Document Title	M043GW32 R0 Product Information			Page No.	1/28
Document No.		Issue date	2013/08/01	Revision	01

Product Information

To:

Product Name: M043GW32 R0

Document Issue Date: 2014/08/01

Customer	InfoVision Optoelectronics
SIGNATURE Please return 1 copy for your confirmation with your signature and comments.	**SIGNATURE** **REVIEWED BY QA** **PREPARED BY FAE**

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Revision	Date	Page	Old Description	New Description	Remark
00	2014-8-1	all	--	First issue.	

CONTENTS

1.0 General Descriptions

1.1 Introduction

The M043GN32 R0 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driver circuit and a backlight system. This TFT LCD has a 4.3 inch diagonally measured active display area with WQVGA resolution (480 horizontal by 272 vertical pixels array).

1.2 Features

- LED Backlight System
- Supported WQVGA Resolution
- TTL Interface
- Compatible with RoHS Standard

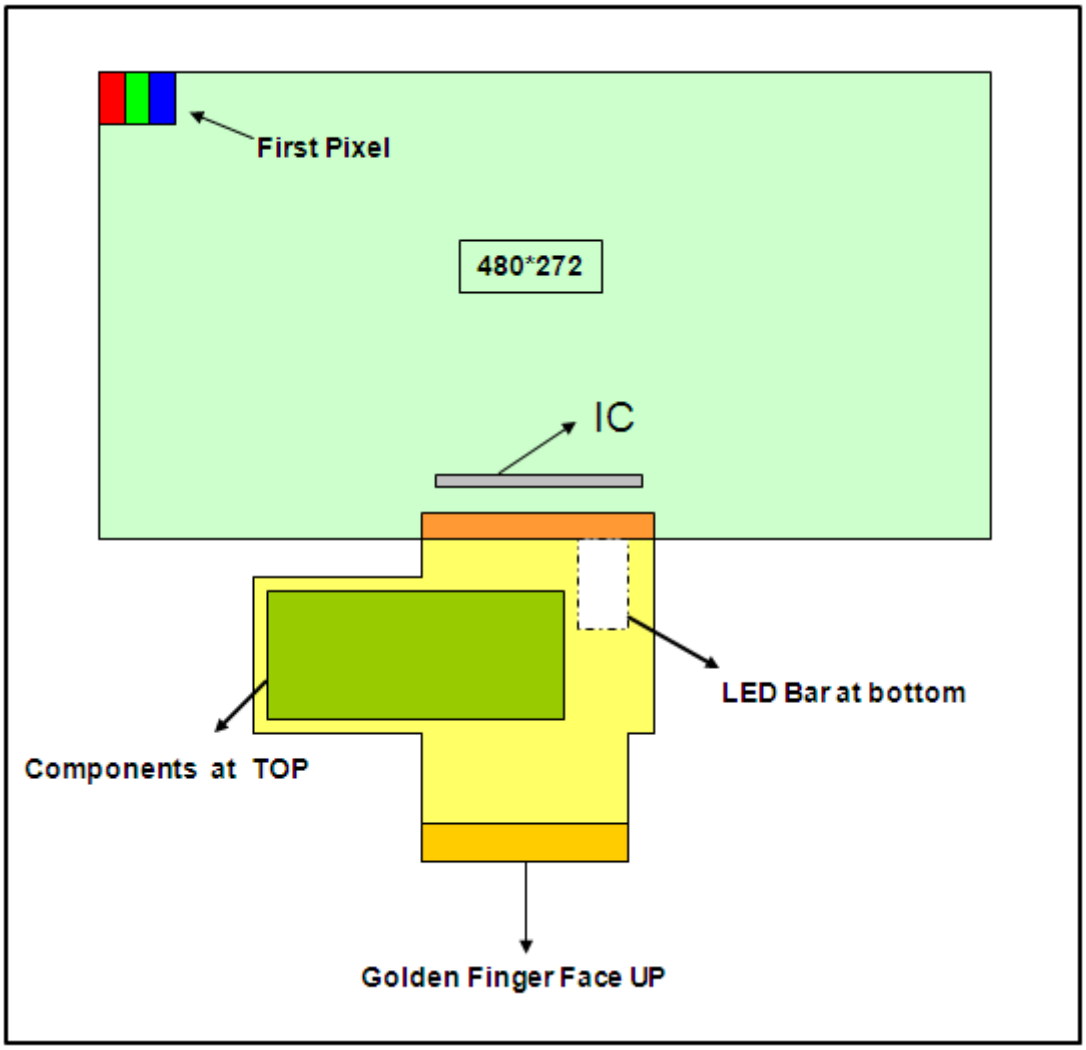
1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	4.3	inch
Active Area (H x V)	95.04 x 53.856	mm
Number of Pixels (H x V)	480 x 272	-
Pixel Pitch (H x V)	0.198 x 0.198	mm
Pixel Arrangement	R.G.B. Stripe	-
Display Mode	TN, Normally White	-
White Luminance	(550) (Typ.) (400) (Min)	cd /m^2
Contrast Ratio	(500) (Typ.) (400) (Min)	-
Response Time	(16) (Typ.) (25) (Max)	ms
Input Voltage	(3.3) (Typ.)	V
Power Consumption	(2.652) (Max.)	W
Weight	(66) (Max.)	g
Outline Dimension (H x V x D)	(105.5) (H) x (67.2) (V) x (5.3) (D)	mm
Electrical Interface (Logic)	TTL	-
Support Color	(16.7)M	-
NTSC	72 (Typ.)	%
Viewing Direction	6 o'clock	-
Surface Treatment	Anti-glare & hardness 3H	-

1.4 Functional Block Diagram

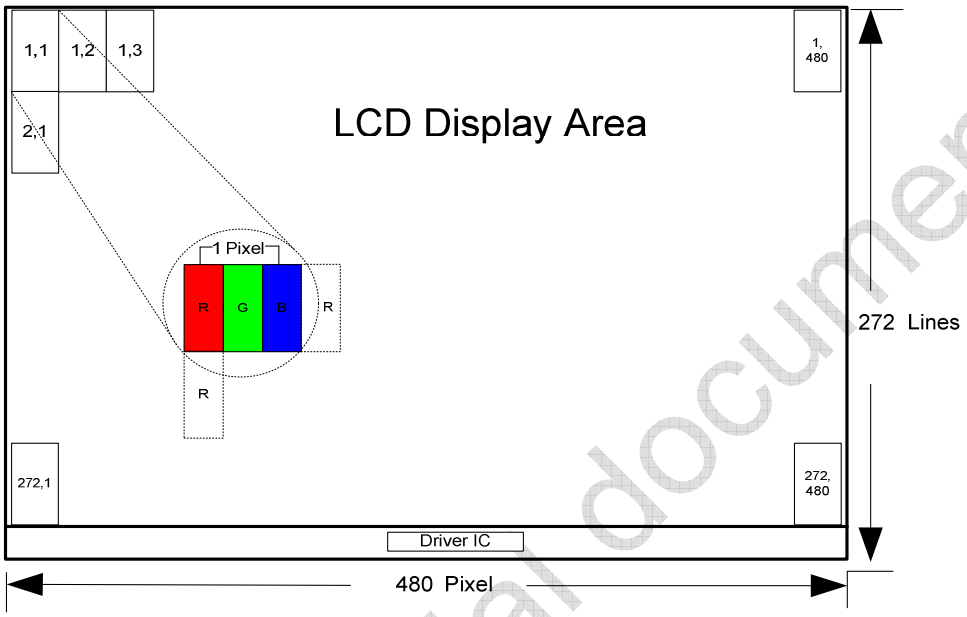
Figure 1 shows the functional block diagram of the LCD module.

Figure 1 Block Diagram



1.5 Pixel Mapping

Figure2 Pixel Mapping in the Display



2.0 Absolute Maximum Ratings

Table 1 Electrical & Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Logic Supply Voltage	V_{DD}	(-0.3)	(3.96)	V	(1),(2)
Operating Temperature	TOP	(-20)	(70)	℃	(3),(4),(5),(6)
Storage Temperature	TST	(-30)	(80)	℃	
Vibration(Non-operating)	VB	-	(1.5)	G	(7)
Shock(Non-operating)	Shock	-	(100)	G	(8)

Note (1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

Note (2) Operating temperature 25℃, humidity 55%RH.

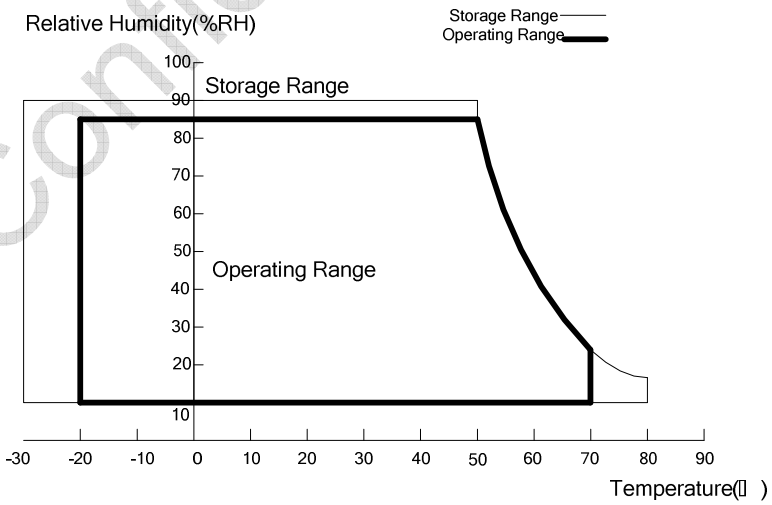
Note (3) (T<=40℃) Note static electricity.Maximum wet bulb temperature at 39℃ or less. (T>40℃) No condensation.

Note (4) 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 70~80℃ or -30~-20℃.

Note (5) There is a possibility of causing the fineness deterioration by the prolonged use in the (high temperature) humidity environment (60%RH or more).

Note (6) In the operating temperature item, the low temperature side is the ambient temperature regulations. The high temperature side is the panel surface temperature regulations.

Figure 3 Absolute Ratings of Environment of the LCD Module



Note (7) 10-500Hz, random vibration, 1h for X, Y, Z axis.
Note (8) 6ms, half sine wave, one time for X, Y, Z axis.

3.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes.

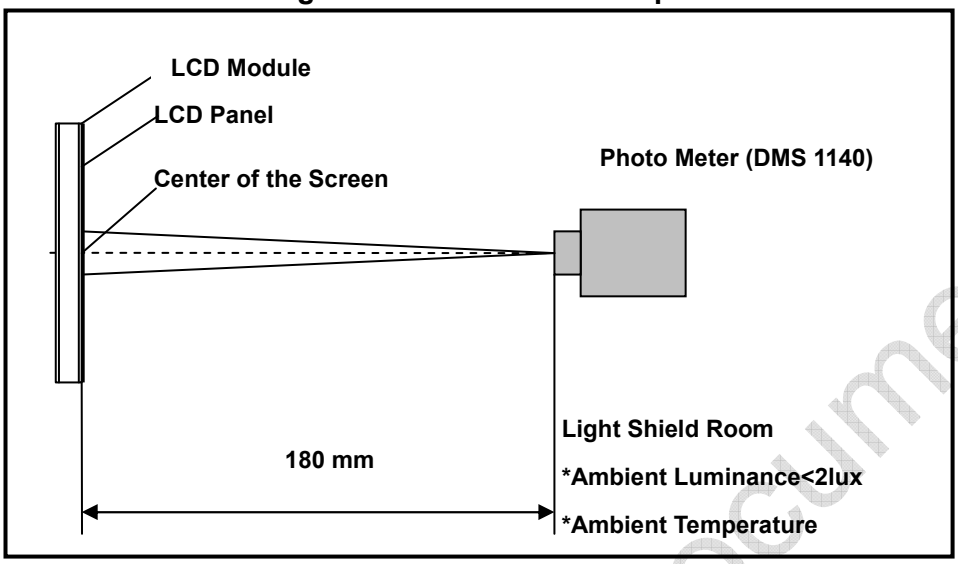
Table 2 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR>10）	Horizontal	θ_x^+	(65)	(75)	-	degree	(1),(2),(3)
		θ_x^-	(65)	(75)	-		
	Vertical	θ_y^+	(50)	(60)	-		
		θ_y^-	(60)	(70)	-		
Contrast Ratio	Center		(400)	(500)	-	-	(1),(2),(4) θx=θy=0°
Response Time	Rising + Falling		-	(16)	(25)	ms	(1),(2),(5) θx=θy=0°
Color Chromaticity (CIE1931)	Red x		Typ. -0.05	(0.628)	Typ. +0.05	-	(1),(2),(3) θx=θy=0°
	Red y			(0.358)		-	
	Green x			(0.309)		-	
	Green y			(0.628)		-	
	Blue x			(0.148)		-	
	Blue y			(0.062)		-	
	White x			(0.310)		-	
	White y			(0.330)		-	
NTSC	-		-	(72)	-	%	(1),(2),(3) θx=θy=0°
White Luminance	-		(400)	(550)	-	cd/m2	(1),(2),(6) θx=θy=0°
Luminance Uniformity	9 Points		(70)	-	-	%	(1),(2),(7) θx=θy=0°

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 4 Measurement Setup

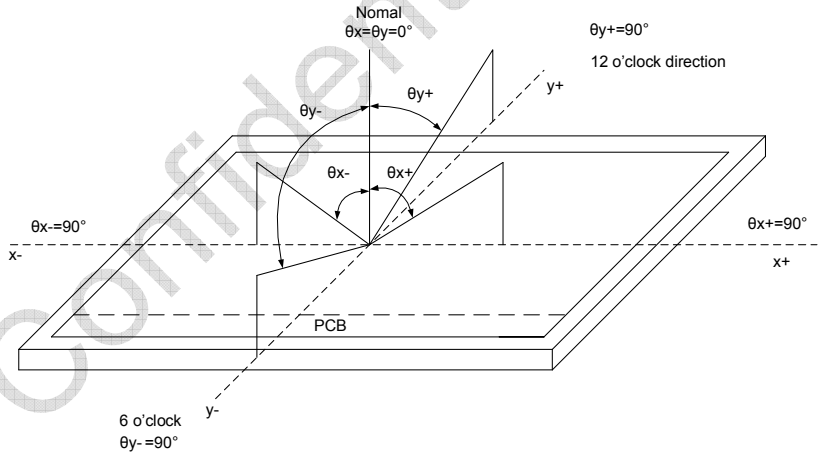


Note (2) The LED input parameter setting as:

I_LED: 80mA

Note (3) Definition of Viewing Angle

Figure 5 Definition of Viewing Angle



Note (4) Definition Of Contrast Ratio (CR)

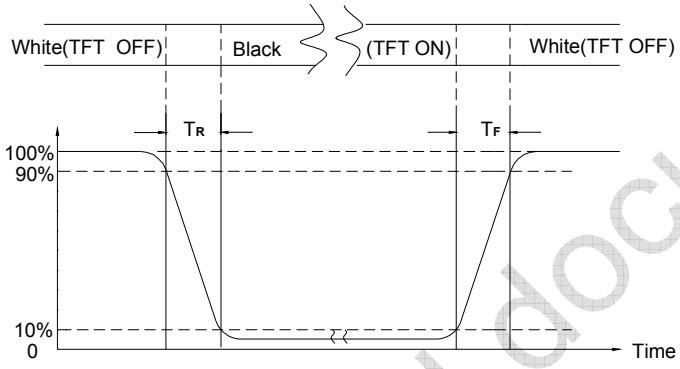
The contrast ratio can be calculated by the following expression:

Contrast Ratio (CR) = L255 / L0

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

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

Figure 6 Definition of Response Time



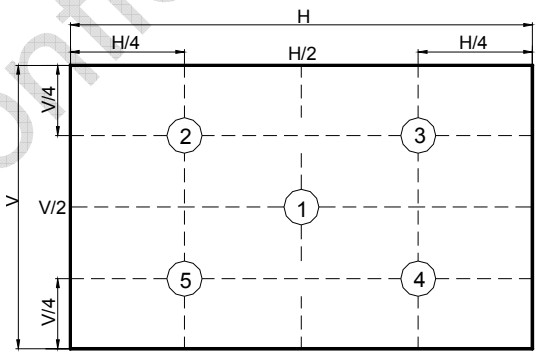
Note (6) Definition Of Luminance White

Measure the luminance of gray level255(Ref.: Active Area)

Display Luminance=(L1+L2+L3+L4+L5) / 5

H—Active Area Length, V—Active Area Width, L—Luminance

Figure 7 Measurement Locations Of 5 Points



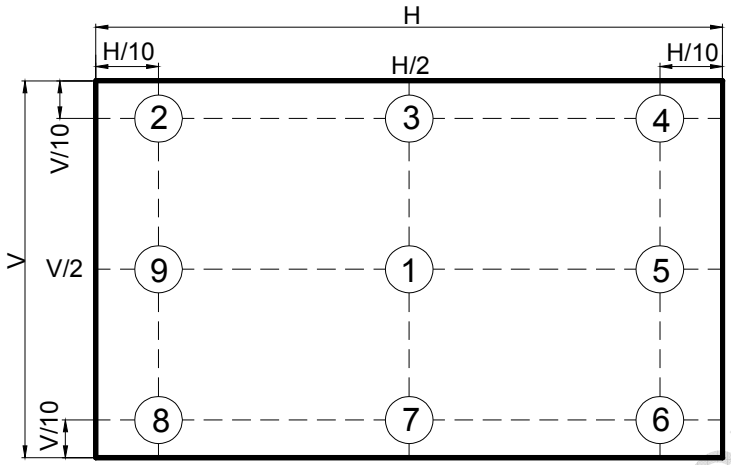
Note (7) Definition Of Luminance Uniformity (Ref.: Active Area)

Measure the luminance of gray level 255 at 9 points.

Luminance Uniformity= Min.(L1, L2, ... L9) / Max.(L1, L2, ... L9)

H—Active Area Length, V—Active Area Width, L—Luminance

Figure 7 Measurement Locations of 9 Points



4.0 Electrical Characteristics

4.1 Interface Connector

Table 3 Signal Connector Type

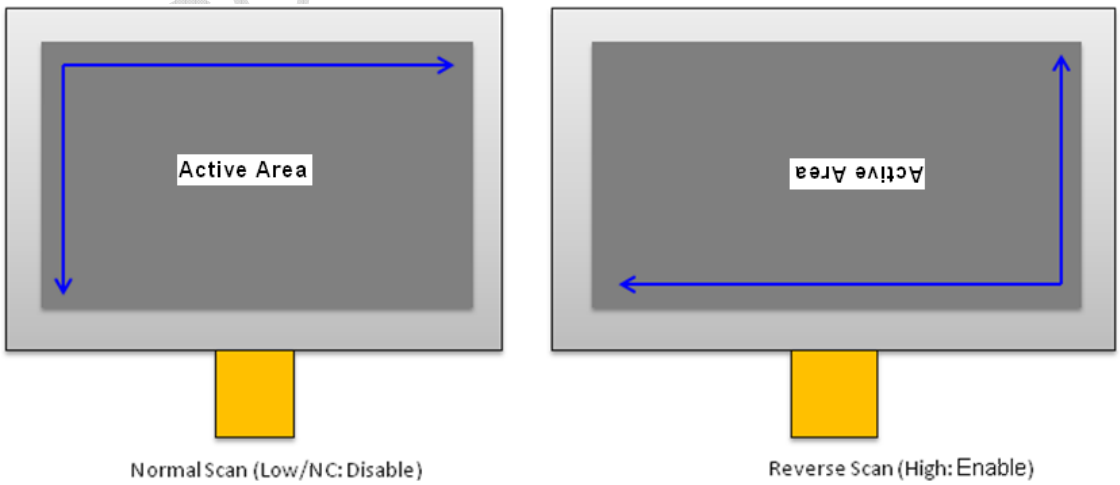
Item	Description
FPC Down Connector (40pin pitch=0.5mm)	Connector recommended model: FH19SC-40S-0.5SH Manufactured by Hirose.

Table 4 Signal Connector Pin Assignment

Pin No.	Symbol	Description	Note
1	VLED-	Power for LED backlight cathode	-
2	VLED+	Power for LED backlight anode	-
3	GND	Power Ground	-
4	VDD	Power voltage	-
5	R0	Red data(LSB, If 18-bit parallel RGB data input, please connect to GND)	-
6	R1	Red data(If 18-bit parallel RGB data input, please connect to GND)	-
7	R2	Red data	-
8	R3	Red data	-
9	R4	Red data	-
10	R5	Red data	-
11	R6	Red data	-
12	R7	Red data(MSB)	-
13	G0	Green data(LSB, If 18-bit parallel RGB data input, please connect to GND)	-
14	G1	Green data(If 18-bit parallel RGB data input, please connect to GND)	-
15	G2	Green data	-
16	G3	Green data	-
17	G4	Green data	-
18	G5	Green data	-
19	G6	Green data	-
20	G7	Green data(MSB)	-

21	B0	Blue data(LSB, If 18-bit parallel RGB data input, please connect to GND)	-
22	B1	Blue data(If 18-bit parallel RGB data input, please connect to GND)	-
23	B2	Blue data	-
24	B3	Blue data	-
25	B4	Blue data	-
26	B5	Blue data	-
27	B6	Blue data	-
28	B7	Blue data(MSB)	-
29	GND	Power ground	-
30	CLK	Pixel clock	-
31	DISP	Display on/off	-
32	HSYNC	Horizontal sync signal	-
33	VSYNC	Vertical sync signal	-
34	DE	Data Enable	-
35	RSV	Reverse Scan Function [H: Enable; L/NC: Disable]	(1)
36	GND	Power ground	-
37	NC	No connection	-
38	NC	No connection	-
39	NC	No connection	-
40	NC	No connection	-

Note (1)



4.2 Power Voltage Specification

Table 5 Power Voltage

Item	Symbol	Min.	Typ.	Max.	Units	Note
Input Power Supply Voltage	V DD	(3.0)	(3.3)	(3.6)	V	TA= 25° C
Input High Level	VIH	(VDDX0.7)	-	(VDD)	V	2.5<VDD<3.6
Input signal voltage	VIL	(0)	-	(VDDX0.3)	V	2.5<VDD<3.6
Output High Level	VOH	(VDDX0.9)	-	(VDD)	V	Iout=100uA
Output Low Level	VOL	(0)	-	(VDDX0.1)	V	Iout=100uA

Note (1) Operating temperature 25℃, humidity 55%RH.

4.3 Interface Timings

4.3.1 Timing Characteristics

Synchronization method should be DE mode.

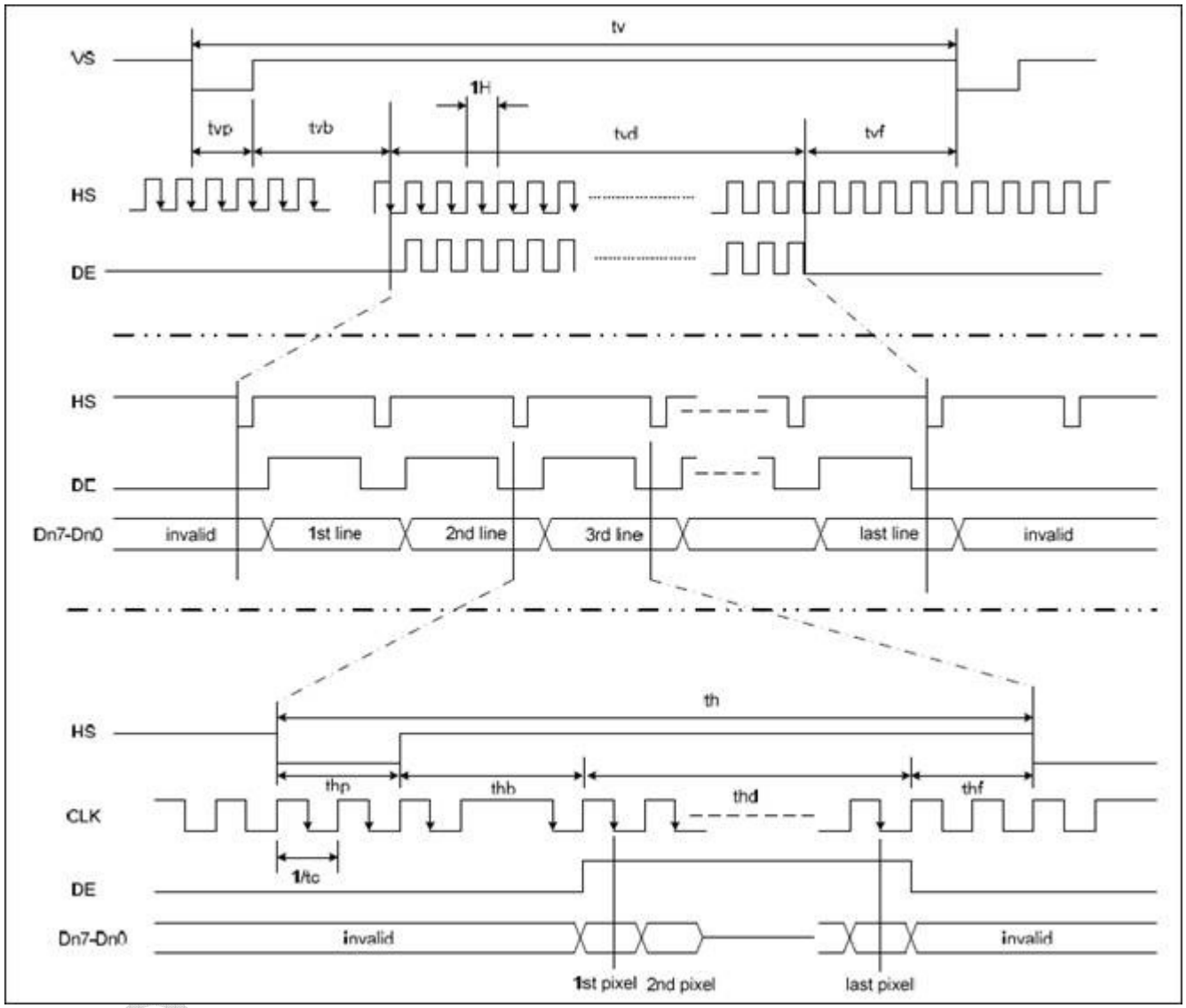
Table 6 Interface Timings

Parameter	Symbol	Unit	Min.	Typ.	Max.
DCLK	fdck	MHz	-	(9)	(15)
H Total Time	Th	clocks	(520)	(525)	(800)
H Active Time	HA	clocks	480	480	480
H Front Porch	Thf	clocks	(2)	(2)	-
H Pulse Width	THP	clocks	(2)	(41)	(41)
H Back Porch	Thb	clocks	(2)	(2)	(41)
V Total Time	Tv	lines	(277)	(288)	(400)
V Active Time	VA	lines	272	272	272
V Front Porch	Tvf	lines	(1)	(4)	-
V Pulse Width	TVP	lines	(1)	(10)	(11)
V Back Porch	Tvb	lines	(1)	(2)	(11)

V Frequency	fv	Hz	-	(60)	-

Note: H Blanking Time and V Blanking Time can not be changed at every frame.

Figure 8 Timing Characteristics



Note: TES is data enable signal setup time.

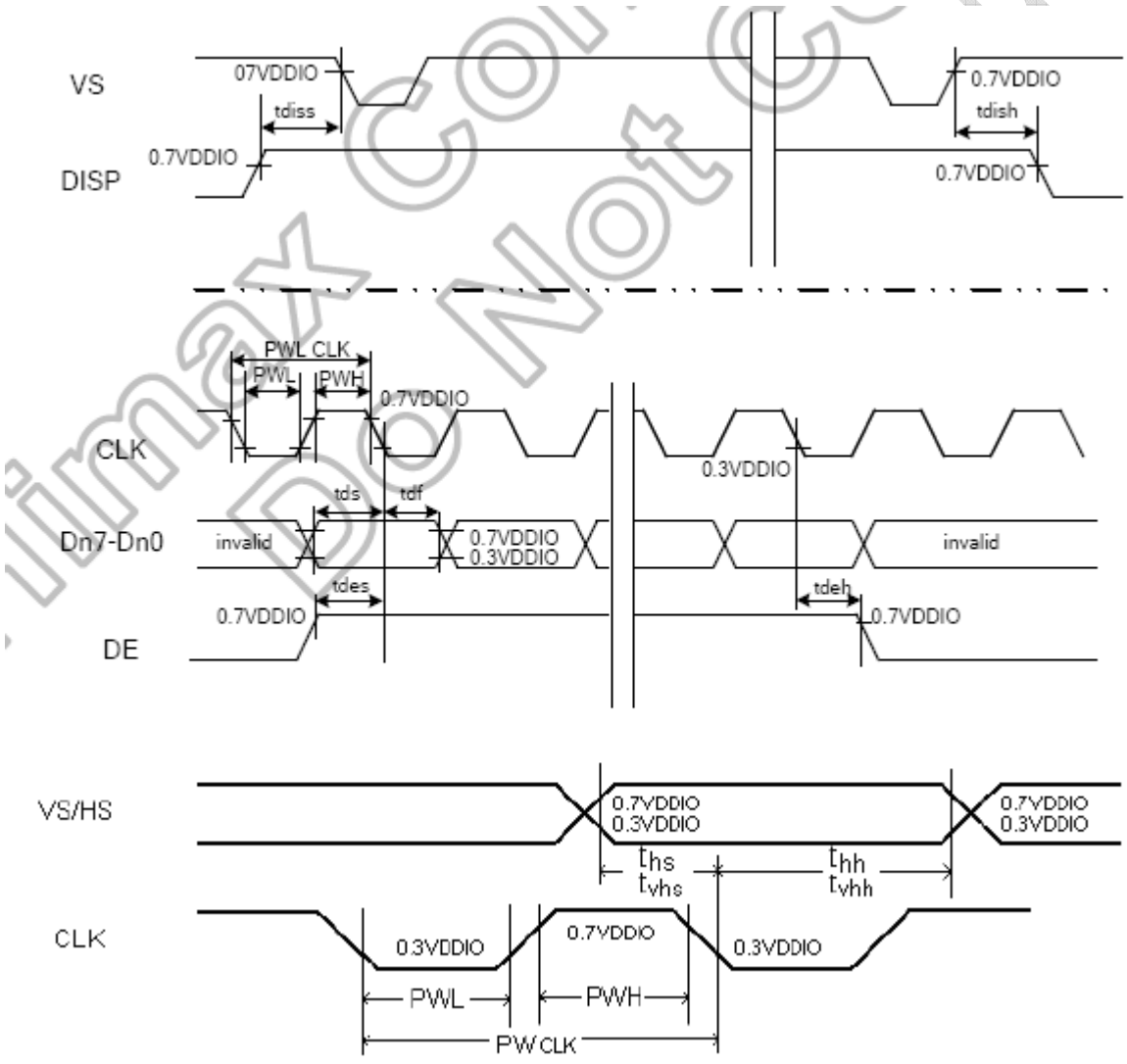
4.3.2 Input setup timing requirement

Parameter	Symbol	Unit	Min.	Typ.	Max.
DISP setup time	t_{diss}	ns	(10)	-	-
DISP hold time	t_{dish}	ns	(10)	-	-
Clock period	PW_{CLK}(1)	ns	(66.7)	-	-
Clock pulse high period	PWH(1)	ns	(26.7)	-	-
Clock pulse low period	PWL(1)	ns	(26.7)	-	-

Hsync setup time	t_{hs}	ns	(10)	-	-
Hsync hold time	t_{hh}	ns	(10)	-	-
Data setup time	t_{ds}	ns	(10)	-	-
Data hold time	t_{dh}	ns	(10)	-	-
DE setup time	t_{des}	ns	(10)	-	-
DE hold time	t_{deh}	ns	(10)	-	-
Vsync setup time	t_{vhs}	ns	(10)	-	-
Vsync hold time	t_{vhh}	ns	(10)	-	-

Note:(1) For parallel interface, maximum clock frequency is 15MHz

Figure 9 Input setup timing requirement



4.4 Input Power Specifications

Input power specifications are as follows.

Table 7 Input Power Specifications

Parameter		Symbol	Min.	Typ.	Max.	Units	Note
System Power Supply							
LCD Drive Voltage (Logic)		V_{DD}	(3.0)	(3.3)	(3.6)	V	(1), (3)
VDD Current	Black Pattern	I_{DD}	-	-	(0.017)	A	(2),(3),(6)
	V-Stripe Pattern		-	-	(0.02)		
VDD Power Consumption	Black Pattern	P_{DD}	-	-	(0.05)	W	
	V-Stripe Pattern		-	-	(0.06)		
Rush Current		I_{Rush}		-	(2.0)	A	(3),(4)
Allowable Logic/LCD Drive Ripple Voltage		V_{VDD-RP}		-	(200)	mV	(3)
LED Power Supply							
LED Input Voltage		V_{LED}	(25.2)	(28.8)	(32.4)	V	(3)
LED Power Consumption		P_{LED}	-	-	(2.592)	W	(3)
LED Forward Voltage		V_F	(2.8)	(3.2)	(3.6)	V	(3)
LED Forward Current		I_F	-	(80)	-	mA	
LED Life Time		LT	(50,000)	-	-	Hours	(3)(5)

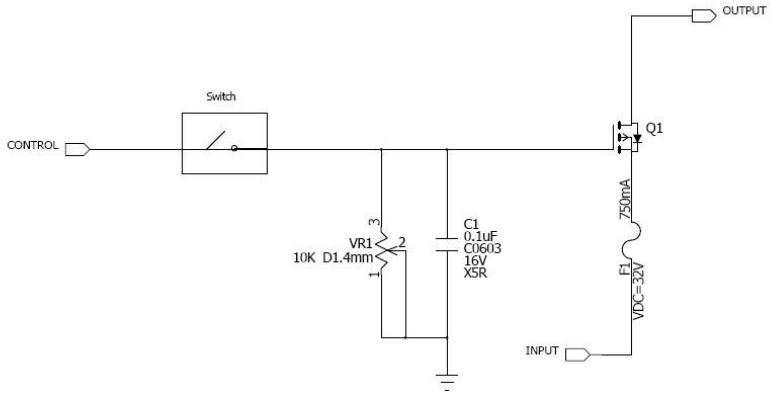
Note (1) VDD Power Dip Condition

VTH< VDD≤ Vmin, td≤ 10ms (a time of the voltage return to normal), our panel can revive automatically.

Note (2) Frame Rate=60Hz, VDD=3.3V, DC Current.

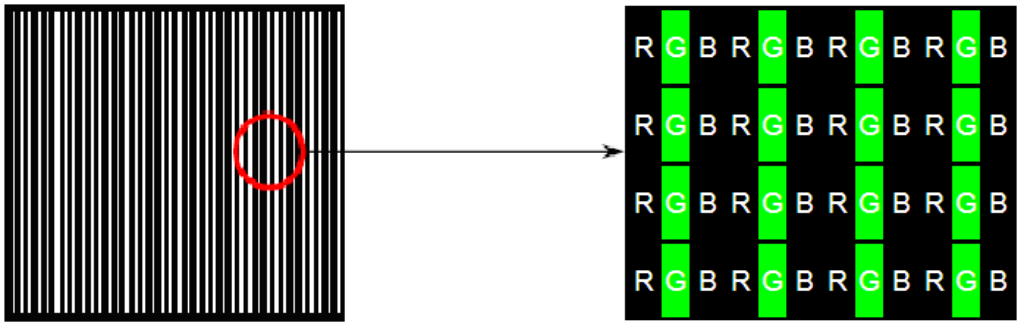
Note (3) Operating temperature 25℃， humidity 55%RH.

Note (4) The reference measurement circuit of rush current.



Note (5) The LED life time define as the estimated time to 50% degradation of initial luminous.

Note (6) Description of the V-Stripe pattern.



4.5 Power ON/OFF Sequence

Interface signals are also shown in the chart. Signals from any system shall be Hi- resistance state or low level when VDD voltages off.

Figure 10 Power On Sequence

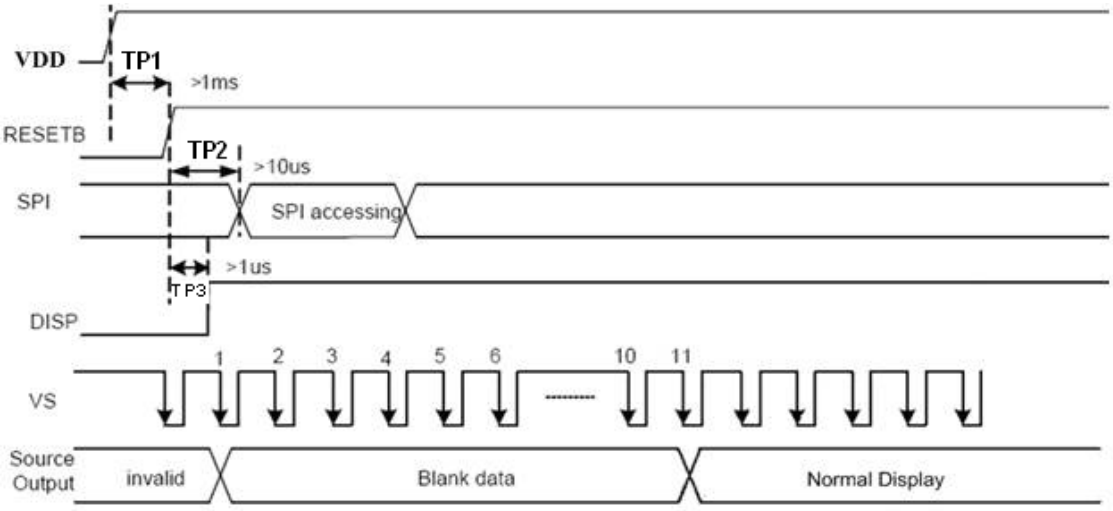


Figure 11 Power Off Sequence

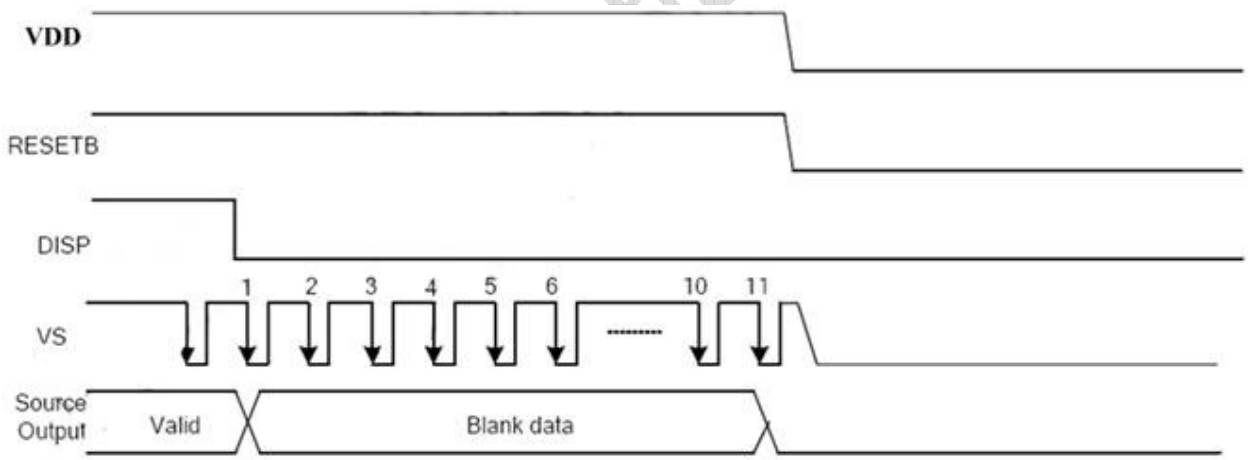


Table 8 Power Sequencing Requirements

Item	Unit	min	typ	max
TP1	ms	(1)	-	-
TP2	us	(10)	-	-
TP3	us	(1)	-	-

5.0 Mechanical Characteristics

5.1 Outline Drawing

Figure 12 Reference Outline Drawing (Front Side)

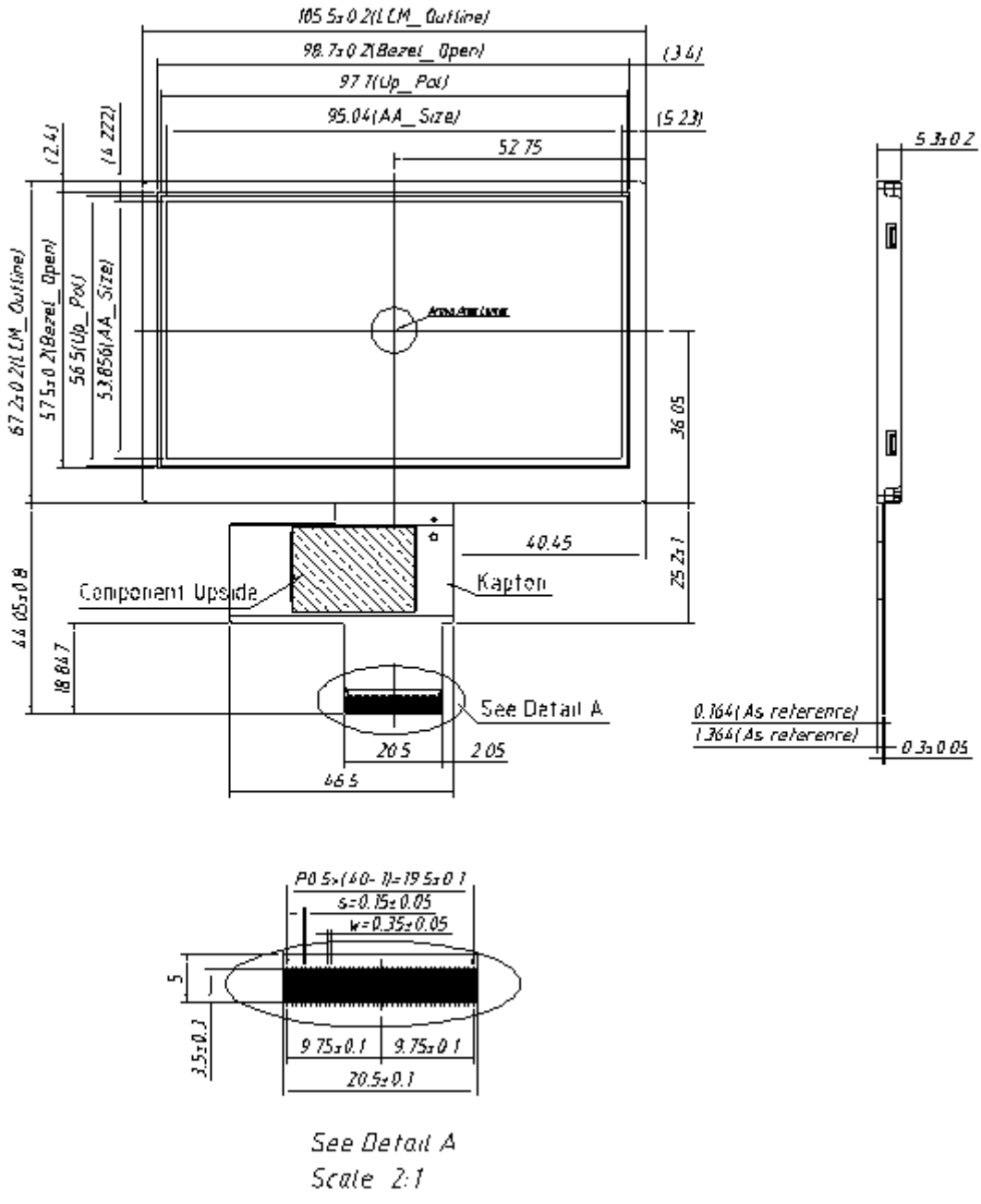
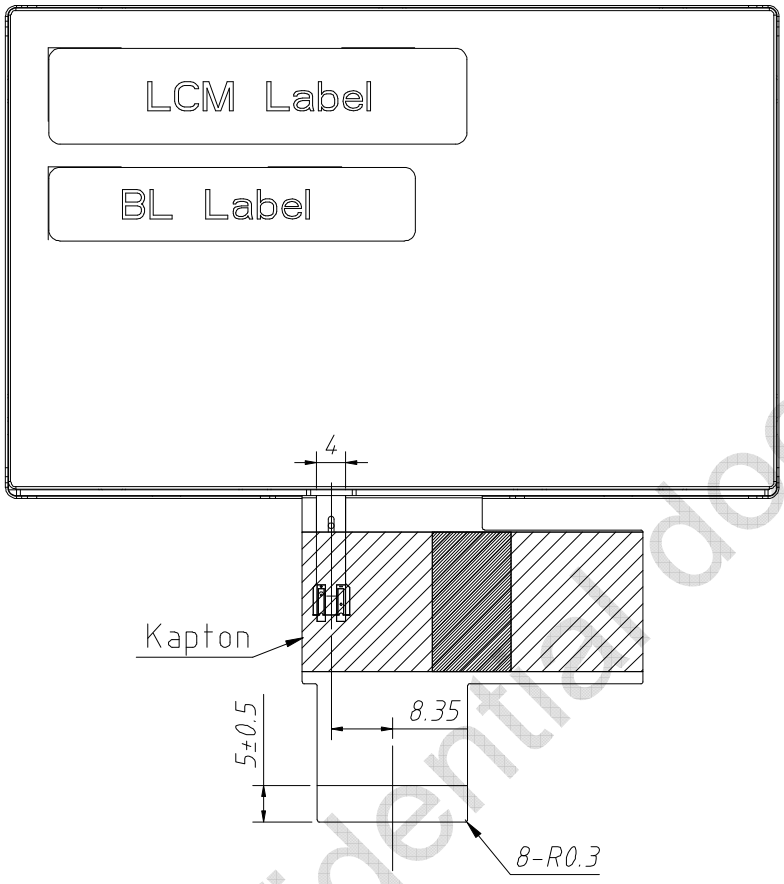


Figure 13 Reference Outline Drawing (Back Side)

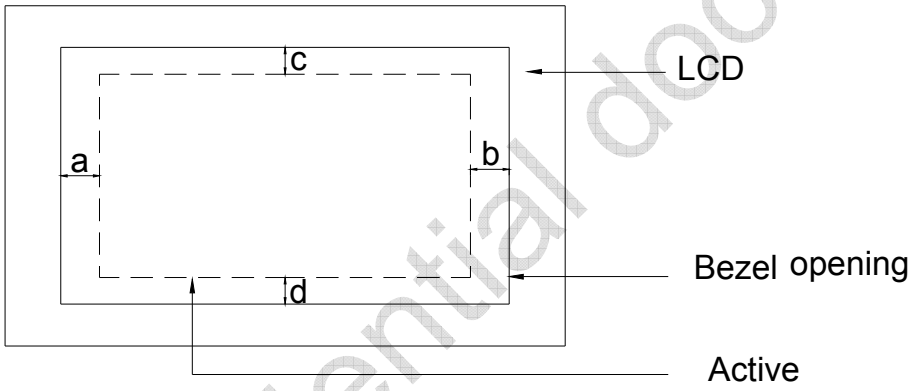


5.2 Dimension Specifications

Table 9 Module Dimension Specifications

Item	Min.	Typ.	Max.	Units
Width	(105.3)	(105.5)	(105.8)	mm
Height	(67.0)	(67.2)	(67.4)	mm
Thickness	(5.1)	(5.3)	(5.5)	mm
Weight	(54)	(60)	(66)	g

Figure 14 BM Area



6.0 Reliability Conditions

Item	Package	Test Conditions	Note
High Temperature Operation Test	Module	70℃, 240hrs	(1)(2)(3)(4))
Low Temperature Operating Test	Module	- 20℃, 240hrs	(1)(2)(3)(4)
High Temperature Storage Test	Module	80℃, 240hrs	(1)(2) (4)
Low Temperature Storage Test	Module	-30℃, 240hrs	(1)(2) (4)
High Temp./High Humidity Operation Test	Module	50℃, 85%, 240hrs	(1)(2)(3)(4)
High Temp./High Humidity Storage Test	Module	50℃, 90%, 240hrs	(1)(2)(3)(4)
Thermal Shock Non-operation Test	Module	-30℃~80℃, 1hr/each cycle,100cycles	(1)(2)(3)(4)
Shock	Module	3 shock in each direction Peak acceleration:981m/s^2 Half Sine Wave; 6ms	(4)
Vibration	Module	1.5G , 10~500 Hz , x、y、z each axis/1h	(4)

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

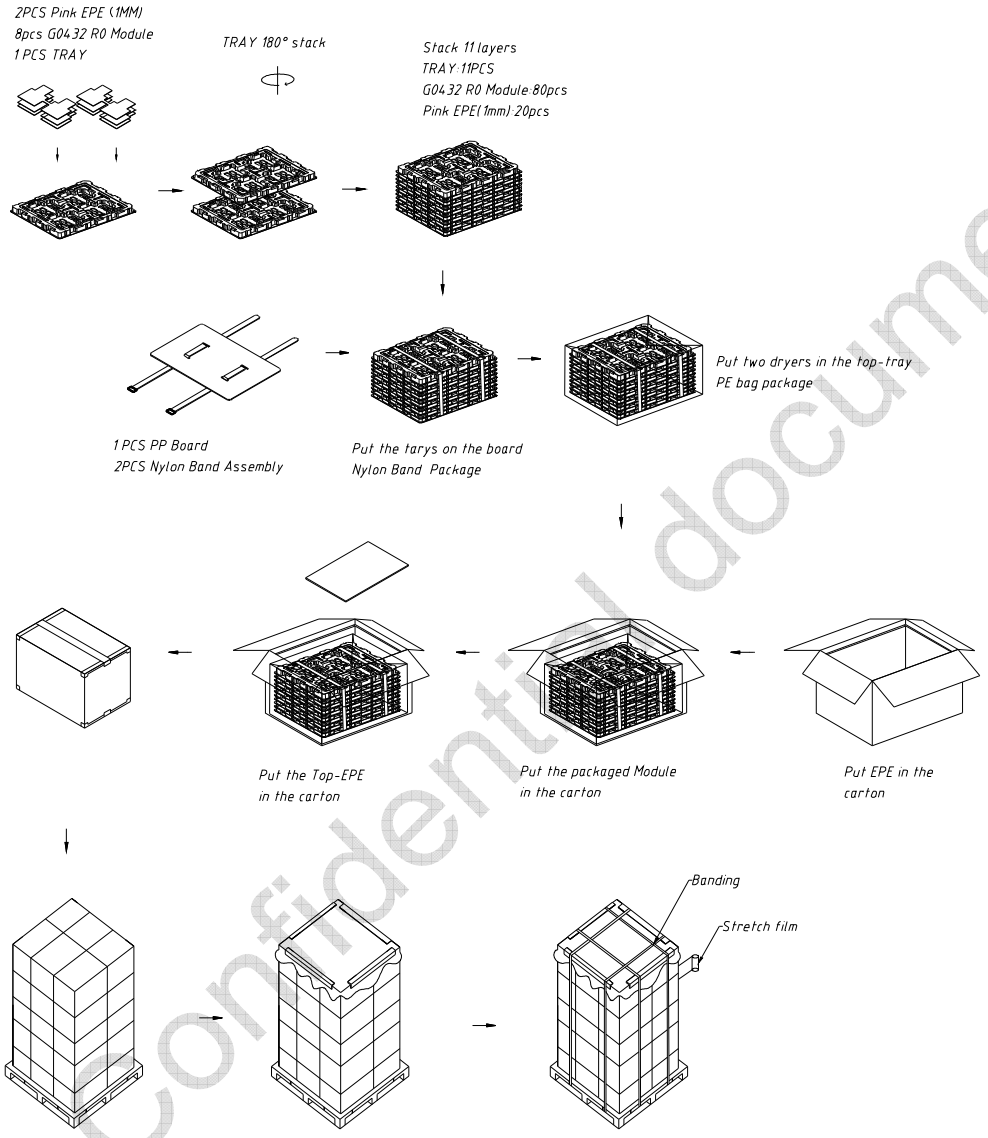
Note (2) During measurement, the condensation water or remains shall not be allowed.

Note (3) In operating test, the backlight voltage and current must be in speccfication.

Note (4) There is no display function issue occurred, all the cosmetic specification is judged before the reliability stress.

7.0 Package Specification

Figure 15 Packing Method



8.0 Lot Mark

Note: This picture is only an example.

8.1 20 Lot Mark

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Code 1,2,4,5,6,7,8,9,10,11,16: IVO internal flow control code.
Code 3: Production Location.
Code 12: Production Year.
Code 13: Production Month.
Code 14,15: Production Day.
Code 17,18,19,20: Serial Number.

8.2 23 Product Barcode

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

Code 1,2: Manufacture District.
Code 3,4,5,6,7: IVO internal module name.
Code 8,9,10,13,16: IVO internal flow control code.
Code 11,12: Cell location Suzhou, China defined as “KS”.
Code 14 ,15: Module location Kunshan, China defined as “KS”; Yangzhou, China defined as “YZ”; Shenzhen, China defined as “SE”; Zhuhai, China defined as “ZH”; Suzhou, China defined as “SZ”.
Code 17,18,19 : Year, Month, Day refer to Note(1), Note(2) and Note(3).
Note (1) Production Year

Year	2006	2007	2008	2009	2010	2011	2012	2013	.....	2035
Mark	6	7	8	9	A	B	C	D	.....	Z

Note (2) Production Month

Month	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct	Nov.	Dec.
Mark	1	2	3	4	5	6	7	8	9	A	B	C

Note (3) Production Day: 1~V.
Code 20~23 : Serial Number.

9.0 General Precaution

9.1 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.

9.2 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.

9.3 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.

9.4 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.

9.5 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.

9.6 Disposal

When disposing LCD module, obey the local environmental regulations.