




PRODUCT SPECIFICATION

MODEL: 20811010210006

<◇>PRELIMINARY SPECIFICATION

<◆>APPROVAL SPECIFICATION

CUSTOMER
APPROVED BY
DATE:

DESIGNED	CHECKED	APPROVED
		

REVISION STATUS

Version	Revise Date	Page	Content	Modified by
V1.0	2011.07.15	-	First Issued.	Sally
V1.1	2011.08.11	18	Change Reliability Test Items	Sally
V1.2	2011.09.10	6,15,18	Change the pin Description、Viewing Angle and Increase the International Reliability standard test Items	Sally
V1.3	2011.10.28	8	Change the VGL voltage and Increase the DVDD voltage	Sally
V1.4	2012.03.23	8	Change the VGL voltage	ChenQi

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1. GENERAL DESCRIPTION

1.1 DESCRIPTION

20811010210006 is a color active matrix thin film transistor (TFT) TN liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, Driver IC, FPC and Backlight, This TFT LCD has a 10.1-inch diagonally measured active display area with WSVGA resolution (1,024 vertical by 600 horizontal pixel array).

1.2 FEATURES:

No.	Item	Specification	Unit
1	Panel Size	10.1"	inch
2	Number of Pixels	1024×RGB (3) ×600	pixels
3	Active Area	222.72(H)× 125.28(V)	mm
4	Pixel Pitch	0.2175(H)×0.2088(V)	mm
5	Outline Dimension	235(W)×143(H)×5.1(D)	mm
6	Number of Colors	16.7M	-
7	Display Mode	Normally White	-
8	Viewing Direction	6 o'clock	-
9	Display Format	RGB vertical stripe	-
10	Luminance (cd/m ²)	200(TYP.)	nit
11	Contrast Ratio	450(typ.)	
12	Surface Treatment	Glare	-
13	Interface	TTL	-
14	Backlight	White LED	-
15	Operation Temperature	-20-70	°C
16	Storage Temperature	-30-80	°C
17	Weight	-	g

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3. PIN DESCRIPTION

No.	Symbol	Function	Remark
1	NC	No connection	
2	NC	No connection	
3	NC	No connection	
4	NC	No connection	
5	GND	Power ground	
6	VCOM	Common voltage	
7	DVDD	Digital Power	
8	MODE	DE/SYNC mode select	Note1
9	DE	Data Input Enable	
10	VS	Vertical sync input	
11	HS	Horizontal sync input	
12	B7	Blue data(MSB)	
13	B6	Blue data	
14	B5	Blue data	
15	B4	Blue data	
16	B3	Blue data	
17	B2	Blue data	
18	B1	Blue data	
19	B0	Blue data(LSB)	
20	G7	Green data(MSB)	
21	G6	Green data	
22	G5	Green data	
23	G4	Green data	
24	G3	Green data	
25	G2	Green data	
26	G1	Green data	
27	G0	Green data(LSB)	
28	R7	Red data(MSB)	
29	R6	Red data	
30	R5	Red data	
31	R4	Red data	
32	R3	Red data	
33	R2	Red data	
34	R1	Red data	
35	R0	Red data(LSB)	
36	GND	Power Ground	
37	DCLK	Clock input	

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38	GND	Power Ground	
39	L/R	Left or Right Display Control	Note2
40	U/D	Up / Down Display Control	Note3
41	VGH	Positive Power for TFT	
42	VGL	Negative Power for TFT	
43	AVDD	Analog Power	
44	RESET	Global reset pin	
45	NC	No connection	
46	VCOM	Common Voltage	
47	DITHB	Dithering function	Note4
48	GND	Power Ground	
49	NC	No connection	
50	NC	No connection	

Note1 : DE/SYNC mode select . Normally pull high.

When MODE = H , DE mode

When MODE = L , SYNC mode

Note2 : Source Driver internal shift register is controlled by this pin as shown below: Normally pull high.

SHLR=H: SO1→ SO2→ SO3→ …→SO1536 (Default)

SHLR=L: SO1536→ SO1535→ SO1534→…→SO1

Note3 : Gate Driver Up/down scan setting. Normally pull low.

When UPDN=H, reverse scan.

STV1 output vertical start pulse and UD pin output “H” to Gate driver

When UPDN=L, normal scan. (Default)

STV2 output vertical start pulse and UD pin output “L” to Gate driver

Note4: Dithering function enable control .Normally pull low

When DITHB =H ,Enable internal dithering function

When DITHB = L , Disable internal dithering function .

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4. ELECTRICAL CHARACTERISTICS

4.1 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Conditions
Digital Supply Voltage	DVDD	-0.3	5	V	
TFT Gate on voltage	VGH	-0.3	40	V	
TFT Gate off voltage	VGL	-20	0.3	V	
Analog power supply voltage	AVDD	-0.5	15	V	

4.2 TFT LCD MODULE

4.2.1 Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Digital Supply Voltage	DVDD	3.0	3.3	3.6	V	
TFT Gate on voltage	VGH	20	21	22	V	
TFT Gate off voltage	VGL	-6.5	-5.5	-4.5	V	
TFT Common electrode voltage	VCOM	3.6	3.8	4	V	
Analog power supply voltage	AVDD	10.65	10.85	11.05	V	

4.3 Current Consumption

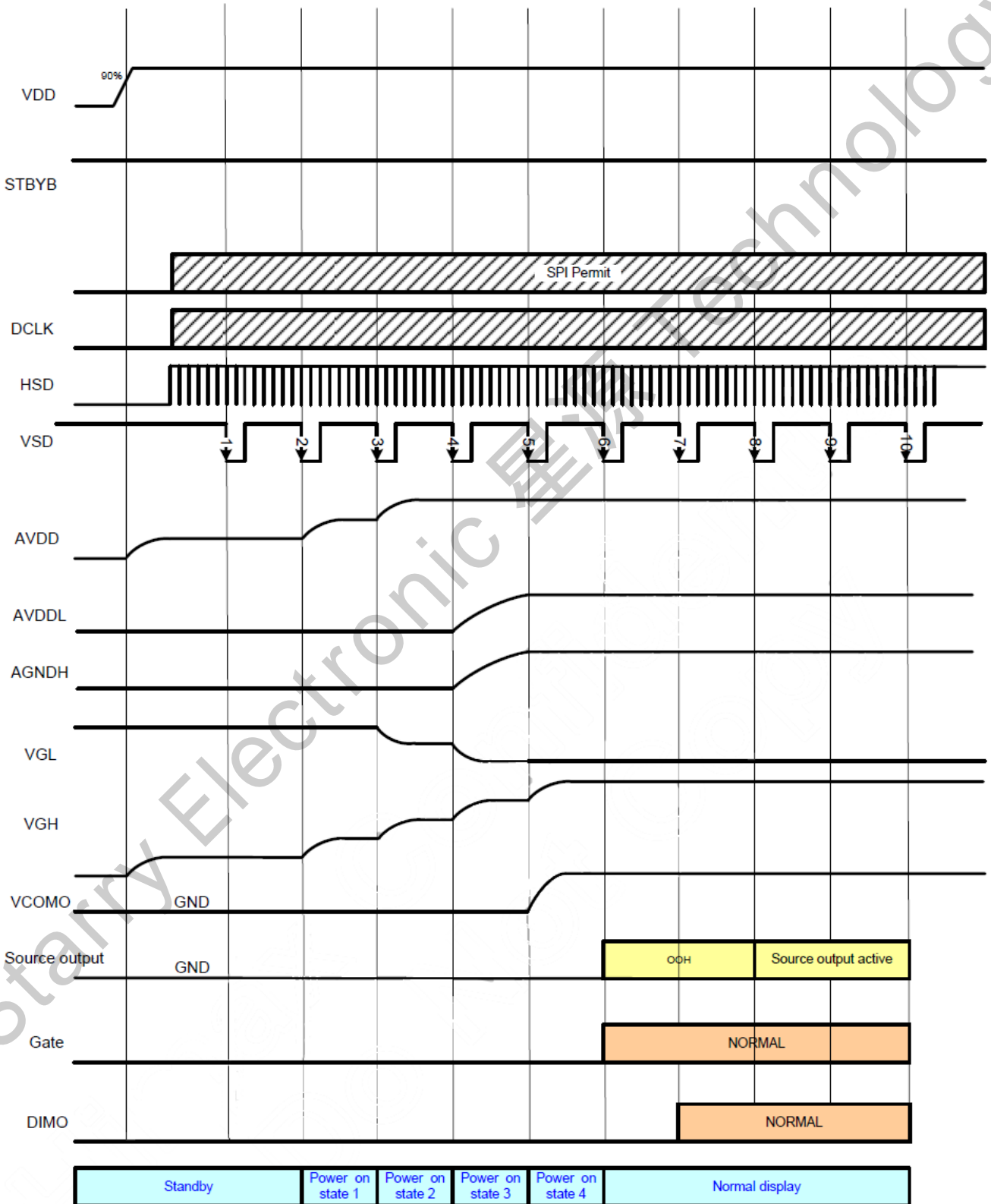
Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Gate on Current	IVGH	VGH = 21 V	-	5.6	-	mA	
Gate off Current	IVGL	VGL = -5.5 V	-	8.1	-	mA	
Digital Current	IDVDD	DVDD = 3.3V	-	12.2	-	mA	
Analog Current	IAVDD	AVDD = 10.85V	-	29.7	-	mA	

4.4 POWER ON/OFF SEQUENCE

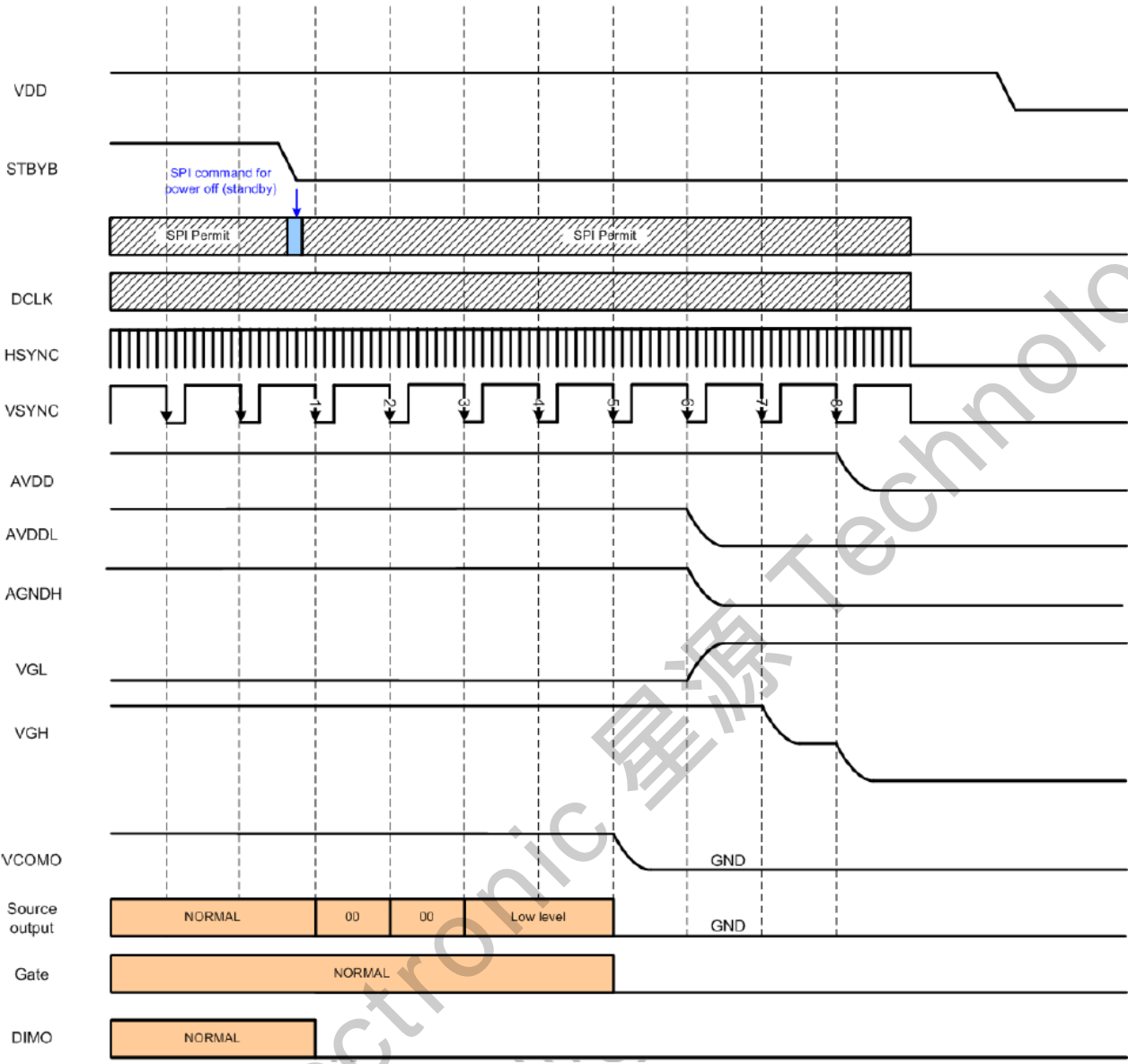
To prevent the device damage from latch up, the power on/off sequence shown below must be followed.

Power on: VDD, GND → AVDD, AGND → V1 to V14

Power off: V1 to V14 → AVDD, AGND → VDD, GND



Power on timing sequence



Power off timing sequence

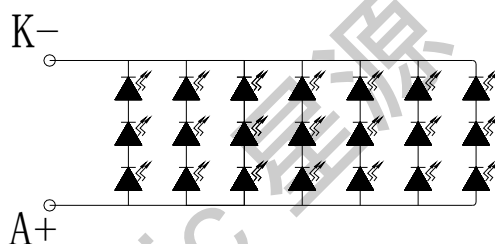
Note: Low level=3FH, when NBW=L (Normally white)
 Low level=00H, when NBW=H (Normally black)

4.5 BACK LIGHT UNIT

Ta=25°C

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	I _{LED}		175		mA	21LEDS
Forward voltage	V _F	9.3	9.9	10.5	v	I _F =175mA 21LEDS
Reverse current	I _R			50	μA	V _R =10V, 1LED
Luminous tolerance	IV-M point5	80			%	(Min/Max)×100
Luminous tolerance	IV-M point13	70			%	(Min/Max)×100
Power dissipation	P _d	1837.5			mW	21LEDS
Peak forward current	I _{FP}	100			mA	1LED
Reverse Voltage	V _R	10			V	1LED

4.5.1 Internal Circuit Diagram



CURRENT I_F=175mA
3*7=21LED

5. INPUT SIGNAL TIMING

5.1 AC ELECTRICAL CHARACTERISTICS

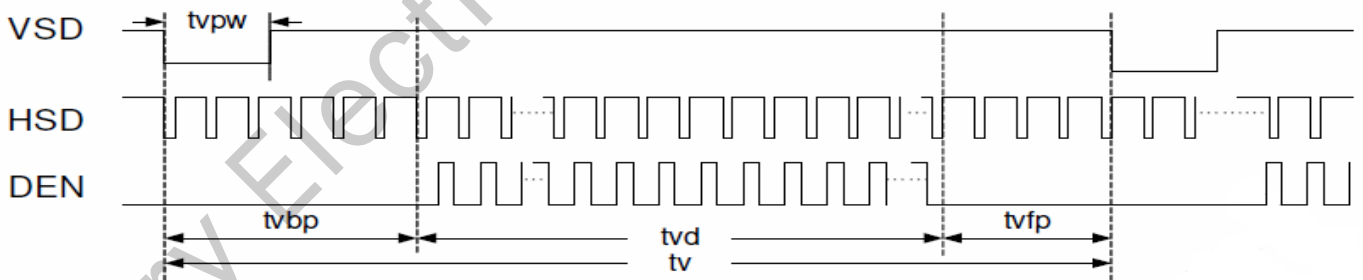
5.1.1. TTL Mode AC Electrical Characteristics

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
VDD Power On Slew rate	T_{POR}	-	-	20	ms	From 0V to 90% VDD
GRB pulse width	T_{Rst}	50	-	-	us	DCLK=65MHz
DCLK cycle time	T_{cph}	14	-	-	ns	
DCLK pulse duty	T_{cwh}	40	50	60	%	
VSD setup time	T_{vst}	5	-	-	ns	
VSD hold time	T_{vhd}	5	-	-	ns	
HSD setup time	T_{hst}	5	-	-	ns	
HSD hold time	T_{hhd}	5	-	-	ns	
Data set-up time	T_{dsu}	5	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to DCLK
Data hold time	T_{dhd}	5	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to DCLK
DE setup time	T_{esu}	5	-	-	ns	
DE hold time	T_{ehd}	5	-	-	ns	
Output stable time	T_{sst}	-	-	6	us	10% to 90% target voltage. CL=90pF, R=10K ohm(Cascade)
				3		Dual gate

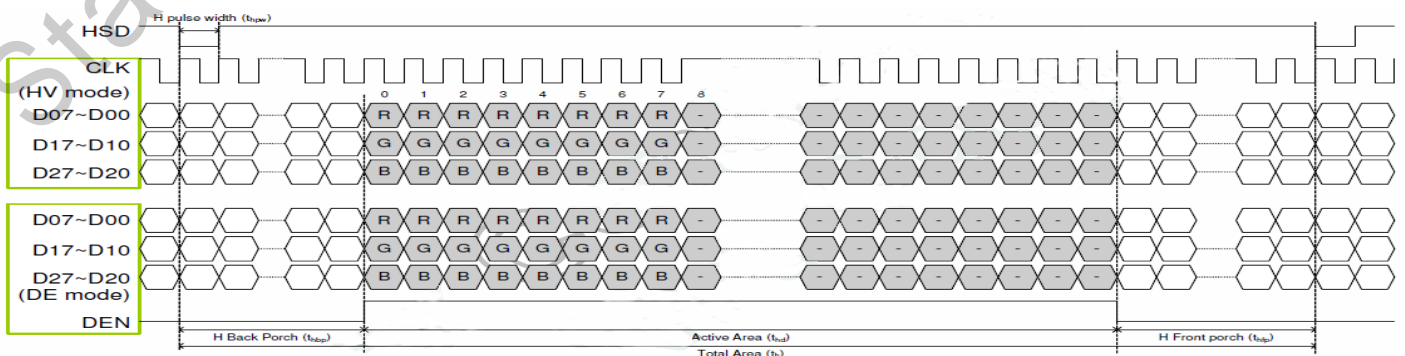
5.2 DATA INPUT FORMAT

5.2.1 TTL Mode Data Input Format

Vertical Timing



Horizontal Timing



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5.3 PARALLEL RGB INPUT TIMING TABLE

5.3.1 DE mode

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	40.8	51.2	67.2	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1114	1344	1400	DCLK
HSD Blanking	thb+ thfp	90	320	376	DCLK
Vertical Display Area	tvd	600			TH
VSD Period	tv	610	635	800	TH
VSD Blanking	tvbp+ tvfp	10	35	200	TH

5.3.2 HV mode

Horizontal timing

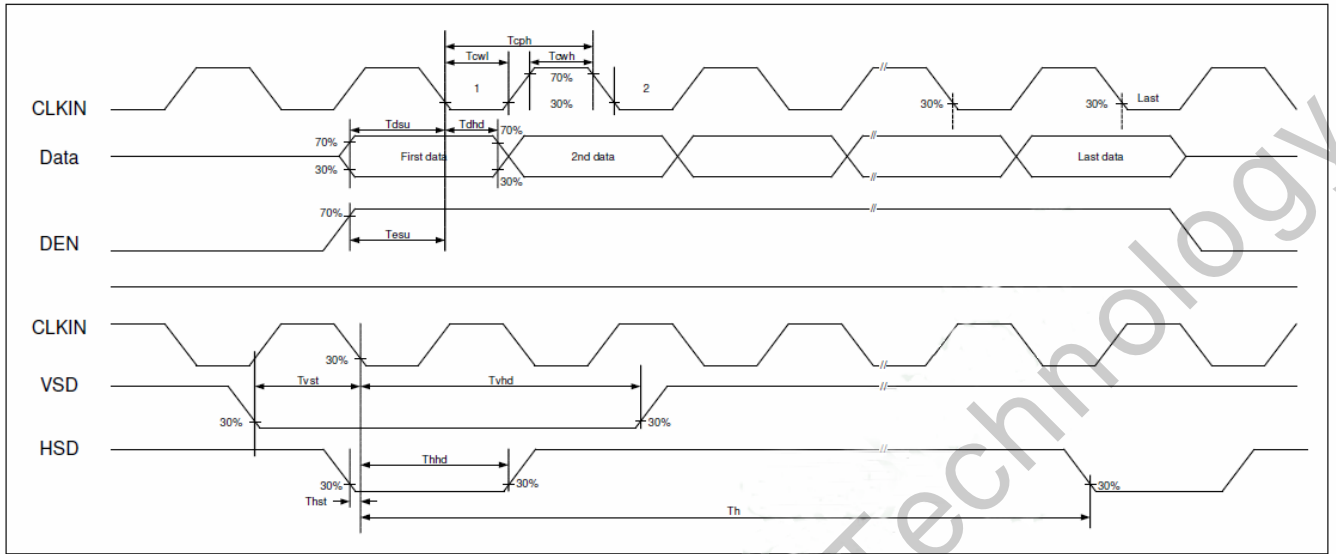
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	44.9	51.2	63	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1200	1344	1400	DCLK
HSD Pulse Width	thpw	1	-	140	DCLK
HSD Back Porch	thbp	160			DCLK
HSD Front Porch	thfp	16	160	216	DCLK

Vertical Timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd	600			TH
VSD Period	tv	624	635	750	TH
VSD Pulse Width	tvpw	1	-	20	TH
VSD Back Porch	tvbp	23			TH
VSD Front Porch	tvfp	1	12	127	TH

5.4 TIMING DIAGRAM

5.4.1 Input Clock and Data Timing Diagram

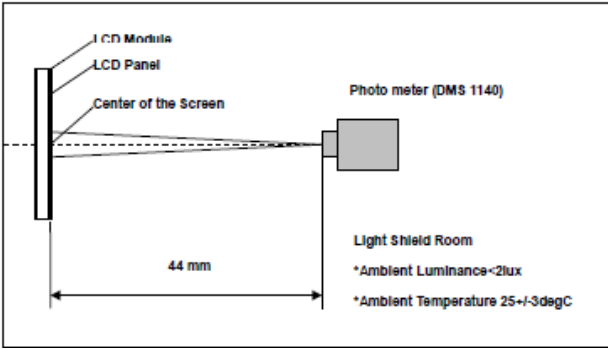


6. OPTICAL CHARACTERISTICS

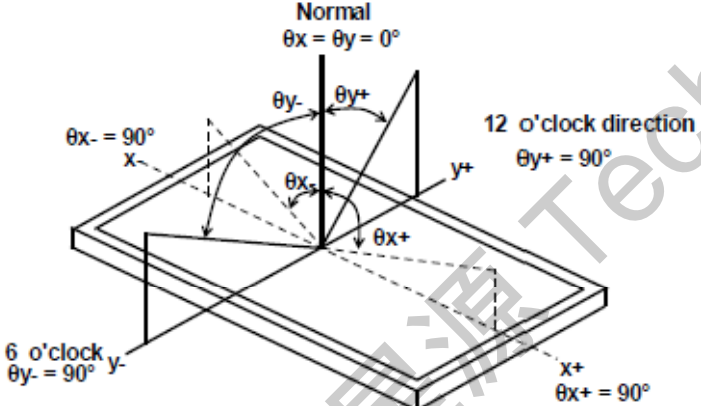
Item		Symbol	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	400	450	-		Note1 Note3
luminance		YL	180	200	-	cd/m2	Note1 Note5
Luminance Uniformity		13 points	70			%	Note1 Note6
		5points	80				
Response Time		Rising + Falling	-	8	-	ms	Note1 Note4
Viewing Angle[degrees] K=Contrast Ratio>10	Horizontal	θ_{y+}	40	45	-	degree	Note1 Note2
		θ_{y-}	40	45	-		
	Vertical	θ_{x+}	10	15	-		
		θ_{x-}	30	35	-		
Color Chromaticity (CIE1931)	Red	x	0.550	0.580	0.610	Note1	
		y	0.320	0.350	0.380		
	Green	x	0.290	0.320	0.350		
		y	0.560	0.590	0.620		
	Blue	x	0.120	0.150	0.180		
		y	0.090	0.120	0.150		
	White	x	0.240	0.280	0.320		
		y	0.290	0.330	0.370		
Color gamut (NTSC ratio)				52		%	Note1

Note1: Measurement Setup

The LCD module should be stabilized at given temperature for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.



Note2: Definition of Viewing Angle



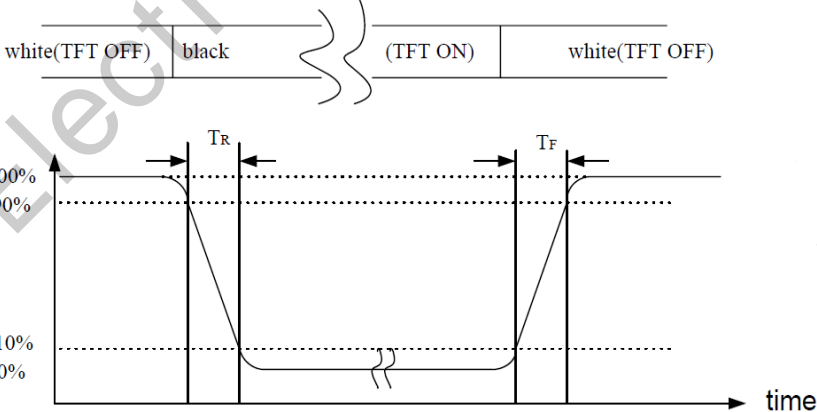
Note3: Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

$$\text{Contrast Ratio (CR)} = L63 / L0$$

L63: Luminance of gray level 63, L0: Luminance of gray level 0

Note4: Definition of Response Time (TR, TF)



Note5: Definition of Luminance White

Measure the luminance of gray level 63 at center point and 5 points.

Center of Luminance = Y1

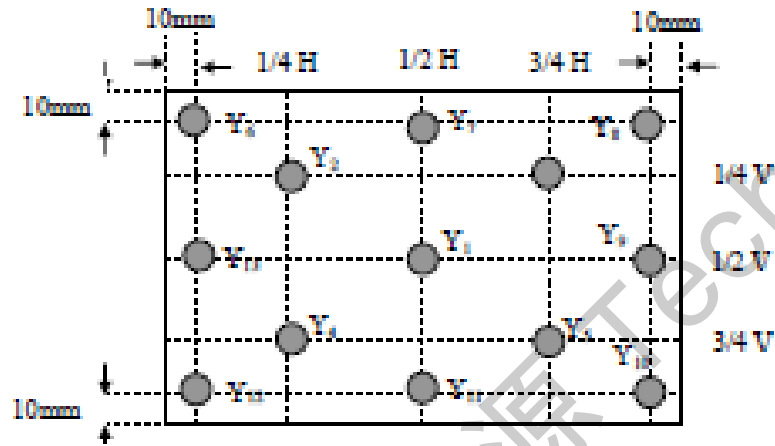
$$\text{Average Luminance of 5 points} = \frac{Y_1 + Y_2 + Y_3 + Y_4 + Y_5}{5}$$

Note6: Definition of Luminance Uniformity(Variation)

Measure the luminance of gray level 63 at 13 points.

$$\text{Uniformity of 13 points} = \frac{\text{Min Luminance of Y1~Y13}}{\text{Max Luminance of Y1~Y13}} \times 100\%$$

$$\text{Uniformity of 5 points} = \frac{\text{Min Luminance of Y1~Y5}}{\text{Max Luminance of Y1~Y5}} \times 100\%$$



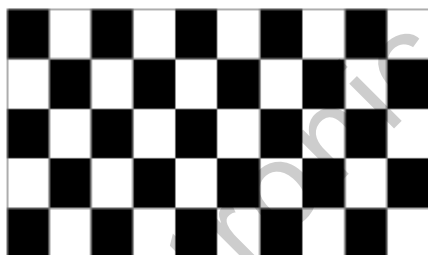
7. RELIABILITY TEST ITEMS

7.1 TEMPERATURE AND HUMIDITY

Test Item	Test Condition	Remark
High Temperature Storage	Ta=80°C; 240hrs	IEC60068-2-1 : 2007 GB2423.2-2008
Low Temperature Storage	Ta=-30°C; 240hrs	IEC60068-2-1 : 2007 GB2423.1-2008
High Temperature Operation	Ta=70°C , 240Hrs	IEC60068-2-1 : 2007 GB2423.2-2008
Low Temperature Operation	Ta=-20°C; 240hrs	IEC60068-2-1 : 2007 GB2423.1-2008
High Temperature High Humidity Operation	Ta=60°C , 90%RH , 240Hrs(no condensation)	IEC60068-2-78 : 2001 GB/T2423.3-2006
Thermal Shock	-30°C(0.5h) ~ 80°C(0.5h) / 100 cycles	Start with cold temperature , End with high temperature , IEC60068-2-14:1984,GB2423.22-2002
Image Sticking	25°C ; 4hrs	Note1

Note1:Condition of image sticking test :25°C±2°C

Operation with test pattern sustained for 4hrs,then change to gray pattern immediately.after5 mins,themura must be disappeared completely



(a) Test Pattern (chess board Pattern)



(b) Gray Pattern

7.2 VIBRATION&SHOCK

Test item	Conditions	Remark
Packing Shock (non-operation)	980m/s ² ,6ms, ±x,y,z 3times for direction	IEC60068-2-27 : 1987 GB/T2423.5-1995
Packing Vibration (non-operation)	Frequency range:10 HZ~50HZ Stroke:1.0mm,sweep:10 HZ ~50HZ x,y,z 2 hours for each direction	IEC60068-2-32 : 1990 GB/T2423.8-1995

7.3ESD

Test item	Conditions	Remark	
Electro Static Discharge Test (non-operation)	150pF , 330Ω , Contact:±4KV,Air:±8KV	1	IEC61000-4-2 : 2001 GB/T17626.2-2006
	200pF , 0Ω , ±200V contact test	2	

Note: Measure point :

1. LCD glass and metal bezel
2. IF connector pins

8. GENERAL PRECAUTION

8.1 SAFETY

1. Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
2. If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
3. If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

8.2 STORAGE CONDITIONS

1. Store the panel or module in a dark place where the temperature is $23\pm 5^{\circ}\text{C}$ and the humidity is below $50\pm 20\%\text{RH}$.
2. Store in anti-static electricity container.
3. Store in clean environment, free from dust, active gas, and solvent.
4. Do not place the module near organics solvents or corrosive gases.
5. Do not crush, shake, or jolt the module.


8.3 HANDLING PRECAUTIONS

- (1) Avoid static electricity which can damage the CMOS LSI.
- (2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not apply excessive force on the surface.
- (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- (6) Do not use ketonic solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (7) Do not operate it above the absolute maximum rating.
- (8) Do not remove the panel or frame from the module.
- (9) When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.
- (10) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining and discoloration may occur.
- (11) 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.

8.4 WARRANTY

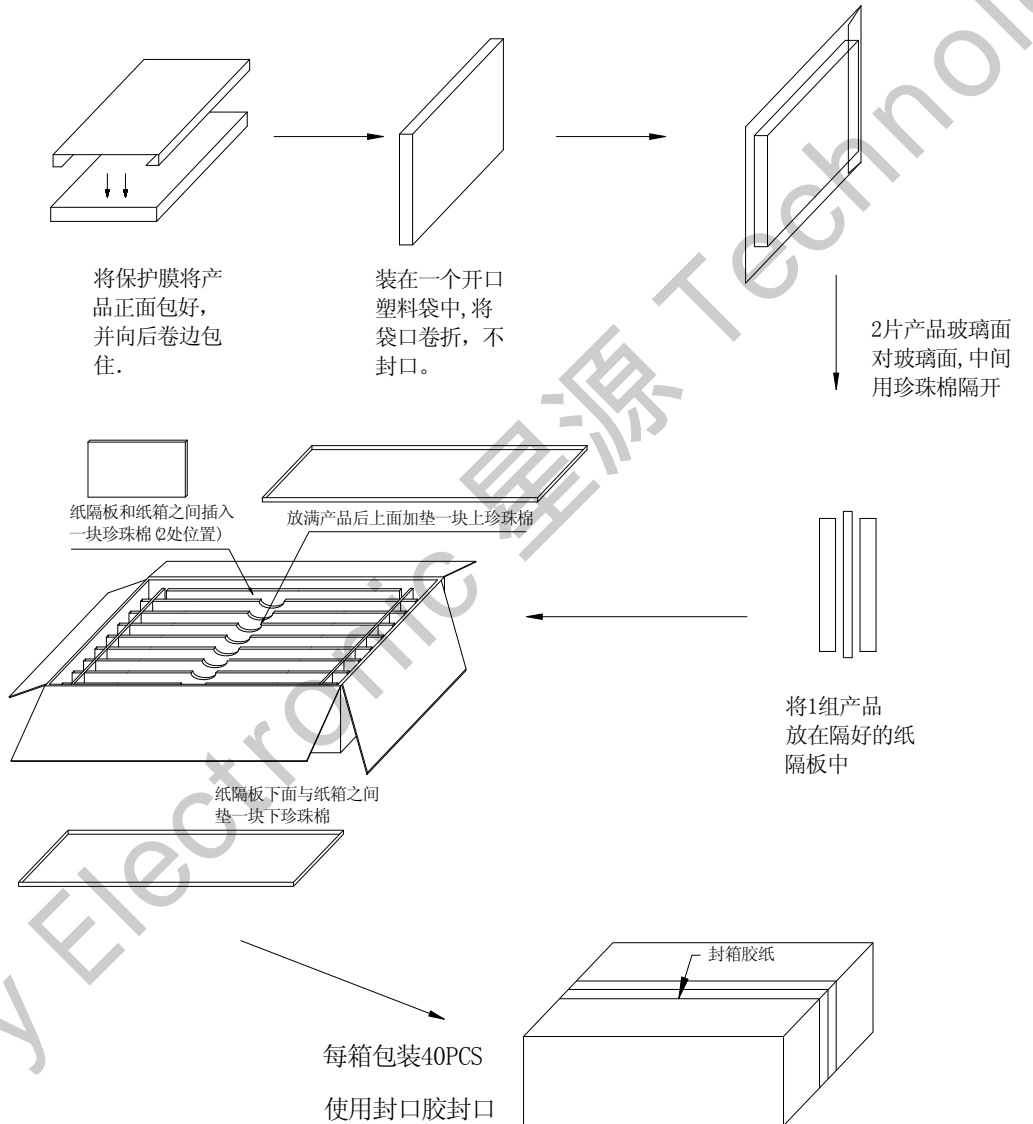
- (1) The period is within twelve months since the date of shipping out under normal using and storage conditions.
- (2) Do not repaired or modified the LCM. It may cause function to lose efficacy, Starry does not warrant the LCM.
- (3) All process and material comply ROHS.

9. PACKAGE DRAWING



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包装方式示意图:



将保护膜将产品正面包好，并向后卷边包住。

装在一个开口塑料袋中，将袋口卷折，不封口。

2片产品玻璃面对玻璃面，中间用珍珠棉隔开

纸隔板和纸箱之间插入一块珍珠棉(2处位置)

放满产品后上面加垫一块上珍珠棉

纸隔板下面与纸箱之间垫一块下珍珠棉

将1组产品放在隔好的纸隔板中

封箱胶纸

每箱包装40PCS
使用封口胶封口

REVISION 版本	A0	<input checked="" type="checkbox"/> 正式规格	<input type="checkbox"/> 临时规格	REVISER 修订人	MODEL NO 产品料号	APPROVED BY 覈準	CHECKED BY 審覈	DRAWN BY 製作
DATE 日期	2011-6-28			杨世杰	星源: 20811010210006			
PAGE 頁碼	5/5							


INCOMING INSPECTION STANDARDS

MODEL: 20811010210006

<◇> PRELIMINARY SPECIFICATION

<◆> APPROVAL SPECIFICATION

CUSTOMER
APPROVED BY
DATE:

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1. INCOMING INSPECTION RIGHT

(1) The Incoming Inspection Standard will be agreed and signed by both sides(Customer and Starry) .

2. INSPECTION CONDITIONS IS AS FOLLOWS:

- (1) Viewing distance is approximately 35 ~ 40 cm
- (2) Viewing angle is normal to the LCD panel as Fig -1(30°)
- (3) Ambient temperature is approximately $25 \pm 5^{\circ}\text{C}$
- (4) Ambient humidity is $60 \pm 5\% \text{ RH}$
- (5) Ambient illuminance is from 300 ~ 500 Lux.
- (6) Input signal timing should be typical value.
- (7) Mura & Light leakage inspection at ND-Filter 5%

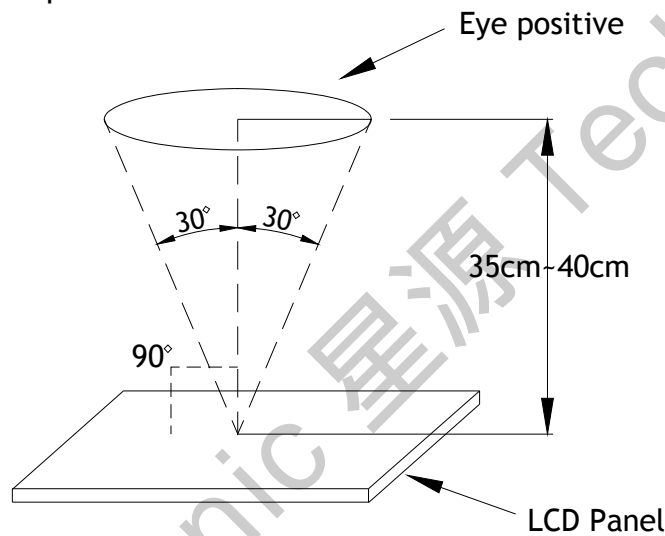


Fig-1

3. SPECIAL CONDITION

- (1) Viewing distance is close for inspection of adjacent dots and distance between defect dots.
- (2) Viewing condition of “Shot block non-uniformity from oblique angle” is as Fig-2.
- (3) Exceptional case: View angle $\pm 40^{\circ}$ while inspected image-sticking.

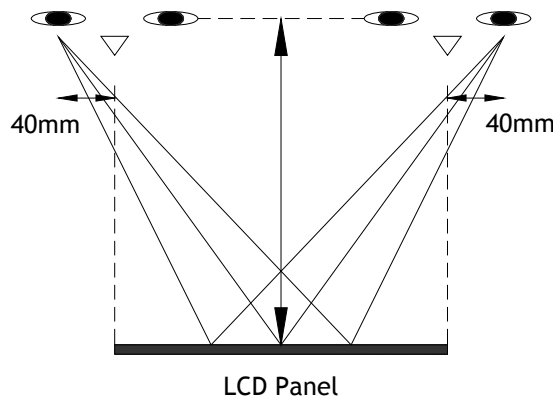


Fig-2

4. INSPECTION CRITERIA

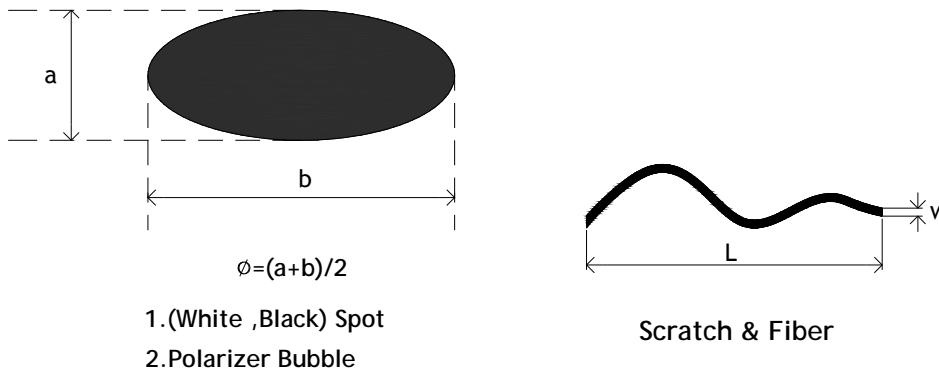
Defecttype		Limit		Note	
Visual defect	Scratch	$W \leq 0.05\text{mm}$	Ignore	Note1	
		$0.05\text{mm} \leq w \leq 0.1\text{mm}$ $L \leq 5\text{mm}$	$N \leq 4$		
		$5\text{mm} < L, 0.1\text{mm} < w$	$N=0$		
	Internal	Spot	$\Phi < 0.2\text{mm}$	Ignore	Note1
			$0.2\text{mm} \leq \varphi \leq 0.5\text{mm}$	$N \leq 3$	
			$0.5\text{mm} < \varphi$	$N=0$	
		Fiber	$0.1\text{mm} \leq W \leq 0.2\text{mm},$ $L \leq 2.5\text{mm}$	$N \leq 3$	Note1
			$0.2\text{mm} < W, 2.5\text{mm} < L$	$N=0$	
		Polarizer bubble	$\Phi < 0.3\text{mm}$	Ignore	Note1
			$0.3\text{mm} \leq \varphi \leq 0.5\text{mm}$	$N \leq 2$	
			$0.5\text{mm} < \varphi$	$N=0$	
		Dent	$\Phi < 0.25\text{mm}$	Ignore	Note1
$0.25\text{mm} \leq \varphi \leq 0.5\text{mm}$	$N \leq 4$				
$0.5\text{mm} < \varphi$	$N=0$				
Electrical Defect	Bright dot	Display Area	Total	Note2 Note3	
		$N \leq 2$ (O area)	$N \leq 2$		
	Dark dot	$N \leq 4$	$N \leq 4$	Note4	
	Total dot	$N \leq 4$	$N \leq 4$		
	2 Adjacent Bright Sub Pixel Defect	$N \leq 0$	$N \leq 0$		
	2 Adjacent Dark Sub Pixel Defect	$N \leq 1$	$N \leq 1$		
	2 Adjacent Bright & Dark Sub Pixel Defect	$N \leq 1$	$N \leq 1$		
	Three or more adjacent dot	Not allowed			
Line defect	Not allowed		Note5		
Zero Bright dot		-		Note6	

(1) one pixel consists of 3 sub-pixels, including R, G, and B dot. (sub-pixel = dot)
 (2) panel is acceptable if distance between 2 dot defects are greater or equal to 5mm.

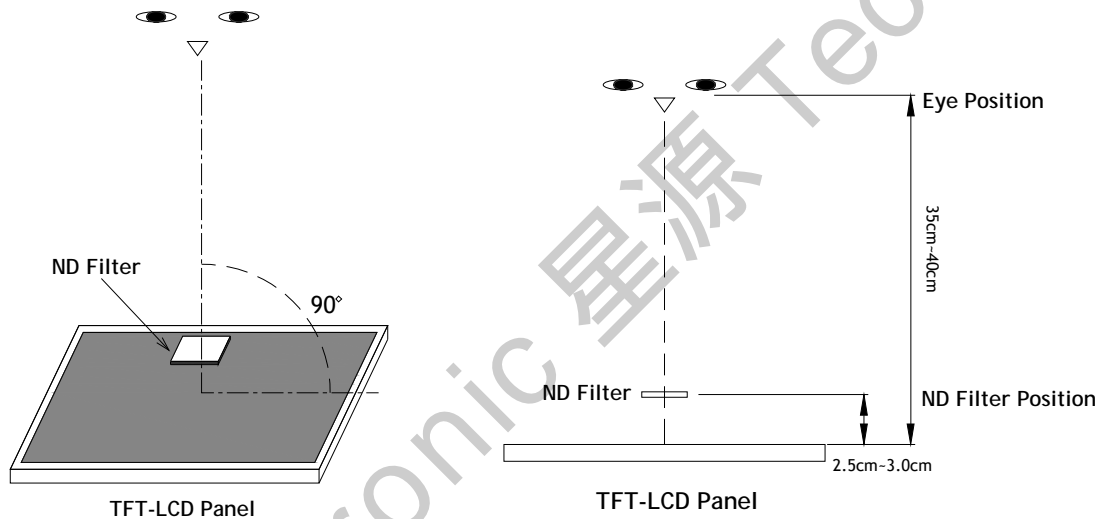
星源电子科技(深圳)有限公司

STARRY ELECTRONIC TECHNOLOGY (SHENZHEN) CO., LTD

Note1 : W : Width[mm], L : Length[mm], N : Number, ϕ : Average Diameter



Note2 : Bright dot is defined as the defective area of the dot is larger than 50% of one sub-pixel area.



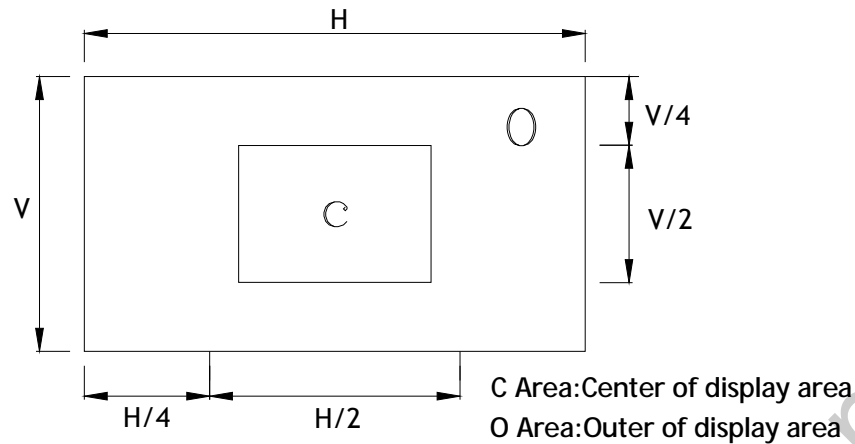
Bright dot : The bright dot size defect at black display pattern . It can be recognized by 2% transparency of filter when the distance between eyes and panel is 350mm±50mm.

Dark dot : Cyan , Magenta or Yellow dot size defect at white display pattern . It can be recognized by 5% transparency of filter when the distance between eyes and panel is 350mm±50mm.

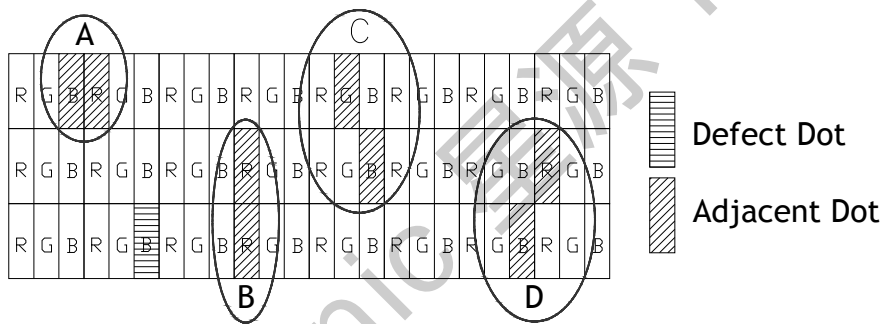
Defect distance & join

Item	Inspection criteria	
Defect distance	Bright dot	5mm or more
	Dark dot	5mm or more
Join dots	Bright dot	Not allowed
	Dark dot	Counted as one defect

Note3 :



Note4 : Judge defect dot and adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dart adjacent dot. And they will be counted 2defect dots in total quantity.



Note5: Line Defect :

Line defect must not be confirmed on arbitrary screen.(vertical , horizontal , cross line)
(note) Exclude ESD defect

Note6 : Other condition

(1) The defects that are not defined above and considered to be problem shall be reviewed and discussed by both parties.

(2) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.

5. HANDLING PRECAUTION

- (1) Don't disassemble and reassemble the module by self.
(禁止自行拆解)
- (2) Acid, alkali, alcohol or touched directly by hand will damage the display.
(酸性、碱性、酒精或手的直接接触将会损伤显示面)
- (3) Static electricity will damage the module. Please configure grounding device.
(静电会损伤模组，请装配接地设备)
- (4) The strong vibration, shock, twist or bend will cause material damage, even module broken.
(强烈的撞击、震动、扭转或弯曲将会造成原材损伤，甚至面板破裂)
- (5) It is easy to cause image sticking while displaying the same pattern for very long time.
(长期显示同一画面会造成影像残留)
- (6) The response time, brightness and performance will vary from different temperature.
(响应时间、亮度与均匀性会因温度而有所改变)
- (7) 12 months of the product term, the starry shipment date began to count.
(从星源出货之日开始产品保质期为 12 个月)