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# LIQUID CRYSTAL DISPLAY MODULE

## Product Specification

<b>CUSTOMER</b>	<b>Standard</b>
<b>CUSTOMER PART NUMBER</b>	
<b>PRODUCT NUMBER</b>	<b>DET080WVNTCMI-1A</b>

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Date: 08-March-13	Date: 08-March-13

Approval for Specification only

Approval for Specification and Sample

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### 3. Module Numbering System

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
D	E	T	0	8	0	W	V	N	T	C	M	U	-	1	A

1	D	
2	E	DENSITRON Standard TFT
3	T	
4~6	0	TFT Size:
	8	<b>035</b> =3.5", <b>043</b> =4.3", <b>057</b> =5.7", <b>070</b> =7", <b>080</b> =8", <b>101</b> =10.1"
	0	
7~8	W	TFT Resolution:
	V	<b>QQ</b> : 480X272 (WQVGA), <b>VG</b> : 640X480 (VGA) <b>WV</b> : 800X480 (WVGA), <b>WS</b> : 1024X600 (WSVGA)
9	N	TFT Brightness: <b>N</b> : Normal Brightness, <b>H</b> : High Brightness
10	T	TFT Interface System: <b>T</b> : TTL, <b>L</b> : LVDS
11~13	C	Touch Type: <b>NT</b> : Non-Touch, <b>CS</b> : Capacitive Single Touch,
	M	<b>CM</b> : Capacitive Multi Touch, <b>RS</b> : Resistive Single Touch, <b>RM</b> : Resistive Multi Touch
	U	Touch Interface: <b>0</b> : No interface, <b>U</b> : USB I/F, <b>I</b> : I2C I/F, <b>S</b> : SPI I/F
14	-	
15~16	1	Revision
	A	A: Standard, W: Wide Viewing Angle

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#### 4. Application

This specification is applied to the 8.0 inch WVGA supported TFT-LCD module With Projected Capacitive Touch (PCT) and can display true 262,144 colors (8 bit/ color). The module is designed for OA, Car TV application and other electronic products which require flat panel display of digital signal interface. This module is composed of 8.0" TFT-LCD panel, a driver circuit and LED backlight unit.

#### 5. Features

- WVGA (800×480 pixels) resolution.
- Digital 24 bit parallel RGB.
- Dot inversion mode with stripe type.
- Projected Capacitive Touch
  - USB Interface
  - Multi Touch (Ten points)

#### 6. General Specifications

Item	Specifications	Unit
Screen Size	8.0 (Diagonal)	inch
Display Format	800RGB(H)×480(V)	dot
Active Area	176.64(H)×99.36(V)	mm
Dot Pitch	0.0736(H)×0.2070(V)	mm
Pixel Configuration	RGB Vertical Stripe	-
Display Mode	TN Type Transmissive Mode Normally White	-
Surface Treatment	Clear(7H)	-
Viewing Direction	6 O'clock (The Gray Inversion will appear at this direction)	-
Outline Dimension	192.8(W)×116.9(H)×7.95(D)	mm
Weight	(TBD)	g
RoHS Compliance	DENSITRON certifies this product to be in compliance with European Union Directive 2002/95/EC on the restriction of certain hazardous substances in electrical and electronic equipment.	-

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## 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)(2)
Operating Ambient Temperature	T <sub>OP</sub>	-20	+70	°C	(1)(2)

Note1: Background color changes slightly depending on ambient temperature.

This phenomenon is reversible.

Note2: Please refer to item of RELIABILITY.

### 7.2 Electrical Absolute Ratings

#### 7.2.1 TFT-LCD Module

(Ta=25±2°C, GND=V<sub>SS</sub>=0V, Note 1)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Digital Power Supply Voltage	DV <sub>DD</sub>	-0.3	5.0	V	-
Analog Power Supply Voltage	AV <sub>DD</sub>	6.5	13.5	V	-
Gate High Voltage	V <sub>GH</sub>	-0.3	40.0	V	-
Gate Low Voltage	V <sub>GL</sub>	-20.0	0.3	V	-
Gate High To Gate Low Voltage	V <sub>GH</sub> - V <sub>GL</sub>	-	40.0	V	-

#### 7.2.2 LED Driver Absolute Maximum Ratings

(Ta=25±2°C, Note 1)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
LED Reverse Voltage	VR	-	1.2	V	Each LED (2)
LED Forward Current	IF	-	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: VR Conditions: Zener Diode 20mA

## 8. Electrical Characteristics

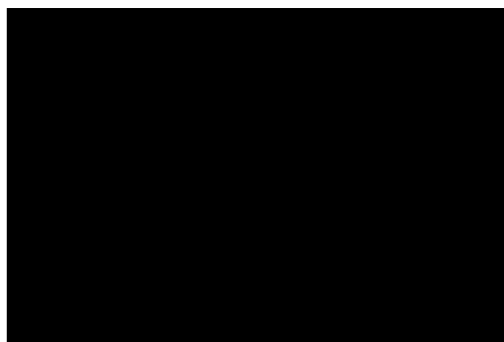
### 8.1 TFT-LCD Module

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Digital Power Supply Voltage	DV <sub>DD</sub>	3.0	3.3	3.6	V	-
Analog Power Supply Voltage	AV <sub>DD</sub>	10.2	10.4	10.6	V	-
Gate High Voltage	V <sub>GH</sub>	15.3	16.0	16.7	V	-
Gate Low Voltage	V <sub>GL</sub>	-7.7	-7.0	-6.3	V	-
Input signal voltage	V <sub>COM</sub>	3.4	4.4	5.4	V	-
Digital Power Supply Current	ID <sub>DD</sub>	-	4	10	mA	(1)
Analog Power Supply Current	IA <sub>DD</sub>		20	50	mA	(1)
Gate High Current	I <sub>GH</sub>		0.2	1	mA	(1)
Gate Low Current	I <sub>GL</sub>		0.2	1	mA	(1)
Input High Threshold Voltage	V <sub>IH</sub>	0.7 DV <sub>DD</sub>	-	DV <sub>DD</sub>	V	-
Input Low Threshold Voltage	V <sub>IL</sub>	0	-	0.3 DV <sub>DD</sub>	V	-
VSYNC Frequency	F <sub>V</sub>	-	60	-	Hz	-
DCLK Frequency	DCLK	-	33.26	-	MHz	-

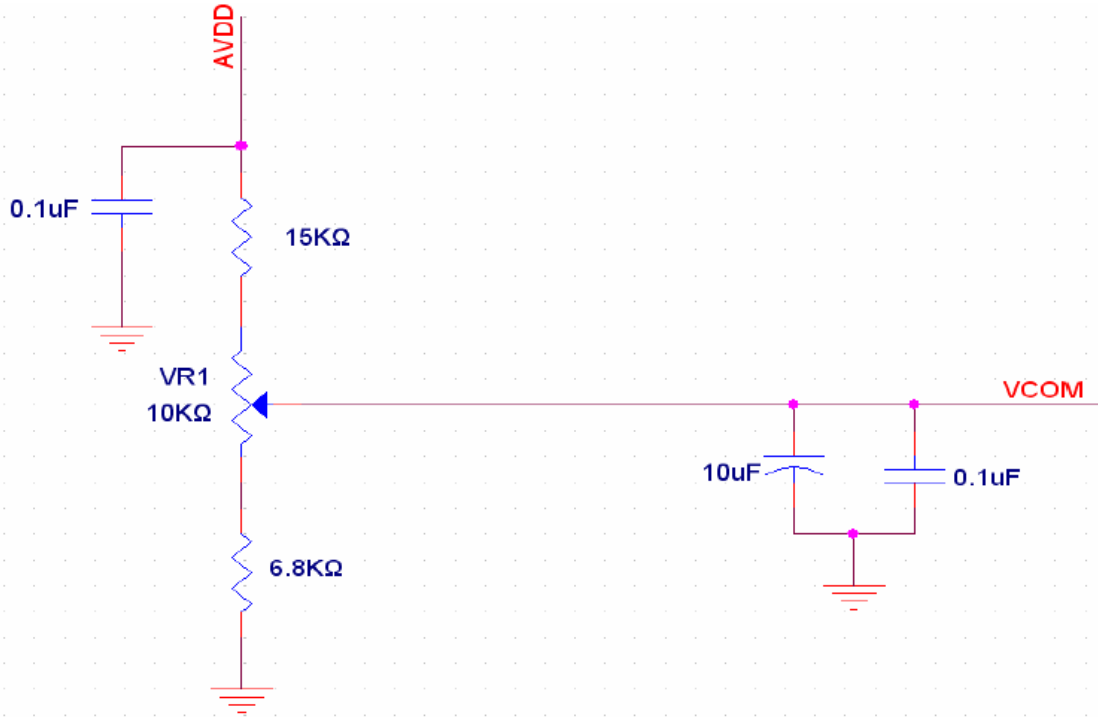
Note (1) The specified power consumption is under the conditions at DV<sub>DD</sub> =3.3V, AV<sub>DD</sub> =10.4V, V<sub>GH</sub> =16.0V, V<sub>GL</sub> =-7.0V, V<sub>COM</sub> =4.4V ,F<sub>V</sub>=60Hz, whereas a power dissipation check pattern below is displayed.

Black Pattern / 0 Gray



Active Area

Note 2: Typ. Vcom is only a reference value, it must be optimized according to each LCM.  
Be sure to use VR;



## 8.2 Backlight Unit

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Current of Backlight Unit	I <sub>B</sub>	216	240	264	mA	-
Voltage of Backlight Unit	V <sub>B</sub>	8.4	9.3	10.2	V	(1)
Power Consumption	P <sub>BL</sub>	-	(2.232)	2.455	W	-
LED Life Time(25°C)	-	20000	-	-	hr	(2)

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25°C and IL =240mA.

Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL =240mA. The LED lifetime could be decreased if operating IL is larger than 240 mA.



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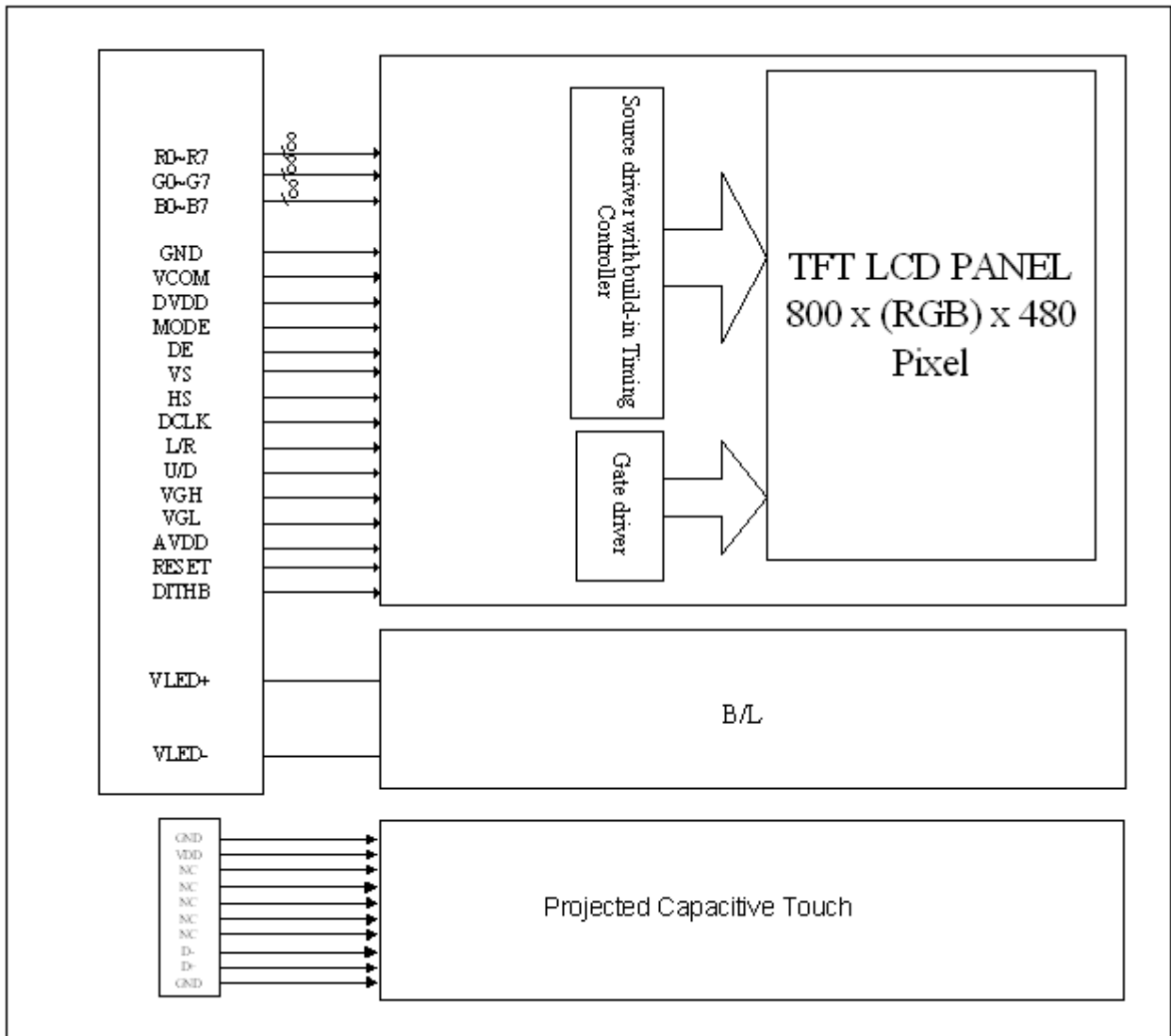
### 8.3 Projected Capacitive Touch

Item	Value			Unit	Note
	Min.	Typ.	Max.		
Operating Voltage	4.8	5.0	5.2	V	-
Power Supply Current	-	TBD	TBD	mA	(1)
Power Consumption	-	TBD	TBD	mW	@5.0V
Interface	USB				-
Function	Multi Touch				-

Note (1) This test condition is touched with 10 points.

## 9. Block Diagram

### 9.1 TFT-LCD Module with Backlight Unit



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## 10. Input / Output Terminals Pin Assignment

### 10.1 TFT-LCD Module

Connector: Hirose FH12A-50S-0.5SH

Pin No.	Symbol	I/O	Description	Remark
1	VLED+	P	Power for LED backlight(Anode)	
2	VLED+	P	Power for LED backlight(Anode)	
3	VLED-	P	Power for LED backlight(Cathode)	
4	VLED-	P	Power for LED backlight(Cathode)	
5	GND	P	Ground	
6	V <sub>COM</sub>	I	Common voltage	
7	DV <sub>DD</sub>	P	Power for Digital Circuit	
8	MODE	I	DE/SYNC mode select	Note 1
9	DE	I	Data Input Enable	
10	VS	I	Vertical Sync Input	
11	HS	I	Horizontal Sync Input	
12	B7	I	Blue data(MSB)	
13	B6	I	Blue data	
14	B5	I	Blue data	
15	B4	I	Blue data	
16	B3	I	Blue data	
17	B4	I	Blue data	
18	B1	I	Blue data	Note 2
19	B0	I	Blue data(LSB)	Note 2
20	G7	I	GREEN data(MSB)	
21	G6	I	GREEN data	
22	G5	I	GREEN data	
23	G4	I	GREEN data	
24	G3	I	GREEN data	
25	G2	I	GREEN data	
26	G1	I	GREEN data	Note 2
27	G0	I	GREEN data(LSB)	Note 2
28	R7	I	RED data(MSB)	
29	R6	I	RED data	
30	R5	I	RED data	

Pin No.	Symbol	I/O	Description	Remark
31	R4	I	RED data	
32	R3	I	RED data	
33	R2	I	RED data	
34	R1	I	RED data	Note 2
35	R0	I	RED data (LSB)	Note 2
36	GND	P	Ground	
37	DCLK	I	Sample clock	Note 3
38	GND	P	Ground	
39	L/R	I	Left / right selection	Note 4,5
40	U/D	I	Up / down selection	Note 4,5
41	V <sub>GH</sub>	P	Gate ON Voltage	
42	V <sub>GL</sub>	P	Gate OFF Voltage	
43	AV <sub>DD</sub>	P	Power for Analog Circuit	
44	RESET	I	Global reset pin.	Note 6
45	NC	-	No connection	
46	V <sub>COM</sub>	I	Common Voltage	
47	DITHB	I	Dithering function	Note 7
48	GND	P	Ground	
49	NC	-	No connection	
50	NC	-	No connection	

I: input, O: output, P: Power

Note 1: DE/SYNC mode select. Normally pull high.

When select DE mode, MODE="1", VS and HS must pull high or be grounded.

When select SYNC mode, MODE="0", DE can pull high must or be grounded.

Note 2: When input 18 bits RGB data, the two low bits of R, G and B data must be grounded.

Note 3: Data shall be latched at the falling edge of DCLK.

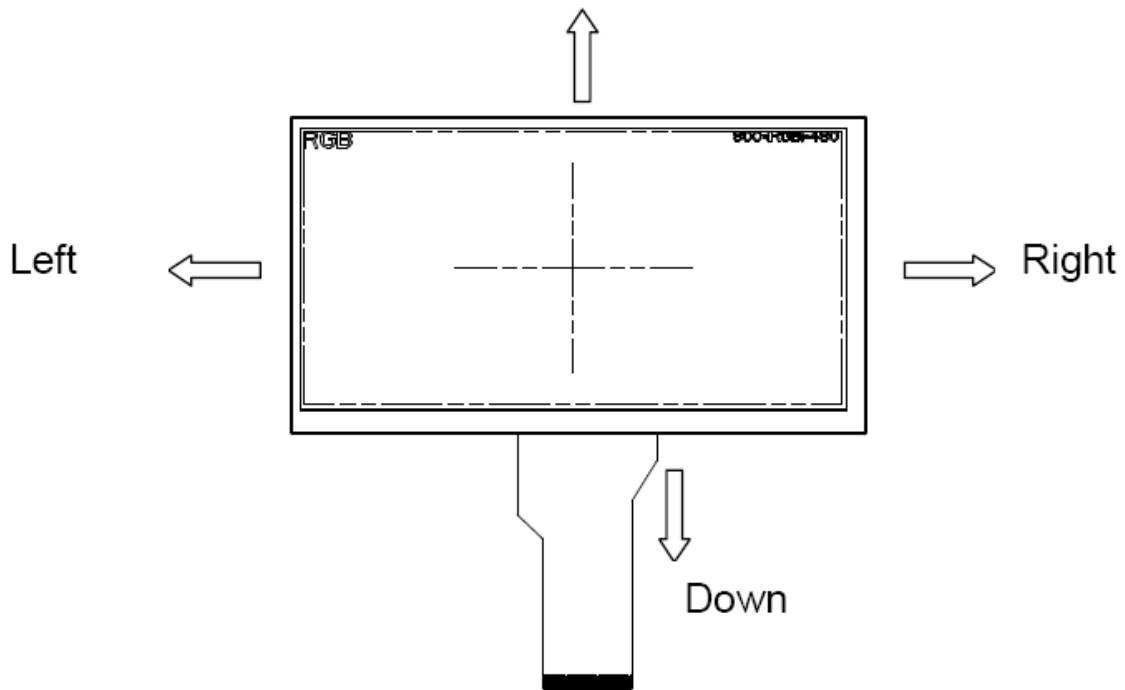
Note 4: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
GND	DV <sub>DD</sub>	Up to down, left to right
DV <sub>DD</sub>	GND	Down to up, right to left
GND	GND	Up to down, right to left
DV <sub>DD</sub>	DV <sub>DD</sub>	Down to up, left to right

Note 5: Definition of scanning direction.

Refer to the figure as below:

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Note 6: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.

Note 7: Dithering function enable control, normally pull high.  
When DITHB="1", Disable internal dithering function,  
When DITHB="0", Enable internal dithering function,

## 10.2 Projected Capacitive Touch

Connector: CVILUX CF25101D0R0-05

No.	Symbol	Functions
1	GND	Ground
2	VDD	+5.0V power supply.
3	NC	Not Connected
4	NC	Not Connected
5	NC	Not Connected
6	NC	Not Connected
7	NC	Not Connected
8	D-	Data-
9	D+	Data+
10	GND	Ground

### 10.3 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	0	0	0	0	0	0	0	0	
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	1	1	1	1	1	1	1	1	
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	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		
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	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	1	0	0	0	0	0	0	0		
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	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	0	1	0	0	0	0	0	0		
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	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		

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## 11. Interface Timing

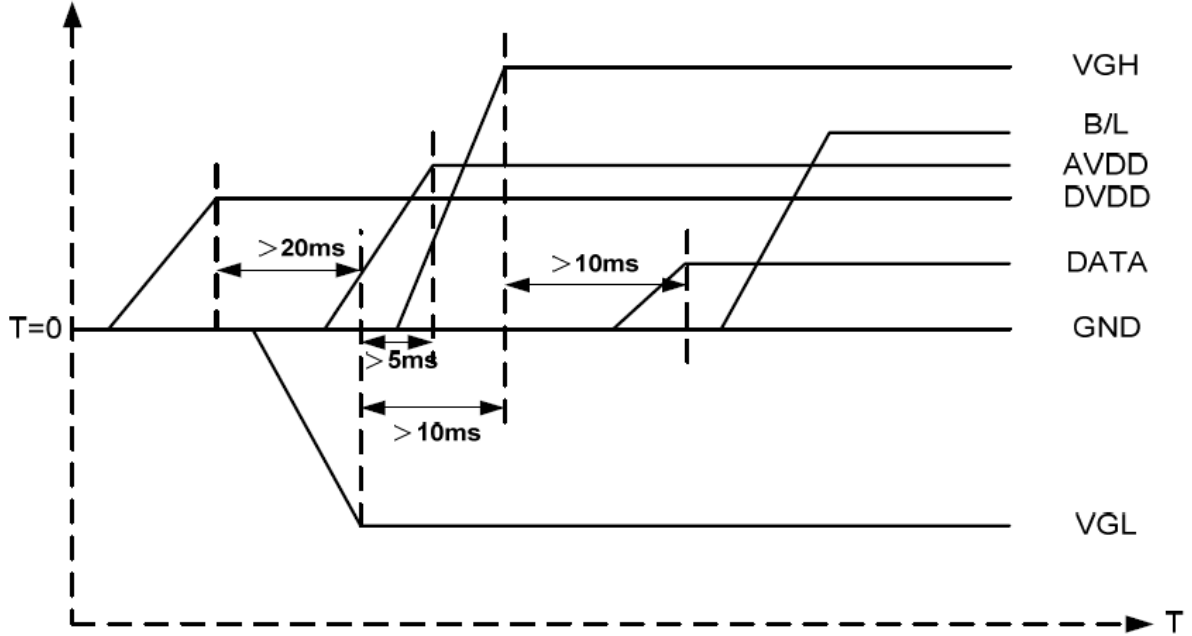
### 11.1 Input Signal Characteristics

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
HS setup time	$T_{hst}$	8	-	-	ns	
HS hold time	$T_{hhd}$	8	-	-	ns	
VS setup time	$T_{vst}$	8	-	-	ns	
VS hold time	$T_{vhd}$	8	-	-	ns	
Data setup time	$T_{dsu}$	8	-	-	ns	
Data hole time	$T_{dhd}$	8	-	-	ns	
DE setup time	$T_{esu}$	8	-	-	ns	
DE hole time	$T_{ehd}$	8	-	-	ns	
DV <sub>DD</sub> Power On Slew rate	$T_{POR}$	-	-	20	ms	From 0 to 90% DV <sub>DD</sub>
RESET pulse width	$T_{Rst}$	1	-	-	ms	
DCLK cycle time	$T_{coh}$	20	-	-	ns	
DCLK pulse duty	$T_{cwh}$	40	50	60	%	



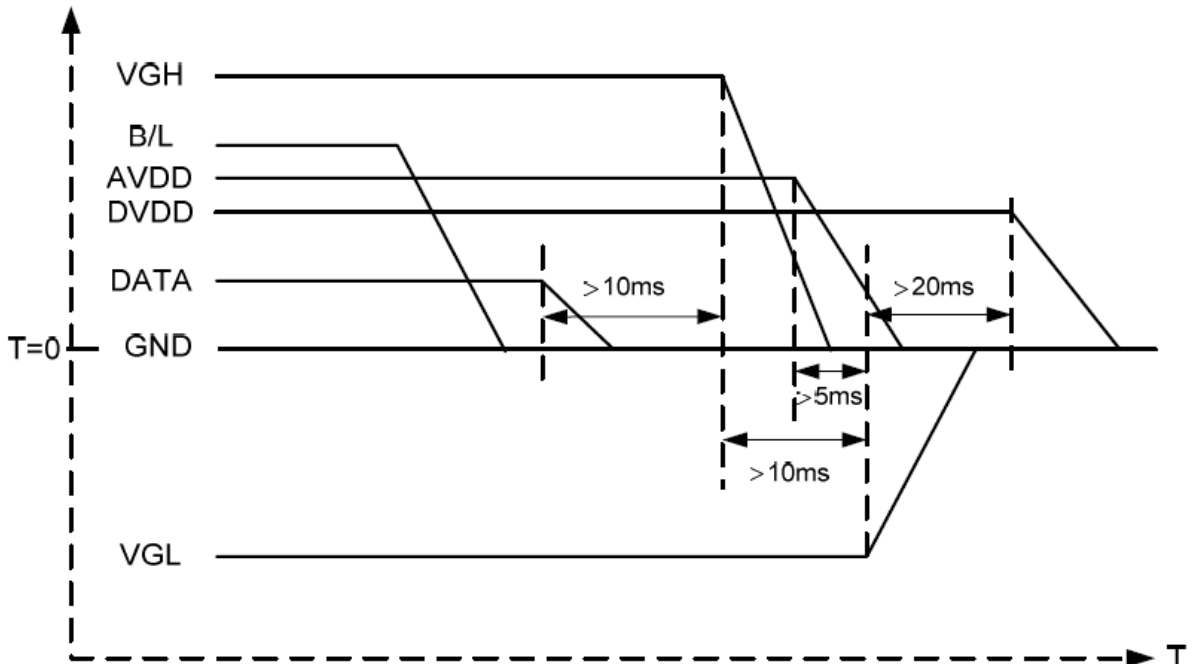
## 11.2 Power Sequence

Power on:



**DV<sub>DD</sub> → VGL → VGH → Data → B/L**

Power off:



**B/L → Data → VGH → VGL → DV<sub>DD</sub>**

Note: Data include R0~R7, B0~B7, GO~G7, U/D, L/R, DCLK, HS, VS, DE.

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### 11.3 Timing

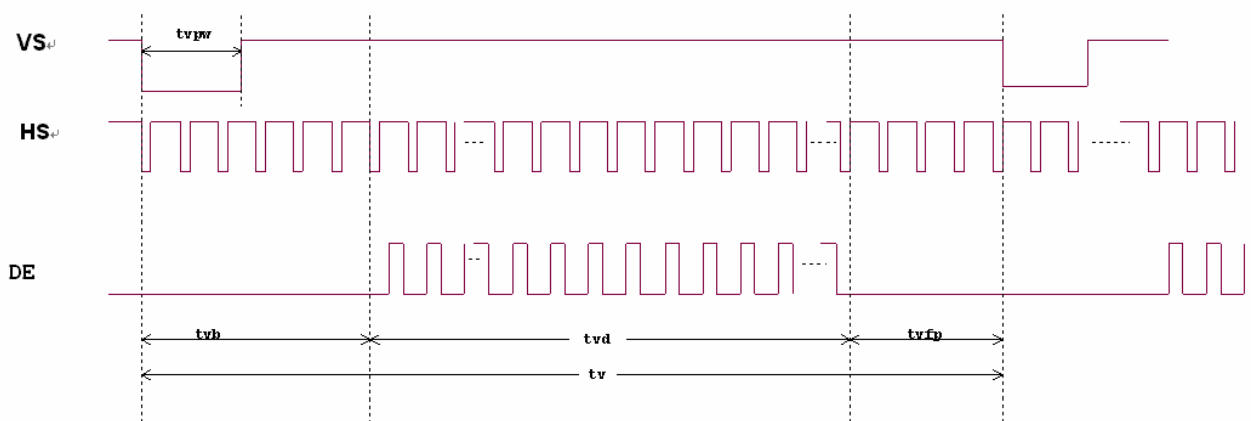
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	-	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd	-	480	-	TH	
VS period time	tv	510	525	650	TH	
VS pulse width	typw	1	-	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

### 11.4 Waveform



Horizontal input timing diagram.



Vertical input timing diagram.

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## 11.5 USB Interface

### 11.5.1 Single Touch Function

Single Touch Function works with plug'n play under system Windows 2000, Windows XP and Windows7 and Windows8.

For other operating systems like Linux a driver must be programmed.

### 11.5.2 Multi Touch Function

The Multi Touch Function works with plug'n play under system Windows7 and Windows8.

For older Windows systems or other operating systems a driver must be programmed.

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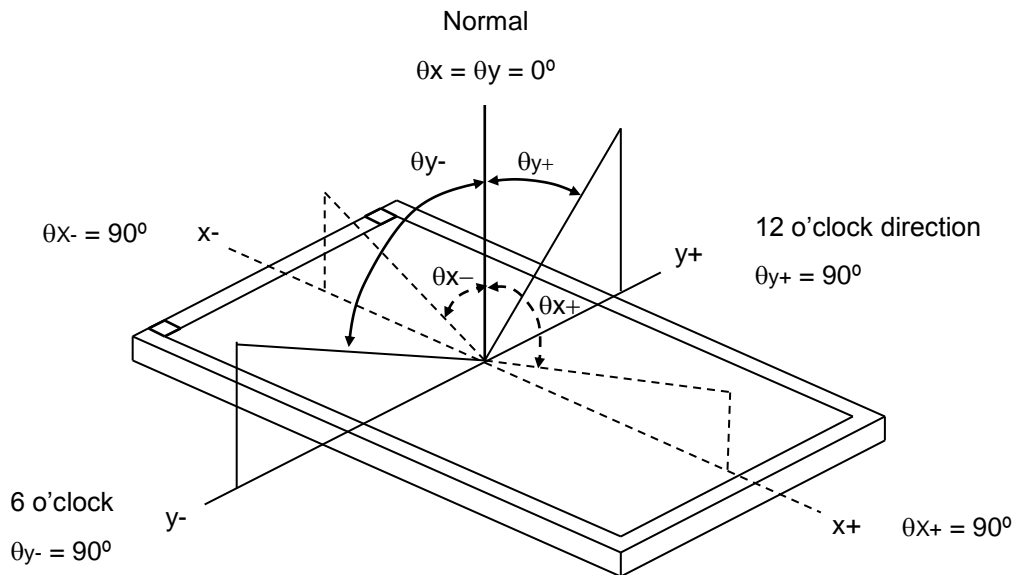
## 12. Optical Characteristics

The optical characteristics should be measured in a dark environment ( $\leq 1$  lux) or equivalent state with the methods shown in Note (4).

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	400	(500)	-	-	(2)
Response Time		$T_R$		-	10	20	ms	(3)
		$T_F$		-	15	30	ms	
Luminance(Center)		Y		300	(380)	-	cd/m <sup>2</sup>	(4)
Brightness uniformity		BUNI		70	(75)	-	%	(5)
Color Chromaticity	White	$W_x$		0.26	0.31	0.36	-	(1),(4)
		$W_y$	0.28	0.33	0.38	-		
Viewing Angle	Horizontal	$\theta_{x+}$	$CR \geq 10$	60	(70)	-	deg.	(1),(4)
		$\theta_{x-}$		60	(70)	-		
	Vertical	$\theta_{y+}$		40	(50)	-		
		$\theta_{y-}$		60	(70)	-		

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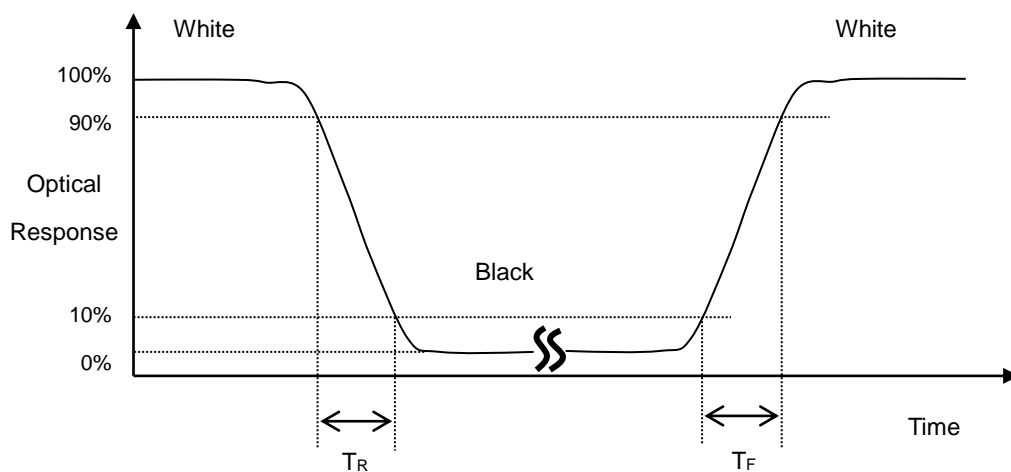
Note (1) Definition of Viewing Angle ( $\theta_x$ ,  $\theta_y$ ):



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

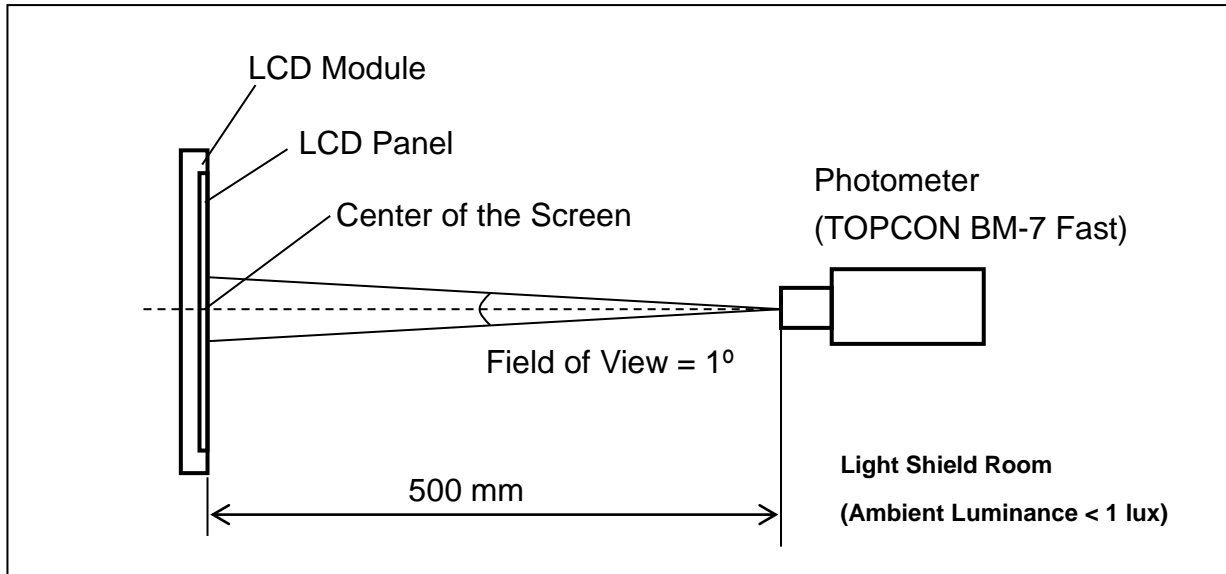
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

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



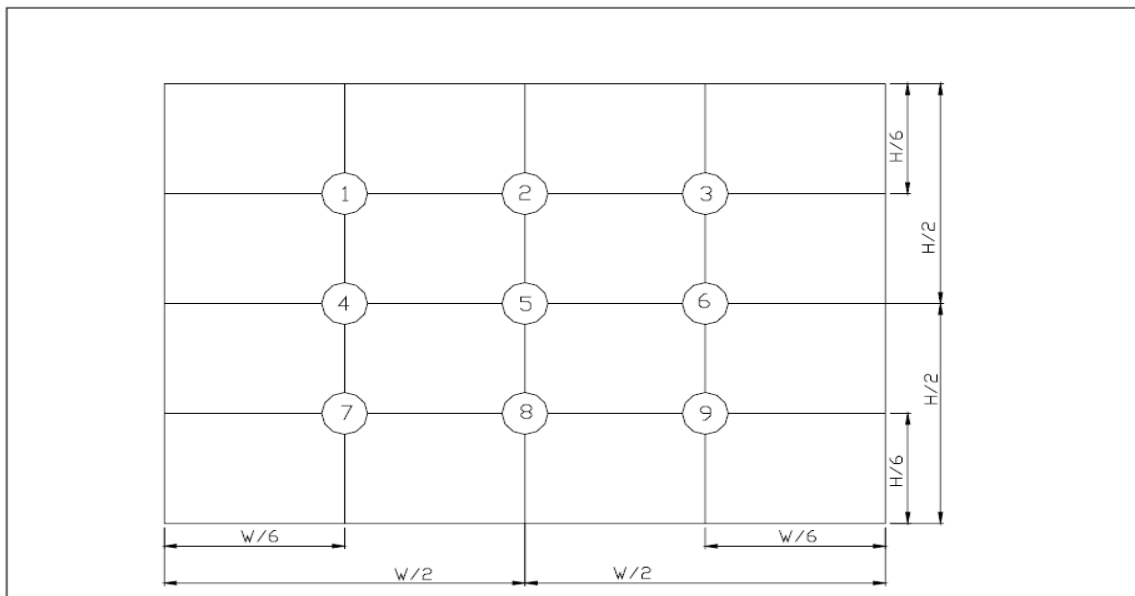
**Note (4) Measurement Set-Up:**

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 )

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### 13. Reliability Test

(Note3)

Item	Test Conditions	Remark
High Temperature Storage	Ta = 80°C                      240hrs	Note 1, Note 4
Low Temperature Storage	Ta = -30°C                      240hrs	Note 1, Note 4
High Temperature Operation	Ts = 70°C                      240hrs	Note 2, Note 4
Low Temperature Operation	Ta = -20°C                      240hrs	Note 1, Note 4
Operate at High Temperature and Humidity	+60°C, 90%RH                      240hrs	Note 4
Thermal Shock	-30°C/30 min ~ +80°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.

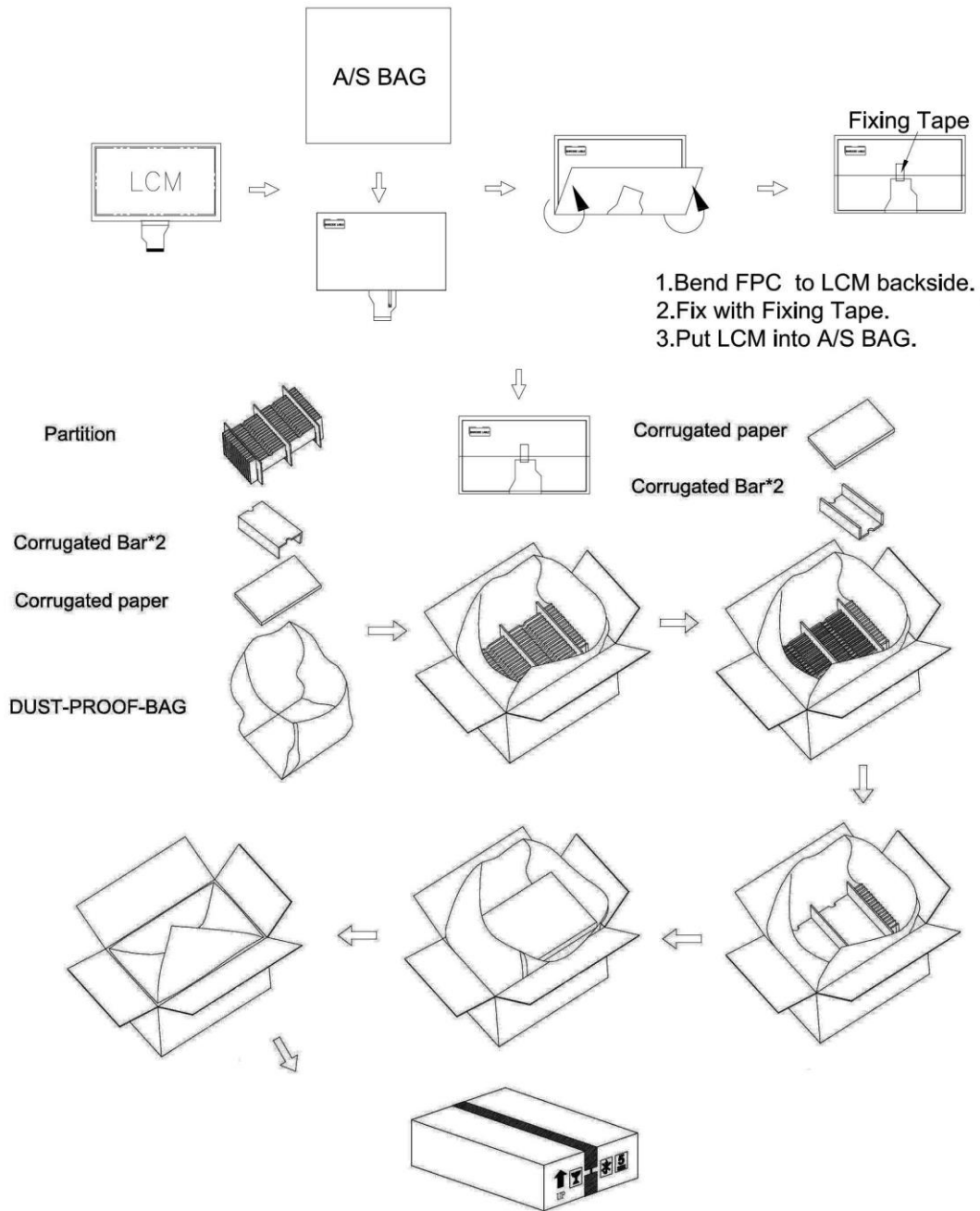
Note 2: Ts is the temperature of panel's surface.

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 don't guarantee all of the cosmetic specification.

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



**14. Packaging**



PARTS LIST					
	ITEM	SIZE(LxWxH) unit:mm	MATERIAL	Q.T.Y	NOTE
1	PARTITION	512.0x349.0x226.0	CORRUGATED PAPER	1	
2	CORRUGATED BAR	349.0x199.0x52.0	CORRUGATED PAPER	4	
3	DUST-PROOF BAG	700.0x530.0	PE	1	
4	A/S BAG	205.0x195.0x0.2	PE	30	
5	CARTON	530.0X355.0X255.0	CORRUGATED PAPER	1	
6	PRODUCT	192.8x116.9x7.95		30	

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## 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.

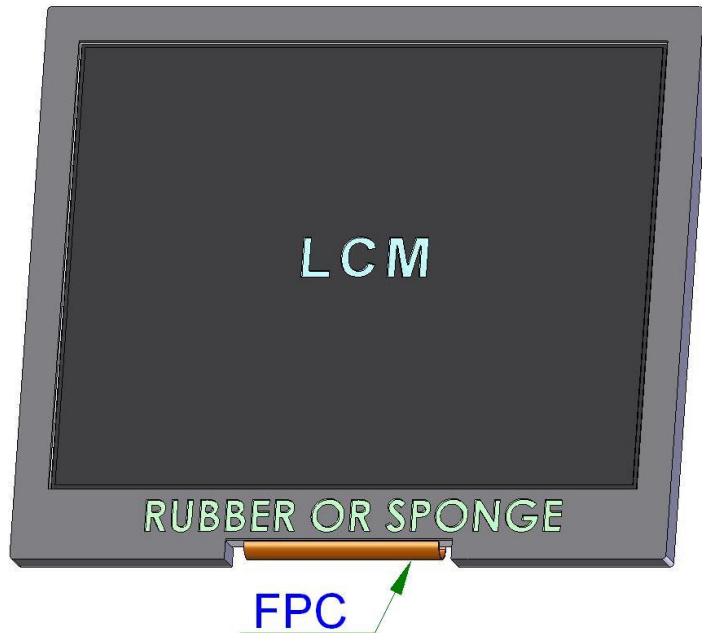
### 15.3 Terms of Warrant

- (1) Acceptance inspection period  
The period is within one month after the arrival of contracted commodity at the buyer's factory site.
- (2) Applicable warrant period  
The period is within twelve months since the date of shipping out under normal using and storage conditions.

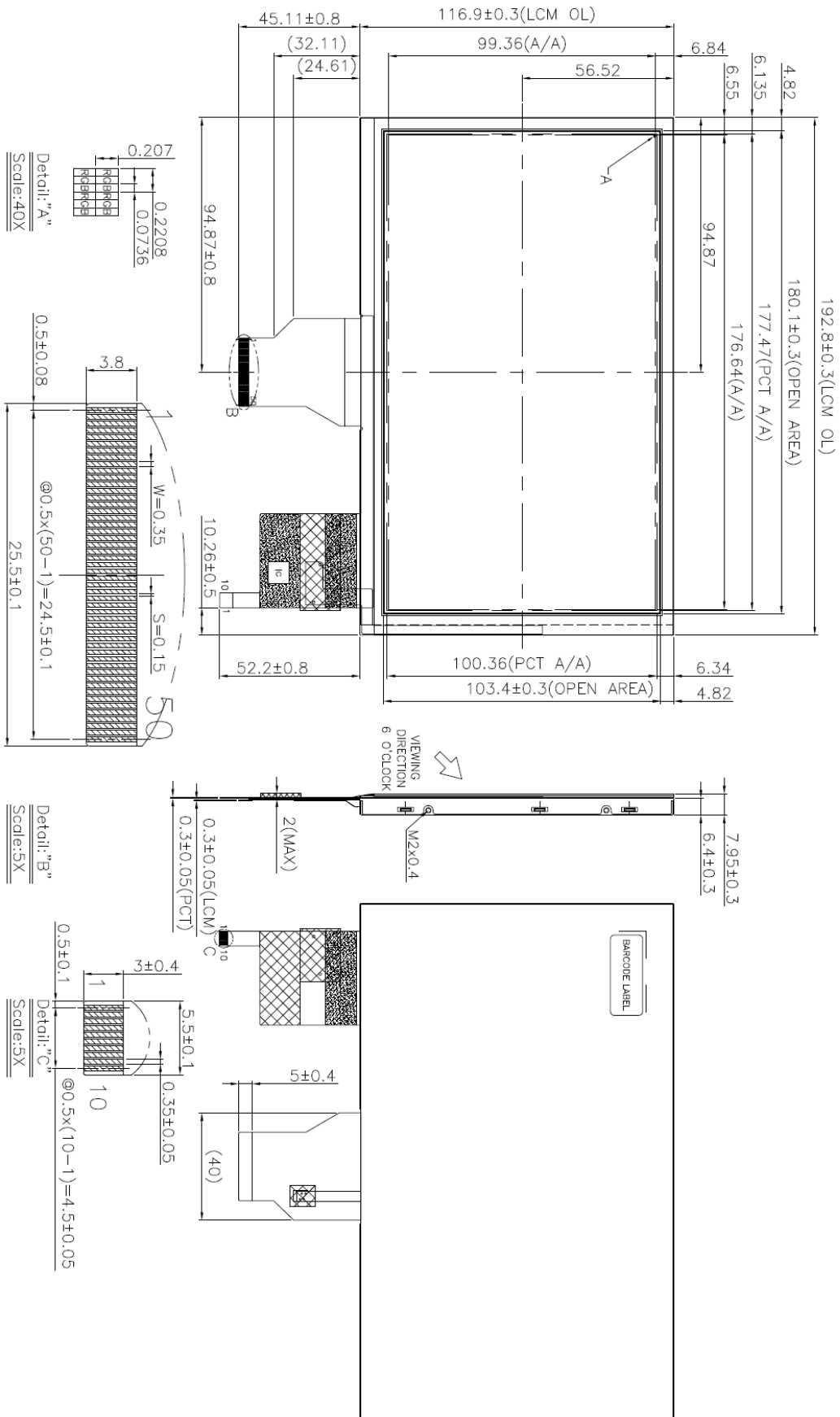
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### 15.4 Cautions for LCM's installing and assembling

Please keep away the FPC while assembling or fixing the LCM to avoid FPC being damaged or extruded or other related problems. Please see below picture.



**16.Outline Drawing**



## 17. Incoming Inspection Standards

### 17.1 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:  $60 \pm 5\%$  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

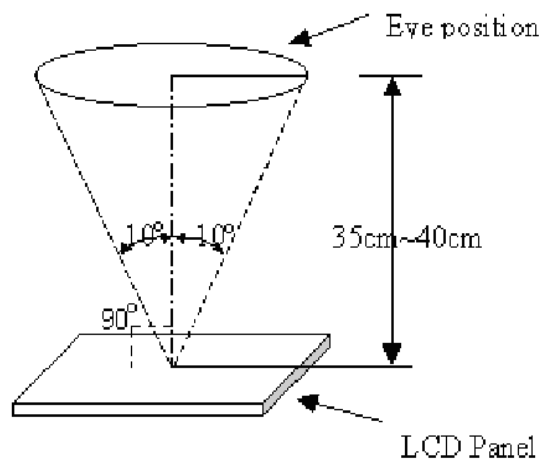


Fig \_ 1

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

- (1) Test method :According to [ANSI/ASQC Z 1.4](#) .General Inspection Level II take a single time
- (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.

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### 17.3 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.			-	
Operating	Point Defect (red,green,blue,dark, white)	Item	Acceptable number			Note: 1、4、 5、6
			A	B	Total	
		BRIGHT DOT	$N \leq 0$	$N \leq 2$	$N \leq 6$	
		DARK DOT	$N \leq 2$	$N \leq 4$		
		TOTAL DOT	$N \leq 2$	$N \leq 4$		
		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:2	
		$L \leq 2.5$	$W \leq 0.1$	3		
		$L > 2.5$	$W > 0.1$	0		
	Dent or bubble on the polarizer	Dimension(mm)		Acceptable number		Note:3
		$D \leq 0.3$		3		
		$D \leq 0.15$		Disregard		
	Line Criteria or Dot Criteria on the polarizer	Inactive dot		Acceptable number		Note:2 、3
		$D \leq 0.2$		Disregard		
		$0.2 \leq D \leq 0.3\text{mm}$		Line & dot number $N \leq 6$		
		$L \leq 1.8\text{mm}, W \leq 0.1\text{mm}$				

**Incoming Inspection Touch Panel**

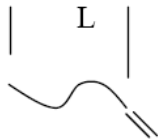
Circular Defects  
Linear Defects  
Scratch  
Air Bubble  
Crack

(1) Circular Defects

$$\phi = (L+W)/2$$

Diameter(mm)	Spec
$\phi \leq 0.2$	No quantity limit
$0.2 < \phi < 0.4$	Max 5 defect
$0.4 \leq \phi$	Reject

(2) Linear Defects



Length	Width	Acceptable
$6.0 \geq L$	$0.06 \geq W$	Accept
$L \geq 6.0$	$W \geq 0.06$	Reject

(3) Scratch

Length	Width	Acceptable
$12.0 \geq L$	$0.06 \geq W$	Accept
$L \geq 12.0$	$W \geq 0.06$	Reject

The Min distance of defects must be above 5.0mm.

(4) Air Bubble

Diameter(mm)	Spec
$\phi \leq 0.2$	No quantity limit
$0.2 < \phi \leq 0.6$	Max 5 defect

The Min distance of defects must be above 5.0mm.

(5) Crack **Reject**

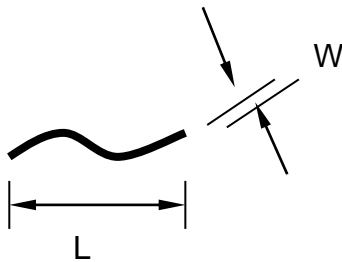


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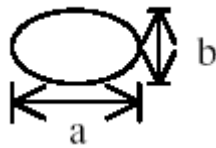
Note1. The definition of dot defect :

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.

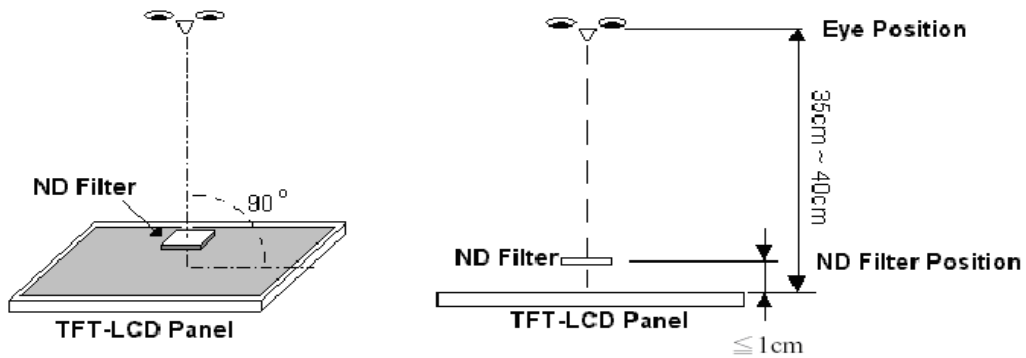
Note2.



Note3. D : Diameter  $D=(a+b)/2$



Note4. Bright dot is defined through 6% transmission ND Filter as following.



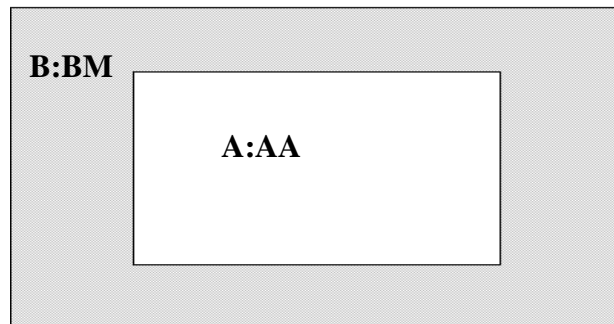
Note5. ADJACENT DOT





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Note6.



#### 17.4 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.