



深圳市百乐奇科技有限公司
SHENZHENSHI BAILEQI TECHNOLOGY CO., LTD



Product Specification

产品规格书

YR350QV003M-01

3.5" 240(V)*320(H)*3(RGB) TFT LCD MODULE

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Customer: _____

Customer Approval and Feedback		

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1. GENERAL DESCRIPTION

1.1 DESCRIPTION

YR350QV003M-01 is a transmissive type color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD module (TFT-LCD panel, driver IC and FPC), a back-light unit and. The resolution of 3.5" contains 240X320RGB pixels and can display up to 16.7M colors.

1.2 GENERAL INFORMATION

Items	Specification	Unit	Note
Display mode	TFT Transmissive, Positive, NW, TN	-	-
Drive element	a-Si TFT active matrix	-	-
LCM outline size	76.84(H) x 63.84(V) x 3.27(T)	mm	Note (1)(2)
Active area	70.08(H)X52.56(V)	mm	-
Number of pixels	320*3RGB(H)X240(V)	pixels	-
Pixel arrangement	RGB stripe	-	-
Pixel size	0.219(W) x 0.219 (H)	mm	-
Display color	16.7M	color	-
Viewing direction	12 Viewing	-	-
Controller / Driver	-	-	-
Data interface	24 BIT RGB Interface	-	
Backlight	6 White LEDs In Series	-	
Weight	TBD	g	

Notes:

- (1) Touch panel and back-light unit are included.
- (2) FPC no included. (Refer to the module outline dimension for further information). Please see module specification drawing in Page14 for more details.



2. ABSOLUTE MAXIMUM RATING

(Ta=25±2°C, Vss=GND=0V)

Characteristics	Symbol	Min.	Max.	Unit	Notes
Power Supply Voltage 1	VDD1	-	-	V	
Power Supply Voltage 2	VDD2	-	-	V	
Power Supply Voltage 3	VDD3	-	-	V	
Power Supply Voltage 4	HS_VCC	-	-	V	
Power Supply Voltage 5	VSP	-	-	V	
Power Supply Voltage 6	VSN	-	-	V	
TFT Gate On voltage	VGH	14	+16	V	
TFT Gate Off voltage	VGL	-12	-8	V	
Logic Signal Input Voltage	V _{IN}	-	VDD1+0.3	V	
HS Input Voltage	V _{IN}	-0.3	+2.0	V	
Backlight Forward Current	I _F	-	20	mA	
Operating Temperature	T _{OPR}	-20	+70	°C	(1), (3)
Storage Temperature	T _{STG}	-30	+80	°C	(2), (3)
Humidity	RH	-	90	%	Max. 60 °C

Notes:

- (1) In case of below 0°C, the response time of liquid crystal (LC) becomes slower and the color of panel becomes darker than normal one. Level of retardation depends on temperature, because of the LC characteristics.
- (2) If product is exposed to high temperatures for extended time, there is a possibility of the polarizer film damage which could degrade the optical characteristics.
- (3) Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded.

Functional operation should be restricted to the conditions described under normal operating conditions.

3. ELECTRICAL CHARACTERISTICS

3.1 LCM DC CHARACTERISTICS

(Ta=25±2°C)

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage 1	VDDIO	-	-	-	V	
Power Supply Voltage 2	VDD	3.1	3.3	3.6	V	
Power Supply Voltage 3	VDD	3.1	3.3	3.6	V	
Power Supply for MTP	VPP	-	-	-	V	
Current Consumption	I _{DD}	-	40	-	mA	Normal mode
	I _{DD-SLEEP}		1		mA	Sleep mode
Input voltage "L" Level	V _{IL}	GND	-	0.3VDD1	V	VDD1=1.65~3.3
Input voltage "H" Level	V _{IH}	0.7VDD1	-	VDD1	V	
Output voltage "L" Level	V _{oL}	0	-	0.2VDD1	V	I _{oL} =1mA
Output voltage "H" Level	V _{oH}	0.8VDD1	-	VDD1	V	I _{oH} =-1mA

3.2 BACK-LIGHT UNIT CHARACTERISTICS

The back-light system is an edge-lighting type with 6 white LEDs. The characteristics of the back-light are shown in the following tables.

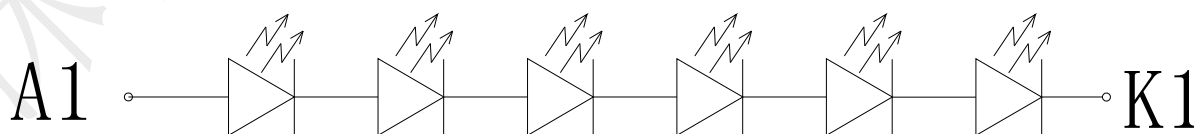
(Ta=25±2°C)

Characteristics	Symbol	Condition	Min.	Type	Max.	Unit	Notes
Forward Voltage	V _f	I _L =20mA	17.4	19.2	20.4	V	-
Forward current	I _L	--	--	20	-	mA	-
Luminance	L _v	I _L =20mA	260	300	340	cd/m ²	-
LED life time	-	I _L =20mA	-	15,000	-	Hr	Note 1

Note:

- (1) The "LED life time" is defined as the module brightness decrease to 50% of original brightness at I_L=20mA. The LED life time could be decreased if operating I_L is larger than 20mA.

Backlight circuit diagram shown in below:





4. OPTICAL CHARACTERISTICS

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room.

Measuring equipment: BM-5AS, BM-7, EZ-Contrast.

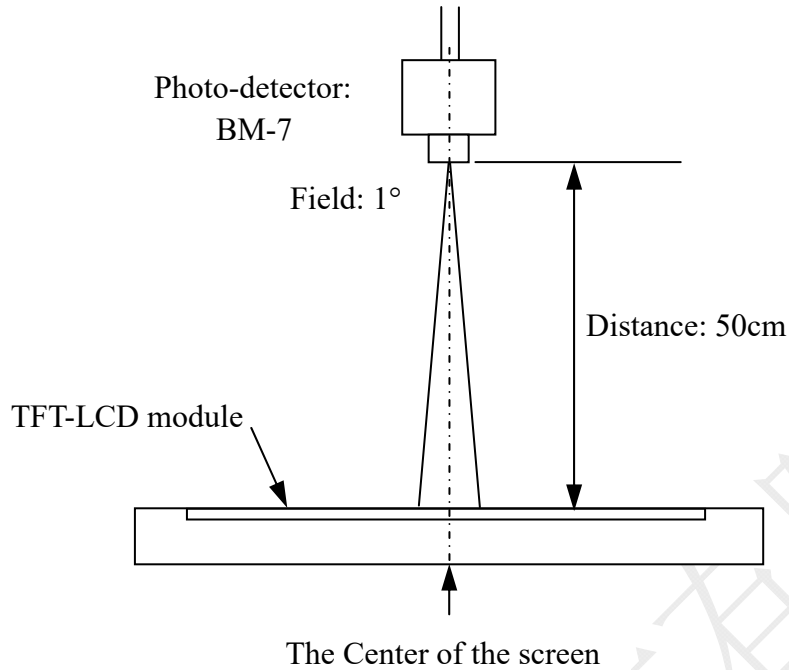
(Ta=25±2°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center point)	C/R	-	-	500	-	-	BM-7 Note(2)
Luminance of white (Center point)	L _w	B/L on	TBD	300	-	cd/m ²	BM-7
Luminance uniformity	U _w	θ = 0. Normal viewing angle B/L On	80	-	-	%	BM-7 Note(3)
Response Time	Tr + Tf		-	20	30	ms	BM-5AS Note(4)
Color Chromaticity (CIE 1931)	White	W _x	0.282	0.312	0.342	-	BM-7 Note(5)
		W _y	0.319	0.349	0.379		
	Red	R _x	0.609	0.639	0.669		
		R _y	0.314	0.344	0.374		
	Green	G _x	0.264	0.294	0.324		
		G _y	0.557	0.587	0.617		
	Blue	B _x	0.102	0.132	0.162		
		B _y	0.319	0.349	0.379		
Viewing Angle	Hor.	θ _L	-	45	-	Deg	EZ Contrast Note(6)
		θ _R	-	45	-		
	Ver.	θ _u	-	15	-		
		θ _D	-	35	-		
Optima View Direction			12 :00				Note(7)

* This condition will be changed by the evaluation circumstance. If product is exposed to high temperatures for extended time, there is a possibility of the polarizer film damage which could degrade the optical characteristics.

Notes:

- (1) Test Equipment Setup: After stabilizing and leaving the panel alone at a given temperature for 30min, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room 30min after lighting the back-light. This should be measured in the center of screen.

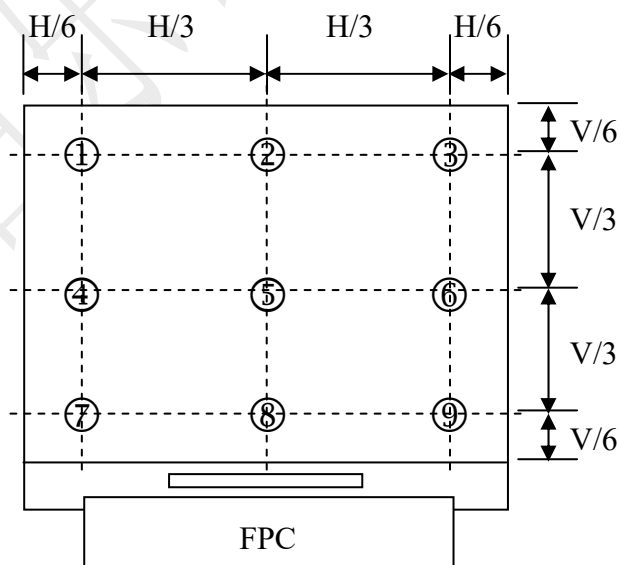


- (2) Definition of Contrast Ratio (CR):

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance measured when LCD on the "white" state}}{\text{Luminance measured when LCD on the "black" state}}$$

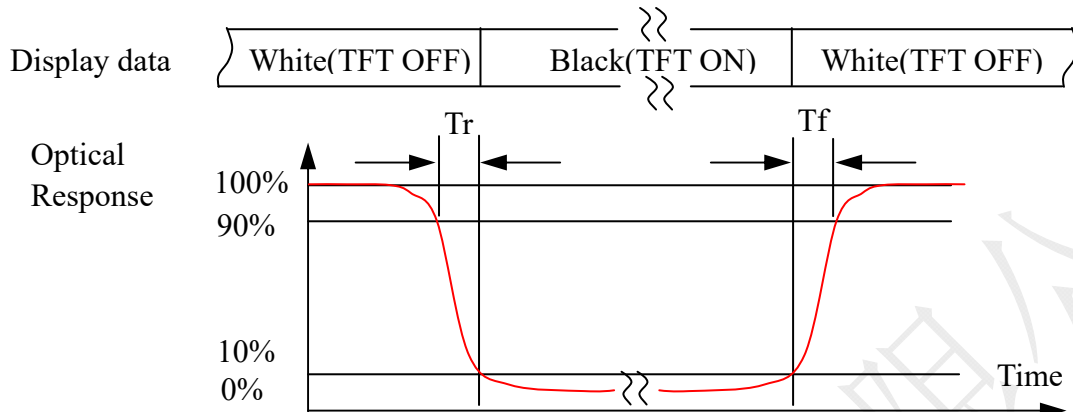
- (3) Definition of Luminance Uniformity: Active area is divided into 9 measuring areas (Shown in below), every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity} = \frac{\text{Min Luminance of white among 9-points}}{\text{Max Luminance of white among 9-points}} \times 100\%$$

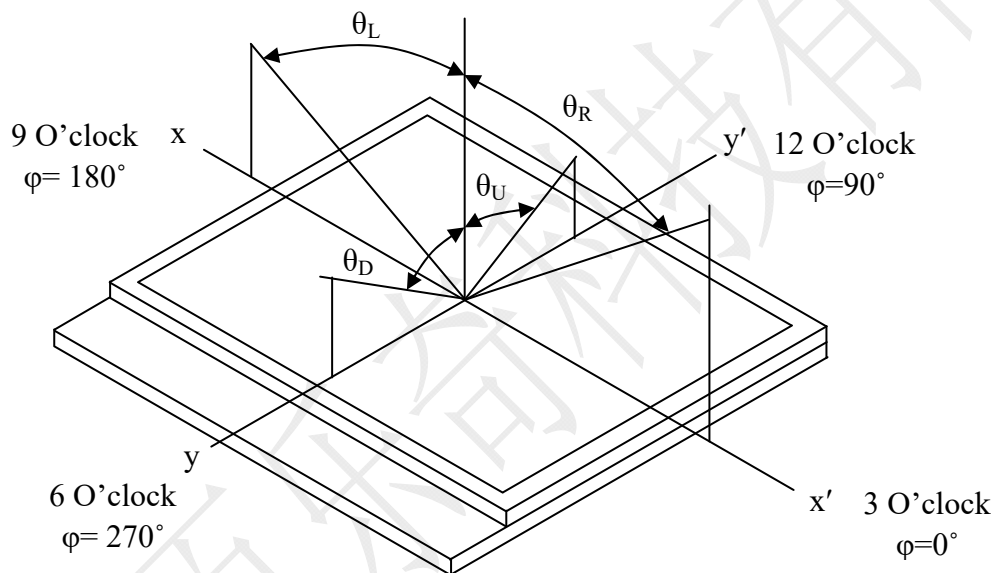


The spot locations for luminance measurement

(4) Definition of Response time: Sum of T_r and T_f .



(5) Definition of Viewing Angle: The viewing angle range that the $CR \geq 10$.



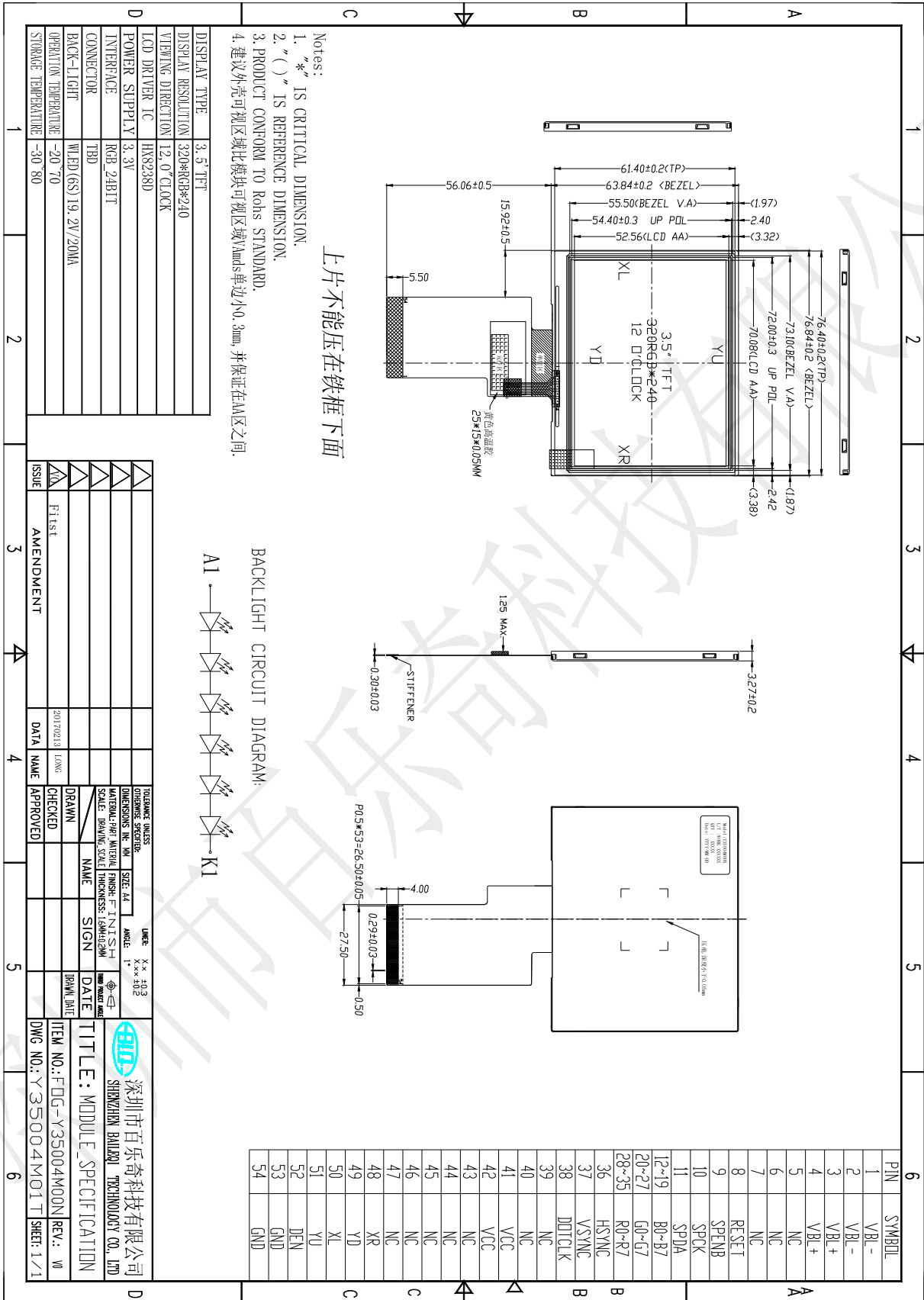
(6) Definition of Color Chromaticity (CIE 1931)

Color coordinate of white & red, green, blue at center point.

(7) The different Rubbing Direction will cause the different optima view direction.



5. MODULE OUTLINE DIMENSION





6. MODULE INTERFACE DESCRIPTION

Pin No.	Symbol	I/O	Function
1~2	VBL-	P	Cathode for LEDs
3~4	VBL+	P	Anode for LEDs
5~7	NC	I	No Connection
8	RESET	I	Reset signal
9	SPENB	I	Chip Selection
10	SPCK	I	Serial communication clock input
11	SDA	I/O	Serial communication data input.
12~19	B0~B7	I	Blue Data bus
20~27	G0~G7	I	Green Data bus
28~35	R0~R7	I	Red Data bus
36	HS	I	Horizontal Sync input. Negative polarity.
37	VS	I	Vertical Sync input. Negative polarity
38	DOTCLK	I	Clock signal. Latching data at the rising edge.
39~40	NC	I	No Connection
41~42	VCC	P	Power supply for charge pump circuit.
43~47	NC	I	No Connection
48	NC(XR)	I	No Connection(Right side of TP)
49	NC(YD)	I	No Connection(Down side of TP)
50	NC(XL)	I	No Connection(Left side of TP)
51	NC(YU)	I	No Connection(Up side of TP)
52	DEN	I	Data Enable
53~54	GND	I	Ground for digital circuits

I: input, O: output, P: power, C: capacitor.



7. REFERENCE APPLICATION CIRCUIT

Please consult our technical department for detail information.

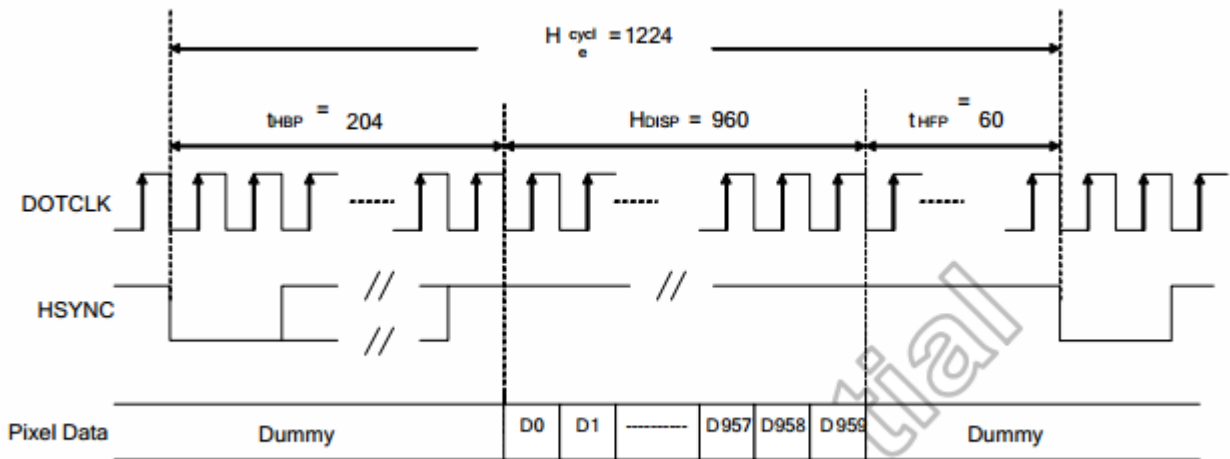
8. TIMINGS FOR 24-bit RGB Interface

8.1 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.

8.2 SYNC Mode



(1) Horizontal Data Transaction Timing

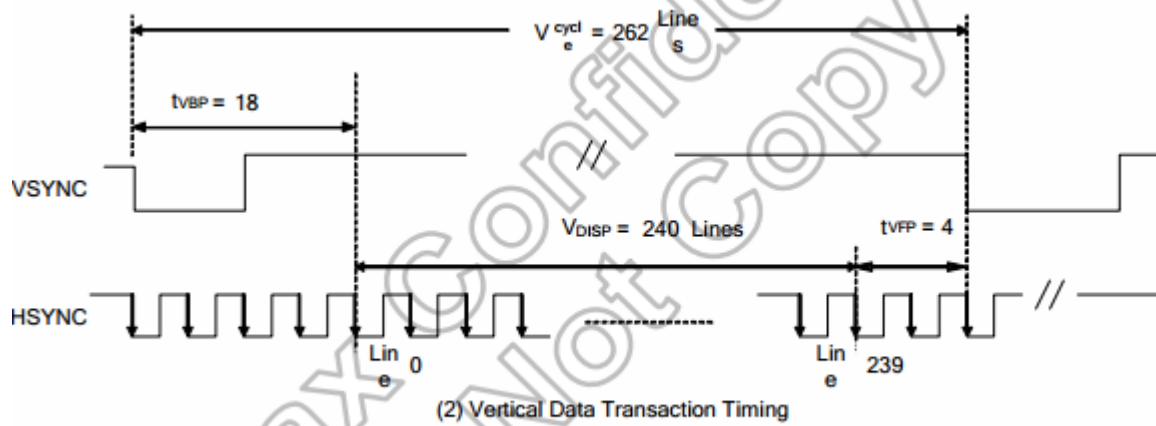


Figure 12.3 Data Transaction Timing in Serial RGB (8 bit) Interface (SYNC Mode)

8.3 DE Mode

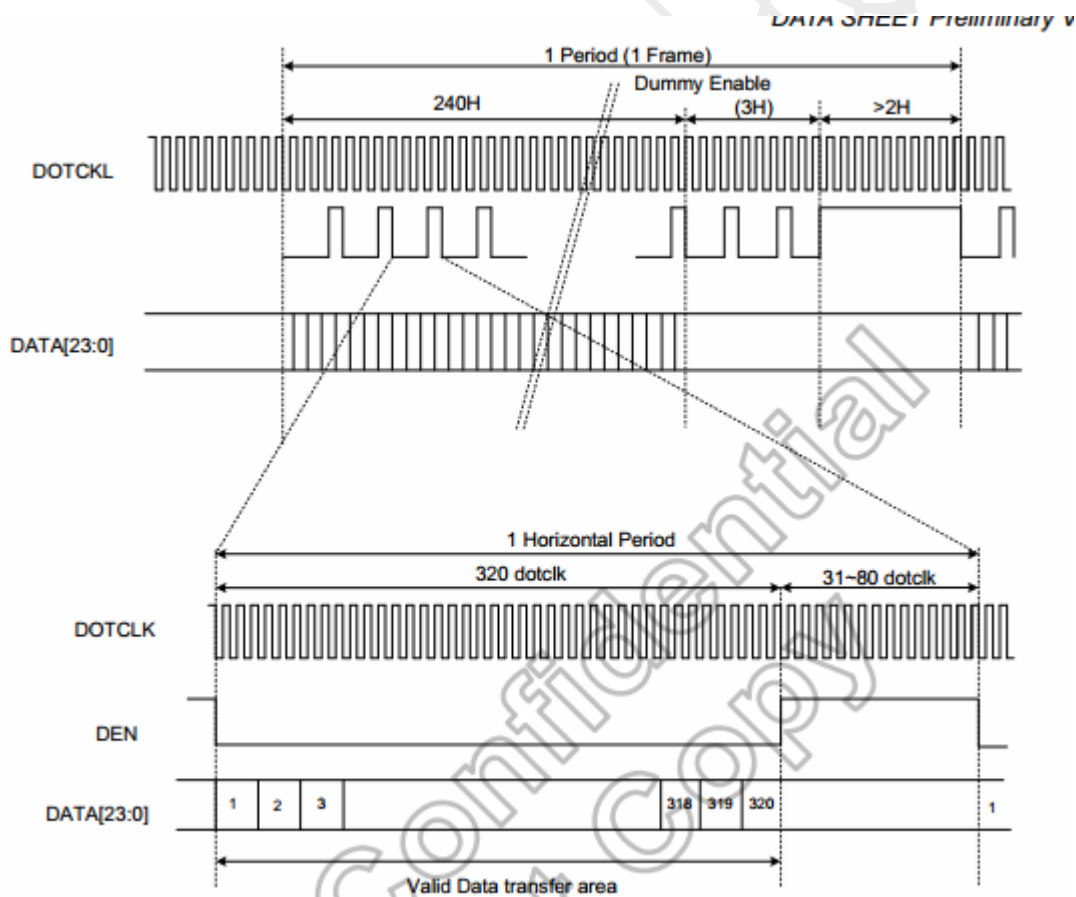


Figure 12.4 Signal Timing in DE Mode



9. RELIABILITY TEST CONDITIONS

No.	Test Item	Test Condition	Notes
1	High Temperature Storage	+80°C / 120H	Inspection after 2~4h storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Sealleak; 3.Non-display; 4. Missing segments; 5.Glass crack; 6.The surface shall be free from damage. 7. The electrical characteristics requirements shall be satisfied.
2	Low Temperature Storage	-30°C / 120H	
3	High Temperature Operating	+70°C / 120H	
4	Low Temperature Operating	-20°C / 120H	
5	Temperature Cycle	Ta=-10°C~+25~+50°C,10 Cycle,per30min	
6	High Temperature /Humidity storage	50+5°C x 90%RH / 120H	
7	Vibration Test	Frequency: 10Hz~55Hz~10Hz Amplitude:1.5mm, 2 hours for each direction of X, Y, Z	
8	Packing Drop Test	Drop to the ground from 1m height, 1 corner, 3 edges, 6 surfaces.	
9	ESD test	Voltage:±8KV R: 330Ω C: 150pF Air discharge, 10time	

Remarks:

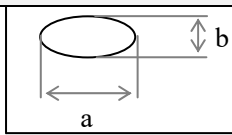
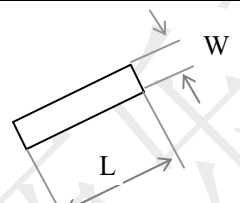
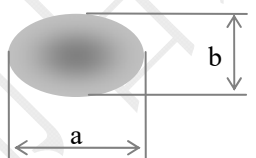
- (1) The test samples should be applied to only one test item.
- (2) Sample size for each test item is 5~10pcs.
- (3) For High Temperature/Humidity storage test, pure water (resistance>10MΩ) should be used.
- (4) In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.
- (5) Failure judgment criterion: basic specification, electrical characteristic, mechanical characteristic, optical characteristic.

10. PACKING SPECIFICATION

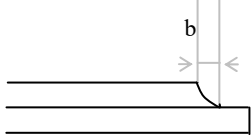
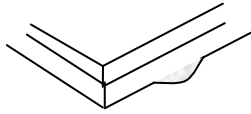


TBD



11. INSPECTION CRITERION

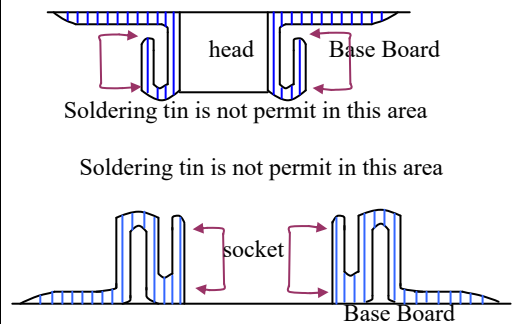
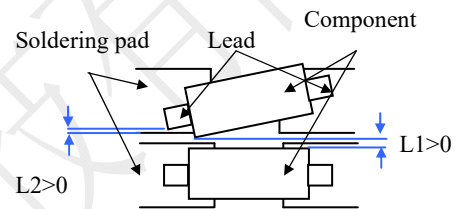
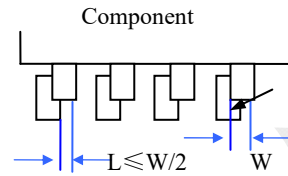
Inspection item		Judgement standard					
		Category		Acceptable number			
				A zone	B zone		
1	Black spot, White spot, Bright Spot, Pinhole Foreign Particle, Bubble and Particle Between polarizer and glass, scratch on polarizer			A	$\Phi \leq 0.10$	Ignored	Ignored
			B	$0.15 < \Phi \leq 0.20$	2		
			C	$0.20 < \Phi$	0		
			D				
			Total defective point(B,C)		2		
1	Bright spot	$0.15 < \Phi \leq 0.20$		$N \leq 0$	Ignored		
	Dark spot/ Black spot	$0.15 < \Phi \leq 0.20$		$N \leq 2$			
	Attached to the two pixels are bright spots	$0.15 < \Phi \leq 0.20$		$N \leq 0$			
	Even a two pixel is dark	$0.15 < \Phi \leq 0.20$		$N \leq 0$			
	Pixel total number	$0.15 < \Phi \leq 0.20$		$N \leq 2$			
	Note1: the spot defect caused by foreign matter is judged according to the defect of the foreign body. Note 2: when the light is not wired to show the type of defects.						
2	Black line, White line, Bubble and Particle Between Polarizer and glass, Scratch on polarizer			A	$W \leq 0.03 L \leq 3.0$	Ignored	Ignored
			B	$0.03 < W \leq 0.05 L \leq 3.0$	2		
			C	$0.05 < W$	0		
		D					
		Total defective point(B,C)		2			
		W:Width, L:Length(mm)					
3	Contrast variation			A	$\Phi \leq 0.2$	Ignored	Ignored
			B	$0.2 < \Phi \leq 0.3$	2		
			C	$0.3 < \Phi \leq 0.4$	1		
			D	$0.4 < \Phi$	0		
		Total defective point(B,C)		3			
4	Bubble inside cell	any size		none	none		
5	Scratch and damage on polarizer, particle on polarizer or between polarizer and glass.	Refer to item 1 and item 2.					
	Bubble, dent and convex	A	$\Phi \leq 0.2$	Ignored	Ignored		
		B	$0.2 < \Phi \leq 0.3$	5			
		C	$0.3 < \Phi$	0			
		Total defective point(B,C)		2			



Inspection item		Judgement standard		
		Category	Acceptable number	
			A zone	B zone
6	Surplusglass	①Stage surplus glass 	$b \leq 0.3\text{mm}$	
		②Surrounding surplus glass 	Should not influence outline dimension and assembling.	
7	MURA	①MURA	Naked eye examination: red, green, blue screen does not allow the appearance, black screen requires visual is not obvious, the specific reference limit samples. Note: the principle of closing the sample is to be installed on the whole machine and the end user will not find it in the normal usage scenario. Inspection basis: 6%ND (MURA mainly in the black screen and indoor light is relatively dark will be found, it is recommended to turn off the indoor lighting inspection.)	
		②Point Black / White / point(MURA) 	1, under the black / gray screen check: $D \leq 0.10\text{mm}$ Ignored; $0.10\text{mm} < D \leq 0.3\text{mm}$, $N \leq 2$; $D > 0.3\text{mm}$: Unqualified. 2, switch to the red, green, blue in which any one of the screen appears black or white or point to point white or point of failure. 	

Inspection item		Judgment standard									
		Category(application: B zone)									
8	Glass defect crack	①The front of lead terminals	<table border="1"> <tr> <td>A</td> <td>If $a \leq t$ and $b \leq 1.0$, c is not limited</td> </tr> <tr> <td>B</td> <td>$a \leq t$, $1 \leq b \leq 2\text{mm}$, $c \leq 3\text{mm}$</td> </tr> <tr> <td>C</td> <td>If glass crack cover alignment mark, $b \leq 0.5\text{mm}$.</td> </tr> <tr> <td>D</td> <td>Crack at two sides of lead terminals should not cover patterns and alignment mark</td> </tr> </table>	A	If $a \leq t$ and $b \leq 1.0$, c is not limited	B	$a \leq t$, $1 \leq b \leq 2\text{mm}$, $c \leq 3\text{mm}$	C	If glass crack cover alignment mark, $b \leq 0.5\text{mm}$.	D	Crack at two sides of lead terminals should not cover patterns and alignment mark
		A	If $a \leq t$ and $b \leq 1.0$, c is not limited								
		B	$a \leq t$, $1 \leq b \leq 2\text{mm}$, $c \leq 3\text{mm}$								
		C	If glass crack cover alignment mark, $b \leq 0.5\text{mm}$.								
D	Crack at two sides of lead terminals should not cover patterns and alignment mark										
②Surrounding crack—non-contact side	<p>$b < \text{Inner borderline of the seal}$</p>										
③ Surrounding crack— contact side	<p>$b < \text{Outer borderline of the seal}$</p>										
④Corner	<table border="1"> <tr> <td>A</td> <td>$a \leq t$, $b \leq 3.0$, $c \leq 3.0$</td> </tr> </table> <p>*Glass crack should not cover patterns used for</p>	A	$a \leq t$, $b \leq 3.0$, $c \leq 3.0$								
A	$a \leq t$, $b \leq 3.0$, $c \leq 3.0$										

Inspection item		Judgement standard
9	FPC defect	<p>Component soldering: No cold soldering, short/open circuit, burr, tin ball.</p> <p>The flat encapsulation component position deviation must be less than 1/2 width of the pin (Pic.1);</p> <p>The sheet component deviation: pin deviates from the pad and contact with the near components is not permitted (Pic.2)</p>
	lead defect:	<p>The lead lack must be less than 1/2 of its width;</p> <p>The lead burr must be less than 1/2 of the seam;</p> <p>Impurities connect with the near leads is not permitted</p>
	Connector soldering:	<p>Soldering tin is at contact position of the plug and socket is not permitted</p> <p>No foundation is scald</p> <p>Serious cave distortion on plug and socket contact pin is not permitted</p>



12. GENERAL PRECAUTIONS



1.1 HANDING

- (1) When the module is assembled, it should be attached to the system firmly. Be careful not to twist and bent the module.
- (2) Refrain from strong mechanical shock and / or any force to the module. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
- (3) Note that display modules are very fragile and could be easily damaged. Do not press or scratch the surface harder than a HB pencil lead.
- (4) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, straining and discoloration may occur.
- (5) If the display module surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, should be wiped by moisten cloth with isopropyl alcohol or ethyl alcohol solvents, DO NOT with water, ketone type materials (e.g. acetone), aromatic, toluene, ethyl acid or methyl chloride, and so on.
- (6) 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.
- (7) Use finger-stalls with sort gloves in order to keep display clean during the incoming inspection and assembly process.
- (8) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
- (9) Do not touch directly conductive parts such as the CMOS LSI pad and the interface terminals with bare hands, therefore operations should be grounded whenever he/she comes into contact with the modules.
- (10) Do not exceed the absolute maximum rating value. (The supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on), otherwise the module may be damaged.

1.2 SOLDERING

- (1) Use soldering irons with proper grounding and no leakage.
- (2) For No RoHS Product: soldering temperature is 290~350°C, soldering time is 3~5s; for RoHS Product: soldering temperature is 340~370°C, soldering time is 3~5s.
- (3) If soldering flux is used, be sure to remove any remaining flux after soldering (This does not apply in the case of a non-halogen type of flux).

1.3 STORAGE

- (1) DO NOT leave the module in high temperature and high humidity for a long times, keep the temperature from 0°C to 35°C and relative humidity of less than 60%.
- (2) It is highly recommended to store the module in a dark place. The Liquid crystal is deteriorated by ultraviolet, DO NOT leave it in direct sunlight and strong ultraviolet ray for many hours.
- (3) The polarizer surface should not come in contact with any other objects.