

TITLE : DV650QUM-N00
Product Preliminary Specification
Rev.P2

HEFEI BOE Display TECHNOLOGY CO. LTD

SPEC. NUMBER
S8-64-AA-042

PRODUCT GROUP
TFT-LCD

Rev. P2

ISSUE DATE
2019.03.14

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REVISION HISTORY

() preliminary specification

(√) Final specification

Revision No.	Page	Description of changes	Date	Prepared
P0	Total Page	Initial Release	2019.01.03	DONG WENBO
P1	4/20/26/27	Update Power Consumption /Luminance Variation/Packing/ DEFINITION OF LABELS	2019.03.07	DONG WENBO
P2	26	Update Luminance Test Method	2019.03.14	DONG WENBO
...				

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1. GENERAL DESCRIPTION

The DV650QUM-N00 is a Color Active Matrix Liquid Crystal Display with LED backlight system. The matrix employs a-Si Thin Film Transistor as the active element. It is a transmissive display type which is operating in the normally black mode. It has a 64.5 inch diagonally measured active display area with UHD resolutions (3840 horizontal by 2160 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this open cell can display 1.07G colors.

It is intended to support LCD TV, PCTV where high brightness, super wide viewing angle, high color gamut, high color depth and fast response time are important

General Features

Active Screen Size	64.53 inches diagonal (1428.48(H)×803.52(V))	
Pixel Pitch	0.372(H) x0.372(V)	
Pixel Format	3840 (H) x2160(V)	
Color Depth	8bit+FRC, 1.07G colors	
Luminance, White	TYP 500 nits	
Viewing Angle (CR>10)	Viewing angle free (R/L 178 (Typ.), U/D 178 (Typ.))	
Power Consumption	Total	Typ:229.6 , Max:280.8
	Logic	Typ:12W ,Max:36W
	BLU	Typ:217.6 ,Max:244.8
Display Mode	Normally black	
Surface Treatment	Haze 1%, 3H, Anti-glare treatment (Front Polarizer) Haze 1%, 3H, Anti-glare treatment (Bottom Polarizer)	
Lift Time	50000 Hrs	
Remark	7*24 Hrs Continuous Operation Landscape and portrait Display(Counterclockwise when placed vertically)	

MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	1449.48	1450.48	1451.48	mm	
	Vertical(V)	824.42	825.42	826.42	mm	
	Depth(D)	31	32	33	mm	
Weight			18.89		kg	

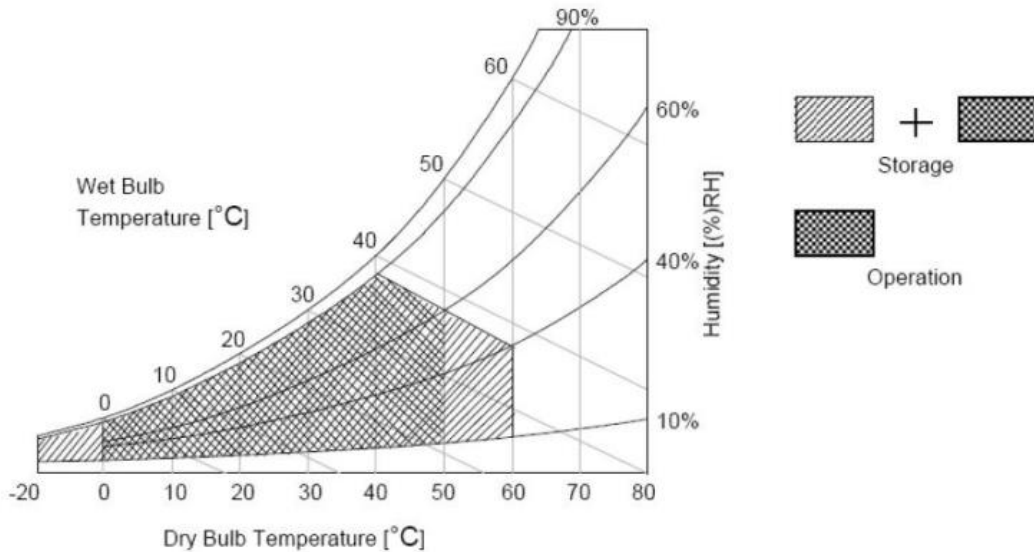
2. Absolute Maximum Ratings

The following items are maximum values which, if exceeded, may cause faulty operation or damage to the LCD module.

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Value		Unit	Note
			Min	Max		
Backlight Input Voltage	LED Bar Circuit	VBL	98.6	122.4	VRMS	
Operating Temperature		TOP	0	+50	°C	1
Storage Temperature		TST	-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.
 Note 2 : Wet bulb temperature should be 39 °C max. and no condensation of water.



3. 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	-	-	1140	mV		
Power Supply Current	IDD	-	800	2000	mA	Note 1	
Power Consumption	PDD	-	9.6	26.4	Watt		
Rush current	IRUSH	-	-	10	A	Note 2	
V by One Interface	Differential Input High Threshold Voltage	VLVTH	-	-	+50	mV	-
	Differential Input Low Threshold Voltage	VLVTL	-50	-	-	mV	-
	Common Input Voltage	VLVC	-	-	-	V	-
	Terminating Resistor	Rt	90	100	110	ohm	-
CMOS Interface	Input High Threshold Voltage	VIH	-	2.31	-	V	
	Input Low Threshold Voltage	VIL	0.8	-	-	V	

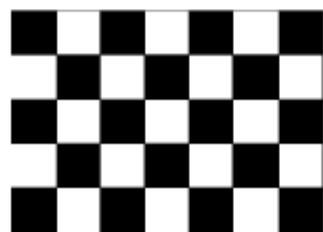
Note 1 : The supply voltage is measured and specified at the interface connector of LCM.

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

Frame rate $f_v=60\text{Hz}$ and Clock frequency = 74.25MHz.

Test Pattern of power supply current

Note 2 : The duration of rush current is about 2ms and rising time of Power Input is 0.5ms(m in)



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



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



c) Flicker Test Pattern

3.2 Backlight Module

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

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Forward Voltage	V	98.6	108.8	122.4	V	
Forward Current	I	-	2000	-	mA	
Power consume	W	197.2	217.6	244.8	W	
Life Time	L	50,000	-	-	Hrs	1

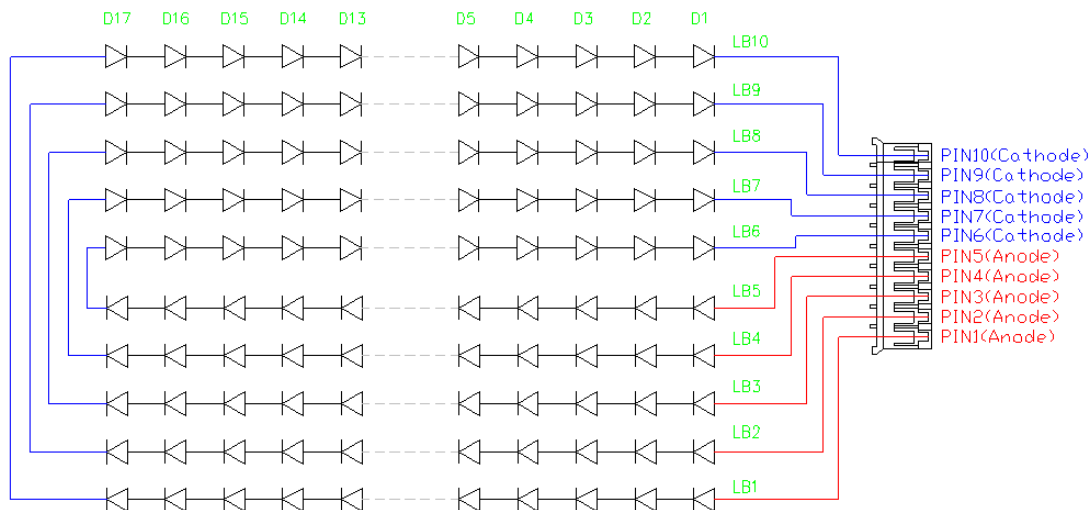
Note

(1) The lifetime is defined as the time which luminance of the LED decays to 30% compared to the initial value, Operating condition: Continuous operating at Ta = 25±2°C

-LED Bar Block Diagram

LED Numbers: 20bar / BLU

Total : 170LED / BLU



3.3 LED Constant current source LED

3.3.1 Input Electrical Characteristics

Input voltage	22Vdc to 26Vdc
Input current	Max.12A at 24Vdc input and full load

3.3.2 Output electrical characteristics

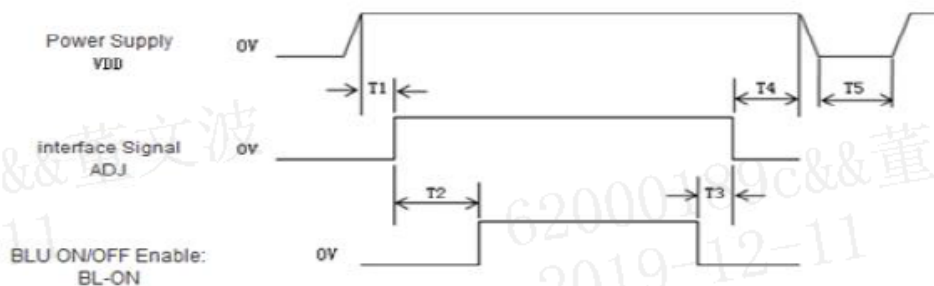
Output Power	Max. 244.8W			
Output Channel	Min Voltage	Type Voltage	Max. Voltage	Output current
LED	98.6V	108.8V	122.4V	400mA*5

The parameter of upon will change when the LCD module changes

3.3.3 Timing

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.



Sequence Table

Parameter	Values			Units
	Min	Typ	Max	
T1	50	—	—	ms
T2	350	—	—	ms
T3	10	—	—	ms
T4	200	—	—	ms
T5	1	—	—	μs

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

3.3.3 Pin assignments

(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 \geq 2.5)	
13	ADJ	Dimming contro	0V=Brightness Max
		1	5V=Brightness Min

CON2 (Type: pitch 2.0mm)

PIN (Pin number)	(Symbol)	(Function)
	LED+	LED+ OUTPUT
6, 7, 8, 9, 10	LED-	LED- OUTPUT

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 back lighting. The signal level must be between 0-5V.

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.

SAMPLE TEST REPORT

CUSTOMER:

MOOEL NO.

XY-CC6575H

1.Input Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Remark	Spec.Limit	Pass/Fail
Input Voltage	Vin	20	24	26	V	Input DC	21.5~25V	Pass
Input Current	Iin		10	12.5	A	Vadj=0V	5~12.5 A	Pass
Input Power	Pin		244.8	300	W		130~300W	Pass
Input Voltage ON/offcontrol	Von/Off	2.5~5	2.5~5	2.5~5	V	On	2.5~5V	Pass
		0~0.5	0~0.5	0~0.5	V	Off	0~0.5V	Pass

2.Output Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Remark	Spec.Limit	Pass/Fail
Output Voltage	+	60	122.8	185	V		60~185	Pass
Output Current	+		400	500	mA		390~500	Pass

Low temperature test

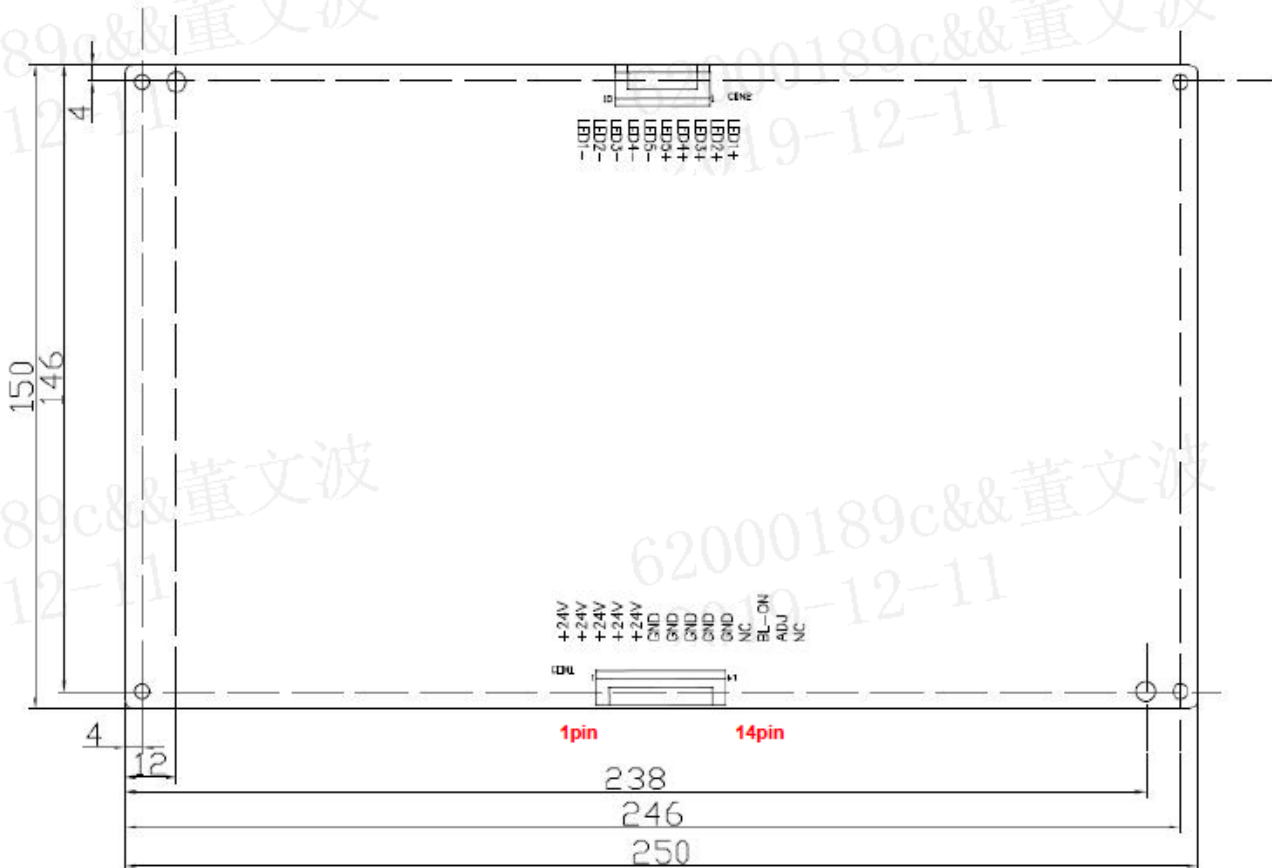
0°C,(24VDC±10%) The sample OK

Please do not live in the assembly of the product, so as to avoid short circuit caused the product damage and other circuit board fault
 Use this product to correspond to the required voltage, current parameter, otherwise cause the load capacity is insufficient or excessive flow, the impact of LED life

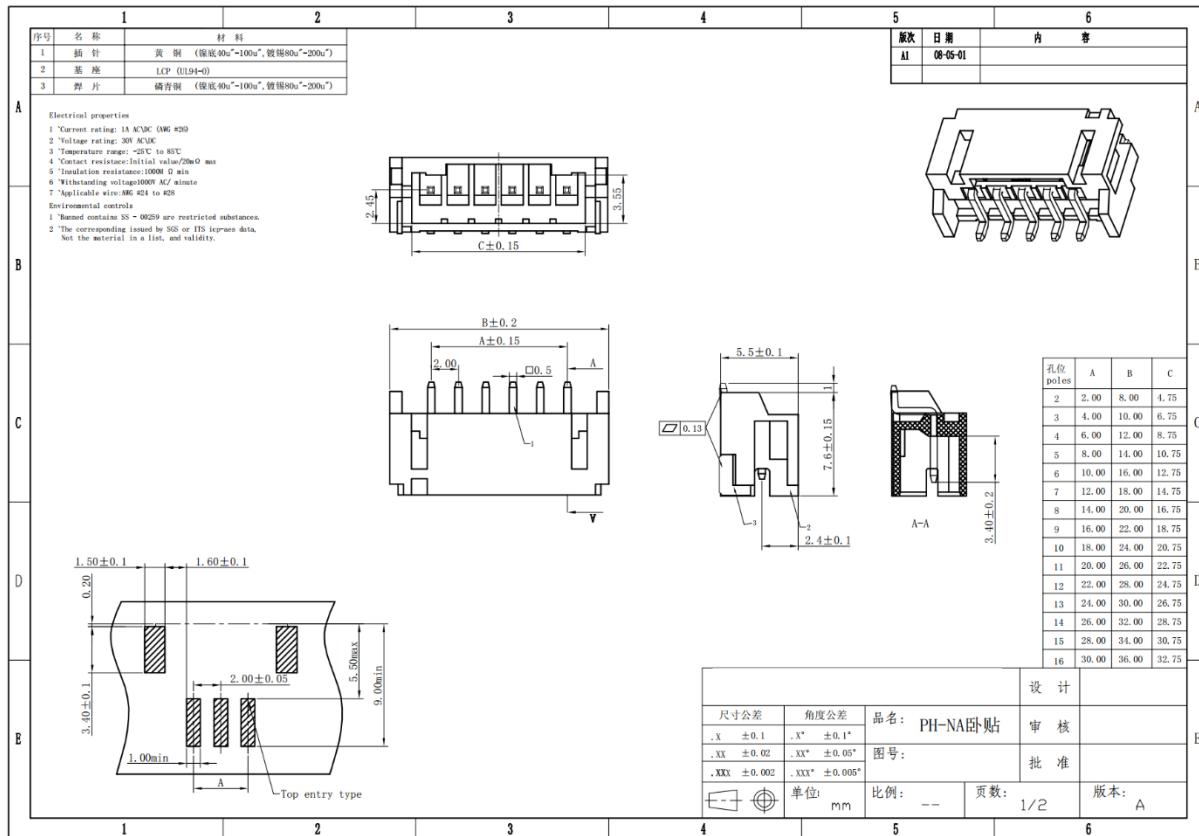
3.3.4 Mechanical Dimension

Dimensions	Dimensions: 250mm (L) *150m (W) *12mm (H)
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(Mounting)



3.3.5 Conector Type



Note

1. The Connector used in this product is 14Pin.
2. This Connector is used for Converter's input.

4. Interface Connections

4.1 Open Cell Input Signal& Power

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

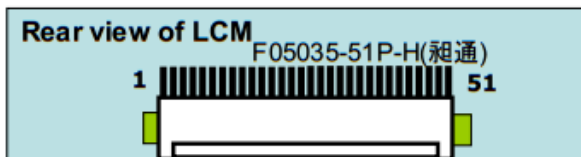
< Table 7. Open Cell Input Connector Pin Configuration >

Pin No	Symbol	Description	Pin No	Symbol	Description
1	VDD	Power Supply +12.0V	27	GND	Ground
2	VDD	Power Supply +12.0V	28	Rx0n	V-by-One HS Data Lane 0
3	VDD	Power Supply +12.0V	29	Rx0p	V-by-One HS Data Lane 0
4	VDD	Power Supply +12.0V	30	GND	Ground
5	VDD	Power Supply +12.0V	31	Rx1n	V-by-One HS Data Lane 1
6	VDD	Power Supply +12.0V	32	Rx1p	V-by-One HS Data Lane 1
7	VDD	Power Supply +12.0V	33	GND	Ground
8	VDD	Power Supply +12.0V	34	Rx2n	V-by-One HS Data Lane 2
9	NC	No Connection	35	Rx2p	V-by-One HS Data Lane 2
10	GND	Ground	36	GND	Ground
11	GND	Ground	37	Rx3n	V-by-One HS Data Lane 3
12	GND	Ground	38	Rx3p	V-by-One HS Data Lane 3
13	GND	Ground	39	GND	Ground
14	GND	Ground	40	Rx4n	V-by-One HS Data Lane 4
15	NC	No Connection	41	Rx4p	V-by-One HS Data Lane 4
16	NC	No Connection	42	GND	Ground
17	NC	No Connection	43	Rx5n	V-by-One HS Data Lane 5
18	SDA	Tcon_SDA_IN	44	Rx5p	V-by-One HS Data Lane 5
19	SCL	Tcon_SCL_IN	45	GND	Ground
20	NC	No Connection	46	Rx6n	V-by-One HS Data Lane 6
21	NC	No Connection	47	Rx6p	V-by-One HS Data Lane 6
22	Section	L : 1 division, H : 2 division Default: L	48	GND	Ground
23	NC	No Connection	49	Rx7n	V-by-One HS Data Lane 7
24	GND	Ground	50	Rx7p	V-by-One HS Data Lane 7
25	HTPDN	Hot plug detec	51	GND	Ground
26	LOCKN	Lock detect			

Note 1: NC (Not Connected) : This pins are only used for BOE internal operations.

Note 2: BIST : This pin is used for selecting display pattern mode when input DE or input CLOCK quits toggling.

BIST Pattern



PT1: Black (2 sec)	PT2: White (2 sec)	PT3: Red (2 sec)	PT4: Green (2 sec)	PT5: Blue (2 sec)

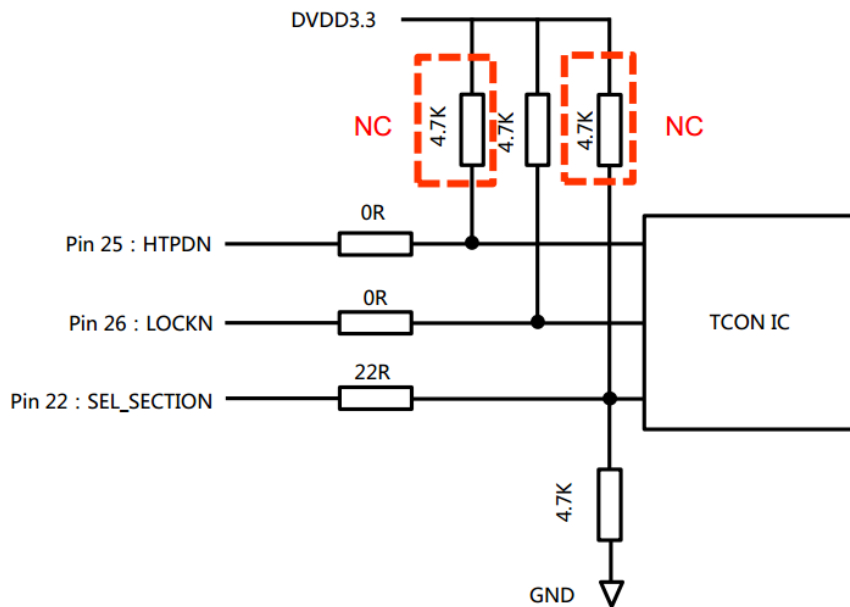
4. Interface Connections

4.1 Open Cell Input Signal& Power

Notes : 1. NC (Not Connected) : This pins are only used for BOE internal operations.

2.BIST : This pin is used for selecting display pattern mode when input DE or input CLOCK quits toggling.

3. Circuit Block Diagram of HTPDN/LOCKN/SEL_SECTION.



4. Interface Connections

4.2 V by one Misc. Setting.-1 Section

- a) System side have to put pull high resistor on LOCKN/HTPDN pins.
- b) V by one data mapping as follows.

< Table 8. V by one setting &data mapping Table >

1 Section								
Hactive = 3840								
	Port0		Port1		Port2		Port3	
V Blanking	Lane0	Lane1	Lane2	Lane3	Lane4	Lane5	Lane6	Lane7
	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS
	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP

	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP
Line 1	FSBE SR	FSBE SR	FSBE SR	FSBE SR	FSBE SR	FSBE SR	FSBE SR	FSBE SR
	Pixel 1	Pixel 2	Pixel 3	Pixel 4	Pixel 5	Pixel 6	Pixel 7	Pixel 8
	Pixel 9	Pixel 10	Pixel 11	Pixel 12	Pixel 13	Pixel 14	Pixel 15	Pixel 16

H Blanking	Pixel 3833	Pixel 3834	Pixel 3835	Pixel 3836	Pixel 3837	Pixel 3838	Pixel 3839	Pixel 3840
	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS
	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP

	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP
Line 2	FSBE	FSBE	FSBE	FSBE	FSBE	FSBE	FSBE	FSBE
	Pixel 1	Pixel 2	Pixel 3	Pixel 4	Pixel 5	Pixel 6	Pixel 7	Pixel 8
	Pixel 9	Pixel 10	Pixel 11	Pixel 12	Pixel 13	Pixel 14	Pixel 15	Pixel 16

	Pixel 3833	Pixel 3834	Pixel 3835	Pixel 3836	Pixel 3837	Pixel 3838	Pixel 3839	Pixel 3840

4. Interface Connections

4.3 V by one Misc. Setting.-2 Section

- a) System side have to put pull high resistor on LOCKN/HTPDN pins.
- b) V by one data mapping as follows.

< Table 9. V by one setting & data mapping Table >

2 Section								
Hactive = 3840								
	Port0		Port1		Port2		Port3	
	Lane0	Lane1	Lane2	Lane3	Lane4	Lane5	Lane6	Lane7
V Blanking	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS
	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP

	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP
	FSBE SR	FSBE SR	FSBE SR	FSBE SR	FSBE SR	FSBE SR	FSBE SR	FSBE SR
Line 1	Pixel 1	Pixel 2	Pixel 3	Pixel 4	Pixel 1921	Pixel 1922	Pixel 1923	Pixel 1924
	Pixel 5	Pixel 6	Pixel 7	Pixel 8	Pixel 1925	Pixel 1926	Pixel 1927	Pixel 1928

	Pixel 1917	Pixel 1918	Pixel 1919	Pixel 1920	Pixel 3837	Pixel 3838	Pixel 3839	Pixel 3840
H Blanking	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS
	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP

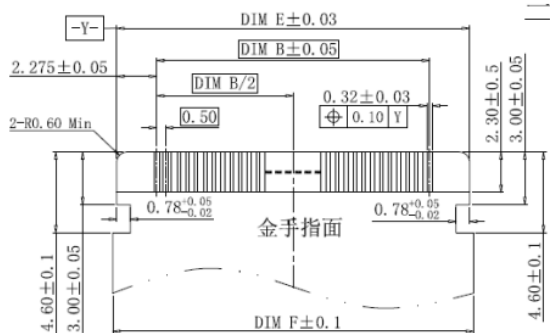
	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP
	FSBE	FSBE	FSBE	FSBE	FSBE	FSBE	FSBE	FSBE
Line 2	Pixel 1	Pixel 2	Pixel 3	Pixel 4	Pixel 1921	Pixel 1922	Pixel 1923	Pixel 1924
	Pixel 5	Pixel 6	Pixel 7	Pixel 8	Pixel 1925	Pixel 1926	Pixel 1927	Pixel 1928

	Pixel 1917	Pixel 1918	Pixel 1919	Pixel 1920	Pixel 3837	Pixel 3838	Pixel 3839	Pixel 3840

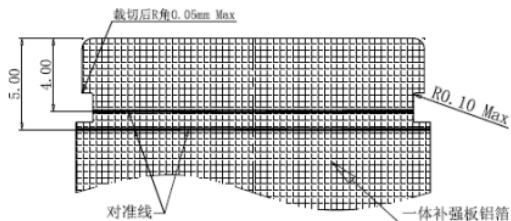
4. Interface Connections

4.4 TCON Board Input CNT & FFC Drawing

-FFC Drawing

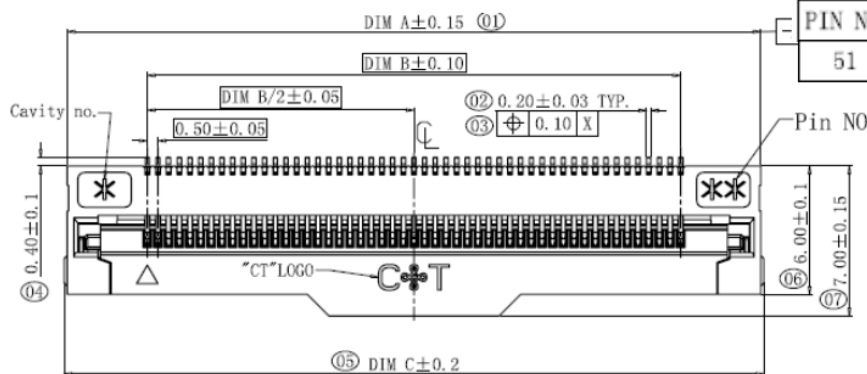


PIN NO.	DIM B	DIM E	DIM F
51	25.00	29.55	30.00

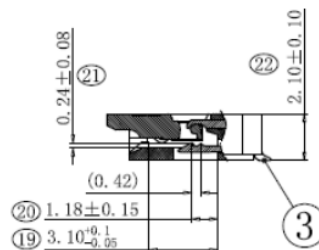
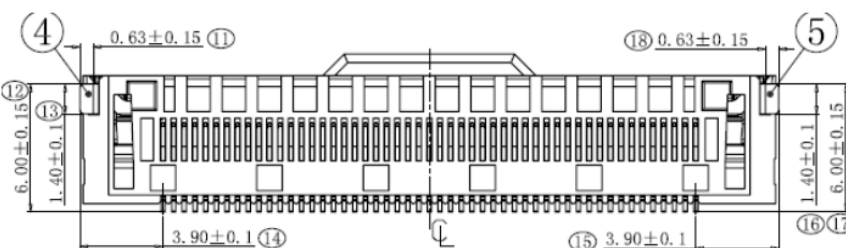
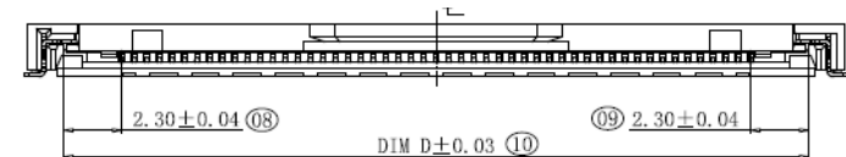
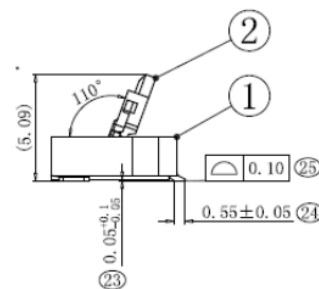


Note 1: This FFC drawing are supplied by the connector vendor.

-51pin Connector Drawing



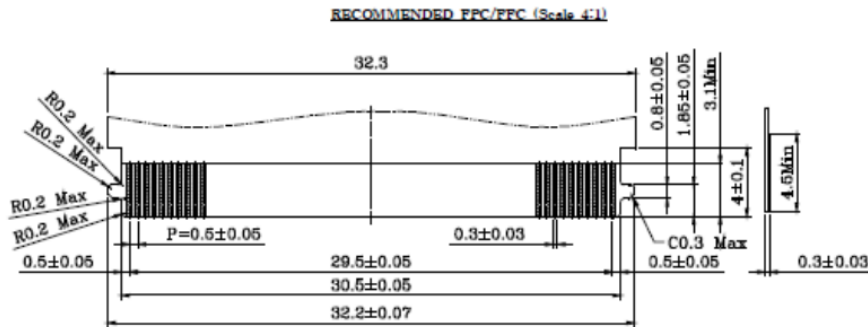
PIN NO.	DIM A	DIM B	DIM C	DIM D
51	32.50	25.00	32.80	29.60



4. Interface Connections

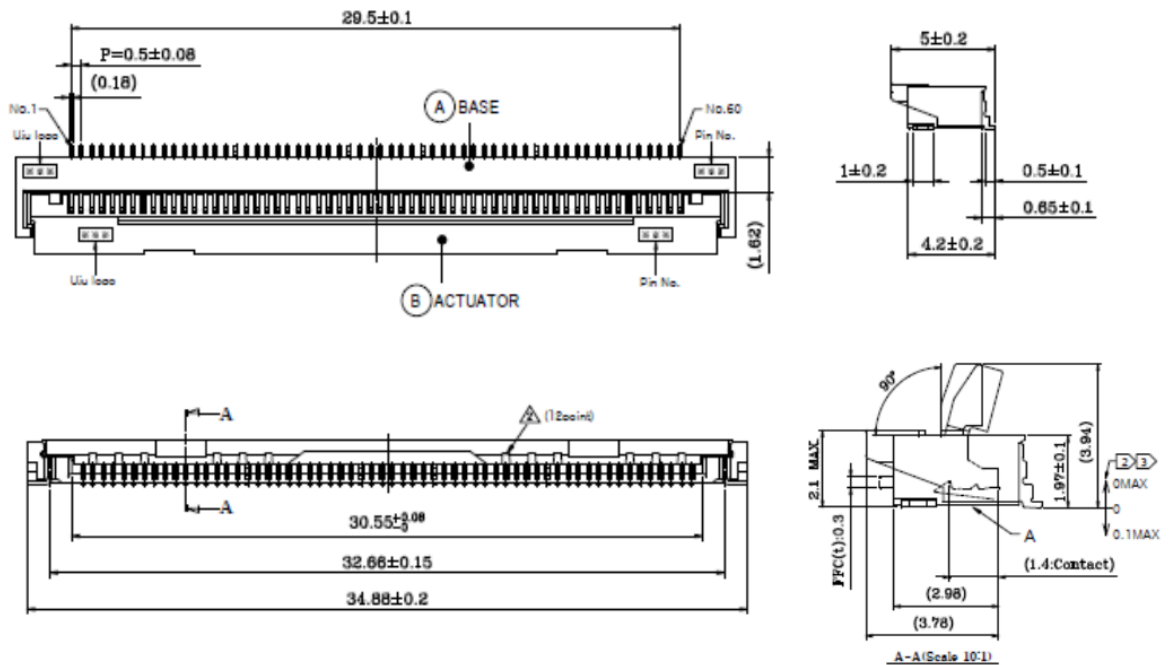
4.6 XPCBA CNT & FPC Drawing

-FPC Drawing



Note 1: This FPC drawing are supplied by the connector vendor.

-60pin Connector Drawing



5. SIGNAL TIMING SPECIFICATION

5.1 Timing Parameters

< Table 12. Timing Table >

Item		Symbols	Min	Typ	Max	Unit
Frequency		1/Tc	69	74.25	78	MHz
Vertical	Frame Rate	F	57	60	62	Hz
	Total	T _V	2180	2250	2450	T _H
	Display	T _{VD}	2160			T _H
	Blank	T _{VB}	20	90	290	T _H
Horizontal	Total	T _H	530	550	570	T _{CLK}
	Display	T _{HD}	-	480	-	T _{CLK}
	Blank	T _{HB}	50	70	90	T _{CLK}

Item		Symbols	Min	Typ	Max	Unit
Frequency		1/Tc	69	74.25	78	MHz
Vertical	Frame Rate	F	47	50	51	Hz
	Total	T _V	2180	2700	2715	T _H
	Display	T _{VD}	2160			T _H
	Blank	T _{VB}	20	540	555	T _H
Horizontal	Total	T _H	530	550	570	T _{CLK}
	Display	T _{HD}	-	480	-	T _{CLK}
	Blank	T _{HB}	50	70	90	T _{CLK}

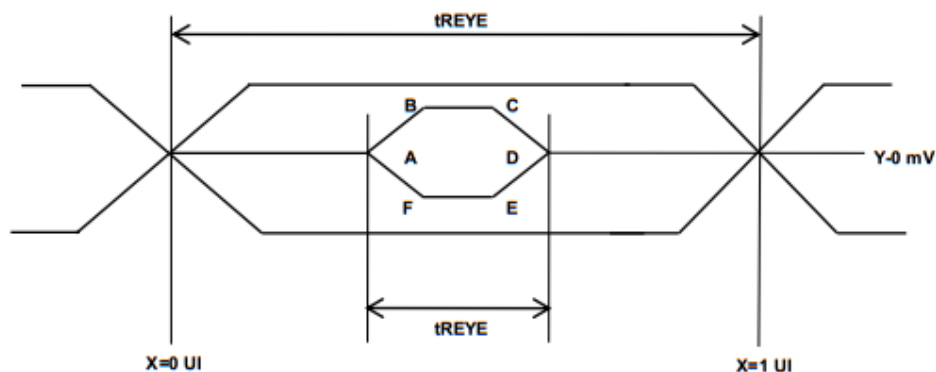
Note 1: This product is DE only mode. The input of Hsync & Vsync signal does not have an effect on normal operation.

5. SIGNAL TIMING SPECIFICATION

5.2 V by one Input Signal Timing

< Table 11. Signal Timing Table >

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Unit Interval(VBO Operation Bit Rate)	tRBIT	3-byte	380	tTCIP/30	1667	PS
		4-byte	285	tTCIP/40	1250	PS
		5-byte	266	tTCIP/50	1000	PS
Eye Width at Package Pin	tREYE	-	-	1	-	UI
Eye Width Position A at Package Pin	tA	-	-	0.25	-	UI
Eye Width Position B at Package Pin	tB	-	-	0.3	-	UI
Eye Width Position Cat Package Pin	tC	-	-	0.7	-	UI
Eye Width Position D at Package Pin	tD	-	-	0.75	-	UI
Eye Width Position E at Package Pin	tE	-	-	0.7	-	UI
Eye Width Position F at Package Pin	tF	-	-	0.3	-	UI
Intra – pair Skew	TTOSK_intra	-	-0.3	-	0.3	UI
Inter – pair Skew	TTOSK_inter	-	-5	-	5	UI
SSCG	-	30KHz modulation	-0.5	-	0.5	%



5. SIGNAL TIMING SPECIFICATION

5.3 V by one data mapping

< Table 8. V by one setting & data mapping Table >

I Section								
Hactive = 3840								
	Port0		Port1		Port2		Port3	
	Lane0	Lane1	Lane2	Lane3	Lane4	Lane5	Lane6	Lane7
V Blanking	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS
	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP

	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP
	FSBE_SR	FSBE_SR	FSBE_SR	FSBE_SR	FSBE_SR	FSBE_SR	FSBE_SR	FSBE_SR
Line 1	Pixel 1	Pixel 2	Pixel 3	Pixel 4	Pixel 5	Pixel 6	Pixel 7	Pixel 8
	Pixel 9	Pixel 10	Pixel 11	Pixel 12	Pixel 13	Pixel 14	Pixel 15	Pixel 16

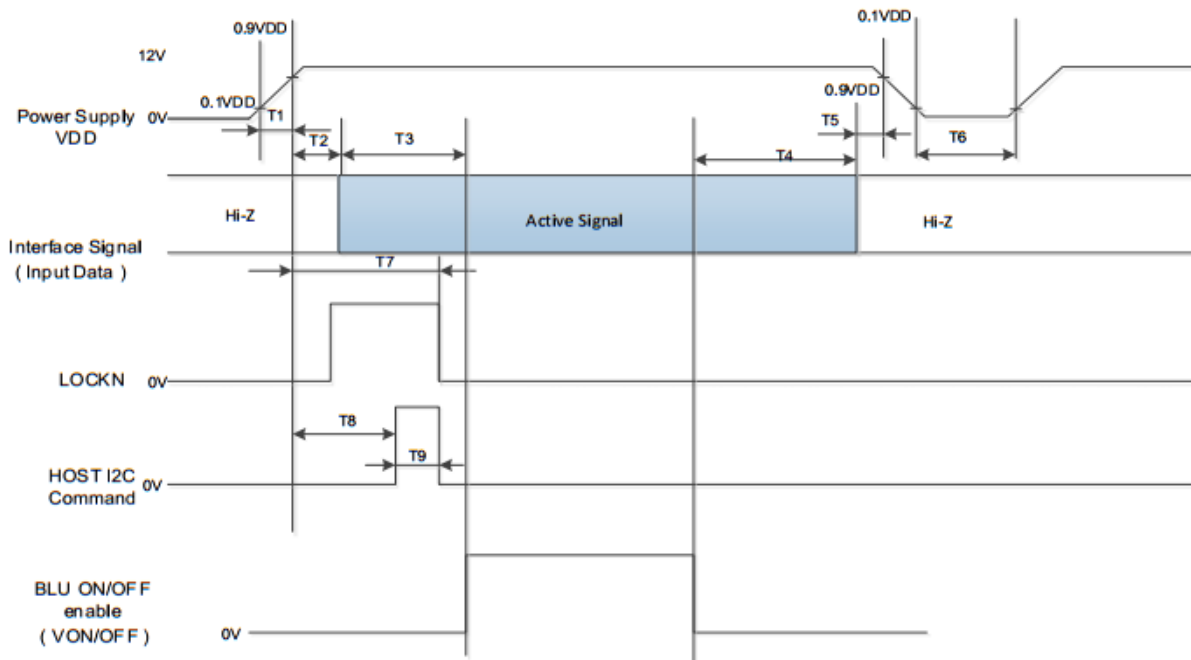
	Pixel 3833	Pixel 3834	Pixel 3835	Pixel 3836	Pixel 3837	Pixel 3838	Pixel 3839	Pixel 3840
H Blanking	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS	FSBS
	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP

	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP	FSBP
	FSBE	FSBE	FSBE	FSBE	FSBE	FSBE	FSBE	FSBE
Line 2	Pixel 1	Pixel 2	Pixel 3	Pixel 4	Pixel 5	Pixel 6	Pixel 7	Pixel 8
	Pixel 9	Pixel 10	Pixel 11	Pixel 12	Pixel 13	Pixel 14	Pixel 15	Pixel 16

	Pixel 3833	Pixel 3834	Pixel 3835	Pixel 3836	Pixel 3837	Pixel 3838	Pixel 3839	Pixel 3840

5. SIGNAL TIMING SPECIFICATION

5.5 Power Sequence



< Table 14. Sequence Table >

Parameter	Values			Units
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0	-	-	ms
T3	200	-	-	ms
T4	100	-	-	ms
T5	0	-	-	ms
T6	1	-	-	s
T7	-	-	200	ms
T8	0	-	1200	ms
T9	Depends on I2C command			ms

Note 1: Even though T1 is over the specified value, there is no problem if I2T spec of fuse is satisfied.

Note 2: Even though T4 is over the specified value, there is no problem if I2T spec of fuse is satisfied.

Note 3: Back Light must be turn on after power for logic and interface signal are valid.

Note 4: HTPN(Hotplug) signal is pulled low on Tcon Board.

6. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable in a dark environment at $25 \pm 2^\circ$ 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 concerning the measurement equipment and method in FIG. 1.

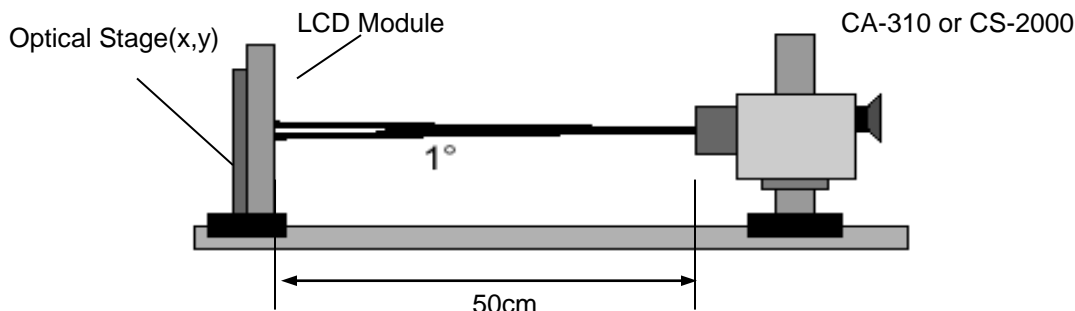


FIG. 1 Optical Characteristic Measurement Equipment and Method

Table 9. OPTICAL CHARACTERISTICS

$T_a = 25 \pm 2^\circ\text{C}$, $I_f = 500\text{mA}$, Aging=30Min

Parameter	Symbol	Value			Unit	Note	
		Min	Typ	Max			
Contrast Ratio	CR	800	1200	-		1	
Surface Luminance, white	L_{WH}	450	500	-	cd/m ²	2	
Luminance Variation	δ_{WHITE} 9P	71	75	-	%	3	
Response Time	Gray-to-Gray	G to G	-	8	10	ms	4
Color Coordinates [CIE1931]	RED	Rx		0.63			
		Ry		0.33			
	GREEN	Gx		0.29			
		Gy	Typ -0.03	0.61	Typ +0.03		
	BLUE	Bx		0.15			
		By		0.06			
	WHITE	Wx		0.28			
Wy			0.29				
Color Uniformity	WHITE	$\Delta Wy, \Delta Wy$	-	-	0.015		7
Color Gamut			72		%	NTSC	
Color Temperature			8000	-	12000	K	
Viewing Angle (CR>10)							
	x axis, right ($\phi=0^\circ$)	θ_r	-	89	-	degree	5
	x axis, left ($\phi=180^\circ$)	θ_l	-	89	-		
	y axis, up ($\phi=90^\circ$)	θ_u	-	89	-		
	y axis, down ($\phi=270^\circ$)	θ_d	-	89	-		
Gray Scale			-	-	-		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 $25 \pm 2^\circ\text{C}$. 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 :

$$\delta \text{ WHITE}(9\text{P}) = \frac{\text{Minimum}(L_{\text{on}1}, L_{\text{on}2}, L_{\text{on}3}, L_{\text{on}4}, L_{\text{on}9})}{\text{Maximum}(L_{\text{on}1}, L_{\text{on}2}, L_{\text{on}3}, L_{\text{on}4}, L_{\text{on}9})}$$

Where $L_{\text{on}1}$ to $L_{\text{on}9}$ 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)**

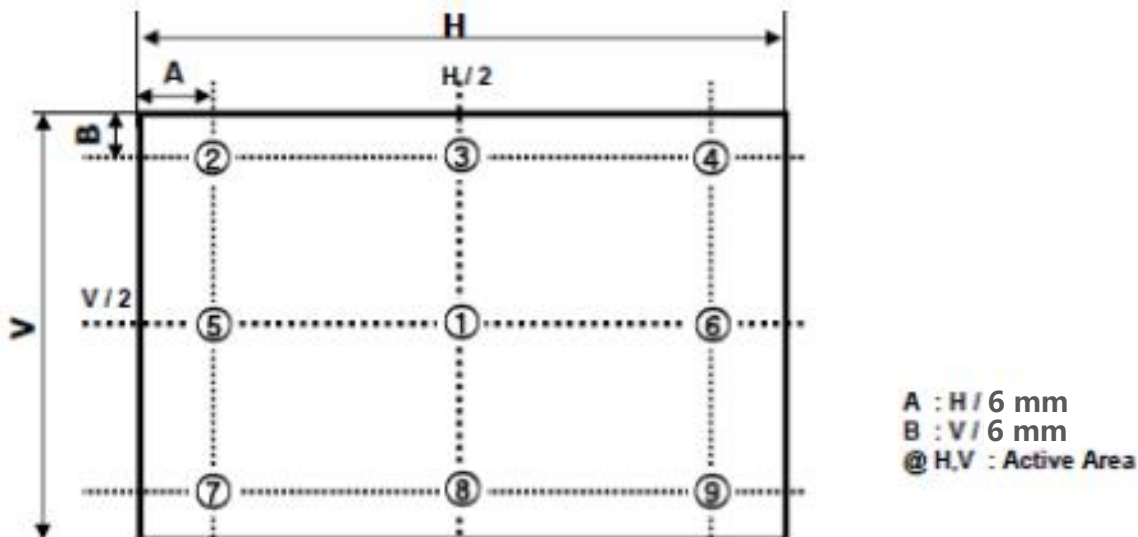


FIG. 2 9 Points for Luminance Measure

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

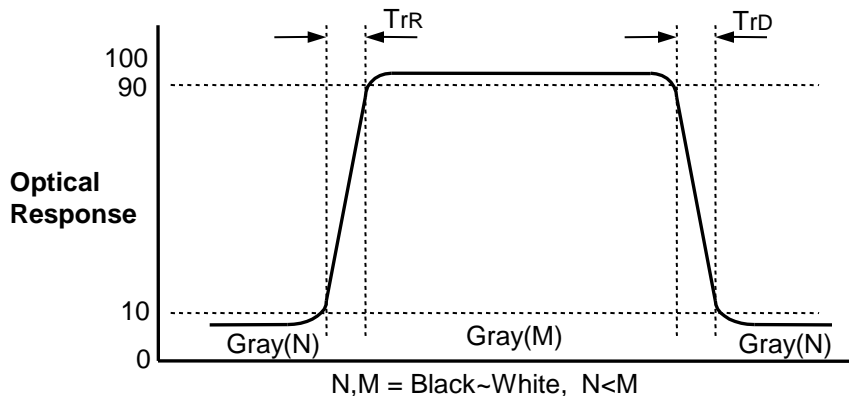


FIG. 3 Response Time

Definitions of viewing angle range

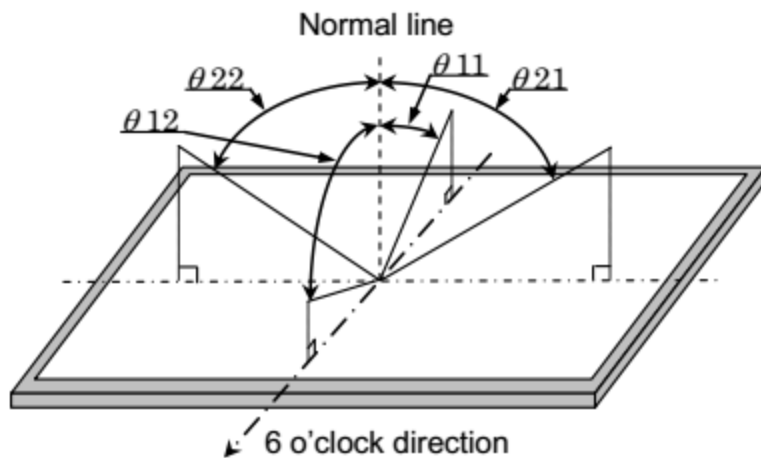
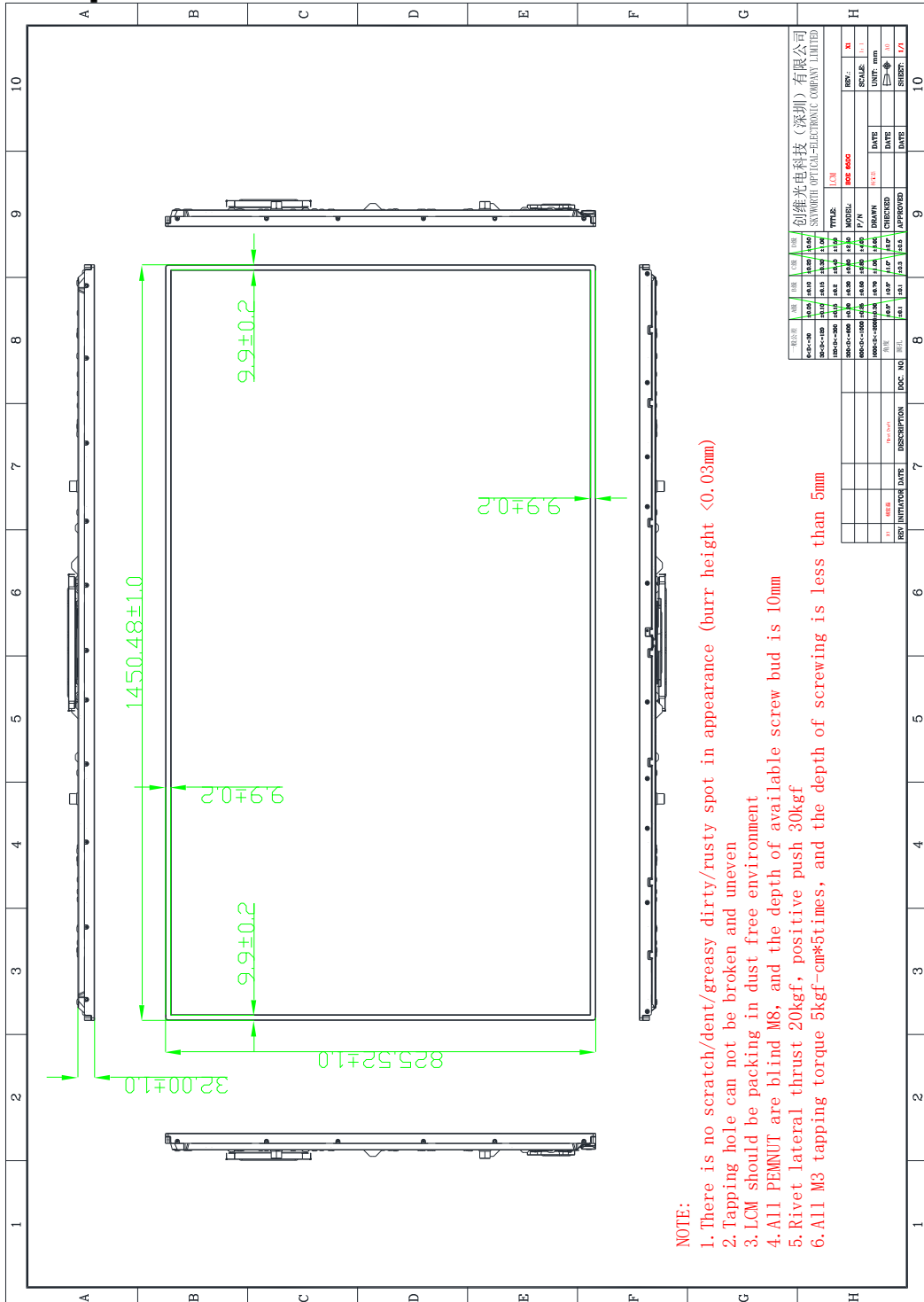


FIG. 4 Viewing Angle

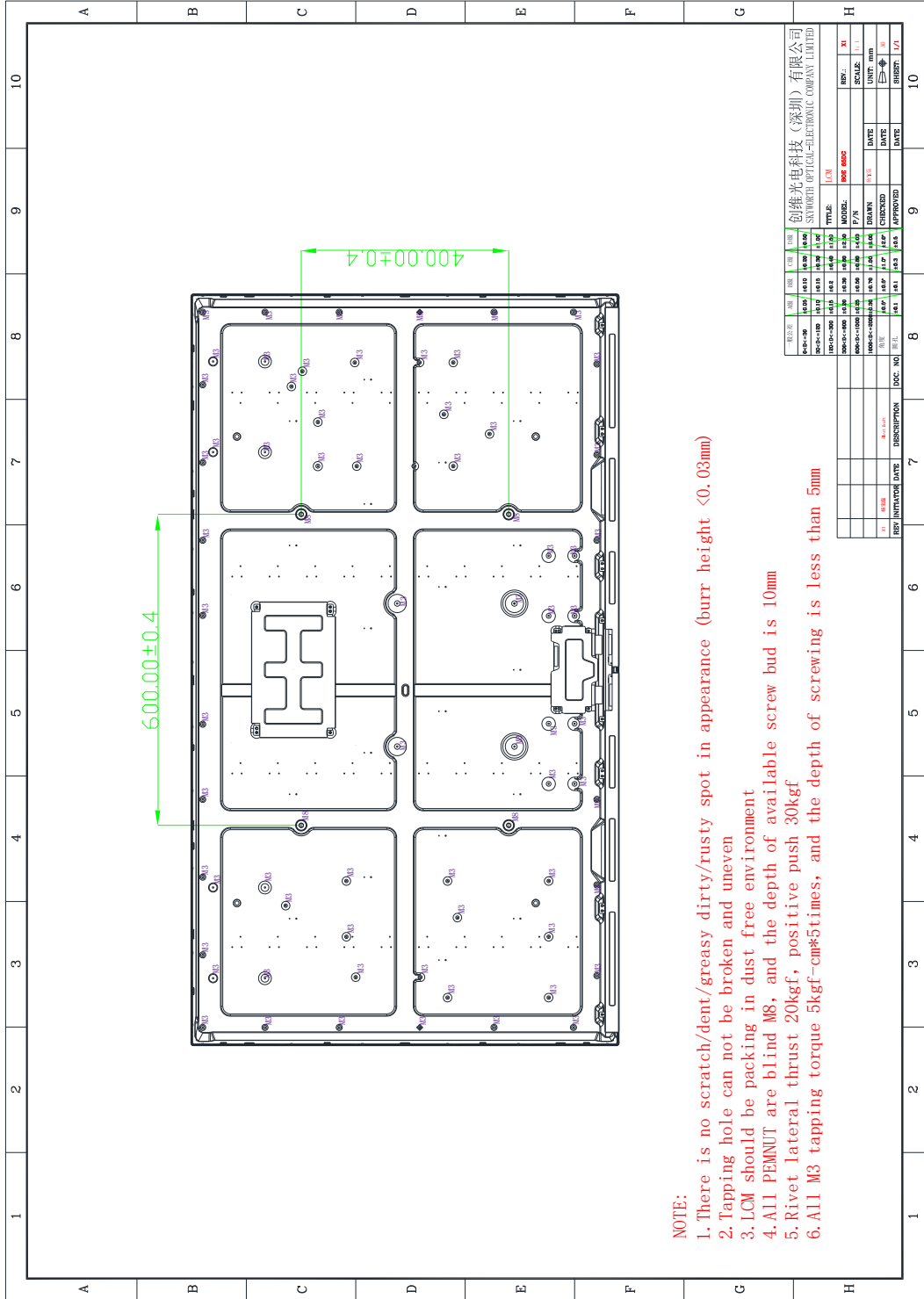
7. FRONT VIEW and REAR VIEW

[FRONT VIEW]



- NOTE:
1. There is no scratch/dent/greasy/dirty/rusty spot in appearance (burr height <0.03mm)
 2. Tapping hole can not be broken and uneven
 3. LCM should be packing in dust free environment
 4. All PEMNUT are blind M8, and the depth of available screw bud is 10mm
 5. Rivet lateral thrust 20kgf, positive push 30kgf
 6. All M3 tapping torque 5kgf-cm*5times, and the depth of screwing is less than 5mm

[REAR VIEW]



NOTE:

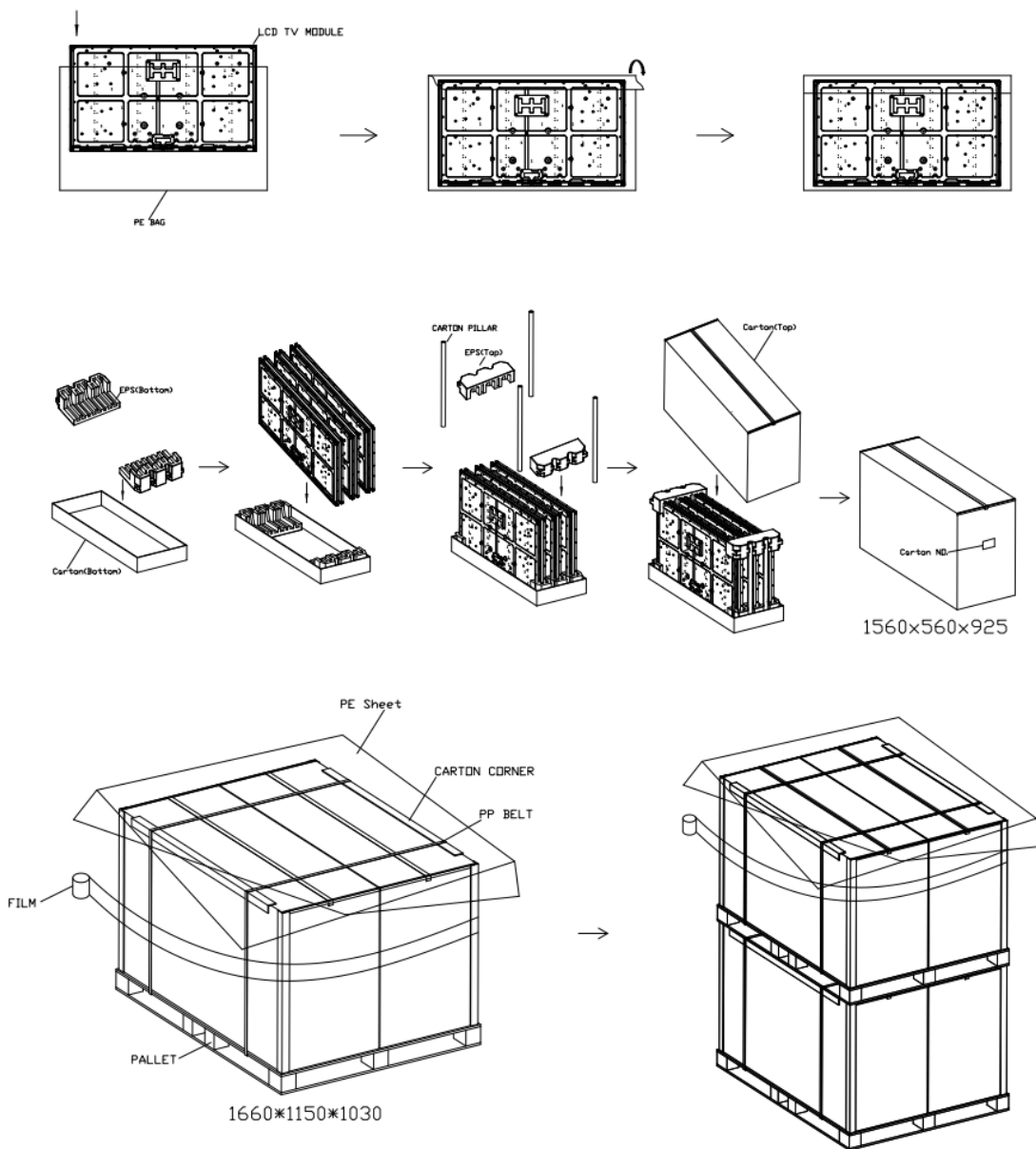
1. There is no scratch/dent/greasy dirty/rusty spot in appearance (burr height < 0.03mm)
2. Tapping hole can not be broken and uneven
3. LCM should be packing in dust free environment
4. All PEMNUT are blind M3, and the depth of available screw bud is 10mm
5. Rivet lateral thrust 20kgf, positive push 30kgf
6. All M3 tapping torque 5kgf-cm*5times, and the depth of screwing is less than 5mm

8. Packing

8.1 PACKING SPECIFICATIONS

- (1) 6LCD TV modules / 1 Box
- (2) Box dimensions: 1560(L) x560(W) x925(H)mm
- (3) Weight: approximately 121.745Kg (6 modules per box)

8.2 PACKING METHOD



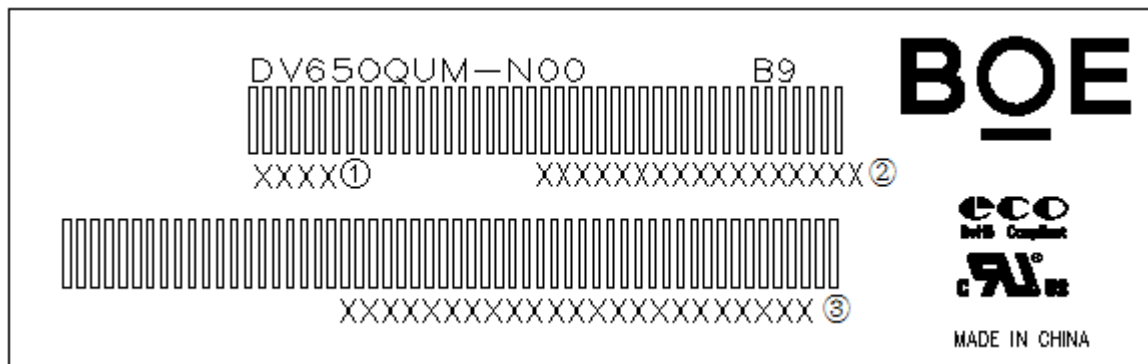
9. DEFINITION OF LABELS

MDL Label

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

Label Size: 80mm (L) ×25mm (W)

Label Picture :



①生产年份+生产周别；②MDL ID；③PPID

MDL ID Naming Rule:

Digit Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Code	S	L	S	9	1	6	3	5	9	4	2	0	A	A	0	0	0
Description	Model Code /GBN		Grade	Line	Year		Month	Model Extension Code (Last 4 Digits Of FG-CODE)				Serial No 00001-ZZZZZZ					

BOX Label

- Label Size : 110 mm (L) × 55 mm (W)
- Contents

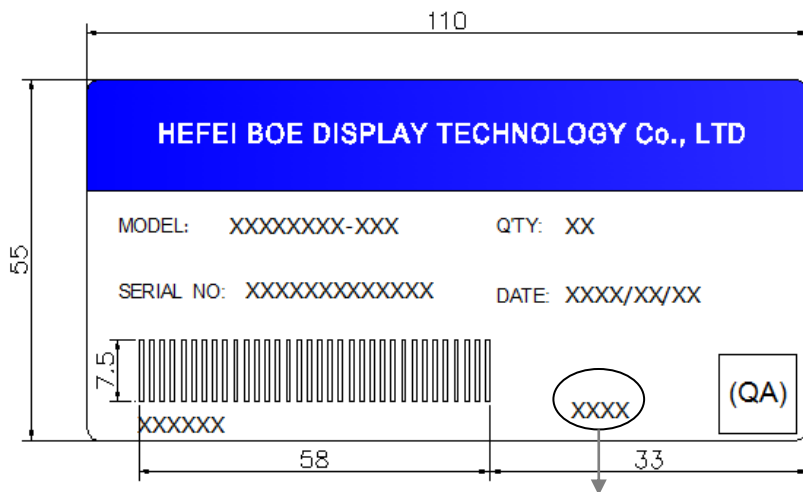
Model : DV650QUM-N00-D840 (FG-Code)

Q`ty : 6 LCM in one box.

Serial No. : Box Serial No.

Date : Packing Date

FG Code : FG Code of Product



Last four digits of FG-Code

Box ID Naming Rule:

Digit Code	1	2	3	4	5	6	7	8	9	10	11	12	13
Code	S	L	S	9	1	6	3	5	9	4	2	0	0
Description	Products GBN		Grade	Line	Year		Mon th	Revision Code	Serial No 00001-ZZZZZZ				