# AND10C210-4HB

## 10.4” VGA Color TFT LCD Module

### Features

**• RoHS Compliant**

- High luminance (1,000 cd/m$^2$)
- Wide viewing angle (Vertical: 90, Horizontal: 110)
- Low reflection
- Built-in long life lamps (20,000 h)
- Thin and lightweight design
- Fully mechanically compatible with AND10C209A-HB (VGA) and AND10C273-HB (SVGA)
- 640 x 480 pixels color display

- 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 (W) x 188.8 (H) x 12 max (D) | mm |
| Number of Pixels | 640 (W) x 480 (H) | Pixels |
| Active Area | 211.2 (W) x 158.4 (H) | mm |
| Pixel Pitch | 0.33 (W) x 0.33 (H) | mm |
| Weight (approx.) | 605 | gram |
| Backlight | Four CCFLs, sidelight type | – |

### Absolute Maximum Ratings

| Item | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Supply Voltage | $V_{DD}$ | -0.3 | 7.0 | V |
| | $V_{FL}$ | 0 | 2.0 | kV(rms) |
| 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) | – | (1800) | Vrms |
| High Level Input Voltage | $V_{IH}$ | 3.5 | – | $V_{DD}$ | |
| Low Level Input Voltage | $V_{IL}$ | 0 | – | 1.5 | V |
| Current Consumption | $I_{DD}$(*1) | – | 125 | 250 | mA |
| | $I_{FL}$(*2) | 3.0 | – | 6.0 | mA(rms) |
| Power Consumption (*1, *2) | P | – | 14 | – | W |

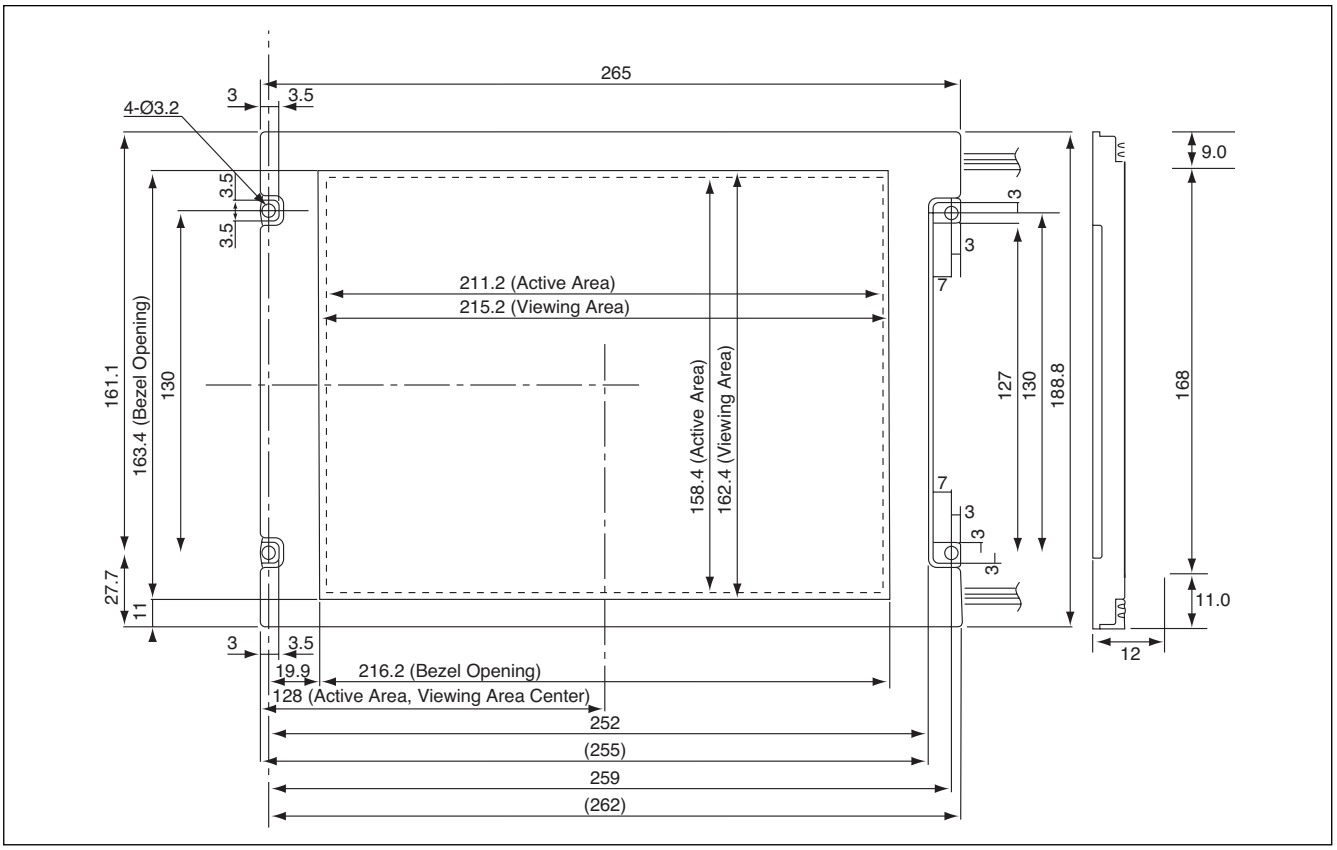
*1: 8 color bars pattern
*2: Before the efficiency loss of CCFL inverter

### Optical Specifications (Ta = 25°C)

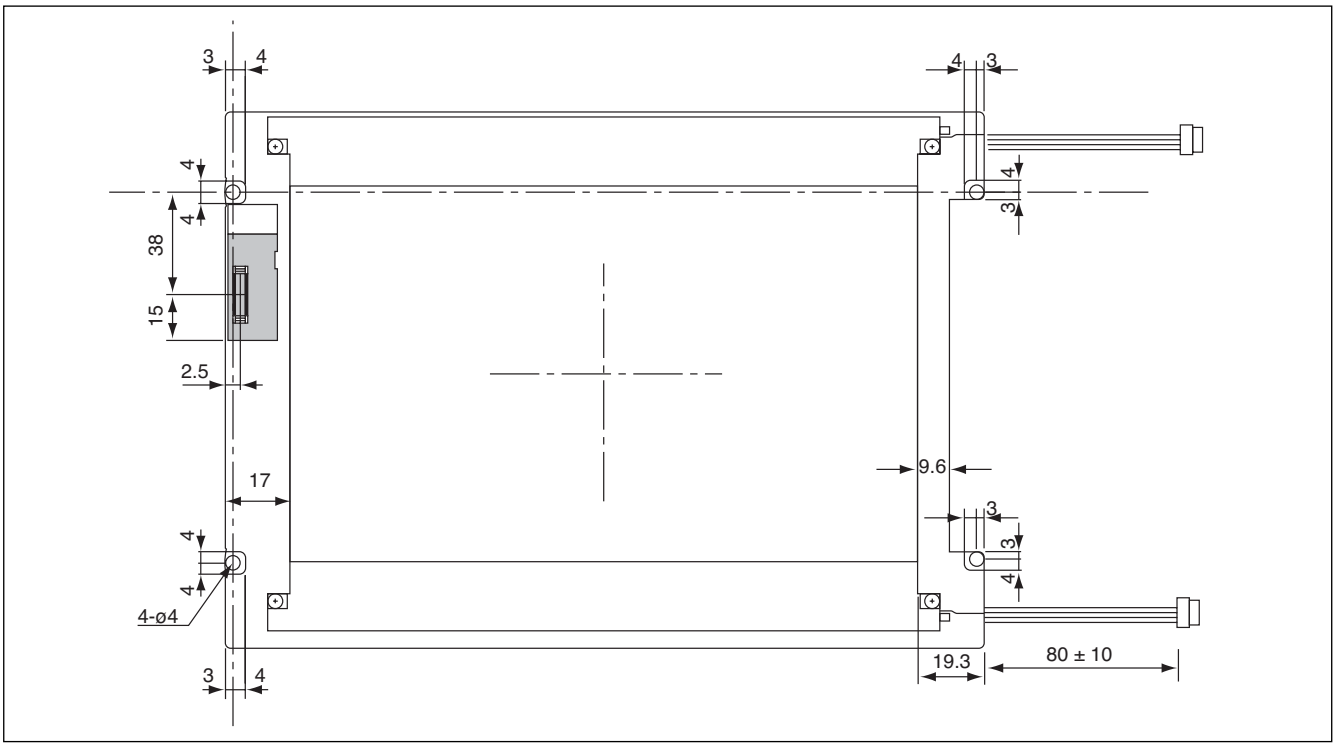
| Item | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Contrast | CR | 100 | 250 | – | – |
| Response | $t_{on}$ | – | – | 50 | ms |
| | $t_{off}$ | – | – | 50 | ms |
| Luminance | L | – | 1,000 | – | cd/m$^2$ |

Product specifications contained herein may be changed without prior notice.
It is therefore advisable to contact Purdy Electronics before proceeding with the design of equipment incorporating this product.

**Dimensional Outline (Front View)**




**Dimensional Outline (Back View)**

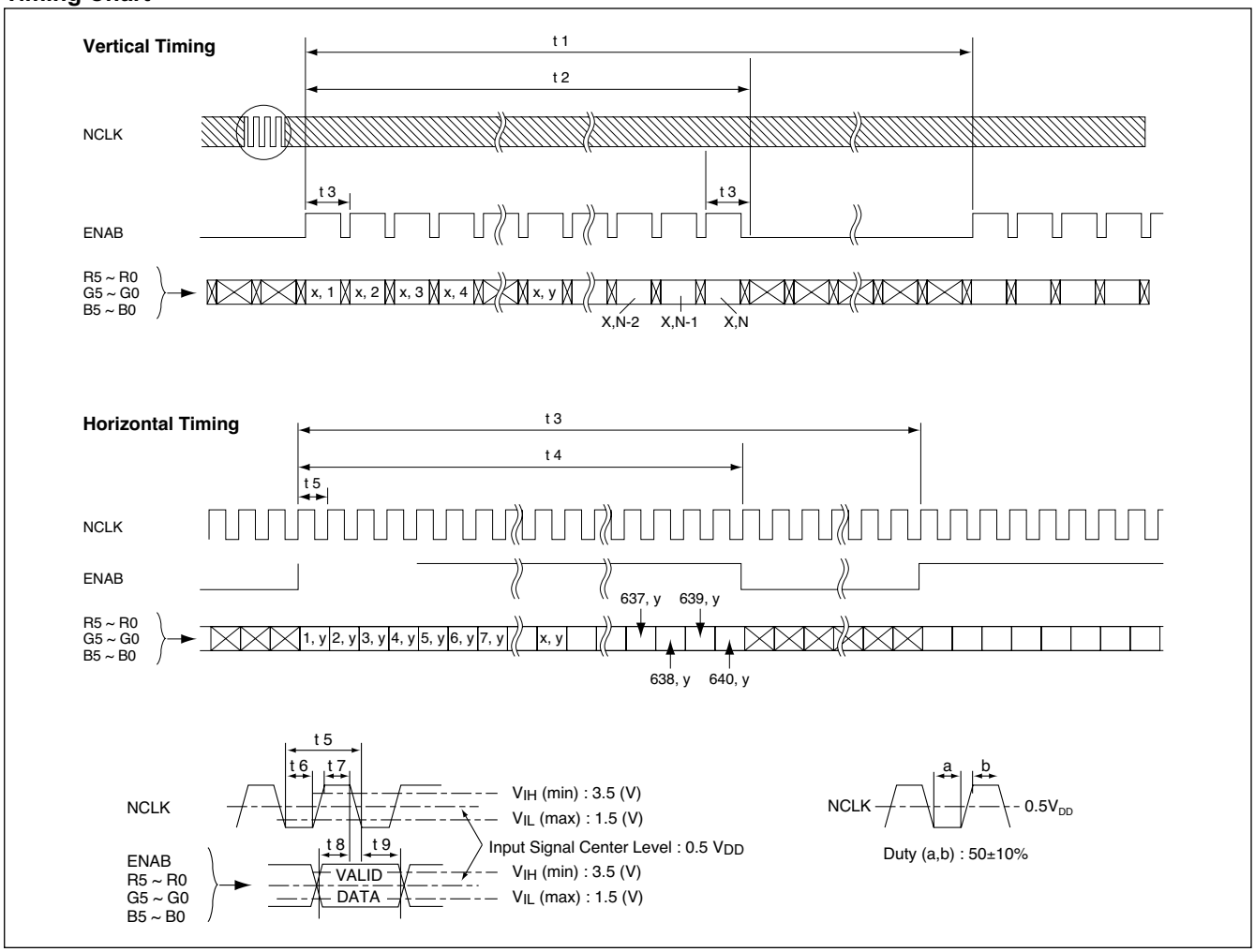


## Timing Specifications

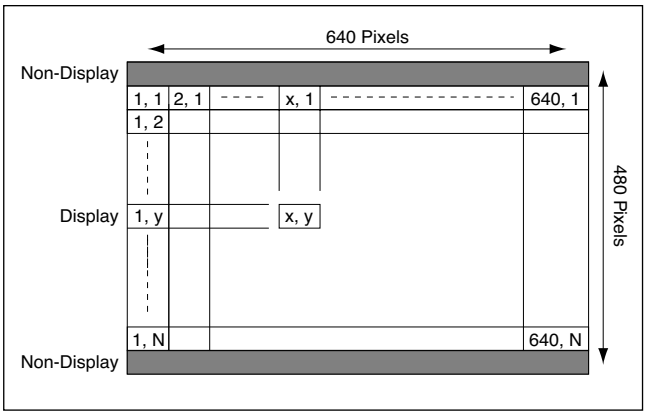
| Item | Sym | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Frame Period | t1 | 249+N/2 x t3<br>– | 525 x t3<br>16.68 | 525 x t3<br>17.85 | –<br>ms |
| Vertical<br>Display Term* | t2 | 300 x t3 | 480 x t3 | 480 x t3 | – |
| One Line Scanning Time | t3 | 684 x t5<br>31.5 | 800 x t5<br>31.78 | 860 x t5 | –<br>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:




## Connector Pin Assignment for Interface

### CN2 CCFL Power Source

Connector: BHR-03VS-1 / Japan Solderless Terminal MFG Co., Ltd.
Mating Connector: SM02(8.0)B-BHS-1 / Japan Solderless

| CN2/CN3 | | |
|---|---|---|
| **Pin** | **Symbol** | **Function** |
| 1 | $V_{FLH1}$ | CCFL Power Supply (High Voltage) |
| 2 | NC | Non Connection (open) |
| 3 | $V_{FLL1}$ | CCFL Power Supply (Low Voltage) |

### CCFL Power Supply

Connector: BHR-03VS-1 / Japan Solderless Terminal MFG Co., Ltd.

Mating Connector: SM02(8.0)B-BHS-1 / Japan Solderless

| CN2/CN3 | | |
|---|---|---|
| **Pin** | **Symbol** | **Function** |
| 1 | $V_{FLH1}$ | CCFL Power Supply (High Voltage) |
| 2 | NC | Non Connection (open) |
| 3 | $V_{FLL1}$ | CCFL Power Supply (Low Voltage) |

### CN1 Input Signal

Connector: DF9B-31P-1V / Hirose Electric Co., Ltd.
Mating Connector: DF9*-31S-1V / Hirose Electric (*:option mark)

| Terminal No. | Symbol | Function |
|---|---|---|
| 1 | GND | Ground |
| 2 | NCLK | Sampling Clock |
| 3 | GND | Ground |
| 4 | R0 | Red Display Data (LSB) |
| 5 | R1 | Red Display Data |
| 6 | R2 | Red Display Data |
| 7 | GND | Ground |
| 8 | R3 | Red Display Data |
| 9 | R4 | Red Display Data |
| 10 | R5 | Red Display Data (MSB) |
| 11 | GND | Ground |
| 12 | G0 | Green Display Data (LSB) |
| 13 | G1 | Green Display Data |
| 14 | G2 | Green Display Data |
| 15 | GND | Ground |
| 16 | G3 | Green Display Data |
| 17 | G4 | Green Display Data |
| 18 | G5 | Green Display Data (MSB) |
| 19 | GND | Ground |
| 20 | ENAB | Compound Synchronization Signal |
| 21 | GND | Ground |
| 22 | B0 | Blue Display Data (LSB) |
| 23 | B1 | Blue Display Data |
| 24 | B2 | Blue Display Data |
| 25 | GND | Ground |
| 26 | B3 | Blue Display Data |
| 27 | B4 | Blue Display Data |
| 28 | B5 | Blue Display Data (MSB) |
| 29 | GND | Ground |
| 30 | $V_{DD}$ | +5V Power Supply |
| 31 | $V_{DD}$ | +5V Power Supply |

| | 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 |
| | | H | H | H | H | L | H | L | L | L | L | L | L | L | L | L | L | L | L | | L61 |
| | Light | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | L | | L62 |
| | Red | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | Red | L63 |
| 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 | L | H | L | L | L | L | L | L | | L1 |
| | | L | L | L | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | | L2 |
| | | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | | L3~ |
| | | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | | L60 |
| | | L | L | L | L | L | L | H | H | H | H | L | H | L | L | L | L | L | L | | L61 |
| | Light | L | L | L | L | L | L | H | H | H | H | H | L | L | L | L | L | L | L | | L62 |
| | Green | L | L | L | L | L | L | H | H | H | H | H | H | L | L | L | L | L | L | Green | L63 |
| 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 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | L | H | | L61 |
| | Light | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | L | | L62 |
| | Blue | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | Blue | L63 |
| 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 |
| | | H | H | H | H | L | H | H | H | H | H | L | H | H | H | H | H | L | H | | L61 |
| | Light | H | H | H | H | H | L | H | H | H | H | H | L | H | H | H | H | H | L | | L62 |
| | White | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | White | L63 |