CHI MEI OPTOELECTRONICS CORP.

Issued Date:Jul.08'2002
Model No.: M150X2-L01
Approval

TFT LCD Approval Specification

MODEL NO.: M150X2 - L01

Customer :SAMSUNG Electronics CO.LTD.

Approved by : _____

Note :

Liquid Crystal Display Division		
QRA Dept.	PDD II Dept.	PD Dept.
Approval	Approval	Approval
陳 91.7.9 永一	韋 91.7.9 忠光	91.7.8

Version 3.1

- CONTENTS -

REVISION HISTORY

Version	Date	Page (New)	Section	Description
Ver 0.0	Apr,16,2001	All	All	Tentative Specification was first issued.
Ver 0.1	July,04,2001	6	2.2.1	Update:Vcc(Symbol.)/Vss-0.3(Min.)→Vdd(Symbol.)/-0.3(Min.)
			2.2.2	Update:Vl:(640)(Min.)/(800)(Max.)→599(Min.)/732(Max.)
				Update:Il:7.0(Max.)→6.5(Max.)
				Update:Il=(6.0)mA→Il=6.0mA
		7	3.1	Delete Ripple Voltage
				Update:Irush;TBD(Max.)→1.5(Max.)
				Update:White:TBD(Typ.)→800(Typ.)
				Update: Black:TBD(Typ.)--.470(Typ.)
				Update: Vertical Stripe:TBD(Typ.)→570(Typ.)
				Update:"H" Level:2.64(Min.)/--(Typ.)/Vcc(Max.)→ --(Min.)/--(Typ.)/100(Max.)
				Update:"L" Level:GND(Min.)→-100(Min.)
				Update:Note(2):TBD→470.
		8	3.2	Update:Vl:(640)(Min.)/(720)(Typ.)/(800)(Max.)→ 599(Min.)/666(Typ.)/732(Max.)
				Update:Il:3.0(Min.)/(6.5)(Typ.)/(7.0)(Max.)→2.0(Min)/6.0(Typ.)/6.5(Max.)
				Update:Vs:(1150)/(1500)→850/1050
				Update:Pl:(9360)(Typ.)→15984(Typ.)
		10	4.1	Add:LVDS INPUT/DC POWER SUPPLY
			4.2	Delete:1.HV(Blue.)
				Delete:2:LV(Black.)
				Delete:1:HV(Pink.)
				Delete:2:LV(White.)
		11	5.1	Update:Pin No: (17)/(18)/(20).
			5.2	Update:BHS→BHSS
		13	6.1	Update:20(Min.)/12.5(Max.)→12.5(Min.)/20(Max.)
		17	7.1	Update:6.5(Value.)→6.0(Value.)
			7.2	Add:Rx:0.588(Min.)/0.638(Max.)/Update:(0.616)(Typ.)→0.613(Typ.)
				Add:Ry:0.320(Min.)/0.370(Max.)/Update:(0.344)(Typ.)→0.345(Typ.)
				Add:Gx:0.276(Min.)/0.326(Max.)/Update:(0.308)(Typ.)→0.301(Typ.)
				Add:Gy:0.538(Min.)/0.588(Max.)/Update:(0.565)(Typ.)→0.563(Typ.)
				Add:Bx:0.125(Min.)/0.175(Max.)/Update:(0.150)(Typ.)→0.150(Typ.)
				Add:By:0.100(Min.)/0.150(Max.)/Update:(0.130)(Typ.)→0.125(Typ.)
				Add:Wx:0.285(Min.)/0.335(Max.)/Update:(0.313)(Typ.)→0.310(Typ.)
				Add:Wy:0.305(Min.)/0.355(Max.)/Update:(0.329)(Typ.)→0.330(Typ.)
Ver 3.0	Apr,23,2002	8	3.1	Revising Rush Current 1.5(Max.)→1(Max.)
				Revising Power Supply Current White 800(Typ.)/→750(Typ.)/800(Max.)
				Revising Power Supply Current Black 470(Typ.)/→510(Typ.)/550(Max.)
				Revising Power Supply Vertical Stripe →600(Max.)
		17	7.2	Revising Color Chromaticity Red (Rx)/(Ry)
				Revising Color Chromaticity Green (Gx)/(Gy)

REVISION HISTORY

Version	Date	Page (New)	Section	Description
Ver 3.0	Apr,23,2002	17	7.2	Revising Color Chromaticity Blue (Bx)/(By) Revising Color Chromaticity White (Wx)/(Wy)
Ver 3.1	Jul,08,2002			Revise Inspection Spec Ver 1.0B → Ver 1.0C

1. GENERAL DESCRIPTION

1.1 OVERVIEW

M150X2-L01 is a 15.0" TFT Liquid Crystal Display module with 4 CCFL Backlight units and 20 pins LVDS interface. This module supports 1024 x 768 XGA mode and can display 16.2M colors. The optimum viewing angle is at 6 o'clock direction. The inverter module for Backlight is not built in.

1.2 FEATURES

- Wide viewing angle
- XGA (1024 x 768 pixels) resolution
- DE (Data Enable) only mode
-High contrast 400:1 Min
-Fast Response: 25ms(T_R+T_F)
-LVDS Interface with 1pixels/clock

1.3 APPLICATION

- Desktop monitors

1.4 GENERAL SPECIFICATI0NS

Item	Specification	Unit	Note
Active Area	304.1(H) x 228.1(V) (15.0" diagonal)	Mm	(1)
Bezel Opening Area	308.2(H) x 232.1(V)	Mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1024 x R.G.B. x 768	Pixel	-
Pixel Pitch	0.297(H) x 0.297(W)	Mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	16,194,277	Color	-
Transmissive Mode	Normally black	-	-

1.5 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	-	331.6	-	Mm	(1)
	Vertical(V)	-	254.76	-	Mm	
	Depth(D)	-	13.0		Mm	
Weight		-	-	1,350	G	-

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

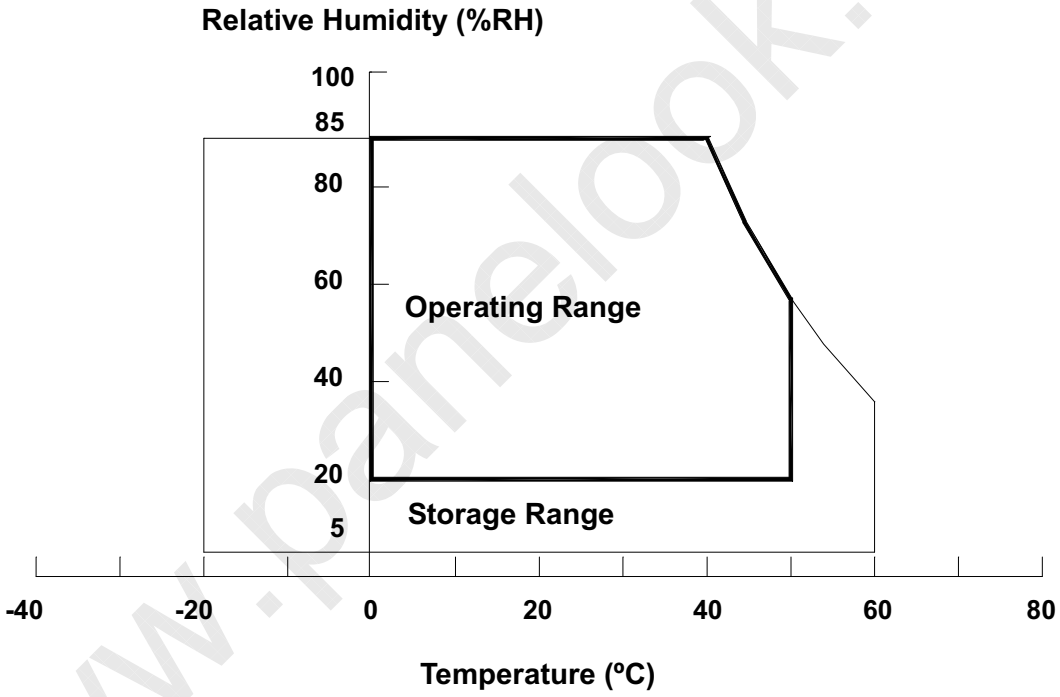
Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	ºC	(1)
Operating Ambient Temperature	T_{OP}	0	+50	ºC	(1), (2)
Storage Humidity	H_{ST}	5	85	%	-
Operation Humidity	H_{OP}	20	85	%	-
Shock (Non-Operating)	S_{NOP}	-	50	G	(3), (5)
Vibration (Non-Operating)	V_{NOP}	-	2	G	(4), (5)

Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 85 %RH Max. (Ta ≦ 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

(c) No condensation of water.



Note (2) The temperature of panel surface should be 0 ºC Min. and 60 ºC Max.

Note (3) 6ms, 1 time each ±X,±Y and ±Z directions

Note (4) 10 ~ 500 Hz, 1 cycle/20min. 1.5mm max, 1 hour each X, Y and Z directions

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V_{DD}	-0.3	4.0	V	

2.2.2 BACKLIGHT UNIT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Lamp Voltage	V_L	599	732	V_{RMS}	(1), (2), I_L = 6.0 mA
Lamp Current	I_L	3.0	6.5	mA_{RMS}	(1), (2)
Lamp Frequency	F_L	30	80	KHz	

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for lamp (Refer to Section 3.2 for further information).

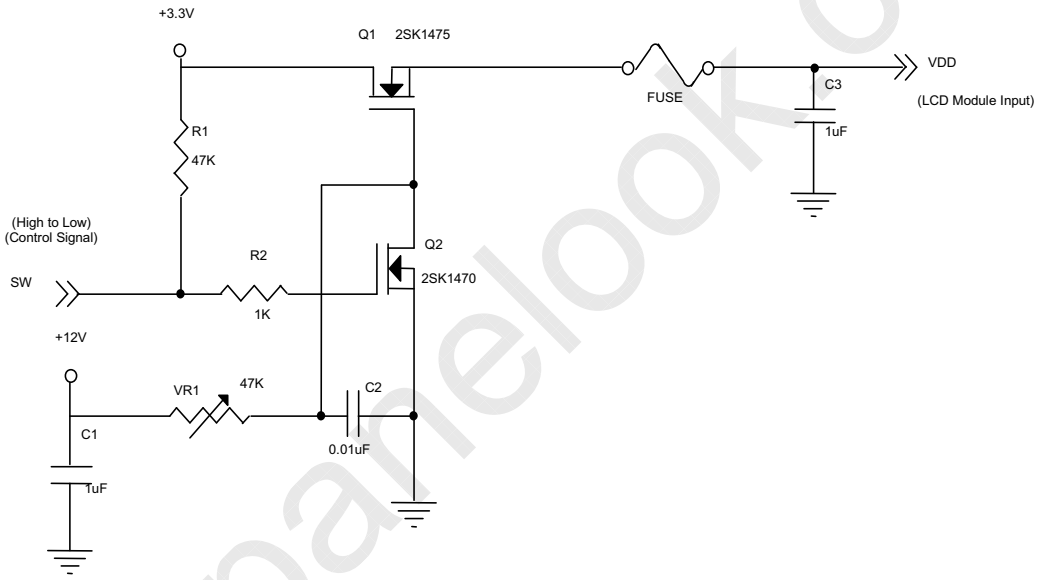
3. ELECTRICAL CHARACTERISTICS

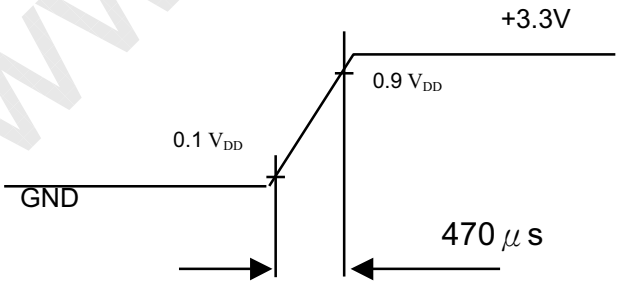
3.1 TFT LCD MODULE

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	3.0	3.3	3.6	V	-
Rush Current		I_{RUSH}	-	-	1	A	(2)
Power Supply Current	White	-	-	750	800	mA	(3)a
	Black	-	-	510	550	mA	(3)b
	Vertical Stripe	-	-	570	600	mA	(3)c
Differential Input Voltage for LVDS Receiver Threshold	"H" Level	V_{IH}	-	-	100	mV	-
	"L" Level	V_{IL}	-100	-	-	mV	-
Terminating Resistor		R_T	-	100	-	Ohm	-

Note (1) The module should be always operated within above ranges.

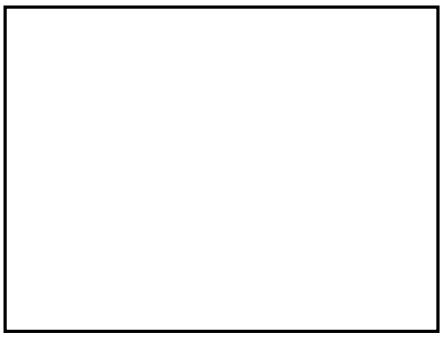
Note (2) Measurement Conditions:





Note (3) The specified power supply current is under the conditions at V_{DD} =3.3V, Ta = 25 ± 2 ºC, DC Current and f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern

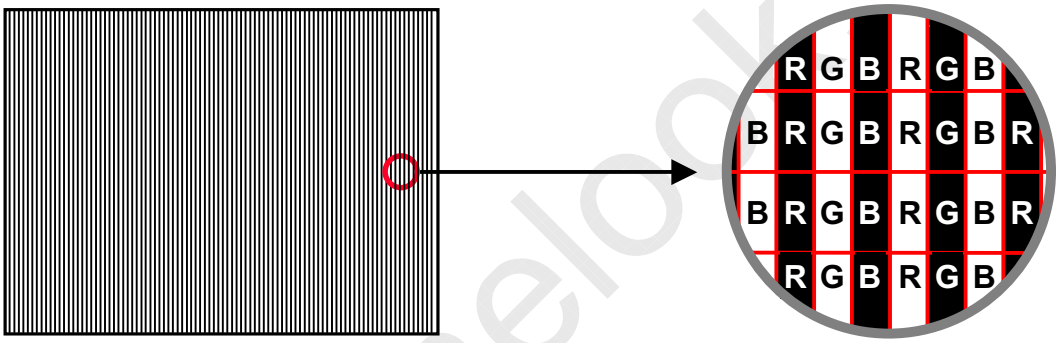


Active Area

b. Black Pattern

Active Area

c. Vertical Stripe Pattern



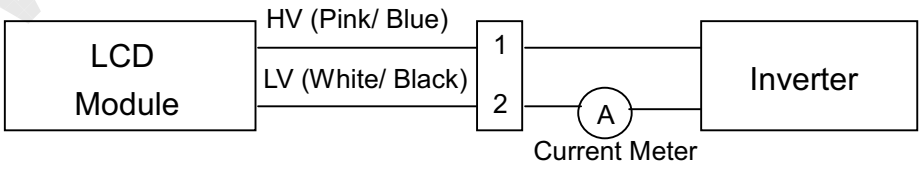
Active Area

3.2 BACKLIGHT UNIT

Ta = 25 ± 2 ºC

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lamp Input Voltage	V_L	599	666	732	V_{RMS}	I_L = 6.0 mA
Lamp Current	I_L	2.0	6.0	6.5	mA_{RMS}	(1)
Lamp Turn On Voltage	V_S	-	-	850 (25 °C)	V_{RMS}	(2)
		-	-	1050 (0 °C)	V_{RMS}	(2)
Operating Frequency	F_L	30	45	80	KHz	(3)
Lamp Life Time	L_{BL}	50,000	-	-	Hrs	(5)
Power Consumption	P_L	-	15984	-	mW	(4), I_L = 6.0 mA

Note (1) Lamp current is measured by utilizing a high frequency current meter as shown below:



Note (2) The voltage shown above should be applied to the lamp for more than 1 second after startup. Otherwise the lamp may not be turned on.

Note (3) The lamp frequency may generate interference with horizontal synchronous frequency from the display, and this may cause line flow on the display. In order to avoid interference, the lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible.

Note (4) $P_L = I_L \times V_L$

Note (5) The lifetime of lamp is defined as the time when it continues to operate under the conditions at Ta = 25 ±2 °C and I_L =7.0mA_{RMS} until one of the following events occurs:

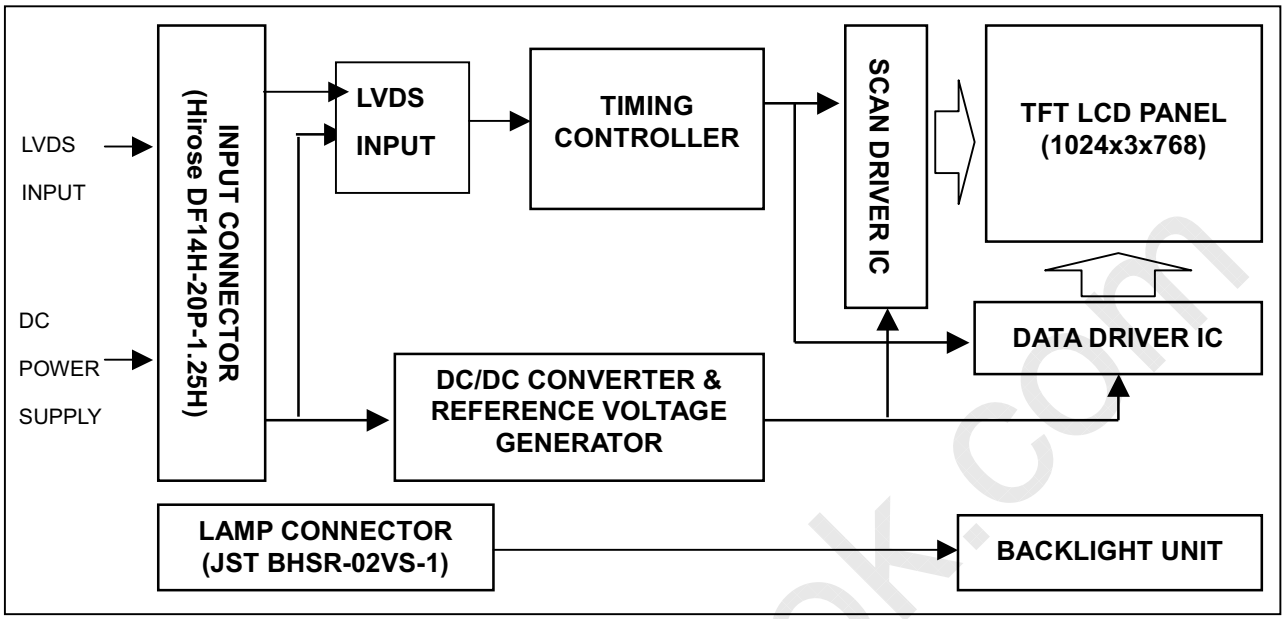
(a) When the brightness becomes ≦ 50% of its original value.

(b) When the effective ignition length becomes ≦ 80% of its original value. (Effective ignition length is defined as an area that the brightness is less than 70% compared to the center point.)

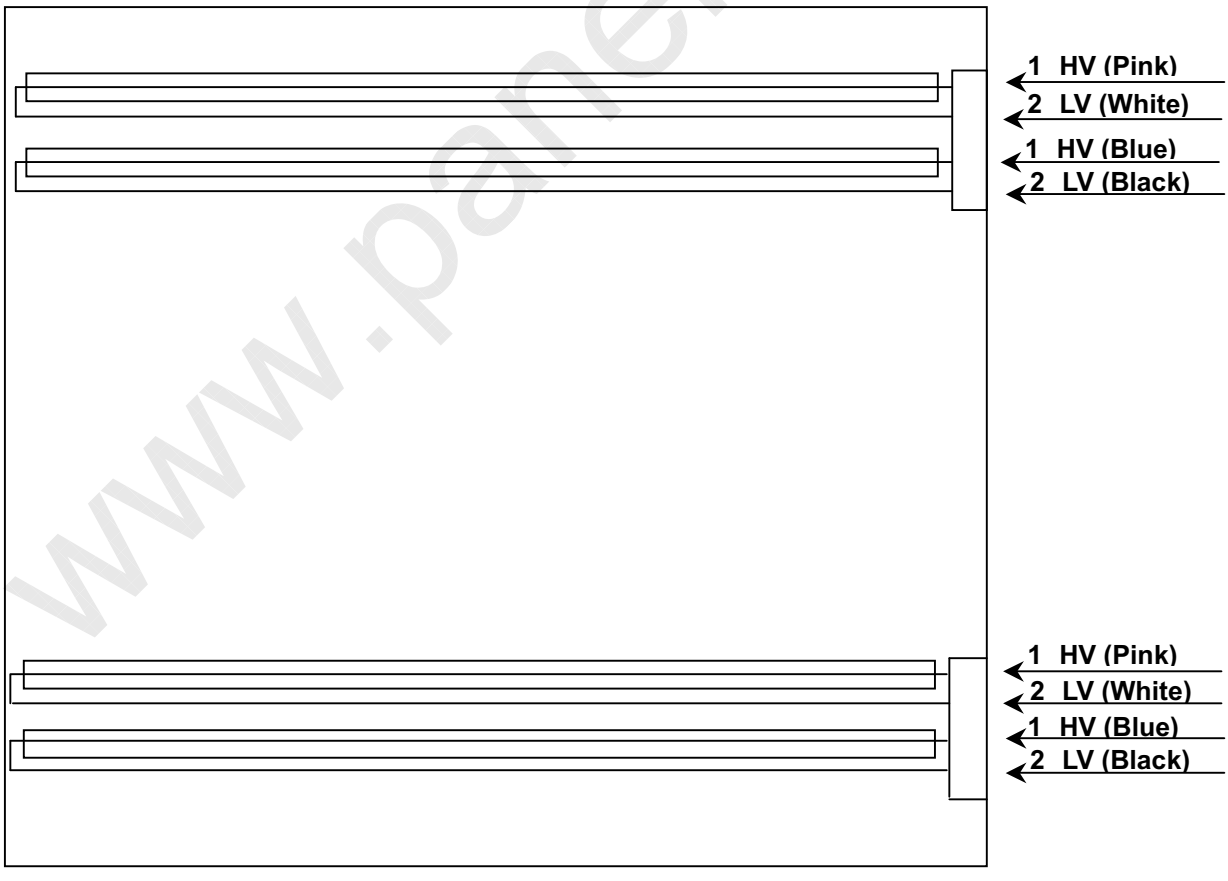
Note (6) The waveform of the voltage output of inverter must be area-symmetric and the design of the inverter must have specifications for the modularized lamp. The performance of the Backlight, such as lifetime or brightness, is greatly influenced by the characteristics of the DC-AC inverter for the lamp. All the parameters of an inverter should be carefully designed to avoid generating too much current leakage from high voltage output of the inverter. When designing or ordering the inverter please make sure that a poor lighting caused by the mismatch of the Backlight and the inverter (miss-lighting, flicker, etc.) never occurs. If the above situation is confirmed, the module should be operated in the same manners when it is installed in your instrument.

4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



4.2 BACKLIGHT UNIT



5. INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE

Pin No.	Symbol	Function	Polarity	Note
1	VDD	Power Supply +3.3V(typical)		
2	VDD	Power Supply +3.3V(typical)		
3	GND	Ground		
4	GND	Ground		
5	RX0-	LVDS Differential Data Input	Negative	
6	RX0+	LVDS Differential Data Input	Positive	
7	GND	Ground		
8	RX1-	LVDS Differential Data Input	Negative	
9	RX1+	LVDS Differential Data Input	Positive	
10	GND	Ground		
11	RX2-	LVDS Differential Data Input	Negative	
12	RX2+	LVDS Differential Data Input	Positive	
13	GND	Ground		
14	RXCLK-	LVDS Differential Data Input	Negative	
15	RXCLK+	LVDS Differential Data Input	Positive	
16	GND	Ground		
17	RX3-	LVDS Differential Data Input	Negative	
18	RX3+	LVDS Differential Data Input	Positive	
19	GND	GND		
20	NC	Reserved		

(1)Connector Part No.: [Hirose] DF14H-20P-1.25H

(2)Matching socket Part No.: [Hirose] DF14-20S-1.25C

5.2 BACKLIGHT UNIT

Pin	Symbol	Description	Color
1	HV1	High Voltage	Pink/ Blue
2	LV	Ground	White/ Black

Note (1) Connector Part No.: BHSR-02VS-1 (JST) or equivalent

Note (2) Matching Connector Part No.: SM02B-BHSS-1-TB (JST) or equivalent

5.3 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	R7	R6	G5	G4	G3	G2	G1	G0	R7	R6	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	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	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	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
Gray Scale Of Red	Red(0) / Dark	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(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(252)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(252)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(252)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0)/Dark	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(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
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	Green(252)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(252)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(252)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	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(1)	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(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
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	Blue(252)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(252)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(252)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

6. INTERFACE TIMING

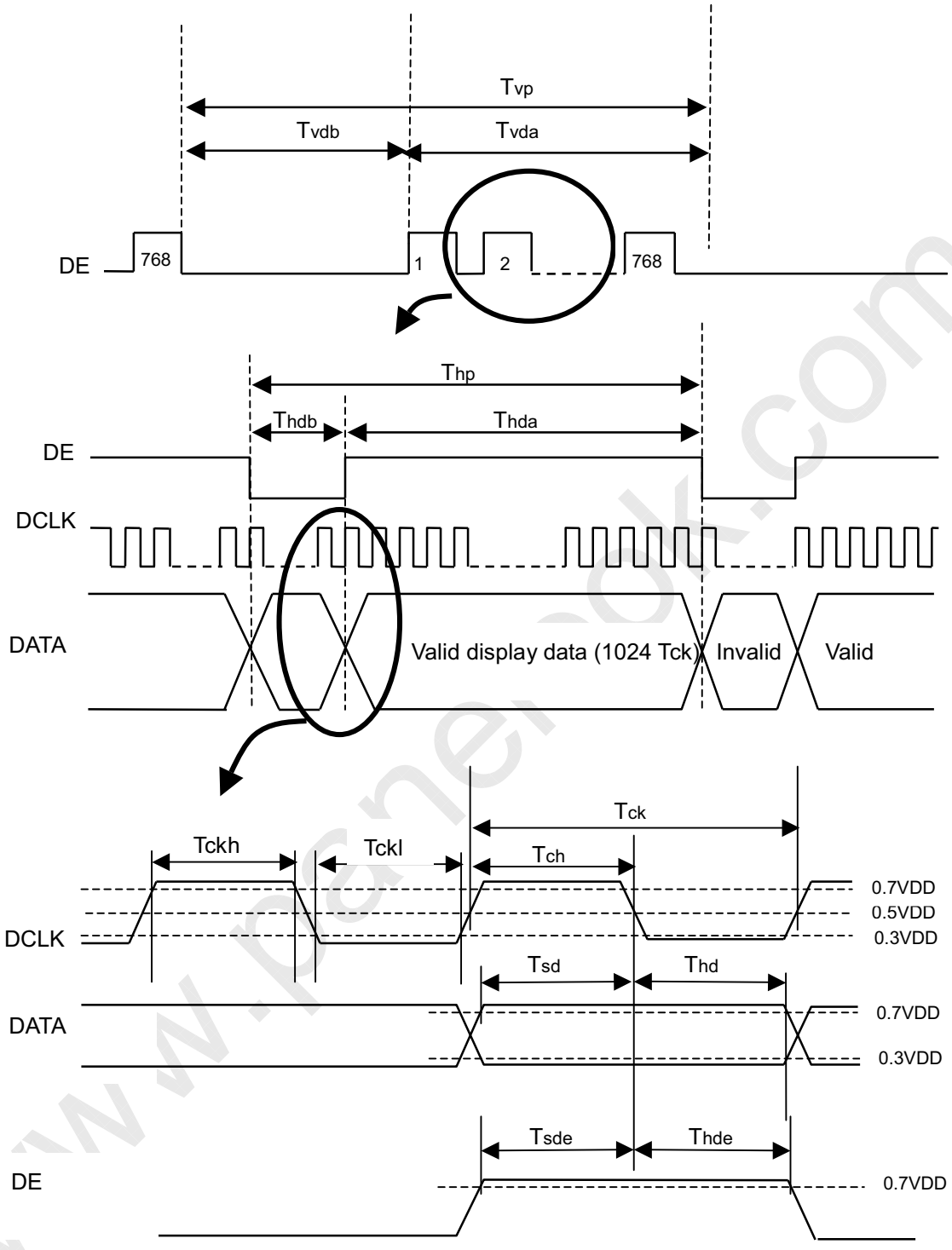
6.1 INPUT SIGNAL TIMING SPECIFICATIONS

The input signal timing specifications are shown as the following table and timing diagram.

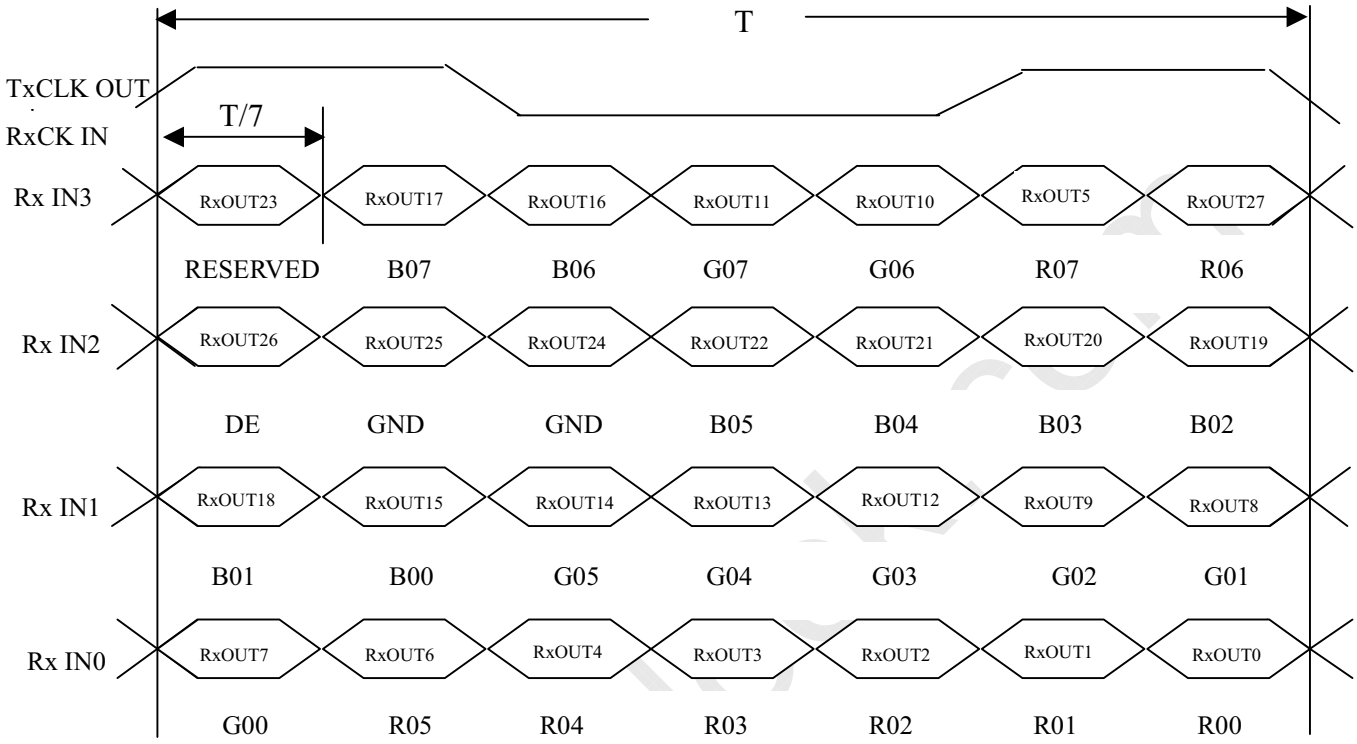
Signal	Parameter	Symbol	Min	Typ	Max	Unit	Remarks
DCLK	Pixel clock Frequency	Fck	-	65	80	MHz	
	Pixel clock period	Tck	12.5	15	20	ns	
	Duty ratio (%Tch)	-	45	50	55	%	Tch/Tck
	High time	Tckh	5	-	-	ns	
	Low time	Tckl	5	-	-	ns	
DATA	Setup time	Tsd	4	-	-	ns	
	Hold time	Thd	4	-	-	ns	
DE	Setup time	Tsde	4	-	-	ns	
	Hold time	Thde	4	-	-	ns	
Vertical	Vertical Frequency	Fv	-	60	75	Hz	
	Vertical display active period	Tvda	768	768	768	Thp	
	Vertical display blank period	Tvdb	1	38	-	Thp	
	Vertical period	Tvp	769	806	-	Thp	
Horizontal	Horizontal display active period	Thda	1024	1024	1024	Tck	
	Horizontal display blank period	Thdb	76	320	776	Tck	
	Horizontal period	Thp	1100	1344	1800	Tck	

Note (1) Because this module is operated by DE only mode, Hsync and Vsync input signals should be set to low logic level or ground. Otherwise, this module would operate abnormally.

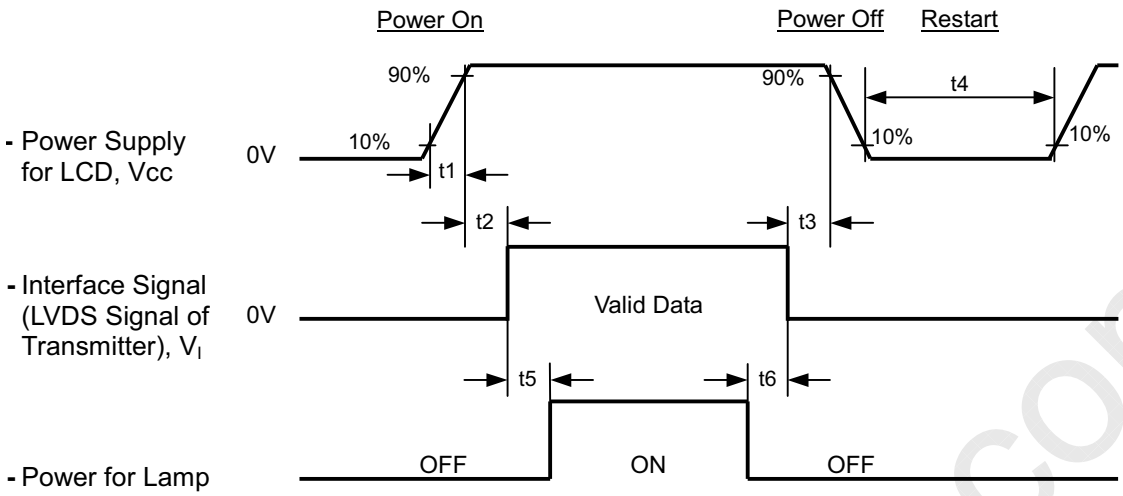
INPUT SIGNAL TIMING DIAGRAM



TIMING DIAGRAM of LVDS



6.2 POWER ON/OFF SEQUENCE



Timing Specifications:

0 < t1 ≦ 10 msec

0 < t2 ≦ 50 msec

0 < t3 ≦ 50 msec

t4 ≧ 1 sec

t5 ≧ 100 msec

t6 ≧ 100 msec

Note (1) Please avoid floating state of interface signal at invalid period.

Note (2) When the interface signal is invalid, be sure to pull down the power supply of LCD V_{DD} to 0 V.

Note (3) The Backlight inverter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight inverter power must be turned off before the power supply for the logic and the interface signal is invalid.

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

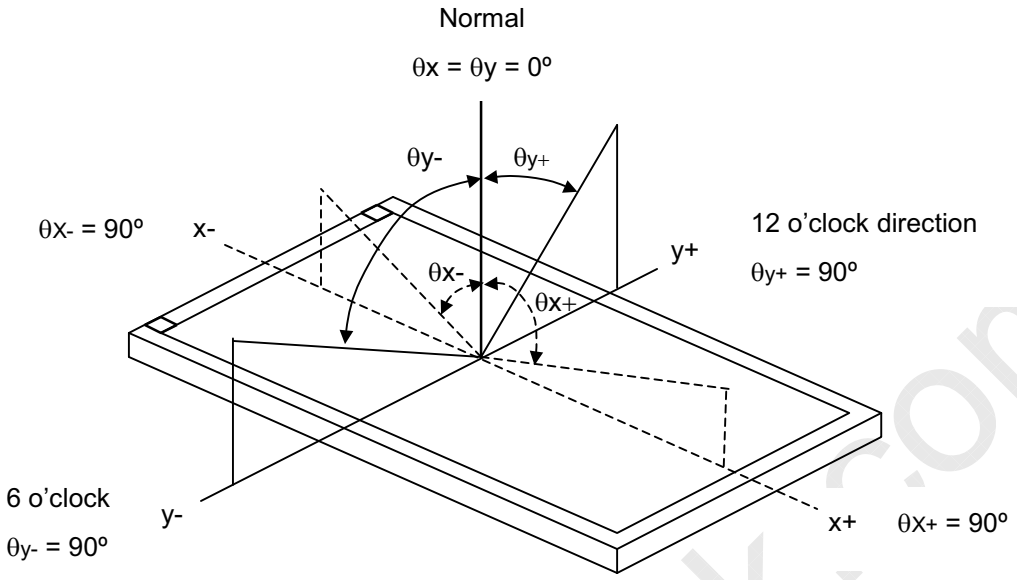
Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	5.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Inverter Current	I_L	6.0	mA

The measurement methods of optical characteristics are shown in Section 7.2. The following items should be measured under the test conditions described in Section 7.1 and stable environment shown in Note (4).

7.2 OPTICAL SPECIFICATIONS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	θ_x=0°, θ_Y =0° Viewing Normal Angle	300	400	-	-	(2), (4)
Response Time		T_R		-	15	30	ms	(3)
		T_F		-	10	25	ms	
Center Luminance of White		L		210	250	-	cd/m^2	(4)
Color Chromaticity	Red	Rx		0.610	0.640	0.670	-	(1), (4)
		Ry		0.328	0.358	0.388	-	
	Green	Gx		0.262	0.292	0.322	-	
		Gy		0.565	0.595	0.625	-	
	Blue	Bx		0.118	0.148	0.178	-	
		By		0.091	0.121	0.151	-	
	White	Wx		0.280	0.310	0.340	-	
		Wy		0.300	0.330	0.360	-	
Viewing Angle	Horizontal	θ_x+	CR≥10	80	-	-	Deg.	
		θ_x-		80	-	-		
	Vertical	θ_Y+		80	-	-		
		θ_Y-		80	-	-		

Note (1) Definition of Viewing Angle (θx, θy):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L63 / L0

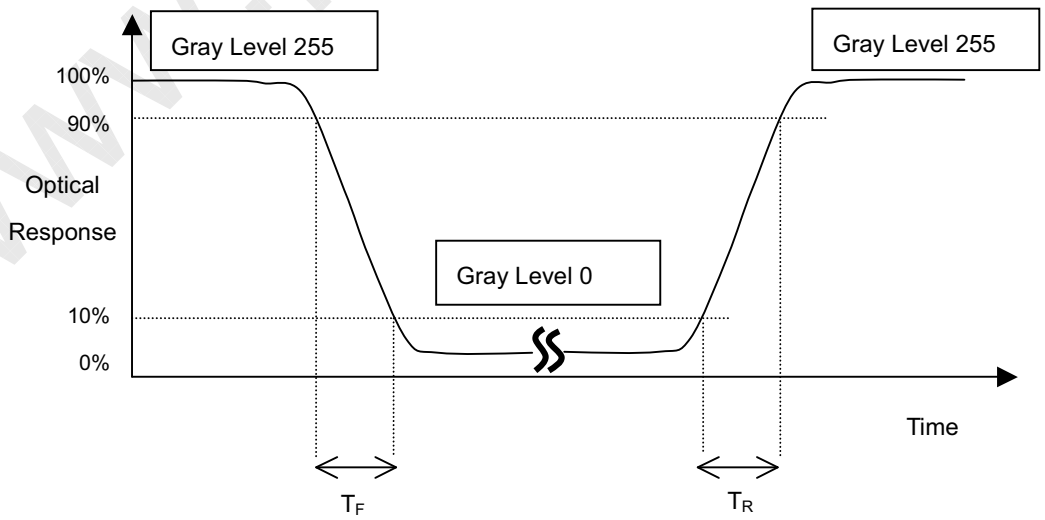
L63: Luminance of gray level 63

L 0: Luminance of gray level 0

CR = CR (5)

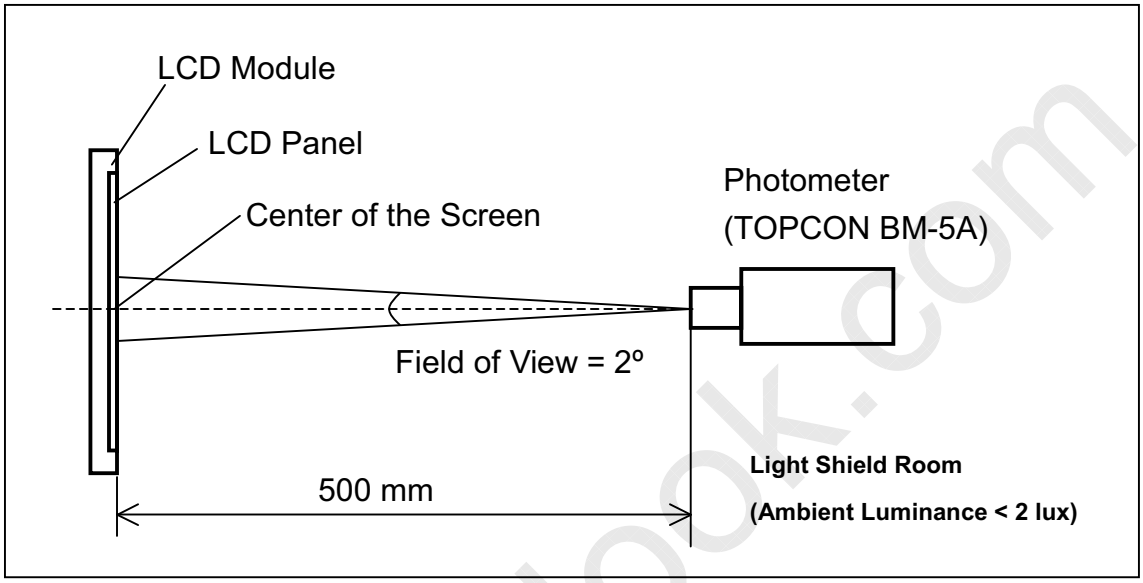
CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

Note (3) Definition of Response Time (T_R, T_F):



Note (4) Measurement Setup:

The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



8. PRECAUTIONS

8.1 HANDLING PRECAUTIONS

(1) The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.

(2) While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.

(3) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.

(4) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.

(5) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.

(6) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.

(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.

(8) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.

(9) Do not disassemble the module.

(10) Do not pull or fold the lamp wire.

(11) Pins of I/F connector should not be touched directly with bare hands.

8.2 STORAGE PRECAUTIONS

(1) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.

(2) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.

(3) It may reduce the display quality if the ambient temperature is lower than 10 ºC. For example, the response time will become slowly, and the starting voltage of lamp will be higher than the room temperature.

8.3 OPERATION PRECAUTIONS

(1) Do not pull the I/F connector in or out while the module is operating.

(2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.

(3) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with inverter. Do not disassemble the module or insert anything into the Backlight unit.

9. PACKAGING

9.1 PACKING SPECIFICATIONS

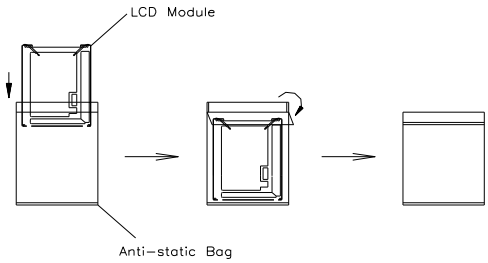
(1) 5 LCD modules / 1 Box

(2) Box dimensions : 353(L) X 268(W) X 462(H) mm

(3) Weight : approximately 8.5Kg (5 modules per box)

9.2 PACKING Method

Figures 9-1and 9-2 are the packing method.



Carton dimensions: 353(L)x268(W)x462(H)mm
Weight: Approx. 8.5Kg(5modules per 1 carton)

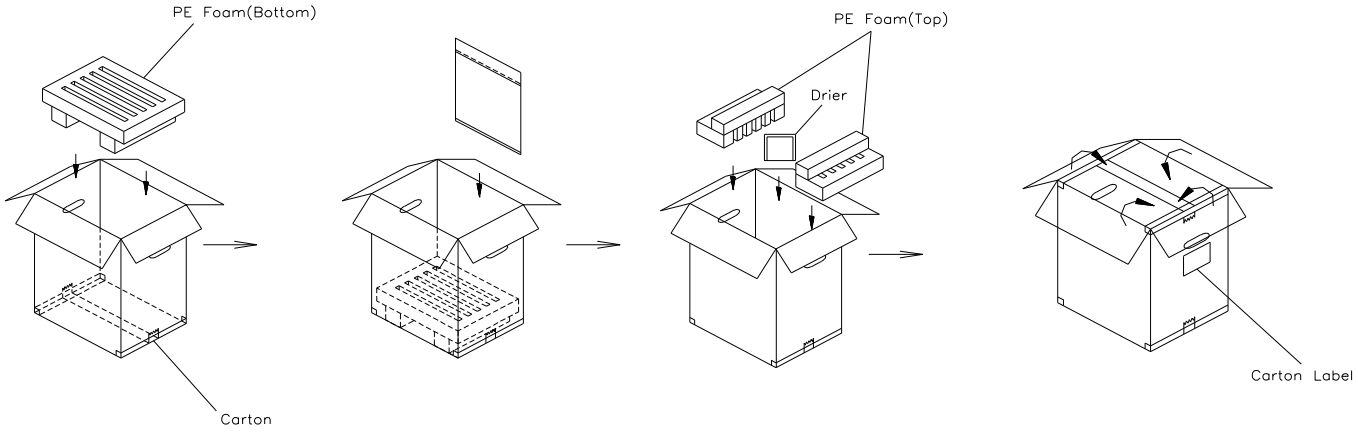


Figure. 9-1 Packing method

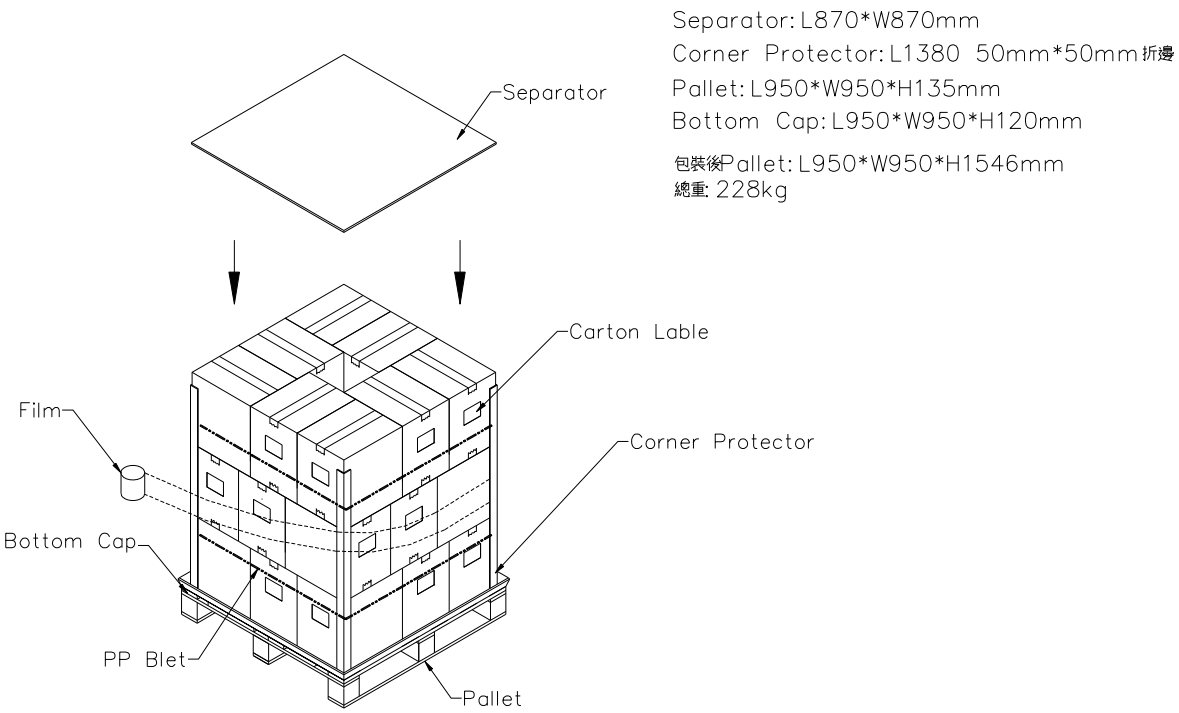


Figure. 9-2 Packing method

10. INCOMING INSPECTION DAY

The Supplier should be acquainted the inspection results (acceptance or rejection) by Customer, and the results are in accordance with the incoming inspection standard within 30 days after the date of the bills of lading. Should Customer fail to so notify the Supplier within the said 30 days period. The Customer's right to reject the LCMS shall then lapse, and the said LCMS shall be deemed to have been accepted by the customer.

11. DEFINITION OF LABELS

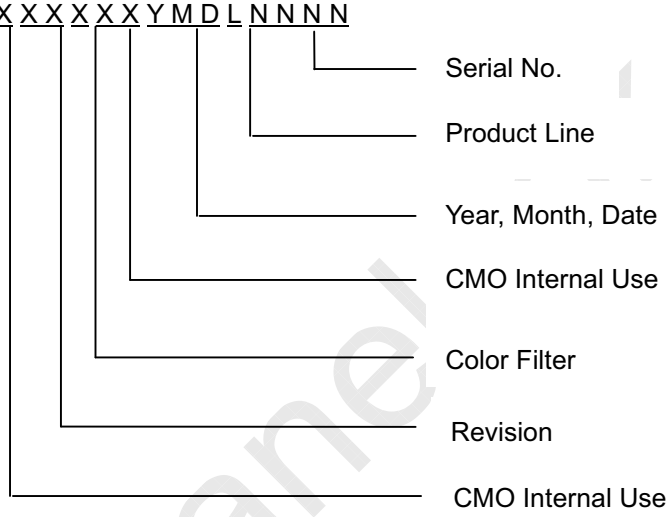
11.1 CMO MODULE LABEL

The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.

(a) Model Name: M150X2 –L01

(b) Revision: Rev. XX, for example: C1, C2 …etc.

(c) Serial ID: X X X X X X X Y M D L N N N N



Serial ID includes the information as below:

(a) Manufactured Date: Year: 1~9, for 2000~2009

Month: 1~9, A~C, for Jan. ~ Dec.

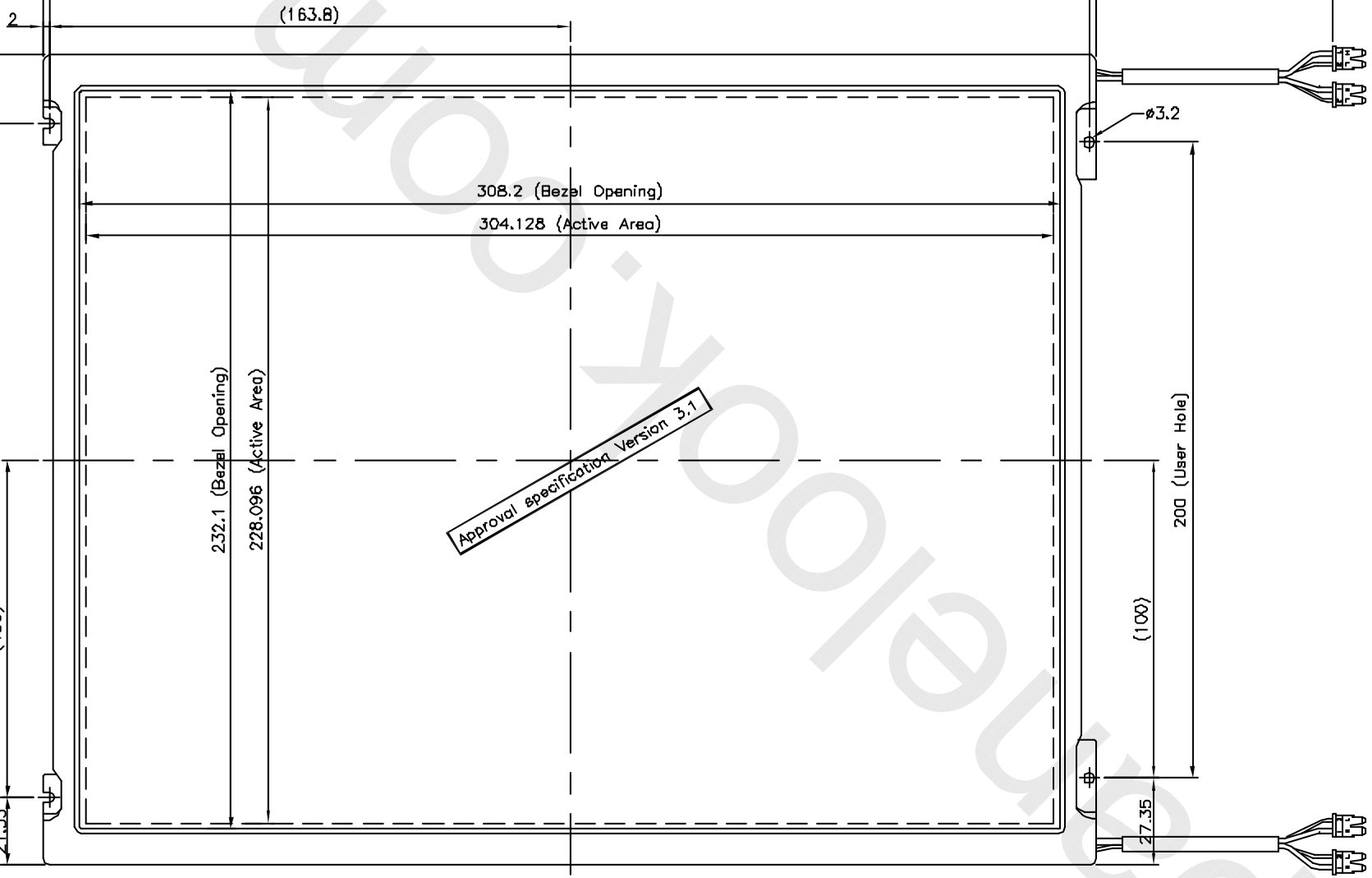
Day: 1~9, A~Y, for 1st to 31st, exclude I and O

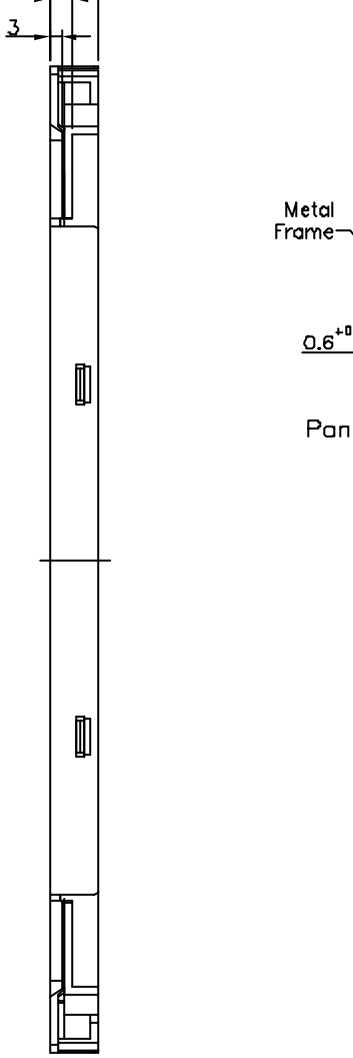
(b) Revision Code: cover all the change

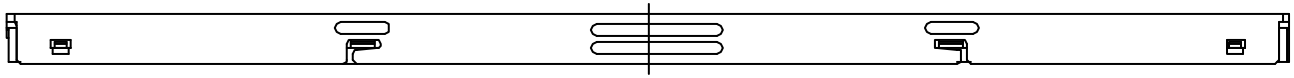
(c) Color Filter: 0 ->CMO, 2 -> Toppan

(d) Serial No.: Manufacturing sequence of product

(e) Product Line: 1 -> Line1, 2 -> Line 2, …etc.

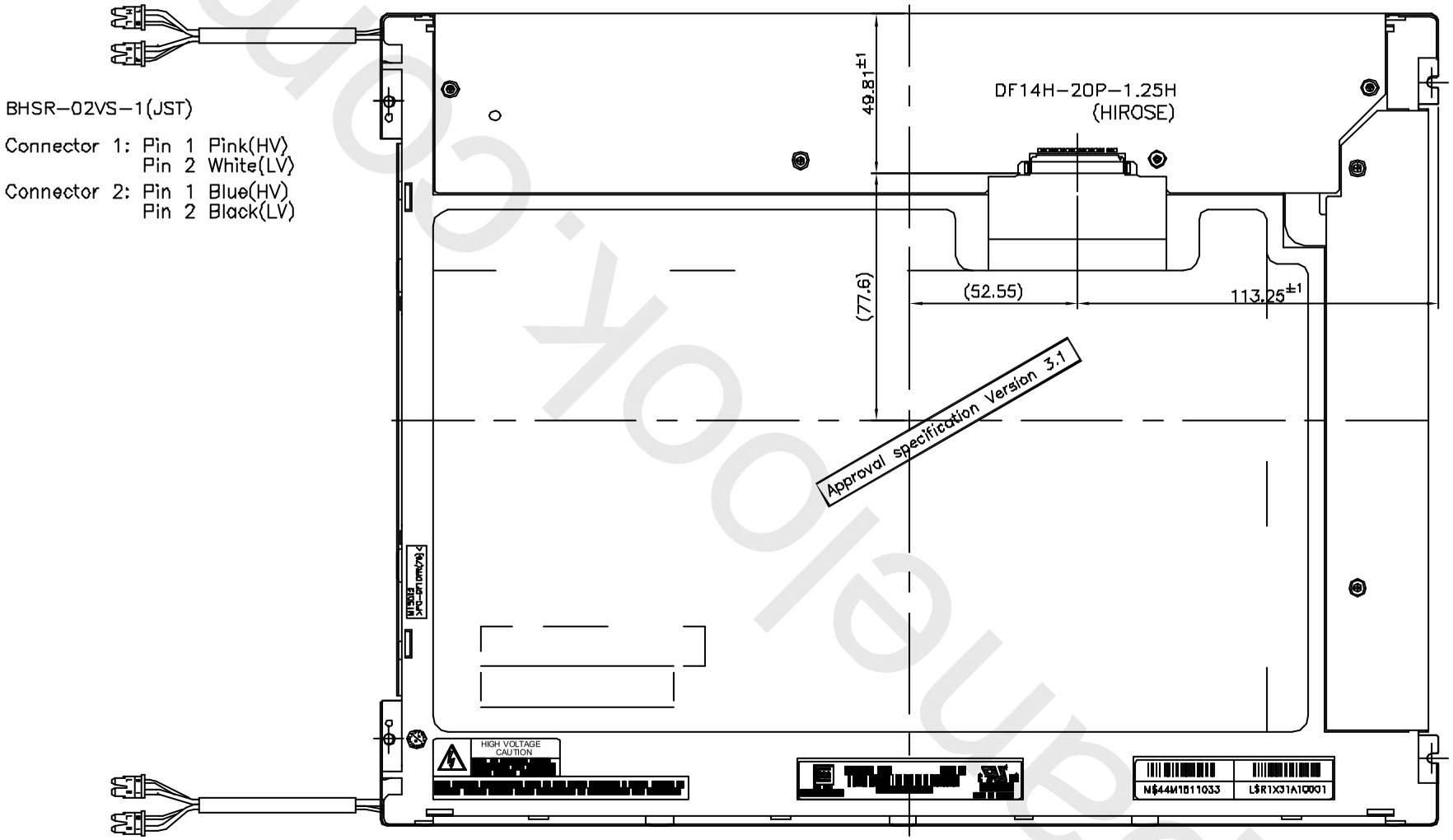






NOTES:
1. GENERAL TOLERANCE: ±0.5

CHI MEI OPTOELECTRONICS CORP. 奇美電子股		
APPROVED:	DAVIS WANG	DWG NO.: M1501
CHECKED:	CHANEY CHEN	DATE: 04/26/2



NOTES:
1. GENERAL TOLERANCE: ±0.5

CHI MEI OPTOELECTRONICS CORP. 奇美電子股			
APPROVED:	DAVIS WANG	DWG NO.:	M150
CHECKED:	CHANEY CHEN	DATE:	04/26/

CHI MEI OPTOELECTRONICS CORP.

Document No.:
Issue Date: 2002/05/09
VERSION: 1.0 C

LCD Module Inspection Specification

Model No.: M150X2-L01

Customer : SAMSUNG Electronics CO. LTD.
Approval By

Approved By		
INT	LCM	QRA
91. 5. 27	91. 5. 14	

1
Address: No. 1, Chi-Yeh Road, Hsin-Shih Village,Tainan Science-Based Industrial Park,Tainan County, Taiwan 744 R.O.C.
TEL: 886-6-5051888

CHI MEI OPTOELECTRONICS CORP.

Document No.:
Issue Date: 2002/05/09
VERSION: 1.0 C

Revision History

Version	Date	Page	Section	Description
Ver. 1.0C	May 09'02	5	6.(3)	Foreign black/white spots: 0.1＜D≦0.5 mm, N≦2
Ver. 1.0C	May 09'02	5	6.(3)	Foreign lint: 0.01＜W≦0.08 mm, 0.3＜L≦1.0 mm, N≦2
Ver. 1.0C	May 09'02	5	6.(3)	Polarizer Scratches: 0.01＜W≦0.1 mm 0.3＜L≦10.0 mm, N≦2
Ver. 1.0C	May 09'02	5	6.(3)	Dent/Air bubble: Avg. D≦0.5 mm, N≦2
Ver. 1.0C	May 09'02	5	6.(3)	Max.: N≦10

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CHI MEI OPTOELECTRONICS CORP.

Document No.:
Issue Date: 2002/05/09
VERSION: 1.0 C

Inspection Standards for LCD Modules

1.Description

These inspection standards shall be applied to LCD Module supplied by CHI MEI Optoelectronics Corporation.

2.The environmental condition of inspection

The environmental condition and visual inspection shall be conducted as below.

(1) Ambient temperature : 15~25℃

(2) Humidity: 25~75 %RH

(3) External appearance inspection shall be conducted by using a single 20W fluorescent lamp or equivalent illumination.

(4) Panel visual inspection on the operation condition for cosmetic shall be conducted at the distance 35cm or more between the LCD module and eyes of inspector. And, the viewing angle shall be 90 degree to the front surface of display panel.

Ambient Illumination: 300 ~ 600Lux for external appearance inspection

Ambient Illumination: 100 ~ 200 Lux for light on inspection

3.Method of sampling inspection

Unless defined in the other document, the sampling method shall be in accordance with MIL-STD-105E.

(1) Lot size: quantity of per delivery for inspection per model.

(2) Sampling type: Normal inspection, Single sampling

(3) Inspection level: level II

(4) Sampling table: MIL-STD-105E

4.Classification of defects

Defects are classified two types, major defect and minor defect according to the defect. And, the definition of defects is classified as below.

(1) Major defect

Any defect may result in functional failure, or reduce the usability of product for its purpose. For example, electrical failure, deformation and etc..

(2) Minor defect

A defect that is not to reduce the usability of product for its intended purpose and un-uniformity, dot defect and etc..

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The criteria on major and/or minor judgement will be according with the classification of defects.

5.Acceptable quality level (AQL)

AQL means that the quality level of product is acceptable for shipment, and the AQL shall satisfy with customer's quality request.

The AQL (%) for major or minor defect are expressed as below respectively.

(1) Major defect: 0.65

(2) Minor defect: 1.0

6.Inspection Criteria

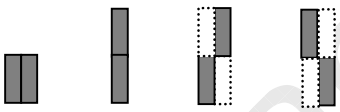
(1) Definition of dot defect

a) The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.

b) Bright dot: Dots appear bright and unchanged in size in which module is displaying under black pattern.

c) Dark dot: Dots appear dark and unchanged in size in which module is displaying under pure red ,green , blue picture.

d) 2 dot adjacent = 1pair = 2 dots



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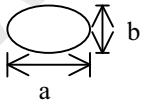
(2) Electrical Inspection

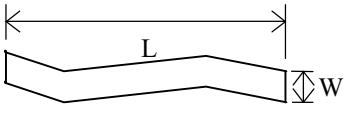
Items		Acceptable count
Bright dot	Random	N≦2
	2 dots adjacent	N≦1
	3 dots adjacent or more	N≦0
Dark dot	Random	N≦5
	2 dots adjacent	N≦1
	3 dots adjacent or more	N≦0
Distance	Minimum Distance Between Bright dots	L≧15mm
	Minimum Distance Between Dark dots	L≧5mm
Total bright and dark spot		N≦7
Display failure (V-line/H-line/Cross line etc.)		Not allowable

(3) Appearance inspection

Item	Standards
Foreign black/white spots	0.1＜D≦0.5 mm, N≦2
Foreign lint	0.01＜W≦0.08 mm, 0.3＜L≦1.0 mm, N≦2
Polarizer Scratches	0.01＜W≦0.1 mm 0.3＜L≦10.0 mm, N≦2
Dent/Air bubble	Avg. D≦0.5 mm, N≦2
Max.	N≦10



D=(a+b)/2



W: width, L：length

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7.Classification of defects

Inspection Item	Criteria and Description	Defect type
Vertical line	Signal input, vertical line off or abnormal V-line appears	major
Horizontal line	Signal input, horizontal line off or abnormal H-line appears	major
Cross line	Pattern signal input, a correct display is not obtained	major
No display	Signal input, display is dead	major
Abnormal display	Pattern signal input, a correct display is not obtained	major
Bezel finger	Bezel finger is missed or not bent	major
Outline size	Length, Wide, High, CCFT cable length	major
Dots defect	Exceed specified standards	minor
Light leakage	Visible light leakage appears around the edges of screen	minor
Foreign material	Exceed specified standards	minor
Mura	The specific mura can be judged by limit sample in agreement with each other.	minor
External Appearance	Rust, deformation, irregular plating, coating missing etc. A appearance defect that do not affect function or performance	minor
Polarizer bubble	Exceed specified standards	minor

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