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《新规　·　变更》
New　　Revision

# 产 品 规 格 书
# Product Specification

产品名
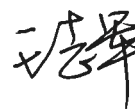Product　　　**TFT-LCD OPENCELL**

机种名
Model

| LC116LF3L |
|---|
| 03 |

| Customer's Approve | NCPD |
|---|---|
|  | Approved by Project Director :<br>Name :<br>Signature: |
|  | Reviewed by Project manager:<br>Name :<br>Signature: |
|  | Reviewed by Project Leader:<br>Name :<br>Signature: |

※ 本规格书由封面、附件等全 23 页构成。如果对该规格书有异议，请在下订单前提出。
※ This Product Specification have 23 pages including the coversheet and Appendices. Please negotiate the objection point before purchase order.

中电熊猫集团
南京中电熊猫平板显示科技有限公司
CEC PANDA GROUP
NANJING CEC PANDA FPD TECHNOLOGY CO., LTD.

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# RECORDS OF REVISION

Model No. : LC116LF1L01

| DATE | NO. | REVISED No. | PAGE | SUMMARY | NOTE |
|---|---|---|---|---|---|
| 2017/01/23 | - | Rev01 | 23 | First   Edition | 1st Version |
| 2017/05/10 | - | Rev02 | 3 | Increase Driving scheme | 2nd Version |
| 2017/05/19 - | - | Rev02 | 17 | Tr | 3rd Version |
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## 1.   Application

This specification applies to a color TFT-LCD open-cell, 11.6inch FHD

## 2. Overview

This module is a color active matrix LCD open-cell incorporating Oxide TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, a control circuit and power supply circuit. Graphics and texts can be displayed on a 1920×3×1080 dots panel with 16,777,216 colors by using eDP (Embedded Display Port)Ver1.2 interface and supplying +3.3V DC supply voltage for TFT-LCD panel driving.

In this TFT-LCD panel, color filters for excellent color performance is incorporated to realize brighter and clearer pictures, making this open-cell optimum for use in multi-media applications.

Optimum viewings are in all directions.

eDP Transfer rate Specification : eDP1.2 / 2.7Gbps / 2 lane

## 3. General specifications.

| Parameter | Specification | Unit | Note |
|---|---|---|---|
| Display size | 11.58 (Diagonal) | inch | |
| | 11.6 (Diagonal) | inch | |
| Active area | 256.32(H) ×144.18(V) | mm | |
| Pixel Format | 1920(H) ×1080(V) （1pixel = R + G + B dot） | pixel | |
| Pixel pitch | 0.1335(H) x 0.1335 (V) | mm | |
| Pixel configuration | R, G, B vertical stripe | - | |
| Display mode | Normally black | - | |
| Driving scheme | FFS,IGZO TFT Active Matrix | - | |
| Surface treatment of front polarizer | Anti-glare coating: (3H) | - | |

Outline dimensions

| Parameter | | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| Unit outline dimensions | Width | - | - | - | mm | [Note 3-1] |
| | Height | - | - | - | mm | [Note 3-1] |
| | Depth | - | - | - | mm | [Note 3-1] |
| Mass | | | 103.8 | | g | with protect films |

[Note 3-1]Outline dimensions is shown in 2D drawing of open cell (pic3) .

## 4. Input Terminals
### 4-1 Driving interface of PWB
CN1 (eDP signals，+3.3V DC power supply and B/L power supply)

| Pin No. | Symbol | I/O | Function | Remark |
|---|---|---|---|---|
| 1 | NC | - | Reserved for LCD | [Note4-1-1] |
| 2 | H_GND | P | High Speed Ground | |
| 3 | Lane1_N | I | Complement Signal Link Lane 1 | |
| 4 | Lane1_P | I | True Signal Link Lane 1 | |
| 5 | H_GND | P | High Speed Ground | |
| 6 | Lane0_N | I | Complement Signal Link Lane 0 | |
| 7 | Lane0_P | I | True Signal Link Lane 0 | |
| 8 | H_GND | P | High Speed Ground | |
| 9 | AUX_CH_P | I | True Signal Auxiliary Channel | |
| 10 | AUX_CH_N | I | Complement Signal Auxiliary Channel | |
| 11 | H_GND | P | High Speed Ground | |
| 12 | LCD_VDD | P | LCD logic and driver power(3.3V) | |
| 13 | LCD_VDD | P | LCD logic and driver power(3.3V) | |
| 14 | NC | I | Reserved for LCD manufacturer's use | [Note4-1-1] |
| 15 | LCD_GND | P | LCD logic and driver ground | |
| 16 | LCD_GND | P | LCD logic and driver ground | |
| 17 | HPD | O | HPD signal pin | [Note4-1-2] |
| 18 | BL_GND | P | Backlight ground | |
| 19 | BL_GND | P | Backlight ground | |
| 20 | BL_GND | P | Backlight ground | |
| 21 | BL_GND | P | Backlight ground | |
| 22 | BL_ENABLE | I | Backlight ON/OFF | [Note4-1-3] |
| 23 | BL_PWM_DIM | I | System PWM | [Note4-1-4] |
| 24 | NC | - | Reserved for LCD manufacturer's use | [Note4-1-1] |
| 25 | NC | - | Reserved for LCD manufacturer's use | [Note4-1-1] |
| 26 | BL_PWR | P | Backlight power | |
| 27 | BL_PWR | P | Backlight power | |
| 28 | BL_PWR | P | Backlight power | |
| 29 | BL_PWR | P | Backlight power | |
| 30 | NC | - | Reserved for LCD manufacturer's use | [Note4-1-1] |

*1 P: POWER I: Input O: Output

The shielding case is connected with signal GND

・Connector used :20455-030E-76 (I-PEX)

・Corresponding connector : 20453-030T (I-PEX)

(Panda is not responsible to its product quality, if the user applies a connector not corresponding to the above model.)
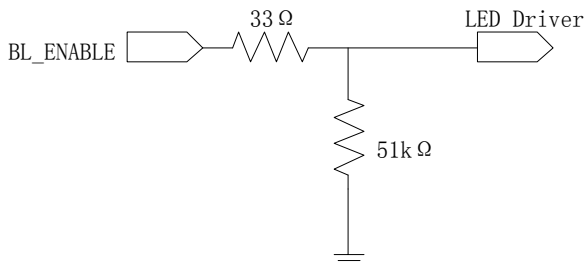
All terminals except NC terminal must be connected to input signal desicribed as above or supply voltage or GND each.

[Note 4-1-1] Do not input any signals or any powers into a NC pin. Keep the NC pin open.
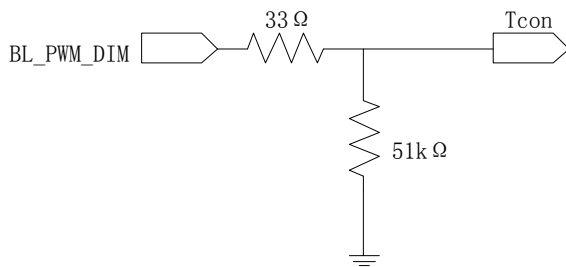
[Note 4-1-2] Output circuit is as below.
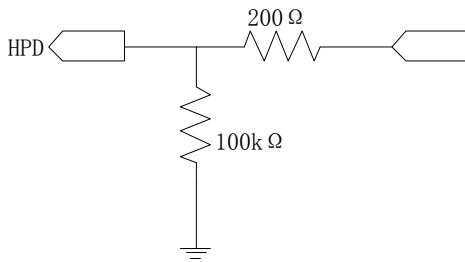


[Note 4-1-3]Input circuit is as below.



[Note 4-1-4]Input circuit is as below.



## 4-2.Backlight driving

The backlight system is an edge-lighting type with white-LED.

(It is usually required to measure under the following condition: Ta=25°C±2°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| Supply voltage | $V_{BL}$ | 10.0 | 12.0 | 21.0 | V | BL_PWR |
| Inrush Current | $Irush_{BL}$ | - | - | 1.0 | A | [Note 4-2-4] |
| Modulated light signal voltage | $V_{PWM}H$ | 1.85 | – | VDD | V | BL_PWM_DIM |
| | $V_{PWM}L$ | 0 | – | 0.7 | V | |
| Brightness Control Duty Ratio | Duty | 1 | – | 100 | % | [Note 4-2-1] |
| Brightness Control pulse width | $T_{PWM}$ | 5 | – | – | μs | [Note 4-2-2] |
| Brightness Control frequency | $f_{PWM}$ | 200 | – | 2,000 | Hz | |
| LED-BL ON/OFF High voltage | $V_{CNT}H$ | 1.8 | 3.3 | 3.6 | V | [Note 4-2-3] |
| LED-BL ON/OFF low voltage | $V_{CNT}L$ | 0 | – | 0.5 | V | [Note 4-2-3] |
| Input signal pin current | $I_{IN}$ | – | $V_{IN}/51kΩ$ | – | μA | BL_ENABLE BL_PWM_DIM |

[Note4-2-1] $V_{PWM}$ Input:100%=Max luminance    1%=Min luminance

[Note4-2-2] The minimum value of the dimming signal pulse width is assumed regulations of the width of high and the width of low

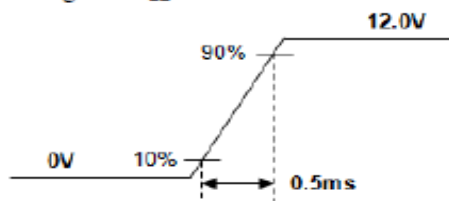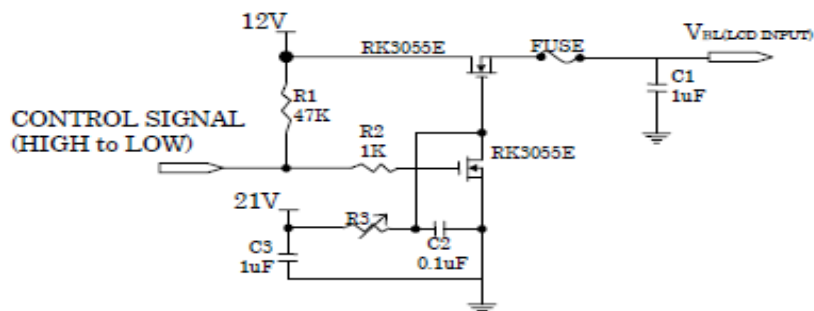[Note4-2-3]BL_ENABLE : High = BL turn on ,low or open =BL turn off

$V_{BL}$-dip conditions



Vmin : (7.0V)

Vth : (0.9$V_{BL}$)
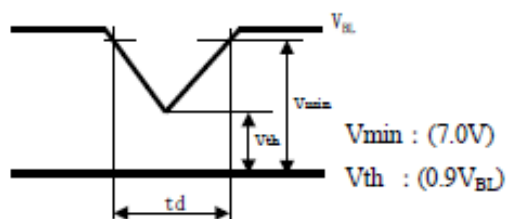
1) Vth $\leq$ $V_{BL}$ < Vmin : td $\leq$ 20ms
2) $V_{BL}$ < Vth : The condition of instantaneous voltage drop is apply to input voltage sequences

[Note4-2-4]

Rising time $V_{BL}$:



· Measurement condition :



LED light bar connector

| Pin No. | Symbol | I/O | Function | Remark |
|---------|--------|-----|----------|--------|
| 1 | A1 | P | LED+ supply | |
| 2 | A2 | P | LED+ supply | |
| 3 | A3 | P | LED+ supply | |
| 4 | A4 | P | LED+ supply | |
| 5 | NC | - | Reserved for LCD for manufacturer's use | [Note4-2-5] |
| 6 | LED-1 | P | LED- | [Note4-2-6] |
| 7 | LED-2 | P | LED- | [Note4-2-6] |
| 8 | LED-3 | P | LED- | [Note4-2-6] |
| 9 | LED-4 | P | LED- | [Note4-2-6] |
| 10 | LED-5 | P | LED- | [Note4-2-6] |

[Note 4-2-5] Don't input any signals or any powers into a NC pin. Keep the NC pin open.
・Connector used :20542-010E-01 (IPEX)
(Panda is not responsible to its product quality, if the user applies a connector not corresponding to the above model.)
[Note4-2-6] Each string is 20 mA, the total voltage is under 34V
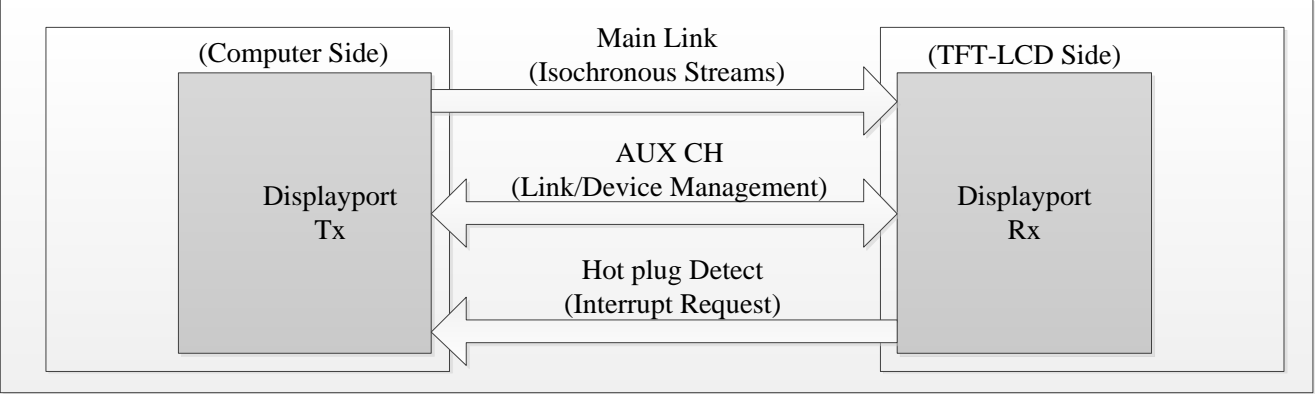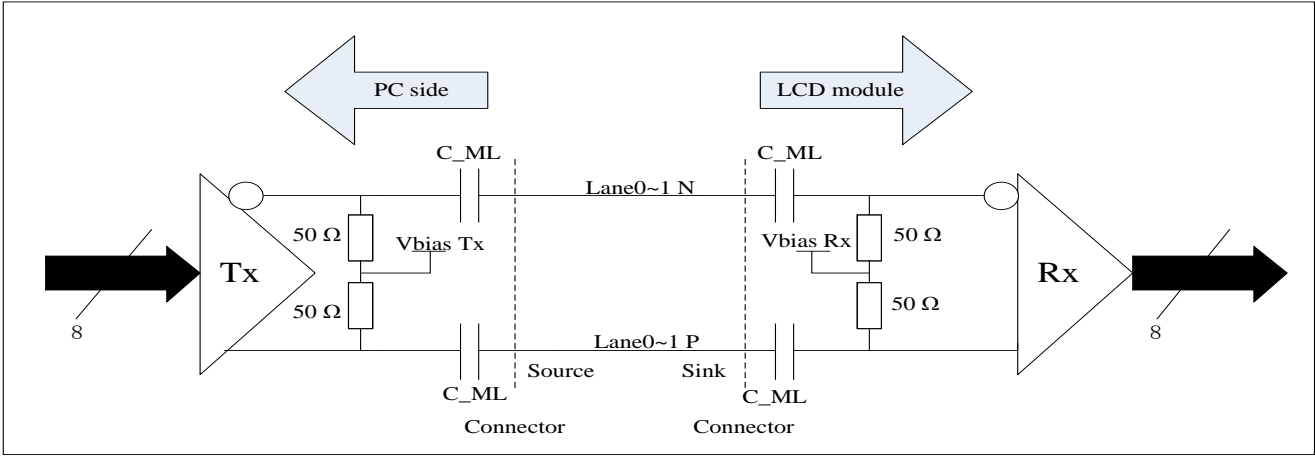
**4-3.eDP interface**

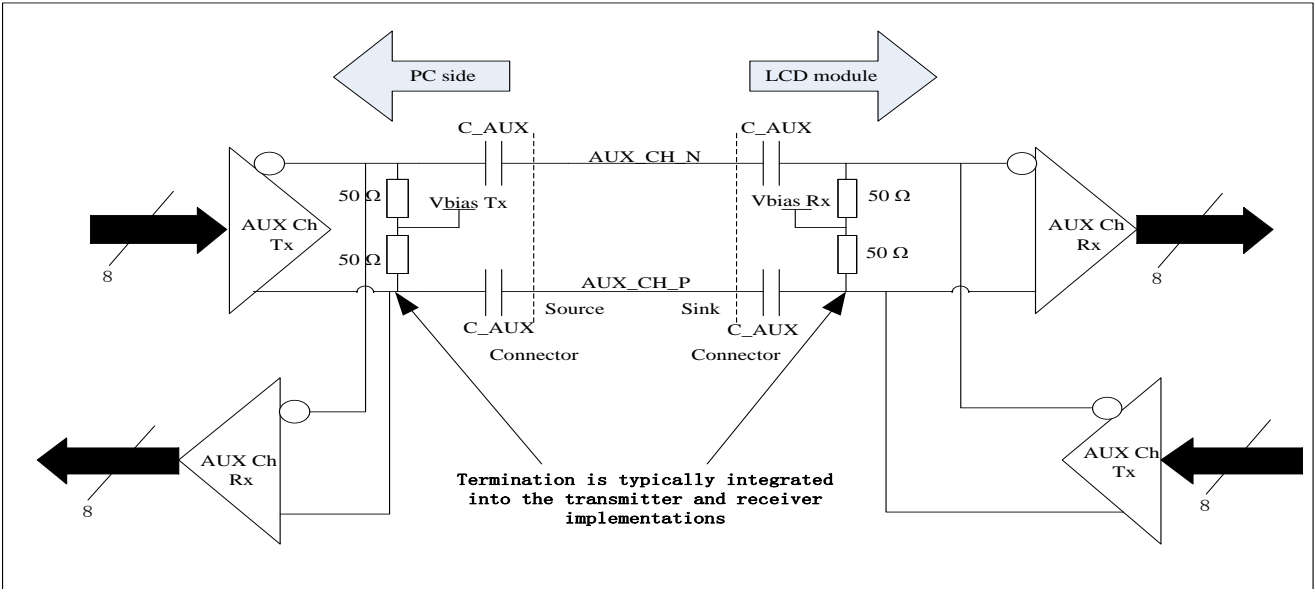Fig.4-2-1 DP architecture

Fig.4-2-2 Main Link differential pair

Termination is typically integrated
into the transmitter and receiver
implementations

Fig.4-2-3 AUX Link differential pair

| Lane0 | Lane1 |
|-------|-------|
| R0-7:0 | R1-7:0 |
| G0-7:0 | G1-7:0 |
| B0-7:0 | B1-7:0 |
| R2-7:0 | R3-7:0 |
| G2-7:0 | G3-7:0 |
| B2-7:0 | B3-7:0 |
| R4-7:0 | R5-7:0 |
| G4-7:0 | G5-7:0 |
| B4-7:0 | B5-7:0 |

Fig.4-2-4 eDP 2lane 8bit input data mapping

## 5.　Absolute Maximum Ratings

| Parameter | Symbol | Condition | Ratings | | Unit | Remark |
|-----------|--------|-----------|---------|---------|------|--------|
| | | | Min. | Max. | | |
| +3.3V supply voltage | VDD | Ta=25°C | -0.3 | +4.0 | V | |
| Backlight supply voltage | $V_{BL}$ | Ta=25°C | -0.3 | +26.5 | V | |
| Input voltage(eDP) | VI | Ta=25°C | -0.3 | +1.5 | V | [Note 5-1] |
| Storage temperature(ambient) | Tstg | - | -20 | +70 | °C | [Note 5-2] |
| Operation temperature(ambient) | Topa | - | -10 | +60 | °C | |

[Note 5-1] eDP signals

[Note 5-2] Humidity: 90%RH Max.at Ta≦+40°C.

　　　　　Maximum wet-bulb temperature at +39°C or less at Ta>+40°C,

　　　　　No condensation.
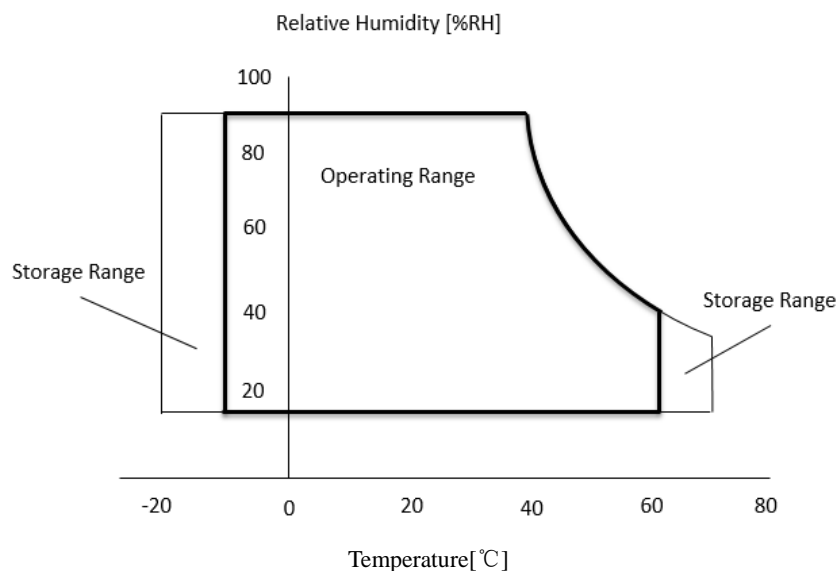
## 6. Electrical Characteristics

6-1. TFT-LCD panel driving

Ta＝+25℃

| DC Electrical Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
| +3.3V supply voltage | VDD | +3.0 | +3.3 | +3.6 | V | [Note 6-1-1] |
| Current dissipation | IDD | - | 212 | 364 | mA | [Note 6-1-2] |
| Inrush Current | Irush | - | - | 1.0 | A | [Note 6-1-3] |
| Permissible input ripple voltage | $V_{RP}$ | - | - | 100 | mVp-p | VDD=+3.3V |
| eDP HPD Signal Characteristics | | | | | | |
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
| HPD High level output voltage | $VOH_{HPD}$ | | VDD-0.1 | - | | |
| HPD Low level output voltage | $VOL_{HPD}$ | - | 0 | | | |
| eDP AUX Channel Characteristics | | | | | | |
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
| Unit Interval for AUX channel | $UI_{AUX}$ | 0.4 | 0.5 | 0.6 | µS | |
| Peak-to-peak voltage at TP1 | $V_{AUX-DIFF-pp}$ | 0.32 | - | 1.36 | V | |
| AUX DC Common mode Voltage | $V_{AUX-DC-CM}$ | 0 | - | 2.0 | V | |
| AUX Short current limit | $I_{AUX\_SHORT}$ | - | - | 90 | mA | |
| AUX CH termination Cresistor | $R_{AUX\_TERM}$ | - | 100 | - | Ω | Differential input |
| AUX AC coupling capacitor | $C_{AUX}$ | 75 | - | 200 | nF | |
| Number of pre-charge pulses | Pre-charge pulses | 10 | - | 16 | - | |
| eDP Main Link Receiver Characteristics | | | | | | |
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
| Link clock down spreading | Down_Spread_Amplitude | 0 | | 0.5 | % | |
| Differential Peak-to-peak Input Voltage at Rx package pins | $V_{RX-DIFFp-p}$ | 120 | - | 1200 | mV | |
| Differential Return Loss at 1.35GHz at Rx package pins | $RL_{RX-DIFF}$ | 9 | - | - | dB | |
| Differential termination resistance | $R_{RX-TERM}$ | - | 100 | - | Ω | |
| RX short circuit Current Limit | $I_{RX-SHORT}$ | - | - | 50 | mA | |
| Lane Intra-pair Skew at RX package pins | $T_{RX-SKEW-INTRA-PAIR-High-Bit-Rate}$ | - | - | 50 | ps | |

[Note 6-1-1] ON-OFF conditions for supply voltage
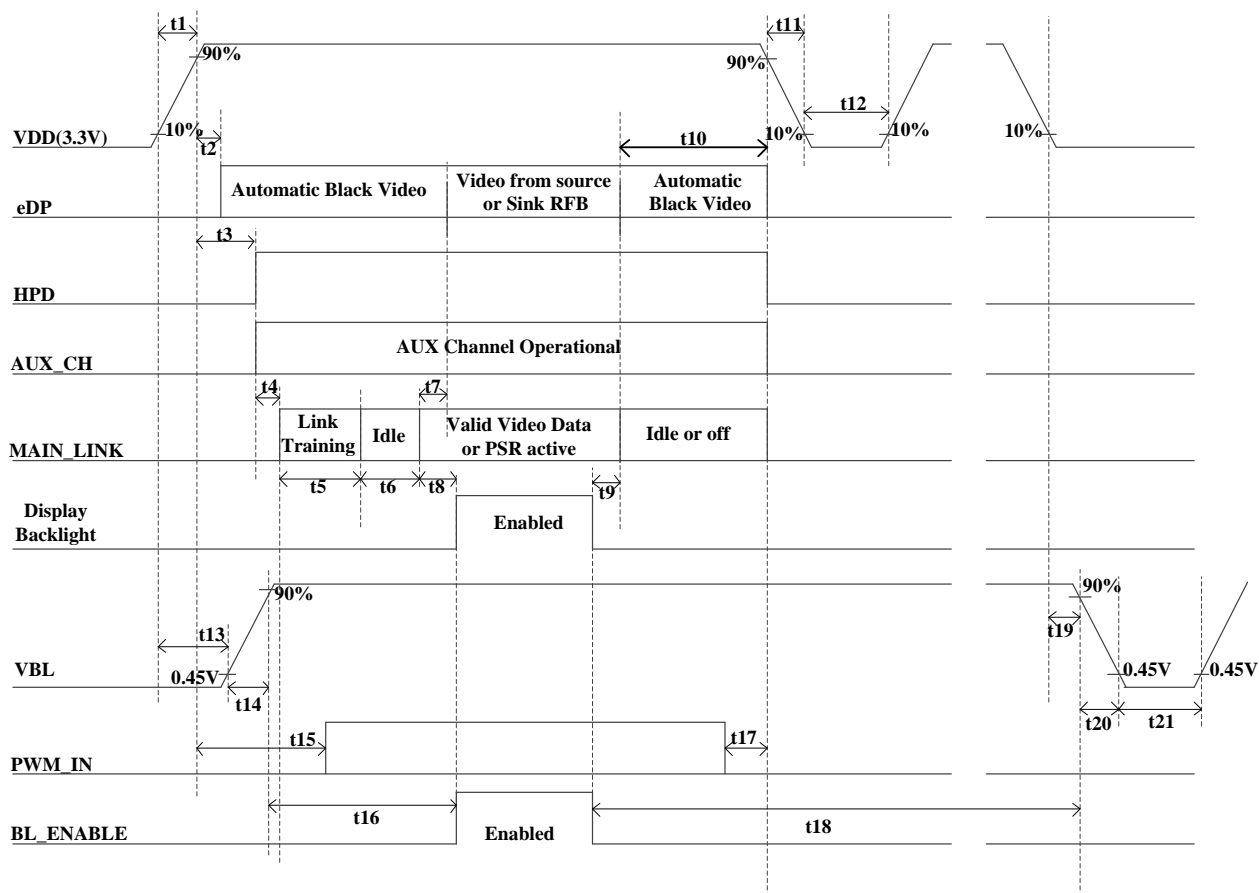
[Note] Do not keep the interface signal high-impedance or unusual signal when power is on.

| Symbol | Min | Max | Unit | Note |
|--------|-----|-----|------|------|
| t1 | 0.5 | 10 | ms | |
| t2 | 0 | 100 | ms | |
| t3 | 0 | 100 | ms | |
| t4 | - | - | ms | |
| t5 | - | - | ms | |
| t6 | - | - | ms | |
| t7 | 0 | 50 | ms | |
| t8 | | | ms | |
| t9 | | | ms | |
| t10 | 0 | 500 | ms | |
| t11 | 1 | 50 | ms | [Note1] |
| t12 | 500 | - | ms | |
| t13 | - | - | ms | |
| t14 | 0.5 | 10 | ms | |
| t15 | 100 | | ms | |
| t16 | - | - | ms | |
| t17 | 0 | - | ms | |
| t18 | - | - | ms | |
| t19 | - | - | ms | |
| t20 | 0.1 | - | ms | |
| t21 | 100 | | ms | |

[Note 1]As for the power off sequence for VDD (t11), be sure to keep above mentioned timing.

If the VDD power off sequence timing is other than shown above, LCD may cause permanent damage.
*1 : As for the power sequence for backlight, it is recommended to apply above mentioned input timing.
If the backlight is light on and off at a timing other than shown above, displaying image maybe getdisturbed.
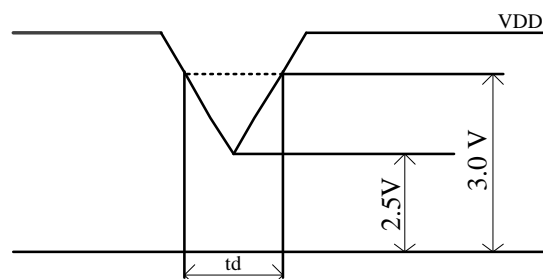
## VDD-dip-conditions

1) $2.5\ V \leqq VDD < 3.0\ V$

$td \leqq 10\ ms$

Under above condition, the display image should return to an appropriate figure after VDD voltage recovers.
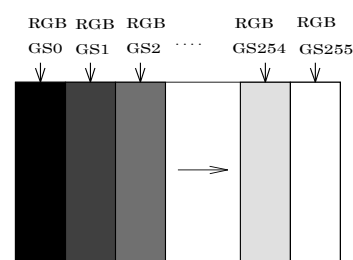
2) $VDD < 2.5\ V$

VDD-dip conditions should also follow the ON-OFF conditions for supply voltage.
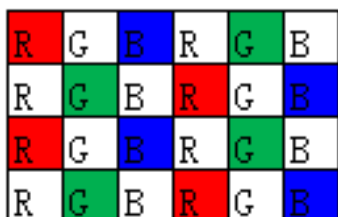


[Note 6-1-2]

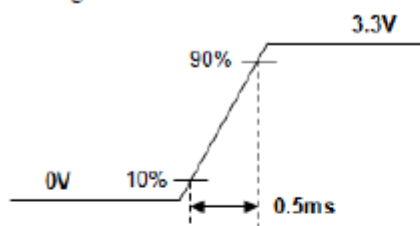Typical current condition: 16-gray-bar pattern.
$VDD = +3.3V$



Maximum current condition: Vertical stripe pattern.
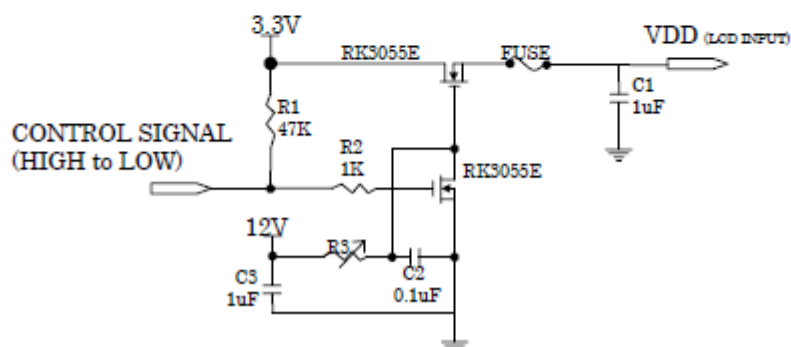$VDD = +3.3V$



[Note 6-1-3]

·Rising time VDD :



·measurement condition :

## 7. Timing characteristics of input signals
### 7-1.Timing Characteristics

**VDD=+3.0V~+3.6,Ta=-10°C~+60°C**

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|
| Clock | Frequency | 1/T$_C$ | – | 138.5 | – | MHz | [Note7-1-1] |
| Data enable signal | Horizontal period | TH | – | 2080 | – | clock | |
| | | | | 15.02 | | μs | |
| | Horizontal period (High) | THd | - | 1920 | - | clock | |
| | Vertical period | TV | – | 1111 | – | line | |
| | | | - | 16.685 | - | ms | |
| | Vertical period (High) | TVd | – | 1080 | – | line | |

[Note 7-1-1] In case of using the long vertical period, the deterioration of display quality, flicker, etc, may occur.
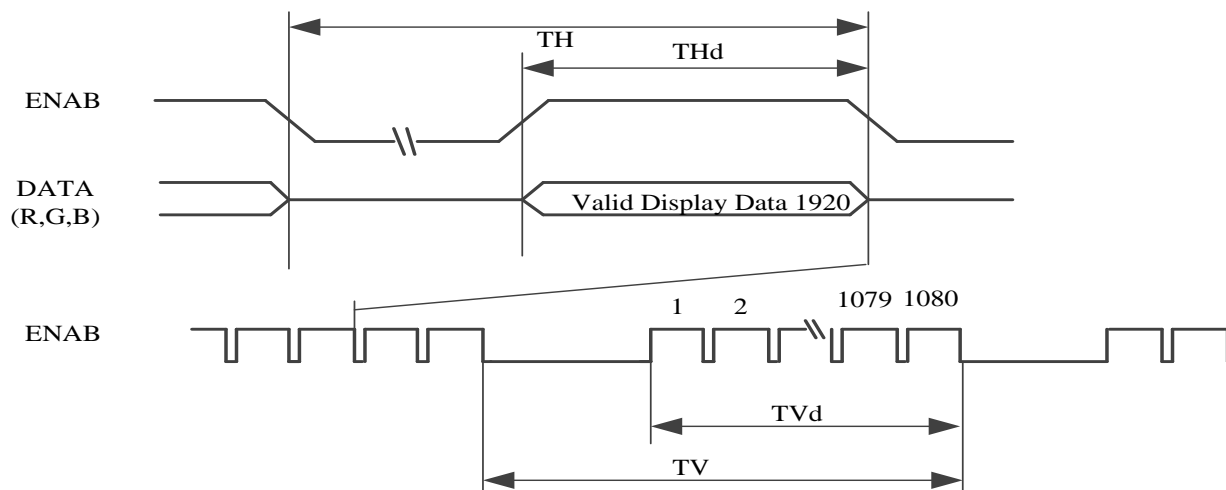


### 7-2. Input data signals and display position on the screen
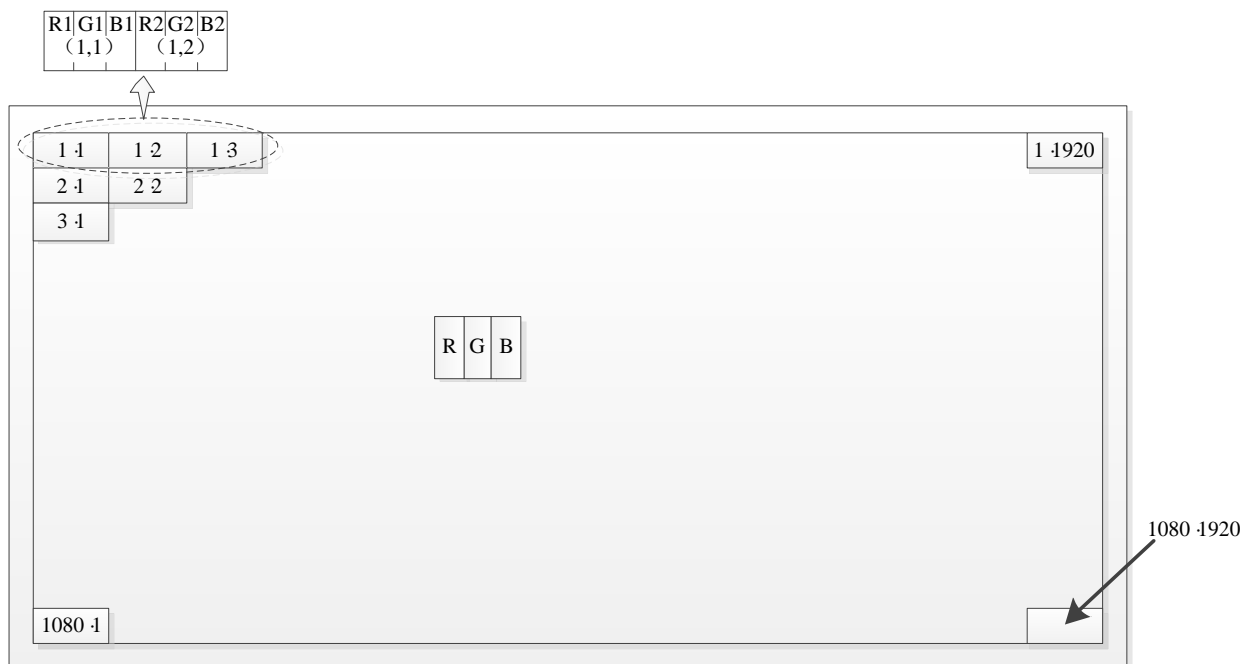


Display position of input data(V·H)

## 8. Input signal, basic display colors and gray scale of each color

| Colors & Gray Scale | | Gray Scale | R0 | R1 | R2 | R3 | R4 | R5 | R6 | R7 | G0 | G1 | G2 | G3 | G4 | G5 | G6 | G7 | B0 | B1 | B2 | B3 | B4 | B5 | B6 | B7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | LSB | | | | | | | MSB | LSB | | | | | | | MSB | LSB | | | | | | | MSB |
| 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 | GS0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ⇑ | GS1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | GS2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ⇑ | ↓ | | | ↓ | | | | | | | | | ↓ | | | | | | | | ↓ | | | | |
| | ⇓ | ↓ | | | ↓ | | | | | | | | | ↓ | | | | | | | | ↓ | | | | |
| | Brighter | GS253 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ⇓ | GS254 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red | GS255 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale of Green | Black | GS0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ⇑ | GS1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | GS2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ⇑ | ↓ | | | ↓ | | | | | | | | | ↓ | | | | | | | | ↓ | | | | |
| | ⇓ | ↓ | | | ↓ | | | | | | | | | ↓ | | | | | | | | ↓ | | | | |
| | Brighter | GS253 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ⇓ | GS254 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green | GS255 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale of Blue | Black | GS0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ⇑ | GS1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | GS2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ⇑ | ↓ | | | ↓ | | | | | | | | | ↓ | | | | | | | | ↓ | | | | |
| | ⇓ | ↓ | | | ↓ | | | | | | | | | ↓ | | | | | | | | ↓ | | | | |
| | Brighter | GS253 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| | ⇓ | GS254 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Blue | GS255 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

0: Low level voltage,     1: High level voltage.

Each basic color can be displayed in 256 gray scales from 8 bit data signals.
According to the combination of 24 bit data signals, the 16.7M color display can be achieved on the screen.

# PANDA

LC116LF3L03

## 9. EDID Specifications

9 - 1. EDID data structure

This is the EDID(Extended Display Identification Data) data formats to support displays as defined in the VESA Plug & Display.

| Byte (decimal) | Byte (hex) | Field Name and Comments | Value (hex) | Value (binary) |
|---|---|---|---|---|
| 0 | 00 | Header | 00 | 00000000 |
| 1 | 01 | Header | FF | 11111111 |
| 2 | 02 | Header | FF | 11111111 |
| 3 | 03 | Header | FF | 11111111 |
| 4 | 04 | Header | FF | 11111111 |
| 5 | 05 | Header | FF | 11111111 |
| 6 | 06 | Header | FF | 11111111 |
| 7 | 07 | Header | 00 | 00000000 |
| 8 | 08 | EISA manufacture code =NCP | 38 | 00111000 |
| 9 | 09 | EISA manufacture code (Compressed ASCII) | 70 | 01110000 |
| 10 | 0A | Product code (LM116LF3L03) | 00 | 00000000 |
| 11 | 0B | Product code (hex,LSB first) | 00 | 00000000 |
| 12 | 0C | LCD module Serial No (fixed "0") | 00 | 00000000 |
| 13 | 0D | LCD module Serial No (fixed "0") | 00 | 00000000 |
| 14 | 0E | LCD module Serial No (fixed "0") | 00 | 00000000 |
| 15 | 0F | LCD module Serial No (fixed "0") | 00 | 00000000 |
| 16 | 10 | Week of manufacture | 00 | 00000000 |
| 17 | 11 | Year of manufacture - 1990 (ex 2000 – 1990 = 10) 2015-1990 = 25 | 19 | 00011001 |
| 18 | 12 | EDID structure version # = 1 | 01 | 00000001 |
| 19 | 13 | EDID revision # = 4 | 04 | 00000100 |
| 20 | 14 | Video i/p definition = Digital 8bit DP support | A5 | 10100101 |
| 21 | 15 | Max H image size(cm) = 26cm | 1A | 00011101 |
| 22 | 16 | Max V image size(cm) = 15cm | 0F | 00010001 |
| 23 | 17 | Display gamma (2.2×100) – 100 = 120 | 78 | 01111000 |
| 24 | 18 | Feature support(stanby,suspend,RGB color/Prefer Time) | 06 | 00000110 |
| 25 | 19 | Red/Green Low bit(RxRy/GxGy) | DE | 11011110 |
| 26 | 1A | Blue/White Low bit(BxBy/WxWy) | 50 | 01010000 |
| 27 | 1B | Red X(Rx) (written value 0.64 ) | A3 | 10100011 |
| 28 | 1C | Red Y(Ry) (written value 0.33 ) | 54 | 01010100 |
| 29 | 1D | Green X(Gx) (written value 0.3 ) | 4C | 01001100 |
| 30 | 1E | Green Y(Gy) (written value 0.6 ) | 99 | 10011001 |
| 31 | 1F | Blue X(Bx) (written value 0.15 ) | 26 | 00100110 |
| 32 | 20 | Blue Y(By) (written value 0.06 ) | 0F | 00001111 |
| 33 | 21 | White X(Wx) (written value 0.313 ) | 50 | 01010000 |
| 34 | 22 | White Y(Wy) (written value 0.329 ) | 54 | 01010100 |
| 35 | 23 | Established timings 1 | 00 | 00000000 |
| 36 | 24 | Established timings 2 | 00 | 00000000 |
| 37 | 25 | Established timings 3(Manufacture's reserved timing) | 00 | 00000000 |
| 38 | 26 | Standard timing ID1 | 01 | 00000001 |
| 39 | 27 | Standard timing ID1 | 01 | 00000001 |
| 40 | 28 | Standard timing ID2 | 01 | 00000001 |

**PANDA**

| 41 | 29 | Standard timing ID2 | 01 | 00000001 |
|---|---|---|---|---|
| 42 | 2A | Standard timing ID3 | 01 | 00000001 |
| 43 | 2B | Standard timing ID3 | 01 | 00000001 |
| 44 | 2C | Standard timing ID4 | 01 | 00000001 |
| 45 | 2D | Standard timing ID4 | 01 | 00000001 |
| 46 | 2E | Standard timing ID5 | 01 | 00000001 |
| 47 | 2F | Standard timing ID5 | 01 | 00000001 |
| 48 | 30 | Standard timing ID6 | 01 | 00000001 |
| 49 | 31 | Standard timing ID6 | 01 | 00000001 |
| 50 | 32 | Standard timing ID7 | 01 | 00000001 |
| 51 | 33 | Standard timing ID7 | 01 | 00000001 |
| 52 | 34 | Standard timing ID8 | 01 | 00000001 |
| 53 | 35 | Standard timing ID8 | 01 | 00000001 |
| 54 | 36 | Detailed timing descriptor#1 fck/10000 (=138.5MHz/10000=13850=361Ah) | 1A | 00011010 |
| 55 | 37 | #1 fck | 36 | 00110110 |
| 56 | 38 | #1 Horizontal active 1920=780h 80h | 80 | 10000000 |
| 57 | 39 | #1 Horizontal blanking 160=0A0h A0h | A0 | 10100000 |
| 58 | 3A | #1 Horizontal active/Horizontal blanking 70h | 70 | 01110000 |
| 59 | 3B | #1 Vertical active 1080=438h 38h | 38 | 00111000 |
| 60 | 3C | #1 Vertical blanking 31=01Fh 1Fh | 1F | 00011111 |
| 61 | 3D | #1 Vertical active/Vertical blanking 40h | 40 | 01000000 |
| 62 | 3E | #1 Horizontal sync , offset(Thfp) 48=030h 30h | 30 | 00110000 |
| 63 | 3F | #1 Horizontal sync , width 32=020h 20h | 20 | 00100000 |
| 64 | 40 | #1 Vertical sync,offset / Vertical sync,width (offset=3h/width=5h) | 35 | 00110101 |
| 65 | 41 | #1 Horizontal sync offset/width/Vertical sync offset/width | 00 | 00000000 |
| 66 | 42 | #1 Horizontal image size 256.32 mm=100h 00h | 00 | 00000000 |
| 67 | 43 | #1 Vertical image size 144mm=090h 90h | 90 | 10010000 |
| 68 | 44 | #1 Horizontal image size / Vertical image size 10h | 10 | 00010000 |
| 69 | 45 | Horizontal boader | 00 | 00000000 |
| 70 | 46 | Vertical boader | 00 | 00000000 |
| 71 | 47 | Flags(Non-interlaced=0/non 3D=00/Degital separate=11/Horizontal polarity/Vertical polarity=00) | 18 | 00011000 |
| 72 | 48 | Detailed timing descriptor#1 fck/10000 (=110.92224MHz/10000=11092.224=2B54h) | 54 | 01010100 |
| 73 | 49 | #2fck | 2B | 00101011 |
| 74 | 4A | #2 Horizontal active 1920=780h 80h | 80 | 10000000 |
| 75 | 4B | #2 Horizontal blanking 160=0A0h A0h | A0 | 10100000 |
| 76 | 4C | #2 Horizontal active/Horizontal blanking 70h | 70 | 01110000 |
| 77 | 4D | #2 Vertical active 1080=438h 38h | 38 | 00111000 |
| 78 | 4E | #2 Vertical blanking 31=01Fh 1Fh | 1F | 00011111 |
| 79 | 4F | #2 Vertical active/Vertical blanking 40h | 40 | 01000000 |
| 80 | 50 | #2 Horizontal sync , offset(Thfp) 48=030h 30h | 30 | 00110000 |
| 81 | 51 | #2 Horizontal sync , width 32=020h 20h | 20 | 00100000 |
| 82 | 52 | #2 Vertical sync, offset / Vertical sync, width (offset=3h/width=5h) | 35 | 00110101 |
| 83 | 53 | #2 Horizontal sync offset/width/Vertical sync offset/width | 00 | 00000000 |
| 84 | 54 | #2 Horizontal image size 256.32mm=100h 00h | 00 | 00000000 |
| 85 | 55 | #2 Vertical image size 144mm=090h 90h | 90 | 10010000 |

| 86 | 56 | #2 Horizontal image size / Vertical image size 10h | 10 | 00010000 |
|---|---|---|---|---|
| 87 | 57 | Horizontal boader | 00 | 00000000 |
| 88 | 58 | Vertical boader | 00 | 00000000 |
| 89 | 59 | Flags(Non-interlaced=0/non 3D=00/Degital separate=11/Horizontal polarity/Vertical polarity=00) | 18 | 00011000 |
| 90 | 5A | Detailed timing descriptor #3 | 00 | 00000000 |
| 91 | 5B | Flag | 00 | 00000000 |
| 92 | 5C | Reserved | 00 | 00000000 |
| 93 | 5D | Dummy Descriptor | 10 | 00010000 |
| 94 | 5E | Flag | 00 | 00000000 |
| 95 | 5F | 1st Dummy | 00 | 00000000 |
| 96 | 60 | 2nd Dummy | 00 | 00000000 |
| 97 | 61 | 3rd Dummy | 00 | 00000000 |
| 98 | 62 | 4th Dummy | 00 | 00000000 |
| 99 | 63 | 5th Dummy | 00 | 00000000 |
| 100 | 64 | 6th Dummy | 00 | 00000000 |
| 101 | 65 | 7th Dummy | 00 | 00000000 |
| 102 | 66 | 8th Dummy | 00 | 00000000 |
| 103 | 67 | 9th Dummy | 00 | 00000000 |
| 104 | 68 | 10th Dummy | 00 | 00000000 |
| 105 | 69 | 11th Dummy | 00 | 00000000 |
| 106 | 6A | New line character #3 indicates end | 00 | 00000000 |
| 107 | 6B | Padding with "blank" character | 00 | 00000000 |
| 108 | 6C | Detailed timing descriptor #4 | 00 | 00000000 |
| 109 | 6D | Flag | 00 | 00000000 |
| 110 | 6E | Reserved | 00 | 00000000 |
| 111 | 6F | Display Product name | FC | 11111100 |
| 112 | 70 | Flag | 00 | 00000000 |
| 113 | 71 | Supplier P/N#1 (L) | 4C | 01001100 |
| 114 | 72 | Supplier P/N#2 (C) | 43 | 01000011 |
| 115 | 73 | Supplier P/N#3 (1) | 31 | 00110001 |
| 116 | 74 | Supplier P/N#4 (1) | 31 | 00110011 |
| 117 | 75 | Supplier P/N#5 (6) | 36 | 00110011 |
| 118 | 76 | Supplier P/N#6 (L) | 4C | 01001100 |
| 119 | 77 | Supplier P/N#7 (F) | 46 | 01000110 |
| 120 | 78 | Supplier P/N#8 (3) | 31 | 00110100 |
| 121 | 79 | Supplier P/N#9 (L) | 4C | 01001100 |
| 122 | 7A | Supplier P/N#10 (0) | 30 | 00110000 |
| 123 | 7B | Supplier P/N#11 (3) | 31 | 00110001 |
| 124 | 7C | Supplier P/N#12 ("space") | 0A | 00001010 |
| 125 | 7D | (If<13 char, then terminate with ASCII code 0Ah,set remaining char 20h) | 20 | 00100000 |
| 126 | 7E | Extension flag | 00 | 00000000 |
| 127 | 7F | Checksum | 9D | 00100000 |

## 10. Optical characteristics

Ta=25°C

| Parameter | | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| Viewing angle range | Horizontal | θ21 θ22 | CR＞10 | 80 | 89 | - | Deg. | [Note10-1,10-3,10-4,10-6] |
| | Vertical | θ11 | | 80 | 89 | - | Deg. | |
| | | θ12 | | 80 | 89 | | Deg. | |
| Contrast ratio | | CR | | 700 | 1000 | - | - | [Note10-2,10-4,10-6] |
| Transmittance | | Tr | | 3.85 | 4.1 | | % | [Note 10-8] |
| Response time | | $\tau_r + \tau_d$ | | - | 25 | - | ms | [Note10-1,10-5,10-6] |
| Chromaticity of white | | x | $\theta$=0 deg. | 0.283 | 0.313 | 0.343 | - | [Note 10-2,10-6] Normal operation (PWM Duty=100%) |
| | | y | | 0.299 | 0.329 | 0.359 | - | |
| Chromaticity of red | | x | | - | 0.640 | - | - | |
| | | y | | - | 0.330 | - | - | |
| Chromaticity of green | | x | | - | 0.300 | - | - | |
| | | y | | - | 0.600 | - | - | |
| Chromaticity of blue | | x | | - | 0.150 | - | - | |
| | | y | | - | 0.060 | - | - | |
| NTSC ratio | | % | | - | 72 | - | - | |
| Luminance of white | | $Y_{LI}$ | | - | - | - | cd/m² | |
| White uniformity 13pt | | δw | $\theta$=0 deg. | - | - | - | - | [Note 10-2,10-7] |

※These values are measured with NCPD back light unit.
※The measurement shall be taken 30 minutes after lighting the module at the following rating.
※Condition: PWM Duty = 100%
※The optical characteristics shall be measured in a dark room or equivalent.

[Note 10-1] Measurement of viewing angle rangeand Response time. [Note 10-2] Measurement of luminance and Chromaticity and Contrast.
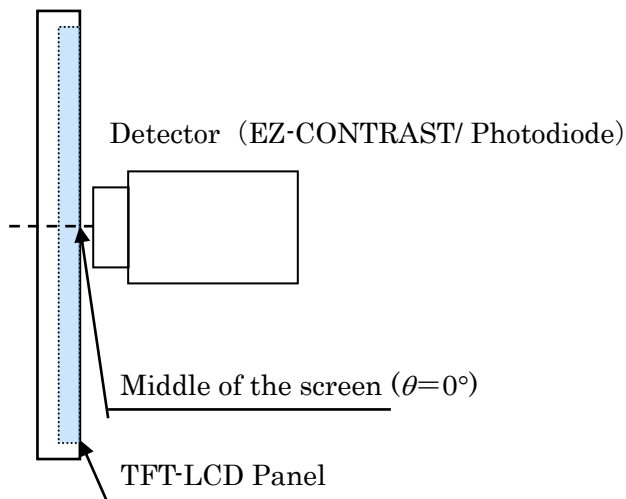


Fig.10-1 Measurement of Viewing angle range
   and Response time.
    (Viewing angle range: EZ-CONTRAST,
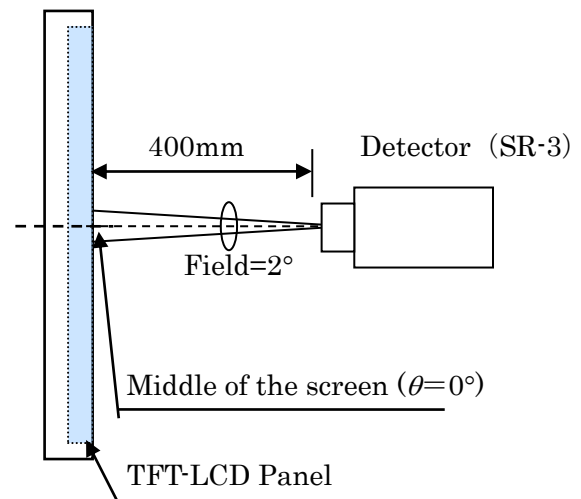    Response time: Photodiode)



Fig10-2 Measurement of Contrast, Luminance,
   Chromaticity, White variation, Crosstalk
   And Color temperature variation.

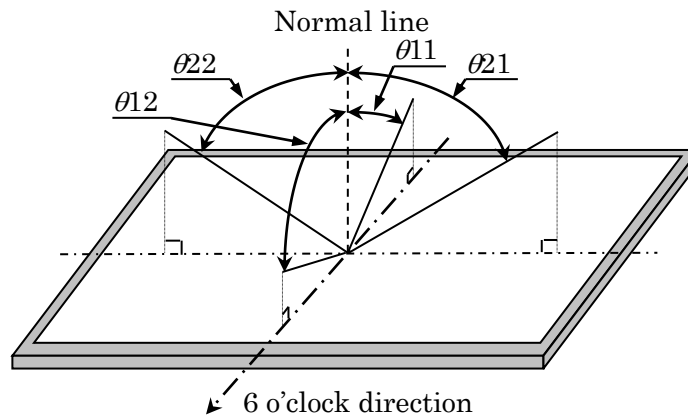[Note 10-3]Definitions of viewing angle range:



Fig.9-3 Viewing angle

[Note 10-4]Definition of contrast ratio:

The contrast ratio is defined as the following.

$$\text{Contrast Ratio} = \frac{\text{Luminance(Brightness) with all pixels white}}{\text{Luminance(Brightness) with all pixels Black}}$$

[Note 10-5]Definition of response time:

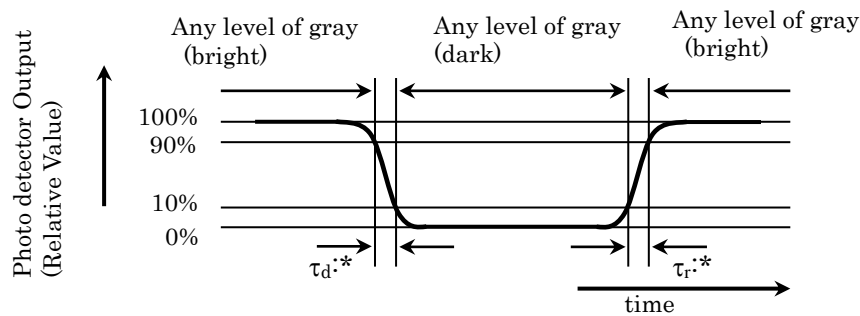The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white" .



Fig.10-4 Response time

[Note 10-6] This shall be measured at center of the screen.

[Note 10-7]Definition of white uniformity:

White uniformity is defined as the following with 13 measurements(A～M).

$$\delta_W = \frac{\text{Maximum Luminance of 13 Points(Brightness)}}{\text{Minimum Luminance of 13 Points(Brightness)}}$$
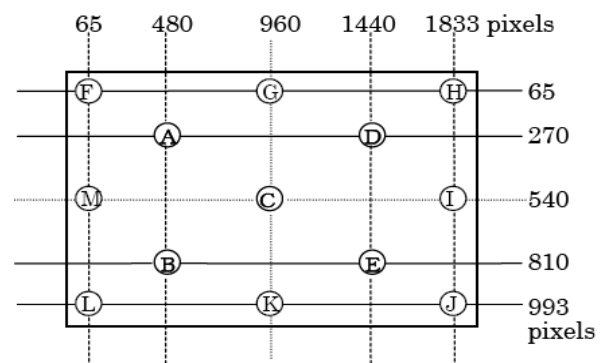


[Note 10-8] Light source here is the BLU of NCPD

**11. Display Quality**

    The display quality of the color TFT-LCD open-cell shall be in compliance with the Incoming Inspection Standard.

**12. Handling Precautions**

a)   Be sure to turn off the power supply when inserting or disconnecting the cable.
Please insert for too much stress not to join a connector in the case of insertion of a connector.

b)   Be sure to design the cabinet so that the open-cell can be installed without any extra stress such as warp or twist.

c)   Since the front polarizer is easily damaged, pay attention not to scratch it.

d)   Wipe off water drop immediately. Long contact with water may cause discoloration or spots.

e)   When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

f)   Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.

g)   Since CMOS LSI is used in this open-cell, take care of static electricity and injure the human earth when handling. Observe all other precautionary requirements in handling components.

h)   This open-cell has its circuitry PCBs on the side and should be handled carefully in order not to be stressed.

i)   Laminate film is attached to the open-cell surface to prevent it from being scratched. Peel the laminate film off slowly just before the use with strict attention to electrostatic charges. Ionized air shall be blown over during the action. Blow off the 'dust' on the polarizer by using an ionized nitrogen gun, etc. Working under the following environments is desirable.
  ・All workers wear conductive shoes, conductive clothes, conductive fingerstalls and grounding belts without fail.
  ・Use Ionized blower for electrostatic removal, and peel of the laminate film with a constant speed. (Peeling of it at over 2 seconds)

j)   The polarizer surface on the panel is treated with Anti-Glare . In case of attaching protective board over the LCD, be careful about the optical interface fringe etc. which degrades display quality.

k)   Do not expose the LCD open-cell to a direct sunlight, for a long period of time to protect the open-cell from the ultra violet ray.

l)   When handling LCD open-cells and assembling them into cabinets, please be noted that long-term storage in the environment of oxidization or deoxidization gas and the use of such materials as reagent, solvent, adhesive, resin, etc. which generate these gasses, may cause corrosion and discoloration of the LCD open-cells.

m)   Liquid crystal contained in the panel may leak if the LCD is broken. Rinse it as soon as possible if it gets inside your eye or mouth by mistake.

n)   Disassembling the open-cell can cause permanent damage and should be strictly avoided.
Please don't remove the fixed tape, insulating tape etc that was pasted on the original open-cell.
(Except for protection film of the panel.)

o)   Be careful when using it for long time with fixed pattern display as it may cause afterimage.
(Please use a screen saver etc., in order to avoid an afterimage.)

p)   If a minute particle enters in the open-cell and adheres to an optical material, it may cause display non-uniformity issue, etc. Therefore, fine-pitch filters have to be installed to cooling and inhalation hole if you intend to install a fan.

q)   Epoxy resin (amine series curing agent), silicone adhesive material (dealcoholization series and oxime series),
tray forming agent (azo compound) etc, in the cabinet or the packing materials may induce abnormal display with polarizer film deterioration regardless of contact or noncontact to polarizer film.
Be sure to confirm the component of them.

r)   Do not use polychloroprene. If you use it, there is some possibility of generating $Cl_2$ gas that influences the reliability of the connection between LCD panel and driver IC.

s)   Do not put a laminate film on LCD open-cell, after peeling of the original one. If you put on it, it may cause discoloration or spots because of the occurrence of air gaps between the polarizer and the film.

t)   Ground open-cell bezel to stabilize against EMI and external noise

u)   When you peel off the protection film
-Be sure to peel off slowly(recommended more than 5sec) and constant speed
-Peeling direction shows the following Figure
-Be sure to ground person with adequate methods such as the anti-static wrist band.
-Be sure to ground all terminals of the PWB connector while peeling of the protection film.
-Ionized air should be blown over during peeling action.

-The protection film must not touch driver-ICs,PWB and all components on PWB.
-If adhesive may remain on the polarizer after the protection film peeling off ,please remove with isopropyl-alcohol.
Front view
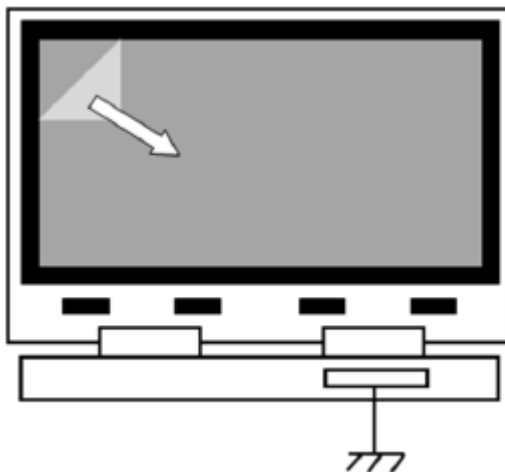


v)  Caution for when bending FPC
    (1)  Not to apply force at connection part (both panel side and PCB side)
    (2)  Not to fold tightly
    (3)  Please make sure to push a part where is no components on ,when sticking PCB on the back of production, Also, please make sure not to break other components by nail
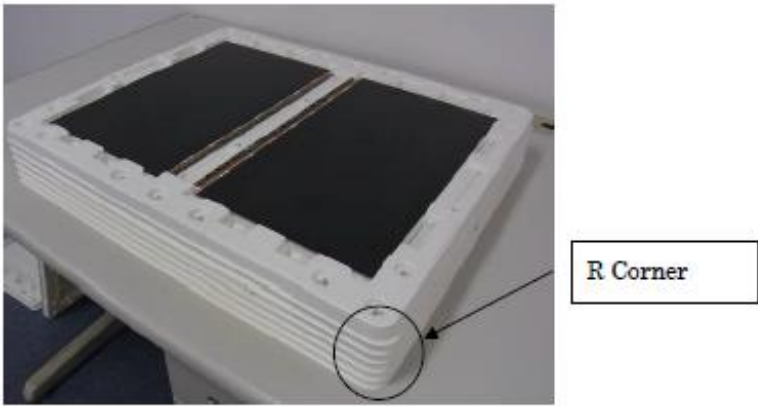
w)  Precautions for Handling Tray
    (1)  Hold center of short side of tray with both hands when handling one or more trays.
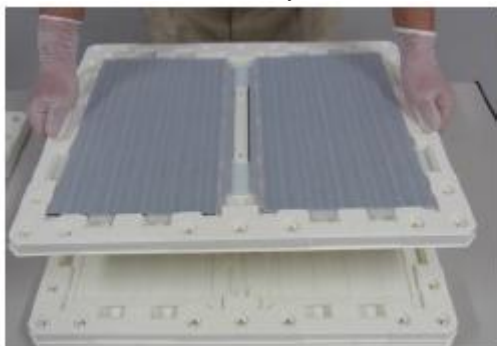


       Caution: Do not handle with only one hand.



    (2)  Always place tray on flat surface.
    (3)  When stacking trays, please align same shape comer of each tray.
       One comer is R comer.(Ref.Pic.1)
    (4)  Maximum stacking quantity is the number of trays inside one box.

Pic. 1

13. Packaging Condition
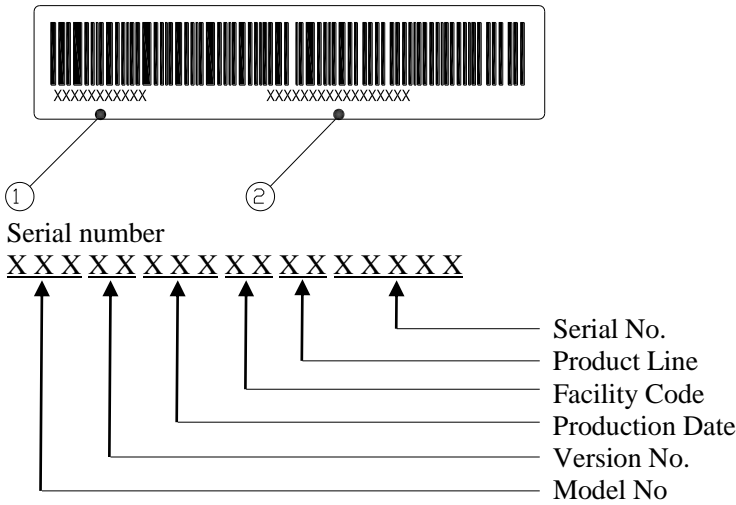
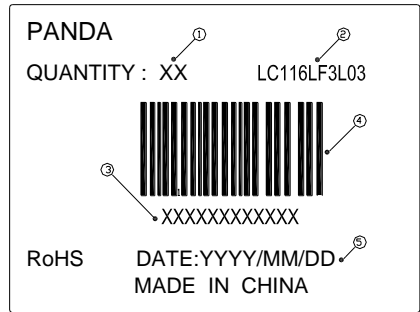| Piling number of cartons | 6 |
|---|---|
| Package quantity in one carton | 40PCS |
| Carton size | 530(L)* 365(W)*233(H) |
| Total mass of one carton filled with full modules | 8.6kg |
| Packing form | Pic2 |
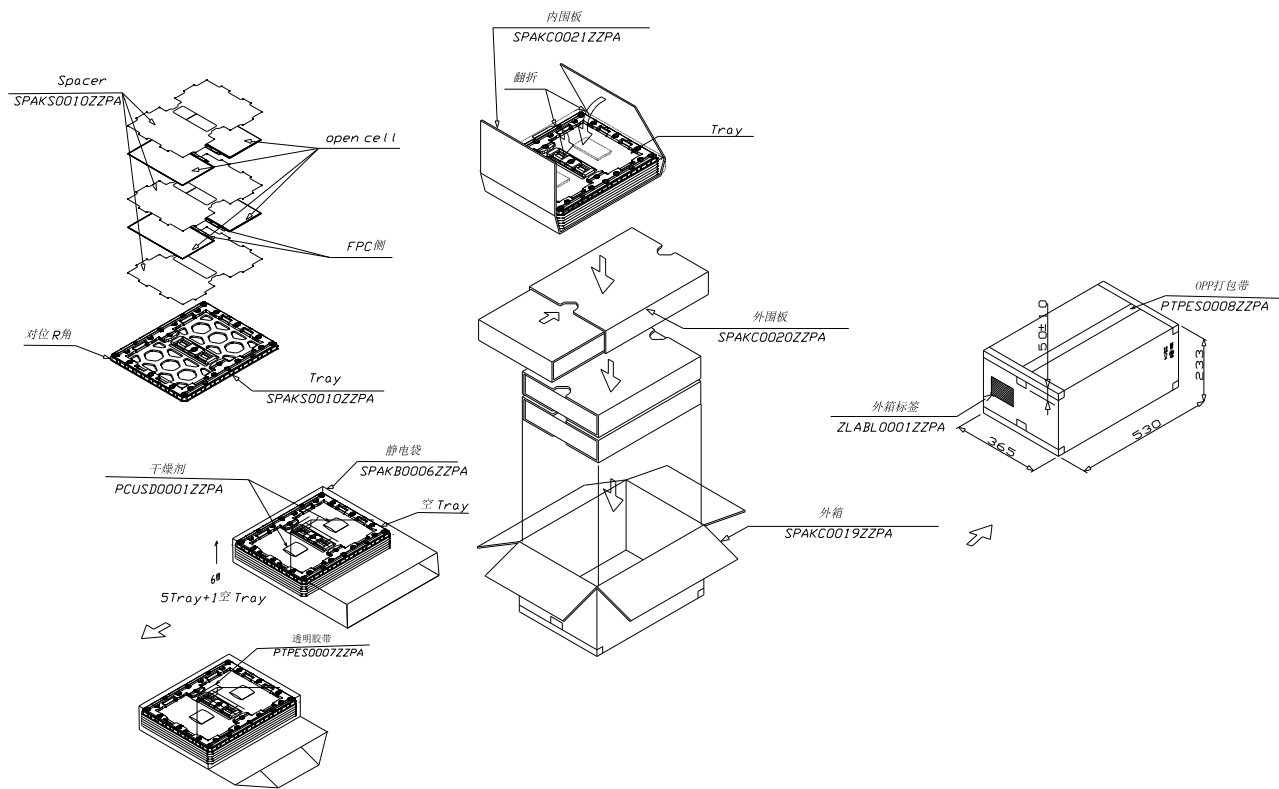


PIC2

14. Label
    1）Open-cell Bar code label：
        ① Model No.
        ② Barcode (Serial number)



Serial number
X X X XX X X X X X X X X X X X X

- Serial No.
- Product Line
- Facility Code
- Production Date
- Version No.
- Model No

    2）Packing bar code label
      ①Quantity(40pcs/Carton)
      ②Model No.
      ③Serial number
      ④Barcode (Serial number).
      ⑤Date.



PANDA
QUANTITY : XX      LC116LF3L03
XXXXXXXXXXX
RoHS     DATE:YYYY/MM/DD
MADE IN CHINA

15. RoHS Directive
   This LCD open-cell is compliant with RoHS Directive.

16. Reliability Test Items

| No. | Test Item | Conditions |
|---|---|---|
| 1 | High temperature storage test | Ta=60℃    240h |
| 2 | Low temperature storage test | Ta=-20℃    240h |
| 3 | High temperature & high humidity operation test | Ta=40℃90%RH   240h (No condensation) |
| 4 | High temperature operation test | Ta=50℃    240h |
| 5 | Low temperature operation test | Ta=0℃    240h |

[Result Evaluation Criteria] Under the display quality test condition with normal operation state.
    Do not change these condition as such changes may affect practical display function.
[Normal operation state] temperature：＋15~＋35℃，Humidity：45~75%，Atmospheric pressure：86~106kPa

261.62[TFT Glass]
130.81[TFT Glass]
259.32[CF Polarizer]
129.66[CF Polarizer]
256.32[Active Area]

1.5

Shield Grounding

Active Center

155.3[TFT Glass]
131.12[CF Glass]
47.18[CF Polarizer]
144.18[Active Area]
80.39[TFT Glass]
76.21[CF Glass]
73.59[CF Polarizer]
4-7.24[S-Drv.]
4-1.06[S-Drv.]

(166.22)

96.12[S-Drv.]    96.12[S-Drv.]
32.04[S-Drv.]    32.04[S-Drv.]
4-24.94[S-Drv.]

81.81[PWB]
91.3[PWB]

11.04
1.5

2-35
63.41[FPC]    63.41[FPC]
94.5[PWB]    94.5[PWB]

Detail A

1.06
0.12[CF Polarizer]    0.12[TFT Polarizer]
0.4[CF Glass]    0.4[TFT Glass]
0.2[S-Drv.]
0.8[PWB厚度]

Detail A
Scale 5:1

258.72[TFT Polarizer]
129.36[TFT Polarizer]

Active Center

146.94[TFT Polarizer]
73.47[TFT Polarizer]
84.74[CN1]
84.76[CN2]
36[CN1]
86.39[CN2]

PIN 1

CN2 插入方向
CN1 插入方向

CN1: 20455-030E-76(IPEX)

CN2: 20542-010E-01(IPEX)

PIC 3