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INX104-01 / INX104HB-01

Product Specification

Rev. 0

10.4 inches XGA TFT-LCD panel
340 / 1000 nits

Inelmatic Electronics

SPEC. NUMBER
101112-01-EN

PRODUCT GROUP
TFT-LCD PRODUCTS

REV.
O

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PRODUCT GROUP

REV

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TFT-LCD PRODUCT

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2010.11.13

REVISION HISTORY

REV.	ECN NO.	DESCRIPTION OF CHANGES	DATE	PREPARED
O		Initial Release	10.11.12	Freda Liu

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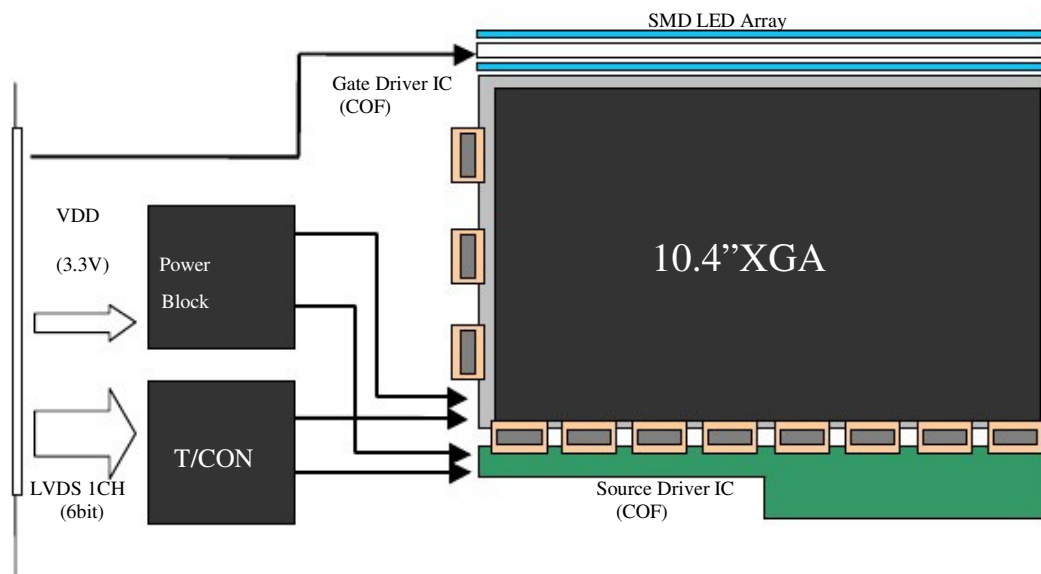
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1.0 GENERAL DESCRIPTION

1.1 Introduction

10.4" AFFS+ TFT-LCD is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as active switching devices. This module has a 10.4 inch diagonally measured active area with XGA resolutions (1024 horizontal by 768 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 262,144 colors. The TFT-LCD panel used for this module is a low reflection and higher color type.



1.2 Features

- 1Ch LVDS Interface with 1 pixel / clock
- 6-bit color depth, Display 262,144 colors
- High luminance and contrast ratio, low reflection and wide viewing angle
- Front Mounting Frame
- DE (Data Enable) mode only
- SLG (Single Level Gate) function use
- RoHS Product
- SMD LED Array
- On board EDID

1.3 Application

- Pen type & Tablet PC (only normal brightness version).

CONTENS

PARAMETER	SPECIFICATION	UNIT	REMARK
Active area	210.432 X 157.824	mm	-
Number of pixels	1024(H) × 768(V)	pixels	-
Pixel pitch	0.2055(H) × 0.2055(V)	mm	-
Pixel arrangement	RGB Vertical stripe	-	-
Display colors	262,144	colors	-
Display mode	Normally Black	-	-
Dimensional outline	238.6±0.5(H) X173.2±0.5(V) X 4.3max	mm	Note 1
Weight	210 Typ. / 220 Max.	gram	-
Back-light	SMD LED Array	-	-
Surface treatment	Optional	-	-

Note : 1. LCM Height : 4.3mm max. (LED), 6.8mm max. (Component)

2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

PARAMETER	SYMBOL	MIN.	MAX.	UNIT	REMARK
Logic Power Supply	V _{DD}	V _{SS} -0.3	4.0	V	Ta = 25 ±2 °C
Logic Input Voltage	V _{IN}	V _{SS} -0.3	V _{DD} +0.3	V	-
Back-light Power Supply Voltage	HV _{DD}	-0.3	40/60	V	-
Back-light LED Current	I _{LED}		30	mA	-
	I _{LED}		20	mA	-
Back-light LED Reverse Voltage	V _R		5	V	-
Operating Temperature	T _{OP}	-20	+70	°C	Note1

Note1. As compromised, T-Con and D-IC are excluded within the range of guarantee for Operating Temperature.

*T-CON : 0~70°C / D-IC : -10 ~ 75°C(Source) / -20 ~ 75°C(Gate)

3.0 ELECTRICAL SPECIFICATIONS

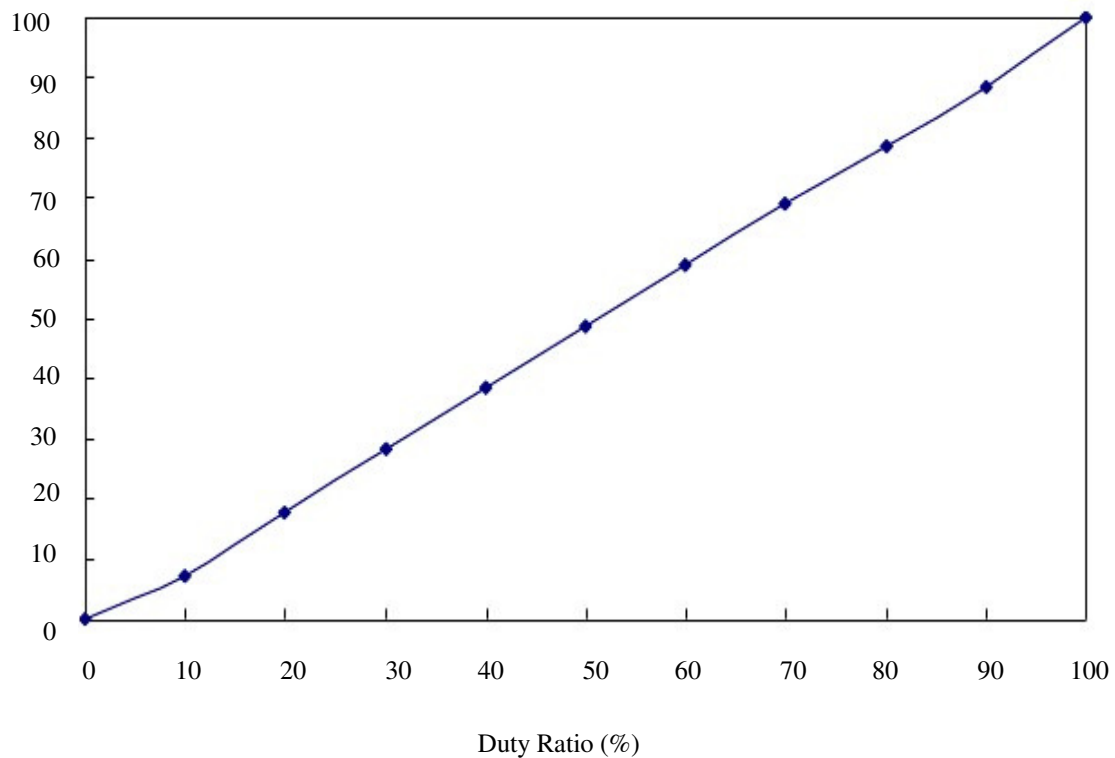
3.1 Electrical Specifications

< Table 3. Electrical Specifications >

Parameter		Min.	Typ.	Max.	Unit	Remarks
Logic Power Supply Voltage	V _{DD}	3.0	3.3	3.6	V	Note 1
Logic Power Supply Current	I _{DD}	-	270	300	mA	Note 1
Back-light Power Supply Voltage	HV _{DD}	7.0	12.0	18	V	Note 2
Back-light Power Supply Current	I _{HVDD}	-	246	283/450	mA	Note 2, 3
Back-light Power Consumption	P _{BL}	-	2.95	3.39/5.5	W	Note 2, 3
LED Driver's Efficiency	η	-	82	-	%	Note 2, 3
Back-light PWM Frequency	F _{PWM}	200	320	350	Hz	-
High Level PWM Signal Voltage	V _{PWMH}	2.1	3.3	5.0	V	-
Low Level PWM Signal Voltage	V _{PWML}	-	0	0.6	V	-
High Level Differential Input Signal Voltage	V _{IH}	-	-	+100	mV	V _{CM} = 1.2V
Low Level Differential Input Signal Voltage	V _{IL}	-100	-	-	mV	--
Back-light LED Voltage / Back-light LED Total Voltage	V _{LED} / V _{BL}	-	3.2 / 22.4	3.4 / 23.8	V	Note 4
Back-light LED Current / Back-light LED Total Current	I _{LED} / I _{BL}	-	19.0 / 114.0	20.0 / 120.0	mV	Note 4
Life Time	-	350nits: 12,000 1000nits: 70,000	-	-	Hrs	Note 6
Power Consumption	P _D	-	0.90	1.00	W	Note 1
	P _{LED}	-	2.55	2.85	W	Note 4
	P _{total}	-	3.45	3.85	W	Note 1, 4

- Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V at 25°C.
a) Typ : Window XP pattern, b) Max : Vertical Sub line pattern
2. The power supply voltage and current is measured and specified at the interface connector of LCM including LED Driver.
3. Reference value, which is measured with LED Driver for 12V.
4. Reference value, which is measured without LED Driver.
5. Calculated value for reference ($V_{LED} \times I_{LED} \times \# \text{ of LEDs (42EA)}$).
6. End of Life shall be determined by the time when any of the following is satisfied under continuous lighting at 25°C and $I_{LED} = 19.0\text{mA}$.
- Intensity drops to 50% of the Initial Value (Luminance Spec.)
- Based on LED

3.2 PWM Duty Ratio vs Brightness





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4.0 OPTICAL SPECIFICATION

The test of Optical specifications shall be measured in a dark room (ambient luminance 1 lux and temperature = $25 \pm 2^\circ\text{C}$) with the equipment of Luminance meter system (Goniometer system and TOPCONE BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0° . We refer to $\theta_{0=0}$ ($=\theta_3$) as the 3 o'clock direction (the right), $\theta_{0=90}$ ($=\theta_{12}$) as the 12 o'clock direction ("upward"), $\theta_{0=180}$ ($=\theta_9$) as the 9 o'clock direction ("left") and $\theta_{0=270}$ ($=\theta_6$) as the 6 o'clock direction ("bottom"). While scanning θ and/or Φ , the center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement. VDD shall be $3.3 \pm 0.3\text{V}$ at 25°C . Optimum viewing angle direction is 6 o'clock.

PARAMETER		SYMBOL	CONDITION	MIN.	TYP.	MAX	UNIT	REMARK
Viewing Angle Range	Horizontal	Θ ₃	CR > 10		89	90	Deg.	Note 1
		Θ ₉			89	90	Deg.	
	Vertical	Θ ₁₂			89	90	Deg.	
		Θ ₆			89	90	Deg.	
Luminance Contrast ratio		CR	Θ = 0°	400	600	-	-	Note 2
Luminance of White	Center	Y _w	Θ = 0°	290	340 / 1000	-	cd/m2	Note 3
White Luminance Uniformity	5 Points	ΔY5		80	-	-	-	Note 4
	13 Points	ΔY13		65	-	-	-	
White Chromaticity		x _w	Θ = 0°	0.273	0.313	0.353	-	Note 5
		y _w		0.289	0.329	0.369	-	
Reproduction of Color	Red	x _R	Θ = 0°	0.521	0.561	0.60	-	
		y _R		0.282	0.322	0.362	-	
	Green	x _G		0.317	0.357	0.397	-	
		y _G		0.516	0.556	0.596	-	
	Blue	x _B		0.117	0.157	0.197	-	
		y _B		0.093	0.133	0.173	-	
Color Reproduction	-	-	-	-	40	-	%	-
Response Time	-	T _r +T _d	Ta= 25° C Θ = 0°	-	36	-	ms	Note 6
Cross Talk	-	CT	Θ = 0°	-		2.0	%	Note 7

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Note : 1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface . (see FIGURE 1) 2. Contrast measurements shall be made at viewing angle of $\Theta = 0^\circ$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically. $CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$ 3. Luminance of white is defined as a luminance value of a point across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display. 4. The White luminance uniformity on LCD surface is then expressed. (See FIGURE 2) $\text{Uniformity } \Delta Y = \frac{\text{Minimum Luminance of 5(or 13) points}}{\text{Maximum Luminance of 5(or 13) points}} \times 100 (\%)$ 5. The color chromaticity coordinates specified in Table 4 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel. 6. The electro-optical response time measurements shall be made as FIGURE 3 by switching the data input signal OFF and ON. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td. 7. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark. (See FIGURE 4).			
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5.0 INTERFACE CONNECTION.

5.1 Electrical Interface Connection

CN1 : Interface Connector : 20455-030E-02(I-PEX) or equivalent

User side Connector : 20453-030T (I-PEX) or equivalent

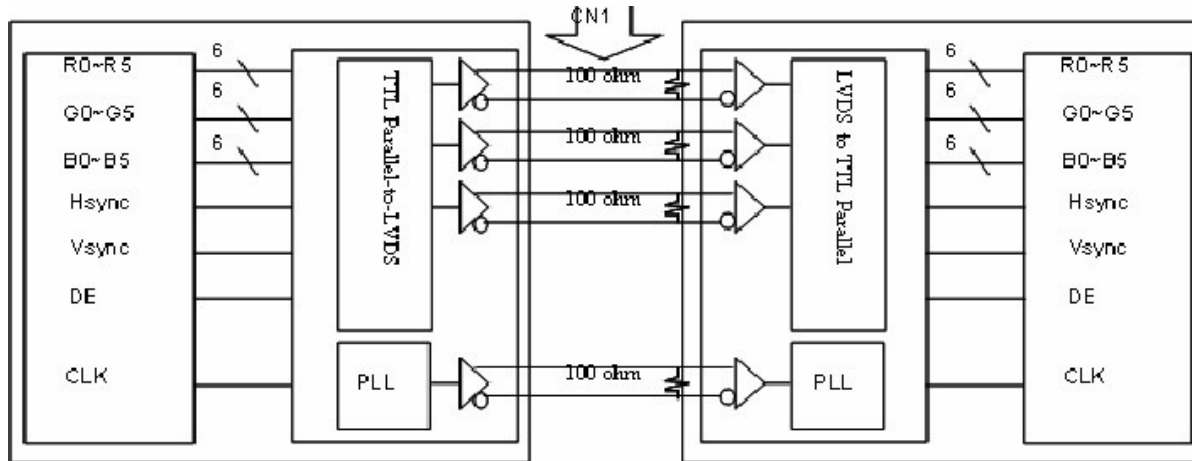
Pin No	Pin No	Function	Remark
1	VSS	Ground	-
2	VDD1	Power Supply: +3.3V	-
3	VDD2	Power Supply: +3.3V	-
4	EDID 3.3V	EDID +3.3V	-
5	NC	Reserved	-
6	EDID CLK	EDID CLK	-
7	EDID DATA	EDID DATA	-
8	RIN0-	LVDS Negative data signal (-)	-
9	RIN0+	LVDS Positive data signal (+)	-
10	VSS	Ground	-
11	RIN1-	LVDS Negative data signal (-)	Tx pin # 48
12	RIN1+	LVDS Positive data signal (+)	Tx pin # 47
13	VSS	Ground	-
14	RIN2-	LVDS Negative data signal (-)	-
15	RIN2+	LVDS Positive data signal (+)	Tx pin # 46
16	VSS	Ground	Tx pin # 45
17	RCLKIN-	LVDS Negative clock signal (-)	-
18	RCLKIN+	LVDS Positive clock signal (+)	Tx pin # 42
19	VSS	Ground	Tx pin # 41
20	VDIM	PWM Brightness Control	-
21	VSW	LED On/Off Control	-
22	VSS	Ground	-
23	VSS	Ground	-
24	VSS	Ground	Tx pin # 40
25	VSS	Ground	Tx pin # 39
26	VCD1	Back-light Power Supply: +12V	-
27	VCD2	Back-light Power Supply: +12V	-
28	VCD3	Back-light Power Supply: +12V	-
29	VCD4	Back-light Power Supply: +12V	-
30	VSS	Ground	-
			HVDD: 7~20V

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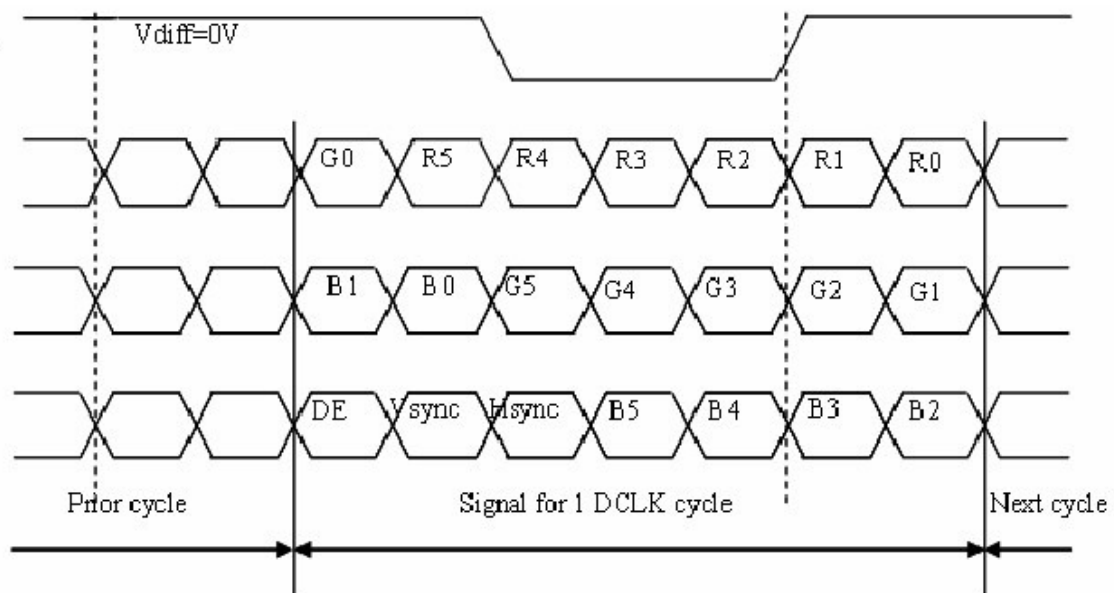
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[LVDS Block Diagram]

5.1.1 INTERFACE CONNECTION



5.2. LVDS Interface

LVDS Transmitter: THC63LVDM83A or equivalent.

INPUT SIGNAL PIN NO.	TRANSMITTERINTERFACE				FI-XB30S-HF10	REMARK
	PIN NO	SYSTEM	(TX)TFT-LCD(RX)		PIN NO.	
R0	51	48 47	OUT0- OUT0+	IN0- IN0+	8 9	
R1	52					
R2	54					
R3	55					
R4	56					
R5	3					
G0	4	46 45	OUT1- OUT1+	IN1- IN1+	11 12	
G1	6					
G2	7					
G3	11					
G4	12					
G5	14					
B0	15	42 41	OUT2- OUT2+	IN2- IN2+	14 15	
B1	19					
B2	20					
B3	22					
B4	23					
B5	24					
HSYNC	27					
VSYNC	28					
DE	30					
MCLK	31	40	CLKOUT-	CLKIN-	17	
		39	CLKIN+	CLKIN+	18	

5.3 Back-light Interface

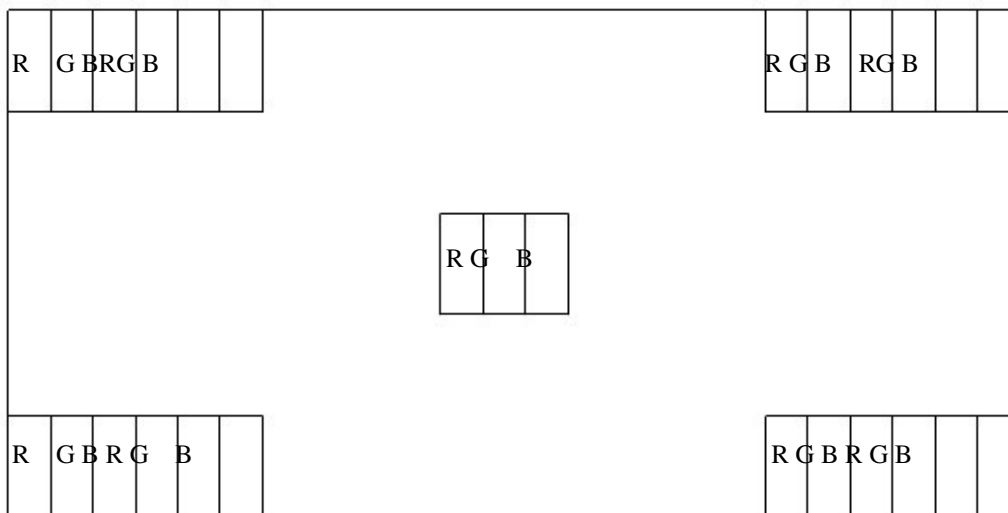
CN2 LED FPC Connector (20397-008E, Manufactured by I-PEX)

Pin No.	Symbol	Function	Remark
1	Anode1	LED Anode Power Supply	LED Anode Power Supply (3.2V X 7 EA = 22.4V)
2	NC	Non-Connection	
3	Cathode1	LED Cathode Power Supply	LED Cathode Power Supply
4	Cathode2	LED Cathode Power Supply	
5	Cathode3	LED Cathode Power Supply	
6	Cathode4	LED Cathode Power Supply	
7	Cathode5	LED Cathode Power Supply	
8	Cathode6	Cathode6	

5.4. Data Input Format

(1.1) (1.2)

(1023.1) (1024.1)



(1,768) (2,768)

Display position of input date

(1023,768) (1024,768)

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6.0. SIGNAL TIMING SPECIFICATIONS

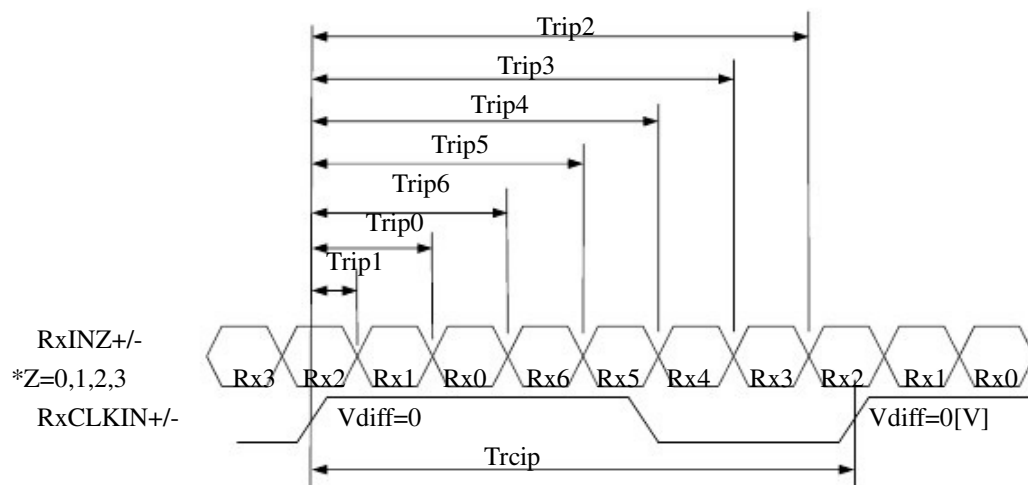
6.1 LVDS Transmitter Input

The 10.4" XGA LCM is operated by the only DE (Data enable) mode (LVDS Transmitter Input)

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Frame Period	T1	772	806		lines
Vertical Display Period	T2		768		lines
One Line Scanning Period	T3	1100	1344		clocks
Horizontal Display Period	T4		1024		clocks
Clock Frequency	1/T5		65	80	MHz

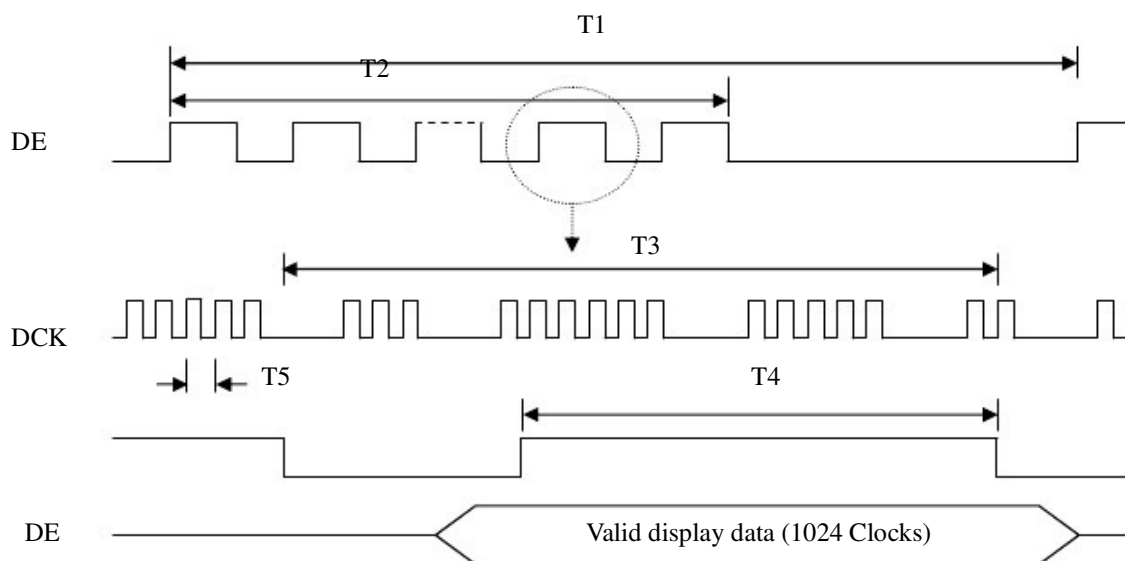
6.2. LVDS Rx interface timing parameter

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	REMARK
CLKIN Period	tRCIP	12.5	15.38		nsec	
Input Data 0	tRIP1	-0.4	0.0	+0.4	nsec	
Input Data 1	tRIP0	tRCIP/7-0.4	tRCIP/7	tRCIP/7+0.4	nsec	
Input Data 2	tRIP6	2 × tRCIP/7-0.4	2 × tRCIP/7	2 × tRCIP/7+0.4	nsec	
Input Data 3	tRIP5	3 × tRCIP/7-0.4	3 × tRCIP/7	3 × tRCIP/7+0.4	nsec	
Input Data 4	tRIP4	4 × tRCIP/7-0.4	4 × tRCIP/7	4 × tRCIP/7+0.4	nsec	
Input Data 5	tRIP3	5 × tRCIP/7-0.4	5 × tRCIP/7	5 × tRCIP/7+0.4	nsec	
Input Data 6	tRIP2	6 × tRCIP/7-0.4	6 × tRCIP/7	6 × tRCIP/7+0.4	nsec	



7.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL (DE MODE)

7.1 Timing Waveforms of Interface Signal



8.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

Each color is displayed in sixty-four gray scales from a 6 bit data signal input. A total of 262,144 colors are derived from the resultant 18 bit data.

COLORS & GRAY SCALE		RED DATA						GREEN DATA						BLUE DATA					
		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	00	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	0	0	0	0		0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	1	1	0	0	0	0	1	1	1	1	1	1
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	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						
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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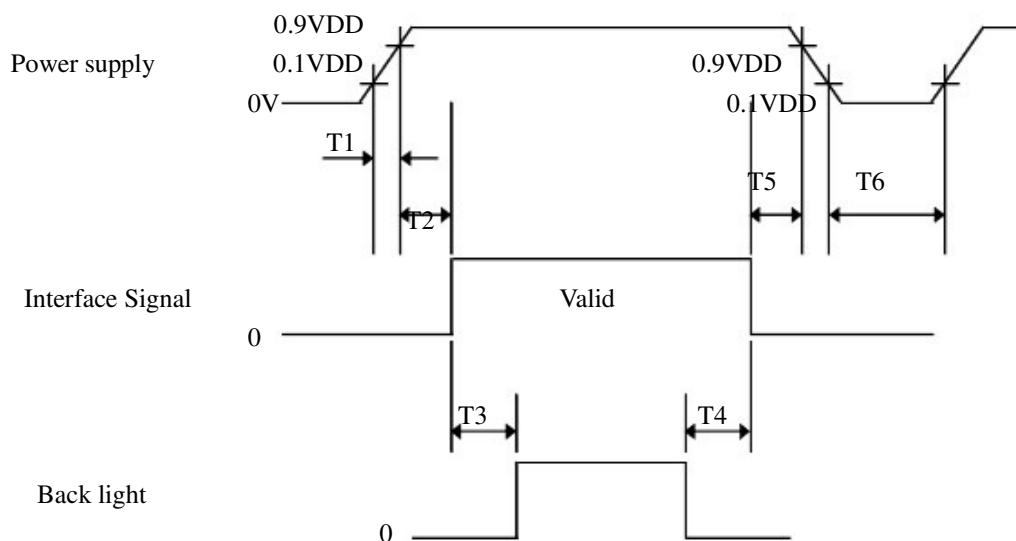
COLORS & GRAY SCALE		RED DATA						GREEN DATA						BLUE DATA					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Gray Scale Of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△																		
	▽																		
	Brighter	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0		0
	△	1	1	1	1	1		0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	
Gray Scale Of Green	Black	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
	Darker	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	△																		
	▽																		
	Brighter	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	△	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale Of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	△																		
	▽																		
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	△	0	0	0		0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Gray Scale Of White & Black	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1
	Darker	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0
	△																		
	▽																		
	Brighter	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1
	△	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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9.0 POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below



Parameter	Values			Units
	Min	Typ	Max	
T1	0	-	10	ms
T2	0	-	50	ms
T3	100	-	-	ms
T4	100	-	-	ms
T5	0	-	50	ms
T6	1	-	-	ms

Notes:

1. When the power supply VDD is 0V, Keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on.
3. Back Light must be turn on after power for logic and interface signal are valid.

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10.0 MECHANICAL CHARACTERISTICS

10.1 Dimensional Requirements

FIGURE 5, 6 shown in appendix shows mechanical outlines for the model.

PARAMETER	SPECIFICATION	UNIT
Active area	210.432 (H) × 157.824 (V)	mm
Number of pixels	1024 (H) × 768 (V) (1 pixel = R + G + B dots)	pixels
Pixel pitch	0.2055 (H) × 0.2055 (V)	mm
Pixel arrangement	RGB Vertical stripe	-
Display colors	262,144	color
Display mode	Normally Black	-
Dimensional outline	238.6±0.5 (W) X 173.2±0.5 (V) X 4.3 Max. (LED), 6.8 Max. (Component)	mm -
Weight	210 Typ. / 220 Max.	g
Back-light	SMD LED Array	-

10.2 Mounting

See FIGURE 5. (shown in Appendix)

10.3 Anti-Glare Polarizer.

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

10.4 Light Leakage

There shall not be visible light from the back-lighting system around the edges of the screen as seen from a distance 50 cm from the screen with an overhead light level of 150lux. The manufacture shall furnish limit samples of the panel showing the light leakage acceptable.

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A4(210 X 297)

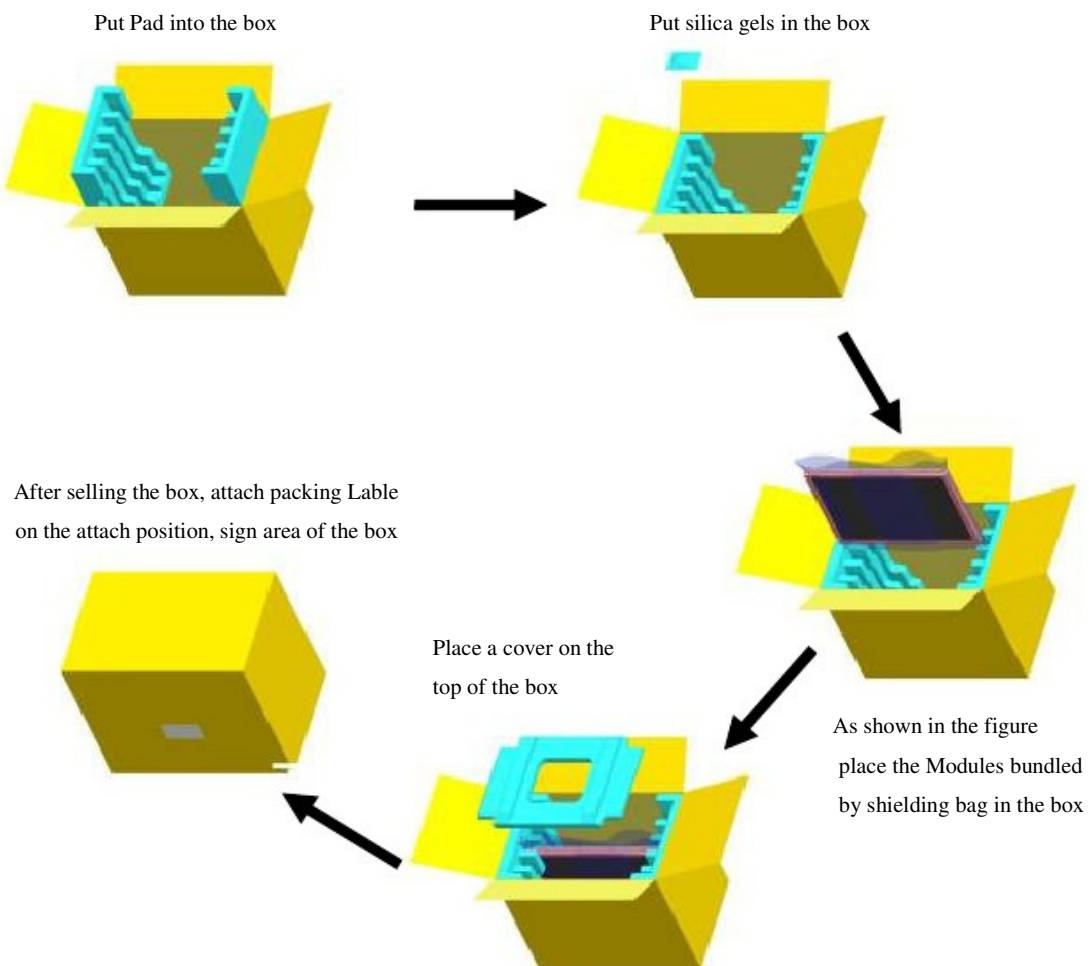
11.0 RELIABILITY TEST

NO	TEST ITEMS	CONDITIONS
1	High temperature storage test	Ta = 80 °C, 240 hrs
2	Low temperature storage test	Ta = -20 °C, 240 hrs
3	High temperature & high humidity operation test	Ta = 50 °C, 80%RH, 240hrs
4	High temperature operation test	Ta = 70 °C, 240 hrs
5	Low temperature operation test	Ta = 0 °C, 240 hrs
6	Thermal shock	Ta = -20 °C ~ 80 °C (0.5H), 100 cycle
7	Vibration test (non-operating)	Frequency : 10~500Hz Gravity/AMP : 1.5G Period : X,Y,Z 30min
8	Shock test (non-operating)	Gravity : 220G Pulse width : 2ms, half sine wave ±X, ±Y, ±Z Once for each direction
9	Electro-Static Discharge Test (non-operating)	Air : 150pF, 330ohm, 15KV Contact : 150pF, 330ohm, 8KV

12.0 PACKING SPECIFICATION

12.1 Packing Order

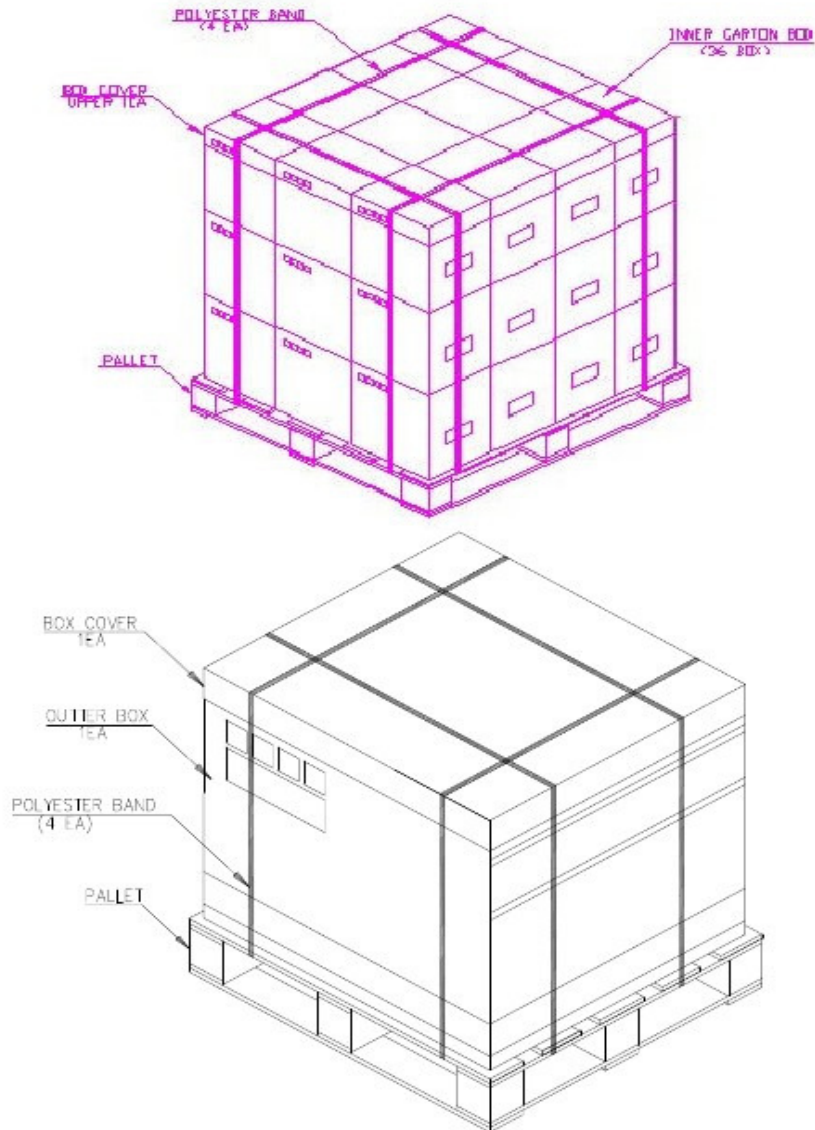
Inelmatic Electronics provides the standard shipping container for customers, unless customer specifies their packing information. The standard packing method is shown in below.



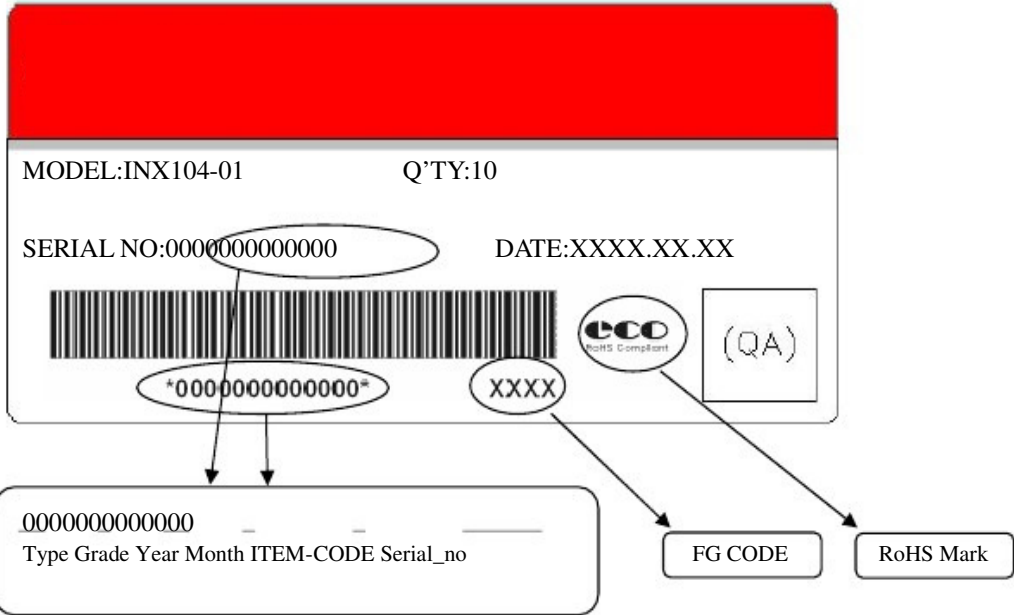
Notes

Box Dimension: 349.0mm(W) X 261.0mm(D) X 311.0mm(H)
 Package Quantity in one Box: 10pcs

12.2 Pallet Packing


Note

Pallet Dimension : : 1100 mm (L) × 1100 mm (W) × 120 mm (H)
 Package Quantity in one Box : 10pcs
 Box Quantity in one Pallet : 36 box

	PRODUCT GROUP	REV	ISSUE DATE
	TFT-LCD PRODUCT	O	2010.11.13
12.3 Packing Label Label Size: 108 mm (L) × 56 mm (W) Contents Model: HX104X01-212 Q`ty: Module Q`ty in one box Serial No.: Box Serial No. See next figure for detail description. Date: Packing Date FG Code: FG Code of Product  The diagram shows a packing label with the following fields and callouts: MODEL:INX104-01 and Q'TY:10 at the top. SERIAL NO:000000000000 and DATE:XXXX.XX.XX in the middle. - A barcode with the number *000000000000* below it. - A callout from the first zero of the serial number points to a box containing: 000000000000 Type Grade Year Month ITEM-CODE Serial_no - A callout from the 'XXXX' date field points to a box labeled FG CODE. - A callout from the 'eccc' RoHS Compliant logo points to a box labeled RoHS Mark. - A box labeled (QA) is also present on the right side of the label.			
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12.3 Product Label

Inelmatic Electronics Barcode

No 1. Control Number

No 5. Month (1, 2, 3,..., 9, X, Y, Z)

No 2. Rank / Grade

No 6. FG Code

No 3. Line Classification (Inelmatic Electronics : I)

No 7. Serial Number

No 4. Year (8 : 2008, 9 : 2009, ...)

	PRODUCT GROUP	REV	ISSUE DATE
	TFT-LCD PRODUCT	O	2010.11.13
13.0 HANDLING & CAUTIONS 13.1 Cautions when taking out the module Pick the pouch only, when taking out module from a shipping package. 13.2 Cautions for handling the module As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible. As the LCD panel and backlight element are made from fragile glass material, impulse and pressure to the LCD module should be avoided. As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning. Do not pull the interface connector in or out while the LCD module is operating. Put the module display side down on a flat horizontal plane. Handle connectors and cables with care. 13.3 Cautions for the operation When the module is operating, do not lose MCLK, DE signals. If any one of these signals were lost, the LCD panel would be damaged. Obey the supply voltage sequence. If wrong sequence were applied, the module would be damaged. 13.4 Cautions for the atmosphere Dewdrop atmosphere should be avoided. Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer-packing pouch and under relatively low temperature atmosphere is recommended. 13.5 Cautions for the module characteristics Do not apply fixed pattern data signal to the LCD module at product aging. Applying fixed pattern for a long time may cause image sticking. 13.6 Other cautions Do not disassemble and/or re-assemble LCD module. Do not re-adjust variable resistor or switch etc. When returning the module for repair or etc, please pack the module not to be broken. We recommend using the original shipping packages.			
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14.0 EDID Data

Add	Function	Hex	Iput Value	Add	Function	Hex	Input Value
00	Header	00	EDID	20	BLue y high bits	21	
01		FF		21	White x high bits	50	0.313
02		FF		22	White y high bits	54	0.329
03		FF		23	Established timing 1	21	
04		FF		24	Established timing 2	08	
05		FF		25	Established timing 3	00	
06		FF		26	Standard timing #1	01	Not Used
07		00		27		01	
08	ID Manufacture	09	ID	28	Standard timing #2	01	Not Used
09	Name	E5		29		01	
0A	ID Product Code	34	10.4XGA	2A	Standard timing #3	01	Not Used
0B		08		2B		01	
0C	32bit serial No.	00		2C	Standard timing #4	01	Not Used
0D		00		2D		01	
0E		00		2E	Standard timing #5	01	Not Used
0F		00		2F		010	
10	Week ofmanufacture	00	0	30	Standard timing #6	01	Not Used
11	Year of Manufacture	14	2010	31		01	
12	EDID Structure Ver.	01	1	32	Standard timing #7	01	Not Used
13	EDID revision #	03	3	33		01	
14	Video input definition	80		34	Standard timing #8	01	Not Used
15	Max H image size	15	21	35		01	
16	Max V image size	10	16	36	Detailed timing / monitor descriptor #1	64	Main clock :65.0MHz Hor. Active : 1024 Hor. Blanking : 320 4 bits of Hor. Active + 4 bits of Hor. Blanking Ver. Active : 768 Ver. Blanking : 38 4 bits of Ver. Active + 4 bits of Ver. Blanking Hor. Sync Offset : 24 H sync Pulse Width:136 V sync Offset : 1 line V Sync Pulse width : 3 line
17	Display Gamma	78	22	37		19	
18	Feature support	EA	RGB mode	38		00	
19	Red/Greenlow bits	BD		39		40	
1A	Blue/White low bits	30		3A		41	
1B	Red x high bits	91		3B		00	
1C	Red y high bits	54		3C		26	
1D	Green x high bits	4F		3D		30	
1E	Green y high bits	8B		3E		18	
1F	Blue x high bits	26		3F		88	

Add	Function	Hex	Input Value	Add	Function	Hex	Input Value
40	Detailed timing / monitor descriptor #1	36	. Horizontal Image Size : 210 mm (Low 8 bits) . Vertical Image Size: 158 mm (Low 8 bits). 4 bits of Hor. Image Size + 4 bits of Ver. Image Size. Hor. Border : 0 pixel. Vertical Border : 0 line	60	Detailed timing / monitor descriptor #3	59	Company name : HYDIS
41		00		61		44	
42		D2		62		49	
43		9E		63		53	
44		00		64		QA	
45		00		65		20	
46		00		66		20	
47		18		67		20	
48	Detailed timing / monitor descriptor #2	28		68		20	
49		15		69		20	
4A		00		6A		20	
4B		10		6B		20	
4C		41		6C	Detailed timing / monitor descriptor #4	00	Model name : HX104X01-212
4D		00		6D		00	
4E		26		6E		00	
4F		30		6F		FE	
50		18		70		00	
51		88		71		48	
52		36		72		58	
53		00		73		31	
54		D2		74		30	
55		9E		75		34	
56		00		76		58	
57		00		77		30	
58		00		78		31	
59		18		79		2D	
5A	Detailed timing / monitor descriptor #3	00		7A		32	
5B		00		7B		31	
5C		00		7C		32	
5D		FE		7D		QA	
5E		00		7E	Extension flag	00	
5F		48		7F	Checksum	A8	

15.0 APPENDIX

Figure 1. Measurement Set Up

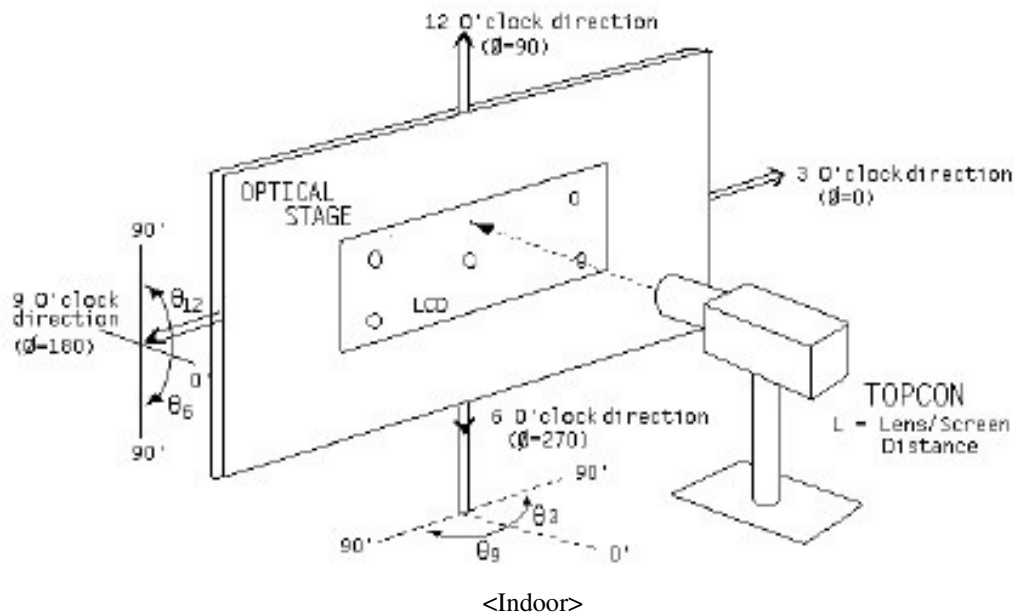
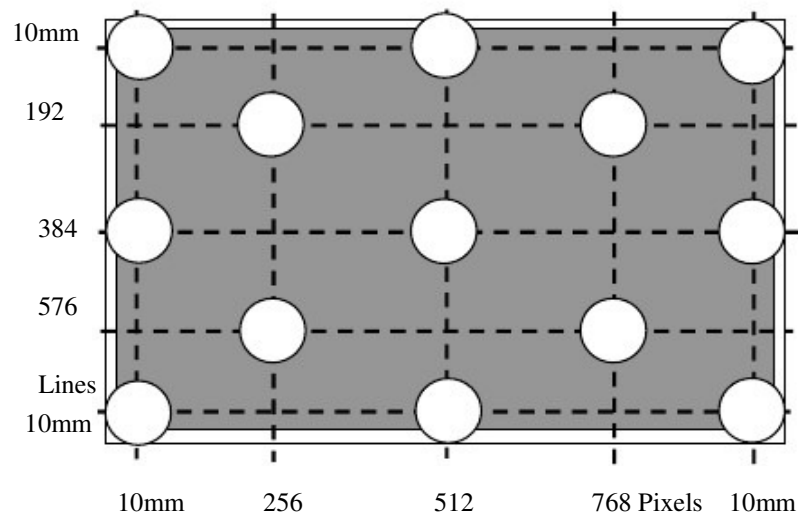


Figure 2. Average Luminance Measurement Locations & Uniformity Measurement Locations



(X) : Test point

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Figure 3. Response Time Testing

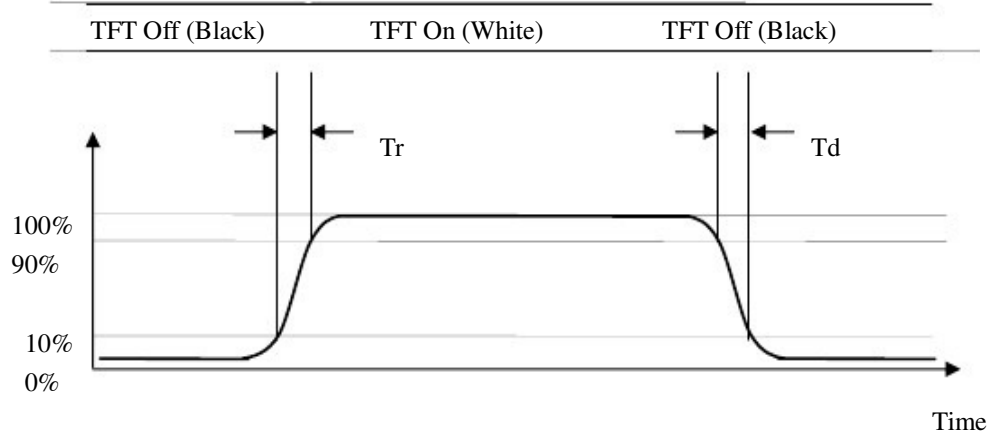
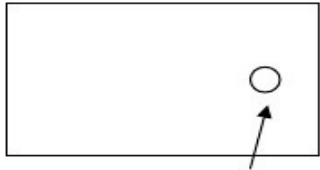


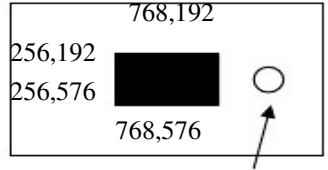
Figure 4. Cross Modulation Test Description

VIEW AREA



YA (896,384)

VIEW AREA



YB (896 384)

CrossTalk= $\frac{YB - YA}{YA} \times 100$

Where:

Y_A = Initial luminance of measured area (cd/m²)

Y_B = Subsequent luminance of measured area (cd/m²)

The location measured will be exactly the same in both patterns.

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Figure 5. TFT-LCD Module Outline Dimensions (Front View)

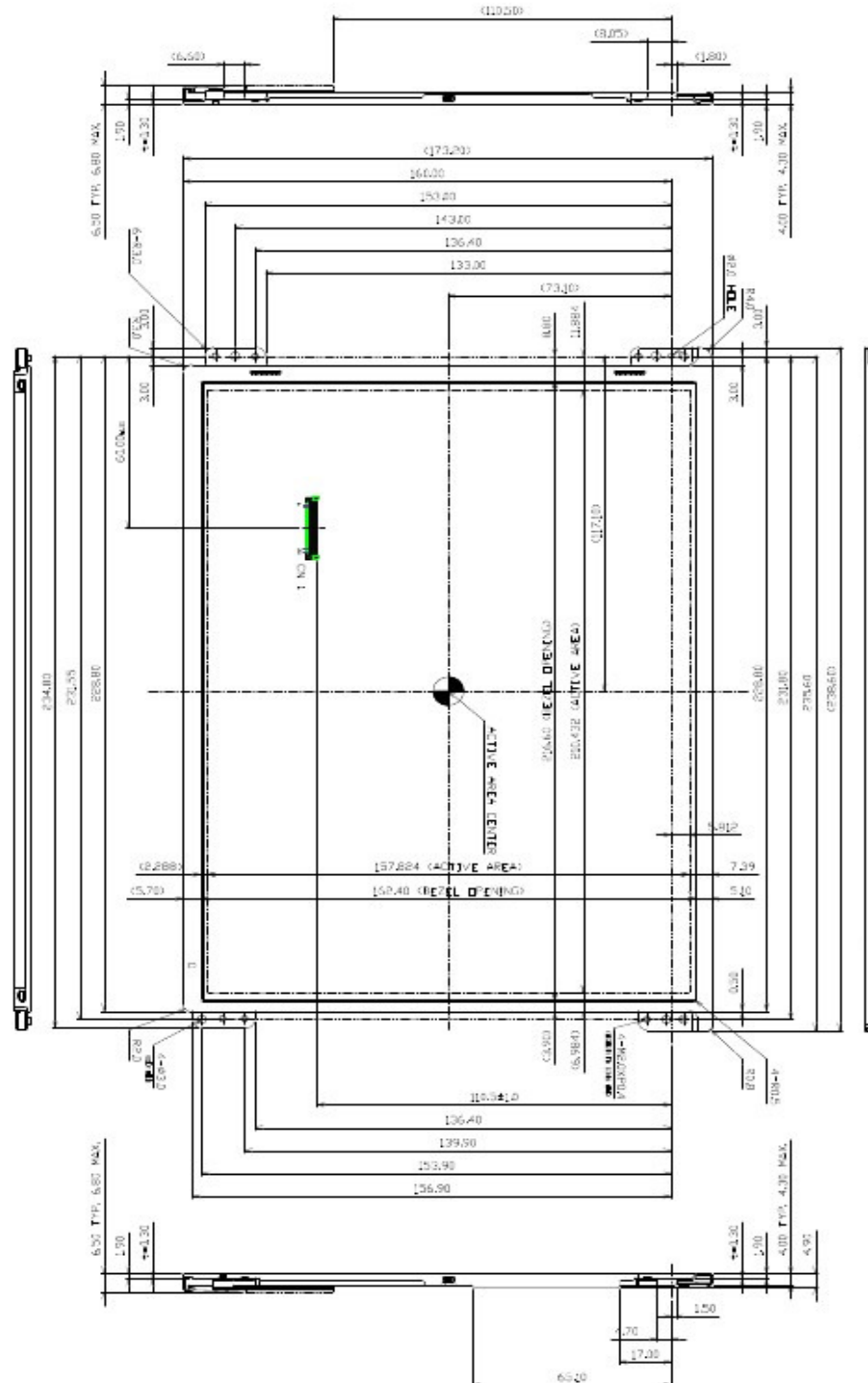
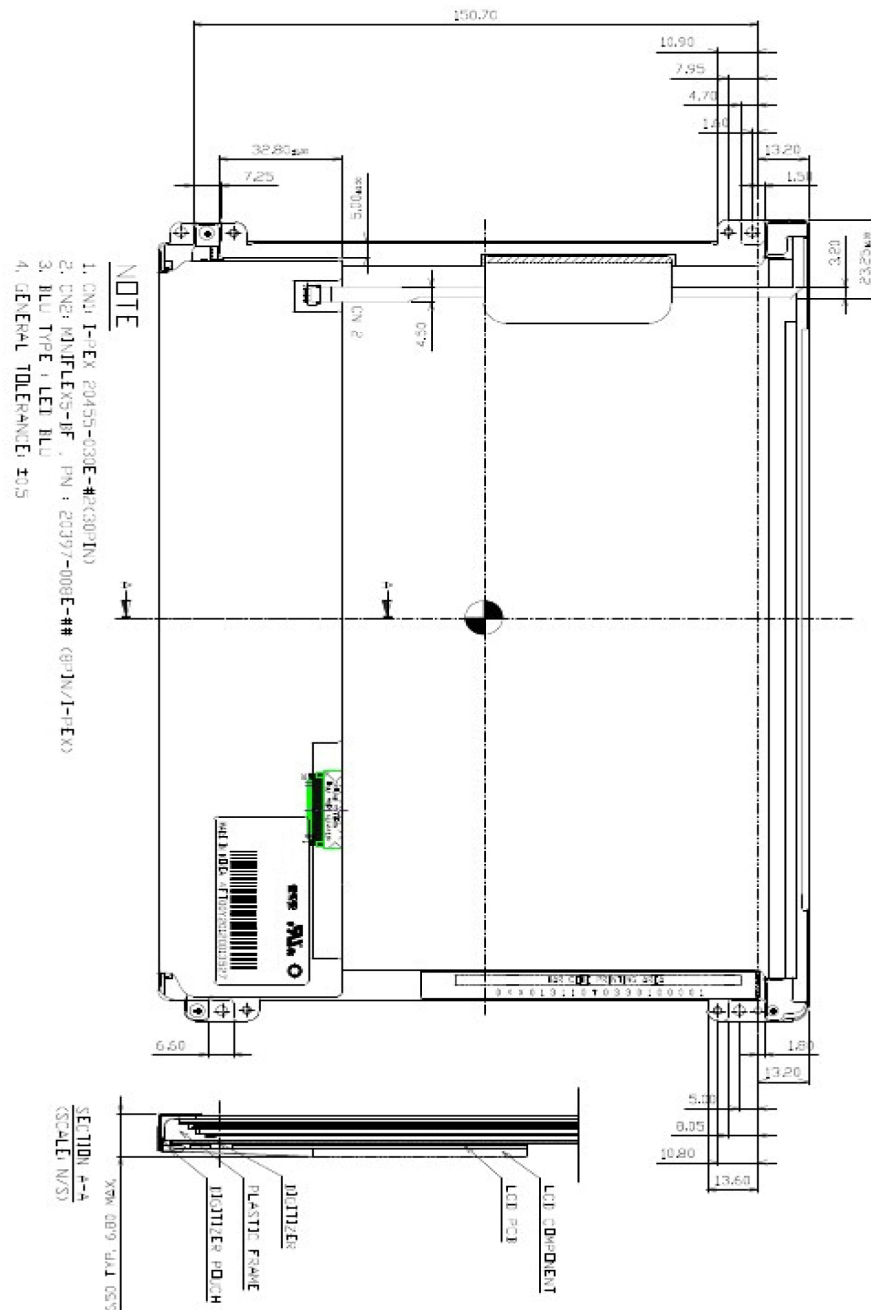


Figure 5. TFT-LCD Module Outline Dimensions (Rear View)



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