SAMSUNG DISPLAY

# Product Specification

**(  ) Product Information**
**(  ) Preliminary Specification**
**( √ ) Approval Specification**

*Any modification of Spec is not allowed without SDC's permission.*

| CUSTOMER | Echom |
|---|---|
| DATE OF ISSUE | 2016.06.28 |

| MODEL NO. | LSI700HN03 |
|---|---|
| EXTENSION CODE | -0 |

| Signature | Customer Approval & Feedback |
|---|---|
| | |

| | |
|---|---|
| Approved by | Lee Kwang Soo<br>2016/06/28 |
| Prepared by | Deoksoo Kang<br>2016/06/28 |
| **New Business Team<br>Samsung Display Co., Ltd** | |

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# REVISION HISTORY

| Date | Rev. No | Page | Summary |
|---|---|---|---|
| 2016.06.28 | 000 | all | First Issue (First Draft) |

# . GENERAL DESCRIPTION

## DESCRIPTION

This model uses a liquid crystal display (LCD) of amorphous silicon TFT as switching components. This model is composed of a TFT LCD panel, a driver circuit, and an ass'y KIT of source PBA. This 70.0" model has a resolution of a 1920 x 1080 and can display up to 16.7 million colors with the wide viewing angle of 89° or a higher degree in all directions. This panel is designed to support applications by providing a excellent performance function of the flat panel display such as home-alone multimedia TFT-LCD TV, Display terminals for AV application products, and Public Information Display [PID]

## FEATURES

RoHS compliance (Pb-free)
High contrast ratio & aperture ratio with the wide color gamut
SPVA(Super patterned vertical align) mode
Wide viewing angle (±178°)
High speed response
FHD Resolution (1920 x 1080 pixels, 16:9)
DE (Data enable) mode
The interface (2pixel/clock) of 2ch LVDS (Low voltage differential signaling)
Landscape Only
Black Mura Improvement Technology

## GENERAL INFORMATION

| Item | Specification | Unit | Note |
|---|---|---|---|
| Active Display Area | 1549.44(H) x 871.56(V) | mm | |
| Glass size | TFT : 1566.44 X 891.26 ㎟<br>CF : 1566.44 X 888.56 ㎟ | mm | ±0.4mm |
| Panel Size | 1566.44 X 891.26 ㎟ | mm | ±0.4mm |
| | 1.40(D) | mm | ±0.1mm |
| Weight | 4,100 | g | ± 10% |
| Display Colors | 16.7M(8 bits-True) | color | |
| Number of Pixels | 1,920 x 1,080 | pixel | 16:9 |
| Pixel Arrangement | RGB Vertical Stripe | mm | |
| Display Mode | Normally Black | | |
| Surface Treatment | AG-POL(Anti-Glare)<br>Haze 2.3% / Hard coating 2H | | ±5.0% |

# 1. ABSOLUTE MAXIMUM RATINGS

If the figures on measuring instruments exceed maximum ratings, it can cause the malfunction or the unrecoverable damage on the device.

| Item | Symbol | Min. | Max. | Unit | Note |
|---|---|---|---|---|---|
| Power supply voltage | $V_{DD}$ | GND-0.4 | 14 | V | (1) |
| Temperature for storage | $T_{STG}$ | -20 | 65 | °C | (2), (4) |
| Temperature of glass surface | $T_{STG2}$ | 0 | 60 | °C | (2) |
| Operating temperature | $T_{OPR}$ | 0 | 50 | °C | (2), (5) |
| Humidity for storage | $H_{STG}$ | 5 | 90 | %RH | (2), (4) |
| Operating humidity | $H_{OPR}$ | 20 | 90 | %RG | (2), (5) |
| Endurance on static electricity | | | 150 | V | (3) |

Note (1) The power supply voltage at Ta= 25 ± 2 °C
Note (2) Temperature and the range of relative humidity are shown in the figure below.
a. 90 % RH Max. (Ta ≤ 39 °C)
b. The relative humidity is 90% or less. (Ta > 39 °C)
c. No condensation
d. Operating condition with SET
Note (3) Keep the static electricity under 150V in Polarizer attaching process.
Note (4) Operating condition with source PCB
Note (5) Storage temperature condition including glass
Note (6) Condition without packing. (Unpacking condition)

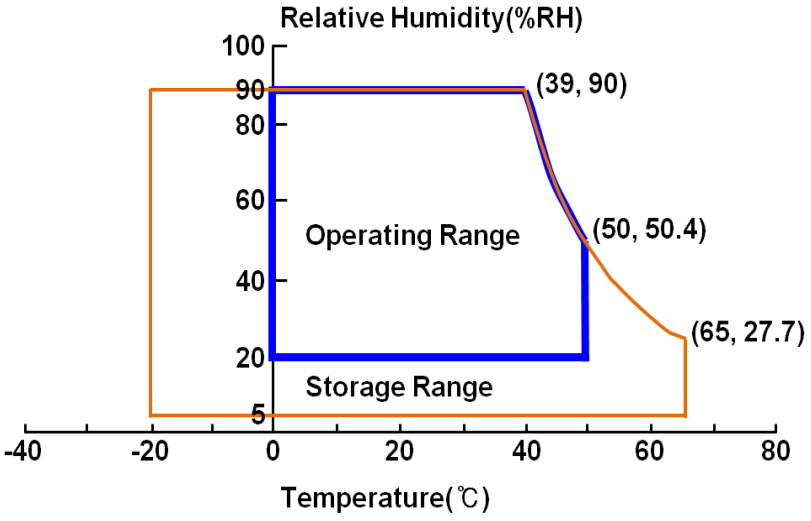



**Fig. Range for temperature and relative humidity**

# 2. APPLICATION INFORMATION FOR PID (Public Information Display)

A PID's screen may display the sudden image such as an image retention.
To extend the lifetime and optimize a function of module, the below-mentioned operating conditions are required.

## 2.1 Normal operating condition

a. Temperature: 20 ±15℃
b. Humidity: 55 ±20 %
c. Display pattern: Moving image or image, which switches regularly.
Note) The sudden image on the screen can be displayed after the static image is shown in the long-term.

## 2.2 The operating conditions when the module is operated under the abnormal condition.

a. Ambient condition
-It is recommended to set the PID up in the well-ventilated place.
b. The function of power off and screen saver
-The function of periodical power-off or a screen saver is needed when the static image is displayed in the long-term.

## 2.3 Operating conditions to prevent the sudden display resulted from displaying the static image in the long-term.

a. The proper operating time: 12 hours a day.
b. The moving image shall be inserted between the static displays periodically.
-The refresh time for liquid crystal is needed.
c. The periodic changing of background color and character's color(image)
-Use the different color for background and character (image) respectively.
-Change colors periodically.
d. Avoid combining the color for background with the color for character, which has a largely different luminance.
Note (1) Abnormal condition means all operating condition except normal operating condition.
Note (2) The moving image or black pattern is strongly recommended as a screen saver.

## 2.4 Only the lifetime of PID stated in this spec is guaranteed if the PID is used under the proper operating conditions.

## 2.5 Clean the system regularly for not accumulating the dust around the system considering user environment, otherwise, its reliability and function may not be satisfied.

# 3. OPTICAL CHARACTERISTICS

The optical characteristics should be measured in the dark room or the space surrounded by the similar setting.

Measuring equipment : TOPCON RD-80S, TOPCON SR-3 ,ELDIM EZ-Contrast

(Ta = 25 ± 2°C, VDD=12.0V, fv=60Hz, $f_{DCLK}$=148.5MHz, Light source: D65 Standard light)

| Item | | Symbol | Condition | Min. | Typ. | Max. | Unit | Light Source | Note |
|---|---|---|---|---|---|---|---|---|---|
| Contrast ratio (At the center of screen) | | C/R | | 3000 | 4000 | - | | Standard | (3) SR-3 |
| Response time | G-to-G | Tg | $T_{PAN,SUR}$ =29.9℃ | - | 8 | 16 | msec | Standard | (5) RD-80S |
| Chromaticity (CIE 1931) | Red | Rx | Normal qL,R=0 qU,D=0 Viewing Angle | TYP. -0.03 | 0.655 | TYP. +0.03 | | Standard | (7),(8) SR-3 |
| | | Ry | | | 0.330 | | | | |
| | Green | Gx | | | 0.280 | | | | |
| | | Gy | | | 0.580 | | | | |
| | Blue | Bx | | | 0.135 | | | | |
| | | By | | | 0.120 | | | | |
| | White | Wx | | | 0.300 | | | | |
| | | Wy | | | 0.370 | | | | |
| Color gamut | | - | | - | 66 | - | % | Standard | (7) SR-3 |
| Color Temp. | | - | | - | 6700 | - | K | Standard | |
| Viewing Angle | Hor. | $q_l$ | C/R≥10 | 75 | 89 | - | Degree | Standard | (8) SR-3 EZ-Contrast |
| | | $q_R$ | | 75 | 89 | - | | | |
| | Ver. | $q_U$ | | 75 | 89 | - | | | |
| | | $q_D$ | | 75 | 89 | - | | | |
| Transmissivity | | T | | 5.1 | 5.7 | - | % | Standard | (4) D65/SR3 |
| Gamma Value | | GMA | Ave(@0~255) | 1.9 | 2.2 | 2.5 | | Standard | SR-3 |

**Notice**

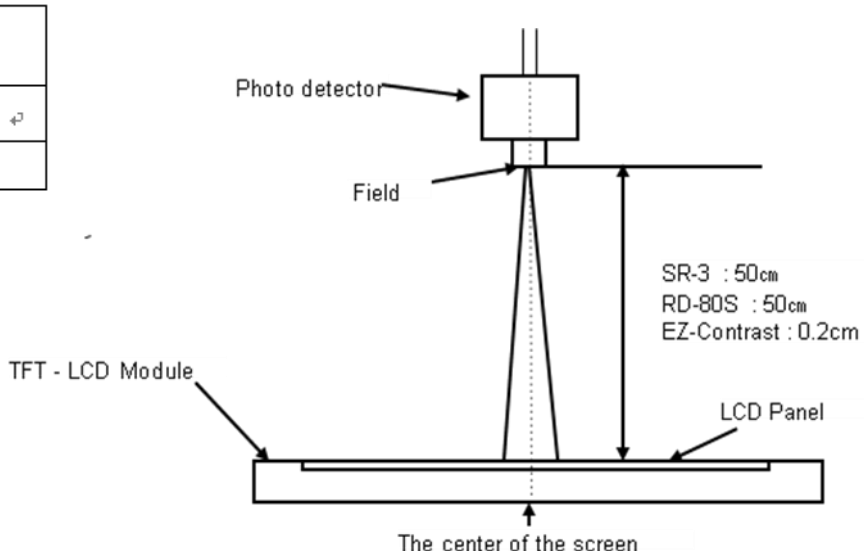
Note(1) Setup for test equipment

The measurement should be executed in a stable, windless, and dark room for 40min and 60min after operating the panel at the given temperature for stabilization of the standard light. (SDC uses the standard luminance of the D65 media).

This measurement should be measured at the center of screen.

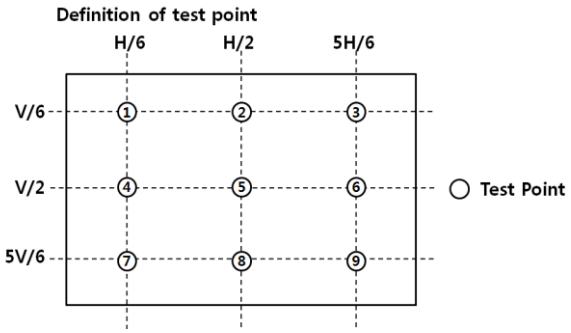
The environment condition: Ta = 25 ± 2 °C

| Photo detector | Field |
|---|---|
| SR-3 | 2°/1° |
| RD-80S | 1° |




The CIE positions D65 as the standard daylight illuminant:
[D65] is intended to represent average daylight and has a correlated color temperature of approximately 6500 K. CIE standard illuminant D65 should be used in all colorimetric calculations requiring representative daylight, unless there are specific reasons for using a different illuminant.

Note(2) Definition of the test point




Note(3) Definition of contrast ratio (C/R)

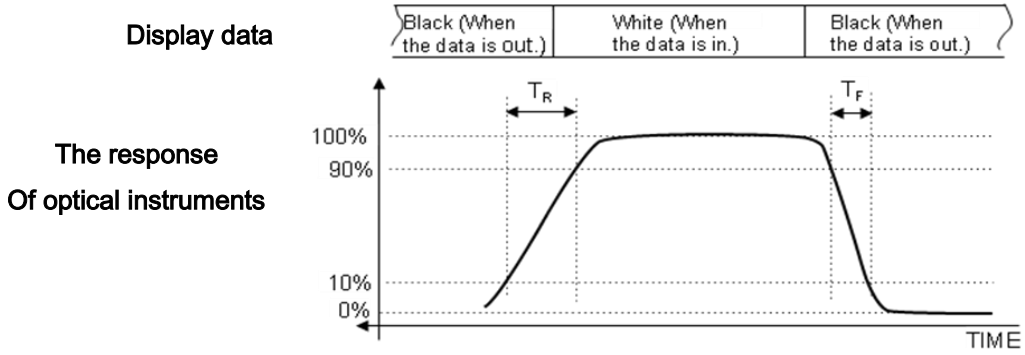
: Ratio of max.gray(Gmax) & min.gray(Gmin) at the center point ⑤ of the panel.

$$C/R = \frac{G\max}{G\min}$$

Gmax : Luminance in all white pixels
Gmin : Luminance in all black pixels.

Note (4) Definition of transmittance
: The measurement shall be executed with the standard light unit.\

Note (5) Definition of the response time : Average response time of all to Gray to Gray except Tr, Tf




※ G-to-G : Average response time between whole gray scale to whole gray scale.

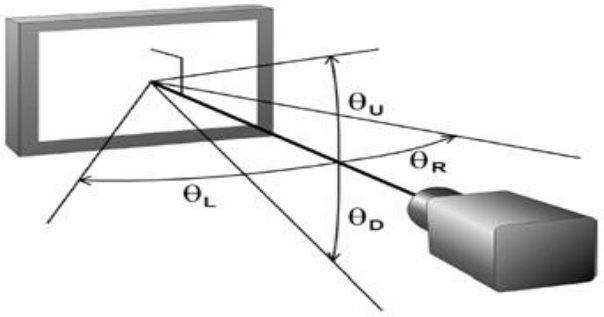
| Gray to Gray Response Time | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Gray | End | | | | | | | | | |
| | | 0 | 31 | 63 | 95 | 127 | 159 | 191 | 223 | 255 | |
| Start | 0 | | Tr(0-31) | Tr(0-63) | Tr(0-95) | Tr(0-127) | Tr(0-159) | Tr(0-191) | Tr(0-223) | Tr(0-255) | $T_{ON}$ |
| | 31 | Tr(31-0) | | Tr(31-63) | Tr(31-95) | Tr(31-127) | Tr(31-159) | Tr(31-191) | Tr(31-223) | Tr(31-255) | |
| | 63 | Tr(63-0) | Tr(63-31) | | Tr(63-95) | Tr(63-127) | Tr(63-159) | Tr(63-191) | Tr(63-223) | Tr(63-255) | |
| | 95 | Tr(95-0) | Tr(95-31) | Tr(95-63) | | Tr(95-127) | Tr(95-159) | Tr(95-191) | Tr(95-223) | Tr(95-255) | |
| | 127 | Tr(127-0) | Tr(127-31) | Tr(127-63) | Tr(127-95) | | Tr(127-159) | Tr(127-191) | Tr(127-223) | Tr(127-255) | |
| | 159 | Tr(159-0) | Tr(159-31) | Tr(159-63) | Tr(159-95) | Tr(159-127) | | Tr(159-191) | Tr(159-223) | Tr(159-255) | |
| | 191 | Tr(191-0) | Tr(191-31) | Tr(191-63) | Tr(191-95) | Tr(191-127) | Tr(191-159) | | Tr(191-223) | Tr(191-255) | |
| | 223 | Tr(223-0) | Tr(223-31) | Tr(223-63) | Tr(223-95) | Tr(223-127) | Tr(223-159) | Tr(223-191) | | Tr(223-255) | |
| | 255 | Tr(255-0) | Tr(255-31) | Tr(255-63) | Tr(255-95) | Tr(255-127) | Tr(255-159) | Tr(255-191) | Tr(255-223) | | |
| | | $T_{OFF}$ | | | | | | | | | |

T*(X-Y) : Response time from level of gray at X to level of gray at Y
**The definition of response time** = Σ [T*(X-Y)] / 72

Note (6) Definition of luminance of white: The luminance of white at the center point ⑤

Note (7) Definition of chromaticity (CIE 1931)
The color coordinate of red, green, blue and white at the center point ⑤

Note (8) Definition of viewing angle: The range of viewing angle (C/R ≥10)
: The measurement shall be executed with the standard light unit or Samsung's standard BLU.



# 4. ELECTRICAL CHARACTERISTICS

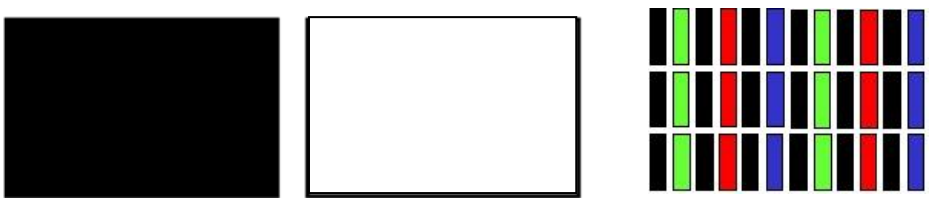
## 4.1 TFT LCD MODULE

* Ta = 25 ± 2 °C

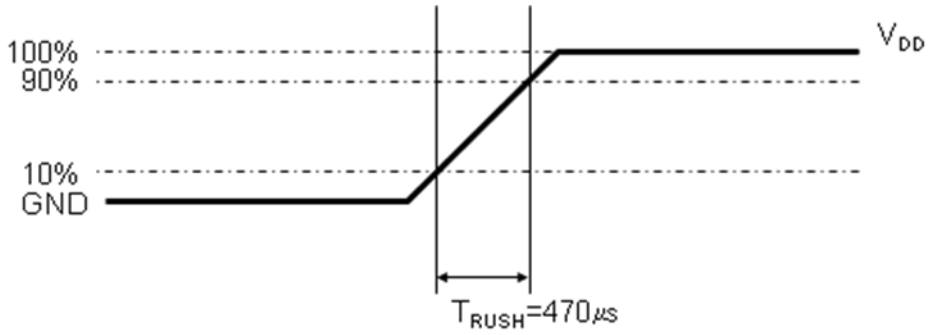
| Item | | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|
| Voltage of power supply | | $V_{DD}$ | 10.8 | 12.0 | 13.2 | V | (1) |
| Current of power supply | (a) Black | $I_{DD}$ | - | 506 | 660 | mA | (2),(3) |
| | (b) White | | - | 504 | 660 | mA | |
| | (c) Sub V-Stripe | | - | 969 | 1270 | mA | |
| Vsync frequency | | $f_V$ | 48 | 60 | 62 | Hz | |
| Hsync frequency | | $f_H$ | 54 | 67.5 | 69.75 | kHz | |
| Main frequency | | $f_{dclk}$ | 118.8 | 148.5 | 153.5 | MHz | |
| Rush current | | $I_{RUSH}$ | - | - | 7 | A | (4) |

Note (1) The ripple voltage should be controlled fewer than 10% of $V_{DD}$ (Typ.) voltage.
Note (2) fV=60Hz, fDCLK =148.5MHz, $V_{DD}$ = 12.0V, DC Current.
Note (3) Power dissipation check pattern (LCD Module only)

a) Black pattern b) White pattern c) Sub-V Stripe



Note (4) Conditions for measurement




The rush current, $I_{RUSH}$ can be measured when $T_{RUSH}$. is 470㎲.

# 5. INPUT TERMINAL PIN ASSIGNMENT

## 5.1 INPUT SIGNAL & POWER

Connector : FI-RE51S-HF-J (JAE)

| PIN No. | Description | | PIN No. | Description | |
|---|---|---|---|---|---|
| 1 | $V_{DD}$ (12V) | | 26 | Even LVDS Signal | Rx2[A]P |
| 2 | $V_{DD}$ (12V) | | 27 | | Rx2[B]N |
| 3 | $V_{DD}$ (12V) | | 28 | | Rx2[B]P |
| 4 | $V_{DD}$ (12V) | | 29 | | Rx2[C]N |
| 5 | $V_{DD}$ (12V) | | 30 | | Rx2[C]P |
| 6 | No Connection (1) | | 31 | | GND |
| 7 | GND | | 32 | | Rx2CLK_N |
| 8 | GND | | 33 | | Rx2CL_P |
| 9 | GND | | 34 | | GND |
| 10 | Odd LVDS Signal | Rx1[A]N | 35 | | Rx2[D]N |
| 11 | | Rx1[A]P | 36 | | Rx2[D]P |
| 12 | | Rx1[B]N | 37 | | Rx2[E]N |
| 13 | | Rx1[B]P | 38 | | Rx2[E]P |
| 14 | | Rx1[C]N | 39 | GND | |
| 15 | | Rx1[C]P | 40 | No Connection (1) | |
| 16 | | GND | 41 | No Connection (1) | |
| 17 | | Rx1CLK_N | 42 | No Connection (1) | |
| 18 | | Rx1CLK_P | 43 | No Connection (1) | |
| 19 | | GND | 44 | No Connection (1) | |
| 20 | | Rx1[D]N | 45 | LVDS_SEL (2) | |
| 21 | | Rx1[D]P | 46 | No Connection (1) | |
| 22 | | Rx1[E]N | 47 | No Connection (1) | |
| 23 | | Rx1[E]P | 48 | No Connection (1) | |
| 24 | GND | | 49 | No Connection (1) | |
| 25 | Even LVDS | Rx2[A]N | 50 | No Connection (1) | |
| | | | 51 | No Connection (1) | |

Note (1) No Connection : These pins are only used for SAMSUNG internal purpose.
This PINS shouldn't connect any signal level or GND from Set.

Note (2) LVDS_SEL : : LVDS_SEL Recommand → This PINS shouldn't connect any signal level
(If This Pin: LOW (GND V)/ NC → NORMAL LVDS FORMAT
Otherwise : HIGH (3.3V) → JEIDA LVDS FORMAT

Note (3) :
- Input Mode 8Bit Setting & 8bit input , → E_Chanel : Floating
- Input Mode 10bit Setting & 8bit input, → E_Chanel : Keep Level '0'

Note (4) Pin number, which starts from the left side.

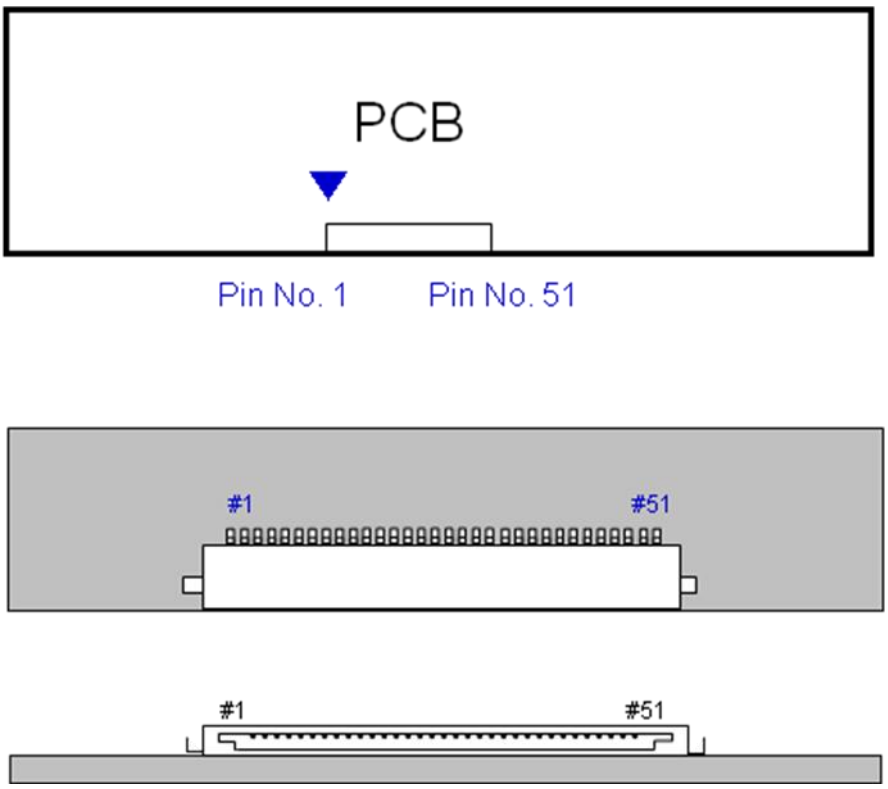



**Fig . The diagram of connector**

a. Power GND pins should be connected to the LCD's metal chassis.
b. All power input pins should be connected together.
c. All NC pins should be separated from other signal or power.

## 5.2 LVDS INTERFACE

- LVDS receiver : T-con(merged) (8Bit)
- Data format Default LVDS Option : JEIDA

| | LVDS pin | JEIDA -DATA | Normal -DATA |
|---|---|---|---|
| TxOUT/RxIN0 | TxIN/RxOUT0 | R2 | R0 |
| | TxIN/RxOUT1 | R3 | R1 |
| | TxIN/RxOUT2 | R4 | R2 |
| | TxIN/RxOUT3 | R5 | R3 |
| | TxIN/RxOUT4 | R6 | R4 |
| | TxIN/RxOUT6 | R7 | R5 |
| | TxIN/RxOUT7 | G2 | G0 |
| TxOUT/RxIN1 | TxIN/RxOUT8 | G3 | G1 |
| | TxIN/RxOUT9 | G4 | G2 |
| | TxIN/RxOUT12 | G5 | G3 |
| | TxIN/RxOUT13 | G6 | G4 |
| | TxIN/RxOUT14 | G7 | G5 |
| | TxIN/RxOUT15 | B2 | B0 |
| | TxIN/RxOUT18 | B3 | B1 |
| TxOUT/RxIN2 | TxIN/RxOUT19 | B4 | B2 |
| | TxIN/RxOUT20 | B5 | B3 |
| | TxIN/RxOUT21 | B6 | B4 |
| | TxIN/RxOUT22 | B7 | B5 |
| | TxIN/RxOUT24 | HSYNC | HSYNC |
| | TxIN/RxOUT25 | VSYNC | VSYNC |
| | TxIN/RxOUT26 | DEN | DEN |
| TxOUT/RxIN3 | TxIN/RxOUT27 | R0 | R6 |
| | TxIN/RxOUT5 | R1 | R7 |
| | TxIN/RxOUT10 | G0 | G6 |
| | TxIN/RxOUT11 | G1 | G7 |
| | TxIN/RxOUT16 | B0 | B6 |
| | TxIN/RxOUT17 | B1 | B7 |
| | TxIN/RxOUT23 | RESERVED | RESERVED |

LVDS Option : High(3.3V) → Normal NS LVDS format / Low(GND or N.C) → JEIDA LVDS format

## 5.3 INPUT COLOR DATA MAPPING

| COLOR | DISPLAY (8bit) | DATA SIGNAL | | | | | | | | | | | | | | | | | | | | | | | | GRAY SCALE LEVEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RED | | | | | | | | GREEN | | | | | | | | BLUE | | | | | | | | |
| | | R0 | R1 | R2 | R3 | R4 | R5 | R6 | R7 | G0 | G1 | G2 | G3 | G4 | G5 | G6 | G7 | B0 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | |
| BASIC 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 | - |
| | 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 | - |
| | 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 | - |
| | 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 | - |
| | 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 | - |
| | 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 | 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 | R0 |
| | DARK ↑ | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | R1 |
| | | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | R2 |
| | | : | : | : | : | : | : | | | : | : | : | : | : | : | | | : | : | : | : | : | : | | | R3~ R252 |
| | | : | : | : | : | : | : | | | : | : | : | : | : | : | | | : | : | : | : | : | : | | | |
| | ↓ LIGHT | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | R253 |
| | | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | R254 |
| | 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 | R255 |
| GRAY SCALE OF GREEN | 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 | G0 |
| | DARK ↑ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | G1 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | G2 |
| | | : | : | : | : | : | : | | | : | : | : | : | : | : | | | : | : | : | : | : | : | | | G3~ G252 |
| | | : | : | : | : | : | : | | | : | : | : | : | : | : | | | : | : | : | : | : | : | | | |
| | ↓ LIGHT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | G253 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | G254 |
| | 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 | G255 |
| GRAY SCALE OF BLUE | 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 | B0 |
| | DARK ↑ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | B1 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | B2 |
| | | : | : | : | : | : | : | | | : | : | : | : | : | : | | | : | : | : | : | : | : | | | B3~ B252 |
| | | : | : | : | : | : | : | | | : | : | : | : | : | : | | | : | : | : | : | : | : | | | |
| | ↓ LIGHT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | B253 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | B254 |
| | 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 | B255 |

Note (1) Definition of gray : Rn: Red gray, Gn: Green gray, Bn: Blue gray (n=gray level)

Note (2) Input signal: 0 =Low level voltage, 1=High level voltage

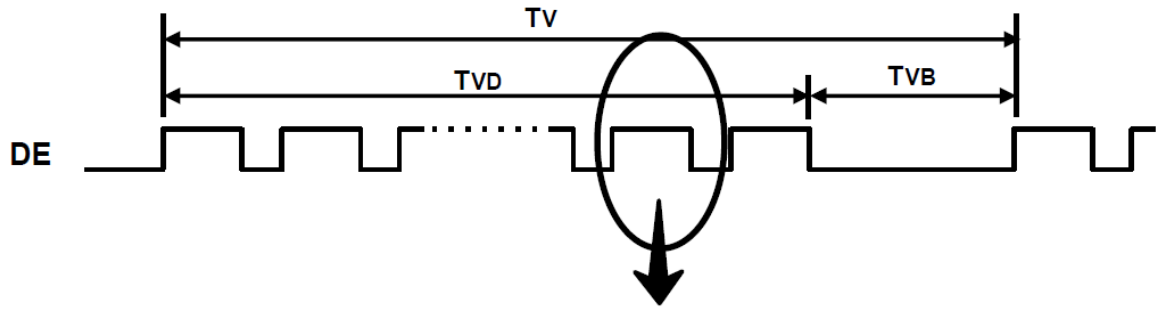
# 6. INTERFACE TIMING

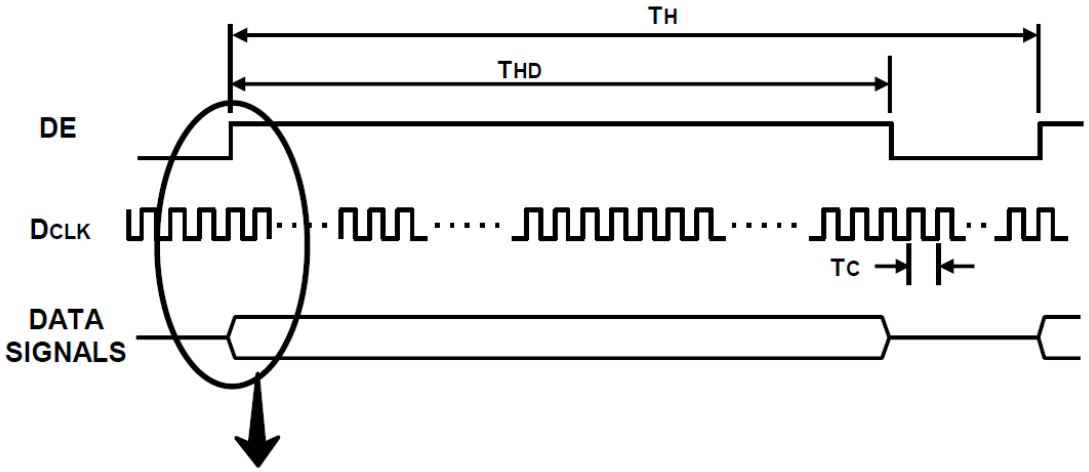
## 6.1 TIMING PARAMETERS OF TIMING (Only DE Mode)

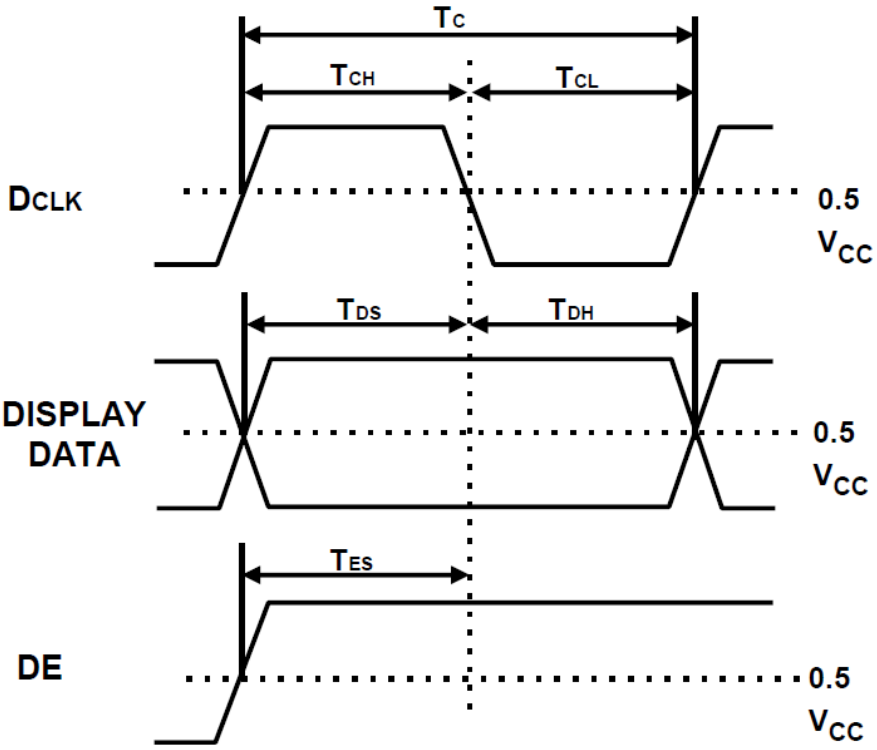
| Signal | Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|
| Clock | Frequency | 1/Tc | 120 | 148.5 | 153.5 | MHz | - |
| Hsync | | $F_H$ | 54 | 67.5 | 69.75 | KHz | |
| Vsync | | $F_V$ | 48 | 60 | 62 | Hz | |
| Term for the Vertical Display | Active display period | $T_{VD}$ | - | 1080 | - | Lines | |
| | Total vertical | $T_V$ | 1115 | 1125 | 1410 | Lines | |
| Term for the Horizontal Display | Active display Period | $T_{HD}$ | - | 1920 | - | Clocks | |
| | Total Horizontal | $T_H$ | 2115 | 2200 | 2345 | Clocks | |

Note) These products don't have to receive the signal of Hsync & Vsync from the input device.
(1)Key points when testing: TTL controls the signal and the CLK at the input terminal of LVDS Tx of the system.
(2) Internal VDD = 3.3V
(3) Spread spectrum
- The limit of spread spectrum's range of SET in which the LCD module is assembled should be within ± 1.5 %

## 6.2 TIMING DIAGRAMS OF INTERFACE SIGNAL



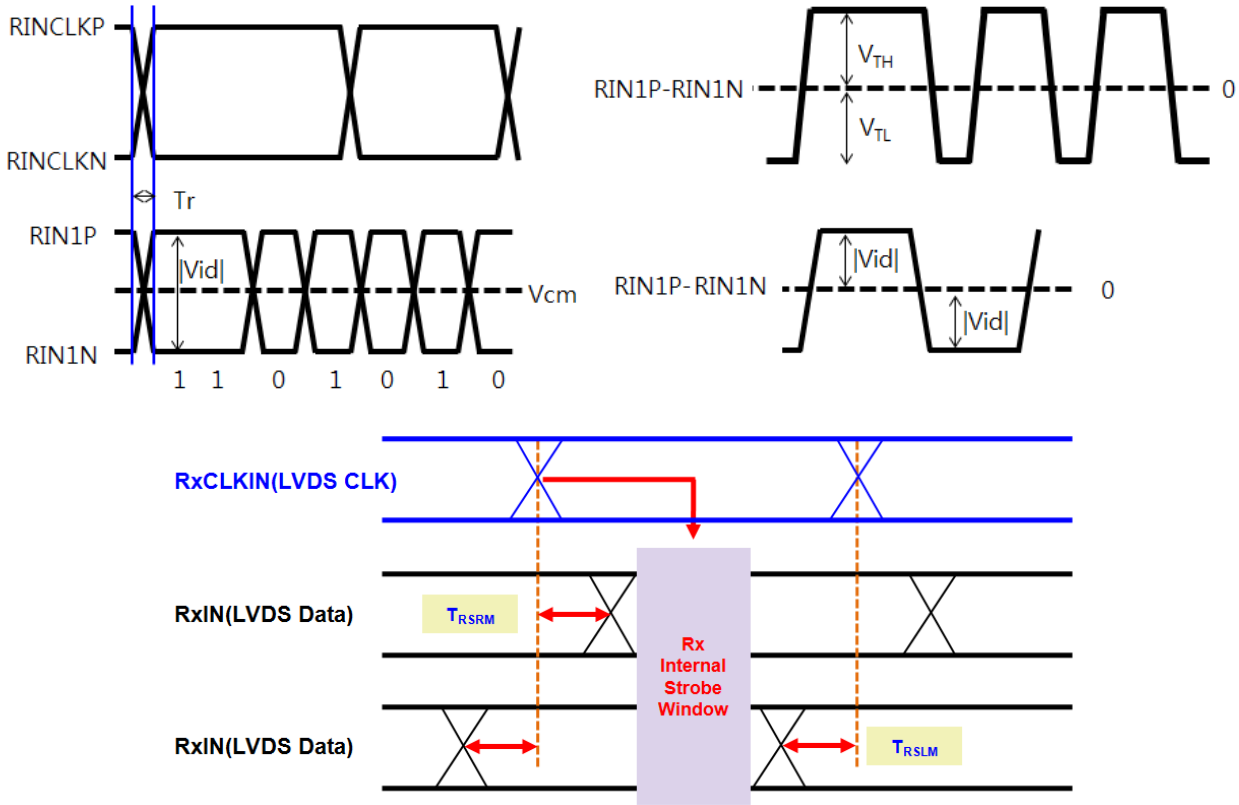



## 6.3 CHARACTERISTICS OF INPUT DATA OF LVDS

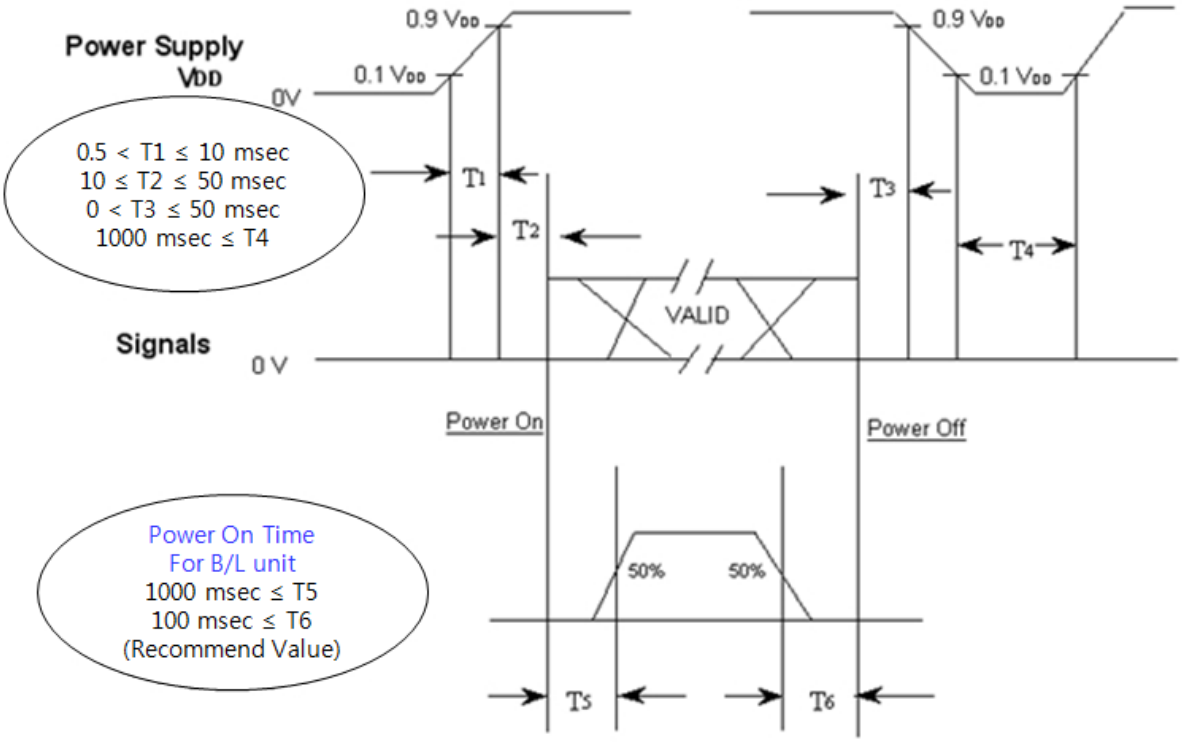
| ITEM | | SYMBOL | Min | Typ | Max | UNIT | NOTE |
|---|---|---|---|---|---|---|---|
| Differential input high threshold voltage | | $V_{TH}$ | 2.5 | - | 3.3 | V | $V_{CM}$ = 1.2V |
| Differential input low threshold voltage | | $V_{TL}$ | -0.3 | - | 0.5 | V | |
| Input common mode voltage | | $V_{CM}$ | 0.2 | 1.2 | 2.0 | V | - |
| Differential Input Voltage | | $\|V_{ID}\|$ | 100 | - | 600 | mV | $\|V_{ID}\|$=100mV |
| Input data position | $F_{IN}$=80MHz | $t_{RSRM}$ | - | - | 450 | ps | - |
| | | $t_{RSLM}$ | -450 | - | - | ps | - |

Note) The spread spectrum should be 0% when the skew is measured.
Position of a measurement is T-CON LVDS input pin.



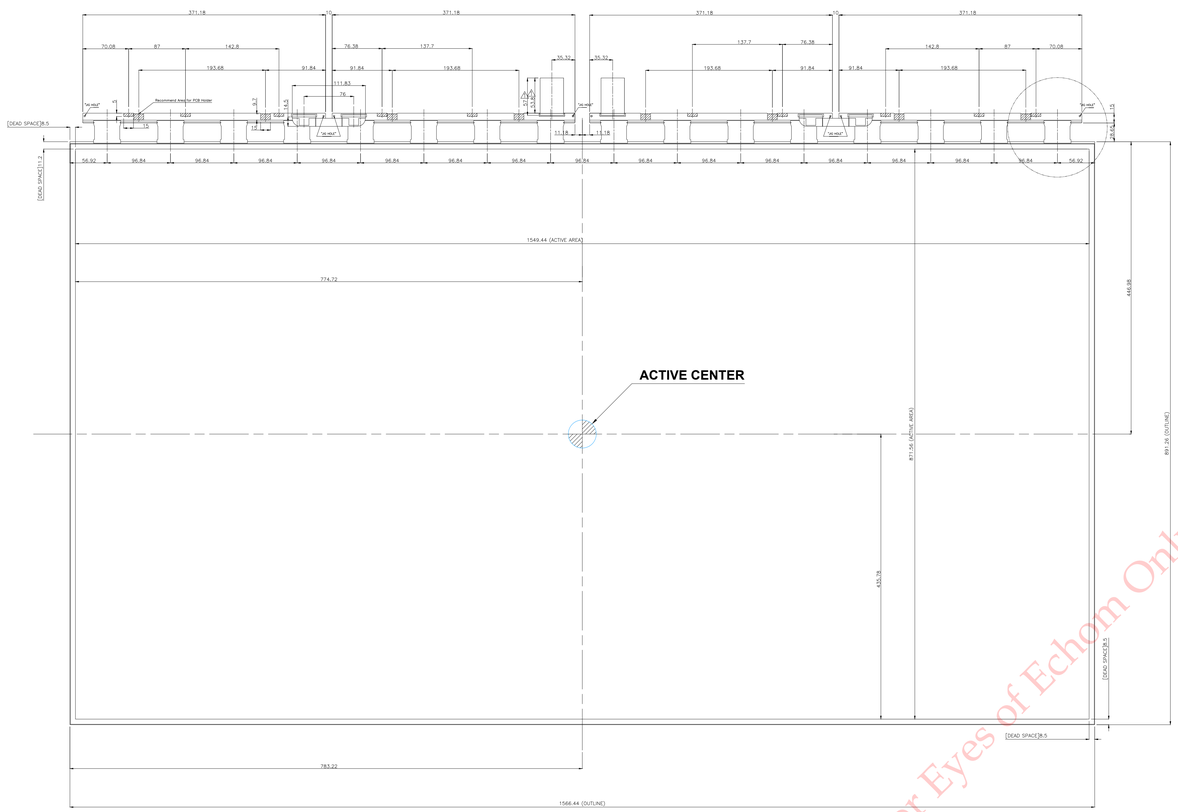
## 6.4 POWER ON/OFF SEQUENCE

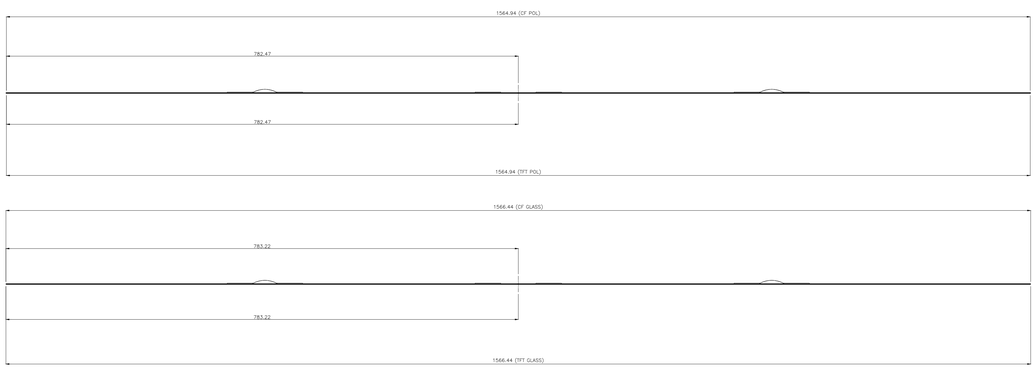
To prevent the product from being latched up or the DC in the LCD module from starting an operation, the order to turn the power on and off should be changed to the order as shown in the diagram below.



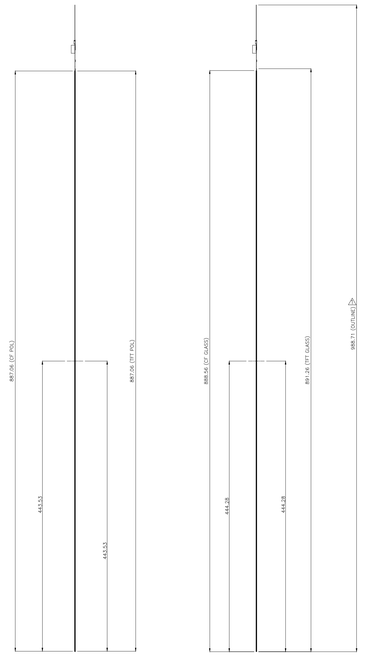

| Timing | Remarks |
|---|---|
| $T_1$ | The time, during which the level of $V_{DD}$ is rising from 10% to 90%. |
| $T_2$ | The changing time, during which the $V_{DD}$ starts rising beyond 90% until the valid data of signal started coming in. |
| $T_3$ | The changing time, during which the valid data of signal starts leaving out until the $V_{DD}$ starts falling below 90%. |
| $T_4$ | The changing time, during which the $V_{DD}$ starts falling below 10% to restart the Windows. |
| $T_5$ | The changing time, during which the signal of BLU starts rising beyond 50%. |
| $T_6$ | The changing time, during which the signal of BLU starts falling below 50%. |

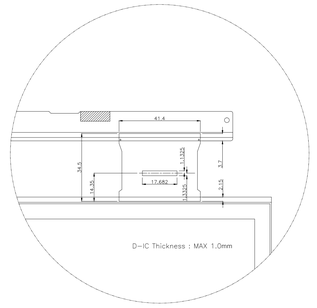
- The inputted $V_{DD}$ 's value for supply voltage, BLU, and signal to the external system of the module shall be computed with referring to the former mentioned value.
- The method to apply the voltage to the LED within the range, which the LCD operates. When the back-light is turned on before the LCD is operated or the power of LCD is turned off before the back-light is turned off, the abnormal display on the screen may be shown momentarily.
- Please keep the level of input signal low or keep the level of impedance high when the value of $V_{DD}$ is below 10%.
- The value shall be measured after the module has been fully discharged between the period, which the power is turned on and the period, which the power is turned off like the T4 timing. The backlight may be flashed if the interface signal remains floated when the above-mentioned signal becomes invalid.



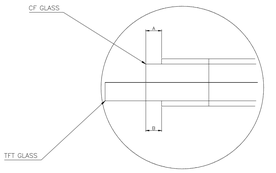






## DETAIL "A" (HIDDEN VIEW) (3 : 1)




| | CF GLASS ~ POL | |
|---|---|---|
| POSITION | A(CF POL) | B(TFT POL) |
| UP | 0.75 | 0.75 |
| DOWN | 0.75 | 0.75 |
| LEFT | 0.75 | 0.75 |
| RIGHT | 0.75 | 0.75 |

## DIMENSION OF POL ATTACHMENT

| UP | DOWN | LEFT | RIGHT |
|---|---|---|---|
| 8.50 | 8.50 | 8.50 | 8.50 |

## REAL BM (FROM ACTIVE)

** NOTE*

1. *PANEL : TFT-LCD*
2. *REFER TO "PRODUCT INFORMATION" OR "PRODUCT SPECIFICATION" DOCUMENTS*
   - *TOLERANCE*
   - *FFC CABLE INFORMATION*
   - *CONNECTOR INFORMATION*
   - *HEIGHT OF CIRCUIT COMPONENTS*
3. *PANEL THICKNESS*
   - *CF POL : T0.2*
   - *CF GLASS : T0.5*
   - *TFT GLASS : T0.5*
   - *TFT POL : T0.2*
4. *SOURCE PBA*
   - *PCB THICKNESS : T0.6*
   - *FFC CONNECTOR HEIGHT : T1.5*
   - *CIRCUIT COMPONENT MAX HEIGHT : T1.3*
   - *SDC RECOMMEND NOT TO USE "JIG HOLE" AS THE METHOD OF FIXING SOURCE PBA (SDC INTERNAL PROCESS ONLY)*

| REVISION | REV | DATE | DESCRIPTION OF REVISION | CHK'D BY |
|---|---|---|---|---|
| | X01 | 16.02.01 | ⚠FFC LENGTH Change : 44 → 57mm | K.W.LEE |

PRELIMINARY

| GENERAL TOLERANCE | | | |
|---|---|---|---|
| STEP | LEVEL 1 | LEVEL 2 | LEVEL 3 |
| 0 < X <= 4 | ±0.05 | ±0.1 | ±0.2 |
| 4 < X <= 16 | ±0.08 | ±0.15 | ± 0.3 |
| 16 < X <= 64 | ± 0.12 | ± 0.25 | ± 0.5 |
| 64 < X <= 256 | ± 0.25 | ± 0.4 | ± 0.8 |

| UNIT | mm | DES'D BY | CHK'D BY | CHK'D BY | APP'D BY | MODEL NAME | LSI700HN03 | | |
|---|---|---|---|---|---|---|---|---|---|
| SCALE | 1:1 | K.W.LEE | J.K.KIM | I.H.YANG | T.C.KANG | SHEET NAME | OUTLINE DIMENSION | | |
| TOLERANCE | | 16.02.01 | 16.02.01 | 16.02.01 | 16.02.01 | SPECIFICATION | FHD, 70", 60Hz, M84, VNB | SHEET | 1/1 |
| SAMSUNG DISPLAY | | | | | SPEC. NO | CODE NO. | | VER. | X01 |

# 8. RELIABILITY TEST

| Item | Test Condition | Quantity | Note |
|---|---|---|---|
| HTOL | 60℃ (Panel change 500hr / Circuit change 250hr) | 8 | |
| LTOL | -5℃, (Panel change 500hr / Circuit change 250hr) | 4 | |
| HTS | 70℃ (Panel change 500hr / Circuit change 250hr) | 4 | |
| LTS | -25℃ (Panel change 500hr / Circuit change 250hr) | 4 | |
| THB | 50℃ / 90%RH (Panel change 500hr / Circuit change 250hr) | 10 | |
| WHTS | 60℃ / 75%RH, Storage | 4 | |
| Image sticking | 25℃, Mosaic pattern (9X10), 12hrs | 8 | |
| ESD | S-IC Input ±7KV, Output ±4KV | 1pallet | |
| Transportation condition | drop(20cm) → temperature/humidity(-30~60℃ / 40℃ 90%RH) → pressure → vibration(5~200Hz 1.05Grms, 2hr) → drop(20cm) | 3 | |
| Altitude | 0℃, 50,000(ft) 48Hr | 4 | |
| Noise | Electromagnetic noise : Overall under 23dB | 2 | |
| Complex stress | -20℃~60℃, 0~90%RH, 2cycle | 4 | |

**[ Criteria on evaluation]**

The components of product, which may affect to the function of display shall not be changed when the display quality test is executed under the normal operating condition.

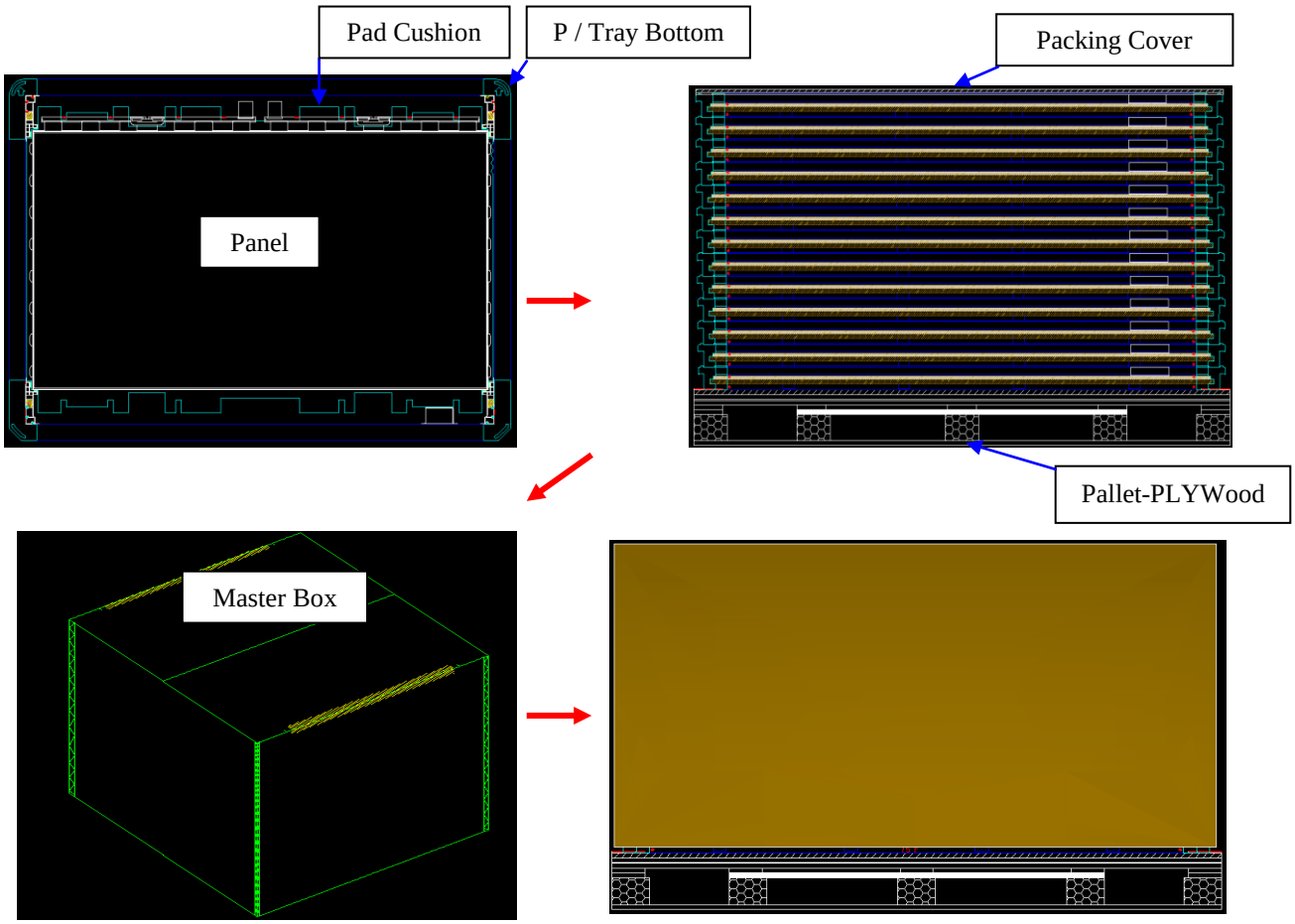
* HTOL / LTOL : The operating at the high and low temperature
* THB : The slant of temperature and humidity
* HTS / LTS : The storage at the high and low temperature
* WHTS : The storage condition at the high temperature with the high humidity

# 9. PACKING

## 9.1 Packing Form

Corrugated fiberboard box and corrugated cardboard as shock absorber

## 9.2 Packing Mathode




Note (1) Total Weight : Approximately 588.4kg
Note (2) Acceptance number of piling : 1pallet
Note (3) Carton size : 1771mm(H) x 1296mm(V) x 1146mm(Height)

## 9.3 Packing Material

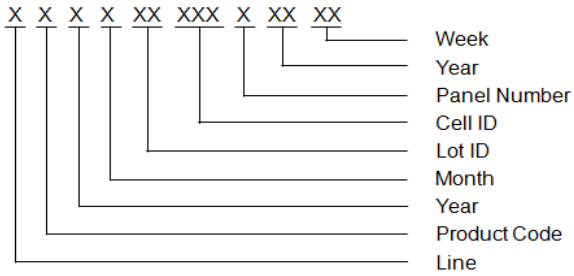
| No | Part name | Quantity |
|---|---|---|
| 1 | Pad Cushion | 78 EA |
| 2 | Master Box | 1 EA |
| 3 | Packing Cover | 1 EA |
| 4 | P / Tray Bottom | 13 EA |
| 5 | Pallet-PLYWood | 1 EA |
| 6 | Tray/Panel | 5 EA |
| 7 | Pallet-PLYWood/Panel | 65 EA |

# 10. Marking and Others

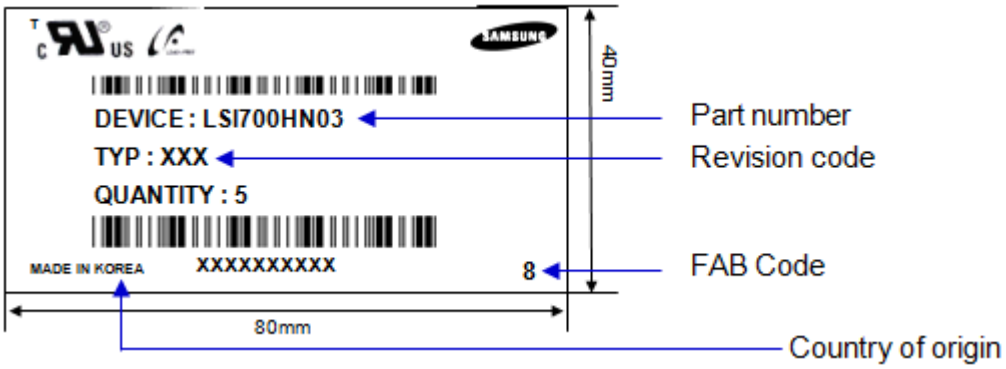
A nameplate is affixed to the specified location on each product.

(1)Open Cell Label at Source PBA

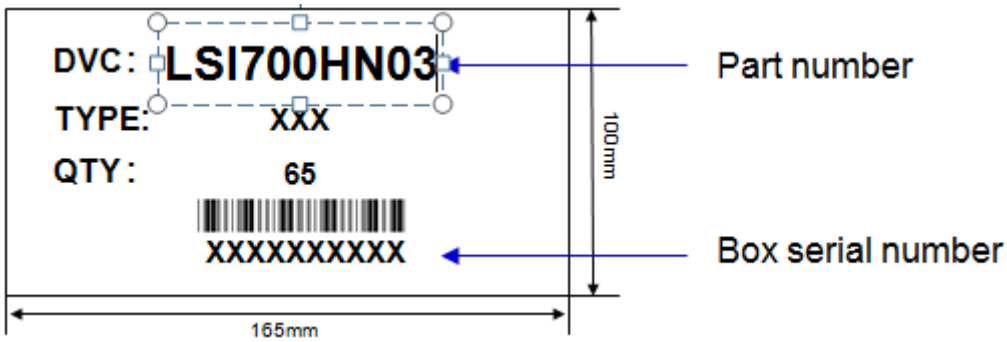

(a)Parts number : LSI700HN03
(b)Revision code : XXX(Three letters)
(c)Lot number :




(2) Tray Label




(3) Packing box Label



# 11. GENERAL PRECAUTIONS

## 11.1 HANDLING

(a) When the panel kit and BLU kit are assembled, the panel kit and BLU kit should be attached to the set system firmly by combining each mounted holes. Be careful not to give the mechanical stress.

(b) Be careful not to give any extra mechanical stress to the panel when designing the set, and BLU kit.

(c) Be cautious not to give any strong mechanical shock and / or any forces to the panel kit.
Applying the any forces to the panel may cause the abnormal operation or the damage to the panel kit and the back light unit kit.

(d) Refrain from applying any forces to the source PBA and the drive IC in the process of the handling or installing to the set. If any forces are applied to the products, it may cause damage or a malfunction in the panel kit.

(e) Refrain from applying any forces which cause a constant shock to the back side of panel kit, the set Design and BLU kit. If any forces are applied to the products, it may cause an abnormal display, a functional failure and etc.

(f) Note that polarizer could be damaged easily.
Do not press or scratch the bare surface with the material which is harder than a HB pencil lead.

(g) Wipe off water droplets or oil immediately. If you leave the droplets for a long time on the product, a staining or the discoloration may occur.

(h) If the surface of the polarizer is dirty, clean it using the absorbent cotton or the soft cloth.

(i) Desirable cleaners are water or IPA (Isopropyl Alcohol).
Do not use Kenton type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. These might cause the permanent damage to the polarizer due to chemical reaction.

(j) If the liquid crystal material leaks from the panel, this should be kept away from the eyes or mouth.
If this contacts to hands, legs, or clothes, you must washed it away with soap thoroughly and see a doctor for the medical examination.

(k) Protect the panel kit and BLU Kit out of the static electricity. Otherwise the circuit IC could be damaged.

- Reference : Process control standard of SDC

| No. | Item | Control standard |
|---|---|---|
| 1 | Ionizer | All Equipment should be controlled under 150V.(Typ. 100V) |
| 2 | Carrying Roller | Carrying Roller should be controlled under 200V. |
| 3 | Equipment Ground Resistance | All Equipment Ground Should be less than 1ohm. |

(l) Remove the stains with finger-stalls wearing soft gloves in order to keep the display clean in the process of the incoming inspection and the assembly process.

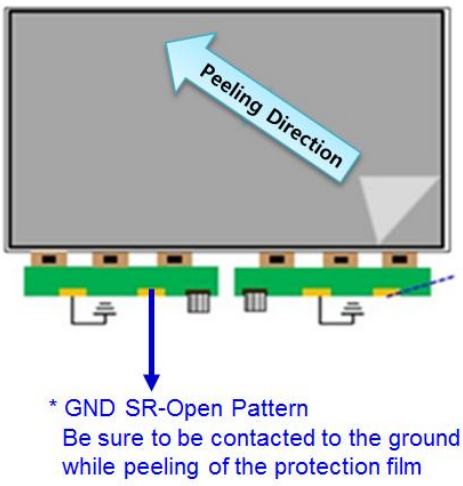
(m) Do not pull or fold the source drive IC which connects to the source PBA and the panel or the gate drive IC.

(n) Do not pull, fold or bend the source drive IC and the gate drive IC in any processes.
If not, the source drive IC could be bent one time in the process of assembling the panel Kit and the BLU Kit.

(o) Do not adjust the variable resistor located on the panel kit and BLU kit except when adjusting the flicker.

(p) Do not touch the pins of the interface connector directly with bare hands.

(q) Be cautious not to be peeled off the protection film.




- Make sure to peel off slowly
  (It is recommended to peel it off at the speed of more than 8sec. constantly.)
- The peeling direction is shown at the Fig
- Instruct the ground worker to work with the adequate methods such as the antistatic wrist band.
- Maker sure to be grounded the source PBA while peeling of the protection film.
- Ionized air should be blown over during the peeling
- The protection film should not t be contacted to the source drive IC.
- If the adhesive stains remain on the polarizer after the protection film is peeled off, please move stains with isopropyl-alcohol liquid.

(r) The protection film for the polarizer on the panel kit should be slowly peeled off just before using so that the electrostatic charge can be minimized.

(s) The panel kit and BLU kit have high frequency circuits. The sufficient suppression to the EMI should be done by the set manufacturers.
(t) The set of which the panel is assembled shall not be twisted. If the product is twisted, it may cause the damage on the product.
(u) Surface Temp. of IC should be controlled less than 100℃, operating over the Temp. can cause the damage or decrease of lifetime.

## 11.2 STORAGE

The storage condition for packing

| ITEM | Unit | Min. | Max. |
|---|---|---|---|
| Storage Temperature | (℃) | 5 | 40 |
| Storage Humidity | (%rH) | 35 | 75 |
| Storage life | 12 months<br>Based on shipping date at SDC site | | |
| Storage Condition | (1) Design the warehouse to be ventilated efficiently with equipping the roof, the ventilation system, and the temp. controller.<br><br>(2) Don't load the product on the floor and store the product with loaded on the pallet placed far away from the wall.<br><br>(3) Avoid exposing the product to the direct light, moisture, and water and prevent the product from being condensed.<br><br>(4) Don't store the product at the container located outside where it rains and the direct light shines.<br><br>(5) Prevent the product from being exposed to the noxious gas such as the acid gas or alkali gas which may damage the electric device.<br><br>(6) Don't store the product at the location surrounded by dangerous factors, which can deteriorate the quality of product. | | |

## 11.3 OPERATION

(a) Do not connect or disconnect the FFC cable during the "Power On" condition.

(b) Power supply should be always turned on and off by the "Power on/off sequence"

(c) The module has high frequency circuits. The sufficient suppression to the electromagnetic interference should be done by the system manufacturers. The grounding and shielding methods is important to minimize the interference.

(d) The cables between TV SET connector and Control PBA interface cable should be connected directly to have a minimized length. A longer cable between TV SET connector and Control PBA interface cable maybe operate abnormal display

(e) Recommend to age for over 1 hour at least in the state, which the product is driving initially to stabilize the characteristic of the initial TFT.

(f) Response time depends on the temperature.( In Lower temperature, it becomes longer)

## 11.4 OPERATION CONDITION GUIDE

(a) The LCD product shall be operated under normal conditions.
The normal condition is defined as below;
- Temperature : 20±15℃
- Humidity : 55±20%
- Display pattern : continually changing pattern (Not stationary)

(b) If the product will be used under extreme conditions such as under the high temperature, humidity, display patterns or the operation time etc.., it is strongly recommended to contact SDC for the advice about the application of engineering . Otherwise, its reliability and the function may not be guaranteed. Extreme conditions are commonly found at airports, transit stations, banks, stock markets, and controlling systems.

## 11.5 OTHERS

(a) The ultra-violet ray filter is necessary for the outdoor operation.

(b) Avoid the condensation of water which may result in the improper operation of product or the disconnection of
electrode.

(c) Do not exceed the limit on the absolute maximum rating. (For example, the supply voltage variation, the input voltage variation, the variation in content of parts and environmental temperature, and so on) If not, panel may be damaged.

(d) If the module keeps displaying the same pattern for a long period of time, the image may be remained to the screen. To avoid the image sticking, it is recommended to use a screen saver.

(e) This Panel has its circuitry of PCB's on the rear side, so it should be handled carefully in order for a force not to be applied.

(f) Please contact the SDC in advance when the same pattern is displayed for a long time

# 12. SPECIAL PRECAUTIONS

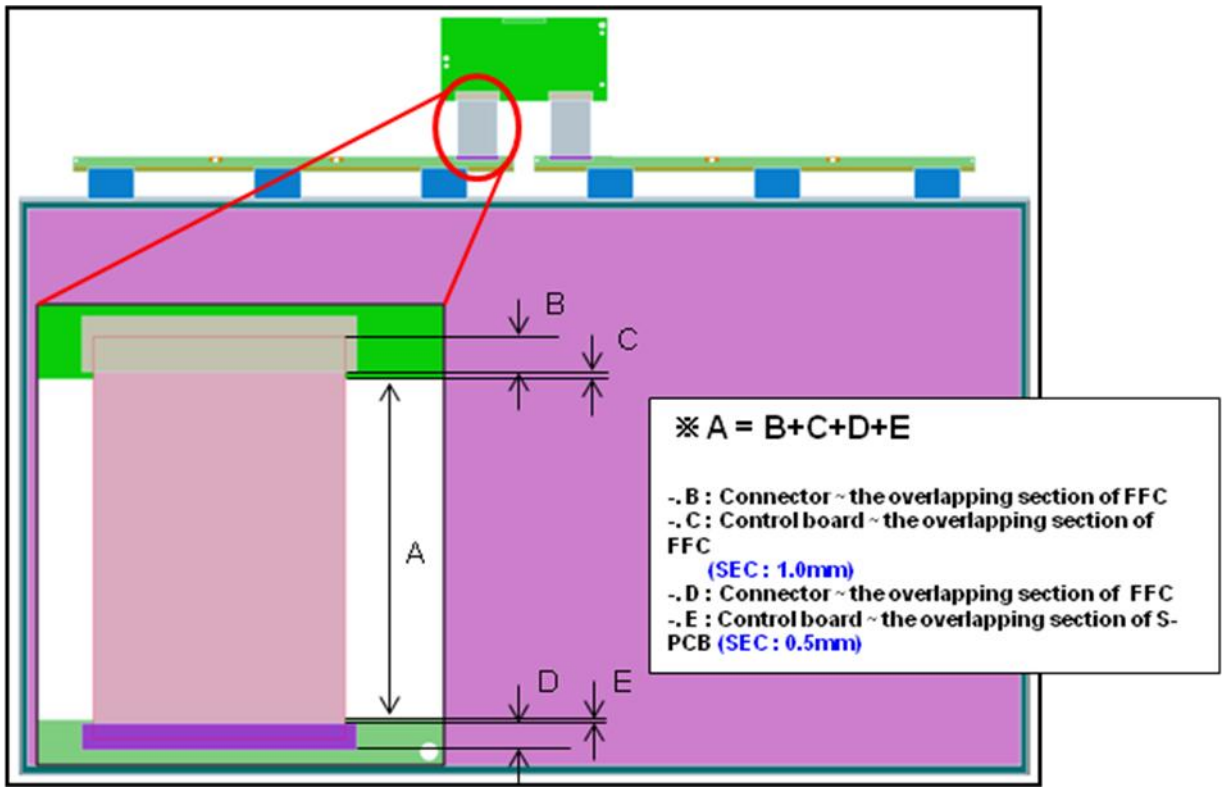
## 12.1 LISTS TO BE CAUTIONS WHEN EXECUTING THE DESIGN PROCESS

| No. | Component | Expected cause |
|---|---|---|
| 1 | Upholding part for panel | Prevent the panel from breaking by assigning gaps between the panel and the upholding part for panel on the drawing for the upholding part for panel.<br>Refer to the (a), (b), (c) of 3-1 for the design of BLU. |
| 2 | The shape of the upholding part for panel | Design the upholding part for panel to fit to the panel appropriately when designing the BLU since the shape of the upholding part for panel may damage the panel.<br>Refer to the (a), (b), (c) of 3-1 for the design of BLU. |
| 3 | The edge of upholding part for panel | Design the edge of panel to have a sufficient space with the upholding part for panel when designing the BLU since the edge of the upholding part for panel may damage the panel when assembling the panel and BLU.<br>Refer to the (a), (b), (c) of 3-1 for the design of BLU. |
| 4 | Upholding part for panel | Place the upholding part for the panel in order for the shape of mold, which contacts with the panel not to interfere with the area of panel.<br>Refer to the (a), (b), (c) of 3-1 for the design of BLU. |
| 5 | Drive IC | Design the BLU in order for the COF not to contain the lead crack resulted from the tensioned COF created when the product is twisted if the space between the D-IC COF and the middle mold isn't sufficient.<br>Refer to the (a), (b), (c),(d),(e),(f), and (g)of 3-2 for the design of BLU. |
| 6 | Drive IC | Design the BLU in order for the product not to contain the lead crack resulted from the tensioned COF caused under the condition, which the product is twisted by fixing the source PCB.<br>Refer to the (a), (b), (c),(d),(e),(f), and (g)of 3-2 for the design of BLU. |
| 7 | IC component | 1) The temperature of each part of product suggested by our company and the second vendor shall meet the standard of temperature, which is recommended not to be exceeded by our company when the product is affected under the various temperature ranges.<br>Apply over 1mm long separation distance stated in the safety standard between the electric part and each conductor. (Apply the rated separation distance when insulating.) |
| 8 | Thermal pad | Apply the thermal pad in a designated size to the product as a measure to lower the temperature of heat in order for each part to use the rated temperature. |
| 9 | POL | The surrounding area of the POL shall be treated with an electrification treatment since the external ESD may cause a phenomenon, which the POL is coming off.<br>In addition, the GND portion of source PBA shall be grounded. |
| 10 | PBA | The GND portion of each PBA shall be contacted with the GND portion of BLU.<br>Refer to the (a) and (b) of 3-3 for the design of BLU. |
| 11 | Circuit | The standardized approval from the client is required since the EMI is executed by a client.<br>Our company can only measure the reference since the client measures the BLU. |
| 12 | The height of component | Design the BLU with considering the maximum height of parts, which our company suggests. |
| 13 | Between the FFC and the C-PBA | Design the instrument with considering the length between the FFC and the control PBA. (The marginal minimum length of 5mm or 8mm is required.) |

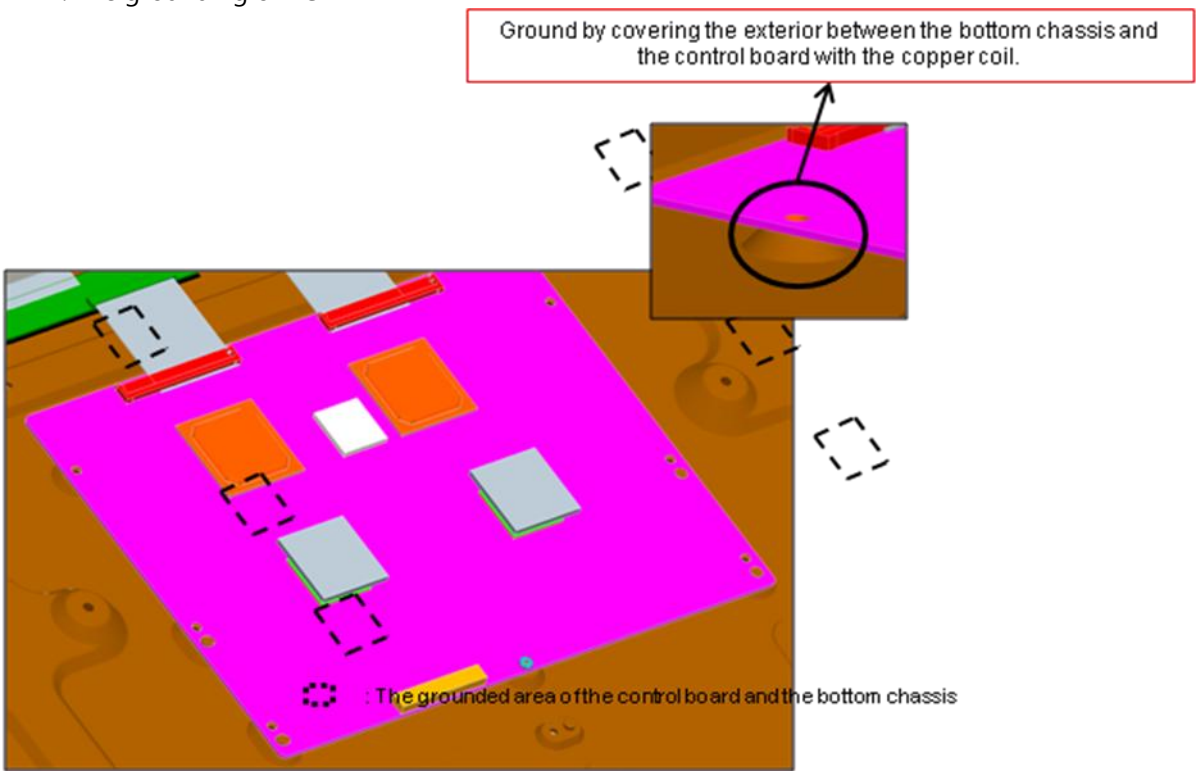
| | | |
|---|---|---|
| 14 | Panel | The surface temperature of panel shall be maintained within 0℃ and 45℃ when the external ambient temperature is at 25℃. (Design the BLU with considering the increase of the temperature in the panel by the LED, CCFL, and etc.) |
| 15 | Aging | Recommend to age for over 1 hour at least in the state, which the product is driving initially to stabilize the characteristic of the initial TFT. |
| 16 | The attachment of gasket | The additional confirmation by our company is required If the attachment of gasket to the S-PBA of our company is required.(To fix the S-PBA or the EMI) |
| 17 | Drive IC | Design the top chassis and the driver IC to be contacted by placing the shape of emboss inside the top chassis as a measure to prevent the driver IC from heating. The size of emboss shall be designed in larger size than the size of IC inside the film of the driver IC. Refer to the (a), (b), (c),(d),(e),(f), and (g)of 3-2 for the design of BLU. |
| 18 | The prohibited bandwidth | Design the BLU in order for the BLU not to interfere with the area, where the control PBA and the source PBA are located densely according to the drawing for the BLU from our company. |
| 19 | S-PBA | The material, which contacts with the bottom side of S-PBA which has a pattern shall be non-conducting material or shall be insulated. |

## 13. FFC and C-PBA Connection

The length between the FFC and the C-PBA




. The grounding of PCB



***Appendix***

# Control PBA Specification
## (Model Name : LMI700HN03-0)

*Any modification of Spec is not allowed without SDC's permission*

**New Business Team**
**Samsung Display Co., Ltd**

# GENERAL DESCRIPTION

| Name | Control PBA | Input voltage | 12V |
|---|---|---|---|
| Size | 133 ㎜ X 57 ㎜ | Tolerance | ±0.20mm |
| Thickness | 1.0T | Tolerance | ±0.1mm |

## FEATURES

RoHS compliance(Pb-free)
Halogen Free
Open / Short / Stress Test Pass
51Pin Connector

## RELIABILITY TEST

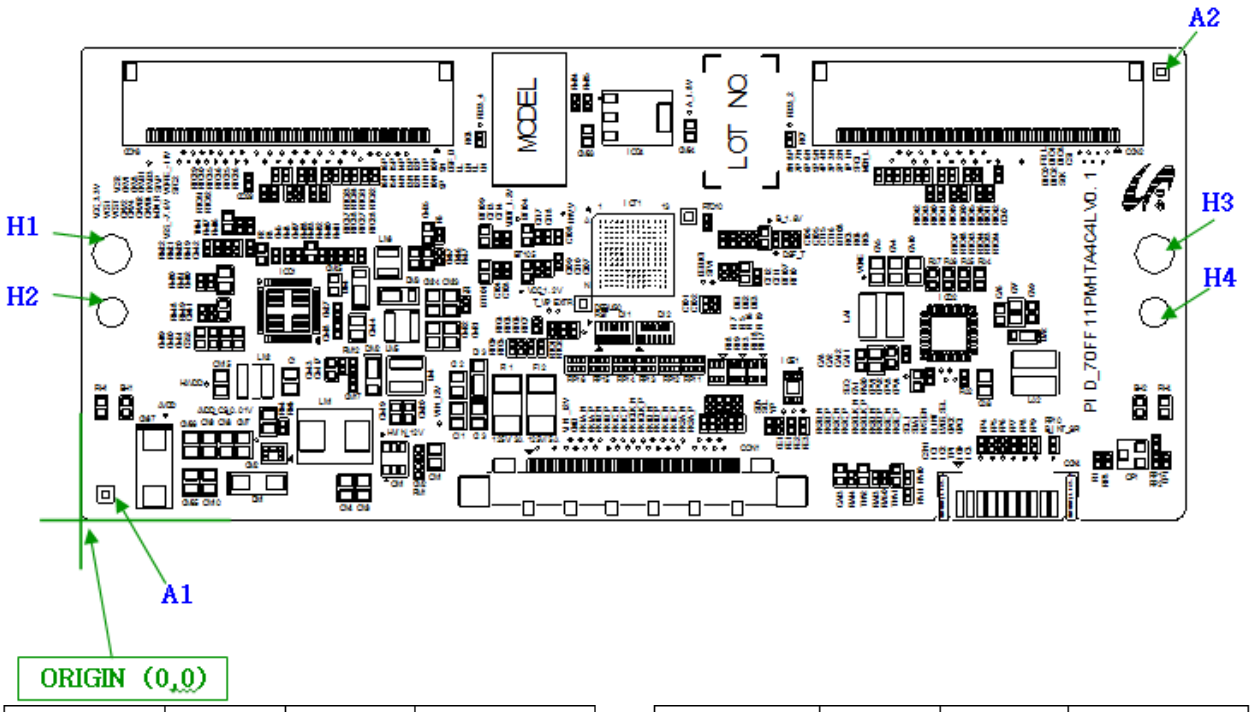
| Item | Test Condition | Quantity | Note |
|---|---|---|---|
| TS | -45℃(30min)~125℃(30min), 100cycle | 10 | |
| WHTS | 60℃, 95%RH, 24Hrs | 10 | |
| Transportation condition | Vibration (5~200Hz 1.05Grms, 2Hrs) | 1box | |
| | Drop (1m), 2times | 1box | |

## STORAGE CONDITION

(1) Temperature for storage : 5 ~ 40℃
(2) Humidity for storage : 35~75%RH
(3) Endurance on static electricity : HBM(Human Body Model) 2kV
CDM(Charged Device Model) 500V
MM(Machine Model) 200V

# 1. Drawing

## 1.1 Front



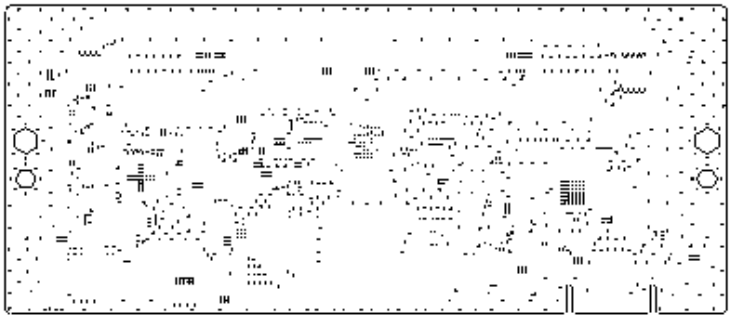

| Align mark | X | Y | Dimension |
|---|---|---|---|
| A1 | 3.0 | 3.0 | 1.0 * 1.0 |
| A2 | 130.0 | 54.0 | 1.0 * 1.0 |

| Hole # | X | Y | Dimension |
|---|---|---|---|
| H1 | 3.75 | 32.0 | Φ 4.8 |
| H2 | 3.75 | 25.0 | Φ 3.8 |
| H3 | 129.25 | 32.0 | Φ 4.8 |
| H4 | 129.25 | 25.0 | Φ 3.8 |
| | | | |

## 1.2 Back

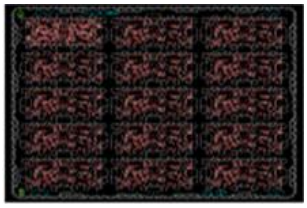
| DRILL CHART: TOP to BOTTOM | | | |
|---|---|---|---|
| ALL UNITS ARE IN MILLIMETERS | | | |
| FIGURE | SIZE | PLATED | QTY |
| · | 0.2 | PLATED | 1151 |
| · | 0.2 | PLATED | 63 |
| ⬡ | 4.8 | NON-PLATED | 2 |
| ⬡ | 3.8 | NON-PLATED | 2 |

No_Single S/P



# 2. PACKING INFORMATION

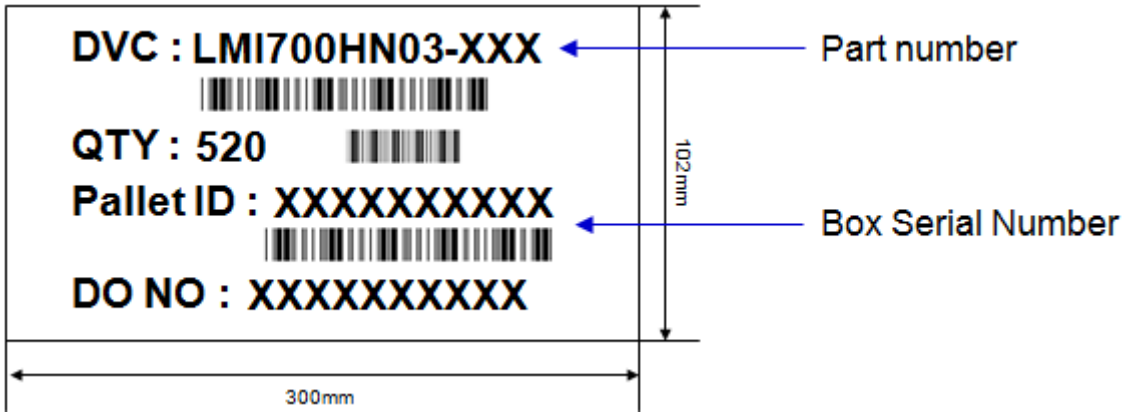
## 2.1 PACKING SPECIFICATION

| Device | Tray picture | Tray Packing | Pave Tray |
|---|---|---|---|
| LMI700HN03-0 |  |  |  |
| Loading specification | 15EA / Tray | 6Tray(First Tray is empty) - PBA 65EA | |
| Size | 505mm x 415mm | - | - |
| Weight | 860g | 4,750g | |

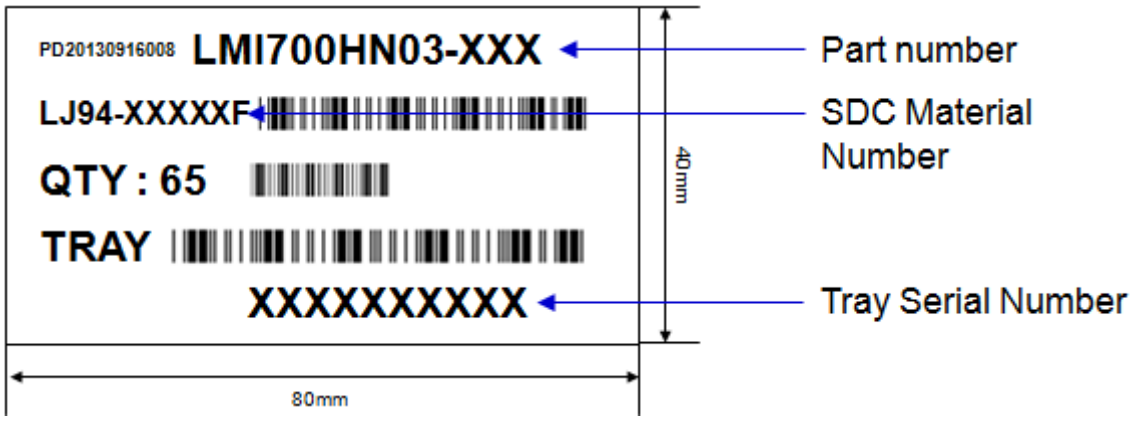
| Device | Large Box | Pallet Box |
|---|---|---|
| LMI700HN03-0 |  |  |
| Pave way | Large Box | 1PLT - Large Box 8ea |
| Loading specification | 65EA / Box | PBA 520EA / Pallet |
| Size | 565mm x 482mm x 94mm | 1150mm x 985mm x 313mm |
| Weight | 6,648g | 58,472g |

## 2.2 LABEL INFORMATION

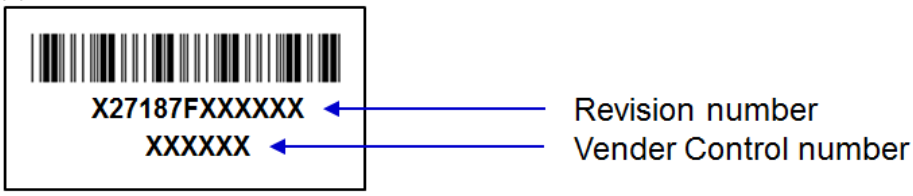
(1) Pallet Label




(2) Small Box Label




(3) PBA Label



# 3. HANDLING GUIDE

(1) Be careful not to give any mechanical stress to PBA on System design and Production process.
- Not to stack each PBA without Tray on production process.
- When handling PBA, one must treat it with extra care from outside interference or collision.

(2) While at work, if PBA (BGA type) dropped, it should not be reused and discarded immediately.

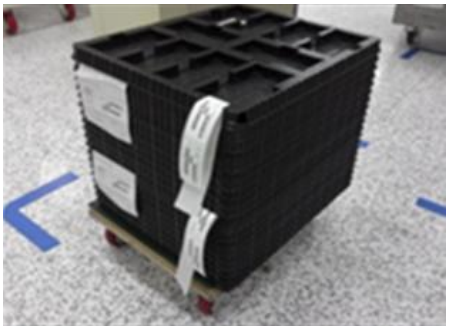
(3) Protect the PBA out of the electricity static on assemble process.
Don't touch the PBA (interface pin) directly with bare hands.
(1)+(2)+(3), if any forces are applied to the products, it may cause an damaged component, a functional failure.

(4) When handling PBA, the PBA should be handled as below.
- PBA should be handled on horizontal direction and both hands, touched the edge area on PBA.
- Do not pull, fold or bend PBA in any process.

(5) All PBA should be kept in Tray (or Box), and This Tray must be placed, used on flat surface.

(6) When move PBA on production line, need to be used the vehicle for PBA Tray(=box).


Both hands / Touch edge of PBA


Use the vehicle for PBA tray

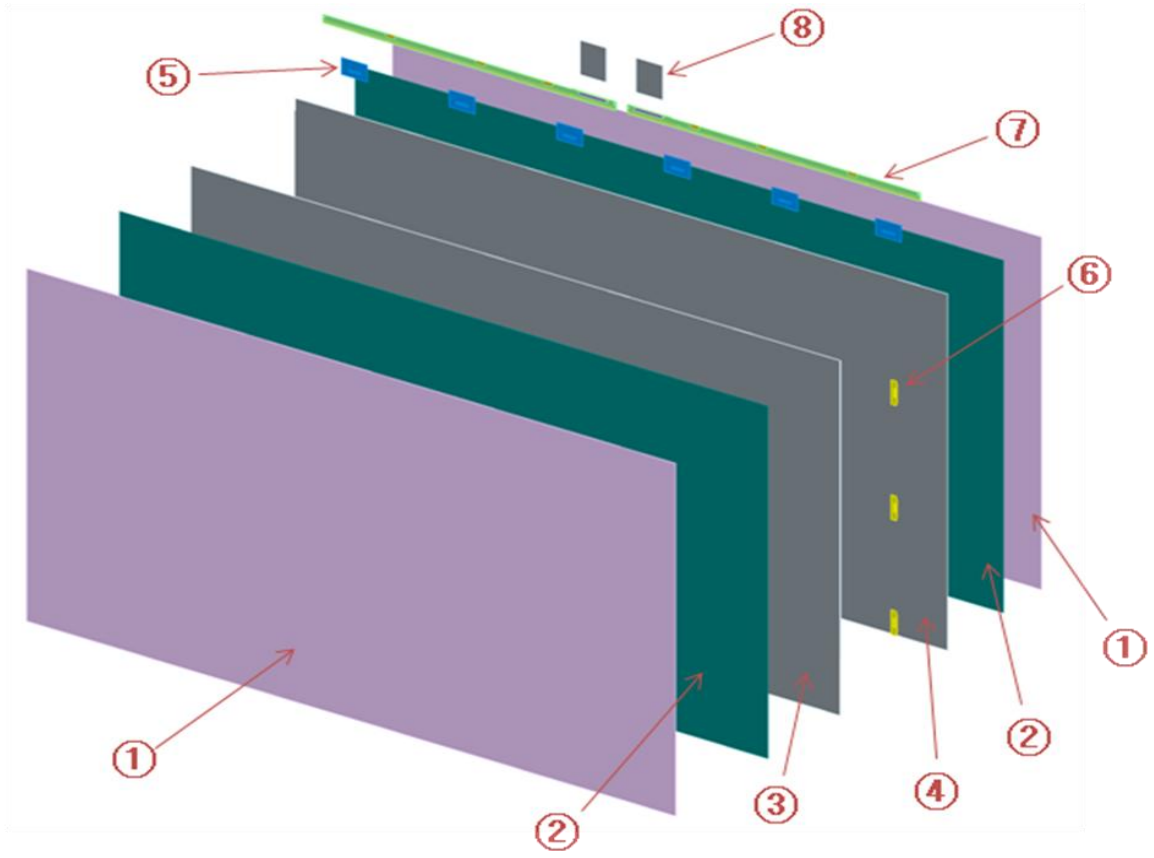
*Appendix1*

# Recommendation for the BLU Design

*The Information described in this specification is for the first draft and can be changed without prior notice*

Samsung Display Co., LTD

## 1. The schematic of panel



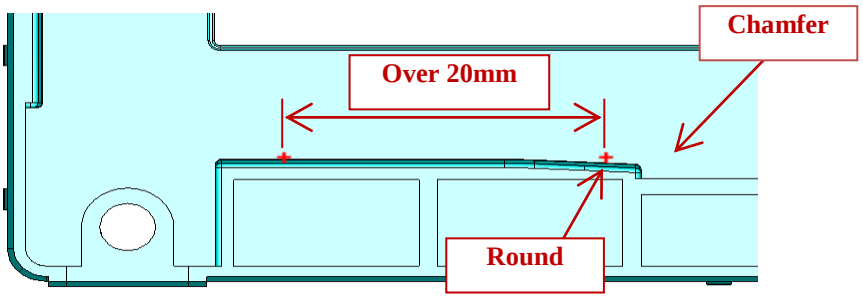

| Item | Symbol | Remark |
|---|---|---|
| Protector Film | ① | Removable |
| Polaroid Film | ② | |
| Color Filter Glass | ③ | |
| TFT Glass | ④ | |
| Source IC | ⑤ | |
| Gate IC | ⑥ | |
| Source PBA | ⑦ | |
| FFC | ⑧ | |

# 2. The guide for the mechanical design

## 2.1 The panel guide

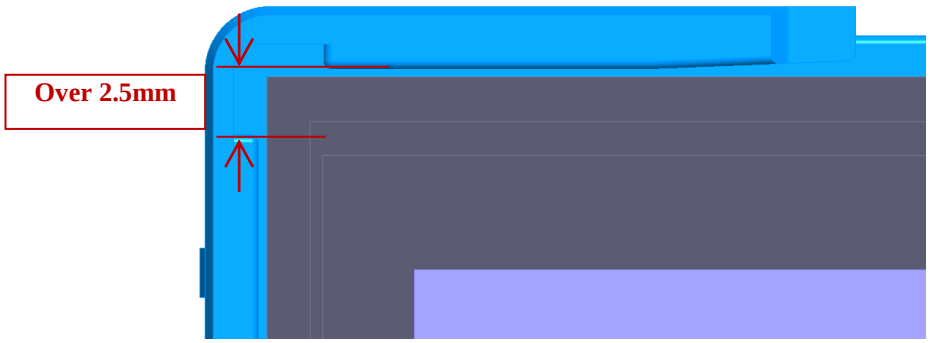
(a) When the panel guiding part is made of plastic resin, the gap between the panel and the guiding structure should be considered at the design process. The shrinkage of the plastic resin under the temperatures change can cause the light leakage. The gap should be determined to cover the temperature change from the guarantee condition and the BLU structure. SDC recommends the total gap between the panel and the guide structure as below, but the suggested dimension does not guarantee the quality of the products.

(b) It is recommended to follow the dimension and the shape of the guiding structure illustrated as below since the distortion of the panel can cause the light leakage.



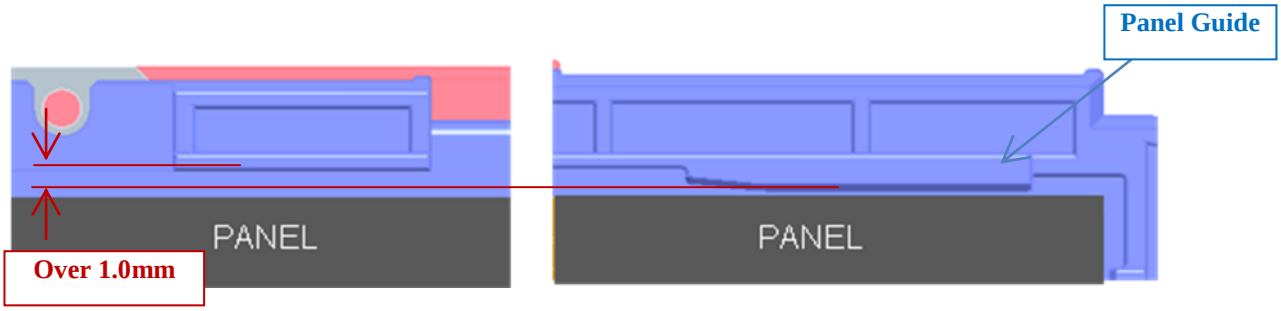

(c) When the panel guide is designed to be located at the corner of the BLU, the edge point of the panel shall not be in contact with the panel guide structures to prevent the crack of the panel caused by the burr at the edge of the glass. The distance larger than 2.5mm as shown in the picture is recommended.

(※ Suggested dimension does not guarantee the quality of the products.)

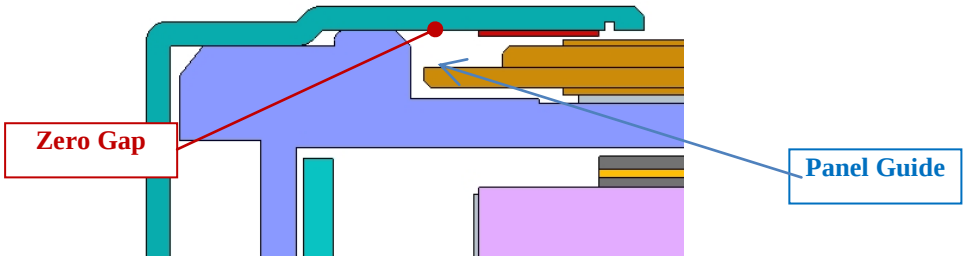


(d) It is recommended to keep the distance between the panel guides and other ribs over 1mm. If the ribs are placed at the same line with the panel guide, panel broken can be happen when the operator makes the mistake by placing the panel on the top of the ribs.

(※ Suggested dimension does not guarantee the quality of the products.)



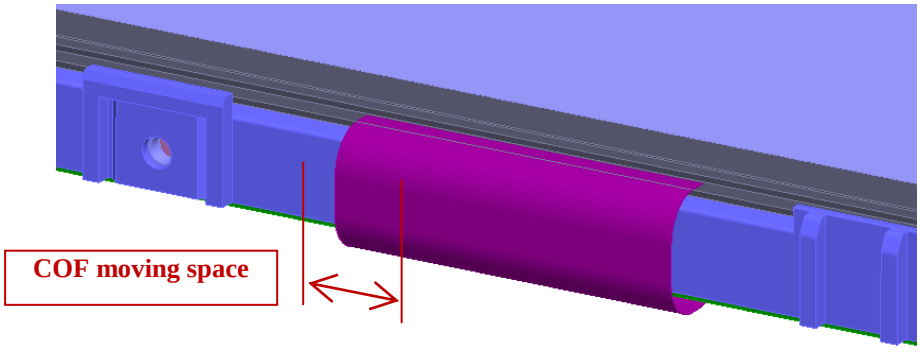

(e) The gap between the panel guide and the front cover (or front chassis) should be zero in z-direction. If there is gap, the panel is easily stuck into the gap and can be broken by external forces.




## 2.2 The COF and the Drive IC

(a) It is recommended to secure sufficient gap between the COF and the other parts, since the lack of gap can cause the damage on the COF such as the lead crack, under the vibration and twist condition.

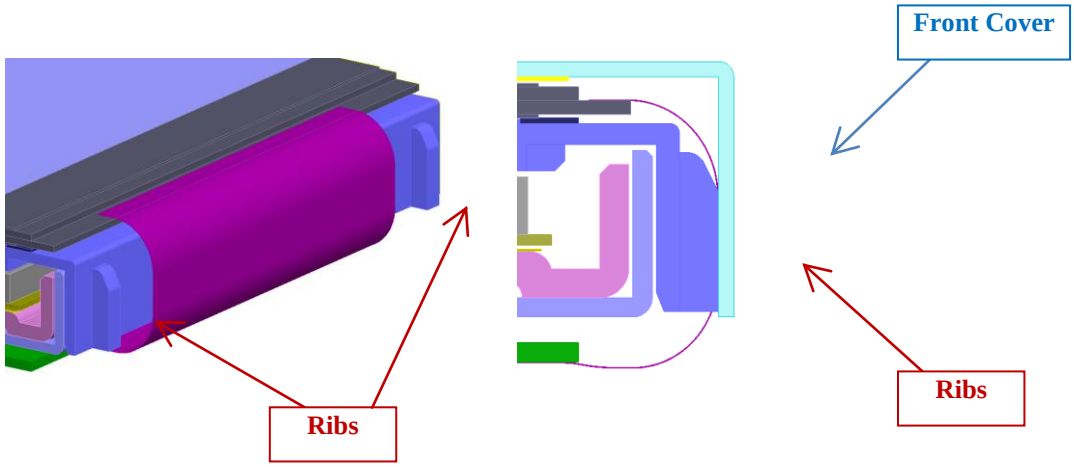
(※ Over 3.0mm for moving space is recommended, but the suggested dimension does not guarantee the quality of the products.)



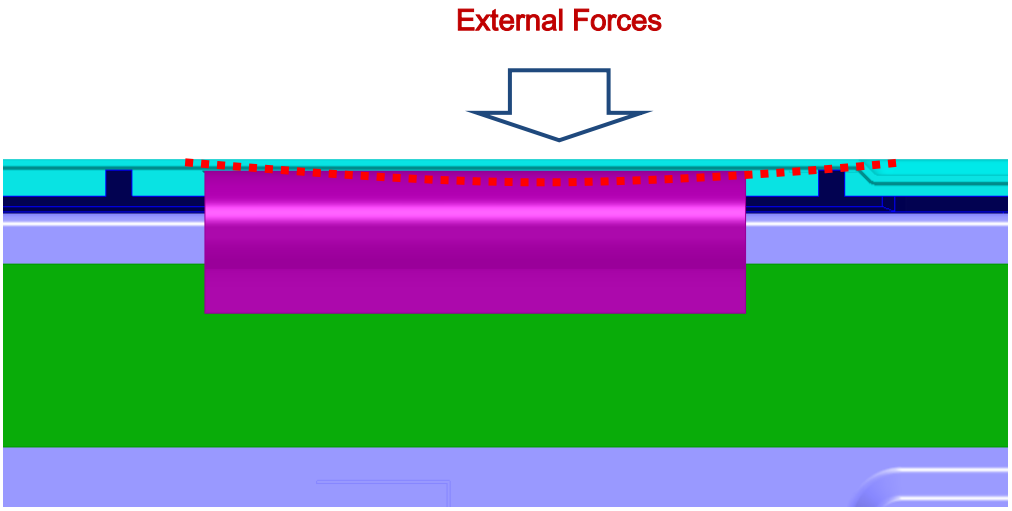
(b) The pattern of COF can be damaged at the sharp edge of the press part and the burr of mold part under the vibration condition. Therefore, it is recommended to avoid placing the gate position and parting line of the injection mold and sharp structure of metal parts around the COF.

(c) The temperature of the surface of Drive-IC should be less than 125℃.

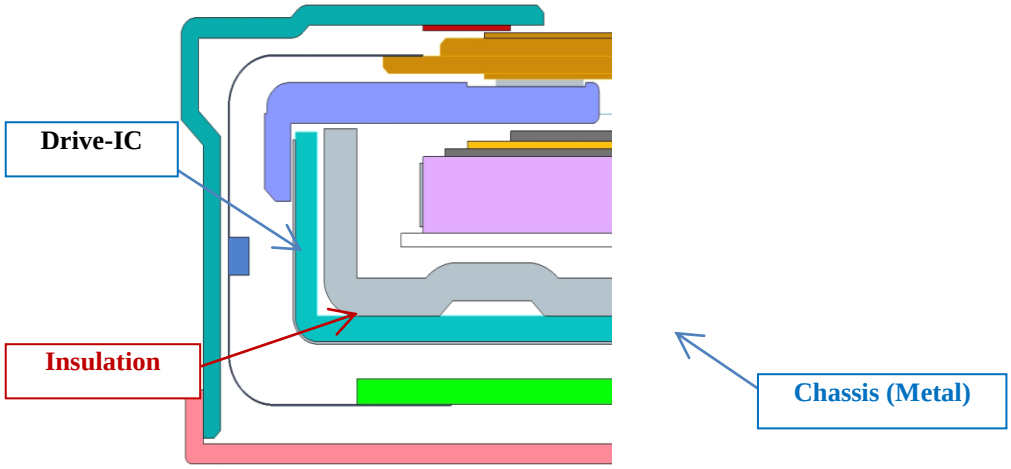
(d) Sufficient space for the COF and the Drive-IC should be secured to prevent the damage on the Drive-IC from external forces by adding the ribs around COF. And it is also important to reduce the gap between the ribs and the front cover as small as possible



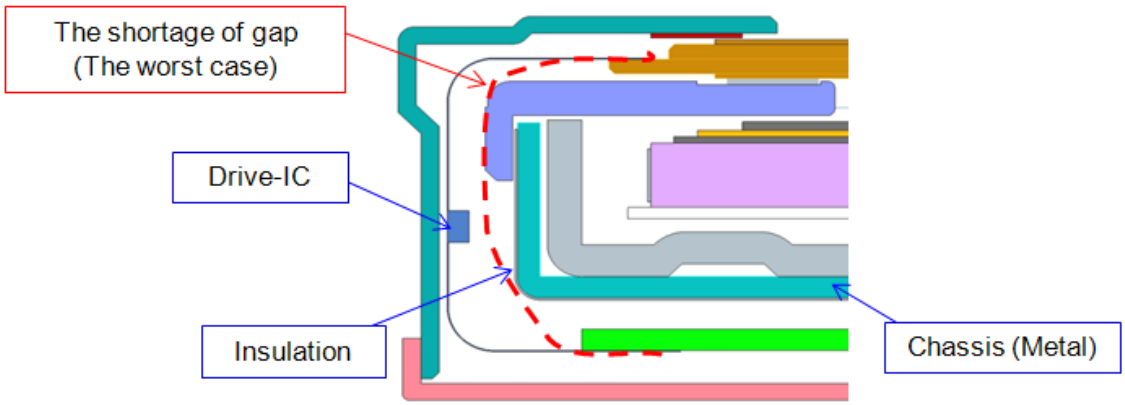

(e) It is recommended to make ribs for protecting Drive-IC as close as possible from the COF, otherwise forces from outside can deform the front cover and damage to the D-IC.



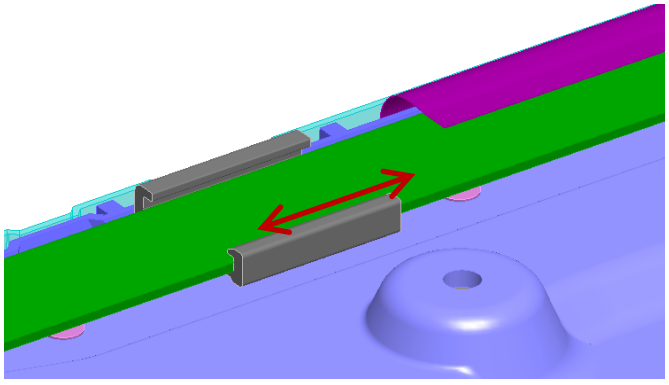
(f) When metal parts are assembled next to the Drive-IC, the metal part should be insulated to avoid the damage on Drive-IC from electrostatic discharge.



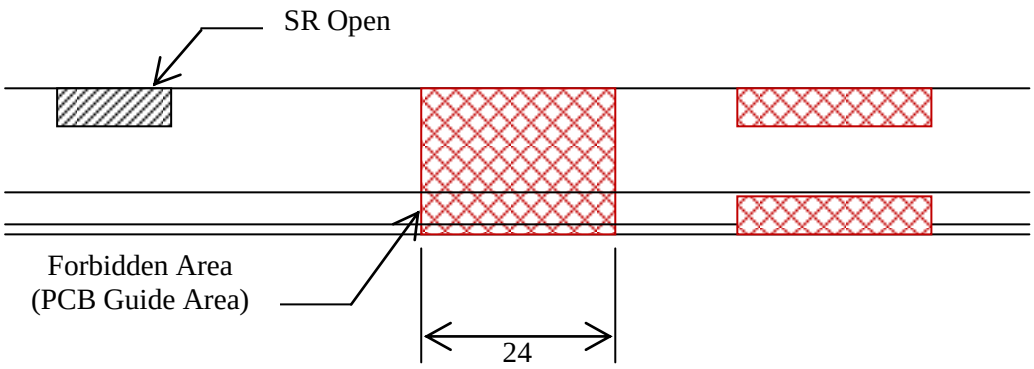

(g) If the length of COF is designed to be short, the lead crack can be occurred by applying the tension on the COF due to the drop, vibration and twist of the product.




(h) It is recommended that the source PCB should be easily moved in the direction which is parallel to the longer side of the panel, in order for the tension not to be applied to the COF under vibrating condition, such as transportation of the product.

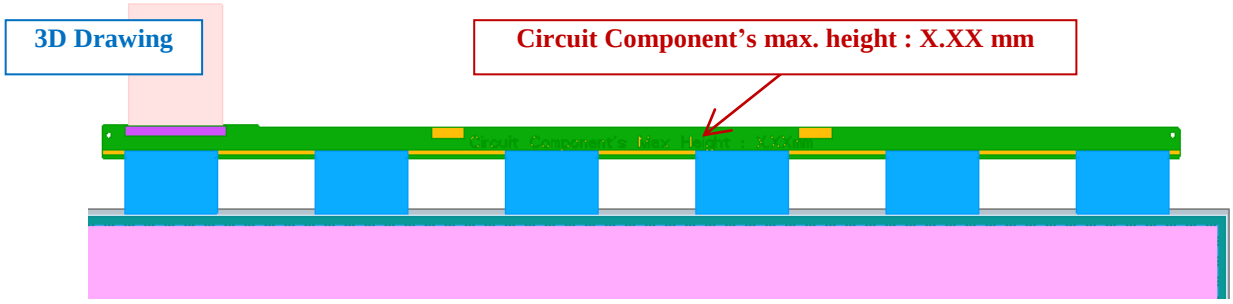


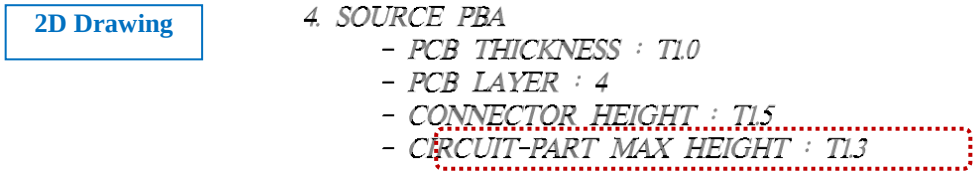
(I) It is suggested to make the holding structures of source PCB at the positions which is provided by SDC. They are marked at the 2D drawing and named as 'PCB guide area'.




### 3.3 The control PBA and the Source PBA

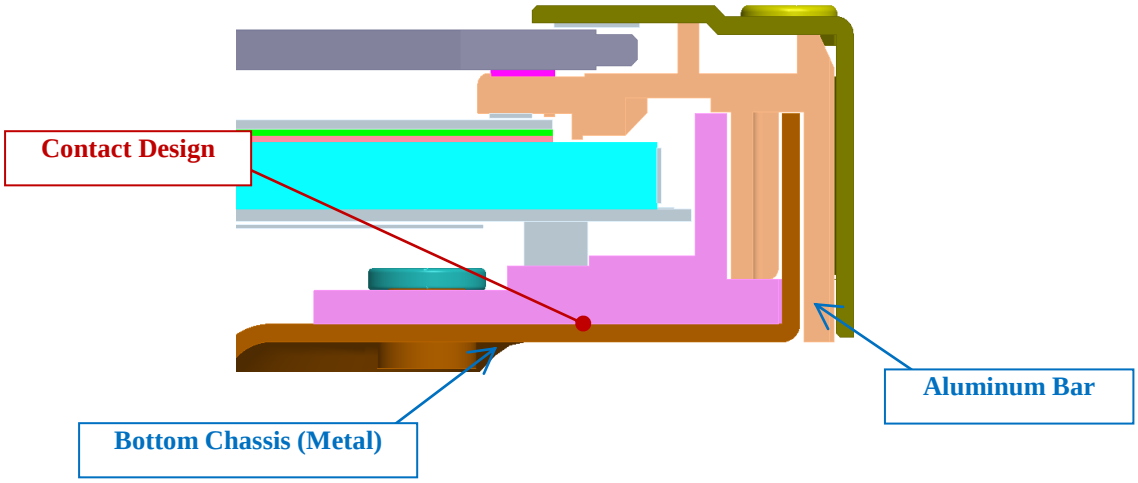
(a) The gap between the circuit parts of the source PBA (or control PBA) and other parts should be considered to avoid damage on electrical parts by the static electrostatic discharge, short and external forces. If the shielding part is made of metal and if there is not enough distance from circuit parts, adding insulation is recommended. SDC will provide maximum height of circuit parts with 2D and 3D drawing, each customer can decide the distance under consideration of the material, thickness and other characteristics.



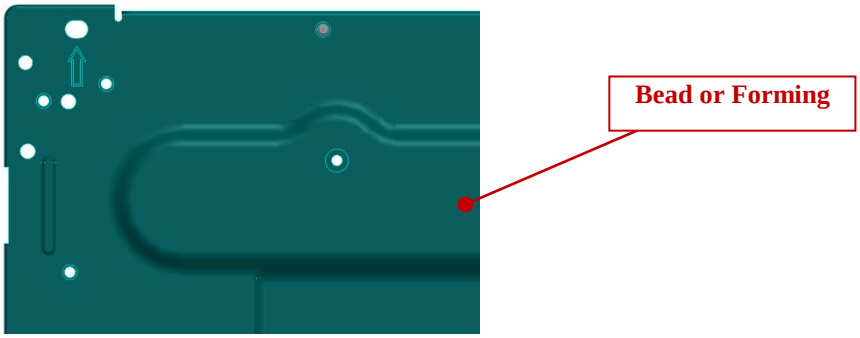



### 3. 4 The 4-Corner and the cloudy light leakage

(a) SDC recommends to design in a way that the heat from light source should be dissipated effectively. For example, it is recommended to make the contact area between the heat sink and the bottom chassis to be maximized. The sharp change of temperature or the large temperature gradient in the surface of panel can cause the light leakage.

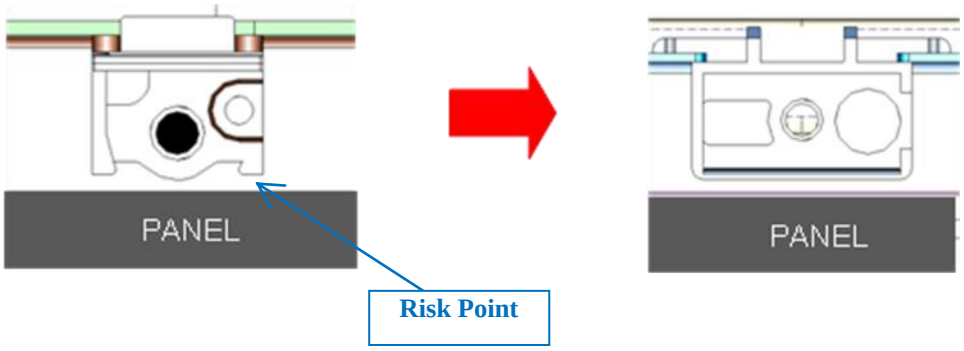



(b) The distortion of the panel by the lack of the stiffness of BLU can cause the light leakage and therefore it is recommended to design strong structure against distortion, such as place the strong beads at the corner of BLU to control the flatness of the panel.



### 3.5 Others

(d) Sharp or the round shape near the panel should be changed to flat shape, such as screw point, gate point of the injection mold etc. Since the panel can be damaged by the concentrated force of the convex point when there is external force.




(b) It is recommended to design the temperature of the active area below 50℃ at room temperature for the protection from abnormalities in the screen due to the deterioration of the liquid crystal. In addition, each customer needs to consider all the guarantee conditions connected with temperature for this problem not to happen.

*Appendix3*

# CAUTION

SDC recommends the avoidance of operating the D-IC for LSF400HM02 model for more than 10 min. Since the temperature of open cell panel's D-IC reaches 125℃(@ air pattern, Ta=25℃) while being operated. In addition, we also recommend that operating the D-IC on the module with maintaining the temperature of the D-IC below 87.5℃.