**MODEL NO. : G1145OA102GF-001**

**ISSUED DATE: 2015-12-21**

**VERSION : A0**

**■Preliminary Specification**

**□Final Product Specification**

**Customer :**_____

| Approved by | Notes |
|---|---|
| | |

**GVO Confirmed :**

| Prepared by | Checked by | Approved by |
|---|---|---|
| 黄赛博 | 文敏 | 魏朝刚 |

This technical specification is subjected to change without notice.

# Table of Contents

# Record of Revision

| Rev | Issue Date | Description | Editor |
|---|---|---|---|
| A0 | 2015-12-16 | Draft | Huang Saibo |
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# 1 General Specifications

| Feature | | Spec | Remark |
|---|---|---|---|
| Display Spec | Screen Size (inch) | 1.45 | |
| | Display Mode | AMOLED | |
| | Resolution(dot) | 272 (W) x RGB x 340(H) | |
| | Active Area(mm) | 23.01 (W)×28.76 (H) | |
| | Pixel Pitch (um) | 84.6 (W) x 84.6 (H) | |
| | Pixel Configuration | V-Style2 | |
| | Technology Type | LTPS | |
| | Color Depth | 16.7M | |
| | Interface | 3-Wire Dual SPI | |
| | Surface Treatment | Hard Coating | |
| Mechanical Characteristics | With TP/Without TP | With TP(on Cell) | |
| | Module Outline Dimension(W x H x D) (mm) | 26.01(W)x33.77(H) x 1.193(D) | Without metal frame |
| | Weight (g) | TBD | |
| Electronic | Driver IC | RM67160 | |
| | TP IC | FT3207 | |

Note 1: Requirements on Environmental Protection: RoHS.

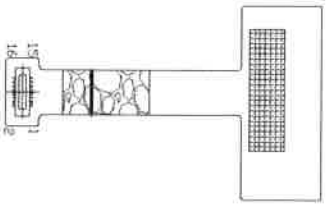
# 2 Input/output Terminals

## 2.1 Main FPC Pin Assignment-AMOLED Panel Input / Output Signal Interface

FPC connector: ASE6H1610 (ASSEM)

Main board recommended connector: ASE5S1610 (ASSEM)

| No | Symbol | I/O | Description |
|---|---|---|---|
| 1 | ELVSS | Power | AMOLED negative power supply |
| 2 | ELVDD | Power | AMOLED positive power supply |
| 3 | GND | GND | Ground |
| 4 | GND | GND | Ground |
| 5 | TE | I | VSYNC(vertical sync)signal output from panel to avoid tearing effect |
| 6 | OTP | Power | 7.5 V, OTP function Pin. Leave this pin OPEN if it is not used. |
| 7 | SWIRE | O | Setting DC/DC Power IC ELVDD & ELVSS output voltage. |
| 8 | VDDIO | Power | Power supply for display logic circuit |
| 9 | VCI | Power | Driver analog power supply |
| 10 | RESX | I | Device reset signal(0:Enable;1:Disable) |
| 11 | GND | GND | Ground |
| 12 | DCX | I | Data or command select |
| 13 | CSX | I | Select chip |
| 14 | SDI_RDX | I | Data input lane |
| 15 | WRX_SCL | I | Clock signal |
| 16 | SDO | O | Data output lane |



Pin layout of B-to-B contact pads

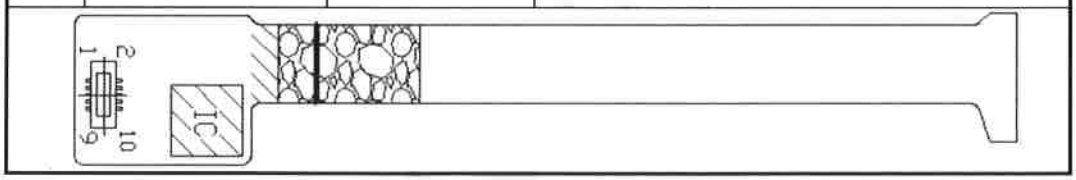
Note: I=Input; O=Output; P=Power; I/O=Input / Output

## 2.2 TP FPC Pin Assignment-On-cell TP Input / Output Signal Interface

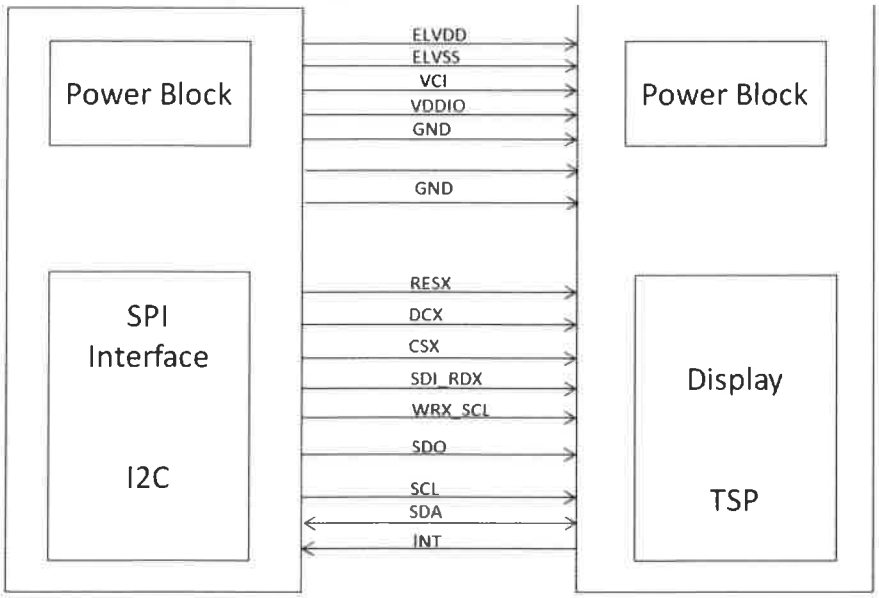
FPC connector: ASE6H1010 (ASSEM)

Main board recommended connector: ASE5S1010 (ASSEM)

| No | Symbol | I/O | Description |
|---|---|---|---|
| 1 | VCC | Power | TP power supply input. |
| 2 | RSTN | I | Touch panel reset. |
| 3 | NC | NC | Not Connected |
| 4 | GND | GND | Ground |
| 5 | NC | NC | Not Connected |
| 6 | SCL | I/O | Touch panel I2C clock. |
| 7 | NC | NC | Not Connected |
| 8 | SDA | I/O | Touch panel I2C data. |
| 9 | INT | O | Touch panel interrupt output. |
| 10 | GND | GND | Ground |




## 2.3 System BD and Display Module Interface Conflagration



# 3 Absolute Maximum Ratings

## 3.1 Driving AMOLED Panel

Maximum Ratings (Voltage Referenced to VSS) Vss=0V, Ta=25℃

| Item | Symbol | MIN | MAX | Unit | Remark |
|---|---|---|---|---|---|
| Input Voltage | VCI | -0.3 | +5.5 | V | |
| Digital Power supply | VDDIO | -0.3 | +5.5 | V | |
| Positive Power Input | ELVDD | - | +5.0 | V | |
| Negative Power Input | ELVSS | -5.0 | - | V | |

Note: Functional operation should satisfy the limits in the Electrical Characteristics tables or Pin Description section. If the module exceeds the absolute maximum ratings, permanent damage may occur. Besides, if the module is operated with the absolute maximum ratings for a long time, the reliability may also drop.

# 4 Electrical Characteristics

## 4.1 Driving AMOLED Panel

Ta=25℃

| Item | | Symbol | MIN | TYP | MAX | Unit | Remark |
|---|---|---|---|---|---|---|---|
| Input Digital Supply Voltage | | VDDIO | 1.65 | 1.80 | 3.30 | V | Note1 |
| Analog Supply Voltage | | VCI | 2.70 | 2.80 | 3.60 | V | |
| ELVDD Supply Voltage | | ELVDD | 4.55 | 4.60 | 4.65 | V | |
| ELVSS Supply Voltage | | ELVSS | -3.06 | -3.00 | -2.94 | V | |
| Input Signal Voltage | High Level | VIH | 0.80*VDDIO | - | VDDIO | V | |
| | Low Level | VIL | 0.00 | - | 0.20*VDDIO | V | |
| Output Signal Voltage | High Level | VOH | 0.80*VDDIO | - | VDDIO | V | |
| | Low Level | VOL | 0.00 | - | 0.20*VDDIO | V | |

Note1: The input digital voltage is the I/O reference voltage.

Note2: VDDIO usually ranges from 1.65V to 1.95 V. If VDDIO is changed, the remaining voltage needs to be changed to the same voltage as VDDIO.

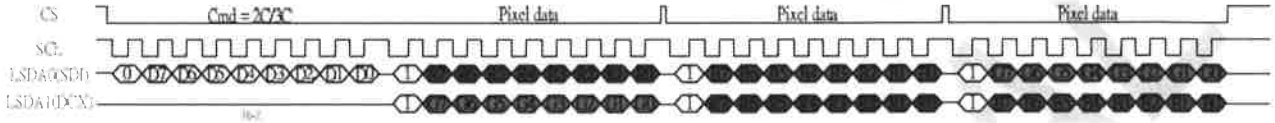
4.2 Current Consumption

| Item | | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| Panel Power | | $P_{NL}$ | ELVDD=4.6V | - | TBD | TBD | mW | Note1 |
| | | $I_{NL}$ | ELVSS= -3V | - | TBD | TBD | mA | Note1 |
| IC | Normal | $I_{VCI}$ | VCI=2.8V | - | TBD | - | mA | - |
| | | $I_{IOVCC}$ | VDDIO=1.8V | - | TBD | - | mA | - |
| | Stand-by | $I_{VCI}$ | VCI=V | - | 0.8 | - | uA | - |
| | | $I_{IOVCC}$ | VDDIO=V | - | 0.4 | - | uA | - |

Note1: Based on L255 (350nits) full white pattern.

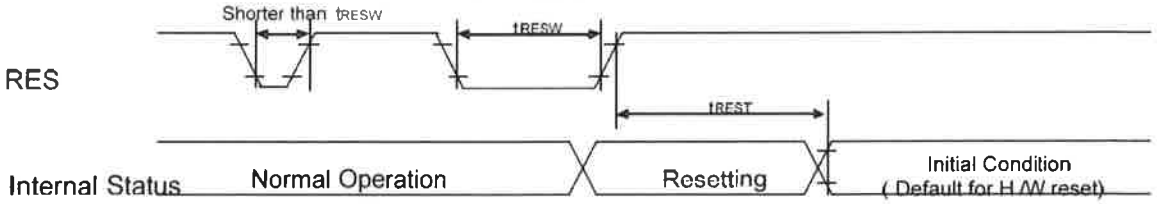
# 5 AC Characteristics

## 5.1 3-Wire Dual SPI Interface Characteristics




## 5.2 Display RESET Timing Characteristics

Reset input timing:




VDDIO=1.65 to 3.3V, VDD=2.7 to 3.6V, AGND=DGND=0V, Ta=-40 to 85℃

Timing Parameters

| Symbol | Parameter | Related Pins | MIN | TYP | MAX | Note | Unit |
|---|---|---|---|---|---|---|---|
| $t_{RESW}$ | *1) Reset low pulse width | RESX | 10 | - | - | - | μs |
| $t_{REST}$ | *2) Reset complete time | - | - | - | 5 | When reset applied during Sleep in mode | ms |
| | | - | | - | 120 | When reset applied during Sleep out mode | ms |

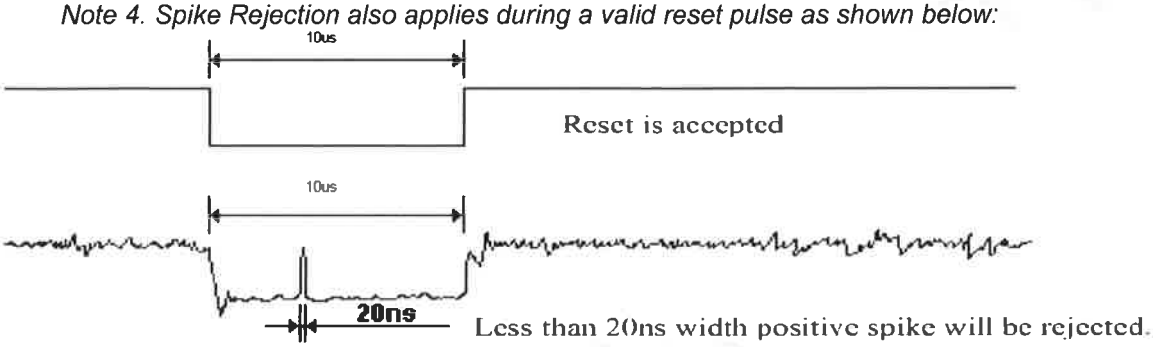
*Note 1. Spike caused by an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.*

| RESX Pulse | Action |
|---|---|
| Shorter than 5μs | Reset Rejected |
| Longer than 10μs | Reset |
| Between 5μs and 10μs | Reset starts<br>(It depends on voltage and temperature condition.) |

*Note 2. During the resetting period, the display will be blank (The display is entering blanking sequence, whose maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains blank in Sleep In –mode) and then return to Default condition for H/W reset.*

*Note 3. During Reset Complete Time, data in OTP will be latched to internal register during this period. This loading is done every time when there is H/W reset complete time (tREST) within 5ms after a rising edge of RESX.*

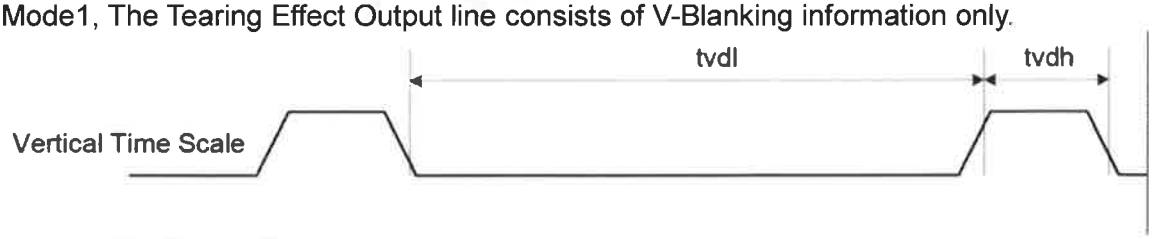
*Note 4. Spike Rejection also applies during a valid reset pulse as shown below:*




*Note 5. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.*

## 5.3 TE Timing Characteristics

Mode1, The Tearing Effect Output line consists of V-Blanking information only.

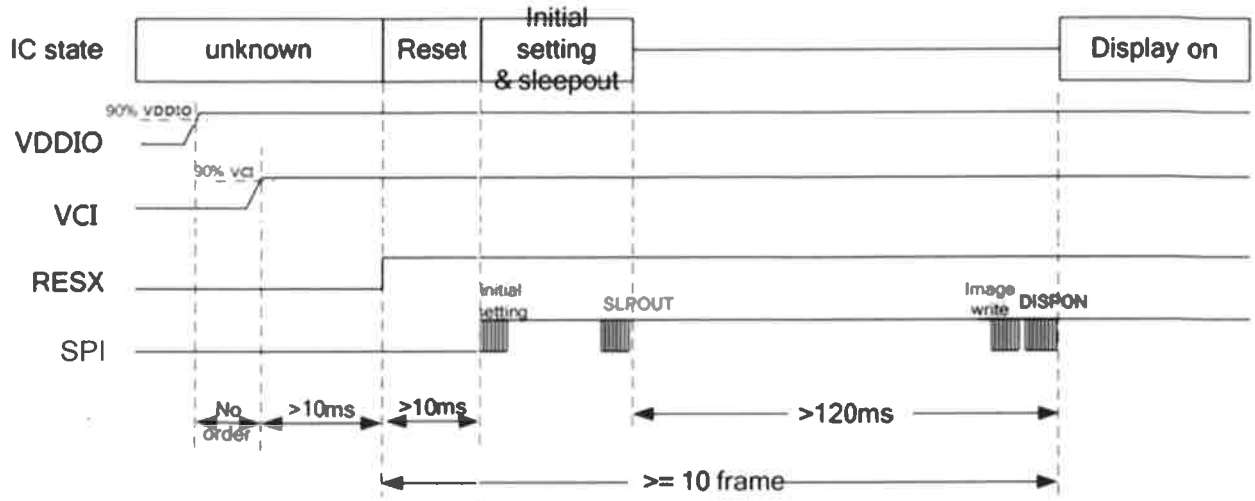



Tvdh = The LCD display is not updated from the frame memory.
Tvdl = The LCD display is updated from the frame memory.

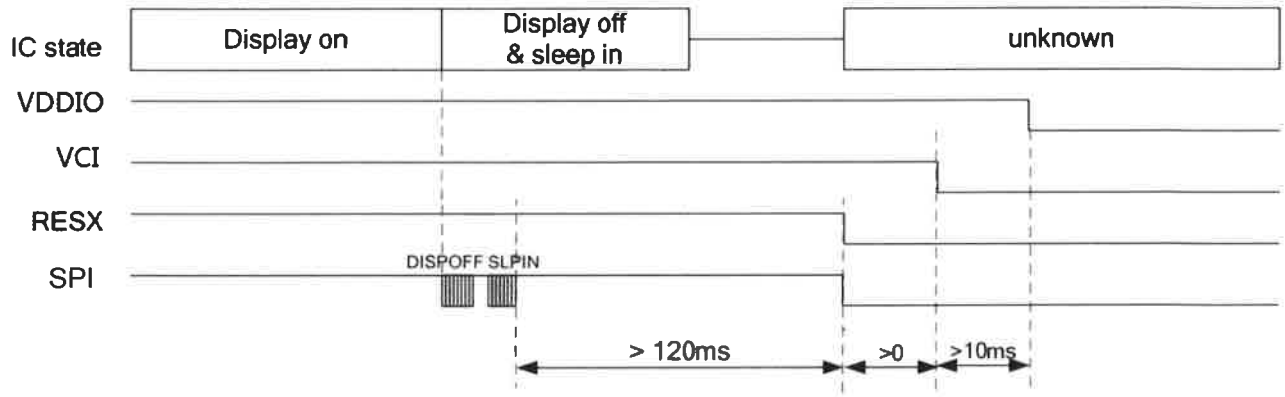
# 6 Recommended Operating Sequence

## 6.1 Display Power on / off Sequence

### 6.1.1 Power On Sequence




### 6.1.2 Power Off Sequence



## 6.2 Display Initial code

| step | Instruction/ Parameter | Delay times | R/W | address | | data |
|---|---|---|---|---|---|---|
| | | | | spi | others | |
| 1 | IC frame rate control | | w | 0xFE | 0xFE40 | 0x01 |
| | | | | 0x05 | 0x0540 | 0x40 |
| | | | | 0x06 | 0x0640 | 0x55 |
| | | | | 0x10 | 0x1040 | 0x71 |
| | | | | 0x0E | 0x0E40 | 0x80 |
| | | | | 0x19 | 0x1940 | 0x55 |
| | | | | 0x18 | 0x1840 | 0x88 |
| | | | | 0x1A | 0x1A40 | 0x10 |
| | | | | 0x1C | 0x1C40 | 0x77 |
| | | | | 0x23 | 0x2340 | 0x21 |
| | | | | 0x21 | 0x2140 | 0x40 |
| | | | | 0x22 | 0x2240 | 0xb7 |
| | | | | 0x25 | 0x2540 | 0x05 |
| | | | | 0x26 | 0x2640 | 0xFC |
| | | | | 0x70 | 0x7040 | 0xFF |
| 2 | VSR Command | | w | 0xFE | 0xFE70 | 0x04 |
| | | | | 0x5D | 0x5D70 | 0x10 |
| | | | | 0x5A | 0x5A70 | 0xFF |
| 3 | VSR1 Timing Set | | w | 0xFE | 0xFE70 | 0x04 |
| | | | | 0x00 | 0x0070 | 0xCC |
| | | | | 0x01 | 0x0170 | 0x00 |
| | | | | 0x02 | 0x0270 | 0x02 |
| | | | | 0x03 | 0x0370 | 0x00 |
| | | | | 0x04 | 0x0470 | 0xA8 |
| | | | | 0x05 | 0x0570 | 0x01 |
| | | | | 0x06 | 0x0670 | 0x8E |
| | | | | 0x07 | 0x0770 | 0xFC |
| | | | | 0x08 | 0x0870 | 0x02 |
| 4 | VSR2 Timing Set | | w | 0xFE | 0xFE70 | 0x04 |
| | | | | 0x09 | 0x0970 | 0xCC |
| | | | | 0x0A | 0x0A70 | 0x00 |
| | | | | 0x0B | 0x0B70 | 0x04 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | 0x0C | 0x0C70 | 0x00 |
| | | | | 0x0D | 0x0D70 | 0x80 |
| | | | | 0x0E | 0x0E70 | 0x02 |
| | | | | 0x0F | 0x0F70 | 0x01 |
| | | | | 0x10 | 0x1070 | 0x00 |
| | | | | 0x11 | 0x1170 | 0x02 |
| 5 | VSR3 Timing Set | | w | 0xFE | 0xFE70 | 0x04 |
| | | | | 0x12 | 0x1270 | 0x8C |
| | | | | 0x13 | 0x1370 | 0x00 |
| | | | | 0x14 | 0x1470 | 0x02 |
| | | | | 0x15 | 0x1570 | 0x01 |
| | | | | 0x16 | 0x1670 | 0x08 |
| | | | | 0x17 | 0x1770 | 0x00 |
| | | | | 0x18 | 0x1870 | 0x8E |
| | | | | 0x19 | 0x1970 | 0x36 |
| | | | | 0x1A | 0x1A70 | 0x02 |
| 6 | VSR4 Timing Set | | w | 0xFE | 0xFE70 | 0x04 |
| | | | | 0x1B | 0x1B70 | 0xCC |
| | | | | 0x1C | 0x1C70 | 0x00 |
| | | | | 0x1D | 0x1D70 | 0x02 |
| | | | | 0x1E | 0x1E70 | 0x00 |
| | | | | 0x1F | 0x1F70 | 0x08 |
| | | | | 0x20 | 0x2070 | 0x00 |
| | | | | 0x21 | 0x2170 | 0x8E |
| | | | | 0x22 | 0x2270 | 0x00 |
| | | | | 0x23 | 0x2370 | 0x02 |
| 7 | VSR5 Timing Set | | w | 0xFE | 0xFE70 | 0x04 |
| | | | | 0x24 | 0x2470 | 0xCC |
| | | | | 0x25 | 0x2570 | 0x00 |
| | | | | 0x26 | 0x2670 | 0x02 |
| | | | | 0x27 | 0x2770 | 0x00 |
| | | | | 0x28 | 0x2870 | 0x08 |
| | | | | 0x29 | 0x2970 | 0x01 |
| | | | | 0x2A | 0x2A70 | 0x8E |
| | | | | 0x2B | 0x2B70 | 0x42 |
| | | | | 0x2D | 0x2D70 | 0x02 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | VSR6 Timing Set | | w | 0xFE | 0xFE70 | 0x04 |
| | | | | 0x2F | 0x2F70 | 0x8C |
| | | | | 0x30 | 0x3070 | 0x00 |
| | | | | 0x31 | 0x3170 | 0x01 |
| | | | | 0x32 | 0x3270 | 0x03 |
| | | | | 0x33 | 0x3370 | 0x00 |
| | | | | 0x34 | 0x3470 | 0x00 |
| | | | | 0x35 | 0x3570 | 0x01 |
| | | | | 0x36 | 0x3670 | 0x43 |
| | | | | 0x37 | 0x3770 | 0x02 |
| 9 | VSR7 Timing Set | | w | 0xFE | 0xFE70 | 0x04 |
| | | | | 0x38 | 0x3870 | 0xCC |
| | | | | 0x39 | 0x3970 | 0x00 |
| | | | | 0x3A | 0x3A70 | 0x02 |
| | | | | 0x3B | 0x3B70 | 0x00 |
| | | | | 0x3D | 0x3D70 | 0x20 |
| | | | | 0x3F | 0x3F70 | 0x01 |
| | | | | 0x40 | 0x4070 | 0xA4 |
| | | | | 0x41 | 0x4170 | 0x57 |
| | | | | 0x42 | 0x4270 | 0x02 |
| 10 | VSR8 Timing Set | | w | 0xFE | 0xFE70 | 0x04 |
| | | | | 0x43 | 0x4370 | 0xCC |
| | | | | 0x44 | 0x4470 | 0x00 |
| | | | | 0x45 | 0x4570 | 0x04 |
| | | | | 0x46 | 0x4670 | 0x00 |
| | | | | 0x47 | 0x4770 | 0x00 |
| | | | | 0x48 | 0x4870 | 0x00 |
| | | | | 0x49 | 0x4970 | 0x01 |
| | | | | 0x4A | 0x4A70 | 0x00 |
| | | | | 0x4B | 0x4B70 | 0x02 |
| 11 | VSR Timing Set | | w | 0xFE | 0xFE70 | 0x04 |
| | | | | 0x4C | 0x4C70 | 0x88 |
| | | | | 0x4D | 0x4D70 | 0x00 |
| | | | | 0x4E | 0x4E70 | 0x01 |
| | | | | 0x4F | 0x4F70 | 0x08 |
| | | | | 0x50 | 0x5070 | 0x01 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | 0x51 | 0x5170 | 0x8E |
| | | | | 0x52 | 0x5270 | 0x36 |
| 12 | Mux SWitch Timing command | | w | 0xFE | 0xFE40 | 0x01 |
| | | | | 0x3A | 0x3A40 | 0x00 |
| | | | | 0x3B | 0x3B40 | 0x00 |
| | | | | 0x3D | 0x3D40 | 0x10 |
| | | | | 0x3F | 0x3F40 | 0x2F |
| | | | | 0x40 | 0x4040 | 0x10 |
| | | | | 0x41 | 0x4140 | 0x0A |
| | | | | 0x37 | 0x4240 | 0x10 |
| 13 | VSR Marping command | | w | 0xFE | 0xFE70 | 0x04 |
| | | | | 0x5E | 0x5E70 | 0x30 |
| | | | | 0x5F | 0x5F70 | 0x32 |
| | | | | 0x60 | 0x6070 | 0x84 |
| | | | | 0x61 | 0x6170 | 0x76 |
| | | | | 0x62 | 0x6270 | 0x51 |
| 14 | ELVSS VOLTAGE SET | | w | 0xFE | 0xFE80 | 0x05 |
| | | | | 0x05 | 0x5E80 | 0x11 |
| | | | | 0x2A | 0x5F80 | 0x00 |
| | | | | 0x91 | 0x6080 | 0x00 |
| 15 | SW Mapping | | w | 0xFE | 0xFE40 | 0x01 |
| | | | | 0x42 | 0x4240 | 0x33 |
| | | | | 0x43 | 0x4340 | 0x22 |
| | | | | 0x44 | 0x4440 | 0x11 |
| | | | | 0x45 | 0x4540 | 0x66 |
| | | | | 0x46 | 0x4640 | 0x55 |
| | | | | 0x47 | 0x4740 | 0x44 |
| | | | | 0x4C | 0x4C40 | 0x33 |
| | | | | 0x4D | 0x4D40 | 0x22 |
| | | | | 0x4E | 0x4E40 | 0x11 |
| | | | | 0x4F | 0x4F40 | 0x66 |
| | | | | 0x50 | 0x5040 | 0x55 |
| | | | | 0x51 | 0x5140 | 0x44 |
| | | | | 0x56 | 0x5640 | 0x11 |
| | | | | 0x58 | 0x5840 | 0x22 |
| | | | | 0x59 | 0x5940 | 0x33 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | 0x5A | 0x5A40 | 0x44 |
| | | | | 0x5B | 0x5B40 | 0x55 |
| | | | | 0x5C | 0x5C40 | 0x66 |
| | | | | 0x61 | 0x6140 | 0x11 |
| | | | | 0x62 | 0x6240 | 0x22 |
| | | | | 0x63 | 0x6340 | 0x33 |
| | | | | 0x64 | 0x6440 | 0x44 |
| | | | | 0x65 | 0x6540 | 0x55 |
| | | | | 0x66 | 0x6640 | 0x66 |
| 16 | | | w | 0xFE | 0xFE00 | 0x00 |
| | | | | 0x35 | 0x3500 | 0x00 |
| 17 | sleep out | | w | 0x11 | 0x1100 | |
| 18 | delay(ms) | 120 | | | | |
| 19 | display on | | w | 0x29 | 0x2900 | |

Send format: send cmd , data.
Example:
send 0xFE,0x04
0x4C,0x88

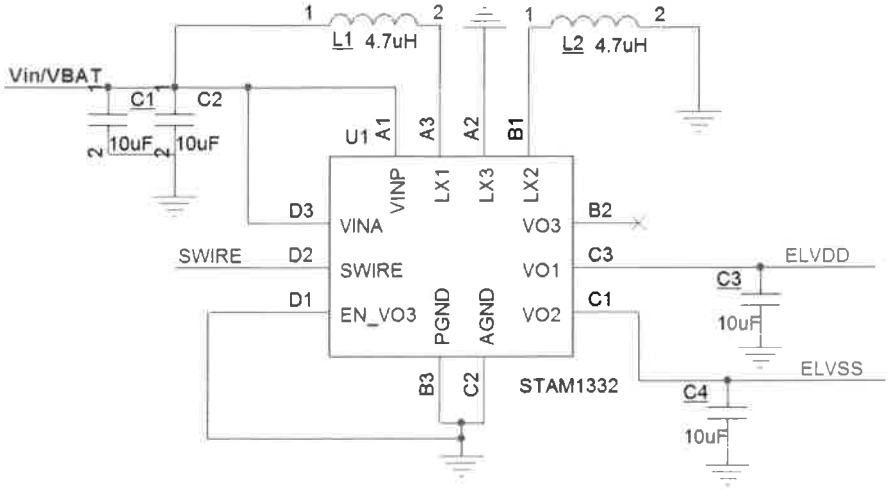
| address | | data |
|---|---|---|
| spi | other | |
| 0xFE | 0xFE70 | 0x04 |
| 0x4C | 0x4C70 | 0x88 |

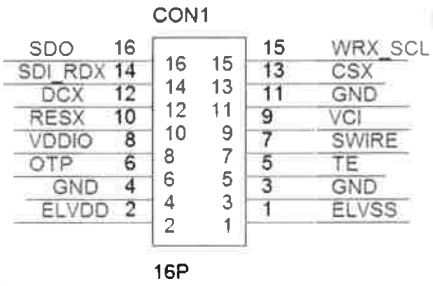
## 6.3 Brightness control

| Inst/Para | R/W | Address | | Date Type | Description |
|---|---|---|---|---|---|
| | | SPI | Other | | |
| BRTCTRL | W | 51h | 5100h | Hex | Value form 0~255(FF) |

# 7 Application Circuit

ELVDD & ELVSS power supply schematic, The Triple DC/DC converter STAM1332 is recommended. The application schematics and external components are as below.




Main board recommended connector: ASE5S1610 (ASSEM)

| Component | Part Number | Specification | Quantity | Manufacturer |
|---|---|---|---|---|
| Capacitance | LMK105CBJ106MVLF | 10uF/10V X5R 0402 ±20% | 4 | TAIYO YUDEN |
| | CL05A106MP5NUNC | | | Samsung |
| Inductance | KMNR201610-4R7M-S-Z | 4.7uH±20% 444mΩ 0.76A | 2 | Ke ming |
| | ACPI201610PF-4R7MT | | | Amode |

# 8 Optical Characteristics Optical Specification

| Item | | Symbol | Condition | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| View Angle | | θT | CR≥10 | 80 | | | Degree | Note 2<br>Test Equipment: CS2000A |
| | | θB | | 80 | | | | |
| | | θL | | 80 | | | | |
| | | θR | | 80 | | | | |
| Contrast Ratio | | CR | θ=0° | 10000 | | | | Note1<br>Note3<br>Test Equipment: CS2000A |
| Response Time | | $T_{ON}$ | 25℃ | | | 4 | ms | Note1<br>Note4<br>Test Equipment: Admesy MSE |
| | | $T_{OFF}$ | | | | | | |
| Chromaticity | White | x | | (0.292) | (0.312) | (0.332) | | Test Equipment: CS2000A<br>Note: Chromaticity can be modified according to customer demand |
| | | y | | (0.309) | (0.329) | (0.349) | | |
| | Red | x | | (0.624) | (0.664) | (0.704) | | |
| | | y | | (0.305) | (0.335) | (0.365) | | |
| | Green | x | | (0.200) | (0.250) | (0.300) | | |
| | | y | | (0.656) | (0.706) | (0.756) | | |
| | Blue | x | | (0.097) | (0.137) | (0.177) | | |
| | | y | | (0.015) | (0.055) | (0.095) | | |
| Uniformity | | U | | 75 | | | % | Note1<br>Note6<br>luminance of center point is 350±35nits<br>Test Equipment: CS2000A |
| NTSC | | | | 85 | 100 | | % | Note5 |
| Luminance | | L | | 315 | 350 | 385 | $Cd/m^2$ | Note1<br>Note7<br>Test Equipment: CS2000A |
| Cross-talk | | | | | | 3 | % | Note8<br>L≤350nits<br>Test Equipment: |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | CS2000A |
| Gamma | | | 1.9 | 2.2 | 2.5 | | Gamma=2.2±0.3（L≤350nits）；<br>Gamma Self-adjustment (L＞350nits)<br>Test Equipment：CS2000A |

Test Conditions:

1. the ambient temperature is 25℃.
2. The test systems refer to Note1 and Note2.

Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. The optical properties are measured at the center point of the AMOLED screen. All input terminals AMOLED panel must be ground when measuring the center area of the panel.

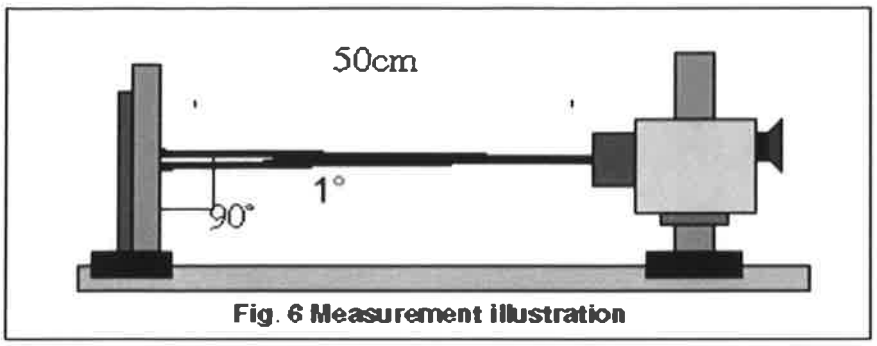



**Fig. 6 Measurement illustration**

Note 2: Definition of viewing angle range and measurement system.

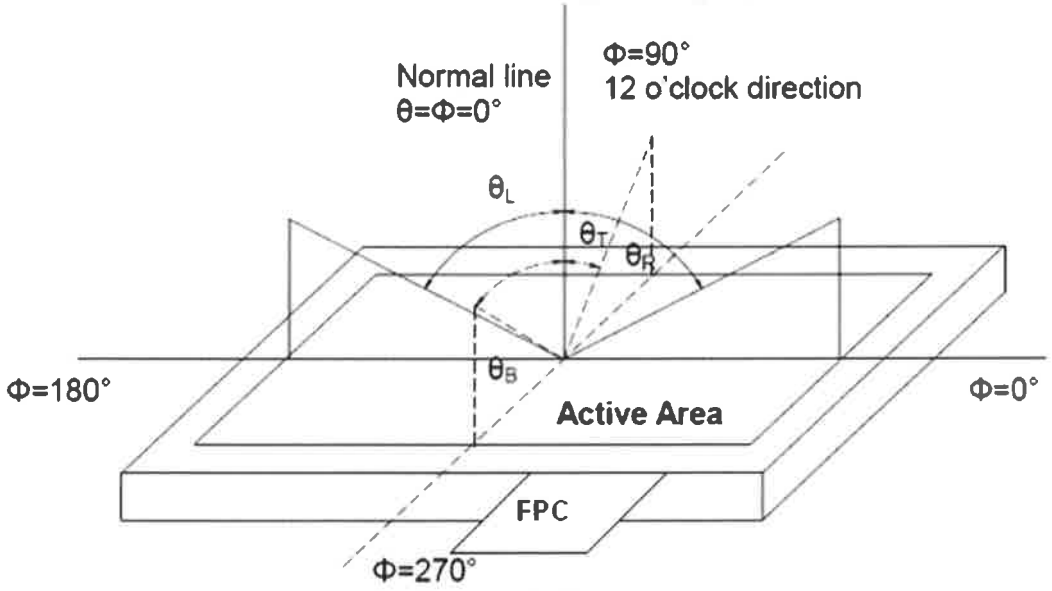



Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

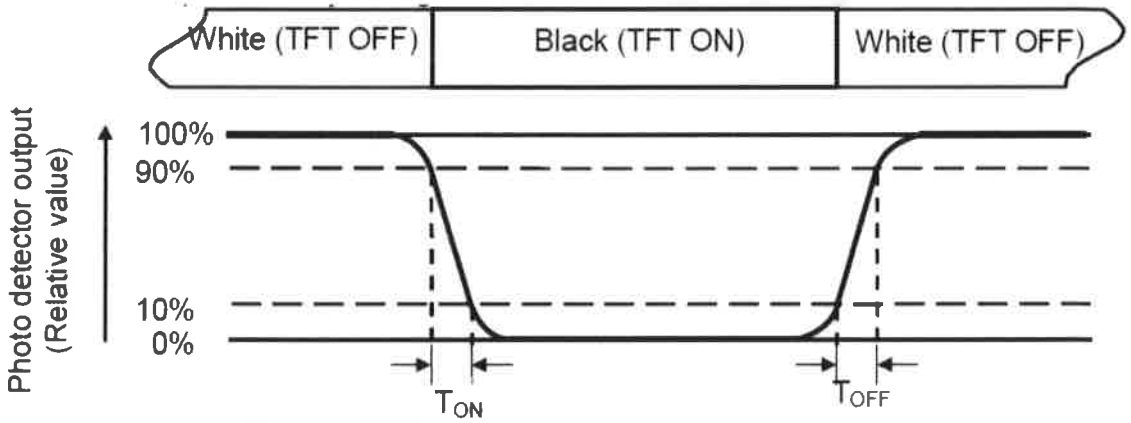
$$\text{Contrast ratio(CR)} = \frac{\text{Luminance measured when LCD is on the "white" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

"White state ": A state where the AMOLED should be driven by Vwhite.

"Black state": A state where the AMOLED should be driven by Vblack.

Note 4: Definition of response time

The response time is defined as the AMOLED optical switching time interval between "White" state and "Black" state. Rise time ($T_{ON}$) is the time between photo detector output intensity changing from 90% to 10%. And fall time ($T_{OFF}$) is the time between photo detector output intensity changing from 10% to 90%.




Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of AMOLED.

Note 6: Definition of luminance uniformity

Active area is divided into 5 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity(U) = Lmin/ Lmax

L-------Active area length W----- Active area width

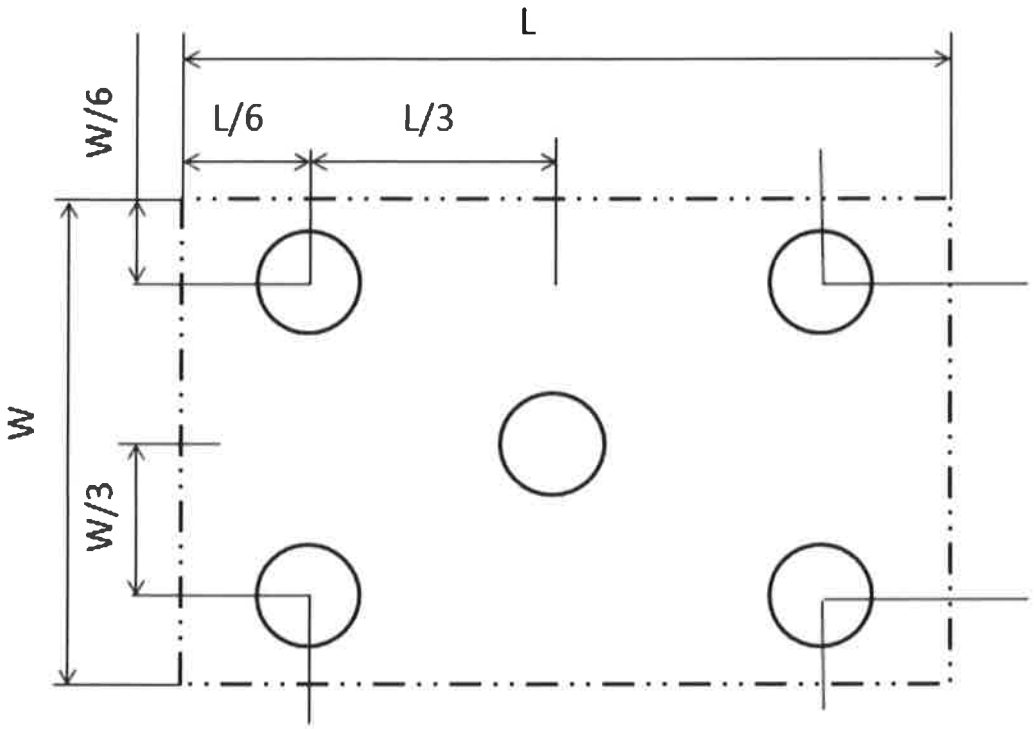



Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of luminance:

Measure the luminance of white state at center point.

Note 8: Cross Talk

A. Measure luminance at the position, P0.

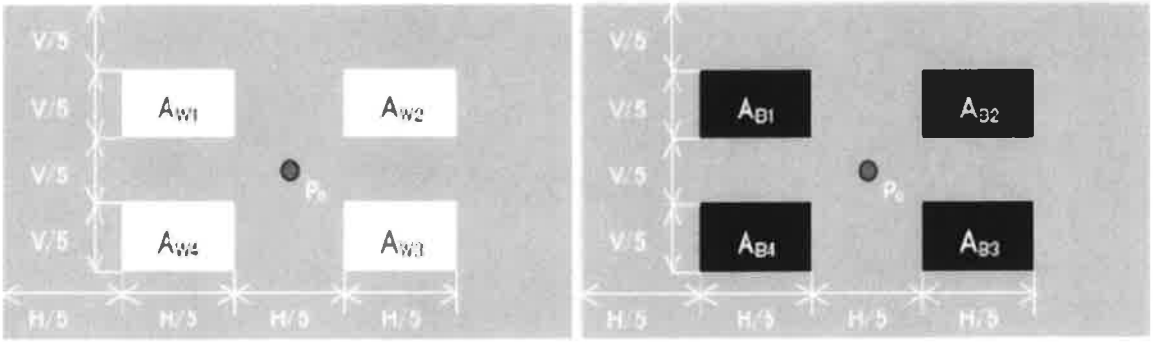
B. Calculate cross talk as below equation.

$$L_{W\_OFF} = \frac{L_{W1} + L_{W2} + L_{W3} + L_{W4}}{4}$$

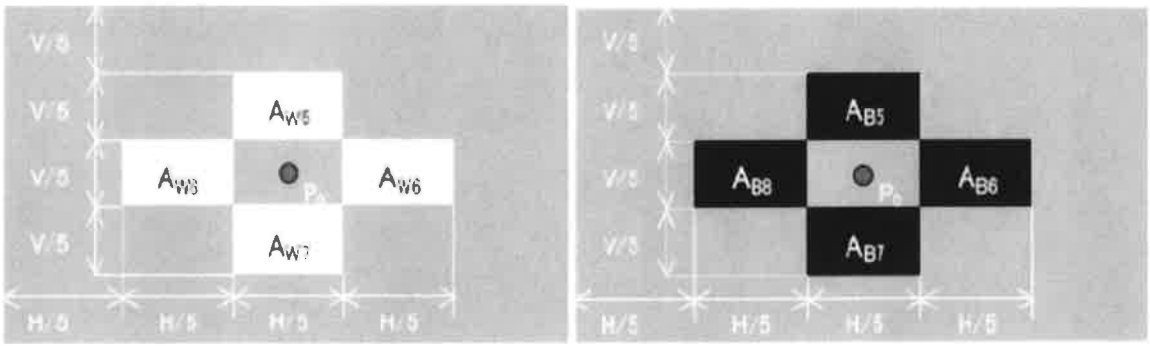
$$L_{B\_OFF} = \frac{L_{B1} + L_{B2} + L_{B3} + L_{B4}}{4}$$

$$\text{crosstalk} = \frac{|L_{Wi\_ON} - L_{W\_OFF}|}{L_{W\_OFF}} \times 100\% \qquad (i = 5 \text{ to } 8)$$

$$\text{crosstalk} = \frac{|L_{Bi\_ON} - L_{B\_OFF}|}{L_{B\_OFF}} \times 100\% \qquad (i = 5 \text{ to } 8)$$

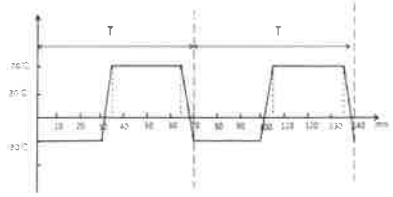
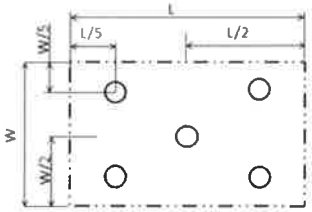



(a) $L_{W\_OFF}$, $L_{B\_OFF}$ measuring pattern




(b) $L_{W\_ON}$, $L_{B\_ON}$ measuring pattern

# 9 Environmental / Reliability Test

| No | Test Item | Condition | Remark |
|---|---|---|---|
| 1 | High Temperature Operation | +60℃, 240hrs | IEC60068-2-1,GB2423.2 |
| 2 | Low Temperature Operation | -20℃, 240hrs | IEC60068-2-1<br>GB2423.1 |
| 3 | High Temperature Storage | +70℃, 240hrs | IEC60068-2-1<br>GB2423.2 |
| 4 | Low Temperature Storage | -30℃, 240hrs | IEC60068-2-1<br>GB2423.1 |
| 5 | High Temperature & High Humidity Operation | 60℃, 90% RH,240hrs | IEC60068-2-78<br>GB/T2423.3 |
| 6 | Thermal Shock (Non-operation) | -30℃( 30 min)~+70℃( 30 min),<br>Change time:5min, 100 Cycles<br>  | Start with cold temperature,<br>End with high temperature,<br>IEC60068-2-14,GB2423.22 |
| 7 | Electro Static Discharge (Operation) | C=150pF, R=330Ω，5points/panel<br>Air:±8KV, 5times;<br>Contact:±4KV, 5 times;<br>(Environment: 15℃~35℃, 30%~60%, 86Kpa~106Kpa).<br>  | IEC61000-4-2<br>GB/T17626.2 |
| 8 | Package Drop Test | 1 corner, 3 edges, 6 surfaces<br>Drop height:760mm | IEC60068-2-32<br>GB/T2423.8 |
| 9 | Package Vibration Test | Random Vibration:<br>1.15Grms, 1~200Hz, Random,<br>30mins/ (X，Y，Z) axis | IEC60068-2-34<br>GB/T2423.11 |

The above reliability verification brightness L≤350nits;

# 10 Quality Level

## 10.1 AMOLED Module of Characteristic Inspection

The environmental condition and visual inspection shall be conducted as below:

(1) Ambient temperature: 22± 3℃

(2) Humidity: 65 ± 20%RH

(3) Ambient light intensity: 800 ~ 1200 lux

(4) Viewing Distance: 35 ± 5cm

(5) Viewing angle (tolerance): the front side 90° (Z) ±30°

(6) Inspection time: 10 ±2 sec

## 10.2 Sampling Procedures for each item acceptance table

| Defect type | Sampling Procedures | AQL |
|---|---|---|
| Major defect | GB/T2828.1-2003 Inspection level II<br>normal inspection<br>single sample inspection | 0.65 |
| Minor defect | GB/T2828.1-2003 Inspection level II<br>normal inspection<br>single sample inspection | 1.50 |

Major defect:
Any defect may result in functional failure, or reduce the usability of product for its purpose. For example electrical failure, deformation and etc.

Minor defect
A defect does not reduce the usability of product for its intended purpose and un-uniformity, such as dot defect and etc.

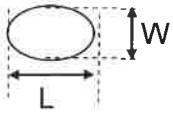
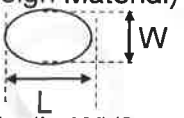
The criteria on major and/or minor judgment will be according with the classification of defects. AQL means that the quality level of product is acceptable for shipment, and the AQL shall satisfy with customer's quality request.

10.3 Inspection Item

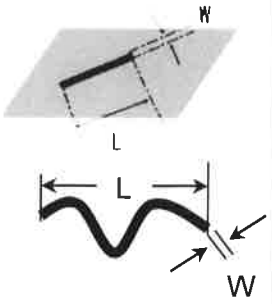
10.3.1 Function tests

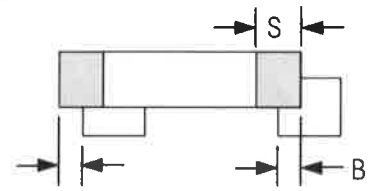
<table>
<tr><th>No.</th><th>Item</th><th>Criterion of Defect</th><th>Type</th></tr>
<tr><td>1</td><td>Dot Defect</td><td>
<table>
<tr><th colspan="2">Defect</th><th>Acceptable number</th></tr>
<tr><td colspan="2">Bright Dot</td><td>0</td></tr>
<tr><td rowspan="3">Dark Dot</td><td>Red</td><td>2</td></tr>
<tr><td>Green</td><td>2</td></tr>
<tr><td>Blue</td><td>2</td></tr>
</table>
Dark Dot Distance ≧ 5mm(Acceptable)
</td><td>Minor</td></tr>
<tr><td>2</td><td>No Display</td><td>Not allowed</td><td>Major</td></tr>
<tr><td>3</td><td>Abnormal Display</td><td>Not allowed</td><td>Major</td></tr>
<tr><td>4</td><td>Normally white</td><td>Not allowed</td><td>Major</td></tr>
<tr><td>5</td><td>Flicker</td><td>Not allowed</td><td>Major</td></tr>
<tr><td>6</td><td>Missed Line</td><td>Not allowed</td><td>Major</td></tr>
<tr><td>7</td><td>Mura</td><td>Limit samples</td><td>Major</td></tr>
</table>

10.3.2 Visual inspection

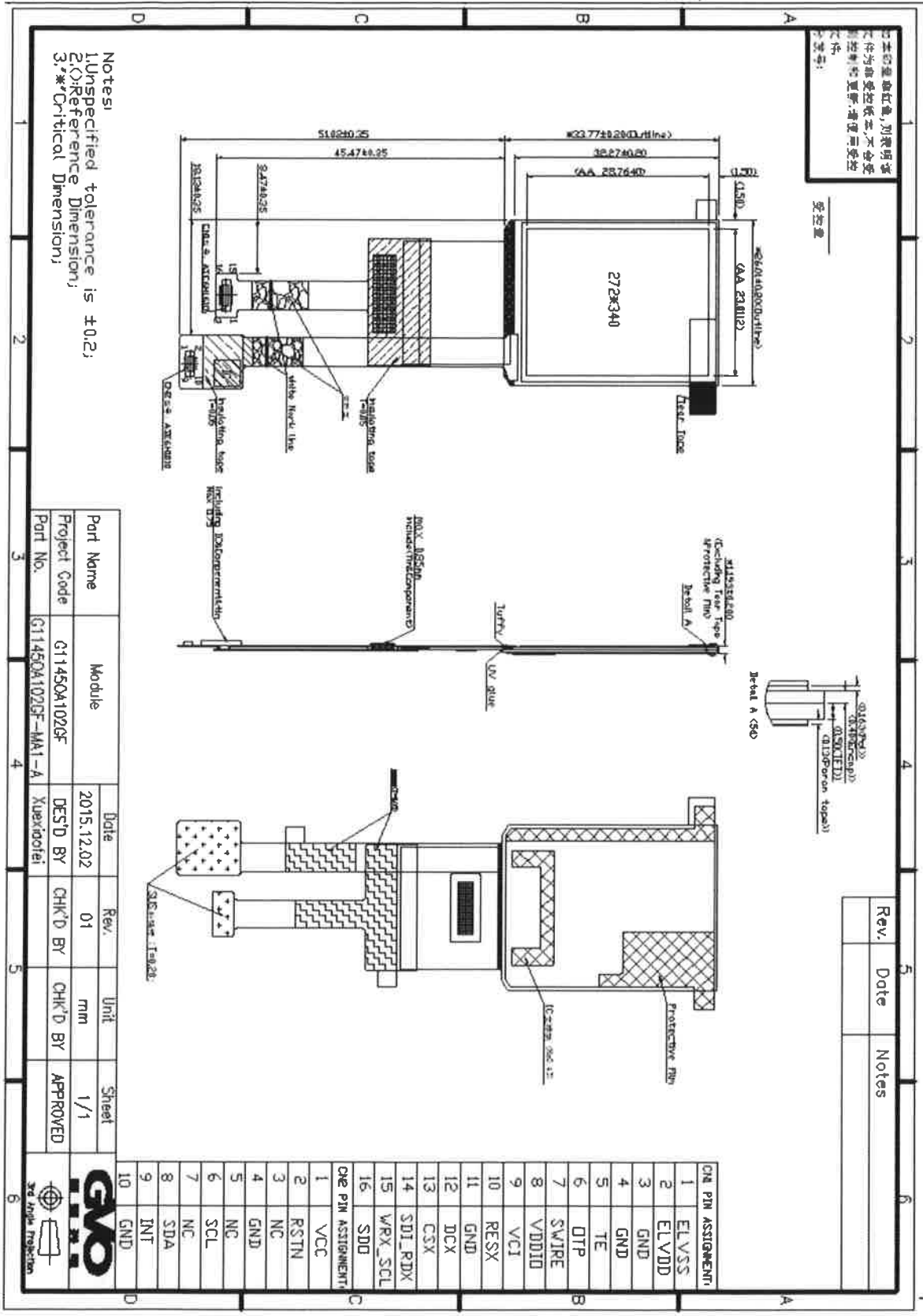
<table>
<tr><td rowspan="2">1</td><td>Polarizer Dent/Bubble<br> 
</td><td>
<table>
<tr><th>Size Φ (mm)</th><th>Acceptable number</th></tr>
<tr><td>Φ ≦ 0.15</td><td>Ignore</td></tr>
<tr><td>0.15<Φ ≦ 0.30</td><td>1</td></tr>
<tr><td>0.30<Φ</td><td>0</td></tr>
</table>
</td><td>Major</td></tr>
<tr><td>Polarizer Dark/Bright Spots (Foreign Material)<br> 

Φ=(L+W)/2</td><td>
<table>
<tr><th>Size Φ (mm)</th><th>Acceptable number</th></tr>
<tr><td>Φ ≦ 0.10</td><td>Ignore</td></tr>
<tr><td>0.10<Φ ≦ 0.20</td><td>1</td></tr>
<tr><td>0.20<Φ</td><td>0</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

<table>
<tr><td>2</td><td>Polarizer Scratch/ Fiber(Linear)<br>  <br></td><td><table>
<tr><th>Width(mm)</th><th>Length(mm)</th><th>Acceptable number</th></tr>
<tr><td>W≦0.02</td><td>Ignore</td><td>Ignore</td></tr>
<tr><td>0.02<W≦0.03</td><td>L≦1.00</td><td>1</td></tr>
<tr><td>0.03<W</td><td>-</td><td>0</td></tr>
<tr><td></td><td>L>1.00</td><td>0</td></tr>
</table></td><td>Minor</td></tr>
<tr><td>3</td><td>Discoloration</td><td>If its limit sample is needed, it can be fixed mutually with a customer</td><td>Minor</td></tr>
<tr><td rowspan="3">4</td><td>Encap glass chipping \ chipping<br>  </td><td>The following standards apply to any side of the panel. (unit: mm)<table>
<tr><th>Z</th><th>X</th><th>Y</th></tr>
<tr><td><t</td><td>≤1.0</td><td>≤0.5</td></tr>
</table></td><td>Minor</td></tr>
<tr><td>Substrate glass chipping \ chipping<br>  <br>Front<br>  <br>Rear</td><td>The following standards just apply to the side of the pad.(unit: mm)<table>
<tr><th colspan="2"></th><th>Z</th><th>X</th><th>Y</th></tr>
<tr><td rowspan="2">Front of the pad</td><td>Near the screen</td><td><t</td><td>≤1.0</td><td>≤0.3</td></tr>
<tr><td>Away from the pattern</td><td><t</td><td>≤1.2</td><td>≤0.4</td></tr>
<tr><td colspan="2">Rear of the pad</td><td><t</td><td>≤1.2</td><td>≤0.4</td></tr>
</table></td><td>Minor</td></tr>
<tr><td>The following standards apply to any side of the panel (except pad side). (unit: mm)<table>
<tr><th>Z</th><th>X</th><th>Y</th></tr>
<tr><td><t</td><td>≤1.0</td><td>≤0.5</td></tr>
</table></td><td>Minor</td></tr>
<tr><td>5</td><td>Glass crack</td><td>Not allowed</td><td>Major</td></tr>
<tr><td>6</td><td>Panel Scratch</td><td><table>
<tr><th>Width(mm)</th><th>Length(mm)</th><th>Acceptable number</th></tr>
<tr><td>W≤0.03</td><td>Ignore</td><td>Ignore</td></tr>
<tr><td rowspan="2">0.03<W≤0.05</td><td>L≤2.0</td><td>Ignore</td></tr>
<tr><td>2.0<L≤5.0</td><td>2</td></tr>
<tr><td>0.05<W</td><td>-</td><td>0</td></tr>
<tr><td></td><td>L>5.0</td><td>0</td></tr>
</table></td><td>Minor</td></tr>
<tr><td>7</td><td>Encapsulation</td><td>Frit width can't be less than the design width of 9/10.</td><td>Minor</td></tr>
</table>

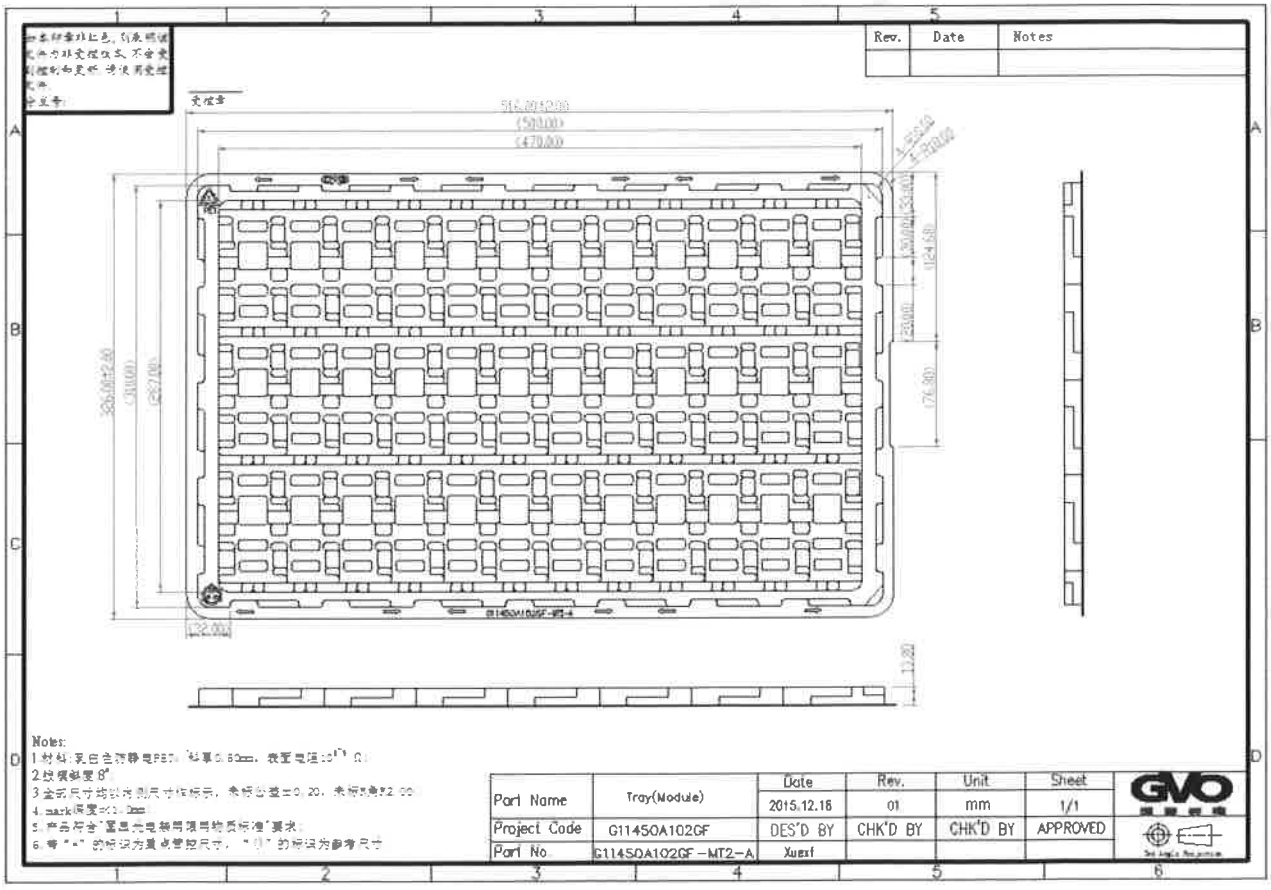
| | | | |
|---|---|---|---|
| 8 | Over Coating | The coating of non-IC side should not exceed glass section.<br>The coating of IC side is not allowed higher than POL. | Minor |
| 9 | FPCA | (1) The component should no polarity opposition. | Major |
| | | (2) No wrong insertion. | Major |
| | | (3) FPC should not have serious crease which destroys the line, prick and spots damage, scratch is not allowed if Cu layer is exposed. | Minor |
| | | (4) The gold fingers should not be oxidized, scraped, folded, impressed, broken, spotted or dissymmetry. | Major |
| | | (5) Make sure FPC is not scalded, with its location holes are not deficiency or obviously shift. | Major |
| | | (6)The component of FPC should be the same as BOM list. | Major |
| | | (7)No remaining soldering Sn. | Major |
| | | (8)No visual particle on the pad line. | Minor |
| 10 | FPCA End Overhang | The size above 1/2 of soldering electrode of the parts overhang to the LAND is prohibited.<br>(but contacting near other components is prohibited)<br>  <br>End Overhang | Major |
| 11 | FPC Tilt Defect | Not allowed | Major |
| 12 | Package | (1) Products should put into the anti-static trays, with non-overlapping, and the trays should be staggered placed.<br>(2) Different products cannot be mixed into the same inner package.<br>(3) The package should not have obvious deformation, breakage, and the printing. Besides, labels type and quantity should be correct.<br>(4) The package should have QC signet. ROHS label is needed if the product is under ROHS control. | Minor |

## 11 Mechanical Drawing



# Packing Drawing

| Packing Condition | Contents |
|---|---|
| Packing Type | TRAY + Carton packing type |
| TRAY material model | tray ($10^5$~$10^9\Omega$) |
| Tray packing type | See the picture 1 |
| Number of panels per tray | 36 pieces |
| Number of Tray per carton | 19units (( 18 units + 1 empty)PET tray ) |
| Number of panels per carton | 648 pieces |




Picture 1

# 12 Precautions for Use of AMOLED Modules

## 12.1 Handling Precautions:

12.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from height.

12.1.2 Do not press down the screen or the adjoining areas too hard because-the color tone may be shifted).

12.1.3 The polarizer covering the display surface of the AMOLED module is soft and easily scratched. Handle this polarizer carefully.

12.1.4 If the display surface is contaminated, blow on the surface and gently wipe it with a soft dry cloth. If it is still not completely clear, moisten the cloth with ethyl alcohol.

12.1.5 Solvents may damage the polarizer. Do not use water、ketone or aromatic solvents except ethyl alcohol.
Do not attempt to disassemble the AMOLED Module.

12.1.6 If the logic circuit power is off, do not apply the input signals.

12.1.7 To prevent destruction from static electricity, be careful to maintain an optimum working environment.

12.1.8 Be sure to make yourself in contact with the ground when handling with the AMOLED Modules.

12.1.9 Tools required for assembly, such as soldering irons, must be properly ground.

12.1.10 To reduce the generation of static electricity, do not conduct assembly or other work under dry conditions.

12.1.11 To protect the display surface, the AMOLED Module is coated with a film. Be careful when peeling off this protective film, because static electricity may generate.

## 12.2 Storage precautions:

12.2.1 When storing the AMOLED modules, be sure that they are not directly exposed to the sunlight or the light of fluorescent lamps.

12.2.2 The AMOLED modules should be stored under the storage temperature range. If the AMOLED modules will be stored for a long time, the recommended condition is:
Temperature: 0℃~40℃ Relatively humidity: ≤80%

12.2.3 The AMOLED modules should be stored in the room without acid, alkali or harmful gas.

## 12.3 Transportation Precautions:

12.3.1 The AMOLED modules should not be suffered from falling and violent shocking during transportation. Besides, excessive press, water, damp and sunshine, should be avoided.