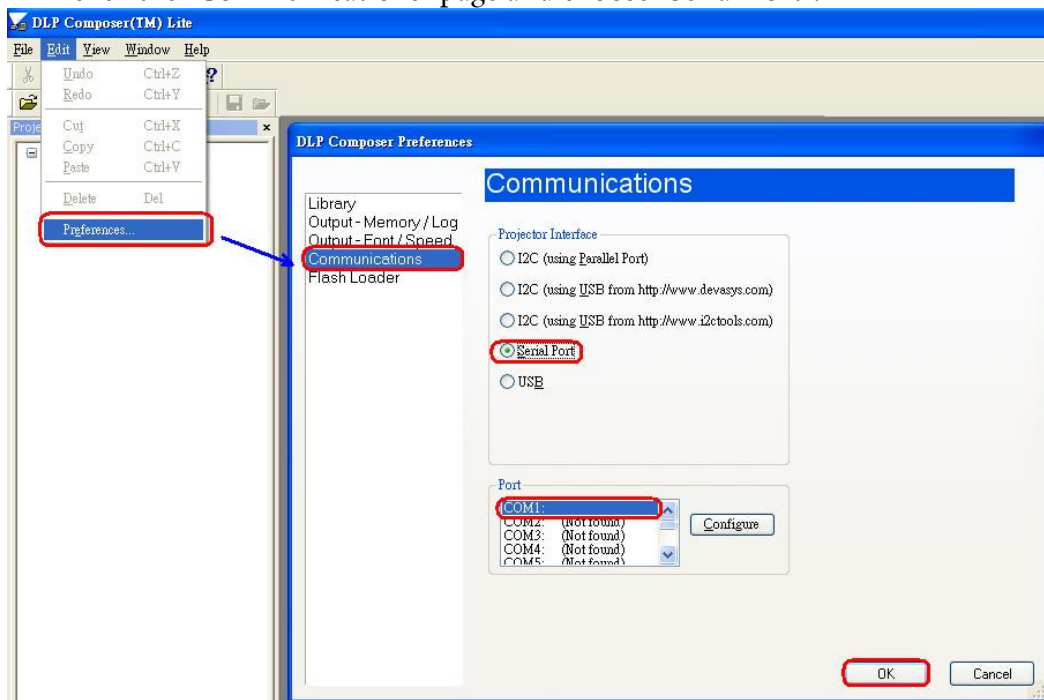
1. Connect RS-232 cable to PC and projector



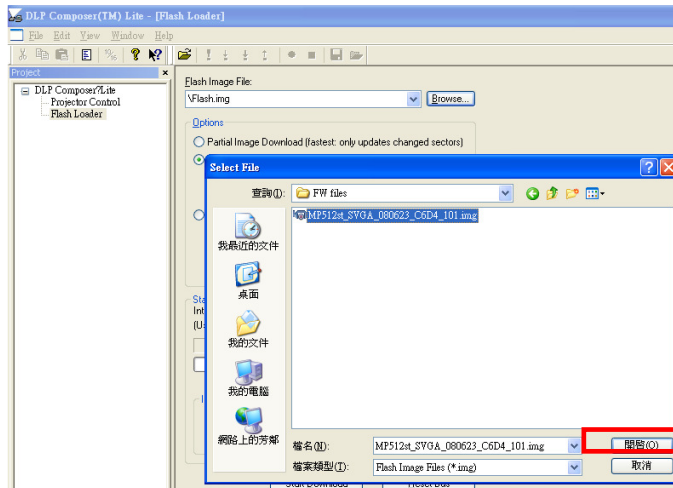
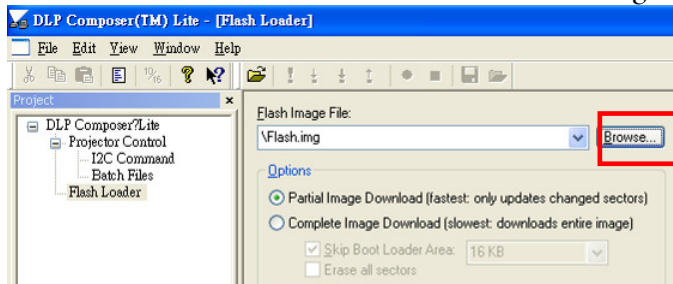
2. Let projector be in **Download Mode**:
 - Press and hold keypad-**POWER** and **AUTO** at the same time, then plug in power cord.
 - Power LED will show Green for around 1 sec, then show Red continuously.
3. Execute DLP Composer Lite 9.2 program



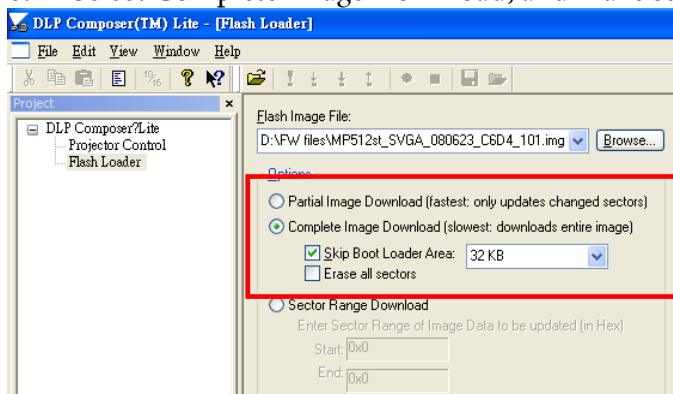
4. To select the RS-232 communications interface, choose "Preferences" from the "Edit" menu, click the "Communications" page and choose "Serial Port".



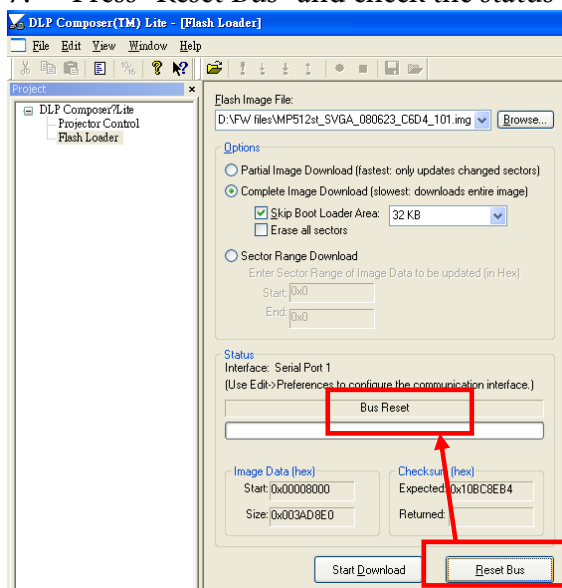
5. Click on “Flash Loader” and browse the image file (new version firmware)



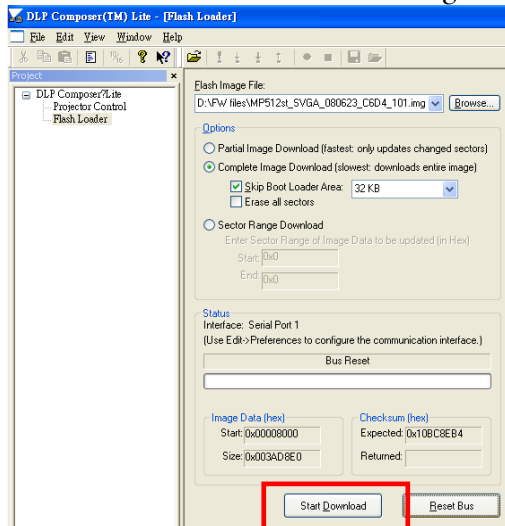
6. Select Complete Image Download, and make sure to check “Skip Boot loader area (32KB)”



7. Press “Reset Bus” and check the status which should show “Bus Reset”



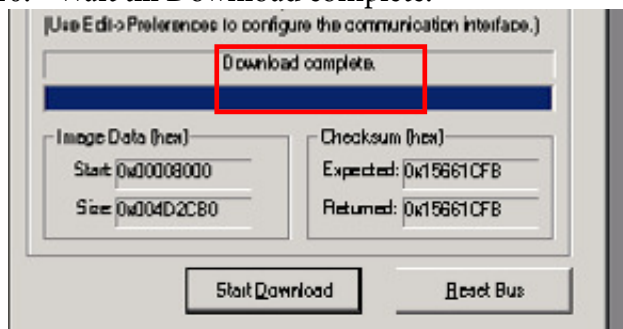
8. Press “Start Download” to begin update new firmware.



9. Press “Yes” to continue.



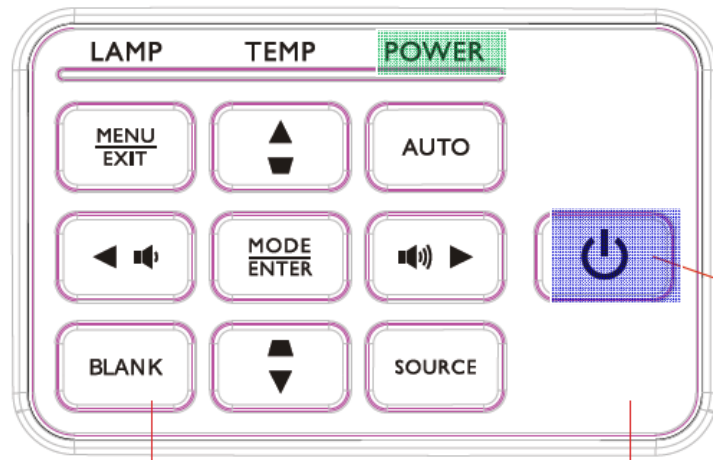
10. Wait till Download complete.



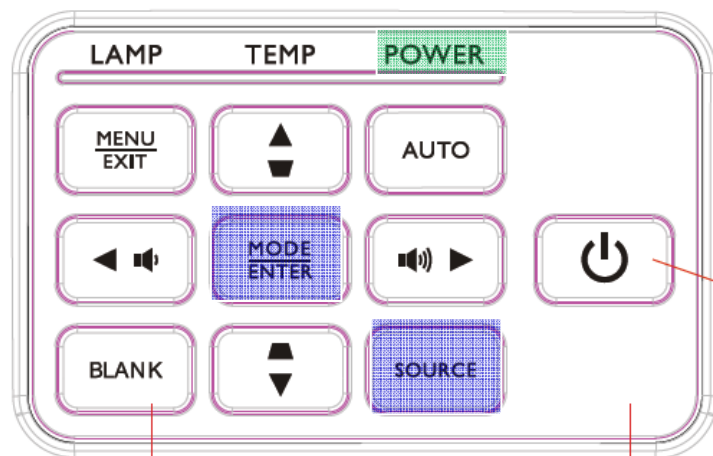
11. When download complete, LED signal on projector will show standby status (orange light continuously).

4.4 Method to enter factory menu

1. Press Menu/EXIT on keypad than the main menu popup



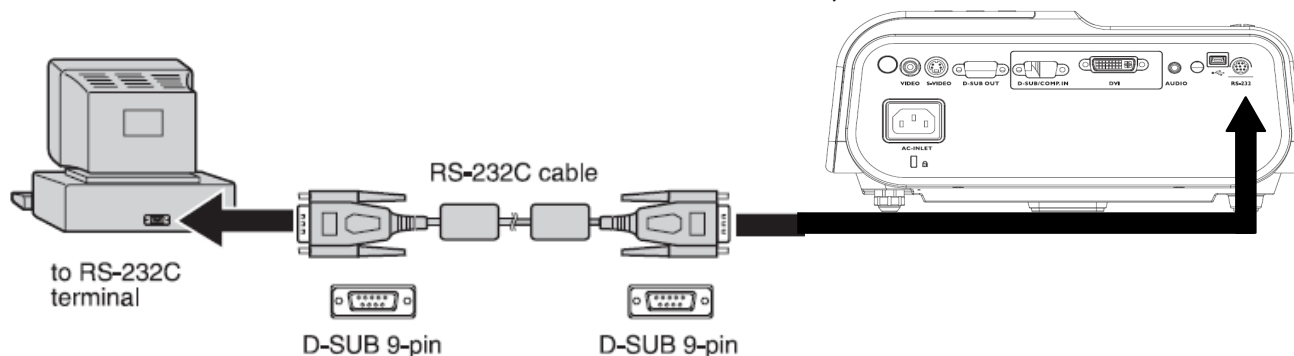
2. When showing main menu, press Source + Mode/ENTER at the same time



3. Factory menu popup at the top-left of display

4.5 RS-232 connection

1. Below shows the illustration of connection between PC and Projector.

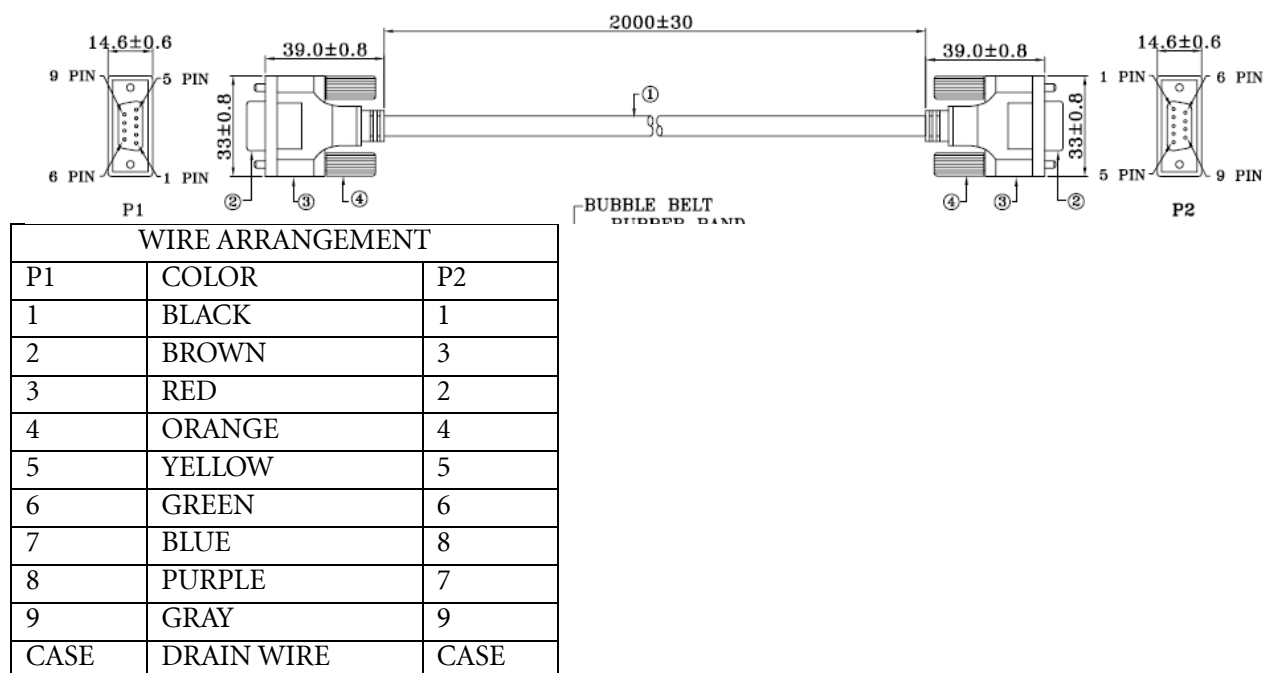


<CAUTION>

- ◆ Make sure that your computer and projector are turned off before connection.
- ◆ Power on the computer first, and then plug the power cord of the projector. (It may cause Com port incorrect function, if you do not follow this instruction)
- ◆ Adapters may be necessary depending on the PC connected to this projector. Please contact with your dealer for further details.

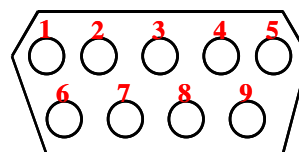
2. Hardware connection

<Download cable 1>



<pin assignment for this two end>

Pin	Description	Pin	Description
1	NC	2	RXD
3	TXD	4	NC
5	GND	6	NC
7	RTS	8	CTS
9	NC		



Interface Settings

RS-232 protocol	
Baud Rate	115200 bps (default) Changeable settings in User OSD (2400/4800/9600/14400/19200/38400/57600/115200)
Data Length	8 bit
Parity Check	None
Stop Bit	1 bit
Flow Control	None

Software specification

1. When input cmd fail, e.g. correct input is “*pow=?#” but input “*po=?#”, or input “*mute=on#” while projector is already mute, it will show “*Illegal format#”.
2. When input cmd but projector has no such function item, e.g. input “*sour=RGB2#” but projector has no RGB2 connector, it will show “*Unsupported item#”.
3. When cmd and function are both workable, but it's not under the status which cmd can be executed, e.g. input “*asp=4:3#” while not connecting source, it will show “*Block item#”.
4. When input “query” cmd (with “?”), e.g. input “*sour=?#”, it will echo the same input strings with some value.
5. Press “Enter” key after “>”, it should be no echo and skip to the next row.
6. Press “Space” and “Enter” key after “>”, it will echo “*Illegal format#”

Command Category

Refer to Appendix 2

4.6 Adjustment / Alignment Procedure

Content

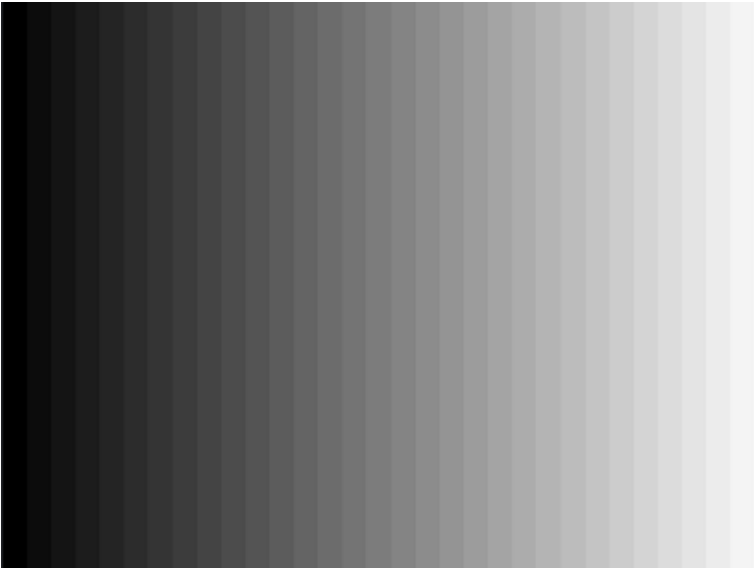
1. Color Wheel Delay Alignment
2. Overfill adjustment
3. PC Alignment Procedure

1. Color Wheel Delay Alignment

Procedure:

- 1. Enter Factory Mode
- 2. Enter Block

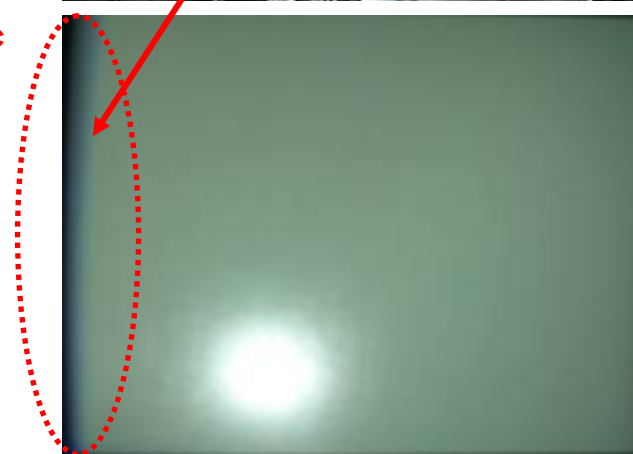
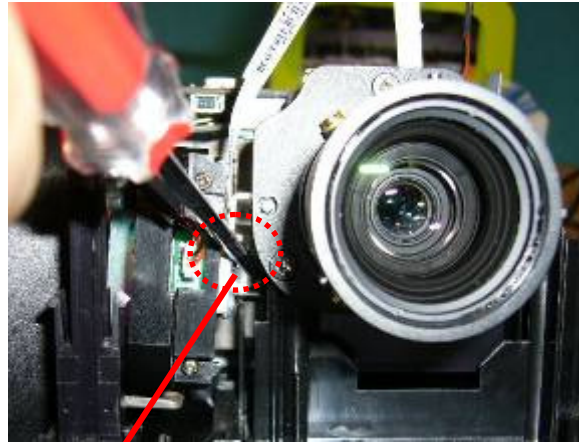
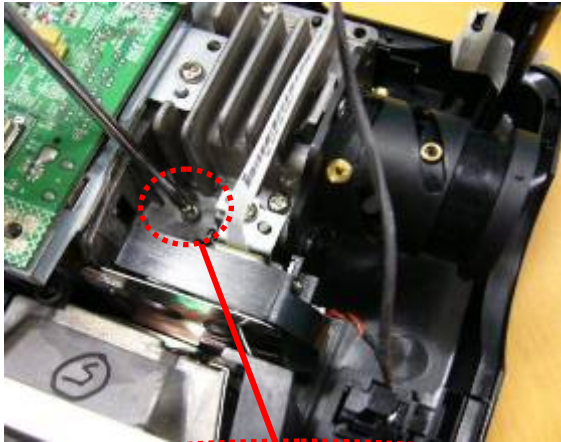
1
- 3. Change CW Delay by adjusting the following gray pattern to smooth



32 Gray pattern

2. Overfill adjustment

1. “Full White Pattern” is suggested for this alignment.
2. Adjust 2 LP-alignment Screws (upper side / lower front side of Optical Engine) behind Color Wheel.
3. Alignment Criteria is to adjust these 2 screws until “No Dark Edges” and “No Shadows” can be observed in image.



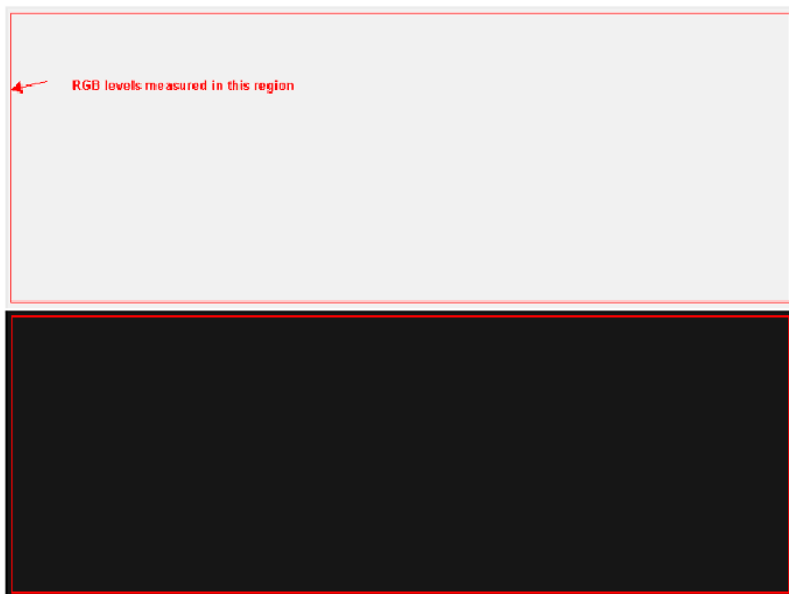
3. PC Alignment Procedure

Equipment :

- Pattern generator

OSD Default value :

Item	Value
Cal R Offset	512
Cal G Offset	512
Cal B Offset	512
Cal R Gain	1300
Cal G Gain	1300
Cal B Gain	1300
YPbPr R Offset	512
YPbPr B Offset	512



Procedure :

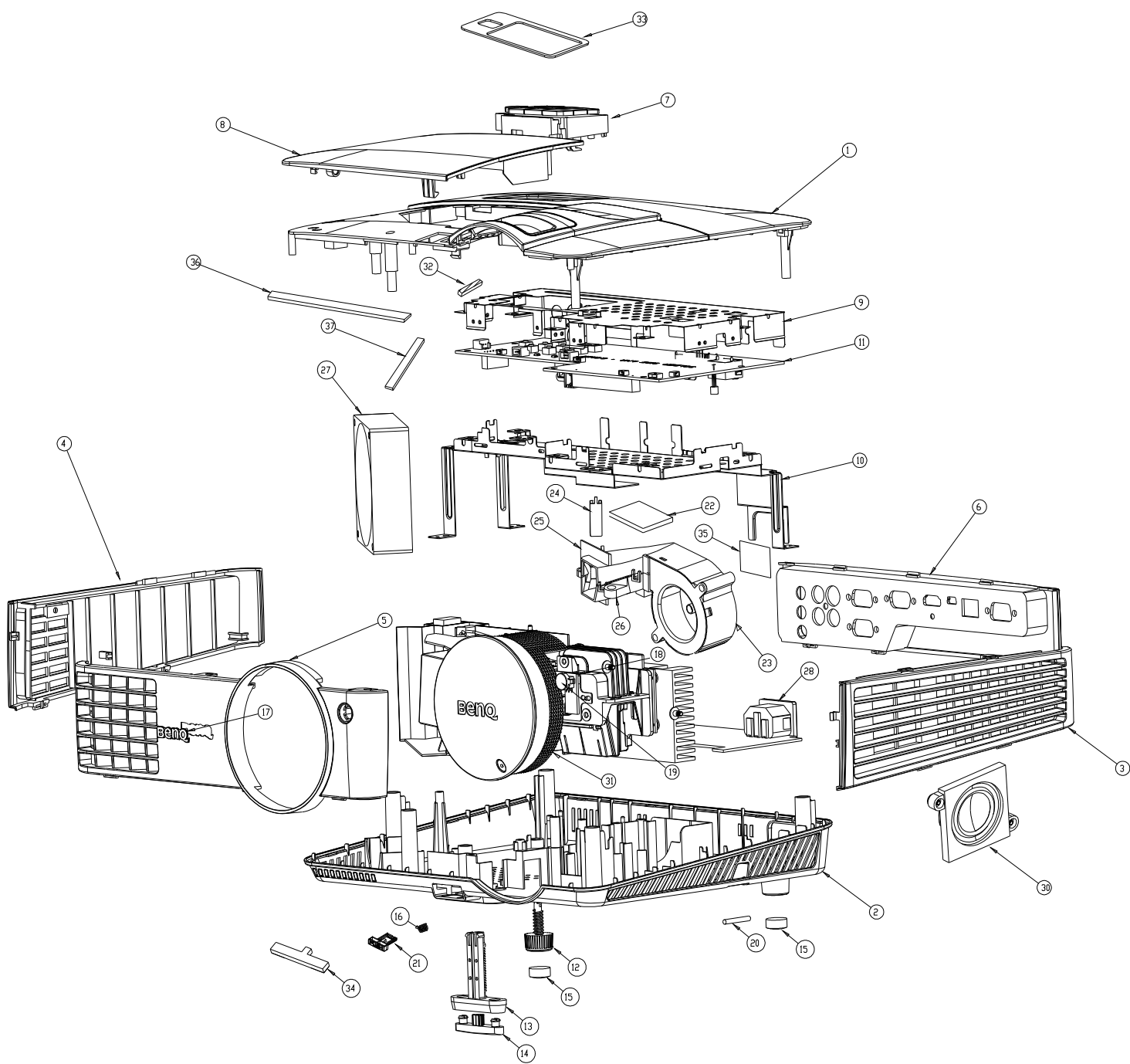
1. Connect power cord and **PC D-sub source** into projector.
2. Turn on projector.
3. Change **Timing** of pattern generator:
Timing: 1280*800@60Hz (WXGA models)
4. Change Pattern of pattern generator:
Pattern: Full frame pattern, ex.pattern1
5. Press "Auto" to catch the full screen
6. Change Pattern of pattern generator:
Pattern: A near white color (240,240,240) and a near black color(16,16,16)
7. Enter Factory mode, block 3
8. Press "**Calibration RGB <Press L or R>**" to let the black level to just distinguish, and the light output of white level to just max.
9. Check the 32 levels of gray. All steps must appear.
10. Done

5. Level 2 Circuit Board and Standard Parts Replacement

5.1 Product Exploded View

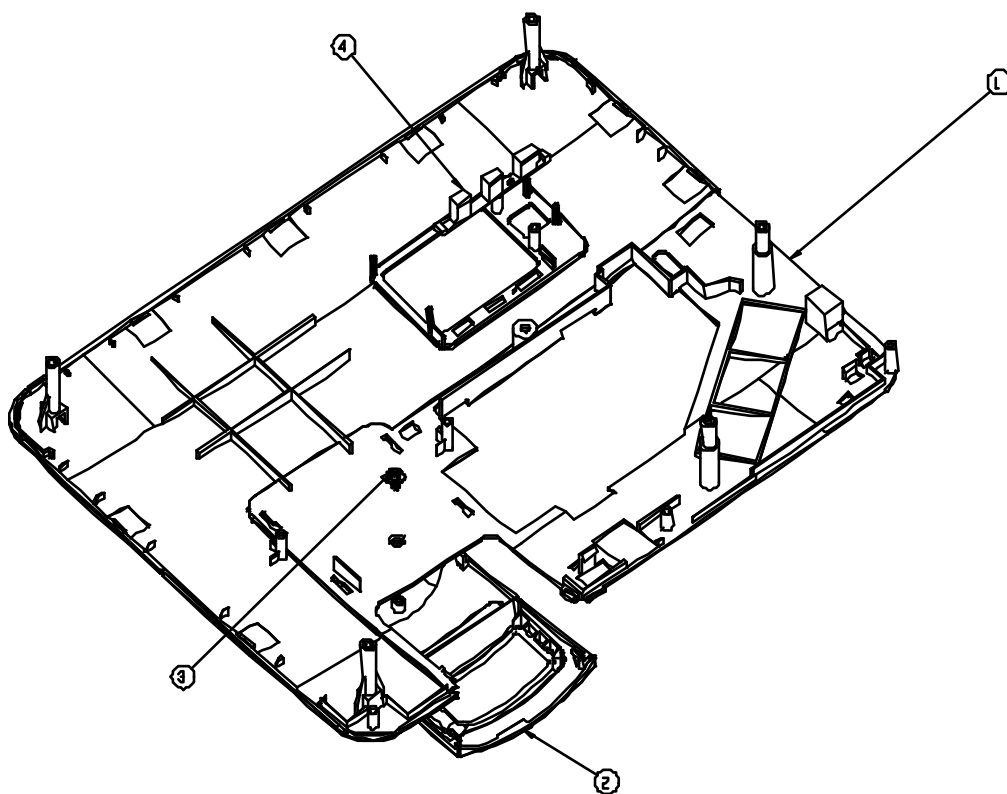
Module 1 – Total Exploded View

No.	Part Name	Qty
1	SUB ASSY CASE UPPER MW814ST	1
2	SUB ASSY CASE LOWER MW814ST	1
3	CASE INLET MW814ST	1
4	CASE OUTLET MX501	1
5	CASE FRONT MW814ST	1
6	SUB ASSY CASE REAR MW814ST	1
7	KEYPAD MW814ST	1
8	SUB ASSY DOOR LAMP	1
9	MAIN SHIELDING MW814ST	1
10	MAIN BRACKET MW814ST	1
11	MAIN BOARD MW814ST	1
12	FOOT REAR MW814ST	1
13	FOOT_ADJ PC PLUTO10-2	1
14	PAD ADJFOOT	1
15	RUBBER FOOT REAR comet+2	2
16	SPRING SLIDER SUS304 MP622	1
17	LOGO BENQ AL 29MM MP622	1
18	IR BOARD	1
19	IR LENS	1
20	BAR SECURITY JUPITER	1
21	BUTTON PUSH	1
22	EMI GASKET	1
23	BLOWER 6025	1
24	SHD THERMAL BREAKER CU MP610	1
25	NOZZLE TOP MW814ST	1
26	NOZZLE BTM MW814ST	1
27	AXIAL FAN 80x80x25	1
28	POWER BOARD	1
29	ASSY LAMPBOX	1
30	SPK 10W80HM	1
31	ENGINE	1
32	SPONGE F CVR MW814ST	1
33	MYLAR KEYPAD	1
34	SPONGE AJ FOOT MW814ST	1
35	MYLAR MAIN BRACKET	1
36	SPONGE RIGHT CASE UPPER MW814ST	
37	SPONGE LEFT CASE UPPER MW814ST	



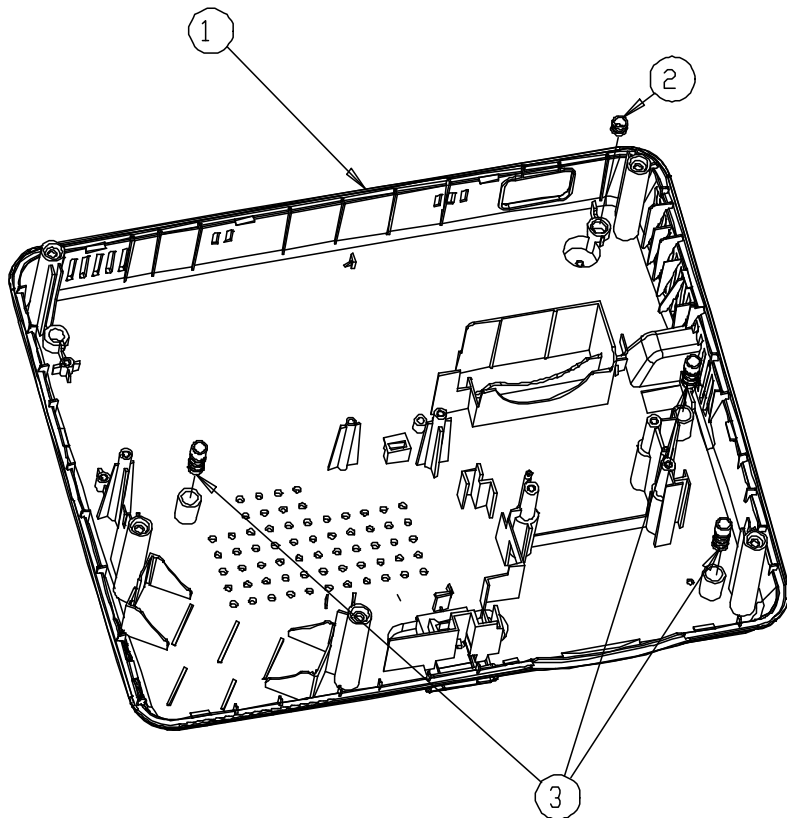
Module 2 – ASSY UPPER CASE

No	Part Name	Q'TY
1	CASE UPPER	1
2	Z_F COVER	1
3	SCREW	1
4	LED LENS	1

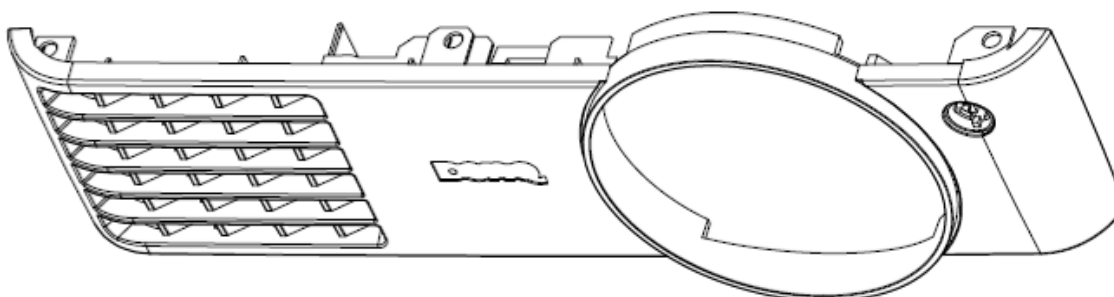


Module 3 – ASSY LOWER CASE

No.	Part Name	Q'ty	Remark
1	CASE LOWER MW814ST	1	
2	NUT INSERT M4*4.8L BRASS	1	MELT IN
3	NUT INSERT M4*15L D6.3 BRASS	3	MOLD IN

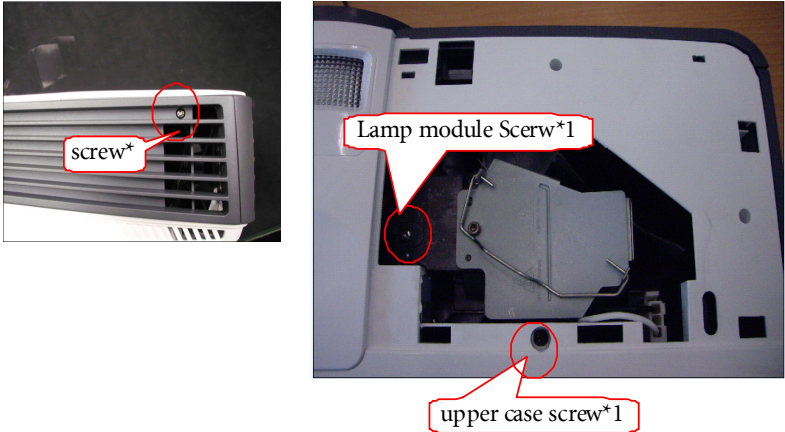
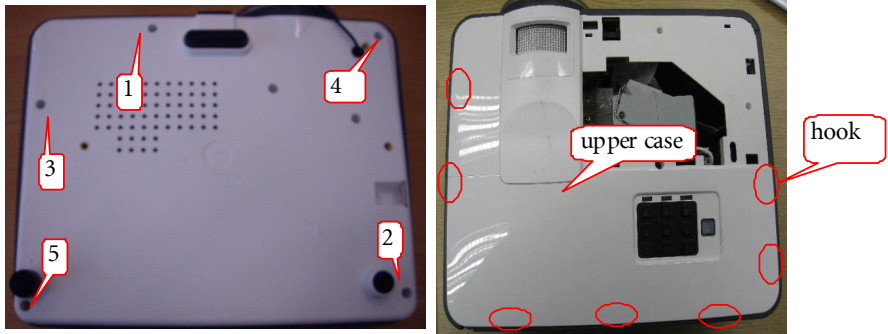
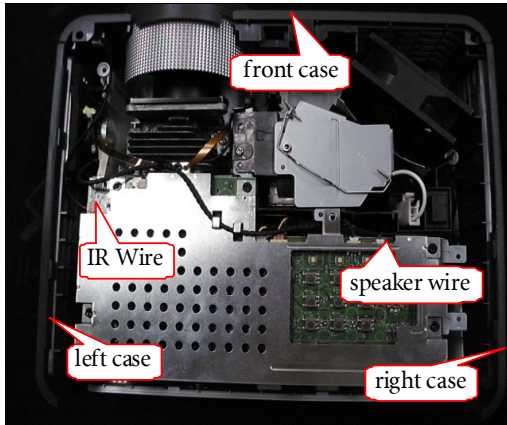
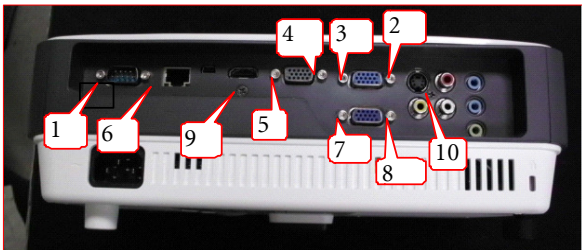


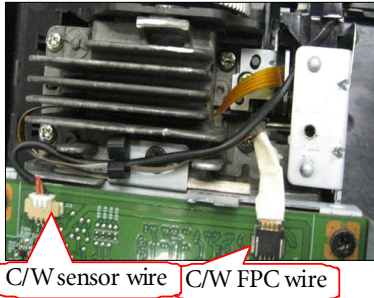
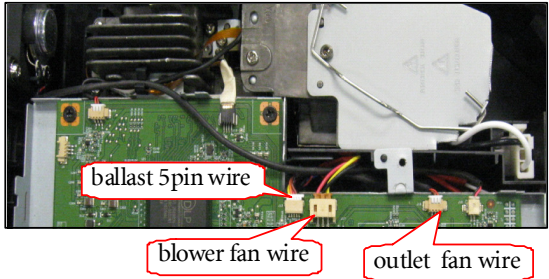
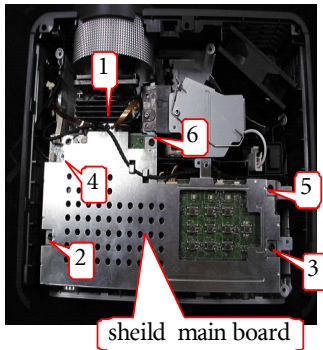
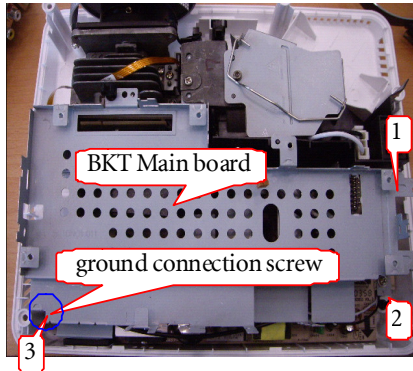
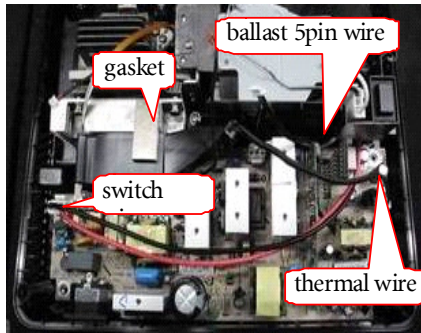
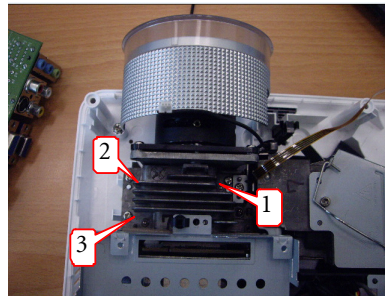
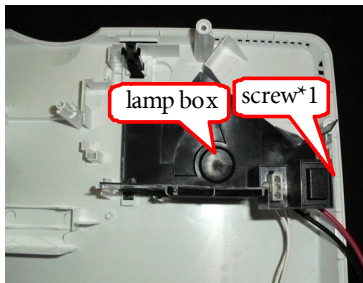
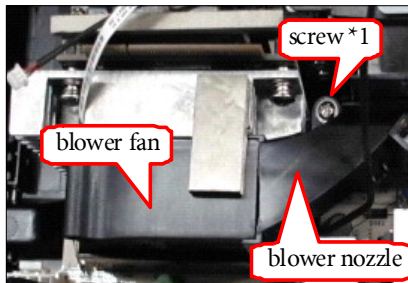
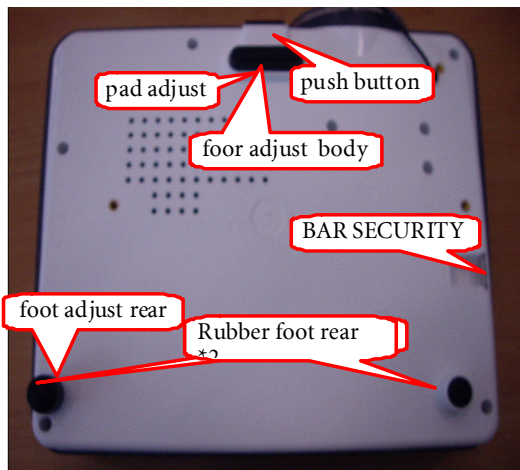
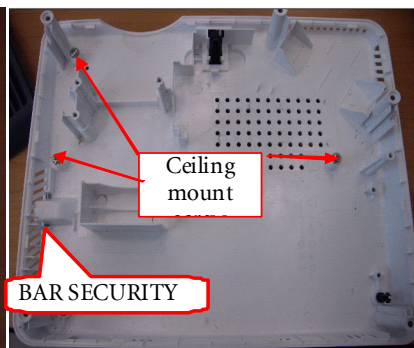
Module 4 – ASSY FRONT CASE



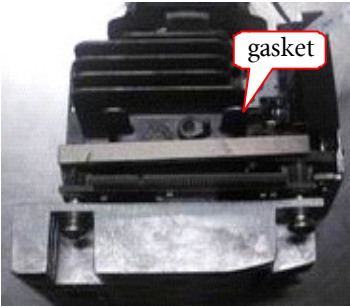

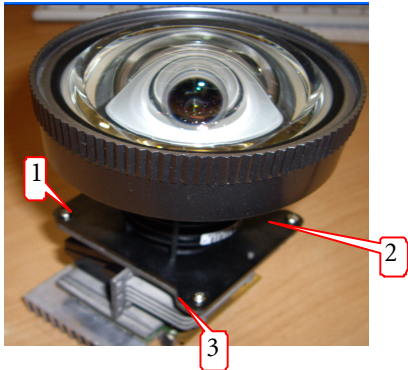
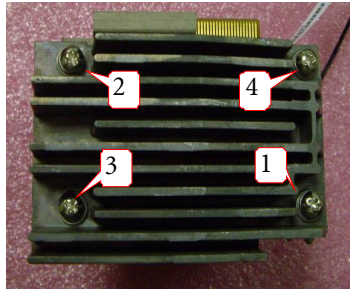
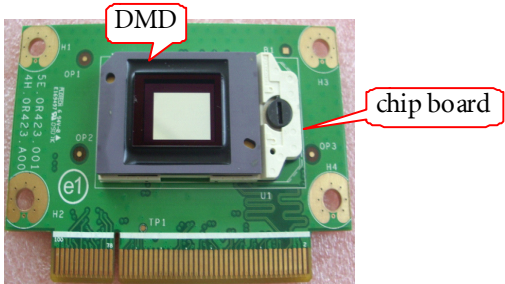
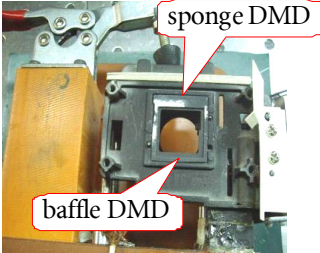

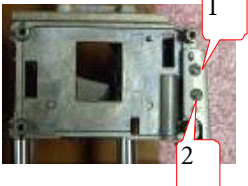
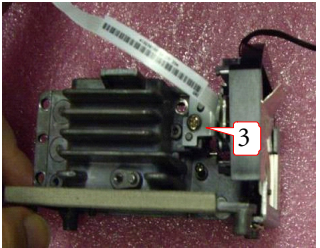
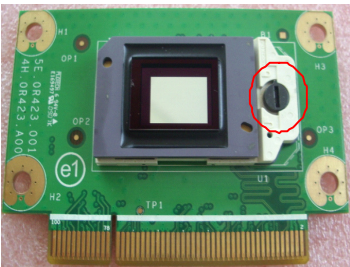

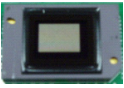
5.2 Product Disassembly / Assembly

MW814ST Dismantle SOP

Step	Description		Tool
1	<p>Disassemble the Left case screw*1 and take off the lamp door.</p> <p>Disassemble the lamp module screw*1 and take off the lamp module, as the right Figure .</p> <p>Disassemble the upper case screw*1.</p>		screw driver
2	<p>Disassemble the lower case screw*5, and take off the upper case(hook x7)</p>		screw driver
3	<p>Extract the IR Wire and the speaker wire from mainboard and take off the front case module.</p> <p>Push the boss behind, and take off the left case and right case module.</p>		
4	<p>Dismantle screw*8 and 8L screw *2 on rear case then take off rear case</p>		screw driver*2

5	Dismantle C/W FPC wire, C/W sensor wire, blower fan wire, ballast 5pin wire, outlet fan wire on main board.	 	
6	<p>Disassemble the screw*6, and take off the shield main board .</p> <p>Disassemble the main board and take off the outlet fan.</p> <p>Disassemble the screw*3 and take off the BKT main board</p>	 	screw driver
7	<p>Extract the door switch wire, thermal wire, ballast 5pin wire.</p> <p>Take off the Power board</p> <p>Take off the gasket*1.</p> <p>Disassemble the screw*3 and take off the Engine module.</p>	 	screw driver
9	<p>Disassemble the screw*1, and take off the lamp box.</p> <p>Disassemble the screw*1, and take off the blower fan and blower nozzle.</p>	 	screw driver
10	Extract the rubber foot rear *2, foot adjust rear, pad adjust, foot adjust body, spring slider and the push button in the lower case.	 	screw driver

MW814ST Engine Dismantle SOP

Step	Description		Tool
1	Take off the gasket*1. Disassemble the Ring Zoom.	 	
2	Take off the LENS screw*3		screw driver
3	Disassemble the screw*4, and take off the Heat-sink and DMD chip with Chip BD.	 	screw driver
4	Disassemble the baffle DMD and sponge DMD. Disassemble the screw*3 and take off the CW module.	   	screw driver
5	Rotate to open the switch on socket, and take off the DMD chip board.	  	

5.3 Module Assembly Key Point - Optical Engine

1. Light Pipe Module assembly and overfill alignment

1.1 Assembly LP Module to HSG DMD

- i. Assembly two Overfill adjustment screws (M2) to HSG DMD (Fig. 1-1).
** Adjustment criteria refer to below item 1.2 & Fig. 1-2.
- ii. Press CLIP of BKT LP first and push it into the hole (Fig. 1-3).
- iii. Hook Clip LP to HSG DMD, and lock with screw well. (Fig. 1-4).
- iv. Placed LP Module on LP datum of “DMD HSG” and adjustment screw well, shown (Fig. 1-5).
- v. Assembly “Baffle LP”, Hook top of Baffle LP first (Fig. 1-6) & Hook bottom of Baffle LP to HSG DMD well (Fig. 1-7).

1.2 Overfill Adjustment @ LP Module

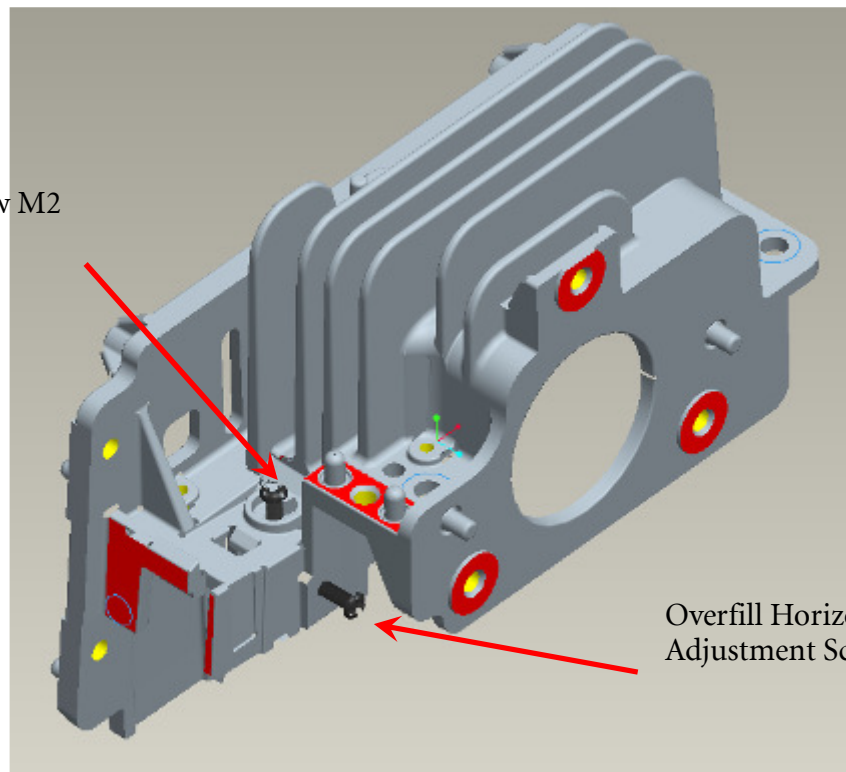
Overfill Adjustment Criteria:

- i. Pre-assembly 2 adjusting screws. Criteria shown as Fig.1-4
- ii. Alignment Sequence:
 - a. To adjust “Horizontal Adjustment Screw” firstly, and then “Vertical Adjustment Screw”.
 - b. Refer to Fig. 1-4

1.3 For Overfill Re-adjustment:

- a. Those 2 Adjustment Screws must be released closely to the “Pre-assembly” positions first (Fig. 1-4).
- b. Follow adjustment steps shown in Item 1.1-ii..

Overfill Vertical
Adjustment Screw M2



Overfill Horizontal
Adjustment Screw M2

Fig. 1-1

Pre assemble this screw not over the side surface.

Pre assemble this screw not over the bottom surface.

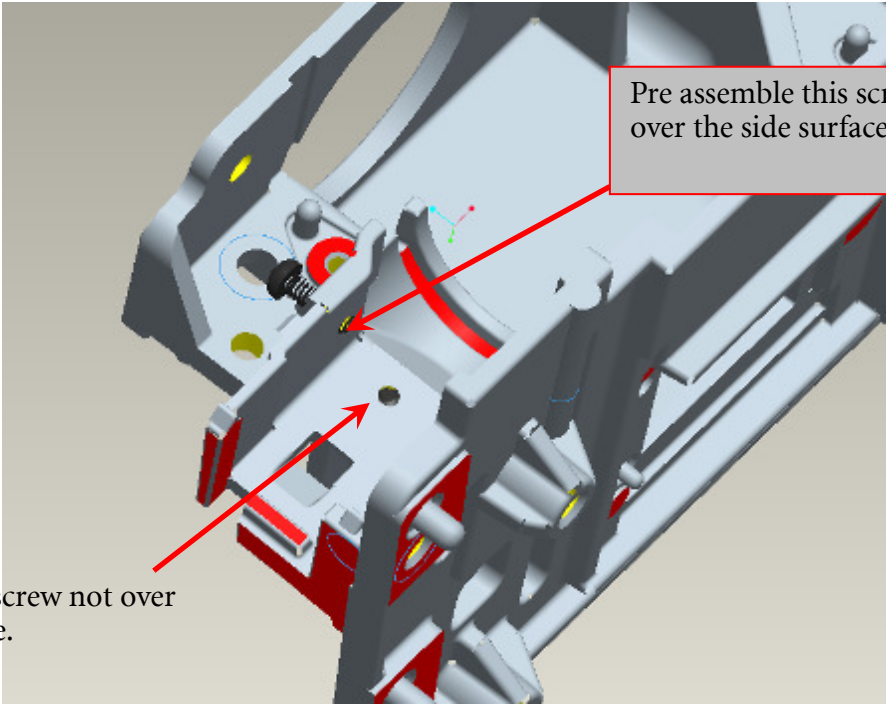


Fig. 1-2

Insert the LP Module

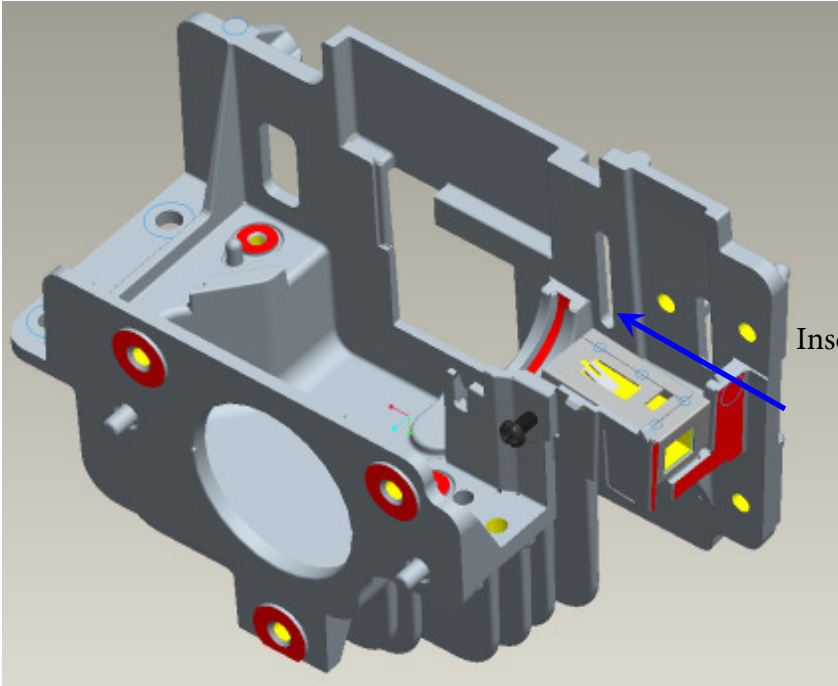


Fig. 1-3

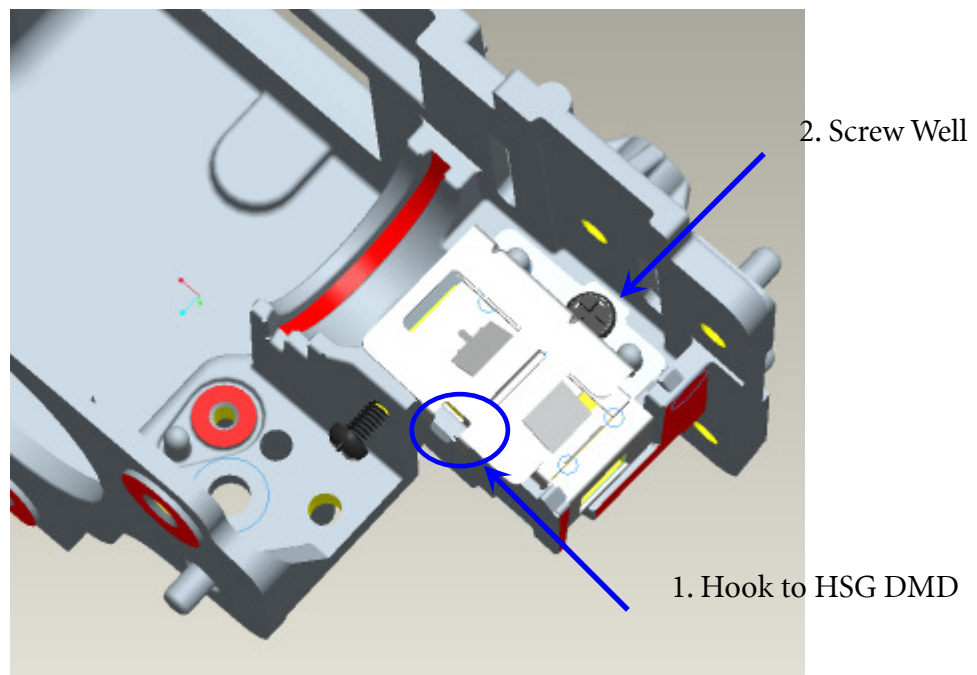


Fig. 1-4

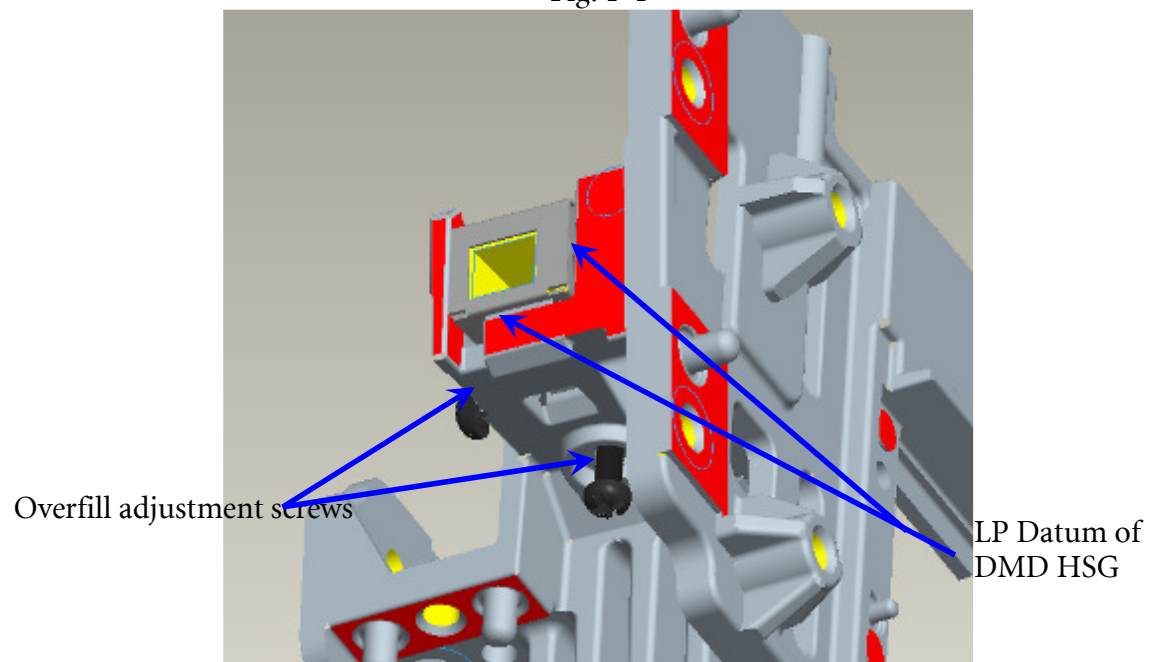


Fig. 1-5

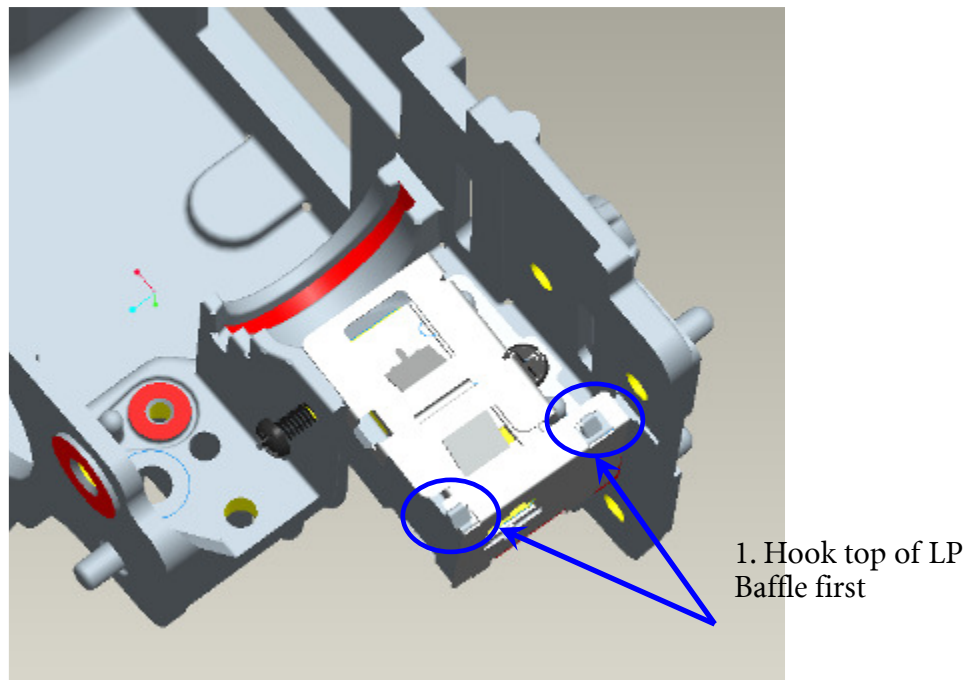


Fig. 1-6

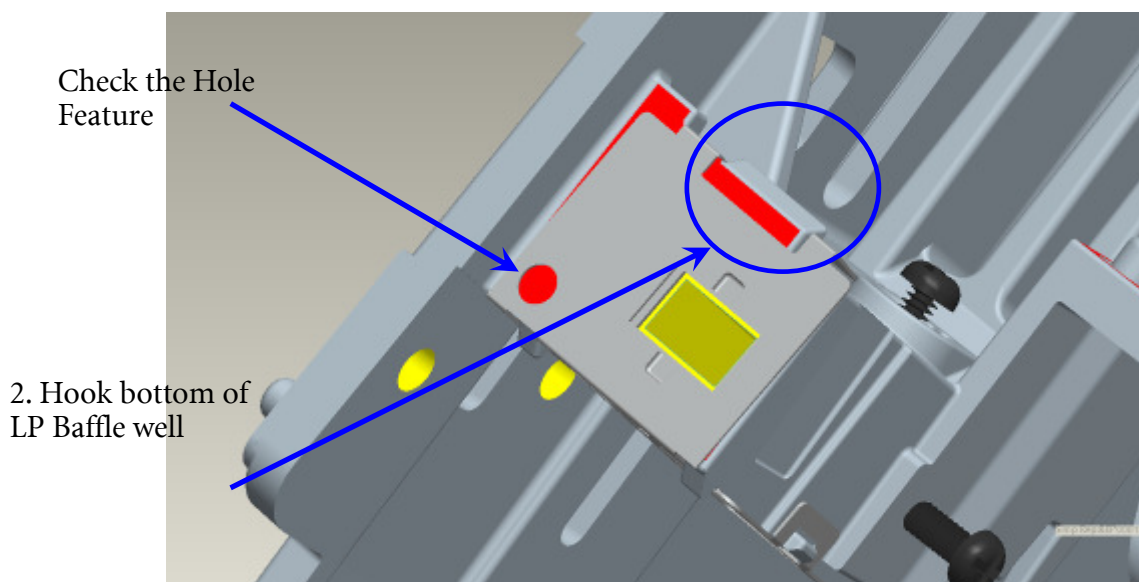


Fig. 1-7

2. Assembly HSG ILL Module:

2.1 CM Assembly

- i. Place "Clip CM Front" first, and screw well (Fig. 2-1).
- ii. Insert Clip CM Side to Sub HSG (Fig. 2-2).
- iii. Assemble CM to Sub HSG and to make CM contact Sub HSG datum Well (Fig. 2-3).
- iv. Assemble Clip CM Up to Sub HSG & Check the feature for Clip CM Up XGA. (Fig. 2-4).
- v. To check and make sure Clip CM Up hooks the Sub HSG Well (Fig. 2-5).
- vi. Paste "Sponge tube AL" on cannellure of "HSG ILL" (Fig. 2-5).

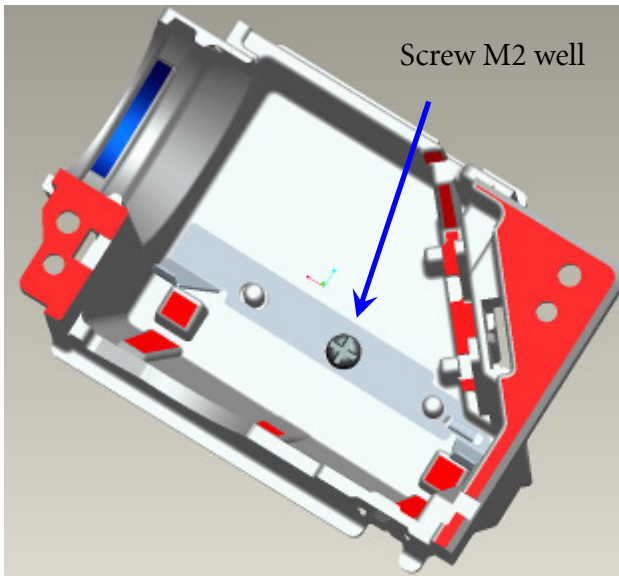


Fig. 2-1

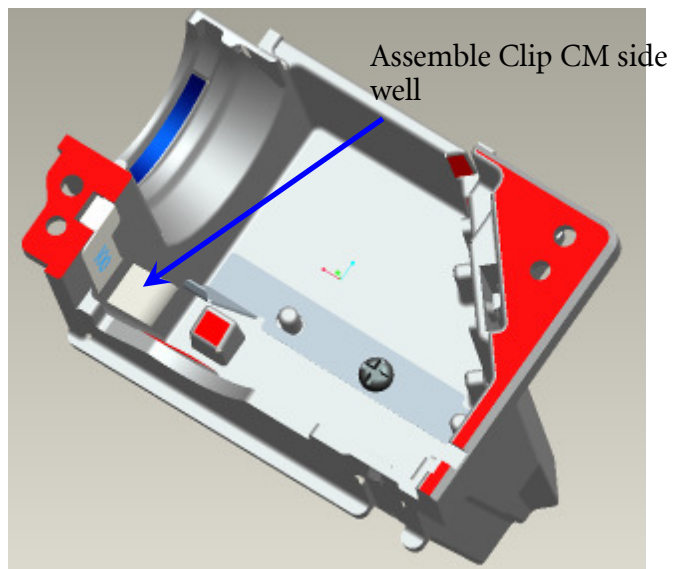


Fig. 2-2

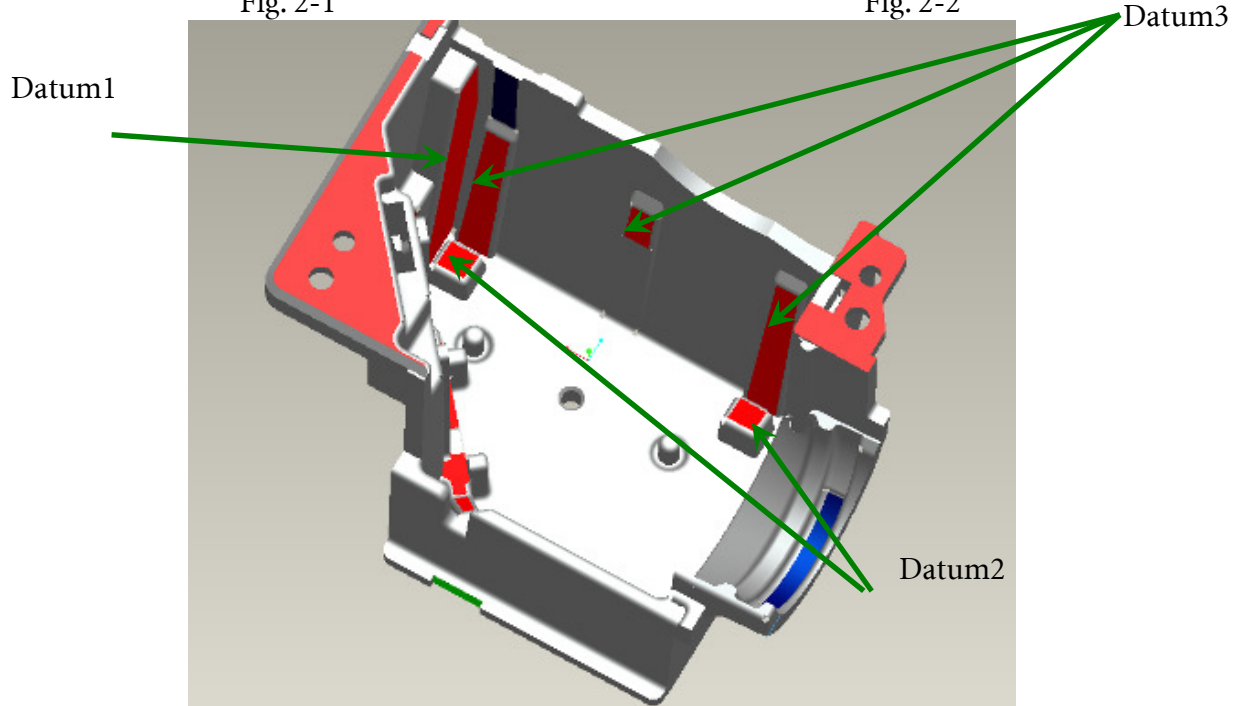


Fig. 2-3

Check Feature

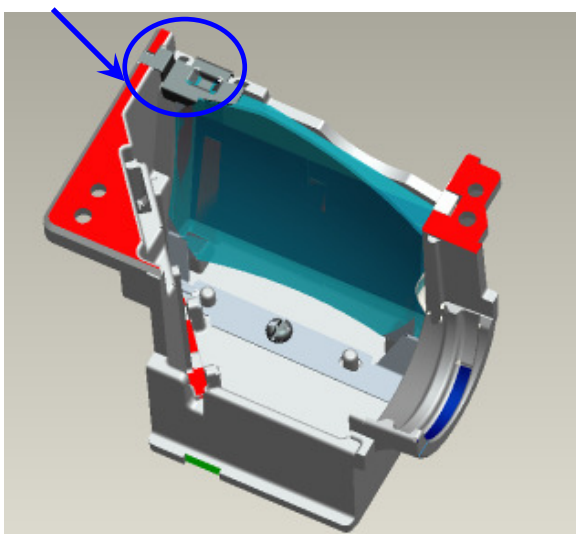


Fig. 2-4

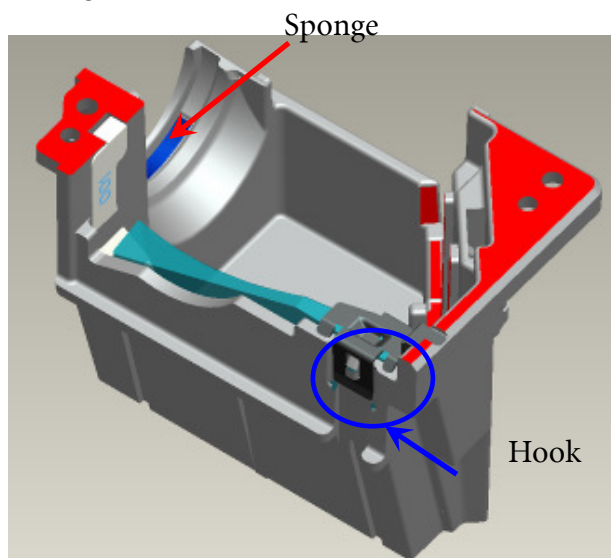


Fig. 2-5

2.2 FM Module Assembly

- i. Check mark point of FM and place FM on “Sub HSG” surface (Fig. 2-6-1, 2-6-2).
- ii. Assemble “Clip FM Z5” to fix FM (Fig. 2-7).
- iii. Check Clip FM hook Sub HSG Well (Fig. 2-8)

Mark Point

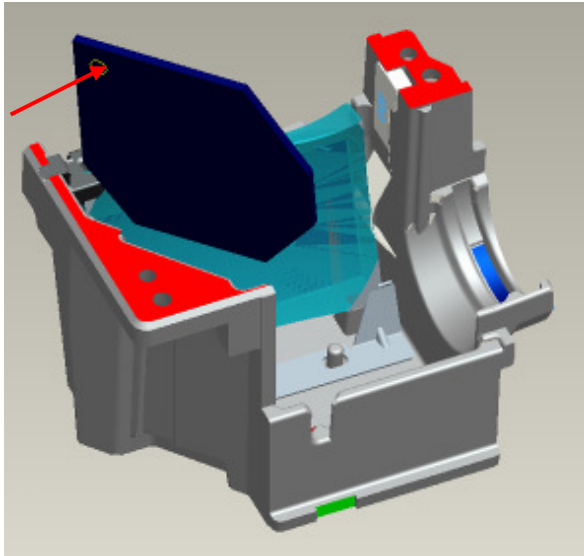


Fig. 2-6-1

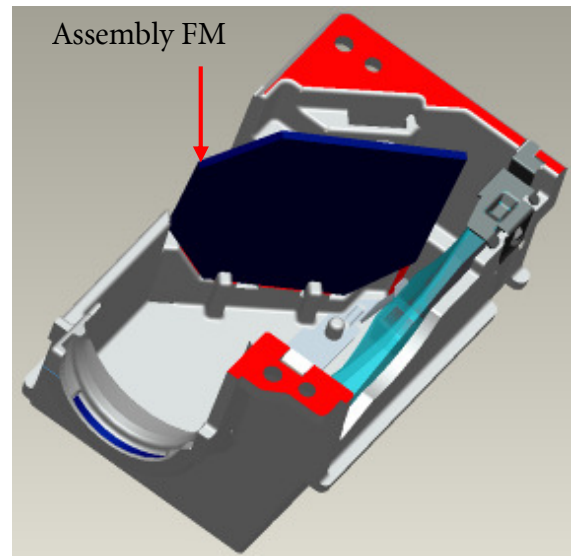


Fig. 2-6-2

Clip FM Z5

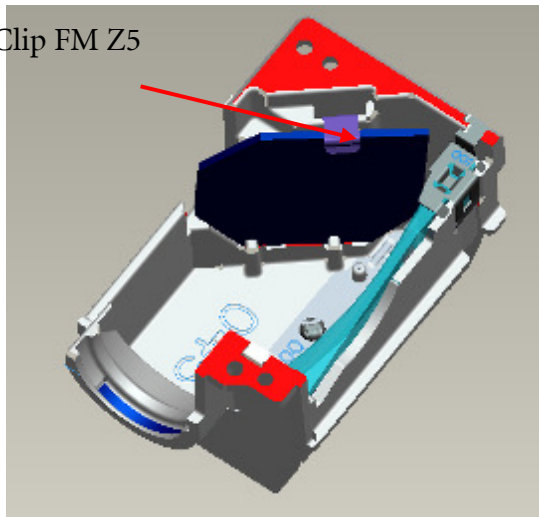


Fig. 2-7

Clip FM hook to Sub HSG

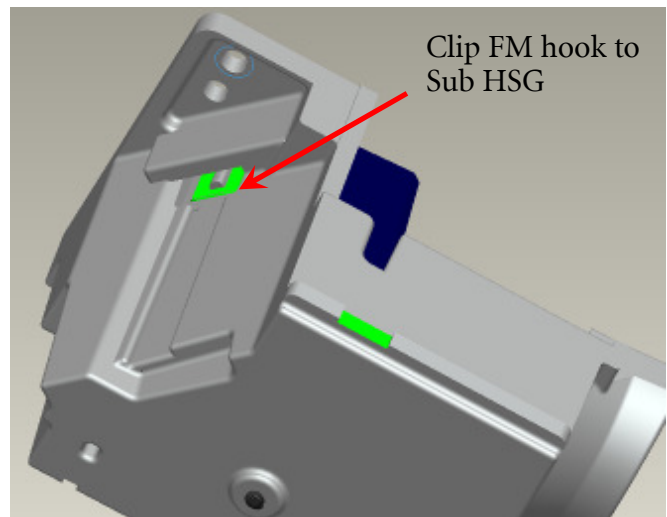


Fig. 2-8

3. AL, HSG ILL and HSG DMD Assembly:

- 3.1 Placed “AL” on the “HSG DMD”. The “raised surface” of “AL” shall toward “DMD direction” (Fig. 3-1).
- 3.2 To assemble ”HSG ILL SUB Module” with “HSG DMD” and cover over on “AL” and the then lock with screws (Fig. 3-2).

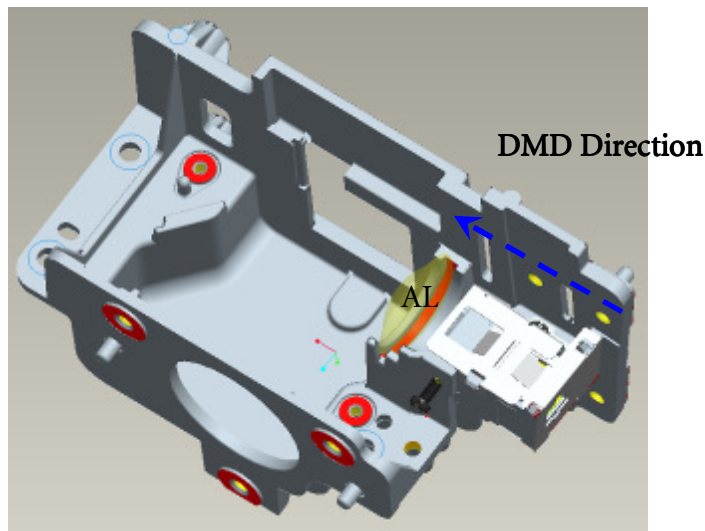


Fig. 3-1

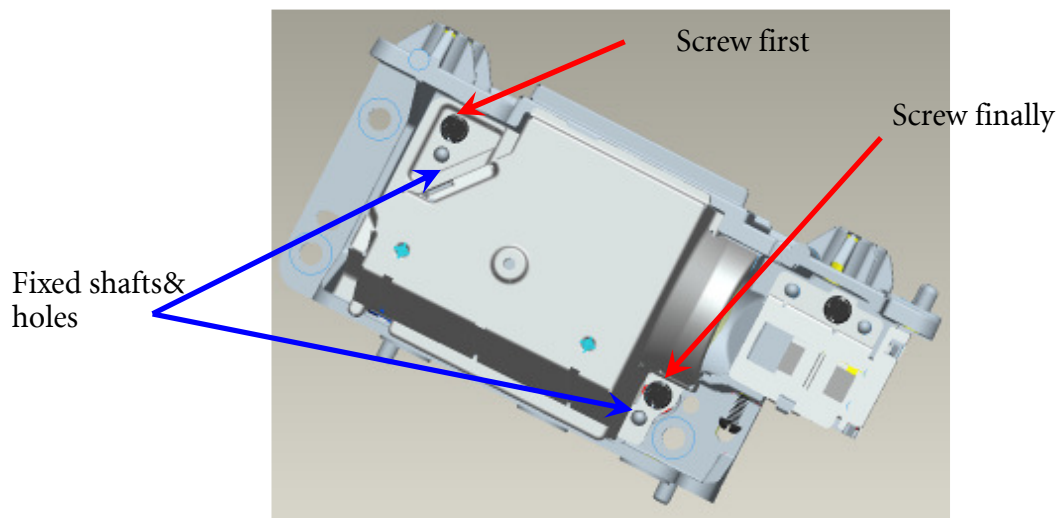


Fig. 3-2

4. DMD and Chip B/D Module:

- 4.1. Judge Chip B/D and DMD alignment keying first (Fig. 4-1, 4-2).
- 4.2. Align keying and Assemble DMD to Chip B/D (Fig. 4-3).
- 4.3. Push DMD slightly and use screwdriver rotate clockwise button to lock (close notation) DMD on Chip B/D (Fig. 4-4).

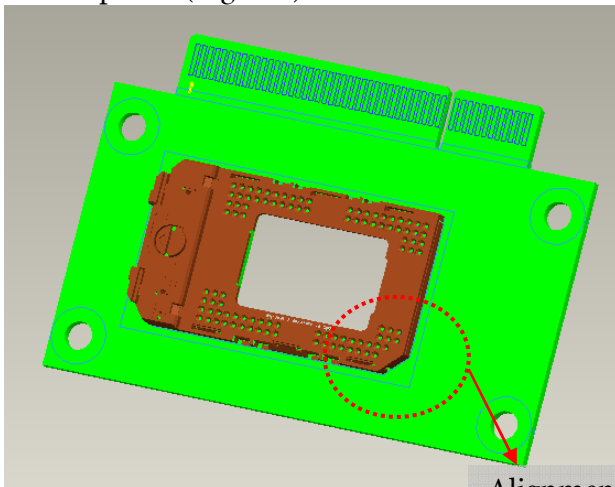


Fig. 4-1

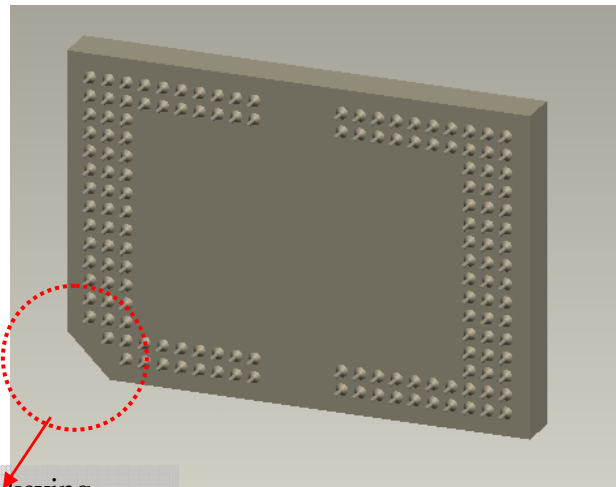


Fig. 4-2

Alignment keying

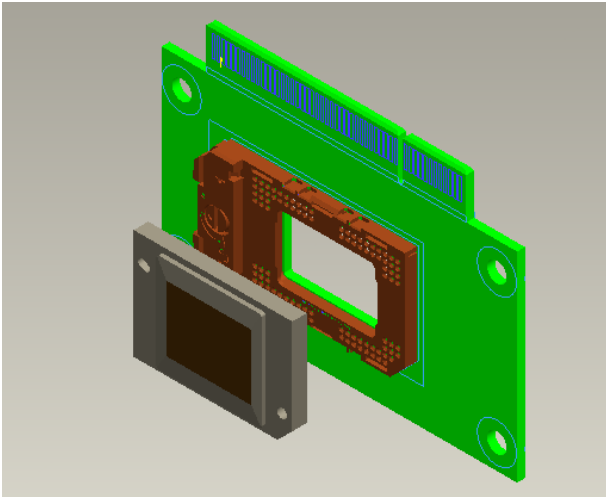


Fig. 4-3

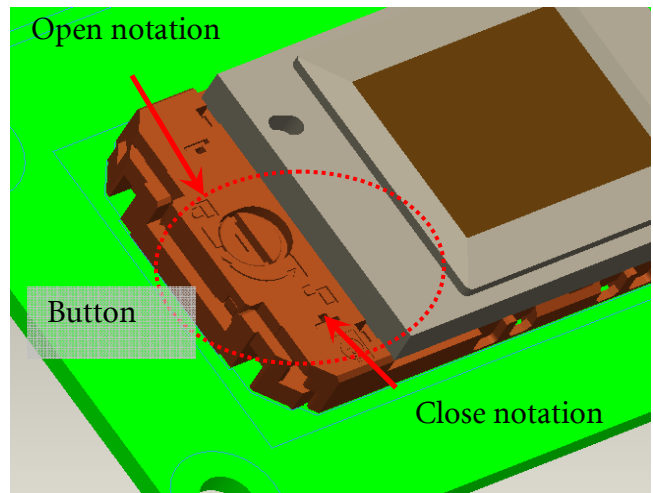


Fig. 4-4

4.4 Place Damper on the surface of Chip-BD Fig. 4-5.

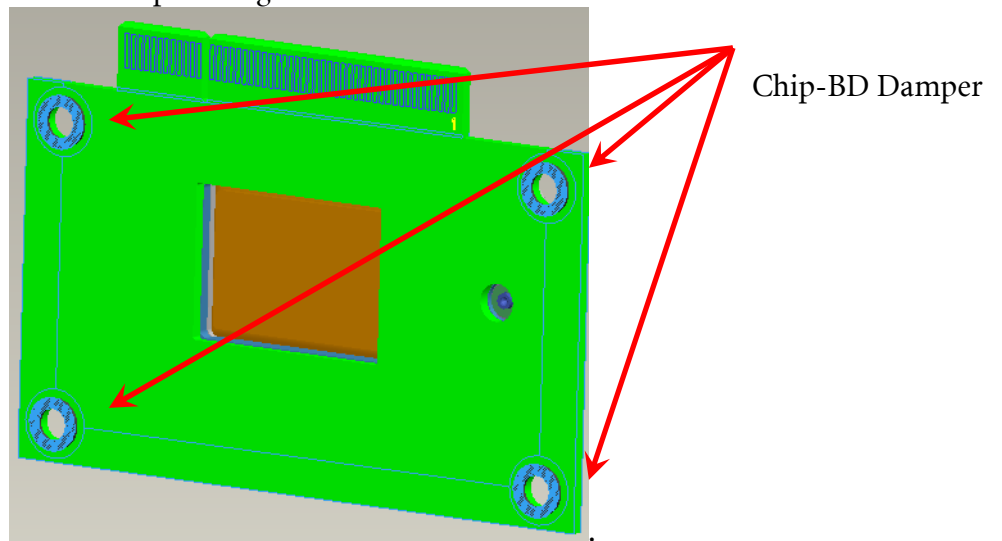


Fig. 4-5

5. Assembly Optical ENG

5.1 Assemble "Baffle DMD" to "HSG DMD" (Fig.5-1).

5.2 Assemble "Sponge DMD" to "HSG DMD" (Fig.5-1).

5.3 Assemble Chip B/D Module to "HSG DMD" (Fig. 5-2 , Fig. 5-3).

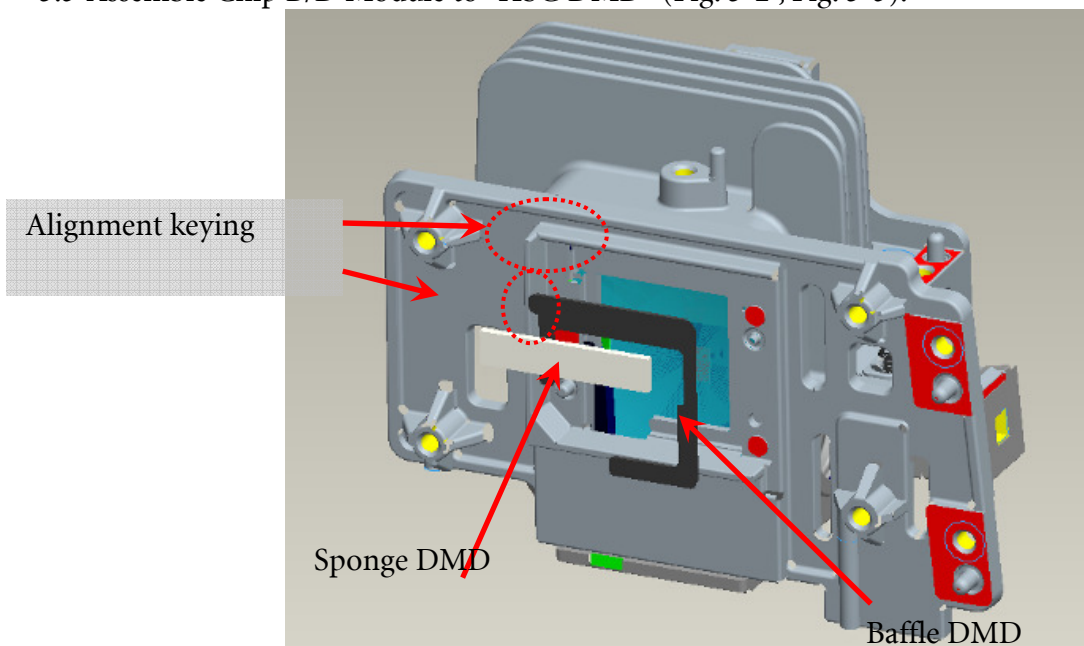


Fig. 5-1

Fixed shafts of
DMD HSG

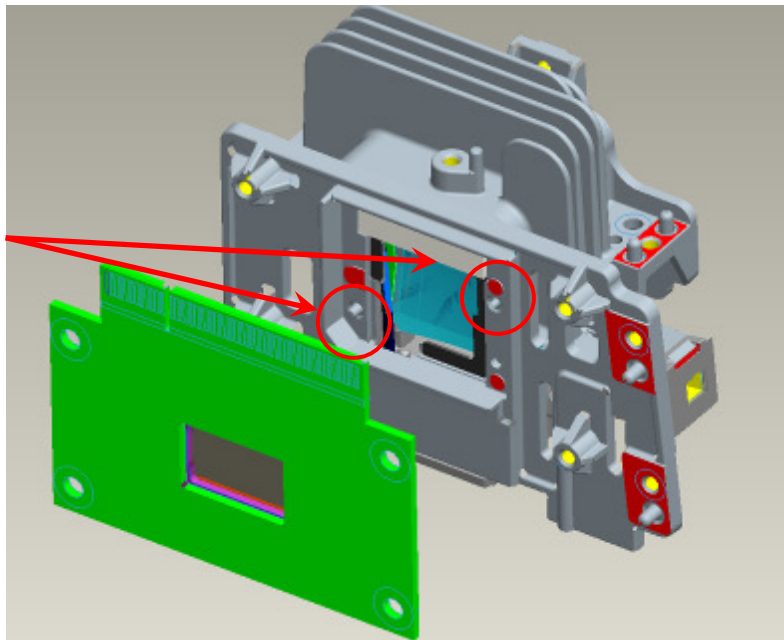


Fig.5-2

Fixed holes of DMD

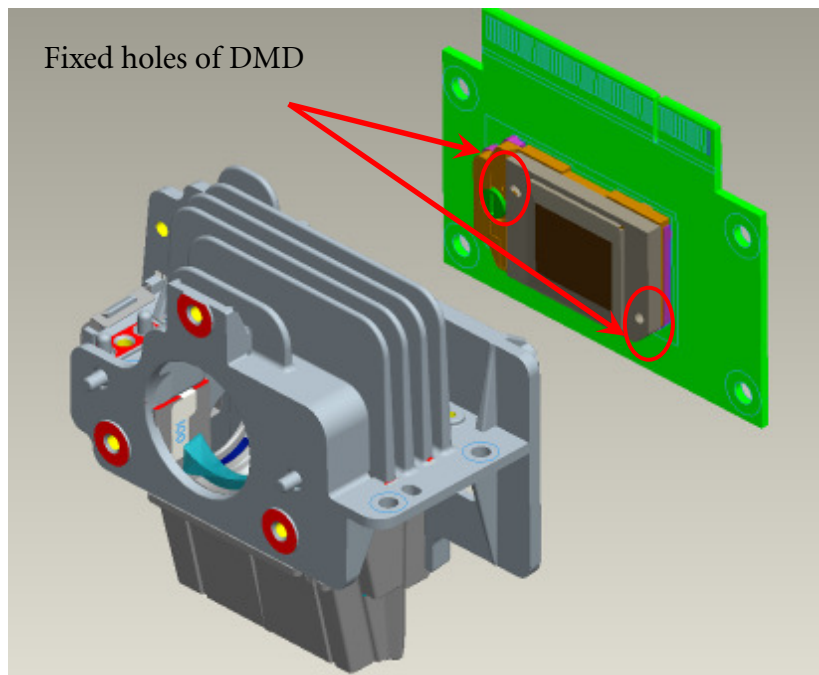


Fig.5-3

5.4 Assemble Thermal Pad & Gasket Hest-sink then place contact DMD (Fig. 5-4-1~2).

- 1.>Press center of Heatsink before assemble spring screw, then keeps press until spring screw assembly finish.
- 2.>Pre-fastening Sequence: [1] - [2] - [3] - [4].
- 3.>Fastening Sequence: [2] - [1] - [4] - [3].
- 4.>Screw Torque must be confirmed to be 6 kg-cm.

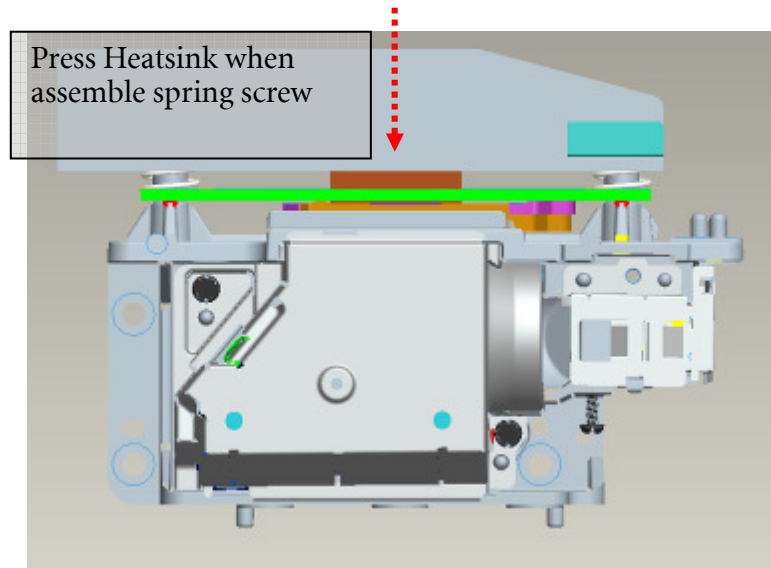


Fig. 5-4-1

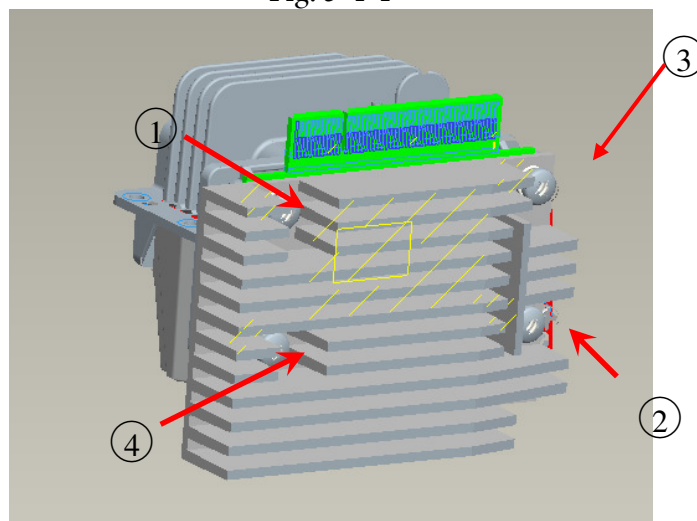


Fig. 5-4-2

5.5 Assemble “CW Module” to “DMD HSG” and lock with screws well (Fig.5-5).

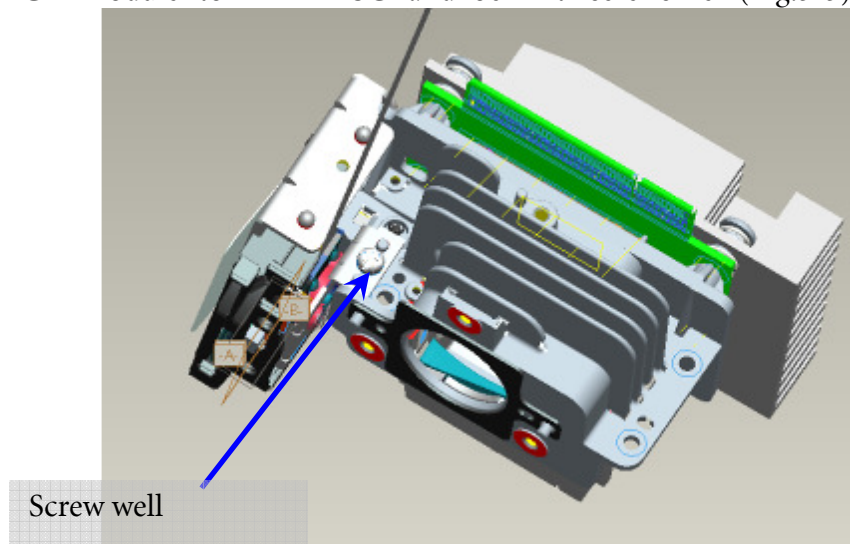


Fig. 5-5

5.6 Assemble “BKT Link Lamp & CW shield” on “DMD HSG” and then screws well (Fig. 5-6).

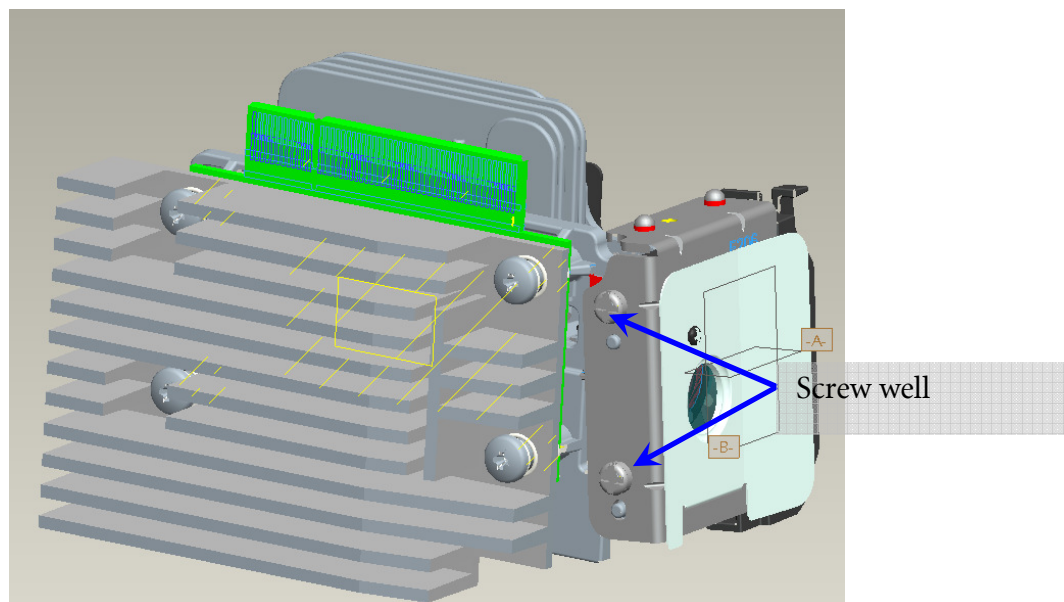


Fig. 5-6

5.7 Assemble “Sponge Adaptor” and lock with screws well.

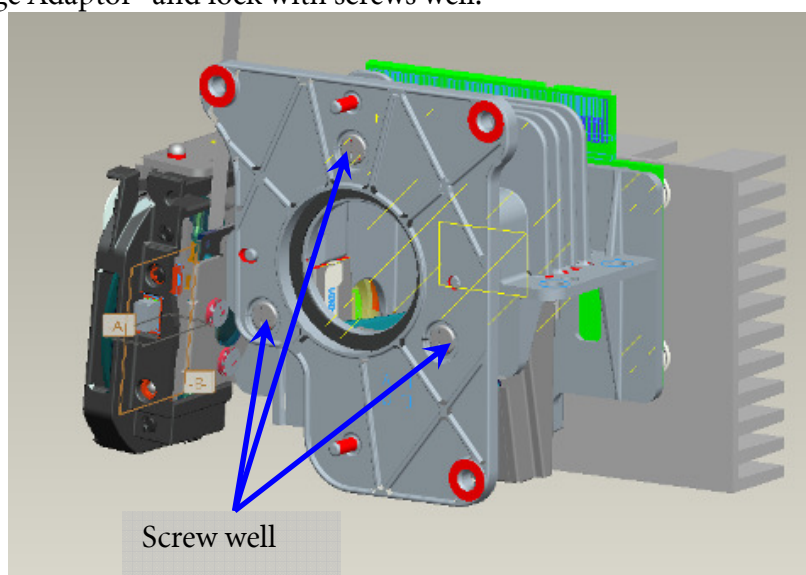


Fig.5-7

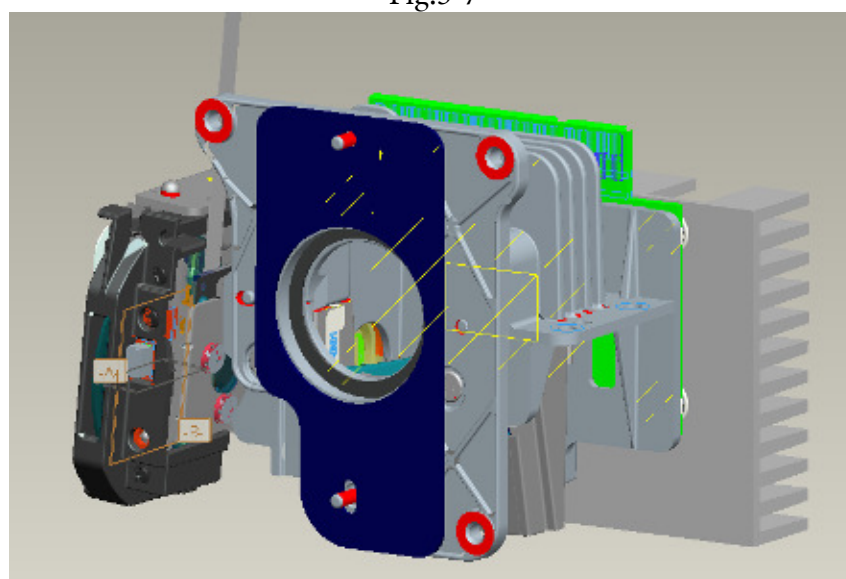


Fig.5-8

5.8 Assemble “Lens” and lock with screws well

- i. Assemble Lens and the Assembly direction must be horizontal(Fig. 5-9)
- ii. Pre-fastening Screws firstly. Screw Torque must be confirmed to be 1-2 kg-cm. (Fig. 5-11)
- iii. Fastening the Screws well. Screw Torque must be confirmed to be 6.0-7.0 kg-cm. (Fig. 5-11)
- iv. Place Frame to “low position” finally.

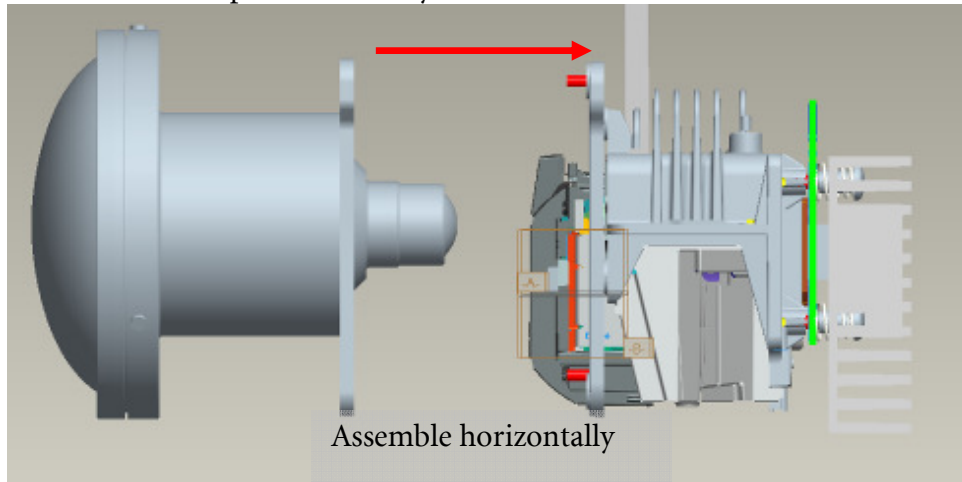


Fig. 5-9

1. **Pre-fastening firstly**, screw torque is 1-2 kg-cm.
2. **Lock screws well**, screw torque is 6-7 kg-cm

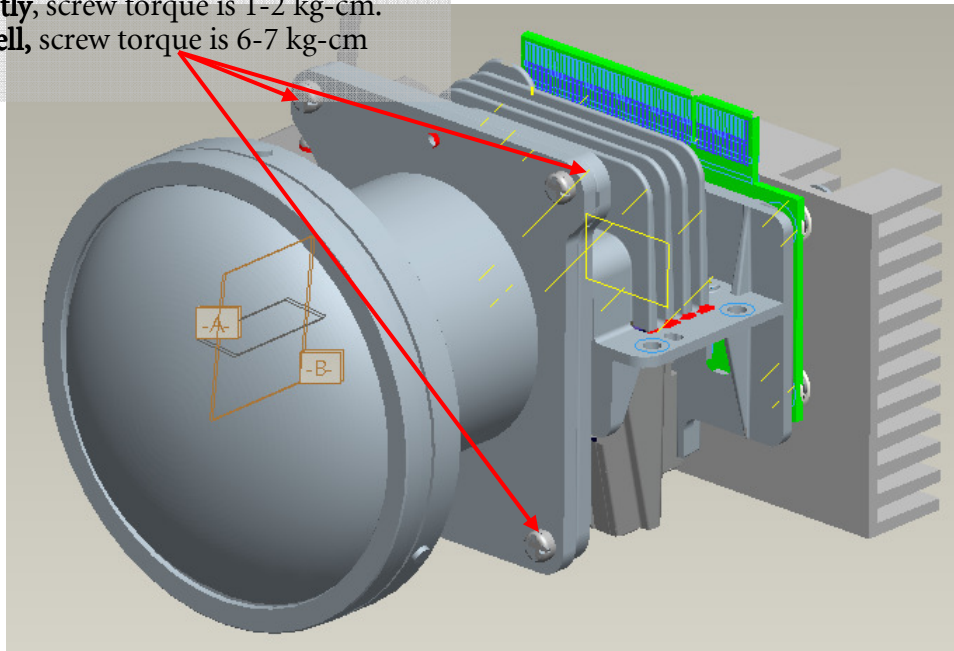


Fig. 5-10

5.9 Assemble Ring Focus well

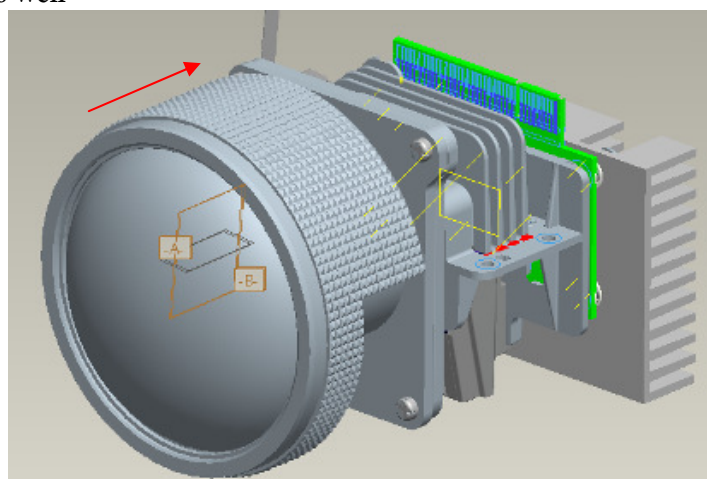


Fig.5-11

5.10 Assemble Lamp Module to “BKT Link Lamp” and then lock with screw well (Fig. 5-13).

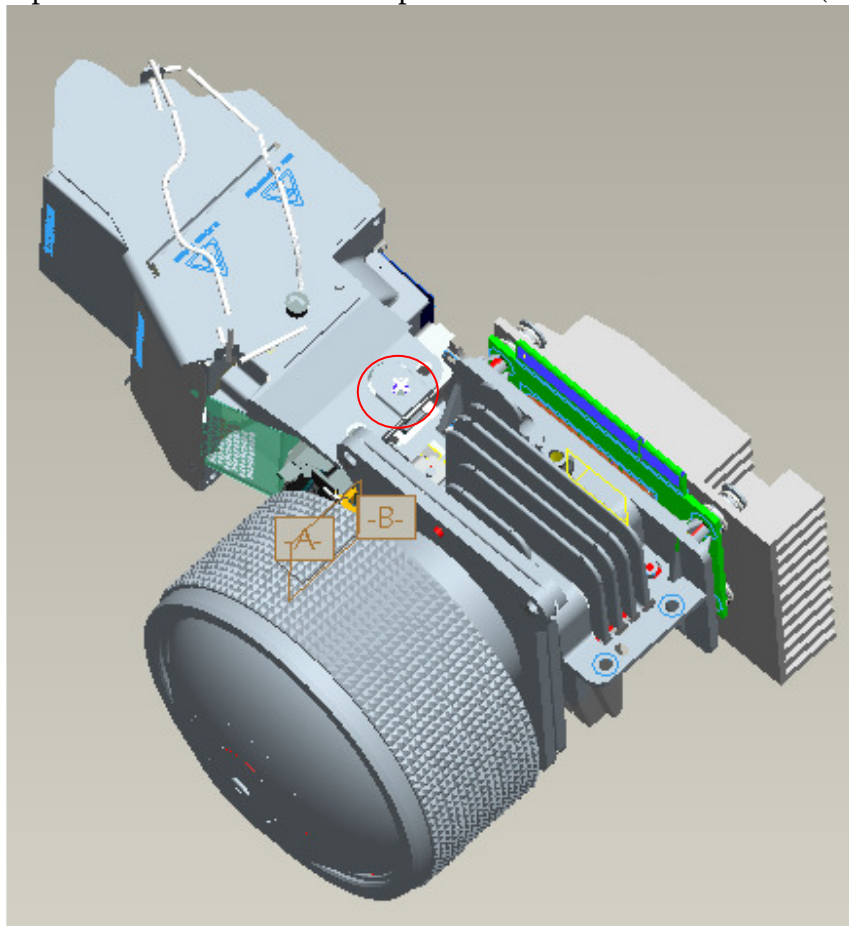
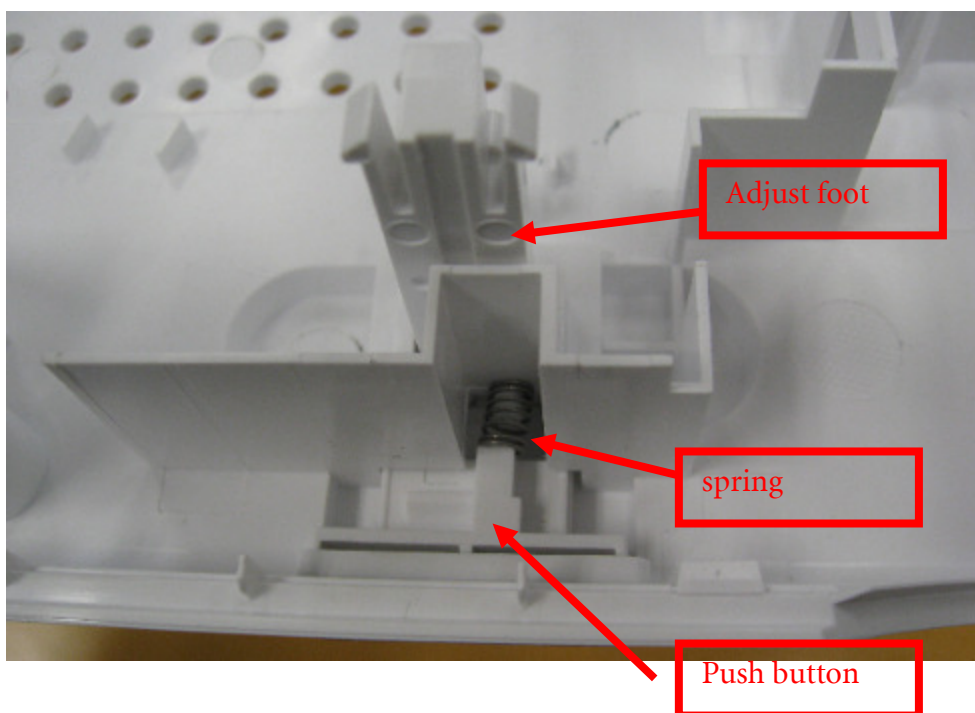
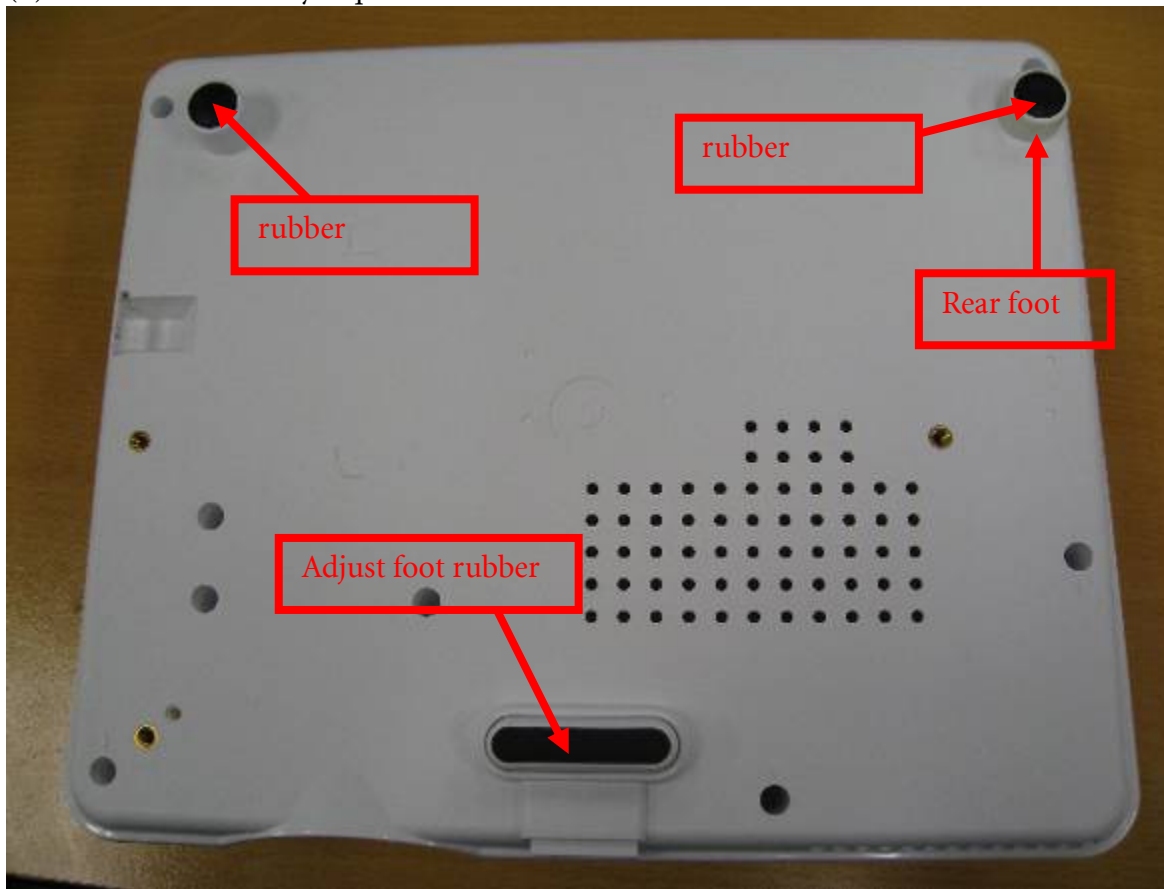


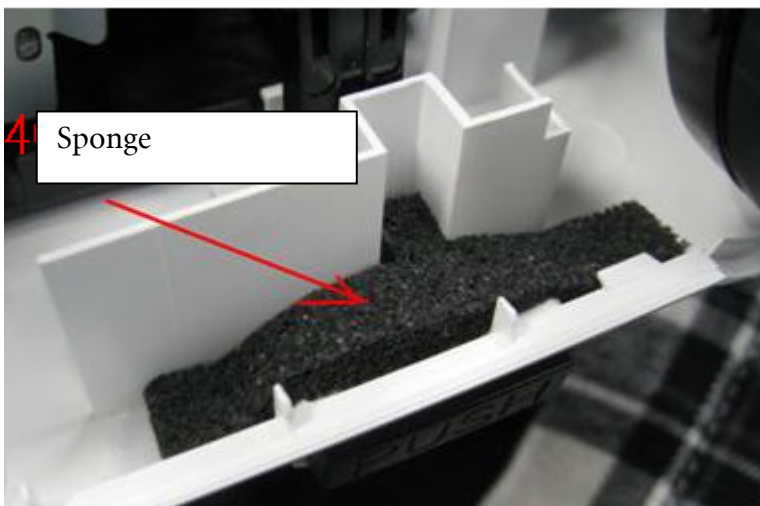
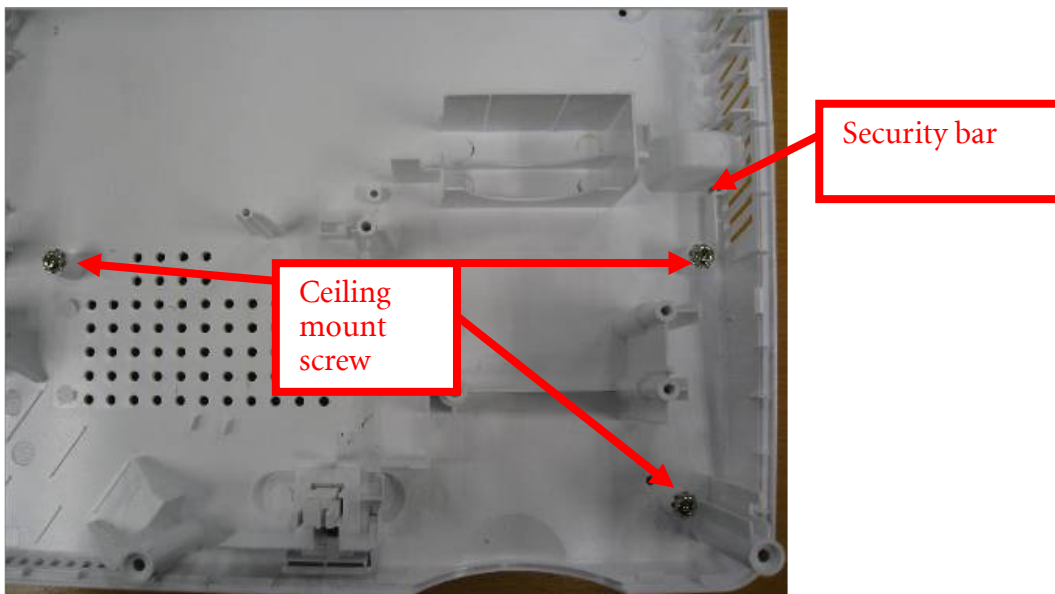
Fig.5-12

5.4 Module Assembly Key Point - Mechanical

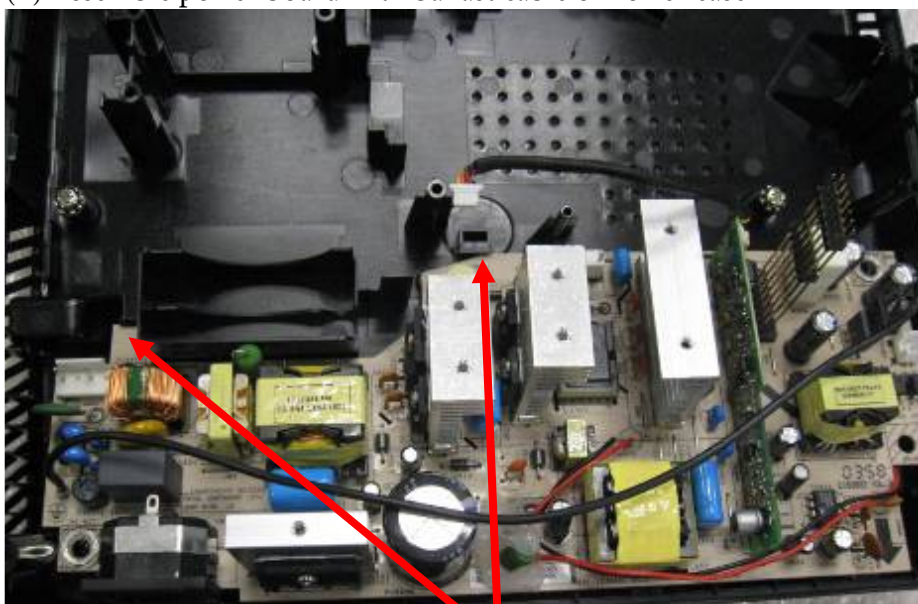
1. Assembly sequence

(1) Lower case assembly sequence

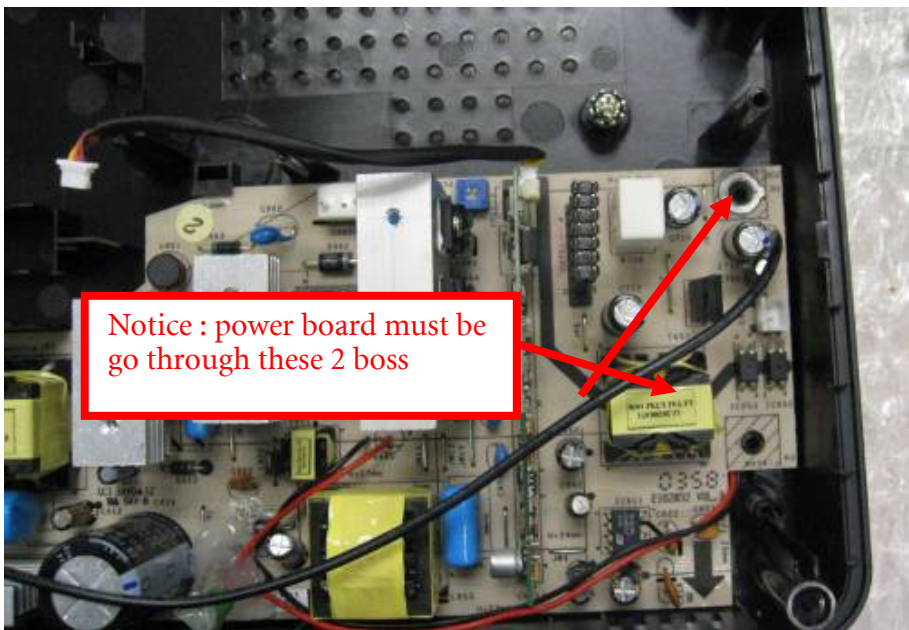




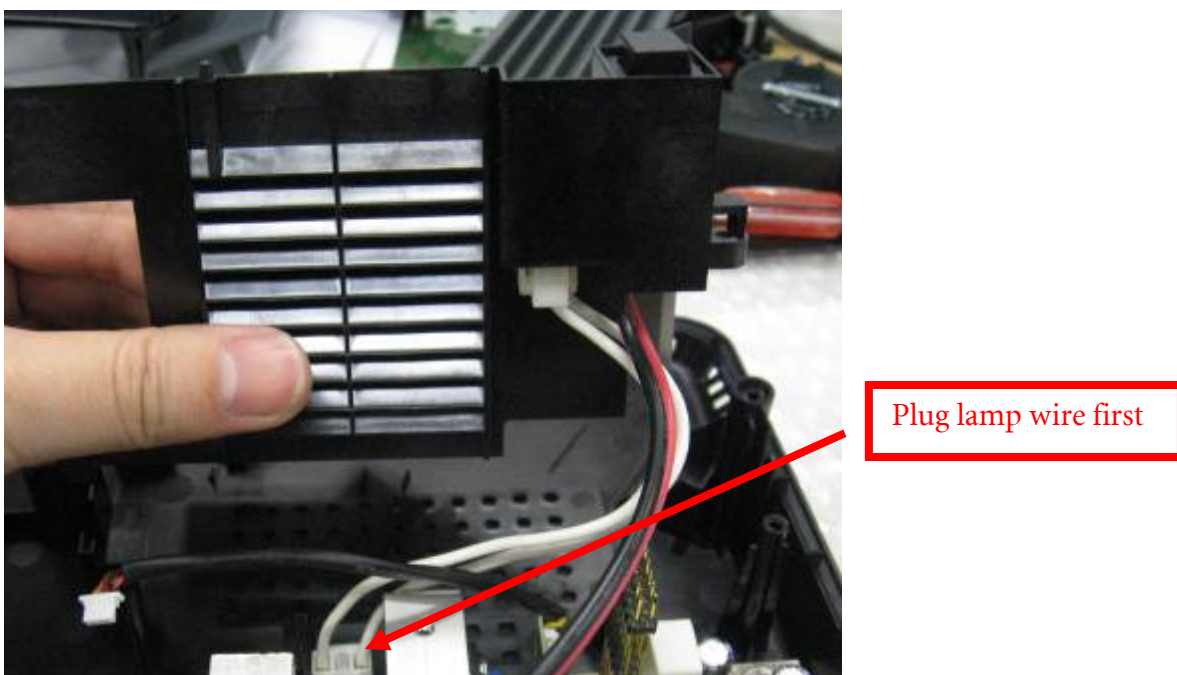
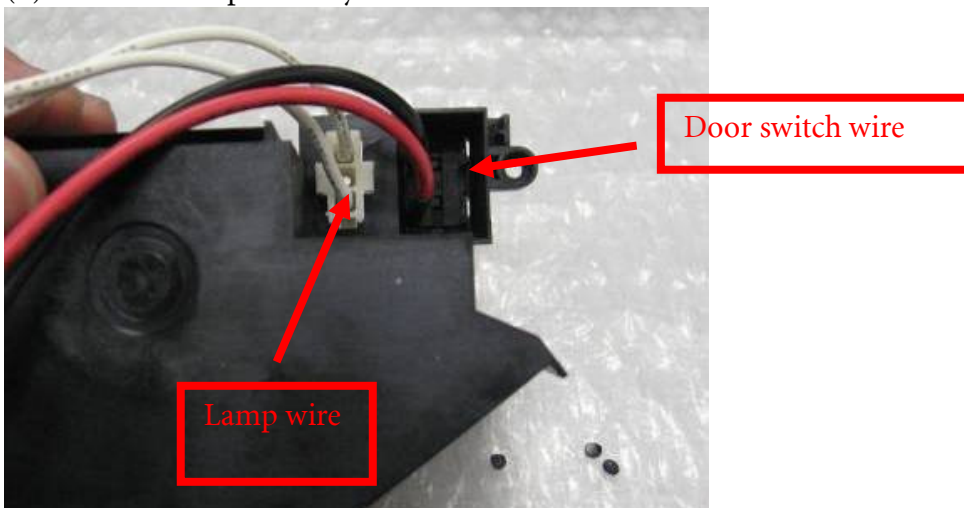
(2) Assemble power board with ballast cable on lower case

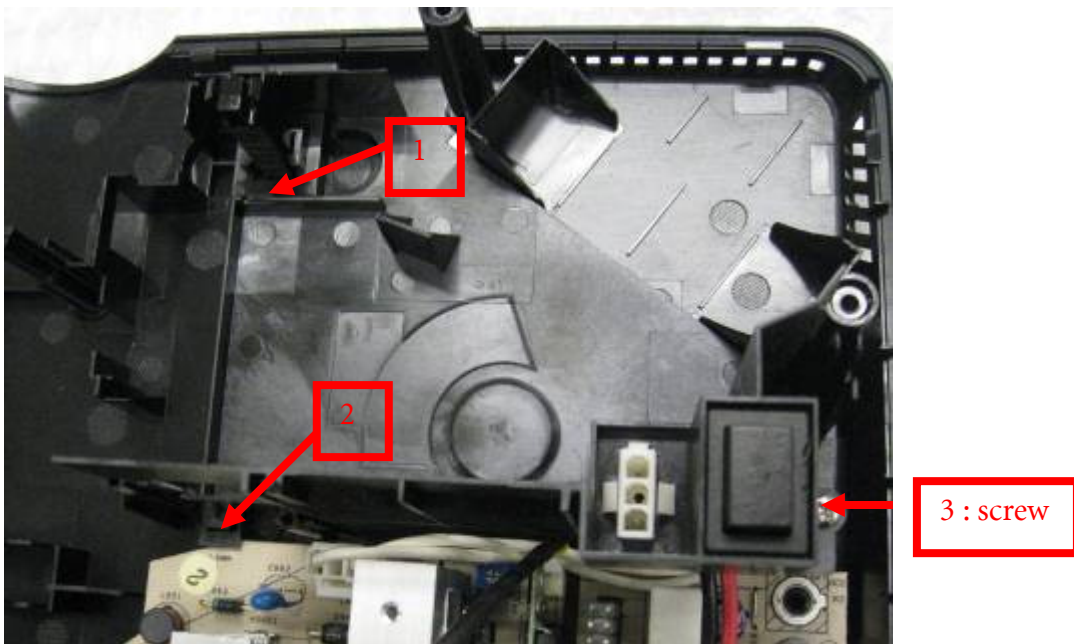


Notice : power board must be under these 2 hook

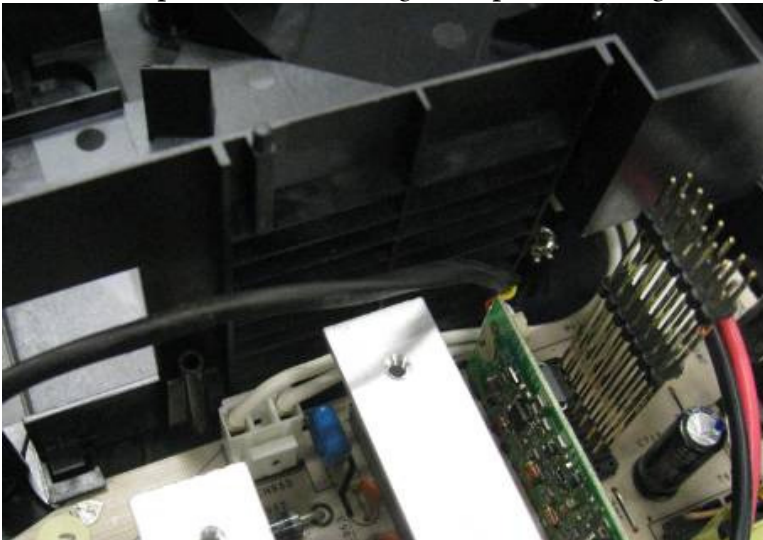


(3) Assemble lamp box assy on lower case

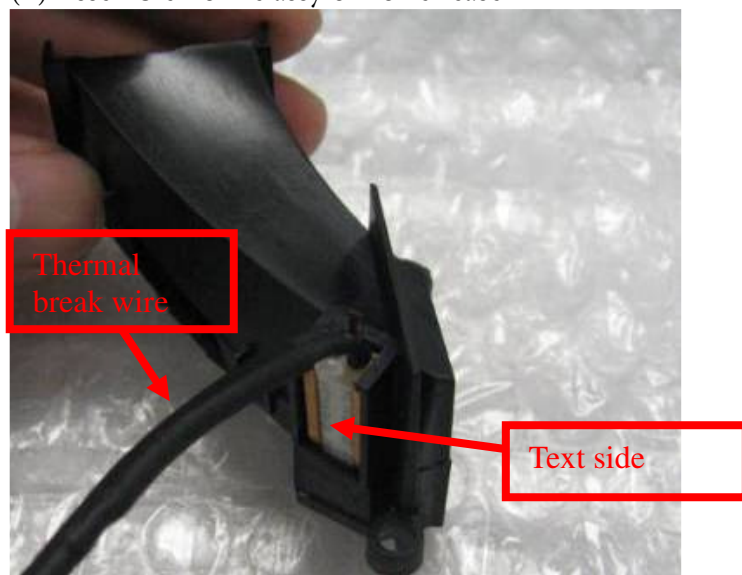


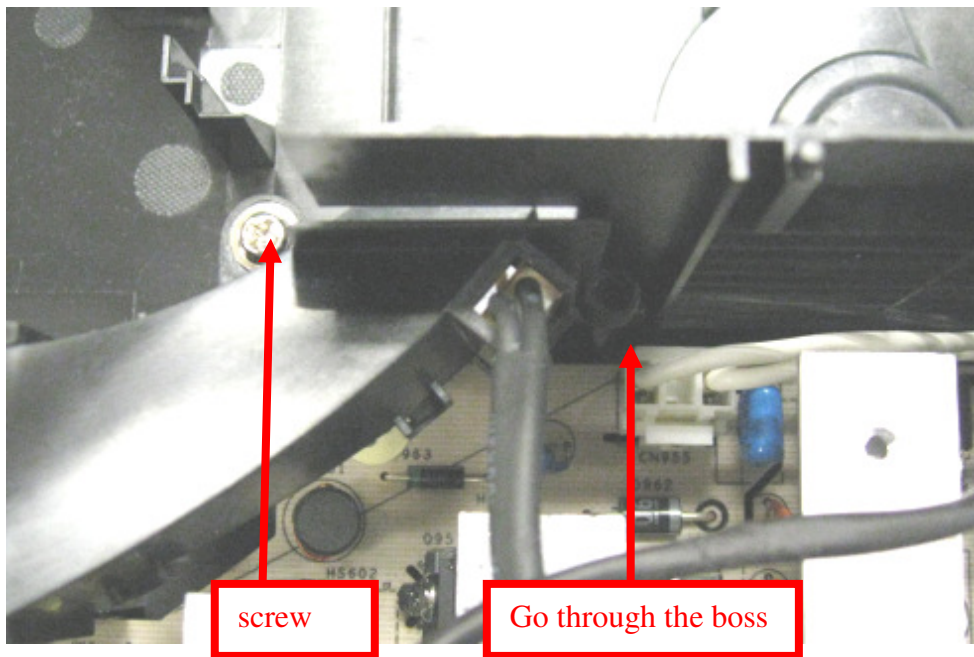


Notice : lamp wire cable routing : Lamp wire must go under the ballast cable

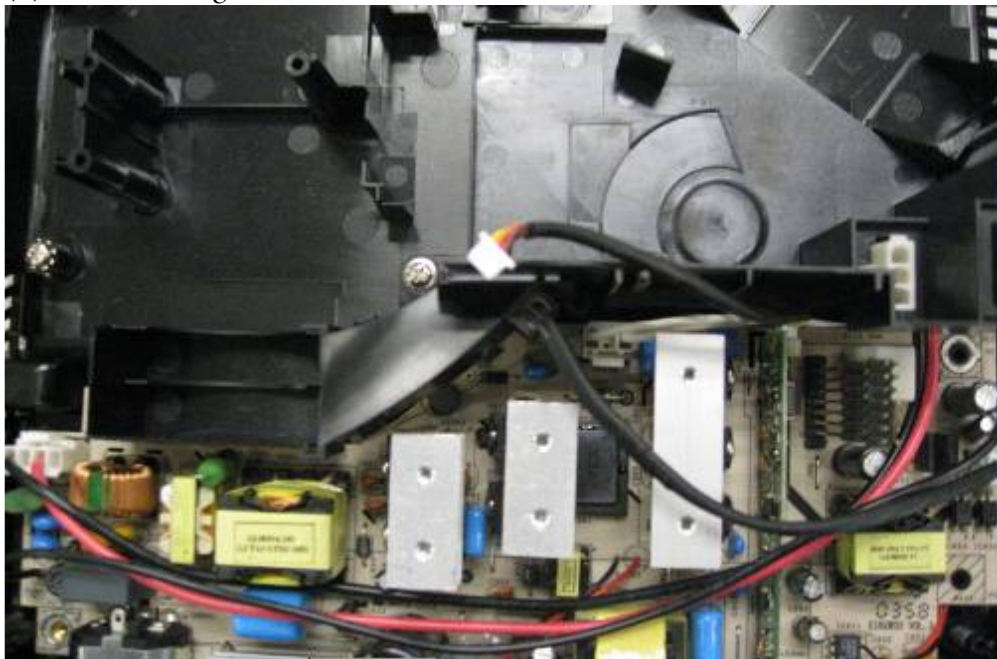


(4) Assemble nozzle assy on lower case

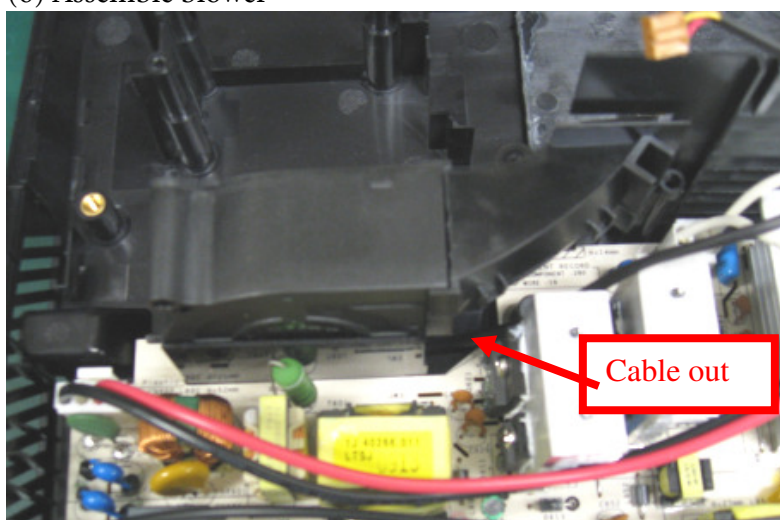




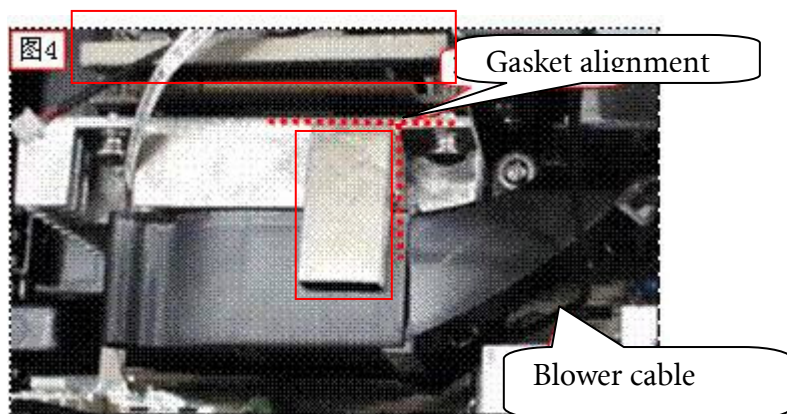
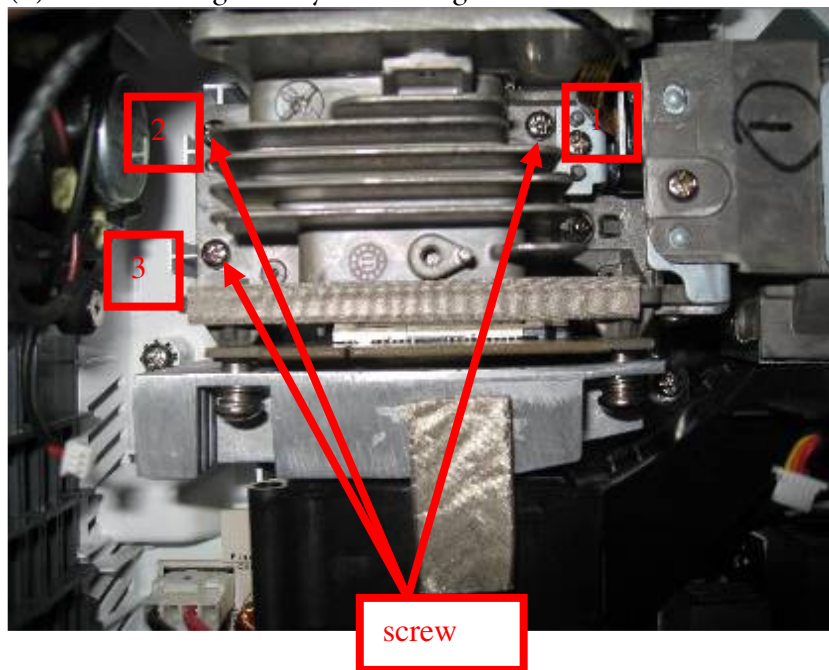
(5) Cable routing of thermal break wire & door switch wire



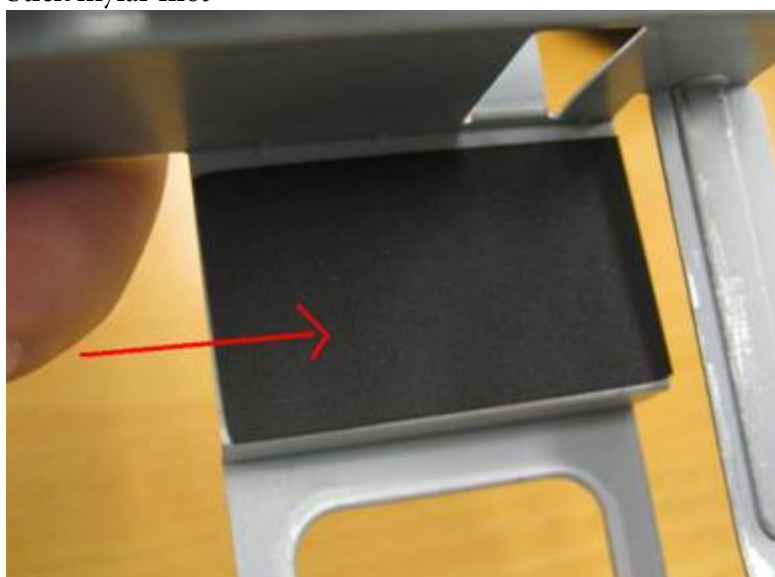
(6) Assemble blower

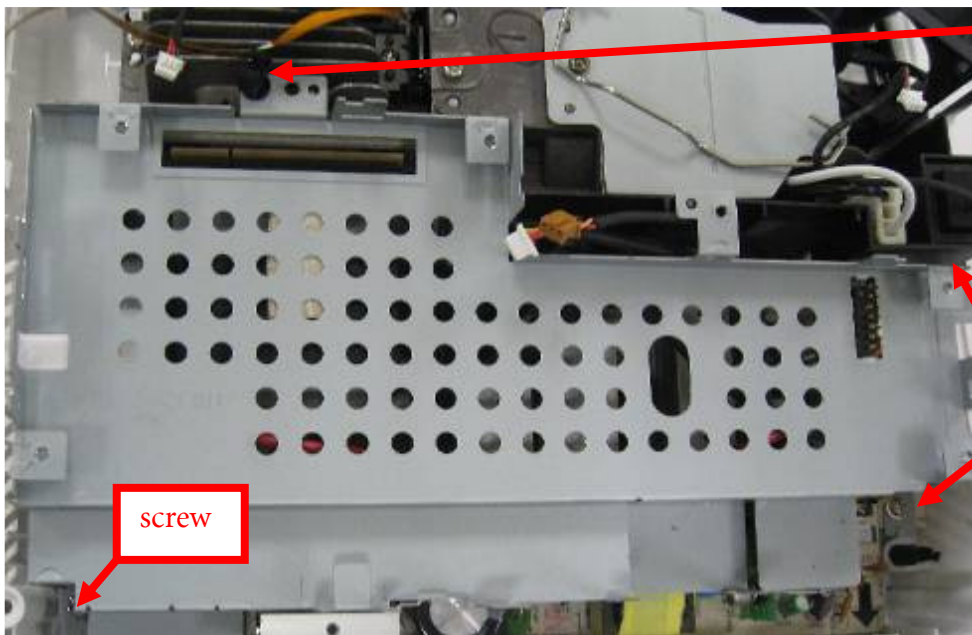


(7) Assemble engine assy and EMI gasket on lower case



(8) Assemble main bracket
Stick mylar first



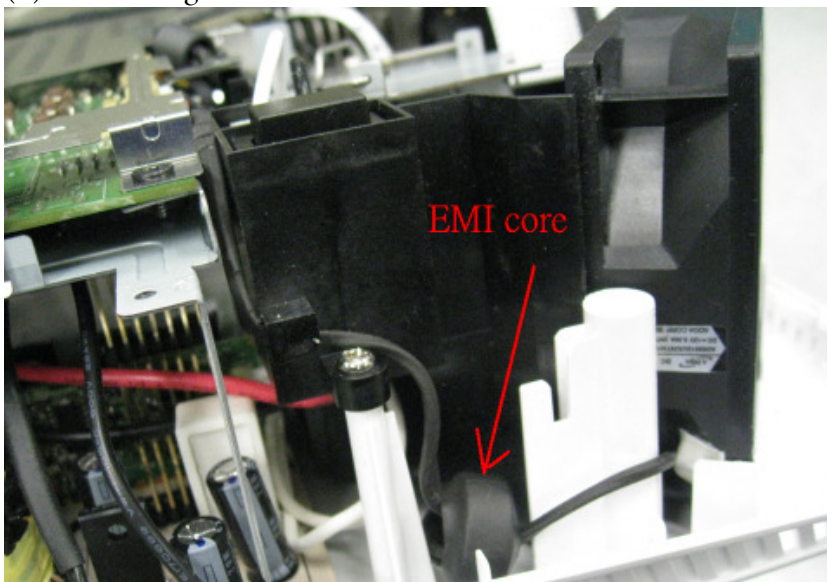


Clip: assemble before assembling main bracket on lower case

screw

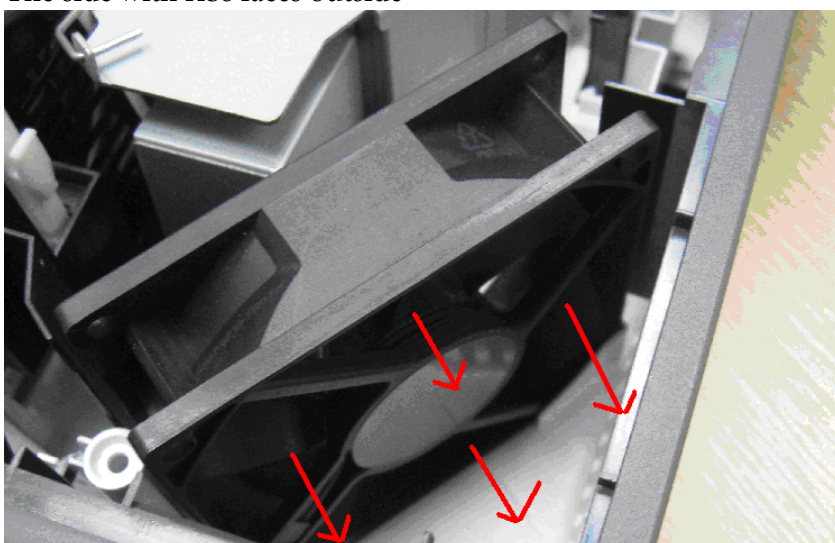
screw

(9) Assembling axial fan

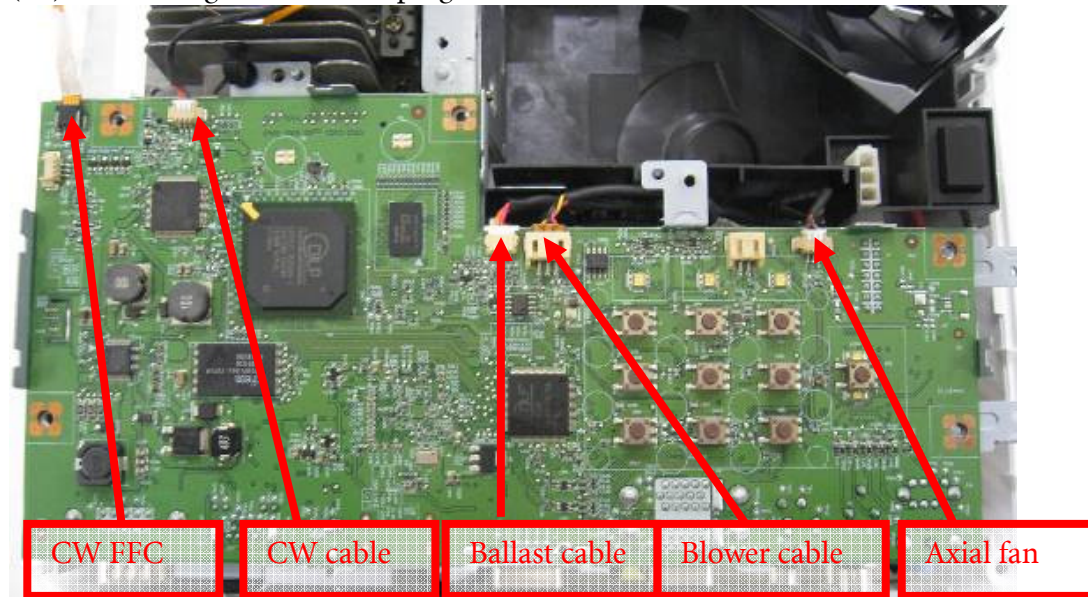


EMI core

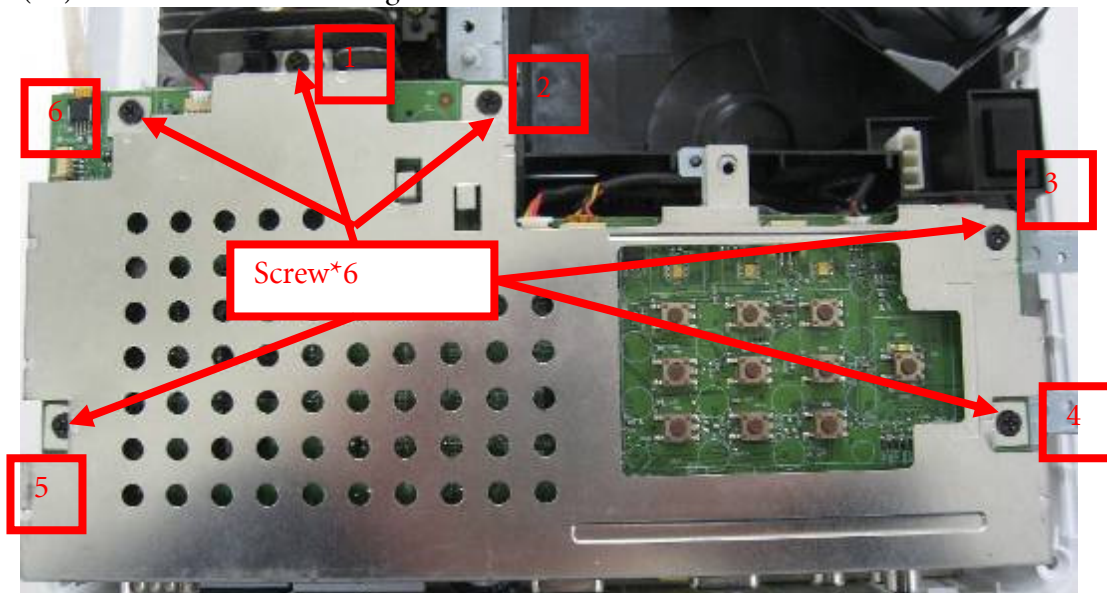
The side with ribs faces outside



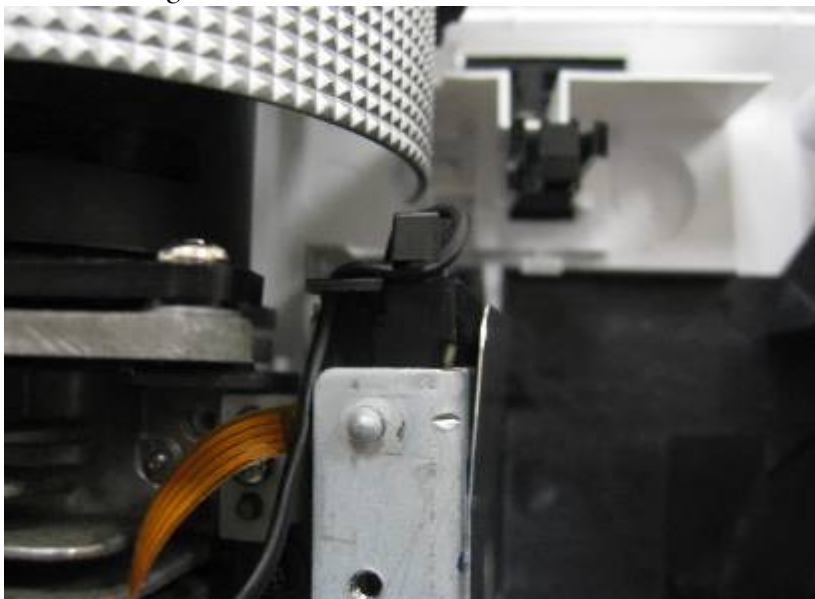
(10) Assembling main board , plug connector.



(11) Assemble main shielding

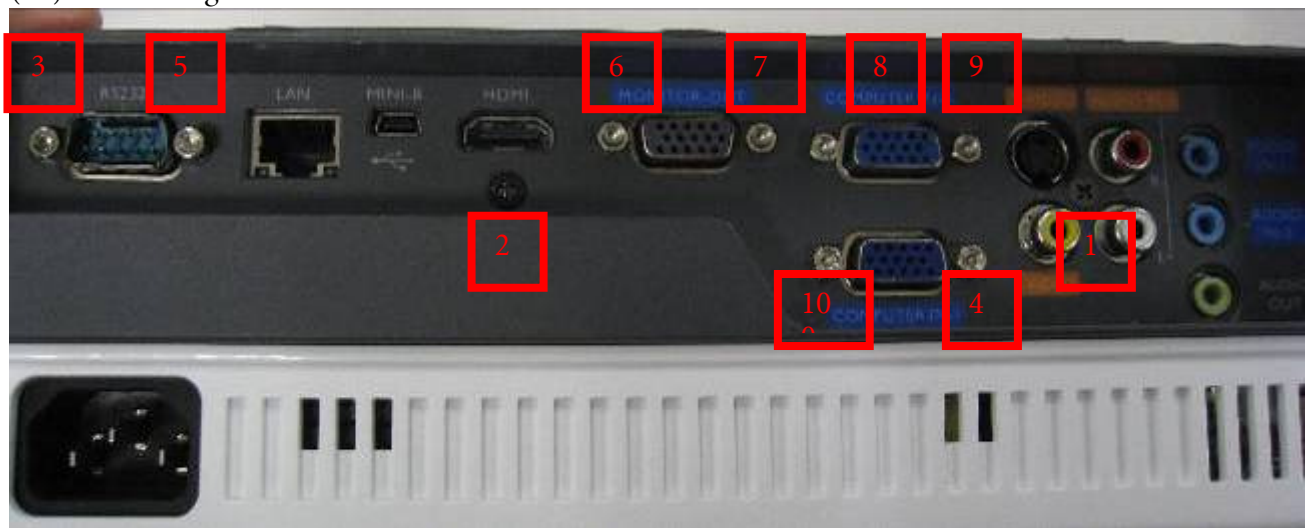


Cable routing for CW cable





(12) Assembling rear case



(13) Assembling front case assy
a. assemble IR lens in front case



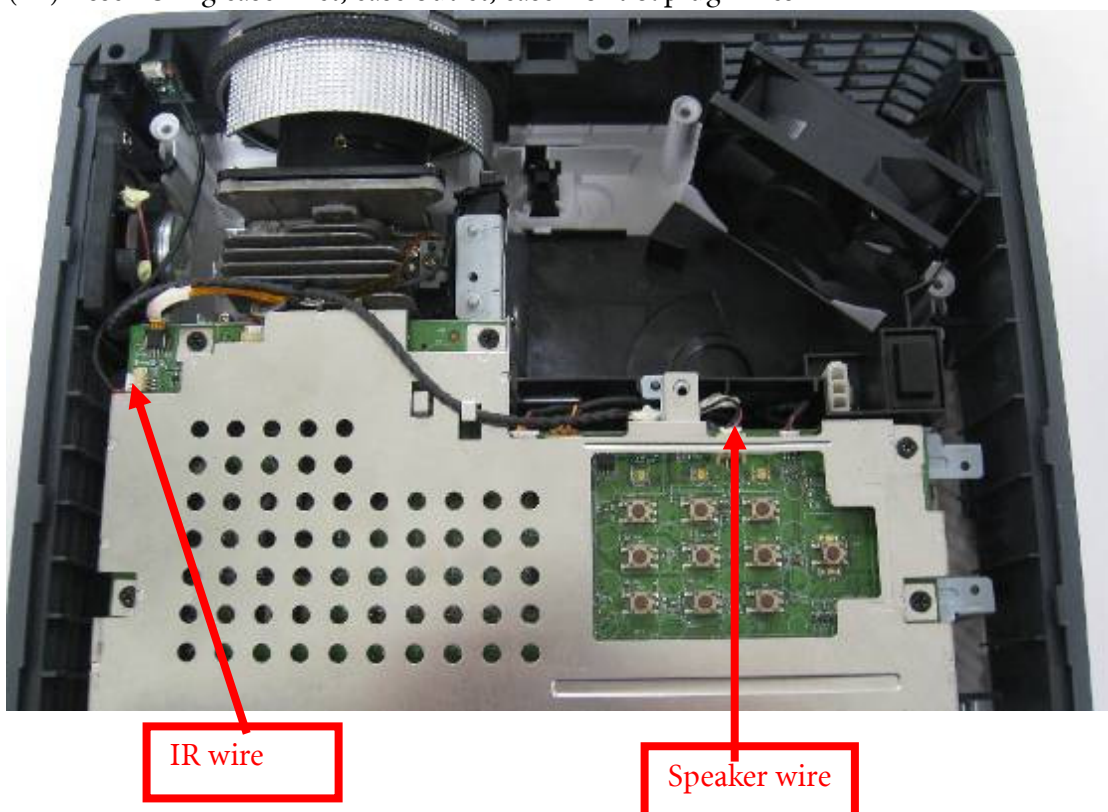
- b. Assembly sequence of IR board
- plug IR cable into IR board



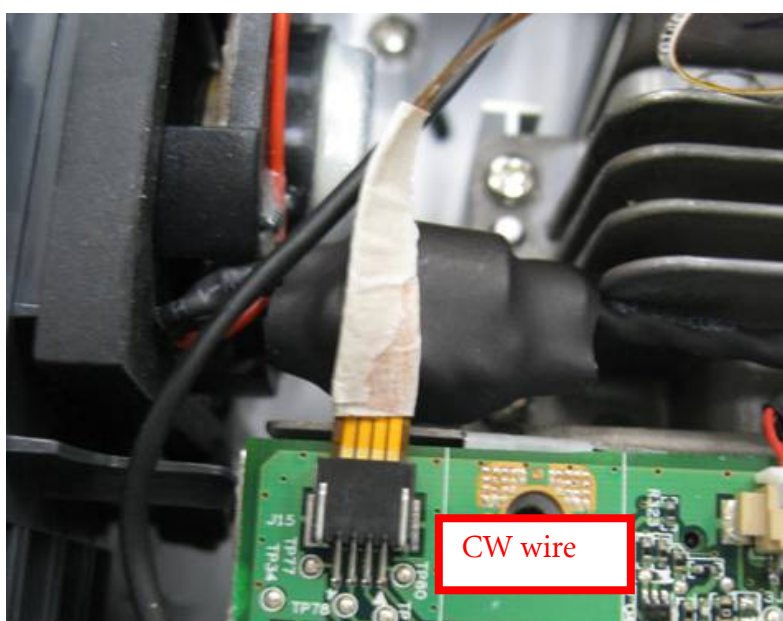
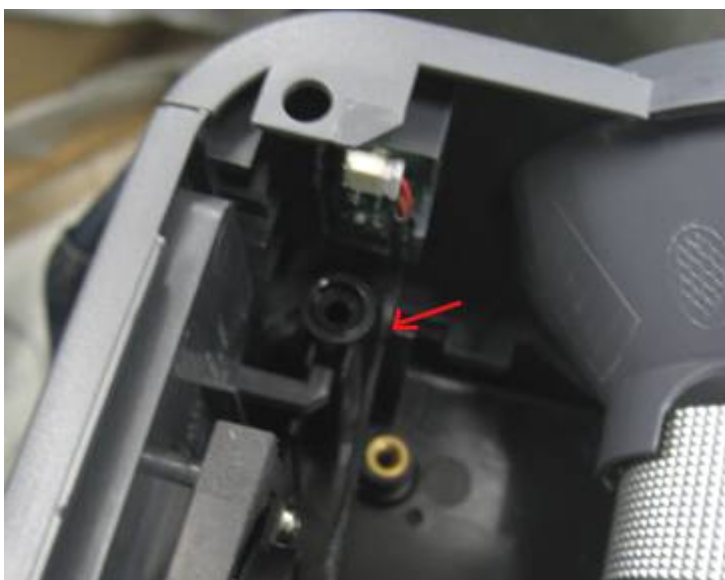
- assemble IR board into front case



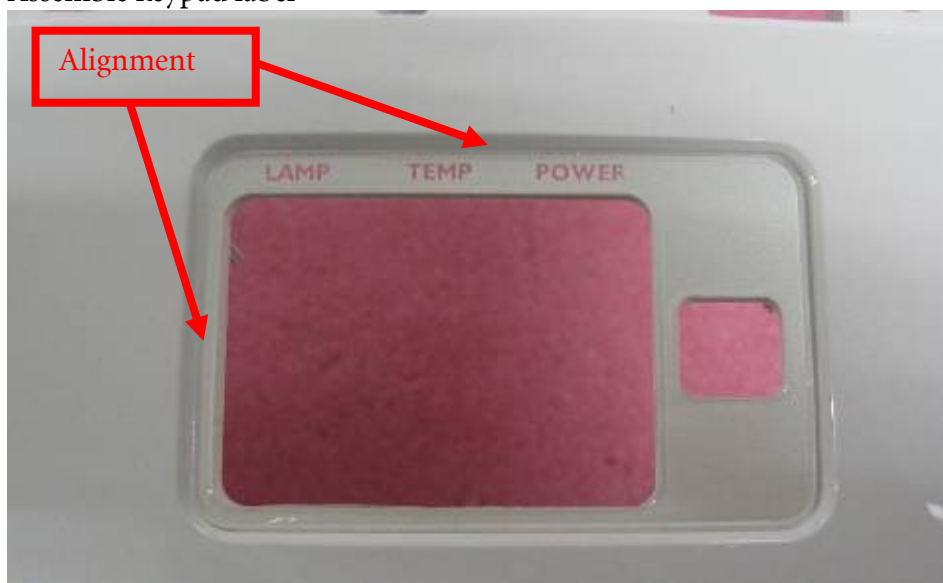
- (14) Assembling case inlet, case outlet, case front & plug wires



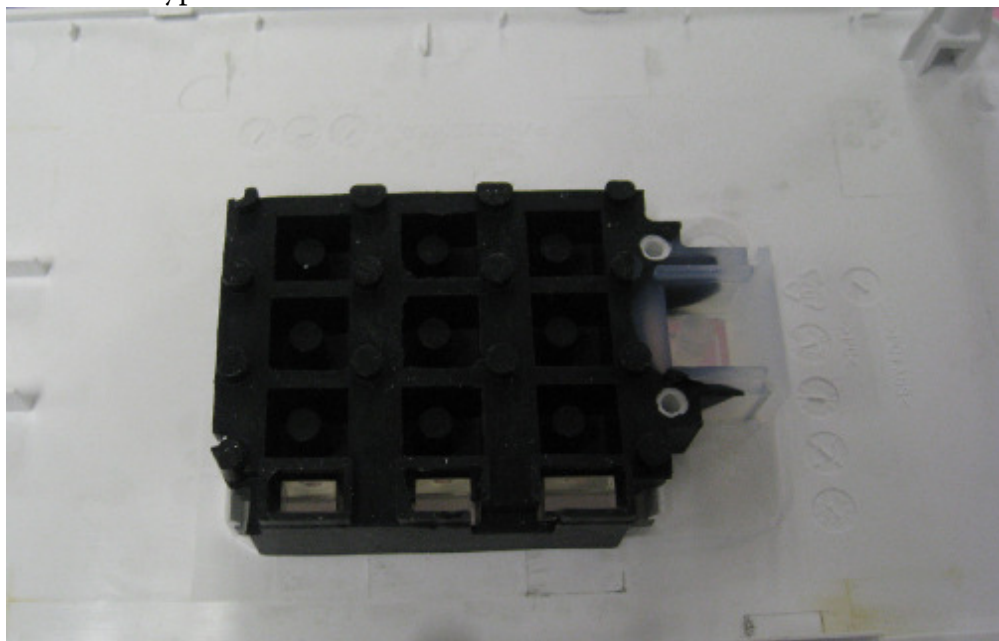
Dress IR cable into the slot of boss.



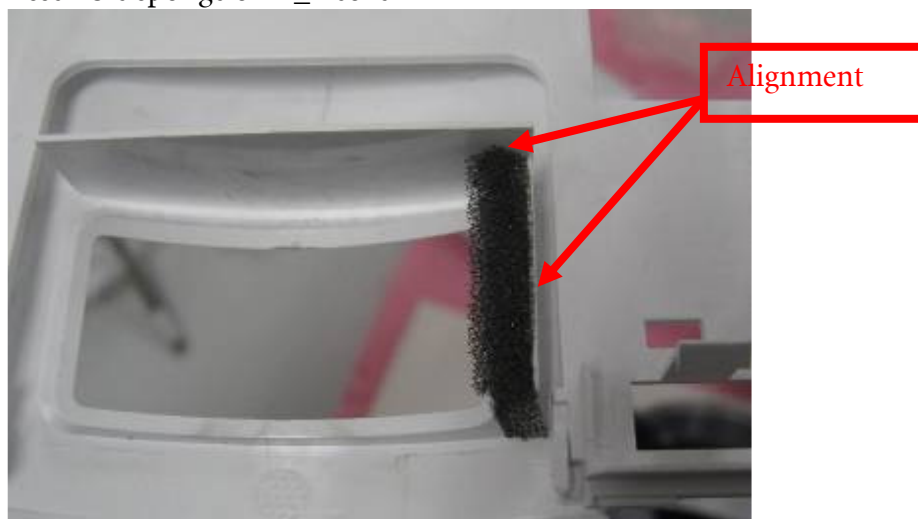
(15) Assembling upper case
Sub upper case
Assemble keypad label

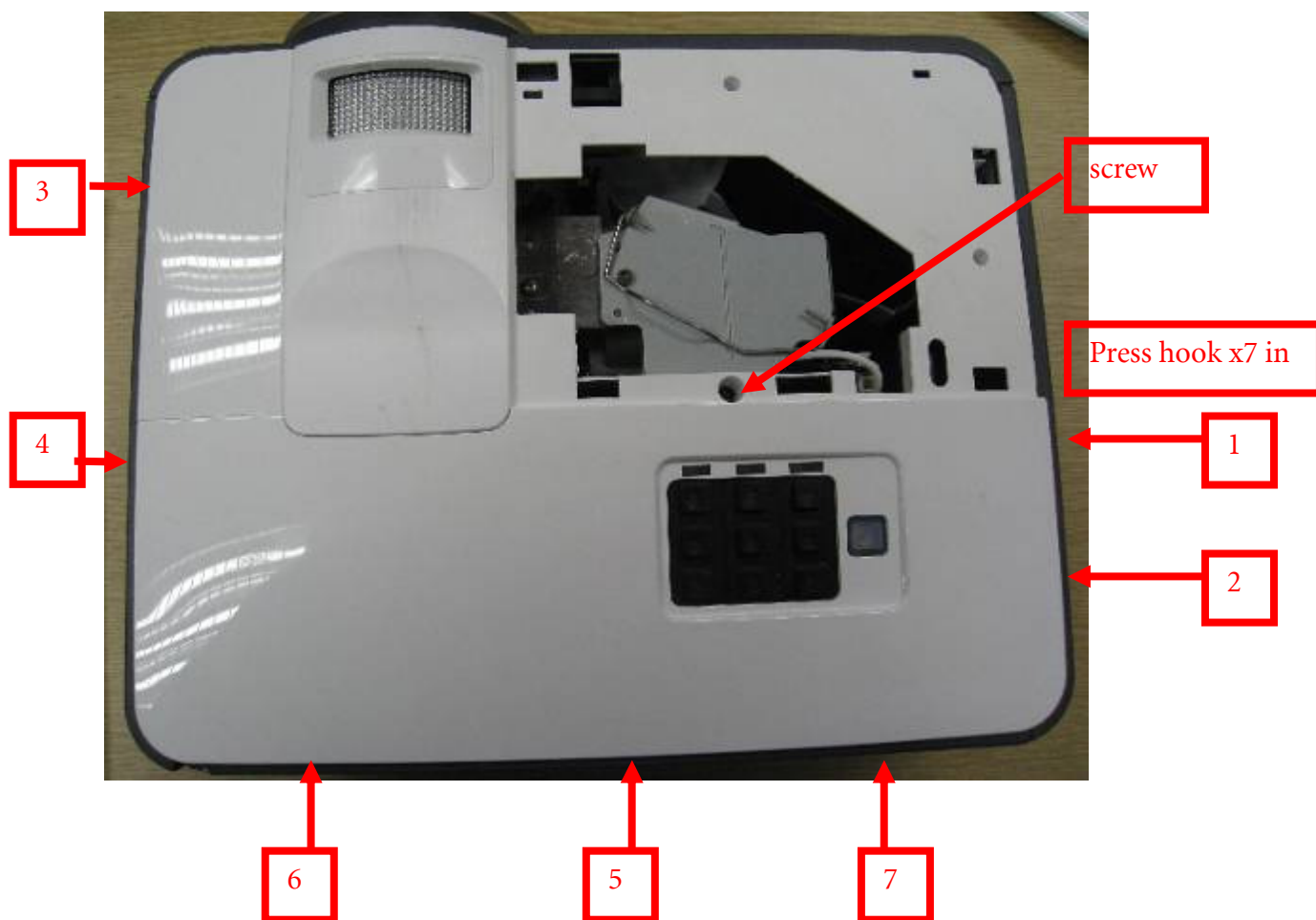


Assemble keypad



Assemble sponge on Z_F cover

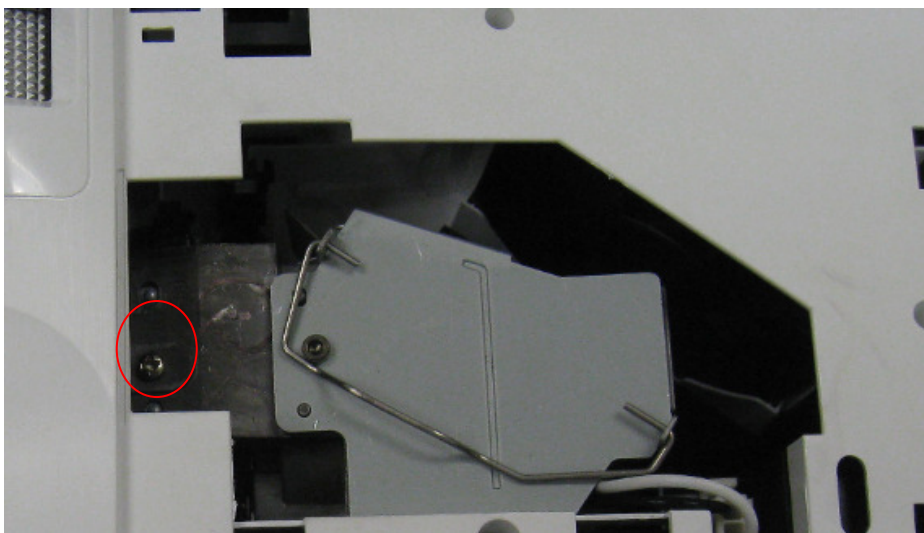
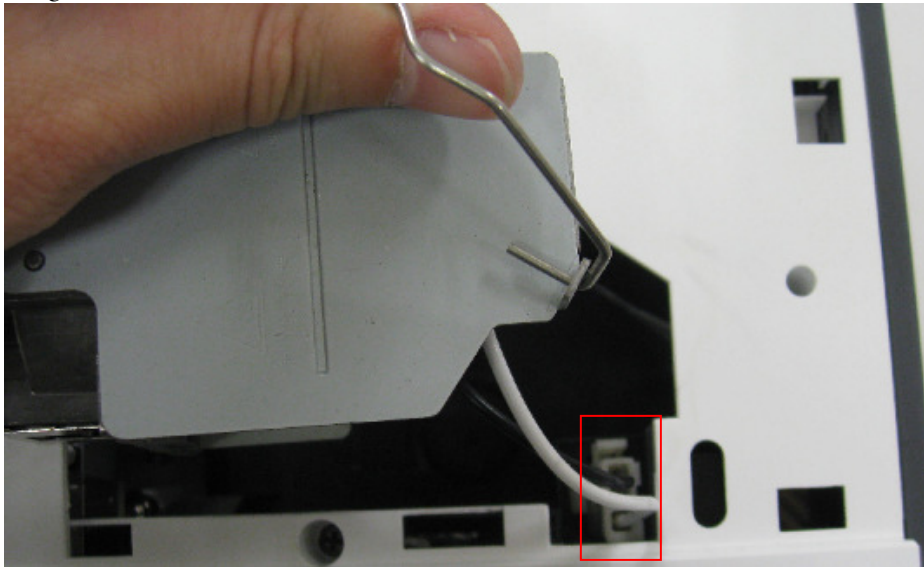




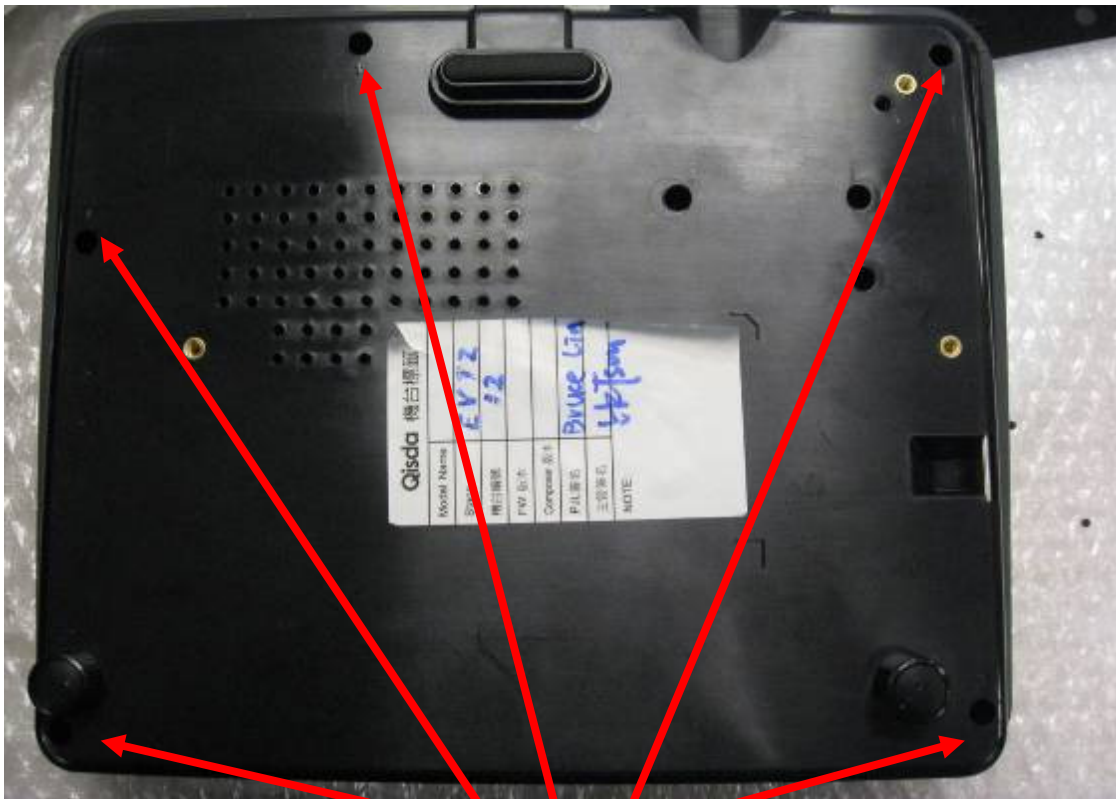
When press 3 & 4, please press the location 3mm from the edge



(16) Assemble lamp
Plug connector first

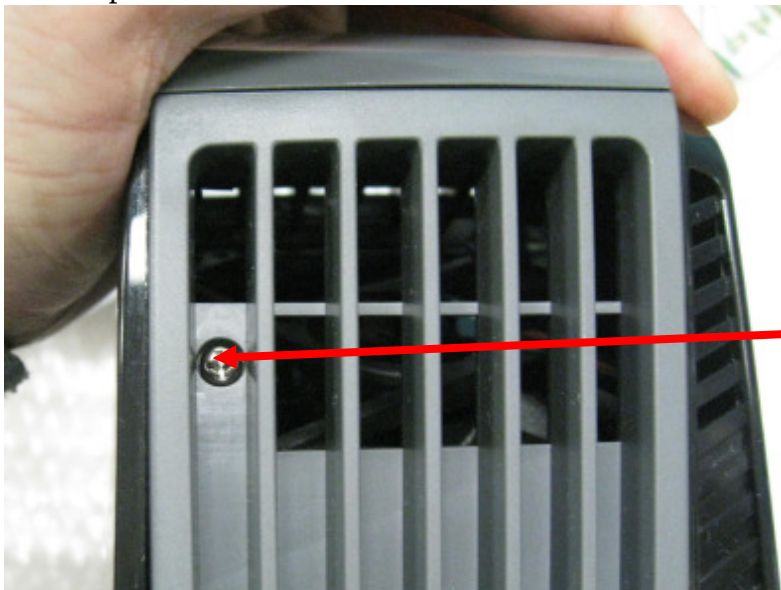


(17) fasten screw x 5



Screw*5

(18) assemble lamp door



screw

5.5 Block Diagram

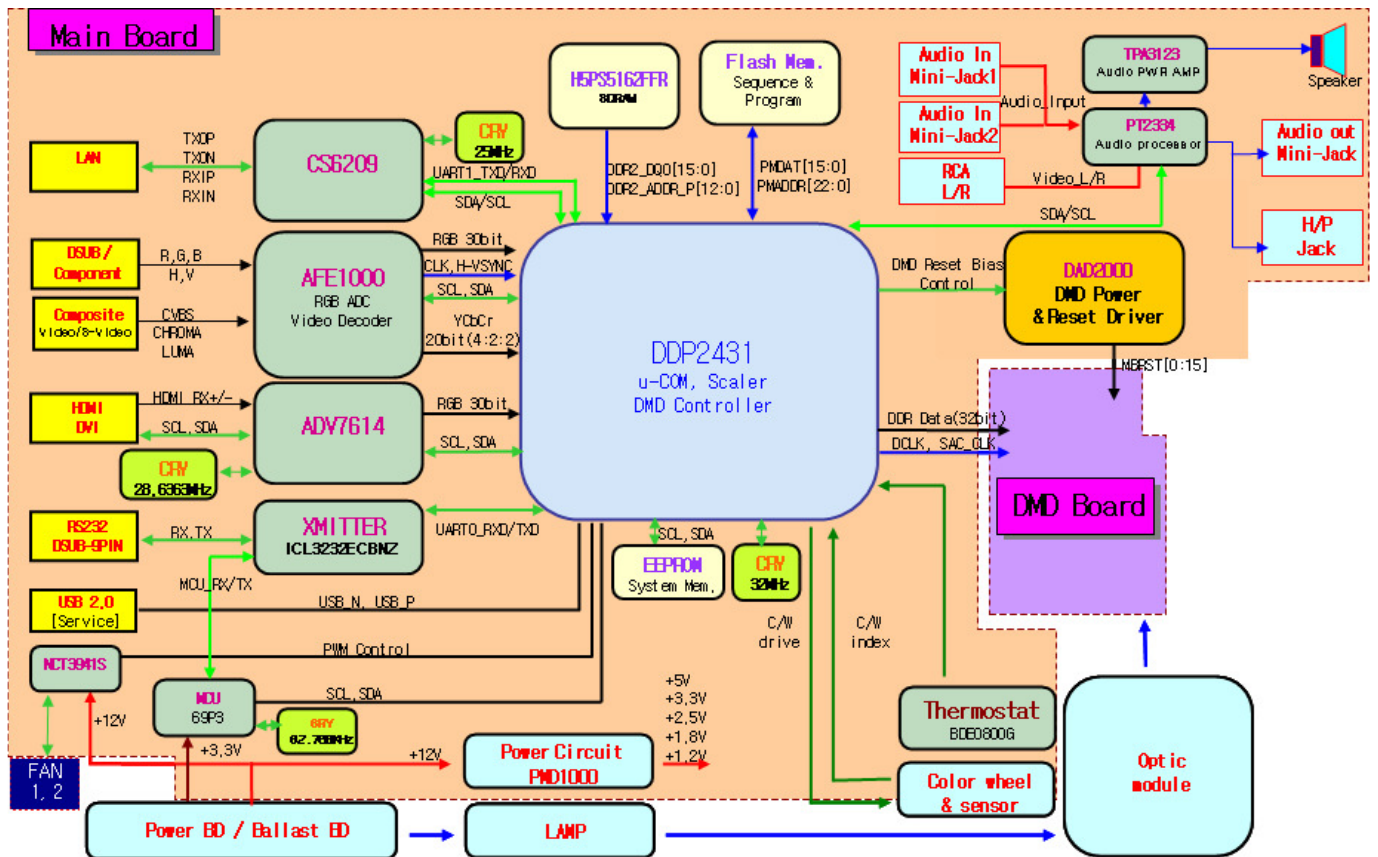


Figure 1 Main board & Input board Block Diagram

5.6 Trouble shooting

Chapter 1 System Analysis

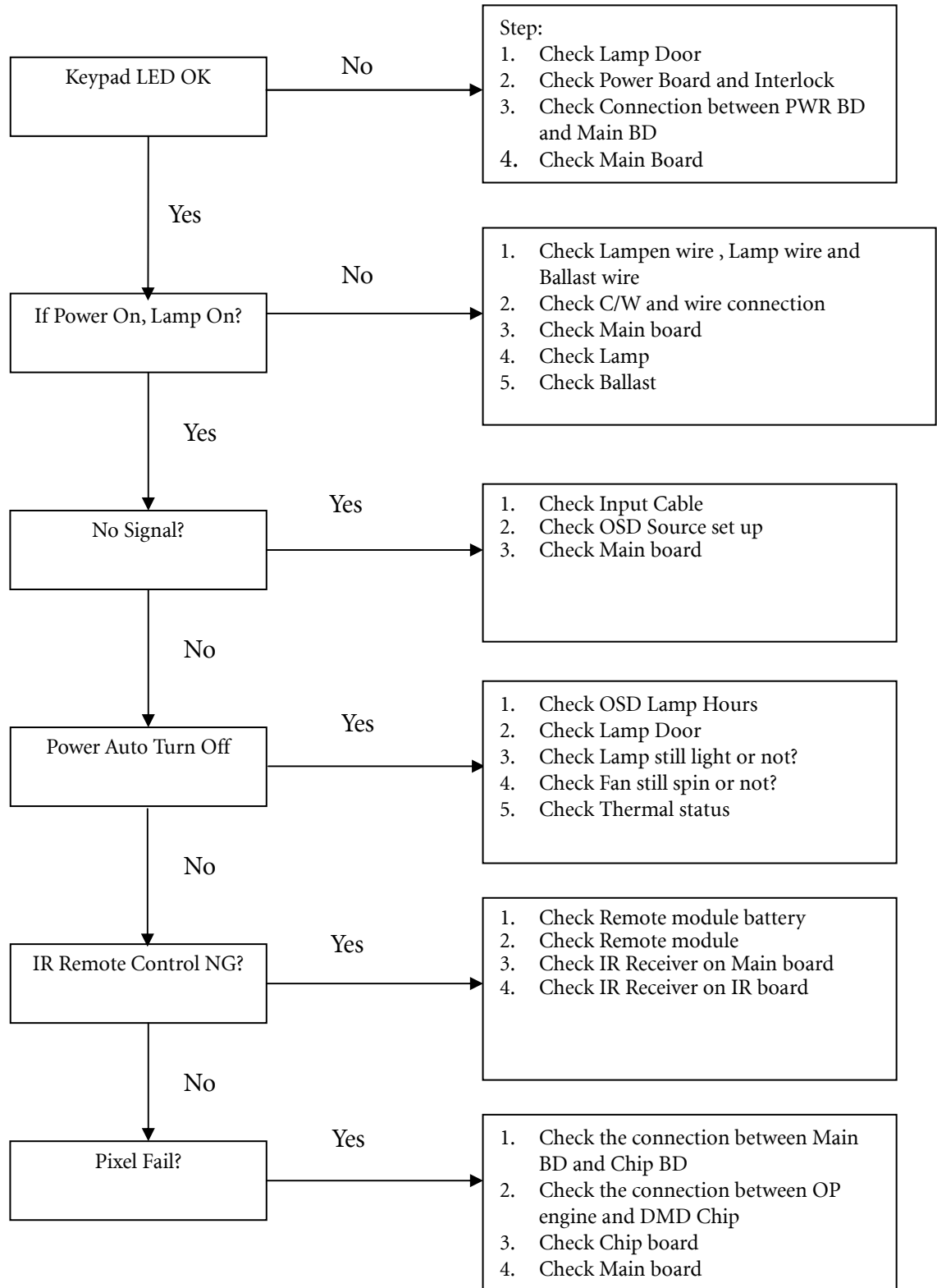
Chapter 2 Optical & Optical Engine Trouble Shooting Guide

Chapter 3 Power Supply Trouble Shooting Guide

Chapter 4 LED Messages Definition

Chapter 5 Error Count Messages Definition

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 parallel between PL datum and DMD
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:
 - c. To adjust "Horizontal Adjustment Screw" firstly, then "Vertical Adjustment Screw".
 - d. Refer to Figure 2-1..

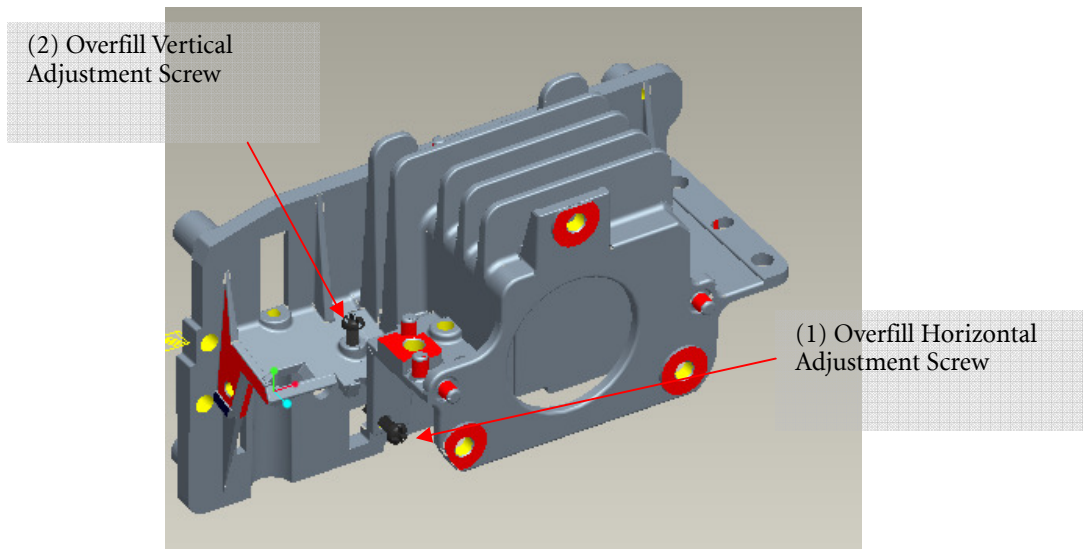


Fig. 2-1

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

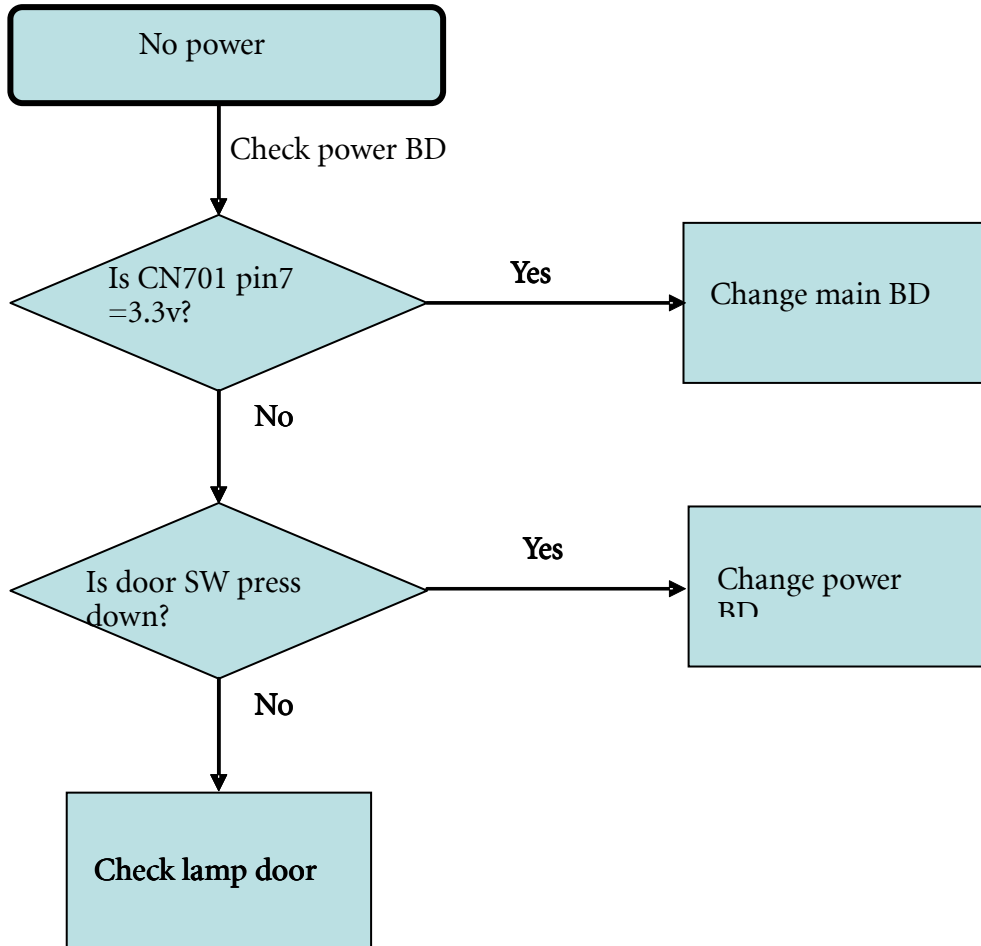
Chapter 3 Power Supply Trouble Shooting Guide

1. Introduction

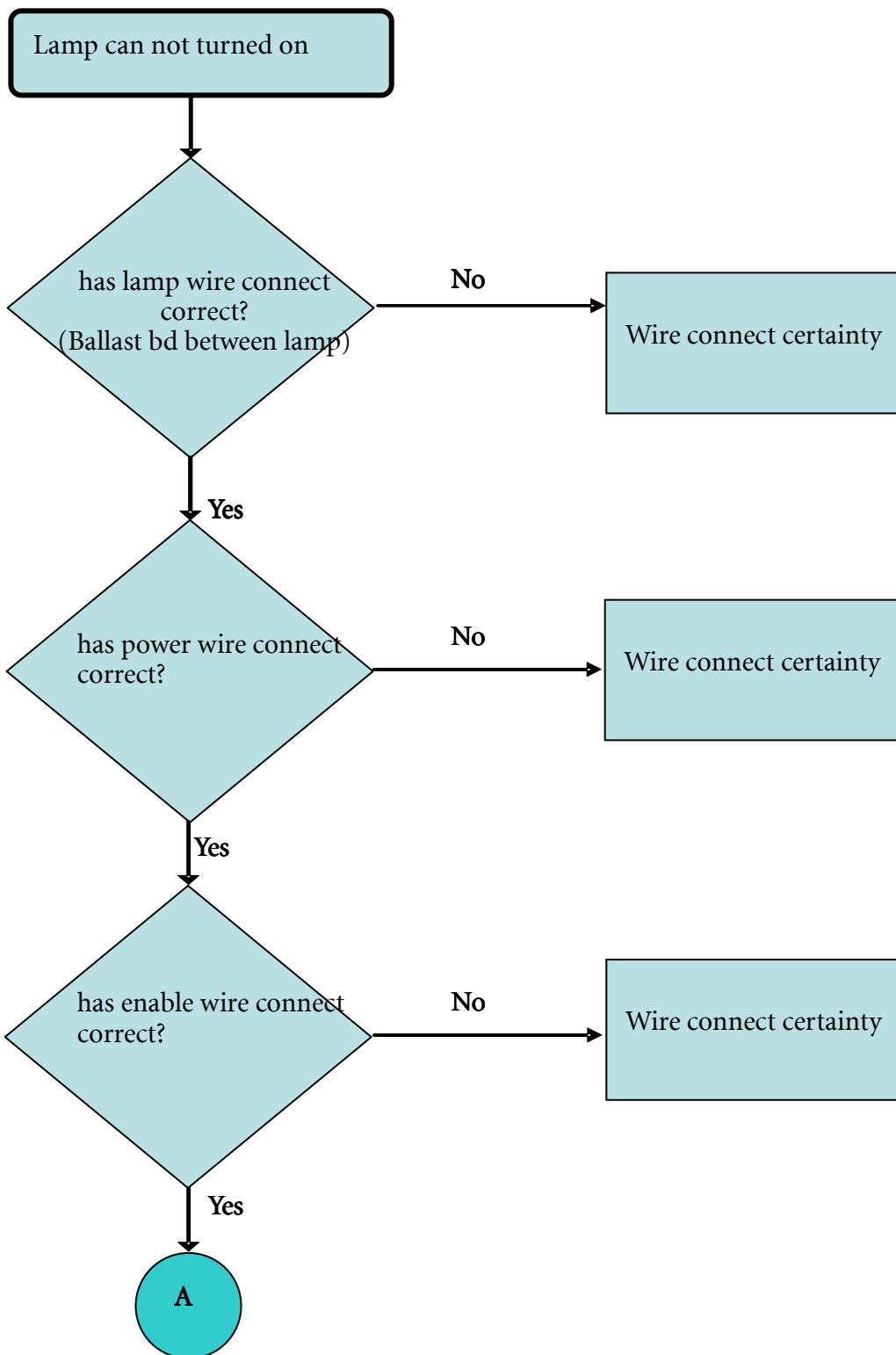
This document is prepared to be a guide to repair trouble sets, some problems happen more frequently are taken as example in it.

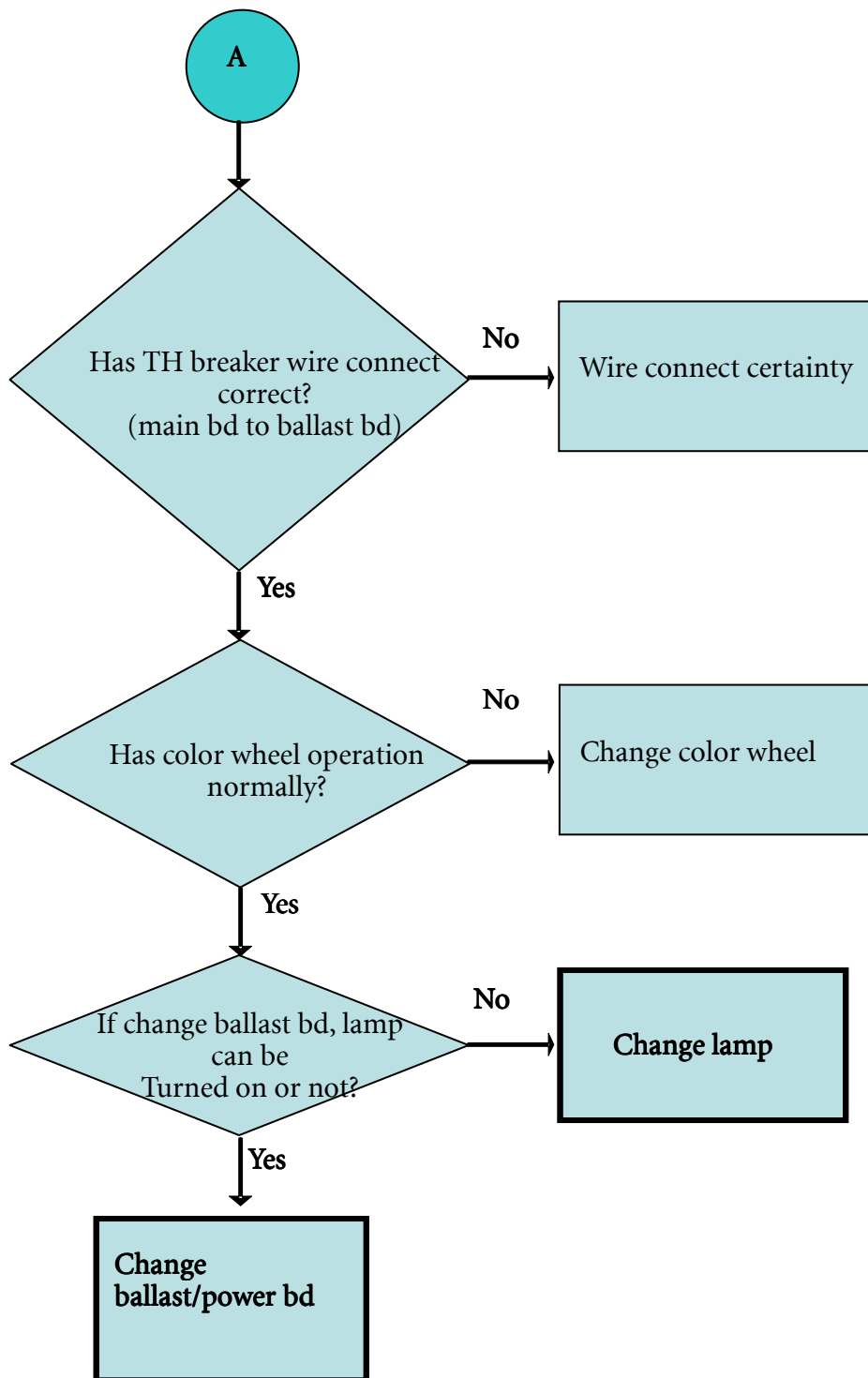
2. Problems

(a) no power




















































(b) lamp can not turned on





Chapter 4 - LED Messages Definition

Lamp	Temp	Power	Status	Note
-	-		Stand-by	
-	-		Powering up	
-	-		Normal operation	
-	-		Normal power-down cooling	
	-		Scaler reset fail	
			Download	Updater
Burn-In Messages				
-	-		Burn-in ON	
			Burn-in OFF	
-	-		Burn-in powering up	
Lamp Error Messages				
	-	-	Lamp error in normal operation	
	-		Lamp is not lit up	
Thermal Error Messages				
-		-	Fan 1 error (the actual fan speed is $\pm 25\%$ outside the desired speed)	
			Fan 2 error (the actual fan speed is $\pm 25\%$ outside the desired speed)	
			Fan 3 error (the actual fan speed is $\pm 25\%$ outside the desired speed)	NA
			Fan 4 error (the actual fan speed is $\pm 25\%$ outside the desired speed)	NA
			Temperature 1 error (over limited temperature)	
			Temperature 2 error (over limited temperature)	NA
			Thermal Sensor 1 open error	
			Thermal Sensor 2 open error	NA
			Thermal Sensor 1 short error	
			Thermal Sensor 2 short error	NA
			Fan IC #1 I2C Connection error	G7931
			Fan IC #2 I2C Connection error	NA
			Fans do not rotate in the process of powering up	
System Error Messages				
-	-		Scaler's shutdown fail	
	-		CW start fail	

Chapter 5 - Error Count Messages Definition

Error Count	Definition	Specification
LAMP Fail Error	Lamp shutdown	Detect LAMPLIT
FAN 1 Speed Error	Blower Fan speed error	SPEED OVER \pm 25%
FAN 2 Speed Error	Lamp Fan speed error	SPEED OVER \pm 25%
Sensor 1 Open Error	Main Board sensor error	Detect Sensor 1
Sensor 1 Short Error	Main Board sensor error	Detect Sensor 1
Temperature 1 Error	Over limited temperature	Detect Sensor 1
Color Wheel Error	Color Wheel operation error	Detect color wheel signal
Abnormal Power down	System shutdown	Detect cooling process
First Burn-In Error Minutes	Error in Burn-In mode	Detect Burn-In Error time

Appendix 1 – Screw List / Torque

model name -MW814ST(Mars) (MD)										
	NO.	screw P/N	description				Torque	Where use	Q'ty	total
		Part name	Type	Head	Length	Surface	(kgf-cm)		Unit	
M3	1	8F.VG564.8R0 SCRW TAP PAN M3*8L NI D-PT	tap	PH	8	Ni	4.5+/-0.5	speaker to inlet case	2	2
	2	8F.VG524.6R0 SCRW TAP PH W/F M3*6L NI D-PT	tap	PH	6	Ni	5.5+/-0.5	main bkt to lower case	2	4
								nozzle to lower case	1	
	3	8F.HA334.6R0 SCRW TAP FPHM3*6(6/1)TP-S B-ZN	mach	PAN	6	Zn	5.5+/-0.5	main shd to main bkt	5	7
							5.5+/-0.5	main shd to op	1	
							5.5+/-0.5	upper case to main bkt	1	
	4	8F.1A724.8R0 SCRW MACH PAN M3*8L B-NI	mach	PAN	8	Ni	4.5+/-0.5	lamp door	1	1
	5	8F.VA564.8R0 SCRW TAP PAN M3*8L NI D-PT	tap	PAN	8	Ni	6.5+/-0.5	top to lower case	5	9
								lampbox to lower case	1	
	6	8F.TA724.8R0 SCRW TAP FH M3*8L B-NI	tap	FH	8	Ni	4.5+/-0.5	op housing to lower case	3	1
M4	8	8F.1D526.6R0 SCRW MACH PAN EXT- TOO M4*6L NI	mach	PAN	6	Ni	5.5+/-0.5	Audio connector	1	1
								HDMI connector	1	1
								ceiling mount boss	3	4
									main bkt to Power bd	1
									sum=	29
Standoff										
	NO.	screw P/N	description				Torque	Where use	Q'ty	total
		Part name	Type	Head	Length	Surface	(kgf-cm)		Unit	
#4-40	1	8F.00649.120 STAND OFF XH4#-40X4+8.1 NI	mach	hex	8	NI	5.5+/-0.5	rear case D-sub	8	8


Screws on Power board										
	NO.	screw P/N	description				Torque	Where use	Q'ty	total
		Part name	Type	Head	Length	Surface	(kgf-cm)		Unit	
M3	1	8F.1A524.8R0 SCRW MACH PAN M3*8L NI	mach	pan	8	ni	4.5+/-0.5	IC == heatsink (power bd)	8	8

Model Name :MW814ST (OM)										
	Type	P/N	Description				Torque	Where use	Unit	Q'ty
			Type	Head	Length	Surface	(kgf-cm)			
DMD HSG	M2	8F.1A752.3R0	MACH	PH	3.0	B-NI	2.5+/-0.5	CW Shield VS. BKT Link Lamp	1	1
		8F.00603.4R0	MACH	PH	4.0	B-NI	2.5+/-0.5	Clip LP VS. HSG DMD	1	3
								Sub HSG VS. HSG DMD	2	
		8F.1A752.8R0	MACH	PH	8.0	B-NI	2.5+/-0.5	LP Adjustment	2	2
	M3	8F.1A554.5R0	MACH	PAN	5.0	NI	4.0+/-0.5	BKT Link Lamp VS. HSG DMD	2	3
								CW Module VS. HSG DMD	1	
		6E.0U101.001	MACH	PH	15.15	NI	6.0+/-0.5	H-Sink VS. HSG DMD	4	4
SUB HSG MODULE	M2	8F.FA322.3R5	MACH	RH	3.5	B-NI	2.2+/-0.5	Clip CM Front VS Sub HSG	1	1
CW MODULE	M2	8F.1A752.3R0	MACH	PH	3.0	B-NI	2.5+/-0.5	CW Sensor BD VS. BKT CW	1	3
								CW CVR VS. BKT CW	2	
		8F.8A752.3R0	MACH	FPH	3.0	B-NI	1.5+/-0.5	CVR Anti Dust VS. CVR CW	1	1
	M2.5	8F.00345.5R6.	MACH	FPH	5.6	NI	3.5+/-0.5	CW VS. BKT CW	3	3
LAMP MODULE	M2	8F.1A752.3R0	MACH	PH	3.0	B-NI	2.5+/-0.5	Cover Lamp VS. HLD Lamp	2	2
	M3	8F.1A554.4R0	MACH	PAN	4.0	NI	4.0+/-0.5	Clip Lamp VS. HLD Lamp	3	5
								FIN VS. HLD Lamp	1	
								Clip FG VS. HLD Lamp	1	
		8F.1A554.6R0	MACH	HEX	6.0	B-NI	5.0+/-0.5	HLD Lamp VS. BKT Link Lamp	1	1
	8F.2R754.6R0	MACH	HEX	6.0	B-NI	5.0+/-0.5	Plate Lamp VS. HLD Lamp	1	1	
LENS / FRAME	M3	8F.1A554.6R0	MACH	PAN	6.0	NI	6.5+/-0.5	Lens VS. Frame	3	3
		8F.JA754.4R0	MACH	FPH	4.0	B-NI	3.0+/-0.5	Frame VS. HSG DMD	3	3
SUM=										36

Appendix 2 - Code List: IR / RS232 / DDC Data

Remote Control Code:

1. IR Code

Key	Function	Description	Code	Support	ID and Protocol	
1	Power	This button will on/off the projector.	0x02	Yes	Frequency	38 KHz
2	Source	This button will show available source options.	0x04	Yes	Protocol	NEC Format
3	Auto	This button will automatically adjust projector's picture quality.	0x08	Yes	Custom Code	0x0030
4	Blank	This button will turn projector into/out of blank mode.	0x07	Yes		
5	Mode	When there is no OSD menu on the screen, the button will change picture mode. When there is OSD menu on the screen, this button will excite the item chooser.	0x10	Yes		
6	Menu/Exit	This button will turn on/off OSD menu.	0x0F	Yes		
7	Right	This button will move the chooser item to the right one.	0x0E	Yes		
8	Left	When there is OSD menu on screen, this button will move the chooser item to the left one.	0x0D	Yes		
9	Up	When there is no OSD on screen, this button will correct optical keystone in negative direction. When there is OSD menu on screen, this button will move the chooser item to the upper one.	0x0B	Yes		
10	Down	When there is no OSD on screen, this button will correct optical keystone in positive direction. When there is OSD menu on the screen, this button will move the chooser item to the next one.	0x0C	Yes		
11	Freeze	This button will freeze/ unfreeze the image.	0x03	Yes		
12	Volume +	This button will magnify the volume gradually.	0x82	Yes		
13	Volume -	This button will reduce the volume gradually.	0x83	Yes		
14	Timer on	When the presentation timer is off , this button will activate/ stop the timer. When the presentation timer is on , this button will restart, continue or turn off the timer.	0x25	Yes		
15	Timer Setup	This button will activate the "Presentation Timer" setting.	0x26	Yes		
16	Digital Zoom +	This button will show	0x18	Yes		

		unsupported logo.			
17	Digital Zoom -	This button will show unsupported logo.	0x19	Yes	
18	Page Up	By pressing “Page Up” button, could enable Page Up function.	0x05	Yes	
19	Page Down	By pressing “Page Down” button, could enable Page Down function.	0x06	Yes	
20	Cotrast	Displays the CONTRAST setting bar.	0x11	No	
21	SWAP		0x12	No	
22	Aspect	Select the display aspect ratios.	0x13	No	
23	Mute	Mutes the built-in speaker.	0x14	No	
24	Enter	Enter key for OSD menu.	0x15	No	
25	Brightness	Displays the BRIGHTNESS setting bar.	0x16	No	
26	Wireless channel		0x17	No	
27	Audio		0x1A	No	
28	PIP	Turns the PIP window on or off and makes related adjustments.	0x1B	No	
29	POP		0x1C	No	
30	PAP		0x1D	No	
31	Capture		0x1E	No	
32	S-video	Displays the S-VIDEO source selection.	0x1F	No	
33	Q?	Starts the INFORMATION function.	0x20	No	
34	Timer ON		0x25	No	
35	Timer Setup		0x26	No	
36	RGBHV	Displays the PC source selection.	0x40	No	
37	RGB-PC1	Displays the PC 1 source selection.	0x41	No	
38	DVI-D	Displays the DVI-D source selection.	0x42	No	
39	DVI-A	Displays the DVI-A source selection.	0x43	No	
40	DVI-I	Displays the DVI-I source selection.	0x44	No	
41	RGB-PC2	Displays the PC 2 source selection.	0x45	No	
42	Power Off	Turns off the projector.	0x4E	No	
43	Power On	Turns on the projector.	0x4F	No	
44	Comp2	Displays the COMPONENT 2 source selection.	0x50	No	
45	Comp1	Displays the COMPONENT 1 source selection.	0x51	No	
46	CVBS-1	Displays the CVBS-1 source selection.	0x52	No	
47	CVBS-2	Displays the CVBS-2 source selection.	0x53	No	
48	S-video2	Displays the S-Video 2 source selection.	0x54	No	
49	HDMI	Displays the HDMI source selection.	0x58	No	
50	ANA	Selects the ANA aspect ratio.	0x70	No	
51	04:03	Selects the 4:3 aspect ratio.	0x71	No	

52	LB	Selects the LB aspect ratio.	0x72	No	
53	WIDE	Selects the WIDE aspect ratio.	0x73	No	
54	REAL	Selects the REAL aspect ratio.	0x74	No	
55	MEMORY1	Select the User memory settings.	0x75	No	
56	MEMORY2	Select the User memory settings.	0x76	No	
57	MEMORY3	Select the User memory settings.	0x77	No	
58	Default		0x78	No	
59	COLOR	Displays the COLOR setting bar.	0x79	No	
60	TINT	Displays the TINT setting bar.	0x7A	No	
61	ACTIVE		0x7B	No	
62	IRIS	Displays the setting bar for the adjustment of the motorised aperture lens IRIS.	0x7C	No	
63	Brilliant Color		0x7D	No	
64	Memory	Select the User memory settings.	0x80	No	
65	Volumn+		0x82	No	
66	Volumn-		0x83	No	
67	Exit	Goes back to previous OSD menu, exits and saves menu settings.	0x85	No	
68	Key Lock		0x87	No	
69	PAN		0x88	No	
70	Lens	Displays the setting page for the adjustment of the motorised vertical Lens shift value.	0x8A	No	
71	Focus		0x8B	No	
72	Zoom		0x8C	No	
73	V-keystone		0x8E	No	
74	H-keystone		0x8F	No	
75	PIP Size		0x90	No	
76	PIP Position		0x91	No	
77	Return		0x92	No	
78	My Screen		0x93	No	
79	Pattern		0x94	No	
80	On(Split screen)		0x95	No	
81	Off(Split screen)		0x96	No	

2. RS-232 Command Code

(Each input upper case and lower case character should be action)

Function	Type	Operation	ASCII	Support
Power	Write	Power On	<CR>*pow=on#<CR>	YES
	Write	Power off	<CR>*pow=off#<CR>	YES
	Read	Power Status	<CR>*pow=?#<CR>	YES
Source Selection	Write	COMPUTER/YPbPr	<CR>*sour=RGB#<CR>	YES
	Write	COMPUTER 2/YPbPr2	<CR>*sour=RGB2#<CR>	YES
	Write	Component	<CR>*sour=ypbr#<CR>	No
	Write	DVI-A	<CR>*sour=dviA#<CR>	No
	Write	DVI-D	<CR>*sour=dvid#<CR>	No
	Write	HDMI	<CR>*sour=hdmi#<CR>	No
	Write	HDMI 2	<CR>*sour=hdmi2#<CR>	No
	Write	Composite	<CR>*sour=vid#<CR>	YES
	Write	S-Video	<CR>*sour=svid#<CR>	YES
	Write	Network	<CR>*sour=network#<CR>	No
	Write	USB Display	<CR>*sour=usbdisplay#<CR>	No
	Write	USB Reader	<CR>*sour=usbreader#<CR>	No
	Read	Current source	<CR>*sour=?#<CR>	YES
Audio Control	Write	Mute On	<CR>*mute=on#<CR>	YES
	Write	Mute Off	<CR>*mute=off#<CR>	YES
	Read	Mute Status	<CR>*mute=?#<CR>	YES
	Write	Volume +	<CR>*vol=+#<CR>	YES
	Write	Volume -	<CR>*vol=-#<CR>	YES
	Read	Volume Status	<CR>*vol=?#<CR>	YES
	Write	Mic. Volume +	<CR>*micvol=+#<CR>	YES
	Write	Mic. Volume -	<CR>*micvol=-#<CR>	YES
	Read	Mic. Volume Status	<CR>*micvol=?#<CR>	YES
Audio source select	Write	Audio pass Through off	<CR>*audiosour=off#<CR>	YES
	Write	Audio-Computer1	<CR>*audiosour=RGB#<CR>	YES
	Write	Audio-Computer2	<CR>*audiosour=RGB2#<CR>	YES
	Write	Audio-Video/S-Video	<CR>*audiosour=vid#<CR>	YES
	Write	Audio-Component	<CR>*audiosour=ypbr#<CR>	YES
	Write	Audio-HDMI	<CR>*audiosour=hdmi#<CR>	YES
	Write	Audio-HDMI2	<CR>*audiosour=hdmi2#<CR>	YES
	Read	Audio pass Status	<CR>*audiosour=?#<CR>	YES
Picture Mode	Write	Dynamic	<CR>*appmod=dynamic#<CR>	YES
	Write	Presentation	<CR>*appmod=preset#<CR>	YES
	Write	sRGB	<CR>*appmod=srgb#<CR>	YES
	Write	Bright	<CR>*appmod=bright#<CR>	No
	Write	Living Room	<CR>*appmod=livingroom#<CR>	No
	Write	Game	<CR>*appmod=game#<CR>	No
	Write	Cinema	<CR>*appmod=cine#<CR>	YES
	Write	Standard	<CR>*appmod=std#<CR>	No
	Write	User1	<CR>*appmod=user1#<CR>	YES
	Write	User2	<CR>*appmod=user2#<CR>	YES
	Write	User3	<CR>*appmod=user3#<CR>	No
	Read	Picture Mode	<CR>*appmod=?#<CR>	YES
Picture Setting	Write	Contrast +	<CR>*con=+#<CR>	YES
	Write	Contrast -	<CR>*con=-#<CR>	YES
	Read	Contrast value	<CR>*con=?#<CR>	YES
	Write	Brightness +	<CR>*bri=+#<CR>	YES
	Write	Brightness -	<CR>*bri=-#<CR>	YES
	Read	Brightness value	<CR>*bri=?#<CR>	YES
	Write	Color +	<CR>*color=+#<CR>	YES

	Write	Color -	<CR>*color=-#<CR>	YES
	Read	Color value	<CR>*color=?#<CR>	YES
	Write	Sharpness +	<CR>*sharp=+#<CR>	YES
	Write	Sharpness -	<CR>*sharp=-#<CR>	YES
	Read	Sharpness value	<CR>*sharp=?#<CR>	YES
	Write	Color Temperature-Warmer	<CR>*ct=warmer#<CR>	No
	Write	Color Temperature-Warm	<CR>*ct=warm#<CR>	YES
	Write	Color Temperature-Normal	<CR>*ct=normal#<CR>	YES
	Write	Color Temperature-Cool	<CR>*ct=cool#<CR>	YES
	Write	Color Temperature-Cooler	<CR>*ct=cooler#<CR>	No
	Read	Color Temperature Status	<CR>*ct=?#<CR>	YES
	Write	Aspect 4:3	<CR>*asp=4:3#<CR>	YES
	Write	Aspect 16:9	<CR>*asp=16:9#<CR>	YES
	Write	Aspect 16:10	<CR>*asp=16:10#<CR>	YES
	Write	Aspect Auto	<CR>*asp=AUTO#<CR>	YES
	Write	Aspect Real	<CR>*asp=REAL#<CR>	YES
	Write	Aspect Letterbox	<CR>*asp=LBOX#<CR>	No
	Write	Aspect Wide	<CR>*asp=WIDE#<CR>	No
	Write	Aspect Anamorphic	<CR>*asp=ANAM#<CR>	No
	Read	Aspect Status	<CR>*asp=?#<CR>	YES
	Write	Digital Zoom In	<CR>*zoomI#<CR>	YES
	Write	Digital Zoom out	<CR>*zoomO#<CR>	YES
	Write	Auto	<CR>*auto#<CR>	YES
	Write	Brilliant color on	<CR>*BC=on#<CR>	YES
	Write	Brilliant color off	<CR>*BC=off#<CR>	YES
	Read	Brilliant color status	<CR>*BC=?#<CR>	YES
Operation Settings	Write	Projector Position-Front Table	<CR>*pp=FT#<CR>	YES
	Write	Projector Position-Rear Table	<CR>*pp=RE#<CR>	YES
	Write	Projector Position-Rear Ceiling	<CR>*pp=RC#<CR>	YES
	Write	Projector Position-Front Ceiling	<CR>*pp=FC#<CR>	YES
	Read	Projector Position Status	<CR>*pp=?#<CR>	YES
	Write	Quick auto search	<CR>*QAS=on#<CR>	YES
	Write	Quick auto search	<CR>*QAS=off#<CR>	YES
	Read	Quick auto search status	<CR>*QAS=?#<CR>	YES
	Write	Direct Power On-on	<CR>*directpower=on#<CR>	YES
	Write	Direct Power On-off	<CR>*directpower=off#<CR>	YES
	Read	Direct Power On-Status	<CR>*directpower=?#<CR>	YES
	Write	Signal Power On-on	<CR>*autopower=on#<CR>	YES
	Write	Signal Power On-off	<CR>*autopower=off#<CR>	YES
	Read	Signal Power On-Status	<CR>*autopower=?#<CR>	YES
	Write	Standby Settings-Network on	<CR>*standbynet=on#<CR>	YES
	Write	Standby Settings-Network off	<CR>*standbynet=off#<CR>	YES
	Read	Standby Settings-Network Status	<CR>*standbynet=?#<CR>	YES
	Write	Standby Settings-Microphone on	<CR>*standbymic=on#<CR>	No
	Write	Standby Settings-Microphone off	<CR>*standbymic=off#<CR>	No
	Read	Standby Settings-Microphone Status	<CR>*standbymic=?#<CR>	No
	Write	Standby Settings-Monitor Out on	<CR>*standbymnt=on#<CR>	YES

	Write	Standby Settings-Monitor Out off	<CR>*standbymnt=off#<CR>	YES
	Read	Standby Settings-Monitor Out Status	<CR>*standbymnt=?#<CR>	YES
Baud Rate	Write	2400	<CR>*baud=2400#<CR>	YES
	Write	4800	<CR>*baud=4800#<CR>	YES
	Write	9600	<CR>*baud=9600#<CR>	YES
	Write	14400	<CR>*baud=14400#<CR>	YES
	Write	19200	<CR>*baud=19200#<CR>	YES
	Write	38400	<CR>*baud=38400#<CR>	YES
	Write	57600	<CR>*baud=57600#<CR>	YES
	Write	115200	<CR>*baud=115200#<CR>	YES
	Read	Current Baud Rate	<CR>*baud=?#<CR>	YES
Lamp Control	Read	Lamp Hour	<CR>*ltim=?#<CR>	YES
	Read	Lamp2 Hour	<CR>*ltim2=?#<CR>	No
	Write	Normal mode	<CR>*lampm=lnor#<CR>	YES
	Write	Eco mode	<CR>*lampm=eco#<CR>	YES
	Write	Smart Eco mode	<CR>*lampm=seco#<CR>	No
	Write	Dual Brightest	<CR>* lampm =dualbr#<CR>	No
	Write	Dual Reliable	<CR>* lampm =dualre#<CR>	No
	Write	Single Alternative	<CR>* lampm =single#<CR>	No
	Write	Single Alternative Eco	<CR>* lampm =singleeco#<CR>	No
Miscellaneous	Read	Lamp Mode Status	<CR>*lampm=?#<CR>	YES
	Read	Model Name	<CR>*modelname=?#<CR>	YES
	Write	Blank On	<CR>*blank=on#<CR>	YES
	Write	Blank Off	<CR>*blank=off#<CR>	YES
	Read	Blank Status	<CR>*blank=?#<CR>	YES
	Write	Freeze On	<CR>*freeze=on#<CR>	YES
	Write	Freeze Off	<CR>*freeze=off#<CR>	YES
	Read	Freeze Status	<CR>*freeze=?#<CR>	YES
	Write	Menu On	<CR>*menu=on#<CR>	YES
	Write	Menu Off	<CR>*menu=off#<CR>	YES
	Write	Up	<CR>*up#<CR>	YES
	Write	Down	<CR>*down#<CR>	YES
	Write	Right	<CR>*right#<CR>	YES
	Write	Left	<CR>*left#<CR>	YES
	Write	Enter	<CR>*enter#<CR>	YES
	Write	3D Sync Off	<CR>*3d=off#<CR>	YES
	Write	3D Sync Top Bottom	<CR>*3d=tb#<CR>	YES
	Write	3D Sync Frame Sequential	<CR>*3d=fs#<CR>	YES
	Read	3D Sync Status	<CR>*3d=?#<CR>	YES
	Write	Remote Receiver-front+rear	<CR>*rr=fr#<CR>	No
	Write	Remote Receiver-front	<CR>*rr=f#<CR>	No
	Write	Remote Receiver-rear	<CR>*rr=r#<CR>	No
	Read	Remote Receiver Status	<CR>*rr=?#<CR>	No
	Write	Instant On-on	<CR>*ins=on#<CR>	No
	Write	Instant On-off	<CR>*ins=off#<CR>	No
	Read	Instant On Status	<CR>*ins=?#<CR>	No
	Write	Lamp Saver Mode-on	<CR>*lpsaver=on#<CR>	No
	Write	Lamp Saver Mode-off	<CR>*lpsaver=off#<CR>	No
	Read	Lamp Saver Mode Status	<CR>*lpsaver=?#<CR>	No
	Write	Projection Log In Code on	<CR>*prjlogincode=on#<CR>	No
	Write	Projection Log In Code off	<CR>*prjlogincode=off#<CR>	No
	Read	Projection Log In Code Status	<CR>*prjlogincode=?#<CR>	No

	Write	Broadcasting on	<CR>*broadcasting=on#<CR>	No
	Write	Broadcasting off	<CR>*broadcasting=off#<CR>	No
	Read	Broadcasting Status	<CR>*broadcasting=?<CR>	No
	Write	AMX Device Discovery-on	<CR>*amxdd=on#<CR>	YES
	Write	AMX Device Discovery-off	<CR>*amxdd=off#<CR>	YES
	Read	AMX Device Discovery Status	<CR>*amxdd=?#<CR>	YES
	Read	Mac Address	<CR>*macaddr=?#<CR>	YES
	Write	High Altitude mode on	<CR>*Highaltitude=on#<CR>	YES
	Write	High Altitude mode off	<CR>*Highaltitude=off#<CR>	YES
	Read	High Altitude mode status	<CR>*Highaltitude=?#<CR>	YES

Note: The above function will be vary from model to model. (ex: source, audio settings, aspect ratio..etc)

DDC

D-Sub

MW814ST Analog EDID

```
00 FF FF FF FF FF FF 00
09 D1 02 05 01 00 00 00
18 15 01 03 0E 00 00 78
0A C9 3D A2 5B 54 92 25
12 50 5D BD EF 80 81 3C
45 7C 61 7C 61 C0 81 80
95 00 90 40 A9 40 9E 20
00 90 51 20 1F 30 48 80
36 00 00 00 00 00 00 1C
00 00 00 FD 00 30 78 1F
66 11 00 0A 20 20 20 20
20 20 00 00 00 FE 00 42
45 4E 51 0A 20 20 20 20
20 20 20 20 00 00 00 FC
00 4D 57 38 31 34 53 54
0A 20 20 20 20 20 00 B6
```


HDMI

MW814ST Digital EDID

00 FF FF FF FF FF FF 00
09 D1 02 05 01 00 00 00
18 15 01 03 80 00 00 78
0A C9 3D A2 5B 54 92 25
12 50 5D BD EF 80 81 3C
45 7C 61 7C 61 C0 81 80
95 00 90 40 A9 40 9E 20
00 90 51 20 1F 30 48 80
36 00 00 00 00 00 00 1C
00 00 00 FD 00 17 78 1F
66 11 00 0A 20 20 20 20
20 20 00 00 00 FE 00 42
45 4E 51 0A 20 20 20 20
20 20 20 20 00 00 00 FC
00 4D 57 38 31 34 53 54
0A 20 20 20 20 20 01 5C
02 03 22 71 4F 15 06 1F
10 03 84 05 11 13 14 02
12 20 21 22 23 09 07 07
83 01 00 00 65 03 0C 00
10 00 02 3A 80 18 71 38
2D 40 58 2C 45 00 00 00
00 00 00 1E 01 1D 80 18
71 1C 16 20 58 2C 25 00
00 00 00 00 00 9E 01 1D
80 D0 72 1C 16 20 10 2C
25 80 00 00 00 00 00 9E
8C 0A D0 8A 20 E0 2D 10
10 3E 96 00 00 00 00 00
00 18 01 1D 00 BC 52 D0
1A 20 B8 28 96 40 00 00
00 00 00 1E 00 00 00 DD

Appendix 3 – Ceiling Mount Drawing

M4, max screw length (L),
L=ceiling arm thickness+8mm

