

CUSTOMER :  
MODEL : MOG-128GB01D-S-A1A01  
DESCRIPTION : LCD MODULE

◆ CUSTOMER APPROVAL

	CHECKED	CHECKED	APPROVAL
APPROVAL			
REMARK			

◆ SUPPLIER APPROVAL

PREPARED	CHECKED		APPROVAL

## MYTECH CORPORATION

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## 1. General Specifications

### 1. Features

- A. Drive Method: 1/64 Duty, 1/9 Bias
- B. The Module Operating Voltage: 5V;
- C. The LCD Operating Voltage : 13.5V;
- D. Viewing Direction: 6:00h
- E. Operating Temperature: -20°C~70°C
- F. Storage Temperature: -30°C~85°C
- G. Display type: STN-YELLOW Positive

### 2. Mechanical Data:

- (1) Module Size ----- 93.0 w \* 70.0 h mm
- (2) Viewing Area ----- 70.7 w \* 38.8 h mm
- (3) Dot Size ----- 0.48 w \* 0.48 h mm
- (4) Number of Dots ----- 128 \* 64 Dots
- (5) Outline Dimensions ----- See Attached Drawing

### 3.Pin Connections:

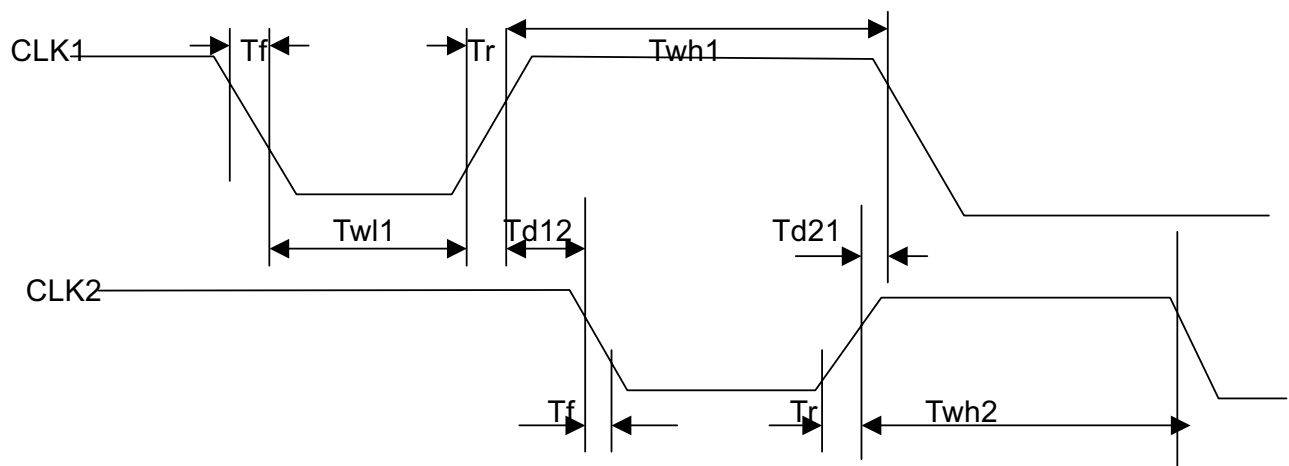
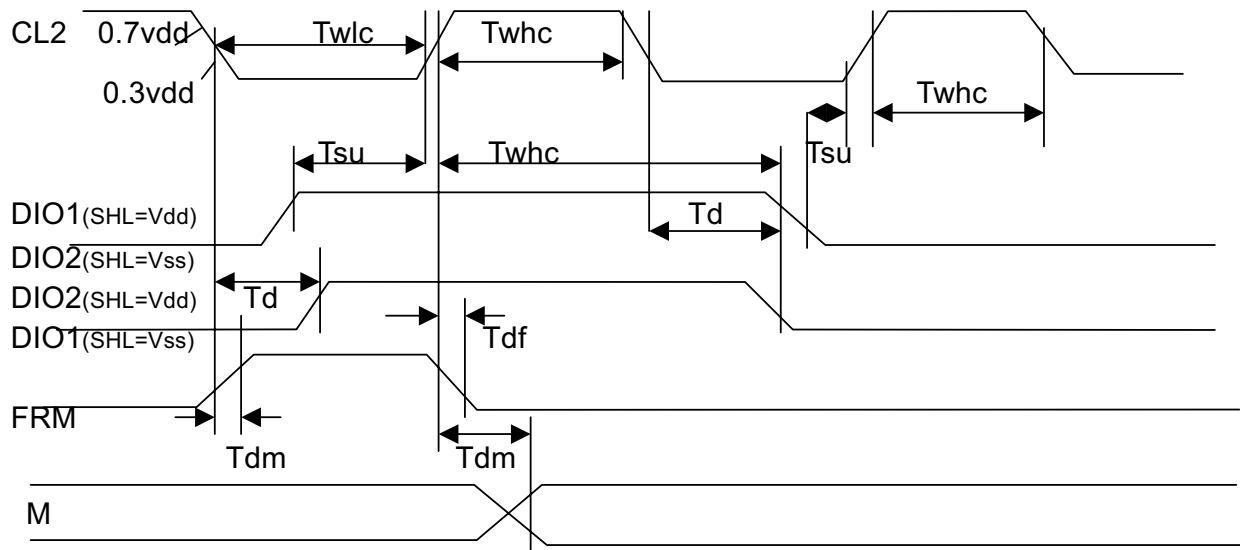
Pin No.	Symbol	Function
1	VSS	Ground(0v)
2	VDD	Logic Supply Voltage(+5.0v)
3	V0	LCD Driver Voltage Input(+13.5v)
4	R/S	Data Or Instruction
5	R/W	Read/Write Select
6	E	Enable Signal
7~14	DB0~DB7	Data Bus Line
15	Cs1	Chip Selection(Segment Driver 1)
16	Cs2	Chip Selection(Segment Driver 2)
17	RSTB	Reset Signal
18	Vout	Dc-Dc-Converter Output
19-20	LED +,-	LED Backlight

### 4.Timing Characteristics:(VDD=5V ± 10%)

#### (1).Common Driver :

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Data Setup Time	Tsu	20	--	--	us
Data Hold Time	Tdh	40	--	--	
Data Delay Time	Td	5	--	--	
FRM Delay Time	Tdf	-2	--	2	
M Delay Time	Tdm	-2	--	2	
Cl2 Low Level Width	Twlc	35	--	--	
Cl2 High Level Width	Twhc	35	--	--	
Clk1 Low Level Width	Twl1	700	--	--	ns
Clk2 Low Level Width	Twl2	700	--	--	
Clk1 High Level Width	Twh1	2100	--	--	

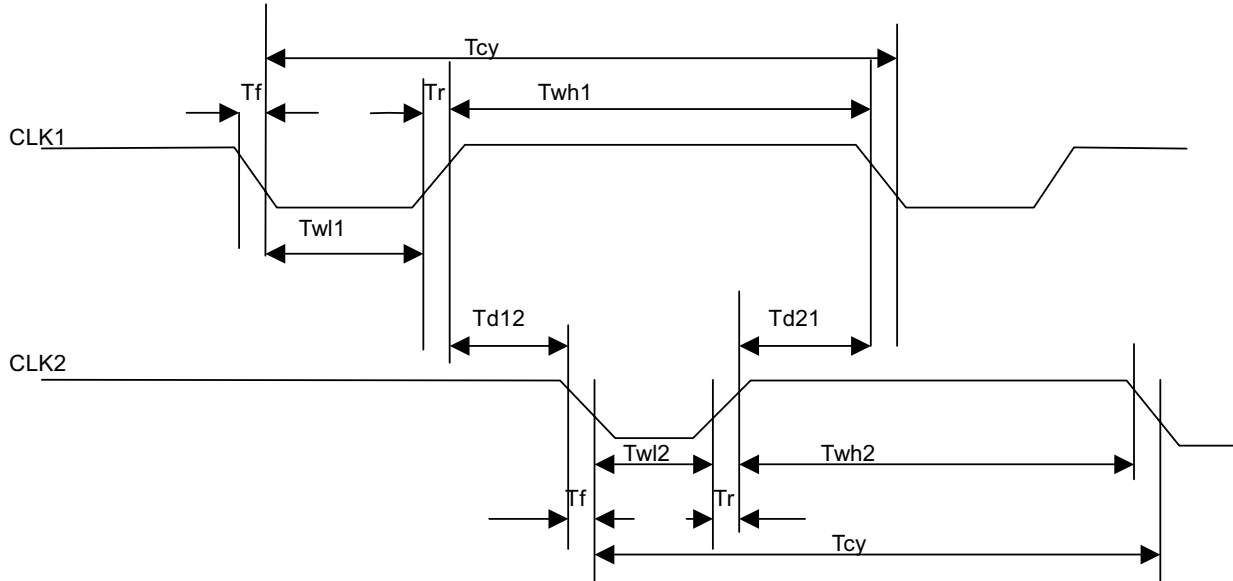
Clk2 High Level Width	Twh2	2100	--	--	
Clk1-Clk2 Phase Difference	Td12	700	--	--	ns
Clk2-Clk1 Phase Difference	Td21	700	--	--	
Clk1,Clk2 Rise/Fall Time	Tr/Tf	--	--	150	



(2) Segment Driver:

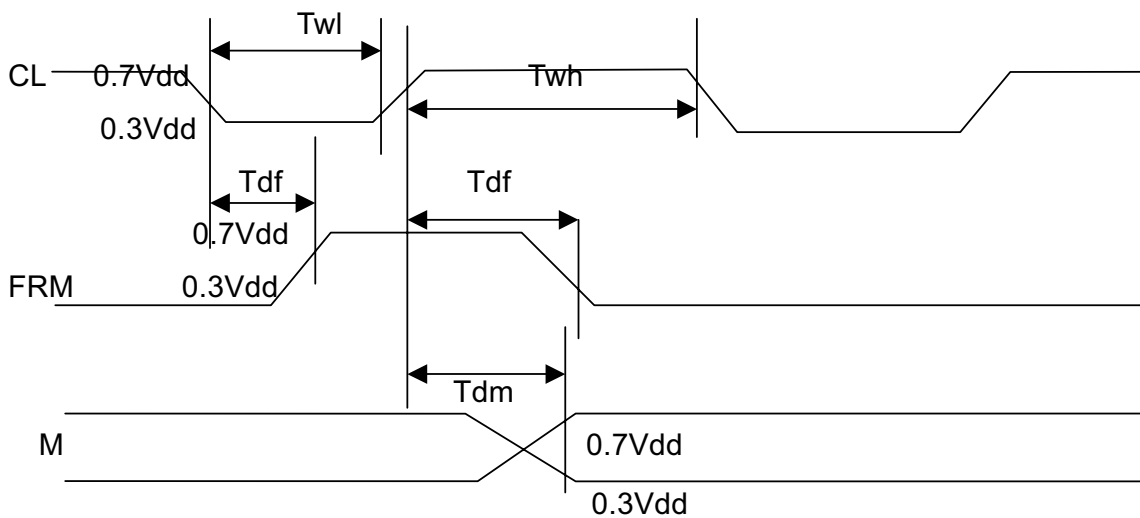
A. Clock Timing:

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Clk1, Clk2 Cycle Time	$T_{cy}$	2.5	--	20	$\mu s$
Clk1 "Low" Level Width	$T_{wl1}$	625	--	--	ns
Clk2 "Low" Level Width	$T_{wl2}$	625	--	--	
Clk1 "High" Level Width	$T_{wh1}$	1875	--	--	
Clk2 "High" Level Width	$T_{wh2}$	1875	--	--	
Clk1-Clk2 Phase Difference	$T_{d12}$	625	--	--	
Clk2-Clk1 Phase Difference	$T_{d21}$	625	--	--	
Clk1, Clk2 Rise Time	$T_r$	--	--	150	
Clk1, Clk2 Fall Time	$T_f$	--	--	150	



## B. Display Control Timing

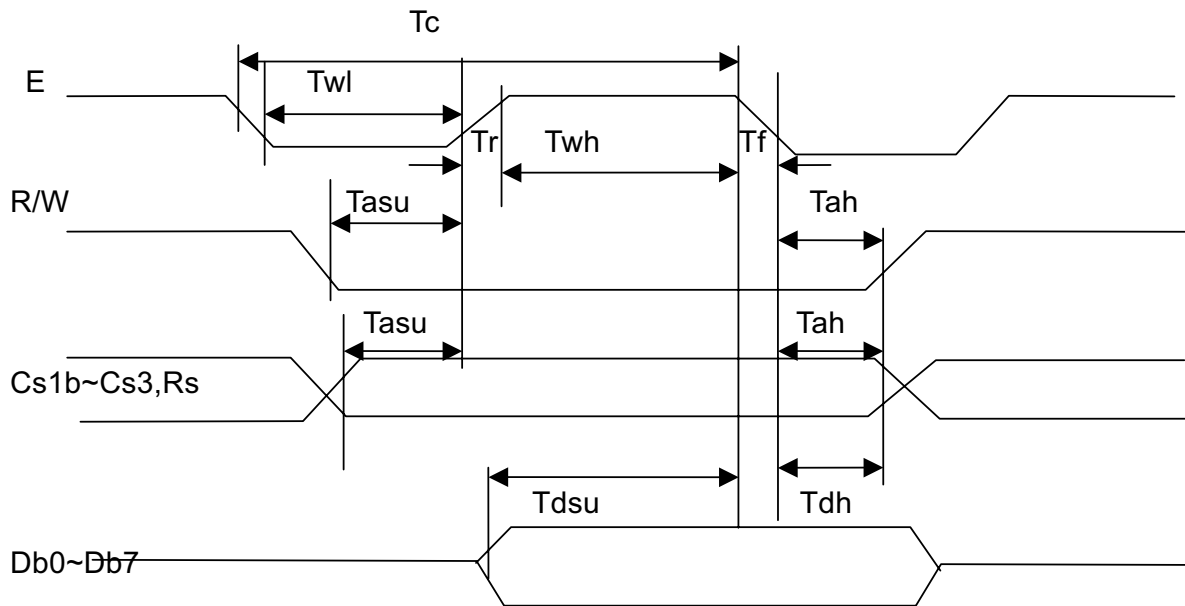
Characteristic	Symbol	Min.	Typ.	Max.	Unit
Frm Delay Time	Tdf	-2	--	+2	$\mu$ s
M Delay Time	Tdm	-2	--	+2	$\mu$ s
Cl"Low" Level Width	Twl	35	--	--	$\mu$ s
Cl"High" Level Width	Twh	35	--	--	$\mu$ s



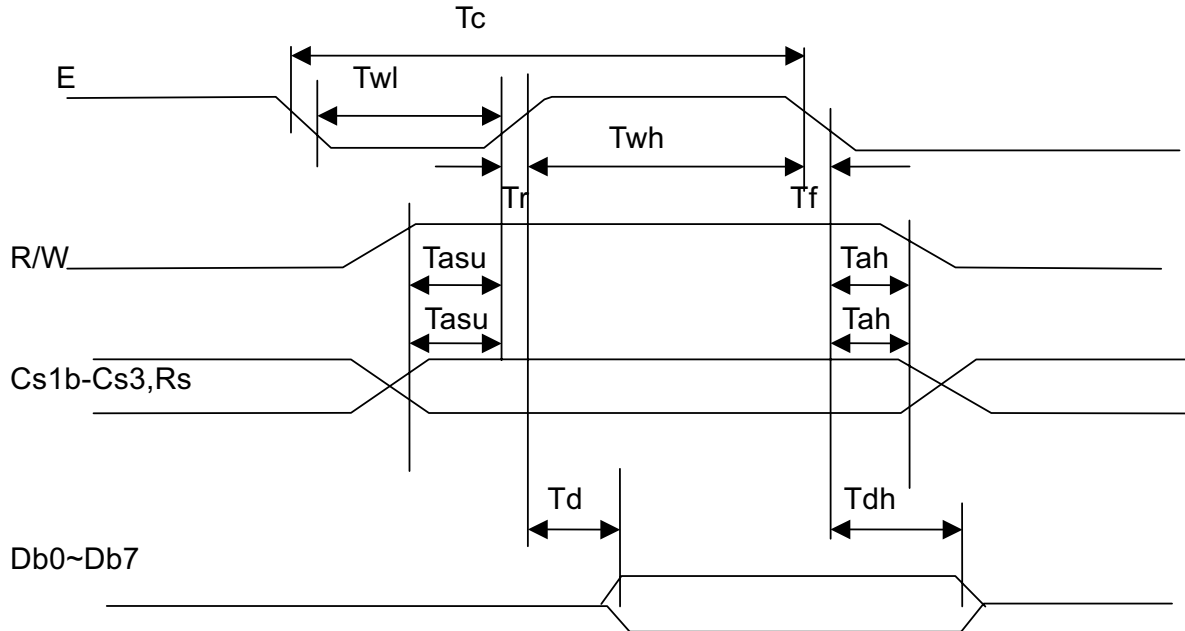
## C. Mpu Interface:

Characteristic	Symbol	Min.	Typ.	Max.	Unit
E Cycle	Tc	1000	--	--	ns
E High Level Width	Twh	450	--	--	
E Low Level Width	Twl	450	--	--	
E Rise Time	Tr	--	--	25	
E Fall Time	Tf	--	--	25	
Address Set-Up Time	Tasu	140	--	--	
Address Hold Time	Tah	10	--	--	
Data Set-Up Time	Tdsu	200	--	--	
Data Delay Time	Td	--	--	320	
Data Hold Time(Write)	Tdhw	10	--	--	
Data Hold Time(Read)	Tdhr	20	--	--	

### Mpu Write Timing:



### Mpu Read Timing:



## 2.The Characteristics and The Reliability Test

### 1.Electro-Optic Characteristics:

Condition:TEMP=(23±3)°C Hum=(70±5)%RH

V<sub>dd</sub>: 5.0V

NO	Item	Symbol	Min	Typ.	Max	Unit	Condition
1	Supply Voltage(Logic)	Vdd-Vss		5.0		V	
2	Supply Current (Logic)	Idd		4.73		mA	Vdd=5V
3	LCD Operating Voltage	Vdd-V <sub>0</sub>		13.9		V	-20°C
				13.5		V	25°C
				13.1		V	70°C
4	Response Time	Ton		103		ms	
		Toff		60		ms	
5	Contrast	CR	3				
6	Viewing Angel	12H	θ 1	44		Deg	(CR≥3.0)
		6H	θ 2	57			
		3H	θ 3	55			
		9H	θ 4	55			
7	LCD Threshold Voltage	Vth		11.6		V	25°C

### 2. Characteristics of backlight (LED unit)

#### (1).Absolute Maximum Ratings:

Item	Symbol	Rating.	Unit	Condition
Forward Current	IFM	300	mA	Ta=25°C
Peak forward current	IFP	720	mA	1 msec plus 10% duty cycle
Reverse Voltage	VR	8	V	Ta=25°C
Power Dissipation	PD	1200	mW	Ta=25°C

#### (2).Electrical-optical Characteristics:

Item	Symbol	Min	Typ	Max	Unit	Condition
Forward Voltage	VF	3.90	4.15	4.30	V	IF=180mA
Reverse current	IR			1200	uA	VR=8V
Luminous	LV	23	28		cd/m <sup>2</sup>	IF=180mA
Color	YELLOW-GREEN					



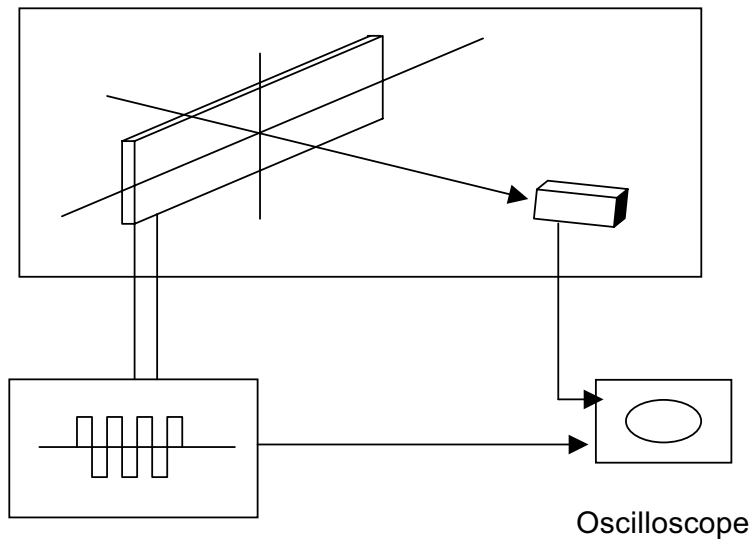
### 3. Reliability Test

No	Items	Test Condition	Equipment	Test Result
1	High TEMP Storage	TEMP: $85 \pm 2^{\circ}\text{C}$ Time: 96h Restore: 24h	Tenny	Passed
2	Low TEMP Storage	TEMP: $-30 \pm 3^{\circ}\text{C}$ Time: 96h Restore: 24h	Tenny	Passed
3	High TEMP Operating	TEMP: $70 \pm 2^{\circ}\text{C}$ Vop: 5V Timp: 24h Restore: 24h	Tenny	Passed
4	Low TEMP Operating	TEMP: $-20 \pm 2^{\circ}\text{C}$ Vop: 5V Timp: 24h Restore: 24h	Tenny	Passed
5	High TEMP High Hum Storage	TEMP: $40 \pm 2^{\circ}\text{C}$ Hum: 95%Rh Time: 96h Restore: 24h	Tenny	Passed
6	Thermal Shock	<p>TEMP: (<math>^{\circ}\text{C}</math>)</p> <p>The diagram shows a thermal shock profile with 5 cycles. The temperature starts at 25°C, drops to -30°C (30 min dwell), rises to 25°C (5 min dwell), then to 85°C (30 min dwell), and finally drops back to 25°C (5 min dwell). This sequence repeats for 5 cycles. A 'Min' label is present at the end of the profile.</p> <p>Restore: 24h</p>	Tenny	Passed

### 3.The LCD Measuring Method and Equipmen

#### 1. Threshold Voltage and Response Time Measuring

##### (1) Equipment

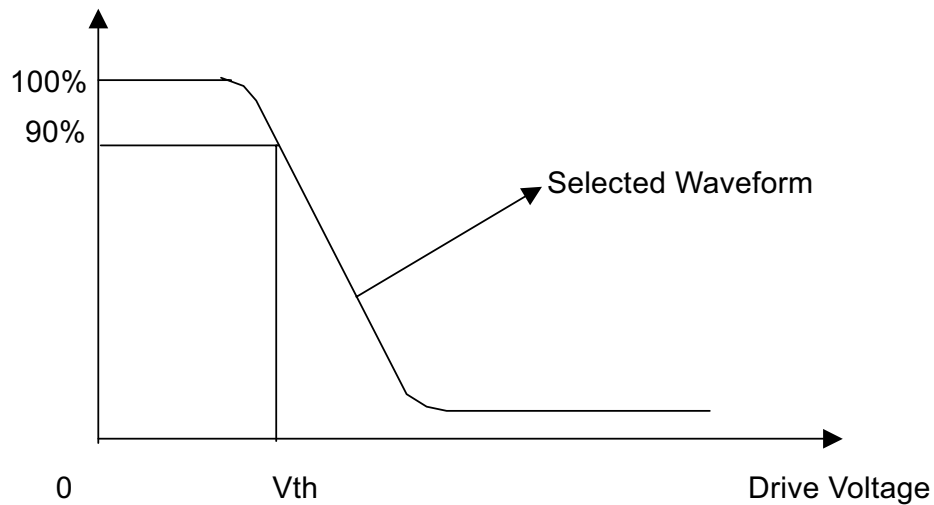


Waveform Generator

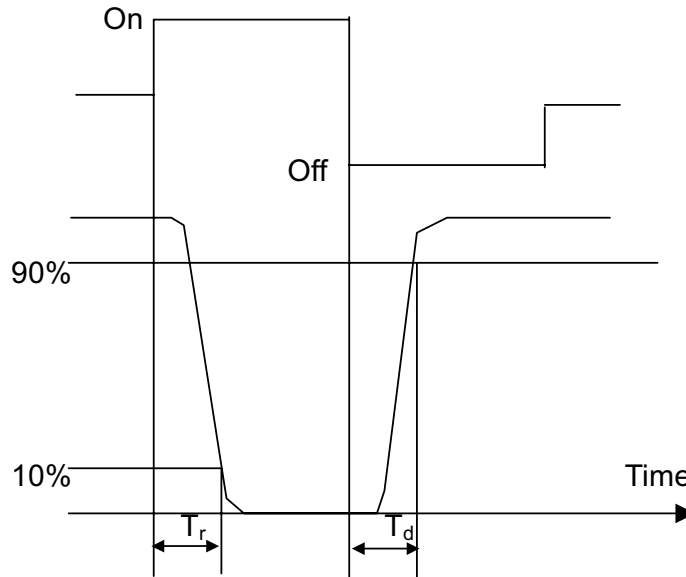
##### (2) Definition

##### A. Threshold Voltage ( $V_{th}$ )

Brightness

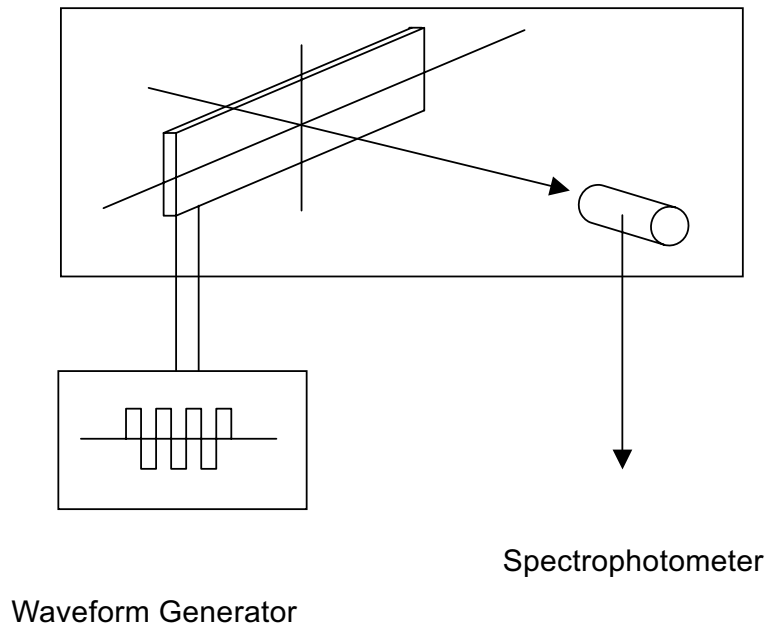


## B. Response Time



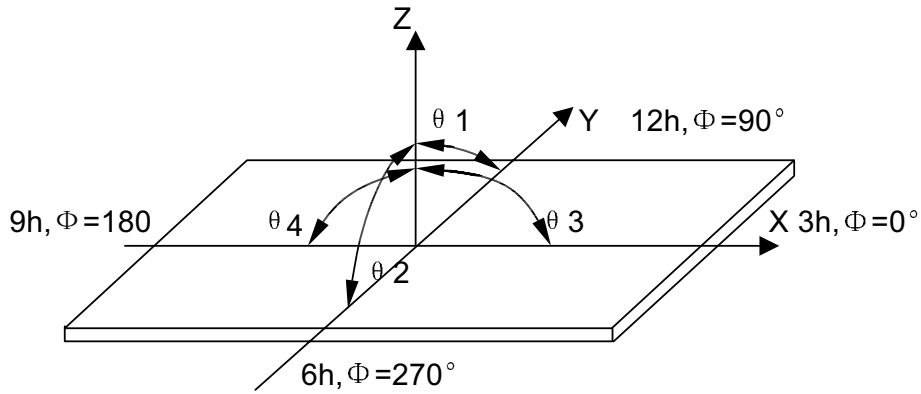
## 2. Contrast Measuring

### (1) Equipment



(2)Definition:

A.Viewing Angle:



B. Contrast Ratio (Positive)

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

3. Reliability Test:

Equipment : TENNY

## 4. Standard Specifications for Product Quality

### 1. Manner of Test: :

1.1. The Test Must be Under 40w Fluorescent Light, and The Distance of View Must Be At 30cm.

1.2. The Test Direction Is Based On Around  $15^{\circ}$  -  $45^{\circ}$  of Vertical Line.

### 2. Definition of Defects

#### 2.1 Major Defects

A: Non-Display

B: Segment Missing

C: Over Current

D: Segment Short

E: Sealant Dishardexn

F: Wrong Polarizer Direction

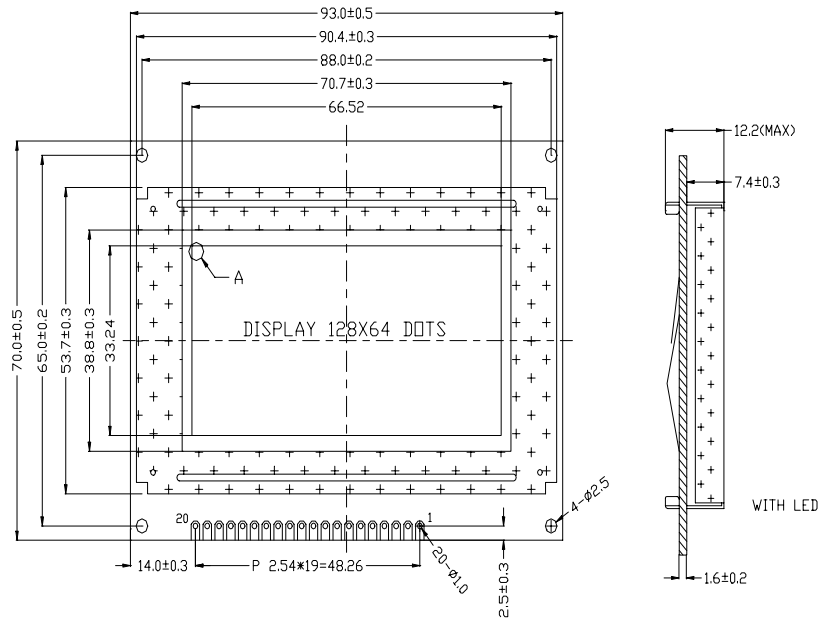
2.2 minor Defects: The Others.

3. Major Defects Should Be In AQL 0.25, And The Minor In AQL 1.00

## 4. Inspection Item and Standards

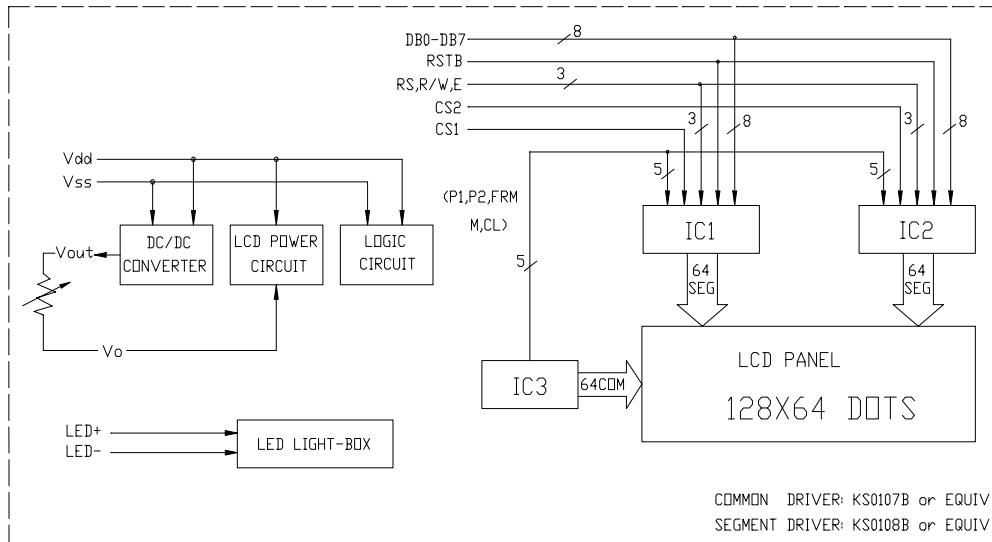
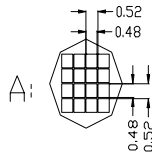
Item	The standard of quality inspection	Checking Manner	Quality Ratio
1.Frame	Smooth and even surface,no crack,no scratch,no rusty,and not be wrenched out of shape.the range between convex and concave is: $d \leq 0.35\text{mm}$ ,and the frame must be connected to the ground.	Checking With Eyes And Using Vernier Caliper, Multimeter	100%
2.LCD	1.The major defects would be reject. 2.No scratch and no dusty on the LCD glass surface. 3. $D \leq 0.15\text{mm}$ $n \leq 2$ diameter of bubble: $d \leq 0.5$ $n \leq 2$ damaged size of polarizer: $d \leq 0.15\text{mm}$ , $n \leq 2$ . 4.No scratch and dusty between the LCD and led.	Check It When Displaying	100%
3.The Relative Position of LCD and Frame	1. The LCD should not be twisted. 2. The LCD graphic should be in the middle position of the frame.	Checking With Eyes	100%
4.The Relative Position of PCB Panel and Frame	1.The frame installing direction must be correct. 2.The twisted angle of the pin is from $45^\circ$ to $60^\circ$ . 3.The pin is vertical to PCB panel and it should be in the middle position of the installing holes.	Checking With Eyes	100%
5.LED	1.The led would be yellow-green. 2.The led would be uniform.	Checking With Eyes	100%
6.Function Test	1. The major defects must be reject. 2. Test flow chart (see attached chart) 3. Background changes evenly and no disorderly displaying phenomenon. 4. Display no shortage.	Check It When Displaying	100%

Note:D~Diameter N~Quantity Unit:mm



**Note:**

1. Operating Voltage: 5.0V
2. Drive method: 1/64Duty, 1/9 Bias
3. Viewing Direction: 6:00
4. Operating Temp: -20°C~70°C
5. Storage Temp: -30°C~85°C
6. Display type: STN, Positive



PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
SYMBOL	V <sub>SS</sub>	V <sub>DD</sub>	V <sub>O</sub>	RS	R/W	E	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	CS1	CS2	RSTB	V <sub>OUT</sub>	LED+	LED-