产 品 规 格 书

PRODUCT SPECIFICATION

产品名称
（Model Name） TFT-LCD Module

产品型号
（Part Number） XC550UD02-D25

项目（Ltem）	拟制（Prepared）	审核（Checked）	批准（Approved）
签名（Signature）			
日期（Date）			
备注（Note）			

客户（Customer）：

签名（Signature）：

日期（Date）：

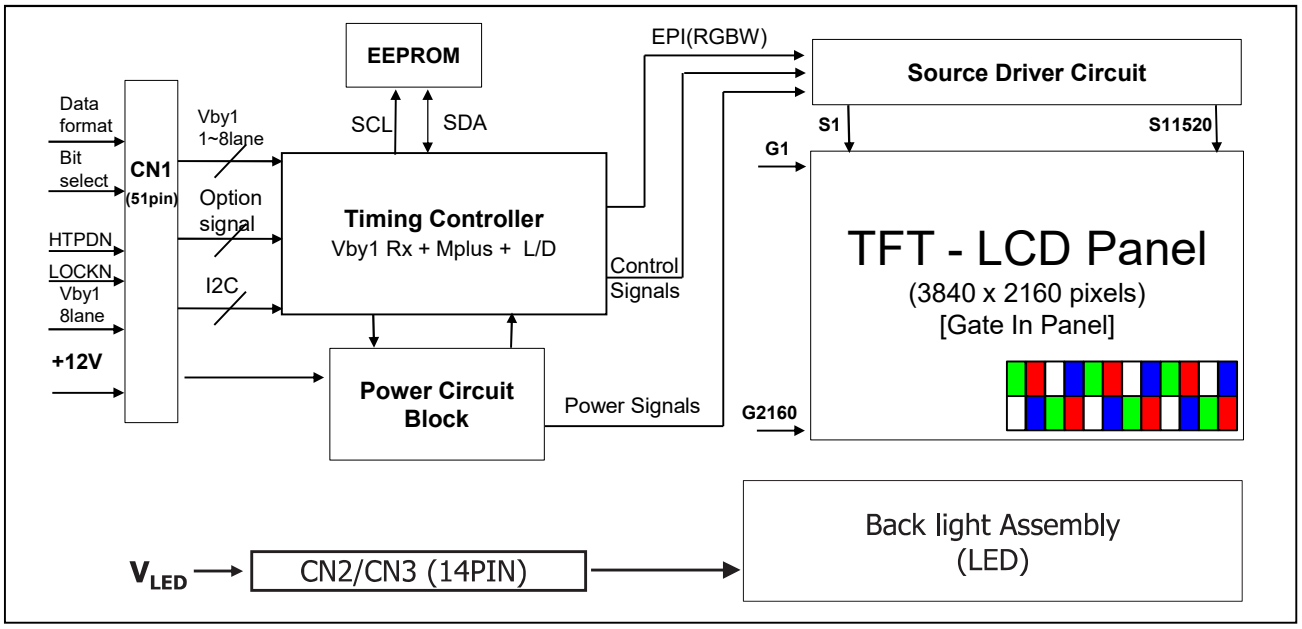
版本介绍 (Version is introduced)

版本 (Version)	发行日期 (Release date)	原版描述 (Old description)	更新描述 (New description)	页码 (Page)
V.0	2018/04/20	首版		/

CONTENTS

1. General Description

The XC550UD02 is a Color Active Matrix Liquid Crystal Display with an integral the Source PCB and Gate implanted on Panel (GIP). The matrix employs a-Si Thin Film Transistor as the active element. It is a transmissive type display operating in the normally black mode. It has a 54.64 inch diagonally measured active display area with QWUXGA resolution (2160 vertical by 3840 horizontal pixel array). Sub-pixels are constructed with Red, Green, Blue and White. Each pixel is divided into RGB or WRG or BWR or GBW or dots which are arranged in vertical stripes. Gray scale or the luminance of the sub-pixel color is determined with a 10-bit gray scale signal for each dot.
Therefore, it can present a palette of more than 1.07 Billion colors.
It has been designed to apply the 10-bit 8 Lane VbyOne interface.
It is intended to support LCD TV, PCTV where high brightness, super wide viewing angle, high color gamut, high color depth and fast response time are important.



General Features

Items	Specification	Unit	Note
Active Screen Size	55 (54.64)	inch	
Number of Pixels	3840 X 2160	Pixel	
Display Area	1209.6 (H) x 680.4(V)	mm	
Pixel Pitch	0.315 (H) x 0.315(V)	mm	
Bezel Opening	1215.2(H) x 686.0(V)	mm	
Outline Dimension	1245.2(H) x 716(V) x 40.0(D)	mm	
Display Colors	10-bit, 1.07 B colors	Colors	
Display Operation Mode	Normally Black		
Pixel Arrangement	RGBW vertical stripe		
Luminance, White	2500 (Center 1 point,Typ.)	cd/m^2	
Power Consumption	Total = 313.98 (Typ.)	W	LCD Open Cell = 13.98 W(Typ.) Backlight = 300 W(Typ.)
Surface Treatment	Anti-Glare, 2H		Haze=3%
Viewing Angle (CR>10)	+89/-89(H), +89/-89(V) Typ.		(CR≥10)

2. Absolute Maximum Ratings

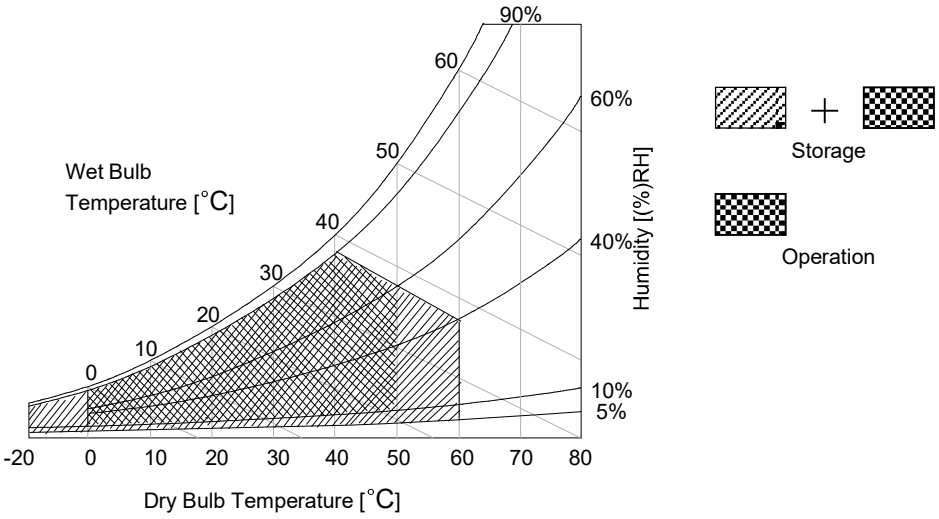
The following items are maximum values which, if exceeded, may cause faulty operation or permanent damage to the LCD module.

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Value		Unit	Note
			Min	Max		
Power Input Voltage	LCD Circuit	VLCD	-0.3	+14.0	VDC	1
T-Con Option Selection Voltage		VLOGIC	-0.3	+4.0	VDC	
Operating Temperature		TOP	0	+50	°C	2,3
Storage Temperature(without packing)		TST	-20	+60	°C	
Panel Front Temperature		TSUR	-	+68	°C	4
Operating Ambient Humidity		HOP	10	90	%RH	2,3
Storage Humidity		HST	5	90	%RH	

Note1. Ambient temperature condition (Ta = 25 ± 2 °C)

2. Temperature and relative humidity range are shown in the figure below.
   Wet bulb temperature should be Max 39°C, and no condensation of water.
3. Gravity mura can be guaranteed below 40°C condition.
4. The maximum operating temperatures is based on the test condition that the surface temperature of display area is less than or equal to 68°C with LCD module alone in a temperature controlled chamber. Thermal management should be considered in final product design to prevent the surface temperature of display area from being over 68℃. The range of operating temperature may be degraded in case of improper thermal management in final product design.



3. Electrical Specifications

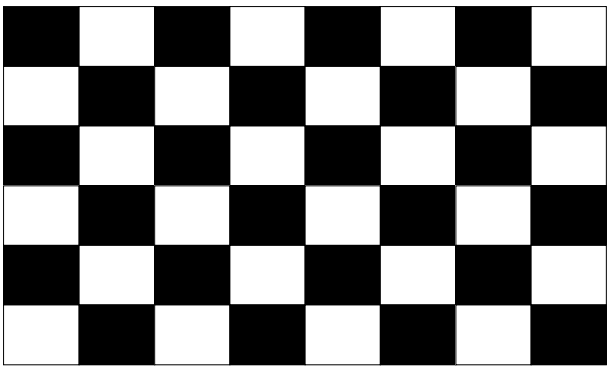
3-1. Electrical Characteristics

Table 2. ELECTRICAL CHARACTERISTICS

Parameter		Symbol	Value			Unit	Note
			Min	Typ	Max		
Circuit :							
Power Input Voltage		V_{LCD}	10.8	12.0	13.2	VDC	
Power Input Current		I_{LCD}	-	1165	1457	mA	1
			-	1880	2445	mA	2
T-CON Option Selection Voltage	Input High Voltage	V_{IH}	2.7	-	3.6	VDC	
	Input Low Voltage	V_{IL}	0	-	0.7	VDC	
Power Consumption		P_{LCD}	-	13.98	17.48	Watt	1
Rush current		I_{RUSH}	-	-	10	A	3

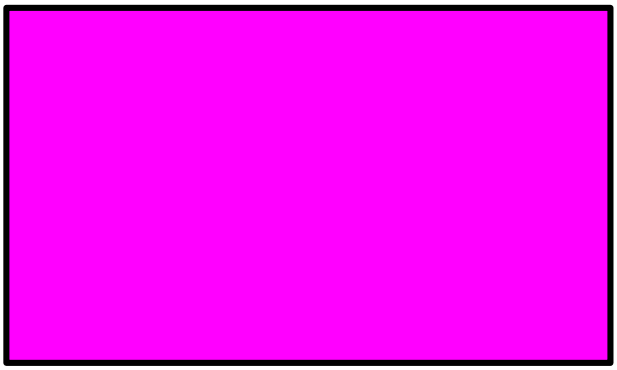
Note 1. The specified current and power consumption are under the V_{LCD}=12.0V, Ta=25 ± 2°C, f_V=60Hz condition, and mosaic pattern(8 x 6) is displayed and f_V is the frame frequency.
2. The current is specified at the maximum current pattern.
3. The duration of rush current is about 2ms and rising time of power input is 0.5ms (min.).
4. Ripple voltage level is recommended under ±5% of typical voltage

White : 1023 Gray
Black : 0 Gray



Mosaic Pattern(8 x 6)

Full Magenta
R : 1023 Gray, G : 0 Gray, B : 1023 Gray



Max Current Pattern

3-1-1 Backlight Specification

Table 2-1: Electrical specification

Parameter			Symbol	Values			Unit	notes
				Min	Typ	Max		
LED Driver :								
Power Supply Input Voltage			VBL	21.6	24.0	26.4	Vdc	1
Power Supply Input Current			IBL	-	12.5	-	A	1
Power Supply Input Current (In-Rush)			In-rush	-	-	(TBD)	A	V_{BL} = 24.0V $ExtV_{BR-B}$ = 100% 3
Power Consumption			PBL	-	300		W	1
Input Voltage for Control System Signals	On/Off	On	V on	2.5	-	5.5	Vdc	
		Off	V off	-0.3	0.0	0.5	Vdc	
	Brightness Adjust		$ExtV_{BR-B}$	30	-	100	%	On Duty 5
				30	-	100	%	
	$ExtV_{BR-B}$ Frequency		f_{PWM}	500	-	1500	Hz	
	Pulse Duty Level (PWM)		High Level	2.5	-	5.5	Vdc	HIGH : on duty LOW : off duty
			Low Level	0.0	-	0.5	Vdc	
LED :								
Life Time				30,000	50,000		Hrs	2

notes :

1. Electrical characteristics are determined after the unit has been 'ON' and stable for approximately 60 minutes at 25±2°C. The specified current and power consumption are under the typical supply Input voltage 24Vand V_{BR} ($ExtV_{BR-B}$: 100%), it is total power consumption.
2. The life time (MTTF) is determined as the time which luminance of the LED is 50% compared to that of initial value at the typical LED current (ExtVBR-B :100%) on condition of continuous operating in LCM state at 25±2°C.
3. The duration of rush current is about 200ms. This duration is applied to LED on time.
4. Even though inrush current is over the specified value, there is no problem if I^2T spec of fuse is satisfied. $ExtV_{BR-B}$ signal have to input available duty range and sequence.
5. After Driver ON signal is applied, $ExtV_{BR-B}$ should be sustained from 30% to 100% more than 500ms. After that, $ExtV_{BR-B}$ 30% and 100% is possible

3-2. Interface Connections

This LCD module employs one kind of interface connection, 51-pin connector is used for the module electronics.

3-2-1. LCD Module

- LCD Connector(CN1): FI-RE51S-HF(manufactured by JAE) or GT05P-51S-H38(manufactured by LSM) or IS050-C51B-C39(manufactured by UJU)

Mating Connector : FI-R51HL(manufactured by JAE) or compatible

Table 3. MODULE CONNECTOR(CN1) PIN CONFIGURATION

No	Symbol	Description	No	Symbol	Description
1	VLCD	Power Supply +12.0V	27	GND	Ground
2	VLCD	Power Supply +12.0V	28	Rx0n	V-by-One HS Data Lane 0
3	VLCD	Power Supply +12.0V	29	Rx0p	V-by-One HS Data Lane 0
4	VLCD	Power Supply +12.0V	30	GND	Ground
5	VLCD	Power Supply +12.0V	31	Rx1n	V-by-One HS Data Lane 1
6	VLCD	Power Supply +12.0V	32	Rx1p	V-by-One HS Data Lane 1
7	VLCD	Power Supply +12.0V	33	GND	Ground
8	VLCD	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	PWM TIN	External VBR (From System)	40	Rx4n	V-by-One HS Data Lane 4
15	PWM TOUT	External VBR (For System)	41	Rx4p	V-by-One HS Data Lane 4
16	Mplus Mode 0	Input Data Format [1:0]	42	GND	Ground
17	Mplus Mode 1	'00':Low Power, '01':High Luminance '10':High Luminance II, '11':HDR Mode ※ Available Mode HDR_EN : L → '00, 01, 10' HDR_EN : H → '11'	43	Rx5n	V-by-One HS Data Lane 5
18	SDA	SDA (For I2C)	44	Rx5p	V-by-One HS Data Lane 5
19	SCL	SCL (For I2C)	45	GND	Ground
20	NC	NO CONNECTION	46	Rx6n	V-by-One HS Data Lane 6
21	HDR_EN	'H' : On, 'L' or NC: : Off	47	Rx6p	V-by-One HS Data Lane 6
22	L/D	Local Dimming Enable 'H' : On, 'L' or NC: : Off	48	GND	Ground
23	AGP or NSB & M+ Bypass	'H' : AGP, M+ bypass 'L' or NC: : NSB (No signal Black), M+	49	Rx7n	V-by-One HS Data Lane 7
24	MSE	'L' : off, 'H' on	50	Rx7p	V-by-One HS Data Lane 7
25	HTPDN	Hot plug detect	51	GND	Ground
26	LOCKN	Lock detect	-	-	-

Note
1. All GND (ground) pins should be connected together to the LCD module's metal frame.
2. All Input levels of V-by-One signals are based on the V-by-One-HS Standard Version 1.4
3. #9 & #20 NC(No Connection) : These pins are used only for LGD (Do not connect)
4. About specific pin(#16,#17, #21) of HDR Function, please see the Appendix V.
5. Specific pin No. #23 is used for "No signal detection" of system signal interface.
   It should be GND or NC for NSB (No Signal Black) while the system interface signal is not.
   If this pin is "H", LCD Module displays AGP (Auto Generation Pattern).

3-2-2 BACKLIGHT INTERFACE CONNECTION

CN2: Input terminal PH2.0-6(2.0mmX14)

PIN #	Symbol	Description
1	V_{DDB}	Operating Voltage Supply, +24V DC Regulated
2	V_{DDB}	Operating Voltage Supply, +24V DC Regulated
3	V_{DDB}	Operating Voltage Supply, +24V DC Regulated
4	V_{DDB}	Operating Voltage Supply, +24V DC Regulated
5	V_{DDB}	Operating Voltage Supply, +24V DC Regulated
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	GND	Ground
10	GND	Ground
11		Not connect
12	VBLON	BL On-Off: High (2.5~5.5V) for BL , Low/Open (0~0.5V) for BL **off**
13	VDIM (note 1)	**Internal PWM Dimming** High (5.5V/100% Duty) for 100% Lum; <NC; when external PWM>
14		Not connect

Note (1) PWM dimming function is included internal PWM and external PWM. Internal PWM: input voltage 0 (GND) ~5.5V to pin 13th, and duty ratio of output voltage/current of inverter is from 30% to 100%. When use pin 13th to control backlight luminance, the pin 14th will be NC .

CN3:Input terminal PH2.0-6(2.0mmX14)

PIN #	Symbol	Description
1	V_{DDB}	Operating Voltage Supply, +24V DC Regulated
2	V_{DDB}	Operating Voltage Supply, +24V DC Regulated
3	V_{DDB}	Operating Voltage Supply, +24V DC Regulated
4	V_{DDB}	Operating Voltage Supply, +24V DC Regulated
5	V_{DDB}	Operating Voltage Supply, +24V DC Regulated
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	GND	Ground
10	GND	Ground
11	NC	No Connect
12	NC	No Connect
13	NC	No Connect
14	NC	No Connect

3-3. Signal Timing Specifications

Table 4 shows the signal timing required at the input of the Vx1 transmitter. All of the interface signal timings should be satisfied with the following specification for normal operation.

Table 4. TIMING TABLE (DE Only Mode)

ITEM		Symbol	Min	Typ	Max	Unit	Note
Horizontal	Display Period	t_{HV}	480	480	480	t_{CLK}	3840/8
	Blank	t_{HB}	60	70	120	t_{CLK}	1
	Total	t_{HP}	540	550	600	t_{CLK}	
Vertical	Display Period	t_{VV}	2160	2160	2160	Lines	
	Blank	t_{VB}	40	90	600	Lines	1
	Total	t_{VP}	2200	2250	2760	Lines	

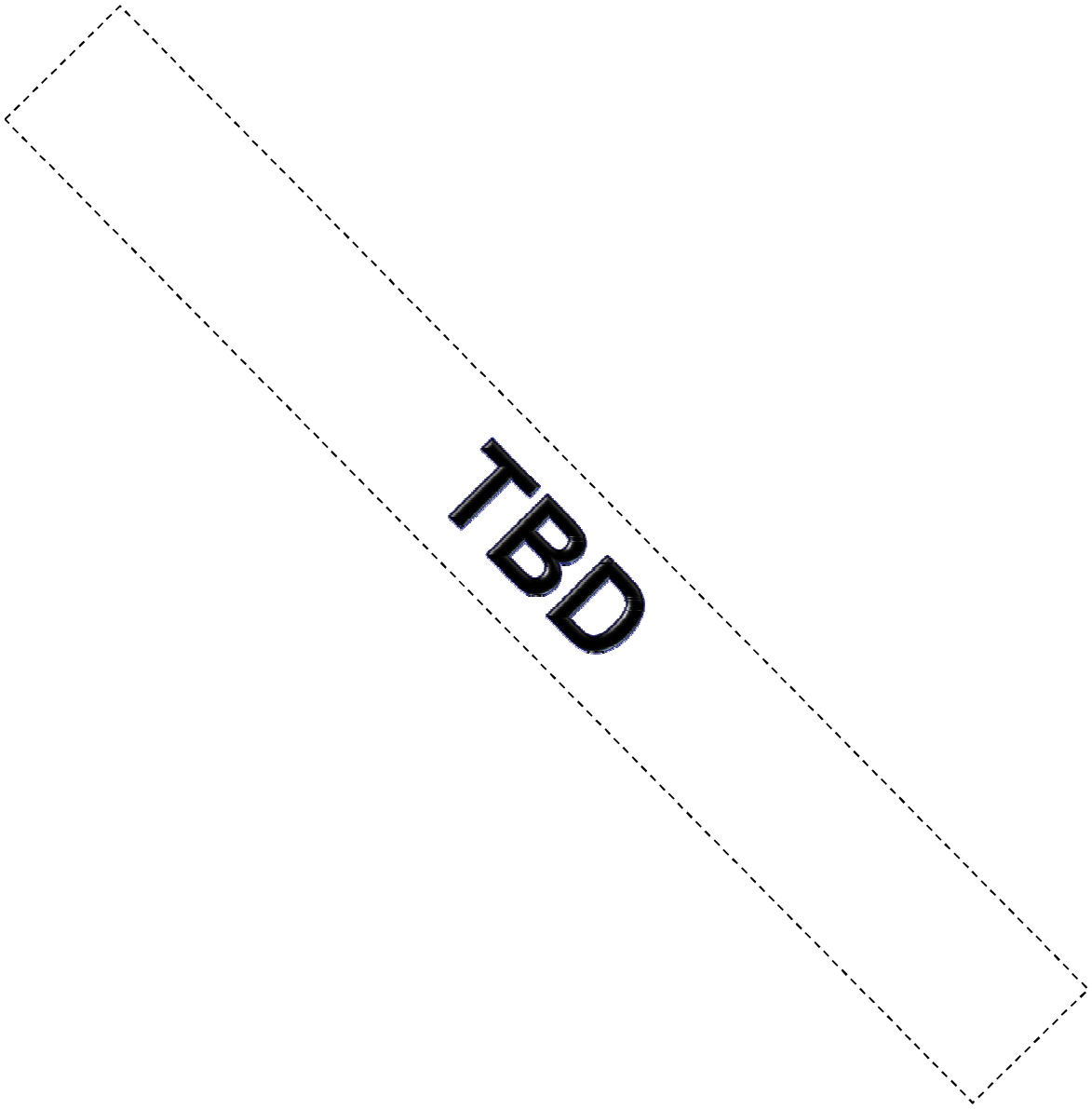
ITEM		Symbol	Min	Typ	Max	Unit	Note
Frequency	DCLK	f_{CLK}	60	74.25	78.00	MHz	594/8
	Horizontal	f_H	121.8	135	140	KHz	2
	Vertical	f_V	47	60	63	Hz	2

notes: 1. The input of HSYNC & VSYNC signal does not have an effect on normal operation (DE Only Mode). If you use spread spectrum of EMI, add some additional clock to minimum value for clock margin.

2. The performance of the electro-optical characteristics may be influenced by variance of the vertical refresh rate and the horizontal frequency

3. Spread Spectrum Rate (SSR) is limited to ±0.5% center spread at 30KHz

※ Timing should be set based on clock frequency.


TBD

3-4. V by One Signal Specifications

3-4-1. V by One input Signal Timing Diagram

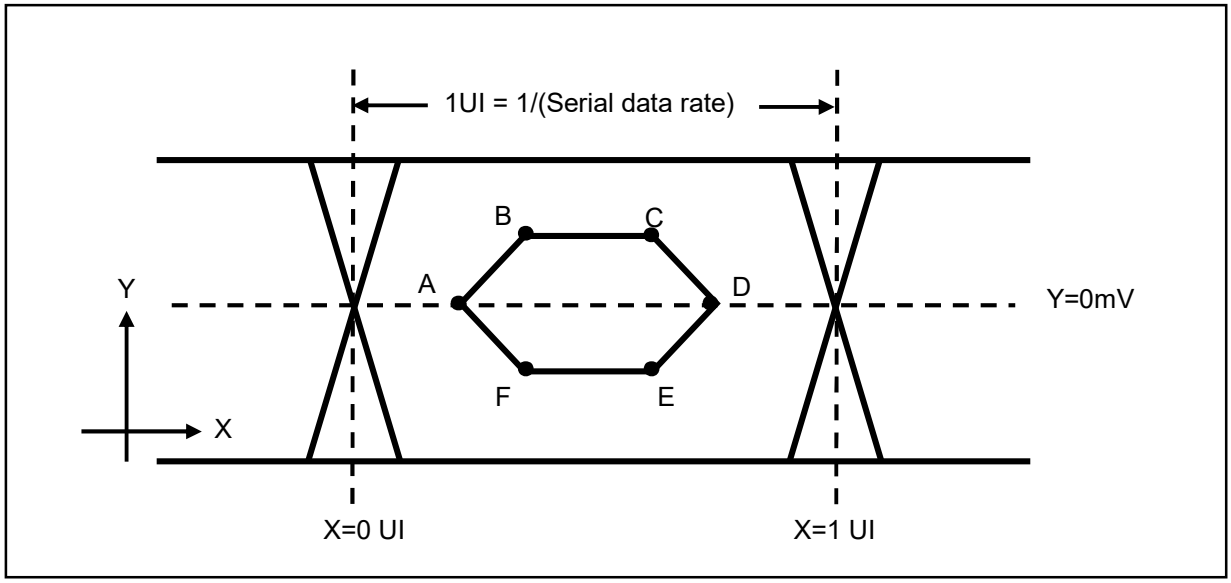
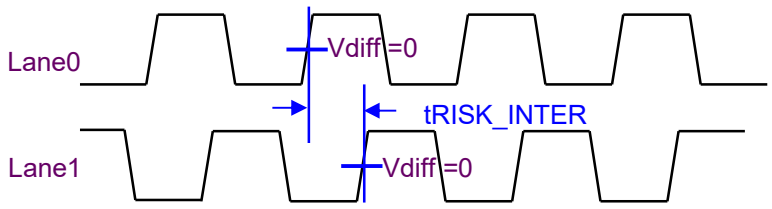


Table5. Eye Mask Specification

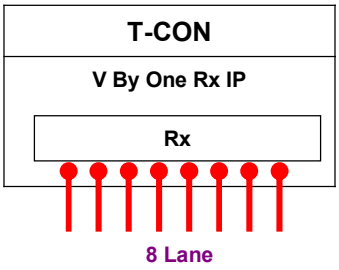
	X[UI]	Note	Y[mV]	Note
A	0.25 (max)	2	0	-
B	0.3 (max)	2	50	3
C	0.7(min)	3	50	3
D	0.75(min)	3	0	-
E	0.7(min)	3	I -50 I	3
F	0.3(max)	2	I -50 I	3

notes 1. All Input levels of V by One signals are based on the V by One HS Standard Ver. 1.4
2. This is allowable maximum value.
3. This is allowable minimum value.
4. The eye diagram is measured by the oscilloscope and receiver CDR characteristic must be emulated.
   - PLL bandwidth : 15 Mhz
   - Damping Factor : 1

3-4-2. V by One Input Signal Characteristics



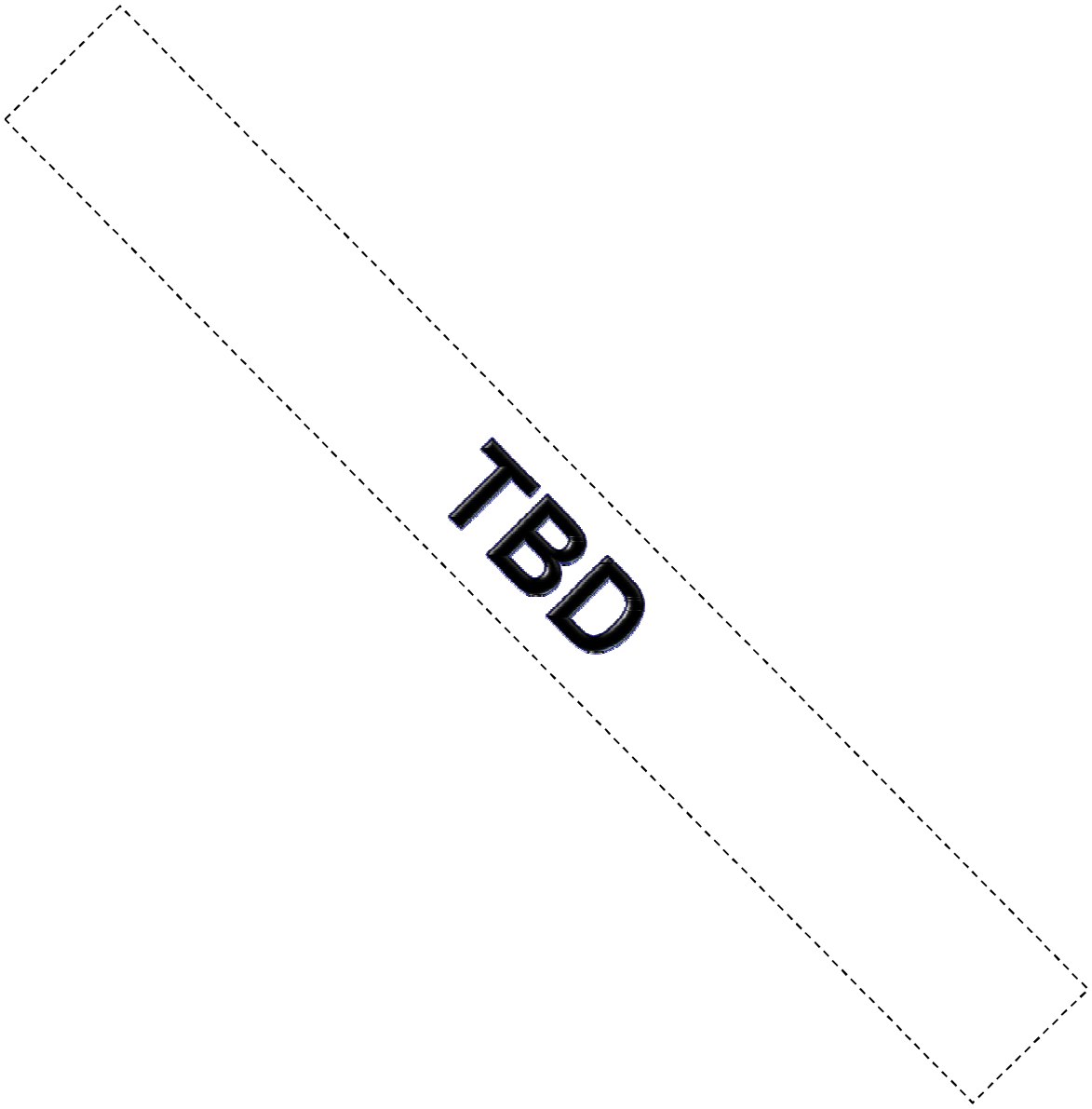
<Inter-pair Skew between two Lanes>



Description	Symbol	Min	Max	Unit	notes
Allowable inter-pair skew between lanes	tRISK_INTER	-	5	UI	1,2

Notes 1.1UI = 1/serial data rate

2. it is the time difference of the differential voltage between any two lanes.

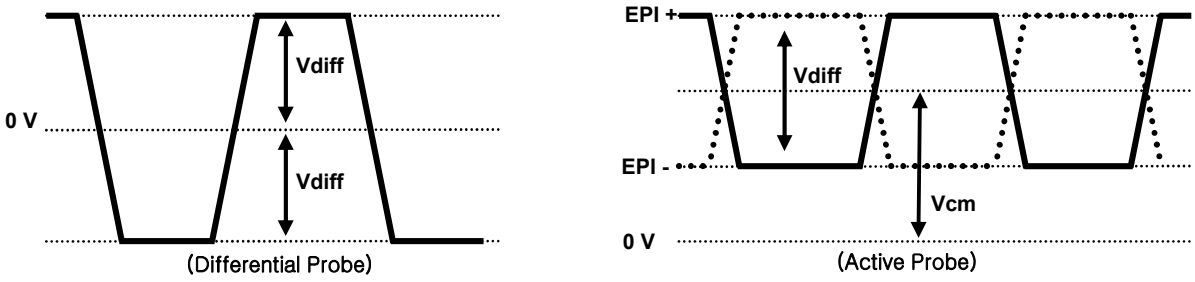

TBD

3-5. Intra interface Signal Specification

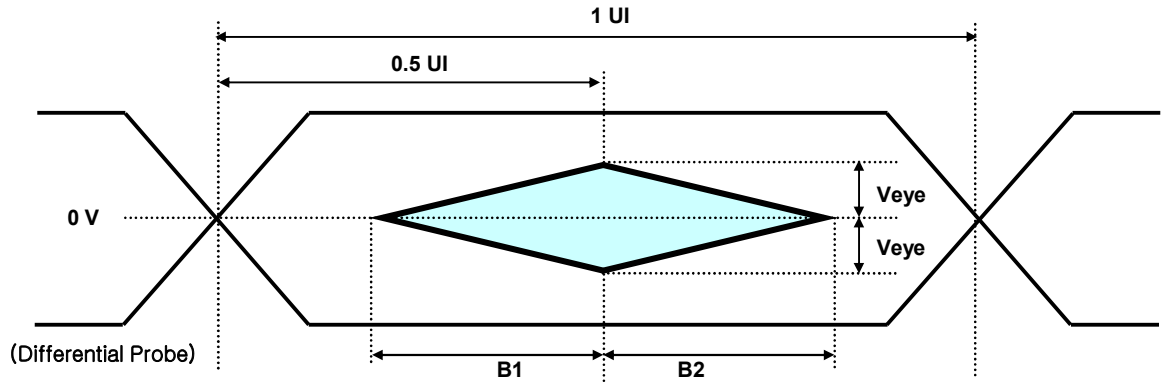
3-5-1. EPI Signal Specification

Table 6. ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Condition	MIN	TYP	MAX	Unit	notes
Logic & EPI Power Voltage	VCC	-	1.62	1.8	1.98	VDC	
EPI input common voltage	VCM	CML Type	0.8	-	1.2-Vdiff/2	V	
EPI input differential voltage	Vdiff	-	150	-	500	mV	
EPI Input eye diagram	Veye	-	90	-	-	mV	
Effective Veye width time	B1&B2		0.25	-	-	UI	



EPI Differential signal characteristics



Eye Pattern of EPI Input

*Source PCB

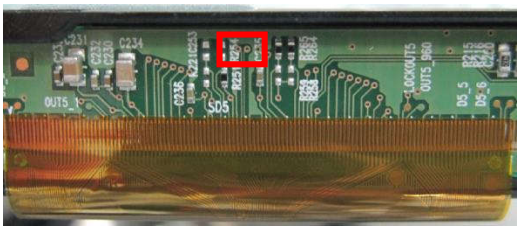


FIG. 3 Measure point

3-6. Color Data Reference

The brightness of each primary color (red, green, blue) is based on the 10bit or 8bit gray scale data input for the color. The higher binary input, the brighter the color. Table 5 provides a reference for color versus data input.

Table 7. COLOR DATA REFERENCE

Packer input & Unpacker output		30bpp RGB (10bit)	24bpp RGB (8bit)
Byte0	D[0]	R[2]	R[0]
	D[1]	R[3]	R[1]
	D[2]	R[4]	R[2]
	D[3]	R[5]	R[3]
	D[4]	R[6]	R[4]
	D[5]	R[7]	R[5]
	D[6]	R[8]	R[6]
	D[7]	R[9]	R[7]
Byte1	D[8]	G[2]	G[0]
	D[9]	G[3]	G[1]
	D[10]	G[4]	G[2]
	D[11]	G[5]	G[3]
	D[12]	G[6]	G[4]
	D[13]	G[7]	G[5]
	D[14]	G[8]	G[6]
	D[15]	G[9]	G[7]
Byte2	D[16]	B[2]	B[0]
	D[17]	B[3]	B[1]
	D[18]	B[4]	B[2]
	D[19]	B[5]	B[3]
	D[20]	B[6]	B[4]
	D[21]	B[7]	B[5]
	D[22]	B[8]	B[6]
	D[23]	B[9]	B[7]
Byte4	D[24]	Don't care	
	D[25]	Don't care	
	D[26]	B[0]	
	D[27]	B[1]	
	D[28]	G[0]	
	D[29]	G[1]	
	D[30]	R[0]	
	D[31]	R[1]	

3-7. Power Sequence

3-7-1. LCD Driving circuit

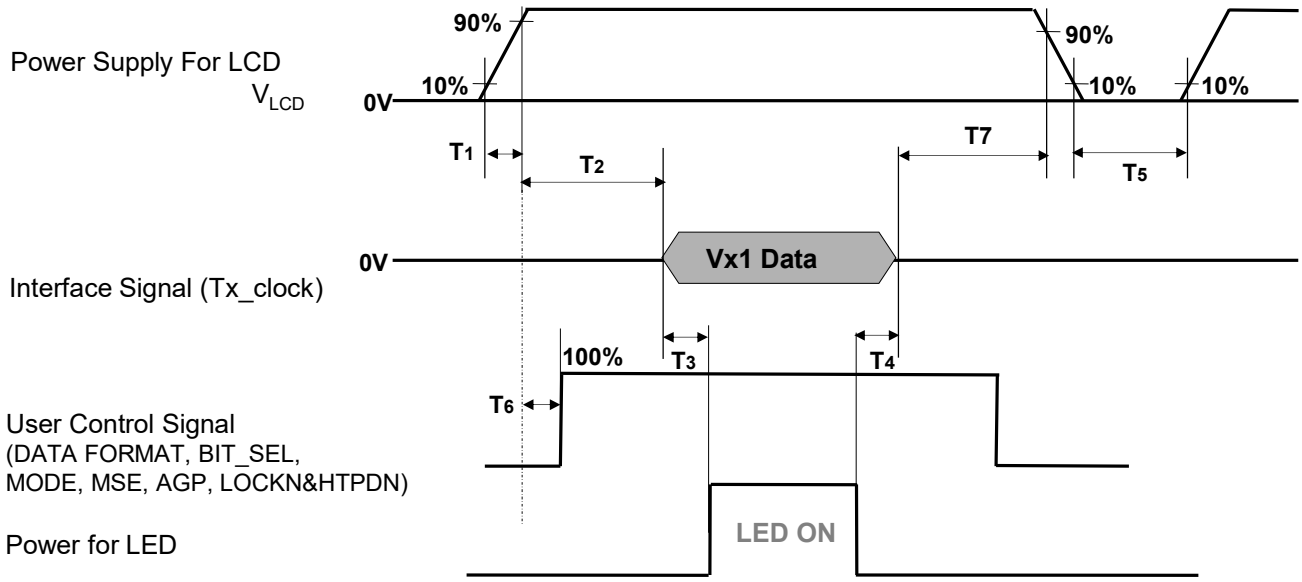


Table 8. POWER SEQUENCE

Parameter	Value			Unit	Note
	Min	Typ	Max		
T1	0.5	-	20	ms	1
T2	0	-	-	ms	2
T3	400	-	-	ms	3
T4	100	-	-	ms	3
T5	1.0	-	-	s	4
T6	0	-	T2	ms	5
T7	0	-	-	ms	6

Note :

1. Even though T1 is over the specified value, there is no problem if I2T spec of fuse is satisfied.
2. If T2 is satisfied with specification after removing LVDS Cable, there is no problem.
3. The T3 / T4 is recommended value, the case when failed to meet a minimum specification, abnormal display would be shown. There is no reliability problem.
4. T5 should be measured after the Module has been fully discharged between power off and on period.
5. If the on time of signals (Interface signal and user control signals) precedes the on time of Power (V_{LCD}), it will be happened abnormal display. When T6 is NC status, T6 doesn't need to be measured.
6. It is recommendation specification that T7 has to be 0ms as a minimum value.

※ Please avoid floating state of interface signal at invalid period.
※ When the power supply for LCD (VLCD) is off, be sure to pull down the valid and invalid data to 0V.

4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable in a dark environment at 25±2°C. The values are specified at 50cm from the LCD surface at a viewing angle of Φ and θ equal to 0 °.
FIG. 1 shows additional information concerning the measurement equipment and method.

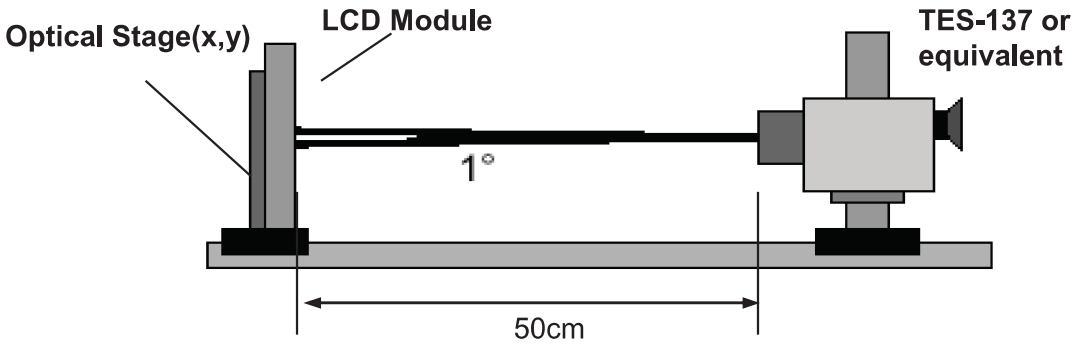


FIG. 1 Optical Characteristic Measurement Equipment and Method

Ta= 25±2°C, V_{LCD}=12.0V, fv=60Hz, Dclk=74.25MHz,
EXTVBR-B =100% Back Light : LGD B/L

Table 10. OPTICAL CHARACTERISTICS

Parameter		Symbol	Values			Unit	Notes
			Min.	Typ.	Max		
Contrast Ratio		CR	800	1200	--		1,2
Surface Luminance (White)		L_{WH} (2D)	2350	2500	--	cd/m^2	1,3
		L_{WH} (3D)			-		
Luminance Variation		$\delta_{WHITE(9P)}$	--	--	1.3		1,4
Response Time (G to G)		Tγ	--	6.0	--	ms	5
Color Gamut		NTSC		90		%	1,6
Color Coordinates							6
	Red	R_X	Typ.-0.03	0.660	Typ.+0.03		
		R_Y		0.325			
	Green	G_X		0.279			
		G_Y		0.586			
	Blue	B_X		0.134			
		B_Y		0.130			
	White	W_X					
		W_Y					
Viewing Angle							5
2D	x axis, right(φ=0°)	θ_r	--	89	--	degree	
	x axis, left(φ=180°)	θ_l	--	89	--	degree	
	y axis, up(φ=90°)	θ_u	--	89	--	degree	
	y axis, down (φ=270°)	θ_d	--	89	--	degree	
3D	y axis, up	θ_u				degree	
	y axis, down	θ_d				degree	
3D cross talk (middle)		--					

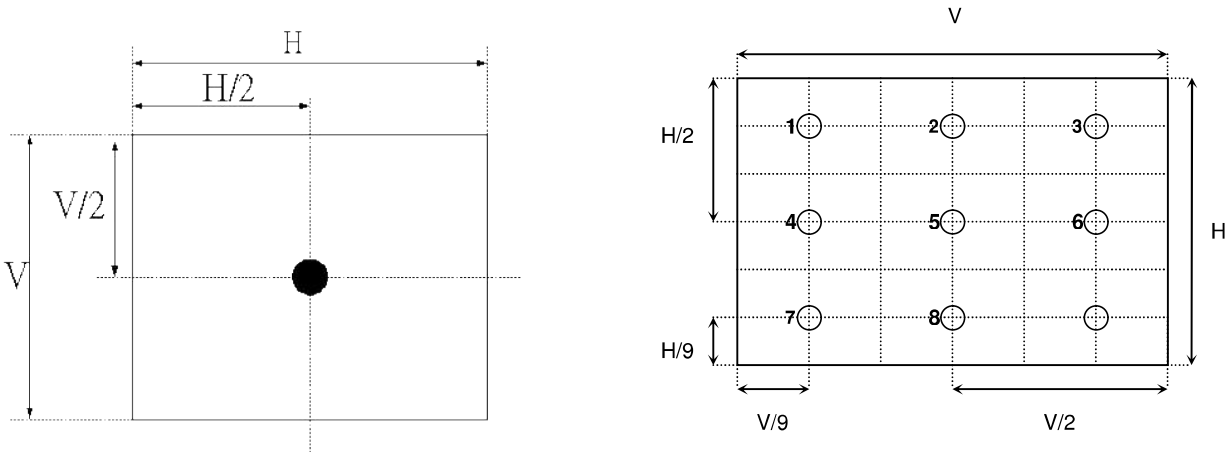
Note:

1. Contrast Ratio (CR) is defined mathematically as:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance of } L_{on5}}{\text{Surface Luminance of } L_{off5}}$$

2. Surface luminance is luminance value at point 5 across the LCD surface 50cm from the surface with all pixels displaying white. From more information see FIG 2. When LED input VDDB =24V, I_{DDB}. = 3.00, L_{WH}=Lon5 where Lon5 is the luminance with all pixels displaying white at center 5 location.

FIG. 2 Luminance



3. The variation in surface luminance, δWHITE is defined (center of Screen) as:

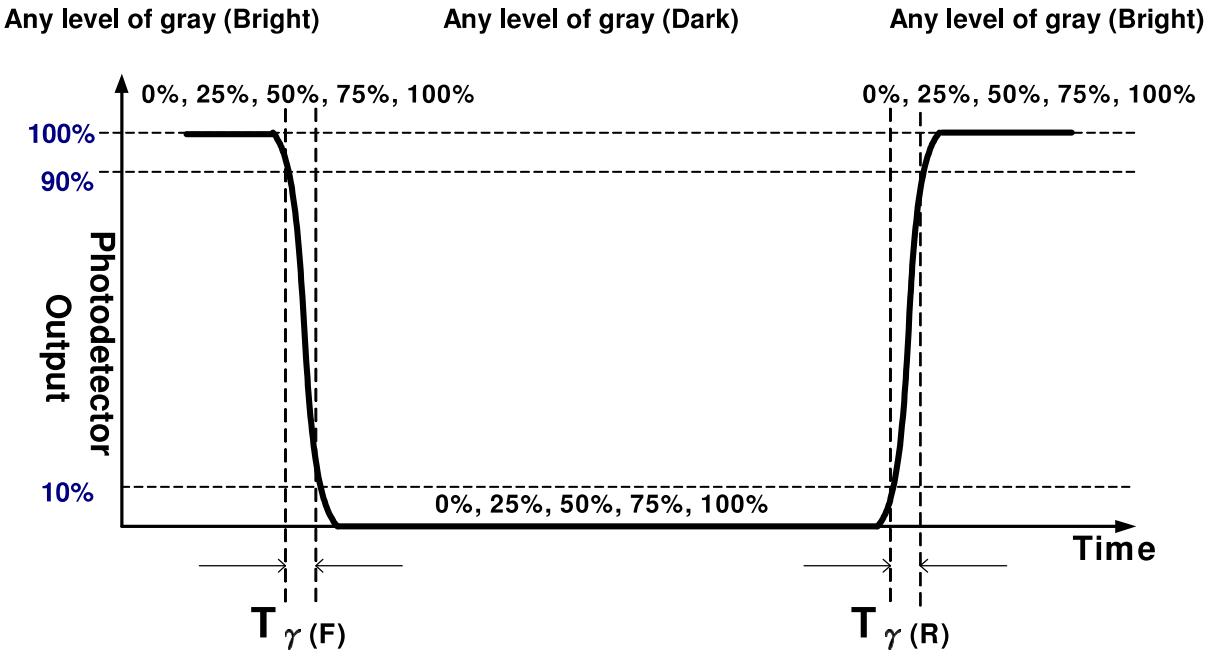
$\delta_{WHITE(9P)}$= Maximum(L_{on1}, L_{on2},…,L_{on9})/ Minimum(L_{on1}, L_{on2},…L_{on9})

4. Response time T_γ is the average time required for display transition by switching the input signal for five luminance ratio (0%,25%,50%,75%,100% brightness matrix) and is based on F_v=60Hz to optimize.

Measured Response Time		Target				
		0%	25%	50%	75%	100%
Start	0%		0% to 25%	0% to 50%	0% to 75%	0% to 100%
	25%	25% to 0%		25% to 50%	25% to 75%	25% to 100%
	50%	50% to 0%	50% to 25%		50% to 75%	50% to 100%
	75%	75% to 0%	75% to 25%	75% to 50%		75% to 100%
	100%	100% to 0%	100% to 25%	100% to 50%	100% to 75%	

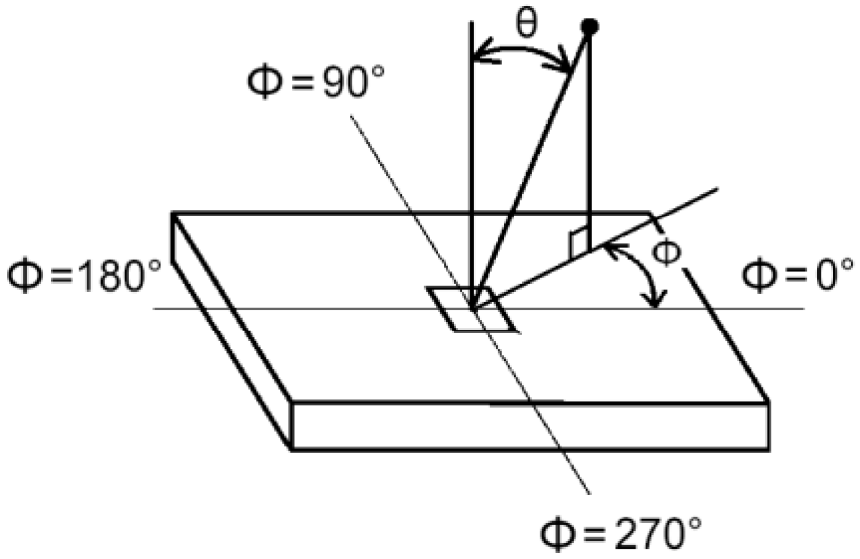
T_γ is determined by 10% to 90% brightness difference of rising or falling period. (As illustrated)

The response time is defined as the following figure and shall be measured by switching the input signal for "any level of grey(bright) " and "any level of gray(dark)".



5. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG3.

FIG.3 Viewing Angle



6. Definition of Transmittance (T%):

$$\text{Transmittance} = \frac{\text{Luminance of LCD module}}{\text{Luminance of backlight}} * 100\%$$

During transmittance measurement, the backlight of LCD module contains no brightness enhancement film. Two diffuser sheets which diffuse the light source uniformly are suggested to use for transmittance measurement.

5. Mechanical Characteristics

Table 9. MECHANICAL CHARACTERISTICS

Item	Value	
Outline Dimension	Horizontal	1245.2 mm
	Vertical	716.0 mm
	Depth	40.0 mm(Typ.), 52.1mm(Max.)
Bezel Area	Horizontal	1215.2 mm
	Vertical	686.0 mm
Active Display Area	Horizontal	1209.6 mm
	Vertical	680.4 mm
Weight	17.5 Kg(Typ.), 17.7 Kg(Max.)	

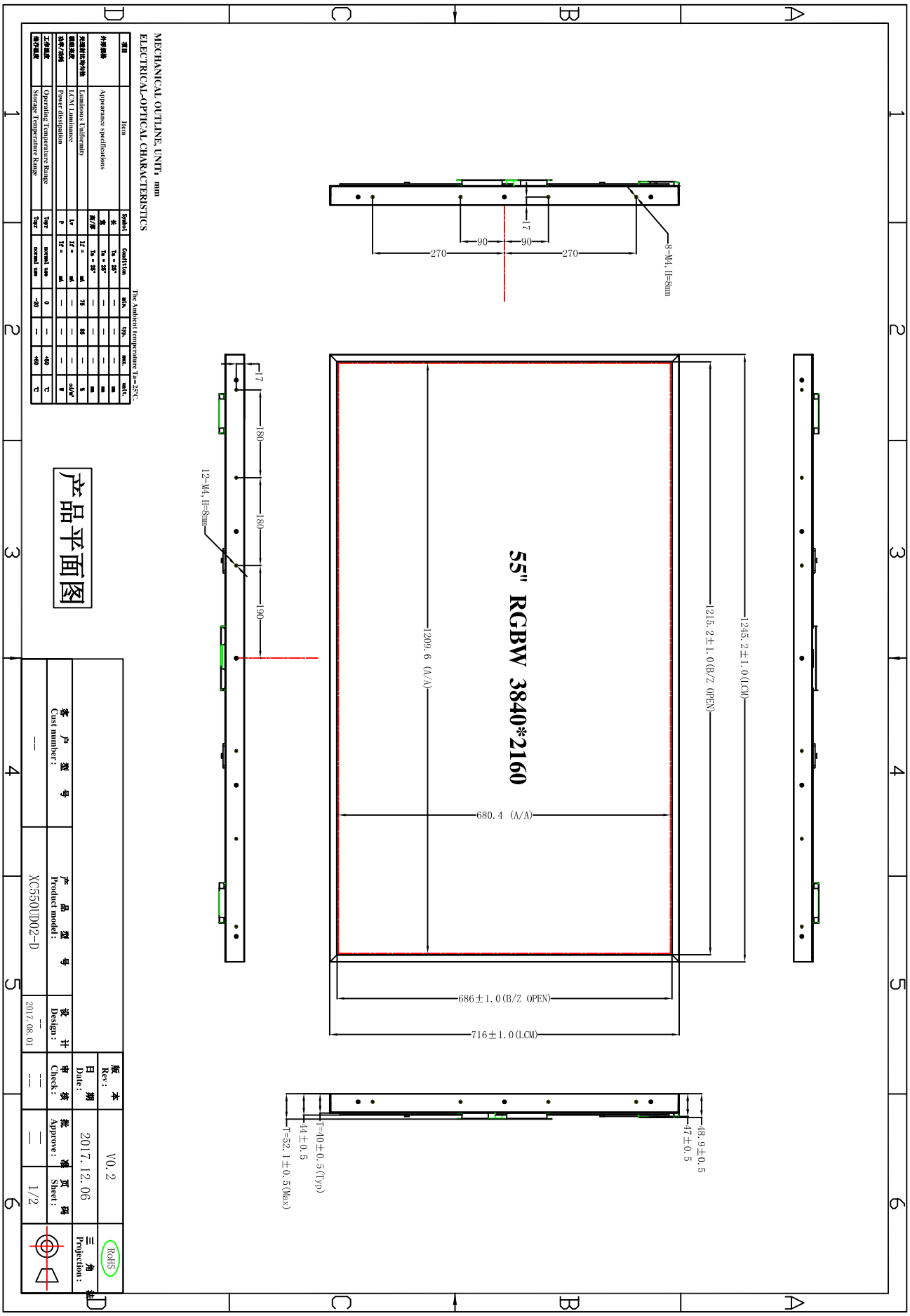
Note : Please refer to a mechanical drawing in terms of tolerance at the next page.

MECHANICAL OUTLINE, UNIT: mm

ELECTRICAL-OPTICAL CHARACTERISTICS

The Ambient temperature Ta=25℃.

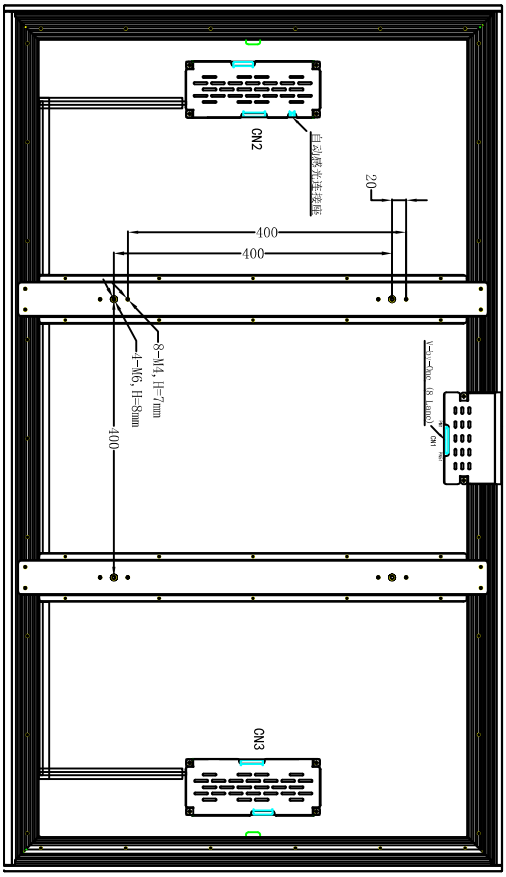
项目	Item		Symbol		Condition	min.	typ.	max.	unit.
外形参数	Appearance specifications		长		Ta = 25℃	—	—	—	mm
			宽		Ta = 25℃	—	—	—	mm
			厚度		Ta = 25℃	—	—	—	mm
光学特性参数	Luminous Uniformity				12 =	75	85	—	%
整机功耗	LCM Luminance		Lv		12 =	—	—	—	cd/㎡
功率消耗	Power dissipation		P		12 = normal	—	—	—	W
工作温度	Operating Temperature Range		Topr		normal	0	—	+50	℃
储存温度	Storage Temperature Range		Tstr		normal	-20	—	+60	℃



产品平面图

客户型号 Cust number:	—	版本 Rev:	V0.2
产品型号 Product model:	XC550UD02-D	日期 Date:	2017.12.06
设计 Design:	— 2017.08.01	审核 Check:	—
		批准 Approve:	—
		页码 Sheet:	1/2
		三角 Projection:	RoHS

MECHANICAL OUTLINE, UNIT: mm



产品平面图

ELECTRICAL-OPTICAL CHARACTERISTICS

The Ambient temperature Ta=25℃

项目	Item	Symbol	Condition	min.	typ.	max.	unit
外形规格	Appearance specifications	长	Ta = 25°	—	—	—	mm
		宽	Ta = 25°	—	—	—	mm
		厚/厚	Ta = 25°	…	…	…	mm
发光均匀性/均匀	Luminous Uniformity			…	…	…	%
液晶亮度	LCM Luminance	Lv	12 V	75	95	—	cd/㎡
功率/功耗	Power dissipation	P	12 V	—	—	…	W
工作温度	Operating Temperature Range	Topr	normal use	0	—	+50	℃
储存温度	Storage temperature Range	Tstr	normal use	-20	—	+60	℃

CN2 (PH2.0X14)

PIN	Symbol	Description	note
1	VCC	Power supply voltage +24V	
2	VCC	Power supply voltage +24V	
3	VCC	Power supply voltage +24V	
4	VCC	Power supply voltage +24V	
5	VCC	Power supply voltage +24V	
6	GND	Power ground	
7	GND	Power ground	
8	GND	Power ground	
9	GND	Power ground	
10	GND	Power ground	
11	NC		
12	ON/OFF	Output enable signal	
13	DIM	Dimming signal	
14	NC		

CN3 (PH2.0X14)

PIN	Symbol	Description	note
1	VCC	Power supply voltage +24V	
2	VCC	Power supply voltage +24V	
3	VCC	Power supply voltage +24V	
4	VCC	Power supply voltage +24V	
5	VCC	Power supply voltage +24V	
6	GND	Power ground	
7	GND	Power ground	
8	GND	Power ground	
9	GND	Power ground	
10	GND	Power ground	
11	NC		
12	NC		
13	NC		
14	NC		

客户型号 Cust number:	产品型号 Product model:	设计 Design:	审核 Check:	批准 Approve:	版本 Rev:	
—	XC550UD02-D	— 2017.08.01	—	—	V0.2	RoHS
				日期 Date: 2017.12.06	页码 Sheet: 2/2	第一角 Projection:

6. Reliability

Table 11. ENVIRONMENT TEST CONDITION

No.	Test Item	Condition
1	High temperature storage test	Ta= 60°C 90% 240h
2	Low temperature storage test	Ta= -20°C 240h
3	High temperature operation test	Ta= 50°C 50%RH 500h
4	Low temperature operation test	Ta= 0°C 500h
5	Humidity condition Operation	Ta= 40 °C ,90%RH
6	Altitude operating storage / shipment	0 - 16,400 ft 0 - 40,000 ft

Note : Before and after Reliability test, LCM should be operated with normal function.

7. International Standards

7-1. Safety

a) UL 60065, Underwriters Laboratories Inc.
Audio, Video and Similar Electronic Apparatus - Safety Requirements.

b) CAN/CSA C22.2 No.60065:03, Canadian Standards Association.
Audio, Video and Similar Electronic Apparatus - Safety Requirements.

c) IEC 60065, The International Electrotechnical Commission (IEC).
Audio, Video and Similar Electronic Apparatus - Safety Requirements.

7-2. Environment

a) RoHS, Directive **2011/65/EU** of the European Parliament and of the council of **8 June 2011**

8. Packing

8-1. Packing Form

a) Package quantity in one Pallet : 5 pcs

b) Pallet Size : 1390 mm(W) X 890 mm(D) X 1080 mm(H)

9. Precautions

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

9-1. Assembly Precautions

(1) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to the resist external force.
(2) You should adopt radiation structure to satisfy the temperature specification.
(3) 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.
(4) 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.)
(5) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzine. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer
(6) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
(7) Board ass'y should be put on the mold frame properly.
(8) FFC Cable should be connected between System board and Source PCB correctly.
(9) Mechanical structure for backlight system should be designed for sustaining board ass'y safely.

9-2. Operating Precautions

(1) Response time depends on the temperature.(In lower temperature, it becomes longer.)
(2) Brightness depends on the temperature. (In lower temperature, it becomes lower.)
And in lower temperature, response time(required time that brightness is stable after turned on) becomes longer
(3) 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.
(4) When fixed patterns are displayed for a long time, remnant image is likely to occur.
(5) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.
(6) Please do not give any mechanical and/or acoustical impact to LCM. Otherwise, LCM can't be operated its full characteristics perfectly.

9-3. Electrostatic Discharge Control

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. And don't touch interface pin directly. Panel ground path should be connected to metal ground.

9-4. Precautions for Strong Light Exposure

Strong light exposure causes degradation of polarizer and color filter.

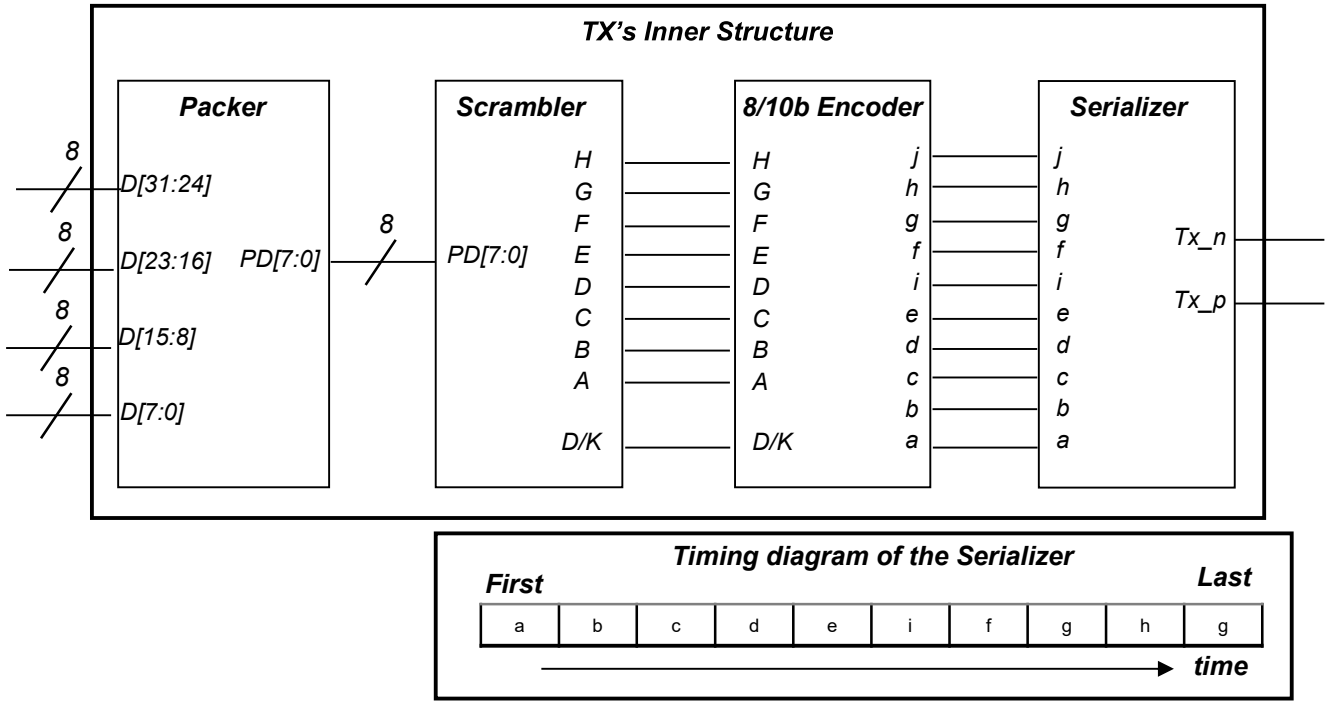
9-5. Storage

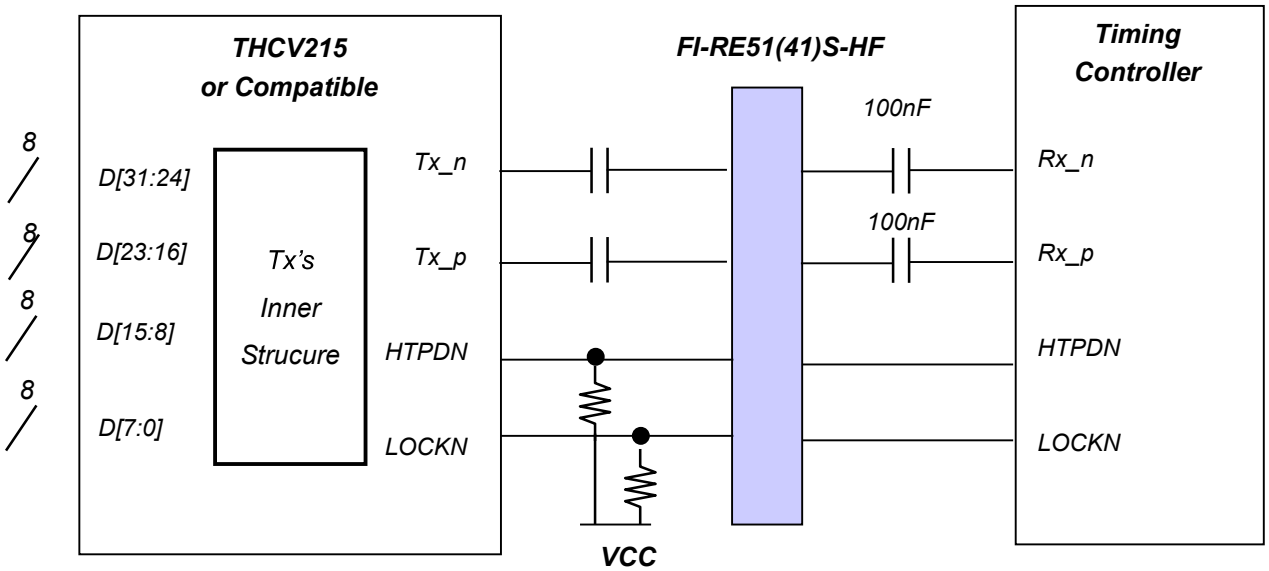
When storing modules as spares for a long time, the following precautions are necessary.

(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
(2) 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.

APPENDIX- I

■ **Required signal assignment for Flat Link (Thine : THCV215) Transmitter**

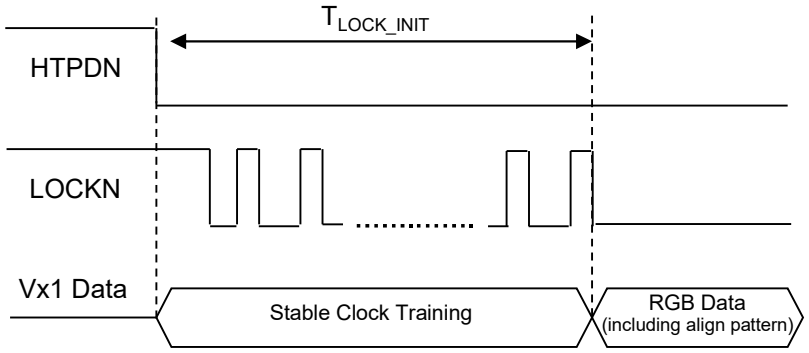




notes: 1. The LCD module uses a 100 nF capacitor on positive and negative lines of each receiver input.
2. Refer to Vx1 Transmitter Data Sheet for detail descriptions. (THCV215 or Compatible)
3. About Module connector pin configuration, Please refer to the Page 8~9.

APPENDIX- II

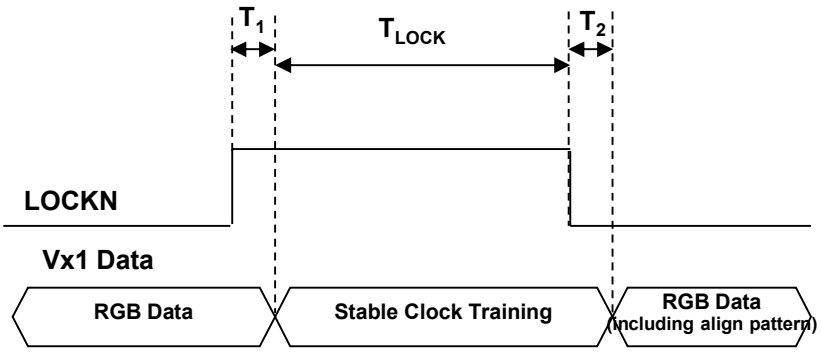
■ Vx1 Initialization Characteristics



Characteristics	Symbol	Min	Typ	Max	Unit
Initial CDR lock time (From Stable CDR training to CDR lock)	T_{LOCK_INT}	0		310	ms

APPENDIX- III

■ Vx1 Lock Timing In Normal Operation



Characteristics	Symbol	Min	Typ	Max	Unit
CDR lock time from stable clock training pattern to LOCKN “Low” in normal operation	T_{LOCK}			2	ms
Latency from LOCKN “High” to clock training pattern	T_1			100	us
Latency from clock “Low” to normal RGB Data	T_2			100	us

※ Vx1 Rx should get clock training pattern in T_1

※ Vx1 Rx should get RGB Data (including align pattern) in T_2