Thin Film Transistor LCD MODULE
MODEL: AWK-800480T50PC35
Customer's No.:

Acceptance

10-1 Floor, No. 192, Tahtung Road,
Sec. 3, Hsi-Chih Dist,
New Taipei City, Taiwan

Approved and Checked by

Approved by	Checked by		Made by
華叡 2023/10/04 NICK	華叡 2023/10/04 JOE		華叡 2023/10/04 TOM

Revision Record

Rev No.	Rev Date	Contents	Note
A	2023/10/04	New issue.	

Table of Contents

1. Scope

This specification defines general provisions as well as inspection standards for TFT module supplied by ACROWISE electronics. If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution

2. General Information

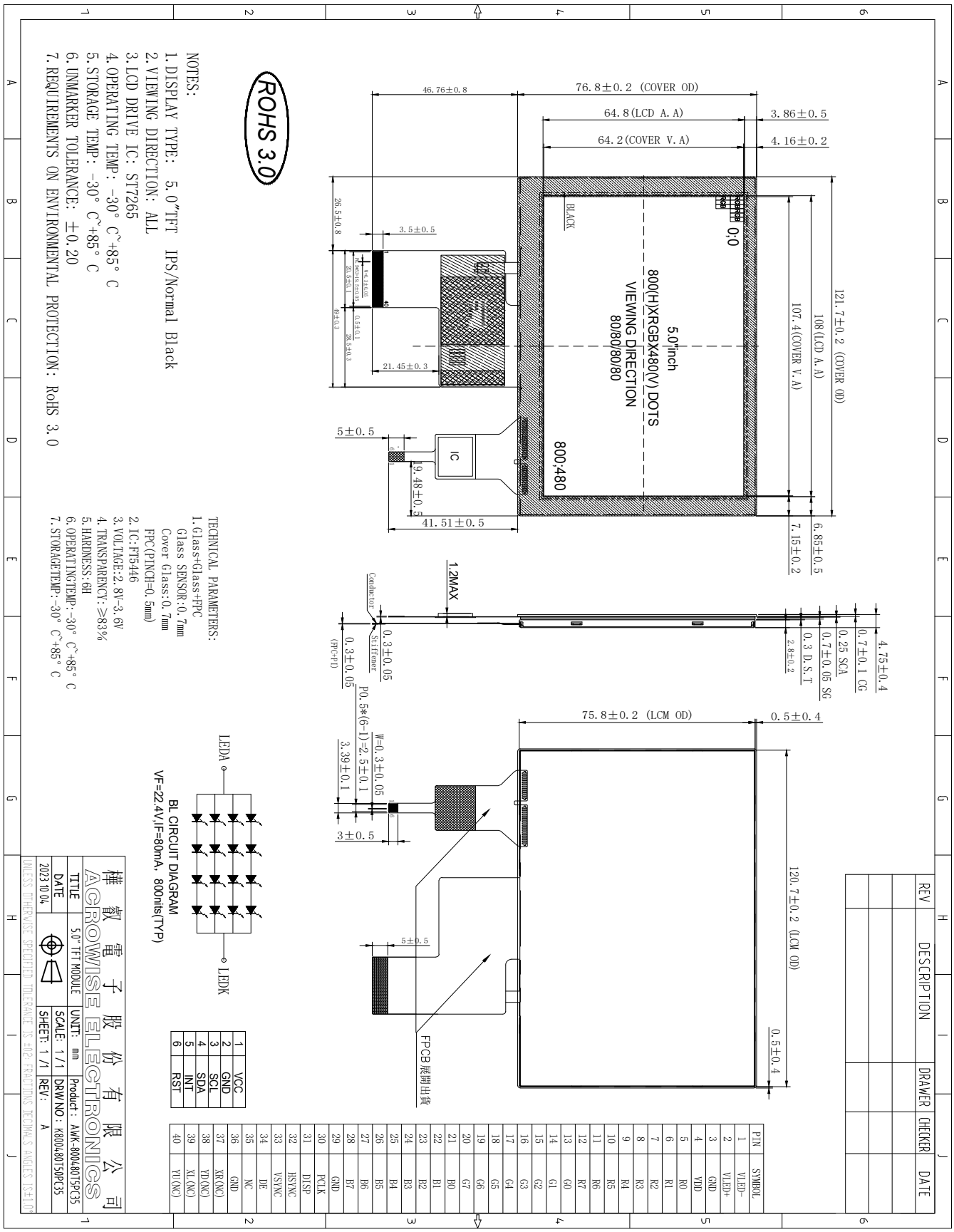
TFT

ITEM	STANDARD VALUES	UNITS
LCD type	5.0"TFT	--
Dot arrangement	800 (RGB)×480	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally Black IPS	-
Eyes Viewing Direction	80/80/80/80	
Driver IC	ST7265	--
Module size	121.7(W)×76.8(H)×4.75(T)	mm
Active area	108.0(W)×64.80(H)	mm
Dot pitch	0.135(W)×0.135(H)	mm
Interface	24-bit Parallel RGB Interface	--
Operating temperature	-30 ~ +85	°C
Storage temperature	-30 ~ +85	°C
Back Light	16 White LEDS	--

CTP

Item	Standard Values	Units
CTP type	Glass + Glass + FPC	--
CTP Driver IC	FT5446	--
Surface hardness	6	H
Transmittance	≥83	%
Operation Voltage	2.8 - 3.6	V
CTP size	121.70 (W)×76.80 (H)×1.95(T)	mm
LENS Viewing area	107.4(W)×64.2(H)	mm
CTP Interface	I²C	-
Pointing Stick	5	-

3. External Dimensions



4. Interface Description

PIN NO.	PIN NAME	DESCRIPTION
1	VLED-	LED backlight (Cathode).
2	VLED+	LED backlight (Anode).
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	PCLK	Clock
31	DISP	Display on/off
32	HSYNC	Horizontal sync input in RGB mode.
33	VSYNC	Vertical sync input in RGB mode.
34	DE	Data enable input. Active high to enable the input data bus.
35	NC	NC
36	GND	Ground.
37	NC	NC
38	NC	NC
39	NC	NC
40	NC	NC

CTP

Pin	Symbol	Description
1	VCC	Digital Power.
2	GND	Power ground
3	SCL	I²C_clock.
4	SDA	I²C_date.
5	INT	Interruption signal.
6	RST	Rest pin.Active low to enter reset state.

5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Power supply	VDD	-0.3	4.0	V
CTP Power supply	VCC	-0.3	3.6	V
Input Voltage	Vin	-0.3	VDD +0.3	V
Operating Temperature	TOP	-30	85	°C
Storage Temperature	TST	-30	85	°C
Storage Humidity	HD	20	90	%RH

6. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power supply	VDD	3.1	3.3	3.6	V	-
Power supply current	IVDD	TBD	TBD	TBD	mA	-
CTP Power supply	VCC	2.8	3.3	3.6	V	-
Input High Voltage	V_{IH}	0.7VDD	-	VDD	V	-
Input Low Voltage	V_{IL}	GND	-	0.3 VDD	V	-
Output High Voltage	V_{OH}	VDD-0.4	-	VDD	V	-
Output Low Voltage	V_{OL}	GND	-	GND+0.4	V	-
I/O Leak Current	ILI	-1	-	1	uA	-

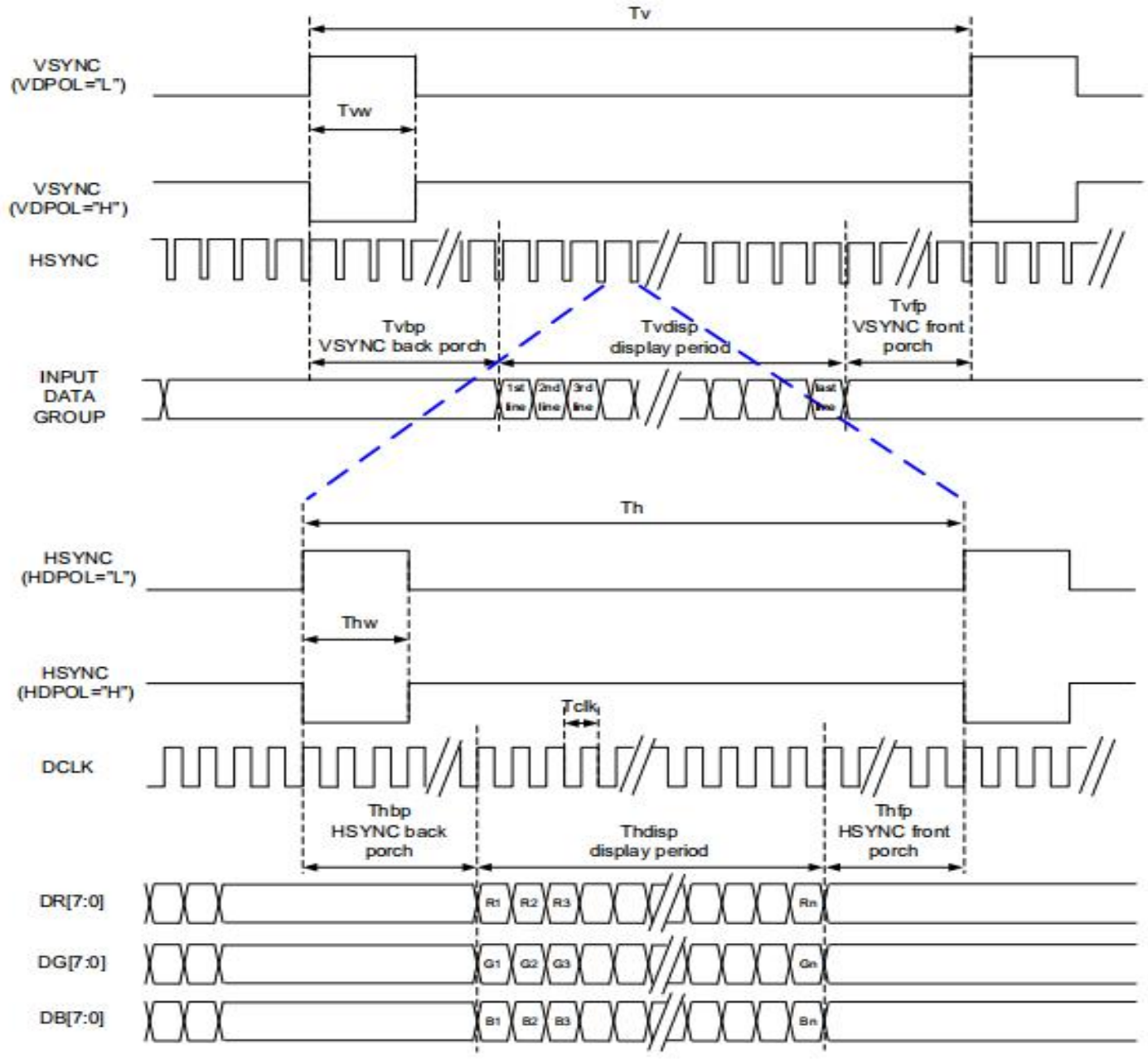
7. Timing Characteristics

7.1. RGB Interface

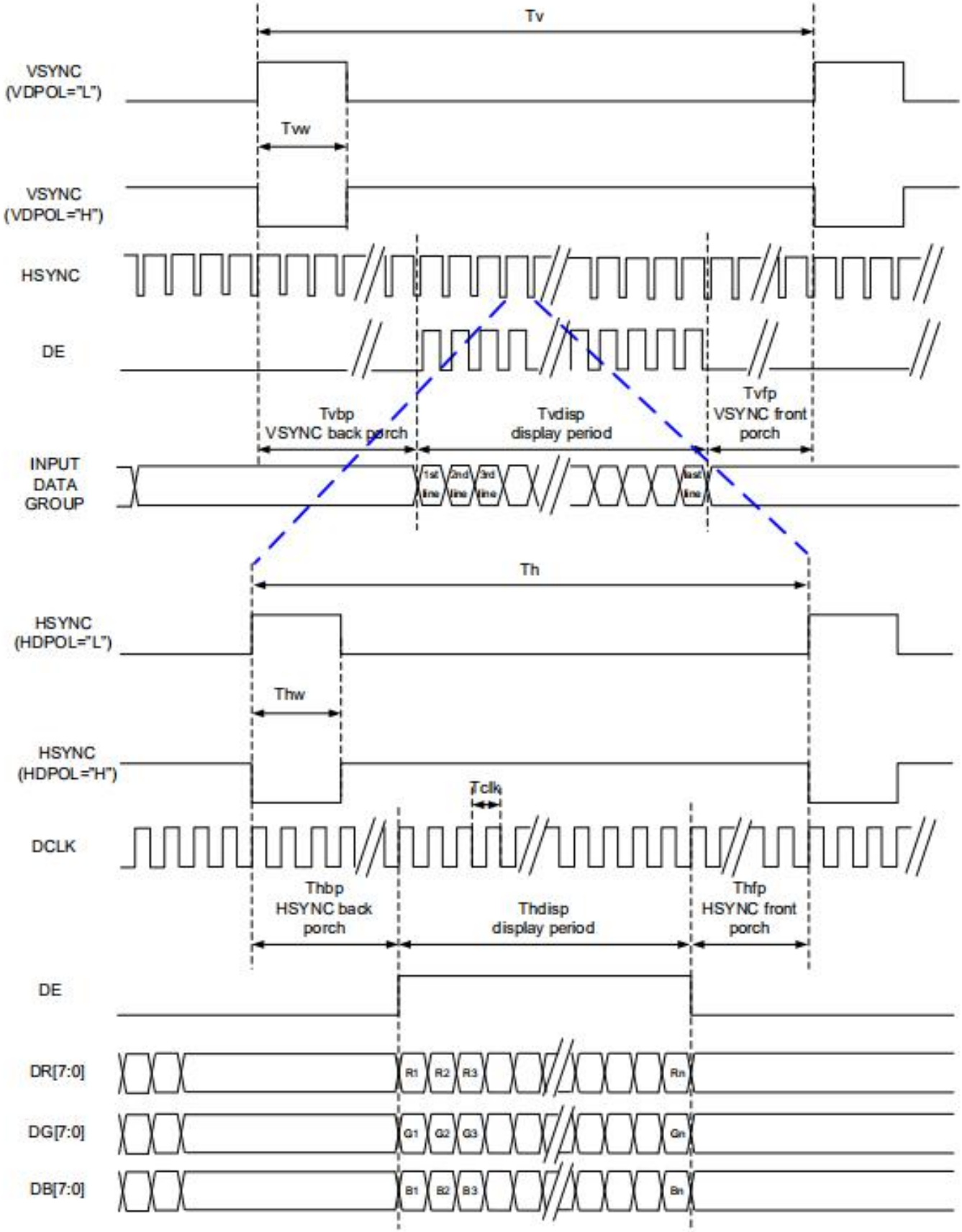
RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

Note: "Input" means these signals are driven by host side.

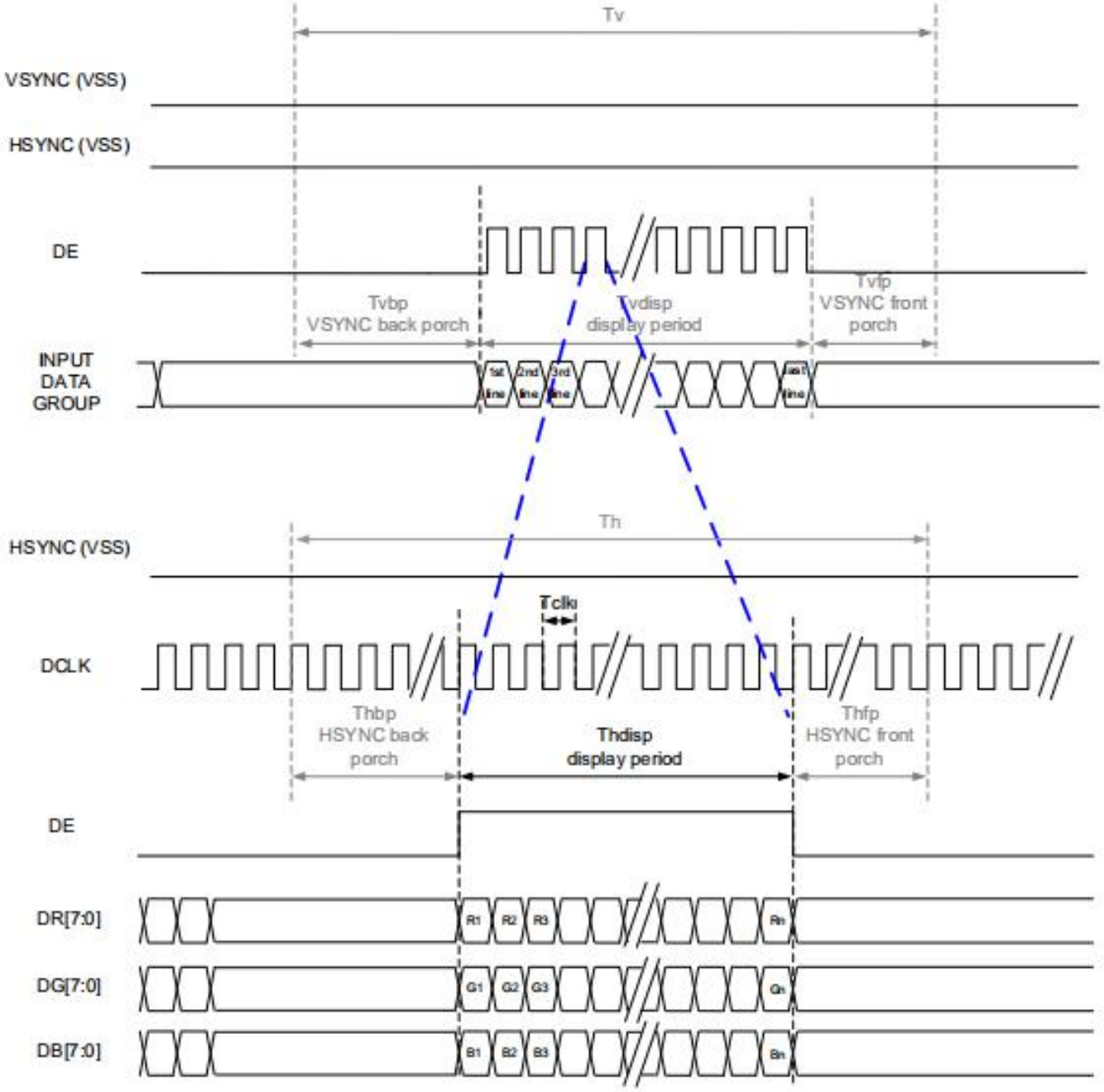
SYNC Mode



SYNC-DE Mode


Tv
VSYNC (VDPOL="L")
Tvw
VSYNC (VDPOL="H")
HSYNC
DE
Tvbp VSYNC back porch
Tvdisp display period
Tvfp VSYNC front porch
INPUT DATA GROUP
1st line
2nd line
3rd line
last line
Th
HSYNC (HDPOL="L")
Thw
HSYNC (HDPOL="H")
Tclk
DCLK
Thbp HSYNC back porch
Thdisp display period
Thfp HSYNC front porch
DE
DR[7:0]
R1
R2
R3
Rn
DG[7:0]
G1
G2
G3
Gn
DB[7:0]
B1
B2
B3
Bn

DE Mode


Tv
VSYNC (VSS)
HSYNC (VSS)
DE
Tvbp
VSYNC back porch
Tvdisp
display period
Tvfp
VSYNC front porch
INPUT
DATA
GROUP
1st line
2nd line
3rd line
last line
Th
HSYNC (VSS)
Tclki
DCLK
Thbp
HSYNC back porch
Thdisp
display period
Thfp
HSYNC front porch
DE
DR[7:0]
R1
R2
R3
Rn
DG[7:0]
G1
G2
G3
Gn
DB[7:0]
B1
B2
B3
Bn

7.2. Parallel 24-bit RGB Input Timing Table

Parallel 24-bit RGB Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C).

Parallel 24-bit RGB Interface Timing Table							
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	23	25	27	MHz	.
HSYNC	Period Time	Th	808	816	848	DCLK	
	Display Period	Thdisp		800		DCLK	
	Back Porch	Thbp	4	8	24	DCLK	
	Front Porch	Thfp	4	8	24	DCLK	
	Pulse Width	Thw	2	4	8	DCLK	
VSYNC	Period Time	Tv	496	512	528	HSYNC	
	Display Period	Tvdisp		480		HSYNC	
	Back Porch	Tvbp	8	16	24	HSYNC	
	Front Porch	Tvfp	8	16	24	HSYNC	
	Pulse Width	Tvw	2	4	8	HSYNC	

Note: 1. The minimum blanking time depends on the GIP timing of the panel specification.

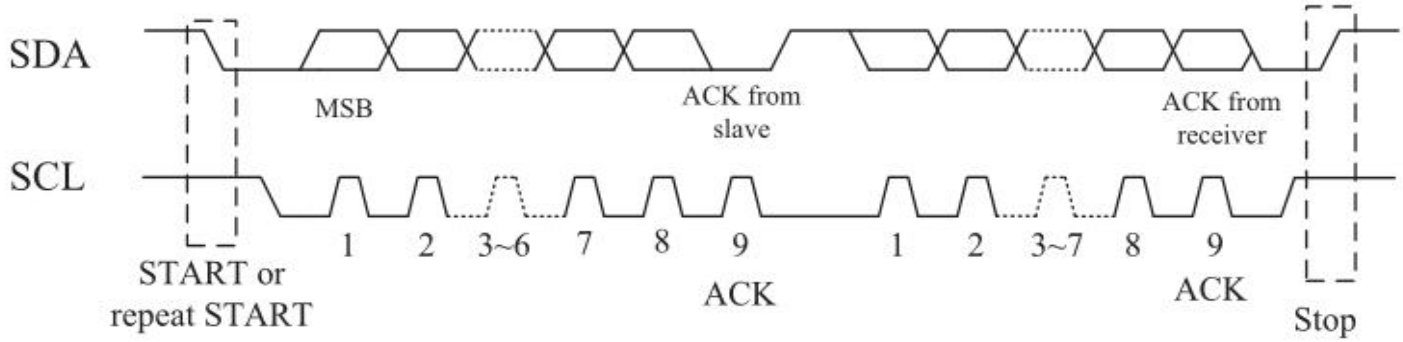
2. To ensure the compatibility of different panels, it is recommended to use the typical setting.

3. It is necessary to keep Tvbp =16 and Thbp =8 in sync mode. DE mode is unnecessary to keep it.

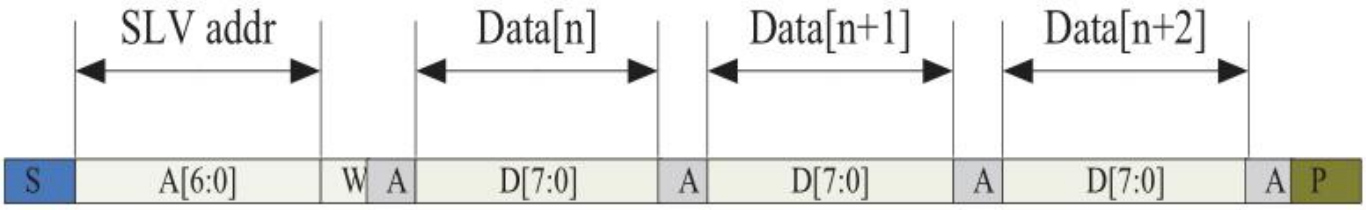
4. The maximum DCLK Frequency is 27MHz. If the case needs faster DCLK, please contact Sitronix.

7.3. CTP Timing

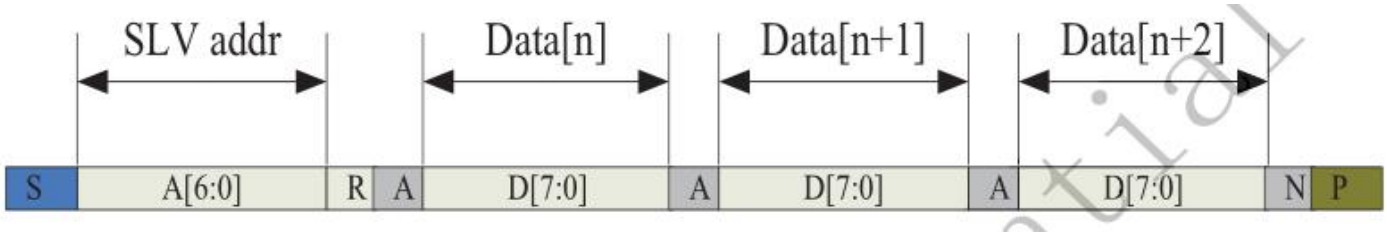
7.3.1 Serial Interface



I²C serial data transfer format



I²C master write, slave read



I²C master read, slave write

Mnemonics description

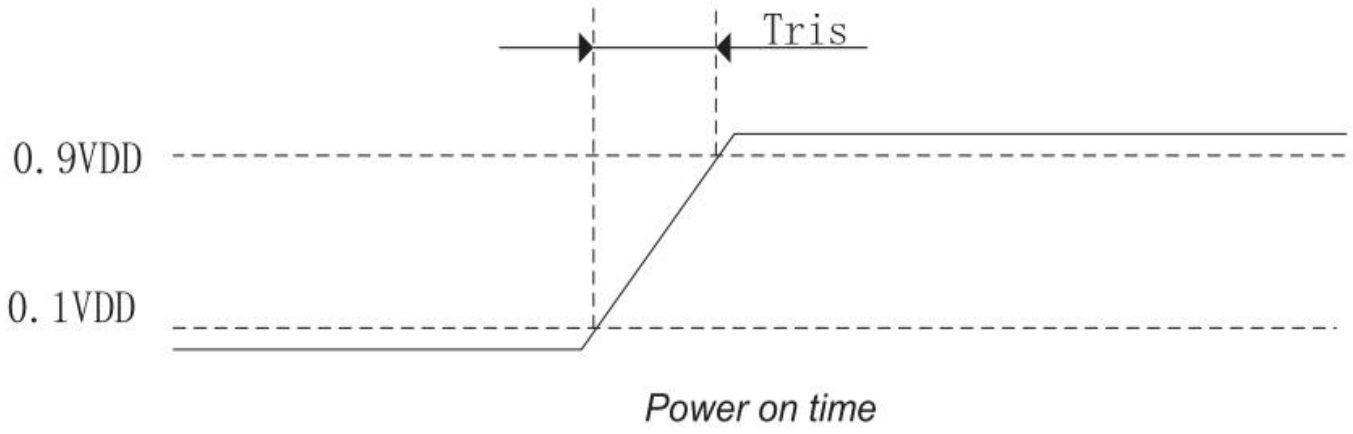
Mnemonics	Description
S	I2C Start or I2C Restart
A[6:0]	Slave address
R/ W	READ/WRITE bit, '1' for read, '0'for write
A(N)	ACK(NACK) bit
P	STOP: the indication of the end of a packet (if this bit is missing, S will indicate the end of the current packet and the beginning of the next packet)

Timing characteristics

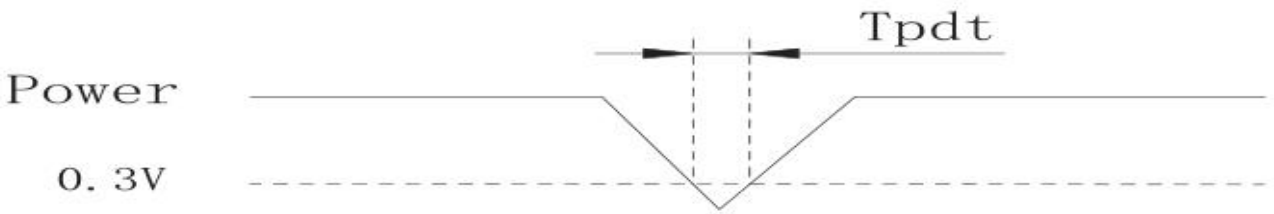
Parameter	Min	Max	Unit
SCL frequency	0	400	KHz
Bus free time between a STOP and START condition	1.3		us
Hold time (repeated) START condition	0.6		us
Data setup time	100		ns
Setup time for a repeated START condition	0.6		us
Setup Time for STOP condition	0.6		us

7.3.2 POWER NO /Reset Sequence

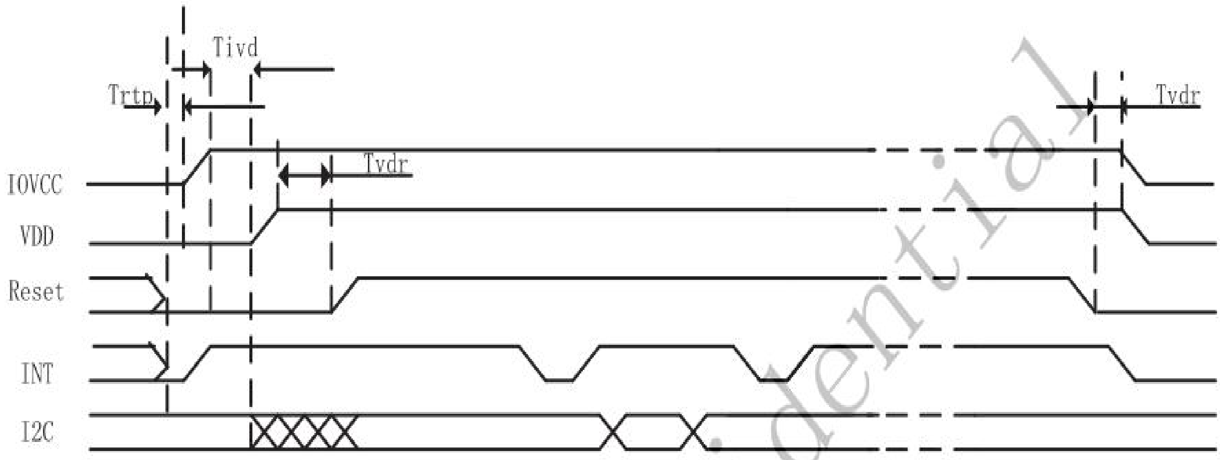
Reset should be pulled down to be low before powering on and powering down. I2C shouldn't be used by other devices during Reset time after VDD powering on (Trtp). INT signal will be sent to the host after initializing all parameters and then start to report points to the host. If Power is down, the voltage of supply must be below 0.3V and Tpdt is more than 1ms.



Power on time

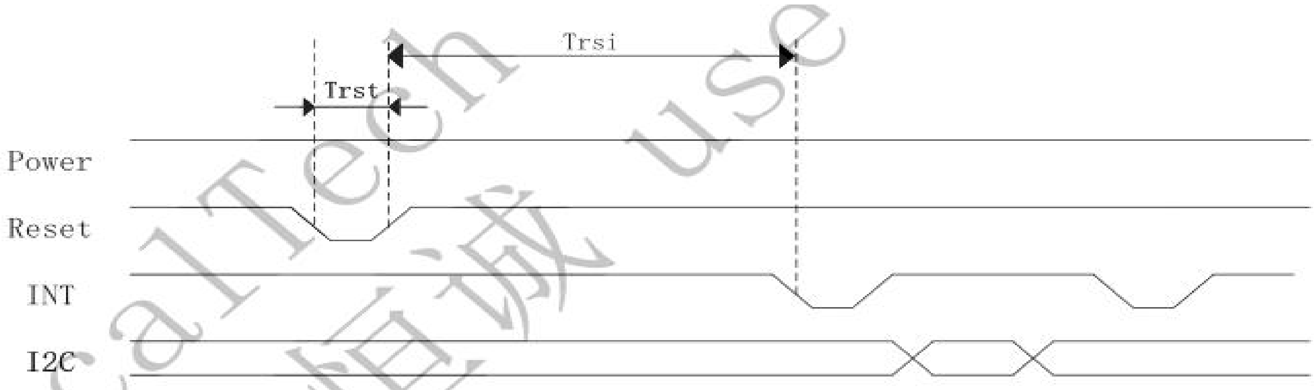


Power Cycle requirement



Power on Sequence

Reset time must be enough to guarantee reliable reset, the time of starting to report point after resetting approach to the time of starting to report point after powering on.



Reset Sequence

Power on/Reset Sequence Parameters

Parameter	Description	Min	Max	Units
Tris	Rise time from 0.1VDD to 0.9VDD	--	5	ms
Tpdt	Time of the voltage of supply being below 0.3V	5	--	ms
Trtp	Time of resetting to be low before powering on	100	--	μs
Tivd	Delay time of VDD powering on after IOVCC	10		μs
Tvdr	Reset time after VDD powering on	1	--	ms
Trsi	Time of starting to report point after resetting	--	200	ms
Trst	Reset time	1	--	ms

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10-1 Floor, No. 192, Tahtung Road, Sec. 3, Hsi-Chih Dist, New Taipei City, Taiwan
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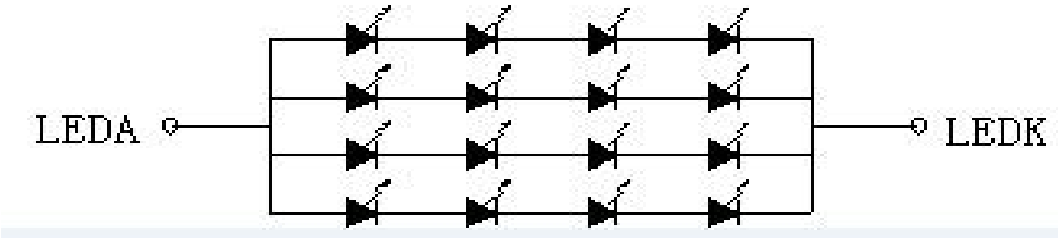
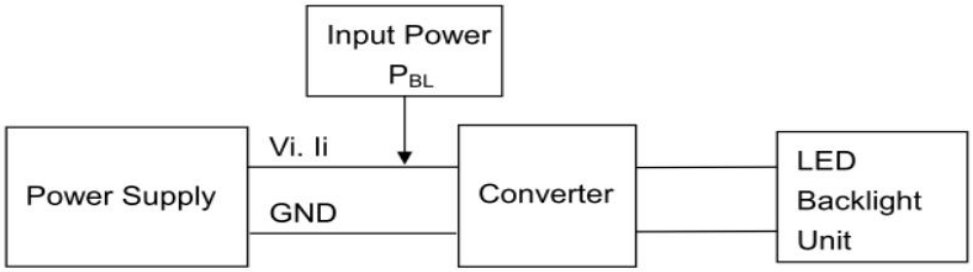
8. Backlight Characteristic



Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	22	24	26	V	If=80mA
Supply Current	If	-	80	-	mA	-
Life Time	-	-	50000	-	Hr	If=80mA
Backlight Color	White					

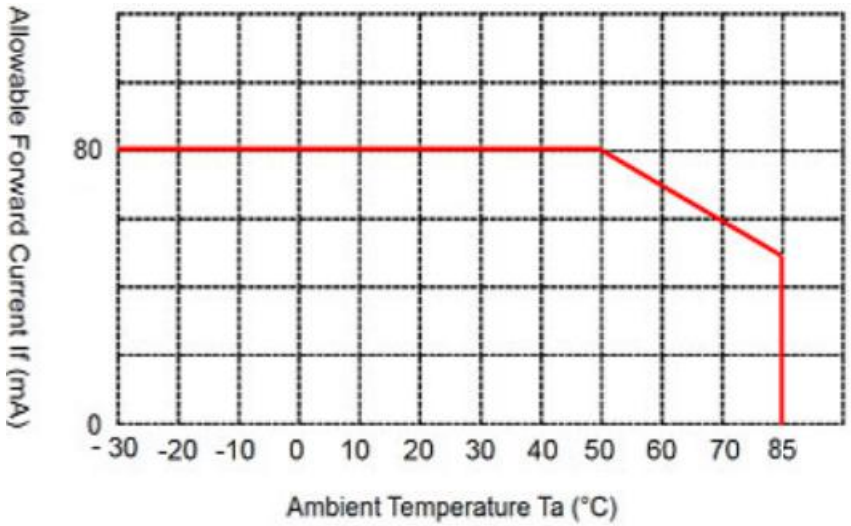
Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and If =80mA.

Note 2: LED current is measured by utilizing a high frequency current meter as shown below:



Note 3: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and If = 80mA. The LED lifetime could be decreased if operating If is larger than 80mA.

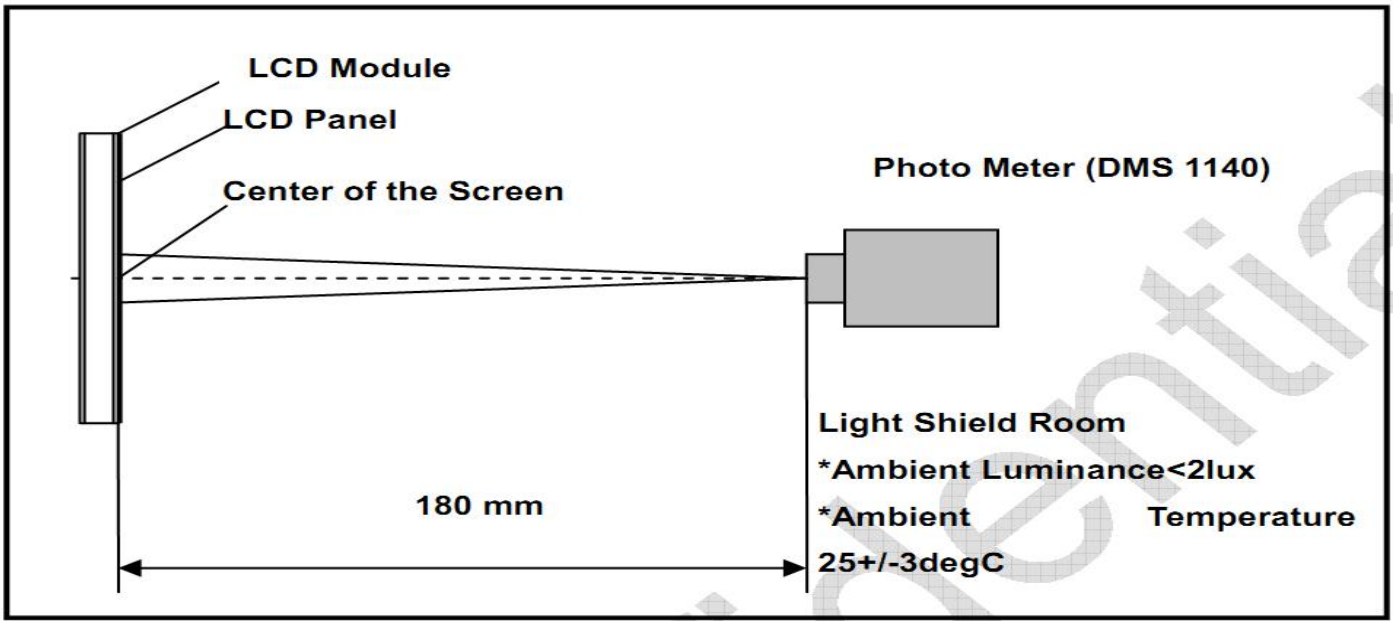
Note 4: LED light bar circuit:



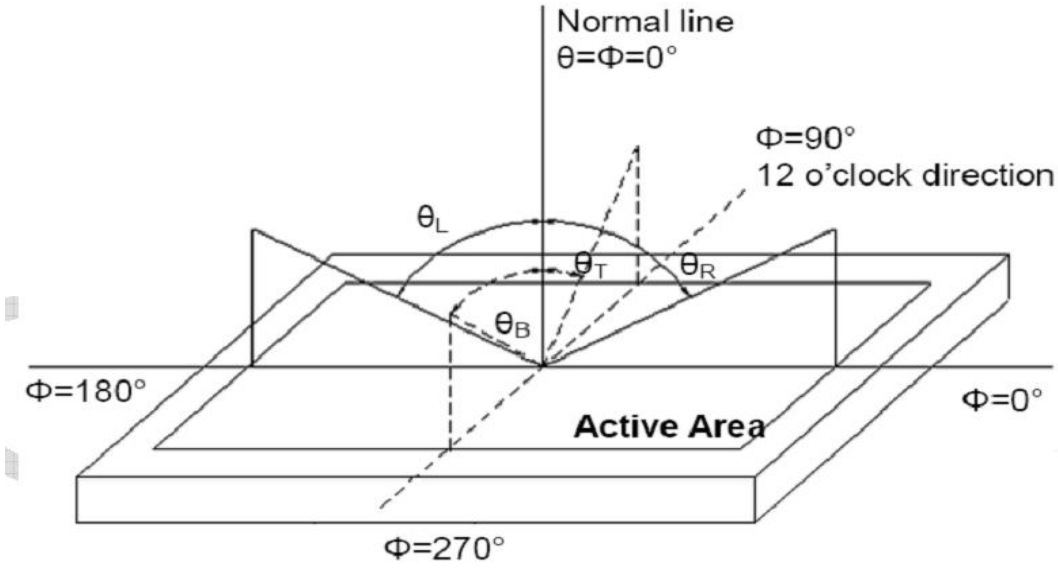
9. Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θL	-	80	-	degree	(1),(2),(6)
		θR	-	80	-		
	Vertical	θT	-	80	-		
		θB	-	80	-		
Luminous Intensity for LCM	-		750	800	-	cd/m2	If =80mA.
Uniformity for LCM	-		80	-	-	%	If =80mA.
Contrast Ratio	Center		1000	1200	-	-	(1),(3),(6)
Response Time	Rising + Falling		-	30	40	ms	(1),(4),(6)
CF Color Chromaticity (CIE1931)	White x		TBD	TBD	TBD	-	(1), (6)
	White y		TBD	TBD	TBD	-	
	Red x		TBD	TBD	TBD	-	
	Red y		TBD	TBD	TBD	-	
	Green x		TBD	TBD	TBD	-	
	Green y		TBD	TBD	TBD	-	
	Blue x		TBD	TBD	TBD	-	
	Blue y		TBD	TBD	TBD	-	
NTSC Ratio	S		-	50	-	%	

Note (1) Measurement Setup: The LCD module should be stabilized at given temp. 25°C for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.



Note (2) Definition of Viewing Angle



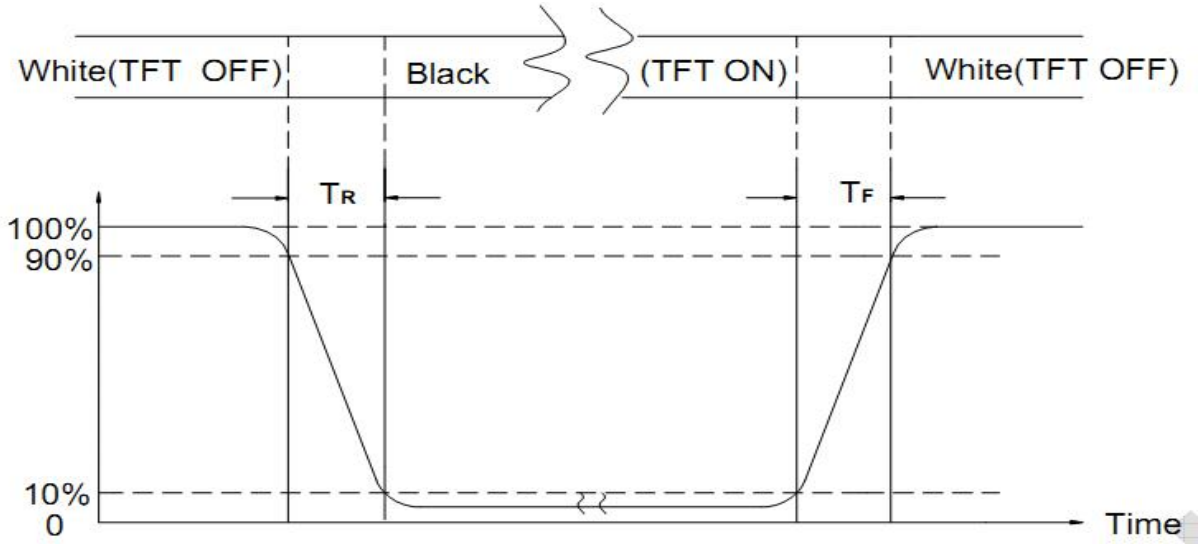
Note (3) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L255 / L0

L255: Luminance of gray level 255, L0: Luminance of gray level 0

Note (4) Definition of response time



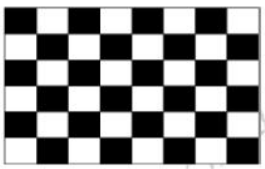
Note (5) Definition of Transmittance (Module is without signal input)

Transmittance = Center Luminance of LCD / Center Luminance of Back Light x 100%

Note (6) Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD.

10. Reliability Test Conditions and Methods

No.	Test Items	Test Condition	Inspection After Test
1	High Temperature Storage	85°C±2°C×96Hours	Inspection after 2~4hours storage at room temperature, the samples should be free from defects: 1, Air bubble in the LCD. 2, Seal leak. 3, Non-display. 4, Missing segments. 5, Glass crack. 6, Current IDD is twice higher than initial value. 7, The surface shall be free from damage. 8, The electric characteristic requirements shall be satisfied.
2	Low Temperature Storage	-30°C±2°C×96Hours	
3	High Temperature Operating	85°C±2°C×96Hours	
4	Low Temperature Operating	-30°C±2°C×96Hours	
5	Temperature Cycle(Storage)	-20°C (30min) ⟺ 25°C (5min) ⟺ 70°C (30min) 1cycle Total 10cycle	
6	Damp Proof Test (Storage)	50°C±5°C×90%RH×96Hours	
7	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5mm X,Y,Z direction for total 3hours (packing condition test will be tested by a carton)	
8	Drooping Test	Drop to the ground from 1M height one time every side of carton. (packing condition test will be tested by a carton)	
9	ESD Test	Voltage:±8KV,R:330Ω,C:150PF,Air Mode,10times	
10	Image Sticking Test	25 ± 2℃ Operation with test pattern sustained for 2 hrs, then change to gray pattern immediately. After 5 mins, the mura must be disappeared completely  Image Sticking –pattern  Mid-Gray pattern	

REMARK:
1, The Test samples should be applied to only one test item.
2, Sample side 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 judge as a good part.
5, EL evaluation should be accepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
6, Failure Judgment Criterion: Basic Specification Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

11. Inspection Standard

11.1 Scope

Specifications contain

11.1.1 Display Quality Evaluation

11.1.2 Mechanics Specification

11.2 Sampling Plan

Unless there is other agreement, the sampling plan for incoming inspection shall follow

MIL-STD-105E.

11.2.1 Lot size: Quantity per shipment as one lot (different model as different lot).

11.2.2 Sampling type: Normal inspection, single sampling.

11.2.3 Sampling level: Level II.

11.2.4 AQL: Acceptable Quality Level

Major defect: AQL=0.65

Minor defect: AQL=1.5

11.3 Panel Inspection Condition

11.3.1 Environment:

Room Temperature: 25±5°C.

Humidity: 65±5% RH.

Illumination: 300 ~ 700 Lux.

11.3.2 Inspection Distance:

35±5 cm

11.3.3 Inspection Angle:

The vision of inspector should be perpendicular to the surface of the Module.

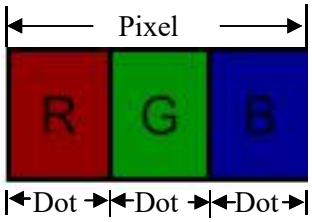
11.3.4 Inspection time：

Perceptibility Test Time: 20 seconds max.

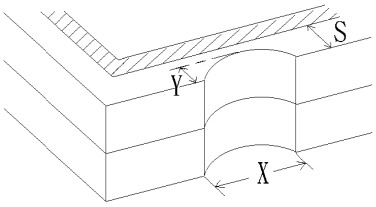
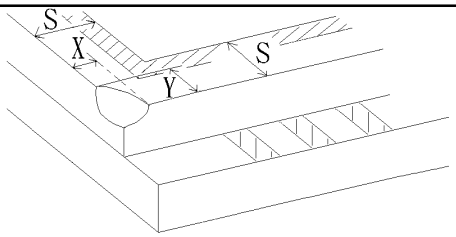
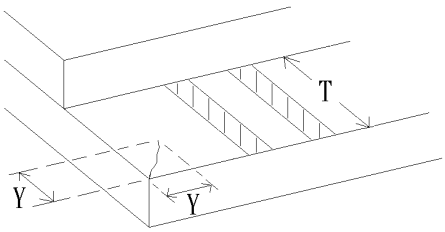
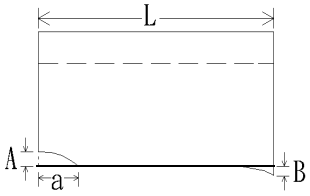
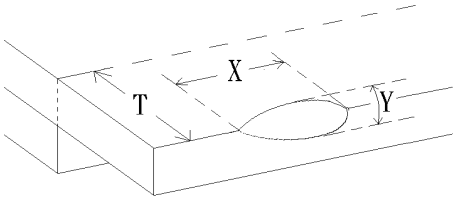
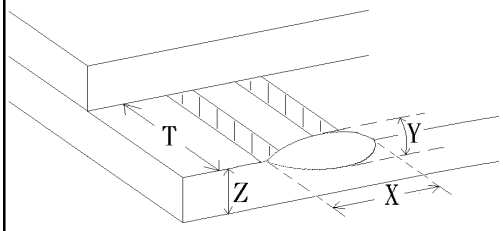
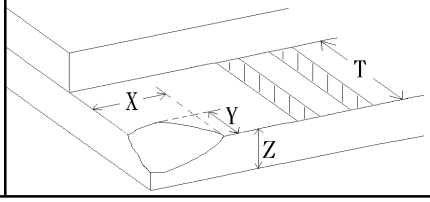
11.4 Inspection Plan

Class	Item	Judgment	Class
Packing & Indicate	1. Outside and inside package.	"MODEL NO.", "LOT NO." and "QUANTITY" should indicate on the package.	Minor
	2. Model mixed and quantity.	Other model mixed Quantity short or over	Major
	3. Product indication.	"MODEL NO." should indicate on the product.	Major
Assembly	4. Dimension, LCD glass scratch and scribe defect.	According to specification or drawing.	Major
Appearance	5. Viewing area.	Polarizer edge or LCD's sealing line is visible in the viewing area…….Rejected.	Minor
	6. Blemish, black spot, white spot in the LCD and LCD glass cracks.	According to standard of visual inspection.(inside viewing area)	Minor
	7. Blemish, black spot, white spot and scratch on the polarizer.	According to standard of visual inspection.(inside viewing area)	Minor
	8. Bubble in polarizer.	According to standard of visual inspection.(inside viewing area)	Minor
	9. LCD's rainbow color.	Strong deviation color (or newton ring) of LCD…….....Rejected. Or according to limited sample.(if needed, and inside viewing area)	Minor
Electrical	10. Electrical and optical characteristics.(contrast Vop chromaticity….etc)	According to specification or drawing.(inside viewing area)	Major
	11. Missing line.	Missing dot line character	Major
	12.Short circuit. Wrong pattern display.	No display, wrong pattern display, current consumption. Out of specification .	Major
	13. Dot defect.(for color and TFT)	According to standard of visual Inspection.	Minor

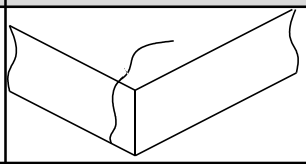
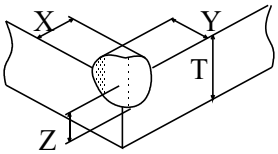
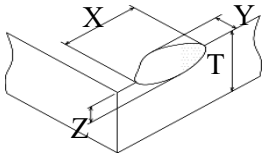
11.5 Standard Of Visual Inspection

<table>
<tr><th>NO.</th><th>CLASS</th><th>ITEM</th><th>JUDGMENT</th></tr>
<tr><td>11.5.1</td><td>Minor</td><td>Black and white spot.
Foreign materiel.
Dust.
Blemish.
Scratch.</td><td>(A) Round type: Unit: mm
<table>
<tr><th>Diameter (mm.)</th><th>Acceptable Q'ty</th></tr>
<tr><td>Φ≦0.2</td><td>Disregard</td></tr>
<tr><td>0.2 < Φ≦0.30</td><td>1(Distance>5mm)</td></tr>
<tr><td>0.30 < Φ</td><td>0</td></tr>
</table>
Note: Φ = (length+width)/2
(B) Linear type: Unit: mm
<table>
<tr><th>Length</th><th>Width (mm.)</th><th>Acceptable Q'ty</th></tr>
<tr><td>--</td><td>W≦0.03</td><td>Disregard</td></tr>
<tr><td>L≦5.0</td><td>0.03 < W≦0.07</td><td>2(Distance>5mm)</td></tr>
<tr><td>--</td><td>0.07 < W</td><td>FOLLOW ROUND TYPE</td></tr>
</table></td></tr>
<tr><td>11.5.2</td><td>Minor</td><td>Dent on polarizer.</td><td>Unit: mm.
<table>
<tr><th>Diameter</th><th>Acceptable Q'ty</th></tr>
<tr><td>Φ≦0.2</td><td>Disregard</td></tr>
<tr><td>0.2 < Φ≦0.7</td><td>2(Distance>5mm)</td></tr>
<tr><td>0.7 < Φ</td><td>0</td></tr>
</table></td></tr>
<tr><td>11.5.3</td><td>Minor</td><td>Bubble in polarizer.</td><td>Unit: mm.
<table>
<tr><th>Diameter</th><th>Acceptable Q'ty</th></tr>
<tr><td>Φ≦0.2</td><td>Disregard</td></tr>
<tr><td>0.2 < Φ≦0.7</td><td>2(Distance>5mm)</td></tr>
<tr><td>0.7 < Φ</td><td>0</td></tr>
</table></td></tr>
<tr><td>11.5.4</td><td>Minor</td><td>Dot defect</td><td>
<table>
<tr><th>Items</th><th>Acceptable Q'ty</th></tr>
<tr><td>Bright dot</td><td>N ≦1</td></tr>
<tr><td>Dark dot</td><td>N ≦2</td></tr>
<tr><td>Total dot</td><td>N ≦3</td></tr>
</table>
Pixel define : 

Note1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.
Note 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.
Note 3: The bright dot defect must be visible through 2% ND filter
Note 4: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue pattern.</td></tr>
<tr><td>11.5.5</td><td>Minor</td><td>Mura</td><td>ND 5% (In 50% gray screen)</td></tr>
</table>

No.	Class	Item	Judgment
11.5.6	Minor	LCD glass chipping.	 Y>S Reject
11.5.7	Minor	LCD glass chipping.	 X or Y>S Reject
11.5.8	Major	LCD glass crack.	 Y>(1/2) T Reject
11.5.9	Major	LCD glass scribe defect.	 1. a>L/3, A>1.5mm Reject 2. B : According to dimension
11.5.10	Minor	LCD glass chipping. (on the terminal area)	 Φ = (x+y)/2>2.5mm Reject
11.5.11	Minor	LCD glass chipping. (on the terminal surface)	 Y>(1/3)T Reject
11.5.12	Minor	LCD glass chipping.	 Y>T Reject

11.6. Inspection Standard Of Touch Panel

No.	Class	Items		Judgment	
11.6.1	Major	Touch panel crack.			Reject
11.6.2	Minor	Touch panel chipping.	Corner.		X≦1mm, Y≦1mm, Z≦1/2T: Accept 1) Corner fragment in the golden finger that seriously affects the product function is regarded as a defect. 2) Corner fragment in the circuit that seriously affects product function is regarded as a defect.
			Edge.		X≦1mm, Y≦1mm, Z≦1/2T: Accept 1) Side fragment in the golden finger that seriously affects the product function is regarded as a defect. 2) Side fragment in the circuit that seriously affects product function is regarded as a defect.
11.6.3	Minor	Scratch. Dust and foreign materiel. (linear type)		W≦0.03	Accept
				0.03mm<W≦0.07mm, L≦5.0mm (Distance>5mm)	Accept 2 ea Max.
				W>0.07mm	Reject
11.6.4	Minor	Scratch. Dust and foreign materiel (round type: φ = (length+width)/2)		Φ≦0.2mm	Accept
				0.2mm＜Φ≦0.25mm (Distance>5mm)	Accept 1 ea Max.
				Φ＞0.25mm	Reject
11.6.5	Minor	Touch panel dent / fish eyes.		Φ≦0.2mm	Accept
				0.2mm＜Φ≦0.5mm (Distance>5mm)	Accept 2 ea Max.
				Φ＞0.5mm	Reject
11.6.6	Minor	Touch panel air bubble.		Φ≦0.2mm	Accept
				0.2mm＜Φ≦0.5mm (Distance>5mm)	Accept 2 ea Max.
				Φ＞0.5mm	Reject
11.6.7	Minor	Touch panel printing area scratch.		W≦0.03mm	Accept
				0.03mm＜W≦0.05mm, L≦5.0mm (Distance>5mm)	Accept 2 ea Max.
				W＞0.05 (W>0.05 follow 11.6.4 round type)	Reject
11.6.8	Minor	Touch panel white haze mark / dust.		Can not be removed	Reject

12. Handling Precautions

12.1 Mounting Method

The LCD panel of ACROWISE TFT module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

12.2 Caution of LCD Handling And Cleaning

When cleaning the display surface, Use soft cloth with solvent

[Recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated:

- Soldering flux
- Chlorine (Cl) , Sulfur (S)

If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (CI), Sulfur (S) from customer, Responsibility is on customer.

12.3 Caution Against Static Charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to power or ground, do not input any signals before power is turned on, and ground your body, work/assembly areas, and assembly equipment to protect against static electricity.

12.4 Packing

- Module employs LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

12.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- Slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

  Usage under the maximum operating temperature, 50%Rh or less is required.

12.6 Storing

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it. And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.

  [It is recommended to store them as they have been contained in the inner container at the time of delivery from us

12.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

13. Precaution for Use

13.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

13.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to ACROWISE TFT , and some problem is arisen in this specification due to the change
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.