



TFT-LCD MONITOR

Product Information

Temporary

MODEL NO. : T070W2D3 v.0L

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Note :

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latest product information and updates of product specification.



Records of Revision

Date	Rev. No.	Summary	Page
2008/10/10	0.1	Temporary Release	



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1.0 Handling Precaution

- 1.) Handle with care. Pay attention not to press or scratch the surface of the monitor, especially the polarizer. Do not twist or bend the monitor. It may cause un-recoverable damage.
- 2.) Do not drop or bump the monitor since this monitor contains fragile glass components. Breakage of this monitor might cause leakage of the liquid crystal sealed inside the glasses. Do not touch the liquid crystal liquid in case of leakage. **Flush with massive water immediately in case of contact with your skin by liquid crystal fluid and call for doctor for immediate medical treatment.**
- 3.) Be sure to turn off power supply while plug or un-plug the power input connector.
- 4.) Clean up the polarizer only with soft solvent if necessary. The desirable cleaners are water, IPA(Isopropyl Alcohol) or Hexane. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, toluene, Ethyl acid or Methyl chloride. It will permanently damage the polarizer due to chemical reaction. 5.) Wipe off fluid drop immediately to prevent from possible discoloration or spots on the polarizer.
- 6.) Do not twist nor bend the monitor structure, even momentarily. Bending or twisting torque may likely damage the internal components of the monitor.
- 7.) The cold cathode fluorescent lamp in LCD contains small amount of mercury (Hg). Please refer to the design specification for application and the local regulations and environmental laws for disposal purpose.
- 8.) Protect the monitor from static environment to prevent from damage to the CMOS gate array IC.



2.0 General Description

T070W2D3 v.0L is a 7 inch (15:9 aspect ratio) color active matrix TFT LCD monitor with slim outlook and excellent display performance driven by a pure **DIGITAL** LVDS interface. This monitor supports 800(H) x RGB x 480(V), stripe color pixel format, and 262,144 colors (RGB 6 bits data) with outstanding color image and **ALL-IN-ONE** functionality, including a **LED backlight** driver, DC-DC conversion circuitry. Its outstanding performances with wide operation temperature range, **-20 ~ 70°C**, good brightness, **300 nits(typ.)** and wide viewing angle(140°/120°) make this monitor very suitable for applications in server environments. Its slim mechanical design and low power consumption provide high design flexibilities in all kind of applications for customers.

2.1 General Applications

- Display terminal for applications of Portable Devices, Video Player, Navigation, Industrial, Medical, Gaming, Amusement or more

2.2 Main Features

- All-in-one design
- LED Backlight
- Built-in T-CON circuitry
- Built-in DC-DC Power Circuit
- Built-in LED Driver Circuit
- Wide Operation Temperature Range & Super Wide Viewing Angle
- High Contrast Ratio
- Digital LVDS Interface
- Very Thin and Light Weight

2.3 General Information

2.3.1 Display Characteristics

Item	Specification	Unit	Note
Display Area (HxV)	152.4 (H) x 91.44 (V)	mm	7" Diagonal
Driver Element	a-Si TFT Active Matrix	-	-
Number of Pixels (HxV)	800 x RGB x 480	pixel	Wide 15:9
Pixel Arrangement	R.G.B Vertical Stripe	-	-
Pixel Pitch (HxV)	0.1905 x 0.1905	mm	Pixel
Display Mode	Normally White	-	-
Viewing Angle (H/V)	140/120	degree	6 o'clock
Signal Interface	Digital RGB 18 bits		262K colors



2.3.2 Mechanical Dimensions

Item		Min.	Typ.	Max.	Unit	Note
Dimension	Horizontal	165.5	165.8	166.1	mm	±0.3 mm
	Vertical	104.5	104.8	105.1	mm	±0.3 mm
	Depth		7.0		mm	±0.3 mm
Weight			120		g	±10 g

3.0 Absolute Maximum Ratings

3.1 Absolute Ratings of Environment Requirement

Item	Symbol	Min.	Max.	Unit	Note
Storage Temperature	Tstg	-30	80	°C	
Operation Temperature (Ambient Temperature)	Topr	-20	70	°C	

3.2 Electrical Absolute Ratings

3.2.1 TFT-LCD Unit

(Ta=25±2°C), Vgg=GND=0V)

Item	SYMBOL	Min.	Max.	UNIT	NOTE
Power Supply Voltage	V _{DD}	-0.3	4.0	V	(1),(2)
Input Voltage	V _{i1}	-0.3	V _{DD} +0.3	V	(1),(2),(3)

3.2.2 LED Driver Unit

Item	SYMBOL	MIN	MAX	UNIT	NOTE
Power Supply Voltage	V _{BL}	-0.3	6.0	V	(1),(2)
Input Voltage	V _{i2}	-0.3	V _{BL} +0.3	V	(1),(2),(4)

3.2.3 Touch Panel Controller Unit (USB port and Hub)

Item	SYMBOL	MIN	MAX	UNIT	NOTE
Power Supply Voltage	V _{USB}	-0.3	6.0	V	(1),(2)
Input Voltage	V _{i3}	-0.3	V _{USB} +0.3	V	(1),(2),(5)

Note (1) Within operating temperature

Note (2) Permanent damage to the device may occur if maximum values are exceeded.

Functional operation should be restricted to the conditions described under normal operating conditions.

Note (3) For all pins except power and ground pins on CN101

Note (4) For pins "DIM" and "ENA" on CN102

Note (5) For all pins except power and ground pins on CN103



4.0 Optical Characteristics

The following items are measured under stable conditions in a dark room or equivalent state.

* Measuring Equipment: BM-5A, PR-650

Note (1),(2)

($V_{DD}=3.3V$, $f_V=60Hz$, $f_H=15.734KHz$, $V_{BL}=5.0V$ $T_a=25\pm 2^\circ C$)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	At optimized Viewing Angle	400	500	-		(4)
Response Time at 25°C	Rising	T_R	$\theta=0^\circ$	-	10	20	ms	(3)
	Falling	T_F		-	15	30		
Luminance		Y_L		240	300		cd/m ²	
Color Chromaticity (CIE 1931)	White	W_X	$\theta = 0^\circ$		TBD			(6)
		W_Y	$\theta = 0^\circ$		TBD			
Viewing Angle	Hor.	θ_L	CR \geq 10 at center point	60	70	-	Degree	(5)
		θ_R		60	70	-		
	Ver.	θ_H		40	50	-		
		θ_L		60	70	-		
Luminance Uniformity		Y_u	$\theta = 0^\circ$	70	75	-	%	

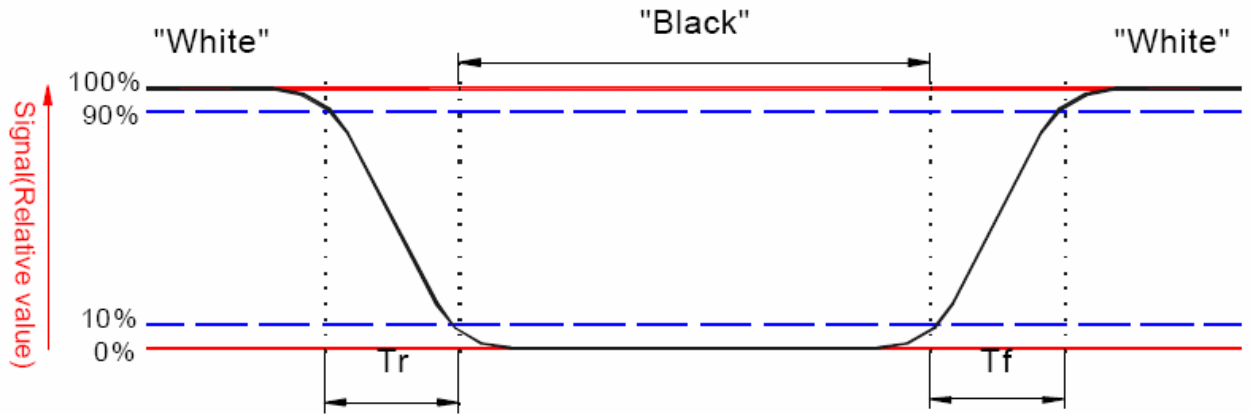
Note (1) : Ambient temperature =25°C , and , using the Mode 2 of LED control scheme and $V_{DIM}=0V$ to get the maximum brightness. To be measured in the dark room.

Note (2) : To be measured on the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-5, after 10 minutes operation.

Note (3) : Definition of response time:

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively.

The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.

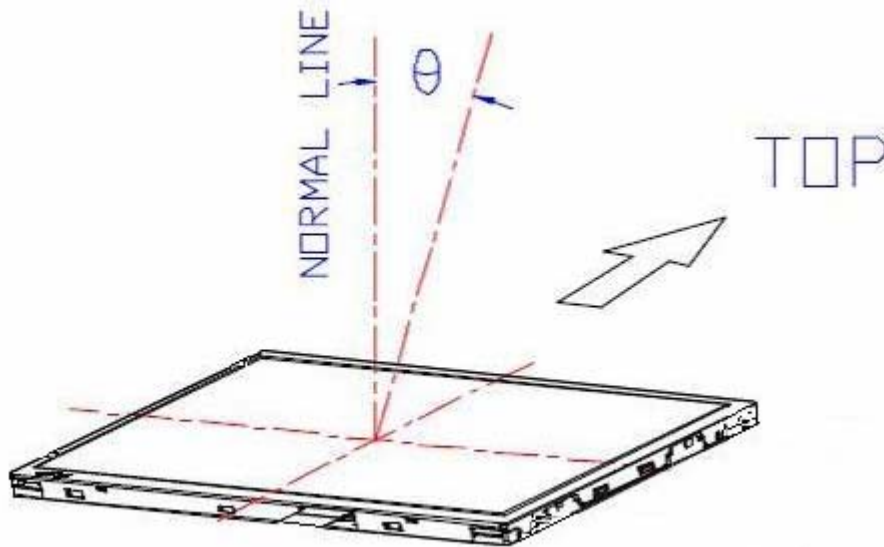


Note (4) : Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

Note (5) : Definition of viewing angle, Refer to figure as below.



Note (6) : Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.



5.0 Electrical Characteristics

5.1 AC Timing Characteristics

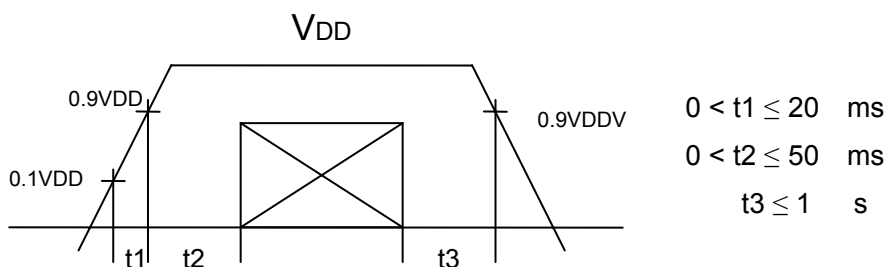
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Clock Frequency	F_{ck}	-	33.3	50	MHz	
Clock Duty Ratio	$T_{ch}/(T_{ch}+T_{cl})$	45	50	55	%	
Horizontal Display Period	T_{hd}		800		clk	
Vertical Display Period	T_{vd}		480		T_h	
Data Setup Time	T_{ds}	5	-	-	ns	
Data Hold Time	T_{ch}	10	-	-	ns	

5.2 DC Characteristics

5.2.1 TFT-LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{DD}	3.0	3.30	3.6	V	(1)
	I_{DD}	-	(230)	(260)	mA	(2)
Permissive Input Ripple Voltage	V_{RF}	-	-	100	mV _{P-P}	$V_{DD}=+5V$
LVDS Differential Input Voltage	V_{id}	-100		100	mV	
LVDS Common Input Voltage	V_{ic}		1.2		V	

Note (1) VDD Power-On condition :



Note (2) Conditions for current consumption :

8 Gray Scale Pattern, $V_{DD}=3.3V$, $f_H=27.86KHz$, $f_V=60.0Hz$, $f_{CLK}=33.3MHz$



5.2.2 Backlight Unit and LED Driver

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{BL}	4.5	5.0	5.5	V	
	I_{BL}	-	0.48	-	mA	(1)

Note 1 : $V_{BL} = 5.0$ V, using the Mode 2 of LED control scheme and $V_{DIM} = 0$ V to get the maximum brightness.

5.3 Input Terminal Pin Assignment

5.3.1 Signal Input Interface, CN101

Hirose connector: 20 pin, DF-19K-20P-1H

Mating Connector : DF-19G-20S-1C or equivalent

Pin No	Symbol	Description	Remark
1	VDD	Power supply (3.3V)	-
2	VDD	Power Supply (3.3V)	-
3	GND	Ground	-
4	GND	Ground	-
5	RxIN0-	LVDS receiver signal channel 0	R0~R5, G0
6	RxIN0+		
7	GND	Ground	-
8	RxIN1-	LVDS receiver signal channel 1	G1~G5, B0, B1
9	RxIN1+		
10	GND	Ground	-
11	RxIN2-	LVDS receiver signal channel 2	B2~B5, DE, Hsync, Vsync
12	RxIN2+		
13	GND	Ground	-
14	CLKIN-	LVDS receiver signal clock	LVDS Level Colck
15	CLKIN+		
16	GND	Ground	-
17	NC	No connection	-
18	NC	No connection	-
19	GND	Ground	-
20	GND	Ground	-



5.3.2 LED Driver Unit, CN401

Connector : Hirose DF19G-14P-01H

: Matching Connector : Hirose DF19G-14S-1C or equivalent

Mode 1

Pin No.	Symbol	Description	Remark
1	V _{BL}	Power Supply for LED Driver	
2	V _{BL}	Power Supply for LED Driver	
3	EN	LED Enable & Dimming Control Input	Note 1
4	DIM	Connect this pin to GND at this mode	Note 2
5	GND	Ground Pin for LED Driver	
6~14	-	N/A (for future extension use)	

Note 1 : The "Enable & Dimming Control" of the LED driver shares the same pinning. The LED backlight will turn on when the input voltage of this pin exceeds +0.6V. The LED current/brightness will be adjustable by applying an analog voltage between +0.8 ~ +1.4V(Max. Brightness).

Note 2: The "DIM" pin should be connected to GND in order to get the full brightness.

Mode 2:

Pin No.	Symbol	Description	Remark
1	V _{BL}	Power Supply for LED Driver	
2	V _{BL}	Power Supply for LED Driver	
3	EN	LED Enable Control Input	Note 1
4	DIM	Dimming Control Input	Note 2
5	GND	Ground Pin for LED Driver	
6~14	-	N/A (for future extension use)	

Note 1 : Disable V_{EN}<0.6 V, Enable V_{EN}>1.8 V

Note 2 : Max Brightness V_{DIM} : 0V, Min Brightness V_{DIM} : 2.2V (≈ 0 Nit)

Mode 3:

Pin No.	Symbol	Description	Remark
1	V _{BL}	Power Supply for LED Driver	
2	V _{BL}	Power Supply for LED Driver	
3	EN	PWM Control Pulse Input	Note 1, 2
4	DIM	Connect this pin to GND at this mode	Note 3
5	GND	Ground Pin for LED Driver	
6~14	-	N/A (for future extension use)	

Note 1: Valley of PWM Pulse V_{PWM}<0.6 V, Peak of PWM Pulse V_{PWM} >1.8 V

Note 2: The frequency of each completed PWM cycle: 100~300 Hz

Note 3: The "DIM" pin should be connected to GND in order to get the full brightness.



5.4 Color Data Reference

The below table is about input signal, Basic display colors and gray scale of each color.

0 : Low Level Voltage 1 : High Level Voltage

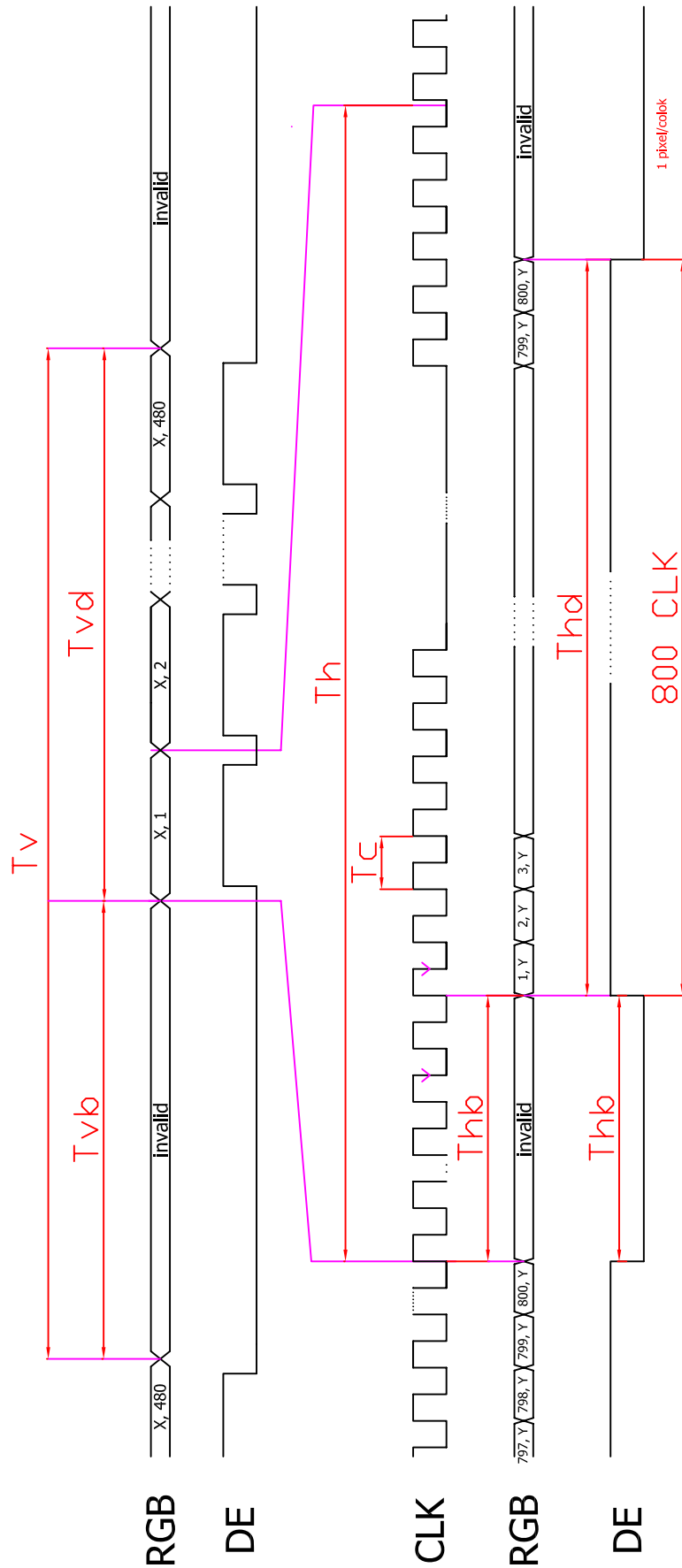
Each basic color can be displayed in 64 gray scales from 6 bit data signals. With the combination of total 18 bit data signals, the 262,144 color display can be achieved on the screen.

- Please refer to the next page



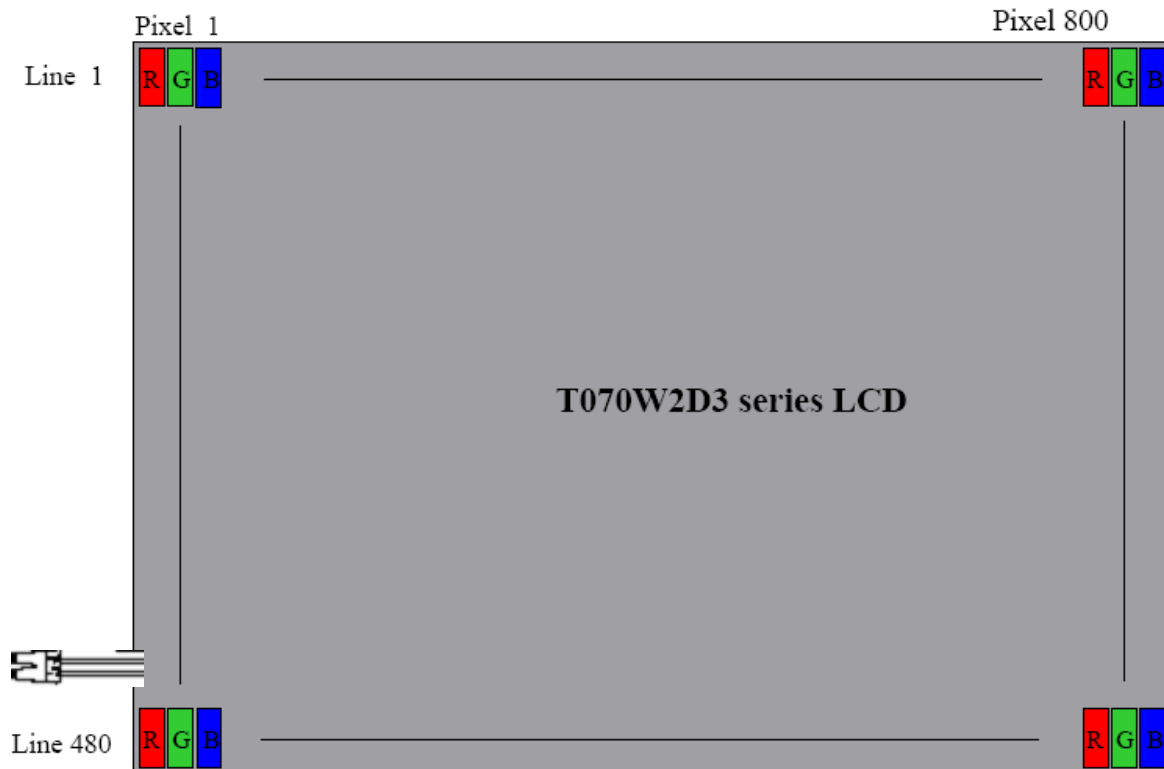
	Colors & Gray Scale	Data Signal																		
		Gray Scale	R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
Basic Color	Black	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	-	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	-	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	-	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	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	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
Gray Scale of Red	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑	↓				↓					↓						↓			
	↓	↓									↓						↓			
	Brighter	GS61	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	↓	GS62	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS63	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑	GS1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	↑	↓				↓														
	↓	↓				↓														
	Brighter	GS61	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
	↓	GS62	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green	GS63	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale of Blue	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑	GS1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	↑	↓																		
	↓	↓																		
	Brighter	GS61	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	↓	GS62	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Blue	GS63	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

5.5 Input Timing Chart





6.0 Pixel Format Image

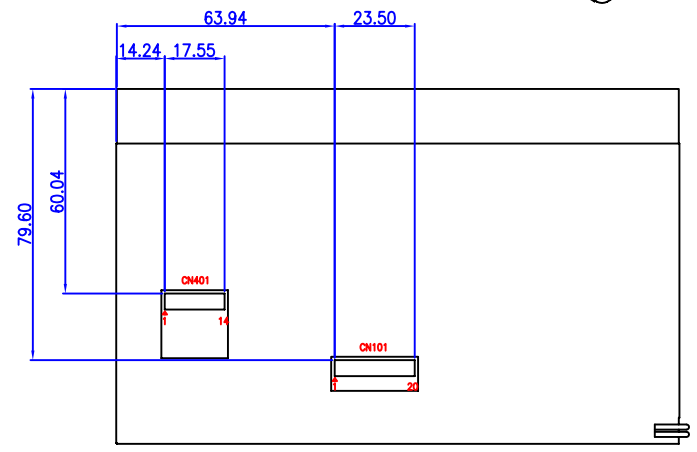
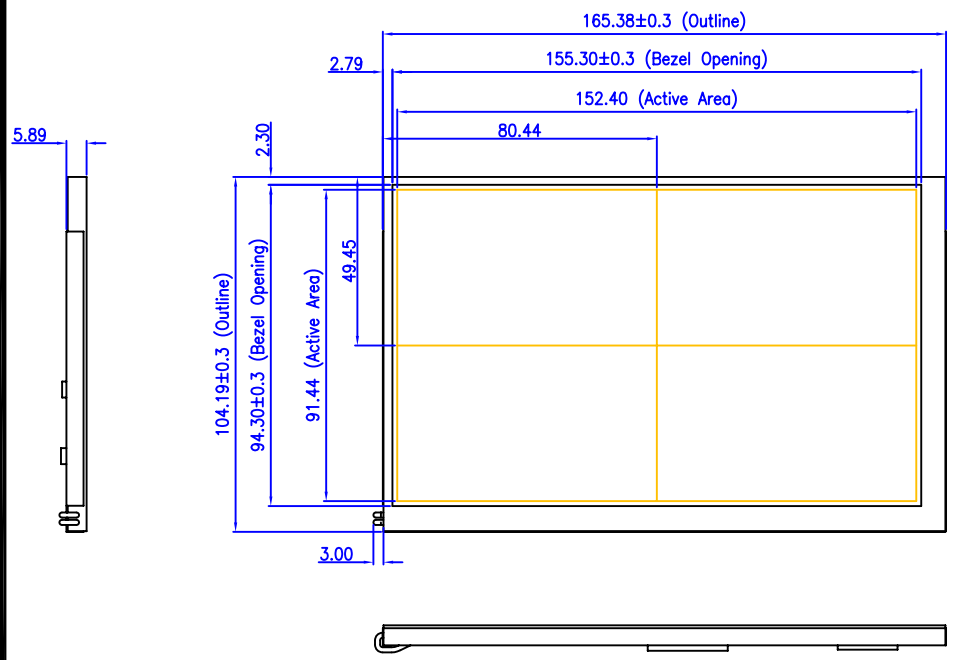
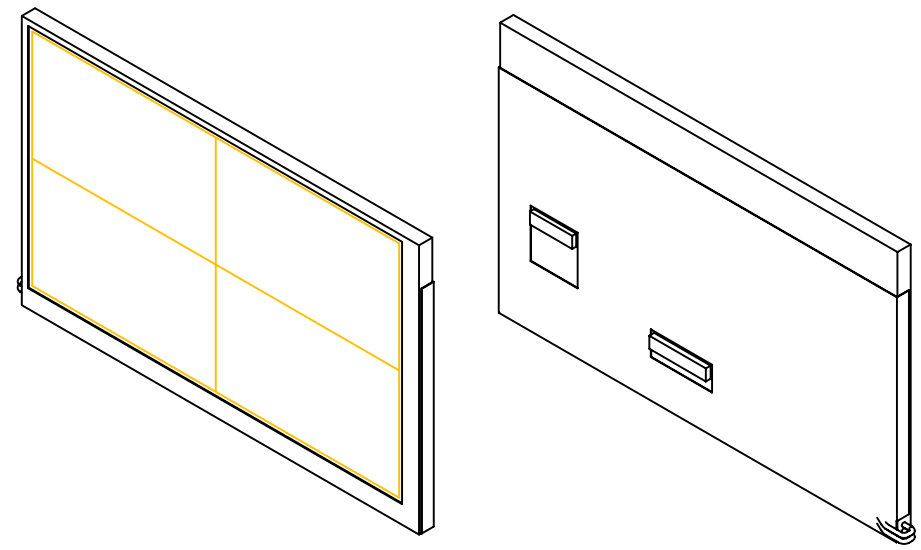


7.0 Display Outline Dimensions

7.1 Monitor Outline Dimensions

- Please refer to the next page

REV	EC NUMBER	DESCRIPTION	DATE
▽	XXXXXXXX	XXXXXXXX	



GENERAL TOLERANCE RANGE				SELECT LEVEL
DIMENSION	1	2	3	
0 - 6	0.1	0.2	0.2	2
6 - 16	0.1	0.2	0.2	
16 - 63	0.1	0.2	0.4	
63 - 250	0.2	0.4	0.6	
250 - 600	0.4	0.6	1.0	
600 - 4000			1.6	

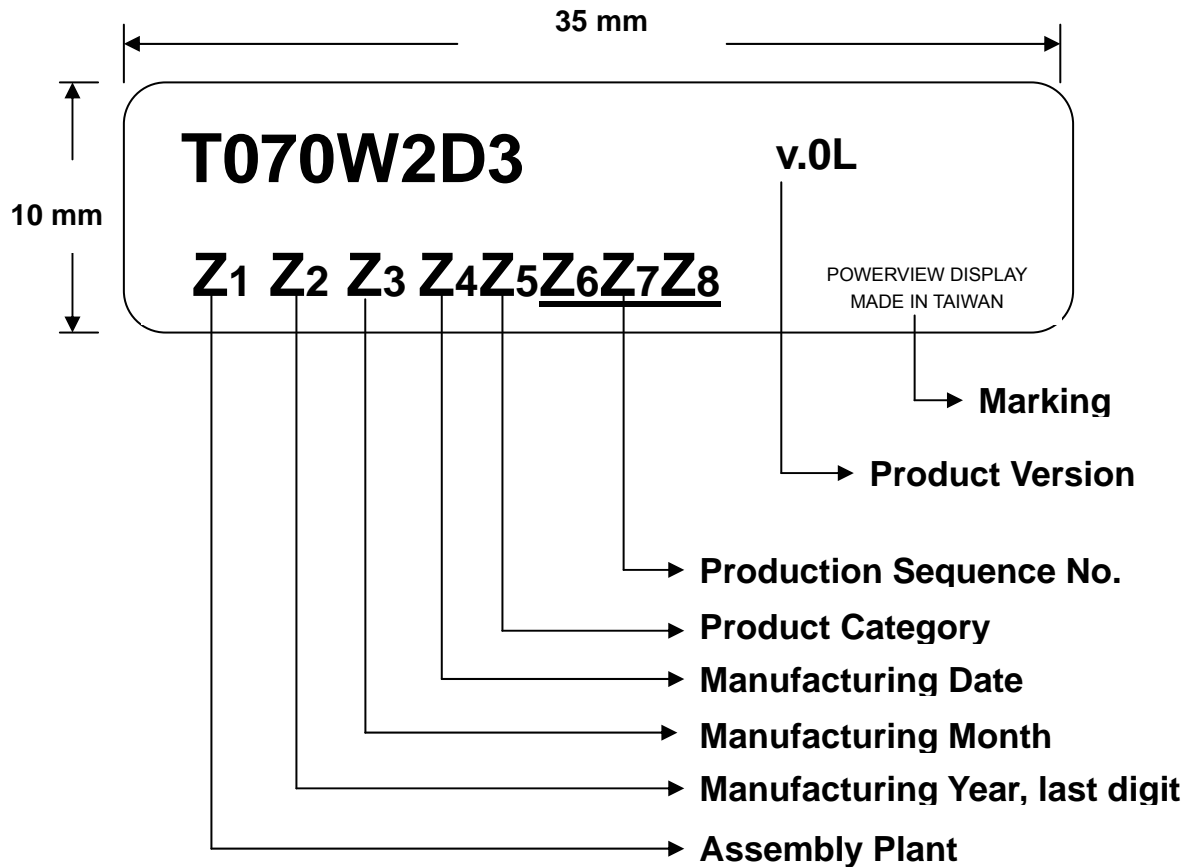
MATERIAL		See notes	UNIT	mm	SCALE	1:1	VIEW	3rd ANGLE	MODEL NAME	T070W2D4
FINISH		finish	CONTROL DIMENSION		FIRST ANGLE				PART DESCRIPTION	
APPROVED			BYD DIMENSION		T070W2D3 v.0L				7" WGA TFT LCD LVDS I/F Outline Dimensions	
CHECKED					DATE		2008/10/08		REV	
DESIGNED		Neal			SIZE		A4		1-1	

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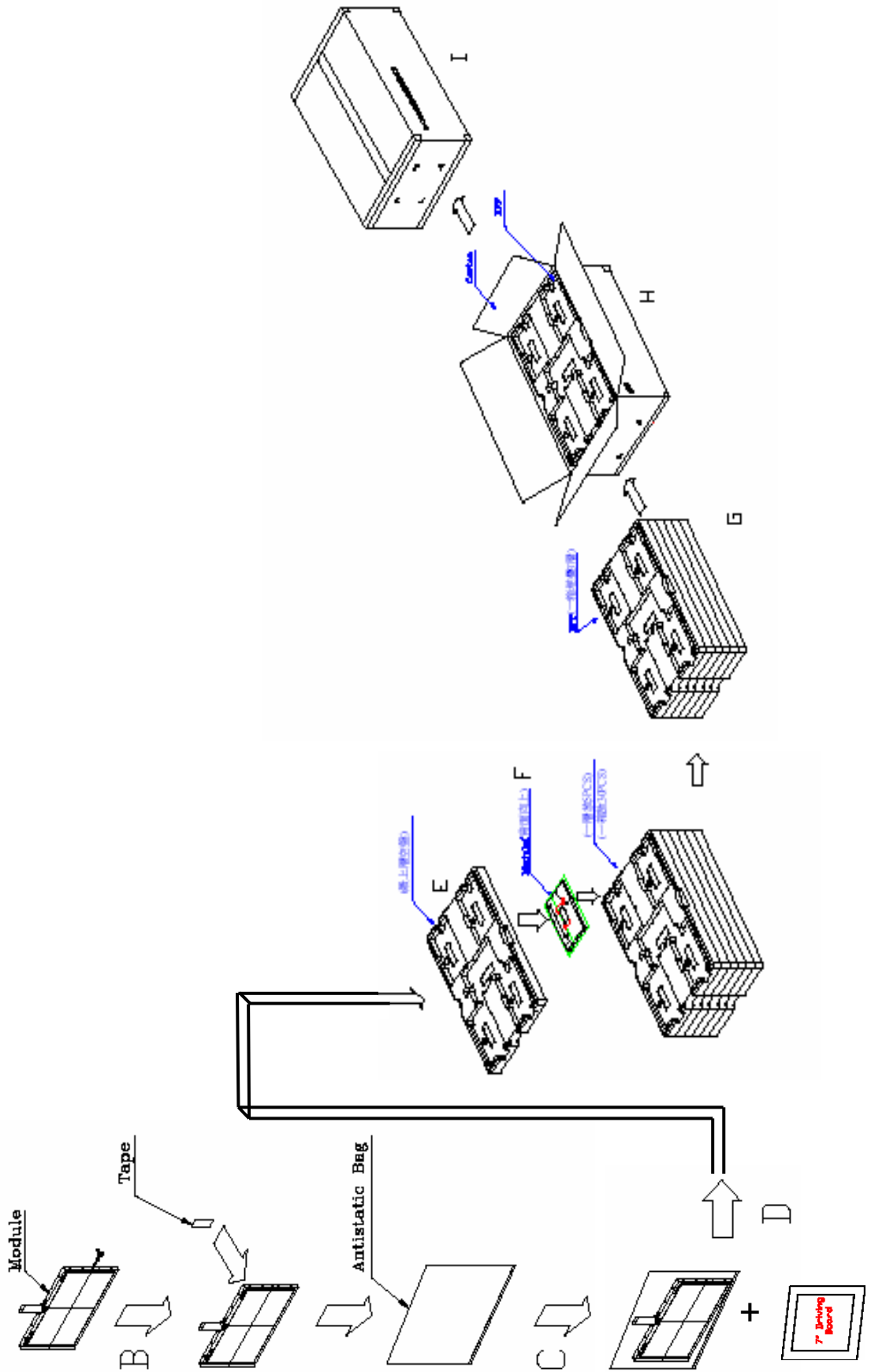
8.0 Labeling, Packaging & Others

* Labeling



* Packaging

- Please refer to the next page





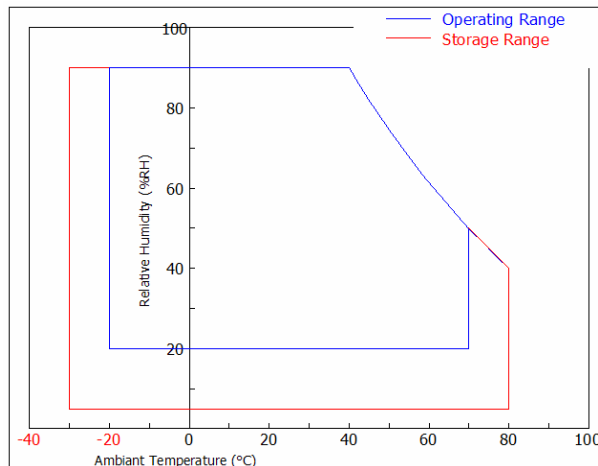
9.0 General Notice

9.1 Reliability Test Items (Note 2)

No.	Test Items	Conditions	Remark
1	High Temperature Storage	Ta= + 80°C 240 Hrs	
2	Low Temperature Storage	Ta= - 30°C 240 Hrs	
3	High Temperature Operation	Ta= + 70°C 240 Hrs	
4	Low Temperature Operation	Ta= - 20°C 240 Hrs	
5	High Temperature and High Humidity	Tp= 60°C, 90%RH 240 Hrs	operation
6	Heat Shock	-25~80°C/200 cycles 1Hr/cycle	Non-operation
7	Electrostatic discharge	±200V, 200pF(0Ω), once for each terminal	Non-operation
8	Vibration	Frequency range : 8~33.3 Hz Stoke : 1.3mm Sweep : 2.9G, 33.3~400Hz Cycle : 15 minutes 2 hours for each direction of X,Z 4 hours for Y direction	JIS C7021, A-10 Condition A
9	Mechanical Shock	100G, 6ms, ±X±Y±Z 3 times for each direction	JIS C7021, A-7 Condition C
10	Vibration (with carton)	Random vibration : 0.015G ² /Hz from 5~200Hz -6dB/octave from 200~500Hz	IEC 68-34
11	Drop (with carton)	Height : 60 cm 1 corner, 3 edges, 6 surfaces	JIS Z0202

Note1: Ta: Ambient temperature.

Note 2: In the standard conditions, there is not display function NG issue occurred. All the cosmetic specification is judged before the reliability stress.





9.2 Storage, Operation & Others

- (a) Do not leave the panel in high temperature, and high humidity for a long time.
It is highly recommended to store the module with temperature from 0 to 35°C and relative humidity of less than 70%.
- (b) Do not store the TFT-LCD module in direct sunlight.
- (c) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during the store.
- (d) Do not connect, disconnect the module in the "Power On" condition.
- (e) Power supply should always be turned on/off by the item 3.2 "Electrical Absolute Ratings"
- (f) The liquid-crystal is deteriorated by ultraviolet rays. Do not leave it in direct sunlight and strong ultraviolet rays for many hours.
- (g) Avoid condensation of water. It may result in improper operation or disconnection of electrode.
- (h) Do not exceed the absolute maximum rating value. (the supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on)
Otherwise the panel may be damaged.
- (i) If the panel displays the same pattern continuously for a long period of time, it can be the situation when the image "Sticks" to the screen.
- (j) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.