TFT LCD Preliminary Specification

Model No.:P102SC-0A00

Customer：

Approval by:

Note:

Record of Revisions

Ver.	Date	Page	Description of change
1.0	Jan.27.2007	All	Tentative product specification was first issued .

Contents

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1.0 GENERAL DESCRIPTION

1.1 Introduction

P102SC-0A00 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 10.2 (15:9) inch diagonally measured active display area with 2400 x 480 dot (800 horizontal by 480 vertical pixels) resolution.

1.2 Features

■ 10.2 (15:9 diagonal) inch configuration
■ Portable DVD Player
■ ROHS design

1.3 General information

Item		Specification	Unit
Outline Dimension		235(H) x 145.8(V)	mm
Display area		222(H) x 132.48(V)	mm
Number of Pixel		800 RGB(H) x480(V)	pixels
Pixel pitch		0.2775(H) x 0.276(V)	mm
Pixel arrangement		RGB Vertical stripe	
Display mode		Normally white	
Weight		TBD	
Back-light		CCFL	
Power Consumption	Logic System	TBD	
	B/L System	TBD	

1.4 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal(H)	—	—	—	mm
	Vertical(V)	—	—	—	mm
	Depth(D)	—	—	—	mm
Weight (Without inverter)		—	—	—	g

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2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

2.1.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Power supply voltage	V_{DD}	-0.5	5	V	GND=0
	V_{GH}	-0.3	40	V	GND=0
	V_{GL}	-20	0.3	V	GND=0
	AV_{DD}	-0.5	13.5	V	AGND=0
Input signal voltage	V_I	-0.5	V_{DD}+0.5	V	
	$V_{GMA(1\sim7)}$	$0.4AV_{CC}$	AV_{DD}-0.1	V	
	$V_{GMA(8\sim14)}$	0.1	$0.6AV_{DD}$		

2.2 Back-Light Unit

Item	Symbol	Min.	Max.	Unit	Note
Lamp current	I_L	TBD	TBD	mA	
Lamp frequency	f_L	TBD	TBD	KHz	

2.3 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	-30	85	℃	
Storage Temperature	T_{stg}	-40	85	℃	

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3 OPTICAL CHARACTERISTICS

3.1 Optical specification

| Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Threshold voltage		Vsat	—	—	—	—	V	(5)
		Vth	—	—	—	—	V	
Transmittance (With SWV PZ)		T	Θ=0 Normal viewing angle	—	TBD	—	％	
Contrast Ratio		CR		—	500	—	—	(1)(2)
Response time		$T_R + T_F$		—	25	—	msec	(1)(3)
White luminance (Center)		Y_L	Θ=0 Normal viewing angle	—	TBD	—	cd/m^2	
Color gamut		S			50		％	(C-light)
Color chromaticity (CIE1931)	White	W_x		0.303	0.305	0.307		(1)(4) CF glass (C-light)
		W_y		0.330	0.332	0.334		
	Red	R_x		0.576	0.578	0.580		
		R_y		0.314	0.316	0.318		
	Green	G_x		0.298	0.300	0.302		
		G_y		0.557	0.559	0.561		
	Blue	B_x		0.137	0.139	0.141		
		B_y		0.140	0.142	0.144		
Viewing angle	Hor.	$Θ_L$	CR>10	—	70	—		
		$Θ_R$		—	70	—		
	Ver.	$Θ_U$		—	65	—		
		$Θ_D$		—	65	—		
Optima View Direction		6 O'clock						(6)

Measuring Condition
- Measuring surrounding : dark room
- Ambient temperature : 25±2°C
- 30min. warm-up time.

3.2 Measuring Equipment
■ Otsuka Electrics Corp., which utilized MCPD-3000 for
  Chromaticity and BM-7 for other optical characteristic.
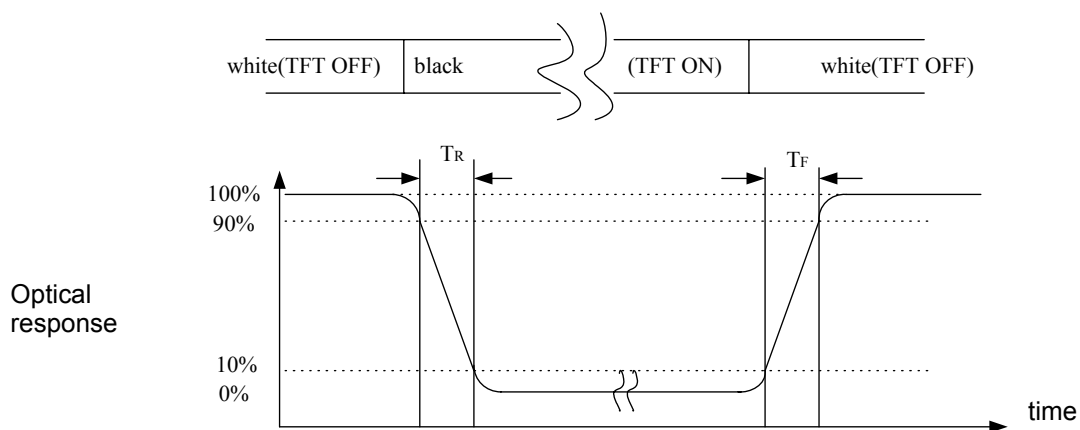■ Measuring spot size : 10 ~ 12 mm

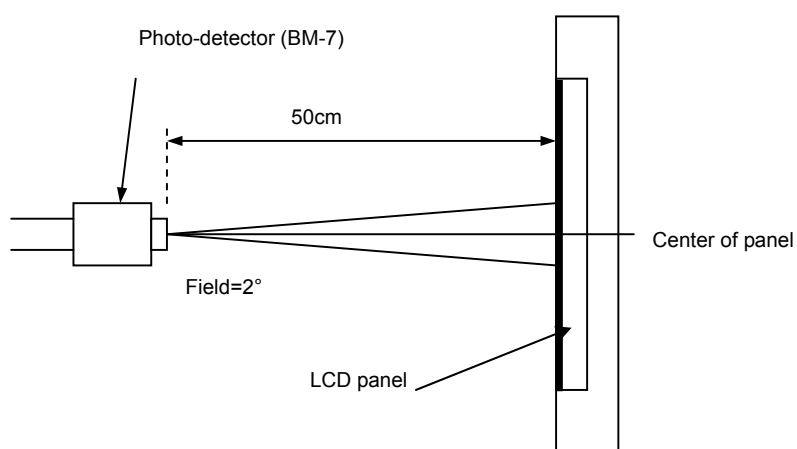**Note (1)** Definition of Viewing Angle :

Θ_U

12' o'clock
$\Phi=90^o$

Θ_L

Θ_R

$\Phi=180^o$

$\Phi=0^o$

Θ_D

6' o'clock
$\Phi=270^o$
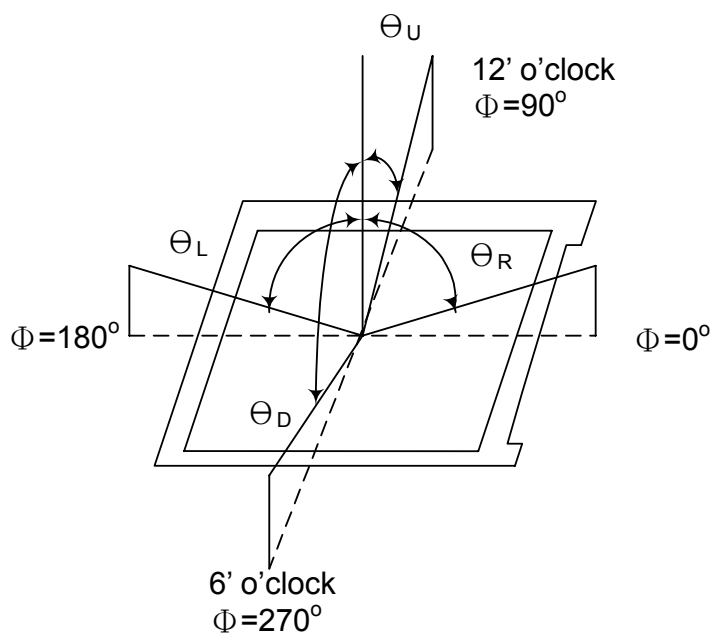
Note (2) Definition of Contrast Ratio(CR) :
        measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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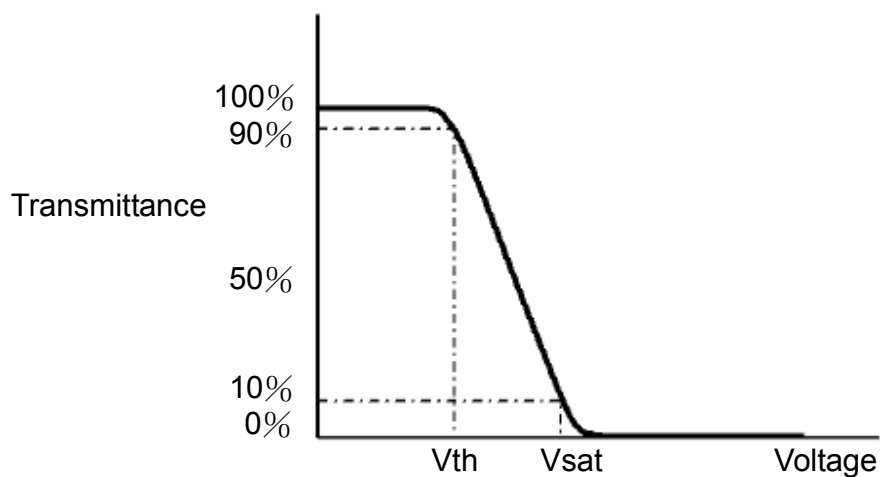**Note (3)** Definition of Response Time : Sum of T_R and T_F

| white(TFT OFF) | black | | (TFT ON) | white(TFT OFF) |

Optical
response

T_R T_F

100%
90%

10%
0%

time

Note (4) Definition of optical measurement setup

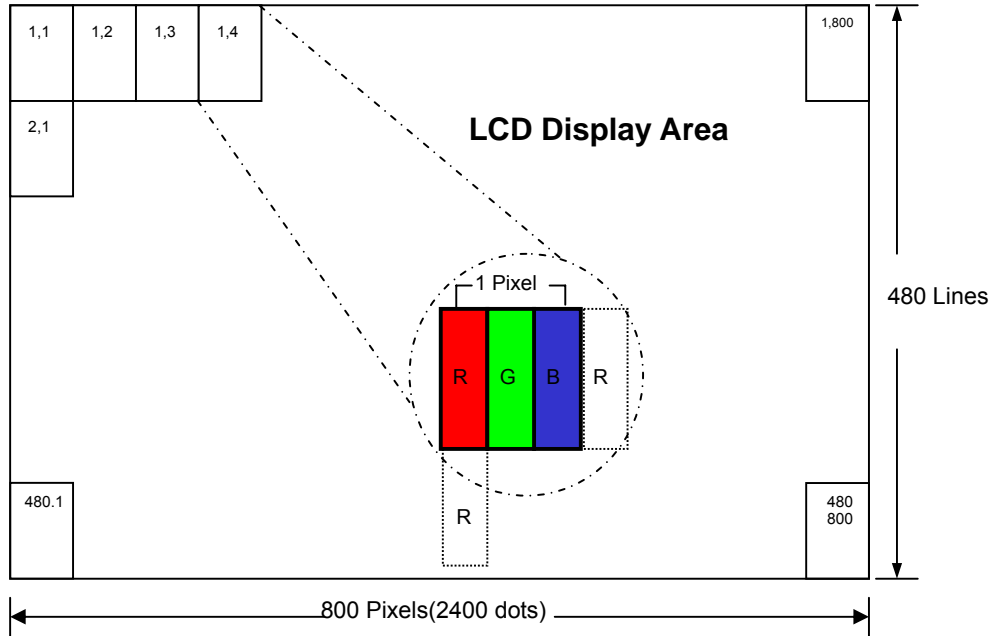Photo-detector (BM-7)

50cm

Field=2°

Center of panel

LCD panel

Note (5) Definition of Vth and Vsat (at 20℃)

Note (6) Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.)

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4.0 Pixel Format

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5.0 INTERFACE PIN CONNECTION

5.1 System pin assignment

Pad No.	Pad Name	Pad No.	Pad Name
1	POL	31	GND
2	STVD	32	D15
3	OE123R	33	D14
4	G-CLKR	34	D13
5	STVU	35	D12
6	GND	36	D11
7	EDGSL	37	D10
8	VCC	38	DIO2/-COF3
9	V9	39	REV
10	VEER	40	GND
11	V2	41	CLK
12	VGGR	42	VCC
13	V6	43	DIO1_COF1
14	U/RD	44	LD
15	VCOM	45	D25
16	AGND	46	D24
17	AVDD	47	D23
18	V14	48	D22
19	V11	49	D21
20	V8	50	D20
21	V5	51	SHL
22	V3	52	V1
23	GND	53	V4
24	D05	54	V7
25	D04	55	V10
26	D03	56	V12
27	D02	57	V13
28	D01	58	AVDD
29	D00	59	AGND
30	GND	60	VCOM

5.2 interface 1ST pin

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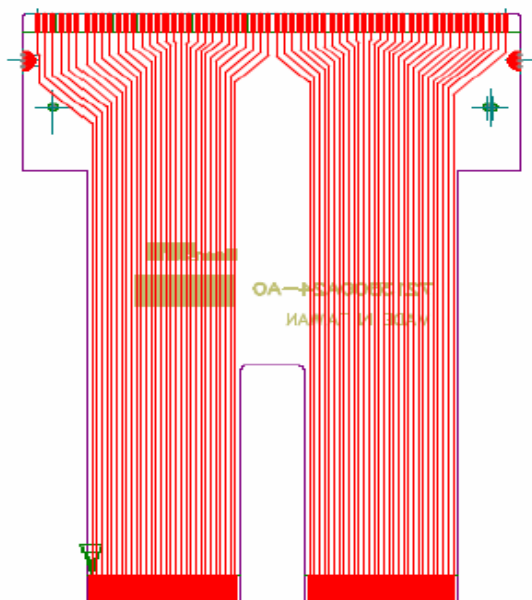
6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

DC Electrical characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{DD}	3.0	3.3	3.6	V	
	V_{GH}	10.0		35	V	
	V_{GL}	-15		-3	V	
	$V_{GH} - V_{GL}$	15.0		40.0		
	V_{COM}	7		Vgl+35	V	
Low level Input Voltage	Vil	0	-	$0.3V_{DD}$	V	
High level Input Voltage	Vih	$0.7V_{DD}$	-	V_{DD}	V	
High level Input Voltage	Voh	V_{DD} -0.4	-	V_{DD}	V	
Low level Input Voltage	Vol	Gnd	-	Gnd+0.4	V	
Sinking Current of Outputs	IOL	I-80I	-	-	uA	
Driving Current of Outputs	IOH	80	-	-	uA	
Supply Analog Voltage	AV_{DD}	6.5	10	13.5	V	
Input level V1~V7	V_{GMA} 1~7	0.4AVDD		AV_{DD}-0.1	V	
Input level V8~V14	V_{GMA}8~14	0.1		$0.6AVV_{DD}$	V	
Current for driver	I_{GG}		100		uA	$V_{GG=25}$
	I_{EE}		-100		uA	$V_{EE=-15}$
	I_{CC}		50		uA	$V_{CC=3.3}$

(VCC=2.7V~3.6,AVDD=6.5~13.5V,AVSS=GND=0V,TA=25℃)

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6.2 AC Characteristics

| Item	Symbol	Min.	Typ.	Max.	Unit
CLK Frequency	Fclk	-	40	45	MHZ
CLK pulse widrh	Tcw	40%	-	60%	Tcph
Data set up time	Tsu	4	-	-	ns
Data hold time	Thd	2	-	60	ns
Propagation delay of DIO2/1	Tphl	6	10	15	ns
Time that the last data to LD	Tld	1	-	-	Tcph
Pulse width of LD	Twld	2	-	-	Tcph
Time that LD to DIO1/2	Tlds	5	-	-	Tcph
POL set up time	Tpsu	6	-	-	ns
POL hold time	Tphd	6	-	-	ns
Output stable time	Tst	-	-	12	us
CKV Pulse Width	TCKV	0.5			us
OEV pulse Width	TOEV	1			us
STV set up time	Tsuv	200			ns
STV hold time	Thdv	200	-		ns

(VDD=3.3V,AVDD=8.4,AVSS= Gnd=0V,Ta=25℃)

6.2 Back-Light Unit

The back-light system is an edge-lighting type with 1CCFL(Cold Cathode Fluorescent Lamp).
The characteristics of the lamp is shown in the following tables.

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Lamp current	IL		TBD		Ma(rms)	(1)(6)
Lamp voltage	VL		TBD		V(rms)	(6)I_L=6.0mA
Frequency	fL				KHZ	(2)
Operating lamp life time	Hr	TBD			Hour	(3)
Startup voltage	Vs				V(rms)	(4)(5)at 25℃
						(4)(5)at 0℃

Note(2) Lamp current is measured with current meter for high frequency as shown below
　　　　 Specified valued are for single lamp
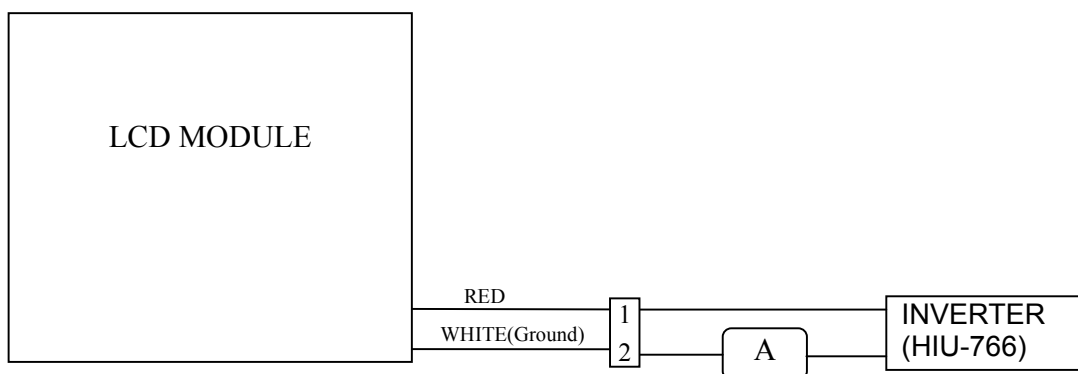
Note (2) Lamp frequency may produce interference with horizontal synchronous
　　　　　frequency and this may cause ripple noise on the display. Therefore lamp
　　　　　frequency shall be kept away from the horizontal synchronous frequency
　　　　　and its harmonics as far as possible in order to avoid interference

Note (3) Lamp life time (Hr) can be defined as the time in which it continues to
　　　　　operate under the condition : Ta=25±3 ^{o}C, typical IL value indicated in
　　　　　the above table and fL=50kHz until the brightness becomes less than
　　　　　50%.

Note (4) CCFL inverter should be able to provide a voltage over specified value
　　　　　(Vs) in the above table. Lamp units need at least Vs value shown above
　　　　　to ignition

Note(5) The voltage over specified value(Vs)should be applied to the lamp more
　　　　　than 1 second after startup. Otherwise, the lamp may not be turned on.
　　　　　The used lamp current is the lamp typical current

Note (6) The output voltage waveform and current waveform of the inverter must be
　　　　　symmetrical (Unsymmetrical ratio is less than 10%). Please do not use the
　　　　　inverter which has unsymmetrical voltage and current waveform, and spike
　　　　　waveform. The inverter design which can provide the best optical performance,
　　　　　power efficiency, and lamp life should under the following conditions.

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a. The asymmetry rate of the inverter waveform should be less than 10%.
b. The distortion tae of the waveform should be within $\sqrt{2}\pm10\%$.
c. The inverter output waveform should be better similar to the ideal sine wave
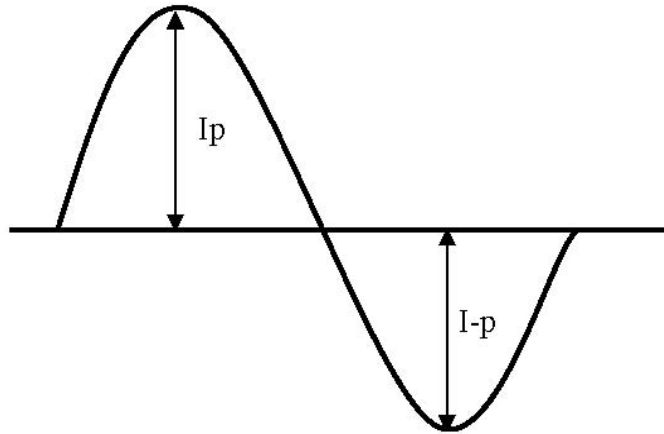
Asymmetry rate = |Ip-I-p| / Irms x 100%
Distortion rate = Ip (or I-p) / Irms

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6.4Timing Diagram of Interface Signal
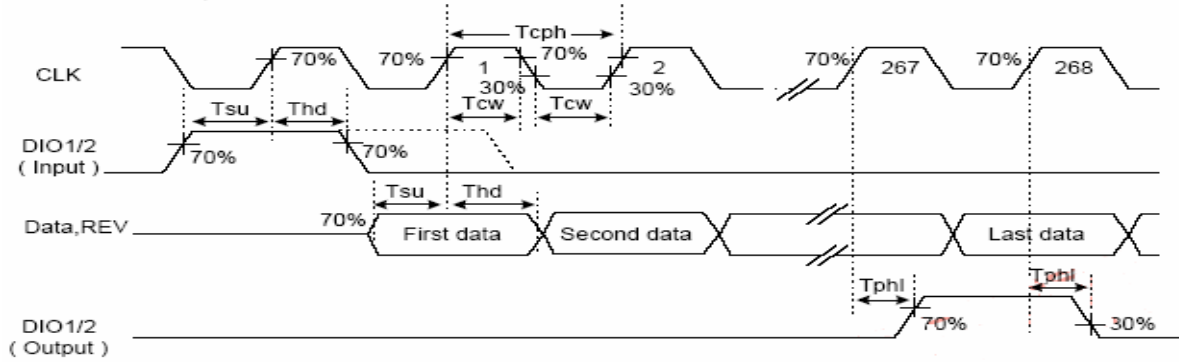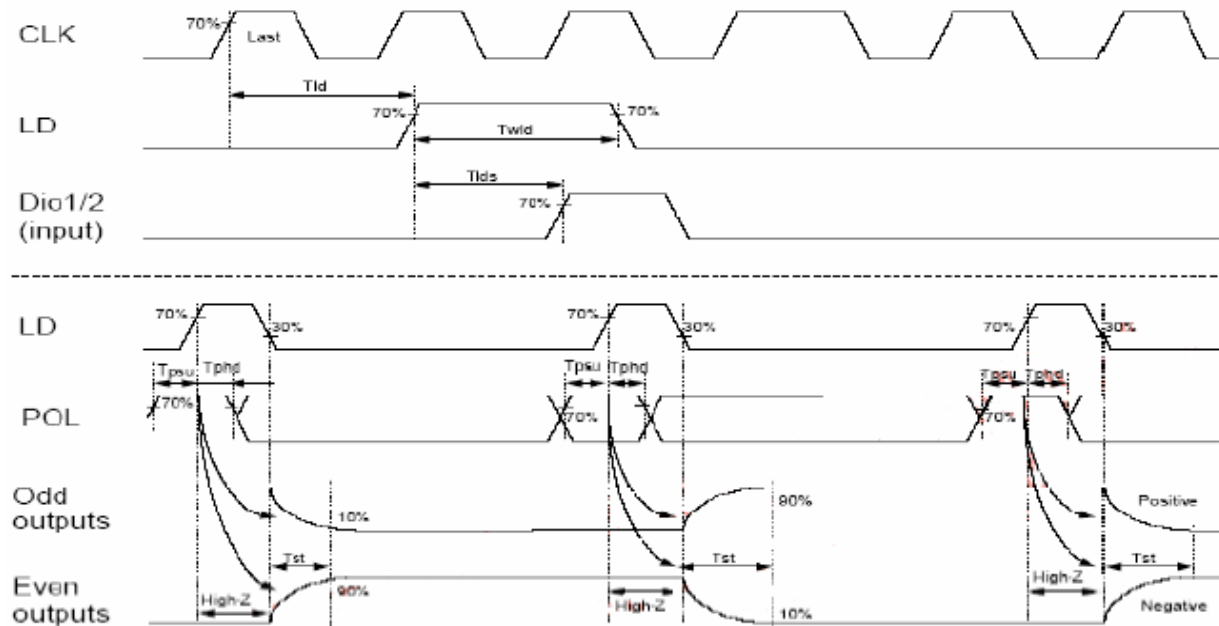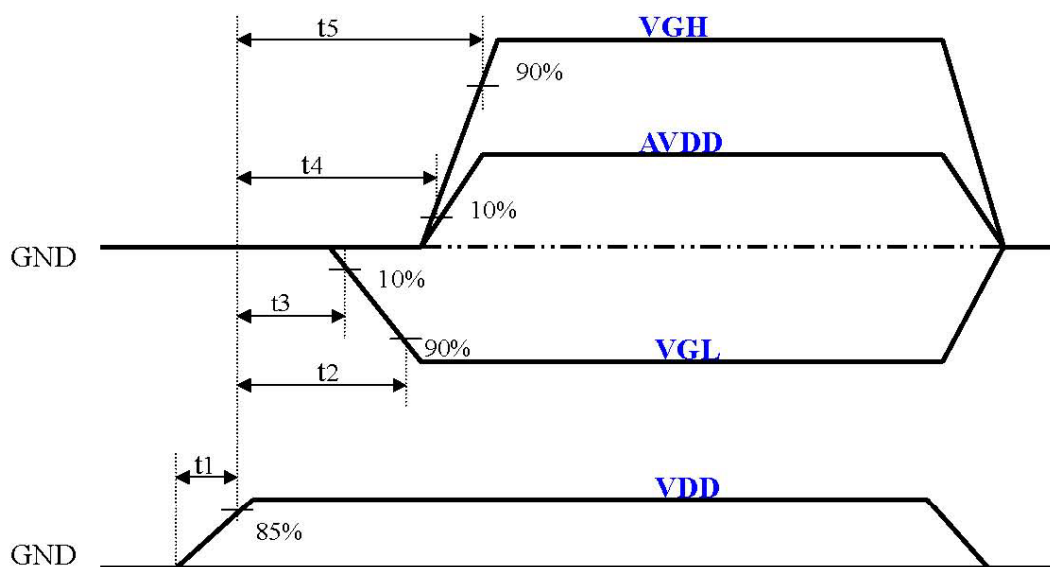
Power Sequence

Power Sequence: VDD -> VGL-> AVDD -> VGH

t1 < 10ms

t3 < t4

t2 , t5 ≤ 40ms.

Note   Apply the lamp volatge within the LCD operation range. When the back-light tur

before the LCD operation or the LCD truns off before the back-light turns off.

the display may momentarily become white.

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7.0 Reliability

No.	Item	Conditions	Remark
1	High temperature storage	Ta=+85℃,240hrs	
2	low temperature storage	Ta=-40℃,240hrs	
3	high temperature operation	Ta=+85℃,240hrs	
4	Low temperature operation	Ta=-30℃,240hrs	
5	High temperature and high humidity (operating)	Ta=+60℃,90％RH,240hrs	
6	Thermal cycling test (non operation)	-40℃(0.5hr)→+85℃(0.5hr),200cycles	
7	Packing	1.Sine,1.5G,5~200hz1hrX,Y,Z direction 2.Random,1.5Grms,5~200Hz,15min/X,Y,Z direction 3.Half-Sine,70G,11ms+X axis,2 Times 4.Half-Sine,200G,2ms+X axis,2 Times 5.90 degree topple to dash against the hard-face of table.	
8	Altitude test(non operation)	50000ft,24hr(25℃)	
9	Altitude test(operation)	10000ft,02hr(25℃)	
10	Pressure cooker test	121℃,100％R.H.,2atm,16hr/20hr	
11	Electrostatic discharge	±200V,200pF,0Ω	

Note：All test above are practiced at mod type.
There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

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8.0 OUTLINE DIMENSION

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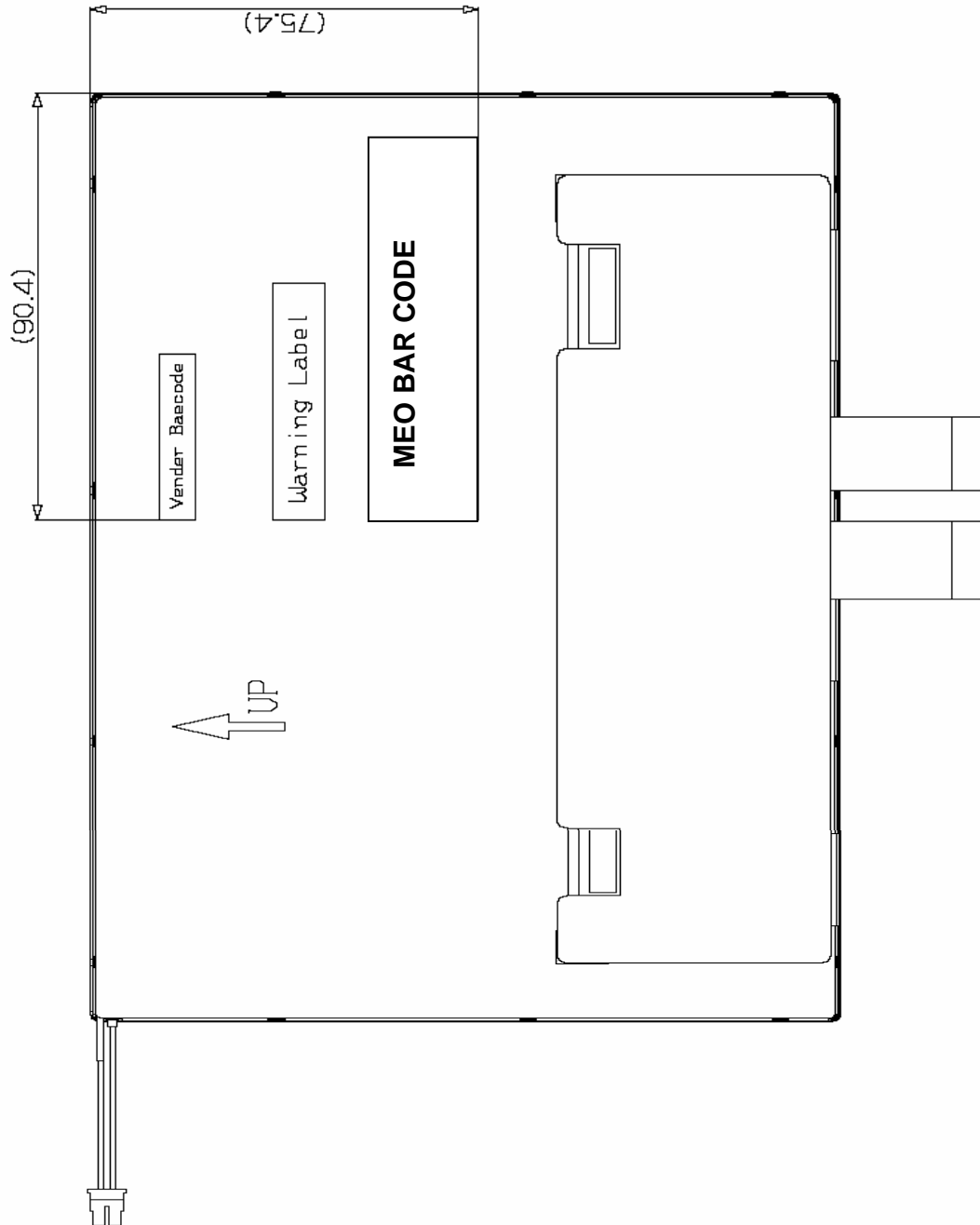
9.0 GENERAL PRECAUTION

9.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

9.2 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. MEO does not warrant the module, if customers disassemble or modify the module.

9.3 Breakage of LCD Panel

9.3.1 If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

9.3.2 If liquid crystal contacts mouth or eyes, rinse out with water immediately.

9.3.3 If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

9.3.4 Handle carefully with chips of glass that may cause injury, when the glass is broken.

9.4 Absolute Maximum Ratings and Power Protection Circuit

9.4.1 Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.

9.4.2 Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

9.4.3 It's recommended to employ protection circuit for power supply.

9.5 Operation

9.5.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

9.5.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

9.5.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

9.5.4 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may cause deformation or color fading.

9.5.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

9.6 Static Electricity

9.6.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

9.6.2 Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge.

9.6.3 Persons who handle the module should be grounded through adequate methods.

9.7 Disposal

When disposing LCD module, obey the local environmental regulations.

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9.8 OTHERS

9.8.1 A strong incident light into LCD panel might cause display characteristics changing
Inferior because of polarizer film, color filter , and other materials becoming inferior
Please do not expose LCD module direct sunlight land strong UV rays

9.8.2 Please pay attention to a panel side of LCD module not to contact with other
materials in preserving it alone

9.8.3   For the. packaging box. Please pay attention to the followings:

9.8.3.1 Packaging box and inner case for LCD are designed to protect the LCDs
From the damage or scratching during transportation. Please do not open
except picking LCDs up from the box

9.8.3.2 Please do not pile them up more than 6 boxes (they are not designed so)
And please do not turn over

9.8.3.3 Please handle packaging box with care not to give them sudden shock and
vibration. And also please do not throw them up

9.8.3.4 Packing box and inner case for LCDs are made of cardboard. So please
pay attention not to get them wet(Such like keeping them in high humidity
or wet place can occur getting them wet

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