# 1. MECHANICAL DATA

| | |
|---|---|
| (1) Product No. | AGM2432B-FE-FBH-T |
| (2) Module Size | 75.1 (W)mm X 93.8 (H)mm X 7.5 (D)mm |
| (3) Dot Size | 0.225 (W)mm X 0.225 (H)mm |
| (4) Dot Pitch | 0.24 (W)mm X 0.24 (H)mm |
| (5) Number of Dots | 240 (W) X 320 (H) Dots |
| (6) Duty | 1/240 |
| (7) LCD Display Mode | FSTN: Black and White(Positive Image)<br>Rear Polarizer: Transflective |
| (8) Viewing Direction | 6 O'clock |
| (9) Backlight | EL B/L (Blue-Green) |
| (10) Weight | 60g(Included EL B/L and TOUCH PANEL) |
| (11) Controller | Excluded |
| (12) DC/DC Converter | Excluded |
| (13) EL B/L inverter Ckt | Included |
| (14) Touch Panel | Included |

Revised: June 6, 2000

# 2. ABSOLUTE MAXIMUM RATINGS

## (1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

| ITEM | SYMBOL | MIN | MAX | UNIT | COMMENT |
|---|---|---|---|---|---|
| Power Supply for Logic | VDD−VSS | −0.3 | 7.0 | V | |
| Power Supply for LC Drive | VEE−VSS | −0.3 | 30.0 | V | |
| Input Voltage | VI | −0.3 | VDD | V | |
| Static Electricity | − | − | − | − | Note 1 |

## (2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

| ITEM | OPERATING | | STORAGE | |
|---|---|---|---|---|
| | MIN. | MAX. | MIN. | MAX. |
| Ambient Temperature | −20 | 70 | −30 | 80 |
| Humidity(Without Condensation | Note 2,4 | | Note 3,4 | |

Note 1 LCM should be grounded during handling.

Note 2 Ta ≦ 70°C : 75%RH max
Ta > 70°C : Absolute humidity must be lower than the humidity of 75%RH at 70°C

Note 3 Ta at −30°C will be < 48hrs, at 80°C will be < 120hrs

Note 4 Background color will change slightly depending on ambient temperature. The phenomenon is reversible.

# 3. ELECTRICAL CHARACTERISTICS

( VDD= 3.3V ± 10% )

| ITEM | | SYMBOL | CONDITION | | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|---|
| Input Voltage | | VIH | H level | | 0.8VDD | – | VDD | V |
| | | VIO | L level | | 0 | – | 0.2VDD | V |
| Recommended LC Driving Voltage | | VEE−VSS (Vop) | 1/240 Duty 1/13 Bias | −20°C | 24.2 | 24.6 | 25.0 | V |
| | | | | 0°C | 22.9 | 23.0 | 23.4 | |
| | | | | 25°C | 22.3 | 22.7 | 23.1 | |
| | | | | 50°C | 21.1 | 21.5 | 21.9 | |
| | | | | 70°C | 20.3 | 20.7 | 21.1 | |
| Power Supply Current | | IDD | VDD= 3.3V VSS= 0V VEE−VSS=22.7V FLM=70Hz PATTERN : ☐■☐■☐■ ■☐■☐■☐ | | – | 0.2 | 0.5 | mA |
| | | IEE | | | – | 4.5 | 7.0 | |
| EL Power Supply Current | | IEL | VEL= 3.3V VELG= 0V BLE=3.3V | | – | 30 | 40 | mA |
| LCM | Surface Luminance | L | PATTERN: (Dots All On) ■■■■ ■■■■ | | – | 2.0 | – | cd/m² |
| | | | PATTERN: (Dots All Off) ☐☐☐☐ ☐☐☐☐ | | – | 9.29 | – | |

# 4. OPTICAL CHARACTERISTICS

AT $V_{OP}$

| ITEM / MODE | | Cr(Contrast Ratio) | | | | | | θ(Viewing Angle) | | φ(Viewing Angle) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0°C | | 25°C | | 50°C | | 25°C | | 25°C | |
| | | MIN. | TYP. | MIN. | TYP. | MIN. | TYP. | MIN. | TYP. | MIN. | TYP. |
| H | L | – | 9.0 | – | 10.0 | – | 7.0 | – | 84 | – | 79 |
| NOTE | | NOTE 6 | | | | | | NOTE 5 | | | |

NOTE :

H: TRANSFLECTIVE(HIGH TRANSPARENCY)

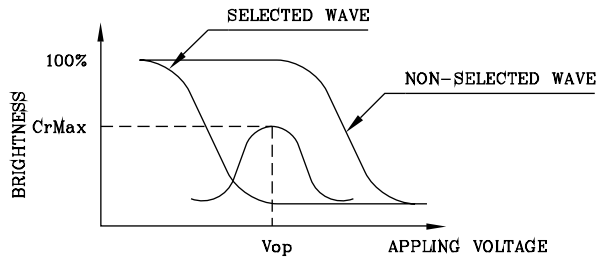
L: NORMALLY WHITE(PAPER WHITE)

AT $\phi=0°$ $\theta=0°$

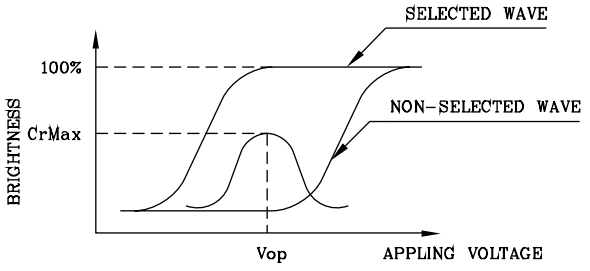
| ITEM | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT | NOTE |
|---|---|---|---|---|---|---|---|
| Response Time (rise) | Tr | −20°C | – | 3000 | 4500 | ms | NOTE 2 |
| | | 0°C | – | 1100 | 1650 | | |
| | | 25°C | – | 300 | 450 | | |
| | | 50°C | – | 150 | 225 | | |
| | | 70°C | – | 100 | 150 | | |
| Response Time (fall) | Tf | −20°C | – | 2800 | 4200 | ms | NOTE 2 |
| | | 0°C | – | 500 | 800 | | |
| | | 25°C | – | 200 | 300 | | |
| | | 50°C | – | 100 | 150 | | |
| | | 70°C | – | 80 | 120 | | |

(NOTE 1)

Definition of Operation Voltage(Vop)




(positive type)



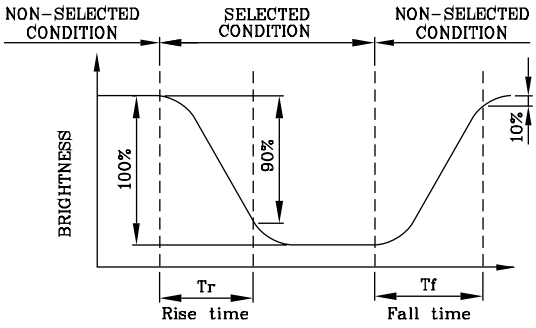

(negative type)

*Conditions

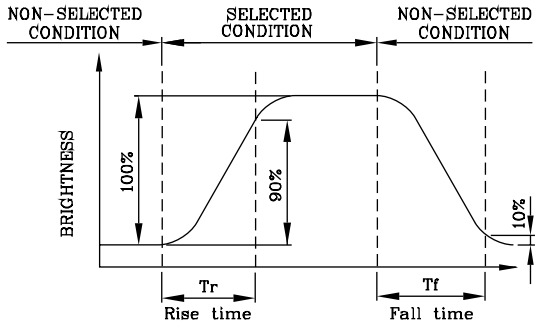
Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : I/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)




(positive type)



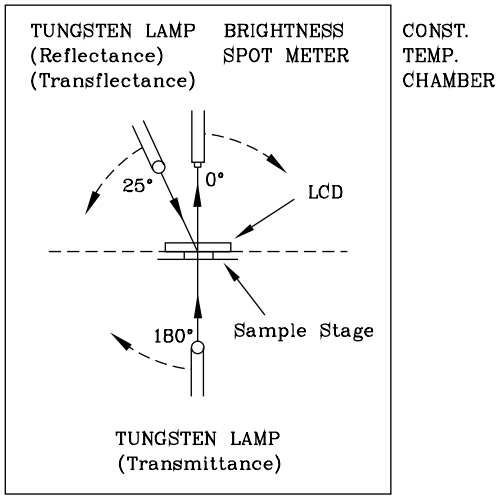

(negative type)

*Conditions

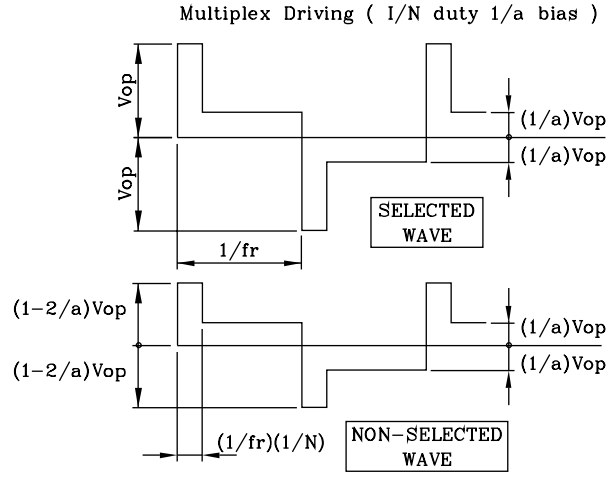
Operating Voltage : Vop
Viewing Angle ( $\theta$,$\phi$) : (0,0)
Frame Frequency : 70Hz
Appling Waveform : I/N duty 1/a bias

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms

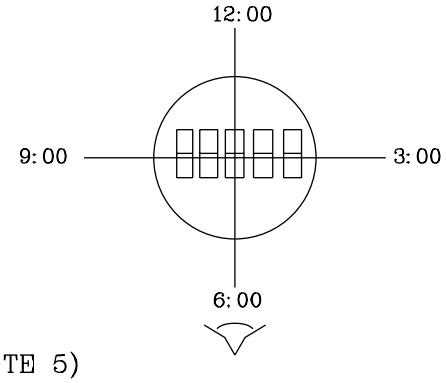



Multiplex Driving ( I/N duty 1/a bias )



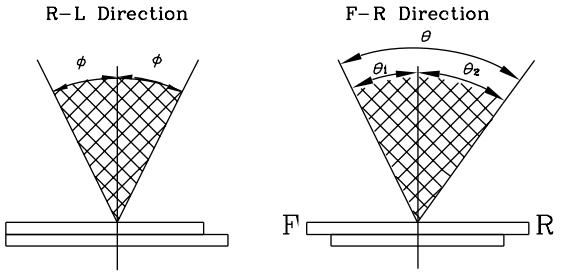
(NOTE 4)

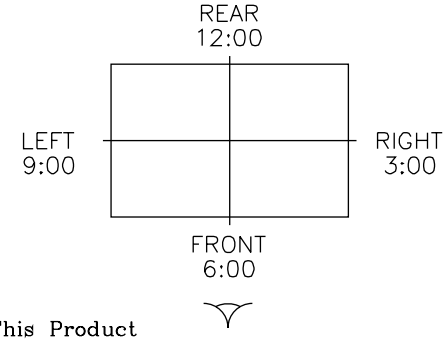
Definition of Viewing Direction




(NOTE 5)

Definition of Viewing Angle




*For This Product

The Viewing Direction Is 6 O'clock

So $\theta 1 > \theta 2$

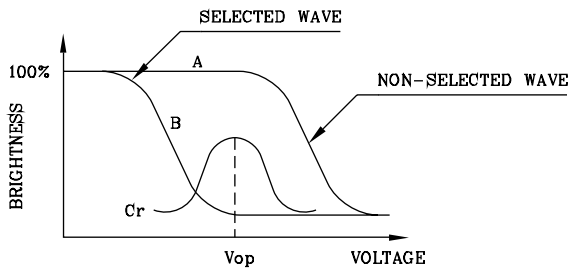
$$\theta = \theta_1 + \theta_2$$

*Conditions

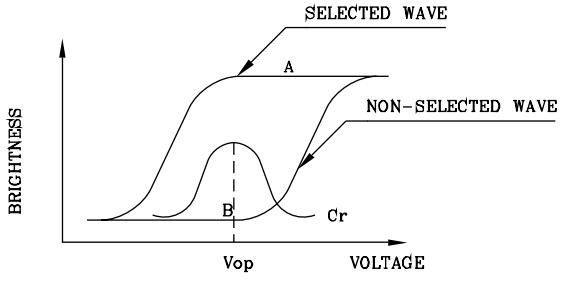
Operating Voltage : Vop
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)




(positive type)



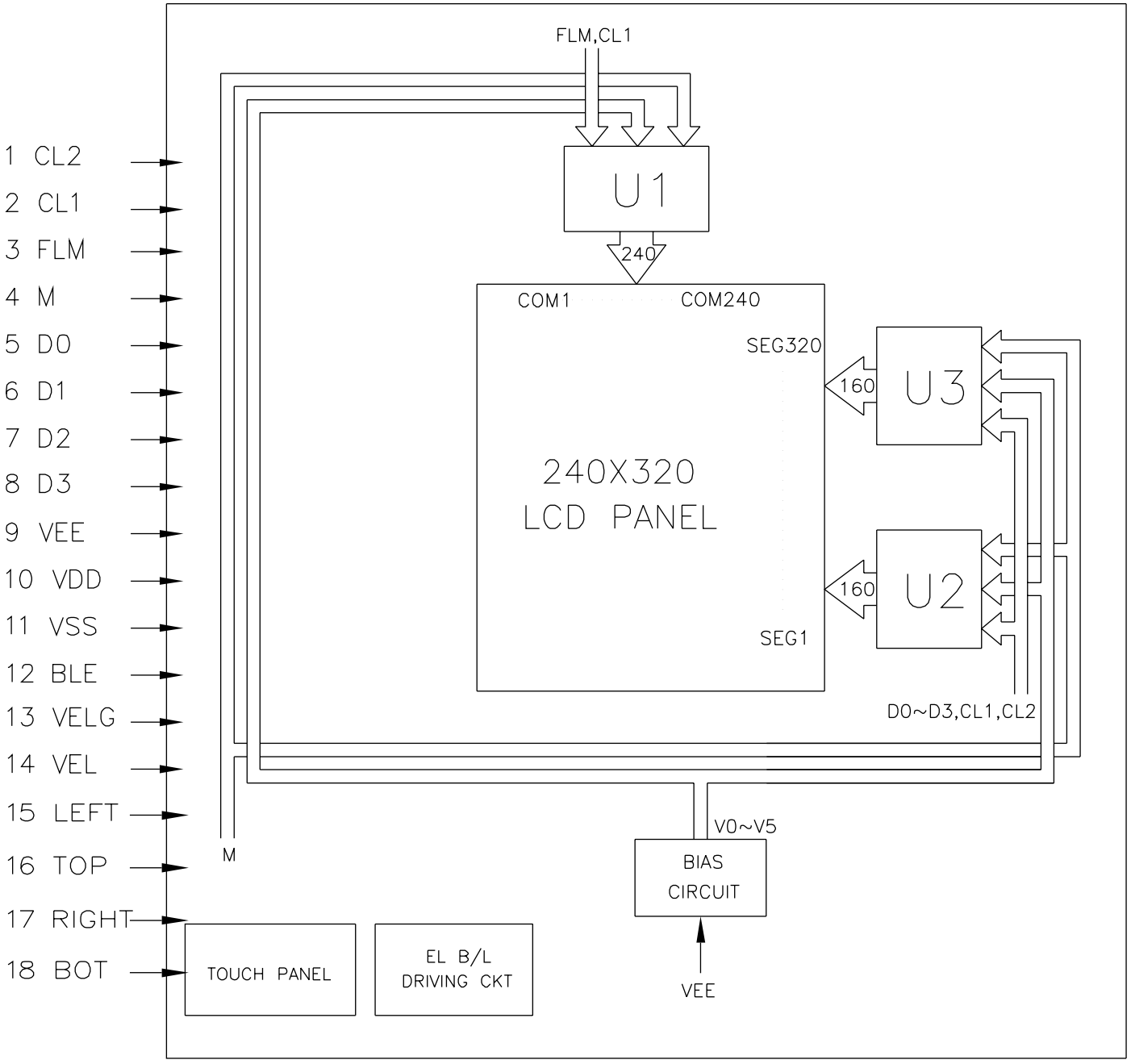

(negative type)

Contrast Ratio : Cr=A/B

*Conditions

Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias

# 5. BLOCK DIAGRAM



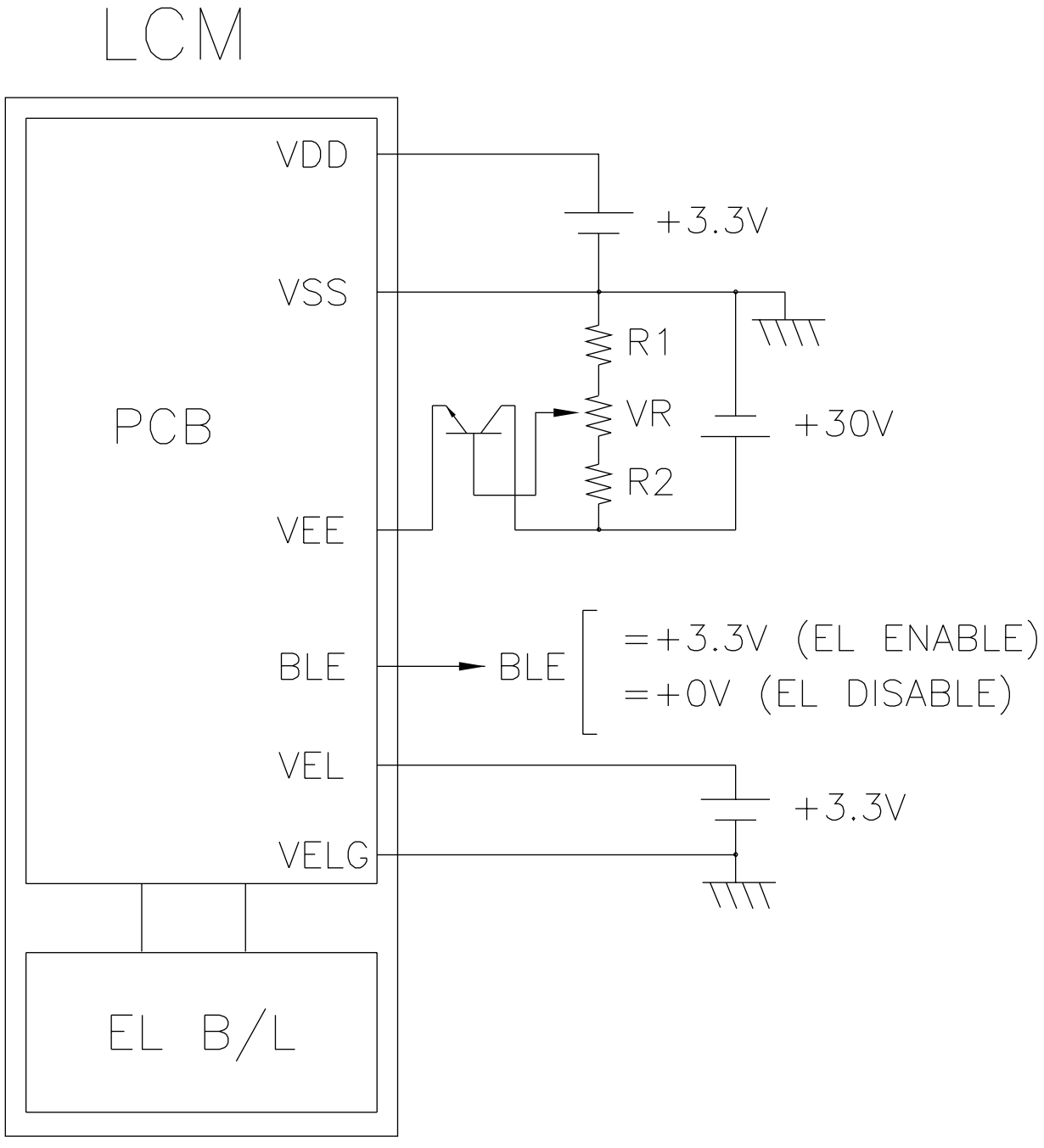
# 6.INTERNAL PIN CONNECTION

CN1

| PinNo. | Symbol | Level | Function |
|---|---|---|---|
| 1 | CL2 | H/L | Data Shift Clock Signal |
| 2 | CL1 | H/L | Data Latch Clock Signal |
| 3 | FLM | H/L | Frame Signal |
| 4 | M | H/L | Alternate Signal |
| 5 | D0 | H/L | Display Data |
| 6 | D1 | H/L | |
| 7 | D2 | H/L | |
| 8 | D3 | H/L | |
| 9 | VEE | – | Power Supply for LCD (+V) |
| 10 | VDD | – | Power Supply for Logic |
| 11 | VSS | – | Power Supply (0V) |
| 12 | BLE | H/L | H: EL Enable ; L: EL Disable |
| 13 | VELG | – | Power Supply for EL (GND,0V) |
| 14 | VEL | – | Power Supply for EL (+) |
| 15 | LEFT | – | Touch Panel Connection |
| 16 | TOP | – | |
| 17 | RIGHT | – | |
| 18 | BOT | – | |

CABLE(CN1) :
FFC,N18,PITCH=1.0mm,THICKNESS=0.3mm
MATING CONNECTOR :
MOLEX 52207-1890 or COMPATIABLE

# 7. POWER SUPPLY




R1+VR+R2=10~20KΩ

# 8. TIMING CHARACTERISTICS

## 8-1 INTERFACE TIMING

@ VDD=3.3V±10%, Ta=-20~70℃

| Item | Symbol | Test condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| CL2 Cycle Time | tC | Fig.a | 125 | – | – | ns |
| CL2 Pulse Width | tSWH,tSWL | Fig.a | 51 | – | – | ns |
| CL2 Rise/Fall Time | tr,tf | Fig.a | – | – | 50 | ns |
| CL1 Pulse Width | tCWH,tCWL | Fig.a , Fig.b | 30 | – | – | ns |
| CL1 Rise/Fall Time | tLRP,tLFP | Fig.b | – | – | 50 | ns |
| CL2 To CL1 Delay Time | tSL | Fig.a | 50 | – | – | ns |
| CL1 To CL2 Delay Time | tLS | Fig.a | 100 | – | – | ns |
| Data Set Up Time | tDSU | Fig.a , Fig.b | 30 | – | – | ns |
| Data Hold Time | tDHD | Fig.a , Fig.b | 50 | – | – | ns |

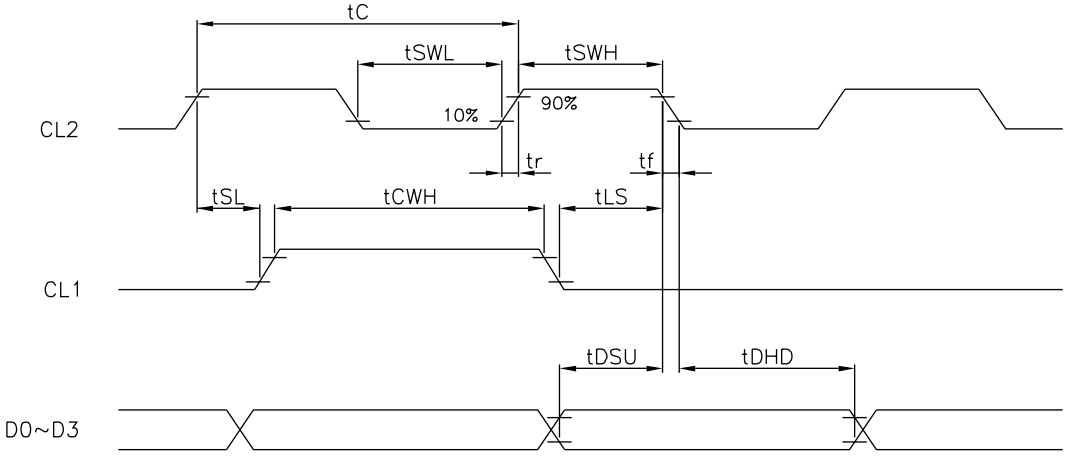



Fig . a Interface timing (SEGMENT)

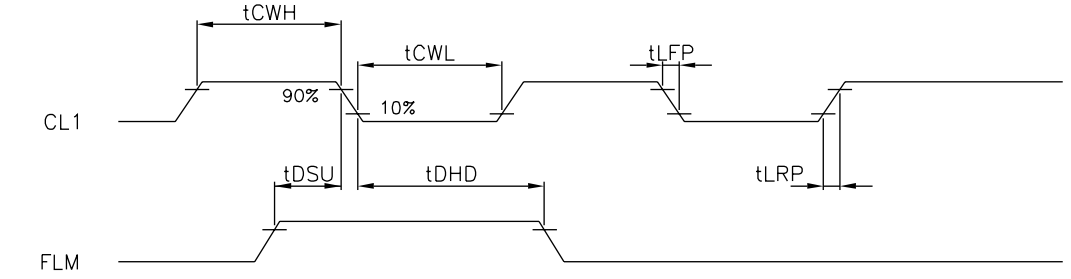
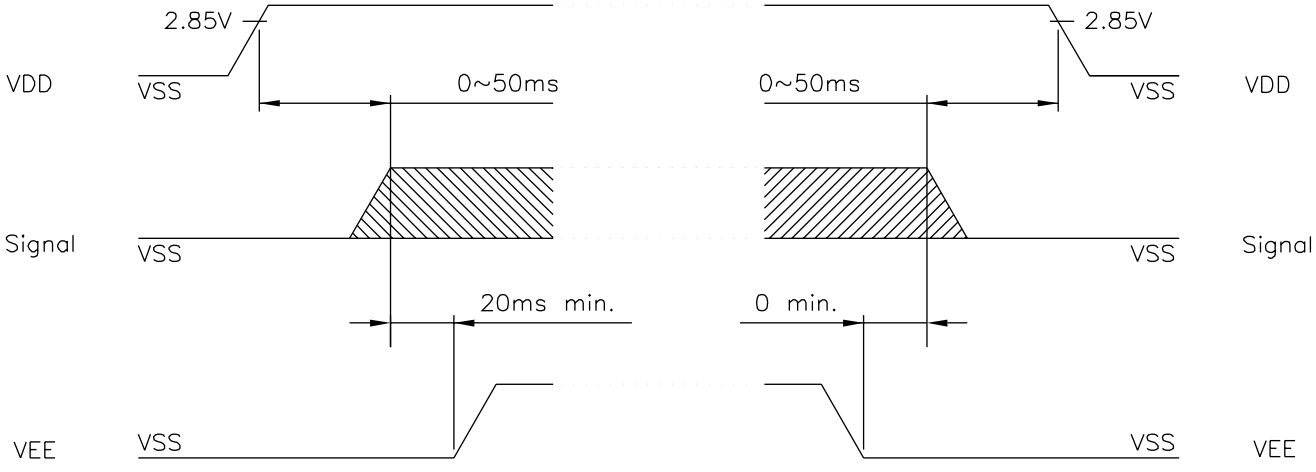



Fig . b Interface timing (COMMON)

## 8-2 POWER ON/OFF TIMING

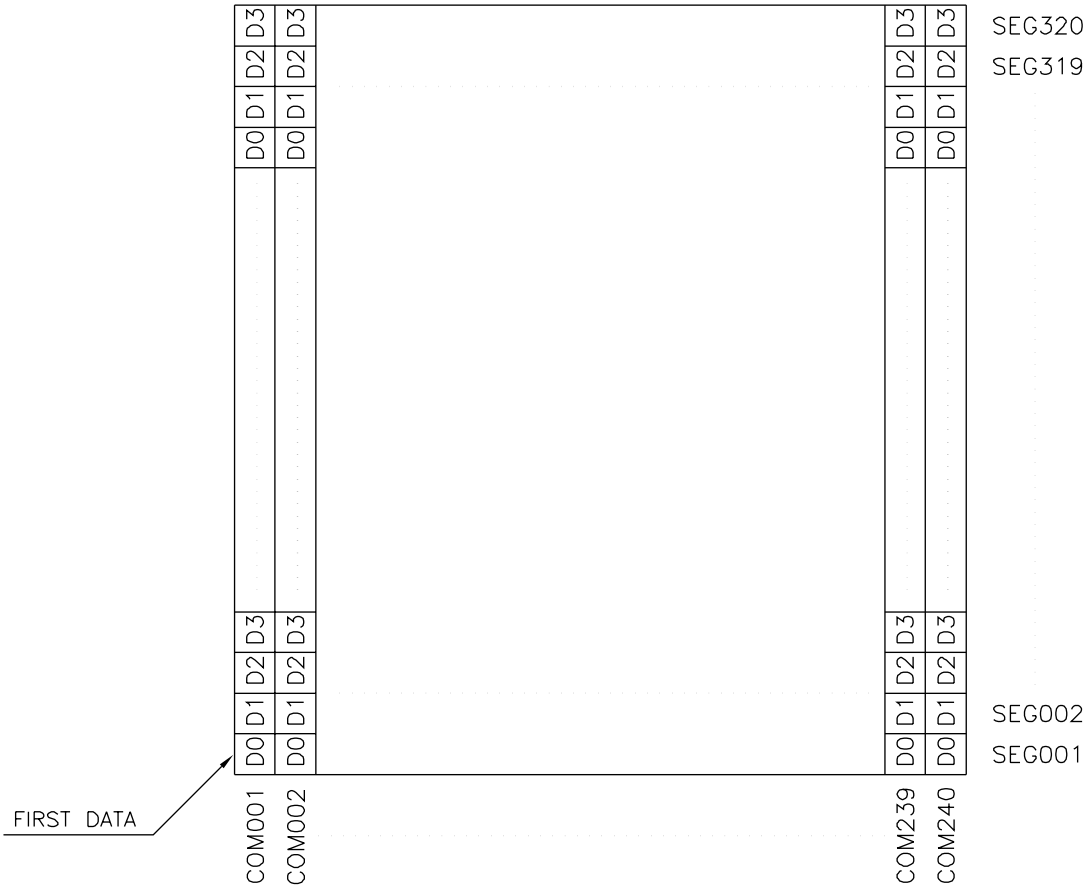



POWER ON

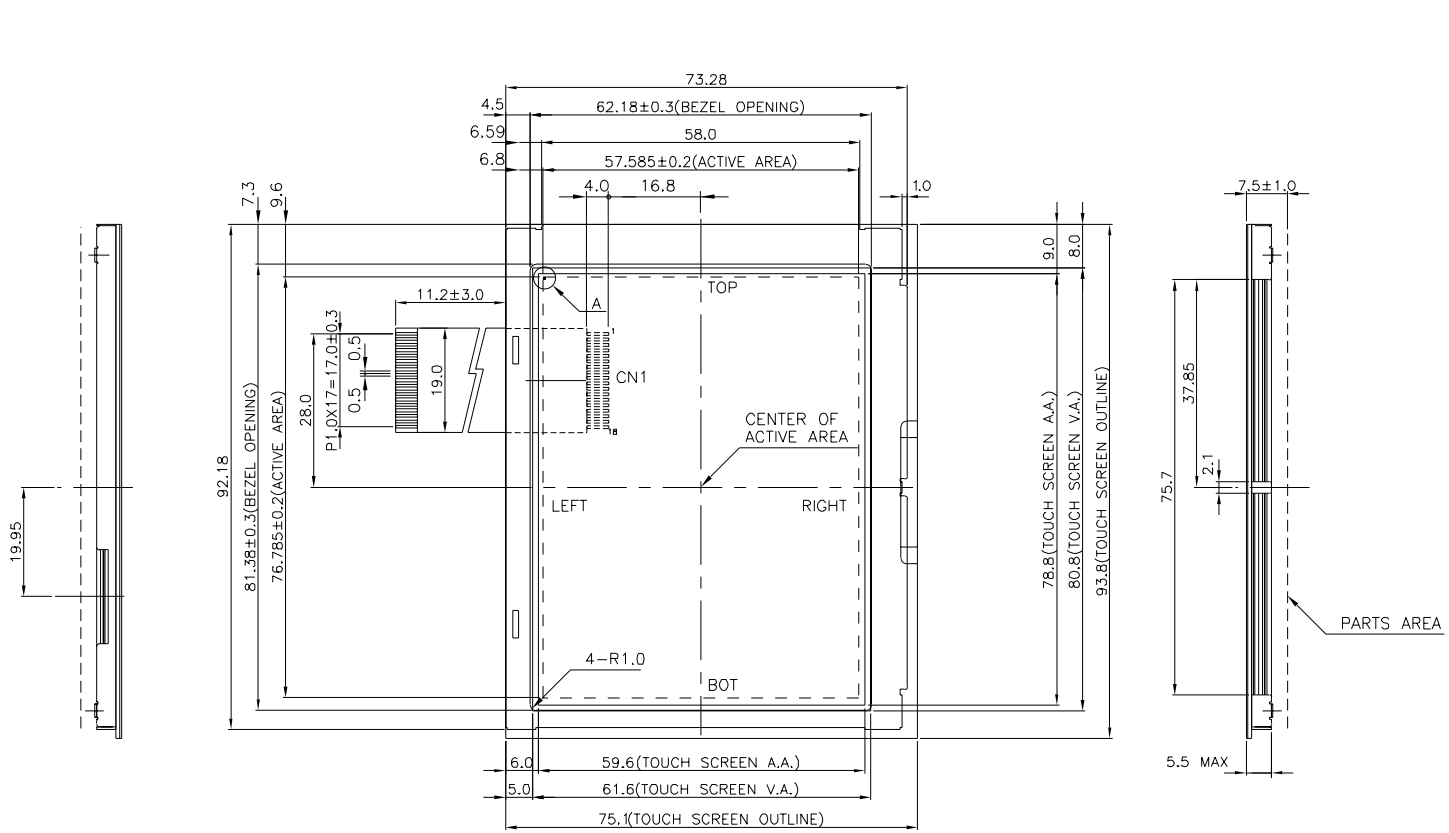
POWER OFF

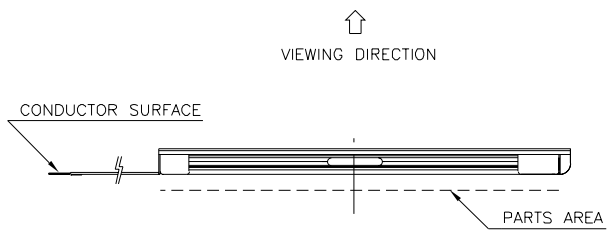
Missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

# 8-3 DISPLAY PATTERN




240 X 320 Dots Matrix




INTERFACE CONNECTION(CN1)

| Pin No. | Symbol | Function |
|---|---|---|
| 1 | CL2 | Data Shift Clock Signal |
| 2 | CL1 | Data Latch Signal |
| 3 | FLM | First Line Marker |
| 4 | M | Alternate Signal |
| 5 | D0 | Display Data |
| 6 | D1 | |
| 7 | D2 | |
| 8 | D3 | |
| 9 | VEE | Power Supply for LCD(+V) |
| 10 | VDD | Power Supply for Logic(+) |
| 11 | VSS | Power Supply for Logic(GND,0V) |
| 12 | BLE | H:EL Enable, L:EL Disable |
| 13 | VELG | Power Supply for EL(GND,0V) |
| 14 | VEL | Power Supply for EL(+) |
| 15 | LEFT | Touch Panel Connection |
| 16 | TOP | |
| 17 | RIGHT | |
| 18 | BOT | |

NOTE :

1. RESOLUTION : 240 X 320 DOTS
2. BACKLIGHT : EL Backlight, Blue-Green
3. TOLERANCE NO SPECIFIED : ±0.5 mm

| | LTD79H202L5GK | | AZ DISPLAYS, INC. | | |
|---|---|---|---|---|---|
| | NAME | DATE | | | |
| APPROVE | | | TITLE | AGM2432B-FE-FBH-T | |
| CHECK | | | DWG-NO | TDBH202L5GK | Rev.A |
| DESIGN | | | THIRD ANGLE PROJECT | UNIT : mm | |
| DRAW | MAY PING | 87.12.03 | | SCALE : 2/3 | |