



OKAYA Electric America, Inc.

SPECIFICATIONS

DRAWING CODE

SAMPLE CODE

(This Code will be changed while mass production)

MASS PRODUCTION CODE

RV800480T-7x0WQ-A2

Customer Approved

Date:

Sales Sign	QC Confirmed	Checked By	Designer

pproval for Specifications Only

This specification is subject to change without notice

pproval for Specifications and Sample



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2. Record of Revisions

[illegible]



4. Application

This specification is applied to the 7 inch WVGA 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 7" TFT-LCD panel, a driver circuit and backlight unit.

5. Features

- WVGA (800×480 pixels) resolution.
- Digital 18 bit parallel RGB.
- Dot inversion mode with stripe type.
- Transparent Touch panel
 - 4-Wire
 - Analog Resistive

6. General Specifications

Item	Specifications	Unit
Screen Size	7 (Diagonal)	inch
Display Format	800RGB(H)×480(V)	dot
Active Area	152.4(H)×91.44(V)	mm
Dot Size	0.0635(H)×0.1905(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	166.6(W)×109.4(H)×11.5(D)	mm
Weight	(220)	g
RoHS Compliance	Okaya 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, 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 Backlight Unit

(Ta=25±2°C)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Current of Backlight Unit	I _B	-	325	mA	(1)
Voltage of Backlight Unit	V _B	-	15	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	-
Power Supply Current	I _{CC}	-	190	266	mA	(1)
Input High Threshold Voltage	V _{IH}	0.7V _{CC}	-	V _{CC}	V	-
Input Low Threshold Voltage	V _{IL}	0	-	0.3V _{CC}	V	-
Power Consumption	P _L	-	627	877.8	mW	(1)
VSYNC Frequency	F _V	-	60	-	Hz	-
DCLK Frequency	DCLK	-	33.26	-	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 Backlight Unit

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Current of Backlight Unit	I _B	-	260	-	mA	-
Voltage of Backlight Unit	V _B	-	9.9	-	V	I _B =260mA
Power Consumption	P _{BL}	-	(2.57)	-	W	I _B =260mA
LED Life Time(25°C)	-	30000	35000	-	hr	(1)(2)

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

Note (2) : Use Nichia LED

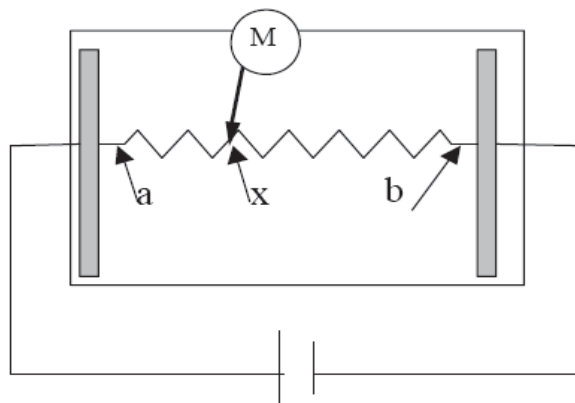
8.3 Transparent Touch panel

Electrical characteristics

Item		Value			Unit	Note
		Min.	Typ.	Max.		
Operating Voltage		3	-	5	V	-
Terminal Resistance	X-direction	200	-	1000	Ω	At connector
	Y-direction	200	-	1000	Ω	At connector
Insulation Resistance		$> 20M\Omega$				At DC25V
Chatting		≤ 10 ms Max				At connector
Linearity		$\leq 2\%$				(1)

Note 1: Measurement condition of Linearity

Linearity Definition



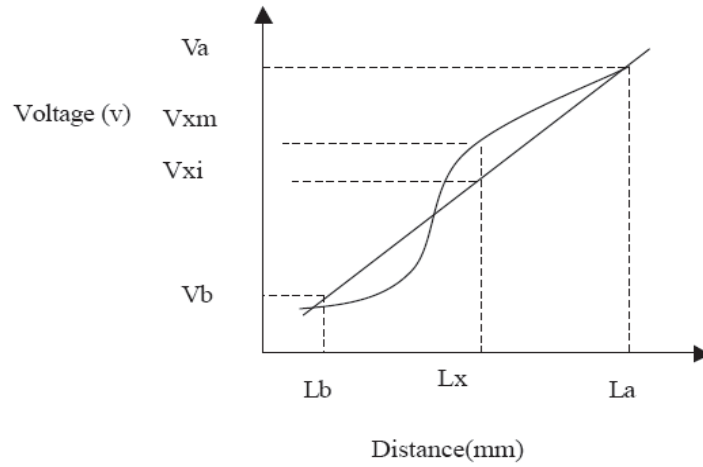
Va : maximum voltage in the active area of touch panel

Vb: minimum voltage in the active area of touch panel

X : random measuring point

Vxm: Actual voltage of Lx point

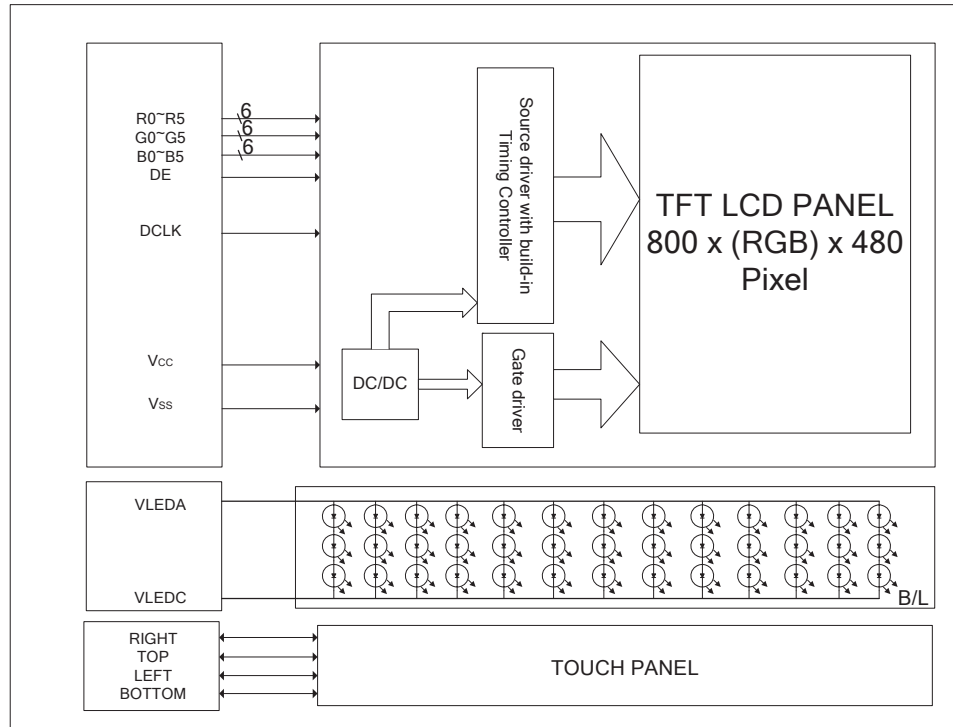
Vxi : Theoretical voltage of Lx point



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

9. Block Diagram

9.1 TFT-LCD Module with Backlight Unit



10. Input / Output Terminals Pin Assignment

10.1 TFT-LCD Module

Connector: JAE FA5B040HP1

Pin No.	Symbol	I/O	Description
1	V _{CC}	I	+3.3V power supply
2	V _{CC}	I	+3.3V power supply
3	V _{CC}	I	+3.3V power supply
4	V _{CC}	I	+3.3V power supply
5	NC	I	No Connect
6	DE	I	Input data enable control
7	V _{SS}	I	Ground
8	NC	I	No Connect
9	V _{SS}	I	Ground
10	NC	I	No Connect
11	V _{SS}	I	Ground
12	B5	I	Blue data(MSB)
13	B4	I	Blue data
14	B3	I	Blue data
15	V _{SS}	I	Ground
16	B2	I	Blue data
17	B1	I	Blue data
18	B0	I	Blue data(LSB)
19	V _{SS}	I	Ground
20	G5	I	GREEN data(MSB)
21	G4	I	GREEN data
22	G3	I	GREEN data
23	V _{SS}	I	Ground
24	G2	I	GREEN data
25	G1	I	GREEN data
26	G0	I	GREEN data(LSB)
27	V _{SS}	I	Ground
28	R5	I	RED data(MSB)
29	R4	I	RED data
30	R3	I	RED data

Pin No.	Symbol	I/O	Description
31	V _{SS}	I	Ground
32	R2	I	RED data
33	R1	I	RED data
34	R0	I	RED data (LSB)
35	NC	I	No Connect
36	V _{SS}	I	Ground
37	V _{SS}	I	Ground
38	DCLK	I	Dot Clock
39	V _{SS}	I	Ground
40	V _{SS}	I	Ground

10.2 Backlight Unit

Connector: JST BHSR-02VS-1(N)

Pin No.	Symbol	I/O	Description	Wire Color
1	VLEDA	I	Backlight LED Anode.	Red
2	VLEDC	I	Backlight LED Cathode.	Black

10.3 Transparent Touch Panel

Connector: CVILUX CF25041D0R0-10

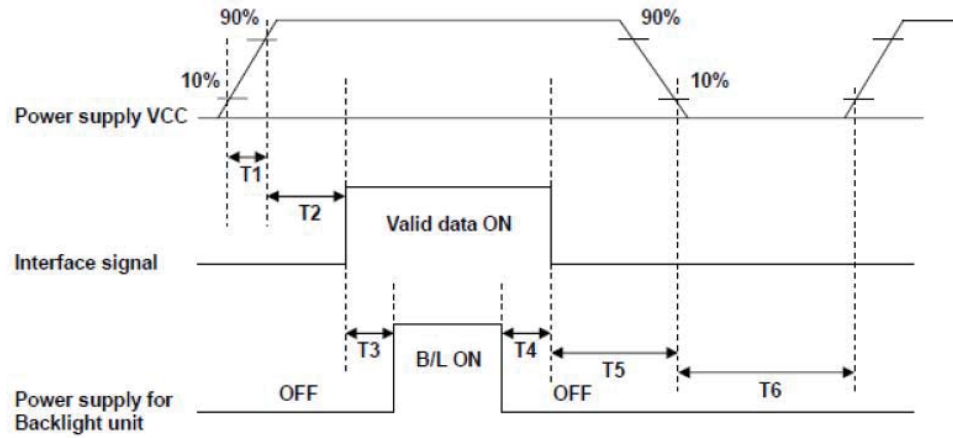
Pin No.	Symbol
1	RIGHT
2	TOP
3	LEFT
4	BOTTOM

10.4 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	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	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	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	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

10.5 Power ON/OFF Sequence



POWER SEQUENCE TABLE

Parameter	Value			Units
	Min.	Typ	Max.	
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	500	-	-	ms
T4	500	-	-	ms
T5	0	-	50	ms
T6	1000	-	-	ms

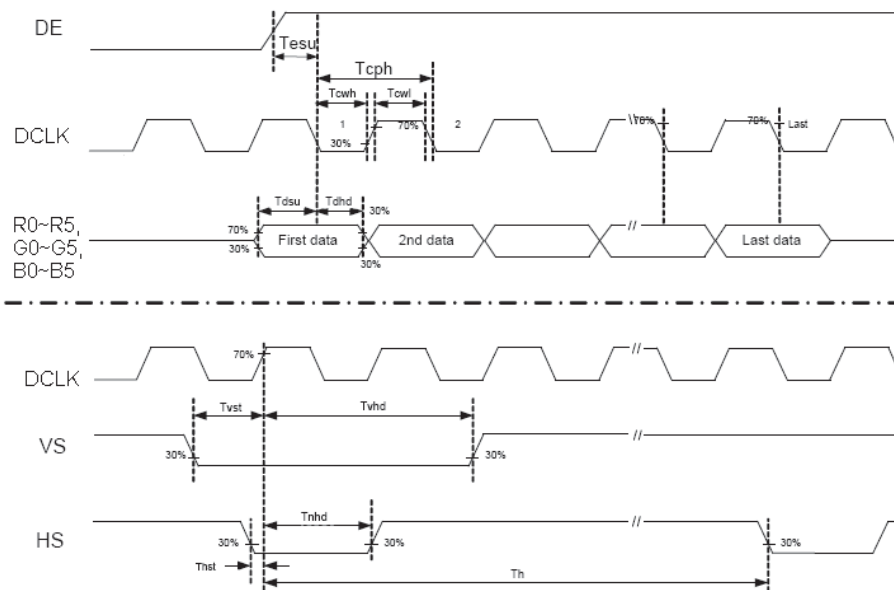
11. Interface Timing

11.1 Input Signal Characteristics

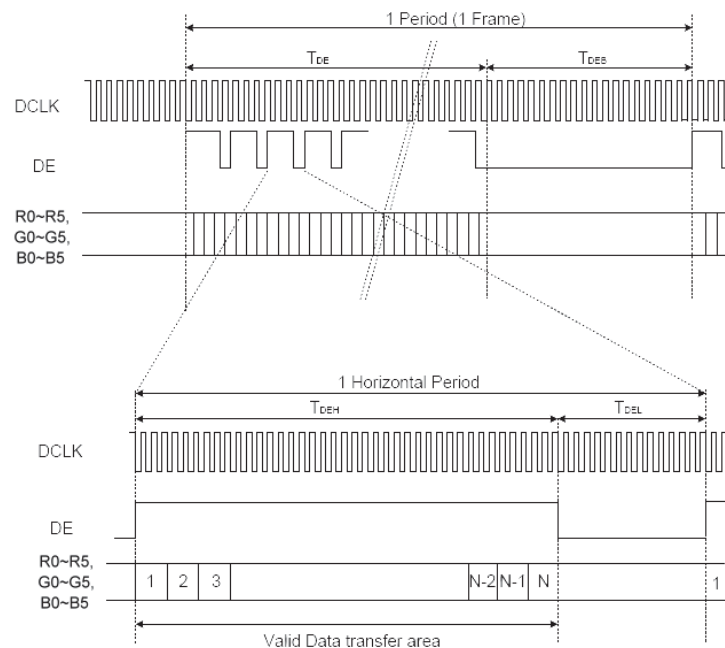
PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	F_{CPH}	-	33.26	-	MHz
DCLK period	T_{CPH}	-	30.06	-	ns
DCLK pulse duty	T_{CWH}	40	50	60	%
DE period	$T_{DEH} + T_{DEL}$	1000	1056	1200	T_{CPH}
DE pulse width	T_{DEH}	-	800	-	T_{CPH}
DE frame blanking	T_{DEB}	10	45	110	$T_{DEH} + T_{DEL}$
DE frame width	T_{DE}	-	480	-	$T_{DEH} + T_{DEL}$
Data setup time	T_{dsu}	6	-	-	ns
Data hold time	T_{dhd}	6	-	-	ns
DE setup time	T_{dsu}	6	-	-	ns

11.2 Waveform

11.2.1 Clock and data input waveforms



11.2.2 Data input format

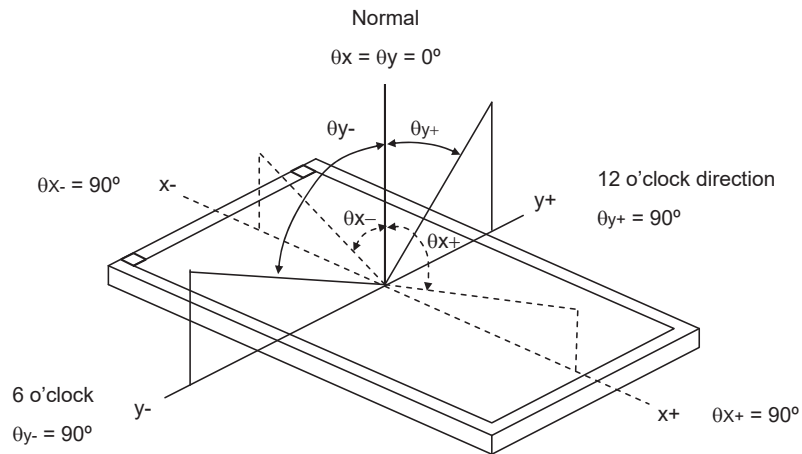


12. Optical Characteristics

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	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	150	(250)	-	-	(2)
Response Time		T_R		-	5	10	ms	(3)
		T_F		-	15	20	ms	
Luminance(Center)		Y		600	(800)	-	cd/m ²	(4)
Brightness uniformity		BUNI		70	(75)	-	%	(5)
Color Chromaticity	Red	Rx		0.540	0.590	0.640	-	(1),(4)
		Ry		0.310	0.360	0.410	-	
	Green	Gx		0.295	0.345	0.395	-	
		Gy		0.530	0.580	0.630	-	
	Blue	Bx		0.100	0.150	0.200	-	
		By		0.090	0.140	0.190	-	
	White	Wx		0.280	0.330	0.380	-	
		Wy		0.310	0.360	0.410	-	
Viewing Angle	Horizontal	θ_{x+}	CR \geq 10	55	(65)	-	deg.	
		θ_{x-}		55	(65)	-		
	Vertical	θ_{y+}		45	(55)	-		
		θ_{y-}		55	(65)	-		

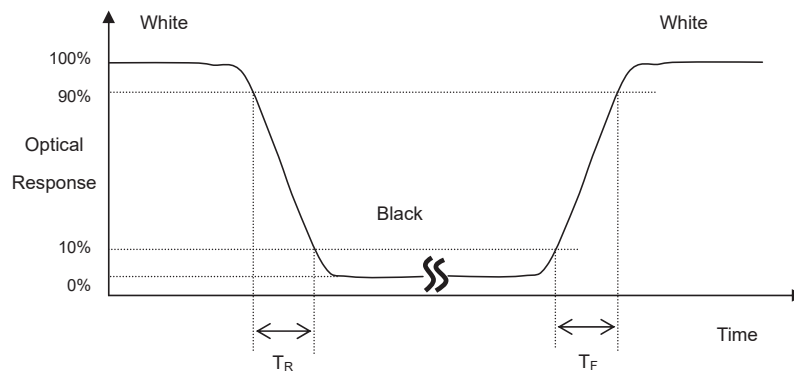
Note (1) Definition of Viewing Angle (θ_x , θ_y):



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

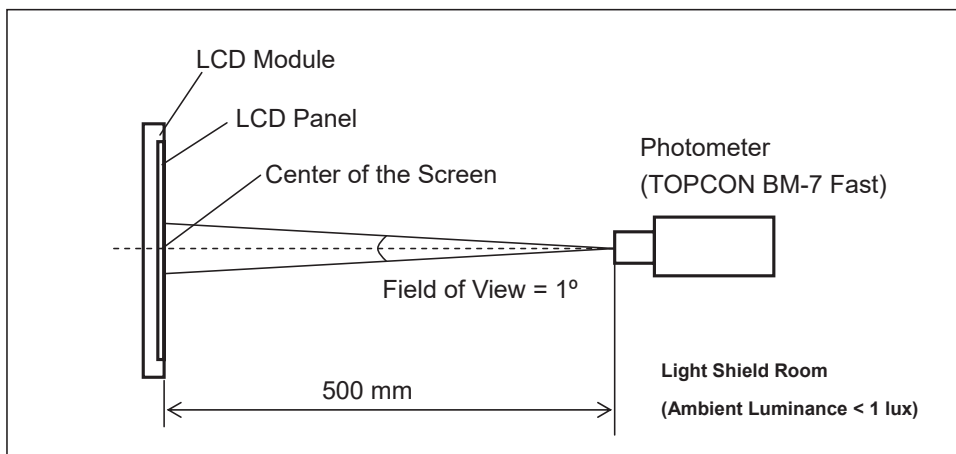
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

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



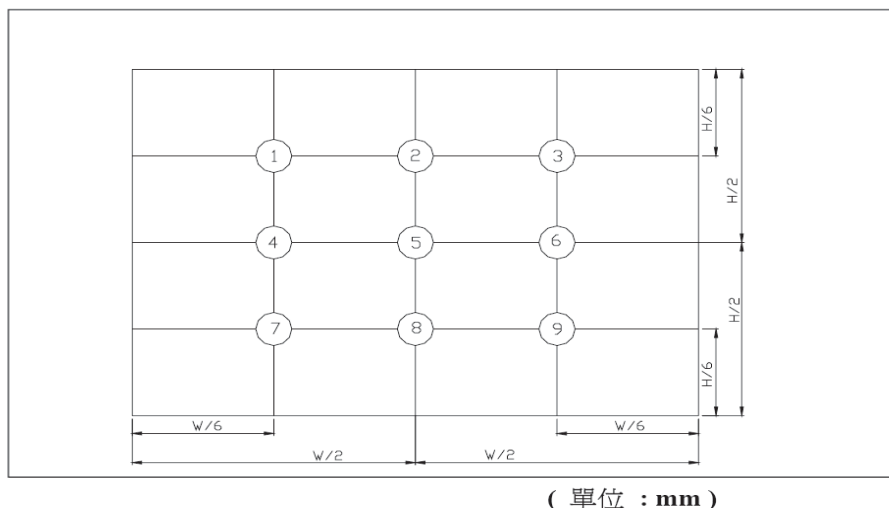
Note (4) Measurement Set-Up:

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 dark room or equivalent condition.



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℃ 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 amplitude:1.5mm 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)

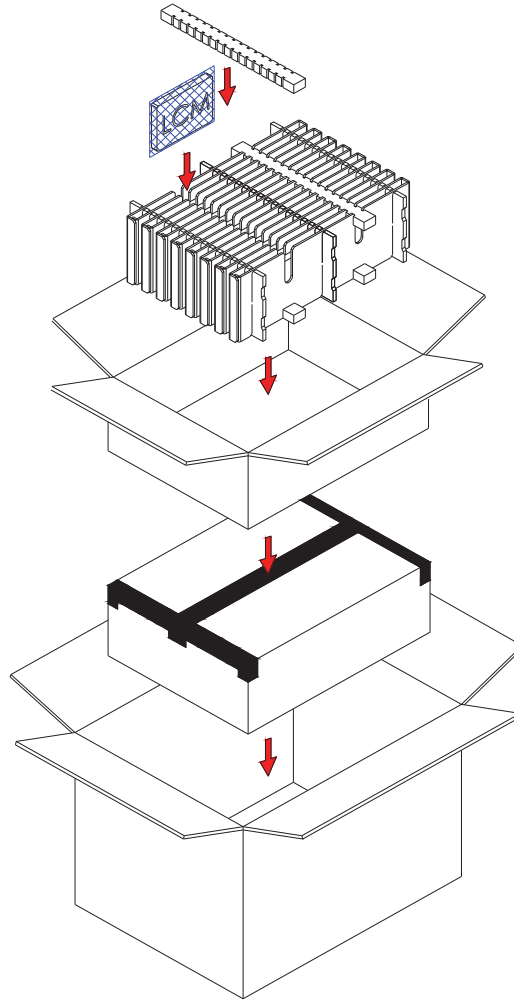
Note 1 : T_a is the ambient temperature of samples.

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 SHIELDING 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	166.6x109.4x11.5		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

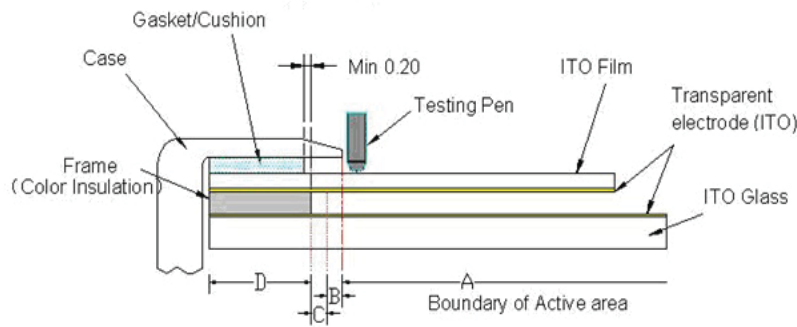
- (1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (2) After the module's end of life, it is not harmful in case of normal operation and storage.

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 eighteen months since the date of shipping out under normal using and storage conditions.

15.4 Cautions for installing and assembling

- Structure, and Area definition: The structure and the performance guaranteed areas of this touch panel are defined below.



- ◇ Area-(A) : Active area

The area guarantees a touch panel operation with the following characteristics when pressed.

- (i) Operation force (ii) Electric characteristics (iii) Tapping durability (iv) Pen sliding durability

- ◇ Area-(B) : Operation non-guaranteed area

The area does not guarantee a touch panel operation and its function. When this area is pressed, touch panel shows degradation of its performance and durability such as a pen sliding durability becomes about one-tenth compared with the active area (Area- (A) as guaranteed area) and its operation force requires about double. About 0.5 mm outside from a boundary of the active area corresponds to this area.

- ◇ Area-(C) : Pressing prohibition area

The area forbids pressing because an excessive load is applied to a transparent electrode and a serious damage is given to a touch panel function by pressing. About 0.5mm outside from a boundary of Area-(B)” the operation non-guaranteed area” corresponds to this area.

- ◇ Area-(D) : Non-Active area (Frame)

The area does not activate even if pressed.

(Remark: In order to prevent unusual performance degradation and malfunction of a touch panel, please inspect firstly whether the set case designing and touch panel assembling method are reasonable or not, and then start to install and assemble after surely confirming the item "15.4 Cautions for installing and assembling".)

✧ Area-(B)+Area-(C): Sensitive area

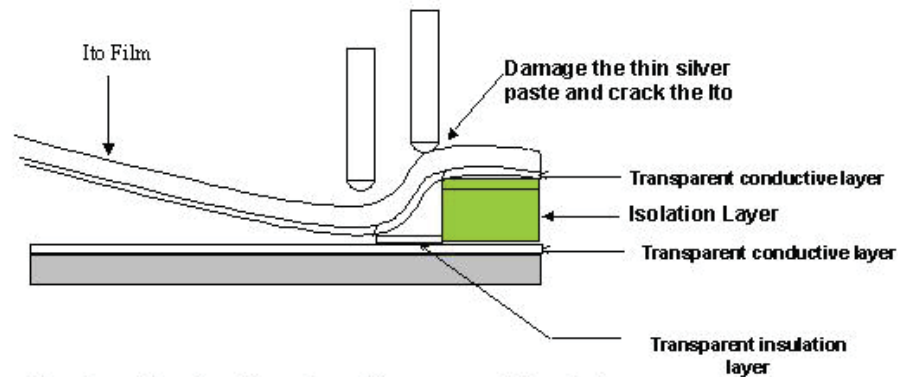
Area-(B) and area-(C) both belong to the sensitive area. This area has a clearance between top and bottom contact side. Great press resulting in transparent electrode cracks, function defect to be exact, will deform surface transparent electrode. Please think about structure of sensitive area and case in order to avoid terminal user to fail to touch this area.

Remark: Please add a layer of gasket/ cushion around it before assembling touch panel. Take care that gasket/ cushion's location should be in the limits of Frame area's location. Min. 0.2mm outside from an inner boundary of Frame area corresponds to this area:

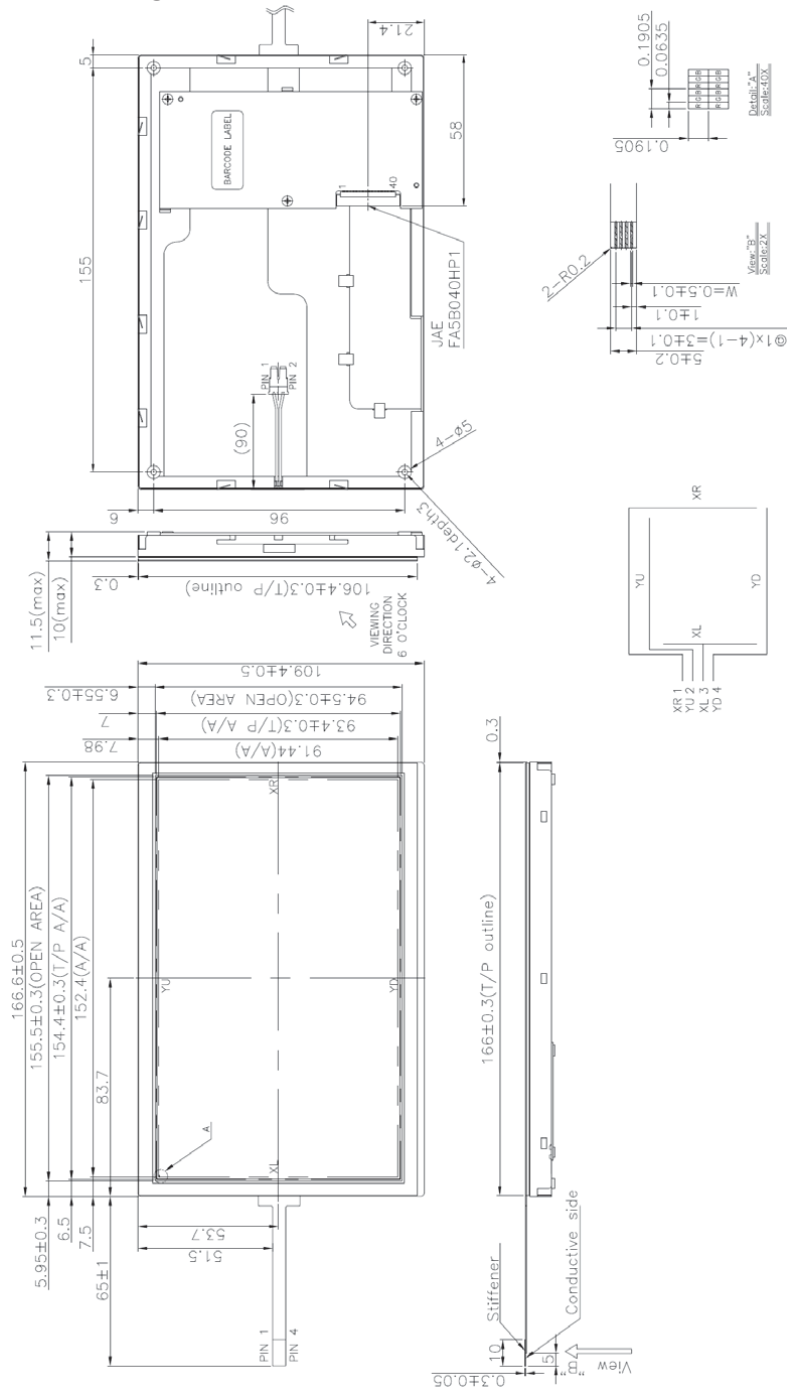
- ① If designed case' s size is bigger than active area' s size, terminal user could touch sensitive area to damage touch panel;
- ② If designed case' s size is smaller than active area' s size, ITO transparent electrode will not damage when sliding test on the edge of case as sensitive area is covered by case around. But cushion/gasket's thickness looks so important when case enters into active area: If too thick, the clearance of case and surface transparent electrode will be so big as to affect touch panel's appearance. If too thin, the case will be pressed directly on the touch panel's surface, which have to be damaged resulting in short circuit. Therefore, you'd better keep clearance of 0.2-0.3 mm between case and transparent electrode.

15.5 Operation Prohibit

Not Suggested Pen Input Position On Touch Panel



Pen input load on the edge of transparent insulation area might damage the ITO of ITO Pet- Film and reduce the durability of touch panel

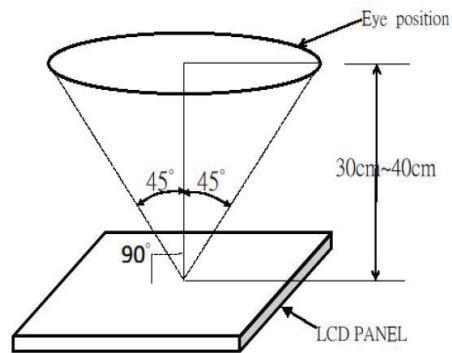


18. Incoming Inspection Standards

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: 45 ~ 65 % RH
- (3) Viewing distance is approximately 30 ~ 40 cm
- (4) Viewing angle is normal to the LCD panel as Fig _1 ($\pm 45^{\circ}$)
- (5) Ambient Illumination: 300 ~ 500 Lux for external appearance inspection



Fig_1


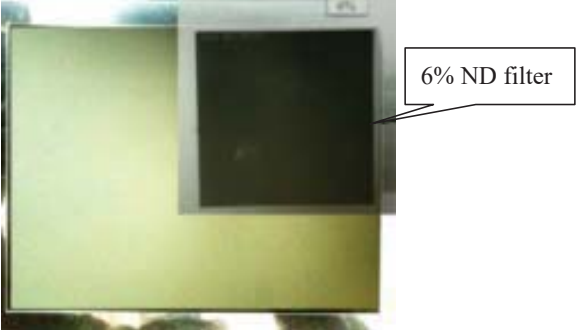
18.2 The defects classify of AQL as following:

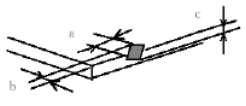

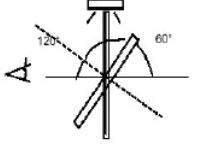

- (1) Test method :According to ANSI/ASQC Z 1.4 .General Inspection Level II take a single time
- (2) The defects classify of AQL as following:

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

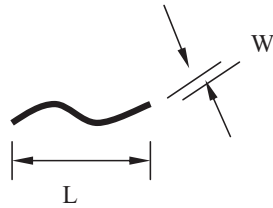
Item		Specification/Description				Note
Display	Function	No Display				-
		Malfunction				-
Operating	Contrast ratio	Out of Spec				-
	Line defect	No obvious Vertical and Horizontal line defect in bright , dark and colored.				-
	Point Defect (red ,green ,blue ,dark ,white)	Item	Acceptable number			Note: 1 、 4 、 5 、 6
			A	B	Total	
		BRIGHT DOT	$N \leq 3$	$N \leq 3$	$N \leq 8$	
		DARK DOT	$N \leq 5$	$N \leq 6$		
		TOTAL DOT	$N \leq 5$	$N \leq 6$		
		TWO ADJACENT DOT	NOT ALLOWED			
	THREE OR MORE ADJACENT DOT	NOT ALLOWED				
External Inspection (non-operating or operating)	Scratch (in display area)	L(mm)	W(mm)	Acceptable number		Note:2
		$L \leq 2.5$	$W \leq 0.1$	4		
		$L > 2.5$	$W > 0.1$	0		
	Polarizer dent or bubble (in display area)	Dimension(mm)		Acceptable number		Note:3
		$D \leq 0.25$		Disregard		
		$D \leq 0.5$		4		
	Line Shape (Particles and Lint in display area)	L(mm)	W(mm)	Acceptable number		Note:2
		-	$W \leq 0.07$	Disregard		
		$L \leq 5$	$W \leq 0.1$	4		
		$L \geq 5$	$W \geq 0.1$	0		
	Dot Shape (Particle in Display area)	Dimension(mm)		Acceptable number		Note:3
		$D \leq 0.25$		Disregard		
		$D \leq 0.5$		4		

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

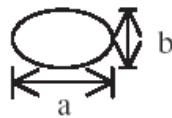
Item		Specification/Description			Note
Touch Panel	Scratch	L(mm)	W(mm)	Acceptable number	Note:2
		$L \leq 10$	$W < 0.05$	Disregard	
			$0.05 \leq W < 0.1$	$N \leq 4$	
			$W \geq 0.1$	0	
	Foreign Materials (Linear shape)	$L \leq 10$	$W < 0.05$	Disregard	Note:2
			$0.05 \leq W < 0.1$	$N \leq 3$	
			$W \geq 0.1$	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			$a \leq 5.0\text{mm}$ $b \leq 3.0\text{mm}$ $c \leq t$ (t : Glass think)	Note:7
				$a \leq 3.0\text{mm}$ $b \leq 3.0\text{mm}$ $c \leq t$ (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			$H \leq 0.4\text{mm}$	-

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.

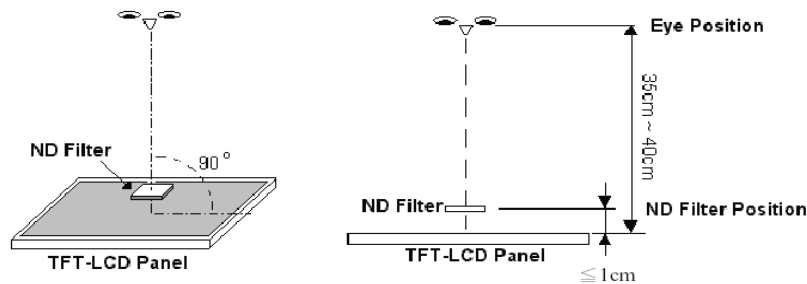
Note2.



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



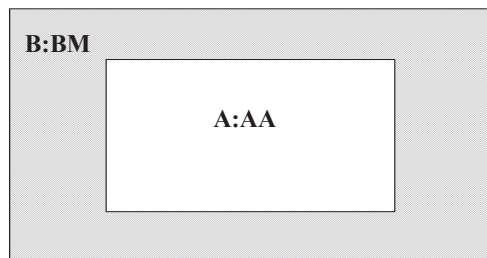
Note4. Bright dot is defined through 2% transmission ND Filter as following.



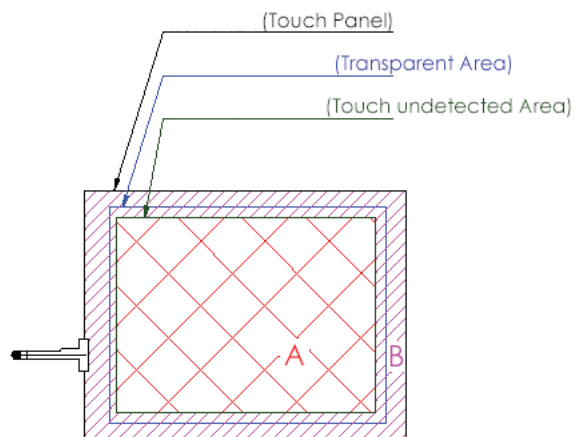
Note5. ADJACENT DOT



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.