POWERTIP TECH. CORP.

SPECIFICATIONS

CUSTOMER	:	CUS999
SAMPLE CODE	:	SH240320T-037-L09Q
MASS PRODUCTION CODE	:	PH240320T-037-L09Q
SAMPLE VERSION	:	01
SPECIFICATIONS EDITION	:	001
DRAWING NO. (Ver.)	:	JLMD- PH240320T-037-L09Q (Ver.001)
PACKAGING NO. (Ver.)	:	-

Customer Approved

Date:

POWERTIP
2009.09.03
JS RD APPROVED

Approved	Checked	Designer
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■ Preliminary specification for design input

□ Specification for sample approval

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History of Version

Date	Ver.	Edi.	Description	Page	Design by
9/2/2009	01	001	New Drawing	-	Bob

Total: 25 Page

Contents

1. SPECIFICATIONS

1.1 Features

Main LCD Panel

Item	Standard Value
Display Type	240 * (R、G、B) * 320 Dots
LCD Type	a-Si TFT , Normally white TN mode , Transmissive
Screen size(inch)	2.8 (Diagonal)
Viewing Direction	12 O'clock
Color configuration	R.G.B. vertical stripe
Backlight	White LED
Interface	8/16-bit 80-system I/F
Driver IC	R61580
ROHS	THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer web side : http://www.powertip.com.tw/news/LatestNews.asp

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	50.0 (W) * 69.2 (L) * 3.05 (H)(Max.)	mm

LCD Panel

Item	Standard Value	Unit
Viewing Area	44.8 (W) * 59.2 (L)	mm
Active Area	43.2(W) * 57.6 (L)	mm

Note : For detailed information please refer to LCM drawing

1.3 Absolute Maximum Ratings

Module

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply Voltage	VCC	-	-0.3	+4.6	V
System Power Supply Voltage	VGH-VGL		-0.3	+30.0	V
	GND-VGL	-	-18.5	+13.0	V
Input Voltage	VIN	-	-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	-	-	3.3	-	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}	IOH = -0.1mA	0.8*VCC	-	-	V
Output Low Voltage	V_{OL}	IOL = 0.1mA	-	-	0.2* VCC	V
Supply Current	ICC	VCC =3.3V, Pattern=Full display *1	TBD	TBD	TBD	mA

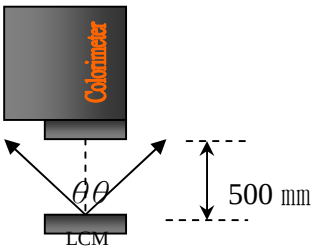
Note1:Maximum current display

1.5 Optical Characteristics

TFT LCD Panel VCC =3.3V, Ta=25°C

Item		Symbol	Condition	Min.	Typ.	Max.	unit	
Response time		Tr + Tf	Ta = 25°C θX, θY = 0°	-	45	68	ms	Note2
Viewing angle	Top	θY+	CR ≥ 10	-	50	-	Deg.	Note4
	Bottom	θY-		-	45	-		
	Left	θX-		-	50	-		
	Right	θX+		-	50	-		
Contrast ratio		CR	Ta = 25°C θX , θY = 0°	TBD	TBD	TBD	-	Note3
Color of CIE Coordinate (With B/L)	White	X		TBD	TBD	TBD	-	Note1
		Y		TBD	TBD	TBD		
	Red	X		TBD	TBD	TBD		
		Y		TBD	TBD	TBD		
	Green	X		TBD	TBD	TBD		
		Y		TBD	TBD	TBD		
	Blue	X		TBD	TBD	TBD		
		Y		TBD	TBD	TBD		
Average Brightness Pattern= white (With B/L)		IV	IF= 80mA	TBD	TBD	TBD	cd/m^2	Note1

Note1:
1：△B=B(min) / B(max) ×100%
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%

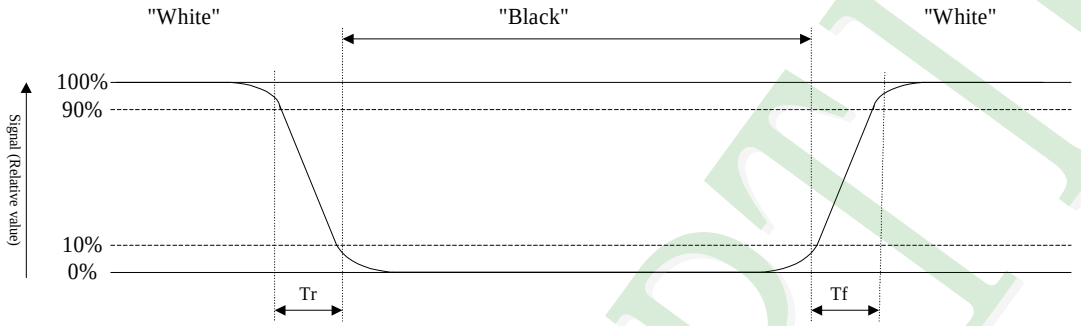


Colorimeter=BM-7 fast

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:



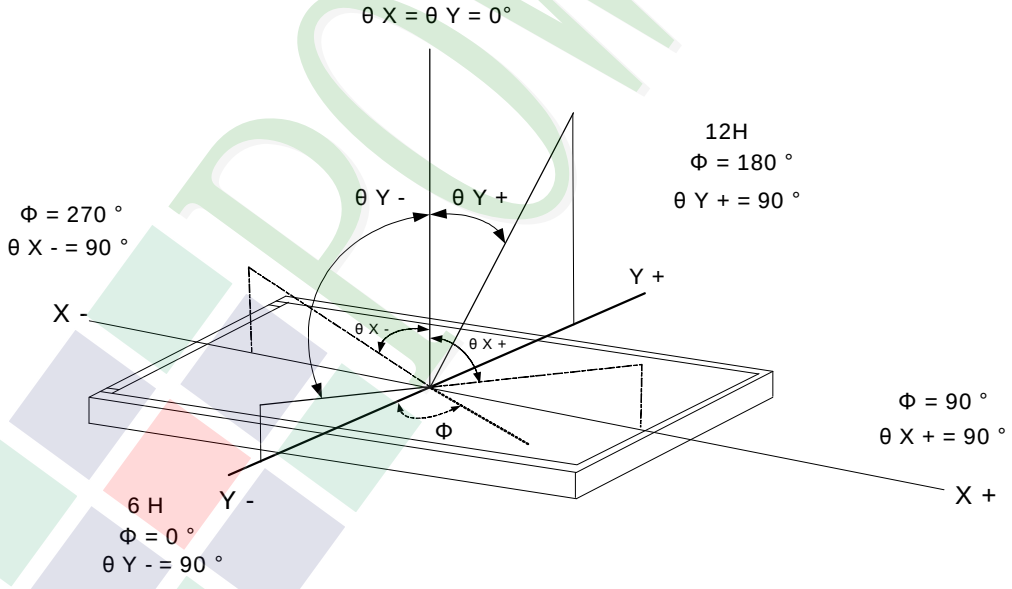
Note3: Definition of contrast ratio:

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:



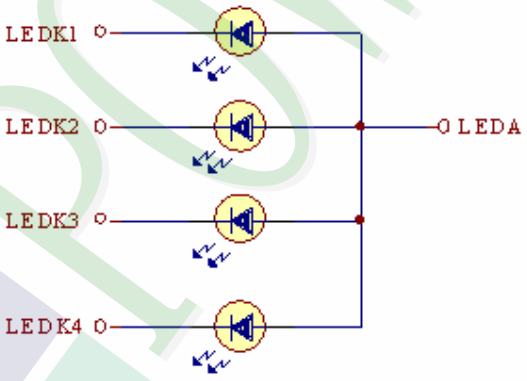
1.6 Backlight & LED Characteristics

Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25℃	-	120	mA
Reverse Voltage	VR	Ta =25℃	-	5	V
Power Dissipation	PD	Ta =25℃	-	430	mW

Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF= 80mA	-	3.3	-	V
Average Brightness (without LCD)	IV		250	300	-	cd/m^2
Color of CIE Coordinate (without LCD)	X		0.26	0.28	0.32	-
	Y		0.26	0.28	0.32	
Color	White					



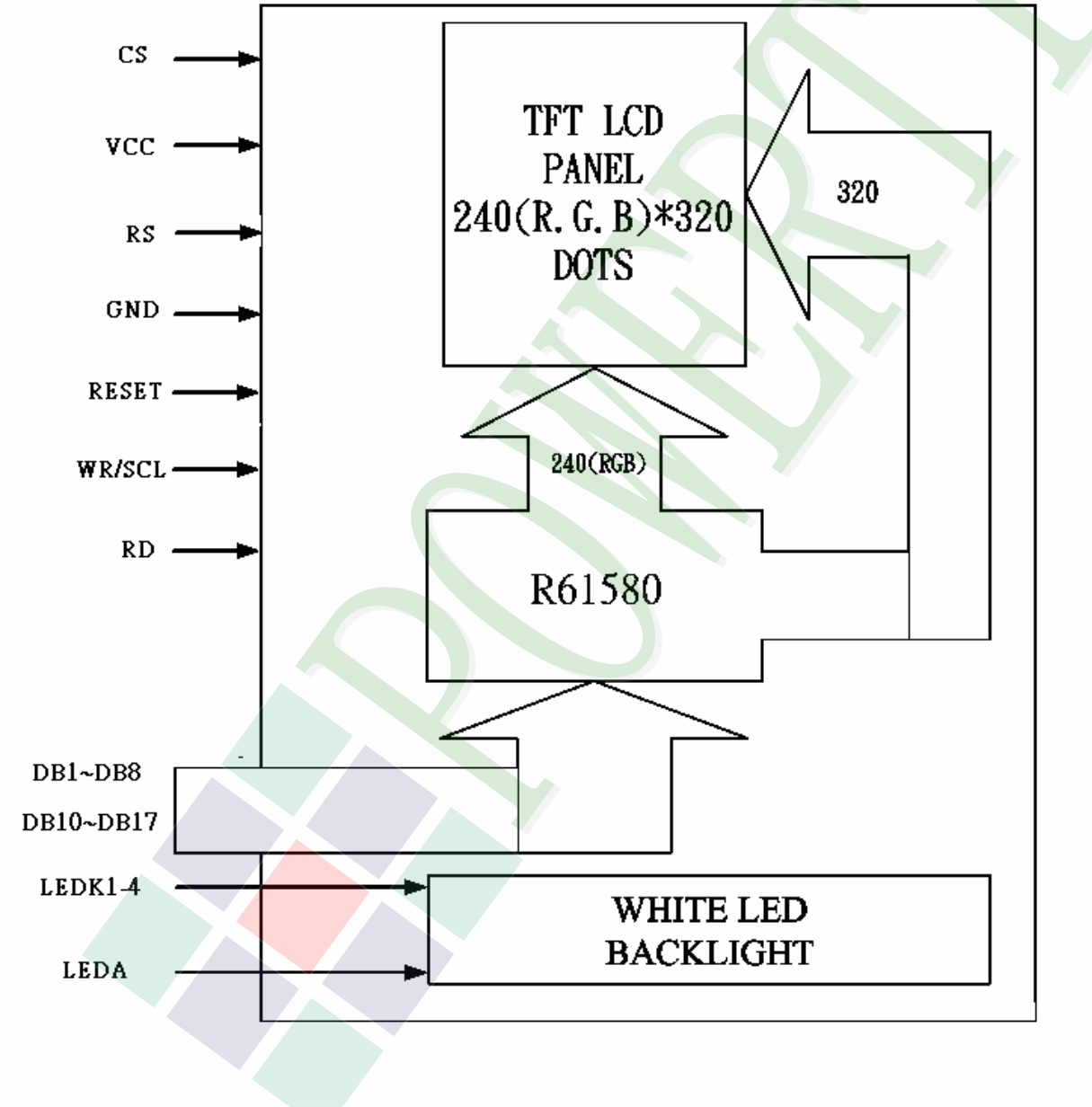
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram

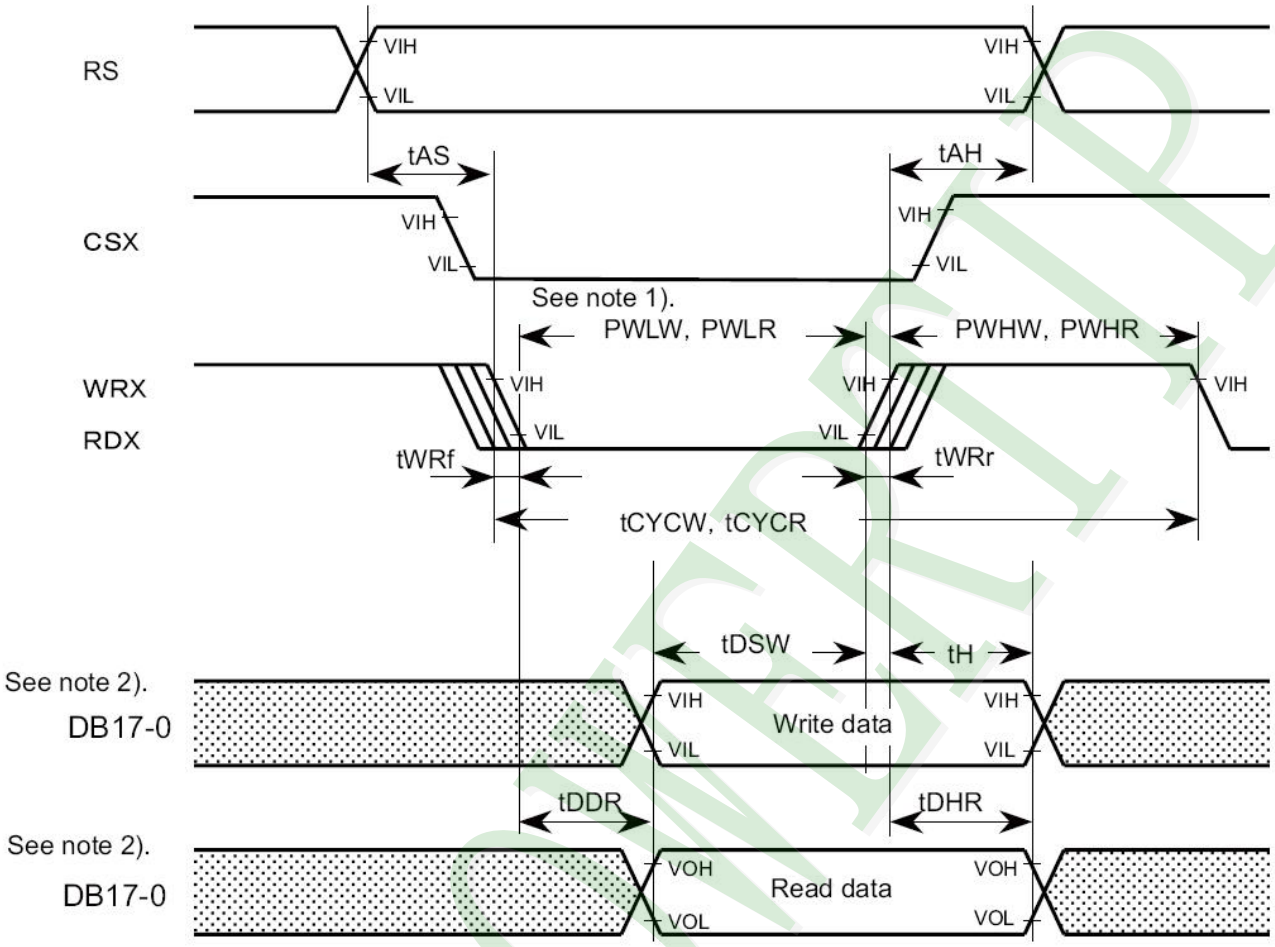


2.2 Interface Pin Description

Pin No.	Symbol	Function
1	LEDK1-4	Power supply for LED Backlight Cathode input
2	3.3V/LEDA	Power supply for LED Backlight Anode input
3	GND	Signal ground.(0V)
4	RESET	Reset input pin for TFT LCD. When RESET is “L”, initialization is executed.
5	DB17	Bi-directional data bus
6	DB16	
7	DB15	
8	DB14	
9	DB13	
10	DB12	
11	DB11	
12	DB10	
13	DB8	
14	DB7	
15	DB6	
16	DB5	
17	DB4	
18	DB3	
19	DB2	
20	DB1	
21	RD	Read signal input，active at Low.
22	WR/SCL	Write signal input，active at Low.
23	RS	When RS = 0: Command. When RS = 1: Display data.
24	CS	Chip select signal , Active at ”L”
25	XR/X+	NC

Pin No.	Symbol	Function
26	YD/Y-	NC
27	XL/X-	
28	YU/Y+	
29	GND	Signal ground.(0V)
30	3.3/VCC	Power supply for the internal logic circuit.

2.3 Timing Characteristics



Note 1) PWLW and PWLR are defined by the overlap period when CSX is "low" and WRX or RDX is "low".
Note 2) Unused DB pins must be fixed at "IOVCC" or "GND".

80-System Bus Interface Timing Characteristics (8-bit Interface)

Item		Symbol	Unit	Timing Diagram	Min.	Typ.	Max.
Bus cycle time	Write	tCYCW	ns	Figure A	70	—	—
	Read	tCYCR	ns	Figure A	450	—	—
Write low-level pulse width		PWLW	ns	Figure A	30	—	—
Read low-level pulse width		PWLR	ns	Figure A	170	—	—
Write high-level pulse width		PWHW	ns	Figure A	25	—	—
Read high-level pulse width		PWHR	ns	Figure A	250	—	—
Write / Read rise/ fall time		tWRr, WRf	ns	Figure A	—	—	25
Setup time	Write (RS to CSX, WRX)	tAS	ns	Figure A	0	—	—
	Read (RS to CSX, RDX)		ns	Figure A	10	—	—
Address hold time		tAH	ns	Figure A	2	—	—
Write data setup time		tDSW	ns	Figure A	25	—	—
Write data hold time		tH	ns	Figure A	10	—	—
Read data delay time		tDDR	ns	Figure A	—	—	150
Read data hold time		tDHR	ns	Figure A	5	—	—

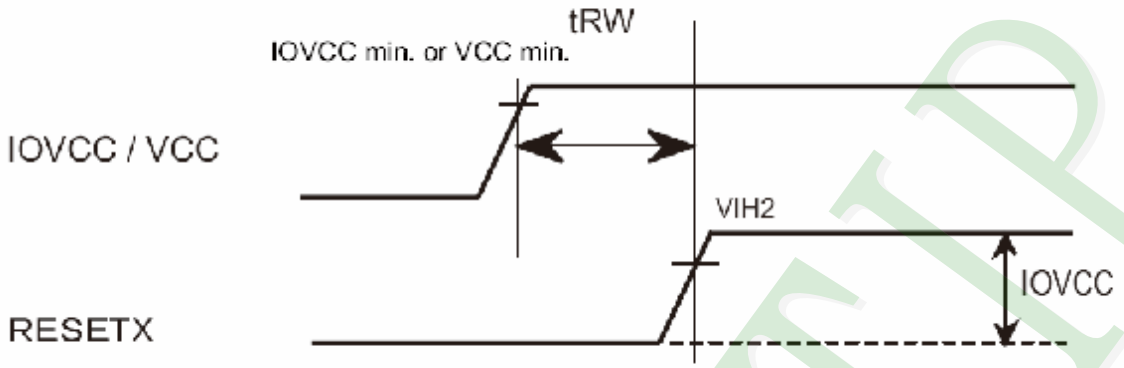
Note: The above values are target values. They are subject to change.

80-System Bus Interface Timing Characteristics (16-bit Interface)

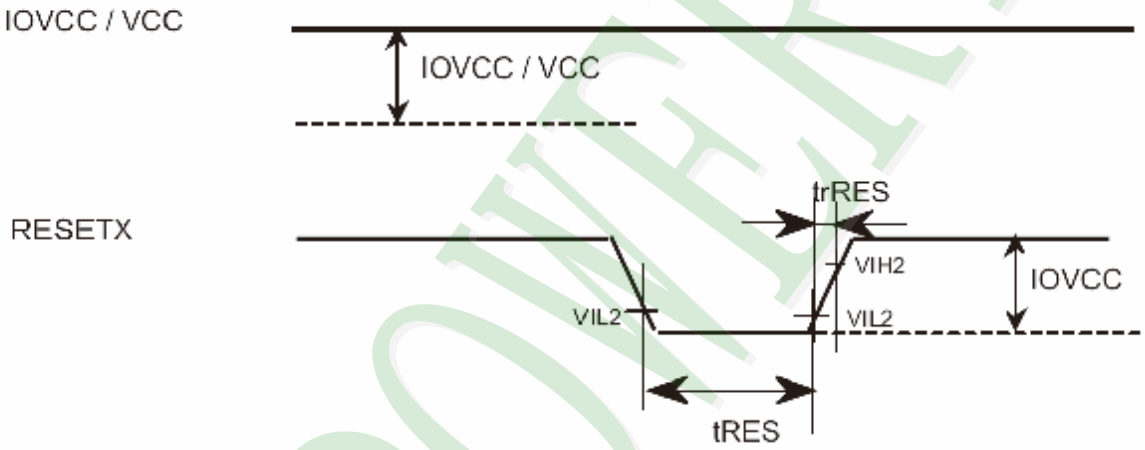
Item		Symbol	Unit	Timing Diagram	Min.	Typ.	Max.
Bus cycle time	Write	tCYCW	ns	Figure A	75	-	-
	Read	tCYCR	ns	Figure A	450	-	-
Write low-level pulse width		PWLW	ns	Figure A	40	-	-
Read low-level pulse width		PWLR	ns	Figure A	170	-	-
Write high-level pulse width		PWHW	ns	Figure A	25	-	-
Read high-level pulse width		PWHR	ns	Figure A	250	-	-
Write / Read rise/ fall time		tWRr, WRf	ns	Figure A	-	-	25
Setup time	Write (RS to CSX, WRX)	tAS	ns	Figure A	0	-	-
	Read (RS to CSX, RDX)		ns	Figure A	10	-	-
Address hold time		tAH	ns	Figure A	2	-	-
Write data setup time		tDSW	ns	Figure A	25	-	-
Write data hold time		tH	ns	Figure A	10	-	-
Read data delay time		tDDR	ns	Figure A	-	-	150
Read data hold time		tDHR	ns	Figure A	5	-	-

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

Reset timing when power supply is input



Reset timing during normal operation



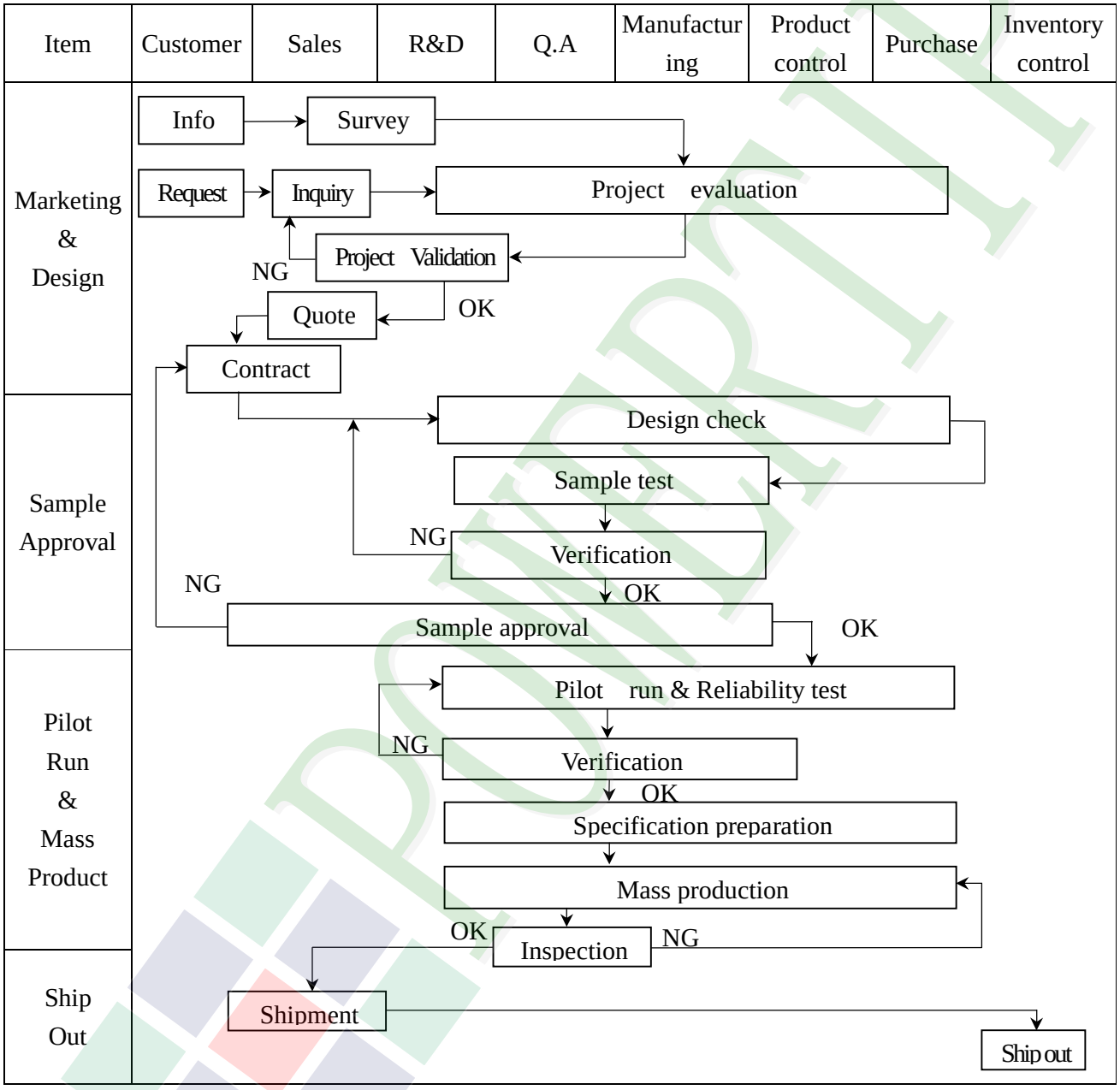
Reset Timing Characteristics

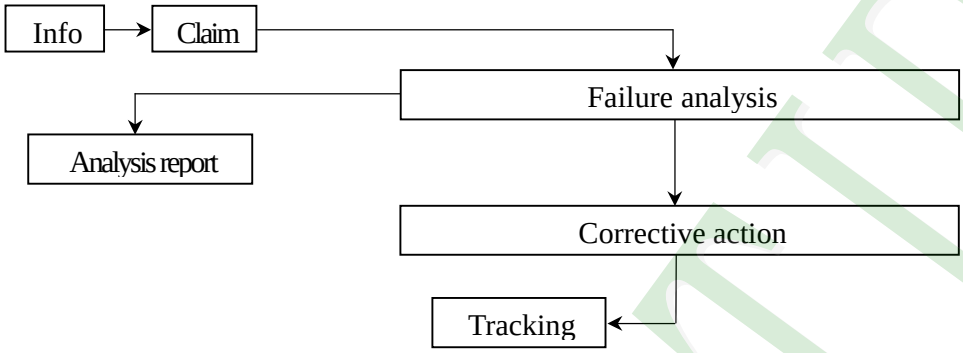
Item	Symbol	Unit	Timing Diagram	Min.	Typ.	Max.
Reset wait time	tRW	ms	Figure C-1	1	—	—
Reset low-level width	tRES	ms	Figure C-2	1	—	—
Reset rise time	trRES	μs	Figure C-2	—	—	10

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

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								
Q.A Activity	1. ISO 9001 Maintenance Activities 2. Process improvement proposal 3. Equipment calibration 4. Education And Training Activities 5. Standardization Management							

3.2 Inspection Specification

◆Scope ：The document shall be applied to TFT-LCD Module for less than 3.5″ (Ver.02).

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

◆Equipment：Gauge、MIL-STD、Powertip Tester、Sample

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

◆OUT Going Defect Level：Sampling.

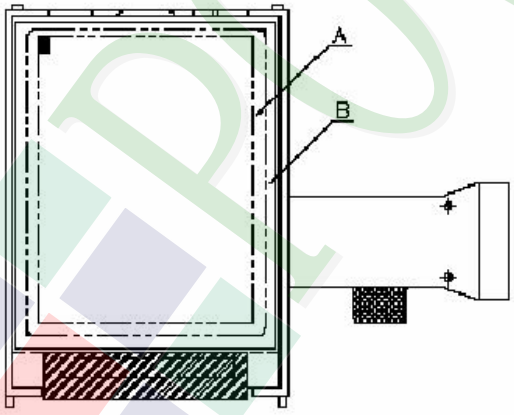
◆Standard of the product appearance test：

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

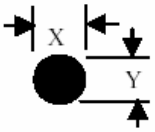
(4). Standard of inspection： (Unit：mm)

◆Specification For TFT-LCD Module Less Than 3.5″ : (Ver.02)

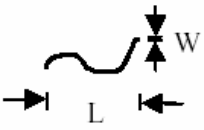
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td rowspan="3">01</td><td rowspan="3">Product condition</td><td>1.1The part number is inconsistent with work order of production.</td><td>Major</td></tr>
<tr><td>1.2 Mixed product types.</td><td>Major</td></tr>
<tr><td>1.3 Assembled in inverse direction.</td><td>Major</td></tr>
<tr><td>02</td><td>Quantity</td><td>2.1The 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>

◆Specification For TFT-LCD Module Less Than 3.5″ : (Ver. 02)

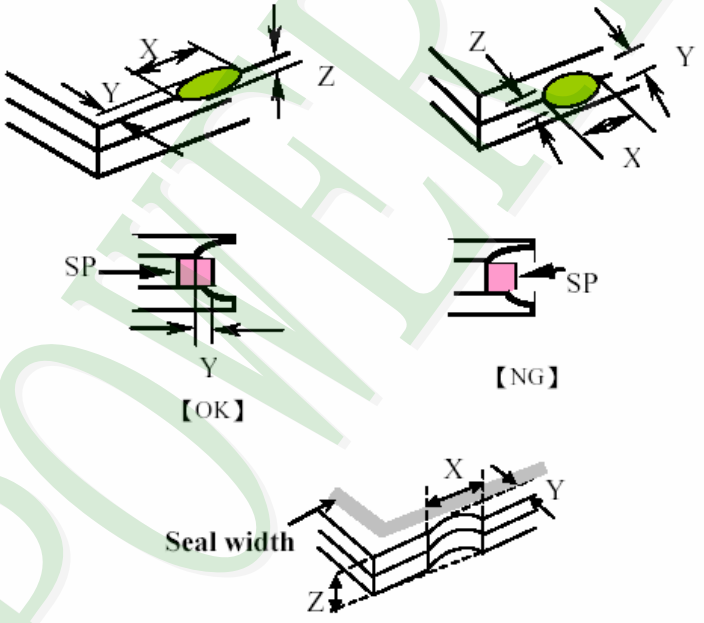
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td>06</td><td>Black or white dot、scratch、contamination

Round type
 

Φ=(x+y) / 2

Line type
 
</td><td>6.1 Round type (Non-display or display) :
<table><tr><th>Dimension (diameter : Φ)</th><th>Acceptance (Q'ty)</th></tr><tr><td>Φ ≦ 0.15</td><td>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>Length (L)</th><th>Width (W)</th><th>Acceptance (Q'ty)</th></tr><tr><td>---</td><td>W ≦ 0.03</td><td>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>Dimension (diameter : Φ)</th><th>Acceptance (Q'ty)</th></tr><tr><td>Φ ≦ 0.20</td><td>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.02)

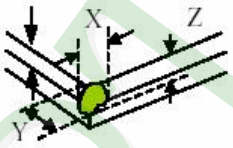
NO	Item	Criterion	Level
08	The crack of glass	Symbols : X : The length of crack Y : The width of crack. Z : The thickness of crack W : terminal length t : The thickness of glass a : LCD side length 8.1 General glass chip : 8.1.1 Chip on panel surface and crack between panels: 	Minor

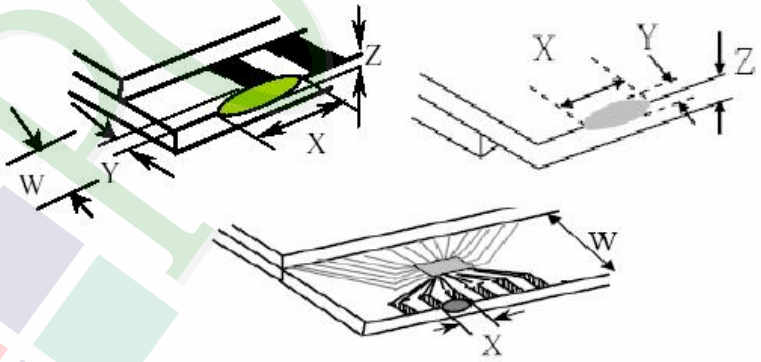
X	Y	Z
≦ a	Crack can't enter viewing area	≦1/2 t
≦ a	Crack can't exceed the half of SP width.	1/2 t < Z ≦2 t

◆Specification For TFT-LCD Module Less Than 3.5″ : (Ver. 02)

<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 :

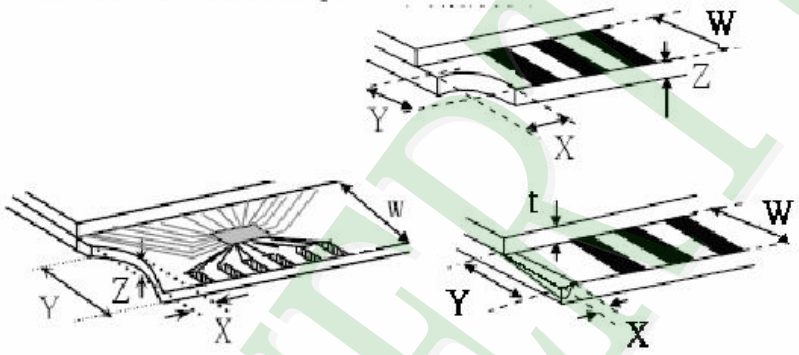
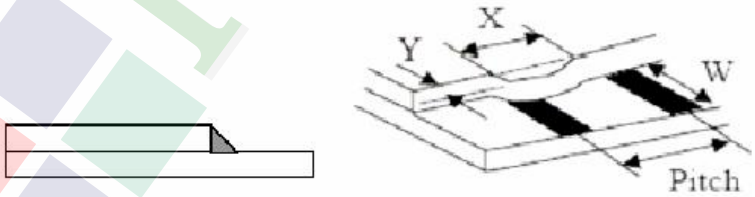
X : The length of crack　　Y : The width of crack.
Z : The thickness of crack　　W : terminal length
t : The thickness of glass　　a : LCD side length

8.1.2 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>
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><td>Minor</td></tr>
</table>

◆Specification For TFT-LCD Module Less Than 3.5″ : (Ver. 02)

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 8.2.2 Non-conductive portion :  X ≦ 1/3 a; Y ≦ W; Z ≦ t ⊙ 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 :  X ≦ a; Y ≦ 1/3 W; Z ≦ t	Minor

◆Specification For TFT-LCD Module Less Than 3.5″ : (Ver. 02)

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

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 & T/P)
4	ESD Test	Air Discharge: (include mobile phone) Apply 2 KV with 5 times Discharge for each polarity +/- Contact Discharge: (include mobile phone) Apply 250V 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 s) (Tolerance if the output voltage indication: ±5%)
5	Temperature Cycling Storage Test	-20℃ → +25℃ → +70℃ → +25℃ (30mins) (30mins) (30mins) (30mins) 10 Cycle Surrounding temperature, then storage at normal condition 4hrs.
6	Vibration Test (Packaged)	1. Sine wave 10～55 Hz frequency (1 min) 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 1times

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.

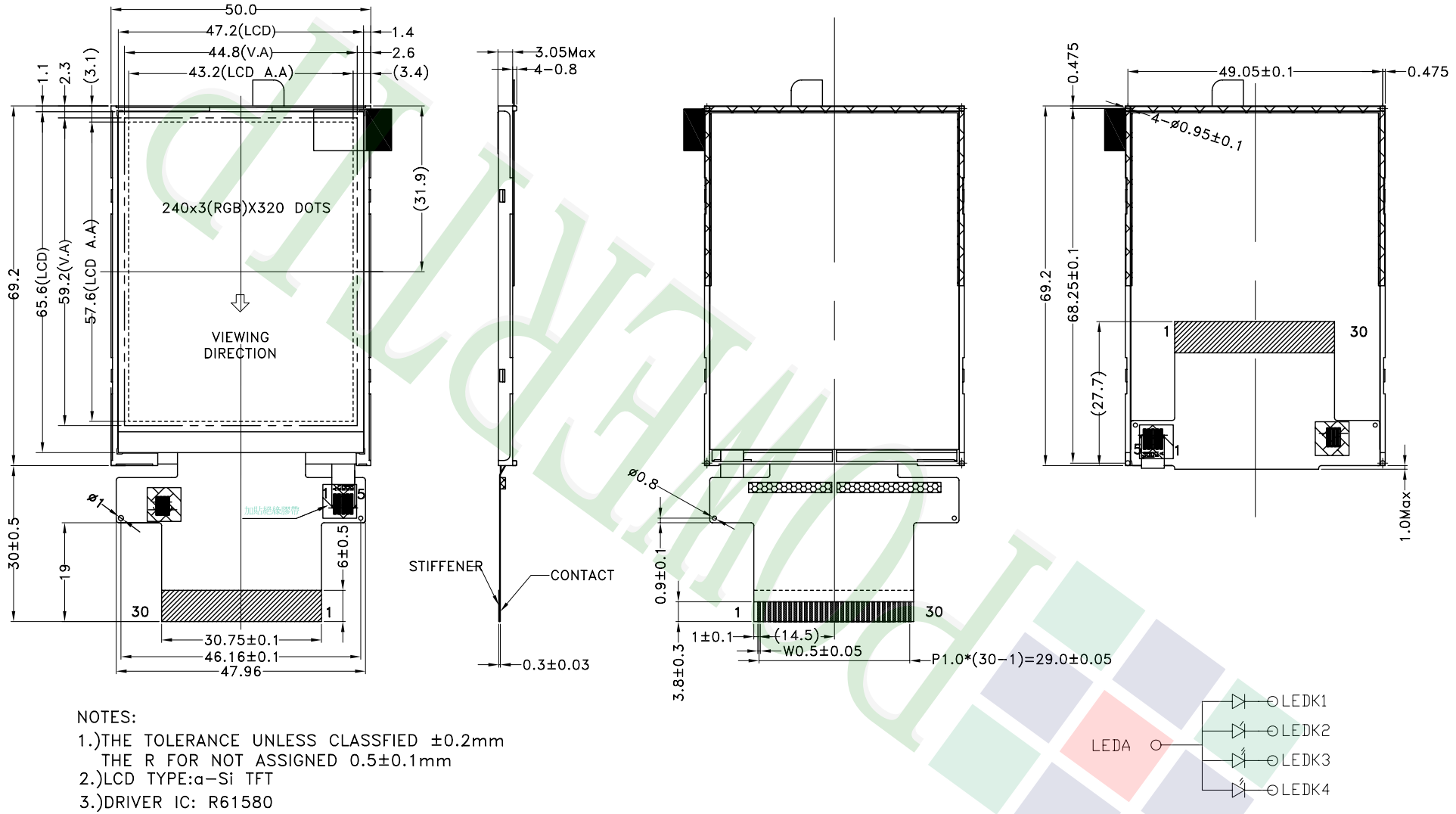
5.4 TERMS OF WARRANTY

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.



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.)VIEWING DIRECTION:12 O'CLOCK

5.)⊠ COMPONENT AREA HEIGHT 1.0 MAX.

REV	REV BY	REVISER	DATE
007			
006			
005			
004			
003			
002			
001	NEW DRAWING	Tang yunxian	2009/8/28

PART NO: PH240320T-037-L09Q

DRAWING NAME : JLMD-PH240320T-037-L09Q

TITLE: LCD MODULE DRAWING

江蘇久正光電股份有限公司
JIANGSU POWERTIP TECHNOLOGY CORPORATION

Design	Tang yunxian	(3)	Surface		
Check	Zhou aimei	Unit	MM	Material	
Approve	Ryan	Scale	1:1	Thickness	
		Page	1/1	Quantity	

最小長度(mm) \ 公差精度等級	精級
1 ~ 4	-
4 ~ 16	-
16 ~ 63	-
63 ~ 250	-
250 ~ 1000	-