



# PRODUCT SPECIFICATION

**MODEL: ZTM082BOEM1802**

<◇>PRELIMINARY SPECIFICATION

<◆>APPROVAL SPECIFICATION

<b>CUSTOMER</b>
<b>APPROVED BY</b>
<b>DATE:</b>

DESIGNED	CHECKED	APPROVED

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REVISION STATUS

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TABLE OF CONTENTS

No.	CONTENTS	PAGE
	REVISION STATUS.....	1
	TABLE OF CONTENTS.....	3
1.	GENERAL DESCRIPTION.....	4
2.	MECHANICAL SPECIFICATION.....	5
3.	PIN DESCRIPTION.....	6
4.	ELECTRICAL CHARACTERISTICS.....	7
5.	INPUT SIGNAL TIMING.....	10
6.	OPTICAL CHARACTERISTICS.....	12
7.	RELIABILITY TEST ITEMS.....	14
8.	GENERAL PRECAUTION.....	15



## 1. GENERAL DESCRIPTION

### 1.1 DESCRIPTION

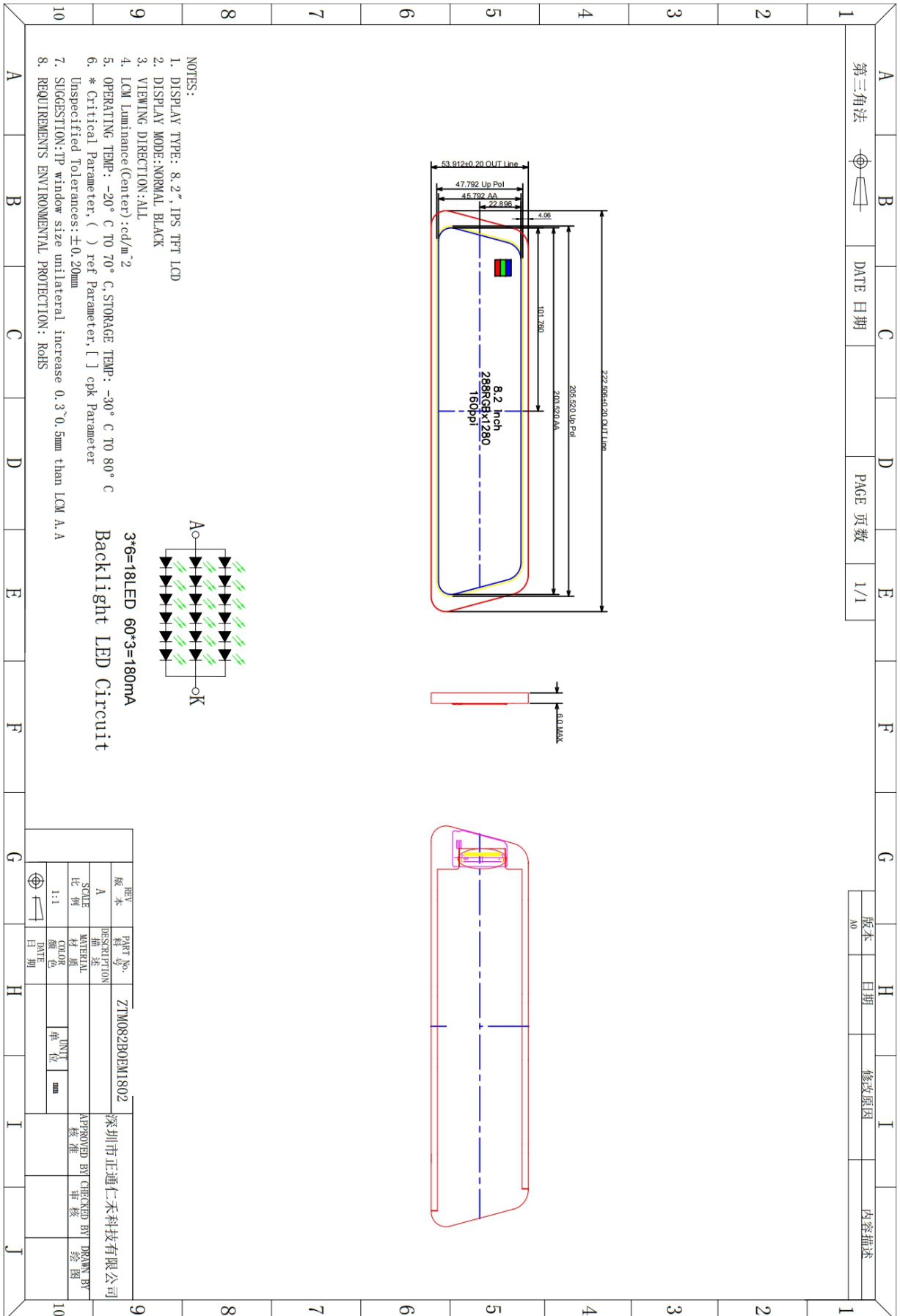
This LCM is a color active matrix thin film transistor (TFT) IPS liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, Driver IC, FPC and Backlight. This TFT LCD has a 8.2-inch diagonally measured active display area with (288 horizontal by 1280 vertical pixel) resolution.

### 1.2 FEATURES:

No.	Item	Specification	Unit
1	Panel Size	8.2"	inch
2	Number of Pixels	288×RGB (3)×1280	pixels
3	Active Area	203.52(H)x 45.792(V)	mm
4	Pixel Pitch	0.053(H)×0.159(V) x RGB	mm
5	Outline Dimension	222.506(W)×53.912(H)×6.0(D)	mm
6	Number of Colors	16.7M	-
7	Display Mode	Transmission mode, Normally black	-
8	Viewing Direction	Full viewing	-
9	Display Format	RGB vertical stripe	-
10	Surface Treatment	Glare	-
11	Interface	MIPI	-
12	Backlight	White LED	-
13	Operation Temperature	-20~70	°C
14	Storage Temperature	-30~80	°C
15	Weight	-	g
16	Driver IC	EK79208	-



2. MECHANICAL SPECIFICATION





### 3. PIN DESCRIPTION

FPC Connector is used for the module electronics interface.

No.	Symbol	Function	Remark
1	GND	Ground	
2	D0P	Positive MIPI differential data input	
3	D0N	Negative MIPI differential data input	
4	GND	Ground	
5	D1P	Positive MIPI differential data input	
6	D1N	Negative MIPI differential data input	
7	GND	Ground	
8	CLKP	Positive MIPI differential clock input	
9	CLKN	Negative MIPI differential clock input	
10	GND	Ground	
11	D2P	Positive MIPI differential data input	
12	D2N	Negative MIPI differential data input	
13	GND	Ground	
14	D3P	Positive MIPI differential data input	
15	D3N	Negative MIPI differential data input	
16	GND	Ground	
17	GND		
18	NC	No connection	
19	NC		
20	NC		
21	NC	No connection	
22	NC	No connection	
23	NC	No connection	
24	RSTB(3.3V)	Reset pin.	
25	STBYB(3.3V)	Standby mode control.	
26	NC	No connection	
27	GND	Ground	
28	K	LED Cathode	
29	K		
30	GND	Ground	
31	NC	No connection	
32	GND	Ground	
33	GND	Ground	
34	NC	No connection	
35	A	LED Anode	
36	A		
37	GND	Ground	
38	VDD(3.3V)	A power supply for the analog power.	
39	VDD(3.3V)		
40	NC	No connection	

**Notes:** Reset and Stbyb voltage needs bring into correspondence with lovcc voltage.



### 4. ELECTRICAL CHARACTERISTICS

#### 4.1 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Digital Supply Voltage	VCI	-0.3	4.0	V	
Digital Supply Voltage	IOVCC	-0.3	4.0	V	

#### 4.2 TFT LCD MODULE

##### 4.2.1 Operating Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	
Logic Input Voltage	VIH	0.8VDD	-	VDD	V	
	VIL	GND	-	0.2VDD	V	

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

Note2: TYP VCOM is only reference value. It must be optimized according to each LCM. Be sure to use VR and OP buffer on VCOM output. Please adjust VCOM to make the flicker level be minimum for getting excellent image.

##### 4.2.2 Current Consumption

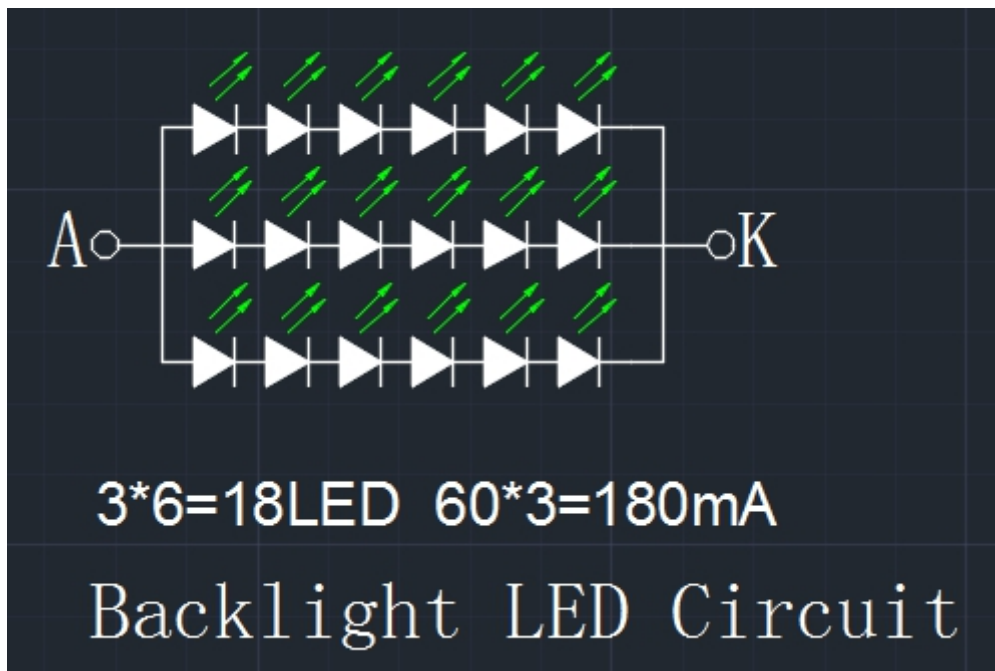
Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Digital Current	IVCI	VDD= 3.3V	-	-	-	mA	Note1

Note1: Typ. specification : Gray-level test Pattern



### 4.3 BACKLIGHT UNIT

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LED Current	Iled	-	180	-	mA	Total LED
Forward voltage	VF	-	19.2	-	V	-
Reverse current	IR	-	-	50	μA	VR=5V,1LED
Power dissipation	Pd	-	3456		mW	Total LED
Peak forward current	IFP	100			mA	1LED
Reverse Voltage	VR	5			V	1LED



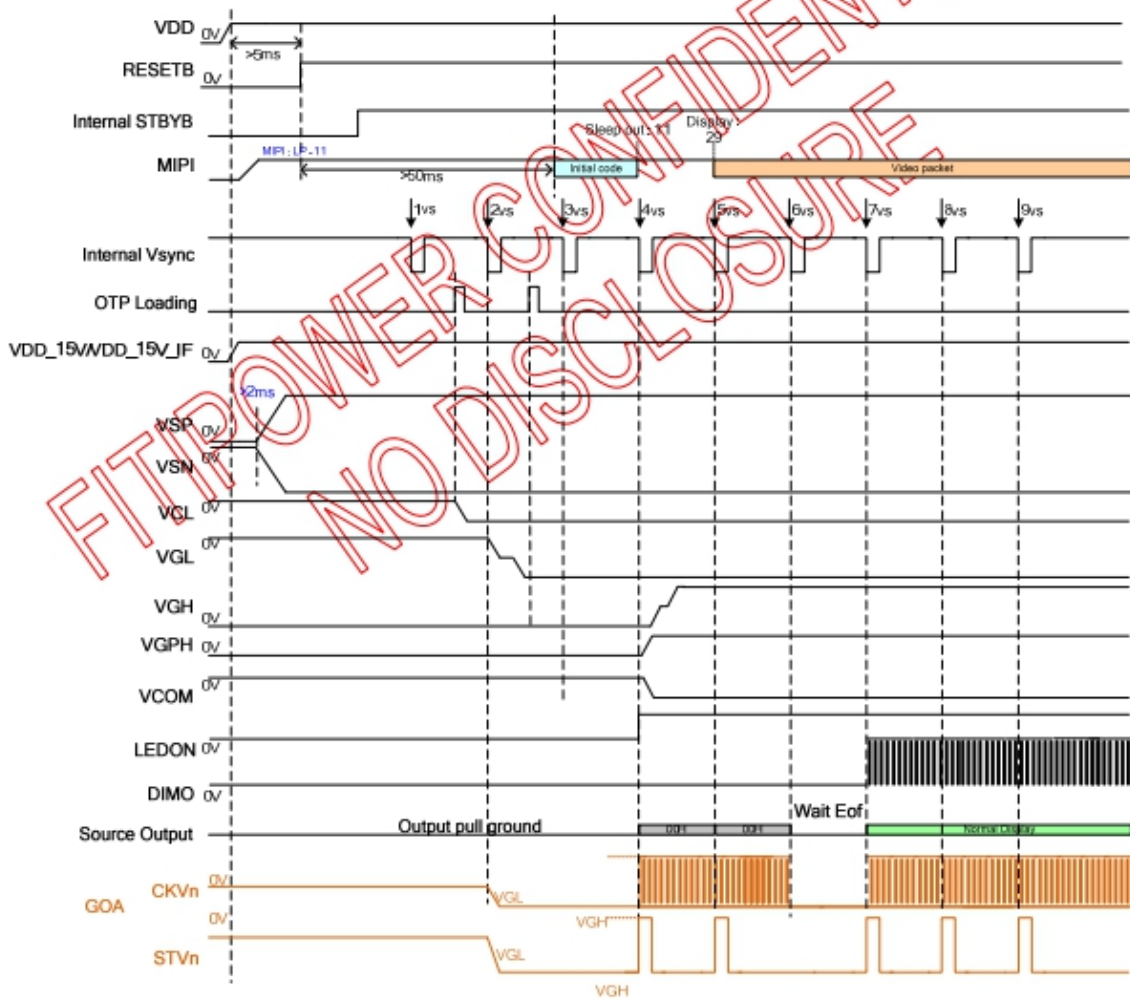




#### 4.4 POWER ON SEQUENCE

After reset state or exit sleep mode, the STBYB signal will be set to high. The power on sequence will start.

To prevent the device from damage due to latch up, The VGL will be earlier than VGH. At 2VS the VGL negative high voltage will be generated via the external charge pump circuit. Then at 2.5VS the VGH positive high voltage can be generated via the external charge pump circuit.





## 5. INPUT SIGNAL TIMING

### 5.1 MODE DC ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Spec.			Unit	Note	
		Min.	Typ.	Max.			
VDD input high level voltage	VIH1	0.8VDD	-	VDD	V	-	
VDD input low level voltage	VIL1	VSS	-	0.2VDD	V	-	
VDD_15V input high level voltage	VIH2	0.8VDD_15V	-	VDD_15V	V	-	
VDD_15V input low level voltage	VIL2	VSS	-	0.2VDD_15V	V	-	
Input leakage current	IL1	-1	-	1	uA	-	
SDAO output high level voltage	VOH	0.8VDD	-	VDD	V	-	
SDAO output low level voltage	VOL	VSS	-	0.2VDD	V	-	
VDDL output voltage	VDDL	1.1	1.2	1.4	V	(VDDL)<10mA	
VCL output voltage	VCL	-3	-	-	V	(VCL)<60mA	
VGH output voltage	VGH	8.7	-	18	V	(VGH)<5mA	
VGL output voltage	VGL	-16	-	-6.7	V	(VGL)<5mA	
VGPH output voltage	VGPH	4.0	4.5	5.5	V	-	
VGPL output voltage	VGPL	0.1	0.2	1.6	V	-	
VGNH output voltage	VGNH	-5.5	-4.5	-4.0	V	-	
VGNL output voltage	VGNL	-1.6	-0.2	-0.1	V	-	
Driving current of GOUT outputs	IGOS	1	-	-	mA	GOUT1~20 VO=15V vs 14.7V VGH=15V,VGL=-13V	
Sinking current of GOUT outputs	IGOB	1	-	-	mA	GOUT1~20 VO=-13V vs -12.7V VGH=15V,VGL=-13V	
VCOM output voltage	VCOM	-2.75	-	-0.20	V	-	
Input terminal pull-high resistance	RPU	-	300	-	Kohm		
Input terminal pull-low resistance	RPD	-	300	-	Kohm		
Source output level deviation	Graycode = 0 ~ 14	-	40	-	-	mV	
	Graycode = 241 ~ 255	-	40	-	-	mV	
	Graycode = 15 ~ 31	-	30	-	-	mV	
	Graycode = 208 ~ 240	-	20	-	-	mV	
Source output offset deviation	Graycode = 0 ~ 14	-	50	-	-	mV	
	Graycode = 241 ~ 255	-	40	-	-	mV	
	Graycode = 15 ~ 31	-	40	-	-	mV	
	Graycode = 208 ~ 240	-	30	-	-	mV	
VDD current consumption	Normal mode	-	-	TBD	-	mA	Note (1)
	Standby mode	-	-	TBD	-	mA	Note (2)
VSP current consumption	Normal mode	-	-	TBD	-	mA	Note (1)
	Standby mode	-	-	TBD	-	mA	Note (2)
VSN current consumption	Normal mode	-	-	TBD	-	mA	Note (1)
	Standby mode	-	-	TBD	-	mA	Note (2)
VOTP operation current	IvOTP	-	-	8	mA	-	

Note: (1) Condition: VDD=1.8V, VSP/VSN=+/-5V, 1 dot inversion, 600RGBx1024 resolution, internal VGH/L (VGH=15V, VGL=-10V), one dot on-off pattern and no loading.  
 (2) Condition: all function and signal stop.



### 5.2 MIPI DC CHARACTERISTICS

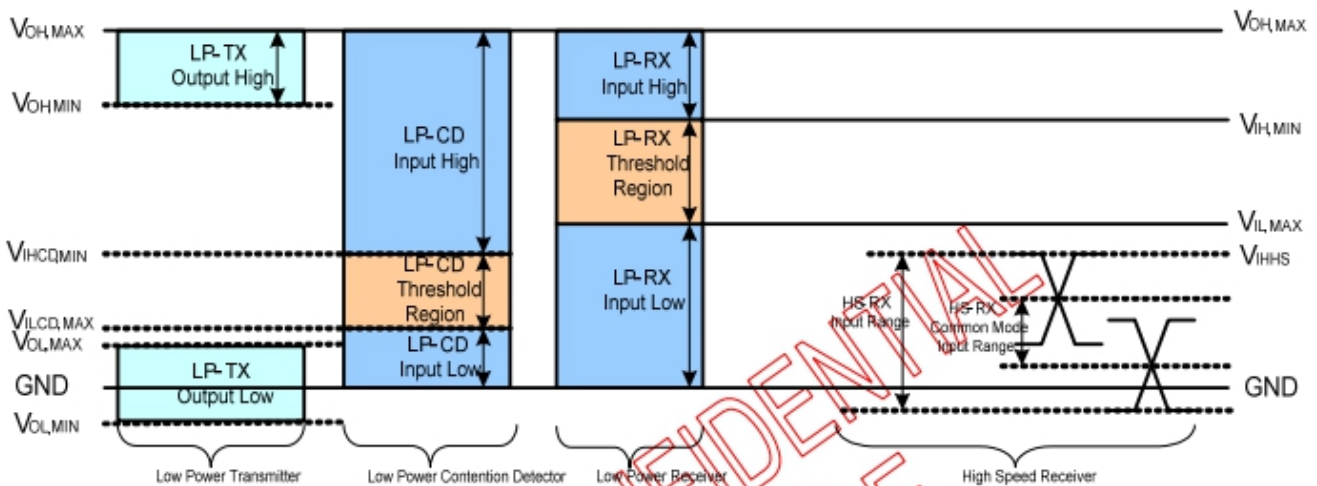


Figure 12.1: MIPI signaling and contention voltage levels

### 5.3 PARALLEL RGB INPUT TIMING TABLE

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Horizontal Display Area	thd		288		DCLK
One Horizontal Line	th	-	792	-	DCLK
HS pulse width	thpw	-	24	-	DCLK
Hs Back Porch(Blanking)	thd		240		DCLK
Hs Front Porch	thfp		240		DCLK

#### Vertical Timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd		1280		TH
VS Period	tv	-	1314	-	TH
VS Pulse Width	tvpw	-	2	-	TH
VS Back Porch(Blanking)	tvb		10		TH
VS Front Porch	tvfp	-	22	-	TH

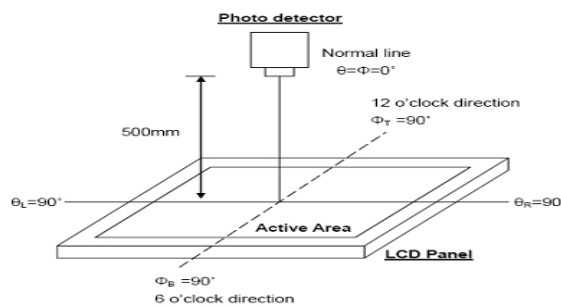


6.OPTICAL CHARACTERISTICS

Ta=25±2℃

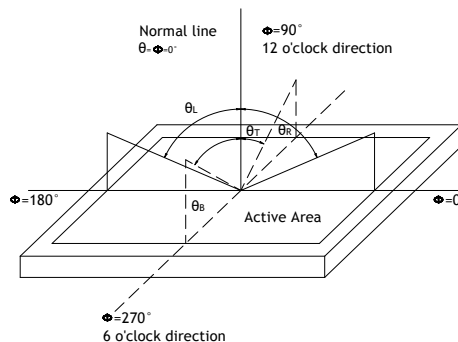
Item	Symbol	Min.	Typ.	Max.	Unit	Note	
Contrast Ratio	CR	800	1000	-		Note1 Note3	
Luminance(center)	L	-	1100	-	cd/m2	Note1 Note5 Note7	
Luminous tolerance	LU	80	85		%	Note7	
Response Time	Rising + Falling	-	-	35	ms	Note1 Note4	
Viewing Angle K=Contrast Ratio>10	Horizontal	$\theta_{x^+}$	75	80	-	degree	Note2
		$\theta_{x^-}$	75	80	-		
	Vertical	$\theta_{y^+}$	75	80	-		
		$\theta_{y^-}$	75	80	-		
Color Chromaticity (CIE1931)	Red	x	Typ- 0.05	-	Typ+ 0.05	Note1 Note5 Note7	
		y		-			
	Green	x		-			
		y		-			
	Blue	x		-			
		y		-			
	White	x		-			
		y		-			
Color gamut (NTSC ratio)		-	-		%		

Note1: Definition of optical measurement system (BM-7)



Note2: Definition of viewing angle range and measurement system

Viewing angle is measured at the center point of the LCD by CONOSCOPE (ergo-80).



Note3: Definition of Response time



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

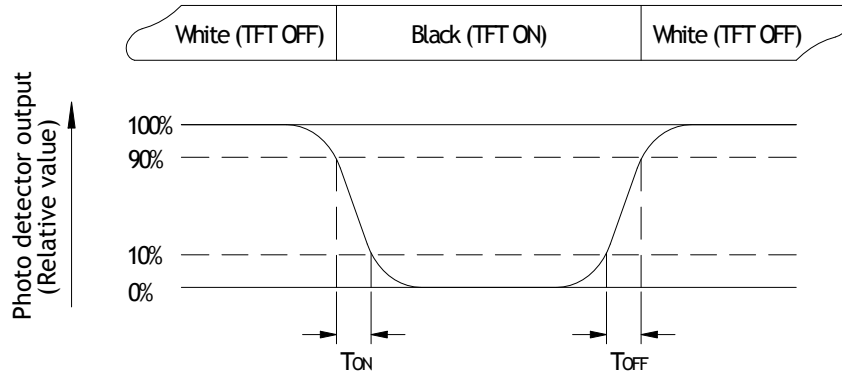


Fig. 6-3 Definition of response time

Note4: Definition of contrast ratio

$$\text{Contrast ratio(CR)} = \frac{\text{Luminance measured when LCD on the Whitestate}}{\text{Luminance measured when LCD on the Blackstate}}$$

“White state “: The state is that the LCD should drive by  $V_{white}$ .

“Black state”: The state is that the LCD should drive by  $V_{black}$ .

$V_{white}$ : To be determined  $V_{black}$ : To be determined.

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

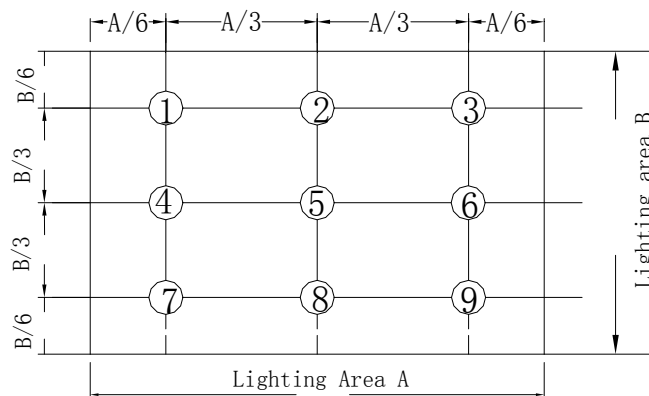
Note6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is  $I_L=180\text{mA}$

Note7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas. Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (U)} = L_{min} / L_{max}$$

L----Active area length, W---- Active area width



$B_{max}$ : The measured maximum luminance of all measurement position.

$B_{min}$ : The measured minimum luminance of all measurement position.



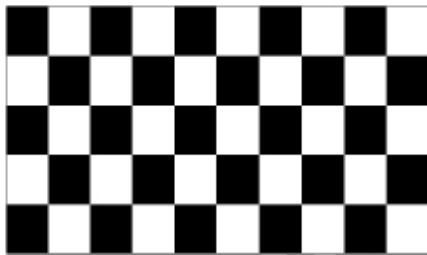
## 7. RELIABILITY TEST ITEMS

### 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 , 96Hrs(no condensation)	IEC60068-2-78 : 2001 GB/T2423.3-2006
Thermal Shock	-20°C(0.5h) ~ 70°C(0.5h) / 100cycles	Start with cold temperature , End with high temperature , IEC60068-2-14:1984,GB2423.22-2002
Image Sticking	25°C ; 1hrs	Note1

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

Operation with test pattern sustained for 1 hrs,then change to gray pattern immediately.after 5 mins,the mura 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 <sup>2</sup> ,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

### 7.3 ESD

Test item	Conditions	Remark	
Electro Static Discharge Test (non-operation)	150pF , 330Ω , Contact:±4KV,Air:±8KV	1	Class C
	200pF , 0Ω , ±200V contact test	2	

Note: Measure point :

1. LCD glass and metal bezel
2. IF connector pins
3. ESD class B:some performance degradation allowed. Self-recoverable.



No data lost, no hardware failures.

## 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  $23 \pm 5^{\circ}$  C and The humidity is below  $50 \pm 20\%$  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 ketonics 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.