SHARP

Document Title	M150MNN1 R0 Product Specification			Page No	1/ 21
Document No.		Issue date	2012/05/29	Revision	00

Product Specification

To:

Product Name: M150MNN1 R0

Document Issue Date: 2012/05/29

Note: 1. Please contact InfoVision Company. before designing your product based on this product.
2. The information contained herein is presented merely to indicate the characteristics and performance of our products.

Revision	Date	Page	Old Description	New Description	Remark
00	2012-5-29	All		First issued	

Contents

1.0 General Descriptions

1.1 Introduction

The M150MNN1 R0 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, a timing controller, voltage reference, common voltage, column driver, and row driver circuit. This TFT LCD has a 15-inch diagonally measured active display area with XGA resolution (1024horizontal by 768 vertical pixel arrays).

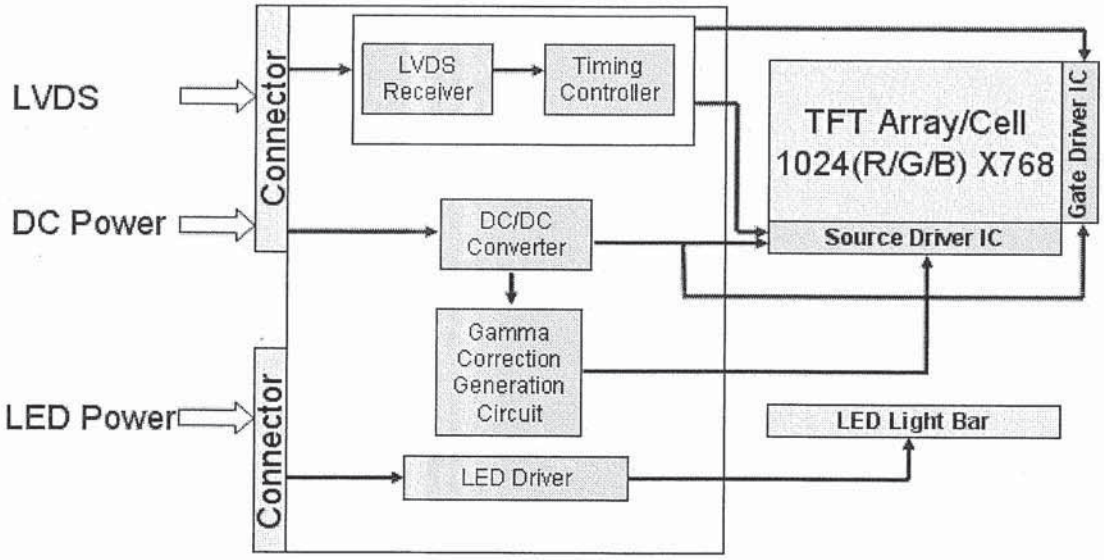
1.2 Features

- 15" TFT LCD Panel
- LED Backlight System
- Supported XGA (1024x768 pixels) resolution
- Aspect ratio: 4:3
- Compatible with RoHS standard

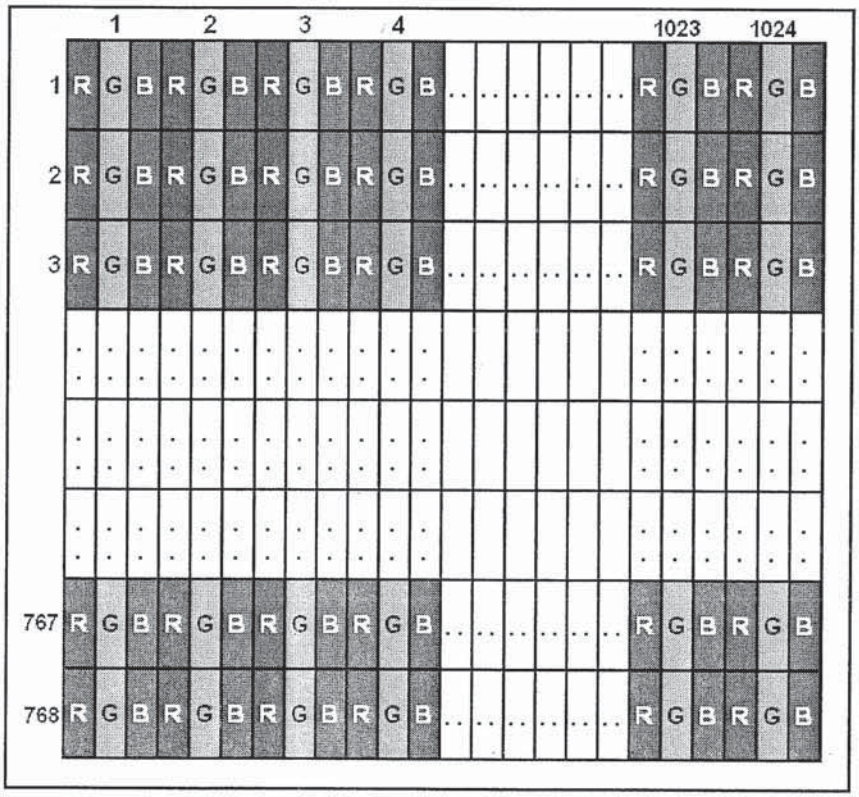
1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	38 (15 inch) Diagonal	cm
Active Area	304.1 (H) x 228.1(V)	mm
Pixel format	1024(H) x768 (V) (1 pixel=R+G+B dot)	pixel
Pixel Pitch	0.297(H) x 0.297(V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally White	-
White Luminance	400typ;320min	cd /m^2
Contrast Ratio	800:1 typ; 450:1min	-
Response Time	30typ	msec
Input Voltage	3.3V(Logic),12V(LED)	V
Weight	995(Typ)	g
Unit outline dimensions	326.5(W) x 253.5(H) x 9.6 (D)	mm
Electrical Interface (Logic)	LVDS	-
Support Color	16.7M colors	-
Surface Treatment	Anti-glare & hard-coating 3H	-

1.4 Functional Block Diagram



1.5 Pixel Format Image



2.0 Absolute Maximum Ratings

Item	Symbol	Condition	Pin	Ratings	Unit	Note
Supply Voltage	Vcc	Ta=25℃	VCC	-0.3~+4.0	V	(1),(2)
	V_{DD}	Ta=25℃	VDD	-0.3~+15.0	V	(1),(2)
Input voltage	V_{I1}	Ta=25℃	RxINi-/+ CK IN-/+	-0.3~Vcc+0.3	V	i=0,1,2,3
	V_{I2}	Ta=25℃	RL/UD,SELLVDS	-0.3~ Vcc+0.3	V	-
	V_{I4}	Ta=25℃	XSTABY,VBR	-0.3~ V_{DD}	V	-
Storage temperature	T_{STG}	-	-	-30~+80	℃	(1)
Operating temperature	T_{OPA}	-	-	-20~+70	℃	(1),(3),(4)

Note (1): Humidity: 95%RH Max. (Ta<=40℃) Note static electricity.
Maximum wet bulb temperature at 39℃ or less. (Ta>40℃) No condensation.

Note (2): The Vcc power supply capacity must use the one of 2A or more.
The V_{DD} power supply capacity must use the one of 3A or more.

Note (3): There is a possibility of causing deterioration in the irregularity and others of the screen and the display fineness though the liquid crystal module doesn't arrive at destruction when using it at 65~70℃ or -10~0℃. There is a possibility of causing the fineness deterioration by the prolonged use in the (high temperature) humidity environment (60% or more).

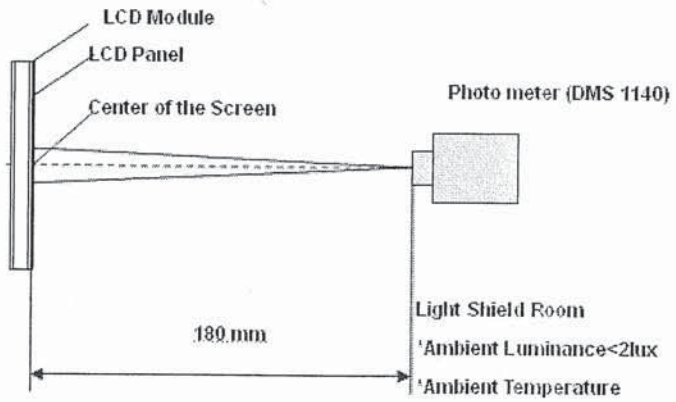
Note (4): In the operating temperature item, the low temperature side is the ambient temperature regulations. The high temperature side is the panel surface temperature regulations.

3.0 Optical Characteristics

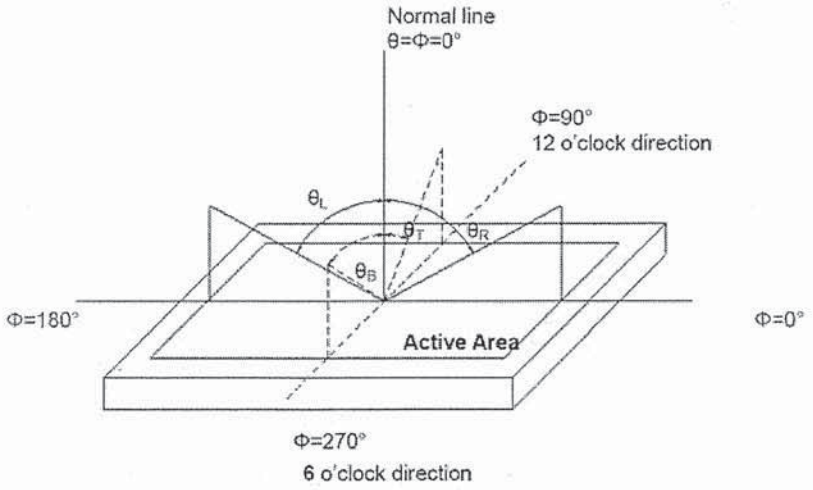
Item	Condition		Specification			
			Min.	Typ.	Max.	Note
Viewing Angle [degrees] K=Contrast Ratio>10	Horizontal	θ_L	(70)	(80)	-	(1),(2),(4)
		θ_R	(70)	(80)	-	
	Vertical	θ_T	(60)	(80)	-	
		θ_B	(70)	(80)	-	
Contrast Ratio	Center		(450)	(800)	-	(2),(4)
Response time	-		-	(30)	TBD	(3),(4)
Color Chromaticity (CIE 1,931)	Red	x	Typ-0.05	TBD	Typ+0.05	(4)
	Red	y	Typ-0.05	TBD	Typ+0.05	
	Green	x	Typ-0.05	TBD	Typ+0.05	
	Green	y	Typ-0.05	TBD	Typ+0.05	
	Blue	x	Typ-0.05	TBD	Typ+0.05	
	Blue	y	Typ-0.05	TBD	Typ+0.05	
	White	x	(0.255)	(0.305)	(0.355)	
	White	y	(0.275)	(0.325)	(0.375)	
White Luminance [cd/m^2]	Center		(320)	(400)	-	(4)
White Uniformity [%]	5Points		-	-	1.33	(5)

The measurement shall be executed 30 minutes after lighting at rating.

The optical characteristics shall be measured in a dark room or equivalent state with the method shown in below.



Note (1): Definitions of viewing angle range



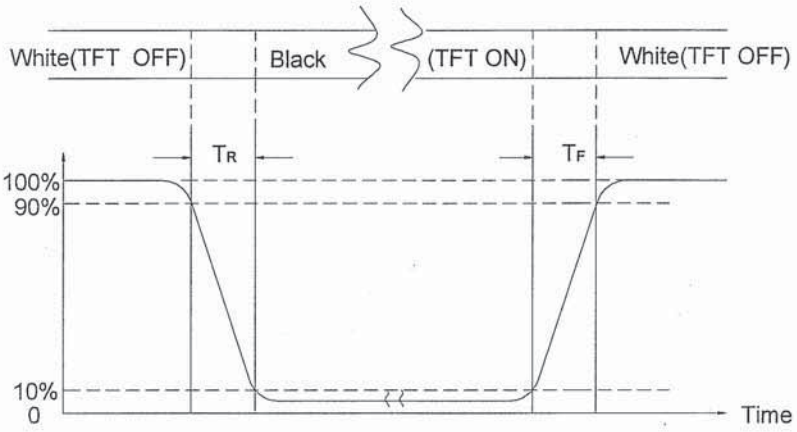
Note (2): Definition of Contrast Ratio (CR)

The contrast ratio is defined as the following

Contrast Ratio (CR) = Luminance with all pixels white / Luminance with all pixels black

Note (3): Definition of Response Time (T_R, T_F)

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white"

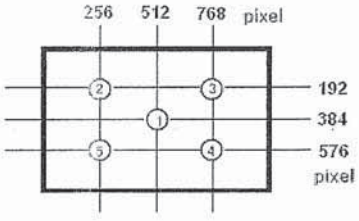


Note (4): This shall be measured at center of the screen.

Note (5): Definition Of white uniformity

White uniformity is defined as the following with five measurements

$$\text{Luminance uniformity} = \frac{(\text{Max Luminance of 5 points})}{(\text{Min Luminance of 5 points})} \times 100\%$$



4.0 Input Terminals

4.1 TFT LCD panel driving

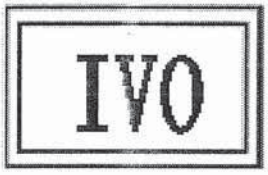
CN1 (Interface signals and +3.3V power supply)

Using connectors: CN1: MSB240420HD (SIN SHENG TERMINAL & MACHINE INC.) or Similar type.

Corresponding connectors: P240420 (SIN SHENG TERMINAL & MACHINE INC.)

Pin #	Symbol	Function	Remarks
1	VCC	+3.3V Power supply	-
2	VCC	+3.3V Power supply	-
3	GND	GND	-
4	GND	GND	-
5	RxIN0-	LVDS receiver signal CH0(-)	LVDS
6	RxIN0+	LVDS receiver signal CH0(+)	LVDS
7	GND	GND	-
8	RxIN1-	LVDS receiver signal CH1(-)	LVDS
9	RxIN1+	LVDS receiver signal CH1(+)	LVDS
10	GND	GND	-
11	RxIN2-	LVDS receiver signal CH2(-)	LVDS
12	RxIN2+	LVDS receiver signal CH2(+)	LVDS
13	GND	GND	-
14	CK IN-	LVDS receiver signal CK(-)	LVDS
15	CK IN+	LVDS receiver signal CK(+)	LVDS
16	GND	GND	-
17	RxIN3-	LVDS receiver signal CH3(-)	-
18	RxIN3+	LVDS receiver signal CH3(+)	-
19	RL/UD	Horizontal/Vertical display mode select signal	*1
20	SELLVDS	LVDS SET	-

【*1】 RL/UD = LOW



RL/UD = HIGH

4.2 LED backlight connector

CN2 Used connector : SM06B-SHLS-TF (J.S.T. Mfg. Co. Ltd)

Corresponding connector: SHLP-06V-S-B (J.S.T. Mfg. Co. Ltd)

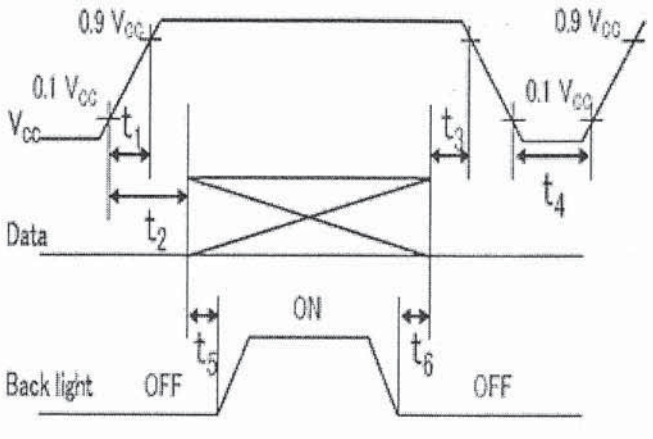
Pin #	Symbol	Function
1	VDD	+12V Power supply
2	VDD	+12V Power supply
3	GND	GND
4	GND	GND
5	XSTABY	Backlight ON/OFF signal
6	VBR	PWM signal

5.0 Electrical Characteristic

5.1 TFT LCD panel driving

Parameter		Symbol	Condition	Min.	Typ.	Max.	Units	Condition
Supply voltage		Vcc	-	3.0	3.3	3.6	[V]	(1)
Current dissipation		Icc	Vcc=3.3V	-	250	350	[mA]	(2)
Input voltage width for LVDS receiver		V_L	-	0	-	2.4	[V]	-
Permissive input ripple voltage		-	-	-	-	200	mVp-p	Vcc=3.3V
Differential input Threshold voltage	High	V_{TH}	-	-	-	Vcm+100	mV	Vcm=1.2V (3)
	Low	V_{TL}	-	Vcm-100	-	-	mV	
Input voltage		V_{IH}	-	2.1	-	-	V	(4)
		V_{IL}	-	-	-	0.8	V	
Input reak current		I_{OH}	-	-	-	400	uA	VI2=+3.3V, (4)
		I_{OL}	-	-10	-	+10	uA	VI2=0V, (4)
Terminal resistor		R_T	-	-	100	-	Ω	Differential input

Note (1): On-off condition for supply voltage



$20us < t_1 \leqq 10ms$

$0 < t_2 \leqq 20ms$

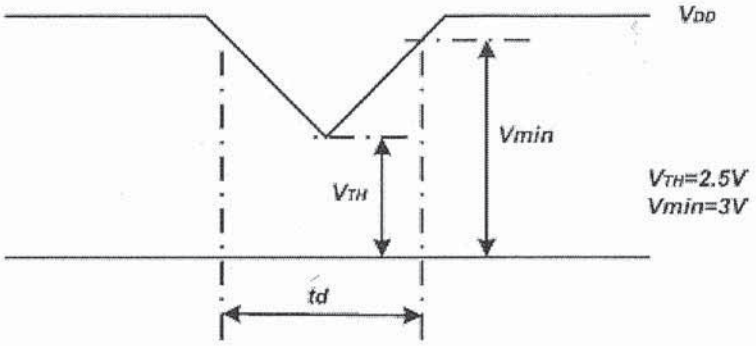
$0 < t_3 \leqq 1s$

$1s \leqq t_4$

$300ms \leqq t_5$

$200ms \leqq t_6$

Vcc-dip Condition



If VTH＜VDD≦Vmin，then td≦10ms；When the voltage return to normal our panel must revive automatically.

If Vcc<Vth, then Vcc-dip conditions should also follow the On-off conditions for supply voltage.

* Hsync/Vsync need not be input so that this model may drive only by the ENAB signal. Even if Hsync/ Vsync is input, it doesn't become a malfunction.

* The relation between the data input and the backlight will recommend the above-mentioned input sequence. When the backlight is turned on before the panel operates, there is a possibility of abnormally displaying. The liquid crystal module is not damaged.

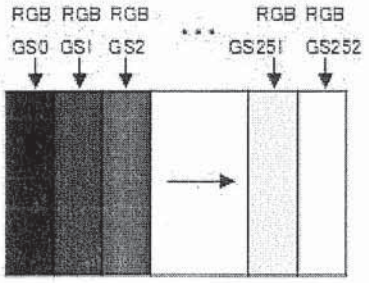
Note (2): Current dissipation

Current dissipation

Typical current situation : 253-gray-bar pattern

(Vcc=+3.3V、fck = 65MHz、Ta=25°C)

V_{CM} : LVDS common mode voltage



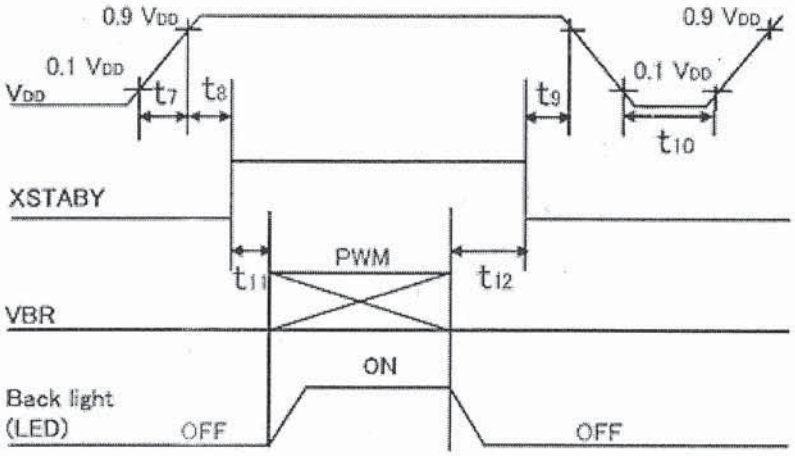
Note (3): Vcm: LVDS Common mode voltage

Note (4): RL/UD, SELLVDS

5.2 LED Backlight

Parameter		Symbol	Min	Typ.	Max.	Units	Note
Supply voltage		V_{DD}	10.2	12	13.8	[V]	(1)
Current dissipation		I_{DD1}	-	(580)	(730)	mA	(2)
Permissive input ripple voltage		V_{RP_BL}	-	-	200	mVp-p	VDD=12V
XSTABY	High voltage	V_{IH_BL1}	2.4	-	V_{DD}	V	(3)
	Low voltage	V_{IL_BL1}		-	0.4	V	
PWM frequency		f_{PWM}	200	-	1K	Hz	(4),(5)
PWM duty		D_{PWM}	10	-	100	%	(4),(5)
VBR	High voltage	V_{IH_BL2}	2.1	-	V_{DD}	V	(4)
	Low voltage	V_{IL_BL2}	-	-	0.4	V	
Life Time		L	(50,000)	-	-	Hours	(6)

Note (1): On-off conditions for supply voltage



$20\,\mu s \leqq t_7 \leqq 200ms$

$0ms \leqq t_8$

$0ms \leqq t_9$

$200ms \leqq t_{10}$

$10ms \leqq t_{11}$

$0ms \leqq t_{12}$

Note (2): Current dissipation

Typ. Value: V_{DD} =+12.0V, Duty=100%

Max. Value: V_{DD} =+10.2V, Duty=100%

Note (3): XSTABY is connected by the pull-down resistor of 33kΩ.

Note (4): VBR is connected by the pull-down resistor of 33kΩ.

Note (5): PWM

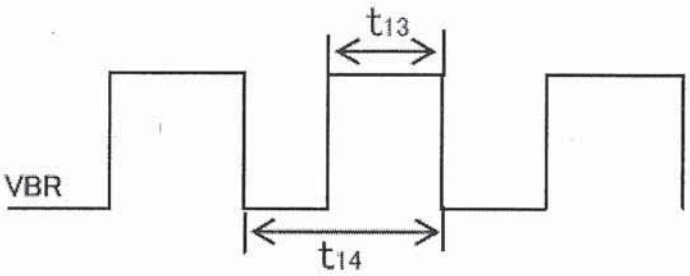
f_{PWM} =1/t14

Duty 10%: Min. Luminance (0%: LED OFF)

Duty 100%: Max. Luminance

Luminance changes in proportion to the duty ratio. (t13>=10us)

When the frequency slows, the display fineness might decrease.

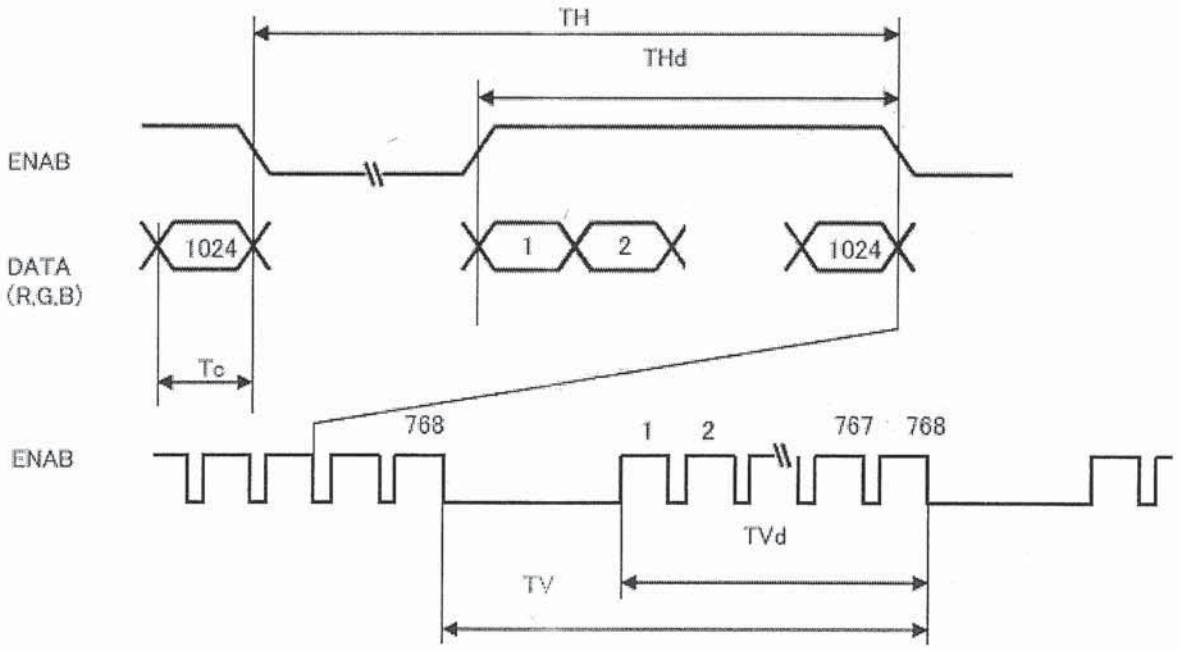


Note (6): Luminance becomes 50% of an initial value. (Ta=25℃, PWM=100%)

6.0 Timing characteristics of the input signal

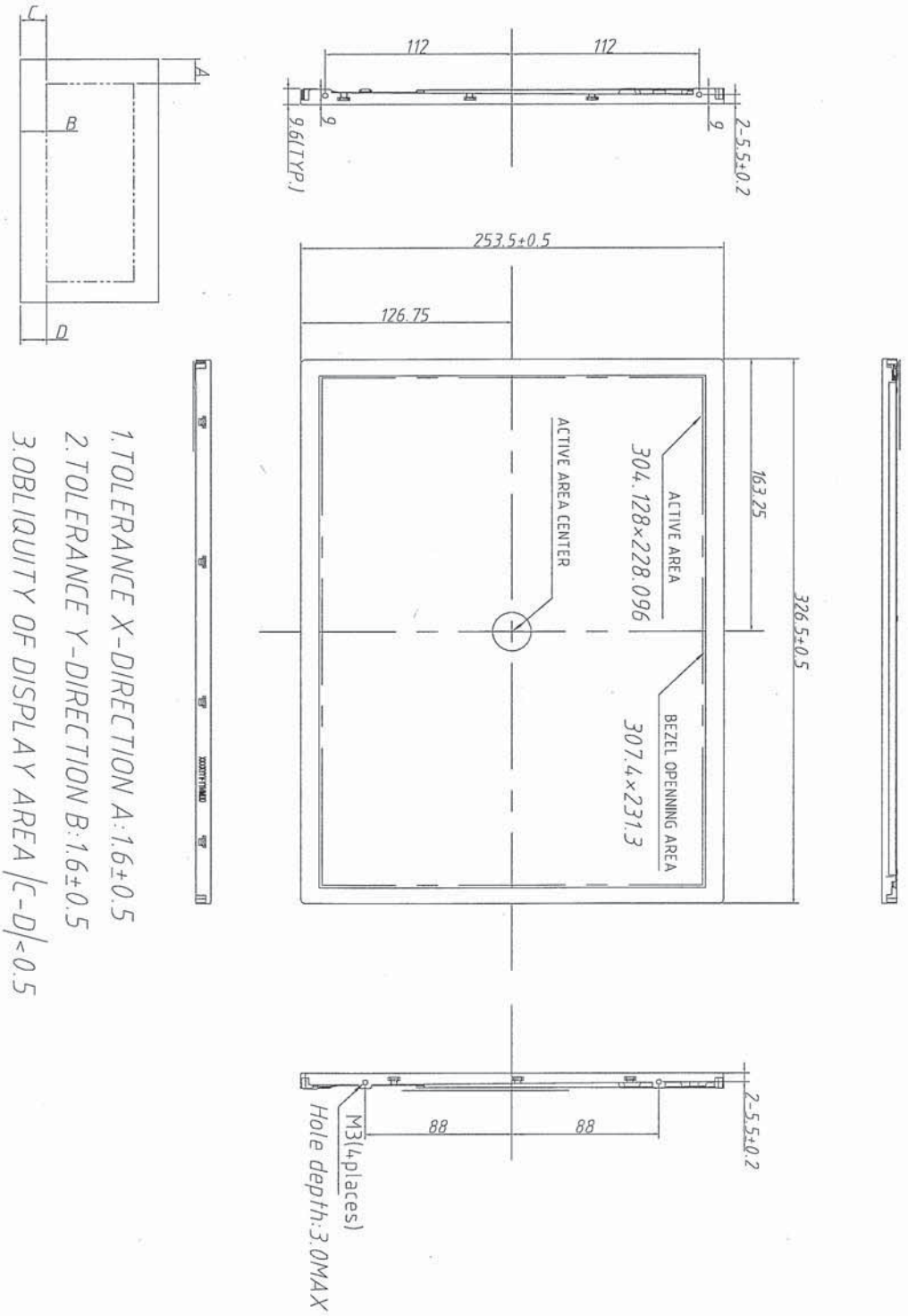
Parameter	Symbol	Min	Typ	Max	Unit	Note
DCLK Frequency	1/Tc	50	65	80	MHz	(1)
Horizontal Display Area	THd		1024		DCLK	
H Total Time	TH	1056	1344	1720	DCLK	
		16.0	20.7	23.4	us	
Vertical Display Area	TVd		768		Line	
V Total Time	TV	772	806	990	line	
		13.3	16.7	18	ms	

Note (1): In case of using the long vertical period, the deterioration of display quality, flicker etc. may occur.



7.0 Mechanical Characteristics

7.1 Outline Drawing



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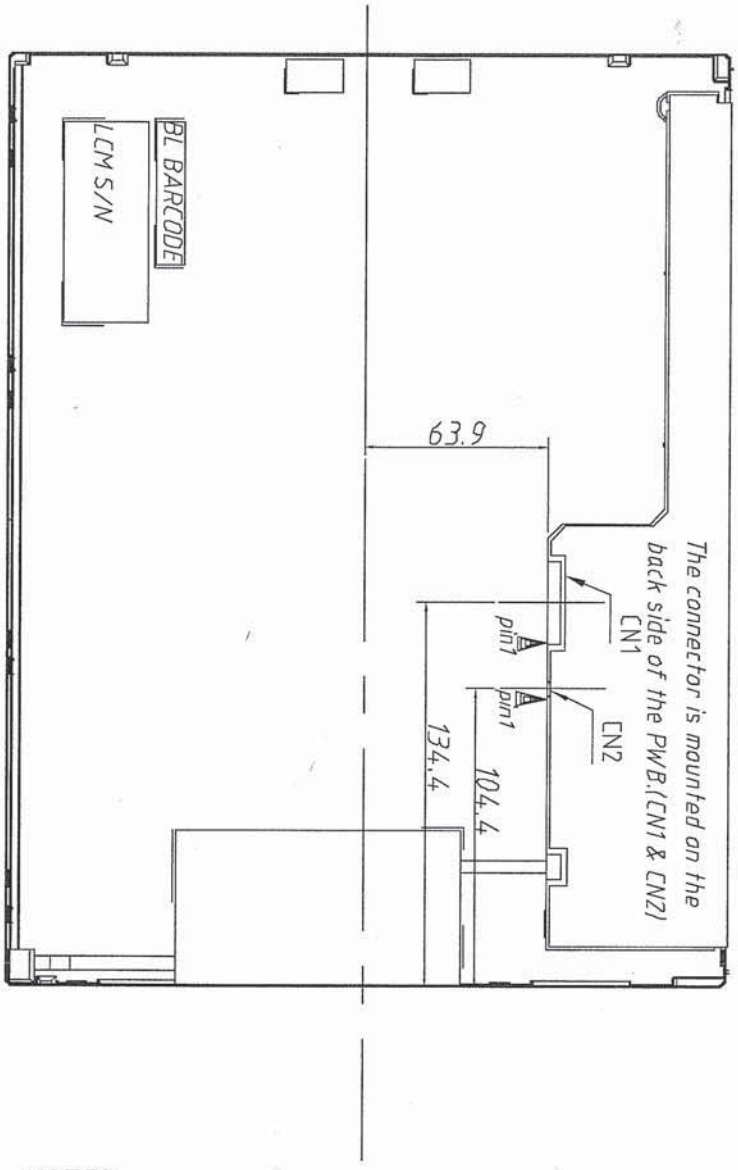


NOTES:

1.UNSPECIFIED TOLERANCE TO BE ±0.5

2.TIGHTEN TORQUE(RECOMMENDATION

0.294±0.02N·m(3.0±0.2kgf·cm)

7.2 Dimension Specifications

Table 8 Module Dimension Specifications

Item	Parameter	Min.	Typ.	Max.	Units
Module Size	Horizontal(H)	326.0	326.5	327.0	mm
	Vertical(V)	253.0	253.5	254.0	mm
	Depth(D)	-	9.6	-	mm
Weight	-	Typ-8%	995	Typ+8%	g

8.0 Reliability

Item	Criterion
A	There is no display function fail issue occurred, all the cosmetic specification is judged before the reliability stress

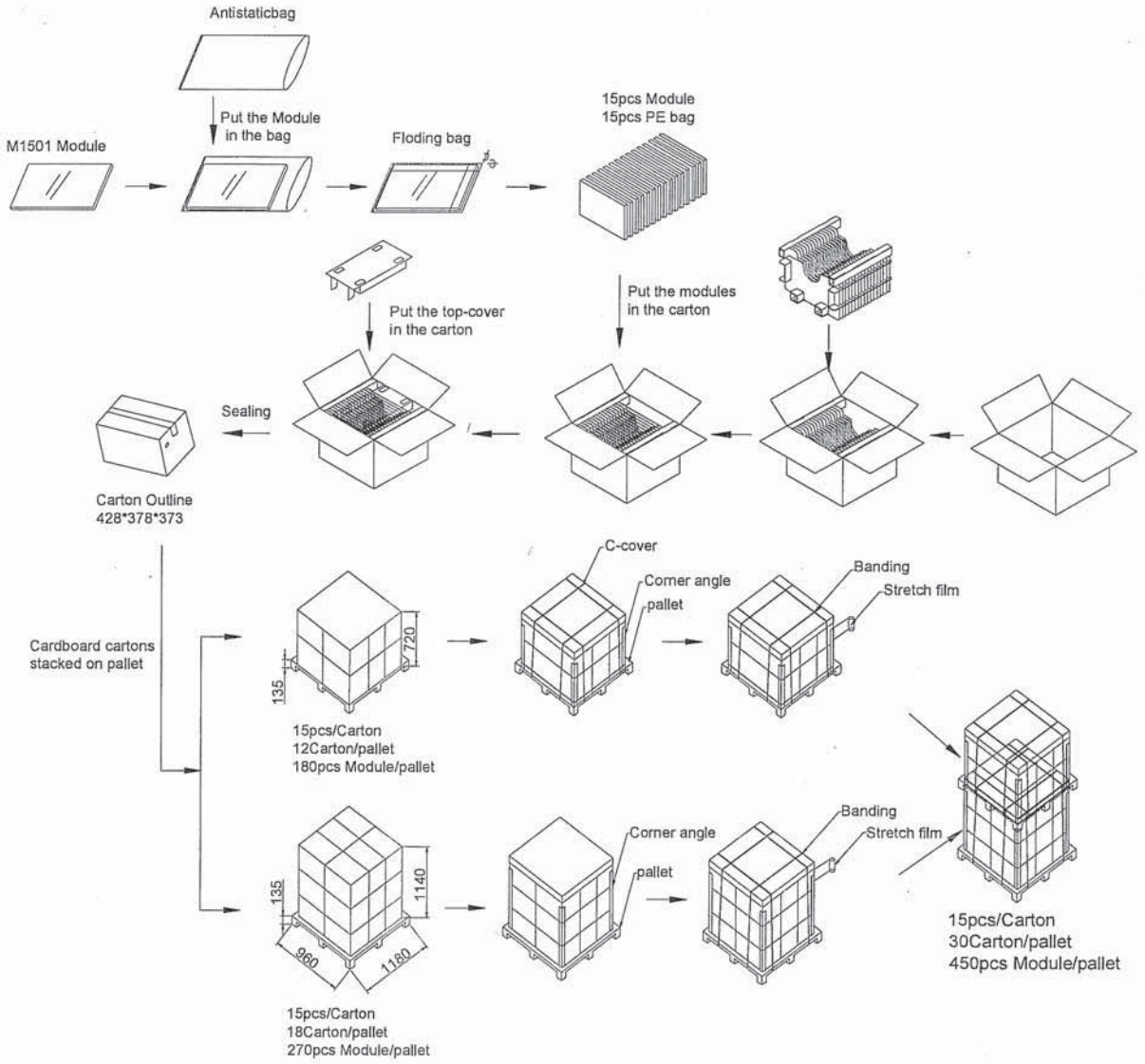
Item	Package	Test Conditions	Condition
High Temperature Storage Test	Module	Ambient temperature 80℃,500hrs	A
Low Temperature Storage Test	Module	Ambient temperature -30℃, 500hrs	A
High Temp./High Humidity Storage Test	Module	Ambient temperature 50℃, Humidity 95%, 500hrs(No condensation)	A
High Temperature Operation Test	Module	Panel surface 70℃, 500hrs	A
Low Temperature Operating Test	Module	Ambient temperature -20℃, 500hrs	A
Shock Test	With package	Half Sine Wave ±X,Y,Z,240G,2ms,1 Times each axis	A
Vibration Test	With package	1.5G,10~500Hz, x,y,z each axis/1h	A
Thermal shock test	Module	-30℃[0.5h]~80℃[0.5]/200cycles	A

Note 1. All the judgments are under normal temperature and the sample need to be static more than 2 hours in the normal temperature before judge.

2. During measurement, the condensation water or remains shall not be allowed.

9.0 Package Specification

M1501 Module



Components Material	Carton	PE Bag	Module	Protect film	Weight
Matrrial Size(mm)	428*378*373	350*330*0.06	326.5*253.5*9.7	317*241*0.1	18.5Kg
Amount (Pcs/Carton)	1	15	15	15	15Pcs Module (include packing)

10.0Lot Mark

TBD

11.0 General Precaution

11.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

11.2 Handling Precaution

(1) Be sure to turn off the power supply when inserting or disconnecting the cable.
(2) Since the front polarizer is easily damaged, pay attention not to scratch it.
(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. Handle with care.
(6) Since CMOS LSI is used in this module, take care of static electricity and injure the human earth when handing. Observe all other precautionary requirements in handling components.
(7) Since there is a circuit board in the module back, stress is not added at the time of a design assembly. Please make it like. If stress is added, there is a possibility that circuit parts may be damaged.
(8) It causes an irregular display and the defective indication, etc., when always put constant pressure on the back of the module. Please do not make the structure to press the back of the module.
(9) Do not expose the LCD panel to direct sunlight. Light proof shade etc. should be attached when LCD panel is used under such environment.
(10) Connect GND to stabilize against EMI and external noise.
(11) When handling LCD modules and assembling them into cabinets, please avoid that long-terms storage in the environment of oxidization or deoxidization gas and the use of such materials as reagent, solvent, adhesive, resin, etc. which generate these gasses, may cause corrosion and discoloration of the modules. Do not use the LCD module under such environment.
(12) When the module is installed, please take care not to pull and to hang LED_FFC.
(13) Liquid crystal contained in the panel may leak if the LCD is broken. Rinse it as soon as possible if it gets inside your eye or mouth by mistake.
(14) Be careful when using it for long time with fixed pattern display as it may cause accidential image.
(15) Adjusting volume has been set optimally before shipment, so do not change any adjusted value. If adjusted value is changed, the specification may not be satisfied.
(16) If a minute particle enters in the module and adheres to an optical material, it may cause display non-uniformity issue, etc. Therefore, fine-pitch filters have to be installed to cooling and inhalation hole if you intend to install a fan.
(17) An abnormal display by changing in quality of the polarizing plate might occur regardless of contact or no contact to the polarizing plate, because of epoxy resin (amine system curing agent) that comes out from the material and the packaging material used for the set side, the silicon adhesive (dealcoholization system and

ozime system), and the tray blowing agents (azo-compound), etc. Please confirm adaptability with your employed material.

(18) The polarizer surface on the panel is treated with Anti-Glare for low reflection. In case of attaching protective board over the LCD, be careful about the optical interface fringe etc. which degrades display quality.

(19) Notice: Never take to pieces the module, because it will cause failure. Please do not peel off the Black tape pasted to the product.

(20) When install LCD modules in the cabinet, please tighten with torque=0.294±0.02N.m (3.0±0.2kgf.cm)

11.3 Storage Precaution

(1) Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

(2) The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

(3) The module should be stored in a dark place. It is prohibited to apply sunlight or fluorescent light in storage.

11.4 Operation Precaution

(1) Do not connect or disconnect the module in the "Power On" condition.

(2) Power supply should always be turned on/off by "Power on/off sequence"

(3) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference should be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.

(4) 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.

11.5 Others

(1) Ultra-violet ray filter is necessary for outdoor operation.

(2) Avoid condensation of water which may result in improper operation or disconnection of electrode.

(3) If the module keeps displaying the same pattern for a long period of time, the image may be "sticked" to the screen.

(4) This module has its circuitry PCB's on the rear side and should be handled carefully in order not to be stressed.

11.6 Disposal

When disposing LCD module, obey the local environmental regulations.