Version : 1.8

TECHNICAL SPECIFICATION

MODEL NO.: OD104SL4

☐Customer's Confirmation

Customer ______________________

By ______________________

☐PVI's Confirmation

Dep	FAE	Panel Design	Electronic Design	Mechanical Design	Product Verification	Prepared by
Sign	[illegible] 10/17/05	[illegible] 10/17	[illegible] 10/17/05	[illegible] [illegible] 10/17/05	[illegible] 10/17/05	[illegible] 10/17/05

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TECHNICAL SPECIFICATION

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1. Application

This data sheet applies to a color TFT LCD module, OD104SL4.

OD104SL4 module applies to notebook PC, sub-note-book PC and other OA product, which require high quality flat panel display. **This module is not designed for aerospace, avionics, medical, F/A, transportation, car or any other products, which require extreme level of reliability.**

Prime View assume no responsibility for any damage resulting from the use of the device which dose not comply with the instructions and the precautions in these specification sheet.

2.Features

. Amorphous silicon TFT LCD panel with back-light unit
. Pixel in stripe configuration
. Slim and compact, designed for O/A application
. Display Colors：262,144 colors
. Optimum Viewing Direction：6 o'clock
. 3.3V LVDS interface standard: DS90CF364 as receiver
. +3.3V DC supply voltage for TFT LCD panel driving
. Backlight driving DC/AC inverter not included in this module
. Long Life Lamp

3.Mechanical Specifications

Parameter	Specifications	Unit
Screen Size	26.4(diagonal)	cm
	10.4 (diagonal)	inch
Display Format	800×(R, G, B)×600	dot
Display Colors	262,144	
Active Area	211.2(H)×158.4 (V)	mm
Pixel Pitch	0.264 (H)×0.264 (V)	mm
Pixel Configuration	Stripe	
Outline Dimension	238.6 (w)×171.0(H)×6.0(typ.) (D)	mm
Weight	310(typ.),320(max.)	g
Back-light	Single CCFL, side-light type	
Surface treatment	Anti-glare and hard-coating	
Display mode	Normally white	

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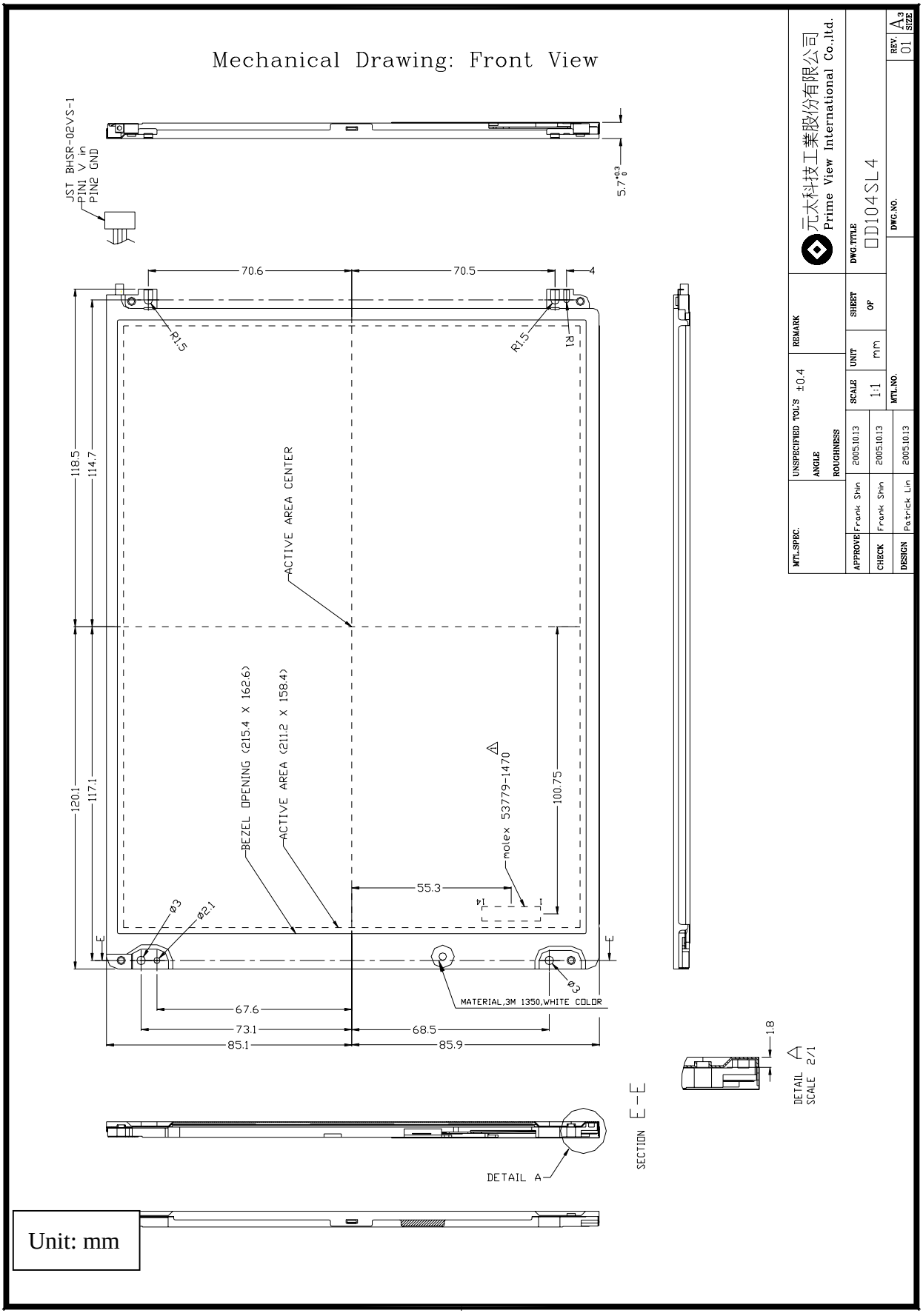
4.Mechanical Drawing of TFT-LCD Module



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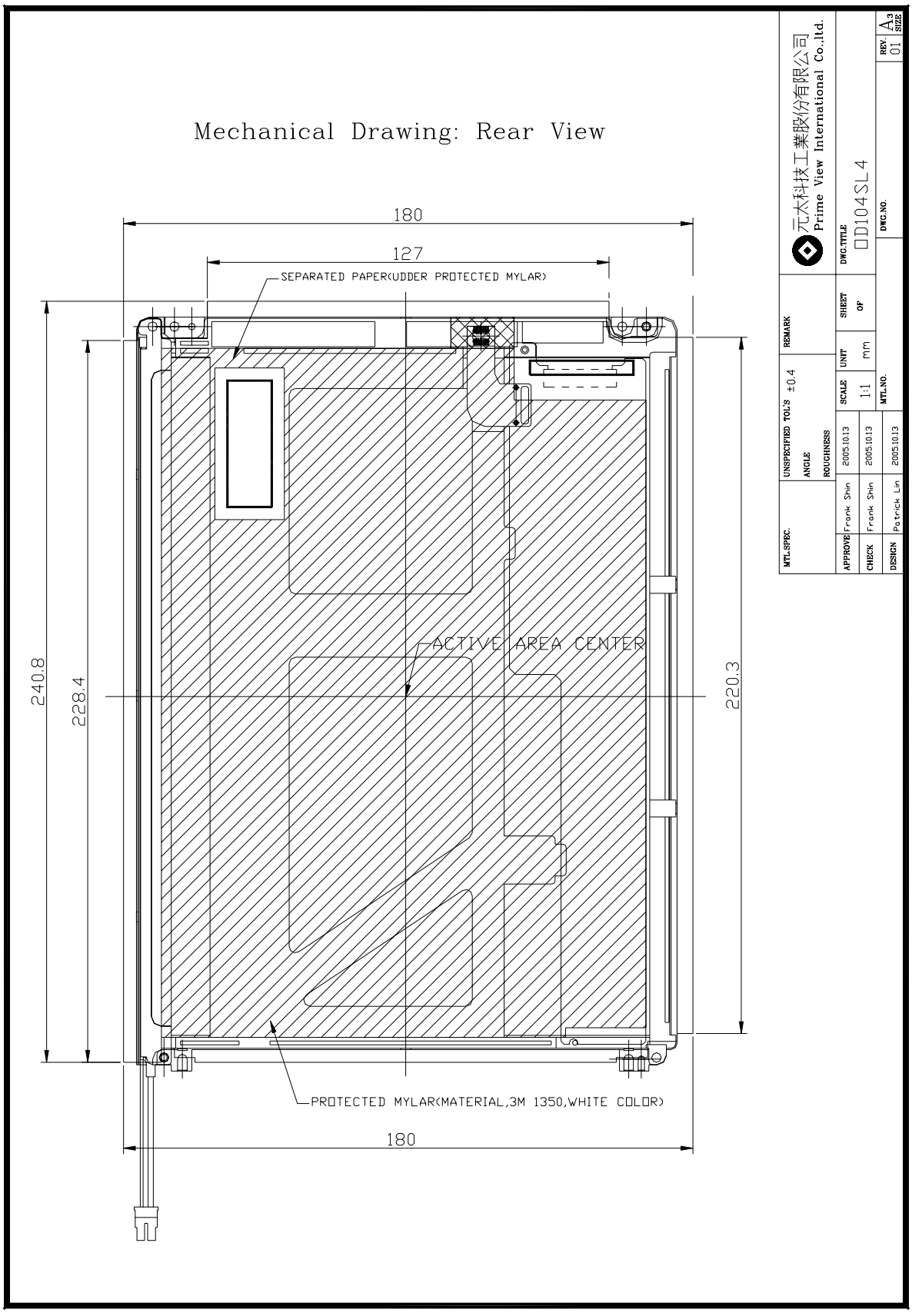
Mechanical Drawing : Rear View



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5.Input Terminals

5-1) TFT-LCD Panel Driving

Connector type: Molex 53779-1470

Pin No.	Symbol	Function	Remark
1	VDD	Power supply : +3.3V	
2	VDD	Power supply : +3.3V	
3	GND		
4	GND		
5	IN0-	Pixel data Transmission pair 0 (negative -)	
6	IN0+	Pixel data Transmission pair 0 (positive +)	
7	IN1-	Pixel data Transmission pair 1 (negative -)	
8	IN1+	Pixel data Transmission pair 1 (positive +)	
9	IN2-	Pixel data Transmission pair 2 (negative -)	
10	IN2+	Pixel data Transmission pair 2 (positive +)	
11	CLK-	Sampling Clock (negative -)	
12	CLK+	Sampling Clock (positive +)	
13	GND		
14	GND		

Recommended Transmitter (DS90C*363 of National Semiconductor) to OD104SL4 interface Assignment:

Input Terminal of DS 90C*363		Graphic controller output signal		Output signal symbol	ToOD104SL4 interface terminal(Symbol)
Symbol	No.	Symbol	Function		
TIN0	44	R0	Red pixel data (LSB)	Tout0-	No.5 : IN0-
TIN1	45	R1	Red pixel data		
TIN2	47	R2	Red pixel data		
TIN3	48	R3	Red pixel data	Tout0+	No.6 : IN0+
TIN4	1	R4	Red pixel data		
TIN5	3	R5	Red pixel data(MSB)		
TIN6	4	G0	Green pixel data (LSB)		
TIN7	6	G1	Green pixel data	Tout1-	No.7 : IN1-
TIN8	7	G2	Green pixel data		
TIN9	9	G3	Green pixel data		
TIN10	10	G4	Green pixel data	Tout1+	No.8 : IN1+
TIN11	12	G5	Green pixel data(MSB)		
TIN12	13	B0	Blue pixel data(LSB)		
TIN13	15	B1	Blue pixel data		
TIN14	16	B2	Blue pixel data	Tout2-	No.9 : IN2-
TIN15	18	B3	Blue pixel data		
TIN16	19	B4	Blue pixel data		
TIN17	20	B5	Blue pixel data(MSB)	Tout2+	N0.10 : IN2+
TIN18	22	NC	No connection		
TIN19	23	NC	No connection		
TIN20	25	ENAB	Compound Synchronization signal		
CLK in	26	NCLK	Data sampling clock	TCLK out- TCLK out+	No.11 : CLK IN- No.12 : CLK IN+

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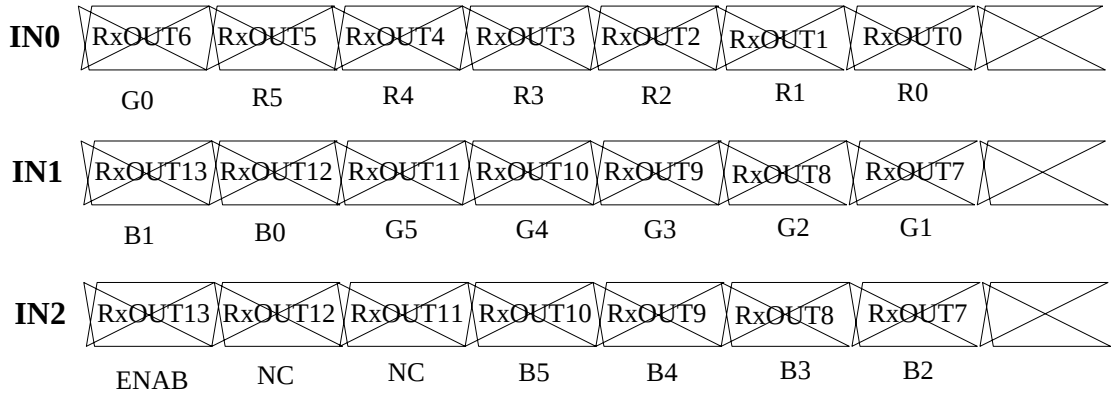
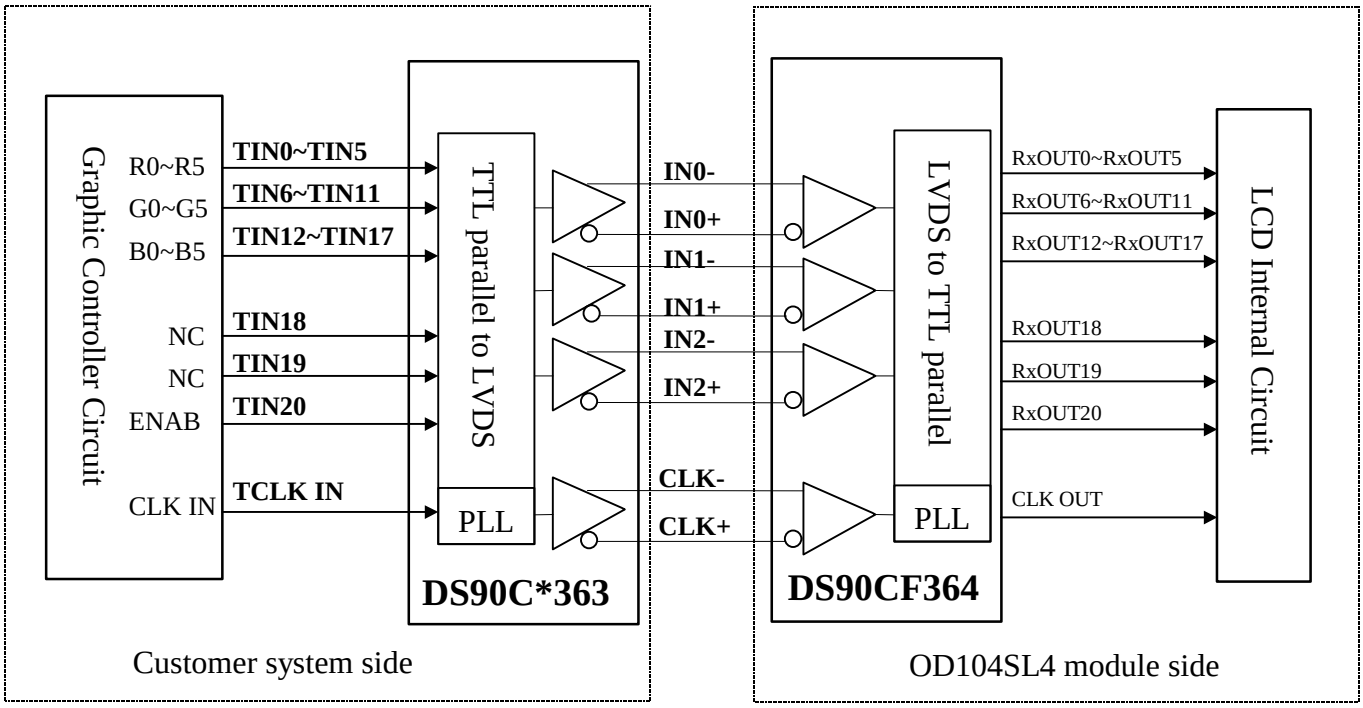
Data stream of IN0-/+, IN1-/+ and IN2-/+ for OD104SL4



LVDS Interface Block Diagram



5-2) Backlight driving

Connector type : “BHSR-02VS-1” of Japan Solderless Terminal MFG Co. LTD

PIN NO.	Symbol	Description	Remark
1	VL1	Input Voltage(High)	
2	VL2	Input Voltage(Low)	

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6.Absolute Maximum Ratings:

GND=0V, Ta=25℃

Parameters	Symbol	MIN.	MAX.	Unit	Remark
Supply Voltage	VDD	-0.3	+4.0	V	
Input Signals Voltage	V_{IN}	-0.3	VDD+0.3	V	Note 6-1
Backlight Driving Voltage	V_L	-	2000	V	
Backlight Driving Frequency	F_L	0	100	KHz	

Note 6-1: LVDS signal

Note 6-2: Humidity : 90% RH Max. at Ta ≤ 40℃.

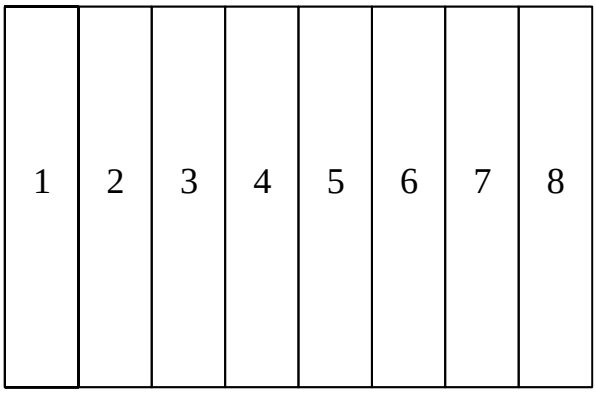
Maximum wet-bulb temperature is at 39℃or less at Ta > 40℃and no condensation.

7.Electrical Characteristics

7-1) Recommended Operating Conditions: GND = 0V, Ta = 25℃

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply Voltage	VDD	3.0	3.3	3.6	V	
		4.5	5.0	5.5	V	
Current Dissipation	I_{DD}	-	350	450	mA	Note 7-1
LVDS Differential input high threshold	V_{TH}	-	-	100	mV	Note 7-2
LVDS Differential input low threshold	V_{TL}	-100	-	-		
Lamp Current	I_{FL}	3.0	5.0	6.0	mA	5mA : 160 cd/m2 Note 7-3 Note 7-6
Lamp Voltage	V_L	450	500	550	Vrms	I_{FL}=5mA Note 7-3
Kick-off voltage (Reference Value)	V_{SFL}	-	1200	-	Vrms	at Ta=25°C Note 7-4
		1000				at Ta=0°C
Lamp Driving Frequency	F_L	-	45	-	KHz	
Total power consumption (at I_{FL}=5mA)		--	3.91	-	W	Note 7-5

Note 7-1 : To test the current dissipation of VDD, using the “color bars” testing pattern shown as below



1. White
2. Yellow
3. Cyan
4. Green
5. Magenta
6. Red
7. Blue
8. Black

Idd current dissipation testing pattern

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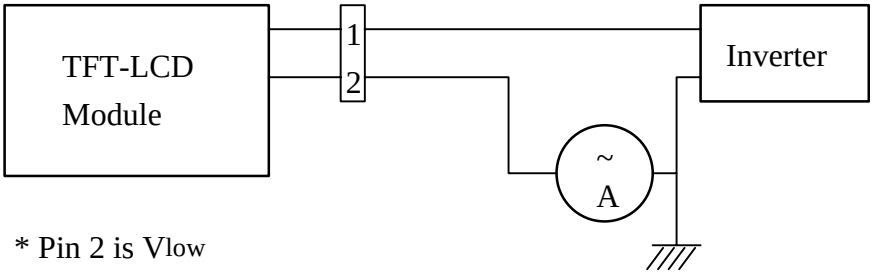
Note 7-2 : Please refers to DS90CF364 specification by National Semiconductor Corporation. This LCD module conforms to LVDS standard.

Note 7-3 : The back-light driving waveform should be as closed to sine-wave as possible. In order to satisfy the quality of B/L , no matter use what kind of inverter , the output lamp current must between Min. and Max. to avoid the abnormal display image caused by B/L.

Note 7-4 : The kick-off times ≧ 1sec.

Note 7-5 : Not including the efficiency of backlight DC/AC inverter

Note 7-6 : Lamp current is measured with current meter for high frequency as shown below



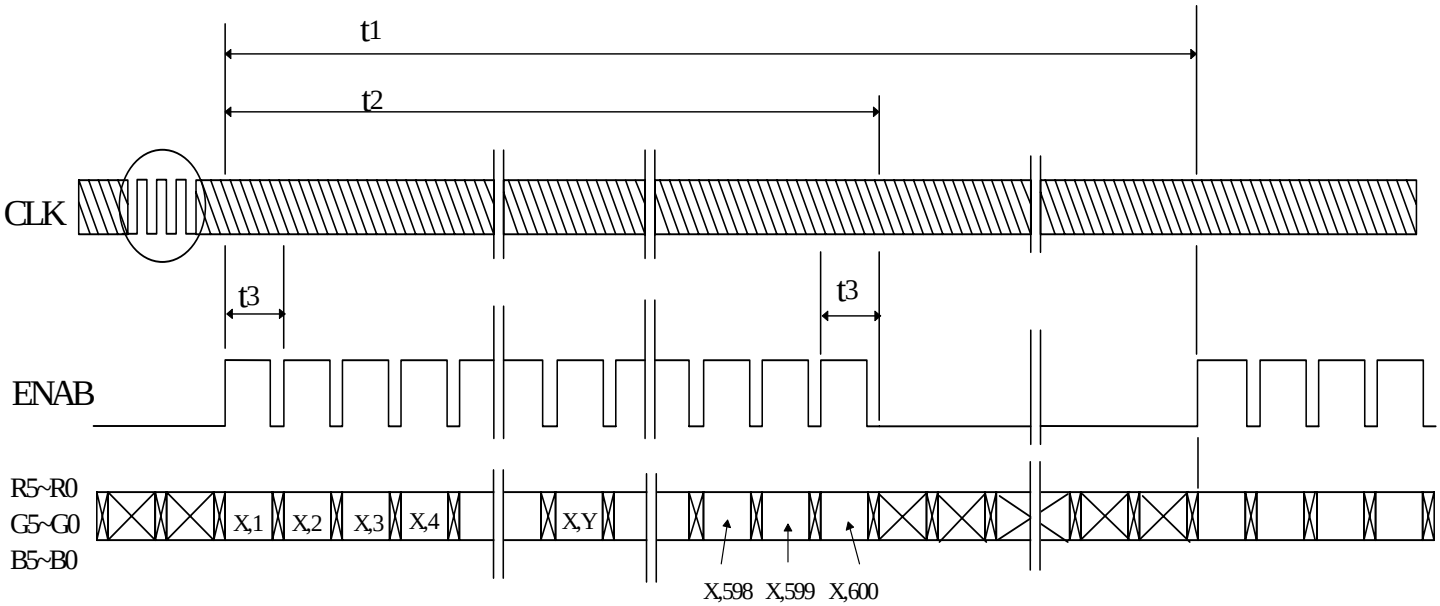
* Pin 2 is Vlow

** Current meter :
Yokogawa 2016-01

Lamp current dissipation testing configuration

7-2) Input / Output signal timing chart

(A) Vertical Timing



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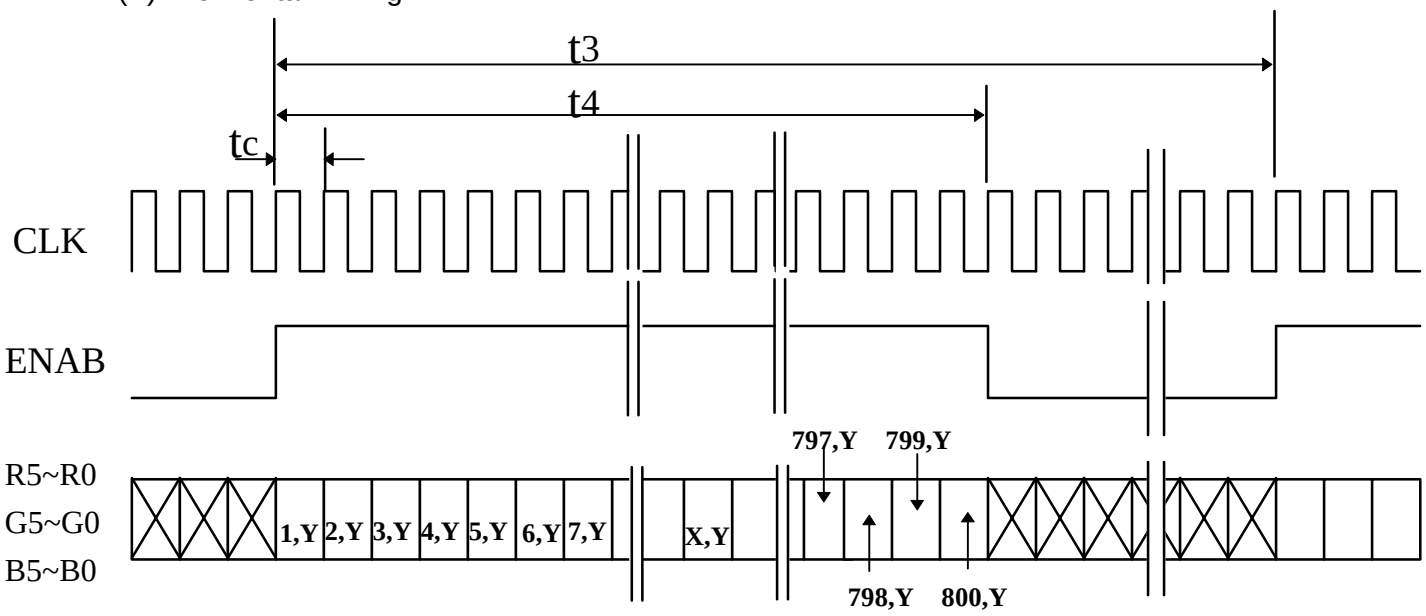
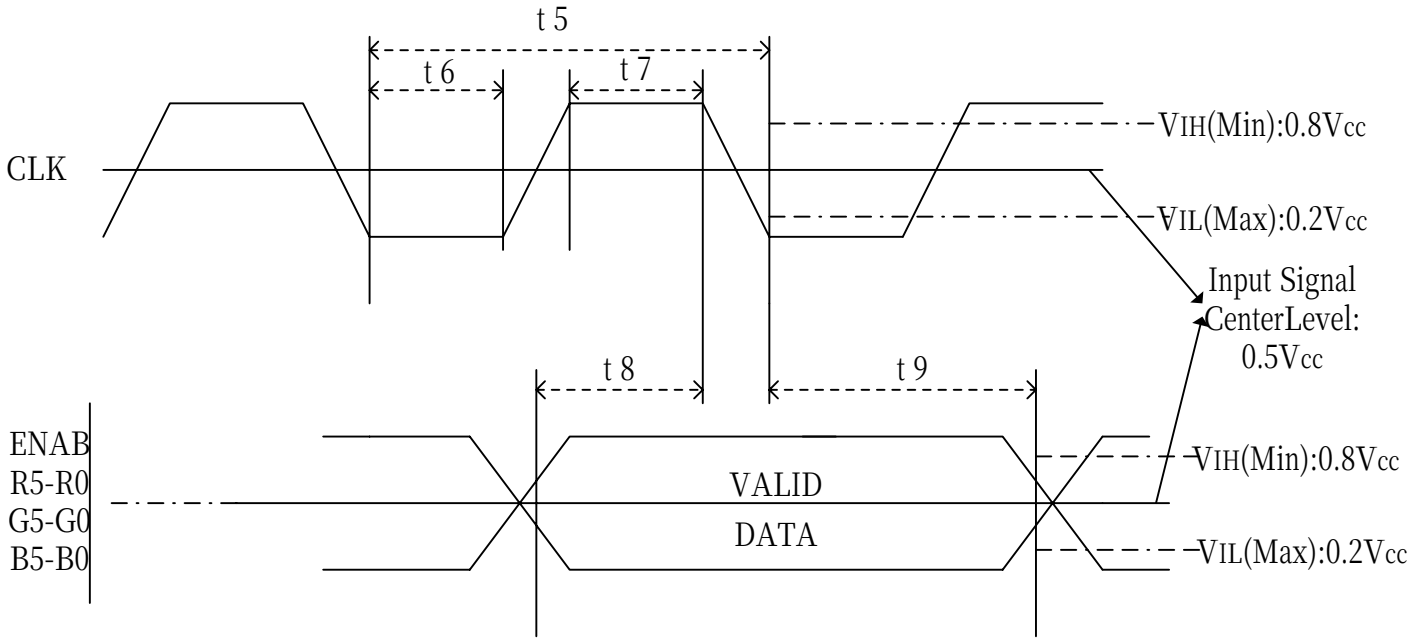
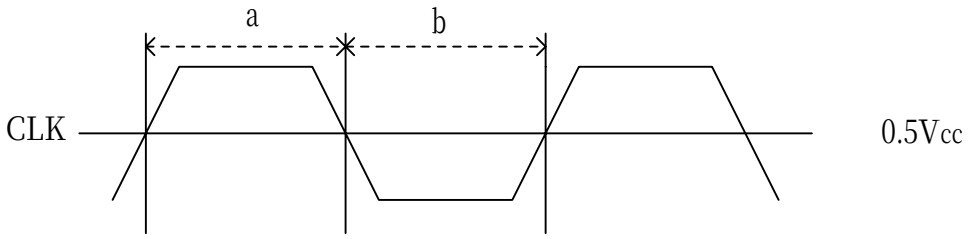
(B) Horizontal Timing







Duty (a ,b) : 50 ± 10%

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D) Timing Specifications

Item	symbol	Min.	Typ.	Max.	Unit	Remark
Frame Cycling	t1	604 X t3	628 X t3	800 X t3		
			16.58		ms	
Vertical Display Period	t2	600 X t3	600 X t3	600 X t3		
Horizontal Scanning Time	t3	920X t5	1056 X t5	1064 X t5		
			26.4		us	
Horizontal Display Period	t4	800 X t5	800 X t5	800 X t5		
Clock Cycle	t5		25.0		ns	
Clock High Level Time	t6	9.0			ns	
Clock Low Level Time	t7	9.0			ns	
Hold time	t8	4.0			ns	
Setup time	t9	5.0			ns	

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7-3) Display Color and Gray Scale Reference

Color		Input Color Data																	
		Red						Green						Blue					
		R5	**R4**	**R3**	**R2**	**R1**	**R0**	**G5**	**G4**	**G3**	**G2**	**G1**	**G0**	**B5**	**B4**	**B3**	**B2**	**B1**	**B0**
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green (63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	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
Red	Red (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (01)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red (02)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker																		
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Brighter																		
	Red (61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red (62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	Green (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green (01)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green (02)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Darker																		
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Brighter																		
	Green (61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green (62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green (63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue	Blue (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue (01)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue (02)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Darker																		
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Brighter																		
	Blue (61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue (62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

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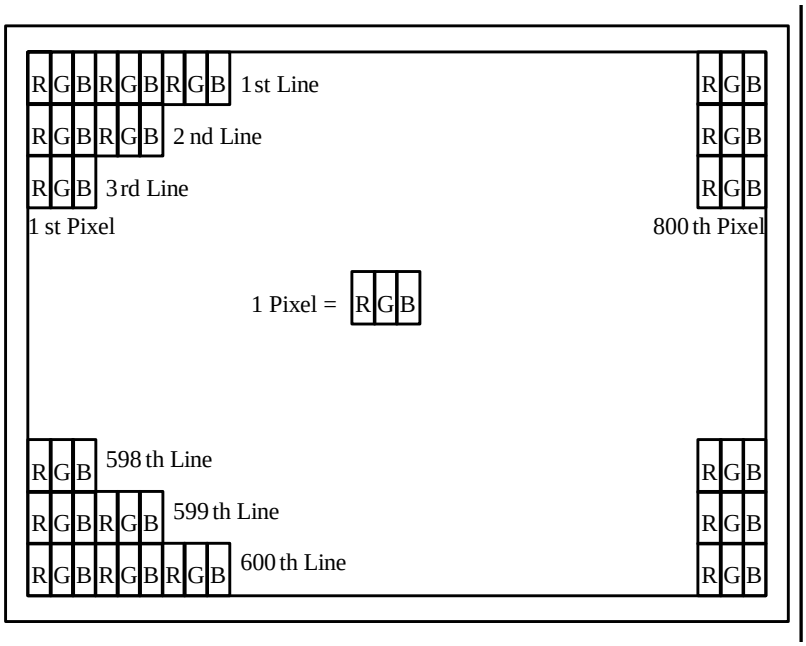
7-4) Pixel Arrangement

The LCD module pixel arrangement is the stripe.



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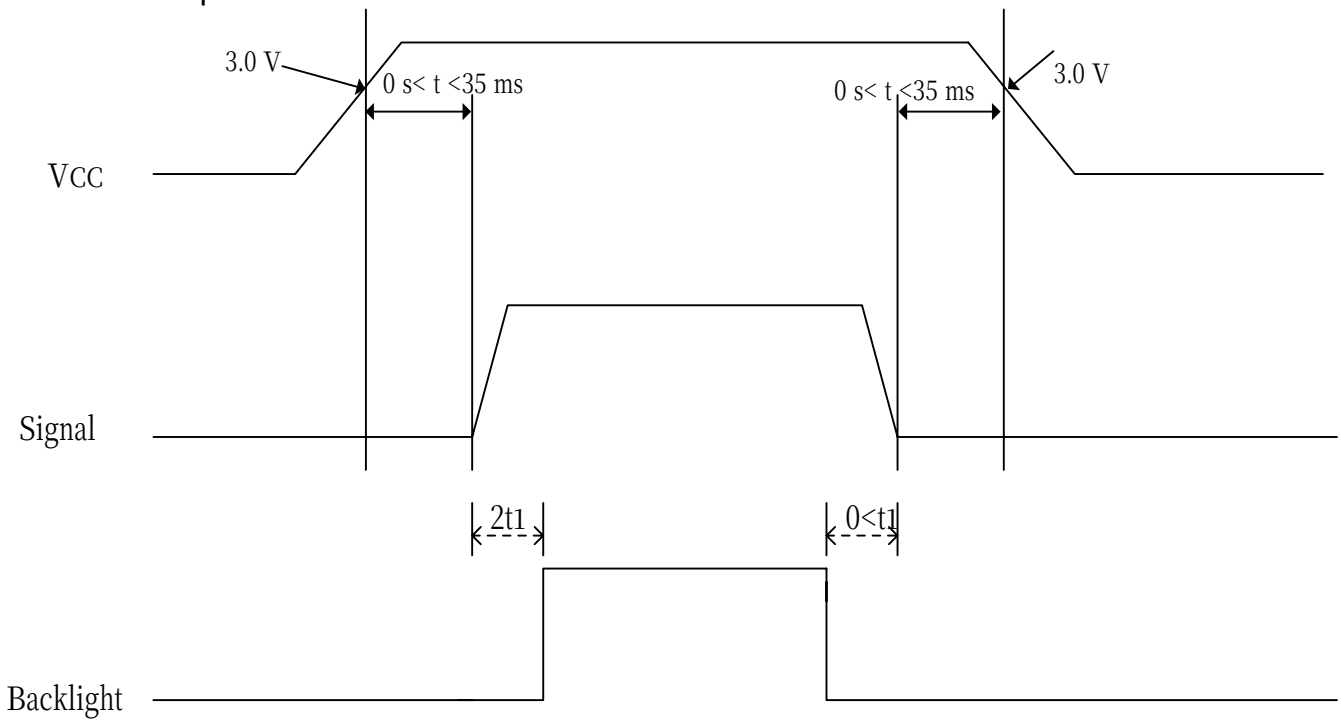
8.Power On Sequence



1. The supply voltage for input signals should be same as $V_{CC.}$
2. When the power is off , please keep whole signals (Hsync, Vsync, CLK, Data) low level

or high impedance

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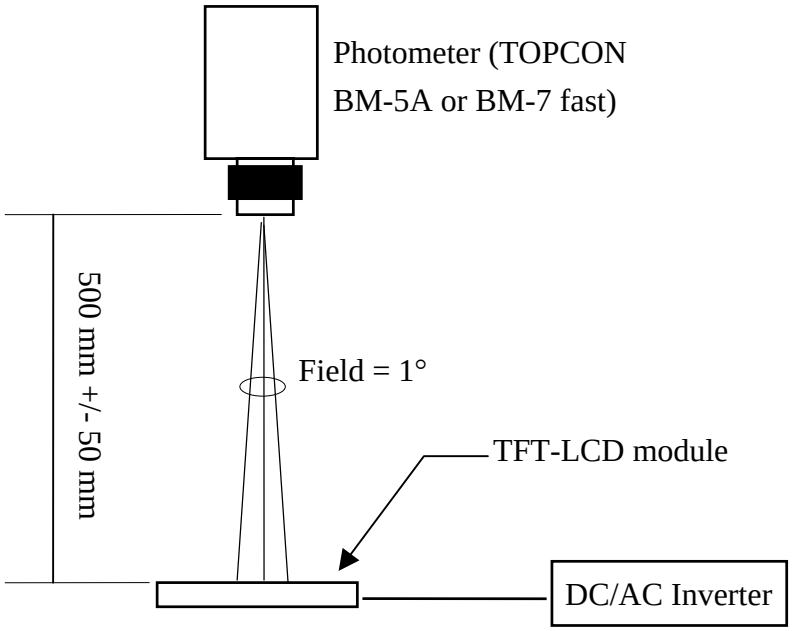
9 Optical Characteristics

9-1) Specification:

Ta = 25℃

Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	θ	CR≥10	±35	±45	-	deg	
	Vertical	θ (to 12 o'clock)		10	15	-	deg	Note 9-1
		θ (to 6 o'clock)		25	40	-	deg	
Contrast Ratio		CR	Optimum direction	200	400	-	-	Note 9-2
Response time	Rise	Tr	θ =0°	-	15	50	ms	Note 9-4
	Fall	Tf	ϕ=0°	-	25	50	ms	
Luminance		L	θ =0°/ϕ=0°	130	160	-	cd/㎡	I_{FL}=5mA, Note 9-3
Luminance Uniformity		U		55	80	-	%	Note 9-5
White Chromaticity		x		0.29	0.32	0.35	-	
		y		0.32	0.35	0.38	-	
Lamp Life Time				30000	40000	-	hr	I_{FL}=5mA
Cross Talk Ratio		CTK		-	-	3.5	%	Note 9-6

All the optical measurement shall be executed 30 minutes after backlight being turn-on. The optical characteristics shall be measured in dark room (ambient illumination on panel surface less than 1 Lux). The measuring configuration shows as following figure.



Optical characteristics measuring configuration

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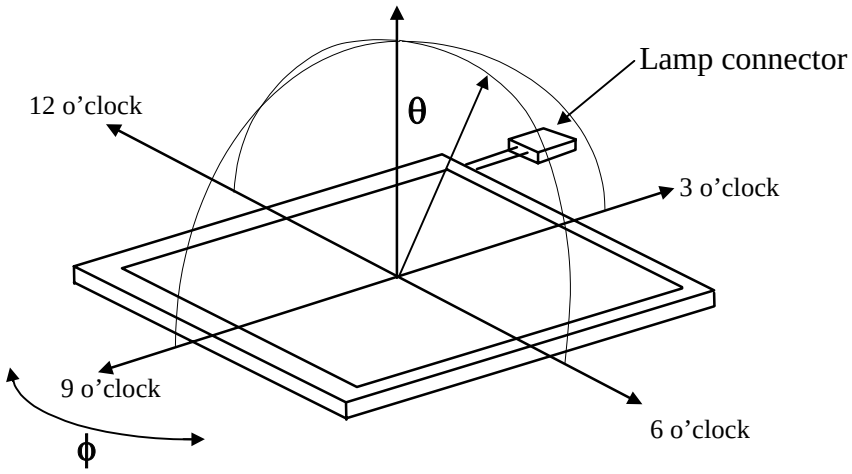
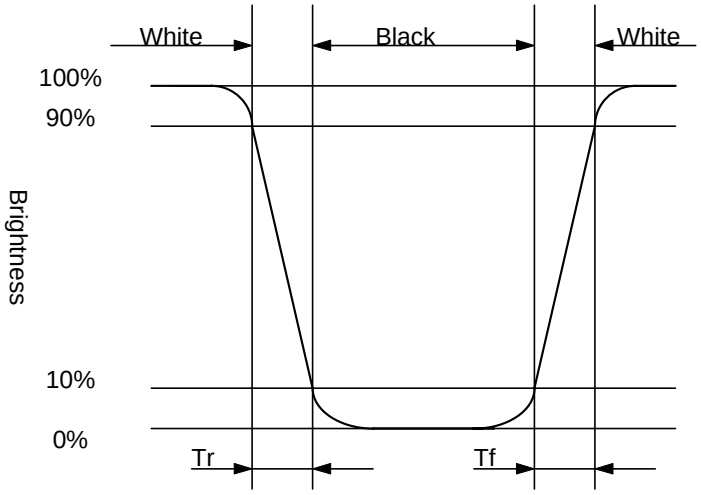
Note 9-1：The definitions of viewing angles are as follows.



Note 9-2 : The definition of contrast ratio $CR = \frac{\text{Luminance at gray level 63}}{\text{Luminance at gray level 0}}$

Note 9-3：Topcon BM-5A luminance meter 1°field of view is used in the testing (after 30 minutes' operation). The typical luminance value is measured at lamp current 5.0 mA.

Note 9-4: Definition of Response Time T_r and T_f:



Note 9-5: The uniformity of LCD is defined as

$$U = \frac{\text{The Minimum Brightness of the 9 testing Points}}{\text{The Maximum Brightness of the 9 testing Points}}$$

Luminance meter : BM-5A or BM-7 fast(TOPCON)

Measurement distance : 500 mm +/- 50 mm

Ambient illumination : < 1 Lux

Measuring direction : Perpendicular to the surface of module

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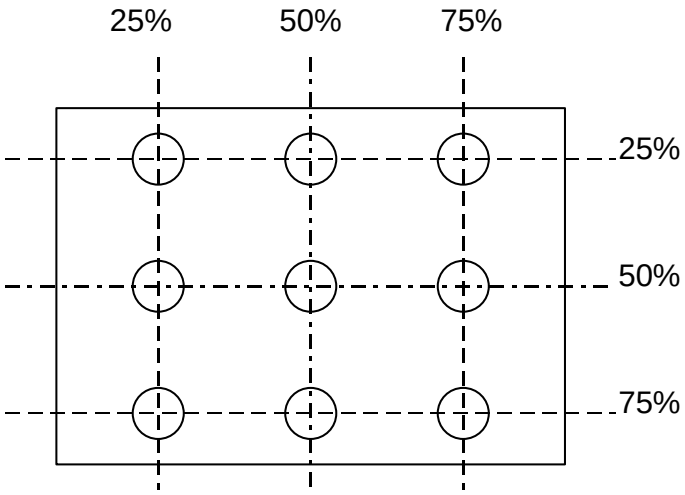
The test pattern is white (Gray Level 63).



Note 9-6: Cross Talk (CTK) = $\frac{|YA-YB|}{YA} \times 100\%$

YA: Brightness of Pattern A

YB: Brightness of Pattern B

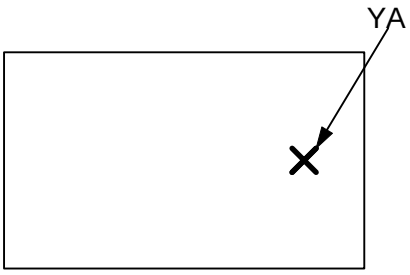
Luminance meter : BM 5A (TOPCON)

Measurement distance : 500 mm +/- 50 mm

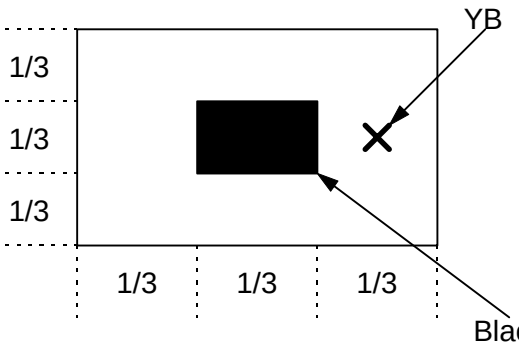
Ambient illumination : < 1 Lux

Measuring direction : Perpendicular to the surface of module

Pattern A
(Gray Level 31)



Pattern B
(Gray Level 31, central black box exclusive)



✕: Measuring Point (A and B are at the same point.)

(Gray Level 0)

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10. Handling Cautions

10-1) Mounting of module

1. Please power off the module when you connect the input/output connector.

b) Please connect the ground pattern of the inverter circuit surely. If the connection is not perfect, some following problems may happen possibly.

3. The noise from the backlight unit will increase.
    1. The output from inverter circuit will be unstable.
    2. In some cases a part of module will heat.

c) Polarizer which is made of soft material and susceptible to flaw must be handled carefully.

d) Protective film (Laminator) is applied on surface to protect it against scratches and dirts. It is recommended to peel off the laminator before use and taking care of static electricity.

10-2) Precautions in mounting

a) When metal part of the TFT-LCD module (shielding lid and rear case) is soiled, wipe it with soft dry cloth.

b) Wipe off water drops or finger grease immediately. Long contact with water may cause discoloration or spots.

c) TFT-LCD module uses glass which breaks or cracks easily if dropped or bumped on hard surface. Please handle with care.

d) Since CMOS LSI is used in the module. So take care of static electricity and earth yourself when handling.

10-3) Adjusting module

a) Adjusting volumes on the rear face of the module have been set optimally before shipment.

b) Therefore, do not change any adjusted values. If adjusted values are changed, the specifications described may not be satisfied.

10-4) Others

a) Do not expose the module to direct sunlight or intensive ultraviolet rays for many hours.

b) Store the module at a room temperature place.

c) The voltage of beginning electric discharge may over the normal voltage because of leakage current from approach conductor by to draw lump read lead line around.

d) If LCD panel breaks, it is possibly that the liquid crystal escapes from the panel. Avoid putting it into eyes or mouth. When liquid crystal sticks on hands, clothes or feet. Wash it out immediately with soap.

e) Observe all other precautionary requirements in handling general electronic components.

f) Please adjust the voltage of common electrode as material of attachment by 1 module.

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11. Reliability Test

No	Test Item	Test Condition	Remark
1	High Temperature Storage Test	Ta = +70℃, 240 hrs	
2	Low Temperature Storage Test	Ta = -20℃, 240 hrs	
3	Low Temperature Operation Test	Ta = 0℃, 240 hrs	
4	High Temperature & High Humidity Operation Test	Ta = +60℃, 80%RH, 240 hrs (No Condensation)	
5	Thermal Cycling Test (non-operating)	0℃←→+60℃, 100 Cycles 1Hr 1Hr	
6	Vibration Test (non-operating)	Frequency：10 ~ 57 H_Z, Amplitude：0.15 mm 58~500Hz, 1G Sweep time: 11 min Test Period: 3 hrs (1 hr for each direction of X, Y, Z)	
7	Shock Test (non-operating)	80G, 6ms, X,Y, Z 1 times for each direction	
8	Electron Static Discharge	C=150pF,R=330Ω Contact=±8KV Air=±15KV 10 times/terminal	

Ta: ambient temperature

Note : The protective film must be removed before temperature test.

[Judgement Criteria]

Under the display quality test conditions with normal operation state , there should be no change which may affect practical display function.

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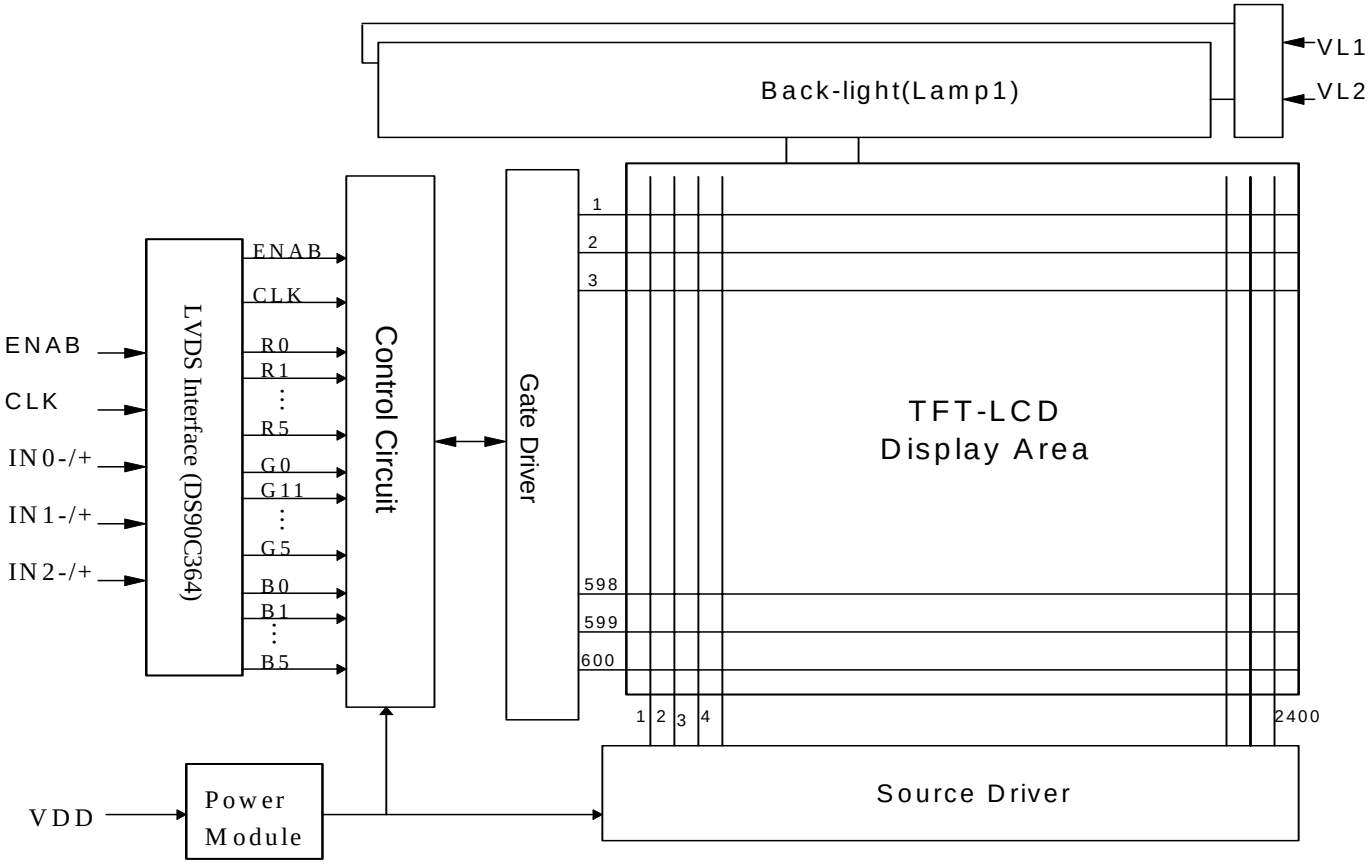
12.Block Diagram



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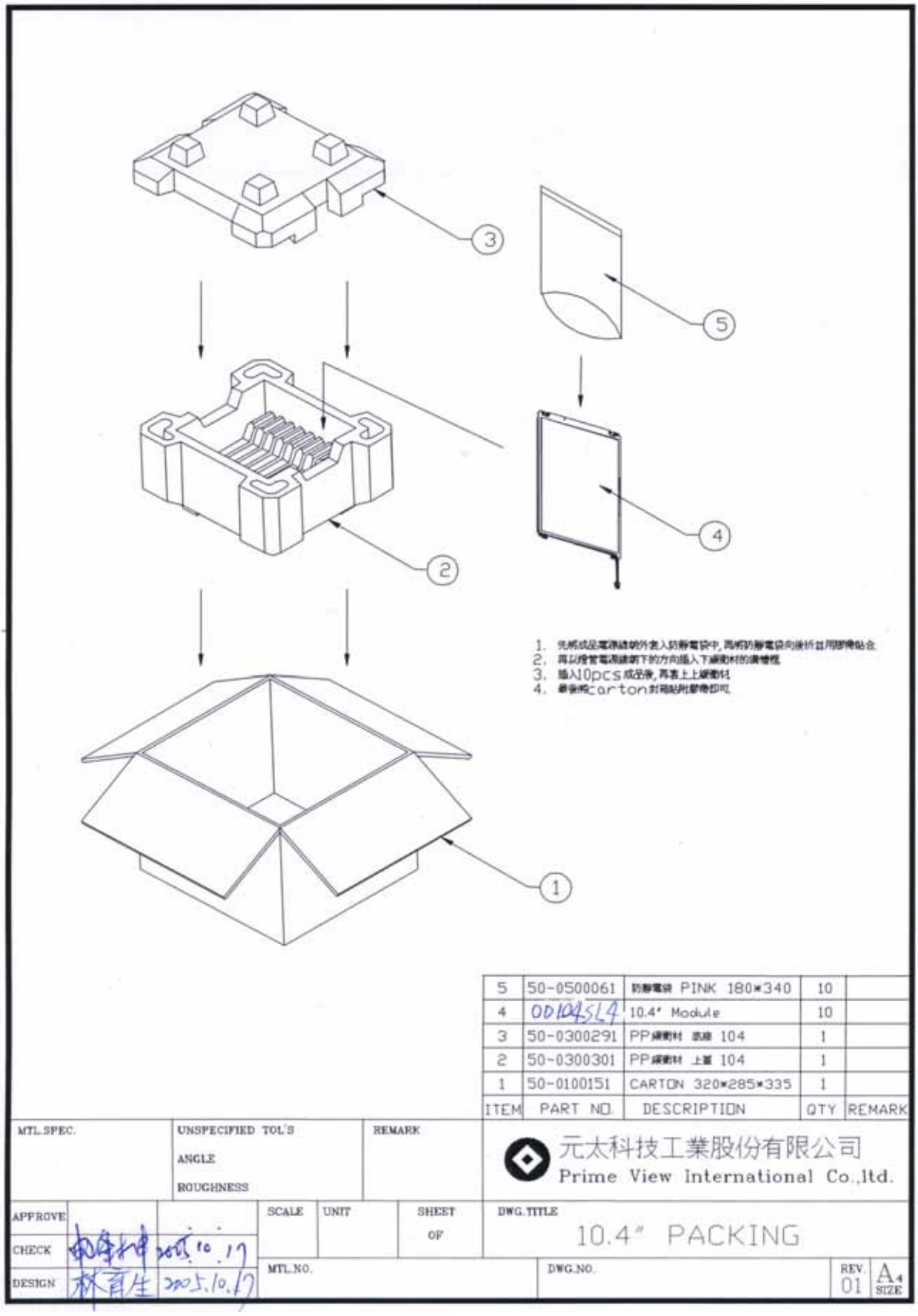
13.Packing



ITEM	PART NO.	DESCRIPTION	QTY	REMARK
5	50-0500061	防靜電袋 PINK 180*340	10	
4	OD104SL4	10.4" Module	10	
3	50-0300291	PP緩衝材 底座 104	1	
2	50-0300301	PP緩衝材 上蓋 104	1	
1	50-0100151	CARTON 320*285*335	1	

MTL.SPEC.	UNSPECIFIED TOL'S ANGLE ROUGHNESS	REMARK	元太科技工業股份有限公司 Prime View International Co.,ltd.	
APPROVE		SCALE	UNIT	SHEET OF
CHECK	2005.10.17	DWG.TITLE: 10.4" PACKING		
DESIGN	林育生 2005.10.17	MTL.NO.	DWG.NO.	REV. 01

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Revision History

Rev.	Issued Date	Revised Content
1.0	Oct 15 , 2002	New
1.1	Dec.30, 2002	**Modify** page 05 : Mechanical Drawing : Rear View
1.2	May.30, 2003	**Modify** page 01 : Delete " This echnical specification is subject to change without notice " page 05 : Rear view drawing , add material name & color . **Add** page 19 : Item 12 – Indication of Lot Number Label .
1.3	Nov.27, 2003	**Modify** Page04 : **Mechanical Drawing :** Front View Page15 : **White Chromaticity :** X from 0.31 to 0.32 , Y from 0.34 to 0.35 **1. TC** Spec delete 4. **Contrast Ratio** Typ 180 to 400 ; Min 100 to 200 . Page19 : 1.**Thermal Cycling test condtion :** 0°C←→+25°C←→+60°C, 50 Cycles to 0°C←→+60°C, 100 Cycles 1Hr 0.5Hr 1Hr 1Hr 1Hr **5. Indication of Lot Number Label :** 1st—Process area : class 1000 , 10K , 100K ⇒ D .
1.4	Feb.24, 2004	**Modify** Page16 : **Note 9-3 :** The typical luminance value is measured at lamp current 5.0 mA.
1.5	Oct 04 , 2004	**Modify** Page08 : Rename Lamp initial voltage to Kick-off voltage add Note 7-4 : The kick-off times ≧1sec. Page21 : Packing
1.6	Jan.10 , 2005	**Modify** Page04 : Mechanical Drawing : Front View (connector's part number). Page08 : Recommended Operating Condition table : Lamp Current,Lamp Voltage,Kick-off Voltage,Lamp driving frequency Total poer consumption. **Delete :** Page19 : Indication of Lot Number Label(Oracle system induction) **Add :** Page19 :Note: The protective film must be removed before temperature test.
1.7	Apr.26,2005	**Modify** Page08 : Current Lamp Voltage,Min change to 450, Max change to 550 Page21 : Packing-change to initial packing.
1.8	Oct.14,2005	**Modify** Page04: Mechanical Drawing of TFT-LCD Module (connector's part number).

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