



Doc. Version	1.1
Total Page	22
Date	2007/03/06

# **Product Specification**

## **7.0" COLOR TFT-LCD MODULE**

MODEL NAME: A070VW02 V0

<◆>Preliminary Specification

< >Final Specification

Note: The content of this specification is subject to change.

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### Record of Revision

Version	Revise Date	Page	Content
0.0	2006/04/07		First draft.
0.1	2006/05/03	5	Modify thickness to 6.7mm.
0.2	2006/05/10	5	Revise weight
		6	Update mechanical drawing
		17	Revise optical specifications
0.3	2006/05/17	13	Add VS timing diagram for HV mode timing
0.4	2006/05/19	21	Add packing form
0.5	2006/06/05	14	Remove power on/off sequence
		19	Revise heat shock condition
0.6	2006/08/05	5	Modify surface treatment description
		7	Modify the outline drawing for rear side
		9	Define IDD value
		15-18	Revise touch panel specifications
		19	Revise the note of RA test
0.7	2006/08/15	13-14	Update timming value
0.8	2006/10/26	9	Update absolute maximum rating
		9	Define LED lifetime
0.9	2006/10/30	8	Revise the pin assignment, EDID pins are reserved but not connect
1.0	2007/01/17	7	Make the outline drawing be clear
1.1	2007/03/06	7	PCBA outline modify



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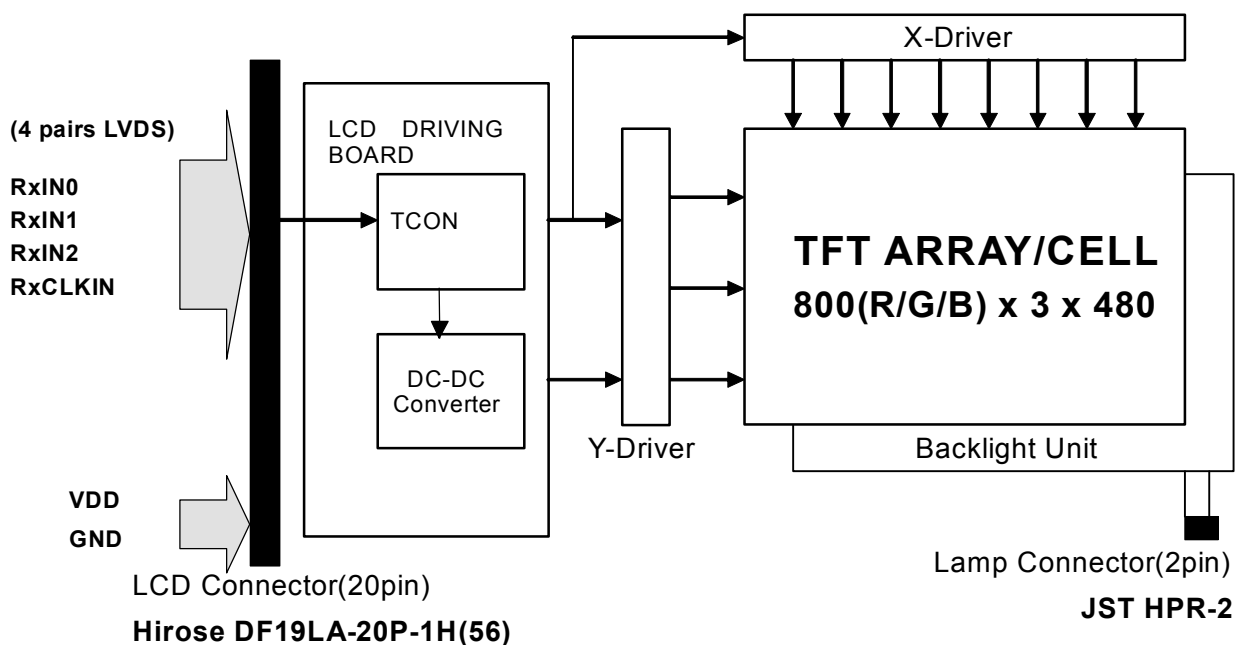
## A. General Description

A070VW02 V0 is a transmissive type color active amorphous Silicon TFT (Thin Film Transistor) LCD (Liquid crystal Display). This model is composed of a TFT-LCD module, a backlight unit, a driving board and a touch panel

## B. Features

- 7-inch display size
- WVGA resolution with stripe dot arrangement
- Single 3.3V power supply for LCD, 6.6V/200mA for LED backlight
- SYNC + DE Mode
- Low power consumption
- LVDS 6-bit input interface
- Wide viewing angle
- Green design

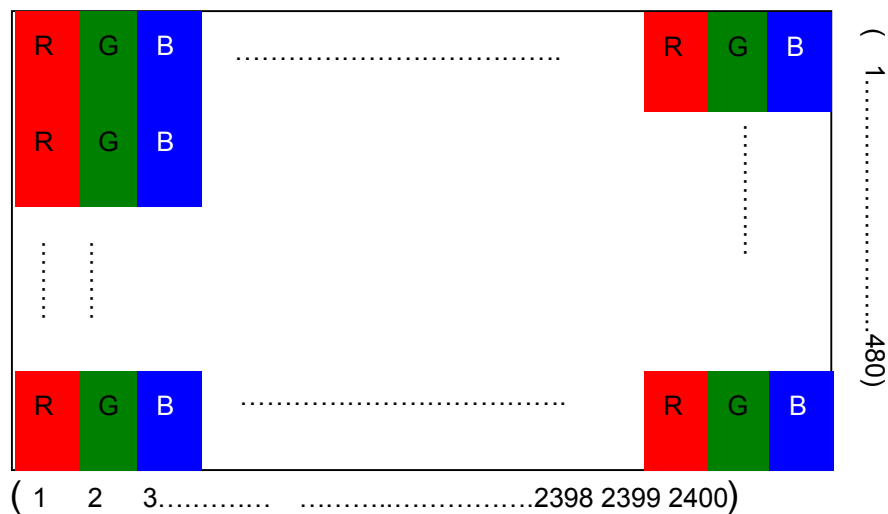
## C. Functional Block Diagram



## D. Physical specifications

NO.	Item	Unit	Specification	Remark
1	Display Resolution	dot	800RGB(H)×480(V)	
2	Active Area	mm	152.40(H)×91.44(V)	
3	Screen Size	inch	7.0(Diagonal)	
4	Pixel Pitch	mm	0.1905(H)×0.1905(V)	
5	Color Configuration	--	R. G. B. Stripe	Note 1
6	Color Depth	--	262K Colors	Note 2
7	Overall Dimension	mm	165(H) × 106(V) × 6.7(T)	Note 3
8	Weight	g	165+/-10%	
9	Surface treatment	--	Anti-Glare(8% haze value)	
10	Display Mode	--	Normally White	

Note 1: Below figure shows the dot stripe arrangement.

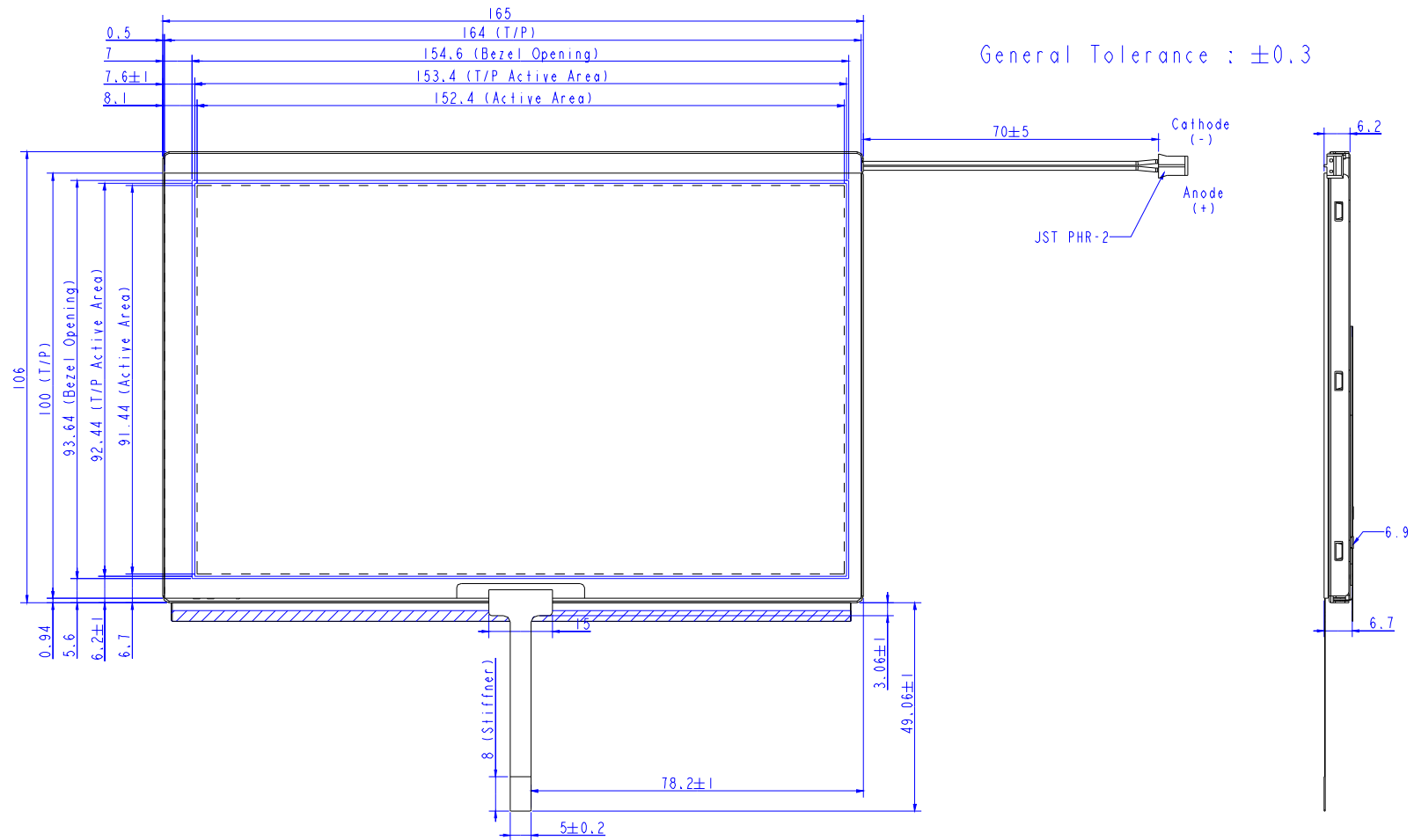


Note 2: The 262K color display depends on 6-bit data signal input.

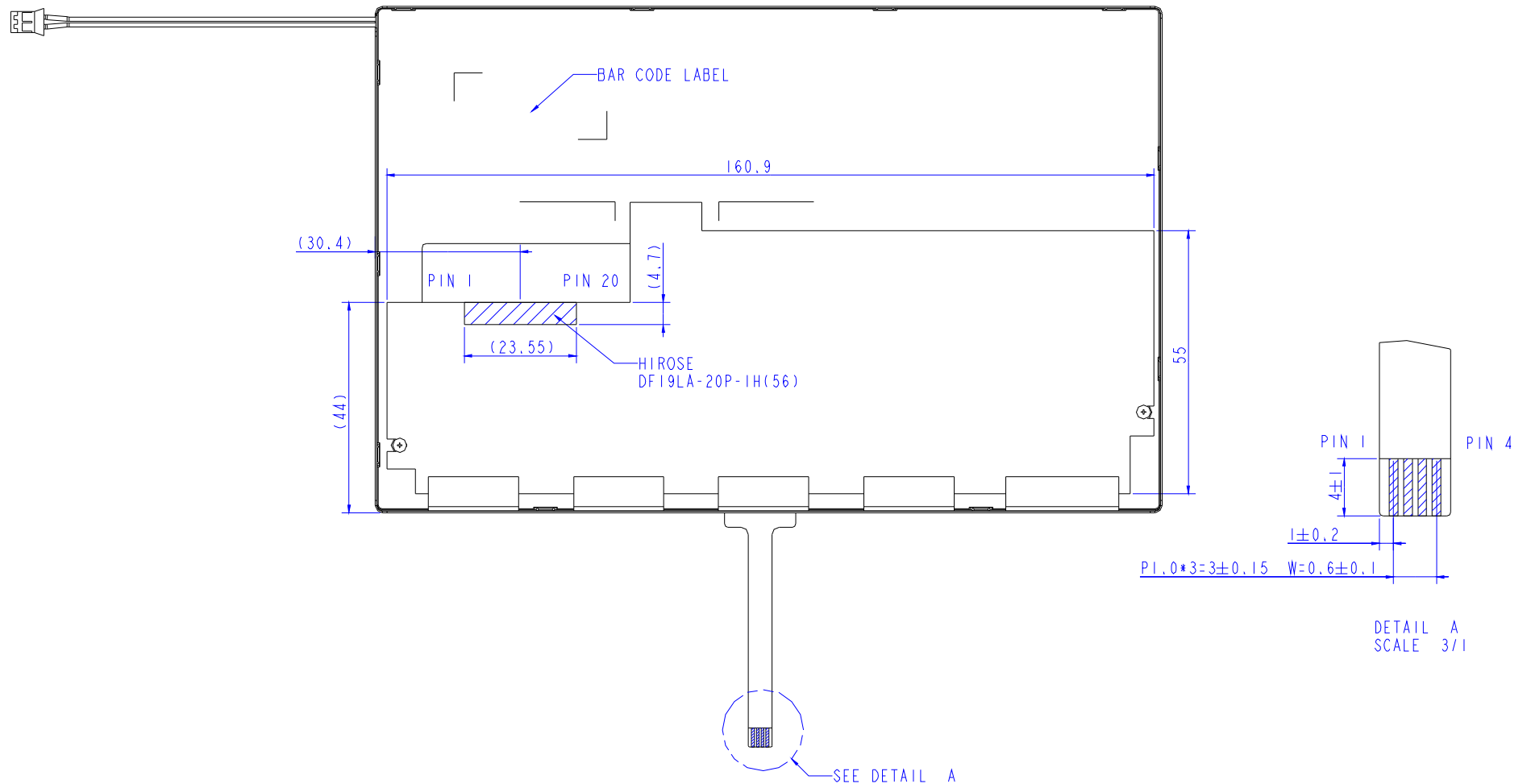
Note 3: Not including the backlight cable and screw height. Refer to next page for further information

## E. Outline Dimension

### 1. TFT-LCD Module – Front View



## 2. TFT-LCD Module – Rear View

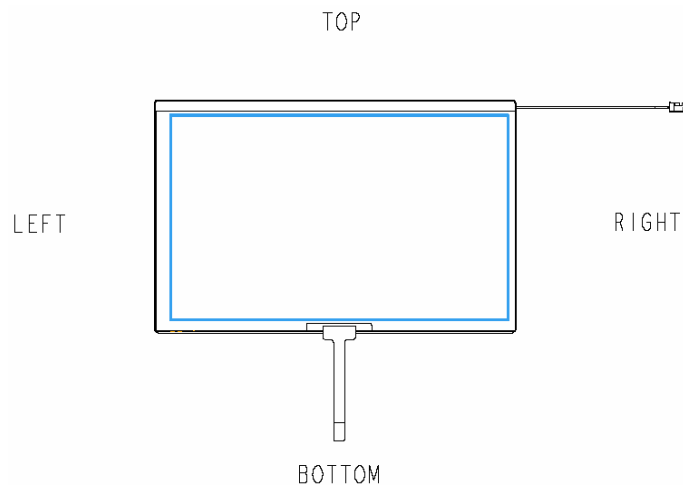


## F. Electrical Specifications

### 1. LVDS Connector Pin Assignment

Pin No	Symbol	I/O	Function
1	GND	G	Ground
2	VDD	P	Power supply 3.3V (typical)
3	VDD	P	Power supply 3.3V (typical)
4	NC	--	Reserved – Do not connect
5	NC	--	Reserved – Do not connect
6	NC	--	Reserved – Do not connect
7	NC	--	Reserved – Do not connect
8	RxIN0N	I	-LVDS differential data input (R0~R5, G0)
9	RxIN0P	I	+LVDS differential data input (R0~R5, G0)
10	GND	G	Ground
11	RxIN1N	I	-LVDS differential data input (G1~G5, B0~B1)
12	RxIN1P	I	+LVDS differential data input (G1~G5, B0~B1)
13	GND	G	
14	RxIN2N	I	-LVDS differential data input (B2~B5, H <sub>sync</sub> , V <sub>sync</sub> , DE)
15	RxIN2P	I	+LVDS differential data input (B2~B5, H <sub>sync</sub> , V <sub>sync</sub> , DE)
16	GND	G	Ground
17	RxCLKINN	I	-LVDS differential clock input
18	RxCLKINP	I	+LVDS differential clock input
19	GND	G	Ground
20	GND	G	Ground

I: Input pin; P: Power pin; G: Ground pin





## 2. Absolute Maximum Ratings

Items	Symbol	Product Specification			Unit
		Min.	Typ.	Max.	
Power Voltage	VDD	-0.3		4	V
Operation Temperature	Topa	0		60	°C
Storage Temperature	Tstg	-20		65	°C

## G. Electrical Characteristics

The following items are measured under a stable condition and suggested application circuit.

### 1. TFT-LCD Typical Operation Condition

Items	Symbol	Product Specification			Unit
		Min.	Typ.	Max.	
Power Voltage	VDD	3.0	3.3	3.6	V
IDD Current	IDD	--	190	210	mA

Note: Above every operation range is based on stable operation.

### 2. Backlight Driving Condition

Parameter	Symbol	Min.	Typ.	Max.	Unit
Voltage for LED	VLED	--	6.6	--	V
Current for LED	ILED	--	200	240	mA
LED lifetime		10,000			Hrs

Note 1: Panel surface temperature should be kept less than content of "Absolute maximum ratings"

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C, IL=200mA

## 3. Signal Electrical Characteristics

### a. Signal Operation Condition

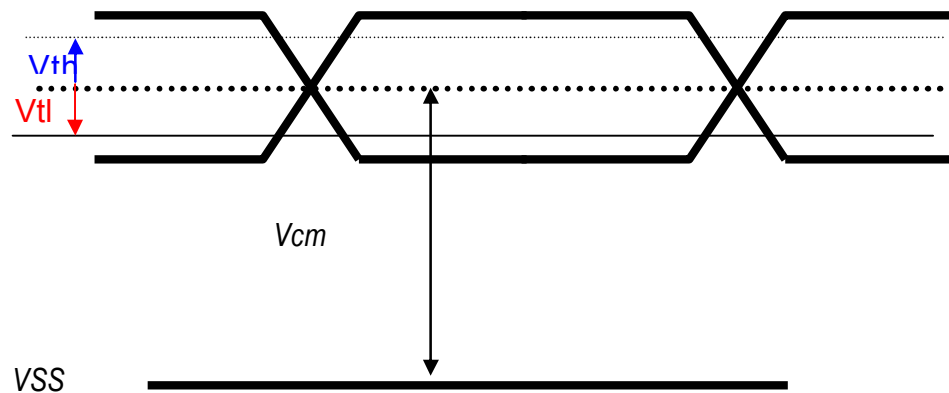
Input signals shall be low or Hi-Z state when VDD is off.

It is recommended to refer to the specifications of SN75LVDS86DGG(Texas Instruments) in detail.

Signal electrical characteristics are as follows

Parameter	Condition	Min	Max	Unit
Vth	Differential Input High Threshold (Vcm=+1.2V)		100	[mV]
Vtl	Differential Input Low Threshold (Vcm=+1.2V)	-100		[mV]

Note: LVDS Signal Waveform:



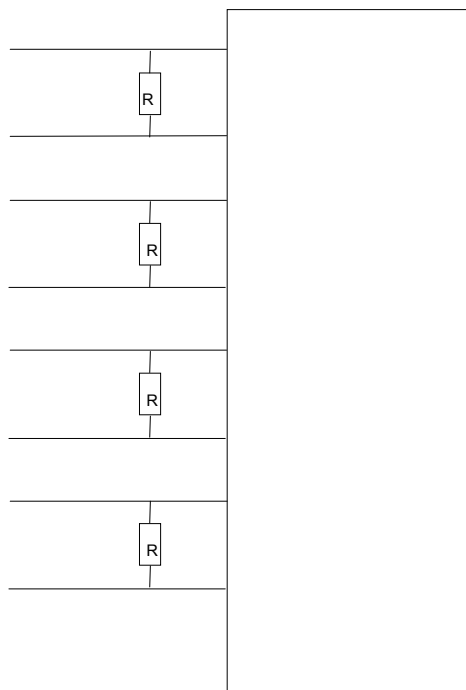
The module uses a 100ohm resistor between positive and negative data lines of each receiver input.

### Signal Input

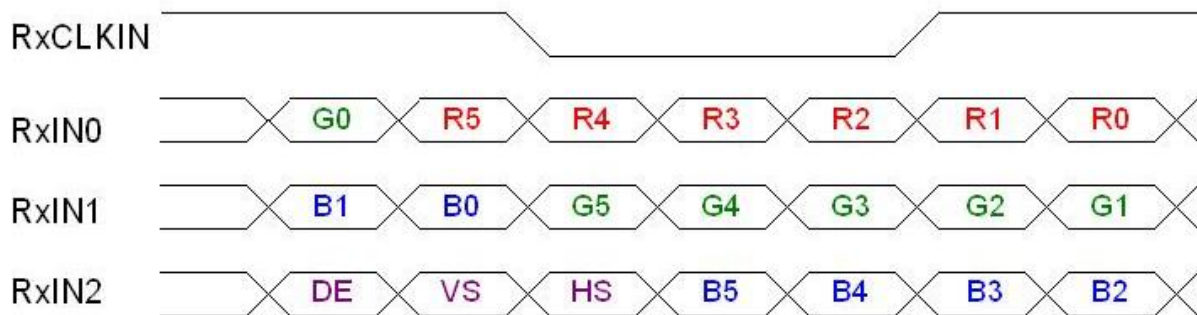
Pin No.

LVDS Receiver

8 RxIN0-  
9 RxIN0+  
11 RxIN1-  
12 RxIN1+  
14 RxIN2-  
15 RxIN2+  
17 RxCLKIN-  
18 RxCLKIN+



## b. Input Data Format



Signal Name	Description	
RED5	Red Data 5 (MSB)	Red-pixel Data Each red pixel's brightness data consists of these 6 bits pixel data.
RED4	Red Data 4	
RED3	Red Data 3	
RED2	Red Data 2	
RED1	Red Data 1	
RED0	Red Data 0 (LSB)	
	Red-pixel Data	
GREEN 5	Green Data 5 (MSB)	Green-pixel Data Each green pixel's brightness data consists of these 6 bits pixel data.
GREEN 4	Green Data 4	
GREEN 3	Green Data 3	
GREEN 2	Green Data 2	
GREEN 1	Green Data 1	
GREEN 0	Green Data 0 (LSB)	
	Green-pixel Data	
BLUE 5	Blue Data 5 (MSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 6 bits pixel data.
BLUE 4	Blue Data 4	
BLUE 3	Blue Data 3	
BLUE 2	Blue Data 2	
BLUE 1	Blue Data 1	
BLUE 0	Blue Data 0 (LSB)	
	Blue-pixel Data	

DTCLK	Data Clock	The signal is used to strobe the pixel data and DSPTMG signals. All pixel data shall be valid at the falling edge when the DSPTMG signal is high.
DSPTMG	Display Timing	This signal is strobed at the falling edge of -DTCLK. When the signal is high, the pixel data shall be valid to be displayed.
VSYNC	Vertical Sync	The signal is synchronized to -DTCLK .
HSYNC	Horizontal Sync	The signal is synchronized to -DTCLK .

Note: Output signals from any system shall be low or Hi-Z state when VDD is off.

### c. Signal Description

The LVDS receiver equipped in this LCD module is compatible with SN75LVDS86 standard. LVDS is a differential signal technology for LCD interface and high speed data transfer device. Transmitter shall be SN75LVDS84 (negative edge sampling) or compatible.

Signal Name	Description
RxIN0N, RxIN0P	LVDS differential data input (Red0-Red5, Green0)
RxIN1N, RxIN1P	LVDS differential data input (Green1-Green5, Blue0-Blue1)
RxIN2N, RxIN2P	LVDS differential data input (Blue2-Blue5, Hsync, Vsync, DSPTMG)
RxCLKINN, RxCLKIN0P	LVDS differential clock input
VDD	+3.3V Power Supply
GND	Ground

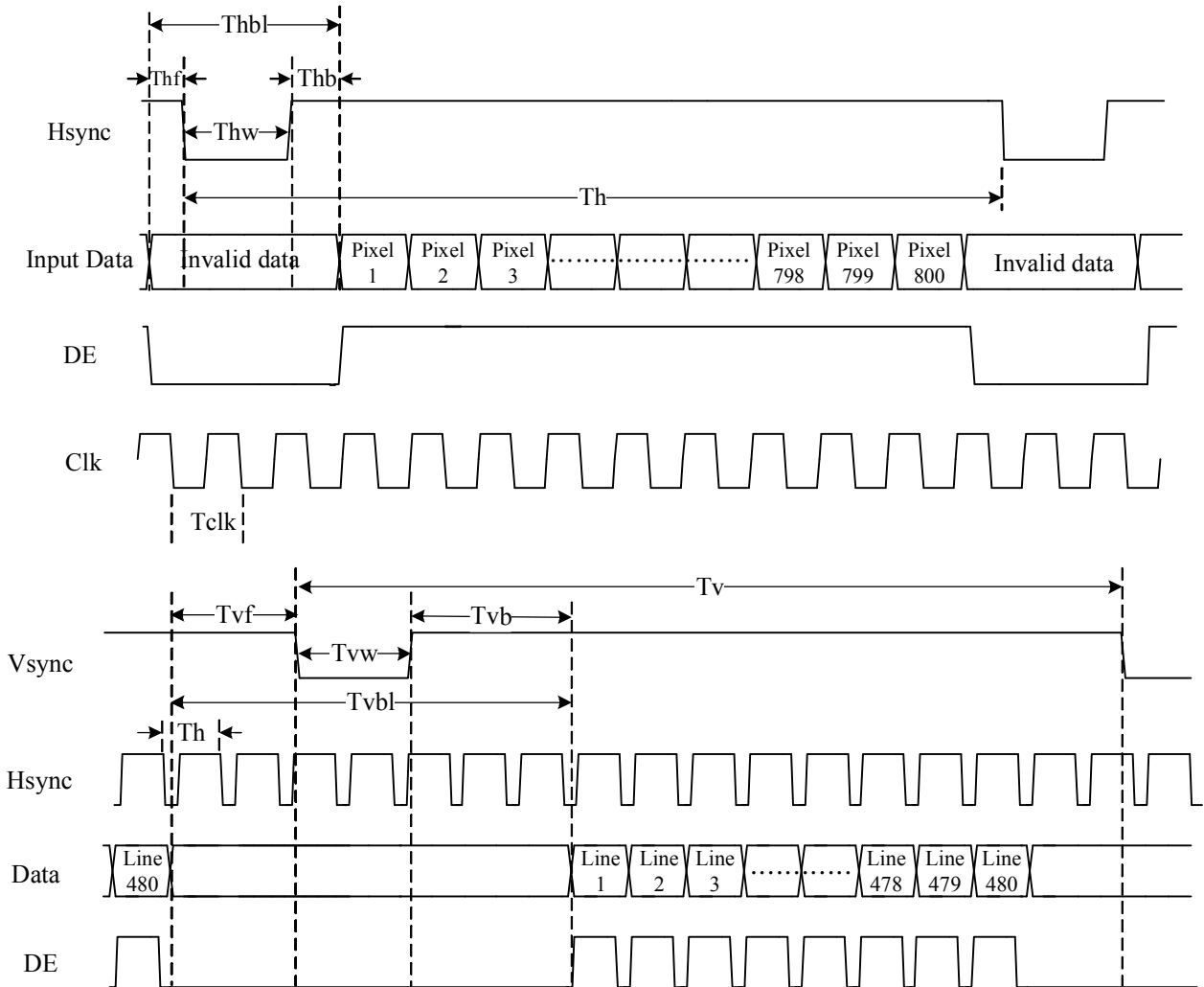
Note 1: Start from right side

Note 2: Please follow VESA

## 4. AC Timing

### a. HV Mode

#### (a-1) Timing Diagram



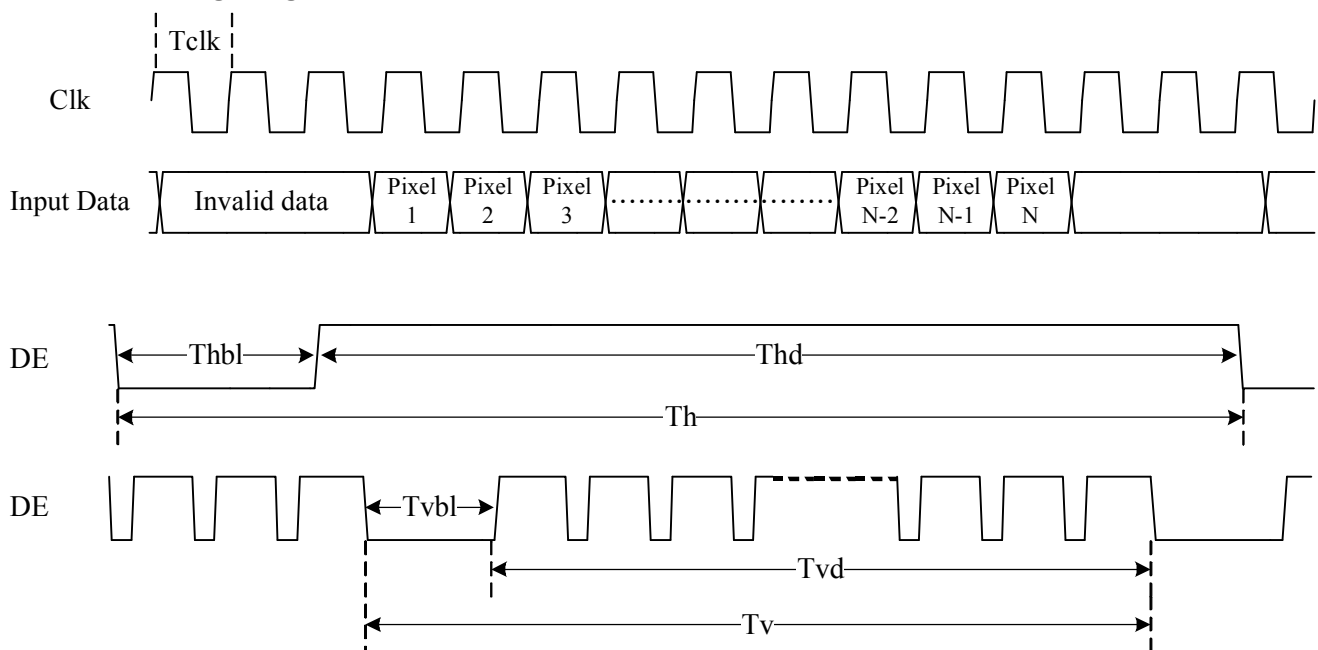
#### (a-2) Timing Condition

Item	Symbol	Min	Typ	Max	Unit	Remark
Frame Rate			60	--	Hz	
Clock frequency	1/Tck	29.58	33.26	39.82	MHZ	
Hsync period	Th	992	1056	1088	Clk	
Hsync pulse width	Thw	40	80	120	Clk	
Hsync back porch	Thb	56	96	136	Clk	
Hsync width + back porch	Thw+Thb	--	176	--	Clk	
Hsync front porch	Thf	16	80	112	Clk	
Hsync blanking	Thbl	192	256	288	Clk	
Vsync period	Tv	497	525	610	Th	

Vsync pulse width	Tvw	1	3	5	Th	
Vsync back porch	Tvb	11	13	15	Th	
Vsync width + back porch	Tvb+Tvw	--	16	--	Th	
Vsync front porch	Tvf	1	29	114	Th	
Vsync blanking	Tvbl	17	45	130	Th	

## b. DE Mode

### (b-1) Timing Diagram



### (b-2) Timing Condition

Item	Symbol	Min	Typ	Max	Unit	Remark
Clock frequency	1/Tck	29.58	33.26	39.82	MHz	
Horizontal blanking	Thbl	192	256	288	Clk	
Horizontal period	Th	992	1056	1088	Clk	
Horizontal active	Thd		800		Clk	
Vertical blanking	Tvbl	17	45	130	Th	
Vertical period	Tv	497	525	610	Th	
Vertical display area	Tvd		480		Th	

## H. Touch Panel Specifications

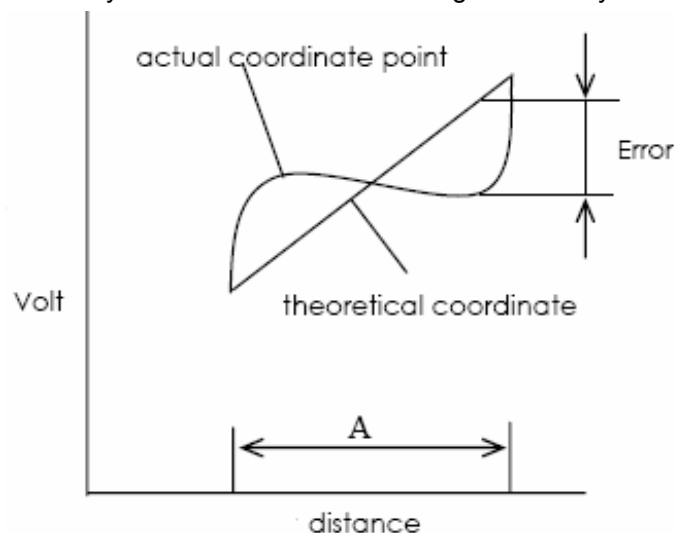
### 1. FPC Pin Assignment

Pin No.	Symbol	I/O
1	Right	O
2	Down	O
3	Left	O
4	Up	O

### 2. Electrical Characteristics

Item		Min.	Max.	Unit	Remark
Operating Voltage / DC		--	7	V	Standard 5V
Contact Current		--	1	mA	
Operating Current	Film	--	20	mA	
	Glass	--	20	mA	
Terminal Resistance	X-axis	200	1200	$\Omega$	At connector
	Y-axis	200	900		
Linearity		-1.5%	1.5%	--	Note 1
Insulation Resistance		20M	--	$\Omega$	DC 25V
Response Time		--	10	ms	
Voltage Endurance Test		60	--	Ms	DC 25V

Note 1: Measurement condition of Linearity: difference between actual voltage & theoretical voltage is an error at any points. Linearity is the value max. error voltage divided by voltage difference on active area.



### 3. Mechanical Characteristics

Item	SPEC		Unit	Remark
Outline Dimension	164.0x100.0x1.2		mm	
Viewing Area	154.6x93.64		mm	
Active Area	153.4x92.44		mm	
Item	Min.	Max.	Unit	Remark
Hardness of Surface	3	--	H	JIS K-5600
Operation Force (Pen or Finger)	--	100	g	Note 1

Note 1: Within "guaranteed active area", but not on the edge and dot-spacer.

### 4. Durability Test

Item	Min.	Max.	Unit	Remark
Touch Test	1000K		Times	Note 1
Handwriting Friction Test	100K		Times	Note 2, 3

Note 1: By using  $\Phi 12\text{mm}/R8.0\text{mm}$  silicon rubber, under the loading of 250g to impact the surface of touch panel under the speed of 2 time/second, after repeat knocking 1000k times, goods must fulfill:

Terminal Resistance: as defined in H.2

Linearity Error: as defined in H.2

Insulation Resistance: as defined in H.2

Note 2: By using  $\Phi 3.0\text{mm}/R0.8\text{mm}/\text{POM}$  pen with 2.45N (250g) loading under 70mm/sec moving speed, within the touch panel 35mm linear contact range and repeat 100K times(one direction moving as test one time), goods must fulfil:

Terminal Resistance: as defined in H.2

Linearity Error: as defined in H.2

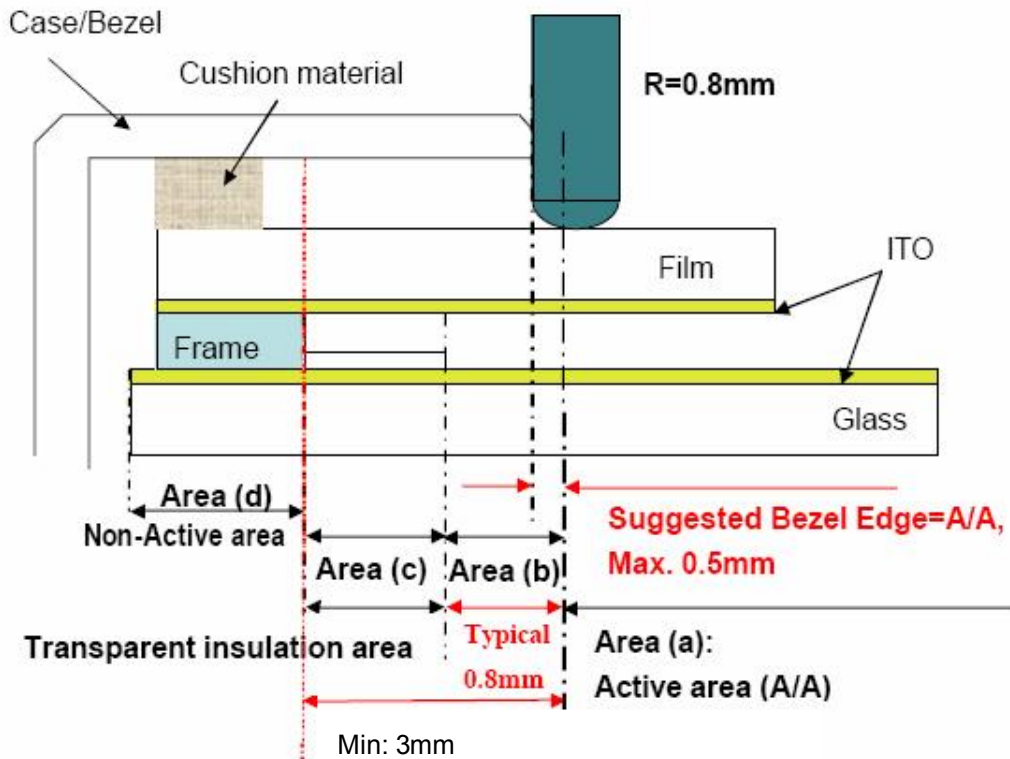
Insulation Resistance: as defined in H.2

Note 3: Test area - Along the diagonals of active area of the touch panel, and the friction center is the same as the center of active area. It means that the distance is 17.5mm extended both at the friction center two sides along the diagonals of active area of the touch panel and proceeding handwriting friction test.



## 5. Structure and Area Definition

Below figure illustrates the recommended bezel and cushion design. In order to prevent unusual performance degradation and malfunction of the touch panel, please carry out the set case designing and a touch panel assembling method after surely considering the definition of each area illustrated in below figure.



### Area (a): Active area

The active area is guaranteed the position data detectable precision, operation force and other operations. It's strongly recommended to place the operation button or menu keys within the active area.

### Area (b): Operating non-guaranteed area

The area doesn't guarantee a touch panel operation and its function. When this area is pressed, touch panel shows degradation of its performance and durability.

### Area (c): Pressing prohibition area

The area which forbids pressing.

### Area (d): Non-active area

The area doesn't activate even if pressed.

## 6. Attention

Please pay attention for below matters at mounting design of touch panel of LCD module.

- 1) Do not design enclosure pressing the view area to prevent from miss input.
- 2) Enclosure support must not touch with view area.
- 3) Do not put a heavy force along the edge of the active area.
- 4) Cushion material: Use elastic or non-conductive material to enclosure touch panel.
- 5) Do not bond film of touch panel with enclosure.
- 6) The touch panel edge is conductive. Do not touch it with any conductive part after mounting.  
If user wants to cleaning touch panel by air gun, pressure  $2\text{kg}/\text{cm}^2$  below is suggested. Not to blow glass from FPC site to prevent FPC peeled off
- 7) Do not put a heavy shock or stress on touch panel and film surface. Ex. Don't lift the panel by film face with vacuum.
- 8) Do not lift LCD module by FPC.
- 9) Please use dry cloth or soft cloth with neutral detergent (after wring dry) or one with ethanol at cleaning.  
Do not use any organic solvent, acid or alkali liquor.
- 10) Do not pile touch panel. Do not put heavy goods on touch panel.

## I. Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response Time							
Rise	Tr	$\theta=0^\circ$		12	50	ms	Note 4
Fall	Tf			18	60	ms	
Contrast ratio	CR	At optimized viewing angle	140	240	-		Note 5, 6
Viewing Angle							
Top		$CR \geq 10$	30	40	-	deg.	
Bottom			50	60	-		
Left			50	60	-		
Right			50	60	-		
Brightness	$Y_L$	$\theta=0^\circ$	140	180	-	$\text{cd}/\text{m}^2$	
White Chromaticity	X	$\theta=0^\circ$	0.26	0.31	0.36		
	y	$\theta=0^\circ$	0.28	0.33	0.38		

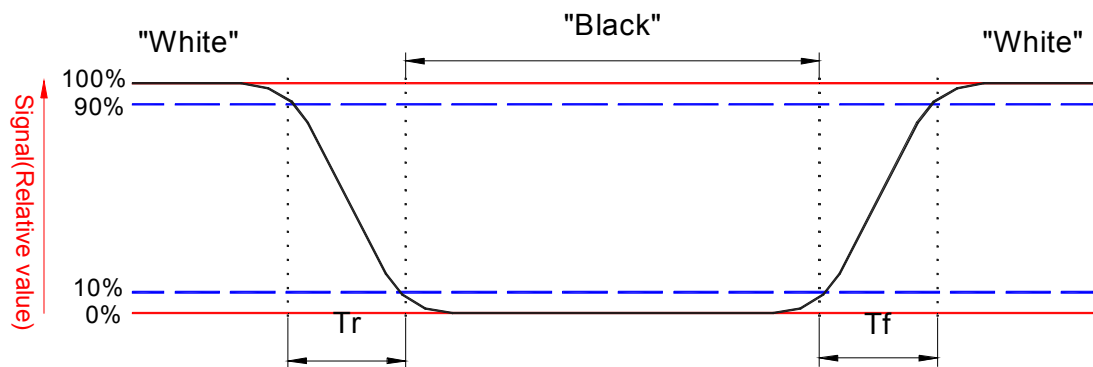
Note 1: Ambient temperature =25℃. To be measured in the dark room.

Note 2: To be measured on the center area of panel with a viewing cone of  $\theta$  by Topcon luminance meter BM-5, after 15 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 the figure below:

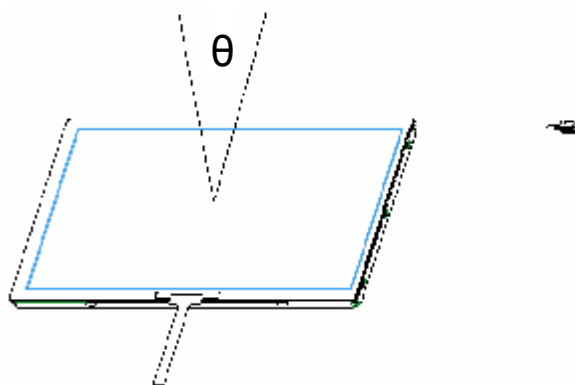


Note 4. Definition of contrast ratio:

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. inition 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

## J. Reliability Test Items

No.	Test items	Conditions		Remark
1	High Temperature Storage	Ta= 65℃	240Hrs	
2	Low Temperature Storage	Ta= -20℃	240Hrs	
3	High Temperature Operation	Ta= 60℃	240Hrs	
4	Low Temperature Operation	Ta= 0℃	240Hrs	
5	High Temperature & Humidity	Ta= 50℃. 80% RH	240Hrs	Operation
6	Heat Shock	-20℃~60℃, 50 cycle, 2Hrs/cycle		Non-operation
7	Electrostatic Discharge	±200V,200pF(0Ω), once for each terminal		Non-operation
8	Vibration	Frequency : 10~55Hz Stoke : 1.5mm Sweep : 10 ~ 55 ~ 10Hz 2 hours for each direction of X,Y,Z (6 hours for total)		JIS C7021, A-10 condition A
9	Mechanical Shock	100G. 6ms, ±X,±Y,±Z 3 times for each direction		Non-operation JIS C7021,A-7 Condition C
10	Vibration (With Carton)	Random vibration: 0.015G <sup>2</sup> /Hz from 5~200Hz		IEC 68-34
11	Drop (With Carton)	Height: 60cm 1 corner, 3 edges, 6 surfaces		

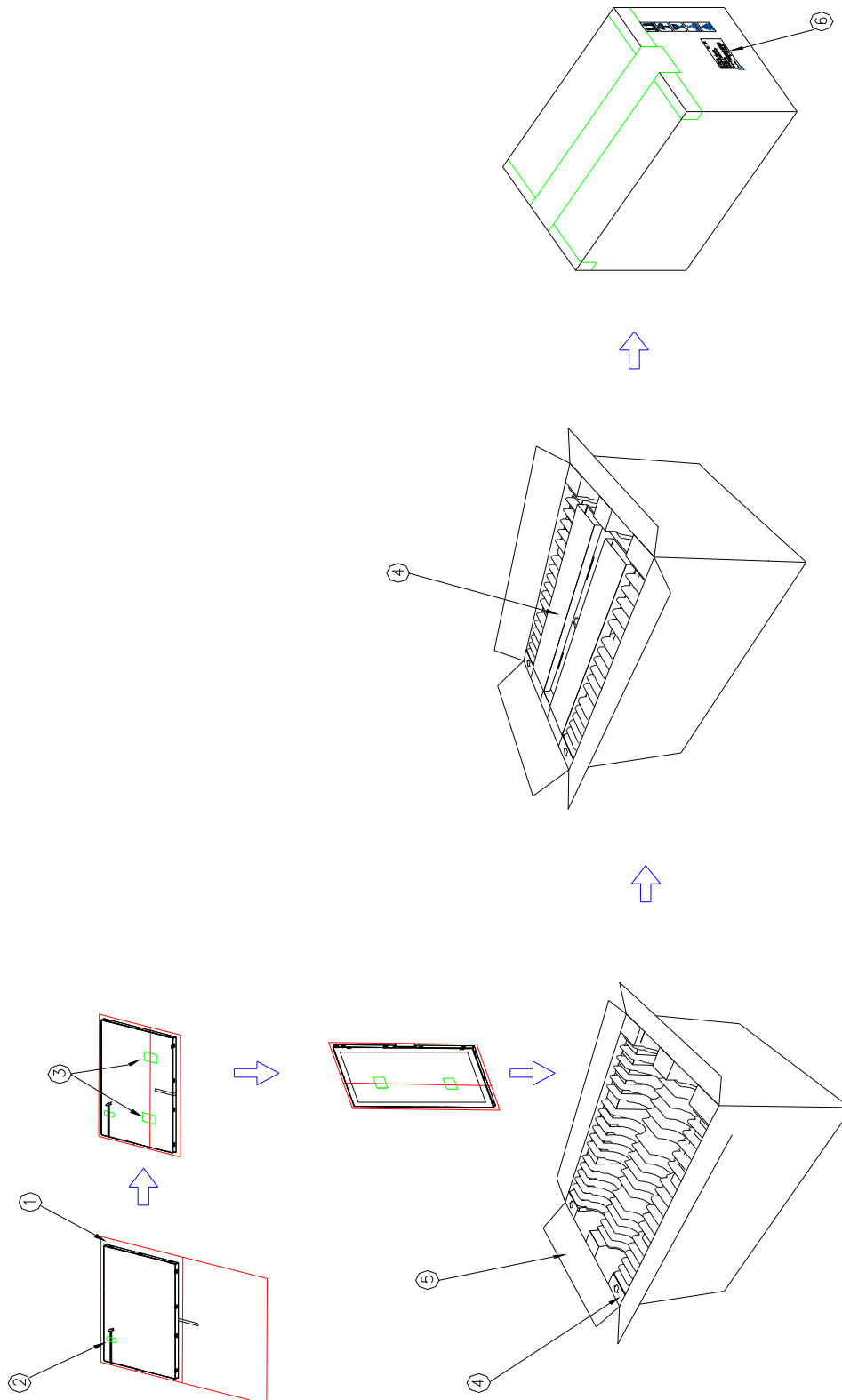
Note 1: Ta: Ambient Temperature

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

## K. Handling Precautions

1. Since the touch panel is easily damaged, pay attention not to scratch it.
2. Be sure to turn off power supply when inserting or disconnecting from input connector.
3. Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
4. When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
5. Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
6. Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.
7. Do not open nor modify the Module Assembly.
8. Do not press the reflector sheet at the back of the module to any directions.
9. At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
10. After installation of the TFT Module into a system enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.

## L. Packing Form



Max. capacity: 30 modules  
Carton outline : 520 x 340 x 250 mm