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## **1.1 Introduction**

This specification describes a 17" color TFT LCD monitor which is supported by analog interface solution and support maximum resolution 1280x1024 at 75Hz refresh rate. It has the following features:

- User controls:
  - (a) "Power on/off" switch.
  - (b) "Exit" key(Back to main OSD menu or leave OSD menu).
  - (c) "I-key"(Intelligent key for automatic adjustment function by pressing one button).
  - (d) "Enter" key(for enter OSD sub-menu or select items.
  - (e) "Wheel"(for selecting adjustable items in left/right direction and increasing / decreasing the selected item by rotating it).
- OSD window for control and information display with 6 languages selection.
- DPMS (Display Power Management System)
- Power on/off indicator.
- High quality advanced zoom function (Scaling function)
- Swivel/Tilt base(with 300 degree swivel function and up/down tilt function from 0 to +25 degree).
- DDC1/2B function supported.
- Optional USB hub supported(compliance with USB version 1.1)
- Optional audio speakers supported.

It is composed of the following materials:

- A LCD monitor
  - (a) Head part:
    - (1) A LCD module(Samsung: LT170E2-131).
    - (2) An Inverter board.
    - (3) An AC-DC board(with audio circuit)
    - (4) An Interface board.
    - (5) A control board.
    - (6) An undetachable 15pin D-sub signal cable.
    - (7) Two speakers(optional)
  - (b)Base part:
    - (1) Swivel/Tilt base.
    - (2) An 1 upstream port/2 downstream ports USB hub(optional).
- A power cord.
- An user menu.
- Setup disk.(including .INF/.ICM/Test pattern)
- A Macintosh signal adapter.
- A USB cable(optional).
- A audio cable(optional).

## 1.2 Operational Specification

### 1.2.1 Environment:

#### 1.2.1.1 Temperature

- Operating 0 to +40°C
- Non-operating -20 to +60°C

#### 1.2.1.2 Humidity

- Operating 20% to 80% at non-condensing and less than 39°C condition
- Non-operating 5% to 95% at non-condensing and less than 39°C condition

#### 1.2.1.3 Altitude

- Operating(without packing condition) 0 to 3,657m (12,000ft)
- Non-operating(with packing condition) 0 to 12,192m (40,000ft)

### 1.2.2 Transport:

#### 1.2.2.1 Vibration Test:

##### 1.2.2.1.1 Sinusoidal Vibration Test:

Frequency(Hz): 2-200-2 Hz

Acceleration: 0.3 G

\*Duration: 25 Minutes/ Per Axis (X, Y, and Z Axis)

Acceleration: 0.5 G at resonant frequency

\*Duration: 15 Minutes/ Per Axis (X, Y, and Z Axis)

(Test passed criteria: After test, there is no electrical and mechanical damage.)

##### 1.2.2.1.2 Random Vibration Test:

10 – 200 – 10Hz, 1.04Grms, 15 min, X, Y, Z Axis. Each one time.

Frequency(Hz)	G <sup>2</sup> /Hz(PSD Level)
2.0	0.0010
4.0	0.0300
8.0	0.0300
40.0	0.0030
55.0	0.0100
70.0	0.0100
200.0	0.0010

(Test passed criteria: After test, there is no electrical and mechanical damage.)

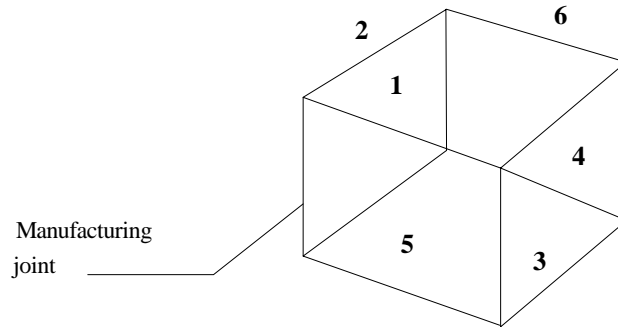
### 1.2.2.2 Drop Test (with packing, non-operating condition)

1.2.2.2.1 Drop Height: 76 cm.

1.2.2.2.2 Drop Sequence

Surface number define:

- 1: Top
- 2: Front
- 3: Bottom
- 4: Rear
- 5: Left
- 6: Right



-Corner 5-3-2 select at weakness side [the low left(or right) corner of the front panel]

-An edge drop with impact on the shortest edge radiating from corner 5-3-2

-An edge drop with impact on the next shortest edge radiating from corner 5-3-2

-An edge drop with impact on the longest edge radiating from corner 5-3-2

-A flat drop with impact on the rear

-A flat drop with impact on the front

-A flat drop with impact on the right

-A flat drop with impact on the left

-A flat drop with impact on the bottom

-A flat drop with impact on the top

(Test passed criteria: After test, there is no electrical and mechanical damage.)

### 1.2.3 Packing Configuration:

#### 1.2.3.1 Container Specification:

##### a.) Shipping Container

Container Type		20'8'8'6" Steel	40'8'8'6" Steel	40'8'9'6" High Cube Steel
Weight (Unit: Kg)	Gross	24,000	30,480	30,480
	Tare	2,370	4,000	4,200
	Payload	21,630	26,480	26,280
Interior Measurement (Unit: mm)	Length	5,898	12,031	12,031
	Width	2,352	2,352	2,352
	Height	2,394	2,394	2,699
Volume(Cubic Meter)		33.2	67.74	76.4
Door opening (Unit: mm)	Width	2,340	2,340	2,340
	Height	2,280	2,280	2,585
Useable Interior Dimension (Deducted pallet(110mm & Operating space 50mm))	Length	5,890	12,000	12,000
	Width	2,330	2,330	2,330
	Height	2,120	2,120	2,405

##### b.) Air Transport:

Container Type		Container (1) 125"*96"*96"	Container (2) 125"*96"*118"	Container (3) 125"*88"*64"
Weight (Unit: Kg)	Gross	6,804	6,804	4,627
	Tare	129	129	129
	Payload	6,675	6,675	4,498
Interior Measurement (Unit: mm)	Length	3,048	3,048	3,048
	Width	2,260	2,260	2,082
	Height	2,438	2,997	1,625
Volume(Cubic Meter)		17	19	11

**1.2.3.2 Carton Specification:**

Product Weight (Unit: KG)	Net	7.5
	Gross	10
Carton Interior Measurement (Unit: mm)	Length	550
	Width	318
	Height	589
Carton External Measurement (Unit: mm)	Length	570
	Width	338
	Height	621

**1.2.3.3 Pallet Specification:**

a.) Dimension:

Transport Type		Pallet A	Pallet B	Pallet C
Shipping Pallet Dimension (Unit: mm)	Length	676	X	X
	Width	1140	X	X
	Height	115	X	X
Air Transport Pallet Dimension (Unit: mm)	Length	676	676	X
	Width	1140	570	X
	Height	115	115	X

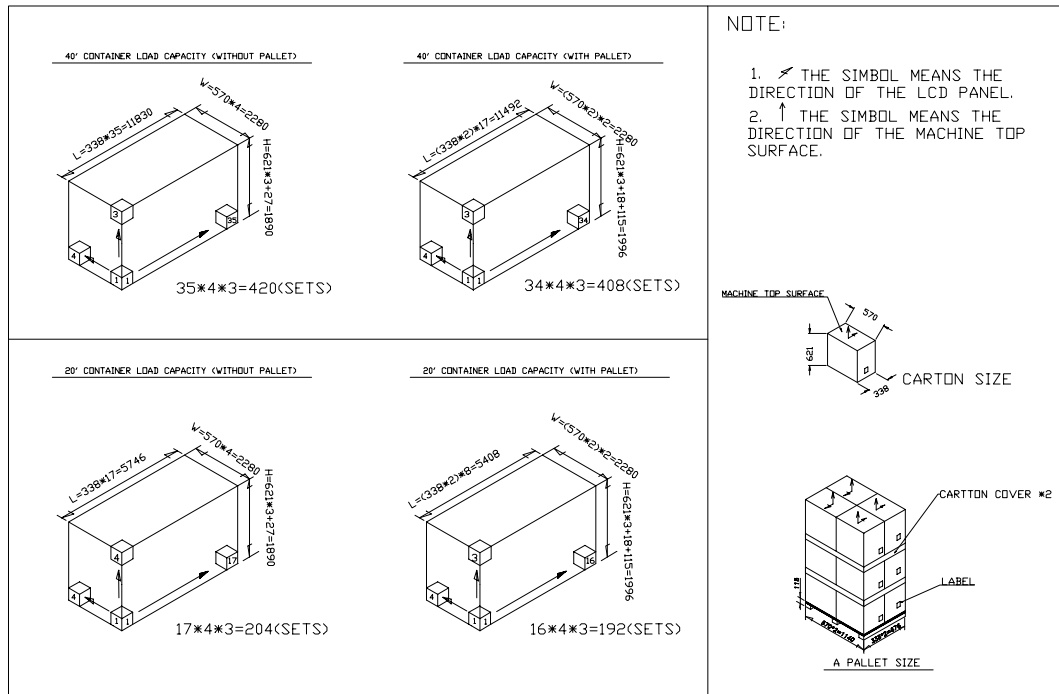
**1.2.3.4 Container Carrying Capacity:**

a.) Shipping Container:

Stowing Type		Quantity of products (sets) (Every container)	Quantity of Products (sets) (Every Pallet)	Quantity of pallet (sets) (Every Container)
with pallet	20'	192	Pallet A: 12	Pallet A: 16
			X	X
	40'	408	Pallet A: 12	Pallet A: 34
			X	X
without pallet	20'	204	X	X
			X	X
	40'	420	X	X
			X	X



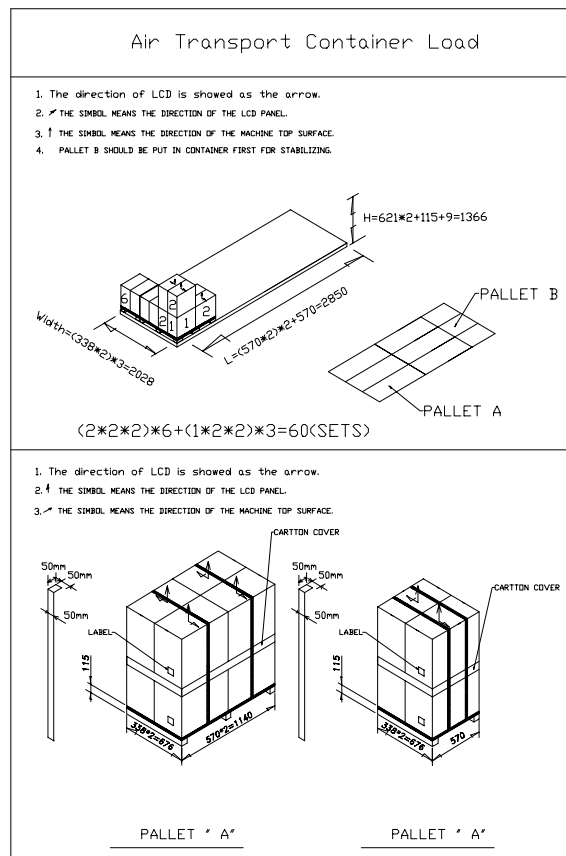
b.) Shipping Container Stowing Method:



c.) Air Transport Container:

Container Type	Quantity of products (sets) (Every container)	Quantity of Products (sets) (Every Pallet)	Quantity of pallet (sets) (Every Container)
Container( 3 ) 3048 * 2082 * 1625	60	Pallet A: 8	Pallet A: 6
		Pallet B: 4	Pallet B: 3
		Pallet C: X	Pallet C: X

d.) Air Transport Container Stowing Method:



### 1.2.4 Electrostatic Discharge Requirements

The subject product must withstand 4 KV for contact discharge and 8 KV for air discharge of Electrostatic Discharge and meet the acceptance criteria as specified in XXXISO 9241-3XXX -- should be IEC 801-2 .

### 1.2.5 Safety Requirements

The display unit complies with the following safety standards and specifications.

- UL compliance....standard for information-processing and business equipment, UL 1950.
- CSA compliance...standard C22.2 No. 950-M89, data processing equipment.
- TUV compliance...EN60950 safety specification-business equipment.
- ISO13406-2 .Ergonomic Requirements of Visual Display.
- Demko...EN60950.
- Nemko...EN60950.
- Semko...EN60950.
- Fimko....EN60950.

**1.2.6 EMI Requirements**

1.2.6.1 This display unit complies with the following EMC rules and regulations.

- FCC compliance...FCC Rule, Part 15, Subpart B, Class B.
- VCCI compliance...VCCI Rule, Class-2.
- CE Mark Compliance... 89/336/EEC.
  - EN55022 Class B
  - EN61000-3-2
  - EN61000-3-3
  - EN55024
  - EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5
  - EN61000-4-6, EN61000-4-8, EN61000-4-11
- DNSF compliance...EN55022, Class B.
- MPR2 compliance & EN50279
- TCO99(option)

1.2.6.2 The sample for EMI agency approval should be under 3 dB of the limit.

The production pilot run units should be under 3 dB of the limit.

The mass production units should be under 1 dB of the limit.

**1.2.7 Reliability**

1.2.7.1 The prediction MTBF of display unit shall be greater than 40,000 hours excluding the lamp.(at 25 °C)

1.2.7.2 Lamp life time: 20,000 hrs minimum at which brightness of lamp is 50% compare to that of initial value at Ta=25+/-2°C and IL=13.0mA.

**1.2.8 Mechanical Design for TCO 99**

1) Front Frame Reflectance:

- \* diffuse reflectance: > 20%
- \* Gloss <= 30% gloss unit

2) Labeling of plastics:

Plastic weight > 25g shall be marked in accordance with ISO11469

3) Variety of Plastic:

All plastic components that weight > 100g shall be made from the same type of plastic.

4) Painting of Plastic:

- \* Any plastic components that weight >100g shall not be painted lacquer or vanished, so that the paint, lacquer or vanish in dry matter exceed 1 weight-% of the plastic component.
- \* Mould decoration (IMD) is not allowed
- \* All paints, lacquers, vanishes or colour additives used shall be declared by the type and mount.

5) Metallization of Plastic Housing:

- \* Metallization is not allowed.

- 6) Plastic components > 25g shall not contain retardants of organically bound chloride or bromide.

**1.2.9 Environment Protection Design :**

Product is Per ES 715-c49 Environment Design Guide

**1.2.10 Acoustical Noise**

With the display operating, the issue of sound measured is contained within 40 dB/A in the audible field.

## 1.3 Input / Output Signal Specification

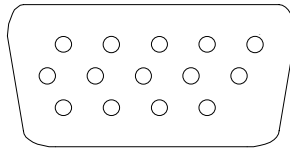
### 1.3.1 Input Signal Requirements

#### 1.3.1.1 Signal cable (Directly attached to unit)

##### 1.3.1.1.1 Video Inputs:

15pin D-sub connector is on the captive signal cable for IBM VGA, compatible graphic adapters.

The pin assignment of this connector is described as below:



\* 15pin D-sub female

- 1 RED VIDEO
- 2 GREEN VIDEO
- 3 BLUE VIDEO
- 4 GROUND
- 5 GROUND
- 6 RED GROUND
- 7 GREEN GROUND
- 8 BLUE GROUND
- 9 PC5V
- 10 SYNC GROUND
- 11 GROUND
- 12 SDA
- 13 H SYNC (H+V)
- 14 V SYNC
- 15 SCL

##### 1.3.1.1.2 Cable length

1500mm +/- 20mm

#### 1.3.1.2 Video signals

RGB separate, Analog 0.7Vp-p/75 Ohm

#### 1.3.1.3 Sync signal

- H/V separate , TTL level
- H/V composite ,TTL level

### 1.3.2 Function

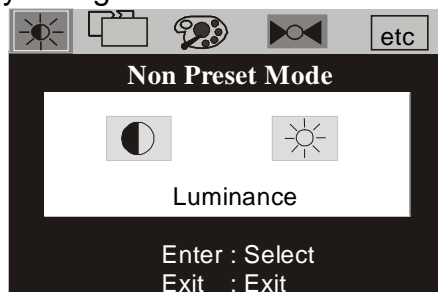
#### 1.3.2.1 Support timing

This Interface board is designed to operate in any of the following video mode.

Incoming display mode(Input timing)					Multi-scan operation
Resolution	Horizontal Frequency (KHz)	Vertical Frequency (Hz)	Dot Clock Frequency (MHz)	Remark	Actual display resolution
*640x350	31.47(P)	70.08(N)	25.17	DOS	full screen 1280x1024
*720x400	31.47(N)	70.08(P)	28.32	DOS	
*640x480	31.47(N)	60.00(N)	25.18	DOS	
*640x480	35.00(N)	67.00(N)	30.24	Macintosh	
*640x480	37.86(N)	72.80(N)	31.5	VESA	
*640x480	37.50(N)	75.00(N)	31.5	VESA	
*800x600	37.88(P)	60.32(P)	40.00	VESA	
*800x600	48.08(P)	72.19(P)	50.00	VESA	
*800x600	46.86(P)	75.00(P)	49.50	VESA	
832X624	49.72(N)	74.55(N)	57.29	Macintosh	
*1024x768	48.36(N)	60.00(N)	65.00	VESA	
1024x768	56.48(N)	70.10(N)	75.00	VESA	
*1024x768	60.02(P)	75.00(P)	78.75	VESA	
1024X768	60.24(N)	74.93(N)	80.00	Macintosh	
1152x864	67.50(P)	75.00(P)	108.00	VESA	
1152x870	68.68(N)	75.06(N)	100.00	Macintosh	
1152x900	61.80(P)	66.00(P)	92.94	SUN 66	
1152x900	71.81(N)	76.14(N)	108.00	SUN	
*1280x1024	64.00(P)	60.00(P)	108.00	VESA	
*1280x1024	75.83(N)	71.53(N)	128.00	IBM1	
*1280x1024	80.00(P)	75.00(P)	135.00	VESA	
1280x1024	81.18(N)	76.16(N)	135.09	SPARC2	

Notes (1) The timings with “\*”symbol will not be adjusted in the factory, but there will be still the default settings(rough data) for these timings.

(2) If the incoming display mode is not supported by this I/F board listed above, the up side of OSD window will show “Non Preset Mode” as below to indicate it. Maybe the picture can show up or doesn’t which is unpredictable, even the picture can display but probably isn’t good or clear.



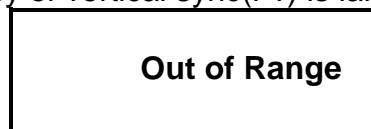
(3) Some signals from graphics board may not function properly.

(4) “P”, “N” stands for “Positive”, “Negative” polarity of incoming HSYNC / VSYNC(input timing).

- (5) OSD will show “No Signal” message on the screen as below to indicate it while no display mode inputs,



- (6) OSD will show “Out of Range” message on the screen as below to indicate it while input display mode meet the following condition,
- (a) The resolution is larger than 1280x1024.
  - (b) The resolution is 1280x1024 but its frequency of vertical sync(Fv) is larger than 77Hz.
  - (c) The frequency of horizontal sync(Fh) is larger than 90KHz.
  - (d) The frequency of vertical sync(Fv) is larger than 110Hz.



### 1.3.3 Number of display colors: 16M color numbers

### 1.3.4 Stment function

#### (A) Hot key function

Contrast, Brightness & Speaker Volume(optional) adjustment.

#### (B) Main OSD menu

- 1.) Luminance: Contrast and Brightness adjustment.
- 2.) Geometry: Horizontal Position, Vertical Position, Phase and Pixel Clock adjustment.
- 3.) Color Adjustment: Recall preset R,G,B color, Red, Green and Blue adjustment.
- 4.) Input signal information: Recall preset geometric values.
- 5.) Miscellaneous: OSD Position adjustment, Zoom(on/off) and Language Selection.

### 1.3.5 Display Power Management System (DPMS)

This Interface board will automatically cut down the power of the monitor when not receiving HSYNC or VSYNC signals over about 5 seconds, and the condition are as below,

HSYNC	VSYNC	LCD Module	Backlight
pulse	pulse	on	on
No pulse	pulse	off	off
pulse	no pulse	off	off
No pulse	no pulse	off	off

**1.3.6 Plug & Play DDC1/2B Support**

When the DDC function is supported, it is necessary to input all EDID data(128 bytes) by using SCL and SDA signal, the DDC data table is as below,

Address	Data	Description
00	00	Header
01	FF	
02	FF	
03	FF	
04	FF	
05	FF	
06	FF	
07	00	
08	06	ID Manufacturer Name = API
09	09	
0A	19	ID Product Code = FP750 (Vender Assigned code)
0B	76	
0C	*	ID Serial Number 32 bits serial no. (use 0 if n/a)
0D	*	
0E	*	
0F	*	
10	*	Week of Manufacture (0-53),use 0 if n/a Year of Manufacture (year – 1990)
11	*	
12	01	EDID version
13	03	Revision
14	6C	Video Input Define
15	22	Max. H. Image Size (cm)
16	1B	Max. V. Image Size (cm)
17	78	(gamma*100) – 100
18	EA	DPMS
19	CB	Red Green Bits Rx1Rx0Rxy1Ry0Gx1Gx0Gy1Gy0 Blue White Bits Bx1Bx0By1By0Wx1Wx0Wy1Wy0 Red x bit9-2 Red y bit9-2 Green x bit9-2 Green y bits9-2 Blue x bit9-2 Blue y bit9-2 White x bit9-2 White y bit9-2
1A	F2	
1B	9B	
1C	5A	
1D	40	
1E	8C	
1F	25	
20	20	
21	4E	
22	57	
23	BD	Established Timing I
24	EF	Established Timing II
25	80	Established Timing III
26	71	Standard Timing Identification #1 1152X864 75HZ
27	4F	



Address	Data	Description
28	81	#2 1280X1024 60HZ
29	80	
2A	01	#3
2B	01	
2C	01	#4
2D	01	
2E	01	#5
2F	01	
30	01	#6
31	01	
32	01	#7
33	01	
34	01	#8
35	01	
36	30	Detailed Timing Description # 1  1280 X 1024 / 60HZ
37	2A	
38	00	
39	98	
3A	51	
3B	00	
3C	2A	
3D	40	
3E	30	
3F	70	
40	13	
41	00	
42	52	
43	0E	
44	11	
45	00	
46	00	
47	1E	
48	D5	Detailed Timing Description # 2  640X350, 70HZ Pixel clock : 25.175MHz
49	09	
4A	80	
4B	A0	
4C	20	
4D	5E	
4E	63	
4F	10	
50	10	
51	60	
52	52	
53	08	

Addr	Data	Description
54	52	
55	0E	
56	11	
57	08	
58	06	
59	1C	
5A	00	Detailed Timing Description # 3
5B	00	This Detailed Timing Description ASCII String "Monitor"
5C	00	
5D	FE	
5E	00	
5F	4D	
60	6F	
61	6E	
62	69	
63	74	
64	6F	
65	72	
66	0A	
67	20	
68	20	
69	20	
6A	20	
6B	20	
6C	00	Detailed Timing Description # 4
6D	00	This Detailed Timing Description ASCII String "Monitor"
6E	00	
6F	FE	
70	00	
71	4D	
72	6F	
73	6E	
74	69	
75	74	
76	6F	
77	72	
78	0A	
79	20	
7A	20	
7B	20	
7C	20	
7D	20	
7E	00	Extension Flag
7F	*	Check sum

**1.3.7 Power Supply Requirements****1.3.7.1 Input Power Requirements**

- (1) Input Voltage Range  
The unit shall meet all the operating requirements with an input voltage range of 90~264 Vac .
- (2) Input Current  
Maximum  
Input Current                      Measuring Range  
(MAX) 2 Arms                      90Vac ~ 264Vac
- (3) Frequency Range  
The unit shall operate within a frequency range of 47Hz to 63Hz.
- (4) Inrush Current  
Power supply inrush current shall be less than the ratings of its critical components(including Power switch, fuse, rectifiers and surge limiting device) for all conditions of line voltage.
- (5) Regulator Efficiency  
70% minimum (measuring at 115Vac and full load)
- (6) Power line Transient Immunity  
The power supply shall function properly after being subjected to a 0.3us / 1.2us, 2000 volts high peak pulse, or 5ns/10ns, 1500 volts fast peak pulse applied either differentially or single endedly to line and neutral at any phase of the power line voltage and shall not cause an unsafe or unrecoverable errors.
- (7) Maximum power consumption < 45 Watts (without USB hub & audio).  
Maximum power consumption < 53 Watts ( with USB hub & without audio )  
Maximum power consumption < 62 Watts ( with USB hub & audio )  
Power saving mode < 3 Watts
- (8) Safety concern:
  1. Earth leakage current < 1mA ( < 0.5mA at 100VAC )
  2. Electric strength > AC 1200V ( 1min )
  3. Insulation resistance > 10Mohm ( 500V )

**1.3.7.2 Output Power Requirements**

The power circuit shall supply DC power outputs as followings:

Output	Nominal	Regulation	Load Current Range
1	12V	±3%	0 ~ 3.0A
2	5V-FIX	±3%	0 ~ 500mA
3	5V	±3%	0 ~ 500mA
4	3.3 V	±3%	0 ~ 500mA

**1.3.7.3 AC Power Inlet**

The display unit shall be supplied with an AC power NICOON NC-174(or equivalent), to be located at the rear of the LCD Monitor.

**1.3.7.4 Input Power Cord**

Each AC adapter unit shall be supplied with a input power cord, with length of 1800mm king cord KC-003 or equivalent.

**1.3.7.5 Power Management**

Mode	H/Vsync	Power consumption	LED Color (Status)	Recovery Time
Normal	Both exist	< 45W (without USB hub)	Green (Normal)	--
off	None or only one exist	< 3W (without USB hub)	Amber	3 sec

**1.3.8 Panel optical Characteristics**

SAMSUNG LT170E2-131 optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25°C. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of  $\Phi$  and  $\theta$  equal to 0° and aperture 1 degree. The test equipment is BM-7. The input signal voltage and timing specification are  $V_{DD}$  of 5V, 60Hz of Fv and 54MHz of pixel rate respectively. The input current of backlight is 13mA rms.

Parameter	Symbol	Values			Units	Notes
		Min.	Typ.	Max.		
Contrast Ratio	CR	200	-	-		1
Luminance of White(center of screen)	YL	150	170	-	cd/m <sup>2</sup>	2
Brightness Uniformity	Buni	-	-	25	%	3
Response Time	T <sub>r</sub>		73	85	msec	
Rise Time	T <sub>R</sub>	-	34	40		
Decay Time	T <sub>F</sub>	-	39	45		
CIE Color Coordinates	x <sub>R</sub>	0.579	0.609	0.639	degree,	4
Red	y <sub>R</sub>	0.322	0.352	0.382		
	x <sub>G</sub>	0.273	0.303	0.333		
Green	y <sub>G</sub>	0.520	0.550	0.580		
	x <sub>B</sub>	0.118	0.148	0.178		
Blue	y <sub>B</sub>	0.098	0.128	0.158		
	x <sub>W</sub>	0.275	0.305	0.335		
White	y <sub>W</sub>	0.312	0.342	0.372		
Viewing Angle by CR ≥ 10	θ	70	80	-	degree,	4
x axis, right (Φ=0°)	θ	70	80	-		
x axis, left(Φ=180°)	θ	70	80	-		
y axis, up(Φ=90°)	θ	70	80	-		
y axis, down (Φ=270°)	θ	70	80	-		

## OPTICAL CHARACTERISTICS

**Notes** 1. Contrast Ratio (CR) is defined mathematically as:

$$\frac{(\text{Surface Brightness with all white pixels})}{(\text{Surface Brightness with all black pixels})}$$

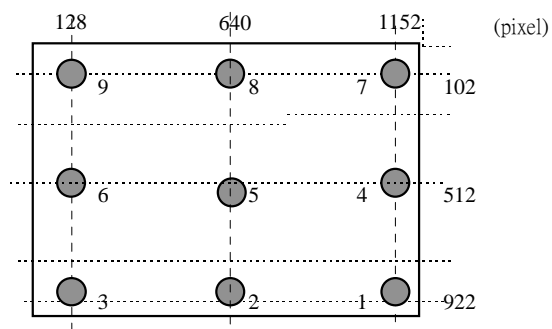
Contrast ratio shall be measured at the center of the screen (Location 5).

2. Luminance of White is brightness value at location 5(refer to note 3) at center of the screen.

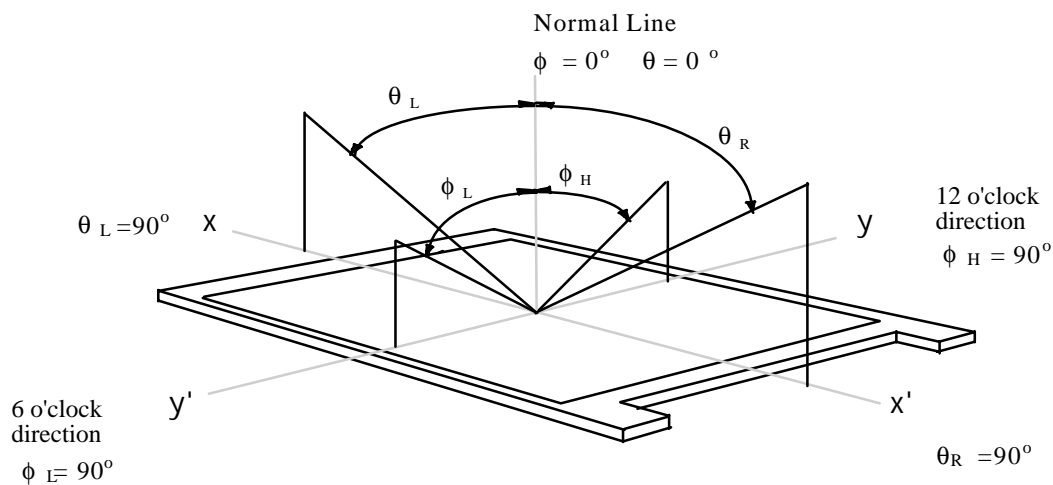
3. The 9 points brightness uniformity, Buni is defined as :

$$\frac{|\text{Maximum}(B_1, B_2, \dots, B_9) - \text{Minimum}(B_1, B_2, \dots, B_9)|}{\text{Maximum}(B_1, B_2, \dots, B_9)} \times 100(\%)$$

Where B1 to B9 are the brightness with all pixels displaying white at 9 locations.



4. Viewing angle is the angle at which the contrast ratio is greater than 10.



### 1.3.9 Panel Electrical Specifications

The SAMSUNG LT170E2-131 requires two power inputs. One input is employed to power the LCD electronics and to drive the voltages to drive the TFT array and liquid crystal. And the second input for the backlight CCFL, is typically generated by an inverter. The inverter is an external unit to the LCD.

Table 2 ELECTRICAL CHARACTERISTICS:

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Lamp Current	IL	6.0	13.0	13.0	mArms	
Lamp Voltage	VL	-	765	-	Vrms	
Lamp Frequency	fL	40	-	60	KHz	1
Operating Life Time	Hr	20,000(13mA)	-	-	Hour	2
		25,000(12.4mA)				
Startup Voltage	Vs	-	-	1100(25°C)	Vrms	3
				1420(0°C)		

- Notes: 1. Lamp frequency may produce interference with horizontal synchronous frequency and this may cause line flow on the display. Therefore lamp frequency shall be detached from the horizontal synchronous frequency and its harmonics as far as possible in order to avoid interference.
2. Life time (Hr) of a lamp is defined as the time in which it continues to operate under the condition of  $T_a = 25 \pm 2^\circ\text{C}$  and  $IL = 13\text{mArms}$  for dual lamps until the brightness becomes 50% or lower than it's original value.
3. If an inverter has shutdown function it should keep its output for more than 1 second even if the lamp connector open. Otherwise the lamps may not to be turned on.

## 1.4. Functional specification

All the tests to verify specifications in this section must be performed under the following standard conditions unless otherwise noted. The standard conditions are:

- Temperature : 0 to 40 degree Celsius
- AC line input voltage : 100 Vac to 240 Vac, 50Hz or 60Hz
- Warm-up time : 30 minutes minimum

### 1.4.1 Display Quality

#### 1.4.1.1 Display Data Area (with full white pattern)

- (1) Horizontal: 404 +/- 0.5 mm
- (2) Vertical: 322.5 +/- 0.5 mm

#### 1.4.1.2 Video Performance

- (1) Resolution : 1280x1024 pixels Maximum
- (2) Contrast ratio : 200(Min.)
- (3) Response time : 73 mS(Typ.)
- (4) Viewing angle : U/D:70° , R/L:70° (Min.) (At contrast ratio >= 10)
- (5) CIE Coordinate: White (0.305, 0.342) +/- (0.03, 0.03)
- (6) Display color: 16.7 M (with FRC)

#### 1.4.1.3 Light Output

Brightness rating : 170cd/m<sup>2</sup> (Typ.)

#### 1.4.1.4 Brightness Adjustment Range

At contrast ratio control set at maximum level, adjusting Brightness control from minimum to maximum position, the light output of WHITE pattern shall be increased more than 40cd/m<sup>2</sup>.

### 1.4.2 Audio Quality(Optional)

#### 1.4.2.1 Preamp + Poweramp:

- (1) Output Power : 1.0 W rms/CH @ 1KHz
- (2) THD (@ 1W) : <1%
- (3) S/N ratio : 50db

#### 1.4.2.2 Speaker Driver:

- (1) Nominal Impedance: 8 Ohm
- (2) Maximum Input Power: 2 W/CH
- (3) Frequency Response: 12KHz
- (4) Size: 30\*70 mm
- (5) Magnetic Shield: Required

#### 1.4.2.3 Audio Controls:

- (1) Volume 0- 5 V

### 1.4.3 USB pure hub(Optional)

- (1) Use ISP1122(Philips stand-alone USB hub device) solution.
- (2) Compliance with "USB Specification Rev.1.1".
- (3) Support 1 upstream port and 2 downstream ports.
- (4) USB power: DC 5V (+/- 0.5V), 1A(+/- 0.1A).

## **1.5. Physical Specifications**

### **1.5.1 Physical Dimension & Appearance**

#### **1.5.1.1 Overall Dimensions**

422mm (W) X 451mm (H) X 207.97mm (D)

#### **1.5.1.2 Outer Appearance**

see Fig.1

### **1.5.2 Construction and Materials on outer surface**

- (1) Materials: Plastic
- (2) Color: WHITE  
To be defined for OEM

### **1.5.3 Base**

- (1) Tilt: 0/+25 °
- (2) Swivel: ±150 °

### **1.5.4 Marking & Labels**

#### **1.5.4.1 Reference Label (Rear panel)**

- (1) Reference numbers
- (2) Manufacture data
- (3) Agency Approvals
- (4) Power Ratings

#### **1.5.4.2 Controls & Connectors**

- (1) AC power cord input: abbreviated labels
- (2) User's Controls: standard print

### **1.5.5 Packaging**

#### **1.5.5.1 Carton Dimension**

510mm (W) X255mm (D) X 530mm (H) ( LCD monitor )

#### **1.5.5.2 Shipping Weight**

10kg ( LCD monitor )

#### **1.5.5.3 Shipping Container**

792 sets per 40 feet container without pallet.



## **1.6 Maintainability Specifications**

### **1.6.1 General & Requirements**

#### **1.6.1.1 Installation**

From outside of unit with standard tools and documentation provided to user.

#### **1.6.1.2 Periodic Maintenance**

No periodic maintenance is required.

#### **1.6.1.3 Repair & Calibration**

Require spare modules or components as specified as followings:

- (1) Interface board ASSY
- (2) AC-DC converter board ASSY
- (3) Control board ASSY
- (4) USB board ASSY(optional)

### **1.6.2 Mean Time to Repair**

#### **1.6.2.1 Module Level**

Less than 10 minutes

#### **1.6.2.2 Component Level**

Less than 15 minutes

### **1.6.3 Accessibility**

#### **1.6.3.1 General:**

All panels, covers, and major assemblies are removable without disruption of permanent mounting or fasteners.

#### **1.6.3.2 Outside Cabinet, access to the following elements**

- Operating Controls
- AC Inlet
- Audio in
- DC Jack for USB hub(optional)

#### **1.6.3.3 Cover Removal, Access**

All sub assemblies and internally adjustable components may be accessed by removing the base and the rear cover .

### **1.6.4 Equipment & Tools Required**

#### **1.6.4.1 Standard Test Equipment**

- (1) Voltmeter
- (2) Dual trace oscilloscope
- (3) Hand tools as required

(4) Computer with IBM VGA , or compatible graphic adapter

**1.6.4.2 Documentation**

A service manual will be available which covers all service requirements.  
A users manual written  
in Japanese German, Italian, Spanish, France and English will be available  
to ship with the product.

**1.6.5 Electrical Emission and Energy Saving summary for TCO99**

**1.6.5.1 Electrical Field(AC):**

- \*Band I < 10V/m (132cd/m<sup>2</sup>, "+" pattern)
- \*Band II < 1V/m (132cd/m<sup>2</sup>, "+" pattern)

Note: Shielded power cord is not acceptable

**1.6.5.2 Magnetic Field(AC):**

- \*Band I < 200nt (132cd/m<sup>2</sup>, "+" pattern)
- \*Band II < 32nt (132cd/m<sup>2</sup>, "+" pattern)

Note: Shielded power cord is not acceptable

**1.6.5.3 Energy Saving:**

- \*1<sup>st</sup> stage: <15W(recover time:3 sec)
- 2<sup>nd</sup> stage: <5W
- \*single stage: <5W(recover time: 3sec)

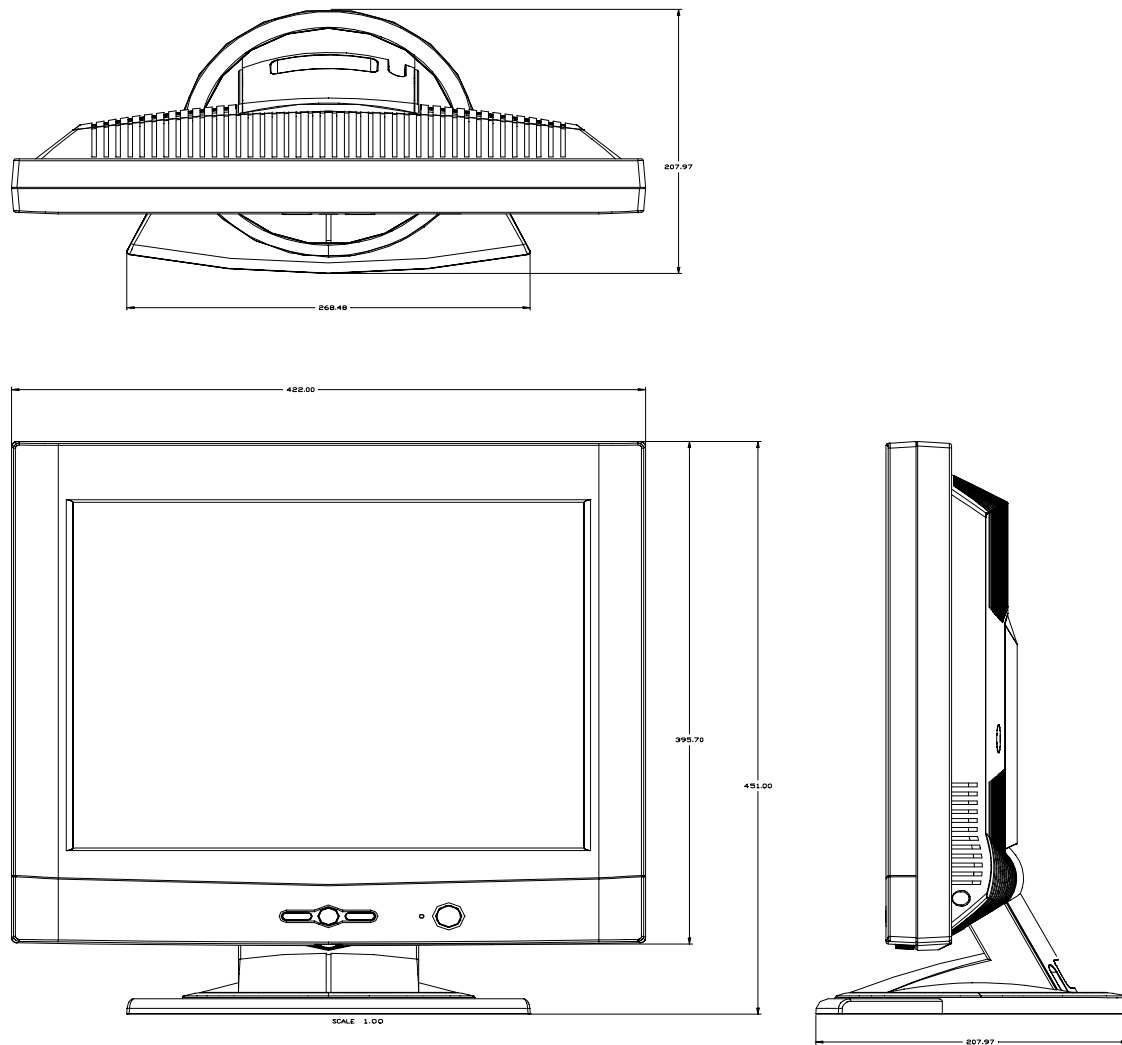


Fig. 1 Physical Dimension Top View, Front View and Side view

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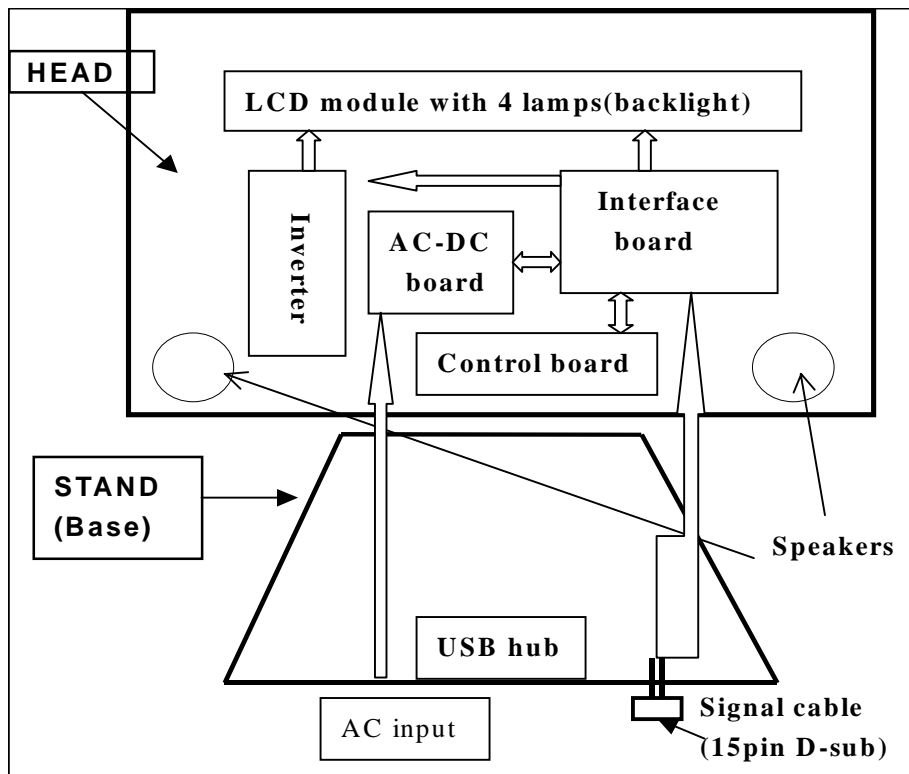
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## 2.1 Introduction

The FP750 is an 17" SXGA(1280x1024) 24 bits color TFT LCD monitor with multi-media function and an optional USB hub. It's an analog interface LCD monitor with an undetachable 15 pins D-sub signal cable and it's compliant with VESA specification to offer a smart power management and power saving function. It also offers OSD menu for users to control the adjustable items and get some information about this monitor, and the best function is to offer users an easy method to set all adjustable items well just by pressing one key, we called it "i-key"(intelligent key) which can auto adjusting all controlled items.

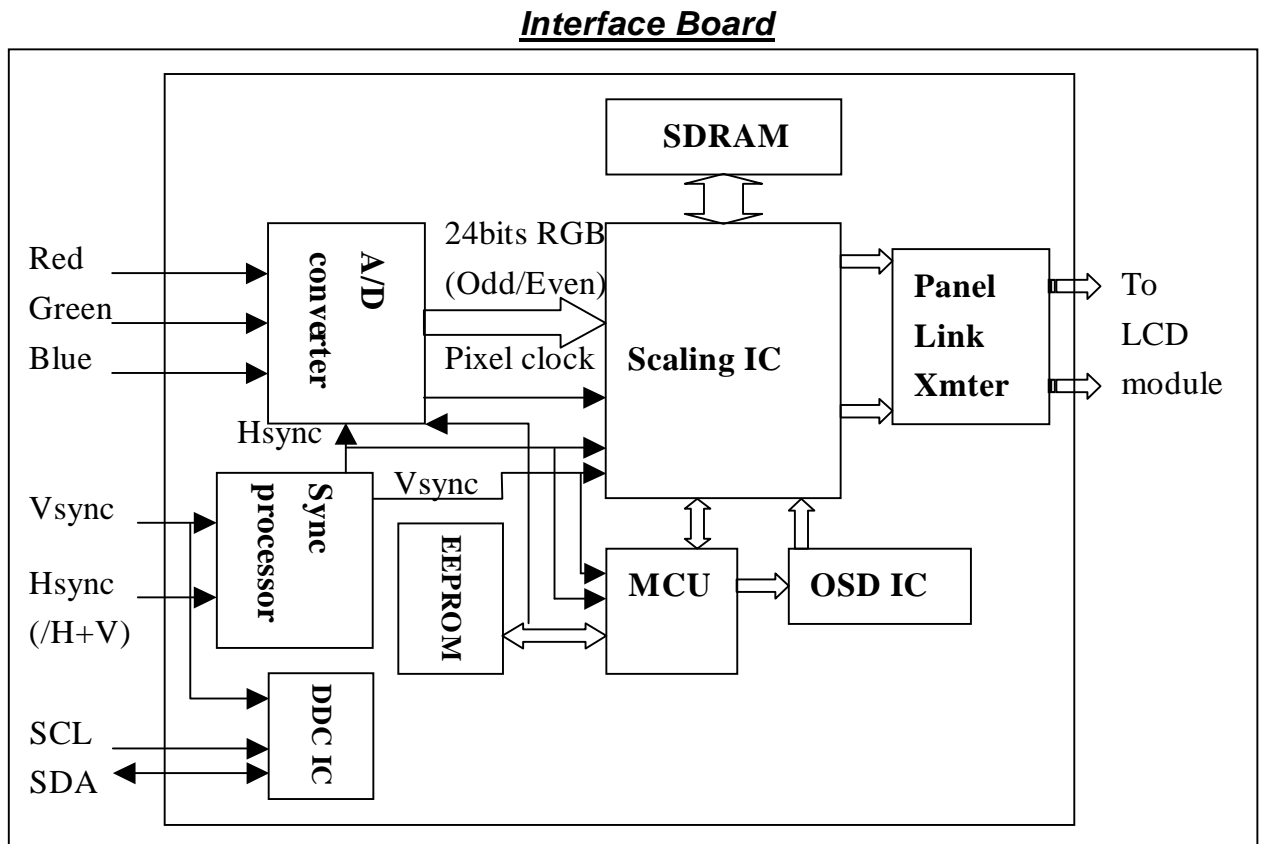
## 2.2 Block diagram

The FP750 consists of a head and a stand(base). The head consists of a LCD module with 6 lamps, an Inverter, an Interface board, a DC-DC board, a Control board and a microphone. The stand consists of an AC-DC board, an Audio board, two speakers and an optional USB hub. The block diagram is shown as below,



## 2.3 Circuit operation theory

### 2.3.1 Interface board diagram



#### (a) Circuit operation theory

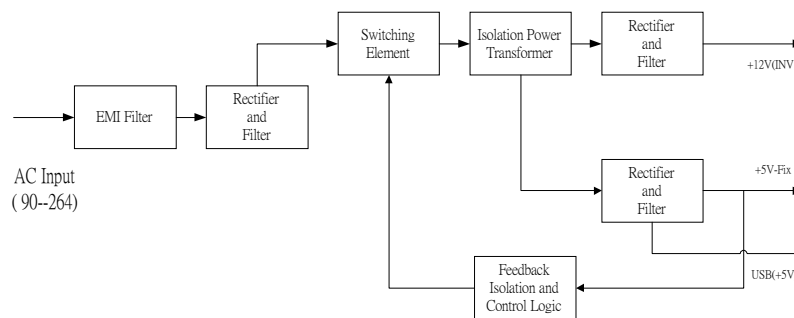
A basic operation theory for this interface board is to convert analog signals of Red, Green and Blue to digital signals of Red, Green and Blue, and by the internal PLL circuit of A/D converter to generate the pixel clock to output to the scaling IC, then the scaling IC use the SDRAM to be the frame buffer to process the different input signals which are operating in the specification of the A/D converter and the scaling IC, finally the scaling IC output the digital RGB data, the fixed frequency of Hsync, Vsync and pixel clock to LCD panel driver IC by PanelLink transmitter.

#### (b) IC introduction

- 1.) DDC(Display Data Channel) IC: We use ATMEL 24C21 to support DDC1/2B function, it will store the information related to LCD monitor and PC can read them by "Vsync and SDA" serial communication for DDC1 or I<sup>2</sup> C communication for DDC2B.
- 2.) Sync Processor: Because the A/D converter and the scaling IC of this board can't separate composite Sync into Hsync and Vsync by themselves, we use 14053B to output the pure Hsync and Vsync respectively to them to solve this application problem.

- 3.) A/D converter: We use AD9884 of ADI which can support maximum 140MHz pixel rate to convert analog signals of RGB to 24bits digital RGB signals and generate a pixel clock signal by Hsync and its internal PLL circuit, then transmit these digital signals to Scaling IC.
- 4.) Scaling IC: We use MX88L282 of Macronix and by its frame buffer function to process the digital RGB signals to maximum 75Hz refresh rate at 1280 by 1024 resolution(about 135MHz pixel rate), it also support a ratio expansion function to display a full screen when the resolution of input signals are less than 1280 by 1024.
- 5.) SDRAM: We use 3 pieces of 2M bytes SDRAM to be the frame buffer of the scaling IC to process maximum 1280 by 1024 resolution of 24 bits RGB data.
- 6.) MCU: We use Myson MTV112V to controls all the functions of this interface board, just like the mode detecting, OSD display setting, the adjustable items, adjusted data storage, DPMS control, the external RS232 communication and the scaling IC
- 7.) EEPROM: We use 24C04 to store all the adjustable data , and we divide it into two parts for the storage of factory settings and user settings.
- 8.) OSD IC: We use LSC3852 of Motorola to do "On Screen Display" function.
- 9.) PanelLink transmitter IC: We use Sil150 of PanelLink of Silicon Image to transmit all the digital data to the LCD panel driver IC because this driver IC has built-in Sil151(PanelLink receiver IC).

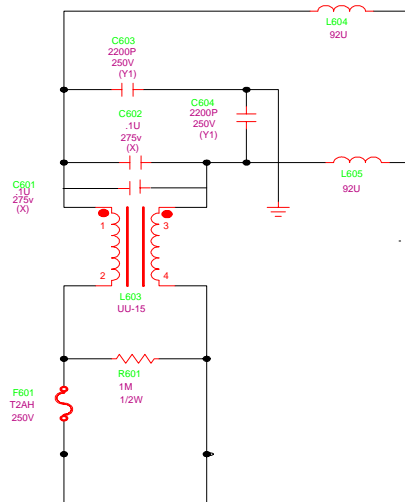
### 2.3.2 AC-DC board diagram



**Fig. 1**

**(a) EMI Filter**

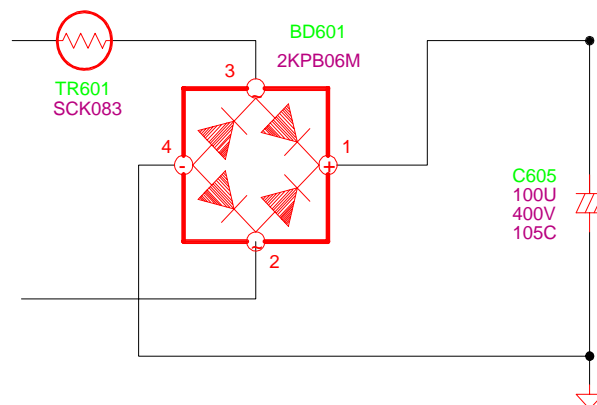
This circuit (fig. 2) is designed to inhibit electric and magnetic interference for Meet FCC, VDE, VCCI standard requirements



**Fig. 2**

### (b) Rectifier and filter

AC Voltage (90-264V) is rectified and filtered by BD601, C605 (See Fig 3) and the DC Output voltage is  $1.4 \times (\text{AC input})$ . (See Fig.3)

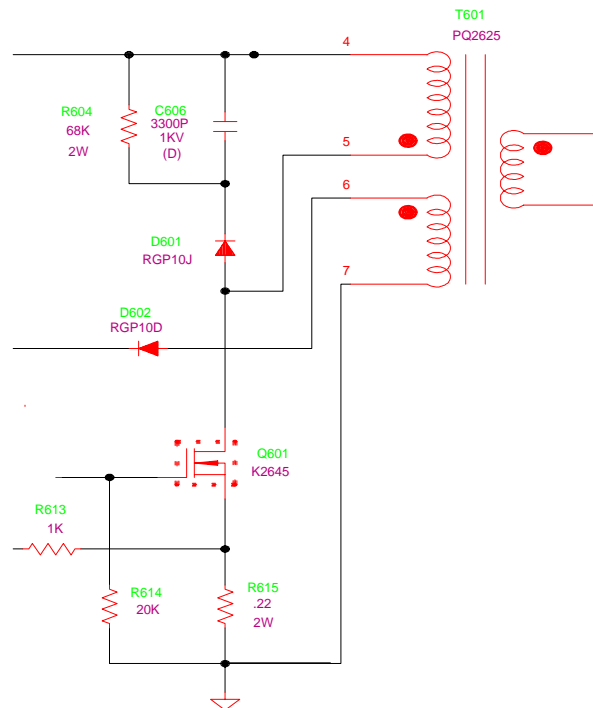


**Fig. 3**

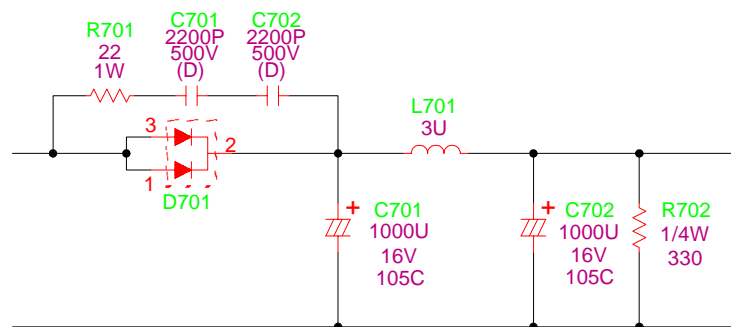


**(c) Switching element and Isolation power transformer**

When the Q601 turns on, energy is stored in the transformer. During Q601 OFF period, the stored energy is delivered to the secondary of transformer. R604, C606 and D601 is a snubber circuit. R605 is current sense resistor to control output power. (See Fig.4)

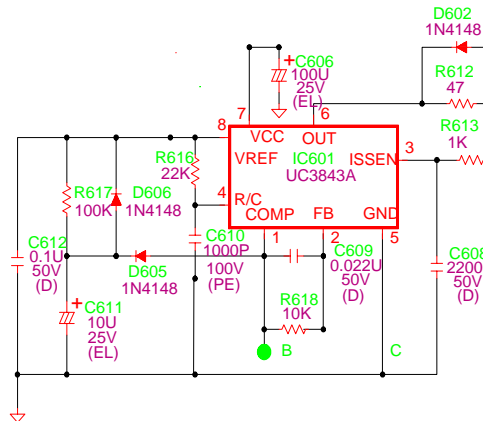
**Fig. 4****(d) Rectifier and filter**

D701 and C701 are to produce DC output. L701 and C702 are to suppress high Frequency switching spikes. R702 is a dummy load. (See Fig.5)

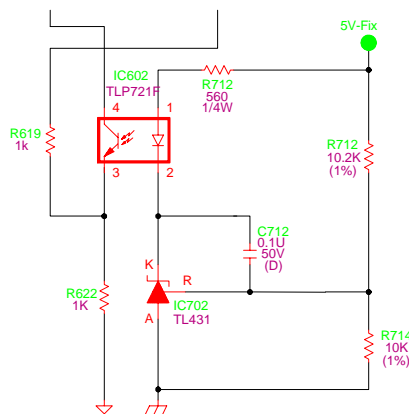
**Fig. 5**

**e) Control circuit**

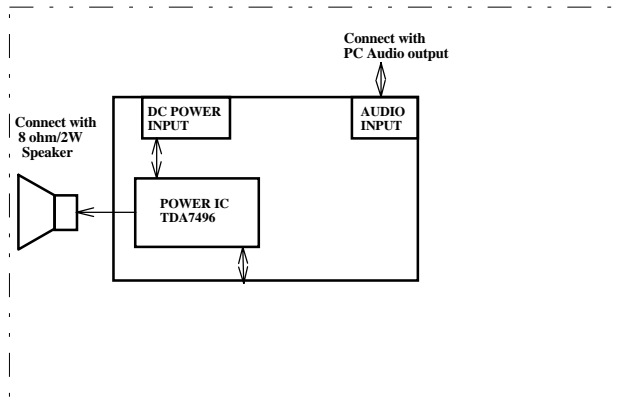
The current mode control IC UC3843A is used to control PWM. When the VCC terminal of it gets 8.4V, IC601 turns on. +5V will be set up at Pin8 through soft start circuit includes R617, C611, D606 and D605. R616 and C610 generate a fixed frequency sawtooth wave at Pin4.

**Fig. 6****(f) Feedback circuit**

TL721F is a optocoupler and TL431 is a shunt regulation. They are used to detect the output voltage change and 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.7)

**Fig. 7**

### 2.3.3 Audio Speaker(optional)



The Audio Speaker is consist of a Audio board. The Audio Speaker have DC Volumn control, use 28mmX40mm Speaker (2W/per chennal),power supply from AC-DC board and Audio input from PC Audio output (Line Out) .

#### (a) Power IC

Use ST POWER IC TDA7496.The IC are stereo AB Class output amplifiers with DC Volume control. The devices are designed for use in TV and monitor, but are also suitable for battery-Fed portable recorders and radios. Use +12V from AC-DC Board and connect speaker to offer 1W per chennal.

#### (b) DC Power Input

To supply +12V to be VCC source Voltage for TDA7496 and built-in AC-DC board.

#### (c) Audio Input

connect with PC Audio output in 3.5mm to 3.5mm signal line.

#### (d) Speaker

Use 8 ohm and 28mmX40mm speaker (2W/per chennal)

#### (e) DC Volumn Control

The voltage range is 1 – 5 V ( From MC )

**Alignment procedure (for function adjustment)**

1. Enter factory area (press “enter” & “exit” & “power on”)
2. select timing timing which has star sign(\*) have to adjust. (see figure 1)
3. clear user area.
4. adjust the contrast and the brightness bar to “50”.
5. Press I-key to adjust the image.
6. check the image if phase is not perfect adjust it to the best step.
7. Save factory parameter then turn off power
8. Clear user area
9. Turn on power enter user area.

Figure 1.

Incoming display mode(Input timing)					Multi-scan operation
Resolution	Horizontal Frequency (KHz)	Vertical Frequency (Hz)	Dot Clock Frequency (MHz)	Remark	Actual display resolution
*640x350	31.47(P)	70.08(N)	25.17	DOS	full screen 1280x1024
*720x400	31.47(N)	70.08(P)	28.32	DOS	
*640x480	31.47(N)	60.00(N)	25.18	DOS	
*640x480	35.00(N)	67.00(N)	30.24	Macintosh	
*640x480	37.86(N)	72.80(N)	31.5	VESA	
*640x480	37.50(N)	75.00(N)	31.5	VESA	
*800x600	37.88(P)	60.32(P)	40.00	VESA	
*800x600	48.08(P)	72.19(P)	50.00	VESA	
*800x600	46.86(P)	75.00(P)	49.50	VESA	
832X624	49.72(N)	74.55(N)	57.29	Macintosh	
*1024x768	48.36(N)	60.00(N)	65.00	VESA	
1024x768	56.48(N)	70.10(N)	75.00	VESA	
*1024x768	60.02(P)	75.00(P)	78.75	VESA	
1024X768	60.24(N)	74.93(N)	80.00	Macintosh	
1152x864	67.50(P)	75.00(P)	108.00	VESA	
1152x870	68.68(N)	75.06(N)	100.00	Macintosh	
1152x900	61.80(P)	66.00(P)	92.94	SUN 66	
1152x900	71.81(N)	76.14(N)	108.00	SUN	
*1280x1024	64.00(P)	60.00(P)	108.00	VESA	
*1280x1024	75.83(N)	71.53(N)	128.00	IBM1	
*1280x1024	80.00(P)	75.00(P)	135.00	VESA	
1280x1024	81.18(N)	76.16(N)	135.09	SPARC2	

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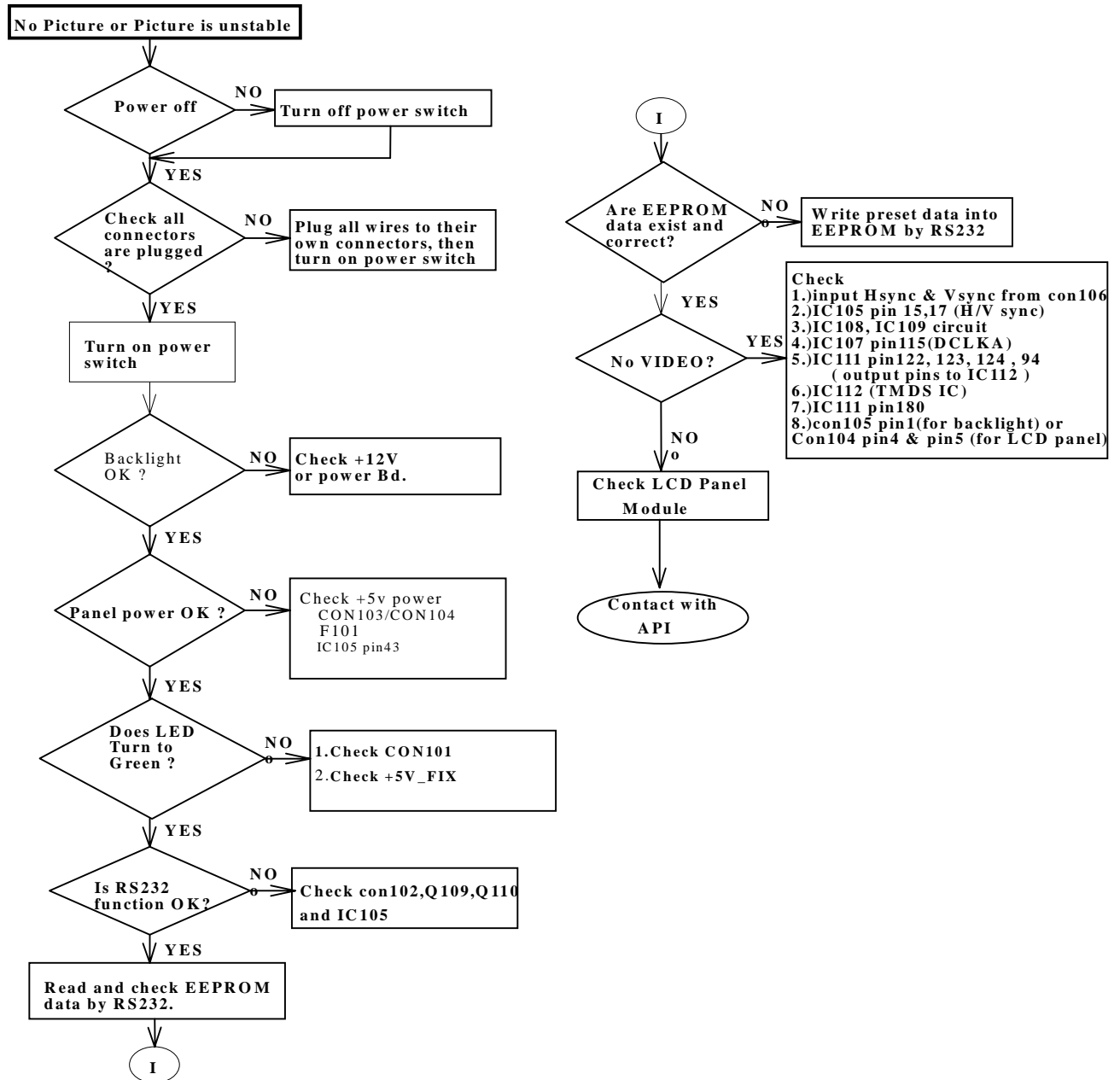
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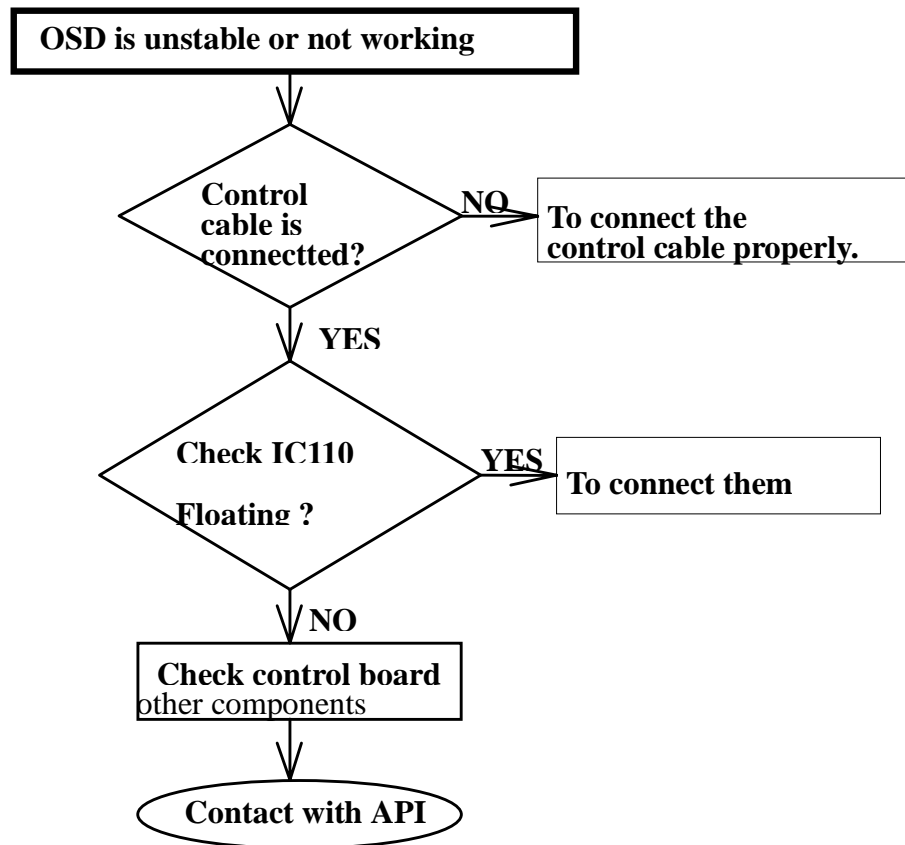
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## 4.1 No Picture or Picture is unstable



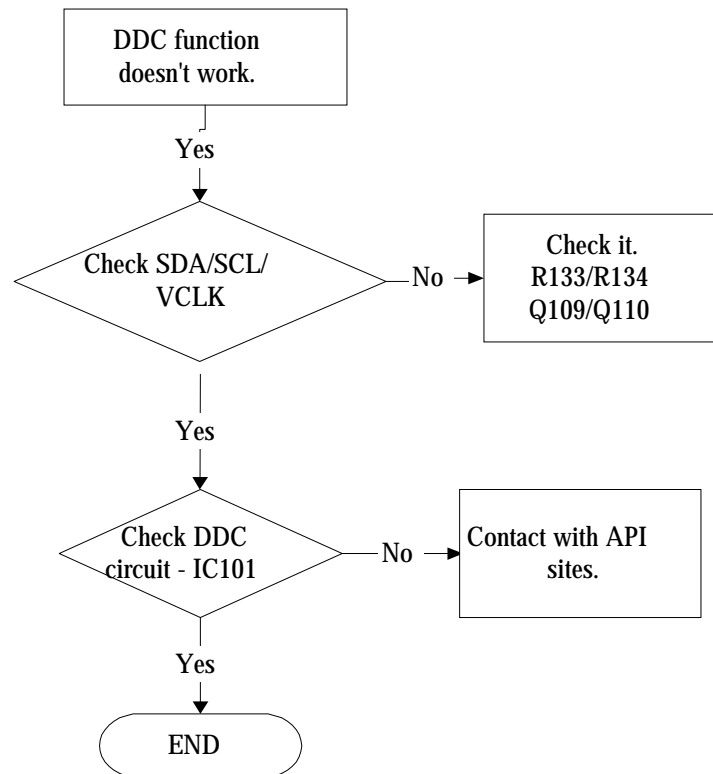
## 4.2 BUTTON function

### 4.2.1 Control Board



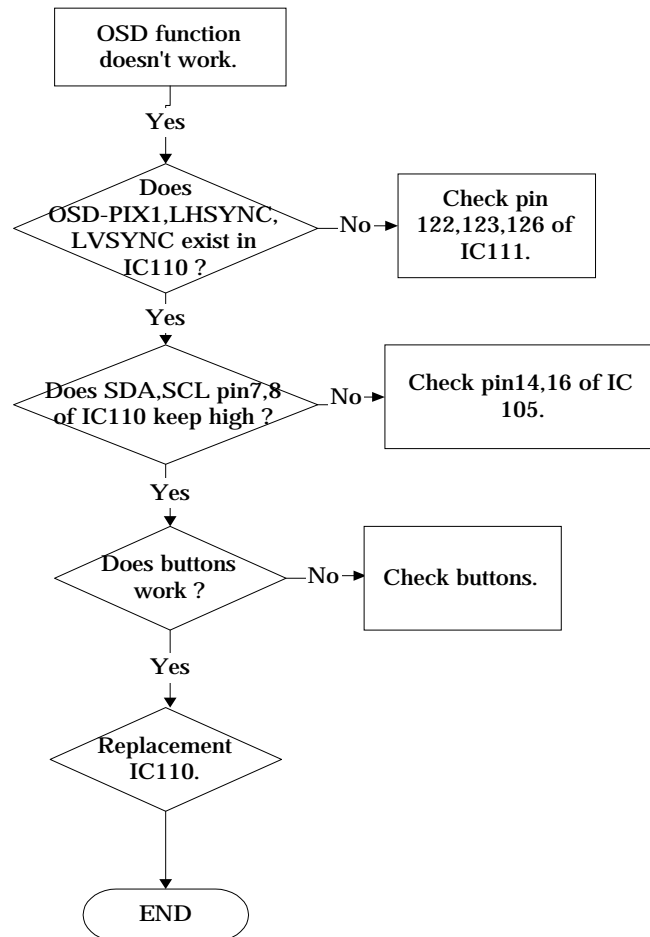
### 4.3 DDC function

#### 4.3.1 Power Board





## 4.4 OSD function



**P/N: 99.L0772.xxx**

ITEM	PART NO.	DESCRIPTION	LOCATION
1	55.L0703.001	INTERFACE BD FP750 (MI)	
2	71.00150.00G	IC PNL LINK SII150A	IC112
3	71.03852.00B	IC OSD LSC3852DW SO-W 24P	IC110
4	71.09884.009	IC GRAPH DIGIT AD9884	IC107
5	71.88282.A0E	IC FPD CTRL MX88L282 256P 3.3V	IC111
6	72.02421.001	IC EEPROM 24LC21AT-SN 8P	IC101
7	72.24C04.A01	IC EEPROM 24C04 512*K 8P	IC102
8	72.45161.A09	IC DRAM 451616AG5-A10-7	IC114,115,113
9	73.07414.061	IC CMOS 74LVC14A SO-N 14P	IC108
10	74.01117.03M	IC V.R LD1117-3.3 0.8A TO-252	IC106,121,122
11	74.14053.091	IC A.S. MC14053BD SO-N 16P	IC109
12	82.30006.001	XTAL 12MHZ 32P 30PPM	Y101
13	82.31431.001	XTAL 14.318MHZ 32P 30PPM 49US	Y102
14	84.04431.037	FET MOS SI4431DY-T1 PC SO-8	IC119
15	71.00112.M0C	IC MICON MTV112M PLCC44P/FP558	IC105
16	55.L0704.001	SPS BD FP750 (MI)	
17	04.07496.010	IC AMP TDA7496 SIP 15P	IC703
18	05.00123.010	IC OPTO PC123F1 DIP 4P	IC602
19	55.L1405.001	USB BD (MI)	
20	55.L2204.001	CTRL BD FP751(MI)	
21	39.L0701.001	CVR REAR PC+ABS 002 FP750 T99	
22	42.L1405.001	CVR BASE PC+ABS 002 FP558	
23	42.L1407.001	CVR USB PC+ABS 002 FP558	
24	50.L1603.001	SIGNAL/C 15/16P 2080MM 002	
25	54.05023.221	INVERTER BD FP750 AMBIT	
26	56.07L07.001	LCDM 17" LT170E2-132/SAMSUNG	
27	60.L0704.001	ASSY BASE 002 FP750	
28	60.L0705.001	ASSY BZL 002 FP750SPK/ACER T99	
29	65.L0701.001	ASSY SPEAKER+WIRE 370MM 8Ohm 2W	
30	65.L0702.001	ASSY SPEAKER+WIRE 200MM 8Ohm 2W	

**P/N: 99.L0772.xxx**

ITEM	PART NO.	DESCRIPTION	LOCATION
31	20.20118.A15	CONN D FML15-3R/ML15P-3 MANU	
32	42.L0811.001	PE-HD BAG 600*650*0.5T 24LNG	
33	44.70A01.071	CTN AB 570*338*621 FP750/ACER	
34	47.L0701.001	CSN L EPS NATURE FP750	
35	47.L0702.001	CSN R EPS NATURE FP750	
36	49.L0701.001	MANUAL USER ACER FP750 T99 8L	
37	50.74405.501	CABLE AUD PC99PT284C/PT577C BK	
38	60.00060.001	ASSY CD MANUAL	
39	44.00004.001	ENVELOPE ACER 17" LCD CD-ROM	
40	53.00039.001	MANUAL CD-ROM ACER 17" LCD	