# 深圳市福瑞达显示技术有限公司

Shenzhen Frida LCD Co.,Ltd

# 承　　认　　书

# SPECIFICATION FOR APPROVAL

**(一)　顾　客:**

**CUSTOMER:_____**

**(二)　品　名:**

**DESCRIPTION:　　HSD　8 寸 模组　　**

**(三)　型　号:**

**PART NO:FRD080HSD001　　**

**(四)　日　期:**

**DATE:_____2013-05-04___**

## 承认签名

## APPROVED SIGNATURES

| 客户核准 | 客户审核 | 客户确认 | 拟定 |
|---|---|---|---|
| | | | |

www.fridalcd.com

【保存期限：产品停止生产后三年】

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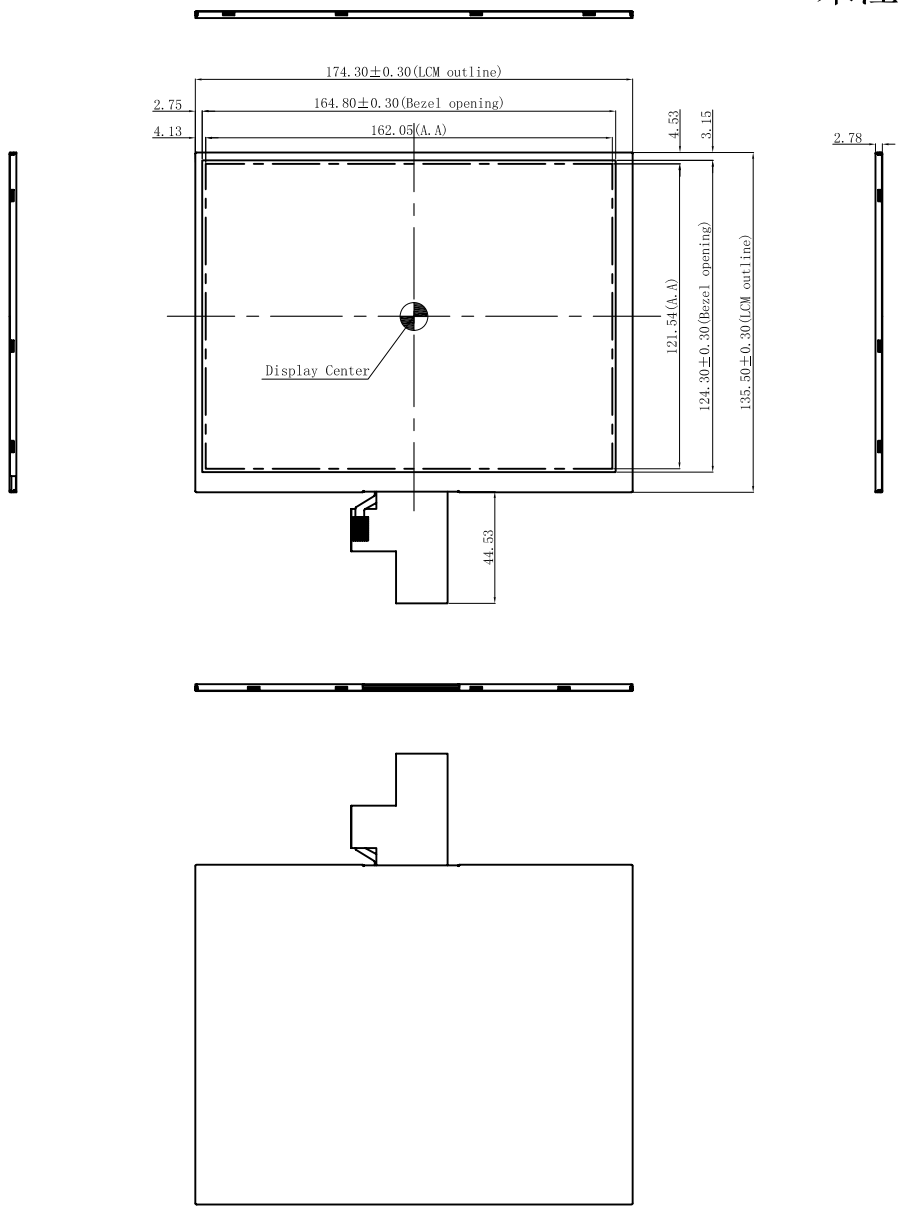
## Shenzhen Frida LCD Co.,Ltd

未注公差：±0.30

Drawing Of LCM:
模组图：




1. Un-dimensioned tolerance is ±0.3mm
   示注公差±0.30mm
2. "☆" :Important dimension.
   标有 ☆为重要尺寸
3、外形测量需测试前、中、后3点。

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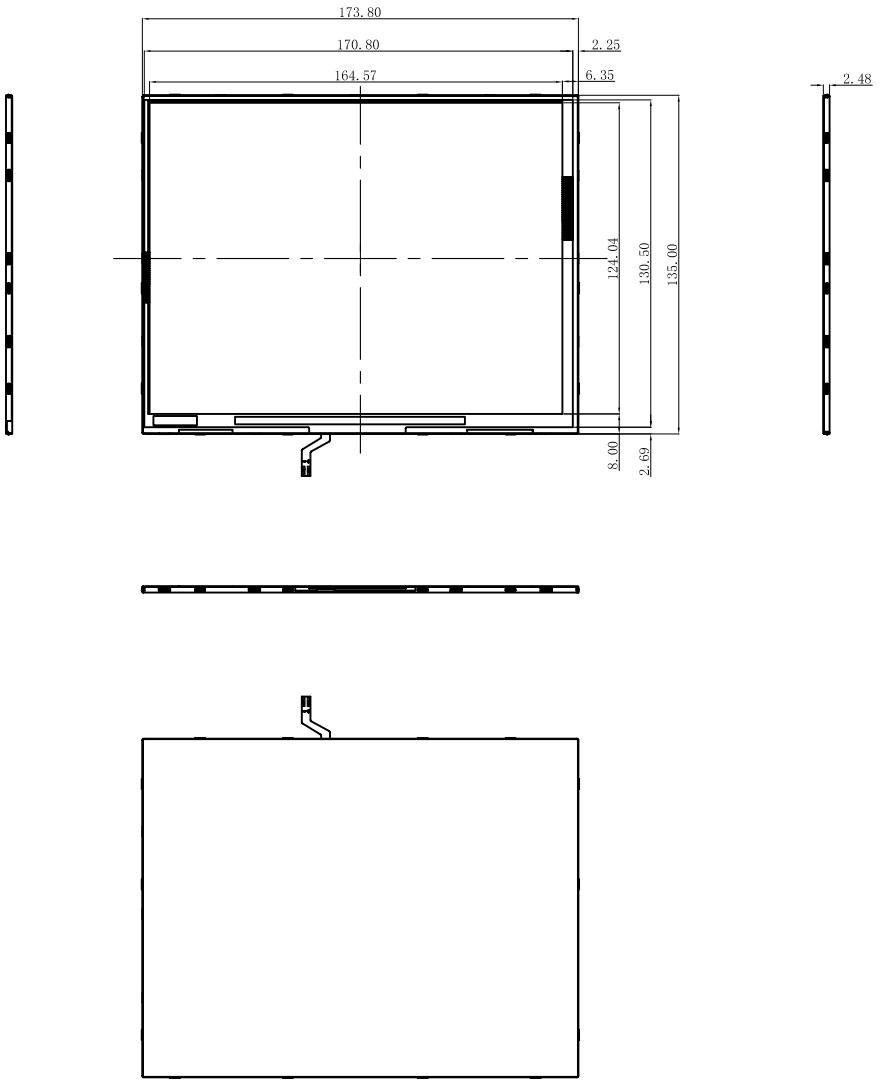
Drawing Of B/L:
背光图：

未注公差：±0.30




1. Un-dimensioned tolerance is ±0.3mm
   示注公差±0.30mm
2. "☆" :Important dimension.
   标有 ☆ 为重要尺寸
3、外形测量需测试前、中、后3点。

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## 3. 极限参数(ABSOLUTE MAXIMUM RATINGS)

(除非特别说明,环境温度 Ta=25°C. Unless specified,The Ambient temperature Ta=25°C)

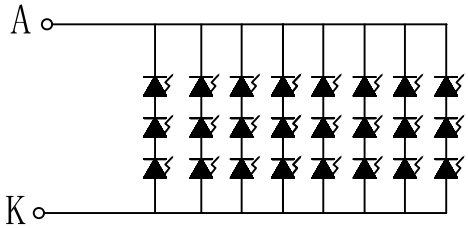
| 项目 Item | 符号 Symbel | 条件 Conditions | 值 Rating | 单位 Unit |
|---|---|---|---|---|
| * 极限直流正向电流 Absolute maximum forward current | Ifm | | 20 | mA |
| * 脉冲驱动时极限正向电流 Peak forward current | Ifp | 1 msec 脉冲,1/10 占空比 1 msec Plus 10% Duty Cycle | 20 | mA |
| 反向电压 Reverse Voltage | Vr | | 4 | V |
| * 极限功耗 Power dissipation | Pd | | 1728 | mW |
| 工作温度 Operating Temperature Range | Topr | | -20~+70°C | °C |
| 贮存温度 Storage Temperature Range | Tstg | | -20~+70°C | °C |

## 4 光电特性(ELECTRICAL-OPTICAL CHARACTERISTICS)

(除非特别说明,环境温度 Ta=25°C. Unless specified,The Ambient temperature Ta=25°C)

| 项目 Item | 符号 Symbol | 最小值 min. | 典型值 typ. | 最大值 max. | 单位 Unit | 测定条件 Condition |
|---|---|---|---|---|---|---|
| 正向电压 Forward Voltage | Vf | 9.0 | 9.6 | 10.8 | V | If= 160 mA |
| 反向电流 Reverse Current | Ir | | | 15 | μA | Vr= 3 V |
| 色坐标(模组) coordinates(LCM) | X | 0.26 | 0.30 | 0.36 | | If= 160 mA |
| | Y | 0.28 | 0.32 | 0.38 | | If= 160 mA |
| 亮度(模组) Luminance(LCM) | Lv | 150 | 200 | | cd/m² | If= 160 mA |
| 均匀性 Lvmin/Lvmax | | 75 | 80 | | % | If= 160 mA |

## ※5. 电路图 (Internal Circuit Diagram)

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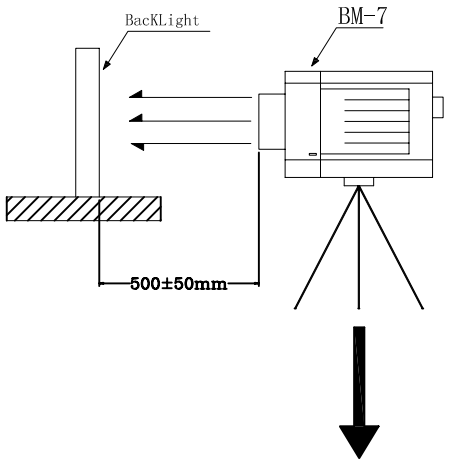
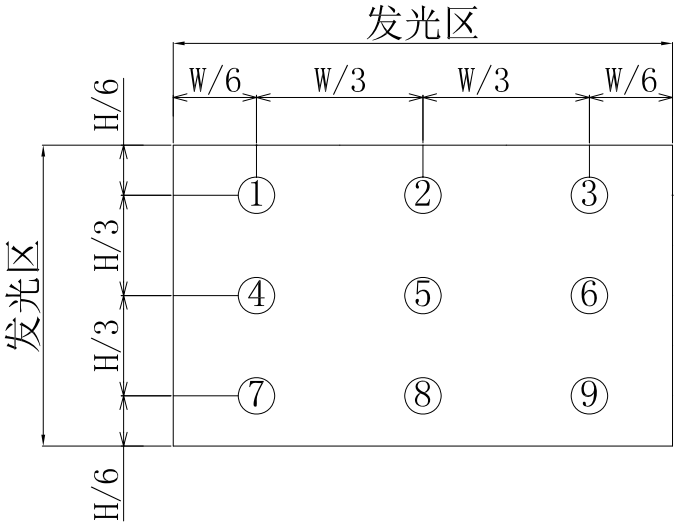
6. 亮度值是 9 个测量点的平均值，使用BM-7亮度色度仪测量，测量光圈ø 5 mm.
**(The luminance is the average value of 9 points,The measurement instrument is BM-7 luminance, Colorimeter.The aperture is ø5 mm.)**

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## 7. 外观标准（DEFECTIVE APPEARANCE）

| 项目（ Items） | 说明（SPECIFICATION） | 允许（TOLERANCE） |
|---|---|---|
| 点状缺陷 spot Whitespot | 0.30<D | 0 |
| | 0.10<D≦0.30 | 3 |
| | D≦0.10 | 通过(Nocheck) |
| 线状缺陷 Foreign Material Line | 2.50<L | 0 |
| | 1.00<L≦2.50 | 3 |
| | L≦1.00 | 通过(Nocheck) |
| | W≦0.02 | 通过(Nocheck) |

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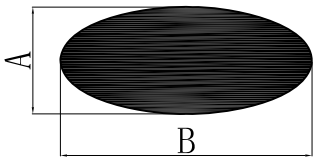
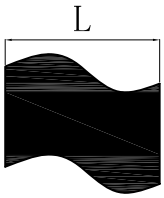



D=(A+B)/2




L:Length

Whatever the length,if any foreign material line is crossed,which will be as a defective unit.
Foreign particle existence other than the light emitting are aneednotbe checked.
It is excluded not to see the foreign particle in light emitting area while separated by 30cm.

## 8. 可靠性实验（Reliability Test）

| NO. | 项目（Test Items） | 测试条件（Test Condition） | 测试时间（Test Time） |
|---|---|---|---|
| 1 | 高温储存<br>High Temperature Storage Test | Ta=70° C | 240Hour |
| 2 | 低温储存<br>Low Temperature Storage Test | Ta=-20° C | 240Hour |
| 3 | 高温动作<br>High Temperature Operation Test | Ta=70° C | 240Hour |
| 4 | 低温动作<br>Low Temperature Operation Test | Ta=-20° C | 240Hour |
| 5 | 高温高湿<br>High Temperature and High Humidity Operation Test | Ta=60° C 96%RH | 120Hour |
| 6 | 冷热冲击<br>Thermal Shock Test | -20° C(0%RH)~70° C(96%RH) | 120Hour |
| 7 | 振动测试<br>Vibration Test(non-Operating) | 45Hz | 1Hour |
| 8 | 跌落测试<br>Package Drop Test | Height:60cm<br>1 Corner 3Edges 6 Surfaces | |

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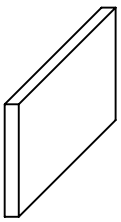
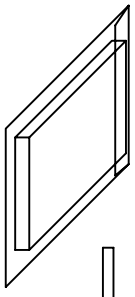
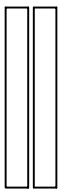
## 9. 包装方式(packaging)



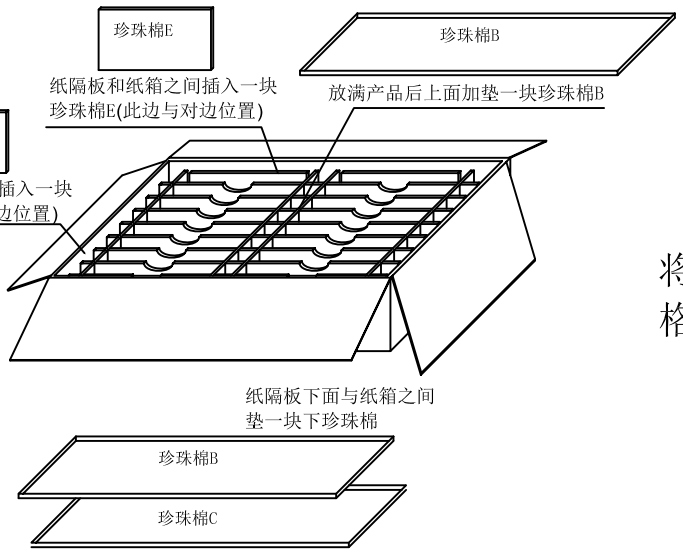
将成品装在一个开口塑料袋中，将袋口卷折，不封口,要反折。



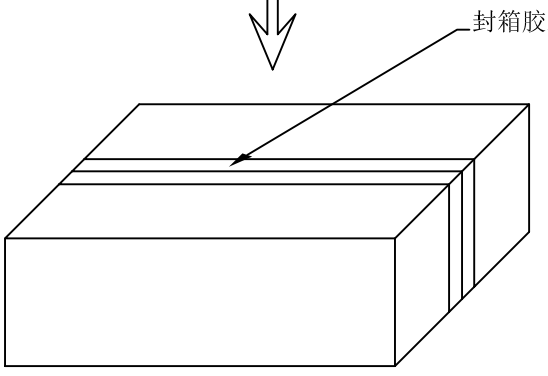
备注：2PCS模组LCD面向靠，



将2片产品放入纸板格子里,共计60pcs




使用封口胶封口

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# Record of Revisions

| Rev. | Date | Sub-Model | Description of change |
|---|---|---|---|
| 1.0 | Aug., 15,2012 | A00-0220 | Formal Specification was first issued. |

# Contents



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# 1.0 GENERAL DESCRIPTION

## 1.1 Introduction

HannStar Display model HSD080PXN1-A00-0220 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel and a driving circuit. This TFT LCD has a 8.0 (4:3) inch diagonally measured active display area with XGA (1024 horizontal by 768 vertical pixel) resolution.

## 1.2 Features

- 8 (4:3 diagonal) inch configuration
- 8-bit color depth with 256 gray-scale
- Parallel 24-bit RGB data input
- RoHS and Halogen-Free compliance

## 1.3 Applications

- Mobile NB
- Digital Photo frame
- Display terminal for AV application
- Tablet PC

## 1.4 General information

| Item | Specification | Unit |
|---|---|---|
| Outline Dimension | 170.5 (H) x 130.2 (V) x 1.23 (Typ.) | mm |
| Display area | 162.048 (H) x 121.536 (V) | mm |
| Number of Pixel | 1024 RGB (H) x 768 (V) | pixels |
| Pixel pitch | 0.15825 (H) x 0.15825 (V) | mm |
| Pixel arrangement | RGB Vertical stripe | |
| Display mode | Normally white | |
| Surface treatment | Hard-Coating | |

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# 2.0 ABSOLUTE MAXIMUM RATINGS

## 2.1 Electrical Absolute Rating

### 2.1.1 TFT LCD Module

| Item | Symbol | Min. | Max. | Unit | Note |
|---|---|---|---|---|---|
| Power supply voltage<br>Logic Signal Input Level | $V_{DD}$ | -0.3 | 5.0 | V | |
| | $V_{GH}$ | -0.3 | 30.0 | V | |
| | $V_{GL}$ | -10.0 | 0.3 | V | |
| | $AV_{DD}$ | 6.5 | 13.5 | V | |
| Logic Signal Input Level | $V_{DD}$ | -0.3 | 5.0 | V | |

### 2.1.2 Environment Absolute Rating

| Item | Symbol | Min. | Max. | Unit | Note |
|---|---|---|---|---|---|
| Operating Temperature | $T_{opa}$ | -20 | 60 | ℃ | |
| Storage Temperature | $T_{stg}$ | -30 | 70 | ℃ | |

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## 3.0 OPTICAL CHARACTERISTICS

### 3.1 Optical specification

| Item | | Symbol | Condition | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| Transmittance (With Polarizer) | | T | | — | 4.48 | — | % | With EWV Polarizer |
| Contrast Ratio | | CR | Θ=0 Normal viewing angle | 400 | 500 | — | | (1)(2)(4) |
| Response time | | $T_R+T_F$ | | — | 16 | 32 | msec | (1)(3) |
| Color gamut | | S | | — | 45 | — | % | C light |
| Color chromaticity (CIE1931) | White | $W_x$ | | 0.252 | 0.302 | 0.352 | | (1)(4) CF Glass C light |
| | | Wy | | 0.273 | 0.323 | 0.373 | | |
| | Red | Rx | | 0.555 | 0.605 | 0.655 | | |
| | | Ry | | 0.277 | 0.327 | 0.377 | | |
| | Green | Gx | | 0.238 | 0.288 | 0.338 | | |
| | | Gy | | 0.467 | 0.517 | 0.567 | | |
| | Blue | Bx | | 0.100 | 0.150 | 0.200 | | |
| | | By | | 0.095 | 0.145 | 0.195 | | |
| Viewing angle | Hor. | $Θ_L$ | CR>10 | 65 | 75 | — | | With EWV Polarizer |
| | | $Θ_R$ | | 65 | 75 | — | | |
| | Ver. | $Θ_U$ | | 60 | 70 | — | | |
| | | $Θ_D$ | | 50 | 60 | — | | |
| Optima View Direction | | 4:30 o'clock | | | | | | (5) |

### 3.2 Measuring Condition

- Measuring surrounding：dark room
- Ambient temperature：25±3°C
- 15min. warm-up time.

### 3.3 Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.
- Measuring spot size：20 ~ 21 mm

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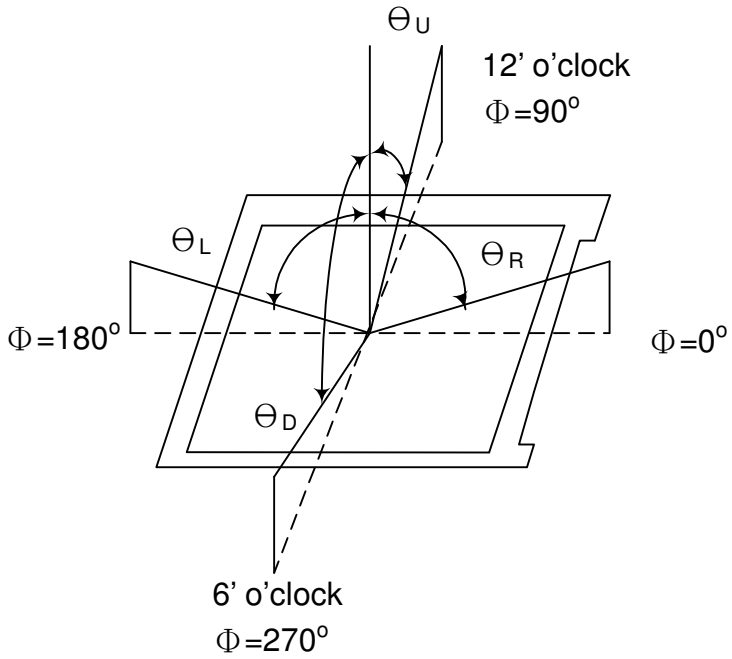
**Note (1)** Definition of Viewing Angle:




**Note (2)** Definition of Contrast Ratio (CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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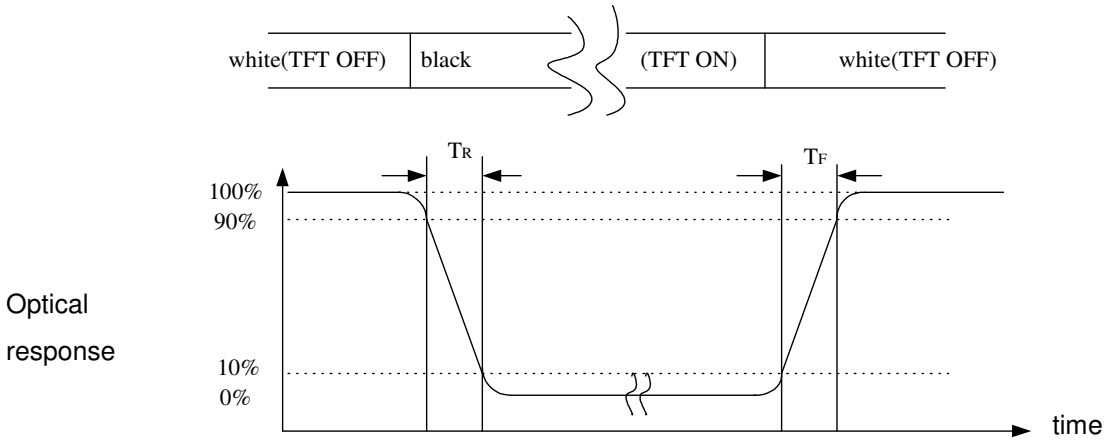
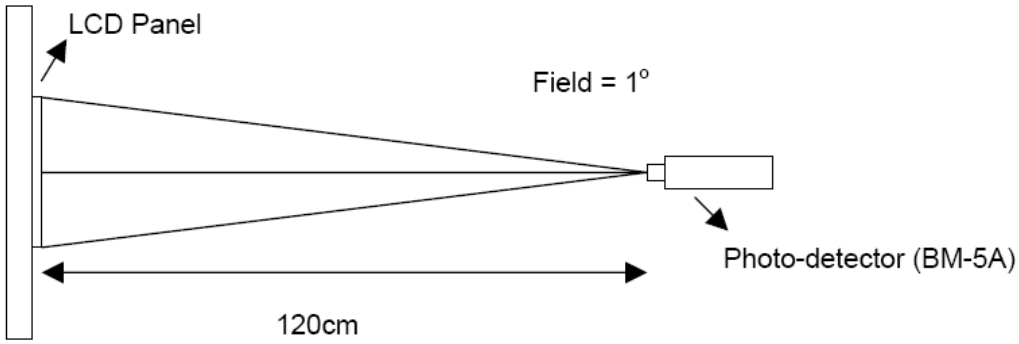
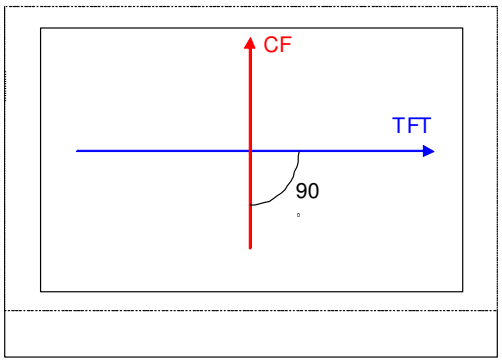
**Note (3)** Definition of Response Time : Sum of $T_R$ and $T_F$




**Note (4)** Definition of optical measurement setup




**Note (5)** Rubbing Direction (The different Rubbing Direction will cause the different optima view direction




TFT Face up

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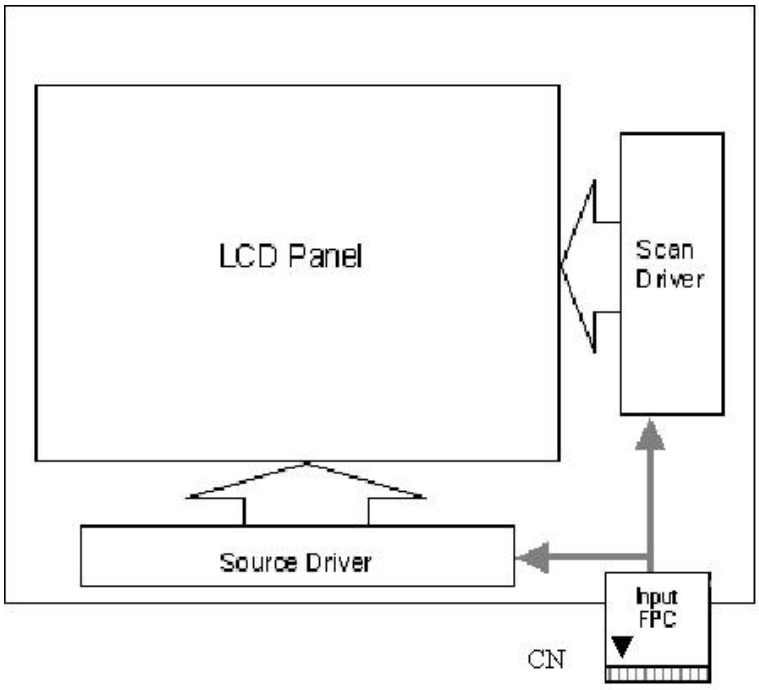
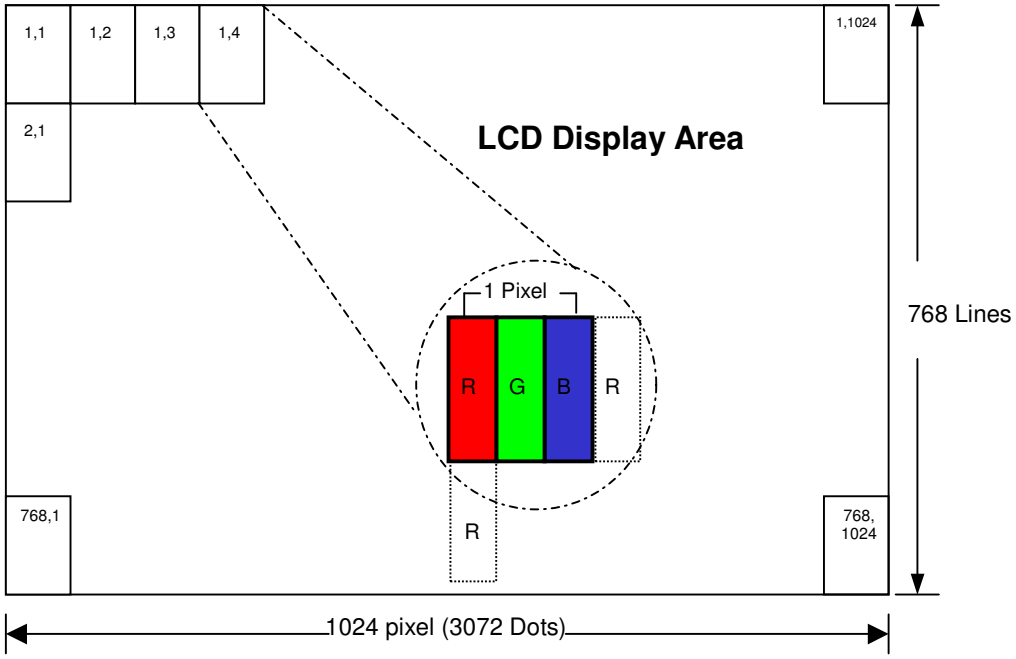
# 4.0 BLOCK DIAGRAM

## 4.1 TFT LCD Module




## 4.2 Pixel Format

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## 4.3 Relationship between Displayed Color and Input

### 4.3.1 6bit

| | Display | MSB LSB R5 | R4 | R3 | R2 | R1 | R0 | G5 | G4 | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 | B0 | Gray scale level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic color | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | - |
| | Blue | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | - |
| | Green | L | L | L | L | L | L | H | H | H | H | H | H | L | L | L | L | L | L | - |
| | Light Blue | L | L | L | L | L | L | H | H | H | H | H | H | H | H | H | H | H | H | - |
| | Red | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | - |
| | Purple | H | H | H | H | H | H | L | L | L | L | L | L | H | H | H | H | H | H | - |
| | Yellow | H | H | H | H | H | H | H | H | H | H | H | H | L | L | L | L | L | L | - |
| | White | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | - |
| Gray scale of Red | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark ↑ ↓ Light | L | L | L | L | L | H | L | L | L | L | L | L | L | L | L | L | L | L | L1 |
| | | L | L | L | L | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L2 |
| | | : | | | | | | : | | | | | | : | | | | | | L3…L60 |
| | | H | H | H | H | L | H | L | L | L | L | L | L | L | L | L | L | L | L | L61 |
| | | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L62 |
| | Red | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | Red L63 |
| Gray scale of Green | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark ↑ ↓ Light | L | L | L | L | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L1 |
| | | L | L | L | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | L2 |
| | | : | | | | | | : : | | | | | | : : | | | | | | L3…L60 |
| | | L | L | L | L | L | L | H | H | H | H | L | H | L | L | L | L | L | L | L61 |
| | | L | L | L | L | L | L | H | H | H | H | H | L | L | L | L | L | L | L | L62 |
| | Green | L | L | L | L | L | L | H | H | H | H | H | H | L | L | L | L | L | L | Green L63 |
| Gray scale of Blue | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark ↑ ↓ Light | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | L1 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | L | L2 |
| | | : | | | | | | : | | | | | | : | | | | | | L3…L60 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | L | H | L61 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | L | L62 |
| | Blue | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | Blue L63 |
| Gray scale of White & Black | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark ↑ ↓ Light | L | L | L | L | L | H | L | L | L | L | L | H | L | L | L | L | L | H | L1 |
| | | L | L | L | L | H | L | L | L | L | L | H | L | L | L | L | L | H | L | L2 |
| | | : | | | | | | : | | | | | | : | | | | | | L3…L60 |
| | | H | H | H | H | L | H | H | H | H | H | L | H | H | H | H | H | L | H | L61 |
| | | H | H | H | H | H | L | H | H | H | H | H | L | H | H | H | H | H | L | L62 |
| | White | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | White L63 |

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### 4.3.2 8bit

| | Display | MSB R7 | R6 | R5 | R4 | R3 | R2 | R1 | LSB R0 | MSB G7 | G6 | G5 | G4 | G3 | G2 | G1 | LSB G0 | MSB B7 | B6 | B5 | B4 | B3 | B2 | B1 | LSB B0 | Gray scale Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic color | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | - |
| | Blue | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | H | - |
| | Green | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | - |
| | Light Blue | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | - |
| | Red | H | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | - |
| | Purple | H | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | H | - |
| | Yellow | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | - |
| | White | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | - |
| Gray scale of Red | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L1 |
| | | L | L | L | L | L | L | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L2 |
| | ↑ | | | | | : | | | | | | | : | | | | | | | | : | | | | | L3…L251 |
| | ↓ | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L252 |
| | Light | H | H | H | H | H | H | L | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L253 |
| | | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L254 |
| | Red | H | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | Red L255 |
| Gray scale of Green | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | L | L1 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | L | L | L2 |
| | ↑ | | | | | : | | | | | | | : | | | | | | | | : | | | | | L3…L251 |
| | ↓ | L | L | L | L | L | L | L | L | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L252 |
| | Light | L | L | L | L | L | L | L | L | H | H | H | H | H | H | L | H | L | L | L | L | L | L | L | L | L253 |
| | | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L254 |
| | Green | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | Green L255 |
| Gray scale of Blue | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | L1 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | L | L2 |
| | ↑ | | | | | : | | | | | | | : | | | | | | | | : | | | | | L3…L251 |
| | ↓ | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | L | L | L252 |
| | Light | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | L | H | L253 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | L | L254 |
| | Blue | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | H | Blue L255 |
| Gray scale of White & Black | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | H | L1 |
| | | L | L | L | L | L | L | H | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | H | L | L2 |
| | ↑ | | | | | : | | | | | | | : | | | | | | | | : | | | | | L3…L251 |
| | ↓ | H | H | H | H | H | H | L | L | H | H | H | H | H | H | L | L | H | H | H | H | H | H | L | L | L252 |
| | Light | H | H | H | H | H | H | L | H | H | H | H | H | H | H | L | H | H | H | H | H | H | H | L | H | L253 |
| | | H | H | H | H | H | H | H | L | H | H | H | H | H | H | H | L | H | H | H | H | H | H | H | L | L254 |
| | White | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | White L255 |

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# 5.0 INTERFACE PIN CONNECTION

## 5.1 PIN ASSIGNMENT

| Pin No. | Pin_Define | Pin No. | Pin_Define | Pin No. | Pin_Define |
|---|---|---|---|---|---|
| 1 | TP1A | 43 | V3 | 76 | AGND |
| 2 | TP1B | 44 | V4 | 77-78 | AVDD |
| 3 | TP1C | 45 | V5 | 79 | GND |
| 4-5 | VCOM | 46 | V6 | 80-81 | VDD |
| 6 | XON | 47 | V7 | 82 | CABC_EN[0] |
| 7 | F_Ctrl_Gate | 48 | GAMH | 83 | CABC_EN[1] |
| 8 | GND | 49 | VSD | 84 | OPDRV |
| 9-10 | VCC | 50 | HSD | 85 | BIST |
| 11-12 | VGL | 51 | G_LVDS | 86 | STBYB |
| 13-14 | VGH | 52 | PIND3 | 87 | GRB |
| 15 | F_Ctrl_Source | 53 | NIND3 | 88 | SHLR |
| 16-17 | VCOM | 54 | GND | 89 | UPDN |
| 18 | AGND | 55 | PIND2 | 90-91 | VDD |
| 19-20 | AVDD | 56 | NIND2 | 92 | GND |
| 21 | GND | 57 | GND | 93-94 | AVDD |
| 22-23 | VDD | 58 | PIND1 | 95 | AGND |
| 24 | DIMI | 59 | NIND1 | 96-97 | VCOM1 |
| 25 | PINCTL | 60 | GND | 98 | PWR_EN |
| 26 | DIMO | 61 | PIND0 | 99-100 | FBL |
| 27 | DITHER | 62 | NIND0 | 101-102 | FBH |
| 28 | HFRC | 63 | GND | 103-104 | FBA |
| 29 | FRAME | 64 | DCLKP | 105-106 | AVDDG |
| 30 | SEL[0] | 65 | DCLKN | 107-108 | DRVA |
| 31 | SEL[1] | 66-67 | VDD_L | 109-110 | DRVH |
| 32 | CSB | 68 | GAML | 111-112 | DRVL |
| 33 | SDA | 69 | V8 | 113-114 | DRVL_B |
| 34 | SCL | 70 | V9 | 115-116 | VCOMO |
| 35-36 | VDD | 71 | V10 | 117 | VGL |
| 37 | GND | 72 | V11 | 118-119 | VCOM |
| 38-39 | AVDD | 73 | V12 | 120 | TP2C |
| 40 | AGND | 74 | V13 | 121 | TP2B |
| 41 | V1 | 75 | V14 | 122 | TP2A |
| 42 | V2 | | | | |

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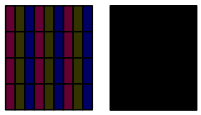
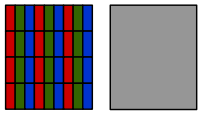
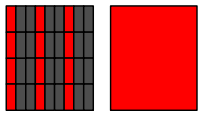
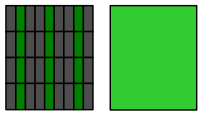
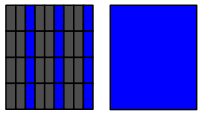
### 5.2 TFT Design Rules

| Item | | Specification | unit |
|---|---|---|---|
| Himax<br>X : HX8282-A<br>Y : HX8695-B02<br>or compatible | Pad number | X : 1865 channel<br>Y : 1038 channel | - |
| | Pin assignment | Based on the IC Spec. | - |

### 5.3 Cell test light on waveform

| Display | Vdata | Pattern |
|---|---|---|
| **Black** | TSR = 0V and 11V<br>TSG = 0V and 11V<br>TSB = 0V and 11V |  |
| **Gray** | TSR = 0V and 6V<br>TSG = 0V and 6V<br>TSB = 0V and 6V |  |
| **Red** | TSR =5V and 6V<br>TSG = 0V and 11V<br>TSB = 0V and 11V |  |
| **Green** | TSR = 0V and 11V<br>TSG = 5V and 6V<br>TSB = 0V and 11V |  |
| **Blue** | TSR = 0V and 11V<br>TSG = 0V and 11V<br>TSB = 5V and 6V |  |

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# 6.0 ELECTRICAL CHARACTERISTICS

## 6.1 TFT LCD Module

| Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Supply Voltage | VDD | 3.0 | 3.3 | 3.6 | V | |
| | VGH | 21.34 | 22.0 | 22.66 | V | |
| | VGL | -7.35 | -7.0 | -6.65 | V | |
| | AVDD | 8.722 | 8.9 | 9.08 | V | |
| VCOM | VCOMin | 2.8 | 3.0 | 3.2 | V | |
| Input signal voltage | ViH | 0.7 VDD | - | VDD | V | Note (1) |
| | ViL | 0 | - | 0.3 VDD | V | |
| Current of power supply | IDD | - | 20 | - | mA | VDD =3.3V |
| | IADD | - | 19 | - | mA | AVDD=8.9V |
| | IGH | - | 0.33 | - | mA | VGH=22V |
| | IGL | - | 0.7 | - | mA | VGL=-7V |

Note (1): HSYNC, VSYNC, DE, Digital Data

Note (2): Be sure to apply the power voltage as the power sequence spec.

Note (3): DGND=AGND=0V,)

## 6.2 Switching Characteristics for LVDS Receiver

| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Differential Input High Threshold | Vth | — | — | 100 | mV | $V_{CM}$=1.2V |
| Differential Input Low Threshold | Vtl | -100 | — | — | mV | |
| Input Current | $I_{IN}$ | -10 | — | +10 | uA | |
| Differential input Voltage | $\|V_{ID}\|$ | 0.1 | — | 0.6 | V | |
| Common Mode Voltage Offset | $V_{CM}$ | 0.7 | 1.2 | 1.6 | V | |

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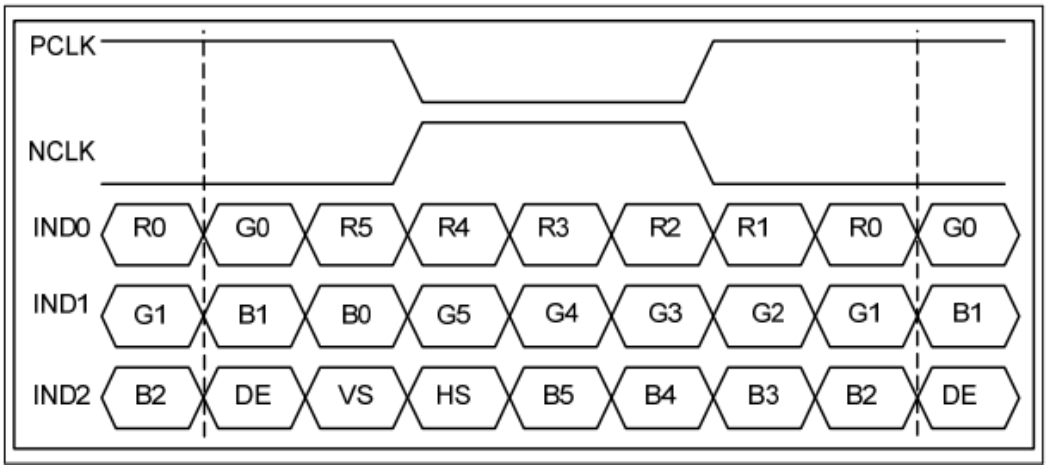
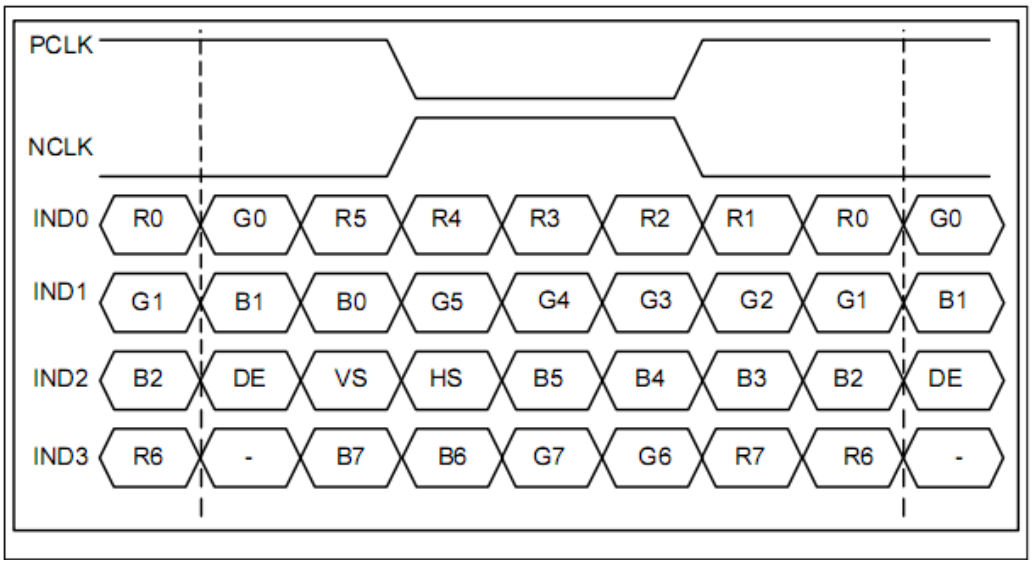
## 6.3 Bit LVDS input

### 6.3.1 6bit LVDS input




### 6.3.2 8Bit LVDS input

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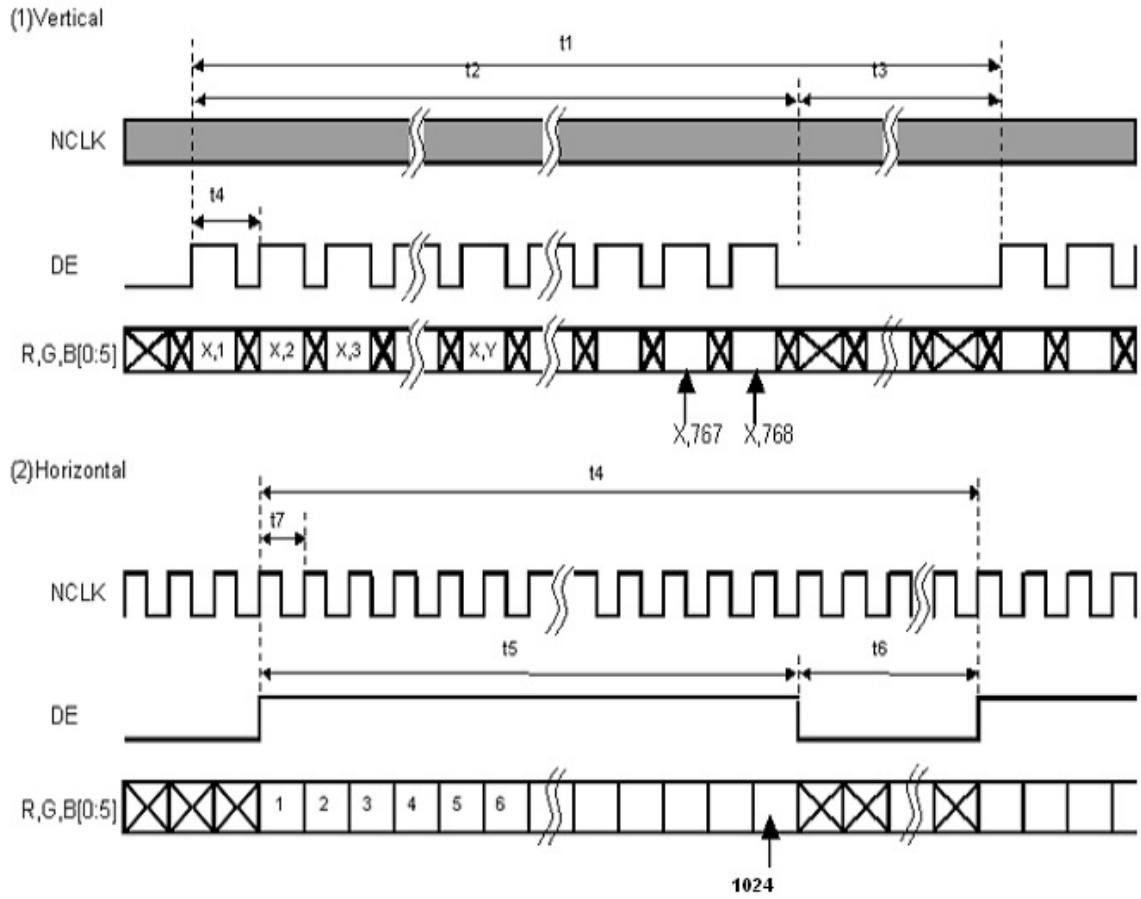
### 6.4 Interface Timing (DE mode)

| Item | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Frame Rate | -- | 55 | 60 | 65 | Hz |
| Frame Period | t1 | 793 | 806 | 819 | line |
| Vertical Display Time | t2 | 768 | 768 | 768 | line |
| Vertical Blanking Time | t3 | 25 | 38 | 51 | line |
| 1 Line Scanning Time | t4 | 1304 | 1344 | 1384 | clock |
| Horizontal Display Time | t5 | 1024 | 1024 | 1024 | clock |
| Horizontal Blanking Time | t6 | 280 | 320 | 360 | clock |
| Clock Rate | t7 | 55 | 65 | 75 | MHz |

### Timing Diagram of Interface Signal (DE mode)

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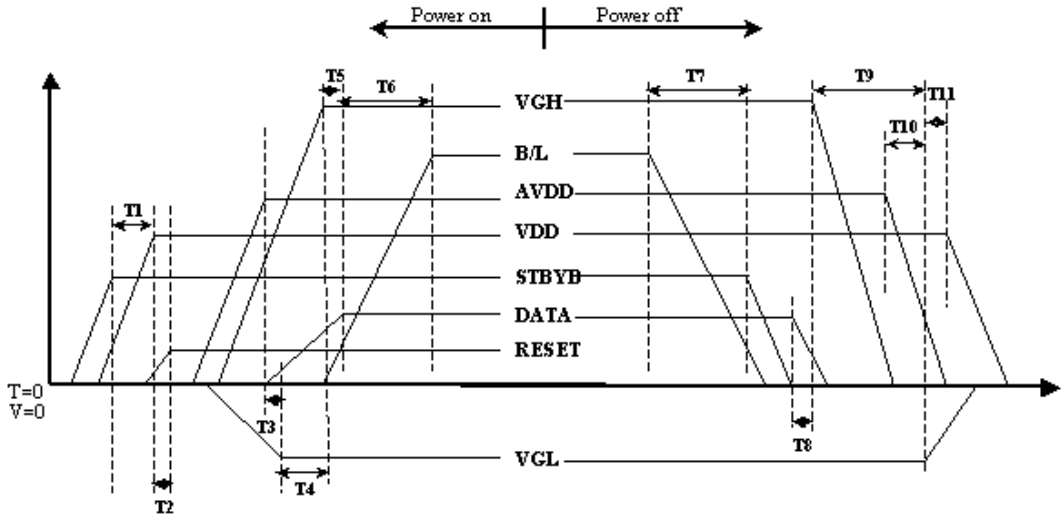
### 6.5 Power On / Off Sequence




| Item | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| T1 | 0 | -- | -- | ms |
| T2 | 50 | -- | -- | ms |
| T3 | 5 | -- | -- | ms |
| T4 | 10 | -- | -- | ms |
| T5 | 20 | -- | -- | ms |
| T6 | 50 | -- | -- | ms |
| T7 | 20 | -- | -- | ms |
| T8 | 10 | -- | -- | ms |
| T9 | 20 | -- | -- | ms |
| T10 | 10 | -- | -- | ms |
| T11 | 20 | -- | -- | ms |

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 °C, typical IL value indicated in the above table until the brightness becomes less than 50%.

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## 7.0 Reliability test items

| No. | Item | Conditions | Remark |
|---|---|---|---|
| 1 | High Temperature Storage | Ta=+70°C, 240hrs | |
| 2 | Low Temperature Storage | Ta=-30°C, 240hrs | |
| 3 | High Temperature Operation | Ta=+60°C, 240hrs | |
| 4 | Low Temperature Operation | Ta=-20°C, 240hrs | |
| 5 | High Temperature and High Humidity (Operating) | Ta=+60°C, 90%RH, 240hrs | |

Note: (1) All tests above are practiced at module type.
(2) There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

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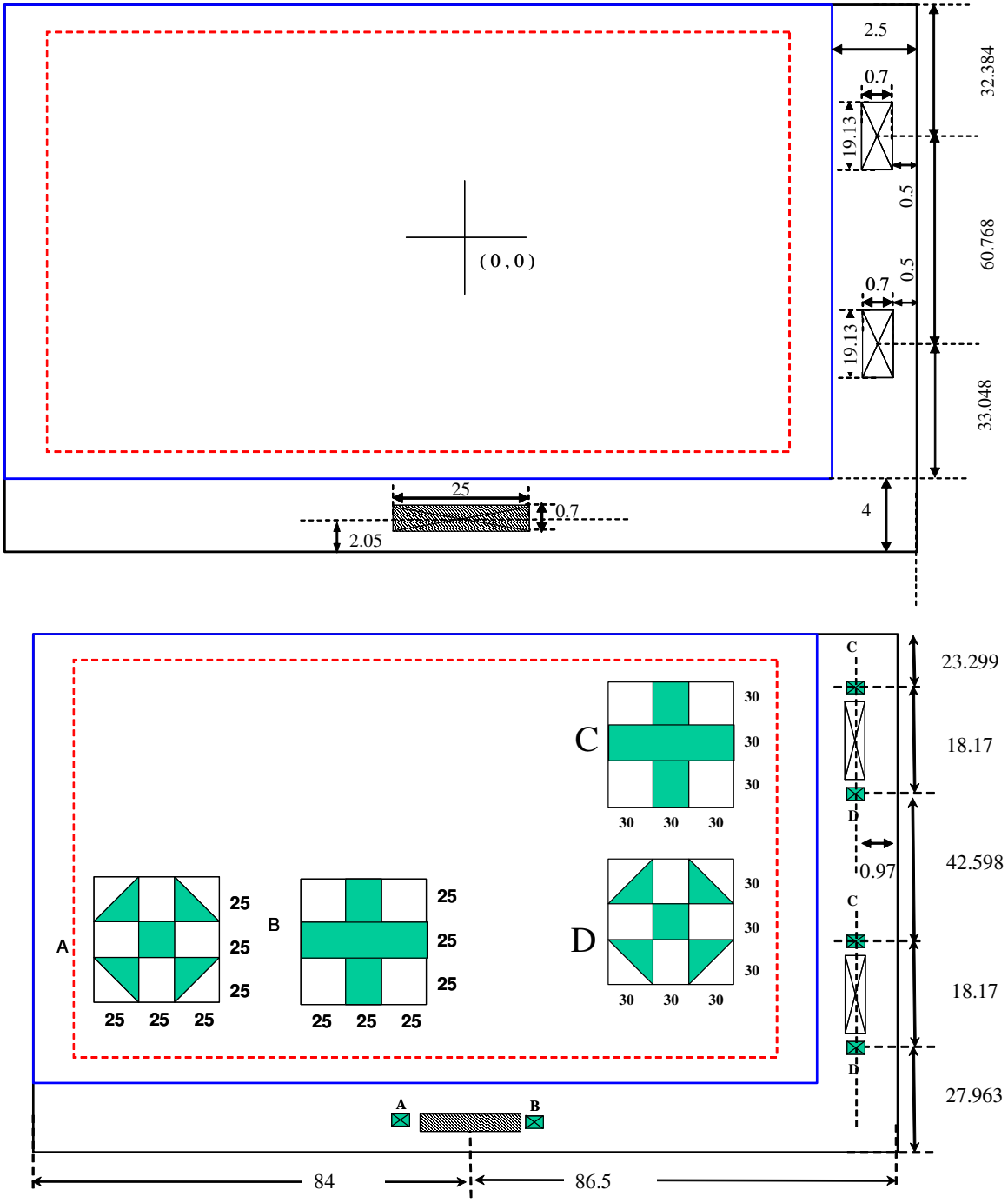
## 8.0 OUTLINE DIMENSION

### 8.1 Driver IC Block Position




Unit : mm

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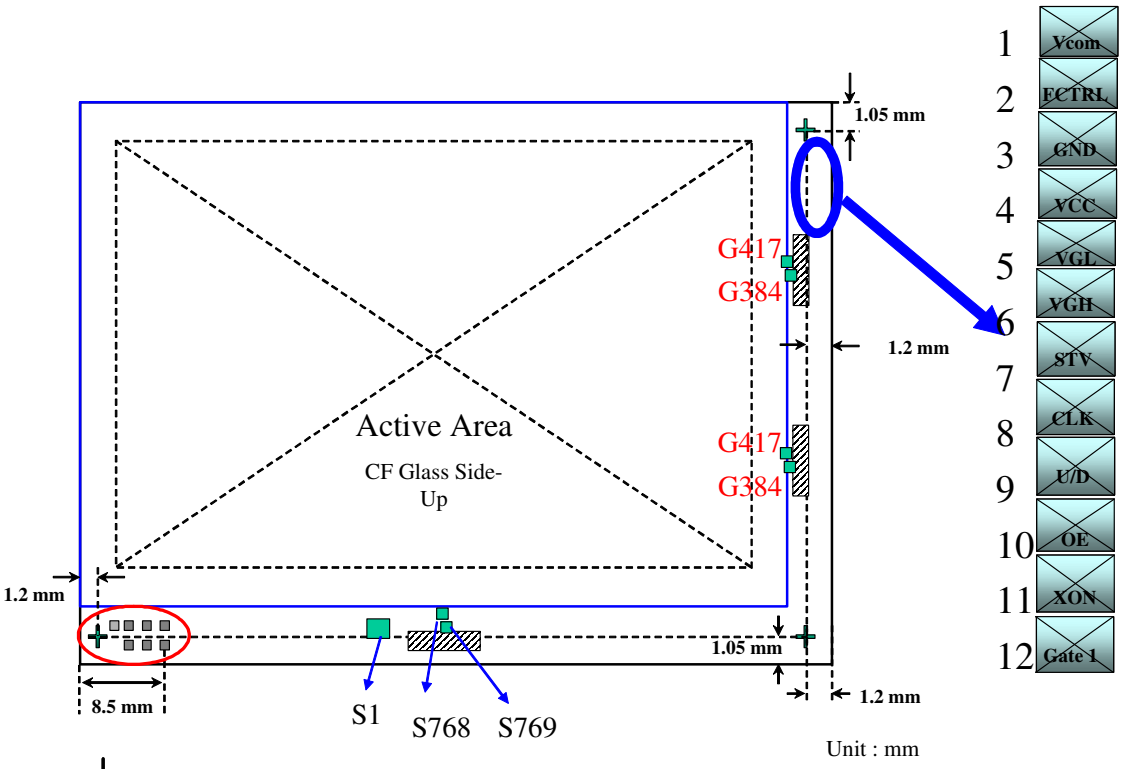
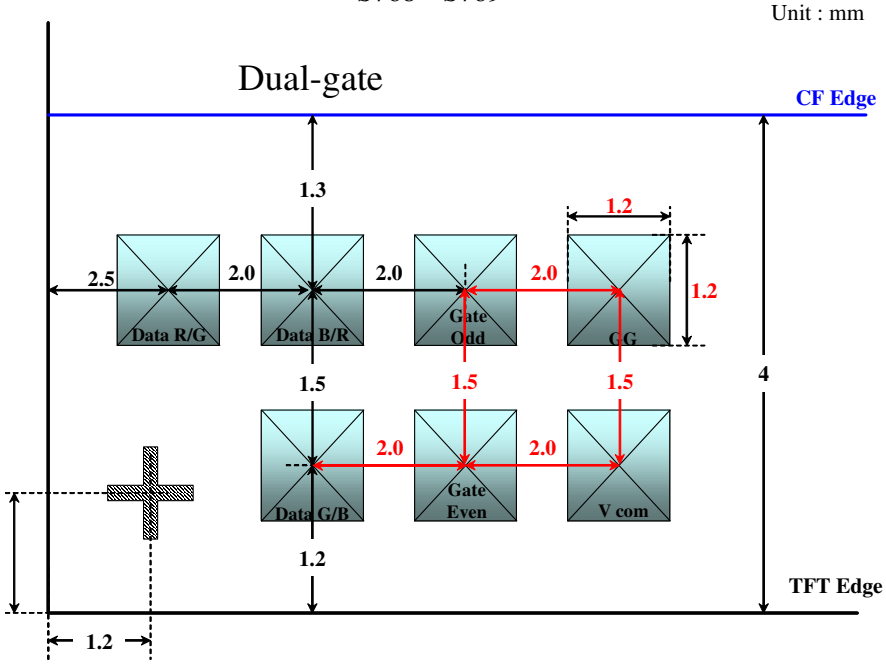
## 8.2 Test Pad Position




Unit : mm

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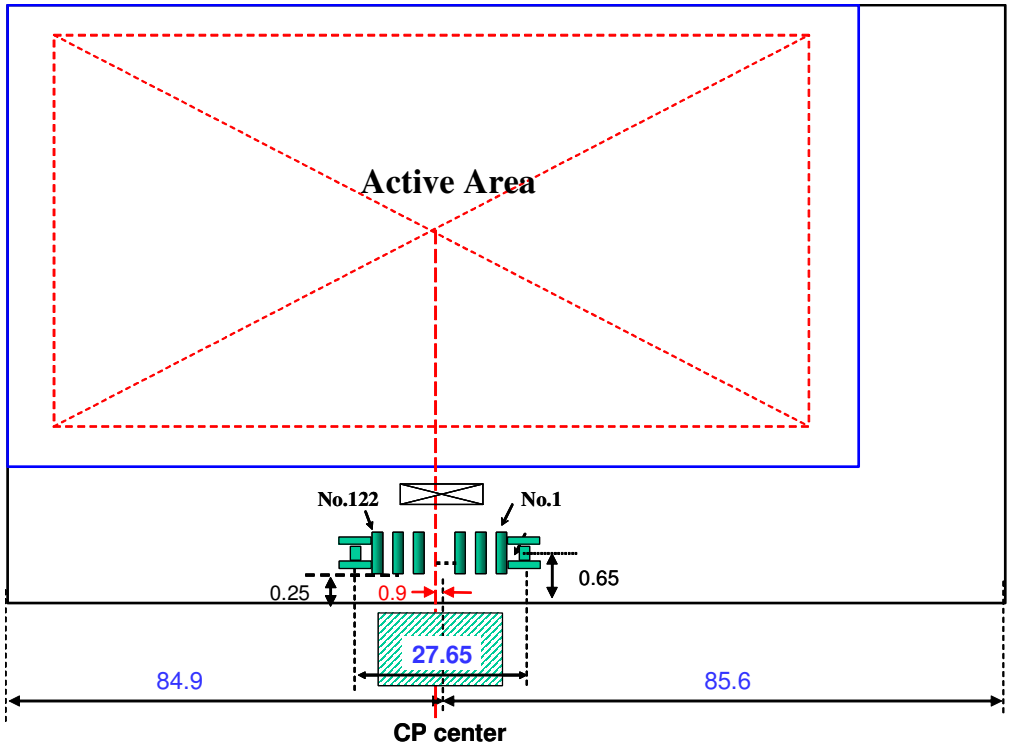
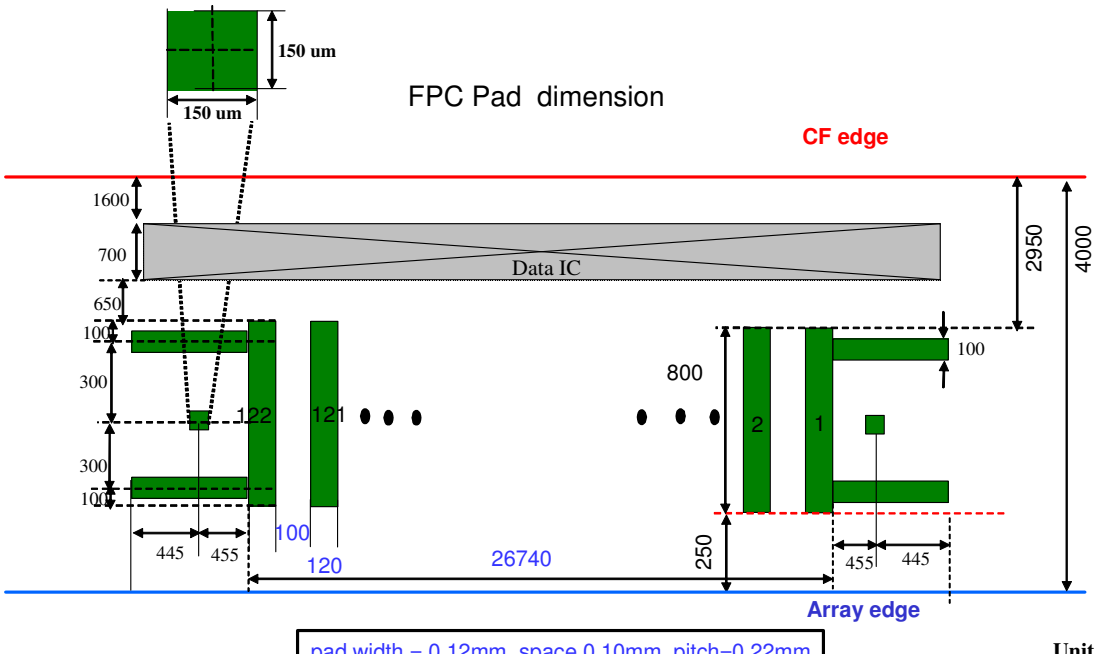
## 8.3 FPC Bonding Pad Position




Unit : mm

pad width = 0.12 mm, space 0.10 mm, pitch 0.22 mm




pad width = 0.12mm, space 0.10mm, pitch=0.22mm

Unit : um

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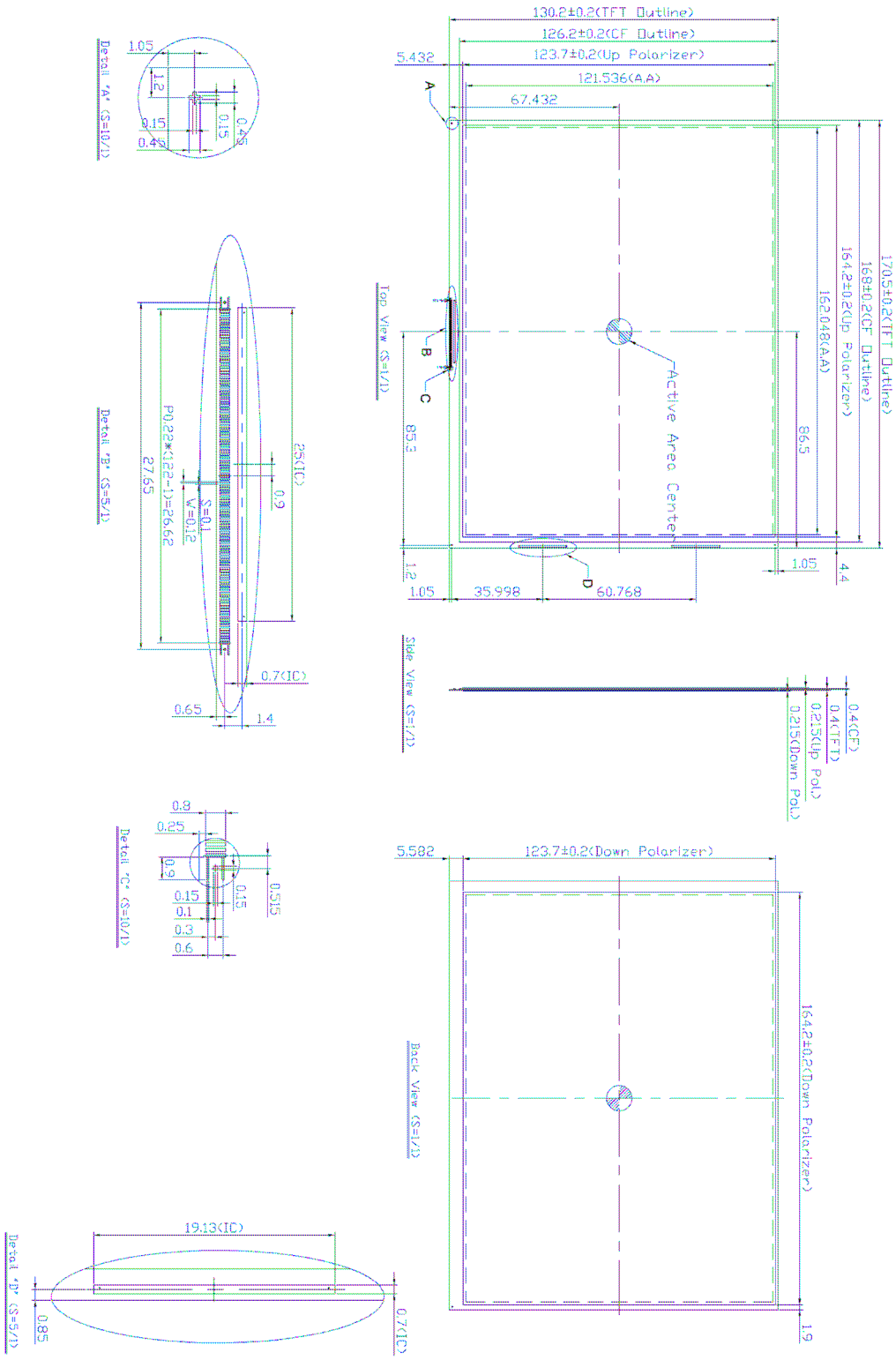
## 8.4 Outline Dimension

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