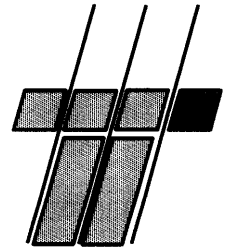


# Trident Data



**12.1" Colour TFT LCD Module**

**LTM12C275A**

TENTATIVE

## FEATURES

- (1) 12.1"SVGA for FA and LCD monitor use
- (2) High Brightness 250cd/m<sup>2</sup> with twin CCFL sidelight
- (3) Wide Viewing Angle
- (4) Long life CCFLs

## APPLICATIONS

- (1) FA Equipment
- (2) Display terminal
- (3) Measuring Instrument
- (4) LCD monitor

## MECHANICAL SPECIFICATIONS

| Item                | Specifications                         |
|---------------------|----------------------------------------|
| Dimensional Outline | 290.0 (W) × 220.0 (H) × 15.0max (D) mm |
| Number of Pixels    | 800 (W) × 600 (H) Pixels               |
| Active Area         | 246.0(W) × 184.5(H) mm                 |
| Pixel Pitch         | 0.3075(W) × 0.3075(H) mm               |
| Weight(Approx.)     | 840 g                                  |
| Backlight           | twin CCFLs. Side-light type            |

## ABSOLUTE MAXIMUM RATINGS

| Item                         |                    | Min. | Max.                 | Unit             |
|------------------------------|--------------------|------|----------------------|------------------|
| Supply Voltage               | (V <sub>DD</sub> ) | -0.3 | 7.0                  | V                |
|                              | (V <sub>FL</sub> ) | 0    | 2000                 | V <sub>RMS</sub> |
| 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        |                    | 0    | 50                   | °C               |
| Storage Temperature          |                    | -20  | 60                   | °C               |
| Storage Humidity             |                    | 10   | 90                   | %RH              |
| (Max. Wet bulb temp. = 39°C) |                    |      |                      |                  |

## ELECTRICAL SPECIFICATIONS(Ta=25°C)

| Item                     | Min.                  | Typ.               | Max.  | Unit               | Remarks                                    |
|--------------------------|-----------------------|--------------------|-------|--------------------|--------------------------------------------|
| Supply Voltage           | (V <sub>DD</sub> )    | 4.75               | 5.0   | 5.25               | V                                          |
|                          | (V <sub>FL</sub> )    | -                  | 630   | -                  | Vrms I <sub>FL</sub> =6.0mA <sub>rms</sub> |
| FL Start Voltage(Ta=0°C) | -                     | 1400               | -     | 1900               | Vrms                                       |
| High Level Input Voltage | (V <sub>IH</sub> )    | 0.8V <sub>DD</sub> | -     | V <sub>DD</sub>    | V                                          |
| Low Level Input Voltage  | (V <sub>IL</sub> )    | 0                  | -     | 0.2V <sub>DD</sub> | V                                          |
| Current Consumption      | *1 (I <sub>DD</sub> ) | -                  | 170   | -                  | mA                                         |
|                          | (I <sub>FL</sub> )    | 3.0x2              | 6.0x2 | 6.5x2              | mA <sub>rms</sub> CCFL x 2                 |
| *1, *2 Power Consumption | -                     | 8.4                | -     | W                  |                                            |

\*1: Toshiba standard pattern (8 Color Bars Pattern)

\*2: Except the efficiency of FL Inverter

## OPTICAL SPECIFICATIONS(Ta=25°C)

| Item           | Min.                                 | Typ. | Max. | Unit              |
|----------------|--------------------------------------|------|------|-------------------|
| Contrast Ratio | (CR)                                 | 100  | 250  | -                 |
| Response Time  | (t <sub>on</sub> +t <sub>off</sub> ) | -    | 100  | ms                |
| Luminance      | (L)                                  | 200  | 250  | cd/m <sup>2</sup> |

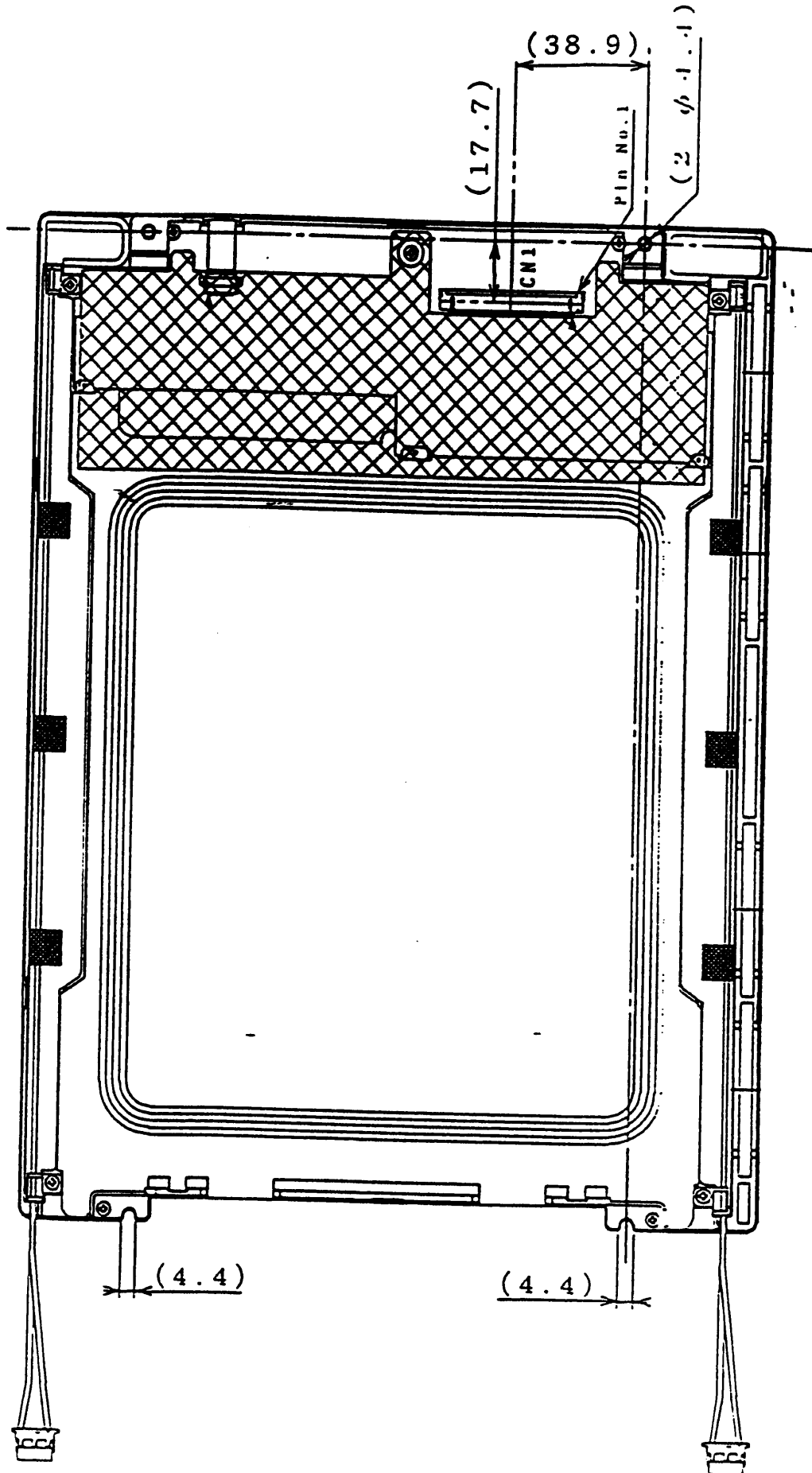
\*The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringement of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of TOSHIBA or others.

\*The information contained herein may be changed without prior notice. It is therefore advisable to contact TOSHIBA before proceeding with the design of equipment incorporating this product.



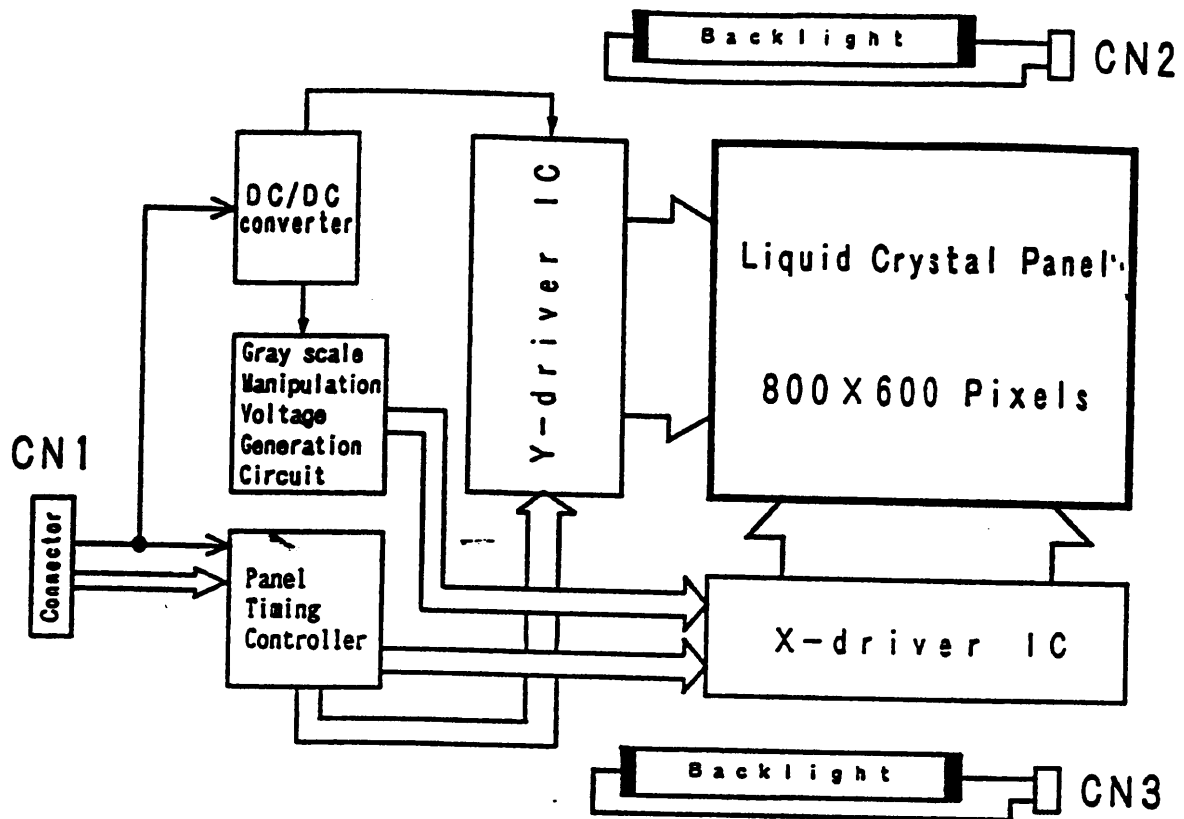
**DIMENSIONAL OUTLINE**  
(back figure)

Unit : mm. Standard Tolerance : 0.5mm



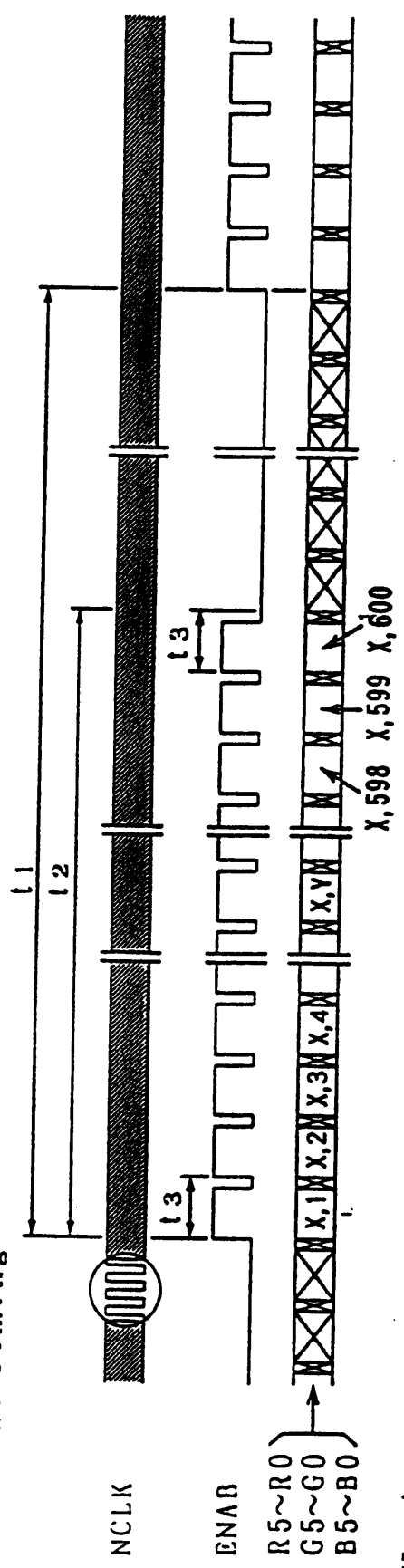
# BLOCK DIAGRAM

LTM120-2752

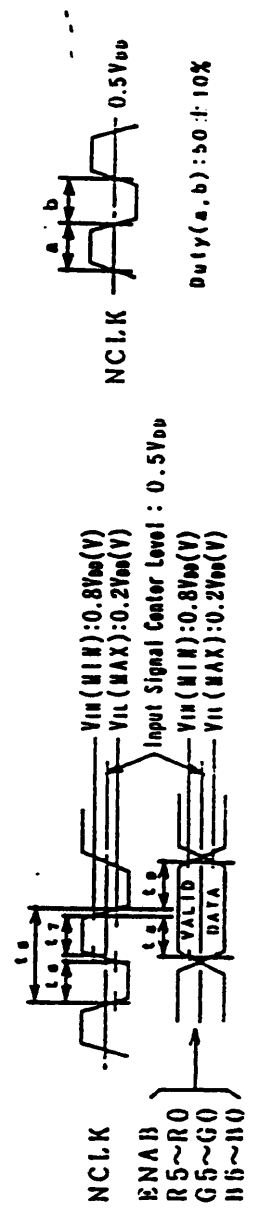
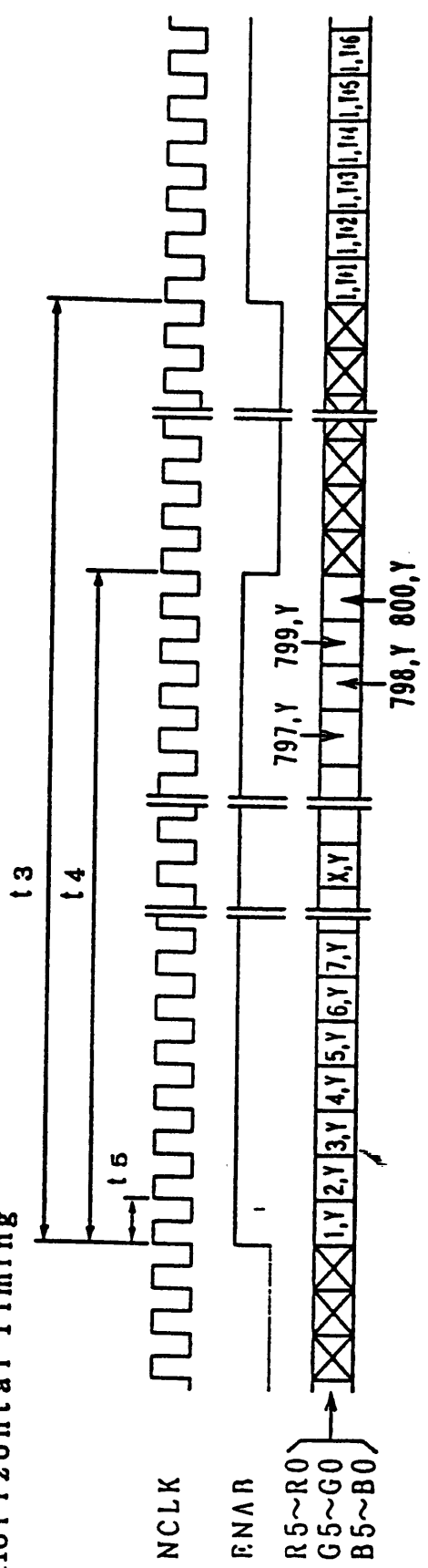


# TIMING CHART

(1) Vertical Timing



(2) Horizontal Timing



## TIMING SPECIFICATIONS

| Item                    | Symbol | Min.      | Typ.       | Max.       | Unit |
|-------------------------|--------|-----------|------------|------------|------|
| Frame Period            | t 1    | 604 × t 3 | 625 × t 3  | 628 × t 3  | —    |
|                         |        | —         | 17.78      | 17.86      | ms   |
| Vertical Display Term   | t 2    | 600 × t 3 | 600 × t 3  | 600 × t 3  | —    |
| One Line Scanning Time  | t 3    | 844 × t 5 | 1024 × t 5 | 1056 × t 5 | —    |
|                         |        | 26.4      | 28.44      | —          | μs   |
| Horizontal Display Term | t 4    | 800 × t 5 | 800 × t 5  | 800 × t 5  | —    |
| Clock Period            | t 5    | 25.0      | 27.78      | —          | ns   |
| Clock "L" Time          | t 6    | 5.0       | —          | —          | ns   |
| Clock "H" Time          | t 7    | 8.0       | —          | —          | ns   |
| Set Up Time             | t 8    | 3.0       | —          | —          | ns   |
| Hold Time               | t 9    | 7.0       | —          | —          | ns   |

Note 1) When ENAB is fixed to "H" level or "L" level after NCLK's input, the panel is displayed as a black.

However, it may be occurred a flicker on the display.

Note 2) Don't fix NCLK to "H" or "L" level while the  $V_{DD}(-5V)$  is supplied.

If NCLK is fixed to "H" or "L" level, the normal operating signal isn't supplied to LCD panel.

This condition results the degradation of the LCD panel display quality.

Note 3) Display area address is as follows.

|                |       |       |         |
|----------------|-------|-------|---------|
| ← 800 Pixels → |       |       |         |
| 1.1            | 2.1   | ----- | 800.1   |
| 1.2            | 2.2   | ----- | 800.2   |
| ⋮              | ⋮     |       | ⋮       |
| 1.599          | 2.599 | ----- | 800.599 |
| 1.600          | 2.600 | ----- | 800.600 |

600 Lines

# CONNECTOR PIN ASSIGNMENT FOR INTERFACE

C.N 1 INPUT SIGNAL (DF14A-30P-1.25H/HIROSE ELECTRIC CO.,LTD.)

Mating Connector : DF14-30S-1.25C. Contact Pin : DF14-2628SCF

| Terminal No. | Symbol           | Function                        |
|--------------|------------------|---------------------------------|
| 1            | GND              |                                 |
| 2            | NCLK             | SAMPLING CLOCK                  |
| 3            | NC <sup>1)</sup> |                                 |
| 4            | NC <sup>1)</sup> |                                 |
| 5            | GND              |                                 |
| 6            | R0 <sup>2)</sup> | RED DISPLAY DATA (LSB)          |
| 7            | R1 <sup>2)</sup> | RED DISPLAY DATA                |
| 8            | R2 <sup>2)</sup> | RED DISPLAY DATA                |
| 9            | R3 <sup>2)</sup> | RED DISPLAY DATA                |
| 10           | R4 <sup>2)</sup> | RED DISPLAY DATA                |
| 11           | R5 <sup>2)</sup> | RED DISPLAY DATA (MSB)          |
| 12           | GND              |                                 |
| 13           | G0 <sup>2)</sup> | GREEN DISPLAY DATA (LSB)        |
| 14           | G1 <sup>2)</sup> | GREEN DISPLAY DATA              |
| 15           | G2 <sup>2)</sup> | GREEN DISPLAY DATA              |
| 16           | G3 <sup>2)</sup> | GREEN DISPLAY DATA              |
| 17           | G4 <sup>2)</sup> | GREEN DISPLAY DATA              |
| 18           | G5 <sup>2)</sup> | GREEN DISPLAY DATA (MSB)        |
| 19           | GND              |                                 |
| 20           | B0 <sup>2)</sup> | BLUE DISPLAY DATA (LSB)         |
| 21           | B1 <sup>2)</sup> | BLUE DISPLAY DATA               |
| 22           | B2 <sup>2)</sup> | BLUE DISPLAY DATA               |
| 23           | B3 <sup>2)</sup> | BLUE DISPLAY DATA               |
| 24           | B4 <sup>2)</sup> | BLUE DISPLAY DATA               |
| 25           | B5 <sup>2)</sup> | BLUE DISPLAY DATA (MSB)         |
| 26           | ENAB             | COMPOUND SYNCHRONIZATION SIGNAL |
| 27           | GND              |                                 |
| 28           | VDD              | -5V POWER SUPPLY                |
| 29           | VDD              | -5V POWER SUPPLY                |
| 30           | GND              |                                 |

C.N 2 CCFL POWER SOURCE (BHR-03VS-1/JAPAN SOLDERLESS TERMINAL MFG CO.,LTD.)

Mating Connector : SX02(8.0)B-BHS-1

| Terminal No. | Symbol           | Function                           |
|--------------|------------------|------------------------------------|
| 1            | VL               | CCFL POWER SUPPLY (HIGH VOLTAGE) - |
| 2            | NC <sup>1)</sup> |                                    |
| 3            | GL               | CCFL POWER SUPPLY (LOW VOLTAGE)    |

C.N 3 CCFL POWER SOURCE (BHR-03VS-1/JAPAN SOLDERLESS TERMINAL MFG CO.,LTD.)

Mating Connector : SX02(8.0)B-BHS-1

| Terminal No. | Symbol           | Function                         |
|--------------|------------------|----------------------------------|
| 1            | VL               | CCFL POWER SUPPLY (HIGH VOLTAGE) |
| 2            | NC <sup>1)</sup> |                                  |
| 3            | GL               | CCFL POWER SUPPLY (LOW VOLTAGE)  |

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

Note 2) See next page.

256k (k=1024) colors Combinations Table

|                             | 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  | -                |
|                             | Light 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  | L 0              |
|                             |            | L  | L  | L  | L  | L  | H  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L 1              |
|                             | Dark       | L  | L  | L  | L  | H  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L 2              |
|                             | ↑          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | L 3~             |
|                             | ↓          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | L 6 0            |
|                             | Light      | H  | H  | H  | H  | L  | H  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L 6 1            |
|                             |            | H  | H  | H  | H  | H  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L 6 2            |
|                             | Red        | H  | H  | H  | H  | H  | H  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | Red L 6 3        |
| Gray Scale of Green         | Black      | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L 0              |
|                             |            | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | H  | L  | L  | L  | L  | L  | L  | L 1              |
|                             | Dark       | L  | L  | L  | L  | L  | L  | L  | L  | L  | H  | L  | L  | L  | L  | L  | L  | L  | L  | L 2              |
|                             | ↑          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | L 3~             |
|                             | ↓          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | L 6 0            |
|                             | Light      | L  | L  | L  | L  | L  | L  | H  | H  | H  | H  | L  | H  | L  | L  | L  | L  | L  | L  | L 6 1            |
|                             |            | L  | L  | L  | L  | L  | L  | H  | H  | H  | H  | H  | L  | L  | L  | L  | L  | L  | L  | L 6 2            |
|                             | Green      | L  | L  | L  | L  | L  | L  | H  | H  | H  | H  | H  | H  | L  | L  | L  | L  | L  | L  | Green L 6 3      |
| Gray Scale of Blue          | Black      | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L 0              |
|                             |            | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | H  | L 1              |
|                             | Dark       | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | H  | L  | L  | L 2              |
|                             | ↑          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | L 3~             |
|                             | ↓          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | L 6 0            |
|                             | Light      | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | H  | H  | H  | H  | L  | H  | L 6 1            |
|                             |            | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | H  | H  | H  | H  | H  | L  | L 6 2            |
|                             | Blue       | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | H  | H  | H  | H  | H  | H  | Blue L 6 3       |
| Gray Scale of White & Black | Black      | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L  | L 0              |
|                             |            | L  | L  | L  | L  | L  | H  | L  | L  | L  | L  | H  | L  | L  | L  | L  | L  | L  | H  | L 1              |
|                             | Dark       | L  | L  | L  | L  | H  | L  | L  | L  | L  | H  | L  | L  | L  | L  | L  | H  | L  | L  | L 2              |
|                             | ↑          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | L 3~             |
|                             | ↓          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | L 6 0            |
|                             | Light      | H  | H  | H  | H  | L  | H  | H  | H  | H  | L  | H  | H  | H  | H  | H  | L  | H  | H  | L 6 1            |
|                             |            | H  | H  | H  | H  | H  | L  | H  | H  | H  | H  | L  | H  | H  | H  | H  | H  | L  | L  | L 6 2            |
|                             | White      | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | H  | White L 6 3      |

## FOR SAFETY

LCD module is generally designed with precise parts to achieve light weight and thin mechanical dimensions.

In using our Modules, make certain that you fully understand and put into practice the warnings and safety precautions detailed in Engineering Information No. EE-N001, "CAUTIONS AND INSTRUCTIONS FOR TOSHIBA LCD MODULES".

Refer to individual specifications and TECHNICAL DATA sheets (hereinafter called "TD") for more detailed technical information.

### 1) SPECIAL PURPOSES

Please inform and contact Toshiba when LCD module is used for the equipment that relates to the safety of human body or human life.

### 2) DISASSEMBLING OR MODIFICATION

DO NOT DISASSEMBLE OR MODIFY the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display.

Toshiba does not warrant the module, if customer disassembled or modified it.

### 3) BREAKAGE OF LCD PANEL

DO NOT INGEST liquid crystal material, DO NOT INHALE this material, and DO NOT CONTACT the material with skin, if LCD panel is broken and liquid crystal material spills out.

If liquid crystal material comes into mouth or eyes, rinse mouth or eyes out with water immediately.

If this material contact with skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

### 4) GLASS OF LCD PANEL

BE CAREFUL WITH CHIPS OF GLASS that may cause injuring fingers or skin, when the glass is broken.

### 5) ELECTRIC SHOCK

DISCONNECT POWER SUPPLY before handling LCD module.

DO NOT TOUCH the parts inside LCD module and the fluorescent lamp's connector or cables in order to prevent electric shock, because high voltage is supplied to these parts from the inverter unit while power supply is turned on.

### 6) ABSOLUTE MAXIMUM RATINGS AND POWER PROTECTION CIRCUIT

DO NOT EXCEED the absolute maximum rating values under the worst probable conditions caused by the supply voltage variation, input voltage variation, variation in parts' constants, environmental temperature, etc., otherwise LCD module may be damaged.

Employ protection circuit for power supply, whenever the specification or TD specifies it.

Suitable protection circuit should be applied for each system design.

### 7) DISPOSAL

When dispose LCD module, obey to the applicable environmental regulations.