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TITLE : HV430QUB-F11

Preliminary Product Specification

Rev. A

Fuzhou BOE Optoelectronics Technology Co., Ltd

SPEC. NUMBER
S8-64-8D-055

PRODUCT GROUP
TFT-LCD

Rev.A

ISSUE DATE
2018.10.19

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BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer SPEC	Rev. A	2018.10.19

REVISION HISTORY

()preliminary specification

(√)Final specification

Revision No.	Page	Description of changes	Date	Prepared
Rev. P0	-	Initial Release	2018.03.20	M.Y.Lee
Rev. O	-	Final specification	2018.10.17	Lin Zhun
Rev. A	28	Product serial Number Lable	2018.10.19	Lin Zhun

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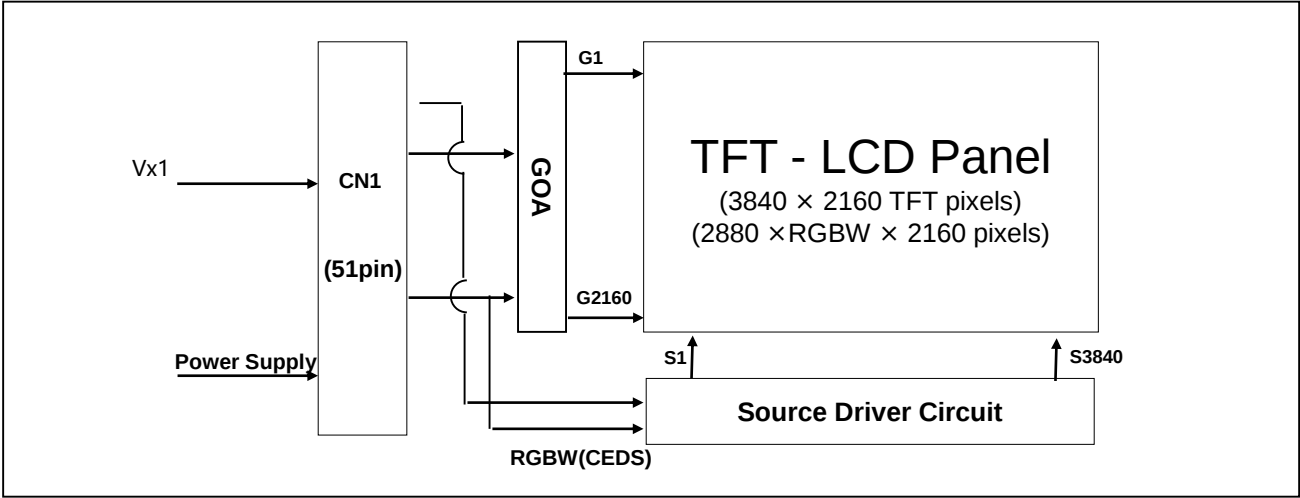
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1.0 GENERAL DESCRIPTION

1.1 Introduction

HV430QUB-F11 is a color active matrix TFT LCD open cell using amorphous silicon TFT's (Thin Film Transistors) as active switching device. This module has a 42.514 inch diagonally measured active area with UHD resolutions (3840 horizontal by 2160 vertical pixel array). Each pixel is divided into WHITE, RED, GREEN, BLUE dots which are arranged in island 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
- DE (Data Enable) only mode
- ADS technology is applied for high display quality
- RoHS compliant

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1.3 Application

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

1.4 General Specification

< Table 1. General Specifications >

Parameter	Specification	Unit	Remark
Active area	941.184(H) × 529.416(V)	mm	
Number of pixels	3840 horiz. by 2160 vert. TFT Pixel, 2880 horiz. by 2160 vert. RGBW CF pixel arrangement	pixels	
Pixel pitch	245.1(H) × 245.1(V)	μm	
Pixel arrangement	Pixels WRGB Island		
Display colors	1.07G (8bits + FRC)	colors	
Display mode	Transmission mode, Normally Black		
Open Cell Transmittance	5.95	%	At center point with BOE BLU
Weight	1.84	Kg	
Power Consumption	12 (Typ)	Watt	
	27(Max)		
Surface Treatment	Haze 1%		

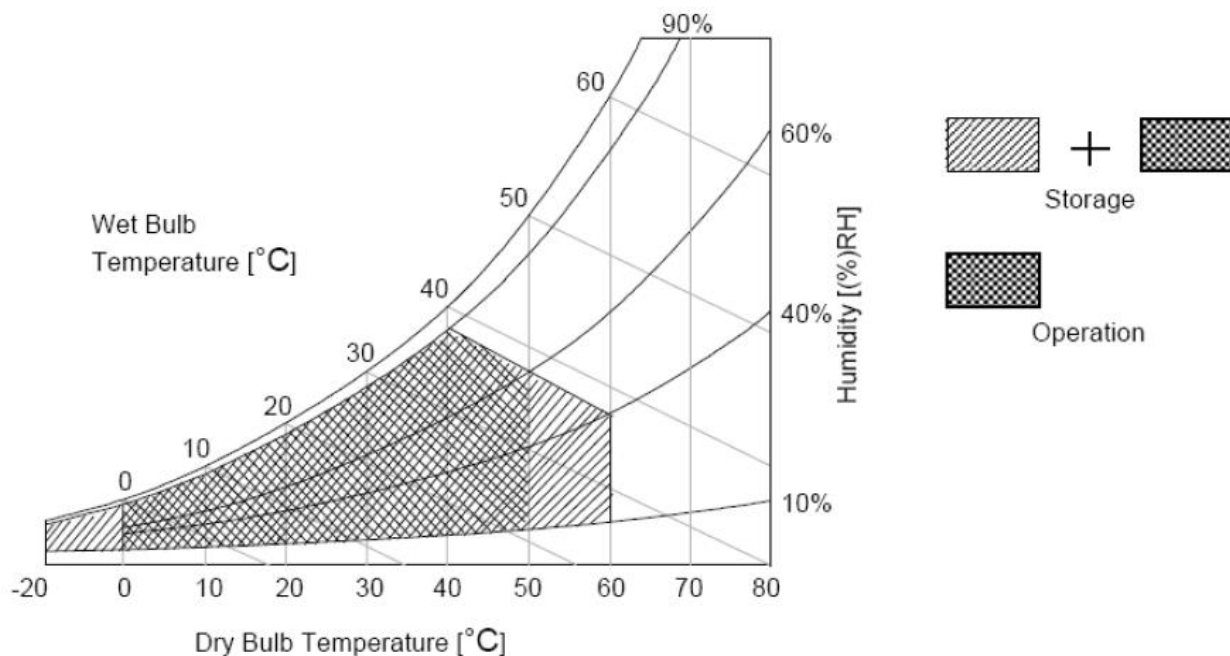
2.0 ABSOLUTE MAXIMUM RATINGS

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. Open Cell Electrical Specifications >

[VSS=GND=0V]

Parameter	Symbol	Min.	Max.	Unit	Remark
Power Supply Voltage	VDD	VSS-0.3	13.5	V	Ta = 25 °C
Operating Temperature	T _{OP}	0	+50	°C	Note 1
Storage Temperature	T _{SUR}	-20	+60	°C	
	T _{ST}	-20	+60	°C	
Operating Ambient Humidity	Hop	10	80	%RH	
Storage Humidity	Hst	10	80	%RH	



3.0 ABSOLUTE MAXIMUM RATINGS

3.1 TFT LCD Open Cell

< Table 3. Open Cell Electrical Specifications >

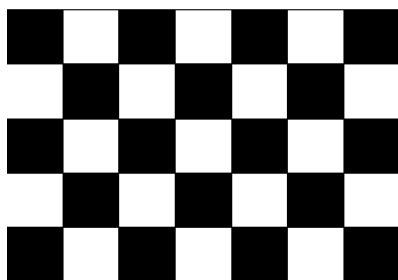
[Ta =25±2 °C]

Parameter		Symbol	Values			Unit	Remark
			Min	Typ	Max		
Power Supply Input Voltage		VDD	10.8	12	13.2	Vdc	
Power Supply Ripple Voltage		VRP	-	-	600	mV	
Power Supply Current		IDD	-	1	3	A	Note 1
Power Consumption		PDD		12	27	Watt	
Rush current		IRUSH	-	-	4	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	2.7	-	3.3	V	
	Input Low Threshold Voltage	VIL	0	-	0.6	V	

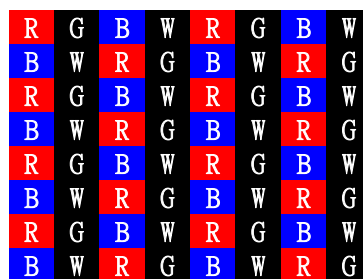
Note 1 : The supply voltage is measured and specified at the interface connector of LCM.

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

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



b) Max : R&B Pattern(L255)



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

c) Flicker Test Pattern

[illegible]

3.2 IC Characteristics

< Table 4. TCON Characteristics >

Parameter	Symbol	Values			Unit	Remark
		Min	Typ	Max		
TCON Surface Temperature	T _{TS}	-	-	110	°C	Note

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

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

< Table 5. Driver Characteristics >

Parameter	Symbol	Values			Unit	Remark
		Min	Typ	Max		
Driver Surface Temperature	T _{DS}	-	-	125	°C	Note

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

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

< Table 6. PMIC Characteristics >

Parameter	Symbol	Values			Unit	Remark
		Min	Typ	Max		
PMIC Surface Temperature	T _{PS}	-	-	100	°C	Note

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

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

3.3 VCOM I2C Bus Format

Step1. Write data to VCOM Register
(DVCOM Register Adjustment)

START	Slave Address							WR	ACK	DVR Register								ACK	DATA								ACK	STOP
	1	1	1	0	1	0	0			0	0	0	0	0	0	0	1		D7	D6	D5	D4	D3	D2	D1	D0		



Step2. Write DVCOM Register data to EEPROM
(After the VCOM adjustment, write the DVCOM data of register to EEPROM)

START	Slave Address							WR	ACK	DVR Register								ACK	DATA								ACK	STOP
	1	1	1	0	1	0	0			0	0	0	0	0	0	0	0		0	0	0	0	1	0	0	0		



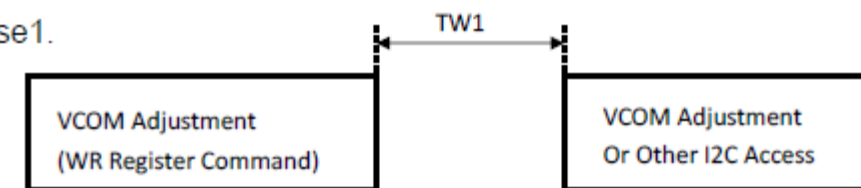
Register Table:

Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Bank	Note
0x00	CTRL BYTE[7:0]								-	Control byte
0x01	DVR[6:0]								-	Digital VCOM

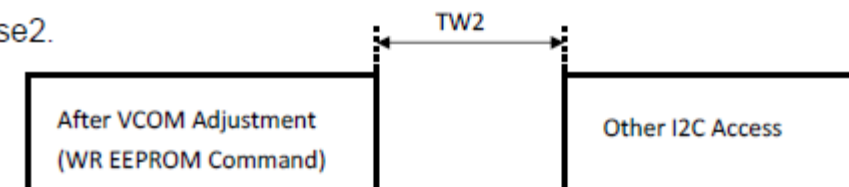
- Tw(Write cycle)

Parameter	Symbol	I2C Command	Min.	Typ.	Max	Unit
Write Cycle Time	TW1	Write Register	10	-	-	ms
	TW2	Write EEPROM	-	32	640	ms

Case1.



Case2.



4.0 INTERFACE CONNECTION.

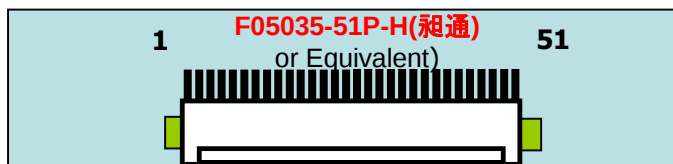
4.1 V by One CN (51Pin) Connector : **F05035-51P-H(昶通)** or Equivalent.

< 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	SDA	44	Rx5p	V-by-One HS Data Lane 5
19	SCL	SCL	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	SEL_SECTION	Low:2 Section(Default) High:1 Section	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 detect	51	GND	Ground
26	LOCKN	Lock detect			

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

Rear view of LCM



BIST Pattern

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

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SPEC. TITLE
HV430QUB-F11 Preliminary Product Specification Rev. A

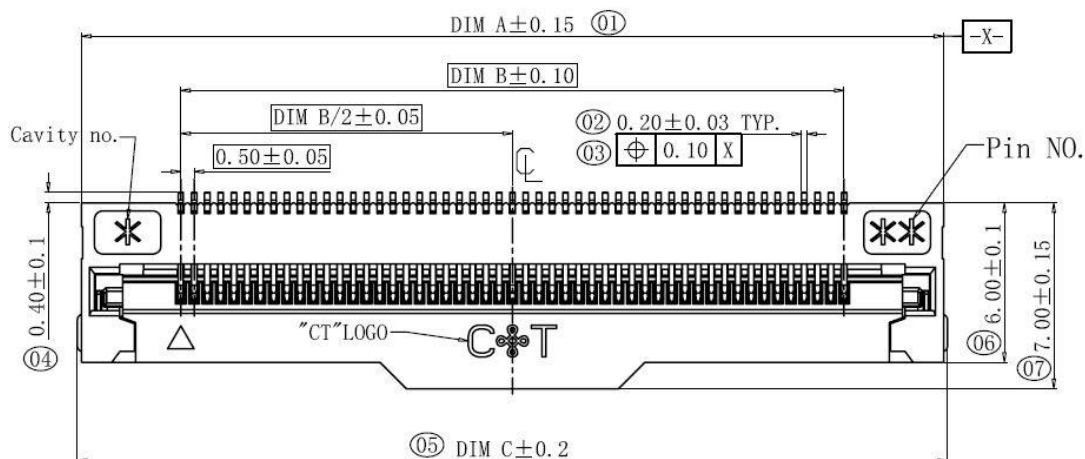
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4.2 V by one Misc. Setting.-2 Section

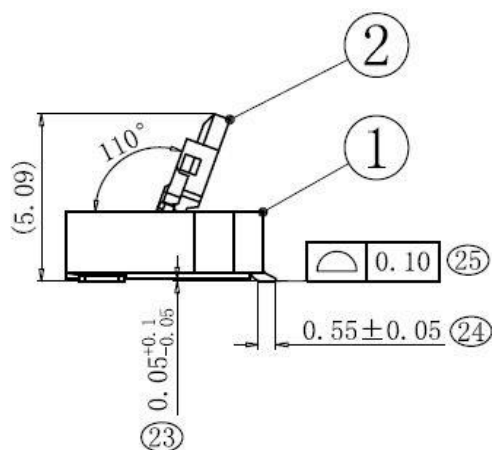
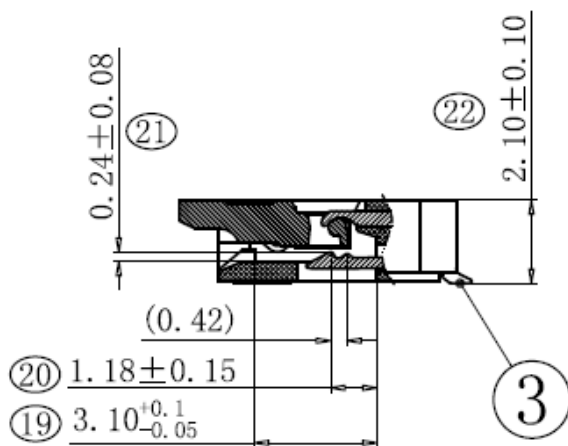
- a) System side have to put pull high resistor on LOCKN/HTPDN pins.
- b) V by one data mapping as follows.

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

2 Section								
Hactive= 3840								
	port 0		port 1		port 2		port 3	
	Lane 0	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7
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



F05035-51P-H(昶通)

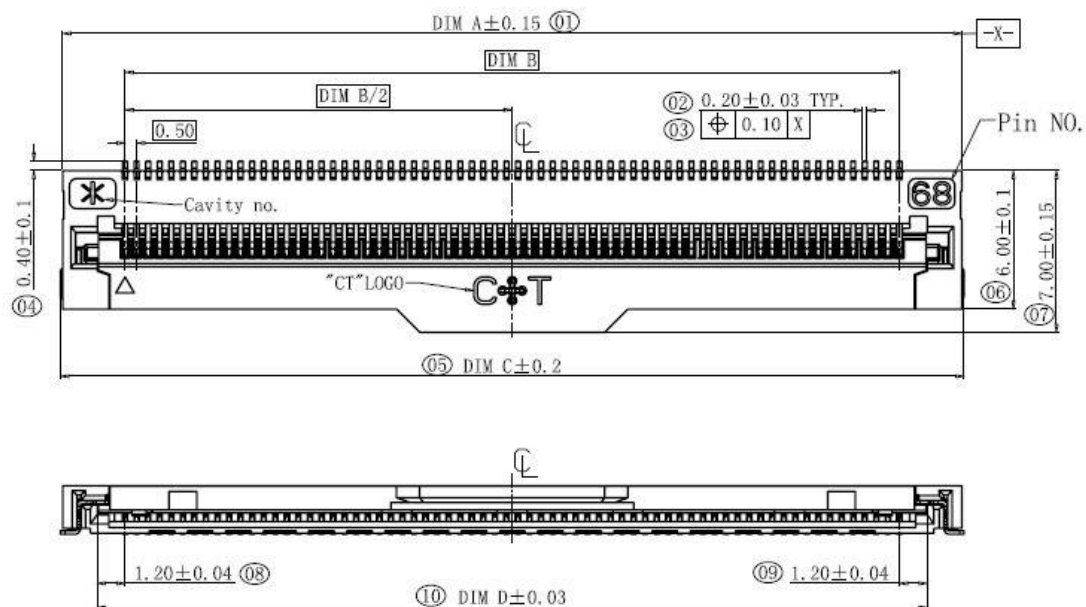
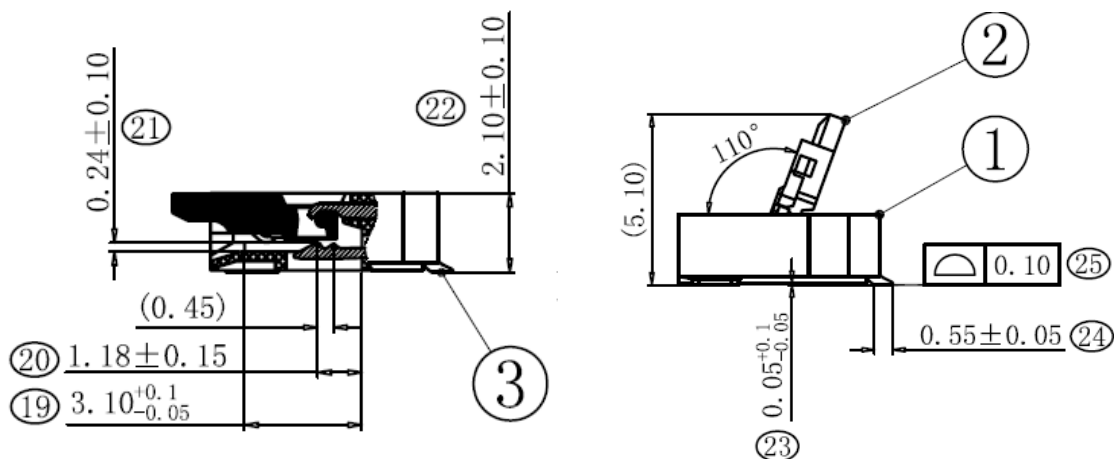


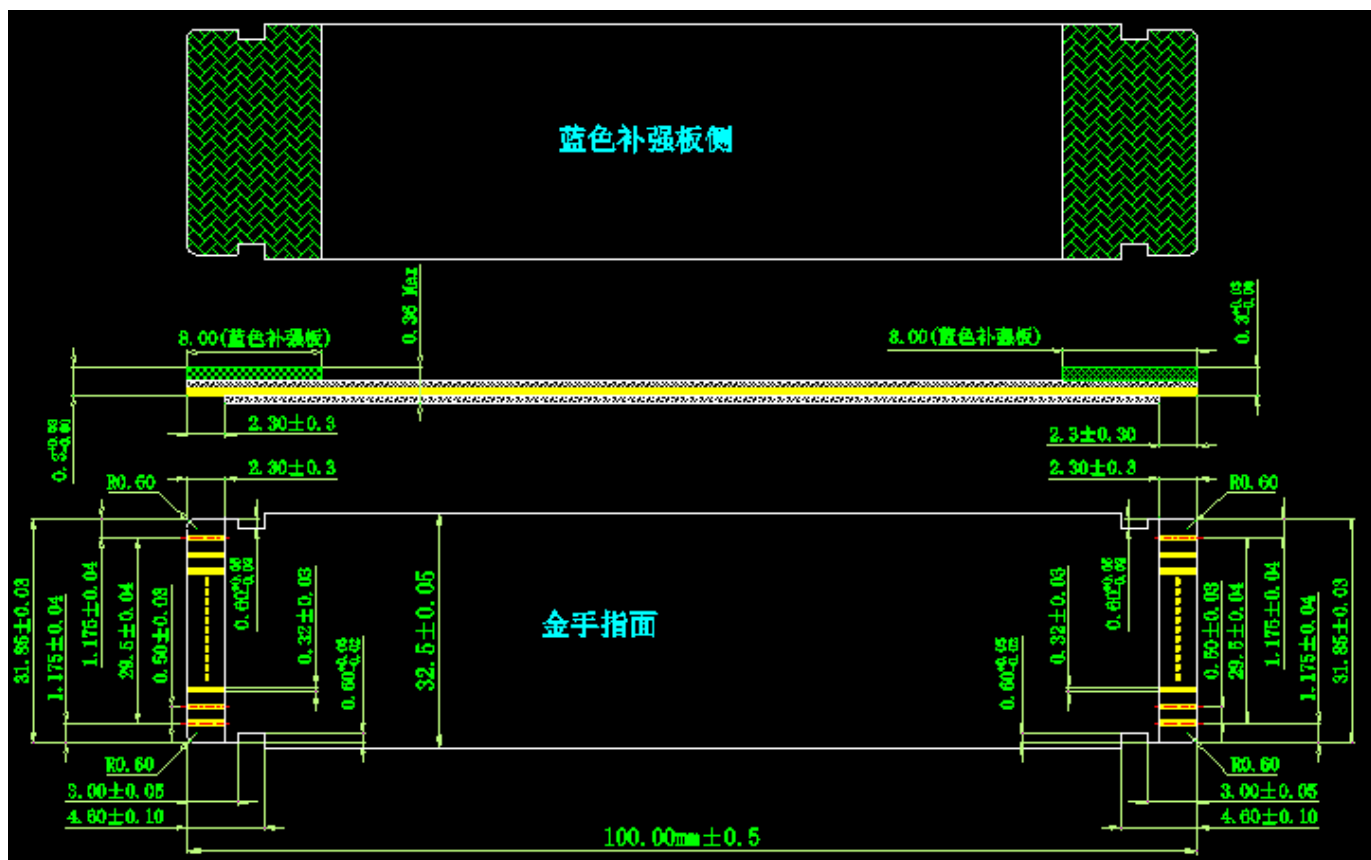
4.3 CEDS CN (60Pin) Connector : **F05039-60P-H(和通) or Equivalent.**

< Table 9. Open Cell Input Connector Pin Configuration >

PIN	Left	Right
1	GMA18	CLK1
2	GMA15	CLK2
3	GMA14	CLK3
4	GMA13	CLK4
5	GMA10	CLK5
6	GMA9	CLK6
7	GMA6	CLK7
8	GMA5	CLK8
9	GMA4	CLK9
10	GMA1	CLK10
11	LOCK_OUT6	NC
12	GND	VDDODD
13	CEDS12-	VDDEVEN
14	CEDS12+	VGL2
15	GND	NC
16	CEDS11-	STV
17	CEDS11+	VGL1
18	GND	VCOM_1
19	CEDS10-	NC
20	CEDS10+	VCOM_0
21	GND	GND
22	CEDS9-	AVDD
23	CEDS9+	AVDD
24	GND	AVDD
25	CEDS8-	AVDD
26	CEDS8+	HAVDD
27	GND	VCC_18
28	CEDS7-	VCC_18
29	CEDS7+	VTERM
30	GND	NC
31	LOCK_OUT3	GND
32	VTERM	CEDS6-
33	VCC_18	CEDS6+
34	VCC_18	GND
35	HAVDD	CEDS5-

36	AVDD	CEDS5+
37	AVDD	GND
38	AVDD	CEDS4-
39	AVDD	CEDS4+
40	GND	GND
41	VCOM_0	CEDS3-
42	NC	CEDS3+
43	VCOM_1	GND
44	VGL1	CEDS2-
45	STV	CEDS2+
46	NC	GND
47	VGL2	CEDS1-
48	VDDEVEN	CEDS1+
49	VDDODD	GND
50	NC	LOCK_OUT3
51	CLK10	GMA18
52	CLK9	GMA15
53	CLK8	GMA14
54	CLK7	GMA13
55	CLK6	GMA10
56	CLK5	GMA9
57	CLK4	GMA6
58	CLK3	GMA5
59	CLK2	GMA4
60	CLK1	GMA1

**F05039-60P-H(祖通)**



FFC图纸

5.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL**5.1 Input data specification CN1**

<Table 10. Vx1 Byte length and Color mapping>

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

6.0 SIGNAL TIMING SPECIFICATION

6.1 Timing Parameters

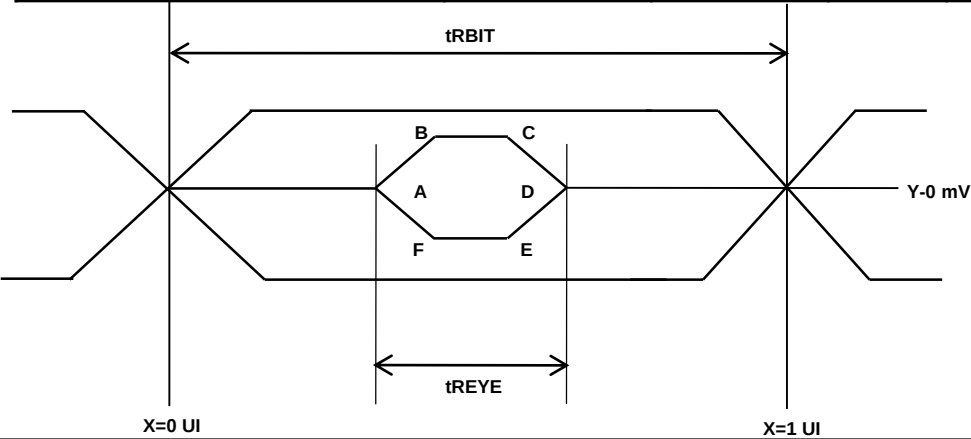
< Table 11. Timing Table >

Item		Symbols	Min	Typ	Max	Unit
Frequency		1/Tc	69	74.5	77	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	74.5	77	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}

< Table 12. Signal Timing Waveforms 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	-	-	0.5	-	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
Intra – pair Skew	TTOSK_inter	-	-5	-	5	UI
SSCG	-	30KHz modulation	-0.5		0.5	%



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

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

< Table 13. Input Signal and Display Color Table >

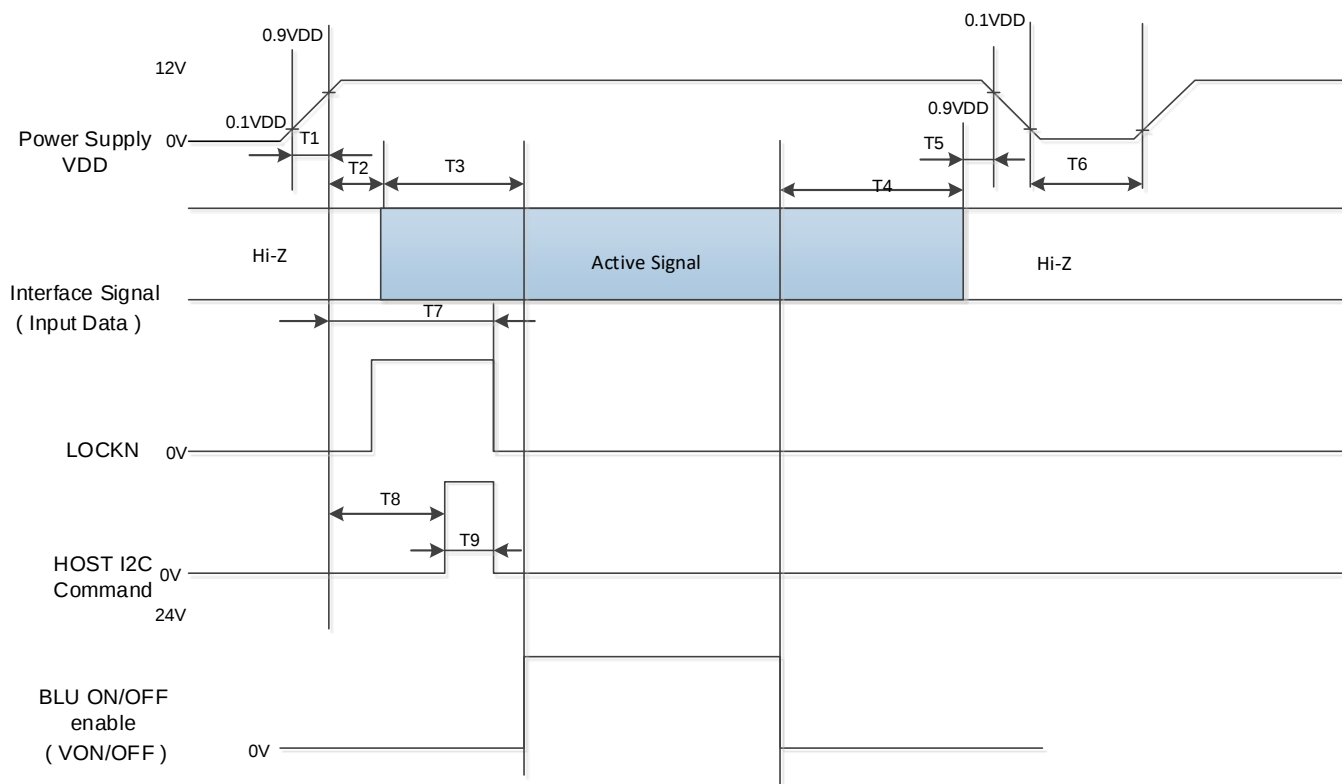
Color		Input Color Data																															
		MSB RED LSB										MSB GREEN LSB										MSB BLUE LSB											
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0		
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	1	

6.4 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	-	50	ms
T6	1	-	-	s
T7	200	-	-	ms
T8	0	-	1200	ms
T9	Depends on I2C command			ms

- Notes: 1. Even though T1 is over the specified value, there is no problem if I2T spec of fuse is satisfied.
 2. Even though T4 is over the specified value, there is no problem if I2T spec of fuse is satisfied.
 3. Back Light must be turn on after power for logic and interface signal are valid.

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7.0 SIGNAL TIMING SPECIFICATION

The test of optical specifications shall be measured in a dark room (ambient luminance≤1 lux and temperature=25±2°C) with the equipment of Luminance meter system (Goniometer system and PR730) 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 $\theta_{\Phi=0}$ ($=\theta_3$) as the 3 o'clock direction (the “right”), $\theta_{\Phi=90}$ ($=\theta_{12}$) as the 12 o'clock direction (“upward”), $\theta_{\Phi=180}$ ($=\theta_9$) as the 9 o'clock direction (“left”) and $\theta_{\Phi=270}$ ($=\theta_6$) as the 6 o'clock direction (“bottom”). While scanning θ and/or Φ , 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 = 120Hz, Ta =25±2 °C]

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Θ_3	CR > 10		89		Deg.	Note 1
		Θ_9			89		Deg.	
	Vertical	Θ_{12}			89		Deg.	
		Θ_6			89		Deg.	
Contrast ratio		CR	$\Theta = 0^\circ$ (Center) Normal Viewing Angle	1000:1	1200:1	-	-	Note 2
Reproduction of color	White	W_x		TYP. - 0.03	0.280	TYP. + 0.03	-	Note 3
		W_y			0.290		-	
	Red	R_x			0.643		-	
		R_y			0.338		-	
	Green	G_x			0.308		-	
		G_y			0.617		-	
	Blue	B_x			0.152		-	
		B_y			0.053		-	
Response Time	G to G	T_g		-	8	10	ms	Note 4
Cell Transmittance					5.35	5.95		%

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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 $\theta = 0^\circ$ 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 15. 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.
4. Response time T_g is the average time required for display transition by switching the input signal as below table and is based on Frame rate $f_V = 60\text{Hz}$ to optimize.
Each time in below table is defined as Figure 2 and shall be measured by switching the

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

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

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8.0 MECHANICAL CHARACTERISTICS

11.1 Dimensional Requirements

Figure 4(located in Appendix) shows mechanical outlines for the model HV430QUB-F11.
Other parameters are shown in Table 16.

< Table 16. Dimensional Parameters >

Parameter	Specification	Unit
Active area	941.184(H) × 529.416(V)	mm
Pixel pitch	245.1 (H) × 245.1 (V)	μm
Number of pixels	3840(H) × 2160(V) (TFT pixel) 2880(H) × 2160(V) (1 CF pixel= R + G + B +W dots)	pixels
Weight	1.84	kg

9.0 RELIABILITY TEST

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

< Table 17. Reliability Test Parameters >

No	Test Items	Conditions
1	High temperature storage test	Ta = 60 °C, 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	High temperature operation test	Ta = 50 °C, 240hrs
5	Low temperature operation test	Ta = 0 °C, 240hrs
6	Thermal shock	Ta = -20 °C ↔ 60 °C (0.5 hr), 100 cycle

This test condition is based on BOE module.

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10.0 HANDLING & CAUTIONS (1) Cautions when taking out the Panel • Pick the pouch only, when taking out panel from a shipping package. (2) Cautions 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. • As the LCD panel and back - light 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. • Do not pull the interface connector in or out while the LCD panel is operating. • Put the panel display side down on a flat horizontal plane. • Handle connectors and cables with care. (3) Cautions for the operation • When the panel 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 panel would be damaged. (4) Cautions for the atmosphere • Dew drop atmosphere should be avoided. • 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. (5) Cautions 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. (6) Other cautions • Do not disassemble and/or re-assemble LCD panel. • Do not re-adjust variable resistor or switch etc. • When returning the panel for repair or etc., Please pack the panel not to be broken. We recommend to use the original shipping packages.			
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11.0 PRODUCT SERIAL NUMBER

FG-Code

XXXXXXXXXX-XXX

BOE



XXXXXXXXXXXXXXXXXXXX

MDL ID

MDL ID Naming Rule:

Digit Code	1	2	3	4	5	6	7	8	9	10	11
Description	Model Code GBN		Grade	Line	Year		Month	Model Extension Code			
Digit Code	12	13	14	15	16	17	18				
Description	Serial No						扫码不显示，BOE厂内用				

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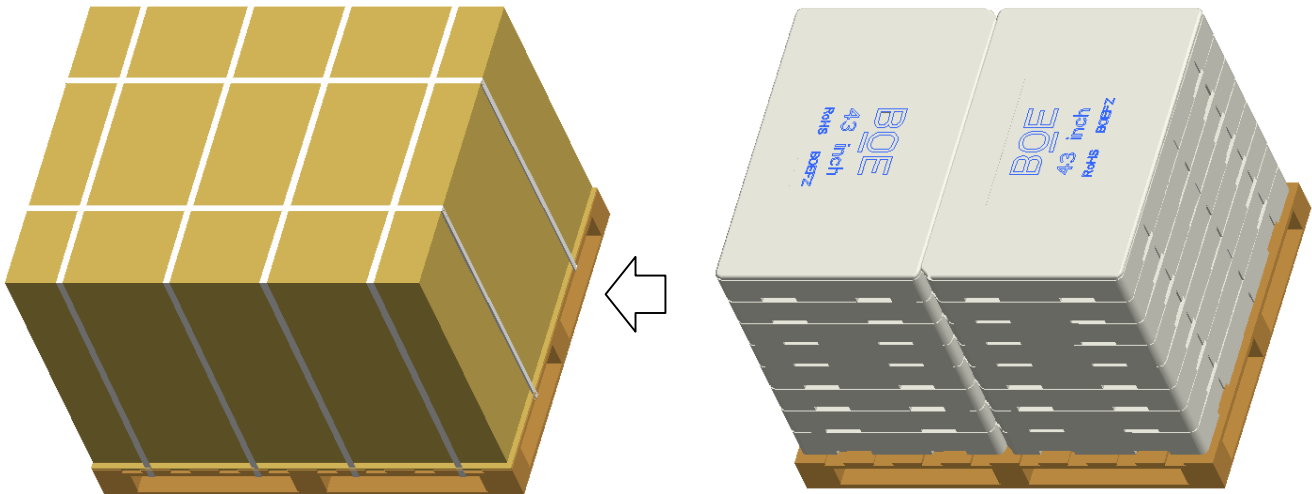
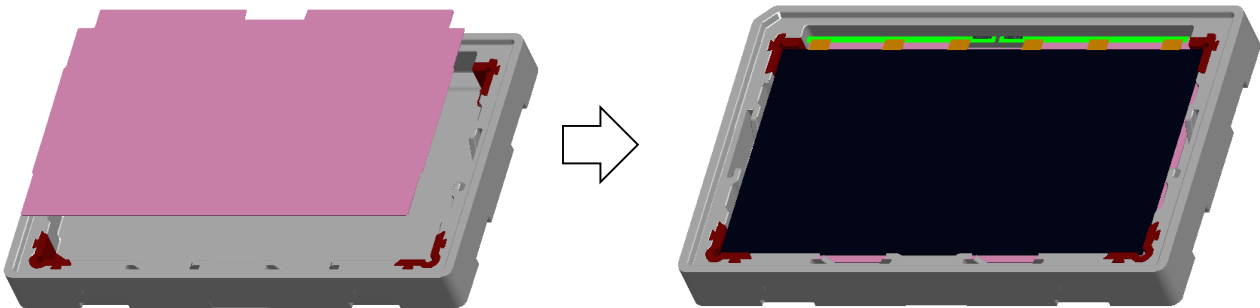
12.0 PACKING

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.

12.1 Packing Order

Put 1Pcs EPE Pad in the box, then put 1Pcs Panel into the box

Totally 17pcs panels and 18Pcs EPE Pad per box



Place wrap film and out box around the boxes. Pack with 6 packing belts.

Fix one paper pad on the pallet, Put totally 16 boxes and 2 cover. (16ea boxes per pallet)

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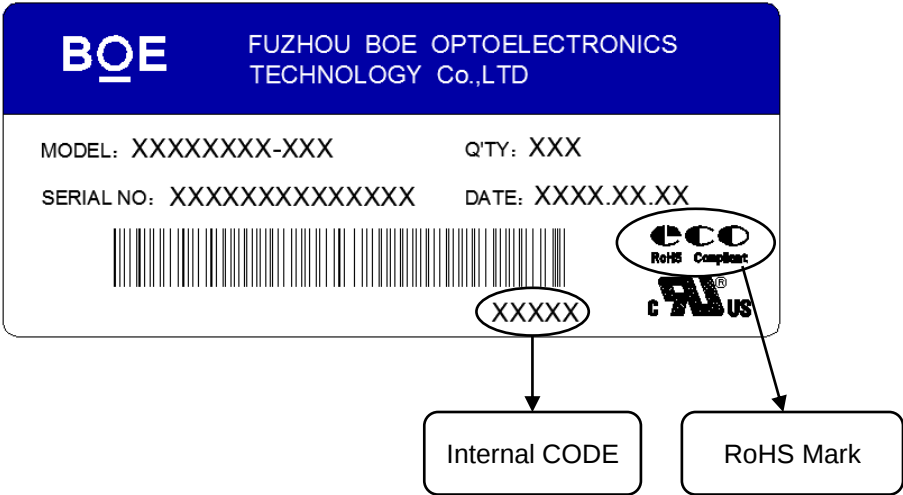
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12.2 Packing Note

- Box Dimension : 1100mmL×705mmW×127mmH
- Package Quantity in one Box : 17pcs

12.3 Box Label

- Label Size : 70 mm (L) × 30 mm (W)
- Contents
 - Model : HV430QUB-F11 (FG Code of Product)
 - Q`ty : 17 Open Cell in one box.
 - Serial No. : Box Serial No.
 - Date : Packing Date



Box ID Naming Rule:

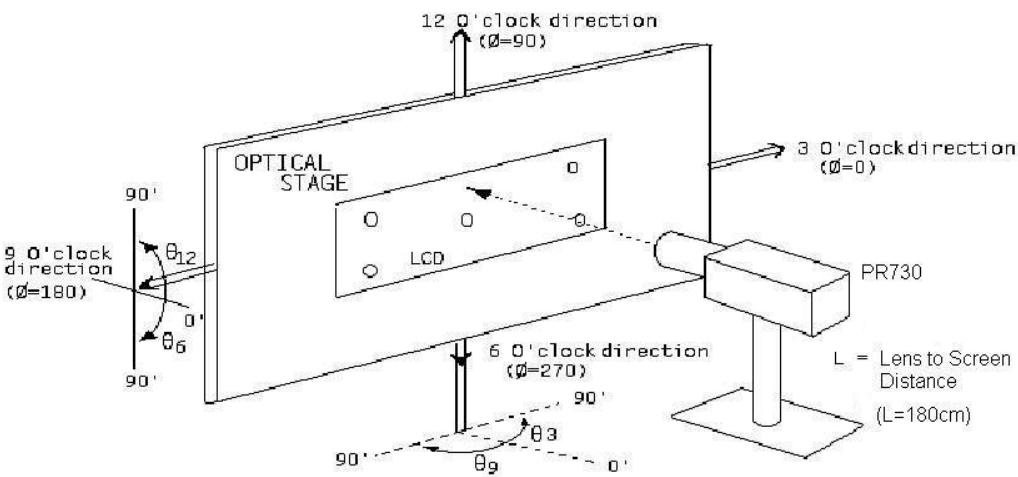
Digit Code	1	2	3	4	5	6	7	8	9	10	11	12	13
Description	Products GBN		Grade	Line	Year		Month	Revision Code	Serial No				

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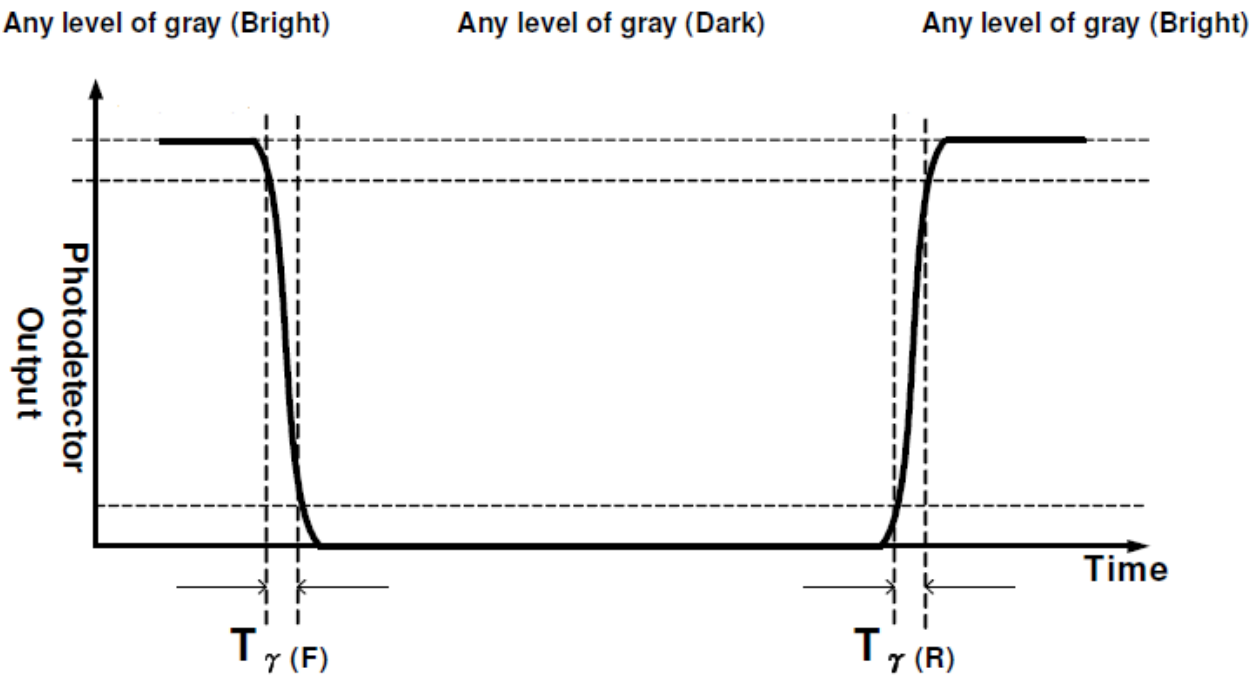
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13.0 APPENDIX

< Figure 1. Measurement Set Up >



< Figure 2. Response Time Testing >



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