Product Specification

Model Name	TFT058B101A
Description	Standard LCD Module 5.8" WVGA 800(RGB)x320 Dots
Date	2017/1/10
Version	2.0

Approved by/Date	Check by/Date	Prepared by/Date
Sam 2017/1/10	Borger 2017/1/10	Jack Guo 2017/1/10

Customer Approval	
Date	

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1. Record of Revision

Rev	Issued Date	Description	Editor
1.0	2016/11/24	First Release.	Jack Guo
2.0	2017/1/10	Update P&N.	Jack Guo

2. General Specifications

Feature		Spec
Characteristics	Size	5.8 inch
	Resolution	800(horizontal)*320(Vertical)
	Interface	RGB-24bit
	Connect type	Connector
	Display Colors	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.1719 x 0.1609
	Pixel Configuration	R.G.B.-Stripe
	Display Mode	Normally White
	LCD Driver IC	HX8264+HX8678
	Viewing Direction	12 O'clock
Mechanical	LCM (W x H x D) (mm)	154.40*63.34*3.70
	Active Area(mm)	137.52 x51.44
	With /Without TSP	Without
	Weight (g)	TBD
	LED Numbers	24 LEDs

Note 1: Requirements on Environmental Protection: RoHs
Note 2: LCM weight tolerance: +/- 5%

3. Input/Output Terminals

LCD PIN-MAP

No.	Symbol	Description
1	AGND	System Ground
2	AVDD	Analog power
3	DVDD	Power supply for logic operation
4~11	R0~R7	Data bus
12~19	G0~G7	Data bus
20~27	B0~B7	Data bus
28	DOTCLK	Pixel clock signal
29	DE	Data Enable
30	HSD	Horizontal Sync signal
31	VSD	Vertical Sync signal
32	MODE	DE/SYNC mode select. Normally pull high H: DE mode. L: HSD/VSD mode
33	RSTB	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=47KΩ，C=1μ)
34	STBYB	Standby mode, normally pull high STBYB="1", normal operation STBYB="0",timming control, source driver will turn off, all output are high-Z
35	SHLR	Left or Right Display Control
36	DVDD	Digital Power
37	UPDN	Up / Down Display Control
38	GND	Digital Ground
39	AGND	Analog Ground
40	AVDD	Analog Power
41	VCOM	Common Voltage
42	DITH	Dithering setting DITH="H" 6bit resolution(last 2 bit of input data truncated) (default setting) DITH="L" 8bit resolution

43,44	NC	Not connect
45	V10	Gamma correction voltage reference
46	V9	Gamma correction voltage reference
47	V8	Gamma correction voltage reference
48	V7	Gamma correction voltage reference
49	V6	Gamma correction voltage reference
50	V5	Gamma correction voltage reference
51	V4	Gamma correction voltage reference
52	V3	Gamma correction voltage reference
53	V2	Gamma correction voltage reference
54	V1	Gamma correction voltage reference
55	NC	Not connect
56	VDDG	Positive Power for TFT
57	DVDD	Digital Power
58	VEEG	Negative Power for TFT
59	GND	Digital Ground
60	NC	Not connect

【Note1】Mating connector：HIROSE, FH28-60S-0.5SH, 60pin,pitch = 0.5mm

【Note2】SHLR：left or right setting

UPDN：up or down setting

SHLR	UPDN	Data shifting
DVDD	GND	Left→Right，Up→Down(default)
GND	GND	Right→Left，Up→Down
DVDD	DVDD	Left→Right，Down→Up
GND	DVDD	Right→Left，Down→Up

Definition of scanning direction.
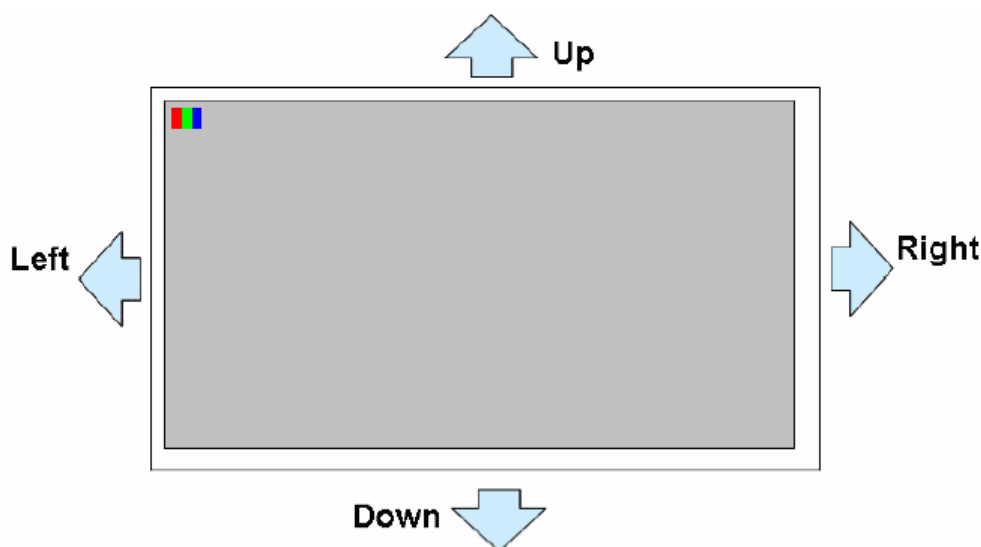
4. Absolute Maximum Rating

Item	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	V_{DD}	-0.5	5.0	V	
Operating Temperature	T_{OPR}	-30	85	℃	
Storage Temperature	T_{STG}	-40	85	℃	

5. Electrical Characteristics

5.1 Typical operation conditions

Ta=25℃

Item	Symbol	Min.	Typ.	Max.	Unit.	Note.
Digital Supply Voltage	DVDD	3	3.3	3.6	V	
Analog Supply Voltage	AVDD	9.0	9.2	9.4	V	
Gate On Voltage	VDDG	17	18	19	V	
Gate Off Voltage	VEEG	-6.6	-6	-5.4	V	
Common Voltage	VCOM	3.8	4	4.2	V	Note1
Gamma Voltage	VR 1	-	9.01	-	V	
	VR 2	-	7.22	-	V	
	VR 3	-	6.88	-	V	
	VR 4	-	6.57	-	V	
	VR 5	-	5.525	-	V	
	VR 6	-	3.925	-	V	
	VR 7	-	2.854	-	V	
	VR 8	-	2.484	-	V	
	VR 9	-	2.04	-	V	
	VR 10	-	0.21	-	V	
Logic Input Voltage	VIH	0.7DVDD	-	DVDD	V	
	VIL	GND	-	0.3DVDD	V	

Note1 : Please adjust VCOM to make the flicker level be minimum.

5.2 Current consumption

Item	Symbol	Condition	Min.	Typ.	Max.	Unit.	Note.
Gate on Current	IVDDG	VDDG =18 V	-	0.5	1	mA	Note1
Gate off Current	IVEEG	VEEG= -6 V	-	0.5	1	mA	Note1
Digital Current	IDVDD	DVDD = 3.3V	-	10	15	mA	Note1
Analog Current	IAVDD	AVDD = 9.2 V	-	30	35	mA	Note1
Total Power Consumption	PC		-	321	396	mW	Note1

Note1: Typ. specification : Gray-level test Pattern
    Max. specification : Black test Pattern

(a)Gray-level Pattern   (b)Black Pattern
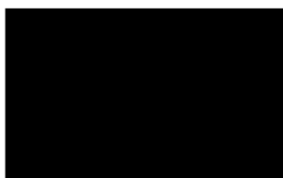
5.3 LED Driving Conditions

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	160	-	mA	
Forward Voltage	V_F	8	9	10	V	
Backlight Power consumption	W_{BL}	-	1.44	-	W	
LED Lifetime		-	25000	-	Hrs	

Note 1: Each LED: IF =20 mA, VF =3+/-0.2V.

Note 2: Optical performance should be evaluated at Ta=25℃ only.

Note 3: If LED is driven by high current, high ambient temperature & humidity condition. The life
Time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness.
Typical operating life time is estimated data.
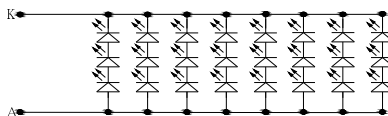
CIRCUIT DIAGRAM
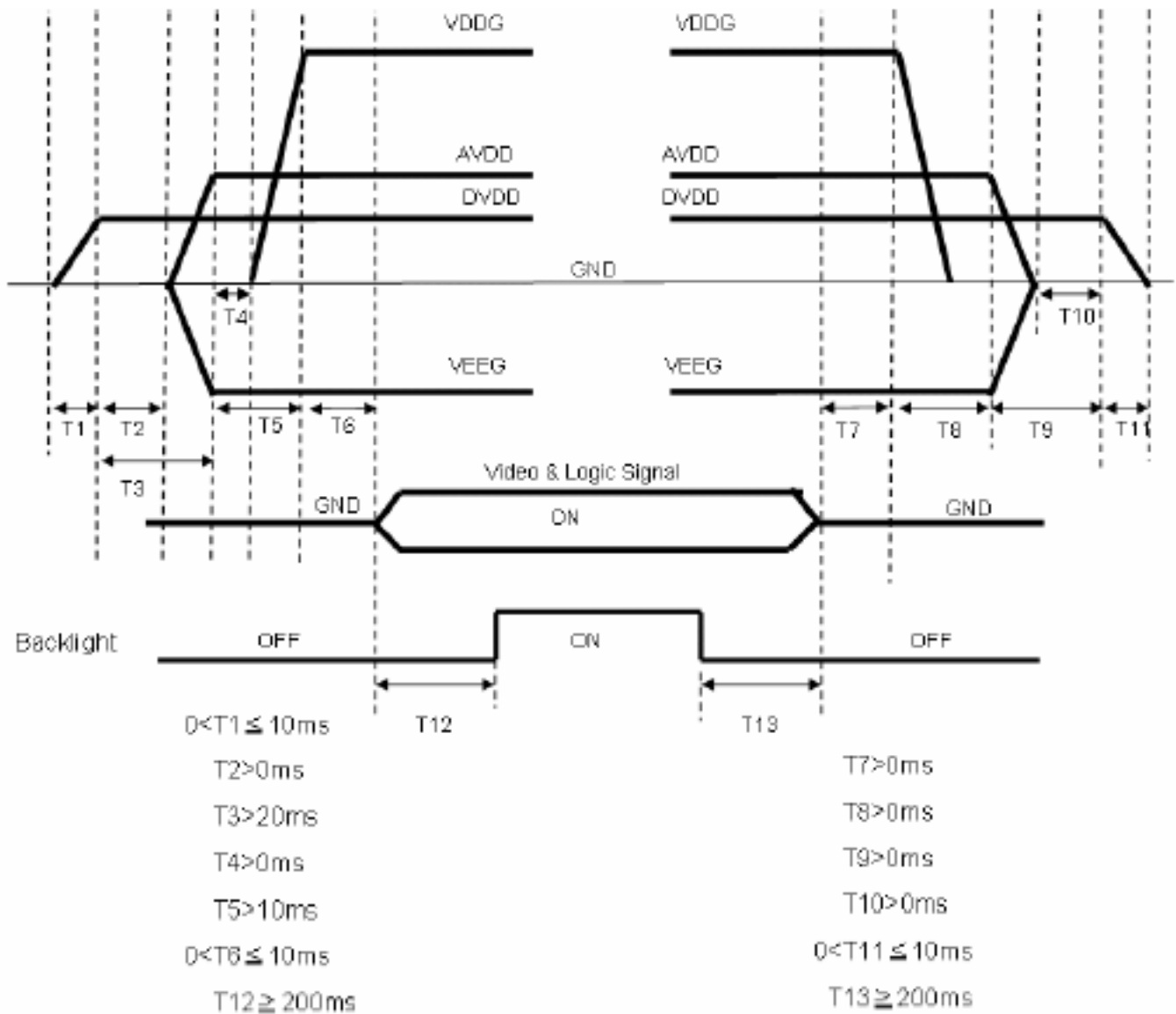Figure: LED connection of backlight(Constant Current)

5.4 Block Diagram
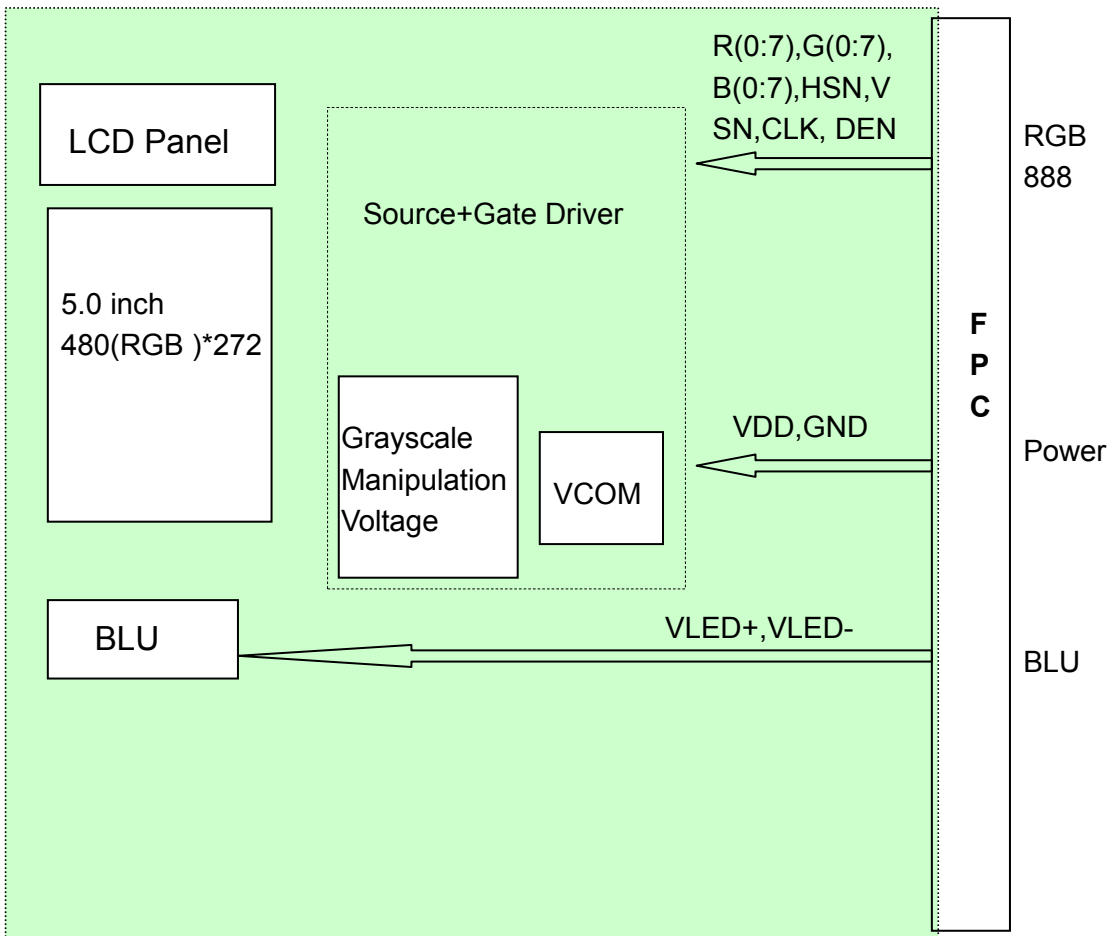
6. Interface Timing

6.1 Power&Signal sequence

Power On : DVDD→AVDD/VEEG→VDDG→Video &Logic Signal→Backlight
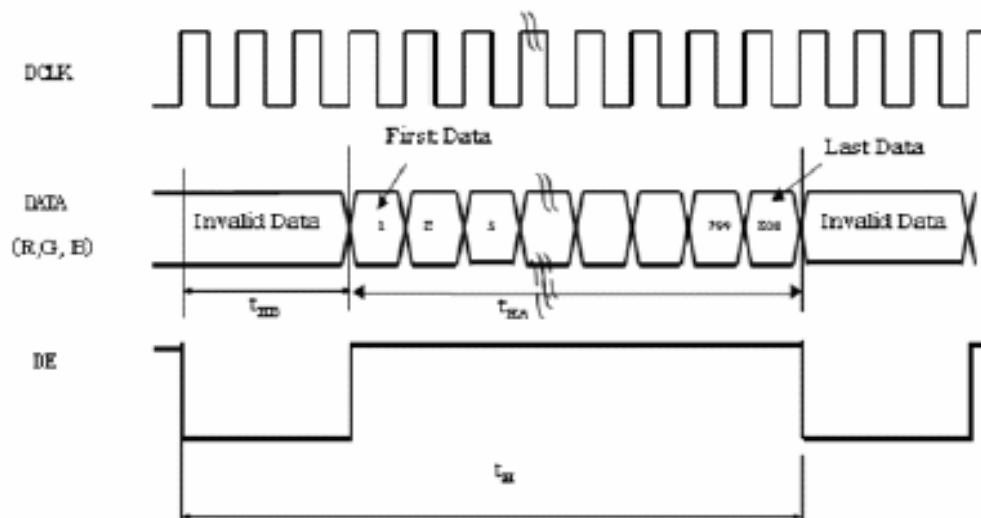Power Off : Backlight→ Video &Logic Signal→VDDG→AVDD/VEEG→DVDD

0<T1≦10ms

T2>0ms

T3>20ms

T4>0ms

T5>10ms

0<T6≦10ms

T12≧200ms

T7>0ms

T8>0ms

T9>0ms

T10>0ms

0<T11≦10ms

T13≧200ms

6.2 Timing characteristics of input signals

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
DCLK	Dot Clock	$1/t_{CLK}$	26	30	35	MHz	
	DCLK pulse duty	Tcwh	40	50	60	%	
DE	Setup Time	Tesu	8	-	-	ns	
	Hold time	Tehd	8	-	-	ns	
	Horizontal Period	t_H	908	928	1000	t_{CLK}	
	Horizontal Valid	t_{HA}		800			
	Horizontal Blank	t_{HB}	108	128	200	t_{CLK}	
	Vertical Period	t_V	515	525	700	t_H	
	Vertical Valid	t_{VA}		480			
	Vertical Blank	t_{VB}	35	45	220	t_H	
SYNC	HSYNC Setup Time	Thst	8	-	-	ns	
	HSYNC Hold Time	Thhd	8	-	-	ns	
	VSYNC Setup Time	Tvst	8	-	-	ns	
	VSYNC Hold Time	Tvhd	8	-	-	ns	
	Horizontal Period	th	908	928	1000	tcux	
	Horizontal Pulse Width	thpw	-	48	-	tcux	thb + thpw=88DCLK is fixed
	Horizontal Back Porch	thb	-	40	-	tcux	
	Horizontal Front Porch	thfp	20	40	112	tcux	
	Horizontal Valid	thd		800			
	Vertical Period	tv	515	525	700	th	
	Vertical Pulse Width	tvpw	-	3	-	th	tvpw + tvb = 32th is fixed
	Vertical Back Porch	tvb	-	29	-	th	
	Vertical Front Porch	tvfp	3	13	188	th	
	Vertical Valid	tvd		480			
DATA	Setup Time	Tdsu	8	-	-	ns	
	Hold Time	Tdhd	8	-	-	ns	

DE mode

Horizontal timing :

Vertical timing：

LINE DATA — Invalid Data | 1 | 2 | 3 | ... | 479 | 480 | Invalid Data

t_v

t_{vb} t_{va}

DE

SYNC mode

Horizontal timing：

DCLK

DATA (R,G, B)

First Data   Last Data

Invalid Data | 1 | 2 | 3 | ... | 799 | 800 | Invalid Data

HSD

thpw   thb   thd   thfp

th

Vertical timing：

LINE DATA — Invalid Data | 1 | 2 | 3 | ... | 479 | 480 | Invalid Data

VSD

tvpw   tvb   tvd   tvfp

tv
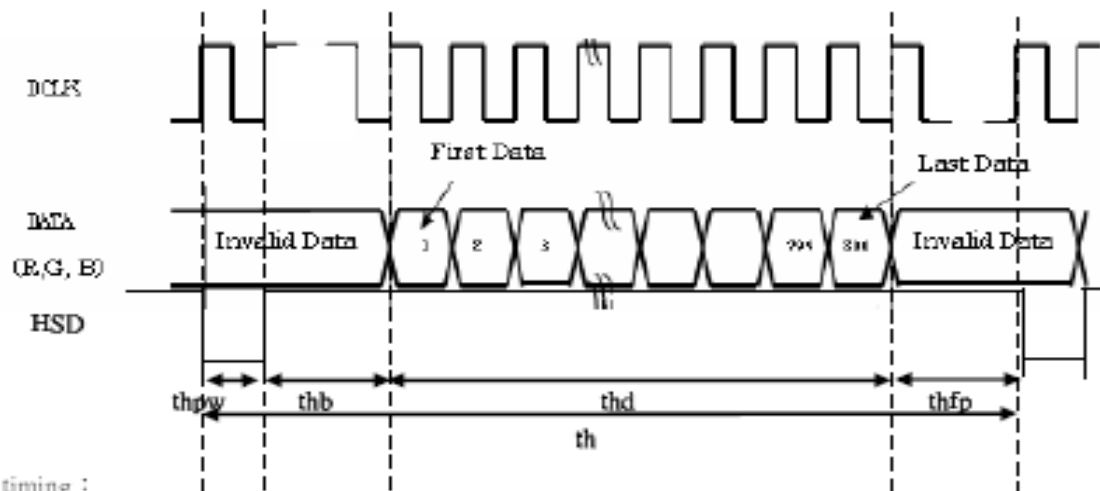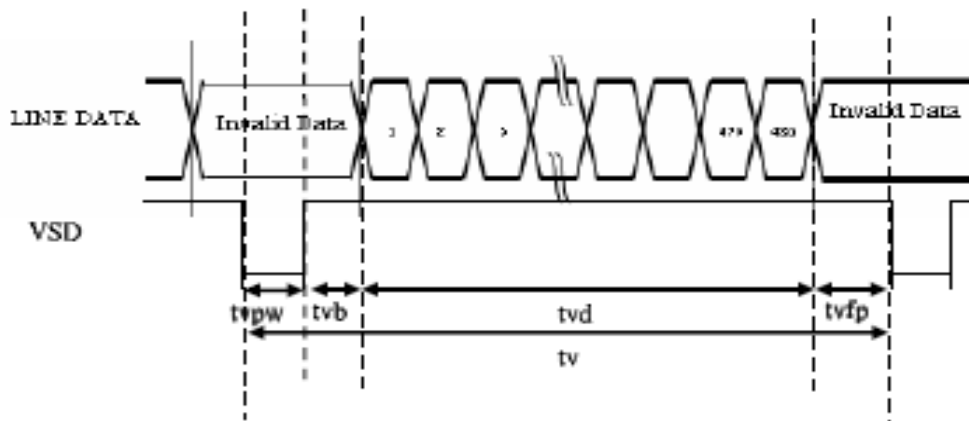
7. Optical Characteristics

Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	Note
Response time		Tr+Tf		-	60	70	ms	FIG.1	Note4
Contrast Ratio		CR	-	480	600	-	-	FIG.2	Note1
Surface luminance		LV	$\theta=0°$	450	500	550	cd/m2	FIG.2	Note2
Luminance uniformity		Yu	$\theta=0°$	80	-	-	%	FIG.2	Note3
NTSC		-	$\theta=0°$	-	50	-	%	FIG.2	Note5
Viewing angle		θ_T	Center CR$\geq$10	-	65	-	deg	FIG.3	Note6
		θ_B		-	65	-	deg	FIG.3	
		θ_L		-	70	-	deg	FIG.3	
		θ_R		-	70	-	deg	FIG.3	
Chromaticity	Red	R_X	$\theta=0°$ $\varnothing=0°$ Ta=25°	0.280	0.310	0.340	-	FIG.2 CIE1931	Note5
		R_Y		0.307	0.337	0.367	-		
	Green	G_X		0.596	0.626	0.656	-		
		G_Y		0.312	0.342	0.372	-		
	Blue	B_X		0.273	0.303	0.333	-		
		B_Y		0.526	0.556	0.586	-		
	White	W_X		0.106	0.136	0.166	-		
		W_Y		0.109	0.139	0.169	-		

Note1. Definition of contrast ratio

Contrast ratio(Cr) is defined mathematically by the following formula. For more information see FIG.2.

$$\text{Contrast ratio} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

For contrast ratio, Surface Luminance, Luminance uniformity and CIE,the testing data is base on TOPCON's BM-5 or BM-7 photo detector or compatible.

Note2. Definition of surface luminance.

Surface luminance is the luminance with all pixels displaying white. For more information see FIG.2.

Lv = Average Surface Luminance with all white pixels(P1,P2,P3, ...,Pn)

Note3. Definition of luminance uniformity

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance.For more information see FIG.2.

$$YU = \frac{\text{Minimum surface luminance with all white pixels (P1,P2,P3,......,Pn)}}{\text{Maximum surface luminance with all white pixels (P1,P2,P3,......,Pn)}}$$

Note4. Definition of response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black"state.Rise time (Tr) is the time between photo detector output intensity changed from 90% to 10%. And fall time (Tf) is the time between photo detector output intensity changed from 10% to 90%.

For additional information see FIG1.

Note5. Definition of color chromaticity (CIE1931)

CIE (x,y) chromaticity,The x,y value is determined by screen active area center position P5.For more information see FIG.2.

Note6. Definition of viewing angle

Viewing angle is the angle at which the contrast ratio is greater than 10. Angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG.3.

For viewing angle and response time testing, the testing data is base on Autronic-Melchers's ConoScope or DMS series Instruments or compatible.

FIG.1.The definition of response Time
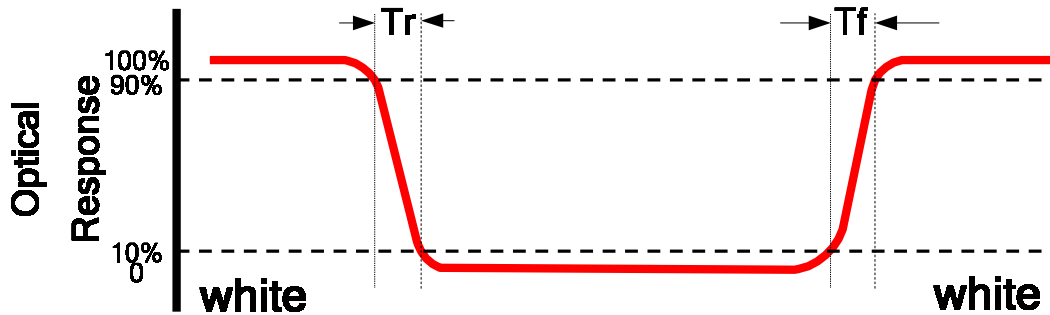
FIG.2. Measuring method for contrast ratio, surface luminance, luminance uniformity, CIE (x,y) chromaticity

Size : S≤5"(see Figure a) A : 5 mm B : 5 mm

H,V : Active area

Light spot size ⌀=5mm(BM-5) or ⌀=7.7mm (BM-7)50cm distance or compatible distance from the LCD surface to detector lens.

test spot position : see Figure a.

measurement instrument : TOPCON's luminance meter BM-5 or
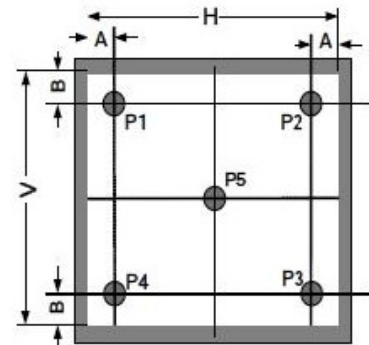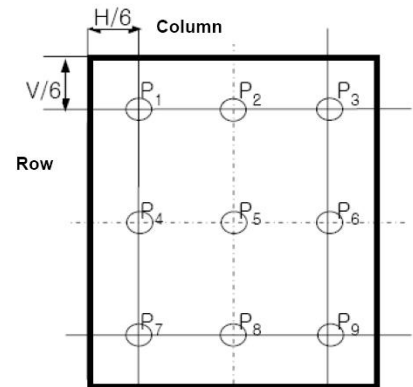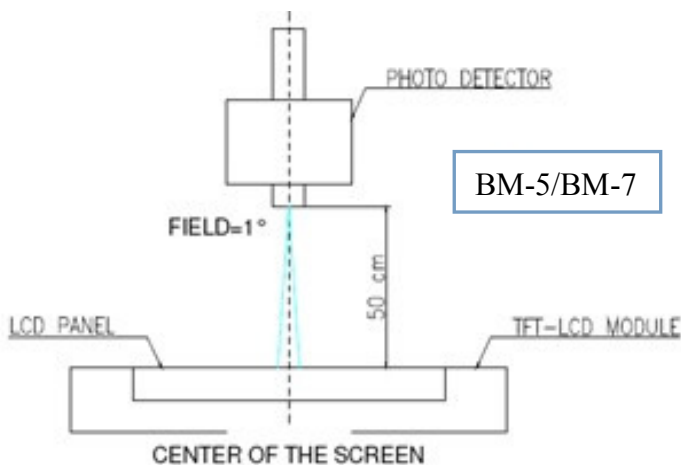
BM-7 or compatible (see Figure c).

Figure a

Size : 5"＜S≤12.3"(see Figure b) H,V : Active area

Light spot size ⌀=5mm(BM-5) or ⌀=7.7mm (BM-7)50cm distance or compatible distance from the LCD surface to detector lens.
test spot position : see Figure b.
measurement instrument : TOPCON's luminance meter BM-5 or

BM-7 or compatible (see Figure c).

Figure b

BM-5/BM-7

Figure c

FIG.3.The definition of viewing angle

θ=0

Up
Φ=90
(12:00)

Left
Φ=180
(9:00)

Right
Φ=0
(3:00)

Down
Φ=270
(6:00)

z

y
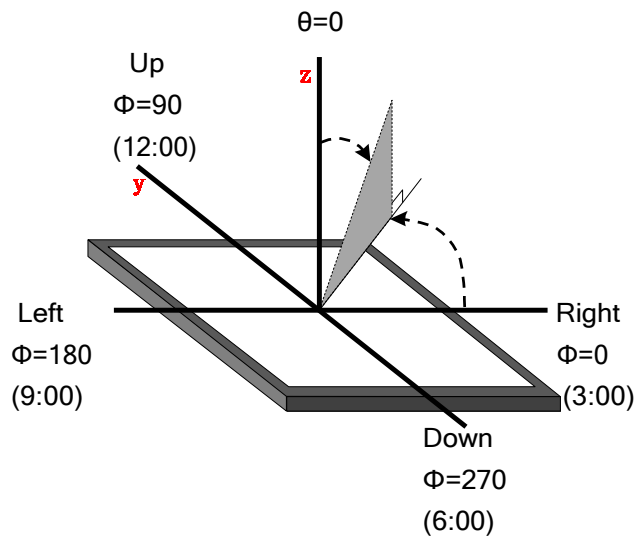
8. Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +85℃, 96hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -30℃, 96hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +85℃, 120hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -40℃, 120hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +60℃, 90% RH max,120 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-20℃ 30 min ~ +60℃ 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Static Discharge (Operation)	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15℃ ~ 35℃, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)	IEC60068-2-6 GB/T2423.5-1995
9	Shock (Non-operation)	60G 6ms, ± X, ±Y , ± Z 3 times for each direction	IEC60068-2-27 GB/T2423.5-1995
10	Package Drop Test	Height: 80 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995
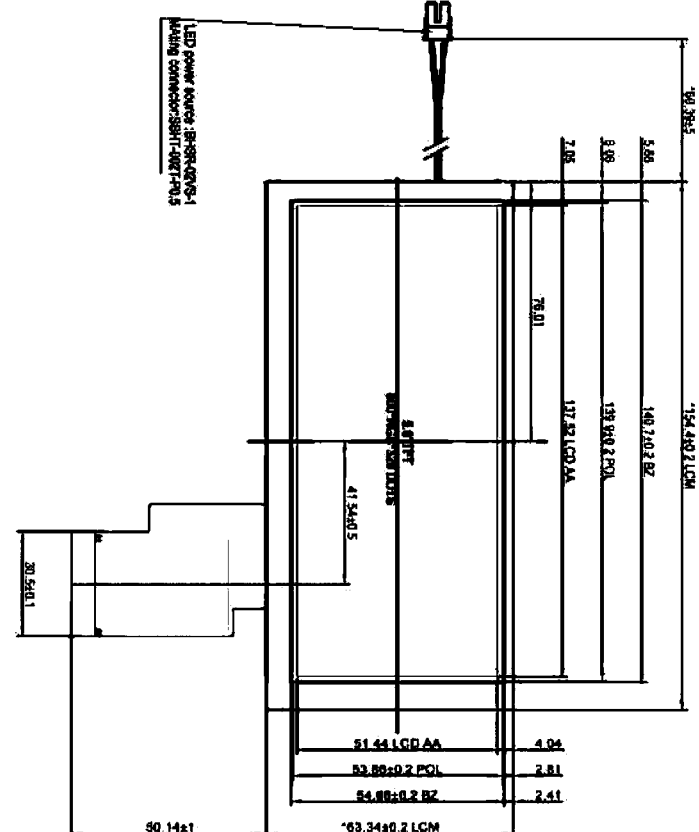
Note: 1. Ts is the temperature of panel's surface.
    2. Ta is the ambient temperature of sample.
    3. The size of sample is 5pcs.

9. Mechanical Drawing

10. Packing

TBD

11.   TFT-LCD Module Inspection Criteria

11.1 Scope

The incoming inspection standards shall be applied to TFT –LCD Modules (hereinafter Called "Modules") that supplied by Dragon China Technology Co., LTD.

11.2 Incoming Inspection

The customer shall inspect the modules within twenty calendar days of the delivery date（the "inspection period）at its own cost. The result of the inspection（acceptance or rejection）shall be recorded in writing, and a copy of this writing will be promptly sent to The seller, If the results of the inspecting from buyer does not send to the seller within twenty Calendar days of the delivery date. The modules shall be regards as acceptance. Should the customer fail to notify the seller within the inspection period, the buyers Right to reject the modules shall be lapsed and the modules shall be deemed to have Been accepted by the buyer

11.3 Inspection Sampling

3.1. Lot size: Quantity per shipment lot per model
3.2. Sampling type: Normal inspection, Single sampling
3.3. Inspection level: II
3.4. Sampling table: MIL-STD-105E
3.5. Acceptable quality level （AQL ）
Major defect: AQL=0.65 Minor defect: AQL=1.50
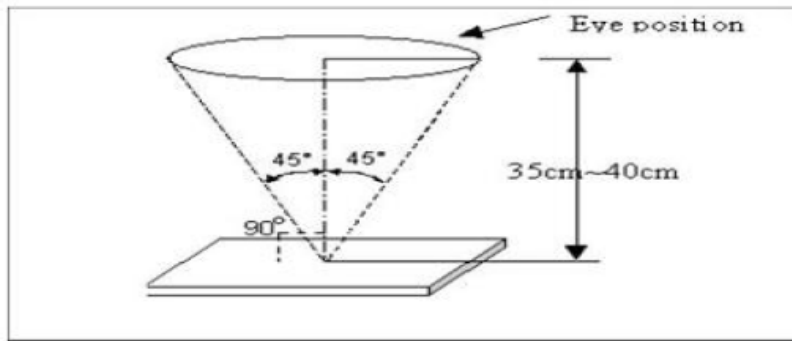
11.4 Inspection Conditions

4.1 Ambient conditions:
a. Temperature: Room temperature 25±5℃
b. Humidity: (60±10) ％RH
c. Illumination: Single fluorescent lamp non-directive (300 to 700 Lux)
4.2 Viewing distance
The distance between the LCD and the inspector's eyes shall be at least 35±5 ㎝.
4.3 Viewing Angle
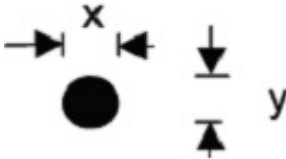U/D: 45 ° /45°, L/R: 45° /45°
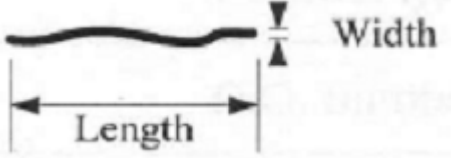
11.5 Inspection Criteria

Defects are classified as major defects and minor defects according to the degree of Defectiveness defined herein.
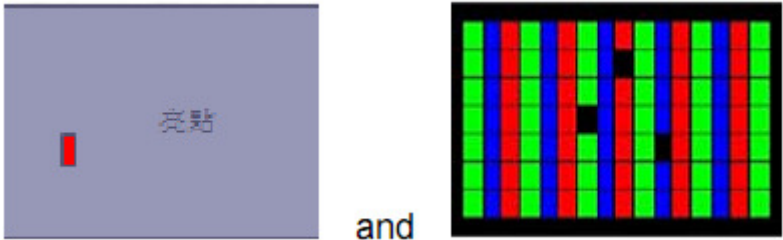
11.5.1 Major defect

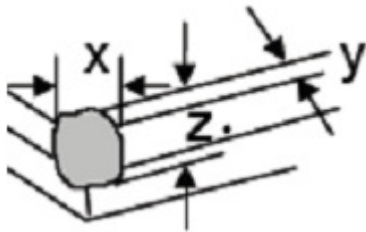| Item No	Items to be inspected	Inspection Standard
5.1.1	All functional defects	1) No display 2) Display abnormally 3) Short circuit 4) line defect
`5.1.2	Missing	Missing function component
5.1.3	Crack	Glass Crack
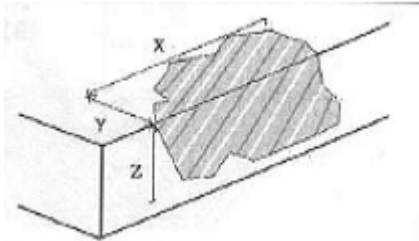
11.5.2 Minor defect

Item No	Items to be inspected	Inspection standard	
5.2.1	Spot Defect Including Black spot White spot Pinhole Foreign particle Polarizer dirt	For dark/white spot is defined $$\varphi = (x+y) / 2$$ 	
		Size φ(mm)	Acceptable Quantity
		φ≤0.1	Ignore
		0.1 < φ≤0.2	N≤3
		0.2 < φ≤0.3	N≤2
		0.3 < φ	Not allowed

5.2.2	Line Defect Including Black line White line Scratch	Define:	
		Width(mm) Length(mm)	**Acceptable Quantity**
		W≤0.03	Ignore
		0.03 < W≤0.05，L≤3.0	N≤2
		0.05 < W≤0.08，L≤3.0	N≤1
		0.08 < W	Not allowed

5.2.3	Polarizer Dent/Bubble	**Size φ(mm)**	**Acceptable Quantity**
		φ≤0.1	Ignore
		0.1 < φ≤0.2	N≤3
		0.2 < φ≤0.3	N≤2
		0.3 < φ	Not allowed

Bright and Black dot define:

and

Two Adjacent Dot

Inspection pattern: Full white、Full black、Red、green and blue screens

5.2.4	Electrical Dot Defect	Item	Acceptable Quantity		
			I	O	Total
		Black dot defect	2	4	5
		Bright dot defect	1	3	3
		Total Dot	2	5	6
		3% Bright Dot is allowed			

5.2.5	Glass defect	1.Corner Fragment:	
		Size(mm)	Acceptable Quantity
		X≤3mm Y≤1mm Z≤T	Ignore T：Glass thickness X: Length Y: Width Z: thickness
		2. Side Fragment:	
		Size(mm)	Acceptable Quantity
		X≤5.0mm Y ≤1mm Z≤T	T：Glass thickness X: Length Y: Width Z: thickness
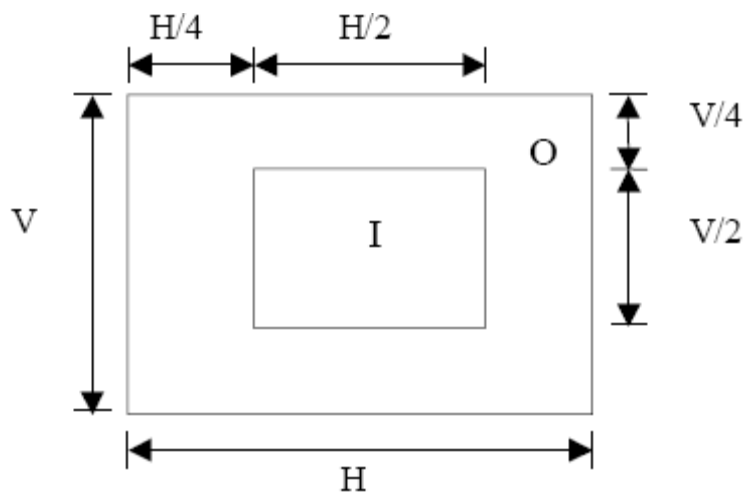
I area & O area

Note: 1). Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area.

2). The distance between two bright dot defects (red, green, blue, and white) should be larger than 15mm.

3). The distance between black dot defects or black and bright dot defects should be more than 5mm apart.

4). Polarizer bubble is defined as the bubble appears on active display area. The defect of polarizer bubble shall be ignored if the polarizer bubble appears on the outside of active display area.

11.6 Mechanics specification

As for the outside dimension, weight of the modules, please refer to product specification
For more details

12. Precautions for Use of LCD modules

12.1 Handling Precautions

12.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

12.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

12.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

12.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

12.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketene
- Aromatic solvents

12.1.6. Do not attempt to disassemble the LCD Module.

12.1.7. If the logic circuit power is off, do not apply the input signals.

12.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

12.1.8.1. Be sure to ground the body when handling the LCD Modules.

12.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

12.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

12.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

12.2 Storage Precautions

12.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

12.2.2. The LCD modules should be stored under the storage temperature range If the LCD modules will be stored   for a long time, the recommend condition is:

Temperature : 0℃ ∼ 40℃   Relatively humidity: ≤80%

12.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

12.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.