

# **AZ DISPLAYS, INC.**

---

*COMPLETE LCD SOLUTIONS*

## **SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY**

**PART NUMBER:**  
**DATE:**

**AGM1264N SERIES**  
**MAR. 7, 2007**

# 1. General Specifications

## 1-1.Features

- A. Drive Method: 1/65 Duty, 1/9 Bias
- B. The Module Operating Voltage: 3V;
- C. The LCD Operating Voltage : 9.0V;
- D. Viewing Direction: 12:00
- E. Operating Temperature: 0°C~50°C
- F. Storage Temperature: -20°C~70°C
- G. Display type: STN or FSTN / Positive or Negative

## 1-2.Mechanical Data:

- (1) Module Size ----- 70.0 w \* 43.0 h mm
- (2) Viewing Area ----- 59.0 w \* 30.5 h mm
- (3) Dot Size ----- 0.39 w \* 0.39 h mm
- (4) Number of Dots ----- 128 \* 64 Dots
- (5) Outline Dimensions----- See Attached Drawing

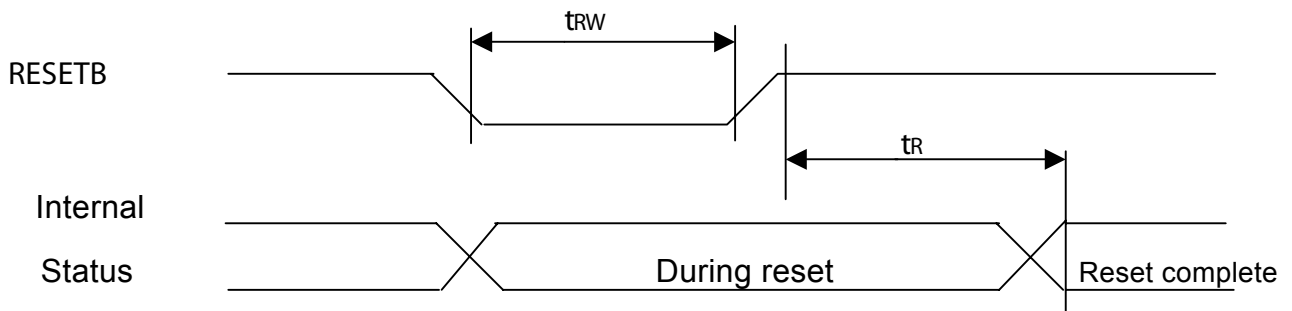
1-3.Pin Connections:

| Pin No. | Symbol | Function  |
|---------|--------|---|
| 1       | NC     | No Connect  |
| 2       | V0     | LCD driver supply voltages                        |
| 3       | V4     | LCD driver supply voltages                        |
| 4       | V3     | LCD driver supply voltages                        |
| 5       | V2     | LCD driver supply voltages                        |
| 6       | V1     | LCD driver supply voltages                        |
| 7       | C2-    | Capacitor 2- connection pin for voltage converter |
| 8       | C2+    | Capacitor 2+connection pin for voltage converter  |
| 9       | C1+    | Capacitor 1+ connection pin for voltage converter |
| 10      | C1-    | Capacitor 1- connection pin for voltage converter |
| 11      | C3+    | Capacitor 3+connection pin for voltage converter  |
| 12      | Vout   | Voltage converter input/ output pin               |
| 13      | VSS    | Ground  |
| 14      | VDD    | Power supply                                      |
| 15      | SI     | Serial input data                                 |
| 16      | SCL    | Serial input clock                                |
| 17      | RS     | Register select input pin                         |
| 18      | /RES   | Reset input pin                                   |
| 19      | /CS1   | Chip select input pins                            |
| 20      | NC     | No Connect  |

#### 1-4. Absolute Maximum Ratings:

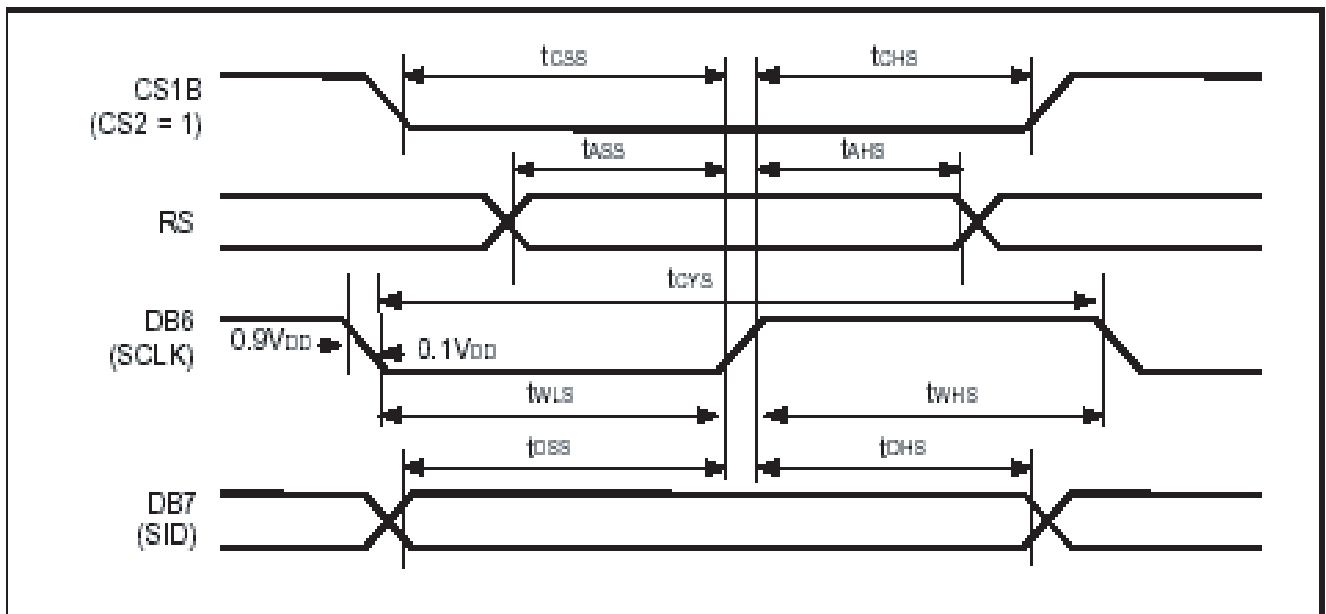
| Characteristics | Symbol          | Ratings                        |
|-----------------|-----------------|--------------------------------|
| Supply Voltage  | VDD             | -0.3V to +7.0V                 |
| Supply Voltage  | VLCD            | -0.3V to +17.0V                |
| Input Voltage   | V <sub>IN</sub> | -0.3V to V <sub>dd</sub> +0.3V |

#### 1-5. Reset Input Timing:



| Item                  | Signal | Symbol   | Min. | Typ. | Max. | Unit |
|-----------------------|--------|----------|------|------|------|------|
| Reset low pulse width | RESETB | $t_{RW}$ | 1.0  | -    | -    | us   |
| Reset time            | -      | $t_R$    | -    | -    | 1.0  | us   |

## 1-6. Serial Interface Characteristics



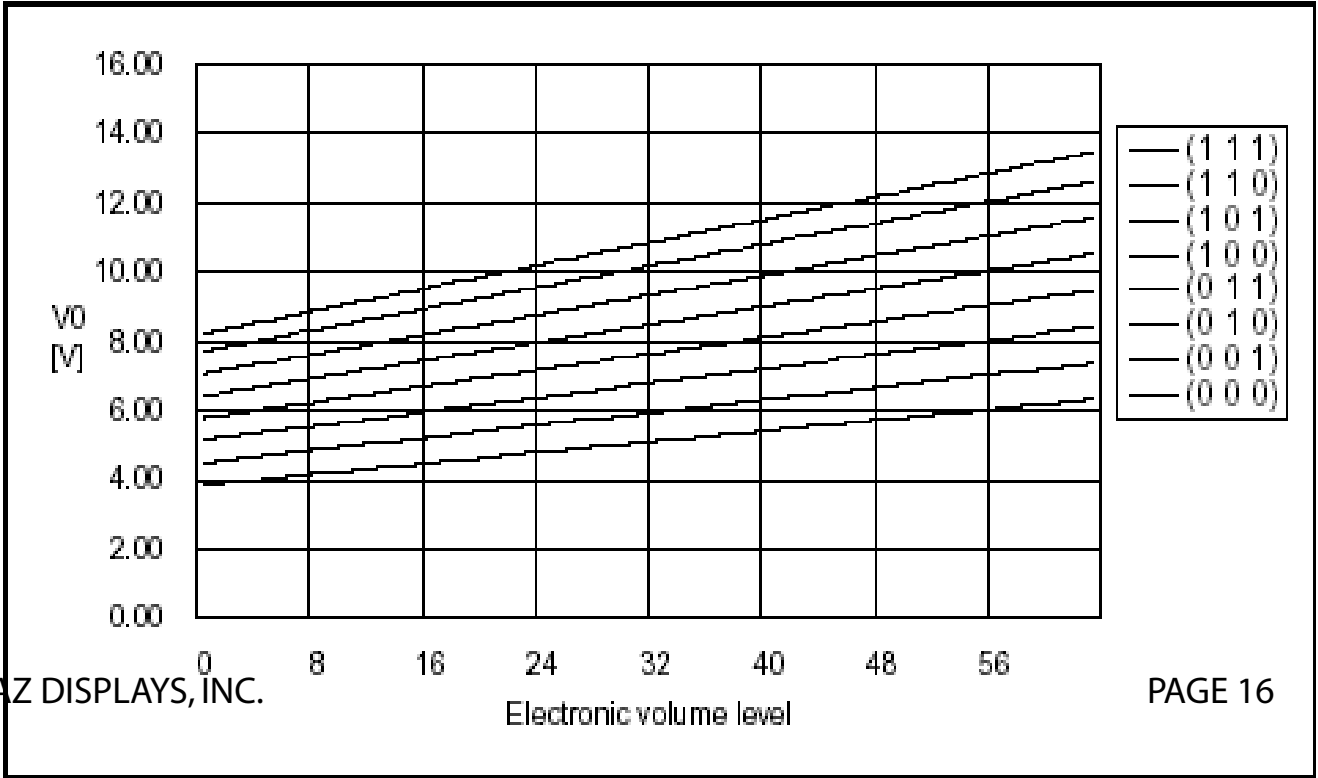
| Item                  | Signal     | Symbol    | Min. | Typ. | Max. | Unit | Remark |
|-----------------------|------------|-----------|------|------|------|------|--------|
| Serial clock cycle    |            | $t_{CYS}$ | 250  | -    | -    |      |        |
| SCLK high pulse width | DB6 (SCLK) | $t_{WHS}$ | 100  | -    | -    | ns   |        |
| SCLK low pulse width  |            | $t_{WLS}$ | 100  | -    | -    |      |        |
| Address setup time    | RS         | $t_{ASS}$ | 150  | -    | -    | ns   |        |
| Address hold time     |            | $t_{AHS}$ | 150  | -    | -    |      |        |
| Data setup time       | DB7 (SID)  | $t_{DSS}$ | 100  | -    | -    | ns   |        |
| Data hold time        |            | $t_{DHS}$ | 100  | -    | -    |      |        |
| CS1B setup time       | CS1B       | $t_{CSS}$ | 150  | -    | -    | ns   |        |
| CS1B hold time        |            | $t_{CHS}$ | 150  | -    | -    |      |        |

## 1-7. Instruction Table

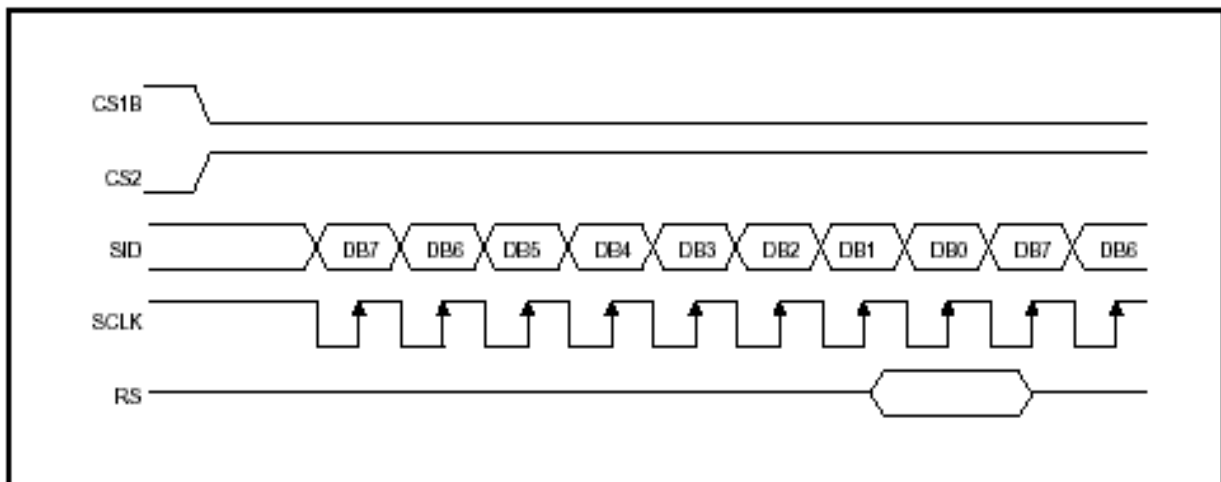
| Instruction                    | RS | RW | BD7        | DB6 | DB5   | DB4    | DB3 | DB2 | DB1 | DB0  | Description   |
|--------------------------------|----|----|------------|-----|-------|--------|-----|-----|-----|------|---|
| Display ON/OFF                 | 0  | 0  | 1          | 0   | 1     | 0      | 1   | 1   | 1   | DON  | Turn on/of LCD panel<br>when DON=0: display OFF<br>when DON=1: display ON   |
| Initial display line           | 0  | 0  | 0          | 1   | ST5   | ST4    | ST3 | ST2 | ST1 | ST0  | Specify DDRAM line f or COM0  |
| Set page address               | 0  | 0  | 1          | 0   | 1     | 1      | P3  | P2  | P1  | P0   | Set page address  |
| Set column address MSB         | 0  | 0  | 0          | 0   | 0     | 1      | Y7  | Y6  | Y5  | Y4   | Set column address MSB  |
| Set column address LSB         | 0  | 0  | 0          | 0   | 0     | 0      | Y3  | Y2  | Y1  | Y0   | Set column address LSB  |
| Read status                    | 0  | 1  | BUSY       | ADC | ONOFF | RESETB | 0   | 0   | 0   | 0    | Read the internal status  |
| Write display data             | 1  | 0  | Write data |     |       |        |     |     |     |      | Write data into DDRAM   |
| Read display data              | 1  | 1  | Read data  |     |       |        |     |     |     |      | Read data from DDRAM  |
| ADC select                     | 0  | 0  | 1          | 0   | 1     | 0      | 0   | 0   | 0   | ADC  | Select SEG output direction<br>When ADC=0: normal direction (SEG0-SEG131)<br>When ADC=1: reverse direction<br>(SEG131-SEG0) |
| Reverse display ON/OFF         | 0  | 0  | 1          | 0   | 1     | 0      | 0   | 1   | 1   | REV  | Select normal/reverse display<br>When REV=0: normal display<br>When REV=1: reverse display                                  |
| Entire display ON/OFF          | 0  | 0  | 1          | 0   | 1     | 0      | 0   | 1   | 0   | EON  | Select normal/entire display ON<br>When EON=0: normal display<br>When EON=1: entire display ON                              |
| LCD bias select                | 0  | 0  | 1          | 0   | 1     | 0      | 0   | 0   | 1   | BIAS | Select LCD bias   |
| Set modify-read                | 0  | 0  | 1          | 1   | 1     | 0      | 0   | 0   | 0   | 0    | Set modify-read mode  |
| Reset modify-read              | 0  | 0  | 1          | 1   | 1     | 0      | 1   | 1   | 1   | 0    | Release modify-read mode  |
| Reset 0                        |    | 0  | 1          | 1   | 1     | 0      | 0   | 0   | 1   | 0    | Initialize the internal functions   |
| SHL select                     | 0  | 0  | 1          | 1   | 0     | 0      | SHL | *   | *   | *    | Select COM output direction<br>When SHL=0: normal direction (COM0-COM63)<br>When SHL=1: reverse direction<br>(COM63-COM0)   |
| Power control                  | 0  | 0  | 0          | 0   | 1     | 0      | 1   | VC  | VR  | VF   | Control power circuit operation   |
| Regulator resistor select      | 0  | 0  | 0          | 0   | 1     | 0      | 0   | R2  | R1  | R0   | Select internal resistance ratio of the regulator resistor  |
| Set reference voltage mode     | 0  | 0  | 1          | 0   | 0     | 0      | 0   | 0   | 0   | 1    | Set reference voltage mode  |
| Set reference voltage register | 0  | 0  | *          | *   | SV5   | SV4    | SV3 | SV2 | SV1 | SV0  | Set reference voltage register  |
| Set static indicator mode      | 0  | 0  | 1          | 0   | 1     | 0      | 1   | 1   | 0   | SM   | Set static indicator mode   |
| Set static indicator register  | 0  | 0  | *          | *   | *     | *      | *   | *   | S1  | S0   | Set static indicator register   |
| Power save                     |    |    |            |     |       |        |     |     |     |      | Compound instruction of display OFF<br>and entire display ON  |
| NOP 0                          |    | 0  | 1          | 1   | 1     | 0      | 0   | 0   | 1   | 1    | Non-Operation command   |
| Test instruction-1             | 0  | 0  | 1          | 1   | 1     | 1      | *   | *   | *   | *    | Don't use this instruction  |
| Test instruction-2             | 0  | 0  | 1          | 0   | 0     | 1      | *   | *   | *   | *    | Don't use this instruction  |

### 1-8. Electronic Volume Level

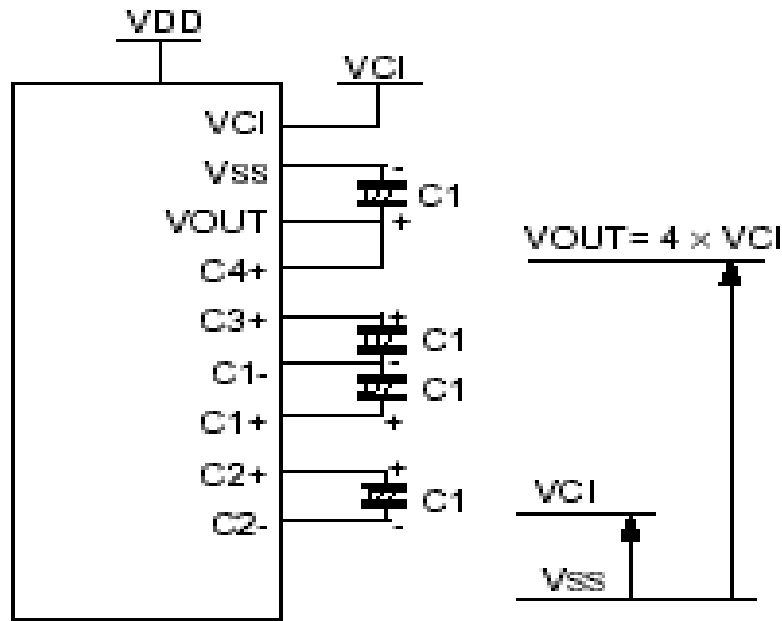
The following figure shows V0 voltage measured by adjusting internal regulator resistor ratio (Rb / Ra) and 6-bit electronic volume registers for each temperature coefficient at Ta = 25 °C.



### 1-9. Serial Interface Timing



### 1-10. Voltage Converter Circuits

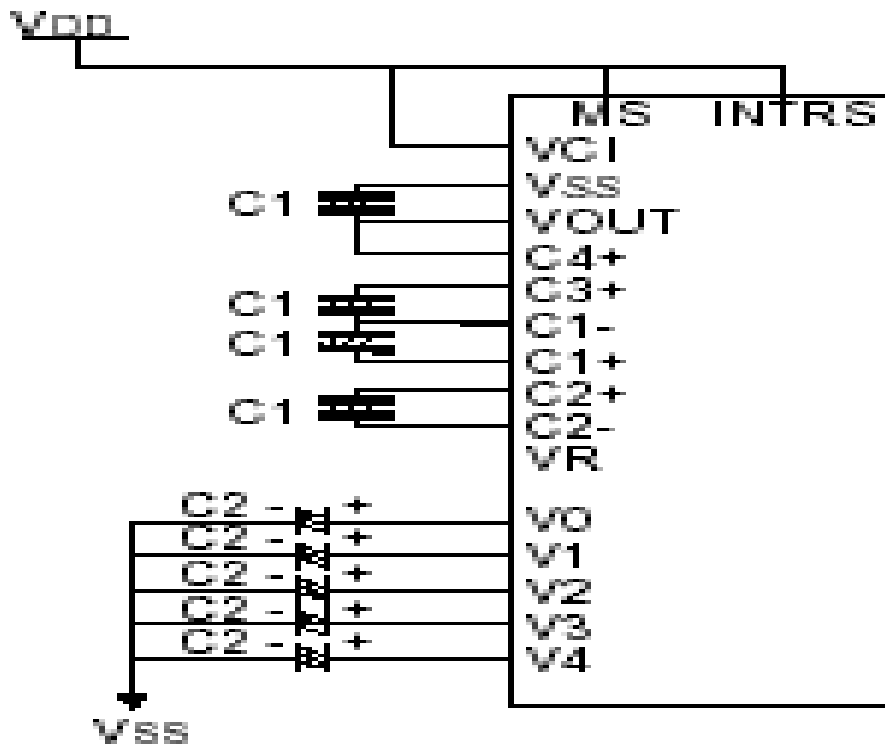


Times Boosting Circuit

C1=1.0~4.7 uF

### 1-11. Reference Circuit

Using internal regulator resistors





## 2.The Characteristics and The Reliability Test

### 1.Electro-Optic Characteristics:

Condition:TEMP=(23±3)°C

| NO | Item                  | Symbol             | Min | Typ. | Max | Unit | Condition |
|----|-----------------------|--------------------|-----|------|-----|------|-----------|
| 1  | Supply Voltage(Logic) | Vdd-Vss            |     | 3.0  |     | V    |           |
| 2  | LCD Operating Voltage | Vdd-V <sub>0</sub> |     | 9.2  |     | V    | 0°C       |
|    |                       |                    |     | 9.0  |     | V    | 25°C      |
|    |                       |                    |     | 8.8  |     | V    | 50°C      |
| 3  | Response Time         | Ton                |     | 112  |     | ms   |           |
|    |                       | Toff               |     | 80   |     | ms   |           |
| 4  | Contrast              | CR                 | 3   |      |     |      |           |
| 5  | Viewing Angel         | 12H                | θ 1 |      | 70  | Deg  | (CR≥3.0)  |
|    |                       | 6H                 | θ 2 |      | 59  |      |           |
|    |                       | 3H                 | θ 3 |      | 60  |      |           |
|    |                       | 9H                 | θ 4 |      | 60  |      |           |
| 6  | LCD Threshold Voltage | Vth                |     | 7.01 |     | V    | 25°C      |

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

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

| Item              | Symbol | Min | Typ  | Max | Unit | Condition |
|-------------------|--------|-----|------|-----|------|-----------|
| Forward Current   | IFM    |     | 60   | 120 | mA   | Ta=25°C   |
| Reverse Voltage   | VR     |     | 10   |     | V    | Ta=25°C   |
| Power Dissipation | PD     |     | 0.27 |     | W    | Ta=25°C   |

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

| Item            | Symbol                | Min | Typ | Max | Unit              | Condition |
|-----------------|-----------------------|-----|-----|-----|-------------------|-----------|
| Forward Voltage | VF                    |     | 4.5 |     | V                 |           |
| Reverse current | IR                    |     | 0.6 |     | mA                |           |
| Luminous        | LV                    |     | 50  |     | cd/m <sup>2</sup> | VF=4.5V   |
| Color           | YELLOW-GREEN OR WHITE |     |     |     |                   |           |

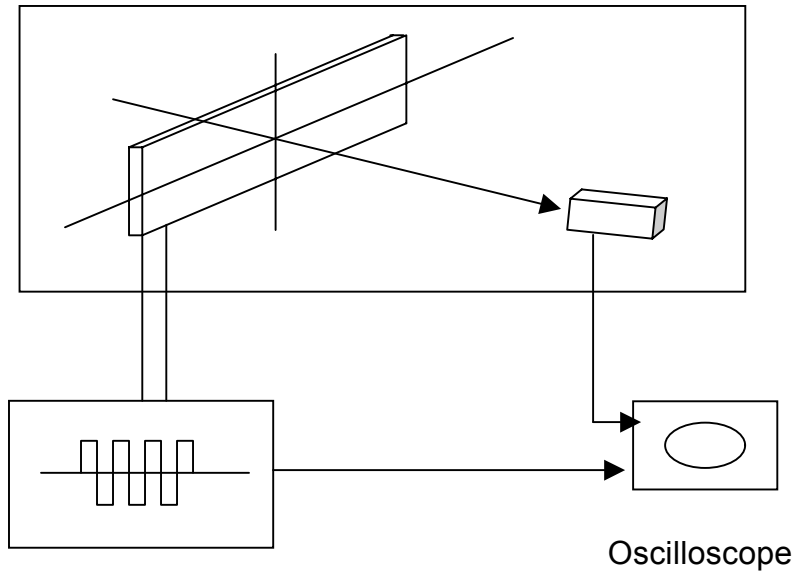
#### **WARNING:**

A BACKLIGHT IS A KIND OF CURRENT DEVICE,IT MUST CONNECT A RESISTANCE FOR LIMITING CURRENT ,OR IT WILL BE DAMAGED.

### 3.The LCD Measuring Method and Equipment

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

##### (1) Equipment

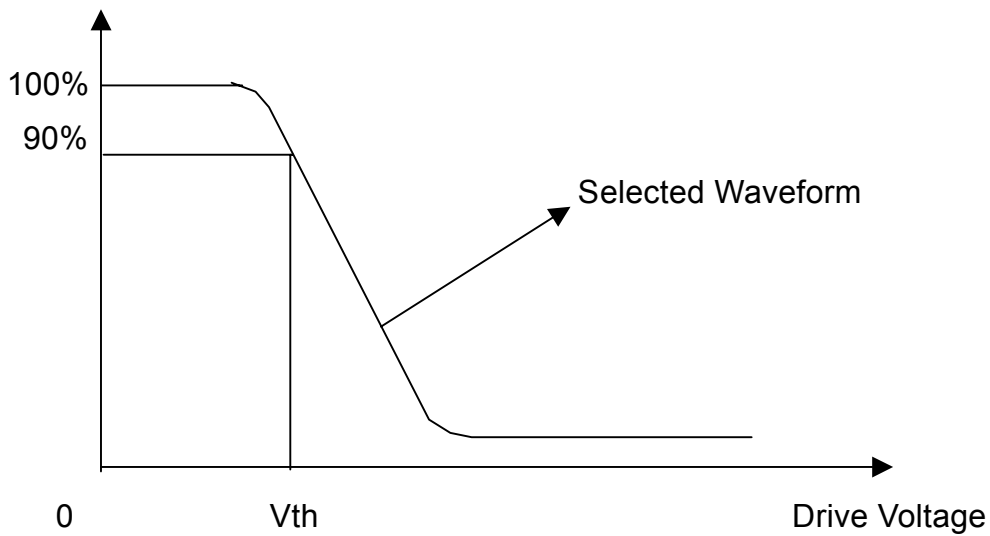


Waveform Generator

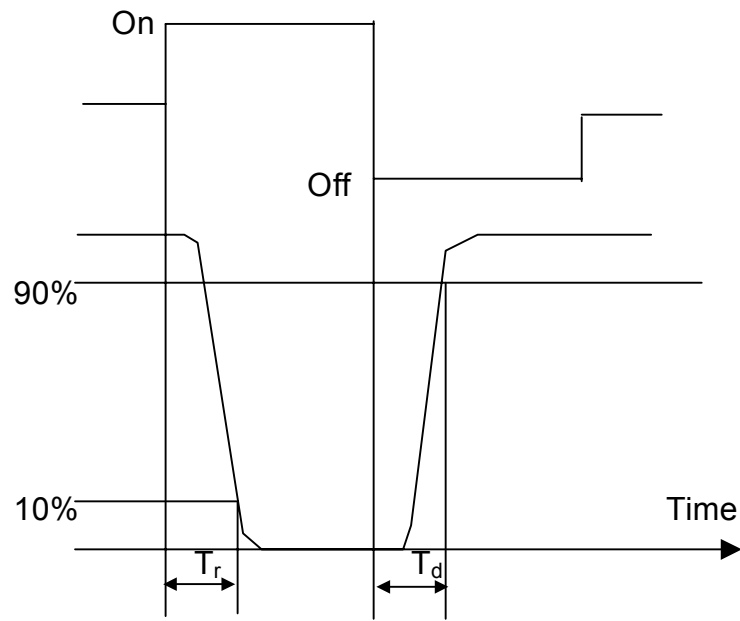
##### (2) Definition

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

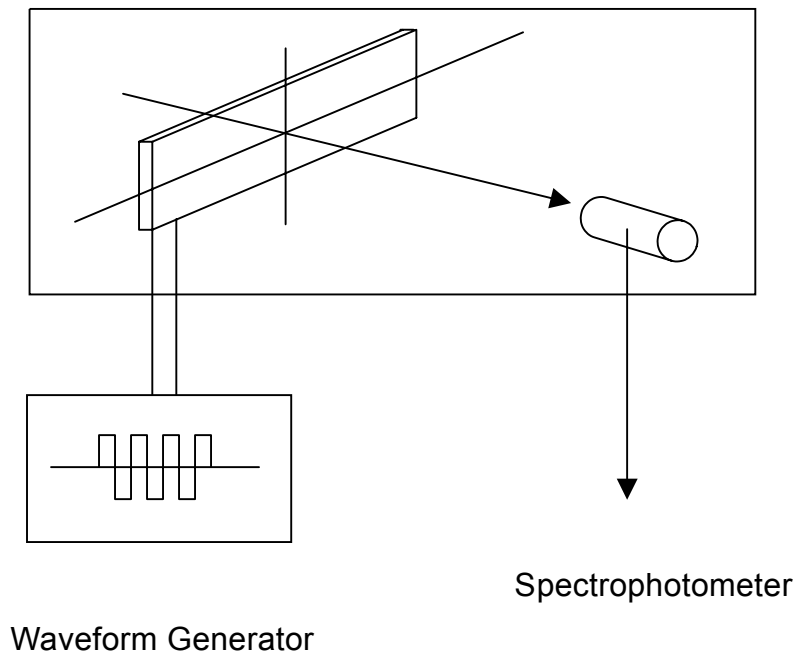
Brightness



## B. Response Time

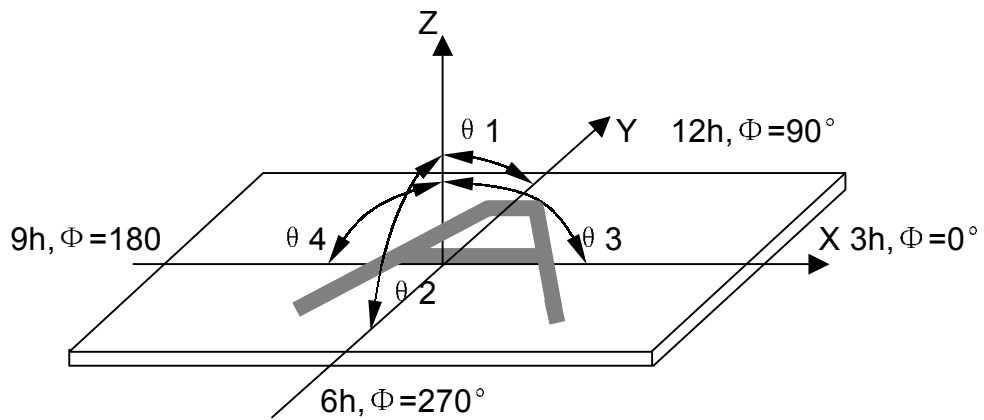


## 2. Contrast Measuring (1) Equipment



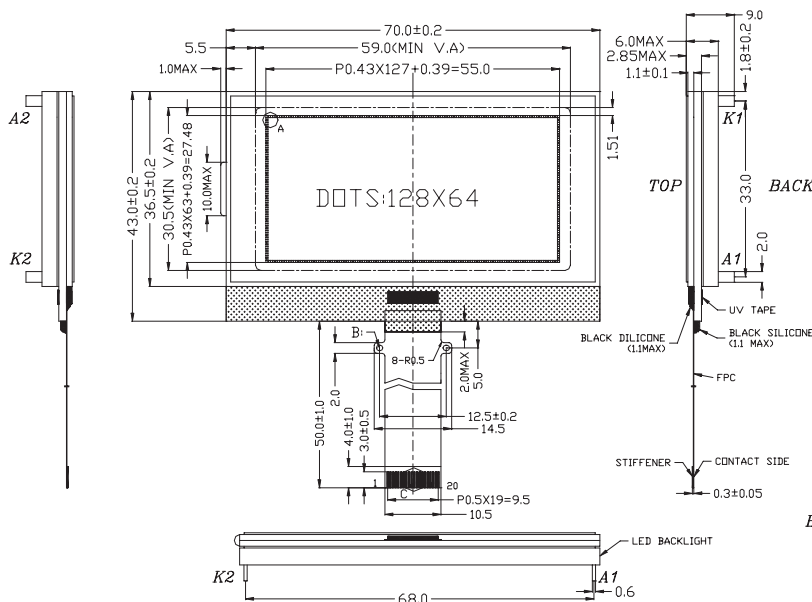
(2) Definition:

A. Viewing Angle:



B. Contrast Ratio (Positive)

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



| PIN | SYMBOL | PIN | SYMBOL |
|-----|--------|-----|--------|
| 1   | NC     | 11  | C3+    |
| 2   | V0     | 12  | VOUT   |
| 3   | V4     | 13  | VSS    |
| 4   | V3     | 14  | VDD    |
| 5   | V2     | 15  | SI     |
| 6   | V1     | 16  | SCL    |
| 7   | C2-    | 17  | RS     |
| 8   | C2+    | 18  | /RES   |
| 9   | C1+    | 19  | /CS1   |
| 10  | C1-    | 20  | NC     |

**Note:**

1. Display Type: STN/FSTN
2. Polarizer Mode: Transflective or Transmissive / Positive or Negative
3. Drive Method: 1/65Duty, 1/9 Bias
4. Viewing Direction: 12:00
5. Operating Temp: 0°C~50°C  
Storage Temp: -20°C~70°C
6. Controller: S6B0724A01-BOCY
7. Resolution: 128X64 Dots
8. Logic Voltage: 3.0V  
LCD Operating Voltage: 9.0V
9. Backlight: LED Yellow-Green or white ; VOLTAGE: 4.5V
10. Unmarked Tolerances: ±0.3