

Control No. :	TR-S-116
Version No. :	1

SPECIFICATIONS

PRODUCT : LCD MODULE

MODEL NO. : P240320-40

CUSTOMER			SUNLIKE DISPLAY		
APPROVED	CHECKED	CHECKED	APPROVED	CHECKED	PREPARED
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- APPROVAL FOR SPECIFICATIONS ONLY
 APPROVAL FOR SPECIFICATIONS AND SAMPLE

上靖光電股份有限公司
SUNLIKE DISPLAY TECH CORP.

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1.GENERAL SPECIFICATIONS :

1-1 SCOPE:

This specification covers the delivery requirements for the liquid crystal display delivered by SUNLIKE DISPLAY TECH CORP. to Customer ◦

1-2 PRODUCTS:

Liquid Crystal Display Module (LCM)

1-3 MODULE NAME:

P320240-40

2.FEATURES :

2-1 Display type: TDF, Gray, Transflective, 6o'clock, Positive

2-2 Driving Method: 1/240 duty 1/13 bias

2-3 LCD Drive : NT7701X2(Segment Device)

NT7702X1(Common Device)

2-4 With Touch Panel

2-5 With Bias & DC/DC circuit

2-6 With EL BACKLIGHT

3.MECHANICAL SPECIFICATIONS :

ITEM	SPECIFICATIONS	UNIT
OUTLINE DIMENSIONS	87.8(W) x 68.6 (H) x 5.3(t) MAX	mm
VIEWING AREA	78.8(W) x 59.6(H)	mm
ACTIVE AREA	76.79(W)x57.59(H)	mm
DISP. CONSTRUCTION	320 X 240 dots	—
NUMBER OF DOTS	320 X 240	Dots
DOT SIZE	0.23(W) x 0.23(H)	mm
DOT PITCH	0.24(W) x 0.24(H)	mm
ASSY. TYPE	TAB	—
BACKLIGHT	EL (WHITE)	—
WEIGHT	About 26	g

4.ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	CONDITIONS	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
POWER SUPPLY FOR LOGIC	VDD-VSS	Ta=25°C	-0.3	—	+7.0	V
POWER SUPPLY FOR LCD DRIVING	VLCD*	Ta=25°C	-0.3	—	+30.0	V
INPUT VOLTAGE	VIN	Ta=25°C	-0.3	—	VDD+0.3	V
OPERATION TEMPERATURE	TOPR	—	0	—	+50	°C
STORAGE TEMPERATURE	TSTG	—	- 10	—	+60	°C

NOTE: LCM SHOULD BE GROUNDED DURING HANDLING LCM

5.ELECTRICAL CHARACTERISTICS

(Ta=25°C)

ITEM	SYMBOL	CONDITIONS	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
POWER SUPPLY VOLTAGE	VDD-VSS	—	2.5	3.3	5.5	V
POWER SUPPLY FOR LCD DRIVING	VLCD (Note)	Ta=0°C	—	—	—	V
		Ta=25°C	—	19.0	—	
		Ta=50°C	—	—	—	
INPUT VOLTAGE "H" LEVEL	VIH	D0~D7, XCK, LP, L/R, FR, MD,	0.8VDD	—	—	V
INPUT VOLTAGE "L" LEVEL	VIL	S/C, EIO1, EIO2, /DISPOFF Pins	—	—	0.2VDD	V
OUTPUT VOLTAGE "H" LEVEL	VOH	EIO1, EIO2 Pins, IOH=-0.4mA	VDD-0.4	—	—	V
OUTPUT VOLTAGE "L" LEVEL	VOL	EIO1, EIO2 Pins, IOH=+0.4mA	—	—	0.4	V
FRAME FREQUENCY	Freq.	---	—	70	—	Hz
POWER SUPPLY CURRENT	IDD (Note)	VDD=3.3V VOP=19.0V	—	0.15	0.45	mA
	IEE (Note)		—	1.5	4.5	mA

Note: Reference items

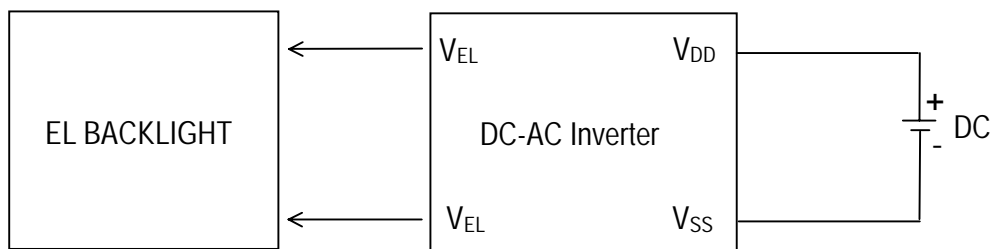
*1: The VLCD (VEE-VSS) & IDD measurement is for "all display on" pattern.

*2: Frame Frequency=70Hz

*3: Power supply current of IEE is bias voltage supply circuit included.

6. EL BACKLIGHT

6-1 POWER SUPPLY FOR EL LAMP



6-2 ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	SPECIFICATIONS	UNIT
VOLTAGE	V _{EL}	140	V _{rms}
SPECTRUM	F _{EL}	800	Hz
OPERATION TEMPERATURE RANGE	TOPR	-20 ~ +70	°C
STORAGE TEMPERATURE RANGE	TSTG	-30 ~ +80	°C

6-3 ELECTRICAL CHARACTERISTICS

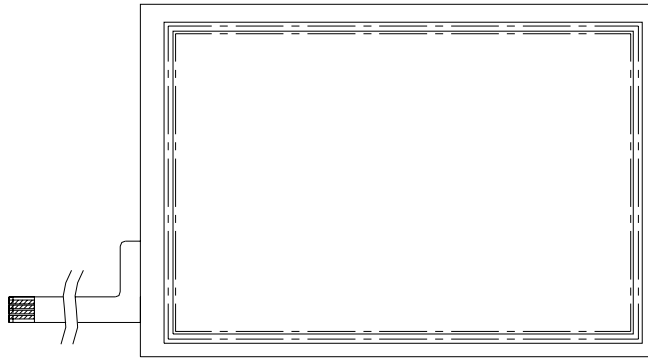
PARAMETER	STANDARD VALUE			UNIT
	MIN	TYP	MAX	
SUPPLY VOLTAGE	—	100	—	V _{rms}
SUPPLY SPECTRUM	—	400	—	Hz
BEGIN INTENSITY	40	—	—	cd/m ²
WHITE	X ±0.03	—	0.27	—
	Y ±0.04	—	0.40	—
CURRENT CONSUMPTION	—	0.17	0.24	mA/cm ²
POWER CONSUMPTION	1.8	—	—	mW/cm ²

6-4 SOLDERING CONDITIONS

PARAMETER	DESCRIPTIONS
SOLDERING AREA	THE TIP OF METAL CONNNECTOR
SOLDERING TEMPERATURE & TIME	350°C ±10°C → 2sec ± 1sec.
	300°C ±10°C → 4sec ± 2sec.
	250°C ±10°C → 6sec ± 2sec

7. TOUCH PANEL

7-1 BLOCK DIAGRAM



7-1 ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITIONS	SPECIFICATIONS	UNIT
SUPPLY VOLTAGE	—	—	DC 7.0	V
ENDURANCE VOLTAGE	—	1 minute	DC 25.0	V
OPERATION TEMPERATURE RANGE	T _{OPR}	20%RH~90%RH	-20 ~ +60	°C
STORAGE TEMPERATURE RANGE	T _{STG}	20%RH~90%RH	-40 ~ +80	°C

7-3 ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
RESISTANCE BETWEEN TERMINAL	R _X	—	200	350	900	Ω	Note1
	R _Y	—	200	450	900	Ω	Note1
INSULATION RESISTANCE	R _{INS}	DC 25V	20	—	—	MΩ	Note1
LINEARITY	—	—	-1.5	—	1.5	%	Note1

Note1: This specifications applied to only touch panel. And calibration is more than 3 points.

7-4 MECHANICAL CHARACTERISTICS

ITEM	CONDITIONS	SPECIFICATIONS	NOTE
OPERATION FORCE	PEN (Push vertically) (Top R0.8, Material Polyacetal)	80g or less	Note2
	RUBBER (Push vertically) (Top R8, Material Silicon)	80g or less	Note2
HARDNESS OF SURFACE	JIS-K5400	PENCIL HARDNESS 2Hmin.	

Note2: Resistance between X & Y axis must be equal or lower than 2KΩ.

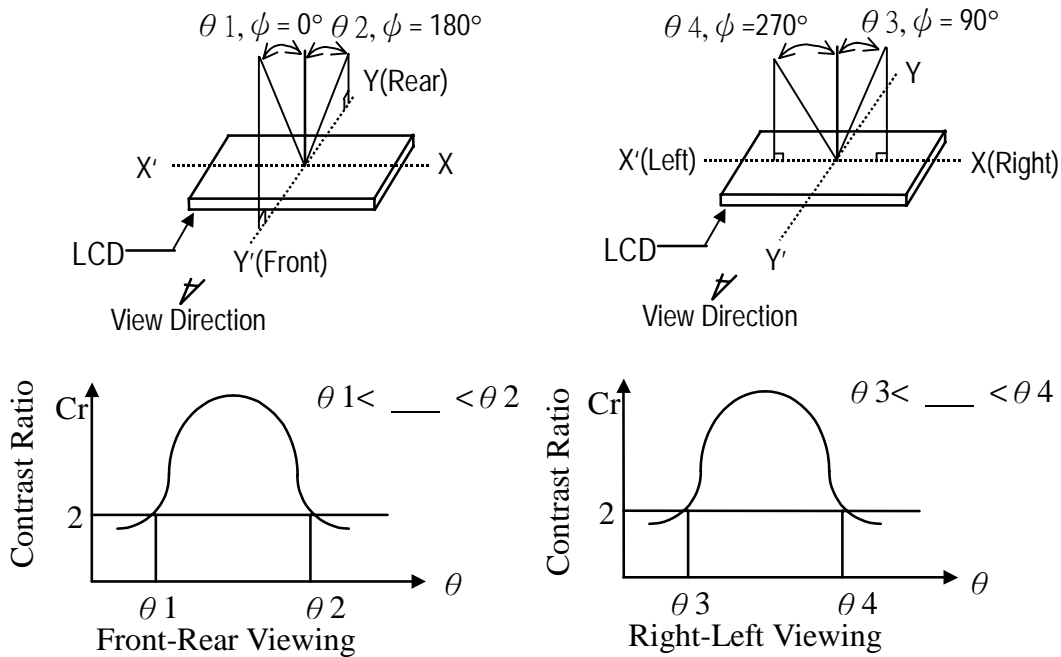
SUNLIKE DISPLAY TECH CORP.

8.OPTICAL CHARACTERISTICS

(Ta=25°C)

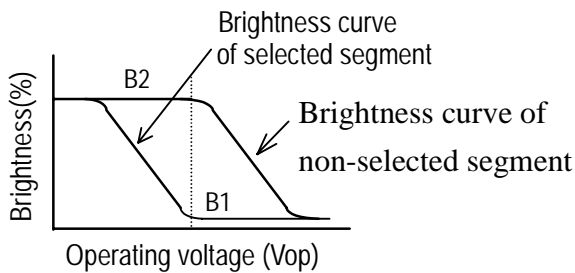
ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	NOTE
VIEWING ANGLE	$\theta 1$	$Cr \geq 2.0$ $Vop=19.0V$	—	35	—	degree	(1)
	$\theta 2, \theta 3, \theta 4$		—	30	—		
CONTRAST RATIO	Cr	$VOP=19.0V$	7.2	9.1	—	—	(2)
RESPONSE TIME (rise)	Tr	$\theta 1=0^\circ \theta 2=0^\circ$	—	119	—	ms	(3)
RESPONSE TIME (fall)	Tf	$\theta 1=0^\circ \theta 2=0^\circ$	—	267	—	ms	(3)

(1) DEFINITION OF VIEWING ANGLE

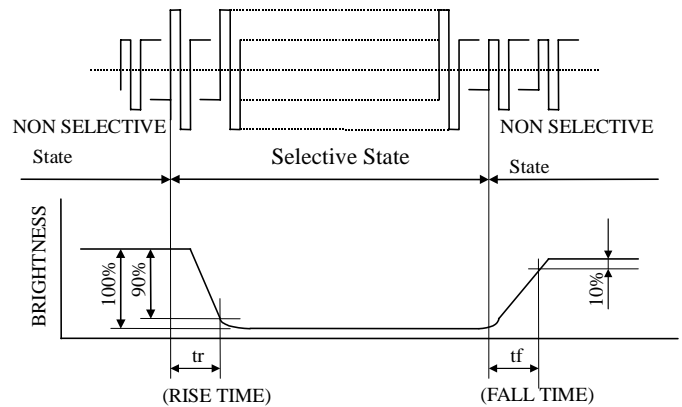


(2) DEFINITION OF CONTRAST

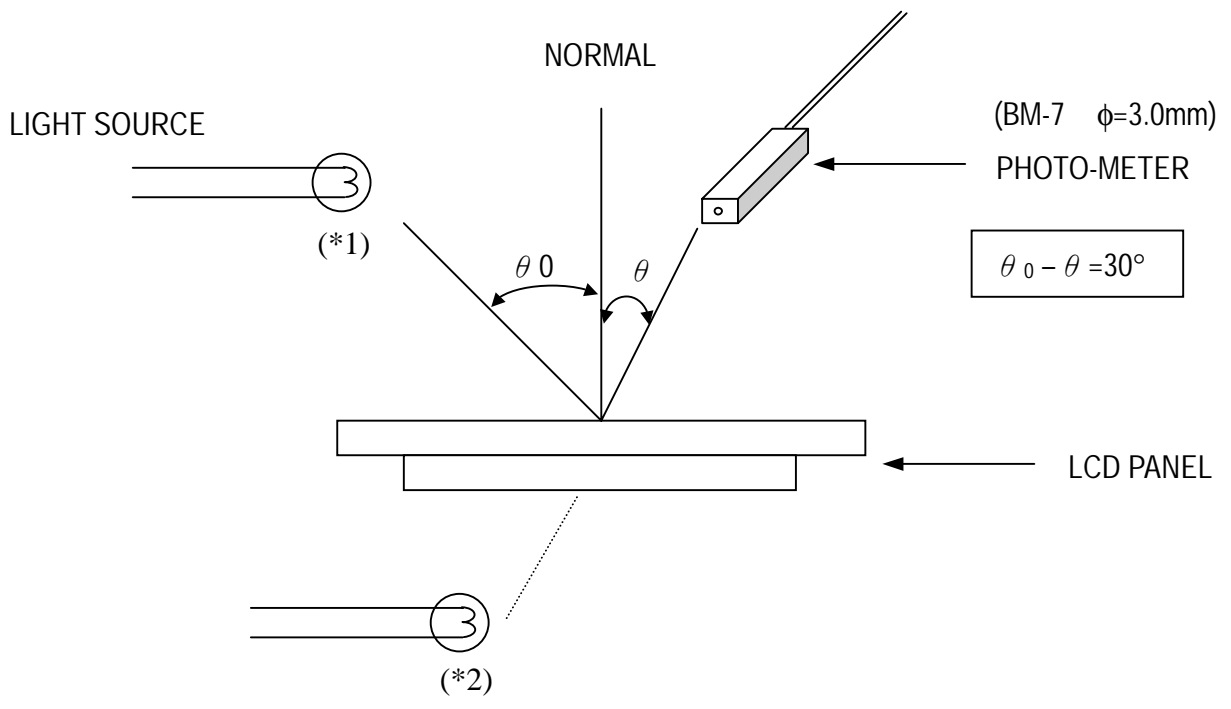
$$C.R = \frac{\text{Brightness of non-selected segment (B2)}}{\text{Brightness of selected segment (B1)}}$$



(3) DEFINITION OF RESPONSE



(4) Measuring Instruments For Electro-optical Characteristics



*1. Light source position for measuring the reflective type of LCD panel
 *2. Light source position for measuring the transfective / transmissive types of LCD panel

9. TIMING CHARACTERISTICS

9-1 INTERFACE TIMING

(VDD-VSS=3.0V±5% , Ta=-20 to +85°C)

Item	Symbol	Conditions	Min	Typ	Max	Unit
CL2 Cycle time	t_{WCK}	Fig (1)	125	—	—	ns
CL2 to CL1 Rise time	t_{LD}	Fig (1)	0	—	—	ns
CL2 to CL1 Fall time	t_{LH}	Fig (1)	51	—	—	ns
CL2 Pulse width	t_{WCKH}, t_{WCKL}	Fig (1)	51	—	—	ns
CL2 Rise/Fall time	t_r, t_f	Fig (1)	—	—	50	ns
Data setup time	t_{DS}	Fig (1)	30	—	—	ns
Data hold time	t_{DH}	Fig (1)	40	—	—	ns
CL1 "H" pulse width	t_{WLPH}	Fig (1), Fig (2)	51	—	—	ns
CL1 Cycle time	t_{WLP}	Fig (2)	250	—	—	ns
CL1 to CL2 Fall time	t_{SL}	Fig (2)	51	—	—	ns
CL1 to CL2 Rise time	t_{LS}	Fig (2)	51	—	—	ns
FLM to CL1 Data setup time	t_{SU}	Fig (2)	30	—	—	ns
FLM to CL1 Data hold time	t_H	Fig (2)	50	—	—	ns
/DISPOFF Removal time	t_{SD}	Fig (2)	100	—	—	ns
/DISPOFF enable pulse width	t_{WDL}	Fig (2)	1.2	—	—	μs

Fig (1). Interface Timing for Segment

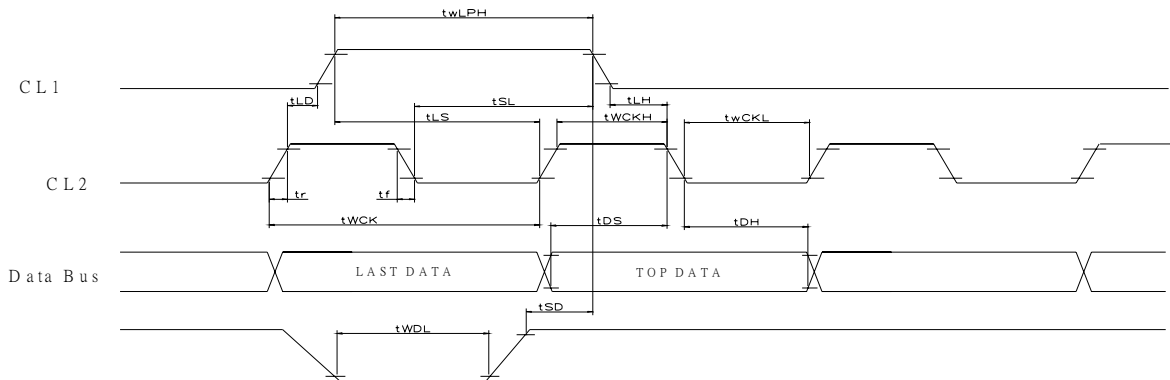
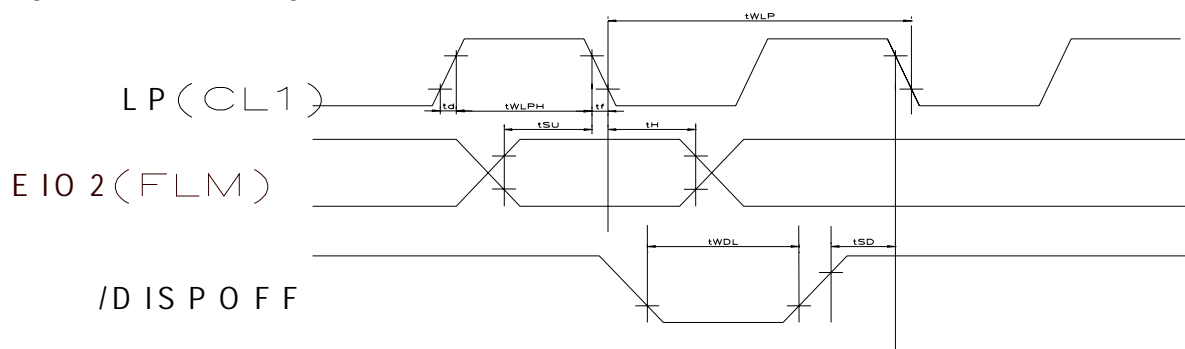
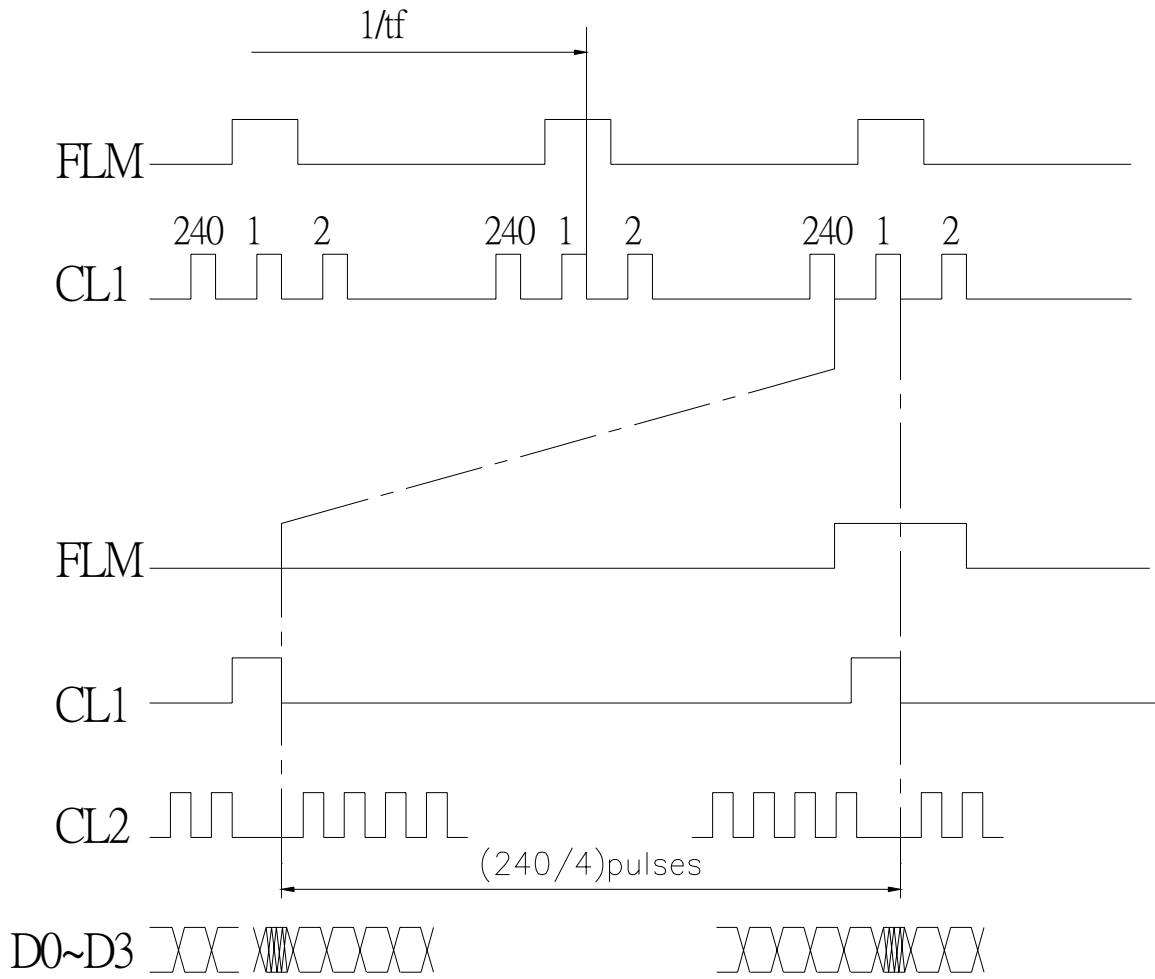


Fig (2). Interface Timing for Common



9-2 TIMING WAVEFORM



10. PIN ASSIGNMENT

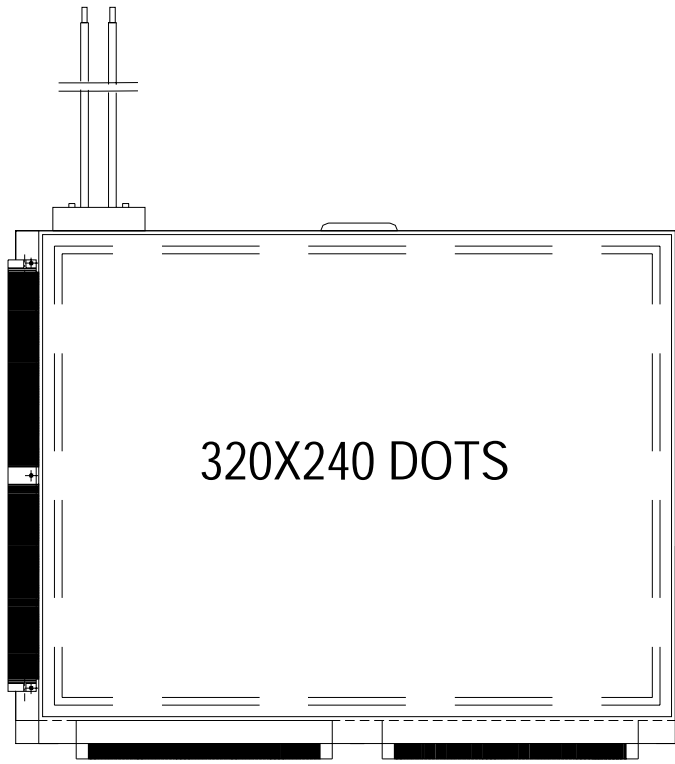
CN1: LCD CONNECTOR

PIN NO.	FUNCTION	SYMBOL
1	SCAN START-UP SIGNAL	FLM
2	DATA LATCH PULSE	CL1
3	DATA SHIFT PULSE	CL2
4	POWER SUPPLY (0V)	VSS
5	FRAME REVERSE SIGNAL (ALTERNATE SIGNAL)	M
6	DISPLAY DATA (UPPER HALF)	D0
7	DISPLAY DATA (UPPER HALF)	D1
8	DISPLAY DATA (UPPER HALF)	D2
9	DISPLAY DATA (UPPER HALF)	D3
10	POWER SUPPLY FOR LOGIC	VDD
11	POWER SUPPLY (0V)	VSS
12	CONTRAST ADJUSTMENT, INPUT VOLTAGE:0.8~2V	CON

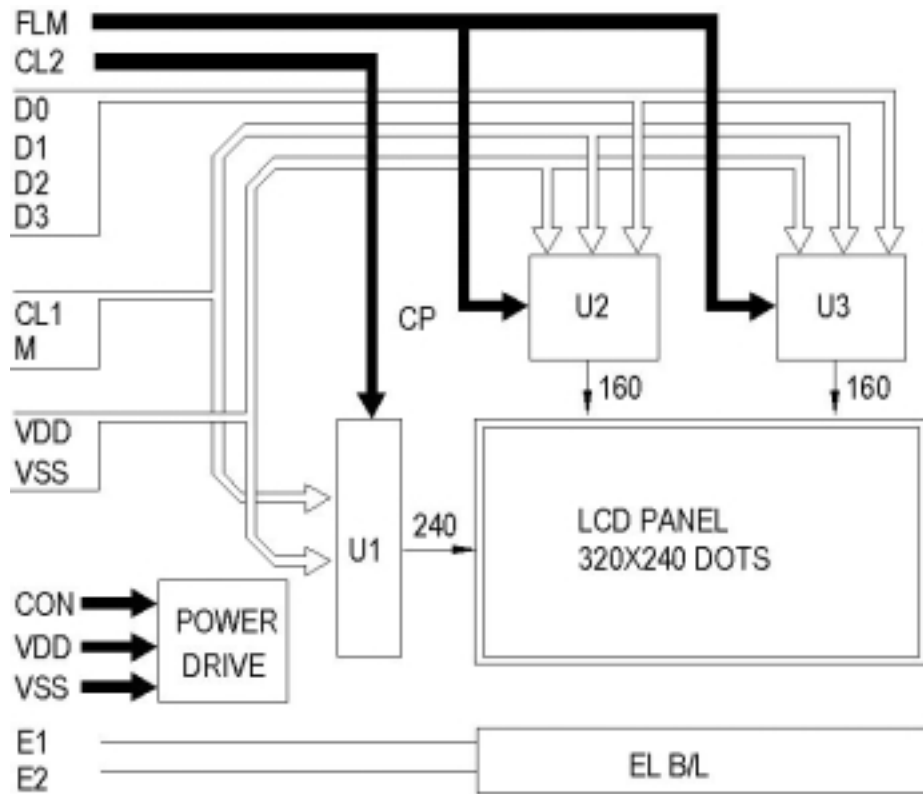
CN2: EL CONNECTOR

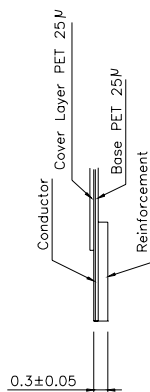
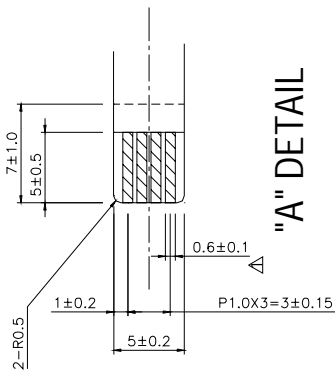
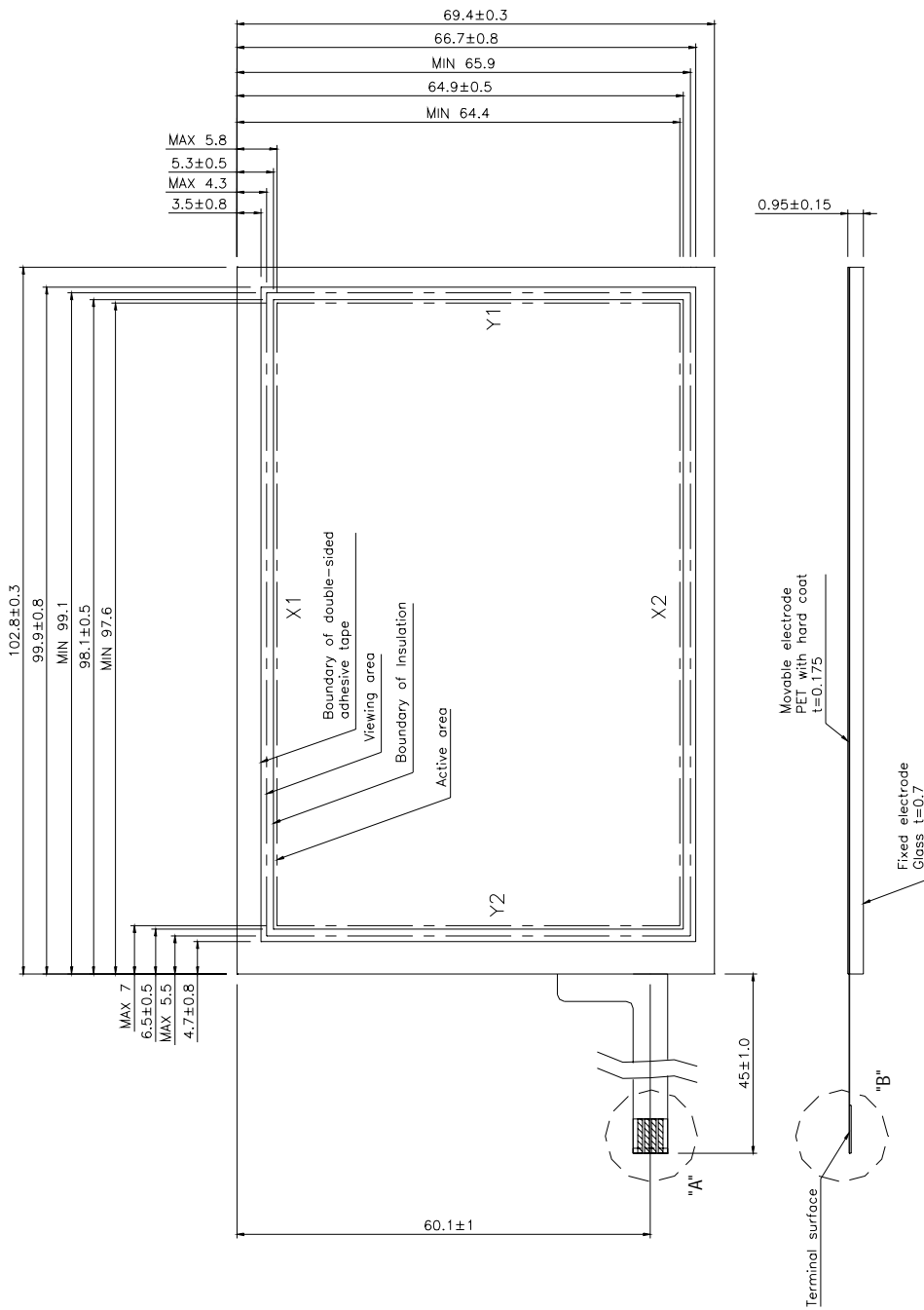
1	POWER SUPPLY FOR EL BACKLIGHT	EL1
2	POWER SUPPLY FOR EL BACKLIGHT	EL2

11. PIN NO

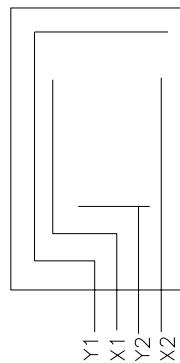


12. BLOCK DIAGRAM





"B" DETAIL



14. ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

14-1 TEMPERATURE RANGE

ITEM	SYMBOL	CONDITION	CRITERION
OPERATING TEMPERATURE	Topr	0°C~+50°C	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
STORAGE TEMPERATURE	Tstg	-10°C~+60°C	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

14-2 TEMPERATURE RANGE

ITEM	CONDITION	CRITERION
OPERATING TEMPERATURE	HIGH TEMPERATURE + 50°C 96HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERATURE 0°C 96HRS	
STORAGE TEMPERATURE	HIGH TEMPERATURE + 60°C 96HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERATURE - 10°C 96HRS	
HUMIDITY	40°C 90%RH 96HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
VIBRATION	<ul style="list-style-type: none"> · Operating Time: thirty minutes exposure for each direction(X,Y,Z) · Sweep Frequency: 10~55Hz (1 min) · Amplitude: 1.5mm 	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
THERMAL SHOCK	0°C(30mins) ←→ +50°C(30mins) 10 cycles	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

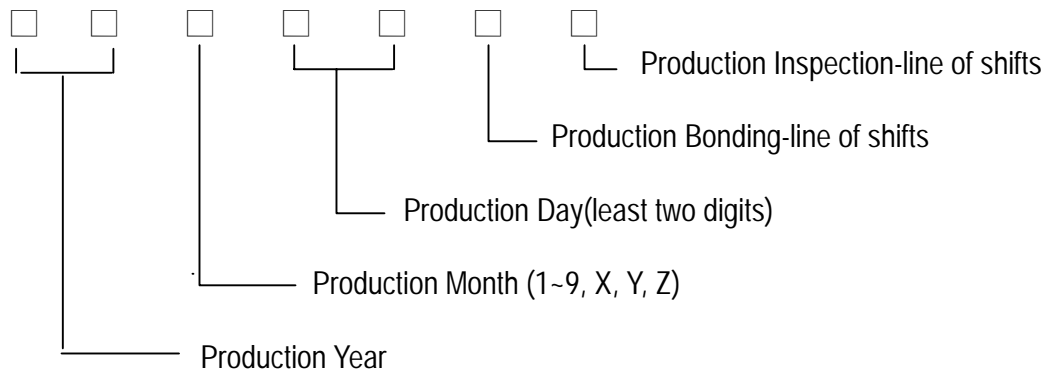
*NOTE: TEST CONDITION

(1)TEMPERATURE AND HUMIDITY: IF NO SPECIFICATION, TEMP. SET AT 25±2°C, HUMIDITY SET AT 60±5%RH

(2) OPERATING STATE: SAMPLES SUBJECT TO THE TESTS SHALL BE IN " OPERATING" CONDITION

15. Code System of Production Lot

The production lot of module is specified on the back of FPC as follows;



16. Precaution for Use

The following precautions should be followed, since this module contains precise parts.

- (1) Do not store module for an extended periods of time under the conditions of high temperature and high humidity.
- (2) Avoid using or storing the module in areas that expose it to direct sunlight or ultraviolet rays.
- (3) Use protective finger covers when handling the module to avoid scratching or staining the module.
- (4) Care should be taken not to expose the module to static electricity, because the module contains C-MOS LSI's.
- (5) The LSI is sensitive to light.
The user's product should be designed so that LSI is not exposed to any light during operation.
- (6) During installation, cover the display area with acrylic protection plates to protect the polarizer plate and LCD cells.
- (7) Do not apply any excessive shocks to the module because the module contains sensitive LCD cells.
Do not use a module which has experienced strong mechanical shock.
- (8) Care should be taken when the power supply turns on as following.
 - (a) Do not apply any input signals before the supplying voltage is applied.
 - (b) Do not turn off the power supply while any input signals are applied.

Caution

- (1) Dangerous. Do not shock glass because glass can break.
- (2) If module breaks, do not touch it directly.
(Glass could stick or cut skin.)
- (3) Do not swallow Liquid Crystal.
(In case of broken LCD panel, do not swallow liquid crystal even if there is no proof that liquid crystal is poisonous.)
- (4) If liquid crystal is exposed to skin, wash the area thoroughly with alcohol or soap.
- (5) When disposing of the product, please observe industrial waste disposal laws in each country and district.
- (6) In case of injury, give immediate treatment and consult with a doctor.
- (7) This product is constructed precisely. Don't disassemble or modify.

※ Neglecting this mark can cause injury to humans and damage to materials.