



Product Service Manual – Level 3

Service Manual for BenQ:
FP241W
P/N: 9J.L2R72.xxx

Applicable for All Regions



Version: 001
Date: 05/09/2006

Notice:

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

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

First Edition (June, 2006)

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Abbreviations & Acronyms

1. 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.

1.1. Trademark

The following terms are trademarks of BenQ Corporation:
BenQ

Importance

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 “Safety Note”.

2. Introduction

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

2.1. 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.

2.2. 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.

2.3. General Descriptions

This Service Manual contains general information. There are 3 levels of service:

Level 1: Cosmetic / Appearance / Alignment Service

Level 2: Circuit Board or Standard Parts Replacement

Level 3: Component Repair to Circuit Boards

2.4. Related Service Information

BenQ Global Service Website: <http://support.benq.com/front/benqmain.asp>

eSupport Website: <http://bqpgsr.benq.corp.com/customize/asplogin.asp>

3. Product Overview

3.1. Specification

This specification describes the FP24W1, which is a 24" Green-Product with analog/digital HDMI Component Composite, S-video interface and also 3 USB ports color TFT LCD monitor (no audio). The monitor supports maximum resolution up to 1920x1200(Reduce Blanking) with analog, digital, HDMI (Digital) inputs, 1080P with Component, HDMI (Video) and NTSC/PAL with composite, S-video inputs. FP24W1 also provide SensEye mode (Movie, Dynamics, Photo and Standard) which allow user to select favorite modes with different content. The features summary is shown below,

*All panel spec. in definition depends on the variance of panel source.

*All spec. of monitor need to warm up at least 1hr.

*All spec. of monitor need to set "Color" on "User preset" mode.

*All spec. of monitor mentioned "Contrast Ratio" the test condition: Set "brightness" at 100, and "contrast" at 50.

*All spec. of monitor mentioned "Luminance" the test condition: Set "brightness" at 100, and "contrast" at 100.

Feature items	Specifications	Remark
Panel supplier & module name	AUO M240UW01 V0	VA
Screen diagonal	24" (611.32mm)	518.4(H) x324(V)
Display Format	1920 (H) x 1200 (V)	Panel Display information
Pixel Pitch	0.27 mm x 0.27 mm	per one triad
Viewing Angle (@ Contrast Ratio >= 10)	R/L:89/89 degrees (typ) and U/D: 89/89 degrees (typ) R/L:75/75 degrees (min) and U/D: 75/75 degrees (min)	
Analog interface with Scaling supported	Yes	With 15-pin D-sub connector
DVI interface with Scaling supported	Yes	With 24-pin DVI-D connector
HDMI interface with Scaling support	Yes	With 19-pin HDMI connector
Video interface with Scaling supported	Yes	Component, Composite, S-Video
Max resolution mode supported	1920x1200@60Hz reduce blanking	162MHZ
Number of Display Colors supported	16.7 millions	8 bits data(R G B)
Contrast Ratio	1000(typ), 700(min)	Test Condition: Set Contrast at 50, Brightness at 100, Color at User preset
Max luminance	500 cd/m ² (typ.),400 cd/m ² (min)	Test Condition: Set contrast at 100, brightness at 100, and color at User preset.
AC power input	Yes	90-264 Volts, 47-63 Hz.
DC power input (with AC power adapter)	No	
DPMS supported	Yes	DPMS mode <2W, Power off-mode <1W
LED indicator for power status showed	Yes	Green/Amber/Non
OSD for control & information supported	Yes	
Multi-language supported for OSD	Yes	8 languages(Asia) 14 language(Europe)
Buttons control supported	Yes	8 buttons including 1 monitor power on/off control button.
Flywheel control supported	No	
Scaling function supported	Yes	
Auto adjustment function supported	Yes	"I-Key" function
DDC function supported (EDID ver. 1.3)	Yes	DDC2B
DDC-CI support version 1.1 or later	Yes	DDC-CI
HDMI support version 1.1	Yes	HDMI
Audio speakers supported	No	
Audio Jack (input connector) supported	No	

Earphone Jack (input connector) supported	No	
Microphone function supported	No	
Mechanical Tilt base design	Yes	From -5 to +20 degree
VESA wall mounting design	Yes	
Mechanical Rotate design	Yes	Swivel: -45~ +45degrees
Mechanical Lift base design	Yes	
Kensington compatible lock design	Yes	

3.1.1. Operational Specification

3.1.1.1. Power supply

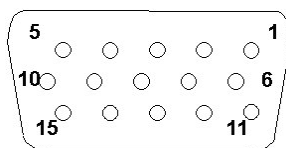
Item	Condition	Spec	OK	N.A	Remark
Input Voltage range	Universal input full range	90~264VAC /47~63Hz	√		
Input Current range	90 ~ 264VAC	≤ 1.5 Arms	√		
Power Consumption	Normal “On” operation	< =95 W (w/o USB)	√		LED: Green
DPMS	DPMS “Off” state	≤ 1 W	√		LED: Off DPMS mode <2W, Power off-mode <1W
Inrush Current	110 VAC 220 VAC	< 40 A (peak) < 60 A (peak)	√		Cold-start
Earth Leakage Current	264 VAC/50Hz	< 3.5 mA	√		
Hi-Pot	1. 1500VAC, 1 sec 2. Ground test: 30A, 1sec	Without damage < 0.1 ohm	√		(on-line test) (in-lab test)
Power Line Transient	IEC1000-4-4	1KV	√		
	IEC1000-4-5 (Surge)	Common: 2KV, Differential: 1KV	√		
CCFL operation range	90 ~ 264VAC		√		Depends on panel source
CCFL Frequency	90 ~ 264VAC	40KHz ~ 60KHz	√		Depends on panel source
Power cord		Color: Black Length: 1500 +/- 50 mm	√		

3.1.1.2. Signal interface

Item	Condition	Spec	OK	N.A	Remark
Signal Cable	15-pin D-Sub	Color: Black Length: 1500 +/- 30 mm	√		
	24-pin DVI-D	Color: Black Length: 2000 +/- 50 mm	√		
	S and Composite video			√	
	HDMI			√	
	USB 2.0 cable	Color: Black Length: 1800 +/- 30 mm	√		
Pin assignment	15-pin D-sub connector	See Note-1	√		For 15-pin D-sub
	24-pin DVI-D connector	See Note-2	√		For 24-pin DVI-D

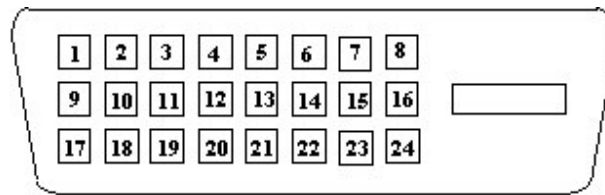
	19-pin HDMI connector	See Note-3	√		For 19-pin HDMI
Analog input	Signal type	Separate analog R/G/B	√		For 15 pin D-Sub
	Level	700 mV (peak to peak) +/- 5 %	√		
	Impedance	75 Ohms +/- 1.5 Ohms	√		
Sync	Signal type	Separate H/V-sync Composite H/V-sync (Positive/Negative)	√		For 15-pin D-sub
	Level	Logic High: 2.4V ~ 5.5V Logic Low: 0V ~ 0.5V (TTL level)	√		Refer to VESA VSIS Standard V1R1
	Impedance	Minimum 2.2KΩ (pull down)	√		10KΩ for application
	Sync Pulse Width (SPW)	0.7 μs < H-SPW 1H < V-SPW	√		
Digital input	Level	600mV for each differential line	√		
	Impedance	50 Ohm TDR Scan needed for DVI cable and interface board	√		
HDMI input		See Note-3		√	
Video pin assignment	S and RCA connector	See Note-4		√	
Video input	Level	(S-VIDEO) Y : 1 Vpp (S-VIDEO) C : 0.286 Vpp (COMPOSITE) 1 volt (p-p)		√	
	Impedance	(S-VIDEO) Y : 75 ohm (S- VIDEO) C : 75 ohm (COMPOSITE) 75 ohm		√	

Note-1: The pin assignment of 15-pin D-sub connector is as below,



Pin	Signal Assignment	Pin	Signal Assignment
1	Red video	9	PC5V (+5 volt power)
2	Green video	10	Sync Ground
3	Blue video	11	Ground
4	Ground	12	SDA
5	Cable Detected	13	H-Sync (or H+V)
6	Red Ground	14	V-sync
7	Green Ground	15	SCL
8	Blue Ground		

Note-2: The pin assignment of 24-pin DVI-D connector is as below,



Pin	Signal Assignment	Pin	Signal Assignment
1	TMDS RX2-	13	Floating
2	TMDS RX2+	14	+5V Power
3	TMDS Ground	15	Ground
4	Floating	16	Hot Plug Detect
5	Floating	17	TMDS RX0-
6	DDC Clock	18	TMDS RX0+
7	DDC Data	19	TMDS Ground
8	Floating	20	Floating
9	TMDS RX1-	21	Floating
10	TMDS RX1+	22	TMDS Ground
11	TMDS Ground	23	TMDS Clock+
12	Floating	24	TMDS Clock-

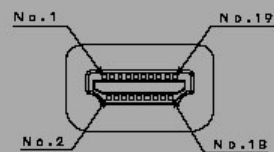
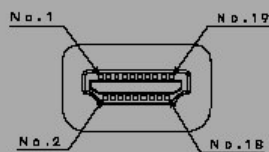
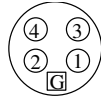


Table 4-8 Type A-to-Type A Cable Wire Assignment

Type A pin	Signal Name	Wire	Type A pin
1	TMDS Data2+	A	1
2	TMDS Data2 Shield	B	2
3	TMDS Data2-	A	3
4	TMDS Data1+	A	4
5	TMDS Data1 Shield	B	5
6	TMDS Data1-	A	6
7	TMDS Data0+	A	7
8	TMDS Data0 Shield	B	8
9	TMDS Data0-	A	9
10	TMDS Clock+	A	10
11	TMDS Clock Shield	B	11
12	TMDS Clock-	A	12
13	CEC	C	13
14	Reserved (in cable but N.C. on device)	C	14
15	SCL	C	15
16	SDA	C	16
17	DDC/CEC Ground	D	17
18	+5V Power	5V	18
19	Hot Plug Detect	C	19

1	GND
2	GND
3	LUMA
4	CHROMA
G	GND



4-pin S-VIDEO jack

Video input II: COMPOSITE video connector



CVBS

Composite jack

Video input II: COMPONENT video connector



Pr Pb Y
Component jack

3.1.1.3. Video performance

Item	Condition	Spec	OK	N.A	Remark
Max. support Pixel rate		162 MHz	√		Both for analog and digital inputs
Max. Resolution		1920 x 1200-R	√		Both for analog and digital inputs
Rise time + Fall time		< 6.25 ns (50 % of minimum pixel clock period)	√		1920 x 1200 @ 60Hz (max. support timing)
Settling Time after overshoot /undershoot		< 5 % final full-scale value	√		Refer to VESA VSIS Standard V1R1
Overshoot/Undershoot		< 12 % of step function voltage level over the full voltage range	√		Refer to VESA VSIS Standard V1R1

3.1.1.4. Scan range

Item	Condition	Spec	OK	N.A	Remark
Horizontal		30 ~ 82 KHz	√		
Vertical		50 ~ 76 Hz	√		

3.1.1.5. Plug & Play DDC2B DDC-CISupport

Item	Condition	Spec	OK	N.A	Remark
DDC channel type		DDC2B	√		
EDID		Version 1.3	√		Refer to FP24W1 S/W spec. document to see the detailed EDID data definition.
DDC-CI		Version 1.1 or Later	√		Refer to FP24W1 S/W spec

3.1.1.6. Support Timings

Input Timing				Actual Output			
Resolution	Horizontal Frequency (KHz)	Vertical Frequency (Hz)	Dot Clock Frequency (MHz)	Actual display Resolution	OK	N.	Remark
640x350	31.47(P)	70.08(N)	25.17	1280x943	√		DOS
720x400	31.47(N)	70.08(P)	28.32	1280x1024	√		DOS
640x480	31.47(N)	60.00(N)	25.18	1280x1024	√		DOS
640x480	35.00(N)	67.00(N)	30.24	1280x1024	√		Macintosh
640x480	37.86(N)	72.80(N)	31.5	1280x1024	√		VESA
640x480	37.50(N)	75.00(N)	31.5	1280x1024	√		VESA
800x600	37.88(P)	60.32(P)	40.00	1280x1024	√		VESA
800x600	48.08(P)	72.19(P)	50.00	1280x1024	√		VESA
800x600	46.86(P)	75.00(P)	49.50	1280x1024	√		VESA
832X624	49.72(N)	74.55(N)	57.29	1280x1024	√		Macintosh
1024x768	48.36(N)	60.00(N)	65.00	1280x1024	√		VESA
1024x768	56.48(N)	70.10(N)	75.00	1280x1024	√		VESA
1024x768	60.02(P)	75.00(P)	78.75	1280x1024	√		VESA
1024X768	60.24(N)	74.93(N)	80.00	1280x1024	√		Macintosh
1152x864	67.50(P)	75.00(P)	108.00	1280x1024	√		VESA
1152x870	68.68(N)	75.06(N)	100.00	1280x1024	√		Macintosh
1152x900	61.80(N)	66.00(N)	94.50	1280x1024	√		SUN 66
1152x900	71.81(N)	76.14(N)	108.00	1280x1024	√		SUN
1280x1024	64.00(P)	60.00(P)	108.00	1280x1024	√		VESA
1280x1024	75.83(N)	71.53(N)	128.00	1280x1024	√		IBM1
1280x1024	80.00(P)	75.00(P)	135.00	1280x1024	√		VESA

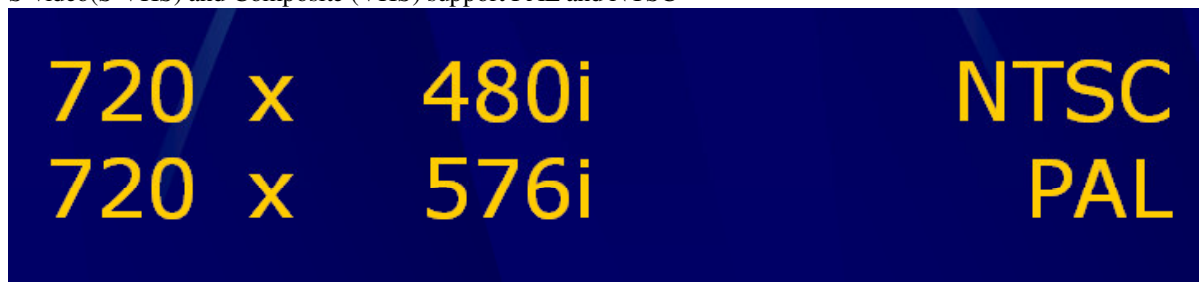
1280x1024	81.18(N)	76.16(N)	135.09	1280x1024	√	SPARC2
1600x1200	75(P)	60(P)	162	1600x1200	√	VESA
1680x1050	65.29(N)	60(P)	146.25	1680x1050	√	CVT 1.76MA
1920x1080	67.158(N)	60(P)	173	1920x1080	√	CVT 2.3MA_R
1920x1200	74.04(P)	60(N)	154	1920x1200	√	CVT 2.30MA-R
1920x1200	74.56(N)	60(P)	193.25	VESA	√	CVT 2.3MA

Note-3: “P”, “N” stands for “Positive”, “Negative” polarity of incoming H-sync/V-sync (input timing)

Component(Y Pb Pr) and HDMI video support timing

Resolution	Pixel clock (unit:MHz)	H-sync (unit:KHz)	V-sync (unit:Hz)	H-Pol	V-Pol	H-sync H-total (unit:pixel)	Display (unit:pixel)	Back- porch (unit:pixel)	Pulse- width (unit:pixel)	Front- porch (unit:pixel)	Border (unit:pixel)	V-sync V-total (unit:line)	Display (unit:line)	Back-porch (unit:line)	Pulse- width (unit:line)	Front- porch (unit:line)	Border (unit:line)	Note
640x480	25.175	31.47	59.94	N	N	800	640	80	62	16	0	525	480	30	6	9	0	SDTV-480p60
720x480	27	31.47	59.94	N	N	858	720	80	62	16	0	525	480	30	6	9	0	SDTV-480p59
720x480	27.027	31.5	60	N	N	858	720	59	63	16	0	525	480	30	6	9	0	SDTV-480p60
1440x480	54	31.47	59.94	N	N	1716	1440	120	124	32	0	525	480	30	6	9	0	SDTV-480p2x59
1440x480	54.054	31.5	60	N	N	1716	1440	118	126	32	0	525	480	30	6	9	0	SDTV-480p2x60
720x576	27	31.25	50	N	N	864	720	68	64	12	0	625	576	39	5	5	0	SDTV-576p50
1440x576	54	31.25	50	N	N	1728	1440	136	128	24	0	625	576	39	5	5	0	SDTV-576p50
1280x720	74.25	45.00	60	P	P	1650	1280	220	40	110	0	750	720	20	5	5	0	HDTV-720p60
1280x720	74.25	37.5	50	P	P	1980	1280	220	40	440	0	750	720	20	5	5	0	HDTV-720p50
1920x1080	148.5	67.5	60	P	P	2200	1920	192	60	28	0	1125	1080	36	5	4	0	HDTV-1080p60

S-video(S-VHS) and Composite (VHS) support PAL and NTSC



3.1.2. Operational & Functional Specification

3.1.2.1. Video performance

*All spec. of monitor need to warm up at least 1hr.

Item	Condition	Spec	OK	N.A	Remark
Resolution	Any input resolution modes which are under 1920x1200	1920 x 1200	√		
Contrast ratio		700(min),1000(typ)	√		Test Condition: Set Contrast at 50, Brightness at 100, Color at User preset.
Brightness	At R/G/B saturated condition	500 cd/m ² (typ.),400(min)	√		Test Condition : Set contrast at 100 , brightness at 100 , color at User preset.
Response time	Rising + Falling time	On/off:16 ms (typ.),20ms(max)	√		Test Equipment: Westar TRD 100 or equal level equipment ;

Response time with AMA	Average response time of gray level to gray level	6ms(typ.), 10ms(max)	√	Test Condition: Set Contrast at 50, Brightness at 90, Color at User preset.
Viewing angle	At Contrast ratio = 10	R/L: 89/89 degrees (typ.) 75/75 degrees (min)	√	
	At Contrast ratio = 10	U/D: 89/89 degrees (typ.) 75/75 degrees (min)	√	
CIE coordinate of White		(0.313, 0.329) +/- (0.03, 0.03)	√	
Display colors		16.7 Millions colors	√	8 bit

3.1.2.2. Brightness Adjustable Range

Item	Condition	Spec	OK	N.A	Remark
Brightness adjustable range	At default contrast level (saturate point) & Full-white color pattern	(Max. brightness value – Min. brightness value) ≥ 100 cd/m ²	√		

3.1.2.3. Acoustical Noise

Item	Condition	Spec	OK	N.A	Remark
Acoustical Noise	At 1 meter distance & “Audio” function disabled	≤ 30 dB/A	√		

3.1.2.4. Environment

Item	Condition	Spec	OK	N.A	Remark
Temperature	Operating	0 ~ +40 °C	√		
	Non-operating	-20 ~ +60 °C	√		
Humidity	Operating	10 ~ 90 %	√		Non-condensing
	Non-operating	10 ~ 90 %	√		Non-condensing
Altitude	Operating	0~3048m (10,000ft)	√		Without packing
	Non-operating	0~12,192m (40,000ft)	√		With packing

3.1.2.5. Transportation

Item	Condition	Spec	OK	N.A	Remark
(1) Vibration	Package, Non-Operating	(1) Sine wave 5~200Hz 1.5G, 1 octave/min, 15 min dwell on each resonant frequency, all primary axis, one sweep (30 min minimum) per orientation, total of 90+ min.	√		

		(2) Random 5 ~100 Hz, 0 dB/Oct. 0.015 g ² /Hz 100 ~200 Hz, -6 dB/Oct. 200 Hz, 0.0038 g ² /Hz Equivalent to 1.47 Grms, All primary axis, 20 min per-orientation, total is 60 min. (3) Procedure: Confirmed sample with appearance and function ready before testing then compare with after test record as brightness, uniformity and contrast ratio. Perform random vibration after sine-wave vibration test.			
(2) Unpackaged Vibration	Unpackaged, Non-Operating	Test Spectrum: 20 Hz 0.0185(g ² /Hz) 200Hz 0.0185(g ² /Hz) Duration : 5 Minutes Axis : 3 axis (Horizontal and Vertical axis ,Z axis)	√		
(3) Drop	Package, Non-Operating	76 cm Height (MP stage) (1 corner, 3 edges, 6 faces)	√		
(4) Shock	Wooden package, Non-Operating	Waveform: half sine Faces: 6 sides/ per orientation 3 shocks. Duration: <3ms Velocity accelerate: 75g	√		

3.1.2.6. Electrostatic Discharge Requirements

Item	Condition	Spec	OK	N.A	Remark
Electrostatic Discharge	IEC801-2 standard	Contact: 8KV Air: 15KV	√		

3.1.2.7. EMC

Item	Condition	Spec	OK	N.A	Remark
TCO03	Electric	Band 1 < 10 V/m Band 2 < 1 V/m	√		
	Magnetic	Band 1 < 200nT Band 2 < 25nT	√		
EMI	FCC part 15J class B	After Mass production under 1dBuv for constant measure. Besides DNSF and VCCI class-2 are optional.	√		
	EN55022 class B				

3.1.2.8. Reliability

Item	Condition	Spec	OK	N.A	Remark
MTBF Prediction	Refer to MIL-217F	> 60,000 Hours	√		Excluding CCFL
CCFL Life time	At 25±2°C, under 6.0mA	40,000 Hours (min)	√		See Note-4

Note-4: CCFL lifetime is determined as the time at which brightness of lamp is 50%. The typical lifetime of CCFL is on the condition at 6.0mA lamp current.

3.1.2.9. Audio performance (Optional)

Item	Condition	Spec	OK	N.A	Remark
Preamp + Power amp					
(1)Output power		2 Wrms/CH @ 1KHz		√	
(2)THD (@ 1W)		<1 %		√	
(3)S/N ratio		>40dB		√	
Speaker Driver					
(1)Nominal impedance		4 ohm		√	
(2)Rated input power		2 W/CH		√	
(3)Frequency response		180~20KHz SPL-10dB		√	
(4)Output sound pressure level		84 ± 3 dB (1W 0.5M)		√	
(5)Dimension of box		284x60x27mm ²		√	
Audio Control					
(1)Volume range		0 ~100 levels		√	
(2)Mute		On/Off		√	

3.1.3. LCD Characteristics

3.1.3.1. The Physical definition & Technology summary of LCD panel

Item	Condition	Spec	OK	N.A	Remark
LCD Panel Supplier		AUO	√		
Panel type of Supplier		AUO M240UW01 V0	√		
Screen Diagonal		611.32mm(24")	√		
Display area	Unit=mm	518.4(H) x 324(V)	√		
Physical Size	Unit=mm	546.4 (W) x352 (H) x35.8 (D)	√		
Weight	Unit=gram	3250(Max.)	√		
Technology		VA type	√		
Pixel pitch	Unit=mm	0.270(H) x 0.270(W)	√		Per one triad
Pixel arrangement		R/G/B vertical stripe	√		
Display mode		Normally Black	√		
Support color		16.7 Millions colors	√		8 bit

3.1.3.2. Optical characteristics of LCD panel

Item	Unit	Conditions	Min.	Typ.	Max.	Remark
Viewing Angle	[degree]	Horizontal (Right)	75	89	-	
	[degree]	CR = 10 (Left)	75	89	-	
	[degree]	Vertical (Up)	75	89	-	
	[degree]	CR = 10 (Down)	75	89	-	
Contrast ratio		Normal Direction	700	1000		
Response Time	[msec]	Rising Time	-	10	12	
	[msec]	Falling Time	-	6	8	
	[msec]	Rising + Falling	-	16	20	
Color / Chromaticity Coordinates (CIE)		Red x	0.623	0.653	0.683	
		Red y	0.307	0.337	0.367	
		Green x	0.265	0.295	0.325	
		Green y	0.577	0.607	0.637	
		Blue x	0.114	0.144	0.174	
		Blue y	0.045	0.075	0.105	
Color Coordinates (CIE) White		White x	0.283	0.313	0.343	
		White y	0.299	0.329	0.359	
Luminance Uniformity	[%]	9 points measurement	75	80		
White Luminance @ CCFL 6.0mA (center)	[cd/m ²]		400	500	-	
Crosstalk (in 75Hz)	[%]				1.5	

* The test methods for the above items' definition are referred to the relative panel specification.

3.1.4. User Controls

3.1.4.1. User's hardware control definition

Item	Condition	Spec	OK	N.A	Remark
Power button			√		
Enter/PIP button			√		
Up/Inc. button			√		
Down/Dec. button			√		
Menu/PIP selection button			√		
Mode button			√		
Input Select button			√		
iKey button			√		
Mute button				√	

3.1.4.2. OSD control function definition

Item	Condition	Spec	OK	N.A	Remark
Auto Adjust		Auto-Geometry	√		
Brightness			√		
Contrast			√		
Horizontal Position			√		
Vertical Position			√		

Pixel Clock			√		
Phase			√		
Color		Bluish Reddish Normal User: Separate R/G/B adjustment	√		
OSD Position		OSD Horizontal position OSD Vertical position	√		
OSD Time		From 5 sec to 30 sec	√		
OSD LOCK			√		
Language		8/14 languages for Asia/Europe Version	√		
Recall		Color recall Recall All	√		
Mode		Standard / Movie / Dynamics / Photo	√		
Input Select		D-sub DVI HDMI Component Composite S-Video	√		
Sharpness			√		
Display Information		For input timing	√		
Volume				√	
Mute				√	
Hot key for Brightness			√		
Hot key for Contrast			√		
Hot key for Volume				√	
Hot key for PIP Select			√		
Hot key for Input Select			√		
Hot key for Mode			√		

* The detailed firmware functions' specification, please refer to C212 S/W spec. document.

3.1.5. Mechanical Characteristics

3.1.5.1. Dimension

Item	Condition	Spec	OK	N.A	Remark
Bezel opening		520.07 x 325.67mm	√		
Monitor without Stand	W x H x D mm	567*81.8*367mm	√		
Monitor with Stand	W x H x D mm	567*248.354*474.2 mm	√		
Carton Box (outside)	L x W x H mm	651 x 560x 298mm	√		
Tilt and Swivel range		Tilt: +5~ -20degree Swivel: -45~ +45degrees	√		

3.1.5.2. Weight

Item	Condition	Spec	OK	N.A	Remark
Monitor (Net)		10.6Kg	√		
Monitor with packing (Gross)		14.2Kg	√		

3.1.5.3. Plastic

Item	Condition	Spec	OK	N.A	Remark
Flammability		>ABS<,94-HB	√		
Heat deflection To	ABS	65 °C	√		
UV stability	ABS	Delta E < 8.0	√		
Resin		MPRII: ABS (SD0150/GP22/D350/PA757/ 3453AS/HF380)	√		
Texture		MT-11010	√		RC partial texture MT-11010
Color		BCS-7015A	√		

3.1.5.4. Carton

Item	Condition	Spec	OK	N.A	Remark
Color		Kraft	√		
Material		AB Flute	√		
Compression strength		348 KGF	√		
Burst Strength		16 KGF/cm ²	√		
Stacked quantity		7 Layers	√		

3.1.6. Pallet & Shipment

3.1.6.1. Container Specification

Stowing Type	Container	Quantity of products (sets) (Every container)	Quantity of Products (sets) (Every Pallet)	Quantity of pallet (sets) (Every Container)
With pallet	20'	230	Pallet A: 28	Pallet A: 8
			Pallet B: 6	Pallet B: 1
	40'	504	Pallet A: 28	Pallet A: 18
			X	X
Without	20'	X	X	X

pallet			X	X
	40'	X	X	X
			X	X

3.1.6.2. Carton Specification

Product:

Net Weight (Kg)	Gross Weight (Kg)	Dimension w/o Base W*H*D (mm)	Dimension w/ Base W*H*D (mm)
10.6Kg	14.2Kg	567*81.8*367mm	567*248.354*474.2 mm

Package:

Carton Interior Dimension (mm) L*W*H	Carton External Dimension (mm) L*W*H
631*540*268	651*560*298

3.2. Customer Acceptance

3.2.1. SCOPE

This document establishes the general workmanship standards and functional acceptance criteria for LCD color monitor model FP241W Produced by BenQ Corp.

3.2.2. PURPOSE

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

3.2.3. APPLICATION

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

3.2.4. DEFINITION

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

3.2.5. CLASSIFICATION OF DEFECTS

The defects are grouped into the following classes:

A) Critical defect

A critical defect is a defect that judgment and experience indicate is likely to result in hazardous or unsafe conditions for individuals using, maintaining or depending upon the product.

B) Major defect

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

C) Minor defect

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

3.2.6. CLASSIFICATION OF DEFECTIVES

A defective is a product which contains one or more defects. The defective will be classified into following classes:

A) Critical defective

A critical defective contains one or more critical and may also contain major and/or minor defects.

B) Major defective

A major defective contains one or more defects and may also contain minor defects but contains no critical defect.

C) Minor defective

A minor defective contains one or more minor defects but contains no critical and major defects.

3.2.7. EXPRESSION OF DEFECTIVES

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

3.2.8. INSPECTION STANDARD

Unless otherwise specified, the inspection standard will be defined by MIL- STD-105E (ISO-2859), SINGLE SAMPLING PLAN. Level II is in use all the time, inspection levels are normal, reduce and tighten.

Acceptance Quality Level

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 organization.

Major Defective: 0.4 AQL

Minor Defective: 1.50 AQL

3.2.9. GENERAL RULES

The inspection must be carried out by trained inspectors having good knowledge of the meaning of "fitness for use". The inspection must be based upon the documents concerning the completely assembled and packed product. When more defects appear with the same cause only the most serious defect must be taken into account. Defects found in accessories packed with the product as connecting cables, plugs, adapters and the like, and being inspected as a part of the complete product, must be included in the evaluation.

The evaluation must be within the limits of the product specification and, for not specified characteristics, be related to the design model, limit samples or judgment of a jury of experts. Faults must be demonstrable.

3.2.10. TEST CONDITIONS

Unless otherwise prescribed, the test conditions are as follows:

- . Nominal mains voltage
- . Temperature: +5~+35°C
- . Warm up time: 30minutes minimum.
- . Visual inspection shall be down with the distance from eyes to the sample 35-50 cm.
- . Display mode: Primary mode 1280*1024

3.2.11. TEST EQUIPMENTS

- . Acer PCs with API display adapter or other specific
- . display adapter which is agreed upon by both parties
- . Test program by API
- . Ruler
- . Power saving test tool
- . Minolta color analyzer (CA-110 or BM – 7)

3.2.12. VISUAL INSPECTION CRITERIA

1. PACKING
2. ACCESSORIES
3. APPEARANCE
4. AC POWER AND SIGNAL CABLE
5. INTERIOR OF THE PRODUCT

No	Description	Class
1	Packing	
1.1	Wrong packing material	Major
1.2	Carton damaged(over 6cm dia).wet, badly taped or stapled, product will not arrive in good condition at customer	Minor
1.3	Carton damaged(3cm to 6cm dia), badly taped or stapled , product will arrive in good condition at customer	Minor
1.4	Wrong marking of trade mark	Major
1.5	Wrong marking of model number	Major
1.6	Wrong serial # marking on carton	Major
1.7	Product wrongly placed in box (upside down)	Major
1.8	Broken polyfoam or PU foam	Major
1.9	Broken packing bag	Major
1.10	Wrong size or poor printing for artwork/character	Major
1.11	Bar-code wrong, missing, or damaged	Major
1.12	Label on box missing or damaged	Major
1.13	Strange object in the box	Major
1.14	Unit not corresponding to model stated on external label	Major
1.15	Superficial breaking 5 ~ 10 cm dia	Minor
2	Accessories	
2.1	Missing accessory parts	Major
2.2	Wrong Accessory parts	Major
3	Appearance of product	
3.1	Incorrect color of cabinet	Major
3.2	Incorrect color of tilt/swivel base	Major
3.3	Wrong logo or name plate	Major

No	Description	Class
3.4	Poor print of logo or name plate	Major
3.5	Label on product Wrong or missing	Major
3.6	Scratched or dirty but legible spec. label	Minor
3.7	GAP between LCD and front bezel is over 2.0 mm	Major
3.8	Dot/area discolor over 1mm dia. in front or over 2mm dia. in other areas	Major
3.9	Cabinet warped, sagged or bulging $> 0.5\%$ of surface length	Major
3.10	Cabinet warped, sagged or bulging noticeable but $< 0.5\%$ of surface length	Minor
3.11	Sharp stud or edge, which can cause damage not safe	Major
3.12	Finishing of piece parts will not arrived in good condition at the customer	Major
3.13	Cabinet step (between housing and bezel) $> 1.0\text{mm}$, $< 1.5\text{mm}$	Minor
3.14	Cabinet step (between housing and bezel) $> 1.5\text{mm}$	Major
3.15	Wiring or fixing cord comes out of cabinet or jammed	Major
3.16	Auxiliary material used during production not removed	Major
3.17	Cabinet parts come loose during normal handling, not safe	Critical
3.18	Cabinet parts come loose during normal handling, but safe	Major
3.19	Tilt/swivel too flexible/not working	Major
3.20	Tilt/swivel stiff	Minor
3.21	Dirty front bezel and housing can't remove	Major
3.22	Dirty front bezel and housing removable easily	Minor


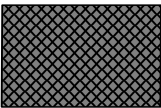

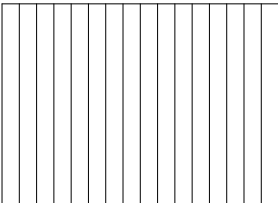
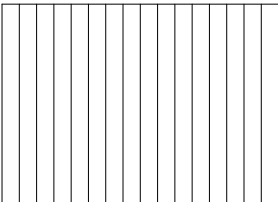
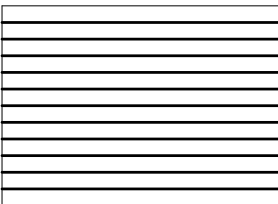
3.20	Sticker or loose user control switch which will not function correctly	Major
3.21	Missing knob or switch, not safe	Critical
3.23	Missing knob or switch, but safe	Major
3.24	Poor functional user controls in mechanical	Major
3.25	Unreadable printing of user controls label	Major
3.26	Rubber foot missing	Major
3.27	LED wrong material or missing	Major
3.28	LED sagged >1.0mm or bulging>0.5mm	Minor
3.29	Wrong S/N between spec. label and monitor display	Major
4	AC power and signal cable	
4.1	AC power or connector not correct or damaged, not safe	Critical
4.2	AC power or connector not correct or damaged, but safe	Major
4.3	Signal cable contact pin dirty	Minor
4.4	Signal cable plug dirty or surface damaged, but safe	Minor
4.5	Cable crack	Major
4.6	Cable scratch (wire not exposed), or dirty	Major

No	Description	Class
4.7	AC-DC adapter no function	Minor
4.8	Signal cable contact pin dirty	Major
5	Interior of the product	
5.1	Use Non-QVL (Qualify vendor list)component	Major
5.2	Wrong parts, broken component, but safe	Major
5.3	Foreign material	
	Conductive (Has potential to short circuit)	Major
	Non-conductive (Moveable)	Minor
5.4	Missing hardware, component or screw, stripped screw	Major
5.5	Loose hardware/screw or insufficient torque	Major
5.6	Poor wire routing, which is no concerned on EMI	Minor
5.7	Cold soldering/loose connections (Electrical)	Major
5.8	Wires and mechanical structure do not meet UL/CSA or TUV	Critical
5.9	Wrong parts, broken component, not safe	Critical
5.10	Component burn	Critical

3.2.13. OPERATIONAL INSPECTION CRITERIA

- TEST PATTERN
- VIDEO PERFORMANCE
- SUPPORT TIMING

3.2.13.1. List of test pattern

KEY	PATTERN	TEST ITEM
A	FULL WHITE 	H - Size , V – Size .Viewing Angle Light Output Impurity, Spot check Contrast Ratio Brightness adjust Range
E	DARK 	Background, Spot check
F	FULL W , R , G , B 	Impurity, Spot check .CIE Coordinate check
G	256 COLORS 	Color Check
H	16 GREY 	Gray Check
H	Black/White stripe pattern 	Electric characteristics

3.2.13.2. Video performance

Item	Condition	Spec	OK	N.A	Remark
Max. support Pixel rate		162 MHz	√		
Max. Resolution		1920 x 1200	√		
Rise time + Fall time		< 6.25 ns (50% of minimum pixel clock period)	√		1920 x 1200 @ 60Hz (max. support timing)
Settling Time after overshoot /undershoot		< 5% final full-scale value	√		Refer to VESA VSIS Standard V1R1
Overshoot/Undershoot		< 12% of step function voltage level over the full voltage range	√		Refer to VESA VSIS Standard V1R1

3.2.13.3. Support Timings

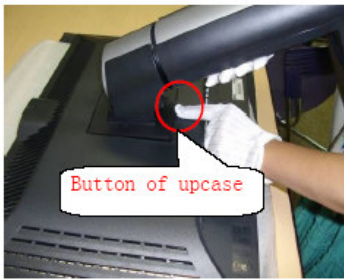
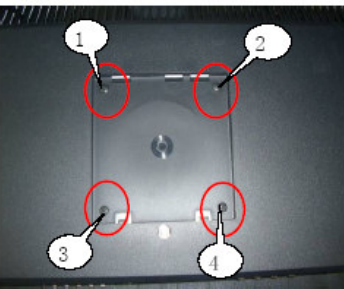

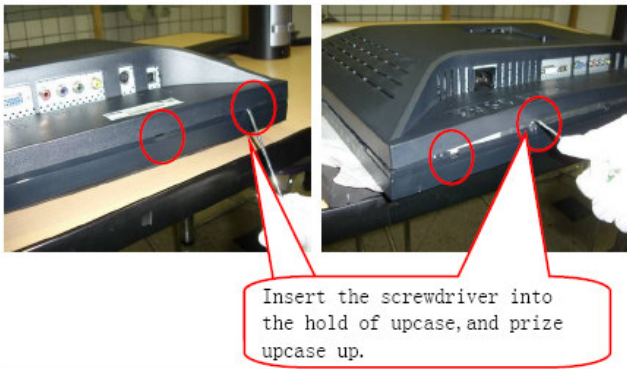
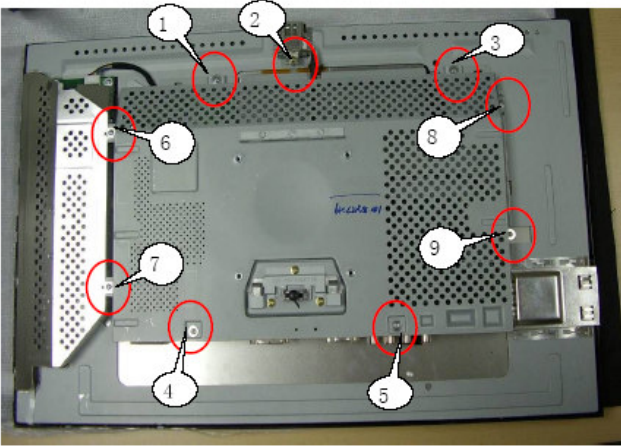
Input Timing				Actual Output			
Resolution	Horizontal Frequency (KHz)	Vertical Frequency (Hz)	Dot Clock Frequency (MHz)	Actual display Resolution	OK	N.	Remark
640x350	31.47(P)	70.08(N)	25.17	1280x943	√		DOS
720x400	31.47(N)	70.08(P)	28.32	1280x1024	√		DOS
640x480	31.47(N)	60.00(N)	25.18	1280x1024	√		DOS
640x480	35.00(N)	67.00(N)	30.24	1280x1024	√		Macintosh
640x480	37.86(N)	72.80(N)	31.5	1280x1024	√		VESA
640x480	37.50(N)	75.00(N)	31.5	1280x1024	√		VESA
800x600	37.88(P)	60.32(P)	40.00	1280x1024	√		VESA
800x600	48.08(P)	72.19(P)	50.00	1280x1024	√		VESA
800x600	46.86(P)	75.00(P)	49.50	1280x1024	√		VESA
832X624	49.72(N)	74.55(N)	57.29	1280x1024	√		Macintosh
1024x768	48.36(N)	60.00(N)	65.00	1280x1024	√		VESA
1024x768	56.48(N)	70.10(N)	75.00	1280x1024	√		VESA
1024x768	60.02(P)	75.00(P)	78.75	1280x1024	√		VESA
1024X768	60.24(N)	74.93(N)	80.00	1280x1024	√		Macintosh
1152x864	67.50(P)	75.00(P)	108.00	1280x1024	√		VESA
1152x870	68.68(N)	75.06(N)	100.00	1280x1024	√		Macintosh
1152x900	61.80(N)	66.00(N)	94.50	1280x1024	√		SUN 66
1152x900	71.81(N)	76.14(N)	108.00	1280x1024	√		SUN
1280x1024	64.00(P)	60.00(P)	108.00	1280x1024	√		VESA


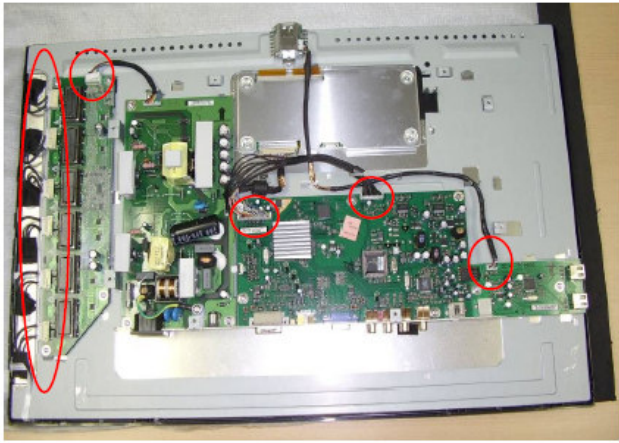
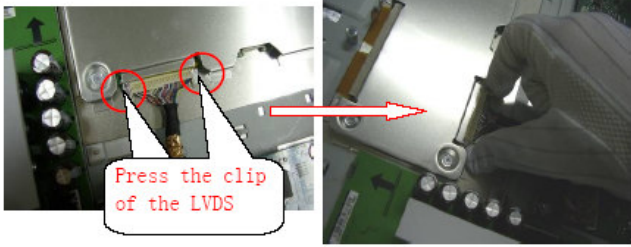
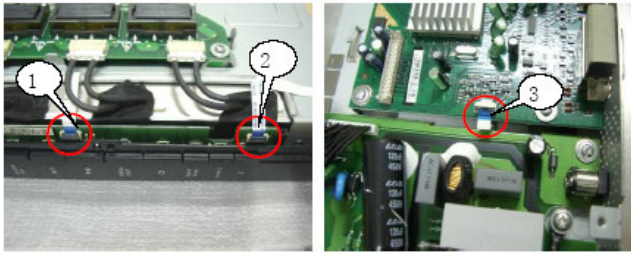
1280x1024	75.83(N)	71.53(N)	128.00	1280x1024	√		IBM1
1280x1024	80.00(P)	75.00(P)	135.00	1280x1024	√		VESA
1280x1024	81.18(N)	76.16(N)	135.09	1280x1024	√		SPARC2
1600x1200	75	60	162	VESA	√		
1920x1200	75	60	162	VESA	√		Reduce Blanking

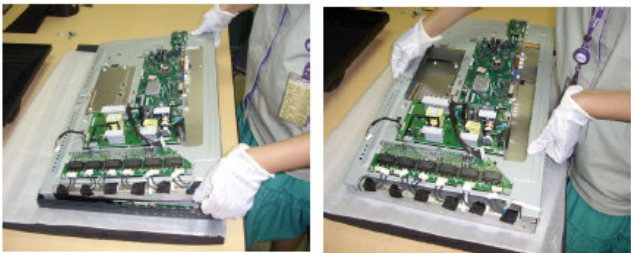
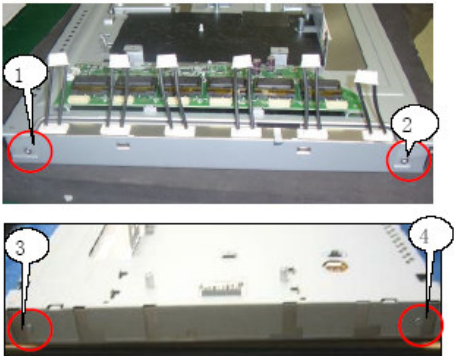
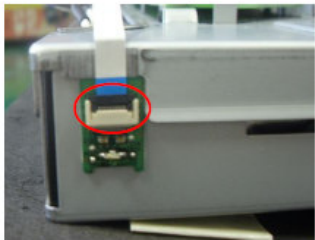

Note-3: “P”, “N” stands for “Positive”, “Negative” polarity of incoming H-sync/V-sync (input timing).

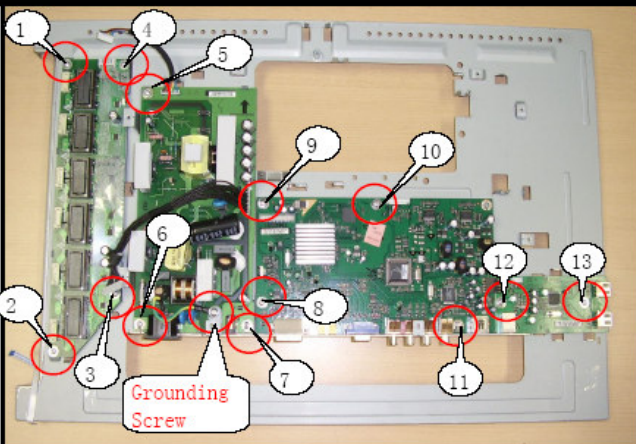
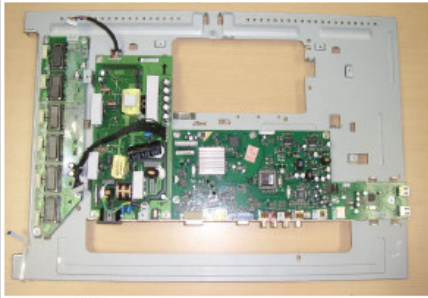
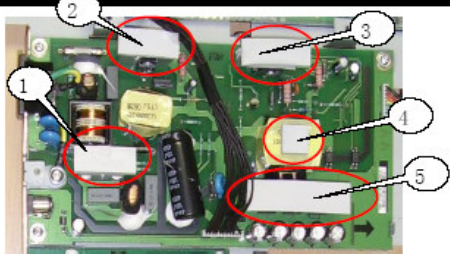
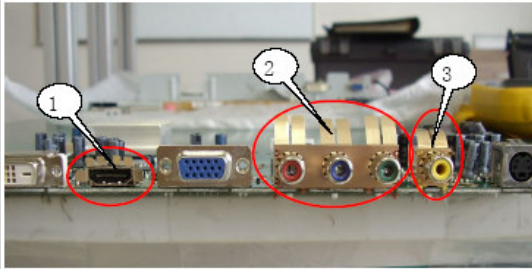

3.2.14. PANEL INSPECTION CRITERIA

Inspection Item	Specification
Line defect	Can't be seen
Bright Dot	<=2 dots
Green bright dots	<=2 dots
Dark dots	<=4 dots
Total dots defect	<=5 dots
Continuous Defect	Two continuous bright dots(vertical ,horizontal, oblique):<=1 pair Exclude continuous green-green bright dots
	Three or more continuous bright dots (vertical, horizontal ,oblique):Not allowed
	Two continuous dark dots(vertical ,horizontal, oblique):<=2 pairs
	Three or more continuous dark dots(vertical, horizontal, oblique):Not allowed
	Distance between 2B dots:>=15mm Distance between 2Ddots:>=15mm Distance between B and D dot :>=10mm

Item	Operation	Tool	Picture	Notes
1	Press the Button of upcase, and disassembly Base.			
2	Unlock Upcase Screw*4	screw-driver		
3	Disassembly the upcase			
4	Unlock shielding screw*9	screw-driver		

5	Disassembly USB Shielding & I/V Shielding & main Shielding		
6	Pull out the cable from the connector		
7	Press the clip of the LVDS, and Pull out LVDS cable from panel		
8	Open the FFC connector Cover, and pull out the FFC*3		

9	Take out the module-panel from bezel			
10	Unlock the panel screw*4			
11	Open the FFC connector Cover, and pull out the FFC			
12	Take up the module-bracket			

13	Unlock PCBA Screw*13, unlock grounding screw*1		
14	Take up the all PCBA		
15	Tear up thermal pad*5 from P/B		
16	Disassembly the spring*3		
17	pull up FFC form Panel, and tear up all the Ac. Tape from panel.		

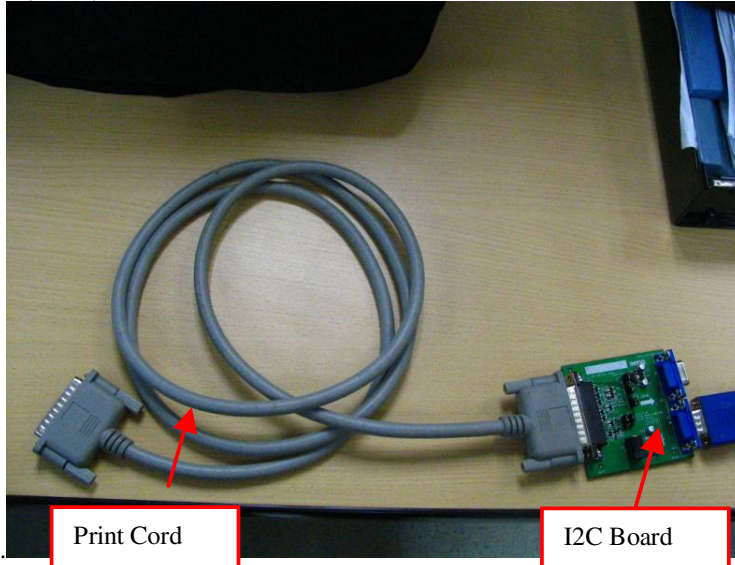
5. Level 1 Cosmetic/ Appearance/ Alignment Service

5.1. Software / Firmware Upgrade Process

ISP Rework By Myson MTV512 software

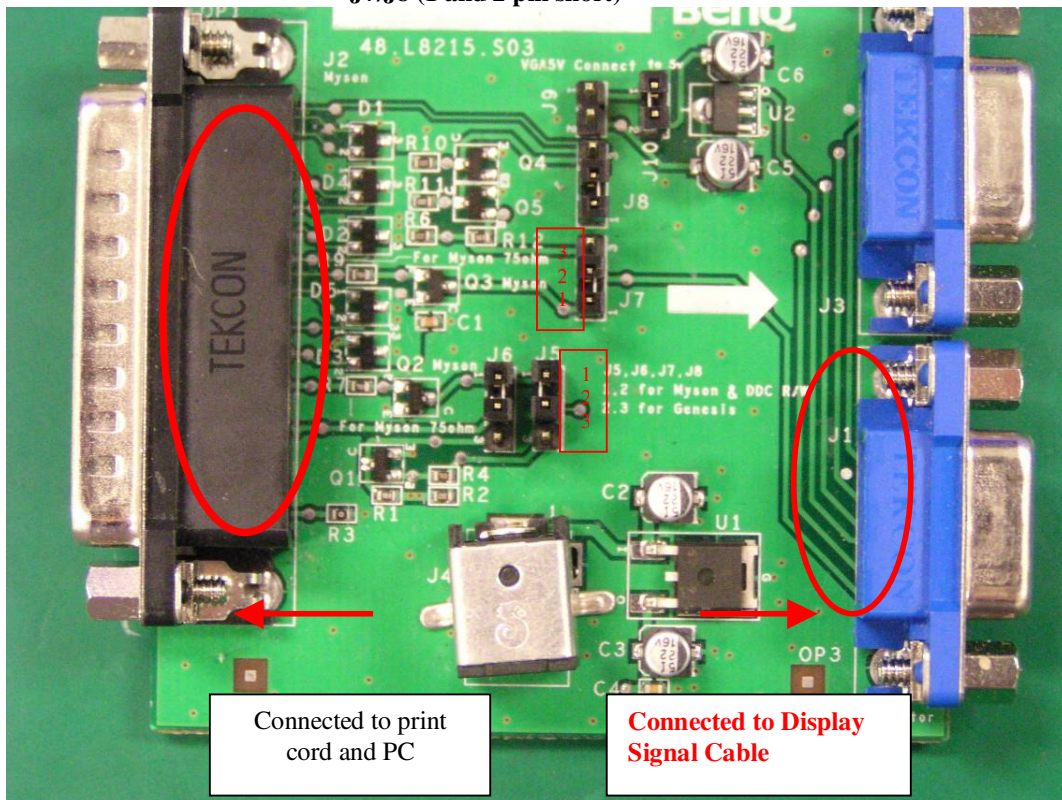
1. Hardware prepared:

- a. Print Board (or not);

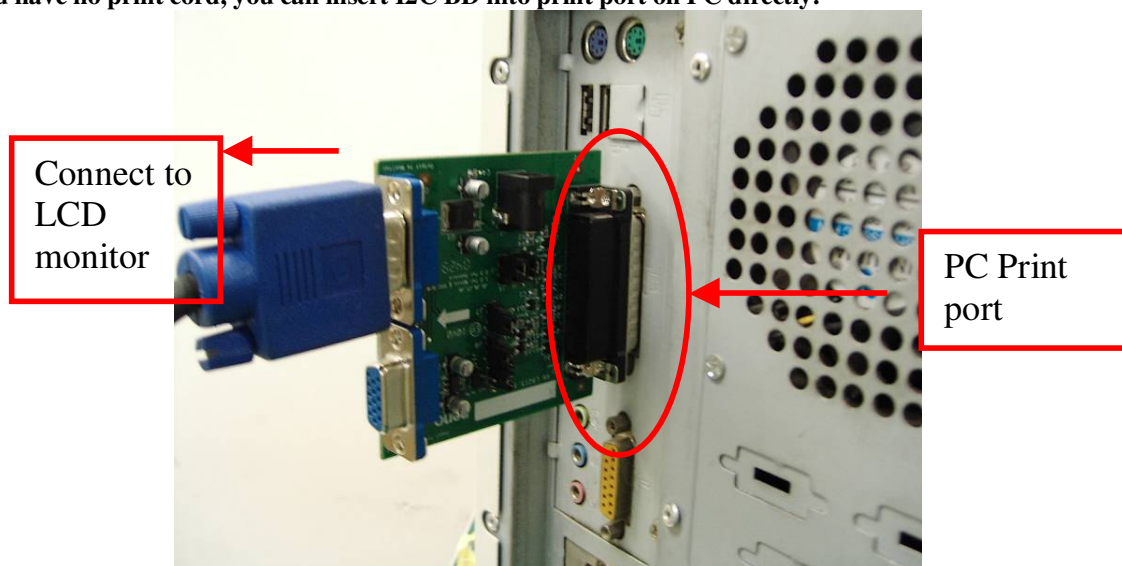


- b. I2CBoard.

And I2C Board Jump wire should follow J10 (short), J9 (open), J5/J6/ (1and 2 pin short)
J7/J8 (1 and 2 pin short)

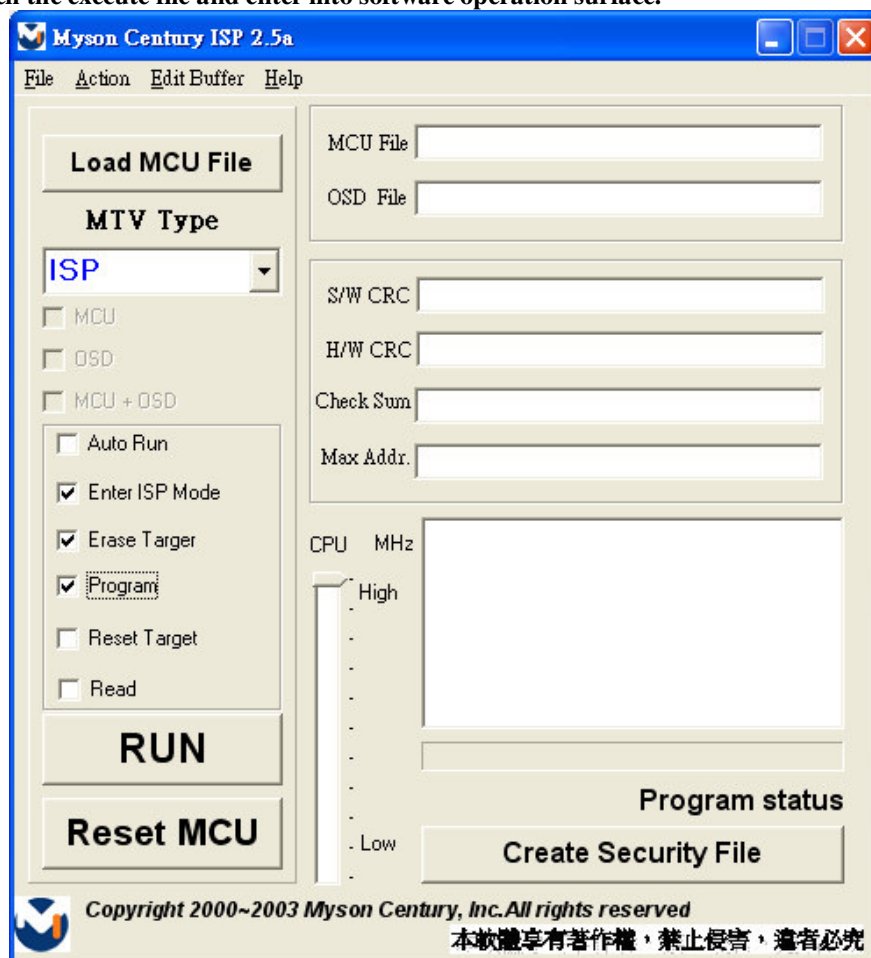


If you have no print cord, you can insert I2C BD into print port on PC directly.

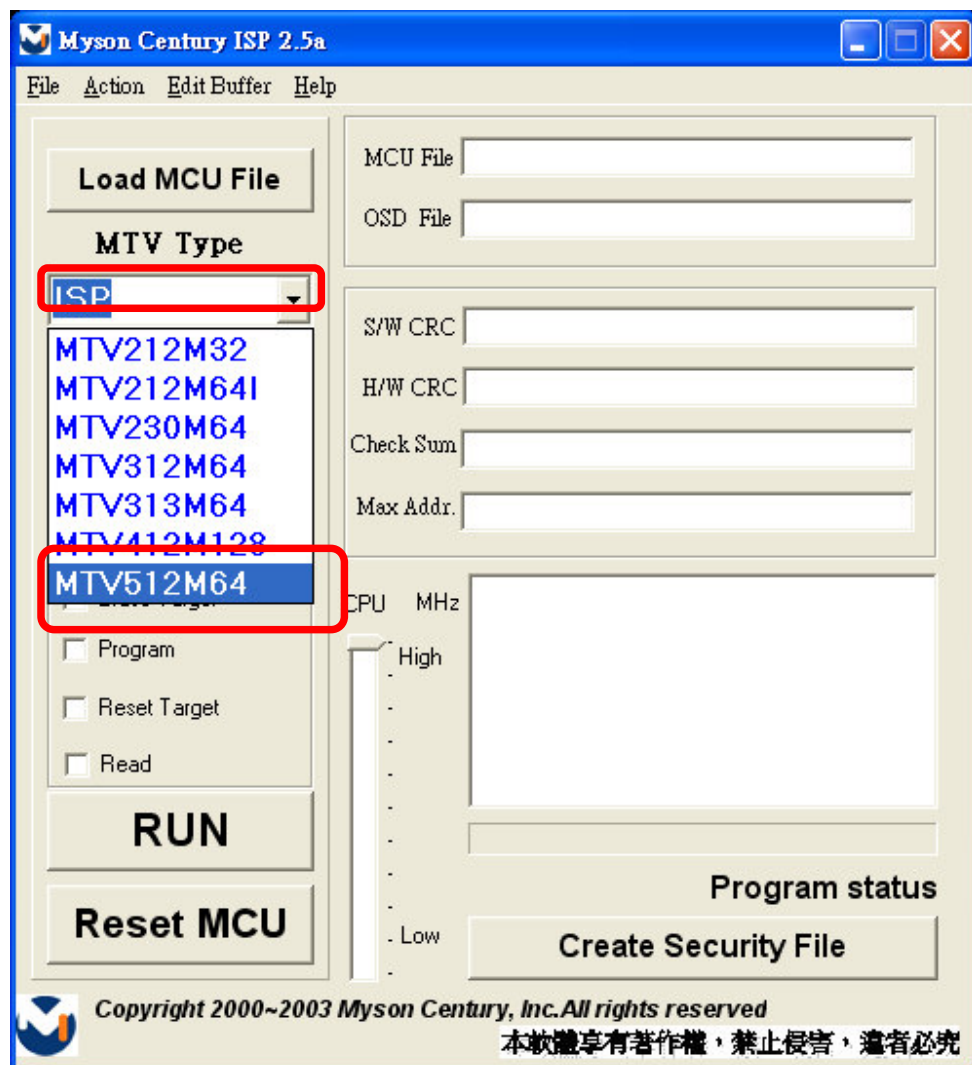


2. Software Prepare:
Please set up attached Myson ISP software.
Operation sequence as following:

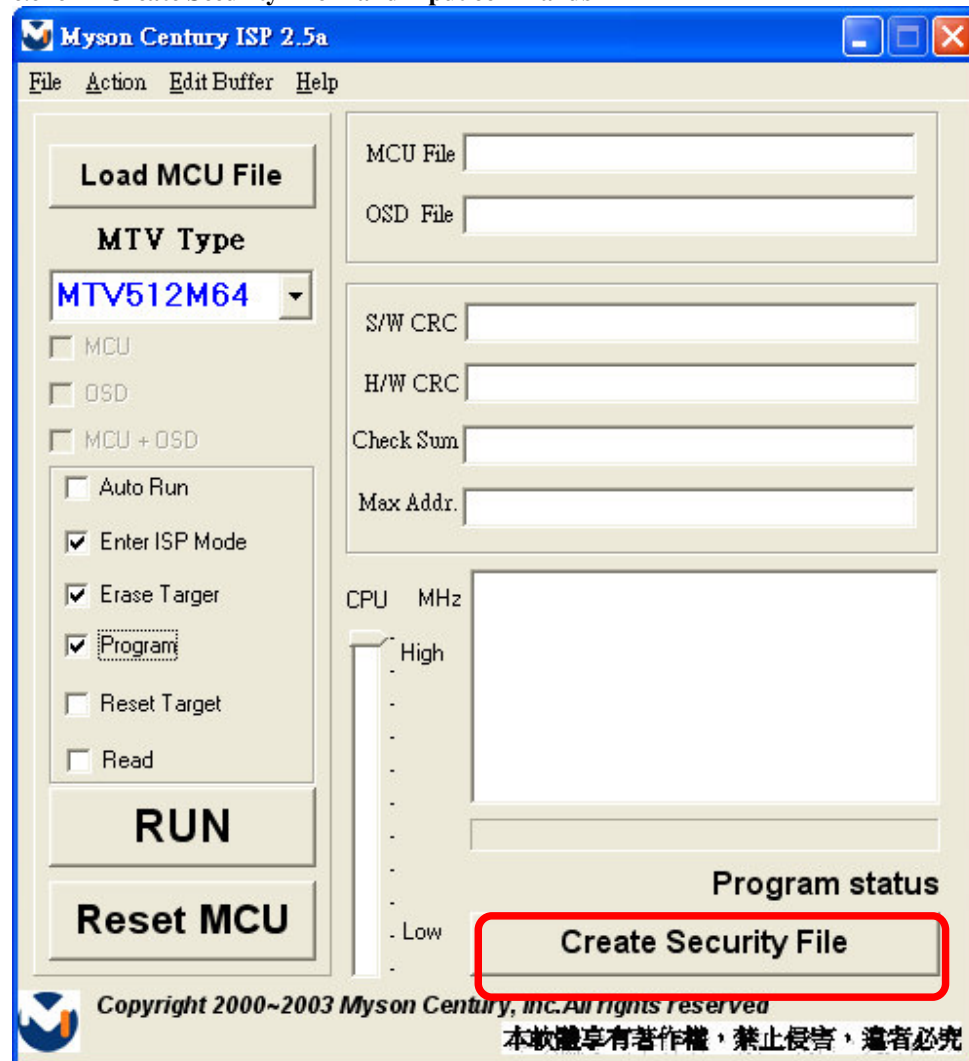
- a. Open the execute file and enter into software operation surface.



b. select MTV512M64 as your ISP Type



c.click "Create Security File " and input commands



Security

ISP Slave Add.	94	0x00 - 0xFF
SlaveB Add.	94	0x00 - 0xFF
Command 1	ac	0x00 - 0xFF
Command 2	ca	0x00 - 0xFF
Command 3	53	0x00 - 0xFF
Command 4		0x00 - 0xFF
Command 5		0x00 - 0xFF
Command 6		0x00 - 0xFF
Command 7		0x00 - 0xFF
Command 8		0x00 - 0xFF
Command 9		0x00 - 0xFF
Command 10		0x00 - 0xFF
Command 11		0x00 - 0xFF
Command 12		0x00 - 0xFF
Command 13		0x00 - 0xFF
Command 14		0x00 - 0xFF
Command 15		0x00 - 0xFF

Command No

4

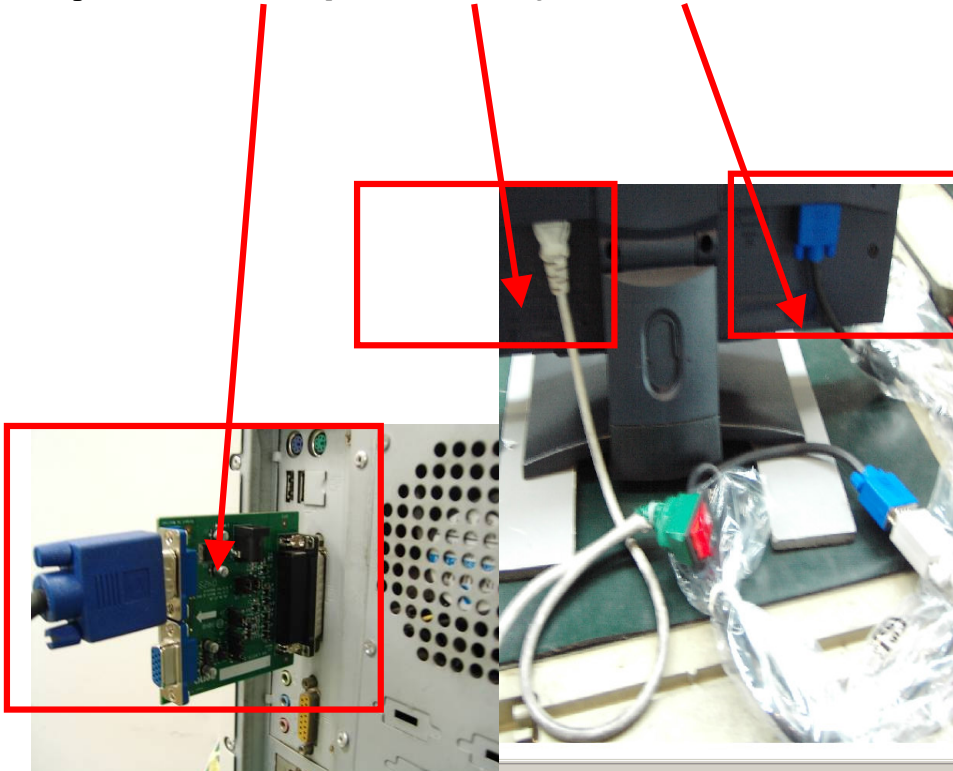
OK

CLEAR

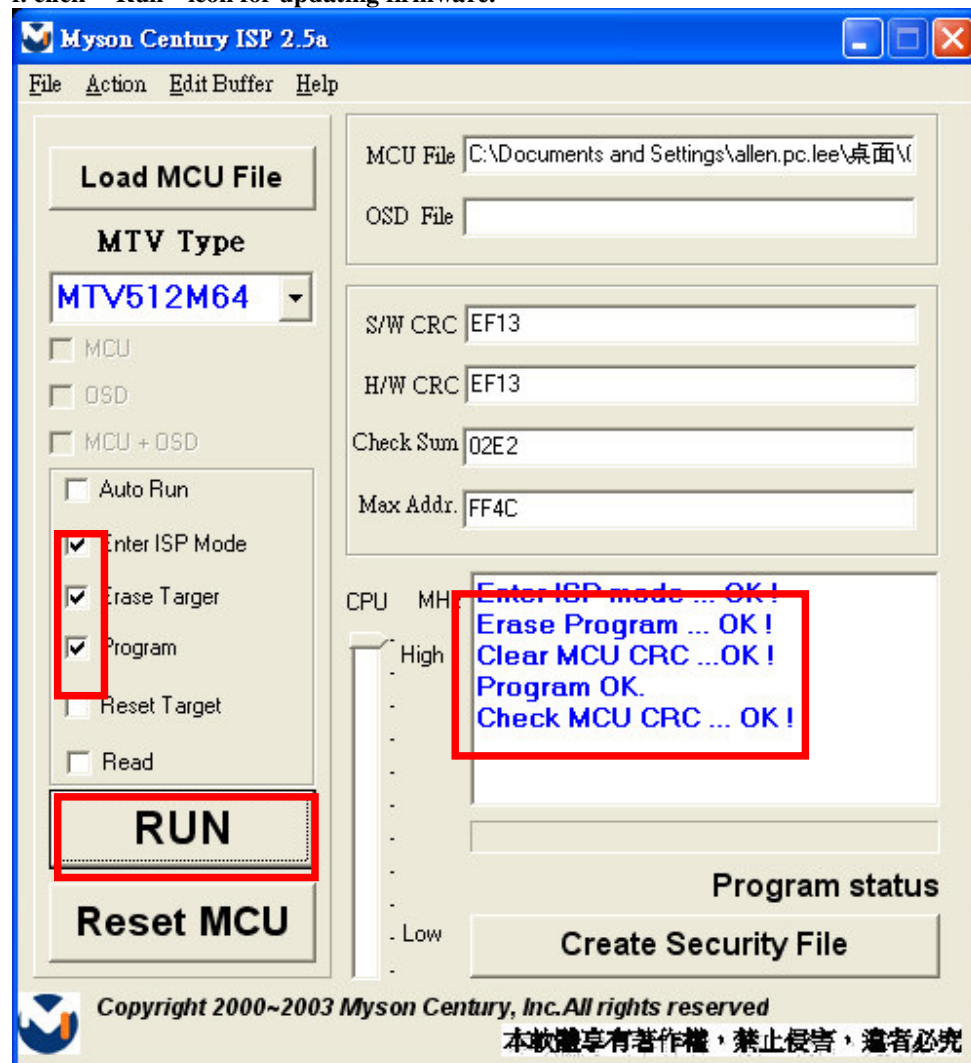
d. click “Load MCU File “ and select your object file

e. Follow the follow steps in turn :

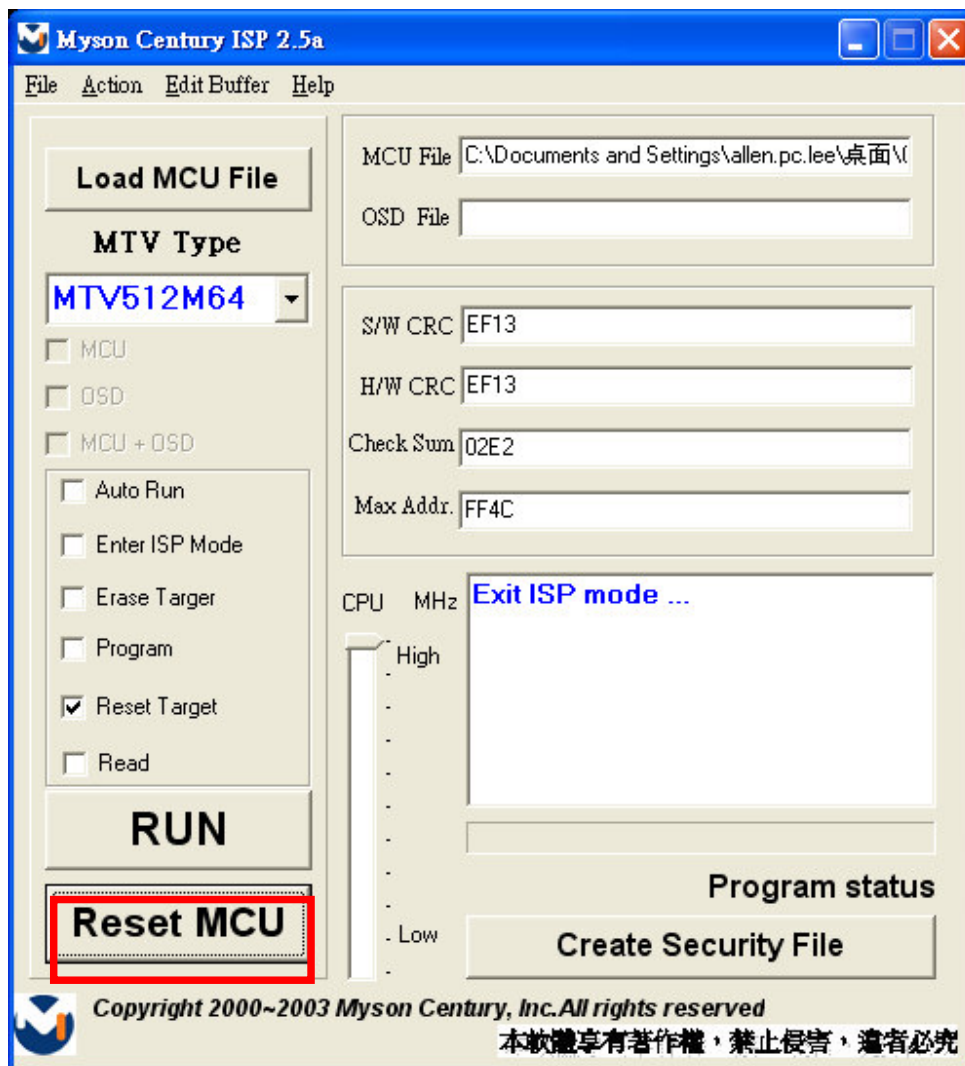
①. link “I2C BD & power cable & signal cable” .



f. click “Run” icon for updating firmware.



g. click “Reset MCU ” for exiting updating.



5.2. Adjustment / Alignment Procedure

5.2.1. Preparation:

1. Setup input timing ICL-605(1280x1024@75Hz), 32-Grays pattern.
2. Setup unit and keep it warm up at least 30 minutes.

5.2.2. Timing adjustment:

1. Enter factory setting area (press “ENTER”, “MENU” and then press “SOFTPOWER”).
2. Check the settings to following values:

Contrast = 50

Brightness = 90

Color = Normal

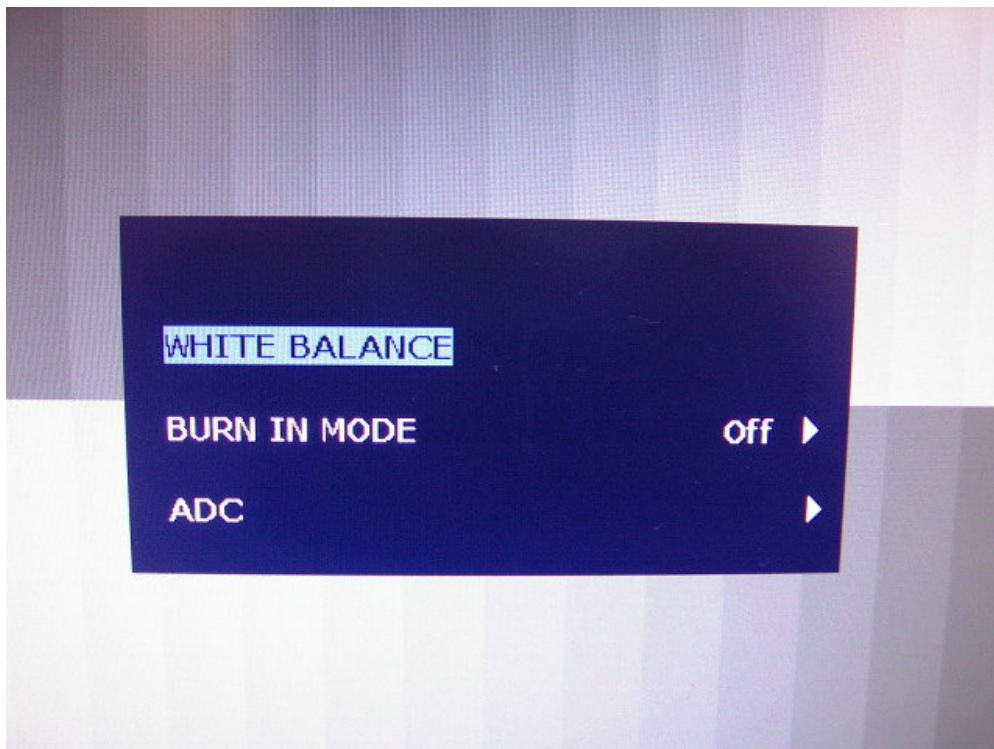
Language = English

Then, turn off the monitor power.

3. Turn on power enter user area.

5.2.3. Color balance adjustment:

1. Enter factory setting area (press and hold “ENTER”, “MENU” and then press “SOFTPOWER”).
2. Setup input timing ICL-605(1280x1024@75Hz), 5 MOSAIC pattern (pattern 42) .
3. Press “I-KEY”, and than OSD will show “White Balance” item and than press “ENTER” button to do auto color.



5.2.4. Color adjustment:

1. Setup input timing ICL-605 to white pattern.
2. Confirm that auto color adjustment has been done.
3. Measure the color temperature by using Minolta CA-110 (or equivalent equipment).
4. Check the color temperature (Bluish, Reddish & Normal). The color temperature specification are as the following:

White Balance (Bluish, 9300K set on OSD)	X+-	0.283+(-) 0.03
	Y+-	0.297+(-) 0.03
White Balance (Reddish, 5800K set on OSD)	X+-	0.326+(-) 0.03
	Y+-	0.342+(-) 0.03
White Balance (sRGB, 6500K set on OSD)	X+-	0.313+(-) 0.03
	Y+-	0.329 +(-) 0.03

5. Setup the input timing, 32 -Gray pattern.

Check if there are any abnormalities on the display during the preset timing modes.

Check the following preset timings with General pattern:

No.	Mode	H	V
1	720×400 @ 70Hz	31.468	70.8
2	640×480 @ 60Hz	31.469	59.940
3	640×480 @ 75Hz	37.500	75.000
4	800×600 @ 60Hz	37.879	60.317
5	800×600 @ 75Hz	46.875	75.000
6	1024×768 @ 60Hz	48.363	60.004
7	1024×768 @ 75Hz	60.023	75.029
8	1152×864 @ 75Hz	67.500	75.000
9	1280×1024 @ 60Hz	63.981	60.020
10	1280×1024 @ 75Hz	79.976	75.025

6. If the picture is not good during the checking, the monitor must be rejected.
7. Check the power consumption by disabling “burn-in mode” setting.
8. Clear the user date and program DDC data of monitor by IIC bus communication.

5.2.5. Writing EDID file:

1. Setup a PC with DDC card.
2. Connect PC to monitor with a D-sub (DVI) signal cable.
3. Please refer to the C212 for the correct EDID file.
4. Run the writing program to write the EDID file into EEPROM.
5. Read EEPROM data and confirm it to match with the C212 document definition.

5.2.6. Command definition :

PC Host will send 0x7C IIC slave address and then following 4 bytes command

I2C Send Command	Byte1	Byte2	Byte3	Byte4	OK	N.A.	Remark
Write Contrast to MCU RAM	CA	55	Data	cksum	√		Write data to MCU RAM and update the related register to refresh the screen immediately. Don't store data to EEPROM.
Write Brightness to MCU RAM	CA	56	Data	cksum	√		
Write Red Gain to MCU RAM	CA	57	Data	cksum	√		
Write Green Gain to MCU RAM	CA	58	Data	cksum	√		
Write Blue Gain to MCU RAM	CA	59	Data	cksum	√		
Read Contrast from MCU RAM	C3	55	XX	cksum	√		
Read Brightness from MCU RAM	C3	56	XX	cksum	√		

Read Red Gain from MCU RAM by color index	C3	57	XX	cksum	√		
Read Green Gain from MCU RAM by color index	C3	58	XX	cksum	√		
Read Blue Gain from MCU RAM by color index	C3	59	XX	cksum	√		Base on current color index to read back the right gain value.
Write C1 (Bluish) R-Gain Data to EEPROM	AA	3C	Data	cksum	√		
Write C1 (Bluish) G-Gain Data to EEPROM	AA	3D	Data	cksum	√		
Write C1 (Bluish) B-Gain Data to EEPROM	AA	3E	Data	cksum	√		
Write C2 (sRGB) R-Gain Data to EEPROM	AA	4C	Data	cksum	√		
Write C2 (sRGB) G-Gain Data to EEPROM	AA	4D	Data	cksum	√		
Write C2 (sRGB) B-Gain Data to EEPROM	AA	4E	Data	cksum	√		
Write C3 (Reddish) R-Gain Data to EEPROM	AA	5C	Data	cksum	√		
Write C3 (Reddish) G-Gain Data to EEPROM	AA	5D	Data	cksum	√		
Write C3 (Reddish) B-Gain Data to EEPROM	AA	5E	Data	cksum	√		
Write User R-Gain Data to EEPROM	AA	6C	Data	cksum	√		
Write User G-Gain Data to EEPROM	AA	6D	Data	cksum	√		
Write User B-Gain Data to EEPROM	AA	6E	Data	cksum	√		
Write Cx R-Gain Data to EEPROM	AA	7C	Data	cksum		√	
Write Cx G-Gain Data to EEPROM	AA	7D	Data	cksum		√	
Write Cx B-Gain Data to EEPROM	AA	7E	Data	cksum		√	Reserved for some model have extra color temperature
Write Contrast to EEPROM	AA	92	Data	cksum	√		
Write Brightness to EEPROM	AA	93	Data	cksum	√		
Write C/T index to EEPROM	AA	94	1~4	cksum	√		1=C1/9300/Bluish, 2=C2/6500/sRGB/ 3=C3/5800/Reddish, 4=User, 5=Cx
Write OSD-Hpos to EEPROM	AA	95	Data	cksum	√		
Write OSD-Vpos to EEPROM	AA	96	Data	cksum	√		
Write Language to EEPROM	AA	97	0~17	cksum	√		0=DE, 1=EN, 2=ES, 3=FR, 4=IT, 5=JA, 6=繁中, 7=簡中 (Also Update MCU RAM) European version: 1=English, 3=French, 0=Deutsch, 4=Italian, 2=Spanish, 8=Hungarian, 9=Serbian, 0A=Russian, 0B=Dutch, 0C=Polish, 0D=Czech, 0E=Swedish, 0F=Portugese, 10=Romanian
Write EEPROM OSD Timer	AA	98	Data	cksum	√		
Write EEPROM Volume	AA	99	Data	cksum	√		
Write EEPROM Gamma index	AA	9A	Data	cksum		√	For model with Gamma curve selection function
Write OSD Transparency to EEPROM	AA	9E	Data	cksum		√	
Write OSD Rotation to EEPROM	AA	9F	Data	cksum		√	
Read C1 (Bluish) R-Gain data from EEPROM	A3	3C	XX	cksum	√		
Read C1 (Bluish) G-Gain data from EEPROM	A3	3D	XX	cksum	√		
Read C1 (Bluish) B-Gain data from EEPROM	A3	3E	XX	cksum	√		
Read C2 (sRGB) R-Gain data from EEPROM	A3	4C	XX	cksum	√		
Read C2 (sRGB) G-Gain data from EEPROM	A3	4D	XX	cksum	√		
Read C2 (sRGB) B-Gain data from EEPROM	A3	4E	XX	cksum	√		
Read C3 (Reddish) R-Gain data from EEPROM	A3	5C	XX	cksum	√		

Read C3 (Reddish) G-Gain data from EEPROM	A3	5D	XX	cksum	√		
Read C3 (Reddish) B-Gain data from EEPROM	A3	5E	XX	cksum	√		
Read User R-Gain data from EEPROM	A3	6C	XX	cksum	√		
Read User G-Gain data from EEPROM	A3	6D	XX	cksum	√		
Read User B-Gain data from EEPROM	A3	6E	XX	cksum	√		
Read Cx R-Gain data from EEPROM	A3	7C	XX	cksum		√	Reserved for some model have extra color temperature
Read Cx G-Gain data from EEPROM	A3	7D	XX	cksum		√	
Read Cx B-Gain data from EEPROM	A3	7E	XX	cksum		√	
Read Contrast from EEPROM	A3	92	XX	cksum	√		
Read Brightness from EEPROM	A3	93	XX	cksum	√		
Read C/T index from EEPROM	A3	94	XX	cksum	√		1=C1/9300/Bluish, 2=C2/6500/sRGB/, 3=C3/5800/Reddish, 4=User, 5=Cx
Read OSD-Hpos EEPROM	A3	95	XX	cksum	√		
Read OSD-Vpos from EEPROM	A3	96	XX	cksum	√		
Read Language from EEPROM	A3	97	XX	cksum	√		0=DE, 1=EN, 2=ES, 3=FR, 4=IT, 5=JA, 6=繁中, 7=簡中 European version: 1=English, 3=French, 0=Deutsch, 4=Italian, 2=Spanish, 8=Hungarian, 9=Serbian, 0A=Russian, 0B=Dutch, 0C=Polish, 0D=Czech, 0E=Swedish, 0F=Portugese, 10=Romanian
Read OSD Timer from EEPROM	A3	98	XX	cksum	√		
Read Volume from EEPROM	A3	99	XX	cksum	√		
Read Gamma index from EEPROM	A3	9A	XX	cksum		√	For model with Gamma curve selection function
Read OSD Transparency from EEPROM	A3	9E	XX	cksum		√	
Read OSD Rotation from EEPROM	A3	9F	XX	cksum		√	
Change Color Temp. to C1/9300K/Bluish	CC	01	XX	cksum	√		Change C/T immediately. And store C/T index to EEPROM.
Change Color Temp. to C2/6500K/sRGB	CC	02	XX	cksum	√		
Change Color Temp. to C3/5800K/Reddish	CC	03	XX	cksum	√		
Change Color Temp. to User	CC	04	XX	cksum	√		Reserved
Change Color Temp. to Cx	CC	05	XX	cksum		√	
Change Input Source to D-Sub	CD	01	XX	cksum		√	
Change Input Source to DVI	CD	02	XX	cksum		√	
On burn in mode	CE	01	XX	cksum	√		Store data to EEPROM
Off burn in mode	CE	XX*	XX	cksum	√		XX* = Non "1" value Store data to EEPROM
Monitor is forced power saving	CF	01	XX	cksum		√	
Monitor wake up from power saving	CF	XX*	XX	cksum		√	XX* = Non "1" value
Change Sense-Eye mode to Standard	C0	00	XX	cksum		√	Change Sense-Eye mode immediately. And store the index to EEPROM.
Change Sense-Eye mode to Movie1	C0	01	XX	cksum		√	
Change Sense-Eye mode to Movie2	C0	02	XX	cksum		√	
Change Sense-Eye mode to Photo	C0	03	XX	cksum		√	Change luminance sensor mode immediately. And store the index to EEPROM.
Set luminance sensor mode to Off	C1	00	XX	cksum		√	
Set luminance sensor mode to Bright	C1	01	XX	cksum		√	
Set luminance sensor mode to Moderate	C1	02	XX	cksum		√	

Set luminance sensor mode to Dim	C1	03	XX	cksum		√	
Increase ADC R-Offset2	AC	23	Data	cksum	√		
Increase ADC G-Offset2	AC	24	Data	cksum	√		
Increase ADC B-Offset2	AC	25	Data	cksum	√		
Increase ADC R-Gain	AC	33	Data	cksum	√		
Increase ADC G-Gain	AC	34	Data	cksum	√		
Increase ADC B-Gain	AC	35	Data	cksum	√		
Decrease ADC R-Offset2	AD	23	Data	cksum	√		
Decrease ADC G-Offset2	AD	24	Data	cksum	√		
Decrease ADC B-Offset2	AD	25	Data	cksum	√		
Decrease ADC R-Gain	AD	33	Data	cksum	√		
Decrease ADC G-Gain	AD	34	Data	cksum	√		
Decrease ADC B-Gain	AD	35	Data	cksum	√		
Read ADC R-Offset2	AE	23	XX	cksum	√		
Read ADC G-Offset2	AE	24	XX	cksum	√		
Read ADC B-Offset2	AE	25	XX	cksum	√		
Read ADC R-Gain	AE	33	XX	cksum	√		
Read ADC G-Gain	AE	34	XX	cksum	√		
Read ADC B-Gain	AE	35	XX	cksum	√		
User mode to factory mode	1A	5A	XX	cksum	√		
Auto Color (Offset1, Offset2, Gain)	1B	5A	XX	cksum		√	
Copy EDID Serial number to EEPROM	1C	5A	XX	cksum		√	For specified “Industry Customer” model.
Factory mode to User mode	1E	5A	XX	cksum	√		
Clear user mode and factory recall	1F	5A	XX	cksum	√		Store data to EEPROM
Write EDID data to MCU DDC RAM	55	NA	NA	NA	√		For MTV312 MCU type
Copy DDC RAM data to EEPROM	BB	NA	NA	NA	√		For MTV312 MCU type
Drive WP pin to low to enable write DDC IC	55	NA	NA	NA		√	For stand alone DDC IC
Drive WP pin to high to disable write function	BB	NA	NA	NA		√	For stand alone DDC IC
Switch DDC bus to DVI-A DDC IC	44	NA	NA	NA		√	For input signal with multi-input source
Switch DDC bus to DVI-D DDC IC	33	NA	NA	NA		√	For input signal with multi-input source
Change Senseye Mode	C0	0~3	XX	cksum		√	
Change Power Status	D0	Data	XX	cksum	√		PowerOFF: Data=AA PowerON: Data=Other Value
Change Language Type	D1	Data	XX	ckssum		√	Asia: Data=AA European: Data=Other Value
EEPROM Bank R/W (For Debug using only, not for Production Line Write EEPROM directly)							
Read EEPROM Bank 0	B0	Address	XX	cksum	√		
Read EEPROM Bank 1	B1	Address	XX	cksum	√		
Read EEPROM Bank 2	B2	Address	XX	cksum		√	(For 24C08 type)
Read EEPROM Bank 3	B3	Address	XX	cksum		√	(For 24C08 type)
Write EEPROM Bank 0	B8	Address	Data	cksum	√		
Write EEPROM Bank 1	B9	Address	Data	cksum	√		
Write EEPROM Bank 2	BA	Address	Data	cksum		√	(For 24C08 type)
Write EEPROM Bank 3	BB	Address	Data	cksum		√	(For 24C08 type)

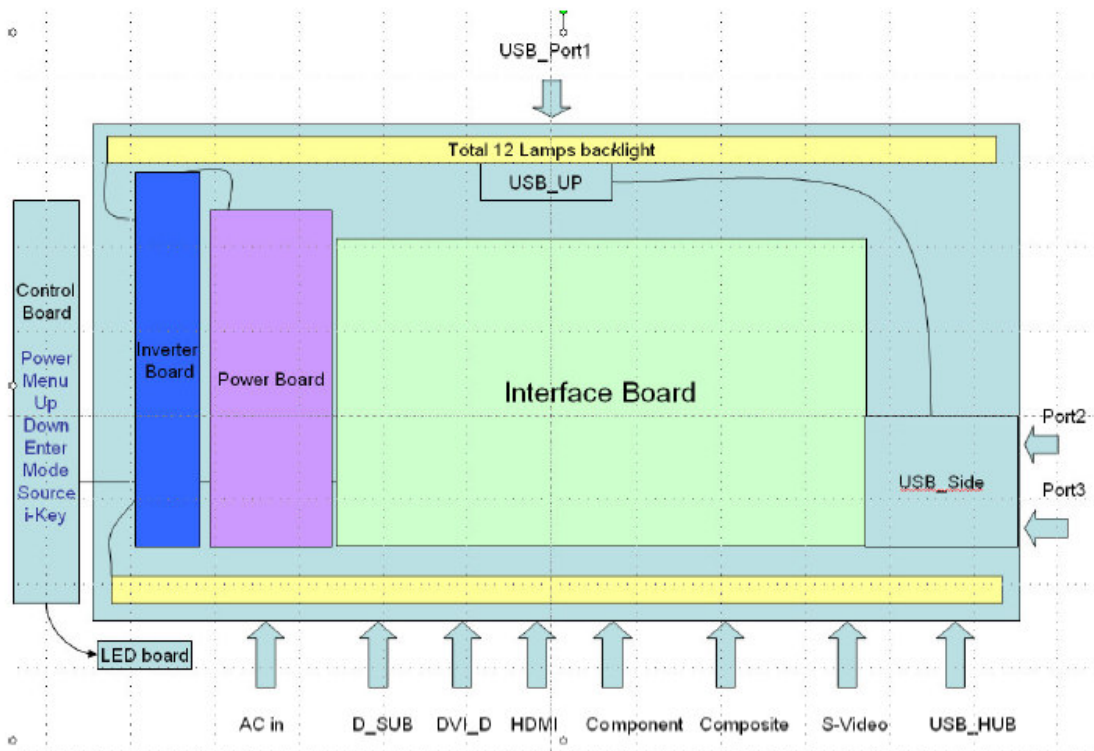
Note A: Byte4 (cksum) = Byte1 + Byte2 + Byte3
 Note B: Data = The value write to MCU or EEPROM
 Note C: XX = don't care, any value (<=0xFF).

When PC Host sends 0x7D command to MCU, MCU must return as following (2 bytes)		
Return Code	R-Byte1	R-Byte2
Checksum error code	FC	AA
Normal return code	the above Byte3 (/data)	FC
If normal return code is exact FCh	FC	CF

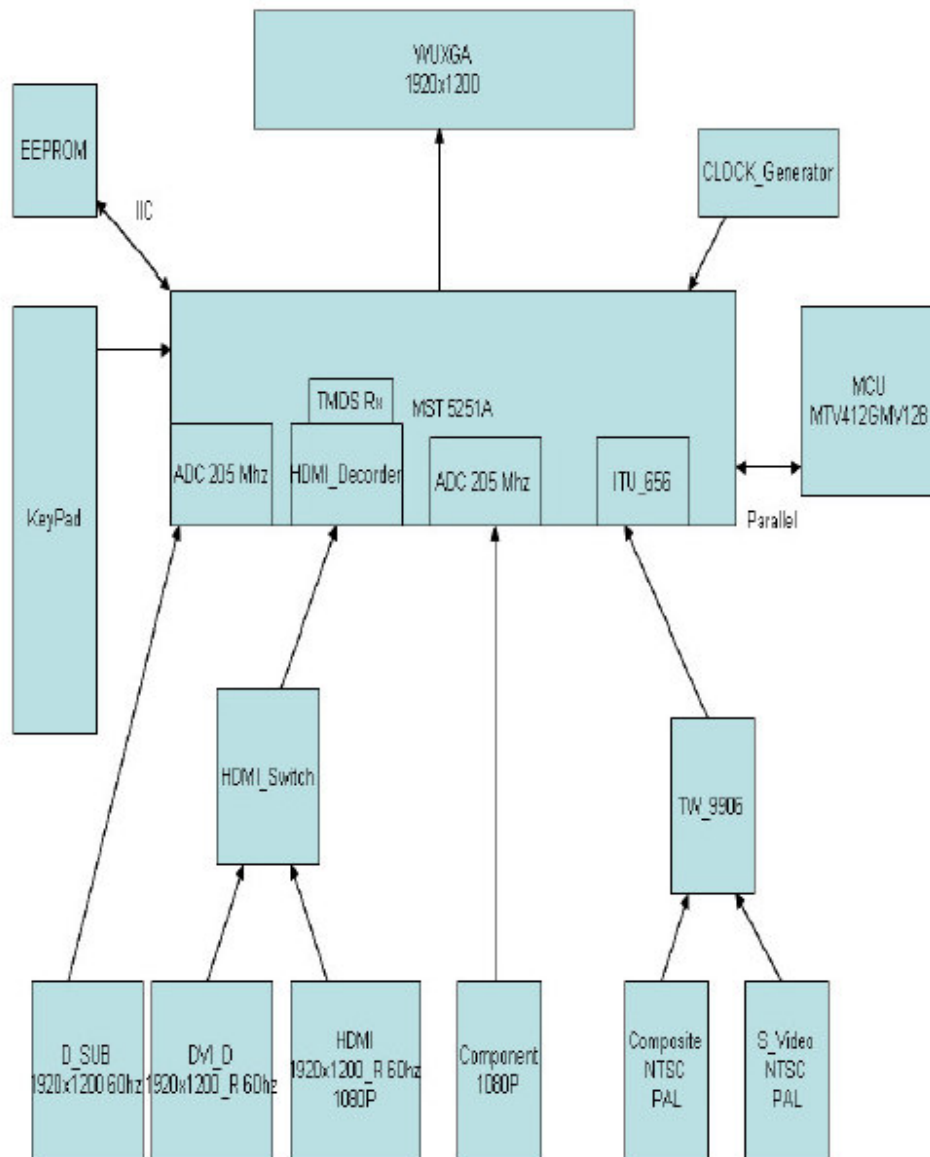
6. Level 2 Circuit Board and Standard Parts Replacement

6.1. Block Diagram

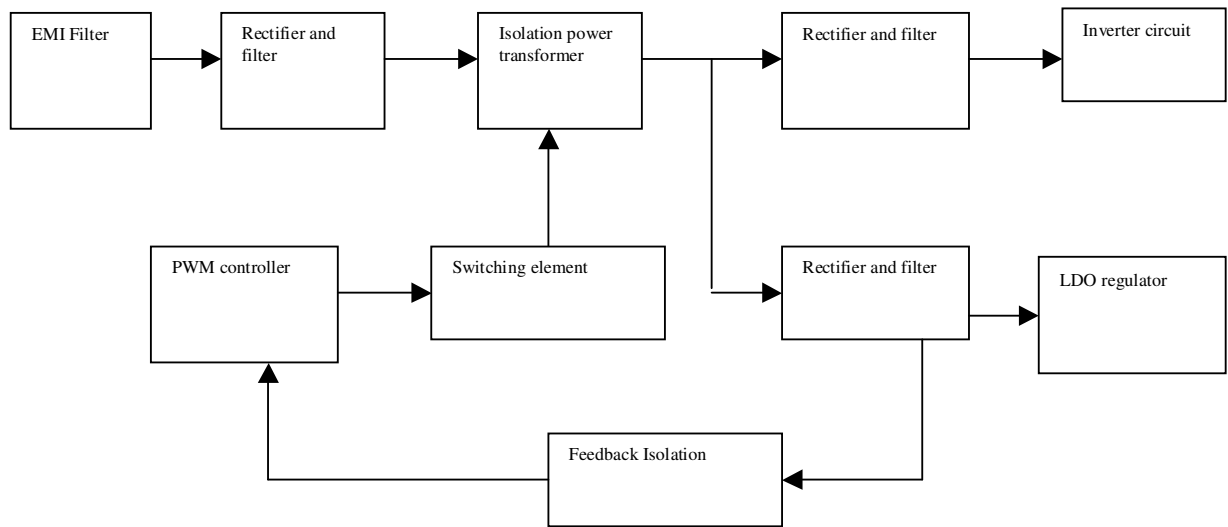
The FP24W1 consists of a LCD module with 12 lamps, a power board, a inverter board,a control board , a LED board, 2 USB board and a interface board. The block diagram is shown as below.



Interface Board Diagram



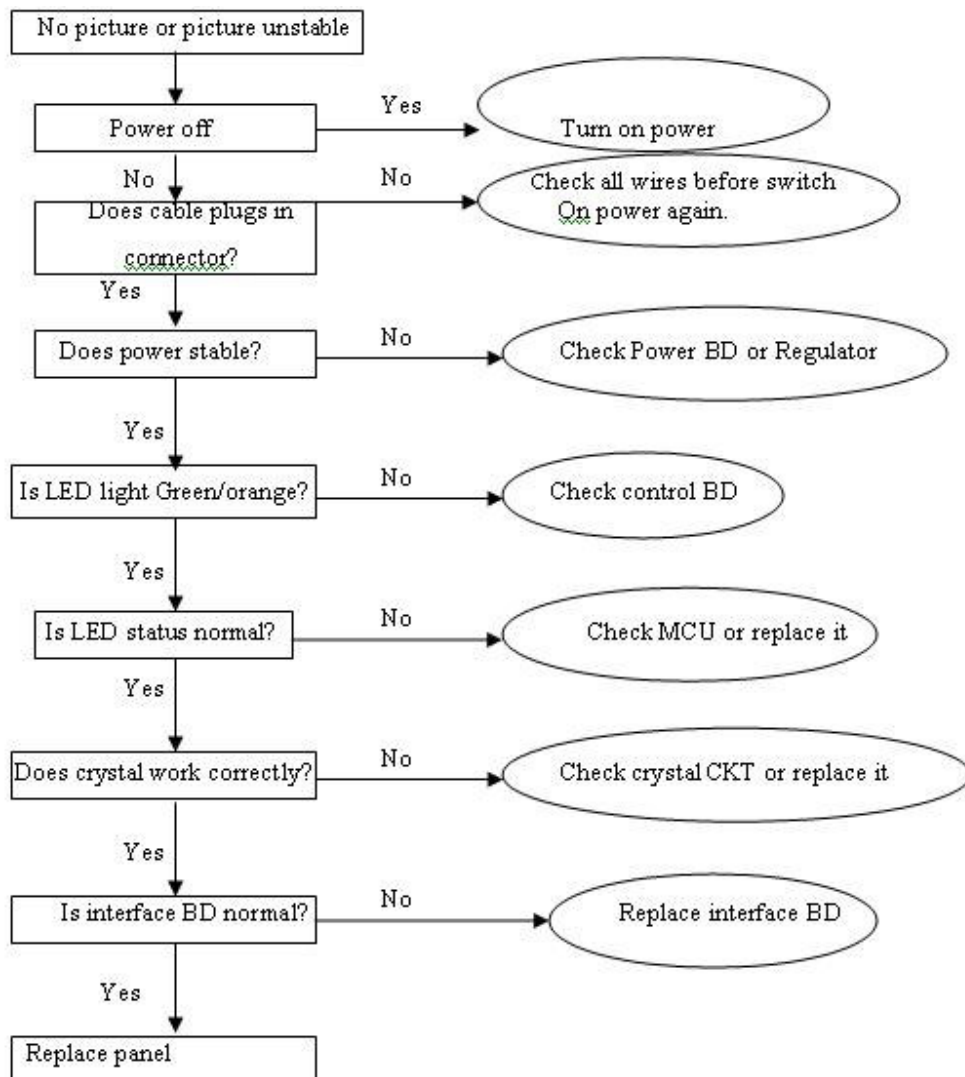
Power board diagram:



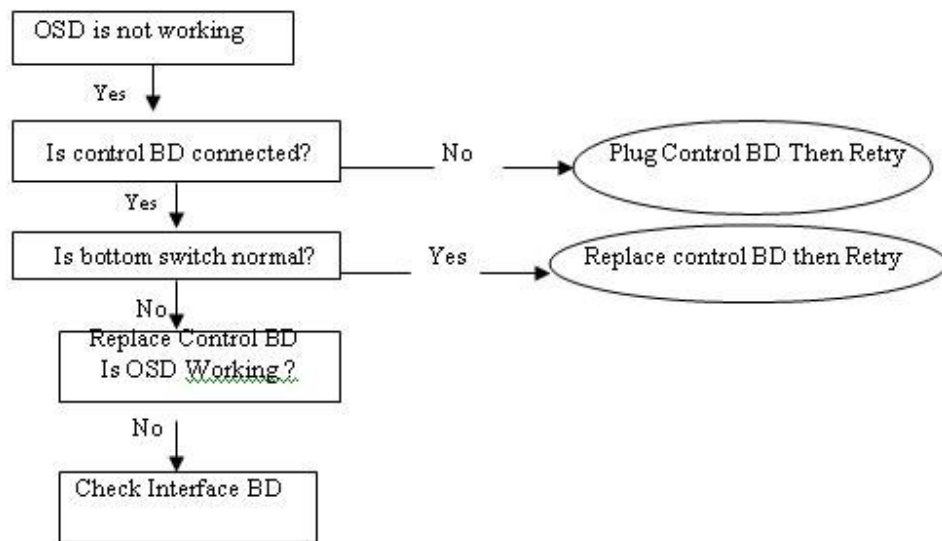
6.2. Trouble Shooting Guide

6.2.1. No Display or display is unstable:

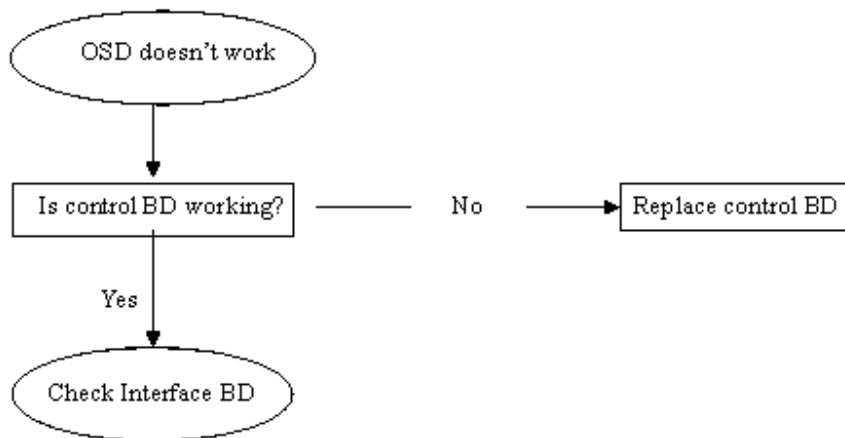
Interface Board:



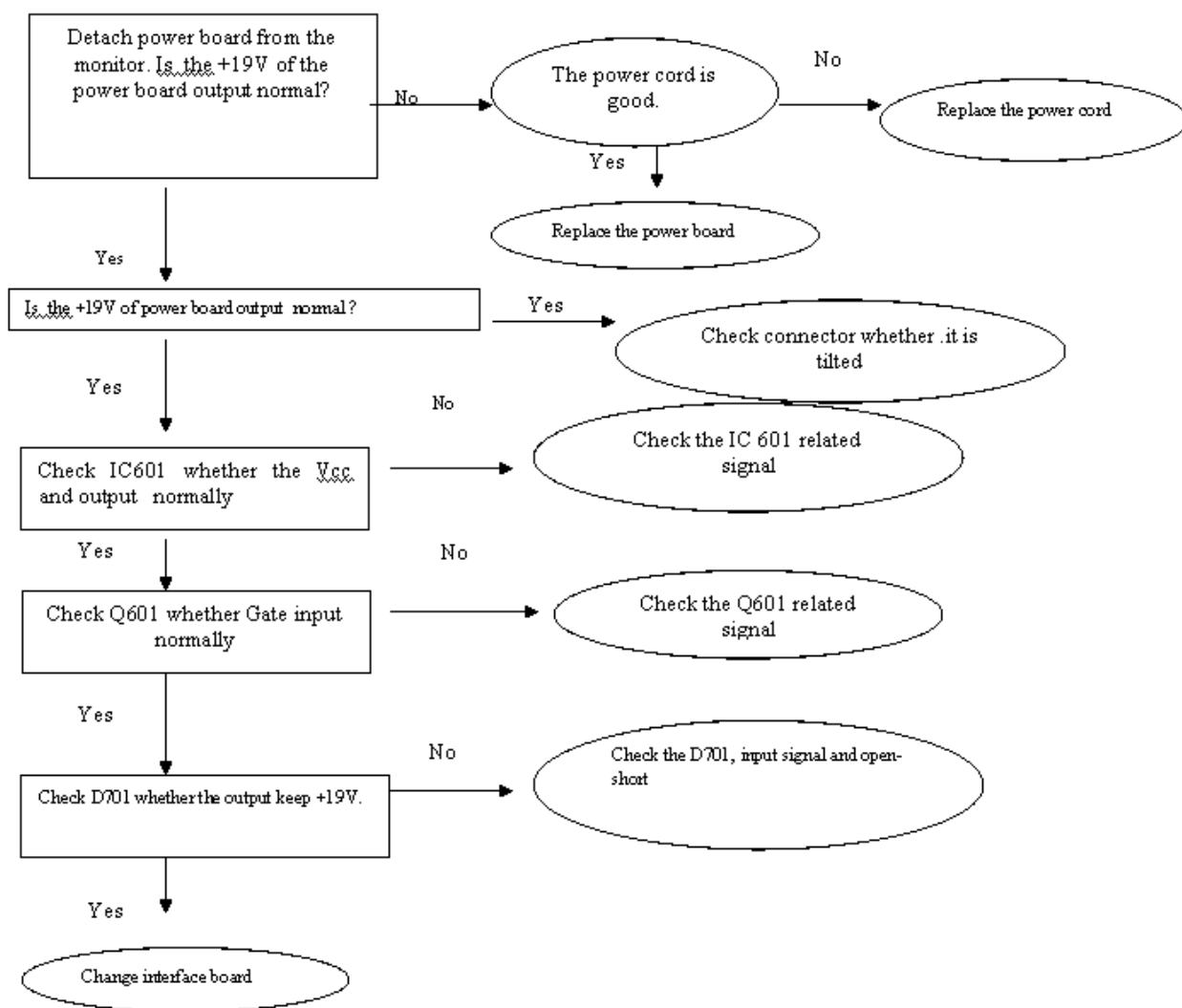
6.2.2. BUTTON function: Control Board



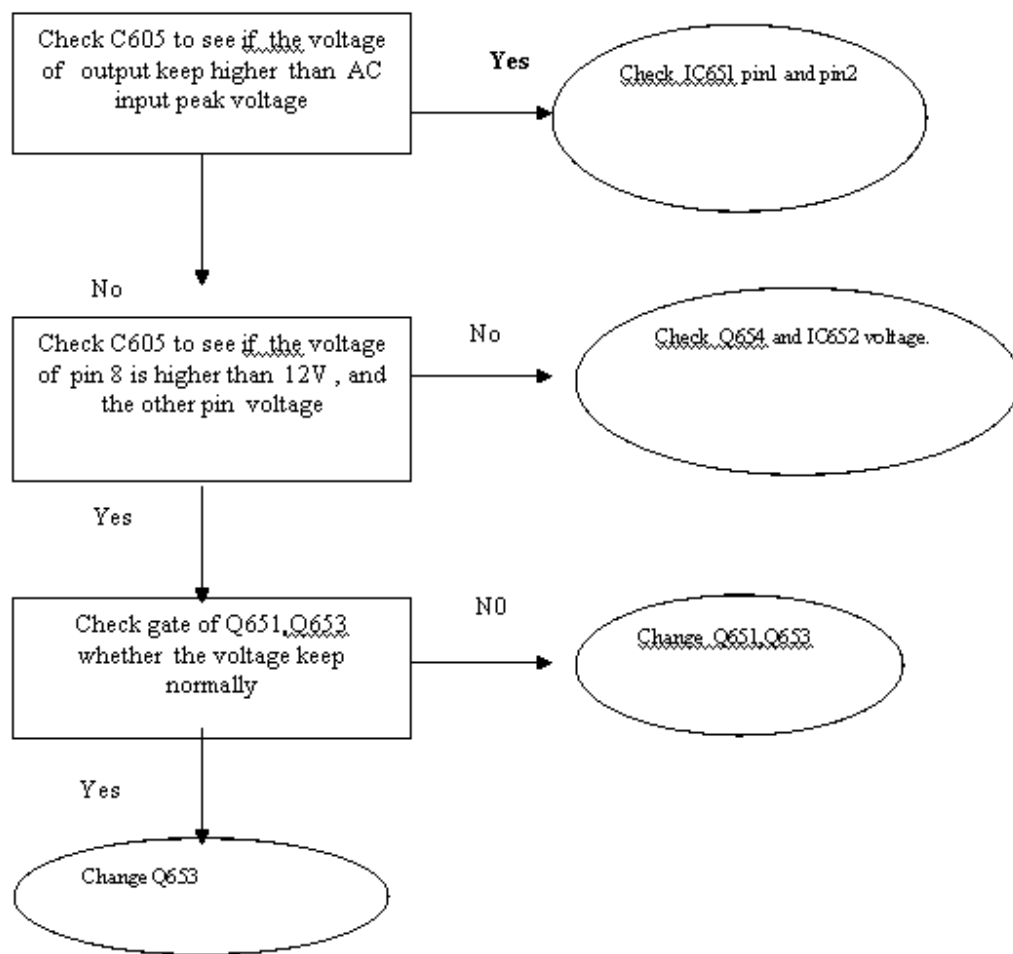
6.2.3. OSD function:



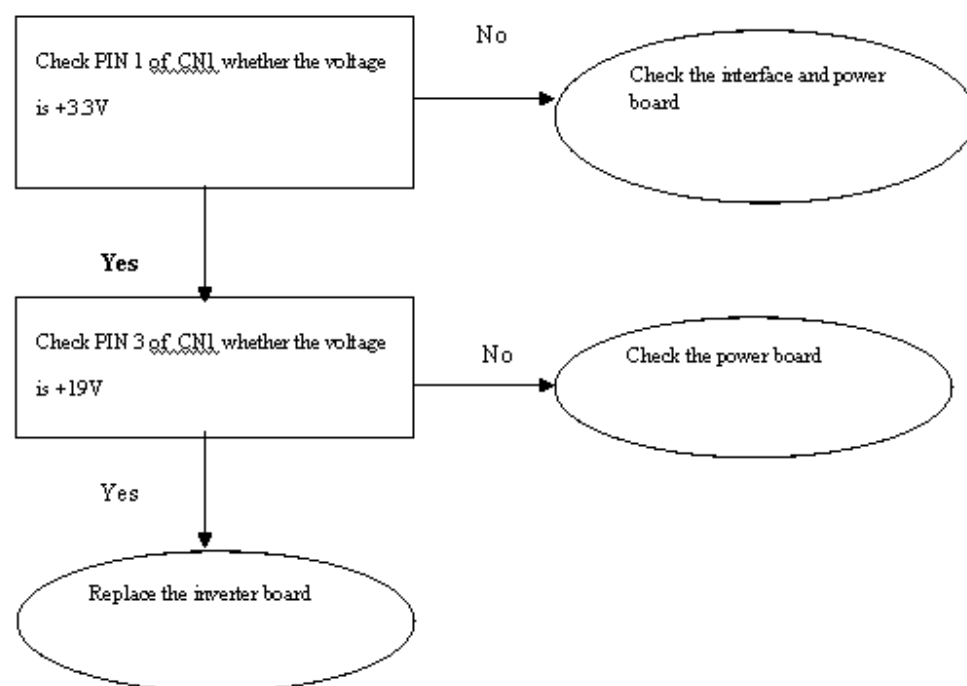
6.2.4. Power no output troubleshooting



6.2.5. Power no PFC troubleshooting



6.2.6. Inverter no work troubleshooting



7.1. Circuit operation theory

A basic operation theory for the interface board is to convert input signal into digital RGB. Analog RGB signal is converted to digital signal through ADC. DVI-D, HDMI signal is converted through HDMI switch to HDMI decoder and TMDS receiver. The component signal(Y Pb Pr) is converted to digital signal through another ADC of MST5251a and max resolution is 1080P. The Video signal which included Composite(CVBS) and S-Video is converted to digital ITU656 format to MST5251A through TW_9906 decoder. The microprocessor MST5251A receives video data and optimizes the image automatically. It also supports 16 color from a 64k palette bitmap OSD, and keypad controlling. The output data are sent to LCD module.

7.1.1. IC introduction:

DDC (Display Data Channel) function: We use DDC IC to support DDC/2B function. DDC data is stored in 24C02(EEPROM). Those data related to LCD monitor specification. PC can read them by "SDA" and "SCL" serial communication for PC communication for DDC2B.

MST5251A IC: There are two ADC(205 Mhz), LVDS transmitter ,TMDS receiver ,HDMI decoder, video processor ,Scaling, and OSD functions in the MST5251a IC. Scaling IC is revolutionary scaling engine, capable of expanding any source resolution to a highly uniform and sharp image, combined with the critically proven integrated 8 bit triple-ADC and patented Rapid-lock digital clock recovery system. It also support detect mode and DPMS control.

MTV412GMV128: To stored the source code which is accessed by MCU to run program.

EEPROM:

We use 24C32 to store all the adjustable data and user settings.

Use three 24C02 to store DVI , D-SUB and HDMI EDID data.

Use one 24C04 to store HDCP key.

TW_9906: We use it as NTSC/PAL multi-standard video decoder of Composite/S-video signal , and output digital signal with ITU-656 format to MST5251A.

7.1.2. Control board introduction:

There are 8 keys for user's control which includes "Power", "Menu", "Up/Plus", "Down/Minus" , "Enter", "Mode" , "Source", and "iKey" . The following descriptions are the introduction of these keys.

(1) Power key: to turn/off power of monitor

(2) "Menu" key: to enter sub-menus or select items.

(3) "Up/Plus key: to select previous and to increase adjustment

(4) "Down/Minus" key: to select next and to decrease adjustment

(5) "Enter/PIP" key: to enter submenu or confirm selection or as a hot-key menu for choosing different PIP input port .

(6) "iKey": to perform auto adjustment

(7) LED: It indicates the DPMS status of this LCD monitor; green light means DPMS on (Normal operating condition). Amber light means DPMS off (Powersaving).

#1 EMI Filter

This circuit (fig. 2) is designed to inhibit electrical and magnetic interference for meeting FCC, VDE, VCCI standard requirements.

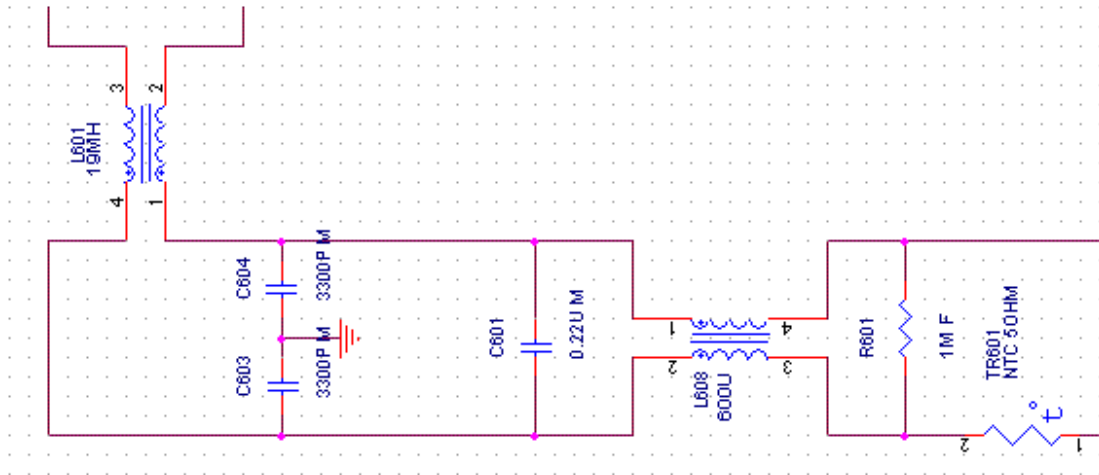


Fig. 2

#2 PFC circuit introduction :

IC651(L6561) is a pre-regulator for power factor correction . The function and circuit is similar to step-up stage. (See Fig. 3) It can boost low AC input voltage to bulk capacitor to get higher power factor.

Pin 1 is the inverting input of the error amplifier. R671,R672,R673 and R674 are resistive divider and are connected between the output regulated voltage and this point , to provide voltage feedback.

Pin 2 is the output of amplifier. A feedback compensation network is placed between this pin and the Pin 1.

Pin 3 is the input of the multiplier stage. R657,R658 and R659 are resistive divider and are connected to this pin the rectified mains . A voltage signal, proportional to the rectified mains, appears on this pin.

Pin 4 is the input to the comparator of the control loop . The current is sensed by resistor R670 and the resulting voltage is applied to this pin.

Pin 5 is the zero current detection input. If it is connected to GND, the device will be disabled.

Pin 6 is the current return for driver and control circuits.

Pin 7 is the gate driver output. A push pull output stage is able to drive the power MOSFET.

Pin 8 is supply voltage of driver and control circuits.

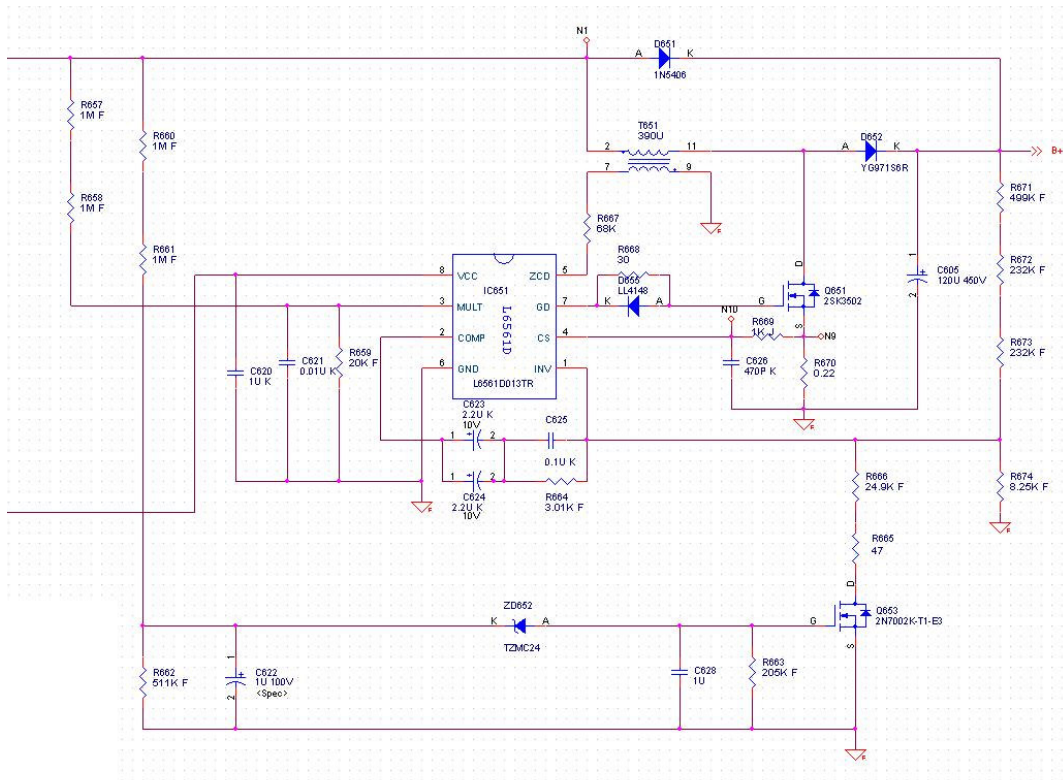


Fig. 3

#3 PWM Control circuit introduction

The PWM controller NCP1200A implements standard current mode architecture with an internal structure operating at 60 KHz. When output current set-point falls below a given value, the output power demands reduction. When IC automatically enters the low power consumption mode that calls skip cycle mode and provides excellent light load efficiency. IC601 (NCP1200A) is the PWM control IC to get stable DC output. It can transfer high DC voltage at primary to low DC voltage at secondary. (See Fig. 4)

- Pin 1. Allows user adjust the level at which the cycle skipping process takes place. Shorting this pin to ground permanently disables the skip cycle feature.
- Pin 2. is connected to optocoupler , the peak current setpoint is adjusted accordingly to the output power demand .
- Pin 3. senses the primary current and routes it to the internal comparator .
- Pin 4. is the IC ground .
- Pin 5. is the driver's output pin to an external MOSFET.
- Pin 6. is Vcc pin and connected to an external bulk capacitor.
- Pin 7. is empty and ensures adequate creepage distance.
- Pin 8. is connected to the high-voltage rail , this pin injects a constant current into the Vcc bulk capacitor .

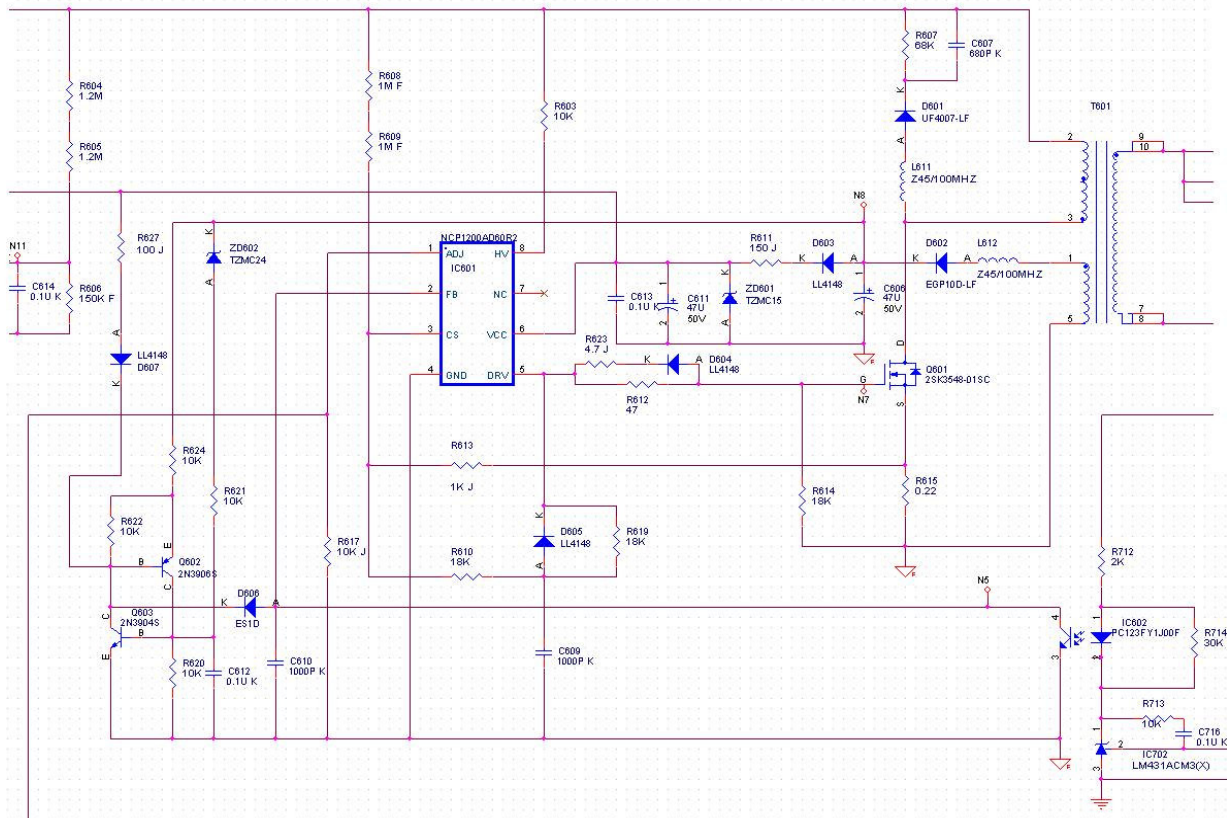


Fig. 4

#4 Rectifier and filter

D701~D703 and C711~C715 are to produce DC 19V output. (See Fig.5)

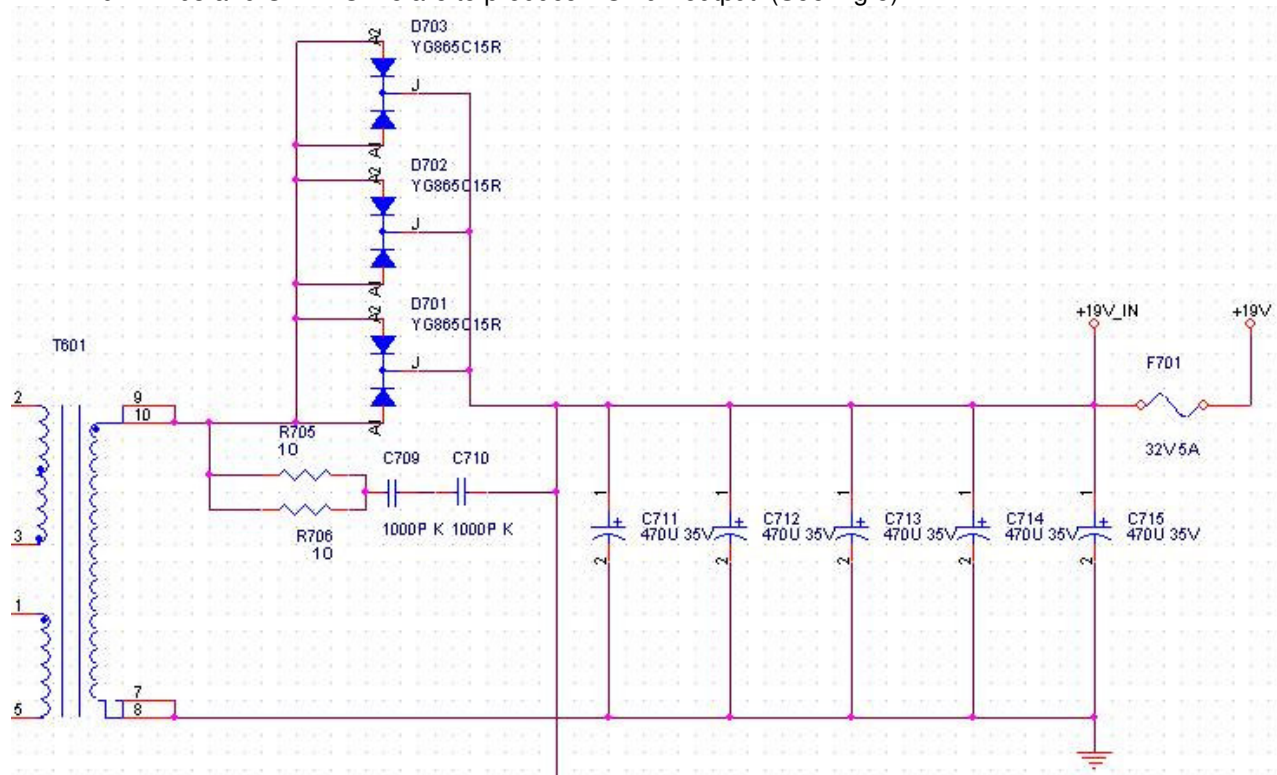


Fig. 5

#5 Feedback circuit

PC123 is a photo-coupler and TL431 is a shunt regulation. They are used to detect the output voltage change and be the primary and secondary isolation. When output voltage changes, the feedback voltage will be compared and duty cycle will be decided to control the correct output voltage. (See Fig.6)

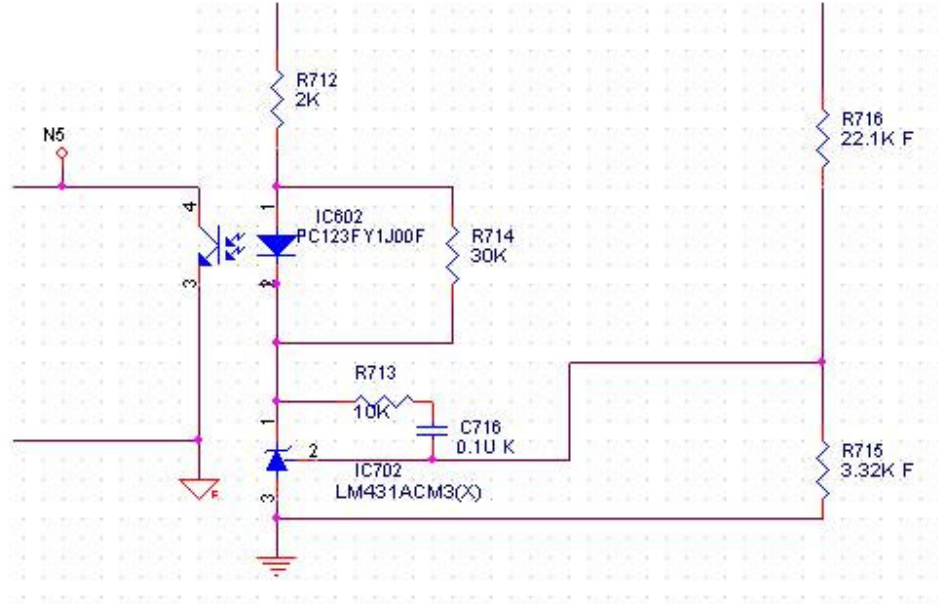


Fig. 6

7.1.3. Control board introduction:

The main parts of the control board are a push button, and a LED.

(a) Push button: It's a simple switch function, pressing it for "ON" to do the auto adjustment function, releasing it for "OFF" to do nothing.

(c) LED: It indicates the DPMS status of this LCD monitor; green light means DPMS on (Normal operating condition). Amber light means DPMS off (Power off condition).

7.1.4. Inverter Circuit Operation Theory

A Intelligent CCFL Inverter Controller --- OZ960G

The OZ960 is a unique, high-efficiency, Cold Cathode Fluorescent. Lamp (CCFL) backlight inverter controller that is designed for wide input. Voltage inverter applications. Additionally, the OZ960 performs the. Lamp dimming function with an analog voltage or low frequency Pulse. Width Modulation (PWM) control.

Operating in a zero-voltage switching, full-bridge configuration, the inverter circuit achieves a very high efficiency power conversion. In addition, the OZ960 operates at a single, content frequency in a Phase-shift PWM mode. Intelligent open-lamp and over-voltage protections provide design flexibility.

The single stage design results in a low cost, reliable transformer. Without expensive. The transformer does not require a more expensive Center tapped primary. Supports multiple CCFL lamps is also important function.

OZ960 PIN DESCRIPTION

Pin No.	Names	I/O	Description
Pin1	CTIMER	I	Capacitor for CCFL ignition duration
Pin2	OVP	I	Output voltage sense $V_{th}=2.0V$
Pin3	ENA	I	Enable input ;TTL signal is applicable
Pin4	SST	I	Soft- start capacitor
Pin5	VDDA	I	Voltage source for the IC
Pin6	GNDA	I	Analog signal ground reference
Pin7	REF	O	Reference voltage output; 2.5V typical
Pin8	RT1	I	Resistor for programming ignition frequency
Pin9	FB	I	CCFL current feedback signal
Pin10	CMP	O	Compensation output of the current error amplifier
Pin11	NDR_D	O	NMOSFET drive output
Pin12	PDR_C	O	PMOSFET drive output
Pin13	LPWM	O	Low-frequency PWM signal burst-mode dimming control
Pin14	DIM	I	Input analog signal for burst-mode dimming control
Pin15	LCT	I	Triangular wave for burst-mode dimming; frequency
Pin16	PGND	I	Power ground reference
Pin17	RT	I	Timing resistor set operating frequency
Pin18	CT	I	Timing capacitor set operating frequency
Pin19	PDR_A	I	PMOSFET drive output
Pin20	NDR_B	I	NMOSFET drive output

Full-Bridge Configuration

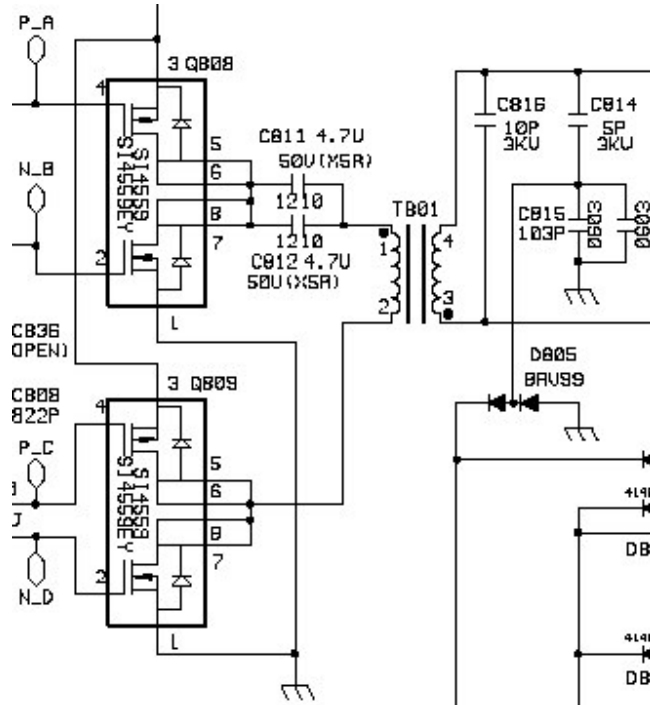


Fig. 1

Fig. 1 the Q808, Q809 and T801 form a full-bridge configuration.
 When the Q808's PMOSFET turn on, then Q808's NMOSFET turn off
 the Q809's PMOSFET turn off, then Q809's NMOSFET turn on.
 the Q808's PMOSFET turn off, then Q808's NMOSFET turn on.
 the Q809's PMOSFET turn on, and then Q809's NMOSFET turn off.
 The result in T801 primary coil has an AC square waveform.
 Certainly, the secondary of T801 will produce high voltage AC square waveform.
 Through C814 and C815 filter capacitor, will output sin waveform. The 1 set
 Q810, Q811 and T803 principle is also the same.

Feed-back Circuit

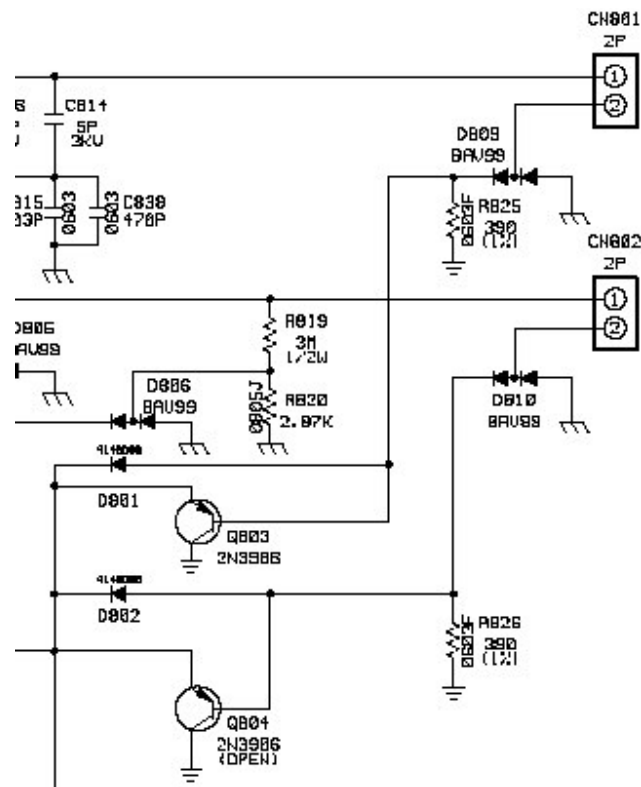
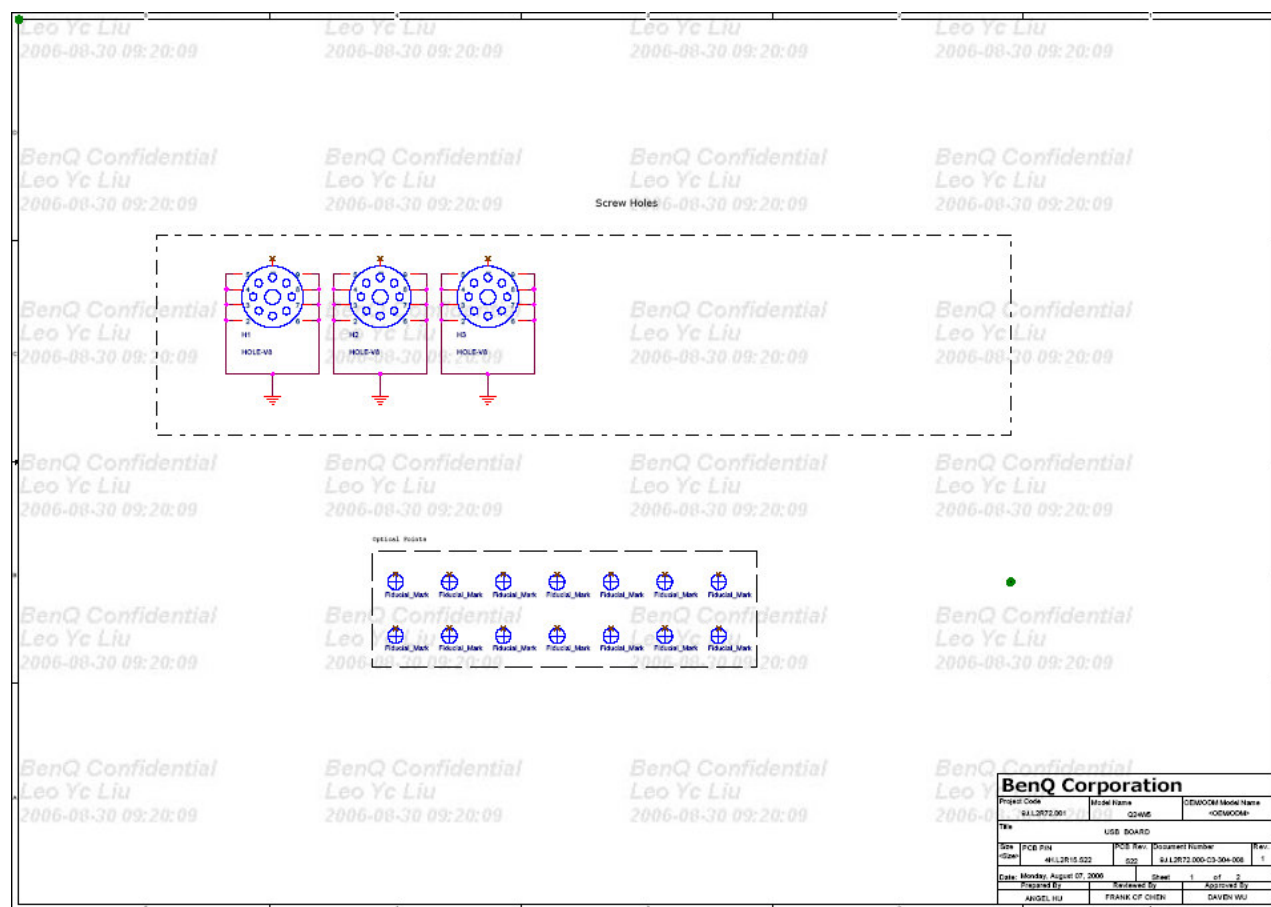


Fig. 2

Fig. 2 the feedback circuit consists of lamp, D809, R825 and D801.

When the lamp current through R825, produce half sin waveform voltage signal. We may get the Maximum value through D801. After IC801 OZ960 get the feedback voltage signal from PIN2, according to voltage signal value to decide duty.

7.2. Circuit Schematics



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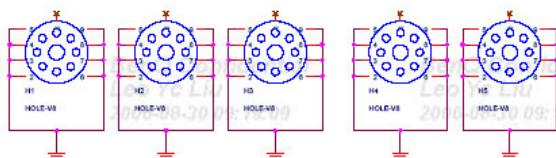
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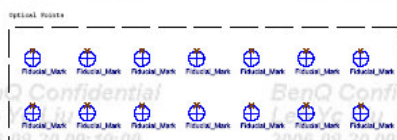
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BenQ Corporation	
Project Code	Model Name
BJL2R75.001	Q2

BenQ Corporation				
Project Code		Model Name		GENCODE Model Name
6LL2R75.001		Q24W5		<GENCODE>
Title				
INTERFACE BOARD				
Size (mm)	PCB PIN	PCB Rev.	Document Number	Rev.
	40LL2R01 A11	A11	6LL2R75.00-03-004-000	3
Date: Monday, July 17, 2006				
Prepared By		Reviewed By		Approved By
AYUMORI MI		AKIYOSHI IRI		DAVID MI

7.3. Spare Parts List

BENQ LCD FP241W Spare Parts List

P/N: 9J.L2R72.ASE

ITEM	PART NUMBER	DESCRIPTION	LOCATION
1	5E.L2R01.011	PCBA I/F BD Q24W5 MSTAR5251 MI IC CTRL MST5251A-LF-205	U12
2	7A.05251.00E	PQFP	
3	5E.L2K02.001	PCBA POWER BD MI 2407WFPB	
4	5E.L2R03.001	PCBA CTRL BD Q24W5 MI	
5	5E.L2R08.001	PCBA USB-UP BD MI Q24W5	
6	5E.L2R15.001	PCBA USB-SIDE BD MI Q24W5	
7	5E.L2R16.001	PCBA LED BD Q24W5 MI PCBA INVERTER BD	
8	5D.L2K01.001	TBD368LR	
<ALT>	5D.L2K01.011	PCBA INVERTER MIT64001.50 2407	
9	5F.91L2R.021	LCDM M240UW01-V3 AUO	
10	6K.L2R01.001	ASSY BZL ABS Y7015A Q24W5	
11	6K.L2R02.001	ASSY RC ABS Y7015A Q24W5	
12	6K.L2R05.001	ASSY BASE (ZN) ABS Y7015 Q24W5	
13	4D.L1S01.021	CTN A 661*253*512 Q24W5 BENQ	
14	4G.L2R01.001	CSN TOP EPS Q24W5	
15	4G.L2R02.001	CSN MIDDLE EPS Q24W5	
16	4G.L2R03.001	CSN BTM EPS Q24W5	
17	5K.L9005.501	CABLE SIGNAL 15/15P CORE*1 1.5M CABLE SIGNAL DVI-D/DVI-D	
18	5K.L1A08.501	2M	

*** THIS PARTS LIST MAY BE SUBJECT TO CHANGE
WITH PRIOR NOTICE BY CSD OF BENQ.**

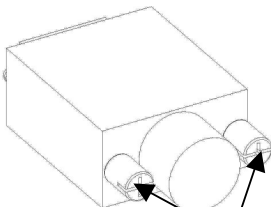
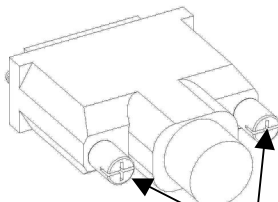
Appendix 1 – Screw List / Torque

(A) STANDARD SCREW TORQUE SPEC.

ITEM	P/N	DESCRIPTION	MOUNTING MATERIAL	TORQUE (KG-CM)	HOLE SIZE (MM)	Screw Head
1	8F.20FB4.019	SCRW MACH HEX #4-40*0.3" NI	METAL	5.0±0.6	#4-40	X
2	8F.5A224.5R0	SCRW MACH FLAT M3*5L ZN	METAL	Side mount:3±0.6 Other: 4±0.6	M3*0.5	#2
3	8F.XA356.6R0	SCRW TAP FLAT M4*6L B-ZN NYL	METAL	9.0±1.0	M4*0.7	#2
4	8F.8A356.100	SCREW MACH FPH M4*10L B-ZN NYL	METAL	11.0±1.0	M4*0.7	#2
5	8F.5A356.8R0	SCRW MACH FH M4*8L B-ZN NYL	METAL	9.0±1.0	M4*0.7	#2
6	6K.L7204.001	ASSY SCREW M4*10L FP527	METAL	11.0±1.0	M4*0.7	#2
7	6K.L8810.001	ASSY SCREW M4*8L FP726A NLK ISU	METAL	9.0±1.0	M4*0.7	#2
9	6K.L8811.001	ASSY SCREW M4*6 FP726A NLK ISU (8F.5A456.6R0+4B.L7212.001)	METAL	9.0±1.0	M4*0.7	#2
9	8F.5A422.2R4	SCRW MACH FLAT-P M2*2.4L ZN	Plastic	1.0±0.1	Φ1.4±0.05	#1
10	8F.VA512.4R0	SCRW TAP PH M2*4L NI	Plastic	1.0±0.2	Ø1.6±0.05	#1
11	8F.XA213.8R0	SCRW TAP FLAT/PT M2.5*8L ZN	Plastic	4.0±0.5	Φ2.0±0.05	#1
12	8F.WA314.8R0	SCRW TAP CAP M3*1.34P*8L B-ZN	PLASTIC	5.0±1.0	Φ2.35±0.05	#2
13	8F.XA524.6R0	SCRW TAP FLT M3*6L NI	PLASTIC	4.5±0.5	Ø2.35±0.05	#2
14	8F.XA314.8R0	SCRW TAP FLAT M3*1.34P*8L B-ZN	PLASTIC	4.5±0.5	Φ2.35±0.05	#2
15	8F.XA326.100	SCRW TAP FLAT M4*10L B-ZN	Plastic	7.5±0.5	Φ3.4±0.05	#2
16	8F.MA224.5R5	SCRW TAP FLAT-P M3*5.5L ZN	Metal	None tread : 8~10 Have tread:6~8 Aluminum:4~5	Φ2.68±0.03	#2
17	8F.MA324.5R5	SCRW TAP FLAT-P M3*5.5L B-ZN	Metal	None tread : 8~10 Have tread:6~8 Aluminum:4~5	Φ2.68±0.03	#2
18	8F.00273.6R0	SCRW TAP PH F/10WSH M3*6L C-ZN	Metal	None tread : 8~10 Have tread:6~8 Aluminum:4~5	Φ2.68±0.03	#2
19	8F.VZ526.6R0	SCRW TAP FLAT+EXTM4*6L ZN-W	Metal	10±1.0	M4*0.7	#2
20	8F.00007.144	SCREW TAP CAP #4-40*10 ZN	Aluminum	3.3±0.3	Φ2.6±0.03	#2

(B) SPECIAL SCREW TORQUE SPEC.

ITEM	P/N	DESCRIPTION	MOUNTING MATERIAL	TORQUE (KG-CM)	HOLE SIZE (MM)	Screw Head
1	8F.00274.8R0	SCREW FPH TAP M3*8L NI	Plastic	5.0±1.0	Φ2.35±0.05	#2
2	8F.00003.143	SCRW TAP PAN #4-40*3/8	Aluminum	3.3±0.3	Φ2.6±0.03	#2
3	8F.VG434.4R0	SCRW TAP PAN F/WSH M3*4L C-ZN	METAL	No thread : 8~10 Have thread: 6~8 Aluminum: 4~5	Ø2.68±0.03	#2
4	8F.1A356.100	SCRW MACH PAN M4*10L B-ZN NYLO	Metal	11.0±1.0	M4*0.7	#2
5	6K.L1G06.001	ASSY SCRW M4*12L L1740	METAL	11.0±1.0	M4*0.7	#2
6	8F.5A356.120	SCRW MACH FHM4*12L B-ZN NYL	METAL	11.0±1.0	M4*0.7	#2
7	8F.PA526.8R0	SCREW TAP PAN M4*8L NI	PLASTIC	7.5±0.5	Ø3.4±0.05	#2
8	8F.5A554.5R0	SCRW MACH FLAT M3*0.5P*5L NI N	METAL	Side mount: 3±0.6 Other: 4±0.6	M3*0.5	#2
9	8F.3A526.6R0	SCRW MACH TRU M4*6L NI	Metal	9.0±1.0	M4*0.7	#2
10	8F.XA514.8R0	SCRW TAP FLAT PT M3*8L NI	Plastic Metal to plastic Plastic to plastic	4.5±0.5	Ø2.35±0.05	#2
11	8F.5A524.6R0	SCRW MACH FLAT M3*0.5P*6L NI	Metal Metal to metal Plastic to metal	Side mount : 3±0.6 other : 4±0.6	M3*0.5	#2
12	8F.5A556.120	SCRW MACH FH M4*12L NI NYL	Metal Metal to metal Plastic to metal	11.0±1.0	M4*0.7	#2
13	8F.VG434.6R0	SCRW TAP ME FW BH M3*6L F/ZN	Metal	No thread : 8~10 Have thread : 6~8 Aluminum : 4~5	Ø2.68±0.03	#2
14	8F.XA514.6R0	SCRW TAP FLAT M3*6L PT NI	Plastic Metal to plastic Plastic to plastic	4.5±0.5	Ø2.35±0.05	#2
15	8F.XA514.8R0	SCRW TAP FLAT PT M3*8L NI	Plastic Metal to plastic Plastic to plastic	4.5±0.5	Ø2.35±0.05	#2

16	8F.5A224.6R0	SCRW MACH FLAT M3*0.5P*6L ZN	Metal Metal to metal Plastic to metal	Side mount : 3±0.6 other : 4±0.6	M3*0.5	#2
*SCREW Q'TYPE AND POSITION REFERRED TO C328. *NOTES: 1. (A)STANDARD SCREW TORQUE SPEC. 2. (B)SPECIAL SCREW TORQUE SPEC. 3. T: TAPPING SCREW. 4. M: MACHING SCREW.			D-SUB Connector SCREW TORQUE SPEC.  SCREW TORQUE: 3±0.5 (KG-CM)	DVI Connector SCREW TORQUE SPEC.  SCREW TORQUE : 3±0.5(KG-CM)		

Appendix 2: Physical Dimension Front View and Side view

Fig. 1 Physical Dimension Front View and Side view

