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Customer: _____
Model Number: YXD101301000
Specification Number: _____
Date: _____
Version: 1.0

For Customer's Acceptance

Approved by	Comments

Approved by	Reviewed by	Prepared by

MODEL NAME:	PAGE: 3 OF 20	DOC. NO.:	VERSION: A.5
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Table of Contents

1.GENERAL DESCRIPTION	4
2.ABSOLUTE MAXIMUM RATINGS	5
3.Touch Screen panel specifications	7
4.AC CHARACTERISTICS	8
5.OPTICAL CHARACTERISTICS	12
6.OUTLINE DIMENSION	14
7.INTERFACE PIN CONNECTION	15
8.RELIABILITY	17
9.PRECAUTIONS	18

MODEL NAME:	PAGE: 4 OF 20	DOC. NO.:	VERSION: A.5
-------------	------------------	-----------	-----------------

1.GENERAL DESCRIPTION

1.1 Features

No.	Item	Specification	Remark
1	LCD size	10.1 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1024X3(RGB)X600	
4	Display mode	Normally white, Transmissive	
5	Dot pitch	0.0725(W)X0.2088(H) mm	
6	Active area	222.72 (W)X125.28 (H) mm	
7	Module size	235.0(W)X149.52(H)X6.1(D) mm	Note 1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	Digital (LVDS)	
11	Backlight power consumption	6.336W(Typ.)	Note 2
12	Panel power consumption	0.990W(Typ.)	Note 3
13	Weight	TBD	

Note1: Refer to mechanical drawing

Note 2: Backlight power consumption.

Note 3: Including T-con Board power consumption.

MODEL NAME:	PAGE: 5 OF 20	DOC. NO.:	VERSION: A.5
-------------	------------------	-----------	-----------------

2.ABSOLUTE MAXIMUM RATINGS

2.1 Electrical absolute maximum ratings

Item	Symbol	Value	Unit	Note
Power Supply Voltage	VCC	-0.3 ~ 3.6	V	AVSS=0 GND=0
	VLED	10.5(Max)	V	
Input signal Voltage	Vi	-0.3 to 6.3	V	Note1
Operation Temperature	Top	-10 to +60	°C	
Storage Temperature	Tst	-20 to +70	°C	
LED Reverse Voltage	Vr	1.2(Max.)	V	Each LED Note2
LED Forward Current	IF	25(Max.)	mA	Each LED

Note 1: The product is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above.

Note 2: Vr Conditions: Zener Diode 20mA

2.2 Typical Operation Conditions

Item	Symbol	Value			Unit	Note
		Min	Typ.	Max		
Power Supply Voltage	VCC	3.1	3.3	3.5	V	AVSS=0
Current consumption	ICC		150		mA	Note1
Differential Input High Threshold	VTHLVDS			100.0	mV	
Differential Input Low Threshold	VTLLVDS	-100.0			mV	
Input Current	Iin			±10.0	uA	Each LED Note2
Input Common Voltage	Vcm	1.125		1.375	V	Each LED

MODEL NAME:	PAGE: 6 OF 20	DOC. NO.:	VERSION: A.5
-------------	------------------	-----------	-----------------

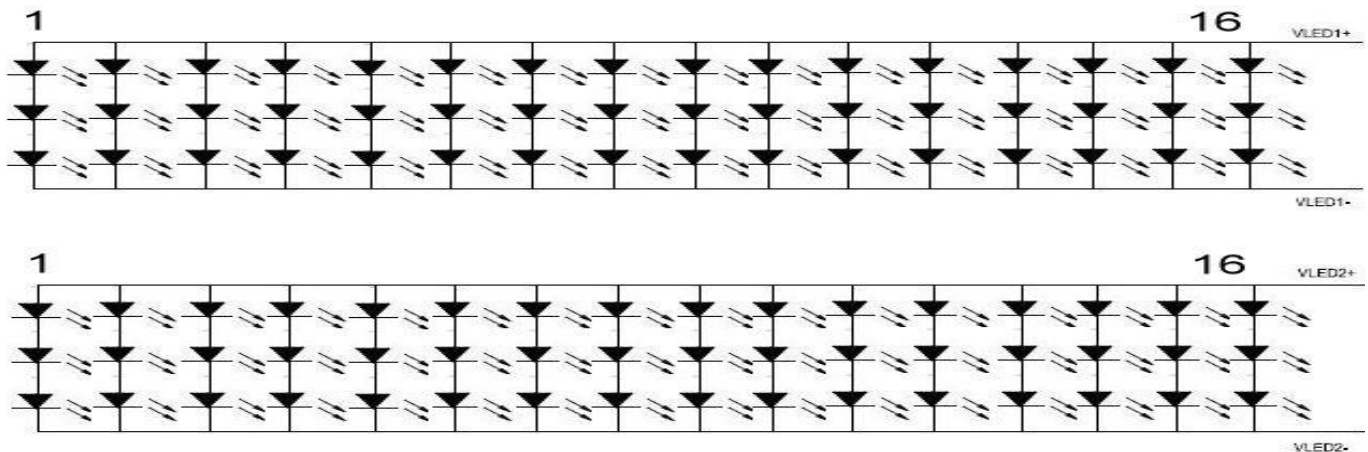
2.3 Backlight driving conditions (LED)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	I_L	300	320	350	mA/LED	Note 2
LED voltage	V_L	9.3	9.9	10.5	V/LED	Note 2
LED lift time		20,000			Hr	Note1

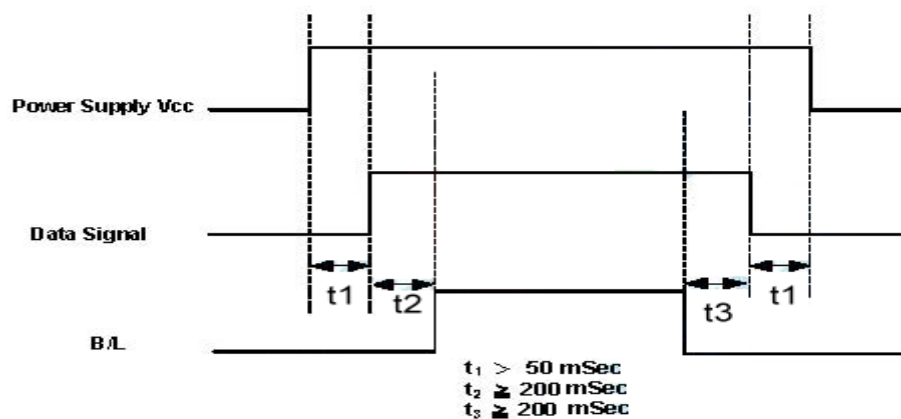
Note 1: The “LED life time” is defined as the module brightness decrease to 50% original brightness at $T_a=25^{\circ}\text{C}$ and $I_L=20\text{mA}$. The LED lifetime could be decreased if operating I_L is larger than 20 mA.

Note 2: The LED Supply Voltage is defined by the number of LED at $T_a=25^{\circ}\text{C}$ and $I_L=20\text{mA}$. In the case of 3pcs LED, $V_L=3.3*3=9.9\text{V}$

Note 3: The LED driving condition is defined for each LED module(3 LED Serial).



2.4 Power Sequence



MODEL NAME:	PAGE: 7 OF 20	DOC. NO.:	VERSION: A.5
-------------	------------------	-----------	-----------------

3 Touch Screen panel specifications

Electronic characteristics

Item		Min.	Typ.	Max.	Unit	Note
Linearity		-	-	1.5	%	
Circuit Resistance	X-axis	450	-	950	Ω	
	Y-axis	100	-	500	Ω	
Insulation Resistance		10	-	-	M Ω	
Operating Voltage		-	-	7	V	
Chattering		-	-	20	ms	
Transmittance		75	-	-	%	

Mechanical & Reliability Characteristics

Item	Min.	Typ.	Max.	Unit	Note
Activation force	-	-	100	g	Note.1
Pen Writing Durability	100,000	-	-	characters	Note.2
Pitting Durability	1,000,000	-	-	touches	Note.3
Surface hardness	3	-	-	H	

Note.1 : Operation force with R0.8mm silicone finger.

Note.2 : With the silicon Rubber R8mm on the same point of the touch panel with 250g force, frequency 240 times/min.

Note.3 : Writing with R0.8mm plastic stylus pen; writing force 150g in active area. Speed is 60mm/sec.

MODEL NAME:	PAGE: 8 OF 20	DOC. NO.:	VERSION: A.5
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4 AC CHARACTERISTICS

4.1 Timing conditions

Item	Symbol	Value			Un	Note
		Min	Typ.	Max		
RxCLKIN Period	t_{RCP}	11.76	T	50	ns	Note1
RxCLKIN High Time	t_{RCH}	–	T/2	–	ns	
RxCLKIN Low Time	t_{RCL}	–	T/2	–	ns	
PAD0/1 to RxCLKIN Delay	t_{RCD}	–	3T/7	–		
Data Setup to RxCLKIN	t_{RS}	1.9	–	–	ns	
Data Hold from RxCLKIN	t_{RH}	3.0	–	–	ns	
Input Data Position 0 (T=11.76ns)	T_{RIP1}	–0.4	0	0.4	ns	Note2
Input Data Position 1 (T=11.76ns)	T_{RIP0}	T/7–0.4	T/7	T/7+0.4	ns	Note2
Input Data Position 2 (T=11.76ns)	T_{RIP6}	2T/7–0.4	2T/7	2T/7+0.4	ns	Note2
Input Data Position 3 (T=11.76ns)	T_{RIP5}	3T/7–0.4	3T/7	3T/7+0.4	ns	Note2
Input Data Position 4 (T=11.76ns)	T_{RIP4}	4T/7–0.4	4T/7	4T/7+0.4	ns	Note2
Input Data Position 5 (T=11.76ns)	T_{RIP3}	5T/7–0.4	5T/7	5T/7+0.4	ns	Note2
Input Data Position 6 (T=11.76ns)	T_{RIP2}	6T/7–0.4	6T/7	6T/7+0.4	ns	Note2

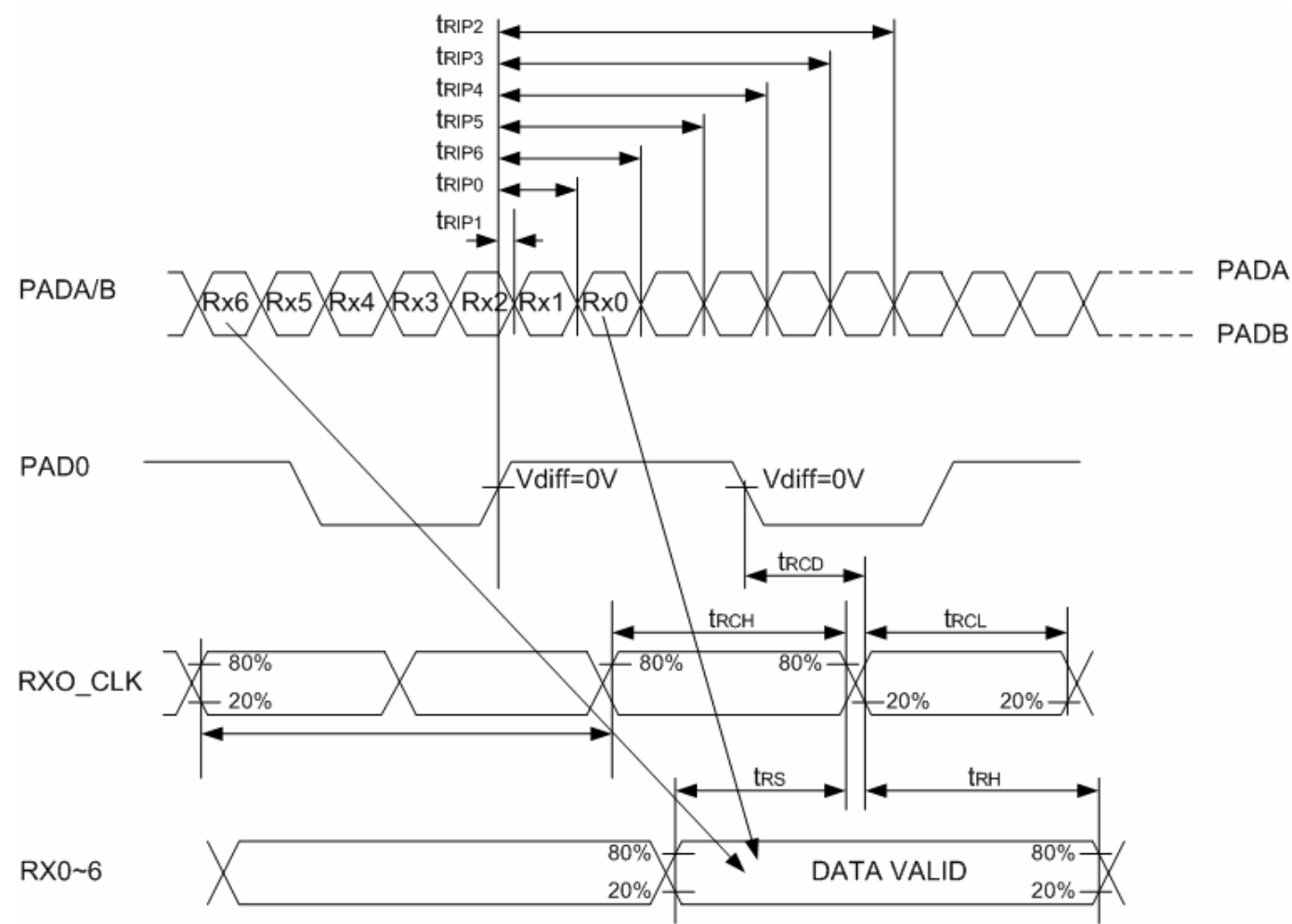
Note 1: T= RxCLKIN Period

Note 2 : VDD=3.3V , Ta=25°C

MODEL NAME:	PAGE: 9 OF 20	DOC. NO.:	VERSION: A.5
-------------	------------------	-----------	-----------------

Item		Value			Unit	Note
		Min	Typ.	Max		
DE	Clock Frequency		50.4		MHZ	Note1
	H-sync Total	1054	1344	1534	CLK	
	H-Active	1024	1024	1024	CLK	
	H-Blanking	30	320	510	CLK	
	V-sync Total	608	625	650	LINE	
	V-Active	600	600	600	LINE	
	V-Blanking	8	25	50	LINE	

MODEL NAME:	PAGE:	DOC. NO.:	VERSION:
	11 OF 20		A.5



LVDS AC Timing Diagrams

MODEL NAME:	PAGE: 12 OF 20	DOC. NO.:	VERSION: A.5
-------------	-------------------	-----------	-----------------

5. OPTICAL CHARACTERISTICS

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note (1).

Measuring equipment: BM-5A, BM-7

(Ta = 25 +/- 2°C, Vcc = Vci = 2.8V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time Rise Fall	Ton	25 °C	-	(10)	(20)	ms	Note 4
	Toff			(15)	(30)		
Contrast ratio	CR	At optimized viewing angle	400	500	-		Note 5,6
Viewing angle Top Bottom Left Right		CR ≥ 10		70 50 70 70	- - - -	deg.	Note 7
Brightness	B	θ = 0°	950	1000	-	nits	
Luminance Uniformity	Yu	θ = 0°	70	75		%	
White chromaticity	x	θ = 0°	0.26	(0.31)	0.36		
	y	θ = 0°	0.28	(0.33)	0.38		

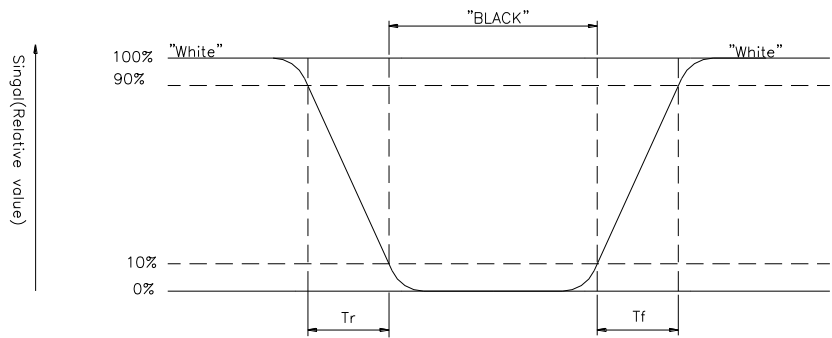
Note 1: Ambient temperature =25°C, And LED current IL=22mA.

Note 2: To be measured in the dark room.

Note 3: To be measured on the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-5A, after 10 minutes operation.

Note 4: 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 shown below.

MODEL NAME:	PAGE: 13 OF 20	DOC. NO.:	VERSION: A.5
-------------	-------------------	-----------	-----------------



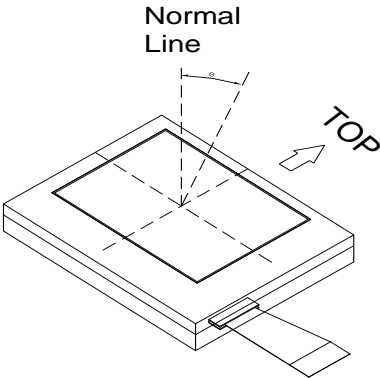
Note 5: Contrast ratio is calculated with the following formula.

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

Note 6: White $V_i = V_{i50} + 1.5V$
 Black $V_i = V_{i50} \pm 2.0V$

“±” means that the analog input signal swings in phase with VCOM signal.
 “∓” means that the analog input signal swings out of phase with VCOM signal.
 “Vi50” : The analog input voltage when transmission is 50%
 The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 7: Definition of viewing angle:
 Refer to figure as below.



Note 8: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

MODEL NAME:	PAGE: 15 OF 20	DOC. NO.:	VERSION: A.5
-------------	-------------------	-----------	-----------------

7 INTERFACE PIN CONNECTION

7.1 TFT LCD module interface(LVDS Connector: Hirose 20347-030E-02 , 30pin)

Pin NO.	Symbol	I/O	Function	Remark
1	VCC	P	Power Supply	
2	VCC	P	Power Supply	
3	VCC	P	Power Supply	
4	NC		Let it to be 0pin	
5	NC		Let it to be 0pin	
6	VSS	P	Power Ground	
7	VSS	P	Power Ground	
8	RIN0-	I	- LVDS differential data input (R0-R5, G0)	
9	RIN0+	I	+ LVDS differential data input (R0-R5, G0)	
10	VSS	P	Power Ground	
11	RIN1-	I	- LVDS differential data input (G1-G5, B0-B1)	
12	RIN1+	I	+ LVDS differential data input (G1-G5, B0-B1)	
13	VSS	P	Power Ground	
14	RIN2-	I	- LVDS differential data input (B2-B5, HS, VS, DE)	
15	RIN2+	I	+ LVDS differential data input (B2-B5, HS, VS, DE)	
16	VSS	P	Power Ground	
17	ClkIN-	I	-LVDS differential clock input	
18	ClkIN+	I	+LVDS differential clock input	
19	VSS	P	Power Ground	
20	RIN3-	I	- LVDS differential data input (R6, R7, G6, G7, B6, B7)	Option

MODEL NAME:	PAGE: 16 OF 20	DOC. NO.:	VERSION: A.5
-------------	-------------------	-----------	-----------------

21	RIN3+	I	+ LVDS differential data input (R6, R7, G6, G7, B6, B7)	Option
22	VSS	P	Power Ground	
23	NC	-	Let it to be Open	
24	NC	-	Let it to be Open	
25	NC	-	Let it to be Open	
26	NC	-	Let it to be Open	
27	NC	-	No Connection	
28	NC	-	No Connection	
29	NC	-	Let it to be Open	
30	NC	-	No Connection	

Note1: If Input data is 6 bit, Rin3-&Rin3+ can't be connected.

Note2: LVDS 8 bits mode (Default), LVDS 6 Bits Mode. (Option)

MODEL NAME:	PAGE: 17 OF 20	DOC. NO.:	VERSION: A.5
-------------	-------------------	-----------	-----------------

8 RELIABILITY

No.	Test Items	Test Conditions
1	High Temperature Storage Test	Ta=70°C , 240 Hrs
2	Low Temperature Storage Test	Ta=-20°C , 240Hrs
3	High Temperature and High Humidity Operating Test	Ta=60°C , 90%RH, 240Hrs (No condensation of dew)
4	High Temperature Operating Test	Ta=60°C , 240Hrs
5	Low Temperature Operating Test	Ta=-10°C , 240Hrs
6	Heat Shock Test	Ta=-20°C (0.5H) ~ 70°C (0.5H) / 50 cycles
7	Electro Static Discharge Test	+200V, 200pF (0Ω), 1 time for each terminal

Note: (1) Evaluation should be tested after storage at room temperature for 24 hours.

(2) There should be no change that might affect the practical display function when the display quality test is conducted under normal operating conditions.

(3) Judgment:

- a. In the standard condition, there shall be no practical problems that may affect the display function.
- b. No serious image quality degradation.

OSD Displays

MODEL NAME:	PAGE: 18 OF 20	DOC. NO.:	VERSION: A.5
-------------	-------------------	-----------	-----------------

9 PRECAUTIONS

9.1 handling

- (1) When the module is assembled, it should be attached to the system firmly. Be careful not to twist and bend the module.
 - (2) Refrain from strong mechanical shock and / or any force to the module. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
 - (3) Note that the polarizer is very fragile and could be easily damaged. Do not press or scratch the surface harder than a B pencil lead.
 - (4) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining and discoloration may occur.
 - (5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
 - (6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Don't use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
 - (7) 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, legs or clothes, it must be washed away thoroughly with soap.
 - (8) Protect the module from static; it may cause damage to the CMOS Gate Array IC.
 - (9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
 - (10) Do not disassemble the module.
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OSD Displays

MODEL NAME:	PAGE: 19 OF 20	DOC. NO.:	VERSION: A.5
-------------	-------------------	-----------	-----------------

- (11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
- (12) Pins of I/F connector shall not be touched directly with bare hands.

9.2 Storage

- (13) 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 35oC and relative humidity of less than 70%.
- (14) Do not store the TFT-LCD module in direct sunlight.
- (15) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during the store.

9.3 Operation

- (16) Do not connect; disconnect the module in the “Power on” condition.
- (17) Power supply should always be turned on/off by the chapter 8 TFT-LCD Driver IC Operation Algorithms.

9.4Precautions in use of touch panel

- (1) Do not give excessive strain to the product.
 - (2) To prevent giving distortion to the film of the product and peeling off of the film from the product, do not fix the film and a set case or a shock absorbing material adhered to a set case by adhesion.
 - (3) Operate it with a polyacetal pen (tip R0.8 or over) or a belly of a finger without applying excessive load. Never use any mechanical pencils, ball point pens and hard fingertips whose tip is hard for input, otherwise malfunctions may result.
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OSD Displays

MODEL NAME:	PAGE: 20 OF 20	DOC. NO.:	VERSION: A.5
-------------	-------------------	-----------	-----------------

- (4) The input position may be fluctuated a little through long-time use. It is desirable to provide a zero-adjustment function by using a circuit and software.
- (5) Operation at the out of Active Area is out of our guarantee. It causes a serious damage of a transparent electrode. Do not operate at the out of Active Area.

9.5 Others

- (18) The Liquid crystal is deteriorated by ultra violet, do not leave it in direct sunlight and strong ultraviolet ray for many hours.
 - (19) Avoid condensation of water. It may result in improper operation or disconnection of electrode.
 - (20) Do not exceed the absolute maximum rating value. (the supply voltage variation, input voltage variation in part contents and environmental temperature and so on). Otherwise the panel may be damaged.
 - (21) 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.
 - (22) His panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.
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