TITLE : HV070WS1-D00

Product Specification

HYDIS Technologies

HYDIS	PRODUCT GROUP	REV	ISSUE DATE
	TFT PRODUCTS	0	2010.12.30

REVISION HISTORY

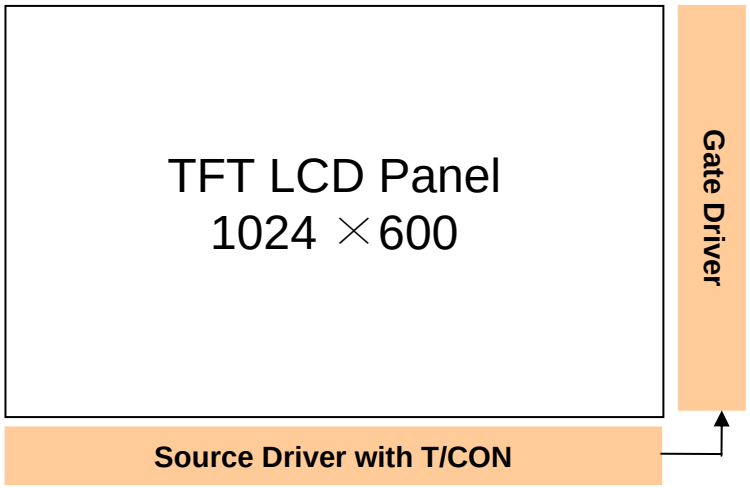
REV.	ECN NO.	DESCRIPTION OF CHANGES	DATE	PREPARED
0		Initial Release	10.12.30	C.Y.CHO

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

7” is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 7.01 inch diagonally measured active area with WSVGA resolutions (1024 horizontal by 600 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical Stripe and this module can display 16.7M colors.



1.2 Features

- 1 Channel LVDS Interface
- 16.7M Colors
- Data Enable Signal Mode
- Green Product (RoHS) & Halogen free

1.3 Application

- Smart/Cell Phone

1.4 General Specifications

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	153.6(H) ×90.0(V)	mm	
Number of pixels	1024(H) x 600(V)	pixels	
Pixel pitch	0.15(H) X 0.15(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Color Gamut	52.3%		Only CF (@ Light Source "C")
Display colors	16.7M	colors	Note 1
Display operating mode	Normally Black		
Dimensional outline	161.45(H) X 97.76(V)	mm	
D-IC	NT52002, NT51008		

Note 1: 6 bit Hi-FRC input driving

2.0 ABSOLUTE MAXIMUM RATINGS

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

<Table 2. Absolute Maximum Ratings>

VSS=GND=0V

Parameter	Symbol	Min	Max	Unit	Remark
LC Operating Voltage *1)	V_{op}		4.7	V	Ta = 25℃
Operating Temperature (Humidity)	T_{OP} RH	-20	+60	℃ %	At 60 ℃
Storage Temperature (Humidity)	T_{ST} RH	-30	+70	℃ %	At 70 ℃

*1) Liquid Crystal driving voltage
Due to the characteristics of LC Material, this voltage varies with environmental temperature

3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Characteristics

<Table 3. Parameters for Electrical Characteristics>

Parameter	Symbol	Value			Unit	Remarks
		Min.	Typ.	Max.		
TFT Gate ON Voltage	VGH	15	-	28	V	Note 1
TFT Gate OFF Voltage	VGL	-12	-	-7	V	Note 2
TFT Common Electrode Voltage	VCom	2	-	4.5	V	Note 3
TFT Kick-Back Voltage Max	ΔV_p Max	0.9	-	2.2	V	
TFT Kick-Back Voltage Min	ΔV_p Min	0.9	-	1.8	V	

Note :

1. VGH is TFT Gate operating voltage.
2. VGL is TFT Gate operating voltage. The low voltage level of VGL signal must be fluctuated with same phase as Vcom.
3. Vcom must be adjusted to optimize display quality, as Crosstalk and Contrast Ratio etc.

4.0 OPTICAL SPECIFICATIONS

4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = 25±2℃) 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°.
The center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement.

4.2 Optical Specifications

<Table 4. Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Threshold voltage		Vsat		3.4	3.7	4.0	V	Appendix Fig. 1
		Vth		1.5	1.8	2.1	V	
Viewing Angle range	Horizontal	Θ_3	CR > 10	80	85	-	Deg.	Note 1
		Θ_9		80	85	-	Deg.	
	Vertical	Θ_{12}		80	85	-	Deg.	
		Θ_6		80	85	-	Deg.	
Contrast ratio		CR	Θ = 0°	600	800			Note 2
Transmittance		T(%)	Θ = 0°	-	5.65			Note 3
White Chromaticity		x_w	Θ = 0°	-	-	-		Note 4
		y_w		-	-	-		
Reproduction Of color	Red	x_R	Θ = 0°	0.596	0.616	0.636		
		y_R		0.306	0.326	0.346		
	Green	x_G		0.240	0.260	0.280		
		y_G		0.538	0.558	0.578		
	Blue	x_B		0.123	0.143	0.163		
		y_B		0.149	0.169	0.189		
Response Time		Tr+Tf	Θ = 0°		30		msec	Note 5

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 2 shown in Appendix).
2. Contrast measurements shall be made at viewing angle of Θ= 0° 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 2 shown in Appendix). Luminance measured with Polarizer. Luminance Contrast Ratio (CR) is defined mathematically

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Transmittance is the value with Polarizer.
4. 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 C/F without Polarizer. Measurement condition is C - light source & Halogen Lamp.
5. The electro-optical response time measurements shall be made as FIGURE 3 shown in Appendix by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

5.0 MECHANICAL CHARACTERISTICS

5.1 Dimensional Requirements

FIGURE 4 shown in appendix shows mechanical outlines for the model.

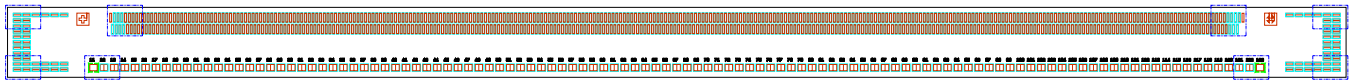
Parameter	Specification	Unit
Active area	153.6(H) ×90.0(V)	mm
Number of pixels	1024 (H) X 600(V)	pixels
	(1 pixel = R + G + B dots)	
Pixel pitch	0.15(H) X 0.15(V)	mm
Pixel arrangement	RGB Vertical stripe	
Display mode	Normally Black	
Dimensional outline	161.45(H) X 97.76(V)	mm

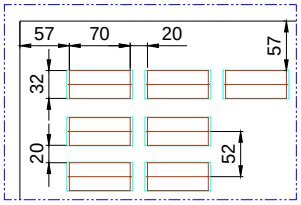
6.0 Gate / Data IC PAD & FPC Pin Assignment

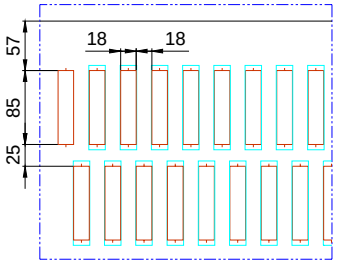
6.1 Gate IC PAD

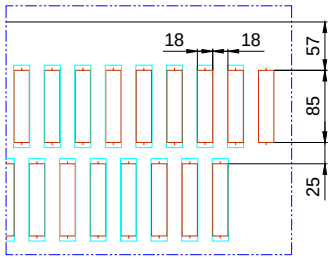
* D-IC :NT52002

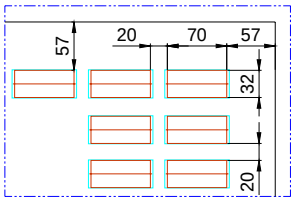
-. Chip Size : 12.85(H) X 0.67(V) mm

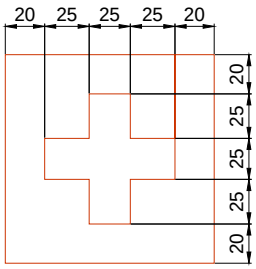


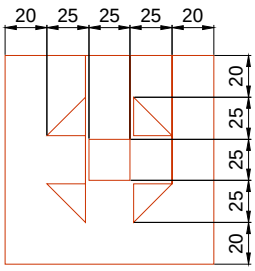


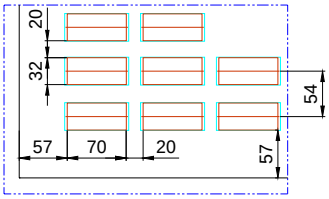


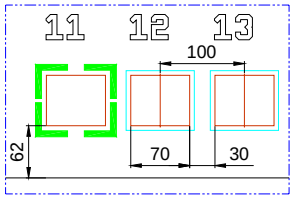


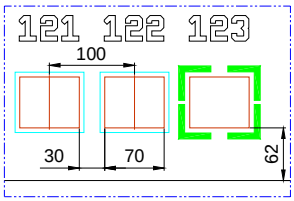


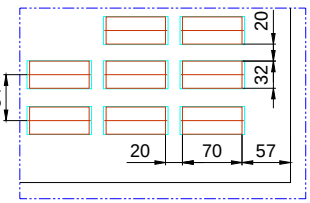










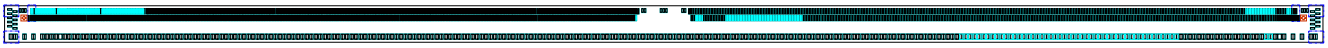


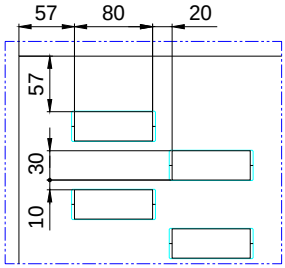
* Bump Top View
* Unit : um

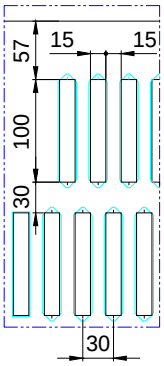
6.2 Data IC PAD

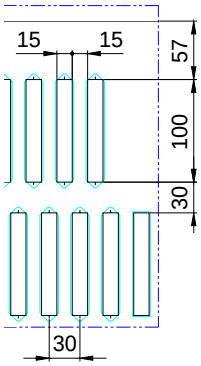
* D-IC : NT51008

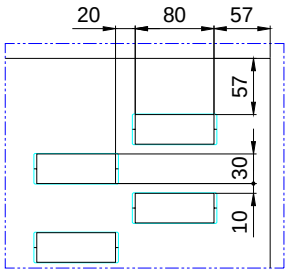
-. Chip Size : 25.0(H) X 0.7(V) mm

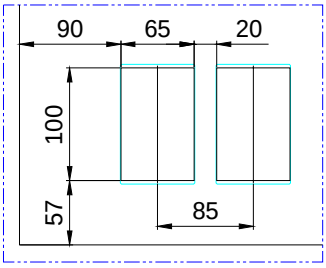


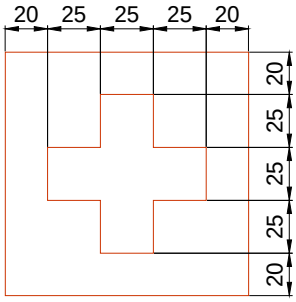


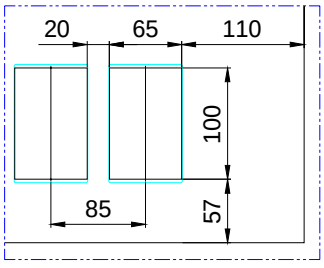










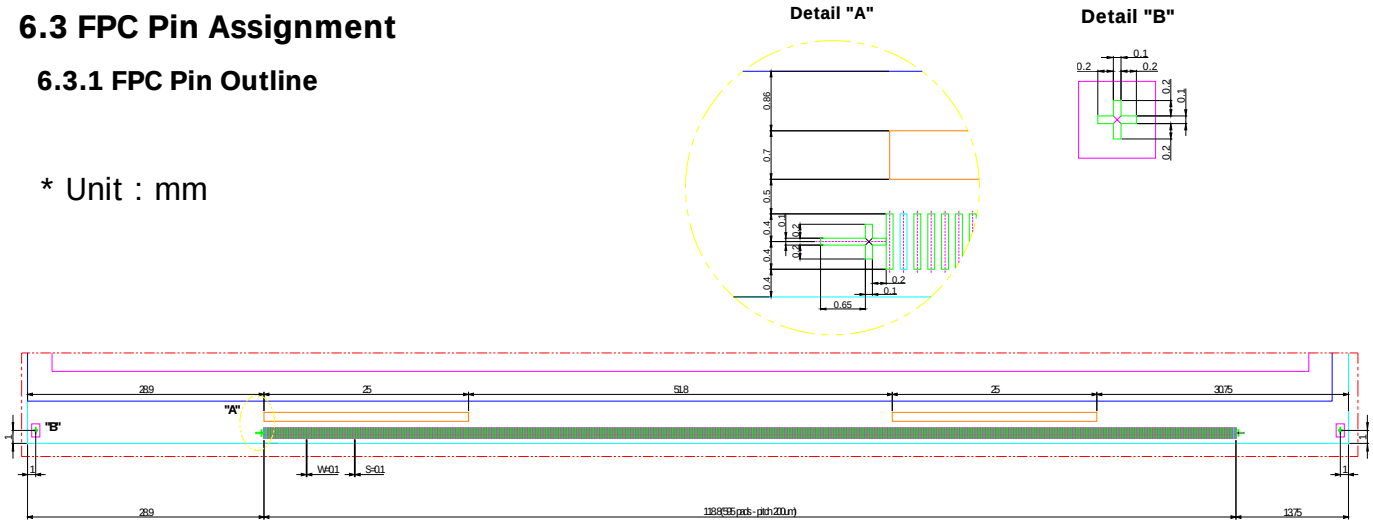


* Bump Top View
* Unit : um

6.3 FPC Pin Assignment

6.3.1 FPC Pin Outline

* Unit : mm



6.3.2 FPC Pin Assignment

FPC Num	Pin name	FPC Num	Pin name	FPC Num	Pin name	FPC Num	Pin name	FPC Num	Pin name	FPC Num	Pin name	FPC Num	Pin name
1	Dummy	117~118	AGND	156	GMA9	207	VCOM	508	GMA5	545	GMA14	593	GND
2	Null	119~120	GMA1	157	GMA10	208	VCOM	509	GMA6	546~547	AGND	594	Null
3~5	GND	121	GMA2	158	GMA11	209~339	Dummy	510	GMA7	548~549	AVDD	595	Dummy
6~8	VCC	122	GMA3	159	GMA12	340	Null	511	GAMH	550~551	GND		
9~13	VEE	123	GMA4	160	GMA13	341~469	Dummy	512	VSD	552~553	VDD		
14~18	VGG	124	GMA5	161	GMA14	470	VCOM	513	HSD	554	DUAL		
19~82	Dummy	125	GMA6	162~163	AGND	471~472	VCOM	514	DEN	555	MA SL		
83~84	VCOM	126	GMA7	164~165	AVDD	473~474	AGND	515	GND_LVDS	556	MASLOC		
85	VCOM	127	GAMH	166~167	GND	475~476	AVDD	516	D3+	557	CABC_EN2		
86	R_A/T用	128	VSD	168~169	VDD	477~478	GND	517	D3-	558	CABC_EN1		
87	G_A/T用	129	HSD	170	DUAL	479~480	VDD	518	GND	559	ORDRV		
88	B_A/T用	130	DEN	171	MA SL	481	PATH	519	D2+	560	MODE		
89~90	AGND	131	GND_LVDS	172	MASLOC	482~483	NBW	520	D2-	561	IFSEL		
91~92	AVDD	132	D3+	173	CABC_EN2	484	PINCTL	521	GND	562	PATH		
93~94	GND	133	D3-	174	CABC_EN1	485	PATH	522	D1+	563	RES0		
95~96	VDD	134	GND	175	ORDRV	486~487	DITHER	523	D1-	564	RES1		
97	PATH	135	D2+	176	MODE	488	HFRC	524	GND	565	CLKPOL		
98~99	NBW	136	D2-	177	IFSEL	489	FRAME	525	D0+	566	STBYB		
100	PINCTL	137	GND	178	PATH	490	SEL0	526	D0-	567	GRB		
101	PATH	138	D1+	179	RES0	491	SEL1	527	GND	568	SHLR		
102~103	DITHER	139	D1-	180	RES1	492	CSB	528~529	DCLK+	569	UPDN		
104	HFRC	140	GND	181	CLKPOL	493	SDA	530~532	DCLK-	570~572	VDD		
105	FRAME	141	D0+	182	STBYB	494	SCL	533~536	GND	573~576	GND		
106	SEL0	142	D0-	183	GRB	495~496	VDD	537	VDD_LVDS	577~580	AVDD		
107	SEL1	143	GND	184	SHLR	497~498	GND	538	GAML	581~584	AGND		
108	CSB	144~145	DCLK+	185	UPDN	499~500	AVDD	539	GMA8	585~587	Dummy		
109	SDA	146~148	DCLK-	186~188	VDD	501~502	AGND	540	GMA9	588	B_A/T用		
110	SCL	149~152	GND	189~192	GND	503~504	GMA1	541	GMA10	589	G_A/T用		
111~112	VDD	153	VDD_LVDS	193~196	AVDD	505	GMA2	542	GMA11	590	R_A/T用		
113~114	GND	154	GAML	197~200	AGND	506	GMA3	543	GMA12	591	VCOM		
115~116	AVDD	155	GMA8	201~206	Dummy	507	GMA4	544	GMA13	592	VCOM		

7.0 RELIABLITY TEST

No	Test Item	Conditions
1	High temperature operation test	Ta = 60 °C, 24 hrs
2	Low temperature operation test	Ta = -20 °C, 24 hrs
3	High temperature & high humidity operation test	Ta = 60 ℃, 90%RH, 96hrs
4	Thermal shock	Ta = -30 °C ↔ 70 °C (30min), 30 cycle
5	Electro-static discharge test (non-operating)	Air : 150pF, 330ohm, 15KV Contact : 150pF, 330ohm, 8KV

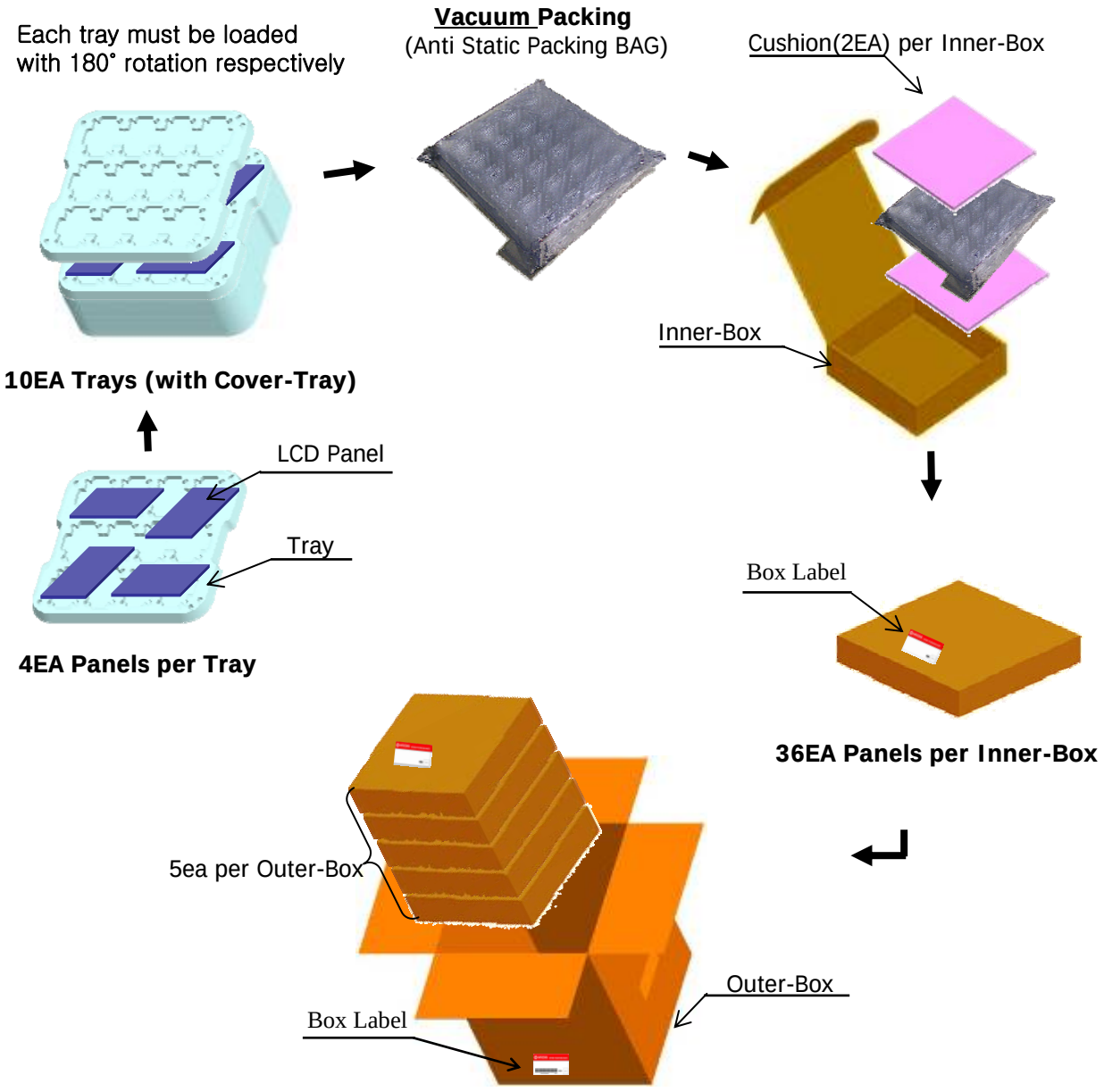
Note : All tests are based on Module type. Except for Pressure Cooker Test.

This test result is for the back-side ITO coated product.

8.0 PACKING SPECIFICATION

8.1 Packing Order

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



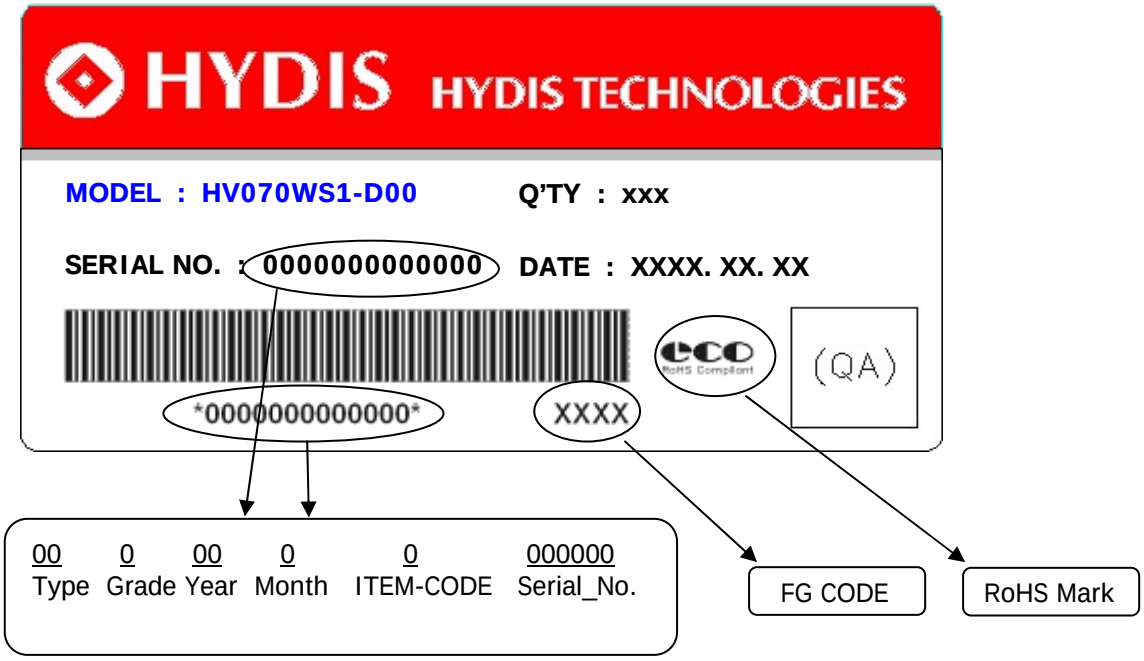
Notes : 1. Box Dimension: 333mm(W) X 333mm(D) X 435mm(H)
2. Package Quantity in one Box : **180pcs**

8.2 Box label

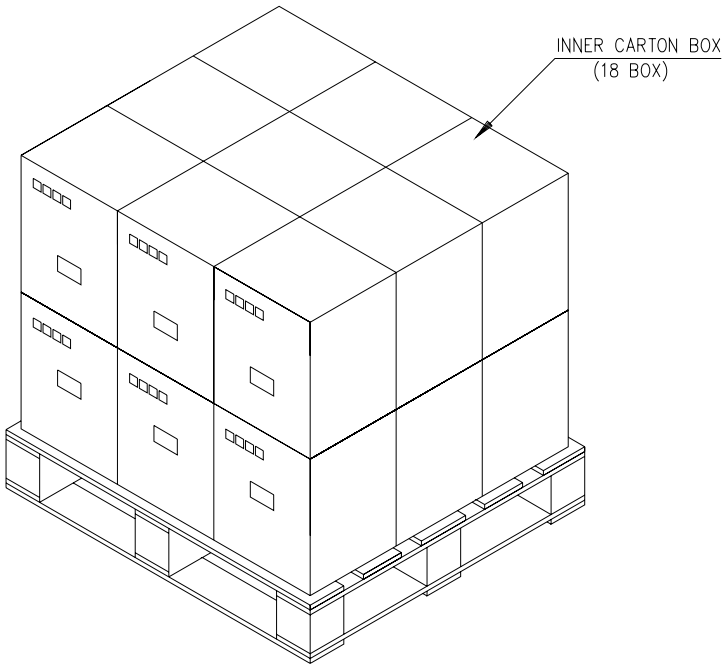
The box label followed by is affixed to a shipped product at the specified location on each packing box.

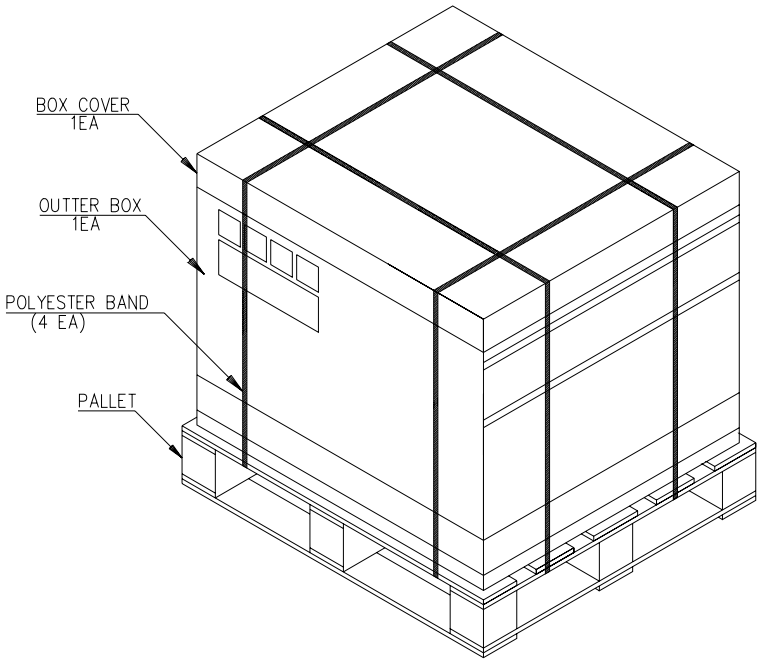
1) Label Size: 108 mm (L) × 56 mm (W)

2) Contents
- Model : **HV070WS1-D00**
- Q`ty : Quantity in one box
- Serial No. : Refer the description as below.
- Date : Packing Date
- FG Code : FG Code of Product



8.3 Pallet Packing





*** Note**

- Pallet Dimension : : 1100 mm (L) × 1100 mm (W) × 120 mm (H)
- Package Quantity in one Box : **180**pcs
- Box Quantity in one Pallet : 18box

9.0 HANDLING & CAUTIONS

9.1 Mounting Method

- The panel of the LCD consists of two thin glasses with polarizer which easily get damaged. So extreme care should be taken when handling the LCD.
- Excessive stress or pressure on the glass of the LCD should be avoided. Care must be taken to insure that no torsional or compressive forces are applied to the LCD unit when it is mounted.
- If the customer's set presses the main parts of the LCD, the LCD may show the abnormal display. But this phenomenon does not mean the malfunction of the LCD and should be processed by the way of mutual agreement.
- To determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
- Mount a LCD module with the specified mounting parts.

9.2 Caution of LCD Handling and Cleaning

- Since the LCD is made of glass, do not apply strong mechanical impact or static load onto it. Handle with care since shock, vibration, and careless handling may seriously affect the product. If it falls from a high place or receives a strong shock, the glass may be broken.
- The polarizers on the surface of the panel are made from organic substances. Be very careful for chemicals not to touch the polarizers or it leads the polarizers to be deteriorated.
- If the use of a chemical is unavoidable, use soft cloth with solvent (recommended below) to clean the LCD's surface and wipe lightly.
  - IPA(Isopropyl Alcohol), Ethyl Alcohol, Trichlorotriflorothane
- Do not wipe the LCD's surface with dry or hard materials that will damage the polarizers and others. Do not use the following solvent.
  - Water, Ketone, Aromatics
- It is recommended that the LCD be handled with soft gloves during assembly, etc. The polarizers on the LCD's surface are vulnerable to scratches and thus to be damaged by sharp particles.
- Do not drop water or any chemicals onto the LCD's surface.
- A protective film is supplied on the LCD and should be left in place until the LCD is required for operation.
- The ITO pad area needs special careful caution because it could be easily corroded. Do not contact the ITO pad area with HCFC, Soldering flux, Chlorine, Sulfur, saliva or fingerprint. To prevent the ITO corrosion, customers are recommended that the ITO pad area would be covered by UV or silicon.

9.3 Caution Against Static Charge

- The LCD modules use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.
- Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, if possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.
- Avoid the use of work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- In handling the LCD, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary.

9.4 Caution for Operation

- It is indispensable to drive the LCD within the specified voltage limit since the higher voltage than the limit causes the shorter LCD's life. An electro-chemical reaction due to DC causes undesirable deterioration of the LCD so that the use of DC drive should avoid.
- Do not connect or disconnect the LCD to or from the system when power is on.
- Never use the LCD under abnormal conditions of high temperature and high humidity.
- When exposed to drastic fluctuation of temperature (hot to cold or cold to hot), the LCD may be affected; specifically, drastic temperature fluctuation from cold to hot, produces dew on the LCD's surface which may affect the operation of the polarizer and the LCD.
- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD may turn black at temperature above its operational range. However those phenomena do not mean malfunction or out of order with the LCD. The LCD will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.
- Do not display the fixed pattern for a long time because it may develop image sticking due to the LCD structure. If the screen is displayed with the fixed pattern, use a screen saver.

9.5 Packaging

- Modules use LCD elements, and must be treated as such.
  - Avoid intense shock and falls from a height.
  - To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity for long periods.

9.6 Storage

- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit. Relative humidity of the environment should therefore be kept below 60%RH.
- Original protective film should be used on LCD's surface (polarizer). Adhesive type protective film should be avoided, because it may change color and/or properties of the polarizers.
- Do not store the LCD near organic solvents or corrosive gasses.
- Keep the LCD safe from vibration, shock and pressure.
- Black or white air-bubbles may be produced if the LCD is stored for long time in the lower temperature or mechanical shocks are applied onto the LCD.
- In the case of storing for a long period of time for the purpose or replacement use, the following ways are recommended.
  - Store in a polyethylene bag with sealed so as not to enter fresh air outside in it.
  - Store in a dark place where neither exposure to direct sunlight nor light is.
  - Keep temperature in the specified storage temperature range.
  - Store with no touch on polarizer surface by the anything else. If possible, store the LCD in the packaging situation LCD when it was delivered.

9.7 Safety

- For the crash damaged or unnecessary LCD, it is recommended to wash off liquid crystal by either of solvents such as acetone and ethanol and should be burned up later.
- In the case the LCD is broken, watch out whether liquid crystal leaks out or not. If your hands touch the liquid crystal, wash your hands cleanly with water and soap as soon as possible.
- If you should swallow the liquid crystal, first, wash your mouth thoroughly with water, then drink a lot of water and induce vomiting, and then, consult a physician.
- If the liquid crystal should get in your eyes, flush your eyes with running water for at least fifteen minutes.
- If the liquid crystal touches your skin or clothes, remove it and wash the affected part of your skin or clothes with soap and running water.

10.0 APPENDIX

Figure 1. The definition of Vth & Vsat

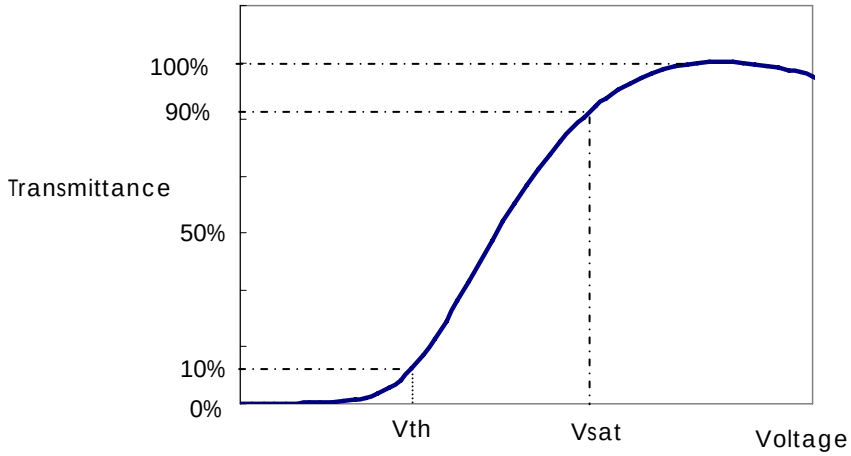


Figure 2. Measurement Set Up

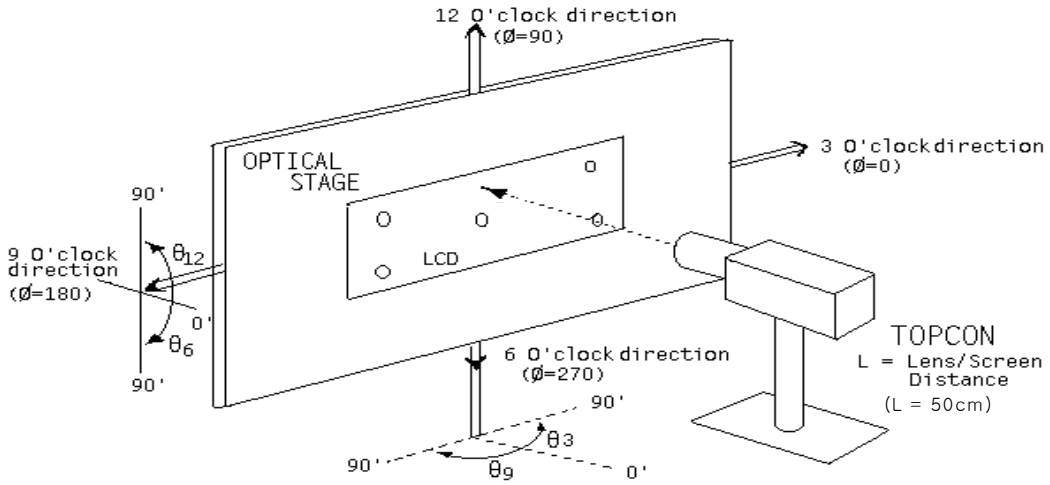


Figure 3. Response Time Testing

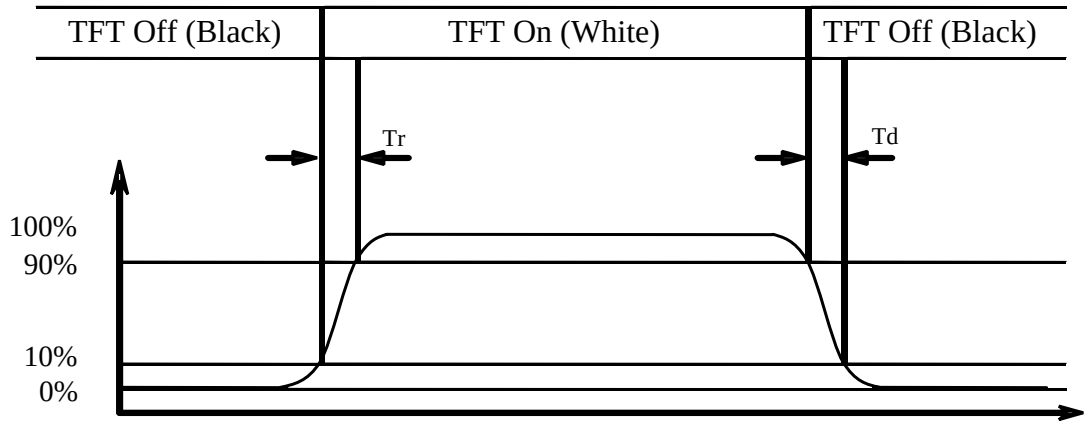
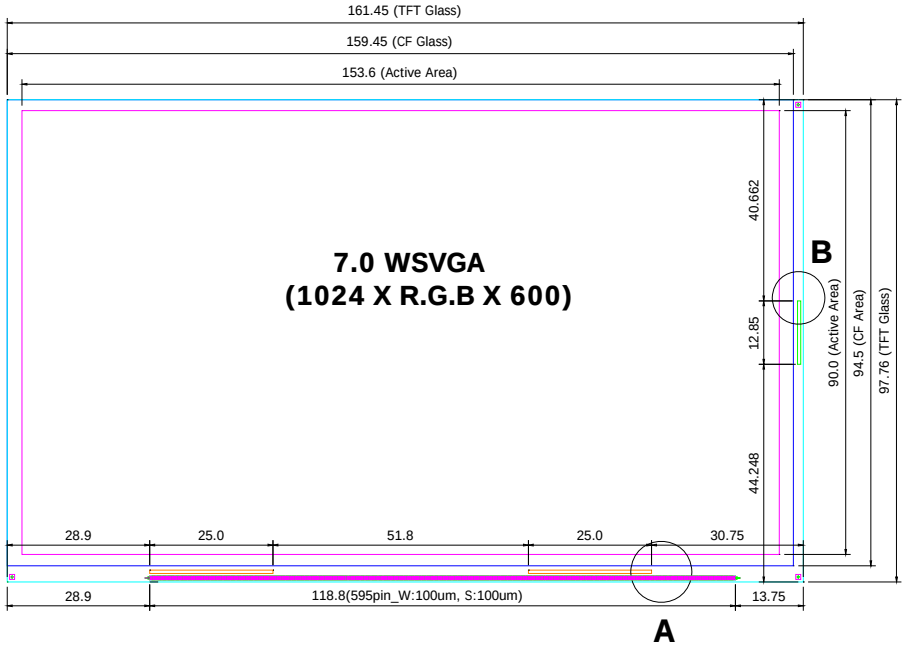
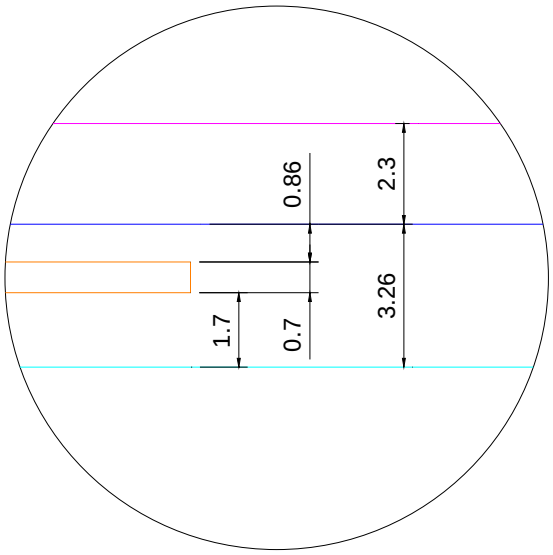


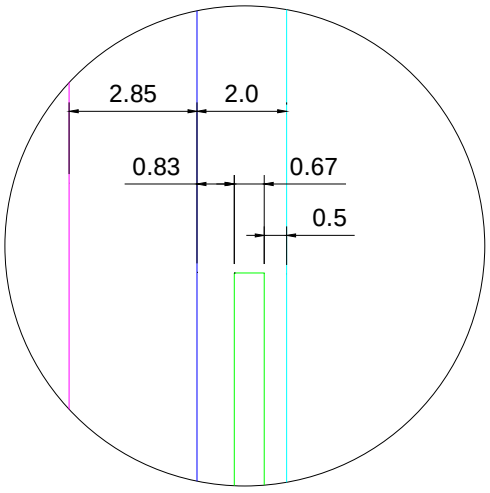
Figure 4. TFT-LCD Panel Outline Dimension (NT52002 / NT51008 D-IC)



Detail "A"

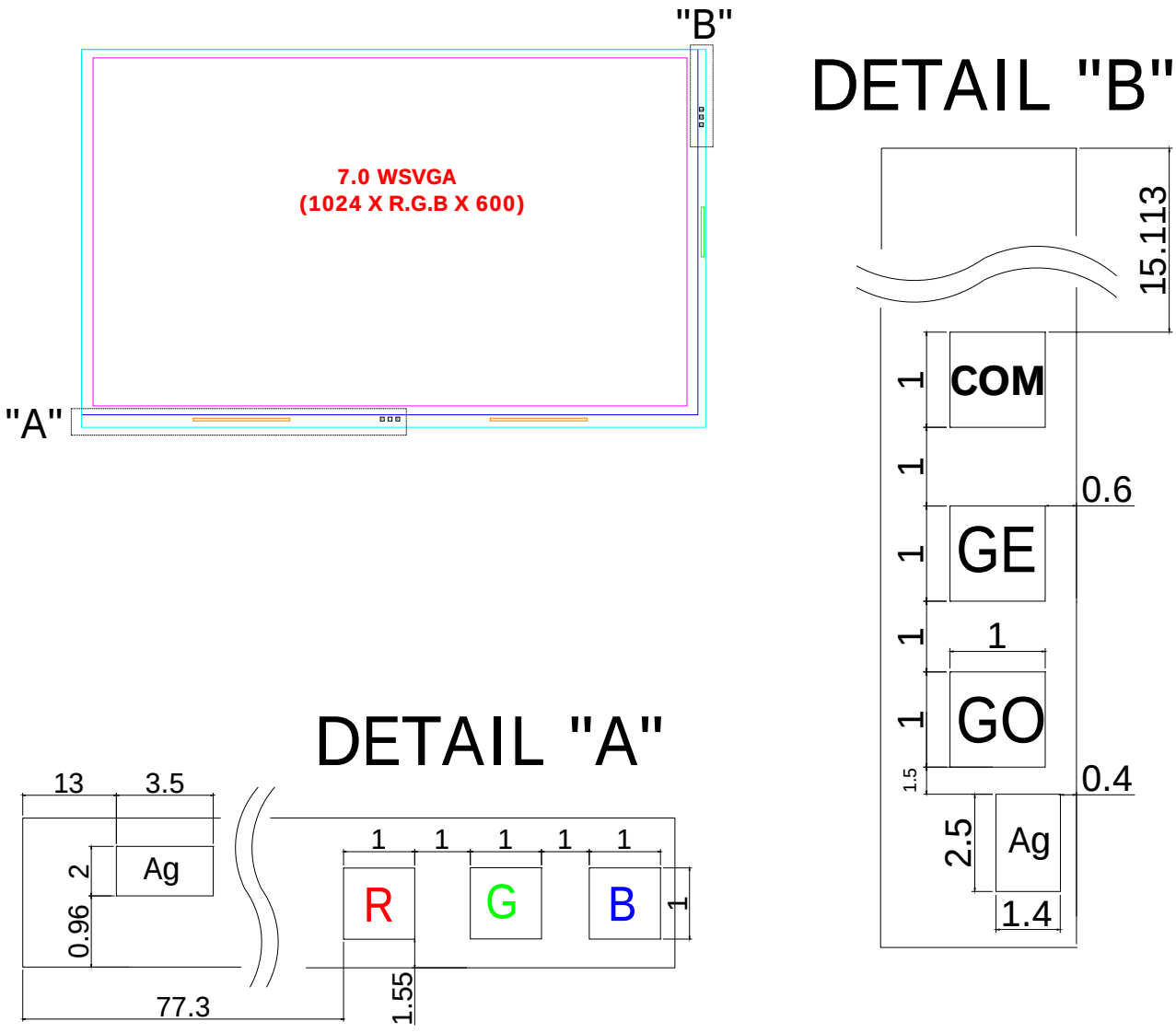


Detail "B"



*** Unit : mm**

Figure 5. Test Pad In Panel



*** Unit : mm**