DV430FHM-NN5

Product Specification

Rev. P3

Hefei BOE Display TECHNOLOGY CO., LTD

REVISION HISTORY

( )Preliminary specification

(√) Final specification

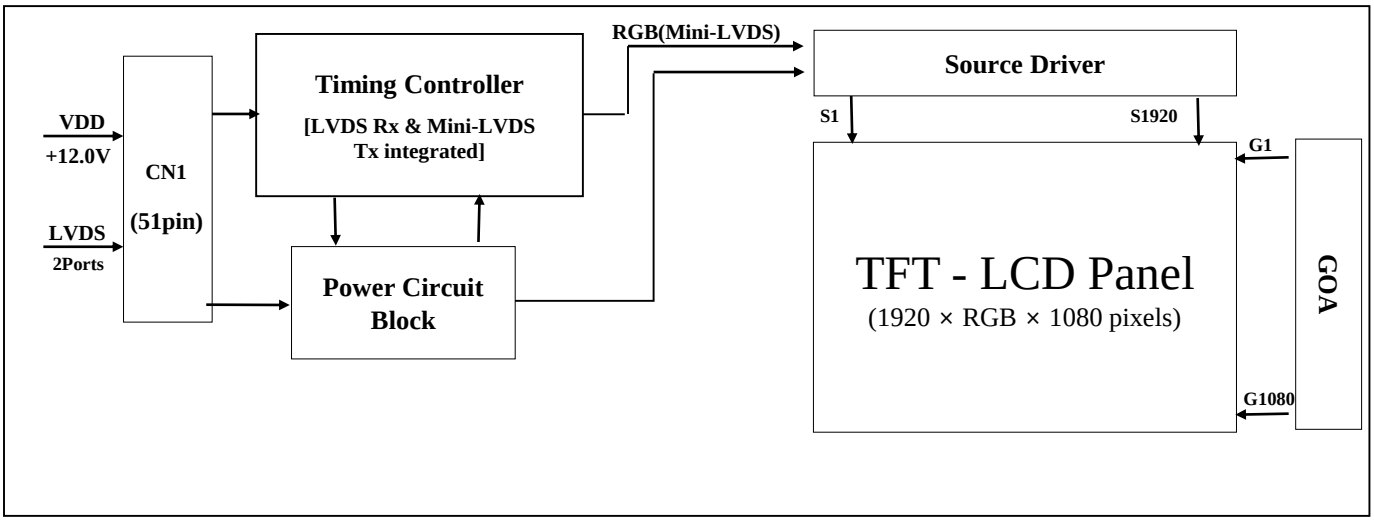
Revision No.	Page	Description of changes	Date	Prepared
P0	-	Initial Release	2020/05/12	Lei ATang
P1	21	Change Color Temperature	2020/09/15	Lei ATang
P2	8	Update Output current & Output power	2021/02/04	Cheng Qian
	12	Adjust LVDS Connector		
	27~33	Update definition of labels & Update Pa cking information		
	40&41	Update Appendix		
P3	29	Change Packing Information	2021/8/13	F.B.Yan

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

DV430FHM-NN5 is a color active matrix TFT LCD MDL using amorphous silicon TFT's (Thin Fil m Transistors) as an active switching devices. This MDL has a 42.5 inch diagonally measured activ e area with FHD resolutions (1920 horizontal by 1080 vertical pixel array). Each pixel is divided in to RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16. 7M colors. The TFT-LCD 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
- Support display horizontally or vertically
- Use 7*24 hr

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	940.896(H) × 529.254(V)	mm	
Number of pixels	1920(H) × 1080(V)	pixels	
Pixel pitch	163.35(H) × 490.05(V)	um	
Pixel arrangement	Pixels RGB Vertical stripe		
Display colors	16.7M	colors	8bits True
Display mode	Normally Black		
Dimensional outline	962.1(H) × 550.5(V) × 12.9(B)	mm	Detail refer to drawing
Open Cell Transmittance	6.15 (Typ)	%	
Weight	8.36(Typ)	Kg	
Power Consumption	LED Driver:56.6(Typ.)	Watt	Note 1
Surface Treatment	Haze 25%		
Back-light	E-LED Backlight		
Possible display type	Landscape and Portrait Enabled		

Note1:LED Driver Power Consumption=I_{LED} *V_{LED}/0.92

2.0 ABSOLUTE MAXIMUM RATINGS

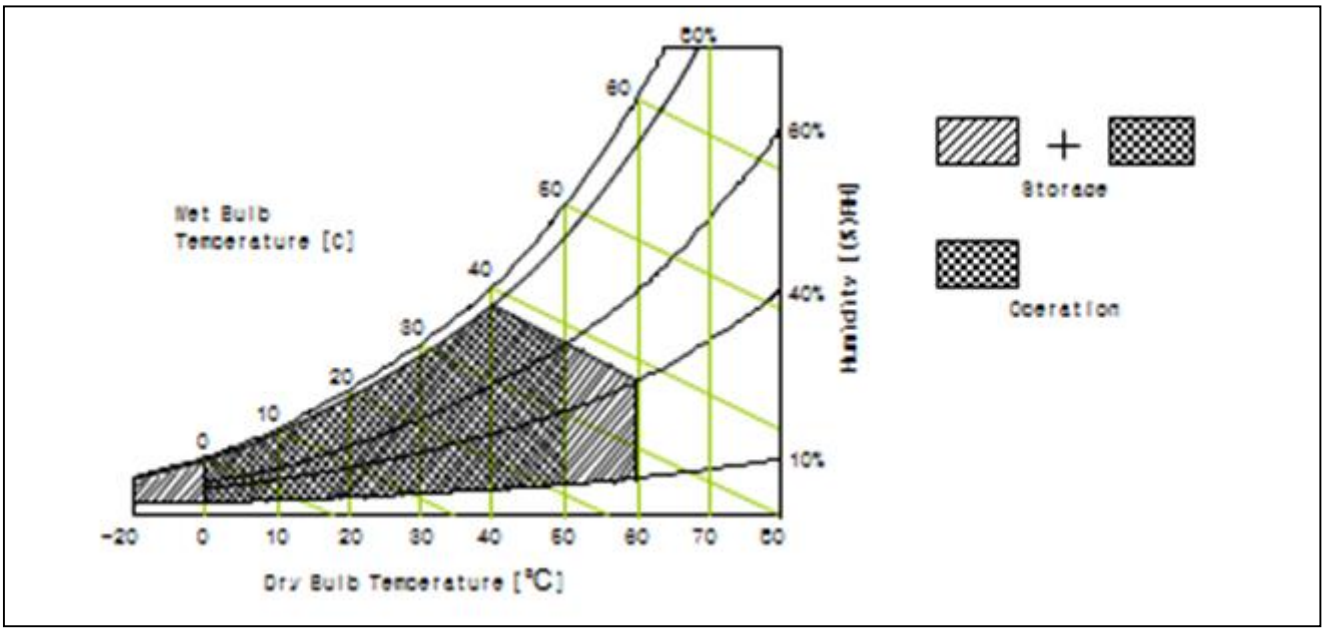
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< 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

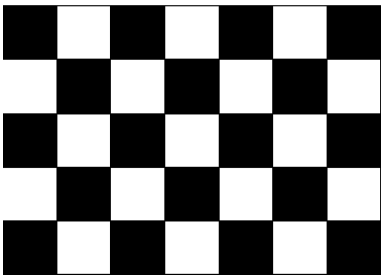
< Table 3. Open Cell Electrical Specifications >

[Ta =25±2 °C]

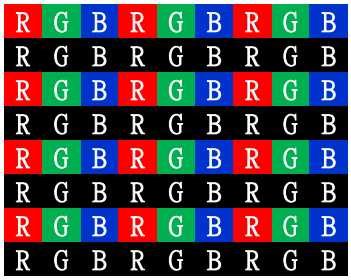
Parameter		Symbol	Values			Unit	Remark
			Min	Typ	Max		
Power Supply Input Voltage		VDD	10.8	12	13.2	Vdc	
Power Supply Ripple Voltage		VRP	-	-	300	mV	
Power Supply Current		IDD	-	500	950	mA	Note 1
Power Consumption		PDD	-	6	11.4	Watt	
Rush current		IRUSH	-		3.0	A	Note 2
LVDS Interface	Differential Input High Threshold Voltage	VLVTH	+100	-	+300	mV	
	Differential Input Low Threshold Voltage	VLVTL	-300	-	-100	mV	
	Common Input Voltage	VLVC	1.0	1.2	1.4	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

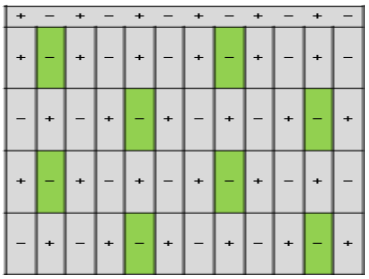
a) Typ : Mosaic 7X5 (L0/L255)



b) Max : Horizontal 1 Line (L0/L255)



c) Flicker Pattern



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

3.2 LED Constant current source LED

3.2.1 Input Electrical Characteristics

Input voltage	22Vdc to 26Vdc
Input current	Max.3.5A at 24Vdc input and full load

3.2.2 Output Electrical Characteristics

(LED DRIVER(DC/DC)ELECTRICAL REQUIREMENTS)

(Output Power)

Output Power	Max. 55.4W

(Constant Current Output Characteristics)

Output Channel	Min Voltage	Type Voltage	Max. Voltage	Output current
LED	58.8V	65.1V	69.3V	400mA*2

(The Backlight On/Off Control)

BL Signal	Remark	Outputs
BL-High	≥2.5V & 2mA	Output
BL-Low	≦0.5V	X
BL-Open	--	X

Remark: 1)The Constant Current Source DC outputs current shall be enable with an active-TTL-compatible signal (BL). The signal level must be between 0-5V.

2)When BL is pulled to TTL high, the DC current outputs are to be enabled.

3)When BL is pulled to TTL low or open circuit, the DC outputs are to be disabled.

(Adjust Backlight Brightness)

PWM Signal	Remark
PWM-High	≥2.5V & 2mA
PWM-Low	≦0.5V
PWM-Duty	10%-99%
PWM-Frequency	150-300Hz

DC Signal	Remark
DC-Voltage	0V-5V

The ADJ pin must be connected to a PWM signal. The PWM signal can adjust the backlight bri ghtness, the wider the duty cycle, the brighter the backlighting. The signal level must be betwe en 2.5V-5V.

The ADJ pin must be connected to a DC signal. The DC signal can adjust the backlight brightn ess, the higher the voltage, the darker the backlighting. The signal level must be between 0-5V.

l Dimming mode：☐ PWM Dimming ■ DC Dimming ☐ Other

3.2.3 Interface Connections

CON1(Type：Pitch 2.0) Connect(XH2.5-14aW)

(Pin Number)	(Symbol)	(Function)	
1. 2. 3. 4. 5	+24V	INPUT VOLTAGE	
6. 7. 8. 9. 10	GND	Ground	
11. 14	NC	NC	
12	BL-ON	LED ON/OFF CONTROL(ON≥2.5)	
13	ADJ	Dimming control	0V=Brightness Max 5V=Brightness Min

CON2(Type：Pitch 2.0mm)

(Pin Number)	(Symbol)	(Function)
1	LED1+	LED+ OUTPUT
3	LED1-	LED- OUTPUT

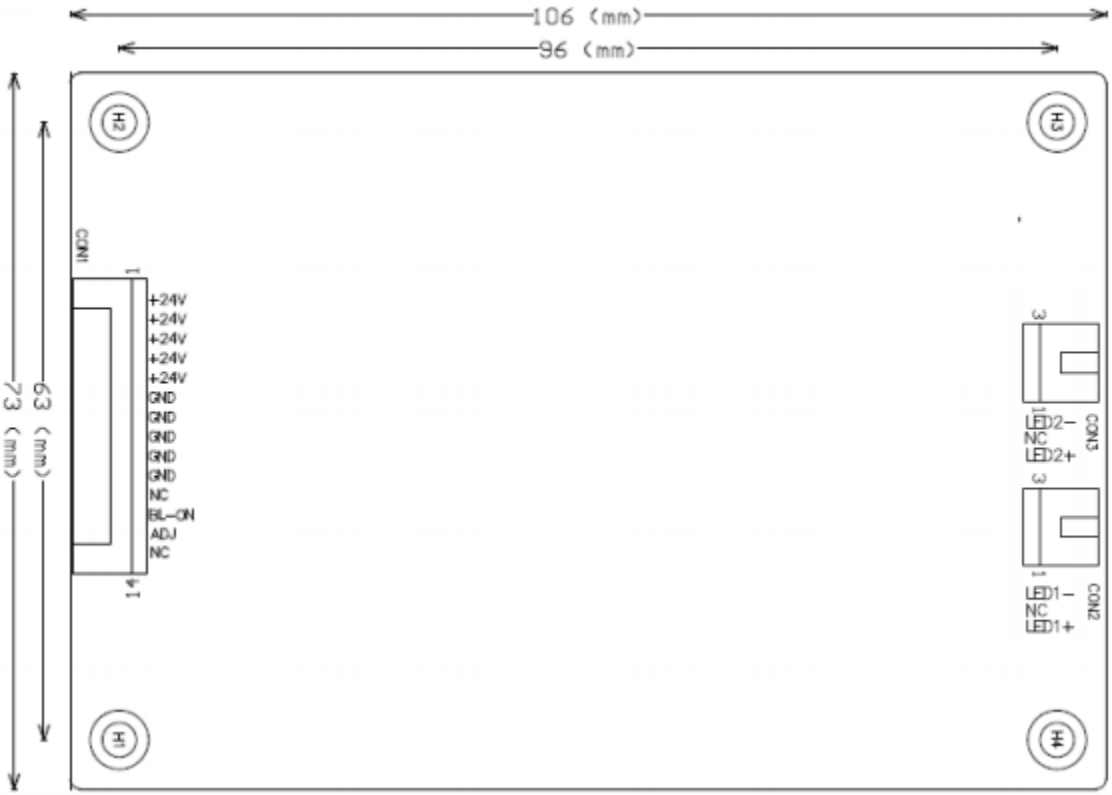
CON3(Type：Pitch 2.0mm)

(Pin Number)	(Symbol)	(Function)
1	LED2+	LED+ OUTPUT
3	LED2-	LED- OUTPUT

Notice: 1. PIN 13:Extermal ADJ Control

3.2.4 Mechanical Characteristics

106.0(L)*73.0(W)*13(H) mm



4.0 INTERFACE CONNECTION

4.1 Open Cell Input Signal & Power

- LVDS Connector : FI-RE51S-HF-R1500 or IS050-C51B-C39-S

< Table 4. Open Cell Input Connector Pin Configuration >

Pin No	Symbol	Description	Pin No	Symbol	Description
1	NC	No Connection	21	GND	Ground
2	SDA	I^2C Data	22	CH1[3]-	First pixel negative LVDS differential data input. Pair3
3	SCL	I^2C Clock	23	CH1[3]+	First pixel positive LVDS differential data input. Pair3
4	NC	Not Connected	24	NC	Not Connected
5	NC	Not Connected	25	NC	Not Connected
6	NC	Not Connected	26	NC	Not Connected
7	SELLVDS	High: JEIDA Low or Open: VESA	27	NC	Not Connected
8	NC	Not Connected	28	CH2[0]-	Second pixel negative LVDS differential data input. Pair0
9	NC	Not Connected	29	CH2[0]+	Second pixel positive LVDS differential data input. Pair0
10	NC	Not Connected	30	CH2[1]-	Second pixel negative LVDS differential data input. Pair1
11	GND	Ground	31	CH2[1]+	Second pixel positive LVDS differential data input. Pair1
12	CH1[0]-	First pixel negative LVDS differential data input. Pair0	32	CH2[2]-	Second pixel negative LVDS differential data input. Pair2
13	CH1[0]+	First pixel positive LVDS differential data input. Pair0	33	CH2[2]+	Second pixel positive LVDS differential data input. Pair2
14	CH1[1]-	First pixel negative LVDS differential data input. Pair1	34	GND	Ground
15	CH1[1]+	First pixel positive LVDS differential data input. Pair1	35	CH2CLK-	Second pixel negative LVDS clock
16	CH1[2]-	First pixel negative LVDS differential data input. Pair2	36	CH2CLK+	Second pixel positive LVDS clock
17	CH1[2]+	First pixel positive LVDS differential data input. Pair2	37	GND	Ground
18	GND	Ground	38	CH2[3]-	Second pixel negative LVDS differential data input. Pair3
19	CH1CLK-	First pixel negative LVDS clock	39	CH2[3]+	Second pixel positive LVDS differential data input. Pair3
20	CH1CLK+	First pixel positive LVDS clock			

Pin No	Symbol	Description	Pin No	Symbol	Description
40	NC	Not Connected	46	GND	Ground
41	NC	Not Connected	47	NC	Not Connected
42	NC	Not Connected	48	VCC	Input Voltage +12V
43	NC	Not Connected	49	VCC	Input Voltage +12V
44	GND	Ground	50	VCC	Input Voltage +12V
45	GND	Ground	51	VCC	Input Voltage +12V

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.

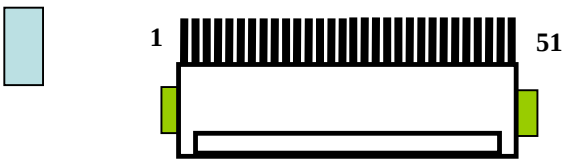
3. LVDS_SEL : This pin is used for selecting LVDS signal data format.

If this Pin : High (3.3V) JEIDA LVDS format

Otherwise : Low (GND) or Open (NC) Normal NS LVDS format

Rear view of LCM

PM.LVS.S040505101 (UJC)



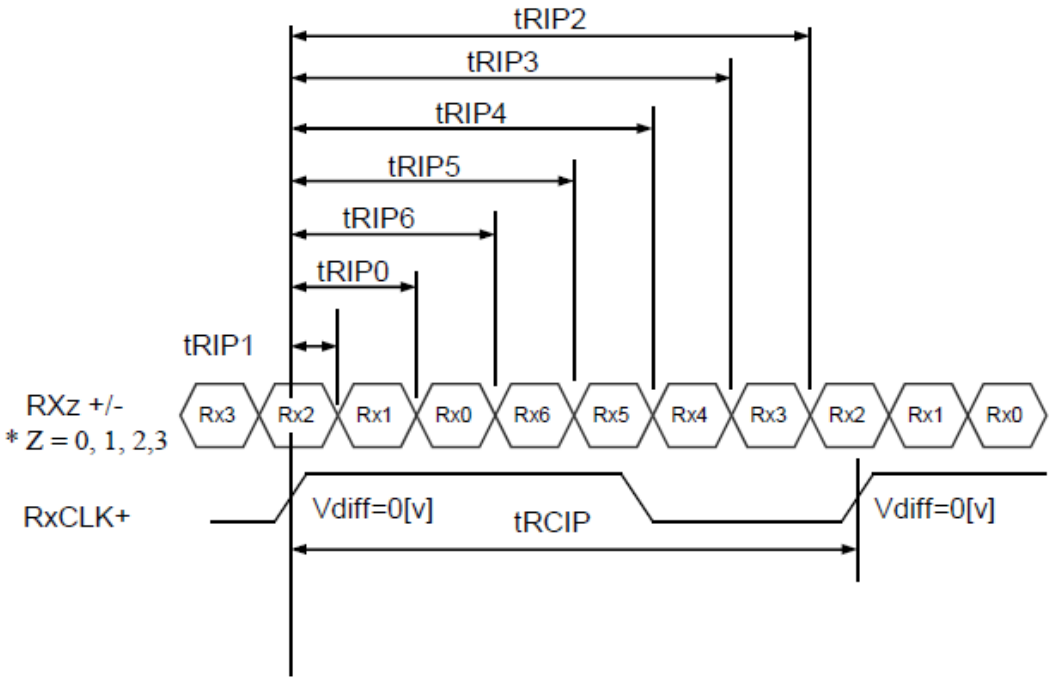
BIST Pattern

4.2 LVDS Interface

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

< Table 5. Open Cell Input Connector Pin Configuration >

Item	Symbol	Min	Typ	Max	Unit	Remark
CLKIN Period	tRCIP	10.31	13.47(10.78)	15.87	nsec	
Input Data 0	tRIP1	-0.42	0.0	+0.42	nsec	
Input Data 1	tRIP0	tRCIP/7-0.42	tRCIP/7	tRCIP/7+0.42	nsec	
Input Data 2	tRIP6	2 ×tRCIP/7-0.42	2 ×tRCIP/7	2 ×tRCIP/7+0.42	nsec	
Input Data 3	tRIP5	3 ×tRCIP/7-0.42	3 ×tRCIP/7	3 ×tRCIP/7+0.42	nsec	
Input Data 4	tRIP4	4 ×tRCIP/7-0.42	4 ×tRCIP/7	4 ×tRCIP/7+0.42	nsec	
Input Data 5	tRIP3	5 ×tRCIP/7-0.42	5 ×tRCIP/7	5 ×tRCIP/7+0.42	nsec	
Input Data 6	tRIP2	6 ×tRCIP/7-0.42	6 ×tRCIP/7	6 ×tRCIP/7+0.42	nsec	

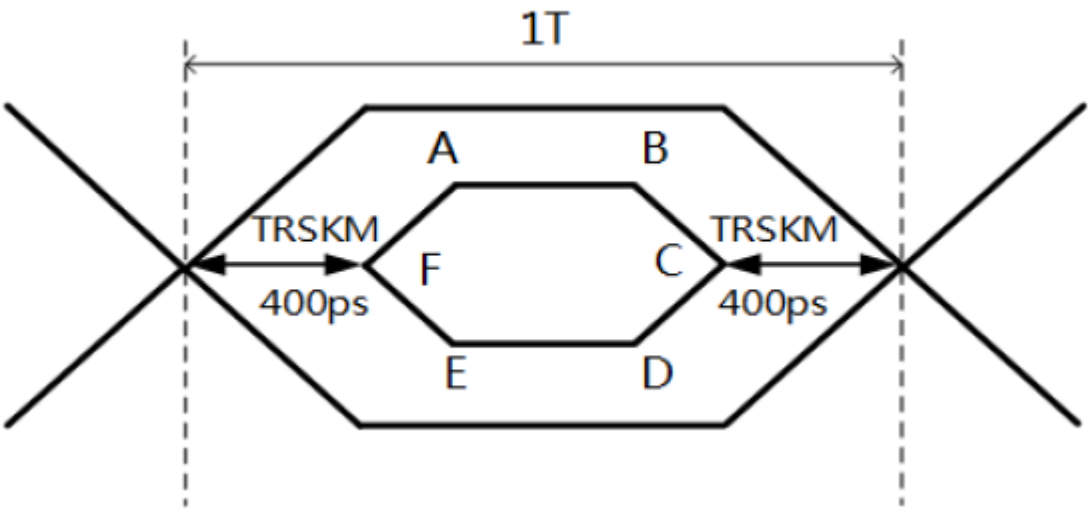


* Vdiff = (RXz+)-(RXz-),…. ,(RXCLK+)-(RXCLK-)

4.3 LVDS Rx Interface Eye Diagram

< Table 6. 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	

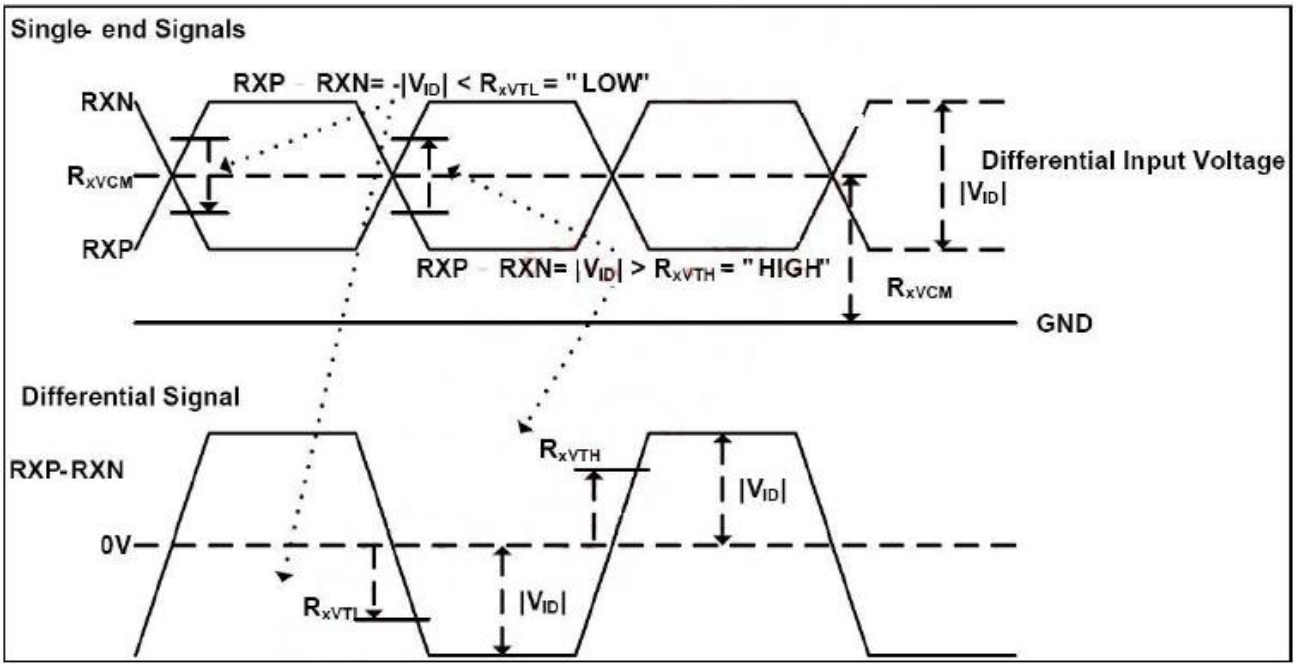


Notes:
1. Time F to A,B to C,C to D,E to F is 150p second.
2. LVDS clock=85Mhz.
3. The time A to B=1T-2*TRSKM-2*150ps.

4.4 LVDS Receiver Differential Input

< Table 7. 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 >

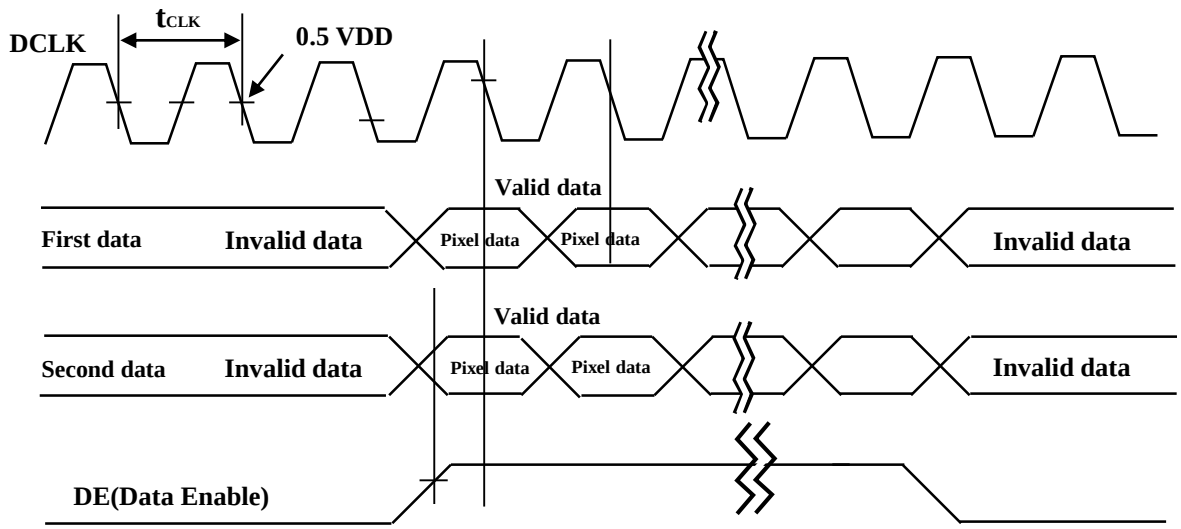
Item		Symbols		Min	Typ	Max	Unit
Clock	Frequency	1/Tc		60	74.25	78	MHz
	High Time	Tch		-	4/7Tc	-	
	Low Time	Tcl		-	4/7Tc	-	
Frame Period		Tv		1100	1125	1149	lines
				48.5	60	63	Hz
Horizontal Active Display Term		Valid	t_{HV}	-	960	-	t_{CLK}
		Total	t_{HP}	1060	1100	1200	t_{CLK}
Vertical Active Display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

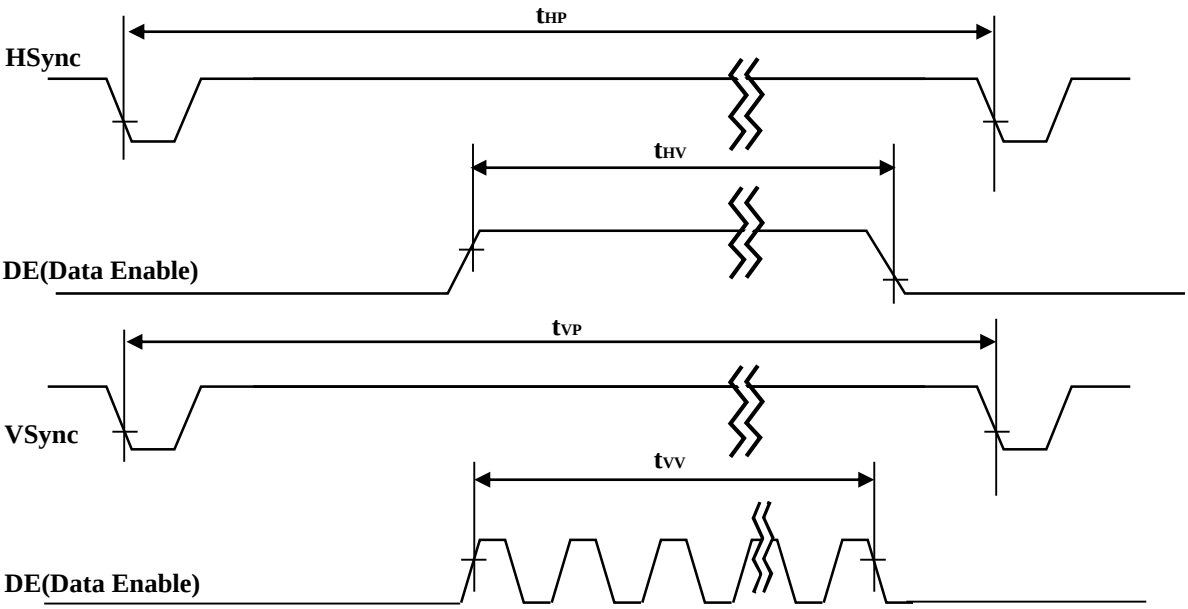
Notes: This product is DE only mode. The input of Hsync & Vsync signal does not have an effect on normal operation.

< 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		-	-	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





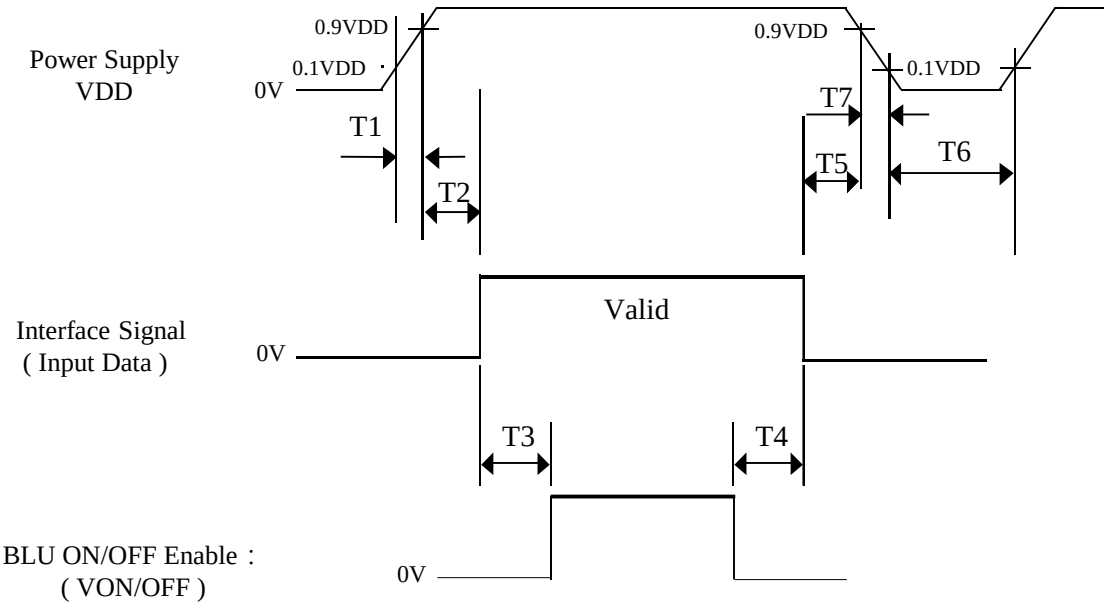
5.3 Input Signals, Basic Display Colors and Gray Scale of Colors

< 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 sho wn 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

Optical characteristics are determined after the unit has been 'ON' and stable in a dark environment at 25±2°C. The values are specified at an approximate distance 50cm from the LCD surface at a viewin g angle of and equal to 0 °. It is presented additional information concerning the measurement e quipment and method in FIG. 1.

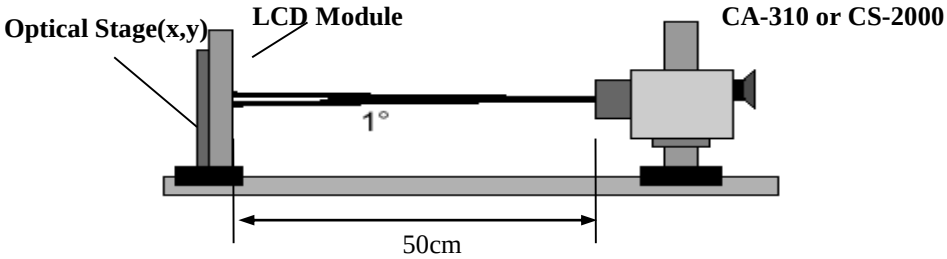


FIG. 1 Optical Characteristic Measurement Equipment and Method

< Table 12. Optical Table >

[VDD = 12.0V, Frame rate = 60Hz, Ta =25±2 °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.	
Color Temperature				9000	10,000	11500	K	
Color Gamut				70	72	-	%	
Contrast ratio		CR	Θ = 0 (Center) Normal Viewing Angle	800:1	1200:1	-		Note 2
Luminance of White		Y_w		600	700	-	cd/m^2	Note 3
White luminance uniformity		ΔY		70	75		%	Note 4
Reproduction of color	White	W_x		TYP. - 0.03	0.280	TYP. + 0.03		Note 5
		W_y			0.290			
	Red	R_x			0.653			
		R_y			0.328			
	Green	G_x			0.275			
		G_y			0.601			
	Blue	B_x			0.148			
		B_y			0.065			
Response Time	G to G	T_g		-	8	10	ms	Note 6
Gamma Scale				2.0	2.2	2.4		Note 7

Note : 1. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD module surface. For more information, see the FIG. 4.

2. Contrast Ratio(CR) is defined mathematically as :

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

It is measured at center 1-point.

3. Surface luminance are determined after the unit has been 'ON' and 1 Hour after lighting the backlight in a dark environment at 25±2°C. Surface luminance is the luminance value at center 1-point across the LCD surface 50cm from the surface with all pixels displaying white. For more information see the FIG. 2.

4. The variation in surface luminance , WHITE is defined as :

$$\text{WHITE(9P)} = \text{Minimum}(L_{on1}, L_{on2}, L_{on3}, L_{on4}, L_{on0}) / \text{Maximum}(L_{on1}, L_{on2}, L_{on3}, L_{on4}, L_{on9})$$

Where L_{on1} to L_{on9} are the luminance with all pixels displaying white at 9 locations . For more information, see the FIG. 2.

5. The color chromaticity coordinates specified in Table 5. 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.
Each time in below table is defined as Figure 3and shall be measured by switching the input signal for "any level of gray(bright)"and "any level of gray(dark)".

7. Gray scale specification

Gamma Value is approximately 2.2.

Measuring point for surface luminance & luminance variation **CA-310 ,Contact method)**

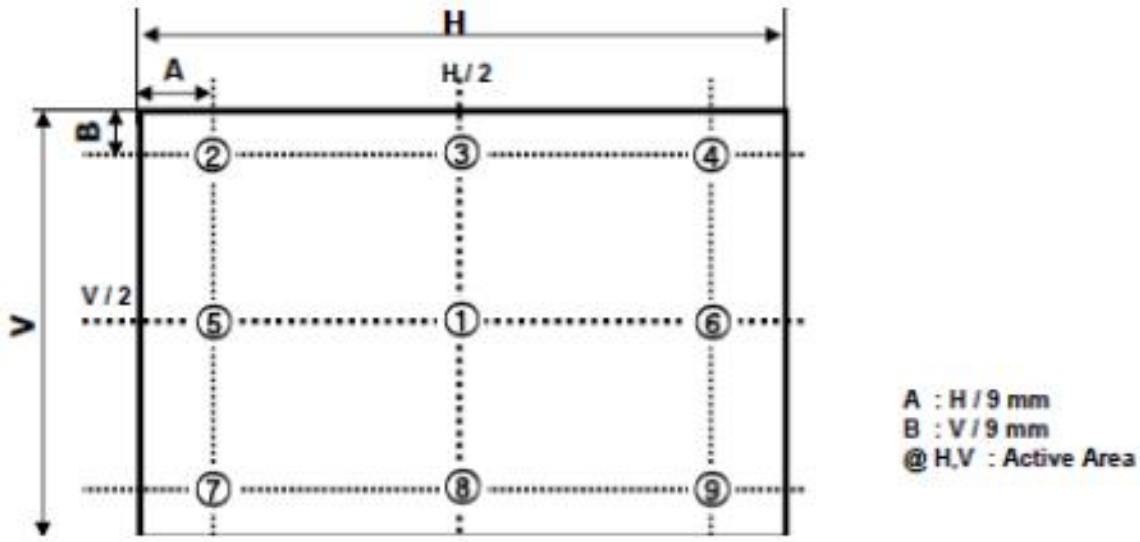


FIG. 2 9 Points for Luminance Measure

Response time is defined as the following figure and shall be measured by switching the input signa l for “Gray(N)” and “Gray(M)”.

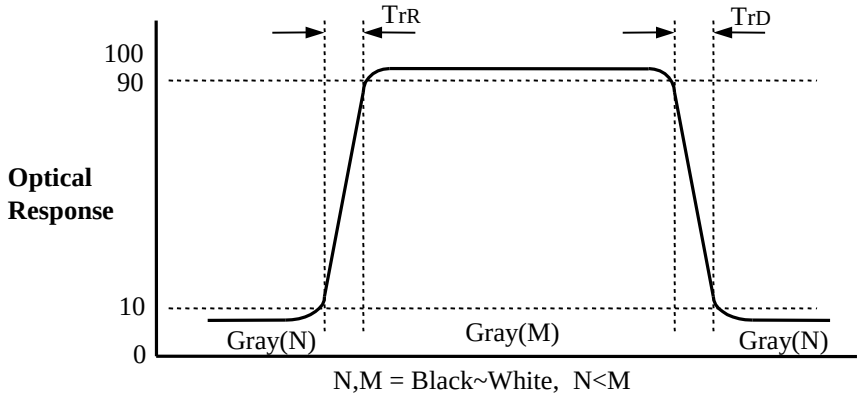


FIG. 3 Response Time

Definitions of viewing angle range

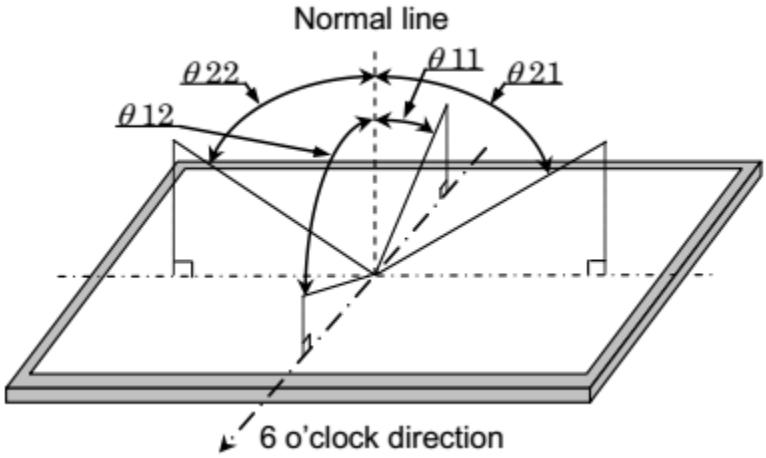


FIG. 4 Viewing Angle

7.0 MECHANICAL CHARACTERISTICS

7.1 Dimensional Requirements

Figure 5 (located in Appendix) shows mechanical outlines for the model DV430FHM-NN5. Other parameters are shown in Table 13.

< Table 13. Dimensional Parameters >

Parameter	Specification	Unit
Dimensional outline	962.1(H) × 550.5(V) × 12.9(B)	mm
Weight	8.36	Kg
Active area	940.896(H) × 529.254(V)	mm
Pixel pitch	163.35(H) × 490.05(V)	mm
Number of pixels	1920(H) ×1080(V) (1 pixel = R + G + B dots)	pixels
Back-light	E-LED Backlight	

7.2 Mounting

See Figure 6. (Shown in Appendix)

7.3 Anti-Glare and Polarizer Hardness.

The surface of the LCD has 25% haze coating. Front Polarizer hardness is at less 3H.

8.0 RELIABILITY TEST

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

< Table 14. Reliability Test Parameters >

No	Test Items	Conditions
2	Low temperature storage test	Ta = -20 ℃, 240hrs
3	High temperature & high humidity operation test	Ta = 50 ℃, 80%RH, 240hrs
4	High temperature operation test	Ta = 60 ℃, 240hrs
5	Low temperature operation test	Ta = -5 ℃, 240hrs
6	Thermal shock	Ta = -20 ℃ ↔ 60 ℃ (0.5 hr), 100 cycle
7	Vibration test (non-operating)	Frequency 1~ 300 Hz, Random Gravity / AMP 1.05 G Period Z 1 hrs
8	Electro-static discharge test	Air : 150 pF, 330Ω, 15 KV Contact : 150 pF, 330Ω, 8 KV

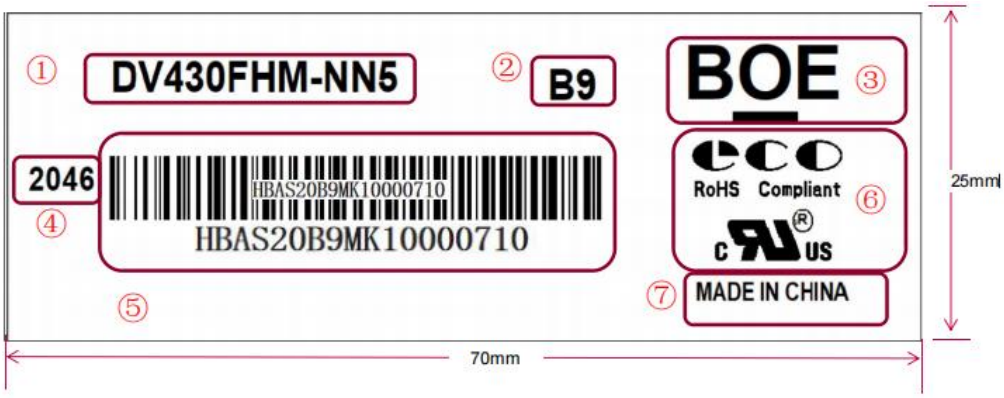
9.0 DEFINITION OF LABELS

MDL Label

He bar code nameplate is pasted on each module as illustration, and its definitions are as following explanation.

Label Size : 70 mm (L)*25 mm (W)

Label Picture :



位置①：表示型号-选取客户提供的FG-CODE前12位（如下图红字处）
FG-CODE：76GC-T4300B-Y00G→DV430FHM-NN5-9MK1（量产）
位置②：表示客户代码：B9
位置③：表示客户； BOE
位置④：表示生产周别：“2046”表示2020年第46周
位置⑤：表示模组条码
位置⑥：依客户要求，列印相关RoHS、UL认证字符；
位置⑦：表示模组产地：MADE IN CHINA

模组条码编码内容说明

HBAS20B9MK10000710

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

位置①(2码)：客户指定编码-选取客户提供的GBN码（如下图红字处）
76GC-T4300B-Y00G→DV430FHM-NN5-9MK1→GBN：HB
位置②(1码)：代表产品等级，默认"A"
位置③(1码)：代表代工厂，"S"表示创维
位置④(2码)：代表生产年份，"20"表示2020年
位置⑤(1码)：表示生产月分，Month(10、11、12月份分别用A、B、C代替)
位置⑥(4码)：表示型号-选取客户提供的FG-CODE后4位（如下图红字处）
FGCODE：76GC-T4300B-Y00G→DV430FHM-NN5-9MK1（量产）

位置⑦(6码)：代表产品流水号000001~999999

注：18位MDL ID，前17位编码规则如上,最后一位为Revision code（扫描不显示）
位置⑧(1码)：代表Revision code，默认为"0"（单独文字框设定，不与前17位一同设定）

10.0 PACKING INFORMATION

10.1 PACKING SPECIFICATIONS

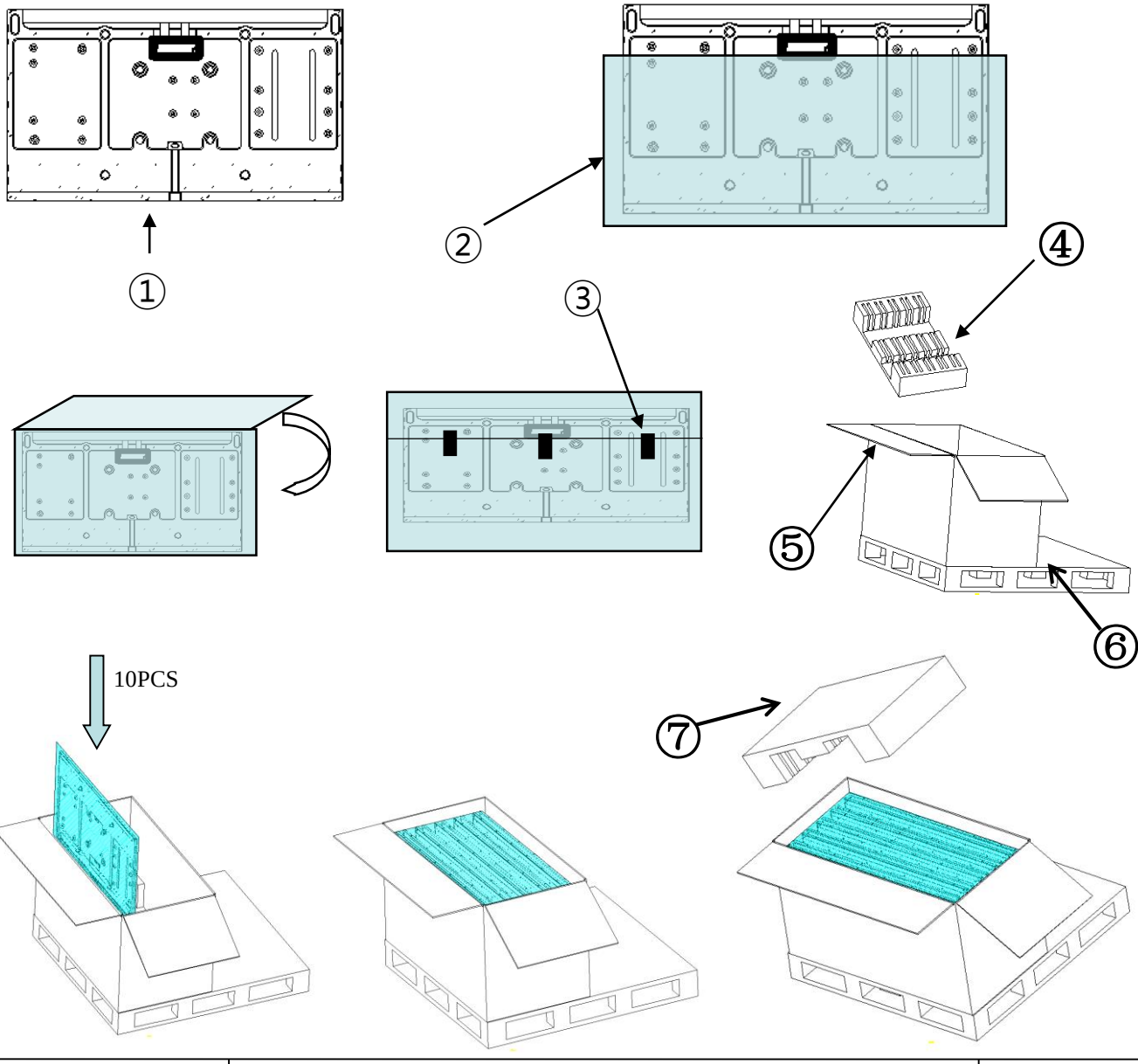
(1) 10 PCS LCD TV modules / 1 Box

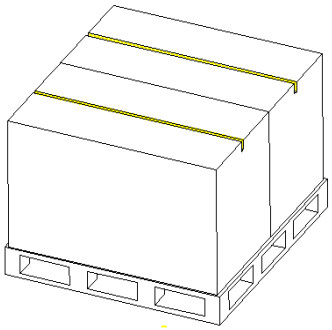
(2) Box dimensions: 1036(W) x 556(D) x 621(H)mm

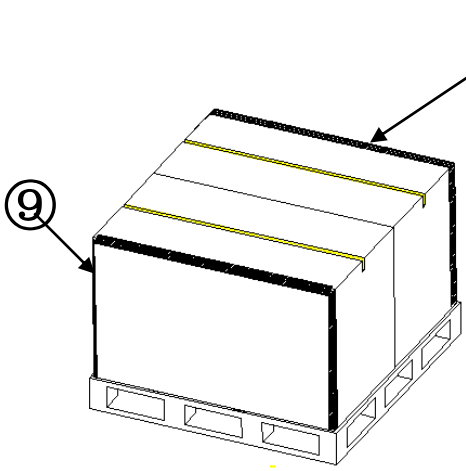
(3) 2 Box/ 1 Pallet

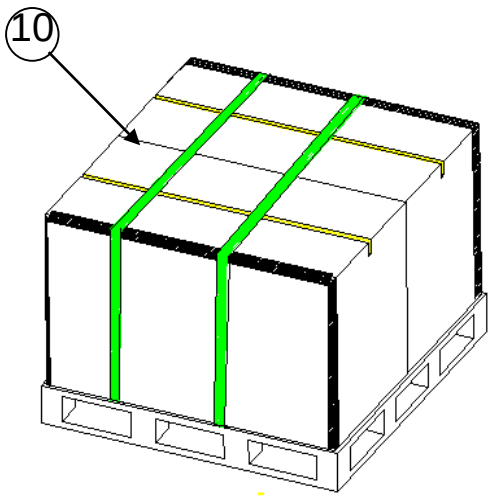
10.2 PACKING METHOD

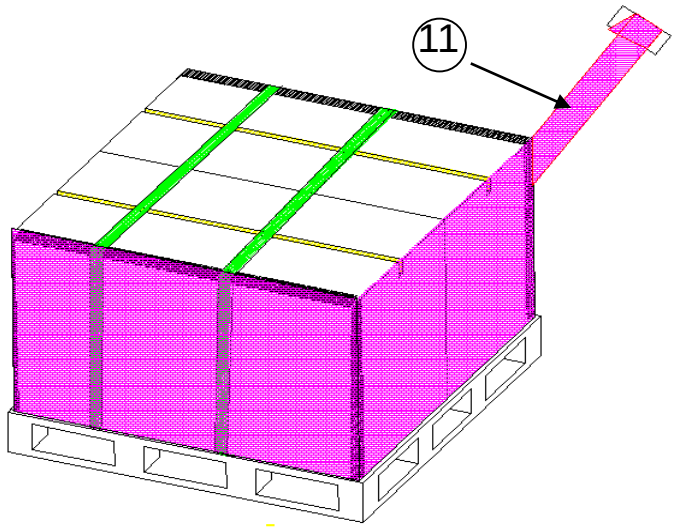
(1) Palletizing Sequence



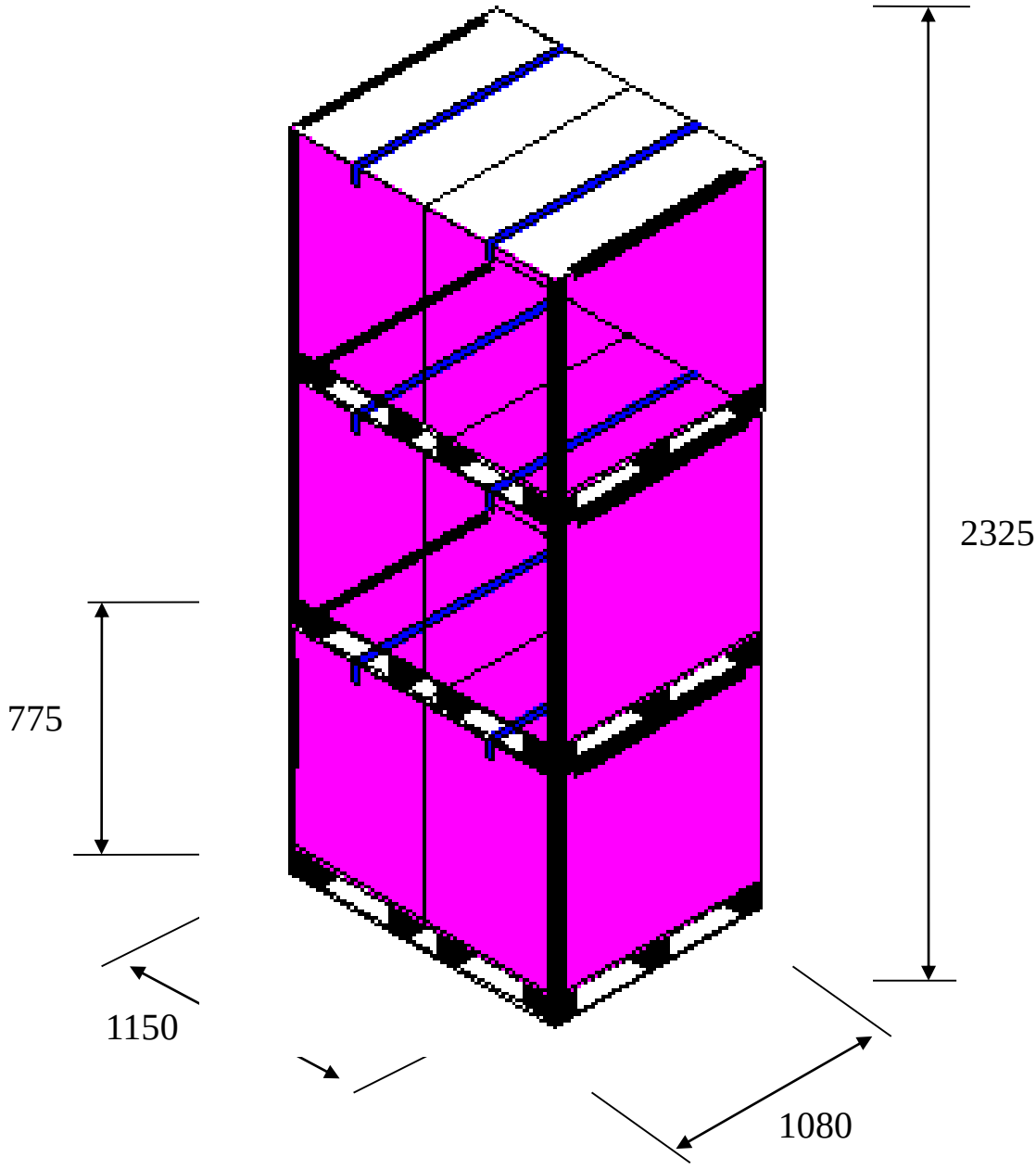








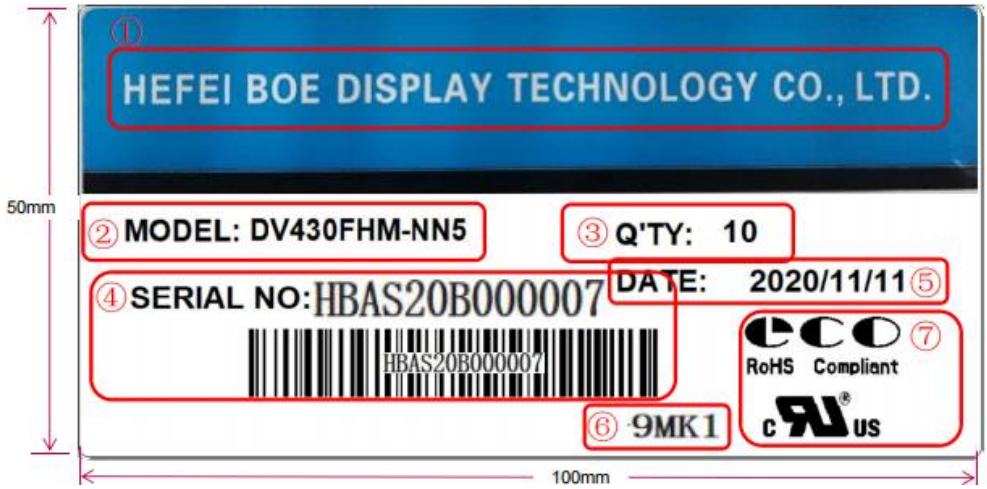
NO.	DESCRIPTION	MATERIAL	QUANTITY
1	43^Module	/	60
2	Bag	PE	60
3	Tape-Bag	OPP	180
4	EPE(Down)	EPE	6
5	Box	K-K	6
6	Pallet	/	3
7	EPE(Up)	EPE	6
8	Corner Protect(Top)	K-K	6
9	Corner Protect(Side)	K-K	12
10	PP Belt	/	/
11	Protect Film	/	/



Total size：1150（W）x1080（D）x2325（H）mm

10.3 Box Label

Label Size : 100 mm (L) * 50 mm (W)
Contents
Model : DV430FHM-NN5
Q`ty : 10 Module in one box.
Serial No. : Box Serial No. See next page for detail description.
Date : Packing Date
FG Code : FG Code of Product



位置①：B9客户专用外箱条码纸“HEFEI”字样
位置②：表示型号-选取客户提供的FG-CODE前12位（如下图红字处）
FGCODE：76GC-T4300B-Y00G→DV430FHM-NN5-9MK1（量产）
位置③：表示装箱数量；
位置④：表示外箱编码及条形码
位置⑤：表示生产装箱日期
位置⑥：表示型号-选取客户提供的FG-CODE后4位（如下图红字处）
FGCODE：76GC-T4300B-Y00G→DV430FHM-NN5-9MK1（量产）

位置⑦：依客户要求，列印相关RoHS、UL认证字符；

① ② ③ ④ ⑤ ⑥ ⑦

HBAS20B000007

位置①(2码)：客户指定编码-选取客户提供的GBN码（如下图红字处）
76GC-T4300B-Y00G→DV430FHM-NN5-9MK1→GBN：HB，②位置(1码)：代表产品等级，默认"A"
位置③(1码)：代表代工厂，"S"表示创维
位置④(2码)：代表生产年份，"20"表示2020年
位置⑤(1码)：表示生产月分，Month(10、11、12月份分别用A、B、C代替)
位置⑥(1码)：代表Revision code，默认为"0"
位置⑦(5码)：代表产品流水号00001~99999

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 module; Abnormal display cause by pressing some parts of module during assembly process , do not belong to product failure, the press should be agreed by two sides.
- Determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
- Do not apply mechanical stress or static pressure on module , 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.
- Protection film for polarizer on the module should be slowly peeled off before display.
- Be careful to prevent water & chemicals contact the module surface.
- You should adopt radiation structure to satisfy the temperature specification.
- 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 & alcohol is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene , 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..

- This module has its circuitry PCB's on the rear side and Driver IC, should be handled carefully in order not to be stressed.
- Avoid impose stress on PCB and Driver IC during assembly process ,Do not drawing, bending, COF package & wire
- Do not disassemble the module.

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, th e module would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.
- Do not allow to adjust the adjustable resistance or switch
- The electrochemical reaction caused by DC voltage will lead to LCD module degradation, so DC d rive should be avoided.
- The LCD modules use C-MOS LSI drivers, so customers are recommended that any unused input te rminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and grou nd you body, work/assembly area, assembly equipment to protect against static electricity.
- 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.
- 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.
- Design the length of cable to connect between the connector for back-light and the converter as short er as possible and the shorter cable shall be connected directly , The long cable between back-light a nd 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.
- Connectors are precision devices to transmit electrical signals, and operators should plug in parallel
- 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.

11.3 Electrostatic Discharge Precautions

- Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make ce rtain 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	(°C)	5	40
Storage Humidity	(%rH)	40	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.

•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.

11.6 Precautions for protection film

- Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, If possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.
- People who peeled off the protection film should wear anti-static strap and grounded well.

11.7 Appropriate Condition for Commercial Display

-Generally large-sized LCD modules are designed for consumer applications . Accordingly, 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. As the low temperature, the response time is greatly delayed. As the high temperatures (higher than the operating temperature) the LCD module 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 module will return to normal display.

d. When expose to drastic fluctuation of temperature (hot to cold or cold to hot ） ,the LCD module may be affected; Specifically, drastic temperature fluctuation from cold to hot ,produces dew on the LCD module ‘s surface which may affect the operation of the polarizer and LCD module

e. 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.

f. Products exposed to low temperature environment for a long time, need to carry out necessary protection , low temperature environment is usually refrigerators , vending machine Etc…

g. Long time and large angle forword use or unconventional use , It is strongly recommended to contact BOE for filed application engineering advice

f. 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.

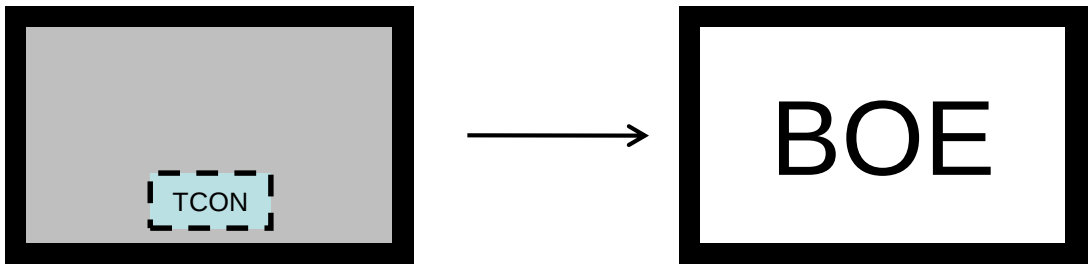
2) Black image or moving image is strongly recommended as a screen save

4. Lifetime in this spec. is guaranteed only when Commercial Display is used according to operating usages.

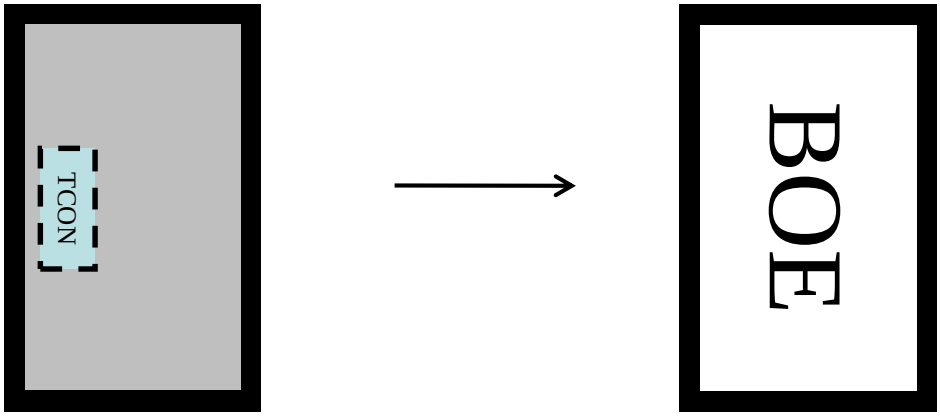
5. Module should be turned clockwise based on front view when used in portrait mode.

- Landscape Mode

The default placement is TCON side on the lower side and the image is shown upright via viewing from the front.



- Portrait Mode
  The default placement is that TCON side has to be placed on the left side via viewing from the front



11.8 Other Precautions

A. LC Leak

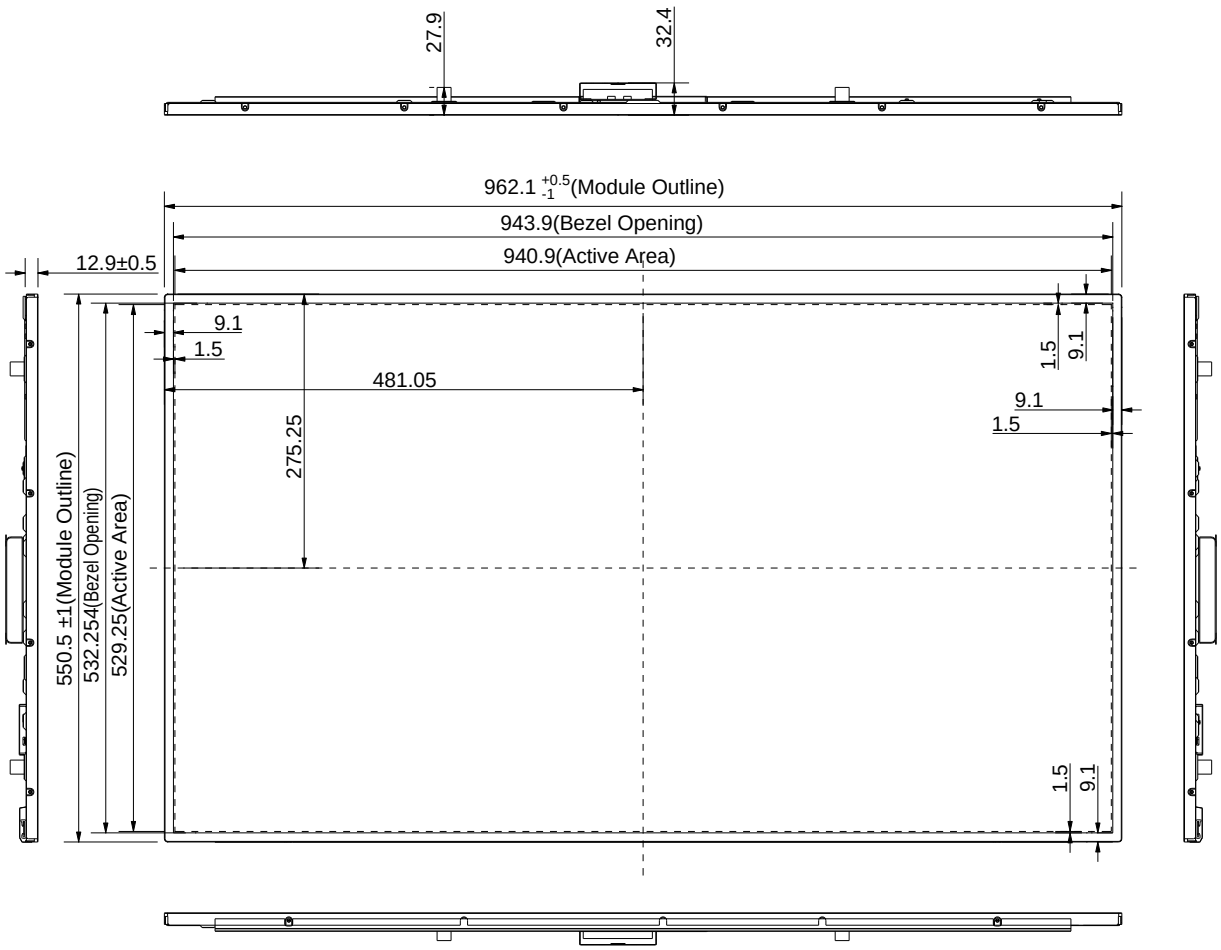
- If the liquid crystal material leaks from the panel, it is recommended to wash the LC with aceto ne or ethanol and then burn it.
- If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mout h. In case of contact with hands, skin or clothes, it has to be washed 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 reco mmend to use the original shipping packages.

12.0 APPENDIX

< Figure 5. TFT-LCD Module Outline Dimensions (Front View) >



< Figure 6. TFT-LCD Module Outline Dimensions (Rear View) >