



LCD MODULE SPECIFICATION

MODEL NO.

BG320240A series

FOR MESSRS:

ON DATE OF:

APPROVED BY:



C O N T E N T S

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1. Numbering System

| <u>B</u> | <u>C</u> | <u>2004</u> | <u>A</u> | <u>G</u> | <u>P</u> | <u>L</u> | <u>E</u> | <u>B</u> | <u>xxx</u> |
|----------|----------|-------------|----------|----------|----------|----------|----------|----------|------------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

| | | | |
|----------|--|--|---|
| 0 | Brand | Bolymin | |
| 1 | Module Type | C= character type G= graphic type P= TAB/TCP type | O= COG type F= COF type |
| 2 | Format | 2002=20 characters, 4 lines 12232= 122 x 32 dots | |
| 3 | Version No. | A type | |
| 4 | LCD Color | G=STN/gray Y=STN/yellow-green C=color STN | B=STN/blue F=FSTN T=TN |
| 5 | LCD Type | R=positive/reflective P=positive/transflective | M=positive/transmissive N=negative/transmissive |
| 6 | Backlight type/color | L=LED array/ yellow-green H=LED edge/white R=LED array/red G=LED edge/yellow-green | D=LED edge/blue E=EL/white B=EL/blue C=CCFL/white |
| 7 | CGRAM Font (applied only on character type) | J=English/Japanese Font E=English/European Font | C=English/Cyrillic Font H=English/Hebrew Font |
| 8 | View Angle/ Operating Temperature | B=Bottom/Normal Temperature H=Bottom/Wide Temperature U=Bottom/Ultra wide Temperature | T=Top/Normal Temperature W=Top/Wide Temperature C=9H/Normal Temperature |
| 9 | Special Code | 3=3 volt logic power supply n=negative voltage for LCD c=cable/connector xxx=to be assigned on data sheet | t=temperature compensation for LCD p=touch panel |



2. General Specification

(1) Mechanical Dimension

| Item | Standard Value | Unit |
|-------------------|--------------------------------|------|
| Number of dots | 320x240 | dots |
| Outline dimension | 166.8(W)x 109.0(H)x 11.0max(T) | mm |
| View area | 122.0(W)x 92.0(H) | mm |
| Active area | 115.18(W)x 86.38(H) | mm |
| Dot size | 0.34(W)x 0.34(H) | mm |
| Dot pitch | 0.36(W)x 0.36(H) | mm |

(2) Controller IC: No built-in Controller (Recommended controller: SED1335)

(3) Temperature Range

| | Normal | Wide |
|-----------|-------------|------------|
| Operating | 0 ~+50°C | -20 ~+70°C |
| Storage | -10 ~+ 60°C | -30 ~+80°C |

(4) Polarizer

FSTN / black / Negative, STN / blue / Negative : Anti-glare Polarizer

3. Absolute Maximum Ratings

| Item | Symbol | Min | Typ | Max | Unit |
|--------------------------|----------------------------------|-----|-----|-----------------|------|
| Operating Temperature | T _{OP} | -20 | — | +70 | °C |
| Storage Temperature | T _{ST} | -30 | — | +80 | °C |
| Input Voltage | V _I | 0 | — | V _{DD} | V |
| Supply Voltage For Logic | V _{DD} | 0 | — | 6.5 | V |
| Supply Voltage For LCD | V _{DD} -V _{EE} | 0 | — | 32 | V |



4. Electrical Characteristics

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|------------------------|-----------------|-----------|--------------|------|-------------|------|
| Logic Voltage | $V_{DD}-V_{SS}$ | — | 3.0 | 5.0 | 5.5 | V |
| Supply Voltage For LCD | $V_{DD}-V_O$ | Ta=-20°C | — | 24.5 | — | V |
| | | Ta=25°C | — | 23.5 | — | V |
| | | Ta=+70°C | — | 21.5 | — | V |
| Input High Volt. | V_{IH} | — | $0.8V_{DD}$ | — | V_{DD} | V |
| Input Low Volt. | V_{IL} | — | 0 | — | $0.2V_{DD}$ | V |
| Output High Volt. | V_{OH} | — | $V_{DD}-0.4$ | — | — | V |
| Output Low Volt. | V_{OL} | — | — | — | 0.4 | V |
| Supply Current | I_{DD} | — | — | 90 | — | mA |
| | I_{EE} | — | — | — | 2.0 | mA |

5. Optical Characteristics

a. STN

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-----------------------|---------------|-------------|------|------|------|------|
| View Angle | (V) θ | $CR \geq 2$ | 10 | | 45 | deg |
| | (H) φ | $CR \geq 2$ | -30 | | 30 | deg |
| Contrast Ratio | CR | — | | 3 | | — |
| Response Time 25°C | T rise | — | | 100 | 150 | ms |
| | T fall | — | | 150 | 200 | ms |

b. FSTN

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-----------------------|---------------|-------------|------|------|------|------|
| View Angle | (V) θ | $CR \geq 3$ | 10 | | 60 | deg |
| | (H) φ | $CR \geq 3$ | -45 | | 45 | deg |
| Contrast Ratio | CR | — | | 5 | | — |
| Response Time 25°C | T rise | — | | 100 | 150 | ms |
| | T fall | — | | 150 | 200 | ms |

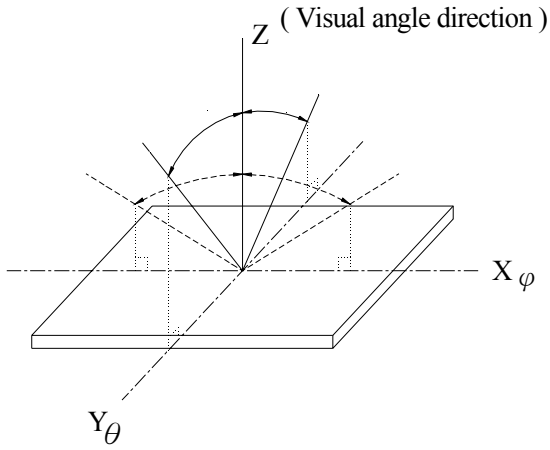
*Polarizer

FSTN / black / Negative, STN / blue / Negative : Anti-glare Polarizer

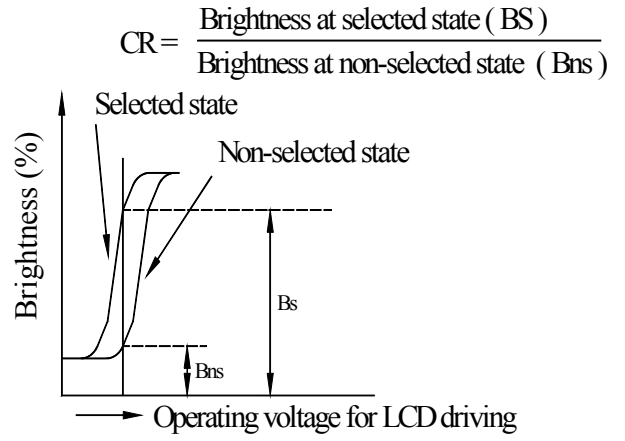


5.1 Definitions

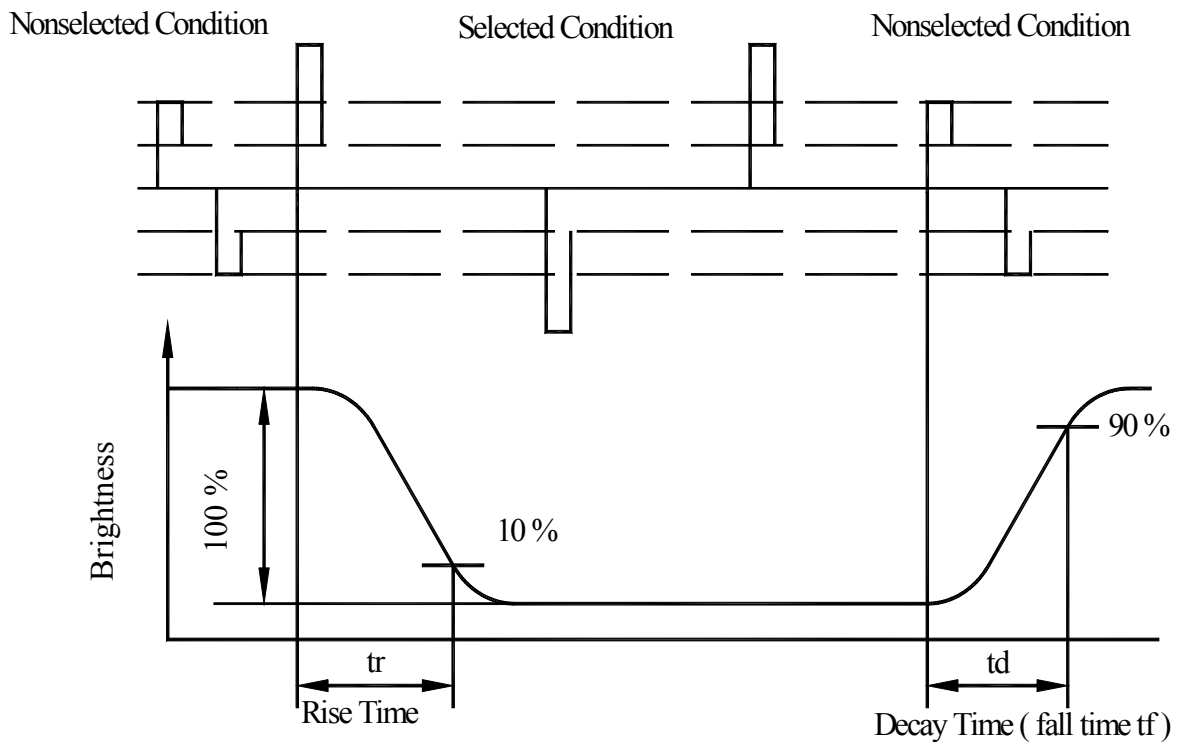
■ View Angles



■ Contrast Ratio



■ Response time



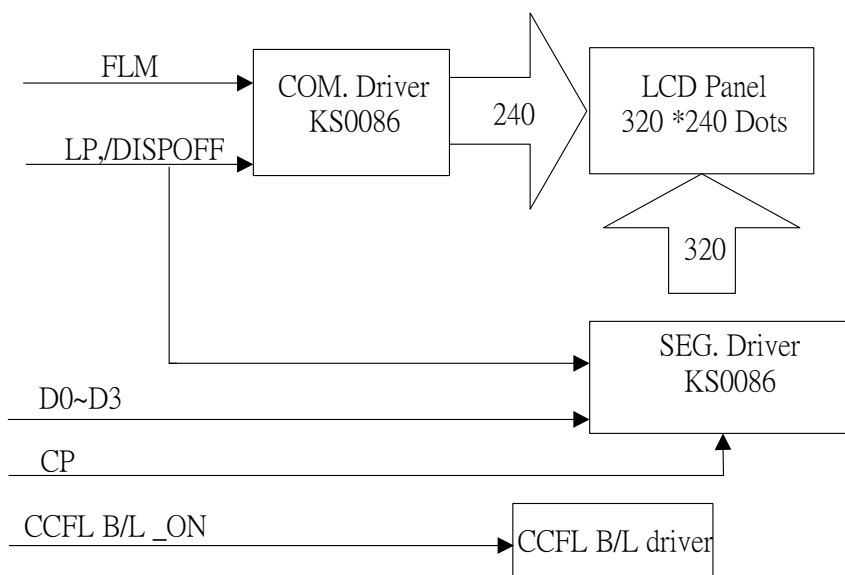


6. Interface Description

| Pin No. | Symbol | Level | Description |
|---------|----------------|------------|---|
| 1 | D0 | H/L | Display data, bit0 |
| 2 | D1 | H/L | Display data, bit1 |
| 3 | D2 | H/L | Display data, bit2 |
| 4 | D3 | H/L | Display data, bit3 |
| 5 | DISPOFF | H/L | H: Display ON, L: Display OFF |
| 6 | FLM | H/L | Scan start-up signal |
| 7 | N.C | | No Connection |
| 8 | LP | H to L | Data latch pulse |
| 9 | CP | H to L | Data shift pulse |
| 10 | VDD | 5.0V | Power supply for Logic (option +3V) |
| 11 | VSS | 0V | Ground |
| 12 | VEE | | Negative voltage output -21.0V (option) |
| 13 | V _O | (Variable) | Driving voltage for LCD |
| 14 | FGND | | Frame Ground |



7. Block Diagram



8. Timing Characteristics

| Item | symbol | Test Condition | Min. | Typ. | Max. | Units |
|--------------------|---------|----------------|------|------|------|-------|
| Clock Cycle | tC | Fig.1 | 100 | — | — | ns |
| CP Pulse Width | tWC | Fig.1 | 50 | — | — | ns |
| LP Pulse Width | tWL | Fig.1 | 50 | — | — | ns |
| Data Set Up Time | tDSU | Fig.1 | 30 | — | — | ns |
| Data Hold Time | tDHD | Fig.1 | 30 | — | — | ns |
| CP Rise/Fall Time | tr,tf | Fig.1 | — | — | 50 | ns |
| CP to LOAD | tCL | Fig.1 | 80 | — | — | ns |
| LOAD to CP | tLC | Fig.1 | 110 | — | — | ns |
| LP Pulse Width | tLW | Fig.1 | 50 | — | — | ns |
| CL1 Pulse Width | tCW | Fig.2 | 63 | — | — | ns |
| Data Set Up Time | tDSU2 | Fig.2 | 100 | — | — | ns |
| Data Hold Time | tDHD2 | Fig.2 | 100 | — | — | ns |
| CL1 Rise/Fall Time | tr2,tf2 | Fig.2 | — | — | 50 | ns |

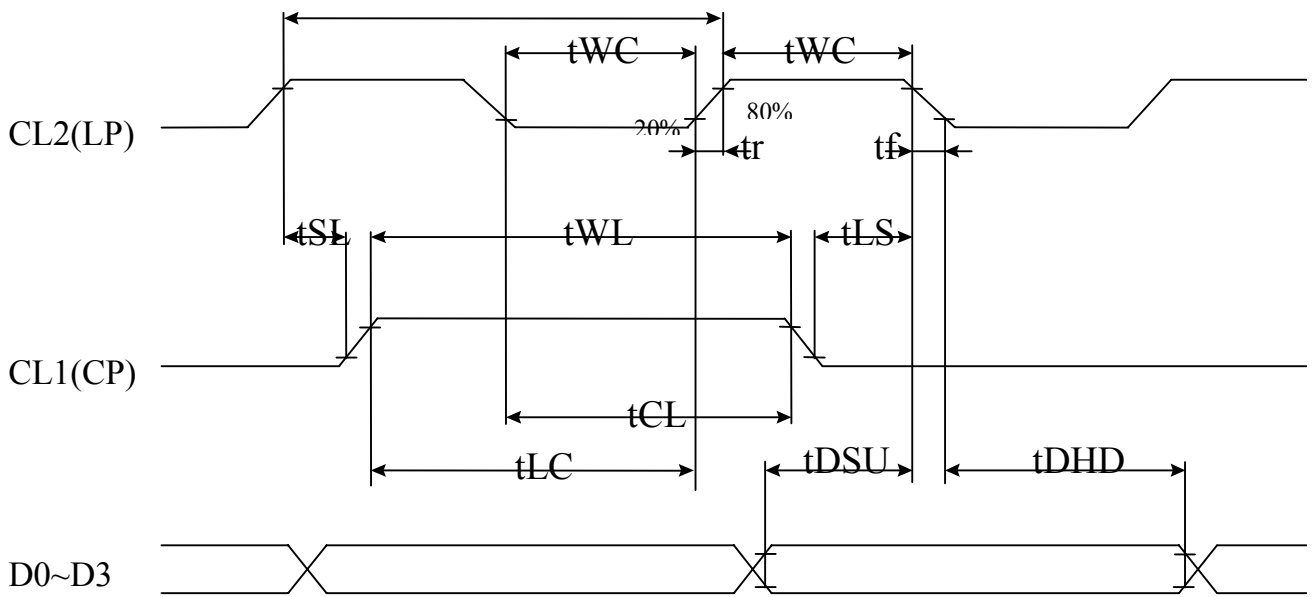


Fig 1. SEGMENT TIMING

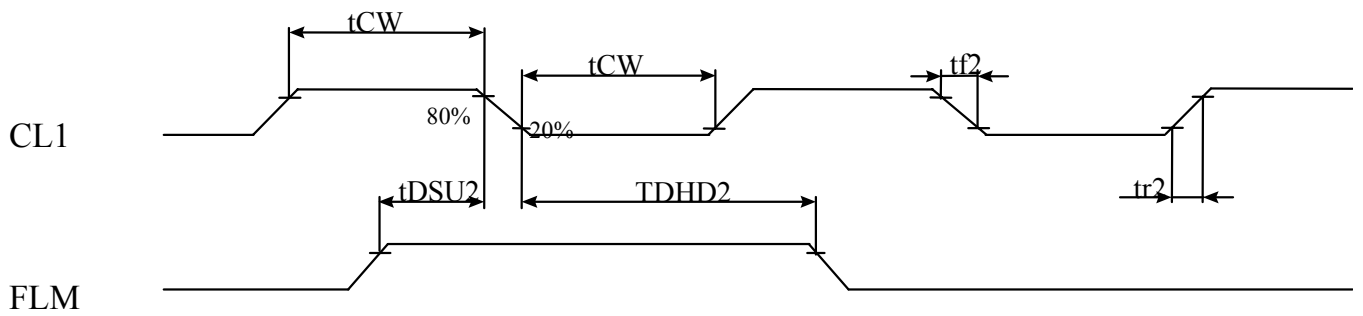
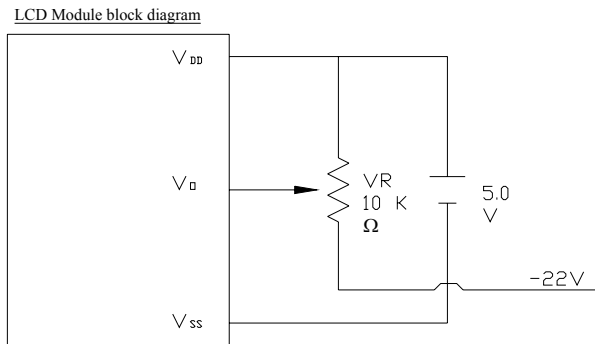


Fig 2 COMMON TIMING

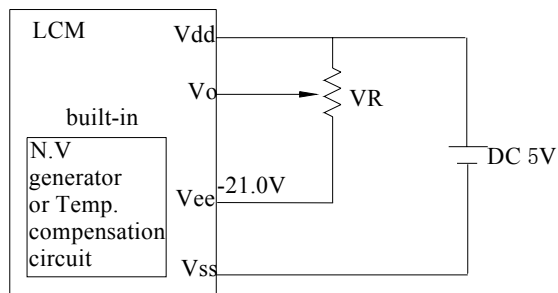


9. Power Supply for LCD Module and LCD Operating Voltage a Adjustment

*(Optional) LCM operating on DC3V or DC5V with external negative voltage.



*(Optional) LCM operating on DC3V or DC5V with built-in negative voltage





10. Backlight Information

10.1 Specification

(1) LED edge/white

| Parameter | Symbol | Min | Typ | Max | Unit | Test Condition |
|--------------------|------------------|-----|-------|-----|-------------------|-------------------------|
| Supply Current | I _{LED} | — | 160 | 200 | mA | V=3.5V |
| Supply Voltage | V | — | 3.5 | 3.7 | V | — |
| Reverse Voltage | V _R | — | — | 8 | V | — |
| Luminous Intensity | I _V | — | 150 | — | cd/m ² | I _{LED} =160mA |
| Life Time | — | — | 15000 | — | Hr. | V ≤ 3.7V |
| Color | White | | | | | |

(2) CCFL / white

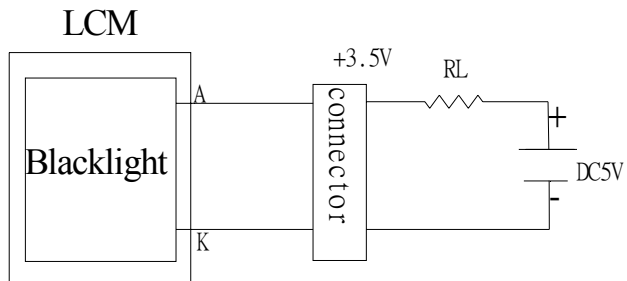
(Ta=25°C)

| Item | Symbol | Specification | | | Unit | Condition |
|---|------------------|---------------|-------|-----|-------------------|---|
| | | Min | Typ | Max | | |
| Driving Voltage | V _{FL} | — | 278 | — | V _{rms} | — |
| Input current | I _{FL} | 3.0 | 5.0 | 6.0 | mArms | — |
| Power consumption | W | — | 1.35 | — | W | — |
| Starting Voltage | V _{FLS} | — | 530 | — | V _{rms} | — |
| Luminance | L | — | 550 | — | Cd/m ² | $\varphi, \theta = 0 \text{ deg}, I_{FL} = 5.0 \text{ mArms}$ |
| Chromaticity | x | — | 0.340 | — | — | — |
| | y | — | 0.370 | — | — | — |
| Luminance Uniformity (Testing 9 point) | — | 75% | — | — | % | $\varphi, \theta = 0 \text{ deg}, I_{FL} = 5.0 \text{ mArms}$ |
| Life time | — | 15000 | — | — | hrs | — |
| Color | White | | | | | |

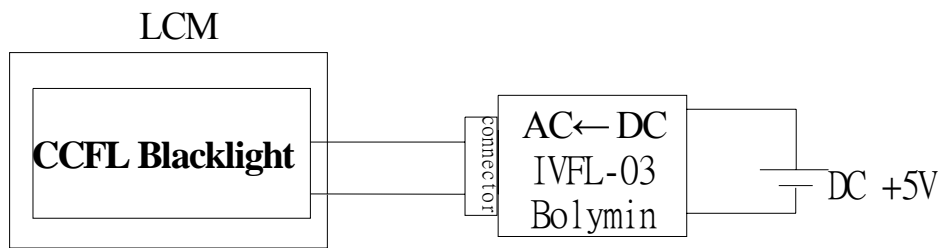


10.2 Backlight driving methods

a. LED white B/L driven from A.K cable directly



b. CCFL B/L driven from A.K cable directly





11.Touch panel Information (5.7")

As shown on TP320240A SPEC.



12. Quality Assurance

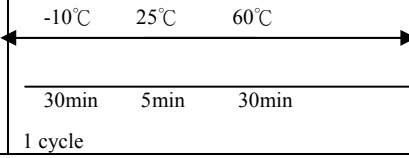
◆ Screen Cosmetic Criteria

| No. | Defect | Judgement Criterion | Partition | | | | | | | | | | | | | | | | | | | | |
|--------------------|-------------------------------|--|------------|-------------------------------|--------------|-----------|--------------------|---|--------------------|---|-----------|---|------------|-------------------------------|--------------|-----------|--------------------|---|--------------------|---|-----------|---|-------|
| 1 | Spots | <p>A)Clear</p> <table border="1"> <thead> <tr> <th>Size: d mm</th> <th>Acceptable Qty in active area</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.1$</td> <td>Disregard</td> </tr> <tr> <td>$0.1 < d \leq 0.2$</td> <td>6</td> </tr> <tr> <td>$0.2 < d \leq 0.3$</td> <td>2</td> </tr> <tr> <td>$0.3 < d$</td> <td>0</td> </tr> </tbody> </table> <p>Note: Including pin holes and defective dots which must be within one pixel size.</p> <p>B)Unclear</p> <table border="1"> <thead> <tr> <th>Size: d mm</th> <th>Acceptable Qty in active area</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.2$</td> <td>Disregard</td> </tr> <tr> <td>$0.2 < d \leq 0.5$</td> <td>6</td> </tr> <tr> <td>$0.5 < d \leq 0.7$</td> <td>2</td> </tr> <tr> <td>$0.7 < d$</td> <td>0</td> </tr> </tbody> </table> | Size: d mm | Acceptable Qty in active area | $d \leq 0.1$ | Disregard | $0.1 < d \leq 0.2$ | 6 | $0.2 < d \leq 0.3$ | 2 | $0.3 < d$ | 0 | Size: d mm | Acceptable Qty in active area | $d \leq 0.2$ | Disregard | $0.2 < d \leq 0.5$ | 6 | $0.5 < d \leq 0.7$ | 2 | $0.7 < d$ | 0 | Minor |
| Size: d mm | Acceptable Qty in active area | | | | | | | | | | | | | | | | | | | | | | |
| $d \leq 0.1$ | Disregard | | | | | | | | | | | | | | | | | | | | | | |
| $0.1 < d \leq 0.2$ | 6 | | | | | | | | | | | | | | | | | | | | | | |
| $0.2 < d \leq 0.3$ | 2 | | | | | | | | | | | | | | | | | | | | | | |
| $0.3 < d$ | 0 | | | | | | | | | | | | | | | | | | | | | | |
| Size: d mm | Acceptable Qty in active area | | | | | | | | | | | | | | | | | | | | | | |
| $d \leq 0.2$ | Disregard | | | | | | | | | | | | | | | | | | | | | | |
| $0.2 < d \leq 0.5$ | 6 | | | | | | | | | | | | | | | | | | | | | | |
| $0.5 < d \leq 0.7$ | 2 | | | | | | | | | | | | | | | | | | | | | | |
| $0.7 < d$ | 0 | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Bubbles Polarize in | <table border="1"> <thead> <tr> <th>Size: d mm</th> <th>Acceptable Qty in active area</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.3$</td> <td>Disregard</td> </tr> <tr> <td>$0.3 < d \leq 1.0$</td> <td>3</td> </tr> <tr> <td>$1.0 < d \leq 1.5$</td> <td>1</td> </tr> <tr> <td>$1.5 < d$</td> <td>0</td> </tr> </tbody> </table> | Size: d mm | Acceptable Qty in active area | $d \leq 0.3$ | Disregard | $0.3 < d \leq 1.0$ | 3 | $1.0 < d \leq 1.5$ | 1 | $1.5 < d$ | 0 | Minor | | | | | | | | | | |
| Size: d mm | Acceptable Qty in active area | | | | | | | | | | | | | | | | | | | | | | |
| $d \leq 0.3$ | Disregard | | | | | | | | | | | | | | | | | | | | | | |
| $0.3 < d \leq 1.0$ | 3 | | | | | | | | | | | | | | | | | | | | | | |
| $1.0 < d \leq 1.5$ | 1 | | | | | | | | | | | | | | | | | | | | | | |
| $1.5 < d$ | 0 | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Scratch | In accordance with spots cosmetic criteria. When the light reflects on the panel surface, the scratches are not to be remarkable. | Minor | | | | | | | | | | | | | | | | | | | | |
| 4 | Allowable Density | Above defects should be separated more than 30mm each other. | Minor | | | | | | | | | | | | | | | | | | | | |
| 5 | Coloration | Not to be noticeable coloration in the viewing area of the LCD panels. Back-light type should be judged with back-light on state only. | Minor | | | | | | | | | | | | | | | | | | | | |



13. Reliability

Content of Reliability Test

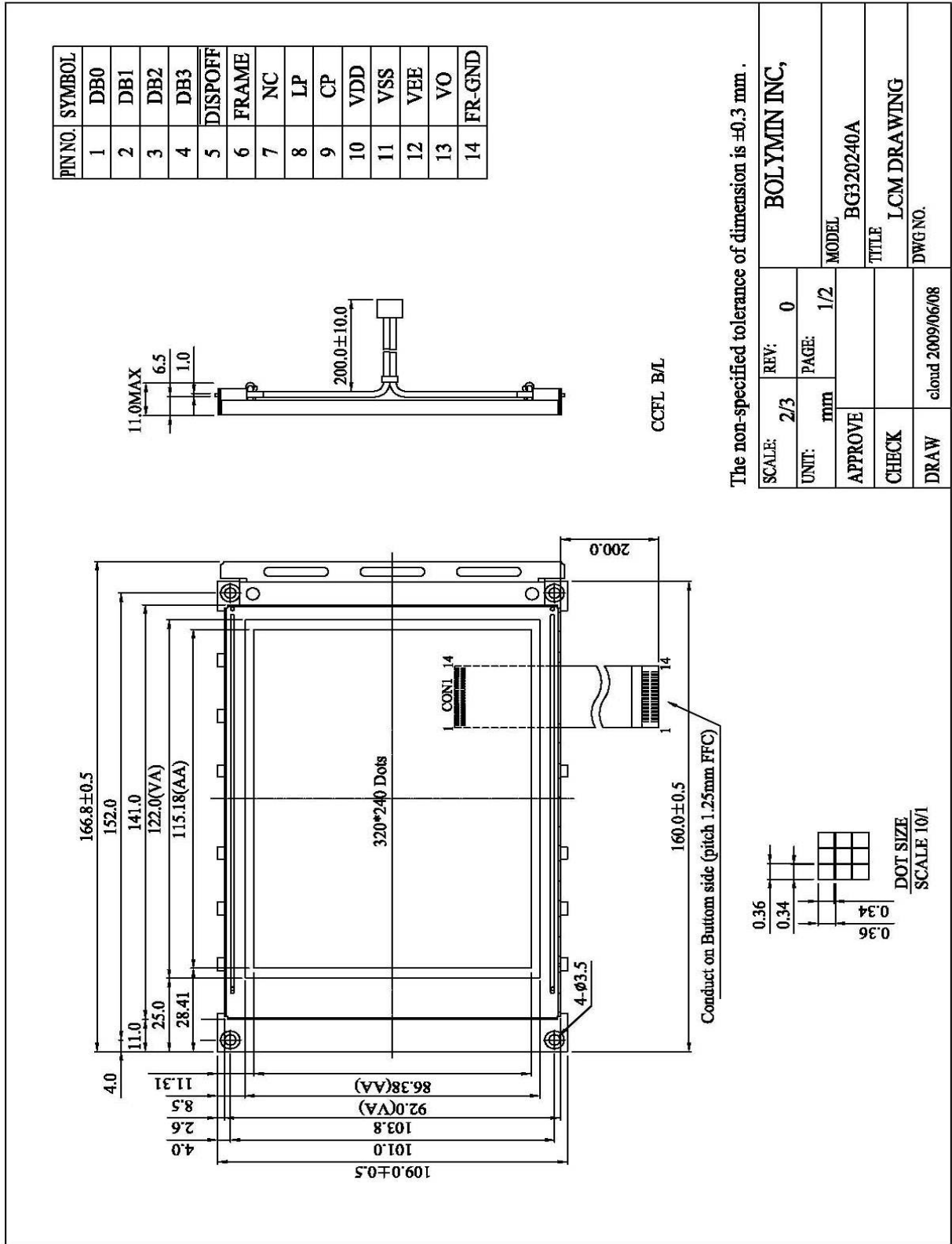
| Environmental Test | | | | |
|--------------------|--------------------------------------|--|---|---------------------|
| No. | Test Item | Content of Test | Test Condition | Applicable Standard |
| 1 | High Temperature storage | Endurance test applying the high storage temperature for a long time. | 60°C 200hrs | — |
| 2 | Low Temperature storage | Endurance test applying the high storage temperature for a long time. | -10°C 200hrs | — |
| 3 | High Temperature Operation | Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time. | 50°C 200hrs | — |
| 4 | Low Temperature Operation | Endurance test applying the electric stress under low temperature for a long time. | 0°C 200hrs | — |
| 5 | High Temperature/ Humidity Storage | Endurance test applying the high temperature and high humidity storage for a long time. | 60°C, 90%RH 96hrs | — |
| 6 | High Temperature/ Humidity Operation | Endurance test applying the electric stress (Voltage & Current) and temperature / humidity stress to the element for a long time. | 50°C, 90%RH 96hrs | — |
| 7 | Temperature Cycle | Endurance test applying the low and high temperature cycle.  | -10°C/60°C 10 cycles | — |
| Mechanical Test | | | | |
| 8 | Vibration test | Endurance test applying the vibration during transportation and using. | 10~22Hz→1.5mmp-p 22~500Hz→1.5G Total 0.5hrs | — |
| 9 | Shock test | Constructional and mechanical endurance test applying the shock during transportation. | 50G Half sign wave 11 msecd 3 times of each direction | — |
| 10 | Atmospheric pressure test | Endurance test applying the atmospheric pressure during transportation by air. | 115mbar 40hrs | — |
| Others | | | | |
| 11 | Static electricity test | Endurance test applying the electric stress to the terminal. | VS=800V, RS=1.5kΩ CS=100pF 1 time | — |

***Supply voltage for logic system=5V. Supply voltage for LCD system =Operating voltage at 25°C



13.Outline drawing

CCFL



The non-specified tolerance of dimension is ±0.3 mm .

| | | | | |
|---------|-------|------------|--------------|-------------|
| SCALE: | REV: | 0 | BOLYMIN INC, | |
| UNIT: | PAGE: | 1/2 | MODEL | BG320240A |
| APPROVE | | | TITLE | LCM DRAWING |
| CHECK | | | DWG NO. | |
| DRAW | cloud | 2009/06/08 | | |



LED

