ORIENT DISPLAY

Your Total LCD Solution Provider

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SPECIFICATION
FOR
LCM MODULE

MODULE NO: JAZZ-C

	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE			
DATE			FEB.24.2012

		SIGNATURE	DATE
CUSTOMER APPROVAL			

REVISION   HISTORY

Rer	Date	Item	Page	Remark
1	FEB.24.2012	Add Charge Pump Application Circuit	P12	

LIST

Ⅰ. **General Specifications**

1. Features

A. Drive Method:Bi-stable display 1/64 Duty, 1/9 Bias

B. The Module Operating Voltage:　3.0V;

C. The LCD Operating Voltage :　　30V;

D. Viewing Direction:　　　　　Free

E. Operating Temperature:　　　0℃~50℃

F. Storage Temperature:　　　-20℃~70℃

G.Display Technology Description:

Bi-stable display is a reflective LCD with extremely low power consumption characteristics.Due to the non-volatile memory feature of the technology,zero power is required to retain the image of the display.Engergy is only required to change the displayed image.No backlighting is required,only ambient lighting from the surrounding is required.Readability when under direct sunlight is excellent and good contrast from viewing at very wide angles are possible.

2.Mechanical　Data:

(1)　Module Size ----------------------　70.5(w) * 44.3(h)mm

(2)　Viewing　Area --------------------　67.5(w)*35.3(h) mm

(3)　Dot　Size　　----------------------　0.46(w) * 0.46 (h) mm

(4)　Dot　Quality----------------------　132 * 64

(5) Outline　Dimensions-------------　See Attached Drawing

3.Front Cover Material Selection:

The following front cover requirements are necessary to insure image quality during the life of the display module:

(1):bi-stable Liquid Crystal materials require protection from UV light.A UV blocking material with a minimum 98% cut of at 380nm and lower spectral components is required.

(2)The finished product design should incorporate a transparent cover such as acrylic,polycarbonate,etc.,to protect the viewing area of the display. Place the protective cover   as close to the display module as possible.The protective cover should be sufficient thickness to resist flexing,or if flexed should not touch the surface of display.

(3)Adding an anti-glare and   or anti-reflective surface film or finish to the viewing side of the protectible cover may improve the optical performance in certain display applications and lighting conditions.

4. Absolute Maximum Ratings

(Voltage Reference to $V_{SS} = 0V$)

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	-0.3 to +3.6	V
V_{DDIO}		-0.3 to $\text{Min}(V_{DD} +0.5,+3.6)$	V
V_0		-0.3 to 38	V
V_{CI}		-0.3 to +3.6	V
V_{in}	Input Voltage	$V_{SS} -0.3$ to $V_{DDIO} +0.3$	V

Maximum Ratings are those beyond which damage to the device may occur. Functional operation should be restricted to the limits in the Electrical Characteristics tables or Pin Description.

5.Pin　Connections:

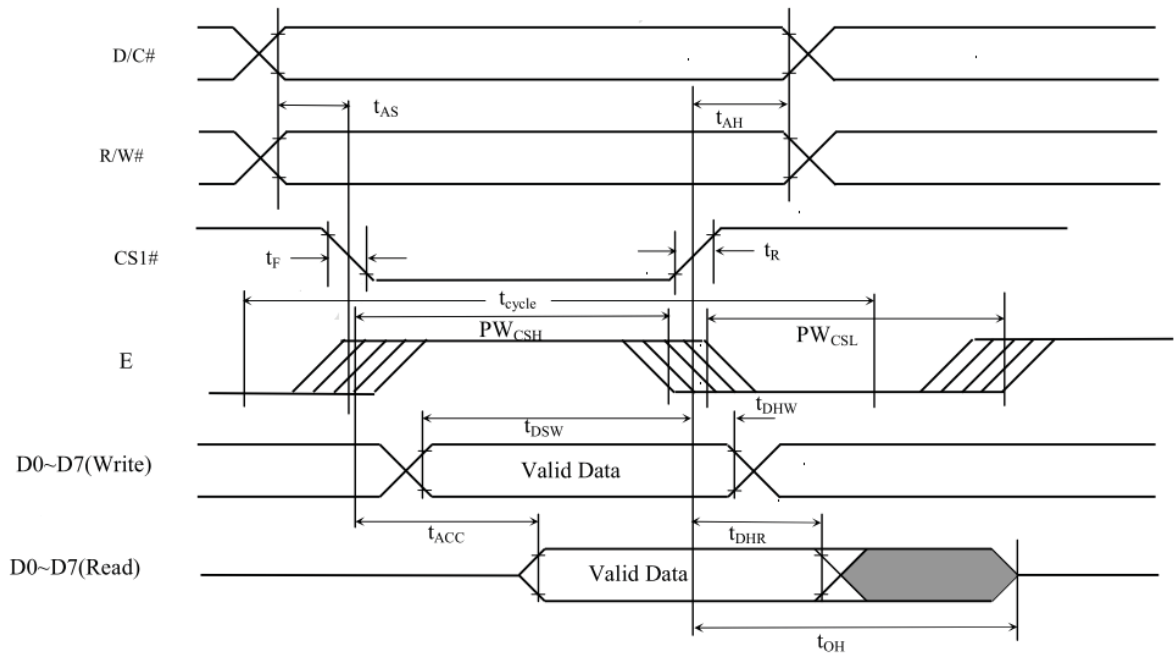| Pin No.	Symbol	Function
1	V0	It is the high voltage power input pin and panel driving voltage
2-5	V4-V1	Panel driving voltage
6-8	PS0,PS1,PS2	These pins are for selecting different bus interface
9	D/C#	This pin is Data/Command control pin
10	E(RD#)	This pin is MCU interface input
11	R/W #	This pin is MCU interface input
12	CS1#	These pins are the chip select inputs for communication between MCU.
13	RES#	This pin is the reset signal input
14-21	D0-D7	Data bus
22	BUSY	A high level indicates busy status of the driver.
23	VDD	Power supply
24	VSS	Ground
25	VCP1	Charge pump output voltage
26-27	C1P, C1N	Charge pump flying capacitor terminal
28	VCP2	Charge pump intermediate output voltage
29-30	C2P, C2N	Charge pump flying capacitor terminal
31	VCP3	Charge pump intermediate output voltage
32-33	C3P,C3N	Charge pump flying capacitor terminal
34	VCP4	Charge pump intermediate output voltage
35-36	C4P, C4N	Charge pump flying capacitor terminal

6. Timing Characteristics:

Conditions:

T_A = -35 to 85°C
V_{DD} = V_{CI} = V_{DDIO} = 2.4V to 3.5V

Parallel 6800-series Interface Timing Characteristics

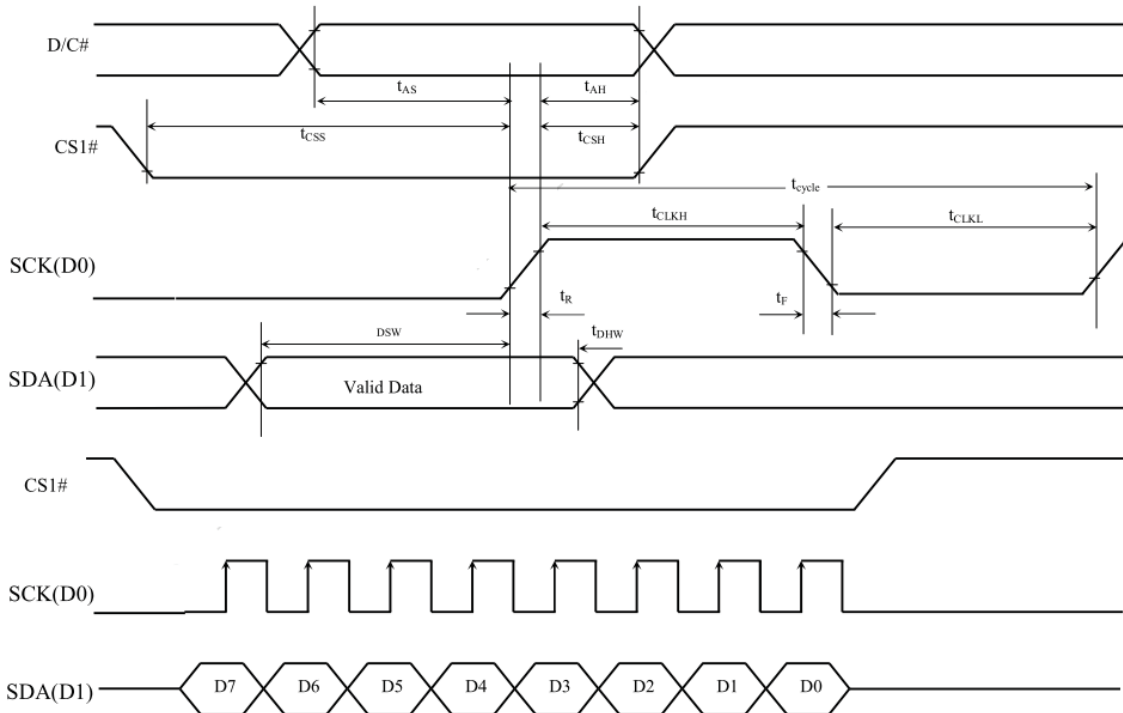| Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	100	-	-	ns
t_{AS}	Address Setup Time	0	-	-	ns
t_{AH}	Address Hold Time	20	-	-	ns
t_{DSW}	Write Data Setup Time	30	-	-	ns
t_{DHW}	Write Data Hold Time	20	-	-	ns
t_{DHR}	Read Data Hold Time	10	-	50	ns
t_{OH}	Output Disable Time	-	-	40	ns
t_{ACC}	Access Time (RAM)	15	-	-	ns
	Access Time (Command)	15	-	-	ns
PW_{CSL}	Chip Select Low Pulse Width (read RAM)	250	-	-	ns
	Chip Select Low Pulse Width (read Command)	250	-	-	ns
	Chip Select Low Pulse Width (write)	50	-	-	ns
PW_{CSH}	Chip Select High Pulse Width (read)	100	-	-	ns
	Chip Select High Pulse Width (write)	50	-	-	ns
t_R	Rise Time	-	-	10	ns
t_F	Fall Time	-	-	10	ns

The PW_{CSH} timing reference is 50% of the rising / falling edge of E or CS1# pin.
The t_{DSW} and t_{DHW} timing is reference to the 50% of rising / falling edge of E or CS1# pin.

Conditions:

T_A = -35 to 85°C

$V_{DD} = V_{CI} = V_{DDIO}$ = 2.4V to 3.5V

Parallel 8080-series Interface Timing Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	100	-	-	ns
t_{AS}	Address Setup Time	0	-	-	ns
t_{AH}	Address Hold Time	20	-	-	ns
t_{DSW}	Write Data Setup Time	30	-	-	ns
t_{DHW}	Write Data Hold Time	20	-	-	ns
t_{DHR}	Read Data Hold Time	10	-	50	ns
t_{OH}	Output Disable Time	-	-	40	ns
t_{ACC}	Access Time (RAM)	15	-	-	ns
	Access Time (Command)	15	-	-	ns
PW_{CSL}	Chip Select Low Pulse Width (read RAM)	250	-	-	ns
	Chip Select Low Pulse Width (read Command)	250	-	-	ns
	Chip Select Low Pulse Width (write)	50	-	-	ns
PW_{CSH}	Chip Select High Pulse Width (read)	100	-	-	ns
	Chip Select High Pulse Width (write)	50	-	-	ns
t_R	Rise Time	-	-	10	ns
t_F	Fall Time	-	-	10	ns

Write Cycle
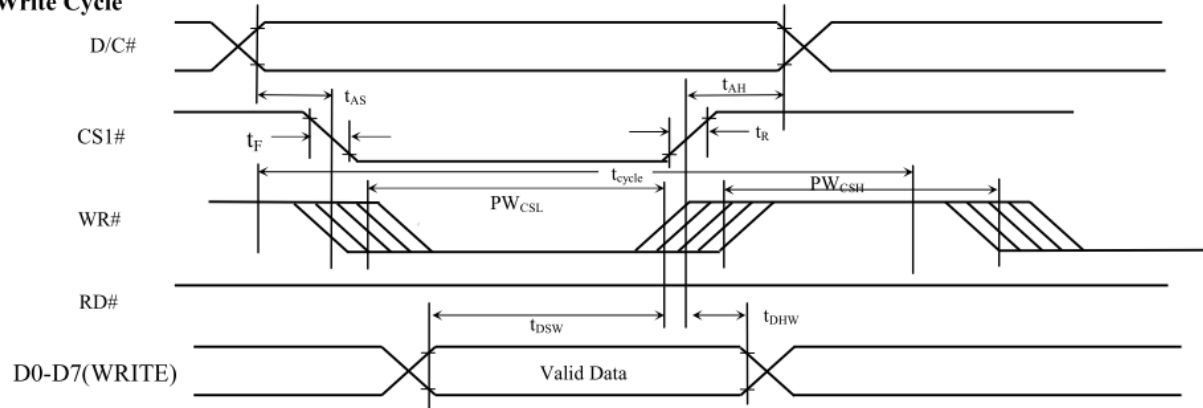
The PW_{CSL} timing reference is 50% of the rising / falling edge of WR# or CS1# pin.

The t_{DSW} and t_{DHW} timing is reference to the 50% of rising / falling edge of WR# or CS1# pin.

Read Cycle
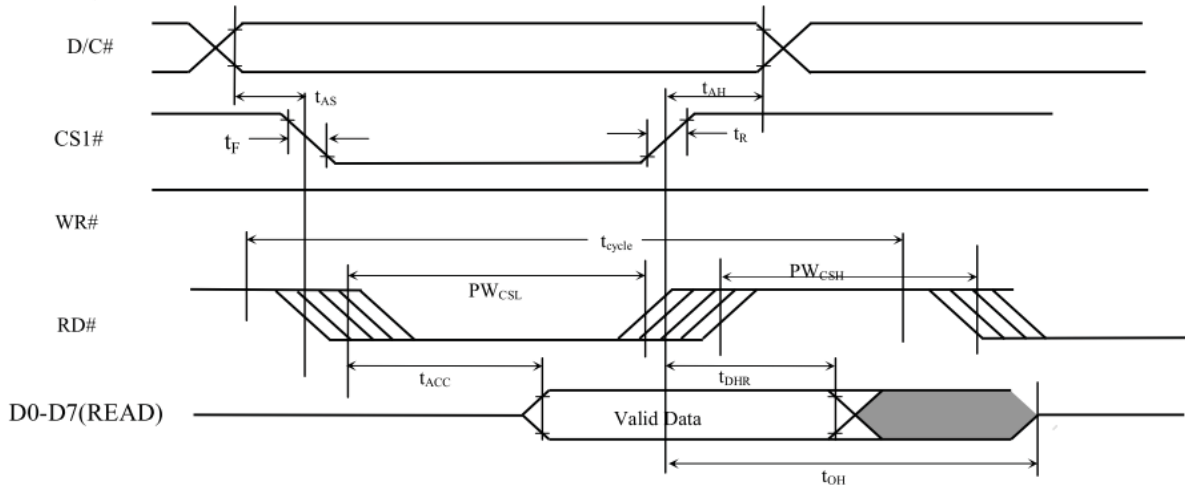
The PW$_{CSL}$ timing reference is 50% of the rising / falling edge of RD# or CS1# pin.
The t$_{DSW}$ and t$_{DHW}$ timing is reference to the 50% of rising / falling edge of RD# or CS1# pin.

Conditions:
T$_A$ = -35 to 85°C
V$_{DD}$ = V$_{CI}$ = V$_{DDIO}$ = 2.4V to 3.5V

4-wires Serial Interface Timing Characteristics

Conditions:
T_A = -35 to 85°C
$V_{DD} = V_{CI} = V_{DDIO}$ = 2.4V to 3.5V

3-wire Serial Interface Timing Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	80	-	-	ns
t_{AS}	Address Setup Time	20	-	-	ns
t_{AH}	Address Hold Time	20	-	-	ns
t_{CSS}	Chip Select Setup Time	30	-	-	ns
t_{CSH}	Chip Select Hold Time	20	-	-	ns
t_{DSW}	Write Data Setup Time	20	-	-	ns
t_{DHW}	Write Data Hold Time	20	-	-	ns
t_{CLKL}	Clock Low Time	40	-	-	ns
t_{CLKH}	Clock High Time	40	-	-	ns
t_R	Rise Time	-	-	10	ns
t_F	Fall Time	-	-	10	ns
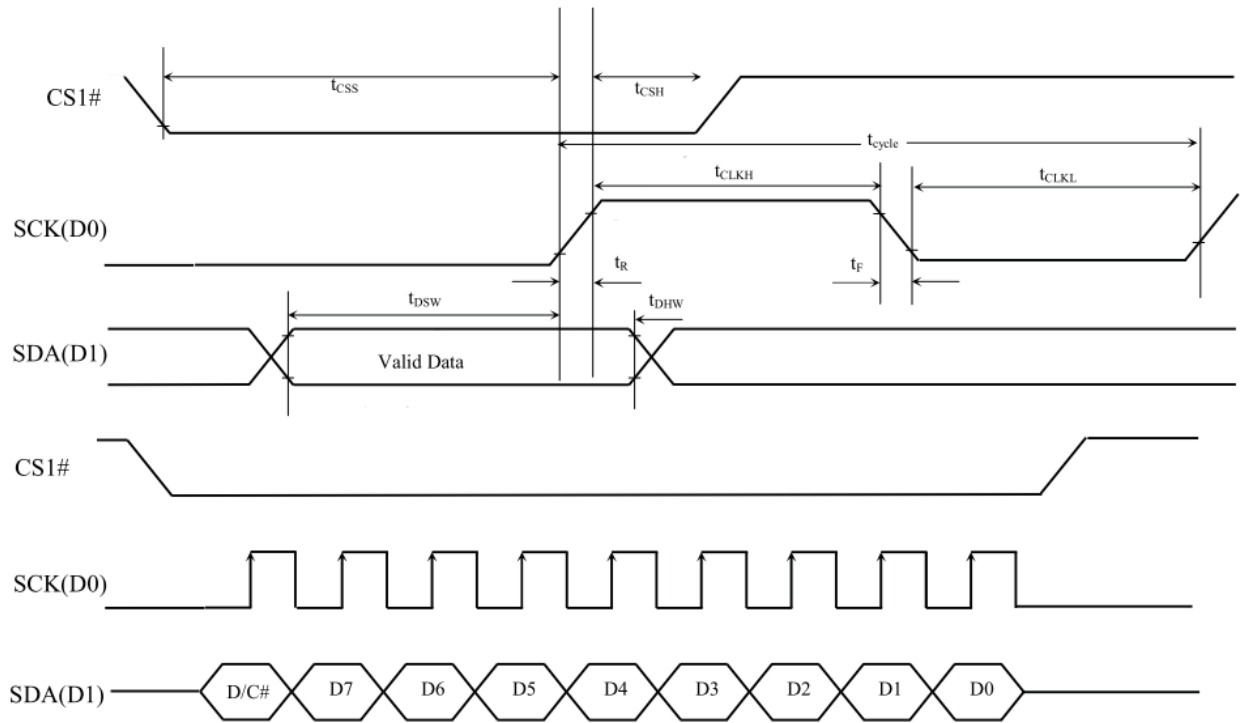
Conditions:
T_A = -35 to 85°C
V_{DD} = V_{CI} = V_{DDIO} = 2.4V to 3.5V

4-wires Serial Interface Timing Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	2.5	-	-	us
t_{HSTART}	Start condition Hold Time	0.6	-	-	us
t_{SD}	Data Setup Time	100	-	-	ns
t_{SSTART}	Start condition Setup Time (Only relevant for a repeated Start condition)	0.6	-	-	us
t_{SSTOP}	Stop condition Setup Time	0.6	-	-	us
t_R	Rise Time for data and clock pin	-	-	300	ns
t_{IDLE}	Idle Time before a new transmission can start	1.3	-	-	us
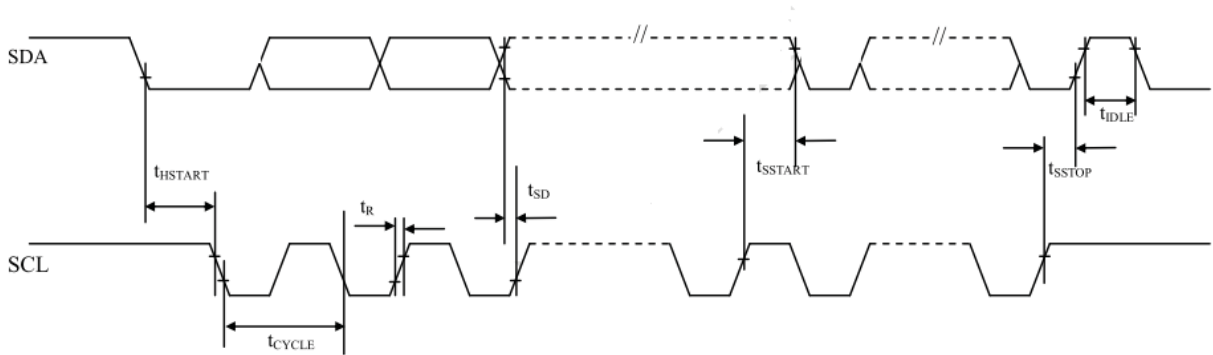
7.Charge Pump Application Circuit
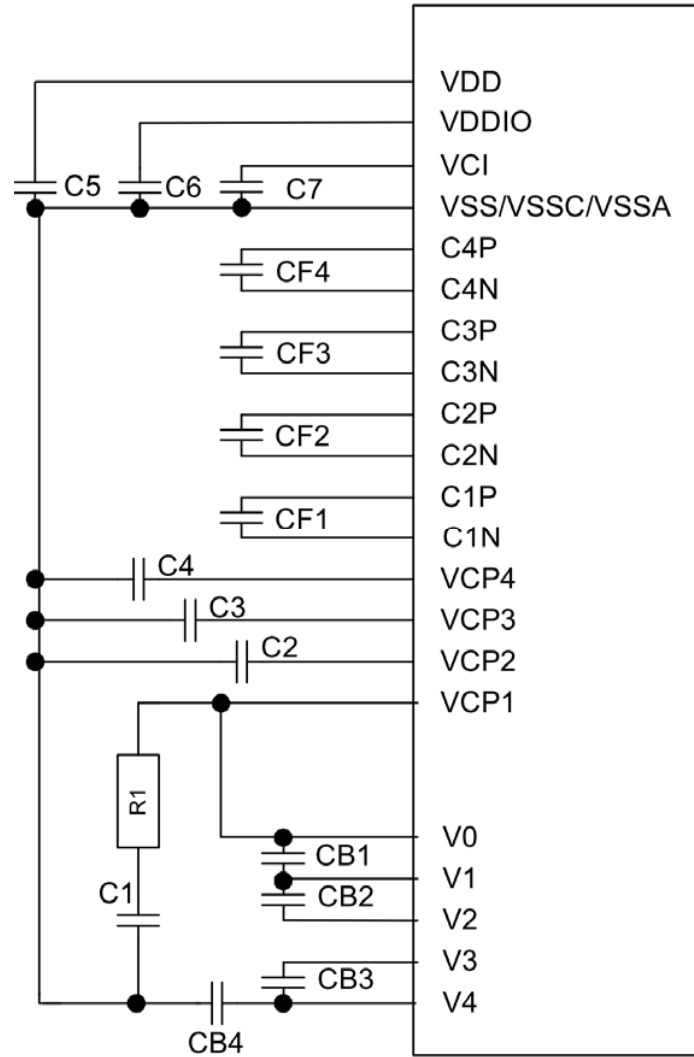
Reference Capacitor Value

Part reference	Value (uF)	Min Rating
CF1	1.0	50V
CF2	1.0	25V
CF3	1.0	25V
CF4	1.0	10V
C1	4.7	50V
C2	0.1	25V
C3	0.1	10V
C4	0.1	10V
C5	1.0	10V
C6	1.0	10V
C7	1.0	10V
CB1	1.0	10V
CB2	1.0	10V
CB3	1.0	10V
CB4	1.0	10V
Part reference	Value (Ohm)	Remark
R1	0	For Typical case

Capacitor values requirement depends on panel loading and voltage setting.

Ⅱ.The Characteristics and The Reliability Test

1.Electro-Optic Characteristics:

Condition:TEMP=(23±3)℃   Hum=(70±5)%RH

NO	Item		Symbol	Min	Typ.	Max	Unit	Condition
1	Supply Voltage(Logic)		Vdd-Vss		3.0		V	
2	LCD Operating Voltage		Vdd-V_0		30.2		V	0℃
				29.8	30.0	30.2		25℃
					29.8			50℃
3	Image refresh time		-		8.0		s	25°C
4	Contrast Ratio		CR		6			
5	Viewing Angle	12H	$\theta 1$		80		Deg.	(CR≥2.0)
		6H	$\theta 2$		80			
		3H	$\theta 3$		80			
		9H	$\theta 4$		80			
6	Sleep mode current		Islp		1		μA	

2.Reliability Test

No	Items	Test Condition	Equipment	Test Result
1	High TEMP Storage	TEMP:70±2℃ Time: 96h Restore:24h	Tenny	Passed
2	Low TEMP Storage	TEMP: -20±3℃ Time: 96h Restore:24h	Tenny	Passed
3	High TEMP Operating	TEMP:50±2℃ Vop: 3.0V Time: 24h Restore:24h	Tenny	Passed
4	Low TEMP Operating	TEMP: 0±2℃ Vop: 3.0V Time: 24h Restore:24h	Tenny	Passed
5	High TEMP High Hum Storage	TEMP:40±2℃ Hum: 95%Rh Time: 96h Restore:24h	Tenny	Passed
6	Thermal Shock	TEMP:(℃) 70℃ 25℃ -20℃ 30 5 30 5 Min 5 Cycles Restore:24h	Tenny	Passed

Ⅲ.The LCD Measuring Method and Equipment

1. Threshold Voltage and Response Time Measuring

    (1) Equipment

Oscilloscope
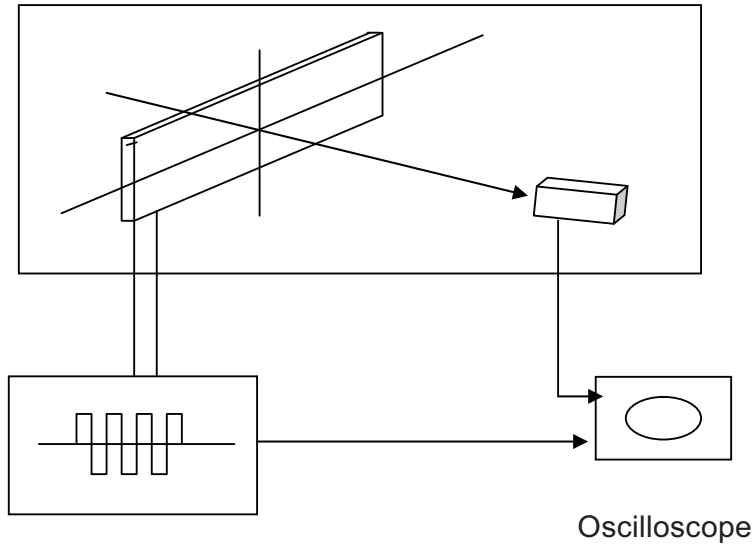
Waveform Generator

    (2) Definition

    A. Threshold Voltage   (Vth)

Brightness

100%

90%

Selected pixel

0   Vth   Drive Voltage

B. Response Time

On

Off

90%

10%

Time

T_r T_d
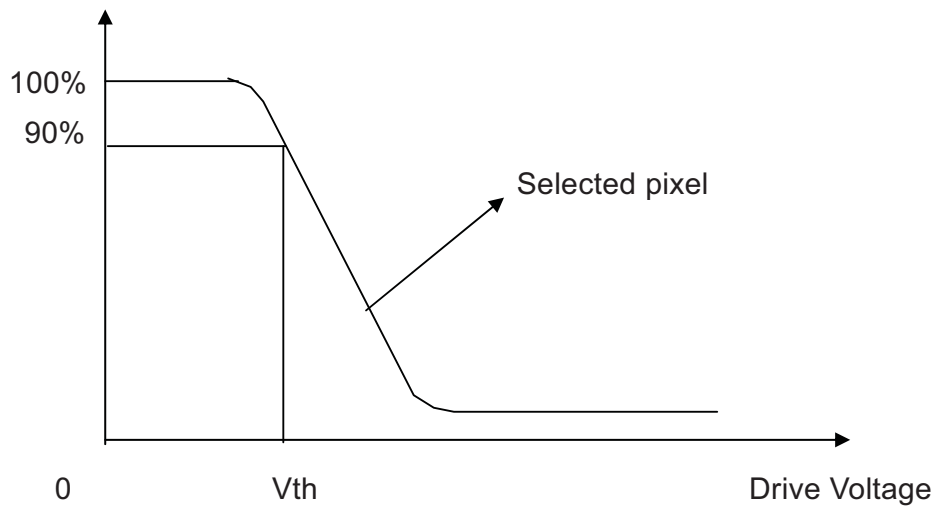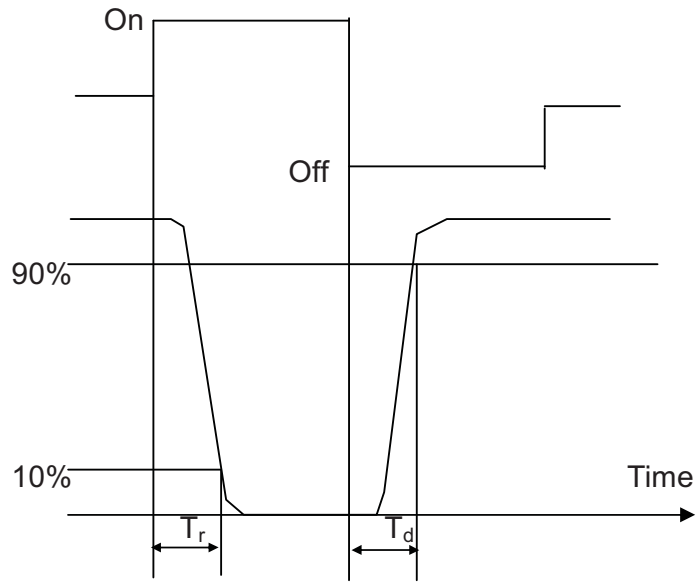
2. Contrast Measuring

(1) Equipment
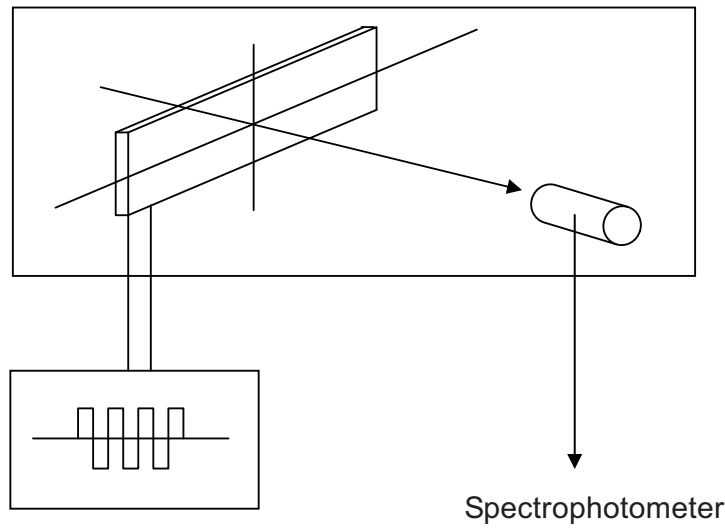
Spectrophotometer

Waveform Generator

(2)Definition:

A.Viewing Angle:
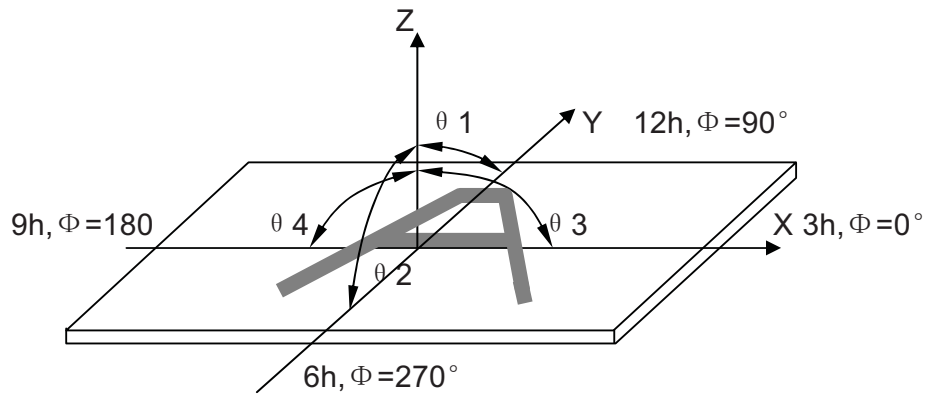
B. Contrast Ratio (Positive)

$$CR= \frac{\text{Brightness of non-selected pixel}}{\text{Brightness of selected pixel}}$$

3.   Reliability Test:

Equipment : TENNY

Ⅳ.Standard Specifications for Product Quality

1.MTBF

More than 50,000 hours.

2. Method of Test:：

(1)The Test Must Be Under 40W Fluorescent Lamp, And The Distance Of View Must Be At 30cm.

(2)The eye's Test Direction Is Based On the vertical direction 15°－45°.

3. Definition Of Defects

(1) Major Defects

A:Non-Display

B:Segment Missing

C:Over Current

D:Segment Short

E: Wrong Polarizer Direction

(2)Minor Defects: The Others.

4.Major Defects Should Be In AQL 0.25,and The Minor In AQL 1.00

The sampling inspection plan is in accordance with the Level Ⅱ and normal inspection.

Definition of area:

I area: viewing area

II area: Outside of viewing area

A area: The area outside sealing

G area : Electrode pad area

F area : Without electrode pad area
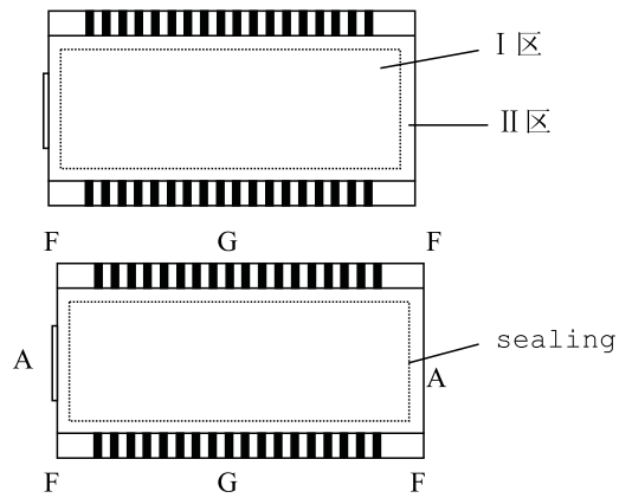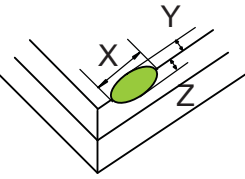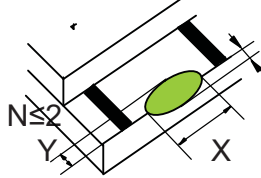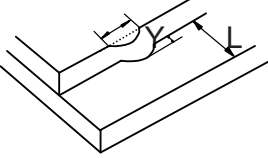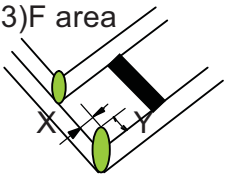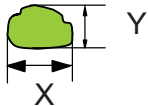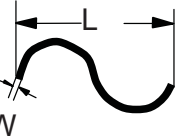
5.Inspection Item and Standards

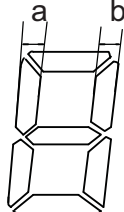| Item	The Standard Of Quality Inspection	Checking Method	Quantity Ratio
Frame	Smooth and even surface,no crack,no scratch,no rusty,and not be wrenched out of shape.the range between convex and concave is:d≤0.35mm,and the frame must be connected with the ground pad.	Checking With Eyes And Using Vernier Caliper, Multimeter	100%
The Relative Position of LCD and Frame	The end seal of the LCD must be at the same side with the frame's opening.	Checking With Eyes	100%
The Relative Position of PCB/Panel /Frame	The frame installing direction must be correct.the twisted angle of the leg is from 45° to 60° ,the leg is vertical to PCB panel and it must be in the middle position of the installing holes.	Checking With Eyes	100%
Function Test	1. The major defects must be reject. 2. Background changes evenly and no disorderly displaying phenomenon. 3. Display no shortage.	Check It When Displaying	100%
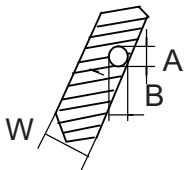
LCD:

Standard of appearance test: (unit: mm)

№	Items	Criterion	Checking manner
1	Substrate crack X: defect Length Y: defect Width Z: defect Depth T: glass Thickness N: defect QTY L:Connector Width	(1) A area X≤3.0 Y：Don't allowed hurt sealing Z≥T/2 N≤3 X≤5.0 Y：Don't allowed hurt sealing Z≤T/2 N≤3 X≤1.0 Y≤0.5 Z≤T/3 No check (2)G area X≤3.0 Y≤0.5 Z≤T/2 X≤1/2 total length Y≤1/4L N≤1 Over the drawing tolerance is not allowed (3)F area X≤2.0 Y≤3 Z≤T N≤3 Don't allowed hurt sealing	checking with eyes
2	Black spot white spot D=(X+Y)/2 Line	(1) 0.2<D≤0.25 N≤1 0.1<D≤0.2 N≤3 D≤0.1 No check Ⅱ area No check (2) L≤2.0 W≤0.03 N≤2 L≤1.0 W≤0.05 N≤1 Ⅱ area No check	Checking on the table with light and polarizer and checking with eyes directly.

№	Items	Criterion	Checking manner
3	Polarizer Bubble	D≤0.15　No check 0.15<D≤0.4　N≤2 Ⅱ area　No check	Checking on the table with light and polarizer, and checking with eyes directly
4	Rainbow Color	Allow tiny rainbow Allow 5% color contrast or accord limitative sample	Checking on the table with light and polarizer, And checking with eyes directly
5	Polarizer or pad appearance	No dirty	Checking with eyes

Standard of display test

№	Items	Criterion	Checking manner
1	Pin hole D=(A+B)/2 W: segment width	W≤0.4 D≤0.20 And　D≤1/2W N≤1 A　W>0.4 D≤0.25 B　And D≤1/3W N≤2 D≤0.05 No check	Checking at the display state
2	Different width of segment	|a-b|<0.25 or |a-b|≤1/4W No check	Checking at the display state

Note:d～Diameter　　n～Quantity　　Unit:mm
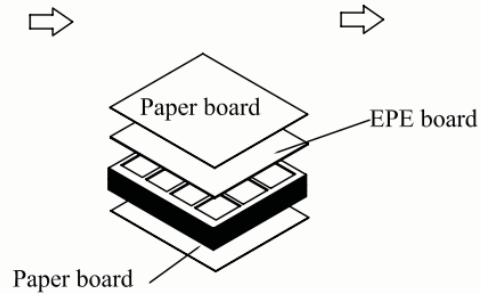
Ⅴ.Attached Drawing
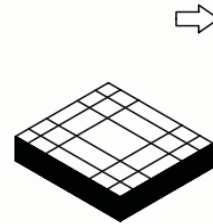
Ⅵ. **Packing**

PACKING ORDER:

1) Putting 16 pcs Modules on each EPE tray.
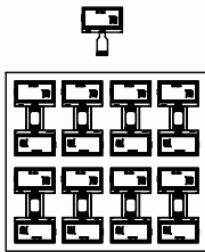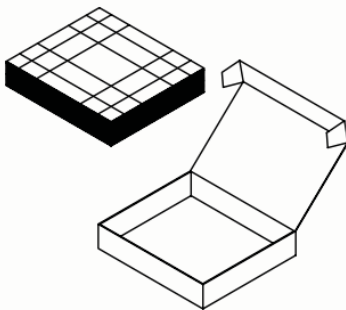
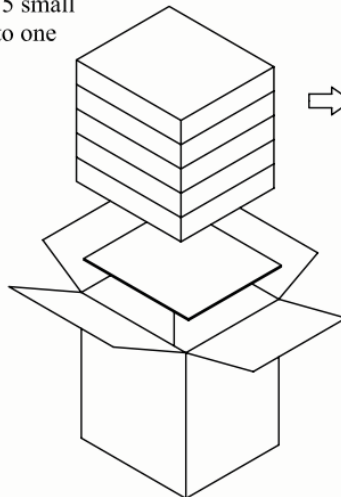2) Putting 8 pcs EPE trays together with EPE paper on the top of EPE tray.

3) Assembling the boards and the tray together with adhesive tape
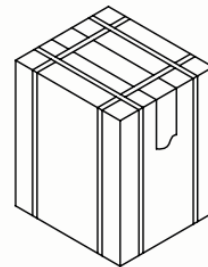
Paper board

EPE board

Paper board

4) Putting in the inner small carton (TYPE:H82)

5) Putting 5 small cartons into one outcarton

6) Packing finished

Note: 16 pcs in a tray, 8 trays in a inner carton,5 inner cartons in a out carton, so 16x8x5=640pcs/Outcarton

Dimension (Small carton): 385*325*87㎜   Dimension (Out carton): 394*344*470㎜

Ⅶ.Precautions For Use

1. Safety

 (1) Do not swallow any liquid crystal, even if there is no proof that liquid
   crystal is poisonous.

 (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.

 (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

2.Storage Conditions

 (1) Store the panel or module in a dark place where the temperature is 23±5°C and the
   humidity is below 50±20%RH.

 (2) Store in anti-static electricity container.

 (3) Store in clean environment, free from dust, active gas, and solvent.

 (4) Do not place the module near organics solvents or corrosive gases.

 (5) Do not crush, shake, or jolt the module.

 (6) Do not exposed to direct sun light of fluorescent lamps.

3.Installing LCD Module

 Attend to the following items when installing the LCM.

 (1) Cover the surface with a transparent protective plate or touch panel to protect the
   polarizer and LC cell.

 (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.

 4.Precautions For Operation

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

 (2) Driving the LCD in the voltage above the limit will shorten its lifetime.

 (3) Response time is greatly delayed at temperature below the operating temperature
   range. However, this does not mean the LCD will be out of the order. It will recover when
   it returns to the specified temperature range.

 (4) When turning the power on, input each signal after the positive/negative voltage

becomes stable.

(5) Do not apply water or any liquid on product which composed of T/P.

5.Handling Precautions

(1) Avoid static electricity which can damage the CMOS LSI; please wear the wrist strap when handling.

(2) The polarizing plate of the display is very fragile. Handle it very carefully.

(3) Do not give external shock.

(4) Do not apply excessive force on the surface; it may cause display abnormal .

(5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch   the surface of plate.

(6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with

 a cleaning naphtha solvent.

(7) Do not operate it above the absolute maximum rating.

(8) Do not remove the panel or frame from the module.

(9) Do not apply water or any liquid on product which composed of T/P.