

**TITLE:            DV320FHM-NN0**  
**Product Specification**  
**Rev. 0**

**BEIJING BOE DISPLAY TECHNOLOGY**



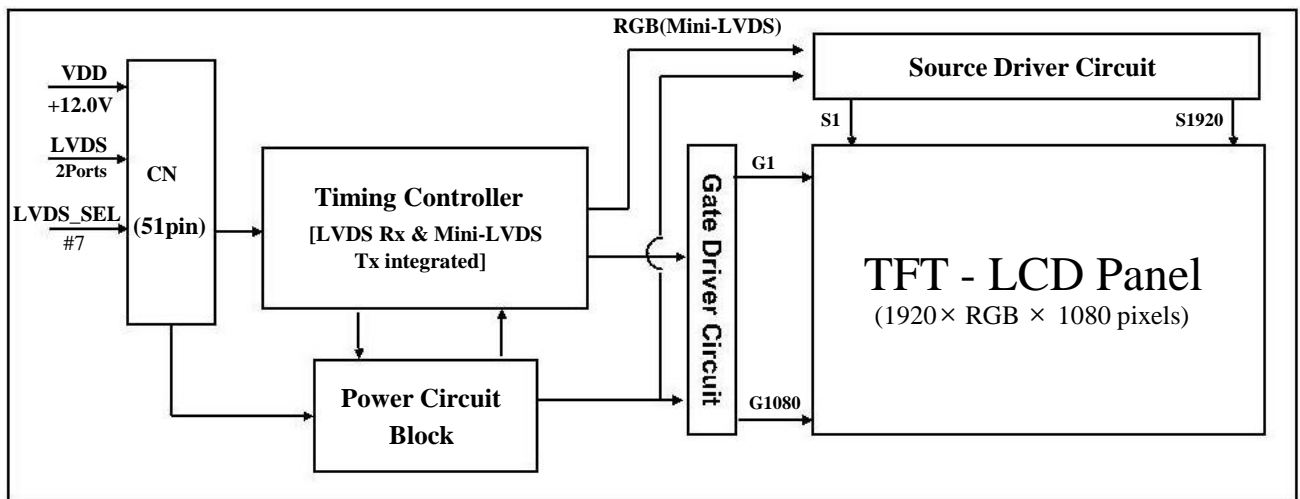
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## 1.0 GENERAL DESCRIPTION

### 1.1 Introduction

DV320FHM-NN0 is a color active matrix TFT LCD MDL using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This open cell has a 31.51 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 open cell can display 16.7M colors. The TFT-LCD panel used for this open cell 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
- High luminance and contrast ratio, low reflection and wide viewing angle
- DE (Data Enable) only mode
- ADSDS technology is applied for high display quality
- RoHS compliant

### 1.3 Application

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

### 1.4 General Specification

< Table 1. General Specifications >

Parameter	Specification	Unit	Remark
Active area	698.4(H) × 392.85 (V)	mm	
Number of pixels	1920(H)×1080(V)	pixels	
Pixel pitch	121.25(H)×RGB×363.75(V)	μm	
Pixel arrangement	Pixels RGB Vertical stripe		
Display colors	16.7M(8bits-true)	colors	
Display mode	Transmission mode, Normally Black		
Open Cell Transmittance	5.0 (Typ.)	%	At center point with BOE BLU
Weight	4.0(Typ)	Kg	
Power Consumption	4.0	Watt	
Surface Treatment	Haze 1%		

## 2.0 ABSOLUTE MAXIMUM RATINGS

### 2.1 ABSOLUTE RATINGS OF ENVIRONMENT

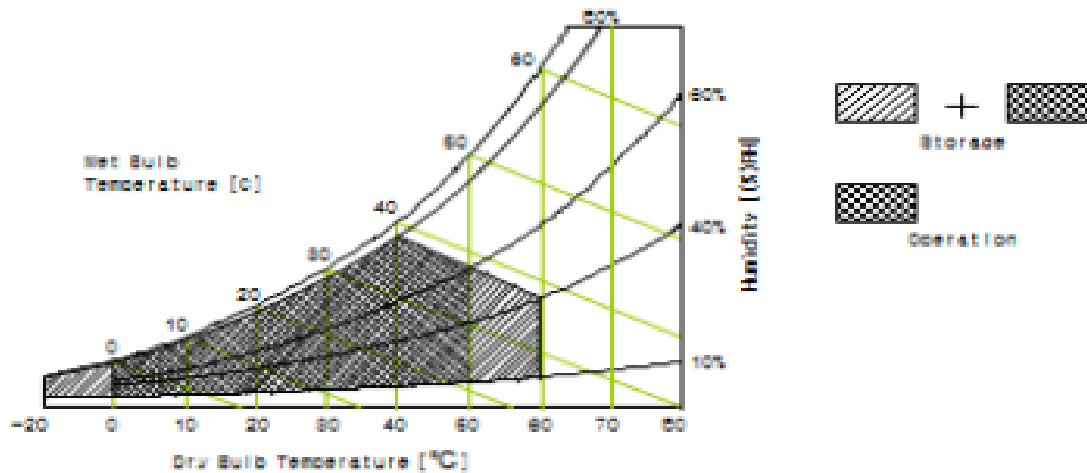
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. Open Cell Electrical Specifications >

[VSS=GND=0V]

Parameter	Symbol	Min.	Max.	Unit	Remark
Power Supply Voltage	VDD	VSS-0.3	14	V	Ta = 25 °C
Operating Temperature	T <sub>OP</sub>	0	+50	°C	Note 1
	T <sub>SUR</sub>	0	+60	°C	
Storage Temperature	T <sub>ST</sub>	-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.



### 2.2 ABSOLUTE RATINGS OF ENVIRONMENT

When storing modules as spares for a long time, the following precaution is necessary.

- (a) Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 20 to 25°C at and 50 ± 10%RH.
- (b) The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.

## 2.3 ELECTRICAL ABSOLUTE RATINGS

&lt; Table 3. Electrical Absolute Ratings(Open Cell) &gt;

Item	Symbol	Value		Unit	Note
		Min	Max		
Power Supply Voltage	VDD	VSS-0.3	14	V	(1)
Logic Input Voltage	Vin	-0.3	3.6	V	

&lt; Table 4 Backlight Unit &gt;

Item	Symbol	Value			Unit	Note
		Min.	Typ	Max.		
LED DC forward current	If	-	540	-	mA	
LED peak pulse	Ip	-		-	mA	
LED Reverse voltage	Vr	3.0	3.2	3.4	V	

Note (1)Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under normal operating conditions.

## 3.0 ELECTRICAL CHARACTERISTICS

### 3.1 TFT LCD MOUDLE

< Table 5. Open Cell Electrical Specifications >

[Ta =25±2 °C]

Parameter		Symbol	Values			Unit	Remark
			Min	Typ	Max		
Power Supply Input Voltage		VDD	10.8	12	14	Vdc	
Power Supply Ripple Voltage		VRP			300	mV	
Power Supply Current		IDD	-	333	630	mA	Note 1
Power Consumption		PDD		4.0	7.6	Watt	
Rush current		IRUSH	-	-	3.3	A	Note 2
LVDS Interface	LVDS Swing Voltage	VID	±100		±300	mV	Note 3
	Common Input Voltage	VLVC	1.0	1.2	1.4	V	
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,

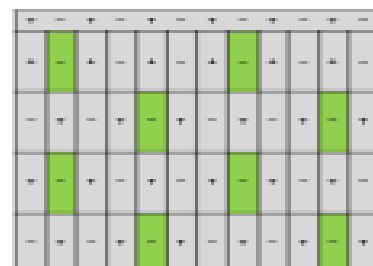
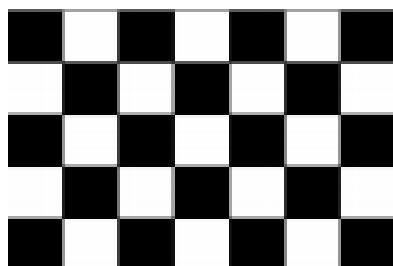
Frame rate  $f_p=60\text{Hz}$  and Clock frequency = 75.4MHz.

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)

Note 3 : The LVDS test point is at each terminal resistor



## 3.2 INTERFACE CONNECTIONS

## 3.2.1 LCD MODULE

- Connector : IS050-C51B-C39-S (UJU) / FI-RE51S-HF-R1500 (JAE) or Equivalent.

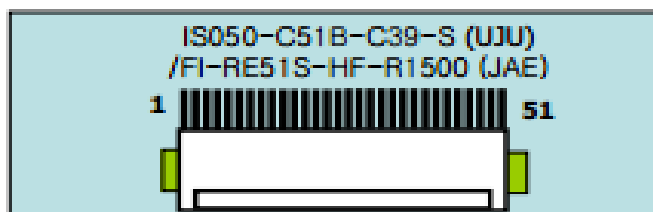
< Table 6. Open Input Connector Pin Configuration >

Pin No	Symbol	Description	Pin No	Symbol	Description
1	NC	No Connection	21	GND	Ground
2	SDA	I <sup>2</sup> C Data	22	CH1[3]-	First pixel negative LVDS differential data input. Pair3
3	SCL	I <sup>2</sup> C 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 or GND	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			

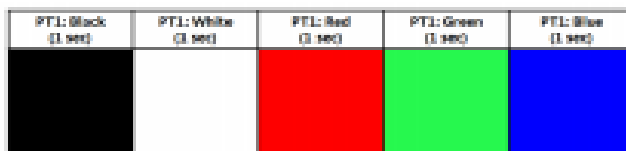
Pin No	Symbol	Description	Pin No	Symbol	Description
40	NC	Not Connected	46	GND	Ground
41	NC	Not Connected	47	NC	Not Connected
42	NC or GND	Not Connected	48	VCC	Input Voltage +12V
43	NC or GND	Not Connected	49	VCC	Input Voltage +12V
44	NC or GND	Ground	50	VCC	Input Voltage +12V
45	GND	Ground	51	VCC	Input 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 IEA 664 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



## 3.3 BACKLIGHT UNIT

### 3.3.1 LED LIGHTBAR UNIT CHARACTERISTICS (Ta = 25 ± 2 °C)

< Table 7. LED Lightbar Unit Characteristics >

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lightbar input Voltage	V	60	64	68	V <sub>RMS</sub>	One channel
Lightbar input current	I <sub>L</sub>	520	540	560	mA	One channel
Power consume	W	28	34.56	41.76	W	One channel
Lightbar Life Time	L <sub>BL</sub>	30,000	-	-	Hrs	

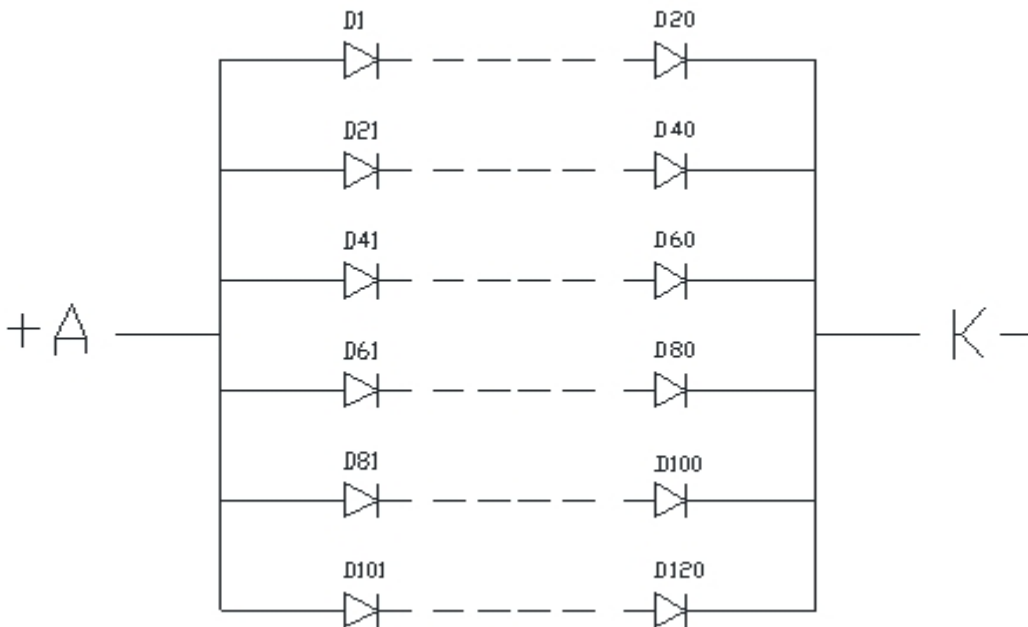
Note (1) The lifetime is defined as the time which luminance of the LED decays to 50% compared to the initial value, Operating condition: Continuous operating at  $T_a = 25 \pm 2^\circ\text{C}$ ,  $I_L=540\text{mA}$

The pin configuration for the housing and leader wire is shown in the table below. Light bar connector type: **CI0102S0000-A, PITCH=2mm**

Pin No.	Symbol	Description	Wire Color
1	+	CH+	Red
2	-	CH-	WHITE

LED Numbers:  $20 \times 6 = 120$

Total: 20 LED / BLU



### 3.4 LED Constant current source LED

#### 3.4.1 Input Electrical Characteristics

< Table 8 Input Electrical Characteristics >

NO	Item	Symbol	Min	Type	Max	Unit
1	Input Voltage	Vin	20.8	24	26	V
2	Input Current	Iin		0.7	2	A
3	Input Power	Pin		36	50	W
4	Brightness Voltage	Vadj	0(bright)	---	5 (dark)	V
5	Control Voltage	Enable Von=1.5---5.0V Disable Voff=0---0.5V				

#### 3.4.2 Out Electrical Characteristics

< Table 9 Output Electrical Characteristics >

Item	Symbol	Test Conditions	Min	Type	Max	Unit
Output Current (per group)	Iout	Vin=24.0V; Vout=57V; Ta=28°C		540	750	mA
Output Voltage	Vout	Vin=24.0V; Ta=28°C	30	66	85	V
Efficiency	$\eta$	Vin=24.0V; Vout=57V;		92.5		%
Output total group	Ggp			1		
The Total Output Current	R	According to the backlight parameters to adjust output current		540	750	MA
output power	W out	Vin=24.0V; Vout=30-85V;		36	50	W

The parameter of upon will change when the LCD module changes

## 3.4.3 Pin Assignments

&lt; Table 10 Pin Assignments &gt;

Input connector: CN1			
Pin No.	Symbol	Description	Parameter
1、 2、 3、 4、 5	+24V	Supply voltage	22~26V
6、 7、 8、 9、 10	GND	Ground	0V
13	ADJ	Dimming control	0V=Brightness Max 5V=Brightness Min
12	N/F	Standby/Operation	On =1-5.0V Off=0-0.5V
14、 11	NC		

Output Socket: CN3			
Pin No.	Symbol	Description	Parameter
1	OUT+	Output voltage	30-85V
2	OUT-	Ground	0

The above output parameters are determined according to the optical requirement.  
The products are not intended for use in systems in which failures of product could result in personal injury.

### 3.5 Signal Timing Specifications

Timing Parameters (DE only mode)

< Table 12 Timing Table >

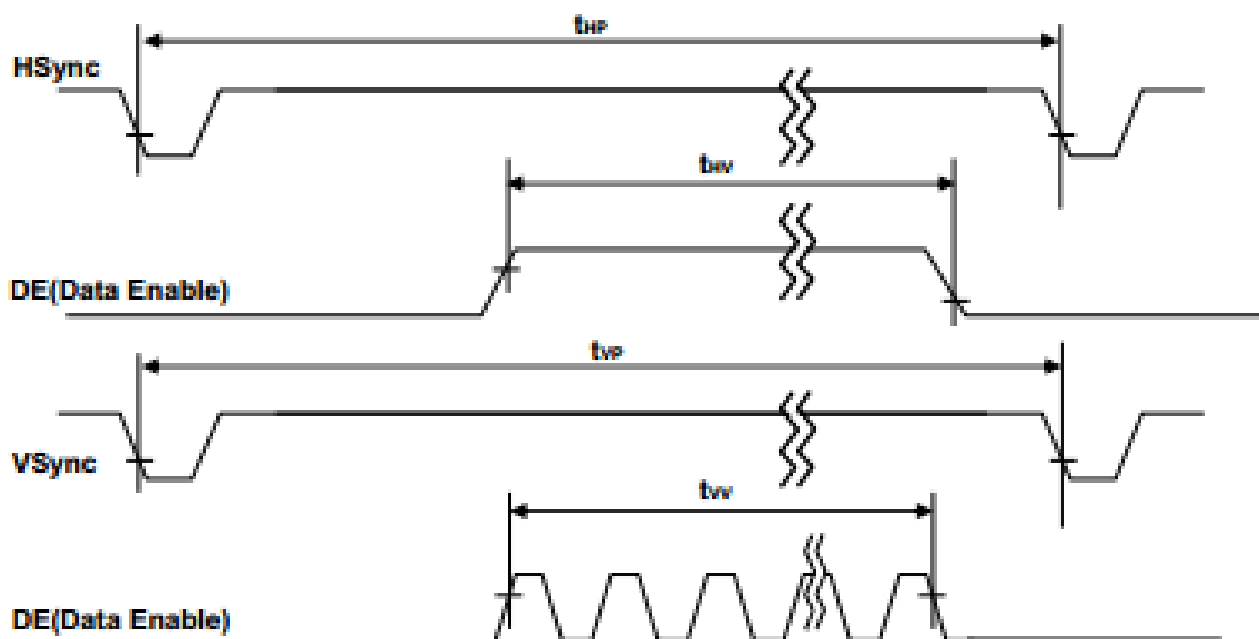
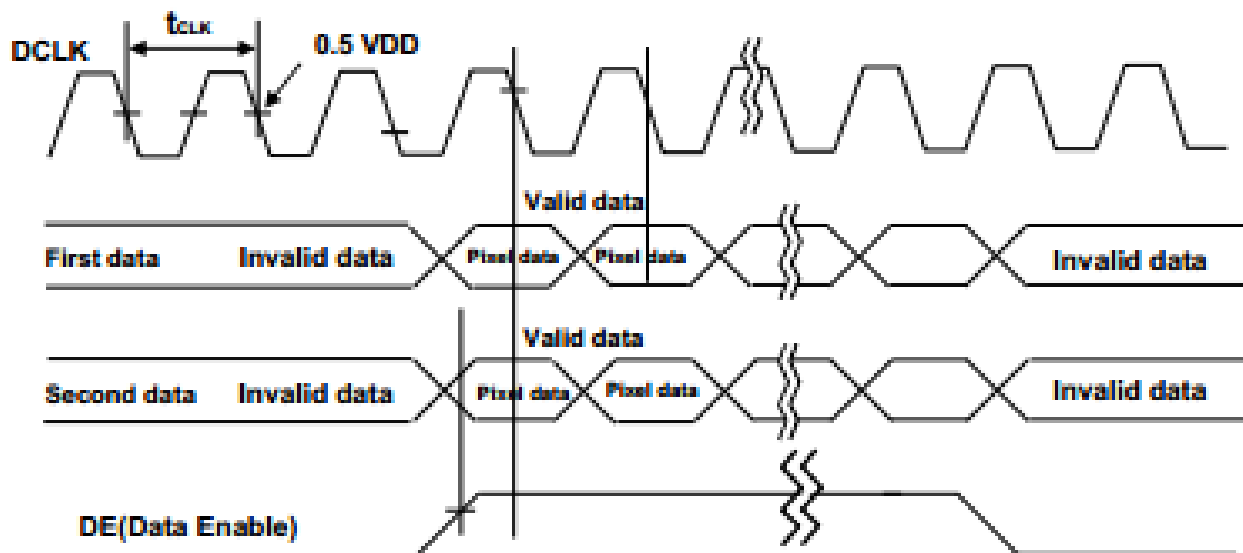
Item		Symbols	Min	Typ	Max	Unit	
Clock	Frequency	$1/Tc$	58	74.25 (92.8)	97	MHz	
	High Time	$T_{ch}$	-	$4/7Tc$	-		
	Low Time	$T_{cl}$	-	$4/7Tc$	-		
Frame Period		$T_v$	1100	1125	1149	lines	
			47	60 (75)	78	Hz	
Horizontal Active Display Term		Valid	$t_{HV}$	-	960	-	$t_{CLK}$
		Total	$t_{HP}$	1060	1100	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 13 LVDS Input SSCG >

Symbol	Parameter	Condition	Min	Typ	Max	Unit
F	LVDS Input frequency	-	58	74.25 (92.8)	97	MHz
$T_{LVSK}$	LVDS channel to channel skew	F=100MHz $V_{IC}=1.2V$ $V_{ID}=\pm 200mV$	$-(1/F)^*$ 30%	-	$(1/F)^*3$ 0%	ps
$F_{LVMOD}$	Modulating frequency of input clock during SSC	F=85MHz $V_{IC}=1.2V$ $V_{ID}=\pm 200mV$	0	-	200	KHz
$F_{LVDEV}$	Maximum deviation of input clock frequency during SSC		-3	-	+3	%
$T_{CYCY}$	Cycle to Cycle jitter		-	-	50	ps

### 3.6 Signal Timing Waveform



### 3.7 COLOR DATA INPUT ASSIGNMENT

Input Signals, Basic Display Colors and Gray Scale of Colors

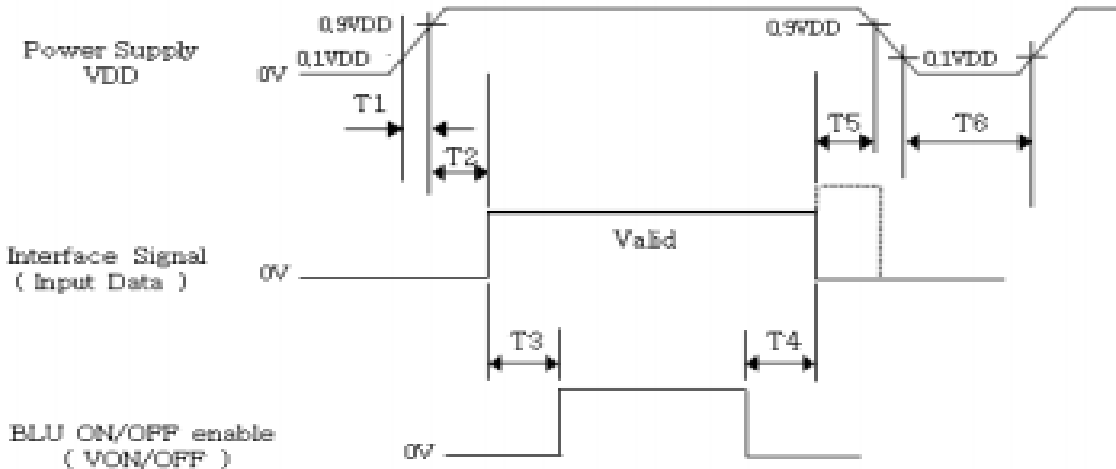
< Table 14 Input Signal and Display Color Table >

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	1	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	1	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	
	△																								
	▽																								
	Brighter	1	1	1	1	1	1	0	1	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	
	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	1	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	
	△																								
	▽																								
	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	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	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	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	
	△																								
	▽																								
	Brighter	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	1	1	1	1	1	1	1	0	
	Blue	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	1	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	1	0	0	0	0	0	0	0	1	0	
	△																								
	▽																								
	Brighter	1	1	1	1	1	1	0	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	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	



### 3.8 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 15 Sequence Table >

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

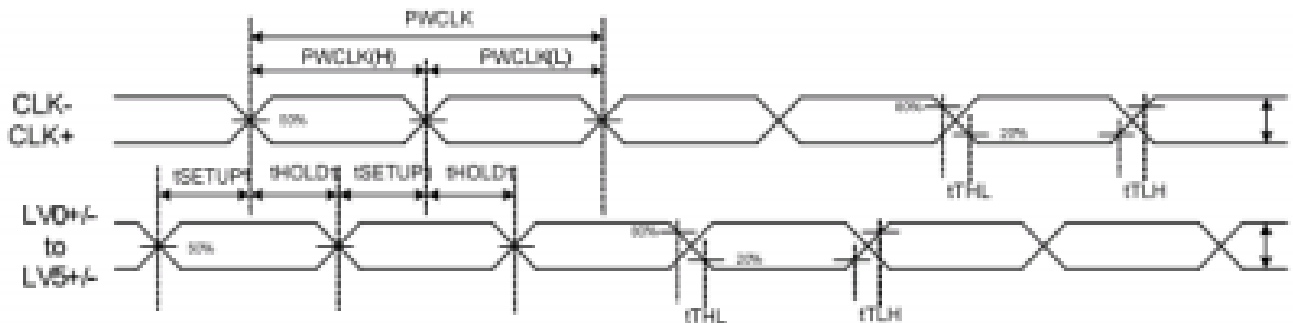
Notes: 1. Back Light must be turn on after power for logic and interface signal are valid.

2. Even though T1 is out of SPEC, it is still ok if the inrush current of VDD is below the limit.

### 3. 9 MINI-LVDS SIGNAL SPECIFICATIONS

< Table 16 Timing Table >

Symbol	Parameter	Min	Typ	Max	Unit
$F_M$	Mini-LVDS Clock frequency	-	-	400	MHz
$F_{MLVMOD}$	Modulating frequency of input clock during SSC	-	-	600	KHz
$F_{MLVDEV}$	Maximum deviation of input clock frequency during SSC	-3	-	+3	%
$V_{IH_{LVDS}}$	Mini-LVDS high input voltage	200	-	-	mV
$V_{IL_{LVDS}}$	Mini-LVDS high input voltage	-	-	-200	mV
$t_{SETUP}$	Data setup time	0.5	-	-	ns
$t_{HOLD}$	Data hold time	0.5	-	-	ns



## 4.0 OPTICAL CHARACTERISTICS

### 4.1 Test Conditions

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V <sub>CC</sub>	-	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Lightbar Current	I <sub>L</sub>	240	mA
Light bar operation voltage	V	49.5	V

### 4.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown as below. The following items should be measured under the test conditions described in 4.1 and stable environment shown in Note (5).

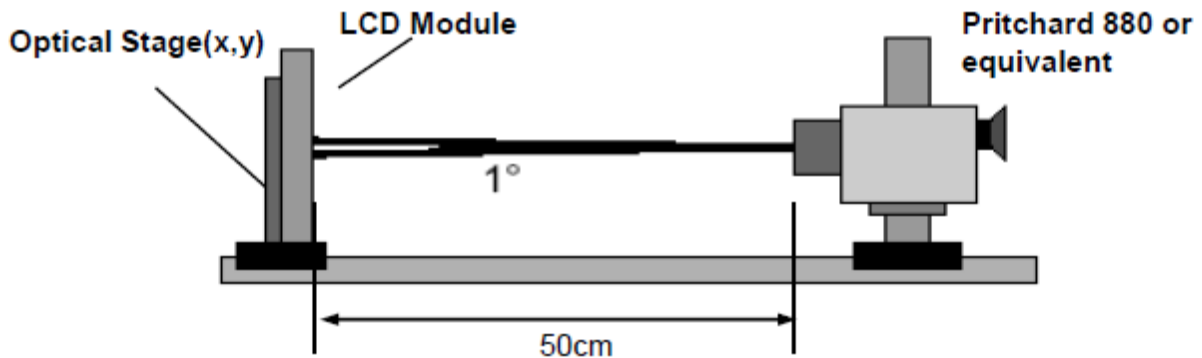


FIG. 1 Optical Characteristic Measurement Equipment and Method

< Table 17 Optical Specifications >

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ$ , $\theta_y=0^\circ$ Viewing Angle at Normal Direction	900	1200	—	—	(2)
Response Time		Gray to gray		—	8	10	ms	(3)
Center Luminance of White		$L_c$		350	400			(4)
White Variation		$\delta W$			-	1.38	-	(6)
Color Chromaticity	Red	Rx		Typ. -0.03	Typ. +0.03	0.630	—	(5)
		Ry				0.344		
	Green	Gx				0.302		
		Gy				0.642		
	Blue	Bx	0.153					
		By	0.046					
	White	Wx	0.280					
		Wy	0.290					
Color Gamut	CG		72	—	%	NTSC Ratio		
Viewing Angle	2D (CR>10)	$\theta_{x+}$	CR≥10		89	—	Deg.	(1)
		$\theta_{x-}$			89	—		

Note (1) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) =  $L_{255} / L_0$

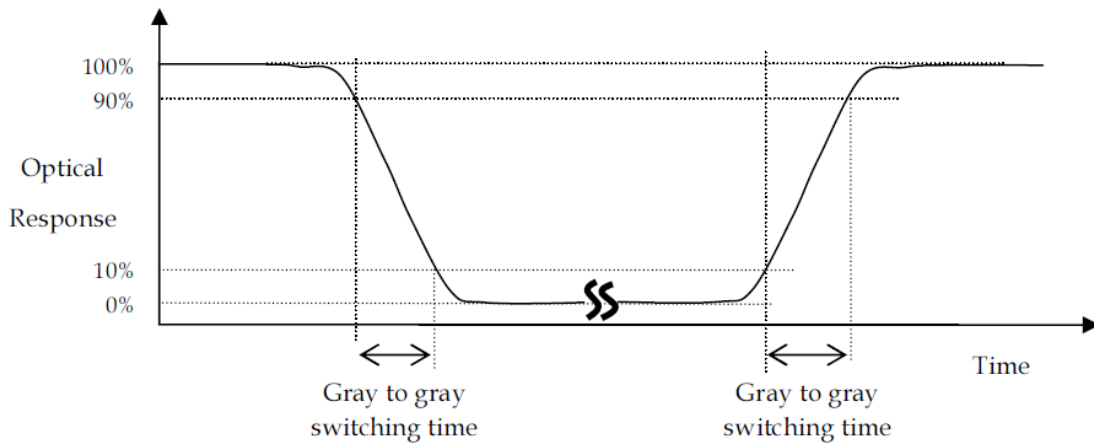
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (5), where CR (X) is corresponding to the Contrast Ratio of the point X at the figure in note(6)

Note (2)

Definition of Gray-to-Gray Switching Time (VA Model) :



The driving signal means the signal of gray level 0, 31, 63, 95, 127, 159, 191, 223 and 255.

Gray to gray average time means the average switching time of gray level 0, 31, 63, 95, 127, 159, 191, 223 and 255 to each other.

Note (3) Definition of Luminance of White ( $L_C$ ):

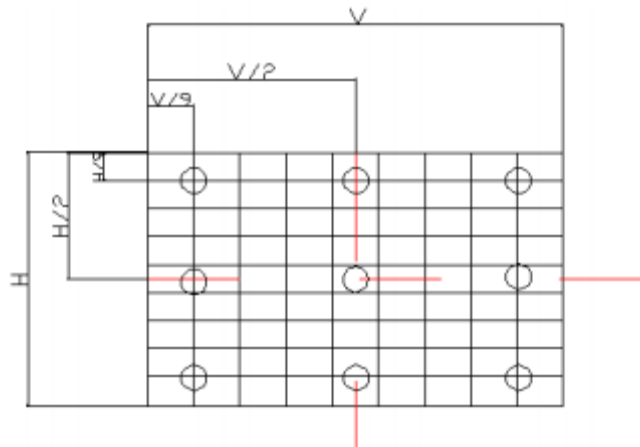
Measure the luminance of gray level 255 at center point and 9 points

$L_C = L(5)$ , where  $L(X)$  is corresponding to the luminance of the point  $X$  at the figure in Note (6)

Note (4) Definition of White Variation ( $\delta W$ ) :

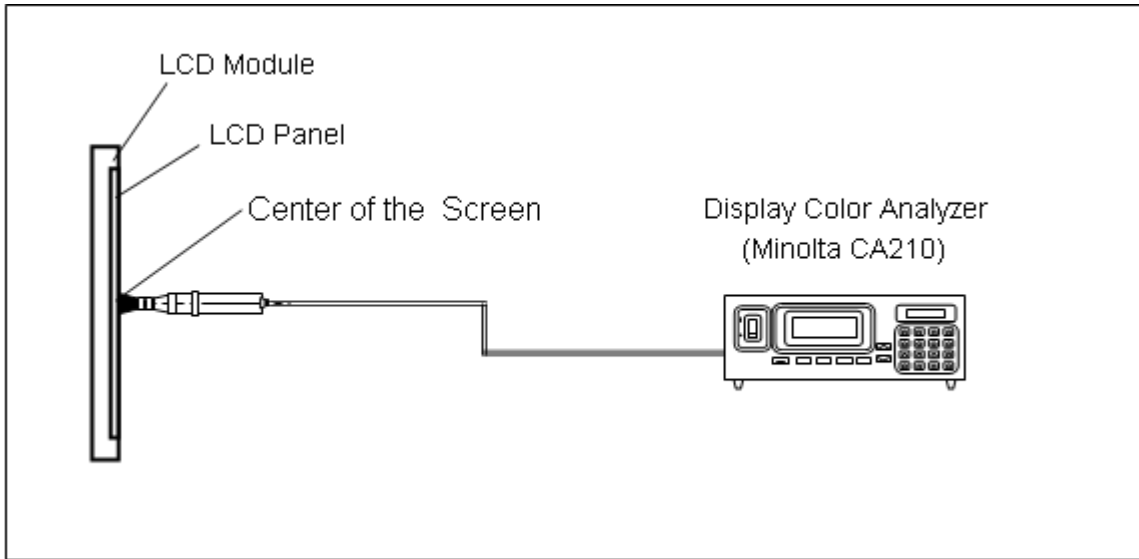
Measure the luminance of gray level 255 at 9 points

$\delta W = \text{Maximum}(Lon1, Lon2, \dots, Lon9) / \text{Minimum}(Lon1, Lon2, \dots, Lon9)$



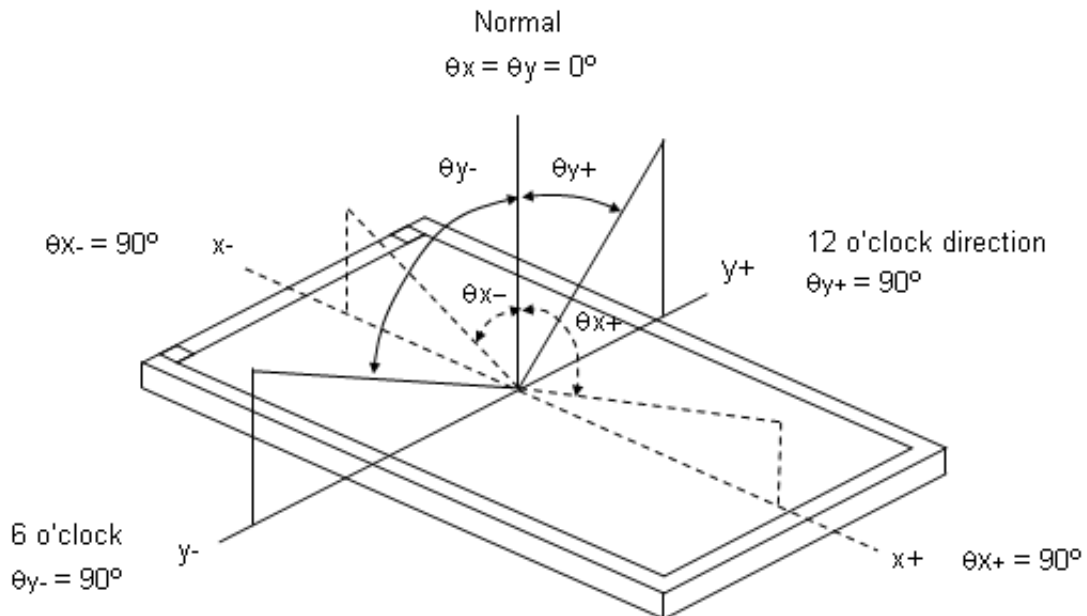
**Note (5) Measurement Setup:**

The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



**Note (6) Definition of Viewing Angle ( $\theta_x$ ,  $\theta_y$ ):**

Viewing angle are measured by CS-2000.



## 5.0 MECHANICAL SPECIFICATIONS

### 5.1 Dimensional Requirements

Figure 1 (located in Appendix) shows mechanical outlines for the model DV320FHM-NN0. Other parameters are shown in Table 18.

< Table 18. Dimensional Parameters >

Parameter	Specification	Unit
Active area	698.4 (H) × 392.85(V)	mm
Pixel pitch	121.25 (H) × 363.75 (V)	μm
Number of pixels	1920(H) × 1080(V) (1 pixel = R + G + B dots)	pixels
Weight	850	gram

### 5.2 Semi-Glare and Polarizer Hardness

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

**6.0 RELIABILITY**

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

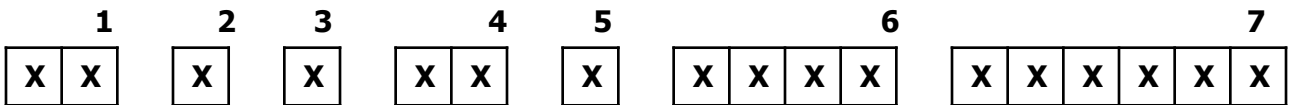
< Table 19. Reliability Test Parameters >

No	Test Items	Conditions
1	High temperature & high humidity storage test	Ta = 60 °C, 90%RH, 240 hrs
2	Low temperature storage test	Ta = -20 °C, 240 hrs
3	High temperature & high humidity operation test	Ta = 50 °C, 80%RH, 240hrs
4	Low temperature operation test	Ta = 0 °C, 240hrs
5	Thermal shock test	Ta = -20 °C ↔ 60 °C (0.5 hr), 100 cycle
6	On/off test	On/Off:10sec(on) / 5sec(off), 30000 times
7	Altitude Test (non-operating)	40000ft -10 °C /24hrs ,25°C /24hrs, -10 °C /24hrs
8	Vibration test (non-operating)	Frequency : 10 ~ 300 Hz, Random Gravity / AMP : 1.0 Grms Period : X, Y, Z 30 min/axis
9	Shock test (non-operating)	Gravity : 50G Pulse width : 11msec, Sine wave ±X, ±Y, ±Z Once for each direction
10	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



## 7.0 PRODCUT SERIAL NUMBER

DP/N	DV320FHM-NN0	B4	
XXXXXX			
XXXX	XXXXXXXXXXXXXXXXXXXX		  MADE IN CHINA
	REV A00		
XX-XXXXXX-XXXXX-XXX-XXXX			



- 1. Control Number
- 2. Rank / Grade
- 3. Line Classification
- 4. Year (2011 : 11, 2012 : 12, ...)

- 5. Month (1,2,3, ... , 9, X, Y, Z)
- 6. Internal Use
- 7. Serial Number

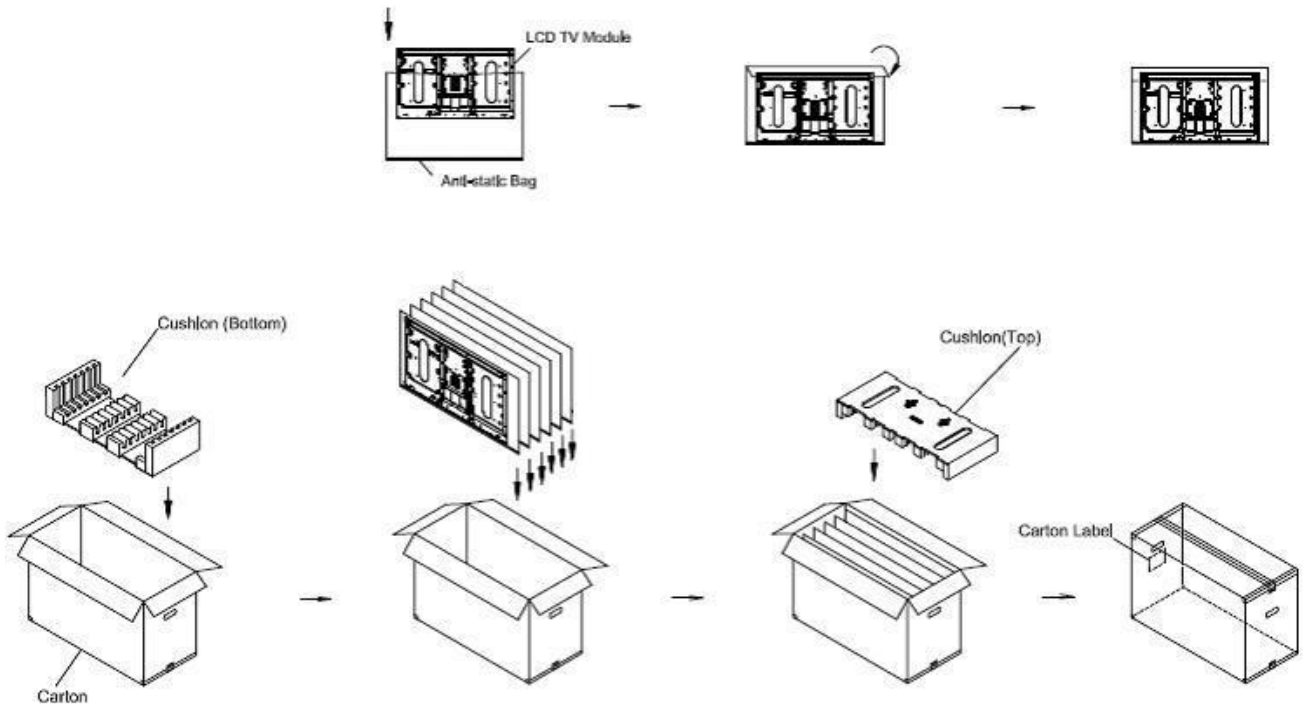
### 8.0 PACKING INFORMATION

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.

#### 8.1 Packing Specifications

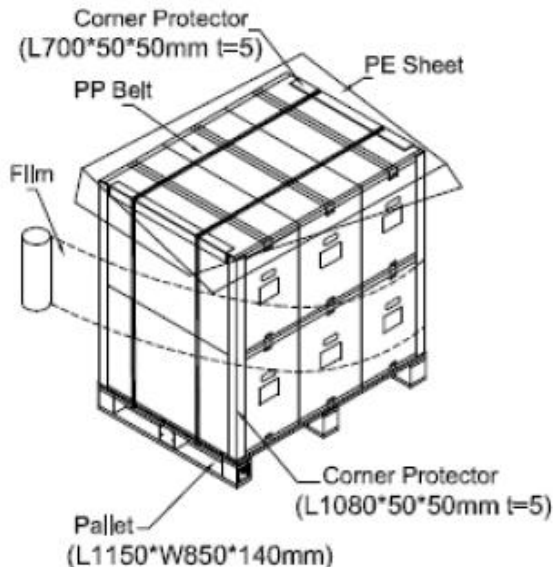
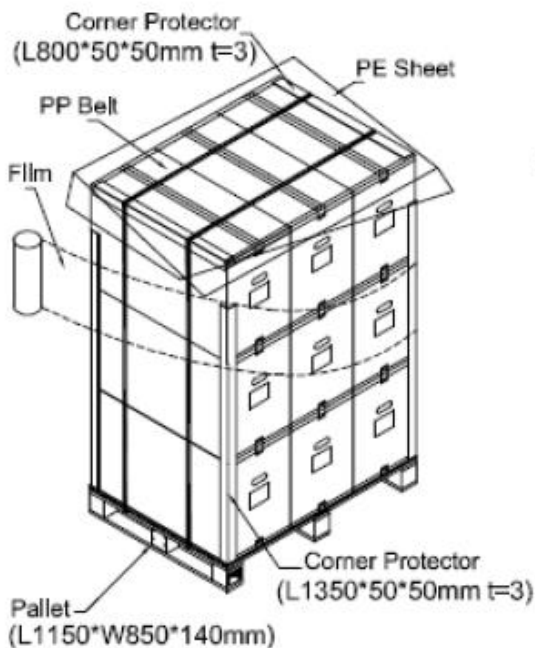
- (1) 6LCD TV modules / 1 Box
- (2) Box dimensions: 820(L) x375(W) x520(H)mm
- (3) Weight: approximately 36Kg (6 modules per box)

#### 8.2 Packing Method



Sea / Land Transportation  
(40ft Container)

Air Transportation



Sea / Land Transportation  
(40ft HQ Container)

Figure. 9-2 Packing method

### 8.3 Box Label

- Label Size : 110 mm (L) × 55 mm (W)

- Contents

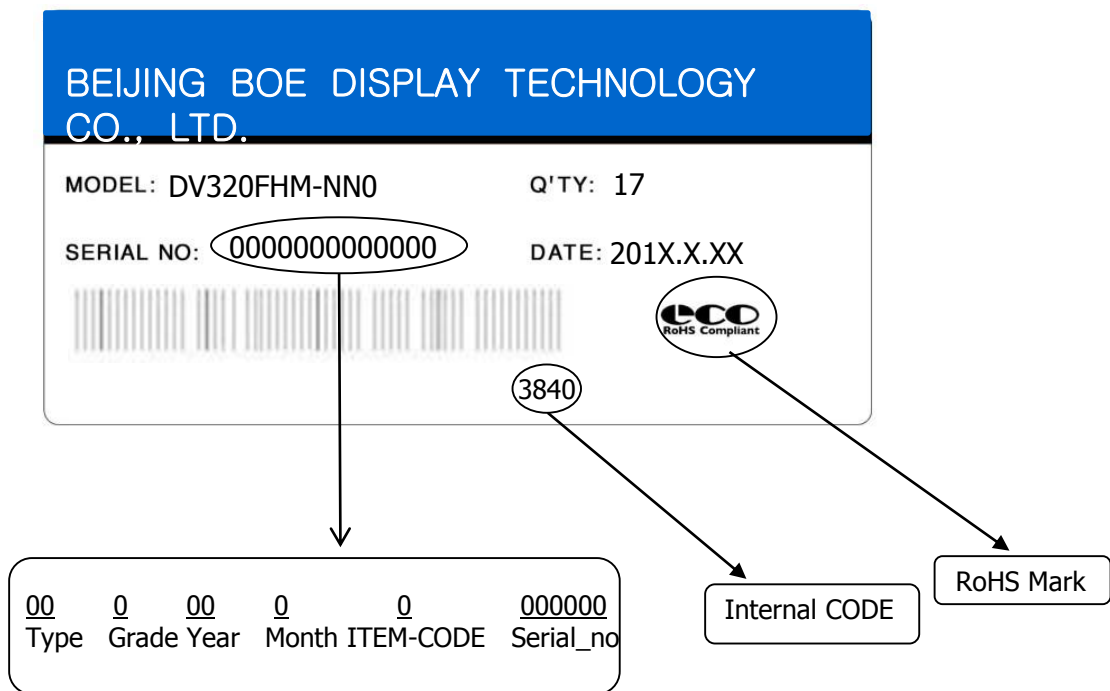
Model : DV320FHM-NN0

Q`ty : 6Pcs

Serial No. : Box Serial No. See next page for detail description.

Date : Packing Date

FG Code : FG Code of Product



## 9.0 HANDLING & CAUTIONS

### 9.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) It is recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) Do not apply pressure or impulse to the module to prevent the damage of LCD panel and backlight.
- (4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.
- (5) Do not plug in or pull out the I/F connector while the module is in operation.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) Moisture can easily penetrate into LCD module and may cause the damage during operation.
- (9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD modules in the specified storage conditions.

### 9.2 SAFETY PRECAUTIONS

- (1) The operation voltage of a backlight is over 60 Volts. It may cause an electrical shock while assembling with the power. Do not disassemble the module or insert anything into the backlight unit.
- (2) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (3) After the module's end of life, it is not harmful in case of normal operation and storage.

### 9.3 STORAGE PRECAUTIONS

When storing modules as spares for a long time, the following precaution is necessary.

- (1) Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35°C at normal humidity without condensation.
- (2) The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.

TFT-LCD Module Outline Dimensions(Front View)

