



深圳显昶光电科技有限公司

Shenzhen Xianyang Optoelectronic Technology Co., Ltd

PRODUCT SPECIFICATION

3.5" a-Si TFT LCD MODULE

MODEL: XY035CHN54V2-CMI-01A Ver:1.0

< ◇ > Preliminary Specification

< ◆ > Finally Specification

CUSTOMER'S APPROVAL	
CUSTOMER :	
SIGNATURE:	DATE:



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1. Record of Revision

Rev	Issued Date	Description	Editor

深圳显昶光电科技有限公司

Shenzhen Xianvang Optoelectronic Technology Co., Ltd

2 . General Specifications

Feature		Spec
Characteristics	Size	3.5inch
	Resolution	320(horizontal)*240(Vertical)
	Interface	24-bit RGB interface
	Connect type	connector
	Color Depth	16M
	Technology type	a-Si
	Display Spec. Pixel pitch (mm)	0.219x 0.219
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally White
	Driver IC	HX8238D
	Surface Treatment	HC
	Viewing Direction	6 0' CLOCK
Mechanical	LCM (W x H x D) (mm)	76.84*63.84*3.18
	Active Area(mm)	70.08 x 52.56
	Without touch panel	
	Weight (g)	TBD
	LED Numbers	6 LEDs



3 . Mechanical Drawing

1		2		3		由Autodesk教育版产品制作5		6		7		PIN SYMBOL	
												VBL-	
												2 VBL-	
												3 VBL+	
												4 VBL+	
												5 YU	
												6 XR	
												7 NC	
												8 RESET	
												9 CS	
												10 SCL	
												11 SDA	
												12 B0	
												13 B1	
												14 B2	
												15 B3	
												16 B4	
												17 B5	
												18 B6	
												19 B7	
												20 G0	
												21 G1	
												22 G2	
												23 G3	
												24 G4	
												25 G5	
												26 G6	
												27 G7	
												28 R0	
												29 R1	
												30 R2	
												1 R3	
												32 R4	
												33 R5	
												4 R6	
												35 R7	
												36 HSYNC	
												37 VSYNC	
												38 DOTCLK	

E		Display Type		TFT/AMOLED, White/TRANSMISSIVE	
Display Resolution		3.5" DOTS: 320 (R, G, B) * 240			
Viewing Angle		6.0° CLOCK			
LCD Controller/Driver		HX82380			
Logic Voltage		VCC=2.8V 10VCC=1.8V/2.8V			
LCD Driving Voltage		-----			
Operation Temperature		-20° C ~ 70° C			
Storage Temperature		-30° C ~ 80° C			
Backlight Speciality		White LED Backlight (6 CHIP-WHITE LED)			
Remark		TFT LCD+IC+HL+FFPC B/M NEED EXTENDED TO GLASS EDGE LCD TRANSMISSION RATE : 4MIN TOLERANCE UNLESS: ±0.1			

F		Display Type		TFT/AMOLED, White/TRANSMISSIVE	
Display Resolution		3.5" DOTS: 320 (R, G, B) * 240			
Viewing Angle		6.0° CLOCK			
LCD Controller/Driver		HX82380			
Logic Voltage		VCC=2.8V 10VCC=1.8V/2.8V			
LCD Driving Voltage		-----			
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G		Display Type		TFT/AMOLED, White/TRANSMISSIVE	
Display Resolution		3.5" DOTS: 320 (R, G, B) * 240			
Viewing Angle		6.0° CLOCK			
LCD Controller/Driver		HX82380			
Logic Voltage		VCC=2.8V 10VCC=1.8V/2.8V			
LCD Driving Voltage		-----			
Operation Temperature		-20° C ~ 70° C			
Storage Temperature		-30° C ~ 80° C			
Backlight Speciality		White LED Backlight (6 CHIP-WHITE LED)			
Remark		TFT LCD+IC+HL+FFPC B/M NEED EXTENDED TO GLASS EDGE LCD TRANSMISSION RATE : 4MIN TOLERANCE UNLESS: ±0.1			

H		Display Type		TFT/AMOLED, White/TRANSMISSIVE	
Display Resolution		3.5" DOTS: 320 (R, G, B) * 240			
Viewing Angle		6.0° CLOCK			
LCD Controller/Driver		HX82380			
Logic Voltage		VCC=2.8V 10VCC=1.8V/2.8V			
LCD Driving Voltage		-----			
Operation Temperature		-20° C ~ 70° C			
Storage Temperature		-30° C ~ 80° C			
Backlight Speciality		White LED Backlight (6 CHIP-WHITE LED)			
Remark		TFT LCD+IC+HL+FFPC B/M NEED EXTENDED TO GLASS EDGE LCD TRANSMISSION RATE : 4MIN TOLERANCE UNLESS: ±0.1			

I		Display Type		TFT/AMOLED, White/TRANSMISSIVE	
Display Resolution		3.5" DOTS: 320 (R, G, B) * 240			
Viewing Angle		6.0° CLOCK			
LCD Controller/Driver		HX82380			
Logic Voltage		VCC=2.8V 10VCC=1.8V/2.8V			
LCD Driving Voltage		-----			
Operation Temperature		-20° C ~ 70° C			
Storage Temperature		-30° C ~ 80° C			
Backlight Special					



4. Input/Output Terminals

Pin No.	Symbol	Description
1, 2	VBL-	Backlight LED Cathode
3, 4	VBL+	Backlight LED Anode.
5	YU	TP Pin
6	XR	TP Pin
7	NC	NC
8	RESET	Reset Signal pin ("Low" is enable)
9	CS	Chip select
10	SCL	Serial Clock.
11	SDA	Serial Data
12, 19	B0-B7	Data bus
20, 27	G0-G7	Data bus
28, 35	R0-R7	Data bus
36	HSYNC	Line Synchronous Signal
37	VSNC	Frame Synchronous Signal
38	DOTCLK	Dot-clock signal and oscillator source
39, 40	NC	NC
41-42	VCC	Power supply for logic operation
43	YD	TP Pin
44	XL	TP Pin
45, 51	NC	NC
52	DEN	Display enable signal
53, 54	GND	System Ground



5. Electrical specification

Item	Symbol	Specification			Unit
		Min.	Typ	Max.	
TFT gate on voltage	V_{GH}	-	+15	-	V
TFT gate off voltage	V_{GL}	-	-10	-	V
TFT common electrode voltage	V_{comH}	2.5	(3.6)	4.5	V
	V_{comL}	-3	(-2.4)	0	

Note: (1) Vcom must be adjusted to optimize display quality: cross talk, contrast ratio and etc.

(2) V_{GH} is TFT gate operating voltage

(3) V_{GL} is TFT gate operating voltage

(4) Environmental condition: $25 \pm 5^{\circ}\text{C}$

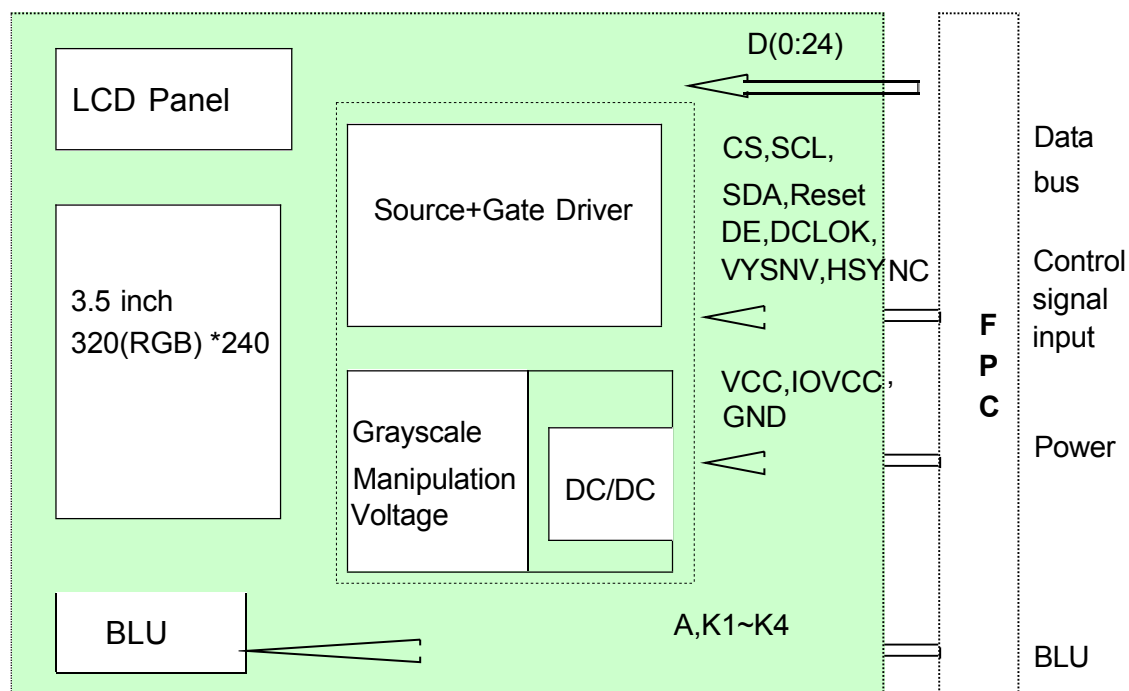
6. Electrical Characteristics

Table 5

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (analog)	VCI-GND		2.6	2.8	3.3	V
Supply voltage (logic)	IOVDD-GND		1.65	1.8	3.3	V
Supply current (Logic & LCD)	ICC	VCI=2.8V	-	-	10	mA
Supply voltage of white LED backlight	$V_{LED} = V_{(BL+)} - V_{(BL-)}$	Forward current =80 mA	-	1.8	-	V
Luminance (on the module surface)		Number of LED dies = 4	-	430	-	cd/m ²



6.1 Block Diagram





7 . Interface Timing

AC Characteristics

(Unless otherwise specified, Voltage Referenced to V_{SS} , $V_{DDIO} = 2.2V$, $T_A = 25^\circ C$)

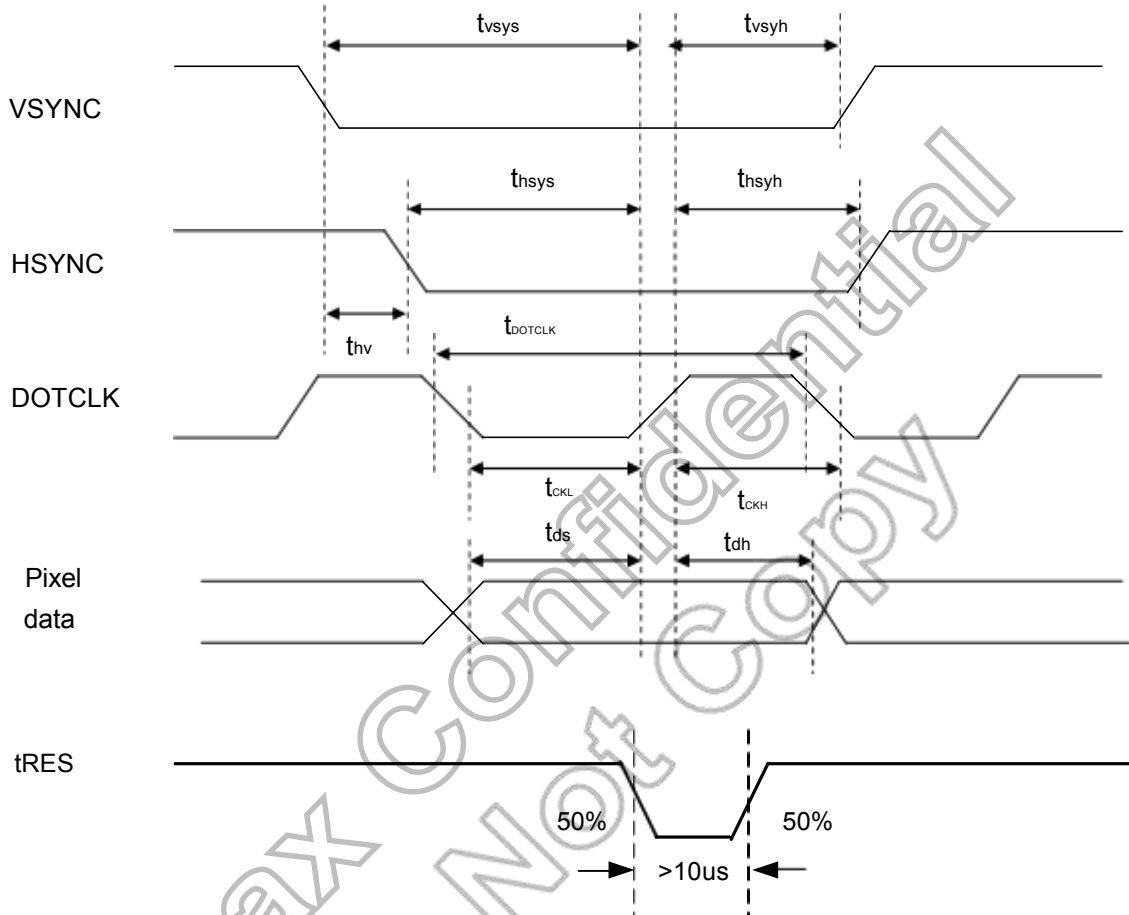
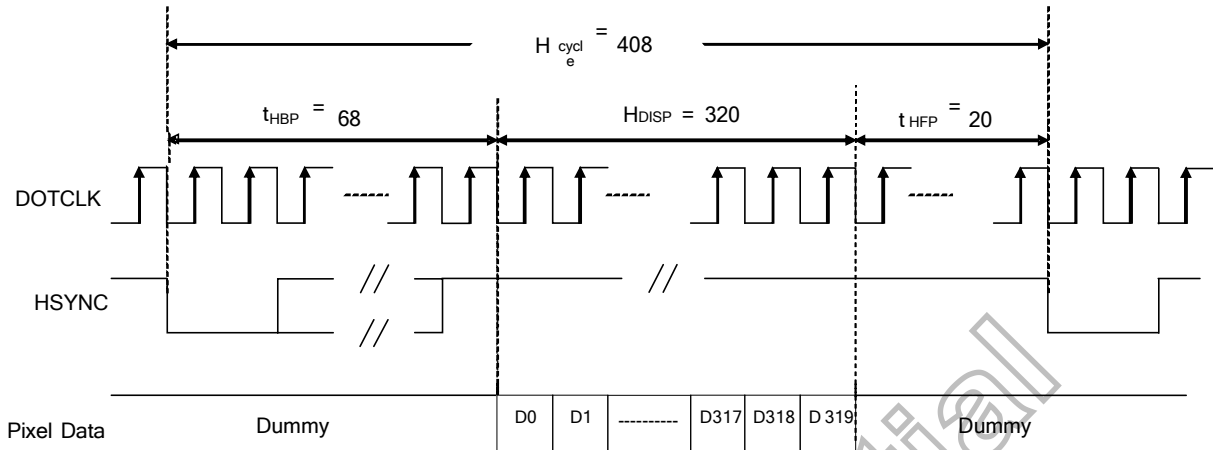


Figure 12. 1 Pixel Timing

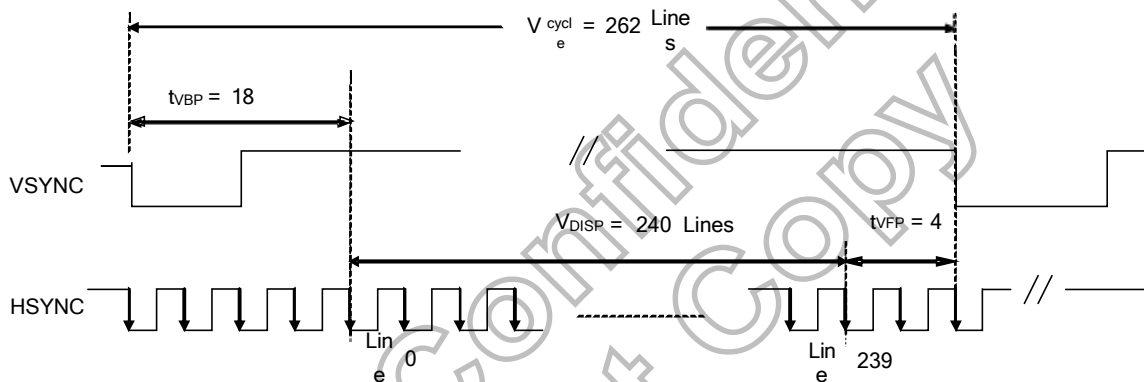
Characteristics	Symbol	Min.		Typ.		Max.		Unit
		24 bit	8 bit	24 bit	8 bit	24 bit	8 bit	
DOTCLK Frequency	fDOTCLK	-	-	6.5	19.5	10	30	MHz
DOTCLK Period	tDOTCLK	100	33.3	154	51.3	-	-	ns
Vertical Sync Setup Time	tvsys	20	10	-	-	-	-	ns
Vertical Sync Hold Time	tvsyh	20	10	-	-	-	-	ns
Horizontal Sync Setup Time	thsys	20	10	-	-	-	-	ns
Horizontal Sync Hold Time	thsyh	20	10	-	-	-	-	ns
Phase difference of Sync Signal Falling Edge	thv	1		-		240		tDOTCLK
DOTCLK Low Period	tCKL	50	15	-	-	-	-	ns
DOTCLK High Period	tCKH	50	15	-	-	-	-	ns
Data Setup Time	tds	12	10	-	-	-	-	ns
Data hold Time	tdh	12	10	-	-	-	-	ns
Reset pulse width	tRES	10		-		-		μs

Note: External clock source must be provided to DOTCLK pin of HX8238-D. The driver will not operate if absent of the clocking signal.

Table 12. 1 Pixel Timing



(a) Horizontal Data Transaction Timing



(b) Vertical Data Transaction Timing

Figure 12. 2 Data Transaction Timing in Parallel RGB (24 bit) Interface (SYNC Mode)

Characteristics	Symbol	Min.		Typ.		Max.		Unit
		24 bit	8 bit	24 bit	8 bit	24 bit	8 bit	
DOTCLK Frequency	fDOTCLK	-	-	6.5	19.5	10	30	MHz
DOTCLK Period	tDOTCLK	100	33.3	154	51.3	-	-	ns
Horizontal Frequency (Line)	fH	-	-	14.9	-	22.35	-	KHz
Vertical Frequency (Refresh)	fV	-	-	60	-	90	-	Hz
Horizontal Back Porch	tHBP	-	-	68	204	-	-	tDOTCLK
Horizontal Front Porch	tHFP	-	-	20	60	-	-	tDOTCLK
Horizontal Data Start Point	tHBP	-	-	68	204	-	-	tDOTCLK
Horizontal Blanking Period	tHBP + tHFP	-	-	88	264	-	-	tDOTCLK
Horizontal Display Area	HDISP	-	-	320	960	-	-	tDOTCLK
Horizontal Cycle	Hcycle	-	-	408	1224	450	1350	tDOTCLK
Vertical Back Porch	tVBP	-	-	18	-	-	-	Lines
Vertical Front Porch	tVFP	-	-	4	-	-	-	Lines
Vertical Data Start Point	tVBP	-	-	18	-	-	-	Lines
Vertical Blanking Period	tVBP + tVFP	-	-	22	-	-	-	Lines
Vertical Display Area	NTSC	-	-	240	-	-	-	Lines
	PAL			280(PALM=0)				
	PAL			288(PALM=1)				
Vertical Cycle	NTSC	-	-	262	-	350	-	Lines
	PAL			313				

Table 12. 2 Data Transaction Timing in Normal Operating Mode



8. Optical Characteristics

Item		Symbol	Conditions	Specifications			Unit	Note
				Min.	Typ.	Max.		
Transmittance		T%	Viewing normal angle $\theta_x = \theta_y = 0^\circ$		7.4		%	All left side data are based on CMO's following condition –T6 NTSC: 60% LC:5091 Light : C light (Machine:BM5A) Normal Polarizer Without DBEF “Simulation Data Reference Only”
Contrast Ratio		CR		200	300		--	
Response Time		T _R			15	30	ms	
		T _F			35	50	ms	
Chromaticity	Red	X _R		0.609	0.639	0.669		
		Y _R		0.314	0.344	0.374		
	Green	X _G		0.264	0.294	0.324		
		Y _G		0.557	0.587	0.617		
	Blue	X _B		0.102	0.132	0.162		
		Y _B		0.106	0.136	0.166		
	White	X _W		0.282	0.312	0.342		
		Y _W		0.319	0.349	0.379		
Viewing Angle	Hor.	θ_{x+}	Center CR≥10		45		deg.	
		θ_{x-}			45			
	Ver.	θ_{y+}			15			
		θ_{y-}			35			

*Note (1) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{63} / L_0$$

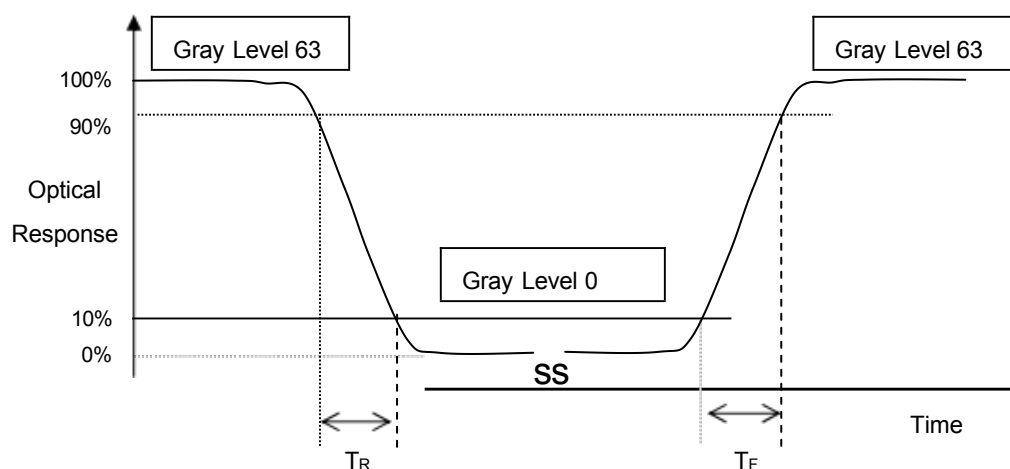
L63: Luminance of gray level 63

L 0: Luminance of gray level 0

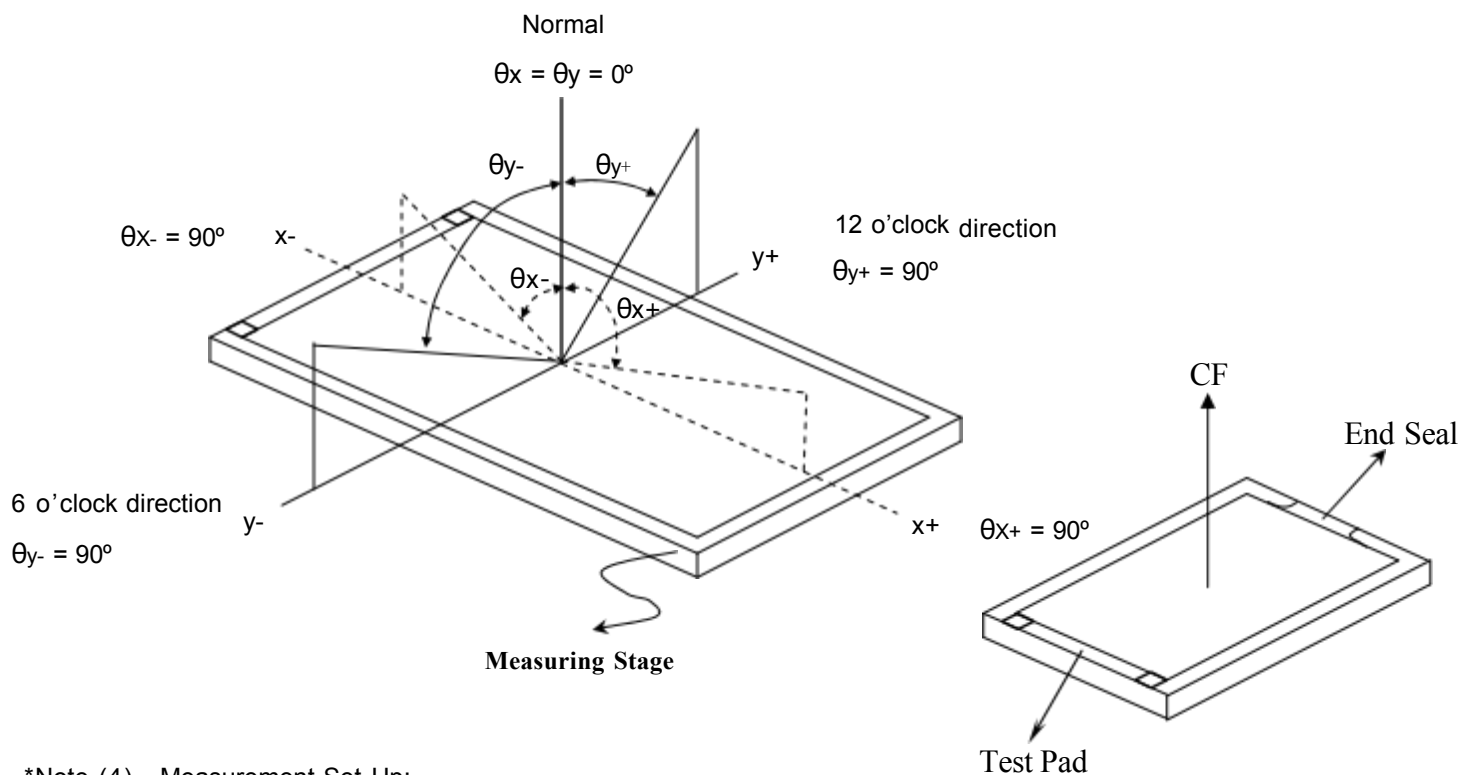
$$CR = CR(10)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

*Note (2) Definition of Response Time (T_R, T_F):

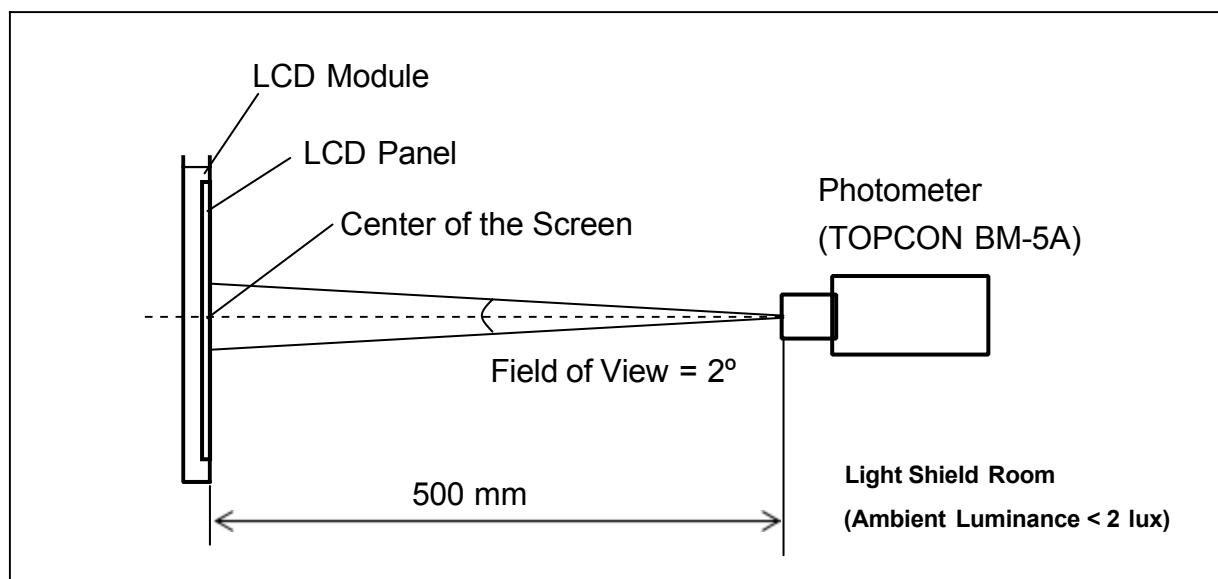


*Note(3) Definition of Viewing Angle



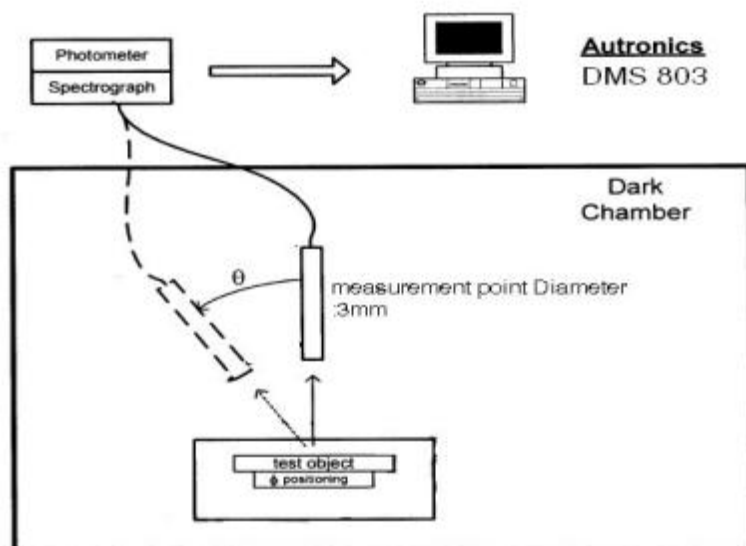
*Note (4) Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.

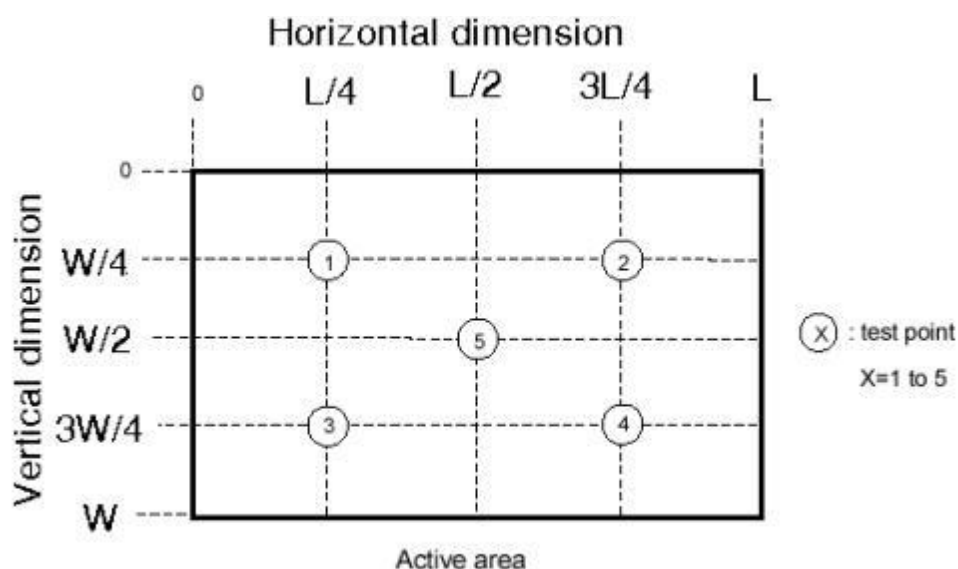


***Note (4) Measurement Set-Up:**

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



***Note (5)**





9 . Environmental / Reliability Tests

Test Item	Test Condition	Judgment	Remark
High Temp. Storage	85℃, 240hrs	Note 1	Note 2 Note 3 Note 4
Low Temp. Storage	-40℃, 240hrs	Note 1	
High Temp. Operation	70℃, 240hrs	Note 1	
Low Temp Operation	-30℃, 240hrs	Note 1	
High Temp& Hum Operation	60℃ 90%RH,240hrs	Note 1	
Thermal Shock Storage	-40℃/30min ↔ 85℃/30min, 100 Cycle	Note 1	

Note1: Pass: Normal display image with no obvious non-uniformity and no line defect.

Fail: No display image, obvious non-uniformity, or line defects.

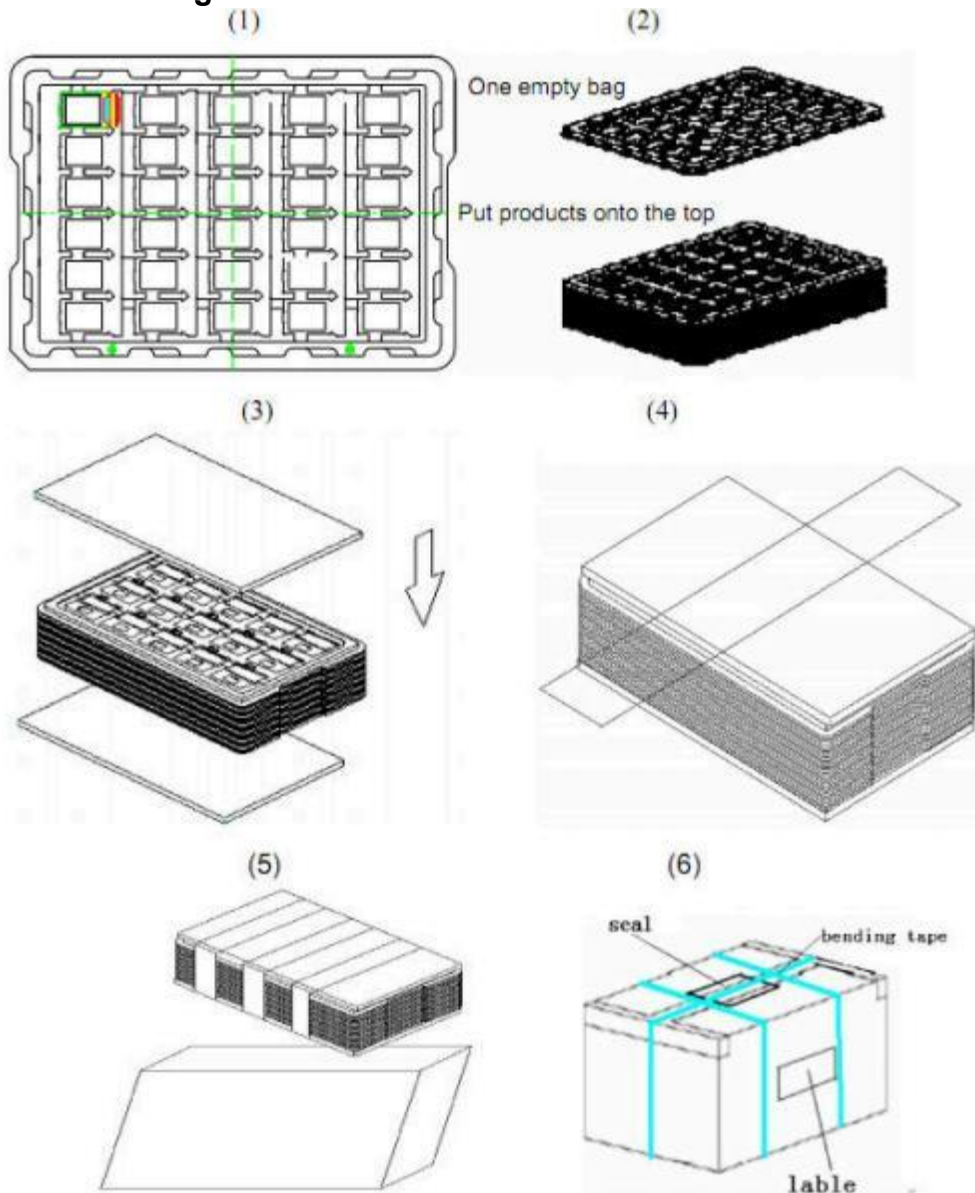
Note2: All tests above are practiced at module type.

Note3: All the cosmetic specification is judged before the reliability stress. Only a single item of these tests shall be executed on a single panel , no more one test item shall be executed on a single panel.

Note4: Evaluation should be tested after storage at room temperature for two hours.

10 . Packing

Packing Method



1. Put module into tray cavity:
2. Tray stacking
3. Put 1 cardboard under the tray stack and 1 cardboard above:
4. Fix the cardboard to the tray stack with adhesive tape:
5. Put the tray stack into carton.
6. Carton sealing with adhesive tape.



11. Precautions For Use of LCD modules

11.1 Handling Precautions

11.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

11.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

11.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

11.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

11.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketone
- Aromatic solvents

11.1.6. Do not attempt to disassemble the LCD Module.

11.1.7. If the logic circuit power is off, do not apply the input signals.

11.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

11.1.8.1. Be sure to ground the body when handling the LCD Modules.

11.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

11.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

11.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

11.2 Storage Precautions

11.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

11.2.2. The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0°C ~ 40°C Relatively humidity: ≤80%

11.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

11.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.