

SPECIFICATION
FOR
LCM Module
KD070HDFPA017

MODULE No:	KD070HDFPA017
CUSTOMER:	

STARTEK	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		

Part. No	KD070HDFPA017	REV	V1.0	Page 1 of 25
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	



Revision History

[illegible]

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* 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 7.0 " TFT-LCD contains 1024x600 pixels, and can display up to 16.7M colors.

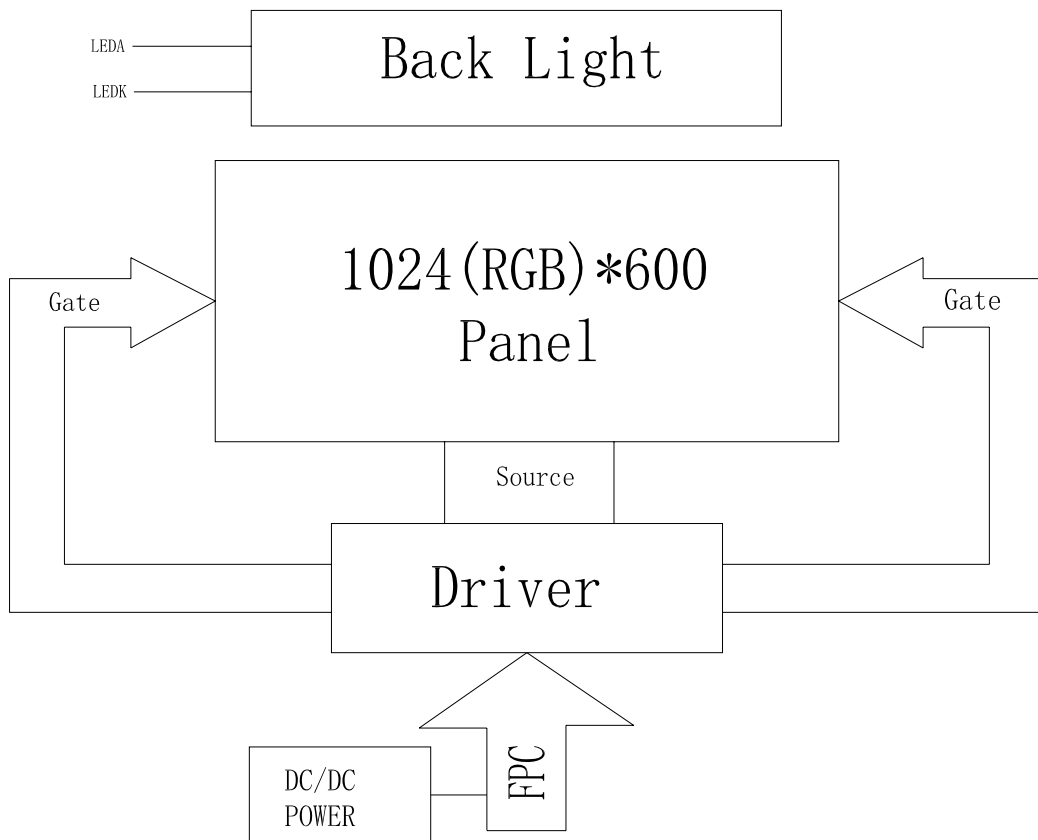
* Features

General Information Items	Specification	Unit	Note
	Main Panel		
Display area (AA)	154.21(H)*85.92 (V) (7.0inch)	mm	
Driver element	TFT active matrix	-	
Display colors	262K/16.7M	colors	
Number of pixels	1024(RGB)*600	dots	
Pixel arrangement	RGB vertical stripe	-	
Pixel pitch	0.1506(H)*0.1432(V)	mm	
Viewing angle	All	o'clock	
Controller IC	EK73215& EK79001	-	
LCM Interface	16/18/24 BIT RGB	-	
Display mode	Transmissive /Normally Black	-	
Operating temperature	-20~+70	℃	
Storage temperature	-30~+80	℃	

* Mechanical Information

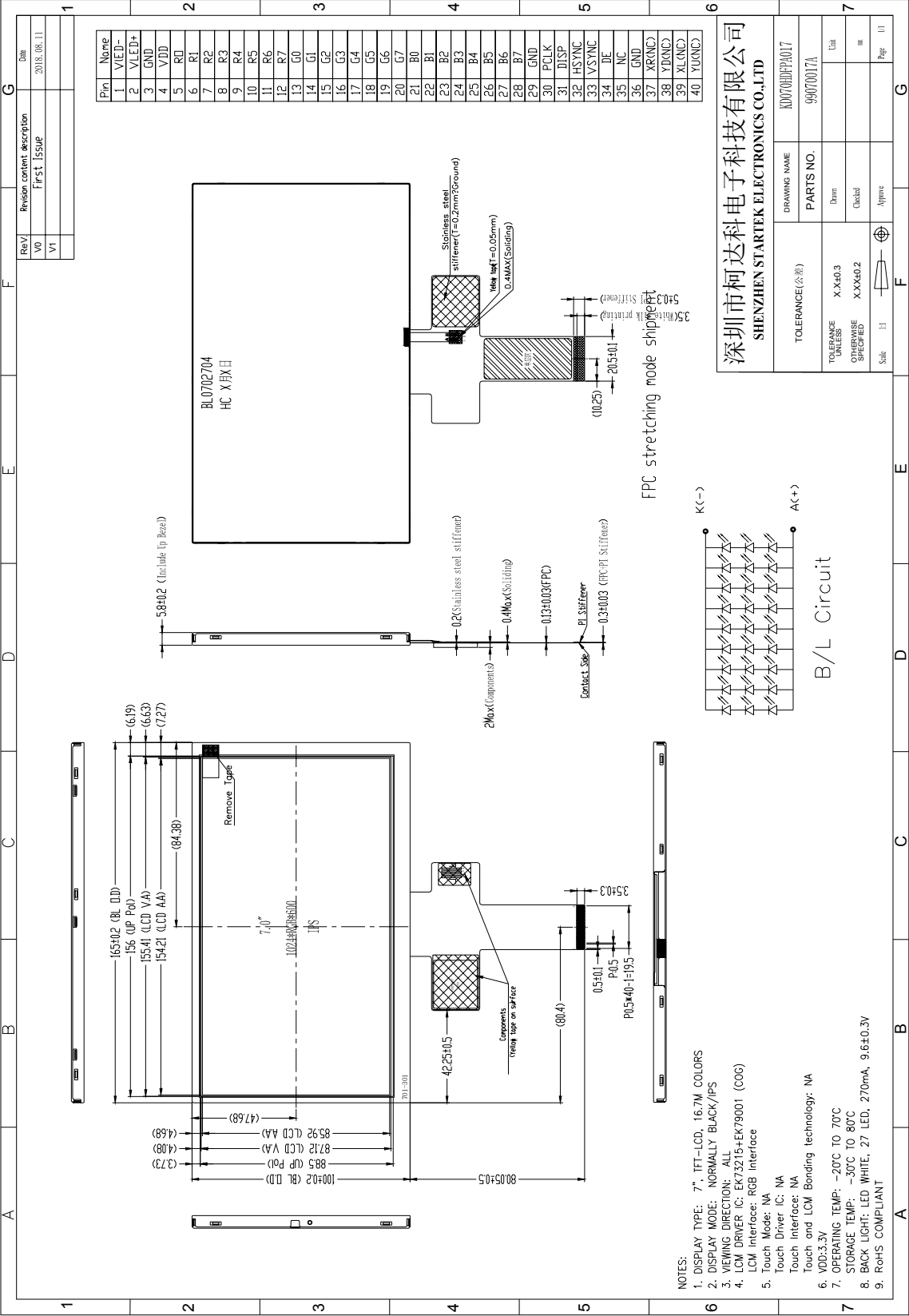
Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	165	-	mm	
	Vertical(V)	-	100	-	mm	
	Depth(D)	-	5.8	-	mm	
Weight		-	(142)	-	g	

1. Block Diagram



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2. Outline dimension



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3. Input terminal Pin Assignment

NO.	SYMBOL	DISCRIPTION	I/O
1	LED-	LED Cathode	P
2	LED+	LED Anode	P
3	GND	Ground	P
4	VDD	Power supply for digital circuits	P
5-12	R0-R7	Red data input	I
13-20	G0-G7	Green data input	I
21-28	B0-B7	Blue data input	I
29	GND	Ground	P
30	PCLK	Input clock edge selection. Normally pull low CLKPOL = "1", Latch data at DCLK rising edge. CLKPOL = "0", Latch data at DCLK falling edge. (Default)	I
31	DISP	Standby mode, Normally pulled high. STBYB = "1", normal operation STBYB = "0", timing controller, source driver will turn off, all output are High-Z	I
32	HSYNC	Horizontal Sync input for TTL mode. Negative polarity	I
33	VSYNC	Vertical Sync input for TTL mode. Negative polarity	I
34	DE	Data Input Enable. Active High to enable the data input bus under "DE Mode". Normally pull low.	I
35	NC	--	--
36	GND	Ground	P
37	XR(NC)	--	--
38	YD(NC)	--	--
39	XL(NC)	--	--
40	YU(NC)	--	--

4. LCD Optical Characteristics

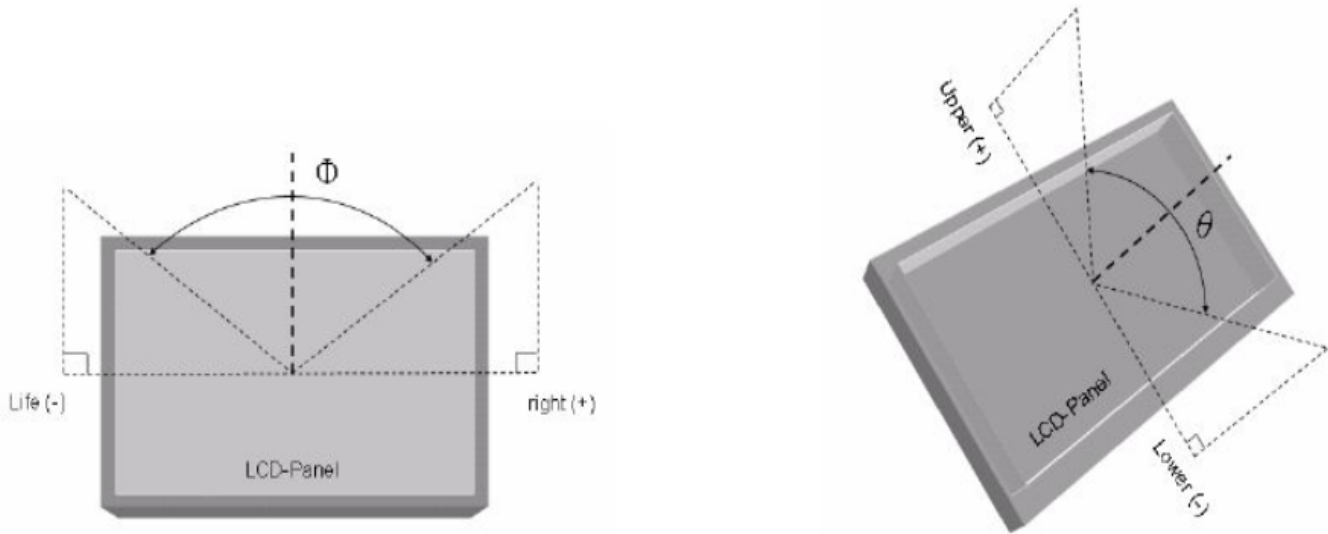
4.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	Θ=0 Normal viewing angle	600	800	--		
Response time	Rising	T _R +T _F		--	25	40	msec	
	Falling							
Uniformity		S(%)		--	50	--	%	
Color Filter Chromacicity	White	W _X		0.2668	0.3068	0.3468		
		W _Y		0.2984	0.3384	0.3784		
	Red	R _X		0.5758	0.6158	0.6558		
		R _Y		0.2915	0.3315	0.3715		
	Green	G _X		0.2907	0.3307	0.3707		
		G _Y		0.5345	0.5745	0.6145		
	Blue	B _X		0.1066	0.1466	0.1866		
		B _Y		0.0738	0.1138	0.1538		
Viewing angle	Hor.	Θ _L	CR>10	--	85	--		
		Θ _R		--	85	--		
	Ver.	Θ _U		--	85	--		
		Θ _D		--	85	--		
Option View Direction		All						

4.2 Measuring Condition

- Measuring surrounding : dark room
- Ambient temperature : 25±2℃
- The measured value of luminace and color coordinate bases BM-7

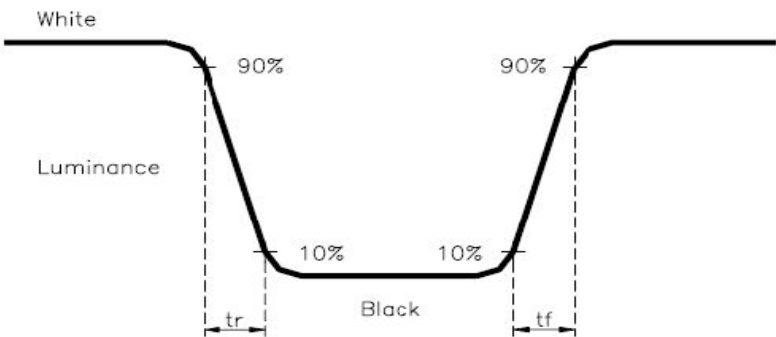
Note (1) Definition of Viewing Angle



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) Definition of Response Time : Sum of Tr and Tf

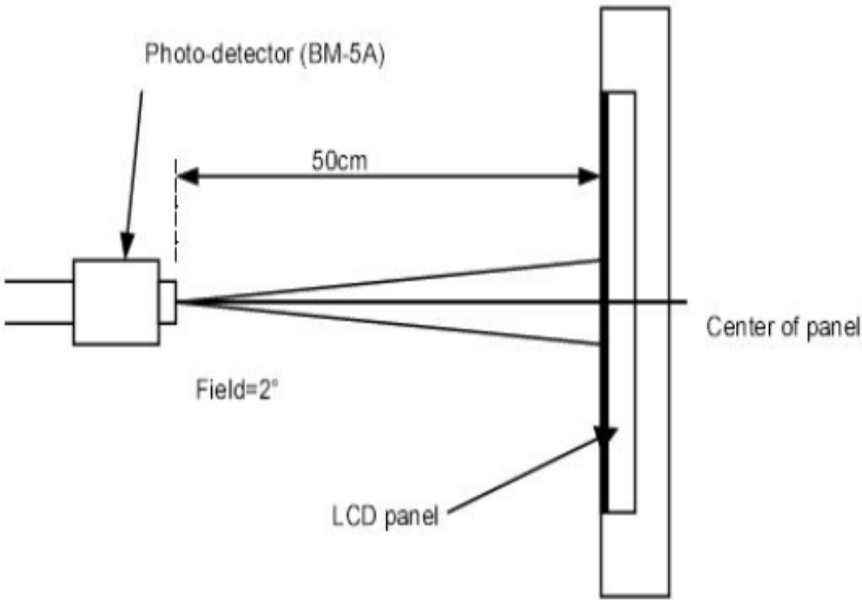


Definition of Response Time

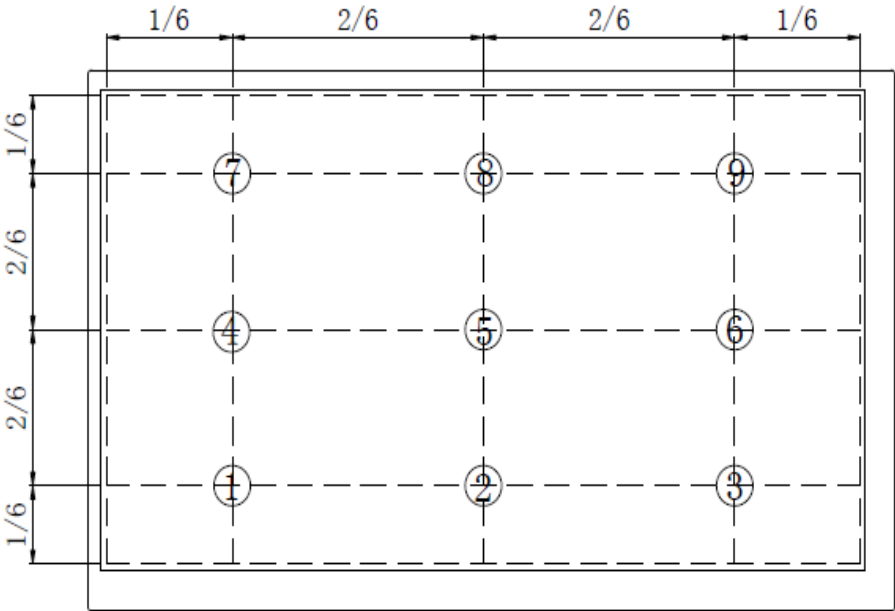
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Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity



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5. Electrical Characteristics

5.1 Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	VDD	-0.3	3.6	V	Note1
Operating temperature	T _{OP}	-20	+70	°C	
Storage temperature	T _{ST}	-30	+80	°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

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	
Normal mode Current	IDD	--	120	--	mA	
Level input voltage	V _{IH}	0.7*VDD	--	VDD	V	
	V _{IL}	0	--	0.3*VDD	V	
Level output voltage	V _{OH}	VDD-0.4	--	VDD	V	
	V _{OL}	0	--	0.4	V	

5.3 LED Backlight Characteristics

The back-light system is edge-lighting type with 27 chips LED

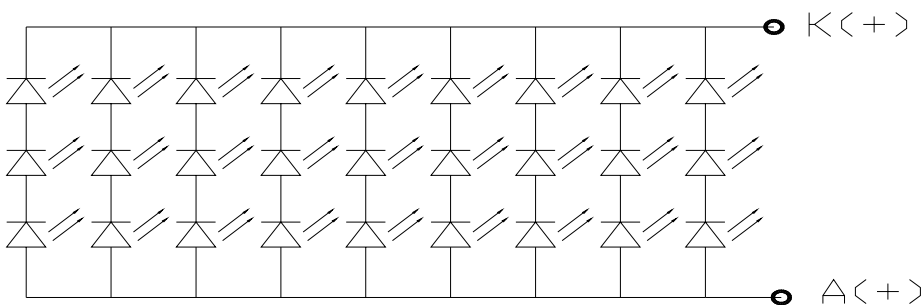
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F	180	270	--	mA	
Forward Voltage	V_F	--	9.6	--	V	
LCM Luminance ($I_F = 180\text{mA}$)	LV	350	450	--	cd/m ²	Note3
LCM Luminance ($I_F = 270\text{mA}$)	LV	550	600	--	cd/m ²	Note3
LED life time	Hr	30000	50000	--	Hour	Note1,2
Uniformity	Avg	80	--	--	%	Note3

Note1: LED life time (Hr) can be defined as the time in which it continues to operate under the condition:

$T_a = 25 \pm 3^\circ\text{C}$, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at

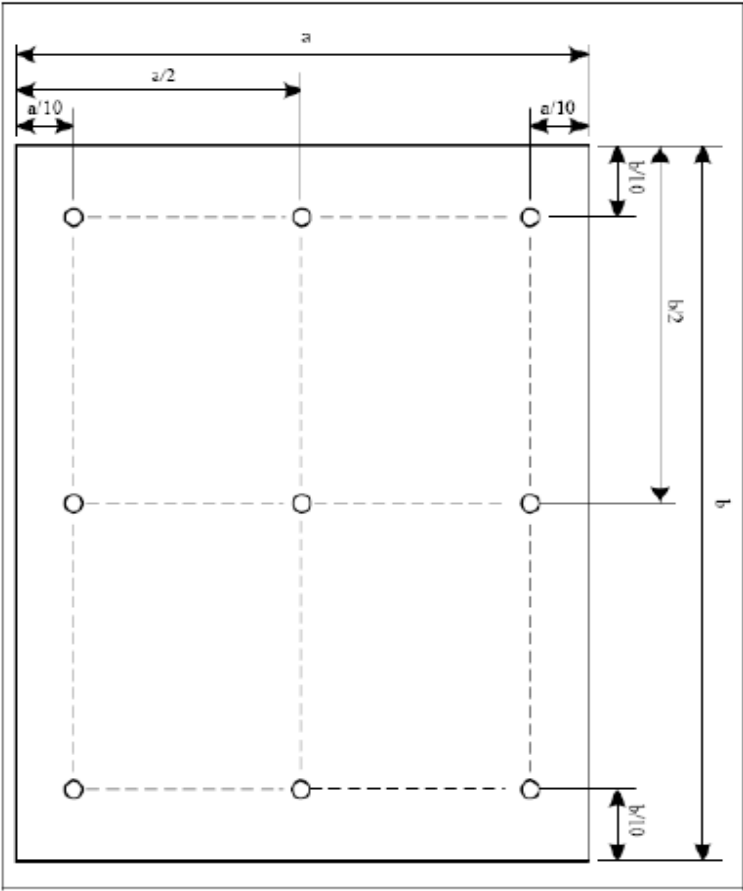
$T_a = 25^\circ\text{C}$ and $I_L = 270\text{mA}$. The LED lifetime could be decreased if operating I_L is larger than 270mA. The constant current driving method is suggested.



B/L Circuit

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Note (3) Luminance Uniformity of these 9 points is defined as below:



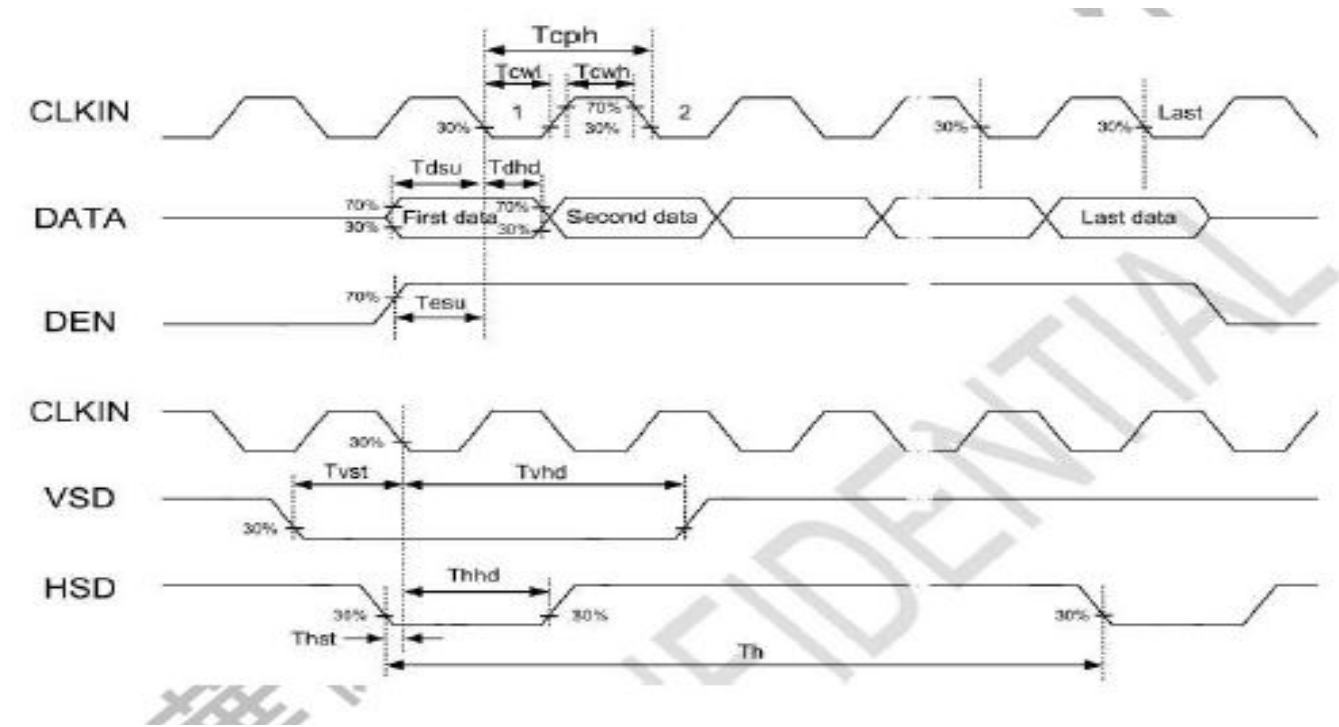
$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

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

6. AC Characteristic

6.1 Input Clock and Data Timing

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
DVDD Power On Slew Rate	TPOR	-	-	20	ms	From 0V to 90% DVDD
RSTB Pulse Width	TRst	50	-	-	us	DCLK=65MHz
DCLK Cycle Time	Tcph	14	-	-	ns	
DCLK Pulse Duty	Tcwh	40	50	60	%	
VSD Setup Time	Tvst	5	-	-	ns	
VSD Hold Time	Tvhd	5	-	-	ns	
HSD Setup Time	Thst	5	-	-	ns	
HSD Hold Time	Thhd	5	-	-	ns	
Data Setup Time	Tdsu	5	-	-	ns	D0[7:0],D1[7:0],D2[7:0] to DCLK
Data Hold Time	Tdhd	5	-	-	ns	D0[7:0],D1[7:0],D2[7:0] to DCLK
DEN Setup Time	Tesu	5	-	-	ns	
DEN Hold Time	Tehd	5	-	-	ns	

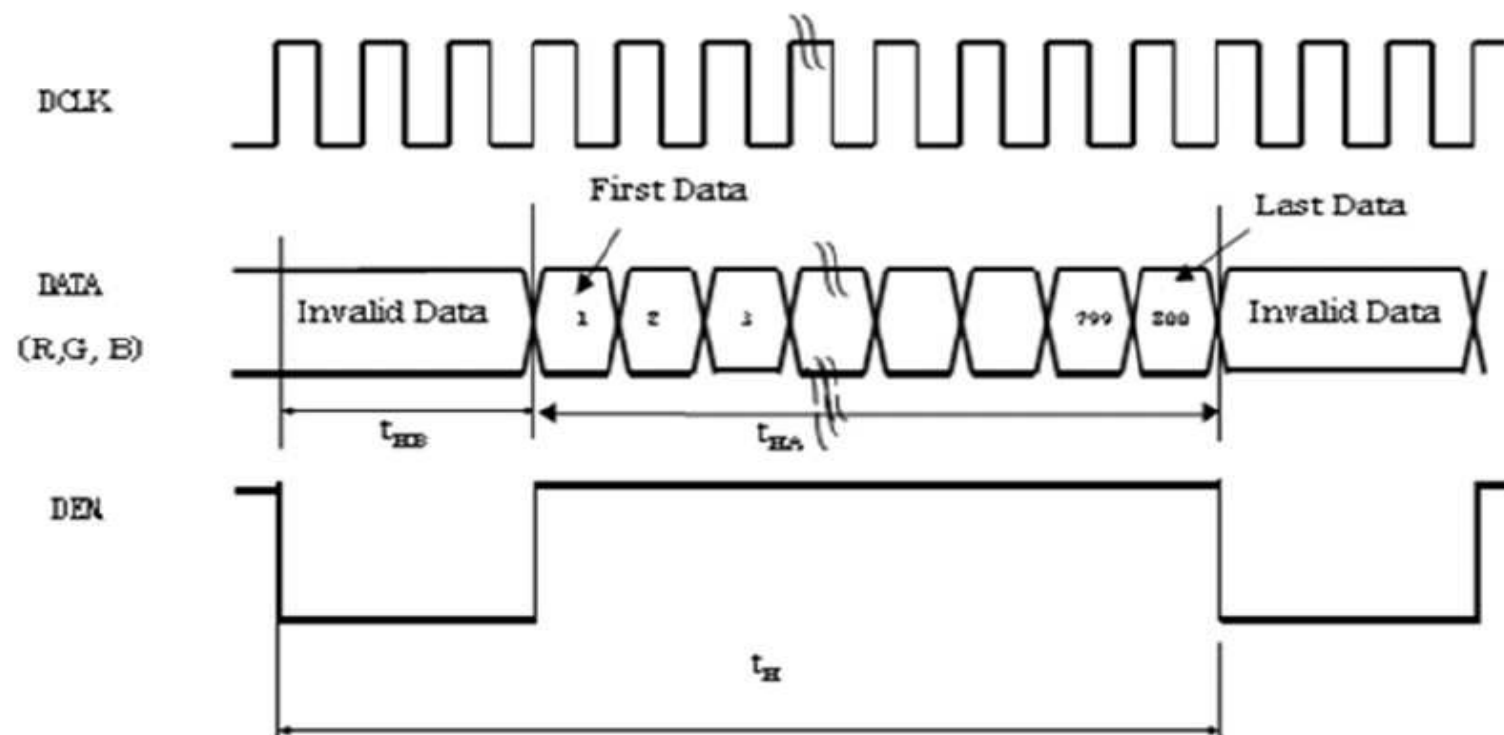




6.2 Input Timing

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
DE MODE	Dot Clock	1/tCLK	45	51.2	57	MHz	
	DCLK Pulse Duty	Tcwh	40	50	60	%	
	Horizontal Total Time	tH	1324	1344	1364	tCLK	
	Horizontal Effective Time	tHA	1024			tCLK	
	Horizontal Blank Time	tHB	300	320	340	tCLK	
	Vertical Total Time	tV	625	635	645	tH	
	Vertical Effective Time	tVA	600			tH	
	Vertical Blank Time	tVB	25	35	45	tH	
SYNC MODE	Horizontal Total Time	TH	1324	1344	1364	tCLK	
	Horizontal Pulse Width	Thpw		20	-	tCLK	thb + thpw = 160DCLK is fixed
	Horizontal Back Porch	Thb		140	-	tCLK	
	Horizontal Front Porch	Thfp	140	160	180	tCLK	
	Horizontal Effective Time	THA	1024			tCLK	
	Vertical Total Time	TV	625	635	645	tH	
	Vertical Pulse Width	Tvpw		3	-	tH	tvpw + tvb = 23th is fixed
	Vertical Back Porch	Tvb	-	20	-	tH	
	Vertical Front Porch	Tvfp	2	12	22	tH	
	Vertical Valid	Tvd	600			tH	

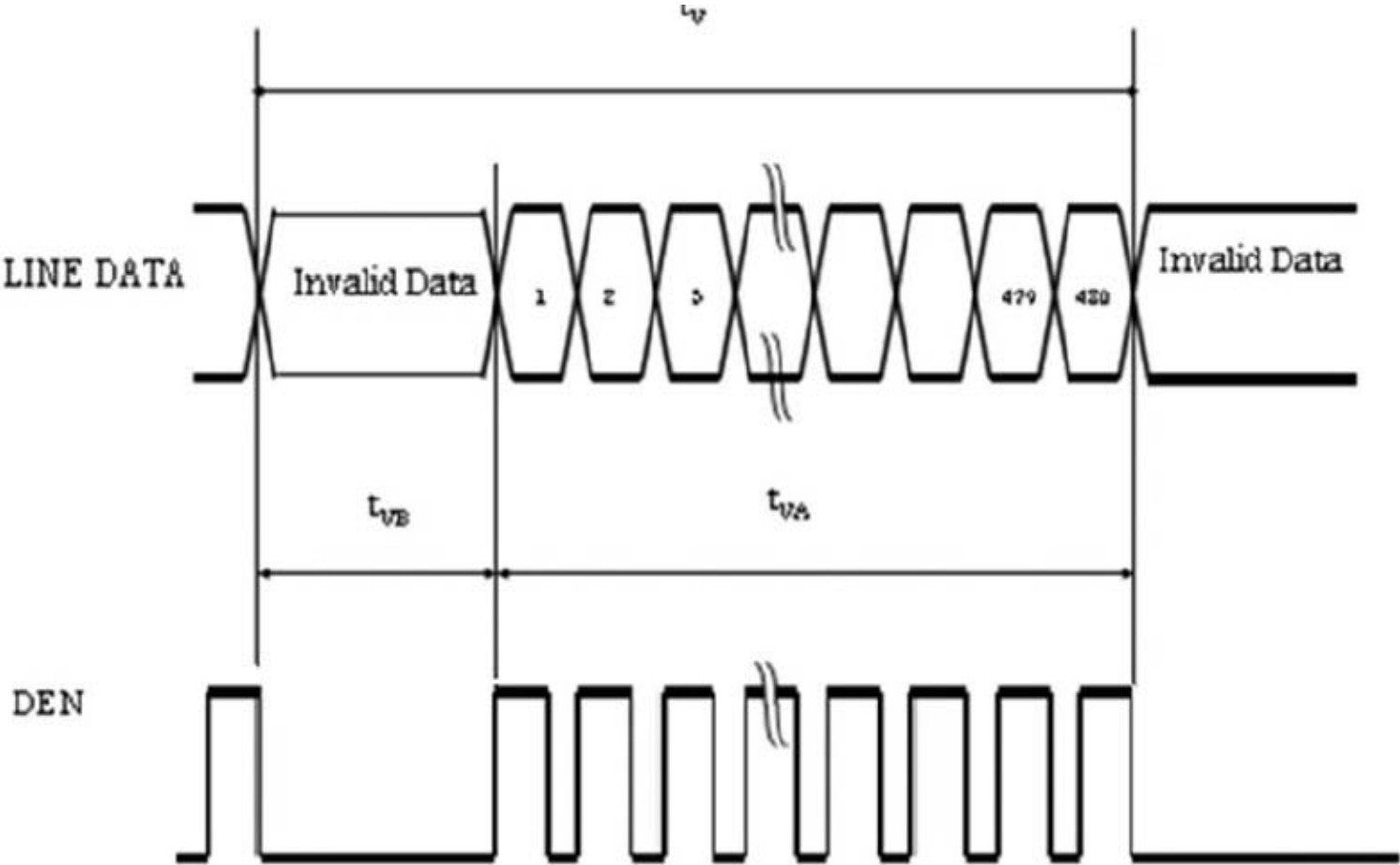
6.3 DE Mode



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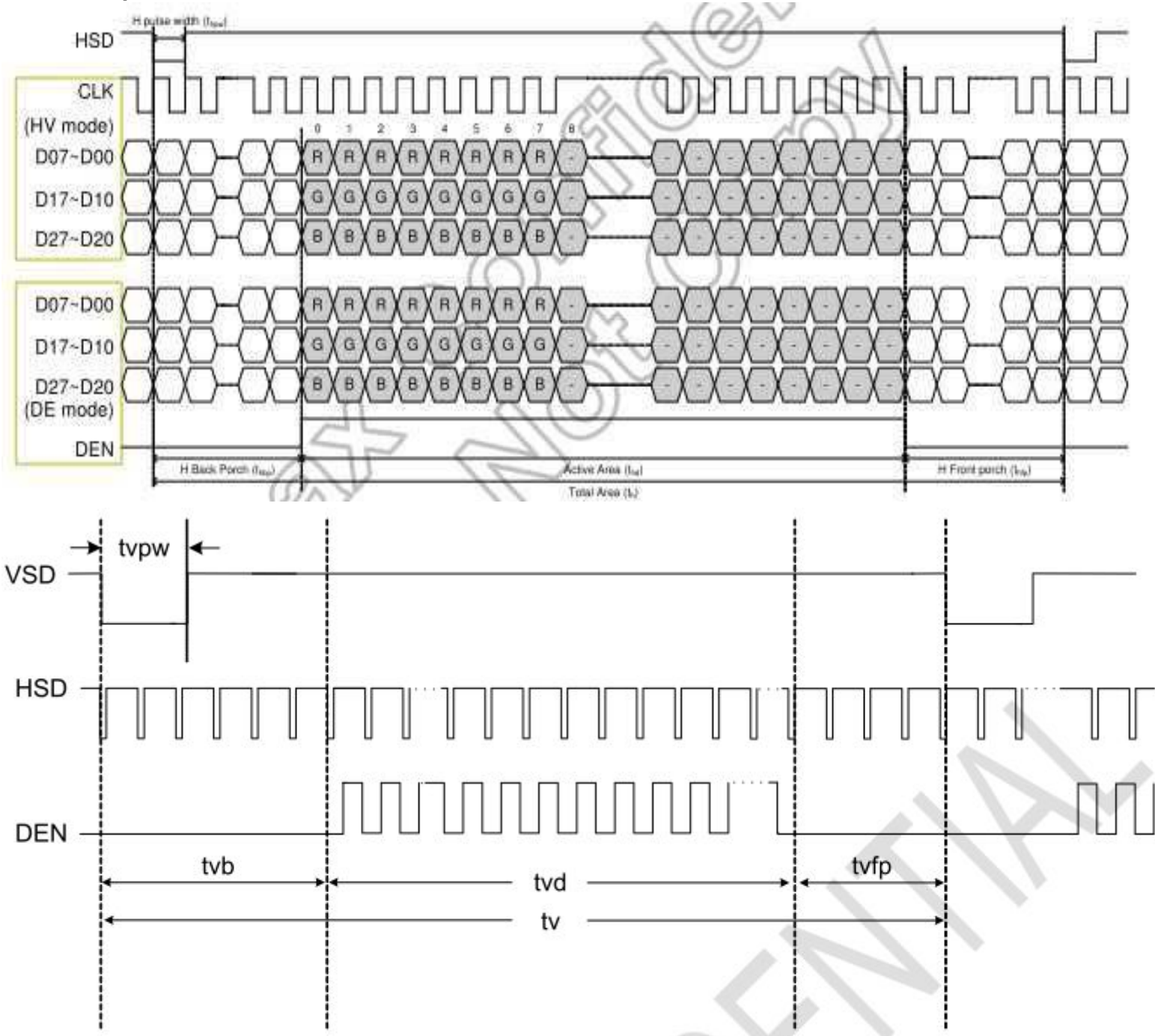
6.4 SYNC Mode



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6.5 Data Input Format



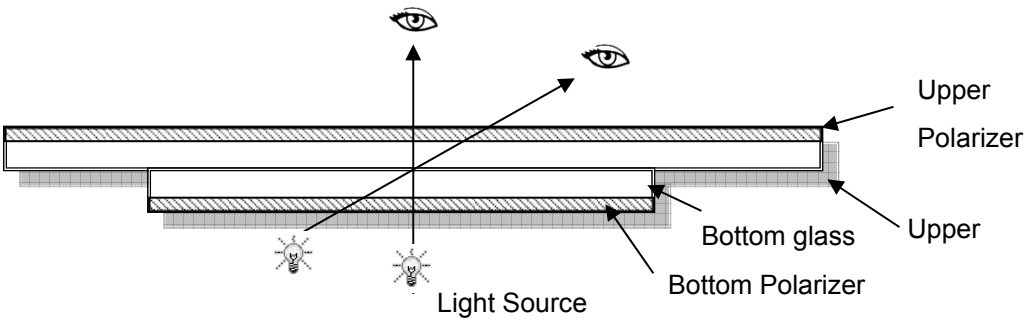
7. LCD Module Out-Going Quality Level

7.1 VISUAL & FUNCTION INSPECTION STANDARD

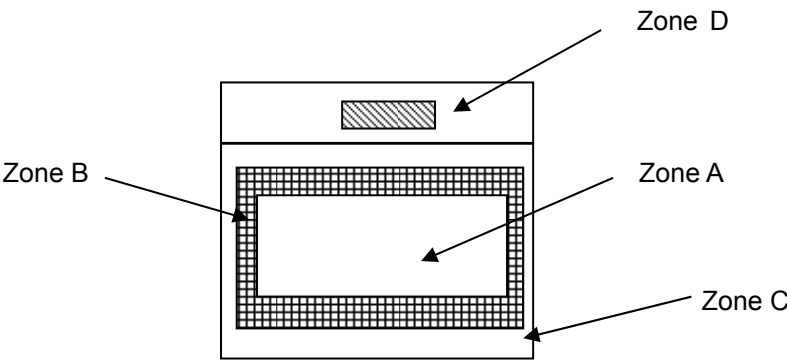
7.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

- Temperature : 25±5℃
- Humidity : 65%±10%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

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7.1.3 Sampling Plan

According to GB/T 2828.1-2003 ; , normal inspection, Class II

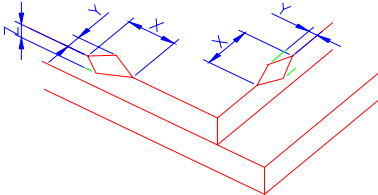
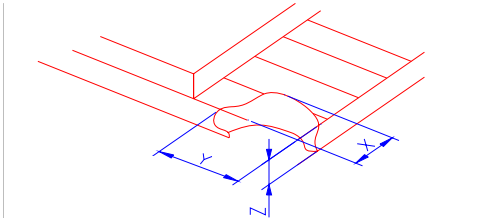
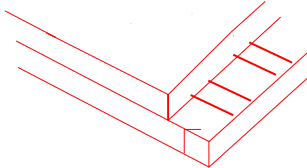
AQL:

Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

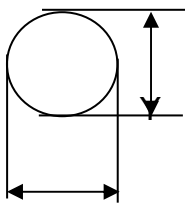
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing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

7.1.4 Criteria (Visual)

Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken NOTE: X: Length Y: Width Z: Height L: Length of ITO, 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							

2.0

Spot defect



X

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

① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.10$	Ignore		
$0.10 < \Phi \leq 0.25$	4(distance $\geq 10\text{mm}$)		
$0.25 < \Phi \leq 0.35$	3		
$\Phi > 0.4$	0		

②Dim spot (LCD/TP/Polarizer dim dot, light leakage、dark spot)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.1$	Ignore		
$0.10 < \Phi \leq 0.25$	4(distance $\geq 10\text{mm}$)		
$0.25 < \Phi \leq 0.35$	3		
$\Phi > 0.4$	0		

③ Polarizer accidented spot

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.2$	Ignore		
$0.3 < \Phi \leq 0.5$	3(distance $\geq 10\text{mm}$)		
$\Phi > 0.5$	1		

④Pixel bad points (light dot, Dim dot, color dot)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.15$	Ignore		
$0.2 < \Phi \leq 0.3$	2(distance $\geq 10\text{mm}$)		
$\Phi > 0.4$	1		

⑤ Polarizer Bubble

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.2$	Ignore		
$0.3 < \Phi \leq 0.4$	4(distance $\geq 10\text{mm}$)		
$0.4 < \Phi \leq 0.5$	3		
$\Phi > 0.5$	1		

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支持小量
NO MOQ

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In Full Range

3.0	Line defect (LCD/TP /Polarizer backlight black/white line, scratch, stain)	<table><tr><td rowspan="2">Width(mm)</td><td rowspan="2">Length(m m)</td><td colspan="3">Acceptable Qty</td></tr><tr><td>A</td><td>B</td><td>C</td></tr><tr><td>$\Phi\leq0.05$</td><td>Ignore</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr><tr><td>$0.05<W\leq0.06$</td><td>$L\leq5.0$</td><td colspan="2">$N\leq3$</td></tr><tr><td>$0.07<W\leq0.08$</td><td>$L\leq4.0$</td><td colspan="2">$N\leq2$</td></tr><tr><td>$0.08<W$</td><td colspan="4">Define as spot defect</td></tr></table>	Width(mm)	Length(m m)	Acceptable Qty			A	B	C	$\Phi\leq0.05$	Ignore	Ignore		Ignore	$0.05<W\leq0.06$	$L\leq5.0$	$N\leq3$		$0.07<W\leq0.08$	$L\leq4.0$	$N\leq2$		$0.08<W$	Define as spot defect			
		Width(mm)			Length(m m)	Acceptable Qty																						
			A	B		C																						
		$\Phi\leq0.05$	Ignore	Ignore		Ignore																						
		$0.05<W\leq0.06$	$L\leq5.0$	$N\leq3$																								
$0.07<W\leq0.08$	$L\leq4.0$	$N\leq2$																										
$0.08<W$	Define as spot defect																											
4.0	Electronic Components SMT	Not allow missing parts, solderless connection, cold solder joint, mis match, The positive and negative polarity opposite																										
5.0	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.																										
6.0	LCD Mura	By 5% ND filter invisible.																										

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
5	TP no function	Not allowed

8. Reliability Test Result

Item	Condition	Inspection after test
High Temperature Operating	70℃,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	-20℃, 96HR	
High Temperature Storage	80℃, 96HR	
Low Temperature Storage	-30℃, 96HR	
High Temperature & High Operating	+60℃, 90% RH ,96 hours.	
Thermal Shock (Non-operation)	-30℃,30 min ↔ 80℃,30 min, Change time:5min 20CYC.	
ESD test	C=150pF, R=330,5points/panel Air:±8KV, 5times; Contact:±6KV, 5 times; (Environment: 15℃~35℃, 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.

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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.

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10. Packing

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常 备 库 存 Stock For Sale	长 期 供 货 Long Time supply	支持小量 NO MOQ	品 种 齐 全 In Full Range	