TFT LCD Approval Specification

MODEL NO.: M150X4–C01

Customer : _____

Approved by : _____

Note :

Liquid Crystal Display Division	
QRA Division.	QA Head Division
Approval	Approval
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REVISION HISTORY

Version	Date	Section	Description
Ver 2.0	Nov., 24 '04	-	Approval Specification was first issued.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

The M150X4-C01 is a 15-inch LCD cell with thin film transistors as active elements and contains 1024x768 pixels. Each pixel is divided into red, green and blue dot, which are arranged in vertical stripe. The cell is normally white mode, and can be applied to the transmission type display. Backlight unit (BLU) and circuit board for the cell are not built in.

1.2 FEATURES

1. Wide viewing angle
2. High contrast ratio
3. Fast response time
4. XGA (1024 x 768 pixels) resolution

1.3 APPLICATION

1. LCD Monitor
2. LCD TV

1.4 GENERAL SPECIFICATI0NS

Item		Specification	Unit
Max Panel Dimension (TFT)		312.8 × 235.8	mm
Glass thickness (TFT/ CF)		0.6 / 0.6	mm
Active Area		304.128(H) × 228.096(V) (15.0” diagonal)	mm
Driver Element		a-si TFT active matrix	-
Pixel Number		1024 × R.G.B. × 768	pixel
Pixel Pitch		0.297(H) × 0.297(W)	mm
Pixel Arrangement		RGB vertical stripe	-
Transmissive Mode		Normally white	-
Surface Treatment		Hard coating (3H), AG (Haze 25%)	-
Polarizer Type		Wide View	-
Polarizer Dimension	TFT	307.2 × 231	mm
	CF	309.8 × 232.8	mm
Polarizer Thickness	TFT	0.405	mm
	CF	0.25	mm

2. ABSOLUTE MAXIMUM RATINGS

1. Storage Condition : With shipping package.
2. Storage temperature range : 25±5 ℃.
3. Storage humidity range : 50±10% RH.
4. Shelf life : 30 days.

3. Suggestive Driving Condition

Item				Min.	Typ.	Max.	Unit
Driving Voltage	V_G	On		17.4	17.75	18.1	V
		Off		-7.1	-6.91	-6.7	V
	V_D	B	Gam1	9.2	9.4	9.6	V
			Gam10	0.01	0.21	0.41	V
		W	Gam5	5.82	6.02	6.22	V
			Gam6	3.81	4.01	4.21	V
	V_{COM}	Center		-	4.14	-	V
	G↓-D offset			-	2.4	-	us
	Charging time			-	14.4	-	us

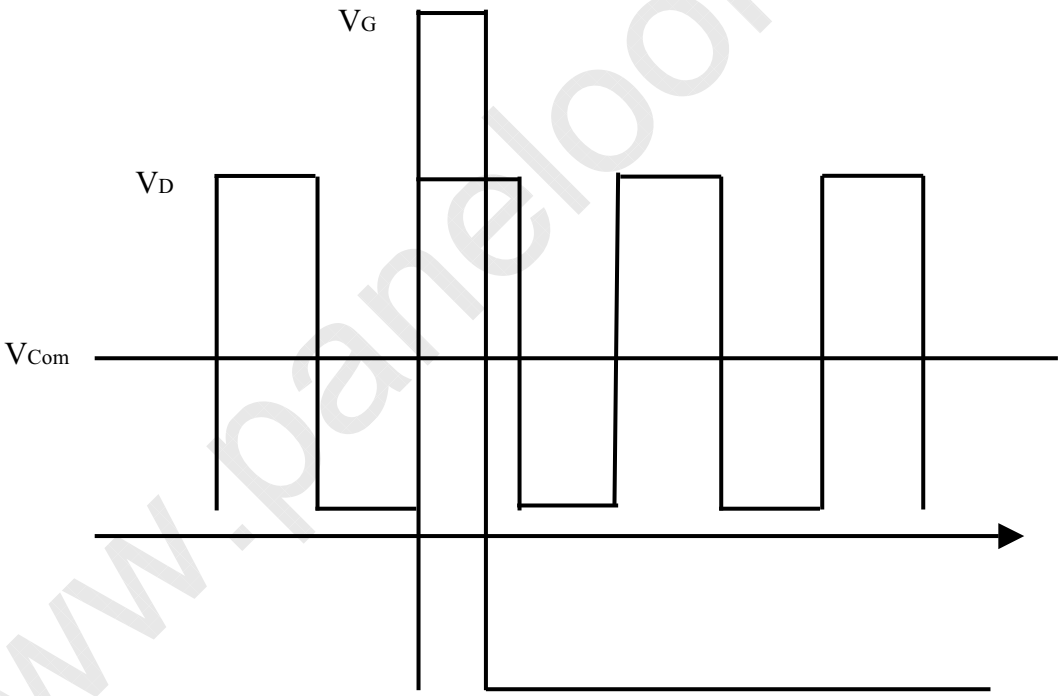
B : Black pattern

W : White pattern

Gamma Voltage : Gam1 > Gam2 > Gam3 > … > Gam10

G↓ : gate pulse falling edge

DRIVING TIMING DIAGRAM



4. Panel PIN Define

Pin No.	Data driver Pin Define		
	TAB1	TAB2~7	TAB8
1~2	NC	NC	NC
3	OE3	NC	NC
4	OE2	NC	NC
5	OE1	NC	NC
6	VDD	NC	NC
7	VGL	NC	NC
8	VEE	NC	NC
9	VGH	NC	NC
10	DIO	NC	NC
11	CKV	NC	NC
12	XAO	NC	NC
13	GND	NC	NC
14	VCOM	VCOM	VCOM
15	floating is recommended	floating is recommended	floating is recommended
16	out1	out1	out1
17	out2	out2	out2
:	:	:	:
398	out383	out383	out383
399	out384	out384	out384
400	floating is recommended	floating is recommended	floating is recommended
401	NC	NC	floating is recommended
402	NC	NC	floating is recommended
403	VCOM	VCOM	VCOM

Note: Recommended Gate IC for the cell is HiMAX's HX8608APD400, 264Ch, or equivalent.

5. OPTICAL CHARACTERISTICS

5.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Gamma voltage		Refer to item 3. Driving Condition	V
Vcom		most suitable Vcom	V

5.2 OPTICAL SPECIFICATIONS

ITEM		Symbol	Condition	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast Ratio		CR	θx=θy=0°	200	350	-	%	4,1
Response Time (Black/White)		Tr	θx=θy=0°	-	6	10	ms	5,1
		Tf	θx=θy=0°	-	17	25	ms	
Center point Transmittance		T%	θx=θy=0°	11.5	13	-	%	7,1
Transmittance uniformity (13pts)		δT%	θx=θy=0°	-	-	1.4	-	6,1
Viewing Angle	Horizontal θx (θy=0°)	Right	CR≧10	50	60	-	Deg	2,3,1
		Left		50	60	-	Deg	
	Vertical θy (θx=0°)	Up		30	40	-	Deg	
		Down		50	60	-	Deg	
Color Coordinates at center point	Red	Rcx	θx=θy=0°	Typ -0.03	0.635	Typ +0.03	-	2,0
		Rcy	θx=θy=0°		0.347		-	
	Green	Gcx	θx=θy=0°		0.296		-	
		Gcy	θx=θy=0°		0.581		-	
	Blue	Bcx	θx=θy=0°		0.129		-	
		Bcy	θx=θy=0°		0.156		-	
	White	Wcx	θx=θy=0°		0.317		-	
		Wcy	θx=θy=0°		0.371		-	
	Red	Rx	θx=θy=0°	Typ -0.03	0.632	Typ +0.03	-	2,1
		Ry	θx=θy=0°		0.347		-	
	Green	Gx	θx=θy=0°		0.302		-	
		Gy	θx=θy=0°		0.580		-	
	Blue	Bx	θx=θy=0°		0.142		-	
		By	θx=θy=0°		0.094		-	
	White	Wx	θx=θy=0°		0.310		-	
		Wy	θx=θy=0°		0.322		-	

Note (0)

Light source is the standard light source “C” which is defined by CIE and driving voltages are based on suitable gamma voltages. The calculating method is as following:

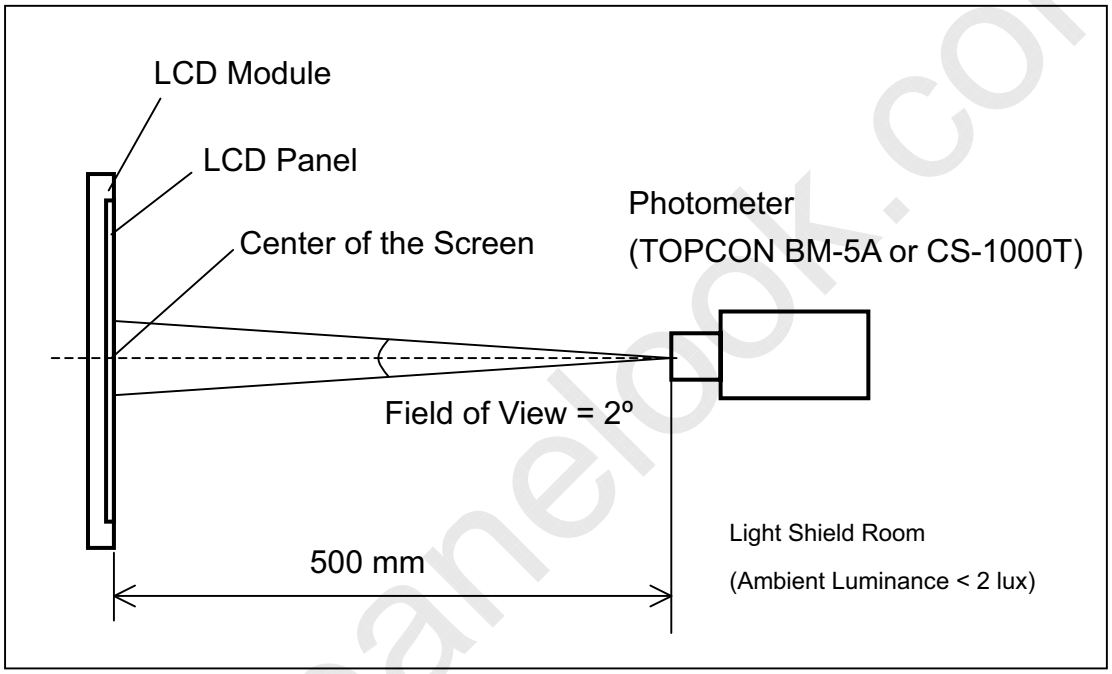
1. Measure LCM module’s and BLU’s spectrums. White is without signal input and R, G, B are with signal input. BLU is supplied by CMO.
2. Calculate cell’s spectrum.
3. Calculate cell’s chromaticity by using the spectrum of standard light source “C”

Note (1)

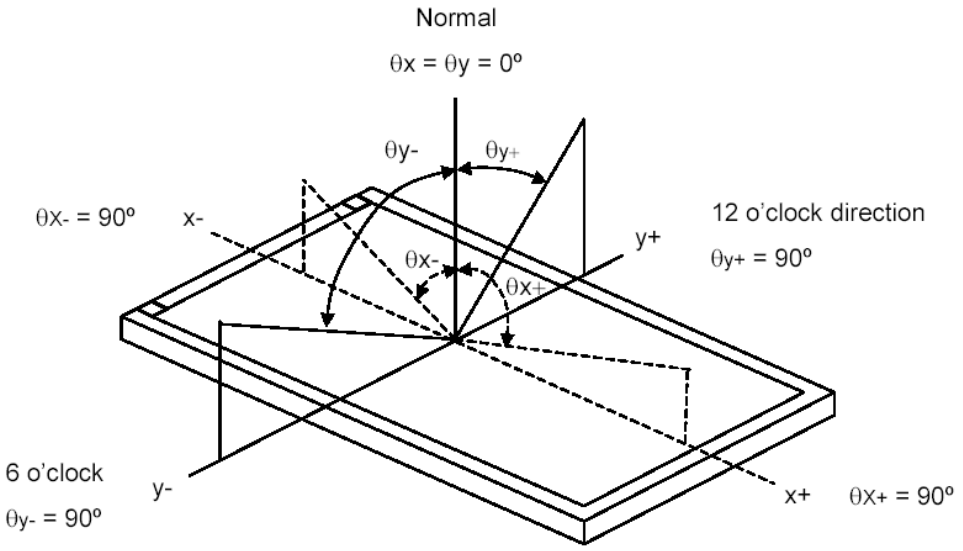
Light source is the BLU which is supplied by CMO and driving voltages are based on suitable gamma voltages. White is without signal input and R, G, B are with signal input. Spec is judged by CMO's golden sample.

Note (2) : 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.



Note (3) : Definition of viewing angle (θx ,θy):

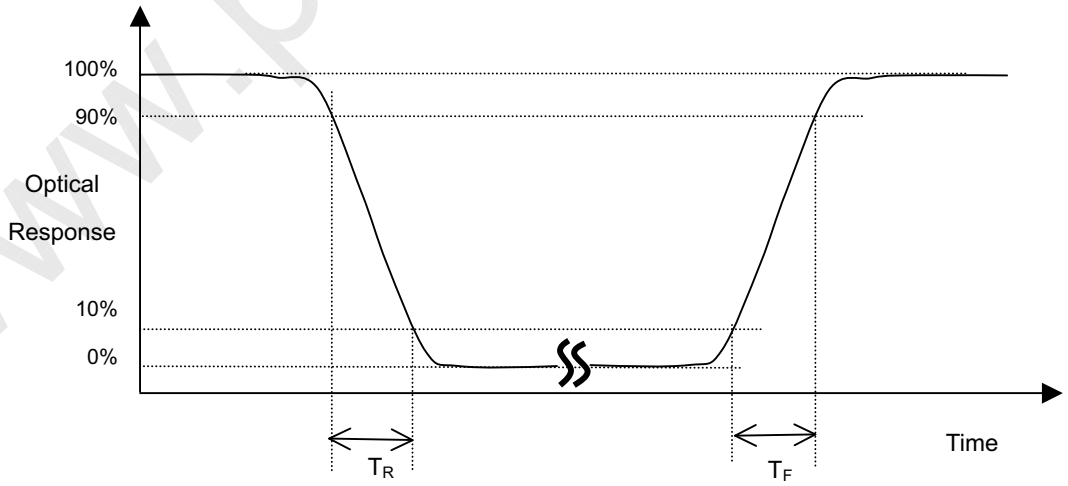


Note (4) : Definition of Contrast Ratio (CR):Ratio of gray max (Gmax), gray min (Gmin), at the center point of panel.

BLU is supplied by CMO

$$CR = \frac{\text{Luminance with all pixel white (Gmax)}}{\text{Luminance with all pixel Black (Gmin)}}$$

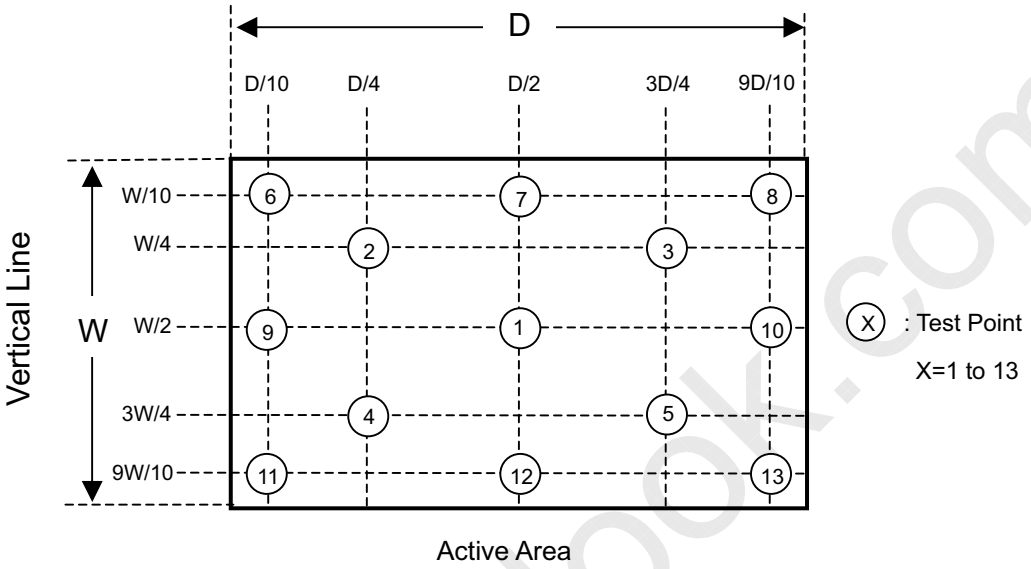
Note (5) : Definition of Response Time (T_R, T_F):



Note (6) : Definition of Transmittance Variation (δT%):

Measure the transmittance at 13 points

$$\delta T\% = \frac{\text{Maximum [T\%(1), T\%(2), … T\%(13)]}}{\text{Minimum [T\%(1), T\%(2), … T\%(13)]}}$$



Note (7) : Definition of Transmittance(T%):

Module is without signal input.

BLU is supplied by CMO

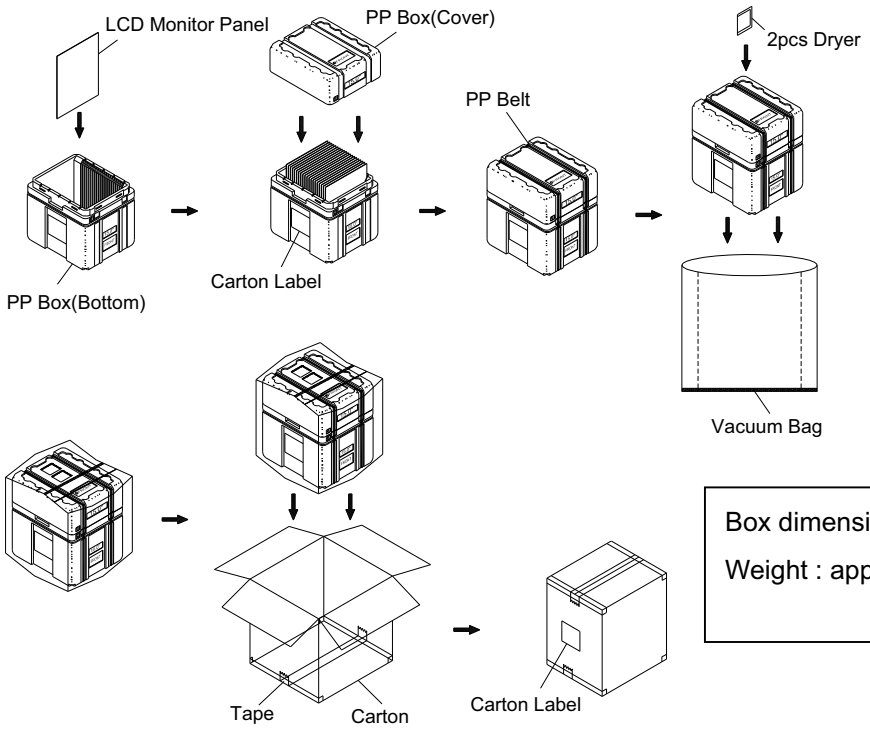
$$\text{Transmittance} = \frac{\text{Luminance of LCD module}}{\text{Luminance of backlight}} * 100\%$$

6. PACKAGING

6.1 PACKING SPECIFICATIONS

1. 20 LCD Panel / 1 Box
2. Box dimensions : 375(L) X 322(W) X 435(H) mm
3. Weight : approximately 7.55Kg (20 panel per box)

6.2 PACKING METHOD



Box dimensions : 375(L) X 322(W) X 435(H) mm

Weight : approximately 7.55Kg (20 panel per box)

Figure. 6-1 Packing method

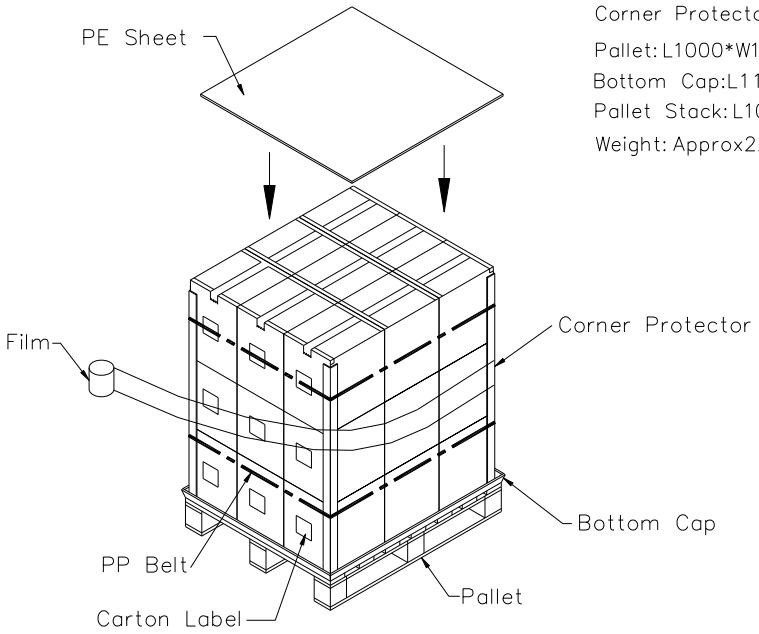


Figure. 6-2 Packing method

7. DEFINITION OF LABELS

1. Model name: M150X4-C01
2. Panel Type: version control
3. Quantity: 20pcs / PP box
4. Case ID: serial number.
5. Note : Notification, if necessary.
6. Barcode : Case ID in code 39 format

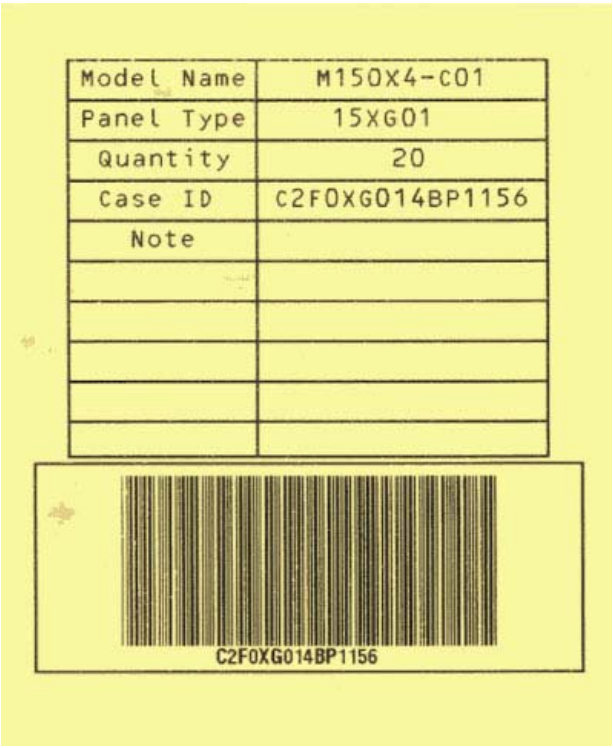


Figure. 7-1 Packing Label

8. PRECAUTIONS

8.1 ASSEMBLY AND HANDLING PRECAUTIONS

1. Do not apply rough force such as bending or twisting to the cell during assembly.
2. To assemble or install cell into customer's module can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
3. It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.
4. Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
5. It is dangerous that moisture come into or contacted the LCD panel, because moisture may damage TFT circuit.
6. High temperature or humidity may reduce the performance of cell. Please store LCD cell within the specified storage conditions.

8.2 SAFETY PRECAUTIONS

1. 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.