

**SPEC**

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| Spec No. |  |
| Date     |  |

**TYPE : T-55343GD035JU-LW-AJN**

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KYOCERA CORPORATION  
DONGGUAN SHILONG KYOCERA Co., Ltd.  
DISPLAY DIVISION

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Consult Kyocera before ordering.

| Original<br>Issue Date | Designed by: Engineering dept. |         |          | Confirmed by: QA dept. |          |
|------------------------|--------------------------------|---------|----------|------------------------|----------|
|                        | Prepared                       | Checked | Approved | Checked                | Approved |
|                        |                                |         |          |                        |          |

## Warning

This product has been manufactured to your company's specifications as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in medical devices, nuclear power control equipment, aerospace equipment, fire and security systems, or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required. If the product is to be used in any of the above applications, we will need to enter into a separate product liability agreement.

- 1) We cannot accept responsibility for any defect, which may arise from additional manufacturing of the product (including disassembly and reassembly), after product delivery.
- 2) We cannot accept responsibility for any defect, which may arise after the application of strong external force to the product.
- 3) We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed your company's acceptance inspection procedures.
- 4) When the product is in CFL models, CFL service life and brightness will vary according to the performance of the inverter used, leaks, etc. We cannot accept responsibility for product performance, reliability, or defect, which may arise.
- 5) We cannot accept responsibility for intellectual property of a third party, which may arise through the application of our product to your assembly with exception to those issues relating directly to the structure or method of manufacturing of our product.
- 6) We will not be held responsible for any quality guarantee issue for defect products judged As KYOCERA-origin in 2 (two) years from our production or 1(one) year from KYOCERA Group delivery whichever is shorter.  
However, priority is given to the contents of the "part (product) basic contract document" concluded in both.

**Revision record**

| Date     |      | Designed by : Engineering dept. |              |          | Confirmed by : QA dept. |          |
|----------|------|---------------------------------|--------------|----------|-------------------------|----------|
|          |      | Prepared                        | Checked      | Approved | Checked                 | Approved |
|          |      |                                 |              |          |                         |          |
| Rev. No. | Date | Page                            | Descriptions |          |                         |          |
|          |      |                                 |              |          |                         |          |

## 1. Application

This specification applies to TFT-LCD module 「with Touch Panel」  
(T-55343GD035JU-LW-AJN)

## 2. General Specifications

Screen Size : 3.5 inches (8.9cm) Diagonal

Active Area : 70.08(W) x 52.56(H) mm

Display Format : 320(W) x 3[R.G.B] x 240(H)

Pixel Size : 0.073 x 3[R.G.B](W) x 0.219(H) mm

Pixel Arrangement : RGB-Stripe

Color Depth : 16M colors

Display Mode : Normally White

Viewing Direction : 12 O'clock (1 Angle of Least Color Inversion)

Surface Treatment : AG Coating

Interface : 24-bit Digital RGB interface(8-bit / color)

Outline Dimension : 79.0(W) x 65.0(H) x 4.8Max\*(D) mm  
\*Without FPC and Component Area

Weight : 46.5gmax

Backlight : LED Backlight / White

RoHS regulation : To our best knowledge, this product satisfies material requirement of RoHS regulation.  
Our company is doing the best efforts to obtain the equivalent certificate from our suppliers.

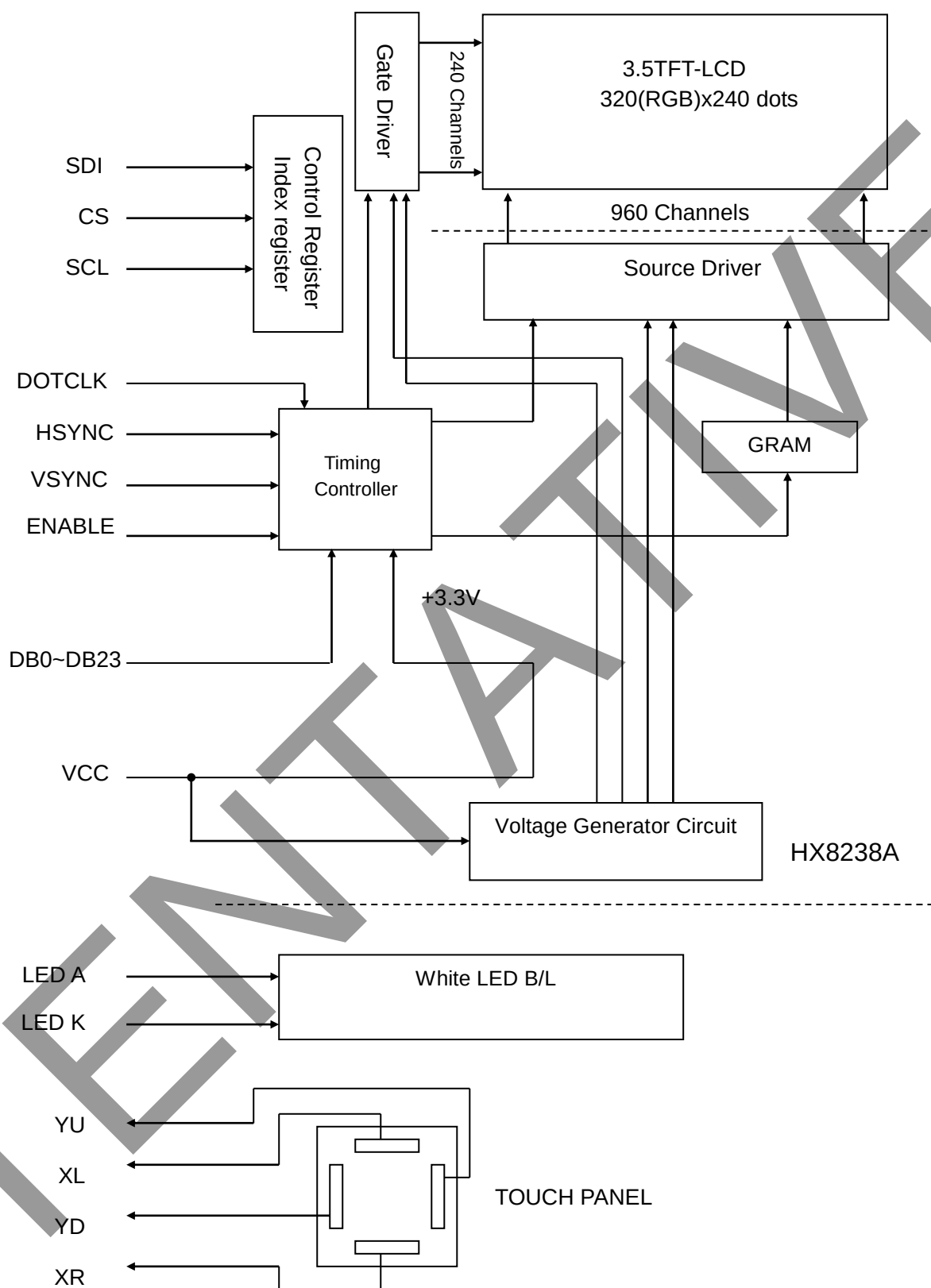
## 3. Operating Conditions

| Item                        | Conditions    | Temperature range | Remark |
|-----------------------------|---------------|-------------------|--------|
| Operating temperature range | Panel surface | -20~70°C          | Note1  |
| Storage temperature range   | Panel surface | -30~80°C          |        |

Note1: Operating temperature range defines the operation only and the contrast, response time

and other display optical characteristics are set at Ta=+25°C.

#### 4. Block Diagram



## 5. I/O Terminal

### 5.1 CN1 Pin Assignment

Used FPC : P0.5mm, 40pin,T=0.3mm

Corresponding Connector : 6240 Series (ELCO)

| No. | Symbol | Functional Description                            |
|-----|--------|---------------------------------------------------|
| 1   | RL     | Input to select Source driver Datashift direction |
| 2   | TB     | Input to select Gate driver Datashift direction   |
| 3   | DOTCLK | Clock Signal                                      |
| 4   | VSYNC  | Vertical Sync Input                               |
| 5   | HSYNC  | Horizontal Sync Input                             |
| 6   | ENABLE | Input Data Enable Control                         |
| 7   | DB23   | Data Signal Graphic Display Data Red-data (MSB)   |
| 8   | DB22   | Data Signal Graphic Display Data Red-data         |
| 9   | DB21   | Data Signal Graphic Display Data Red-data         |
| 10  | DB20   | Data Signal Graphic Display Data Red-data         |
| 11  | DB19   | Data Signal Graphic Display Data Red-data         |
| 12  | DB18   | Data Signal Graphic Display Data Red-data         |
| 13  | DB17   | Data Signal Graphic Display Data Red-data         |
| 14  | DB16   | Data Signal Graphic Display Data Red-data (LSB)   |
| 15  | GND    | Power Supply (0V, GND)                            |
| 16  | DB15   | Data Signal Graphic Display Data Green-data (MSB) |
| 17  | DB14   | Data Signal Graphic Display Data Green-data       |
| 18  | DB13   | Data Signal Graphic Display Data Green-data       |
| 19  | DB12   | Data Signal Graphic Display Data Green-data       |
| 20  | DB11   | Data Signal Graphic Display Data Green-data       |
| 21  | DB10   | Data Signal Graphic Display Data Green-data       |
| 22  | DB9    | Data Signal Graphic Display Data Green-data       |
| 23  | DB8    | Data Signal Graphic Display Data Green-data (LSB) |
| 24  | GND    | Power Supply (0V, GND)                            |
| 25  | DB7    | Data Signal Graphic Display Data Blue-data (MSB)  |
| 26  | DB6    | Data Signal Graphic Display Data Blue-data        |
| 27  | DB5    | Data Signal Graphic Display Data Blue-data        |
| 28  | DB4    | Data Signal Graphic Display Data Blue-data        |
| 29  | DB3    | Data Signal Graphic Display Data Blue-data        |
| 30  | DB2    | Data Signal Graphic Display Data Blue-data        |
| 31  | DB1    | Data Signal Graphic Display Data Blue-data        |
| 32  | DB0    | Data Signal Graphic Display Data Blue-data (LSB)  |

|    |       |                                         |
|----|-------|-----------------------------------------|
| 33 | SDI   | Serial Interface Data                   |
| 34 | SCL   | Serial Interface Clock                  |
| 35 | CS    | Serial Interface Chip Select L : Active |
| 36 | RESET | System RESET L : Reset                  |
| 37 | SDO   | Serial Interface Data                   |
| 38 | GND   | Power Supply (0V, GND)                  |
| 39 | VCC   | Power Supply for System                 |
| 40 | VCC   | Power Supply for System                 |

### 5.2. CN2 Pin Assignment

Used FPC : P0.5mm, 3pin,T=0.2mm

Corresponding Connector : 6298 Series (ELCO)

| No. | Symbol | Functional Description |
|-----|--------|------------------------|
| 1   | LED A  | LED Anode Terminal     |
| 2   | NC     | Non Connection         |
| 3   | LED K  | LED Cathode Terminal   |

### 5.3. CN3 Pin Assignment

Used FPC : P1.0mm, 4pin,T=0.3mm

Corresponding Connector : 6227 Series (ELCO)

| No. | Symbol | Functional Description  |
|-----|--------|-------------------------|
| 1   | YU     | Y [TTS- 12o'clock side] |
| 2   | XL     | X [TTS- left side]      |
| 3   | YD     | Y [TTS- 6o'clock side]  |
| 4   | XR     | X [TTS- right side]     |

## 6. Electrical Specifications

### 6.1 Absolute Maximum Ratings

Ta=-20~70°C, GND=0V

| Parameter      | Symbol | Conditions | Min.    | Max. | Units |
|----------------|--------|------------|---------|------|-------|
| Supply Voltage | VCC    | -          | -0.3    | 4.0  | V     |
| Input Voltage  | VIN    |            | GND-0.3 | 4.0  | V     |

## 6.2 DC Characteristics

Ta=-20~70°C, GND=0V

| Parameter                  | Symbol | Conditions   | Min.   | Typ. | Max.   | Units |
|----------------------------|--------|--------------|--------|------|--------|-------|
| Supply Voltage for System  | VCC    | -            | 3.0    | 3.3  | 3.6    | V     |
| "High" Level Input Voltage | VIH    | -            | 0.8VCC | -    | VCC    | V     |
| "Low" Level Input Voltage  | VIL    | -            | 0      | -    | 0.2VCC | V     |
| High Level Output Voltage  | VOH    | -            | 0.9VCC | -    | VCC    | V     |
| Low Level Output Voltage   | VOL    | -            | 0      | -    | 0.1VCC | V     |
| Operating mode Current     | ICC    | VCC-GND=3.3V | -      | 11.0 | 16.5   | mA    |

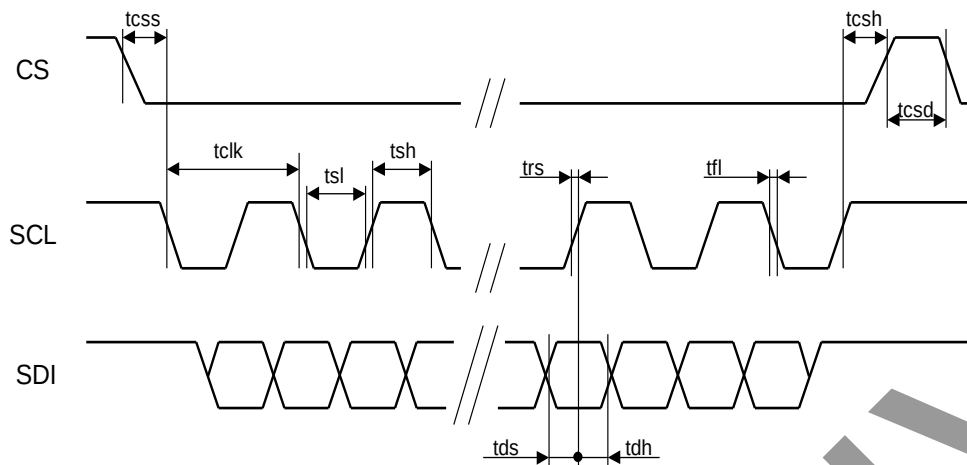
## 6.3 AC Characteristics

## 6.3.1 Serial Interface Timing Characteristics

Ta=-20~70°C, GND=0V

| Parameter                   | Symbol | Min. | Typ. | Max. | Units |
|-----------------------------|--------|------|------|------|-------|
| Serial Clock Cycle Time     | tclk   | 50   | -    | -    | ns    |
| Clock Low Width             | tsl    | 25   | -    | -    | ns    |
| Clock High Width            | tsh    | 25   | -    | -    | ns    |
| Clock Rising Time           | trs    | -    | -    | 30   | ns    |
| Clock falling Time          | tfl    | -    | -    | 30   | ns    |
| Chip Select Setup Time      | tcss   | 0    | -    | -    | ns    |
| Chip Select Hold Time       | tcsh   | 10   | -    | -    | ns    |
| Chip Select High Delay Time | tcsd   | 20   | -    | -    | ns    |
| Data Setup Time             | tds    | 5    | -    | -    | ns    |
| Data Hold Time              | tdh    | 10   | -    | -    | ns    |

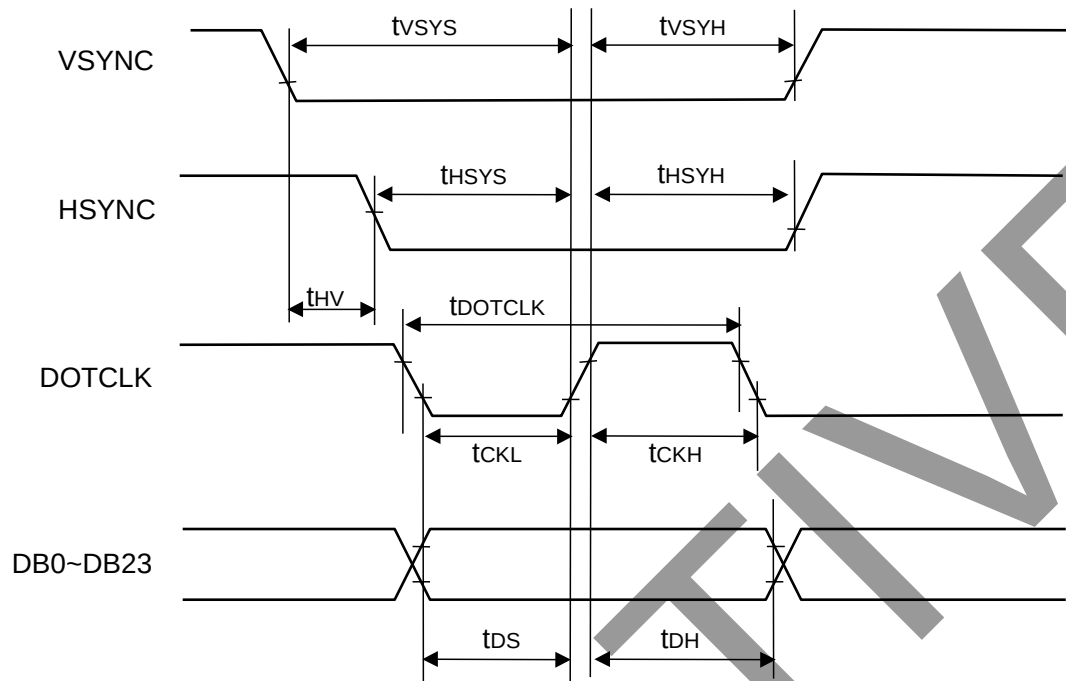




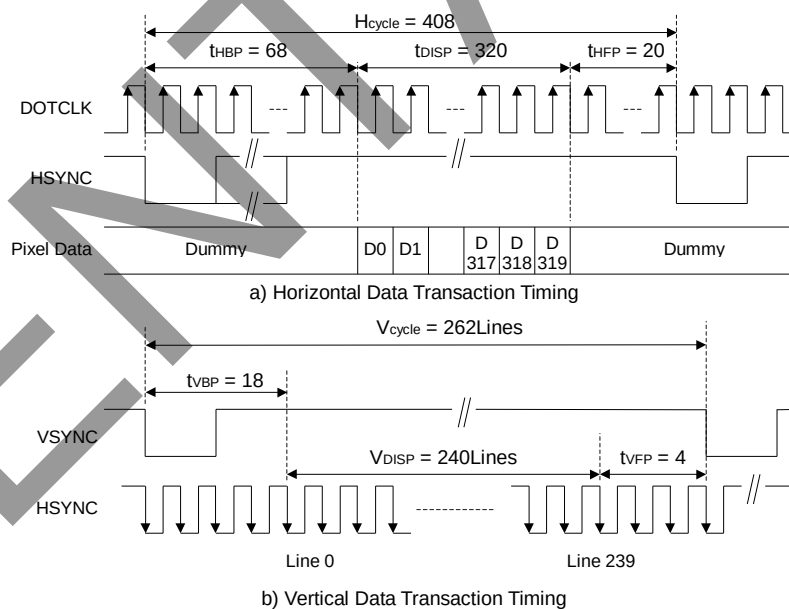
### 6.3.2 Digital RGB Interface Timing Characteristics

$T_a = -20 \sim 70^\circ\text{C}$ , GND=0V

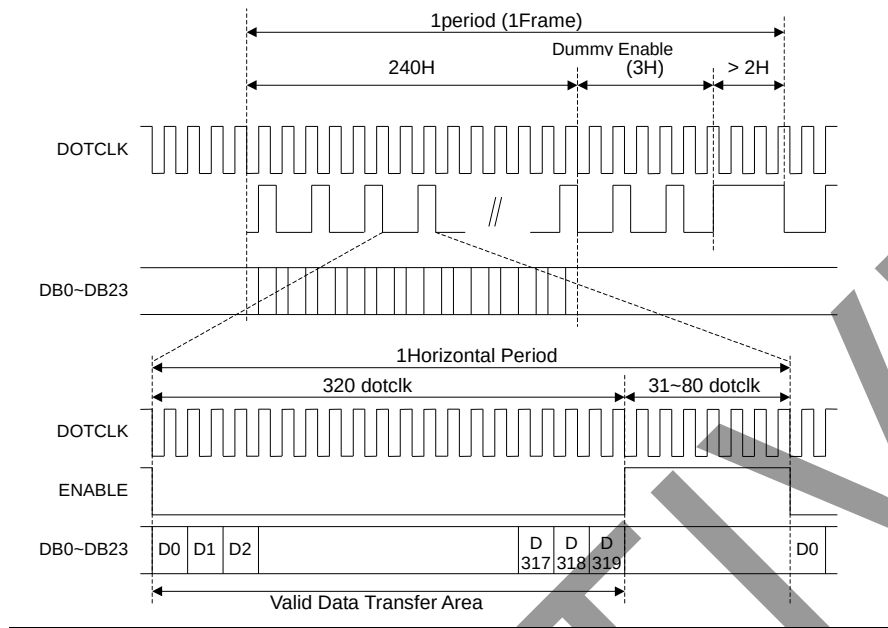
| Parameter                                    | Symbol              | Min. | Typ. | Max. | Units               |
|----------------------------------------------|---------------------|------|------|------|---------------------|
| DOTCLK Frequency                             | $f_{\text{DOTCLK}}$ | -    | 6.5  | 10   | MHz                 |
| DOTCLK Cycle Time                            | $t_{\text{DOTCLK}}$ | 100  | 154  | -    | ns                  |
| Vertical Sync Setup Time                     | $t_{\text{VSY S}}$  | 20   | -    | -    | ns                  |
| Vertical Sync Hold Time                      | $t_{\text{VSY H}}$  | 20   | -    | -    | ns                  |
| Horizontal Sync Setup Time                   | $t_{\text{HSY S}}$  | 20   | -    | -    | ns                  |
| Horizontal Sync Hold Time                    | $t_{\text{HSY H}}$  | 20   | -    | -    | ns                  |
| Phase difference of Sync Signal Falling Edge | $t_{\text{HV}}$     | 1    | -    | 240  | $t_{\text{DOTCLK}}$ |
| DOTCLK Low Width                             | $t_{\text{CKL}}$    | 50   | -    | -    | ns                  |
| DOTCLK High Width                            | $t_{\text{CKH}}$    | 50   | -    | -    | ns                  |
| Data Setup Time                              | $t_{\text{DS}}$     | 12   | -    | -    | ns                  |
| Data Hold Time                               | $t_{\text{DH}}$     | 12   | -    | -    | ns                  |



### 6.3.3 Data Transaction Timing in Parallel RGB Interface (SYNC Mode)



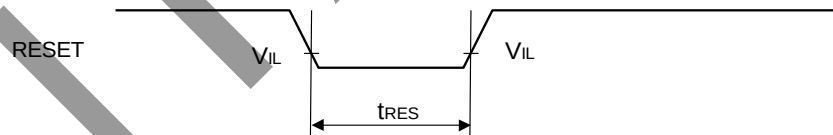
### 6.3.4 Data Transaction Timing in Parallel RGB Interface (ENABLE Mode)



### 6.3.5 Reset Timing Characteristics

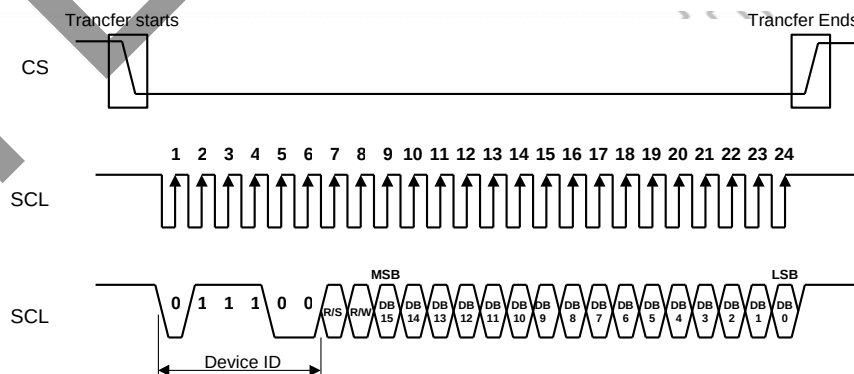
$T_a = -20 \sim 70^\circ\text{C}$ , GND=0V

| Parameter             | Symbol   | Min. | Typ. | Max. | Units         |
|-----------------------|----------|------|------|------|---------------|
| Reset "L" Pulse Width | $t_{RW}$ | 10   | -    | -    | $\mu\text{s}$ |

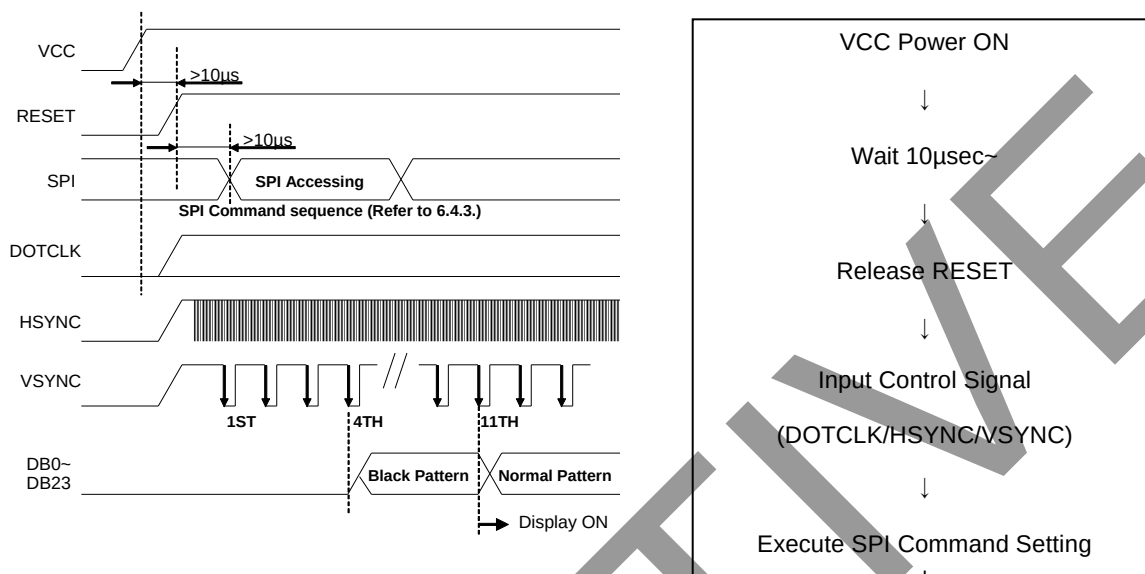


## 6.4 Power ON Sequence

### 6.4.1 Data Transfer of SPI



#### 6.4.2 Power ON Procedure (Recommended Sequence)



#### 6.4.3 Command List for Power ON (Recommended Setting)

| Setting Item                  | Index  | Value  |
|-------------------------------|--------|--------|
| Driver Output                 | 0001 h | 6300 h |
| LCD Driver AC Control         | 0002 h | 0200 h |
| Power Control (1)             | 0003 h | 6064 h |
| Data and Color Filter Control | 0004 h | 0447 h |
| Function Control              | 0005 h | B084 h |
| Contrast/ Brightness Control  | 000A h | 4008 h |
| Frame Cycle Control           | 000B h | D400 h |
| Power Control (2)             | 000D h | 423D h |
| Power Control (3)             | 000E h | 3140 h |
| Gate Scan Starting Position   | 000F h | 0000 h |
| Horizontal Porch              | 0016 h | 9F80 h |
| Vertical Porch                | 0017 h | 2212 h |
| Power Control (4)             | 001E h | 00DB h |
| Gamma Control 1               | 0030 h | 0000 h |
| Gamma Control 2               | 0031 h | 0607 h |
| Gamma Control 3               | 0032 h | 0006 h |
| Gamma Control 4               | 0033 h | 0307 h |
| Gamma Control 5               | 0034 h | 0107 h |
| Gamma Control 6               | 0035 h | 0001 h |
| Gamma Control 7               | 0036 h | 0707 h |
| Gamma Control 8               | 0037 h | 0703 h |
| Gamma Control 9               | 003A h | 0C00 h |
| Gamma Control 10              | 003B h | 0006 h |

## 6.4.4 Color Data Assignment

## 1) 8-bit / color

| COLOR          | INPUT<br>DATA | R DATA                 |          |          |          |          |          |          |          | G DATA                |          |          |          |          |          |         |         | B DATA               |         |         |         |         |         |         |         |
|----------------|---------------|------------------------|----------|----------|----------|----------|----------|----------|----------|-----------------------|----------|----------|----------|----------|----------|---------|---------|----------------------|---------|---------|---------|---------|---------|---------|---------|
|                |               | MSB(DB23)<br>LSB(DB16) |          |          |          |          |          |          |          | MSB(DB15)<br>LSB(DB8) |          |          |          |          |          |         |         | MSB(DB7)<br>LSB(DB0) |         |         |         |         |         |         |         |
|                |               | DB<br>23               | DB<br>22 | DB<br>21 | DB<br>20 | DB<br>19 | DB<br>18 | DB<br>17 | DB<br>16 | DB<br>15              | DB<br>14 | DB<br>13 | DB<br>12 | DB<br>11 | DB<br>10 | DB<br>9 | DB<br>8 | DB<br>7              | DB<br>6 | DB<br>5 | DB<br>4 | DB<br>3 | DB<br>2 | DB<br>1 | DB<br>0 |
| BASIC<br>COLOR | BLACK         | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                | RED (255)     | 1                      | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                | GREEN (255)   | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 1                     | 1        | 1        | 1        | 1        | 1        | 1       | 1       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                | BLUE (255)    | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 1                    | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
|                | CYAN          | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 1                     | 1        | 1        | 1        | 1        | 1        | 1       | 1       | 1                    | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
|                | MAGENTA       | 1                      | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 1                    | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
|                | YELLOW        | 1                      | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1                     | 1        | 1        | 1        | 1        | 1        | 1       | 1       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                | WHITE         | 1                      | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1                     | 1        | 1        | 1        | 1        | 1        | 1       | 1       | 1                    | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| RED            | RED (0)       | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                | RED (1)       | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 1        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                | RED (2)       | 0                      | 0        | 0        | 0        | 0        | 0        | 1        | 0        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                |               |                        |          |          |          |          |          |          |          |                       |          |          |          |          |          |         |         |                      |         |         |         |         |         |         |         |
|                |               |                        |          |          |          |          |          |          |          |                       |          |          |          |          |          |         |         |                      |         |         |         |         |         |         |         |
|                | RED (254)     | 1                      | 1        | 1        | 1        | 1        | 1        | 1        | 0        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                | RED (255)     | 1                      | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
| GREEN          | GREEN (0)     | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                | GREEN (1)     | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 1       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                | GREEN (2)     | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0                     | 0        | 0        | 0        | 0        | 0        | 1       | 0       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                |               |                        |          |          |          |          |          |          |          |                       |          |          |          |          |          |         |         |                      |         |         |         |         |         |         |         |
|                |               |                        |          |          |          |          |          |          |          |                       |          |          |          |          |          |         |         |                      |         |         |         |         |         |         |         |
|                | GREEN (254)   | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 1                     | 1        | 1        | 1        | 1        | 1        | 1       | 0       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                | GREEN (255)   | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 1                     | 1        | 1        | 1        | 1        | 1        | 1       | 1       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
| BLUE           | BLUE (0)      | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                | BLUE (1)      | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 0                    | 0       | 0       | 0       | 0       | 0       | 0       | 1       |
|                | BLUE (2)      | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 0                    | 0       | 0       | 0       | 0       | 0       | 1       | 0       |
|                |               |                        |          |          |          |          |          |          |          |                       |          |          |          |          |          |         |         |                      |         |         |         |         |         |         |         |
|                |               |                        |          |          |          |          |          |          |          |                       |          |          |          |          |          |         |         |                      |         |         |         |         |         |         |         |
|                | BLUE (254)    | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 1                    | 1       | 1       | 1       | 1       | 1       | 1       | 0       |
|                | BLUE (255)    | 0                      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0                     | 0        | 0        | 0        | 0        | 0        | 0       | 0       | 1                    | 1       | 1       | 1       | 1       | 1       | 1       | 1       |

[Note]

## 1) Definition of gray scale

Color (n) --- n indicates gray scale level.

Higher n means brighter level.

## 2) Data 1:High, 0: Low

## 2) 6-bit / color

| COLOR          | INPUT<br>DATA | R DATA                 |      |      |      |      |      | G DATA                 |      |      |      |      |      | B DATA               |     |     |     |     |     |
|----------------|---------------|------------------------|------|------|------|------|------|------------------------|------|------|------|------|------|----------------------|-----|-----|-----|-----|-----|
|                |               | MSB(DB23)<br>LSB(DB18) |      |      |      |      |      | MSB(DB15)<br>LSB(DB10) |      |      |      |      |      | MSB(DB7)<br>LSB(DB2) |     |     |     |     |     |
|                |               | DB23                   | DB22 | DB21 | DB20 | DB19 | DB18 | DB15                   | DB14 | DB13 | DB12 | DB11 | DB10 | DB7                  | DB6 | DB5 | DB4 | DB3 | DB2 |
| BASIC<br>COLOR | BLACK         | 0                      | 0    | 0    | 0    | 0    | 0    | 0                      | 0    | 0    | 0    | 0    | 0    | 0                    | 0   | 0   | 0   | 0   | 0   |
|                | RED (63)      | 1                      | 1    | 1    | 1    | 1    | 1    | 0                      | 0    | 0    | 0    | 0    | 0    | 0                    | 0   | 0   | 0   | 0   | 0   |
|                | GREEN (63)    | 0                      | 0    | 0    | 0    | 0    | 0    | 1                      | 1    | 1    | 1    | 1    | 1    | 0                    | 0   | 0   | 0   | 0   | 0   |
|                | BLUE (63)     | 0                      | 0    | 0    | 0    | 0    | 0    | 0                      | 0    | 0    | 0    | 0    | 0    | 1                    | 1   | 1   | 1   | 1   | 1   |
|                | CYAN          | 0                      | 0    | 0    | 0    | 0    | 0    | 1                      | 1    | 1    | 1    | 1    | 1    | 1                    | 1   | 1   | 1   | 1   | 1   |
|                | MAGENTA       | 1                      | 1    | 1    | 1    | 1    | 1    | 0                      | 0    | 0    | 0    | 0    | 0    | 1                    | 1   | 1   | 1   | 1   | 1   |
|                | YELLOW        | 1                      | 1    | 1    | 1    | 1    | 1    | 1                      | 1    | 1    | 1    | 1    | 1    | 0                    | 0   | 0   | 0   | 0   | 0   |
|                | WHITE         | 1                      | 1    | 1    | 1    | 1    | 1    | 1                      | 1    | 1    | 1    | 1    | 1    | 1                    | 1   | 1   | 1   | 1   | 1   |
| RED            | RED (0)       | 0                      | 0    | 0    | 0    | 0    | 0    | 0                      | 0    | 0    | 0    | 0    | 0    | 0                    | 0   | 0   | 0   | 0   | 0   |
|                | RED (1)       | 0                      | 0    | 0    | 0    | 0    | 1    | 0                      | 0    | 0    | 0    | 0    | 0    | 0                    | 0   | 0   | 0   | 0   | 0   |
|                | RED (2)       | 0                      | 0    | 0    | 0    | 1    | 0    | 0                      | 0    | 0    | 0    | 0    | 0    | 0                    | 0   | 0   | 0   | 0   | 0   |
|                |               |                        |      |      |      |      |      |                        |      |      |      |      |      |                      |     |     |     |     |     |
|                | RED (62)      | 1                      | 1    | 1    | 1    | 1    | 0    | 0                      | 0    | 0    | 0    | 0    | 0    | 0                    | 0   | 0   | 0   | 0   | 0   |
|                | RED (63)      | 1                      | 1    | 1    | 1    | 1    | 1    | 0                      | 0    | 0    | 0    | 0    | 0    | 0                    | 0   | 0   | 0   | 0   | 0   |
| GREEN          | GREEN (0)     | 0                      | 0    | 0    | 0    | 0    | 0    | 0                      | 0    | 0    | 0    | 0    | 0    | 0                    | 0   | 0   | 0   | 0   | 0   |
|                | GREEN (1)     | 0                      | 0    | 0    | 0    | 0    | 0    | 0                      | 0    | 0    | 0    | 0    | 1    | 0                    | 0   | 0   | 0   | 0   | 0   |
|                | GREEN (2)     | 0                      | 0    | 0    | 0    | 0    | 0    | 0                      | 0    | 0    | 0    | 1    | 0    | 0                    | 0   | 0   | 0   | 0   | 0   |
|                |               |                        |      |      |      |      |      |                        |      |      |      |      |      |                      |     |     |     |     |     |
|                | GREEN (62)    | 0                      | 0    | 0    | 0    | 0    | 0    | 1                      | 1    | 1    | 1    | 1    | 0    | 0                    | 0   | 0   | 0   | 0   | 0   |
|                | GREEN (63)    | 0                      | 0    | 0    | 0    | 0    | 0    | 1                      | 1    | 1    | 1    | 1    | 1    | 0                    | 0   | 0   | 0   | 0   | 0   |
| BLUE           | BLUE (0)      | 0                      | 0    | 0    | 0    | 0    | 0    | 0                      | 0    | 0    | 0    | 0    | 0    | 0                    | 0   | 0   | 0   | 0   | 0   |
|                | BLUE (1)      | 0                      | 0    | 0    | 0    | 0    | 0    | 0                      | 0    | 0    | 0    | 0    | 0    | 0                    | 0   | 0   | 0   | 0   | 1   |
|                | BLUE (2)      | 0                      | 0    | 0    | 0    | 0    | 0    | 0                      | 0    | 0    | 0    | 0    | 0    | 0                    | 0   | 0   | 0   | 1   | 0   |
|                |               |                        |      |      |      |      |      |                        |      |      |      |      |      |                      |     |     |     |     |     |
|                | BLUE (62)     | 0                      | 0    | 0    | 0    | 0    | 0    | 0                      | 0    | 0    | 0    | 0    | 0    | 1                    | 1   | 1   | 1   | 1   | 0   |
|                | BLUE (63)     | 0                      | 0    | 0    | 0    | 0    | 0    | 0                      | 0    | 0    | 0    | 0    | 0    | 1                    | 1   | 1   | 1   | 1   | 1   |

[Note]

1) Definition of gray scale

Color (n) --- n indicates gray scale level.

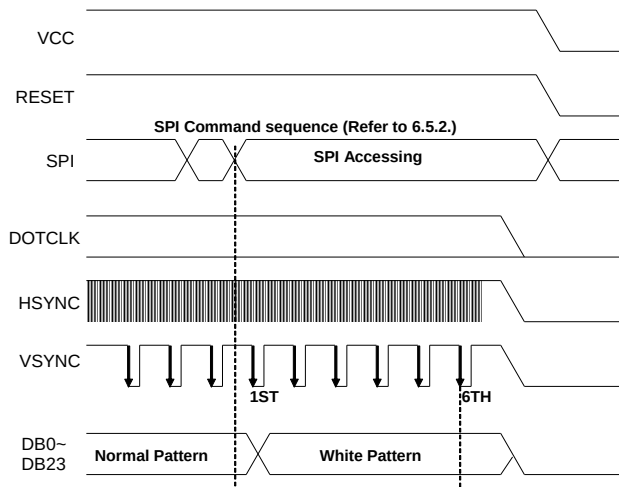
Higher n means brighter level.

2) Data 1:High, 0: Low

3) In case of 6bit / color Lower 2bit at each color (DB17, DB16, DB9, DB8, DB1, DB0) must be connected to GND.

## 6.5 Power OFF Sequence

### 6.5.1 Power OFF Procedure (Recommended Sequence)



Execute SPI Command Setting

Input White Data

LCD Display OFF after 6 frames

Stop Control Signal

### 6.5.2 Command List for Power OFF (Recommended Setting)

| Setting Item      | Index  | Value  |
|-------------------|--------|--------|
| Power Control (1) | 0003 h | 0100 h |

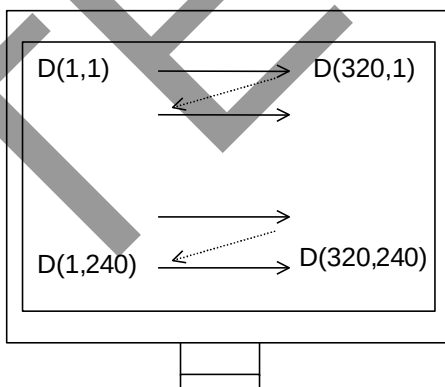
## 6.6 Inverted Scan Capability

This module has the capability of inverting scan direction by signaling from controller.

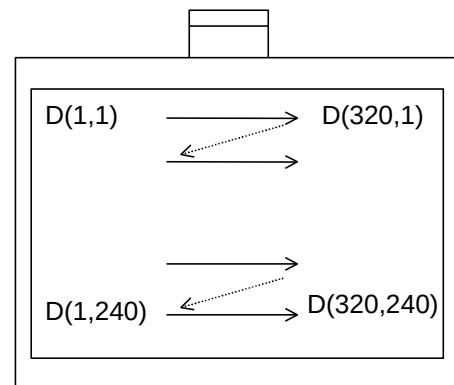
Note: Scan direction cannot be changed during operation.

The following drawing shows the relationship between the viewing direction and the scan direction.

Normal scan (TB: H RL: H)



Reverse scan (TB: L RL: L)



## 6.7 Lighting Specifications

### 6.7.1 Absolute Maximum Ratings

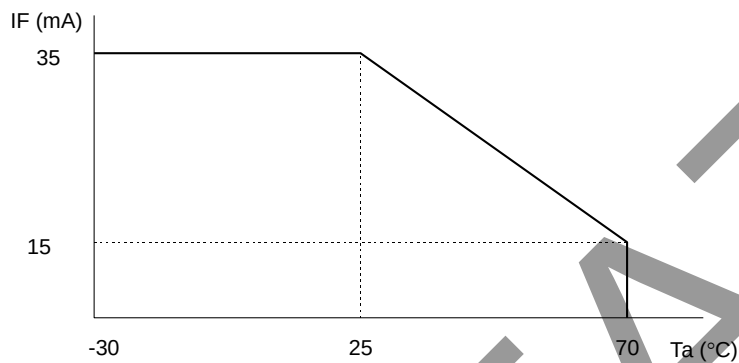
$T_a=25^{\circ}\text{C}$

| Parameter                 | Symbol | Conditions | Min. | Typ. | Max. | Units         |
|---------------------------|--------|------------|------|------|------|---------------|
| Forward Current           | $I_F$  | Note 2     | -    | -    | 35   | mA            |
| Allowable Reverse Current | $I_R$  | -          | -    | -    | 50   | $\mu\text{A}$ |
| LED Power Dissipation     | $P_D$  | -          | -    | -    | 123  | mW            |

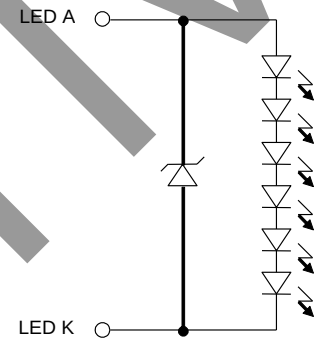
Note 1 : This value is for each 1 line.

Note 2: Refer to the forward current derating curve.

【Forward Current Derating Curve】



【LED Circuit】



### 6.7.2 Operating Characteristics

$T_a=25^{\circ}\text{C}$

| Parameter       | Symbol | Conditions                         | Min. | Typ. | Max. | Units |
|-----------------|--------|------------------------------------|------|------|------|-------|
| Forward Current | $I_F$  | Note1                              | -    | -    | 20   | mA    |
| Forward Voltage | $V_F$  | $I_F=20\text{mA} / 1 \text{ line}$ | -    | 19.2 | -    | V     |
| Power           | $P_L$  |                                    |      |      | 0.39 | W     |

Note1: Current of LED per chip must be lower than 15mA at 70 degC.

The current of LED must be tuned to satisfy as Forward Current Derating Curve mentioned relationship



## 6.8 Touch Panel Specifications

### 6.8.1. Touch Panel Characteristics

Ta=-20~70°C

| Parameter                     |       | Min. | Typ. | Max. | Units | Conditions    |
|-------------------------------|-------|------|------|------|-------|---------------|
| Max Voltage                   |       | -    | -    | 5    | V     |               |
| Resistor between<br>Terminals | XL-XR | 200  | -    | 1000 | Ω     |               |
|                               | YU-YD | 200  |      | 500  | Ω     |               |
| Line Linearity                |       | -    | -    | ±1.5 | %     | Initial Value |
| Insulation Resistance         |       | 20   | -    | -    | MΩ    | At DC25V      |
| Operation Force               |       | 10   | -    | 100  | g     | Initial Value |

## 7. Optical Specifications

### 7.1 Optical Characteristic

| Item                        |       | Symbol         | Conditions            |        |    | Standard Value |       |      | Unit              | Method of Measure | Remark |
|-----------------------------|-------|----------------|-----------------------|--------|----|----------------|-------|------|-------------------|-------------------|--------|
|                             |       |                | $\theta$              | $\phi$ | C  | Min.           | Typ.  | Max. |                   |                   |        |
| (1)Brightness               |       | B              | 0°                    | 0°     |    | -              | 320   |      | Cd/m <sup>2</sup> | (Fig.1)           | Note1  |
| (2)Contrast                 |       | CR             | Optimum Viewing Angle |        |    | 400            | 700   | -    | -                 |                   |        |
| (3)Color Coordinates        | Red   | R <sub>x</sub> | 0°                    | 0°     |    | -              | 0.547 | -    |                   |                   |        |
|                             |       | R <sub>y</sub> | 0°                    | 0°     |    | -              | 0.375 | -    |                   |                   |        |
|                             | Green | G <sub>x</sub> | 0°                    | 0°     |    | -              | 0.347 | -    |                   |                   |        |
|                             |       | G <sub>y</sub> | 0°                    | 0°     |    | -              | 0.595 | -    |                   |                   |        |
|                             | Blue  | B <sub>x</sub> | 0°                    | 0°     |    | -              | 0.149 | -    |                   |                   |        |
|                             |       | B <sub>y</sub> | 0°                    | 0°     |    | -              | 0.101 | -    |                   |                   |        |
|                             | White | W <sub>x</sub> | 0°                    | 0°     |    | -              | 0.322 | -    |                   |                   |        |
|                             |       | W <sub>y</sub> | 0°                    | 0°     |    | -              | 0.358 | -    |                   |                   |        |
| (4)Brightness Uniformity    |       | -              | 0°                    | 0°     |    | 70             | -     | -    | %                 | (Fig.2)           |        |
| (5)Vertical Viewing Angle   | Up    | $\theta_U$     | -                     | 0°     | ≥5 | -              | 80    | -    | Degree            | (Fig.3)           |        |
|                             | Down  | $\theta_D$     | -                     | 0°     | ≥5 | -              | 80    | -    | Degree            |                   |        |
| (6)Horizontal Viewing Angle | Left  | $\phi_L$       | 0°                    | -      | ≥5 | -              | 80    | -    | Degree            |                   |        |
|                             | Right | $\phi_R$       | 0°                    | -      | ≥5 | -              | 80    | -    | Degree            |                   |        |
| (7)Response Time            | Rise  | $\tau_r$       | 0°                    | 0°     |    | -              | 8     | -    | ms                | (Fig.4)           |        |
|                             | Decay | $\tau_d$       | 0°                    | 0°     |    | -              | 15    | -    | ms                |                   |        |

Note1: Under the condition of maximum brightness

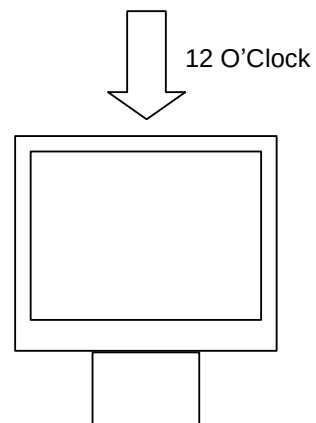
◆ Conditions for Measuring

◇ Environment: Dark room with no light or close to no light.

◇ Temperature: 25±5°C

◇ Humidity: 40~70%RH

◆ Optimal viewing angle (The angle of Least Color Inversion)



◆ Method of Brightness Measurement (Fig.1)

(1) Measuring Device

TOPCON BM-5, Measuring Field: 1°

(2) Measuring Point

Center of Display  $\theta=0^\circ, \phi=0^\circ$

On condition  $\theta$ : A vertical angle from measuring direction to perpendicular.

$\phi$ : A horizontal angle from measuring direction to perpendicular.

(3) Method of Measuring

Apply signal voltage (displayed in white) to maximize brightness and measure brightness B ( $\text{cd/m}^2$ ).

The distance between BM-5's front lens to surface panel is 500mm.

Measured after backlight has been lit for more than 30 minutes.

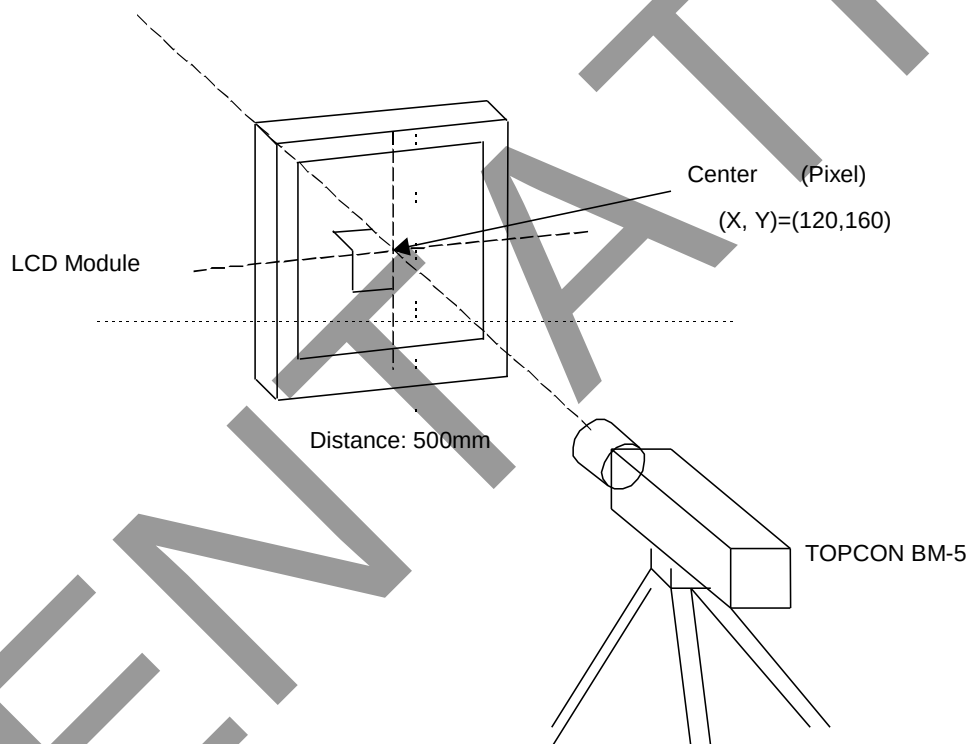


Fig. 1

◆ Method of Contrast Measurement (Fig.1)

(1) Measuring Device

TOPCON BM-5, Measuring Field: 1°

(2) Measuring Point

Center of display: same as Method of Brightness Measurement

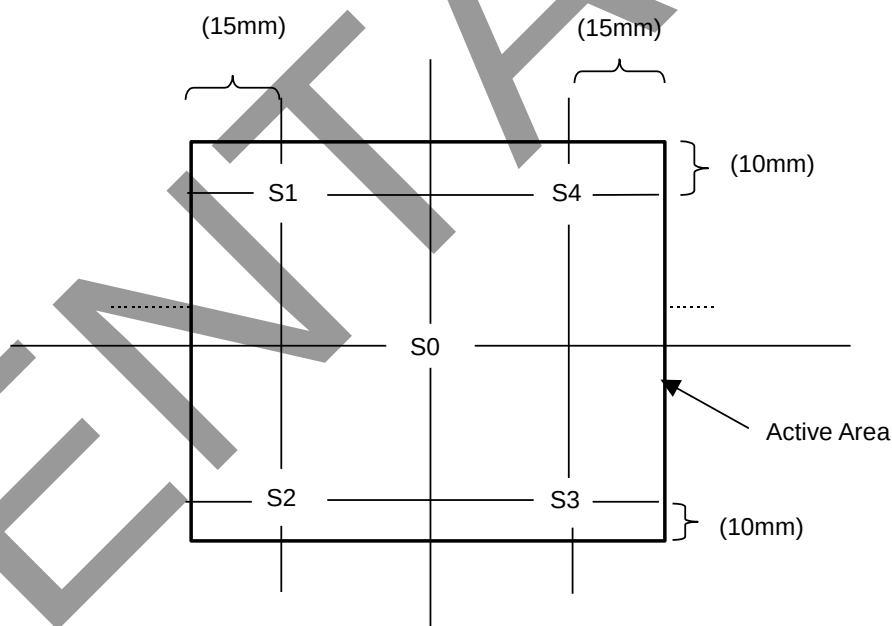
(3) Method of Measuring

- Set LCD module to  $\theta=0^\circ$ ,  $\phi=0^\circ$ .
- Change signal voltage to measure maximum brightness Y1 and minimum brightness Y2.
- Contrast is derived from  $CR=Y1/Y2$ .

◆ Definition of Brightness Uniformity (Fig.2)

Definition is calculated from the 5 points (S0-S4) on the diagram below.

$$\text{Standard value of Brightness Uniformity[\%]} = \frac{S0 \sim S4 \text{ MIN}}{S0 \sim S4 \text{ MAX}} \times 100$$



**Fig. 2**

◆ Method of Viewing Angle Measurement (Fig.3)

(1) Measuring Device

ELDIM EZ : CONTRAST

(2) Measuring Point

Center of display: Same as Method of Brightness Measurement

(3) Angle of Measuring

$\theta$  : An angle vertical to perpendicular line from the viewing direction.

$\phi$  : An angle horizontal to perpendicular from the viewing direction.

(4) Method of Measuring

Set the module on the rotation table and measure a vertical axis direction in the state that fixed  $\phi=0$  degrees horizontal axis direction to  $\theta=90$ degrees.

(Viewing angle is measured automatically by EZ CONTRAST).

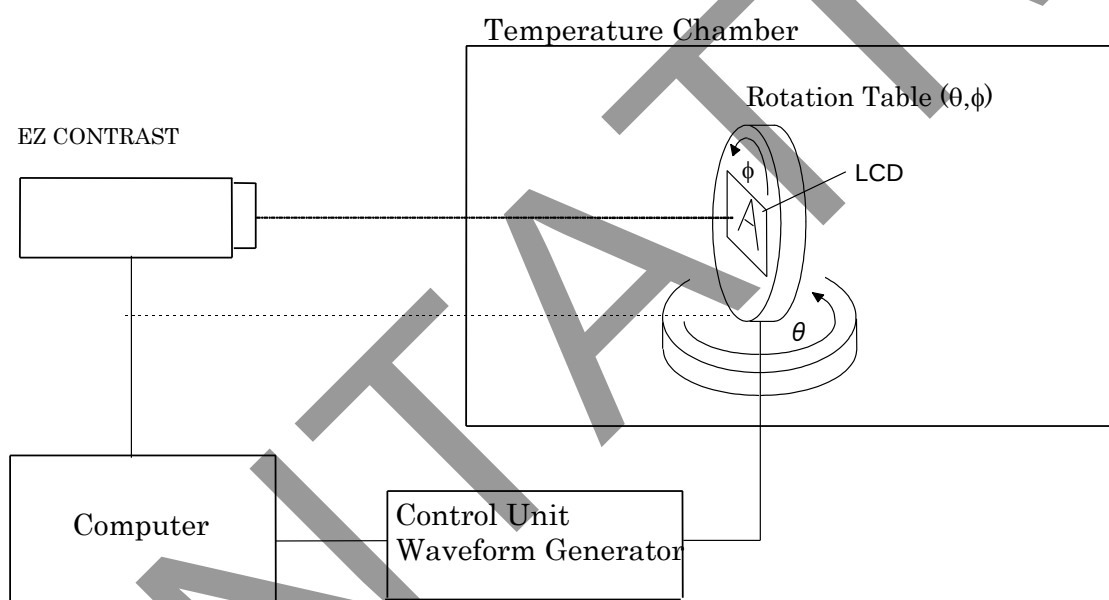


Fig. 3

◆ Measuring Response Time (Fig.4)

(1) Measuring Device

TOPCON BM-5 , Measuring Field: 1°

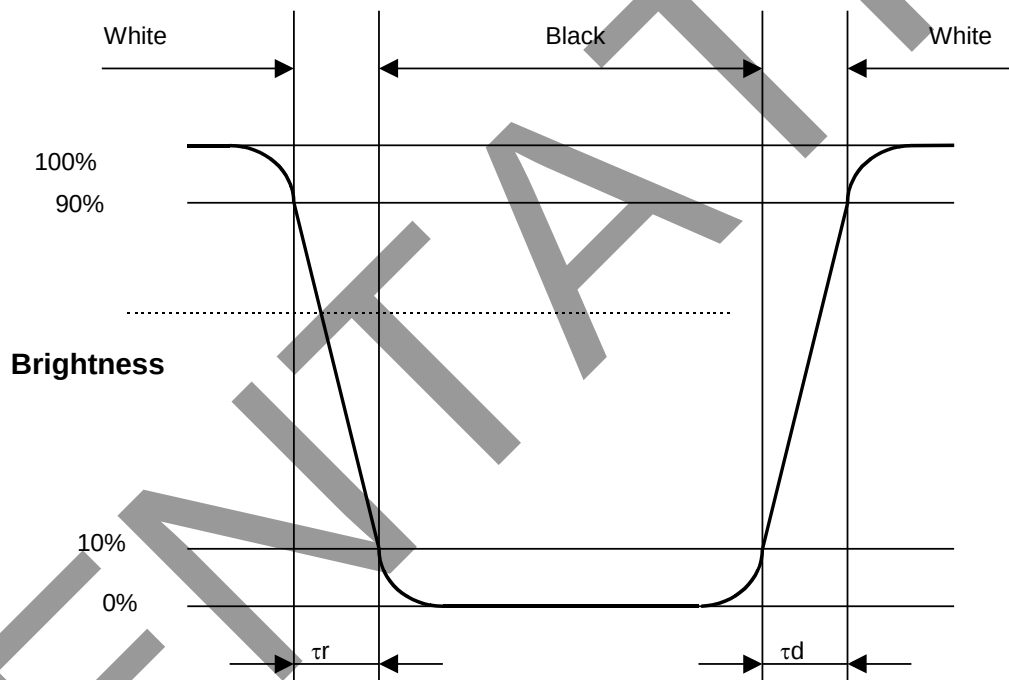
Tektronix Digital Oscilloscope

(2) Measuring Point

Center of display, same as Method of Brightness Measurement

(3) Method of Measuring

- Set LCD panel to  $\theta=0^\circ$ , and  $\phi=0^\circ$ .
- Input white→black→white to display by switching signal voltage.
- If the luminance is 0% and 100% immediately before the change of signal voltage, then  $\tau_r$  is optical response time during the change from 90% to 10% immediately after rise of signal voltage, and  $\tau_d$  is optical response time during the change from 10% to 90% immediately after decay of signal voltage.

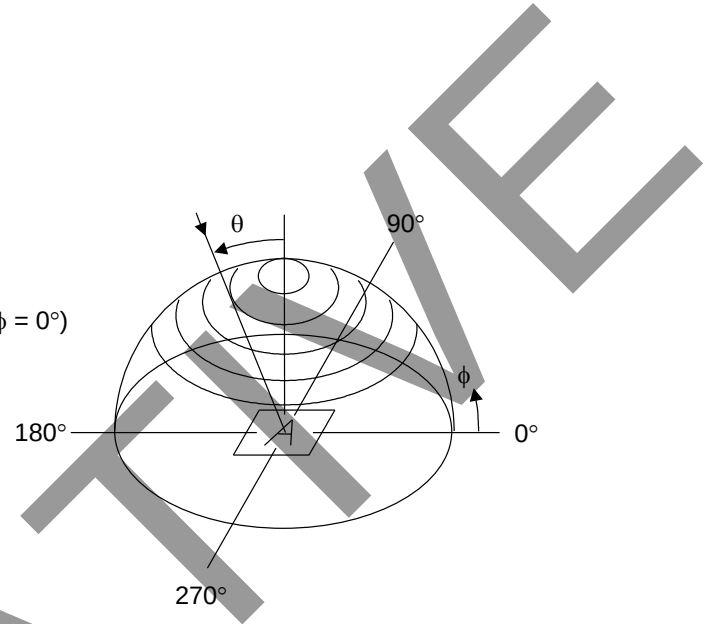
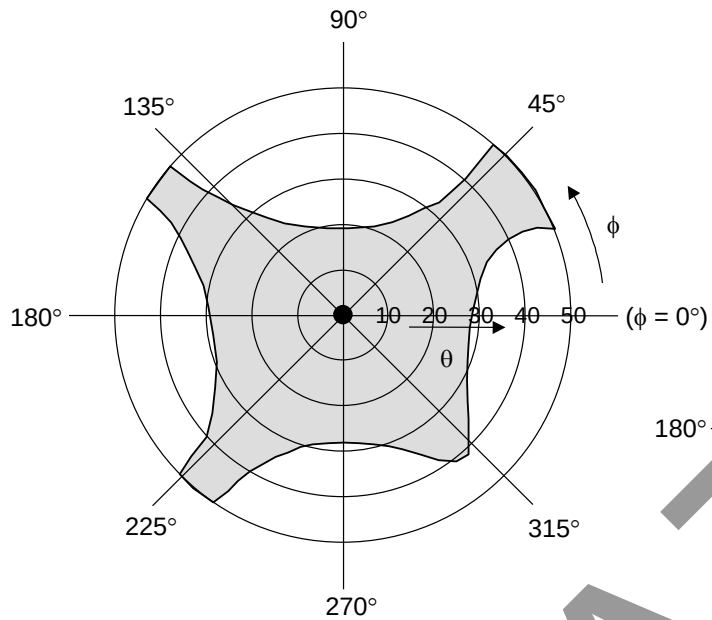


**Fig. 4**

## 7.2 Definition of Viewing Angle and Optimum Viewing Area

\*Point • shows the point where contrast ratio is measured. :  $\theta = 0^\circ$ ,  $\phi = -^\circ$

\*Driving condition: Ff=60Hz



\*Area  shows typ.  $CR \geq 30$

8. Test

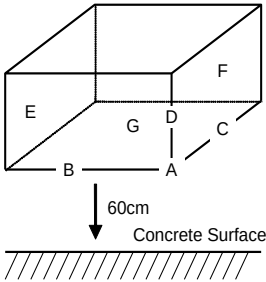
No abnormal function and appearance are found after the following tests.

Conditions: Unless otherwise specified, tests will be conducted under the following condition.

Temperature:  $20 \pm 5^{\circ}\text{C}$

Humidity :  $65 \pm 5\% \text{RH}$

tests will be not conducted under functioning state.

| No. | Parameter                  | Conditions                                                                                                                                                                                                                                                                                                              | Notes |
|-----|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1   | High Temperature Operating | $70^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , 96hrs (operation state)                                                                                                                                                                                                                                                    |       |
| 2   | Low Temperature Operating  | $-20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , 96hrs (operation state)                                                                                                                                                                                                                                                   | 1     |
| 3   | High Temperature Storage   | $80^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , 96hrs                                                                                                                                                                                                                                                                      | 2     |
| 4   | Low Temperature Storage    | $-30^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , 96hrs                                                                                                                                                                                                                                                                     | 1,2   |
| 5   | Damp Proof Test            | $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , 90~95%RH, 96hrs                                                                                                                                                                                                                                                            | 1,2   |
| 6   | Vibration Test             | Total fixed amplitude: 1.5mm<br>Vibration Frequency : 10~55Hz<br>One cycle 60 seconds to 3 directions of X, Y, Z<br>each 15 minutes                                                                                                                                                                                     | 3     |
| 7   | Shock Test                 | To be measured after dropping from 60cm<br>the concrete surface in packing state.<br><br> <p>Dropping method corner dropping<br/>A corner : once<br/>Edge dropping<br/>B,C,D edge : once<br/>Face dropping<br/>E,F,G face : once</p> |       |

Note 1 :No dew condensation to be observed.

Note 2 :The function test shall be conducted after 4 hours storage at the normal  
Temperature and humidity after removed from the test chamber.

Note 3 :Vibration test will be conducted to the product itself without putting it in a container.

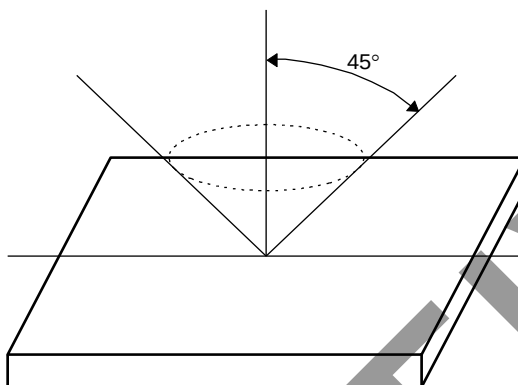


## 9. Appearance Standards

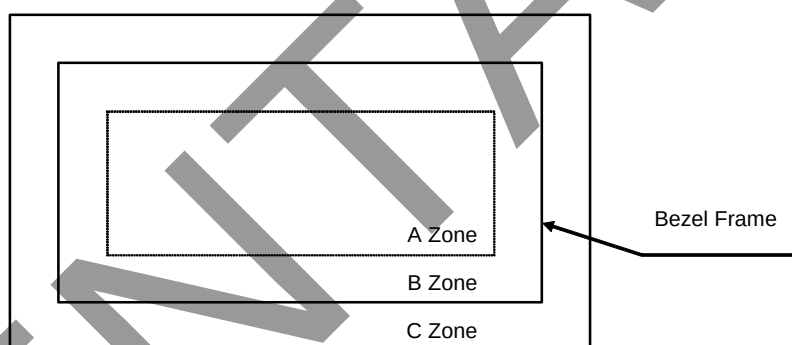
### 9.1 Inspection conditions

The distance between the eyes and the sample shall be more than 30cm.

All directions for inspecting the sample should be within 45° against perpendicular line.



### 9.2 Definition of applicable Zones



A Zone : Active display area

B Zone : Area from outside of "A Zone" to validity viewing area

C Zone : Rest parts

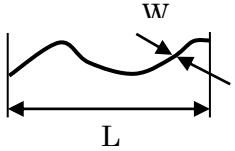
A Zone + B Zone = Validity viewing area

## 9.3 Standards

| No.                 | Parameter                                                                        | Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
|---------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------|------------|---|---------------------|---|----------|---------------|-------------------|---|-----------|---------------------|---|--|-----------|---|--|------|--|-------------------|--|--|-------|-------|---|---|---|---|---------------|-----------|--|-----------|--------------------|---------------------|---|--|--------------|---|-----------|--|
| 1                   | G Line                                                                           | Nothing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| 2                   | S Line                                                                           | Nothing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| 3                   | Leak                                                                             | Nothing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| 4                   | Bright and Dark dot                                                              | <table><tr><th colspan="2">Acceptable Number</th></tr><tr><td>Bright Dot</td><td>2</td></tr><tr><td>Adjacent Bright Dot</td><td>0</td></tr><tr><td>Dark Dot</td><td>3</td></tr><tr><td>Adjacent Dark Dot</td><td>1</td></tr><tr><td>Total</td><td>4</td></tr></table> <p>Definition of Bright dot<br/>Anything that can be seen through 10% transmittance ND filter black Signal is inputted.</p> <p>Adjacent Dot :Horizontal and Vertical Continuous Bright dots.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Acceptable Number |                   | Bright Dot | 2 | Adjacent Bright Dot | 0 | Dark Dot | 3             | Adjacent Dark Dot | 1 | Total     | 4                   |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| Acceptable Number   |                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| Bright Dot          | 2                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| Adjacent Bright Dot | 0                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| Dark Dot            | 3                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| Adjacent Dark Dot   | 1                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| Total               | 4                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| 5                   | Contrast Variation                                                               | Not to be conspicuous defects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| 6                   | Black and White Spots, Foreign Material in Polarizer and LR/AR Coat Bright point | <p>(1) Round Shape</p> <table><tr><th rowspan="2">Zone<br/>Dimension</th><th colspan="3">Acceptable Number</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td><math>D \leq 0.15</math></td><td colspan="2">Disregard</td><td rowspan="3">Disregard</td></tr><tr><td><math>0.15 &lt; D \leq 0.5</math></td><td colspan="2">4</td></tr><tr><td><math>0.5 &lt; D</math></td><td colspan="2">0</td></tr></table> <p><math>D = ( \text{Long} + \text{Short} ) / 2</math></p> <p>(2) Line Shape</p> <table><tr><th colspan="2">Zone</th><th colspan="3">Acceptable Number</th></tr><tr><th>X(mm)</th><th>Y(mm)</th><th>A</th><th>B</th><th>C</th></tr><tr><td>—</td><td><math>W \leq 0.05</math></td><td colspan="2">Disregard</td><td rowspan="3">Disregard</td></tr><tr><td><math>0.3 &lt; L \leq 2.0</math></td><td><math>0.05 &lt; W \leq 0.1</math></td><td colspan="2">2</td></tr><tr><td><math>L \leq 0.3</math></td><td>—</td><td colspan="2">Disregard</td></tr></table> <p>X : Length Y : Width</p> <p>Total defects shall not exceed 2.</p> | Zone<br>Dimension | Acceptable Number |            |   | A                   | B | C        | $D \leq 0.15$ | Disregard         |   | Disregard | $0.15 < D \leq 0.5$ | 4 |  | $0.5 < D$ | 0 |  | Zone |  | Acceptable Number |  |  | X(mm) | Y(mm) | A | B | C | — | $W \leq 0.05$ | Disregard |  | Disregard | $0.3 < L \leq 2.0$ | $0.05 < W \leq 0.1$ | 2 |  | $L \leq 0.3$ | — | Disregard |  |
| Zone<br>Dimension   | Acceptable Number                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
|                     | A                                                                                | B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | C                 |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| $D \leq 0.15$       | Disregard                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Disregard         |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| $0.15 < D \leq 0.5$ | 4                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| $0.5 < D$           | 0                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| Zone                |                                                                                  | Acceptable Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| X(mm)               | Y(mm)                                                                            | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | B                 | C                 |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| —                   | $W \leq 0.05$                                                                    | Disregard                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   | Disregard         |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| $0.3 < L \leq 2.0$  | $0.05 < W \leq 0.1$                                                              | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| $L \leq 0.3$        | —                                                                                | Disregard                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |
| 7                   | Color Variation                                                                  | Not to be conspicuous defects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                   |                   |            |   |                     |   |          |               |                   |   |           |                     |   |  |           |   |  |      |  |                   |  |  |       |       |   |   |   |   |               |           |  |           |                    |                     |   |  |              |   |           |  |

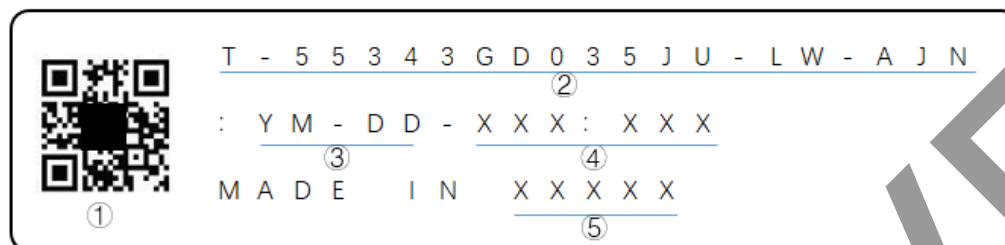
| No.                                       | Parameter                                     | Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                           |                   |  |  |  |   |   |   |         |           |  |           |                |   |  |                |   |  |           |   |  |
|-------------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------|--|--|--|---|---|---|---------|-----------|--|-----------|----------------|---|--|----------------|---|--|-----------|---|--|
| 8                                         | Air Bubbles<br>(between glass<br>& polarizer) | <table><tr><th><div>Zone</div><div>Dimension (mm)</div></th><th colspan="3">Acceptable Number</th></tr><tr><th></th><th>A</th><th>B</th><th>C</th></tr><tr><td>D ≤0.10</td><td colspan="2">Disregard</td><td rowspan="4">Disregard</td></tr><tr><td>0.10 &lt; D ≤0.15</td><td colspan="2">1</td></tr><tr><td>0.15 &lt; D ≤0.20</td><td colspan="2">1</td></tr><tr><td>0.20&lt; D ≤</td><td colspan="2">0</td></tr></table> <p>The polarizer edge has not floated.</p> | <div>Zone</div> <div>Dimension (mm)</div> | Acceptable Number |  |  |  | A | B | C | D ≤0.10 | Disregard |  | Disregard | 0.10 < D ≤0.15 | 1 |  | 0.15 < D ≤0.20 | 1 |  | 0.20< D ≤ | 0 |  |
| <div>Zone</div> <div>Dimension (mm)</div> | Acceptable Number                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                           |                   |  |  |  |   |   |   |         |           |  |           |                |   |  |                |   |  |           |   |  |
|                                           | A                                             | B                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | C                                         |                   |  |  |  |   |   |   |         |           |  |           |                |   |  |                |   |  |           |   |  |
| D ≤0.10                                   | Disregard                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Disregard                                 |                   |  |  |  |   |   |   |         |           |  |           |                |   |  |                |   |  |           |   |  |
| 0.10 < D ≤0.15                            | 1                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                           |                   |  |  |  |   |   |   |         |           |  |           |                |   |  |                |   |  |           |   |  |
| 0.15 < D ≤0.20                            | 1                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                           |                   |  |  |  |   |   |   |         |           |  |           |                |   |  |                |   |  |           |   |  |
| 0.20< D ≤                                 | 0                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                           |                   |  |  |  |   |   |   |         |           |  |           |                |   |  |                |   |  |           |   |  |
| 9                                         | Polarizer Scratches                           | Not to be conspicuous defects.                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                           |                   |  |  |  |   |   |   |         |           |  |           |                |   |  |                |   |  |           |   |  |
| 10                                        | Polarizer Dirts                               | If the stains are removed easily from LCDP surface, the module is not defective.                                                                                                                                                                                                                                                                                                                                                                                      |                                           |                   |  |  |  |   |   |   |         |           |  |           |                |   |  |                |   |  |           |   |  |

#### 9.4 Standards on Touch panel

| No. | Item                                    | Criteria                       |                                                                                 | Note                                                                                  |
|-----|-----------------------------------------|--------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1   | Dot type foreign material, Dent         | Dimension (mm)                 | Judgement                                                                       | D(mm): average diameter=(Long dia.+ short dia.)/2                                     |
|     |                                         | $D \leq 0.1$                   | Disregard                                                                       |                                                                                       |
|     |                                         | $0.1 < D < 0.15$               | Distance from any other foreign object >10mm : Ignore<br><10mm : less than 2pcs |                                                                                       |
|     |                                         | $D > 0.15$                     | Nothing                                                                         |                                                                                       |
| 2   | Linear foreign material, Linear scratch | Dimension (mm)                 | Judgement                                                                       |  |
|     |                                         | $W < 0.025$                    | Disregard                                                                       |                                                                                       |
|     |                                         | $0.025 < W < 0.035$ $L \leq 2$ | Distance from any other foreign object >10mm : Ignore<br><10mm : less than 2pcs |                                                                                       |
|     |                                         | $0.035 < W < 0.05$ $L \leq 2$  | Distance from any other foreign object <10mm : less than 2pcs                   |                                                                                       |
|     |                                         | $W > 0.05$ mm                  | Nothing                                                                         |                                                                                       |

## 10. Lot Number Identification

The lot number shall be indicated on the back of the backlight case of each LCD.



No①. - No⑤. above indicate

- ①Data matrix(For internal control purpose only)  
(The item from parts No. to Version No. is included in data matrix.)
- ②Module product name
- ③Manufacturing Date
- ④Version Number
- ⑤Country of origin (Japan or China)

③Manufacturing Date :

Year 0~9,for 2020~2029  
Month 1~9, X~Z, for Jan. ~ Dec.  
Day 01~31,for 1st to 31th

## 11. Applying Precautions

Please contact us when questions and/or new problems not specified in this Specifications arise.

## 12. Precautions Relating Product Handling

The Following precautions will guide you in handling our product correctly.

### 1) Liquid crystal display devices

1. The liquid crystal display panel used in the liquid crystal display module is made of plate glass. Avoid any strong mechanical shock. Should the glass break handle it with care.
2. The polarizer adhering to the surface of the LCD is made of a soft material.  
Guard against scratching it.

### 2) Care of the liquid crystal display module against static electricity discharge.

1. When working with the module, be sure to ground your body and any electrical equipment you may be using. We strongly recommend the use of anti static mats (made of rubber), to protect worktables against the hazards of electrical shock.
2. Avoid the use of work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
3. Slowly and carefully remove the protective film from the LCD module, since this operation can generate static electricity.

### 3) When the LCD module must be stored for long periods of time:

1. Protect the modules from high temperature and humidity.

Conditions: Temperature : 0°C~40°C

Humidity : Less than 60%RH

No dew condensation to be observed.

2. Keep the modules out of direct sunlight or direct exposure to ultraviolet rays.
3. Protect the modules from excessive external forces.
4. After a long period storage of the product (or LCD) under the low temperature and the dark, it might take a longer time to turn on the CCFL than normal.

- 4) Use the module with a power supply that is equipped with an overcurrent protector circuit, since the module is not provided with this protective feature.

- 5) Do not ingest the LCD fluid itself should it leak out of a damaged LCD module. Should hands or clothing come in contact with LCD fluid, wash immediately with soap.

- 6) Conductivity is not guaranteed for models that use metal holders where solder connections between the metal holder and the PCB are not used. Please contact us to discuss appropriate ways to assure conductivity.

### 7) For models which use CFL:

1. High voltage of 1000V or greater is applied to the CFL cable connector area. Care should be taken not to touch connection areas to avoid burns.
2. Protect CFL cables from rubbing against the unit and thus causing the wire jacket to become worn.
3. The use of CFLs for extended periods of time at low temperatures will significantly shorten their service life.
4. After storing the product (or LCD) under low temperature and/or in dark atmosphere for a long period of time, CCFL may take longer time to reach its specified brightness.

### 8) For models which use touch panels:

1. Do not stack up modules since they can be damaged by components on neighboring modules.
2. Do not place heavy objects on top of the product. This could cause glass breakage.

9) For models which use COG,TAB,or COF:

- 1.The mechanical strength of the product is low since the IC chip faces out unprotected from the rear. Be sure to protect the rear of the IC chip from external forces.
- 2.Given the fact that the rear of the IC chip is left exposed, in order to protect the unit from electrical damage, avoid installation configurations in which the rear of the IC chip runs the risk of making any electrical contact.

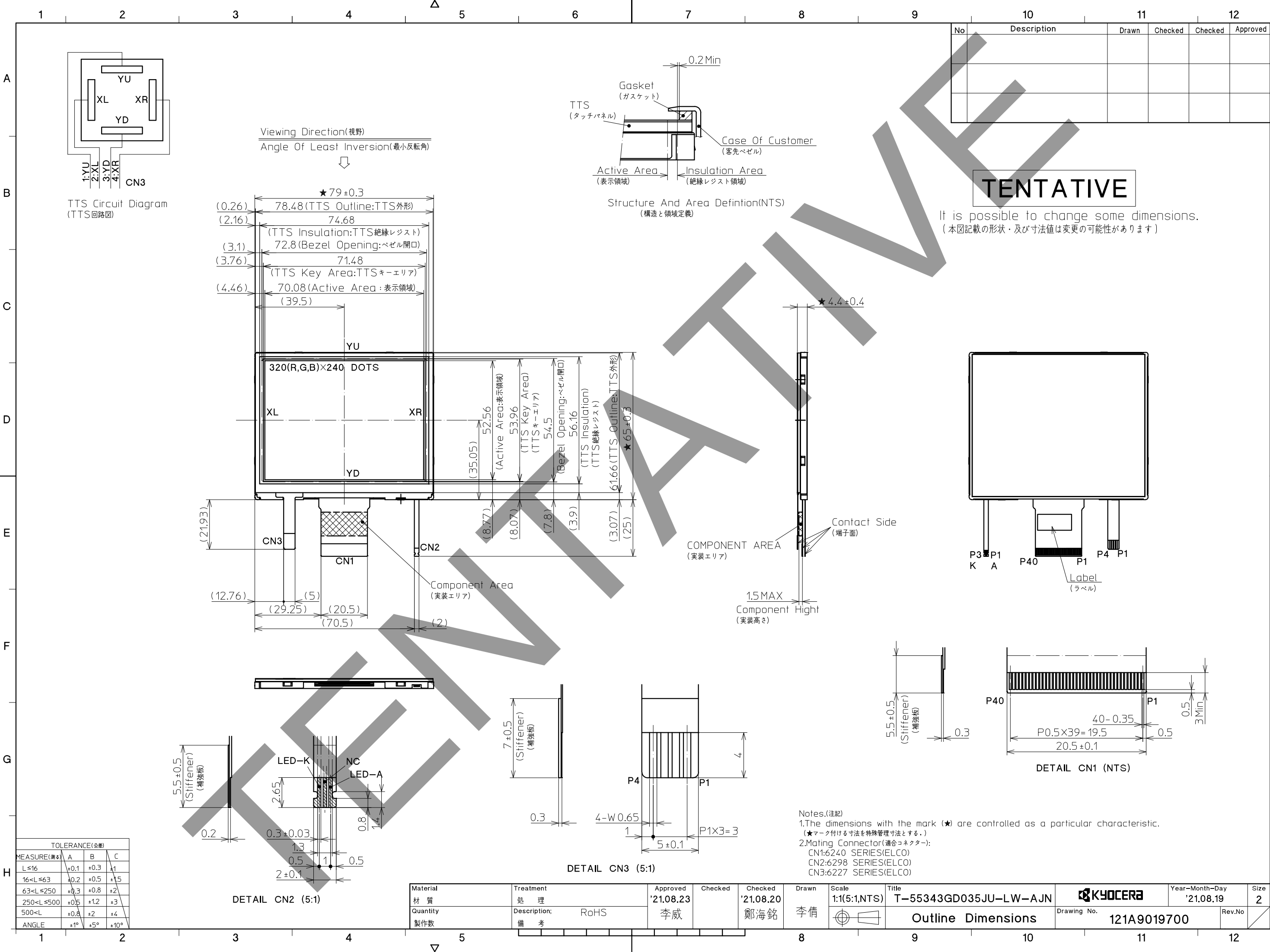
10) Models which use flexible cable, heat seal, or TAB:

- 1.In order to maintain reliability, do not touch or hold by the connector area.
- 2.Avoid any bending, pulling, or other excessive force, which can result in broken connections.

11) In case of buffer material such as cushion / gasket is assembled into LCD module, it may have an adverse effect on connecting parts ( LCD panel-TCP / HEAT SEAL / FPC / etc., PCB-TCP / HEAT SEAL / FPC etc., TCP-HEAT SEAL, TCP-FPC, HEAT SEAL-FPC, etc.,) depending on its materials. Please check and evaluate these materials carefully before use.

12) In case of acrylic plate is attached to front side of LCD panel, cloudiness (very small cracks) can occur on acrylic plate, being influenced by some components generated from polarizer film.  
Please check and evaluate those acrylic materials carefully before use.

13) Flickering due to optical interference may occur by combination of a) LCD driving frame frequency decided by either internal oscillator in driver IC or external clock input by the customer and b) lighting frequency of either backlight or other light sources.  
Please evaluate enough at the environment of actual use, and decide the driving condition that does not cause flickering.



| No | Description | Drawn | Checked | Checked | Approved |
|----|-------------|-------|---------|---------|----------|
|    |             |       |         |         |          |
|    |             |       |         |         |          |

TENTATIVE

It is possible to change some dimensions.  
( 本図記載の形状・及び寸法値は変更の可能性があります )

- Notes.(注記)
- The dimensions with the mark (★) are controlled as a particular characteristic.  
(★マーク付ける寸法を特殊管理寸法とする.)
  - Mating Connector(適合コネクタ):  
CN1:6240 SERIES(ELCO)  
CN2:6298 SERIES(ELCO)  
CN3:6227 SERIES(ELCO)

| TOLERANCE(公差) |      |      |      |
|---------------|------|------|------|
| MEASURE(測定)   | A    | B    | C    |
| L≤16          | ±0.1 | ±0.3 | ±1   |
| 16<L≤63       | ±0.2 | ±0.5 | ±1.5 |
| 63<L≤250      | ±0.3 | ±0.8 | ±2   |
| 250<L≤500     | ±0.5 | ±1.2 | ±3   |
| 500<L         | ±0.8 | ±2   | ±4   |
| ANGLE         | ±1°  | ±5°  | ±10° |

|                 |                    |                             |                             |             |                       |                                |         |                             |           |
|-----------------|--------------------|-----------------------------|-----------------------------|-------------|-----------------------|--------------------------------|---------|-----------------------------|-----------|
| Material<br>材質  | Treatment<br>処理    | Approved<br>'21.08.23<br>李威 | Checked<br>'21.08.20<br>鄭海銘 | Drawn<br>李倩 | Scale<br>1:1(5:1,NTS) | Title<br>T-55343GD035JU-LW-AJN | KYOCERA | Year-Month-Day<br>'21.08.19 | Size<br>2 |
| Quantity<br>製作数 | Description;<br>備考 | RoHS                        |                             |             |                       | Outline Dimensions             |         | Rev.No                      |           |