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DV430QUM-N10

Product Specification

Rev. O

FUZHOU BOE OPTOELECTRONICS TECHNOLOGY Co.,LTD

SPEC. NUMBER
S8-65-8D-026

PRODUCT GROUP
TFT-LCD

Rev. O

ISSUE DATE
2020/06/11

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REVISION HISTORY

() preliminary specification

(✓) Final specification

Revision No.	Page	Description of changes	Date	Prepared
P0		Initial Release	2019/08/13	Anna.An
P1	4	1.1 Introduction	2020/06/11	Anna.An
	5	1.3 Application 1.4 General Specification	2020/06/11	Anna.An
	6	2.0 Temperature/humidity range figure	2020/06/11	Anna.An
	9	3.3 VCOM tuning SOP	2020/06/11	Anna.An
	11	3.4 Backlight Unit information	2020/06/11	Anna.An
	12	3.5 Backlight Input Pin Assignments	2020/06/11	Anna.An
	29	8.1 Dimensional Requirements	2020/06/11	Anna.An
	41	Outline Dimensions(Front view)	2020/06/11	Anna.An
	42	Outline Dimensions(rear view)	2020/06/11	Anna.An
O		Final Release	2020/06/11	Anna.An

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1.3 Application

- Indoor Commercial Digital Display
- Indoor Display Terminals for Control System
- Indoor Landscape and Portrait Display

1.4 General Specification

< Table 1. General Specifications >

Parameter	Specification	Unit	Remarks
Active area	941.184(H) × 529.416 (V)	mm	
Number of pixels	3840*(RGB)*2160	pixels	
Pixel pitch	245.1(H) ×245.1 (V)	um	
Pixel arrangement	Pixels RGB Island		
Display colors	1.07G (8bits + FRC)	colors	
Display mode	Transmission mode, Normally Black		
Dimensional outline	962.1(H)*550.5(V)*12.9(B)	mm	Detail refer to drawing
Weight	8.3	Kg	
Power Consumption	83.8(Typ.)	Watt	With TCON Board
Bezel width (L/R/U/D)	8.9/8.9/8.9/8.9	mm	
Surface Treatment	Haze 1% , 3H		
Back-light	Upper edge side, 2- LED Light bar		
Possible display type	Landscape and Portrait Enabled		
Remark	7*24Hrs Continuous Operation Horizontal and Perpendicular compatibility(Vertical Spec : Rotate 90° clockwise facing the LCM front)		

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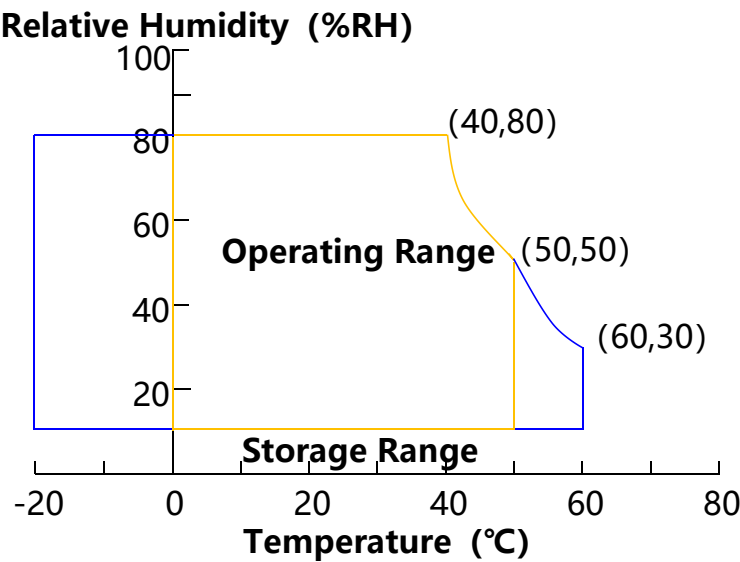
2.0 ABSOLUTE MAXIMUM RATINGS

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	13.2	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	

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.



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3.0 ELECTRICAL SPECIFICATIONS

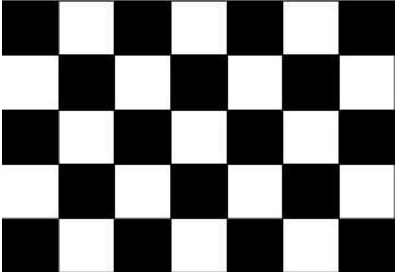
3.1 TFT LCD Open Cell

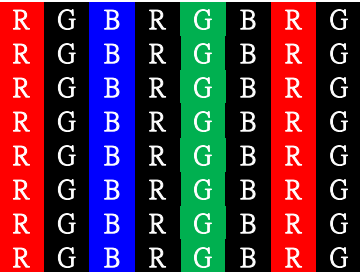
< Table 3. Open Cell Electrical Specifications >

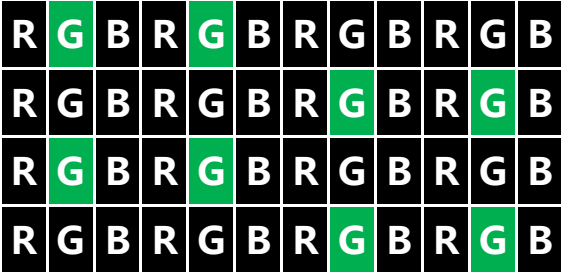
[Ta =25±2 °C]

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	-	0.8	2.3	A	Note 1
Power Consumption		PDD		9.6	27	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	2.0	-	3.3	V	
	Input Low Threshold Voltage	VIL	0	-	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

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

b) Max : Vertical Sub Line(L255)
 

c) Flicker Test Pattern
 

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

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3.0 ELECTRICAL SPECIFICATIONS

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.

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3.0 ELECTRICAL SPECIFICATIONS

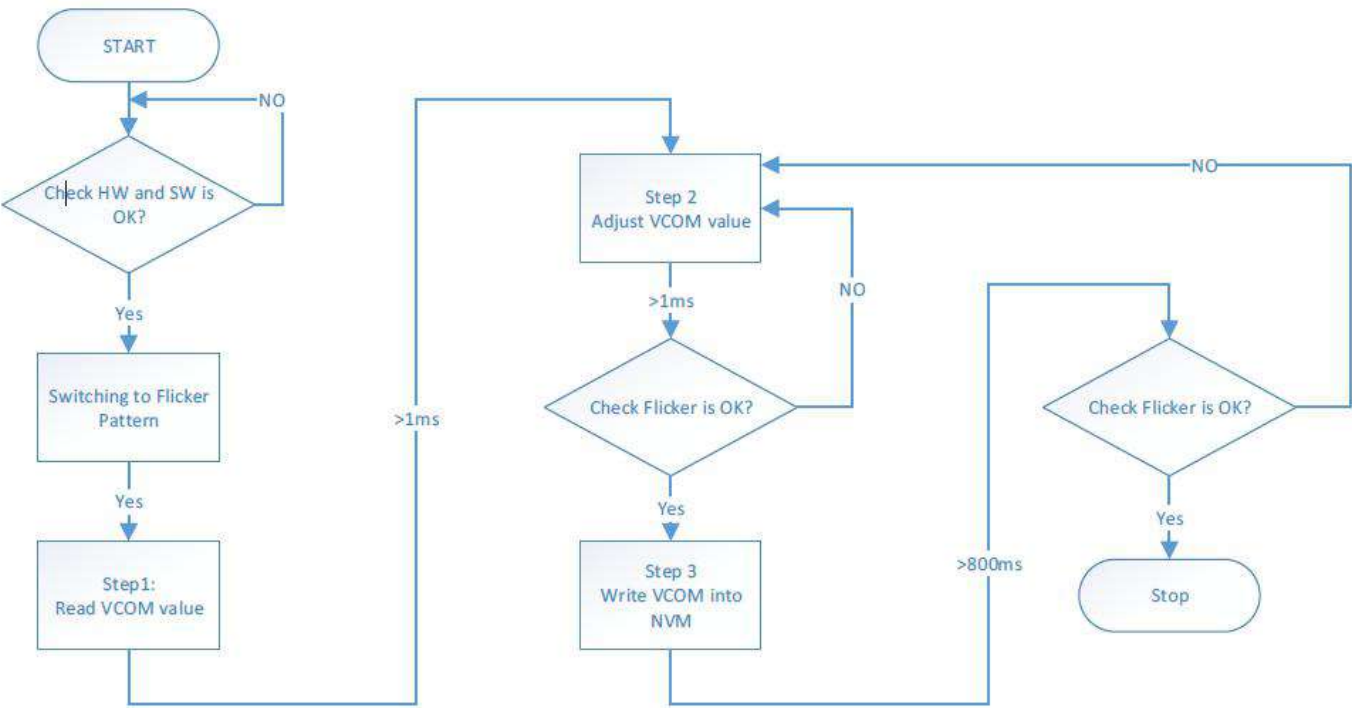
3.3 VCOM tuning SOP

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

A0		
Hardware Setting	Software Setting	Hardware 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



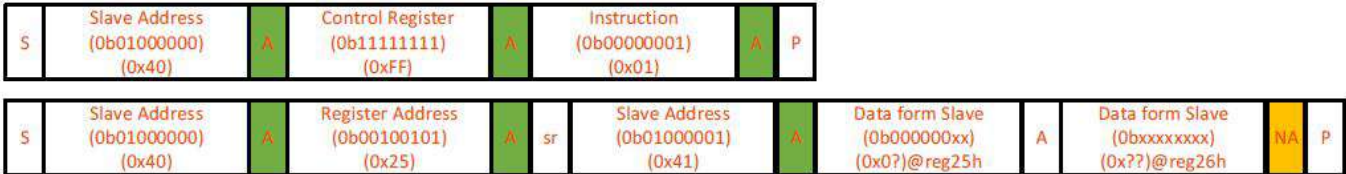
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3.0 ELECTRICAL SPECIFICATIONS

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:

S

:

START condition

P

:

STOP condition

A

:

ACK form slave

A

:

ACK form master

NA

:

NACK form master

sr

:

Repeated START

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3.0 ELECTRICAL SPECIFICATIONS

3.4 Backlight Unit

< Table 7. Backlight Unit Electrical Specifications > [Ta =25±2 °C]

Parameter		Min.	Typ.	Max.	Unit	Remarks
LED Forward Voltage	V _F	60.9	67.2	71.4	V	-
LED Forward Current	I _F	-	960	-	mA	-
LED Driver Power Consump tion	P _{LED}	-	74.2	-	W	Note 1
LED Life-Time	N/A	30000	-	-	Hour	IF = 480mA
PWM Contr ol Level	PWM High Le vel	-	-	-	V	
	PWM Low Le vel	-	-	-	V	
PWM Control Frequency	F _{PWM}	-	-	-	Hz	
Duty Ratio	-	-	-	-	%	

Notes : 1. Power supply voltage12V for LED Driver, Driver efficiency 87%,
Calculator Value for reference IF × VF / 0.87 = PLED
2. The LED Life-time define as the estimated time to 50% degradation of initial luminous.

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3.0 ELECTRICAL SPECIFICATIONS

3.5 Backlight Input Pin Assignments

Connector type : PH2.0-14A(Horizontal) or equivalent

Pin No.	Symbol	Feature
1、 2、 3、 4、 5	+24V	Supply voltage
6、 7、 8、 9、 10	GND	Ground
13	ADJ	Dimming control (0V=Brightness Max ,5V=Brightness Min)
12	N/F	Standby/Operation (On =2V-5.0V/Off=0-0.8V)
14、 11	NC	

DC Output specification

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
LED forward voltage per channel	VLED	60.9	67.2	71.4	V
LED forward current per channel	ILED	-	480	-	mA

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4.0 INTERFACE CONNECTION

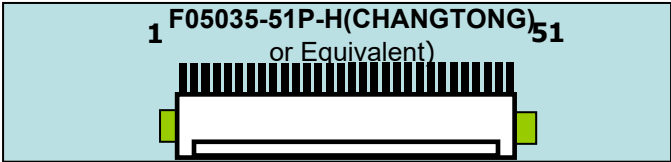
4.1 V by One CN (51Pin) Connector : F05035-51P-H(CHANGTONG)or Equivalent.

< Table 8. 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 or NC: 1 section(default) High: 2 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			

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

Rear view of LCM



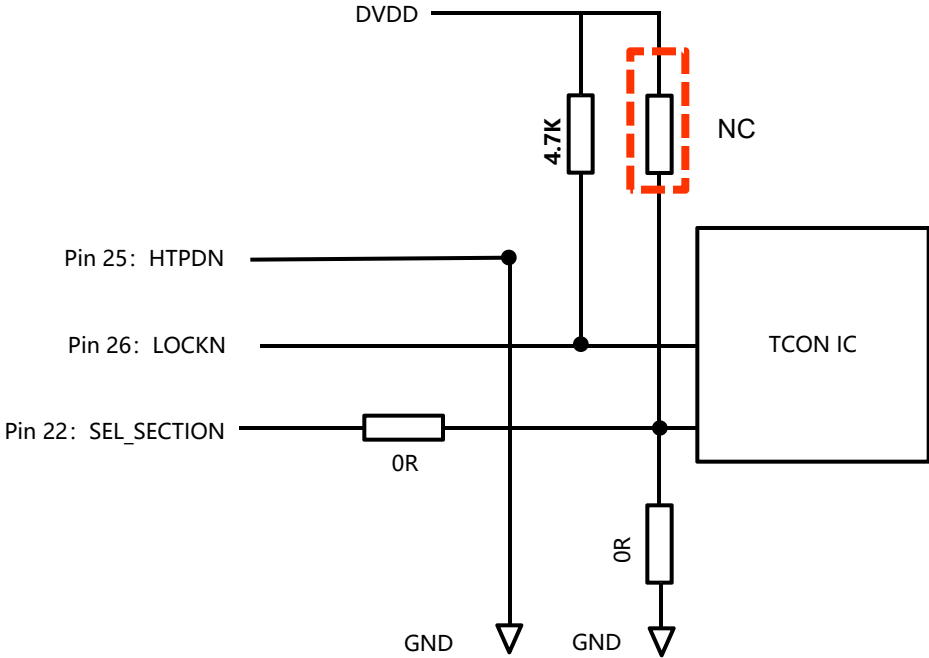
BIST Pattern

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

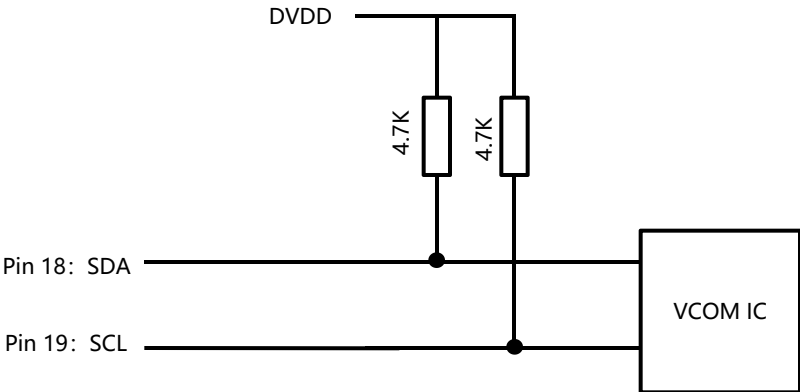
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- Notes :
1. NC (Not Connected) : This pins are only used for BOE internal operations.
 - 2.BIST : This pin is used for selecting display pattern mode when input DE or input CLOCK quits toggling.
 3. Circuit Block Diagram of HTPDN/LOCKN/SEL_SECTION.



4. Circuit Block Diagram Pin of SDA/SCL/WP.



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4.0 INTERFACE CONNECTION

4.2 V by one Misc. Setting for 1 Section.

- a) System side has 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 >

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

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4.0 INTERFACE CONNECTION

4.3 V by one Misc. Setting for 2 Section.

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

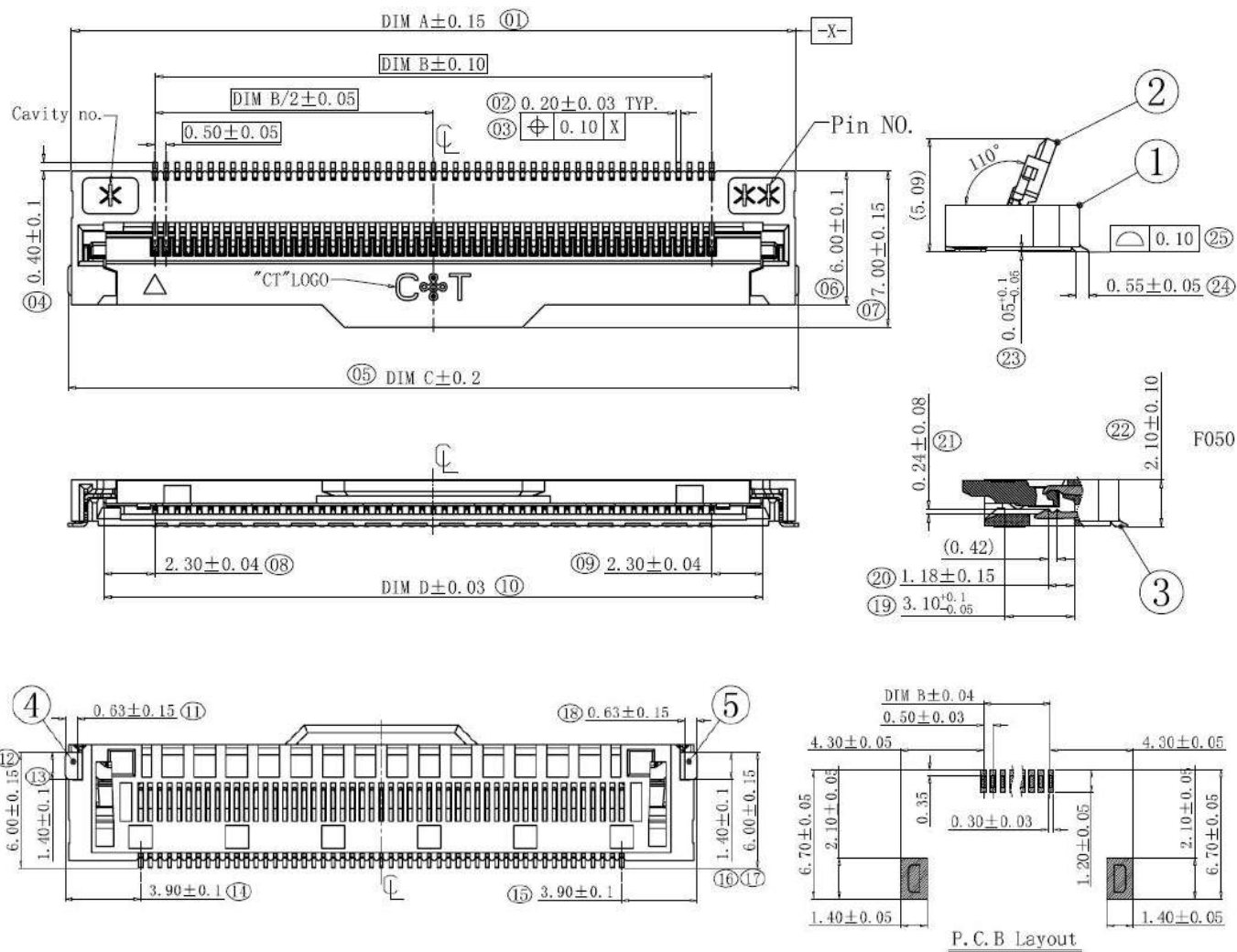
< Table 10. V by one setting &data mapping table >

2 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 1921	Pixel 1922	Pixel 1923	Pixel 1924
	Pixel 5	Pixel 6	Pixel 7	Pixel 8	Pixel 1925	Pixel 1926	Pixel 1927	Pixel 1928
	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...
H Blanking	Pixel 1917	Pixel 1918	Pixel 1919	Pixel 1920	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 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

4.0 INTERFACE CONNECTION

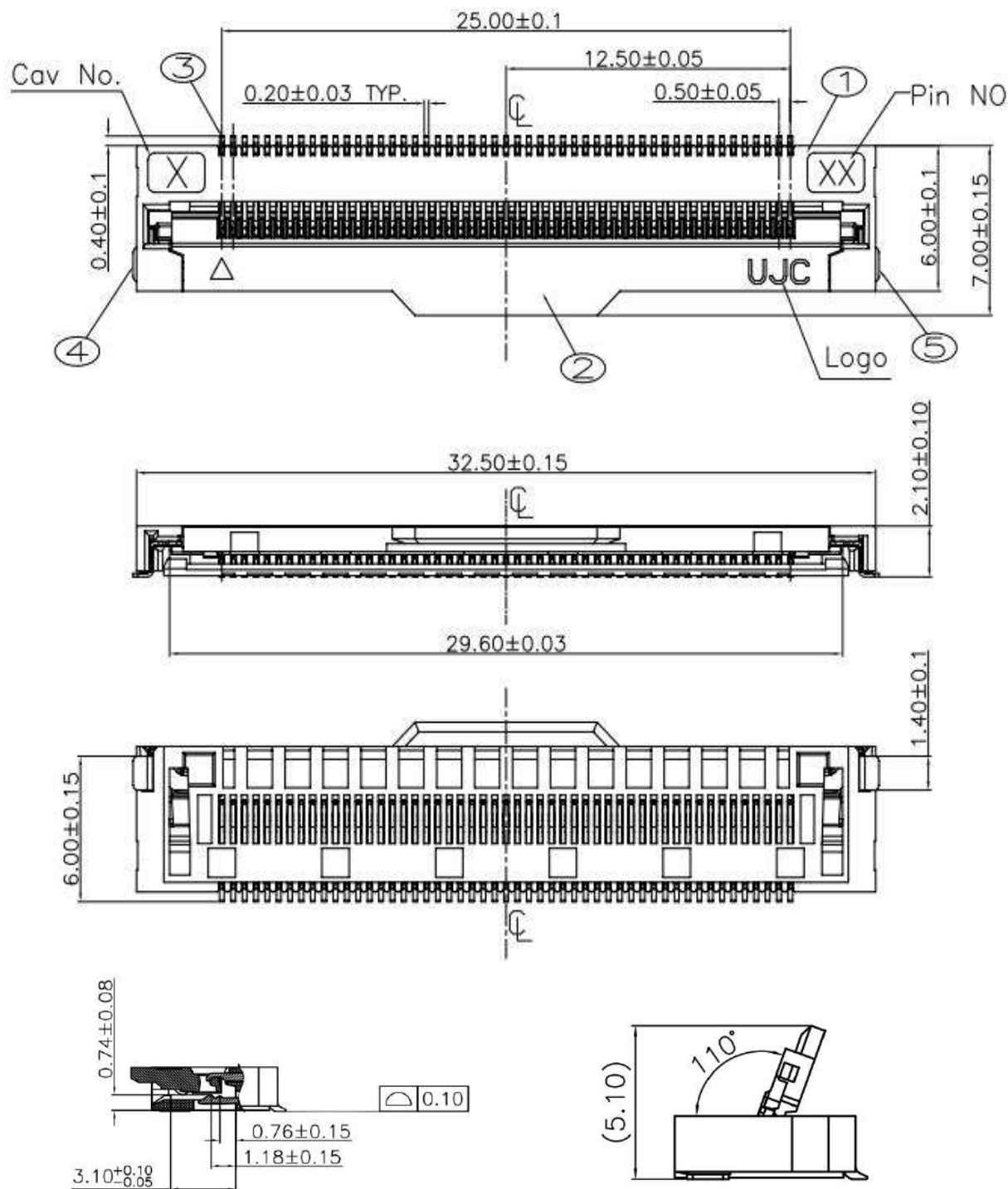
4.4 TCON Board Input CNT & FFC Drawing

-51pin Connector Drawing-F05035-51P-H (Changtong)



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

-51pin Connector Drawing-PM.FPC.LVS0505101(UJC)

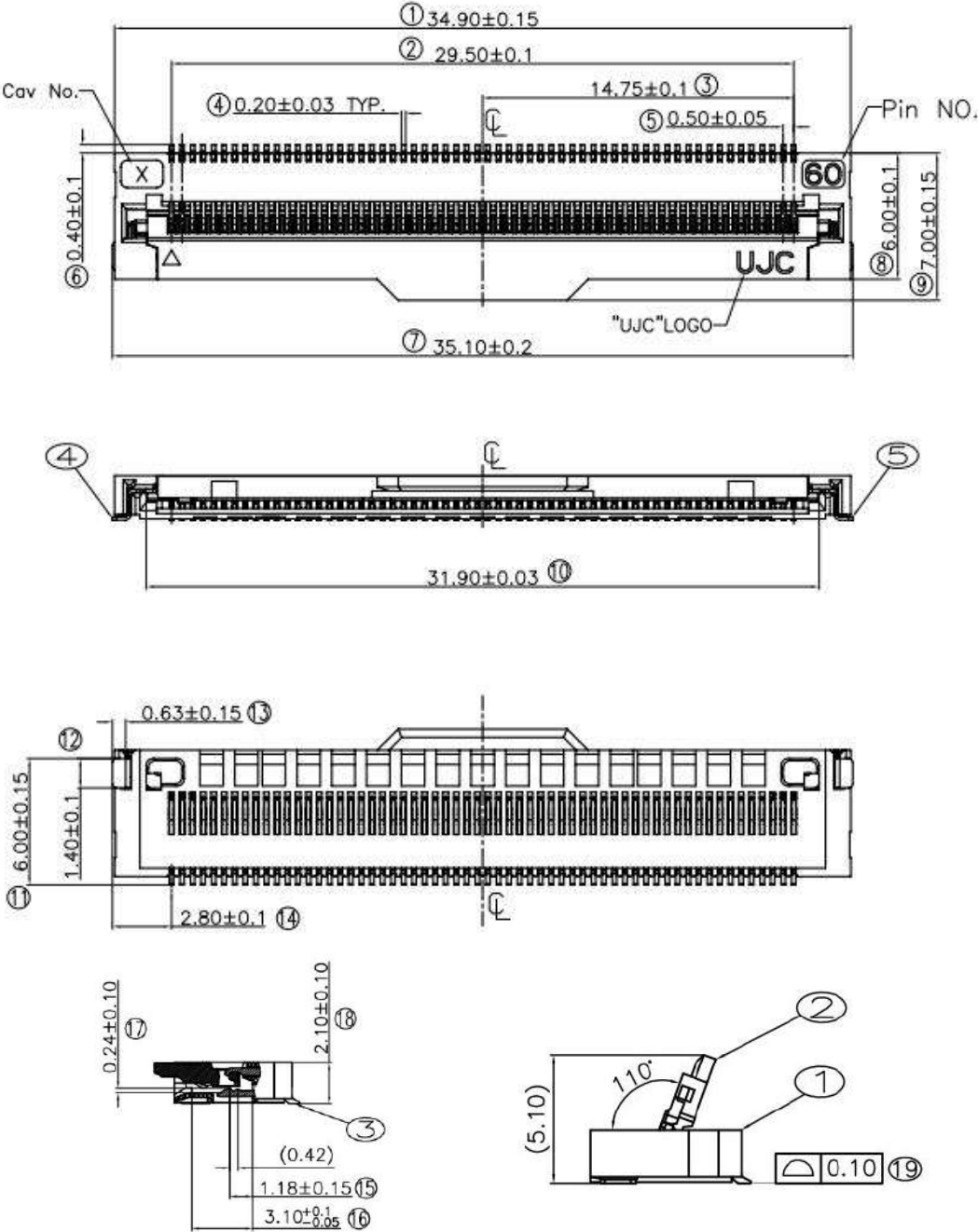


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4.0 INTERFACE CONNECTION

4.5 TCON Board Output CNT &FFC Drawing

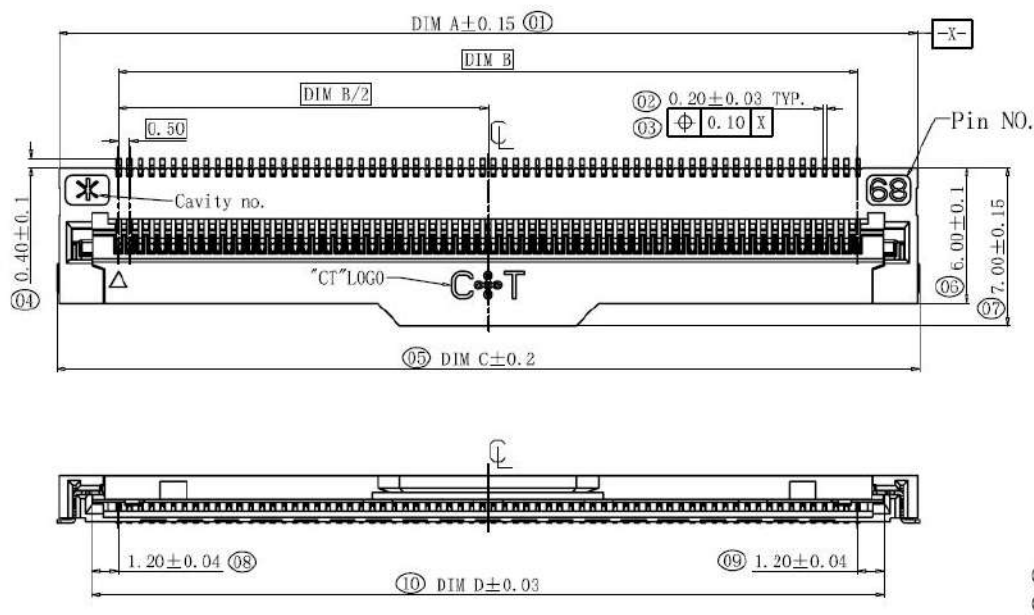
-60pin Connector Drawing-PM.FPC.LVS0506001(UJC)



Note: TCON Board output CNT = XPCBA Input CNT.

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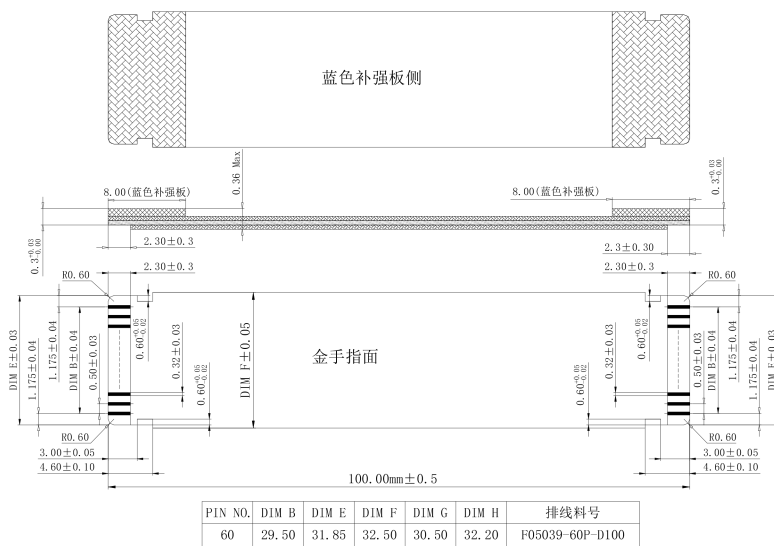
-60pin Connector Drawing-F05039-60P-H



PIN NO.	DIM A	DIM B	DIM C	DIM D
60	34.90	29.50	35.10	31.90

Note: TCON Board output CNT = XPCBA Input CNT.

-FFC Drawing



Notes: This FFC drawing is supplied by the connector vendor.

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5.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL

5.1 Input data specification

<Table 11. Vx1 Byte length and Color mapping>

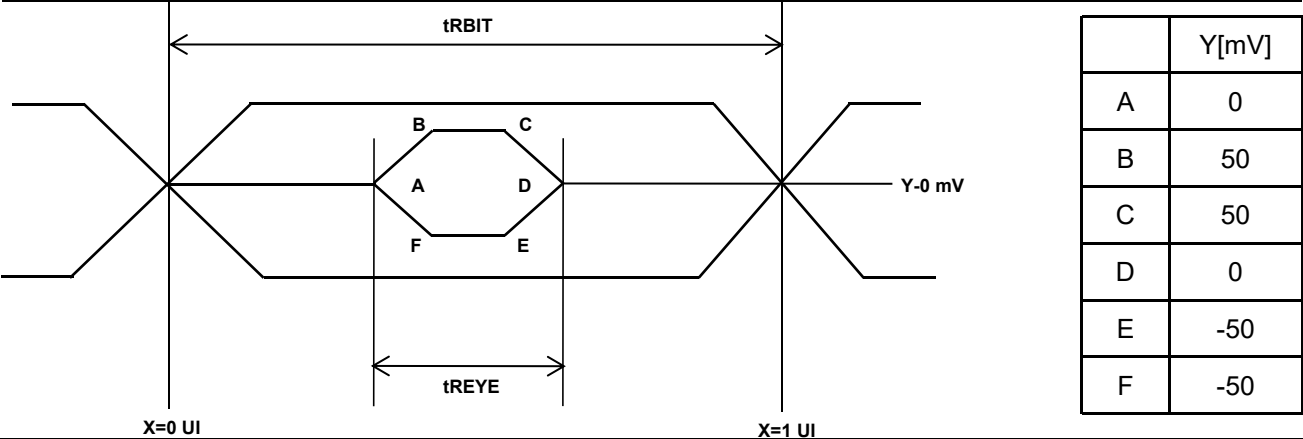
Byte	Packer input	Color data mapping
		30 bpp RGB
0	Bit-0	R2
	Bit-1	R3
	Bit-2	R4
	Bit-3	R5
	Bit-4	R6
	Bit-5	R7
	Bit-6	R8
	Bit-7	R9
1	Bit-8	G2
	Bit-9	G3
	Bit-10	G4
	Bit-11	G5
	Bit-12	G6
	Bit-13	G7
	Bit-14	G8
	Bit-15	G9
2	Bit-16	B2
	Bit-17	B3
	Bit-18	B4
	Bit-19	B5
	Bit-20	B6
	Bit-21	B7
	Bit-22	B8
	Bit-23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

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5.2 Vx1 Input Signal Timing

< 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 Pack age Pin	tA	-	-	0.25	-	UI
Eye Width Position B at Pac kage 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	%



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6.0 SIGNAL TIMING SPECIFICATION

6.1 Timing Parameters(DE only mode)

< Table 13. Timing Table >

Item		Symbols	Min	Typ	Max	Unit
Frequency		1/Tc	69	74.25	75	MHz
Vertical	Frame Rate	F	57	60	62	Hz
	Total	T _V	2200	2250	2330	T _H
	Display	T _{VD}	2160			T _H
	Blank	T _{VB}	40	90	170	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	75	MHz
Vertical	Frame Rate	F	47	50	51	Hz
	Total	T _V	2200	2700	2715	T _H
	Display	T _{VD}	2160			T _H
	Blank	T _{VB}	40	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}

Notes: This product is DE only mode. The input of Hsync & Vsync signal does not have an effect on normal o
peration.

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6.0 SIGNAL TIMING SPECIFICATION

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

< Table 14. 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	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	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	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	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	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	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	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	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	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	0	0	0	0	0	

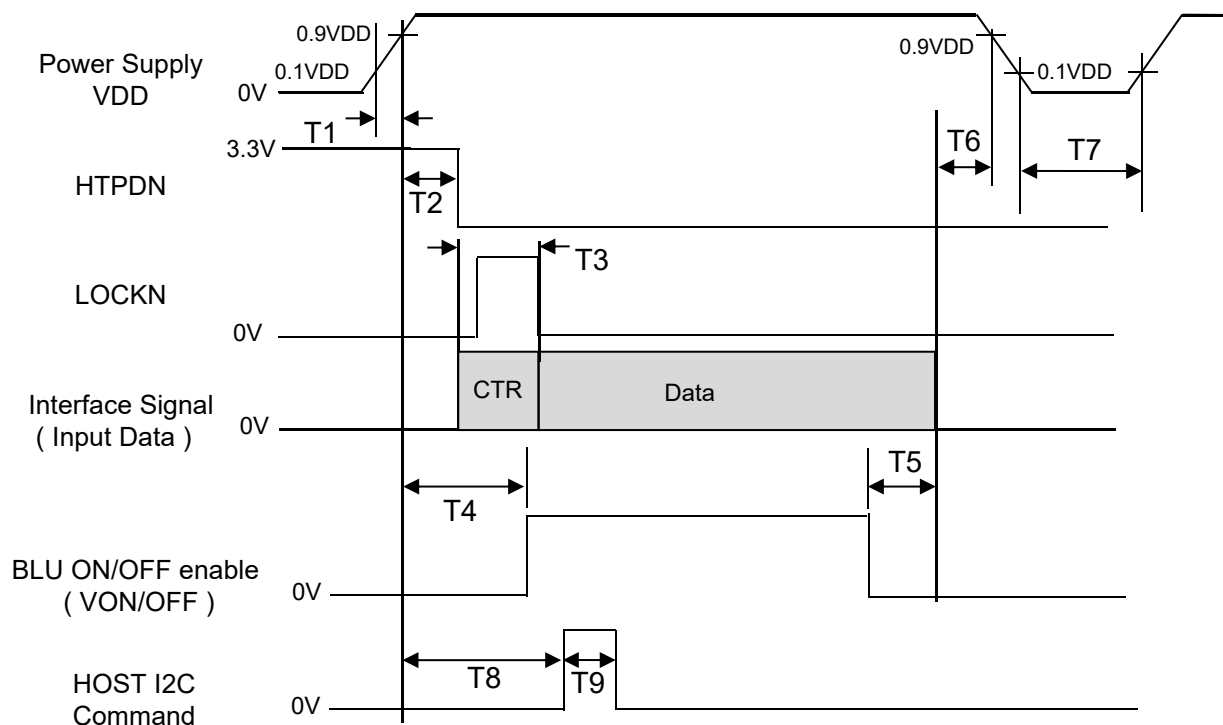
	RED(1022)	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	RED(1023)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Green (000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Green (000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0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

6.0 SIGNAL TIMING SPECIFICATION

6.3 Power Sequence



< Table 15. 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	1	-	-	s
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. Back Light must be turn on after power for logic and interface signal are valid.

3. BLU enable must after input data.

4. HOST I2C operate after BLU enable.

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7.0 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 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 θ_{∅=0} (=θ₃) as the 3 o'clock direction (the “right”), θ_{∅=90} (= θ₁₂) as the 12 o'clock direction (“upward”), θ_{∅=180} (= θ₉) as the 9 o'clock direction (“left”) and θ_{∅=270}(= θ₆) as the 6 o'clock direction (“bottom”). While scanning θ and/or ∅, 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℃. Optimum viewing angle direction is 6 ’clock.

< Table 16. Optical Table >

[VDD = 12.0V, Frame rate = 120Hz, Ta =25±2 ℃]

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.	
Brightness		Lv	$\Theta = 0^\circ$ (Center) Normal Viewing Angle	400	500	-	nit	
Contrast ratio		CR		1000:1	1200:1	-		Note 2
White luminance uniformity		ΔY		80	-	-	%	Note 3
Reproduction of color	White	W_x		TYP. - 0.03	0.28	TYP. + 0.03		Note 4
		W_y			0.29			
	Red	R_x			0.634			
		R_y			0.351			
	Green	G_x			0.311			
		G_y			0.612			
	Blue	B_x			0.143			
		B_y			0.053			
Color Gamut				-	72	-	%	
Response Time	G to G	T_g		-	8	10	ms	Note 5

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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 White luminance uniformity on LCD surface is then expressed as :
 $\Delta Y = (\text{Minimum Luminance of 9 points} / \text{Maximum Luminance of 9 points}) * 100$
 (See Figure 5 shown in Appendix).
4. The color chromaticity coordinates specified in Table 9.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.
5. 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

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8.0 MECHANICAL CHARACTERISTICS

8.1 Dimensional Requirements

Figure 3(located in Appendix) shows mechanical outlines for the model DV430QUM-N10 . Other parameters are shown in Table 13.

< Table 17. Dimensional Parameters >

Parameter	Specification	Unit
Dimensional outline	962.1(H)*550.5(V)*12.9(B)	mm
Weight	8.3	Kg
Active area	941.184(H) × 529.416 (V)	mm
Pixel pitch	245.1(H) ×245.1 (V)	um
Number of pixels	3840(H) × 2160(V) (TFT pixel) 3840(H) × 2160(V) (1 CF pixel= R + G + B dots)	pixels
Back-light	Up edge side 2-LED Light bar Type	

8.2 Mounting

See FIGURE 5. (shown in Appendix)

8.3 Anti-Glare and Polarizer Hardness.

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

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9.0 RELIABILITY TEST

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

< Table 18. 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	
7	Vibration test (non-operating)	Frequency 10 ~ 300 Hz, Sweep rate 30 min Gravity / AMP 1.5 G Period X, Y, Z 30 min	
8	Shock test (non-operating)	Gravity	50G
		Pulse width	11msec, half sine wave
		Direction	± X, ± Y, ± Z Once for each
9	Electro-static discharge test (non-operating)	Air : 150 pF, 330Ω, 15 KV Contact : 150 pF, 330Ω, 8 KV	
10	Altitude test	Operating: 0 to 15000ft , 0 to 40°	
		Non Operating: 0 to 40000ft, -10 to 25°	

This test condition is based on BOE module.

10.0 PRODCUT SERIAL NUMBER

XXXX④
XXXXXX

XXXXXXXX-XXX①

B10

Module ID 条形码

XXXX⑤

XXXXXXXXXXXXXXXXXXXX②

PP ID 条形码

XX-XXXXXX-XXXXX-XXX-XXXX③

MADE IN CHINA

① FG-CODE

② Module ID，最后一位为Revision Code（扫描不显示），前17位编码规则如下

③ PPID（客户端ID）

④ D/PN码，规格待确定

⑤ 生产年份+生产周别（中间无空格）

MDL ID Naming Rule:

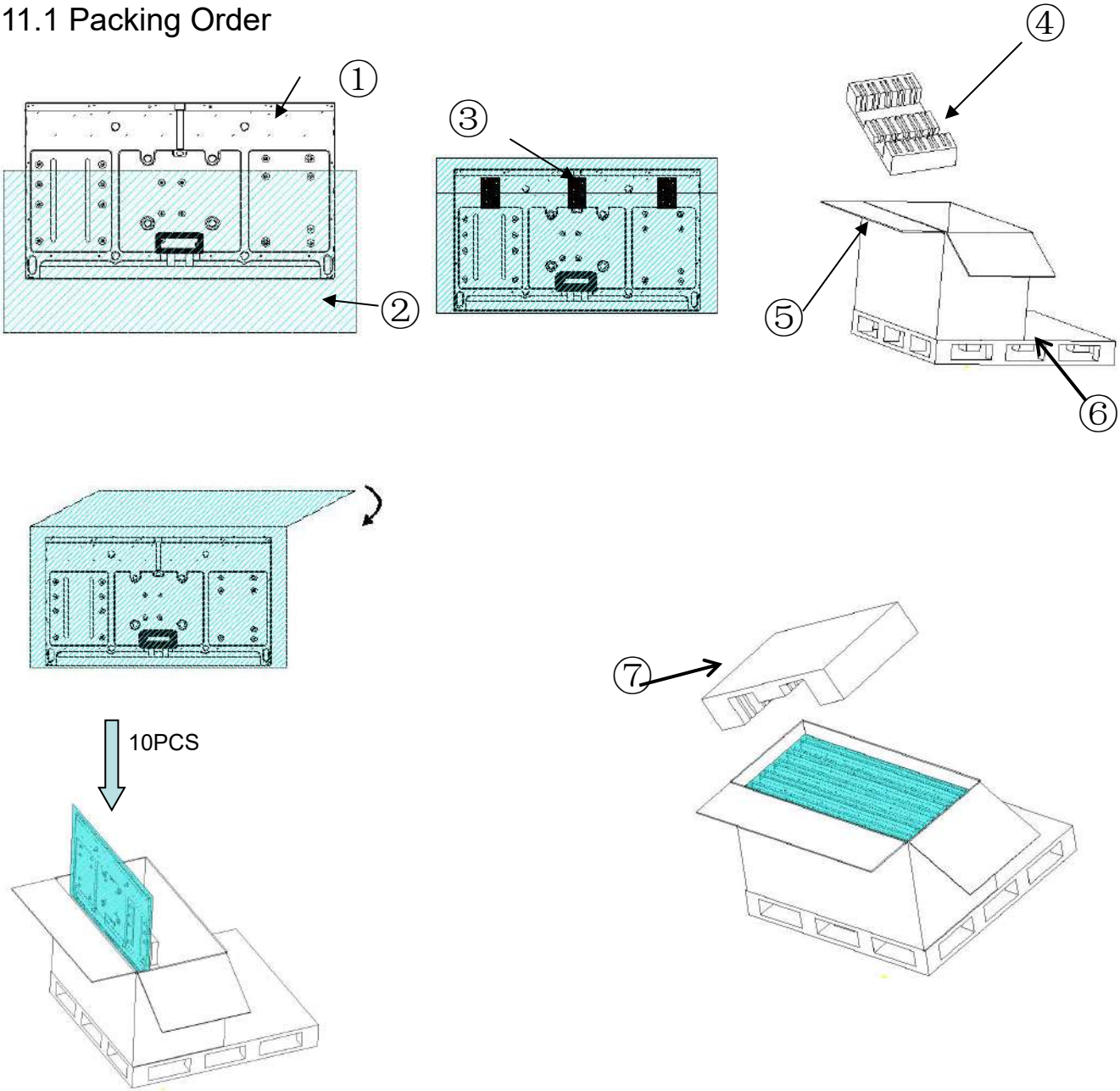
Digit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Code	S	L	S	A	1	0	8	5	9	4	2	0	0	0	1	D	B
Description	Product Code/GBN→FG-CODE一一对应		Grade	line	Year		Month	Model Extension Code (Last 4 Digits of FG-CODE)				Serial No. Hex-Decimal 000000-FFFFFF					

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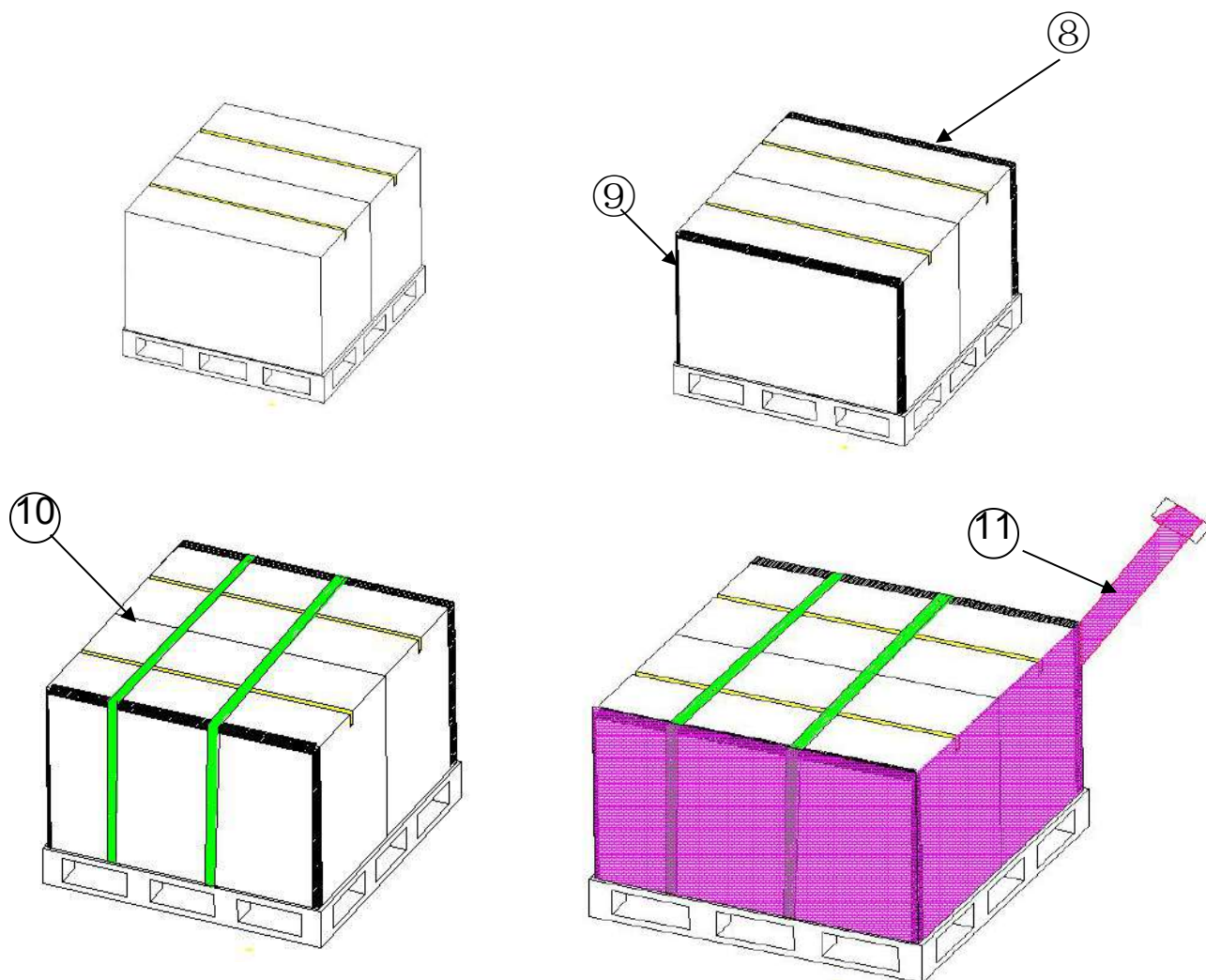
11.0 PACKING INFORMATION

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

11.1 Packing Order



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

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11.2 Packing Note

- Box Dimension : 1106mm(L)×477mm(W)×316mm(H)
- Package Quantity in one Box : 8pcs

11.3 Box Label

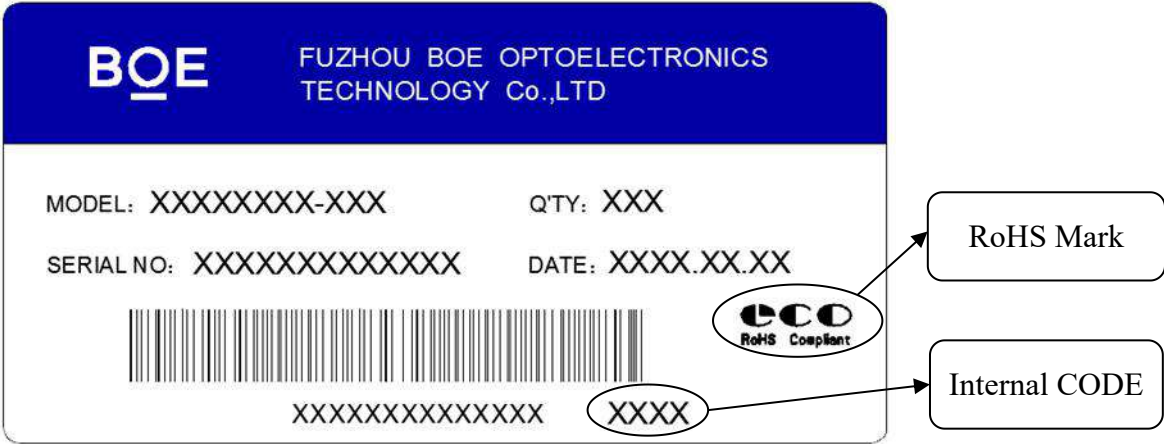
- Label Size : 100mm (L) × 50mm (W)
 - Contents

Model : DV430QUM-N10

Q`ty : Module 8 Q`ty in one box

Serial No. : Box Serial No.

Date : Packing Date



Digit	1		2	3	4		5	6	7				
Code	x	x	x	x	x	x	x	x	x	x	x	x	x
Des.	1. Model Code GBN 2. Grade 3. Line 4. Year(2016:16, 2017:17, ...) 5. Month(1, 2, 3, ..., 9, X, Y, Z) 6. Revision Code 7. Serial Number												

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12.0 PRECAUTIONS

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

12.1 Mounting Precautions

- Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- You must mount a module using specified mounting holes (Details refer to the drawings)
- You should consider the mounting structure so that uneven force (ex. Twisted stress, Concentrated stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
- Do not apply mechanical stress or static pressure on module; Abnormal display cause by pressing some parts of module during assembly process , do not belong to product failure, the press should be agreed by two sides.
- Determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
- Do not apply mechanical stress or static pressure on module , and avoid impact, vibration and falling.
- 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.
- Protection film for polarizer on the module should be slowly peeled off before display.
- Be careful to prevent water & chemicals contact the module surface.
- You should adopt radiation structure to satisfy the temperature specification.
- Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of polarizer for bare hand or greasy cloth.(Some cosmetics are detrimental to the polarizer.)
- When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzine. Normal-hexane & alcohol is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene , because they cause chemical damage to the polarizer.
- Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading..

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- This module has its circuitry PCB’s on the rear side and Driver IC, should be handled carefully in order not to be stressed.
- Avoid impose stress on PCB and Driver IC during assembly process ,Do not drawing, bending, COF package & wire
- Do not disassemble the module.

12.2 Operating Precautions

- Do not connector or disconnect the cable to/from the Module at the “Power On” Condition.
- When the module is operating, do not lose CLK, ENAB signals. If any one of these signals i s lost, the module would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be dam aged.
- Do not allow to adjust the adjustable resistance or switch
- The electrochemical reaction caused by DC voltage will lead to LCD module degradation, s o DC drive should be avoided.
- The LCD modules use C-MOS LSI drivers, so customers are recommended that any unuse d input terminal would be connected to Vdd or Vss, do not input any signals before power i s turn on, and ground you body, work/assembly area, assembly equipment to protect again st static electricity.
- Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.
- Module has high frequency circuits. Sufficient suppression to the electromagnetic interferen ce shall be done by system manufacturers. Grounding and shielding methods may be impor tant to minimized the interference.
- Design the length of cable to connect between the connector for back-light and the converte r as shorter as possible and the shorter cable shall be connected directly , The long cable b etween back-light and Converter may cause the Luminance of LED to lower and need a hig her startup voltage
- The cables should be as short as possible between System Board and PCB interface.
- Connectors are precision devices to transmit electrical signals, and operators should plug in parallel
- Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.

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12.3 Electrostatic Discharge Precautions

- Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc.
- Do not close to static electricity to avoid product damage.
- Do not touch interface pin directly.

12.4 Precautions for Strong Light Exposure

- Do not leave the module operation or storage in Strong light . Strong light exposure causes degradation of polarizer and color filter.

12.5 Precautions for Storage

A. Atmosphere Requirement

ITEM	UNIT	MIN	MAX
Storage Temperature	(°C)	5	40
Storage Humidity	(%rH)	40	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.		

B. Package Requirement

- The product should be placed in a sealed polythene bag.
- Product Should be placed on the pallet, Which is away from the floor, Be cautions not to pile the product up.
- The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.
- As the original protective film, do not use the adhesive protective film to avoid change of Pol color and characteristic.

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12.6 Precautions for protection film

- Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, If possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.
- People who peeled off the protection film should wear anti-static strap and grounded well.

12.7 Appropriate Condition for Commercial Display

-Generally large-sized LCD modules are designed for consumer applications . Accordingly, long-term display like in Commercial Display application, can cause uneven display including image sticking. To optimize module's lifetime and function, several operating usages are required.

1. Normal operating condition

- Temperature: 20±15℃
- Operating Ambient Humidity : 55±20%
- Display pattern: dynamic pattern (Real display)
- Well-ventilated place is recommended to set up Commercial Display system

2. Special operating condition

- Ambient condition
 - Well-ventilated place is recommended to set up Commercial Display system.
- Power and screen save
 - Periodical power-off or screen save is needed after long-term display.
- As the low temperature, the response time is greatly delayed. As the high temperatures (higher than the operating temperature) the LCD module may turn black screen. The above phenomenon cannot explain the failure of the display. When the temperature returns to the normal operating temperature, the LCD module will return to normal display.
- 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 exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.
- Products exposed to low temperature environment for a long time, need to carry out necessary protection , low temperature environment is usually refrigerators , vending machine Etc...
- Long time and large angle forward use or unconventional use , It is strongly recommended to contact BOE for filed application engineering advice

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- h. 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 images, running time, long time operation, outdoor operation, etc. It is strongly recommended to contact BOE for filed application engineering advice. Otherwise, its reliability and function may not be guaranteed. Extreme conditions are commonly found at airports, transit stations, banks, stock market and controlling systems.
3. Operating usages to protect against image sticking due to long-term static display.
- a. Suitable operating time: under 20 hours a day.
 - b. Static information display recommended to use with moving image.
 - Cycling display between 5 minutes' information(static) display and 10 seconds' moving image.
 - c. Background and character (image) color change
 - Use different colors for background and character, respectively.
 - Change colors themselves periodically.
 - d. Avoid combination of background and character with large different luminance.
 - 1) Abnormal condition just means conditions except normal condition.
 - 2) Black image or moving image is strongly recommended as a screen save
4. Lifetime in this spec. is guaranteed only when Commercial Display is used according to operating usages.
5. Module should be turned clockwise based on front view when used in portrait mode.

11.8 Other Precautions

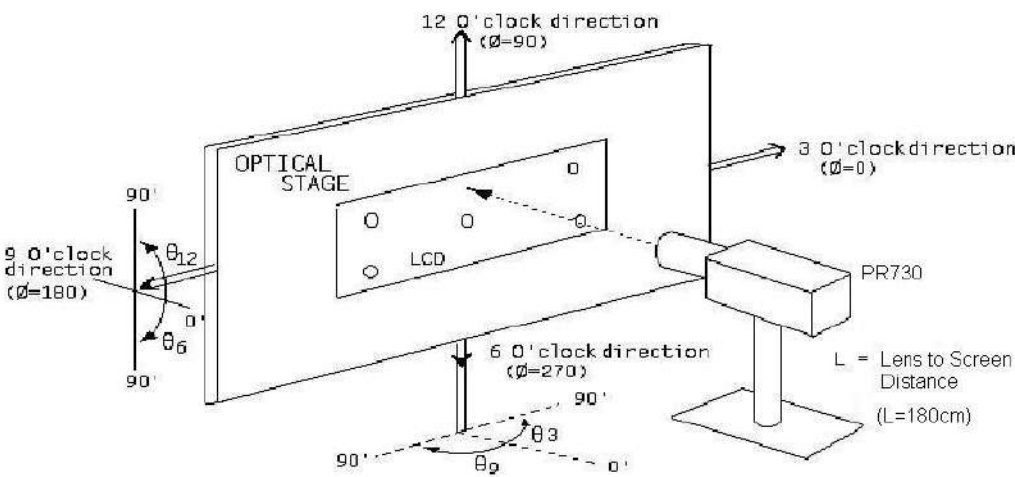
- A. LC Leak
- If the liquid crystal material leaks from the panel, it is recommended to wash the LC with acetone or ethanol and then burn it.
 - If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
 - If LC in mouth, mouth need to be washed, drink plenty of water to induce vomiting and follow medical advice.
 - If LC touch eyes, eyes need to be washed with running water at least 15 minutes.
- B. Rework
- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

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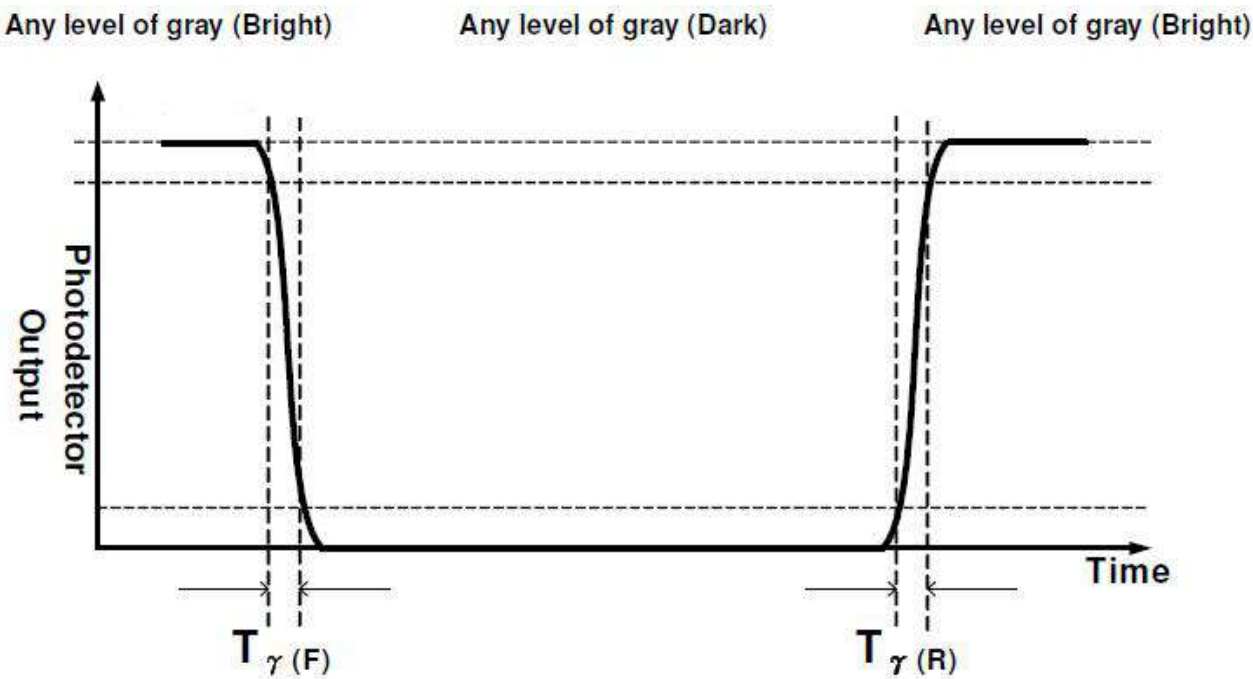
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12.0 APPENDIX

< Figure 1. Measurement Set Up >



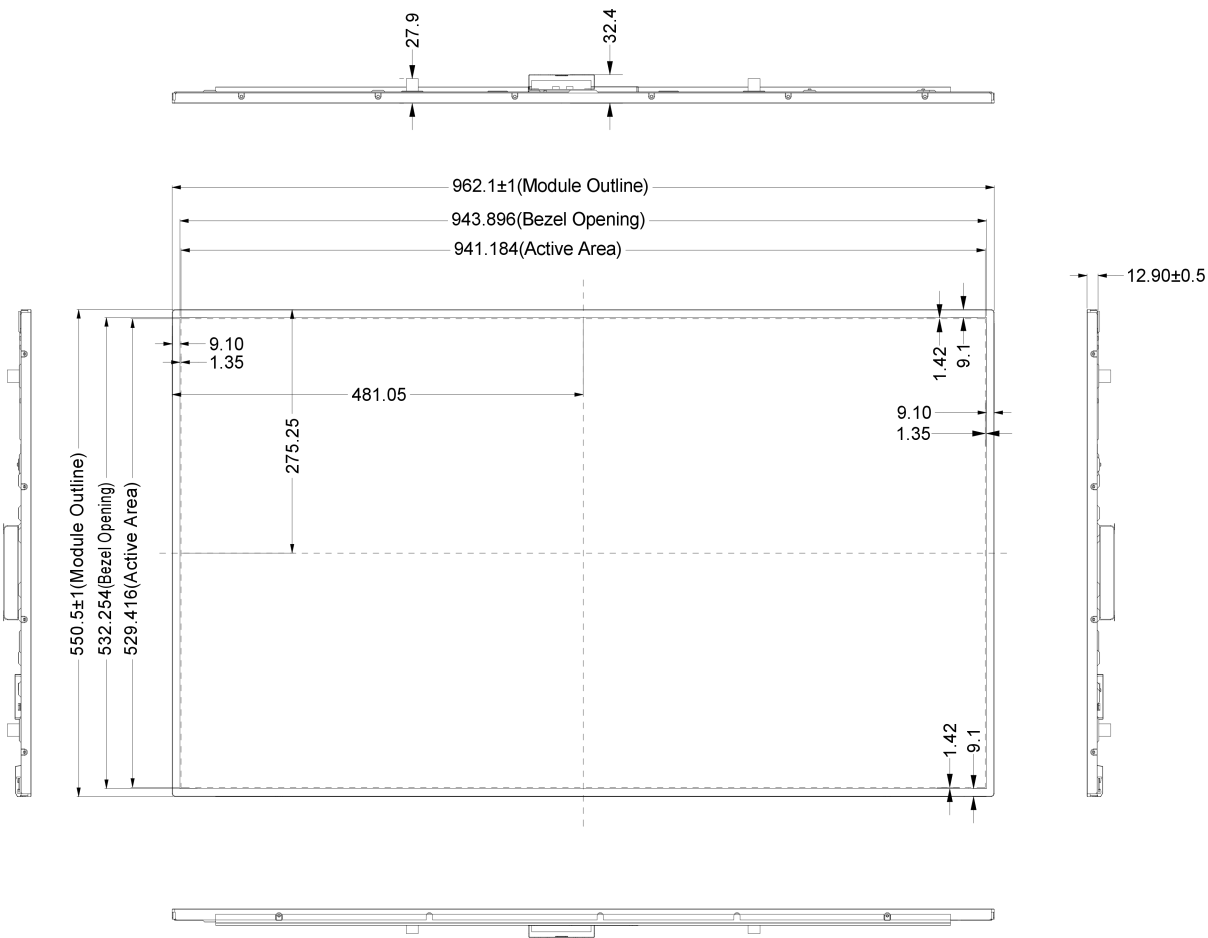
< Figure 2. Response Time Testing >



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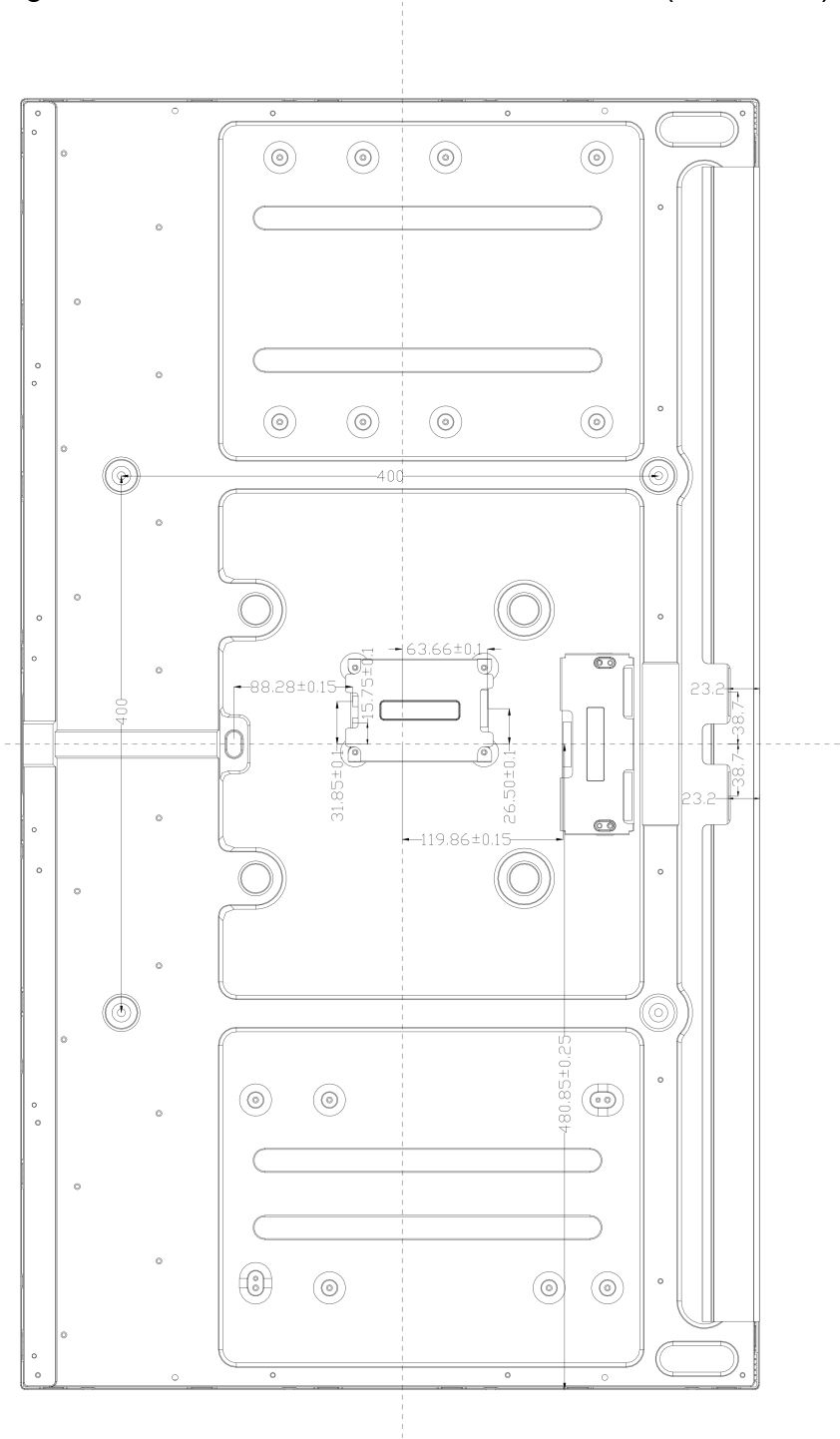
< Figure 3.TFT-LCD Module Outline Dimensions (Front View) >



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< Figure 4.TFT-LCD Module Outline Dimensions (Rear View) >



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Measuring point for surface luminance & luminance variationCA-310 ,Contact method)

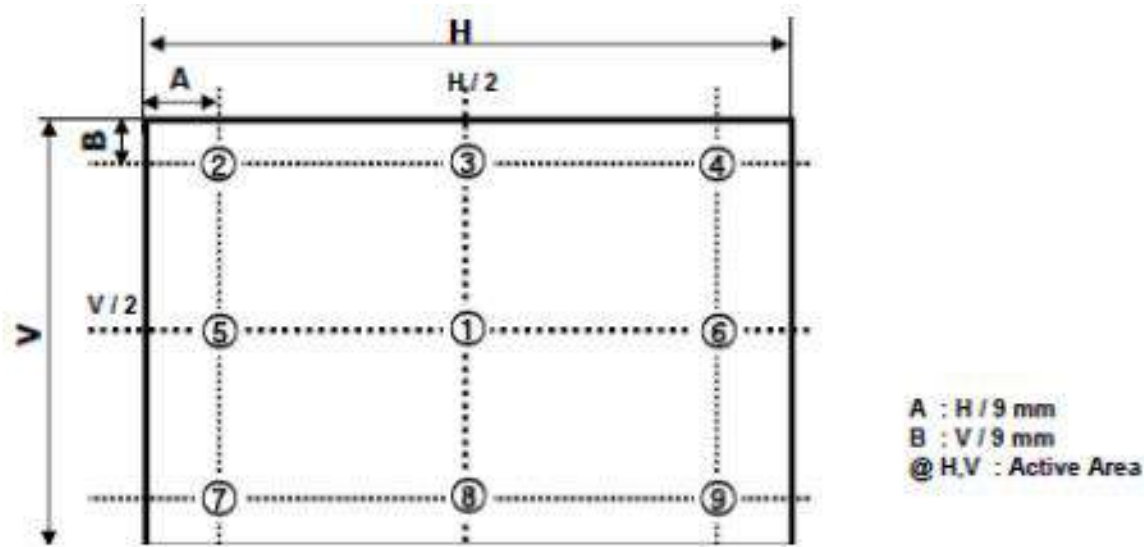


FIG.5 9 Points for Luminance Measure

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