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- Tentative Specification
- Preliminary Specification
- Approval Specification

MODEL NO.: G170J1
SUFFIX: LE1

| | |
|---|------------------|
| Customer: | |
| APPROVED BY | SIGNATURE |
| <u>Name / Title</u> _____ Note | _____ _____ |
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|-------------|------------|-------------|
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REVISION HISTORY

| Version | Date | Section | Description |
|---------|-----------|---------|--|
| 2.0 | 2012.3.22 | All | Approval spec was first issued |
| 2.1 | 2013.3.19 | 3.2 | Add Converter Inrush current item and Note(3) Add Vi rising time scheme |
| | | 6.2 | Update POWER ON/OFF SEQUENCE |

1. GENERAL DESCRIPTION

1.1 OVERVIEW

G170J1- LE1 is a 17" TFT Liquid Crystal Display module with LED backlight unit and 30-pin-and-1ch LVDS interface. This product supports 1920 x 1200 WUXGA format and can display true 16.7M colors.

The converter for LED backlight is built-in.

1.2 FEATURES

- Excellent brightness (600 nits)
- High color saturation NTSC 70%
- WUXGA (1920 x 1200 pixels) resolution
- DE (Data Enable) only mode
- LVDS (Low Voltage Differential Signaling) interface
- Ultra wide viewing angle: 176(H)/ 176(V) (CR>10)
- Wide operation and storage temperature range

1.3 APPLICATION

- TFT LCD monitor for Industrial application

1.4 GENERAL SPECIFICATIONS

| Item | Specification | Unit | Note |
|------------------------------|------------------------------------|-------|------|
| Active Area | 365.76 (H) x 228.6 (V) | mm | (1) |
| Bezel Opening Area | 369 (H) x 231.8 (V) | mm | |
| Driver Element | a-si TFT active matrix | - | - |
| Pixel Number | 1920 x R.G.B. x 1200 | pixel | - |
| Pixel Pitch | 0.1905 (H) x 0.1905 (V) | mm | - |
| Pixel Arrangement | RGB vertical stripe | - | - |
| Display Colors | 16.7 M | color | - |
| Display Operation Mode | Transmissive mode / Normally black | - | - |
| Surface Treatment | Glare | - | - |
| Total power consumption(typ) | 25.45 | W | typ |

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

1.5 MECHANICAL SPECIFICATIONS

| Item | Min. | Typ. | Max. | Unit | Note | |
|-------------|----------------|-------|-------|-------|------|-----|
| Module Size | Horizontal (H) | 386.2 | 386.8 | 387.4 | mm | (1) |
| | Vertical (V) | 250.2 | 250.8 | 251.4 | mm | |
| | Depth (D) | 18.25 | 18.6 | 18.95 | mm | - |
| Weight | - | 1675 | 1745 | g | - | |

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

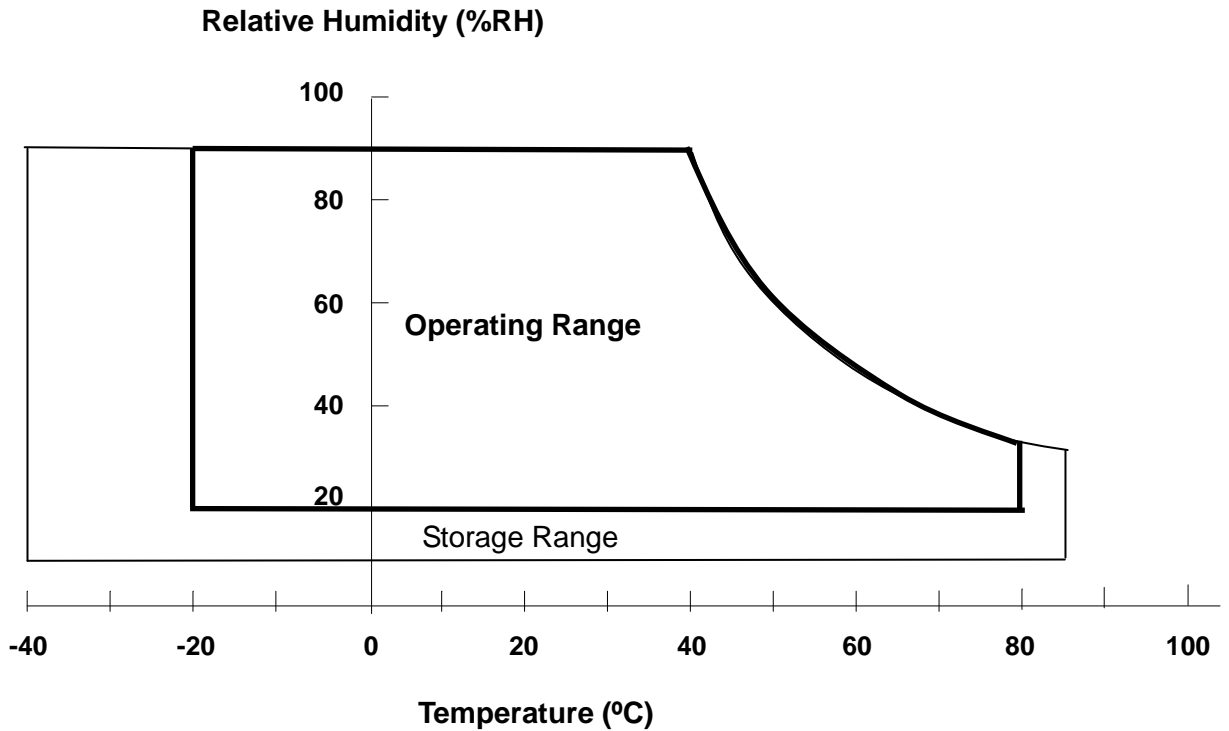
2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

| Item | Symbol | Value | | Unit | Note |
|-------------------------------|-----------------|-------|------|------|------|
| | | Min. | Max. | | |
| Operating Ambient Temperature | T _{OP} | -20 | +80 | °C | |
| Storage Temperature | T _{ST} | -40 | +85 | °C | |

Note (1) Temperature and relative humidity range is shown in the figure below.

- (a) 90 %RH Max. (Ta ≤ 40 °C).
- (b) Wet-bulb temperature should be 39 °C Max. (Ta > 40 °C).
- (c) No condensation



2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

| Item | Symbol | Value | | Unit | Note |
|----------------------|--------|-------|------|------|------|
| | | Min. | Max. | | |
| Power Supply Voltage | VCC | -0.3 | 7 | V | (1) |

2.2.2 LED CONVERTER

| Item | Symbol | Value | | Unit | Note |
|-------------------|--------|-------|------|------|----------|
| | | Min. | Max. | | |
| Converter Voltage | V_i | -0.3 | 24 | V | (1), (2) |
| Enable Voltage | EN | --- | 5.5 | V | |
| Backlight Adjust | ADJ | --- | 5.5 | V | |

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for LED light bar (Refer to 3.2 for further information).

3. ELECTRICAL CHARACTERISTICS

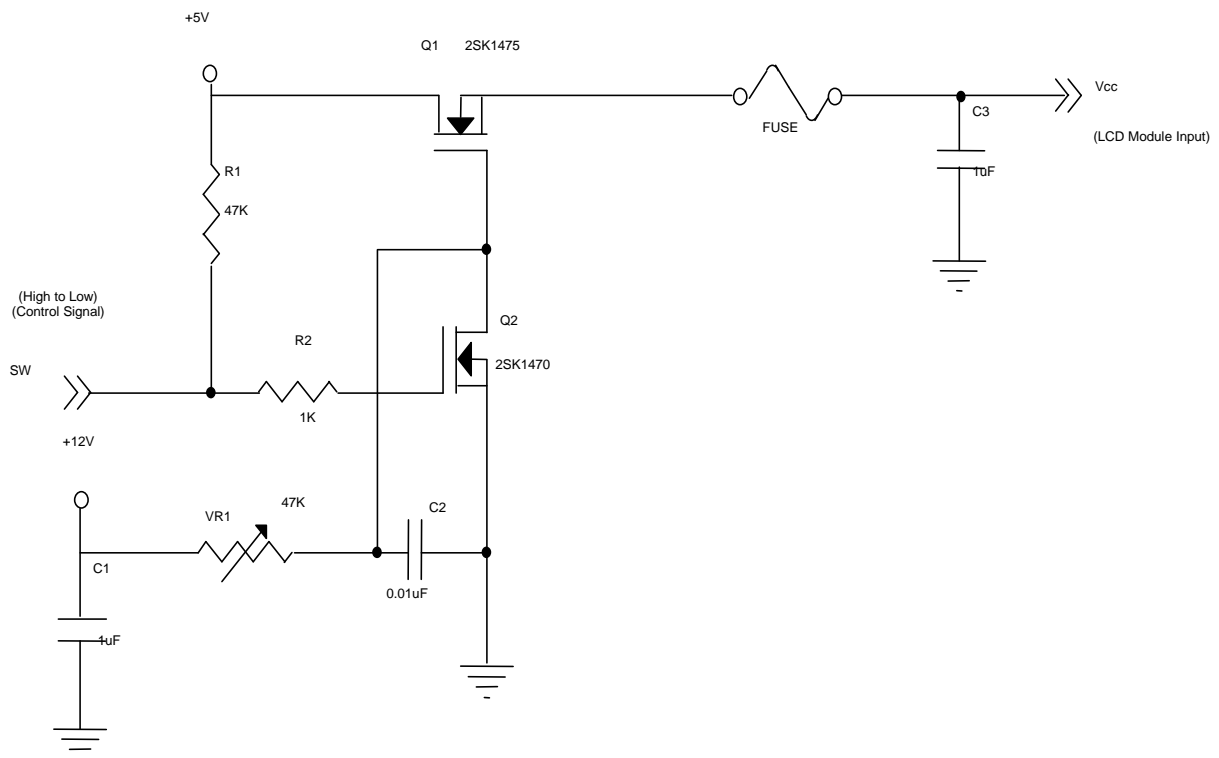
3.1 TFT LCD MODULE

Ta = 25 ± 2 °C

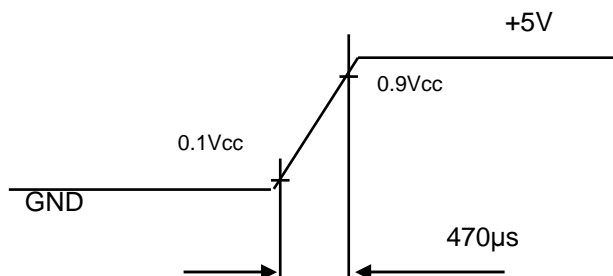
| Parameter | Symbol | Value | | | Unit | Note |
|---------------------------------|-------------------|-------|------|------|------|------|
| | | Min. | Typ. | Max. | | |
| Power Supply Voltage | V _{CC} | 4.5 | 5 | 5.5 | V | (1) |
| Rush Current | I _{RUSH} | - | - | 3.0 | A | (2) |
| Power Supply Current | White | 950 | 1050 | 1150 | mA | (3) |
| | Black | 450 | 550 | 650 | mA | |
| Power Consumption | P _L | --- | 5.25 | --- | W | |
| LVDS differential input voltage | VID | 100 | - | 600 | mV | - |
| LVDS common input voltage | V _{ICM} | 0.7 | - | 1.6 | V | - |

Note (1) The assembly should be always operated within above ranges.

Note (2) Measurement Conditions:

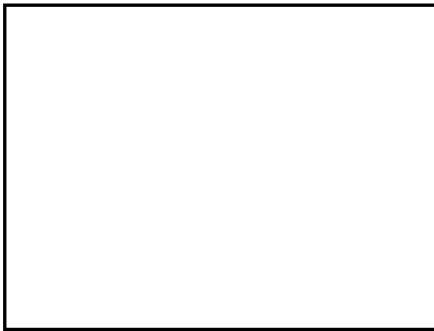


VCC rising time is 470us



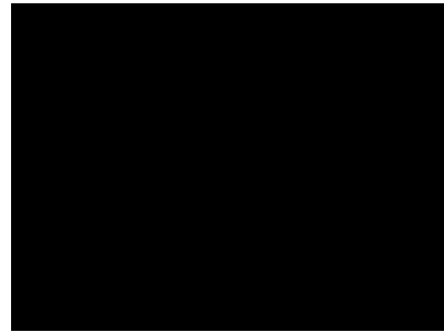
Note (3) The specified power supply current is under the conditions at V_{CC} = 5 V, Ta = 25 ± 2 °C, f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern



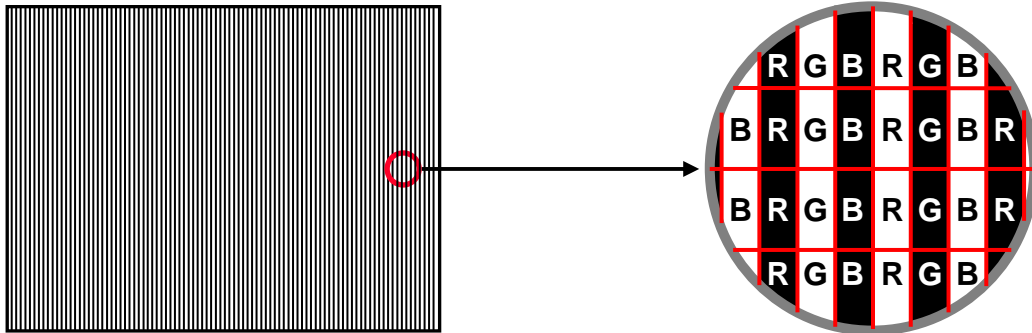
Active Area

b. Black Pattern



Active Area

c. Vertical Stripe Pattern



Active Area

3.2 LED CONVERTER

Ta = 25 ± 2 °C

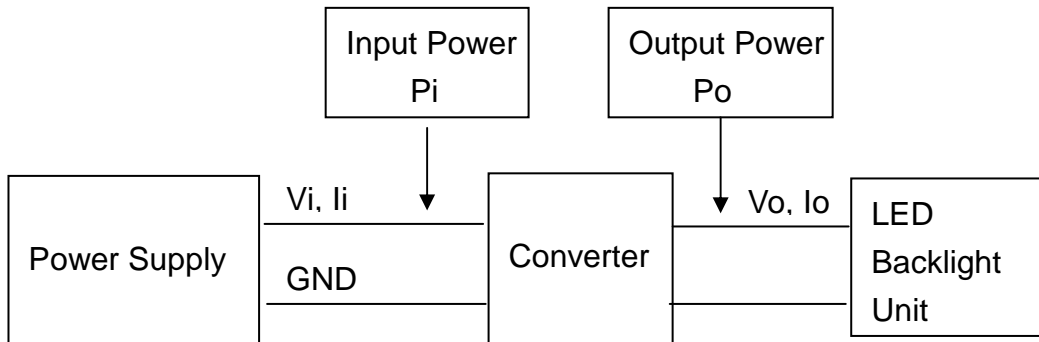
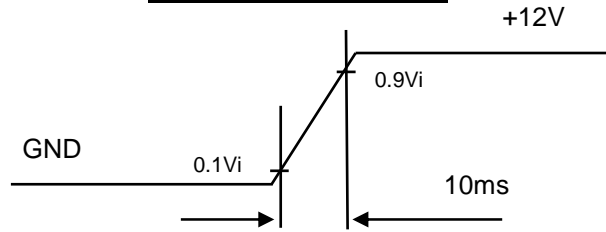
| Parameter | Symbol | Value | | | Unit | Note |
|--------------------------------|--------------------|--------|------|------|------|---------------------------|
| | | Min. | Typ. | Max. | | |
| Converter Power Supply Voltage | V _i | 9 | 12.0 | 16 | V | (Duty 100%) |
| Converter Power Supply Current | I _i | 1.58 | 1.68 | 1.78 | A | @ Vi = 12V (Duty 100%) |
| Converter Inrush Current | I _{iRush} | - | - | 3.8 | A | (3) |
| LED Power Consumption | P _{LED} | --- | 20.2 | --- | W | @ Vi = 12V (Duty 100%) |
| EN Control Level | Backlight on | 2.0 | --- | 5 | V | |
| | Backlight off | 0 | --- | 0.8 | V | |
| PWM Control Level | PWM High Level | 2.0 | --- | 5 | V | |
| | PWM Low Level | 0 | --- | 0.15 | V | |
| PWM Control Duty Ratio | | 5 | | 100 | % | |
| PWM Control Frequency | f _{PWM} | 190 | 200 | 210 | Hz | |
| LED Life Time | L _L | 30,000 | | | Hrs | (2) |

Note (1) LED current is measured by utilizing a high frequency current meter as shown below:

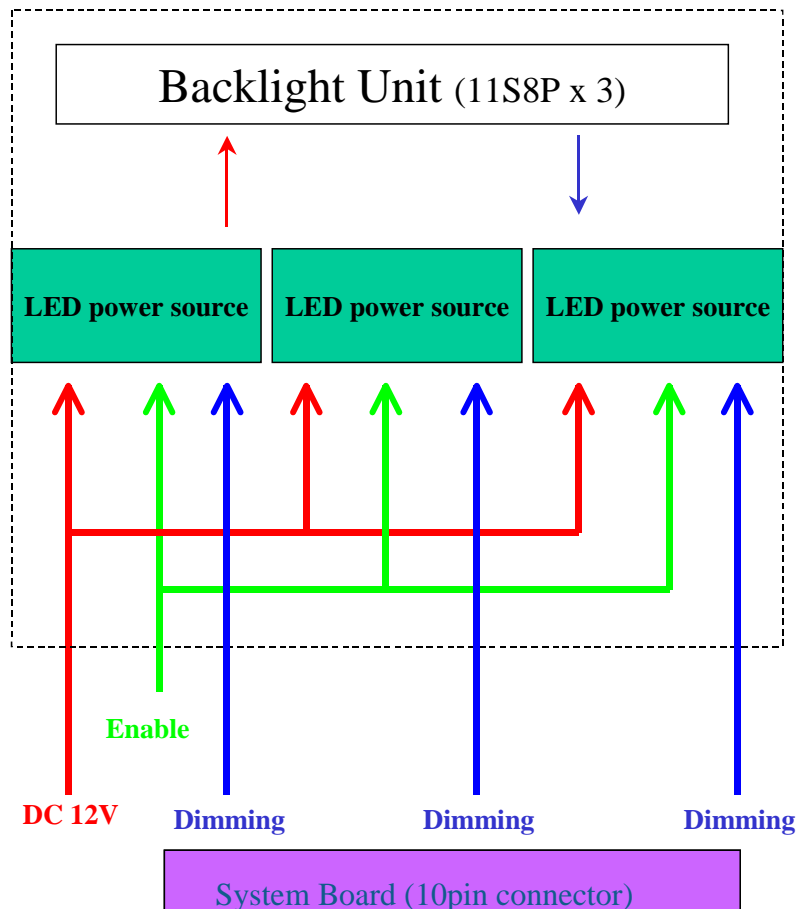
Note (2) The lifetime of LED is defined as the time when it continues to operate under the conditions at Ta = 25 ± 2 °C and I_{LED} = 20mA_{DC}(LED forward current) until the brightness becomes ≤ 50% of its original value.

Note (3) Converter Power Supply Voltage rising time is 10ms from 0.1Vi to 0.9Vi

Vi rising time is 10ms

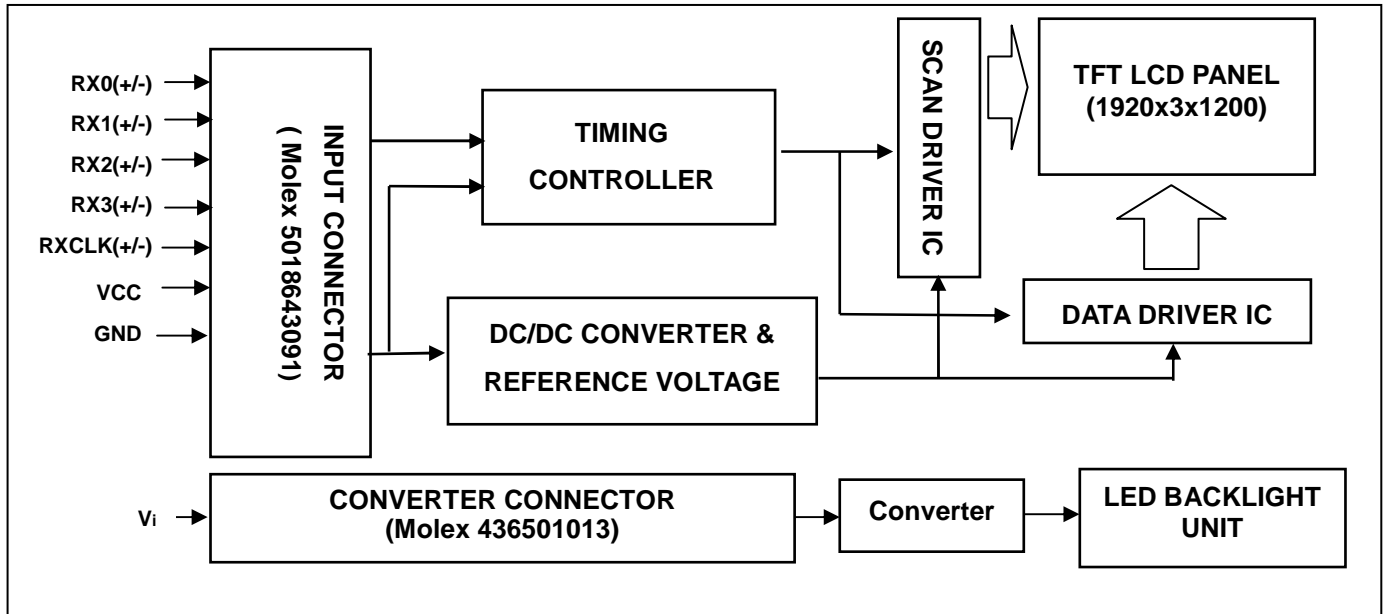


LED BL Block Diagram



4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



5.1 CN3 Interface Connector

| CN3: Interface Connector JAE FI-RE41S-HF | | |
|--|--------|---|
| Pin | Signal | Description |
| 1 | NC | No Connection |
| 2 | VI | Converter input voltage +12V |
| 3 | VI | Converter input voltage +12V |
| 4 | VI | Converter input voltage +12V |
| 5 | VGND | Converter ground |
| 6 | VGND | Converter ground |
| 7 | VGND | Converter ground |
| 8 | EN | Enable pin 3,3V |
| 9 | ADJ1-3 | Area1 PWM adjust 1) |
| 10 | ADJ1-3 | Area2 PWM adjust 1) |
| 11 | ADJ1-3 | Area3 PWM adjust 1) |
| 12 | RXO0- | -LVDS differential data input, Chan 0-Odd |
| 13 | RXO0+ | +LVDS differential data input, Chan 0-Odd |
| 14 | RXO1- | -LVDS differential data input, Chan 1-Odd |
| 15 | RXO1+ | +LVDS differential data input, Chan 1-Odd |
| 16 | RXO2- | -LVDS differential data input, Chan 2-Odd |
| 17 | RXO2+ | +LVDS differential data input, Chan 2-Odd |
| 18 | VSS | TFT Ground |
| 19 | RXOC- | -LVDS differential Clock input (Odd) |
| 20 | RXOC+ | +LVDS differential Clock input (Odd) |
| 21 | RXO3- | -LVDS differential data input, Chan 3-Odd |
| 22 | RXO3+ | +LVDS differential data input, Chan 3-Odd |
| 23 | RXE0- | -LVDS differential data input, Chan 0-Even |
| 24 | RXE0+ | +LVDS differential data input, Chan 0-Even |
| 25 | VSS | TFT Ground |
| 26 | RXE1- | -LVDS differential data input, Chan 1-Even |
| 27 | RXE1+ | +LVDS differential data input, Chan 1-Even |
| 28 | VSS | TFT Ground |
| 29 | RXE2- | -LVDS differential data input, Chan 2-Even |
| 30 | RXE2+ | +LVDS differential data input, Chan 2-Even |
| 31 | RXEC- | -LVDS differential Clock input (Even) |
| 32 | RXEC+ | +LVDS differential Clock input (Even) |
| 33 | RXE3- | -LVDS differential data input, Chan 3-Even |
| 34 | RXE3+ | +LVDS differential data input, Chan 3-Even |
| 35 | VSS | TFT Ground |
| 36 | VSS | TFT Ground |
| 37 | NC | No Connection |
| 38 | AGMODE | Aging mode selection [Default connection GND] |
| 39 | Vcc | +5.0V TFT power supply |
| 40 | Vcc | +5.0V TFT power supply |
| 41 | Vcc | +5.0V TFT power supply |

1) Pin 8 + 9 + 10 is short on PCB with R1&R2 0R 1/16W $\pm 5\%$. Can be removed, to have ADJ1, ADJ2, ADJ3 separated.

Matching Connector: JAE FI-RE41HL

5.3 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

| Color | | Data Signal | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|-----------------|-------------|----|----|----|----|----|----|----|-------|----|----|----|----|----|----|----|------|----|----|----|----|----|----|----|
| | | Red | | | | | | | | Green | | | | | | | | Blue | | | | | | | |
| | | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Colors | 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 | 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 | 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 | 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 |
| Gray Scale Of Red | Red(0) / Dark | 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(253) | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 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 |
| Gray Scale Of Green | Green(0) / Dark | 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 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Green(253) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 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 |
| Gray Scale Of Blue | Blue(0) / Dark | 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(253) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| | 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) 0: Low Level Voltage, 1: High Level Voltage

6. INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

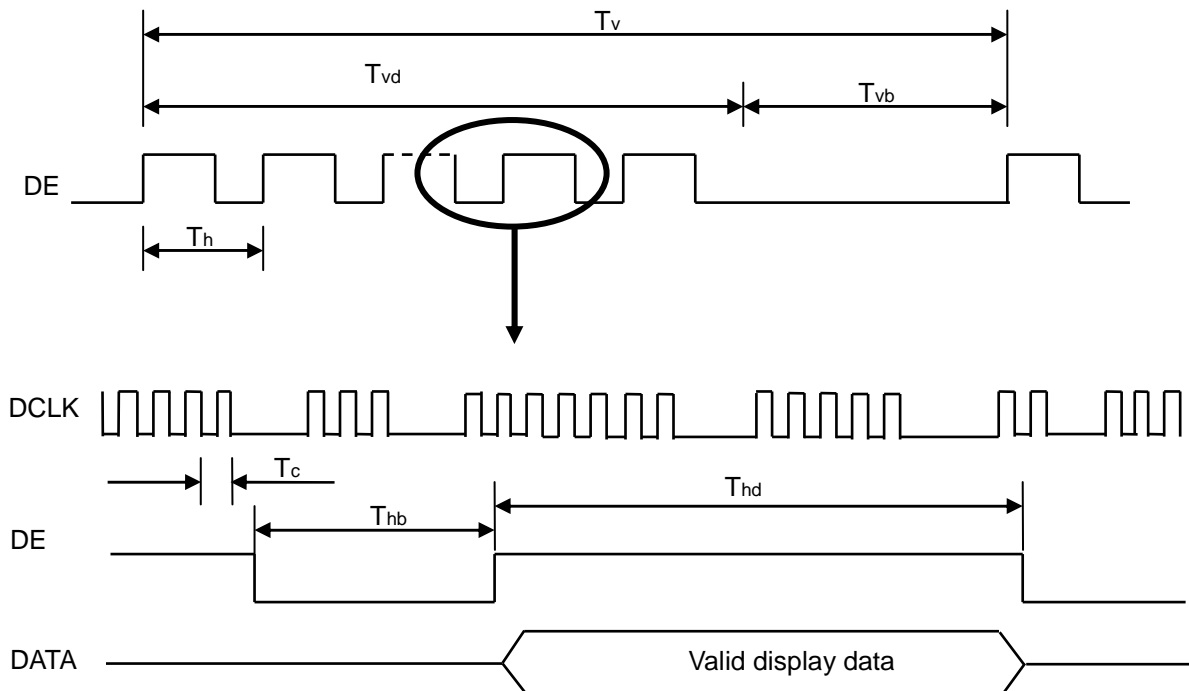
The input signal timing specifications are shown as the following table and timing diagram.

| Signal | Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|--------------------------------|--------------------------|--------|-------|--------|--------|------|------------|
| DCLK | Frequency | Fc | - | 154.13 | 159.26 | MHz | |
| | Input clock to data skew | TLVCCS | -0.25 | - | 0.25 | ns | (3) |
| Vertical Active Display Term | Total | Tv | 1202 | 1235 | 1235 | Th | Tv=Tvd+Tvb |
| | Display | Tvd | 1200 | 1200 | 1200 | Th | - |
| | Blank | Tvb | 2 | 35 | 35 | Th | - |
| Horizontal Active Display Term | Total | Th | 2000 | 2080 | 2080 | Tc | Th=Thd+Thb |
| | Display | Thd | 1920 | 1920 | 1920 | Tc | - |
| | Blank | Thb | 80 | 160 | 160 | Tc | - |

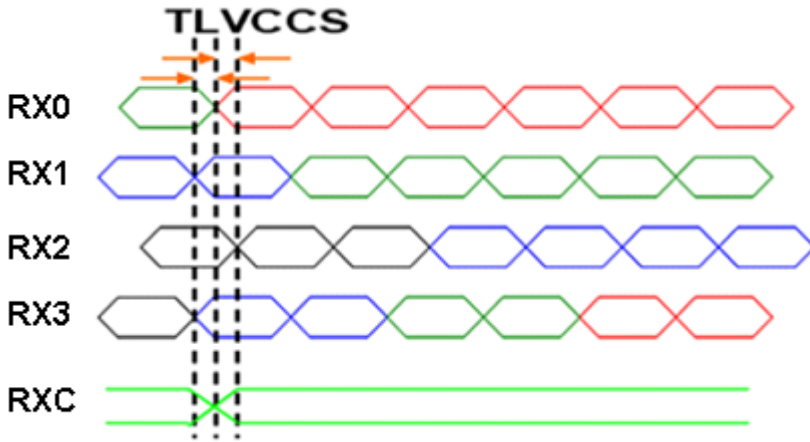
Note (1) Since this assembly is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level. Otherwise, this assembly would operate abnormally.

(2) Frame rate is 60Hz

INPUT SIGNAL TIMING DIAGRAM

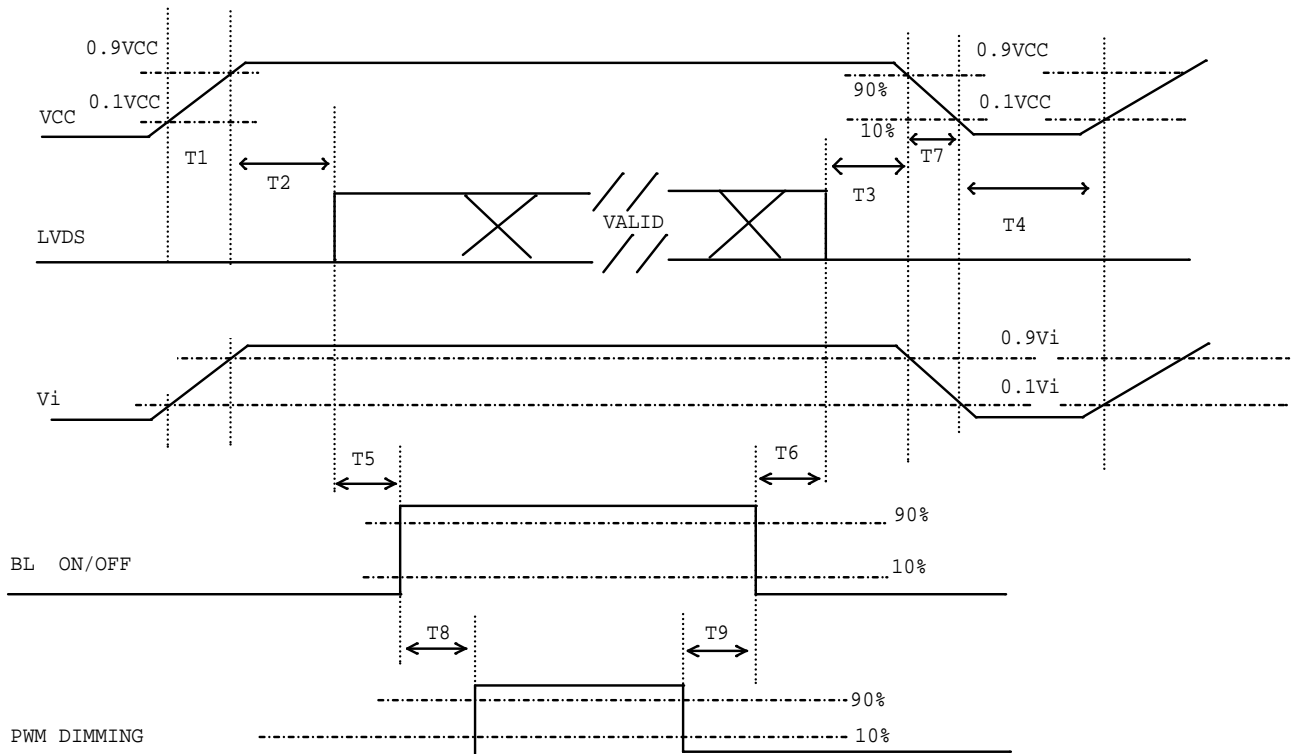


Note (3) Input Clock to data skew is defined as below figures.



6.2 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD assembly, the power on/off sequence should be as the diagram below.



Power ON/OFF sequence

Note (1) Please avoid floating state of interface signal at invalid period.

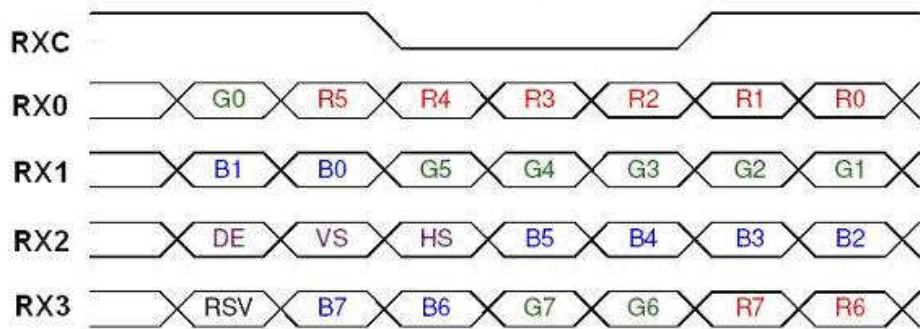
Note (2) When the interface signal is invalid, be sure to pull down the power supply of LCD VCC to 0 V.

Note (3) The Backlight converter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight converter power must be turned off before the power supply for the logic

and the interface signal is invalid.

| Parameter | Value | | | Units |
|-----------|-------|-----|-----|-------|
| | Min | Typ | Max | |
| T1 | 0.5 | - | 10 | ms |
| T2 | 0 | - | 50 | ms |
| T3 | 0 | - | 50 | ms |
| T4 | 500 | - | - | ms |
| T5 | 200 | - | - | ms |
| T6 | 200 | - | - | ms |
| T7 | 5 | - | 100 | ms |
| T8 | 10 | - | - | ms |
| T9 | 10 | - | - | Ms |

6.3 The Input Data Format



Note (1) R/G/B data 7: MSB, R/G/B data 0: LSB

Note (2) Please follow PSWG

| Signal Name | Description | Remark |
|--|---|---|
| R7 R6 R5 R4 R3 R2 R1 R0 | Red Data 7 (MSB) Red Data 6 Red Data 5 Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0 (LSB) | Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data. |
| G7 G6 G5 G4 G3 G2 G1 G0 | Green Data 7 (MSB) GreenData 6 GreenData 5 GreenData 4 GreenData 3 GreenData 2 GreenData 1 GreenData 0 (LSB) | Green-pixel Data Each green pixel's brightness data consists of these 8 bits pixel data. |
| B7 B6 B5 B4 B3 B2 B1 B0 | Blue Data 7 (MSB) Blue Data 6 Blue Data 5 Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0 (LSB) | Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data. |
| RXCLKIN+ RXCLKIN- | LVDS Clock Input | |
| DE | Display Enable | |
| VS | Vertical Sync | |
| HS | Horizontal Sync | |

Note (3) Output signals from any system shall be low or Hi-Z state when VCC is off

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

| Item | Symbol | Value | Unit |
|---------------------|---|--------|------|
| Ambient Temperature | T _a | 25±2 | °C |
| Ambient Humidity | H _a | 50±10 | %RH |
| Supply Voltage | V _{CC} | 5 | V |
| Input Signal | According to typical value in "3. ELECTRICAL CHARACTERISTICS" | | |
| Converter Current | I _L | 20±1mA | mA |

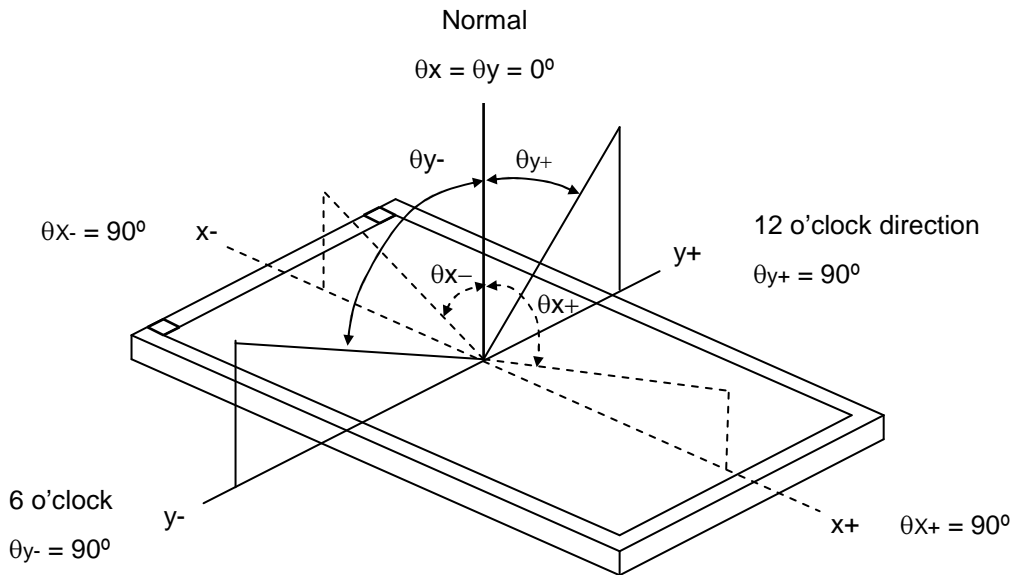
7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).

| Item | | Symbol | Condition | Min. | Typ. | Max. | Unit | Note |
|---------------------------|------------|-----------------|---|---|---------------|-------|-------------------|------|
| Contrast Ratio | | CR | θ _x =0°, θ _y =0° Viewing angle at normal direction | 1500 | 2000 | - | - | (2) |
| Response Time | | T _R | | - | 20 | 25 | ms | (3) |
| | | T _F | | - | 9 | 15 | ms | |
| Center Luminance of White | | L _C | | 500 | 600 | - | cd/m ² | (4) |
| White Variation | | δW | | - | 1.2 | 1.4 | - | (6) |
| Chromaticity | Red | R _x | | θ _x =0°, θ _y =0° Viewing angle at normal direction | Typ. -0.05 | 0.629 | Typ. +0.05 | - |
| | | R _y | 0.341 | | | - | | |
| | Green | G _x | 0.3160 | | | - | | |
| | | G _y | 0.622 | | | - | | |
| | Blue | B _x | 0.148 | | | - | | |
| | | B _y | 0.070 | | | - | | |
| | White | W _x | 0.313 | | | - | | |
| | | W _y | 0.329 | | | - | | |
| Viewing Angle | Horizontal | θ _{x+} | CR≥10 | 80 | 88 | - | Deg. | (1) |
| | | θ _{x-} | | 80 | 88 | - | | |
| | Vertical | θ _{y+} | | 80 | 88 | - | | |
| | | θ _{y-} | | 80 | 88 | - | | |

Note (1) Definition of Viewing Angle (θ_x, θ_y):

Viewing angles are measured by BM5A



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

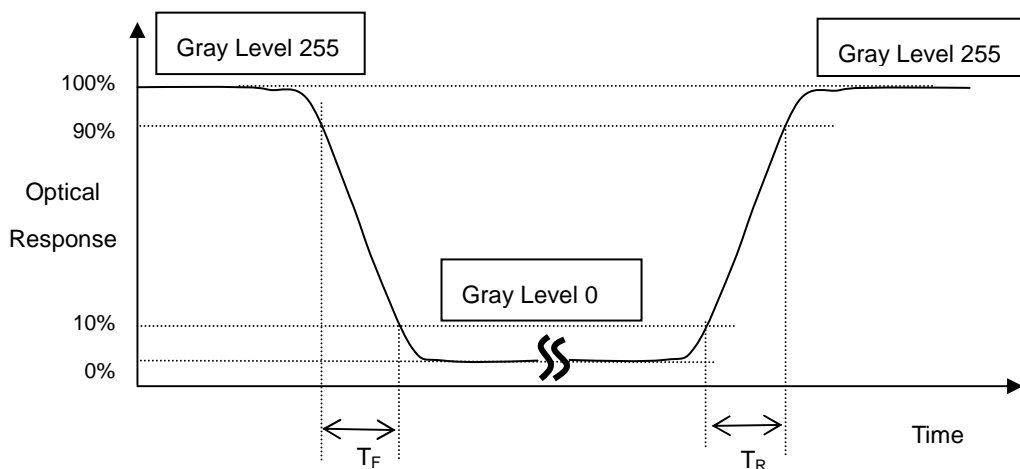
$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (5), where CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (7).

Note (3) Definition of Response Time (T_R, T_F):



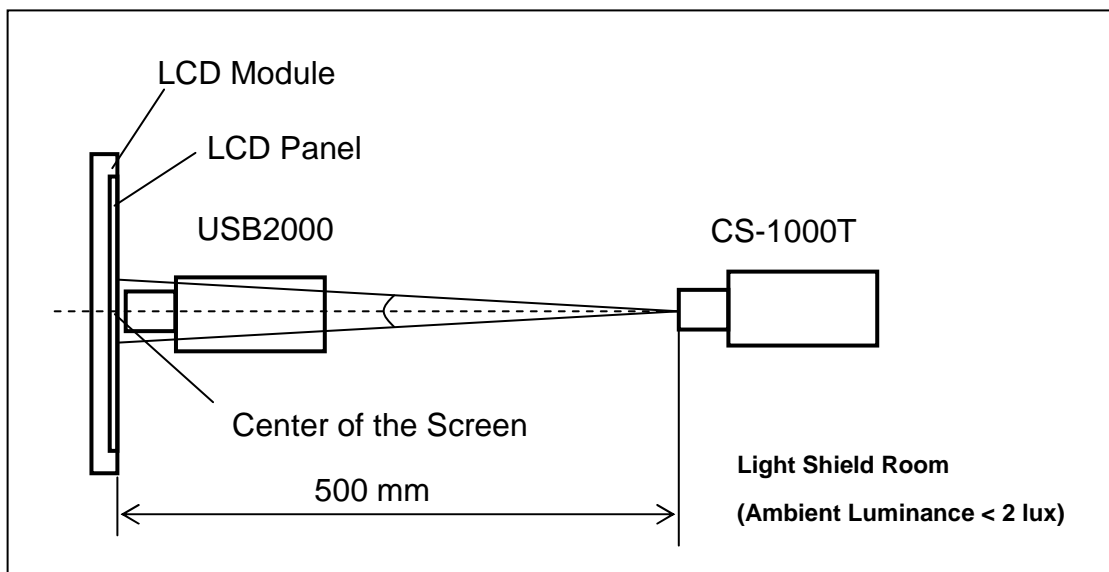
Note (4) Definition of Luminance of White (L_C):

Measure the luminance of gray level 255 at center point and 5 points

$L_C = L(5)$, where $L(X)$ is corresponding to the luminance of the point X at the figure in Note (7).

Note (5) Measurement Setup:

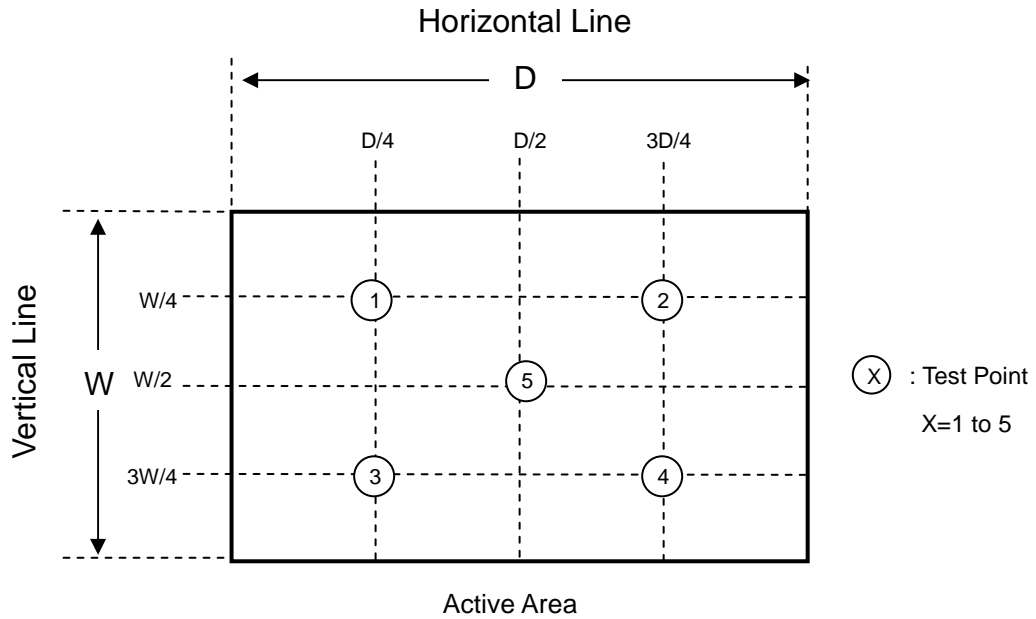
The LCD assembly should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

$$\delta W = \text{Maximum} [L(1), L(2), L(3), L(4), L(5)] / \text{Minimum} [L(1), L(2), L(3), L(4), L(5)]$$



8. RELIABILITY TEST CRITERIA

| Test Item | Test Condition | Note |
|---|---|---------|
| High Temperature Storage Test | 85°C, 240 hours | (1) (2) |
| Low Temperature Storage Test | -30°C, 240 hours | |
| Thermal Shock Storage Test | -30°C, 30min \longleftrightarrow 85°C, 30min; 100cycles, | |
| High Temperature Operation Test | 80°C, 240 hours | |
| Low Temperature Operation Test | -20°C, 240 hours | |
| High Temperature & High Humidity Operation Test | 60°C, 90%RH, 240 hours | |
| Shock (Non-Operating) | 50G, 11ms, half sine wave, 3 time for $\pm X$, $\pm Y$, $\pm Z$. | (3) |
| Vibration (Non-Operating) | 1.5Grms, 10 ~ 300 Hz, 0.5 hour/cycle, 3 cycles each X, Y, Z | (3) |

Note (1) There should be no condensation on the surface of panel during test.

Note (2) Temperature of panel display surface area should be 80 °C Max.

Note (3) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

Note (4) In the standard conditions, there is no function failure issue occurred. All the cosmetic specification is judged before the reliability test.

9. PACKAGING

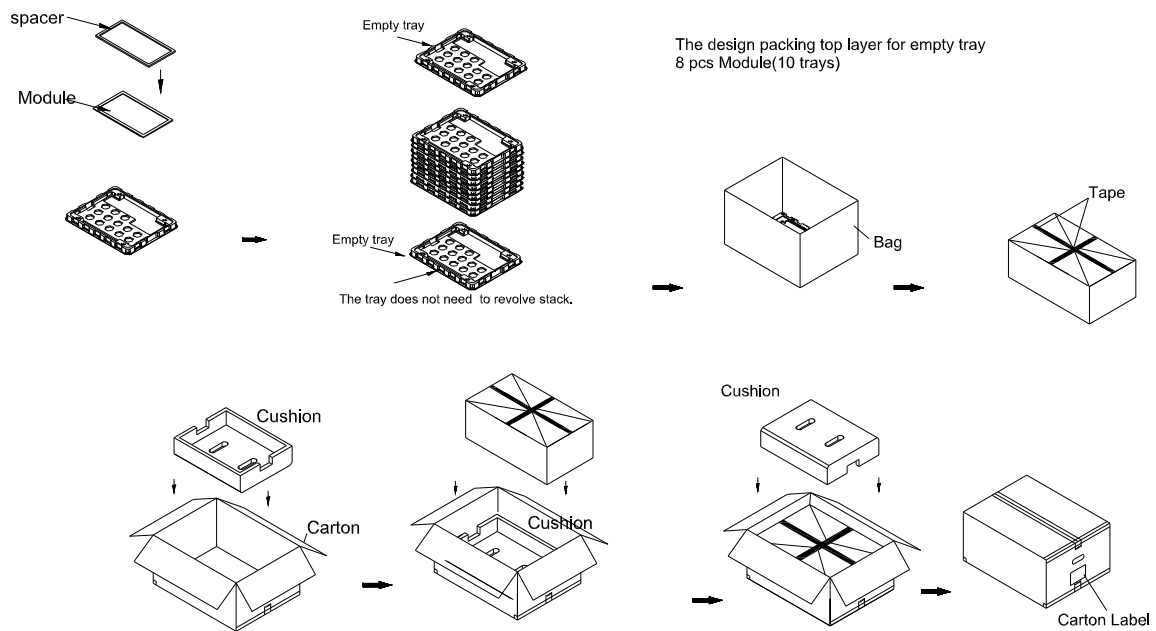
9.1 PACKING SPECIFICATIONS

- (1) 8pcs LCD modules / 1 Box
- (2) Box dimensions: 615 (L) X 515 (W) X 320 (H) mm
- (3) Weight: approximately 21.1Kg (8 modules per box)

9.2 PACKING METHOD

- (1) Carton Packing should have no failure in the following reliability test items.

| Test Item | Test Conditions | Note |
|---------------|--|---------------|
| Vibration | ISTA STANDARD Random, Frequency Range: 2 – 200 Hz Top & Bottom: 30 minutes (+Z), 10 min (-Z), Right & Left: 10 minutes (X) Back & Forth 10 minutes (Y) | Non Operation |
| Dropping Test | 1 Angle, 3 Edge, 6 Face, 46 cm | Non Operation |



- (1) Carton dimensions : 615(L)x515(W)x320(H)mm
- (2) 8 modules/Carton

Figure. 9-1 Packing method

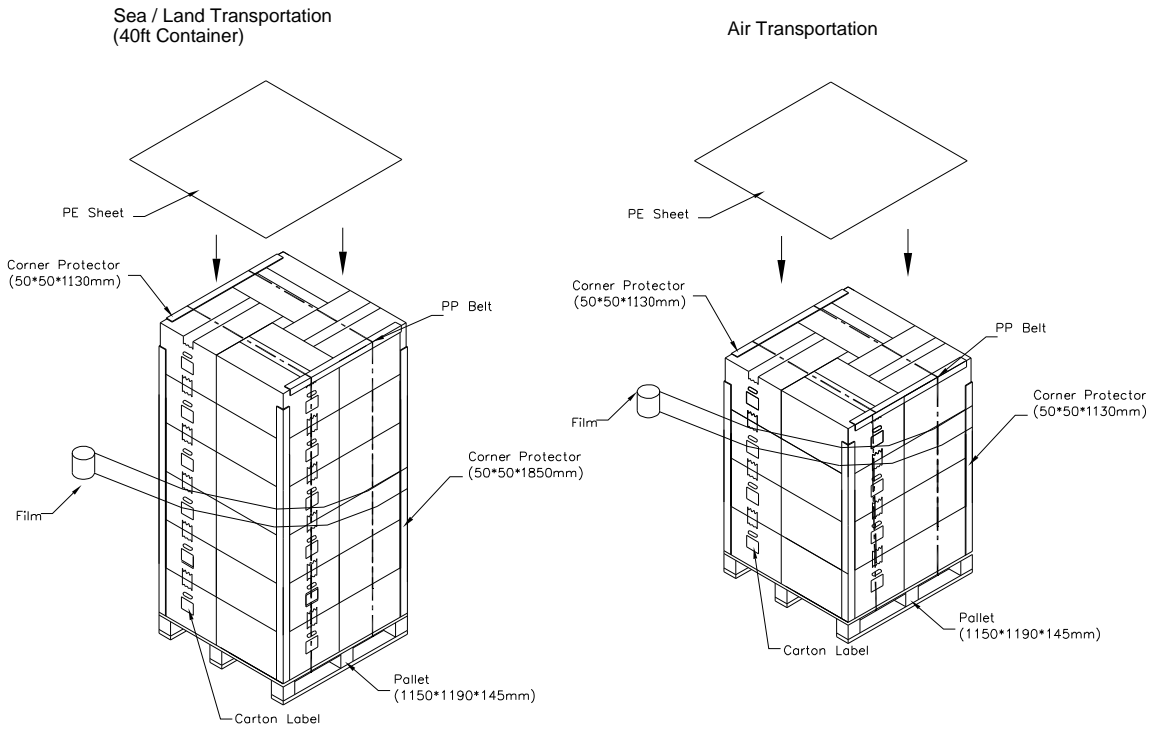
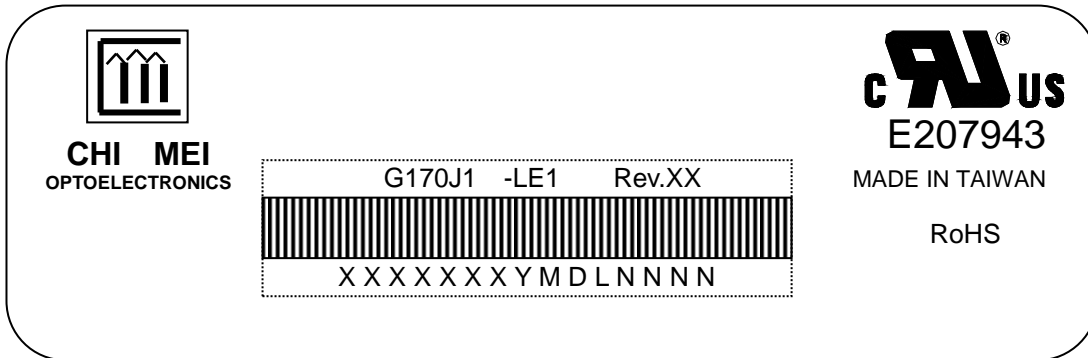


Figure. 9-2 Packing method

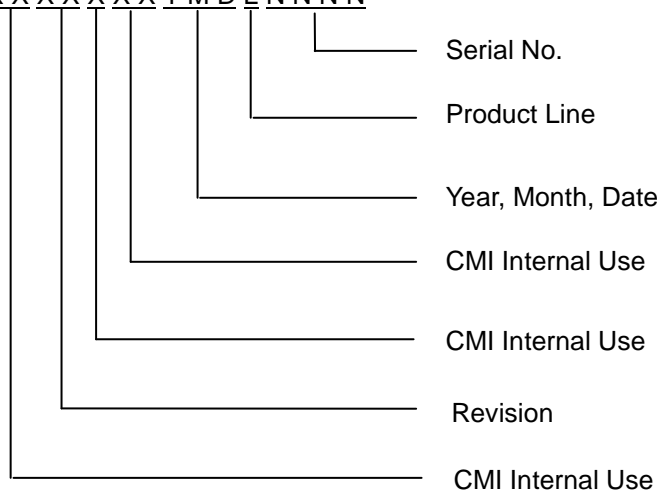
10.DEFINITION OF LABELS

10.1 CMI MODULE LABEL

The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



- (a) Model Name: G170J1-LE1
- (b) Revision: Rev. XX, for example: A0, A1... B1, B2... or C1, C2...etc.
- (c) Serial ID: XXXXXXXXYMDLNNNN



Serial ID includes the information as below:

- (a) Manufactured Date: Year: 0~9, for 2010~2019
 Month: 1~9, A~C, for Jan. ~ Dec.
 Day: 1~9, A~Y, for 1st to 31st, exclude I ,O, and U.
- (b) Revision Code: Cover all the change
- (c) Serial No.: Manufacturing sequence of product
- (d) Product Line: 1 -> Line1, 2 -> Line 2, ...etc.

11. PRECAUTIONS

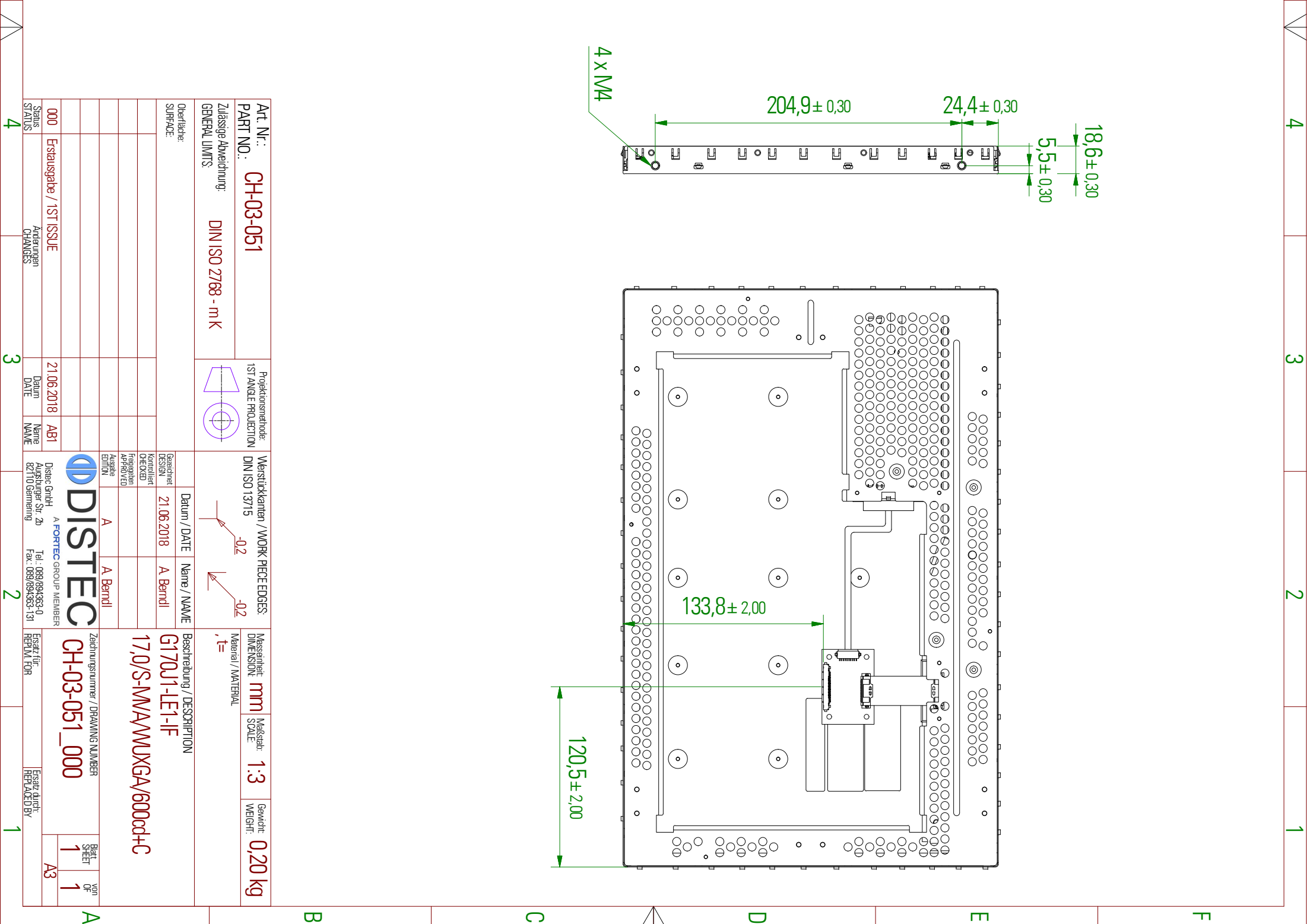
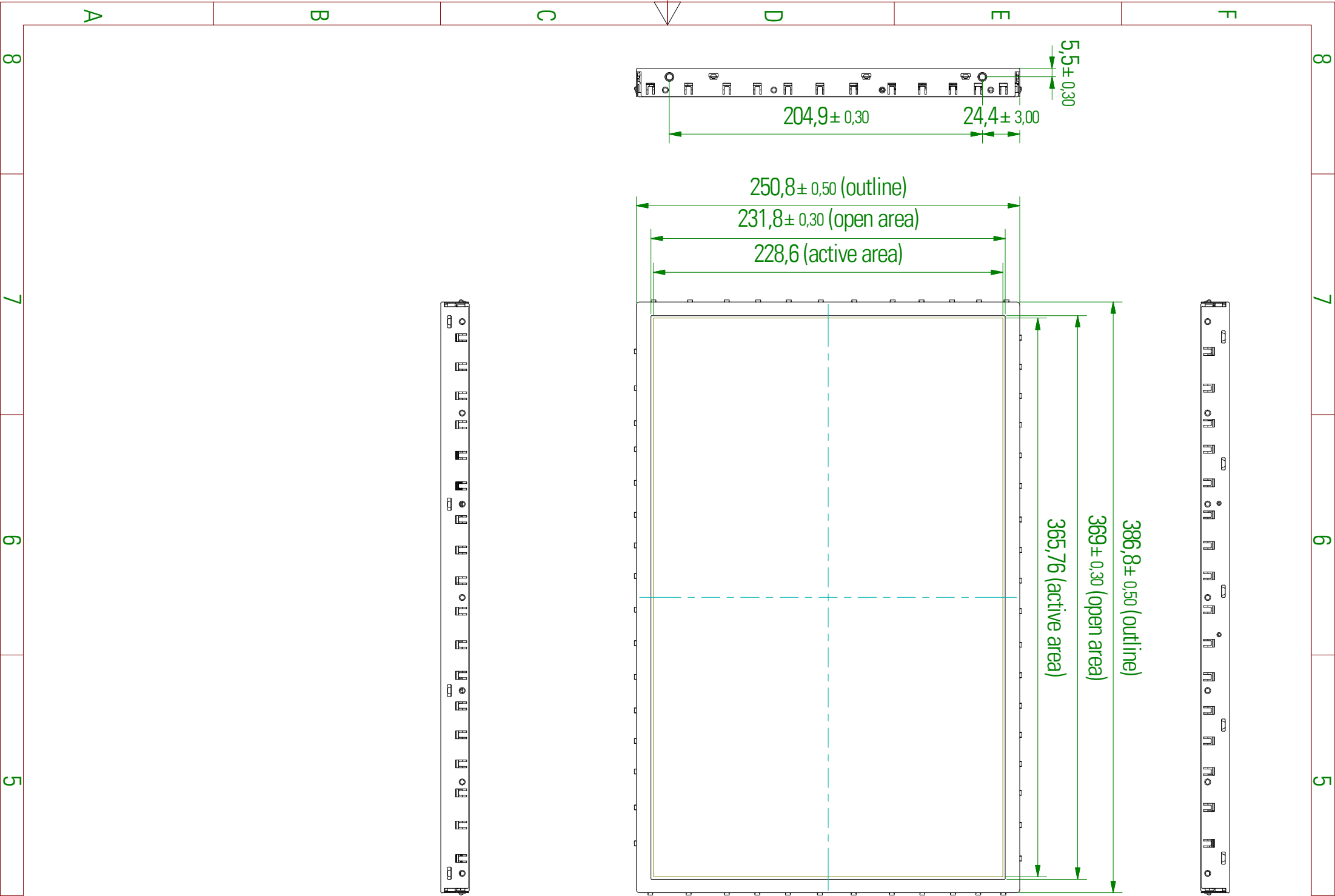
11.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) It is recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) Do not apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.
- (4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.
- (5) Do not plug in or pull out the I/F connector while the module is in operation.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) Moisture can easily penetrate into LCD module and may cause the damage during operation.
- (9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD modules in the specified storage conditions.
- (10) When ambient temperature is lower than 10°C, the display quality might be reduced. For example, the response time will become slow, and the starting voltage of backlight will be higher than that of room temperature.
- (11) Do not keep same pattern in a long period of time. It may cause image sticking on LCD.

11.2 SAFETY PRECAUTIONS

- (1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (2) After the module's end of life, it is not harmful in case of normal operation and storage.

12. MECHANICAL CHARACTERISTICS



| | | | | | | | | | | | |
|----------------------------|--|---|--|---|--|-----------------------------------|--|-------------------|--|--------------------|--|
| Art. Nr.: CH-03-051 | | Projektionsmethode: 1ST ANGLE PROJECTION | | Verstütkkanten / WORK PIECE EDGES: DIN ISO 13715 | | Messgröße: DIMENSION | | Maßstab: SCALE | | Gewicht: WEIGHT | |
| PART NO.: CH-03-051 | | Zulässige Abweichung: GENERAL LIMITS | | DIN ISO 2768 - m K | | Material / MATERIAL | | 1:3 | | 0,20 kg | |
| Oberfläche: SURFACE: | | Datum / DATE | | Name / NAME | | Beschreibung / DESCRIPTION | | | | | |
| 000 | | 21.06.2018 | | A. Berndt | | G170J1-LE1-IF | | | | | |
| Erstausgabe / 1ST ISSUE | | 21.06.2018 | | A. Berndt | | 17,0/S-1M/A/WUXGA/600cd+C | | | | | |
| Status | | Datum | | Name | | Zeichnungsnummer / DRAWING NUMBER | | | | Blatt SHEET | |
| 000 | | 21.06.2018 | | A. Berndt | | CH-03-051_000 | | | | 1 1 | |
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| Status | | Datum | | Name | | Zusätzliche Informationen | | | | von BY | |
| 000 | | 21.06.2018 | | A. Berndt | | | | | | 1 1 | |
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Our company network supports you worldwide with offices in Germany, Austria, Switzerland, the UK and the USA. For more information please contact:

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