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SPEC. NUMBER

PRODUCT GROUP

TFT-LCD

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**TITLE :**

**ZK438FBM-18D Product Specification**

Jiangsu Gaomingan Photoelectric Co., Ltd.

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## REVISION HISTORY

REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0	-	Initial Release	2018.03.16	Shi baole



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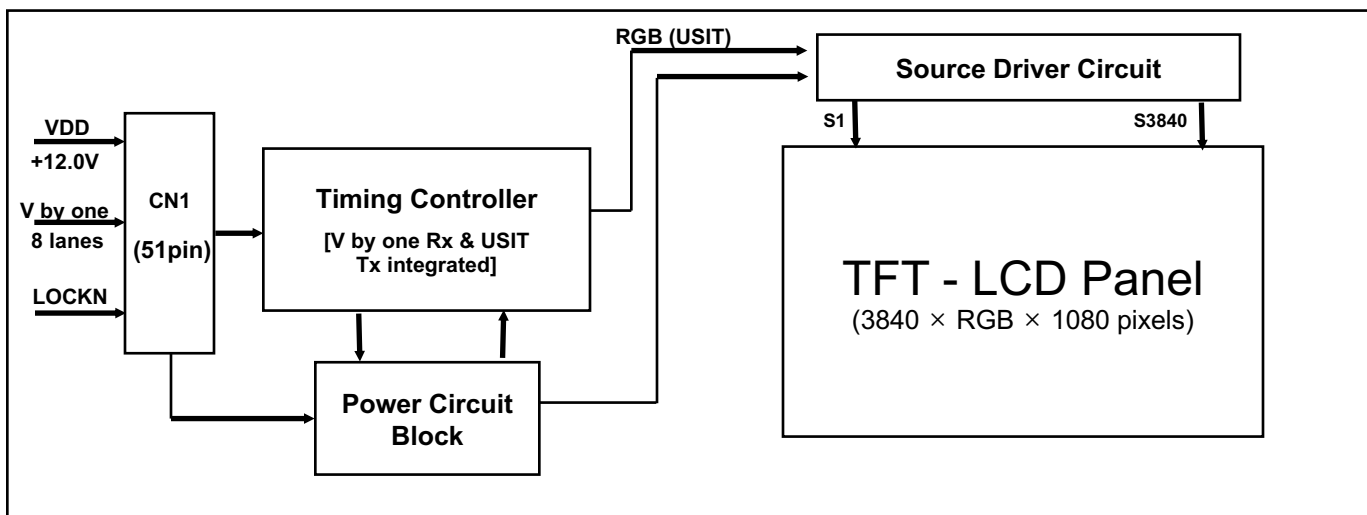
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## 1.0 GENERAL DESCRIPTION

### 1.1 Introduction

ZK438FBM-18D is a color active matrix TFT LCD open cell using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This OC has a 43.8 inch diagonally measured active area with resolutions (3840 horizontal by 1080 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this OC can display 1.07G colors. The TFT-LCD panel used for this OC is adapted for a low reflection and higher color type.



### 1.2 Features

- V by one interface with 8 lanes
- High-speed response
- Low color shift image quality
- 8-bit + FRC color depth, display 1.07G colors
- High luminance and contrast ratio, low reflection and wide viewing angle
- Gate driver use GOA mode
- ADS technology is applied for high display quality
- RoHS compliant

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### 1.3 Application

- Home Alone Multimedia TFT-LCD TV
- Display Terminals for Control System
- Ultra High Definition TV(3840\*1080)
- AV application Products

### 1.4 General Specification

< Table 1. General Specifications >

Parameter	Specification	Unit	Remarks
Active area	1071.36(H) × 301.32(V)	mm	
Number of pixels	3840(H) × 1080(V)	pixels	
Pixel pitch	279(H) × 279(V)	um	
Pixel arrangement	Pixels RGB Vertical stripe		
Display colors	1.07G (8bits+FRC)	colors	
Luminance,White	1500	nit	
Open Cell Transmittance	4.2 (Typ.)	%	At center point with BOE BLU
Dimensional outline	1084(H) × 314.88(V) × 1.35 (B) .	mm	Detail refer to drawing
Weight	10.28(Typ.)	kg	预估
Power Consumption	151.8(Typ.) [Logic= 7.8 W, Back light= 144.0 W]	Watt	
BM Size (L/R/U/D)	6.32/6.32/4.98/8.58	mm	
Surface Treatment	AG25/Clear(CF /TFT POL)		

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## 2.0 ABSOLUTE MAXIMUM RATINGS

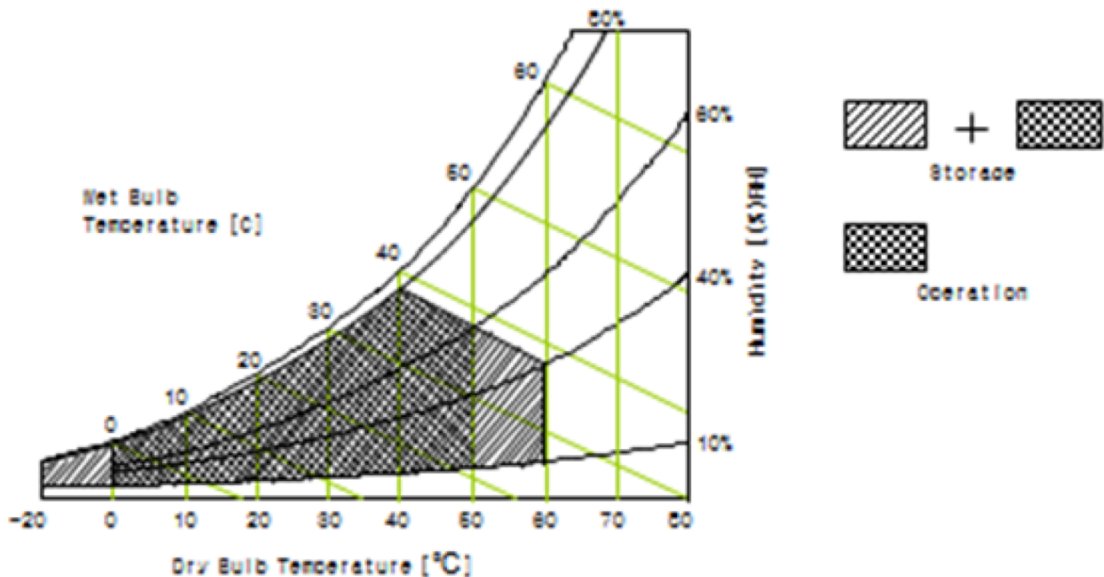
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. Open Cell Electrical Specifications >

[VSS=GND=0V]

Parameter	Symbol	Min.	Max.	Unit	Remark
Power Supply Voltage	VDD	VSS-0.3	13.2	V	Ta = 25 °C
Operating Temperature	T <sub>OP</sub>	0	+50	°C	Note 1
Storage Temperature	T <sub>SUR</sub>	-20	+60	°C	
	T <sub>ST</sub>	-20	+60	°C	
Operating Ambient Humidity	Hop	10	80	%RH	
Storage Humidity	Hst	10	80	%RH	

Note 1 : Temperature and relative humidity range are shown in the figure below.  
Wet bulb temperature should be 39 °C max. and no condensation of water.



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### 3.0 ELECTRICAL SPECIFICATIONS

#### 3.1 TFT LCD Open Cell

< Table 3. Open Cell Electrical Specifications >

[Ta =25 ±2 °C]

Parameter		Symbol	Values			Unit	Remark
			Min	Typ	Max		
Power Supply Input Voltage		VDD	10.8	12	13.2	Vdc	
Power Supply Ripple Voltage		VRP	-	-	600	mV	
Power Supply Current		IDD	-	650	1450	mA	Note 1
Power Consumption		PDD	-	7.8	17.4	Watt	
Rush current		IRUSH	-	-	4	A	Note 2
V by One Interface	Differential Input High Threshold Voltage	VLVTH	-	-	+50	mV	-
	Differential Input Low Threshold Voltage	VLVTL	-50	-	-	mV	-
	Terminating Resistor	Rt	90	100	110	ohm	-
CMOS Interface	Input High Threshold Voltage	VIH	2.7	-	3.3	V	
	Input Low Threshold Voltage	VIL	0	-	0.6	V	

Note 1 : The supply voltage is measured and specified at the interface connector of LCM.

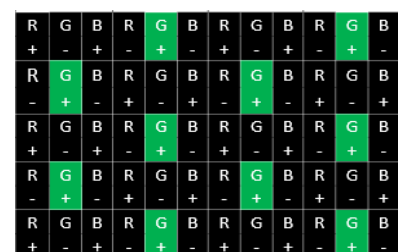
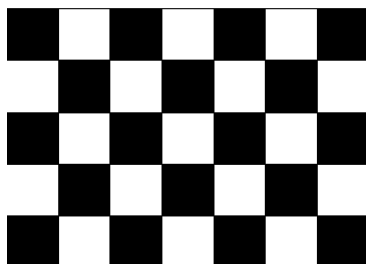
The current draw and power consumption specified is for VDD=12.0V,

Frame rate  $f_v=60\text{Hz}$  and Clock frequency = 37.125MHz.

Test Pattern of power supply current

- a) Typ : Mosaic 7X5 (L0/L255)      b) Max : Horizontal 1 Line (L0/L255)      c) Flicker Test Pattern

Note 2 : The duration of rush current is about 2ms and rising time of Power Input is 0.5ms(min)



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## 3.0 ELECTRICALSPECIFICATIONS

### 3.5 Backlight Module

< Table 7. LED LIGHTBAR UNIT CHARACTERISTICS > [Ta =252 ]

parameter		Symbol	VALUES			Unit	Notes	
			MIN	TYP	MAX			
Power supply input voltage		VBL	22.6	24	26.4	VDC	1	
Power supply input current		IBL_A	-	6.0	-	A	VBR=3.3 V	
Power consumption		PBL		144.0		W	VBR=3.3 V	
Input signal for inverter control	On/off	on	V on	2.5	-	5	V	
		off	V off	0	-	0.5	V	
	Brightness adjust	EXTVBR-B	35			100	%	Automatic sensitization control

Note1 :The lifetime is defined as the time which luminance of the LED decays to 50% compared to the initial value, Operating condition: Continuous operating at Ta = 252

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## 4.0 INTERFACE CONNECTION

### 4.1 Open Cell Input Signal & Power

- V by one Connector : F05035-51P-H(Changtong) or Equivalent.

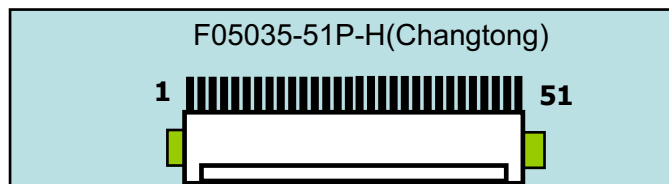
< Table 4. Open Cell Input Connector Pin Configuration >

Pin No	Symbol	Description	Pin No	Symbol	Description
1	VDD	Power Supply +12.0V	27	GND	Ground
2	VDD	Power Supply +12.0V	28	Rx0n	V-by-One HS Data Lane 0
3	VDD	Power Supply +12.0V	29	Rx0p	V-by-One HS Data Lane 0
4	VDD	Power Supply +12.0V	30	GND	Ground
5	VDD	Power Supply +12.0V	31	Rx1n	V-by-One HS Data Lane 1
6	VDD	Power Supply +12.0V	32	Rx1p	V-by-One HS Data Lane 1
7	VDD	Power Supply +12.0V	33	GND	Ground
8	VDD	Power Supply +12.0V	34	Rx2n	V-by-One HS Data Lane 2
9	NC	No Connection	35	Rx2p	V-by-One HS Data Lane 2
10	GND	Ground	36	GND	Ground
11	GND	Ground	37	Rx3n	V-by-One HS Data Lane 3
12	GND	Ground	38	Rx3p	V-by-One HS Data Lane 3
13	GND	Ground	39	GND	Ground
14	GND	Ground	40	Rx4n	V-by-One HS Data Lane 4
15	NC	No Connection	41	Rx4p	V-by-One HS Data Lane 4
16	NC	No Connection	42	GND	Ground
17	NC	No Connection	43	Rx5n	V-by-One HS Data Lane 5
18	SDA	SDA(For Vcom Tuning)	44	Rx5p	V-by-One HS Data Lane 5
19	SCL	SCL(For Vcom Tuning)	45	GND	Ground
20	NC	No Connection	46	Rx6n	V-by-One HS Data Lane 6
21	NC	No Connection	47	Rx6p	V-by-One HS Data Lane 6
22	SEL_SECTION	High:1 Section	48	GND	Ground
23	NC	No Connection	49	Rx7n	V-by-One HS Data Lane 7
24	GND	Ground	50	Rx7p	V-by-One HS Data Lane 7
25	GND	Ground	51	GND	Ground
26	LOCKN	Lock detect			

Notes : NC (Not Connected) : This pins are only used for BOE internal operations.

SEL\_SECTION : High:1 Section, Low&NC:2 Section. It should be high.

#### Rear view of LCM



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#### 4.2 V by one Misc. Setting.-1 Section

- a) System side have to put pull high resistor on LOCKN pins.
- b) V by one data mapping as follows.

< Table 5. V by one setting & data mapping Table >

1 Section								
Hactive= 3840								
	port 0		port 1		port 2		port 3	
	Lane 0	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7
V Blanking	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS
	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP
	...	...	...	...	...	...	...	...
	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP
	FSBE_SR	FSBE_SR	FSBE_SR	FSBE_SR	FSBE_SR	FSBE_SR	FSBE_SR	FSBE_SR
Line 1	Pixel 1	Pixel 2	Pixel 3	Pixel 4	Pixel 5	Pixel 6	Pixel 7	Pixel 8
	Pixel 9	Pixel 10	Pixel 11	Pixel 12	Pixel 13	Pixel 14	Pixel 15	Pixel 16
	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...
	Pixel 3833	Pixel 3834	Pixel 3835	Pixel 3836	Pixel 3837	Pixel 3838	Pixel 3839	Pixel 3840
H Blanking	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS
	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP
	...	...	...	...	...	...	...	...
	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP
	FSBE	FSBE	FSBE	FSBE	FSBE	FSBE	FSBE	FSBE
Line 2	Pixel 1	Pixel 2	Pixel 3	Pixel 4	Pixel 5	Pixel 6	Pixel 7	Pixel 8
	Pixel 9	Pixel 10	Pixel 11	Pixel 12	Pixel 13	Pixel 14	Pixel 15	Pixel 16
	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...
	Pixel 3833	Pixel 3834	Pixel 3835	Pixel 3836	Pixel 3837	Pixel 3838	Pixel 3839	Pixel 3840

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## 5.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL

### 5.1 Input data specification CN1

- Table 6 Vx1 Byte length and Color mapping

Byte	Packer input	Color data mapping
		30 bpp RGB
0	Bit-0	R2
	Bit-1	R3
	Bit-2	R4
	Bit-3	R5
	Bit-4	R6
	Bit-5	R7
	Bit-6	R8
	Bit-7	R9
1	Bit-8	G2
	Bit-9	G3
	Bit-10	G4
	Bit-11	G5
	Bit-12	G6
	Bit-13	G7
	Bit-14	G8
	Bit-15	G9
2	Bit-16	B2
	Bit-17	B3
	Bit-18	B4
	Bit-19	B5
	Bit-20	B6
	Bit-21	B7
	Bit-22	B8
	Bit-23	B9
3	Bit-24	-
	Bit-25	-
	Bit-26	B0
	Bit-27	B1
	Bit-28	G0
	Bit-29	G1
	Bit-30	R0
	Bit-31	R1

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## 6.0 SIGNAL TIMING SPECIFICATION

### 6.1 Timing Parameters

< Table 7. Timing Table >

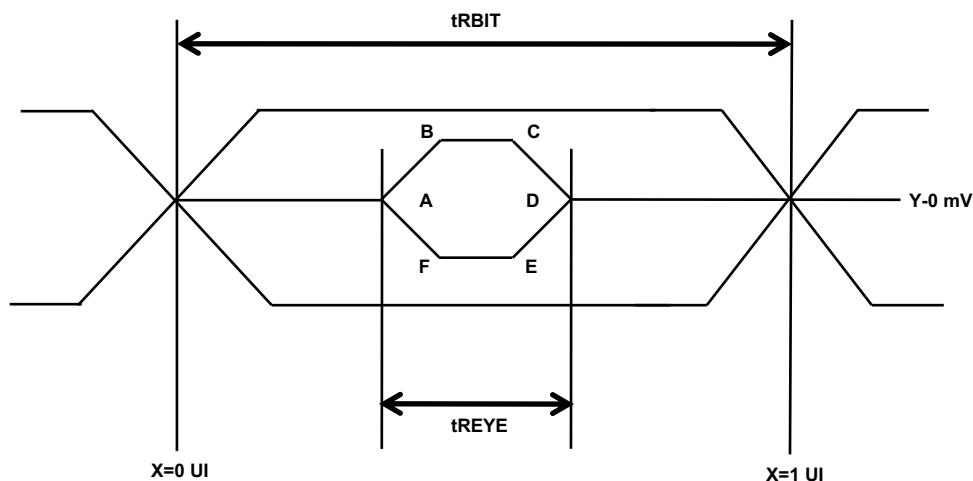
Item	Symbols	Min	Typ	Max	Unit	
Frequency	1/Tc	33	37.125	48	MHz	
Vertical	Frame Rate	F	58	60	62	Hz
	Total	T <sub>V</sub>	1115	1125	1380	T <sub>H</sub>
	Display	T <sub>VD</sub>	1080			T <sub>H</sub>
	Blank	T <sub>VB</sub>	35	45	300	T <sub>H</sub>
Horizontal	Total	T <sub>H</sub>	540	550	600	T <sub>CLK</sub>
	Display	T <sub>HD</sub>	480			T <sub>CLK</sub>
	Blank	T <sub>HB</sub>	60	70	120	T <sub>CLK</sub>

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## 6.2 Signal Timing Waveform

< Table 8. Signal Timing Table >

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Unit Interval(VBO Operation Bit Rate)	tRBIT	3-byte	380	tTCIP/30	1667	PS
		4-byte	285	tTCIP/40	1250	PS
		5-byte	266	tTCIP/50	1000	PS
Eye Width at Package Pin	tREYE	-	-	0.5	-	UI
Eye Width Position A at Package Pin	tA	-	-	0.25	-	UI
Eye Width Position B at Package Pin	tB	-	-	0.3	-	UI
Eye Width Position Cat Package Pin	tC	-	-	0.7	-	UI
Eye Width Position D at Package Pin	tD	-	-	0.75	-	UI
Eye Width Position E at Package Pin	tE	-	-	0.7	-	UI
Eye Width Position F at Package Pin	tF	-	-	0.3	-	UI
Intra – pair Skew	TTOSK_intra	-	-	-	0.3	UI
Inter – pair Skew	TTOSK_inter	-	-	-	40	UI
SSCG	-	30KHz modulation	-0.5		0.5	%

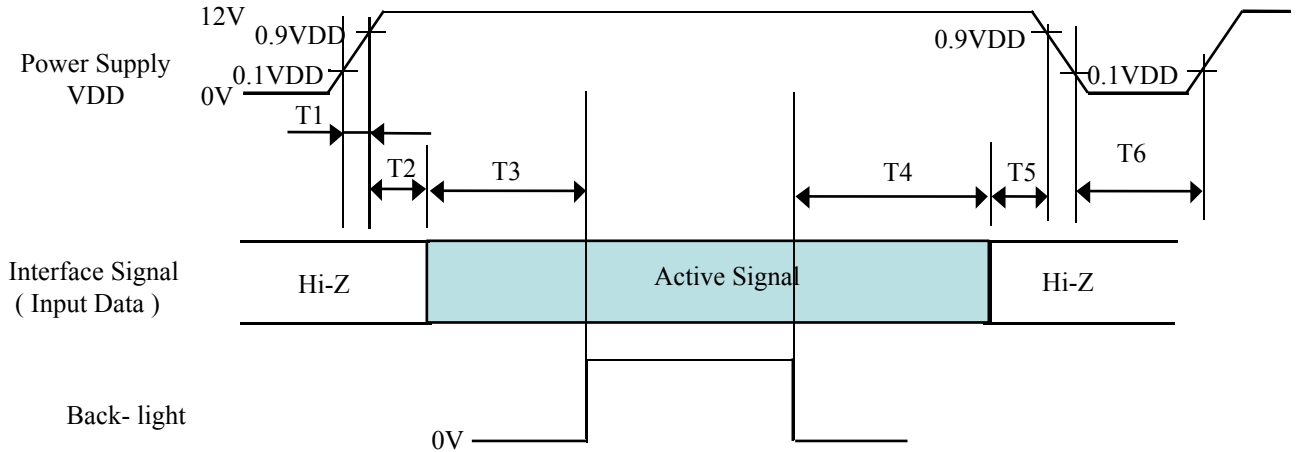


	Y[mV]
A	0
B	50
C	50
D	0
E	-50
F	-50



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## 6.4 Power Sequence



< Table 10. Sequence Table >

Parameter	Values			Units
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	200	-	-	ms
T4	200	-	-	ms
T5	0	-	50	ms
T6	1	-	-	s

Notes:

1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on.
3. Back Light must be turn on after power for logic and interface signal are valid.
4. If T4=0ms, there is a risk of abnormal display when power off.
5. If T5=0ms, there is a risk of flicker when power On/Off.

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## 7.0 OPTICAL SPECIFICATIONS

The test of optical specifications shall be measured in a dark room (ambient luminance  $\leq 1$  lux and temperature  $= 25 \pm 2^\circ\text{C}$ ) with the equipment of Luminance meter system (Goniometer system and PR730) and test unit shall be located at an approximate distance 180cm from the LCD surface at a viewing angle of  $\theta$  and  $\Phi$  equal to  $0^\circ$ . We refer to  $\theta_{\Phi=0}$  ( $=\theta_3$ ) as the 3 o'clock direction (the "right"),  $\theta_{\Phi=90}$  ( $=\theta_{12}$ ) as the 12 o'clock direction ("upward"),  $\theta_{\Phi=180}$  ( $=\theta_9$ ) as the 9 o'clock direction ("left") and  $\theta_{\Phi=270}$  ( $=\theta_6$ ) as the 6 o'clock direction ("bottom"). While scanning  $\theta$  and/or  $\Phi$ , the center of the measuring spot on the Display surface shall stay fixed. The measurement shall be executed after 30 minutes warm-up period. VDD shall be 12.0V at  $25^\circ\text{C}$ . Optimum viewing angle direction is 6 'clock.

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remark	
Viewing Angle	Horizontal	$\Theta_3$	CR > 10		89		Deg.	Note 1	
		$\Theta_9$			89		Deg.		
	Vertical	$\Theta_{12}$			89		Deg.		
		$\Theta_6$			89		Deg.		
Surface Luminance, white		L	$\Theta = 0^\circ$ (Center) Normal Viewing Angle	1300	1500	-	cd/m <sup>2</sup>		
Contrast ratio		CR		700:1	1000:1	-		Note 2	
Reproduction of color	White	$W_x$		TYP. - 0.03		0.279	TYP. + 0.03		Note 3
		$W_y$				0.318			
	Red	$R_x$				0.652			
		$R_y$				0.340			
	Green	$G_x$				0.302			
		$G_y$				0.620			
	Blue	$B_x$				0.147			
		$B_y$				0.064			
Response Time	G to G	$T_g$	-	14	25	ms	Note 4		
Gamma Scale				2.0	2.2	2.4			

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Note :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing 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.
2. Contrast measurements shall be made at viewing angle of  $\theta = 0^\circ$  and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See Figure 1 shown in Appendix) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. The color chromaticity coordinates specified in Table 9 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel. The BLU is used by BOE.
4. Response time  $T_g$  is the average time required for display transition by switching the input signal as below table and is based on Frame rate  $f_V = 60\text{Hz}$  to optimize. Each time in below table is defined as Figure 2 and shall be measured by switching the

Measured Response Time	Target																
	0	15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255
Start	0																
	15																
	31																
	47																
	63																
	79																
	95																
	111																
	127																
	143																
	159																
	175																
	191																
	207																
	223																
	239																
255																	

5. Definition of Transmittance (T%) :

OC is with white(L255) signal input

$$\text{Transmittance} = \frac{\text{Luminance of LCD OC}}{\text{Luminance of BLU}} \times 100 \%$$

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## 9.0 RELIABILITY TEST

The Reliability test items and its conditions are shown in below.

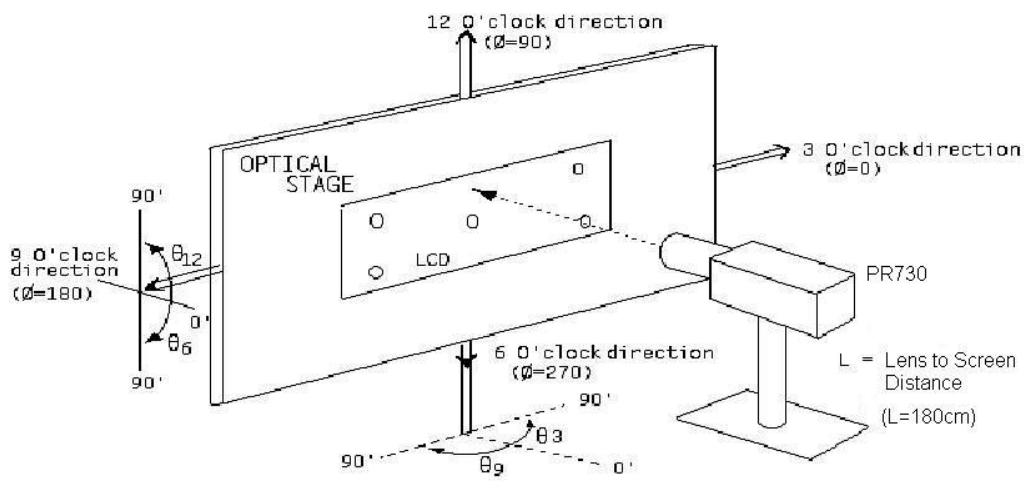
< Table 13. Reliability Test Parameters >

Item	Test Item	Test Condition
Reliability	THO	50°C/ 80%, 240hr
	LTO	-5°C, 240hr
	HTO	60°C, 240hr
	THS	60°C/ 90%, 240hr
	LTS	-20°C, 240hr
	TST-1	-20°C~60°C (Per 30min) ,100Cycle
	TST-2	-40°C~100°C (Per 30min) ,100Cycle
	8585	85°C/ 85%, 240hr
	Image Sticking	7*5 , 168hr+1, focus on 48+30min
	RTO+OnOff	25°C, 1sec on / 1sec off, 100times ; 10sec on / 5sec off, 30000times, aging 240hr, Operation

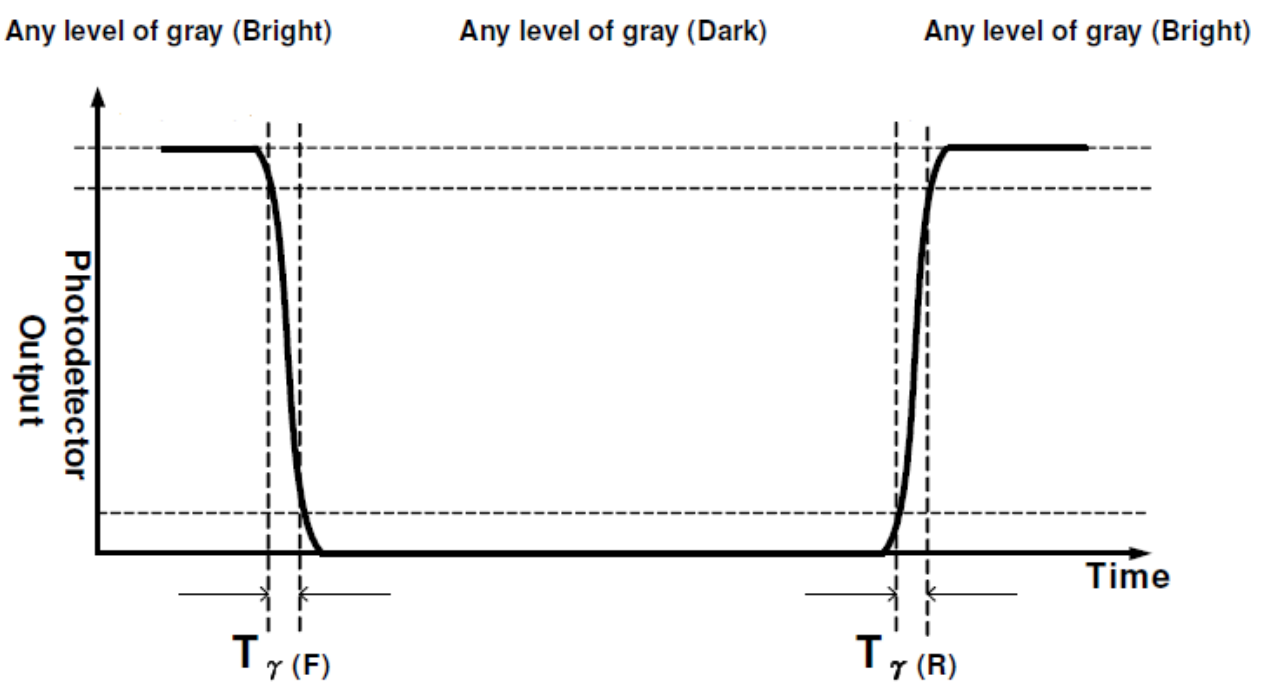
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**10.0 APPENDIX**

< Figure 1. Measurement Set Up >



< Figure 2. Response Time Testing >



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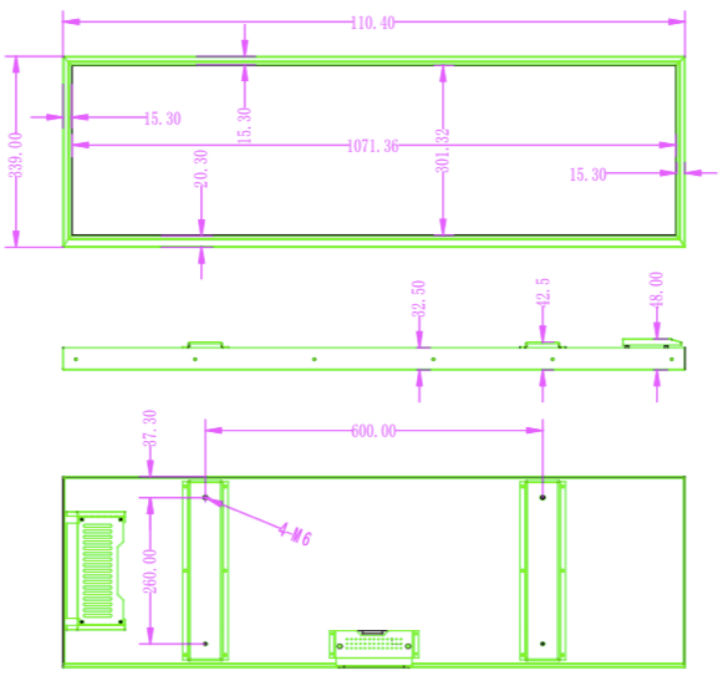
## 10.1 Dimensional Requirements

Figure 4 (located in Appendix) shows mechanical outlines for the model UV550FBD-R10 Other parameters are shown in Table 12.

< Table 11. Dimensional Parameters >

Parameter	Specification	Unit
Dimensional outline	1103.4(H)x339.0(V) × 48.0(B)	mm
Weight	10.28	Kg
Active area	1071.36(H) × 301.32(V)	mm
Pixel pitch	210(H) × RGB × 630(V)	μm
Number of pixels	3840(H) × 1080(V) (1 pixel = R + G + B dots)	pixels
Back-light	D-LED Backlight	

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.x	±0.50		未标注尺寸以 测量尺寸为准	项目:43.8寸-显示屏
.x	±0.30			产品名称:总装图
.xx	±0.15	零件图号:	材料:冷轧板+铝型材+电解板	
.xxx	±0.05	批准:	日期:	工艺:
.x."	±2.0"	审核:	日期:	单套数量:1
.x"	±1.0"	制图:张周标	日期:2019.06.25	单位: MM
.xx"	±0.5"	设计:	日期:	比例: 1:1 页数: