7.0” WSVGA

High brightness color TFT-LCD module

Model: VM07B5 VA

Date: Mar. 18th, 2021

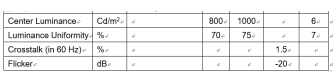
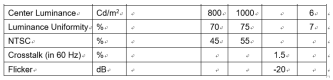
Note: This specification is subject to change without notice

Customer： _____ **Date：** _____

Approved	**Prepared**
Date:	**Date:**

Contents

RECORD OF REVISION

Version and Date	Page	Old description	New description	Remark
0.1 2020/10/07	All	First Edition for customer		
0.2 2021/03/18	7			

1. Handling Precautions

1) Since front polarizer 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 or 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 an 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.

2. General Description

2.1 Overview

This specification applies to the Color Active Matrix Liquid Crystal Display composed of a TFT-LCD display a LED backlight system. The screen format is intended to support WSVGA (1024(H) x 600(V)) screen and 16.7M colors.

2.2 Features

- High brightness display, 1000nits by LED backlight.
- Long operation lifetime BLU design
- Wide operation temperature
- RoHS Compliance

2.3 Application

Industrial applications.

2.4 Display specifications

Items	Unit	Specification
Screen Diagonal	mm	7.0
Active Area	mm	154.21 (H) X 85.92 (V)
Pixels H x V	pixels	1024 x3(RGB) x 600
Pixel Arrangement		RGB Vertical stripe
White luminance (center)	Cd/m^2	1000 (Typ)
Contrast ratio		800:1 (Typ.)
Optical Response Time	msec	20 ms (Typ. On/off)
Normal Input Voltage VDD	Volt	3.3
Power Consumption (Vcc Line + LED backlight)	Watt	4.229W (VDD line=0.429 W; LED lines= 3.8 W)
Weight	Grams	TBD
Physical size	mm	165 (W)×100 (H)×5.7 (D)
Electrical Interface		LVDS
Support colors		16.7M colors
Surface Treatment		Anti-glare and hard-coating 3H
Temperature range Operating Storage	 ^0C ^0C	 -20 ~ 70 -30 ~ 80
RoHS Compliance		RoHS Compliance

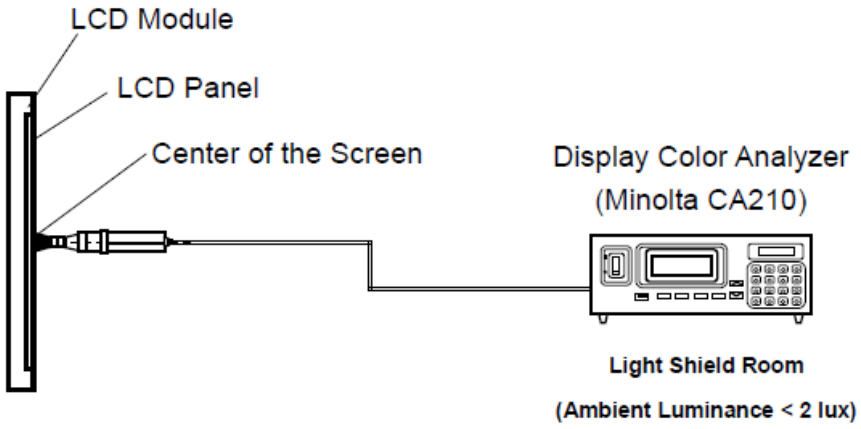
2.5 Optical characteristics

The following optical characteristics are measured under stable condition at 25 ^{0}C

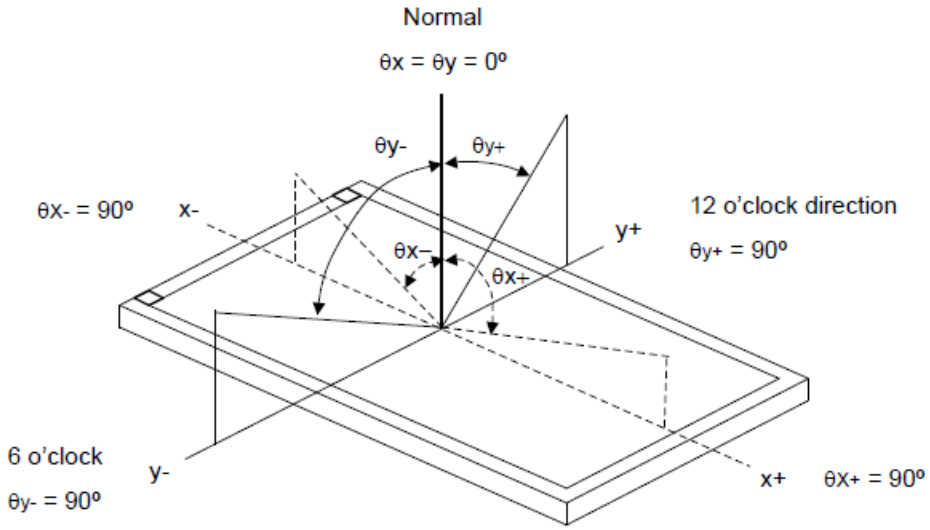
Items	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing angle	Deg.	Horizontal (Right) CR=10 (Left)		80 80		2
		Vertical (Up) CR=10 (Down)		80 80		
Contrast Ratio		Normal Direction	600	800		3
Response Time	msec	Raising + Falling		20		4
Color / Chromaticity Coordinates (CIE)		Red x	-0.05	0.5707	+0.05	5
		Red y		0.3412		
		Green x		0.3247		
		Green y		0.5582		
		Blue x		0.1372		
		Blue y		0.0766		
Color coordinates (CIE) White		White x		0.2761		
		White y		0.2967		
Center Luminance	Cd/m^2		800	1000		6
Luminance Uniformity	%		70	75		7
NTSC	%		45	55		
Crosstalk (in 60 Hz)	%				1.5	
Flicker	dB				-20	

Note 1: Measurement method

The LCD module should be stabilized at given temperature for 0.5 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.



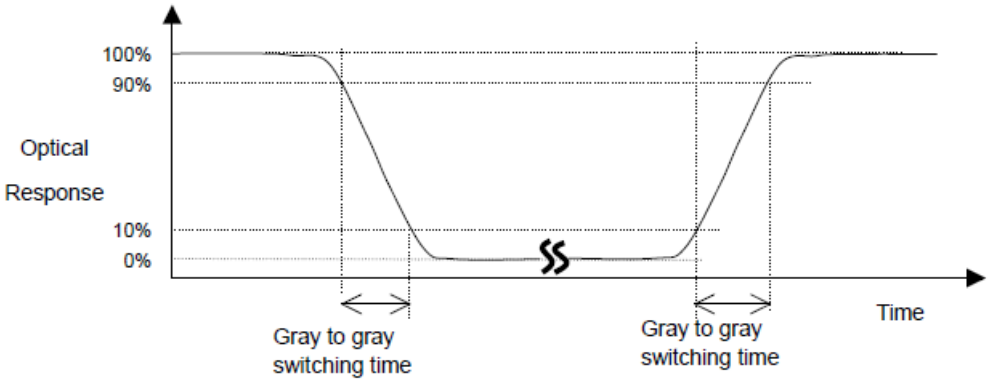
Note 2: Definition of viewing angle



Note 3: Contrast ratio is measured by Minolta CA210

Note 4: Definition of Response time

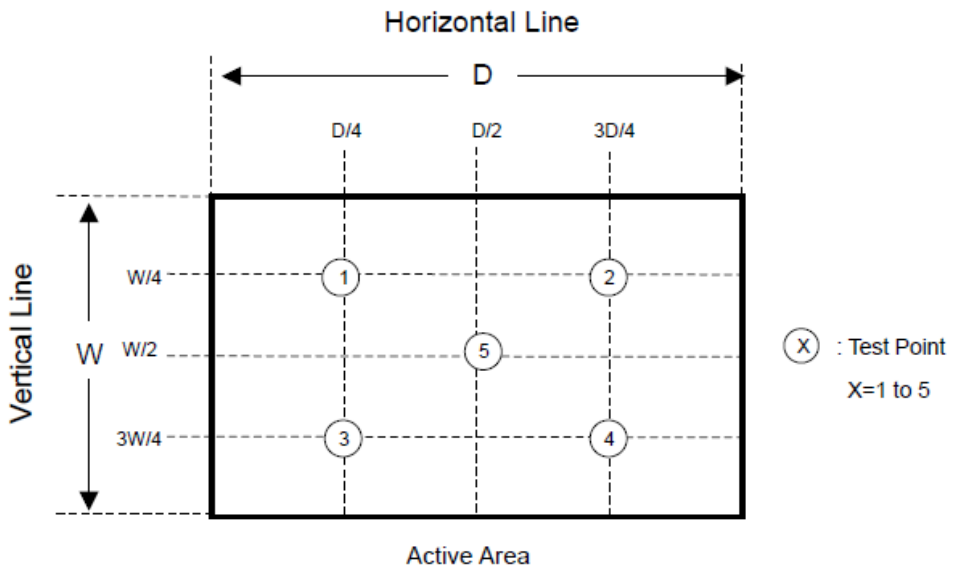
The output signals of photo detector are measured when the input signals are changed from “Full Black” to “Full White” (rising time), and from “Full White” to “Full Black” (falling time), respectively. The response time is interval between the 10% and 90% of amplitudes. Please refer to the figure as below.



Note 5: Color chromaticity and coordinates (CIE) is measured by Minolta CA210

Note 6: Center luminance is measured by Minolta CA210

Note 7: Luminance uniformity of these 5 points is defined as below and measured by Minolta CA210



Uniformity = (Min. Luminance of 5 points) / (Max. Luminance of 5 points)

3. Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

3.1 TFT LCD module

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{DD}	-0.3	3.6	V	1,2

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
2. V_{CC} >V_{SS} must be maintained.
3. Please be sure users are grounded when handing LCD Module.

3.2 Environment

Items	Symbol	Values			Unit	Conditions
		Min.	Typ.	Max.		
Operation temperature	T_{OS}	-20	-	70	^{0}C	Note 3
Operation Humidity	H_{OP}	10		85	%	
Storage temperature	T_{ST}	-30		80	^{0}C	
Storage Humidity	H_{ST}	5		90	%	

Note 1: With in Ta= 25℃

Note 2: Permanent damage to the device may occur if exceed maximum values

Note 3: For quality performance, please refer to IIS (Incoming Inspection Standard).

4. Electrical characteristics

4.1 LCD electronics specification

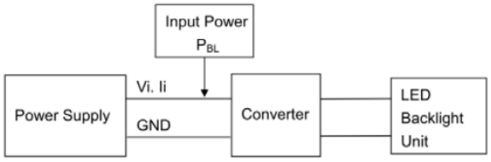
Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply		VDD	Ta=25℃	3.0	3.3	3.6	V	
Input voltage	'H'	V_{IH}	V_{DD}=3.3V	0.8V_{CC}	-	V_{CC}	V	
	'L'	V_{IL}	V_{DD}=3.3V	0	-	0.2V_{CC}	V	
Current Consumption		I_{CC1}	Normal mode	-	-	-	mA	1
		I_{CC2}	Sleep mode	-	-	-	mA	1
Current of digital supply Voltage		IVDD	VDD=3.3V color bar pattern	65	130	260	mA	

4.2 Backlight unit

Item	Symbol	Min	Typ	Max	Unit	Note
Supply voltage	Vf	8.8	9.5	10.2	V	Note 1
Supply Current	If	-	400	-	mA	Note 2
LED life time	-	-	50000	-	Hr	Note 3,4

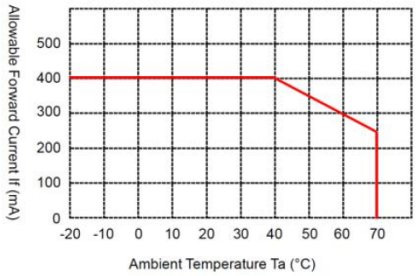
Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and If =400mA.

Note 2: LED current is measured by utilizing a high frequency current meter as shown below:



Note 3: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and If =400mA. The LED lifetime could be decreased if operating If is larger than 400 mA.

Note 4: LED light bar circuit:



4.3 Interface connector

4.3.1 TFT connector(CN1)

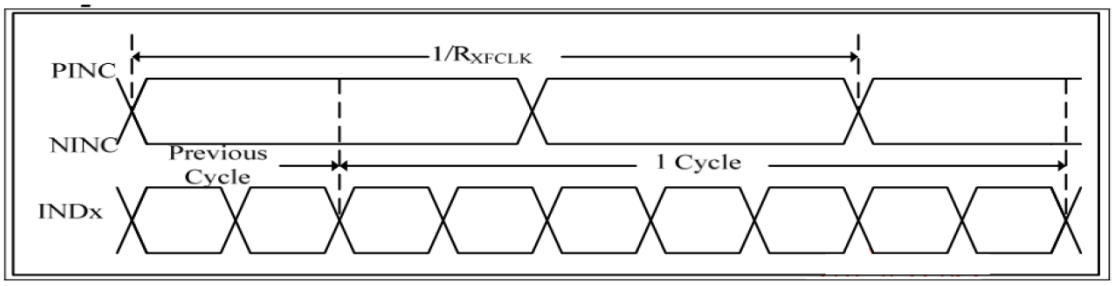
Pin No.	Symbol	I/O	Function
1	NC	-	No connection
2-3	VDD	P	Power for digital circuit
4	NC	-	No connect
5	RESET	I	Global reset pin
6	STBYB	I	Stand mode:
7	GND	P	Ground
8	RXIN0-	I	-LVDS differential data input
9	RXIN0+	I	+LVDS differential data input
10	GND	P	Ground
11	RXIN1-	I	-LVDS differential data input
12	RXIN1+	I	+LVDS differential data input
13	GND	P	Ground
14	RXIN2-	I	-LVDS differential data input
15	RXIN2+	I	+LVDS differential data input
16	GND	P	Ground
17	RXCLKIN-	I	-LVDS differential clock input
18	RXCLKIN+	I	+LVDS differential clock input
19	GND	P	Ground
20	RXIN3-	I	-LVDS differential data input
21	RXIN3+	I	+LVDS differential data input
22	GND	P	Ground
23-24	NC	-	No connection
25	GND	P	Ground
26~27	NC	-	No connection
28	SELB	I	6bit/8bit select H:6bit, L:8bit
29	NC	-	No connection
30	GND	P	Ground
31-32	LED-	P	LED Cathode
33	L/R	I	Horizontal inversion
34	U/D	I	Vertical inversion
35	NC	-	No connection
36~37	NC	-	No connection
38	NC	-	No connection
39~40	LED+	P	LED Anode

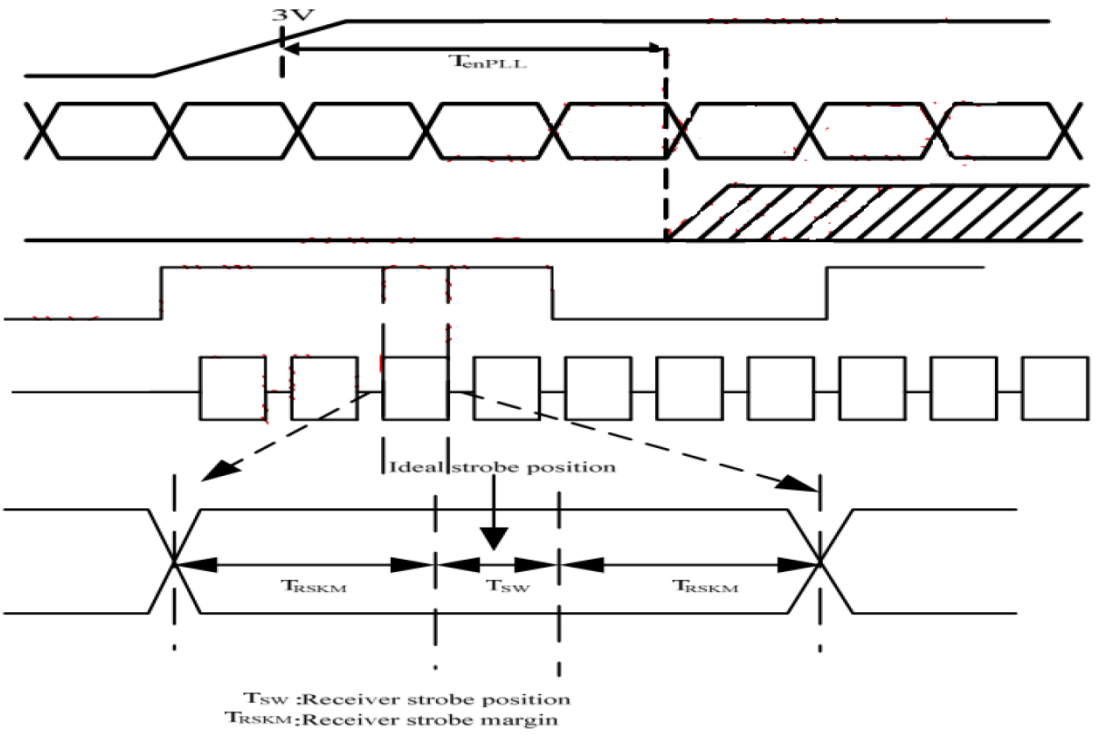
5. Signal characteristics

5.1 AC characteristics

LVDS mode

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Clock Frequency	R_{xFCLK}		20	-	71	MHz
Input data skew margin	T_{RSKM}	$\|V_{ID}\|$=400mV R_{xVCM}=1.2V R_{xFCLK}=71MHz	500			ps
Clock High Time	T_{LVCH}			4/(7* R_{xFCLK})		ns ns
Clock Low Time	T_{LVCL}			3/(7* R_{xFCLK})		ns
PLL wake-up-time	T_{enPLL}				150	us

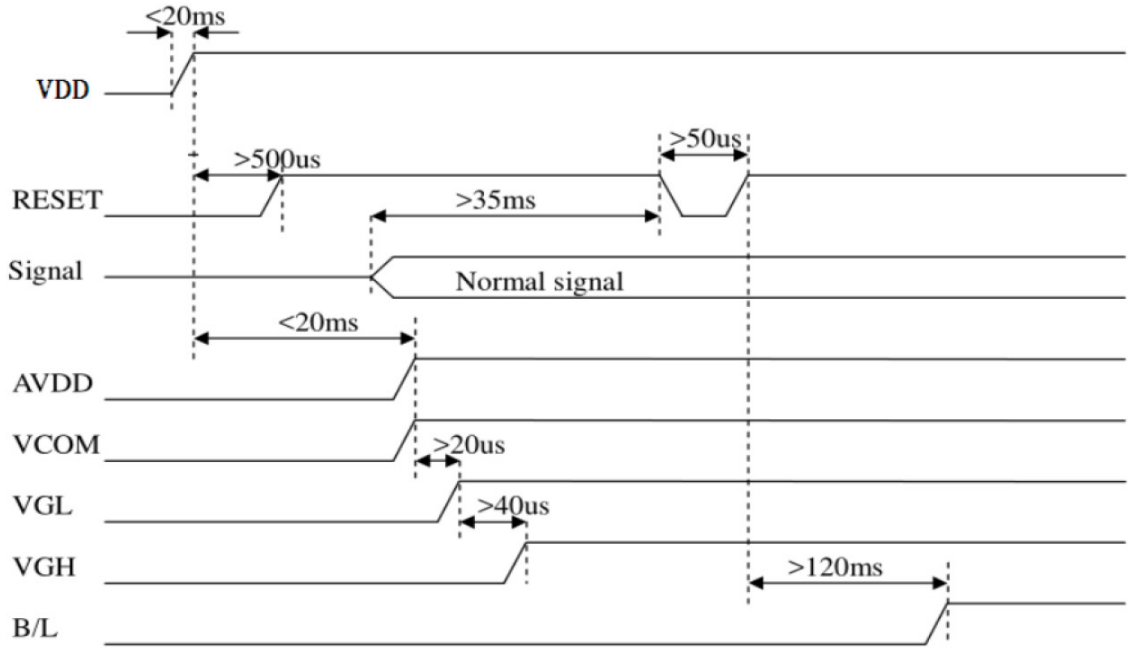




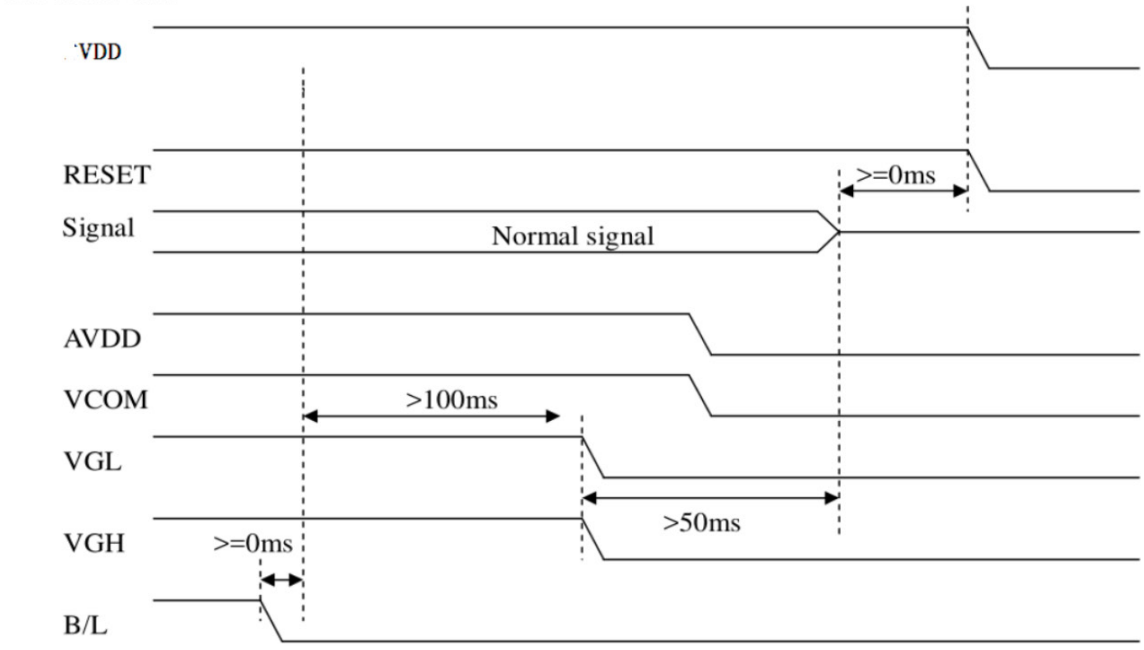
TSW :Receiver strobe position
TRSKM:Receiver strobe margin

5.2 Power ON/OFF sequence

a. Power on:



b. Power off:



6. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta=40℃, 80%RH, 24hours	
High Temperature Operation (HTO)	Ta= 70℃, 24hours	
Low Temperature Operation (LTO)	Ta= -20℃, 24hours	
High Temperature Storage (HTS)	Ta= 80℃, 24hours	
Low Temperature Storage (LTS)	Ta= -30℃, 24hours	
Thermal Shock Test (TST)	-20℃/30min, 60℃/30min, 10 cycles	
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (ElectroStatic Discharge)	Contact/Air Discharge: ± 2KV, 150pF(330Ω) 1sec/cycle	

Note 1: The TFT-LCD module will not sustain damage after being subjected to 10 cycles of rapid temperature change. A cycle of rapid temperature change consists of varying the temperature from -10℃ to 50℃, and back again. Power is not applied during the test. After temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

Note 2: TFT surface.

Note 3: There should be no condensation on the surface of panel during test.

Note 4: In the standard conditions, there is no function failure issue occurred. All the cosmetic specification is judged before reliability test.

Note 5: Before cosmetic and function test, the product must have enough recovery time, at least 4 hours at room temperature.

7. Shipping package
(TBD)

8. Mechanical Characteristics