



AND10C209A-HB

10.4" VGA Color TFT LCD Module

Features

- High luminance
- Twin CCFL backlight
- Low reflection
- Clear 256K colors (K=1024)
- Thin and lightweight design
- Fully compatible with AND10C273-HB (SVGA)
- 640 x 480 pixels color display
- Replaceable lamp structure
- Fast response time
- Applications: Display Terminals, Scientific Instruments, Medical Instruments, Test and Measurement Instruments, Process Control/Factory Automation Equipment, Office Automation Equipment

Mechanical Specifications

| Item | Specification | Unit |
|--------------------|------------------------------------|--------|
| Outline Dimensions | 265.0 (H) x 188.8 (V) x 12 max (D) | mm |
| Number of Pixels | 640 (H) x 480 (V) | Pixels |
| Active Area | 211.2 (H) x 158.4 (V) | mm |
| Pixel Pitch | 0.33 (H) x 0.33 (V) | mm |
| Weight (approx.) | 590 | gram |
| Backlight | CCFL, Side-light type (twin lamps) | — |

Absolute Maximum Ratings

| Item | Symbol | Min | Max | Unit |
|--------------------------------------|-----------|------|----------------|------|
| Supply Voltage | V_{DD} | -0.3 | 7.0 | V |
| | V_{FL} | 0 | 2000 | Vrms |
| FL Driving Frequency | f_{FL} | 0 | 100 | KHz |
| Input Signal Voltage | V_{IN} | -0.3 | $V_{DD} + 0.3$ | V |
| Operating Temperature | T_{op} | 0 | 50 | °C |
| Storage Temperature | T_{stg} | -20 | 60 | °C |
| Humidity (Max. Wet bulb temp = 39°C) | — | 10 | 90 | %RH |

Electrical Specifications (Ta = 25°C)

| Item | Symbol | Min | Typ | Max | Unit |
|-----------------------------|----------|------|-----|----------|-------|
| Supply Voltage | V_{DD} | 4.75 | 5.0 | 5.25 | V |
| | V_{FL} | 500 | 550 | 600 | Vrms |
| FL Start Voltage (Ta = 0°C) | | 1500 | — | — | Vrms |
| High Level Input Voltage | V_{IH} | 3.5 | — | V_{DD} | V |
| Low Level Input Voltage | V_{IL} | 0 | — | 1.5 | V |
| Current Consumption | I_{DD} | — | 125 | 250 | mA |
| | I_{FL} | 3.0 | 6.0 | 7.0 | mArms |
| Power Consumption (*1) | P | — | 7.2 | — | W |

*1: Before the efficiency loss of CCFL inverter

Optical Specifications (Ta = 25°C)

| Item | Symbol | Min | Typ | Max | Unit |
|-----------|-----------|-----|-----|-----|-------------------|
| Contrast | CR | 100 | — | — | — |
| Response | t_{on} | — | — | 50 | ms |
| | t_{off} | — | — | 50 | ms |
| Luminance | L | — | 250 | — | cd/m ² |



Technical drawing of a monitor bezel showing front, side, and top views with dimensions in millimeters.

Front View Dimensions:

- Overall width: 265
- Overall height: 188.8
- Active Area width: 211.2
- Viewing Area width: 215.2
- Active Area height: 158.4
- Viewing Area height: 162.4
- Top bezel opening: 163.4
- Bottom bezel opening: 216.2
- Center of Active Area/Viewing Area: 128
- Top mounting holes: 4-Ø3.2
- Bottom mounting holes: 2
- Side mounting holes: 2
- Top bezel thickness: 8
- Bottom bezel thickness: 6
- Top bezel opening offset: 5.5
- Bottom bezel opening offset: 2.5
- Bottom bezel opening offset: 2.5
- Bottom bezel opening offset: 12 Max

Side View Dimensions:

- Overall depth: 27.7
- Top bezel thickness: 8
- Bottom bezel thickness: 6
- Top bezel opening offset: 5.5
- Bottom bezel opening offset: 2.5
- Bottom bezel opening offset: 2.5
- Bottom bezel opening offset: 12 Max

Top View Dimensions:

- Overall width: 265
- Overall height: 188.8
- Active Area width: 211.2
- Viewing Area width: 215.2
- Active Area height: 158.4
- Viewing Area height: 162.4
- Top bezel opening: 163.4
- Bottom bezel opening: 216.2
- Center of Active Area/Viewing Area: 128
- Top mounting holes: 4-Ø3.2
- Bottom mounting holes: 2
- Side mounting holes: 2
- Top bezel thickness: 8
- Bottom bezel thickness: 6
- Top bezel opening offset: 5.5
- Bottom bezel opening offset: 2.5
- Bottom bezel opening offset: 2.5
- Bottom bezel opening offset: 12 Max

Technical drawing of a rectangular frame assembly, likely a component of a medical device. The drawing shows a top-down view of the frame with various dimensions and labels.

Dimensions:

- Overall width: 55 ± 10 mm (indicated on both the top and bottom edges).
- Overall height: 38 mm (indicated on the left edge).
- Internal vertical spacing: 15 mm (between the top and bottom horizontal bars).
- Internal horizontal spacing: 2.5 mm (between the left and right vertical bars).
- Internal vertical spacing (bottom): 7.7 ± 0.5 mm (between the two horizontal bars).
- Internal horizontal spacing (right): 4 mm (between the vertical bars).
- Internal horizontal spacing (left): 4 mm (between the vertical bars).
- Internal horizontal spacing (top): 4 mm (between the vertical bars).
- Internal horizontal spacing (bottom): 4 mm (between the vertical bars).
- Internal horizontal spacing (right): 3 mm (between the vertical bars).
- Internal horizontal spacing (left): 3 mm (between the vertical bars).
- Internal horizontal spacing (top): 3 mm (between the vertical bars).
- Internal horizontal spacing (bottom): 3 mm (between the vertical bars).

Labels:

- POB**: Points of Bore, indicating the location of the bore holes.
- 4-Ø4**: Four holes with a diameter of 4 mm, located on the left vertical bar.

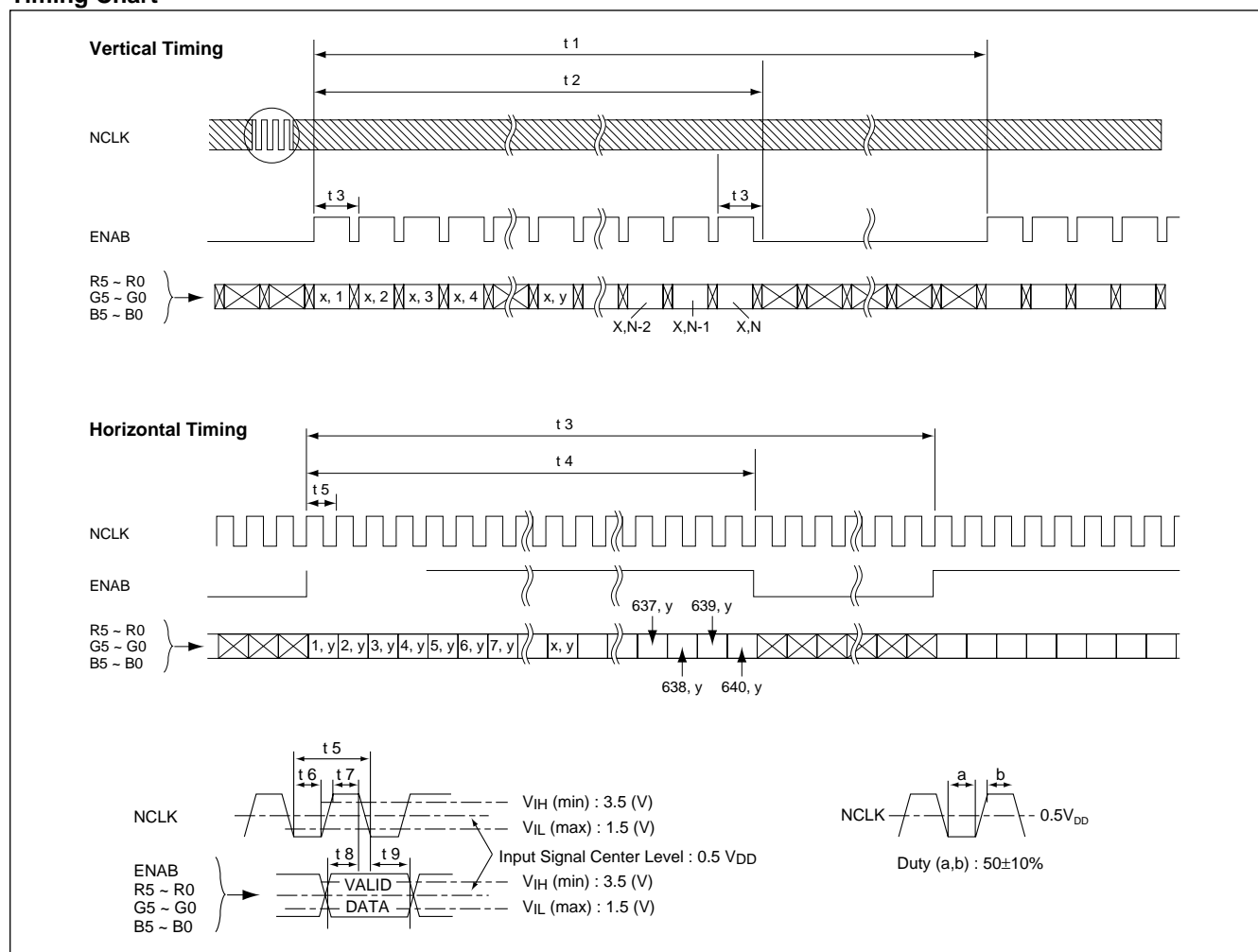


Timing Specifications

| Item | Sym | Min | Typ | Max | Unit |
|-------------------------|-----|----------------------------|-------------------|-------------------|---------|
| Frame Period | t1 | $(249+N/2) \times t3$ — | 525 x t3 16.68 | 525 x t3 17.85 | — ms |
| Vertical Display Term* | t2 | 300 x t3 | 480 x t3 | 480 x t3 | — |
| One Line Scanning Time | t3 | 684 x t5 31.5 | 800 x t5 31.78 | 860 x t5 | — μs |
| Horizontal Display Term | t4 | 640 x t5 | 640 x t5 | 640 x t5 | — |
| Clock Period | t5 | 35.0 | 39.72 | — | ns |
| Clock "L" Time | t6 | 10.0 | — | — | ns |
| Clock "H" Time | t7 | 7.0 | — | — | ns |
| Set Up Time | t8 | 5.0 | — | — | ns |
| Hold Time | t9 | 10.0 | — | — | ns |

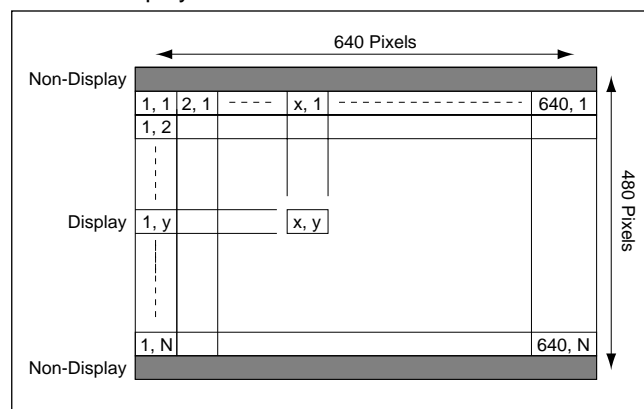
* t2 = Nx t3

Timing Chart





Note: When the vertical display period (N) is shorter than 480, the actual display area is shifted to the center. The non-display area becomes dark as follows:



- Recommended LCD Controller: CL-GD6440 (Cirrus Logic) 65548, 65550 (Chips & Technologies)
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- Recommended Inverter: INVC193 (Hitachi)

Connector Pin Assignment for Interface

CN2 CCFL Power Supply

(BHR-03VS-1/Japan Solderless Terminal Mfg. Co. Ltd –JST)

| Terminal No. | Symbol | Function |
|--------------|-------------------|-----------------------------|
| 1 | VL | CCFL 1 Input (High Voltage) |
| 2 | NC ⁽¹⁾ | Open |
| 3 | GL | CCFL 1 Input (GND Side) |

CN3 CCFL Power Supply

(BHR-03VS-1/Japan Solderless Terminal Mfg. Co. Ltd.)

| Terminal No. | Symbol | Function |
|--------------|-------------------|-----------------------------|
| 1 | VL | CCFL 2 Input (High Voltage) |
| 2 | NC ⁽¹⁾ | Open |
| 3 | GL | CCFL 2 Input (GND Side) |

Note (1): NC terminal is open. (Don't use.)

CN1 Input Signal (1)

(DF9-31P-1V/Hirose Electric Co. Ltd.)

| Terminal No. | Symbol | Function |
|--------------|-------------------|---------------------------------|
| 1 | GND | Ground |
| 2 | NCLK | Sampling Clock |
| 3 | GND | Ground |
| 4 | R0 ⁽²⁾ | Red Display Data (LSB) |
| 5 | R1 ⁽²⁾ | Red Display Data |
| 6 | R2 ⁽²⁾ | Red Display Data |
| 7 | GND | Ground |
| 8 | R3 ⁽²⁾ | Red Display Data |
| 9 | R4 ⁽²⁾ | Red Display Data |
| 10 | R5 ⁽²⁾ | Red Display Data (MSB) |
| 11 | GND | Ground |
| 12 | G0 ⁽²⁾ | Green Display Data (LSB) |
| 13 | G1 ⁽²⁾ | Green Display Data |
| 14 | G2 ⁽²⁾ | Green Display Data |
| 15 | GND | Ground |
| 16 | G3 ⁽²⁾ | Green Display Data |
| 17 | G4 ⁽²⁾ | Green Display Data |
| 18 | G5 ⁽²⁾ | Green Display Data (MSB) |
| 19 | GND | Ground |
| 20 | ENAB | Compound Synchronization Signal |
| 21 | GND | Ground |
| 22 | B0 ⁽²⁾ | Blue Display Data (LSB) |
| 23 | B1 ⁽²⁾ | Blue Display Data |
| 24 | B2 ⁽²⁾ | Blue Display Data |
| 25 | GND | Ground |
| 26 | G3 ⁽²⁾ | Blue Display Data |
| 27 | G4 ⁽²⁾ | Blue Display Data |
| 28 | G5 ⁽²⁾ | Blue Display Data (MSB) |
| 29 | GND | Ground |
| 30 | V _{DD} | +5V Power Supply |
| 31 | V _{DD} | +5V Power Supply |



Note (2): 512K colors are displayed by the combinations of 18 data bits.

| | Display | R5 | R4 | R3 | R2 | R1 | R0 | G5 | G4 | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 | B0 | Gray Scale Level |
|-----------------------------|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------------------|
| Basic Color | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | – |
| | Blue | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | – |
| | Green | L | L | L | L | L | L | H | H | H | H | H | H | L | L | L | L | L | L | – |
| | Lt. Blue | L | L | L | L | L | L | H | H | H | H | H | H | H | H | H | H | H | H | – |
| | Red | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | – |
| | Purple | H | H | H | H | H | H | L | L | L | L | L | L | H | H | H | H | H | H | – |
| | Yellow | H | H | H | H | H | H | H | H | H | H | H | H | L | L | L | L | L | L | – |
| | White | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | – |
| Gray Scale of Red | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark | L | L | L | L | L | H | L | L | L | L | L | L | L | L | L | L | L | L | L1 |
| | | L | L | L | L | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L2 |
| | | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | L3~ L60 |
| | | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | |
| | Light | H | H | H | H | L | H | L | L | L | L | L | L | L | L | L | L | L | L | L61 |
| | | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L62 |
| | | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | Red L63 |
| | | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | |
| Gray Scale of Green | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark | L | L | L | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | L1 |
| | | L | L | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | L | L2 |
| | | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | L3~ L60 |
| | | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | |
| | Light | L | L | L | L | L | L | H | H | H | H | L | H | L | L | L | L | L | L | L61 |
| | | L | L | L | L | L | L | H | H | H | H | H | L | L | L | L | L | L | L | L62 |
| | | L | L | L | L | L | L | H | H | H | H | H | H | L | L | L | L | L | L | Green L63 |
| | | L | L | L | L | L | L | H | H | H | H | H | H | L | L | L | L | L | L | |
| Gray Scale of Blue | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | L1 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | L | L2 |
| | | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | L3~ L60 |
| | | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | |
| | Light | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | L | H | L61 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | L | L62 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | Blue L63 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | |
| Gray Scale of White & Black | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark | L | L | L | L | L | H | L | L | L | L | L | H | L | L | L | L | L | H | L1 |
| | | L | L | L | L | H | L | L | L | L | L | H | L | L | L | L | L | H | L | L2 |
| | | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | L3~ L60 |
| | | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | |
| | Light | H | H | H | H | L | H | H | H | H | L | H | H | H | H | H | H | L | H | L61 |
| | | H | H | H | H | H | L | H | H | H | H | L | H | H | H | H | H | H | L | L62 |
| | | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | White L63 |
| | | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | |