TITLE:

DV430FHM-NN1
Product Specification

Fuzhou BOE Optoelectronics Technology Co.,Ltd

REVISION HISTORY

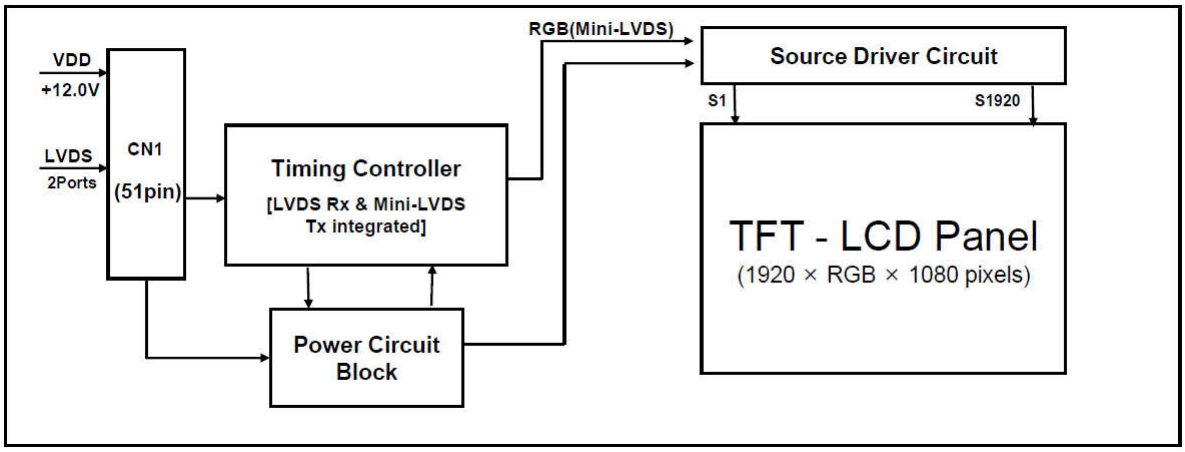
REV.	ECN NO.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0	-	Initial Release	2019.03.28	Weng Z.W

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

DV430FHM-NN1 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 42.5 inch diagonally measured active area with FHD resolutions (1920 horizontal by 1080 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors. The TFT-LCD panel 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
- Narrow bezel and wide viewing angle, gate driver use GOA mode
- DE (Data Enable) only mode
- ADS technology is applied for high display quality
- RoHS compliant

1.3 Application

- Home Alone Multimedia TFT-LCD TV
- Display Terminals for Control System
- Full High Definition TV(FHD TV)
- AV application Products

1.4 General Specification

< Table 1. General Specifications >

Parameter	Specification	Unit	Remark
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)	㎛	
Pixel arrangement	Pixels RGB Vertical stripe		
Display colors	16.7M (8bits True)	colors	
Display mode	Transmission mode, Normally Black		
Outline Dimension	961.7(H)x550.1(V)× 11.7(B)	mm	
Weight	8.36(Typ)	Kg	
Power Consumption	LED Driver:56.3W)	Watt	
Surface Treatment	Haze 1%,		

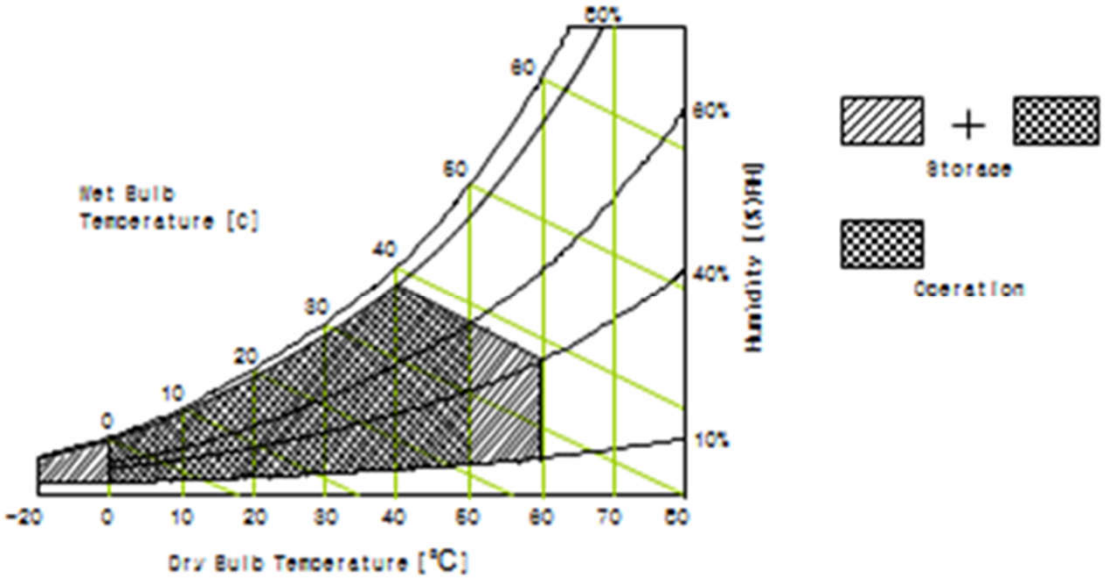
2.0 ABSOLUTE MAXIMUM RATINGS

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. LCD Module Electrical Specifications > [VSS=GND=0V]

Parameter		Symbol	Min.	Max.	Unit	Remark
Power Supply Voltage	LCD Module	VDD	VSS-0.3	13.5	V	Ta = 25 ℃
	Converter	VBL	VSS-0.3	26.4	V	
Operating Temperature		T_{OP}	0	+50	℃	Note 1
		T_{SUR}	-20	+60	℃	
Storage Temperature		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

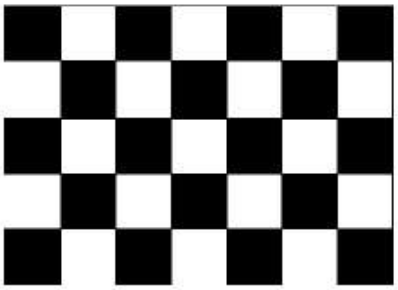
3.1 TFT LCD Open Cell

< Table 3. Open Cell Electrical Specifications > [Ta =25±2 ℃]

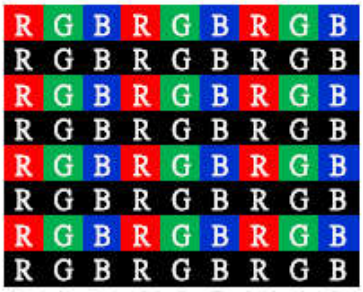
Parameter		Symbol	Values			Unit	Remark
			Min	Typ	Max		
Power Supply Input Voltage		VDD	10.8	12	13.2	Vdc	
Power Supply Ripple Voltage		VRP			300	mV	
Power Supply Current		IDD	-	0.5	0.95	A	Note 1
Power Consumption		PDD		6	11.4	Watt	
Rush current		IRUSH	-	-	3.0	A	Note 2
V by One Interface	Differential 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	
	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 fV=60Hz and Clock frequency = 74.25MHz.
Test Pattern of power supply current

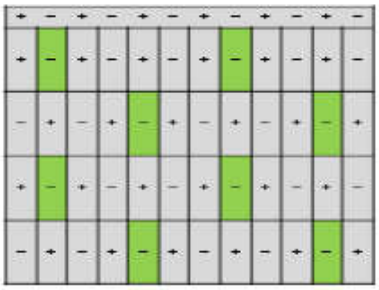
a) Typ : Mosaic 7X5 (L0/L255)



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

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

3.2.2 Output Electrical Characteristics

(LED DRIVER(DC/DC)ELECTRICAL REQUIREMENTS)

输出功率(Output Power)

输出功率 Outpur Power	Max. 64W

恒流输出特性(Constant Current Output Characteristics)

输出通道 Output Channel	最低电压 Min Voltage	典型电压 Type Voltage	最高电压 Max. Voltage	输出电流 Output current
LED	58V	62V	66V	480mA*2

背光控制(The Backlight On/Off Control)

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

备注：恒流源输出受控于一个 TTL 电平兼容的信号（BL），此信号电平需在 0-5V 之间
Remark: 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.

- BL 高电平，打开输出。
  When BL is pulled to TTL high, the DC current outputs are to be enabled.
- BL 低电平或悬空，关闭输出。
  When BL is pulled to TTL low or open circuit, the DC outputs are to be disabled.

调光(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

备注(Remark):

l ADJ 脚接 PWM 信号,此 PWM 信号能调节背光亮度，PWM 信号占空比越宽，背光越亮,此信号电平需在2.5V-5V 之间。

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

l ADJ脚接DC信号。此DC信号能调节背光亮度，电压越高，背光越暗，此信号电平需在0V-5V之间。

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

l 调光方式：□ PWM调光 ■ DC调光 □ Other

3.2.3 Interface Connections

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

PIN号(Pin Number)	符号(Symbol)	功能(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

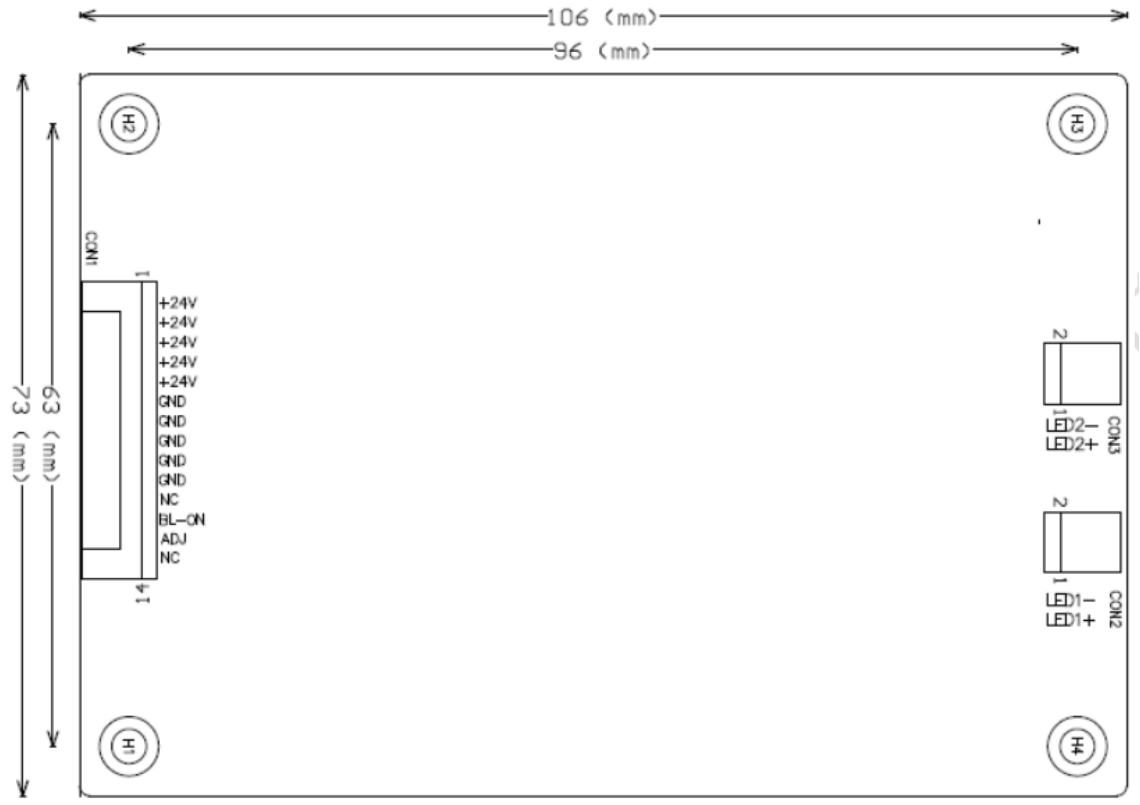
CON2(Type：Pitch 2.0mm)

PIN号(Pin Number)	符号(Symbol)	功能(Function)
1	LED1+	LED+ OUTPUT
2	LED1-	LED- OUTPUT

Notice: 1. PIN 13:Extermal ADJ Control

3.2.4 Mechanical Characteristics

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



4.0 INTERFACE CONNECTION

4.1 Open Cell Input Signal & Power

-LVDS Connector : PM.LVS.S040505101(UJC) or Equivalent.

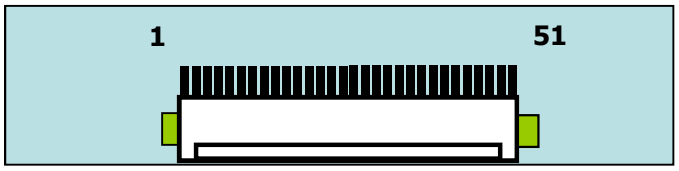
< Table 5. Open Cell Input Connector Pin Configuration >

Pin No	Symbol	Description	Pin No	Symbol	Description
1	NC	No connection	21	GND	Ground
2	SDA	I²C Data	22	CH1[3]-	First pixel negative LVDS differential data input. Pair3
3	SCL	I²C Clock	23	CH1[3]+	First pixel positive LVDS differential data input. Pair3
4	NC	Not Connected	24	NC	No connection
5	NC	Not Connected	25	NC	No connection
6	NC	Not Connected	26	NC	No connection
7	SELLVDS	High: JEIDA Low or Open: VESA	27	NC	No connection
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



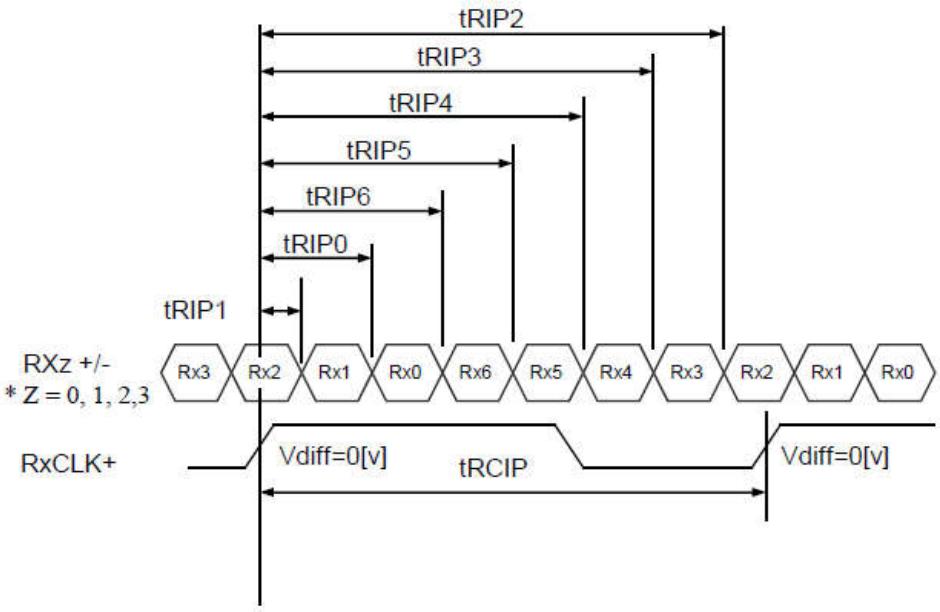
BIST Pattern

4.2 LVDS Interface

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

< Table 7. 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	

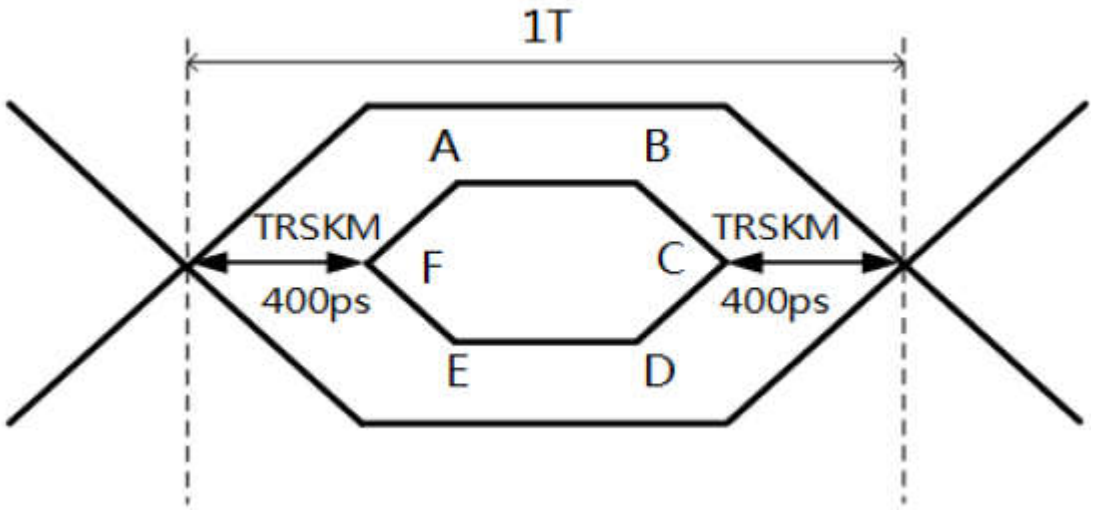


* Vdiff = (RXz+)-(RXz-),…. ,(RXCLK+)-(RXCLK-)

4.3 LVDS Rx Interface Eye Diagram

< Table 8. 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	

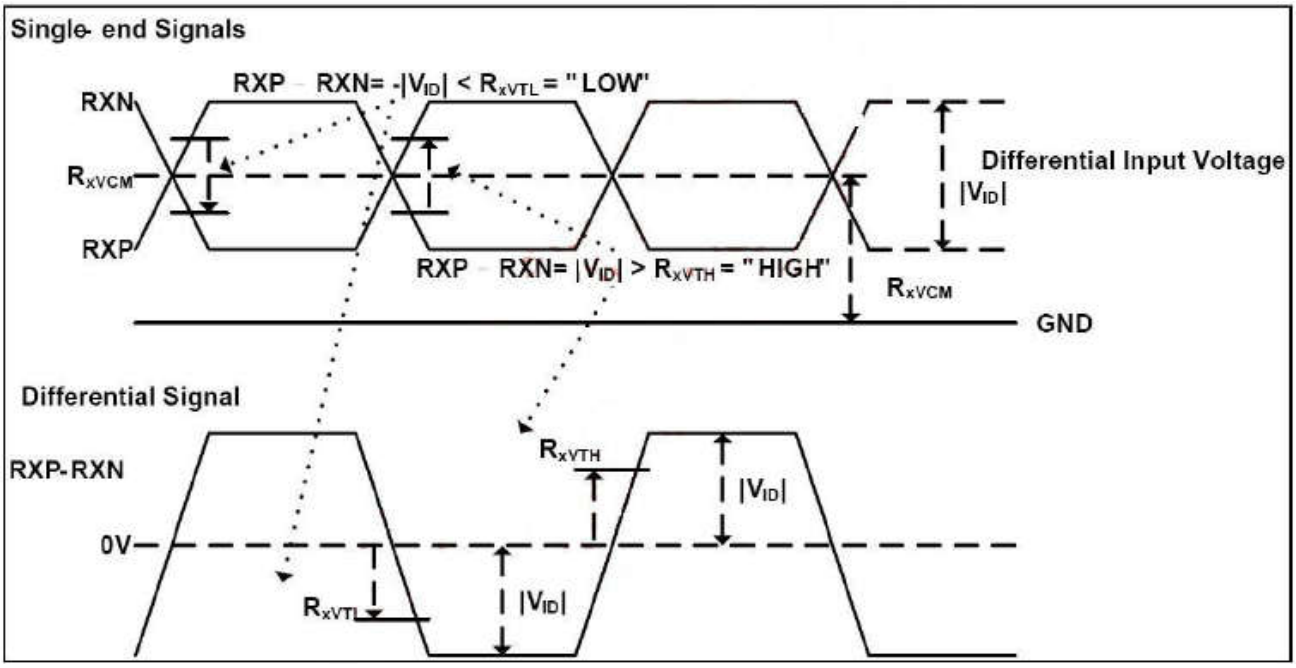


Notes:
1. Time F to A,B to C,C to D,E to F is 150p second.
2. LVDS clock=85Mhz.
3. The time A to B=1T-2*TRSKM-2*150ps.

4.4 LVDS Receiver Differential Input

< Table 9. 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	$\lvert V_{ID} \rvert/2$		2.4-$\lvert V_{ID} \rvert/2$	V	
$\lvert V_{ID} \rvert$	Differential input voltage	0.1		0.6	V	



5.0 SIGNAL TIMING SPECIFICATION

5.1 Timing Parameters (DE only mode)

< Table 10. Timing Table >

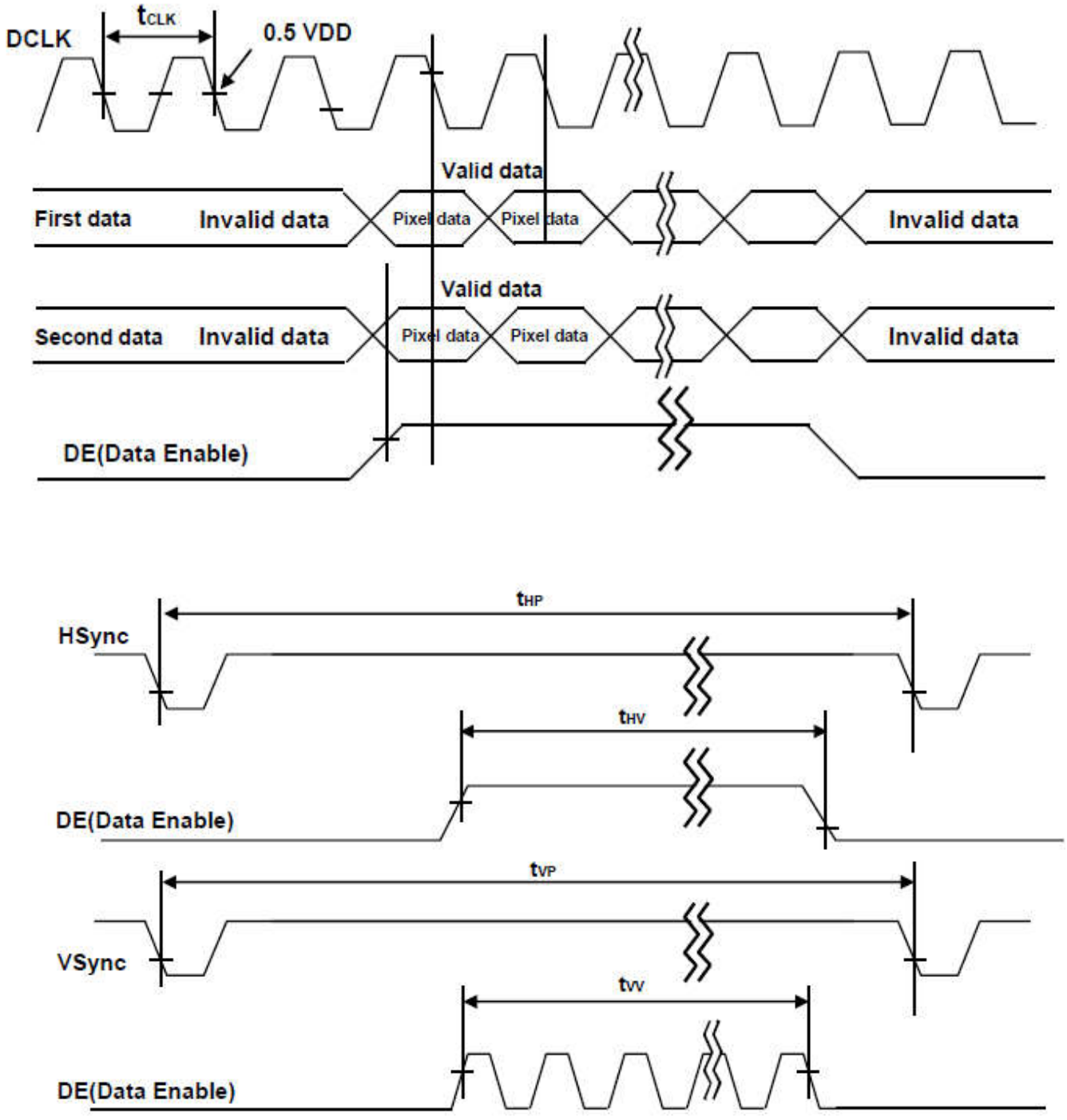
Item		Symbols		Min	Typ	Max	Unit
Clock	Frequency	1/Tc		60	74.25	78	MHz
	High Time	Tch		-	4/7Tc	-	
	Low Time	Tcl		-	4/7Tc	-	
Frame Period		Tv		1100	1125	1149	lines
				48.5	60	63	Hz
Horizontal Active Display Term		Valid	t_{HV}	-	960	-	t_{CLK}
		Total	t_{HP}	1060	1100	1200	t_{CLK}
Vertical Active Display 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 11. LVDS Input SSCG>

Symbol	Parameter	Condition	Min	Typ	Max	Unit
F	LVDS Input frequency	-	60	74.25	78	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



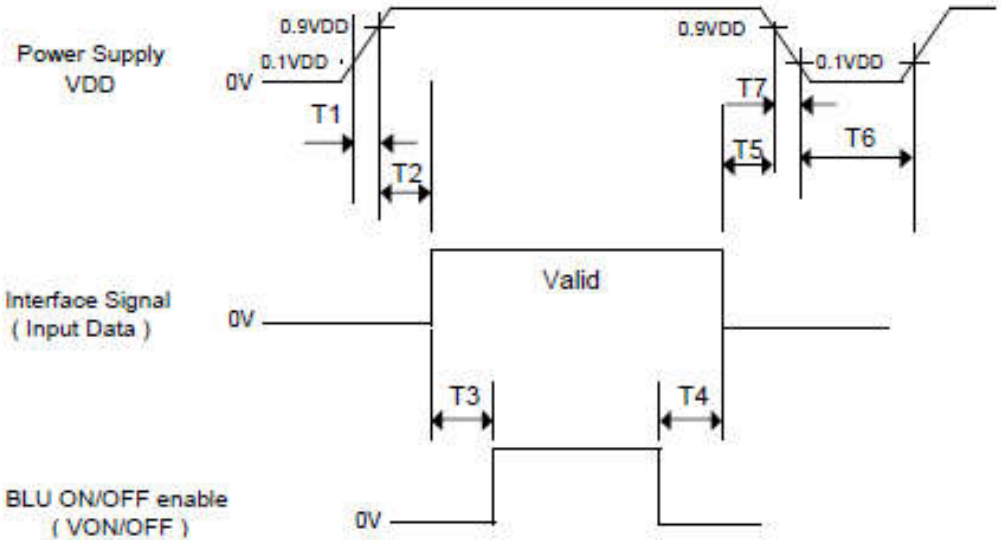
5.3 Input Signals, Basic Display Colors and Gray Scale of Colors

< Table 12. 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 13. 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 envir onment at 25±2°C. The values are specified at an approximate distance 50cm from the LCD surface at a viewing angle of Φ and θ equal to 0 °. It is presented additional information conc erning the measurement equipment and method in FIG. 1.

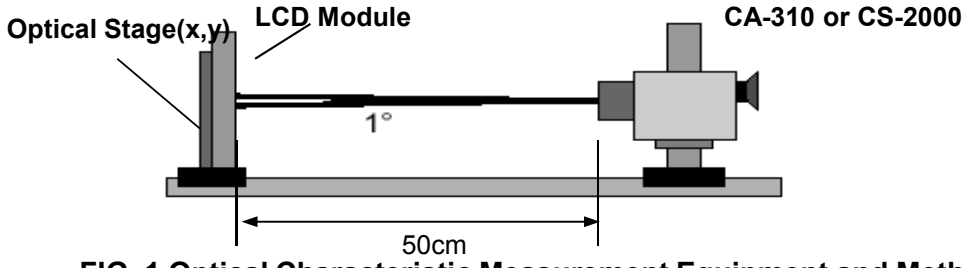


FIG. 1 Optical Characteristic Measurement Equipment and Method

< Table 14. 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		89		Deg.	Note 5
		Θ_9			89		Deg.	
	Vertical	Θ_{12}			89		Deg.	
		Θ_6			89		Deg.	
Color Temperature				9000	10,000	11,500	K	
Color Gamut				70	72	-	%	
Contrast ratio		CR	Θ = 0° (Center) Normal Viewing Angle	800:1	1200:1	-		Note 1
Luminance of White		Y_w		350	400	-	cd/m^2	Note 2
White luminance uniformity		ΔY		70	75		%	Note 3
Reproduction of color	White	W_x		TYP. - 0.03	0.280	TYP. + 0.03		
		W_y			0.290			
	Red	R_x			0.640			
		R_y			0.334			
	Green	G_x			0.296			
		G_y			0.607			
	Blue	B_x			0.149			
		B_y			0.069			
Response Time	G to G	T_g		-	8	10	ms	Note 4
Gamma Scale				2.0	2.2	2.4		Note 6

Note : 1. 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.

2. 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.

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

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

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

4. 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.

5. Gray scale specification
Gamma Value is approximately 2.2.

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

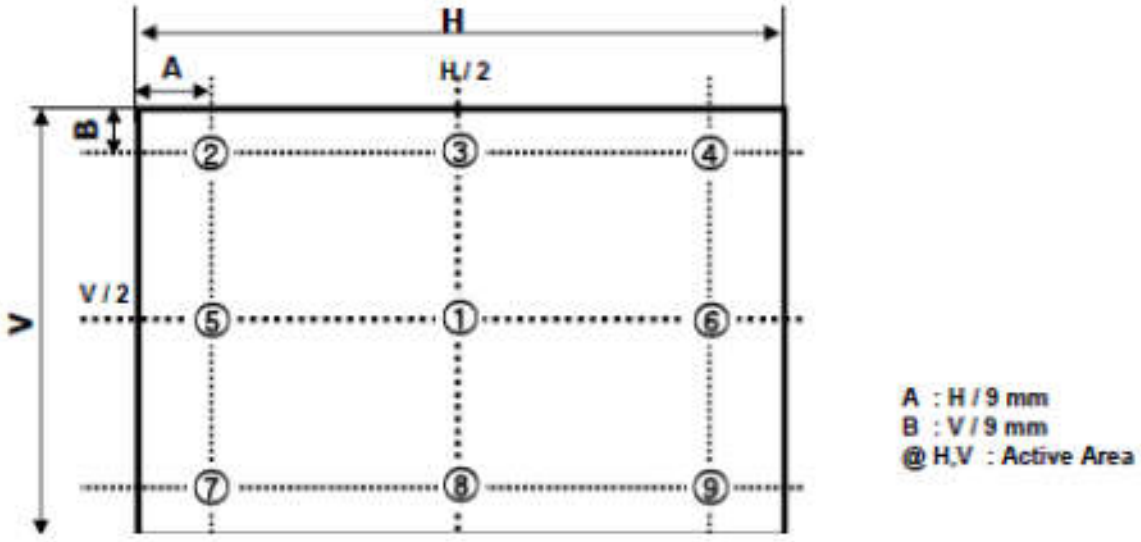


FIG. 2 9 Points for Luminance Measure

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

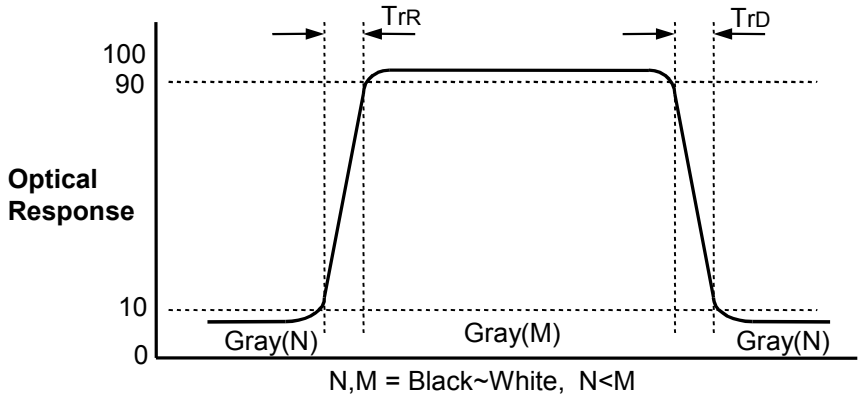


FIG. 3 Response Time

Definitions of viewing angle range

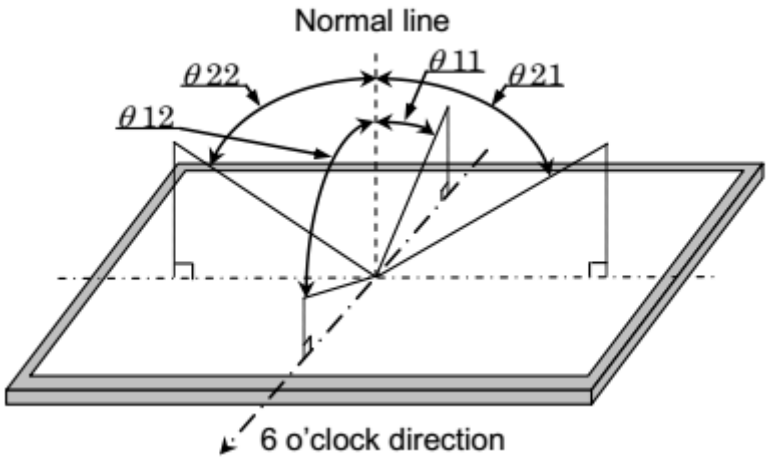


FIG. 4 Viewing Angle

7.0 MECHANICAL CHARACTERISTICS

7.1 Dimensional Requirements

Figure 5 (located in Appendix) shows mechanical outlines for the model DV430FHM-NN1. Other parameters are shown in Table 15.

< Table 15. Dimensional Parameters >

Parameter	Specification	Unit
Dimensional outline	961.7(H)x550.0(V)× 11.7(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 an low haze coating to reduce scratching. Front Polarizer hardness is at less 3H.

8.0 RELIABILITY TEST

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

< Table 16. 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 ℃ ↔ 60 ℃ (0.5 hr), 100 cycle
7	Vibration test (non-operating)	Frequency : 10 ~ 300 Hz, Random Gravity / AMP : 1.0 Grms Period : X, Y, Z 30 min/axis
8	Shock test (non-operating)	Gravity : 50G Pulse width : 11msec, Sine wave ±X, ±Y, ±Z Once for each direction
9	Electro-static discharge test	Air : ±15kV ,150pF/330Ω ,100Point ,1time/Point Contact : ±8kV ,150pF/330Ω ,100Point ,1time/Point Non operation Contact: ±4KV~±6KV,150pF/330Ω,100Point, Input connector Pin, 3 times/pin with no function loss

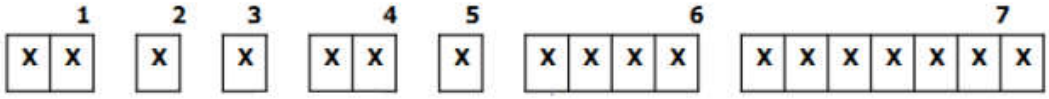
9.0 DEFINITION OF LABELS

MDL Label

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

Label Size: 80mm (L) x 25mm (W)

Label Picture :



1. Control Number
2. Rank / Grade
3. Line Classification
4. Year (2001 : 01, 2002 : 02, ...)
5. Month (1,2,3, ... , 9, X, Y, Z)
6. Internal Use
7. Serial Number

10.0 PACKING INFORMATION

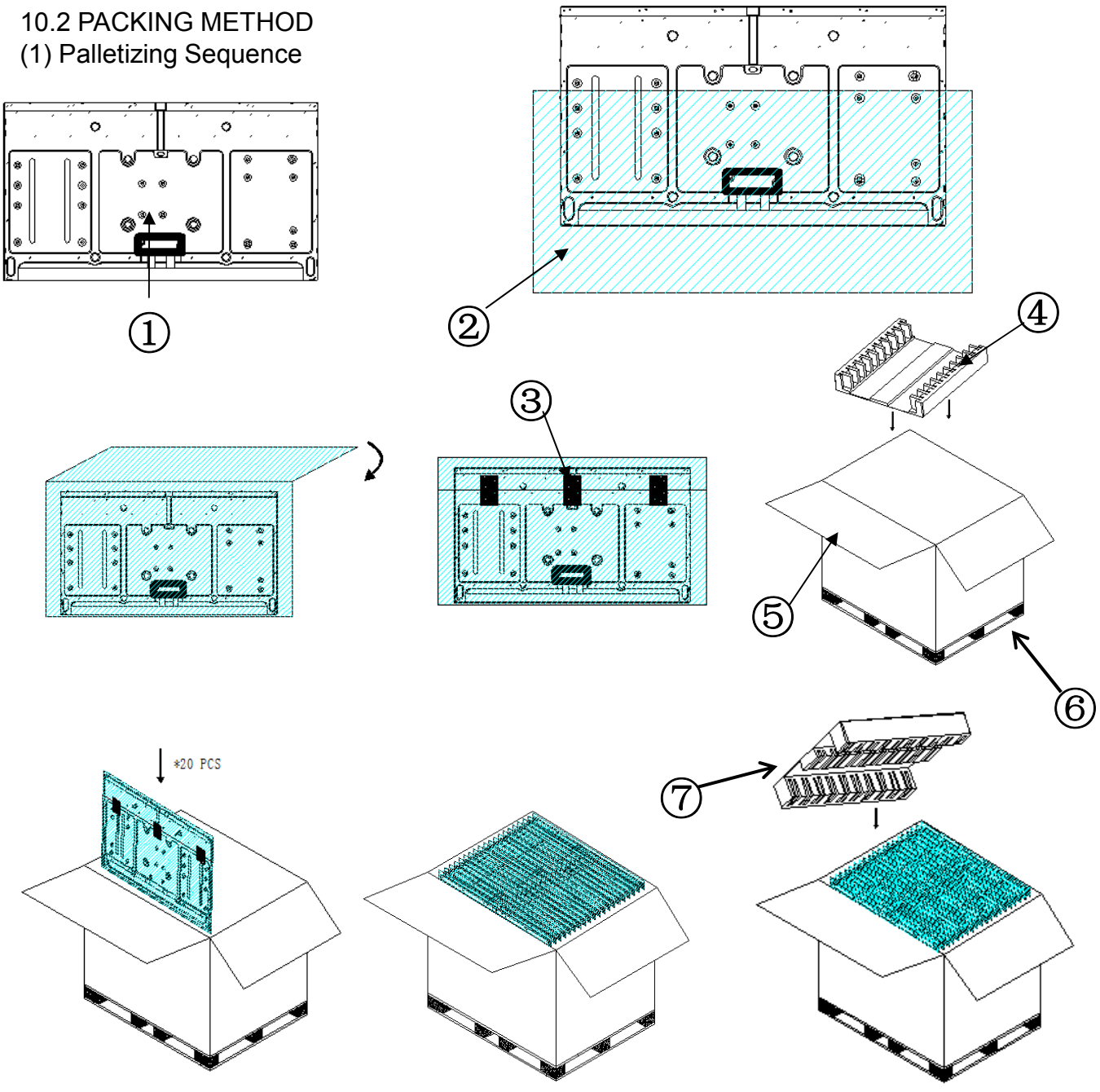
10.1 PACKING SPECIFICATIONS

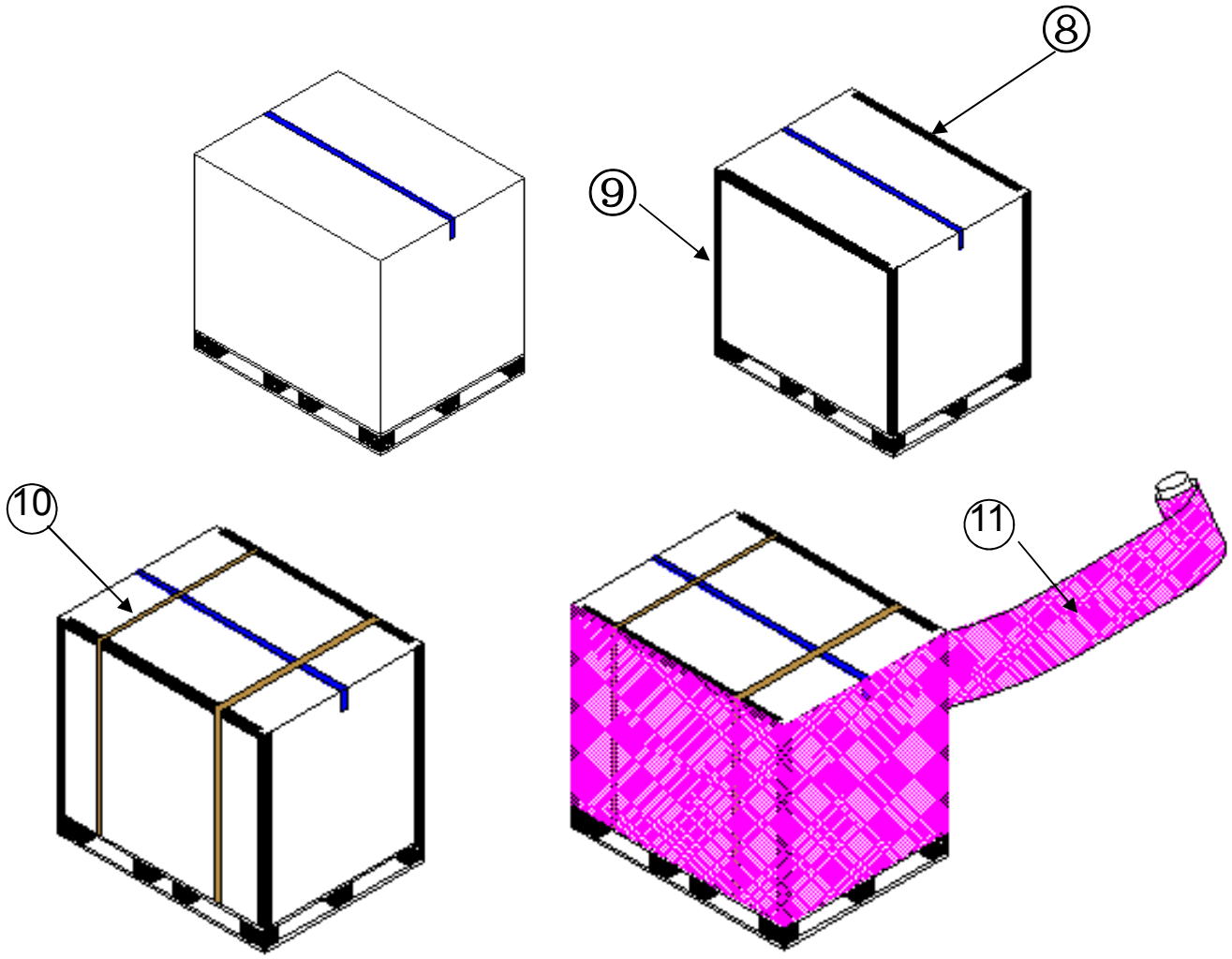
(1) 20LCD TV modules / 1 Box

(2) Box dimensions: 1065(W) x 1120(D) x 640 (H)mm

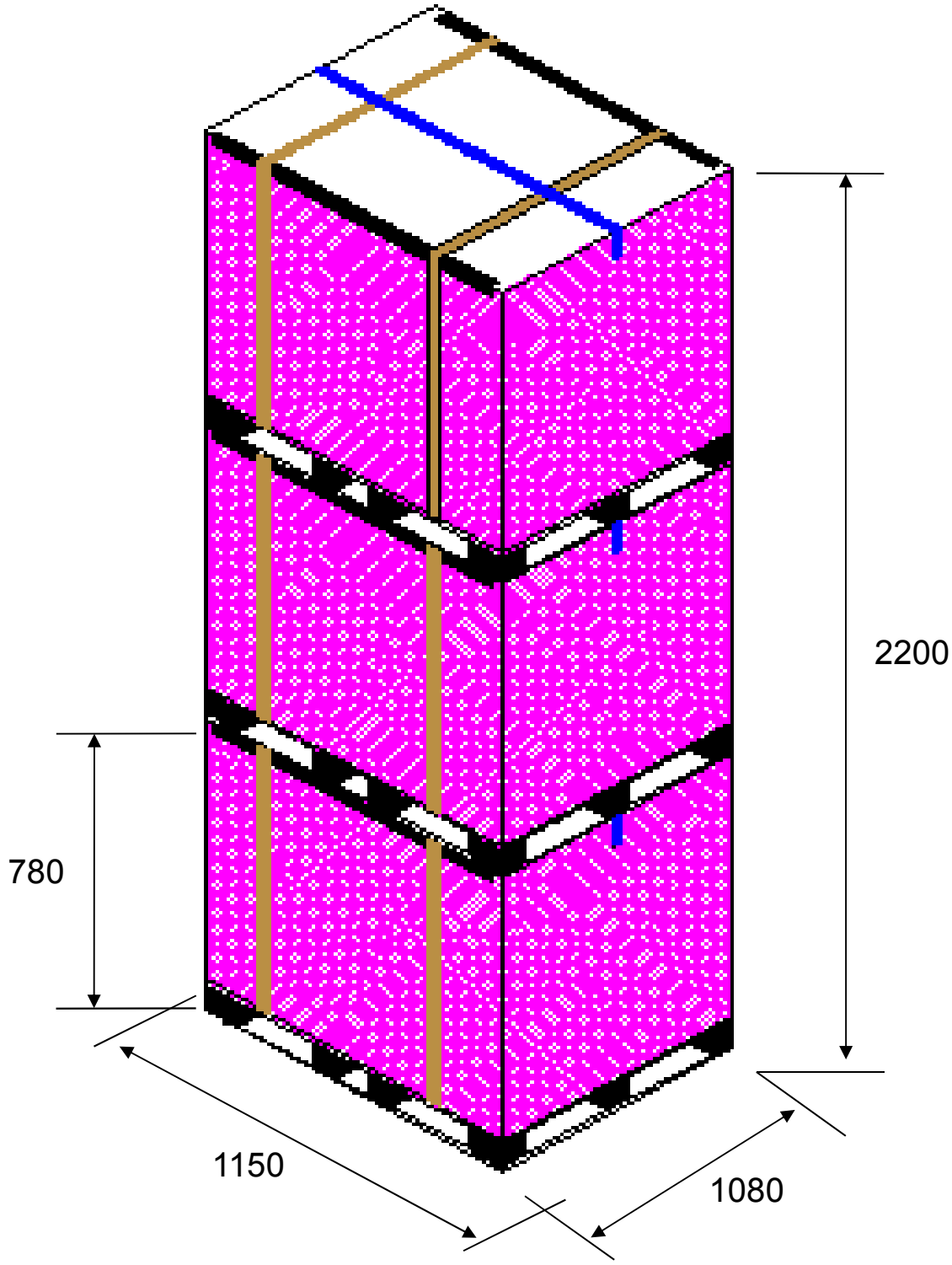
10.2 PACKING METHOD

(1) Palletizing Sequence





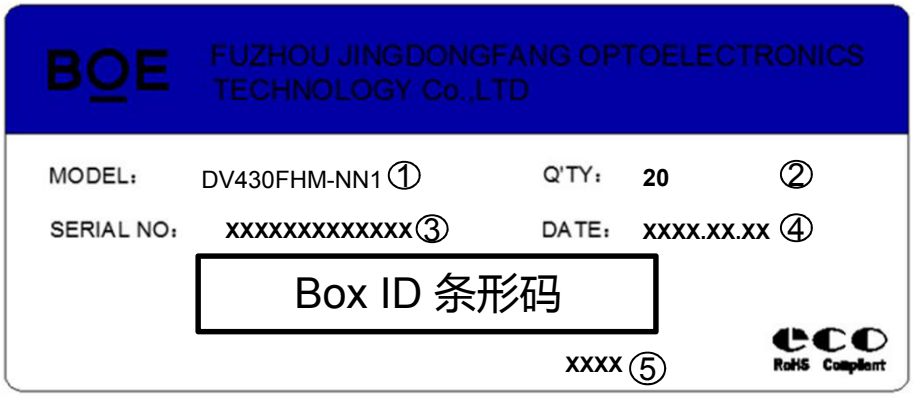
NO.	DESCRIPTION	MATERIAL	QUANTITY
1	43″ Module	/	60
2	Bag	PE	60
3	Tape_Bag	OPP	180
4	EPE(Down)	EPE	3
5	Box	K-K	3
6	Pallet	/	3
7	EPE(Up)	EPE	3
8	Corner Protect(Top)	K-K	6
9	Corner Protect(Side)	K-K	12
10	PP Belt	/	/
11	Protect Film	/	/



Total size：1150（W）x1080（D）x2220（H）mm

10.3 Box Label

- Label Size : 100 mm (L) × 50 mm (W)
- Contents
  Model : DV430FHM-NN1
  Q`ty : 20 Module in one box.
  Serial No. : Box Serial No. See next page for detail description.
  Date : Packing Date
  FG Code : FG Code of Product



➢ 打印标识，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. FG-CODE 后四位

BOX ID编码原则

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

11.0 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.

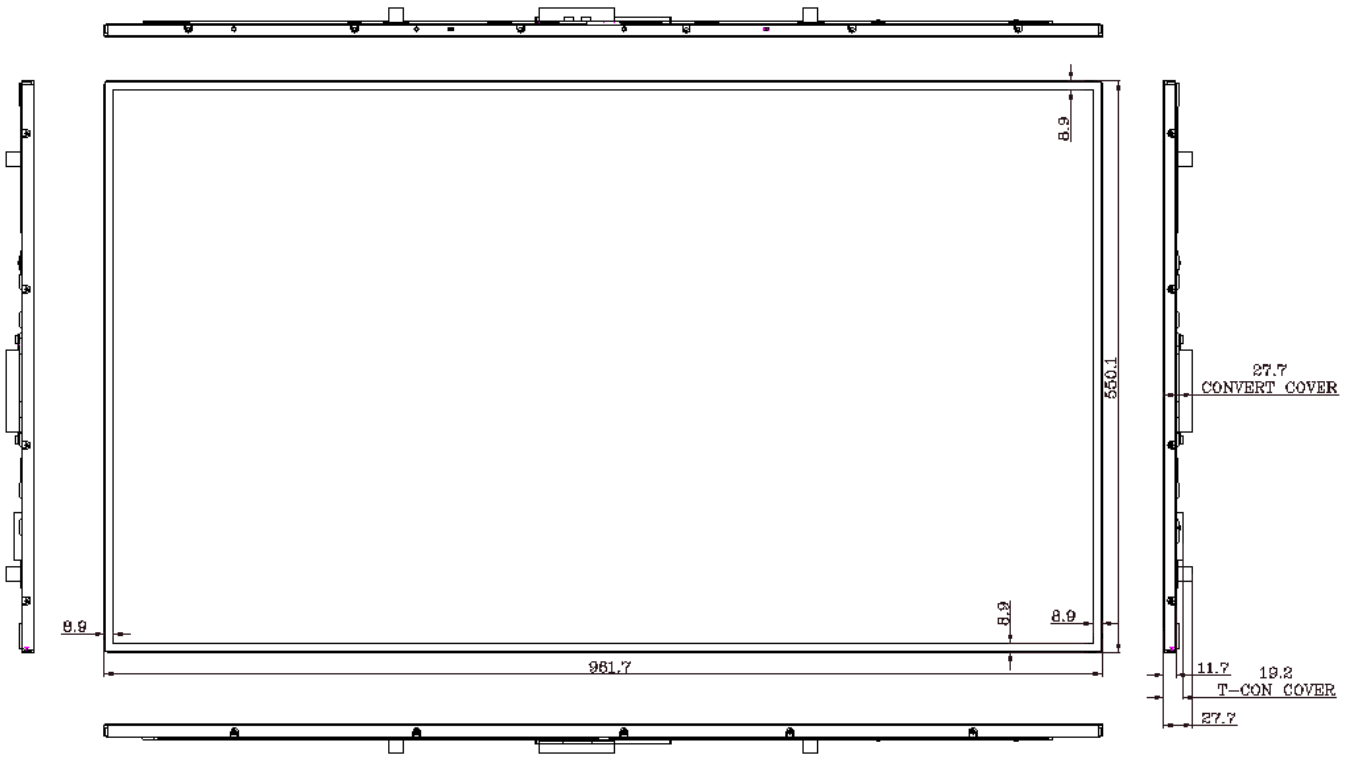
(4) Cautions for the atmosphere
- Dew drop atmosphere should be avoided.
- Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.

(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.

12.0 APPENDIX

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



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