MULTI-INNO TECHNOLOGY CO., LTD.

www.multi-inno.com

LCD MODULE SPECIFICATION

Model : MI0177JT-1

This module uses ROHS material

For Customer's Acceptance:

Customer	
Approved	
Comment	

Revision	1.7
Engineering	
Date	2016-06-07
Our Reference	

REVISION RECORD

REV NO.	REV DATE	CONTENTS	REMARKS
1.0	2011-12-25	Preliminary specification release	
1.1	2012-03-25	Update viewing direction	
1.2	2012-07-23	Update temperature	
1.3	2013-10-10	Update contrast ratio	
1.4	2013-11-21	IC changed from ST7735R to ST7735S	
1.5	2013-12-10	Update viewing angle range	
1.6	2014-05-21	Add LED lifetime	P.6
		Correct contrast ratio from 450 to 500	P.7
1.7	2016-06-07	Correct Reliability Test Conditions Format	P.13

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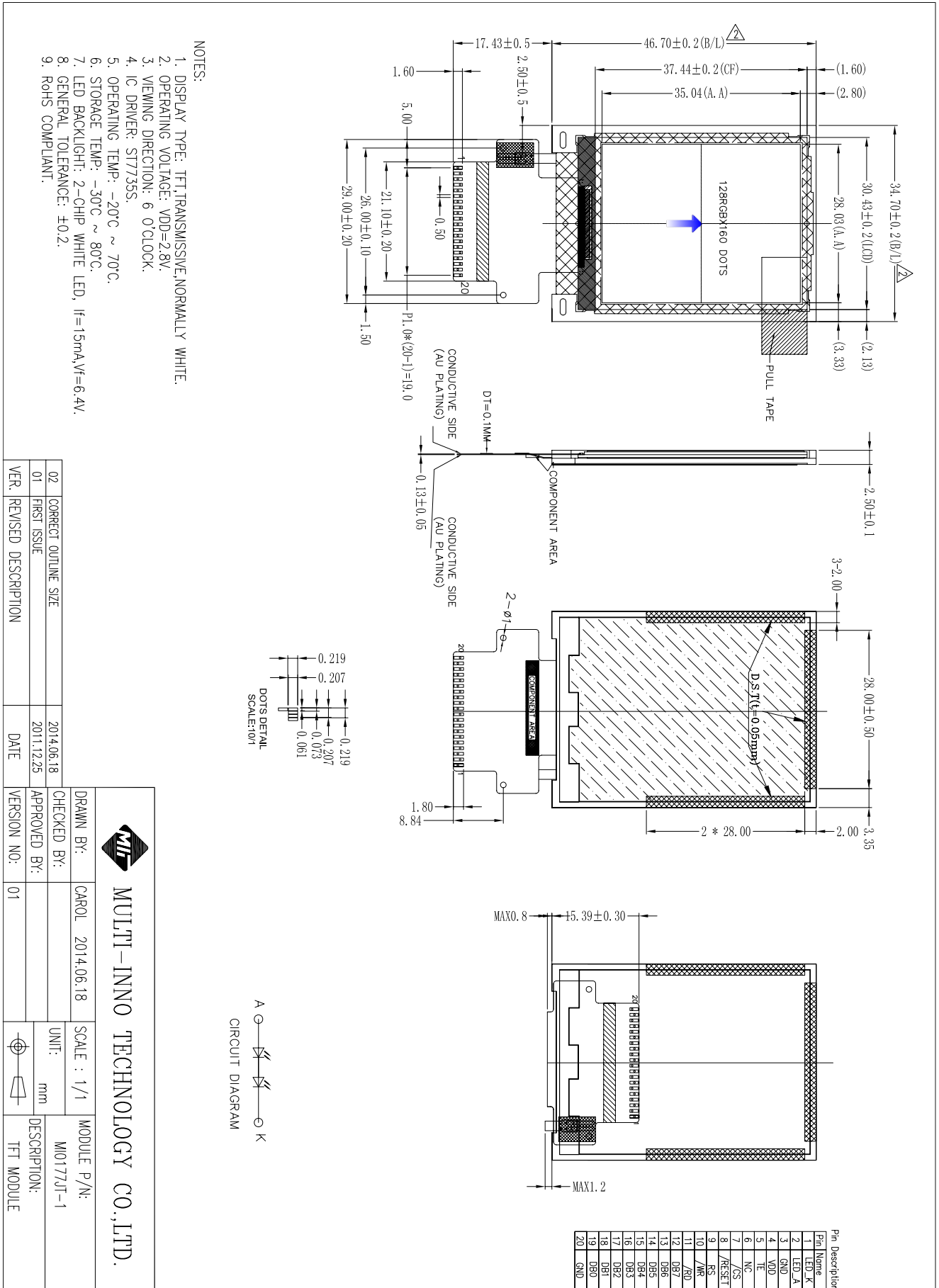
■PACKING SPECIFICATION

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■ **GENERAL INFORMATION**

Item	Contents	Unit
LCD type	TFT/Transmissive/Normally white	/
Size	1.77	Inch
Viewing direction	6:00(without image inversion and least brightness change)	O' Clock
Gray scale inversion direction	12:00(contrast peak located at)	O' Clock
LCM (W × H × D)	34.70×46.70×2.50	mm^3
Active area (W×H)	28.03×35.04	mm^2
Pixel pitch (W×H)	0.219×0.219	mm^2
Number of dots	128 (RGB) × 160	/
Driver IC	ST7735S	/
Backlight type	2 LEDs	/
Interface type	8bit CPU	/
Color depth	262K	/
Pixel configuration	R.G.B vertical stripe	/
Surface treatment	Anti-glare	/
Input voltage	2.8	V
With/Without TSP	Without TSP	/
Weight	TBD	g

Note 1: RoHS compliant;
Note 2: LCM weight tolerance: ± 5% .

■ EXTERNAL DIMENSIONS

NOTES:

1. DISPLAY TYPE: TFT,TRANSMISSIVE,NORMALLY WHITE.
2. OPERATING VOLTAGE: VDD=2.8V.
3. VIEWING DIRECTION: 6 O'CLOCK.
4. IC DRIVER: ST7735S.
5. OPERATING TEMP: −20℃ ~ 70℃.
6. STORAGE TEMP: −30℃ ~ 80℃.
7. LED BACKLIGHT: 2−CHIP WHITE LED, If=15mA,Vf=6.4V.
8. GENERAL TOLERANCE: ±0.2.
9. RoHS COMPLIANT.

VER.	REVISED DESCRIPTION	DATE	VERSION NO:	01
02	CORRECT OUTLINE SIZE	2014.06.18		
01	FIRST ISSUE	2011.12.25		

MULTI-INNO TECHNOLOGY CO.,LTD.

DRAWN BY:	CAROL 2014.06.18	MODULE P/N:
CHECKED BY:	SCALE : 1/1	MI0177JT-1
APPROVED BY:	UNIT: mm	DESCRIPTION:
		TFT MODULE

CIRCUIT DIAGRAM

A ○
K ○

DOTS DETAIL
SCALE:10/1

0.219
0.207
0.219
0.207
0.073
0.061

Pin	Description
Pin	Name
1	LED_K
2	LED_A
3	GND
4	VDD
5	TE
6	NC
7	/CS
8	/RESET
9	RS
10	/WR
11	/RD
12	DB7
13	DB6
14	DB5
15	DB4
16	DB3
17	DB2
18	DB1
19	DB0
20	GND

■ ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Supply voltage for logic	VCC	-0.3	3.3	V
Input voltage for logic	VIN	-0.5	VCC+0.3	V
Operating temperature	Top	-20	70	°C
Storage temperature	TST	-30	80	°C
Backlight forward current	I_{LED}	-	30	mA
Humidity	RH	-	90%(Max60 °C)	RH

■ ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage for logic	VCC	2.5	2.8	3.3	V
Input voltage'H'level	VIH	0.8xVCC	-	VCC	V
Input voltage'L'level	VIL	-0.3	-	0.2xVDD	V
LED forward voltage	Vf	6.0	6.4	6.8	V
Input leakage current	I_{LKG}	-	-	-	μA
Inout backlight current	I_{LED}	-	15	20	mA
LED lifetime	-	20000	-	-	Hrs

■ ELECTRO-OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark	Note
Response time	Tr+Tf	θ=0° ∅=0° Ta=25℃	-	30	-	ms	Fig.1	4
Contrast ratio	Cr		-	500	-	---	FIG2.	1
Luminance uniformity	δ WHITE		80	85	-	%	FIG2.	3
Surface Luminance	Lv		-	320	-	cd/m^2	FIG 2.	2
Viewing angle range	θ	∅ = 90°	-	65	-	deg	FIG3.	6
		∅ = 270°	-	55	-	deg	FIG3.	
		∅ = 0°	-	65	-	deg	FIG3.	
		∅ = 180°	-	65	-	deg	FIG3.	
CIE (x, y) chromaticity	Red x	θ=0° ∅=0° Ta=25℃	-	0.633	-	-	FIG 2.	5
	Redy		-	0.329	-			
	Greenx		-	0.297	-			
	Greeny		-	0.577	-			
	Bluex		-	0.133	-			
	Bluey		-	0.129	-			
	White x		-	0.280	-			
	White y		-	0.320	-			

Note1.　　Contrast Ratio(CR) is defined mathematically by the following formula.　For more information see FIG 2.:

Contrast Ratio = $\dfrac{\text{Average Surface Luminance with all white pixels (P 1,P2, P 3,P4, P5)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P 3,P4, P5)}}$

Note2.　　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)

Note3.　　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.

δ WHITE = $\dfrac{\textbf{Minimum}\text{ Surface Luminance with all white pixels }(\textbf{P}_1,\textbf{ P}_2,\textbf{ P}_3,\textbf{P}_4,\textbf{ P}_5)}{\textbf{Maximum}\text{ Surface Luminance with all white pixels }(\textbf{P}_1,\textbf{ P}_2,\textbf{ P}_3,\textbf{P}_4,\textbf{ P}_5)}$

Note4.　　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..

Note5.　　CIE (x, y) chromaticity ,The x,y value is determined by screen active area position 5.　For more information see FIG 2.

Note6.　　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.

Note7.　　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 and CIE，　the testing data is base on TOPCON's BM-5 photo detector.

Note8.　　For　TFT module, Gray scale reverse occurs in the direction of panel viewing angle

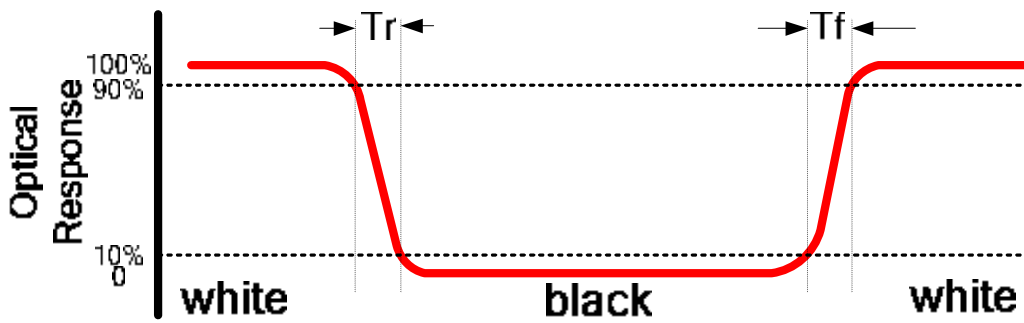**FIG.1.   The definition of Response Time**

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 $\varnothing$=5mm, 500mm distance from the LCD surface to detector lens
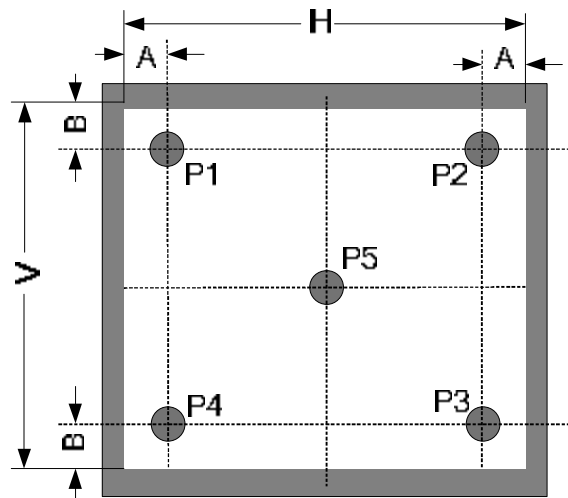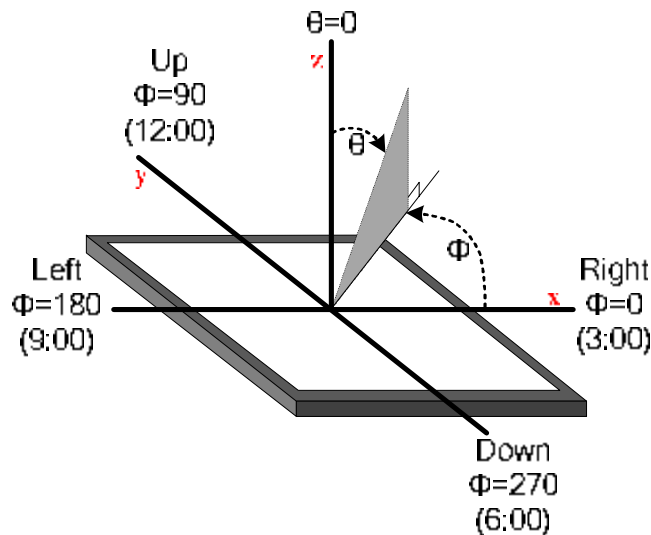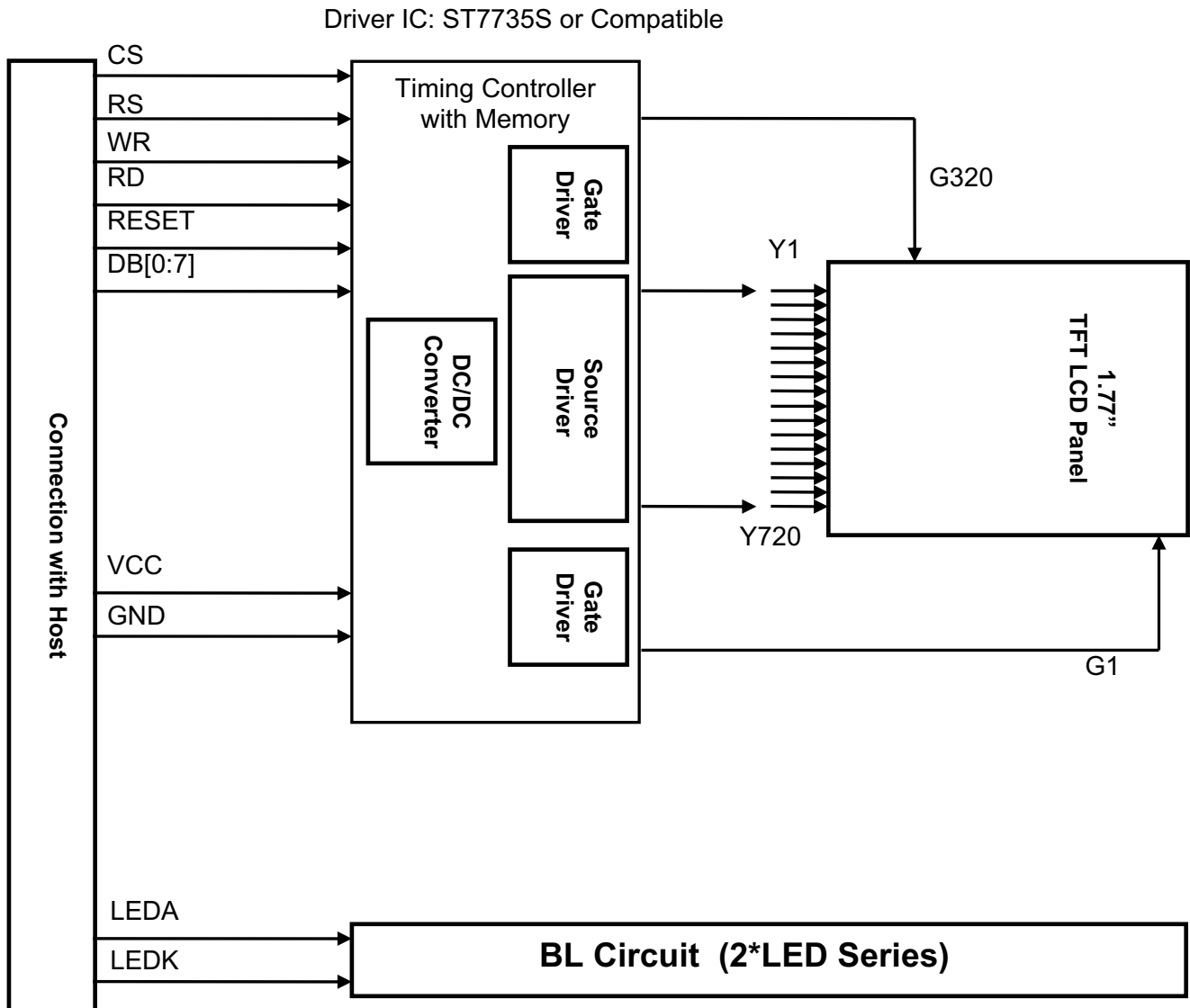measurement instrument is TOPCON's luminance meter BM-5

FIG.3.   The definition of viewing angle

■ INTERFACE DESCRIPTION

NO.	SYMBOL	Description	I/O
1	LED_K	LED Cathode	Power supply
2	LED_A	LED Anode	Power supply
3	GND	Ground	Power supply
4	VDD	Power supply	
5	TE	No connection	
6	NC	No connection	
7	/CS	Chip Select	I
8	RESET	LCD RERSET TERMINAL ACITVE"L"	I
9	RS	Command/Data Select	I
10	WR	Write signal	I
11	RD	Read signal	I
12	DB7	Data Bus	
13	DB6	Data Bus	
14	DB5	Data Bus	
15	DB4	Data Bus	
16	DB3	Data Bus	
17	DB2	Data Bus	I
18	DB1	Data Bus	I
19	DB0	Data Bus	I
20	GND	Ground	

■ BLOCK DIAGRAM

Driver IC: ST7735S or Compatible

Connection with Host	

CS
RS
WR
RD
RESET
DB[0:7]

VCC
GND

LEDA
LEDK

Timing Controller with Memory

Gate Driver

DC/DC Converter

Source Driver

Gate Driver

G320

Y1

Y720

G1

1.77" TFT LCD Panel

BL Circuit (2*LED Series)

■ APPLICATION CIRCUIT

1 Timing chart

1.1 Parallel Interface Characteristics:8-bit Bus(8080 Series MCU Interface)
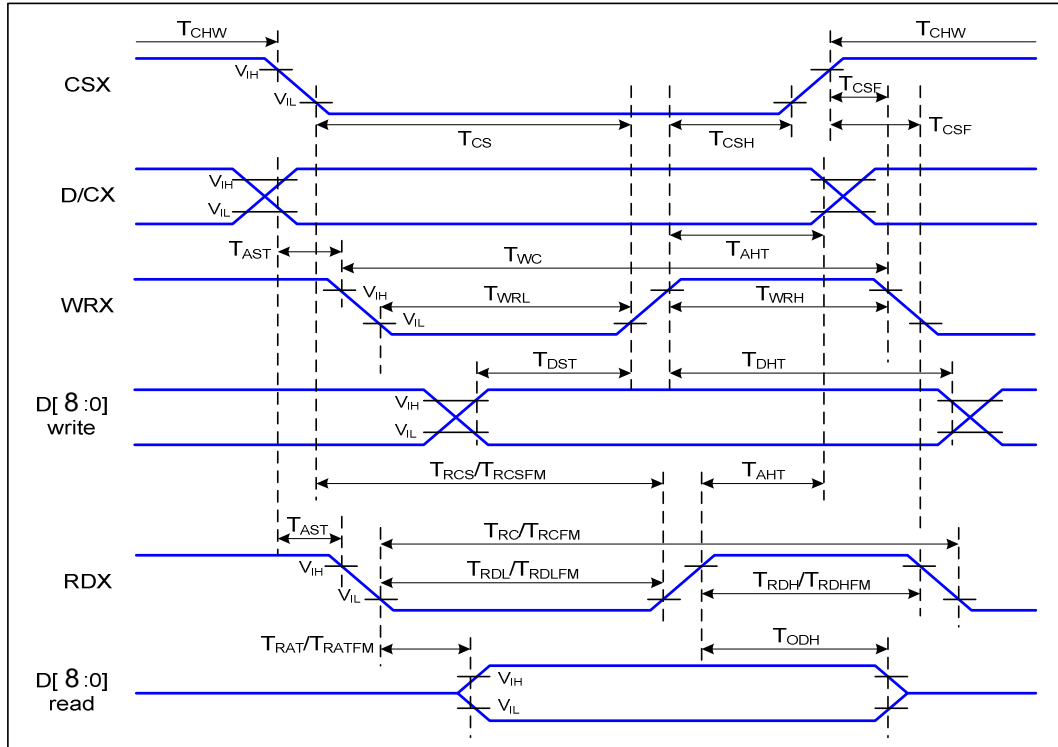
Figure 1 Parallel Interface Timing Characteristics (8080 Ceries MCU Interface)

Ta=25 ℃, VDDI=1.65~3.7V, VDD=2.5~4.8V

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	TAST	Address Setup Ttime	0		ns	-
	TAHT	Address Hold Time (Write/Read)	10		ns	
CSX	TCHW	Chip Select "H" Pulse Width	0		ns	-
	TCS	Chip Select Setup Time (Write)	15		ns	
	TRCS	Chip Select Setup Time (Read ID)	45		ns	
	TRCSFM	Chip Select Setup time (Read FM)	355		ns	
	TCSF	Chip Select Wait Time (Write/Read)	10		ns	
	TCSH	Chip Select Hold Time	10		ns	
WRX	TWC	Write Cycle	66		ns	
	TWRH	Control Pulse "H" Duration	15		ns	
	TWRL	Control Pulse "L" Duration	15		ns	
RDX (ID)	TRC	Read Cycle (ID)	160		ns	When Read ID Data
	TRDH	Control Pulse "H" Duration (ID)	90		ns	
	TRDL	Control Pulse "L" Duration (ID)	45		ns	

RDX (FM)	TRCFM	Read Cycle (FM)	450		ns	When Read from Frame Memory
	TRDHFM	Control Pulse "H" Duration (FM)	90		ns	
	TRDLFM	Control Pulse "L" Duration (FM)	355		ns	
D[8:0]	TDST	Data Setup Time	10		ns	For CL=30pF
	TDHT	Data Hold Time	10		ns	
	TRAT	Read Access Time (ID)		40	ns	
	TRATFM	Read Access Time (FM)		340	ns	
	TODH	Output Disable Time	20	80	ns	

Table 4 8080 Parallel Interface Characteristics
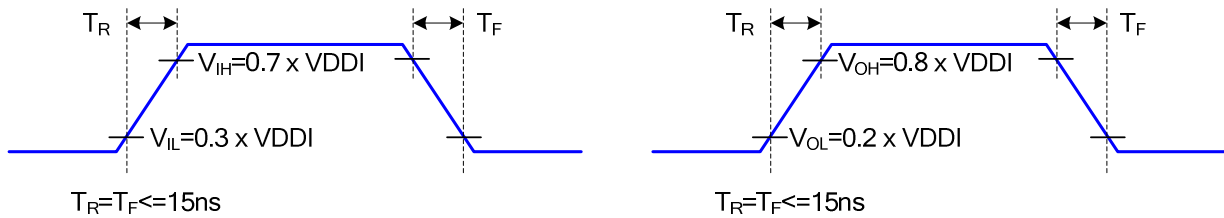
Figure 2 Rising And Falling Timing for Input And Output Signal
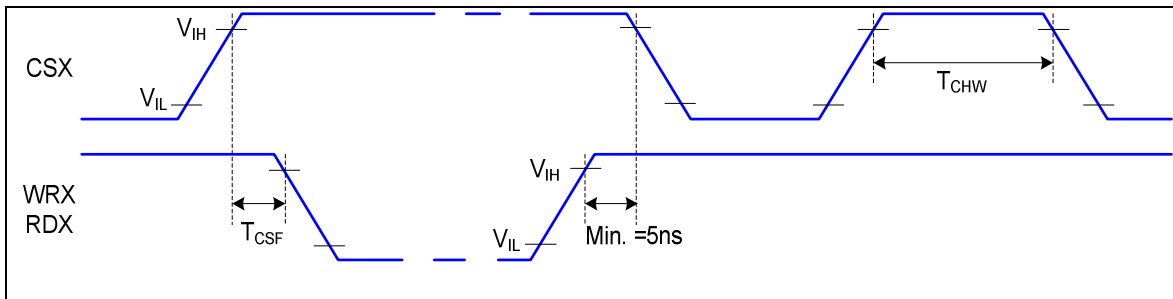
Figure 3 Chip Selection (CSX) Timing
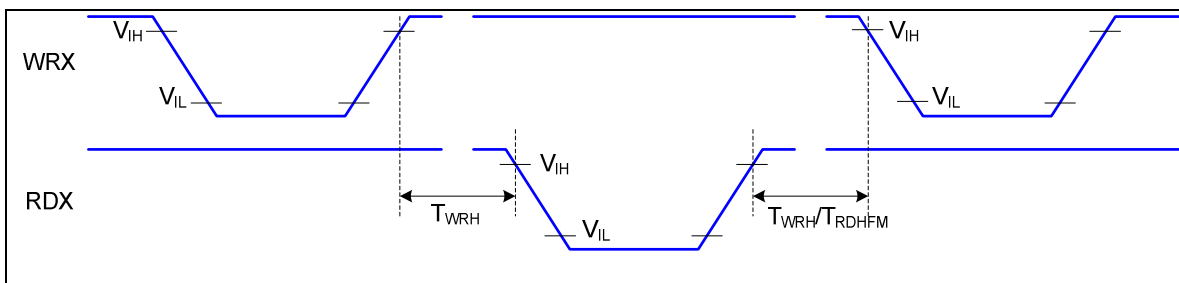
Figure 4 Write-to-Read And Read-to-Write Timing
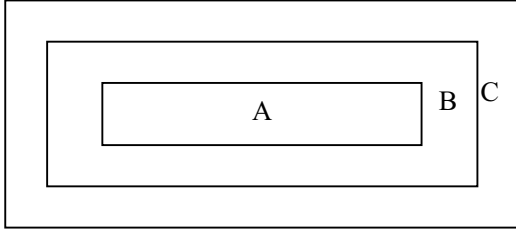
■ RELIABILITY TEST CONDITIONS

No.	Test Item	Test Condition	Remarks
1	High Temperature Storage Test	T=80℃ 120h	Note2
2	Low Temperature Storage Test	T=-30℃ 120h	Note1,2
3	High Temperature Operation Test	T=70℃ 120h	
4	Low Temperature Operation Test	T=-20℃ 120h	Note1
5	High Temperature and High Humidity Operation Test	Ta=40℃,90%RH 120h	Note1,2
6	Thermal Shock Test (Non-operating)	-30℃(30Min)~25℃(5Min)~80℃(30Min) 100Cycles	
7	Vibration Test (Non-operating)	Frequency:10~55Hz Amplitude: 1.5mm Sweep Time: 11Mins Test Period: 6 Cycles For Each Direction Of X,Y,Z	
8	Shock Test (Non-operating)	100G, 6Ms Direction: ±X,±Y, ±Z Cycle: 3Times	
9	Electro Static Discharge Test	Voltage: ±8KV R:330Ω C:150pF Air Discharge, 10 Time.	
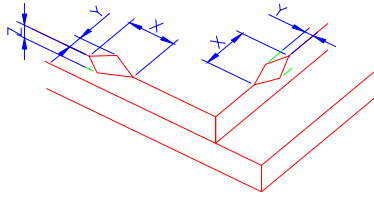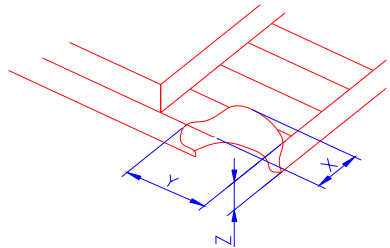
Note 1：Without water condensation
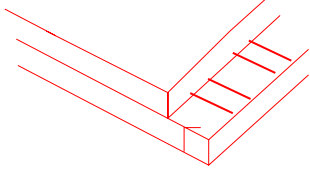
Note 2：The function test shall be conducted after 2 hours storage at the room temperature and humidity after removed from the test chamber.
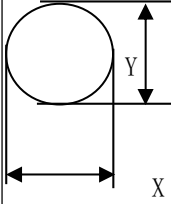
■ INSPECTION CRITERION

OUTGOING QUALITY STANDARD	P A G E 1 O F 6
TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA	

This specification is made to be used as the standard acceptance/rejection criteria for TFT module.

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.

	OUTGOING QUALITY STANDARD	P A G E 2 O F 6
TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA		

4. Inspection standards

No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display,open or miss line 2) Display abnormally,short 3) Backlight no lighting,abhormal lighting 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness,refer to limited sample	Minor
5	Soldering appearance	Good soldering,peeling off is not allowed	
6	LCD/Polarizer/TP	Black/white,spot/line,scratch,crack,etc.	

Number	Items	Criteria(mm)
1.0 LCD Crack/broken Note: X:Length Y:Width Z:Height L:Length of ITO T:Height of LCD	1) The edge of LCD broken	 <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr></table>
	2) LCD cornet broken	 <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table>

	OUTGOING QUALITY STANDARD	PAGE 3 OF 6
TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA		

Number	Items	Criteria(mm)
	3) LCD crack	Crack Not allowed

	OUTGOING QUALITY STANDARD	P A G E 4 O F 6
	TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA	

Number	Items	Criteria(mm)
2.0	Spot defect	1) Light dot (LCD/TP/Polarizer black/white spot,light dot,pinhole,dent,stain)

$\Phi = (X+Y)/2$

1) Light dot (LCD/TP/Polarizer black/white spot,light dot,pinhole,dent,stain)

Zone / Size(mm)	Acceptable Qty		
	A	B	C
$\Phi \leqslant 0.10$	Ignore		Ignore
$0.10 < \Phi \leqslant 0.15$	3(distance $\geqslant$ 10mm)		
$0.15 < \Phi \leqslant 0.20$	1		
$0.20 < \Phi$	0		

2) Dim spot (LCD/TP/Polarizer dim dot,light leakage,dark spot)

Zone / Size(mm)	Acceptable Qty		
	A	B	C
$\Phi \leqslant 0.10$	Ignore		Ignore
$0.10 < \Phi \leqslant 0.20$	2(distance $\geqq$ 10mm)		
$0.20 < \Phi \leqslant 0.30$	1		
$\Phi > 0.30$	0		

3) Polarizer accidented spot

Zone / Size(mm)	Acceptable Qty		
	A	B	C
$\Phi \leqslant 0.20$	Ignore		Ignore
$0.20 < \Phi \leqslant 0.50$	2(distance $\geqq$ 10mm)		
$\Phi > 0.50$	0		

	OUTGOING QUALITY STANDARD	PAGE 5 OF 6
	TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA	

	Line defect (LCD/TP/ Polarizer/ black/white line,scratch, stain)	Width(mm)	Length(mm)	Acceptable Qty				
				A	B	C		
		$\Phi \leqslant 0.03$	Ignore	Ignore				
		$0.03 < W \leqslant 0.05$	$L \leqslant 3.0$	$N \leqslant 2$		Ignore		
		$0.05 < W \leqslant 0.08$	$L \leqslant 2.0$	$N \leqslant 2$				
		$0.08 < W$	Define as spot defect					

3.0	Polarizer bubble	Size(mm) \ Zone	Acceptable Qty		
			A	B	C
		$\Phi \leqslant 0.2$	Ignore		
		$0.2 < \Phi \leqslant 0.4$	2(distance $\geqslant$ 10mm)		Ignore
		$0.4 < \Phi \leqslant 0.6$	1		
		$0.6 < \Phi$	0		

4.0	SMT	According to IPC-A-610C class II standard.Function defect and missing part are major defect,the others are minor defect.

	TP bubble/ accidented spot	Size Φ (mm)	Acceptable Qty		
			A	B	C
		$\Phi \leqslant 0.1$	Ignore		
		$0.1 < \Phi \leqslant 0.2$	2(distance $\geqslant$ 10mm)		Ignore
		$0.2 < \Phi \leqslant 0.3$	1		
		$0.3 < \Phi$	0		

Assembly deflection	Beyond the edge of backlight $\leqslant$ 0.15mm

	OUTGOING QUALITY STANDARD	P A G E 6 O F 6
TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA		

5.0	TP related	Newton ring	Newtom ring area>1/3 TP area NG Newtom ring area≤1/3 TP area OK	
		TP cornet broken X:Length Y:Width Z:Height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤3.0mm</td><td>Y≤3.0mm</td><td>Z<LCD thickness</td></tr></table>*Circuitry broken is not allowed	
		TP edge broken X:Length Y:Width Z:Height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤6.0mm</td><td>Y≤2.0mm</td><td>Z<LCD thickness</td></tr></table>	

Criteria (Functional items)

Number	Items	Criteria(mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed

■ 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.
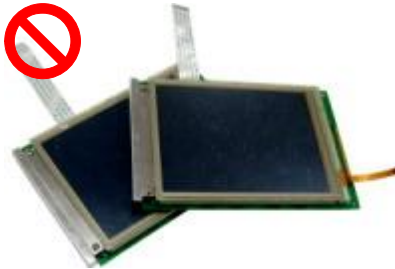   **2.2   Correct handling:**

As above picture, please handle with anti-static gloves around LCM edges.
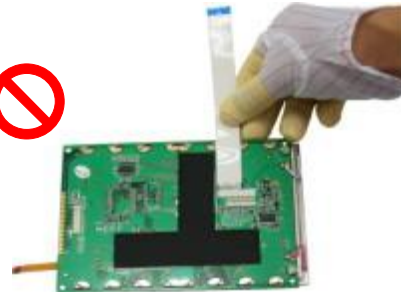
    2.3   Incorrect handling:

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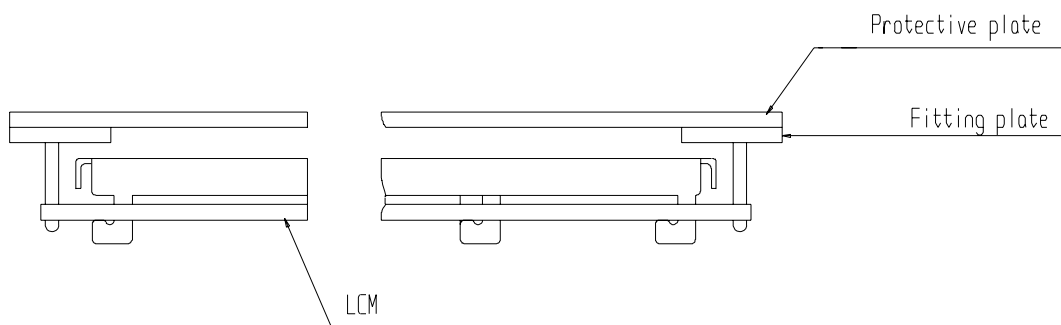
      4.1.2 When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be ±0.1mm.

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
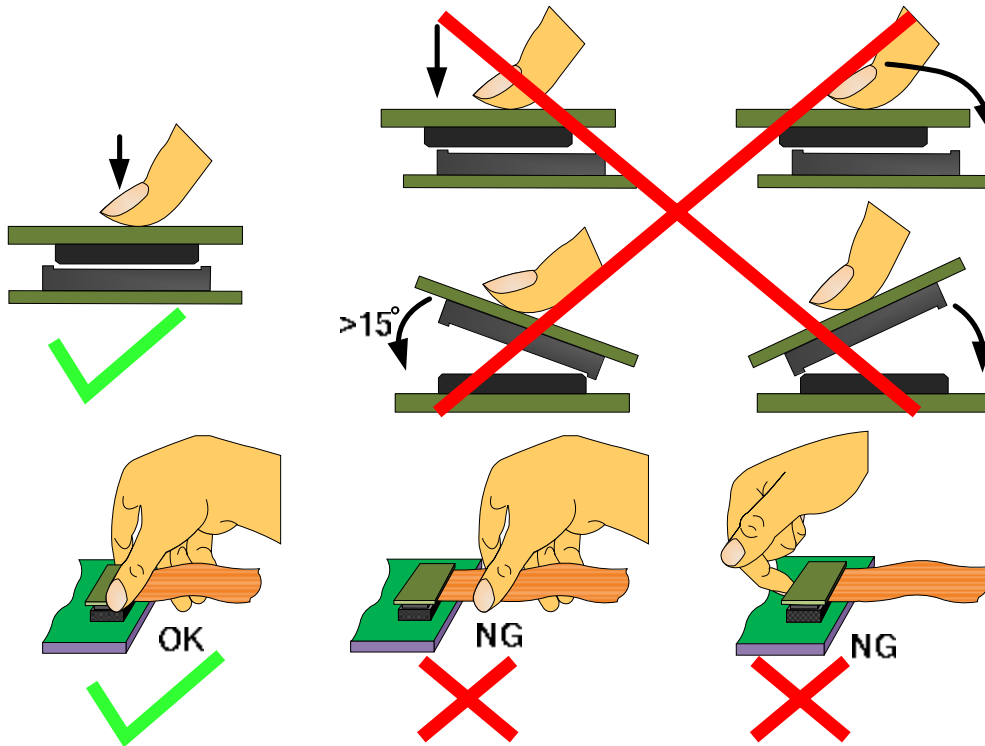
4.3   Precaution for soldering the LCM

	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 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 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 replacement 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

1.①For Multi-Inno standard products, we keep the right to change material, process ... for improving the product property without notice on our customer.
 ②For OEM products, if any change needed which may affect the product property, we will consult with our customer in advance.
2. If you have special requirement about reliability condition, please let us know before you start the test on our samples.