Product Specification

SPECIFICATION
FOR
APPROVAL

(   ) **Preliminary Specification**

(●) **Final Specification**

Title	17.1" TFT LCD

BUYER	
MODEL	

SUPPLIER	LG.Philips LCD Co., Ltd.
*MODEL	**LM171W02**
MODEL	**A4M1**

*When you obtain standard approval,
please use the above model name without suffix

SIGNATURE	DATE
/	
/	
/	

Please return 1 copy for your confirmation with your signature and comments.

SIGNATURE	DATE
S.W. Lee / G.Manager	
REVIEWED BY	
J.T. Kim / G. Manager	
PREPARED BY	
K.H. Choi / Engineer	

**MNT/TV Products Engineering Dept.
LG. Philips LCD Co., Ltd**

Contents

RECORD OF REVISIONS

Revision No	Revision Date	Page	DESCRIPTION
1.0	Jan. 27. 2003	-	Final Specifications
2.0	Mar. 18. 2003	21	Changed the Mechanical drawing(Rear view)

Product Specification

1. General Description

The LM171W02-A4M1 is a Color Active Matrix Liquid Crystal Display with an integral Cold Cathode Fluorescent Lamp(CCFL) backlight system. The matrix employs a-Si Thin Film Transistor as the active element. It is a transmissive type display operating in the normally white mode. This TFT-LCD has a 17.1 inch diagonally measured active display area with WXGA resolution(900 vertical by 1440 horizontal pixel array) Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 6-bit gray scale signal for each dot, thus, presenting a palette of more than 262,144 colors.

The LM171W02-A4M1 has been designed to apply the 8Bit TMDS interface method.The LM171W02-A4M1 is intended to support displays where high brightness, wide viewing angle, high color saturation, and high color depth are very important.
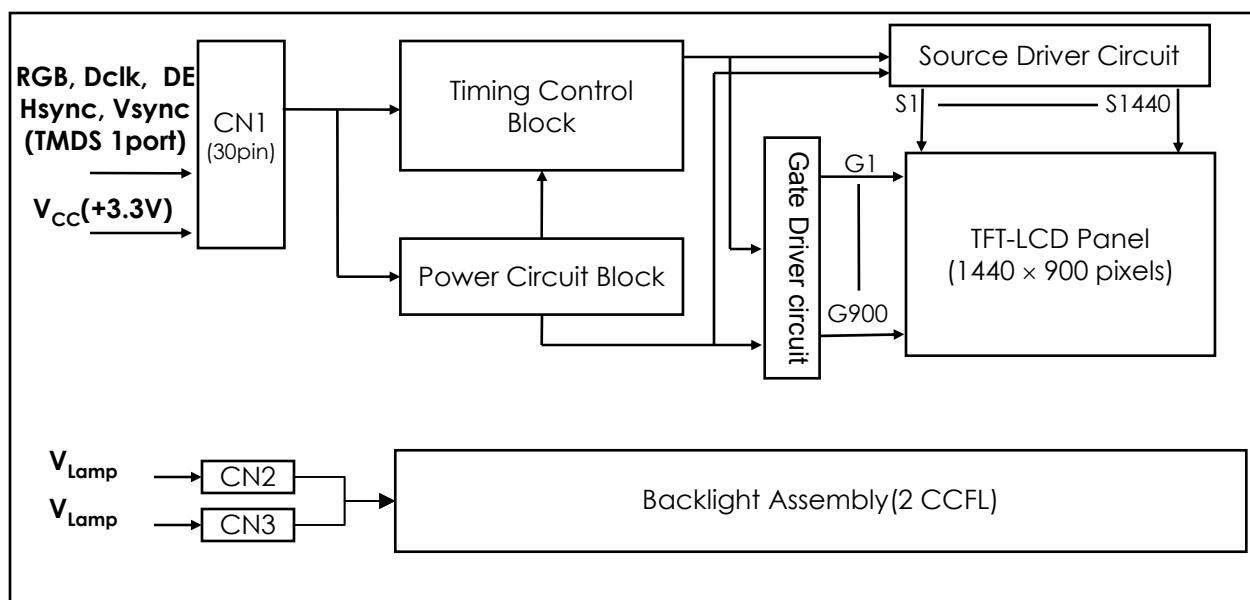
General Features

|	
Active Screen Size	17.1 inches(43.3019cm) diagonal
Outline Dimension	395(H) x 256.4(V) x 11(D)mm (Typ.)/11.5(D)mm(Max.)
Pixel Pitch	0.255mm x 0.255m
Pixel Format	1440 horiz. By 900 vert. Pixels RGB strip arrangement
Color Depth	262,144 Colors (6bit)
Luminance, White	200 cd/m² (Typ.)
Power Consumption	Total 11.5 Watt(Typ.)
Weight	1,250 g (Max.)
Display Operating Mode	Transmissive mode, normally white
Surface Treatment	Hard coating(3H) Anti-glare treatment of the front polarizer,

2. Absolute Maximum Ratings

The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Values		Units	Notes
		Min	Max		
Power Input Voltage	Vcc	-0.3	4.0	Vdc	at 25 ± 5°C
Operating Temperature	TOP	0	50	°C	1
Storage Temperature	HST	-20	60	°C	1
Operating Ambient Humidity	HOP	10	90	%RH	1
Storage Humidity	HST	10	90	%RH	1

Note : 1. Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39 °C Max, and no condensation of water.
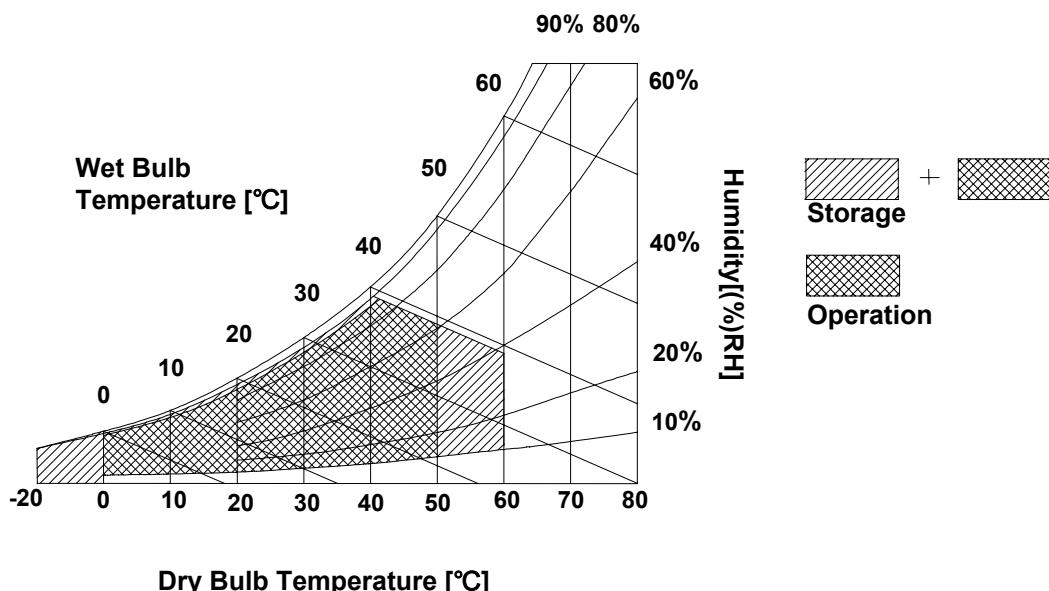
3. Electrical Specifications

3-1. Electrical Characteristics

The LM171W02-A4M1 requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second input which powers the CCFL, is typically generated by an inverter. The inverter is an external unit to the LCD.

Table 2. ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
MODULE :						
Power Supply Input Voltage	Vcc	3.15	3.3	3.5	Vdc	
Power Supply Input Current	Icc	-	570	950	mA	1
Power Consumption	Pc	-	1.9	3.1	Watt	1
LAMP :						
Operating Voltage	V_{BL}	580(9mA)	600(8mA)	785(2.5mA)	V_{RMS}	3
Operating Current	I_{BL}	2.5	8.0	9.0	mA_{RMS}	
Established Starting Voltage	Vs					4
at 25 °C				1000	V_{RMS}	
at 0 °C				1300	V_{RMS}	
Operating Frequency	f_{BL}	40	60	80	kHz	5
Discharge Stabilization Time	Ts			3	minutes	6
Power Consumption	P_{BL}		9.6	10.6	Watt	7
Life Time		40,000			Hrs	8

Note. The inverter used in a system should meet above electrical specifications for LCM Assembly.
The performance of the Lamp in LCM, for example life time or brightness, is extremely influenced by the characteristics of the DC-AC Inverter. So all the parameters of an inverter should be carefully designed so as not to produce too much leakage current from high-voltage output of the inverter. When you design or order the inverter, please make sure unwanted lighting caused by the mismatch of the lamp and the inverter(no lighting,flicker,etc) never occurs.When you confirm it,the LCD Assembly should be operated in the same condition as installed in your instrument.

Note. Do not attach a conducting tape to lamp connecting wire.. If the lamp wire attach to conducting tape, TFT-LCD Module have a low luminance and the inverter has abnormal action because leakage current occurs between lamp wire and conducting tape.

LG.Philips LCD

Product Specification

Notes:

1. The specified current and power consumption are under the V_{CC}=3.3V, 25°C, f_V=60Hz condition whereas mosaic pattern(8 x 6) is displayed and f_V is the frame frequency.
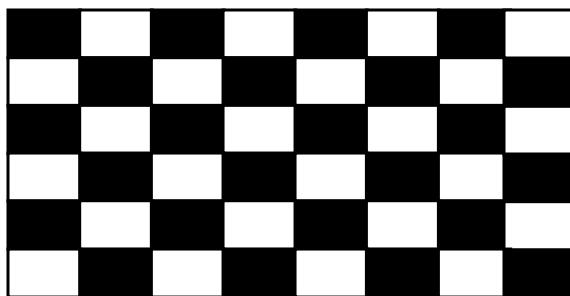

2. This impedance value is needed to proper display and measured from $TMDST_X$ to the mating connector.
3. Operating voltage is measured at 25°C. The variance of the voltage is ±10%.
4. The voltage above V_S should be applied to the lamps for more than 1 second for start-up.
   Otherwise, the lamps may not be turned on.
   The output voltage at the transformer in the inverter must be high considering to the loss of the ballast condenser in the inverter..
5. Lamp frequency may produce interface with horizontal synchronous frequency and as a result this may cause beat on the display. Therefore lamp frequency shall be as away possible from the horizontal synchronous frequency and from its harmonics in order to prevent interference.
6. Let's define the brightness of the lamp after being lighted for 5 minutes as 100%.
   T_S is the time required for the brightness of the center of the lamp to be not less than 95%.
   The used lamp current is the lamp typical current.
7. The lamp power consumption shown above does not include loss of external inverter at 25°C.
   . The used lamp current is the lamp typical current.
8. The life is determined as the time at which luminance of the lamp is 50% compared to that of initial value at the typical lamp current on condition of continuous operating at 25 ± 2°C.

Note. The output of the inverter must have symmetrical(negative and positive) voltage waveform and symmetrical current waveform(Asymmetry ratio is less than 10%). Please do not use the inverter which has asymmetrical voltage and asymmetrical current and spike wave.
Requirements for a system inverter design, which is intended to have a better display performance, a better power efficiency and a more reliable lamp.
It shall help increase the lamp lifetime and reduce its leakage current.
   a. The asymmetry rate of the inverter current and voltage waveform should be 10% below;
   b. The distortion rate of the current and voltage waveform should be within $\sqrt{2}$ ±10%;
   c. The ideal sine current and voltage waveform shall be symmetric in positive and negative polarities.
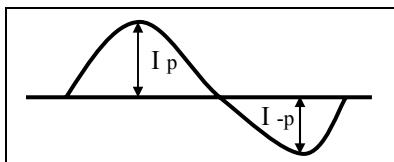
* Asymmetry rate = $| I_p - I_{-p} | / I_{rms}$ * 100%

* Distortion rate = I_p (or I_{-p}) / I_{rms}

◈ The inverter which is combined with this LCM, is highly recommended to connect coupling(ballast) condenser at the high voltage output side. When you use the inverter which has not coupling(ballast) condenser, it may cause abnormal lamp lighting because of biased mercury as time goes.

3-2. Interface Connections

- LCD Connector(CN1) : FI-XB30SL-HF10 (JAE) or equivalent
- Mating Connector : FI-X30C21 (Level type) or Compatible

Table 3-1. MODULE CONNECTOR(CN1) PIN CONFIGURATION

Pin No	Symbol	Description
1	GND	Ground
2	GND	Ground
3	RX2+	TMDS Low Voltage Differential Signal Input Data 2(+)
4	RX2-	TMDS Low Voltage Differential Signal Input Data 2(-)
5	GND	Ground
6	RX1+	TMDS Low Voltage Differential Signal Input Data 1(+)
7	RX1-	TMDS Low Voltage Differential Signal Input Data 1(-)
8	GND	Ground
9	RX0+	TMDS Low Voltage Differential Signal Input Data 0(+)
10	RX0-	TMDS Low Voltage Differential Signal Input Data 0(-)
11	GND	Ground
12	RXC+	TMDS Low Voltage Differential Signal Input Data C(+)
13	RXC-	TMDS Low Voltage Differential Signal Input Data C(-)
14	GND	Ground
15	VEDID	DDC Power Supply 3.3V
16	NC	NC
17	CLK-EDID	DDC Clock
18	DATA-EDID	DDC Data
19	GND	Ground
20	GND	Ground
21	GND	Ground
22	VCC	Power Supply 3.3V
23	VCC	Power Supply 3.3V
24	VCC	Power Supply 3.3V
25	POWER-ON	Power Control
26	HSYNC	Hsync Output
27	VSYNC	Vsync Output
28	GND	Ground
29	NC	NC, Reserved for HDCP
30	NC	NC, Reserved for HDCP

Note: 1. All GND(ground) pins should be connected together and to Vss which should also be connected to
the LCD's metal frame.
2. All Vcc (power input) pins should be connected together.

User Connector Diagram

CN1 : FI-XB30SL-HF10

No. 30   No. 1

PCB

Component

CELL
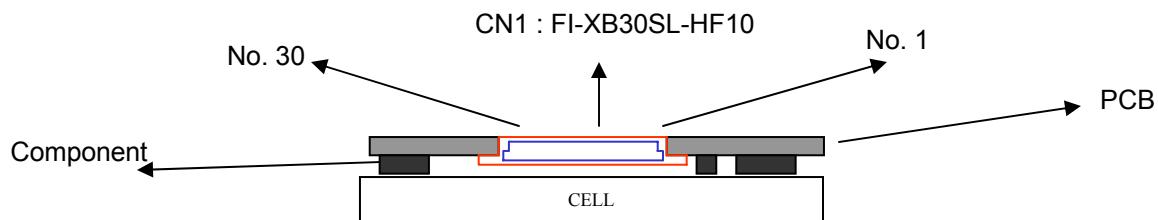
Table 4. BACKLIGHT CONNECTOR PIN CONFIGURATION (CN2,CN3)

Pin	Symbol	Description	Notes
1	HV	Power supply for lamp (high)	1) LCD : BHSR-02VS-1 (JST)
2	LV	Power supply for lamp (Low)	2) System : SM02B-BHSS-1 (JST)

Notes : 1. The high voltage side terminal is colored pink.
　　　　　　2. The low voltage side terminal is colored white.

Lamp1

2
1   CN2

Lamp2

1
2   CN3
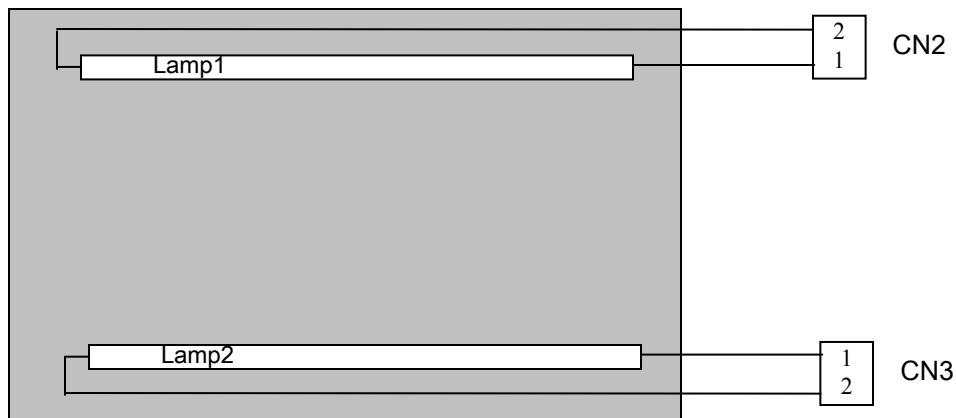
3-3. Signal Timing Specifications

This is the signal timing required at the input of the User connector. All of the interface signal timing should be satisfied with the following specifications for it's proper operation.

Table 5. Timing Table

| ITME	Symbol		Min	Typ	Max	Unit	Notes
DCLK	Frequency	f_{CLK}	96.21	96.21	96.21	MHz	
	Period	t_{CLK}	10.39	10.39	10.39	ns	
Hsync	Period	t_{HP}	1760	1760	1760	t_{CLK}	1
	Width-Active	t_{WH}	32	32	32		2
Vsync	Frequency	t_{VSY}	59.939	59.939	59.939	Hz	3
	Period	t_{VP}	912	912	912	t_{HP}	
	Width-Active	t_{WV}	3	3	3		4
Data Enable	Horizontal back porch	t_{HBP}	224	224	224	t_{CLK}	
	Horizontal front porch	t_{HFP}	64	64	64	t_{CLK}	
	Horizontal active Data	t_{HA}	1440	1440	1440	t_{CLK}	
	Vertical back porch	t_{VBP}	6	6	6	t_{HP}	
	Vertical front porch	t_{VFP}	3	3	3	t_{HP}	
	Vertical active data	t_{VA}	900	900	900	t_{HP}	

Notes: 1. Hsync period shall be a double number of 8
       2. Horizontal sync shall be active high.
       3. Vertical frequency is only 60Hz
       4. Vertical sync shall be active high.

3-4. Signal Timing Waveforms

Condition : V_{LOGIC} =3.3V

DCLK, Data Enable, Hsync, Vsync, data

0.7 V_{LOGIC}

0.3V_{LOGIC}

DCLK

t_{CLK} t_{WCH} t_{WCL} t_{CLK} t_{CLK}

t_{CLKL}

DATA

t_{SD} t_{HD}

t_{HI} t_{SI}

DE

DCLK

t_{HC}

H_{SYNC}

t_{HV}

V_{SYNC}

H_{SYNC}

t_{HP}

t_{WH}

t_{HBP} t_{HFP}

DE

V_{SYNC}

t_{VP}

t_{WV}

t_{VBP} t_{VFP}

DE
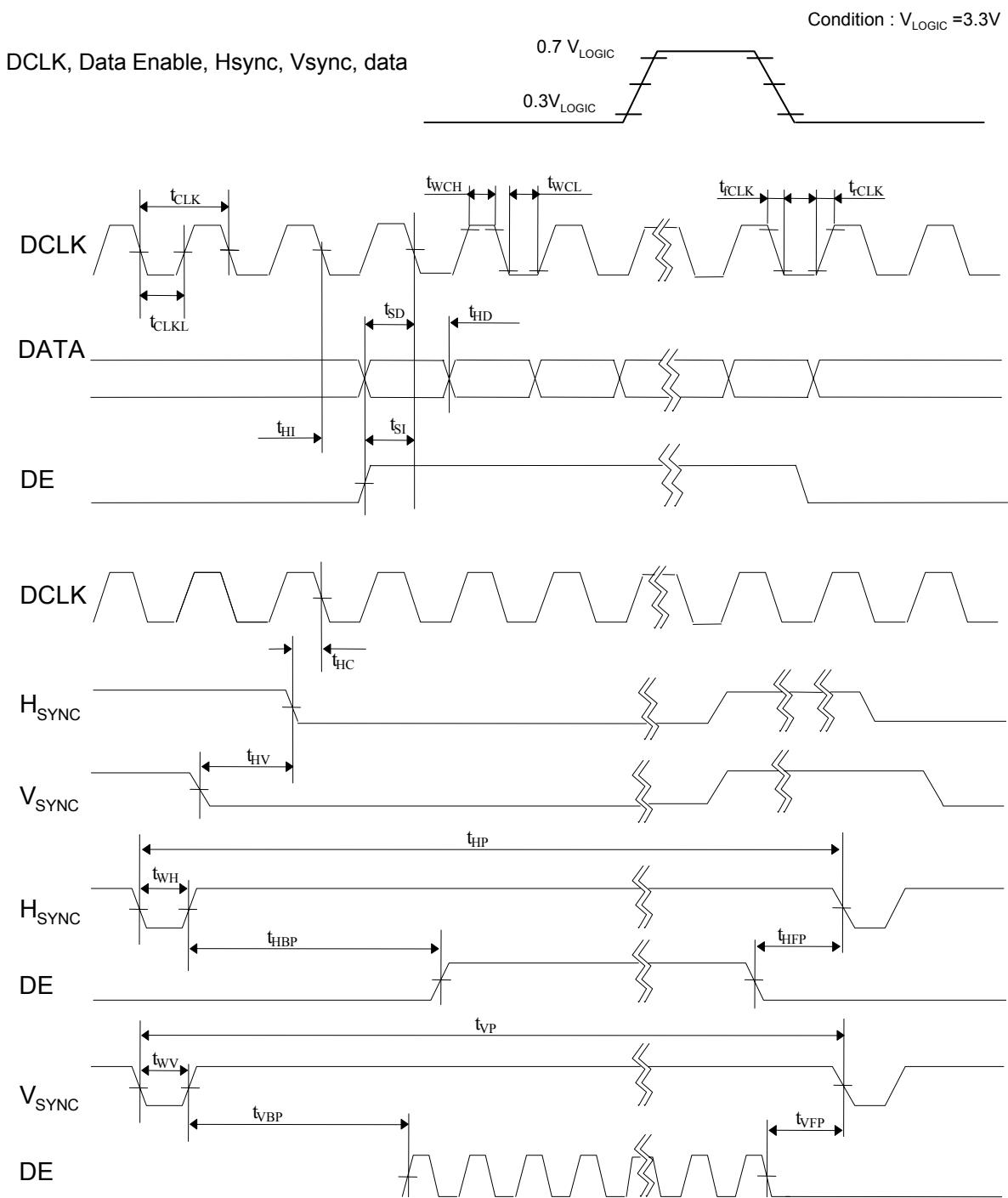
3-5. Color Input Data Reference

The brightness of each primary color (red,green and blue) is based on the 6-bit gray scale data input for the color ; the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

Table 6. COLOR DATA REFERENCE

Color		Input Color Data																		
		RED MSB					LSB	GREEN MSB					LSB	BLUE MSB					LSB
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green (63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (01)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	…	…						…						…					
	RED (62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN (01)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	...	…						…						…					
	GREEN (62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	GREEN (63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
BLUE	BLUE (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE (01)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	...	…						…						…					
	BLUE (62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	BLUE (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

3-6. Power Sequence
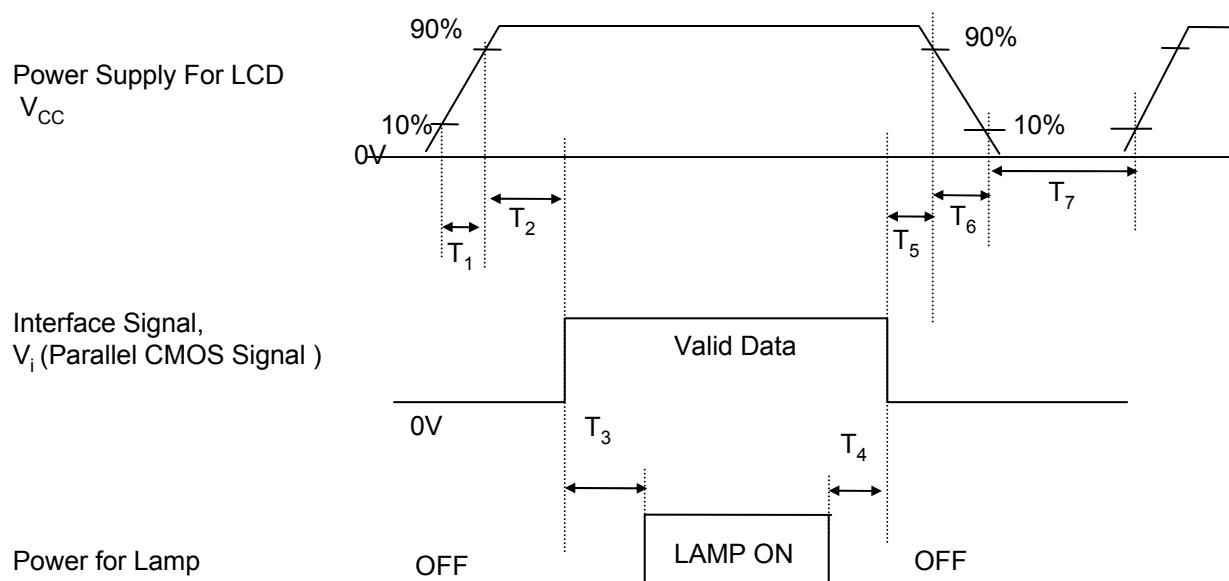
Parameter	Values			Units
	Min	Typ	Max	
T1	-	-	10	ms
T2	0.5	-	50	ms
T3	200	-	-	ms
T4	200	-	-	ms
T5	0.5	-	50	ms
T6	-	-	10	ms
T7	400	-	-	ms

Notes : 1. Please avoid floating state of interface signal at invalid period.
2. When the interface signal is invalid, be sure to pull down the power supply for LCD V_{CC} to 0V.
3. Lamp power must be turn on after power supply for LCD an interface signal are valid.

3-7. V$_{CC}$ Power Dip Condition

The V$_{CC}$ dip condition is caused by the PWM IC initialization.
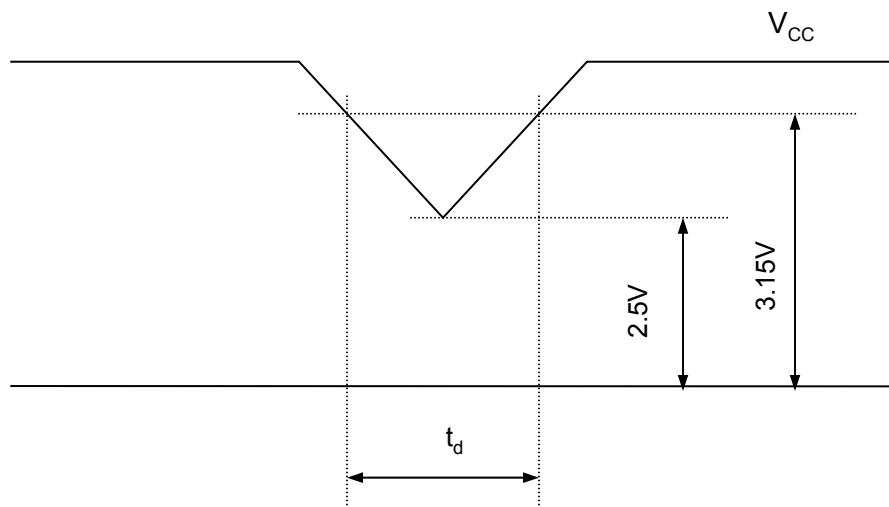
[figure 10] Power Dip condition

1) Dip condition

    2.5V≤V$_{CC}$ < 3.15V , t$_d$≤20ms

2) V$_{CC}$ < 2.5V

    V$_{CC}$-dip conditions should also follow the Power On/Off conditions for supply voltage.

4. Optical Specification

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 Φ and θ equal to 0 °.
FIG. 1 presents additional information concerning the measurement equipment and method.

### FIG. 1 Optical Characteristic Measurement Equipment and Method

Optical Stage(x,y) **LCD Module** **Pritchard 880 or equivalent**

1°

500mm
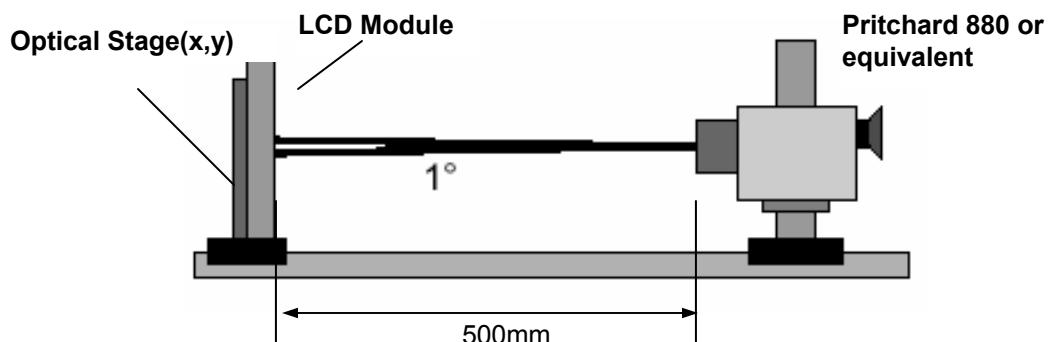
Table 7. OPTICAL CHARACTERISTICS

Ta=25 °C, V_{CC}=3.3V, fv=60Hz
Dclk=96.2MHz, I_{BL}=8mA

Parameter		Symbol	Values			Units	Notes
			Min	Typ	Max		
Contrast Ratio		CR	300	350			1
Surface Luminance, white		L_{WH}	170	200		cd/m^2	2
Luminance Variation		δ_{WHITE}			40	%	3
Response Time		Tr		25	40	ms	4
	Rise Time	Tr_R		7	15		
	Decay Time	Tr_D		18	25		
Color Coordinates							
	RED	RX	0.596	0.626	0.656		
		RY	0.317	0.347	0.377		
	GREEN	GX	0.278	0.308	0.338		
		GY	0.558	0.588	0.618		
	BLUE	BX	0.116	0.146	0.176		
		BY	0.079	0.109	0.139		
	WHITE	WX	0.283	0.313	0.343		
		WY	0.299	0.329	0.359		
Viewing Angle							
	x axis, right(ϕ=0°)	θr	55	60		degree	5
	x axis, left (ϕ=180°)	θl	55	60			
	y axis, up (ϕ=90°)	θu	40	45			
	y axis, down (ϕ=270°)	θd	40	45			
Gray Scale							6

Product Specification

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

Contrast Ratio = $\dfrac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$

2. Surface luminance is luminance value at 5 points average across the LCD surface 50cm from the surface with all pixels displaying white. For more information see FIG 2.
 When I_{BL}=8mA, $L_{WH=}$170cd/m^2(Min.) 200cd/m^2(Typ.)
L_{WH} = = Average[$L_{on}1, L_{on}2, L_{on}3, L_{on}4, L_{on}5$]

3. The variation in surface luminance , δ_{WHITE} is defined as :

$$\delta_{WHITE} = \frac{\text{Maximum}(L_{on1}, L_{on2}, ... L_{on13}) - \text{Minimum}(L_{on1}, L_{on2}, ... L_{on13})}{\text{Average}(L_{on1}, L_{on2}, ... L_{on5})} \times 100(\%)$$

4. Response time is the time required for the display to transition from to black(Rise Time, Tr_R) and from black to white(Decay Time, Tr_D). For additional information see FIG 3.

5. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 4.

6. Gray scale specification

Gray Level	Luminance [%] (Typ)
L0	0.17
L3	0.22
L7	0.51
L11	1.51
L15	3.39
L19	6.34
L23	10.0
L27	14.8
L31	20.0
L35	26.1
L39	33.1
L43	41.1
L47	50.5
L51	61.1
L55	72.2
L59	86.1
L63	100

FIG. 2 Luminance

<measuring point for surface luminance & measuring point for luminance variation>

A : H/4 mm
B : V/4 mm
@ H,V : Active Area

Active Area
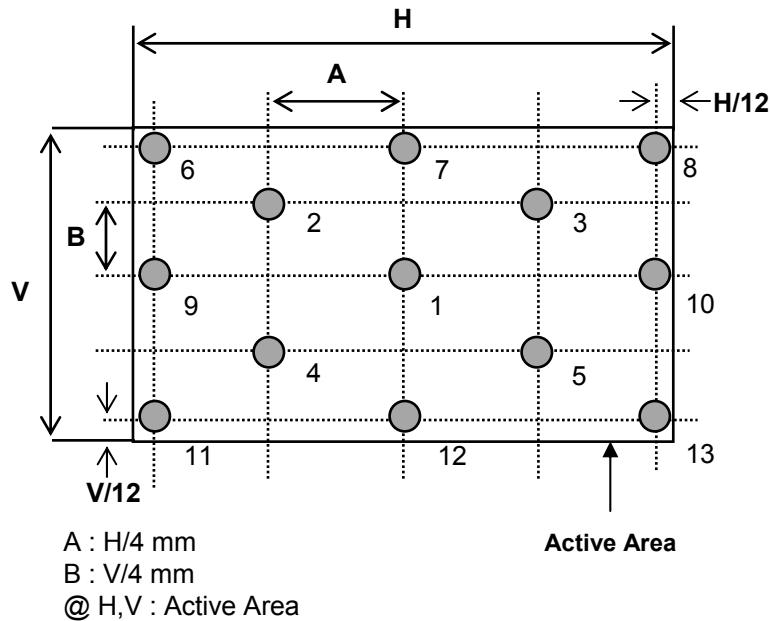
FIG. 3 Response Time

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".
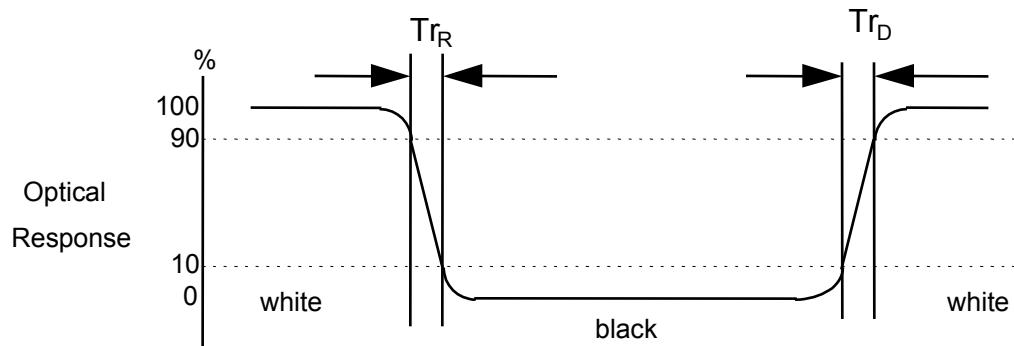
Product Specification

FIG. 4 Viewing angle

<Dimension of viewing angle range>
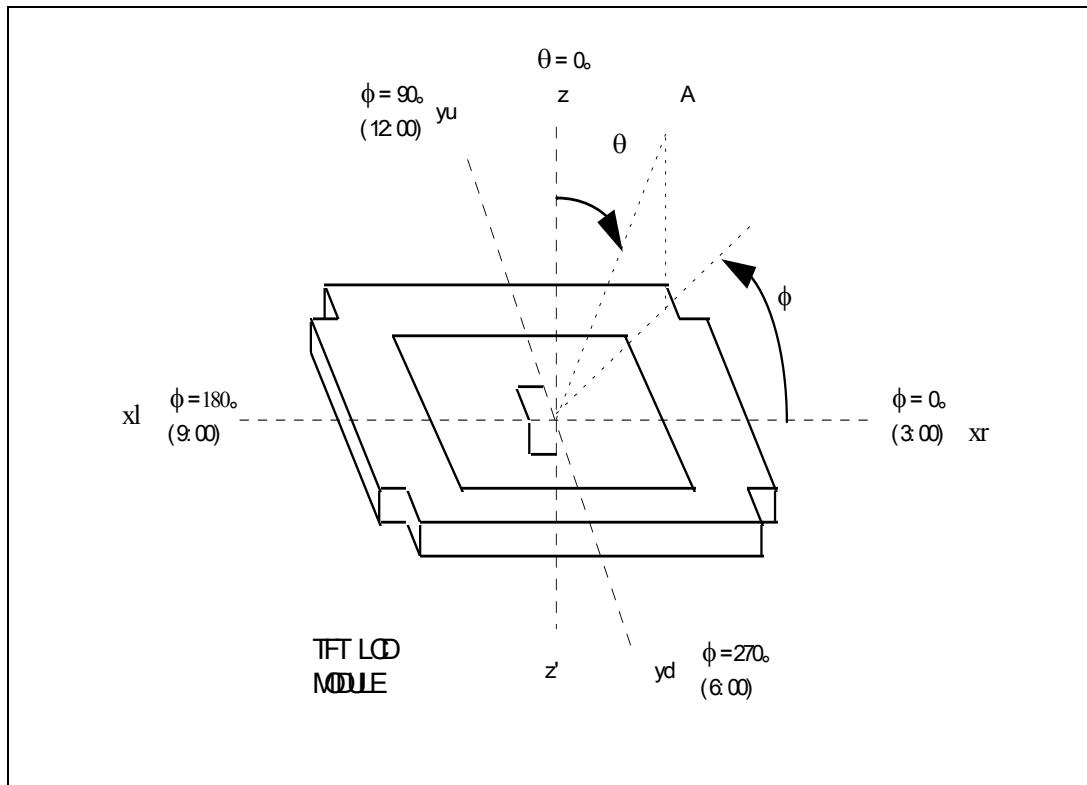
5. Mechanical Characteristics

The contents provide general mechanical characteristics for the model LM171W02-A4M1. In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outline Dimension	Horizontal	395± 0.5mm
	Vertical	256.4 ± 0.5mm
	Depth	11.0 ± 0.5mm(Typ.)/ 11.5 ± 0.5mm(Max.)
Bezel Area	Horizontal	371.2 ± 0.5mm
	Vertical	233.6 ± 0.5mm
Active Display Area	Horizontal	367.2mm
	Vertical	229.5mm
Weight	1220g (Typ.)	1250g (Max.)
Surface Treatment	Hard coating(3H) Anti-glare treatment of the front polarizer	

LG.PHILIPS LCD

<FRONT VIEW>
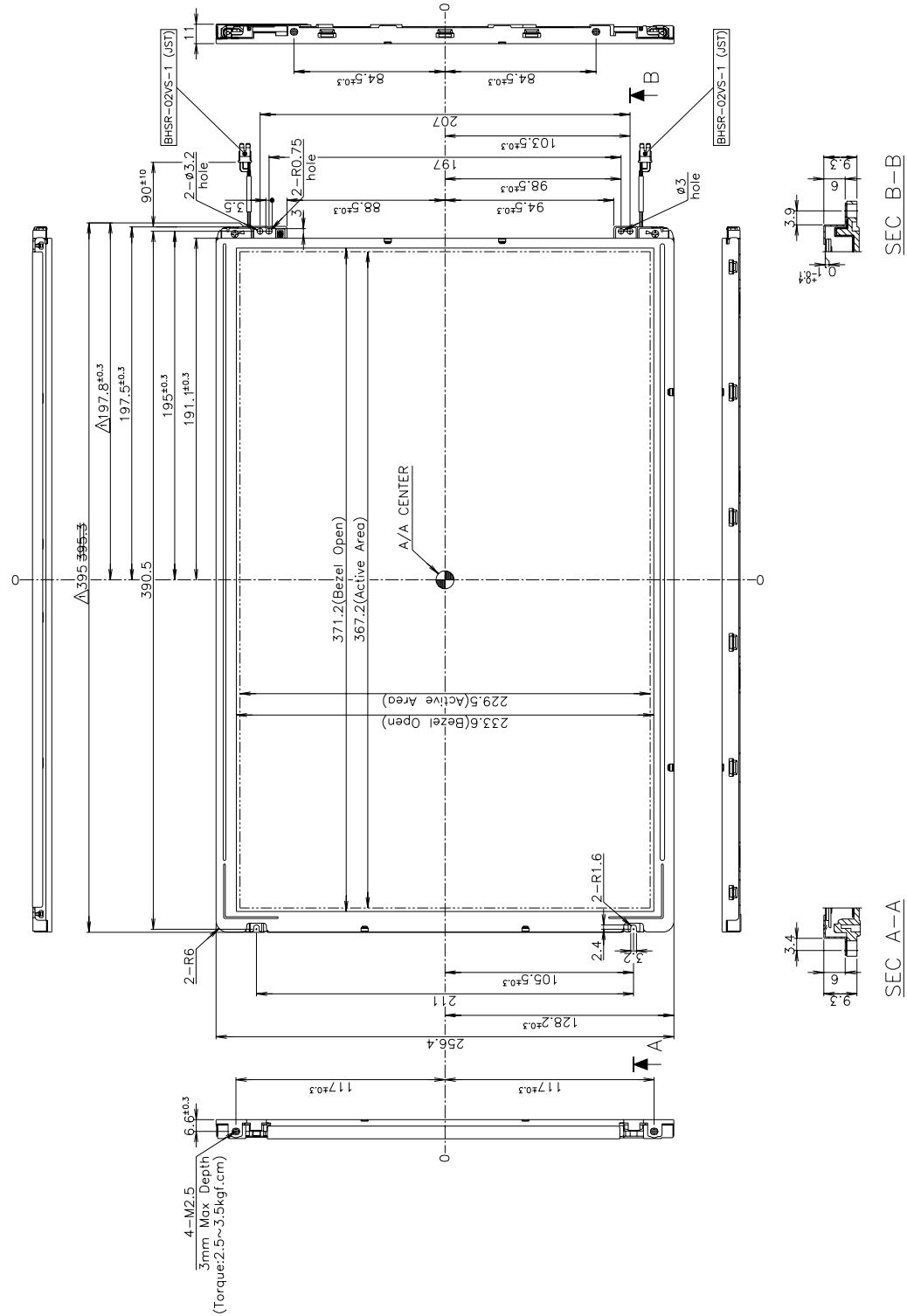
Product Specification

<REAR VIEW>
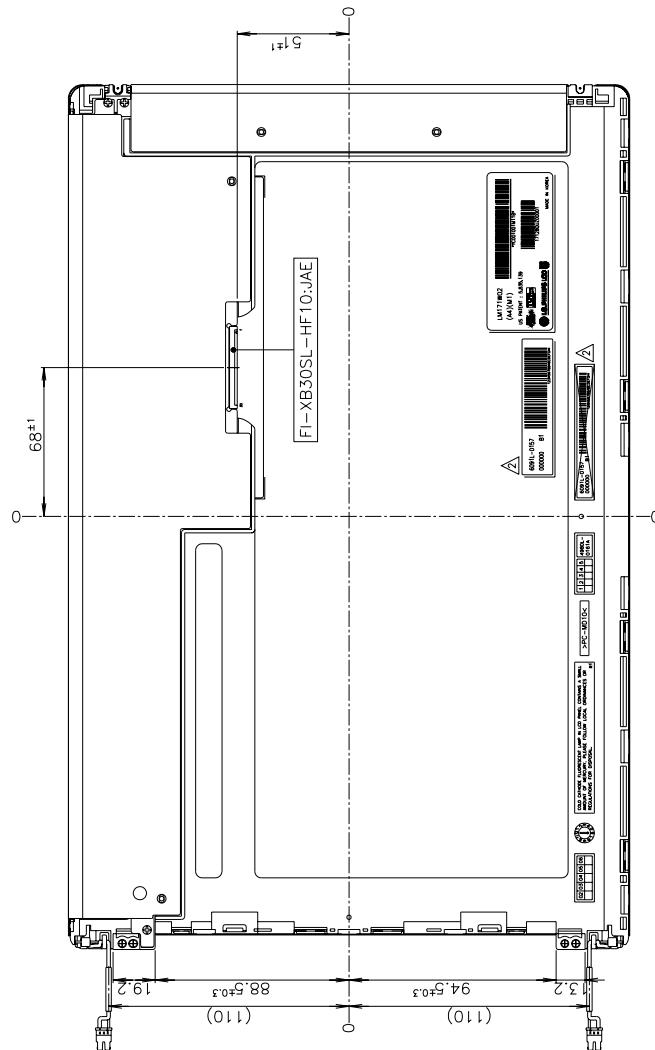

NOTES
1. UNSPECIFED TOLERANCE IS ±0.5.
2. BACKLIGHT WIRES AND CONTRACTION TUBES ARE EXCLUDED FROM OUTLINE DIMENSIONS.
3. TILT AND A PARTIAL DISPOSITION TOLERANCE OF DISPLAY AREA
   ARE AS FOLLOWS.
   1) X-DIRECTION : | A-B | ≤ 1.0mm.
   2) Y-DIRECTION : | C-D | ≤ 1.0mm.
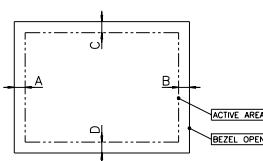
4. LAMP(CCFL) LOT NO. IS MARKED AT BACKLIGHT CONNECTOR.
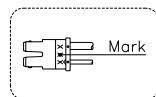
5. DO NOT WIND CONDUCTIVE TAPE AROUND THE BACKLIGHT WIRES.

6. Reliability

Environment test condition

No	Test Item	Condition
1	High temperature storage test	Ta= 60°C 240h
2	Low temperature storage test	Ta= -20°C 240h
3	High temperature operation test	Ta= 50°C 50%RH 240h
4	Low temperature operation test	Ta= 0°C 240h
5	Vibration test (non-operating)	Wave form : random Vibration level : 1.0G RMS Bandwidth : 10-500Hz Duration : X,Y,Z, 20 min One time each direction
6	Shock test (non-operating)	Shock level : 120G Waveform : half sine wave, 2ms Direction : ±X, ±Y, ±Z One time each direction
	Altitude storage / shipment	0 - 40,000 feet(12,192m)

{ Result Evaluation Criteria }
There should be no change which might affect the practical display function when the display quality test is conducted under normal operating condition.

7. International Standards

7-1. Safety

a) UL 1950 Third Edition, Underwriters Laboratories, Inc. Jan. 28, 1995.
Standard for Safety of Information Technology Equipment Including Electrical Business Equipment.
b) CAN/CSA C22.2 No. 950-95 Third Edition, Canadian Standards Association, Jan. 28, 1995.
Standard for Safety of Information Technology Equipment Including Electrical Business Equipment.
c) EN 60950 : 1992+A1: 1993+A2: 1993+C3: 1995+A4: 1997+A11: 1997
IEC 950 : 1991+A1: 1992+A2: 1993+C3: 1995+A4: 1996
European Committee for Electrotechnical Standardization(CENELEC)
EUROPEAN STANDARD for Safety of Information Technology Equipment Including Electrical Business Equipment.

7-2. EMC

a) ANSI C63.4 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electrical Equipment in the Range of 9kHZ to 40GHz. "American National Standards Institute(ANSI), 1992
b) C.I.S.P.R "Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment." International Special Committee on Radio Interference.
c) EN 55022 "Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment." European Committee for Electrotechnical Standardization.(CENELEC), 1998

8. Packing

8-1. Designation of Lot Mark

a) Lot Mark

A	B	C	D	E	F	G	H	I	J	K	L	M

A,B,C : SIZE
D : YEAR
E : MONTH
F,G : PANEL CODE
H : ASSEMBLY CODE
I,J,K,L,M : SERIAL NO.

Note
1. YEAR

Year	97	98	99	2000	2001	2002	2003	2004	2005	2006	2007
Mark	7	8	9	0	1	2	3	4	5	6	7

2. MONTH

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

3. Serial No.

Year	1 ~ 99999	100000 ~
Mark	00001 ~ 99999	A0001 ~ A9999, ... , Z9999

b) Location of Lot Mark

Serial NO. is printed on the label. The label is attached to the backside of the LCD module.
This is subject to change without prior notice.

8-2. Packing Form

a) Package quantity in one box : 10 pcs

b) Box Size : 355mm × 344mm × 449mm

9. PRECAUTIONS

Please pay attention to the followings when you use this TFT LCD module.

9-1. MOUNTING PRECAUTIONS

(1) You must mount a module using holes arranged in four corners or four sides.
(2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
(3) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to the resist external force.
(4) You should adopt radiation structure to satisfy the temperature specification.
(5) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
(6) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
Do not touch the surface of polarizer for bare hand or greasy cloth.(Some cosmetics are detrimental to the polarizer.)
(7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
(8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
(9) Do not open the case because inside circuits do not have sufficient strength.

9-2. OPERATING PRECAUTIONS

(1) The spike noise causes the mis-operation of circuits. It should be lower than following voltage :
V=±200mV(Over and under shoot voltage)

(2) Response time depends on the temperature.(In lower temperature, it becomes longer.)
(3) Brightness depends on the temperature. (In lower temperature, it becomes lower.)
And in lower temperature, response time(required time that brightness is stable after turned on) becomes longer.
(4) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
(5) When fixed patterns are displayed for a long time, remnant image is likely to occur.
(6) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.

9-3. ELECTROSTATIC DISCHARGE CONTROL

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

9-4. PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

9-5. STORAGE

When storing modules as spares for a long time, the following precautions are necessary.

(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
(2) The polarizer surface should not come in contact with any other object.
It is recommended that they be stored in the container in which they were shipped.

9-6. HANDLING PRECAUTIONS FOR PROTECTION FILM

(1) The protection film is attached to the bezel with a small masking tape.
When the protection film is peeled off, static electricity is generated between the film and polarizer.
This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
(2) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the Bezel after the protection film is peeled off.
(3) You can remove the glue easily. When the glue remains on the Bezel or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

10. E-EDID DATA FOR LM171W02-A4M1

Byte# (HEX)	Field Name	Comments	Value (HEX)	Value (BIN)
	Header			
00	00h		00	00000000
01	FFh		FF	11111111
02	FFh		FF	11111111
03	FFh		FF	11111111
04	FFh		FF	11111111
05	FFh		FF	11111111
06	FFh		FF	11111111
07	00h		00	00000000
	Vender/ Product ID			
08	ID Manufacture Name	"APP"	06	00000110
09	EISA 3- character ID		10	00010000
0A	ID Product Code	9C, 27	27	00100111
0B			9C	10011100
0C	ID Serial Number	don't care	00	00000000
0D			00	00000000
0E			00	00000000
0F			00	00000000
10	Week of manufacture = don't care	don't care	00	00000000
11	Year of manufacture	2002	0C	00001100
	EDID Version/Revision			
12	EDID Structure version #	1	01	00000001
13	EDID Revision #	3	03	00000011
	Basic Display Parameters / Features			
14	Video input definition	Digital	80	10000000
15	Max H image size (cm)	36.72cm	25	00100101
16	Max V image size (cm)	22.95cm	17	00010111
17	Display Transfer Characteristic (gamma)	2.2	78	01111000
18	Feature support	Active off, RGB Color	28	00101000
	Color Characteristics			
19	Red/Green low Bits		7F	01111110
1A	Blue/White Low Bits		70	01110000
1B	Red X	Rx = 0.626	A0	10100000
1C	Red Y	Ry = 0.347	58	01011000
1D	Green X	Gx = 0.308	4F	01001110
1E	Green Y	Gy = 0.588	96	10010110
1F	Blue X	Bx = 0.146	25	00100101
20	Blue Y	By = 0.109	1B	00011011
21	White X	Wx = 0.313	50	01010000
22	White Y	Wy = 0.329	54	01010100
	Established Timings			
23	Established Timing I	No	00	00000000
24	Established Timing II	No	00	00000000
25	Manufacturer's Timings	No	00	00000000
	Standard Timing Identification			
26	Standard Timing Identification 1	not used	01	00000001
27	Standard Timing Identification 1	not used	01	00000001
28	Standard Timing Identification 2	not used	01	00000001
29	Standard Timing Identification 2	not used	01	00000001

Product Specification

Byte# (HEX)	Field Name	Comments	Value (HEX)	(BIN)
2A	Standard Timing Identification 3	not used	01	00000001
2B	Standard Timing Identification 3	not used	01	00000001
2C	Standard Timing Identification 4	not used	01	00000001
2D	Standard Timing Identification 4	not used	01	00000001
2E	Standard Timing Identification 5	not used	01	00000001
2F	Standard Timing Identification 5	not used	01	00000001
30	Standard Timing Identification 6	not used	01	00000001
31	Standard Timing Identification 6	not used	01	00000001
32	Standard Timing Identification 7	not used	01	00000001
33	Standard Timing Identification 7	not used	01	00000001
34	Standard Timing Identification 8	not used	01	00000001
35	Standard Timing Identification 8	not used	01	00000001
	Detailed Timing Descriptor #1			
36	Pixel clock	96.21MHz	95	10010101
37	1440 X 900 @60		25	00100101
38	Horizontal Active	1440 Pixels	A0	10100000
39	Horizontal Blanking	320 Pixels	40	01000000
3A	Horizontal Active : Horizontal Blanking		51	01010001
3B	Vertical Avtive	900 Lines	84	10000100
3C	Vertical Blanking	12 Lines	0C	00001100
3D	Vertical Active : Vertical Blanking		30	00110000
3E	Horizontal Sync. Offset	64 Pixels	40	01000000
3F	Horizontal Sync Pulse Width =	32 Pixels	20	00100000
40	Vertical Sync. Offset :Vertical Sync Width	3 Lines	33	00110011
41	Horizontal, Vertical Sync Offset/Width		00	00000000
42	Horizontal Image Size	367.2 mm	6F	01101111
43	Vertical Image Size	229.5 mm	E5	11100101
44	Horizontal & Vertical Image Size		10	00010000
45	Horizontal Border	0	00	00000000
46	Vertical Border	0	00	00000000
47	Flags(Non- interlaced, Normal Display, no stereo		18	00011000
	Detailed Timing Descriptor #2 or Monitor Description			
48			00	00000000
49			00	00000000
4A			00	00000000
4B			FF	11111110
4C			00	00000000
4D		l	4C	01001100
4E		M	4D	01001101
4F		1	31	00110001
50		7	37	00110111
51		1	31	00110001
52		W	57	01010111
53		0	30	00110000
55		2	32	00110010
55			00	00000000
56			00	00000000
57			00	00000000
58			00	00000000
59			00	00000000

Product Specification

Byte# (HEX)	Field Name	Comments	Value (HEX)	(BIN)
	Detailed Timing Descriptor #3 or Monitor Description			
5A			00	00000000
5B			00	00000000
5C			00	00000000
5D			FF	11111110
5E			00	00000000
5F		I	4C	01001100
60		M	4D	01001101
61		1	31	00110001
62		7	37	00110111
63		1	31	00110001
64		W	57	01010111
65		0	30	00110000
66		2	32	00110010
67			00	00000000
68			00	00000000
69			00	00000000
6A			00	00000000
6B			00	00000000
	Detailed Timing Descriptor #4 or Monitor Description			
6C			00	00000000
6D			00	00000000
6E			00	00000000
6F			FF	11111110
70			00	00000000
71		C	43	01000011
72		O	4F	01001111
73		I	4C	01001100
74		O	4F	01001111
75		R	52	01010010
76			00	00000000
77		I	4C	01001100
78		C	43	01000011
79		D	44	01000100
7A			00	00000000
7B			00	00000000
7C			00	00000000
7D			00	00000000
	Extension flag			
7E			00	00000000
	Checksum			
7F			27	00100111