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SPEC. NUMBER
S8-65-8D-150PRODUCT GROUP
TFT-LCD

Rev. P0

ISSUE DATE
2019.12.26PAGE
1 OF 25**TITLE :****DV438FBD-N50 Preliminary Product Specification For 120Hz Rev.P0**

Fuzhou BOE Optoelectronics Technology Co.,Ltd

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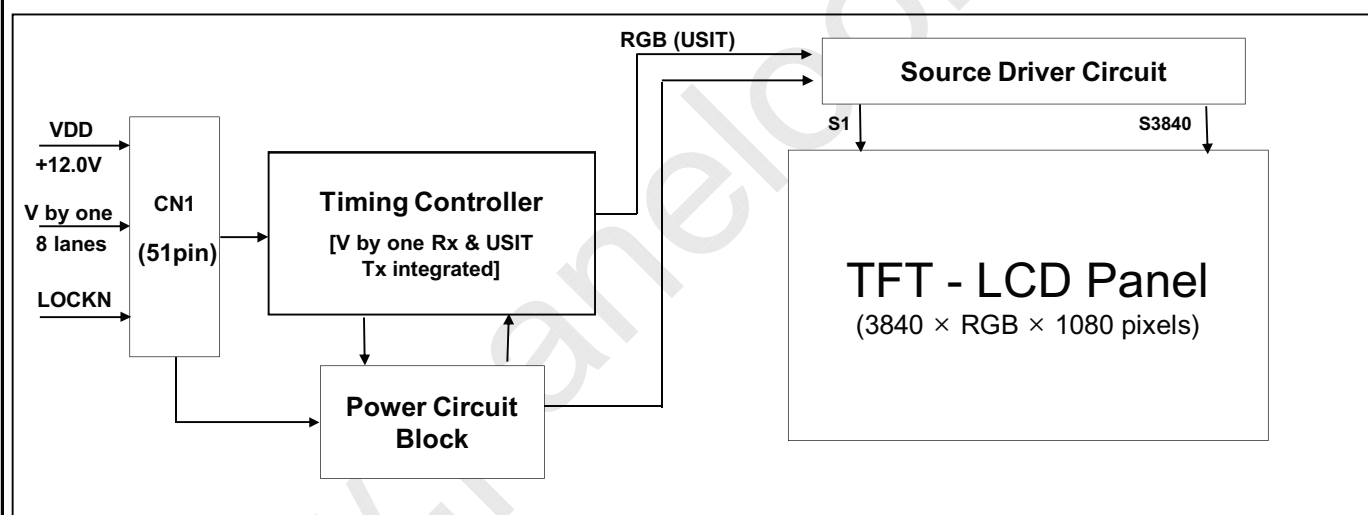
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1.0 GENERAL DESCRIPTION

1.1 Introduction

DV438FBD-N50 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	
Display mode	Normally Black		
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	900(Typ.)	g	预估
Power Consumption	7.8(Typ.)	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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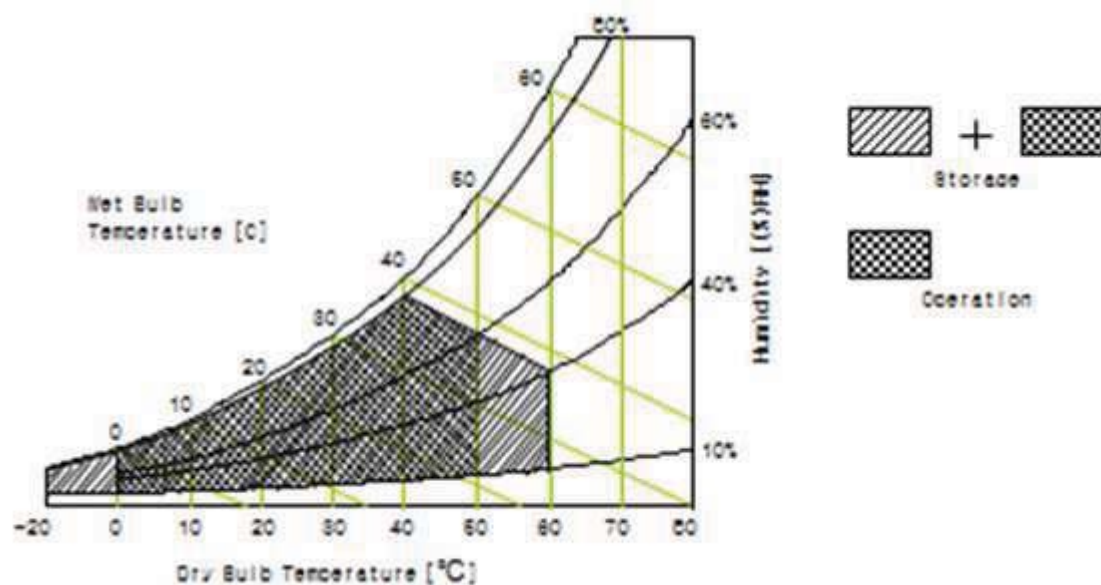
2.0 ABSOLUTE MAXIMUM RATINGS

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 _{OP}	0	+50	°C	Note 1
Storage Temperature	T _{SUR}	-20	+60	°C	
	T _{ST}	-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.

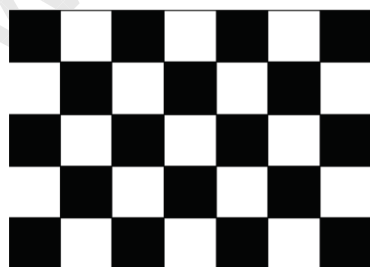
The current draw and power consumption specified is for VDD=12.0V,

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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4.0 INTERFACE CONNECTION

4.1 Open Cell Input Signal & Power

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

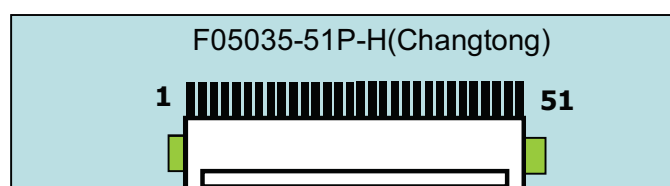
< Table 4. Open Cell Input Connector Pin Configuration >

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

- System side have to put pull high resistor on LOCKN pins.
- 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 >

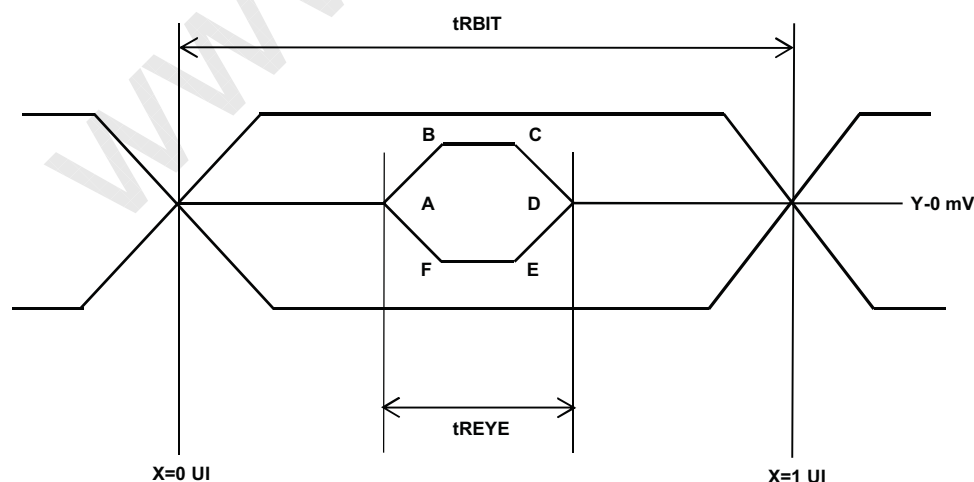
Item		Symbols	Min	Typ	Max	Unit
Frequency		1/Tc	69	74.25	75	MHz
Vertical	Frame Rate	F	117	120	122	Hz
	Total	T _V	1115	1125	1180	T _H
	Display	T _{VD}	1080			T _H
	Blank	T _{VB}	35	45	100	T _H
Horizontal	Total	T _H	540	550	600	T _{CLK}
	Display	T _{HD}	480			T _{CLK}
	Blank	T _{HB}	60	70	120	T _{CLK}

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6.2 Signal Timing Waveform

< Table 8. Signal Timing Table >

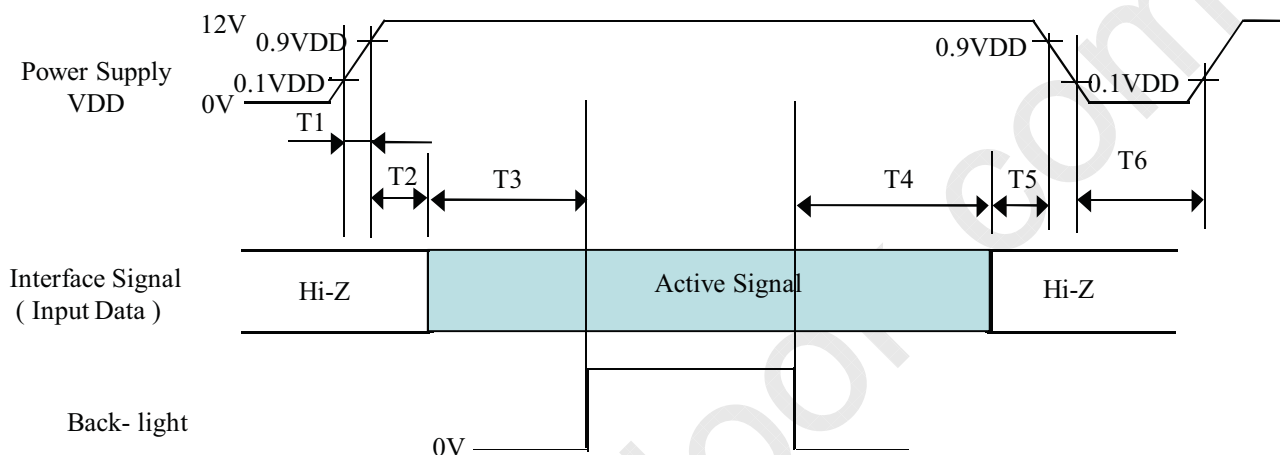
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Unit Interval(VBO Operation Bit Rate)	tRBIT	3-byte	380	tTCIP/30	1667	PS
		4-byte	285	tTCIP/40	1250	PS
		5-byte	266	tTCIP/50	1000	PS
Eye Width at Package Pin	tREYE	-	-	0.5	-	UI
Eye Width Position A at Package Pin	tA	-	-	0.25	-	UI
Eye Width Position B at Package 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 θ and Φ equal to 0° . 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 θ and/or Φ , 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 11. Optical Table >

[VDD = 12.0V, Frame rate = 60Hz, Ta = $25\pm 2^{\circ}\text{C}$]

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Θ_3	CR > 10		89		Deg.	Note 1
		Θ_9			89		Deg.	
	Vertical	Θ_{12}			89		Deg.	
		Θ_6			89		Deg.	
Cell Transmittance				3.78	4.2		%	
Contrast ratio		CR		700:1	1000:1	-		Note 2
Reproduction of color	White	W_x	$\Theta = 0^{\circ}$ (Center) Normal Viewing Angle	TYP. - 0.03	0.311	TYP. + 0.03		Note 3
		W_y			0.347			
	Red	R_x			0.679			
		R_y			0.315			
	Green	G_x			0.282			
		G_y			0.663			
	Blue	B_x			0.153			
		B_y			0.061			
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
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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8.0 MECHANICAL CHARACTERISTICS

8.1 Dimensional Requirements

Figure 3(located in Appendix) shows mechanical outlines for the model DV430FBD-N50. Other parameters are shown in Table 12.

< Table 12. Dimensional Parameters >

Parameter	Specification	Unit
Dimensional outline	1084(H) × 314.88(V) × 1.35 (B) .	mm
Weight	900 (typ.)预估	gram
Active area	1071.36(H) × 301.32(V)	mm
Pixel pitch	279(H) × 279(V)	um
Number of pixels	3840(H) × 1080(V) (1 pixel = R + G + B dots)	pixels

8.2 Anti-Glare and Polarizer Hardness.

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

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9.0 RELIABILITY TEST

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

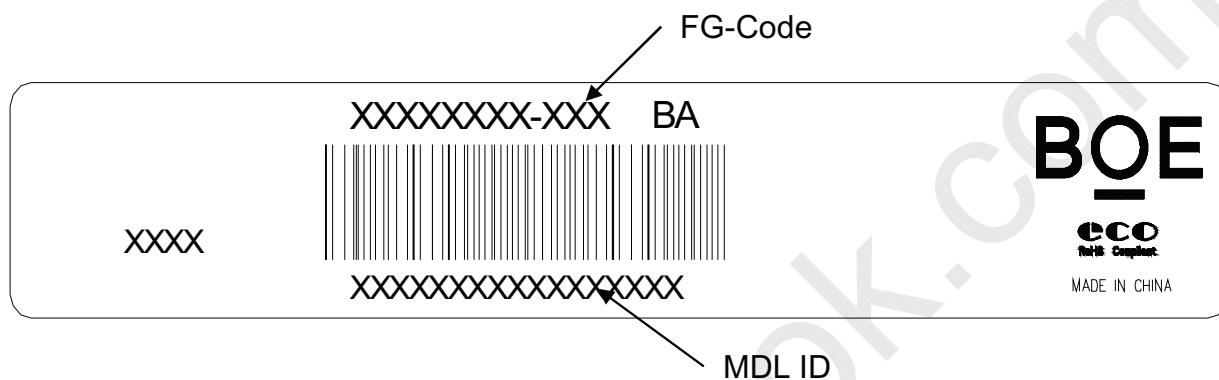
< Table 13. Reliability Test Parameters >

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

This test condition is based on BOE OC.

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10.0 PRODCUT SERIAL NUMBER



MDL ID Naming Rule:

Digit Code	1	2	3	4	5	6	7	8	9	10	11
Description	Model Code GBN		Grade	Line	Year		Month	Model Extension Code			
Digit Code	12	13	14	15	16	17	18				
Description	Serial No						扫码不显示, BOE厂内用				

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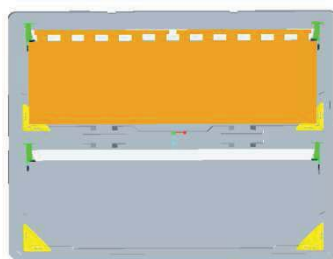
11.0 PACKING INFORMATION

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.

11.1 Packing Order



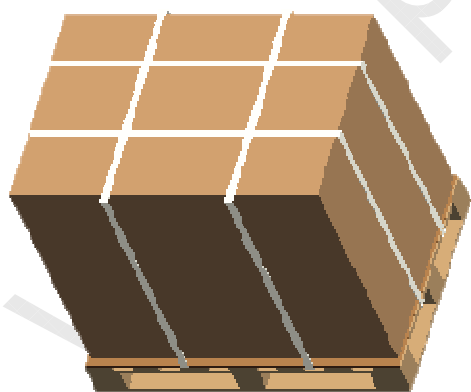
Put 1Pcs 2t EPE pad in one groove of box



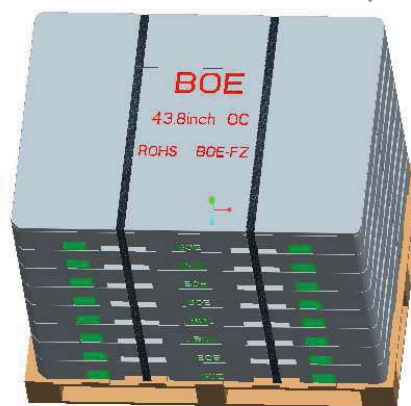
Put 1Pcs Open Cell, ... , totally 17 pcs open cell and 18 pcs EPE pad in one groove of Box



According to above steps , put open cell and EPE in another groove ; Totally , 34Pcs open cells in one box



Put totally 8 boxes. Place paper corners and wrap film around the boxes. Pack with 4 packing belts.



Put one paper pad on the pallet,
Put totally 8boxes and 1 cover,
Pack with 2 Package belts.
(8ea boxes per pallet)

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11.2 Packing Note

- Box Dimension : 1240mm(L)×934mm(W)×121mm(H)
- Package Quantity in one Box : 34 pcs

11.3 Box Label

- Label Size : 100 mm (L) × 50 mm (W)
 - Contents
 - OC: DV438FBD-N50
 - Q`ty : OC 34 Q`ty in one box
 - Serial No. : Box Serial No.
 - Date : Packing Date



Digit	1	2	3	4	5	6	7
Code	x	x	x	x	x	x	x
Des.	1. Model Code GBN 2. Grade 3. Line 4. Year(2016:16, 2017:17, ...) 5. Month(1, 2, 3, ..., 9, X, Y, Z) 6. Revision Code 7. Serial Number						

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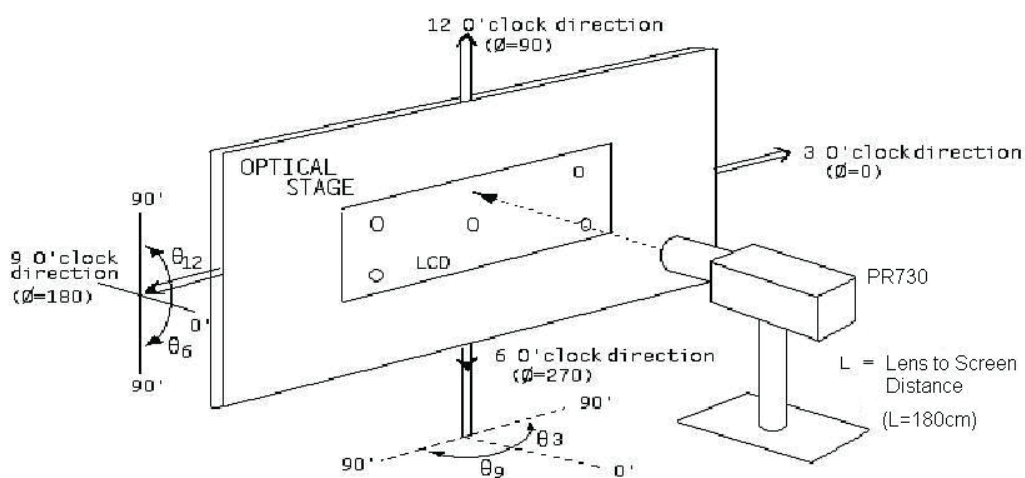
12.0 HANDLING & CAUTIONS

- (1) Cautions when taking out the OC
 - Pick the pouch only, when taking out OC from a shipping package.
- (2) Cautions for handling the OC
 - As the electrostatic discharges may break the LCD OC, handle the LCD OC 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 OC 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 OC is operating.
 - Put the OC display side down on a flat horizontal plane.
 - Handle connectors and cables with care.
- (3) Cautions for the operation
 - When the OC 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 OC would be damaged.
- (4) Cautions for the atmosphere
 - Dew drop atmosphere should be avoided.
 - Do not store and/or operate the LCD OC 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 OC characteristics
 - Do not apply fixed pattern data signal to the LCD OC 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 OC.
 - Do not re-adjust variable resistor or switch etc.
 - When returning the OC for repair or etc., Please pack the OC not to be broken. We recommend to use the original shipping packages.

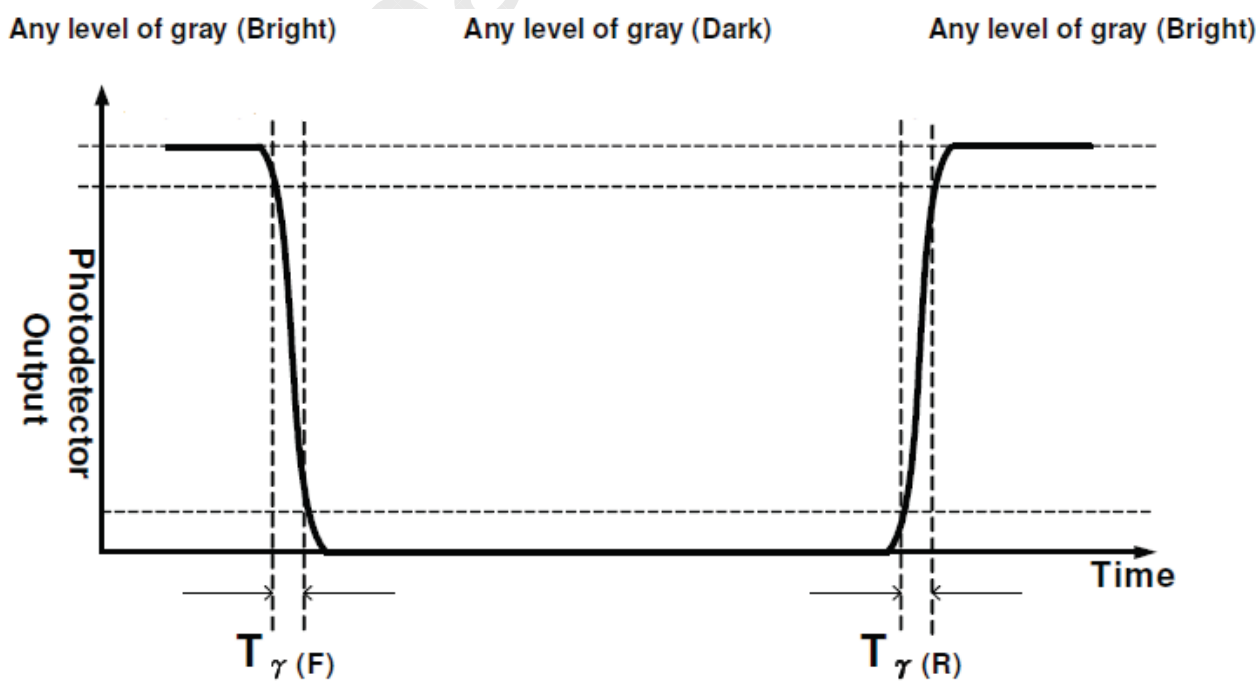
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13.0 APPENDIX

< Figure 1. Measurement Set Up >

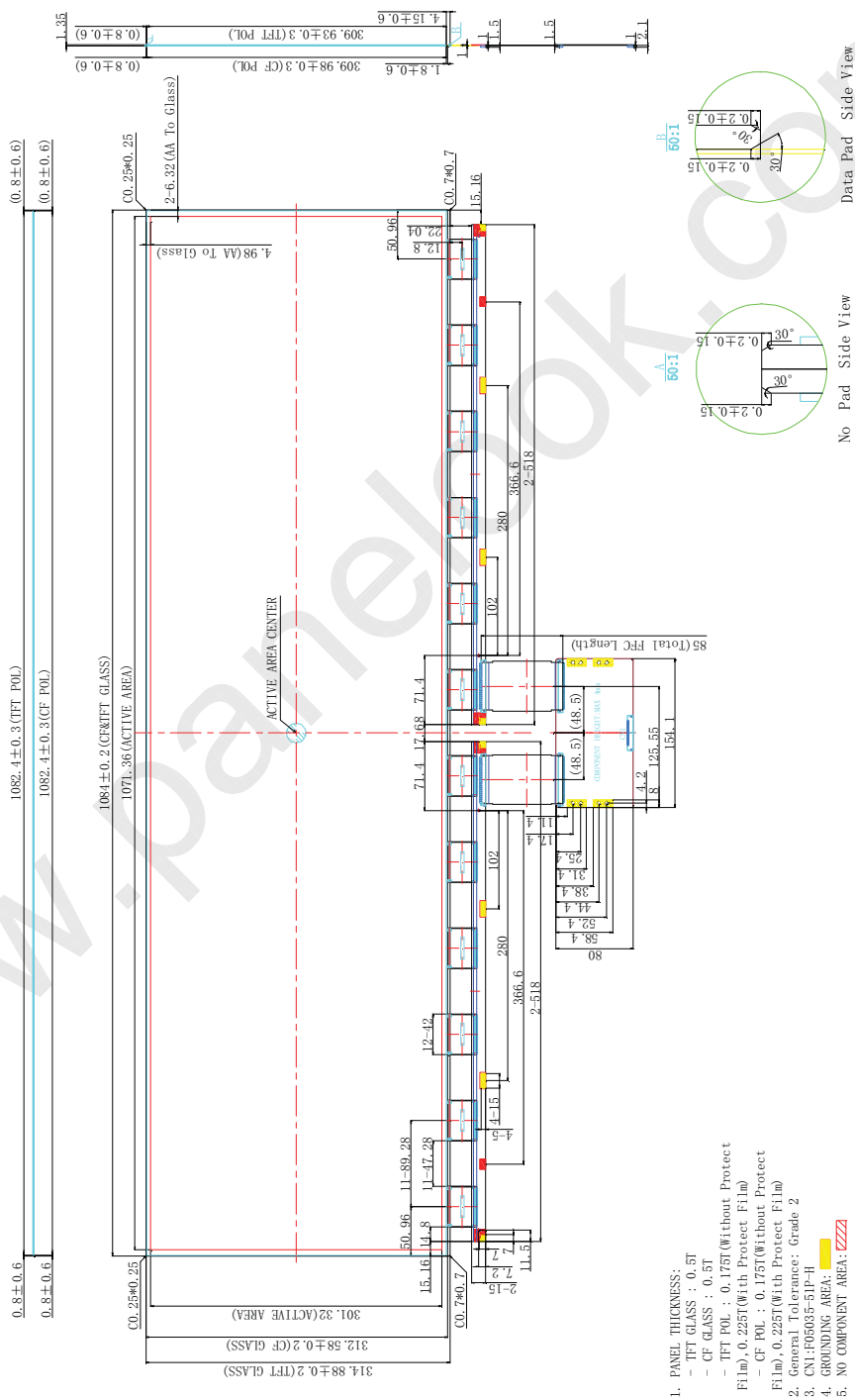


< Figure 2. Response Time Testing >



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

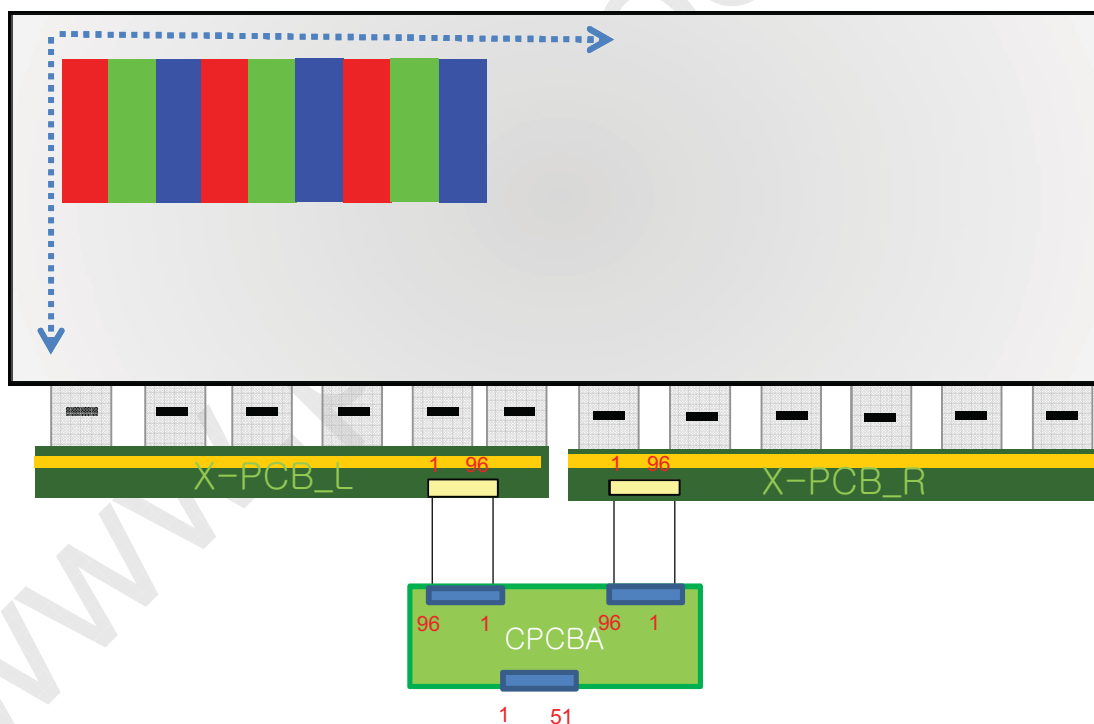


R2013-9024-O(3/3)

A4(210 X 297)

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< Figure 4. Display Mode >



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