PRODUCT SPECIFICATION

Part Number

PT482743A-TLMWD-EH13

CUSTOMER	
CUSTOMER PART NUMBER	
DESCRIPTION	4.3” TFT LCD, High Brightness
APPROVED BY	
DATE	

1. Table of Contents

2. Record of Revisions

Rev.	Comments	Page	Date
1	Preliminary Specification was first issued.	All	9/27’11
2	Modify 13 Reliability Test	18	11/15’11
3	Modify 14 Packaging	19	7/18’12
4	Modify 6. General Specifications	5	9/17'15
4	Modify 8.2 Backlight Unit	8	9/17’15
4	Add 15.4 Caution	20	9/17'15
4	Modify 17 Definition of Labels	23	9/17’15
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3. Module Numbering System

P T ____ __ __ - _ __ _ _ - _ _ _ _ __ _

1. 2. 3. 4. 5. 6. 7. 8. 9 10. 11. 12. 13. 14.

1. P-TEC TFT

2. LENGTH x WIDTH PIXELS
If third character is a zero, it is removed to shorten part number. Example: 240 x 320 = PT3224

3. DIAGONAL DIMENSIONS
Example: 3.5” display = 35 in part number

4. PRODUCT VERSION
Series assigned by P-tec

5. LCD MODE
T: TN
I: IPS
V: VA

6. POLARIZER
LM: Transmissive
LF: Transflective

7. BACKLIGHT COLOR
No Backlight: Left Blank
W: White
B: Blue/Green
S: Yellow/Green

8. VIEWING DIRECTION
D: 6 o’clock
U: 12 o’clock
F: Full Viewing Angle

9. A ~ Z CODE
Assigned by P-tec

11. TEMPERATURE RANGE
Normal: Left Blank
Wide: X

12. LUMINANCE
Blank: Normal (<300 nit)
M: Middle (>/= 300 nit)
H: High (> 600 nit)

13. TOUCH PANEL OPTION
No TP: Left Blank
C: Capacitive TP
R: Resistive TP

14. SPECIAL CHARACTERS
Customer special requirements

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.

5. Features

- WQVGA (480×272 pixels) resolution.
- 8 bit MCU interface.
- LCD Controller :SSD1963

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 and Hard Coating(3H)	-
Viewing Direction	6 O'clock (The Gray Inversion will appear at this direction)	-
Outline Dimension	105.5(W)×67.2(H)×8.0(D)	mm
Weight	57	g
RoHS Compliance	P-tec certifies this product to be in compliance with European Union Directive 2011/65/EU on the restriction of certain hazardous substances in electrical and electronic equipment.	-

7. Absolute Maximum Ratings

7.1 Absolute Ratings of Environment

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-30	+80	°C	(1)(2)
Operating Temperature	T_{OP}	-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, VSS=0V)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Digital Power Supply Voltage	VCC	-0.5	4.6	V	-

7.2.2 LED Driver Absolute Maximum Ratings

(Ta=25±2°C)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
LED Driver For EN	EN	-	6	V	(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.		
Digital Power Supply Voltage	VCC	3.0	3.3	3.6	V	-
Input High Threshold Voltage	VIH	0.7VCC	-	VCC	V	-
Input Low Threshold Voltage	VIL	0	-	0.3 VCC	V	-
VSYNC Frequency	F_V	-	60	-	Hz	-
Digital Current	ICC	-	250	350	mA	-
Power Consumption	PC	-	0.825	1.155	W	(1)
Pixel Clock	PCLK	-	9.0	15.0	MHz	-

Note (1) The specified power consumption is under the conditions at VCC = 3.3V,
FV=60Hz, DCLK=9.0 MHz, whereas a power dissipation check Pattern below is displayed.

Black Pattern / 0 Gray

Active Area

8.2 LED Driver Unit

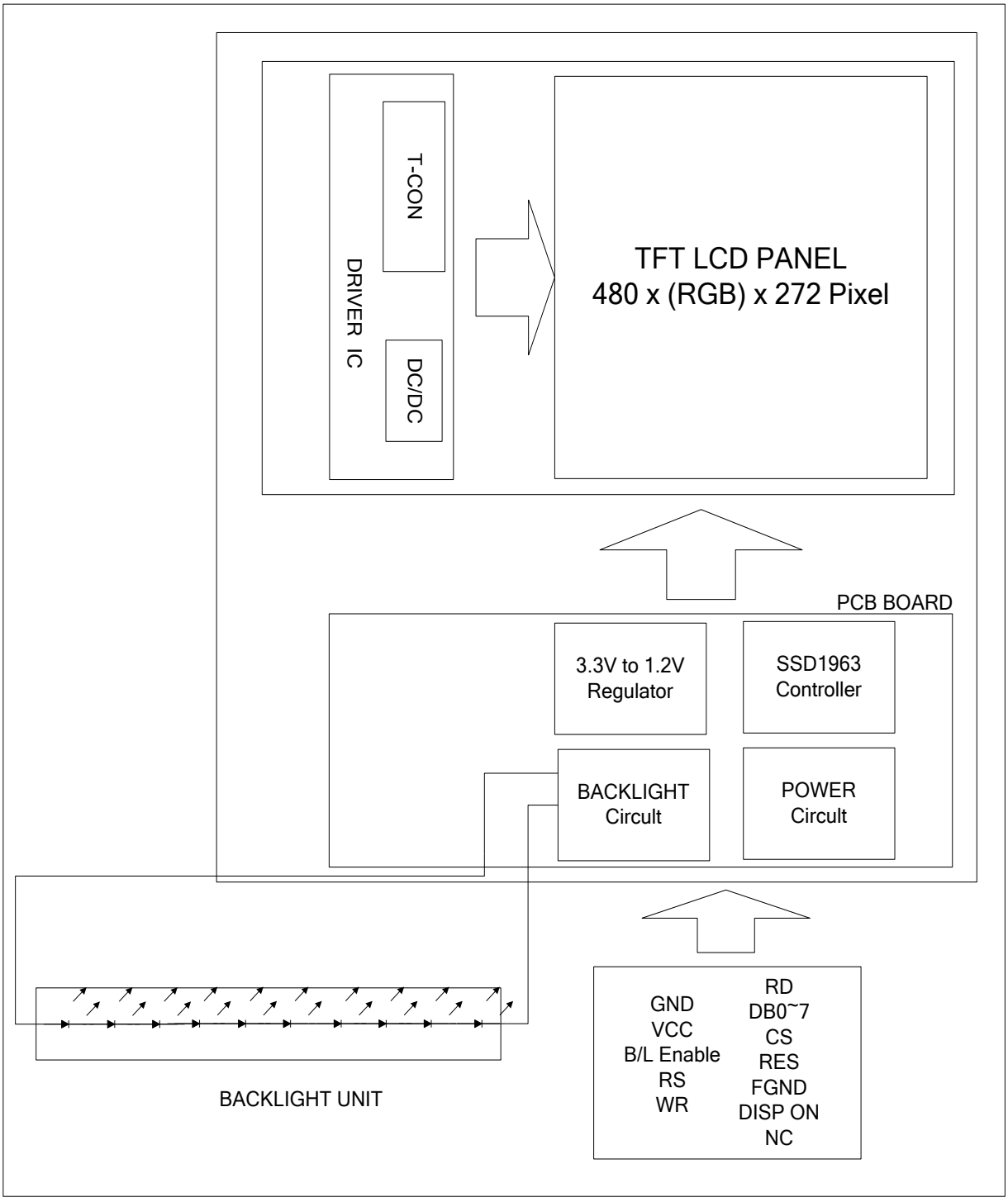
Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
EN Voltage High	VIH	2.0	-	3.6	V	-
EN Voltage Low	VIL	0	-	0.8	V	-
LED Life Time(25℃)	-	50000	60000	-	hr	-

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

(2) The LED life time is defined as the module brightness decrease to 50%, original brightness at Ta=25℃, I_{LED} =20mA.

9. Block Diagram

TFT-LCD Module with Backlight Unit



10. Input / Output Terminals Pin Assignment

10.1 TFT-LCD Module

Recommendation CN:CF25201D0R0-10

Pin No.	Symbol	Description
1	GND	Ground
2	VCC	POWER SUPPLY(+3.3V)
3	B/L ENABLE	Backlight control
4	RS	Data/Command select
5	WR	8080 mode: WR# (write strobe signal)
6	RD	8080 mode: RD# (read strobe signal)
7	DB0	Data bus
8	DB1	Data bus
9	DB2	Data bus
10	DB3	Data bus
11	DB4	Data bus
12	DB5	Data bus
13	DB6	Data bus
14	DB7	Data bus
15	CS	Chip select
16	RES	RESET
17	NC	NC
18	FGND	Ground
19	DISP ON	Display ON/OFF Signal
20	NC	NC

10.2 Pixel Data Format

8080 support 8-bit. Depending on the width of the data bus, the display data are packed into the data bus in different ways

Table: Pixel Data Format

Interface Cycle

Interface	Cycle	D[23]	D[22]	D[21]	D[20]	D[19]	D[18]	D[17]	D[16]	D[15]	D[14]	D[13]	D[12]	D[11]	D[10]	D[9]	D[8]	D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]
8 bits	1st																	R7	R6	R5	R4	R3	R2	R1	R0
	2nd																	G7	G6	G5	G4	G3	G2	G1	G0
	3rd																	B7	B6	B5	B4	B3	B2	B1	B0

11. Interface Timing

11.1 Timing Requirement

Clock Timing

Table 11-1 :Clock Input Requirements for CLK (PLL-bypass)

Symbol	Parameter	Min	Max	Units
F_{CLK}	Input Clock Frequency (CLK)		110	MHz
T_{CLK}	Input Clock period (CLK)	$1/f_{CLK}$		ns

Table 11-2 : Clock Input Requirements for CLK

Symbol	Parameter	Min	Max	Units
F_{CLK}	Input Clock Frequency (CLK)	2.5	50	MHz
T_{CLK}	Input Clock period (CLK)	$1/f_{CLK}$		ns

Table 11-3 : Clock Input Requirements for crystal oscillator XTAL

Symbol	Parameter	Min	Max	Units
F_{XTAL}	Input Clock Frequency	2.5	10	MHz
T_{XTAL}	Input Clock period	$1/f_{XTAL}$		ns

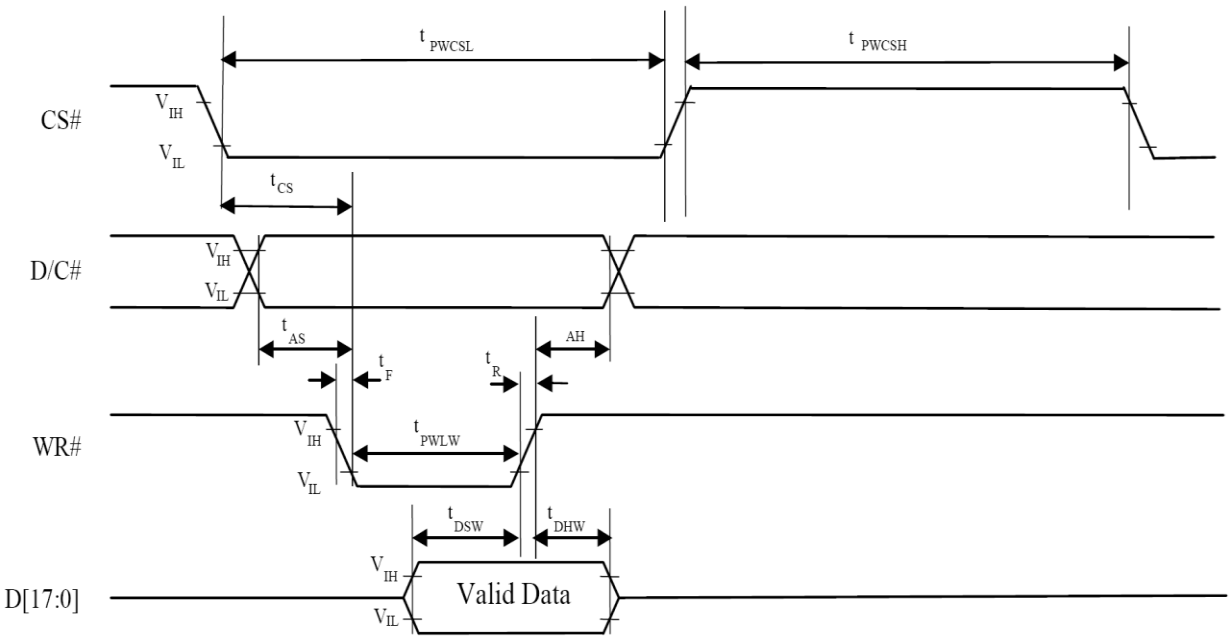
Parallel 8080-series Interface Timing

Table : Parallel 8080-series Interface Timing Characteristics

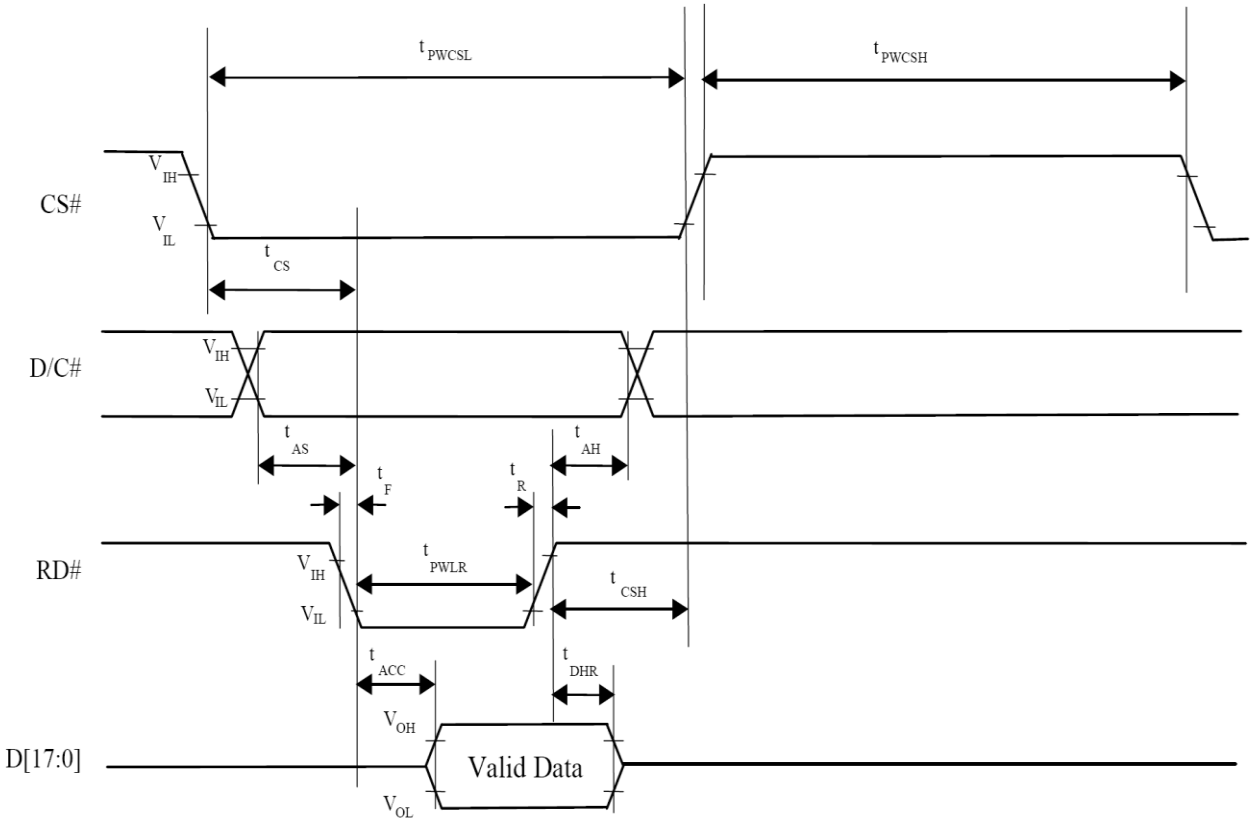
Symbol	Parameter		Min	Typ	Max	Unit
f_{MCLK}	System Clock Frequency*		1	-	110	MHz
t_{MCLK}	System Clock Period*		$1/f_{MCLK}$	-	-	ns
t_{PWCSL}	Control Pulse High Width	Write	13	$1.5* t_{MCLK}$	-	ns
		Read	30	$3.5* t_{MCLK}$		
t_{PWCSH}	Control Pulse Low Width	Write (next write cycle)	13	$1.5* t_{MCLK}$	-	ns
		Write (next read cycle)	80	$9* t_{MCLK}$		
		Read	80	$9* t_{MCLK}$		
t_{AS}	Address Setup Time		1	-	-	ns
t_{AH}	Address Hold Time		2	-	-	ns
t_{DSW}	Write Data Setup Time		4	-	-	ns
t_{DHW}	Write Data Hold Time		1	-	-	ns
t_{PWLW}	Write Low Time		12	-	-	ns
t_{DHR}	Read Data Hold Time		1	-	-	ns
t_{ACC}	Access Time		32	-	-	ns
t_{PWLR}	Read Low Time		36	-	-	ns
t_R	Rise Time		-	-	0.5	ns
t_F	Fall Time		-	-	0.5	ns
t_{CS}	Chip select setup time		2	-	-	ns
t_{CSH}	Chip select hold time to read signal		3	-	-	ns

* System Clock denotes external input clock (PLL-bypass) or internal generated clock (PLL-enabled)

Parallel 8080-series Interface Timing Diagram (Write Cycle)


CS#
D/C#
WR#
D[17:0]
t PWCSL
t PWCSH
V IH
V IL
t CS
t AS
t F
t R
AH
t PWLW
t DSW
t DHW
Valid Data

Parallel 8080-series Interface Timing Diagram (Read Cycle)

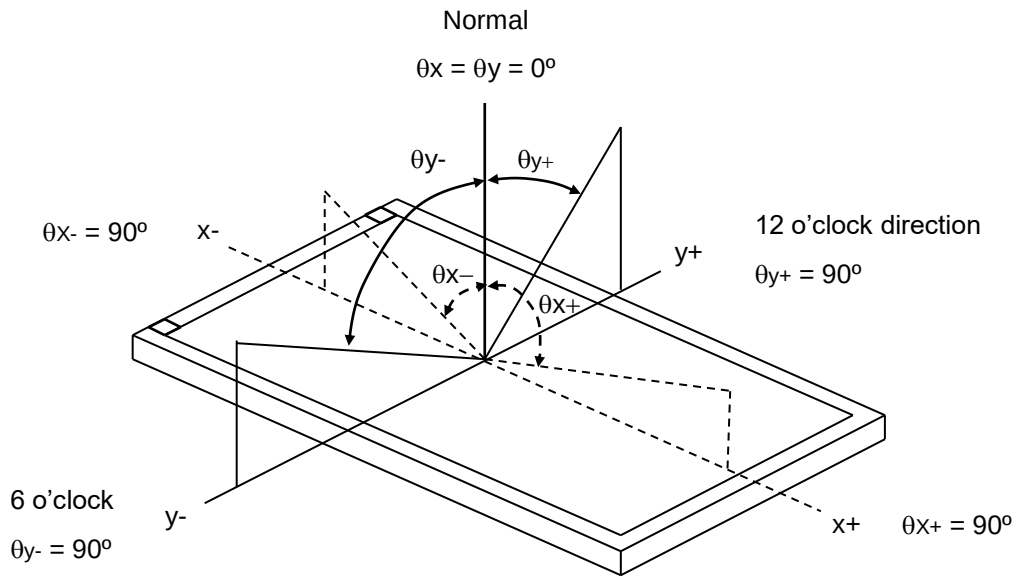


12. Optical Characteristics

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

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	θ_X=0°, θ_Y =0° Viewing Normal Angle	300	(450)	-	-	(2),(5)
Response Time		T_{R+} T_F		-	20	-	ms	(3)
Luminance (Center)		LC		500	(650)	-	cd/m^2	(4),(5)
Brightness uniformity		B_{UNI}		70	(75)	-	%	(5),(6)
Color Chromaticity	Red	Rx		0.570	0.620	0.670	-	(1),(5)
		Ry		0.290	0.340	0.390	-	
	Green	Gx		0.290	0.340	0.390	-	
		Gy		0.510	0.560	0.610	-	
	Blue	Bx		0.090	0.140	0.190	-	
		By		0.050	0.100	0.150	-	
	White	Wx		0.260	0.310	0.360	-	
		Wy		0.270	0.320	0.370	-	
Viewing Angle	Horizontal	θ_X+	CR≥10	55	(65)	-	deg.	
		θ_X-		55	(65)	-		
	Vertical	θ_Y+		40	(50)	-		
		θ_Y-		50	(60)	-		

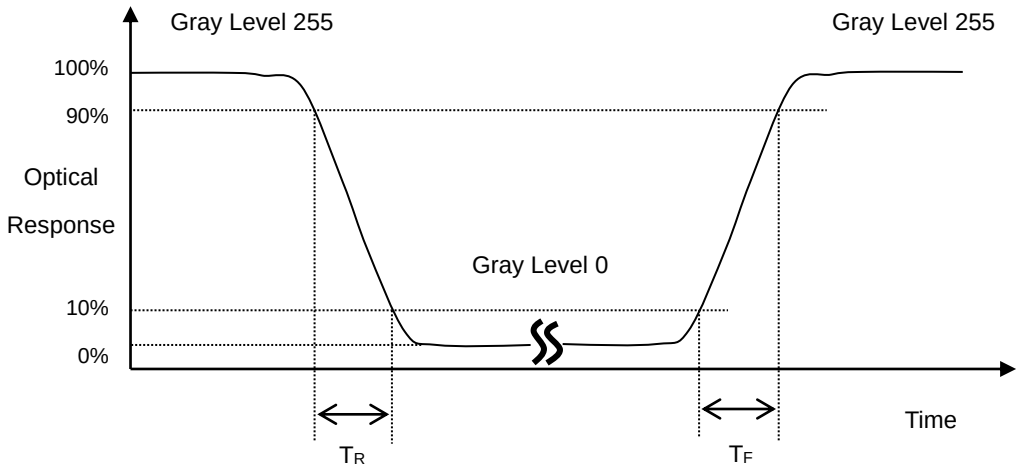
Note (1) Definition of Viewing Angle (θx, θy):



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

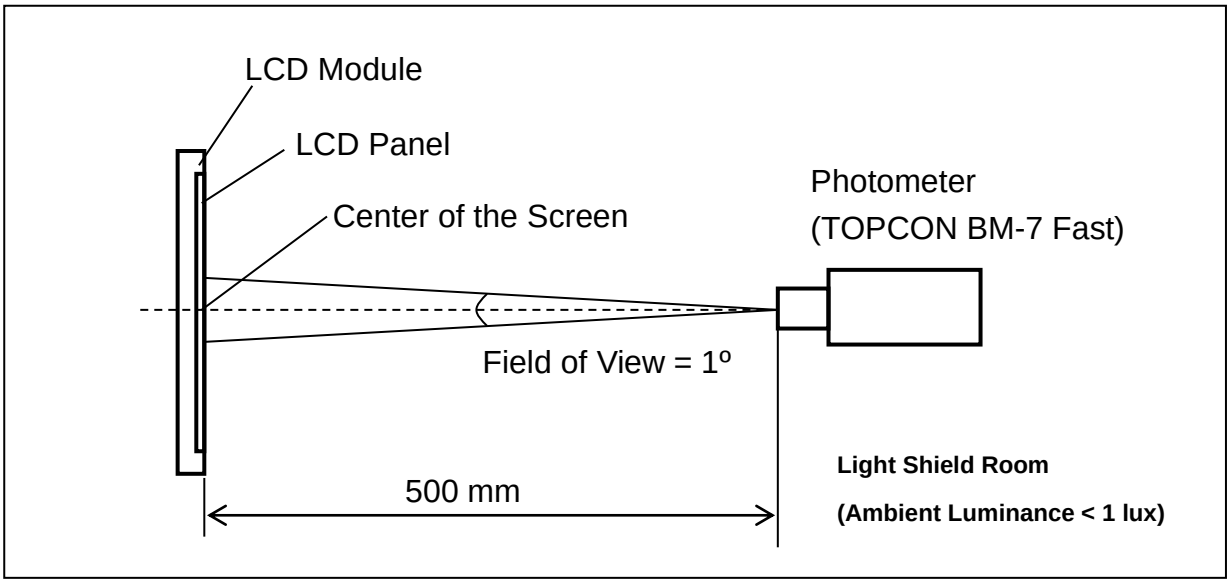
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

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



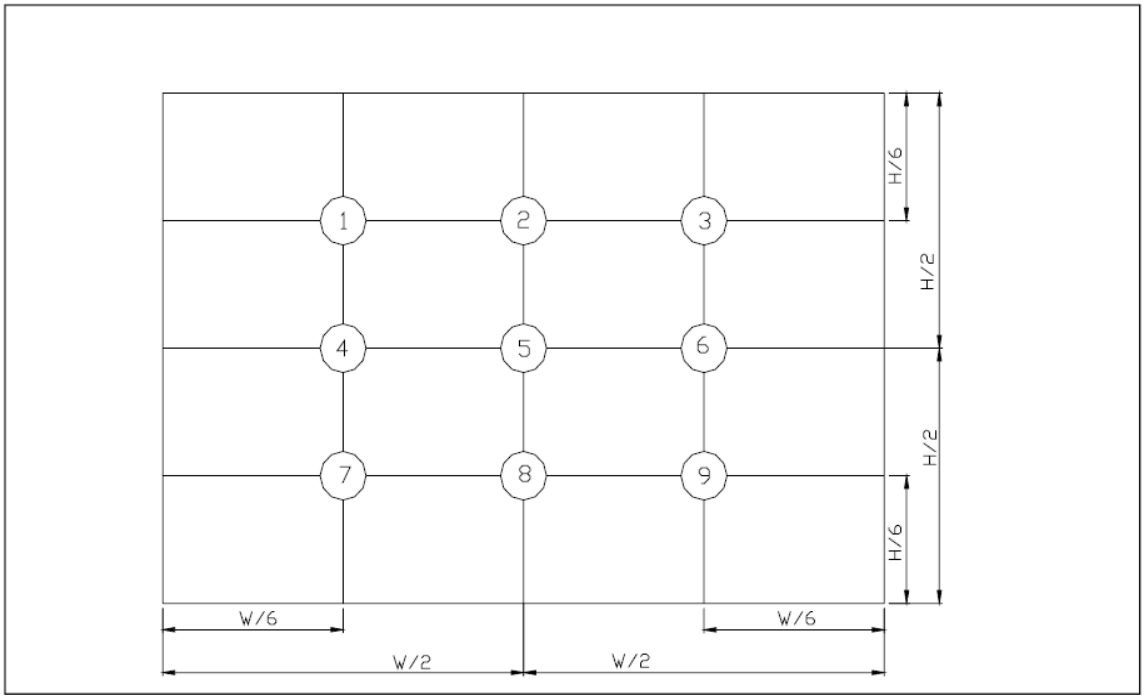
Note (4) Measurement Set-Up:

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 dark room or equivalent condition.



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_a= 80℃ 240 hours	(1),(3),(4)
2	Low Temperature Storage Test	T_a= -30℃ 240 hours	(1),(3),(4)
3	High Temperature Operation Test	T_S= 70℃ 240 hours	(2),(3),(4)
4	Low Temperature Operation Test	T_a= -20℃ 240 hours	(1),(3),(4)
5	High Temperature and High Humidity Operation Test	T_a=60℃ 90%RH 240 hours	(3),(4)
6	Electro Static Discharge Test (non-operating)	-Panel Surface/Top Case : 150pF, 330Ω Air: ±15kV, Contact: ±8kV	(3)
7	Mechanical Shock Test (non-operating)	Half sine wave, 100G, 6ms 3 times shock of each six surfaces	(3)
8	Vibration Test (non-operating)	Sine wave, 10 ~ 55 ~ 10Hz, 3 axis, 2 hours/axis	(3)
9	Thermal Shock Test (non-operating)	-20℃(30min) ~ 70℃(30min),100 cycles	(3),(4)
10	Drop Test(with Carton)	Height: 80cm 1 corner, 3 edges, 6 surfaces	(3)

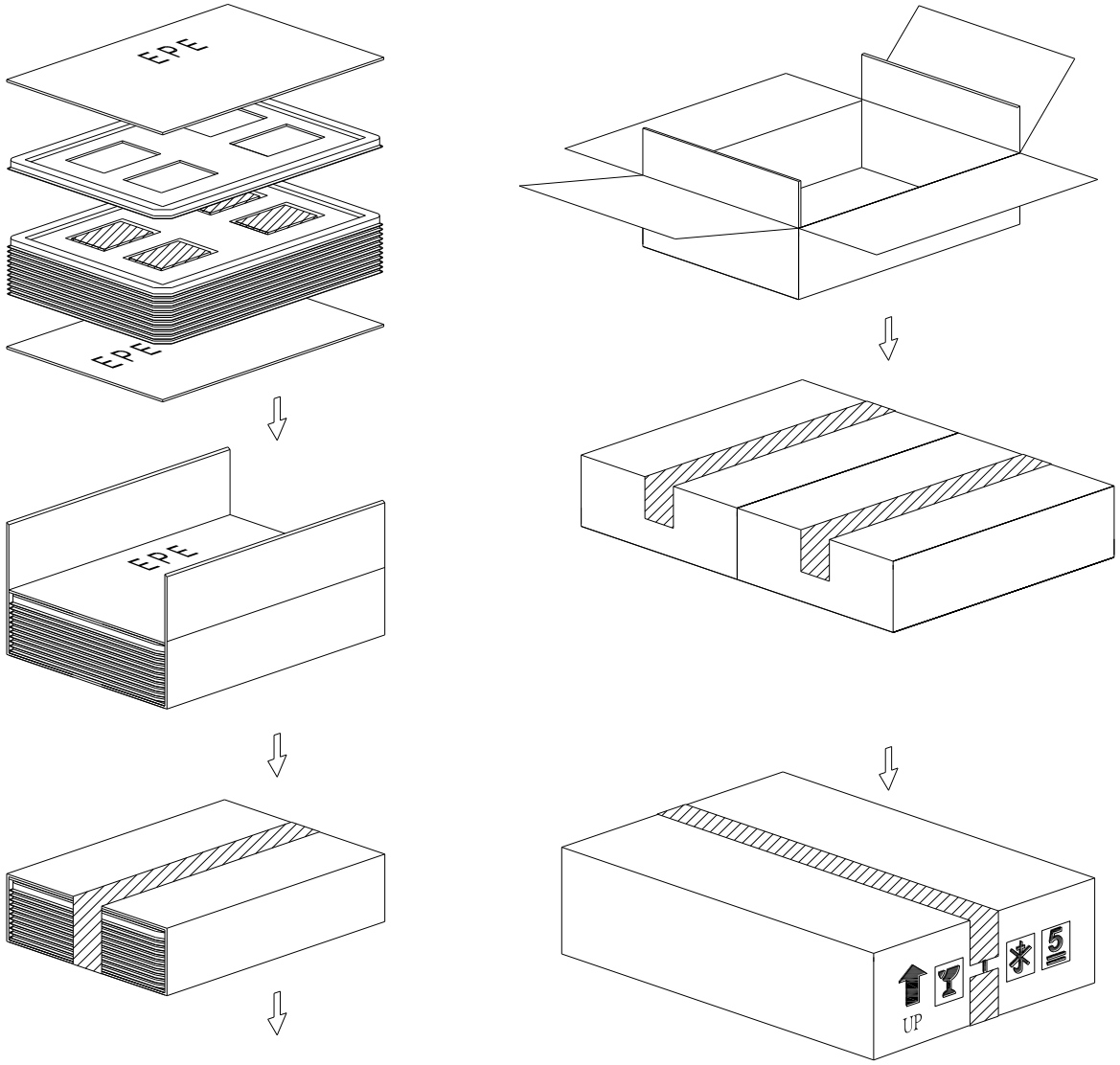
Note 1: Ta is the ambient temperature of samples.

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 specifiction.

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(LxW xH) unit:mm	MATERIAL	Q.T.Y	NOTE
1	TRAY	372.0x262.0x18.3	PS	20	
2	CARD BOARD(P1)	945.0x275.0x3.5	CARTON	2	
3	CARD BOARD(P2)	816.0x375.0x3.5	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	105.5x67.2x8		72	

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 10ºC, 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.

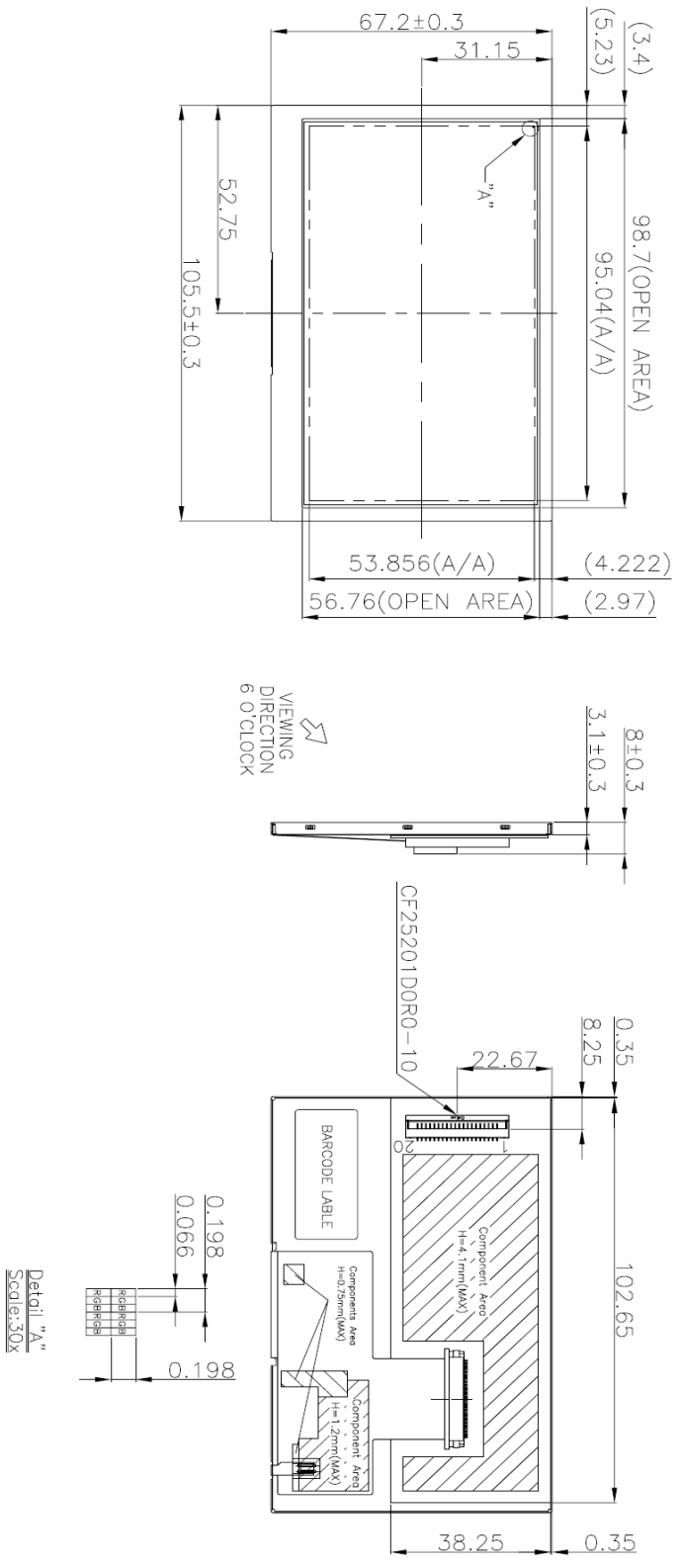
(2) Applicable warrant period

The period is within twelve months since the date of shipping out under normal using and storage conditions.

15.4 Caution

This P-tec LCD module has been specifically designed for use only in electronic devices in the areas of audio control, office automation,industrial control, home appliances, etc. The modules should not be used in applications where module failure could result in physical harm or loss of life, and P-tec expressly disclaims any and all liability relating in any way to the use of the module in such applications.

16.Outline Drawing



17.Definition of Labels

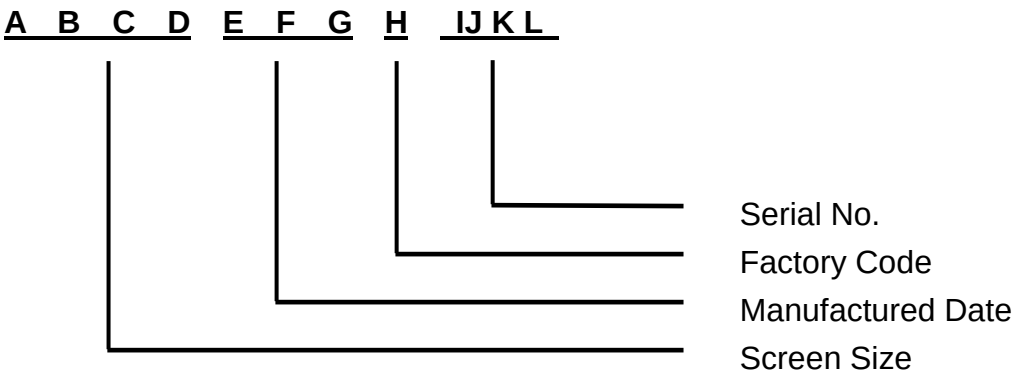
The bar code nameplate is pasted on each module as illustration, and its definitions are as following explanation.

PT482743A-TLMWD-EH13

ABCDEFGHIJKL

（a）Module Name：PT482743A-TLMWD-EH13

（b）Serial ID：



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
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Mark	A	B	C	D	E	F	G	H	I	J

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 P-TEC internal use.

（d） Serial No. （IJKL）:

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 ± 5℃

(2) Humidity: 45 ~ 65 % RH

(3) Viewing distance is approximately 30 ~ 40 cm

(4)Viewing angle is normal to the LCD panel as Fig _1 (± 45°)

(5) Ambient Illumination: 300 ~ 500 Lux for external appearance inspection

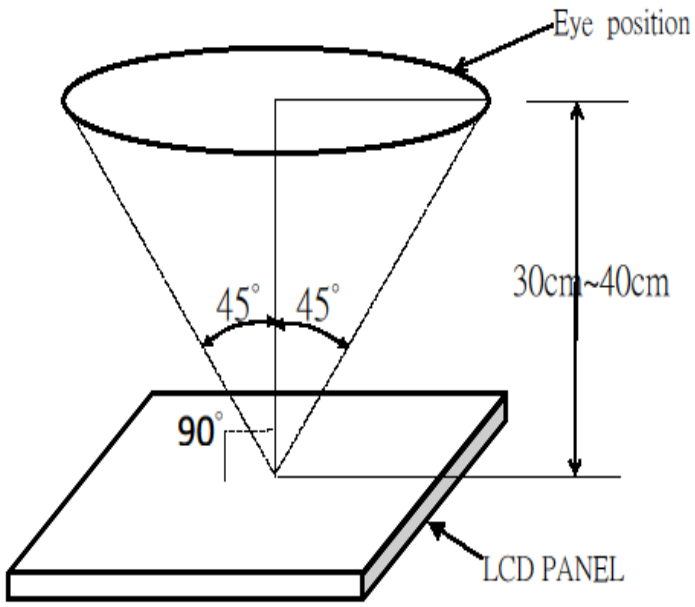


Fig_1

18.2 The defects classify of AQL as following:

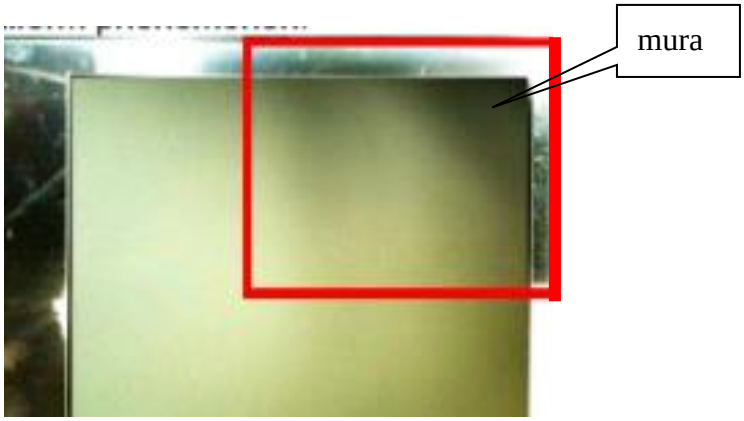
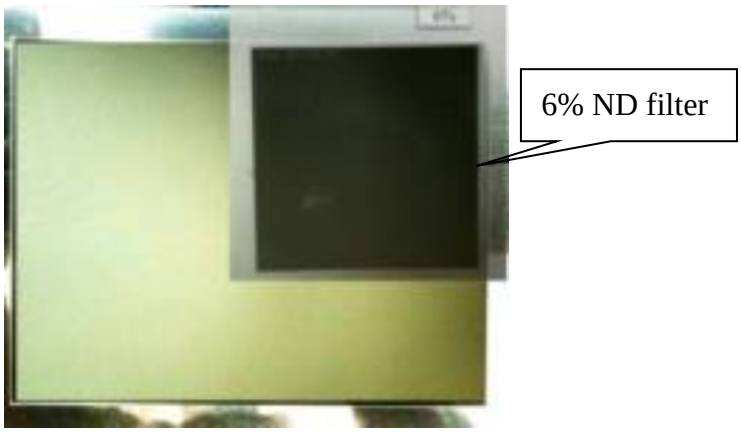
(1) Test method :According to ANSI/ASQC Z 1.4 .General Inspection Level Ⅱ take a single time

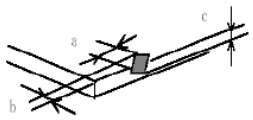
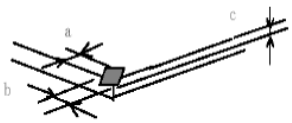
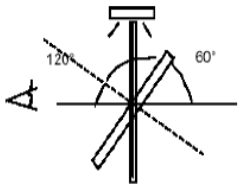
(2) The defects classify of AQL as following:

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.

18.3 Inspection Parameters

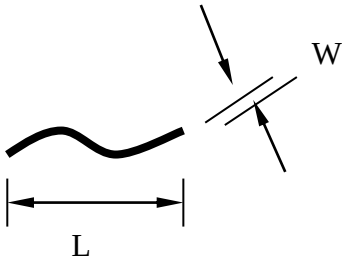
<table>
<tr><th colspan="2">Item</th><th>Specification/Description</th><th>Note</th></tr>
<tr><td rowspan="2">Display</td><td rowspan="2">Function</td><td>No Display</td><td>-</td></tr>
<tr><td>Malfunction</td><td>-</td></tr>
<tr><td rowspan="5">Operating</td><td>Contrast ratio</td><td>Out of Spec</td><td>-</td></tr>
<tr><td>Line defect</td><td>No obvious Vertical and Horizontal line defect in bright , dark and colored.</td><td>-</td></tr>
<tr><td rowspan="5">Point Defect
(red ,green ,blue ,dark ,white)</td><td colspan="3"><table>
<tr><th rowspan="2">Item</th><th colspan="3">Acceptable number</th></tr>
<tr><th>A</th><th>B</th><th>Total</th></tr>
<tr><td>BRIGHT DOT</td><td>N≦2</td><td>N≦2</td><td rowspan="3">N≦7</td></tr>
<tr><td>DARK DOT</td><td>N≦3</td><td>N≦4</td></tr>
<tr><td>TOTAL DOT</td><td>N≦4</td><td>N≦5</td></tr>
<tr><td>TWO ADJACENT DOT</td><td colspan="3">NOT ALLOWED</td></tr>
<tr><td>THREE OR MORE ADJACENT DOT</td><td colspan="3">NOT ALLOWED</td></tr>
</table></td><td>Note:
1、 4、
5、6</td></tr>
<tr><td rowspan="4">External Inspection
(non-operating or operating)</td><td>Scratch
(in display area)</td><td><table>
<tr><th>L(mm)</th><th>W(mm)</th><th>Acceptable number</th></tr>
<tr><td>L≦2.5</td><td>W≦0.1</td><td>4</td></tr>
<tr><td>L＞2.5</td><td>W＞0.1</td><td>0</td></tr>
</table></td><td>Note:2</td></tr>
<tr><td>Polarizer dent or bubble
(in display area)</td><td><table>
<tr><th>Dimension(mm)</th><th>Acceptable number</th></tr>
<tr><td>D≦0.25</td><td>Disregard</td></tr>
<tr><td>D≦0.5</td><td>4</td></tr>
</table></td><td>Note:3</td></tr>
<tr><td>Line Shape
(Particles and Lint in display area)</td><td><table>
<tr><th>L(mm)</th><th>W(mm)</th><th>Acceptable number</th></tr>
<tr><td>-</td><td>W≦0.07</td><td>Disregard</td></tr>
<tr><td>L≦5</td><td>W≦0.1</td><td>4</td></tr>
<tr><td>L≧5</td><td>W≧0.1</td><td>0</td></tr>
</table></td><td>Note:2</td></tr>
<tr><td>Dot Shape
(Particle in Display area)</td><td><table>
<tr><th>Dimension(mm)</th><th>Acceptable number</th></tr>
<tr><td>D≦0.25</td><td>Disregard</td></tr>
<tr><td>D≦0.5</td><td>4</td></tr>
</table></td><td>Note:3</td></tr>
</table>

Item		Specification/Description	Note
External Inspection (non-operating or operating)	mura	Has the non-uniform phenomenon 	
		Weak defect will be defined as mura if it can be observed through ND filter 6% 	

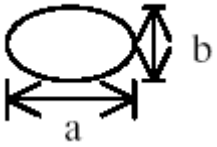
Item		Specification/Description			Note
Touch Panel	Scratch	L(mm)	W(mm)	Acceptable number	Note:2
		L≦10	W＜0.05	Disregard	
			0.05≦W＜0.1	N≦4	
			W≧0.1	0	
	Foreign Materials (Linear shape)	L≦10	W＜0.05	Disregard	Note:2
			0.05≦W＜0.1	N≦3	
			W≧0.1	0	
	Foreign Materials (Circular shape)	Dimension(mm)		Acceptable number	Note:3
		D≦0.25		Disregard	
		0.25＜D≦0.5		N≦6	
		D＞0.5		0	
	Glass chipping			a≦5mm b≦3mm c≦t (t：Glass think)	Note:7
				a≦3mm b≦3mm c≦t (t：Glass think)	Note:7
	Newton-ring	(In case of doubtful situations) Observe on 60° from the product surface under a while Fluorescent lamp(3-wavelength lamp). 		Average diameter ≦1/3 Touch Panel area Disregard.	Note:7
	Membrane Drum			H≦0.35mm	

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.

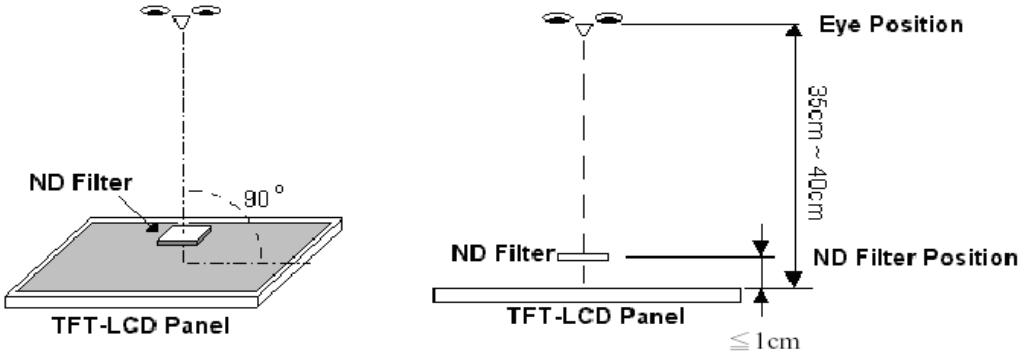
Note2.



Note3. D：Diameter D=(a+b)/2

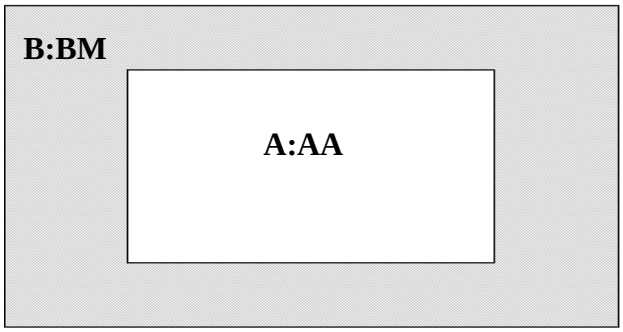


Note4. Bright dot is defined through 6% transmission ND Filter as following.

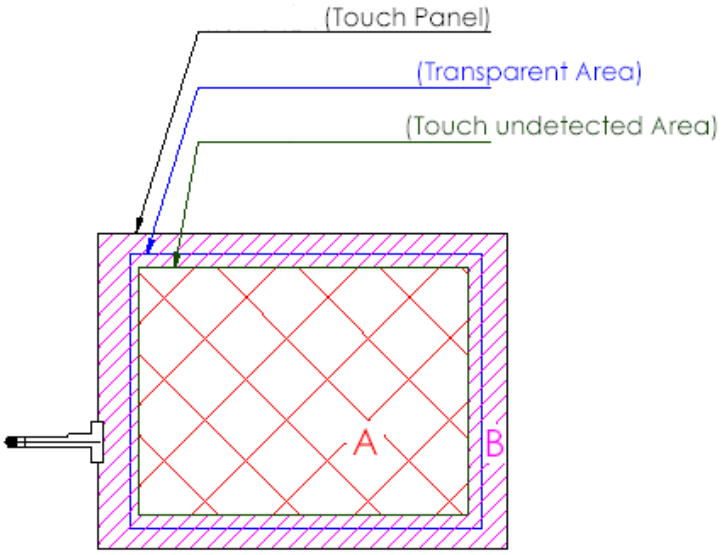


Note5. ADJACENT DOT

Note6.



Note7.



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.