TITLE : HV750QUB-F9E

Product Specification

Rev.A

Hefei BOE Display Technology Co., Ltd.

REVISION HISTORY

( )preliminary specification
(√)Final specification

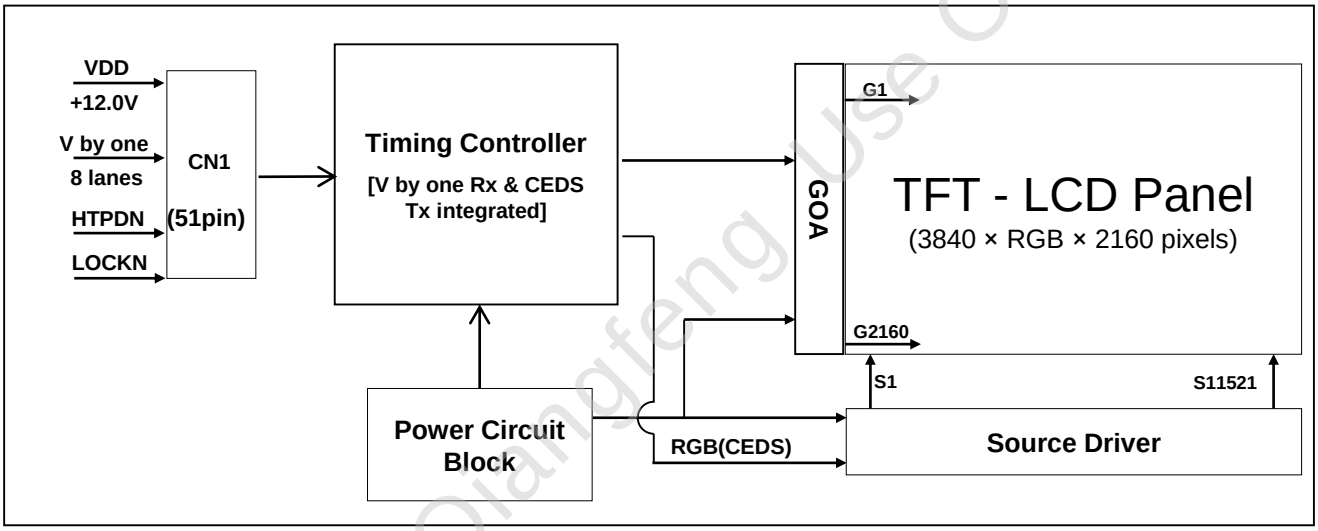
Revision No.	Page	Description of changes	Date	Prepared
P0	Total Page	Initial Release	2022.03.15	Lan Jian
O	Total Page	Final Release	2022.11.23	Lan Jian
A	17	Update 68pin Connector size	2023.01.17	Lan Jian

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

HV750QUB-F9E is a color active matrix TFT LCD open cell using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 75 inch diagonally measured active 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 module can display 1.07G colors. The TFT-LCD panel used for this module is adapted for a low reflection and higher color type.



1.2 Features

- V by one interface with 8 lanes
- High-speed response
- Low color shift image quality
- 8-bit + FRC color depth, display 1.07G colors
- High luminance and contrast ratio, low reflection and wide viewing angle
- Gate driver use GOA mode
- ADS technology is applied for high display quality
- RoHS compliant

1.0 GENERAL DESCRIPTION

1.3 Application

- Home Alone Multimedia TFT-LCD TV only
- Ultra High Definition TV(UHD TV)
- Display Terminals for Control System, Public Monitor and etc… are not allowed

1.4 General Specification

< Table 1. General Specifications >

Parameter	Specification	Unit	Remark
Active area	1649.664(H) × 927.936(V)	mm	
Number of pixels	3840*(RGB)*2160	pixels	
Pixel pitch	143.2(H) ×3(RGB) ×429.6 (V)	μm	
Pixel arrangement	Pixels RGB Vertical stripe	-	
Display colors	1.07G (8bits + FRC)	colors	8bit driver IC
Display mode	Transmission mode, Normally Black		
Open Cell Transmittance	5.5%(Typ.)	%	At center point with BOE BLU
Weight	4850(Typ.)	gram	
Power Consumption	12(Typ.)	Watt	With TCON board
Surface Treatment	Haze 1%, 2H (min) , Anti-glare treatment (Front Polarizer) Clear(Bottom Polarizer)	-	

2.0 ABSOLUTE MAXIMUM RATINGS

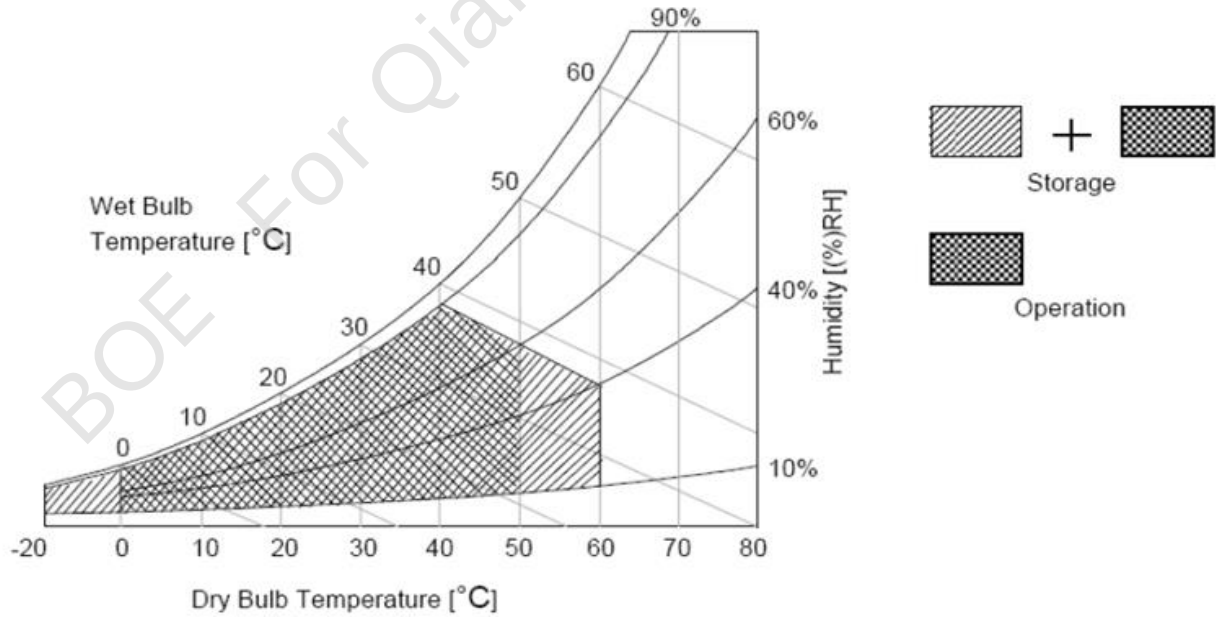
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. Open Cell Absolute Maximum Ratings >

[VSS=GND=0V]

Parameter	Symbol	Min.	Max.	Unit	Remark
Power Supply Voltage	VDD	VSS-0.3	14.0	V	Ta=25℃
Operating Temperature	T_{OP}	0	+50	℃	Note 1 Note 2
Storage Temperature	T_{SUR}	-20	+60	℃	
	T_{ST}	-20	+60	℃	
Operating Ambient Humidity	Hop	10	90	%RH	
Storage Humidity	Hst	10	90	%RH	

Note 1 : Temperature and relative humidity range are shown in the figure below.
Note 2 : Wet bulb temperature should be 39 ℃ max. and no condensation of water.



3.0 ELECTRICAL SPECIFICATIONS

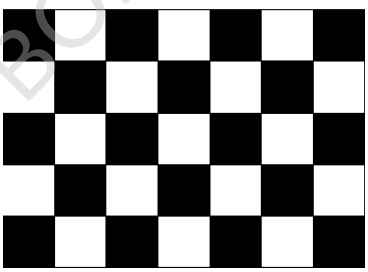
3.1 TFT LCD Open Cell

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

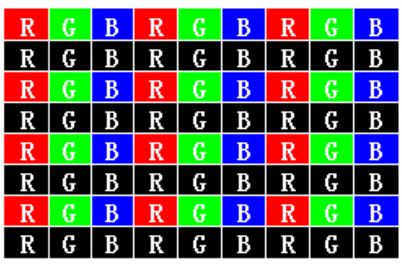
Parameter		Symbol	Values			Unit	Remark
			Min	Typ	Max		
Power Supply Input Voltage		VDD	10.8	12	13.2	Vdc	
Power Supply Ripple Voltage		VRP	-	-	600	mV	
Power Supply Current		IDD	-	1000	2000	mA	Note 1
Power Consumption		PDD	-	12	24	Watt	
Rush current		IRUSH	-	-	10	A	Note 2
V by One Interface	Differential 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	-	3.3	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=60Hz 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(min)



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



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

c) Flicker Test Pattern

3.0 ELECTRICAL SPECIFICATIONS

3.2 TCON Characteristics

< Table 4. TCON Characteristics >

Parameter	Symbol	Values			Unit	Remark
		Min	Typ	Max		
TCON Surface Temperature	T_{TS}	-	-	100	℃	Note

Note 1 : Any point on the TCON surface must be less than 110 ℃ under any conditions.

Note 2 : This test condition is based on BOE module.

3.3 Driver Characteristics

< Table 5. Driver Characteristics >

Parameter	Symbol	Values			Unit	Remark
		Min	Typ	Max		
Driver Surface Temperature	T_{DS}	-	-	125	℃	Note

Note 3 : Any point on the driver surface must be less than 125 ℃ under any conditions.

Note 4: This test condition is based on BOE module.

3.4 PMIC Characteristics

< Table 6. PMIC Characteristics >

Parameter	Symbol	Values			Unit	Remark
		Min	Typ	Max		
PMIC Surface Temperature	T_{PS}	-	-	100	℃	Note

Note 5 : Any point on the PMIC surface must be less than 100 ℃ under any conditions.

Note 6: This test condition is based on BOE module.

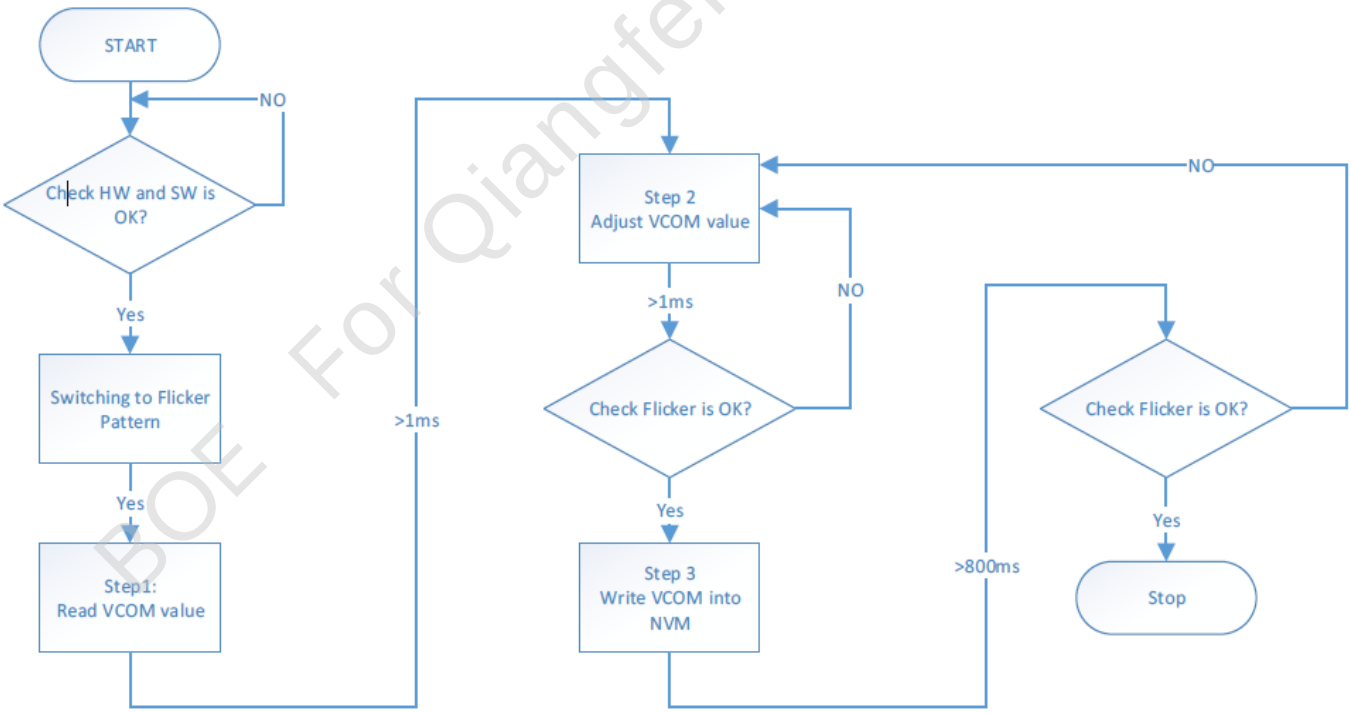
3.5 VCOM I2C Bus Format and interval setting requirement

1. Check Hardware A0 pin setting and use corresponding I2C VCOM commend.

A0		
Hardware Setting Software Setting	Hardware Setting Software Setting	
	Read	Write
A0=L Level	0b01000001 (0x41)	0b01000000 (0x40)
A0= H Level	0b01000011 (0x43)	0b01000010 (0x42)

Note1: 0b: binary, 0x: hex
Note2: taking A0=0 for below example.

2. Flow chart

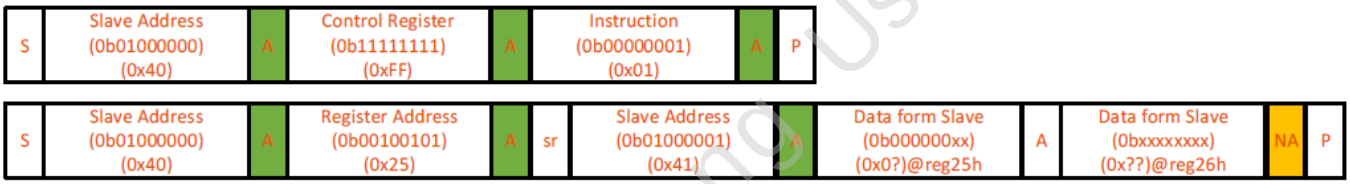


3.5 VCOM I2C Bus Format and interval setting requirement

Note 3:
Data @ reg25h is from 0x00 (0b00000000) to 0x03 (0b00000011)
Data @ reg26h is from 0x00 (0b00000000) to 0xFF (0b11111111)
[reg25h reg26h] = 0x0000 to 0x03FF
MSB of VCOM is b2@reg25h, and LSB is b0@reg26h

	Default		Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
25h	[7:0]	02h	VCOM	-	-	-	-	-	-	VC[9]	VC[8]
26h	[7:0]	00h		VC[7]	VC[6]	VC[5]	VC[4]	VC[3]	VC[2]	VC[1]	VC[0]

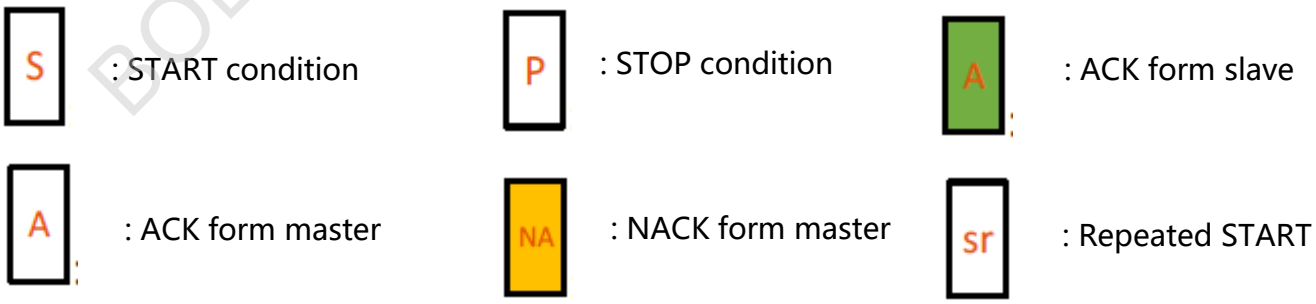
3. Step1: Read NVM VCOM Value



4. Step 2 Adjust VCOM Value

5. Step 3 Write VCOM Value into NVM

Note 4:



4.0 INTERFACE CONNECTION

4.1 Open Cell Input Signal & Power

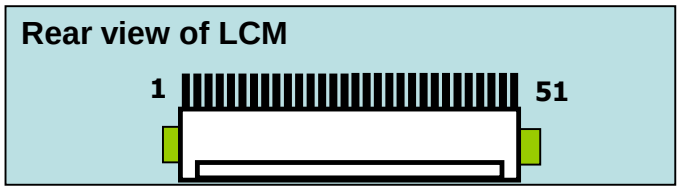
- V by one Connector

< 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	SSCG0	SSCG1/SSCG0 L/L&NC : OFF(default); L/H : ±1%;H/L : ±1.5%; H/H : ±2.0%	42	GND	Ground
17	SSCG1		43	Rx5n	V-by-One HS Data Lane 5
18	SDA	SDA(For Vcom Tuning)	44	Rx5p	V-by-One HS Data Lane 5
19	SCL	SCL(For Vcom Tuning)	45	GND	Ground
20	NC	No Connection	46	Rx6n	V-by-One HS Data Lane 6
21	NC	No Connection	47	Rx6p	V-by-One HS Data Lane 6
22	Section	Low&NC:1 section (default) High:2 section	48	GND	Ground
23	POL	Low&NC: OFF(default) High: ON	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.

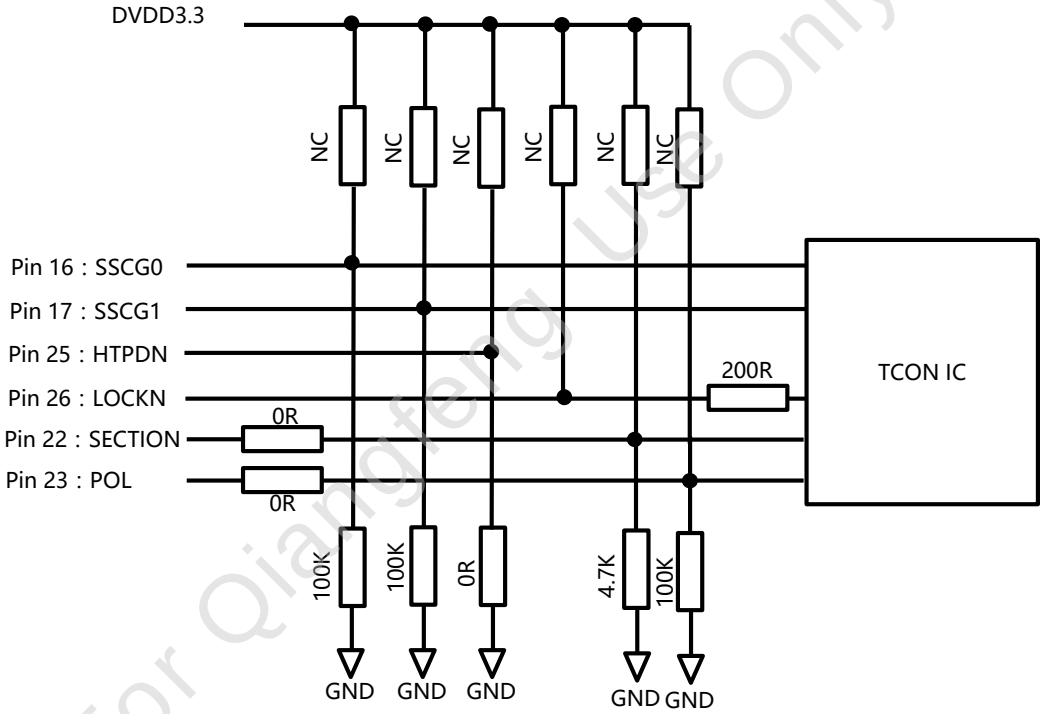
Note 2: If T/con board can't receive correct V-by-One signals, T/con will run BIST pattern as bellow.



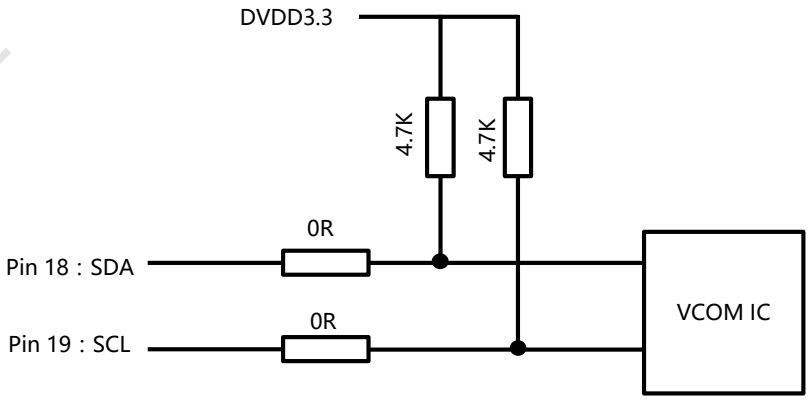
BIST Pattern

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

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



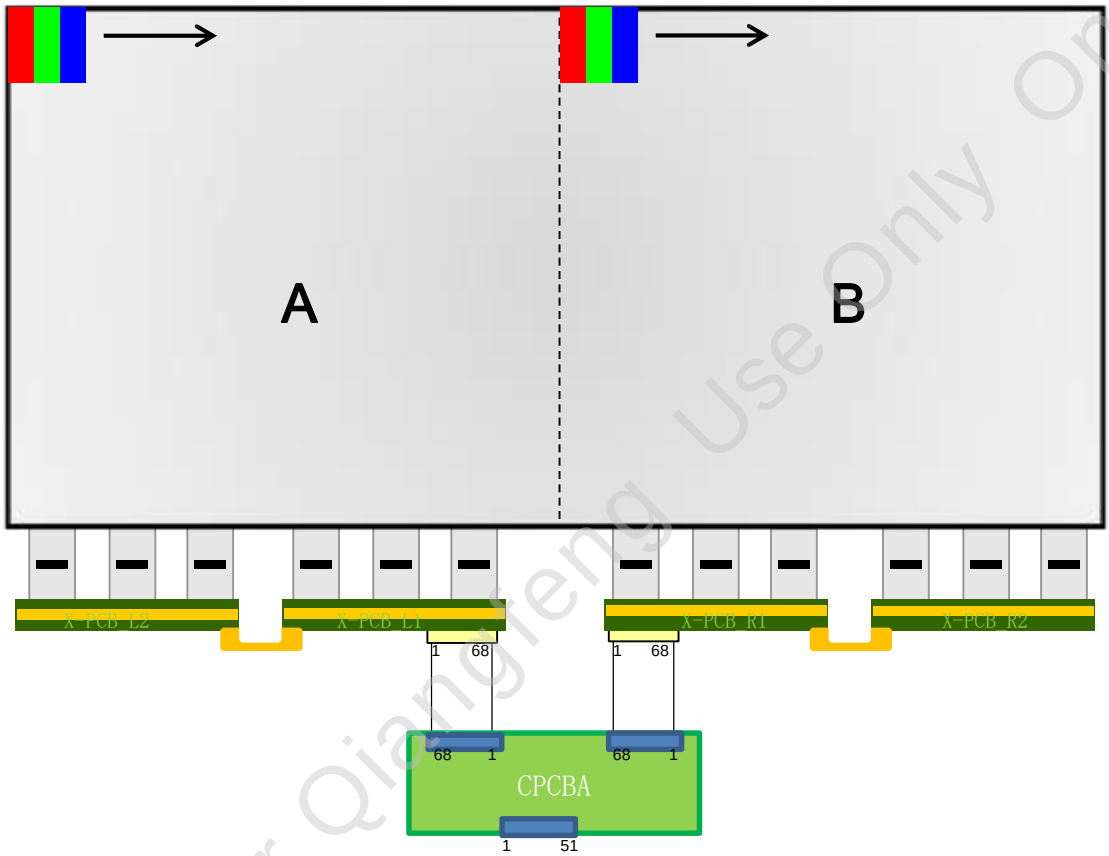
Note 4： Circuit Block Diagram Pin of SDA/SCL.



4.0 INTERFACE CONNECTION

4.2 V by one Misc. Setting.

< Table 8. V By One Mapping Diagram >



Connector	V-by-One
CN1	Lane 0 – Lane 7

4.0 INTERFACE CONNECTION

4.2 V by one Misc. Setting.

< Table 9. V By One Data Mapping Setting Table >

1 Section					
Area	Lane	Input Data Stream			
		1st	2nd	……	480th
A+B	Lane 0	Pixel 1	Pixel 9	……	Pixel 3833
	Lane 1	Pixel 2	Pixel 10	……	Pixel 3834
	Lane 2	Pixel 3	Pixel 11	……	Pixel 3835
	Lane 3	Pixel 4	Pixel 12	……	Pixel 3836
	Lane 4	Pixel 5	Pixel 13	……	Pixel 3837
	Lane 5	Pixel 6	Pixel 14	……	Pixel 3838
	Lane 6	Pixel 7	Pixel 15	……	Pixel 3839
	Lane 7	Pixel 8	Pixel 16	……	Pixel 3840

2 Section					
Area	Lane	Input Data Stream			
		1st	2nd	……	480th
A	Lane 0	Pixel 1	Pixel 5	……	Pixel 1917
	Lane 1	Pixel 2	Pixel 6	……	Pixel 1918
	Lane 2	Pixel 3	Pixel 7	……	Pixel 1919
	Lane 3	Pixel 4	Pixel 7	……	Pixel 1920
B	Lane 4	Pixel 1921	Pixel 1925	……	Pixel 3837
	Lane 5	Pixel 1922	Pixel 1926	……	Pixel 3838
	Lane 6	Pixel 1923	Pixel 1927	……	Pixel 3839
	Lane 7	Pixel 1924	Pixel 1928	……	Pixel 3840

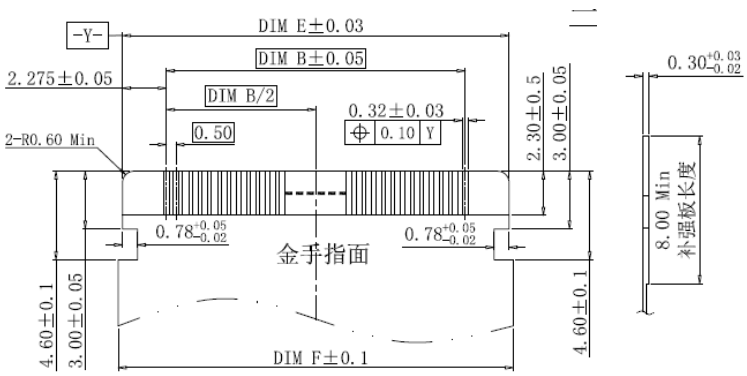
Note: T/con board supports two kinds of sections. System board output can choose either of them.

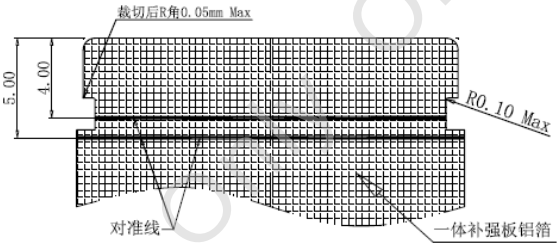
4.0 INTERFACE CONNECTION

4.3 TCON Board Input CNT &FFC Drawing

-FFC Drawing

PIN NO.	DIM B	DIM E	DIM F
30	14.50	19.05	19.50
41	20.00	24.55	25.00
51	25.00	29.55	30.00

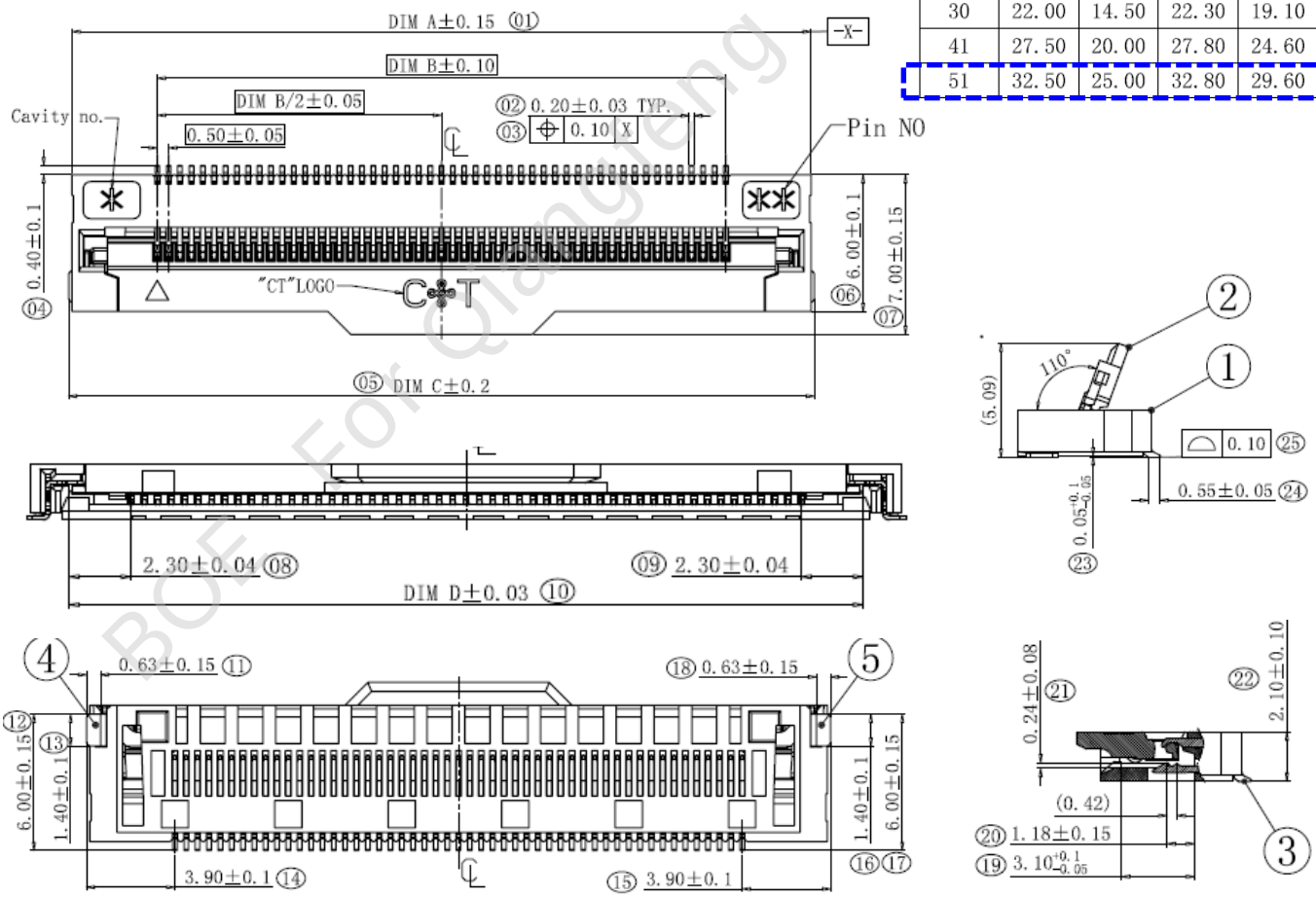




Note 1: This FFC drawing are supplied by the connector vendor.

-51pin Connector Drawing:F05035-51P-H

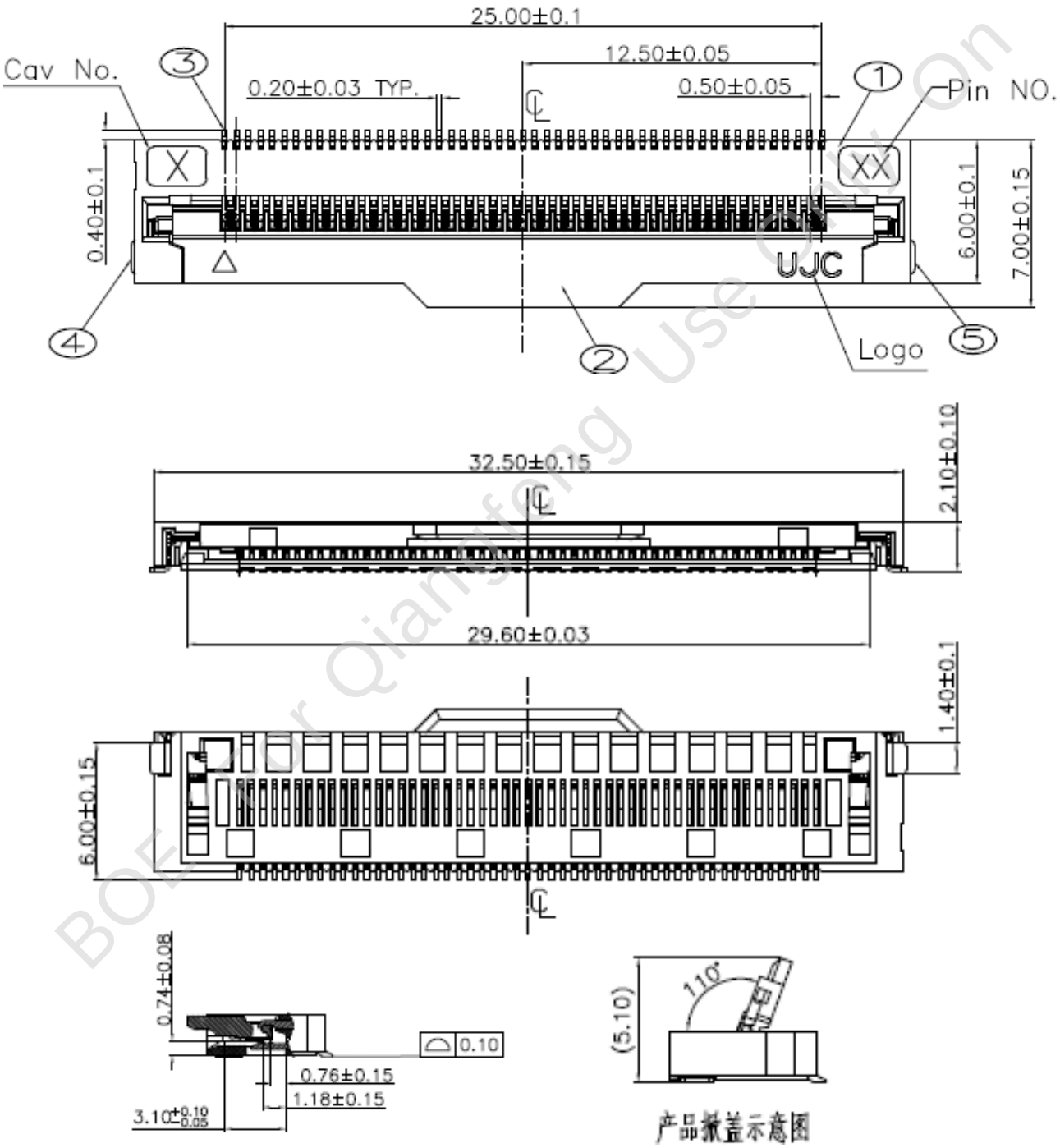
PIN NO.	DIM A	DIM B	DIM C	DIM D
30	22.00	14.50	22.30	19.10
41	27.50	20.00	27.80	24.60
51	32.50	25.00	32.80	29.60



4.0 INTERFACE CONNECTION

4.3 TCON Board Input CNT &FFC Drawing

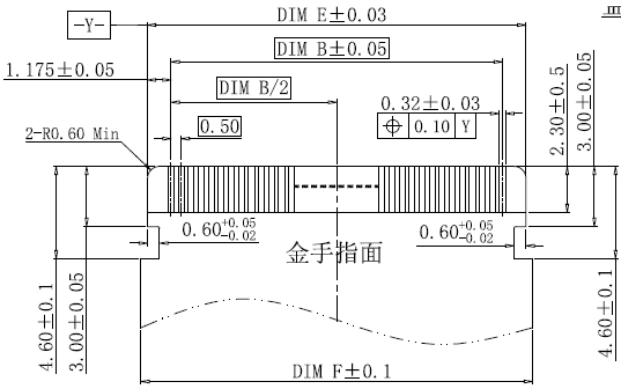
-51pin Connector Drawing:PM.FPC.LVS0505101



4.0 INTERFACE CONNECTION

4.4 TCON Board Output CNT &FFC Drawing

-FFC Drawing

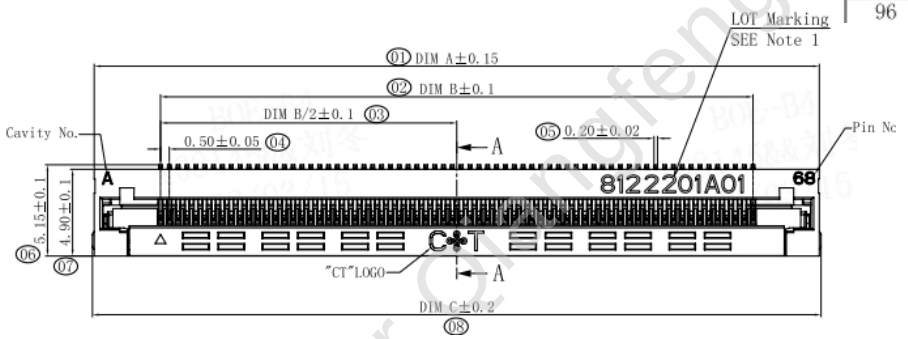


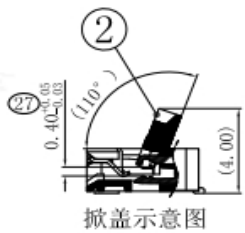
PIN NO.	DIM B	DIM E	DIM F
60	29.50	31.85	32.50
68	33.50	35.85	36.50

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

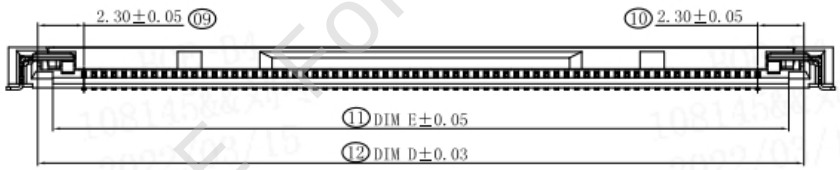
-68pin Connector Drawing:

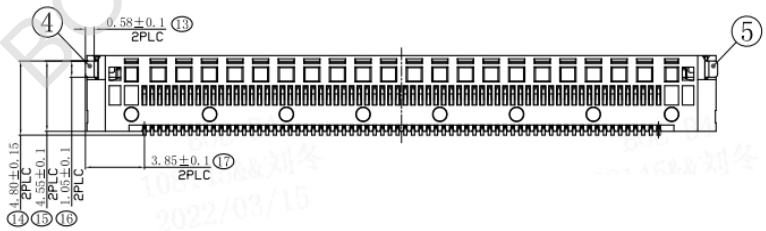
PIN NO.	DIM A	DIM B	DIM C	DIM D	DIM E
60	37.00	29.50	37.20	34.10	32.60
68	41.00	33.50	41.20	38.10	36.60
80	47.00	39.50	47.20	44.10	42.60
96	55.00	47.50	55.20	52.10	50.60

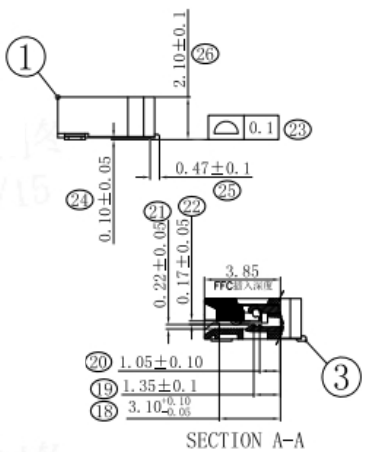




掀盖示意图





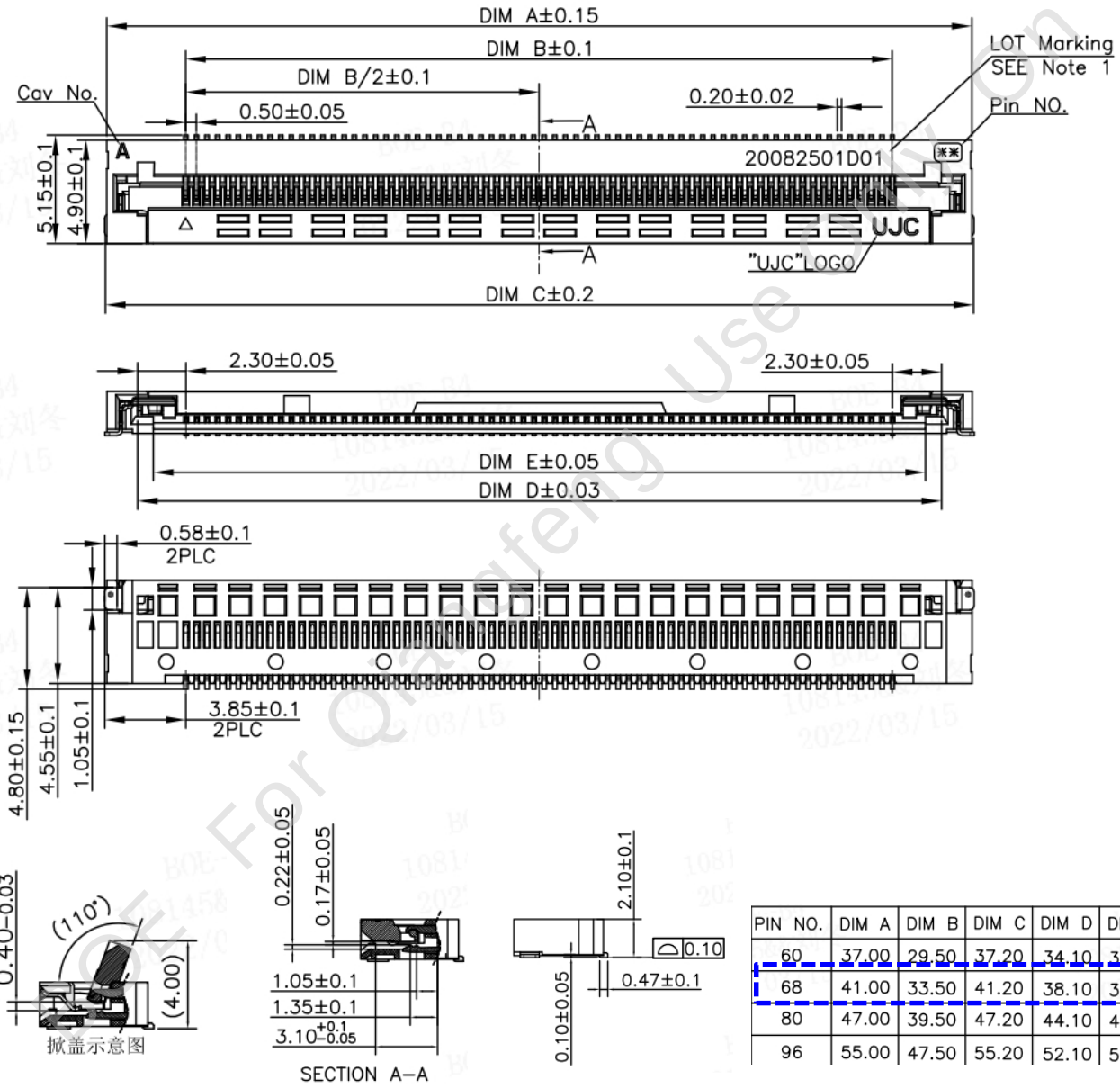


Note: TCON Board output CNT is not same as XPCBA Input CNT.

4.0 INTERFACE CONNECTION

4.4 TCON Board Output CNT &FFC Drawing

-68pin Connector Drawing:PM.FPC.LVS0506801



PIN NO.	DIM A	DIM B	DIM C	DIM D	DIM E
60	37.00	29.50	37.20	34.10	32.60
68	41.00	33.50	41.20	38.10	36.60
80	47.00	39.50	47.20	44.10	42.60
96	55.00	47.50	55.20	52.10	50.60

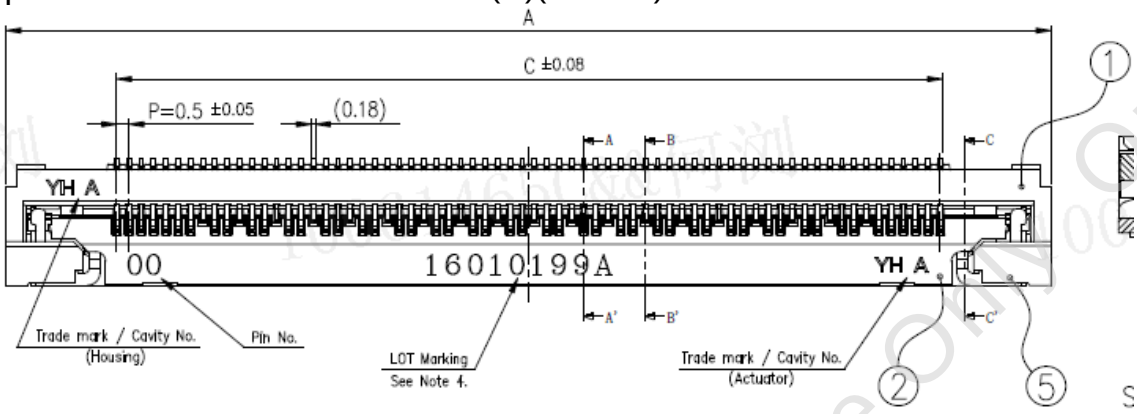
Notes: 1. This FFC drawing are supplied by the connector vendor.

2. FFC recommend impedance is 100±10%Ω.

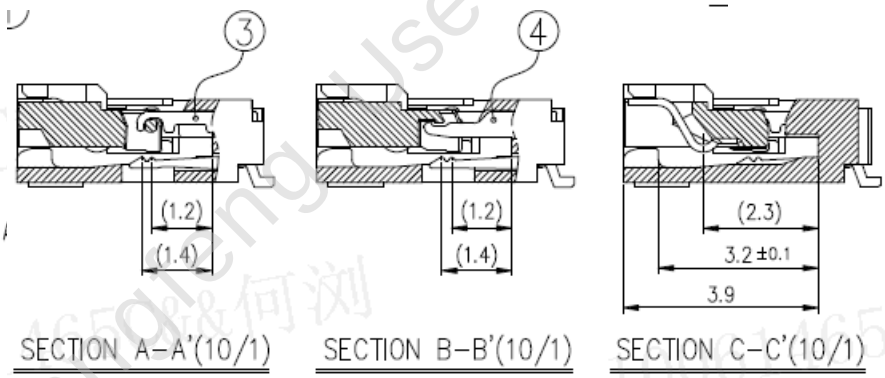
4.0 INTERFACE CONNECTION

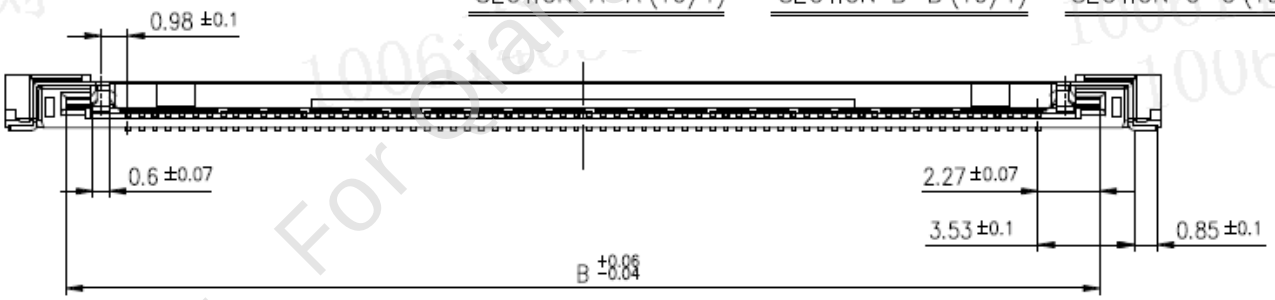
4.5 XPCB Input CNT &FFC drawing

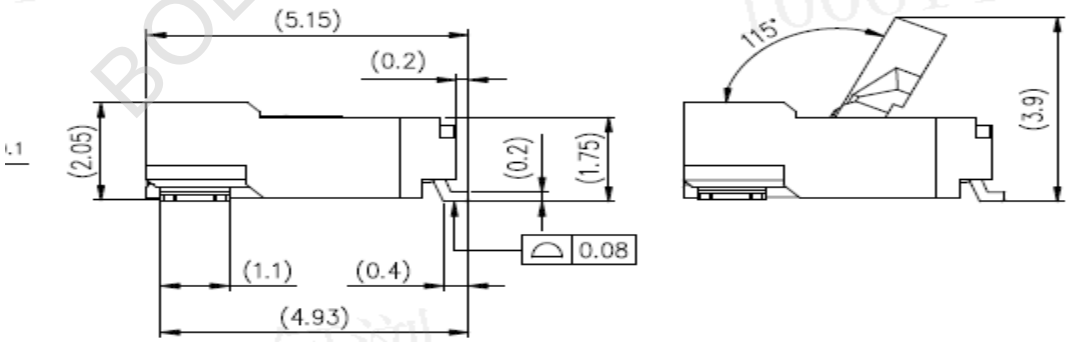
-68pin Connector： 05030HR-H68D(G)(Yeonho)



CIRCUIT	PARTS NO.	A	B	C
41	05030HR-H41D	29.00	24.54	20.00
√51	05030HR-H51D	34.00	29.54	25.00
60	05030HR-H60D	38.50	34.04	29.50
√68	05030HR-H68D	42.50	38.04	33.50



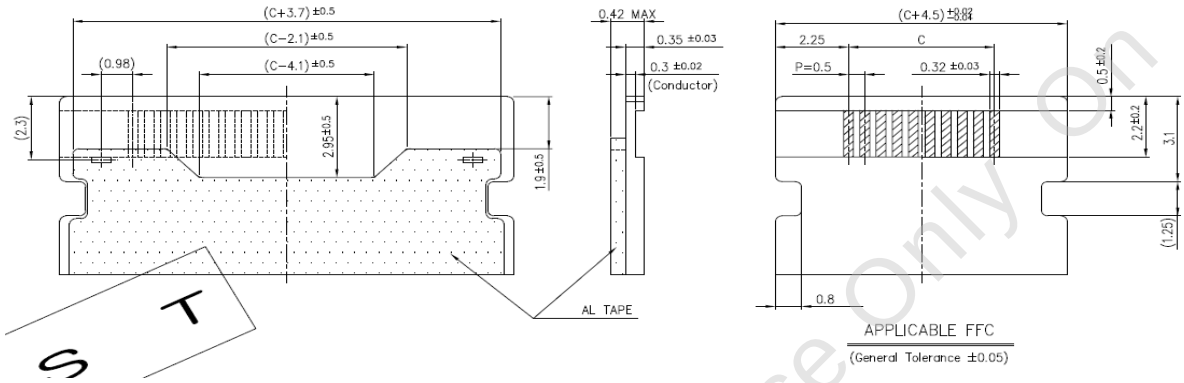




4.0 INTERFACE CONNECTION

4.5 XPCB Input CNT &FFC drawing

-68pin FFC Drawing



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

2. FFC recommend impedance is 100±10%Ω.

5.0 INTERFACE SIGNAL TIMING SPECIFICATION

5.1 V by One signal specification

- Vx1 Byte length and Color mapping

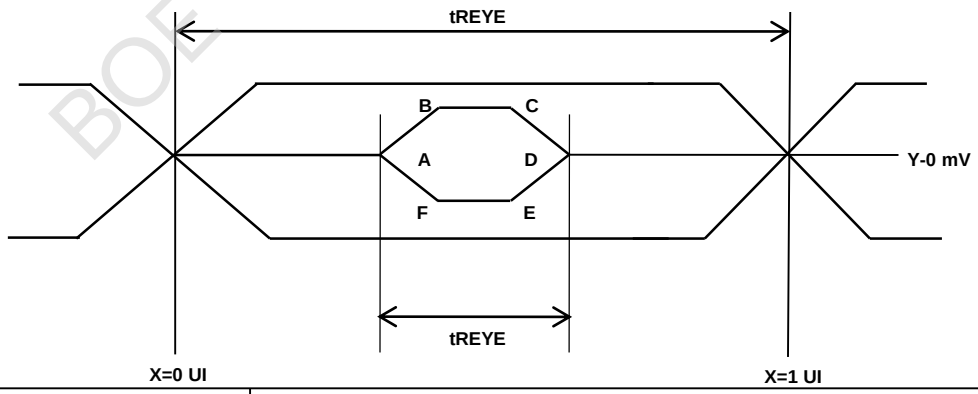
Byte	Packer input	Color data mapping
		30 bpp RGB
0	Bit-0	R2
	Bit-1	R3
	Bit-2	R4
	Bit-3	R5
	Bit-4	R6
	Bit-5	R7
	Bit-6	R8
	Bit-7	R9
1	Bit-8	G2
	Bit-9	G3
	Bit-10	G4
	Bit-11	G5
	Bit-12	G6
	Bit-13	G7
	Bit-14	G8
	Bit-15	G9
2	Bit-16	B2
	Bit-17	B3
	Bit-18	B4
	Bit-19	B5
	Bit-20	B6
	Bit-21	B7
	Bit-22	B8
	Bit-23	B9
3	Bit-24	-
	Bit-25	-
	Bit-26	B0
	Bit-27	B1
	Bit-28	G0
	Bit-29	G1
	Bit-30	R0
	Bit-31	R1

5.0 INTERFACE SIGNAL TIMING SPECIFICATION

5.2 Vx1 Input Signal Timing

< Table 11. Signal Timing Table >

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Unit Interval (VBO Operation Bit Rate)	tRBIT	3-byte	392	tTCIP/30	606	PS
		4-byte	294	tTCIP/40	454	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	UI
Inter – pair Skew	TTOSK_inter	-	-	-	80	UI



	Y[mV]
A	0
B	50
C	50
D	0
E	-50
F	-50

5.0 INTERFACE SIGNAL TIMING SPECIFICATION

5.3 Signal 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.

2. This product should keep data frequency and Horizontal value fixed when adjusting frame rate.

3. This product supports frequency between 50Hz and 60Hz and Vertical & Horizontal values must follow the t able.

5.0 INTERFACE SIGNAL TIMING SPECIFICATION

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

< Table 13. Input Signal and Display Color Table >

Color		Input Color Data																													
		MSB RED LSB										MSB GREEN LSB										MSB BLUE LSB									
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	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
	Red(1023)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1023)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	Blue(1023)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	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	1	1	1	1	0	0	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	1	1	1	1	1	1
R	RED(000)	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
	RED(001)	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	0	0	0	0

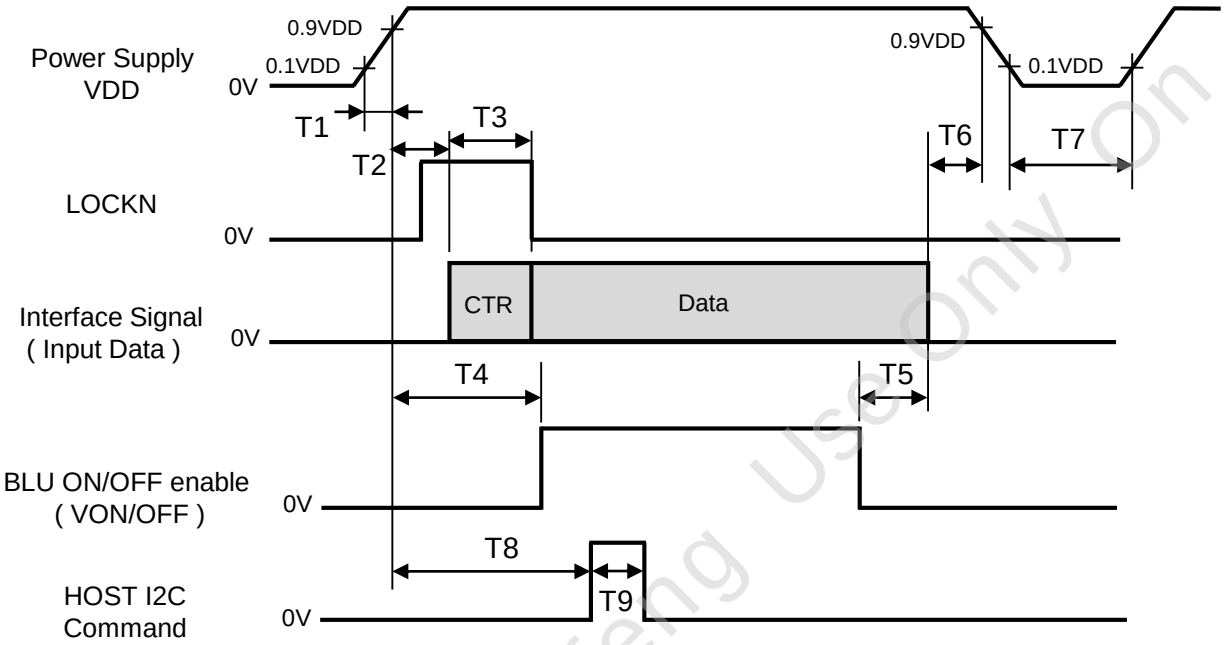
	RED(1022)	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1023)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Green (000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green (000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0

	Green (1022)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	Green (1023)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
B	Blue(000)	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
	Blue(000)	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

	Blue(1022)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
	Blue(1023)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1

5.5 Power Sequence

In order to get a normal display of the Open Cell, the power on/off sequence shall be as shown in below.



< Table 14. Sequence Table >

Parameter	Values			Units
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0	-	-	ms
T3	-	-	500	ms
T4	T2+T3	-	-	-
T5	100	-	-	ms
T6	0	-	-	ms
T7	1	-	-	s
T8	T4	-	-	-
T9	Depends on I2C command			ms

Notes: 1. Even though T1 is out of Min SPEC, it is still ok if the inrush current of VDD is below the limit.

2. Back Light enable must after power ready for logic and interface signal are valid.

3. All input signals should set to 0 volt before VDD rising edge ready.

4. If possible, T4 should not less than hundreds of milliseconds, so do T2+T3.

5. HOST I2C should operate after BLU enable. It‘s used for flicker tuning. If customer does not need adjust panel flicker, ignoring T8 & T9.

6. VDD should rise and fall smoothly. If there is rebounding voltage when falling stage, VDD must smaller than 6 volts.

7.When the power supply for LCD is off，be sure to pull down the valid and invalid data to 0V.

8.For any switch (power on/off) operation，the sequence must be satisfied with specification.

6.0 OPTICAL SPECIFICATION

The test of optical specifications shall be measured in a dark room (ambient luminance≤1 lux and temperature=25±2℃) with the equipment of Luminance meter system (Goniometer system and PR788) and test unit shall be located at an approximate distance 180cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to $\theta_{Ø=0}$ (=θ_3) as the 3 o'clock direction (the "right"), $\theta_{Ø=90}$ (= θ_{12}) as the 12 o'clock direction ("upward"), $\theta_{Ø=180}$ (= θ_9) as the 9 o'clock direction ("left") and $\theta_{Ø=270}$(= θ_6) as the 6 o'clock direction ("bottom"). While scanning θ and/or Ø, the center of the measuring spot on the Display surface shall stay fixed. The measurement shall be executed after 30 minutes warm-up period. VDD shall be 12.0V +/-10% at 25°C. Optimum viewing angle direction is 6 'clock.

< Table 15. 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.	Note1
		Θ_9		-	89	-	Deg.	
	Vertical	Θ_{12}		-	89	-	Deg.	
		Θ_6		-	89	-	Deg.	
Contrast ratio		CR	Θ = 0° (Center) Normal Viewing Angle	800:1	1200:1	-		Note2
Reproduction of color	White	W_x		TYP. - 0.03	0.284	TYP. + 0.03		Note3
		W_y			0.296			
	Red	R_x			0.673			
		R_y			0.314			
	Green	G_x			0.267			
		G_y			0.649			
	Blue	B_x			0.151			
		B_y			0.051			
Response Time	G to G	T_g		-	8	11	ms	Note4
Gamma Scale				2.0	2.2	2.4		
Cell Transmittance				4.95	5.5	-	%	Note 5

Note :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface.
2. Contrast measurements shall be made at viewing angle of $\theta = 0°$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See Figure 1 shown in Appendix) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. The color chromaticity coordinates specified in Table 12.shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel. The BLU is used by BOE.

4Response 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 shall be measured by switching the input signal for "any level of gra y(bright)"and "any level of gray(dark)"

Measured Response Time		Target																
		0	15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255
Start	0																	
	15																	
	31																	
	47																	
	63																	
	79																	
	95																	
	111																	
	127																	
	143																	
	159																	
	175																	
	191																	
	207																	
	223																	
	239																	
	255																	

5. Definition of Transmittance (T%) :
Module is with white(L255) signal input

$$\text{Transmittance} = \frac{\text{Luminance of LCD Module}}{\text{Luminance of BLU}} \times 100\ \%$$

7.0 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 = 0 ℃, 240hrs
6	Thermal shock	Ta = -20 ℃↔ 60 ℃ (0.5 hr), 100 cycle

This test condition is based on BOE module.

8.0 PRECAUTIONS

Please pay attention to the followings when you use this TFT LCD Open Cell.

8.1 Precautions when taking out the Panel

- Pick the pouch only, when taking out panel from a shipping package.
- Recommend to use suitable sucker to pick up and put down panel.

8.2 Precautions for handling the panel

- As the electrostatic discharges may break the LCD panel, handle the LCD panel with care. Peel a protection sheet off from the LCD panel surface as slowly as possible. Refer to the appendix 3.
- As the LCD panel and backlight element are made from fragile glass material, impulse and pressure to the LCD panel should be avoided.
- As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- Put the panel display side down on a flat horizontal plane.
- Handle connectors and cables with care.

8.3 Precautions for the operation

- The LCD product shall be operated under normal conditions as below:
  - VDD: 12±0.12V
  - Temperature: 20±15℃
  - Humidity: 55±20%
  - Display pattern: continually changing pattern(Not stationary)
- 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 patterns, long time operation, outdoor operation, etc.., it is strongly recommended to contact BOE for the advice about the application of engineering. Otherwise its reliability and function may not be guaranteed. Extreme conditions are commonly found at airports, transit stations, banks, stock markets, and controlling systems.
- Do not exceed the absolute maximum rating value.
- Periodical power-off or screen save is needed after long-term display. Product reliability and functions may not be guaranteed when it under 24 hours operation continuously per day.

8.0 PRECAUTIONS

- Do not insert or pull out the interface connector while the LCD panel is operating.
- LCD Response time depends on the temperature.(In lower temperature, it becomes longer)
- Ensure all input signals and power supplies are complete and valid when the panel is operating. Otherwise the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the panel would be damaged. Specially, pay attention to the turn on and off sequence.

8.4 Precautions for the atmosphere

- Storage atmosphere requirement.

ITEM	UNIT	MIN	MAX
Storage Temperature	(℃)	5	40
Storage Humidity	(%RH)	35	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.		

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

8.5 Precautions for the panel characteristics

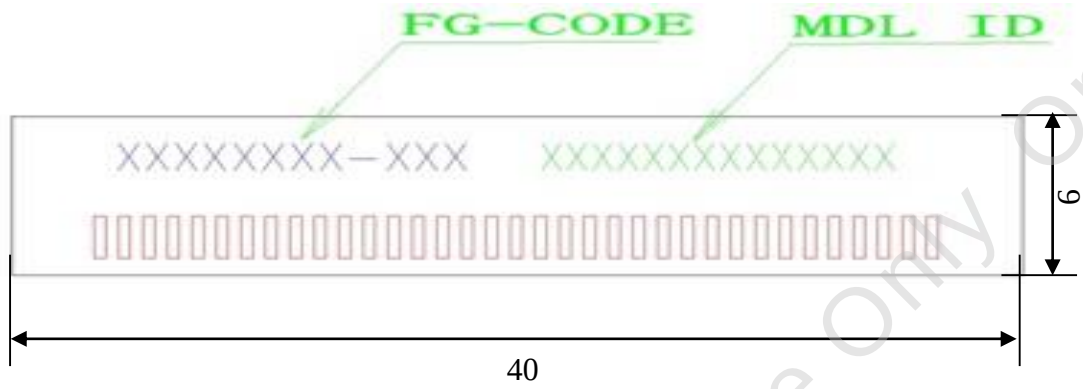
- Do not apply fixed pattern data signal to the LCD panel at product aging.
- Applying fixed pattern for a long time may cause image sticking.

8.0 PRECAUTIONS

8.6 Other precautions

- In particular in winter, Before putting Panel boxes on the line, aging process is required to make the temperature of products similar to the temperature of workplace.
- Do not disassemble and/or re-assemble LCD panel.
- Do not re-adjust variable resistor or switch etc.
- Product assembled into module should be stored in the bag(cover case).
- 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.
- Be careful not to give any extra mechanical stress to the panel when designing the set, and backlight.
- Do not pull, fold or bend the source COF and the gate COF in any processes.
- If the liquid crystal material leaks from the panel, this should be kept away from the eyes or mouth. If this contacts to hands, legs, or clothes, you must washed it away with soap thoroughly and see a doctor for the medical examination.
- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

9.0 PRODUCT SERIAL NUMBER



MDL ID Naming Rule:

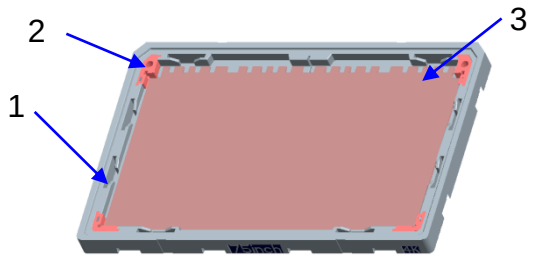
Digit / Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Code	S	L	S	9	1	6	3	5	9	4	2	0	A	A	0	0	0
Description	Model Code /GBN		Grade	Line	Year		Month	Model Extension Code (Last 4 Digits Of FG-CODE)				Serial No 00001-ZZZZZZ					

10.0 PACKING INFORMATION

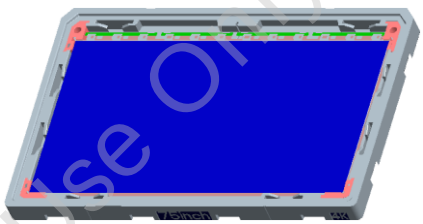
BOE provides the standard shipping container for customers, unless customer specifies their packing information. The standard packing method and Barcode information are shown in below.

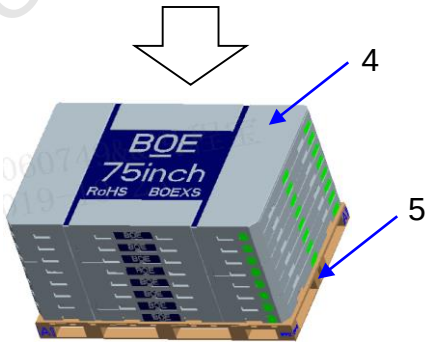
10.1 Packing Order

Put 2Pcs EPE Pad in the box.

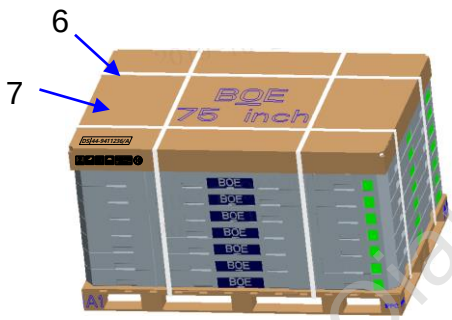


Then put 1Pcs Panel into the box. Totally 8pcs panels and 10Pcs EPE Pad per box.





Put totally 8boxes and 1 EPO cover on pallet.



Put 1 paper cover on the E PO cover and pack with 4 Package belt. (8ea boxes per pallet).

Cautions：
When transferring in warehouse or factory，the arm length of electric forklift or hand pall et truck must be longer than the pallet along the insertion direction

10.1 Packing Order

N0.	Description	Material
1	Bottom	EPO
2	Cushion	ABS
3	Cushion	EPP
4	Pad	EPE
5	Cover	EPO
6	Pallet	Wood
7	Band	PP
8	Paper Cover	Paper

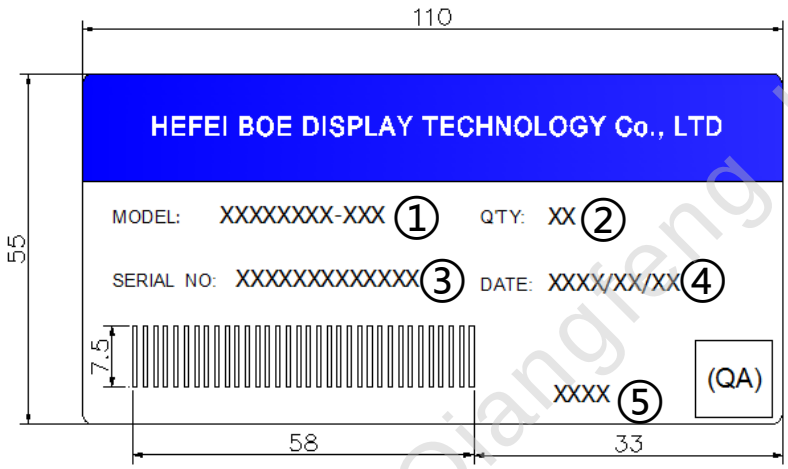
10.2 Packing Note

- Box Dimension : 1862(-3/+7)mmL×1228(-2/+6)mmW×123(±1.5)mmH
- Package Quantity in one Box : 8pcs
- Wood Pallet Dimension : 1890（±10）*1250（±10）*141（±5）mm

10.3 Box Label

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

  Model : HV750QUB-F9E
  Q`ty :8 Open Cell in one box.
  Serial No. : Box Serial No. See next page for detail description.
  Date : Packing Date
  FG Code : FG Code of Product



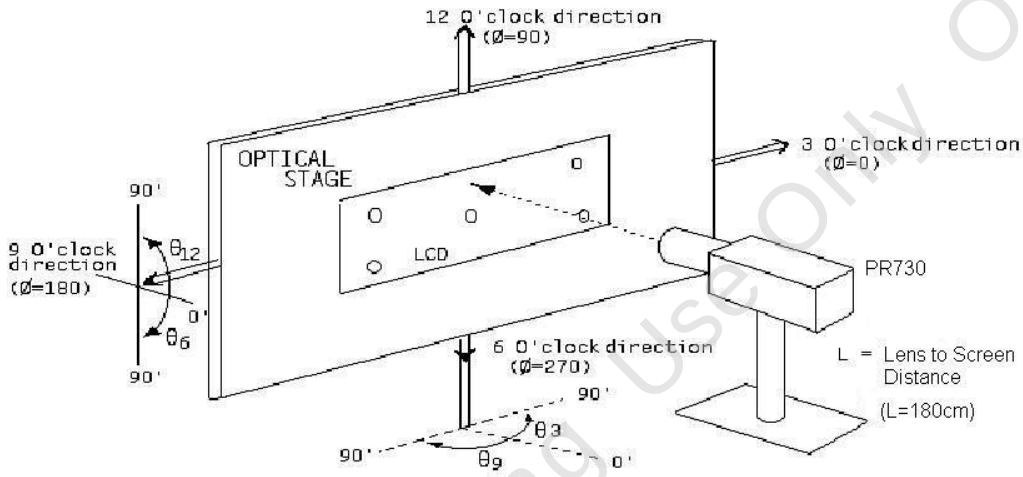
1. FG-CODE(前12位)
2. 包装数量
3. Box ID
4. 包装日期
5. FG-Code后四位

Box ID Naming Rule:

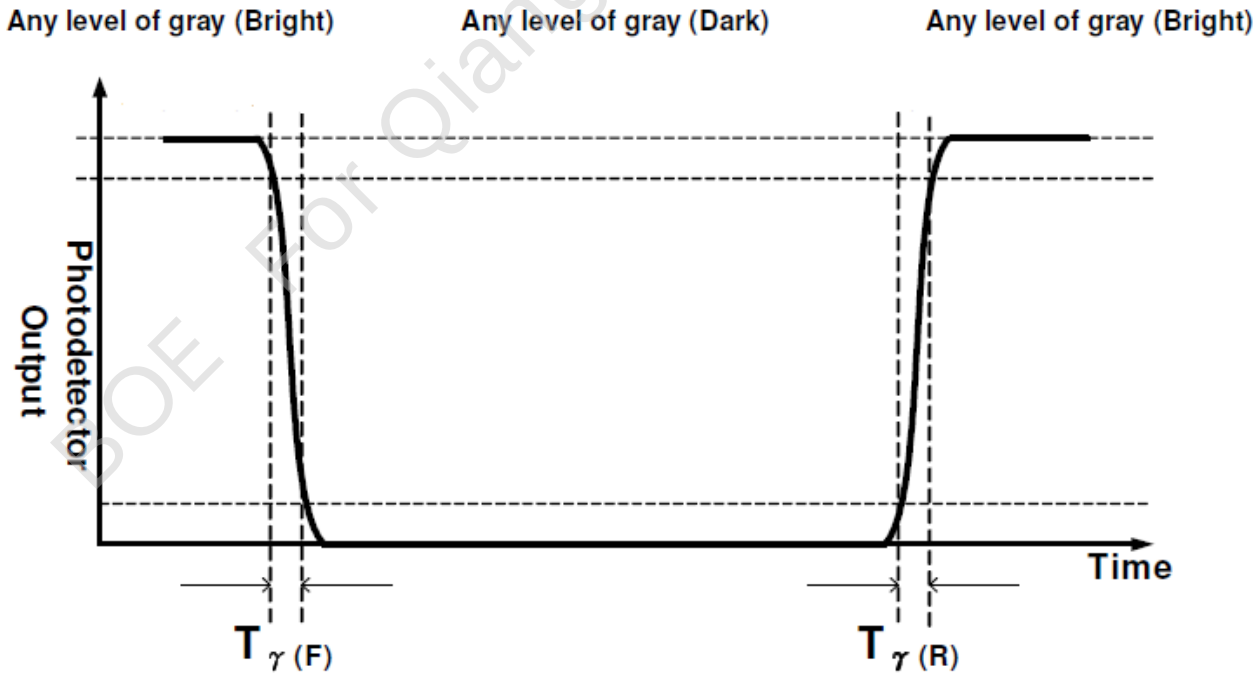
Digit / Code	1	2	3	4	5	6	7	8	9	10	11	12	13
Code	S	L	S	9	1	6	3	5	9	4	2	0	0
Description	Products GBN		Grade	Line	Year		Month	Revision Code	Serial No 00001-ZZZZZZ				

11.0 APPENDIX 1

< Figure 1. Measurement Set Up >

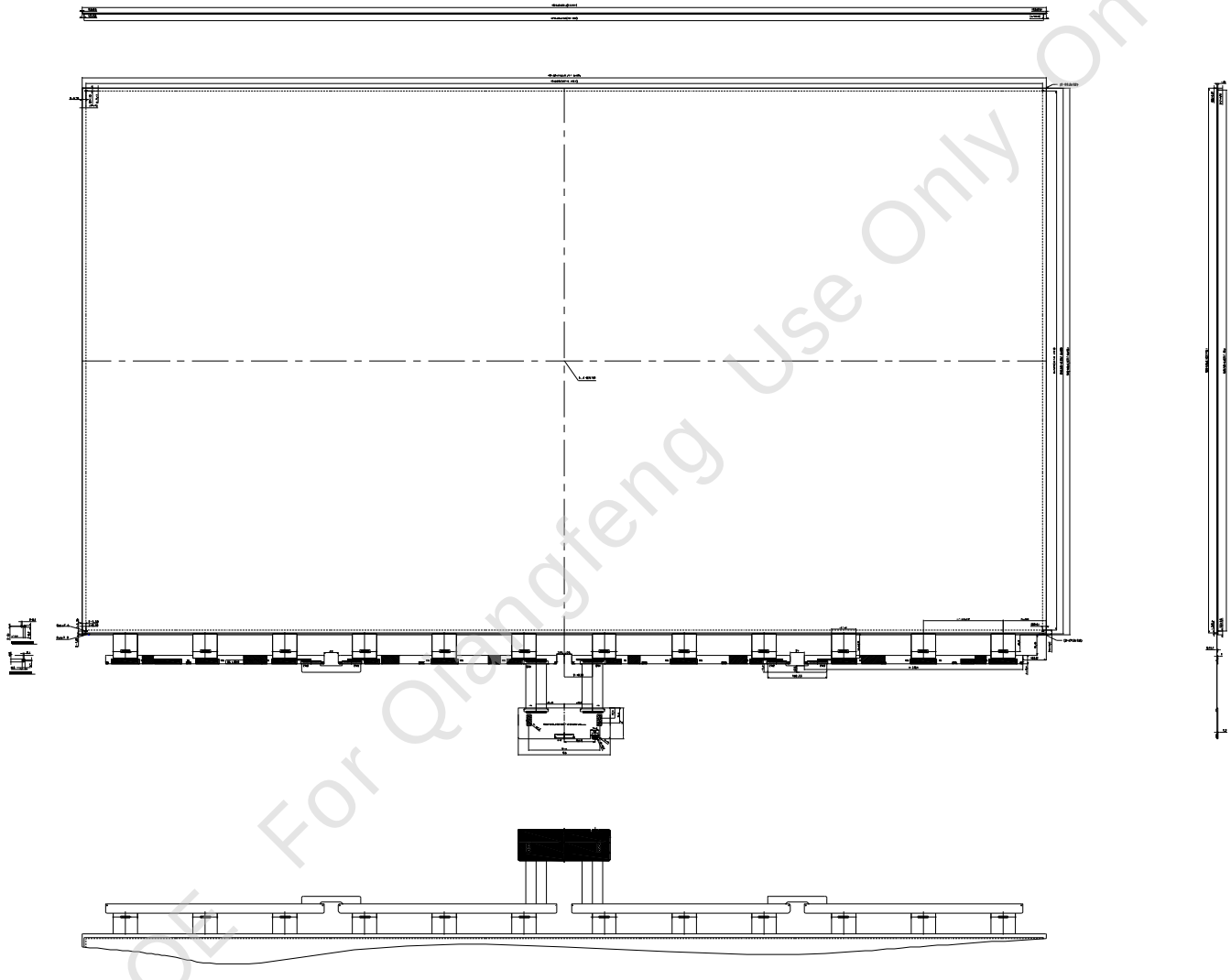


< Figure 2. Response Time Testing >



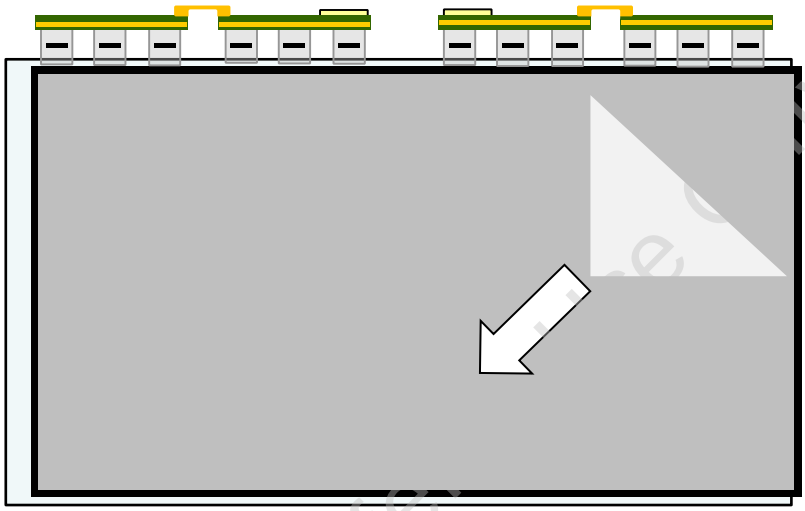
11.0 APPENDIX 2

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



11.0 APPENDIX 3

< Figure 4. TFT POL Protect Film Peeling Method >



1. Be sure to peel off slowly(recommended more than 7sec) and constant speed.
2. Peeling direction shows in Figure 4.
3. Be sure to ground person with adequate methods such as the anti-static wrist band.
4. Be sure to ground each S-PCB while peeling off the protection film.
5. Ionized air should be blown over during peeling action.
6. The protection film must not touch drivers and S-PCBs.
7. If adhesive may remain on the polarizer after the protection film peeling off, please rem ove with isopropyl-alcohol.

11.0 APPENDIX 4

(a)This Product is Reverse type display Mode