

PRODUCT SPECIFICATION

MODEL:RV050WVM-720-50

<◇>PRELIMINARY SPECIFICATION

<◆>APPROVAL SPECIFICATION

CUSTOMER APPROVED	DESIGNED	CHECKED	APPROVED

SUPPLIER APPROVED	DESIGNED	CHECKED	APPROVED

PREPARED BY:

REVISION STATUS

Revision	Description	Page	Revision Date
1.0	First Revision	---	2020.03.20

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1.0 GENERAL DESCRIPTION

1.1 Introduction

The model **RV050WVM-720-50** is a color active matrix thin film transistor (TFT) liquid crystal display

(LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 5.0(15:9) inch diagonally measured active display area with (800 horizontal by 480 vertical pixel) resolution.

1.2 Features

- 5.0 inch(15:9diagonal) configuration.
- Compatible with NTSC & PAL system
- RoHS design
- Image Reversion: UP/DOWN and LEFT/RIGHT

1.3 Applications

- Automotive cluster

1.4 General information

Item	Specification	Unit
Screen Size	5.0 inches	Diagonal
Number of Pixel	800 RGB (H) ×480(V)	Pixels
Display area	108(H) × 64.8(V)	mm
Module Outline Dimension	120.70x 75.8 x4.5(Typ)	mm
Display mode	Normally Black , IPS	--
Pixel arrangement	RGB Vertical stripe	--
Pixel pitch	0.135(H) ×0.135(V)	mm
Back-light	LED Side-light type	--
VIEW DIRECTION	IPS	--
Interface	RGB	

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	120.55	120.7	120.85	mm
	Vertical (V)	75.65	75.8	75.95	mm
	Depth (D)	4.3	4.5	4.7	mm
Weight		--	72	--	g

2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

2.1.1 Absolute Maximum Ratings (GND = 0 V)

Item	Symbol	Min	Max	Unit
Power supply voltage	VDD	-0.5	3.96	V
	VCOM	--	--	V
	AVDD	-5.5	5.5	V
Analog Supply Voltage, VDDA, V1~V14		--	--	v

Note:

1. Permanent damage may occur to the LCD module if beyond this specification, Functional operation should be restricted to the conditions described under normal operating conditions.
2. VOLTAGE ($T_A = 25 \pm 0.2^\circ\text{C}$, $V_{SS} = V_{SSA} = 0\text{V}$)

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit
Storage temperature	T_{STG}	-35	85	$^\circ\text{C}$
Operating temperature	T_{OPR}	-30	80	$^\circ\text{C}$

3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item		Symb	Condition	Min	Type	Max	Unit	Note
White luminance (Center)		YL	$\Theta=0$ Normal Viewing Angle	750	--	TBD	Cd/m2	(1)(4)(6)
Response time		T _{r+Tf}		--	30	40	msec	(1)(3)
		--		--	--			
Contrast ratio		CR		--	1000	--	--	(1)(2)
Color Chromaticity (CIE 1931)	white	W _x		0.260	0.310	0.360		(1)(4)
		W _y		0.280	0.330	0.380		
Viewing Angle	Hor.	Θ _L	CR≥100	--	85	--		(1)(4)
		Θ _R		--	85	--		
	Ver.	Θ _U		--	85	--		
		Θ _D		--	85	--		
Brightness uniformity		B _{UNI}	Θ=0	80	--	--	%	(5)
Color gamut (NTSC)		S		--	70	--	%	C-Light
Optima View Direction		free						

1), 客户签样亮度 $\pm 10\%$ = 大货亮度,小于10%视为不良。

2), 大货同一批色调一致的情况下（目视同为冷色或暖色）与客户签样相比, X色坐标相差 ± 0.015 , Y色坐标相差 ± 0.02 以内视为正常OK品。

3.2 Measuring Condition

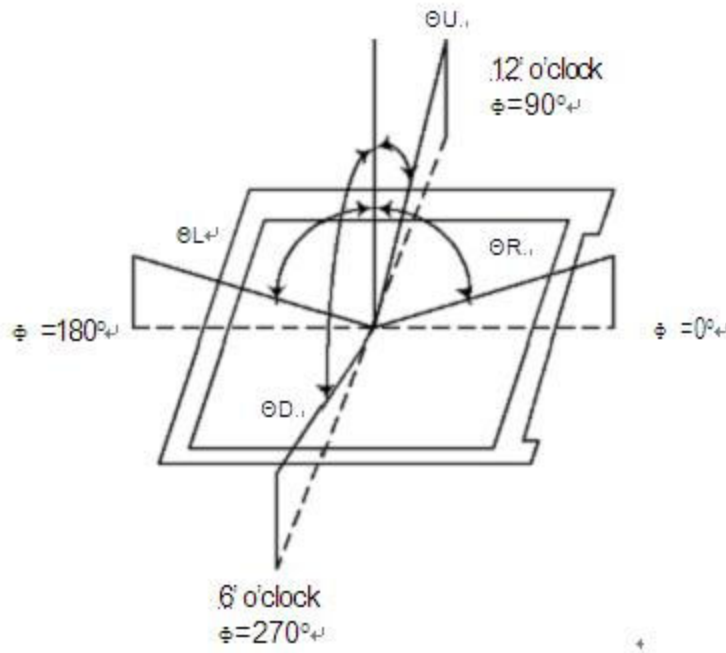
- Measuring surrounding: dark room
- LED current IL:90mA
- Ambient temperature: $25 \pm 2^\circ\text{C}$
- 30min. warm-up time

3.3 Measuring Equipment

- BM-7 optical characteristics.
- Measuring spot size: 20 ~ 21mm

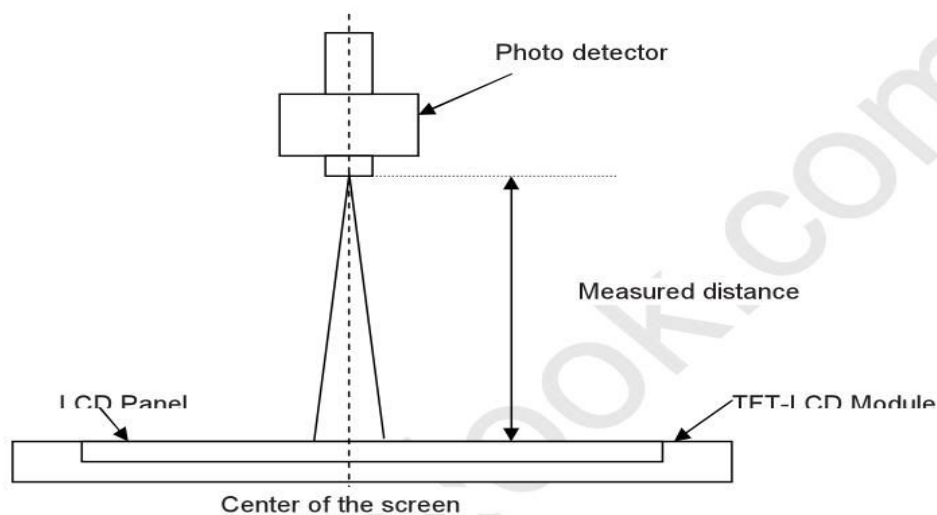
Note (1) Definition of Viewing angle range:

Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

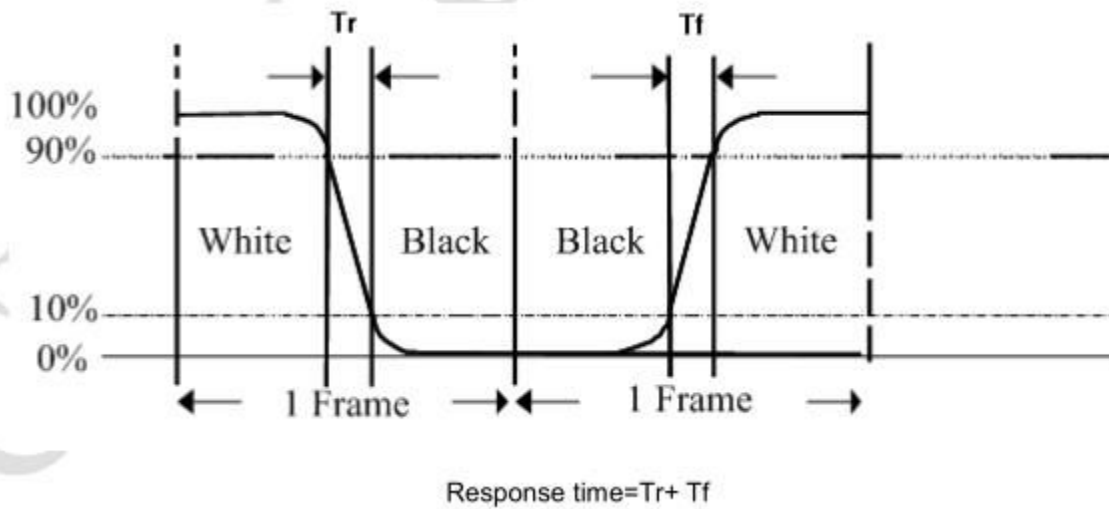


Note (2) Definition of Contrast Ratio(CR): Measured at the center point of panel

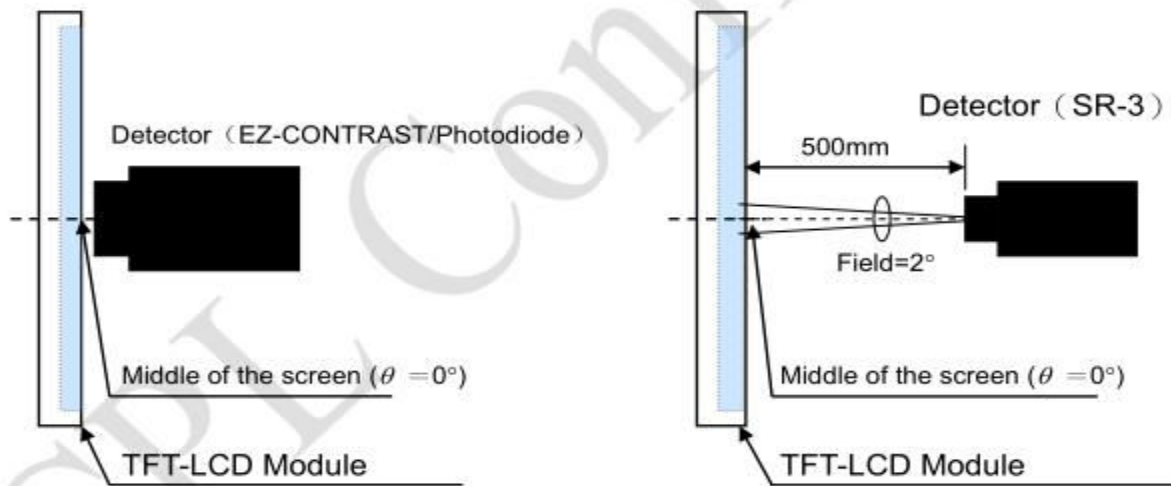
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$



Note (3) Definition of Response Time: Sum of T_r and T_f



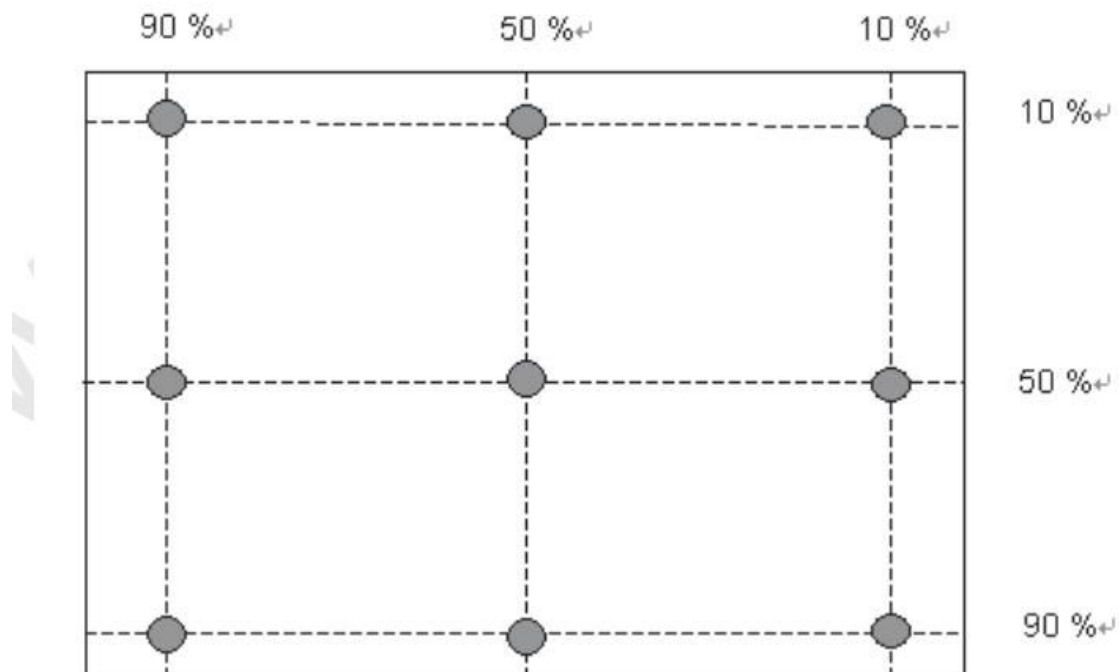
Note (4) Definition of optical measurement setup



Measurement of viewing angle range, Response time.

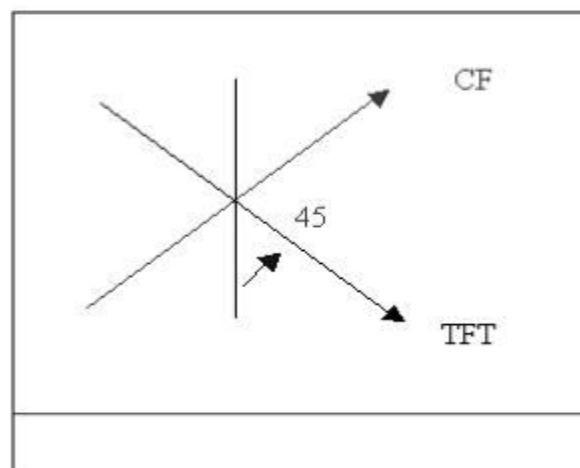
Measurement of Contrast, Luminance, Chromaticity.

Note (5) Definition of brightness uniformity



$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100 \%$$

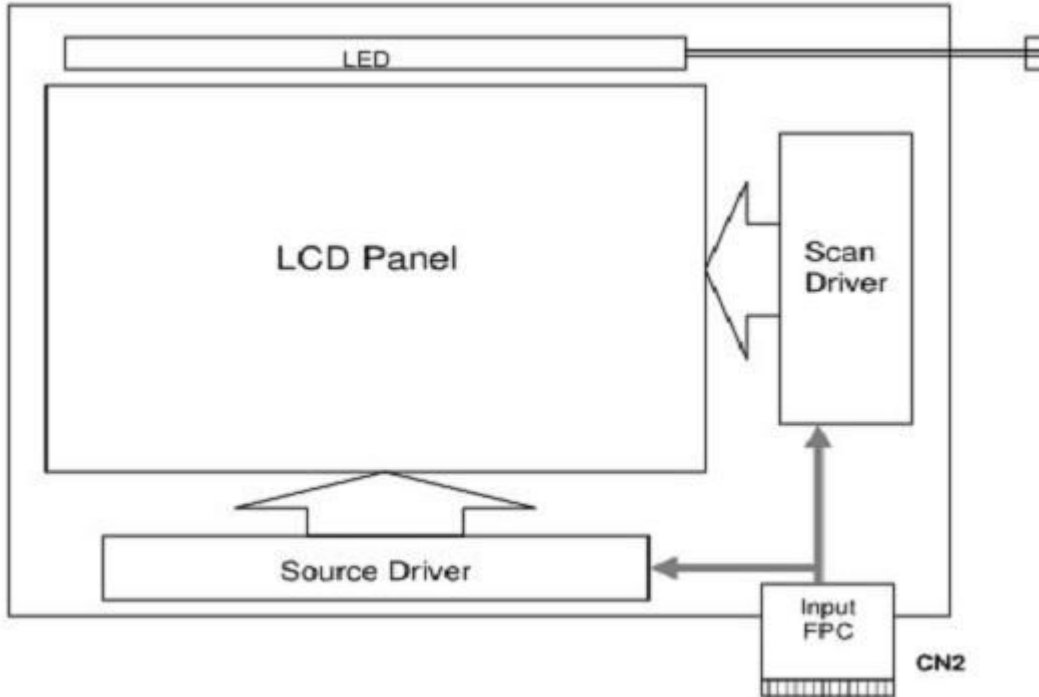
Note (6) Rubbing Direction (The different Rubbing Direction will cause the different optima view direction).



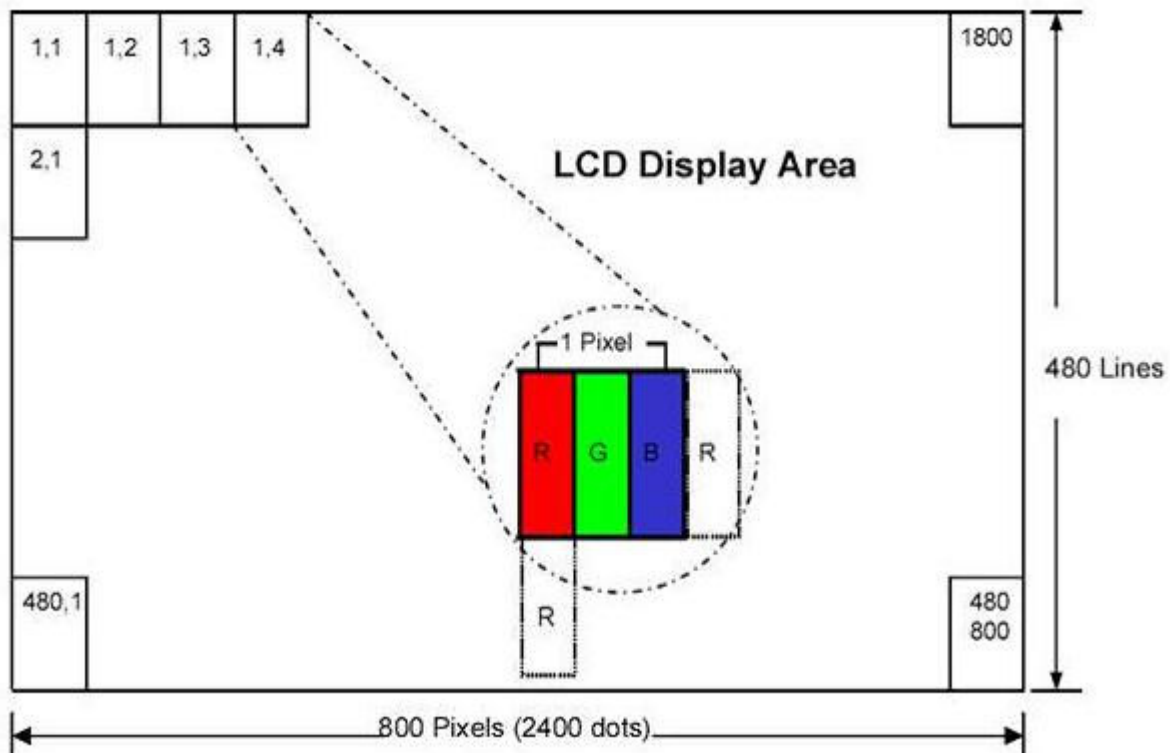
(Alignment Direction)

4.0 BLOCK DIAGRAM

4.1 TFT LCD Module



4.2 Pixel Format



5.0 INTERFACE PIN CONNECTION

5.1 TFT LCD Module: FPC UP Connector, (FH33-40S-0.5H (HIROSE), 40pin, pitch = 0.5mm)

Pin No	Definition	Description
1	LEDK2	Backlight cathode
2	LEDK1	Backlight cathode
3	LEDA	Backlight anode
4	LEDA	Backlight anode
5	NC	No connection
6	GND	Ground
7	VDD_MTP	Please OPEN in customer's PCB board side
8	ROM_RLB	Please connect to ground.
9	SDA	Clock signal input for I2C interface; If the driver has been MTP the initial code, please open.
10	SCL	Data signal input for I2C interface; If the driver has been MTP the initial code, please open.
11	LR	Source driver Left/Right scan sequence LR=L: Right to Left. LR=H: Left to Right.
12	UD	Gate UP or Down scan selection UD=L: Down to UP. UD=H: UP to Down.
13	VCC	LCD Input power, +3.3V
14	VCC	LCD Input power, +3.3V
15	GND	Ground
16	DE	Data enable signal (DE) for DE mode or latch signal (LD) for source driver mode
17	HSYNC	Line synchronous signal (HS) for SYNC mode
18	VSYNC	Frame synchronous signal (VS) for SYNC mode or polarity (POL) for source driver mode
19	GND	Ground
20	CLK	Pixel clock input
21	GND	Ground
22	B07	Display data inputs for blue color
23	B06	
24	B05	
25	B04	
26	B03	
27	B02	
28	B01	
29	B00	
30	GND	Ground
31	G07	Display data inputs for green color
32	G06	
33	G05	
34	G04	
35	G03	
36	G02	
37	G01	
38	G00	
39	GND	Ground

40	R07	Display data inputs for red color
41	R06	
42	R05	
43	R04	
44	R03	
45	R02	
46	R01	
47	R00	
48	GND	Ground
49	RESET	Reset pin H : normal operation L : reset state, suggest to connecting with an RC circuit for stability
50	STBYB	Standby mode H : normal operation L : TCON, SD, power circuit and temp sensor will turn off

5.2 Back-Light Unit

The backlight system is an edge-lighting type with 7C2P=14LED

The characteristics of the LED are shown in the following tables.

Item	Symbol	Min	Typ	Max	Unit	Note
LED current	IL		70*2	94.5*2	mA	
LED voltage	VL	18.5	21.0	22.8	V	
Operating LED life time	Hr	20000	25000	-	Hour	(1)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the

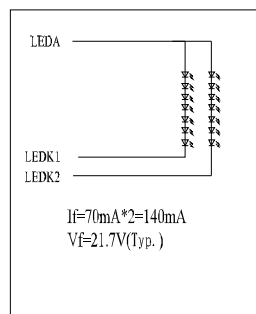
Condition: $T_a=25\pm3\text{ }^{\circ}\text{C}$, typical IL value indicated in the above table and the $f_L=50\text{ kHz}$

until the brightness becomes less than 50%.

CN1 LED Power Source (BHSR-02VS-1) or equivalent

Mating Connector: (SBHT-002T-P0.5) or equivalent

BKL CIRCUIT DIAGRAM:



7*2=14 PCS

5.3 Back-Light Unit

CN1 LED Power source (BHSR-02VS-1) or equivalent

Mating Connector: (SBHT-002T-P0.5) or equivalent

Terminal no.	Symbol	Function	Color
1	VL	LED poer supply(high voltage)	white
2	GL	LED poer supply(low voltage)	black

6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Power Supply Voltage For LCD	VDD	3.0	3.3	3.6	V	
Analog Power Supply Voltage	Vsig	-5.5	--	5.5	V	调整对比度, 调大颜色变深, 调小颜色变浅
Gate On Power Supply Voltage	VGH	13	15	17	V	
Gate Off Power Supply Voltage	VGL	-8.0	-10	-12.0	V	
Common Power Supply Voltage	VCOM	--	(0)	--	V	Note 1
Operation frequency	FCKV	--	--	200	KHz	

Note 1: Please adjust VCOM to make the flicker level be minimum. Typ VCOM 电压值

只做参考, 具体以实际效果为准 (根据FLICKER 状态可调整)

Note (2): Be sure to apply the power Voltage as the power sequence spec.

Note (3): GND=0V

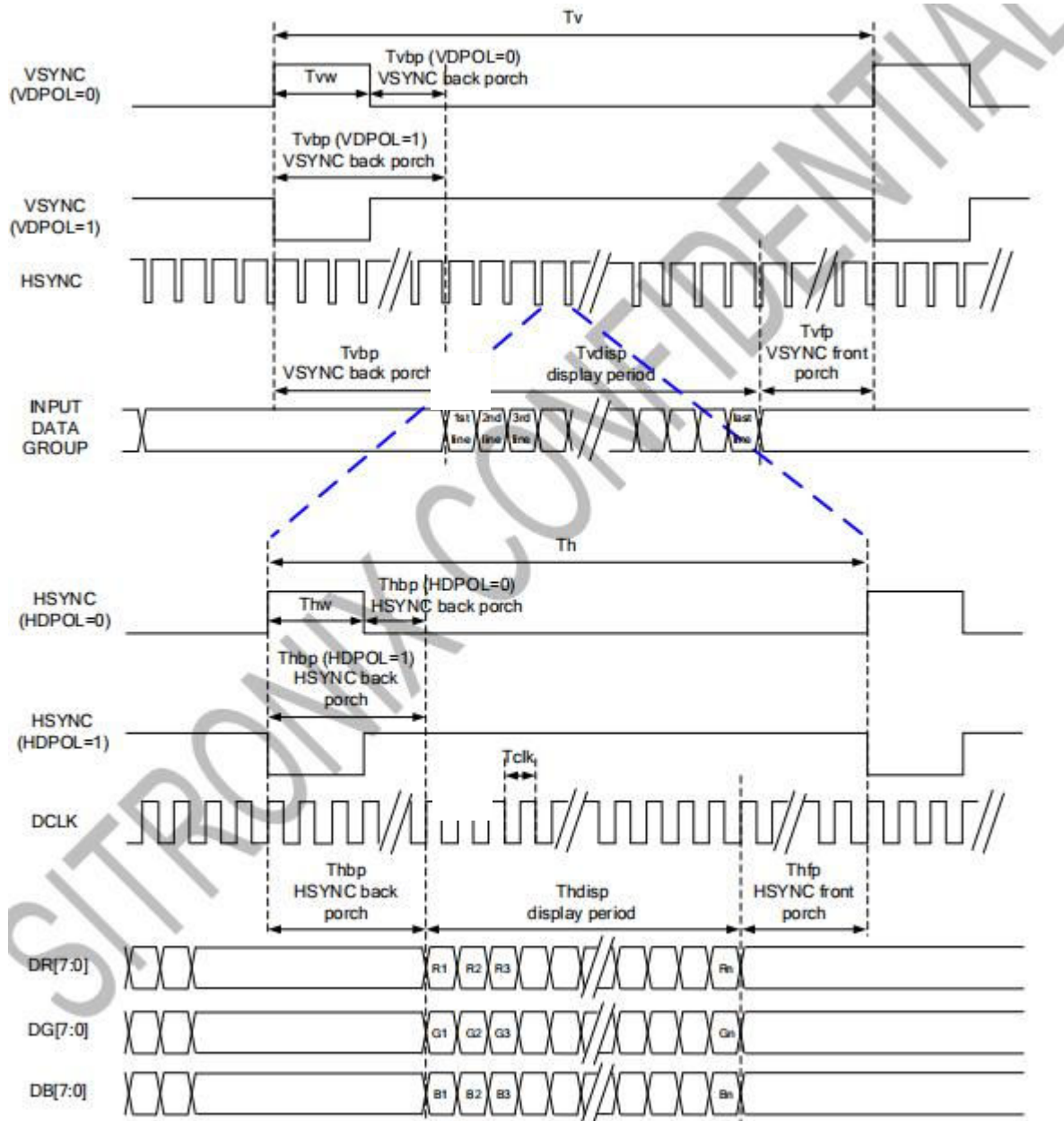
6.2 Electrical Characteristics

6.2.1 System Operation AC Characteristics

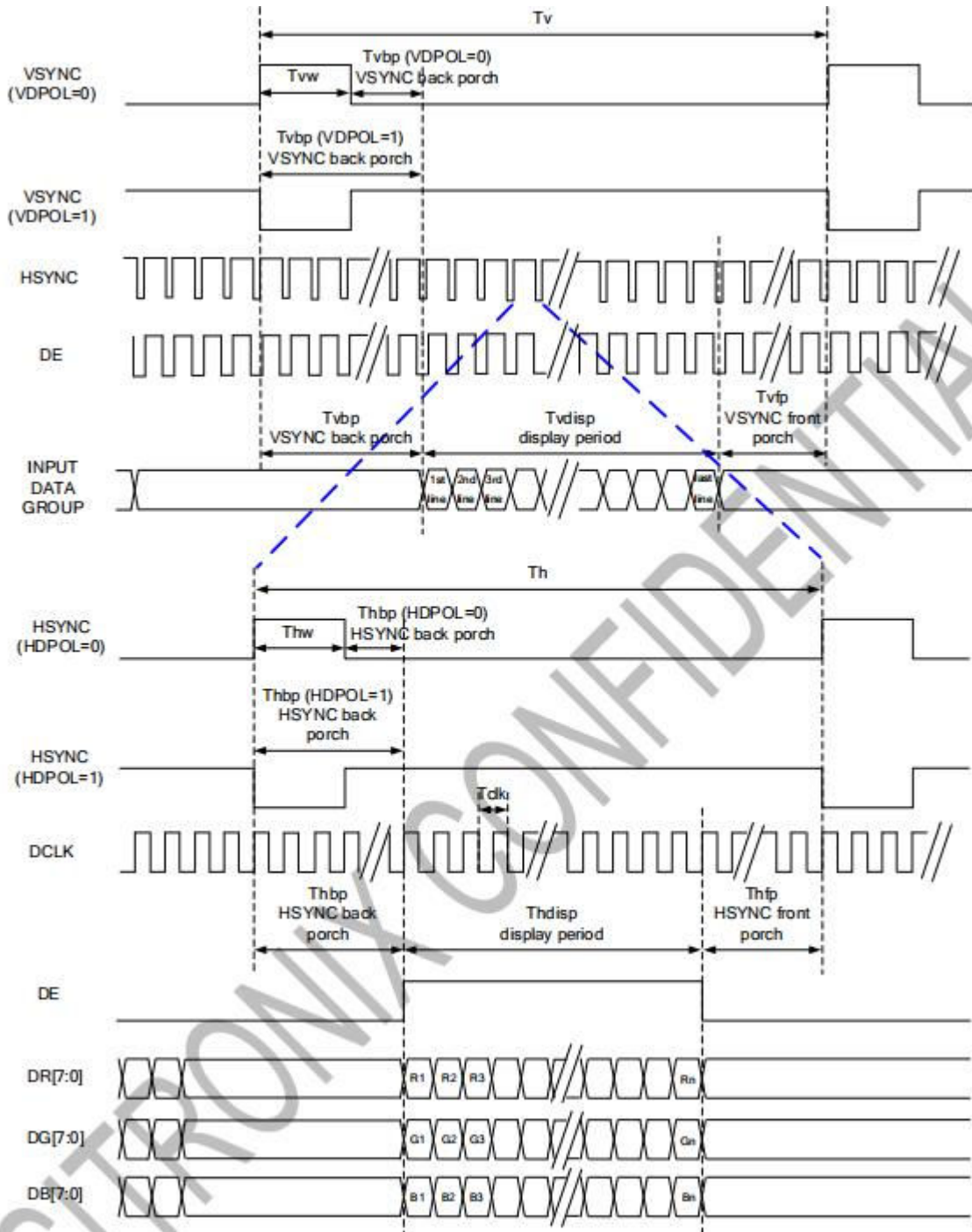
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
VDD Power Source Slew Time	TPOR	-	-	20	ms	From 0V to 99% VDD
GRB Pulse Width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
SD Output Stable Time	Tst	-	-	TBD	us	Output settled within +20mV Loading = 6.8k+28.2pF.
GD Output Rise and Fall Time	Tgst	-	-	TBD	us	Output settled (5%~95%), Loading = 4.7k+29.8pF

6.3 mode data input format

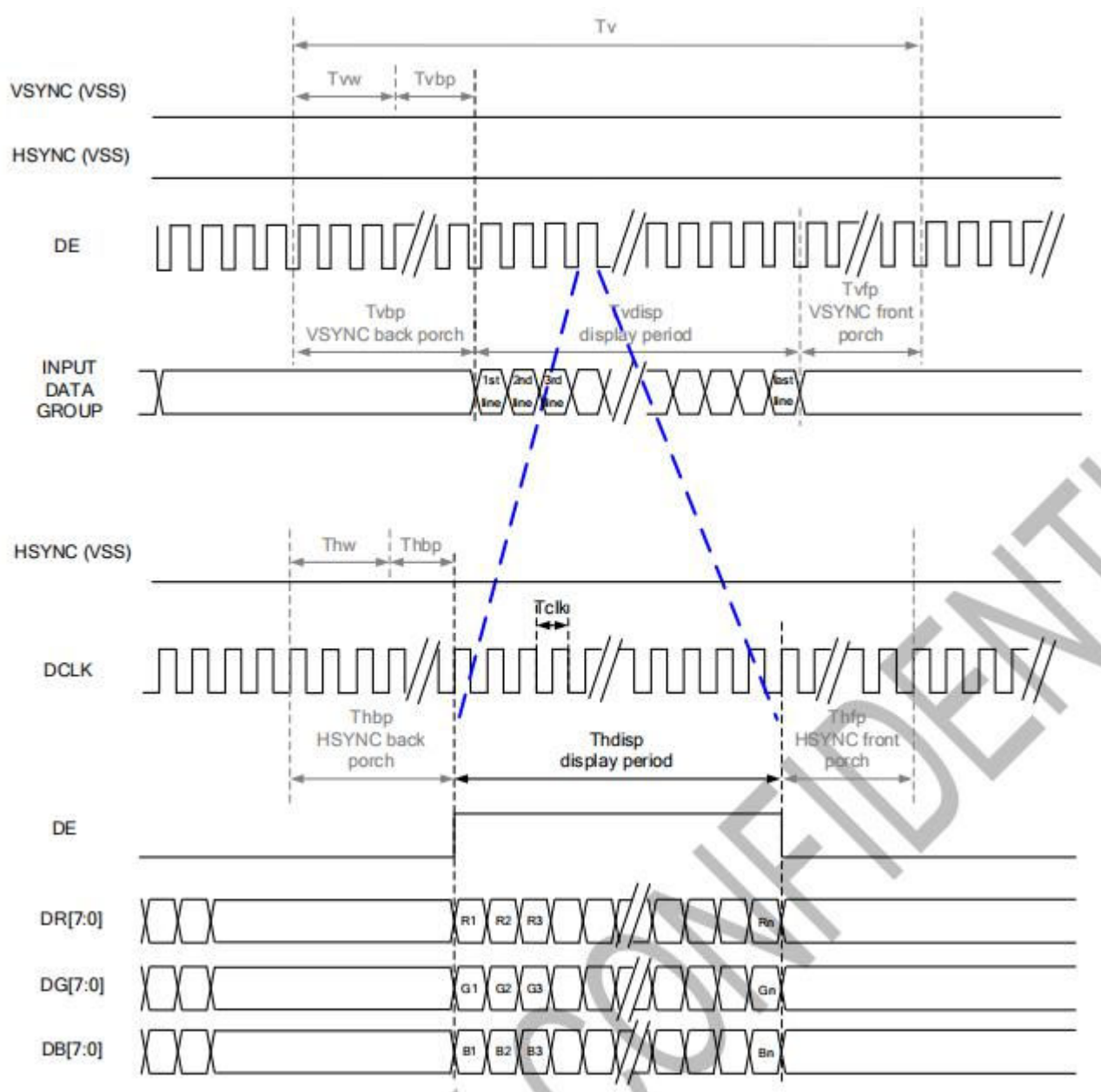
SYNC Mode



SYNC-DE Mode



DE Mode



6.4 Parallel RGB input time table

6.4.1 Resolution:800*480

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	896	DCLK	
	Display Period	Thdisp	800			DCLK	
	Back Porch	Thbp	4	8	48	DCLK	
	Front Porch	Thfp	4	8	48	DCLK	
	Pulse Width	Thw	2	4	8	DCLK	
VSYNC	Period Time	Tv	488	496	504	HSYNC	
	Display Period	Tvdisp	480			HSYNC	
	Back Porch	Tvbp	4	8	12	HSYNC	
	Front Porch	Tvfp	4	8	12	HSYNC	
	Pulse Width	Tww	2	4	8	HSYNC	

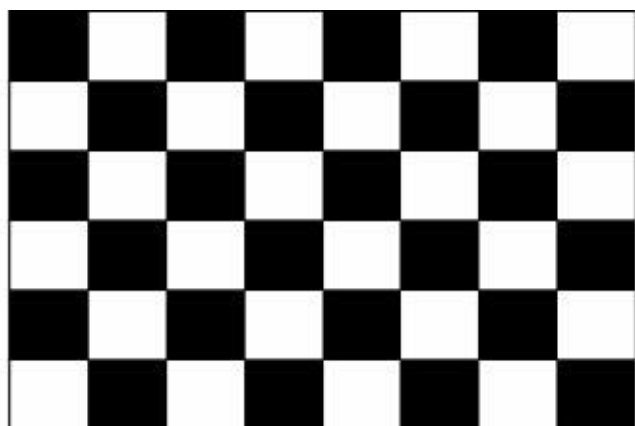
7.0 RELIABILITY TEST ITEMS

No.	Item	Conditions	Notes
1	High Temperature Storage	Ta=+85℃, 240hrs	
2	Low Temperature Storage	Ta=-35℃, 240hrs	
3	High Temperature Operation	Ta=+80℃, 240hrs	
4	Low Temperature Operation	Ta=-30℃, 240hrs	
5	High Temperature and High Humidity(operation)	=+60℃,90%RH ,240hrs	
6	Thermal cycling Test	-30℃/30 min ~ +80℃/30 min for a total 10cycles, Start with cold temperature and end with high temperature.	
7	ESD	150pF, 330Ω, ±8kV&±4kV Air & Contact test	1
		200pF,0Ω ±200V Contact test	2

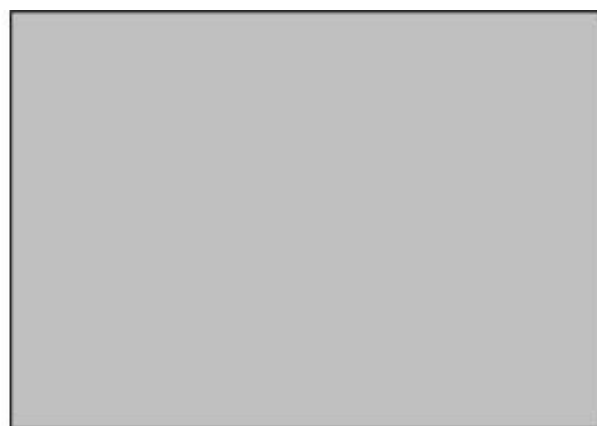
Note 1: LCD glass and metal bezel

Note 2: IF connector pins

Note 3: Operation with test pattern sustained for 4hrs, then change to gray pattern immediately.
after 15 mins,the mura must be disappeared completely



(a) Test Pattern (chess board Pattern)



(b) Gray Pattern

8.0 OUTLINE DIMENSION

[illegible]

9.0 Gamma circuit

10.0 LOT MARK

10.1 Location of Lot Mark

- (1) Location: The label is attached to the backside of the LCD module.
- (2) Detail of the Mark: as attached below.
- (3) This is subject to change without prior notice.

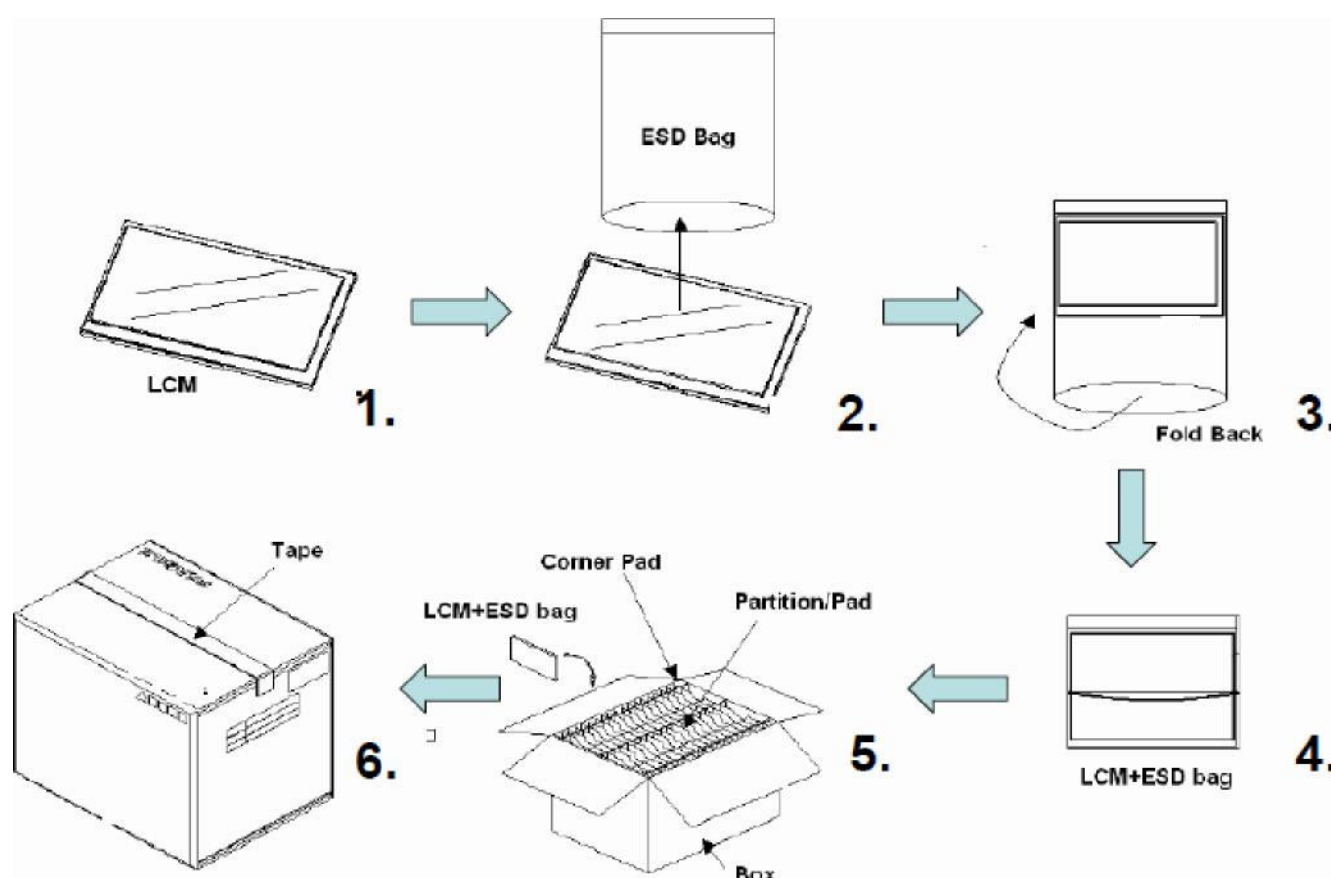
---(T.B.D)

11.0 PACKAGE SPECIFICATION 11.1

Packing form

LCM Model	LCM Qty. in the box	Inner Box Size (mm)	Note
WD050SHT40QF-A1	60 pcs/box	435±5 x 350±5 x 135±5	

11.2 Packing assembly drawings



Items	Material	Notice
Box	Corrugated Paper Board	AB Flute
Partition/Pad	Corrugated Paper Board	B Flute
Corner Pad	Corrugated Paper Board	AB Flute
ESD bag	PE	

12.0 GENERAL PRECAUTION

12.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

12.2 Assembly Precaution

- 12.2.1 Please use the mounting hole on the module side in installing and do not bending or wrenching LCD in assembling. And please do not drop, bend or twist LCD module in handling.
- 12.2.2. Please design display housing in accordance with the following guide lines.
 - 12.2.2.1 Housing case must be destined carefully so as not to put stresses on LCD all sides and not to wrench module. The stresses may cause non-uniformity even if there is no non-uniformity statically.
 - 12.2.2.2 Keep sufficient clearance between LCD module back surface and housing when the LCD module is mounted. The clearance in the design is recommended taking into account the tolerance of LCD module thickness and mounting structure height on the housing.
- 12.2.3 Please do not push or scratch LCD panel surface with any-thing hard. And do not soil LCD panel surface by touching with bare hands.(Polarizer film, surface of LCD panel is easy to be flawed.)
- 12.2.4 Please do not press any parts on the rear side such as source IC, gate IC, and FPC during handling LCD module, If pressing rear part is unavoidable, handle the LCD module with care not to damage them.
- 12.2.5 Please wipe out LCD panel surface with absorbent cotton or soft cloth in case of it being soiled.
- 12.2.6 Please wipe out drops of adhesives like saliva and water on LCD panel surface immediately. They might damage to cause panel surface variation and color change.
- 12.2.7 Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.

12.3 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. Century does not warrant the module, if customers disassemble or modify the module.

12.4 Breakage of LCD Panel

- 12.4.1.If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.
- 12.4.2. If liquid crystal contacts mouth or eyes, rinse out with water immediately.
- 12.4.3. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.
- 12.4.4. Handle carefully with chips of glass that may cause injury, when the glass is broken.

12.5 Absolute Maximum Ratings and Power Protection Circuit

- 12.5.1. Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.
- 12.5.2. Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
- 12.5.3. It's recommended to employ protection circuit for power supply.

12.6 Operation

- 12.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.
- 12.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.
- 12.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.
- 12.6.4 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.
- 12.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzene or other adequate solvent.

12.7 Static Electricity

- 12.7.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.
- 12.7.2. Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge.
- 12.7.3 Persons who handle the module should be grounded through adequate methods.

12.8 Disposal

When disposing LCD module, obey the local environmental regulations.

12.9 Others

- 12.9.1 A strong incident light into LCD panel might cause display characteristics' changing inferior because of Polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight Land Strong UV rays.
- 12.9.2 Please pay attention to a panel side of LCD module not to contact with other materials in pressing it alone.
- 12.9.3 For the packaging box, please pay attention to the followings:
 - 12.9.3.1 Packaging box and inner case for LCD are designed to protect the LCDs from the damage or scratching during transportation. Please do not open except picking LCDs up from the box.
 - 12.9.3.2 Please do not pile them up more than 6 boxes(They are not designed so) And please do not turn over.
 - 12.9.3.3 Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
 - 12.9.3.4 Packing box and inner case for LCDs are made of cardboard, So please pay attention not to get them wet(Such like keeping them in high humidity or wet place can occur getting them wet.)

13.0 INSPECTION CRITERION 检验标准

13.1 Scope 适用范围

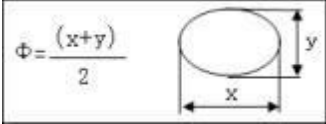
All LCM module. 液晶显示模组

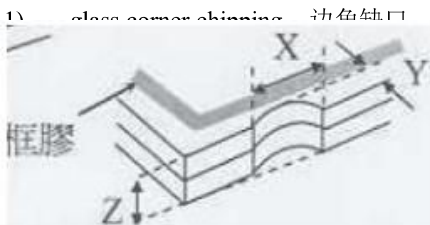
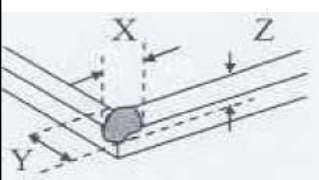
13.2 Sampling plan and defect definition 抽样方案及缺陷定义

Using standard GB/T2828.1-2012, it's a general inspection method of LEVEL II. If the customer has specific requirements, give priority of sampling plan to customer. Major defect: the defects of some or all the function, AQL 0.4. Minor defect: There is some defects, but it doesn't lead to function defects, AQL 0.65.

采用GB/T2828.1-2012标准，一般II级检验方法。如客户有特殊要求，优先使用客户提供抽样方案。主要缺陷是指使产品部分或全部功能丧失的缺陷，AQL=0.4；次要缺陷是指不会导致功能不良或功能丧失的缺陷，AQL=0.65。

13.3 Criterion for common defects showed in below table 常见缺陷检验标准如下表。

No. 序号	Item 检验项目	Criterion for defects 检验标准	Degree of defect 缺陷程度		
1	Function defect 功能缺陷	◆ No display / Abnormal display 无显/显示异常 NG ◆ Missing line 缺线 NG ◆ backlight does not work 、 flick 背光点不亮、闪烁NG ◆ CTP Abnormal function CTP 功能不良 NG	Major		
2	missing components 少件	missing components that affect the product function NG 缺少元器件， 影响产品功能	Major		
3	Spotdefect (Black and White spotColorpoint , pinhole, Foreign bodypoint 点状缺陷（显示区内黑白点、色点、针孔、异物点）	spot definition 黑白点尺寸Φ的定义： $\Phi=\frac{(x+y)}{2}$ 			Minor
		Size 尺寸（mm）	Acceptable number 允许数量	Judgment 判断	
		Φ≤0.1	Ignore (Intensity is not allowed) 不计（密集不允许）	OK	
		0.1≤Φ≤0.15	N≤2 (Distance>5mm)	OK	
		0.15<Φ≤0.20	N≤1	OK	
		0.20<Φ	0	NG	
		Note: Difficult to differentiate the shape of length width and Measure the size of the greatest diameter. 备注： 肉眼观察难以区分长与宽的形状，测量时以最大直径为其尺寸			
4	Polarizer surface pollution 偏光片表面污	There is the powder that air gun can clean and the dust that cleaning cloth can wipe, it is acceptable.According to judgment standard to confirm the defect within the stain cannot be clean.气枪可吹掉粉尘或无尘布沾酒精可擦拭的脏污可接受； 不可擦拭的点按点缺陷标准判定	Minor		
5	Polarizer bump point and bubble偏光片凹凸点、气泡	If there is not the visible point, it is acceptable. And if there is, to judge point defects on the display state显示点亮透光不可见可接受，点亮可见时在显示状态按点缺陷判断	Minor		

6	Linear defects (Black lines, white lines, polarizerScratch 线状缺陷黑 线, 白线,偏 光片划痕)	line definition 线缺陷长度L, 宽度W			Minor	
		Size尺寸 (mm)		Acceptable number 允许数量		Judgment 判断
		Wide宽(W)	Length长(L)			
		W≤0.03	Ignore 不计	Ignore (Intensity is not allowed)不计(密集不允 许)		OK
		0.03≤W≤0.05 0.05≥W	L≤5	N≤2 (Distance>5mm) Treat asSpotdefect		OK NG
7	Mura 不均	8% ND filter The invisible8% ND filter 下不可见OK			Minor	
8	Glass defect 玻璃崩缺	1) glass corner chipping 边角缺口 			Minor	
		X	Y	Z		
		≤3.0	≤ITO line width引脚长度	Ignore 不计		
		Acceptable number 允许数量: N≤2				
		2) glass side chipping 边缘缺口 				
X	Y	Z				
ignore忽略	≤1.5mm	any 不计				
Acceptable number 允许数量: N≤2						
3) crack: Acceptable number: N=0 裂痕: 玻璃出现裂痕, 趋于断裂, 不允许 			Minor			
9	Display uniformity 显示均匀度	Display uniformityis more than 80% in white 在白色画面测试均匀度大等于 80%			Minor	
10	chromaticity 显示颜色偏 差	Reference Specification: X=Xengineer sample±0.03, Y=Y engineer sample±0.03 白色画面测试判断, CIE色坐标范围, 具体参考规格书 X=工程样板X坐标±0.03, Y=工程样板Y坐标±0.03			Minor	