



# AND10C210-HB-KIT

## 10.4" VGA Color TFT LCD Module

### Features

- λ High luminance (400cd/m<sup>2</sup>)
- λ Wide viewing angle (Vertical: 90, Horizontal: 110)
- λ Low reflection
- λ Built-in long life lamps (50,000 h)
- λ Thin and lightweight design
- λ Fully mechanically compatible with AND10C209A-HB (VGA) and AND10C273-HB (SVGA)
- λ 640 x 480 pixels color display
- λ Fast response time
- λ 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.)   | 605                                | gram   |
| Backlight          | Twin CCFLs, sidelight type         | -      |

### Absolute Maximum Ratings

| Item                                 | Symbol           | Min  | Max                   | Unit    |
|--------------------------------------|------------------|------|-----------------------|---------|
| Supply Voltage                       | V <sub>DD</sub>  | -0.3 | 7.0                   | V       |
|                                      | V <sub>FL</sub>  | 0    | 2.0                   | kV(rms) |
| FL Driving Frequency                 | f <sub>FL</sub>  | 0    | 100                   | KHz     |
| Input Signal Voltage                 | V <sub>IN</sub>  | -0.3 | V <sub>DD</sub> + 0.3 | V       |
| Operating Temperature                | T <sub>op</sub>  | 0    | 50                    | °C      |
| Storage Temperature                  | T <sub>stg</sub> | -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 <sub>DD</sub>      | 4.75   | 5.0   | 5.25            | V       |
|                             | V <sub>FL</sub>      | (500)  | (550) | (600)           | Vrms    |
| FL Start Voltage (Ta = 0°C) |                      | (1500) | -     | (1800)          | Vrms    |
| High Level Input Voltage    | V <sub>IH</sub>      | 3.5    | -     | V <sub>DD</sub> |         |
| Low Level Input Voltage     | V <sub>IL</sub>      | 0      | -     | 1.5             | V       |
| Current Consumption         | I <sub>DD</sub> (*1) | -      | 125   | 250             | mA      |
|                             | I <sub>FL</sub> (*2) | 3.0    | -     | 6.0             | mA(rms) |
| Power Consumption (*1, *2)  | P                    | -      | (7.2) | -               | W       |

\*1: 8 color bars pattern

\*2: Before the efficiency loss of CCFL inverter

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

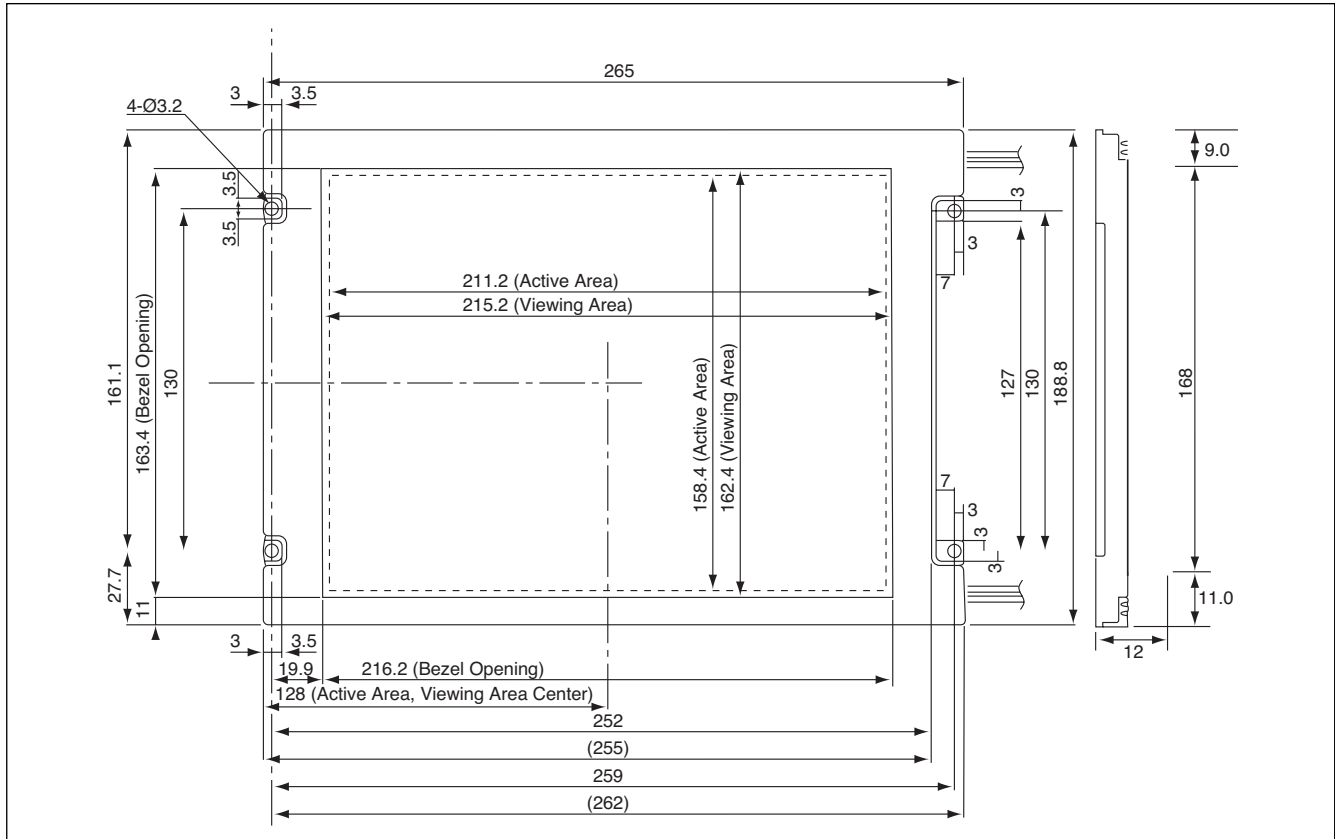
| Item      | Symbol           | Min | Typ | Max | Unit              |
|-----------|------------------|-----|-----|-----|-------------------|
| Contrast  | CR               | 100 | 250 | -   | -                 |
| Response  | t <sub>on</sub>  | -   | -   | 50  | ms                |
|           | t <sub>off</sub> | -   | -   | 50  | ms                |
| Luminance | L                | 300 | 400 | -   | cd/m <sup>2</sup> |

Product specifications contained herein may be changed without prior notice.

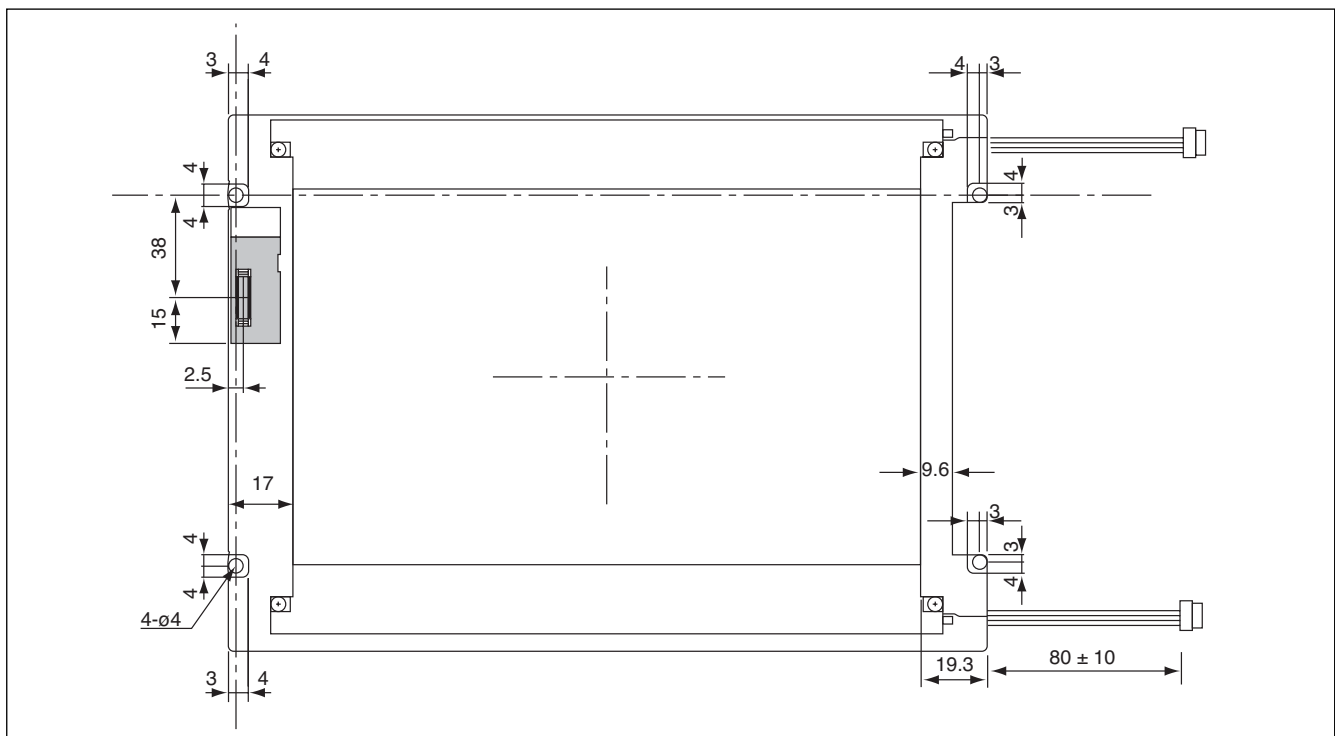
It is therefore advisable to contact Purdy Electronics before proceeding with the design of equipment incorporating this product.

Purdy Electronics Corporation λ 720 Palomar Avenue λ Sunnyvale, CA 94085

Dimensional Outline (Front View)



Dimensional Outline (Back View)



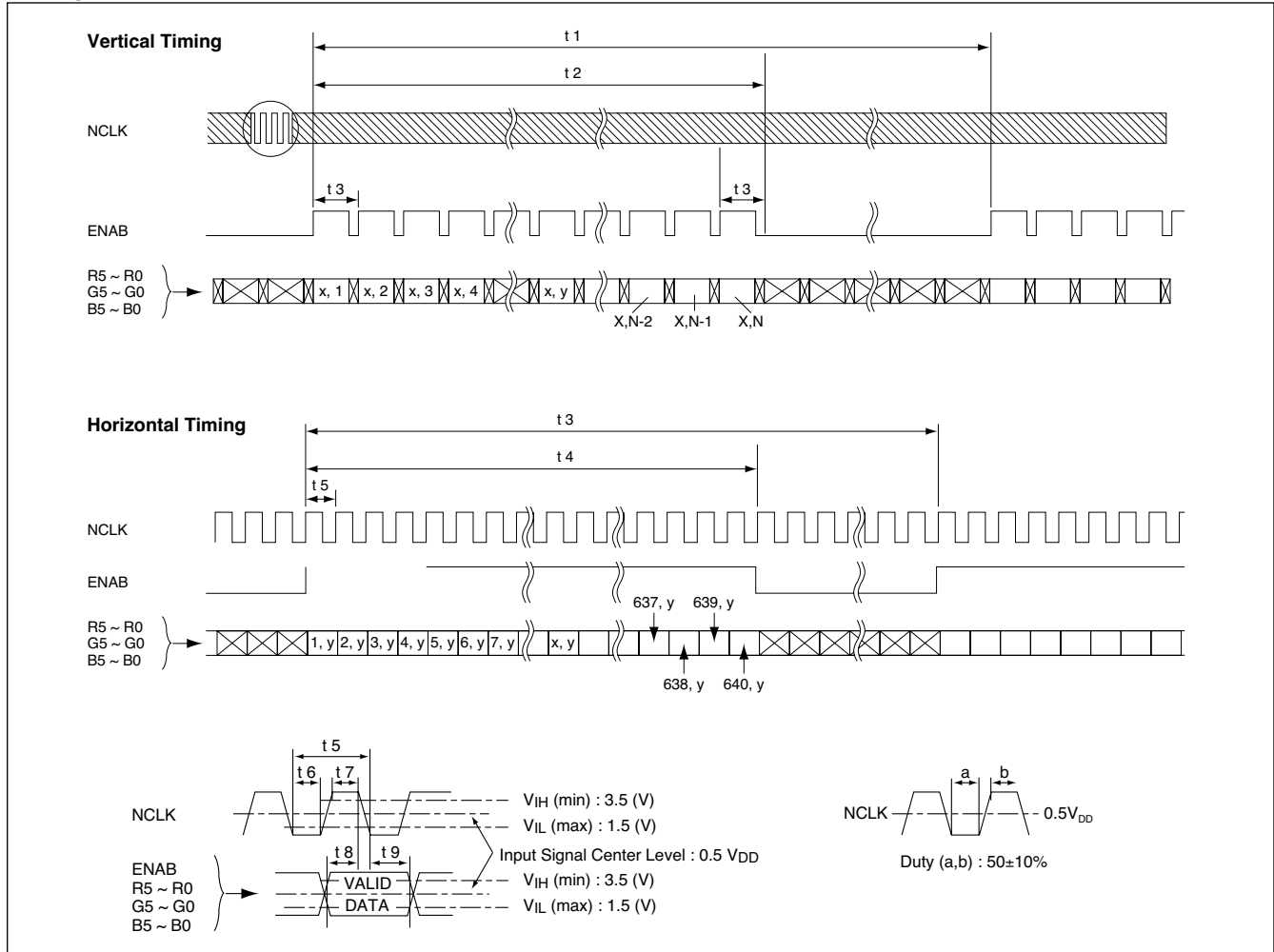


Timing Specifications

| 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 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      |

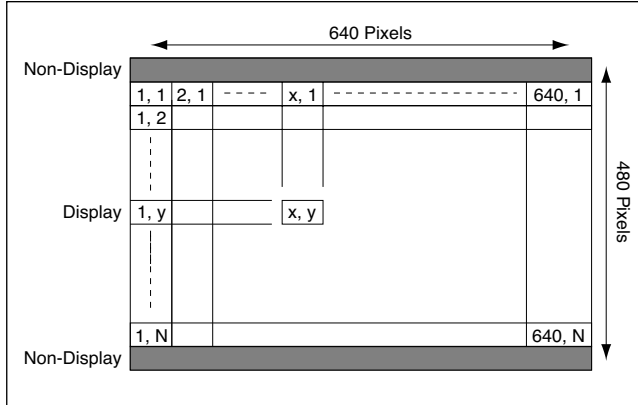
\* t2 = Nx t3

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 <sub>FLH1</sub> | CCFL Power Supply (High Voltage) |
| 2       | NC                | Non Connection (open)            |
| 3       | V <sub>FLL1</sub> | 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 <sub>FLH1</sub> | CCFL Power Supply (High Voltage) |
| 2       | NC                | Non Connection (open)            |
| 3       | V <sub>FLL1</sub> | 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 <sub>DD</sub> | +5V Power Supply                |
| 31           | V <sub>DD</sub> | +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  | L  | H  | H  | H  | H  | H  | L  | L  | L  | L  | L  | L  | -                |            |
|                             | Lt. Blue       | L  | L  | L  | L  | L  | L  | L  | 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<br>↑<br>↓ | L  | L  | L  | L  | L  | H  | L  | 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  | L                | L2         |
|                             |                | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :                | L3~<br>L60 |
|                             |                | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :                |            |
|                             | Light          | H  | H  | H  | H  | L  | H  | L  | 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  | L                | L62        |
|                             | Red            | H  | H  | H  | H  | H  | H  | L  | 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<br>↑<br>↓ | L  | 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  | L  | H  | L  | L  | L  | L  | L  | L  | L  | L                | L2         |
|                             |                | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :                | L3~<br>L60 |
|                             |                | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :                |            |
|                             | Light          | L  | L  | L  | L  | L  | L  | H  | H  | H  | H  | L  | H  | L  | 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  | L                | L62        |
|                             | Green          | L  | L  | L  | L  | L  | L  | H  | H  | H  | H  | H  | H  | L  | 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<br>↑<br>↓ | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | H  | L                | L1         |
|                             |                | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | H  | L  | L                | L2         |
|                             |                | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :                | L3~<br>L60 |
|                             |                | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :                |            |
|                             | Light          | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | H  | H  | H  | H  | L  | H  | L                | L61        |
|                             |                | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | H  | H  | H  | H  | H  | L  | L                | L62        |
|                             | Blue           | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | H  | H  | H  | H  | H  | H  | L                | 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<br>↑<br>↓ | L  | L  | L  | L  | L  | H  | L  | L  | L  | L  | L  | H  | L  | L  | L  | L  | L  | H  | L                | L1         |
|                             |                | L  | L  | L  | L  | H  | L  | L  | L  | L  | L  | H  | L  | L  | L  | L  | L  | H  | L  | L                | L2         |
|                             |                | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :                | L3~<br>L60 |
|                             |                | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :                |            |
|                             | Light          | H  | H  | H  | H  | L  | H  | H  | H  | H  | H  | L  | H  | H  | H  | H  | H  | L  | H  | L                | L61        |
|                             |                | H  | H  | H  | H  | H  | L  | H  | H  | H  | H  | H  | L  | H  | H  | H  | H  | H  | L  | L                | L62        |
|                             | White          | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H                | White L63  |