



Product Specification

Model Name	KS150XGI02NS
Description	15.0" XGA 1024(RGB)x768 Dots
Date	2020/7/30
Version	1.0

Approved by/Date	Check by/Date	Prepared by/Date
Borger 2020/6/23	Kevin 2020/6/23	Evan 2020/6/23

Customer Approval	
Date	

Table of Contents

1. Record of Revision.....	2
2. General Specifications.....	3
3. Mechanical Drawing.....	5
4. Input/Output Terminals.....	6
5. Absolute Maximum Rating.....	7
6. Power Consumption.....	8
7. Interface Timing.....	10
8. Optical Characteristics.....	11
9. Environmental / Reliability Tests.....	14
10. Packing.....	15
11. General Precaution.....	16

1. Record of Revision

Rev	Issued Date	Description	Editor
1.0	2020/7/30	First Release.	Evan

2. General Specifications

2.1 Introduction

The M150GNN2 R1 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 backlight system, column driver and row driver circuit. This TFT LCD has a 15.0-inch diagonally measured active display area with resolution (1024 horizontal by 768 vertical pixels array).

2.2 Features

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

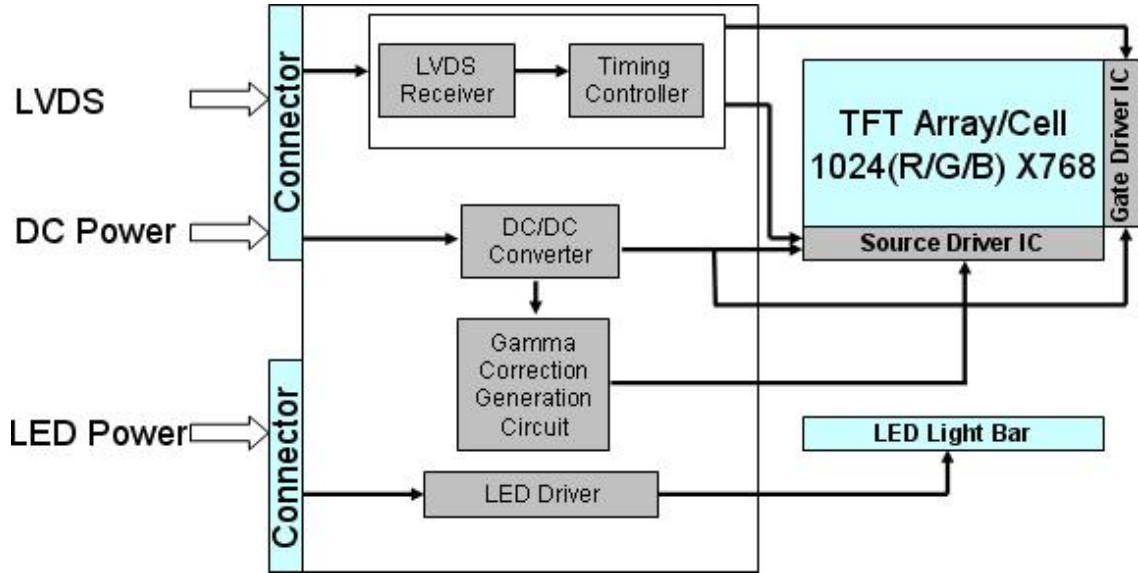
2.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	15.0	Inch
Active Area (H x V)	304.128 x 228.096	mm
Number of Pixels (H x V)	1024(RGB) x768	-
Pixel Pitch (H x V)	0.297 x 0.297	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally White	-
White Luminance	420(Typ.)	cd /m ²
Contrast Ratio	800(Typ)	-
Response Time	16(Typ.)	ms
Input Voltage	3.3(Typ.)	V
Weight	960 (Max)	g
Outline Dimension (H x V x D)	326.5(Typ.)x 253.5(Typ.)x12(Typ.)	mm
Electrical Interface (Logic)	LVDS	-
Support Color	16.2M	-
Optimum Viewing Direction	6 o'clock	-
Surface Treatment	Anti-glare, Hard-Coating (3H)	-

2.4 Functional Block Diagram

Figure 1 shows the functional block diagram of the LCD module.

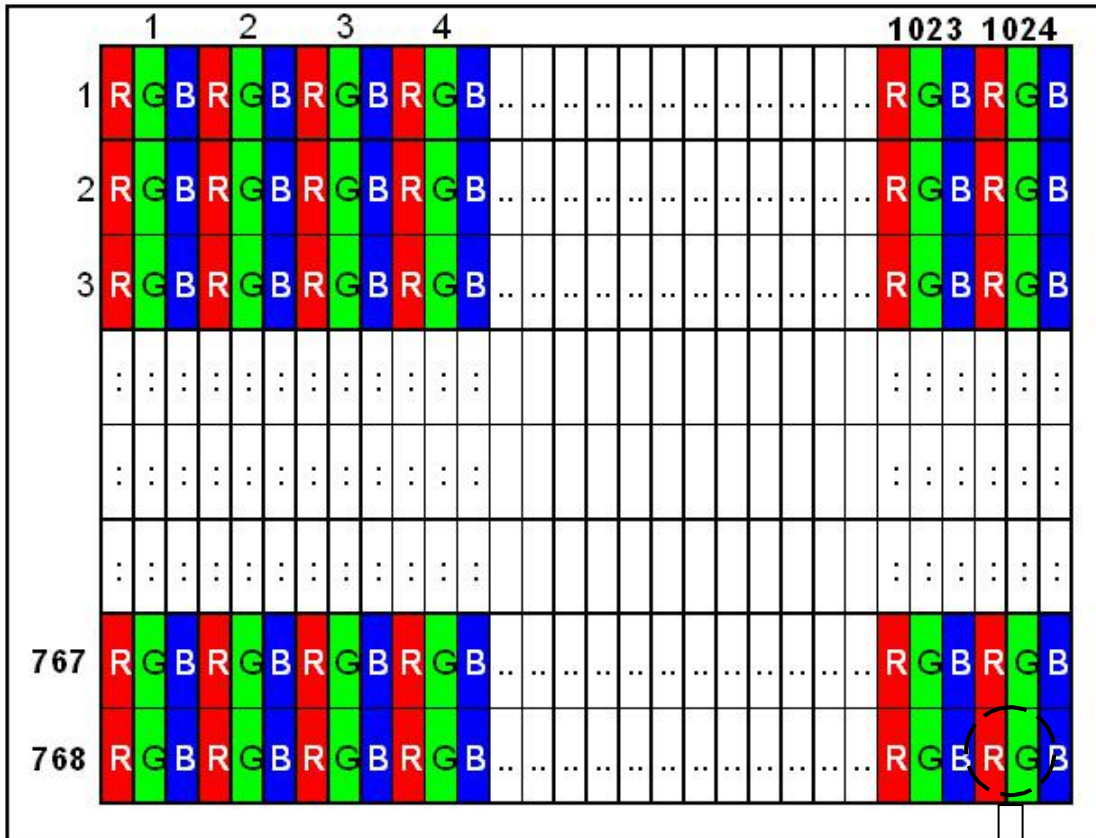
Figure 1 Block Diagram



2.5 Pixel Format Image

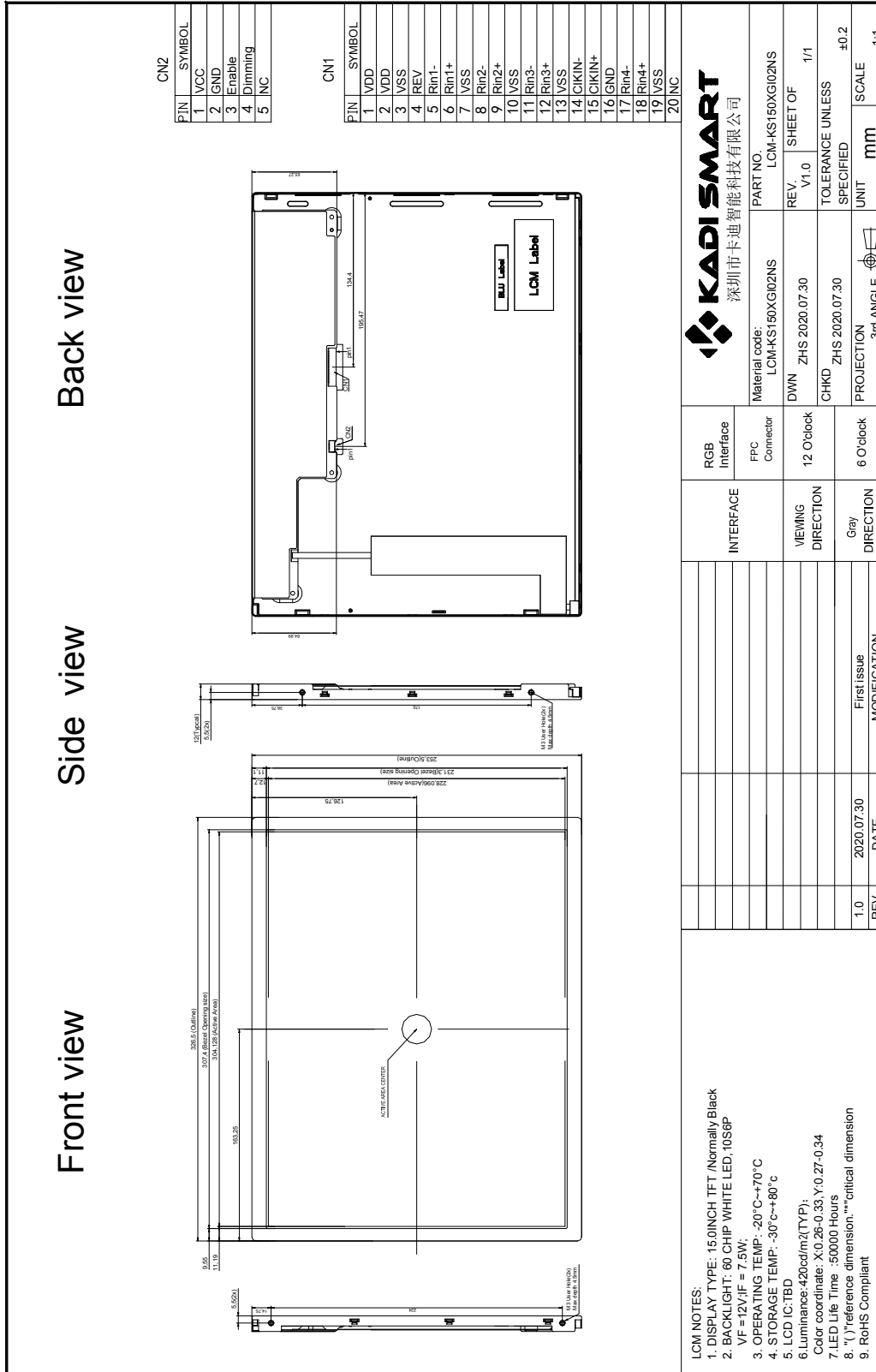
Figure 2 shows the relationship of the input signals and LCD pixel format image.

Figure 2 Pixel Format



R+G+B dots=1 pixel

3. Mechanical Drawing



4. Input/Output Terminals

4.1 TFT LCD Module Interface

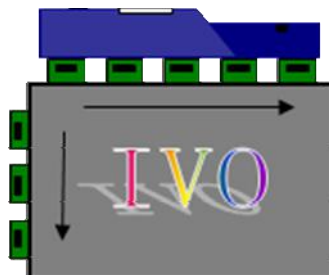
Table 4 Connector Name / Designation

Item	Description
Type / Part Number	MSB240420HD
Mating Model Number	P240420 or compatible

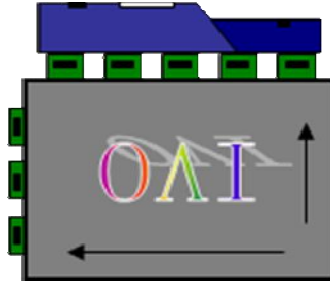
Table 5 Signal Pin Assignment

Pin #	Signal Name	Description	Remarks
1	VDD	Power Supply, 3.3V (typical)	
2	VDD	Power Supply, 3.3V (typical)	
3	VSS	Ground	
4	REV	Reverse Scan selection	Note
5	Rin1-	-LVDS differential data input (R0-R5,G0)	
6	Rin1+	+LVDS differential data input (R0-R5,G0)	
7	VSS	Ground	
8	Rin2-	-LVDS differential data input	
9	Rin2+	+LVDS differential data input	
10	VSS	Ground	
11	Rin3-	-LVDS differential data input	
12	Rin3+	+LVDS differential data input	
13	VSS	Ground	
14	CIKIN-	-LVDS differential clock input	
15	CIKIN+	+LVDS differential clock input	
16	GND	Ground	
17	Rin4-	-LVDS differential data input	
18	Rin4+	+VDS differential data input	
19	VSS	Ground	
20	NC	Not connect	

Note: I REV = LOW/NC



II REV = High



4.2 LED Interface Connector

Table 6 Connector Name / Designation

Connector Name/Designation	LED Driver Connector
Manufacturer	STM or compatible
Connector Model Number	MSB24038P5A or compatible
Mating Model Number	P24038P5A or compatible

Table 7 LED Connector Pin Assignment

Pin #	Symbol	Signal Name
1	Vcc	12V
2	GND	GND
3	Enable	5V-On / 0V-Off
4	Dimming	PWM Dimming or Analog Dimming
5	NC	NC

5. Absolute Maximum Rating

Table 1 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Supply Voltage	V _{DD}	-0.5	5	V	(1)
Operating Temperature	TOP	-20	70		(1) (2) (3) (4)
Operating Humidity	HOP	10	85	%RH	-
Storage Humidity	HST	10	95	%RH	-

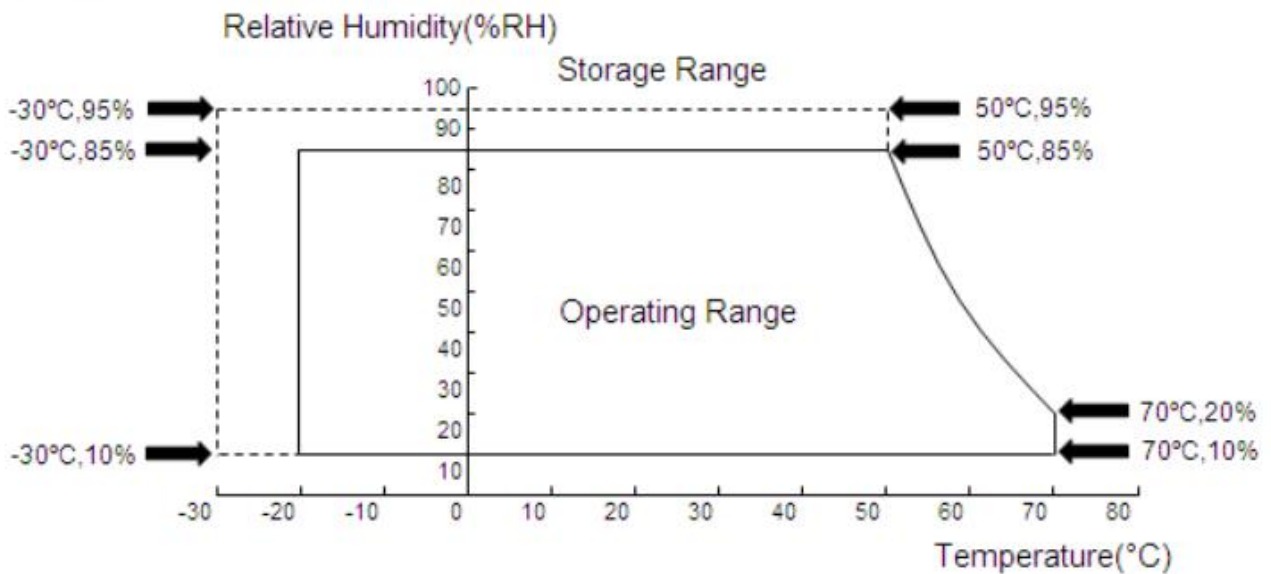
Note (1): Humidity: 85%RH Max. ($T \leq 40$) Note static electricity.

Maximum wet bulb temperature at 39 or less. ($T > 40$) No condensation.

Note (2): 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 60~70 or -20~0

Note (3): 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 surfacetemperature regulations.



6. Power Consumption

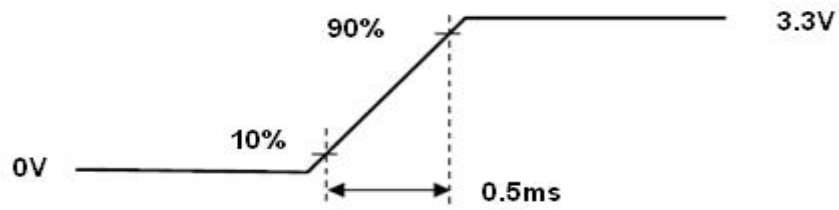
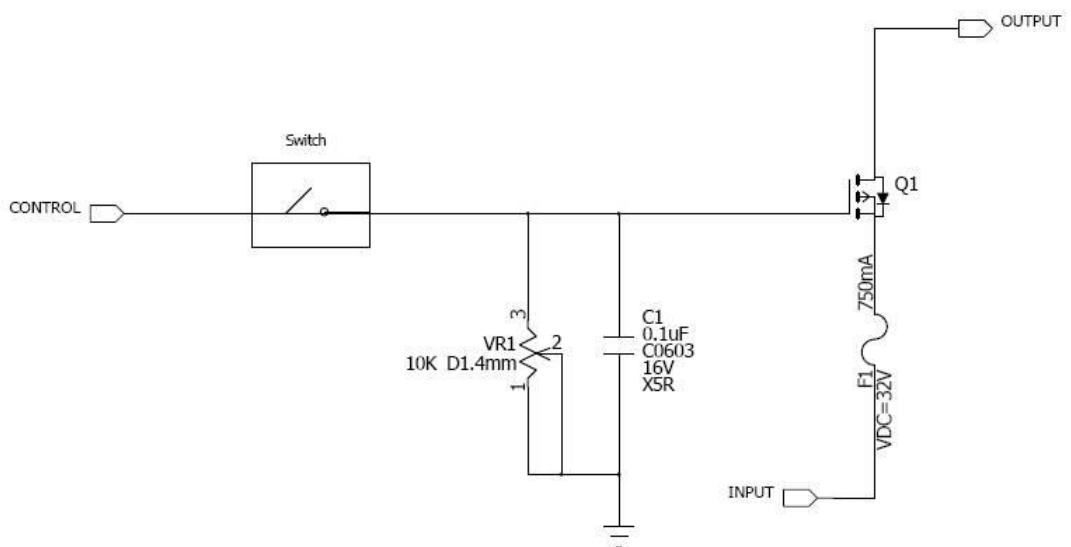
Input power specifications are as follows.

Table 9 Power Consumption

Symbol	Parameter	Min.	Typ.	Max.	Units	Condition
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	[V]	-
IDD	VDD Current	-	0.25	-	[A]	3.3V/Black pattern
PDD	VDD Power	-	-	1.3	[W]	Black Pattern, 60Hz
Irush	Rush Current	-	-	3	[A]	Note1
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	200	[mV]p-p	Note 2

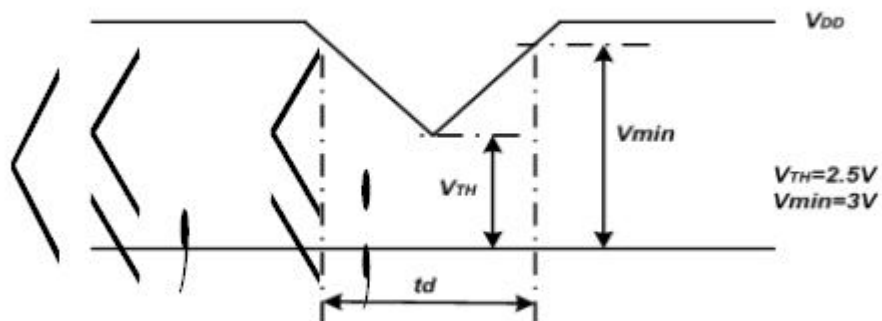
Note 1. Measure Condition

Figure 9 VDD rising time


VDD rising time


Note 2. VDD Power Dip Condition

Figure 10 VDD Power Dip



If $V_{TH} > V_{DD} > V_{min}$ then $t_d > 10ms$ When the voltage return to normal our panel must revive automatically.

7. Interface Timing

7.1 Timing Characteristics

Table 8 Interface Timings

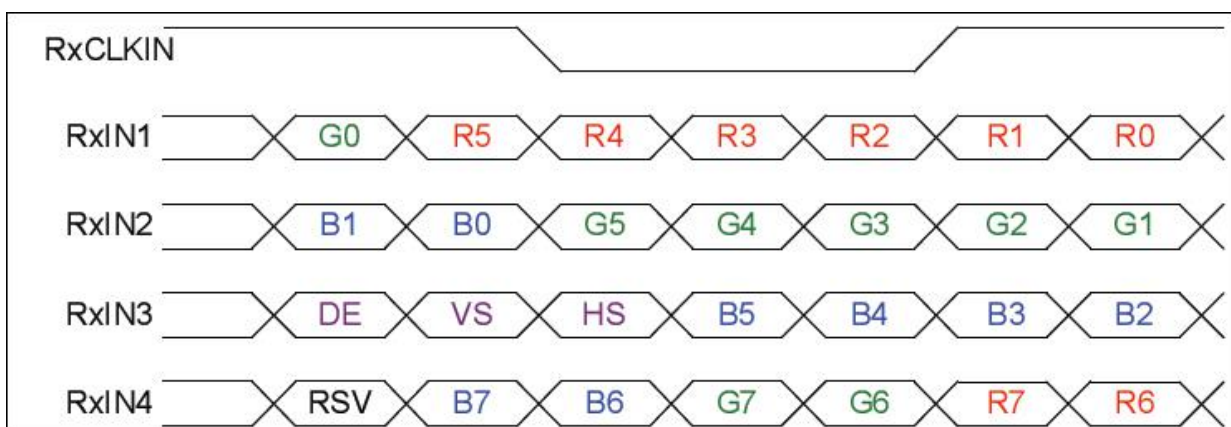
Synchronization Method DE only

Note: H Blank area and V Blank area can not be changed at every frame

Parameter	Symbol	Unit	Min.	Typ.	Max.
LVDS Clock Frequency <single >	fdck	MHz	50	65	80
H Total Time	Thp	clocks	1056	1344	1720
H Active Time	HA	clocks	1024	1024	1024
H Front Porch	Thfp	clocks	-	48	-
H Sync Pulse Width	HSPW	clocks	-	32	-
H Back Porch	Thbp	clocks	-	240	-
H Frequency	fh	kHz	46.32	48.36	59.40
V Total Time	Tvp	lines	772	806	990
V Active Time	VA	lines	768	768	768
V Front Porch	Tvfp	lines	-	3	-
V Sync Pulse Width	VSPW	lines	-	12	-
V Back Porch	Tvbp	lines	-	23	-
V Frequency	fv	Hz		60	

7.2 Timing Diagram of Interface Signal

Figure 8 Timing Characteristics



8. Optical Characteristics

The optical characteristics are measured under stable conditions as following notes

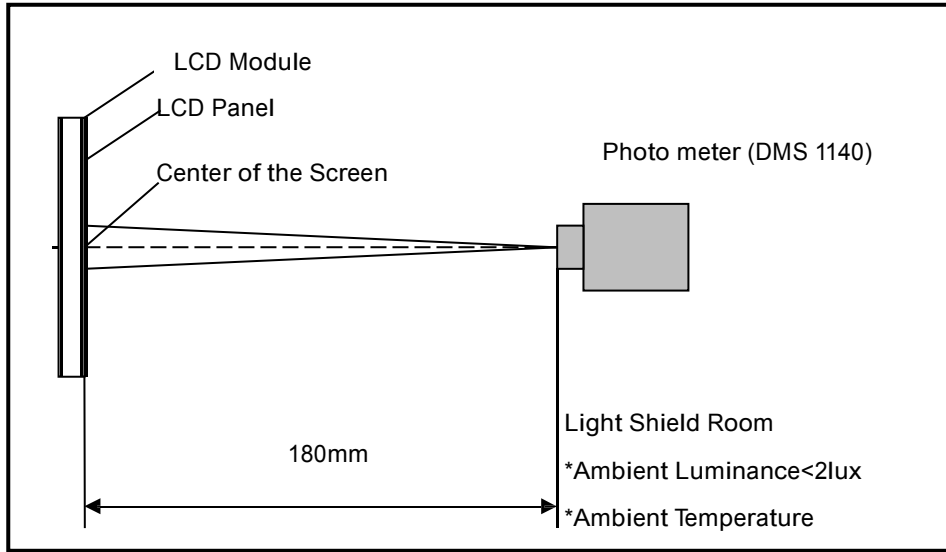
Table 2 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note	
Viewing Angle CR>10	Horizontal	θ_L	70	80	-	degree	(1),(2),(3)	
		θ_R	70	80	-			
	Vertical	θ_T	70	80	-			
		θ_B	60	80	-			
Contrast Ratio	Center		450	800	-	-	(1),(2),(4)	
Response Time	Falling		-	-	-	ms	(1),(2),(5)	
	Rising + Falling		-	16	-	ms		
Color Chromaticity (CIE1931)	NTSC		-	70	-	%	(1),(2)	
	Red	x	Typ. -0.03	0.625	Typ. +0.03	-	(1),(2)	
	Red	y		0.352				
	Green	x		0.315				
	Green	y		0.63				
	Blue	x		0.149				
	Blue	y		0.067				
	White	x		0.255		0.305		0.355
	White	y		0.275		0.325		0.375
White Luminance	Center		-	420	-	cd/m ²	(1),(2),(6)	
Luminance Uniformity	9Points		75	80	-	%	(1),(2),(6)	

Note (1) Measurement Setup:

The LCD module should be stabilized at given temperature(25) for 15 minutes to Avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.

Figure 3 Measurement Setup



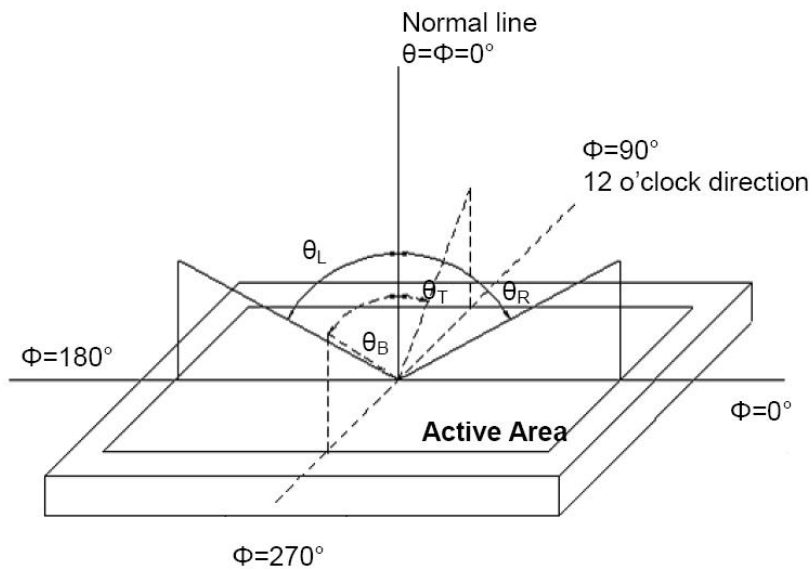
Note (2) The LED input parameter setting as:

VLED: 12V;

PWM_LED: Duty 100 %

Note (3) Definition of Viewing Angle

Figure 4 Definition of Viewing Angle



Note (4) Definition Of Contrast Ratio (CR)

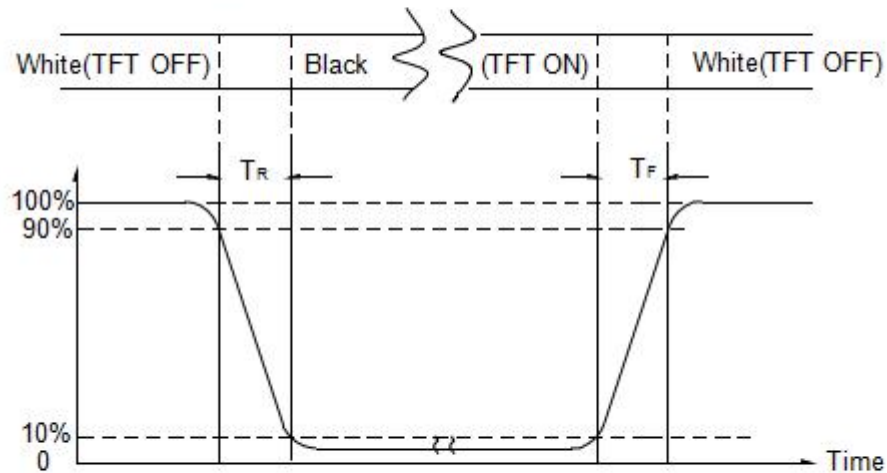
The contrast ratio can be calculated by the following expression

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

L255: Luminance of gray level 255, L0: Luminance of gray level 0

Note (5) Definition Of Response Time (T_R , T_F)

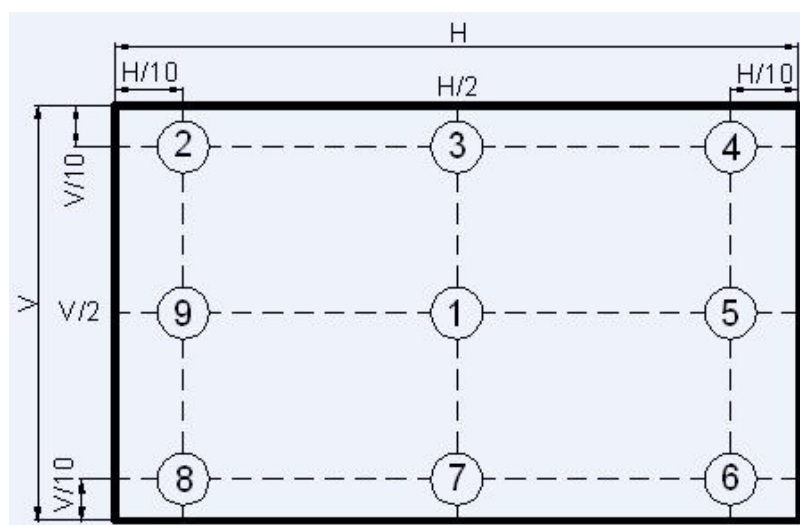
Figure Definition of Response Time



Note (6) Definition Of Brightness Luminance

$$\text{Luminance Uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

Figure 6 Measurement Locations



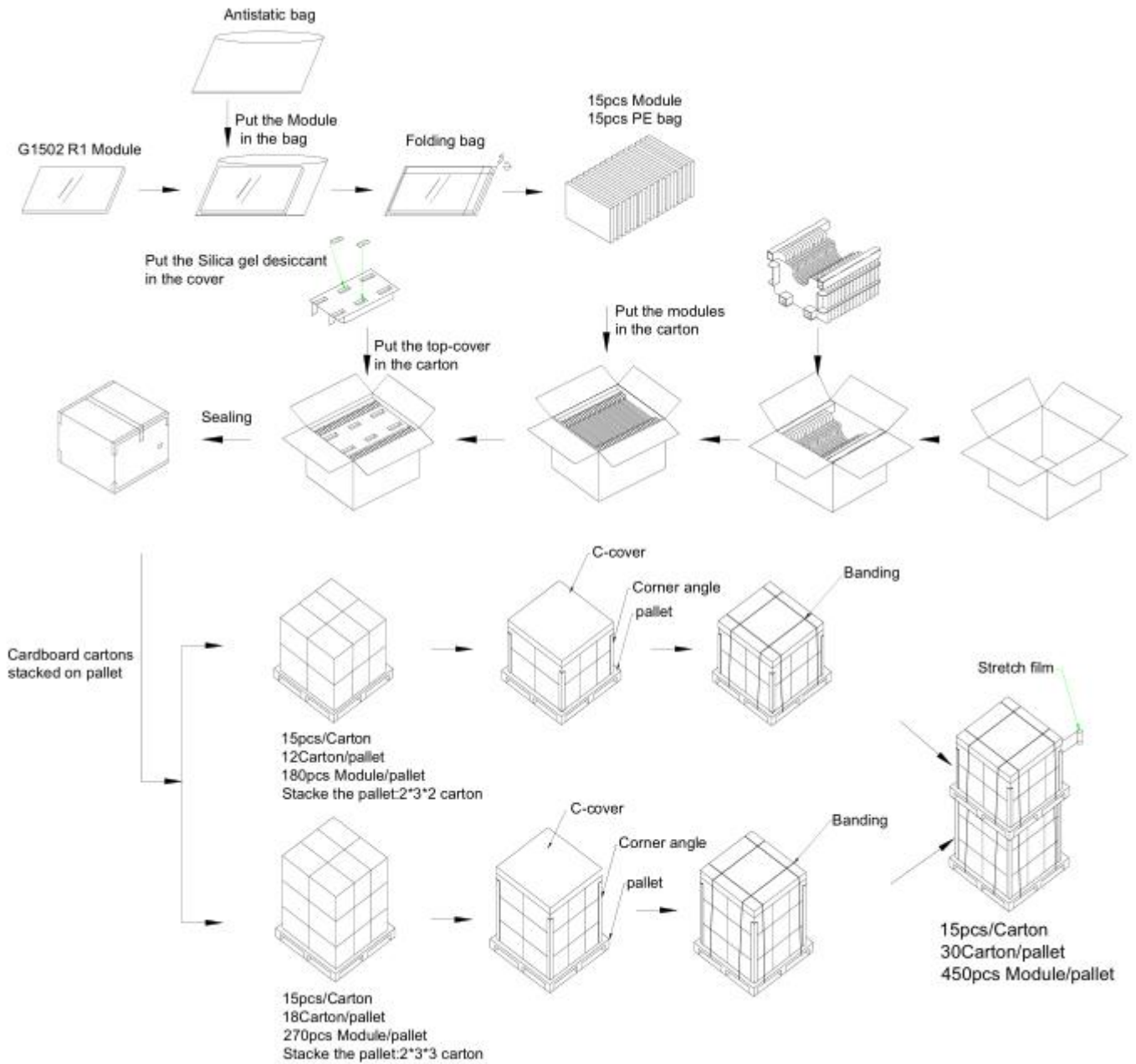
9. Environmental / Reliability Tests

Table 12 Reliability Test Criteria

Items	Required Condition	Note
High Temperature Operation Test	70 , 300hrs	-
High Temperature Storage Test	80 , 300hrs	-
Low Temperature Operating Test	-20 ,300hrs	-
Low Temperature Storage Test	-30 ,300hrs	-
High Temp./High Humidity Operating Test	50 , 85%, 300hrs	-
Thermal Shock Non-operation Test	-20 ~60 ,1hr/each cycle,100cycles	-
Shock	50G,20ms,Half Sine Wave,(X, Y, Z)	-
Vibration	1.5G , 10~200 Hz , x y z each axis/30min	-
ESD Test	Contact Discharge: ±8KV,150pF(330Ω); Air Discharge: ±15KV,150pF(330Ω)	1

Note1: ESD class C: Performance could be recovered by reset if temporary failure happened.

10. Packing



11. 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) Please mount LCD module by using mounting holes arranged in four corners tightly.
- (2) Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. IVO does not warrant the module, if customers disassemble or modify the module.
- (3) If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid Crystal, and do not contact liquid crystal with skin. If liquid crystal contacts mouth or eyes, rinse out with water immediately. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and Rinse thoroughly with water.
- (4) Disconnect power supply before handling LCD module
- (5) Refrain from strong mechanical shock and /or any force to the module.
- (6) Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature; etc otherwise LCD module may be damaged. It's recommended employing protection circuit for power supply.
- (7) Do not touch, push or rub the polarizer with anything harder than HB pencil lead. Use fingerstalls of soft gloves in order to keep clean display quality, when Persons handle the LCD module for incoming inspection or assembly.
- (8) When the surface is dusty, please wipe gently with absorbent cotton or other soft Material. When cleaning the adhesives, please use absorbent cotton wetted with a little Petroleum benzene or other adequate solvent.
- (9) Wipe off saliva or water drops as soon as possible. If saliva or water drops Contact with polarizer for a long time, they may causes deformation or color Fading.
- (10) Protection film must remove very slowly from the surface of LCD module to Prevent from electrostatic occurrence.
- (11) Because LCD module uses CMOS-IC on circuit board and TFT-LCD panel, it is Very weak to electrostatic discharge, Please be careful with electrostatic Discharge .Persons who handle the module should be grounded through adequate methods.
- (12) Do not adjust the variable resistor located on the module.

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.

11.5Others

- (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.

11.6Disposal

When disposing LCD module, obey the local environmental regulations.