Fukui (HK) CO., Limited

Product Specification
产品规格书

HK-035Q35-50

3.5″ 800(H)*3(RGB)*480(V) TFT LCD MODULE

May 19, 2018

Customer:____________

Customer Approval and Feedback

LONGCHI Signature:		
Prepared by	Checked by	Approved by
ZHH	XZ	YXN

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REVISION HISTORY

Rev	Description	Page	Date
1.0	Initial Release	All	2018/05/19

1. GENERAL DESCRIPTION

1.1 DESCRIPTION

FJ035WV05-VO-50PIN 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 800RGBX480 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	87.1(H) x 56.8(V) x 2.75(T)	mm	Note (1)(2)
Active area	77.59H)X43.65(V)	mm	-
Number of pixels	800*3RGB(H)X480(V)	pixels	-
Pixel arrangement	RGB stripe	-	-
Pixel size	0.03233*3(W) x 0.09093 (H)	mm	-
Display color	262k	color	-
Viewing direction	6 O'CLOCK	-	-
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	12	+19	V	
TFT Gate Off voltage	VGL	-7.0	-10	V	
Logic Signal Input Voltage	V_{IN}	-0.3	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	VDD	3	3.3	3.6	V	
Power Supply Voltage 2	AVDD	10	9.6	10.6	V	
Common Power Supply Voltage	VCOM	3.2	3.86	4.1	V	
Gate Driver High voltage	VGH	17	18	19	V	
Gate Driver Low voltage	VGL	-9	-6	-5	V	
Current Consumption	I_{DD}	-	TBD	-	mA	Normal mode
	$I_{DD\text{-}SLEEP}$		TBD		uA	Sleep mode
Input voltage "L" Level	V_{IL}	GND	-	0.3VDD	V	VDD1=1.65~ 3.6
Input voltage "H" Level	V_{IH}	0.7VDD	-	VDD	V	
Output voltage "L" Level	V_{oL}	-	-	GND+0.4	V	I_{OL}=1mA
Output voltage "H" Level	V_{oH}	VDD-0.4	-	-	V	I_{OH}=-1mA

3.2 BACK-LIGHT UNIT CHARACTERISTICS

The back-light system is an edge-lighting type with 7 white LEDs. The characteristics of the back-light are shown in the following tables.

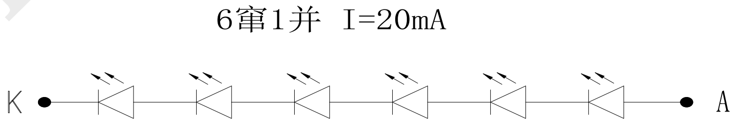
(Ta=25±2°C)

Characteristics	Symbol	Condition	Min.	Type	Max.	Unit	Notes
Forward Voltage	Vf	I_L=20mA	8.7	9.6	10.5	V	-
Forward current	I_L		--	120	-	mA	-
Luminance	Lv	I_L=20mA	TBD	TBD	--	cd/m^2	-
LED life time	-	I_L=20mA	10,000	20,000	--	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:



产品电路原理图

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	400	450	-	cd/m^2	BM-7
Luminance uniformity		U_W	θ = 0. Normal viewing angle B/L On Note(1)	80	-	-	%	BM-7 Note(3)
Response Time		Tr + Tf		-	25	-	ms	BM-5AS Note(4)
Color Chromaticity (CIE 1931)	White	W_X		-0.05	0.297	+0.05	-	BM-7 Note(5)
		W_X		-0.05	0.311	+0.05		
	Red	R_X		-0.05	0.555	+0.05		
		R_Y		-0.05	0.324	+0.05		
	Green	G_X		-0.05	0.354	+0.05		
		G_y		-0.05	0.601	+0.05		
	Blue	B_X		-0.05	0.146	+0.05		
		B_Y		-0.05	0.072	+0.05		
Viewing Angle	Hor.	θ_L	C/R$\geq$10	-	70	-	Deg	EZ Contrast Note(6)
		θ_R		-	70	-		
	Ver.	θ_u		-	60	-		
		θ_D		-	70	-		
Optima View Direction			6 :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.

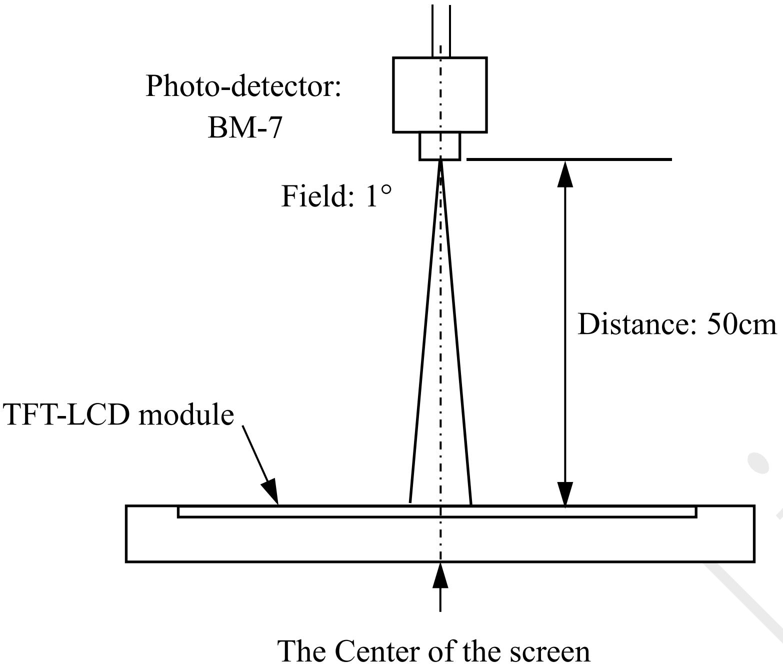


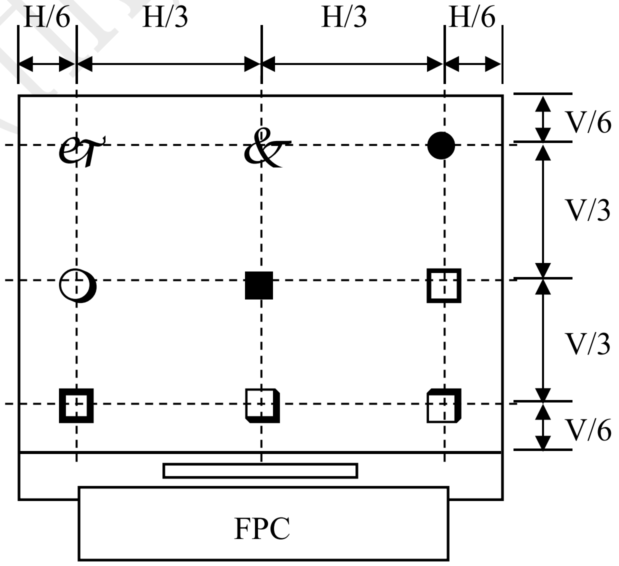
Photo-detector:
BM-7
Field: 1°
Distance: 50cm
TFT-LCD module
The Center of the screen

(2) Definition of Contrast Ratio (CR):

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

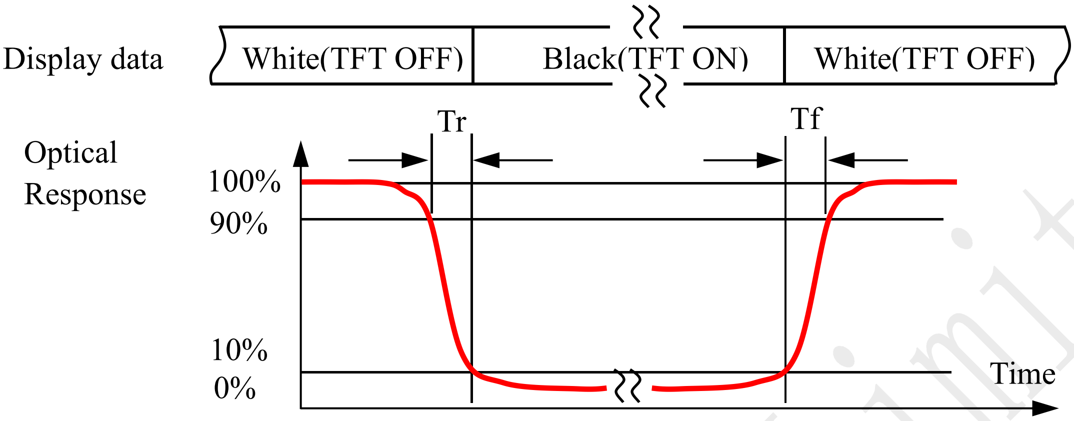
(3) Definition of Luminance Uniformity: Active area is divided into 9 measuring areas (Shown in below), every measuring point is placed at the center of each measuring area.

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

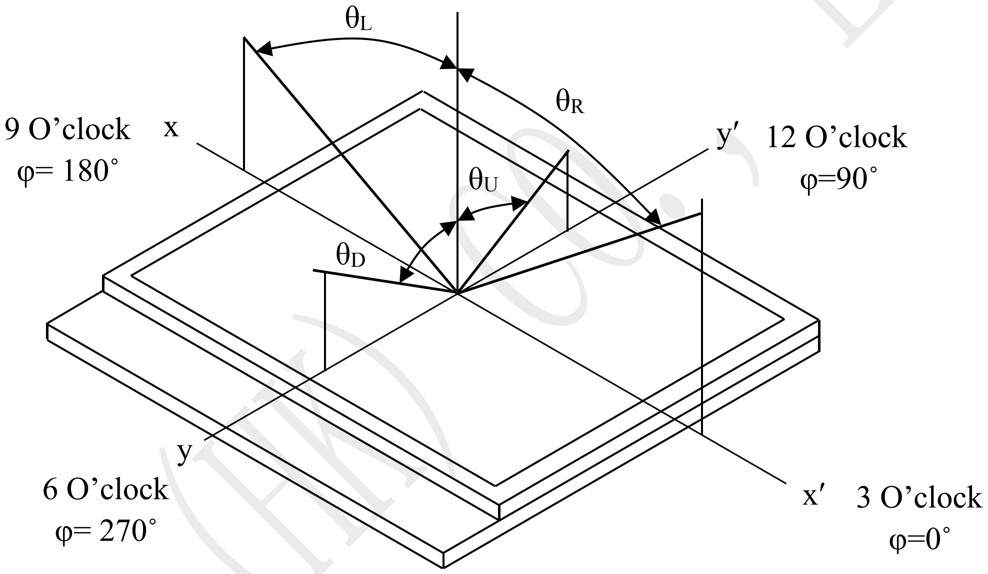

H/6
H/3
H/3
H/6
V/6
V/3
V/3
V/6
FPC

The spot locations for luminance measurement

(4) Definition of Response time: Sum of Tr and Tf.



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

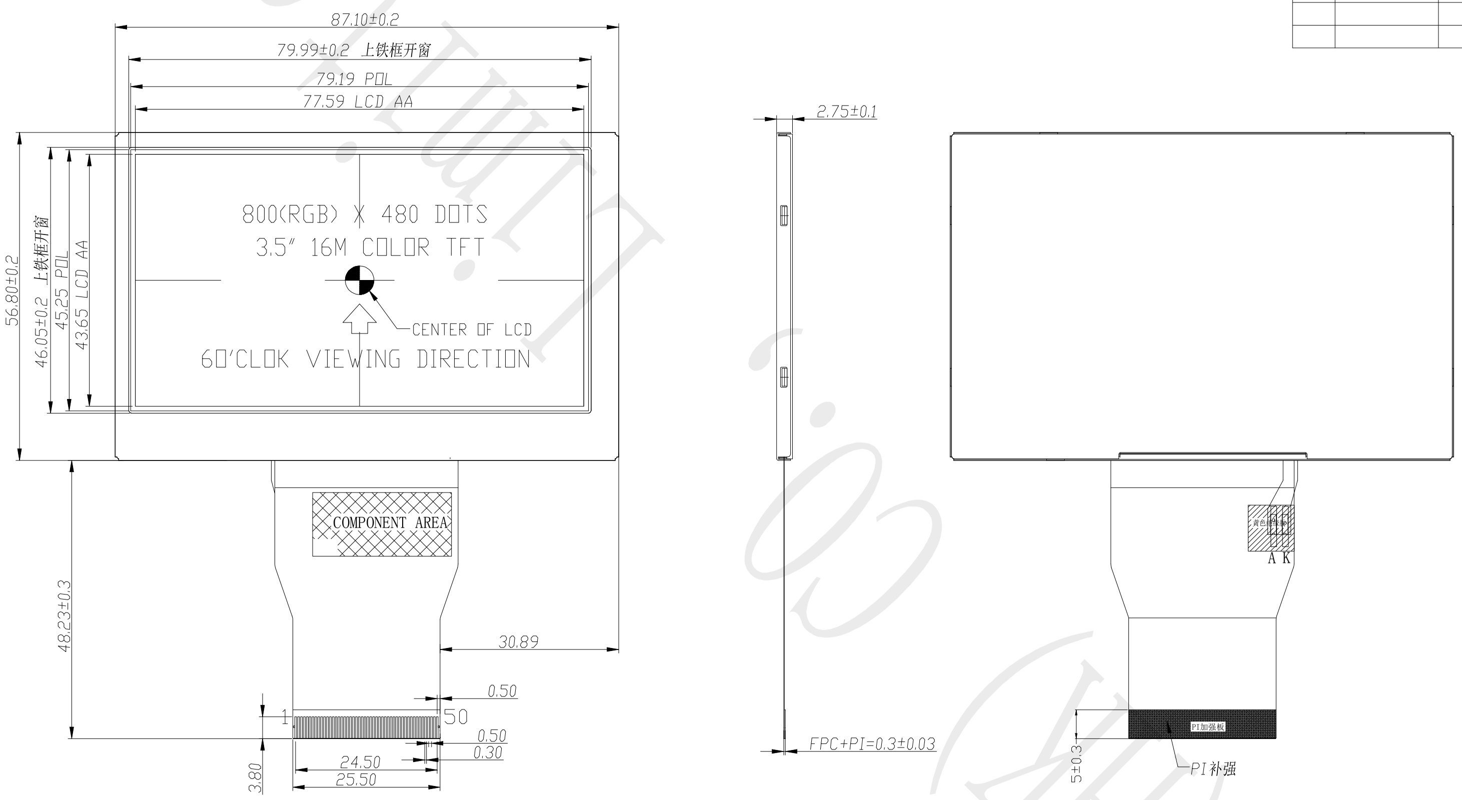

θL
θR
θU
θD
9 O'clock
φ= 180°
x
y'
12 O'clock
φ=90°
y
6 O'clock
φ= 270°
x'
3 O'clock
φ=0°

(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

REV	日 期	更改内容	签 署
V01	2018-4-8	新出图	zhh

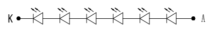

87.10±0.2
79.99±0.2 上铁框开窗
79.19 POL
77.59 LCD AA
56.80±0.2
46.05±0.2 上铁框开窗
45.25 POL
43.65 LCD AA
800(RGB) X 480 DOTS
3.5" 16M COLOR TFT
CENTER OF LCD
6O'CLOK VIEWING DIRECTION
COMPONENT AREA
48.23±0.3
30.89
0.50
1
50
0.50
0.30
24.50
25.50
3.80
2.75±0.1
FPC+PI=0.3±0.03
黄色绝缘胶
A K
PI加强板
5±0.3
PI补强

ROHS

PIN	SYMBOL
1	LEDA
2	LEDA
3	LEDK
4	LEDK
5	GND
6	VCOM
7	DVDD
8	MODE
9	DE
10	VS
11	HS
12	B7
13	B6
14	B5
15	B4
16	B3
17	B2
18	B1
19	B0
20	G7
21	G6
22	G5
23	G4
24	G3
25	G2
26	G1
27	G0
28	R7
29	R6
30	R5
31	R4
32	R3
33	R2
34	R1
35	R0
36	GND
37	DCLK
38	GND
39	L/R
40	U/D
41	VGH
42	VGL
43	AVDD
44	RESET
45	NC
46	VCOM
47	DITHB
48	GND
49	NC
50	NC

Fukui (HK) CO., Limited

DESIGN 设计:	DATE 日期: 2018.4.8		
CHECKED 核对:	图纸视角:		
APPROVED 批准:	Page:(页数)	1/1	
SPECIFICATION FOR BACKLIGHT 规 格		EDITION:(版本号)	
CUSTOMER'S CODE:(客户型号)		V02	
SHX MODEL NO:(供应商料号)	FJ035WV05-V0-50PIN-LCM	V02	

项目	符号 Symbol	最小值 Min	典型值 Typ	最大值 Max	单位 Unit	测试条件 Condition
模组亮度	Lv	400	450	--	cd/m²	6窜1并 I=20mA  产品电路原理图
均匀性	Avg	80	--	--	%	
色坐标	X	0.25	--	0.35		
	Y	0.26	--	0.36		
LCD透过率				--	%	
正向电压	Vf	19.2	19.8	20.4	V	
反向电流	Ir	--	--	--	uA	
反向电压	Vr	--	--	--	V	
工作温度	Topr	-20	--	70	°C	
贮存温度	Tstg	-30	--	80	°C	

未注公差表

FIELD	TOLERANCES
0.00-10.00	±0.10
10.01-50.00	±0.15
50.01-100.00	±0.15
100.01-180.00	±0.20
180.01-260	±0.20
260.01-	±0.20
ANGLE(角度)	±1°

技术要求:

1. 测试仪器：BM-7，测试距离：500mm，测试角度1°,见光学测试图
2. 尺寸管控: 图纸标准尺寸为重点尺寸
3. 材质需符合ROHS标准
4. 铁框要求表面光洁无划痕和毛刺
5. △1为修改记录
7. 未注公差以未注公差表为准，未注圆角R0.2

未标注尺寸以CAD为准

Please Confirm This Drawing On/Before

请 签 回 此 图

6. MODULE INTERFACE DESCRIPTION

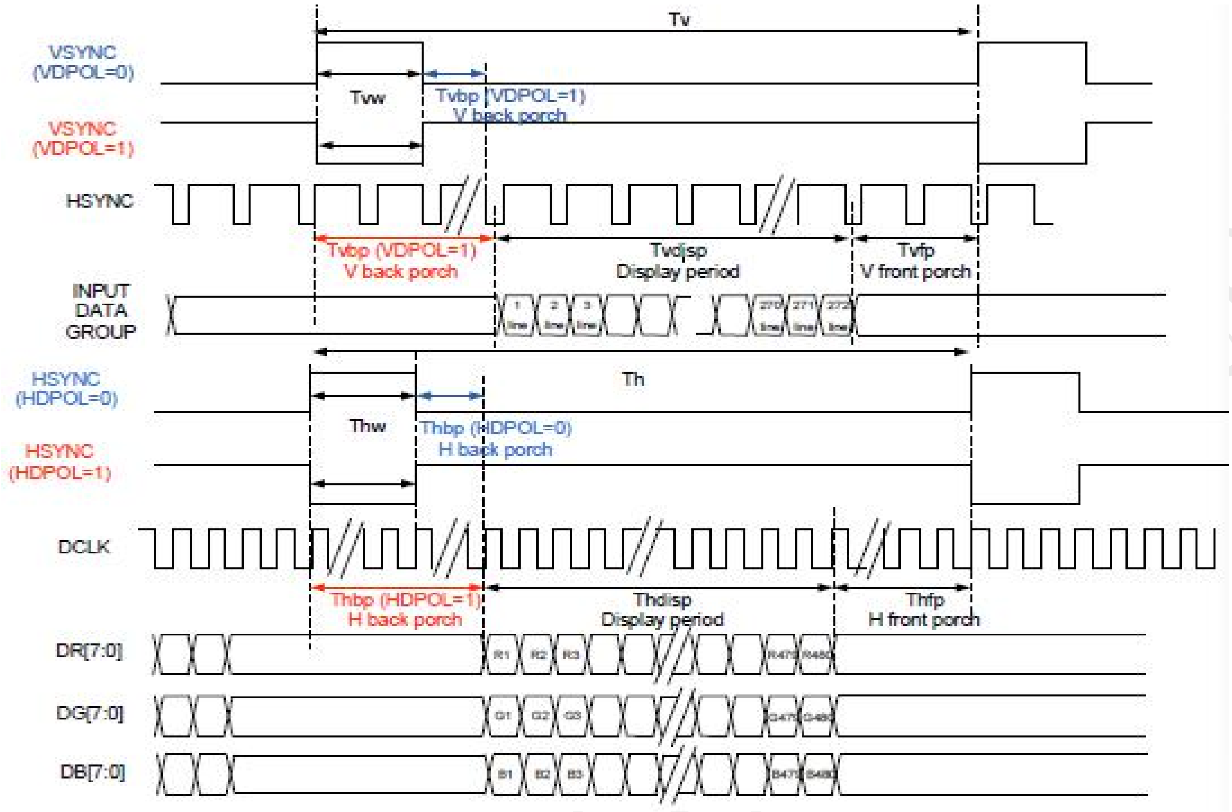
Pin No.	Symbol	I/O	Description	Note
1~2	LED+	P	LED Anode	
3~4	LED-	P	LED Cathode	
5	GND	P	Ground	
6	VCOM	P	Common Power Supply	
7	DVDD	P	Power supply	
8	MODE	I	DE/SYNC mode select,H:DE mode; L:SYNC mode	
9	DE	I	Data enable signal	
10	VS	I	Vertical sync input.Negative polarity.	
11	HS	I	Horizontal sync input.Negative polarity.	
12~19	B7~B0	I/O	Blue Data input	
20~27	G7~G0	I/O	Green Data input	
28~35	R7~R0	I/O	Red Data input	
36	GND	P	Ground	
37	DCLK	I	Clock input	
38	GND	P	Ground	
39	L/R	I	Left or Right Display Control	
40	U/D	I	Up and Down Display Control	
41	VGH	P	Positive Power for TFT	
42	VGL	P	Negative Power for TFT	
43	AVDD	P	Analog Power	
44	RESET	I	Global reset pin.	
45	NC	-	NC	
46	VCOM	P	Common Power Supply	
47	ITHB	I	Dithering function enable control.	
48	GND	P	Ground	
49	NC	-	NC	
50	NC	-	NC	

7. REFERENCE APPLICATION CIRCUIT

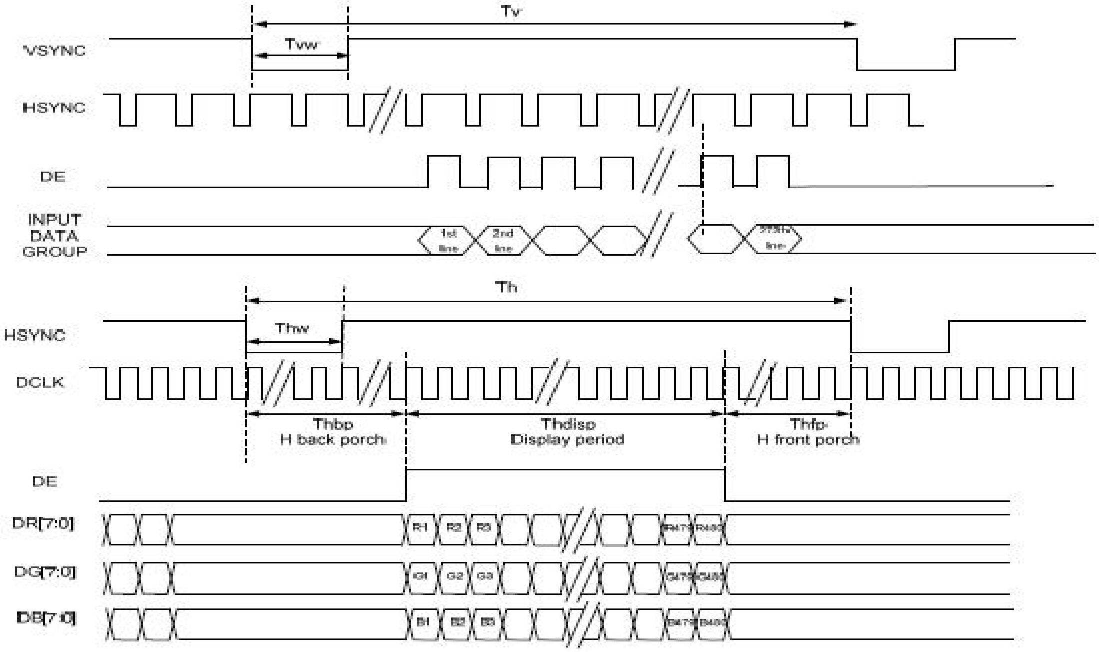
Please consult our technical department for detail information.

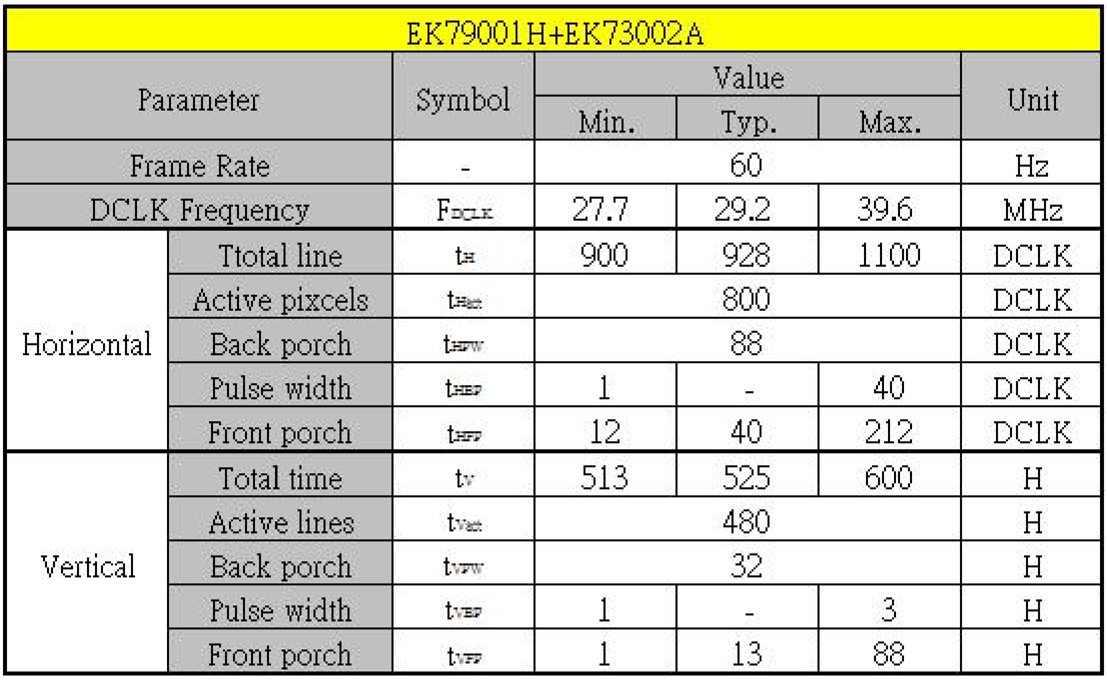
8. TIMINGS FOR 24-bit RGB Interface

8.1 SYNC Mode Timing Diagram


Tv
VSYNC (VDPOL=0)
Tvw
Tvbp (VDPOL=1) V back porch
VSYNC (VDPOL=1)
HSYNC
Tvbp (VDPOL=1) V back porch
Tvdisp Display period
Tvfp V front porch
INPUT DATA GROUP
1 line
2 line
3 line
270 line
271 line
272 line
Th
HSYNC (HDPOL=0)
Thw
Thbp (HDPOL=0) H back porch
HSYNC (HDPOL=1)
DCLK
Thbp (HDPOL=1) H back porch
Thdisp Display period
Thfp H front porch
DR[7:0]
R1
R2
R3
R479
R480
DG[7:0]
G1
G2
G3
G479
G480
DB[7:0]
B1
B2
B3
B479
B480

8.2 SYNC-DE Mode Timing Diagram


Tv
Tvw
VSYNC
HSYNC
DE
INPUT DATA GROUP
1st line
2nd line
272th line
Th
Thw
HSYNC
DCLK
Thbp
H back porch
Thdisp
Display period
Thfp
H front porch
DE
DR[7:0]
R1
R2
R3
R479
R480
DG[7:0]
G1
G2
G3
G479
G480
DB[7:0]
B1
B2
B3
B479
B480



EK79001H+EK73002A						
Parameter		Symbol	Value			Unit
			Min.	Typ.	Max.	
Frame Rate		-	60			Hz
DCLK Frequency		F_{DCLK}	27.7	29.2	39.6	MHz
Horizontal	Ttotal line	t_H	900	928	1100	DCLK
	Active pixcels	t_{Hact}	800			DCLK
	Back porch	t_{HPW}	88			DCLK
	Pulse width	t_{HBP}	1	-	40	DCLK
	Front porch	t_{HFP}	12	40	212	DCLK
Vertical	Total time	t_V	513	525	600	H
	Active lines	t_{Vact}	480			H
	Back porch	t_{VPW}	32			H
	Pulse width	t_{VBP}	1	-	3	H
	Front porch	t_{VFP}	1	13	88	H

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. Seal leak; 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	0±2°C∆25°C∆+50±2°C x 10cycles (30min) (5min) (30min)	
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.

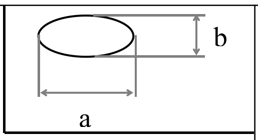
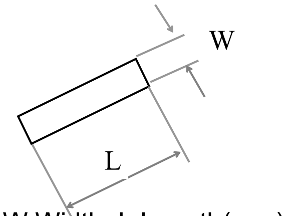
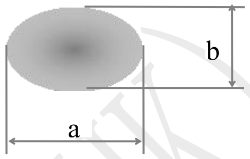
(5) Failure judgment criterion: basic specification, electrical characteristic, mechanical characteristic, optical characteristic.

10. PACKING SPECIFICATION

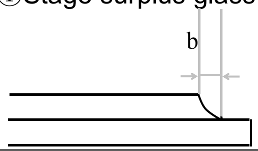
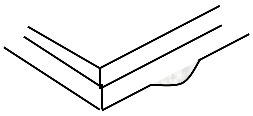
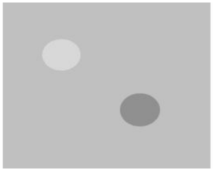
TBD.

11. INSPECTION CRITERION

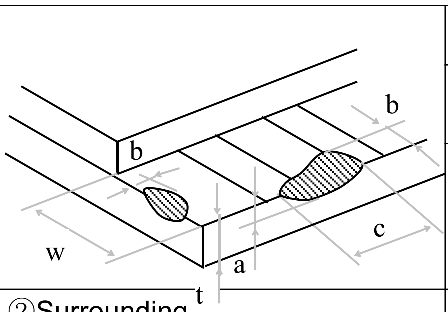
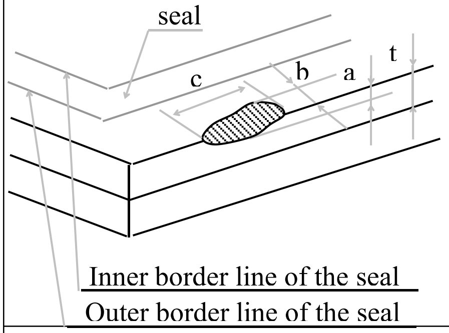
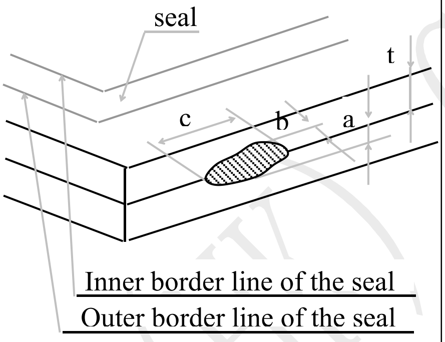
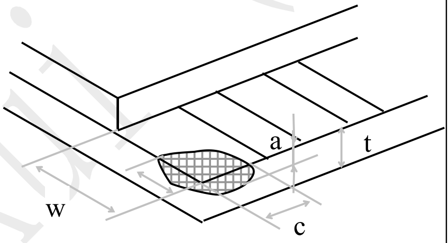
Inspection item	Judgement standard		
	Category	Acceptable number	
		A zone	B zone

1	Black spot, White spot, Bright Spot, Pinhole Foreign Particle, Bubble and Particle Between polarizer and glass, scratch on polarizer	 Φ=(a+b)/2(mm)	A B C D	Φ≦0.15 0.15<Φ≦0.20 0.20<Φ≦0.30 0.30<Φ	Ignored 2 1 0	Ignored
			Total defective point(B,C)		3	
	Pixel point defect	Bright spot		0.15<Φ≦0.20	N≦0	Ignored
		Dark spot/ Black spot		0.15<Φ≦0.20	N≦2	
		Attached to the two pixels are bright spots		0.15<Φ≦0.20	N≦0	
		Even a two pixel is dark		0.15<Φ≦0.20	N≦0	
		Pixel total number		0.15<Φ≦0.20	N≦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	 W:Width, L:Length(mm)	A B C D	W≦0.10 0.01<W≦0.03 L≦3.0 0.03<W≦0.05 L≦3.0 0.05<W	Ignored 2 1 0	Ignored
			Total defective point(B,C)		2	
3	Contrast variation	 Φ=(a+b)/2(mm)	A B C D	Φ≦0.2 0.2<Φ≦0.3 0.3<Φ≦0.4 0.4<Φ	Ignored 2 1 0	Ignored
			Total defective point(B,C)		3	
4	Bubble inside cell		any size		none	none
5	Polarizer defect (if Polarizer is used)	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 B C	Φ≦0.3 0.3<Φ≦0.7 0.7<Φ	Ignored 2 0	Ignored
			Total defective point(B,C)		2	

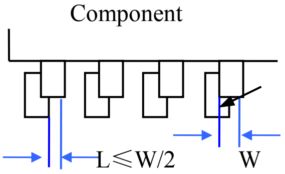
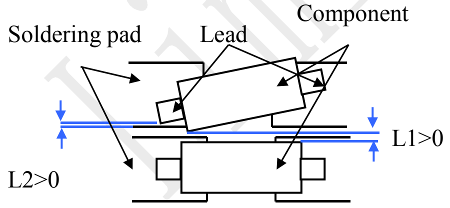
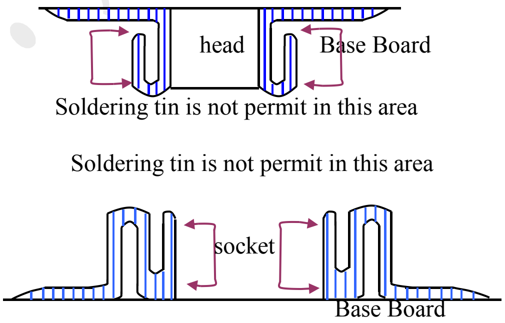
Inspection item	Judgement standard		
	Category	Acceptable number	
		A zone	B zone

6	Surplus glass	①Stage surplus glass  	b≦0.3mm
		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≦0. 10mm Ignored； 0. 10mm<D≦0. 3mm, N≦2； D>0. 3mm： 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	①The front of lead terminals	A	If a≦t and b ≦1.0,　c is not limited

	defect crack		B	a≦t, 1≦b≦2mm, c≦3mm
			C	If glass crack cover alignment mark, b≦0.5mm.
			D	Crack at two sids of lead terminals should not cover patterns and alignment mark
		②Surrounding crack—non-contact side  seal c b a t Inner border line of the seal Outer border line of the seal	b < Inner borderline of the seal	
		③ Surrounding crack— contact side  seal t c b a Inner border line of the seal Outer border line of the seal	b < Outer borderline of the seal	
		④Corner 	A	a ≦ t, b ≦ 3.0, c ≦ 3.0
			*Glass crack should not cover patterns used for	

Inspection item	Judgement standard

9	FPC defect	Component soldering: No cold soldering, short/open circuit, burr, tin ball. The flat encapsulation component position deviation must be less than 1/2 width of the pin (Pic.1)； The sheet component deviation: pin deviates from the pad and contact with the near components is not permitted（Pic.2）	 Component L≤W/2 W
		lead defect: The lead lack must be less than 1/2of its width; The lead burr must be less than 1/2 of the seam; Impurities connect with the near leads is not permitted	 Soldering pad Lead Component L1>0 L2>0
		Connector soldering: Soldering tin is at contact position of the plug and socket is not permitted No foundation is scald Serious cave distortion on plug and socket contact pin is not permitted	 head Base Board Soldering tin is not permit in this area Soldering tin is not permit in this area socket Base Board

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.