

SPECIFICATION FOR APPROVAL

DESCRIPTION: 5.0"LCD Module _____

CUSTOMER: _____

Product No: BR050WBI1230-B4 V.2 _____

Released Date: 2021.03.18 _____

Revision: .01 _____

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APPROVED SIGNATURES			

Record of Revision

Version	Revise Date	Page	Content
.01	2021/03/18		Initial Release.

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1. General Specifications

	Feature	Spec
Characteristics	Size	5.0inch
	Resolution	800(horizontal)*480(Vertical)
	Interface	24bit RGB Interface
	Connect type	Connector
	Color Depth	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.135 x 0.135
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally Black
	LCD Driver IC	-----
	Viewing Direction	ALL View
	Gray Scale Inversion Direction	---
	Mechanical	LCM (W x H x D) (mm)
Active Area(mm)		108 x 64.80
With /Without TSP		Without TSP
Weight (g)		TBD
LED Numbers		12LEDs

Note 1: Viewing direction is following the data which measured by optics equipment.

Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: +/- 5%

2. Pin Assignment

2.1.TFT LCD Panel Driving Section

FPC Connector is used for the module electronics interface. The recommended model is "FH19SC-40S-0.5SH" manufactured by HIROSE.

Pin No.	Symbol	I/O	Function	Remark
1	V _{LED-}	P	Power for LED backlight cathode	
2	V _{LED+}	P	Power for LED backlight anode	
3	GND	P	Power ground	
4	V _{DD}	P	Power voltage	
5	R0	I	Red data (LSB)	
6	R1	I	Red data	
7	R2	I	Red data	
8	R3	I	Red data	
9	R4	I	Red data	
10	R5	I	Red data	
11	R6	I	Red data	
12	R7	I	Red data (MSB)	
13	G0	I	Green data (LSB)	
14	G1	I	Green data	
15	G2	I	Green data	
16	G3	I	Green data	
17	G4	I	Green data	
18	G5	I	Green data	
19	G6	I	Green data	
20	G7	I	Green data (MSB)	

21	B0	I	Blue data (LSB)	
22	B1	I	Blue data	
23	B2	I	Blue data	
24	B3	I	Blue data	
25	B4	I	Blue data	
26	B5	I	Blue data	
27	B6	I	Blue data	
28	B7	I	Blue data (MSB)	
29	GND	P	Power ground	
30	CLK	I	Pixel clock	
31	DISP	I	Display on/off	
32	HSYNC	I	Horizontal Sync signal	
33	VSYNC	I	Vertical Sync signal	
34	DE	I	Data Enable	
35	NC	-	No connection	
36	GND	P	Power ground	
37	NC	-	No connection	
38	NC	-	No connection	
39	NC	-	No connection	
40	NC	-	No connection	

I: input, O: output, P: Power

3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

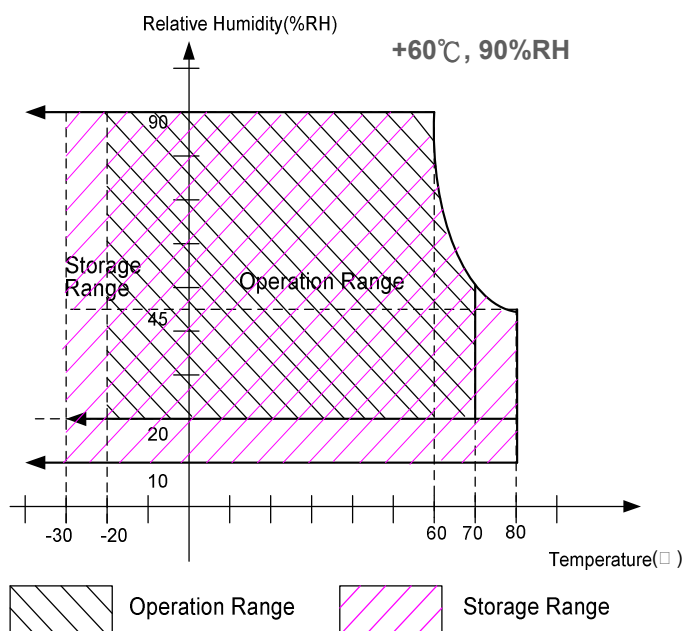
Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	V _{DD}	-0.5	5.0	V	
Input signal voltage	Logic input	-0.5	5.0	V	
Operation temperature	T _{OP}	-20	70	°C	Note 3, 4
Storage temperature	T _{ST}	-30	80	°C	Note 3, 4
LED Reverse Voltage	V _R	-	5.0	V	Each LED Note 2
LED Forward Current	I _F	-	25	mA	Each LED

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. A module should be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed.

Note 2: V_R Conditions: Zener Diode 20mA

Note 3: 90% RH Max. (Max wet temp. is 60°C)

Maximum wet-bulb temperature is at 60°C or less. And No condensation (no drops of dew)



Note 4: In case of temperature below 0°C, the response time of liquid crystal (LC) becomes slower and the color of panel darker than normal one.

3.2. Typical operation conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V_{DD}	3.1	3.3	3.5	V	
Current for Driver	$I_{V_{DD}}$	-	TBD	25	mA	$V_{DD} = 3.3V$
Input logic high voltage	V_{IH}	$0.8V_{DD}$	-	V_{DD}	V	Note 1
Input logic low voltage	V_{IL}	GND	-	$0.2V_{DD}$	V	

Note1: CLK, DE, R0~ R7, G0~ G7, B0~ B7.

3.3 Backlight Driving Conditions

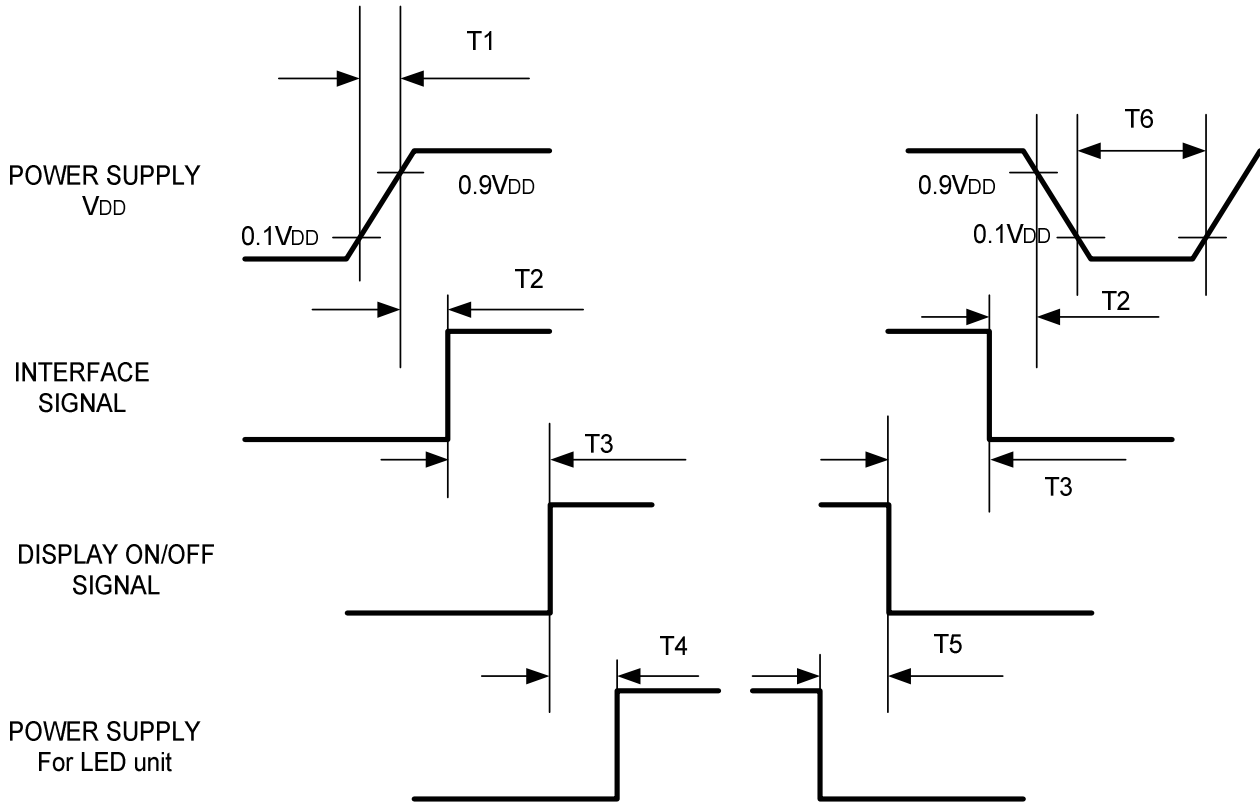
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_L	17.4	18.0	20.4	V	Note 2
Current for LED Backlight	I_L	36	40	50	mA	
LED life time	-	30,000	-	-	Hr	Note 1

Note 1: The "LED life time" is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25°C and $I_L = 40mA$. The LED lifetime could be decreased if operating I_L is larger than 50 mA.

Note 2: The LED Supply Voltage is defined by the number of LED at $T_a = 25^\circ C$ and $I_L = 40mA$.

3.4. Power Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence should be as the diagram below.



Symbol	Specification	Symbol	Specification
T1	$0 \leq T1 \leq 10 \text{ msec}$	T4	$160 \text{ msec} \leq T4$
T2	$0 \leq T2 \leq 100 \text{ msec}$	T5	$160 \text{ msec} \leq T5$
T3	$0 \leq T3 \leq 200 \text{ msec}$	T6	$1 \text{ msec} \leq T6$

3.5. Timing Characteristics

3.5.1. Timing Conditions

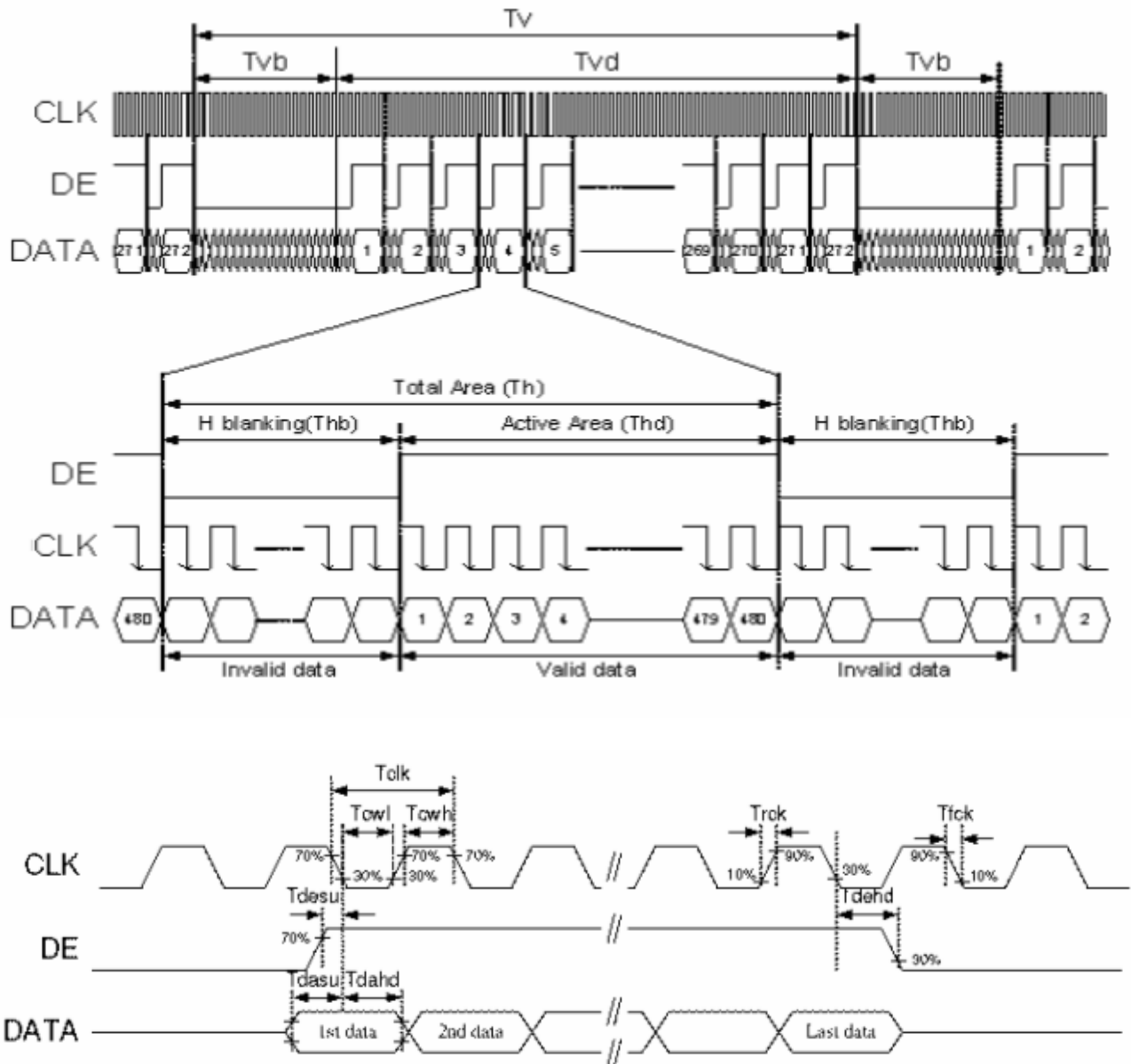
I Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Horizontal Display Area	thd	800			DCLK
DCLK frequency	fc k	23	25	27	MHz
One Horizontal Line	th	808	816	896	DCLK
HS pulse width	thpw	1	8	48	DCLK
HS Back Porch (Blanking)	thb	88			DCLK
HS Front Porch	thfp	1	40	255	DCLK
DE mode Blanking	th-thd	85	128	512	DCLK

I Vertical timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd	480			T _H
VS period time	tv	488	496	504	T _H
VS pulse width	tvpw	3	3	255	T _H
VS Back Porch (Blanking)	tvb	32			T _H
VS Front Porch	tvfp	1	13	255	T _H
DE mode Blanking	tv-tvd	4	45	255	T _H

3.5.2. Timing Diagram



4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	$\Phi=180^\circ$ (9 o'clock)	70	80	-	degree	Note 1
	θ_R	$\Phi=0^\circ$ (3 o'clock)	70	80	-		
	θ_T	$\Phi=90^\circ$ (12 o'clock)	70	80	-		
	θ_B	$\Phi=270^\circ$ (6 o'clock)	70	80	-		
Response time	T_{ON}	Normal $\theta=\Phi=0^\circ$	-	10	20	msec	Note 3
	T_{OFF}		-	15	30	msec	Note 3
Contrast ratio	CR		800	1000	-	-	Note 4
Color chromaticity	W_X		0.26	0.31	0.36	-	Note 2 Note 5 Note 6
	W_Y		0.28	0.33	0.38	-	
Luminance	L		350	400	-	cd/m ²	Note 6
Luminance uniformity	Y_U		80	-	-	%	Note 7

Test Conditions:

1. $V_{DD}=3.3V$, $I_L=40mA$ (Backlight current), the ambient temperature is $25^\circ C$.
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range

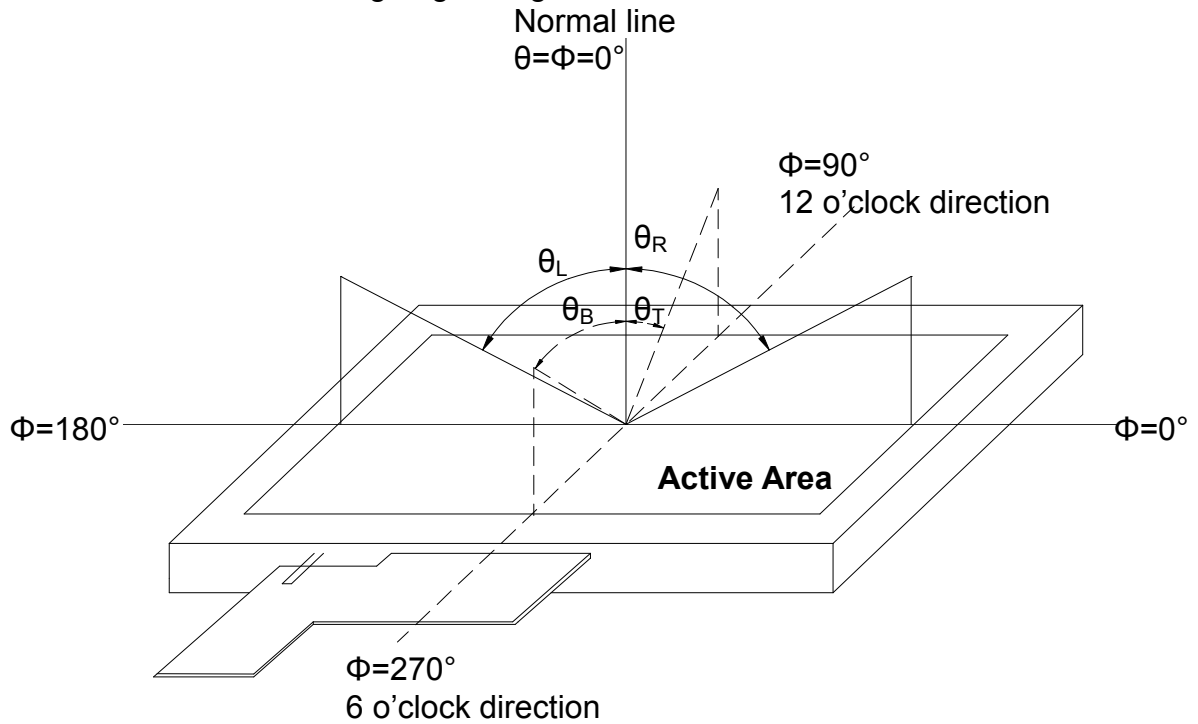


Fig. 4-1 Definition of viewing angle

Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)

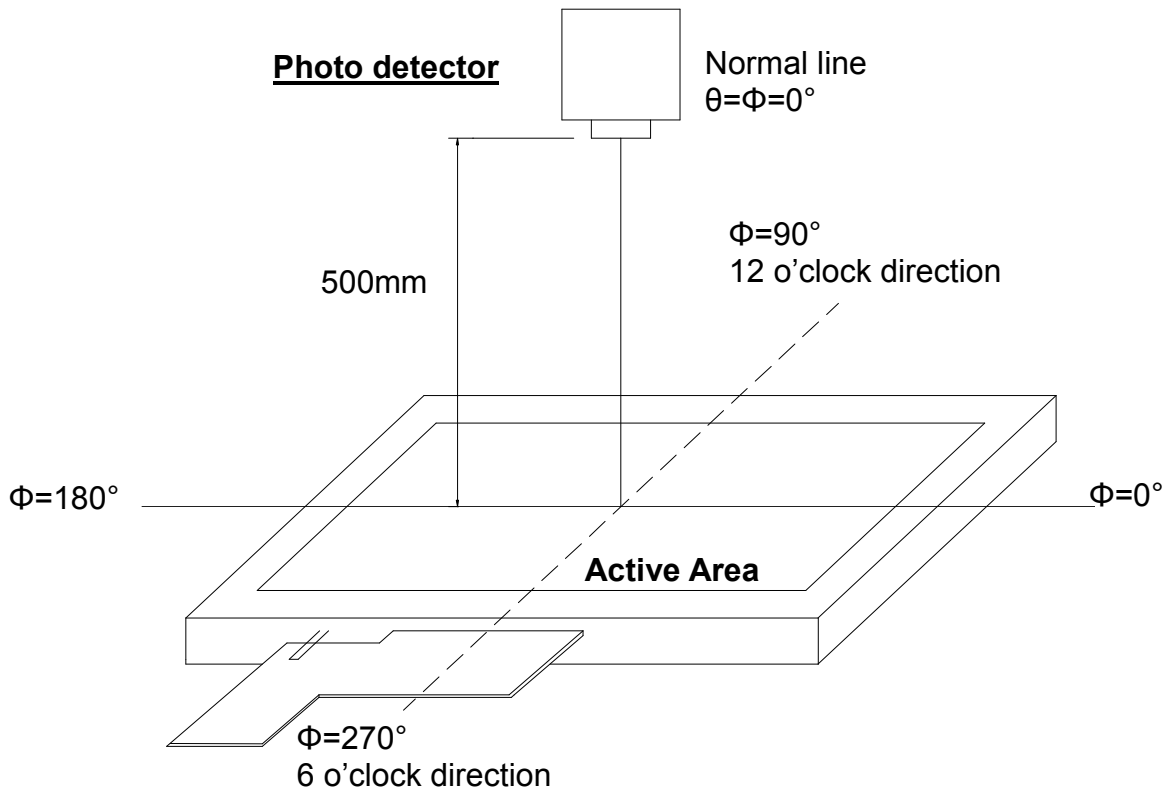


Fig. 4-2 Optical measurement system setup

Note 3: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

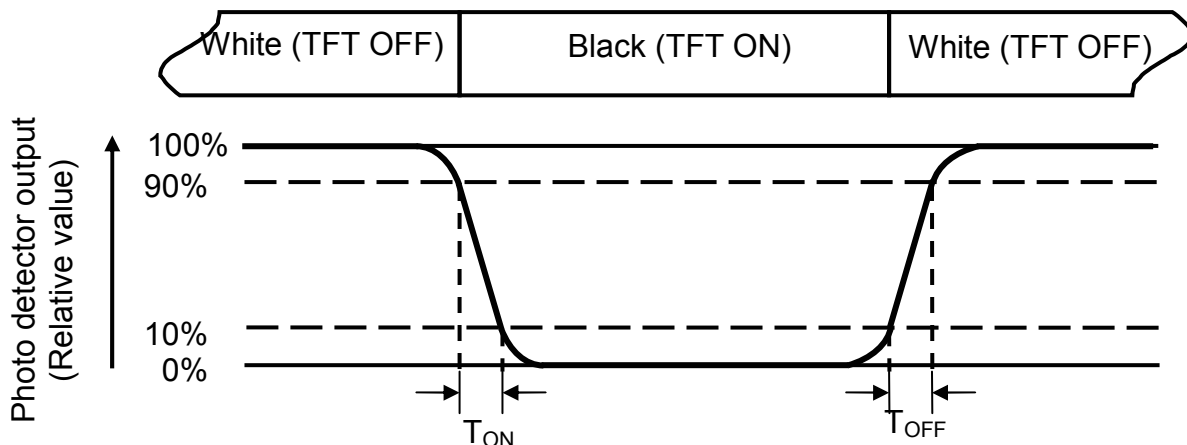


Fig. 4-3 Definition of response time

Note 4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is $I_L=40\text{mA}$.

Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{min}}{B_{max}}$$

L-----Active area length W----- Active area width

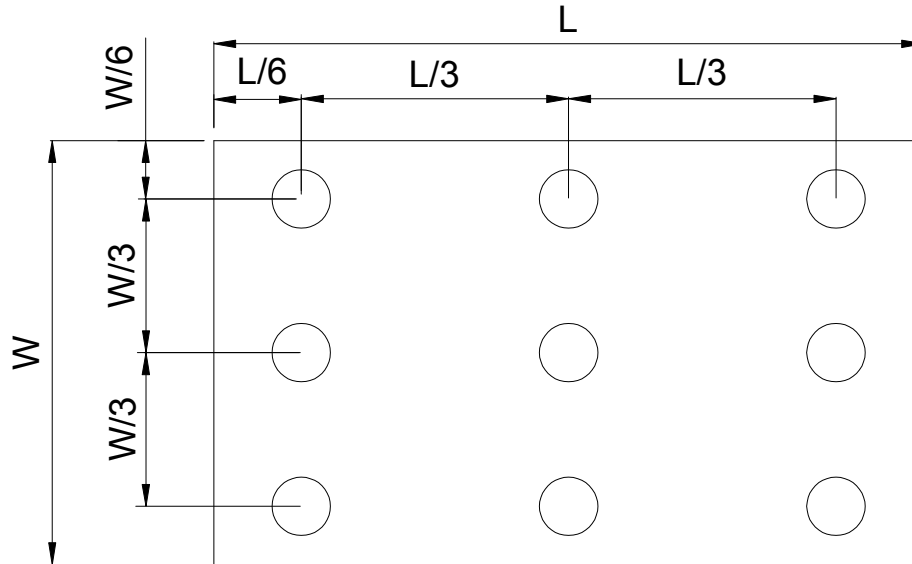


Fig. 4-4 Definition of measuring points

B_{max}: The measured maximum luminance of all measurement position.

B_{min}: The measured minimum luminance of all measurement position.

5. Reliability Test Items

(Note3)

Item	Test Conditions	Remark
High Temperature Storage	Ta = 70°C 96hrs	Note 1,Note 4
Low Temperature Storage	Ta = -20°C 96hrs	Note 1,Note 4
High Temperature Operation	Ts = 80°C 96hrs	Note 2,Note 4
Low Temperature Operation	Ta = -30°C 96hrs	Note 1,Note 4
Operate at High Temperature and Humidity	+60°C, 85%RH 96hrs	Note 5
Thermal Shock	-30°C/30 min ~ +85°C/30 min for a total 100 cycles, Start with cold temperature and end with high temperature	Note 4
Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	
Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	

Note 1: Ta is the ambient temperature of samples.

Note 2: Ts is the temperature of panel's surface.

Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but doesn't guarantee all the cosmetic specification.

Note 4: Before cosmetic and function tests, the product must have enough recovery time, at least 2 hours at room temperature.

6. General Precautions

6.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

6.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

6.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

6.4. Storage

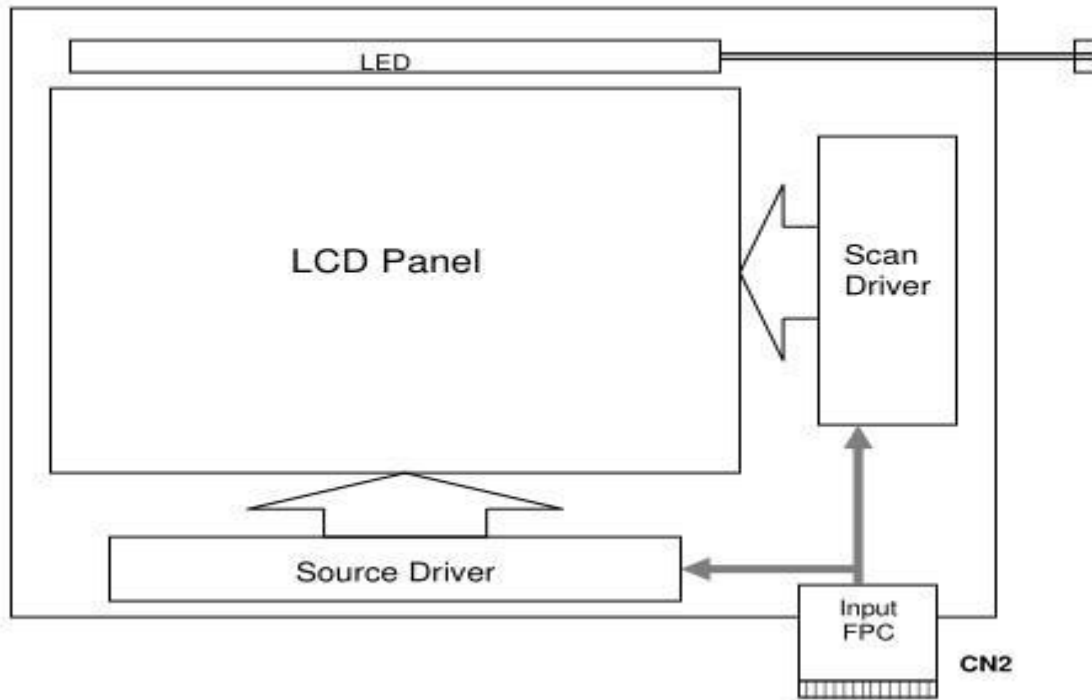
1. Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

6.5. Cleaning

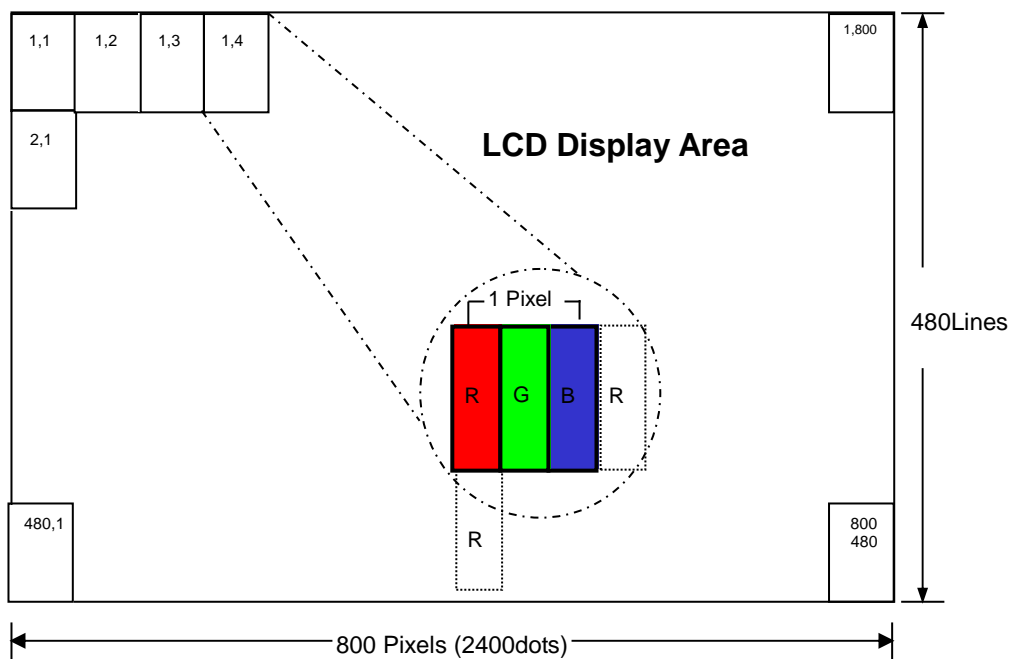
1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

7.0 BLOCK DIAGRAM

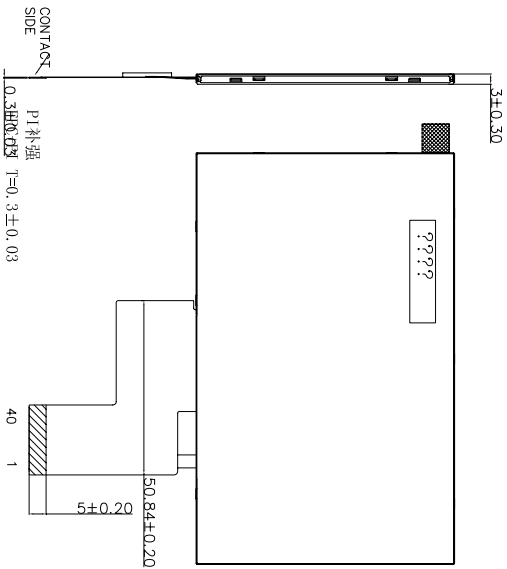
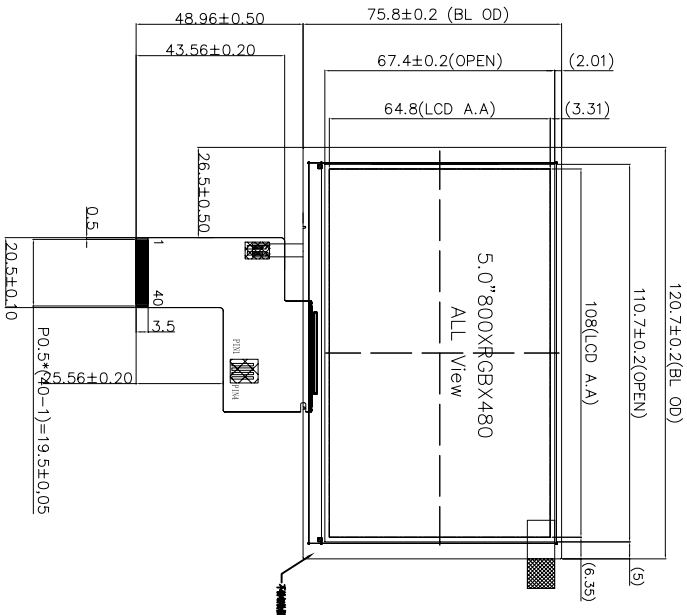
7.1 TFT LCD Module



7.2 Pixel Format

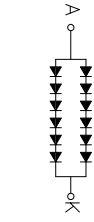


8. Mechanical Drawing



PIN SYSTEM	
1	VDD
2	NC
3	GND
4	VDO
5	R1
6	R2
7	R3
8	R4
9	R4
10	R5
11	R5
12	R6
13	GND
14	NC
15	R7
16	R8
17	R9
18	R10
19	R11
20	R12
21	R13
22	R14
23	R15
24	R16
25	R17
26	R18
27	R19
28	R20
29	R21
30	R22
31	DISP
32	HSYNC
33	V
34	DE
35	NC
36	NC
37	NC
38	NC
39	NC
40	NC

- NOTES:
 1. GENERAL TOLERANCE: ±0.2
 2. () REFERENCE DIMENSION
 3. RECOMMENDED CUSHION ADHERENT AREA: TP V. A+1. 6mm
 4. REQUIREMENTS ON ENVIRONMENTAL PROTECTION: ROHS



6 #2 #
 VF ≈ 18.0V
 IF = 40mA

Display Type	TFT
Viewing Angle	NORMALLY BLACK, TRANSMISSIVE
LCD Driver IC	ALL
Operating Voltage	VDD=3.3V
Operation Temperature	-20°C TO 70°C
Storage Temperature	-30°C TO 80°C
Interface	24bit- RGB
Backlight	12-LED WHITE 40 mA
Surface Luminance	400cd/m ² (TYP)
Write X/Y	X0.3±0.05 Y0.3±0.05

VER.	SYMBOL	Priest issue	XW/qin	2021.03.12	CUSTOMER'S APPROVAL	DRAWN	ME. CHECKED	EE. CHECKED	APPROVED
	AMENDMENT		SIGN	DATE					
						TITLE MODULE SPEC.			
						DRAWING-NO. 050WB1230-B4 V.2			
						UNIT mm SCALE SHDET 1 OF 1			
						3rd Angle FIT			
						深圳市伯朗瀚科技有限公司 Shenzhen Brownopto Technology Co., Ltd			

9.0 BOM LIST

(TBD)

10.0 LOT MARK

10.1 Location of Lot Mark

- (1) Location: The label is attached to the backside of the LCD module.
- (2) Detail of the Mark: as attached below.
- (3) This is subject to change without prior notice.

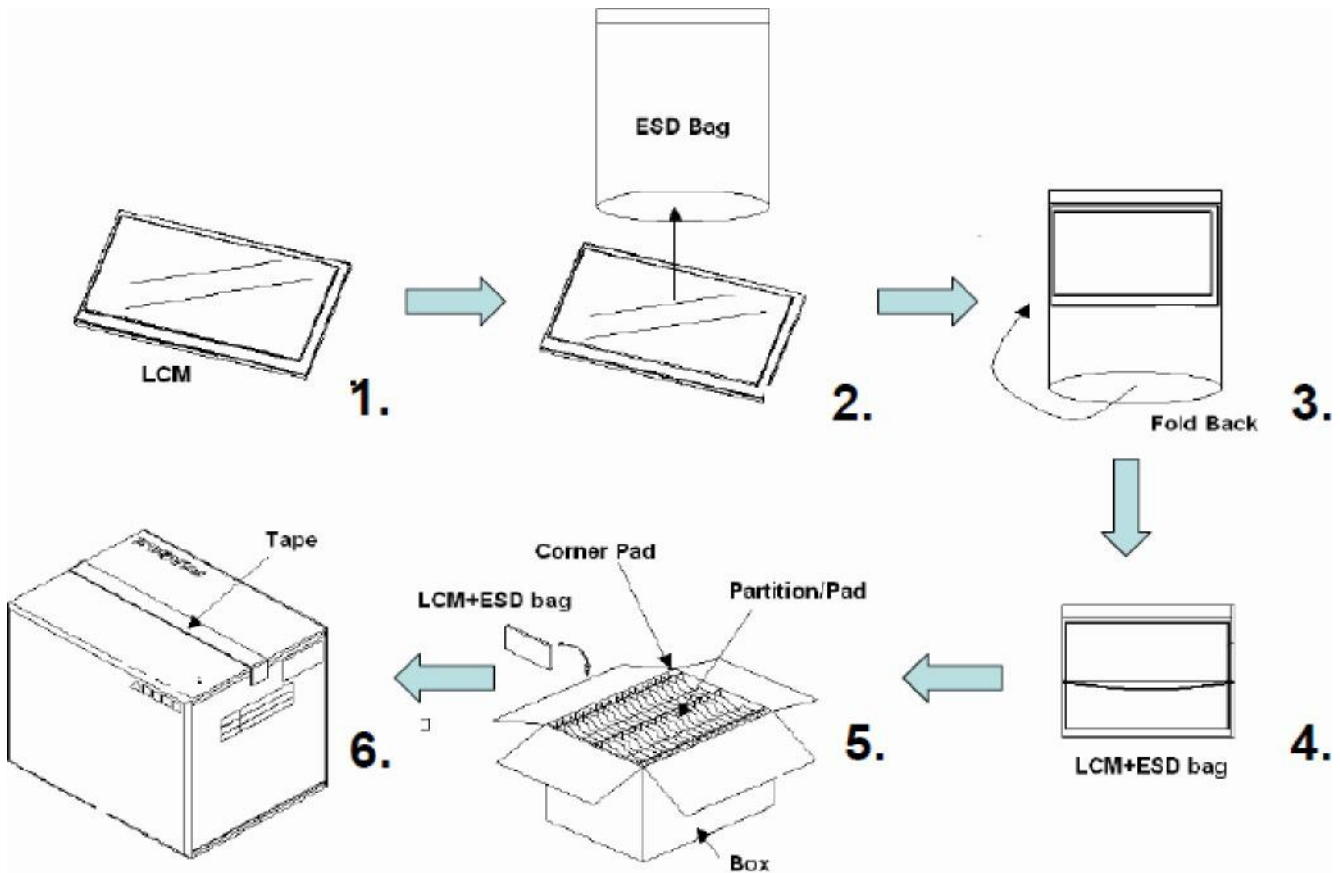


11.0 PACKAGE SPECIFICATION

11.1 Packing form

LCM Model	LCM Qty. in the box	Inner Box Size (mm)	Note
050WBI1230-B4 V.2	TBD pcs/box	490±5 x 340±5 x 250±5	

11.2 Packing assembly drawings



Items	Material	Notice
Box	Corrugated Paper Board	AB Flute
Partition/Pad	Corrugated Paper Board	B Flute
Corner Pad	Corrugated Paper Board	AB Flute
ESD bag	PE	

- 12.2.2.1 Housing case must be destined carefully so as not to put stresses on LCD all sides and not to wrench module. The stresses may cause non-uniformity even if there is no non-uniformity statically.
- 12.2.2.2 Keep sufficient clearance between LCD module back surface and housing when the LCD module is mounted. The clearance in the design is recommended taking into account the tolerance of LCD module thickness and mounting structure height on the housing.
- 12.2.3 Please do not push or scratch LCD panel surface with any-thing hard. And do not soil LCD panel surface by touching with bare hands.(Polarizer film, surface of LCD panel is easy to be flawed.)
- 12.2.4 Please do not press any parts on the rear side such as source IC, gate IC, and FPC during handling LCD module, If pressing rear part is unavoidable, handle the LCD module with care not to damage them.
- 12.2.5 Please wipe out LCD panel surface with absorbent cotton or soft cloth in case of it being soiled.
- 12.2.6 Please wipe out drops of adhesives like saliva and water on LCD panel surface immediately. They might damage to cause panel surface variation and color change.
- 12.2.7 Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.

12.3 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. Century does not warrant the module, if customers disassemble or modify the module.

12.4 Breakage of LCD Panel

12.4.1.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.

12.4.2. If liquid crystal contacts mouth or eyes, rinse out with water immediately.

12.4.3. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

12.4.4. Handle carefully with chips of glass that may cause injury, when the glass is broken.

12.5 Absolute Maximum Ratings and Power Protection Circuit

12.5.1. 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.

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

12.5.3. It's recommended to employ protection circuit for power supply.

12.6 Operation

12.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

12.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

12.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

12.6.4 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.

- 12.6.5** When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzene or other adequate solvent.
- 12.7 Static Electricity**
- 12.7.1** Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.
- 12.7.2.** Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge.
- 12.7.3** Persons who handle the module should be grounded through adequate methods.
- 12.8 Disposal**
When disposing LCD module, obey the local environmental regulations.
- 12.9 Others**
- 12.9.1** A strong incident light into LCD panel might cause display characteristics' changing inferior because of Polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight Land Strong UV rays.
- 12.9.2** Please pay attention to a panel side of LCD module not to contact with other materials in pressing it alone.
- 12.9.3** For the packaging box, please pay attention to the followings:
- 12.9.3.1** Packaging box and inner case for LCD are designed to protect the LCDs from the damage or scratching during transportation. Please do not open except picking LCDs up from the box.
- 12.9.3.2** Please do not pile them up more than 6 boxes(They are not designed so) And please do not turn over.
- 12.9.3.3** Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
- 12.9.3.4** Packing box and inner case for LCDs are made of cardboard, So please pay attention not to get them wet(Such like keeping them in high humidity or wet place can occur getting them wet.)