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DV366FBM-N10

Product Specification

Rev. P2

FUZHOU BOE OPTOELECTRONICS TECHNOLOGY Co.,LTD

REVISION HISTORY

( )preliminary specification
(√)Final specification

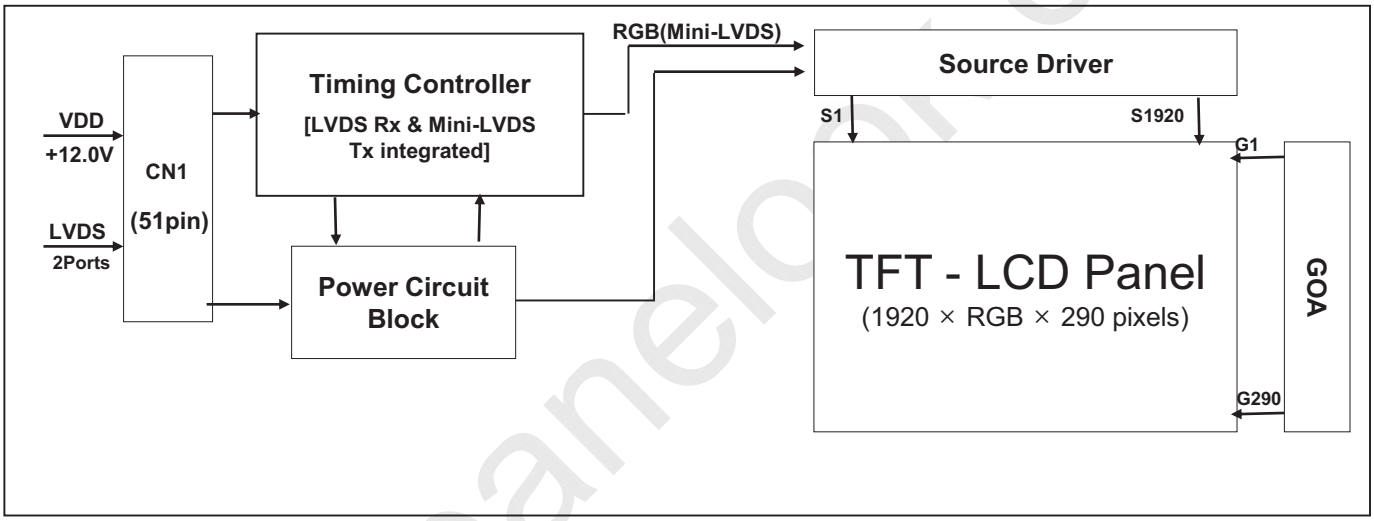
Revision No.	Page	Description of changes	Date	Prepared
P0		Initial Release	2018/09/21	LIU TAO
P1	9	3.3 Backlight Input Pin Assignments	2018/11/20	LIU TAO
	11	4.2 LVDS Interface	2018/11/06	LIU TAO
	12	4.3 LVDS Rx Interface Timing Parameter	2018/11/06	LIU TAO
	13	4.4 LVDS Rx Interface Eye Diagram	2018/11/06	LIU TAO
	14	4.5 LVDS Receiver Differential Input	2018/11/06	LIU TAO
	15	5.1 Timing Parameters (DE only mode)	2018/11/06	LIU TAO
	16	5.2 Signal Timing Waveform	2018/11/06	LIU TAO
	17	5.3 Input Signals, Basic Display Colors and Gray Scale of Colors	2018/11/06	LIU TAO
	18	5.4 Power Sequence	2018/11/06	LIU TAO
	19	Update Viewing Angle	2018/11/06	LIU TAO
	19	Update Reproduction of color	2018/11/06	LIU TAO
	23	PRODCUT SERIAL NUMBER	2018/11/06	LIU TAO
	25	Box Label	2018/11/06	LIU TAO
P2	5	1.3 ADD Application Mode	2019/03/21	LIU TAO
	7	Adjust Power Supply Current & Power Consumption	2019/03/21	LIU TAO
	8&9	Adjust LED LED Forward Voltage	2019/03/21	LIU TAO
	20	6.0 Update TBD ITEM	2019/03/21	LIU TAO
	27~31	11. PRECAUTIONS	2019/03/21	LIU TAO
	33	Figure 3 Add details	2019/03/21	LIU TAO
	34	Figure 4 Add details	2019/03/21	LIU TAO

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

DV366FBM-N10 is a color active matrix TFT LCD MDL using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This MDL has a 36.6 inch diagonally measured active area with FHD resolutions (1920 horizontal by 290 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 MDL panel is adapted for a low reflection and higher color type.



1.2 Features

- LVDS interface with 2 pixel / clock
- High-speed response
- Low color shift image quality
- 8-bit color depth, display 16.7M colors
- Wide viewing angle
- DE (Data Enable) only mode
- ADS technology is applied for high display quality
- RoHS compliant

1.3 Application

- Commercial Digital Display
- Display Terminals for Control System
- Landscape and Portrait Display

1.4 General Specification

< Table 1. General Specifications >

Parameter	Specification	Unit	Remarks
Active area	919.3(H) × 138.85 (V)	mm	
Number of pixels	1920(H) ×290(V)	pixels	
Pixel pitch	159.6(H) ×478.8(V)	um	
Pixel arrangement	Pixels RGB Vertical stripe		
Display colors	16.7M	colors	8bits True
Display mode	Normally Black		
Dimensional outline	960(H)*174.35(V)*16.9(B)	mm	Detail refer to drawing
Weight	3260	g	
Power Consumption	5.4	Watt	Typ.
Bezel width (L/R/U/D)	17.85/17.85/15.25/15.25	mm	
Surface Treatment	Haze 1%		
Back-light	Down edge side, 2- LED Light bar		
Possible display type	Landscape and Portrait Enabled		

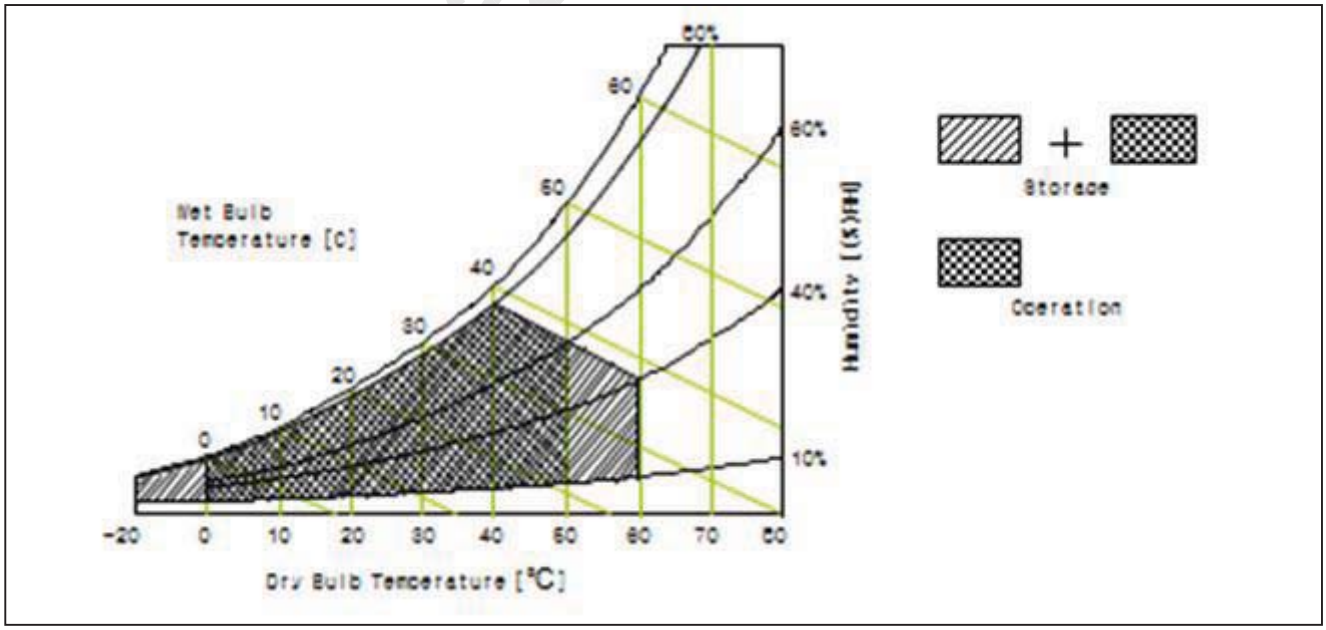
2.0 ABSOLUTE MAXIMUM RATINGS

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	13.5	V	Ta = 25 ℃
Operating Temperature	T_{OP}	0	+50	℃	Note 1
Storage Temperature	T_{SUR}	-20	+60	℃	
	T_{ST}	-20	+60	℃	
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 ℃ max. and no condensation of water.



3.0 ELECTRICAL SPECIFICATIONS

3.1 TFT LCD Open Cell

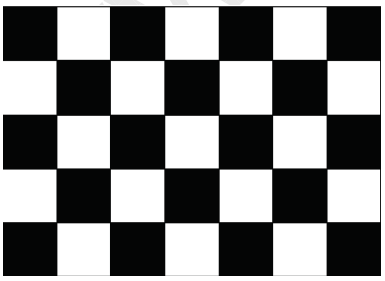
< Table 3. Open Cell Electrical Specifications >

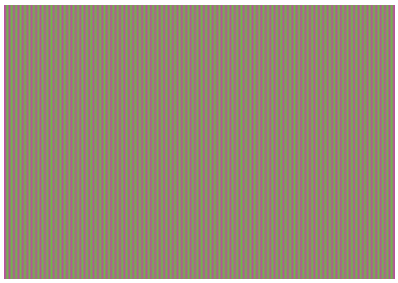
[Ta =25±2 ℃]

Parameter		Symbol	Values			Unit	Remark
			Min	Typ	Max		
Power Supply Input Voltage		VDD	10.8	12	13.2	Vdc	
Power Supply Ripple Voltage		VRP	-	-	300	mV	
Power Supply Current		IDD	-	450	600	mA	Note 1
Power Consumption		PDD	-	5.4	8	Watt	
Rush current		IRUSH	-		3.0	A	Note 2
LVDS Interface	Differential Input High Threshold Voltage	VLVTH	+100	-	+300	mV	
	Differential Input Low Threshold Voltage	VLVTL	-300	-	-100	mV	
	Input Differential Voltage	| VID |	200	-	600	mV	
	Common Input Voltage	VLVC	0.6	1.2	2.4- | VID | /2	V	
CMOS Interface	Input High Threshold Voltage	VIH	2.7	-	3.3		
	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=60Hz and Clock frequency = 74.25MHz.
Test Pattern of power supply current

a) Typ : Mosaic 7X5 (L0/L255) b) Max : Vline Subline (L255)) c) Flicker Pattern





Note 2 : The duration of rush current is about 2ms and rising time of Power Input is 1ms(min)

3.0 ELECTRICAL SPECIFICATIONS

3.2 Backlight Unit

< Table 3. Backlight Unit Electrical Specifications >

[Ta =25±2 ℃]

Parameter			Min.	Typ.	Max.	Unit	Remarks
LED Forward Voltage		V_F	-	3.1	3.2	V	-
LED Forward Current		I_F	-	100	-	mA	-
LED Power Consumption		P_{LED}		34.2	-	W	Note 1
LED Life-Time		N/A	50000	-	-	Hour	IF = 100mA
PWM Control Level	PWM High Level		-	-	-	V	
	PWM Low Level		-	-	-	V	
PWM Control Frequency		F_{PWM}	-	-	-	Hz	
Duty Ratio		-	-	-	-	%	

Notes : 1. Power supply voltage12V for LED Driver, Driver efficiency 87%,
Calculator Value for reference IF × VF ×96/ 0.87 = PLED
2. The LED Life-time define as the estimated time to 50% degradation of initial luminous.

3.3 Backlight Input Pin Assignments

Connector type : CI0106S0000-6pin or equivalent

Pin No.	Symbol	Feature
1	CH1+	VLED OUT CH1,Blue
2	CH1-	I Return CH1,White
3	NC	NC
4	NC	NC
5	CH1+	VLED OUT CH1,Blue
6	CH1-	I Return CH1,White

DC Input specification

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
LED forward voltage per channel	VLED	-	37.2	38.4	V
LED forward current per channel	ILED	-	400	-	mA

4.0 INTERFACE CONNECTION

4.1 Open Cell Input Signal & Power

- LVDS Connector : IS050-C51B-C39-S(UJU).

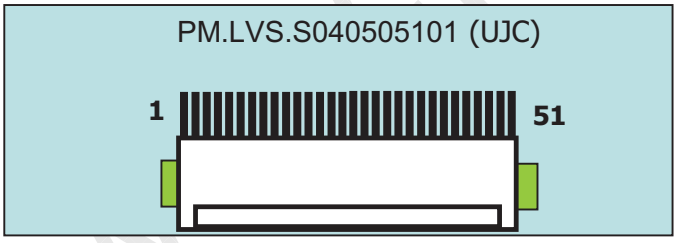
< Table 4. Open Cell Input Connector Pin Configuration >

Pin No	Symbol	Description	Pin No	Symbol	Description
1	GND	Ground	16	ERX2-	Even pixel Negative LVDS differential data input.
2	SCL	I2C Clock	17	ERX2+	Even pixel Negative LVDS differential data input.
3	SDA	I2C Data	18	GND	Ground
4	NC	No Connection	19	ECLK-	Even pixel Negative LVDS differential clock input.
5	NC	No Connection	20	ECLK+	Even pixel Negative LVDS differential clock input.
6	NC	No Connection	21	GND	Ground
7	SELLVDS	LVDS data format selection	22	ERX3-	Even pixel Negative LVDS differential data input.
8	NC	No Connection	23	ERX3+	Even pixel Negative LVDS differential data input.
9	NC	No Connection	24	NC	No Connection
10	NC	No Connection	25	NC	No Connection
11	GND	Ground	26	GND	Ground
12	ERX0-	Even pixel Negative LVDS differential data input.	27	GND	Ground
13	ERX0+	Even pixel Negative LVDS differential data input.	28	ORX0-	Odd pixel Negative LVDS differential data input.
14	ERX1-	Even pixel Negative LVDS differential data input.	29	ORX0+	Odd pixel Negative LVDS differential data input.
15	ERX1+	Even pixel Negative LVDS differential data input.	30	ORX1-	Odd pixel Negative LVDS differential data input.

Pin No	Symbol	Description	Pin No	Symbol	Description
31	ORX1+	Odd pixel Negative LVDS differential data input.	42	GND	Ground
32	ORX2-	Odd pixel Negative LVDS differential data input.	43	GND	Ground
33	ORX2+	Odd pixel Negative LVDS differential data input.	44	GND	Ground
34	GND	Ground	45	GND	Ground
35	OCLK-	Odd pixel Negative LVDS differential clock input.	46	GND	Ground
36	OCLK+	Odd pixel Negative LVDS differential clock input.	47	NC	No Connection
37	GND	Ground	48	VCC	+12V
38	ORX3-	Odd pixel Negative LVDS differential data input.	49	VCC	+12V
39	ORX3+	Odd pixel Negative LVDS differential data input.	50	VCC	+12V
40	NC	No Connection	51	VCC	+12V
41	NC	No Connection			

Notes : 1. NC(Not Connected) : This pins are only used for BOE internal operations.
2. Input Level of LVDS signal is based on the EIA-644 Standard.

Rear view of LCM



BIST Pattern

4.2 LVDS Interface

- LVDS Receiver : Timing Controller (LVDS Rx merged) / LVDS Data : Pixel Data

< Table 5. Open Cell Input Connector Pin Configuration >

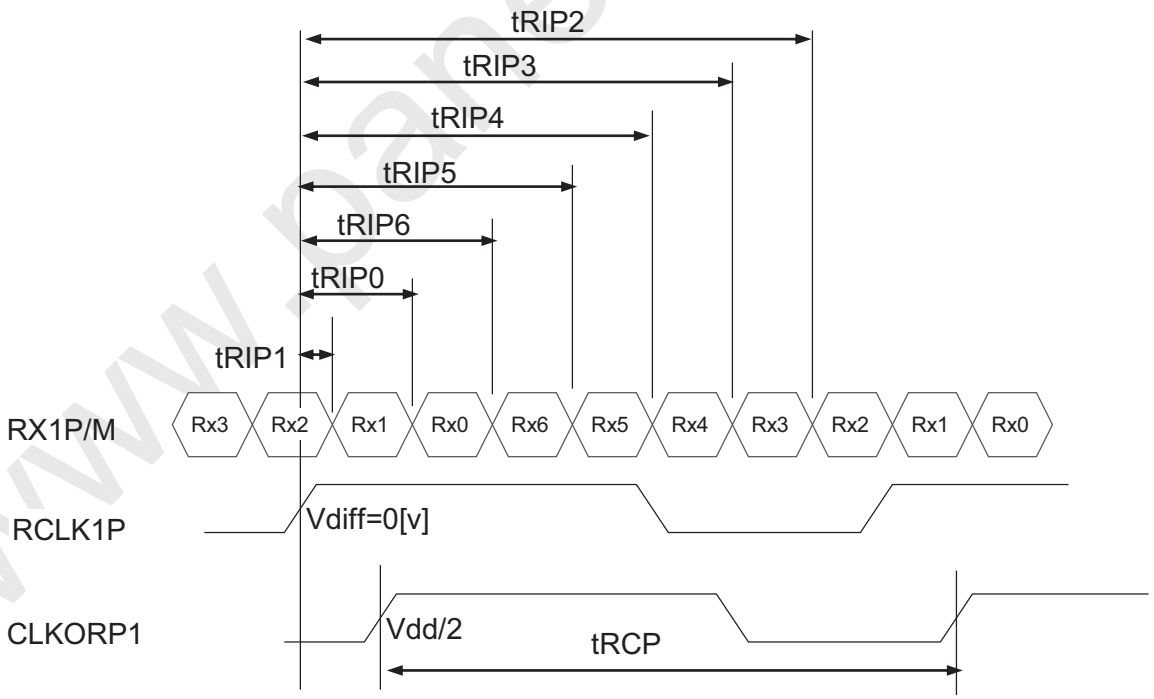
Channel No.	Data No.	8-bit LVDS Type	
		NS	JEIDA
0	Bit-0	R0	R2
	Bit-1	R1	R3
	Bit-2	R2	R4
	Bit-3	R3	R5
	Bit-4	R4	R6
	Bit-5	R5	R7
	Bit-6	G0	G2
1	Bit-0	G1	G3
	Bit-1	G2	G4
	Bit-2	G3	G5
	Bit-3	G4	G6
	Bit-4	G5	G7
	Bit-5	B0	B2
	Bit-6	B1	B3
2	Bit-0	B2	B4
	Bit-1	B3	B5
	Bit-2	B4	B6
	Bit-3	B5	B7
	Bit-4	HS	HS
	Bit-5	VS	VS
	Bit-6	DE	DE
3	Bit-0	R6	R0
	Bit-1	R7	R1
	Bit-2	G6	G0
	Bit-3	G7	G1
	Bit-4	B6	B0
	Bit-5	B7	B1
	Bit-6	-	

4.3 LVDS Rx Interface Timing Parameter

The specification of the LVDS Rx interface timing parameter is shown in Table 6.

<Table 6. LVDS Rx Interface Timing Specification>

Item	Symbol	Min	Typ	Max	Unit	Remark
CLKIN Period	tRCP	9.09	T	40	nsec	
Receiver Data Input Margin	tRMG	-0.35	-	0.35	nsec	fCLKIN=110MHz
		-0.40	-	0.40	nsec	fCLKIN=95MHz
		-0.45	-	0.45	nsec	fCLKIN=85MHz
		-0.60	-	0.60	nsec	fCLKIN=65MHz
Input Data 0	tRIP1	- | tRMG |	0.0	| tRMG |	Clock	
Input Data 1	tRIP0	T/7- | tRMG |	T/7	T/7+ | tRMG |	Clock	
Input Data 2	tRIP6	2 T/7- | tRMG |	2T/7	2T/7+ | tRMG |	Clock	
Input Data 3	tRIP5	3T/7- | tRMG |	3T/7	3T/7+ | tRMG |	Clock	
Input Data 4	tRIP4	4T/7- | tRMG |	4T/7	4T/7+ | tRMG |	Clock	
Input Data 5	tRIP3	5T/7- | tRMG |	5T/7	5T/7+ | tRMG |	Clock	
Input Data 6	tRIP2	6T/7- | tRMG |	6T/7	6T/7+ | tRMG |	Clock	

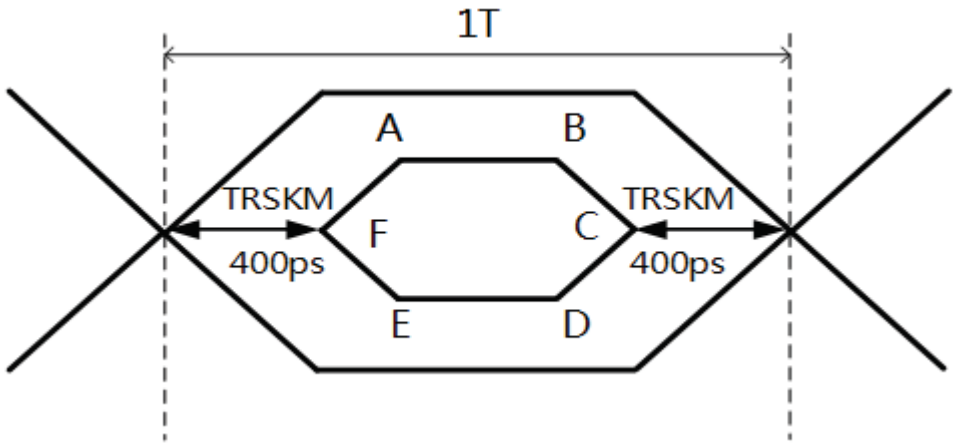


* Vdiff = (RXz+)-(RXz-),…. ,(RXCLK+)-(RXCLK-)

4.4 LVDS Rx Interface Eye Diagram

< Table 7. LVDS Rx Interface Eye Diagram>

Symbol	Min	Typ	Max	Unit	Note
A	—	100	—	mV	
B	—	100	—	mV	
C	—	0	—	mV	
D	—	-100	—	mV	
E	—	-100	—	mV	
F	—	0	—	mV	

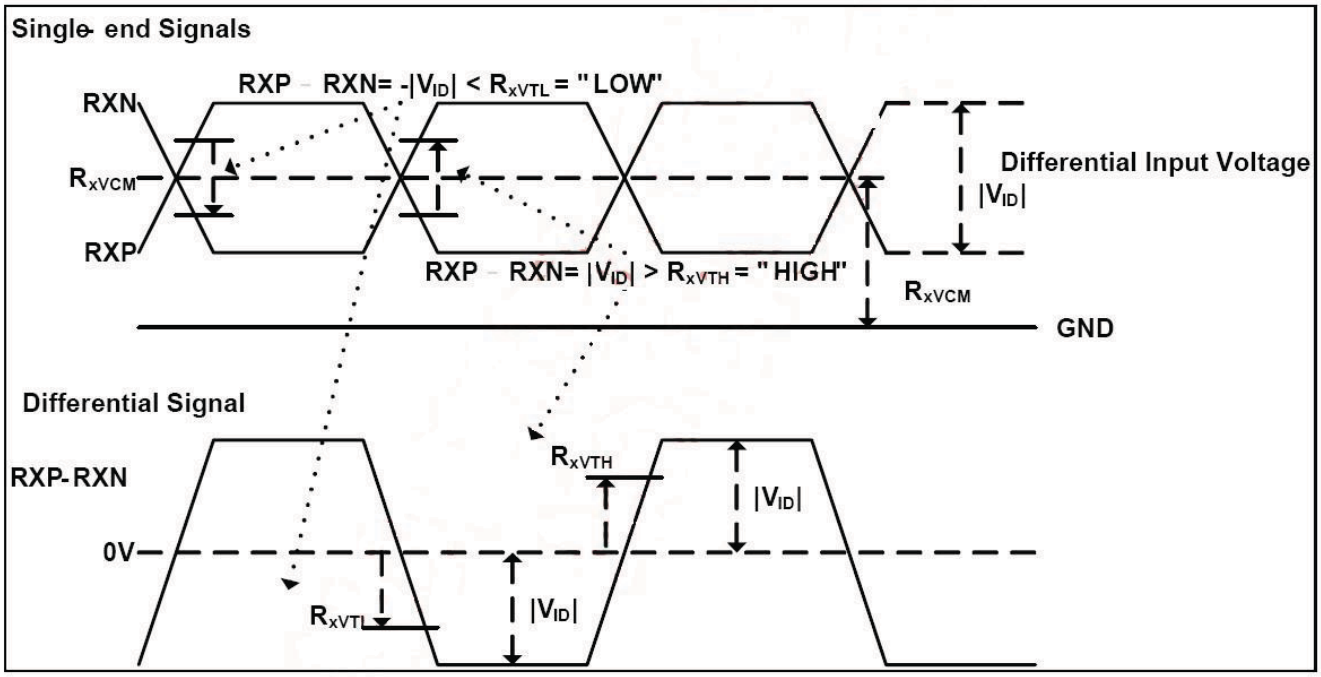


Notes: 1. Time F to A,B to C,C to D,E to F is 150p second.
2. LVDS clock=85Mhz.
3. The time A to B=1T-2*TRSKM-2*150ps.

4.5 LVDS Receiver Differential Input

< Table 7-1. LVDS Receiver Differential Input>

Symbol	Parameter	Min	Typ	Max	Unit	Condition
R_{xVTH}	Differential input high threshold voltage			+0.1v	V	RxVCM =1.2V
R_{xVTL}	Differential input low threshold voltage	-0.1V			V	
R_{XVIN}	Input voltage range (singled-end)	0		2.4	V	
R_{xVCM}	Differential input common mode voltage	$\|V_{ID}\|/2$		2.4-$\|V_{ID}\|/2$	V	
$\|V_{ID}\|$	Differential input voltage	0.1		0.6	V	



5.0 SIGNAL TIMING SPECIFICATION

5.1 Timing Parameters (DE only mode)

< Table 8. Timing Table >

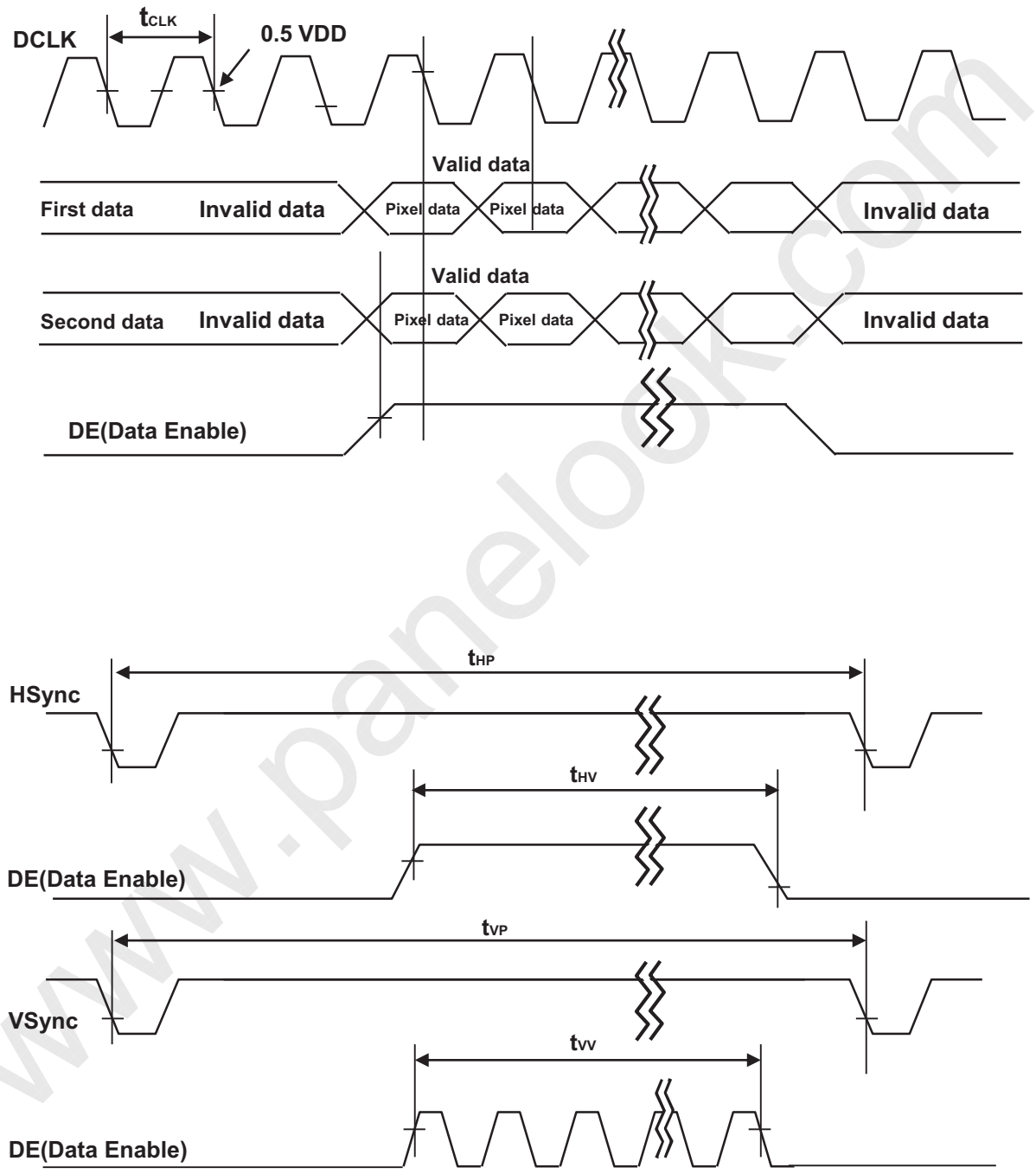
Item		Symbols		Min	Typ	Max	Unit
Clock	Frequency	1/Tc		60	74.25	78	MHz
	High Time	Tch		-	4/7Tc	-	
	Low Time	Tcl		-	3/7Tc	-	
Frame Period		Tv		1100	1125	1149	lines
				48.5	60	63	Hz
Horizontal Active Display Term		Valid	t_{HV}	-	960	-	t_{CLK}
		Total	t_{HP}	1060	1100	1200	t_{CLK}
Vertical Active Display Term		Valid	t_{VV}	-	1080	-	t_{HP}
		Total	t_{VP}	1100	1125	1149	t_{HP}

Notes: This product is DE only mode. The input of Hsync & Vsync signal does not have an effect on normal operation.

< Table 9. LVDS Input SSCG>

Symbol	Parameter	Condition	Min	Typ	Max	Unit
F	LVDS Input frequency	-	45	74.25	85	MHz
T_{LVSK}	LVDS channel to channel skew	F=100MHz V_{IC}=1.2V V_{ID}=±400mV	-380	-	+380	ps
F_{LVMOD}	Modulating frequency of input clock during SSC		60	-	85	KHz
F_{LVDEV}	Maximum deviation of input clock frequency during SSC		-3	-	+3	%
T_{CY-CY}	Cycle to Cycle jitter		-	-	100	ps

5.2 Signal Timing Waveform



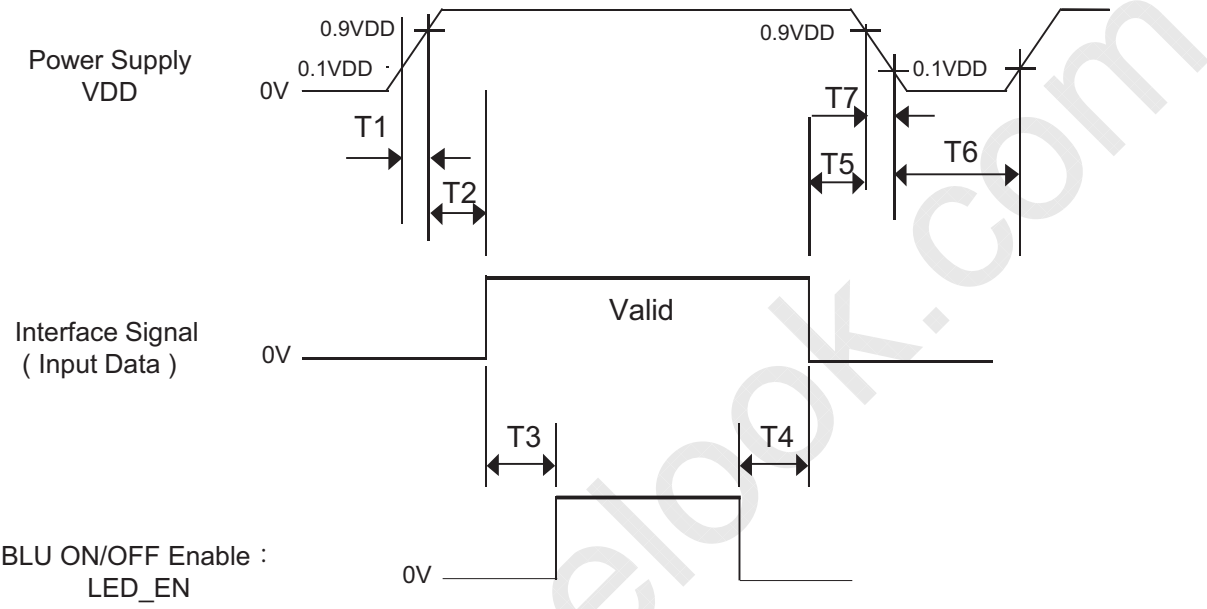
5.3 Input Signals, Basic Display Colors and Gray Scale of Colors

< Table 10. Input Signal and Display Color Table >

Color & Gray Scale		Input Data Signal																							
		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

5.4 Power Sequence

To prevent a latch-up or DC operation of the Open Cell, the power on/off sequence shall be as shown in below



< Table 11. Sequence Table >

Parameter	Values			Units
	Min	Typ	Max	
T1	0.5	-	20	ms
T2	10	-	100	ms
T3	200	-	-	ms
T4	200	-	-	ms
T5	0	-	-	ms
T6	1	-	-	s

Notes: 1. Back Light must be turn on after power for logic and interface signal are valid.
2. Even though T1 is out of SPEC, it is still ok if the inrush current of VDD is below the limit.
3. When VDD<0.9VDD(Typ.),Power off.
4. T7 decreases smoothly, if there were rebounding voltage, it must smaller than 5 volts.

6.0 OPTICAL SPECIFICATIONS

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 PR730) and test unit shall be located at an approximate distance 180cm 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 12.0V at 25°C. Optimum viewing angle direction is 6 'clock.

< Table 12. Optical Table >

[VDD = 12.0V, Frame rate = 60Hz, Ta =25±2 ℃]

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Θ_3	CR > 10	80	89	-	Deg.	Note 1
		Θ_9		80	89	-	Deg.	
	Vertical	Θ_{12}		80	89	-	Deg.	
		Θ_6		80	89	-	Deg.	
Brightness		Lv	Θ = 0° (Center) Normal Viewing Angle	560	700	-	nit	
Contrast ratio		CR		800:1	1200:1	-		Note 2
White luminance uniformity		ΔY		75	-	-	%	Note 3
Reproduction of color	White	W_x		TYP. - 0.03	0.289	TYP. + 0.03		Note 4
		W_y			0.332			
	Red	R_x			0.650			
		R_y			0.341			
	Green	G_x			0.304			
		G_y			0.625			
	Blue	B_x			0.148			
		B_y			0.071			
Color Gamut				70	72	-	%	
Response Time	G to G	T_g		-	8	10	ms	Note 5

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 θ= 0° 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 White luminance uniformity on LCD surface is then expressed as :
   ΔY = (Minimum Luminance of 9 points / Maximum Luminance of 9 points) * 100
   (See Figure 5 shown in Appendix).
4. 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.
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 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%) :
   Module is with white(L255) signal input

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

7.0 MECHANICAL CHARACTERISTICS

7.1 Dimensional Requirements

Figure 3(located in Appendix) shows mechanical outlines for the model DV366FBM-N10 . Other parameters are shown in Table 13.

< Table 13. Dimensional Parameters >

Parameter	Specification	Unit
Dimensional outline	960(H)*174.35(V)*16.9(B)	mm
Weight	3260	gram
Active area	919.3(H)*138.85(V)	mm
Pixel pitch	159.6(H) ×478.8(V)	um
Number of pixels	1920(H) ×290(V)(1 pixel = R + G + B dots)	pixels
Back-light	Down edge side 2-LED Light bar Type	

7.2 Mounting

See FIGURE 5. (shown in Appendix)

7.3 Anti-Glare and Polarizer Hardness.

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

8.0 RELIABILITY TEST

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

< Table 14. 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 ℃ (0.5 hr), 100 cycle	
7	Vibration test (non-operating)	Frequency Gravity / AMP Period	10 ~ 300 Hz, Sweep rate 30 min 1.5 G X, Y, Z 30 min
8	Shock test (non-operating)	Gravity	50G
		Pulse width	11msec, half sine wave
		Direction	± X, ± Y, ± Z Once for each
9	Electro-static discharge test (non-operating)	Air : 150 pF, 330Ω, 15 KV Contact : 150 pF, 330Ω, 8 KV	
10	Altitude test	Operating: 0 to 15000ft , 0 to 40˚	
		Non Operating: 0 to 40000ft, -10 to 25˚	

This test condition is based on BOE module.

9.0 PRODCUT 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:

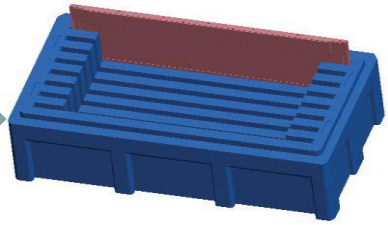
Digit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Code	S	L	S	A	1	0	8	5	9	4	2	0	0	0	1	D	B
Description	Product Code/GBN→FG-CODE一一对应		Grade	line	Year		Month	Model Extension Code (Last 4 Digits of FG-CODE)				Serial No. Hex-Decimal 000000-FFFFFF					

10.0 PACKING INFORMATION

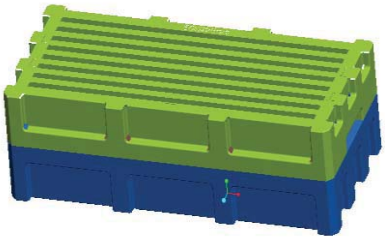
BOE provides the standard shipping container for customers, unless customer specifies their packing information. The standard packing method and Barcode information are shown in below.

10.1 Packing Order

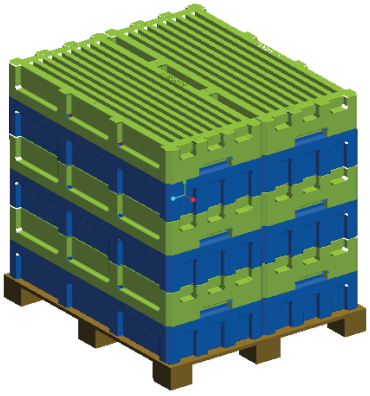
1. Put one MDL in the PE bag.



2. Put 8pcs MDL in the EPS Box.



3. Put one EPS Cover.



4. Put the boxes on the pallet (6ea boxes per pallet)

5. Put 4ea Paper Conner and one Top Cover on the EPS Boxs (48ea MDLs per pallet) and Pack with 4 packing belts.

10.2 Packing Note

- Box Dimension : 1106mm(L)×477mm(W)×316mm(H)
- Package Quantity in one Box : 8pcs

10.3 Box Label

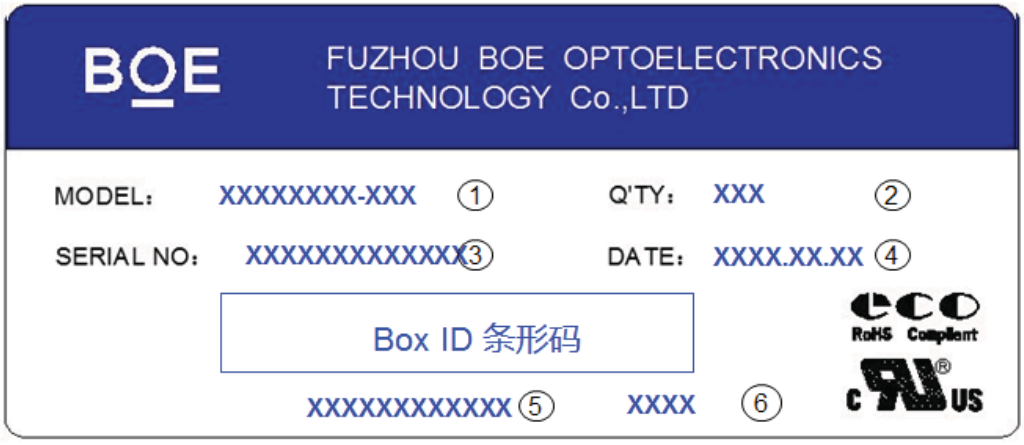
- Label Size : 100mm (L) × 50mm (W)
  - Contents

    Model : DV366FBM-N10

    Q`ty : Module 8 Q`ty in one box

    Serial No. : Box Serial No.

    Date : Packing Date



打印内容，说明如下:

① FG-CODE
② 产品数量
③ Box ID, 编码规则如下
④ Box Packing 日期
⑤ 产品物料号(客户端)
⑥ FG-CODE 后四位

Digit / Code	1	2	3	4	5	6	7	8	9	10	11	12	13
Code	X	X	X	X	1	6	3	D	0	0	1	A	1
Description	Products GBN		Grade	Line	Year		Month	Revision Code	Serial No.				

11.0 PRECAUTIONS

Please pay attention to the followings when you use this TFT LCD module.

11.1 Mounting Precautions

- Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- You must mount a module using specified mounting holes (Details refer to the drawings)
- You should consider the mounting structure so that uneven force (ex. Twisted stress, Concentrated stress)is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
- Do not apply mechanical stress or static pressure on LCD, and avoid impact, vibration and falling.
- Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
- Be careful to prevent water & chemicals contact the module surface.
- You should adopt radiation structure to satisfy the temperature specification.
- Connectors are precision devices to transmit electrical signals, and operators should plug in parallel
- Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of polarizer for bare hand or greasy cloth.(Some cosmetics are detrimental to the polarizer.)
- When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzine. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
- Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading..
- Do not disassemble the module.
- This module has its circuitry PCB's on the rear side and Driver IC and should be handled carefully in order not to be stressed.

11.2 Operating Precautions

- Do not connector or disconnect the cable to/from the Module at the “Power On” Condition.
- 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.
- Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.
- Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
- As the low temperature, the response time is greatly delayed. As the high temperatures (higher than the operating temperature) the LCD may turn black screen. The above phenomenon cannot explain the failure of the display. When the temperature returns to the normal operating temperature, the LCD will return to normal display.
- Do not exceed the absolute maximum rating value.(supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on). Otherwise the Module may be damaged.
- Please do not give any mechanical and/or acoustical impact to LCM. Otherwise, LCM can’t be operated its full characteristics perfectly.
- Design the length of cable to connect between the connector for back-light and the converter as shorter as possible and the shorter cable shall be connected directly , The long cable between back-light and Converter may cause the Luminance of LED to lower and need a higher startup voltage
- The cables should be as short as possible between System Board and PCB interface.
- The conductive material and signal cables are kept away from LED driver inductor to prevent abnormal display, sound noise and temperature rising.

11.3 Electrostatic Discharge Precautions

- Avoid to wear synthetic clothing, cotton clothing or other antistatic fibers are suggested. Wear anti-static gloves, anti-static wrist strap and conductive shoes grounding when contact with LCM
- Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc.
- Do not close to static electricity to avoid product damage.
- Do not touch interface pin directly.

11.4 Precautions for Strong Light Exposure

- Do not leave the module operation or storage in Strong light . Strong light exposure causes degradation of polarizer and color filter.

11.5 Precautions for Storage

A. Atmosphere Requirement

ITEM	UNIT	MIN	MAX
Storage Temperature	(℃)	5	40
Storage Humidity	(%rH)	35	75
Storage Life	6 months		
Storage Condition	• The storage room should be equipped with a dark and good ventilation facility. • Prevent products from being exposed to the direct sunlight, moisture and water. • The product need to keep away from organic solvent and corrosive gas. • Be careful for condensation at sudden temperature change. • Storage condition is guaranteed under packing conditions.		

B. Package Requirement

- The product should be placed in a sealed polythene bag to avoid air.
- Product Should be placed on the pallet, Which is away from the floor, Be cautions not to pile the product up.
- The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.
- As the original protective film, do not use the adhesive protective film to avoid change of Pol color and characteristic.
- The phase transition of Liquid Crystal in the condition of the low or high storage temperature will be recovered when the LCD module returns to the normal condition.

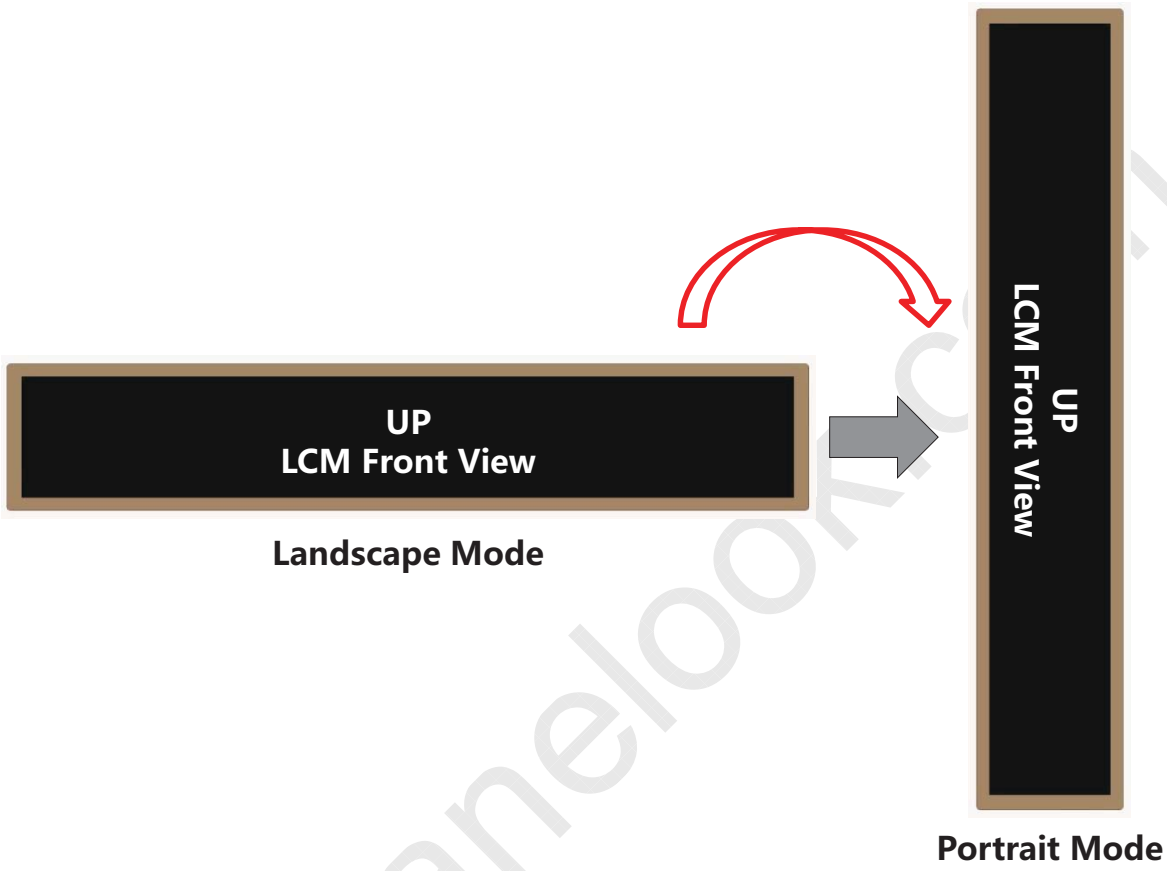
11.6 Precautions for protection film

- The ambient is maintained at more than 50%RH with anti-static equipment such as the iron fan when peeled off the protection film .
- People who peeled off the protection film should wear anti-static strap.

11.7 Appropriate Condition for Commercial Display

-Generally large-sized LCD modules are designed for consumer applications . Accordingly, a long-term display like in Commercial Display application, can cause uneven display including image sticking. To optimize module's lifetime and function, several operating usages are required.

1. Normal operating condition
   - Temperature: 20±15℃
   - Operating Ambient Humidity : 55±20%
   - Display pattern: dynamic pattern (Real display)
   - Well-ventilated place is recommended to set up Commercial Display system
2. Special operating condition
   a. Ambient condition
   - Well-ventilated place is recommended to set up Commercial Display system.
   b. Power and screen save
   - Periodical power-off or screen save is needed after long-term display.
   c. Product reliability and functions are only guaranteed when the product is used under right operation usages. If product will be used in extreme conditions such as high temperature, high humidity, high altitude, special display images, running time, long time operation, outdoor operation, etc. It is strongly recommended to contact BOE for filed application engineering advice. Otherwise, its reliability and function may not be guaranteed. Extreme conditions are commonly found at airports, transit stations, banks, stock market and controlling systems.
3. Operating usages to protect against image sticking due to long-term static display.
   a. Suitable operating time: under 20 hours a day.
   b. Static information display recommended to use with moving image.
   - Cycling display between 5 minutes' information(static) display and 10 seconds' moving image.
   c. Background and character (image) color change
   - Use different colors for background and character, respectively.
   - Change colors themselves periodically.
   d. Avoid combination of background and character with large different luminance.
   1) Abnormal condition just means conditions except normal condition.
   2) Black image or moving image is strongly recommended as a screen save
4. Lifetime in this spec. is guaranteed only when Commercial Display is used according to operating usages.
5. Module should be turned clockwise based on front view when used in portrait mode.



11.8 Other Precautions

A. LC Leak

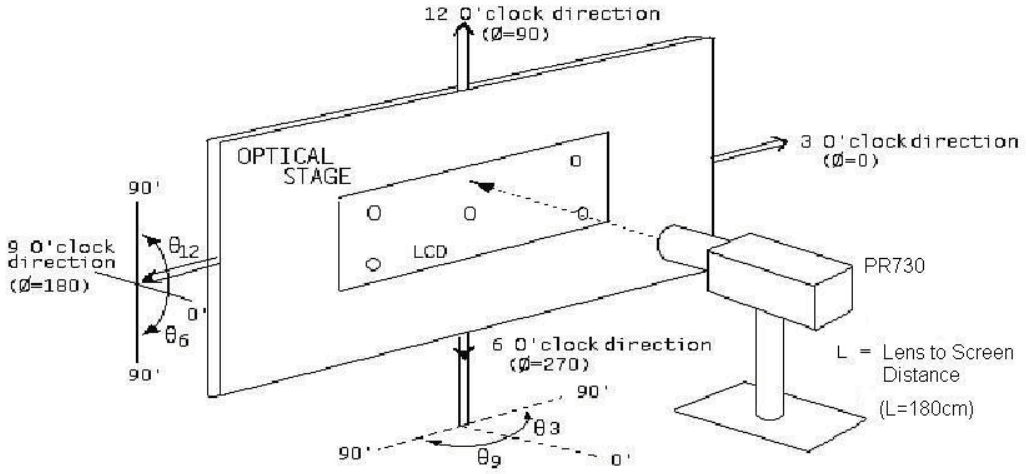
- If the liquid crystal material leaks from the panel, it is recommended to wash the LC with acetone or ethanol and then burn it.
- If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- If LC in mouth, mouth need to be washed, drink plenty of water to induce vomiting and follow medical advice.
- If LC touch eyes, eyes need to be washed with running water at least 15 minutes.

B. Rework

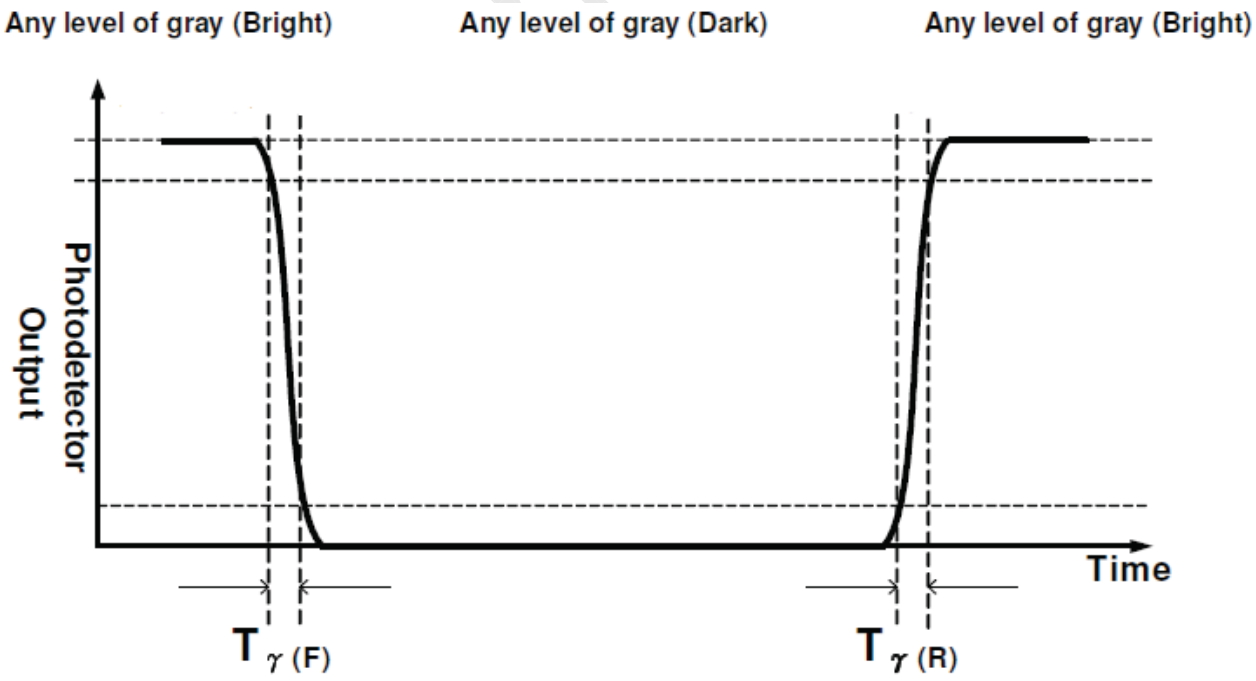
- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

12.0 APPENDIX

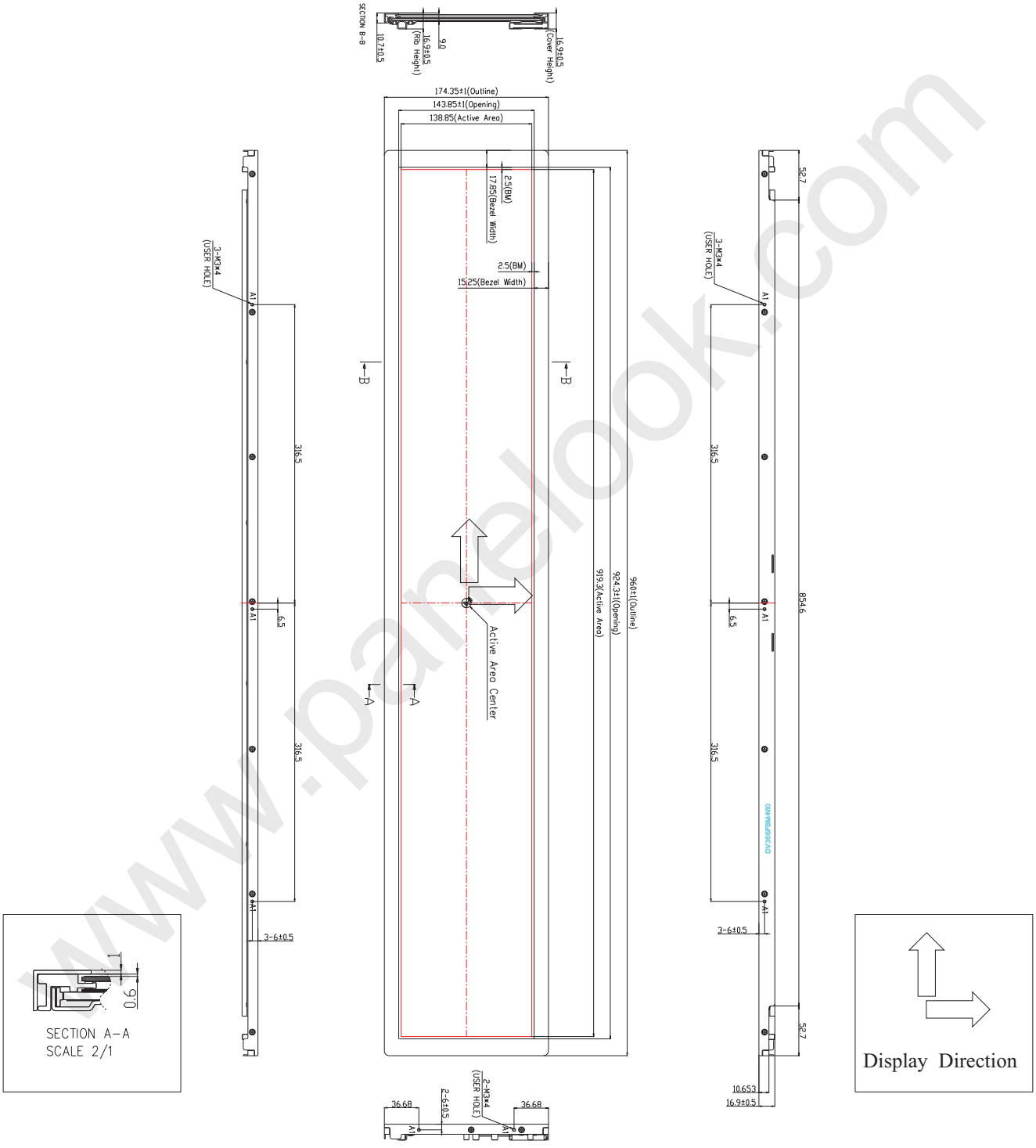
< Figure 1. Measurement Set Up >



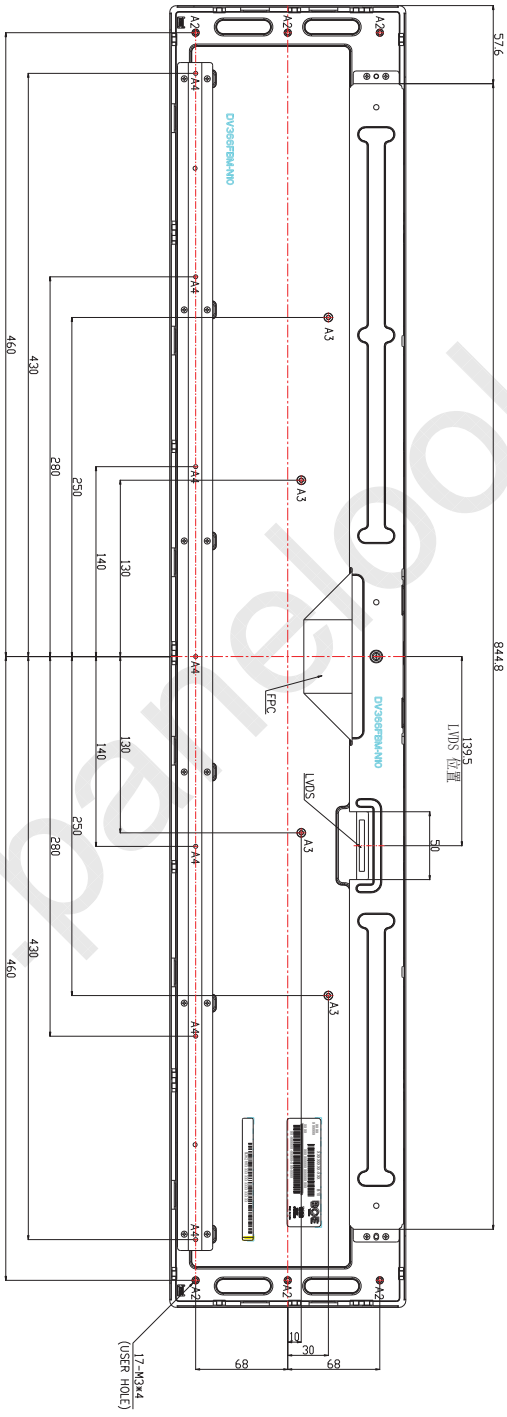
< Figure 2. Response Time Testing >



< Figure 3.TFT-LCD Module Outline Dimensions (Front View) >



< Figure 4.TFT-LCD Module Outline Dimensions (Rear View) >



ITEM NO.	DESCRIPTION	TYPE	UDM Height (mm)	Max. Depth (mm)	Torque kgf·cm
A1	M3	Short Rivet	0.0	4.0	Max.5.0
A2	M3	Middle Rivet	6.0	5.0	Max.5.0
A3	M3	Longt Rivet	7.7	5.0	Max.5.0
A4	M3	Thread Hole	0.0	5.0	Max.5.0

< Figure 5. White Luminance and Uniformity Measurement Locations >