



# 勁佳光電股份有限公司

## VBEST ELECTRONICS LTD.

Product Specification For LCD Module  
(KVPF-7B-002-16)

**Model NO. : VGG482704-6UFLWC(LF)**

**REVISION : 1**

APPROVAL FOR SPECIFICATIONS ONLY





APPROVAL FOR SPECIFICATIONS AND SAMPLE

CUSTOMER :

STD.

APPROVED BY :

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### 3. Module Numbering System

**V G G 4827 04 – 6 U F L W C**

Serial No.:A~Z

Backlight Color:  
N: Without Backlight;  
A: Amber; B: Blue; G: Green;  
L: Yellow; O: Orange; R: Red;  
W: White; Y: YellowGreen;  
X: Others

Backlight Type:  
N: Without Backlight; E: EL; F: CCFL;  
L: General LED; H: High NTSC LED ;  
R: RGB LED; X: Others

LCD Model:  
T: TN; H: HTN; G: STN Gray, Y: STN Yellow;  
B: STN Blue; W: FSTN Black/White;  
C: CSTN; F: TFT; O: OLED; P: PLED;  
L: LTPS; N: Others

LCD Type:  
R: Reflective/Positive;  
S: Reflective/Negative ;  
F: Transflective/Positive ;  
G: Transflective/Negative ;  
U: Transmissive/Positive ;  
T: Transmissive/Negative ; N: Others

Temperature Range & View Direction:  
General Purpose : 1:6H 2:12H 3:3H 4:9H 5:Others  
High Performance: 6:6H 7:12H 8:3H 9:9H 0:Others

STD Product Serial No.: 01~99  
Customer Made Serial No.: A1,A2... A9,B1,B2... B9,C1..

Display Function:  
Segment Number / Characters Lines / Column and Row Dots  
/ Length \* Width of Other

Display Type:  
C: Character Type; G: Graphic Type; S: Segment Type; O: Other

Package Type:  
B: COB; F: COF; G: COG; H: Heat Seal; S: SMT; T: TAB; O: Others



#### 4. Application

This specification is applied to the 4.3 inch supported TFT-LCD module With Transparent Touch Panel, and can display true 16.7M colors (8 bit/ color). The module is designed for PMP, GPS, DMB, other electronic products which require flat panel display of digital signal interface, and used as the input devices for general electric appliances via both finger and pen-entry.

#### 5. Features

- WQVGA (480×272 pixels) resolution.
- 24 bit parallel RGB.
- Transparent Touch panel
  - 4-Wire
  - Analog Resistive

#### 6. General Specifications

Item	Specifications	Unit
Screen Size	4.3 (Diagonal)	inch
Display Format	480RGB(H)×272(V)	dot
Active Area	95.04(H)×53.856(V)	mm
PIXEL Pitch	0.198(H)×0.198(V)	mm
Pixel Configuration	RGB Vertical Stripe	-
Display Mode	TN Type Transmissive Mode Normally White	-
Surface Treatment	Anti-Glare	-
Viewing Direction	6 O'clock	-
Outline Dimension	105.5(W)×67.2(H)×4.2(D)	mm
Weight	68	g



## 7. Absolute Maximum Ratings

### 7.1 Absolute Ratings of Environment

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T <sub>ST</sub>	-30	+80	°C	(1)
Operating Ambient Temperature	T <sub>OP</sub>	-20	+70	°C	(1)

Note (1) Temperature and relative humidity range are shown in the figure below.

(a) 95%RH Max. ( $T_a \leq 50^\circ\text{C}$ ).

(b) Wet-bulb temperature should be 39°C Max. ( $T_a > 50^\circ\text{C}$ ).

(c) No condensation.

### 7.2 Electrical Absolute Ratings

#### 7.2.1 TFT-LCD Module

( $T_a = 25 \pm 2^\circ\text{C}$ ,  $V_{SS} = 0\text{V}$ )

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Analog Power Supply Voltage	AVDD	-0.3	6.0	V	-
Digital Power Supply Voltage	DVDD	-0.3	6.0	V	-

#### 7.2.2 Backlight Unit

( $T_a = 25 \pm 2^\circ\text{C}$ )

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Current of Backlight Unit	I <sub>B</sub>	-	25	mA	(1)

Note (1) Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded.

**8. Electrical Characteristics****8.1 TFT-LCD Module**

(Ta=25±2°C)

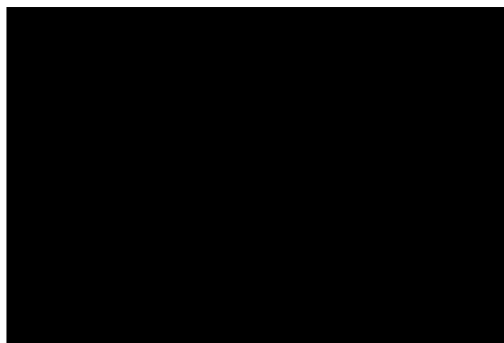
Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Analog Power Supply Voltage	AVDD	4.8	5.0	5.2	V	-
Digital Power Supply Voltage	DVDD	2.3	2.5	3.6	V	-
Input High Threshold Voltage	VIH	0.7DVDD	-	DVDD	V	-
Input Low Threshold Voltage	VIL	0	-	0.3 DVDD	V	-
Vsync Frequency	F <sub>v</sub>	-	59.94	-	Hz	-
Hsync Frequency	FH	-	17.14	-	KHz	-
Dot Clock	DCLK	-	9.0	15.0	MHz	-

(VSS = 0V)

Parameter	SYMBOL	Condition	Min	Typ	Max	Unit	Remarks
Analog Current	IAVDD	AVDD = 5V	-	17.4	27	mA	(1)
Digital Current	IDVDD	DVDD=2.5V	-	3.2	6	mA	(1)
Total Power Consumption	PC	-	-	95	150	mW	(1)

Note (1) The specified power consumption is under the conditions at DVDD = 2.5V, AVDD = 5.0V, F<sub>v</sub>=60Hz, DCLK=9.0 MHz, whereas a power dissipation check Pattern below is displayed.

Black Pattern / 0 Gray



Active Area



### 8.2 Backlight Unit

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Voltage	VL	-	30.9		V	(1)
Current of Backlight Unit	I <sub>B</sub>	-	18		mA	(1)
Power Consumption	P <sub>BL</sub>	-	(556)		mW	(1)

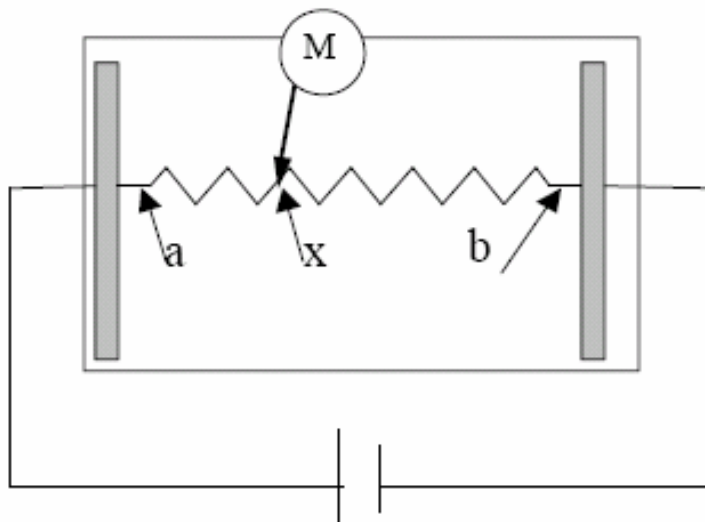
Note (1) The driving design of backlight unit is dependent on serial consideration of 10 LEDs.

### 8.3 Transparent Touch panel

Item		Value			Unit	Note
		Min.	Typ.	Max.		
Operating Voltage		-	5	-	V	-
Terminal Resistance	X-direction	140	-	530	Ω	At connector
	Y-direction	200	-	520	Ω	At connector
Insulation Resistance		≥ 20MΩ			at DC25V	
Chatting		≤ 10 ms			Test Condition Voltage: 3V Frequency: 5Hz	
Linearity		≤ 1.5%			(1)	

Note(1): Measurement condition of Linearity

Linearity Definition







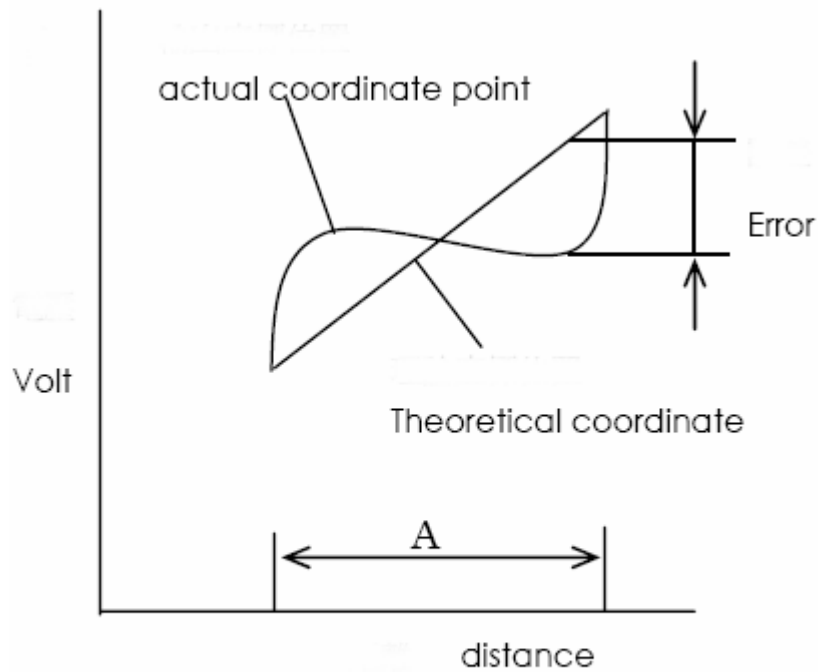
Va : maximum voltage in the active area of touch panel

Vb: minimum voltage in the active area of touch panel

X : random measuring point

Vxm: Actual voltage of Lx point

Vxi : Theoretical voltage of Lx point

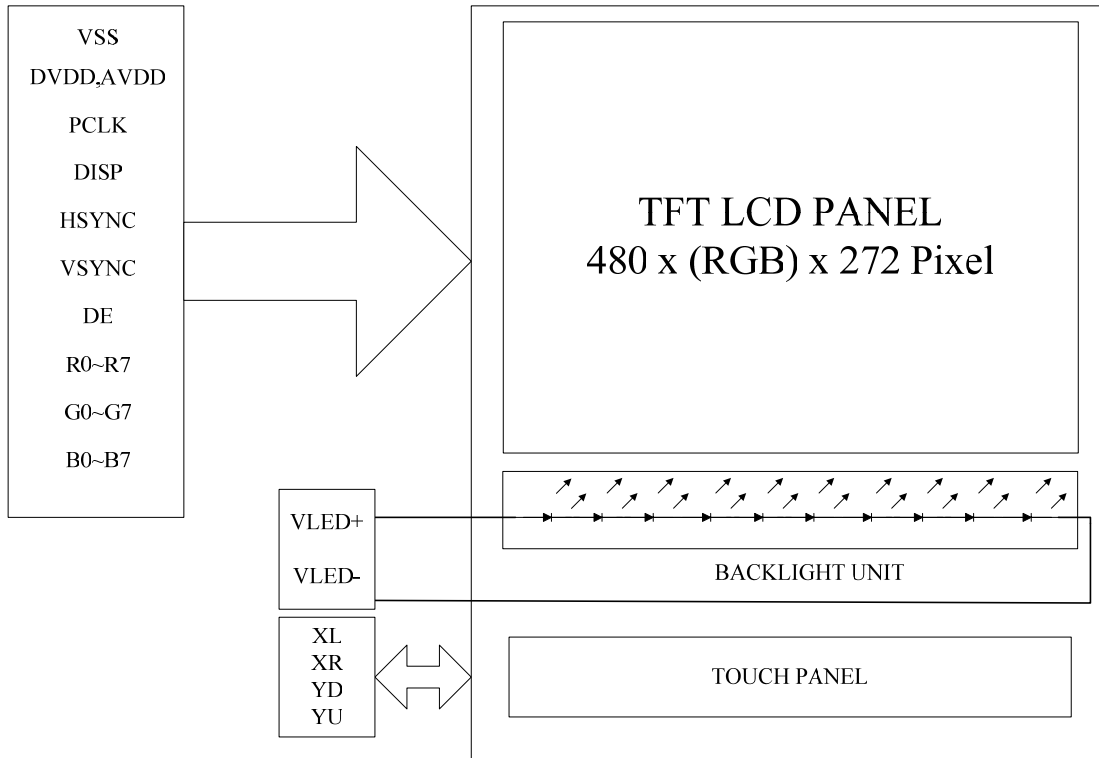


A:  $\frac{1}{2}(V_{xi} - V_{xm})$

Linearity :  $[\frac{1}{2}V_{xi} - V_{xm}] / (V_a - V_b) * 100\%$



### 9. Block Diagram TFT-LCD Module with Backlight Unit





## 10. Input / Output Terminals Pin Assignment

### 10.1 TFT-LCD Module

(Reference Connector :

Hirose Electric CO., LTD. Product No.: FH12A-40S-0.5SH(55) Top contact type)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	VSS	Ground	21	B0	Blue data(LSB)
2	VSS	Ground	22	B1	Blue data
3	DVDD	POWER SUPPLY(+2.5V)	23	B2	Blue data
4	DVDD	POWER SUPPLY(+2.5V)	24	B3	Blue data
5	R0	Red data(LSB)	25	B4	Blue data
6	R1	Red data	26	B5	Blue data
7	R2	Red data	27	B6	Blue data
8	R3	Red data	28	B7	Blue data(MSB)
9	R4	Red data	29	VSS	Ground
10	R5	Red data	30	PCLK	Pixel clock
11	R6	Red data	31	DISP	Display ON/OFF Signal
12	R7	Red data(MSB)	32	HSYNC	Horizontal Sync input with negative polarity
13	G0	Green data(LSB)	33	VSYNC	Vertical Sync input with negative polarity
14	G1	Green data	34	NC	NC
15	G2	Green data	35	AVDD	Power supply(+5V)
16	G3	Green data	36	AVDD	Power supply(+5V)
17	G4	Green data	37	NC	NC
18	G5	Green data	38	NC	NC
19	G6	Green data	39	NC	NC
20	G7	Green data(MSB)	40	NC	NC



## 10.2 Backlight

(Reference Connector :

Kyocera Elco Corporation Product No. : 6298 Bottom contact type)

Terminal No.	Signal	Functions
1	VLED-	LED Power Source Input terminal (Cathode side)
2	NC	No Connection
3	NC	No Connection
4	VLED+	LED Power Source Input terminal (Anode side)

## 10.3 Touch panel

(Reference Connector: FCI (59453-041110) ,(59453-042110)

No.	Symbol	Functions
1	XL	X-axis left terminal
2	YD	Y-axis lower terminal
3	XR	X-axis right terminal
4	YU	Y-axis upper terminal



### 10.4 Color Data Input Assignment

The brightness of each primary color(red, green and blue) is based on the 8 bit gray scale data input for the color. The higher the binary input, the brighter the color. The table provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Gray Scale Of RED	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Red(1)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0		
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		
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	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0		
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0		
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0		
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
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	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0		
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0		
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1		



## 11. Interface Timing

### 11.1 Timing Requirement 1

(480RGBx272,  $T_A=25^\circ\text{C}$ , DVDD=2.25V to 3.6V, DVSS= 0V)

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
Clock cycle	$1/t_c^{*1}$	-	9	15	MHz
Hsync cycle	$1/f_H$	-	17.14	-	KHz
Vsync cycle	$1/f_V$	-	59.94	-	Hz
Horizontal Signal					
Horizontal cycle	$th^{*2}$	-	525	-	CLK
Horizontal display period	thd	-	480	-	CLK
Horizontal front porch	thf	2	-	-	CLK
Horizontal pulse width	thp	2	41	-	CLK
Horizontal back porch	thb	2	2	-	CLK
Vertical Signal					
Vertical cycle	tv	-	286	-	H
Vertical display period	tvd	-	272	-	H
Vertical front porch	tvf	1	2	-	H
Vertical pulse width	tvp	1	10	-	H
Vertical back porch	tvb	1	2	-	H

**Note:**

1.  $thd=480\text{CLK}$ ,  $thf=2\text{CLK}$ ,  $thp=41\text{CLK}$ ,  $thb=2\text{CLK}$ ,  $thf + fhp + ftb > 44$
2.  $525\text{CLK} = 480\text{CLK} + 2\text{CLK} + 41\text{CLK} + 2\text{CLK}$

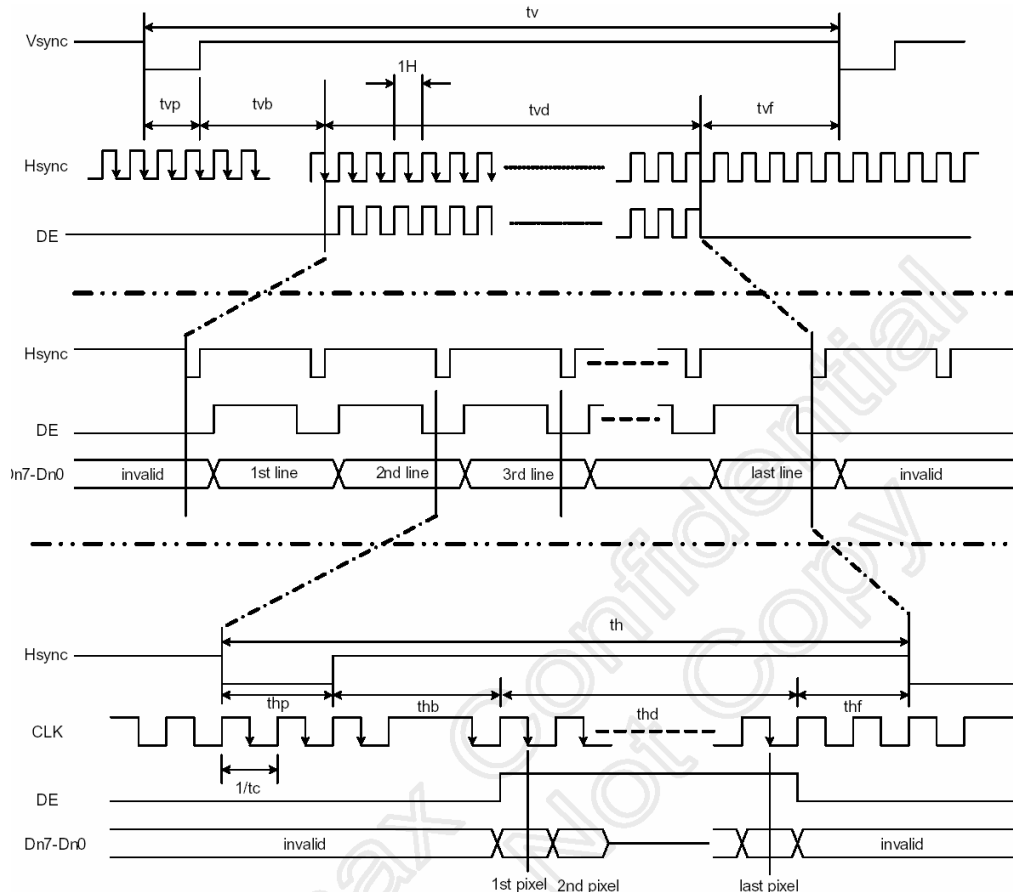


Figure 11.1 Input timing



## 11.2 Timing Requirement 2

( $T_A=25^\circ\text{C}$ ,  $DVDD=2.25\text{V}$  to  $3.6\text{V}$ ,  $DVSS=0\text{V}$ ,  $t_r=t_f=2\text{ns}$ )

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
DISP setup time	$t_{diss}$	10	-	-	ns
DISP hold time	$t_{dish}$	10	-	-	ns
Clock period	$PW_{CLK}^{*1}$	66.7	-	-	ns
Clock pulse high period	$PWH^{*1}$	26.7	-	-	ns
Clock pulse low period	$PWL^{*1}$	26.7	-	-	ns
Hsync setup time	$t_{hs}$	10	-	-	ns
Hsync hold time	$t_{hh}$	10	-	-	ns
Data setup time	$t_{ds}$	10	-	-	ns
Data hold time	$t_{dh}$	10	-	-	ns
DE setup time	$t_{des}$	10	-	-	ns
DE hold time	$t_{deh}$	10	-	-	ns
Vsync setup time	$t_{vhs}$	10	-	-	ns
Vsync hold time	$t_{vhh}$	10	-	-	ns

**Note:**

1. For parallel interface, maximum clock frequency is 15MHz.
2.  $t_r$ ,  $t_f$  is defined 10% to 90% of signal amplitude.

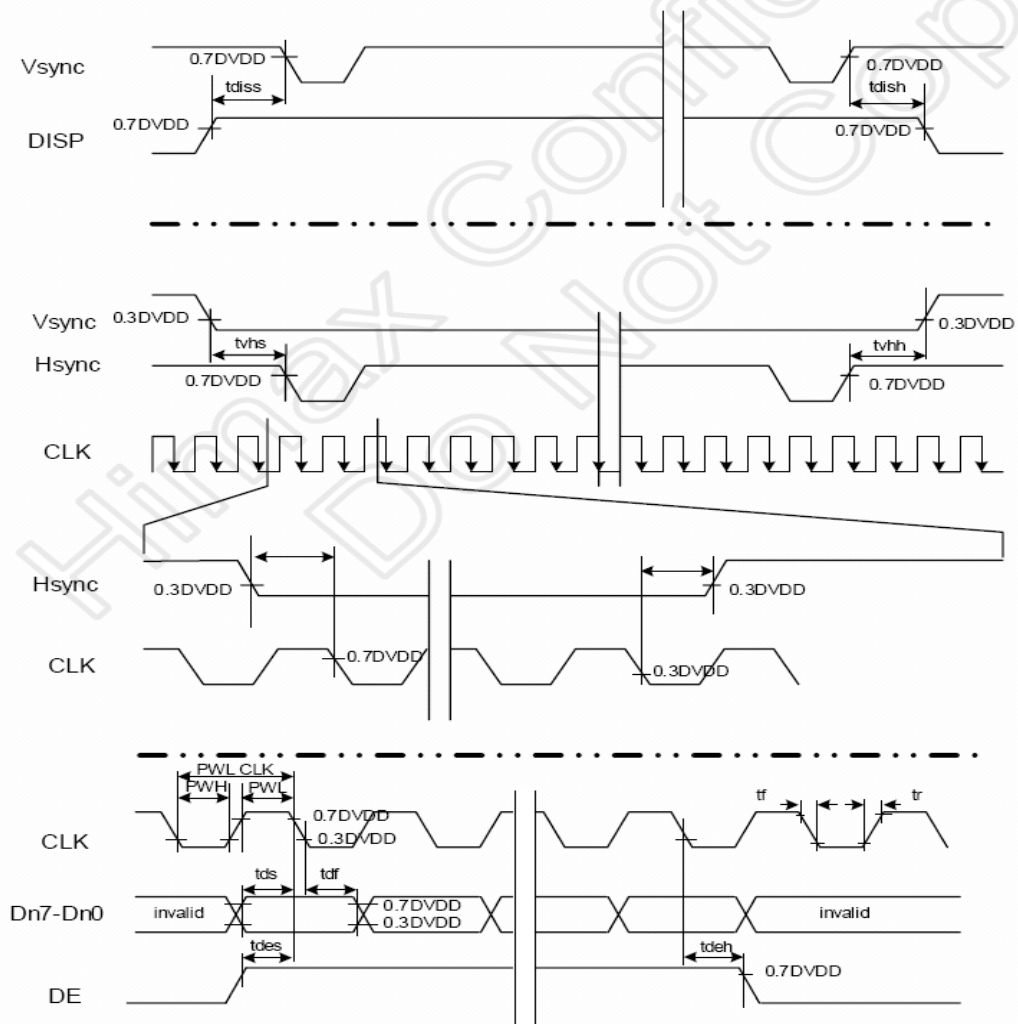
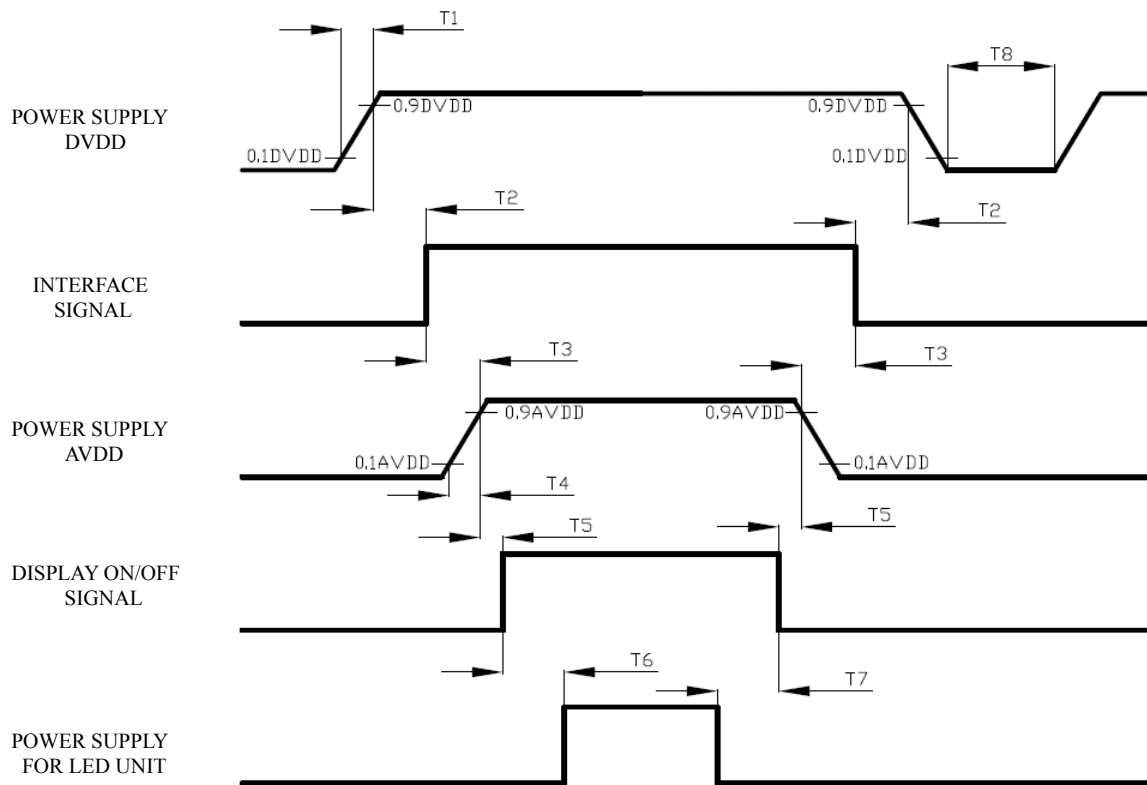


Figure 11.2 Input setup timing



### 11.3 Power On / Off Sequence

To prevent the latch-up or DC operation of LCD module, the power on/off sequence shown below must be followed.



Power ON/OFF Sequence

Symbol	Specification	Symbol	Specification
T1	$0 \leq T1 \leq 10 \text{ msec}$	T5	$0 \leq T5 \leq 50 \text{ msec}$
T2	$0 \leq T2 \leq 50 \text{ msec}$	T6	$160 \text{ msec} \leq T6$
T3	$0 \leq T3 \leq 50 \text{ msec}$	T7	$160 \text{ msec} \leq T7$
T4	$0 \leq T4 \leq 10 \text{ msec}$	T8	$1 \text{ sec} \leq T8$





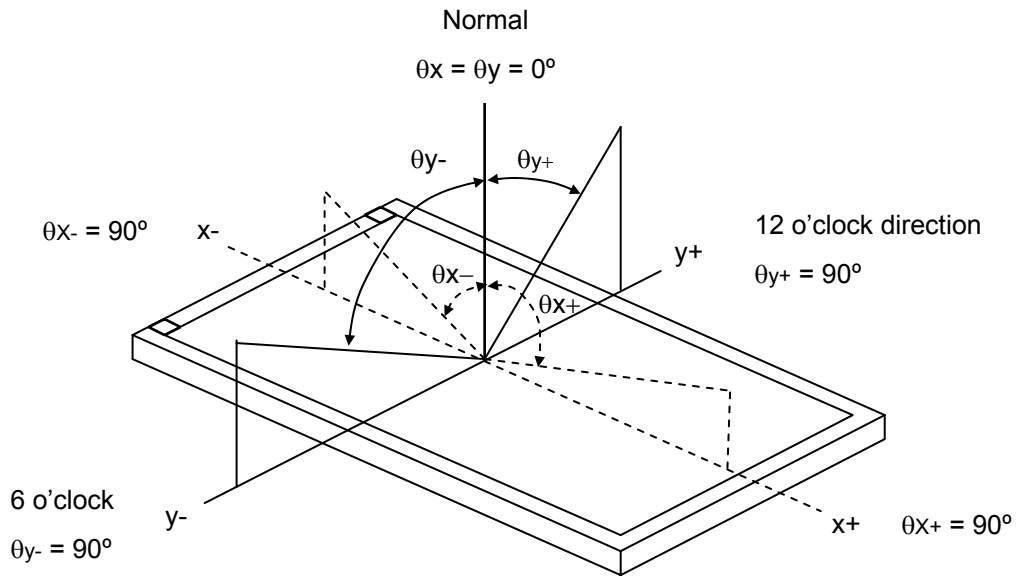
### 12. Optical Characteristics

The optical characteristics should be measured in a dark environment ( $\leq 1$  lux) or equivalent state with the methods shown in Note (5).

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	300	450	-	-	(2),(5)
Response Time		$T_{R+} T_F$		-	50	70	ms	(3)
Center Luminance of White		$L_{AVE}$		240	(290)	-	$cd/m^2$	(4),(5)
Brightness uniformity		BUNI		70		-	%	(5),(6)
Color Chromaticity	Red	Rx		0.566	0.596	0.626	-	(1),(5)
		Ry		0.325	0.355	0.385	-	
	Green	Gx		0.315	0.345	0.375	-	
		Gy		0.557	0.587	0.617	-	
	Blue	Bx		0.113	0.143	0.173	-	
		By		0.055	0.085	0.115	-	
	White	Wx	0.287	0.317	0.347	-		
		Wy	0.310	0.340	0.370	-		
Viewing Angle	Horizontal	$\theta_{x+}$	CR $\geq$ 10	50	(65)	-	deg.	
		$\theta_{x-}$		50	(65)	-		
	Vertical	$\theta_{y+}$		45	(50)	-		
		$\theta_{y-}$		55	(60)	-		



Note (1) Definition of Viewing Angle ( $\theta_x$ ,  $\theta_y$ ):



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

The contrast ratio can be calculated by the following expression.

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

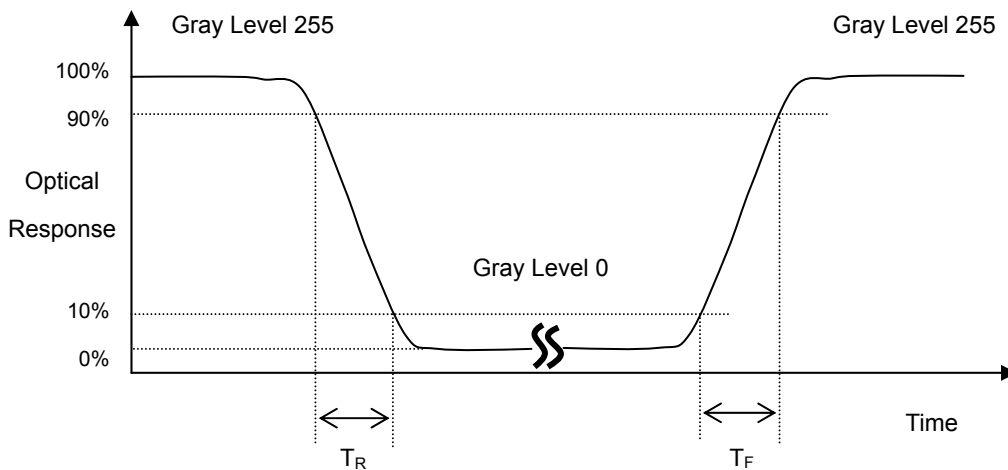
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

$$\text{CR} = \text{CR} (10)$$

CR (X) is corresponding to the contrast ratio of the point X at figure in Note (6).

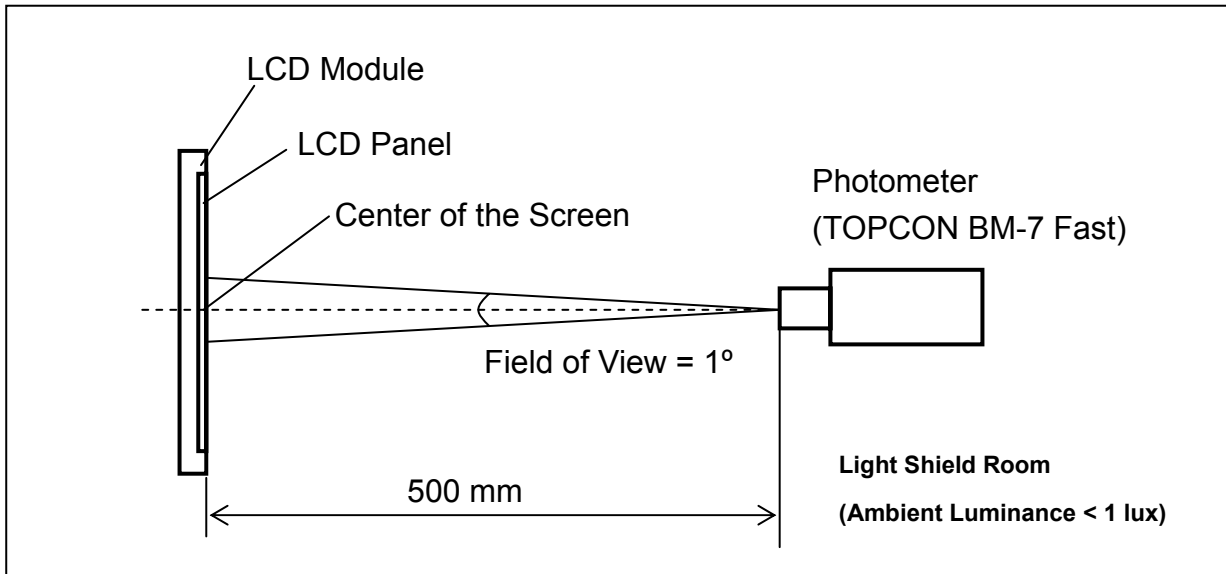
Note (3) Definition of Response Time ( $T_R$ ,  $T_F$ ):





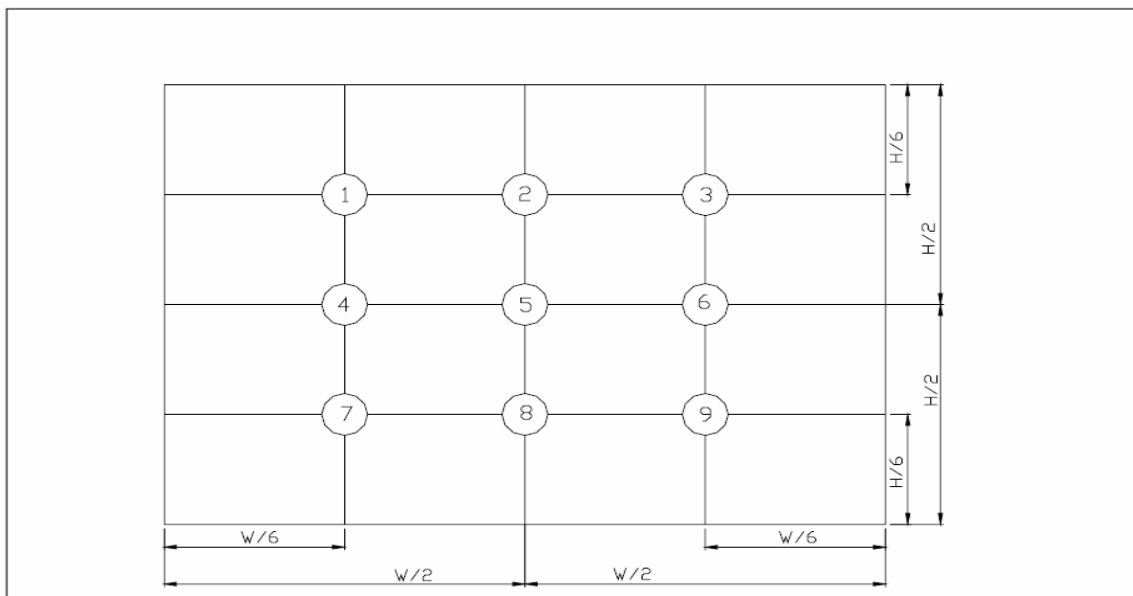
Note (4) Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



Note (5) Definition of brightness uniformity

Brightness uniformity=(Min Luminance of 9 points)/(Max Luminance of 9 points)×100%



( 單位 : mm )

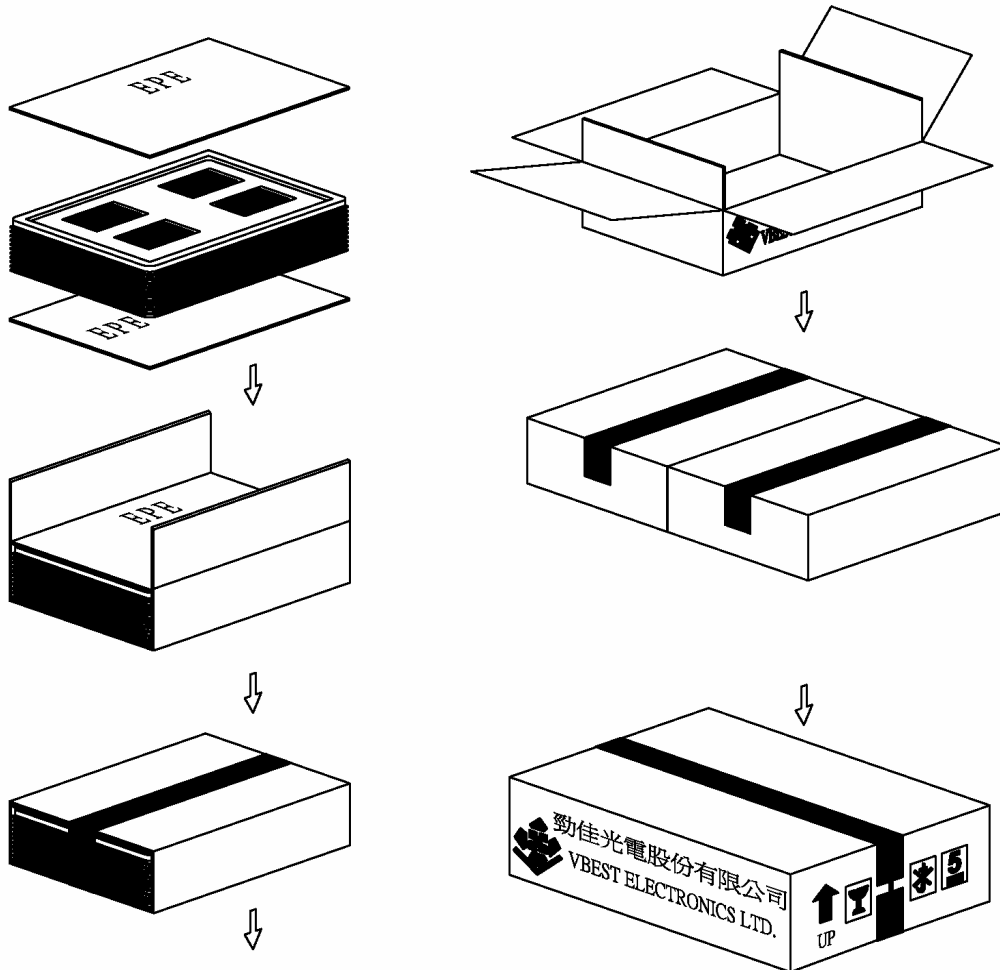
**13. Reliability Test**

No.	Test Items	Test Condition	Remark
1	High Temperature Storage Test	T <sub>a</sub> = 80°C 240 hours	-
2	Low Temperature Storage Test	T <sub>a</sub> = -30°C 240 hours	-
3	High Temperature Operation Test	T <sub>a</sub> = 70°C 240 hours	-
4	Low Temperature Operation Test	T <sub>a</sub> = -20°C 240 hours	-
5	High Temperature and High Humidity Operation Test	T <sub>a</sub> =40°C 90%RH 240 hours	-
6	Electro Static Discharge Test (non-operating)	-Panel Surface/Top Case : 150pF, 330Ω Air: ±15kV, Contact: ±8kV	-
7	Mechanical Shock Test (non-operating)	Half sine wave, 80G, 11ms 3 times shock of each six surfaces	-
8	Vibration Test (non-operating)	Sine wave, 10 ~ 55 ~ 10Hz, 3 axis, 2 hours/axis	-
9	Thermal Shock Test	-30°C ~ 80°C (1h),200 cycles, 30min 30min	-
10	Drop Test(with Carton)	Height: 80cm 1 corner, 3 edges, 6 surfaces	-



### 14. Packaging

#### Packing Method



PARTS LIST					
	ITEM	SIZE(LxWxH) unit:mm	MATERIAL	Q.T.Y	NOTE
1	TRAY	372.0x262.0x13.6	PS	26	
2	CARD BOARD(P1)	925.0x275.0x3.5	CARTON	2	
3	CARD BOARD(P2)	776.0x375.0x3.5	CARTON	2	
4	CARD BOARD(P3)	375.0x265.0x3.5	CARTON	4	
5	INTERNAL BOX(B2)	400.0x290.0x150.0	CARTON	2	
6	EXTERNAL BOX(B1)	600.0x420.0x170.0	CARTON	1	
7	PRODUCT	105.5x67.2x4.2		96	



## 15. Precautions

### 15.1 Assembly and Handling Precautions

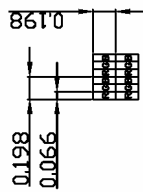
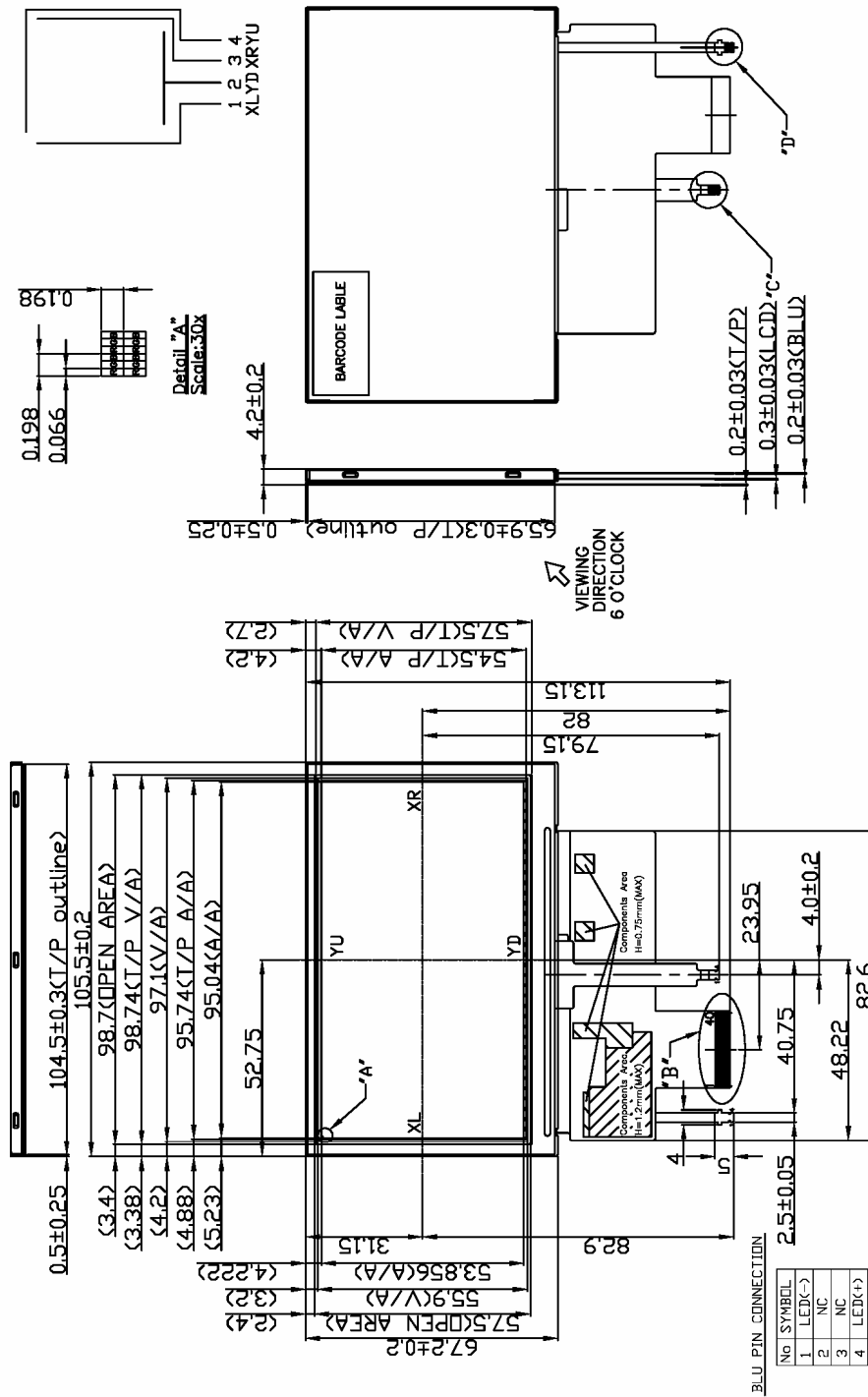
- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) It's recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) Don't apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.
- (4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.
- (5) Do not plug in or pull out the I/F connector while the module is in operation.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) Moisture can easily penetrate into LCD module and may cause the damage during operation.
- (9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD module in the specified storage conditions.
- (10) When ambient temperature is lower than 10°C, the display quality might be reduced. For example, the response time will become slow.

### 15.2 Safety Precautions

- (1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (2) After the module's end of life, it is not harmful in case of normal operation and storage.



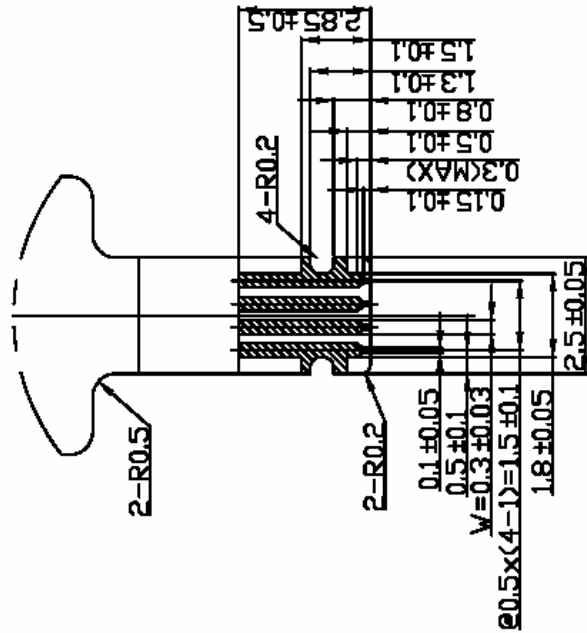
16.Outline Drawing



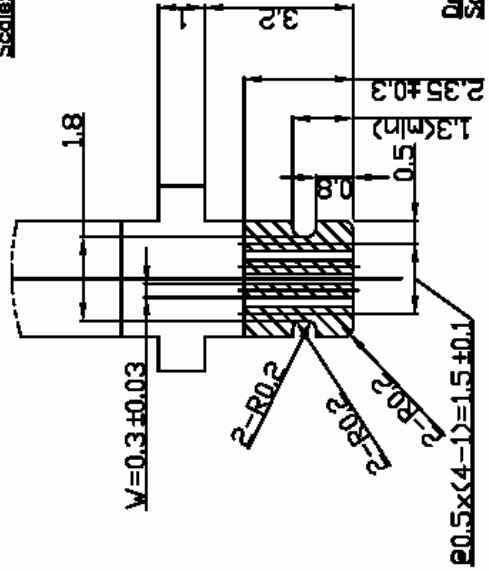
1 2 3 4  
XLYD XRYU

VIEWING DIRECTION  
6 O'CLOCK

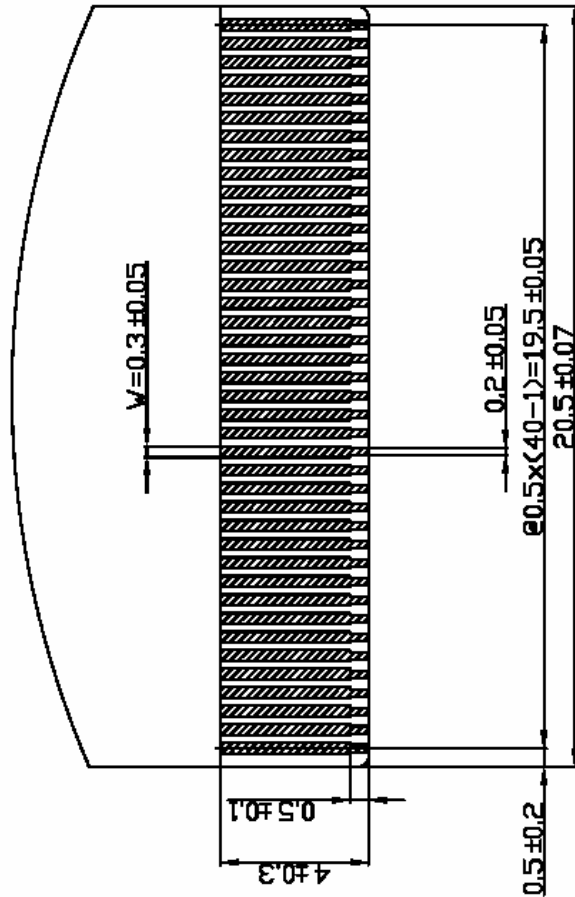
BLU PIN CONNECTION



Detail "C"  
Scale: 10x



Detail "D"  
Scale: 10x



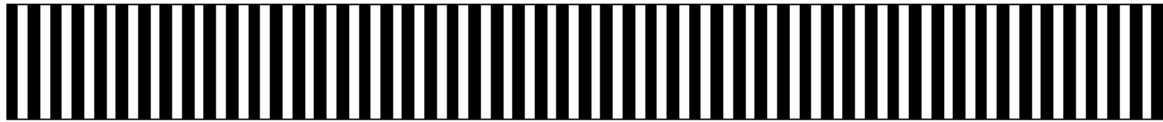
Detail "B"  
Scale: 8x



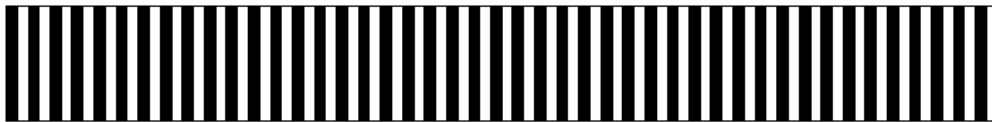


### 17. Definition of Labels

The bar code nameplate is pasted on each module as illustration, and its definitions are as following explanation.



VGG482704-6UFLWC

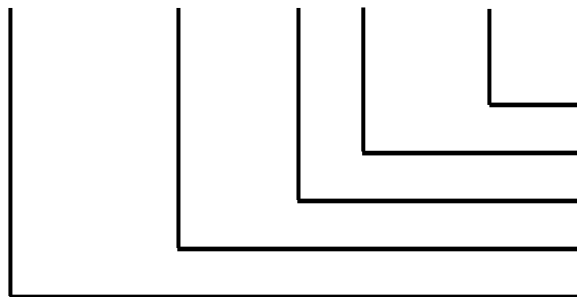


ABCDEFGHIJKLM

(a) Module Name: VGG482704-6UFLWC

(b) Serial ID:

A B C D E F G H I J K L M



Serial No.  
Revision Code  
Factory Code  
Manufactured Date  
Screen Size

Serial ID includes the information as below:

(a) Screen size (Diagonal): Inch Code (ABCD)

3.5" → 0350

10.4" → 1040

(b) Manufactured Date: Year, Month, Day (EFG)

Year (E)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Mark	0	1	2	3	4	5	6	7	8	9



**Month (F)**

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

**Day (G)**

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mark	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Mark	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	

(c) Factory Code (H):

For VBEST internal use.

(d) Revision Code (I):

Cover all the change, for example: 1: Rev.1, 2: Rev.2, 3: Rev.3...etc.

(e) Serial No. (JKLM):

Manufacturing sequence of product, for example: 0001~9999.



### 18. Incoming Inspection Standards

#### 18.1 The environmental condition of inspection

The environmental condition and visual inspection shall be conducted as below.

- (1) Ambient temperature  $25 \pm 5^{\circ}\text{C}$
- (2) Humidity:  $60 \pm 5\% \text{ RH}$
- (3) Viewing distance is approximately 35 ~ 40 cm
- (4) Viewing angle is normal to the LCD panel as Fig \_1( $10^{\circ}$ )
- (5) Ambient Illumination: 300 ~ 500 Lux for external appearance inspection

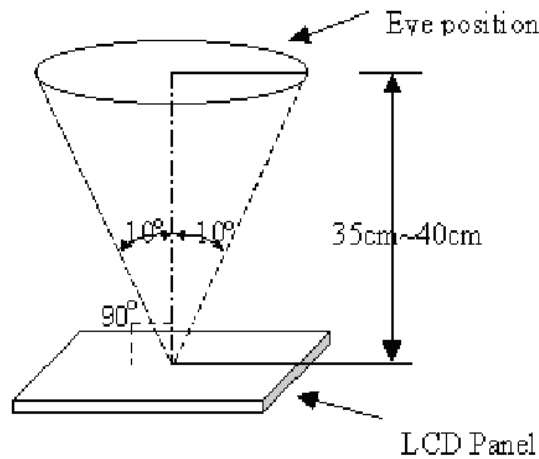


Fig \_ 1

#### 18.2 The defects classify of AQL as following:

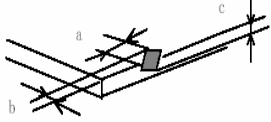
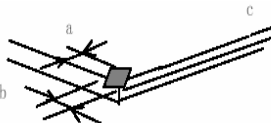
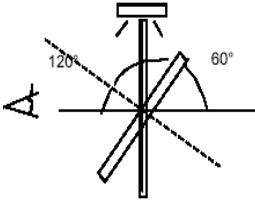
Class of defects	AQL	Definition
Major	0.65%	It is defect that is likely to result in failure or to reduce materially the usability of the intended function.
Minor	1.5%	It is a defect that will not result in functioning problem with deviation classified.



**18.3 Inspection Parameters**

Item		Specification/Description			Note	
Display	Function	No Display			-	
		Malfunction			-	
Operating	Contrast ratio	Out of Spec			-	
	Line defect	No obvious Vertical and Horizontal line defect in bright , dark and colored.			-	
	Point Defect (red,green, blue,dark)	Item	Acceptable number			Note: 1、2、 5、6、7
			A	B	Total	
		BRIGHT DOT	$N \leq 2$	$N \leq 2$	$N \leq 7$	
		DARK DOT	$N \leq 3$	$N \leq 4$		
		TOTAL DOT	$N \leq 4$	$N \leq 5$		
TWO ADJACENT DOT	NOT ALLOWED					
THREE OR MORE ADJACENT DOT	NOT ALLOWED					
External Inspection (non-operating)	Scratch on the polarizer	L(mm)	W(mm)	Acceptable number	Note:3	
		$L \leq 2.5$	$W \leq 0.1$	4		
		$L > 2.5$	$W > 0.1$	0		
	Dent or bubble on the polarizer	Dimension(mm)	Acceptable number		Note:4	
		$D \leq 0.5$	4			
		$D \leq 0.15$	Disregard			
	Foreign material on the polarizer	Dimension(mm)	Acceptable number		Note:4	
		$D \leq 0.5$	4			
		$D \leq 0.15$	Disregard			

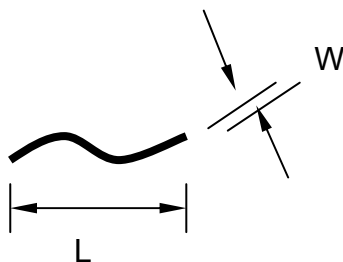


Item	Specification/Description		Note	
Touch Panel	Glass chipping		$a \leq 3\text{mm}$ $b \leq 3\text{mm}$ $c \leq t$ (t:Glass think)	Note: 8
	Glass chipping		$a \leq 3\text{mm}$ $b \leq 3\text{mm}$ $c \leq t$ (t:Glass think)	Note: 8
	Newton-ring	<p>(In case of doubtful situations)            Observe on 60° from the product surface under a while            Fluorescent lamp(3-wavelength lamp).</p> 	<p>Average diameter <math>\leq 7\text{mm}</math>  <math>N \leq 1</math></p>	Note: 8

Note1. Distance between point defect distance should be large than 5 mm.

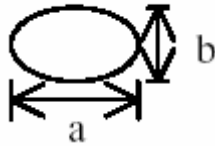
Note2. The definition of dot defect : The dot defect was judged after repair and the size of a defective dot over 1/2 of whole dot is regarded as one defective dot.

Note3.

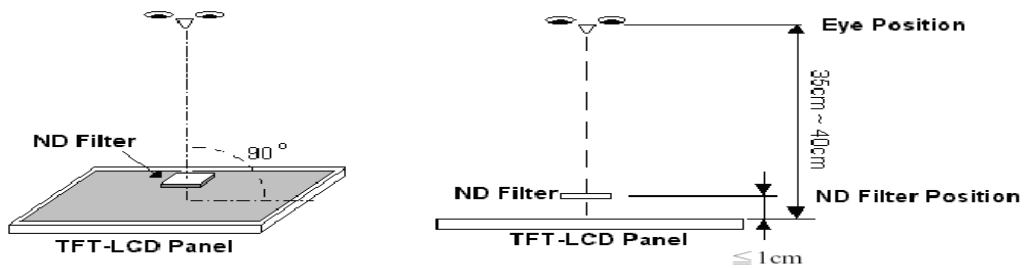




Note4. D : Diameter  $D=(a+b)/2$



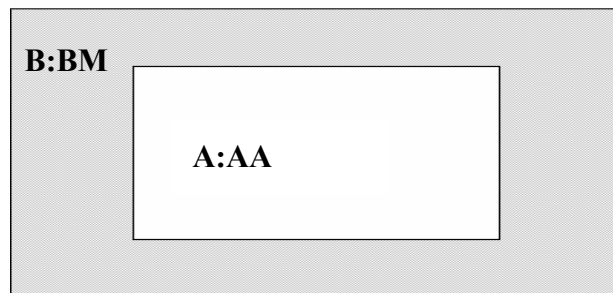
Note5. Bright dot is defined through 6% transmission ND Filter as following.



Note6. ADJACENT DOT

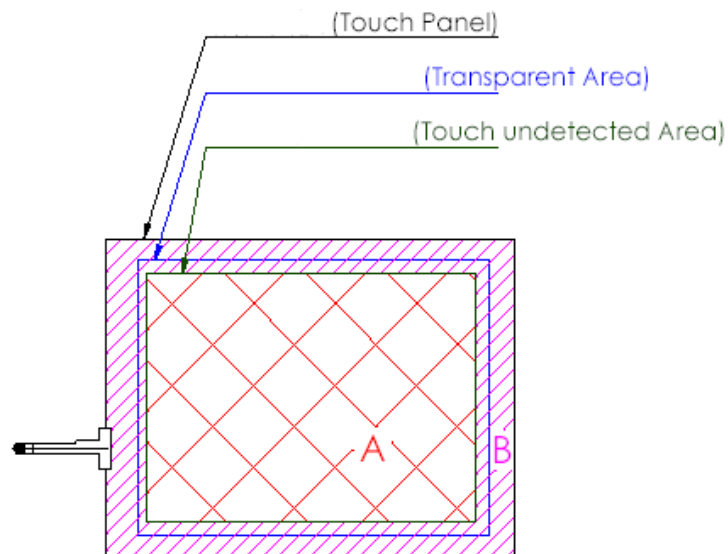


Note7.





Note8.



A area : Without any defect point effect on normal operation.

B area : None-specify

#### 18.4 Handling of LCM

- (1) Don't give external shock.
- (2) Don't apply excessive force on the surface.
- (3) Liquid in LCD is hazardous substance. Must not lick and swallow. when the liquid is attach to your hand, skin, cloth etc. Wash it out thoroughly and immediately.
- (4) Don't operate it above the absolute maximum rating.
- (5) Don't disassemble the LCM.