US Micro Products

Electronic Products for the OEM

TFT-LCD PRODUCT SPECIFICATION

PART NUMBER:	**USMP-TT032WJ-01A**
DESCRIPTION:	3.2″ TFT LCD with 240 x 320 resolution, White LED B/L and 18-bit or 16-bit data bus(80 System Interface)

ISSUE DATE	APPROVED BY (Customer Use Only)	CHECKED BY	PREPARED BY
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RECORDS OF REVISION

Date (mm / dd / yyyy)	Ver.	Edi.	Description	Page	Design by
07/03/2009	01	001	New Drawing	-	Wesley
9/15/2009	01	002	New Sample		Wesley
12/10/2009	02	003	The sample modify the Length of FPC	Appendix	Wesley

Total: 25 Pages

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Appendix：LCM Drawing

1. SPECIFICATIONS

1.1 Features

Main LCD panel

Item	Standard Value
Display Type	240 *(R、G、B) * 320 Dots
LCD Type	Active matrix TFT , Transmissive type
Screen size(inch)	3.2 (Diagonal)
Viewing Direction	9 O'clock
Color configuration	R.G. B. vertical stripe
Backlight	White LED B/L
Interface	18-bit or 16-bit data bus(80 System Interface)
Other(controller/driver IC)	R61580

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	57.04 (W) * 78.7 (L) * 3.1 MAX(H)	mm

LCD panel

Item	Standard Value	Unit
Viewing Area	50.2 (W) * 66.4 (L)	mm
Active Area	48.6 (W) * 64.8 (L)	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	VCC	-	-0.3	4.6	V
	VGH-VGL	-	-0.3	30	V
Input Voltage	V_I	-	-0.3	VCC +0.3	V
Operating Temperature	T_{OP}	-	-20	70	°C
Storage Temperature	T_{ST}	-	-30	80	°C
Storage Humidity	H_D	Ta < 40 °C	20	90	%RH

1.4 DC Electrical Characteristics

Module GND 0V, Ta 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	VCC	-	2.7	2.8	2.9	V
Input High Voltage	V_{IH}	-	0.8*VCC	-	VCC	V
Input Low Voltage	V_{IL}	-	-0.3	-	0.2*VCC	V
Output High Voltage	V_{OH}	-	0.8*VCC	-	-	V
Output Low Voltage	V_{OL}	-	0	-	0.2*VCC	V
Supply Current	IDD	VCC 2.8 V Pattern TBD *1	-	7.8	12	mA

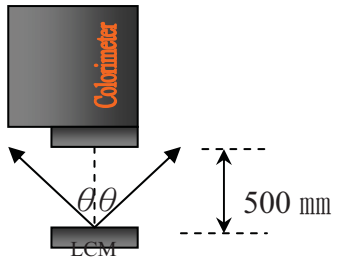
Note1:Maximum current display

1.5 Optical Characteristics

TFT LCD panel Ta 25°C

Item		Symbol	Condition	Min.	Typ.	Max.	unit	
Response time	Rise	Tr +Tf	Ta 25°C θX, θY 0°	-	40	60	ms	Note2
	Fall							
Viewing angle	Top	θY+	CR ≥ 10	-	50	-	Deg.	Note4
	Bottom	θY-		-	50	-		
	Left	θX-		-	35	-		
	Right	θX+		-	50	-		
Contrast ratio		CR	Ta 25°C θX , θY 0°	200	250	-		Note3
Color of CIE Coordinate (With LCD & touch panel on)	White	X		0.27	0.30	0.33	-	Note1
		Y		0.30	0.33	0.36		
	Red	X		0.60	0.65	0.70		
		Y		0.28	0.33	0.38		
	Green	X		0.28	0.33	0.38		
		Y		0.56	0.61	0.66		
	Blue	X		0.09	0.14	0.19		
		Y		0.04	0.09	0.14		
Average Brightness Pattern white display (With B/L)		IV	VF 16V IF 15mA	100	150	-	cd/m2	Note1
Uniformity (With B/L)		△B	VF 16V IF 15mA	80	-	-	%	Note1

Note1:
1：△B B(min) / B(max)
2：Measurement Condition for Optical Characteristics:
a：Environment: 25℃±5℃ / 60±20%R.H，no wind，dark room below 10 Lux at typical lamp current and typical operating frequency.
b：Measurement Distance: 500 ± 50 ㎜ ，(θ 0°)
c：Equipment: TOPCON BM-7 fast，(field 1°)，after 10 minutes operation.
d：The uncertainty of the C.I.E coordinate measurement ±0.01，Average Brightness ± 4%



Colorimeter BM 7 fast

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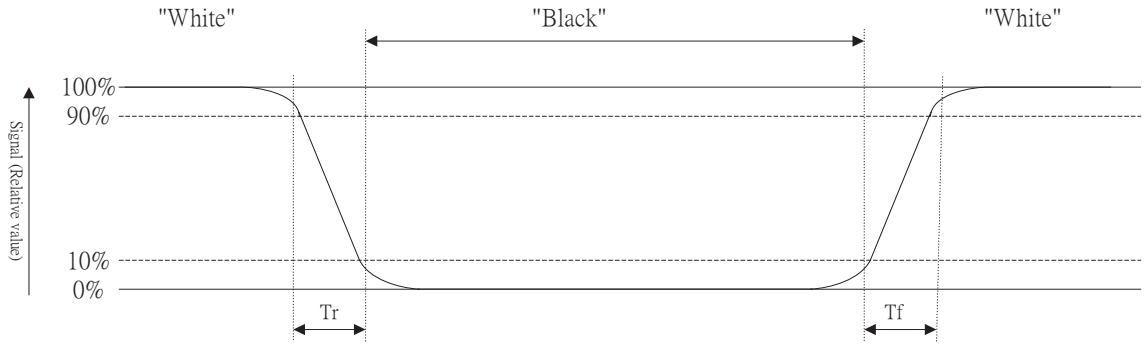
Note2: Definition of response time:

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:



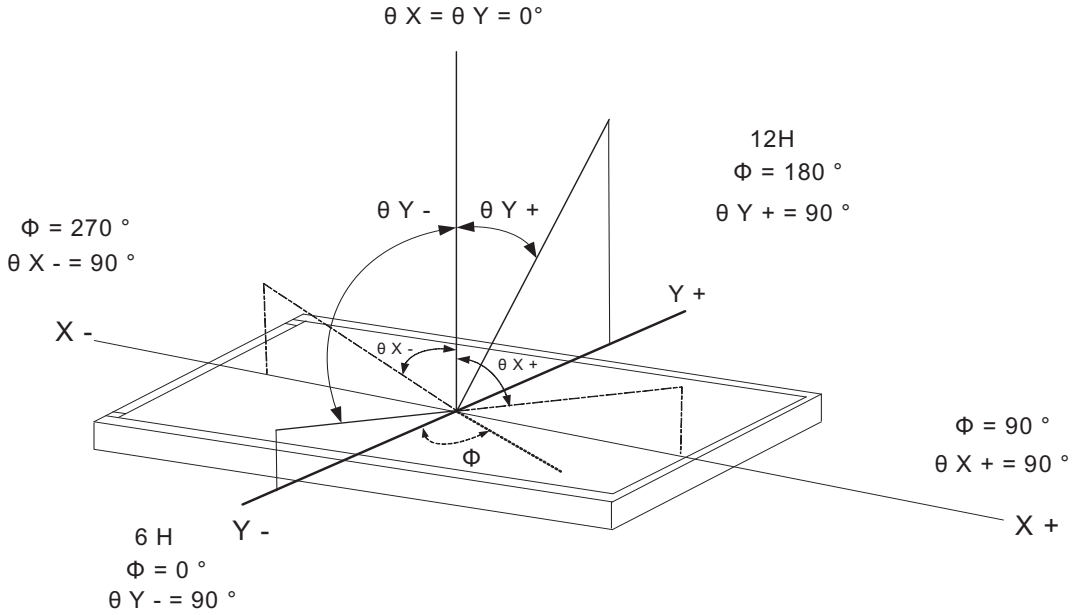
Note3: Definition of contrast ratio:

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:



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1.6 Backlight & LED Characteristics

Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta 25℃	-	30	mA
Reverse Voltage	VR	Ta 25℃	-	25	V
Forward Voltage	VF	Ta 25℃		20	V

Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF 15mA	15	16	17.5	V
Average Brightness （Without LCD）	IV		2800	3300	-	cd/m^2
Color of CIE Coordinate (Without LCD)	X		0.25	0.28	0.31	-
	Y		0.25	0.28	0.31	
Color	White					

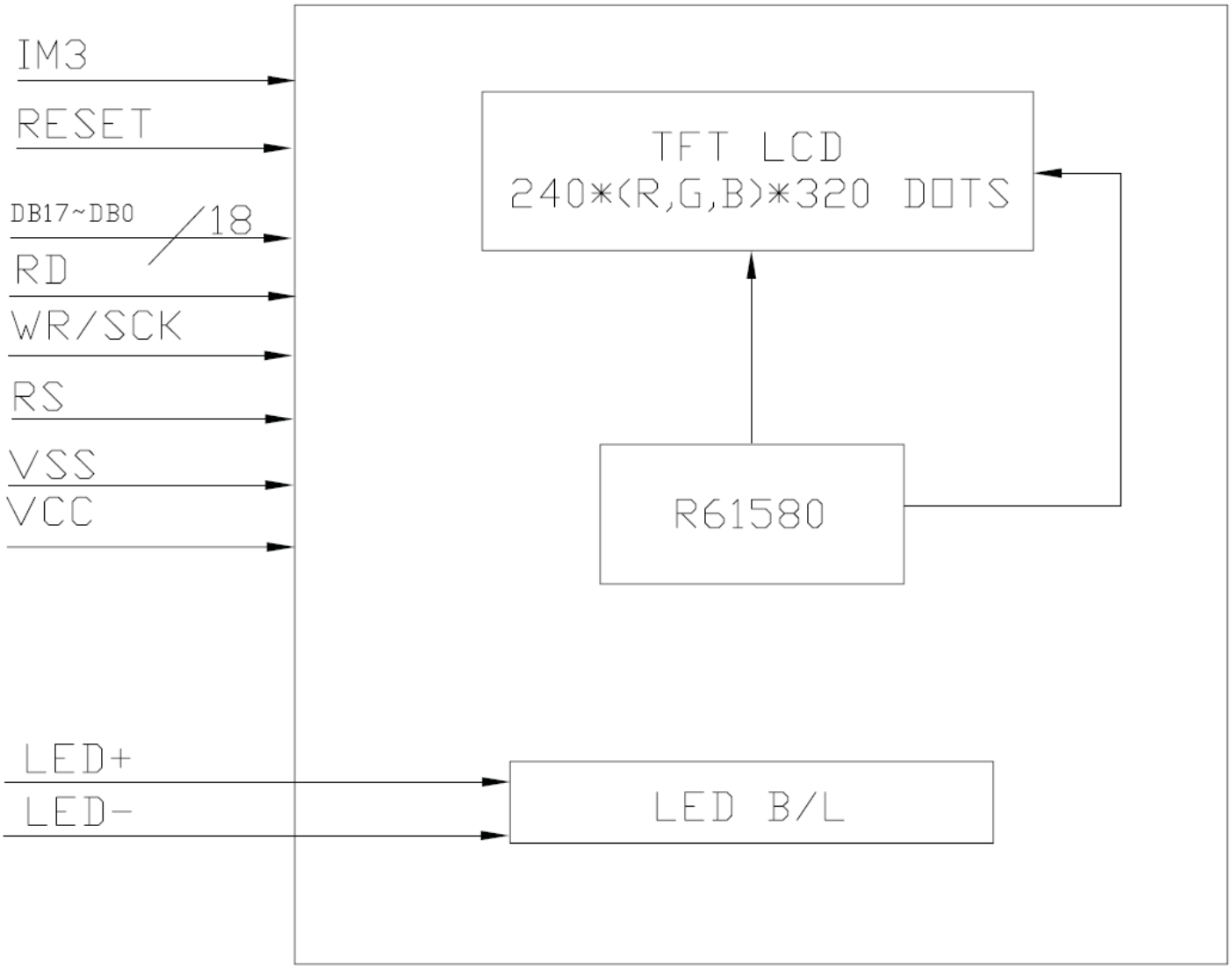
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



2.2 Interface Pin Description

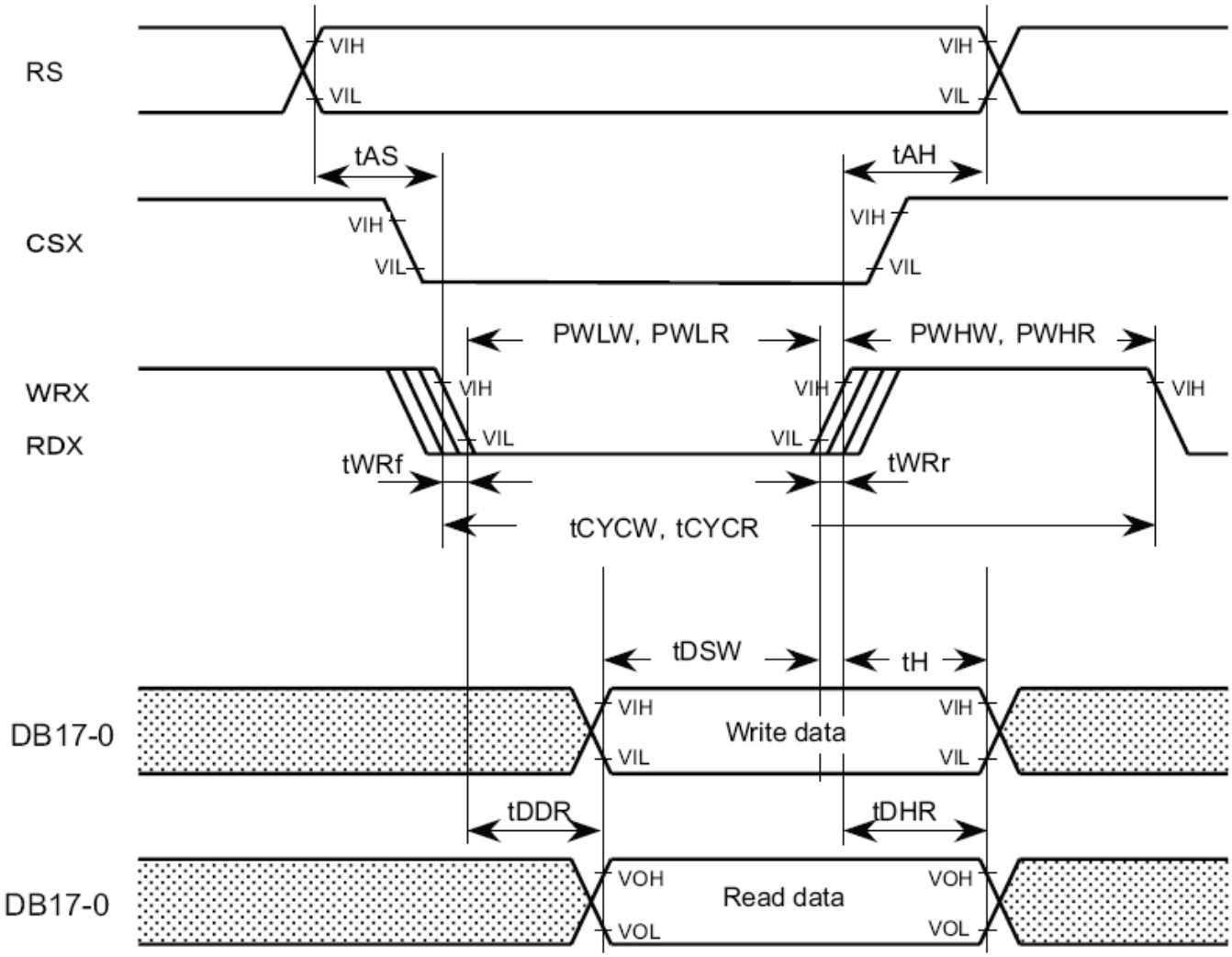
Pin No.	Symbol	Function
1	NC	Not connection.
2	NC	Not connection.
3	IM3	Select mode to interface to an MPU IM3 0: 16-bit interface IM3 1: 18-bit interface
4	NC	Not connection.
5	RESET	Reset input pin for TFT LCD. When RESET is “L”, initialization is executed.
6	NC	Not connection.
7	NC	Not connection.
8	NC	Not connection.
9	NC	Not connection.
10	DB17	18Bit Parallel bi-directional data bus for 80-system interface operation
11	DB16	
12	DB15	
13	DB14	
14	DB13	
15	DB12	
16	DB11	
17	DB10	
18	DB9	
19	DB8	
20	DB7	
21	DB6	
22	DB5	
23	DB4	
24	DB3	
25	DB2	

26	DB1	
27	DB0	

Pin No.	Symbol	Function
28	RD	Connect RD signal. Active “L”.
29	WR/SCK	Connect WR signal. Active “L”.
30	RS	Command / Display data selection High Indicates that display data Low Indicates that display data
31	NC	Not connection.
32	NC	Not connection.
33	NC	Not connection.
34	CS	When CS Low, Input/Output of Data/Command is enabled.
35	VSS	System Ground.(0V)
36	VCC	Power supply(+2.8V)
37	LED-	Backlight LED cathode input pin.
38	LED+	Backlight LED anode input pin
39	VSS	System Ground.(0V)
40	NC	Not connection.

2.3 Timing Characteristics

80-System Bus Interface

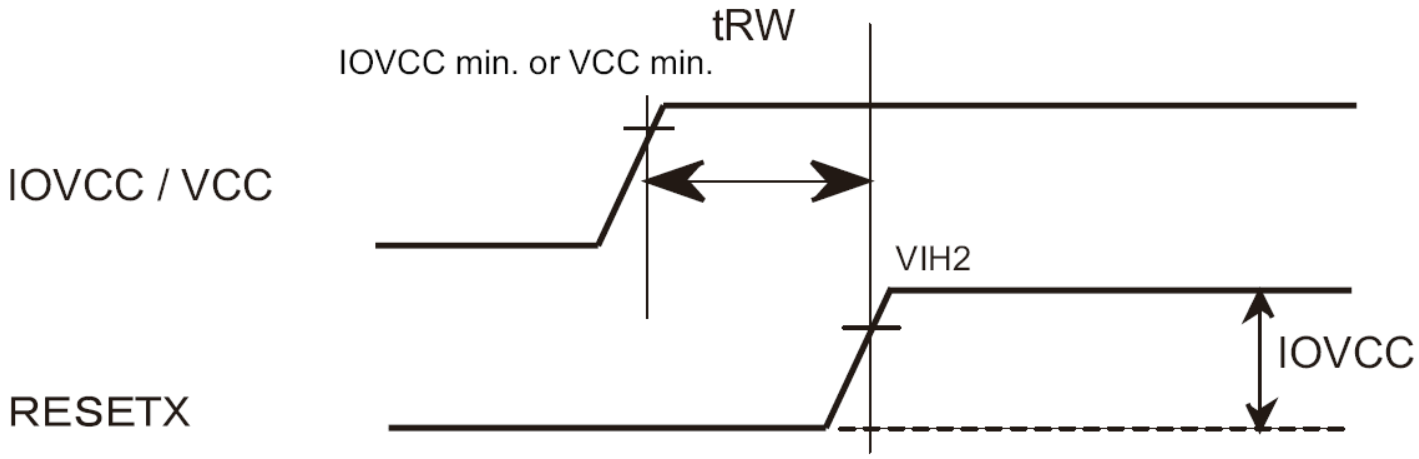


Item		Symbol	Unit	Min.	Typ.	Max.
Bus cycle time	Write	t_{CYCW}	ns	75	-	-
	Read	t_{CYCR}	ns	450	-	-
Write low-level pulse width		PW_{LW}	ns	40	-	-
Read low-level pulse width		PW_{LR}	ns	170	-	-
Write high-level pulse width		PW_{HW}	ns	25	-	-
Read high-level pulse width		PW_{HR}	ns	250	-	-
Write / Read rise/ fall time		t_{WRr}, $_{WRf}$	ns	-	-	25
Setup time	Write (RS to CSX, WRX)	t_{AS}	ns	0	-	-
	Read (RS to CSX, RDX)		ns	10	-	-
Address hold time		t_{AH}	ns	2	-	-
Write data setup time		t_{DSW}	ns	25	-	-
Write data hold time		t_H	ns	10	-	-
Read data delay time		t_{DDR}	ns	-	-	150
Read data hold time		t_{DHR}	ns	5	-	-

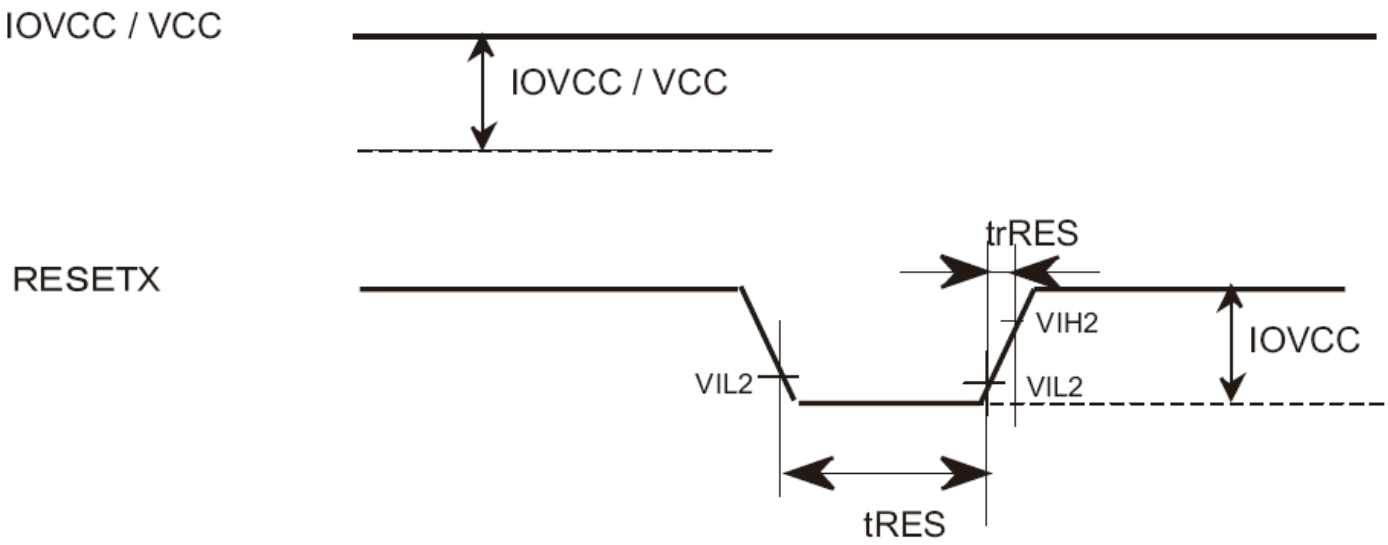
Note: The above values are target values. They are subject to change.

2.3.2 Reset Timing Characteristics

- **Reset timing when power supply is input**

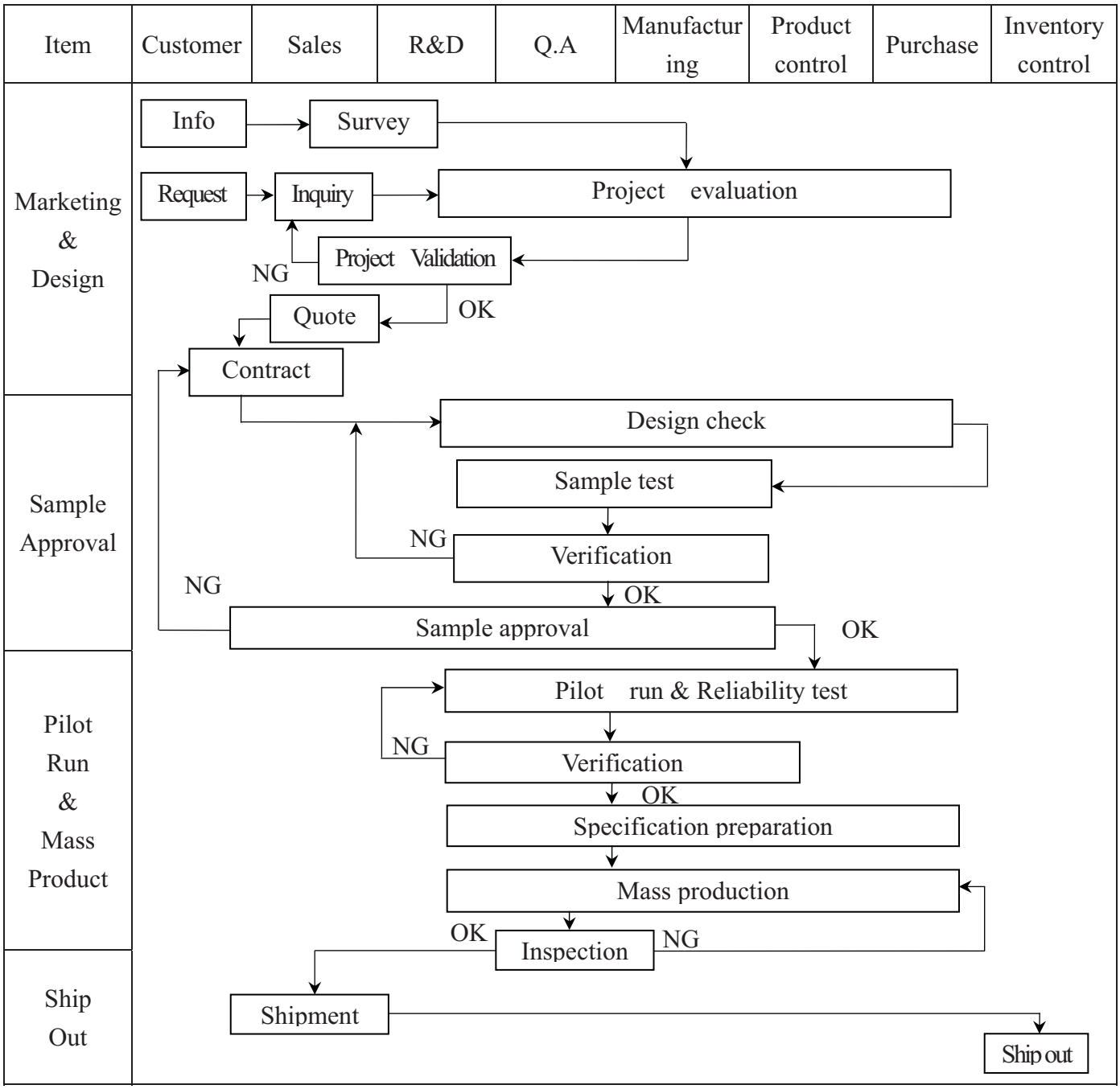


- **Reset timing during normal operation**



3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart



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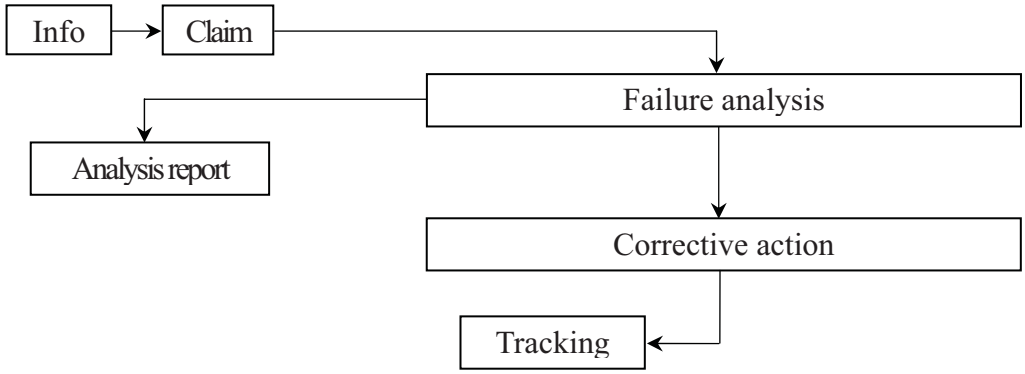
Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service								
Q.A Activity	1. ISO 9001 Maintenance Activities 3. Equipment calibration 5. Standardization Management			2. Process improvement proposal 4. Education And Training Activities				

3.2 Inspection Specification

◆Scope ：The document shall be applied to TFT-LCD Module for less than 3.5″ (Ver.B01).

◆Inspection Standard：MIL-STD-105E Table Normal Inspection Single Sampling Level Ⅱ.

◆Equipment：Gauge、MIL-STD、Sample

◆Defect Level：Major Defect AQL： 0.4 ； Minor Defect AQL： 1.5

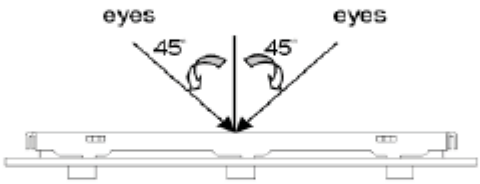
◆OUT Going Defect Level：Sampling.

◆Standard of the product appearance test：

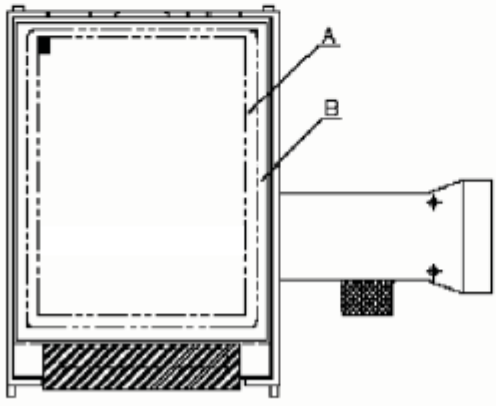
a. Manner of appearance test：

(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 Less Than 3.5″ : (Ver.B01)

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td rowspan="3">01</td><td rowspan="3">Product condition</td><td>1.1 The part number is inconsistent with work order of production.</td><td>Major</td></tr>
<tr><td>1.2 Mixed product types.</td><td>Major</td></tr>
<tr><td>1.3 Assembled in inverse direction.</td><td>Major</td></tr>
<tr><td>02</td><td>Quantity</td><td>2.1 The quantity is inconsistent with work order of production.</td><td>Major</td></tr>
<tr><td>03</td><td>Outline dimension</td><td>3.1 Product dimension and structure must conform to structure diagram.</td><td>Major</td></tr>
<tr><td rowspan="5">04</td><td rowspan="5">Electrical Testing</td><td>4.1 Missing line character and icon.</td><td>Major</td></tr>
<tr><td>4.2 No function or no display.</td><td>Major</td></tr>
<tr><td>4.3 Display malfunction.</td><td>Major</td></tr>
<tr><td>4.4 LCD viewing angle defect.</td><td>Major</td></tr>
<tr><td>4.5 Current consumption exceeds product specifications.</td><td>Major</td></tr>
<tr><td>05</td><td>Dot defect
(Bright dot、Dark dot)
On -display</td><td>
<table>
<tr><th colspan="2">Item</th><th>Acceptance (Q'ty)</th></tr>
<tr><td rowspan="4">Dot Defect</td><td>Bright Dot</td><td>≦ 2</td></tr>
<tr><td>Dark Dot</td><td>≦ 3</td></tr>
<tr><td>Joint Dot</td><td>≦ 2</td></tr>
<tr><td>Total</td><td>≦ 3</td></tr>
</table>
5.1 Inspection pattern：full white , full black , Red , Green and blue screens.
5.2 It is defined as dot defect if defect area ＞1/2 dot.
5.3 The distance between two dot defect ≧5 mm.
</td><td>Minor</td></tr>
</table>

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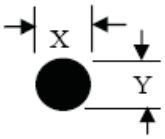
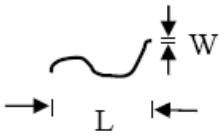
◆Specification For TFT-LCD Module Less Than 3.5″ : (Ver.B01)

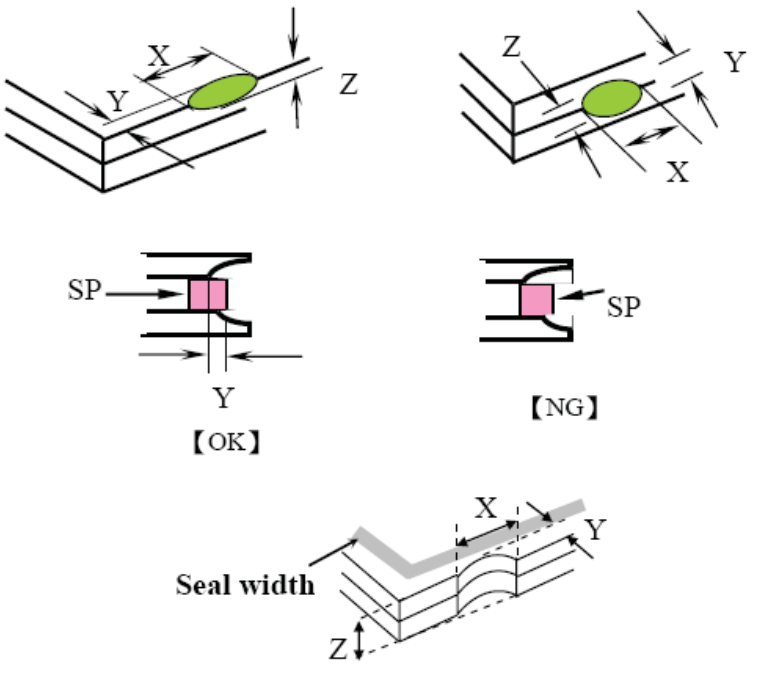
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td>06</td><td>Black or white dot、scratch、contamination

Round type
 

Φ=(x+y) / 2

Line type
 
</td><td>6.1 Round type (Non-display or display) :
<table><tr><th rowspan="2">Dimension
(diameter : Φ)</th><th colspan="2">Acceptance (Q'ty)</th></tr><tr><th>A area</th><th>B area</th></tr><tr><td>Φ ≦ 0.15</td><td>Ignore</td><td rowspan="5">Ignore</td></tr><tr><td>0.15 < Φ ≦ 0.20</td><td>2</td></tr><tr><td>0.20 < Φ ≦ 0.30</td><td>2</td></tr><tr><td>Φ > 0.30</td><td>0</td></tr><tr><td>Total</td><td>3</td></tr></table>
6.2 Line type(Non-display or display) :
<table><tr><th colspan="2">Dimension</th><th colspan="2">Acceptance (Q'ty)</th></tr><tr><th>Length (L)</th><th>Width (W)</th><th>A area</th><th>B area</th></tr><tr><td>---</td><td>W ≦ 0.03</td><td>Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>L ≦5.0</td><td>0.03 <W ≦ 0.05</td><td>3</td></tr><tr><td>---</td><td>W >0.05</td><td>As round type</td></tr><tr><td colspan="2">Total</td><td>3</td></tr></table></td><td>Minor</td></tr>
<tr><td>07</td><td>Polarizer Bubble</td><td><table><tr><th rowspan="2">Dimension
(diameter : Φ)</th><th colspan="2">Acceptance (Q'ty)</th></tr><tr><th>A area</th><th>B area</th></tr><tr><td>Φ ≦ 0.20</td><td>Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>0.20 < Φ ≦ 0.50</td><td>3</td></tr><tr><td>Φ > 0.50</td><td>0</td></tr><tr><td>Total</td><td>3</td></tr></table></td><td>Minor</td></tr>
</table>

◆Specification For TFT-LCD Module Less Than 3.5″ : (Ver.B01)

NO	Item	Criterion	Level
08	The crack of glass	Symbols : X : The length of crack Y : The width of crack. Z : The thickness of crack W : terminal length t : The thickness of glass a : LCD side length 8.1 General glass chip : 8.1.1 Chip on panel surface and crack between panels: 	Minor

X	Y	Z
≦ a	Crack can't enter viewing area	≦1/2 t
≦ a	Crack can't exceed the half of SP width.	1/2 t < Z ≦2 t

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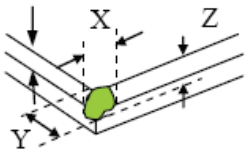
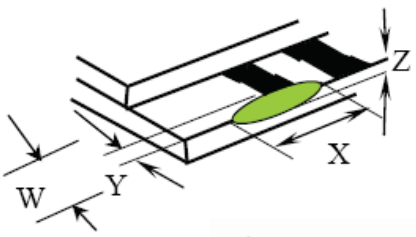
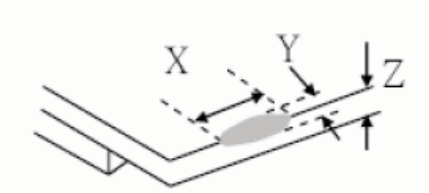
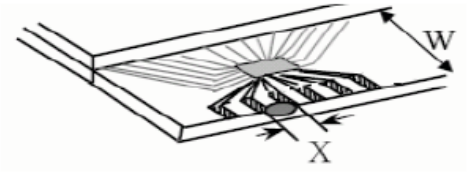
◆Specification For TFT-LCD Module Less Than 3.5″ : (Ver.B01)

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td rowspan="3">08</td><td rowspan="3">The crack of glass</td><td>Symbols :

X : The length of crack
Z : The thickness of crack
t : The thickness of glass
Y : The width of crack.
W : terminal length
a : LCD side length</td><td rowspan="3">Minor</td></tr>
<tr><td>8.1.2 Corner crack :
 

<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≦1/5 a</td><td>Crack can’t enter viewing area</td><td>Z ≦ 1/2 t</td></tr>
<tr><td>≦1/5 a</td><td>Crack can’t exceed the half of SP width.</td><td>1/2 t < Z ≦ 2 t</td></tr>
</table></td></tr>
<tr><td>8.2 Protrusion over terminal :
8.2.1 Chip on electrode pad :
 



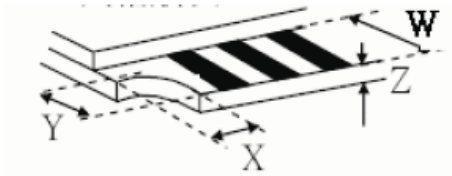


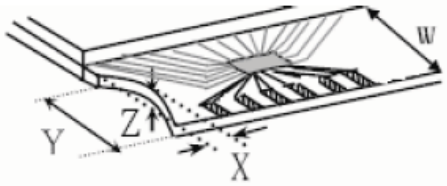
<table>
<tr><th></th><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>Front</td><td>≦ a</td><td>≦ 1/2 W</td><td>≦ t</td></tr>
<tr><td>Back</td><td>≦ a</td><td>≦ W</td><td>≦ 1/2 t</td></tr>
</table></td></tr>
</table>

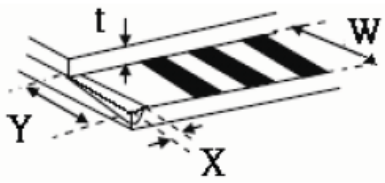
◆Specification For TFT-LCD Module Less Than 3.5″ : (Ver.B01)

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td>08</td><td>The crack of glass</td><td>
Symbols :

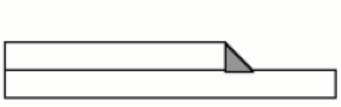
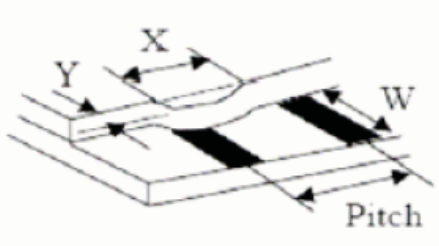
X : The length of crack　　Y : The width of crack.
Z : The thickness of crack　　W : terminal length
t : The thickness of glass　　a : LCD side length

8.2.2 Non-conductive portion :






<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≦ 1/3 a</td><td>≦W</td><td>≦t</td></tr>
</table>
⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.

8.2.3 Glass remain :



<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≦ a</td><td>≦ 1/3 W</td><td>≦t</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

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◆Specification For TFT-LCD Module Less Than 3.5″ : (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 ≦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 +80 ±2℃ 96 hrs Surrounding temperature, then storage at normal condition 4hrs.
2	Low Temperature Storage Test	Keep in −30 ±2℃ 96 hrs Surrounding temperature, then storage at normal condition 4hrs.
3	High Temperature / High Humidity Storage Test	Keep in +60 ℃ / 90% R.H duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer)
4	Temperature Cycling Storage Test	−30℃ → +25℃ → +80℃ → +25℃ (30mins) (5mins) (30mins) (5mins) 10 Cycle Surrounding temperature, then storage at normal condition 4hrs.
5	ESD Test	Air Discharge: Apply 2 KV with 5 times Discharge for each polarity +/- ; Contact Discharge: Apply 250 V 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 10～55 Hz frequency (1 min/sweep) 2. The amplitude of vibration :1.5 mm 3. Each direction (X、Y、Z) duration for 2 Hrs
7	Drop Test (Packaged)	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

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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 ± 10°C 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°C ± 5°C 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.

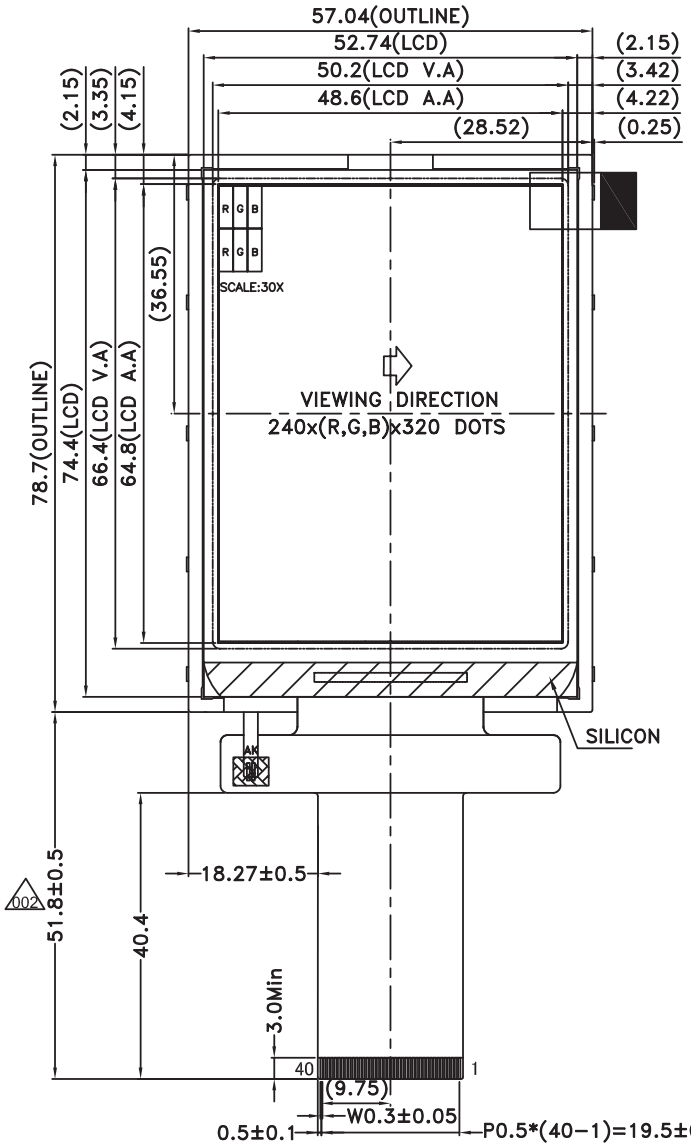
5.4 TERMS OF WARRANTY

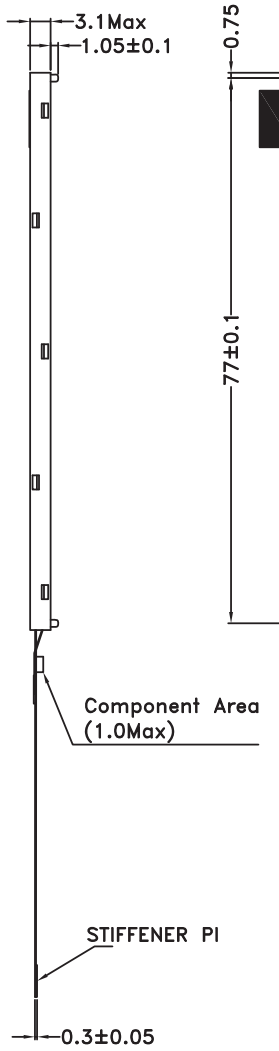
5.4.1 Applicable warrant period

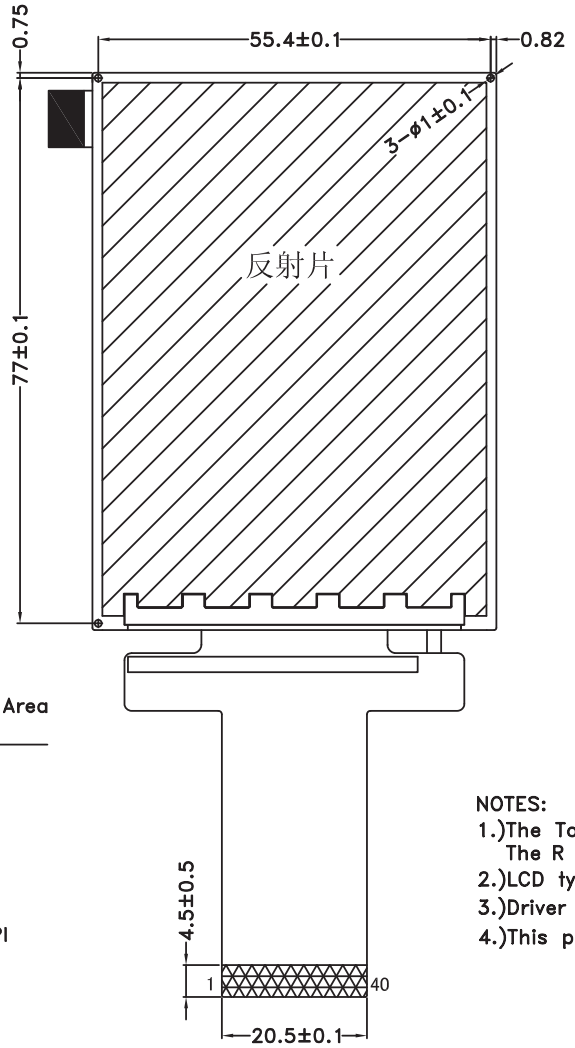
The period is within thirteen months since the date of shipping out under normal using and storage conditions.

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.







Pin	Name	Pin	Name
1	NC	21	DB6
2	NC	22	DB5
3	IM3	23	DB4
4	NC	24	DB3
5	RESET	25	DB2
6	NC	26	DB1
7	NC	27	DB0
8	NC	28	RD
9	NC	29	WR/SCK
10	DB17	30	RS
11	DB16	31	NC
12	DB15	32	NC
13	DB14	33	NC
14	DB13	34	CS
15	DB12	35	VSS
16	DB11	36	VCC
17	DB10	37	LED-
18	DB9	38	LED+
19	DB8	39	VSS
20	DB7	40	NC

NOTES:
1.)The Tolerance unless classfied ±0.2mm
The R for not assigned 0.5±0.1mm
2.)LCD type:a-Si TFT
3.)Driver IC:R61580
4.)This product conforms ROHS

REV	REV BY	REVISER	DATE
007			
006			
005			
004			
003			
002	Modification FPC length	Eddy	2009/11/20
001	NEW DRAWING	Eddy	2009/07/02

PART NO: USMP-TT032WJ-01A

DRAWING NAME : USMP-TT032WJ-01A

TITLE: LCD MODULE DRAWING

US Micro Products
Electronic Products for the OEM

6207 Bee Caves Rd., Ste.330; Austin, TX 78746 USA
Tel: (800) 741-7755, sales@usmicroproducts.com
www.usmicroproducts.com

Design	Eddy	Surface	
Check	Ryan	Material	
Approve	Sam	Thickness	
Unit	MM	Quantity	
Scale	1:1		
Page	1/1		

最小長度 (mm)	公差等級	精級
1 ~ 4		-
4 ~ 16		-
16 ~ 63		-
63 ~ 250		-
250 ~ 1000		-

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