# ILLUMINANT 北極光企業有限公司

# PRODUCT SPECIFICATION FOR LCM

| | |
|---|---|
| CUSTOMER: | |
| MODEL NO: | IG-B241201-6BFLWA |
| ACCEPTED BY: | |

| APPROVED BY: | CHECKED BY: | ORGANIZED BY: |
|---|---|---|
| 北极光 2007.09.29 贺秋芳 | 北极光 2007.09.29 隆茂生 | 北极光 2007.09.29 隆茂生 |

□Approval for Specifications Only

■Approval for Specifications and Sample

**Note: 1. Version of Specifications : 1**

**2. Others: Rohs Compliment**


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| 1 | 07/09/29 | Initial Release |
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## 3. GENERAL SPECIFICATIONS :

3-1 SCOPE :

This specification covers the delivery requirements for the liquid crystal display delivered by ILLUMINANT to Customer.

3-2 PRODUCTS :

Liquid Crystal Display Module (LCM)

3-3 MODULE NAME

IG-B241201-6BFLWA

## 4. FEATURES :

| | |
|---|---|
| (1) Display Type | : 240x128 Dots |
| (2) LCD Type | : STN Blue, Transflective, Negative |
| (3) Driving Method | : 1/128 Duty, 1/12 Bias |
| (4) Driver IC | : T6963 |
| (5) Viewing Direction | : 6 O'clock |
| (6) Interface | : 8080 Series or 6800 Series |

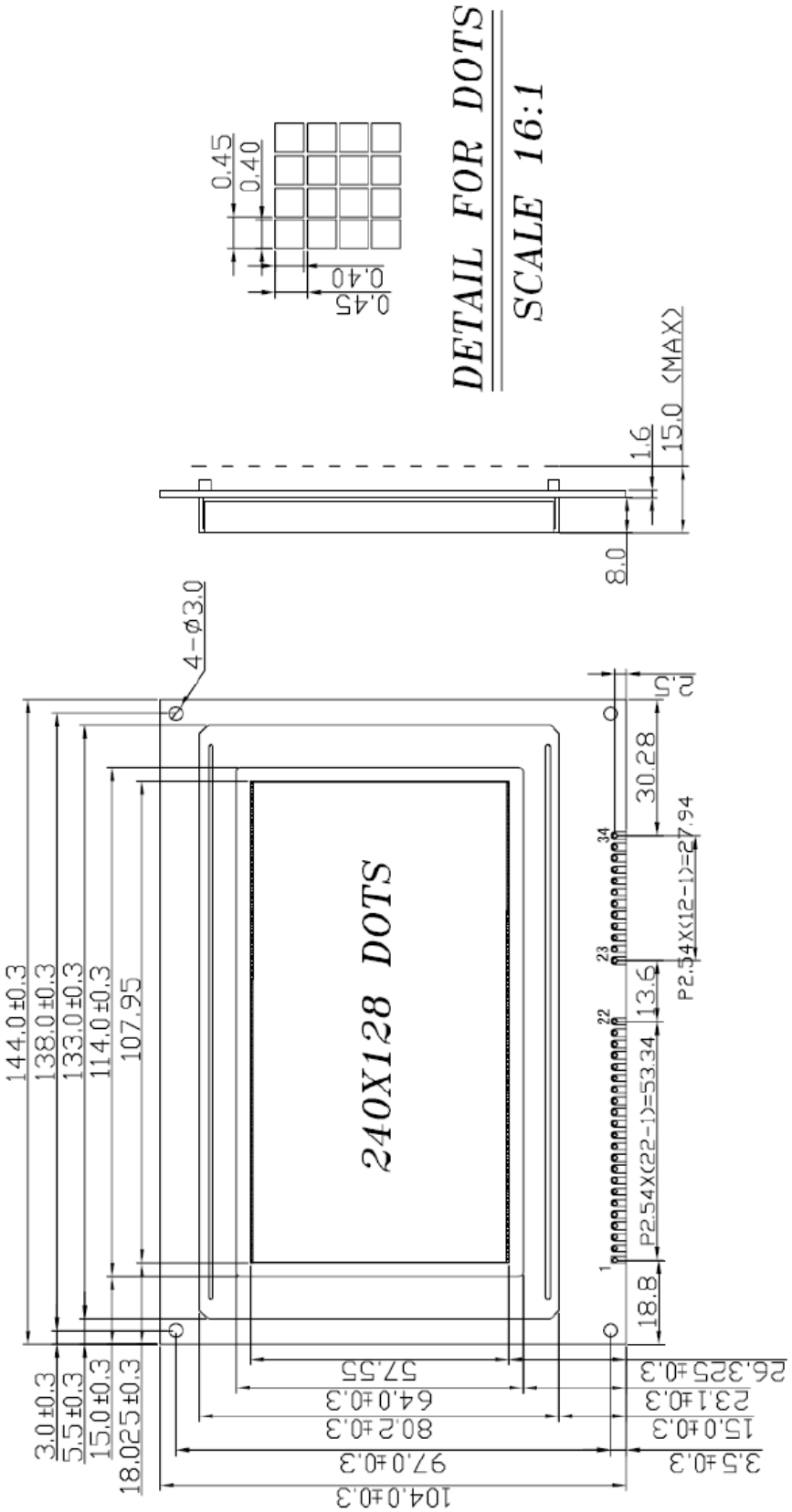
## 5. MECHANICAL SPECIFICATIONS :

| ITEM | SPECIFICATIONS | UNIT |
|---|---|---|
| MODULE SIZE | 144.00(W)X104.00 (H)X15.00MAX(D) | mm |
| VIEWING AREA | 114.00(W)X64.00(H) | mm |
| ACTIVE AREA | 107.95(W)X57.55(H) | mm |
| BACKLIGHT | WHITE LED | -- |
| ASSY.TYPE | COB | -- |
| WEIGHT | TBD | -- |

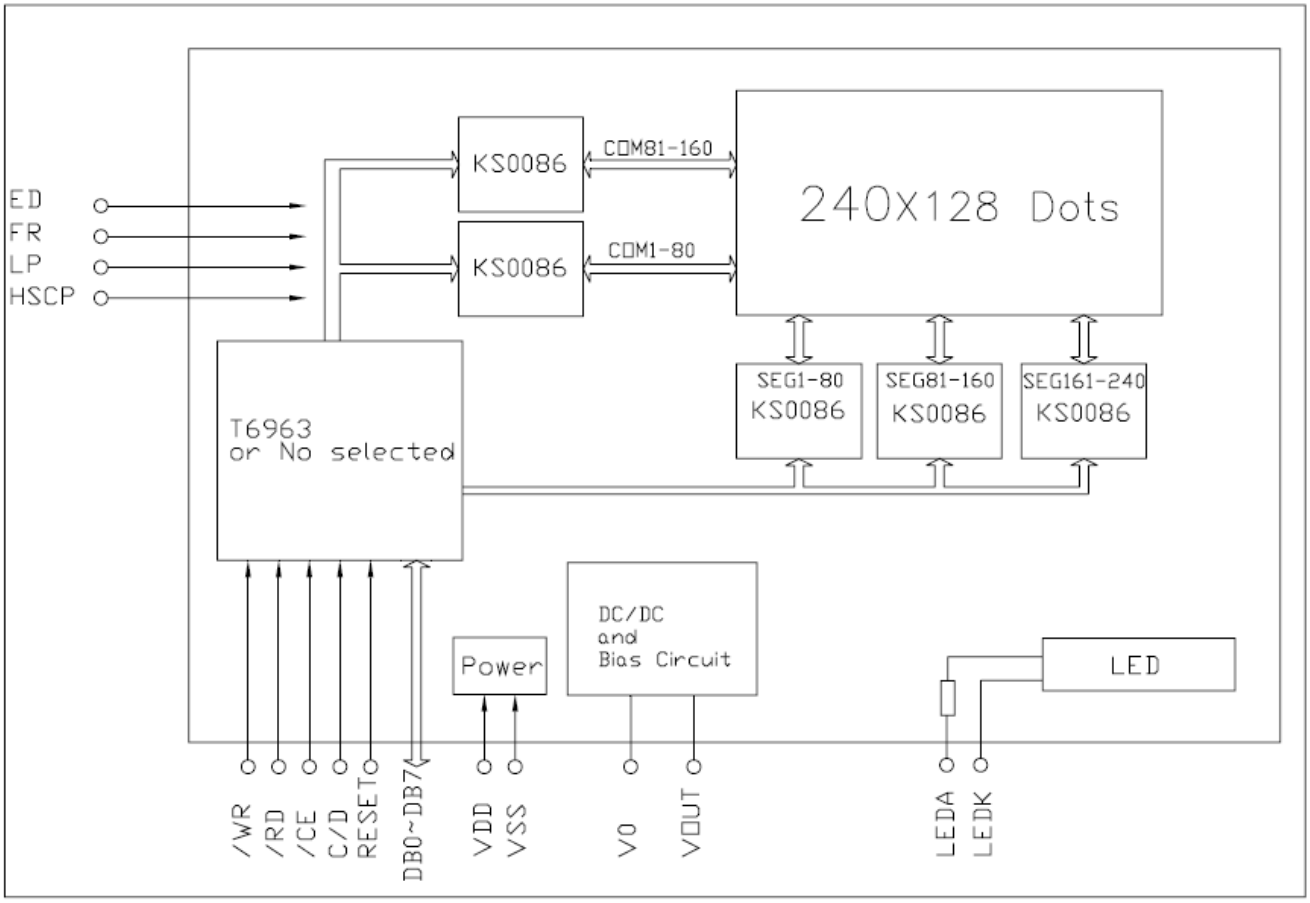
NOTES :

LCM should be grounded during handling LCM.

## 6. OUTLINE DIMENSIONS :

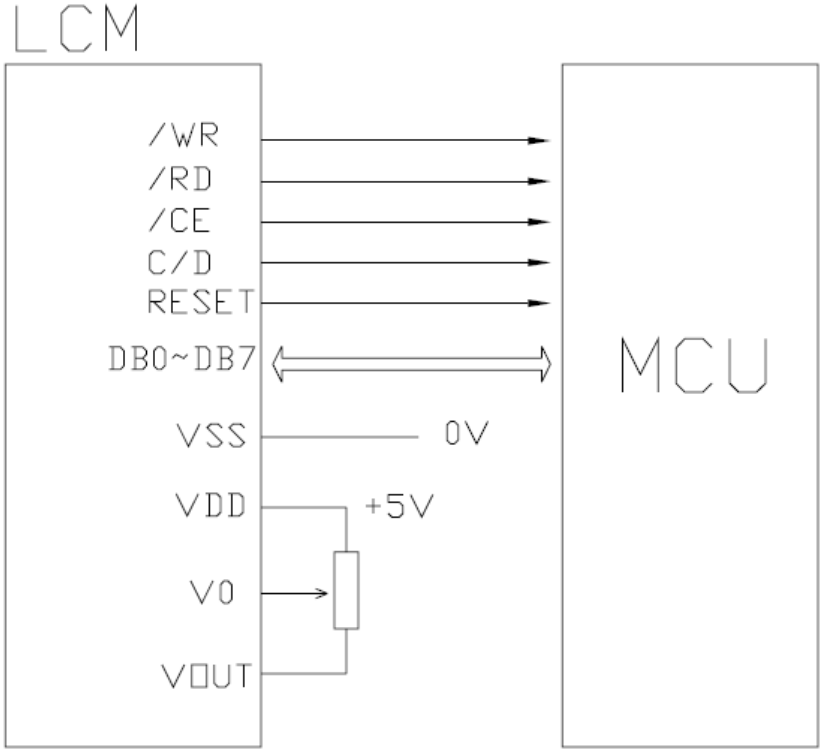


## 7. BLOCK DIAGRAM :

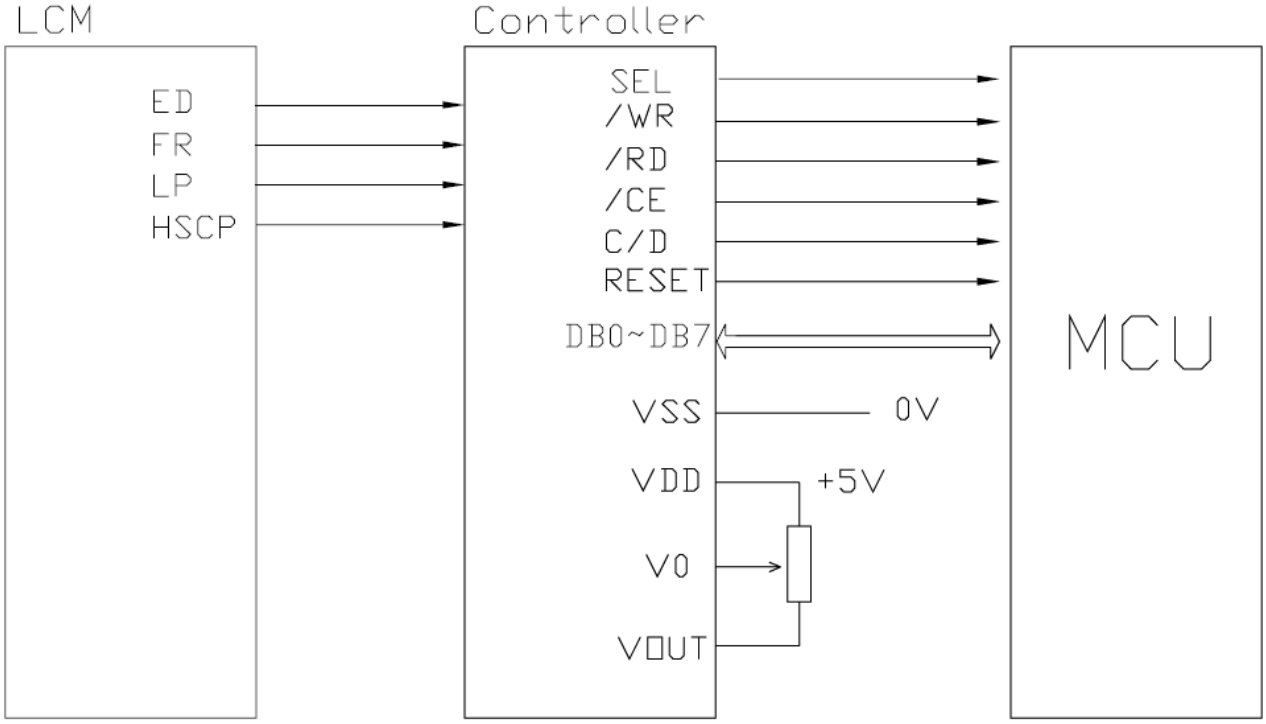


## 8. APPLICATION CIRCUIT

8-1 Built-in T6963 Application




8-2 KS0086(NO Controller) Application



## 9. ABSOLUTE MAXIMUM RATINGS :

| CHARACTERISTICS | SYMBOL | CONDITION | STANDARD VAULE | | | UNIT |
|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | |
| Power Supply For Logic | $V_{DD}$ | Ta=25℃ | -0.3 | - | 7.0 | V |
| Input Voltage | $V_{IN}$ | Ta=25℃ | -0.3 | - | VDD+0.3 | V |
| Module Operating Temperature | $T_{OPR}$ | --- | -20 | - | +70 | ℃ |
| Module Storage Temperature | $T_{STG}$ | --- | -30 | - | +80 | ℃ |
| Storage Humidity | $H_D$ | Ta<40℃ | - | | 90 | %RH |

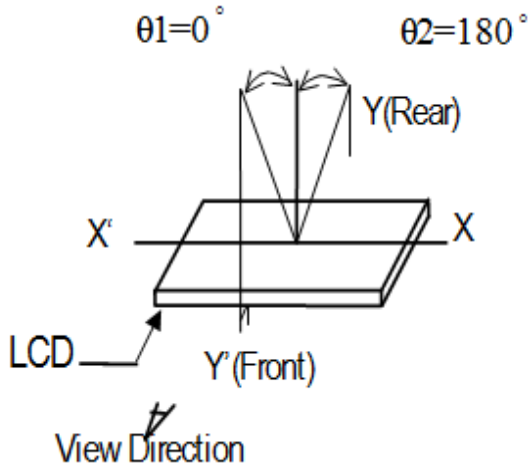
## 10. ELECTRICAL CHARACTERISTICS :

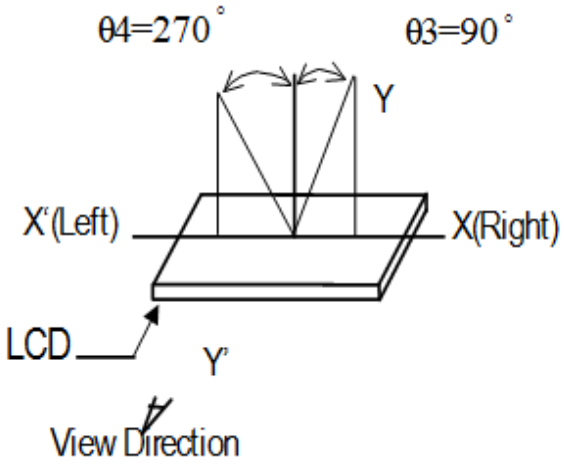
| CHARACTERISTIC | SYMBOL | CONDITION | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Supply Voltage (Logic) | VDD-VSS | - | 4.5 | 5.0 | 5.5 | V |
| Supply Voltage (LCD) | VDD-V0 | Ta=+25℃ | - | -18.5 | - | V |
| Input Signal Voltage | V-IH | “H” Level | VDD-2.2 | - | VDD | V |
| | V-IL | “L” Level | 0 | - | 0.8 | V |
| Output Signal Voltage | V-OH | “H” Level | VDD-0.3 | - | VDD | V |
| | V-OL | “L” Level | 0 | - | 0.3 | V |
| Supply Current (Logic) | IDD | VDD=5.0V | - | - | - | uA |
| Backlight Voltage | V-BL | LED(White) | - | 3.1 | - | V |
| Backlight Current | I-BL | LED(White) | 70 | 130 | 150 | mA |

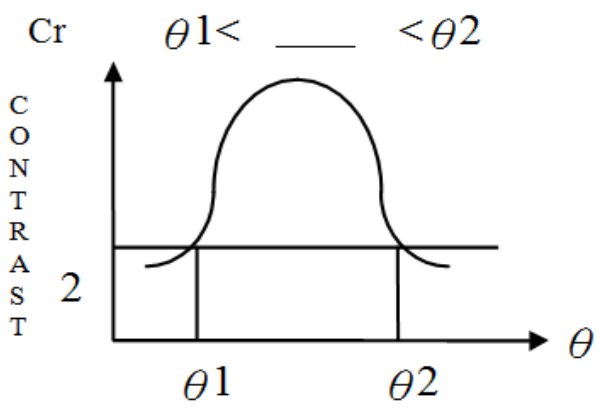
## 11. OPTICAL CHARACTERISTICS :

| ITEM | SYMBOL | CONDITIONS | STANDARD VALUE | | | UNIT |
|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | |
| Response Time | Tr | - | - | 498 | - | ms |
| | Tf | - | - | 123 | - | ms |
| Contrast Ratio | Cr | - | - | 11.6 | - | |
| Viewing Angle | Θ=90 | Cr≥2 | 26 | - | - | deg |
| | Θ=270 | | 26 | - | - | deg |
| | Θ=0 | | 29 | - | - | deg |
| | Θ=180 | | 57 | - | - | deg |

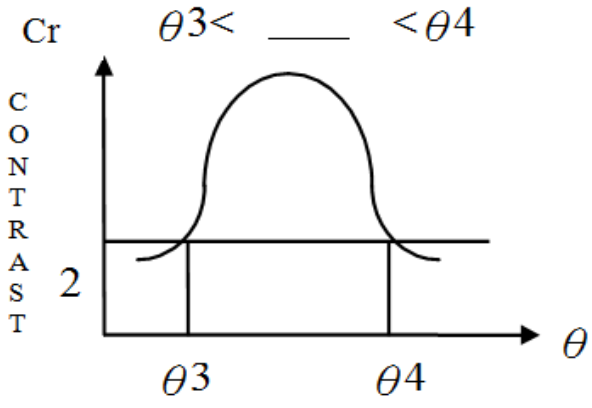
## 11-1 DEFINITION OF VIEWING ANGLE



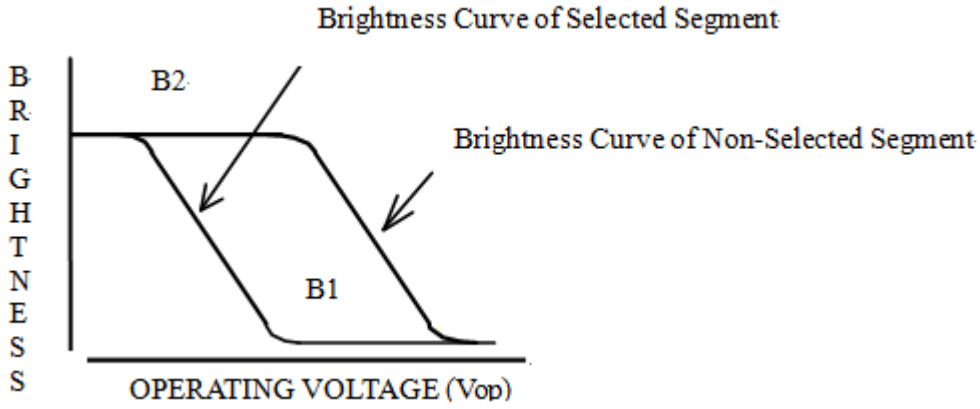

Front-Rear Viewing Angle



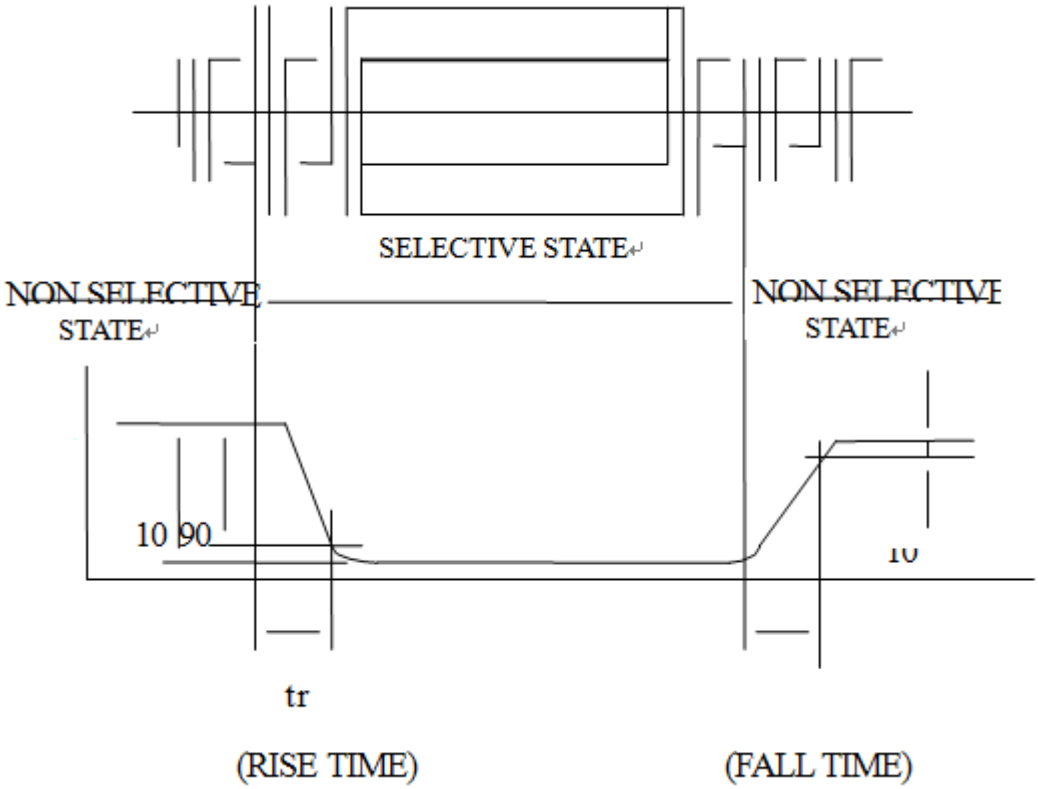

Right-Left Viewing Angle

## 11-2 DEFINITION OF CONTRAST RATIO

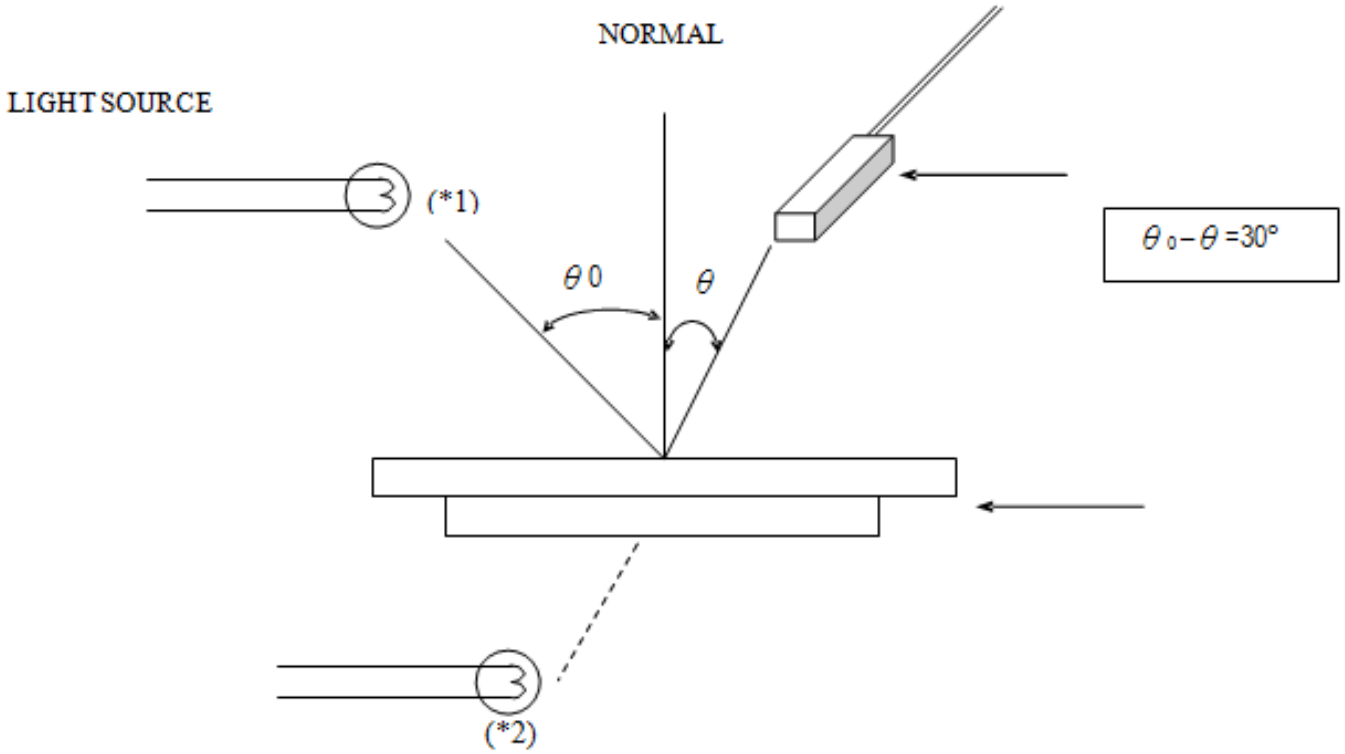
$$CR = \frac{\text{Brightness of Non-selected Segment (B2)}}{\text{Brightness of Selected Segment (B1)}}$$




## 11-3 DEFINITION OF RESPONSE TIME



## 11-4 DEFINITION OF RESPONSE TIME



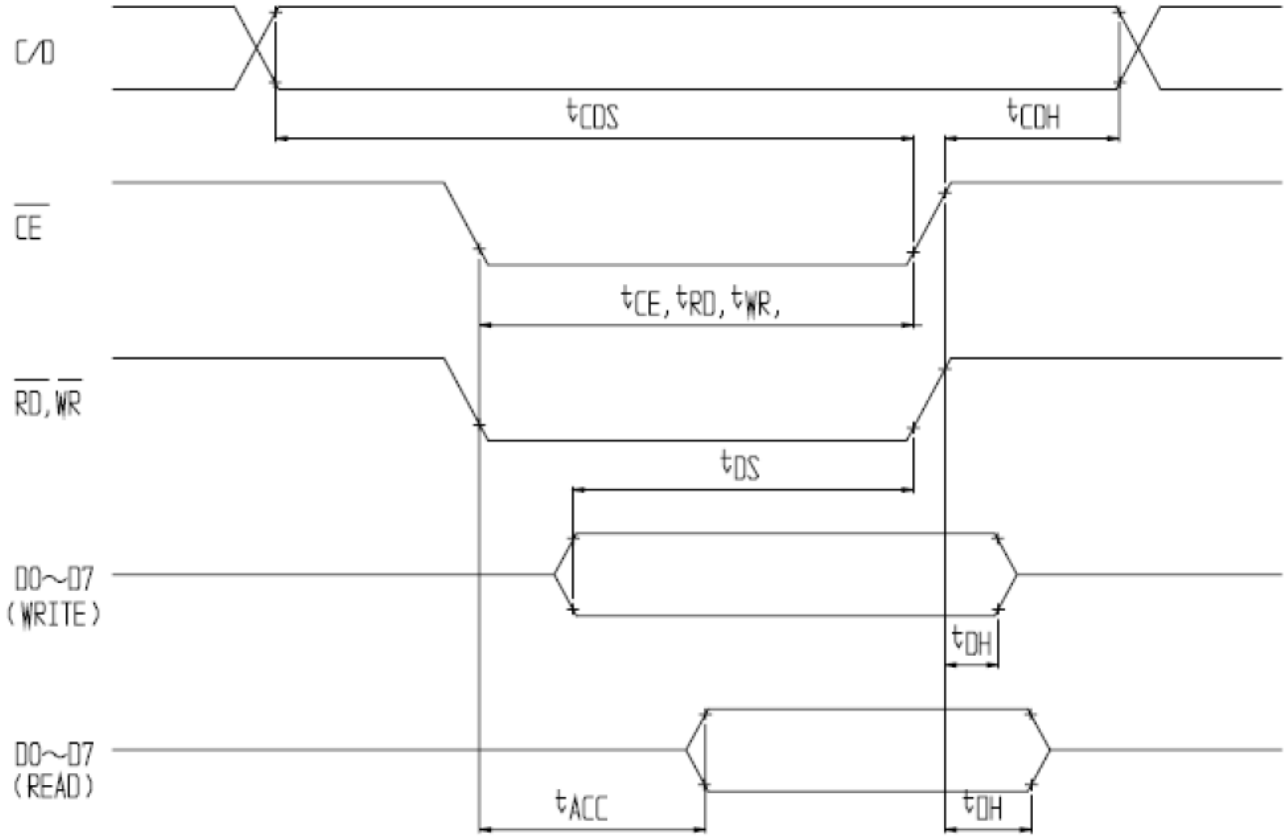

*1. Light source position for measuring the reflective type of LCD panel.

*2. Light source position for measuring the transflective / transmissive types of LCD panel.

## 12. TIMING CHARACTERISTICS :

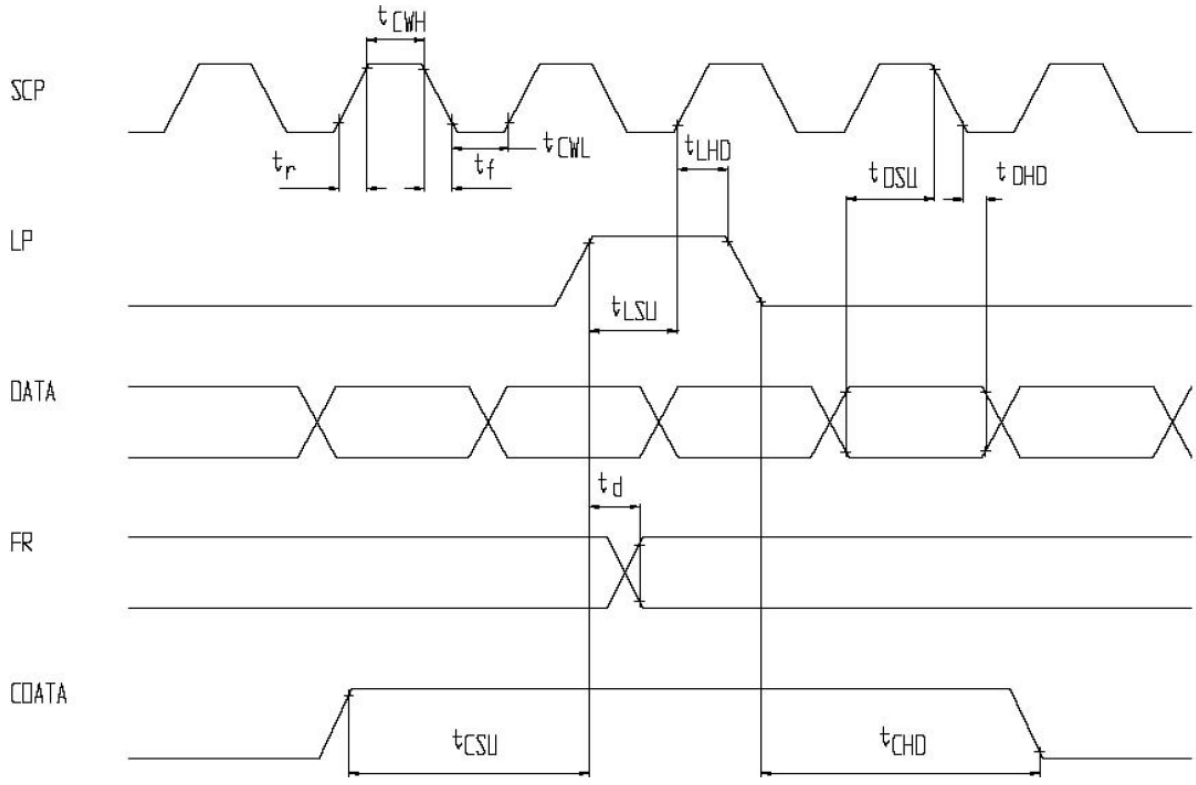
12-1 T6936 Timing

| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| C/D Set Up Time | $t_{CDS}$ | 100 | --- | ns |
| C/D Hold Time | $t_{CDH}$ | 10 | --- | ns |
| CE, RD, WR Pulse Width | $t_{CE}, t_{RD}, t_{WR}$ | 80 | --- | ns |
| Data Set Up Time | $t_{DS}$ | 80 | --- | ns |
| Data Hold Time | $t_{DH}$ | 40 | --- | ns |
| Access Time | $t_{ACC}$ | --- | 150 | ns |
| Output Hold Time | $t_{OH}$ | 10 | 50 | ns |



## 12-2 KS0086 Timing

| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Operating Frequency | $f_{SCP}$ | - | 2.75 | MHz |
| SCP Pulse Width | $t_{CWH}$, $t_{CWL}$ | 45 | - | ns |
| SCP Rise/Fall Time | tr, tf | - | 30 | ns |
| LP Set Up Time | $t_{LSU}$ | 80 | - | ns |
| LP Hold Time | $t_{LHD}$ | 80 | | ns |
| Data Set Up Time | $t_{DSU}$ | 30 | | ns |
| Data Hold Time | $t_{DHD}$ | 30 | | ns |
| FR Delay Time | td | 0 | 1.0 | ns |
| CDATA Set Up Time | $t_{CSU}$ | 30 | - | μs |
| CDATA Hold Time | $t_{CHD}$ | 30 | - | ns |



## 13. PIN ASSIGNMENT :

| PIN NO. | SYMBOL | I/O | FUNCTION DESCRIPTION |
|---|---|---|---|
| 1 | FG | | Frame Ground |
| 2 | VSS | I | Ground Pin, Connected to 0V |
| 3 | VDD | I | Power Supply Pin for Logic (+5V) |
| 4 | V0 | I | Contrast Control (VDD~VOUT) |
| 5 | /WR | I | Data Write :<br>Write Data into T6963 when /WR is L |
| 6 | /RD | I | Data Read :<br>Read Data from T6963 when /RD is L. |
| 7 | /CE | I | Chip Enable for T6963 :<br>/CE must be L when CPU communicates with T6963 |
| 8 | C/D | I | C/D = L : /WR=L Data Write, /RD=L Data Read<br>C/D = H : /WR=L Command Write, /RD=L Status Read |
| 9 | RESET | I | Reset Signal :<br>H : Normal (T6963 has internal pull-up resistor)<br>L : Initialize T6963. Text and graphic have address and text and graphic area setting are retained. |
| 10 | DB0 | I/O | Data I/O Pins for Display Memory |
| 11 | DB1 | I/O | Data I/O Pins for Display Memory |
| 12 | DB2 | I/O | Data I/O Pins for Display Memory |
| 13 | DB3 | I/O | Data I/O Pins for Display Memory |
| 14 | DB4 | I/O | Data I/O Pins for Display Memory |
| 15 | DB5 | I/O | Data I/O Pins for Display Memory |
| 16 | DB6 | I/O | Data I/O Pins for Display Memory |
| 17 | DB7 | I/O | Data I/O Pins for Display Memory |
| 18 | FS | I | Pin for Selection of Font :<br>FS=H : 7x8 dots<br>FS=L : 8x8 dots |
| 19 | LEDA | I | LED Anode (+5V) |
| 20 | LEDK | I | LED Cathode (0V) |

| | | | |
|---|---|---|---|
| 21 | VOUT | O | Power Output, LCD Power Supply |
| 22 | NC | | NC |
| 23 | ED | | Display Data Input |
| 24 | CDATA | | Frame Signal |
| 25 | FR | | AC Signal for LCD Driver Output<br>Alternate signal input pin for LCD Driving. Normal frame inversion signal is input into this pin. |
| 26 | LP | | Data Latch Clock<br>This signal is used for latching the shift register contents at the falling edge of this clock pulse. CL1 pulse “High” level initializes power-down function block. |
| 27 | HSCP | | Clock pulse input for the bi-directional shift register. The data is shifted to 20 x 4-bit segment data shift. The clock pulse, which was input when the enable bit (ELB/ERB) is in not active condition, is invalid. |
| 28 | NC | | NC |
| 29 | VDD | | Power Supply Pin for Logic (+5V) |
| 30 | VSS | | Ground Pin, Connected to 0V |
| 31 | V0 | | Contrast Control (VDD~VOUT) |
| 32 | VOUT | | Power Output, LCD Power Supply |
| 33 | LEDA | | LED Anode (+5V) |
| 34 | LEDK | | LED Cathode (0V) |

## 14. RELIABILITY :

| ITEM | CONTENT OF TEST | CONDITION | APPLICABLE STANDARD |
|---|---|---|---|
| High Temperature Storage | Endurance test applying the high storage temperature for a long time. | 80℃<br>200hrs | |
| Low Temperature Storage | Endurance test applying the low storage temperature for a long time | -30℃<br>200hrs | |
| High Temperature Operation | Endurance test applying the electric stress(voltage& current) and the thermal stress to the element for a long time | 70℃<br>200hrs | |
| Low Temperature Operation | Endurance test applying the electric stress under low temperature for a long time | -20℃<br>200hrs | |
| High Temperature Humidity Storage | Endurance test applying the high temperature and high humidity storage for a long time | 50℃, 90RH<br>96hrs | MIL-202E-103B<br>JIS-C5023 |
| High Temperature Humidity Operation | Endurance test applying the electric stress(voltage& current) and temperature humidity stress to the element for a long time | 50℃, 90RH<br>96hrs | MIL-202E-103B<br>JIS-C5023 |
| Temperature Cycle | Endurance test applying the low and high temperature cycle.<br>-20°C 30min. ⇌ 25°C 5min. ⇌ 70°C 30min.<br>1 cycle | -20℃~70℃<br>10cycles | |
| Vibration Test | Endurance test applying the vibration during transportation and using | 10-22 Hz->1.5mmp-p<br>22-500 Hz->1.5G<br>Total 0.5hrs | MIL-202E-201A<br>JIS-C5025<br>JIS-C7022-A-10 |
| Shock Test | Constructional and mechanical endurance test applying the shock during transportation | 50G half sign wave 11 msedc 3times of each direction | MIL-202E-213B |
| Atmospheric Pressure Test | Endurance test applying the atmospheric pressure during transportation by air | 115mbar 40hrs | MIL-202E-105C |
| Static Electricity Test | Endurance test applying the electric stress to the terminal | VS=800V, RS=1.5k<br>CS=100Pf<br>1time | MIL-883B-3015.1 |

*NOTE : TEST CONDITION

Supply Voltage for Logic System = 3V

Supply Voltage for LCD System = Operating Voltage at 25℃.

## 15. PRECAUTION FOR USE :

The following precaution should be followed, since this module contains precise parts.

(1) Do not store module for an extended periods of time under the conditions of high temperature and high humidity.
(2) Avoid using or storing the module in areas that expose it to direct sunlight or ultraviolet rays.
(3) Use protective finger covers when handling the module to avoid scratching or staining the module.
(4) Care should be taken not to expose the module to static electricity, because the module contains C-MOS LSI's.
(5) The LSI is sensitive to light. The user's product should be designed so that LSI is not exposed to any light during operation.
(6) During installation, cover the display area with acrylic protection plates to protect the polarizer plate and LCD cells.
(7) Do not apply any excessive shocks to the module because the module contains sensitive LCD cells. Do not use a module, which has experienced strong mechanical shock.
(8) Care should be taken when the power supply turns on as following.
   (a) Do not apply any input signals before the supplying voltage is applied.
   (b) Do not turn off the power supply while any input signals are applied.

| CAUTION |
| --- |
| (1) Dangerous. Do not shock glass because glass can break.<br>(2) If module breaks, do not touch it directly.<br>(Glass could stick or cut skin)<br>(3) Do not swallow Liquid Crystal.<br>(In case of broken LCD panel, do not swallow liquid crystal even if there is no proof that liquid crystal is poisonous)<br>(4) If liquid crystal is exposed to skin, wash the area thoroughly with alcohol or soap.<br>(5) When disposing of the product, please observe industrial waste disposal laws in each country and district.<br>(6) In case of injury, give immediate treatment and consult with a doctor.<br>(7) This product is constructed precisely. Don't disassemble or modify.<br><br>※ Neglecting this mark can cause injury to humans and damage to materials. |