SPECIFICATION

For

APPROVAL

( ) Preliminary Specification

( ) Final Specification

Title	12.1” SVGA TFT LCD

BUYER NAME	
MODEL NAME	

SUPPLIER	LG Electronics, **Inc.**
MODEL NAME	LP121SQ

SIGNATURE	DATE
/	
/	
/	

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

APPROVED BY	DATE
H.YOON /G. Manager	
REVIEWED BY	
H.K.LEE /S. Engineer	
PREPARED BY	
J.D.KIM /A. Engineer	

Product Engineering Dept.
LCD Division LG Electronics, **Inc.**

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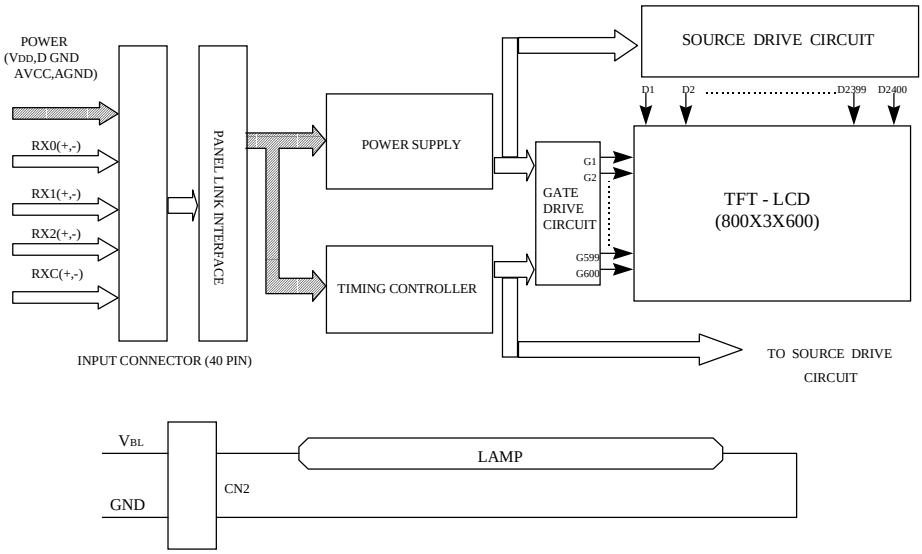
Record of Revision

DATE AND VERSION	DESCRIPTION
Oct.17,1996 (Ver.1.1)	3. Table 2 Input Current 450 --> 510mA 550--->600mA 6. tHP 1020 --> 990
Dec.02,1996 (Ver.1.2)	6. Signal Timing spec. Vsync period tVP : 603 --> 604 1000--> 825
Dec.10,1996 (Ver.1.3)	5. Interface Connections 4 RCL- ---> RCL+ 6 RCL+ ---> RCL- 6. Signal Timing spec. Vsync period tVP : 825 --> 730
Jan.23,1997 (Ver.1.4)	5. Interface Connections DF15B-20DS-0.65V --> WR-L40S-VF-1 HIROSE JAE 20 PIN 40 PIN Configuration : 20PIN --> 40PIN 6. Signal Timing Spec. Vsync period tVP : 604 --> 603

1. General Description

The LG Electronics model LP121SQ LCD is a Color Active Matrix Liquid Crystal Display with an integral Cold Cathode Fluorescent Tube(CCFT) back light 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 12.1 inch diagonally measured active display area with SVGA resolution(600 vertical by 800 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 LP121SQ LCD is intended to support applications where low power consumption, weight and thickness are critical factors and graphic displays are important. In combination with the vertical arrangement of the sub-pixels, the LP121SQ characteristics provide an excellent flat panel display for office automation products such as portable computers.

LP121SQ BLOCK DIAGRAM



General Display Characteristics

The following are general feature of the model LP121SQ LCD;

Active display area	12.1 inches(30.75cm) diagonal
Outsize dimensions	275W * 197H * 6T mm
Pixel pitch	0.3075mm * 0.3075mm
Pixel format	800 horiz. By 600 vert. pixels RGB stripe arrangement
Color depth	6-bit
Display operating mode	transmissive mode, normally white
Surface treatments	hard coating(2H), anti-glare treatment of the front polarizer

2. 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	V_{DD}	0	+3.63	Vdc	at 25•
Logic Input Voltage	$V_{L/H}$	-0.3	V_{DD}+0.3	Vdc	at 25•
Operating Temperature	T_{OP}	3	+50	•	1
Storage Temperature	T_{ST}	-10	+60	•	1

Note: 1. The Relative Humidity must not exceed 80% non-condensing at temperatures of 40• or less.
At temperatures greater than 40•, the wet bulb temperature must not exceed 39•.
At low temperature the brightness of CCFL drop and the life time of CCFL become to be short.
2. Under no condition should the unit be exposed to corrosive chemicals.

3. Electrical Specifications

The LP104S3 requires two power inputs. One is employed to power the LCD electronics and to derive the voltages to drive the TFT array and liquid crystal. The second input which powers the backlight CCFT, is typically generated by an inverter. The inverter is an external unit to the LCD.

Table 2 ELECTRICAL CHARACTERISTICS:

Parameter	Symbol	Values			Units	Notes
		Min.	Typ.	Max.		
MODULE:(Receiver 101)						
Power Supply Input Voltage	V_{DD}	3.15	3.3	3.45	V(dc)	
Power Supply Input Current	I_{DD}	-	400	500	mA	1
Ripple/Noise	-	-	-	60	mV	
Logic Input Level, High	V_{IH}	1.9	-	VDD+0.3	V(dc)	2
Logic Input Level, Low	V_{IL}	Vss	-	0.7	V(dc)	2
Differential Input Voltage(swing)	V_{ID}			TBD	mV	
BACKLIGHT						
Backlight Input voltage	V_{BL}	635	705	730	V_{RMS}	3
Backlight Current	I_{BL}	2.0	3.0	4.0	mA	
Lamp Kick-Off Voltage				1280	V_{RMS}	0±2•
Operating Frequency	F_{BL}	40	43	60	KHz	

Notes: 1. The current draw and power consumption specified is for 3.3 V(dc) at 25• and 38MHz (DCLK). Typical power consumption check pattern is 8 gray scale bar.
2. Logic levels are specified for V_{DD} of 3.3 Vdc at 25•. The values specified apply to all logic inputs; Hsync, Vsync, DCLK, Data signals, etc.
3. The backlight power consumption shown above does not include loss of external inverter.

4. Optical Specifications

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25•. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of Φ and θ equal to 0°.

Appendix A presents additional information concerning the specified characteristics.

Table 2 OPTICAL CHARACTERISTICS

Parameter	Symbol	Values			Units	Notes
		Min.	Typ.	Max.		
Contrast Ratio	CR	80	100	-		1
Surface Brightness, white(I_{BL}=3mA)	SB_{WH}	50	70		cd/m^2	2
Brightness Variation	SB_V		1.45	1.55		3
Response Time						
Rise Time	Tr_R		50		msec	4
Decay Time	Tr_D		50		msec	4
CIE Color Coordinates						
Red	x_R	0.54	0.58	0.62		
	y_R	0.31	0.35	0.39		
Green	x_G	0.28	0.32	0.36		
	y_G	0.52	0.56	0.60		
Blue	x_B	0.12	0.16	0.20		
	y_B	0.10	0.14	0.18		
White	x_W	0.28	0.32	0.36		
	y_W	0.29	0.33	0.37		
Viewing Angle(CR>10)						
x axis, right (•=0º)	•			40	degree, °	5
x axis, left (•=180º)	•			40		
y axis, up (•=90º)	•			10		
y axis, down (•=270º)	•			30		

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

(Surface Brightness with all white pixels)
(Surface Brightness with all black pixels)

2. Surface brightness is the average of 5 measurement across the LCD surface 50cm from the surface with all pixels displaying white. For more information see Appendix A.
3. The variation in surface brightness, SB_V is determined by measuring B_{ON} at each test position 1 through 5, and then dividing the maximum B_{ON} by the minimum B_{ON}.

Maximum (B_{ON1}, B_{ON2}, ...B_{ON5})
Minimum (B_{ON1}, B_{ON2}, ...B_{ON5})

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

5. Interface Connections

This LCD employs two interface connections, a 40 pin connector is used for the module electronics and a three pin connector is used for the integral backlight system.
The electronics interface connector is a model WR-L40S-VF-1, manufactured by JAE. The mating connector part number is WR-L40P-VF-1 or equivalent. The pin configuration for the connector is shown in the table below.

Table 3 MODULE CONNECTOR PIN CONFIGURATION

Pin		Symbol	Description	Notes
1	2	AVCC	Power supply analog voltage for PanelLink interface	1
3	4	RXC-	Low voltage swing differential input clock pairs	
5	6	RXC+	"	
7	8	AVCC	Power supply analog voltage for PanelLink interface	
9	10	RX0-	Low voltage swing differential input data pairs	
11	12	RX0+	"	
13	14	AVCC	Power supply analog voltage for PanelLink interface	
15	16	RX1-	Low voltage swing differential input data pairs	
17	18	RX1+	"	
19	20	AVCC	Power supply analog voltage for PanelLink interface	
21	22	RX2-	Low voltage swing differential input data pairs	
23	24	RX2+	"	
25	26	AVCC	Power supply analog voltage for PanelLink interface	
27	28	AGND	Analog ground for PanelLink interface	
29	30	DGND	Ground	2
31	32	VDD	Power supply voltage	3
33	34	VDD	"	
35	36	VDD	"	
37	38	VDD	"	
39	40	DGND	Ground	

Notes: 1. All AVCC pins should be connected together.
2. All DGND(ground) pins should be connected together.
3. All VDD(power supply) pins should be connected together.

Interface Connections (cont'd)

The backlight interface connector is a model BHR-03VS-1, manufactured by JST. The mating connector part

number is SM02(8.0)B-BHS-1-TB or equivalent. The pin configuration for the connector is shown in the table below.

Table 4 BACKLIGHT CONNECTOR PIN CONFIGURATION

Pin	Symbol	Description	Notes
1	HV	Lamp power input	1
2	NC	No connected	
3	LV	Ground	

Notes: 1. The input power terminal is colored pink.

6. Signal Timing Specifications

ITEM		Symbol	Value			Units	Notes
			Min.	Typ.	Max.		
DCLK	Frequency	f_{CLK}	-	38	40	MHz	Jitter • 2ns
	Width-Low	t_{WCL}	10	-	-	ns	
	Width-High	t_{WCH}	10	-	-	ns	
	Rise Time	tr_{CLK}	-	-	25	ns	
	Fall Time	tf_{CLK}	-	-	25	ns	
	Duty	D	0.45	0.5	0.55	-	D= f_{CLK} / f_{CLKL}
Hsync	Set-up Time	t_{SH}	10	-	-	ns	for DCLK
	Hold Time	t_{HH}	10	-	-	ns	
	Period	t_{HP}	990	1024	1200	f_{CLK}	
	Width-Active	T_{wH}	12	-	120	f_{CLK}	
	Rise/Fall Time	t_{Hr},t_{Hf}	-	-	30	ns	
Vsync	Set-up Time	t_{SV}	0	-	- -	f_{CLK}	for Hsync
	Hold Time	t_{HV}	2	-		f_{CLK}	
	Period	t_{VP}	603	625	730	t_{HP}	
	Width-Active	t_{WV}	1	-	24	t_{HP}	
	Rise/Fall Time	t_{Vr},t_{Vf}	-	-	50	ns	
DTMG	Set up Time	t_{SI}	10	-	-	ns	for DCLK
	Hold Time	t_{HI}	10	-	-	ns	
	Rise/Fall Time	t_{Ir},t_{If}	-	-	30	ns	
	Horizontal Back Porch	t_{HBP}	32	-	-	f_{CLK}	
	Horizontal Front Porch	t_{HFP}	16	-	-	f_{CLK}	
	Vertical Back Porch	t_{VBP}	0	-	-	t_{HP}	
	Vertical Front Porch	t_{VFP}	3	-	-	t_{HP}	
DATA	Set up Time	t_{SD}	10	-	-	ns	for DCLK
	Hold Time	t_{HD}	10	-	-	ns	
	Rise/Fall Time	$t_{Dr,}$ t t_{Df}	-	-	25	ns	

7. Signal Timing Wave Forms

(DATA : Latched at Fall edge of DCLK)

DCLK

tCLKL

DATA Invalid Data Invalid Data

DTMG

DCLK

Hsync

Vsync

Hsync

DTMG

Vsync

DTMG

8. 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 5 COLOR DATA REFERENCE

Color		Input Color Data																	
		Red						Green						Blue					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(00)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green(00)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue(00)	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(63) Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(61)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
		:	:	:	:	:	:	0	0	0	0	0	0	0	0	0	0	0	0
	Red(02)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(01)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(00)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	Green(63) Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(61)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
		0	0	0	0	0	0	:	:	:	:	:	:	0	0	0	0	0	0
	Green(02)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(01)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(00)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue	Blue(63) Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
		0	0	0	0	0	0	0	0	0	0	0	0	;	:	:	:	:	:
	Blue(02)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(01)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(00)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

9. Power Sequence

t1ó5msec, 0<t2ó50msec, 0<t3ó50msec, t4<5msec, 0<t5ó50msec, 0<t6ó50msec

* Set 0 Volt • Vi(t) • V_{DD}(t)

Here Vi(t), V_{DD}(t) indicate the transitive state of Vi, V_{DD} when power supply is turned ON or OFF

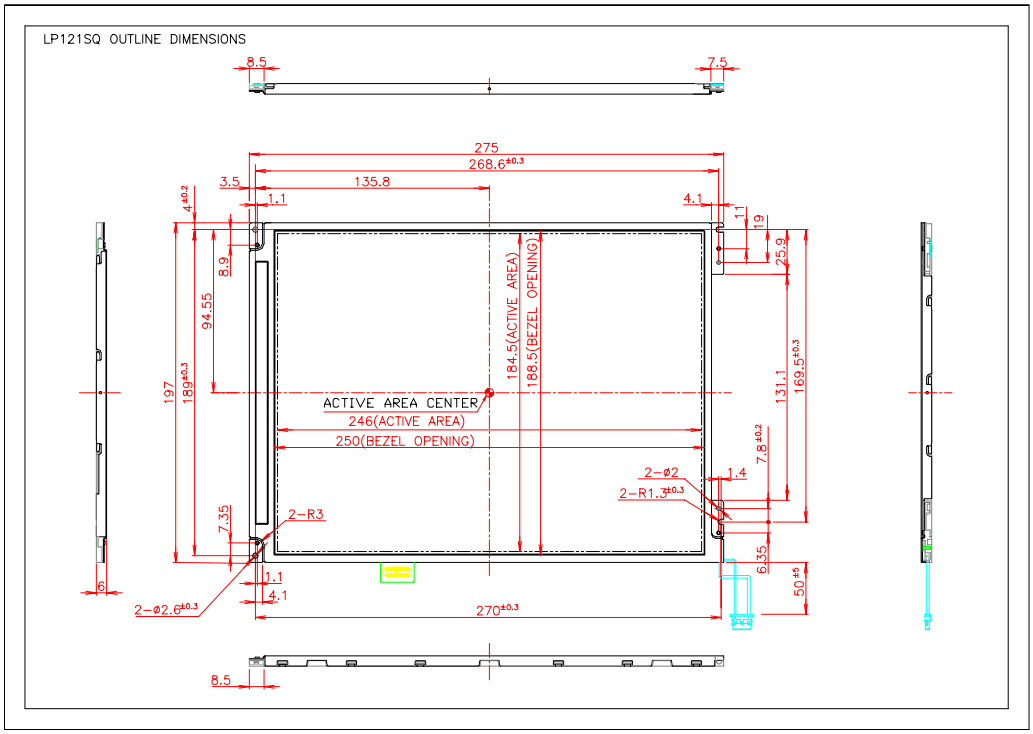
Notes : 1. Please avoid floating state of interface signal at invalid period.
2. When the interface signal is invalid, be sure to pull down the power supply for LCD V_{DD} to 0V.

10. Mechanical Characteristics

The chart below provides general mechanical characteristics for the model LP121SQ LCD. The surface of the LCD has an anti-glare coating to minimize reflection and a 2H hard coating to reduce scratching. In

addition, the figure below is a detailed mechanical drawing of the LCD. Note that dimension are given for reference purposes only.

Outside dimensions	Width	275 mm
	Height	197 mm
	Thickness	6 mm
Active Display area	Width	246 mm
	Height	184.5 mm
	Diagonal	307.5 mm
Weight (approximate)		430 ± 20 gram



11.Cosmetic

This cosmetic inspection is related to the acceptance quality levels of any defects

in the LCD module which we produce.
For more information about the following , contact LG Electronics any time.

11.1 Cosmetic Inspection Conditions

11.1.1 Inspective viewing angle

- This inspection should be executed according to the following figure.

- Viewing angle should be in the range of :
  - < 40 ^{o} when non-operating inspection
  - < 5^{o} when operating inspection

11.1.2 Environment Conditions

- Ambient temperature : 25 ± 5 ^{o}C
- Ambient Humidity : 65 ±5 % RH
- Ambient Lumination : Using single 20 watts fluorescent lamp (about 500 lux)

11.1.3 Sampling method[TBD]

- Lot size : Quality of shipment per model
- Sampling type : Normal inspection, single sampling
- Inspection level :

- Sampling table : Table in MIL-STD-

11.1.4 Acceptance Quality Level ['AQL'] [TBD]

- Major Defects : AQL %
- Minor Defects : AQL %

11.2 Cosmetic Specifications

	Item	Description	Classification	
Display Inspection	System function	No display Malfunction	Major Major	
	Display defects	Vertical line defect Horizontal line defect Sub-pixel defect Flicker Deterioration of display Quantity Newton ring	Major Major Minor Minor Minor Minor	
	Contrast ratio	Out of spec.	Major	
	Viewing angle	Out of spec.	Minor	
	Uniformity	Out of spec.	Minor	
	Backlight	No operation	Major	
	Image persistance	Out of spec.	Minor	1
Appearance Inspection	Dimension	Outline Mounting hole position	Major Major	
	Scratch & Dent on the polarizer		Minor	
	Bezel status	Irregular plating & coating	Minor	
	Black / White spot or line	Active area, below 10 dots	Minor	2
	Damaged part	Deep damage of B/L lead wire	Major	
	Others	Polarizer bubble Scratch on C/F or Cr layer	Minor Minor	

Notes : 1.Image persistence should be tested after displaying same pattern for 30 minutes and should disappear within 20 seconds.

2. Inspected in the bright/dark pattern respectively.

3. Quality acceptance level of defects on LCM module is defined as follows.

Item	Acceptance Level	Conditions
Black spot White spot Line	TBD	When operating
Scratches Dent	TBD	On the polarizer

[L : Length in mm , D : Diameter in mm , N & Nt : Number]

12. Reliability

No.	Test ITEM	Conditions

1	High temperature operation test	Ta = 40• 80%RH 168 Hrs (no condensation)
2	Low temperature operation test	Ta = 0• 168 Hrs
3	Vibration test (non-operating)	5 ~ 500 Hz 0.5G 0.5 oct/min 1 hour for each direction of X,Y,Z
4	Shock test (non-operating)	50G 2 msec one for each direction of X,Y,Z

{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.

In High temperature and low temperature operation test, tube current of lamp should be 3.0 mA.

13. International Standards

13.1 Safety

UL1950 "Safety of Information Technology Equipment Including Electrical Business Equipment. Second Edition" Underwriters Laboratories, Inc. 1993

CAS C22.2 "Safety of Information Technology Equipment Including Electrical Business Equipment. Second Edition" Canadian Standards Association, 1993

EN 60 950 "Safety of Information Technology Equipment Including Electrical Business Equipment." European Committee for Electrotechnical Standardization (CENELEC),1993,(IEC 950, Second Edition, including Amendments 1 and 2)

13.2 EMC

ANSI C63.4 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz." American National Standards Institute(ANSI),1992.

C.I.S P.R "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment."International Special Committee on Radio Interference

EN 55 022 "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment."European Committee for Electrotechnical Standardization (CENELEC),1988

14. Designation of Lot Mark

14.1.Lot Mark

1) 2)

A,B : SBU CODE
C,D,E : MODEL CODE
F : YEAR
G : MONTH
H,I,J,K,L : SERIAL NO.

NOTE 1) YEAR

YEAR	89	90	91	92	93	94	95	96	97	98	99
Mark	9	0	1	2	3	4	5	6	7	8	9

2) MONTH

MONTH	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Mark	1	2	3	4	5	6	7	8	9	O	N	D

14.2. Location of Lot Mark

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

15. Packing Form

a) Package quantity in one box : 10pcs
b) Box size : TBD

16. Handling Precautions

Please pay attention to the followings when you use this TFT/LCD module with Back-light unit.

16.1.MOUNTING PREACAUTION

1)You must mount Module using mounting holes arranged in 4 corners.
Be sure to turn off the power when connecting or disconnecting the circuit.

2) Note that the polarizers are easily damaged. Pay attention not to scratch or press this surface with any hard object.

3) When the LCD surface become dirty, please wipe it off with a soft material.
(ie. cotton ball)

4) Protect the module from the ESD as it may damage the electronic circuit (C-MOS).
Make certain that treatment person's body are grounded thru wrist bend.

5) Do not disassemble the module and be careful not to incur a mechanical shock that might occur during installation. It may cause permanent damage.

6) Do not leave the module in high temperatures, Particularly in areas of high humidity for a long time.

7) The module not be expose to the direct sunlight.

8) Avoid contact with water as it may a short circuit within the module.

16.2 OPERATING PRECAUTION

1) The spike noise causes the mis-operation of circuits.
Be lower the spike noise as follows :
VDD=±200mV, V1=±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 turn on)becomes longer.
4) Be careful for condensation at sudden temperature change. Condensation make damage to polarizer or electrical contact part. And after fading condensation, smear or spot will occur.
5) When fixed pattern are displayed at long times, remnant image is likely to occur.
6) Module has high frequency circuit. If you need to shield the electromagnetic noise. Please do in yours.
7) When Back-light unit is operating, it sounds.
If you need to shield the noise, please do in yours.

16.3 ELECTROSTATIC DISCHARGE CONTROL

Since module is composed with electronic circuit, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through list band etc.. And don't touch I/F pin directly.

16.4 PRECAUTION FOR STRONG LIGHT EXPOSURE.

Strong light exposure causes degradation of polarizer and color filter.

16.5 STORAGE

When storing module as spares for long time, the following precautions are necessary.
1) Store them in a dark place : do not expose then to sunlight or fluorescent light. Keep the temperature between 5 and 35 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.

16.6 HANDLING PRECAUTIONS FOR PROTECTION FILM

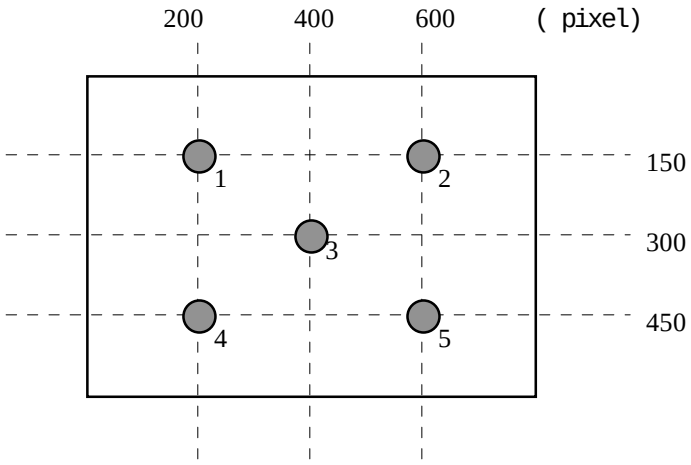
1) When the protection film is pealed off, static electricity is generated between the film and the polarizer. This film should be pealed off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition. etc.

2) The protection film is attached the polarizer with a small amount of glue. If some stress is applied to rub the protection film against the polarizer during the time you peal off the film, the glue is apt to remain more on the polarizer. So please carefully peal off the protection film without rubbing it against the polarizer.
3) When the module with protection film attached is stored for long time, sometimes there remains a very small amount of glue still on the polarizer after the protection film is pealed off.
Please refrain from storing the module at the high temperature and high humidity for glue is apt to remain in these condition.
4) The glue may be taken for the modules failure, but you can remove the glue easily. When the glue remains on the polarizer surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with Normal-hexane.

16.7 SAFETY
1) If module is broken, be careful to handle not to injure. (TFT/LCD and lamp are made of glass)
Please wash hands sufficiently when you touch the liquid crystal coming out from broken LCDs.
2) As it is possible for PCB or other electronic parts of module to small to smoke and to take fire because of the short circuit. Please design the circuit of your instrument not to flow the electric current to TFT/LCD module more than 1A. (by apply the fuse for example)
3) As Back-light unit has high voltage circuit internal, do not open the case and do not insert foreign materials in the case.

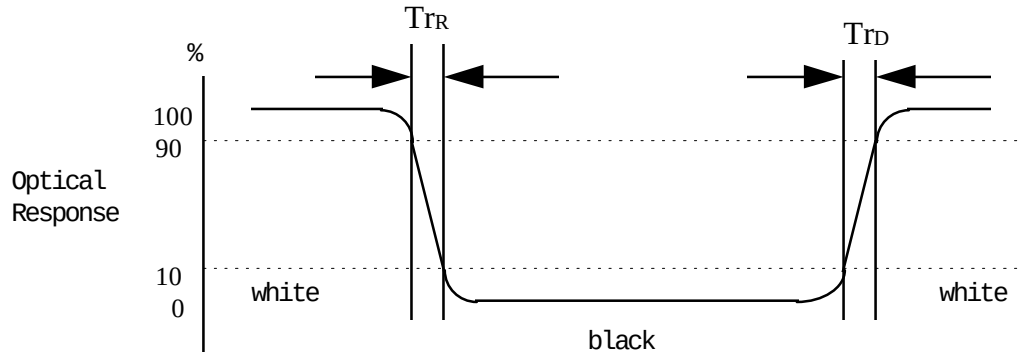
A-1 Brightness

<measuring point>



A-2 RESPONSE TIME

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



A-3 Viewing angle

<Definition of viewing angle range>