

INDUSTRIAL STRENGTH... Start Your Application From YOURITECH

Integration support

Obsolescence Management

PCAP

Embedded Systems

Human Machine Interface

Touch Solutions

Software

Quality Management

Open Frame Monitors

LCD Controller

Research & Development

Firmware

EMC tests

on-site service

In-house Manufacturing

Optical Bonding

Cover glass

System solutions

OEM Solutions

Custom Display

Production Custom designs Installation

Mechanical design



SPECIFICATION FOR LCM Module

MODULE No:	ET190SX20-K
CUSTOMER:	

YOURITECH	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		



[illegible]

Contents

1. Block Diagram.....	5
2. Outline dimension.....	6
3. Input terminal Pin Assignment.....	7
3.1 TFT-LCD Module.....	7
3.2 Backlight.....	8
4. LCD Optical Characteristics.....	9
4.1 Optical specification.....	9
5. TFT Electrical Characteristics.....	12
5.1 Absolute Maximum Rating (Ta=25 VSS=0V).....	12
5.2 DC Electrical Characteristics.....	12
5.3 LED Backlight Characteristics.....	14
6. Signal Characteristic.....	16
6.1. The input Data Format.....	16
6.2. Input Timing Specification.....	16
6.3. Timing Diagram.....	17
6.4. Power on/off Sequence.....	17
7. LCD Module Out-Going Quality Level.....	18
7.1 VISUAL & FUNCTION INSPECTION STANDARD.....	19
7.1.1 Inspection conditions.....	19
7.1.2 Definition.....	19
7.1.3 Sampling Plan.....	20
7.1.4 Criteria (Visual).....	21
8. Reliability Test Result.....	25
9. Cautions and Handling Precautions.....	26
9.1 Handling and Operating the Module.....	26
9.2 Storage and Transportation.....	26
10. Packing.....	27



* Description

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This module is composed of a Transmissive type TFT-LCD Panel, driver circuit, back-light unit. The resolution of a 19.0" TFT-LCD contains 1280x1024 pixels, and can display up to 16.7M colors.

* Features

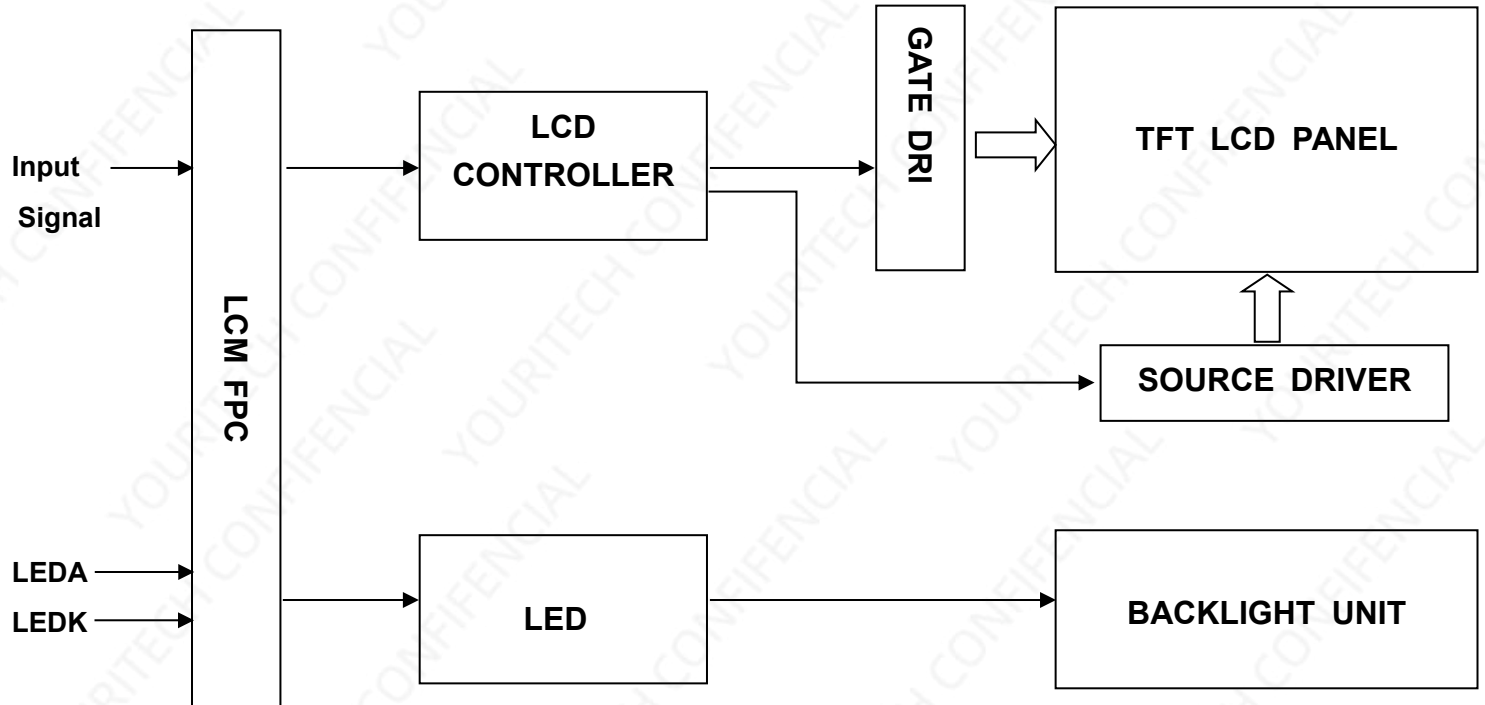
General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	376.32(H)*301.06(V) (19.0inch)	mm	-
Driver element	TFT active matrix	-	-
Display colors	16.7M	colors	-
Number of pixels	1280(RGB)*1024	dots	-
TFT Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.294 (W)*0.294(H)	mm	-
Viewing angle	ALL	o'clock	-
TFT Controller IC	TBD	-	-
LCM Interface	Dual channel LVDS	-	-
Display mode	Normally White	-	-
Operating temperature	-30~+85	℃	-
Storage temperature	-30~+85	℃	-

* Mechanical Information

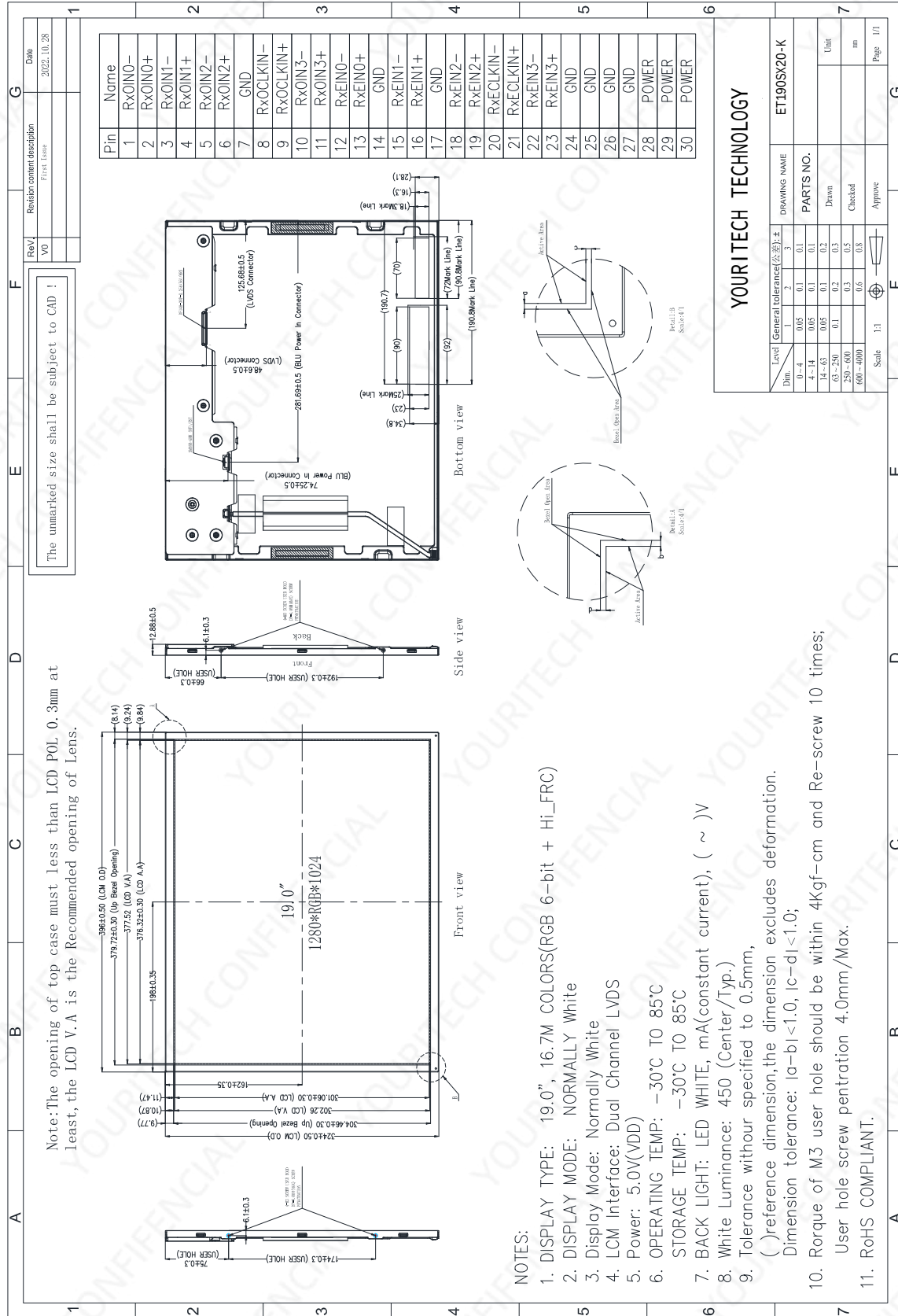
Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)		396.00		mm	-
	Vertical(V)		324.00		mm	-
	Depth(D)		12.88		mm	-
Weight			TBD		g	-



1. Block Diagram



2. Outline dimension



3. Input terminal Pin Assignment

3.1 TFT-LCD Module

NO.	SYMBOL	DISCRIPTION	I/O
1	RxOIN0-	Negative LVDS differential data input (Odd data)	I
2	RxOIN0+	Positive LVDS differential data input (Odd data)	I
3	RxOIN1-	Negative LVDS differential data input (Odd data)	I
4	RxOIN1+	Positive LVDS differential data input (Odd data)	I
5	RxOIN2-	Negative LVDS differential data input (Odd data)	I
6	RxOIN2+	Positive LVDS differential data input (Odd data)	I
7	GND	Power Ground	P
8	RxOCLKIN-	Negative LVDS differential clock input (Odd clock)	I
9	RxOCLKIN+	Positive LVDS differential clock input (Odd clock)	I
10	RxOIN3-	Negative LVDS differential data input (Odd data)	I
11	RxOIN3+	Positive LVDS differential data input (Odd data)	I
12	RxEIN0-	Negative LVDS differential data input (Even data)	I
13	RxEIN0+	Positive LVDS differential data input (Even data)	I
14	GND	Power Ground	P
15	RxEIN1-	Negative LVDS differential data input (Even data)	I
16	RxEIN1+	Positive LVDS differential data input (Even data)	I
17	GND	Power Ground	P
18	RxEIN2-	Negative LVDS differential data input (Even data)	I
19	RxEIN2+	Positive LVDS differential data input (Even data)	I
20	RxECLKIN-	Negative LVDS differential clock input (Even clock)	I
21	RxECLKIN+	Positive LVDS differential clock input (Even clock)	I
22	RxEIN3-	Negative LVDS differential data input (Even data)	I
23	RxEIN3+	Positive LVDS differential data input (Even data)	I
24	GND	Power Ground	P



25	GND	Power Ground	P
26	GND	Power Ground	P
27	GND	Power Ground	P
28	POWER	Power +5V	P
29	POWER	Power +5V	P
30	POWER	Power +5V	P

3.2 Backlight

NO.	SYMBOL	DISCRIPTION	I/O
1	Ch1	LED Current Feedback Terminal (Channel 1)	P
2	Ch2	LED Current Feedback Terminal (Channel 2)	P
3	VSLED	LED Power Supply Voltage Input Terminal	P
4	VSLED	LED Power Supply Voltage Input Terminal	P
5	Ch3	LED Current Feedback Terminal (Channel 3)	P
6	Ch4	LED Current Feedback Terminal (Channel 4)	P



4. LCD Optical Characteristics

4.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	$\Theta=0$ Normal viewing angle	600	1000	--		(1)(2)
Response time	Rising	T_R+T_F		--	--	40	msec	
	Falling							(1)(3)
Color Gamut		S(%)		65	70	--	%	
Color Filter Chromaticity	White	W_X		0.270	0.300	0.330		(1)(4) CF glass
		W_Y		0.290	0.320	0.350		
	Red	R_X		0.610	0.640	0.670		
		R_Y		0.312	0.342	0.372		
	Green	G_X		0.293	0.323	0.353		
		G_Y		0.596	0.626	0.656		
	Blue	B_X		0.116	0.146	0.176		
		B_Y		0.046	0.076	0.106		
Viewing angle	Hor.	Θ_L	CR>10	75	85	--		(1)(4)
		Θ_R		75	85	--		
	Ver.	Θ_U		70	80	--		
		Θ_D		70	80	--		
Option View Direction		Free						

*The data comes from the LCD specification.

Measuring Condition

Measuring surrounding : dark room

Ambient temperature : $25\pm 2^\circ\text{C}$

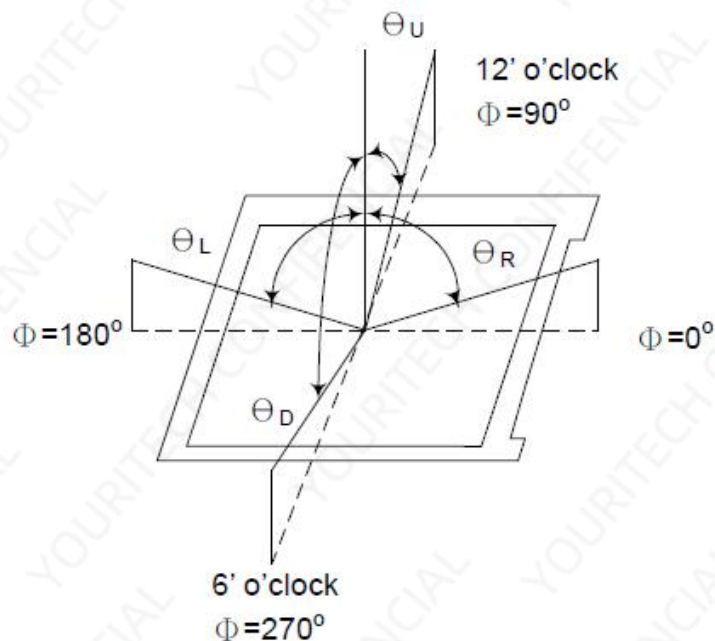
15min. warm-up time.

Measuring Equipment

FPM520 , which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.



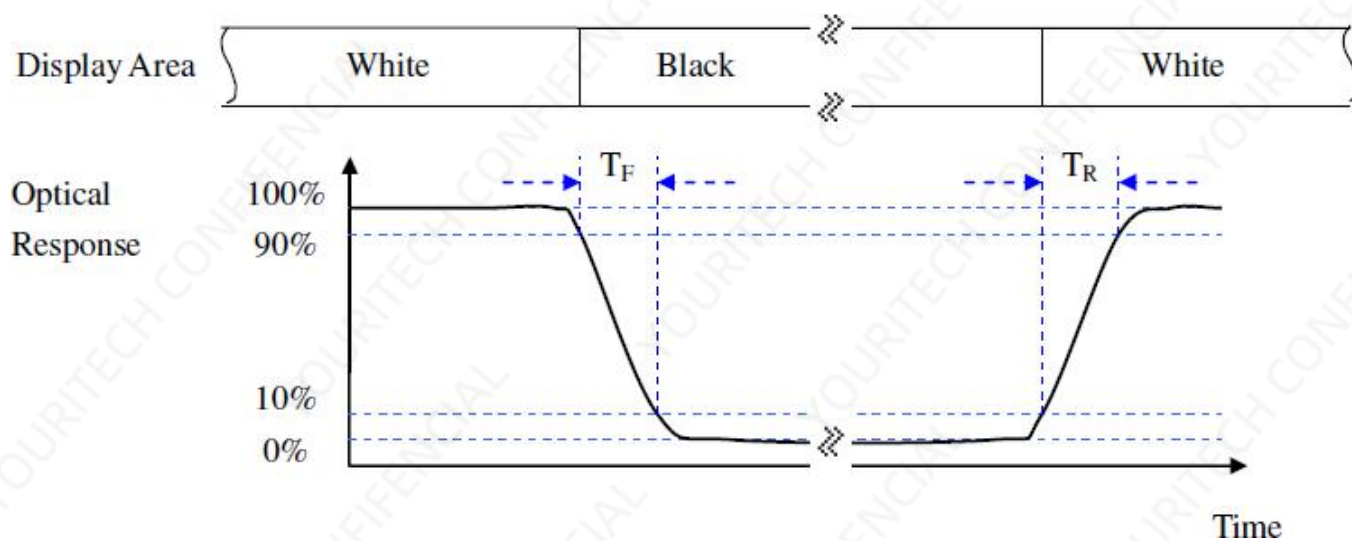
Note (1): Definition of Viewing Angle :



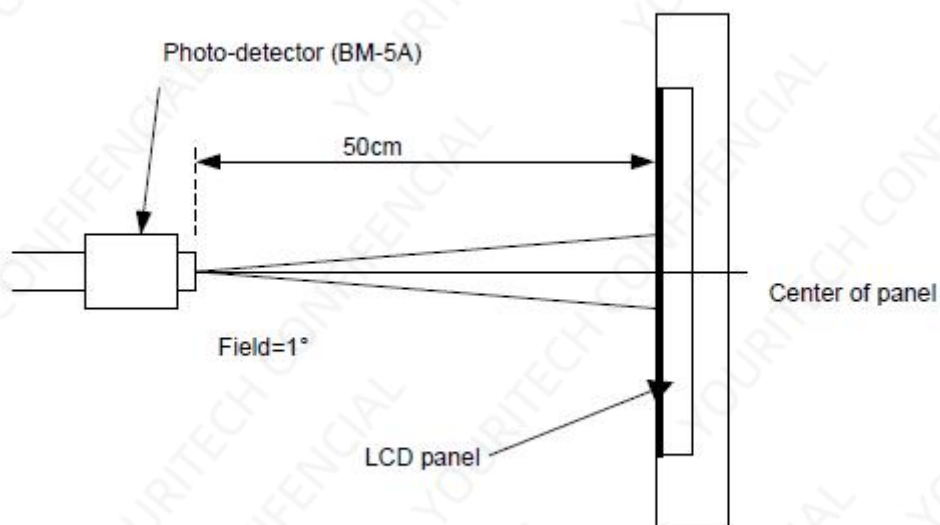
Note (2): Definition of Contrast Ratio(CR) :measured at the center point of panel

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

Note (3): Response Time



Note (4): Definition of optical measurement setup



5. TFT Electrical Characteristics

5.1 Absolute Maximum Rating (Ta=25 VSS=0V)

Characteristics	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	POWER	-0.3	6	V	Note1
Operating temperature	T _{OP}	-30	+85	°C	
Storage temperature	T _{ST}	-30	+85	°C	

NOTE1: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

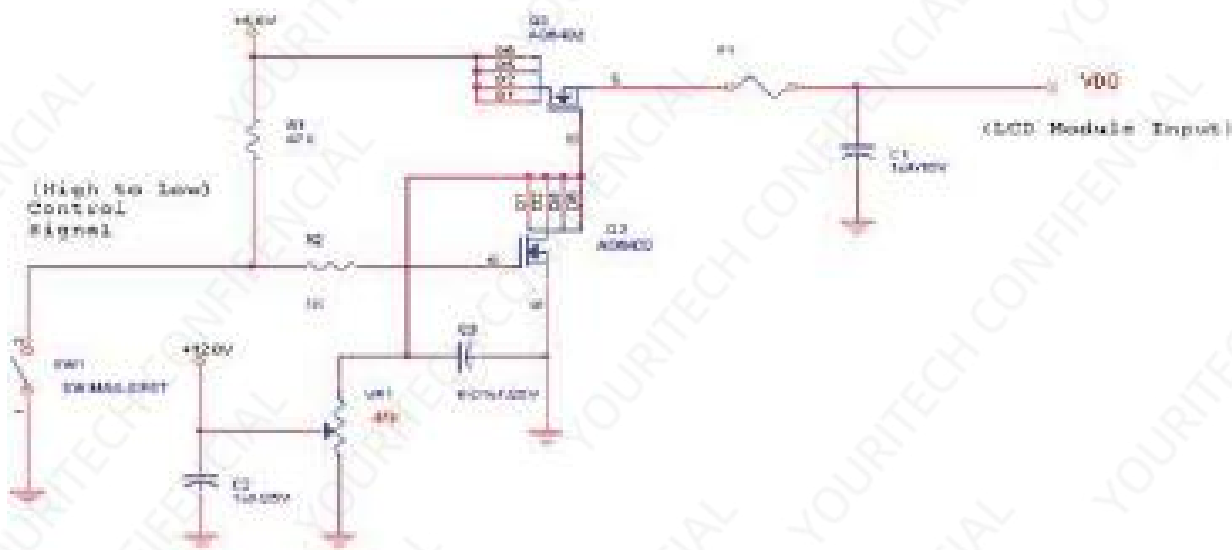
5.2 DC Electrical Characteristics

Symbol	Description	Min	Typ	Max	Unit	Remark
POWER	Power supply Input voltage	4.5	5.0	5.5	[Volt]	
IDD	Power supply Input	-	0.53	0.64	[A]	VDD= 5.0V, Black Pattern, Fv=60Hz
	Current (RMS)		0.61	0.73	[A]	VDD= 5.0V, Black Pattern, Fv=75Hz
PDD	VDD Power	-	2.7	3.2	[Watt]	VDD= 5.0V, Black Pattern, Fv=60Hz
	Consumption		3.05	3.7	[Watt]	VDD= 5.0V, Black Pattern, Fv=75Hz
IRush	Inrush Current	-	-	3.0	[A]	Note 3-1
VDDrp	Allowable VDD Ripple Voltage	-	-	500	[mV]	VDD= 5.0V, Black Pattern, Fv=75Hz



Note 3-1: Inrush Current measurement:

Test circuit:



5.3 LED Backlight Characteristics

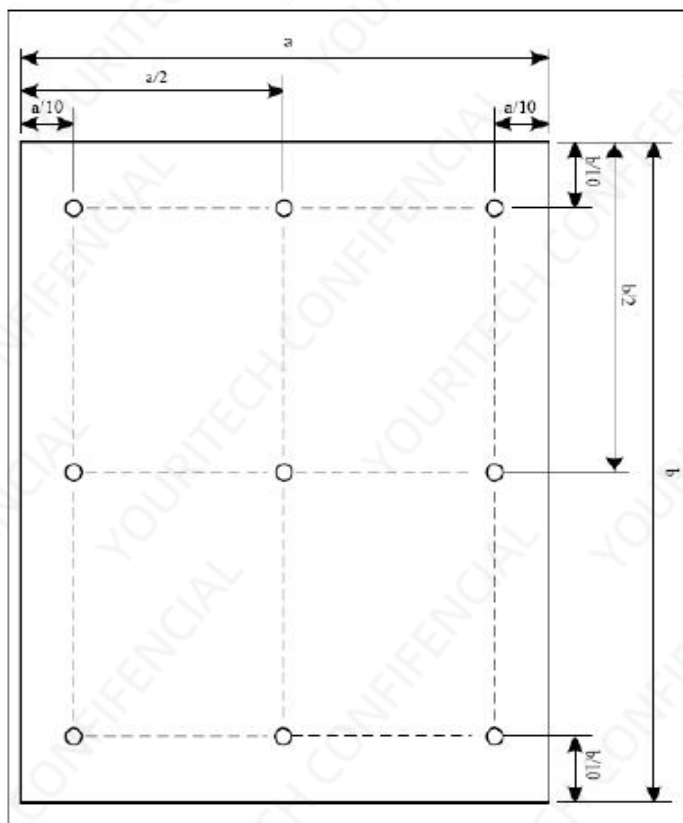
Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

NO.	SYMBOL	DISCRIPTION	I/O
1	VLED	12V input	P
2	VLED	12V input	P
3	VLED	12V input	P
4	GND	Power Ground	P
5	GND	Power Ground	P
6	GND	Power Ground	P
7	On/OFF	3.3-5V:ON,0V:OFF	I
8	Diming	PWM	I

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LCM Luminance	L _v	360	450	--	cd/m ²	Note3
LED life time	Hr	30000	--	--	Hour	Note1,2
Uniformity	AVg	80	--	--	%	Note3



NOTE 3: Luminance Uniformity of these 9 points is defined as below:



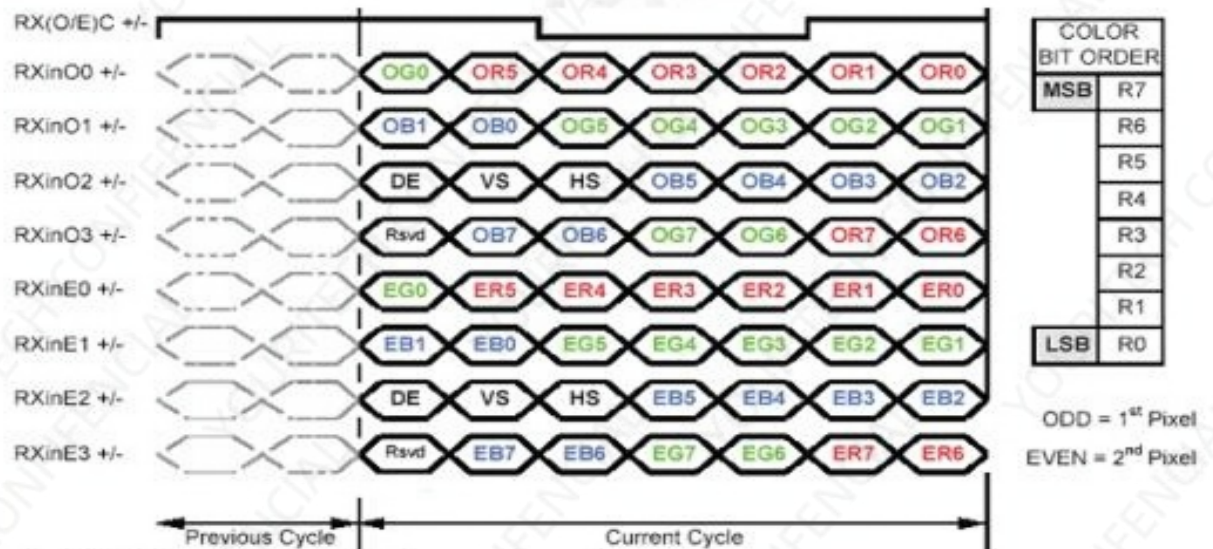
$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

$$\text{Luminance} = \frac{\text{Total Luminance of 9 points}}{9}$$



6. Signal Characteristic

6.1. The input Data Format



Note1: DE only, VS, HS on EVEN channel are not used.

Note2: Please follow PSWG.

Note3: 8-bit in

6.2. Input Timing Specification

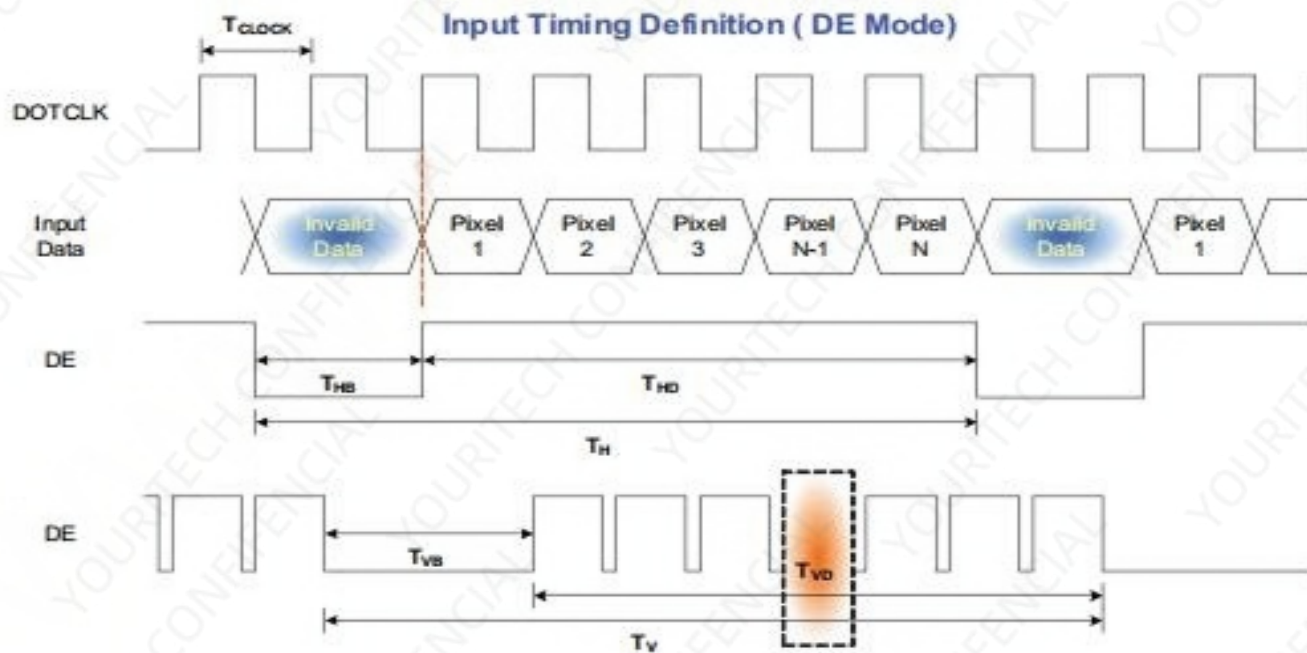
It only support DE mode, and the input timing are shown as the following table.

Signal	Item	Symbol	Min	Typ	Max	Unit
Vertical Section	Period	Tv	1032	1066	1150	Th
	Active	Tdisp(v)	1024	1024	1024	Th
	Blanking	Tbp(v)+Tfp(v)+PWvs	8	42	126	Th
Horizontal Section	Period	Th	780	844	2047	Tclk
	Active	Tdisp(h)	640	640	640	Tclk
	Blanking	Tbp(h)+Tfp(h)+PWhs	140	204	-	Tclk
Clock	Period	Tclk	22.2	18.52	14.81	ns
	Frequency	Freq.	44	54	67.5	MHz
Frame Rate	Frequency	1/Tv	49	60	75	Hz

Note: DE mode only

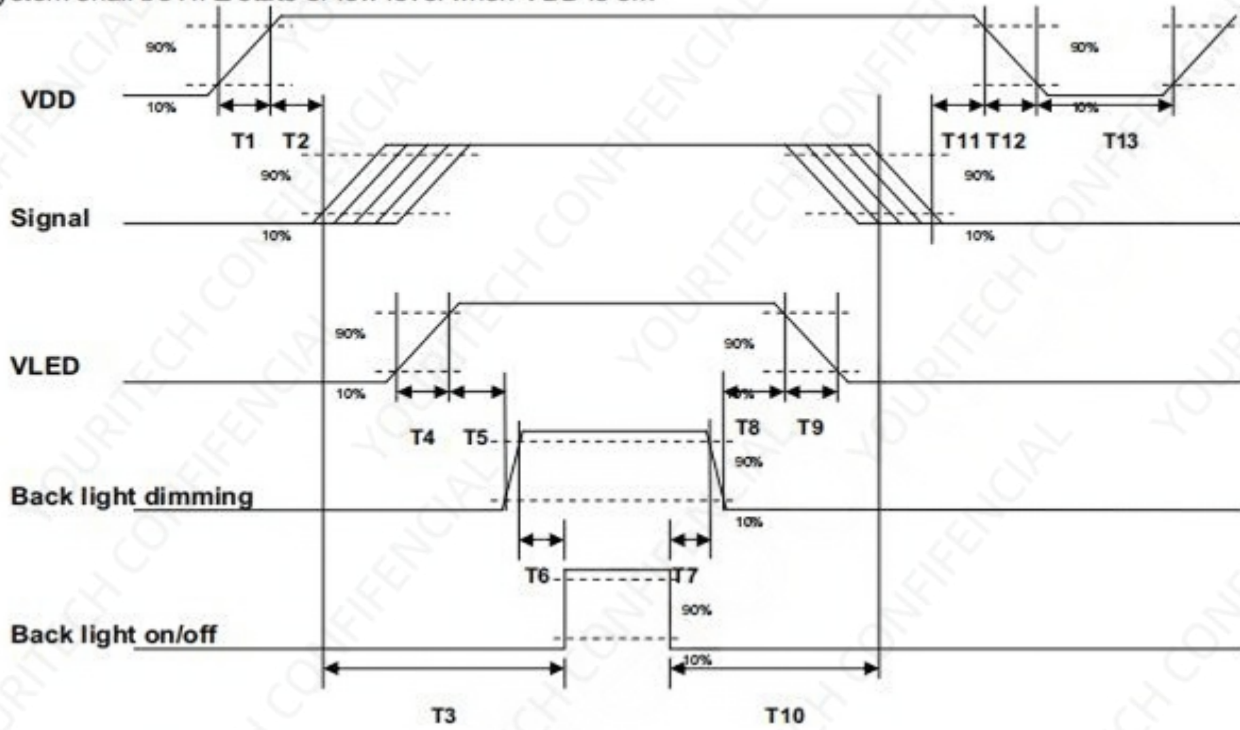


6.3. Timing Diagram



6.4 Power ON/OFF Sequence

VDD power and led on/off sequence are as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	30	40	50	[ms]
T3	200	-	-	[ms]
T4	0.5	-	10	[ms]
T5	10	-	-	[ms]
T6	10	-	-	[ms]
T7	0	-	-	[ms]
T8	10	-	-	[ms]
T9	-	-	10	[ms]
T10	110	-	-	[ms]
T11	0	16	50	[ms]
T12	-	-	10	[ms]
T13	1000	-	-	[ms]



7. LCD Module Out-Going Quality Level

7.1 VISUAL & FUNCTION INSPECTION STANDARD

7.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

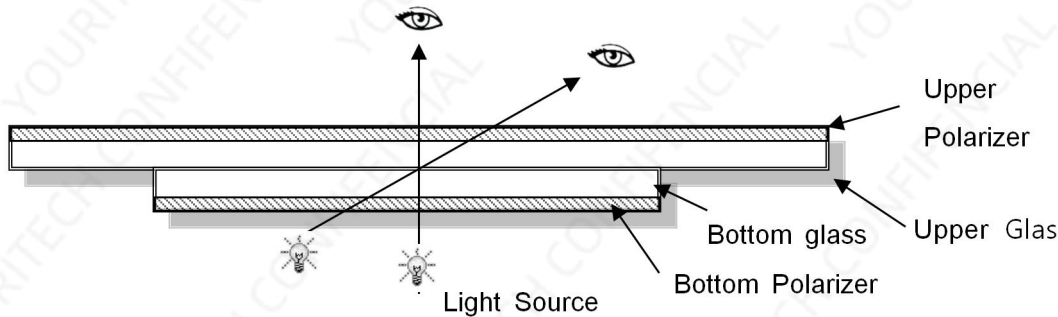
Temperature : $25\pm 5^{\circ}\text{C}$

Humidity : $65\%\pm 10\%\text{RH}$

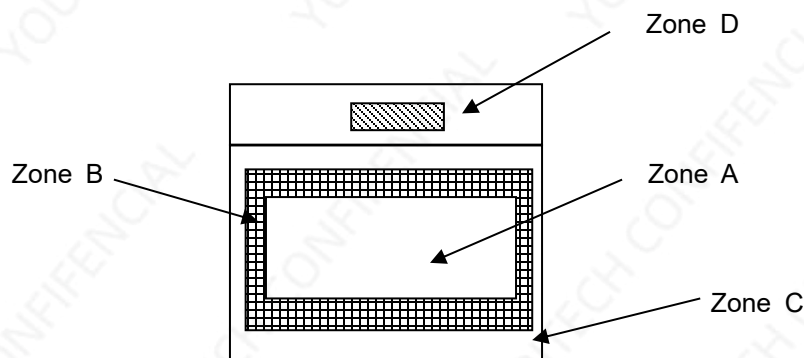
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance: 30-50cm



7.1.2 Definition



Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Zone D : IC Bonding Area

Note:As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer



7.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class II

AQL:

Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , LCM: Liquid Crystal Module

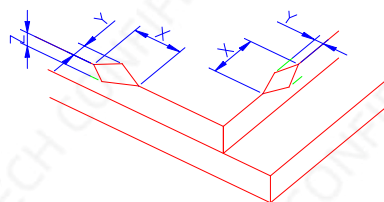
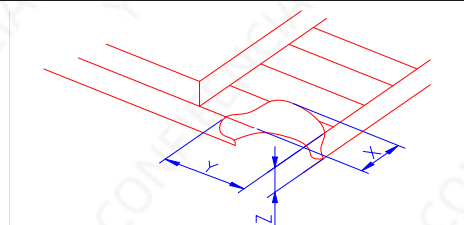
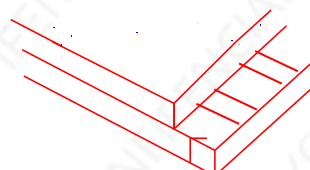
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. etc...	Major
2	Missing	Missing components and etc...	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed, deformation and etc...	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Spot/Line defect	Light dot, Dim spot, (Note1) Polarizer Air Bubble, Polarizer accidented spot and etc...	
6	Soldering appearance	Good soldering , Peeling off is not allowed and etc...	
7	LCD/Polarizer	Black/White spot/line, scratch, crack, etc.	

Note1: a) Light dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

b) Dim dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.



7.1.4 Criteria (Visual)

Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken NOTE: X: Length Y: Width Z: Height L: Length of IT O, T: Height of LCD	(1) The edge of LCD broken	 <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr></table>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
	X	Y	Z					
	≤3.0mm	<Inner border line of the seal	≤T					
(2)LCD corner broken	 <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table>	X	Y	Z	≤3.0mm	≤L	≤T	
X	Y	Z						
≤3.0mm	≤L	≤T						
(3) LCD crack	 Crack Not allowed							



Spot defect

X

$$\Phi = (X + Y) / 2$$

① light dot (black/white spot , pinhole, stain, etc.)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.15$	Ignore	Ignore	
$0.15 < \Phi \leq 0.25$	3(distance $\geq 10\text{mm}$)		
$0.25 < \Phi \leq 0.4$	2(distance $\geq 10\text{mm}$)		
$\Phi > 0.4$	0		

② Dim spot (light leakage、dent、dark spot, etc)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.15$	Ignore	Ignore	
$0.15 < \Phi \leq 0.25$	3(distance $\geq 10\text{mm}$)		
$0.25 < \Phi \leq 0.4$	2(distance $\geq 10\text{mm}$)		
$\Phi > 0.4$	0		

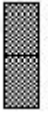
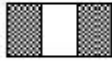
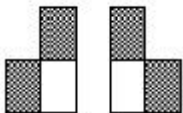
③ Polarizer accidented spot

Zone Size (mm)	Acceptable Qty			
	A	B	C	
$\Phi \leq 0.2$	Ignore		Ignore	
$0.2 < \Phi \leq 0.5$	2(distance $\geq 10\text{mm}$)			
$\Phi > 0.5$	0			

④ Polarizer Bubble

Zone Size (mm)	Acceptable Qty			
	A	B	C	
$\Phi \leq 0.2$	Ignore		Ignore	
$0.2 < \Phi \leq 0.4$	2(distance $\geq 10\text{mm}$)			
$0.4 < \Phi \leq 0.5$	1			
$\Phi > 0.5$	0			



3.0	LCD Pixel defect	Pixel bad points <table data-bbox="539 309 1497 1059"> <tr> <th data-bbox="539 309 730 365">Item</th><th data-bbox="730 309 1241 365">Zone A</th><th data-bbox="1241 309 1497 365">Acceptable Qt</th></tr> <tr> <td data-bbox="539 365 730 521" rowspan="3">Bright dot</td><td data-bbox="730 365 1241 421">Random</td><td data-bbox="1241 365 1497 421">$N \leq 2$</td></tr> <tr> <td data-bbox="730 421 1241 477">2 dots adjacent</td><td data-bbox="1241 421 1497 477">$N \leq 0$</td></tr> <tr> <td data-bbox="730 477 1241 521">3 dots adjacent</td><td data-bbox="1241 477 1497 521">$N \leq 0$</td></tr> <tr> <td data-bbox="539 521 730 689" rowspan="3">Dark dot</td><td data-bbox="730 521 1241 577">Random</td><td data-bbox="1241 521 1497 577">$N \leq 3$</td></tr> <tr> <td data-bbox="730 577 1241 633">2 dots adjacent</td><td data-bbox="1241 577 1497 633">$N \leq 0$</td></tr> <tr> <td data-bbox="730 633 1241 689">3 dots adjacent</td><td data-bbox="1241 633 1497 689">$N \leq 0$</td></tr> <tr> <td data-bbox="539 689 730 1003">Distance</td><td data-bbox="730 689 1241 1003"> 1. Minimum Distance Between Bright dots. 2. Minimum Distance Between dark dots 3. Minimum Distance Between dark and bright dot. </td><td data-bbox="1241 689 1497 1003">5mm</td></tr> <tr> <td colspan="2" data-bbox="539 1003 1241 1059">Total bright and dark dot</td><td data-bbox="1241 1003 1497 1059">$N \leq 4$</td></tr> </table> Note: A) Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern. B) Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture. C) 2 dot adjacent = 1 pair = 2 dots Picture:  2 dot adjacent  2 dot adjacent (vertical)  2 dot adjacent  2 dot adjacent (slant)	Item	Zone A	Acceptable Qt	Bright dot	Random	$N \leq 2$	2 dots adjacent	$N \leq 0$	3 dots adjacent	$N \leq 0$	Dark dot	Random	$N \leq 3$	2 dots adjacent	$N \leq 0$	3 dots adjacent	$N \leq 0$	Distance	1. Minimum Distance Between Bright dots. 2. Minimum Distance Between dark dots 3. Minimum Distance Between dark and bright dot.	5mm	Total bright and dark dot		$N \leq 4$
Item	Zone A	Acceptable Qt																							
Bright dot	Random	$N \leq 2$																							
	2 dots adjacent	$N \leq 0$																							
	3 dots adjacent	$N \leq 0$																							
Dark dot	Random	$N \leq 3$																							
	2 dots adjacent	$N \leq 0$																							
	3 dots adjacent	$N \leq 0$																							
Distance	1. Minimum Distance Between Bright dots. 2. Minimum Distance Between dark dots 3. Minimum Distance Between dark and bright dot.	5mm																							
Total bright and dark dot		$N \leq 4$																							



4.0	Line defect (LCD /Polarizer backlight black/white line, scratch, stain)																											
																												
	W: width, L : length																											
	N : Count																											
		<table><tr><th rowspan="2">Width(mm)</th><th rowspan="2">Length(m)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>$\Phi \leq 0.05$</td><td>Ignore</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr><tr><td>$0.05 < W \leq 0.06$</td><td>$L \leq 5.0$</td><td colspan="2">$N \leq 3$</td></tr><tr><td>$0.06 < W \leq 0.08$</td><td>$L \leq 4.0$</td><td colspan="2">$N \leq 2$</td></tr><tr><td>$W > 0.08$</td><td colspan="4">Define as spot defect</td></tr></table>	Width(mm)	Length(m)	Acceptable Qty			A	B	C	$\Phi \leq 0.05$	Ignore	Ignore		Ignore	$0.05 < W \leq 0.06$	$L \leq 5.0$	$N \leq 3$		$0.06 < W \leq 0.08$	$L \leq 4.0$	$N \leq 2$		$W > 0.08$	Define as spot defect			
Width(mm)	Length(m)	Acceptable Qty																										
		A	B	C																								
$\Phi \leq 0.05$	Ignore	Ignore		Ignore																								
$0.05 < W \leq 0.06$	$L \leq 5.0$	$N \leq 3$																										
$0.06 < W \leq 0.08$	$L \leq 4.0$	$N \leq 2$																										
$W > 0.08$	Define as spot defect																											
5.0	Electronic Components SMT.	Not allow missing parts, solderless connection, cold solder joint, mismatch, The positive and negative polarity opposite																										
6.0	Display color& Brightness.	1. Color: Measuring the color coordinates, The measurement standard according to the datasheet or samples. 2. Brightness: Measuring the brightness of White screen, The measurement standard according to the datasheet or Samples.																										
7.0	LCD Mura/Waving/ Hot spot	Not visible through 5% ND filter in 50% gray or judge by limit sample if necessary.																										

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed



8. Reliability Test Result

Item	Condition	Inspection after test
High Temperature Operating	85°C,96H	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Non-display; 3.Missing segments/line; 4.Glass crack; 5.Current IDD is twice higher than initial value.
Low Temperature Operating	-30°C, 96HR	
High Temperature Storage	85°C, 96HR	
Low Temperature Storage	-30°C, 96HR	
High Temperature & High Humidity Operating	+50°C, 80% RH ,96 hours.	
Thermal Shock (Non-operation)	-20°C,30 min ↔ +60°C,30 min, Change time:5min 20CYC.	
ESD test	C=150pF, R=330,5points/panel Air:±15KV, 5times; Contact:±15KV, 5 times; (Environment: 15°C~35°C, 30%~60%).	
Vibration (Non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total) (Package condition).	
Box Drop Test	1 Corner 3 Edges 6 faces,80cm(MEDIUM BOX)	

Remark:

- 1.The test samples should be applied to only one test item.
- 2.Sample size for each test item is 5~10pcs.
- 3.For Damp Proof Test, Pure water(Resistance > 10MΩ) should be used.
- 4.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.
- 5.Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.
6. The color fading mura of polarizing filter should not care.



9. Cautions and Handling Precautions

9.1 Handling and Operating the Module

- (1) When the module is assembled, it should be attached to the system firmly.
Do not warp or twist the module during assembly work.
- (2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
- (3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
- (4) Do not allow drops of water or chemicals to remain on the display surface.
If you have the droplets for a long time, staining and discoloration may occur.
- (5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
- (6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.
Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
- (7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.
- (8) Protect the module from static; it may cause damage to the CMOS ICs.
- (9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (10) Do not disassemble the module.
- (11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
- (12) Pins of I/F connector shall not be touched directly with bare hands.
- (13) Do not connect, disconnect the module in the "Power ON" condition.
- (14) Power supply should always be turned on/off by the item 6.1 Power On Sequence & 6.2 Power Off Sequence

9.2 Storage and Transportation.

- (1) Do not leave the panel in high temperature, and high humidity for a long time.
It is highly recommended to store the module with temperature from 0 to 35 °C and relative humidity of less than 70%
- (2) Do not store the TFT-LCD module in direct sunlight.
- (3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
- (4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.
In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.
- (5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.