MULTI-INNO TECHNOLOGY CO., LTD.

www.multi-inno.com

LCD MODULE SPECIFICATION

Model : MI0350B3T

For Customer's Acceptance:

Customer	
Approved	
Comment	

Revision	1.1
Engineering	
Date	2013-04-19
Our Reference	

REVISION RECORD

REV NO.	REV DATE	CONTENTS	REMARKS
1.0	2013-02-04	First Release	
1.1	2013-04-19	Add reflectance	

CONTENTS

■ GENERAL INFORMATION

■ EXTERNAL DIMENSIONS

■ ABSOLUTE MAXIMUM RATINGS

■ ELECTRICAL CHARACTERISTICS

■ BACKLIGHT CHARACTERISTICS

■ ELECTRO-OPTICAL CHARACTERISTICS

■ INTERFACE DESCRIPTION

■ BLOCK DIAGRAM

■ APPLICATION NOTES

■ RELIABILITY TEST

■ INSPECTION CRITERION

■ PRECAUTIONS FOR USING LCD MODULES

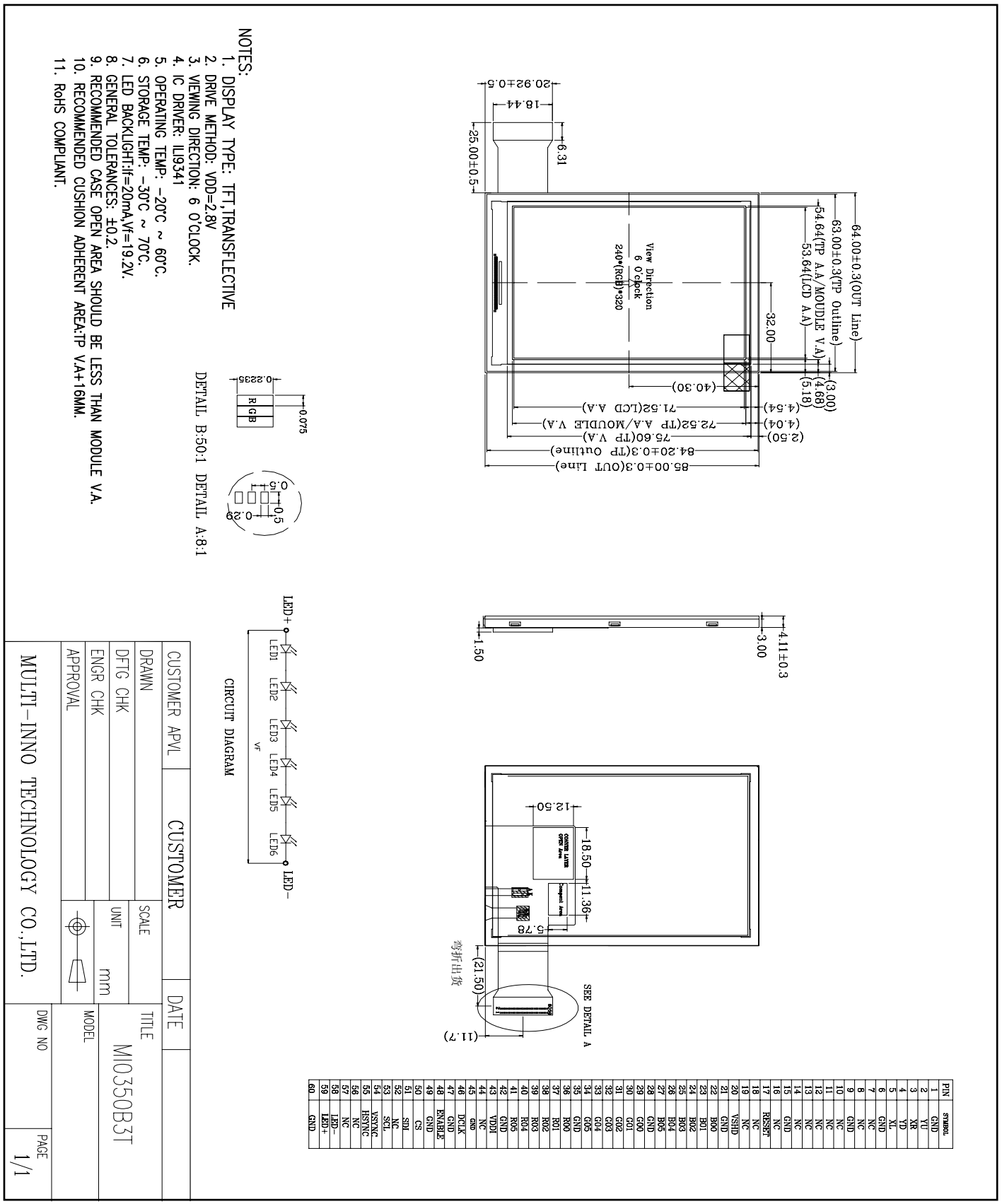
■ PRIOR CONSULT MATTER

■ GENERAL INFORMATION

Item	Contents	Unit
LCD type	TFT/Transflective	/
Size	3.5	Inch
Viewing direction	6:00	O' Clock
Gray scale inversion direction	12:00	O' Clock
LCM (W × H × D)	64.00×85.00×4.11	mm^3
Active area (W×H)	53.64×71.52	mm^2
Dot pitch (W×H)	0.075×0.2235	mm^2
Number of dots	240 (RGB) × 320	/
Driver IC	ILI9341	/
Backlight type	6 LEDs	/
Interface type	RGB 18 bits+SPI	/
Color depth	262K	/
Pixel configuration	R.G.B vertical stripe	/
Input voltage	2.8	V
With/Without TSP	With TSP	/
Weight	TBD	g

Note 1:Viewing direction for best image quality is different from TFT definition, there is a 180 degree shift.
Note 2 : RoHS compliant;
Note 3: LCM weight tolerance: ± 5% .

■ EXTERNAL DIMENSIONS



PIN	SYMBOL
1	GND
2	YU
3	XR
4	YD
5	XL
6	GND
7	NC
8	NC
9	GND
10	NC
11	NC
12	NC
13	NC
14	NC
15	GND
16	NC
17	RESET
18	NC
19	NC
20	VSHD
21	GND
22	B00
23	B01
24	B02
25	B03
26	B04
27	B05
28	GND
29	G00
30	G01
31	G02
32	G03
33	G04
34	G05
35	GND
36	R00
37	R01
38	R02
39	R03
40	R04
41	R05
42	GND
43	VDDI
44	NC
45	GND
46	DCLK
47	GND
48	ENABLE
49	GND
50	CS
51	SDL
52	NC
53	SCL
54	VSYNC
55	HSYNC
56	NC
57	NC
58	LED-
59	LED+
60	GND

■ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Supply voltage	VSHD	-0.3	4.6	V
Driver supply voltage	VGH-VGL	-0.3	32	V
Logic supply voltage	VDDI	-0.3	4.6	V
Operating temperature	TOP	-20	60	°C
Storage temperature	TST	-30	70	°C
Humidity	RH	-	90%(Max60°C)	RH

■ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	VSHD	2.3	2.8	3.3	V
Logic supply voltage	VDDI	1.65	2.8	3.3	V

■ BACKLIGHT CHARACTERISTICS

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	Vf	18	19.2	21	V	With 6 LEDs
Forward current	If	-	20	-	mA	
Power consumption	WBL	-	390	600	mW	
CIE	X	0.24		0.30		IF=20mA
	Y	0.24		0.30		
Operating life time	-	-	25000	-	Hrs	

■ELECTRO-OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark	Note
Response time		Tr+Tf	θ=0° ∅=0° Ta=25℃	-	35	-	ms	FIG 1.	4
Contrast ratio		Cr		100	150	-	---	FIG 2.	1
Reflectance				-	7.0	-	%	FIG 2.	3
Luminance uniformity		δ WHITE		80	90	-	%	FIG 2.	3
Surface Luminance		Lv		80	90	-	cd/m^2	FIG 2.	2
Viewing angle range		θ	∅ = 90°	-	55	-	deg	FIG 3.	6
			∅ = 270°	-	40	-	deg	FIG 3.	
			∅ = 0°	-	40	-	deg	FIG 3.	
			∅ = 180°	-	45	-	deg	FIG 3.	
CIE (x, y) chromaticity	Red	x	θ=0° ∅=0° Ta=25℃	-	0.624	-		FIG 2.	5
		y		-	0.368	-			
	Green	x		-	0.350	-			
		y		-	0.550	-			
	Blue	x		-	0.143	-			
		y		-	0.119	-			
	White	x		-	0.310	-			
		y		-	0.320	-			

Note 1. Contrast Ratio(CR) is defined mathematically as For more information see FIG 2.

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P 3,P4, P5)}}$$

Note 2. Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see FIG 2.

Lv = Average Surface Luminance with all white pixels (P1, P2, P 3, P4, P5)

Note 3. The uniformity in surface luminance ， δ WHITE is determined by measuring luminance at each test position 1 through 5, and then dividing the maximum luminance of 5 points luminance by minimum luminance of 5 points luminance. For more information see FIG 2.

$$\delta\ \text{WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P 3, P4, P5)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P 3, P4, P5)}}$$

Note 4. Response time is the time required for the display to transition from White to black(Rise Time, Tr) and from black to white(Decay Time, Tf). For additional information see FIG 1. The test equipment is Autronic-Melchers's ConoScope. Series.

Note 5. CIE (x, y) chromaticity，The x, y value is determined by measuring luminance at each test position 1 through 5,and then make average value.

Note 6. Viewing angle is the angle at which the contrast ratio is greater than 2. For TFT module the conrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 3.

Note 7. For viewing angle and response time testing, the testing data is base on Autronic-Melchers's ConoScope. Series Instruments For contrast ratio, Surface Luminance, Luminance uniformity, CIE The test data is base on TOPCON's BM-5 photo detector.

FIG. 1 The definition of Response Time

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".

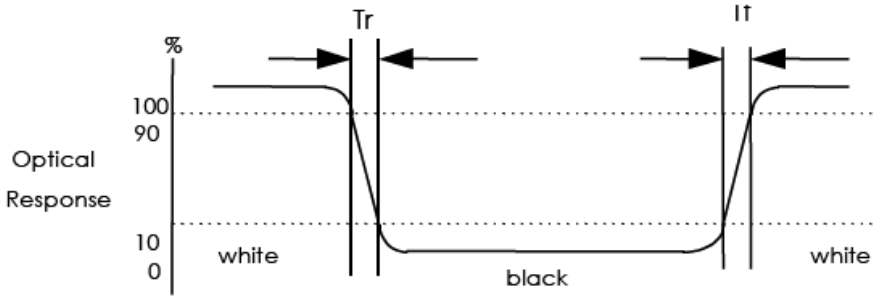
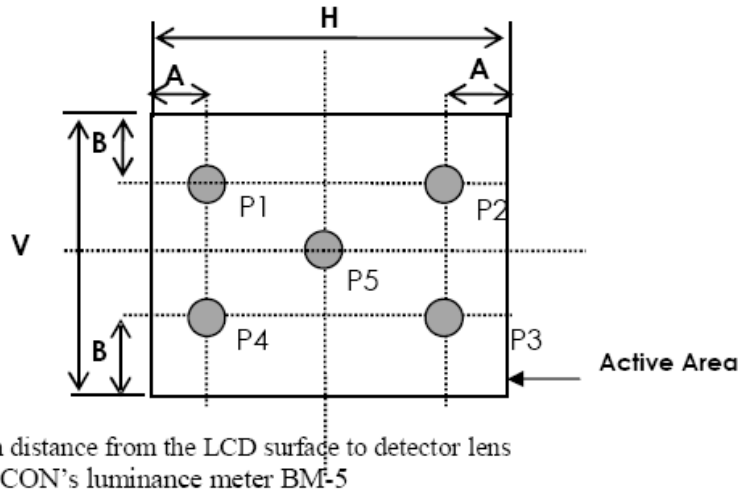
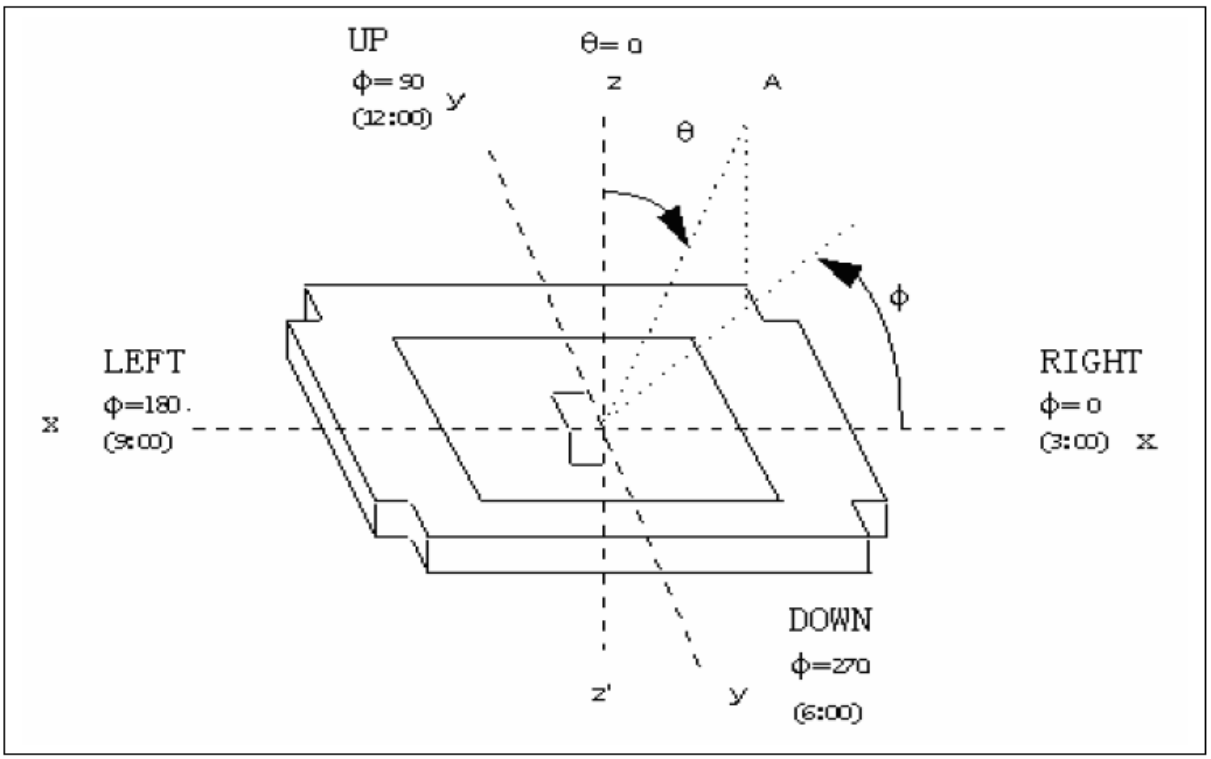


FIG. 2 Measuring method for Contrast ratio, surface luminance, Luminance uniformity , CIE (x, y) chromaticity



A : 5 mm
B : 5 mm
H,V : Active Area
Light spot size ∅=7mm, 500mm distance from the LCD surface to detector lens
measurement instrument is TOPCON's luminance meter BM-5

FIG. 3 The definition of viewing angle



■ INTERFACE DESCRIPTION

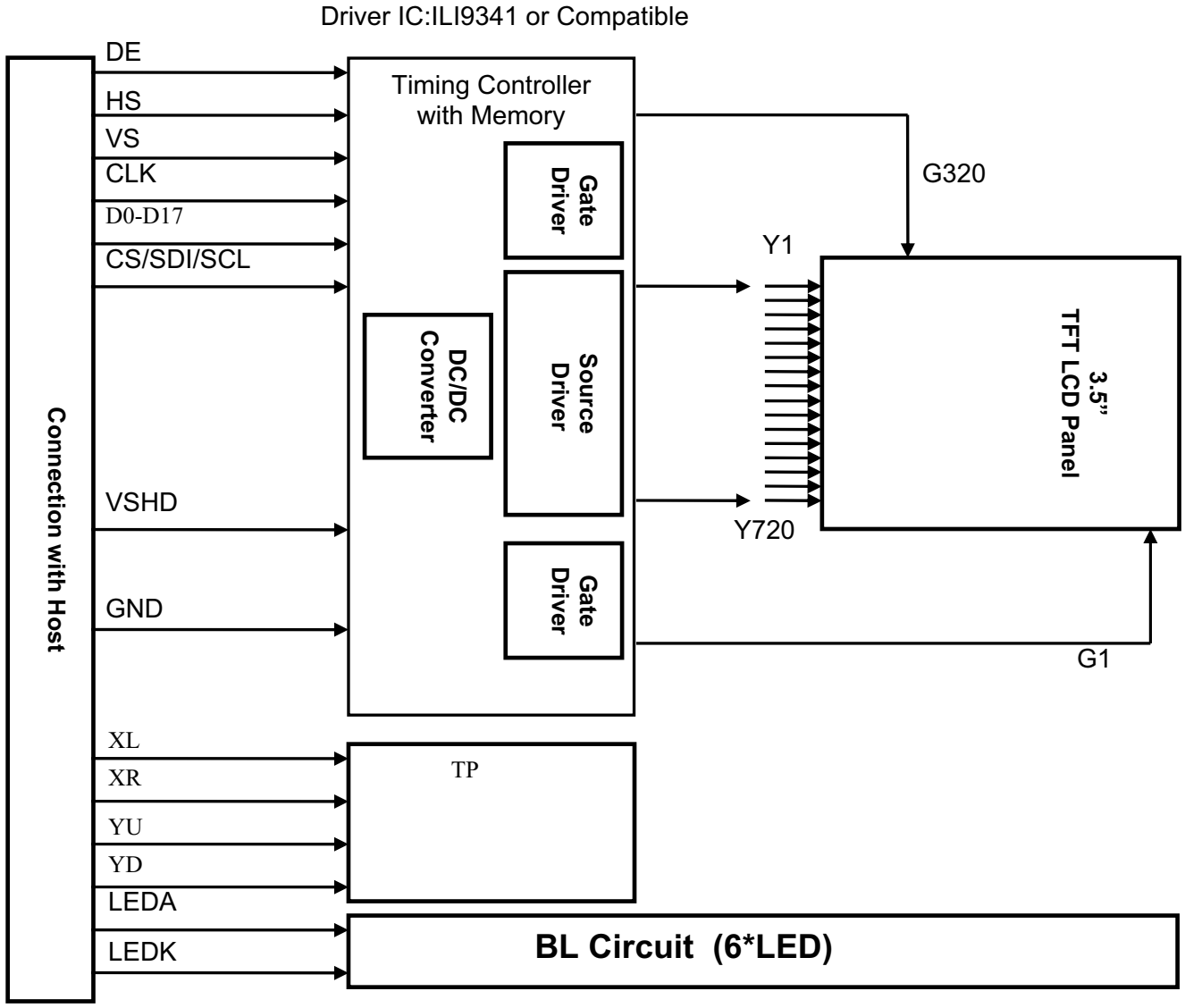
Pin No.	Symbol	Description
1	GND	Ground
2	YU	TP YU
3	XR	TP XR
4	YD	TP YD
5	XL	TP XL
6	GND	Ground
7	NC	No connection
8	NC	No connection
9	GND	Ground
10	NC	No connection
11	NC	No connection
12	NC	No connection
13	NC	No connection
14	NC	No connection
15	GND	Ground
16	NC	No connection
17	RESET	Reset(Low active)
18	NC	No connection
19	NC	No connection
20	VSHD	Analog supply voltage 2.8V
21	GND	Ground
22	B0	Blue data input(LSB)
23	B1	Blue data input
24	B2	Blue data input
25	B3	Blue data input
26	B4	Blue data input
27	B5	Blue data input(MSB)
28	GND	Ground
29	G0	Green data input(LSB)
30	G1	Green data input
31	G2	Green data input
32	G3	Green data input
33	G4	Green data input
34	G5	Green data input(MSB)
35	GND	Green data input

36	R0	Red data input(LSB)
37	R1	Green data input
38	R2	Green data input
39	R3	Green data input
40	R4	Green data input
41	R5	Red data input(MSB)
42	GND	Ground
43	VDDI	Logic supply voltage 2.8V
44	NCI	No connection
45	GND	Ground
46	DCLK	Pixel clock signal in RGB mode
47	GND	Ground
48	ENABLE	Data enable
49	GND	Ground
50	CS	Chip select input(Low enable)
51	SDI	Serial data input
52	NC	No connection
53	SCL	Serial interface clock input
54	VSYNC	Vertical SYNC input
55	HSYNC	Horizontal sync in RGB mode
56	NC	No connection
57	NC	No connection
58	LED-	Power supply for LED(Low voltage)
59	LED+	Power supply for LED(High voltage)
60	GND	Ground

Note:

1. The PIN connect is :AXK6F60347YG.

■BLOCK DIAGRAM



■ APPLICATION NOTES

1. Data input timing

1.1 Signal AC Timing

(VSHD=2.5~3.2V,Ta=25℃)

Parameter	Description	Min	Max	Unit
tSYNCS	VSYNC/HSYNC setup time	15		ns
tSYNCH	VSYNC/HSYNC	15		ns
tENS	ENAB	15		ns
tENH	ENAB	15		ns
tPOS	Data	15		ns
tPDH	Data	15		ns
PWDH	DCLK high-level period	15		ns
PWDL	DCLK low-level period	15		ns
tCYCD	DCLK cycle time	100		ns
trgbr , trgbf	DCLK,HSYNC,VSYNC rise/fall		15	ns

Table 1.1 RGB Interface Characteristics

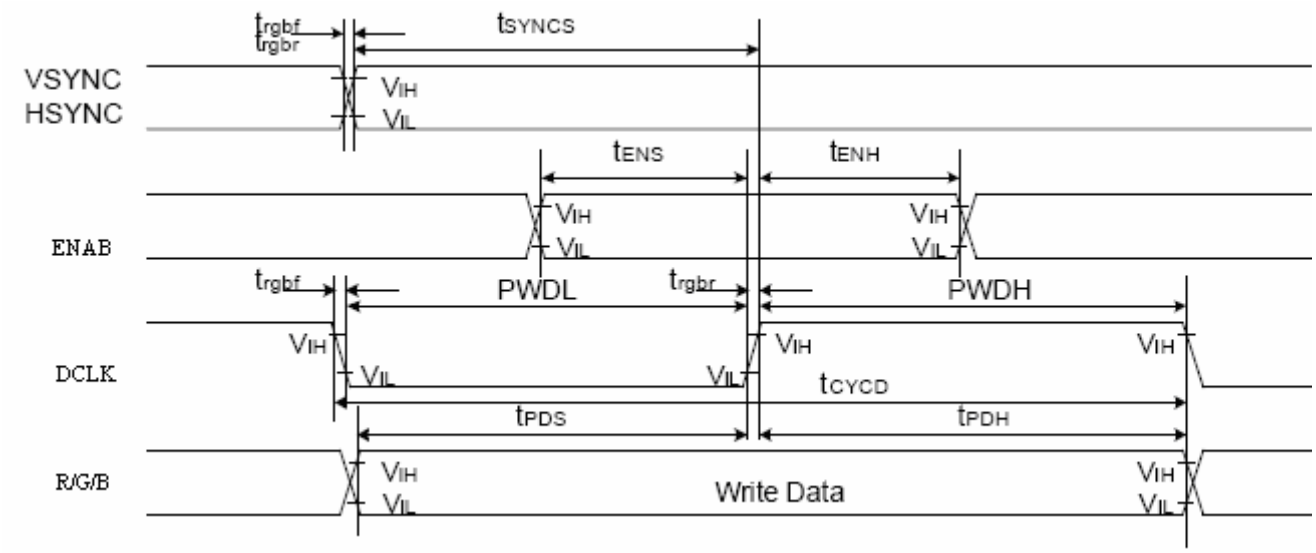


Fig.1-1 RGB Interface Timing

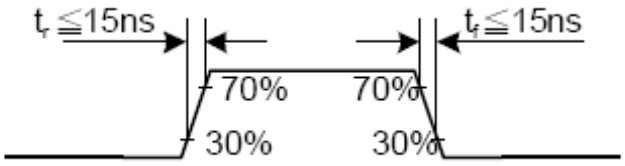


Fig.1-2 Input signal's rise and fall times

1.2 Recommend RGB Interface Timing

(VSHD=2.5~3.2V,Ta=25℃)

Parameter	Symbol	Symbol	Min	Typ	Max	Unit
DCLK	DCLK frequency	fDCYC		5.64	10	MHz
	DCLK period	tDCYC	100	177.15		ns
HSYNC	Horizontal	Thd		240		DCLK
	1horizontalline	Th		310		
	Horizontal blank	Thb	56	60		
	Horizontal front porch	Thfp	2	10	16	
VSYNC	Vertical display area	Tvd		320		Line
	Vsync period time	Tv		328		
	Vsync blank	Tvb	2	4		
	Vsync Front porch	Tvfp	2	4		

Tab.1-2 Recommend Input Timing (DCLK, HSYNC, VSYNC, ENAB)

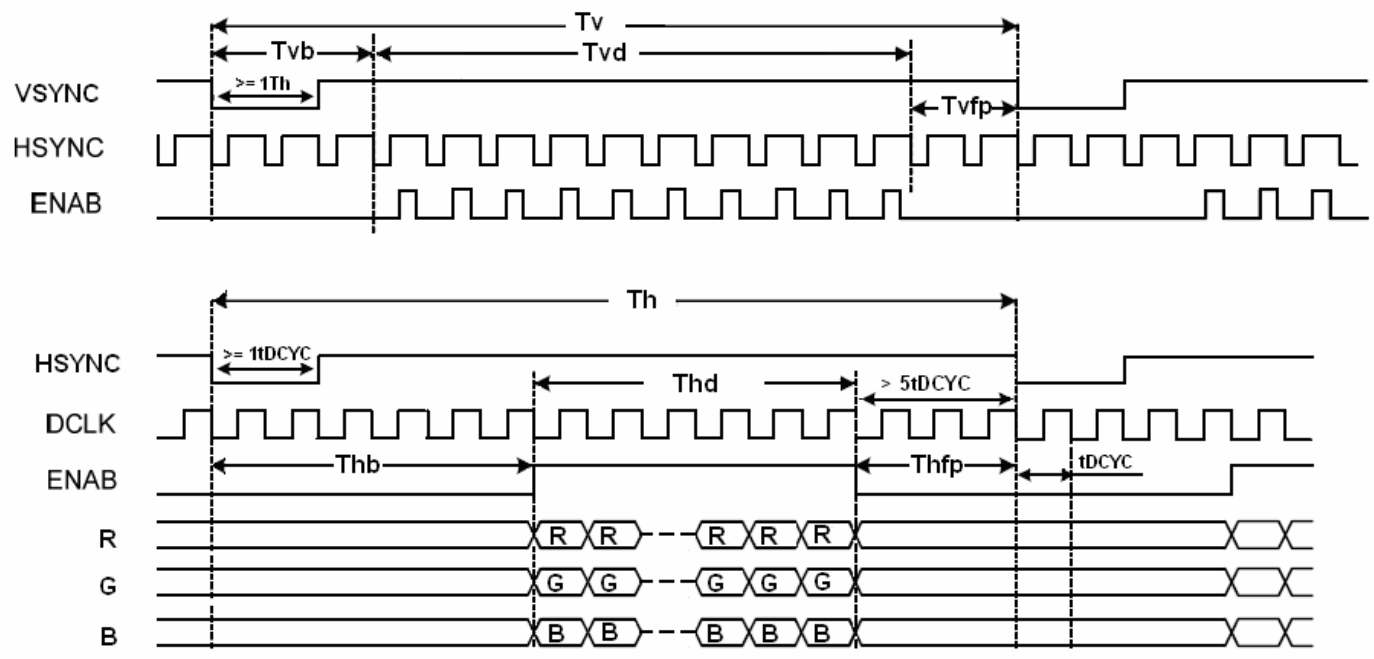


Fig.1-3 Recommend RGB Interface Timing

1.2 3-Wire 9-BIT Serial Interface

1.2.1 3-Wire 9-Bit data serial interface write mode

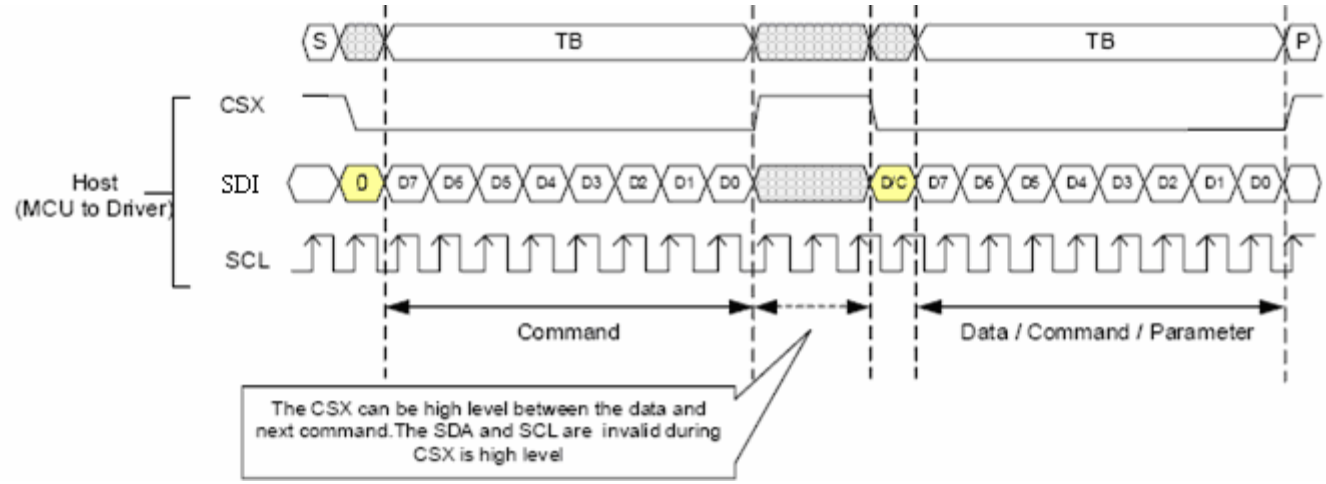


Figure.1-4 3-Wire 9-Bit Serial Interface I Bus Protocol, Write to Register or Display RAM
Note: D/C =0, Transfer Command; D/C =1, Transfer Data.

1.2.2 3-Wire 9-Bit data serial interface read 1-byte mode

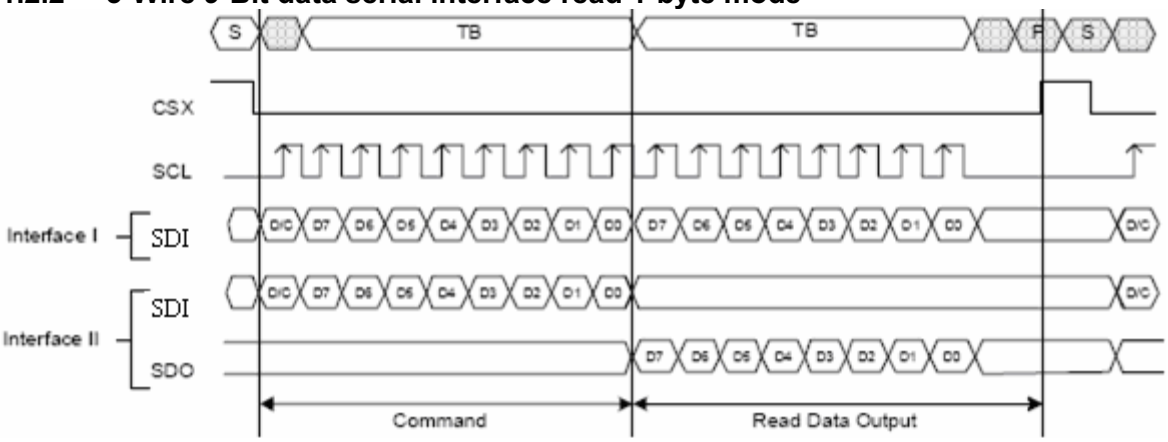


Figure. 1-5 3-Wire 9-Bit Serial Interface I/II Bus Protocol, Read 1-Byte From Register
Note: D/C=0, Transfer Command; D/C=1, Transfer Data

1.2.3 3-Wire 9-Bit data serial interface read 3-byte mode

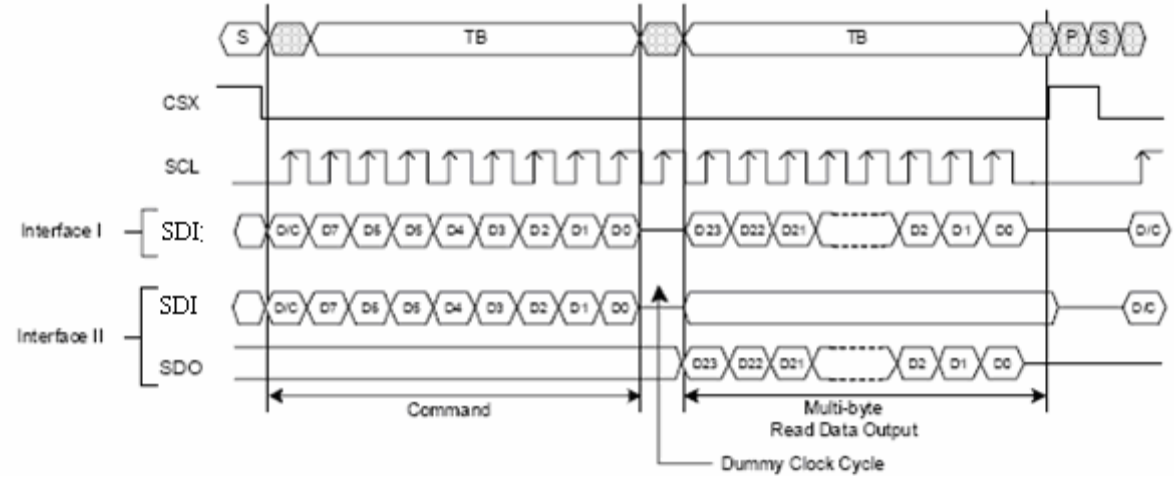


Figure. 1-6 3-Wire 9-Bit Serial Interface I/II Bus Protocol, Read 3-Byte From Register
Note: D/C=0, Transfer Command; D/C=1, Transfer Data.

1.2.4 3-Wire 9-Bit serial interface Timing

(VSHD=2.5~3.2V,Ta=25℃)

Parameter	Symbol	Conditions	Min	Max	Unit	Remark
Serial Clock Cycle(Write)	tscycw	SCL	100		ns	
SCL “H” pluse width(Write)	tshw	SCL	40		ns	
SCL “L” pluse width(Write)	tslw	SCL	40		ns	
Data setup time(Write)	tsds	SDI	30		ns	
Data hold time(Write)	tsdh	SDI	30		ns	
Serial Clock Cycle(Read)	tscycr	SCL	150		ns	
SCL “H” pluse width(Read)	tshr	SCL	60		ns	
SCL “L” pluse width(Read)	tslr	SCL	60		ns	
Access time	tacc	SDO(Read)	10		ns	
Output disable time	toh	SDO(Read)	10	50	ns	
CS “H” pluse width	tchw	CS	40		ns	
CS-SCL time	tcss	CS(write)	60		ns	
	tcsh	CS(write)	65		ns	

Tab.1-3 AC Characteristics of 3-Wire 9-Bit Serial Interface

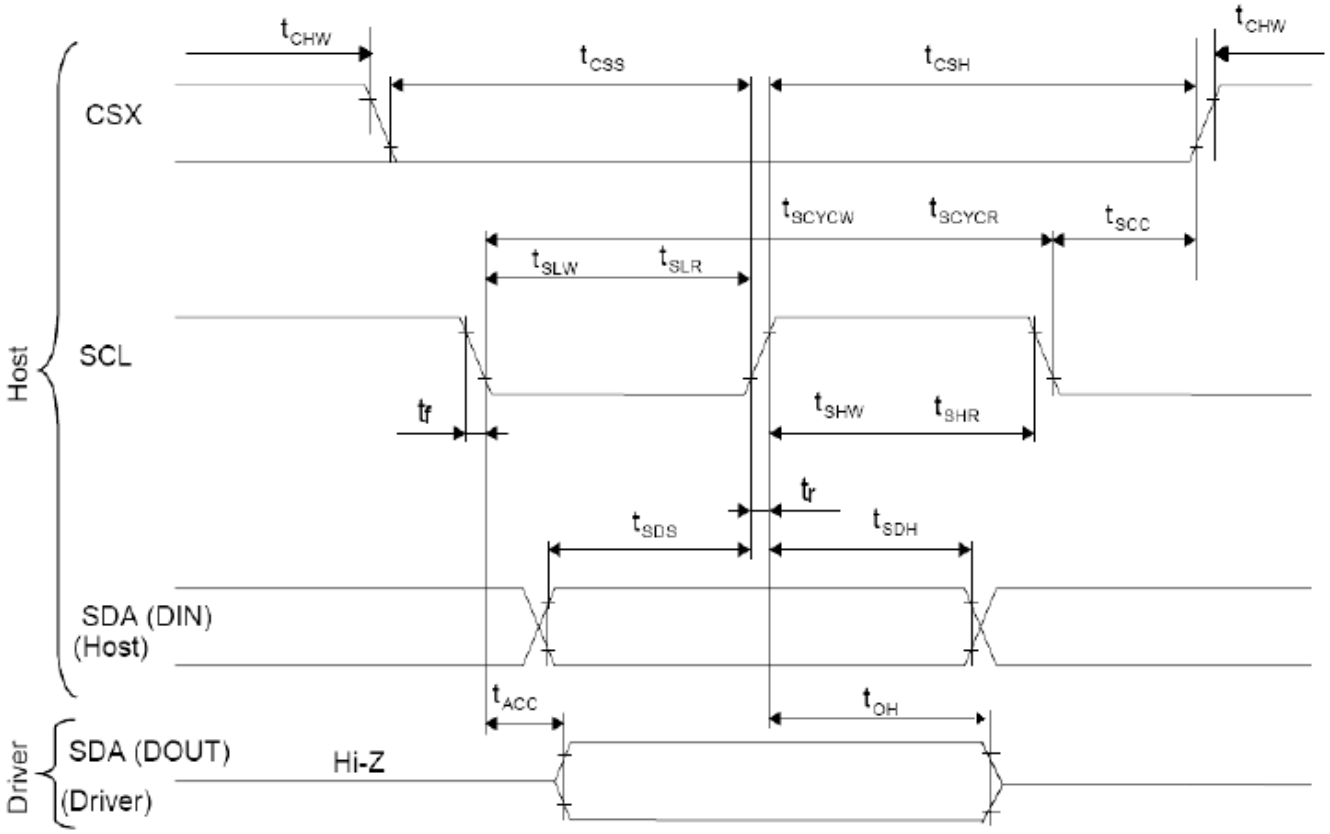


Fig.1-7 AC Characteristics of 3-Wire 9-Bit Serial Interface timing

1.3 Reset Timing

Parameter	Symbol	MIN	TYP	MAX	Unit	Remark
RESET	tRW	10			us	
	tRT			5	ms	note 1
				120	ms	note 2

Tab.1-4 Reset input timing

Note1: When Reset applied during Sleep In Mode.
Note2: When Reset applied during Sleep Out Mode.

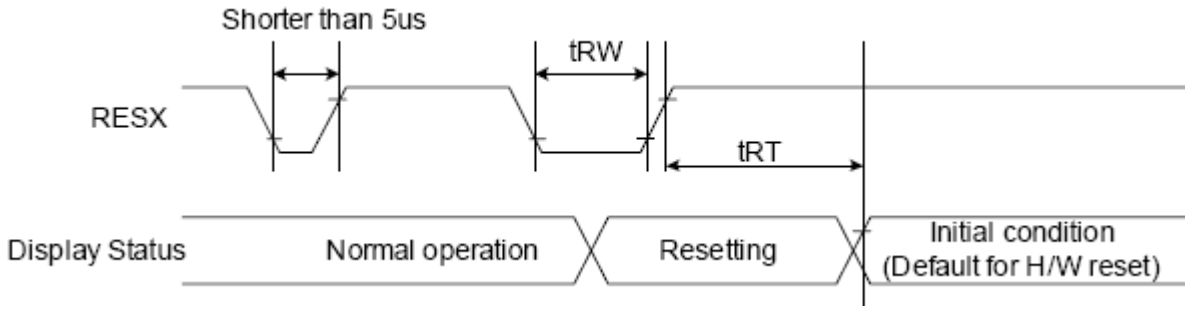


Fig.1-8 Reset timing

■ RELIABILITY TEST

No.	Test Item	Test Condition	Inspection after test
1	High Temperature Storage	70±2℃/240hours	1. Functional test is OK. Missing Segment, short, unclear segment, non-display, display abnormally and liquid crystal leak are un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temperature Storage	-30±2℃/240hours	
3	High Temperature Operating	60±2℃/240hours	
4	Low Temperature Operating	-20±2℃/240hours	
5	Temperature Cycle	-30±2℃~25~70±2℃×20cycles (30min.) (5min.) (30min.)	
6	Damp Proof Test	40℃±5℃×90%RH/240hours	
7	Vibration Test	Frequency：10Hz~55Hz Amplitude：1.0mm, Each direction on X,Y axe 0.5 houre, circle 2 hours	1. Function test is OK. 2. No glass crack,chipped glass, end seal loose and fall, epoxy frame crack 3. No structure loose and fall.
8	Dropping test	Drop to the ground from 80cm height, one time, every side of carton.	

■ INSPECTION CRITERION

OUTGOING QUALITY STANDARD	PAGE 1 OF 5
TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA	MDS Product

This specification is made to be used as the standard acceptance/rejection criteria for Color mobile phone LCM.

1 Sample plan

Sampling plan according to GB/T2828.1-2003/ISO 2859-1：1999 and ANSI/ASQC Z1.4-1993, normal level 2 and based on:

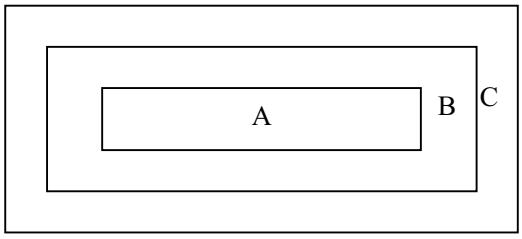
Major defect: AQL 0.65

Minor defect: AQL 1.5

2. Inspection condition

Viewing distance for cosmetic inspection is about 30cm with bare eyes, and under an environment of 20~40W light intensity, all directions for inspecting the sample should be within 45°against perpendicular line.

3. Definition of inspection zone in LCD.



Zone A: character/Digit area

Zone B: viewing area except Zone A (ZoneA+ZoneB=minimum Viewing area)

Zone C: Outside viewing area (invisible area after assembly in customer's product)

Fig.1 Inspection zones in an LCD.

Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble for quality and assembly of customer's product.

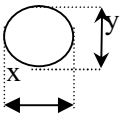
4. Inspection standards

4.1 Major Defect

Item No	Items to be inspected	Inspection Standard	Classification of defects
4.1.1	All functional defects	1) No display 2) Display abnormally 3) Missing vertical，horizontal segment 4) Short circuit 5) Back-light no lighting, flickering and abnormal lighting.	Major
4.1.2	Missing	Missing component	
4.1.3	Outline dimension	Overall outline dimension beyond the drawing is not allowed.	

4.2 Cosmetic Defect

<table>
<tr><th>Item No</th><th>Items to be inspected</th><th>Inspection Standard</th><th>Classification of defects</th></tr>
<tr><td rowspan="2">4.2.1</td><td>Clear Spots

Black and white Spot defect Pinhole, Foreign Particle, Dirt under polarizer</td><td>For dark/white spot, sizeΦis defined as Φ= $\frac{(x+y)}{2}$
 

1.
<table>
<tr><th rowspan="2">Zone / Size(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.10</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.10＜Φ≤0.15</td><td colspan="2">2</td></tr>
<tr><td>0.15＜Φ≤0.20</td><td colspan="2">1</td></tr>
<tr><td>Φ＞0.20</td><td colspan="2">0</td></tr>
</table></td><td>Minor</td></tr>
<tr><td>Dim Spots

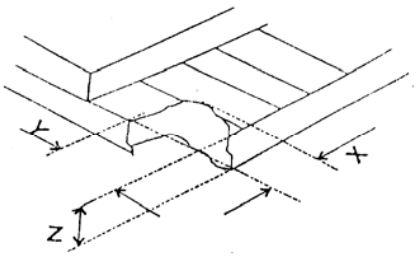
Circle shaped and dim edged defects</td><td>2.
<table>
<tr><th rowspan="2">2. Zone / Size(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.20＜Φ≤0.40</td><td colspan="2">3</td></tr>
<tr><td>0.40＜Φ≤0.60</td><td colspan="2">2</td></tr>
<tr><td>0.60＜Φ≤0.80</td><td colspan="2">1</td></tr>
<tr><td>0.80＜Φ</td><td colspan="2">0</td><td></td></tr>
</table></td><td>Minor</td></tr>
</table>

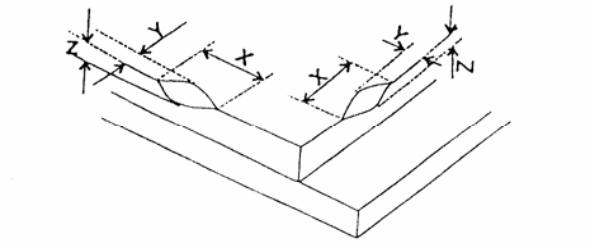
4.2. Cosmetic Defect

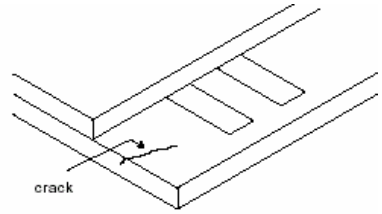
<table>
<tr><th>Item No</th><th>Items to be inspected</th><th>Inspection Standard</th><th>Classification of defects</th></tr>
<tr><td>4.2.2</td><td>Line defect
Black line,
White line,
Foreign material under polarizer,</td><td>
<table>
<tr><th colspan="2">Size(mm)</th><th colspan="4">Acceptable Qty</th></tr>
<tr><th rowspan="2">L(Length)</th><th rowspan="2">W(Width)</th><th colspan="3">Zone</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Ignore</td><td>W≤0.02</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>L≤3.0</td><td>0.02＜W≤0.03</td><td colspan="2">2</td></tr>
<tr><td>L≤2.0</td><td>0.03＜W≤0.05</td><td colspan="2">1</td></tr>
<tr><td></td><td>0.05＜W</td><td colspan="2">Define as spot defect</td></tr>
</table>
</td><td>Minor</td></tr>
<tr><td>4.2.3</td><td>Polarizer scratch</td><td>If the Polarizer scratch can be seen after mobile phone cover assembling or in the operating condition, judge by the line defect of 4.2.2.
If the Polarizer scratch can be seen only in non-operating condition or some special angle, judge by the following.
<table>
<tr><th colspan="2">Size(mm)</th><th colspan="4">Acceptable Qty</th></tr>
<tr><th rowspan="2">L(Length)</th><th rowspan="2">W(Width)</th><th colspan="3">Zone</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Ignore</td><td>W≤0.03</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>5.0＜L≤10.0</td><td>0.03＜W≤0.05</td><td colspan="2">2</td></tr>
<tr><td>L≤5.0</td><td>0.05＜W≤0.08</td><td colspan="2">1</td></tr>
<tr><td></td><td>0.08＜W</td><td colspan="2">0</td></tr>
</table>
</td><td>Minor</td></tr>
<tr><td>4.2.4</td><td>Polarize
Air bubble</td><td>Air bubbles between glass & polarizer
<table>
<tr><th rowspan="2">2. Zone
Size(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.20＜Φ≤0.30</td><td colspan="2">2</td></tr>
<tr><td>0.30＜Φ≤0.50</td><td colspan="2">1</td></tr>
<tr><td>0.50＜Φ</td><td colspan="2">0</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

OUTGOING QUALITY STANDARD	PAGE 4 OF 5
TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA	MDS Product

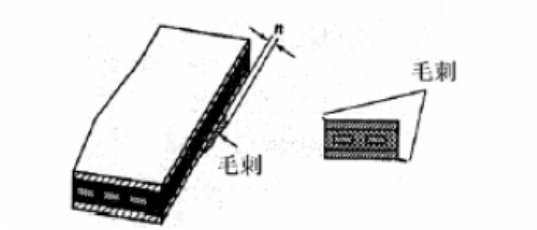
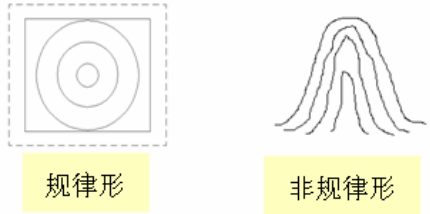
4.3. Cosmetic Defect

<table>
<tr><th>Item No</th><th>Items to be inspected</th><th>Inspection Standard</th><th>Classification of defects</th></tr>
<tr><td rowspan="3">4.3.5</td><td rowspan="3">Glass defect</td><td>(i) Chips on corner
 

<table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤2.0</td><td>≤S</td><td>Disregard</td></tr></table>Notes: S=contact pad length
Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal.</td><td>Minor</td></tr>
<tr><td>(ii)Usual surface cracks
 

<table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3.0</td><td><Inner border line of the seal</td><td>Disregard</td></tr></table></td><td>Minor</td></tr>
<tr><td>(iii) Crack
Cracks tend to break are not allowed.
 
</td><td>Major</td></tr>
<tr><td>4.3.6</td><td>Parts alignment</td><td>1) Not allow IC and FPC/heat-seal lead width is more than 50% beyond lead pattern.
2) Not allow chip or solder component is off center more than 50% of the pad outline.</td><td>Minor</td></tr>
<tr><td>4.3.7</td><td>SMT</td><td>According to the <Acceptability of electronic assemblies> IPC-A-610C class 2 standard. Component missing or function defect are Major defect, the others are Minor defect.</td><td></td></tr>
</table>

OUTGOING QUALITY STANDARD	PAGE 5 OF 5
TITLE: FUNCTIONAL TEST & INSPECTION CRITERIA	

	4.3.8 TP Defect	1、 Pattern font： Pattern fonts are clear and symmetrical，pattern fonts filter lightly are allowed; The fort line is not allow to thinner or thicker than 1/3of normal size, and swing is not more than 0.1mm. the line is smooth and not broken.  图案字体 Pattern font 2、The wing forward in the side of Visual Area： The length of wing forward inside of the Visual Area: n≤0.2mm; Not excess 3 point，and the distanceD≥20mm。  3、Film impression:With operation, must be invisibility. 4、Touch panel knob：if writing function normally,it could be allowed.  TP鼓 TP knob 5、 Newton ring Without operation, the color circle of Regularity or Non-regularity from the normal or slope angle of view. 1、**Regularity：** The area of the newton ring is less than 1/3 area of the touch panel; and no character affected and line distorted after touch panel lightening. It's ok. 2、 **Non-regularity** ： The area of the Newton ring is less than the 1/2 area of touch panel with lightening. And no character affected and line  	Minor

■ PRECAUTIONS FOR USING LCD MODULES

1 Handing Precautions

1.1 The display panel is made of glass and polarizer. As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.

1.2 If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.

1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals (some cosmetics are determined to the polarizer).

1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on it. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming in to contact with room temperature air.

1.5 If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents

- Isopropyl alcohol
- Ethyl alcohol

Do not scrub hard to avoid damaging the display surface.

1.6 Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.

- Water
- Ketone
- Aromatic solvents

Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contact with oil and fats.

1.7 Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.

1.8 Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.

1.9 Do not attempt to disassemble or process the LCD module.

1.10 NC terminal should be open. Do not connect anything.

1.11 If the logic circuit power is off, do not apply the input signals.

1.12 Electro-Static Discharge Control，Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

- Before removing LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential. Be sure to ground the body when handling the LCD modules.
- Tools required for assembling, such as soldering irons, must be properly grounded. Make certain the AC power source for the soldering iron does not leak. When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.
- To reduce the amount of static electricity generated, do not conduct assembling

and other work under dry conditions. To reduce the generation of static electricity be careful that the air in the work is not too dry. A relative humidity of 50%-60% is recommended. As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.

- The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

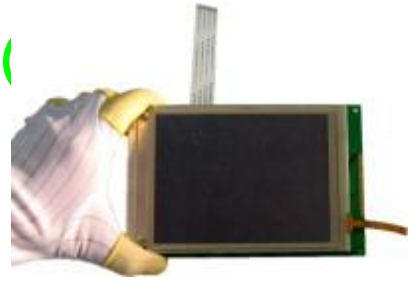
1.13 Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

- Do not alter, modify or change the shape of the tab on the metal frame.
- Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
- Do not damage or modify the pattern writing on the printed circuit board.
- Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.
- Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
- Do not drop, bend or twist the LCM.

2 Handling precaution for LCM

2.1 LCM is easy to be damaged. Please note below and be careful for handling.

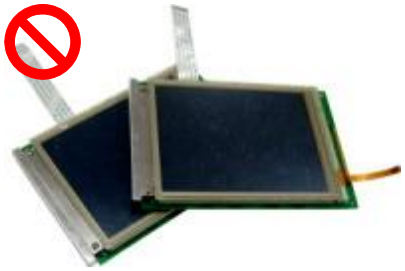
2.2 Correct handling:



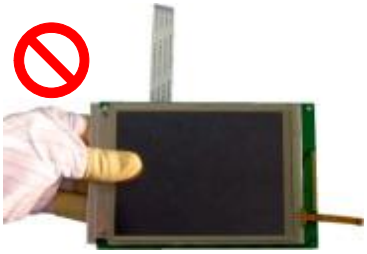
As above picture, please handle with anti-static gloves around LCM edges.

2.3 Incorrect handling:

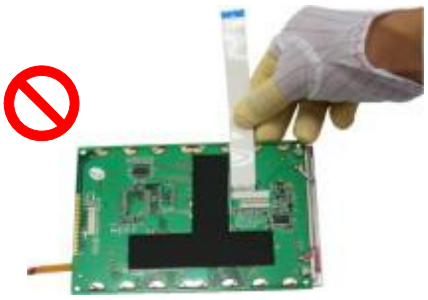
Please don't touch IC directly.



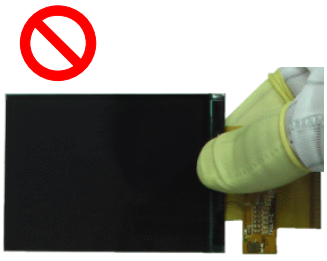
Please don't stack LCM.



Please don't hold the surface of panel.



Please don't stretch interface of output, such as FPC cable.



Please don't hold the surface of IC.

Please don't operate with sharp stick such as pens.

3 Storage Precautions

3.1 When storing the LCD modules, the following precaution are necessary.

3.1.1 Store them in a sealed polyethylene bag. If properly sealed, there is no need for the desiccant.

3.1.2 Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C, and keep the relative humidity between 40%RH and 60%RH.

3.1.3 The polarizer surface should not come in contact with any other objects (We advise you to store them in the anti-static electricity container in which they were shipped).

3.2 Others 其它

3.2.1 Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

3.2.2 If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

3.2.3 To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.

3.2.3.1 - Exposed area of the printed circuit board.

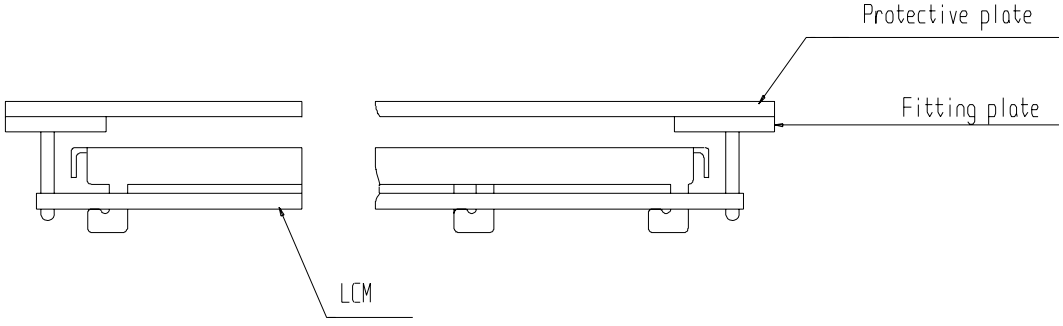
3.2.3.2 -Terminal electrode sections.

4 USING LCD MODULES

4.1 Installing LCD Modules

The hole in the printed circuit board is used to fix LCM as shown in the picture below. Attend to the following items when installing the LCM.

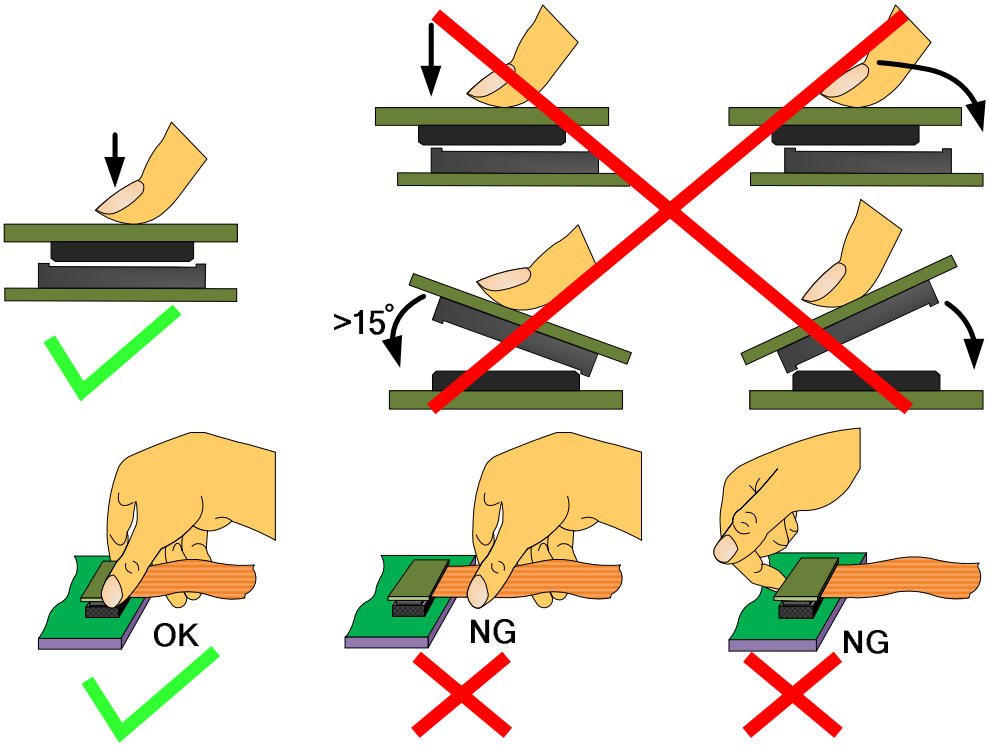
4.1.1 Cover the surface with a transparent protective plate to protect the polarizer and LC cell.



4.1.2 When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be ±0.1mm.

4.2 Precaution for assemble the module with BTB connector:

Please note the position of the male and female connector position, don't assemble or assemble like the method which the following picture shows



4.3 Precaution for soldering the LCM

	Manual soldering	Machine drag soldering	Machine press soldering
No RoHS Product	290°C ~350°C. Time : 3-5S.	330°C ~350°C. Speed : 15-17 mm/s.	300°C ~330°C. Time : 3-6S. Press: 0.8~1.2Mpa
RoHS Product	340°C ~370°C. Time : 3-5S.	350°C ~370°C. Speed : 15-17 mm/s.	330°C ~360°C. Time : 3-6S. Press: 0.8~1.2Mpa

4.3.1 If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation (This does not apply in the case of a non-halogen type of flux). It is recommended that you protect the LCD surface with a cover during soldering to prevent any damage due to flux spatters.

4.3.2 When soldering the electroluminescent panel and PC board, the panel and board should not be detached more than three times. This maximum number is determined by the temperature and time conditions mentioned above, though there may be some variance depending on the temperature of the soldering iron.

4.3.3 When remove the electroluminescent panel from the PC board, be sure the solder has completely melted, the soldered pad on the PC board could be damaged.

4.4 Precautions for Operation

4.4.1 Viewing angle varies with the change of liquid crystal driving voltage (VLCD). Adjust VLCD to show the best contrast.

4.4.2 It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life. An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.

4.4.3 Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operating temperature.

4.4.4 If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then back on.

4.4.5 A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit. Usage under the maximum operating temperature, 50%RH or less is required.

4.4.6 Input logic voltage before apply analog high voltage such as LCD driving voltage when power on. Remove analog high voltage before logic voltage when power off the module. Input each signal after the positive/negative voltage becomes stable.

4.4.7 Please keep the temperature within the specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.

4.5 Safety

4.5.1 It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.

4.5.2 If any liquid leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

4. 6 Limited Warranty

Unless agreed between Multi-Inno and the customer, Multi-Inno will replace or repair any of its LCD modules which are found to be functionally defective when inspected in accordance with Multi-Inno LCD acceptance standards (copies available upon request) for a period of one year from date of production. Cosmetic/visual defects must be returned to Multi-Inno within 90 days of shipment. Confirmation of such date shall be based on data code on product. The warranty liability of Multi-Inno limited to repair and/or replace on the terms set forth above. Multi-Inno will not be responsible for any subsequent or consequential events.

4.7 Return LCM under warranty

4.7.1 No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are :

4.7.1.1 - Broken LCD glass.

4.7.1.2 - PCB eyelet is damaged or modified.

4.7.1.3 -PCB conductors damaged.

4.7.1.4 - Circuit modified in any way, including addition of components.

4.7.1.5 - PCB tampered with by grinding, engraving or painting varnish.

4.7.1.6 - Soldering to or modifying the bezel in any manner.

4.7.2 Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet, conductors and terminals.

■ PACKING SPECIFICATION

Please consult our technical department for detail information.

■ PRIOR CONSULT MATTER

1 For Multi-Inno standard products, we keep the right to change material, process ... for improving the product property without prior notice to our customer.

2 For OEM products, if any changes are needed which may affect the product property, we will consult with our customer in advance.

3 If you have special requirement about reliability condition, please let us know before you start the test on our samples.