TITLE : DV238FHM-P20

Product Specification

Ver.P1

FUZHOU BOE OPTOELECTRONICS CO., LTD

REVISION HISTORY

(●) Preliminary specification
( ) Final specification

Revision No.	Page	Description of changes	Date	Prepared
P0	-	Initial Release	2021.07.12	You Li
P1	-	Updated ES8.0 Specifications	2021.09.15	Zhuolong Li

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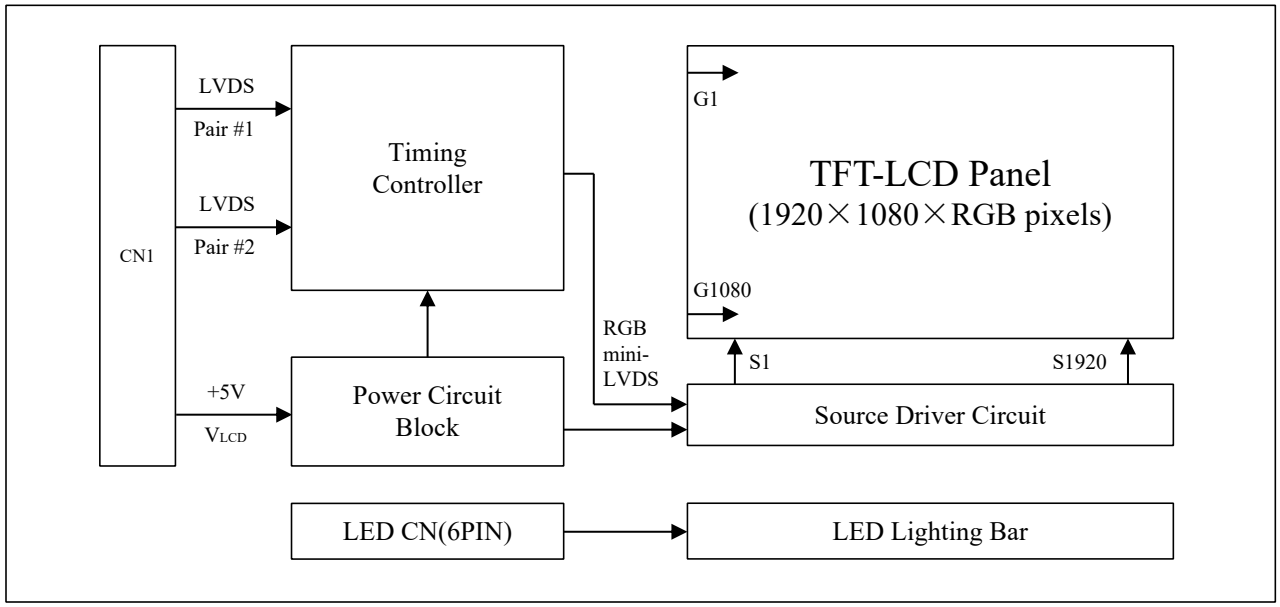
1.0 GENERAL DESCRIPTION

1.1 Introduction

DV238FHM-P20 is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 23.8 inch diagonally measured active area with FHD resolutions (1920 horizontal by 1080 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors. The TFT-LCD panel used for this module is adapted for a low reflection and higher color type.



1.2 Features

- LVDS Interface with 2 pixel / clock
- 8-bit (6-bit+FRC) color depth, display 16. 7M colors
- High luminance and contrast ratio, low reflection and wide viewing angle
- DE (Data Enable) only
- RoHS/Halogen Free
- Gamma Correction

1.3 Application

Desktop Type of PC & Workstation Use
Slim-Size Display for Stand-alone Monitor
Display Terminals for Control System
Monitors for Process Controller

1.4 General Specification

The followings are general specifications at the model DV238FHM-P20

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	527.04(H) × 296.46(V)	mm	
Number of pixels	1920(H) ×1080(V)	pixels	
Pixel pitch	0.2745 (H) ×0.2745(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	16.7M	colors	6-bit+FRC
Display mode	Normally Black		
Dimensional outline	543(H) x 316(V) typ.	mm	Detail refer to drawing
Weight	2300(max)	g	
Surface Treatment	Anti-Glare, 3H		
Power Consumption	13.08W	Watt	Typ. (Estimated)
Bezel width (L/R/U/D)	6.5/6.5/8.06/8.52	mm	
Back-light	Lower side E-LED Light bar Type		
Display Direction	landscape & Portrait		

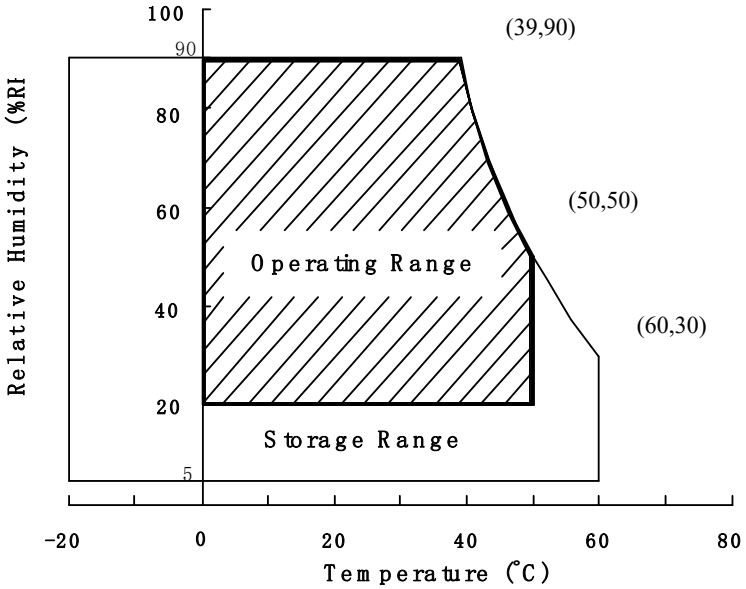
2.0 ABSOLUTE MAXIMUM RATINGS

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. Absolute Maximum Ratings> [VSS=GND=0V]

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	VDD	-0.3	6.0	V	Ta = 25 ℃
Logic Supply Voltage	VIN	VSS-0.3	VDD+0.3	V	
Operating Temperature	TOP	0	+50	℃	1)
Storage Temperature	TST	-20	+60	℃	1)
LCM Surface Temperature (Operation)	Tsurface	0	+65	℃	2)

Note : 1) Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39 ^{O}C max. and no condensation of water.
2) Panel Surface Temperature should be Min. 0^{O}C and Max. +65^{O}C under the VDD = 5.0V, Frame rate = 60Hz,25^{O}C ambient Temp. no humidity control and LED string current is typical value.



3.0 ELECTRICAL SPECIFICATIONS

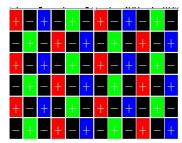
3.1Electrical Specifications

< Table 3. Electrical specifications > [Ta =25±2 °C]

Parameter.		Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage	VDD	4.5	5.0	5.5	V	Note1
Power Supply Current	IDD	-	600	900	mA	
In-Rush Current	IRUSH	-	2.0	3.0	A	Note 2
Permissible Input Ripple Voltage	VRF	-	-	300	mV	Note 1,3
High Level Differential Input Threshold Voltage	VIH	-	-	+100	mV	
Low Level Differential Input Threshold Voltage	VIL	-100	-	-	mV	
Differential input voltage	|VID |	200	-	600	mV	
Differential input common mode voltage	Vcm	1.0	1.2	1.5		VIH=100mV, VIL=-100mV
Power Consumption	PD	-	3.0	4.5	W	Note 4
	PBL			10.8	W	Max

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for VDD=5.0V, Frame rate=60Hz
Clock frequency = 92.8 MHz. Test Pattern of power supply current

a) Typ : Color Test



b) Max : Skip sub pixel 255

2. Duration of rush current is about 2 ms and rising time of VDD is 520 μs ± 20 %
3. Ripple Voltage should be covered by Input voltage Spec.
4. Calculated value for reference (Input pins*VPIN ×IPIN) excluding inverter loss.

3.2 Backlight Unit

< Table 4. Backlight Unit Electrical Specifications >

Parameter		Min.	Typ.	Max.	Unit	Remarks
LED Light Bar Input Voltage P er Input Pin	VPIN		56	60	V	Duty 100%
LED Light Bar Input Current P er Input Pin	IPIN		45	-	mA	Note1,2,
LED Power Consumption	PBL		10.08	10.8	W	Note 3
LED Life-Time	-	30,000	-		Hrs	Note 4

LED bar consists of 80LED packages,4 strings(parallel)*20packages(serial)
Note1: There are one light bar ,and the specified current is input LED chip 100% duty current
Note2: The sense current of each input pin is 45mA
Note3: PBL=4 Input pins*VPIN ×IPIN
Note4: The lifetime is determined as the time at which luminance of LED become 50% of the initial brightness or not normal lighting at IPIN=45mA on condition of continuous operating at 25 ±2 ℃

3.3 LED Light Bar

-LED connector：A1009AWV(6)

< Table 5. LED Light Bar>

Pin No	Symbol	Description
1	IRLED1	LED current sense for string1
2	IRLED2	LED current sense for string2
3	VLED	LED power supply
4	VLED	LED power supply
5	IRLED3	LED current sense for string3
6	IRLED4	LED current sense for string4

4.0 OPTICAL SPECIFICATION

4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance 1 lux and temperature = 25 2℃) with the equipment of Luminance meter system (Goniometer system and TOPCONE PR730) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0 . We refer to $\theta_{Ø=0}$ (=θ_3) as the 3 o'clock direction (the "right"), $\theta_{Ø=90}$ (= θ_{12}) as the 12 o'clock direction ("upward"), $\theta_{Ø=180}$ (= θ_9) as the 9 o'clock direction ("left") and $\theta_{Ø=270}$(= θ_6) as the 6 o'clock direction ("bottom"). While scanning θ and/or Ø, 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 5.0V +/-10% at 25 C. Optimum viewing angle direction is 6 'clock.

4.2 Optical Specifications

[VDD = 5.0V, Frame rate = 60Hz, Clock = 92.8MHz, I_{BL} =180mA, Ta =25±2 ℃]

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ3	CR > 10	85	89	-	Deg.	Note 1
		Θ9		85	89	-	Deg.	
	Vertical	Θ12		85	89	-	Deg.	
		Θ6		85	89	-	Deg.	
Brightness		Lv	Θ = 0° ILED=60mA	250	300	-	nit	Note 2
Uniformity	9 Points	ΔY9		75%	80%	-		Note 4
Cell Transmittance		Tr	Θ = 0 (Center) Normal Viewing Angle	4.7%	5.1%	-	-	Note 5
Reproduction of color	White	Wx		0.283	0.313	0.343	-	Note 6
		Wy		0.299	0.329	0.359	-	
	Red	Rx		TBD	TBD	TBD	-	
		Ry		TBD	TBD	TBD	-	
	Green	Gx		TBD	TBD	TBD	-	
		Gy		TBD	TBD	TBD	-	
	Blue	Bx		TBD	TBD	TBD	-	
		By		TBD	TBD	TBD	-	
Color Gamut				68%	72%	-	%	Note 7
Response Time	GTG	Tg		-	14	20	ms	Note 8
Cross Talk		CT		-	-	2.0	%	Note 9

Note :

1. The value in upper table are based on BLU provided by FUYIN
2. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizo ntal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is nor mal to the LCD surface.
3. Luminance of LCD module shall be made without signal input. Cell transmittance is defined mathematically, BLU provided by FUYING.

$$\text{Transmittance} = \frac{\text{Luminance of LCD Module}}{\text{Luminance of BLU}}$$

4. The color chromaticity coordinates specified in Table 4. 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 with BLU provided by FUYING.
5. Response time Tg is the average time required for display transition by switching the input signal as below table and is based on Frame rate fV =60Hz to optimize. Each time in below table is defined as Figure 3 and shall be measured by switching the input signal for "any level of gray(bright)"and "any level of gray(dark)".
6. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (Y_A) of a 25 mm diameter area, with all display pixels set to a gray level, to the luminance (Y_B) of that same area when any adj acent area is driven dark. (See FIGURE 4 shown in Appendix).

5.0 INTERFACE CONNECTION.

5.1 Electrical Interface Connection

- CN101 Module Side Connector : UJU IS100-L30O-C23or Equivalent
  User Side Connector : JAE FI-X30H or Equivalent

Pin No	Symbol	Function	Remark
1	RXO0-	Negative Transmission data of Pixel 0 (ODD)	
2	RXO0+	Positive Transmission data of Pixel 0 (ODD)	
3	RXO1-	Negative Transmission data of Pixel 1 (ODD)	
4	RXO1+	Positive Transmission data of Pixel 1 (ODD)	
5	RXO2-	Negative Transmission data of Pixel 2 (ODD)	
6	RXO2+	Positive Transmission data of Pixel 2 (ODD)	
7	BIST	Bist function	Note 1
8	RXOC-	Negative Transmission Clock (ODD)	
9	RXOC+	Positive Transmission Clock (ODD)	
10	RXO3-	Negative Transmission data of Pixel 3 (ODD)	
11	RXO3+	Positive Transmission data of Pixel 3 (ODD)	
12	RXE0-	Negative Transmission data of Pixel 0 (EVEN)	
13	RXE0+	Positive Transmission data of Pixel 0 (EVEN)	
14	GND	Power Ground	
15	RXE1-	Negative Transmission data of Pixel 1 (EVEN)	
16	RXE1+	Positive Transmission data of Pixel 1 (EVEN)	
17	GNG	Power Ground	
18	RXE2-	Negative Transmission data of Pixel 2 (EVEN)	
19	RXE2+	Positive Transmission data of Pixel 2 (EVEN)	
20	RXEC-	Negative Transmission Clock (EVEN)	
21	RXEC+	Positive Transmission Clock (EVEN)	
22	RXE3-	Negative Transmission data of Pixel 3 (EVEN)	
23	RXE3+	Positive Transmission data of Pixel 3 (EVEN)	
24	GND	Power Ground	Note 2
25	NC	*Reserved for LCD manufacturer‘s use (SCL)	
26	NC	*Reserved for LCD manufacturer‘s use (SDA)	
27	NC	No Connection	
28	VDD	Power Supply: +5V	
29	VDD		
30	VDD		

Note 1: H: White-Black-Red-Green-Blue Pattern Aging, L: Black Pattern, when no LVDS signal.

Note 2: This pin should be connected with GND.

6.0 SIGNAL TIMING SPECIFICATION

6.1 The DV238FHM-P20 is operated by the DE only.

Item	Symbols		Min	Typ	Max	Unit	Note
DCLK	Period	tCLK	10.78	13.47	16.16	ns	
	Frequency	-	61	74.25	92.8	MHz	
Hsync	Period	tHP	1050	1100	1120	tCLK	
	Horizontal Valid	tHV	960	960	960	tCLK	
	Horizontal Blank	tHB	90	140	160		
	Frequency	fH	56	67.5	84.5	KHz	
Vsync	Period	tVP	1110	1125	1251	tHP	
	Vertical Valid	tVV	1080	1080	1080	tHP	
	Vertical Blank	tVB	30	45	171	tHP	
	Frequency	fV	50	60	75	Hz	
LVDS R eceiver c lock	Input spread spect rum ratio	SSr	-3	-	+3	%	

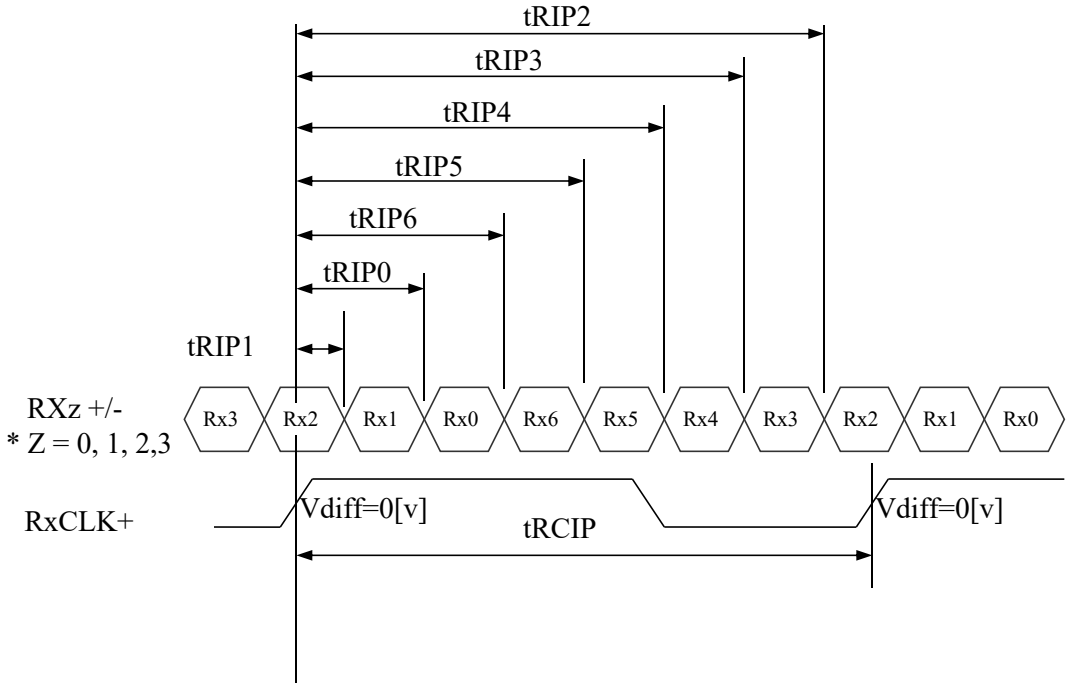
Note: The DCLK range at last line of V-blanking should be set in 0~987.

6.2 LVDS Rx Interface Timing Parameter

The specification of the LVDS Rx interface timing parameter is shown in Table 4.

<Table 4. LVDS Rx Interface Timing Specification>

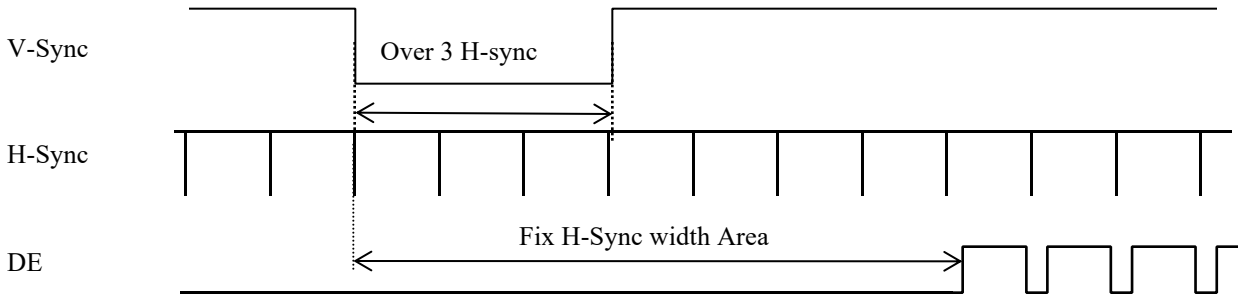
Item	Symbol	Min	Typ	Max	Unit	Remark
CLKIN Period	tRCIP	10.47	13.47	17.7	nsec	
Input Data 0	tRIP1	-0.4	0.0	+0.4	nsec	
Input Data 1	tRIP0	tRCIP/7-0.4	tRCIP/7	tRCIP/7+0.4	nsec	
Input Data 2	tRIP6	2 ×tRCIP/7-0.4	2 ×tRCIP/7	2 ×tRCIP/7+0.4	nsec	
Input Data 3	tRIP5	3 ×tRCIP/7-0.4	3 ×tRCIP/7	3 ×tRCIP/7+0.4	nsec	
Input Data 4	tRIP4	4 ×tRCIP/7-0.4	4 ×tRCIP/7	4 ×tRCIP/7+0.4	nsec	
Input Data 5	tRIP3	5 ×tRCIP/7-0.4	5 ×tRCIP/7	5 ×tRCIP/7+0.4	nsec	
Input Data 6	tRIP2	6 ×tRCIP/7-0.4	6 ×tRCIP/7	6 ×tRCIP/7+0.4	nsec	



* Vdiff = (RXz+)-(RXz-),…. ,(RXCLK+)-(RXCLK-)

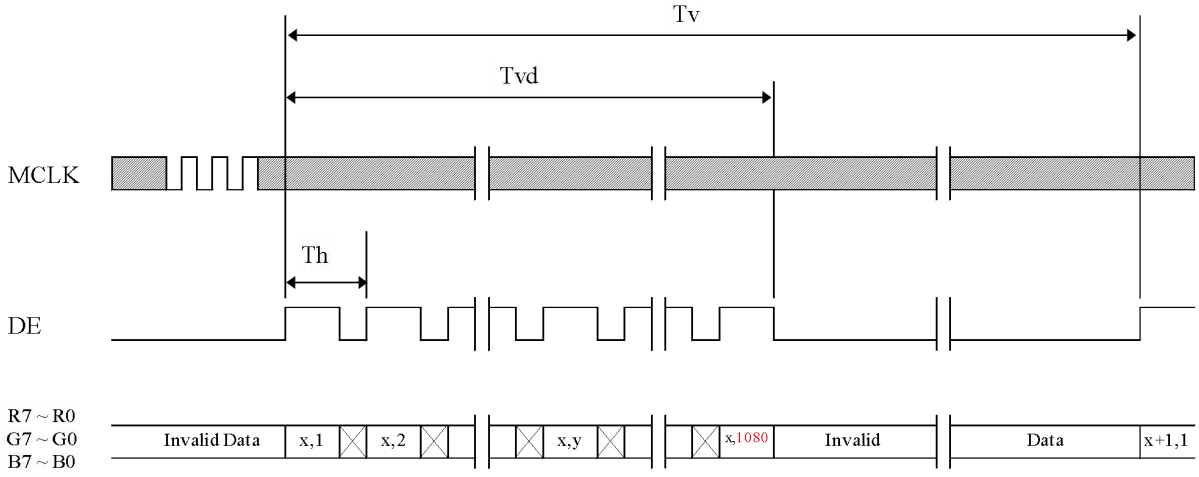
7.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL

7.1 Sync Timing Waveforms

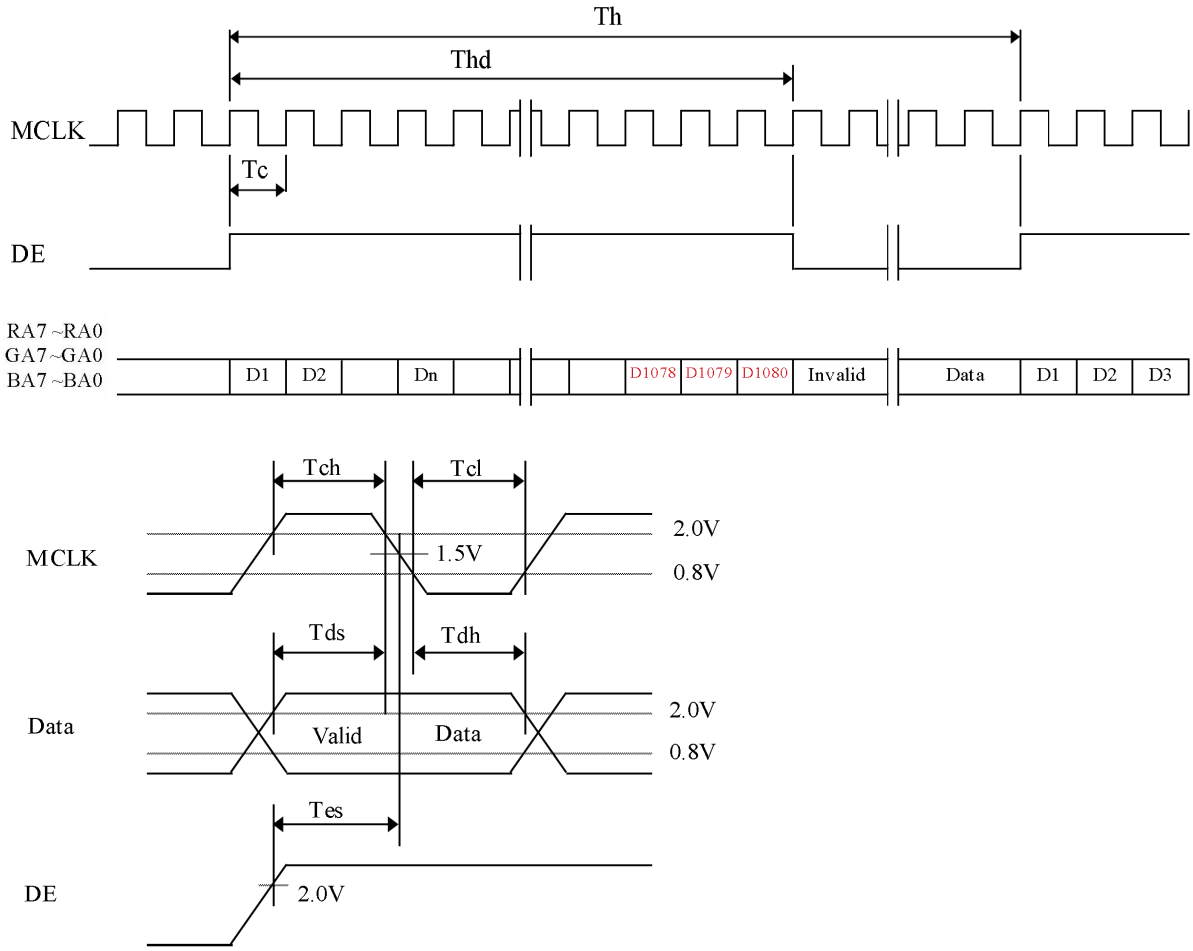


1) Need over 3 H-sync during V-Sync Low
2) Fix H-Sync width from V-Sync falling edge to first rising edge

7.2 Vertical Timing Waveforms



7.3 Horizontal Timing Waveforms

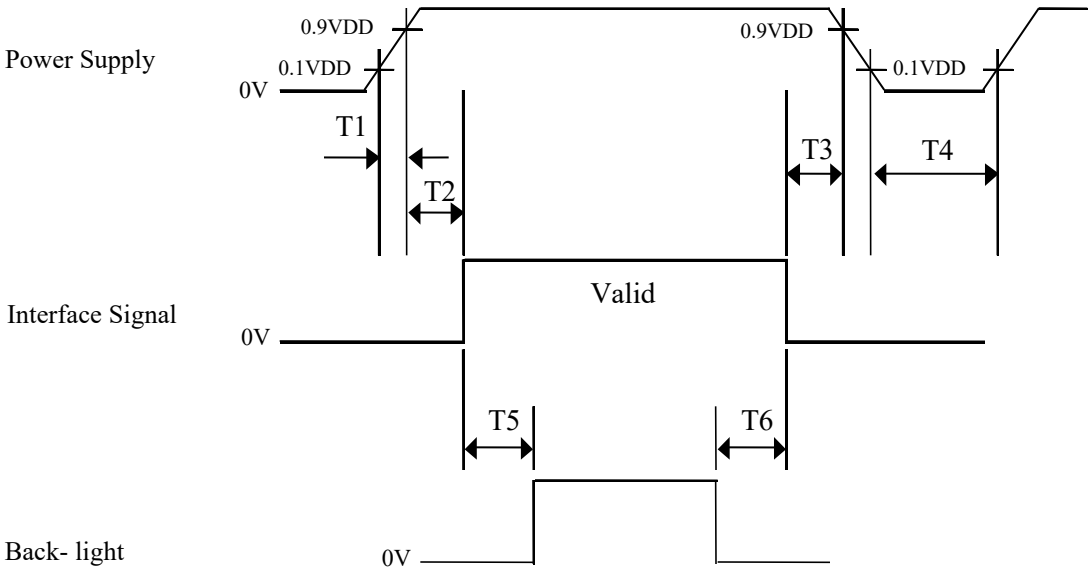


8.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

Color & Gray Scale		RED DATA								GREEN DATA								BLUE DATA							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of RED	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	▽	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of GREEN	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of BLUE	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Gray Scale of WHITE	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
	▽	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

9.0 POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence s hall be as shown in below.



0.5 ms ≤ T1 10 ms
0 T2 50 ms
0 < T3 50 ms
1 sec T4
500 ms T5
200 ms T6

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. The above power sequence should be satisfied at these case
   -.AC/DC power On, DC power off
   -.Mode Change (Resolution, frequency, timing, sleep mode, color depth change etc.)
   If not to follow power sequence, there is a risk of abnormal display.
5. If T3=0ms, there is a risk of flicker when power On/Off.
6. If T6=0ms, there is a risk of abnormal display when power off.

10.0 MECHANICAL CHARACTERISTICS

10.1 Dimensional Requirements

FIGURE 6 (located in Appendix) shows mechanical outlines for the model DV238FHM-P20
Other parameters are shown in Table 5.

<Table 5. Dimensional Parameters>

Parameter	Specification	Unit
Dimensional outline	543(H) x 316(V) typ.	mm
Weight	2300g(max)	gram
Active area	527.04(H) × 296.46(V)	mm
Pixel pitch	0.2745(H)mm x 0.2745(V)mm	mm
Number of pixels	1920 (H)×1080 (V) (1 pixel = R + G + B dots)	pixels

10.2 Anti-Glare and Polarizer Hardness.

The surface of the LCD has an anti-glare coating to minimize reflection and a coating to reduce scratching.

10.3 Light Leakage

There shall not be visible light from the back-lighting system around the edges of the screen as seen from a distance 50cm from the screen with an overhead light level of 350lux.

11.0 RELIABLITY TEST

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

<Table 6. Reliability Test Parameters >

No	Test Items	Conditions
1	High temperature storage test	Ta = 60 ℃, 240 hrs
2	Low temperature storage test	Ta = -20 ℃, 240 hrs
3	High temperature & high humidity operation test	Ta = 50 ℃, 80%RH, 240hrs
4	High temperature operation test	Ta = 50 ℃, 240hrs
5	Low temperature operation test	Ta = 0 ℃, 240hrs
6	Thermal shock	Ta = -20℃~60℃（Per 30min）
7	Vibration test (non-operating)	Frequency 1 ~ 200 Hz Gravity / AMP 1.2G Period Random +X/+Y per 30min,±Z 1Hr
9	Electro-static discharge test (non-operating)	Air : 150 pF, 330Ω, 15 KV Contact : 150 pF, 330Ω, 8 KV

This test condition is based on BOE module.

12.0 HANDLING & CAUTIONS

(1) Cautions when taking out the module

Pick the pouch only, when taking out module from a shipping package.

(2) Cautions for handling the module

As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.

As the LCD panel and back - light element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.

As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.

Do not pull the interface connector in or out while the LCD module is operating.

Put the module display side down on a flat horizontal plane.

Handle connectors and cables with care.

(3) Cautions for the operation

When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.

Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.

Ultra-violet ray filter is necessary for outdoor operation

If the product will be used in extreme conditions such as high temperature, humidity, display patterns, operation time, etc., it is strongly recommended to contact BOE for application engineering device. Otherwise, the reliability and function of the module may not be guaranteed. Extreme conditions are commonly found at airports, transit stations, banks, stocks, markets, and controlling systems.

(4) Cautions for the atmosphere

Dew drop atmosphere should be avoided.

Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.

(5) Cautions for the module characteristics

Do not apply fixed pattern data signal to the LCD module at product aging.

Applying fixed pattern for a long time may cause image sticking.

12.0 HANDLING & CAUTIONS

(6) Other cautions

Do not disassemble and/or re-assemble LCD module.

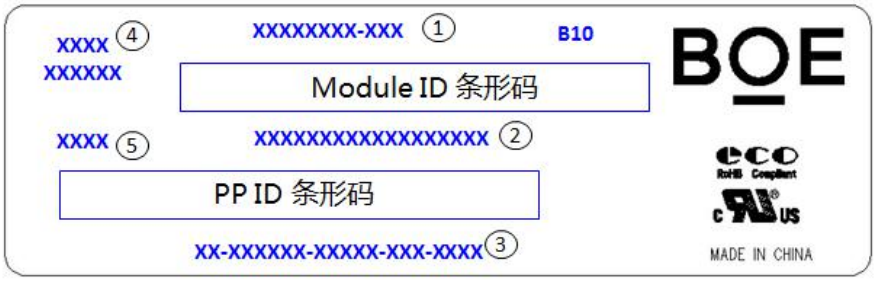
Do not re-adjust variable resistor or switch etc.

When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

When this reverse model is used as a forward-type model (PCB on top side), BOE can not guarantee any defects of LCM.

If LCD module containing system is out of BOE "s operating or storing condition, BOE can not guarantee LCD module operating properly.

13.0 PRODUCT SERIAL NUMBER



① FG-CODE
② Module ID，最后一位为Revision Code（扫描不显示），前17位编码规则如下
③ PPID（客户端ID）
④ D/PN码，规格待确定
⑤ 生产年份+生产周别（中间无空格）

MDL ID Naming Rule:

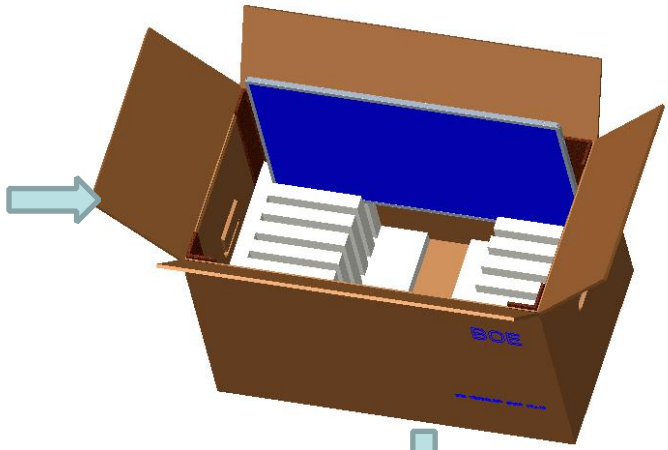
Digit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Code	S	L	S	A	1	0	8	5	9	4	2	0	0	0	1	D	B
Description	Product Code/GBN → FG-CODE一一对应		Grade	line	Year		Month	Model Extension Code (Last 4 Digits of FG-CODE)				Serial No. Hex-Decimal 000000-FFFFFF					

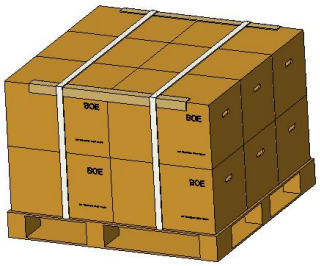
14.0 Packing

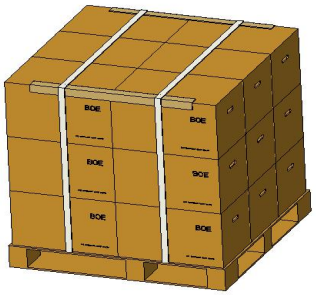
14.1 Packing Order

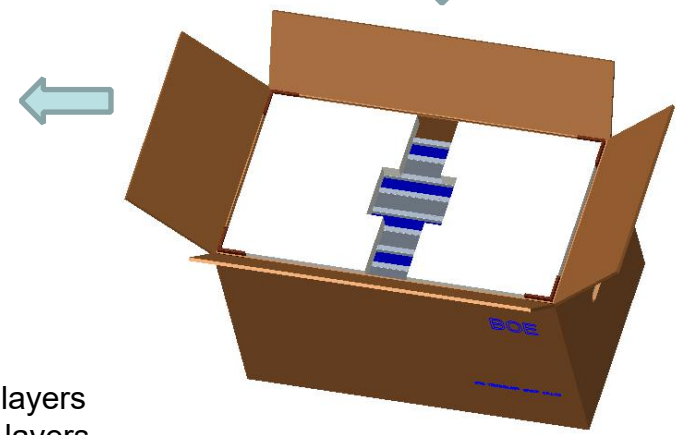
10.1 Packing Order

Put each module into a PE bag.
Insert 8 Pcs MDL into each box









-Put the boxes on the Pallet
12boxes/Pallet:6boxes per layer, total 2 layers
18boxes/Pallet:6Boxes per layer, total 3 layers
-Place paper corners and wrap film around the boxes
-Pack with 2 packing belts

Put 1 EPE cover in and seal the box.

14.2 Packing Note

Box Dimension :618mm(L) 351mm(W) 394mm(H)

Package Quantity in one Box : 8pcs

14.3 Box label

- Label Size : 100 mm (L) 50 mm (W)
- Contents

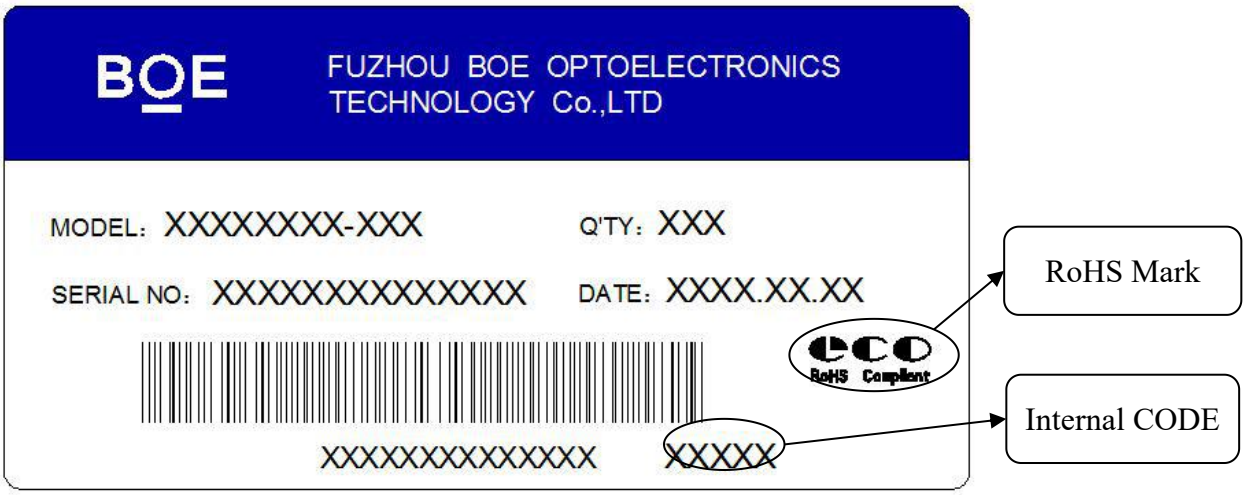
Model : DV238FHM-P20-AW50/1

Q`ty : 8 Q`ty in one box

Serial No. : Box Serial No. See next page for detail description.

Date : Packing Date

FG Code : FG Code of Product



Digit / Code	1	2	3	4	5	6	7	8	9	10	11	12	13
Description	Products GBN		Grade	Line	Year		Month	Revision Code	Serial No				

15.0 APPENDIX

Figure 1. Measurement Set Up

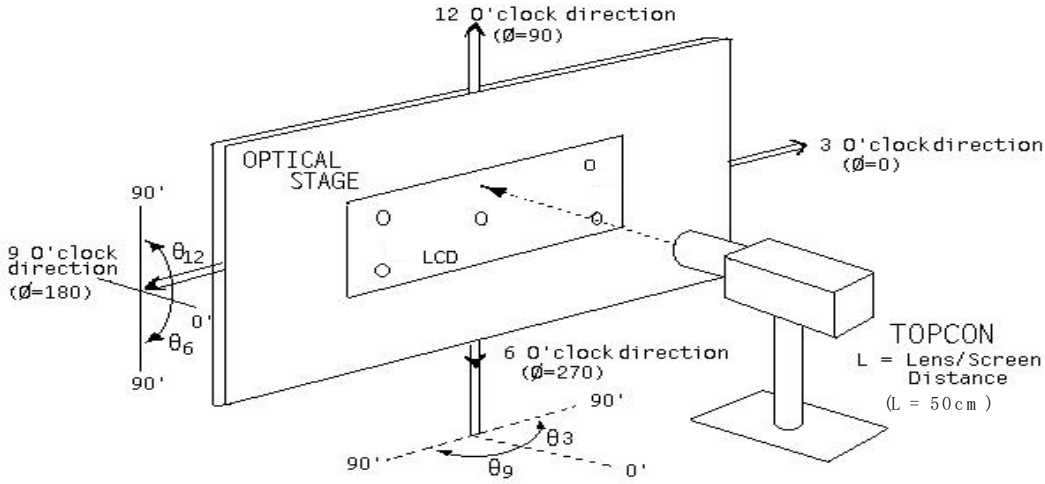


Figure 2. White Luminance and Uniformity Measurement Locations (9 points)

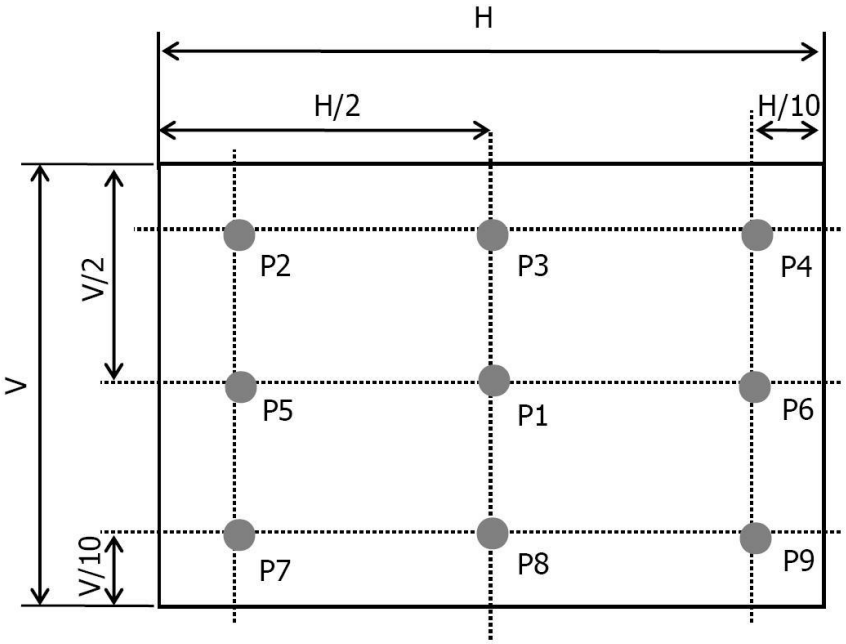


Figure 3. Response Time Testing

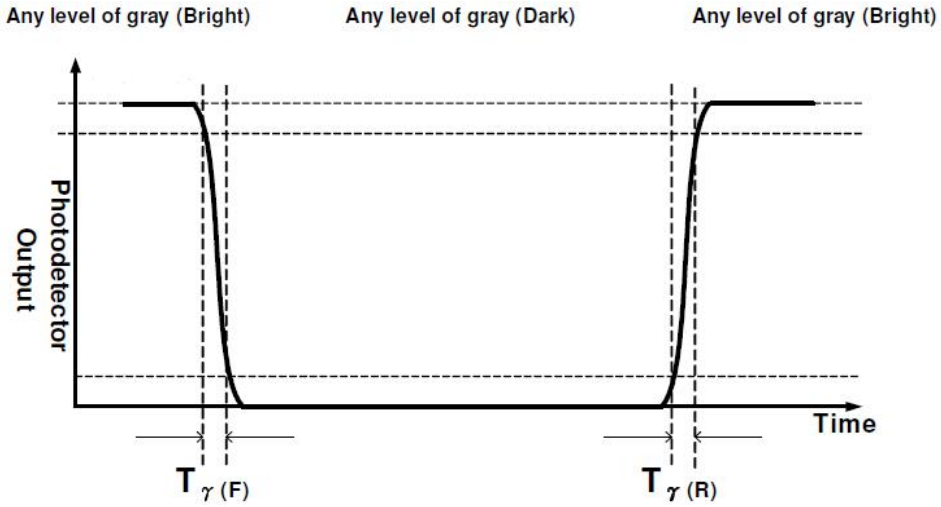
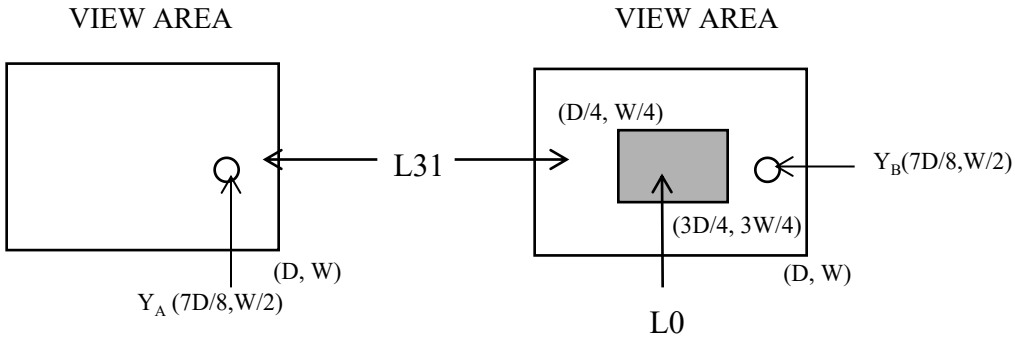


Figure 4. Cross Modulation Test Description



$$\text{Cross-Talk (\%)} = \left| \frac{Y_B - Y_A}{Y_A} \right| \times 100$$

Where: Y_A = Initial luminance of measured area (cd/m^2)
Y_B = Subsequent luminance of measured area (cd/m^2)
The location measured will be exactly the same in both patterns

16.0 MECHANICAL OUTLINE DIMENSION

Figure 4. TFT-LCD Module Outline Dimensions (Front view，Horizontal placement)

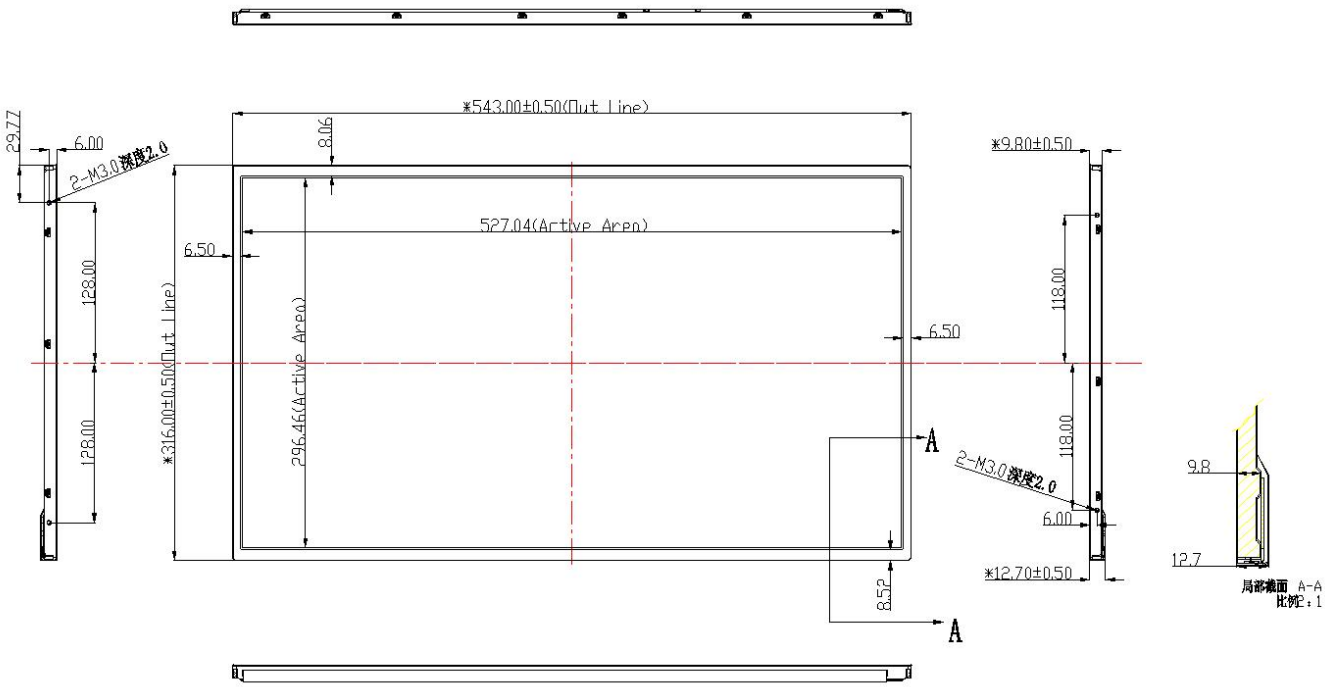


Figure 5. TFT-LCD Module Outline Dimensions (Rear view，Horizontal placement)