Date : 2008.11.20

# SAMSUNG
# MOBILE DISPLAY

# Specification for Approval

customer :

model name : UF-80I011A

description : Liquid Crystal Display module

| (Proposed by) | | 승 인(Approved by) |
|---|---|---|
| **Designed** | **Approved** | |
| | | |
| S.H.HA<br>2008.11.20 | H.S.KIM<br>2008.11.20 | |

# SAMSUNG MOBILE DISPLAY CO., LTD

| REV. | DATE | CONTENTS | WRITTEN | APPROVED |
|------|------|----------|---------|----------|
| 0.0 | '08.07.01 | Initial Specification Release. | S.H.HA | S.J.JANG |
| 1.0 | '08.10.02 | Changed Product Drawing. | M.J.BAEK | H.S.KIM |
| 2.0 | '08.11.20 | Changed Product Drawing. | S.H.HA | H.S.KIM |

# CONTENTS

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| Doc. No.: UF80I011A | Ref. No. : | Rev. : 2.0 | 3 |

## 1. Introduction

This specification defines the general provisions of the product as well as the inspection standard for Samsung SDI's a-Si TFT LCD module. If the event of unforeseen problems or unspecified items occur, we naturally shall negotiate and agree to solution with customer.

## 2. Warranty and Disclaimer

Samsung warranty term is 12 months from the production date. Within the period, Samsung shall compensate for the defectives as specified in this document. User must take care of the precautions and the product should be stored and used in right manner specified in this document. Any type of mishandling or any type of change on the Samsung product in electrical and mechanical shall void Samsung warranty. After the expiration of the warranty period, the replacement of any parts or of the entire product shall be charged. For further information or the customer service, contact Samsung Quality Assurance Group.

This Specification stipulates the final and comprehensive requirements for the respective products hereof. Beyond this Specification, it is the responsibility of the customer to explicitly disclose any additional requirements, information or reservations regarding these requirements to Samsung SDI prior to implementation, where any and all disclosures of the customer shall be with an authorized representative of Samsung SDI in writing. Samsung SDI shall not be responsible for safety, performance, functionality or compatibility of the system with which the Samsung SDI-supplied components are integrated unless such features have been expressly communicated and described in the Specification. **SAMSUNG SDI MAKES NO GUARANTY OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, TO ANY PARTY.** Moreover, any party should do their own due diligence regarding these requirements prior to implementation.

# 3. Features

## 3-1 MAIN LCD

| ITEM | Specifications | Unit | Note |
|---|---|---|---|
| Number of dots | 800(W) * (RGB) * 480(H) | Dot | - |
| Display Mode | IPS<br>(Normally Black and 16.7M colors by FRC) | - | - |
| Viewing Angle | 6 | o'clock | |
| Driving LSI &<br>Manufacturer | HX8258(Source), HX8662C(Gate) by HIMAX | | |
| Pixel Array | RGB vertical stripes | | |
| BACK LIGHT | LED, WHITE | | |
| CPU INTERFACE | 24 bit Parallel RGB Interface | | |
| DISPLAY SIZE | 4.3" | | |

## 4. Mechanical characteristics

| ITEM | Specifications | Unit |
|---|---|---|
| Dimensional outline | 103(W) X 69.06(H) X 3.43(T) | mm |
| Number of dots | 800(W) X 480(H) | Pixels |
| Active area | 93.6(W) X 56.16(H) | mm |
| Pixel pitch | 0.117(W) X 0.117(H) | mm |
| Dots size | 0.039(W) X RGB X 0.117(H) | mm |
| Glass Thickness | 0.5(T) | mm |
| Surface Hardness for pol | 2 | H |

## 5. Maximum rating

| ITEM | | Symbol | Min. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Supply voltage | Digital Power | VCC | -0.3 | 7.0 | V | 1,2 |
| | Analog Power | VBAT | -0.3 | 7.0 | V | 1,2 |
| Input voltage | | Vin | -0.3 | VCC+0.3 | V | 2 |
| Operating temperature | | Top | -20 | 60 | ℃ | |
| Humidity | | Hop | 10 | 90 | %RH | |
| Storage temperature | | Tstg | -30 | 70 | ℃ | |
| Humidity | | Hstg | 10 | 90 | %RH | 3 |

Note 1) All supply voltages should be supplied over Vss(GND) level.
Note 2) This product must be used under the absolute maximum ratings at any time.
The values exceeding the ratings may result in a permanent failure of the product.
Note 3) Wet bulb temperature should be kept under 29℃ of no condensation.

# 6. Electrical characteristics

## 6-1. Electrical Characteristics.

( Vss=0V )

| ITEM | | Symbol | Condition | Min | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| Supply voltage (Logic) | | VCC | - | 2.7 | 2.8 | 3.6 | V | 4 |
| Supply voltage (Power Circuit) | | VBAT | - | 4.75 | 5.0 | 5.5 | V | - |
| Input voltage | "H" level | $V_{IH}$ | - | 0.8VCC | - | VCC | V | 1,4 |
| | "L" level | $V_{IL}$ | | Vss | - | 0.2VCC | | |
| Output voltage | "H" level | $V_{OH}$ | $I_{OH}$ = -400uA $I_{OL}$ = 400uA | 0.8VCC | - | VCC | V | 1 |
| | "L" level | $V_{OL}$ | | Vss | - | 0.2VCC | | |
| I/O leakage current | | $I_{IL}$ | $V_{IN}$=0 or Vss | -1.0 | - | +1.0 | uA | 2 |
| Current consumption | | Icc | Full Display (VCC=2.8V) | - | 7 | 10.5 | mA | 3 |
| | | Ibat | Full Display (VBAT=5V) | - | 46 | 69 | mA | 3 |

Note

1) The following figures illustrate the configurations of 1 pin - I pin and O pin.

2) This excludes the current through the output drive MOS.

3) Typ. : Full white display ( Backlight power consumption is excluded.)

4) If two Interface voltage gap is larger than threshold, the leakage path will be turn on, so minimize two interface voltage gap as possible.

## 6-2. LED back light specification (per a Chip)

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit. |
|---|---|---|---|---|---|---|
| Forward voltage | $V_F$ | $I_F$=20㎃ | 2.9 | - | 3.4 | V |
| Reverse voltage | $V_R$ | $I_R$=10㎃ | 0.6 | - | 2.0 | V |
| Forward current | $I_F$ | - | - | - | 22 | mA |
| Reverse Current | $I_R$ | $V_R$=5V | - | - | 85 | mA |
| Uniformity(with L/G) | - | $I_F$=20㎃ | 70% | - | - | - |
| Luminous color | White | | | | | |
| Chip , maker | SLSNNWH462USI , SEM | | | | | |
| RANK SORTING | Rank of the chromaticity coordinate : V Rank of the luminous intensity : AR | | | | | |
| Chip connection | 10 EA (2Channel, Each Channel 5chip serial connection) | | | | | |

# 7. Electro-Optical characteristic

## 7-1. Targeted optical characteristics for design

(Ta : 25°C)

| ITEM | | Symbol | Condition | | | Min. | Typ. | Max. | Unit. | Note |
|------|------|--------|-----------|---|---|------|------|------|-------|------|
| Response time | Rising | Ton | Φ=0°,θ=0° Display : Black → White | | | - | 15ms | 30ms | msec | 1,2,3 |
| | Falling | Toff | Φ=0°,θ=0° Display : White → Black | | | - | 20ms | 40ms | | |
| Viewing angle | | Φ | K≥10 | θ=180° | Display B/W | 75 | 80 | - | deg. | 1,4,6 |
| | | | | θ= 0° | | 75 | 80 | - | | |
| | | | | θ= 90° | | 75 | 80 | - | | |
| | | | | θ=270° | | 75 | 80 | - | | |
| Contrast ratio | | K | Φ=0°,θ=0° | | | - | 500:1 | - | - | 1,2,5 |
| Brightness | Normal | Bn | Φ=0°,θ=0° ILED=20mA | | | 250 | 300 | - | cd/㎡ | 1,2 |
| Color of CIE coordinate | White | X | Φ=0°θ=0° | | | 0.27 | 0.32 | 0.37 | - | 1,2 |
| | | Y | | | | 0.32 | 0.37 | 0.42 | - | |
| | Red | X | | | | 0.54 | 0.59 | 0.64 | - | |
| | | Y | | | | 0.29 | 0.35 | 0.39 | - | |
| | Green | X | | | | 0.28 | 0.33 | 0.38 | - | |
| | | Y | | | | 0.56 | 0.61 | 0.66 | - | |
| | Blue | X | | | | 0.09 | 0.14 | 0.19 | - | |
| | | Y | | | | 0.06 | 0.11 | 0.16 | - | |

Note 1) Φ and θ Definition

[Vertical]
θ=0°
Φ=0°

**Measurement Direction**

Φ

[Top]
θ=180°
Φ=90°

Φ1
2

θ=270°

[Horizontal]
θ=90°

[Bottom]
θ=0°
Φ=90°

Θ
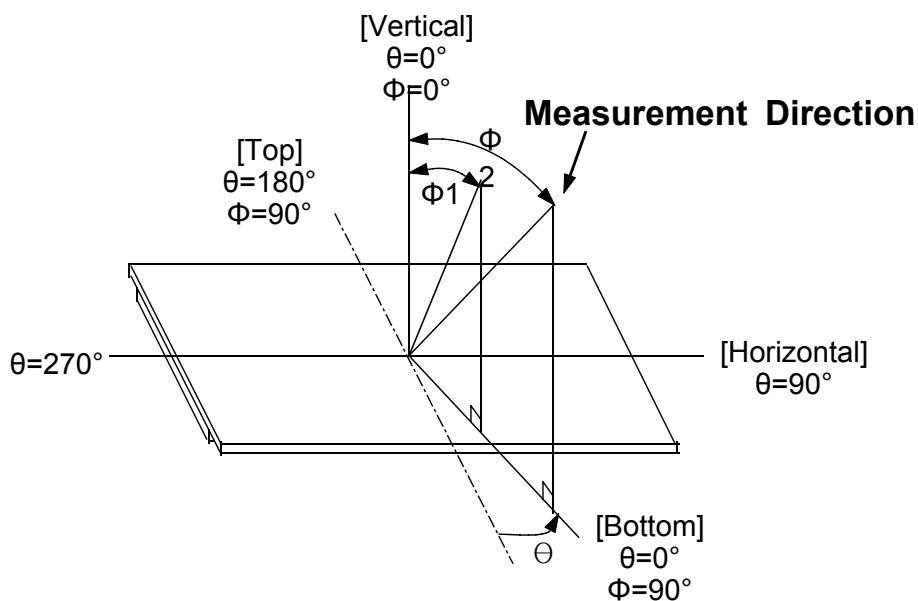
Note 2) Backlight Measurement.

Measuring equipment : BM-7 (TOPCON), Vertical front Measurement.

5mm

5mm

LCD Outline.

Measurement 9 Points ($\phi$ 7.7)
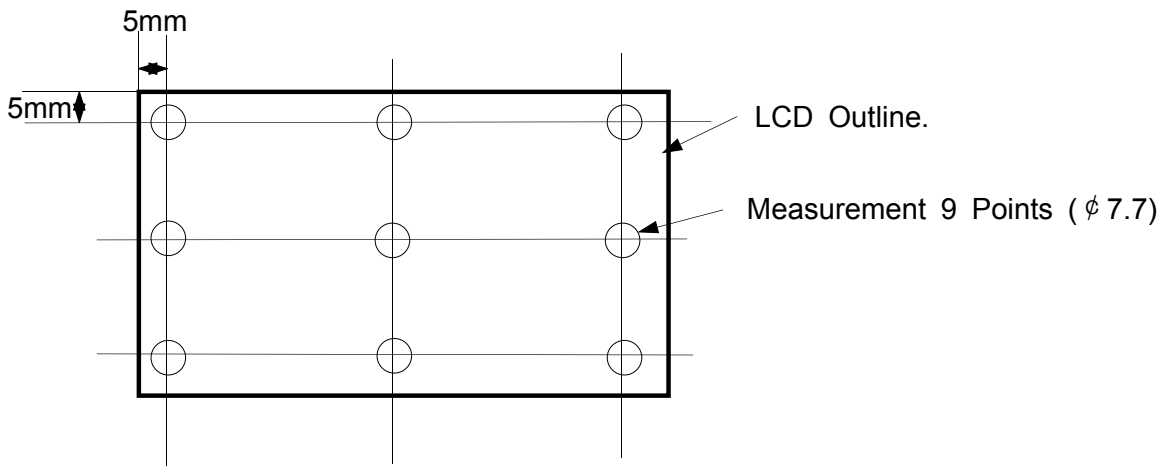
Uniformity = Lmin/Lmax * 100 [%]

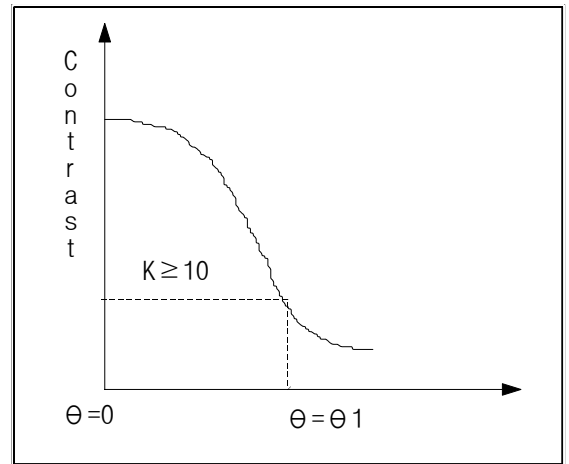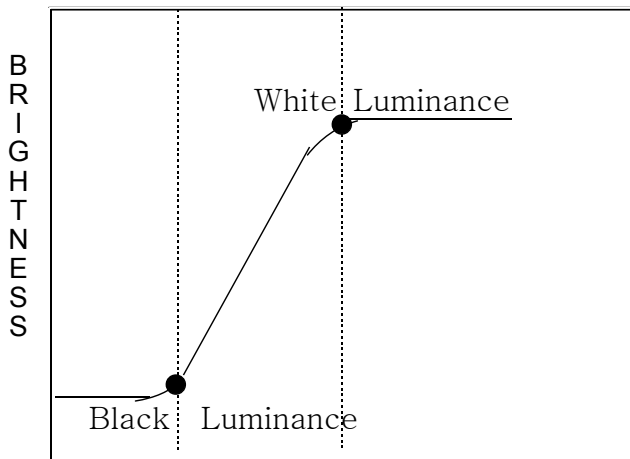| Instruments | field |
|-------------|-------|
| BM-7 | 1° |

BM-7

field

50㎝

LCD PANEL

The center of the display
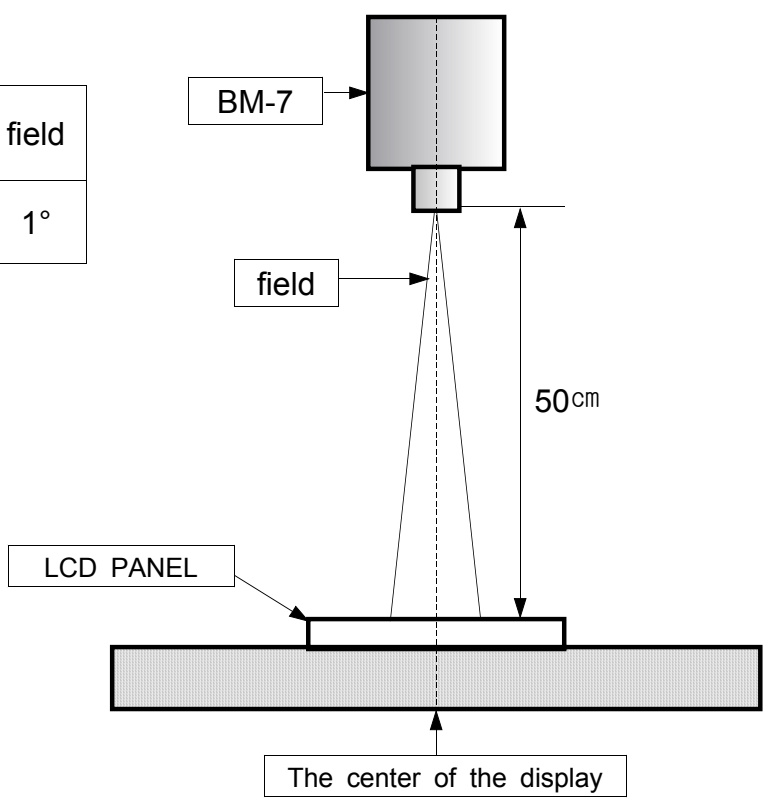
Note 3) Definition of Response time
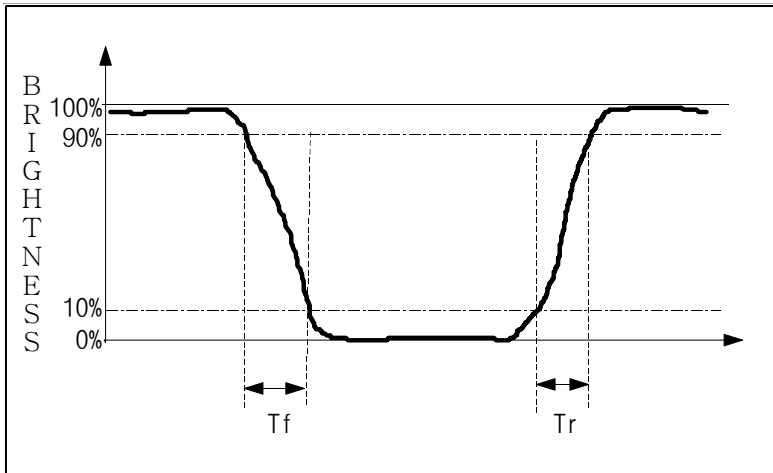


Note 4) Definition of Viewing angle



Note 5) Definition of contrast ratio (K)

Note 6) Optical measuring system
temperature regulated chamber



Drive voltage
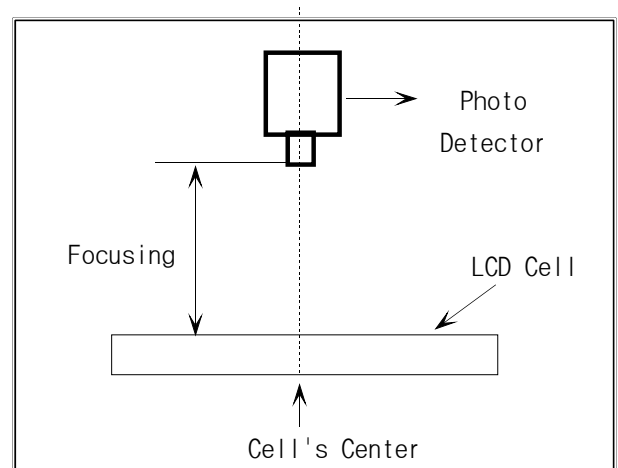


$$\text{Contrast ratio } (K) = \frac{\text{Brightness of non-Selected dot (Boff)}}{\text{Brightness of selected dot (Bon)}}$$

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# 8. Interface

## 8-1. I/O connection

| Pin No. | Symbol | Pin No. | Symbol |
|---------|--------|---------|--------|
| 1 | GND | 27 | D27 |
| 2 | VCC | 28 | SDI |
| 3 | VCC | 29 | SPCK |
| 4 | D0 | 30 | SPEN |
| 5 | D1 | 31 | RESETB |
| 6 | D2 | 32 | DE |
| 7 | D3 | 33 | HS |
| 8 | D4 | 34 | GND |
| 9 | D5 | 35 | CLK |
| 10 | D6 | 36 | VBAT |
| 11 | D7 | 37 | VBAT |
| 12 | D10 | 38 | VS |
| 13 | D11 | 39 | NC |
| 14 | D12 | 40 | LED1+ |
| 15 | D13 | 41 | LED1- |
| 16 | D14 | 42 | LED2+ |
| 17 | D15 | 43 | LED2- |
| 18 | D16 | 44 | XL |
| 19 | D17 | 45 | YD |
| 20 | D20 | 46 | XR |
| 21 | D21 | 47 | YU |
| 22 | D22 | 48 | NC |
| 23 | D23 | 49 | NC |
| 24 | D24 | 50 | NC |
| 25 | D25 | 51 | GND |
| 26 | D26 |  |  |

*) VCC is the digital supply voltage for HX8258, HX8662C.

VBAT is the supply voltage of external DC/DC converter for analog power of HX8662C & HX8258

**) D7~D0 : RED(MSB to LSB), D17~D10 : GREEN(MSB to LSB)

D27~D20 : BLUE(MSB to LSB)

## 8-2. Circuit block diagram

<div align="center">

**LCD PANEL**
**800 X R,G,B X 480**

</div>

<div align="center">

DC/DC Converter
VCOM
Logic Control

Timing Controller
D/A Converter

**HX8258, HX8662C**

</div>

RGB interface signals, 24bit data signals, Power signals, ETC
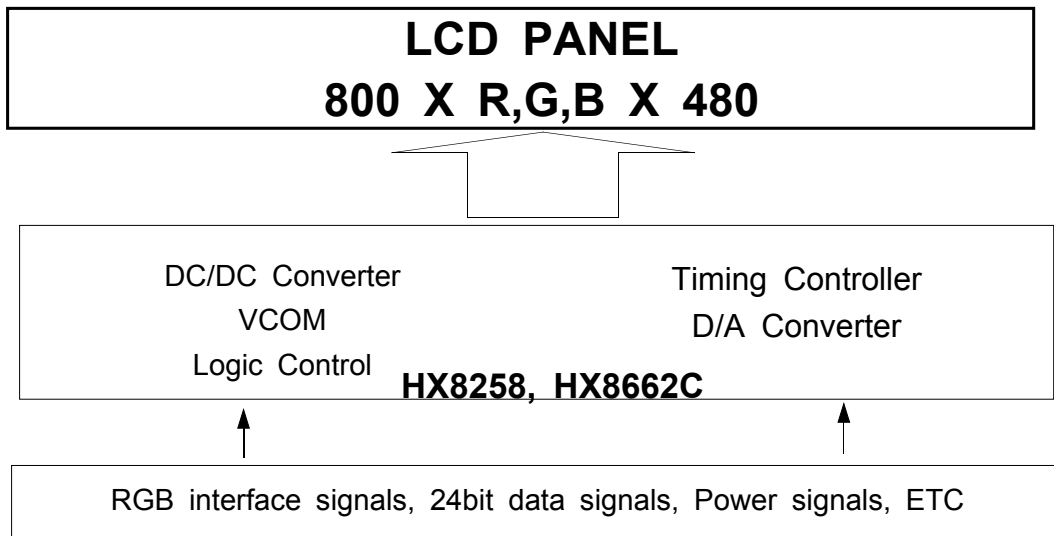
## 8-3. Signal timing diagram for TFT LCD driver HX8258

### 8-3-1. Interface Function
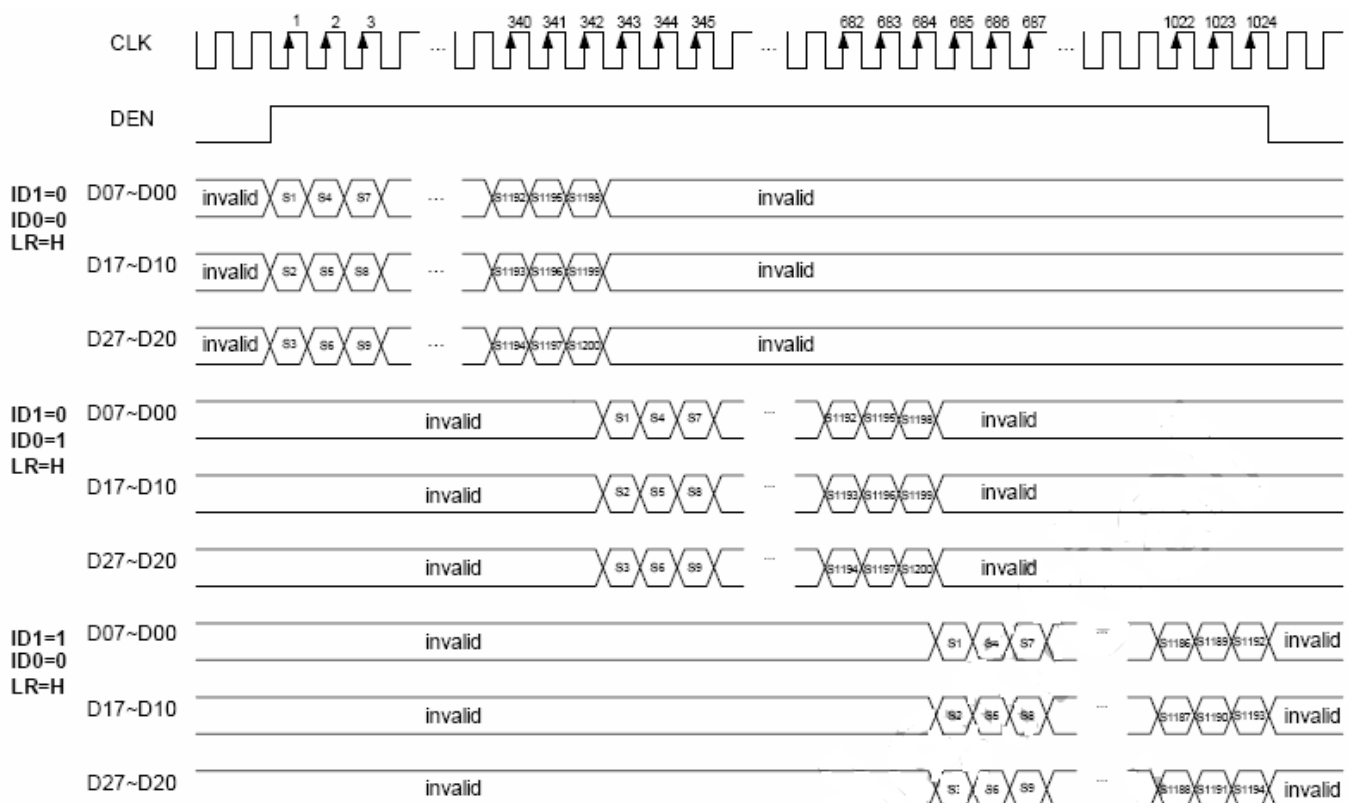


**Figure 5. 21 Input output relationship when TCON enable (TEN=H)**
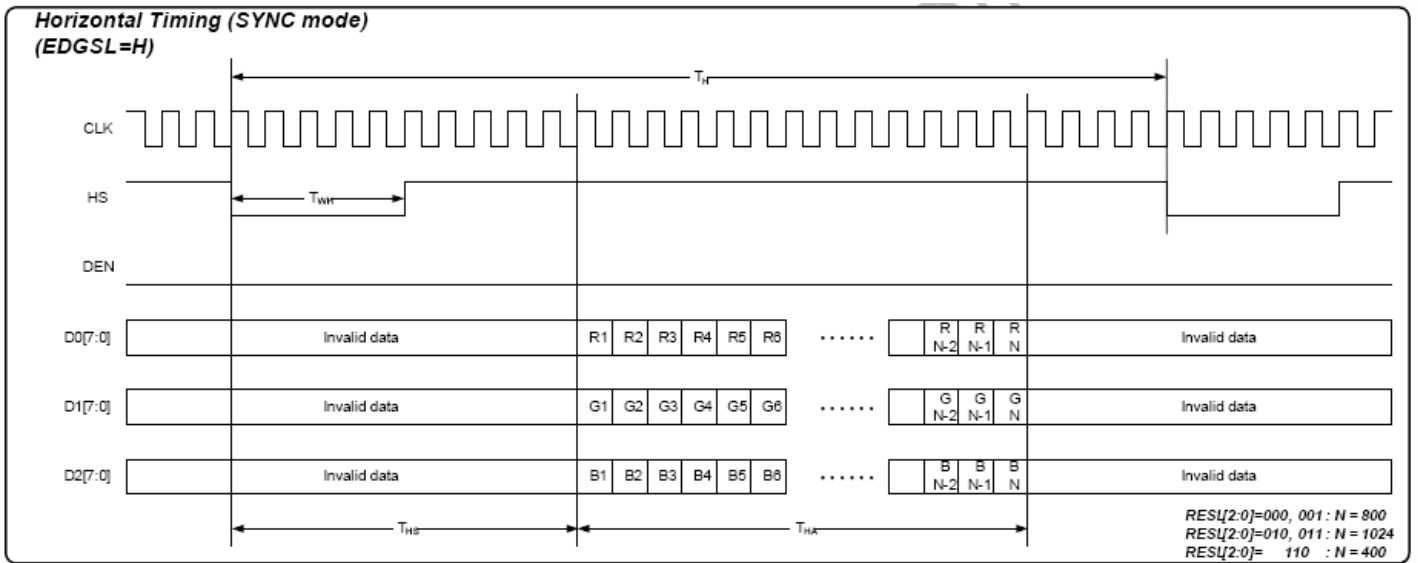
## 8-3-2. Parallel RGB Interface Timing Operation

**Horizontal Timing (SYNC mode)**
**(EDGSL=H)**



RESL[2:0]=000, 001 : N = 800
RESL[2:0]=010, 011 : N = 1024
RESL[2:0]=    110  : N = 400

**Figure 8. 2 SYNC Mode Horizontal Data Format**

**Vertical Timing**



RESL[2:0]=000       : M=480
RESL[2:0]=001, 010 : M=600
RESL[2:0]=011       : M=768
RESL[2:0]=111       : M=234
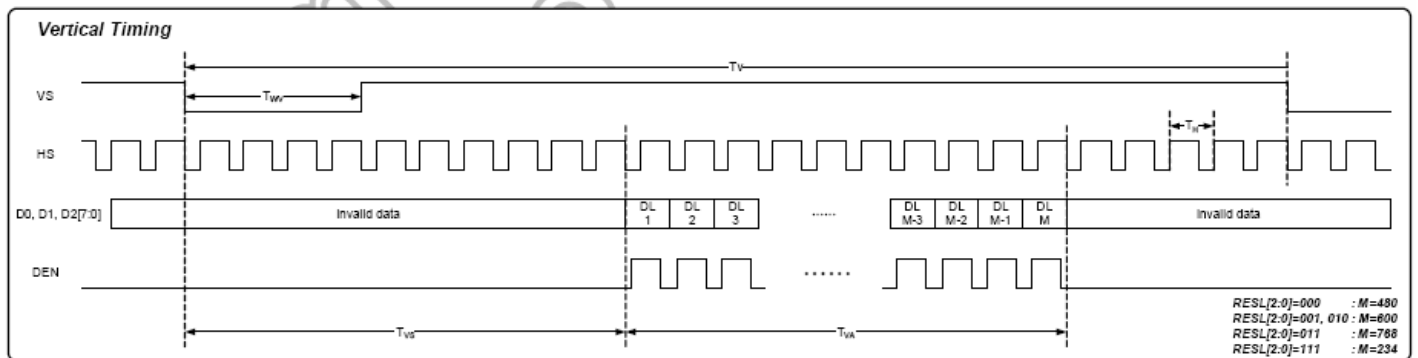
**Figure 8. 3 SYNC Mode Vertical Data Format**

8-3-3.  AC  Electrical  Characteristics

| PARAMETER | Symbol | Spec. | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| HS setup time | $T_{hst}$ | 6 | - | - | ns |
| HS hold time | $T_{hhd}$ | 6 | - | - | ns |
| VS setup time | $T_{vst}$ | 6 | - | - | ns |
| VS hold time | $T_{vhd}$ | 6 | - | - | ns |
| Data setup time | $T_{dsu}$ | 6 | - | - | ns |
| Data hold time | $T_{dhd}$ | 6 | - | - | ns |
| DEN setup time | $T_{esu}$ | 6 | - | - | ns |
| Source output settling time | $T_{ST}$ | - | - | 15 | µs |
| Source output loading R | $R_{SL}$ | - | 2 | - | kΩ |
| Source output loading C | $C_{SL}$ | - | 60 | - | pF |
| Repair OP output loading C | $C_{RL}$ | - | 150 | - | pF |
| Repair OP output settling time | $T_{RT}$ | - | - | 15 | µs |
| POL output delay time | $T_{DP}$ | - | - | 40 | ns |

● sync mode

| Parameter | Symbol | Spec. | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| CLK frequency | $F_{CPH}$ | 29.93 | 33.26 | 36.59 | MHz |
| CLK period | $T_{CPH}$ | 27.32 | 30.06 | 33.41 | ns |
| CLK pulse duty | $T_{CWH}$ | 40 | 50 | 60 | % |
| HS period | $T_H$ | 950 | 1056 | 1600 | $T_{CPH}$ |
| HS pulse width | $T_{WH}$ | 1 | 128 | $T_{HS}$ -2 | $T_{CPH}$ |
| HS-first horizontal data time | $T_{HS}$ | STHD[7:0]+88[1] | | | $T_{CPH}$ |
| HS Active Time | $T_{HA}$ | - | 800 | - | $T_{CPH}$ |
| VS period | $T_V$ | 490 | 525 | 625 | $T_H$ |
| VS pulse width | $T_{WV}$ | 1 | 2 | $T_{VS}$ | $T_H$ |
| VS-DEN time | $T_{VS}$ | STVD[6:0]+8 | | | $T_H$ |
| VS Active Time | $T_{VA}$ | - | 480 | - | $T_H$ |

**Note:** (1) $T_{HS}+T_{HA}<T_H$

## 8-3-4. SPI Interface Timing Operation

SPEN must keep low more than 13 clock after SDI starting to write data.

Write SPI commend must after RESET rising more than 10us.

| PARAMETER | Symbol | Spec. Min. | Spec. Typ. | Spec. Max. | Unit |
|---|---|---|---|---|---|
| SPCK period | $T_{CK}$ | 60 | - | - | ns |
| SPCK high width | $T_{CKH}$ | 30 | - | - | ns |
| SPCK low width | $T_{CKL}$ | 30 | - | - | ns |
| Data setup time | $T_{SU1}$ | 12 | - | - | ns |
| Data hold time | $T_{HD1}$ | 12 | - | - | ns |
| SPENA to SPCK setup time | $T_{CS}$ | 20 | - | - | ns |
| SPENA to SPDA hold time | $T_{CE}$ | 20 | - | - | ns |
| SPENA high pulse width | $T_{CD}$ | 50 | - | - | ns |
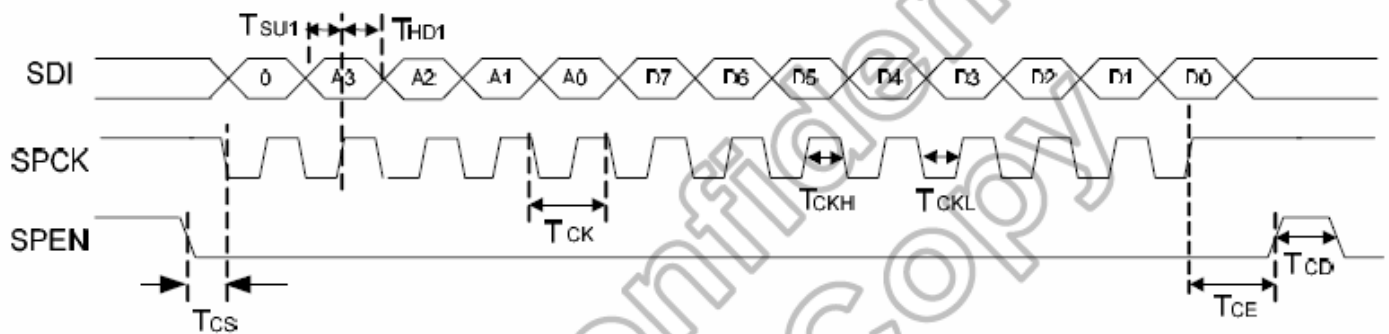


Figure 9. 1 SPI timing (write data)

### 8-3-5. Reset Timing when power on

HX8258-A is internally initialized by the global reset signal, RESETB. The reset input must be held for at least 1ms after power is stable. Write SPI commend must after RESET rising more than 10us.
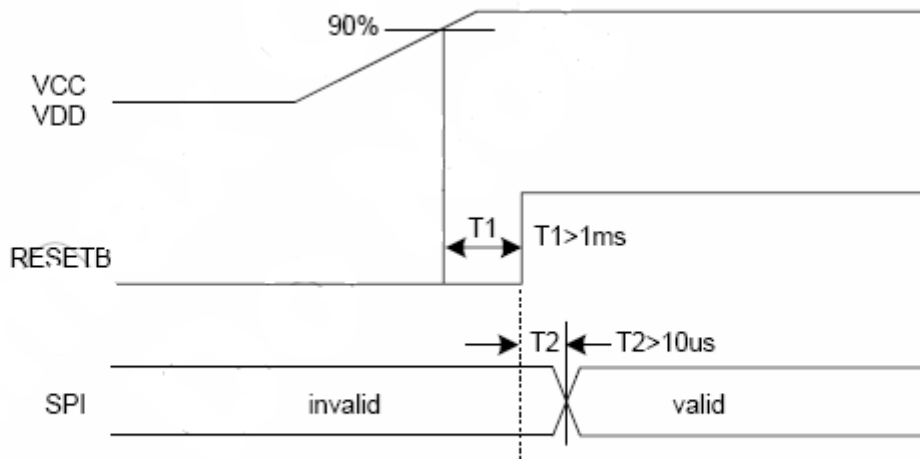


**Figure 5. 4 RESETB control after power stable**

### 8-3-6. Hardware reset timing

| PARAMETER | Symbol | Spec. | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| RESETB low pulse width | $T_{rstw}$ | 10 | - | - | μs |
| Negative noise pulse width | $T_{nr}$ | | - | 2 | μs |
| Reset start time | $T_{st}$ | 2 | - | | μs |
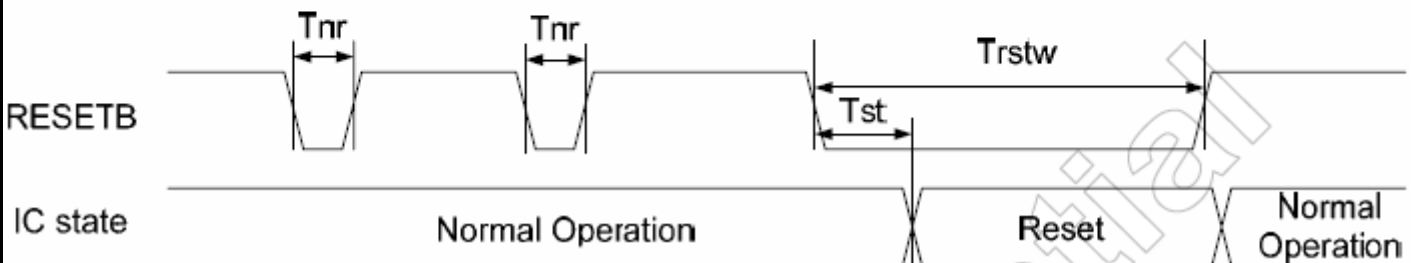
8-4. Power circuit set-up sequence

8-4-1. Power on/off sequence

To prevent the device damage from latch up, the power ON/OFF sequence shown below must be followed.

- Power ON : VCC, GND -> VDDA, VSS -> V1 to V10
- Power OFF : V1 to V10 -> VDDA, VSS -> VCC, GND
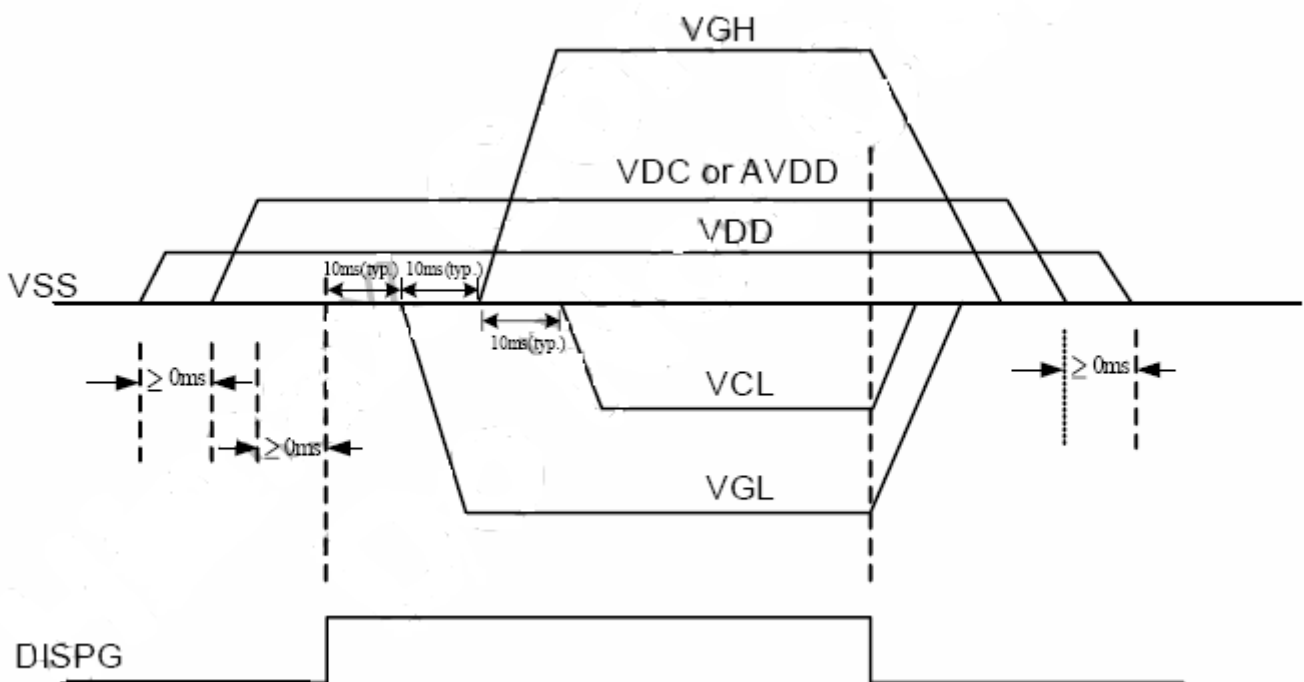
# 9. Quality level

## 9-1. Inspection conditions

### 9-1-1. The environmental conditions for inspection shall be as follows.

Room temperature　　:　　20 ± 3℃

Humidity　　　　　　:　　65 ± 20%RH

### 9-1-2. The external visual inspection

The inspection shall be performed by using a single 20W fluorescent lamp for illumination and the distance should be kept more than 30cm between inspector`s eyes and surface of LCD.

### 9-1-3.

#### (1) Light method

Y　　Z

Display surface

Fluorescent lamp will be set on the surface of LCD perpendicularly

X
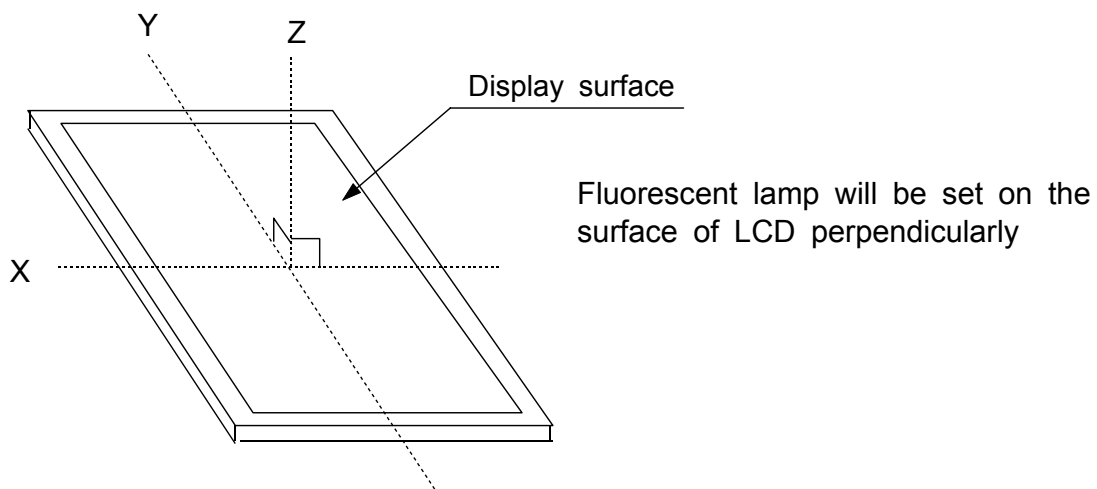
#### (2) Inspection distance and angle

Z

Y

30°　30°

X

Inspection should be performed within ∅ (∅ is usually 30° ) from Z axis to each X and Y axis. Inspection distance in direction within ∅ must be kept more than 30cm to the surface of LCD.

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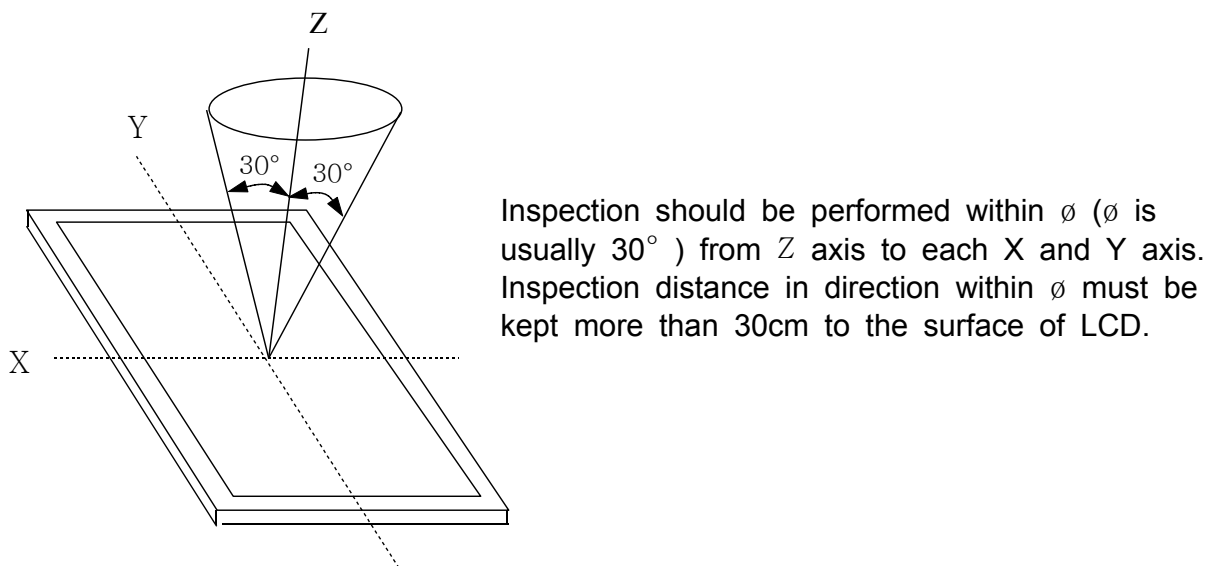
9-2. Sampling procedures for each item's acceptance level

| Defect type | Sampling procedures | AQL |
|---|---|---|
| Major defect | MIL-STD-105D Inspection level Ⅰ<br>normal inspection<br>single sample inspection | 0.65 |
| Minor defect | MIL-STD-105D Inspection level Ⅰ<br>normal inspection<br>single sample inspection | 1.5 |

9-3. Classification of defects
   9-3-1. Major defect
         : A major defect refers to the defect which is considered to
           substantial degradation to the usability for product application.
   9-3-2. Minor defect
         : A minor defect refers to the defect which is not considered to be
           substantial degradation for product application, or the defect which deviates
           from the existing standards, and it is almost irrelated to the effective use
           of the product or its operation.
   9-3-3.Defect application zone :Viewing Area
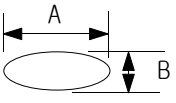


"B" zone :
Defects in `B` zone
should not be judged

"A" zone :
      Viewing Area

| | |
|---|---|
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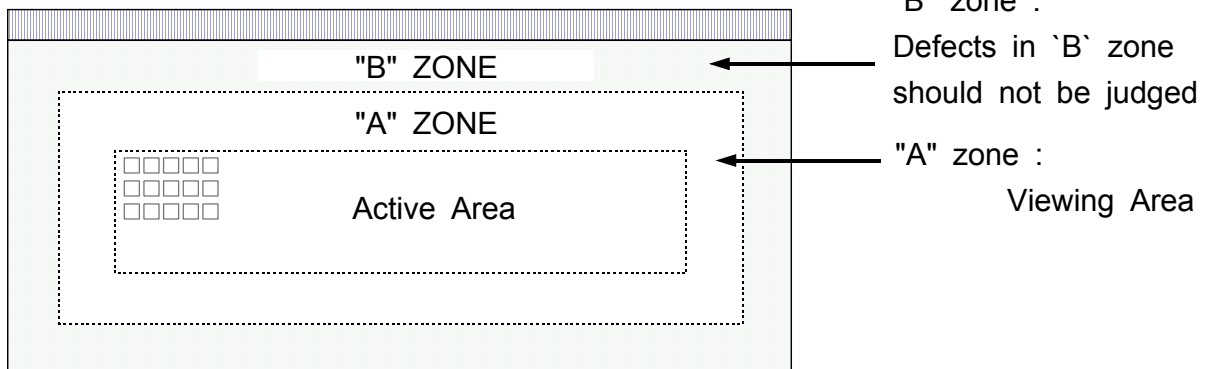
## 9-4. Inspection standards

※All of electrical defects must be judged at the state of optimum voltage that has the best contrast.

| ITEM | Criterion for defects | Defect type |
|---|---|---|
| 1) Non display | ·No non display is allowed | Major |
| 2) Irregular operating | ·No irregular operation is allowed | Major |
| 3) Short | ·No shorts are allowed | Major |
| 4) Open | ·Any segments or common patterns that don't activate are rejectable. | Major |
| 5) Black/White spot(ㅣ) | <table><tr><td>Size ø (mm)</td><td>Acceptable number</td></tr><tr><td>ø ≤ 0.10</td><td>Ignore</td></tr><tr><td>0.10 < ø ≤ 0.20</td><td>2</td></tr><tr><td>0.20 < ø ≤ 0.25</td><td>1</td></tr><tr><td>0.25 < ø</td><td>0</td></tr></table> | Minor |
| 6) Black/White line(ㅣ) | <table><tr><td>size</td><td>Acceptable number</td></tr><tr><td>W≤0.03</td><td>Ignore</td></tr><tr><td>0.03<W≤0.05 1.0< L≤3.0</td><td>2</td></tr><tr><td>0.03<W≤0.05 3.0< L</td><td>0</td></tr></table> | Minor |
| 7) Back Light | 1)No Lighting is rejectable<br>2)Flickering and abnormal lighting are rejectable<br><br>※In case of the model with back light<br>  (E/L , LED or CCFT type ) | Major |
| 8) Blemish & Foreign matters<br>Size :<br>  ø=(A+B)/ 2 | <table><tr><td>Size ø (mm)</td><td>Acceptable number</td></tr><tr><td>ø ≤ 0.10</td><td>Ignore</td></tr><tr><td>0.10 < ø ≤ 0.20</td><td>2</td></tr><tr><td>0.20 < ø ≤ 0.25</td><td>1</td></tr><tr><td>0.25 < ø</td><td>0</td></tr></table> | Minor |

| ITEM | Criterion for defects | | | Defect type |
|---|---|---|---|---|
| 9)Scratch on Polarizer, Line shape | width (mm) | Length (mm) | Acceptable number | Minor |
| | W≤0.03 | Ignore | 3 | |
| | 0.03<W≤0.05 | L≤2.0 | 2 | |
| | 0.05<W≤0.08 | L≤1.0 | 1 | |
| | | Note (1) | 1 | |
| | 0.08<W | | Note(1) | |
| | Note 1) Regard as a blemish | | | |
| 10) Bubble in polarizer, Dent | Size ø (mm) | | Acceptable number | Minor |
| | ø ≤ 0.10 | | Ignore | |
| | 0.10 < ø ≤ 0.20 | | 2 | |
| | 0.15 < ø ≤ 0.25 | | 1 | |
| | 0.25 < ø | | 0 | |
| 11) Stains on LCD panel surface | Stains which cannot be removed even when wiped lightly with a soft cloth or similar cleaning too are rejectable. | | | Minor |
| 12) Rust in Bezel | Rust which is visible in the bezel is rejectable. | | | Minor |
| 13) Defect of land surface contact (Poor soldering) | Evident crevices which is visible are rejectable. | | | Minor |
| 14) Parts alignment | (1) LSI, IC lead width is more than 50% beyond pad outline. | | | Minor |
| | (2) Chip component is off center and more than 50% of the leads is off the pad outline. | | | Minor |
| 15) Conductive foreign matter (Solder ball, Solder chips) | (1) 0.45 <ø , N≥ 1 | | | Minor |
| | (2) 0.30 <ø≤0.45 , N≥ 1 | | | Minor |
| | ø: Average diameter of solder ball (unit::mm) | | | |
| | (3) 0.50 <L , N≥ 1 | | | Minor |
| | L: Average length of solder chip (unit::mm) | | | |

| ITEM | Criterion for defects | Defect type |
|---|---|---|
| 16) Flicker of TFT LCD | Flicker of TFT LCD is not the item of the rejection. | |
| 17) Dot Defect | (see below) | Minor |

For item 17) Dot Defect:

| ITEM [1][2] | Specifications | |
|---|---|---|
| | Number of missing dots | Total |
| Bright dots[3][5] | 0 | 2 |
| | 1 | |
| Dark dots [4] | 2 | |

Irregular light emissions by individual dots, caused by failures in TFT array, are counted as dot defects.

Note 1) Any missing dots in TFT array are counted as bright dots.
Note 2) Any inconspicuous dot  defect shall not be counted as a defect.
Note 3) A bright dot refers to a bright dot at gradation level(black)
Note 4) A dark dot refers a dark dot at gradation level L63(R,G,B)
Note 5) Defect number of center of active area  : 0
        Defect number of another area : 1

1/3 of Acitve

| | | |
|---|---|---|
| | | |
| | Center | |
| | | |

1/3 of Acitve

**[ Connector connection ]**

By the foreign material or the operator's mis-alignment, when assemble LCD module into the set with connector, the connection can be poor. So it needs to contact several time when abnormal display or no display.

9-5. The natural characteristics of LCD Module.

The following phenomena is the natural characteristics of LCD Module.

It would be judged as a good part.

| ITEM | Phenomenon |
|---|---|
| 1) Color shift | The white color looks more bluish or yellowish at each viewing angle. |
| 2) Light leakage in black mode | If a power push on or twist the LCD, the display color can be changed. Especially in black color |
| 3) Seal color | Around the edge, the color looks more yellowish. |
| 4) Bright line in the active area | When look into active area on one side, a bright line appeared. |

## 10. Reliability

### 10-1. Items of reliability

: All test result of items should be judged in 12 hour recovery time at Room temperature.

| ITEM | Condition | Criterion |
|---|---|---|
| 1) High temperature operating | 60℃ 48 hrs | · After testing,cosmetic defects should not happen.<br><br>· Contrast ratio should not happen lower than 10% of initial value<br><br>· Total current consumption should not be over 10% of initial value.<br><br>Polarizers may fail in humidity test, but only this failure is allowable. |
| 2) Low temperature operating | -20℃ 48 hrs | |
| 3) Humidity | 40℃, 90%RH, 48 hrs | |
| 4) High temperature storage | 70℃ 48 hrs | |
| 5) Low temperature storage | -30℃ 48 hrs | |
| 6) Thermal shock | 25℃→-30℃→25℃→70℃<br>5(min) 30(min) 5(min) 30(min)<br>5 cycle, 55~60%RH | |
| 7) Temperature humidity cycle | JIS.C.0028.1<br>5 cycle | |
| 8) Vibration | 10~55~10Hz<br>amplitude : 1.5mm<br>2hrs for each direction<br>(X, Y, Z) | · Not allowed cosmetic and electrical defects.<br><br> Test will be performed at state of carton box,not each of the modules |
| 9)Static Electricity | 150pF 330Ω ±8kV<br>10 times air discharge. | · After testing ,cosmetic and electrical defects should not happen.<br>· Total current consumption should be below double of initial value (Note1) |

(Note1)

In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

# 11. Handling precautions

## 11-1. Mounting method

The LCD panel of SAMSUNG SDI LCD module consists of two thin glass plates with polarizes which easily be damaged.  And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board. Extreme care should be needed when handling the LCD modules.


## 11-2. Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent [recommended below] and wipe lightly

- ◎ Isopropyl alcohol
- ◎ Ethyl alcohol
- ◎ Trichlorotriflorothane

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- ◎ Water
- ◎ Ketone
- ◎ Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the  ITO patterns.

Do not use the following solvent on the pad or prevent it from being contaminated :

- ◎ HCFC
- ◎ Soldering flux
- ◎ Chlorine(Cl), Salfur(S)
- ◎ Spittle, Fingerprint( It contains Cl )

If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion  as time goes on.

SAMSUNG SDI would like to propose that the Customer conduct the Silicon coating unless the goods supplied without Silicon coating.

  If ITO corrosion happen by mis-handling or using some materials such as
    Chlorine(Cl), Salfur(S) from customer, Responsibility is on customer.

11-3. Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you;
Connect any unused input terminal to Vdd or Vss, do not input any signals
before power is turned on, and ground your body, work/assembly areas,
assembly equipment to protect against static electricity.


11-4. Packing

◎ Module employ LCD elements, and must be treated as such.
Avoid intense shock and falls from a height.

◎ To prevent modules from degradation, do not operate or store them
exposed direct to sunshine or high temperature/humidity.


11-5. Caution for operation

◎ It is an indispensable condition to drive LCD's within the specified
voltage limit since the higher voltage then the limit cause the shorter
LCD life.
An electrochemical reaction due to direct current causes LCD's undesirable
deterioration, so that the use of direct current drive should be avoided.

◎ Response time will be extremely delayed at lower temperature then
the operating temperature range and on the other hand at higher
temperature LCD's show dark color in them.
However those phenomena do not mean malfunction or out of order with
LCD's, Which will come back in the specified operating temperature.

◎ If the display area is pushed hard during operation, Some font will be
abnormally displayed but it resumes normal condition after turning off once.

◎ A slight dew depositing on terminals is a cause for electro-chemical
reaction resulting in terminal open circuit.
Usage under the maximum operating temperature,50%RH or less is required.


11-6. Storage

In the case of storing for a long period of time [for instance, for years  for the
purpose or replacement use, The following ways are recommended.

◎ Storage in a polyethylene bag with the opening sealed so as not to enter
fresh air outside in it. And with no desiccant.

◎ Placing in a dark place where neither exposure to direct sunlight nor light's Keeping the storage temperature range.

◎ Storing with no touch on polarizer surface by the anything else.

[It is recommended to store them as they have been contained in the inner container at the time of delivery from us.]

11-7. Safety

◎ It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, Which should be burned up later.

◎ When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water.

## 12. Precaution for use

12-1. A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity.

Judgement by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

12-2. On the following occasions, the handling of problem should be decided through discussion and agreement between responsible of the both parties.

◎ When a question is arisen in this specifications.

◎ When a new problem is arisen which is not specified in this specifications.

◎ When an inspection specifications change or operating condition change in customer is reported to SDI, and some problem is arisen in this specification due to the change.

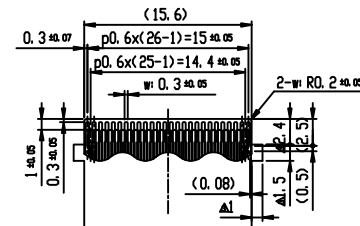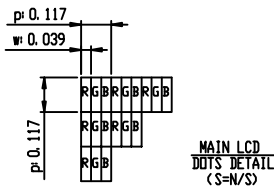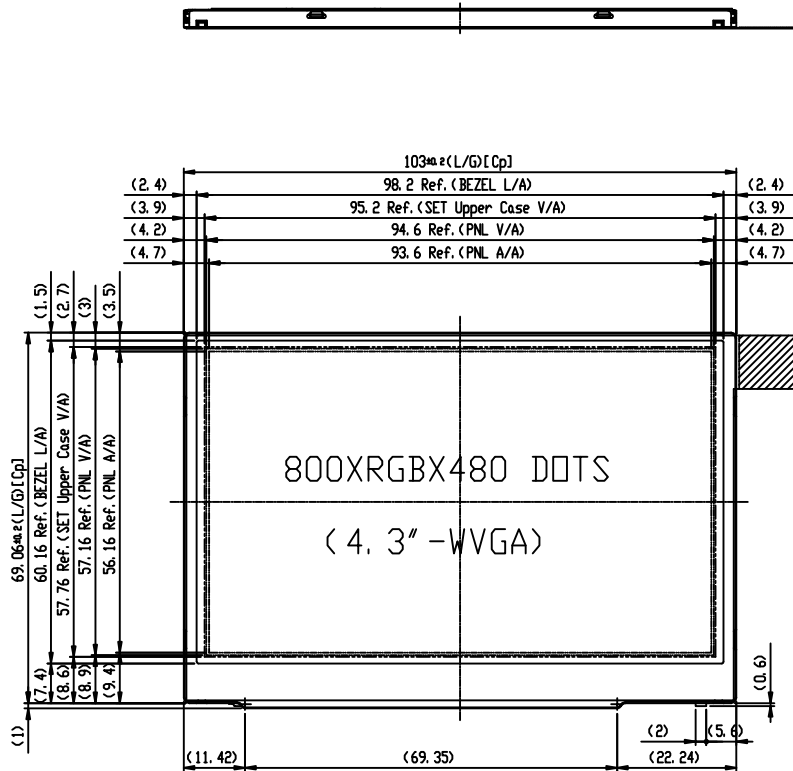◎ When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.
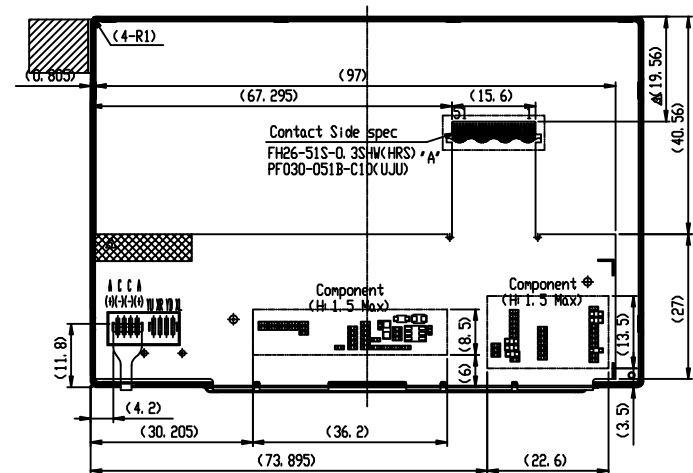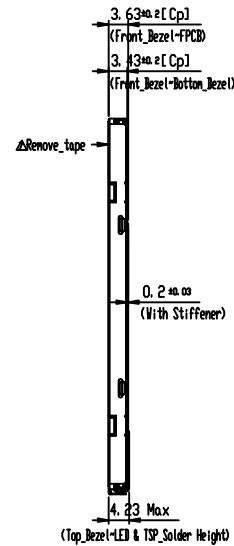
## 13. Dimensional Outline

**See the next page.**

DRAWING NO. UF-80I-011A

## PIN DESCRIPTION

| No | PIN NAME | No | PIN NAME |
|----|----------|----|----------|
| 1 | GND | 27 | D27 |
| 2 | VCC | 28 | SDI |
| 3 | VCC | 29 | SPCK |
| 4 | D0 | 30 | SPEN |
| 5 | D1 | 31 | RESETB |
| 6 | D2 | 32 | DE |
| 7 | D3 | 33 | HS |
| 8 | D4 | 34 | GND |
| 9 | D5 | 35 | CLK |
| 10 | D6 | 36 | VBAT |
| 11 | D7 | 37 | VBAT |
| 12 | D10 | 38 | VS |
| 13 | D11 | 39 | NC |
| 14 | D12 | 40 | LED1+ |
| 15 | D13 | 41 | LED1- |
| 16 | D14 | 42 | LED2+ |
| 17 | D15 | 43 | LED2- |
| 18 | D16 | 44 | XL |
| 19 | D17 | 45 | YD |
| 20 | D20 | 46 | XR |
| 21 | D21 | 47 | YU |
| 22 | D22 | 48 | NC |
| 23 | D23 | 49 | NC |
| 24 | D24 | 50 | NC |
| 25 | D25 | 51 | GND |
| 26 | D26 | | |

800XRGBX480 DOTS

( 4.3" -WVGA )

DETAIL "C" (S=2/1)

103±0.2(L/G)[Cp]
98.2 Ref.(BEZEL L/A)
95.2 Ref.(SET Upper Case V/A)
94.6 Ref.(PNL V/A)
93.6 Ref.(PNL A/A)

69.06±0.2(L/G)[Cp]
60.16 Ref.(BEZEL L/A)
57.76 Ref.(SET Upper Case V/A)
57.16 Ref.(PNL V/A)
56.16 Ref.(PNL A/A)

3.63±0.2[Cp] (Front_Bezel-FPCB)
3.43±0.2[Cp] (Front_Bezel-Bottom_Bezel)
Remove_tape
0.2±0.03 (With Stiffener)
4.23 Max (Top_Bezel-LED & TSP_Solder Height)

Contact Side spec
FH26-51S-0.3SHW(HRS) "A"
PF030-051B-C1X(UJU)

MAIN LCD DOTS DETAIL (S=N/S)
p: 0.117
w: 0.039
p: 0.117

## NOTE

1. ▨▨▨ GND
2. Critical Parameters are Denoted by the Symbol [Cp]

| REV | DATE | ECN NO. | REVISION DESCRIPTIONS |
|-----|------|---------|----------------------|
| ⚠ | 08.11.20 | LJ-R08xxxxxx | Changed the Remove Tape. |
| ⚠ | 08.10.17 | LJ-R08100070 | Changed the Rev.(Ref4.1 -> 4.2) |
| ⚠ | 08.06.10 | Y.B.LEE | Changed the GND Outline. |
| ⚠ | 08.04.04 | Y.B.LEE | Changed the Bezel Hook Outline. |
| ⚠ | 08.04.03 | Y.B.LEE | Changed the FPCB Outline. |

| | |
|---|---|
| DESIGNED | Y.B.LEE 08.11.20 |
| CHECKED | S.H.HA 08.11.20 |
| APPROVED | J.Y.SHIM 08.11.20 |
| PROJECTION | STD.TOL ±0.3 | DIM. mm | SCALE 1/1 | SIZE A3 |

DRAWING NO. UF-80I-011A
REFERENCE NO. 4.3" WVGA-STD (Without TSP)
SHEET 1/1

SAMSUNG MOBILE DISPLAY

**SAMSUNG**

**MOBILE DISPLAY**