



PRODUCT SPECIFICATION

Part Number

PT322457F-TLMWU-EH26

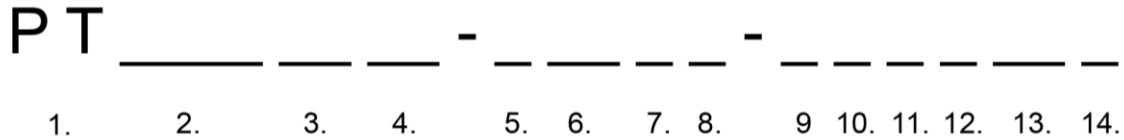
CUSTOMER	
CUSTOMER PART NUMBER	
DESCRIPTION	5.7" TFT LCD, High Brightness
APPROVED BY	
DATE	

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3. Module Numbering System



1. P-TEC TFT

8. VIEWING DIRECTION

D: 6 o'clock
U: 12 o'clock
F: Full Viewing Angle

2. LENGTH x WIDTH PIXELS

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

9. A ~ Z CODE

Assigned by P-tec

3. DIAGONAL DIMENSIONS

Example: 3.5" display = 35 in part number

11. TEMPERATURE RANGE

Normal: Left Blank
Wide: X

4. PRODUCT VERSION

Series assigned by P-tec

12. LUMINANCE

Blank: Normal (<300 nit)
M: Middle (>= 300 nit)
H: High (> 600 nit)

5. LCD MODE

T: TN
I: IPS
V: VA

13. TOUCH PANEL OPTION

No TP: Left Blank
C: Capacitive TP
R: Resistive TP

6. POLARIZER

LM: Transmissive
LF: Transflective

14. SPECIAL CHARACTERS

Customer special requirements

7. BACKLIGHT COLOR

No Backlight: Left Blank
W: White
B: Blue/Green
S: Yellow/Green



4. Application

This specification is applied to the 5.7 inch QVGA supported TFT-LCD module, and can display true 262,144 colors(6 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 a 5.7”TFT-LCD panel, a driver circuit and LED backlight unit.

5. Features

- QVGA (320x240 pixels) resolution.
- Digital 18 bit parallel RGB.
- Line inversion mode with stripe type.
- SYNC mode is supported for digital RGB input data format.
- LED driver circuit is built in this module to provide PWM Dimmer function.

6. General Specifications

Item	Specifications	Unit
Screen Size	5.7 (Diagonal)	inch
Display Format	320RGB(H)x240(V)	dot
Active Area	115.2(H)x86.4(V)	mm
Dot Size	0.120(H)x0.360(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	12 O'clock (The Gray Inversion will appear at this direction)	-
Outline Dimension	144.0(W)x104.6(H)x13.0(D)	mm
Weight	(153)	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 Ambient 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, GND=V_{SS}=0V)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Digital Power Supply Voltage	V _{CC}	-0.3	4.3	V	-

7.2.2 LED Driver Absolute Maximum Ratings

(Ta=25±2°C)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
LED Driver Supply Voltage	V _{LED}	-0.3	17	V	(1)
LED Driver PWM	PWM	-0.3	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

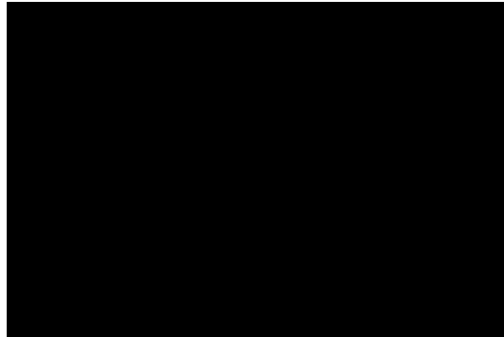
8.1 TFT-LCD Module

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V _{CC}	3.0	3.3	3.6	V	-
Input High Threshold Voltage	V _{IH}	0.7V _{CC}	-	V _{CC}	V	-
Input Low Threshold Voltage	V _{IL}	0	-	0.3V _{CC}	V	-
Power Supply Current	I _{CC}	-	27.0	37.8	mA	(1)
Power Consumption	P _L		0.089	0.125	W	(1)
Frame Frequency	F _V	-	60	-	Hz	-
Dot Clock	CLK	-	6.4	7	MHz	-

Note (1) The specified power consumption is under the conditions at V_{CC}=3.3V, F_V=60Hz, whereas a power dissipation check pattern below is displayed.

Black Pattern / 0 Gray



Active Area

**8.2 LED Driver Unit**

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Voltage of LED Driver Unit	V _{LED(DU)}	4.5	5	12.5	V	-
Voltage of LED Driver Unit	V _{LED(DU)}	4.5	12	12.5	V	-
Current of LED Driver Unit	I _{LED(DU)}	-	500	700	mA	I _{LED} =200mA, V _{LED} =5V
Current of LED Driver Unit	I _{LED(DU)}	-	370	518	mA	I _{LED} =150mA, V _{LED} =5V
Current of LED Driver Unit	I _{LED(DU)}	-	260	364	mA	I _{LED} =100mA, V _{LED} =5V
Current of LED Driver Unit	I _{LED(DU)}	-	230	322	mA	I _{LED} =200mA, V _{LED} =12V
Current of LED Driver Unit	I _{LED(DU)}	-	170	238	mA	I _{LED} =150mA, V _{LED} =12V
Current of LED Driver Unit	I _{LED(DU)}	-	110	154	mA	I _{LED} =100mA, V _{LED} =12V
Dimmer signal Low voltage	VPWML	-	-	0.2	V	-
Dimmer signal High voltage	VPWMH	4	5.0	5.5	V	-
Dimmer frequency	fPWM	-	120	-	Hz	-
PWM Pulse width	TPWMH	10			us	-
LED Life Time(25°C)	-	40000	50000	-	hr	(1)(2)

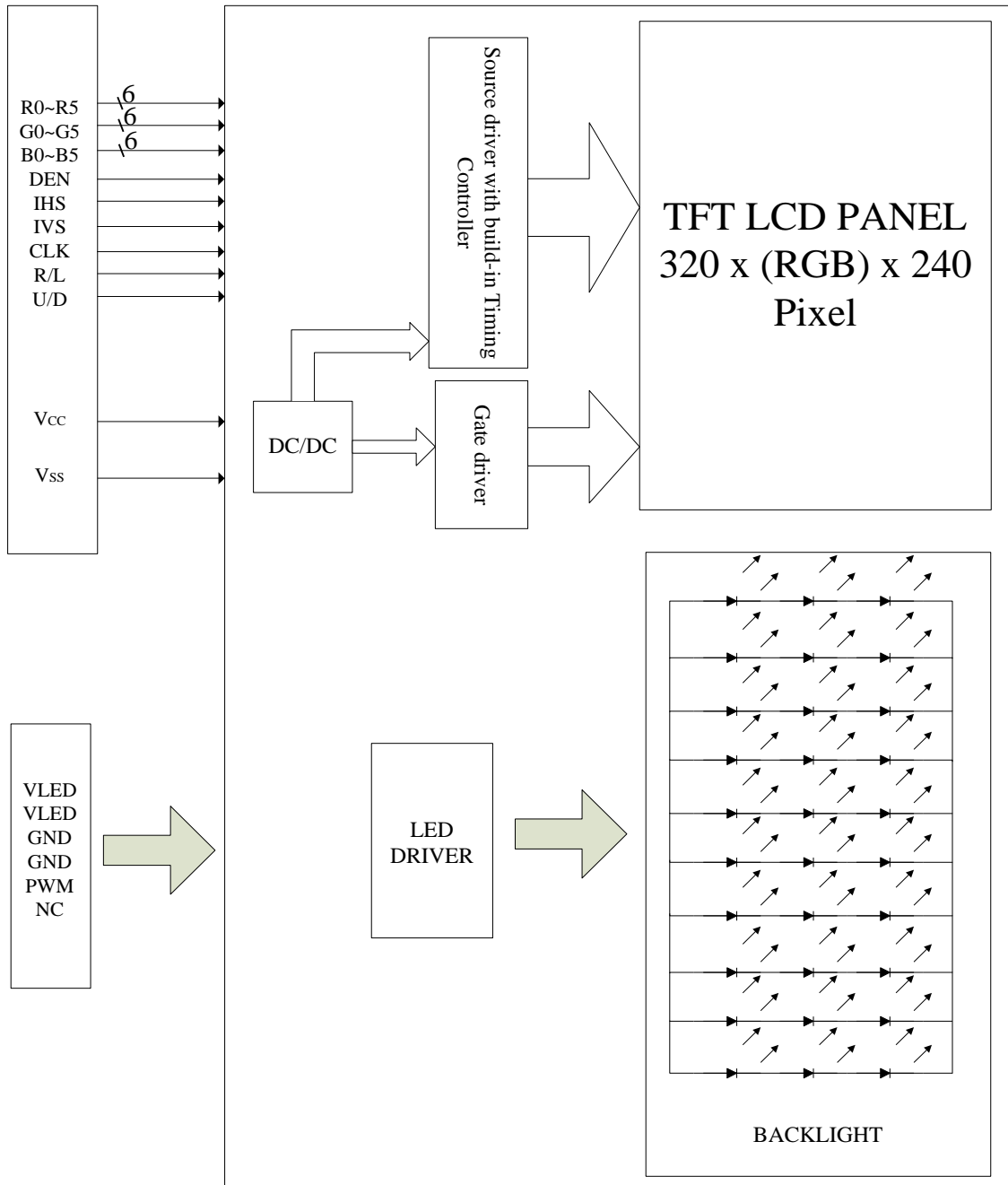
PWM=High:ON, PWM=Low:OFF

Note (1) : LED life time is defined as under 25±2°C , when the average brightness decrease to 50% of original brightness

Note (2) : Lifetime statement is concerning to the max backlight current of 200mA.



9. Block Diagram





10. Input / Output Terminals Pin Assignment

10.1 TFT-LCD Module

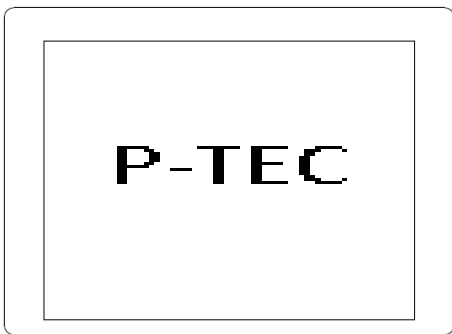
Connector: CVILUX CF25331D0R0-05

Pin No.	Symbol	I/O	Description
1	Vss	I	Ground
2	CLK	I	Clock signal
3	IHS	I	Horizontal synchronous signal
4	IVS	I	Vertical synchronous signal
5	Vss	I	Ground
6	R0	I	RED data (LSB)
7	R1	I	RED data
8	R2	I	RED data
9	R3	I	RED data
10	R4	I	RED data
11	R5	I	RED data(MSB)
12	Vss	I	Ground
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(MSB)
19	Vss	I	Ground
20	B0	I	Blue data(LSB)
21	B1	I	Blue data
22	B2	I	Blue data
23	B3	I	Blue data
24	B4	I	Blue data
25	B5	I	Blue data(MSB)
26	Vss	I	Ground
27	DEN	I	Input data enable control
28	Vcc	I	+3.3V power supply
29	Vcc	I	+3.3V power supply
30	R/L	I	Right-and-Left scan setting. ("L" : Normally , "H" : Right-and-Left reversal) .Note(1)

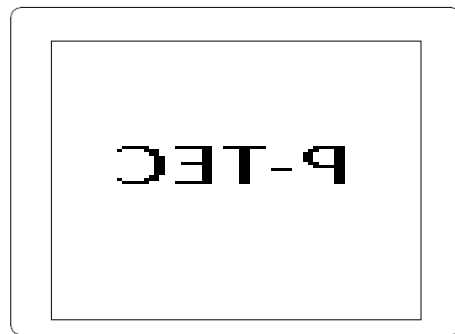


Pin No.	Symbol	I/O	Description
31	U/D	I	Up/down scan setting. ("H": normal scan. "L": Up-and-Down reversal.) Note(1)
32	NC	I	No connection
33	Vss	I	Ground

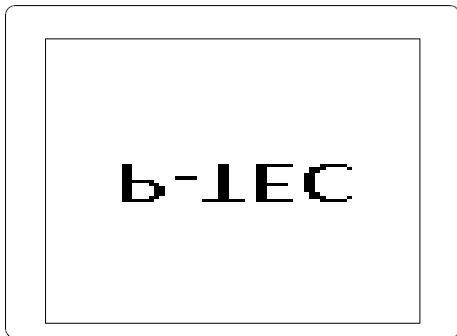
Note (1)



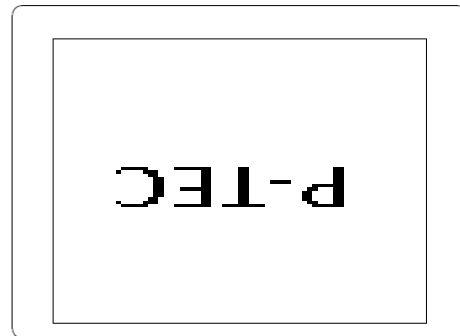
R/L=L, U/D=H



R/L=H, U/D=H



R/L=L, U/D=L



R/L=H, U/D=L



10.2 Backlight Unit

Employed Connector : CVILUX CI1106M1HR0-LF

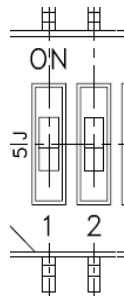
Adapted connector : CVILUX CI1106S

JST SHR-06V-S

JST SHR-06V-S-B

Pin No.	Symbol	Description
1	VLED	LED drive circuit power supply (4.5~12.5V)
2	VLED	LED drive circuit power supply (4.5~12.5V)
3	GND	Ground
4	GND	Ground
5	PWM	PWM Dimmer
6	NC	NO CONNECTION

JUMP : HCH HDS502-E



PIN 1	PIN2	Result
ON	ON	200mA
ON	OFF	150mA
OFF	ON	150mA
OFF	OFF	100mA



10.3 Color Data Input Assignment

The brightness of each primary color(red, green and blue) is based on the 6 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					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	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
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	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
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
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	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
	Green(1)	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	1	0	0	0	0	0	0	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	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
	Blue(1)	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	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

**11. Interface Timing****11.1 Input Signal Characteristics**

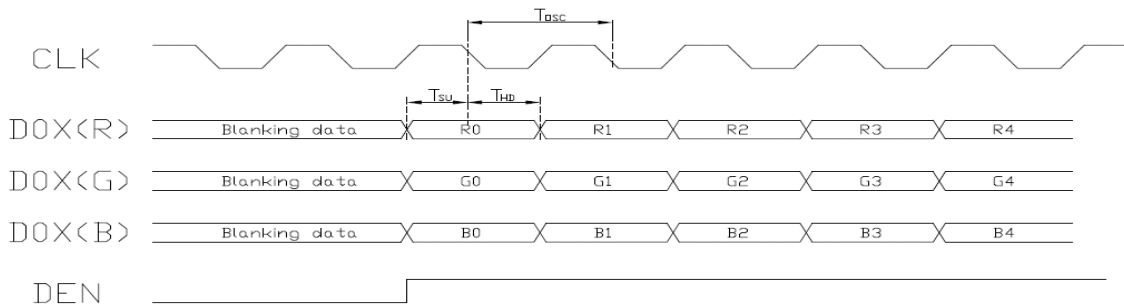
PARAMETER		Symbol	Min.	Typ.	Max.	Unit
CLK period		T_{OSC}	-	156	-	ns
Data setup time		T_{SU}	12	-	-	ns
Data hold time		T_{HD}	12	-	-	ns
IHS period		T_H	-	408	-	T_{OSC}
IHS pulse width		T_{HS}	5	30	-	T_{OSC}
IHS setup time		T_{Cr}	12	-	-	ns
IHS hold time		T_{Cf}	12	-	-	ns
IVS pulse width		T_{VS}	1	3	5	T_H
IVS setup time		T_{Vr}	12	-	-	ns
IVS hold time		T_{Vf}	12	-	-	μ s
IVS-DEN time	NTSC	T_{VSE}	-	18	-	T_H
	PAL	T_{VSE}	-	26	-	T_H
IHS-DEN time		T_{HE}	36	68	88	T_{OSC}
DEN pulse width		T_{EP}	-	320	-	T_{OSC}
DEN-STH time		T_{DES}	-	1	-	T_{OSC}
IVS period	NTSC	-	-	262.5	-	T_H
	PAL	-	-	312.5	-	T_H

Note: When SYNC mode is used, 1st data start from 68th CLK after IHS falling.

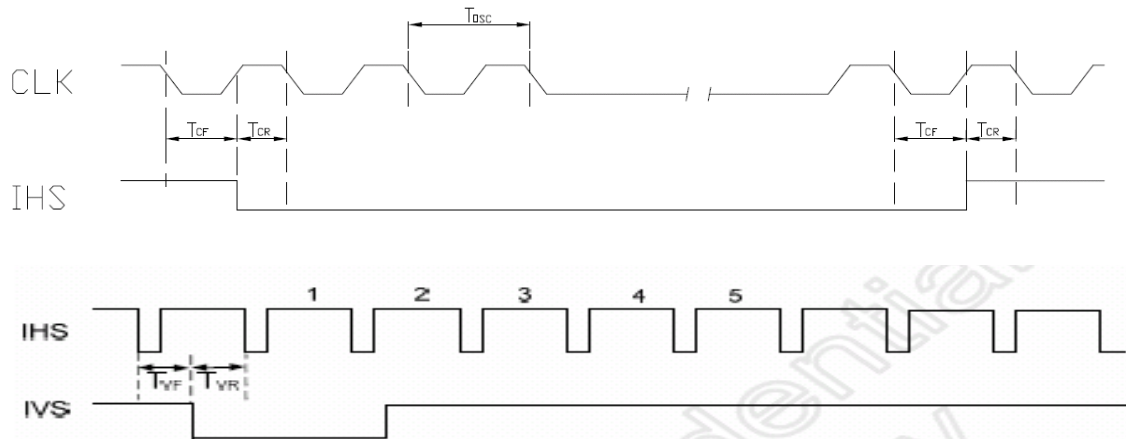


11.2 Waveform

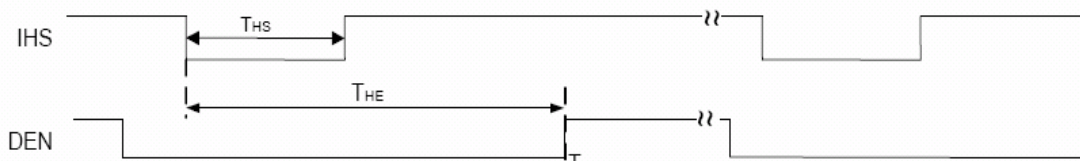
11.2.1 Clock and Data Waveform



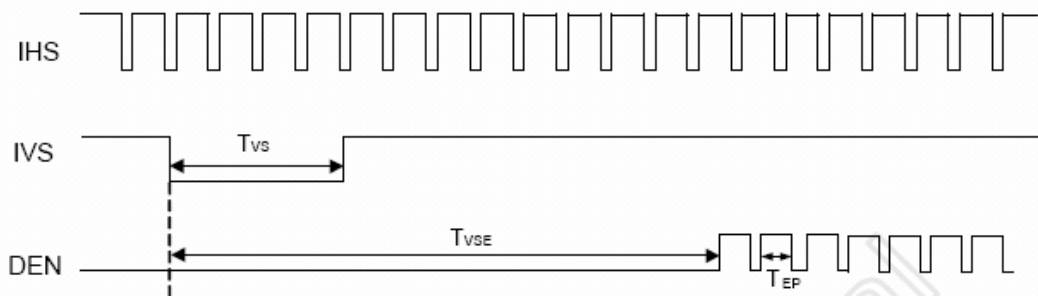
11.2.2 Clock and Sync waveforms



11.2.3 IHS and horizontal control timing waveforms



11.2.4 IHS and vertical control timing waveforms





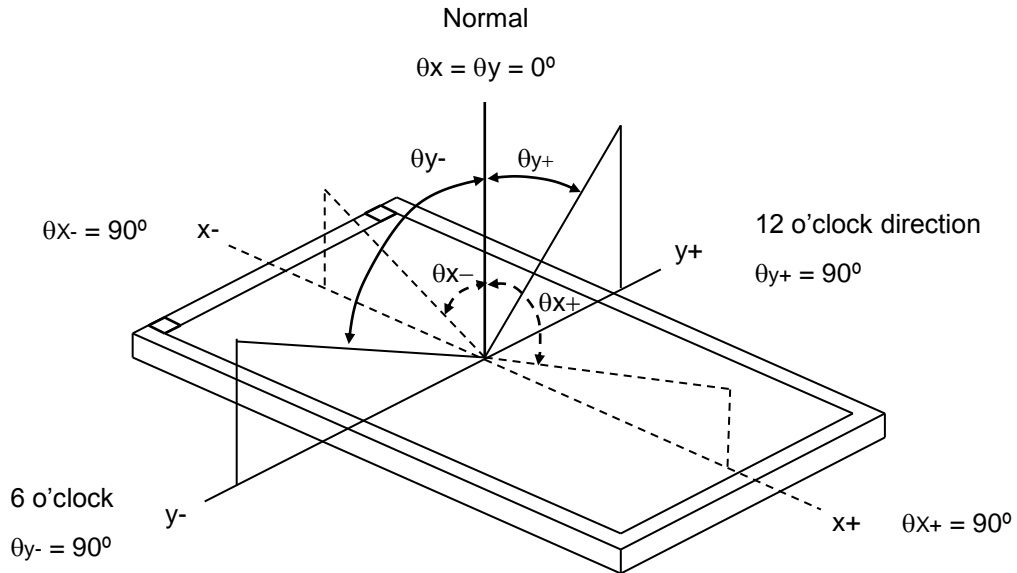
12. Optical Characteristics

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

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
Contrast Ratio	CR	$\theta_x=0^\circ, \theta_y=0^\circ$	300	(450)	-	-	(2)
Response Time	T_R	Viewing Normal	-	15	-	ms	(3)
	T_F	Angle	-	35	-	ms	
Luminance(Center)	Y	B/L=200mA	1000	(1200)	-	cd/m ²	(4)
		B/L=150mA	750	(900)	-	cd/m ²	
		B/L=100mA	500	(600)	-	cd/m ²	
Brightness uniformity	BUNI		75	(80)	-	%	(5)
Color Chromaticity	Red	Rx	0.590	0.640	0.690	-	(1),(4)
		Ry	0.300	0.350	0.400	-	
	Green	Gx	0.320	0.370	0.420	-	
		Gy	0.540	0.590	0.640	-	
	Blue	Bx	0.095	0.145	0.195	-	
		By	0.035	0.085	0.135	-	
	White	Wx	0.280	0.330	0.380	-	
		Wy	0.310	0.360	0.410	-	
Viewing Angle	Horizontal	θ_{x+}	55	(60)	-	deg.	
		θ_{x-}	55	(60)	-		
	Vertical	θ_{y+}	55	(60)	-		
		θ_{y-}	45	(50)	-		



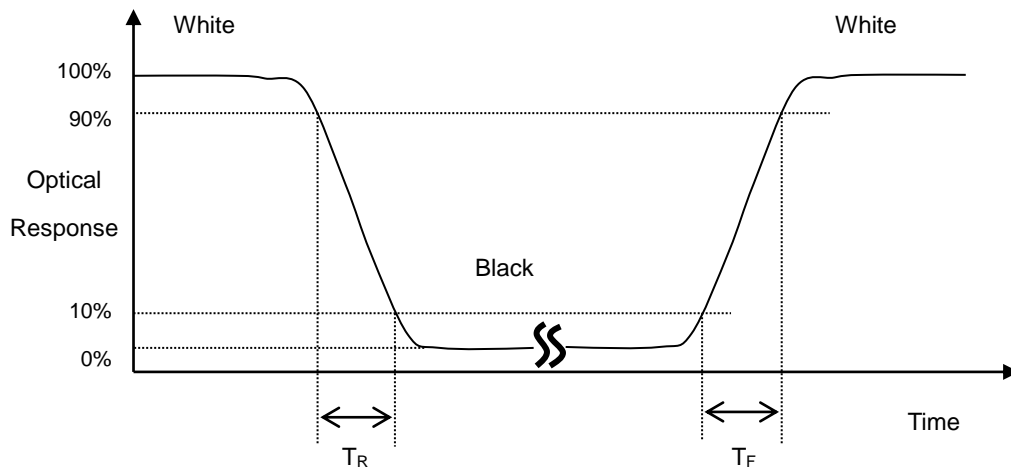
Note (1) Definition of Viewing Angle (θ_x, θ_y):



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

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

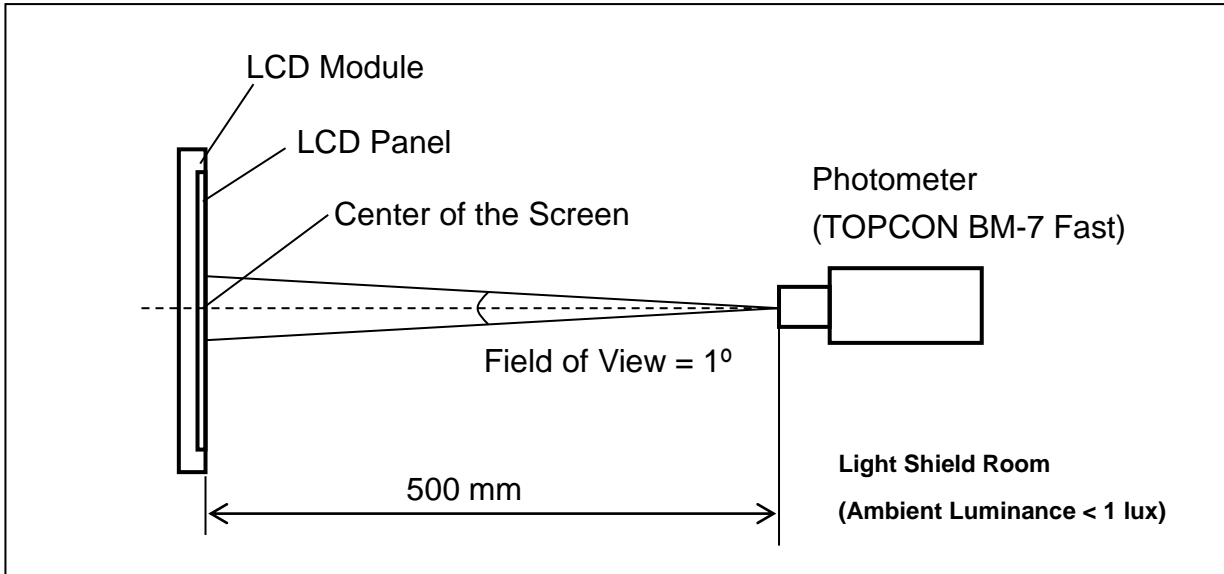
Note (3) Definition of Response Time (T_R, T_F):





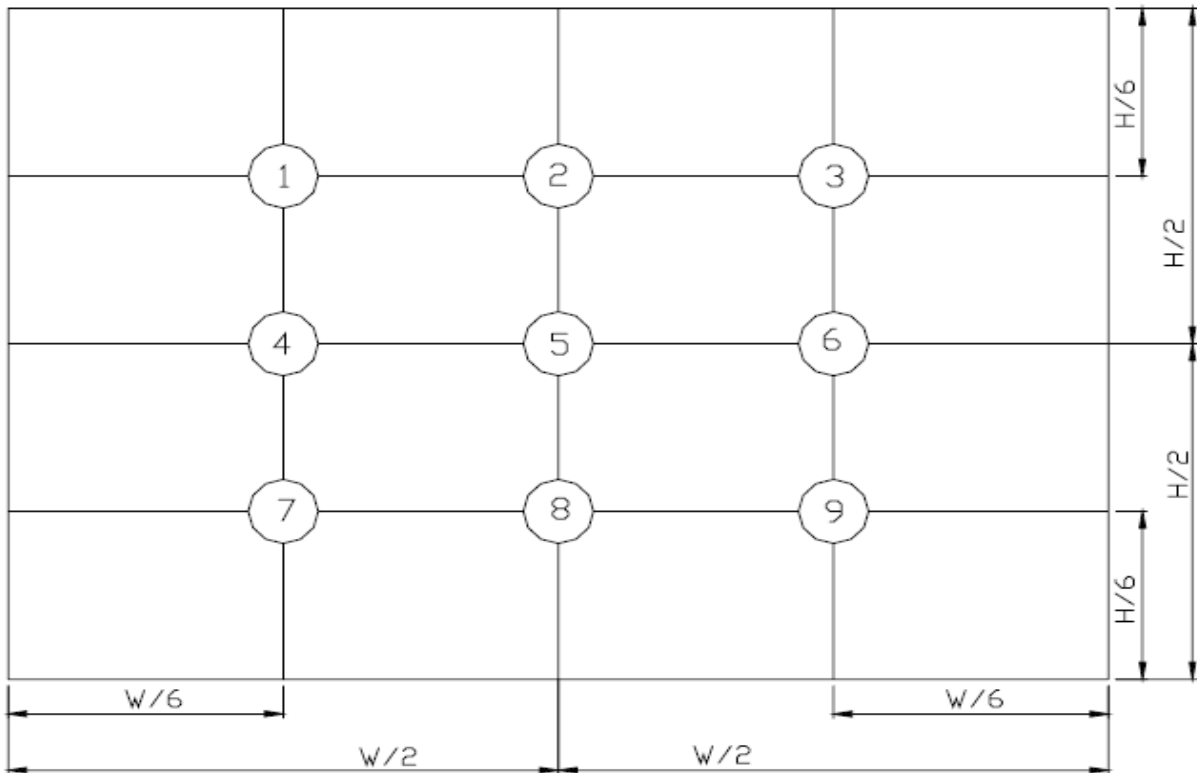
Note (4) Measurement Set-Up:

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%



**13. Reliability Test**

No.	Test Items	Test Condition	Remark
1	High Temperature Storage Test	T _a = 80°C 240 hours	(1),(3),(4)
2	Low Temperature Storage Test	T _a = -30°C 240 hours	(1),(3),(4)
3	High Temperature Operation Test	T _s = 70°C 240 hours	(2),(3),(4)
4	Low Temperature Operation Test	T _a = -20°C 240 hours	(1),(3),(4)
5	High Temperature and High Humidity Operation Test	T _a =60°C 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°C (30min)~ 70°C (30min),100 cycles	(3), (4)
10	Drop Test(with Carton)	Height : 80cm 1 corner, 3 edges, 6 surfaces	(3)

Note 1 : T_a is the ambient temperature of samples.

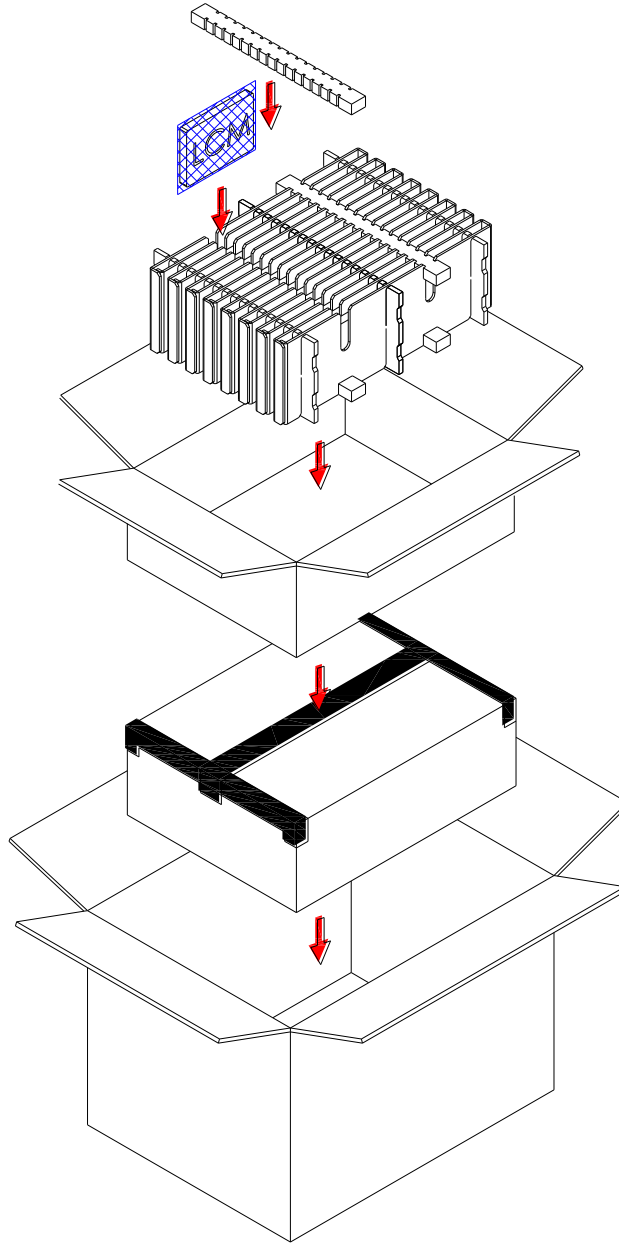
Note 2 : T_s is the temperature of panel' s surface.

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	STATIC SHIEDING BAGS	300.0x145.0x0.09		60	
2	EPE PAD	345.0x30.0x20.0	EPE	8	
3	CARD BOARD	345.0x150.0x3.5	CARTON	6	
4	CARD BOARD	450.0x23.0x150.0	CARTON	16	
5	INTERNAL BOX	455.0x350.0x164.0	CARTON	2	
6	EXTERNAL BOX	475.0x370.0x375.0	CARTON	1	
7	PRODUCT	144.0x104.6x13.0		60	



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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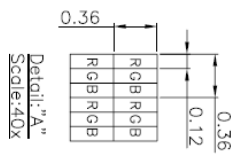
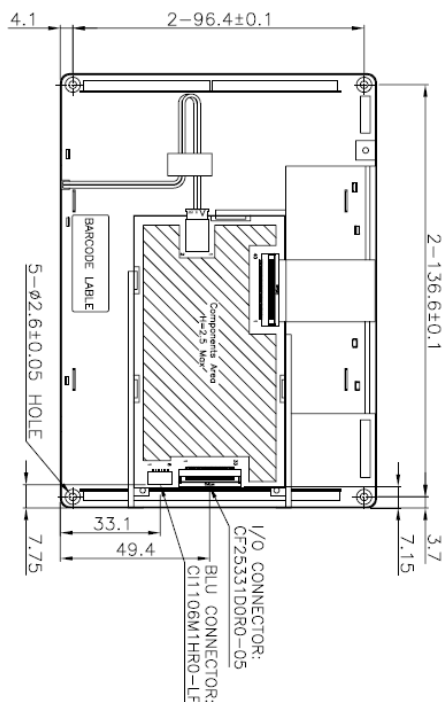
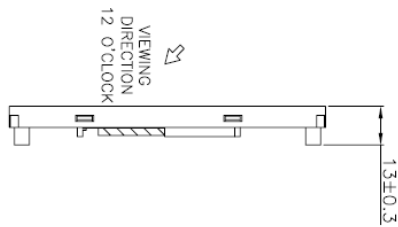
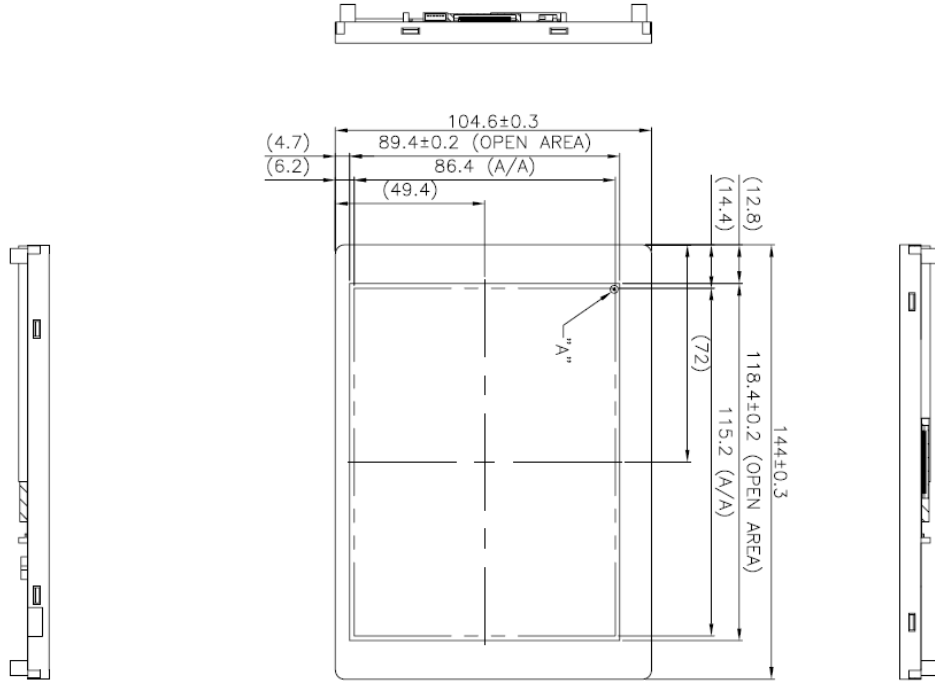
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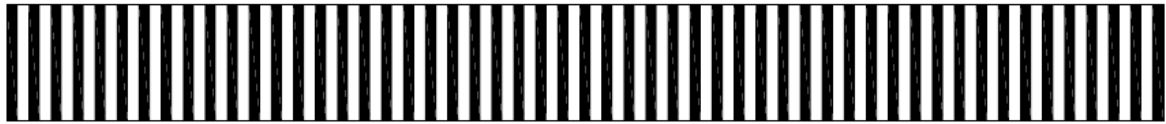
16.Outline Drawing



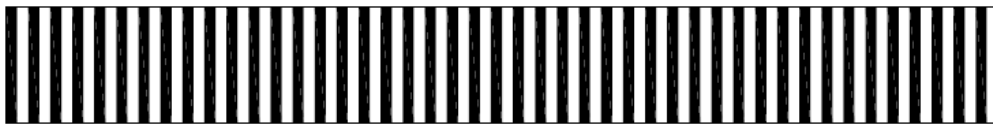


17. Definition of Labels

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



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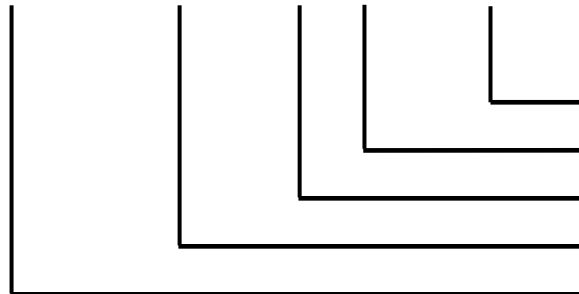


ABCDEFGHIJKLM

(a) Module Name: PT644857F-TLMWU-EH26

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



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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) 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.

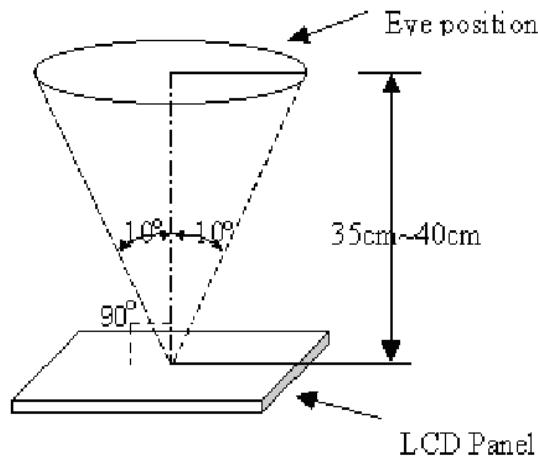


18. Incoming Inspection Standards

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



Fig_1

18.2 The defects classify of AQL as following:

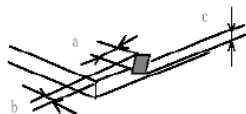
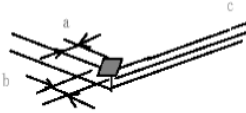

Class of defects	AQL	Definition
Major	0.65%	It is defect that is likely to result in failure or to reduce materially the usability of the intended function.
Minor	1.5%	It is a defect that will not result in functioning problem with deviation classified.



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, white)	Item	Acceptable number			Note: 1、4、5、6
			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:2	
		$L \leq 2.5$	$W \leq 0.1$	4		
		$L > 2.5$	$W > 0.1$	0		
	Dent or bubble on the polarizer	Dimension(mm)		Acceptable number		Note:3
		$D \leq 0.5$		4		
		$D \leq 0.15$		Disregard		
	Foreign material on the polarizer	Dimension(mm)		Acceptable number		Note:3
		$D \leq 0.5$		4		
		$D \leq 0.15$		Disregard		

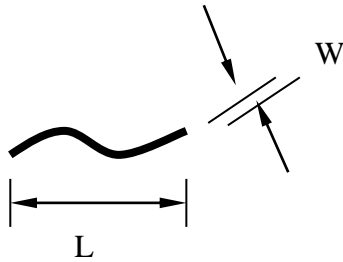


Item		Specification/Description			Note
Touch Panel	Scratch	L(mm)	W(mm)	Acceptable number	Note:2
		$L \leq 10$	$W < 0.05$	Disregard	
			$0.05 \leq W < 0.1$	$N \leq 4$	
			$W \geq 0.1$	0	
	Foreign Materials (Linear shape)	$L \leq 10$	$W < 0.05$	Disregard	Note:2
			$0.05 \leq W < 0.1$	$N \leq 3$	
			$W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



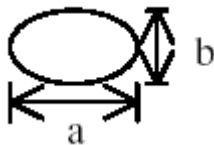
Note1. The definition of dot defect : The dot defect was judged after repair and the size of a defective dot over 1/2 of whole dot is regarded as one defective dot.

Note2.

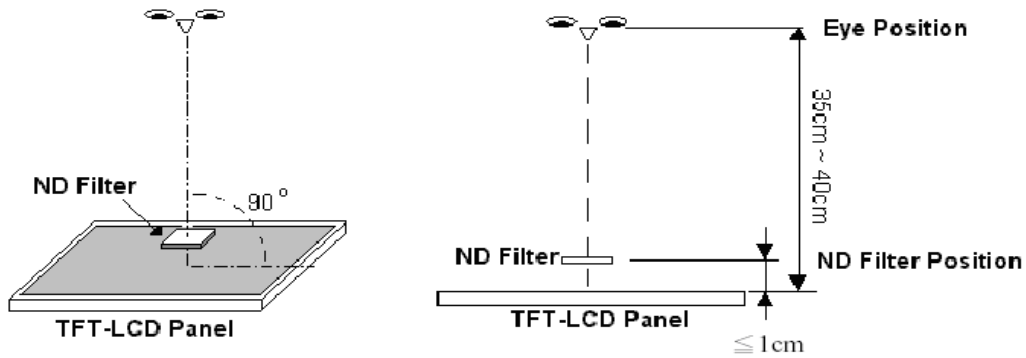


Note3. D : Diameter $D=(a+b)/2$

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



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

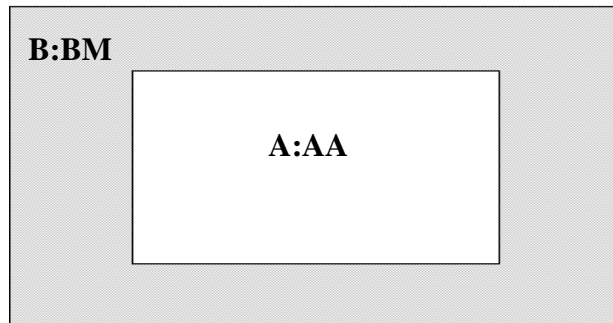


Note5. ADJACENT DOT

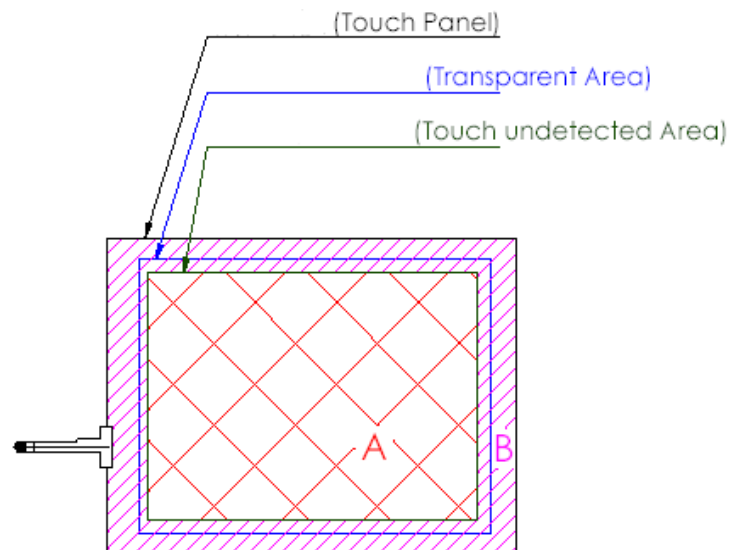




Note6.



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.