ILLUMINANT 北極光企業有限公司

PRODUCT SPECIFICATION FOR TFT LCM

CUSTOMER:	
MODEL NO:	I5002-6HPT4827A
ACCEPTED BY:	

APPROVED BY:	CHECKED BY:	ORGANIZED BY:
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■Approval for Specifications Only

□Approval for Specifications and Sample

Note: 1. Version of Specifications : 1

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Version	Date	Contents
1	08/05/15	Initial Release

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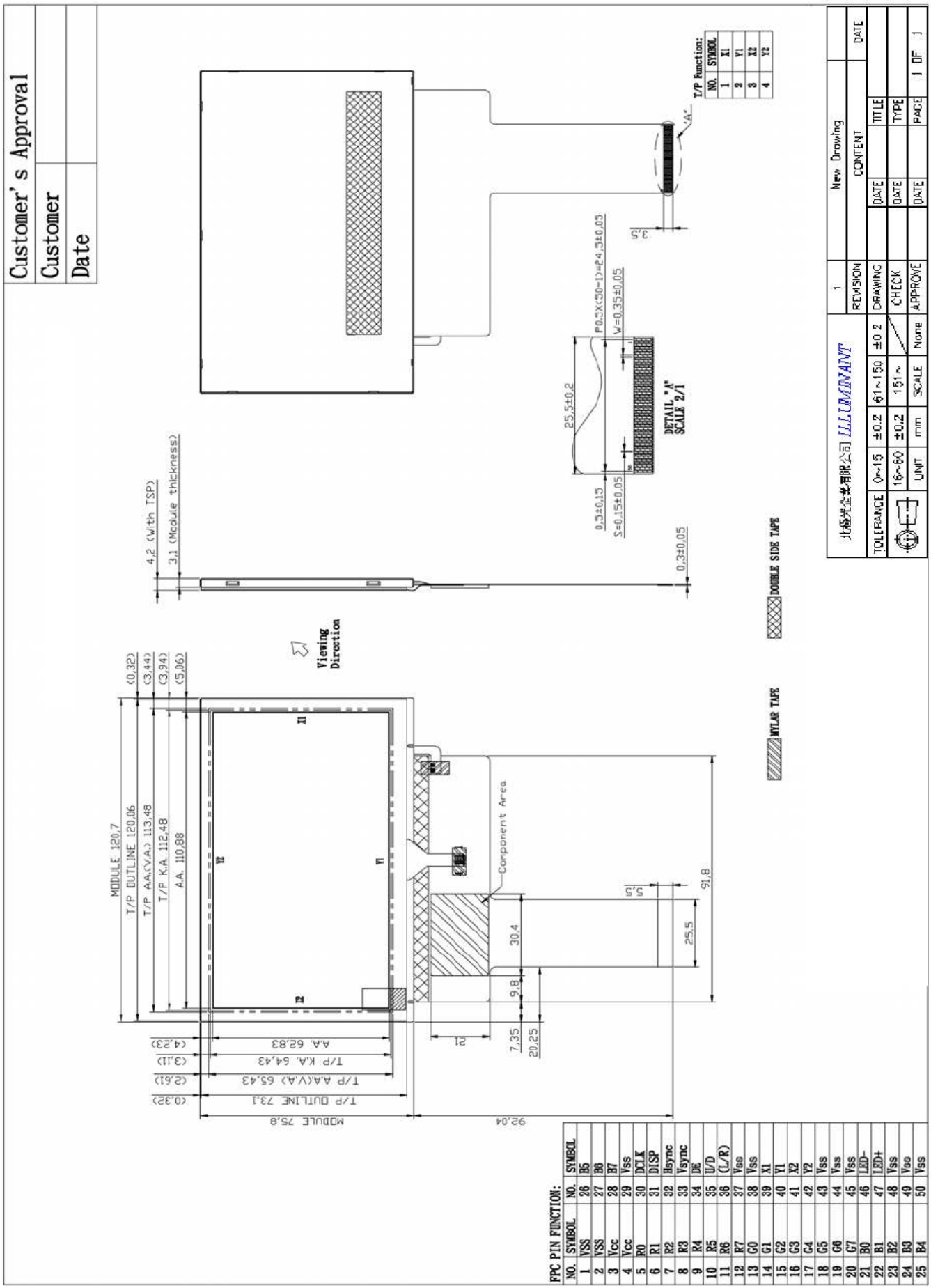
1. Mechanical Specification

Item	Standard Value	Unit
Display Size	5.0	inch
Module Dimension	120.7 (W)*75.8 (H)*4.2 (D)	mm
Active Area	110.88 (W)*62.83 (H)	mm
Number of Dots	480RGB*272Dots	Dot
Pixel Pitch	0.231 (W)mm*0.231 (H)mm	mm
LCD Type	Normal White	-
Viewing Direction	6H	-
Driver	HX8227-A HX8655-A	-
Approx. Weight	TBD	g
Various Color Display	16.7M	-
Brightness	TBD	cd/m2
Backlight Type	10-LED serial	
Backlight Color	White	
Touch Panel	4-Wire analog resistive	


Customer's Approval
Customer
Date
T/P Function:
NO. SYMBOL
1 X1
2 Y1
3 X2
4 Y2
'A'
DETAIL 'A'
SCALE 2/1
P0.5X(50-1)=24.5±0.05
W=0.35±0.05
S=0.15±0.05
0.5±0.15
25.5±0.2
0.3±0.05
4.2 (With TSP)
3.1 (Module thickness)
Viewing Direction
DOUBLE SIDE TAPE
MYLAR TAPE
Component Area
MODULE 120.7
T/P OUTLINE 120.06
T/P A.A.(V.A.) 113.48
T/P K.A. 112.48
A.A. 110.88
(0.32)
(3.44)
(3.94)
(5.06)
MODULE 75.8
T/P OUTLINE 73.1
T/P A.A.(V.A.) 65.43
T/P K.A. 64.43
A.A. 62.83
(0.32)
(2.61)
(3.11)
(4.23)
92.04
91.8
30.4
25.5
9.8
7.35
20.25
12
FPC PIN FUNCTION:
NO. SYMBOL NO. SYMBOL
1 VSS 26 B5
2 VSS 27 B6
3 Vcc 28 B7
4 Vcc 29 Vss
5 R0 30 DCLK
6 R1 31 DISP
7 R2 32 Hsync
8 R3 33 Vsync
9 R4 34 DE
10 R5 35 U/D
11 R6 36 (L/R)
12 R7 37 Vss
13 G0 38 Vss
14 G1 39 X1
15 G2 40 Y1
16 G3 41 X2
17 G4 42 Y2
18 G5 43 Vss
19 G6 44 Vss
20 G7 45 Vss
21 B0 46 LED-
22 B1 47 LED+
23 B2 48 Vss
24 B3 49 Vss
25 B4 50 Vss
1
New Drawing
REVISION
CONTENT
DATE
DRAWING
DATE
CHECK
DATE
APPROVE
DATE
TITLE
TYPE
PAGE
1 OF 1
TOLERANCE
0~15 ±0.2
16~60 ±0.2
61~150 ±0.2
151~ ±0.2
UNIT mm
SCALE None

2. Absolute Maximum Ratings

If the operating condition exceeds the following absolute maximum ratings, the TFT LCD module may be damaged permanently

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply Voltage for Logic	V_{CC}	-0.3		+6.0	V	
Input voltage	Vin	-0.3		V_{DD}+0.3	V	
Operating Temperature	T_{OP}	-20	-	+70	℃	-
Signal LED forward current	IF			30	mA	
Storage Temperature	T_{ST}	-30	-	+80	℃	-

3. Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage for Logic	V_{DD}	Ta=25℃	2.8	3.3	3.6	V
High-level input voltage	VIHC	V_{DD}=3.0V	0.8V_{DD}		V_{DD}	
Low-level input voltage	VILC	V_{DD}=3.0V	-0.3		0.2V_{DD}	
Power Supply Current for VDD	I_{DD}	V_{DD}=3.0V	-	60	--	mA

4. Optical Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Units	Note
Luminance of white		Lwh	(200)	(260)	---	Cd/m^2	
Contrast Ratio		CR	280	350	---	-	*5)
Response Time (Tr+Tf)			---	25	30	Ms	*4)
Viewing Angle (CR≧10)	X axis right (φ=0°)	θx	---	65	---	Degree	*6)
	X axis left (φ=180°)	θx	---	65	---		
	Y axis up (φ=90°)	θy	---	60	---		
	Y axis down (φ=270°)	θy	---	50	---		
CIE color Coordinates	White	Wx	---	0.313	---		BM7; 2°angle
		Wy	---	0.329	---		
	Red	Rx	---	0.591	---		
		Ry	---	0.332	---		
	Green	Gx	---	0.345	---		
		Gy	---	0.577	---		
	Blue	Bx	---	0.153	---		
		By	---	0.109	---		

- For LCM

Note 1. Ambient temperature = 25°C±2°C.

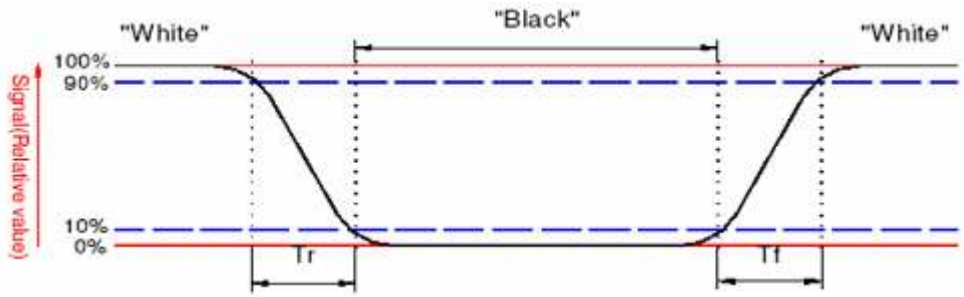
Note 2. To be measured in the dark room.

Note 3. To be measured at the center area of panel with a viewing cone of 2° by

Topcon luminance meter BM-7, after 10minues operation (module).

Note 4. Definition of response time :

The output signals of photo detector are measured when the input signals are changed from "black" to "white" (falling time) and from "white" to "black" (rising time), respectively.
The response time is defined as the time interval between the 10% and 90% of amplitudes.
Refer to figure as below :



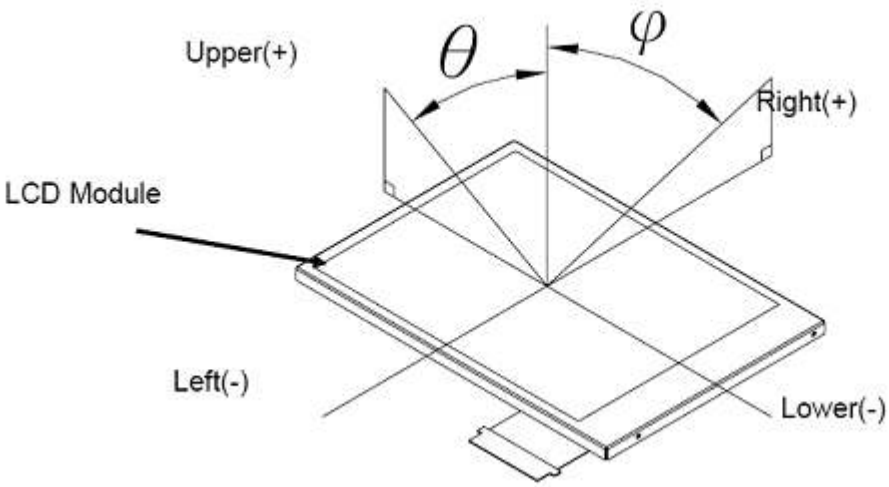
Note 5. Definition of contrast ratio :

Contrast ratio is calculated with the following formula.

$$\text{Contrast Ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

Note 6. Definition of viewing angle (LCD-5200) :

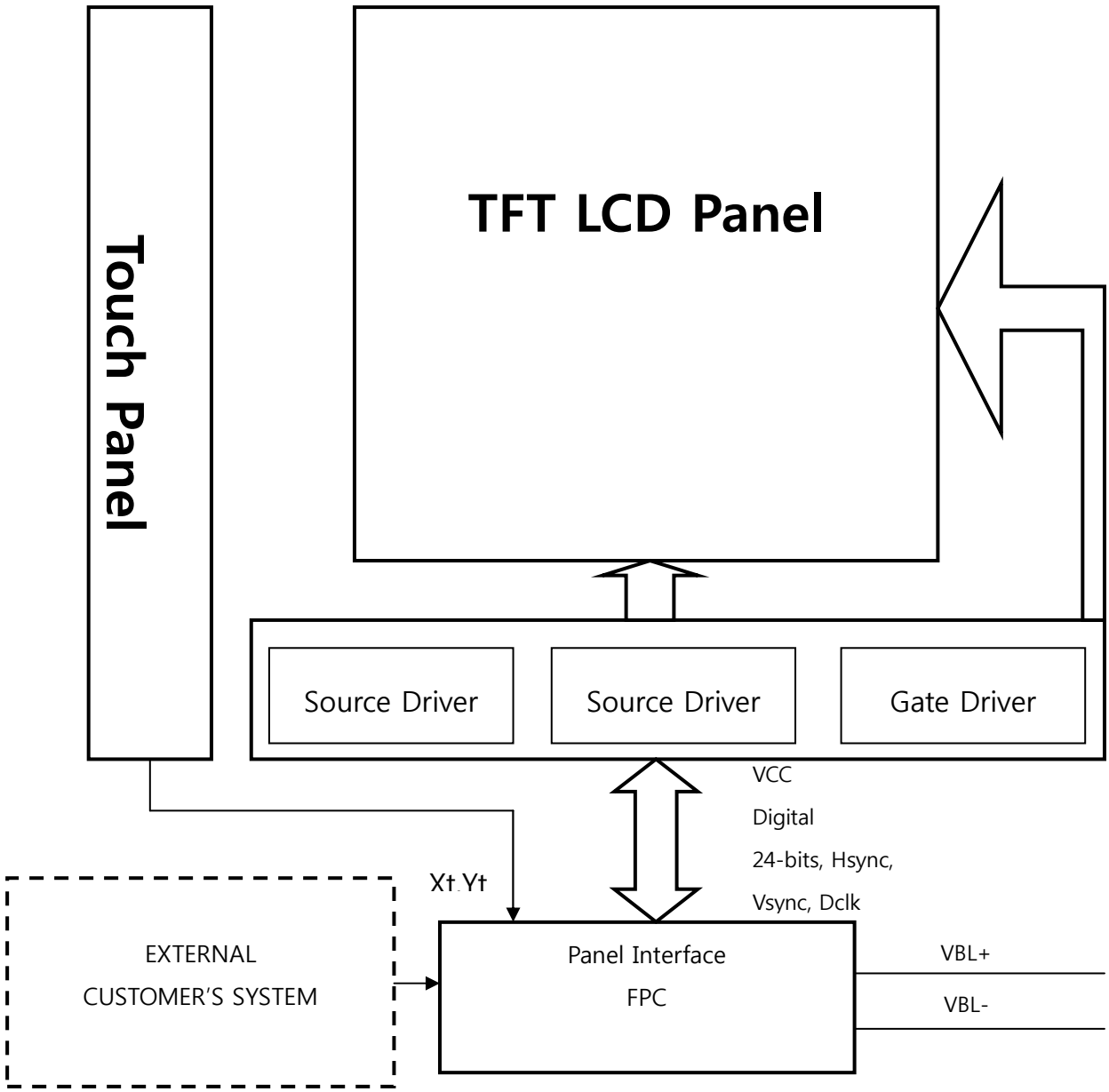
Refer to the figure as below



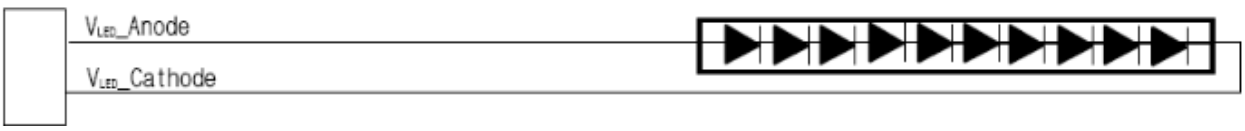
5. Interface

Pin No.	Pin Name	Description
1	VSS	Ground
2	VSS	Ground
3	VCC	Power Supply
4	VCC	Power Supply
5~12	R0~R7	Red Data Bit 0~7
13~20	G0~G7	Green Data Bit 0~7
21~28	B0~B7	Blue Data Bit 0~7
29	VSS	Ground
30	DCLK	Dot Data Clock
31	DISP	Display on / Display off Note : DISP set High, input data are valid. DISP set Low, input data are invalid.
32	Hsync	Horizontal Sync Input
33	Vsync	Vertical Sync Input
34	DE	Data Enable Control DE is High, data can be access. DE is Low, data can not be access.
35	U/D	Shift up or down Control U/D set High → UP to Down. U/D set Low → Down to UP.
36	(L/R)	(Shift Left or Right Control) L/R set High → Left to Right. L/R set Low → Right to Left.
37	VSS	Ground
38	VSS	Ground
39	X1	Touch Panel Pins
40	Y1	Touch Panel Pins
41	X2	Touch Panel Pins
42	Y2	Touch Panel Pins
43	VSS	Ground
44	VSS	Ground
45	VSS	Ground
46	VLED-	LED Ground (K)
47	VLED+	LED Power (A)
48	VSS	Ground
49	VSS	Ground
50	VSS	Ground

6. Block Diagram



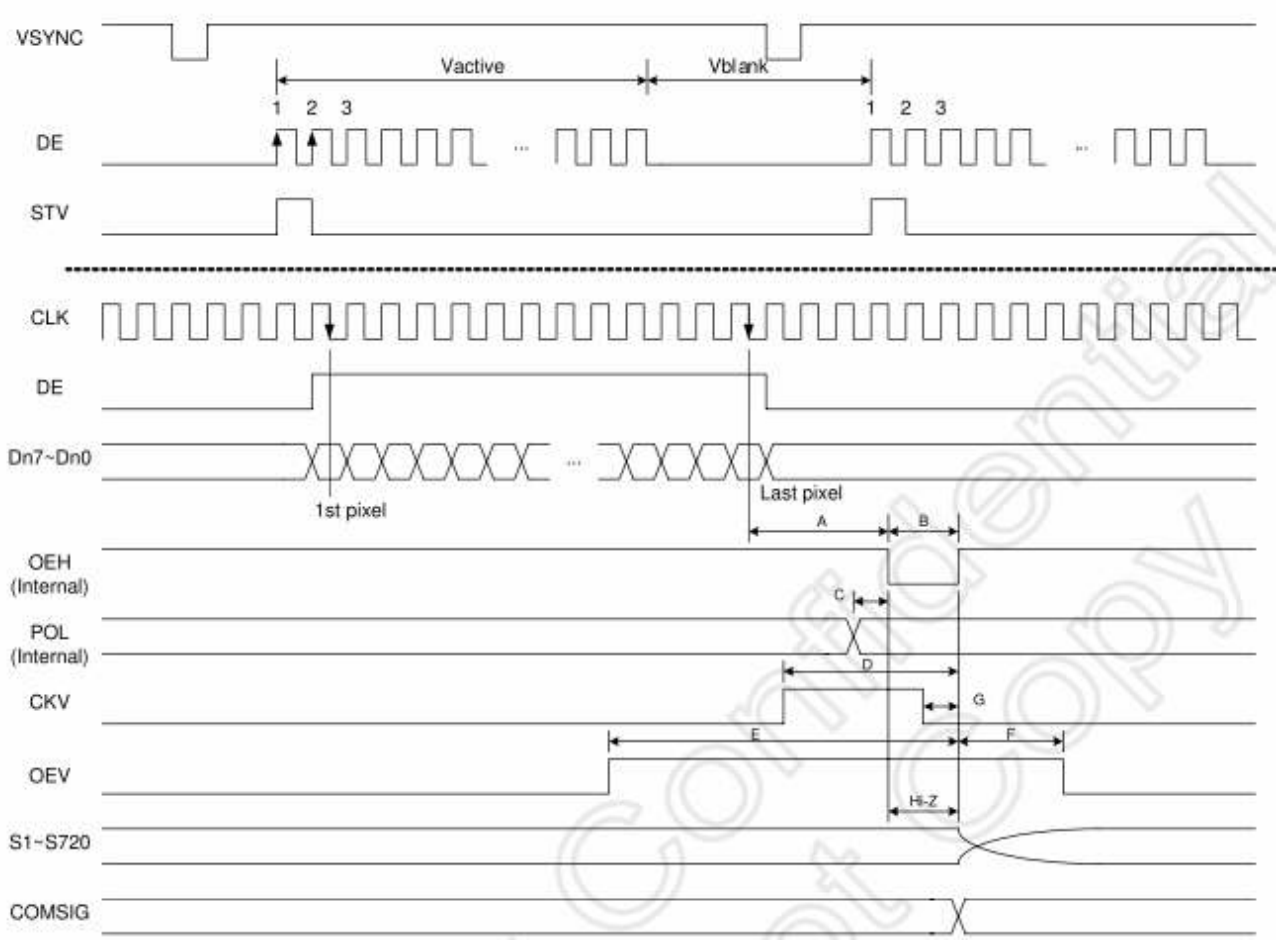
Backlight Unit (Connector : 2 pin FPC Solder Type)



7. Timing Characteristics

7.1 Gate driver Timing control

HX8227-A01 outputs gate driver timing signals from CKV, STV, and OEV pins.

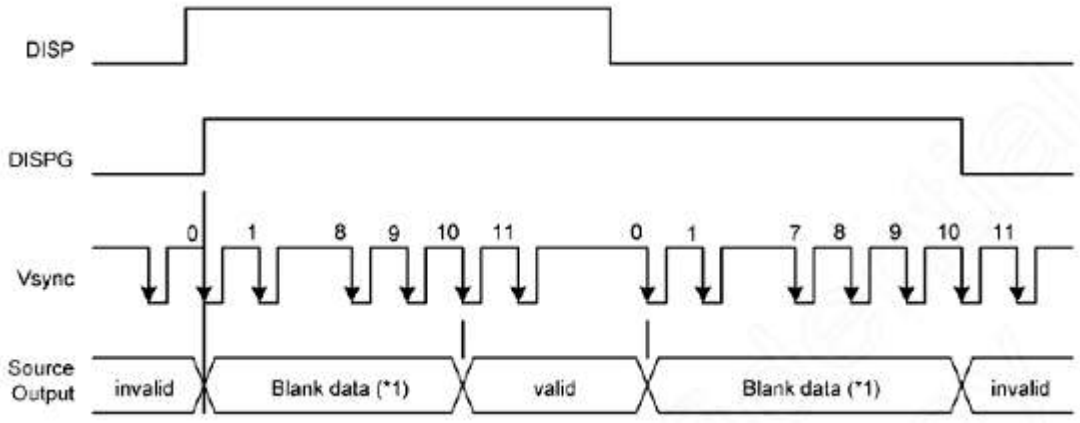


Timing	480RGBx272	480RGBx240	240RGBx320	240RGBx240
A	8	8	4	4
B	4	4	2	2
C	0	0	0	0
D	10	10	5	5
E	34	34	17	17
F	6	6	3	3
G	2	2	1	1

Note : The above parameters are for 24-bit parallel RGB interface. For 8-bit serial RGB interface, the parameters are all tripled.

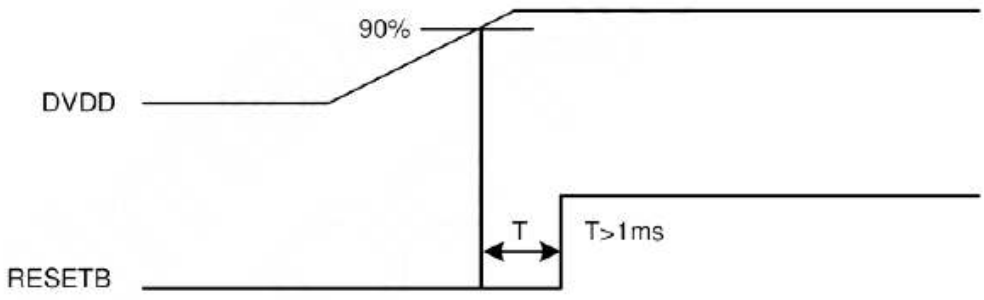
7.2 Power ON/OFF Control

HX8227-A has a power ON/FF sequence control function. When DISP pin is pulled "H", blank data is outputted for 10-frames first, from the falling edge of the following VSYNC signal. Similarly, when DISP is pulled "L", 10-frames of blank data will be outputted from the falling edge of the following VSYNC, too. The blank data would be gray level 0 for normally black LC (NBW="H"), and be gray level 255 for normally white LC (NBW="L")



7.3 Reset

HX8227-A is internally initialized by the global reset signal, RESETB. The reset input must be held for at least 1ms after power is stable.



7.4 Timing specification

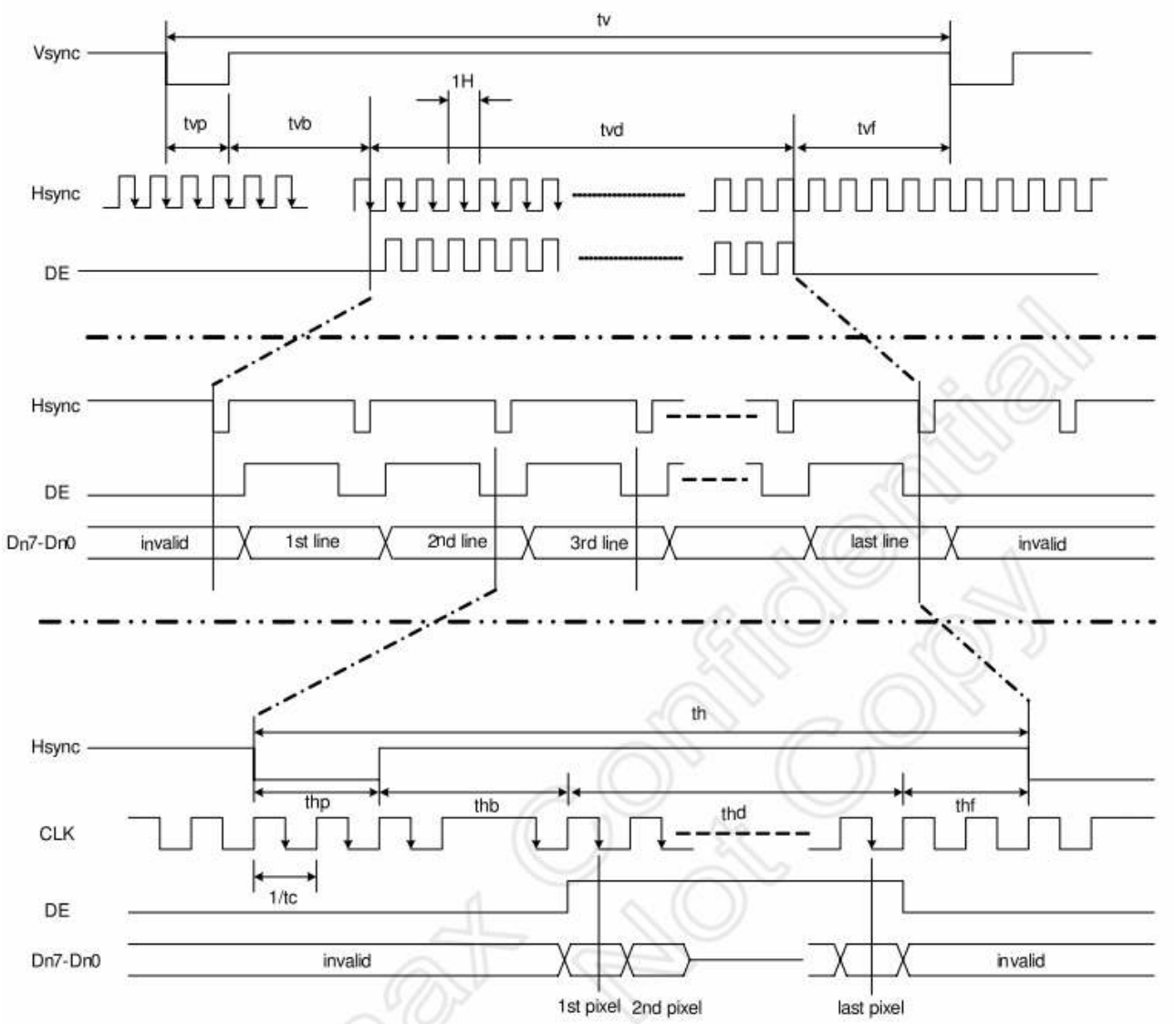
(480RGBx272, T_A=25°C, DVDD=2.25V to 3.6V, DVSS=0V)

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

Note :

1. Parallel interface. Clock frequency and horizontal signal parameters are tripled in serial interface. The Maximum clock frequency of serial interface is 33MHz.
2. thd=480CLK, thf=2CLK, thp=41CLK, thb=2CLK, thf+thp+thb>44CLK. (CLK=1/fCLK, H=th)

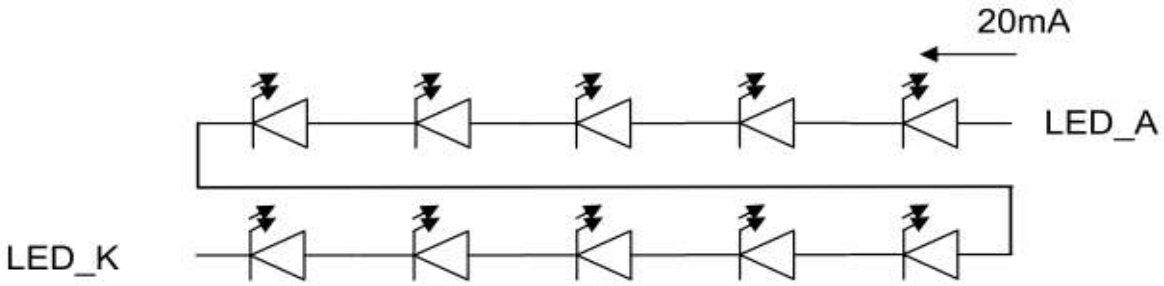
7.5 Timing characteristic



8. Backlight

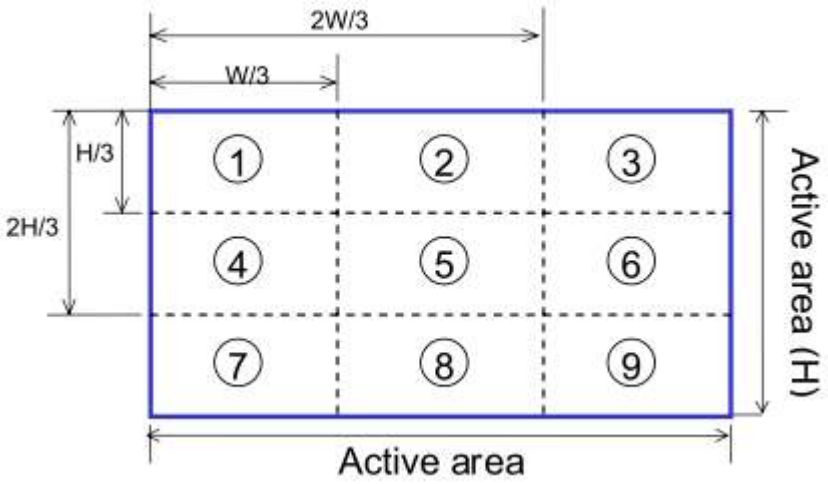
Item	Symbol	Condition	Min.	Typ.	Max.	Units
LED module voltage	V_{LED}	I_{LED}=20mA	27.0	33.0	37.0	V
LED module current	I_{LED}	V_{LED}=33.0V	---	20	---	mA
Power consumption	W_{LED}	I_{LED}=20mA		660.0		mW
Surface brightness uniform (without LCD)	L_D	I_{LED}=20mA V_{LED}=33.0V	---	80	---	%

● **1. Backlight LED Circuit :**



● **2. Uniform measure condition :**

(a) To measure 9 point. Measure location is show below :
(b) Uniform = (Min. brightness / Max. brightness) x100%
(c) Best Contrast, Main and sub panel all dots turn ON (White screen)



9. Reliability

9.1 MTTF

The LCD module shall be designed to meet a minimum MTTF value of 50,000 hours with normal condition. (25°C in the room without sunlight; not include lifetime of backlight and Touch Panel).

9.2 Tests

No.	Item	Condition	Criterion
1	High Temperature Operating	+70°C 240hrs	。No defect of operational function in room temperature are allowable. 。Leakage current should be below double of initial value.
2	Low Temperature Operating	-20°C 240hrs	
3	High Temperature Non-Operating	+80°C 240hrs	
4	Low Temperature Non-Operating	-30°C 240hrs	
5	High Temperature / Humidity Non-Operating	50°C ; 90%RH ; 240hrs	
6	Temperature Shock Non-Operating	-30°C ←→ 80°C (30min) (5min) (30min) 10 Cycles	
7	Electro-Static Discharge	HBM : ±2kv	

Note 1: Test after 24 hours in room temperature(23±5°C).

Note 2: The sampling above is individually for each reliability testing condition.

Note 3: The color fading of polarizing filter should not care.

Note 4: All of the reliability testing chamber above, is using D.I. water.(Min value:1.0 MΩ-cm)

Note 5: In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

10. Inspection Criteria

10.1 Inspection Conditions

10.1.1 Environmental Conditions

The environmental conditions for inspection shall be as follows

Room Temperature : 23±5°C

Humidity : 50±20%RH

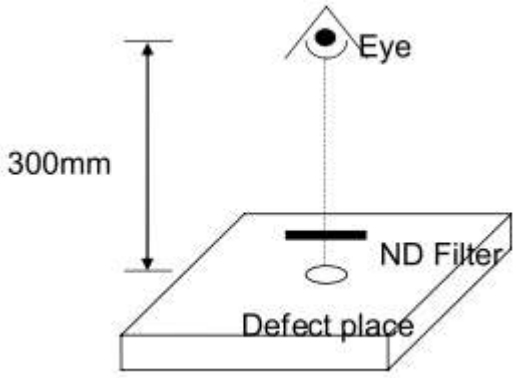
10.1.2 The External Visual Inspection

With 1000±200 lux fluorescent lamp as the light source, the inspection was in the distance of 30cm or more from the LCD to the inspector's eyes .

10.2 Light Method

Environment lamp under 1000±200 lux, viewing direction for inspection over 30 cm

The distance from eye to defect around 300mm, the distance from ND Filter to defect around 20~30mm



10.3 Classification of Defects

10.3.1 Major Defect

A major defect refers to a defect that may substantially degrade usability for product applications.

10.3.2 Minor Defect

A minor defect refers to a defect which is not considered to be able substantially degrade the product application or a defect that deviates from existing standards almost unrelated to the effective use of the product or its operation.

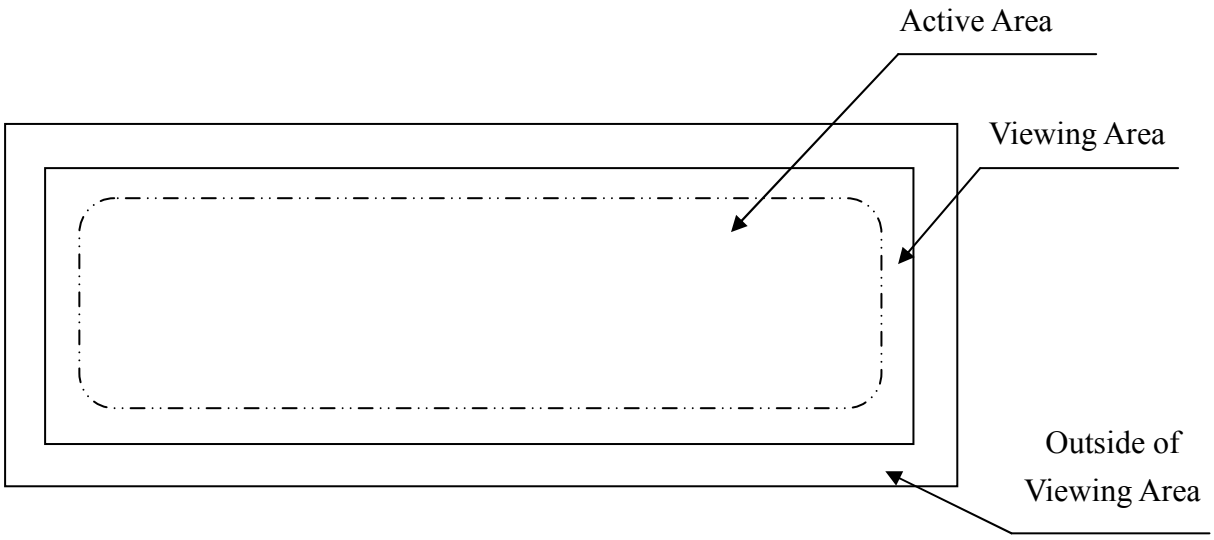
Notes: If the LCD/LCM's cosmetic and display performance do not specify in "inspection criterion", it should be based on these delivered samples.

10.4 Sampling & Acceptable Quality Level

Inspection Item	Major Defect	Minor Defect
Cosmetic	1.0%	1.5%
Electrical-display	0.4%	0.65%

10.5 Definition of Inspection Area

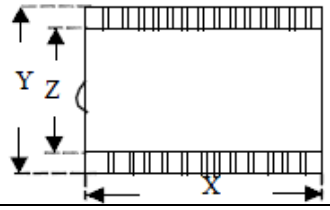
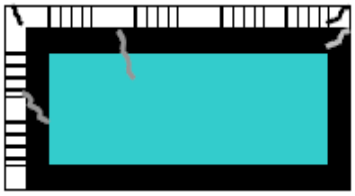
V/A : Viewing Area
A/A : Active Area



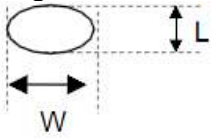
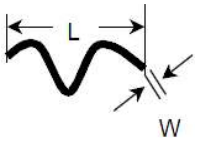
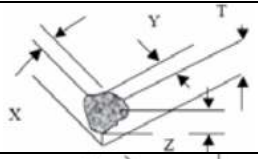
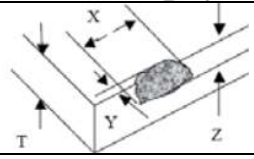
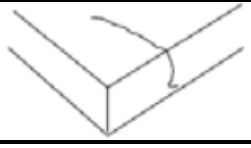
10.6 Items and Criteria

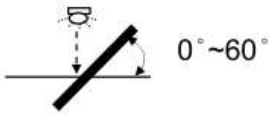
10.6.1 Visual Inspection Criterion in Cosmetic

(1) Glass Defect

Glass Defect			
No	**Defect**	**Criteria**	**Remark**
1	Dimension (Minor)	By engineering diagram	
2	Cracks (Major)	Extensive crack [Reject]	

(2) LCM Appearance Defect with in A.A. (With Touch Panel)

No	Defect	Criteria		Remark
1	Round Type (Minor)	Spec.	Permissible Q'ty	1. Φ =(L+W)/2, L: Length, W: Width 2. Disregard if out of A.A. 
		Φ ≦0.20mm	Disregard	
		0.20mm< Φ ≦0.50mm	5	
		0.50mm< Φ	0	
2	Line Type (Minor)	Spec.	Permissible Q'ty	1. L: Length, W: Width 2. Disregard if out of A.A. 
		W≦0.10mm and L≦10mm	Disregard	
		L≦10mm and 0.10mm<W≦0.25mm	4	
		W>0.25mm or L>10mm	0	
3	Corner chip (Minor)	X≦3.0mm, Y≦3.0mm, Z≦T	[Disregard]	
4	Edge chip (Minor)	X≦3.0mm, Y≦3.0mm, Z≦T	[Disregard]	
5	Crack (Major)	Not allowed		

6	Newton's ring (Minor)	Defect Spec.	Permissible Q'ty	Under day light 
		Φ ≦7mm	Disregard	
		Φ >7mm	0	

(3) FPC

No	Defect	Criteria	Remark
1	Copper Peeling (Minor)	Copper Peeling [Reject]	

(4) Black Tape

No	Defect	Criteria	Remark
1	Shift (Minor)	IC exposed [Reject]	
2	No Black Tape (Minor)	No Black Tape [Reject]	

(5) Silicon

No	Defect	Criteria	Remark
1	Amount of Silicon (Minor)	ITO exposed [Reject]	

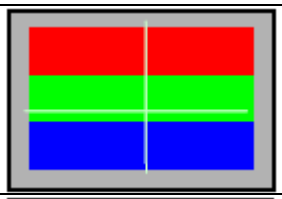
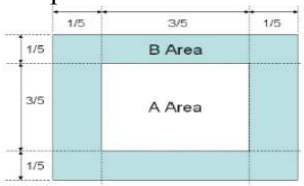
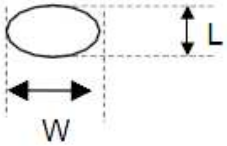
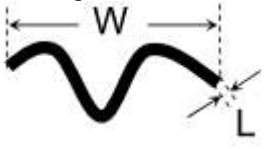
(6) Bezel

No	Defect	Criteria	Remark
1	Oxidized spot (Minor)	Oxidized spot, rust [Reject]	
2	Outline Deformation (Minor)	By engineering diagram	
3	Greasiness (Minor)	Greasiness [Reject]	
4	Spots, round type (Minor)	H≦By engineering diagram [Disregard]	H=Total height (thickness)
5	Plating (Minor)	Bubble, peeling [Reject]	

(7) Power cord

No	Defect	Criteria	Remark
1	Power cord (Minor)	Power cord loose	

10.6.2 LCM Electrical Criterion (with Touch Panel)

No	Defect	Criteria				Remark
1	No Display (Major)	Not Allowed				
2	Missing Line (Major)	Not Allowed				
3	Darker or Lighter Line (Major)	Not Allowed				
4	Weak Line (Minor)	By Limited Sample				
5	Bright / Dark Point (Minor)		A area	B area	Total	1:1sub-pixel: 1R or 1G or 1B 2:Point defect area≧1/2 sub pixel. 
		Bright point	0	2	2	
		Dark dot point	2	3	3	
		Bright + Dark point	2	3	4	
		Two adjacent dot	0	1	1	
6	Round Type (Minor)	Spec.	Permissible Q'ty			1. Φ =(L+W)/2 , L:Length, W: Width 2. Disregard if out of A.A. 
		Φ ≦0.20mm	Disregard			
		0.20mm<Φ ≦0.50mm	5			
		0.50mm<Φ	0			
7	Line Type (Minor)	Defect Spec.	Permissible Q'ty			1. L: Length, W: Width 2. Disregard if out of A.A. 
		W≦0.10mm and L≦10mm	Disregard			
		0.10mm<W≦0.25mm and L≦10mm	4			
		W>0.25mm or L>10mm	0			
8	Mura (Minor)	By 2% ND filter invisible				

Others

1. Issues that are not defined in this document shall be discussed and agreed with both parties. (Customer and supplier)
2. Unless otherwise agreed upon in writing, the criteria shall be applied to both parties. (Customer and supplier)

11. Touch Panel Criteria

11.1. Range Of Application

This specification shall apply to analog type pen or finger input transparent touch panel.

11.2. Shape

Shape, structure and dimension please refer to attached drawing or table.

11.3. Rating

11.3.1 Operating Voltage

DC 5 Volt, 35mA at contact point between upper and lower layer.

11.3.2 Operating temperature range

From 0℃ to 50℃ (60% RH , No dew condensation),

11.3.3 Storage temperature range

From -10℃ to 60℃ (60% RH , No dew condensation), but continually excess

240hrs is not allowed when the storage temperature in –10℃；and continually excess

240hrs is not allowed when the storage temperature in 60℃.

11.4.Electric Performance

11.4.1 Terminal resistance

Direction ”X”：（145~380）ohm；Direction ”Y”：（240~625）ohm

Use 0.8R stylus at 35gm, measuring 4 corners of touch panel, 5mm inside the active

area, each corner must blow 900Ω

11.4.2 Linearity

Direction ”X” 1.5% or less

Direction ”Y” 1.5% or less

11.4.3 Insulation resistance

20 Mohm or more with DC 25 Volt applied.

11.4.4 Response time

15 msec or less

11.5. Mechanical Performance

11.5.1 Input

Through 0.8R stylus or finger

11.5.2 Activation force

Input with stylus：Stylus： < 90gf

11.5.3 Surface hardness

3H pencil or more according to JIS-K5400

11.6. Optical Performance

11.6.1 Optical Transparency

Total Transmission：Over 75%

Haze：min 1% haze(scattering rate)

Newton ring：specified level or less(arrange in advance with acceptable sample)

Inspected under (500) Lux incandescent daylight.