TITLE : DV480FBM-N00

Preliminary Product Specification

Rev. P1

Chongqing BOE Optoelectronics Technology Co., Ltd

REVISION HISTORY

(●)preliminary specification
( )Final specification

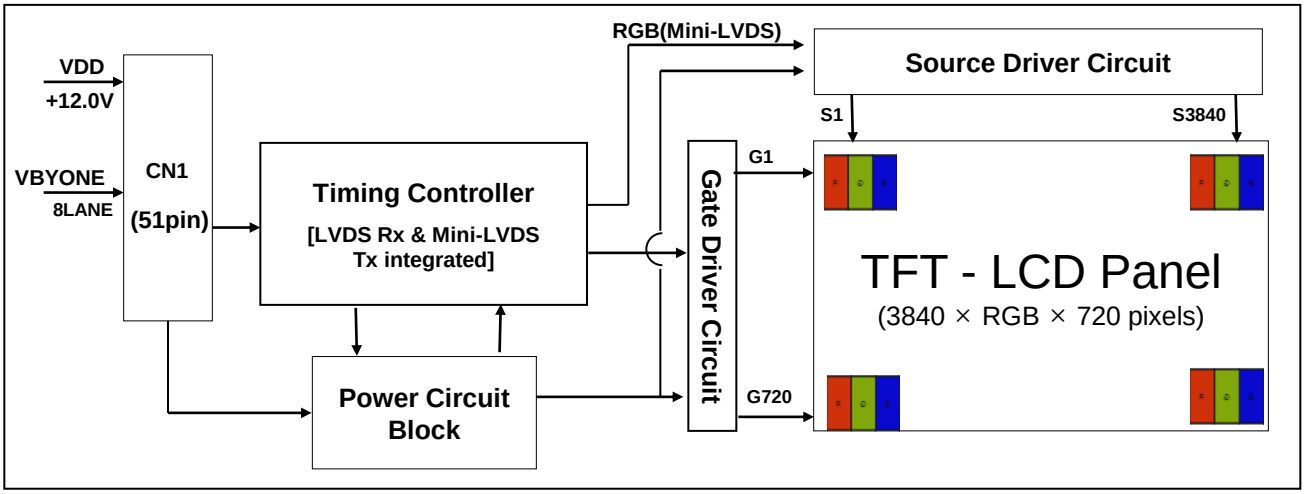
Revision No.	Page	Description of changes	Date	Prepared
P0		Initial Release	2018.01.11	T.F.Wang
P1		size changed 49”→48”	2018.05.25	X.Tian

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

DV480FBM-N00is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 49 inch diagonally measured active area with FB resolutions (3840 horizontal by 720 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 1.07G colors. The TFT-LCD panel used for this module is adapted for a low reflection and higher color type.



1.2 Features

- VBYONE Interface
- High-speed response
- 8-bit+FRC color depth, display 1.07G colors
- High luminance and contrast ratio, low reflection and wide viewing angle
- E-LED Backlight
- DE (Data Enable) only
- RoHS/Halogen Free

1.3 Application

- Automotive Product

1.4 General Specification

The followings are general specifications at the model DV480FBM-N00.

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	1194.048(H) x 223.884(V)	mm	
Number of pixels	3840(H) x 720 (V)	pixels	
Sub Pixel Pitch	103.65(H) x 310.95(V)	um	
Pixel arrangement	Pixel RGB Vertical stripe		
Display colors	1.07G	colors	8bit+FRC
Display mode	Normally Black		
Color Gamut	NTSC 72%		
Dimensional outline	1217.9(H) x 248.2(V) x 9.6(B) typ.	mm	
Weight （typ）	TBD	g	
Surface Treatment	Hard Coating, 3H		
Back-light	E-LED, 2-LED Lighting Bar Type		

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		Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage	VDD	VSS-0.3	12	13.2	V	Ta = 25 ℃
Operating Temperature		-20	-	+60	℃	
Storage Temperature		-30	-	+80	℃	
Operating Ambient Humidity(Note1)		10	-	Note2	%RH	Note2
Storage Humidity		10	-	80	%RH	Note2

Note1 : Temp≤60℃ 90% RH MAX
Note2: No condensation of water.

3.0 ELECTRICAL SPECIFICATIONS

3.1 Panel Electrical Specifications

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

Parameter		Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage	VDD	VSS-0.3	12	13.2	V	Note1
Power Supply Current		-	600	1000	mA	
Power Consumption		-	7.2	13.2	Watt	
Rush current		-	-	5	A	
Ptotal		-	-	-	W	

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,

3.2 Converter Electrical Specifications

< Table 4. Converter Electrical Specifications >

Parameter	Symbol	Values			Unit	Remark
		Min	Typ	Max		
Power Supply Input Voltage	VBL	21.6	24	26.4	Vdc	
Power Supply Ripple Voltage	VRP	-	-	400	mV	
Power Supply Current	IDD	-	4	-	A	
Power Consumption	PDD	-	96	-	Watt	Note 1

Note 1:The specified current and power consumption are under the typical supply Input voltage, 24V. It is total power consumption.

3.2 Backlight Unit

< Table 5. Backlight Input Pin Assignments>

Pin No.	Symbol	Feature
1	24V	Power Supply +24.0V
2	24V	Power Supply +24.0V
3	24V	Power Supply +24.0V
4	24V	Power Supply +24.0V
5	24V	Power Supply +24.0V
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	GND	Ground
10	GND	Ground
11	NC	No Connection
12	BLON	BLON
13	PWM_IN	PWM_IN
14	FAIL	FAIL

< Table 6. DC Input Specification> [Ta =25±2 ℃]

Parameter		Min.	Typ.	Max.	Feature
LED Forward Voltage	VF	5.6	-	6.4	V
LED Forward Current	IF	30	120	180	Ma
LED Power Consumption	PLED		78.8		W
LED Life-Time	N/A		50000		Hour

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

< Table 5. Optical Specifications >

[VDD = TBD, Frame rate = 60Hz, Clock = TBD, I_{BL} = 400mA, Ta =25±2 ℃]

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	-	89	-	Deg.	Note 1
		Θ_9		-	89	-	Deg.	
	Vertical	Θ_{12}		-	89	-	Deg.	
		Θ_6		-	89	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0° (Center) Normal Viewing Angle	-	1000	-		Note 2
Luminance of White		Y_w		TBD	1000		cd/m^2	Note 3
White luminance uniformity		ΔY		75	-		%	Note 4
Reproduction of color	White	W_x			0.280		-	Note 5
		W_y			0.290		-	
	Red	R_x			TBD		-	
		R_y			TBD		-	
	Green	G_x			TBD		-	
		G_y			TBD		-	
	Blue	B_x			TBD		-	
		B_y			TBD		-	
Response Time	GTG	T_g			16	20	ms	Note 6
Cross Talk		CT		-	-	TBD	%	Note 7

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.

Luminance when displaying a white raster
Luminance when displaying a black raster
LD ON=Local dimming enable,
LD OFF=Local dimming disable.

3. Center Luminance of white is defined as the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.
4. The White luminance uniformity on LCD surface is then expressed as :
   ΔY = (Minimum Luminance of 9points / Maximum Luminance of 9points) * 100
   (See FIGURE 2 shown in Appendix).
5. 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.
6. 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.

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																	

7. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (Y_A) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (Y_B) of that same area when any adjacent area is driven dark. (See FIGURE 4 shown in Appendix).

5.0 INTERFACE CONNECTION.

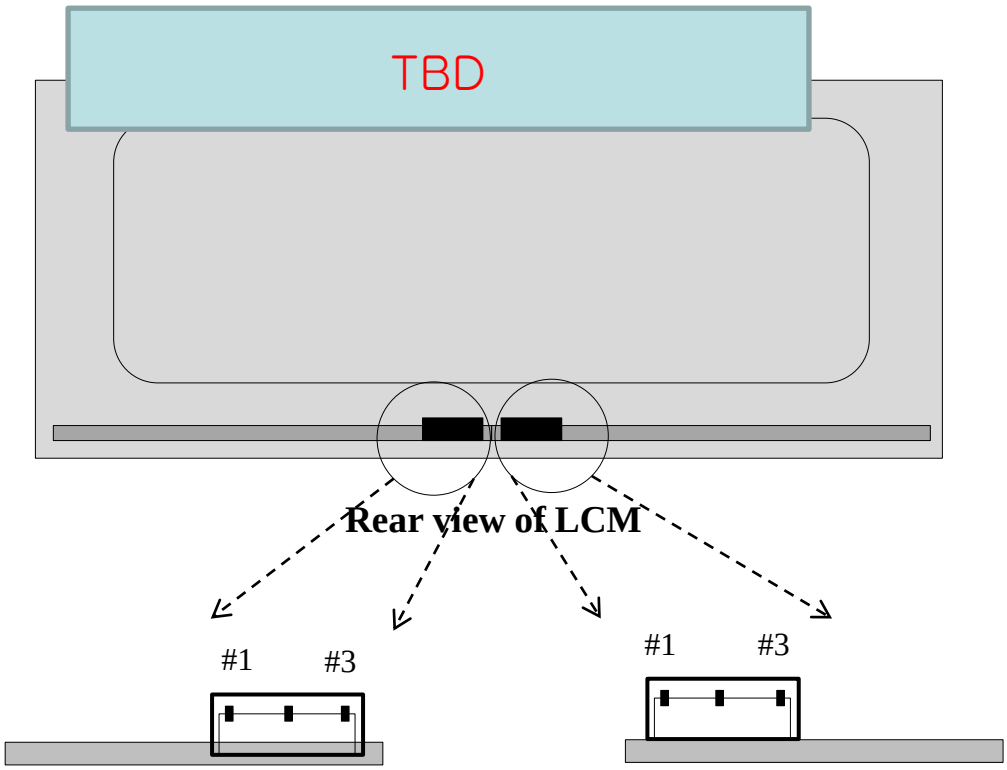
5.1 Electrical Interface Connection

5.1.1 LED Light Bar

-LED connector： A1253AWR-03-CIMB-R manufactured by CNJST or equivalent

< Table 6. LED Light Bar>

Pin No	Symbol	Description
1	ILED	LED current out
2	NC	
3	VLED	LED power supply



5.1.2 Open Cell Input Signal & Power

- Connector : 51pin(Manufactured by 德润) or Equivalent

< Table 7. 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	PWM TIN	External VBR(From System)	40	Rx4n	V-by-One HS Data Lane 4
15	PWM TOUT	External VBR(For System)	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 I2C)	44	Rx5p	V-by-One HS Data Lane 5
19	SCL	SCL(For I2C)	45	GND	Ground
20	NC	No Connection	46	Rx6n	V-by-One HS Data Lane 6
21	Local_ON	'L' = Local dimming Disable	47	Rx6p	V-by-One HS Data Lane 6
22	SEL_SEC	分区选择信号,L/NC:2section,H:1section	48	GND	Ground
23	PQ-MODE	No Connection	49	Rx7n	V-by-One HS Data Lane 7
24	GND	Ground	50	Rx7p	V-by-One HS Data Lane 7
25	HTPDN	Hot plug detect	51	GND	Ground
26	LOCKN	Lock detect			

5.2 VBYONE Interface

< Table 9. 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

6.0 SIGNAL TIMING SPECIFICATION

Input data specification V-By-One Connector

- Timing characteristics of input signals

<Table 10. Timing characteristics of input signals >

Item		Symbols	Min	Typ	Max	Unit
Frequency		1/Tc				MHz
Vertical	Frame Rate	F	47	60	61	Hz
	Total	T_V	740	810	1010	T_H
	Display	T_{VD}	720			T_H
	Blank	T_{VB}	20	90	290	T_H
Horizontal	Total	T_H	530	550	570	T_{CLK}
	Display	T_{HD}	480			T_{CLK}
	Blank	T_{HB}	50	70	90	T_{CLK}

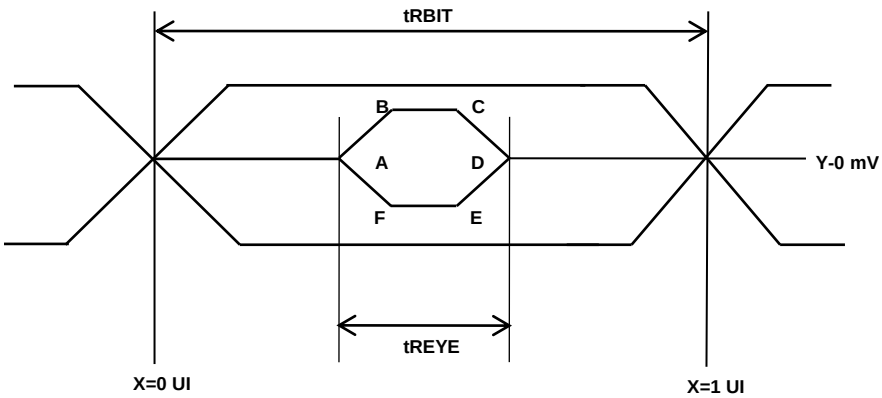
7.0 Electrical inspection specification

- V by one Input Signal Timing

SSCG Receive Information of TCON: When modulation frequency is 30KHz, spread spectrum modulation range is inner ±0.5% .

<Table 11. V by one Input Signal Timing >

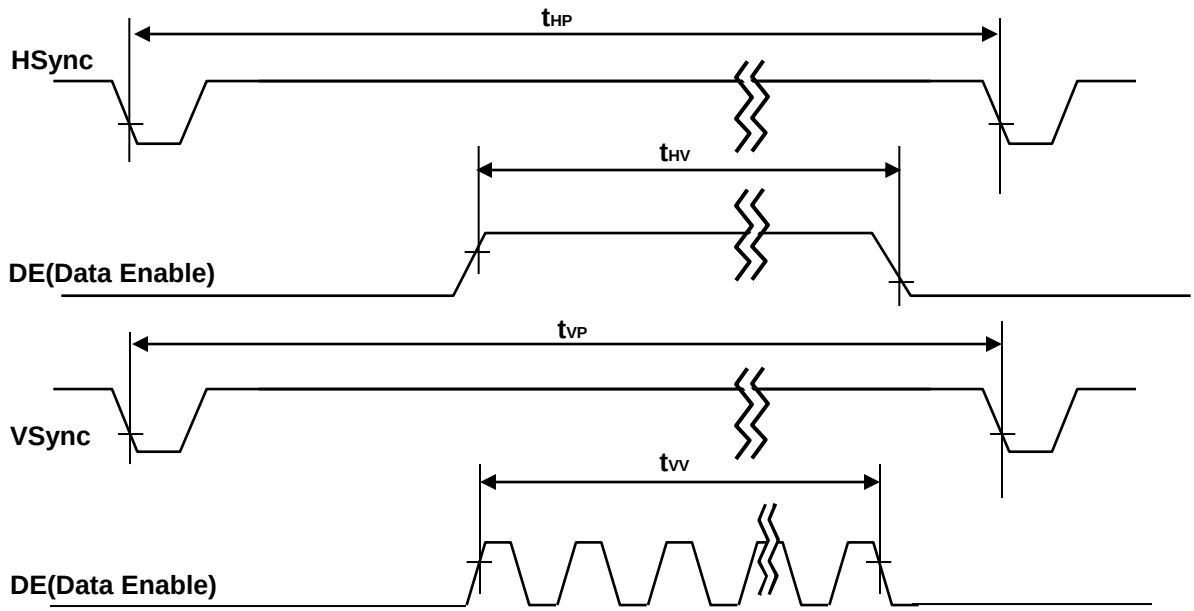
Parameter	Symbol	Condition	Min	Typ	Max	Unit	Voltage
Unit Interval(VBO Operation Bit Rate)	tRBIT	3-byte	392	tTCIP/30	-	PS	-
		4-byte	294	tTCIP/40	-	PS	-
Eye Width at Package Pin	tREYE	-	-	0.5	-	UI	-
Eye Width Position A at Package Pin	tA	-	-	0.25	-	UI	0 mV
Eye Width Position B at Package Pin	tB	-	-	0.3	-	UI	50 mV
Eye Width Position Cat Package Pin	tC	-	-	0.7	-	UI	50 mV
Eye Width Position D at Package Pin	tD	-	-	0.75	-	UI	0 mV
Eye Width Position E at Package Pin	tE	-	-	0.7	-	UI	-50 mV
Eye Width Position F at Package Pin	tF	-	-	0.3	-	UI	-50 mV
Intra – pair Skew	TTOSK_intra	-	-0.3	-	0.3	UI	-
Intra – pair Skew	TTOSK_inter	-	-500	-	500	UI	-



8.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL

Input data specification

- Timing characteristics of input signals

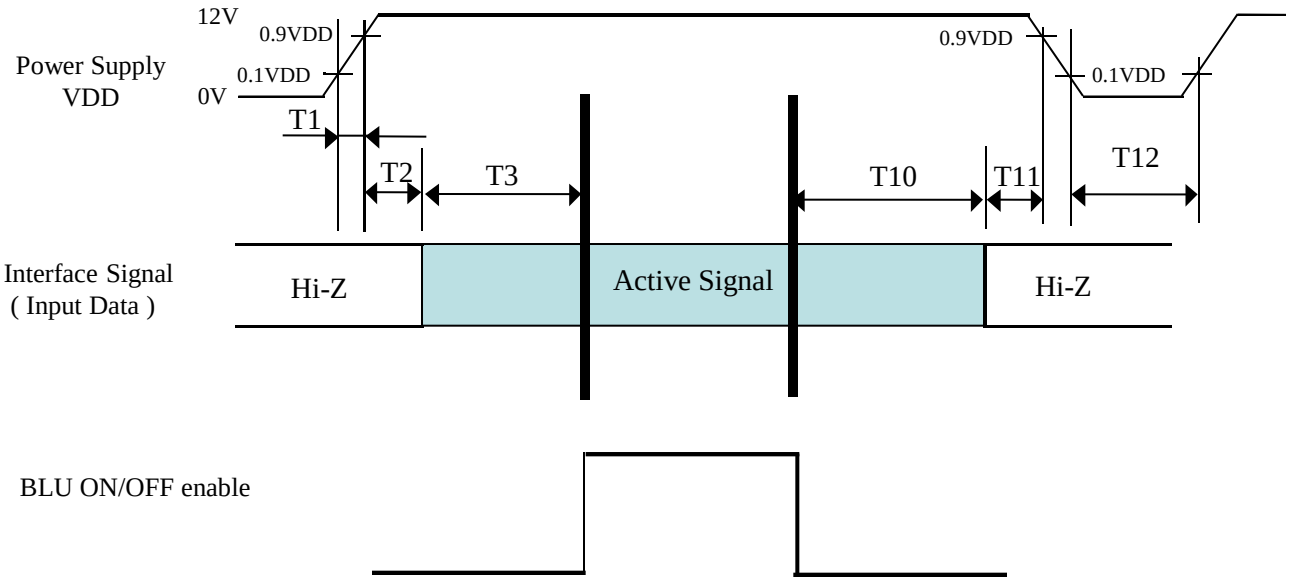


-V by one Data format as follows this table

Mode 1: Non-Division

Lane	1st Data	2nd Data	Data#
Lane0	1	9	3833
Lane1	2	10	3834
Lane2	3	11	3835
Lane3	4	12	3836
Lane4	5	13	3837
Lane5	6	14	3838
Lane6	7	15	3839
Lane7	8	16	3840

9.0 POWER SEQUENCE



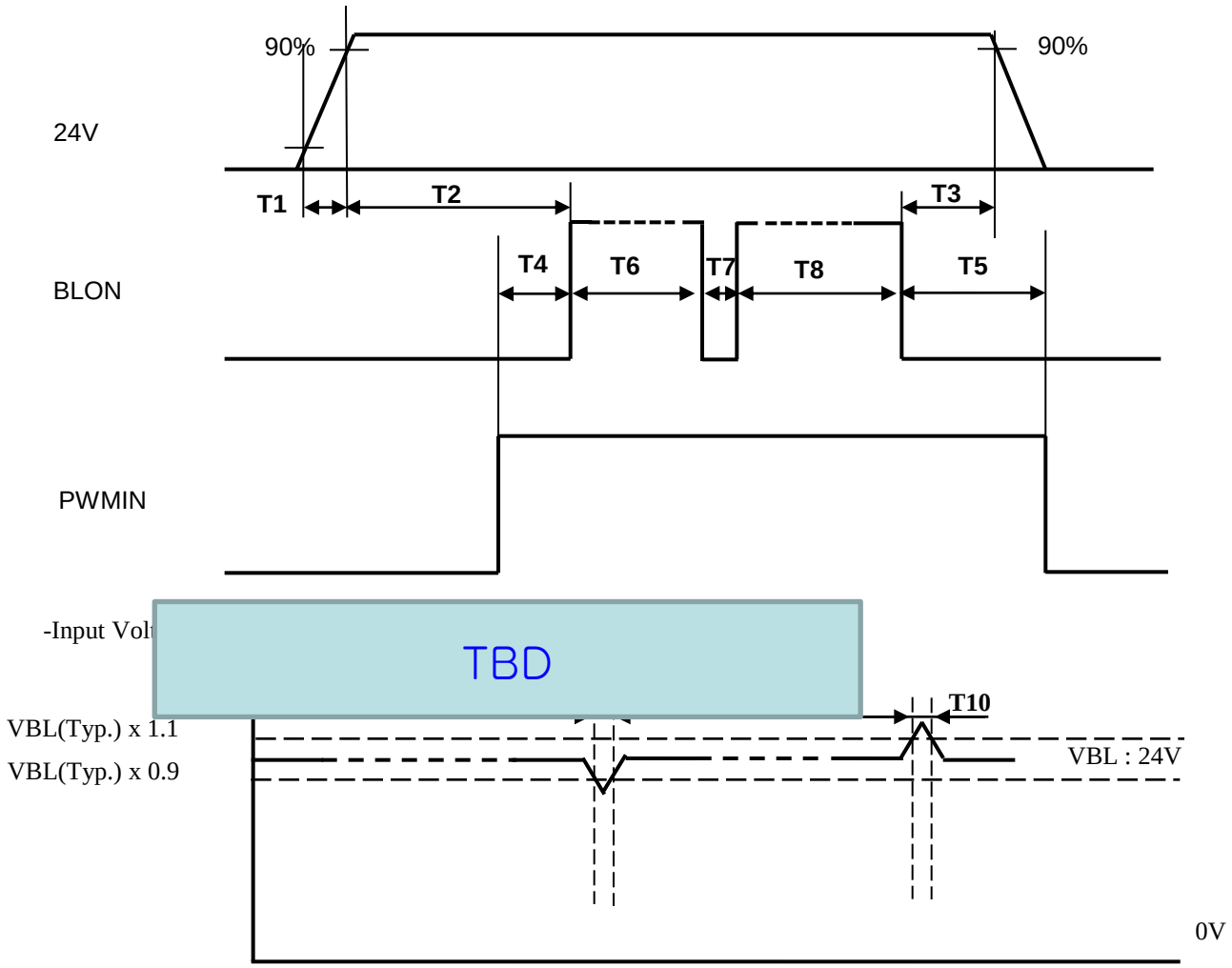
< Table 9. Sequence Table >

Parameter	Values			Units
	Min	Typ	Max	
T1	0.5	-	-	ms
T2	0	-	-	ms
T3	600	-	-	ms
T10	200	-	-	ms
T11	0	-	-	ms
T12	1	-	-	s

10.0 BL Power Sequence

- Sequence for converter

Power supply for converter



Parameter	Values			Units
	Min	Typ	Max	
T1/T3	10	-	-	ms
T2	200	-	-	ms
T4/T5	0.1	-	-	ms
T6/T8	2	-	-	sec
T7	500	-	-	ms
T9/T10	0.3	-	-	ms

11.0 MECHANICAL CHARACTERISTICS

11.1 Dimensional Requirements

FIGURE 6 (located in Appendix) shows mechanical outlines for the model DV480FBM-C00. Other parameters are shown in Table 5.

<Table 5. Dimensional Parameters>

Parameter	Specification	Unit
Dimensional outline	1217.9(H) x 248.2(V) x 9.6(B) typ.	mm
Weight	TBD	gram
Active area	1194.048(H) x 223.884(V)	mm
Dot pitch	0.10365(H) ×0.31095(V)	mm
Number of pixels	3840(H)×720(V) (1 pixel = R + G + B dots)	pixels
Back-light	E-LED	

11.2 Mounting

See FIGURE 5,6 （shown in Appendix）

11.3 Hard Coating and Polarizer Hardness.

The surface of the LCD has an hard coating and reduce scratching.

11.4 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.

12.0 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 = -5℃, 240hrs	
6	Thermal shock	Ta = -20 ℃ ↔ 85℃ (0.25 hr), 300 cycle	
7	Vibration test (non-operating)	Frequency	Random,1 ~ 200 Hz, 30 min/Axis
		Gravity / AMP	1.2 Grms
		Period	X, Y, Z 30 min
8	Shock test (non-operating)	Gravity	50G
		Pulse width	11msec, half sine
		Direction	±X, ±Y, ±Z Once for each
9	Electro-static discharge test	Air : 150 pF, 330Ω, 15 KV Contact : 150 pF, 330Ω, 8 KV	

Note: Some Materials can not reach automotive reliability condition, so the reliability condition basis on the development agreement.

13.0 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.

(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.

(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.

13.0 PRODUCT SERIAL NUMBER

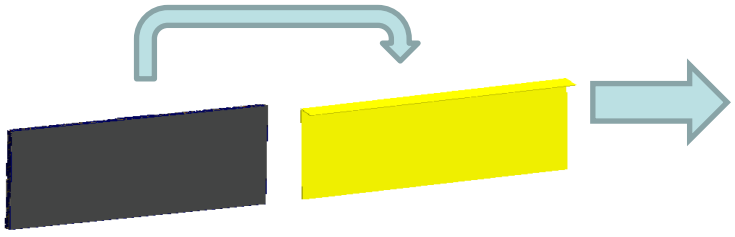
1	2	3	4	5	6	7
X X	X	X	X X	X	X X X X	X X X X X X

1. Model Code/GBN
2. Rank / Grade
3. Line Classification
4. Year (2001 : 01, 2002 : 02, …)
5. Month (1,2,3, … , 9, X, Y, Z)
6. Model Extension Code
   (Last 4 Digits Of FG-CODE)
7. Serial Number

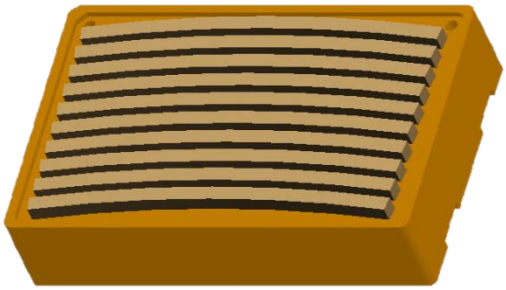
14.0 Packing

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.

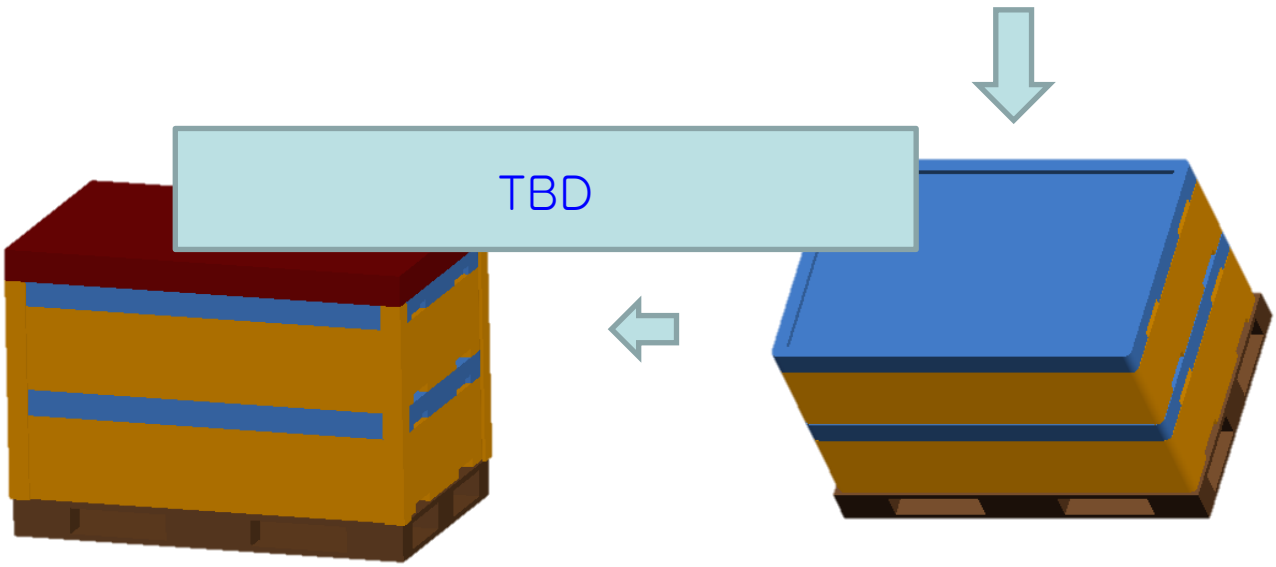
14.1 Packing Order



Put 8 LCD MDL in the EPS BOX



Put 8 LCD MDL in the EPS BOX.



Put the Top-Cover and 4 paper Corners on the Box (16ea MDLs per ballet) and Pack with 4 packing belts.

Put 2 EPS BOX (2layers) on the pallet.

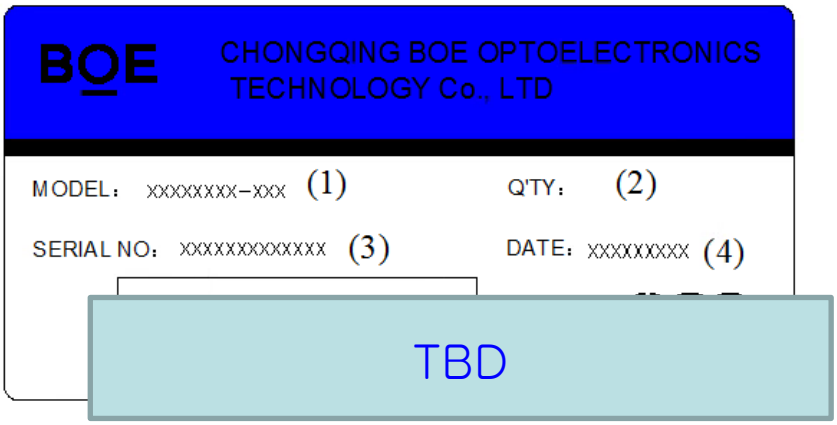
14.2 Packing Note

- Box Dimension : 1360mmL×880mmW×380mmH
- Package Quantity in one Box : 8 pcs

14.3 Box Label

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

  Model : DV480FBM-N00
  Q`ty : 8 LCM in one box.
  Serial No. : Box Serial No. See next page for detail description.
  Date : Packing Date
  FG Code : FG Code of Product



1. FG-CODE(前12位)
2. 包装数量
3. Box ID
4. 包装日期
5. FG-Code后四位

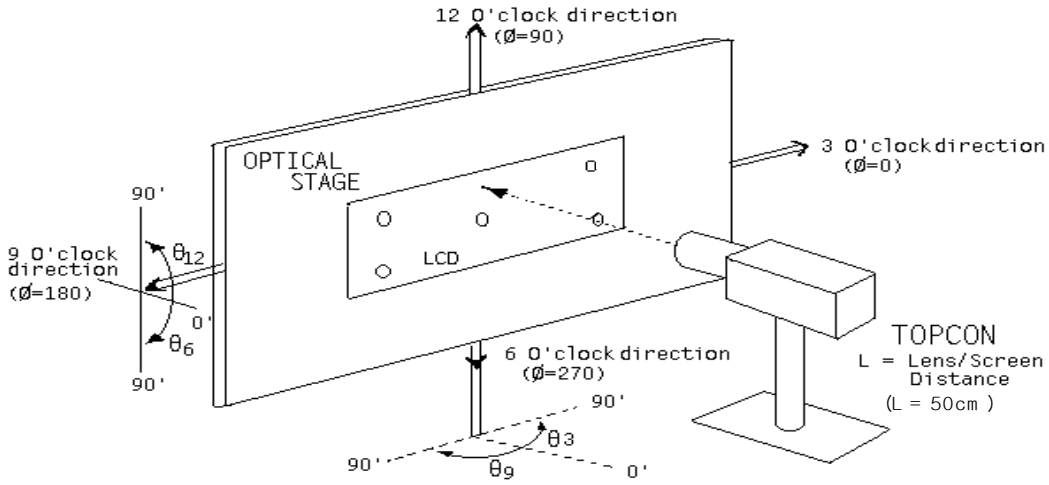
Box ID Naming Rule:

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

14.4 Packing Material ESD Specification

Item	SPEC
Surface Resistance [10^n Ω]	Control by 10^6~10^9 - Box, Spacer, POL Protection film

15.0 APPENDIX



PS. 亮度测试需要垂直于显示面进行测试

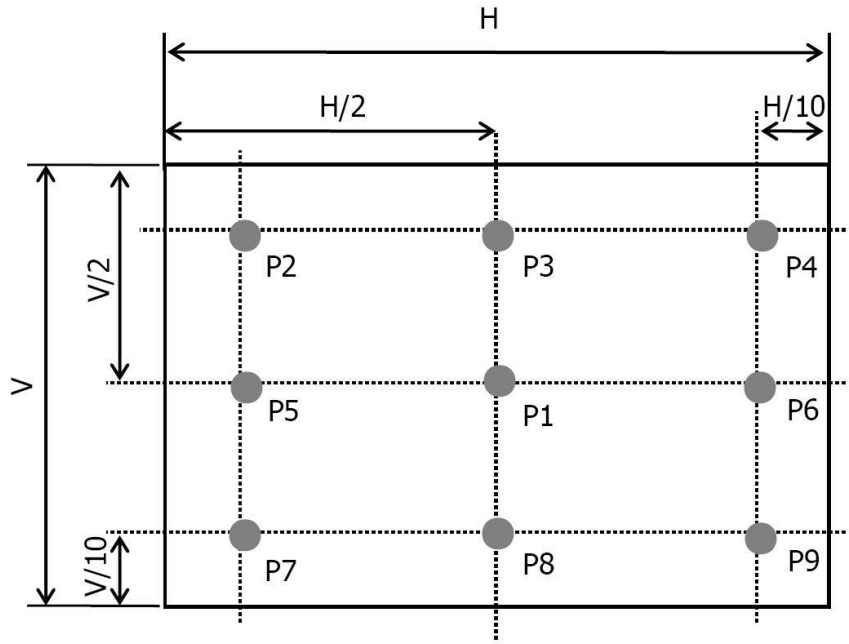
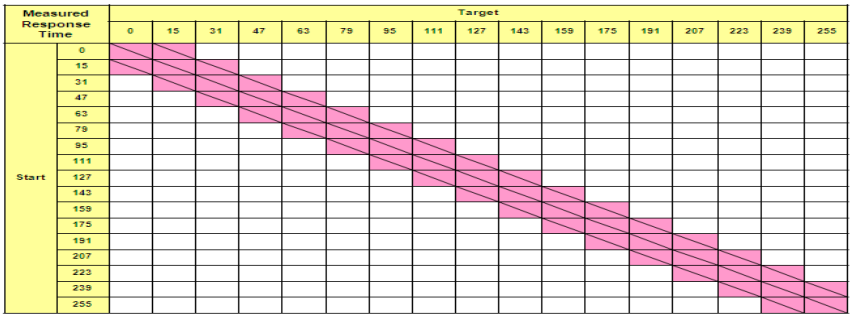


Figure 2. White Luminance and Uniformity Measurement Locations (9 points)

Figure 3. Response Time Testing



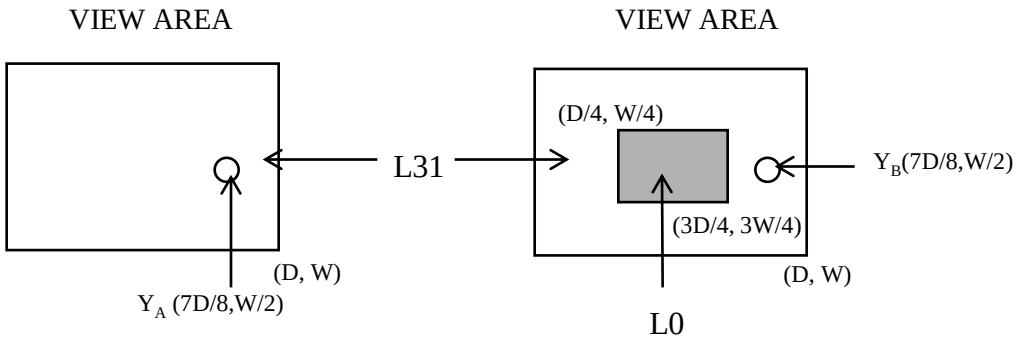


Figure 4. Cross Modulation Test Description

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

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

Figure 5. TFT-LCD Module Outline Dimensions (Front view)

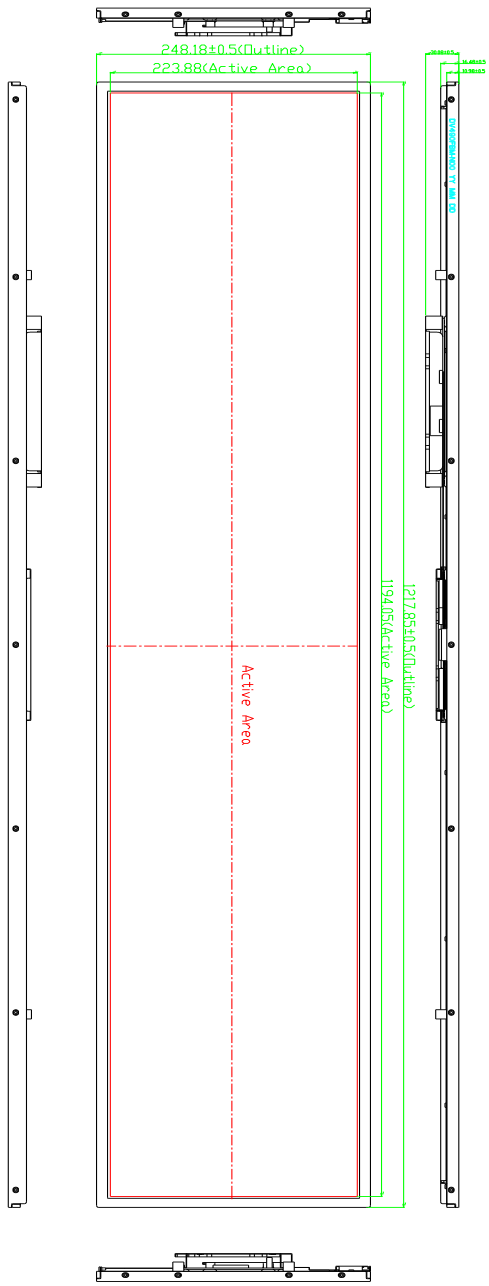


Figure 6. TFT-LCD Module Outline Dimensions (Rear view)