

PRODUCT SPECIFICATION

MODEL NO: SEL14767A1

< ◇ > PRELIMINARY SPECIFICATION

< ◆ > APPROVAL SPECIFICATION

CUSTOMER
APPROVED BY
DATE:

DESIGNED	CHECKED	APPROVED

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1. GENERAL DESCRIPTION

SEL1467A1 is a Transmissive type color active matrix liquid crystal display (LCD), which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, driver IC, FPC, Touch panel and a backlight unit. The following table described the features of SEL1467A1.

2. FEATURES

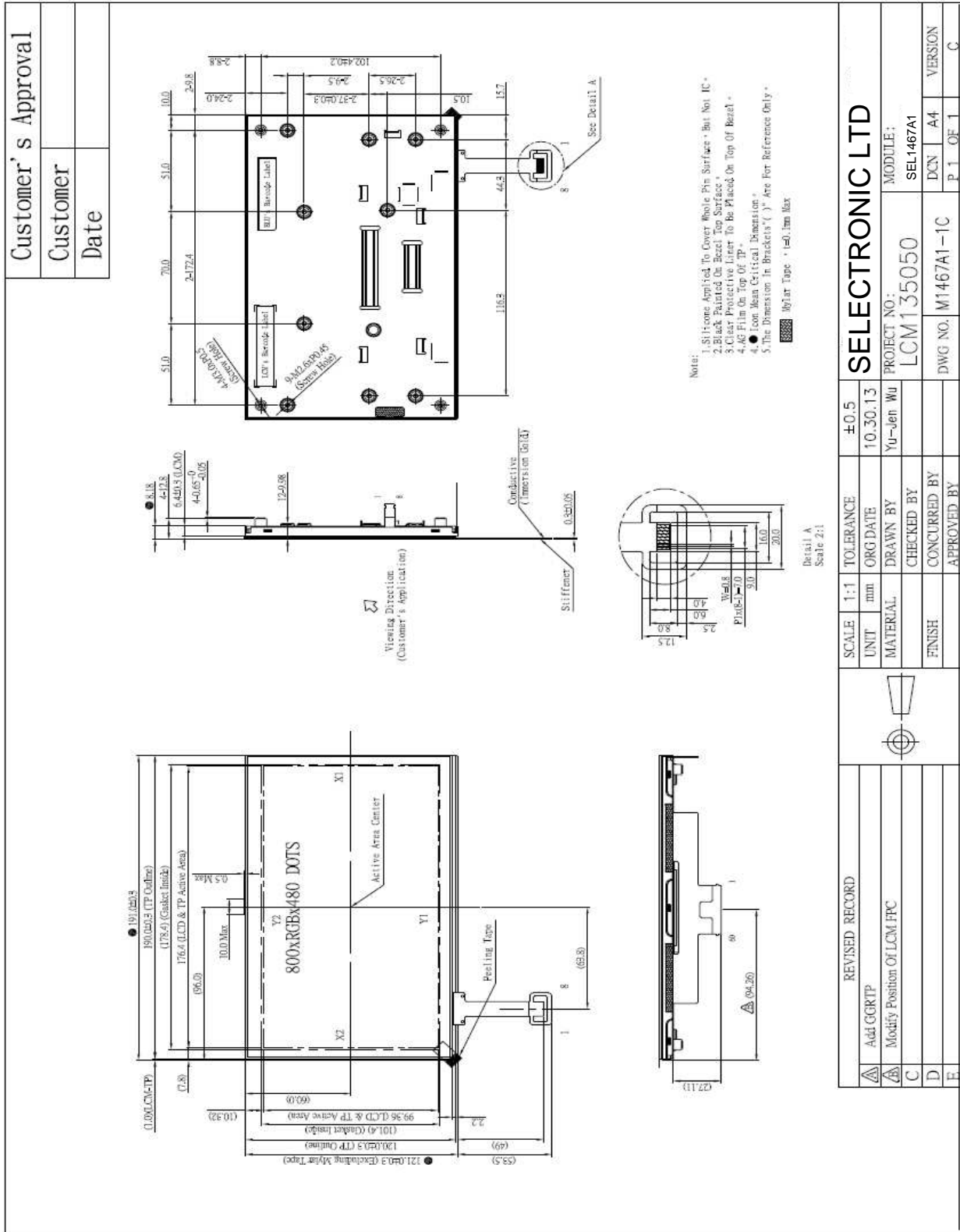
Display Mode	Transmissive Type
	a-Si TFT AWVA, Normally Black
Display Format	RGB Strip type
Color	262K color
Interface	RGB data bus, 18 bit parallel data
Viewing Direction	Free
Backlight type / color	LED / White

3. MECHANICAL SPECIFICATION

Item	Specifications	Unit
Display Size	8.0	Inch
Dimensional outline	191 (W) × 121(H) × 12.8(D)*	mm
Resolution	800×3(R,G,B)×480	dot
Active area	176.4(W) × 99.36(H)	mm
Pixel pitch	0.2205 (W) × 0.207(H)	mm
Polarizer	AG / Clear	

* Exclude FPC/PCB

4. MECHANICAL DIMENSION



5. MODULE FUNCTION DESCRIPTION

5.1. PIN Description

Pin	Symbol	Description	Remark
1	GND	Ground	
2	VCOM	Panel Ground	
3	VCOM	Panel Ground	
4	NC	NO connect pin	
5	GND	Ground	
6	GND	Ground	
7	BLKEN	Backlight Enable	
8	VSYNC	Vertical Sync Input	
9	HSYNC	Horizontal Sync Input	
10	DE	Date Input Enable	
11	GND	Ground	
12	CLK	Clock for Input Date	
13	GND	Ground	
14	B5	Blue Date 5	
15	B4	Blue Date 4	
16	B3	Blue Date 3	
17	B2	Blue Date 2	
18	B1	Blue Date 1	
19	B0	Blue Date 0	
20	G5	Green Data 5	
21	G4	Green Data 4	
22	G3	Green Data 3	
23	G2	Green Data 2	
24	G1	Green Data 1	
25	G0	Green Data 0	
26	R5	Red Data 5	
27	R4	Red Data 4	
28	R3	Red Data 3	
29	R2	Red Data 2	
30	R1	Red Data 1	
31	R0	Red Data 0	
32	DIR	Display Scan Direction Internally Pulled down	
33	STBYB	Standby Mode	
34	RSTB	Reset input Suggest to connection with RC Reset circuit for stavility	
35	VCC	Power Supply for Digital Circuits	
36	GND	Ground	

37	V14	Gamma Correction Reference Voltage	
38	V13		
39	V12		
40	V11		
41	V10		
42	V9		
43	V8		
44	V7		
45	V6		
46	V5		
47	V4		
48	V3		
49	V2		
50	V1		
51	AVDD	Power Supply for Analog Circuits	
52	AVDD	Power Supply for Analog Circuits	
53	NC	NO connect pin	
54	VGH	Power Supply for Gate High	
55	NC	NO connect pin	
56	VGL	Power Supply for Gate Low	
57	NC	NO connect pin	
58	VCOM	Panel Ground	
59	VCOM	Panel Ground	
60	GND	ground	

5.2. MAXIMUM RATINGS

If the operating condition exceeds the following absolute maximum ratings, the TFT LCD module may be damaged permanently.

Item	Symbol	Values		Unit	Condition
		Min.	Max.		
Logic supply voltage	VCC	-0.3	5.0	V	
Analog supply voltage	AVDD	-0.5	15.0	V	
Panel ground voltage	VCOM	2.0	8.0	V	
Storage Temperature	T _{ST}	-40	95	°C	
Operating Temperature (Ambient Temperature)	T _{OP}	-30	85	°C	
Humidity	-	-	90	%RH	Note1

Note1: T_A ≤ 40°C Without dewing

5.3. ELECTRICAL CHARACTERISTICS

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Supply Voltage	VDD	3.0	3.3	3.6	V	Note1
LCM brightness	B _{LCM}	550	600	-	Cd/m ²	Note 2

Note1: These supply & Input & Output Voltage base on IC data Sheet.

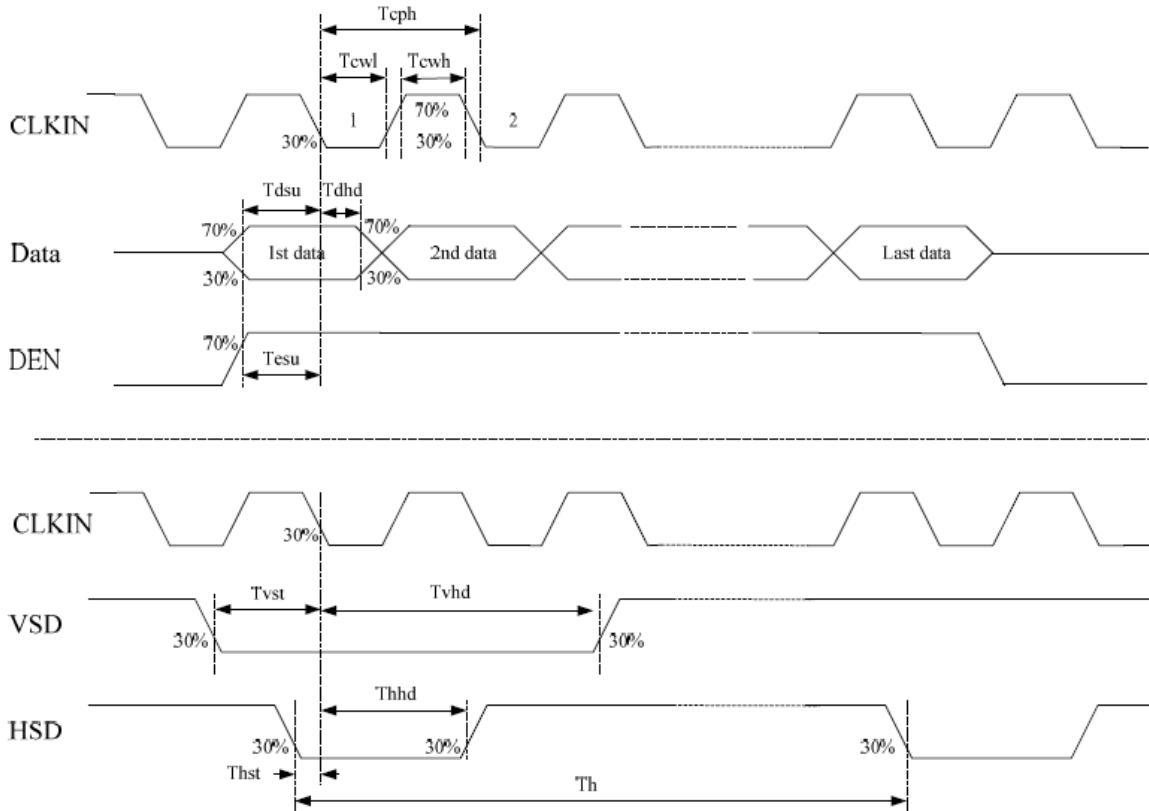
Note2: a. Test Instrument: BM-5 (Distance =500mm; Field = 1°)

b. Driving conditions: Constant current I_{AK} =90 mA/chain

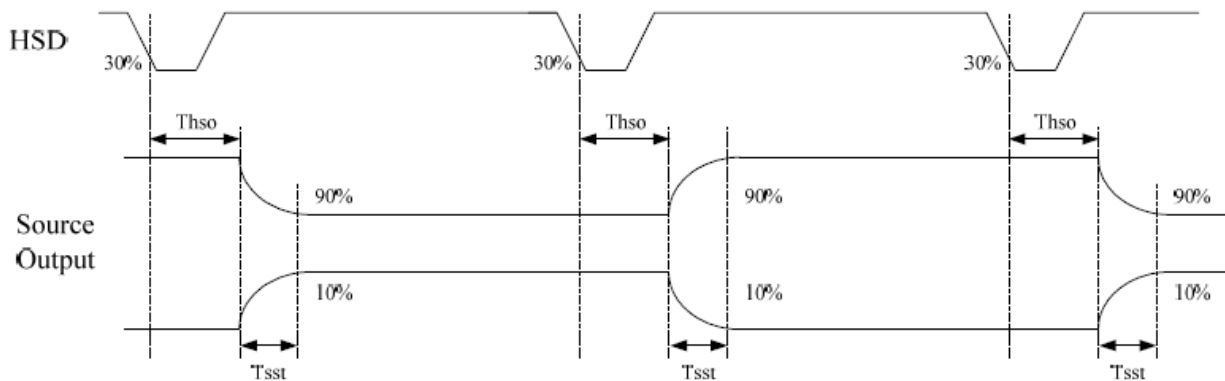
c. Measure position: The center of AA

5.4. Timing characteristics

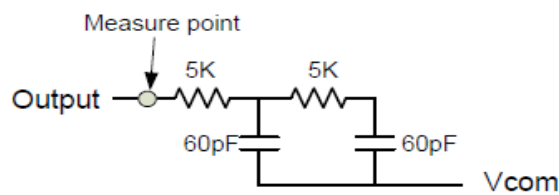
5.4.1. Clock and Data Input Timing Diagram



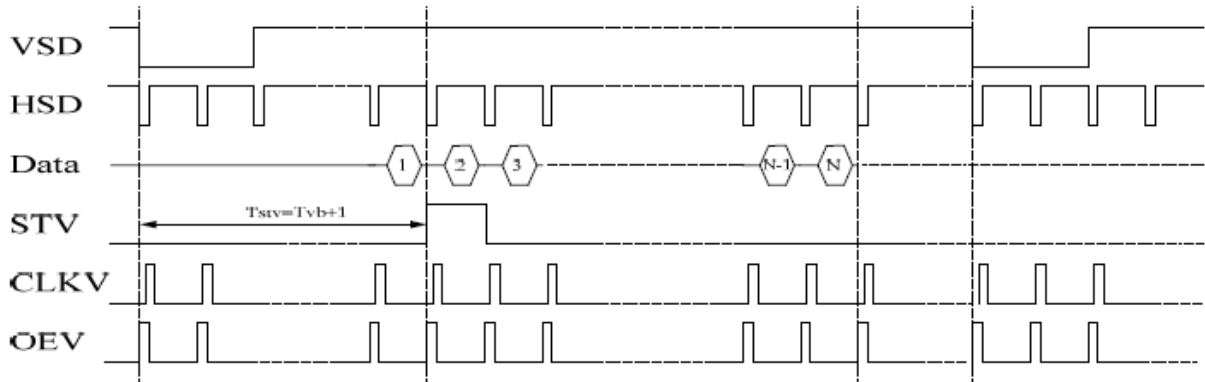
5.4.2. Source Output timing Diagram



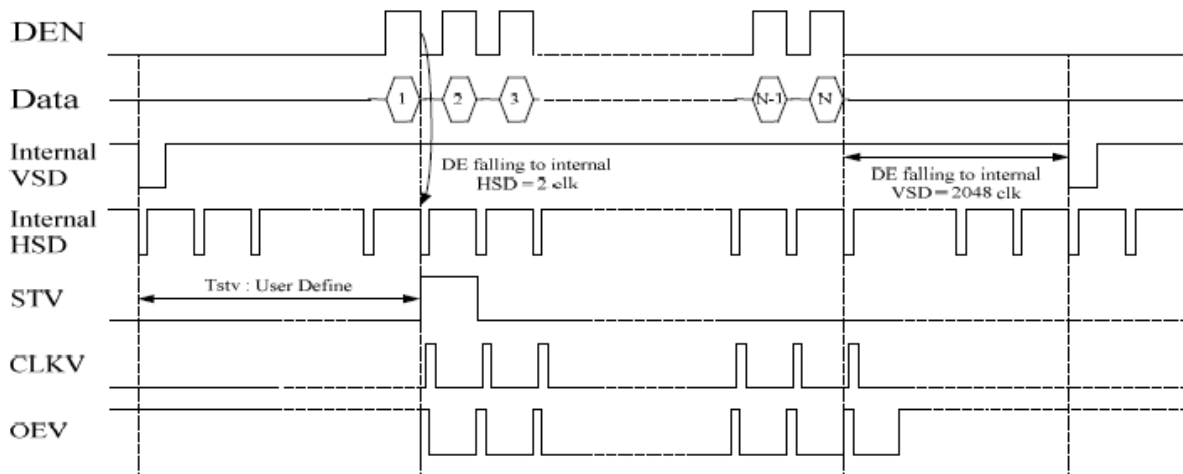
Output Load Condition



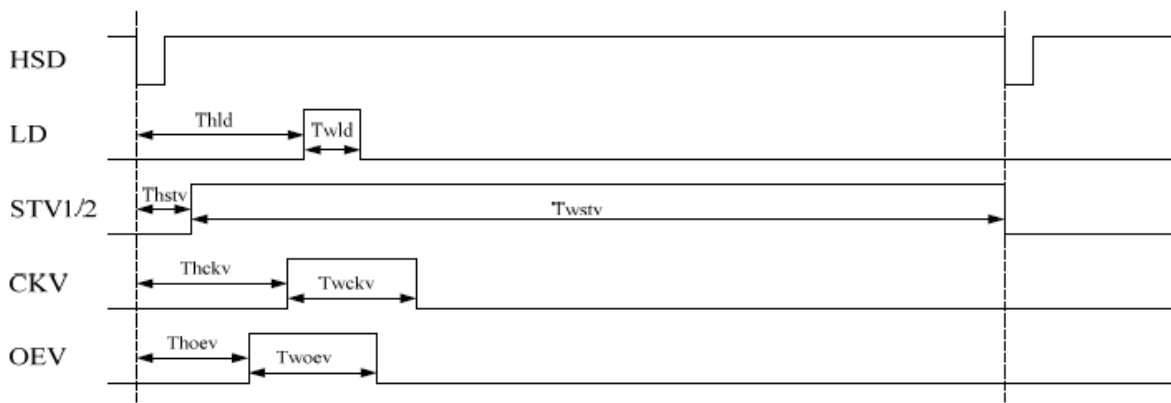
Vertical Timing Diagram SYNC



Vertical Timing Diagram DE



Gate output Timing Diagram



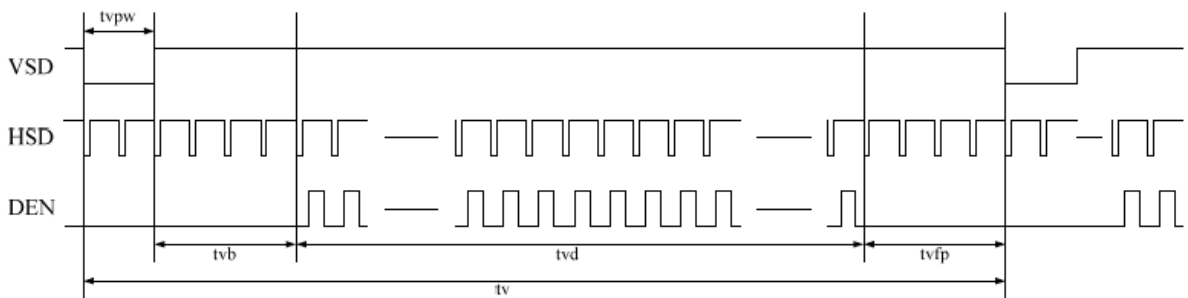
5.4.3.AC Electrical Characteristics

(VDD =2.7~3.6V, VDDA=6.5~13.5V, GNDA=GND=0V, TA=-40 to 95°C)

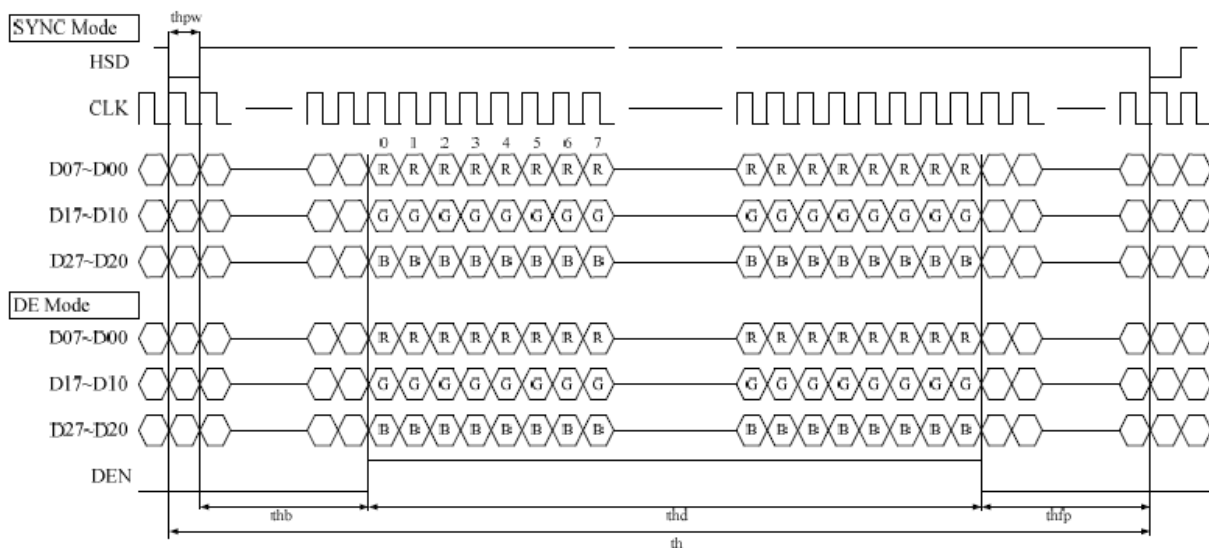
Parameter	Symbol	Min	Typ.	Max.	Unit	Conditions
VDD Power on Slew Rate	T_{POR}	-	-	20	ms	From 0V to 90% VDD
RSTB pulse width	T_{RST}	50	-	-	us	Clkin=50MHz
CLKIN cycle time	T_{cph}	20	-	-	ns	
CLKIN pulse duty	T_{cwh}	40	50	60	%	
VSD setup time	T_{vst}	8	-	-	ns	
VSD hold time	T_{vhd}	8	-	-	ns	
HSD setup time	T_{hst}	8	-	-	ns	
HSD hold time	T_{hhd}	8	-	-	ns	
Data setup time	T_{dsu}	8	-	-	ns	D[7:0], D1[7:0], D2[7:0] to clkin
Date hold time	T_{dhd}	8	-	-	ns	D[7:0], D1[7:0], D2[7:0] to clkin
DE setup time	T_{esu}	8	-	-	ns	
DE hold time	T_{ehd}	8	-	-	ns	
Output stable time	T_{sst}	-	-	6	us	10% to 90% target voltage. CL=120pF, R=10Kohm

5.4.4. Data Input format

Vertical input timing



Horizontal input timing



Timing Characteristic

Horizontal input timing

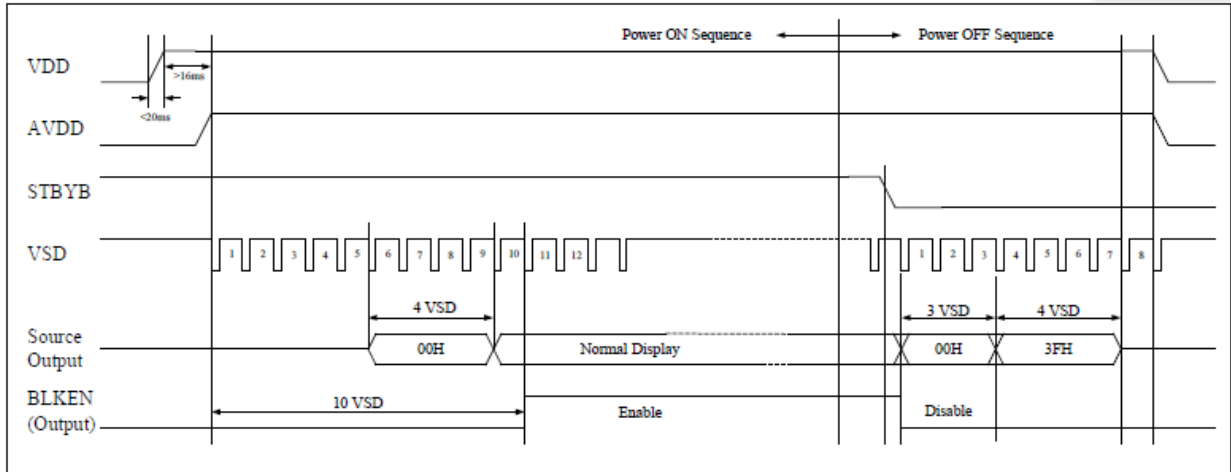
Parameter		Symbol	Value			Unit	Note
Horizontal display area		thd	800			DCLK	
DCLK frequency		fclk	Min.	Typ.	Max.		
			-	33.3	50	MHz	
1 Horizontal Line		th	928			DCLK	thb+thpw=88 DCLK is fixed.
HSD pulse width	Min.	thpw	1				
	Typ.		48				
	Max.		-				
HSD Back Porch (Blanking)		thb	-	40			
HSD Front Porch		thfp	-	40			

Vertical input timing

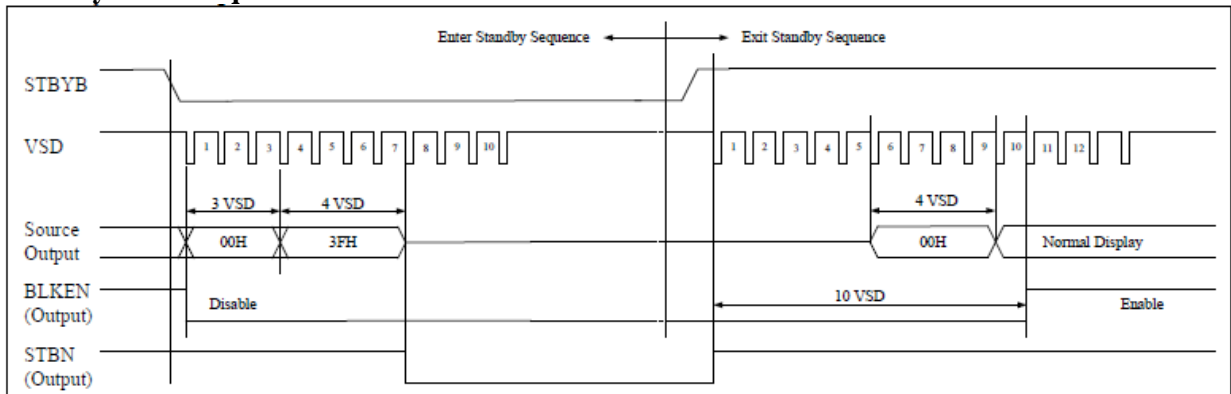
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Vertical display area	tvd	480			H	
VSD period time	tv	-	525		H	tpw+tvb=32H is fixed
VSD pulse width	tpw	1	3		H	
VSD Back Porch (Blanking)	tvb	-	29		H	
VSD Front Porch	tvfp	-	13		H	

5.5.Functional Descriptions

Power-On/Off Timing Sequence



Standby Mode Sequence



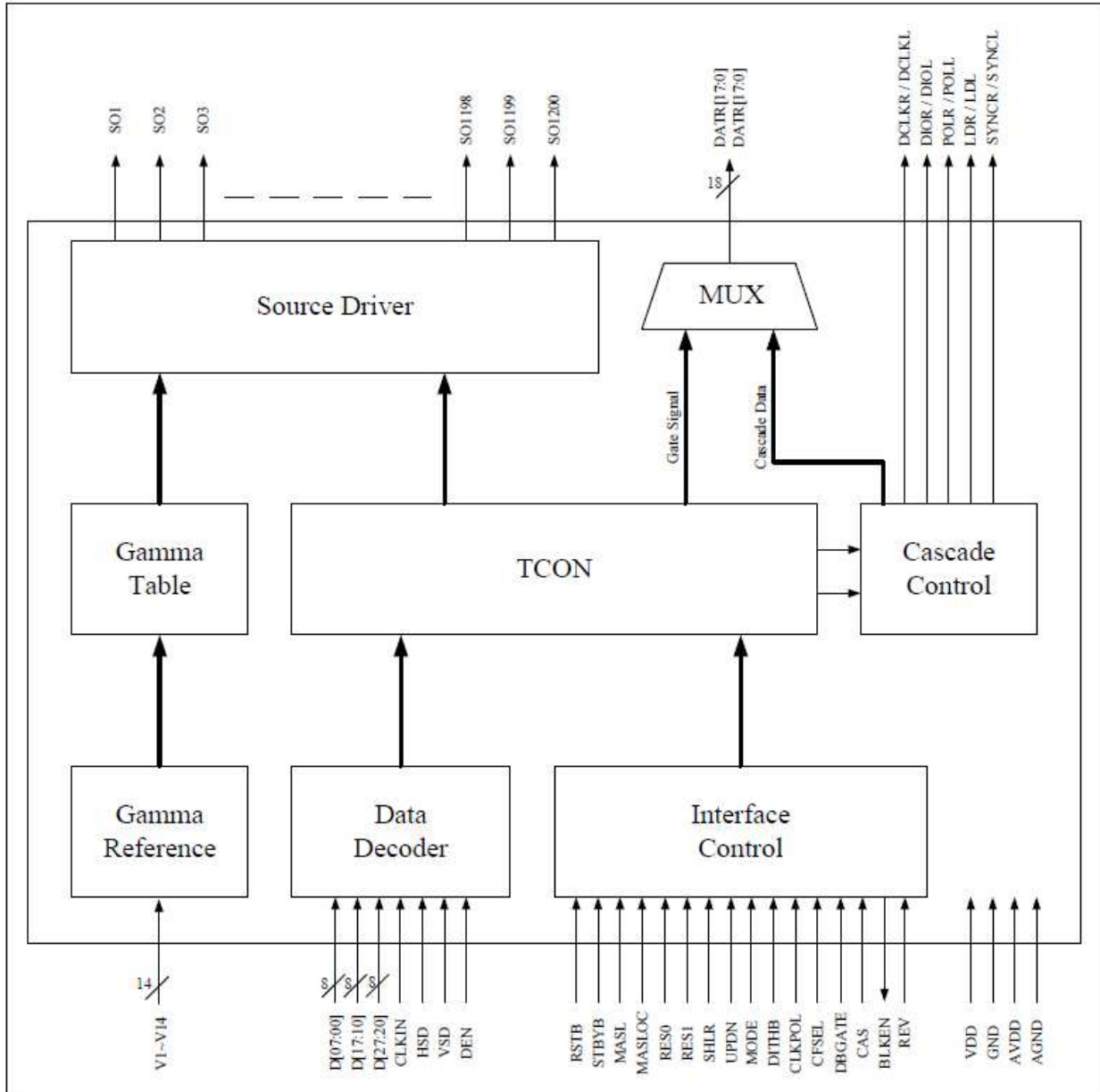
5.6.DC ELECTRICAL CHARACTERISTICS

(VDD=2.7~3.6V, VDDA=6.5~13.5V, GND=GND=0V, TA=-40 to 95°C)

Parameter	Symbol	Min	Typ.	Max.	Unit	Conditions
Low level input voltage	Vil	0	-	0.3xVDD	V	For digital circuit
High level input voltage	Vih	0.7xVDD	-	VDD	V	For digital circuit
Input leakage current	Ii	-	-	+/-1	uA	For digital circuit
High level output voltage	Voh	VDD-0.4	-	-	V	Ioh=-400uA
Low level output voltage	Vol	-	-	GND+0.4	V	Iol=+400uA
Pull low/high resistor	Ri	200K	250K	300K	Ohm	For the digital input pin@VDD=3.3V
Digital Operation Current	Idd	-	8	10	mA	Fclk=50MHz, FLD=48KHz, VDD=3.3V
Digital Stand-by current	Ist1	-	10	50	uA	Clock & all functions are stopped
Analog Operation Current	Idda	-	10	12	mA	No load Fclk=50Mhz, FLD=48K@AVDD=10V, V1=8V, V14=0.4V
Analog Stand-by Current	Ist2	-	10	50	uA	No load. Clock & all functions are stopped
Input Level of V1~V7	Vref1	0.4*AVDD	-	AVDD-0.1	V	Gamma correction voltage input
Input Level of V8~V14	Vref2	0.1	-	0.6*AVDD	V	Gamma correction voltage input
Output Voltage deviation	Vod1	-	+/- 20	+/- 35	mV	Vo=AGND+0.1V~ AGND +0.5V& Vo= AVDD -0.5V~AVDD-0.1V
Output Voltage deviation	Vod2	-	+/- 15	+/- 20	mV	Vo=AGND+0.5V~AVDD-0.5V
Output Voltage offset between chips	Voc	-	-	+/- 20	mV	Vo=AGND+0.5V~AVDD-0.5V
Dynamic Range of Output	Vdr	0.1	-	AVDD-0.1	V	SO1~SO1200
Sinking current of Output	IOLy	80	-	-	uA	SO1~SO1200; Vo=0.1V vs. 1.0V, AVDD=13.5V
Driving current of outputs	IOHy	80	-	-	uA	SO1~SO1200; Vo=13.4V vs. 12.5V, AVDD=13.5V
Resistance of Gamma Table	Rg	0.7*Rn	1.0*Rn	1.3*Rn	ohm	Rn:Internal gamma resistor

6. MODULE FUNCTION DESCRIPTION

6.1. Block Diagram



7. Backlight Characteristic

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Consumption	P_{LED}	-	5346	-	mW	
LED Current	I_{AK}	-	180	-	mA	
LED Voltage	V_{AK}	-	3.3*9	-	V	$I_{AK}=90\text{mA}/\text{chain}$, 25°C
LED life time	-	10,000	-	-	Hr	$I_{AK}=90\text{mA}/\text{chain}$, 25°C Note 2
Uniformity	-	70	-	-	%	Note 4

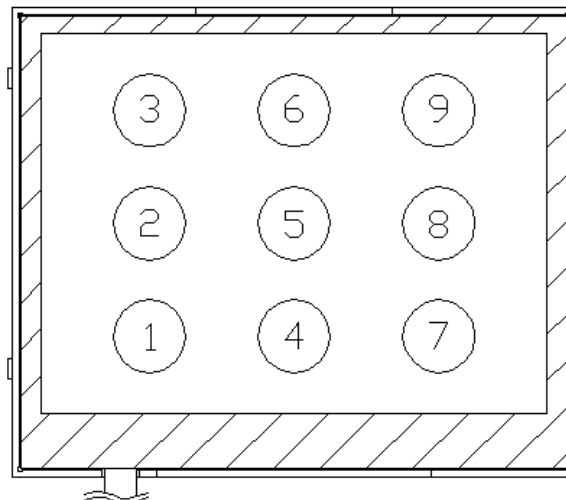
Note 1: We suggest using constant current driving this backlight unit.

Note 2: The LED chip luminance decrease to be 50% of original

Note 3: For PWM driving only .

Conditions : Pulse width $T_w \leq 0.1\text{ms}$, Duty ratio $\leq 1/10$

Note 4:



- Test Instrument: BM-7 (Distance = 500mm; Field = 1°)
- Conditions: $I_{AK} = 180\text{ mA}$, V_{AK} (Typ.) = 29.7V
- Measure Brightness: 1 ~ 9
- Uniformity = (Min. Brightness / Max. Brightness) * 100%

8. ELECTRO-OPTICAL CHARACTERISTICS

The following items are measured under stable conditions. The optical characteristics should be measured in dark room or equivalent state with the methods shown in Note 1.

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark	
Brightness (LCM)	-	-	550	650	-	cd/m ²		
Response time	T _R +T _F	Θ=0, -20°C	-	400	-	ms	Note 2	
		Θ=0, 25°C	-	25	35			
Contrast ratio	CR	At the center point of A.A.	500	800	-	-	Note 3	
Color Gamut	-	-	-	70	-	%		
CIE color Coordinates	White	W _x	-0.05	(0.304)	+0.05	-	BM5; 2° angle	
		W _y	-0.05	(0.332)	+0.05	-		
	RED	R _x	-0.05	(0.644)	+0.05	-		
		R _y	-0.05	(0.337)	+0.05	-		
	GREEN	G _x	-0.05	(0.291)	+0.05	-		
		G _y	-0.05	(0.586)	+0.05	-		
	BLUE	B _x	-0.05	(0.149)	+0.05	-		
		B _y	-0.05	(0.055)	+0.05	-		
Viewing Angle	Φ _H	12	CR ≥ 10	-	80	-	Degree	Note 5
	θ _R	3		-	80	-		
	Φ _L	6		-	80	-		
	θ _L	9		-	80	-		

T_a=25±2°C

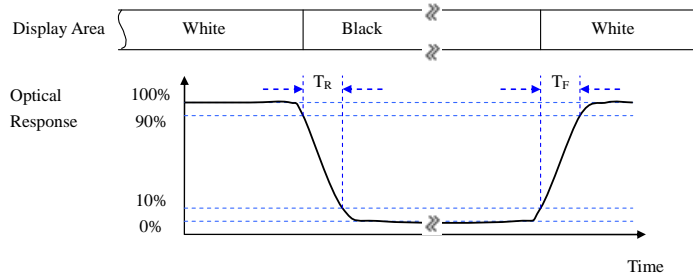
Note:

1. Test equipment setup

After stabilizing and leaving the panel alone at a given temperature for 30 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-5A with a viewing angle of 2° at a distance of 50cm and normal direction.

2. Definition of response time: T_R and T_F

The figure below is the output signal of the photo detector.



3. Definition of contrast ratio:

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness measured when LCD is at "white state"}}{\text{Brightness measured when LCD is at "black state"}}$$

White $V_i = V_{i50\%} \pm 1.5V$

Black $V_i = V_{i50\%} \mp 2.0V$

"±" means that the analog input signal swings in phase with VCOM signal.

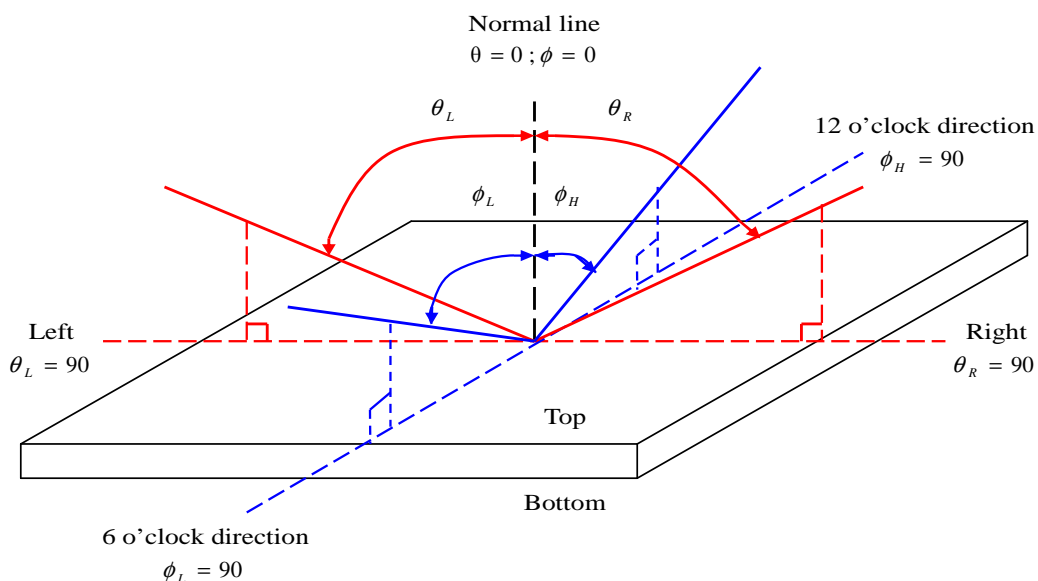
"∓" means that the analog input signal swings out of phase with VCOM signal.

$V_{i50\%}$: The analog input voltage when transmission is 50%.

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

4. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

5. Definition of viewing angle:



9. RELIABILITY

9.1. MTTF

The LCD module shall be designed to meet a minimum MTTF value of 50,000 hours with normal condition. (25°C in the room without sunlight; not include life time of backlight)

9.2. TESTS

NO.	ITEM	CONDITION	CRITERION
1	High Temperature Non-Operating	95°C , 500hrs	◦ No Defect Of Operational Function In Room Temperature Are Allowable.
2	Low Temperature Non-Operating	-40°C , 500hrs	
3	High Temperature Operating	85°C , 500hrs	
4	Low Temperature Operating	-30°C , 500hrs	
5	High Temperature/ Humidity Non-Operating	65°C ,90%RH 240 hrs	
6	Temperature Shock Non-Operating	-40°C ←→ 85°C (30min) (5min) (30min) trans : 5min ,500 cycle	
7	Electro-static Discharge	150pF,330ohm Contact Discharge : ±15KV	

Note 1: Test after 24 hours in room temperature.

Note 2: The sampling above is individually for each reliability testing condition.

Note 3: The color fading of polarizing filter should not care.

Note 4: All of the reliability testing chamber above, is using D.I. water.(Min value:1.0 MΩ -cm)

Note 5: In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

Note 6: ESD test by customer audio-set. (Test only for customer requirement)

9.3.Color Performance

No.	ITEM	Criterion (initial)
1	Luminance	>50%
2	NTSC	>70%
3	Contrast Ratio	>50%

10.INSPECTION CRITERIA

10.1.Inspection Conditions

10.1.1.Environmental conditions

The environmental conditions for inspection shall be as follows

Room temperature: $23\pm 5^{\circ}\text{C}$

Humidity: $50\pm 20\% \text{RH}$

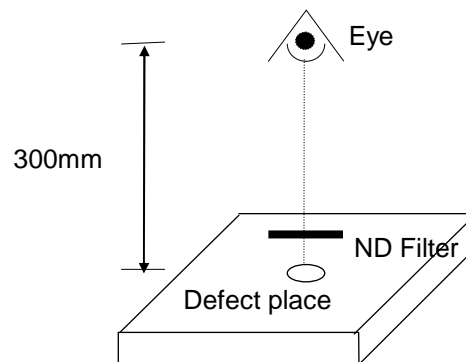
10.1.2.The external visual inspection

With a single 1000 ± 200 lux fluorescent lamp as the light source, the inspection was in the distance of 30cm or more from the LCD to the inspector's eyes.

10.2.Light Method

10.2.1.Environment lamp under 1000 ± 200 lux, Viewing direction for inspection over 300 mm

10.2.2.The distance from eye to defect around 300mm, the distance from ND Filter to defect around 25~30mm



10.3.Classification Of Defects

10.3.1.Major defect

A major defect refers to a defect that may substantially degrade usability for product applications.

10.3.2.Minor defect

A minor defect refers to a defect which is not considered to be able substantially degrade the product application or a defect that deviates from existing standards almost unrelated to the effective use of the product or its operation.

Notes: If the LCD/LCM 's cosmetic and display performance do not specify in "inspection criterion", it should be based on these delivered samples.

10.4.Sampling & Acceptable Quality Level

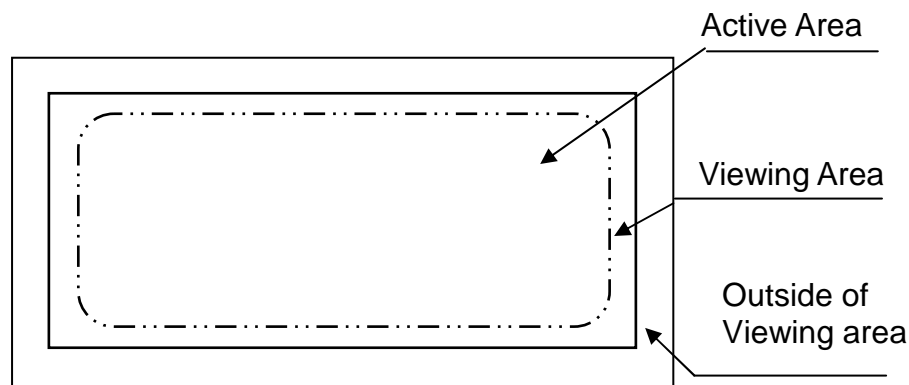
Level II, MIL-STD-105E

Inspection Item	Major defect	Minor defect
Cosmetic	1.0%	1.5%
Electrical test	0.4%	0.65%

10.5.Definition Of Inspection Area

V.A: Viewing Area

A.A: Active Area



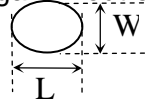
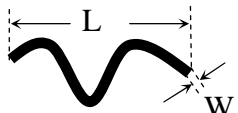
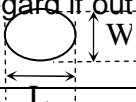
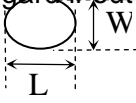
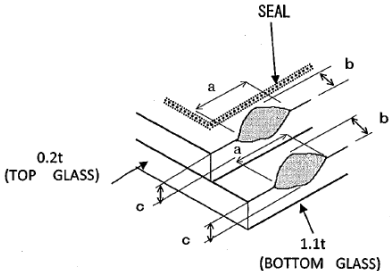

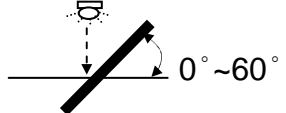
10.6.Inspection Item and Criteria

10.6.1. Cosmetic criterion

(1) Glass defect

No	Defect	Criteria	Remark
1	Dimension (Minor)	By engineering diagram	
2	Cracks (Major)	Extensive crack 【Reject】	

(2) LCM appearance defect with in A.A

No	Item	Criteria		Remark
1	Round type (Minor)	Spec.	Permissible Q'ty	1. $\phi = (L+W)/2$, L: Length, W: Width 2. Disregard if out of V.A. 
		$\phi < 0.30\text{mm}$	Disregard	
		$0.30\text{mm} \leq \phi \leq 0.60\text{mm}$	5	
		$0.60\text{mm} < \phi$	0	
2	Line type · Scratch Fiber (Minor)	Defect Spec.	Permissible Q'ty	1: L: Length, W: Width 2: Disregard if out of V.A. 
		$W \leq 0.20\text{mm}$ and $L \leq 25\text{mm}$	Disregard	
		$L \leq 25\text{mm}$ and $0.20\text{mm} < W \leq 0.30\text{mm}$	5	
		$W > 0.30\text{mm}$ or $L > 25\text{mm}$	0	
3	Polarizer Bubble (Minor)	Spec.	Permissible Q'ty	1. $\phi = (L+W)/2$, L: Length, W: Width 2. Disregard if out of A.A. 
		$\phi < 0.30\text{mm}$	Disregard	
		$0.30\text{mm} \leq \phi \leq 0.6\text{mm}$	4	
		$0.6\text{mm} < \phi$	0	
4	Polarizer Dent / Bulge (Minor)	Spec.	Permissible Q'ty	1. $\phi = (L+W)/2$, L: Length, W: Width 2. Disregard if out of A.A. 
		$\phi < 0.30\text{mm}$	Disregard	
		$0.30\text{mm} \leq \phi \leq 0.6\text{mm}$	4	
		$0.6\text{mm} < \phi$	0	
5	Bottom Glass (Minor)	$a \leq 5.0\text{mm}, b \leq 2.0\text{mm}, c \leq t$ 【Disregard】		
6	Top Glass (Minor)	$a \leq$ Not counted, $b \leq$ Boundary of Seal, $c \leq$ Not counted 【Disregard】		
7	Crack (Major)	Not allowed		
8	Newton's ring (Minor)	Defect Spec.	Permissible Q'ty	Under day light 
		$\phi \leq 15\text{mm}$	Disregard	
		$\phi > 15\text{mm}$	0	

(3) FPC

No	Defect	Criteria	Remark
1	Copper peeling (Minor)	Copper peeling 【Reject】	

(4) Black tape

No	Defect	Criteria	Remark
1	Shift (Minor)	IC exposed 【Reject】	
2	No black tape (Minor)	No black tape 【Reject】	

(5) Silicon

No	Defect	Criteria	Remark
1	Amount of silicon (Minor)	ITO exposed 【Reject】	

(6) Bezel

No	Defect	Criteria	Remark
1	Oxidized spot (Minor)	Oxidized spot, rust 【Reject】	
2	Outline deformation (Minor)	By engineering diagram	
3	Greasiness (Minor)	Greasiness 【Reject】	
4	Spots, round Type (Minor)	$H \leq$ By engineering diagram 【Disregard】	H=Total height (thickness)
5	Plating (Minor)	Bubble, peeling 【Reject】	

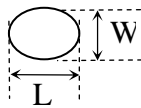
(7) Power cord

No	Defect	Criteria	Remark
1	Power cord (Minor)	Power core loose	

10.6.2.LCM electrical criterion

(1).LCM electrical criterion

No	Defect	Criteria				Remark
1	No display (Major)	Not allowed				
2	Missing line (Major)	Not allowed				
3	Darker or lighter line (Major)	Not allowed				
4	Bright / Dark point (Minor)		A Area	B Area	Total	1. 1sub-pixel: 1R or 1G or 1B 2. Point defect area $\geq 1/2$ sub pixel.
		Bright point	<u>1</u>	<u>2</u>	<u>3</u>	
		Dark dot point	<u>2</u>	<u>3</u>	<u>4</u>	
		Bright +Dark point	<u>3</u>	<u>4</u>	<u>5</u>	
5	Round type (Minor)	Spec.		Permissible Q'ty		1. $\phi = (L+W)/2$, L: Length, W: Width 2. Disregard if out of A.A.
		$\phi < 0.30\text{mm}$		Disregard		
		$0.30\text{mm} \leq \phi \leq 0.60\text{mm}$		5		
		$0.60\text{mm} < \phi$		0		
6	Line type · Scratch Fiber (Minor)	Defect Spec.		Permissible Q'ty		1. L: Length, W: Width 2. Disregard if out of A.A.
		$W \leq 0.20\text{mm}$ and $L \leq 25\text{mm}$		Disregard		
		$L \leq 25\text{mm}$ and $0.20\text{mm} < W \leq 0.30\text{mm}$		5		
		$W > 0.30\text{mm}$ or $L > 25\text{mm}$		0		
7	Polarizer Bubble (Minor)	Spec.		Permissible Q'ty		1. L: Length, W: Width 2. Disregard if out of A.A.
		$\phi < 0.30\text{mm}$		Disregard		
		$0.30\text{mm} \leq \phi \leq 0.6\text{mm}$		4		
8	Polarizer Dent / Bulge	Spec.		Permissible Q'ty		1. $\phi = (L+W)/2$, L: Length, W: Width 2. Disregard if out of A.A.
		$\phi < 0.30\text{mm}$		Disregard		
		$0.30\text{mm} \leq \phi \leq 0.6\text{mm}$		4		

	(Minor)	$0.6\text{mm} < \phi$	0	
9	Mura (Minor)	By 2% ND filter invisible		

10.6.3.Others

1. Issues that are not defined in this document shall be discussed and agreed with both parties. (Customer and supplier)
2. Unless otherwise agreed upon in writing, the criteria shall be applied to both parties. (Customer and supplier)

11. TOUCH SCREEN PANEL SPECIFICATIONS

11.1. EI Range Of Application

This specification shall apply to analog type pen or finger input transparent touch panel.

11.2. Optical Characteristic.

Test by light measure device and the result should be 73% Typ.

11.3. Operating Force

0.2~1.96N

11.4. Electrical Characteristics

11.4.1. 10 MΩ or more (DC 25V 1min)

11.4.2. Resistance Between Terminals.

Direction X (Glass side): 460Ω~ 2060Ω

Direction Y (Film side): 130Ω~ 650Ω

11.4.3. Linearity

Test:

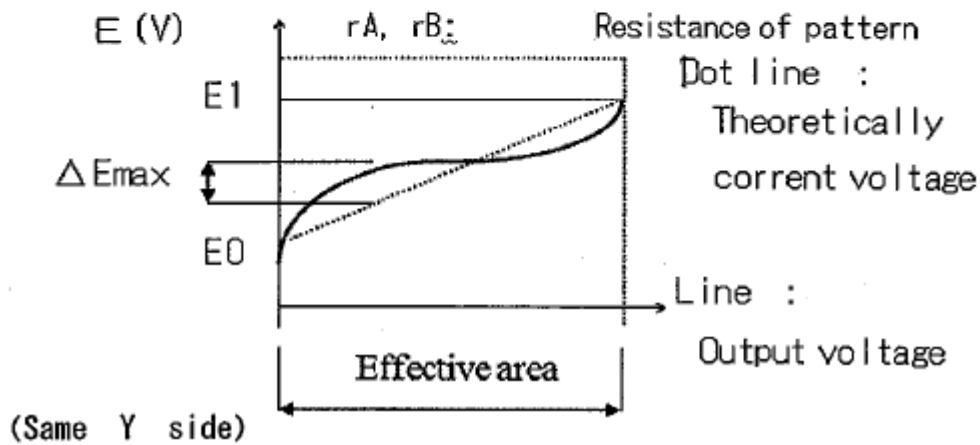
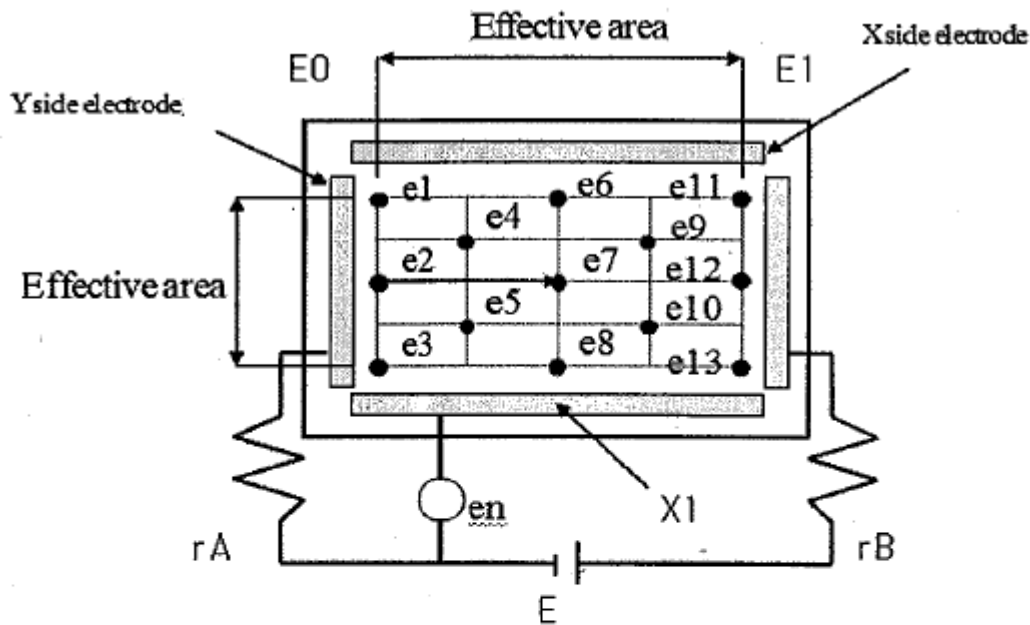
X: ±3% or less

Y: ±3% or less

Measure the difference between the theoretical output voltage and actual output voltage when pressure is applied to the active area. This is measured by Y electrode with applying 5V to X electrode at 13 different points in the valid area.

$$\text{Linearity} = \frac{\Delta E_{\max}}{E_1 - E_0} \times 100 (\%) \leq 3 \%$$

$$\Delta E = e_n - e_{n0}$$

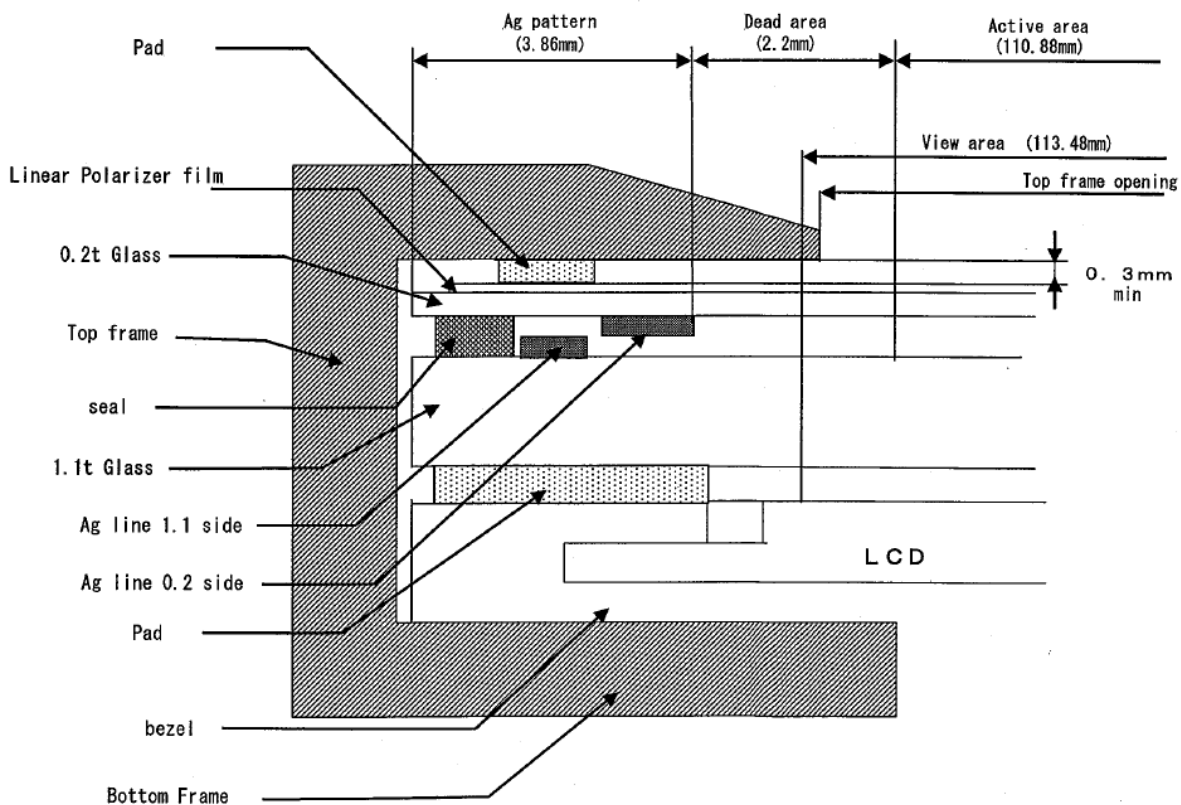


11.5.Design guide

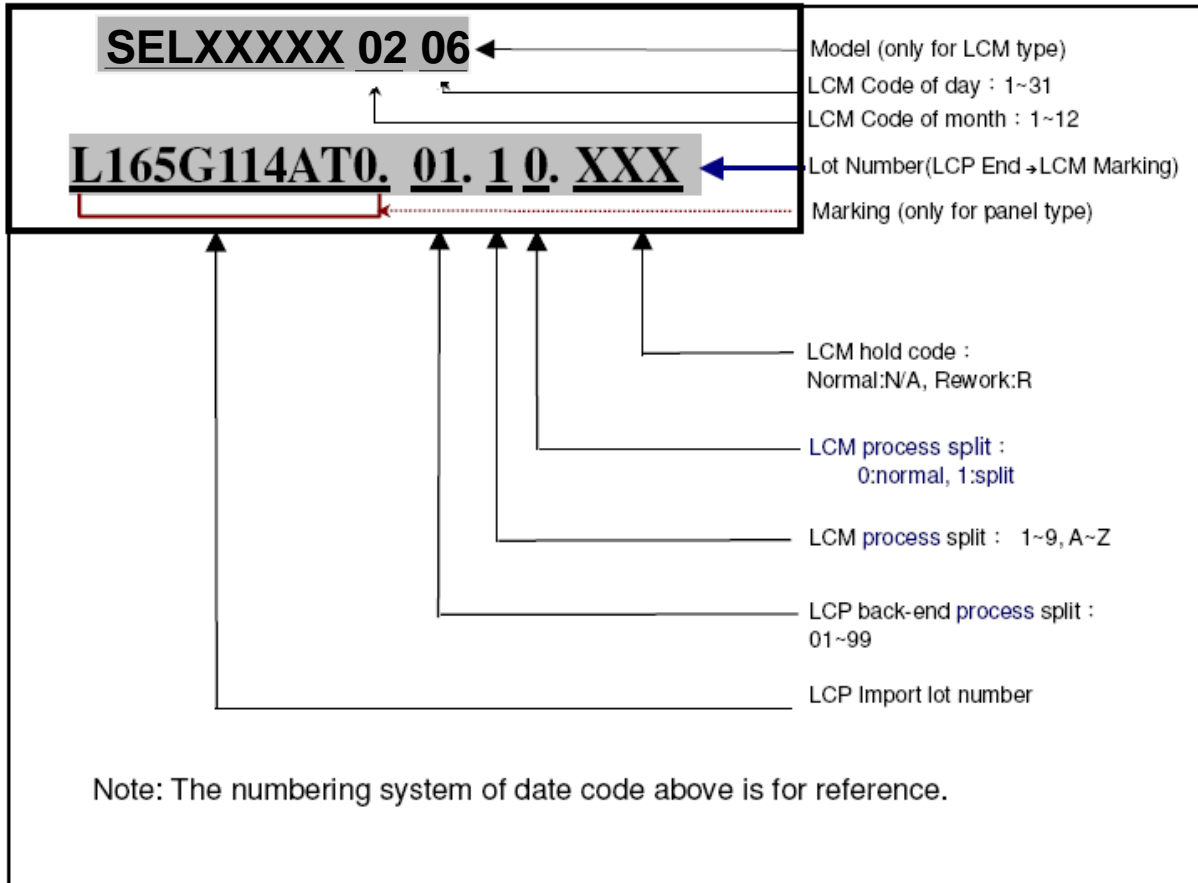
When mounting Analog Touch panel.

- (1) Touch panels shall be placed on a smooth surface such as a liquid crystal display bezel. If situations require use of rubber products, they should be as wide and even as practical. To prevent deformation of a liquid crystal display, adopt the referred fixation method. Touch panels shall be kept at least 1mm apart from a liquid crystal display surface so they can withstand a mechanical shock. (0.5mm or more with touch panels of 150mm or smaller)

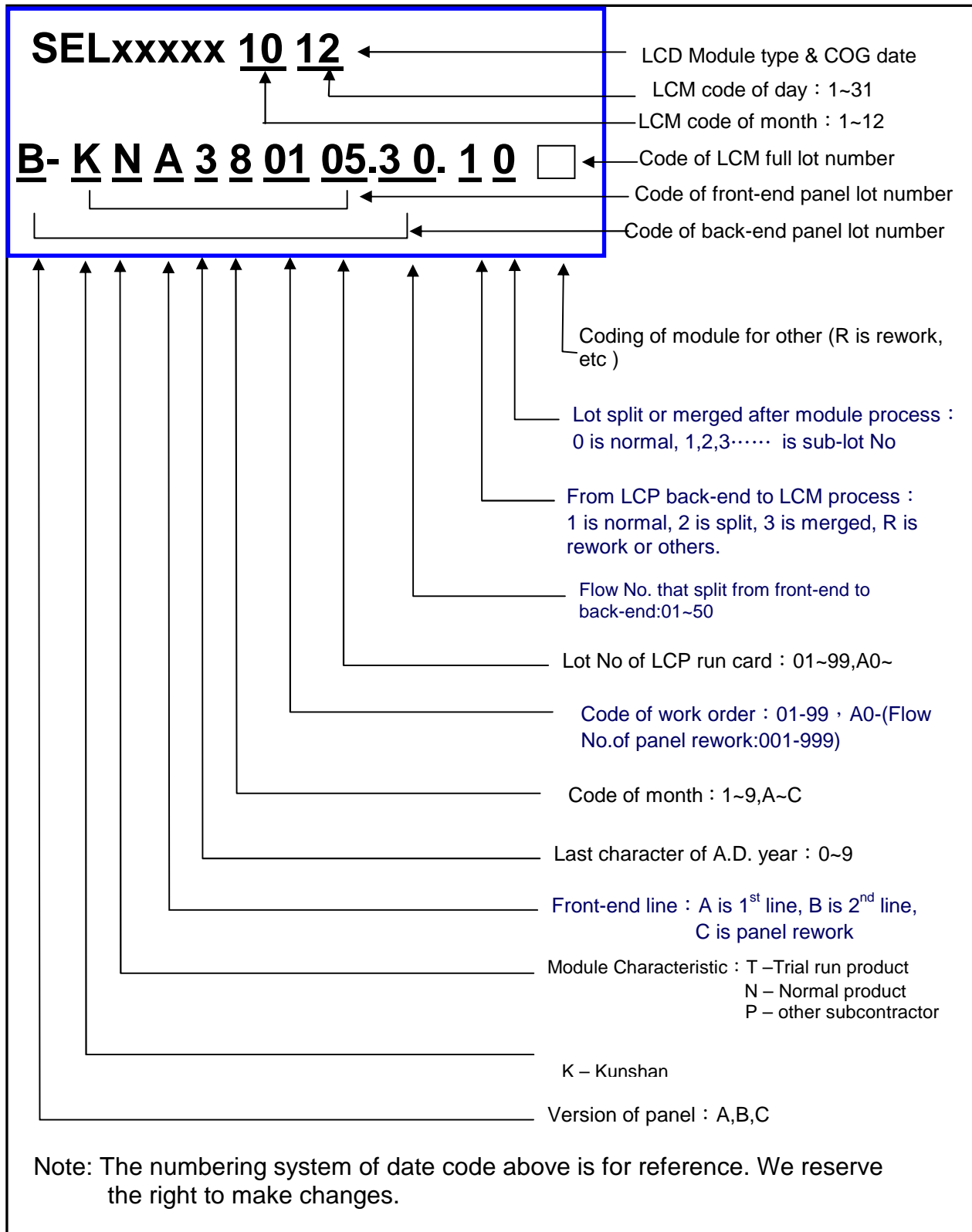
- (2) A top frame shall be designed for the practically minimal holding pressure and must be placed at the insulation area (You must avoid bonding of the top frame and the touch panel .to prevent touch Panel from any damage caused by deformation of a case)
 Use of a soft pad below a touch panel requires a top frame be designed to allow for application of pressure directly over or inside the pad. (Otherwise, leverage may be created and touch panels bent.)
- (3) A clearance of a minimum of 0.3mm must be reserved between the bottom surface of the top frame opening end and top surface of a touch panel. The clearance must permit non -application of pressure caused by frame deformed by heat or something else.



12. ILLUSTRATION OF LCD DATE CODE



13. ILLUSTRATION OF LCD DATE CODE



14. RoHS COMPLIANT WARRANTY

RoHS Hazardous substances including:

- Cd < 100 ppm
- Pb < 1000 ppm
- Hg < 1000 ppm
- Cr +6 < 1000 ppm
- PBDE < 1000 ppm
- PBB < 1000 ppm

15. PRECAUTIONS FOR USE

15.1. Safety

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

15.2. Storage Conditions

- (1) Store the panel or module in a dark place where the temperature is $23\pm 5^{\circ}\text{C}$ and the humidity is below $50\pm 20\%\text{RH}$.
- (2) Store in anti-static electricity container.
- (3) Store in clean environment, free from dust, active gas, and solvent.
- (4) Do not place the module near organics solvents or corrosive gases.
- (5) Do not crush, shake, or jolt the module.
- (6) Do not exposed to direct sun light of fluorescent lamps.

15.3. Installing LCD Module

Attend to the following items when installing the LCM.

- (1) Cover the surface with a transparent protective plate or touch panel to protect the polarizer and LC cell.
- (2) When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be $\pm 0.1\text{mm}$.

15.4. Precautions For Operation

- (1) Viewing angle varies with the change of liquid crystal driving voltage (V_o). Adjust V_o to show the best contrast.
- (2) Driving the LCD in the voltage above the limit will shorten its lifetime.
- (3) Response time is greatly delayed at temperature below the operating temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to the specified temperature range.
- (4) When turning the power on, input each signal after the positive/negative voltage becomes stable.
- (5) Do not apply water or any liquid on product which composed of T/P.

15.5. Handling Precautions

- (1) Avoid static electricity which can damage the CMOS LSI; please wear the wrist strap when handling.
- (2) The polarizing plate of the display is very fragile. so, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not apply excessive force on the surface; it may cause display abnormal .
- (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- (6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (7) Do not operate it above the absolute maximum rating.
- (8) Do not remove the panel or frame from the module.
- (9) Do not apply water or any liquid on product, which composed of T/P.

15.6. Warranty

- (1) The period is within 12 months since the date of shipping out under normal using and storage conditions.
- (2) The warranty will be avoided in case of defect induced by customer.

16. REVISION HISTORY

Version	Revise record	Date
A	New version	2013/11/07