SPECIFICATION
AGO 043B0-NN-N

PRODUCT SPECIFICATIONS

AGO 043B0-NN-N

Product   Standard 4.3" TFT Module
480 x RGB x 272 Dots graphic type
With Matte RTP
With White LED backlight,
10 LED dice, 300cd/m2

Version	Prepared / dd-mm-yy	Approved / dd-mm-yy
A	HB.Wan 01/12-2016	Zhanghong 01/12-2016

Table of Contents

1. Revision History

Version	Summary	Date dd-mm-yy
A	Original	1/12-2016

2. PHYSICAL DATA

Item	Contents	Unit
LCD type	4.3inch TFT	---
Polarizer mode	Transmissive	---
Viewing direction	6:00	O'clock
Module size (W×H×T)	105.50X67.20X4.10	mm
Active area (W×H)	95.04x 53.86	mm
Number of dots	480(W) x RGB x 272 (H)	Dots
Dot Pitch	0.198x0.198	mm
Driver IC		---
Operation temperature	-20 ~70	℃
Storage temperature	-30 ~80	℃
Back light type/Color	LED back light/ White	---
Touch panel	No	---

105.5±0.2
104.8 (TP Outline)
96.7 (TP A.A)
(LCD A.A.)95.04
5.23
(52.75)
4.11
(31.04)
(LCD A.A)53.86
55(TP A.A)
67.2±0.2
65 (TP Outline)
46.01±0.5

Y+
4,3" TFT 480×RGB×272
X- X+
6 o'clock
Y-

4.1±0.2

0.30±0.05

4.8
单层FX
PI补强板

18.27±0.5
20.50
3.5

3.5±0.3
0.35±0.05 0.15±0.05
0.5 P0.5*(40-1)=19.5±0.1 0.5
20.5±0.1
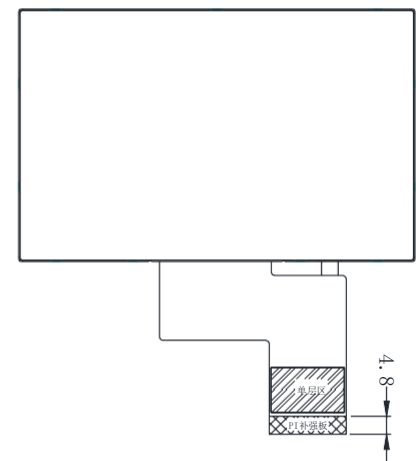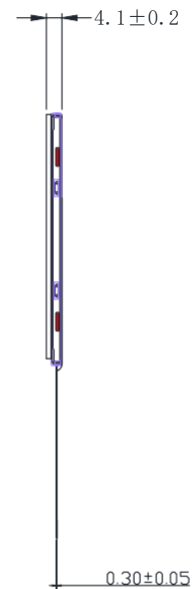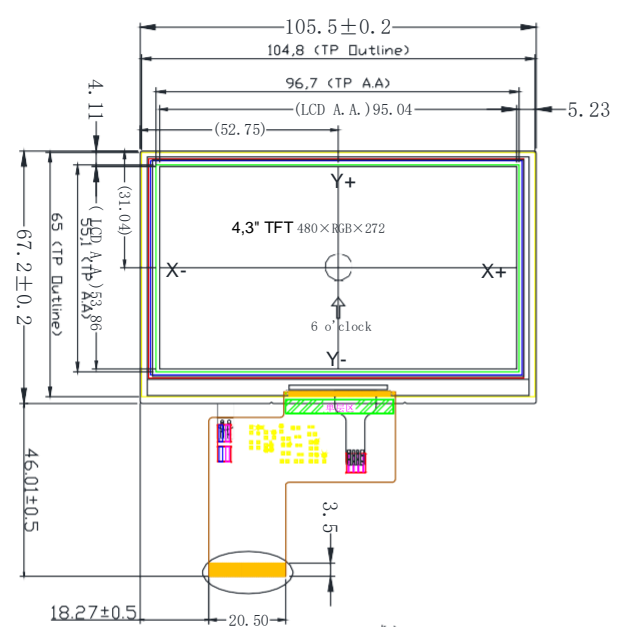
NOTES:
1. FPC Connector Suggestion:
2. OPERATING TEMP: -20°C~70°C
3. STORAGE TEMP : -30°C~80°C
4. General Tolerance:±0.20
5. Driver IC:

背光电路图 Backlight Circuit diagram (LED 5×2=10)
A K

AGTECHNOLOGIES			
DUTY	TITLE	TFT MODULE	MODEL NUMBER AGO 043B0-NN-N
BIAS	DRWN/DATE HB.Wan 23/ 1/2016		DRAWING NUMBER
O.V.	CHKD/DATE		TOLERANCE UNLESS SPECIFIED ±0.2	UNIT mm
O'CLOCK	APPD/DATE Zhanghong 23/ 1/2016		REV. 0	SCALE

REV.	CONTENTS	DATE

4. **ABSOLUTE MAXIMUM RATINGS** (Ta=25℃)

Name	symbol	Min	Type	Max	Unit
Operation Temperature	TOP	-20	-	70	℃
Storage Temperature	TST	-30	-	80	℃

5. ELECTRICAL CHARACTERISTICS

5-1. Type Electrical Characteristics

Name	Symbol	Min	Type	Max	Unit
Logical Voltage	VDD	3.0	3.3	3.6	V
Input Low Voltage	VIL	-0.3	-	0.2IOVCC	V
Output High Voltage	VOH	0.8IOVCC	-	-	V
Output Low Voltage	VOL	-	-	0.2IOVCC	V
Current Consumption	IDD	-	-	25	Ma

5-2. BACKLIHGT ELECTRICAL CHARACTERISTICS

Name	Min	Type	Max	Unit
Current	30	40	50	Ma
Voltage	14	15.5	17	V
Power Consumption	-	620	-	Mw
luminance	300	300	-	CD/M(ST-86LA)
Luminance uniformity	75%	80%	-	(Note2)
X Color Coordinates				
Y Color Coordinates				

Note1：This luminance is tested with assembling the LCD

Note2：Definition of Luminance Uniformity.

Active area is divided into 9 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

$$Luminance\ Uniformity\ (Yu) = \frac{B_{min}}{B_{max}}$$

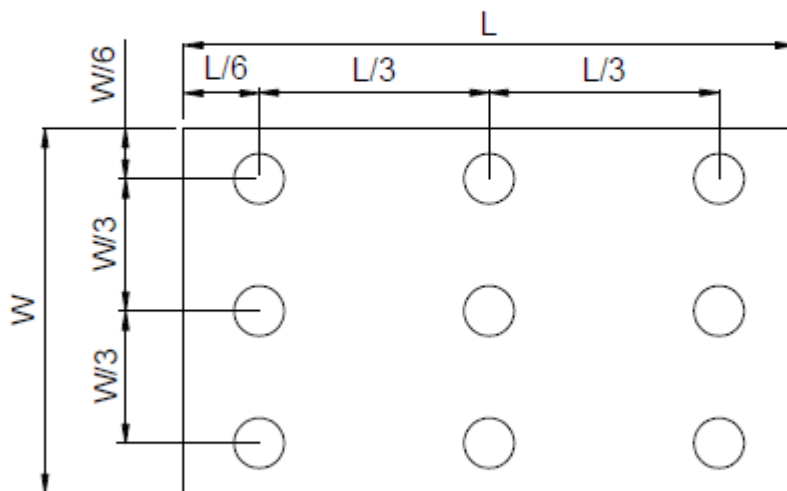L-------Active area length   W----- Active area width

Fig. 4-4 Definition of measuring points

B_{max}: The measured maximum luminance of all measurement position.
B_{min}: The measured minimum luminance of all measurement position.

6. ENVIRONMENTAL REQUIREMENTS

Item	Operating temperature (Topr)		Storage temperature (Tstg) (Note 1)		Remark
	Min.	Max.	Min.	Max.	
Ambient temperature (Ta)	-20°C	+70°C	-30°C	+80°C	Dry
Humidity (Note 1)	90% max. RH for Ta ≤ 40°C < 50% RH for 40°C < Ta ≤ Maximum operating temperature				No condensation
Vibration (IEC 68-2-6) cells must be mounted on a suitable connector	Frequency: 10 ~ 55 Hz Amplitude: 0.75 mm Duration: 20 cycles in each direction.				3 directions
Shock (IEC 68-2-27) Half-sine pulse shape	Pulse duration: 11 ms Peak acceleration: 981 m/s^2 = 100g Number of shocks: 3 shocks in 3 mutually perpendicular axes.				3 directions

Note: Product cannot sustain at extreme storage conditions for long time.

7. INTERFACE PIN CONNECTIONS

PIN No.	PIN Name	Function Description
1	VLED-	back light power supply negative
2	VLED+	back light power supply positive
3	GND	Ground
4	VDD	Power supply
5-12	R0-R7	Red Data
13-20	G0-G7	Green Data
21-28	B0-B7	Blue Data
29	GND	Ground
30	CLK	Clock signal
31	DISP	Display on/off
32	HSYNC	Horizontal sync input in RGB mode(short to GND if not used)
33	VSYNC	Vertical sync input in RGB mode(short to GND if not used)
34	DE	Data enable
35	NC	No Connection
36	GND	Ground
37	XR	Touch panel X-right
38	YD	Touch panel Y-bottom
39	XL	Touch panel X-left
40	YU	Touch panel Y-up

8. OPTICAL CHARACTERISTICS

Name	Symbol	Min	Type	Max	Unit
Transmittance rate	T(%)	-	4.6	-	%
Contrast ratio	C/R	400	500	-	-
Response time	Tr+Tf	-	45	-	ms
Viewing Angle	θ U	40	50	-	degree （C/R>10）
	θ D	60	70	-	
	θ L	60	70	-	
	θ R	60	70	-	

Note 1: Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression.
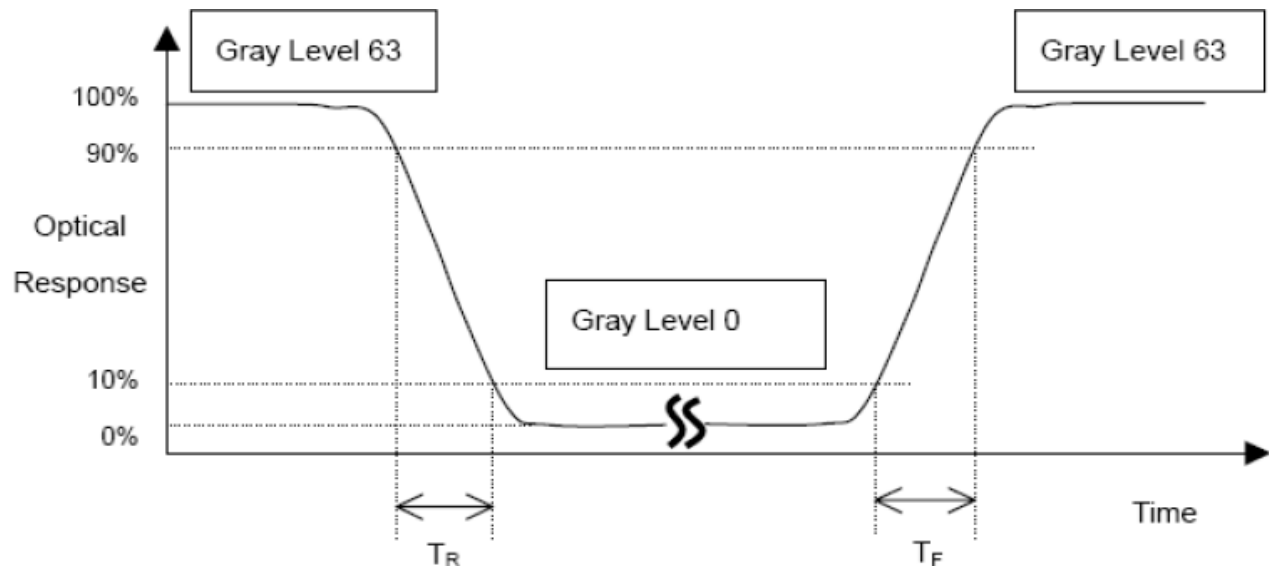
Contrast Ratio (CR) =L63 / L0

L63: Luminance of gray level 63(WHITE)

L0: Luminance of gray level 0(BLACK)

CR =CR (10)
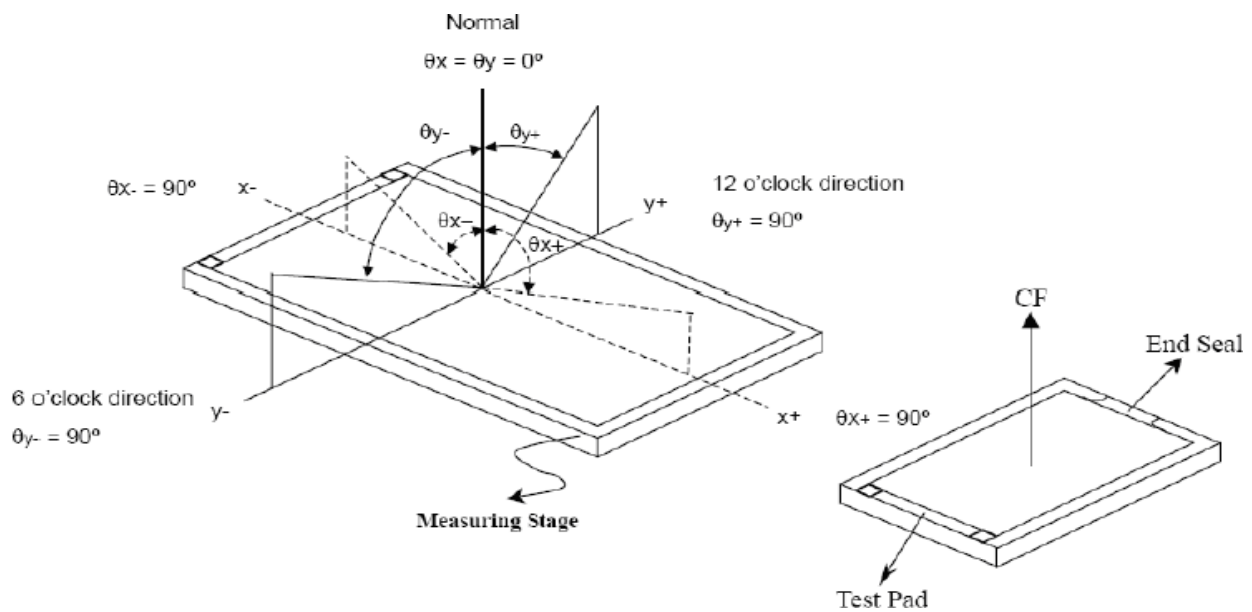
CR (X) is corresponding to the Contrast Ratio of the point (X) at Figure in Note (5).
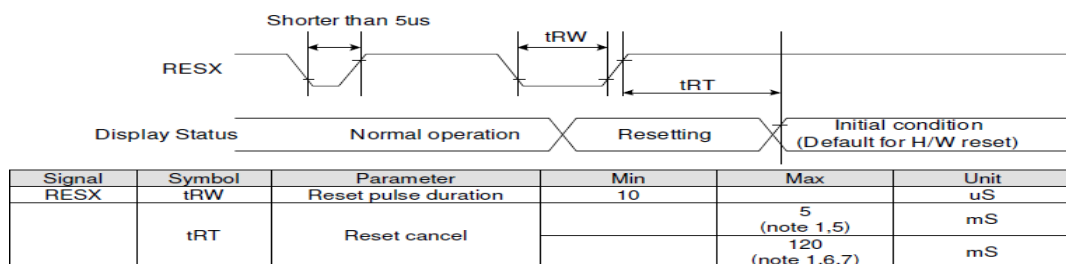
Note 2: Definition of Response Time (TR,TF)

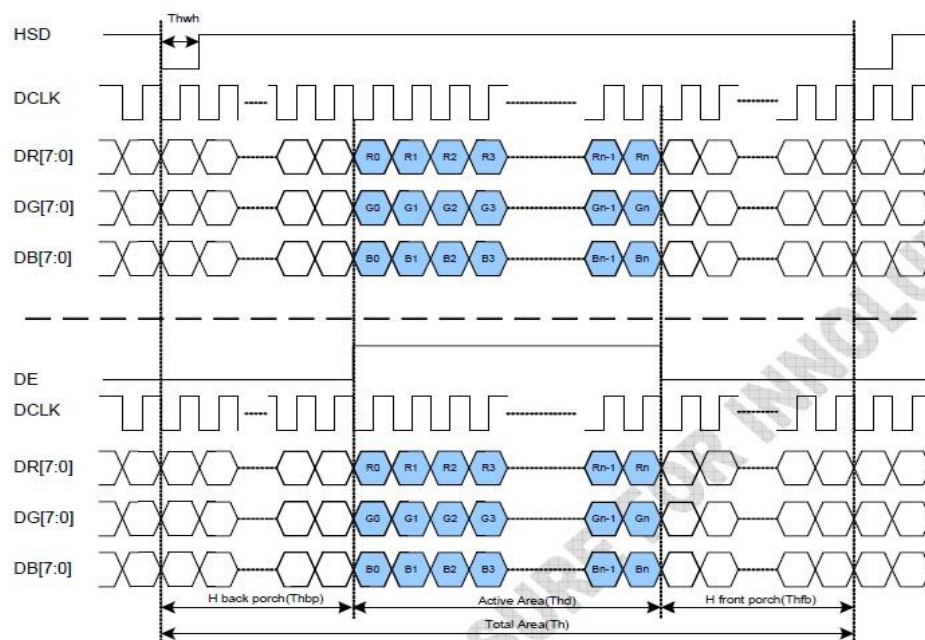# Note 3: Definition of Viewing Angel

9. Interface Timing

9-1 Reset Timing

Signal	Symbol	Parameter	Min	Max	Unit
RESX	tRW	Reset pulse duration	10		uS
	tRT	Reset cancel		5 (note 1,5)	mS
				120 (note 1,6,7)	mS

9-2 RGB Interface Timing

Parallel RGB input timign table

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	5	9	12	MHz
VSD period time	Tv	277	288	400	H
VSD display area	Tvd		272		H
VSD back porch	Tvb	3	8	31	H
VSD front porch	Tvfp	2	8	97	H
HSD period time	Th	520	525	800	DCLK
HSD display area	Thd		480		DCLK
HSD back porch	Thbp	36	40	255	DCLK
HSD front porch	Thfp	4	5	65	DCLK

9-3 AC Timing Diagram
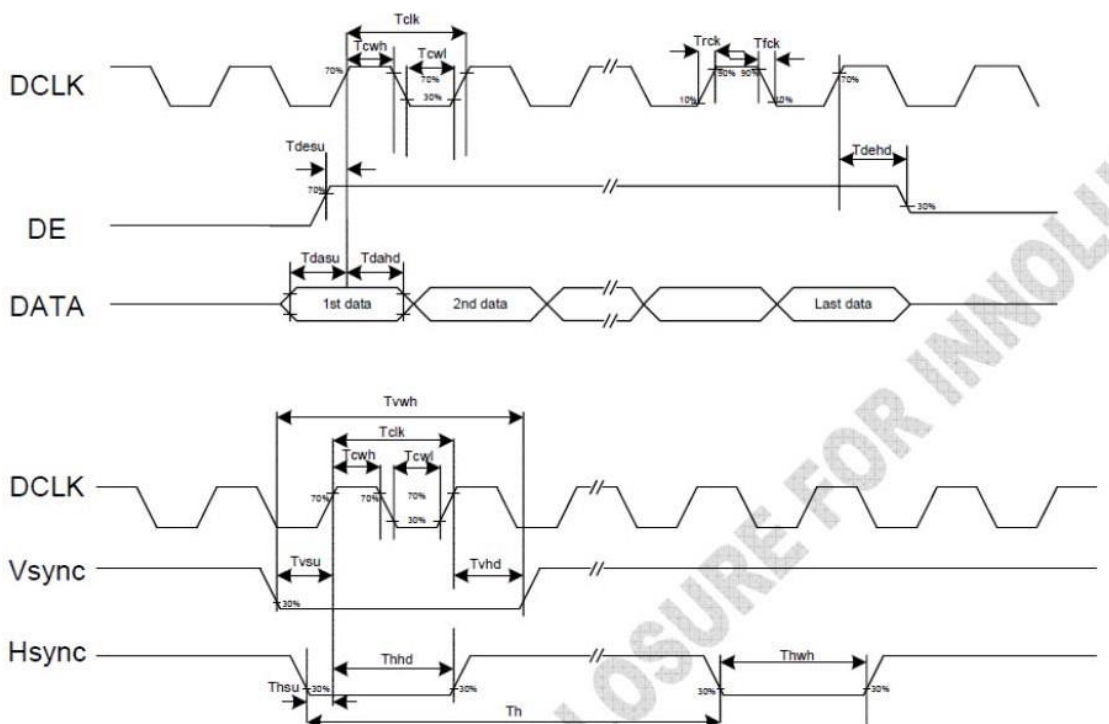
DCLK clock time	Tclk	33.3	-	-	ns	DCLK=30MHz
DCLK clock low period	Tcwl	40	-	60	%	
DCLK clock high period	Tcwh	40	-	60	%	
Clock rising time	Trck	9	-	-	ns	
Clock falling time	Tfck	9	-	-	ns	
HSD width	Thwh	1	-	-	DCLK	
HSD period time	Th	55	60	65	us	
HSD setup time	Thsu	12	-	-	ns	
HSD hold time	Thhd	12	-	-	ns	
VSD width	Tvwh	1	-	-	Th	
VSD setup time	Tvsu	12	-	-	ns	
VSD hold time	Tvhd	12	-	-	ns	
Data setup time	Tdasu	12	-	-	ns	
Data hold time	Tdahd	12	-	-	ns	
DE setup time	Tdesu	12	-	-	ns	
DE hold time	Tdehd	12	-	-	ns	
Source output setting time	Tsst	-	-	TBD	us	10% to 90% CL=60pF, RL=2Kohm
Gate output setting time	Tgst	-	-	TBD	ns	10% to 90%, CL=60pF
VCOM output setting time	Tcst	-	-	TBD	us	10% to 90%, CL=40nF, RL=50ohm
Time from VSD to 1st line data input	Tvs	3	8	31	Th	HV mode By HDL[4:0] setting

10. TFT panel inspection specification

10-1. Electrical Testing

1. Missing vertical, horizontal segment, segment contrast defect.
2. Missing character, dot or icon.
3. Display malfunction.
4. No function or no display.
5. Current consumption exceeds product specifications.
6. LCD viewing angle defect.
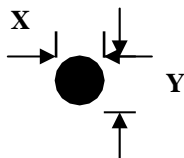7. Mixed product types.
8. Contrast defect

10-2. Black or white spots on LCD (display only)

1. White and black spots on display $\leqq 0.20$mm, no more than three white or black spots present.
2. Densely spaced: No more than two spots or lines within 5mm

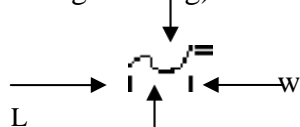## 10-3. LCD black spots, white spots, contamination (non-display)

1. Round type: As following drawing

$$\psi =(x+y)/2$$

SIZE	Acceptable QTY
$\psi \leqq 0.10$	Accept no dense
$0.10 \ \langle\psi\leqq 0.15$	2
$0.15 \ \langle\psi\leqq 0.20$	1
total	2

2. Line Type: (As following drawing)

Length	Width	Acceptable QTY
---	$W\leqq 0.02$	Accept no dense
$L\leqq 3.0$	$0.02< W\leqq 0.03$	
$L\leqq 2.5$	$0.03< W\leqq 0.05$	2
---	$0.05< W$	As round type

10-4. Polarizer bubbles

If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction.

Size ψ	Acceptable QTY
$\psi \leqq 0.20$	Accept no dense
$0.20< \ \psi \leqq 0.50$	2

10-5. Scratches

Follow NO.3 LCD black spots, white spots, contamination

10-6. Chipped glass

Symbols:

X: Chip length y: Chip width   z: Chip thickness

K: Seal width t: Glass thickness a: LCD side length

L: Electrode pad length

1. General glass chip:

1-1 Chip on panel surface and crack between panels:

z: chip thickness	y: chip width	x: chip length
z<=1/2t	Not over viewing area	X<=a
1/2t<z<=2t	Not exceed 1/3k	X<=1/2a

If there are 2 or more chips, x is the total length of each chip.

1-2 Corner crack:

z: chip thickness	y: chip width	x: chip length
z<=1/2t	Not over viewing area	X<=a
1/2t<z<=2t	Not exceed 1/3k	X<=1/2a

If there are 2 or more chips, x is the total length of each chip.

2. Protrusion over terminal:

2-1 Chip on electrode pad:

y: Chip width	x: chip length	z: chip thickness
y<=0.5mm	X<=a	0<z<=t

2-2 Non-conductive portion:

y: Chip width	x: chip length	z: chip thickness
y<=L	X<=1/8a	0<z<=t

If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.

If the product will be heat sealed by the customer, the alignment mark must not be damaged.

2-3 Substrate protuberance and internal crack.

y: width	x:length
y<=1/4L	x<=a

10-7. Cracked glass

The LCD with extensive crack is not acceptable.

10-8. Backlight elements

1. Illumination source flickers when lit.
2. Spots or scratches that appear when lit must be judged using LCD spot, lines and contamination standards.
3. Backlight doesn't light or color is wrong

10-9. Soldering

1. No unmelted solder paste may be present on the PCB.

2. No cold solder joints, missing solder connections, oxidation or icicle.

3. No residue or solder balls on PCB.

4. No short circuits in components on PCB.

10-10. General appearance

1. No oxidation, contamination, curves or, bends on interface pin(OLB) of TCP.

2. No cracks on interface pin(OLB) of TCP

3. NO contamination, solder residue or solder balls on product.

4. The IC on the TCP may not be damaged, circuits.

5. The uppermost edge of the protective strip on the interface pin must be present or look as if it cause the interface pin to sever.

6. The residual rosin or tin oil of soldering(component or chip component) is not burned into brown or black color.

7. Sealant on top of the ITO circuit has not hardened

8. Pin type must match type in specification sheet.

9. LCD pin loose or missing pins.

10. Product packaging must the same as specified on packaging specification sheet.

11. Product dimension and structure must conform to product specification sheet.

12. The appearance of Heat Seal should not admit any dirt and break.

11. USING LCD MODULES

11-1. Liquid Crystal Display Modules

LCD is composed of glass and polarizer. Pay attention to the following items when handling.

1. Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.

2. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc).

3. N-hexane is recommended for cleaning the adhesive used to attach front/rear polarizers and reflectors made of organic substances which will be damaged by chemicals such as acetone, toluene, ethanol and isopropylalcohol.

4. When the display surface becomes dusty, wipe gently with absorbent cotton or other soft material like chamois soaked in petroleum benzin. Do not scrub hard to avoid damaging the display surface.

5. Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading.

6. Avoid contacting oil and fats.

7. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizers. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.

8. Do not put or attach anything on the display area to avoid leaving marks on.

9. Do not touch the display with bare hands .This will stain the display area and degradate insulation between terminals (some cosmetics are determinated to the polarizers).

10. As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring.

11-2. Precaution for Handling LCD Modules

Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

1. Do not alter, modify or change the shape of the tab on the metal frame.
2. Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
3. Do not damage or modify the pattern writing on the printed circuit board.
4. Absolutely do no modify the zebra rubber strip (conductive rubber) or heat seal connector.
5. Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
6. Do not drop, bend or twist LCM.

11-3. Electro-Static Discharge Control

Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC.

1. Make certain that you are grounded when handing LCM.
2. Before remove LCM from its packing case or incorporating it into a set , be sure the module and your body have the same electric potential.
3. When soldering the terminal of LCM, make certain the AC power source for the soldering iron does not leak.
4. When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.
5. As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.
6. To reduce the generation of static electricity be careful that the air in the work is not too dried. A relative humidity of 50%~60% is recommended.

## 11-4. Precaution for soldering to the LCM

1. Observe the following when soldering lead wire, connector cable and etc. to the LCM.
   - Soldering iron temperature:280℃±10℃
   - Soldering time: 3-4 sec.
   - Solder: eutectic solder.

If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation. (This does not apply in the case of a non- halogen type of flux.) It is recommended that you protect the LCD surface with a cover during soldering to prevent any damage dug to flux spatters.

2. When soldering the electroluminescent panel and PC board, the panel and board should not be detached more than three times. This maximum number is determined by the temperature of the soldering iron.
3. When remove the electroluminescent panel form the PC board, be sure the solder has completely melted, the soldered pad on the PC board could be damaged

11-5. Precaution for Operation

1. Viewing angle varies with the change of liquid crystal driving voltage (Vo). Adjust Vo to show the best contrast.

2. Driving the LCD in the voltage above the limit shortens its life.

3. Response time is greatly at temperature below the ope rating temperature range. However, this does not mean the LCM will be out of the order. It will recover when it returns to the specified temperature range.

4. If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then back on.

5. Condensation of terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, it must be used under the relative condition of 40℃,50%RH .

6. When turning the power on, input each signal after the positive/negative voltage becomes stable.
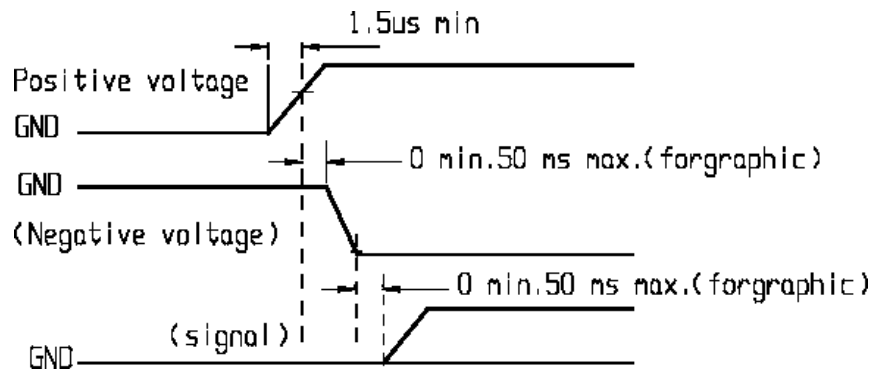
14-6. Storage

When storing LCD as spares for some years, the following precaution are necessary.

1. Store them in a sealed polyethylene bag. If properly sealed, there is no need for dessicant.

2. Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0℃ and 35℃.

3. The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped.)

4. Environmental conditions:
   - Do not leave them for more than 168hrs. at 60℃.
   - Should not be left for more than 48hrs. at -20℃.

14-7. Safety

1. It is recommended to crush damaged or unnecessary LCD into pieces and wash off with solvents such as acetone and ethanol, which should later be burned.

2. If any liquid leak out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

14-8. Limited Warranty

Unless agreed between AGT and customer, AGT will repl ace or repair any of its LCD modules which are found to be functionally defective when inspected in accordance with AGT LCD acceptance standards(copies available upon request) for a period of one year from date of shipments. Cosmetic/ visual defects must be returned to

AGT within 90 days of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of AGT limited to repair and/or replacement on th e terms set forth above. AGT will not be responsible for any subsequent or consequential events.

14-9. Return LCM under warranty

No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are:

- Broken LCD glass.
- PCB eyelet's damaged.
- PCB conductors damaged.
-Circuit modified in any way, including addition of components.
- PCB tampered with by grinding, engraving or painting varnish.
-Soldering to or modifying the bezel in any manner.

Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet's conductors and terminals.