

# TFT SPECIFICATION

Part Number	USMP-T043-048027NAS-A0
Size	4.3"
Resolution	480 x 272
Brightness	460 cd/m <sup>2</sup>
Contrast	600:1
Viewing Angle	60/60/60/60
Operating Temp.	-20 ~ 70°C

FOR ADDITIONAL INFORMATION  
PLEASE CONTACT:  
[engineering@usmicroproducts.com](mailto:engineering@usmicroproducts.com)

Issue Date	Approved by (customer use)	Checked by	Prepared by

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## History of Version

Date (mm / dd / yyyy)	Ver.	Edi.	Description	Page	Design by
05/22/2014	01	001	New Drawing.	-	Howard
06/04/2014	01	002	Second Drawing Disp pin internal connect to H Modify Frame Drawing	12 Appendix	Howard
07/15/2014	01	003	New Sample	-	Howard
05/26/2015	01	004	Modify Average Brightness Add LED Life Time Add Rear View	6 9 Appendix	Howard
10/20/2015	01	005	Modify Packaging Specification	Appendix	Howard

Total: 27 Pages

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2. Packaging Specification

Note : For detailed information please refer to IC data sheet :

Primacy(TFT LCD): Sitronix--ST7282-G4

(Or compatible IC )

# 1. SPECIFICATIONS

## 1.1 Features

Item	Standard Value
Display Type	480 * 3 (RGB) * 272 Dots
LCD Type	a-Si TFT , Normally white, Transmissive type
Screen size(inch)	4.3 inch
Viewing Direction	6 O'clock
Color configuration	RGB-Strip
Backlight Type	LED B/L
Interface	Digital 24-bits RGB
Other(controller/driver IC)	ST7282-G4 (Or Compatible IC )
ROHS	THIS PRODUCT CONFORMS THE ROHS

## 1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	105.5(W) x 67.2 (L) x 2.6(H) +0,-0.2	mm

### LCD panel

Item	Standard Value	Unit
Viewing Area	96.7 (W) * 55.3 (L)	mm
Active Area	95.04 (W) x 53.856 (L)	mm
Pixel Size	0.198 (W) * 0.198 (H)	mm

Note : For detailed information please refer to LCM drawing

### 1.3 Absolute Maximum Ratings

#### Module

Item	Symbol	Condition	Min.	Max.	Unit
System Power Supply Voltage	VDD	GND=0	-0.3	4.6	V
Operating Temperature	T <sub>OP</sub>	-	-20	70	°C
Storage Temperature	T <sub>ST</sub>	-	-30	80	°C
Storage Humidity	H <sub>D</sub>	Ta < 60 °C	10	90	%RH

### 1.4 DC Electrical Characteristics

#### Module

GND = 0V, Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	VDD	-	3.0	3.3	3.6	V
	VGH	-	13	15	16	V
	VGL	-	-10	-10	-7	V
Input H/L Level Voltage	VIH	-	0.7VDD	-	VDD	V
	VIL	-	0	-	0.3VDD	V
Output H/L Level Voltage	VOH	-	VDD-0.4	-	VDD	V
	VOL	-	0	-	GND+0.4	V
Supply Current	I <sub>DD</sub>	VDD = 3.3 V Pattern=Photo *1	-	25	40	mA

Note1:Maximum current display

## 1.5 Optical Characteristics

### TFT LCD Module

VDD= 3.3 V, Ta=25°C

Item		Symbol	Condition	Min.	Typ.	Max.	unit	-
Response time	Tr+Tf	25	-	-	30	-	ms	-
Viewing angle	Top	$\theta Y+$	CR $\geq$ 10	-	60	-	Deg.	Note 4
	Bottom	$\theta Y-$		-	60	-		
	Left	$\theta X-$		-	60	-		
	Right	$\theta X+$		-	60	-		
Contrast ratio		CR		500	600	-	-	Note 3
Color of CIE Coordinate ( With B/L )	White	X	Ta = 25°C $\theta X, \theta Y = 0^\circ$	0.24	0.29	0.34	-	Note1
		Y		0.29	0.34	0.39		
	Red	X		0.54	0.59	0.64		
		Y		0.29	0.34	0.39		
	Green	X		0.28	0.33	0.38		
		Y		0.57	0.62	0.67		
	Blue	X		0.10	0.15	0.20		
		Y		0.06	0.11	0.16		
Average Brightness Pattern=white display (With LCD)*1		IV	IF= 20 mA	310	460	-	cd/m <sup>2</sup>	Note1
Uniformity (With LCD)*2		B	IF= 20 mA	70	-	-	%	Note1

Note 1:

\*1 :  $B=B(\min) / B(\max) * 100\%$

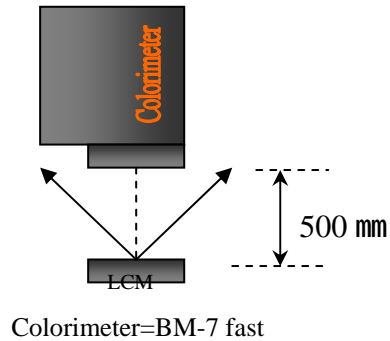
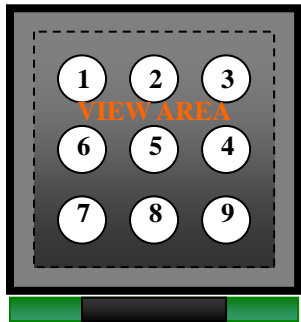
\*2 : Measurement Condition for Optical Characteristics:

a : Environment:  $25 \pm 5$  /  $60 \pm 20\%$ R.H , no wind , dark room below 10 Lux at typical lamp current and typical operating frequency.

b : Measurement Distance:  $500 \pm 50$  mm , ( $\theta = 0^\circ$ )

c : Equipment: TOPCON BM-7 fast , (field  $1^\circ$ ) , after 10 minutes operation.

d : The uncertainty of the C.I.E coordinate measurement  $\pm 0.01$  , Average Brightness  $\pm 4\%$



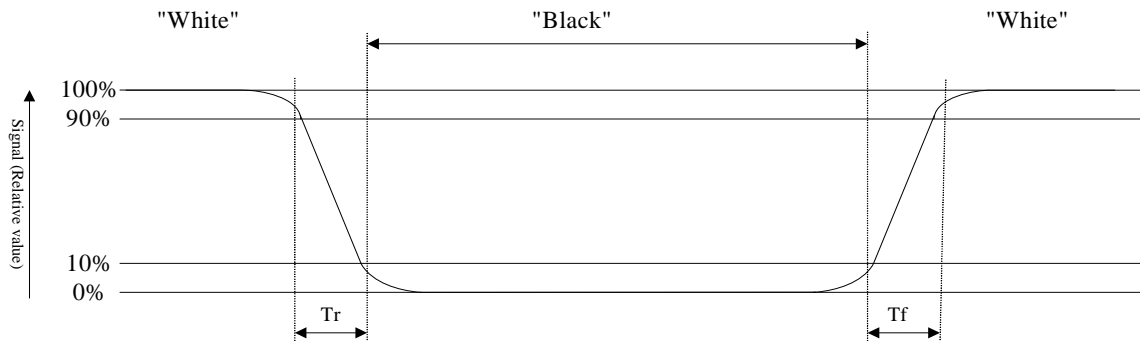
To be measured at the center area of panel with a viewing cone of  $1^\circ$  by Topcon luminance meter BM-7, after 10 minutes operation (module)

Note2: Definition of response time:

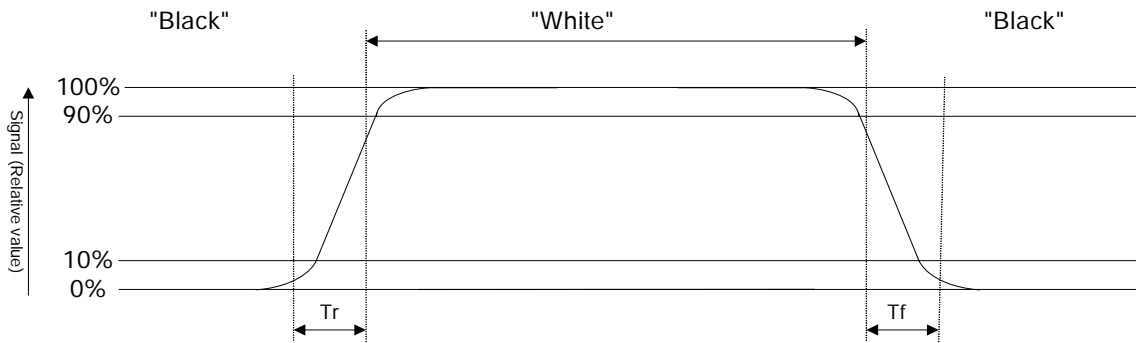
The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.

Refer to figure as below:

Normally White



Normally Black



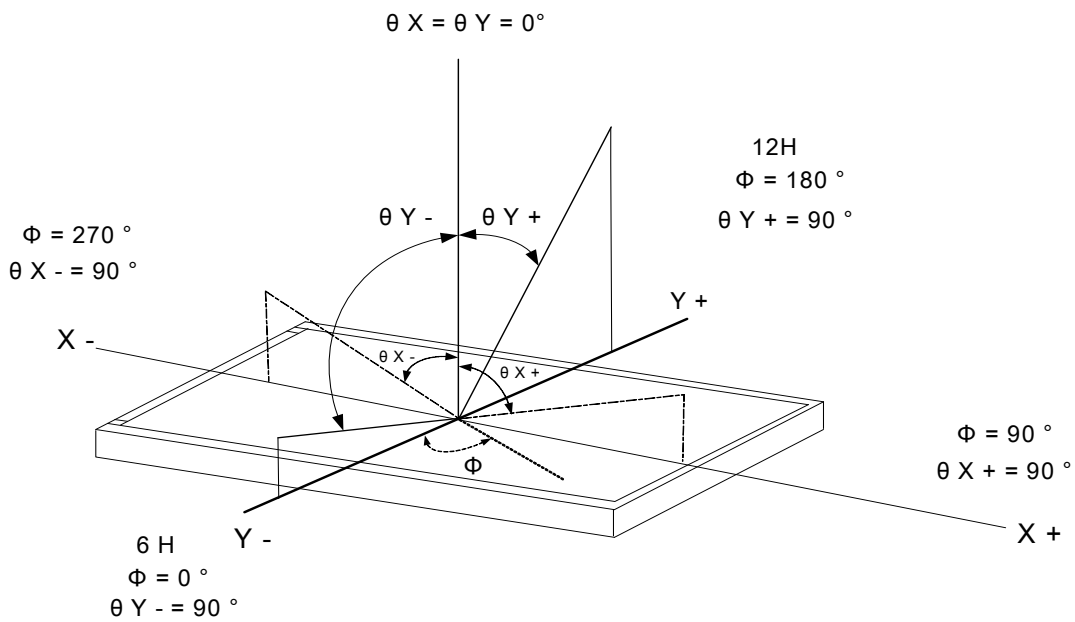
Note3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula

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

Note4: Definition of viewing angle:

Refer to figure as below:





## 1.6 Backlight Characteristics

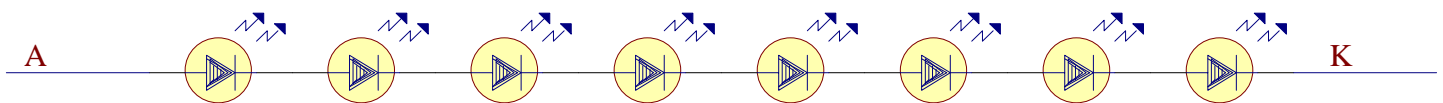
### Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
LED Forward Current (Each LED)	IF	Ta =25	-	30*1	mA
LED Reverse Voltage (Each LED)	VR	Ta =25	-	5.0	V
Power Dissipation	PD	Ta =25	-	90*8	mW

### Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF=20mA	-	25.6	-	V
Average Brightness (Without LCD )	IV		6500	7800	-	cd/m <sup>2</sup>
CIE Color Coordinate (Without LCD )	X		-	0.28	-	-
	Y		-	0.30	-	
Color	White					
LED Lifetime	20000 Hrs at 25					

B/L Internal Circuit Diagram:



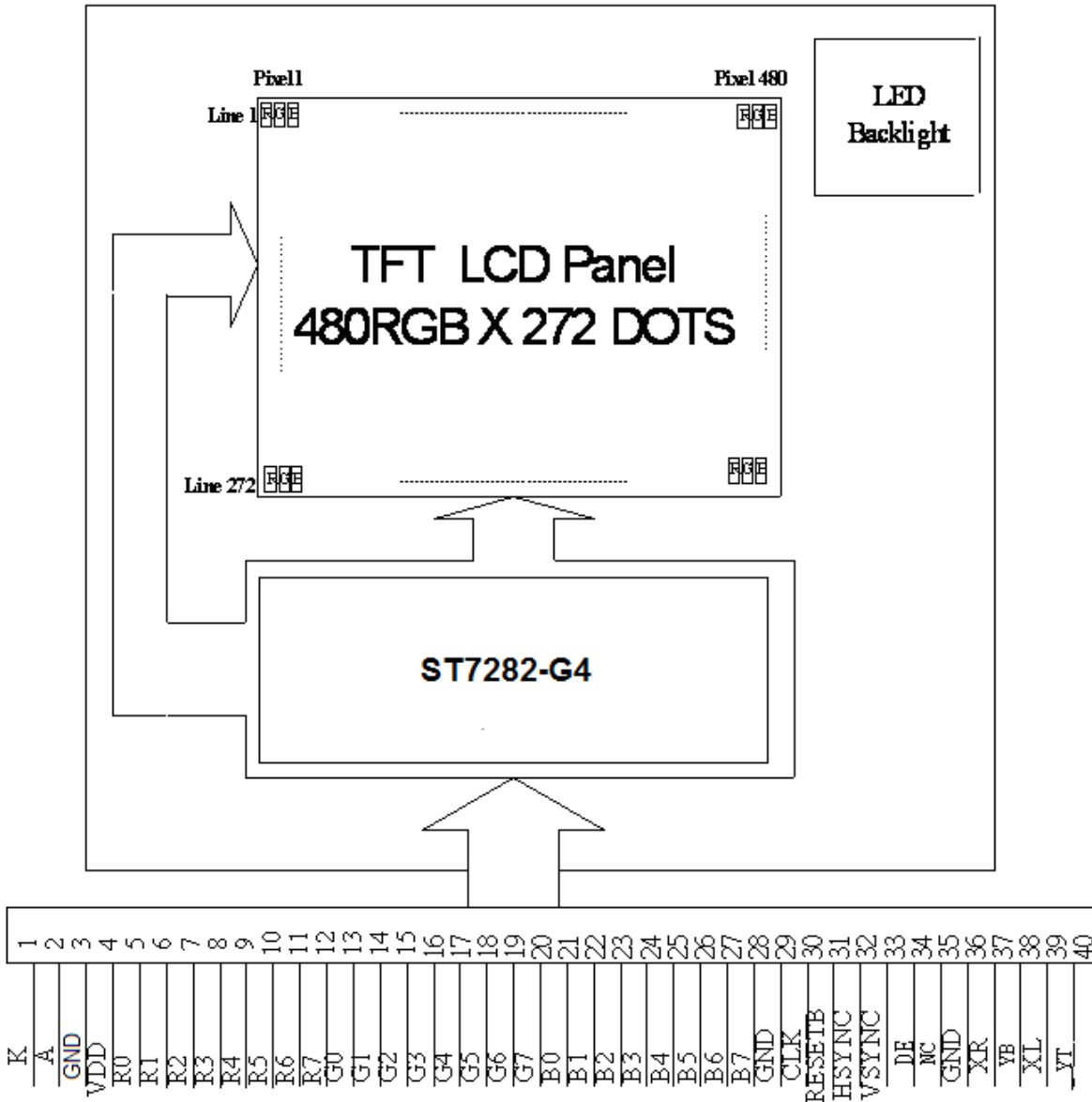
## 2. MODULE STRUCTURE

### 2.1 Counter Drawing

#### 2.1.1 LCM Mechanical Diagram

\* See Appendix

#### 2.1.2 Block Diagram



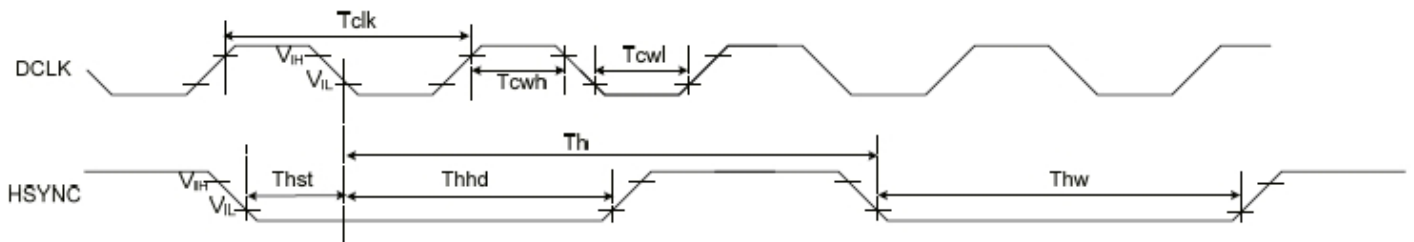
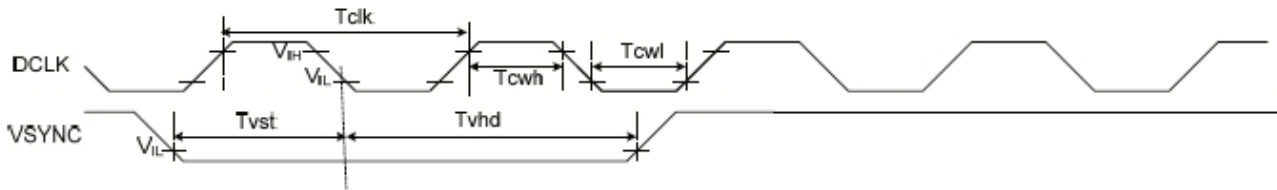
## 2.2 Interface Pin Description

Pin No.	Symbol	Function
1	K	Power supply for LED Backlight cathode input
2	A	Power supply for LED Backlight anode input
3	GND	Ground
4	VDD	Digital power
5	R0	Red data bit 0
6	R1	Red data bit 1
7	R2	Red data bit 2
8	R3	Red data bit 3
9	R4	Red data bit 4
10	R5	Red data bit 5
11	R6	Red data bit 6
12	R7	Red data bit 7
13	G0	Green data bit 0
14	G1	Green data bit 1
15	G2	Green data bit 2
16	G3	Green data bit 3
17	G4	Green data bit 4
18	G5	Green data bit 5
19	G6	Green data bit 6
20	G7	Green data bit 7

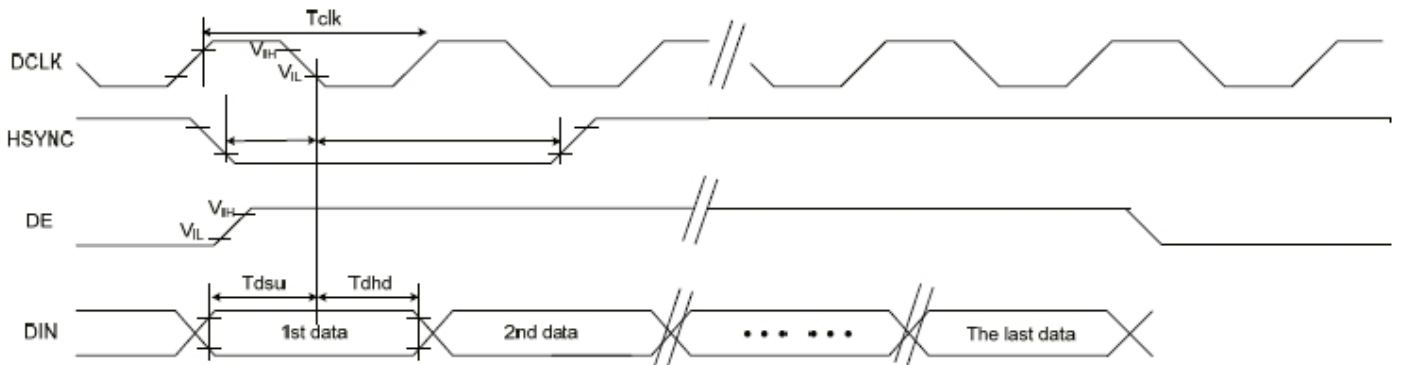
Pin No.	Symbol	Function
21	B0	Blue data bit 0
22	B1	Blue data bit 1
23	B2	Blue data bit 2
24	B3	Blue data bit 3
25	B4	Blue data bit 4
26	B5	Blue data bit 5
27	B6	Blue data bit 6
28	B7	Blue data bit 7
29	GND	Ground
30	CLK	Dot data clock
31	DISP	Display control / standby mode selection "High" : Normal display
32	HSYNC	Horizontal sync input
33	VSYNC	Vertical sync input
34	DE	Data input enable. Active High to enable the data input
35	N.C	Not Connect.
36	GND	Ground
37	XR	Not Connect.
38	YB	Not Connect.
39	XL	Not Connect.
40	YT	Not Connect.

## 2.3 Timing Characteristics

### 2.3.1 Clock and Data Input Timing



### 2.3.2 SYNC-DE MODE

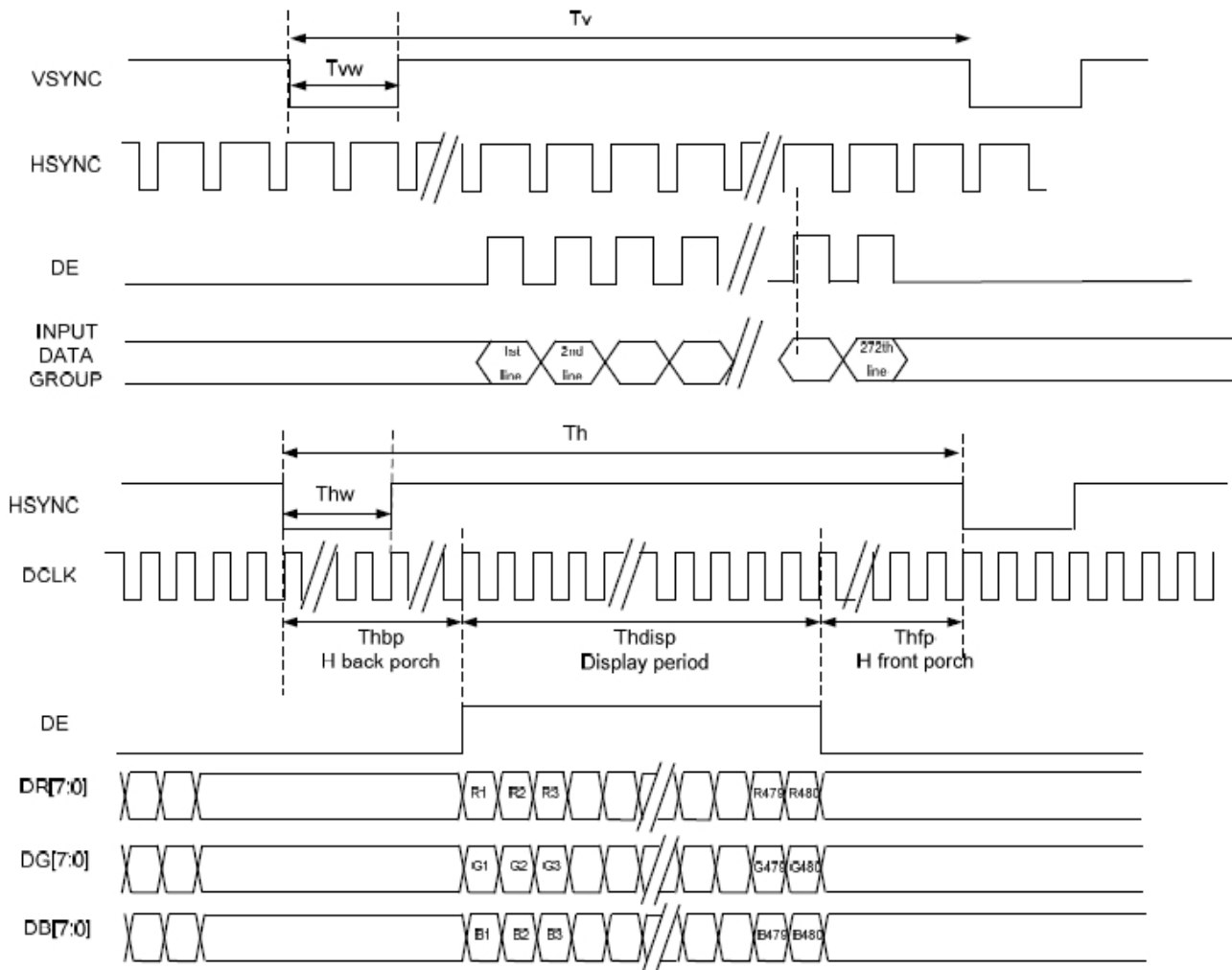


Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
System operation timing						
VDD power source slew time	TPOR	-	-	20	ms	From 0V to 99% VDD
GRB pulse width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
Input/ Output timing						
CLK pulse duty	Tcw	40	50	60	%	
Hsync width	Thw	1	-	-	DCLK	
Hsync period	Th	55	60	65	us	
Vsync setup time	Tvst	12	-	-	ns	
Vsync hold time	Tvhd	12	-	-	ns	
Hsync setup time	Thst	12	-	-	ns	
Hsync hold time	Thhd	12	-	-	ns	
Data setup time	Tdsu	12	-	-	ns	
Data hold time	Tdhd	12	-	-	ns	
SD output stable time	Tst	-	-	12	us	Output settled within +20mV Loading = 6.8k+28.2pF.
GD output rise and fall time	Tgst	-	-	6	us	Output settled (5%~95%), Loading = 4.7k+29.8pF

### 2.3.3 Parallel RGB Input Timing Table

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	9	12	15	MHz	
DCLK Period		Tclk	67	83	111	ns	
HSYNC	Period Time	Th	485	525	532	DCLK	
	Display Period	Thdisp		480		DCLK	
	Back Porch	Thbp	3	43	50	DCLK	By H_Blanking setting
	Front Porch	Thfp	2	2	2	DCLK	
	Pulse Width	Thw	1	1	1	DCLK	
VSYNC	Period Time	Tv	275	285	303	H	
	Display Period	Tvdisp		272		H	
	Back Porch	Tvbp	2	12	30	H	By V_Blanking setting
	Front Porch	Tvfp	1	1	1	H	
	Pulse Width	Tvw	1	1	1	H	

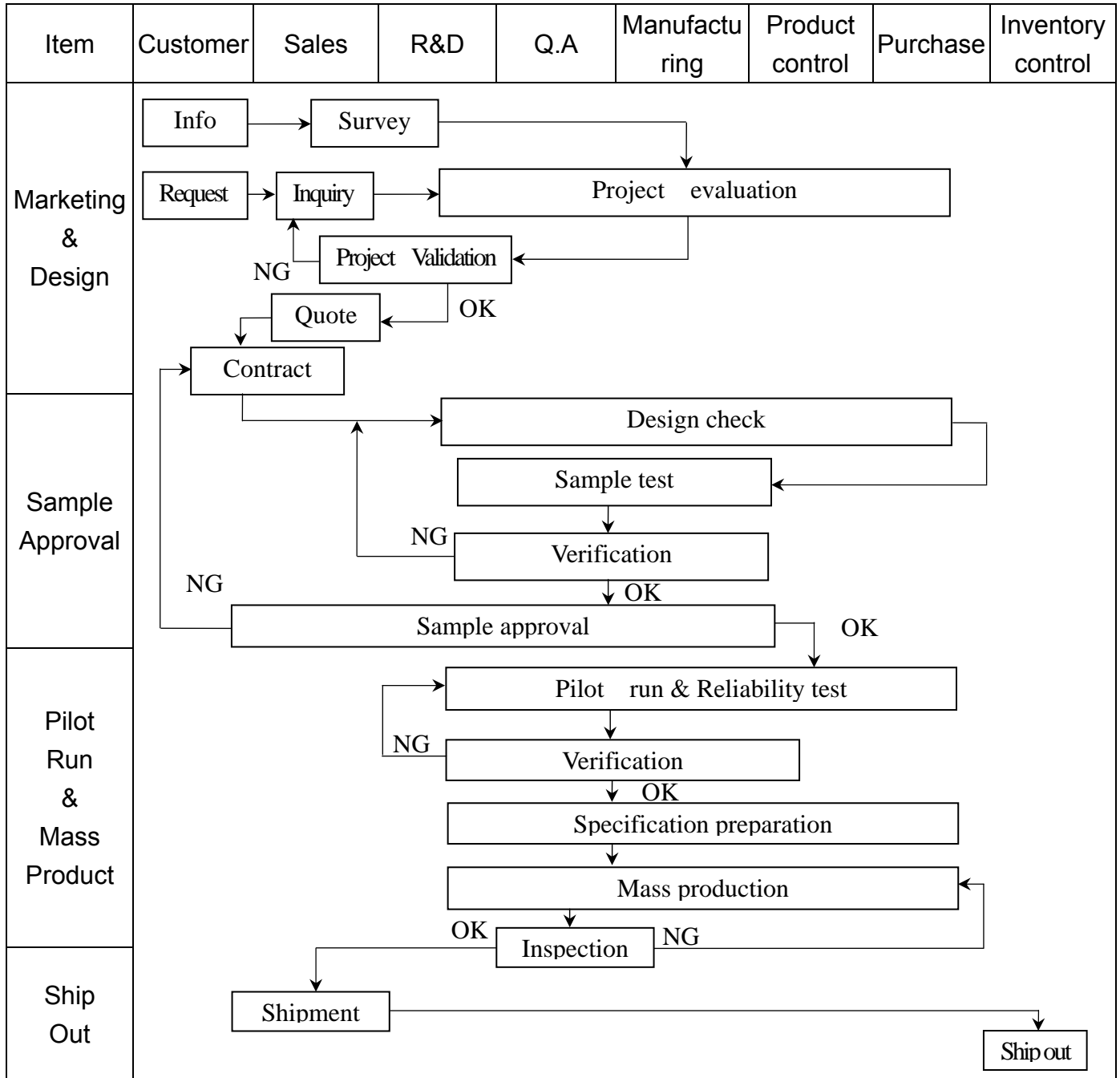
### 2.3.4 SYNC-DE Mode Timing





### 3. QUALITY ASSURANCE SYSTEM

#### 3.1 Quality Assurance Flow Chart



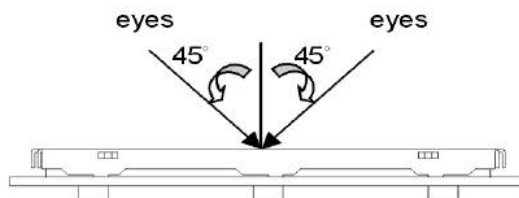
Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service	<pre> graph TD     Info[Info] --&gt; Claim[Claim]     Claim --&gt; Failure[Failure analysis]     Failure --&gt; Report[Analysis report]     Failure --&gt; Action[Corrective action]     Action --&gt; Tracking[Tracking]           </pre>							
Q.A Activity	1. ISO 9001 Maintenance Activities 3. Equipment calibration 5. Standardization Management				2. Process improvement proposal 4. Education And Training Activities			

### 3.2 Inspection Specification

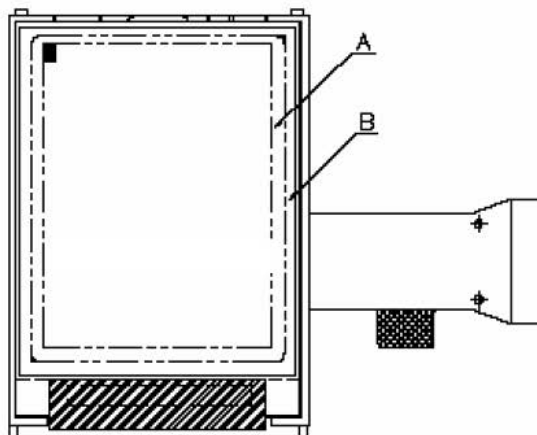
- ◆Scope : The document shall be applied to TFT-LCD Module for 3.5" ~10" (Ver.B01).
- ◆Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II.
- ◆Equipment : Gauge 、 MIL-STD 、 Tester 、 Sample
- ◆Defect Level : Major Defect AQL : 0.4 ; Minor Defect AQL : 1.5
- ◆OUT Going Defect Level : Sampling.
- ◆Standard of the product appearance test :

a. Manner of appearance test :

- (1). The test best be under 20W×2 fluorescent light , and distance of view must be at 30 cm.
- (2). The test direction is base on about around 45° of vertical line.



(3). Definition of area.



*A* area : viewing area

*B* area : Outside of viewing area

(4). Standard of inspection : (Unit : mm)

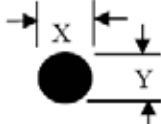
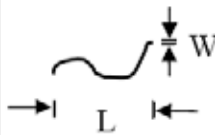
**◆ Specification For TFT-LCD Module 3.5" ~10" :**

(Ver.B01)

NO	Item	Criterion	Level												
01	Product condition	1. 1 The part number is inconsistent with work order of production.	Major												
		1. 2 Mixed product types.	Major												
		1. 3 Assembled in inverse direction.	Major												
02	Quantity	2. 1 The quantity is inconsistent with work order of production.	Major												
03	Outline dimension	3. 1 Product dimension and structure must conform to structure diagram.	Major												
04	Electrical Testing	4. 1 Missing line character and icon.	Major												
		4. 2 No function or no display.	Major												
		4. 3 Display malfunction.	Major												
		4. 4 LCD viewing angle defect.	Major												
		4. 5 Current consumption exceeds product specifications.	Major												
05	Dot defect (Bright dot 、 Dark dot)  On -display	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Item</th> <th>Acceptance (Q'ty)</th> </tr> </thead> <tbody> <tr> <td rowspan="4" style="text-align: center; vertical-align: middle;">Dot Defect</td> <td style="text-align: center;">Bright Dot</td> <td style="text-align: center;"><math>\leq 4</math></td> </tr> <tr> <td style="text-align: center;">Dark Dot</td> <td style="text-align: center;"><math>\leq 5</math></td> </tr> <tr> <td style="text-align: center;">Joint Dot</td> <td style="text-align: center;"><math>\leq 3</math></td> </tr> <tr> <td style="text-align: center;">Total</td> <td style="text-align: center;"><math>\leq 7</math></td> </tr> </tbody> </table> <p>5. 1 Inspection pattern : full white , full black , Red , Green and blue screens.</p> <p>5. 2 It is defined as dot defect if defect area <math>&gt; 1/2</math> dot.</p> <p>5. 3 The distance between two dot defect <math>\geq 5</math> mm.</p>		Item	Acceptance (Q'ty)	Dot Defect	Bright Dot	$\leq 4$	Dark Dot	$\leq 5$	Joint Dot	$\leq 3$	Total	$\leq 7$	Minor
	Item	Acceptance (Q'ty)													
Dot Defect	Bright Dot	$\leq 4$													
	Dark Dot	$\leq 5$													
	Joint Dot	$\leq 3$													
	Total	$\leq 7$													

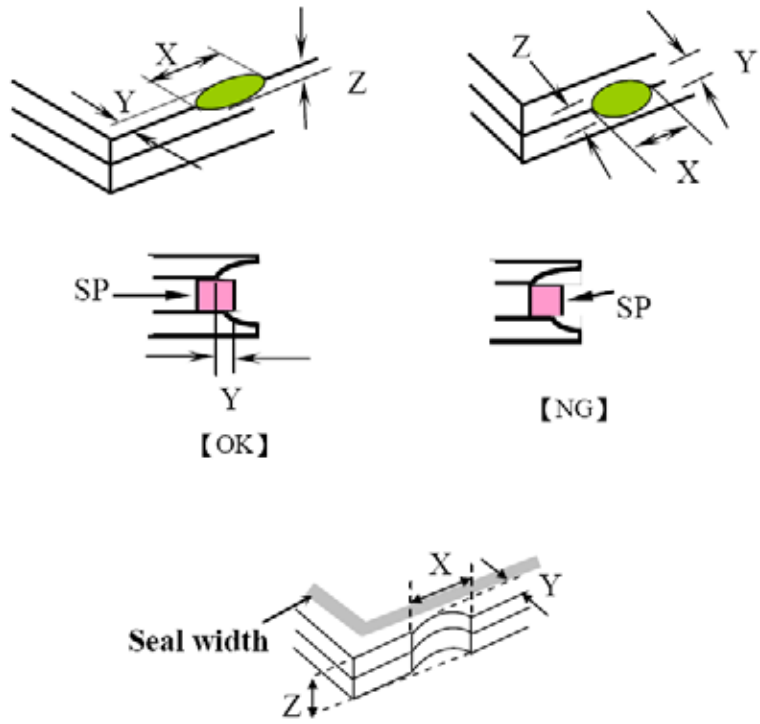
**◆ Specification For TFT-LCD Module 3.5" ~10" :**

(Ver.B01)

NO	Item	Criterion	Level																																						
06	<p>Black or white dot、scratch、contamination</p> <p>Round type</p>  <p><math>\Phi = (x + y) / 2</math></p> <p>Line type</p> 	<p>6.1 Round type ( Non-display or display) :</p> <table border="1" data-bbox="542 421 1305 828"> <thead> <tr> <th rowspan="2">Dimension (diameter : <math>\Phi</math>)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.25</math></td> <td colspan="2">Ignore</td> </tr> <tr> <td><math>0.25 &lt; \Phi \leq 0.50</math></td> <td>5</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>\Phi &gt; 0.50</math></td> <td>0</td> </tr> <tr> <td><b>Total</b></td> <td>5</td> </tr> </tbody> </table> <p>6.2 Line type( Non-display or display) :</p> <table border="1" data-bbox="513 945 1331 1402"> <thead> <tr> <th rowspan="2">Length (L)</th> <th rowspan="2">Width (W)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td>---</td> <td><math>W \leq 0.03</math></td> <td>Ignore</td> <td rowspan="4">Ignore</td> </tr> <tr> <td><math>L \leq 10.0</math></td> <td><math>0.03 &lt; W \leq 0.05</math></td> <td>4</td> </tr> <tr> <td><math>L \leq 5.0</math></td> <td><math>0.05 &lt; W \leq 0.10</math></td> <td>2</td> </tr> <tr> <td>---</td> <td><math>W &gt; 0.10</math></td> <td>As round type</td> </tr> <tr> <td colspan="2"><b>Total</b></td> <td>5</td> <td></td> </tr> </tbody> </table>	Dimension (diameter : $\Phi$ )	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.25$	Ignore		$0.25 < \Phi \leq 0.50$	5	Ignore	$\Phi > 0.50$	0	<b>Total</b>	5	Length (L)	Width (W)	Acceptance (Q'ty)		A area	B area	---	$W \leq 0.03$	Ignore	Ignore	$L \leq 10.0$	$0.03 < W \leq 0.05$	4	$L \leq 5.0$	$0.05 < W \leq 0.10$	2	---	$W > 0.10$	As round type	<b>Total</b>		5		Minor
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07	Polarizer Bubble	<table border="1" data-bbox="507 1469 1337 1881"> <thead> <tr> <th rowspan="2">Dimension (diameter : <math>\Phi</math>)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.25</math></td> <td colspan="2">Ignore</td> </tr> <tr> <td><math>0.25 &lt; \Phi \leq 0.50</math></td> <td>4</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>0.50 &lt; \Phi \leq 0.80</math></td> <td>1</td> </tr> <tr> <td><math>\Phi &gt; 0.80</math></td> <td>0</td> </tr> <tr> <td><b>Total</b></td> <td>5</td> <td></td> </tr> </tbody> </table>	Dimension (diameter : $\Phi$ )	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.25$	Ignore		$0.25 < \Phi \leq 0.50$	4	Ignore	$0.50 < \Phi \leq 0.80$	1	$\Phi > 0.80$	0	<b>Total</b>	5		Minor																				
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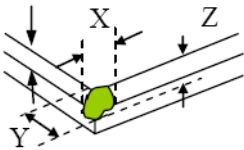
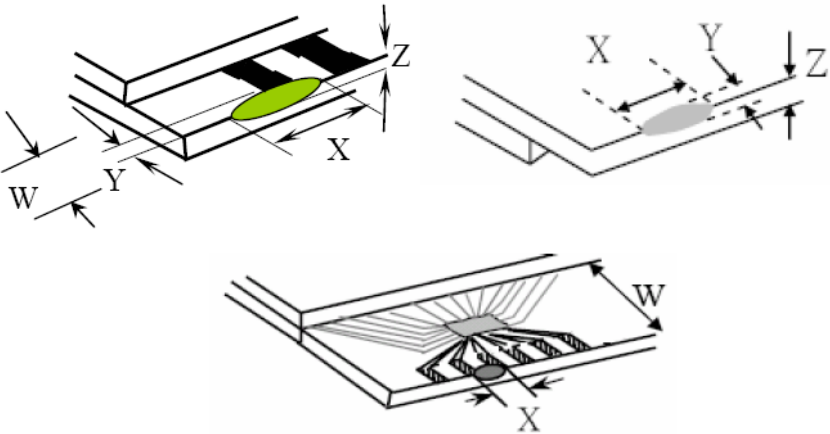
◆ Specification For TFT-LCD Module 3.5" ~10" :

(Ver.B01)

NO	Item	Criterion	Level						
08	The crack of glass	<p><b>Symbols :</b></p> <p><b>X : The length of crack</b>  <b>Z : The thickness of crack</b>  <b>t : The thickness of glass</b></p> <p><b>Y : The width of crack.</b>  <b>W : terminal length</b>  <b>a : LCD side length</b></p> <hr/> <p>8.1 General glass chip :            8.1.1 Chip on panel surface and crack between panels:</p> 	Minor						
		<table border="1"> <thead> <tr> <th data-bbox="544 1563 687 1619">X</th> <th data-bbox="687 1563 1043 1619">Y</th> <th data-bbox="1043 1563 1347 1619">Z</th> </tr> </thead> <tbody> <tr> <td data-bbox="544 1619 687 1731"><math>\leq a</math></td> <td data-bbox="687 1619 1043 1731">Crack can't enter viewing area</td> <td data-bbox="1043 1619 1347 1731"><math>\leq 1/2 t</math></td> </tr> <tr> <td data-bbox="544 1731 687 1843"><math>\leq a</math></td> <td data-bbox="687 1731 1043 1843">Crack can't exceed the half of SP width.</td> <td data-bbox="1043 1731 1347 1843"><math>1/2 t &lt; Z \leq 2 t</math></td> </tr> </tbody> </table>		X	Y	Z	$\leq a$	Crack can't enter viewing area	$\leq 1/2 t$
X	Y	Z							
$\leq a$	Crack can't enter viewing area	$\leq 1/2 t$							
$\leq a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$							

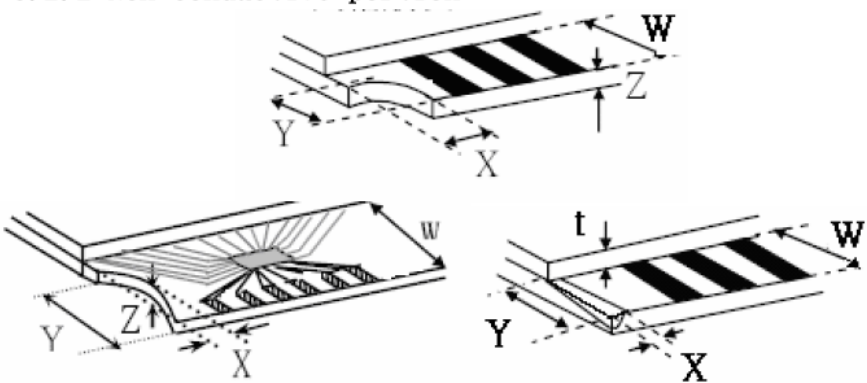
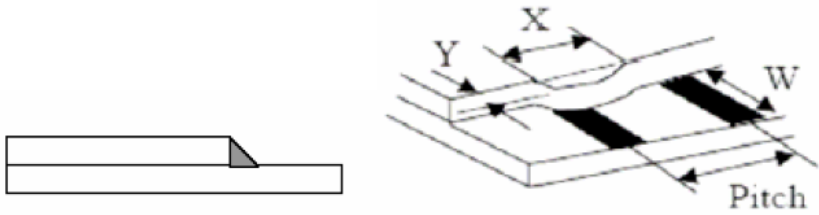
◆ Specification For TFT-LCD Module 3.5" ~10" :

(Ver.B01)

NO	Item	Criterion	Level												
08	The crack of glass	<p><b>Symbols :</b></p> <p><b>X :</b> The length of crack  <b>Z :</b> The thickness of crack  <b>t :</b> The thickness of glass</p> <p><b>Y :</b> The width of crack.  <b>W :</b> terminal length  <b>a :</b> LCD side length</p> <hr/> <p>8.1.2 Corner crack :</p>  <table border="1" data-bbox="525 759 1334 1048"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq 1/5 a</math></td> <td>Crack can't enter viewing area</td> <td><math>Z \leq 1/2 t</math></td> </tr> <tr> <td><math>\leq 1/5 a</math></td> <td>Crack can't exceed the half of SP width.</td> <td><math>1/2 t &lt; Z \leq 2 t</math></td> </tr> </tbody> </table>	X	Y	Z	$\leq 1/5 a$	Crack can't enter viewing area	$Z \leq 1/2 t$	$\leq 1/5 a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$				
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		<p>8.2 Protrusion over terminal :</p> <p>8.2.1 Chip on electrode pad :</p>  <table border="1" data-bbox="563 1680 1345 1850"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><b>Front</b></td> <td><math>\leq a</math></td> <td><math>\leq 1/2 W</math></td> <td><math>\leq t</math></td> </tr> <tr> <td><b>Back</b></td> <td><math>\leq a</math></td> <td><math>\leq W</math></td> <td><math>\leq 1/2 t</math></td> </tr> </tbody> </table>		X	Y	Z	<b>Front</b>	$\leq a$	$\leq 1/2 W$	$\leq t$	<b>Back</b>	$\leq a$	$\leq W$	$\leq 1/2 t$	Minor
	X	Y	Z												
<b>Front</b>	$\leq a$	$\leq 1/2 W$	$\leq t$												
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◆ Specification For TFT-LCD Module 3.5" ~10" :

(Ver.B01)

NO	Item	Criterion	Level									
08	The crack of glass	<p><b>Symbols :</b></p> <p><b>X : The length of crack</b>                      <b>Y : The width of crack.</b>  <b>Z : The thickness of crack</b>                <b>W : terminal length</b>  <b>t : The thickness of glass</b>                 <b>a : LCD side length</b></p>	Minor									
		<p>8.2.2 Non-conductive portion :</p>  <table border="1" data-bbox="630 963 1268 1120"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq 1/3 a</math></td> <td><math>\leq W</math></td> <td><math>\leq t</math></td> </tr> </tbody> </table> <p>⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.</p> <p>8.2.3 Glass remain :</p>  <table border="1" data-bbox="550 1736 1244 1892"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq a</math></td> <td><math>\leq 1/3 W</math></td> <td><math>\leq t</math></td> </tr> </tbody> </table>		X	Y	Z	$\leq 1/3 a$	$\leq W$	$\leq t$	X	Y	Z
X	Y	Z										
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X	Y	Z										
$\leq a$	$\leq 1/3 W$	$\leq t$										



**◆Specification For TFT-LCD Module 3.5" ~10" :**

(Ver.B01)

NO	Item	Criterion	Level
09	Backlight elements	9. 1 Backlight can't work normally.	Major
		9. 2 Backlight doesn't light or color is wrong.	Major
		9. 3 Illumination source flickers when lit.	Major
10	General appearance	10. 1 Pin type 、 quantity 、 dimension must match type in structure diagram.	Major
		10. 2 No short circuits in components on PCB or FPC .	Major
		10. 3 Parts on PCB or FPC must be the same as on the production characteristic chart .There should be no wrong parts , missing parts or excess parts.	Major
		10. 4 Product packaging must the same as specified on packaging specification sheet.	Minor
		10. 5 The folding and peeled off in polarizer are not acceptable.	Minor
		10. 6 The PCB or FPC between B/L assembled distance(PCB or FPC ) is $\leq 1.5$ mm.	Minor

## 4. RELIABILITY TEST

### 4.1 Reliability Test Condition

(Ver.B01)

NO.	TEST ITEM	TEST CONDITION											
1	High Temperature Storage Test	Keep in <b>+80 ±2</b> 96 hrs Surrounding temperature, then storage at normal condition 4hrs.											
2	Low Temperature Storage Test	Keep in <b>-30 ±2</b> 96 hrs Surrounding temperature, then storage at normal condition 4hrs.											
3	High Temperature / High Humidity Storage Test	Keep in <b>+60</b> / <b>90%</b> R.H duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer)											
4	Temperature Cycling Storage Test	<p style="text-align: center;"> <span style="color: blue;"><b>-30</b></span> → <span style="color: blue;"><b>+25</b></span> → <span style="color: blue;"><b>+80</b></span> → <span style="color: blue;"><b>+25</b></span>  <span style="color: blue;"><b>(30mins)</b></span>    <span style="color: blue;"><b>(5mins)</b></span>    <span style="color: blue;"><b>(30mins)</b></span>    <span style="color: blue;"><b>(5mins)</b></span>  <span style="color: blue;"><b>←</b></span> <span style="color: blue;"><b>→</b></span>  <b>10 Cycle</b> </p> Surrounding temperature, then storage at normal condition 4hrs.											
5	ESD Test	Air Discharge: Apply <b>2 KV</b> with 5 times Discharge for each polarity +/-	Contact Discharge: Apply <b>250 V</b> with 5 times discharge for each polarity +/-										
		1. Temperature ambiance : 15 35 2. Humidity relative : 30% 60% 3. Energy Storage Capacitance(Cs+Cd) : 150pF±10% 4. Discharge Resistance(Rd) : 330Ω±10% 5. Discharge, mode of operation : Single Discharge (time between successive discharges at least 1 sec) (Tolerance if the output voltage indication : ±5%)											
6	Vibration Test (Packaged)	1. Sine wave <b>10 55</b> Hz frequency (1 min/sweep) 2. The amplitude of vibration : <b>1.5</b> mm 3. Each direction (X、Y、Z) duration for <b>2</b> Hrs											
7	Drop Test (Packaged)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Packing Weight (Kg)</th> <th>Drop Height (cm)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0 ~ 45.4</td> <td style="text-align: center;">122</td> </tr> <tr> <td style="text-align: center;">45.4 ~ 90.8</td> <td style="text-align: center;">76</td> </tr> <tr> <td style="text-align: center;">90.8 ~ 454</td> <td style="text-align: center;">61</td> </tr> <tr> <td style="text-align: center;">Over 454</td> <td style="text-align: center;">46</td> </tr> </tbody> </table>		Packing Weight (Kg)	Drop Height (cm)	0 ~ 45.4	122	45.4 ~ 90.8	76	90.8 ~ 454	61	Over 454	46
		Packing Weight (Kg)	Drop Height (cm)										
0 ~ 45.4	122												
45.4 ~ 90.8	76												
90.8 ~ 454	61												
Over 454	46												
Drop Direction : 1 corner / 3 edges / 6 sides each 1time													

## 5. PRECAUTION RELATING PRODUCT HANDLING

### 5.1 SAFETY

- 5.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.
- 5.1.2 If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

### 5.2 HANDLING

- 5.2.1 Avoid any strong mechanical shock which can break the glass.
- 5.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module , be sure to ground your body and any electrical equipment you may be using.
- 5.2.3 Do not remove the panel or frame from the module.
- 5.2.4 The polarizing plate of the display is very fragile. So , please handle it very carefully ,do not touch , push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)
- 5.2.5 Do not wipe the polarizing plate with a dry cloth , as it may easily scratch the surface of plate.
- 5.2.6 Do not touch the display area with bare hands , this will stain the display area.
- 5.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.
- 5.2.8 To control temperature and time of soldering is  $320\pm 10$  and 3-5 sec.
- 5.2.9 To avoid liquid (include organic solvent) stained on LCM .

### 5.3 STORAGE

- 5.3.1 Store the panel or module in a dark place where the temperature is  $25 \pm 5$  and the humidity is below 65% RH.
- 5.3.2 Do not place the module near organics solvents or corrosive gases.
- 5.3.3 Do not crush , shake , or jolt the module.

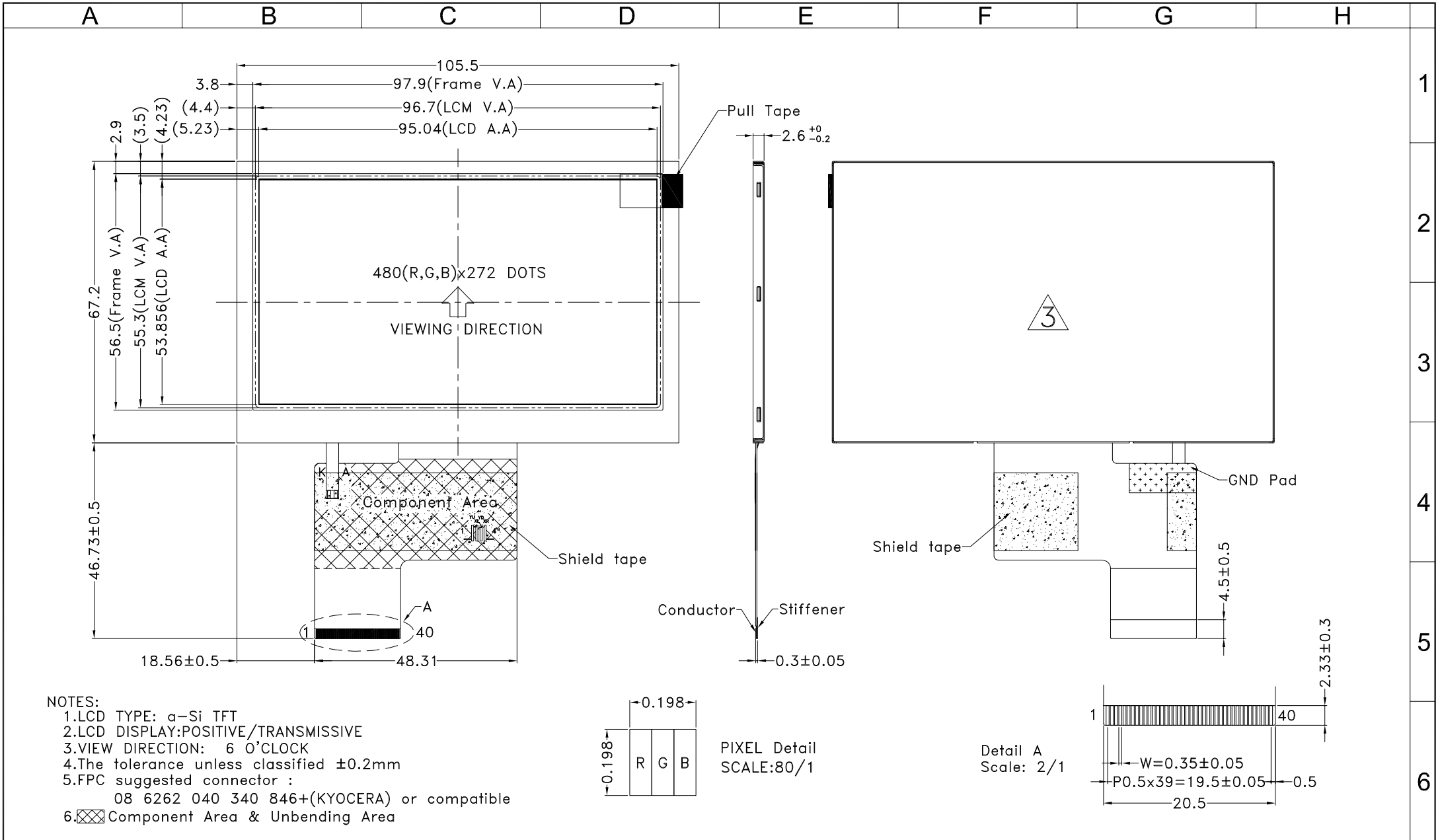
### 5.4 TERMS OF WARRANTY

#### 5.4.1 Applicable warrant period

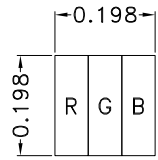
The period is within thirteen months since the date of shipping out under normal using and storage conditions.

#### 5.4.2 Unaccepted responsibility

This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment , we cannot take responsibility if the product is used in nuclear power control equipment , aerospace equipment , fire and security systems or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required.

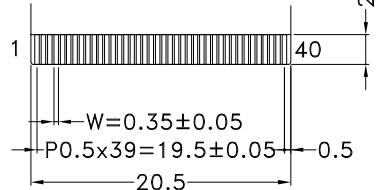


- NOTES:
- 1.LCD TYPE: a-Si TFT
  - 2.LCD DISPLAY:POSITIVE/TRANSMISSIVE
  - 3.VIEW DIRECTION: 6 O'CLOCK
  - 4.The tolerance unless classified  $\pm 0.2\text{mm}$
  - 5.FPC suggested connector : 08 6262 040 340 846+(KYOCERA) or compatible
  6. Component Area & Unbending Area



PIXEL Detail  
SCALE:80/1

Detail A  
Scale: 2/1



007			
006			
005			
004			
003	Add Rear View	Mandy	2015/05/20
002	Modify Frame Drawing	Mandy	2014/06/04
001	NEW DRAWING	Mandy	2014/05/22
REV	REV BY	REVISER	DATE

TITLE:  
LCD Module Drawing



Design	Mandy Chang
Check	Tina Chen
Approve	Linda Lee

Unit	MM	Surface		<table border="1"> <tr> <th>Tolerance Length(Min)(mm)</th> <th>Precision Level</th> </tr> <tr> <td>1 ~ 4</td> <td>-</td> </tr> <tr> <td>4 ~ 16</td> <td>-</td> </tr> <tr> <td>16 ~ 63</td> <td>-</td> </tr> <tr> <td>63 ~ 250</td> <td>-</td> </tr> <tr> <td>250 ~ 1000</td> <td>-</td> </tr> </table>	Tolerance Length(Min)(mm)	Precision Level	1 ~ 4	-	4 ~ 16	-	16 ~ 63	-	63 ~ 250	-	250 ~ 1000	-
Tolerance Length(Min)(mm)	Precision Level															
1 ~ 4	-															
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Scale	1:1	Material														
Page	1/1	Thickness														
		Quantity														