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|------------------|--|----------------------|-------------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 1 of 17 |

Specification For EE0430AE-1 SVGA EPD

Model NO.: EE0430AE-1

| Prepared by | Checked by | Approved by |
|--------------------|-------------------|--------------------|
| | | |

Customer approval

| Customer | Approved by | Date of approval |
|-----------------|--------------------|-------------------------|
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|------------------|--|----------------------|-------------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 2 of 17 |

| Version | Content | Date | Producer |
|----------------|-----------------|-------------|-----------------|
| 1.0 | New release | 2017/01/13 | ZHP |
| 1.1 | Update bar code | 2018/06/22 | ZHP |
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| | | | |
|-----------|---------------------------------------|---------------|------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 3 of 17 |

Contents

| | |
|---|----|
| 1. General Description..... | 4 |
| 2. Features..... | 4 |
| 3. Application..... | 4 |
| 4. Pin Assignment..... | 5 |
| 5. Eletrical Characteristics..... | 6 |
| 6. Power On/Off Sequence..... | 9 |
| 7. Mechanical Specifications..... | 10 |
| 8. Optical Characteristics..... | 12 |
| 9. Handling, Safety, and Enviroment Requirements..... | 13 |
| 10. Reliability Test..... | 14 |
| 11. Block Diagram..... | 15 |
| 12. Packaging..... | 16 |
| 13. Mark and Bar Code Definition | 17 |



| | | | |
|------------------|--|----------------------|-------------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 4 of 17 |

1 General Description

EE0430AE-1 is an Active Matrix Electrophoretic Display(AM EPD), High-Resolution AM TFT Black/White display module can be used in portable electronic devices, such as E-book Reader.

The module is a TFT-array driving electrophoretic display, with integrated circuits including source and gate drivers.

The resolution of the module is 800×600 (SVGA), and the active area is 4.3 inch diagonal.

2 Features

- ◆ 800×600 display
- ◆ White Reflectance above 33%(0 minute)
- ◆ Contrast Ratio above 8:1(0 minute)
- ◆ 4:3 aspect ratio
- ◆ 230 dpi
- ◆ Wide viewing angle
- ◆ Ultra low power consumption
- ◆ Reflective mode
- ◆ Bi -stable display
- ◆ Commercial temperature range
- ◆ Landscape, portrait modes
- ◆ Hard-coat antiglare display surface

3 Application

E-book reader.



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|------------------|--|----------------------|-------------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 5 of 17 |

4 Pin Assignment

| No. | Pin Name | Description |
|------------|-----------------|-------------------------------------|
| 1 | VNEG | Negative power supply source driver |
| 2 | VGL | Negative power supply gate driver |
| 3 | VSS | Ground |
| 4 | NC | NO Connection |
| 5 | NC | NO Connection |
| 6 | VDD | Digital power supply drivers |
| 7 | VSS | Ground |
| 8 | CLK | Clock source driver |
| 9 | VSS | Ground |
| 10 | LE | Latch enable source driver |
| 11 | OE | Output enable source driver |
| 12 | SPH | Start pulse source driver |
| 13 | D0 | Data signal source driver |
| 14 | D1 | Data signal source driver |
| 15 | D2 | Data signal source driver |
| 16 | D3 | Data signal source driver |
| 17 | D4 | Data signal source driver |
| 18 | D5 | Data signal source driver |
| 19 | D6 | Data signal source driver |
| 20 | D7 | Data signal source driver |
| 21 | VCOM | Common connection |
| 22 | NC | NO Connection |
| 23 | NC | NO Connection |
| 24 | NC | NO Connection |
| 25 | NC | NO Connection |
| 26 | VSS | Ground |
| 27 | NC | NO Connection |
| 28 | CPV | Shift clock input |
| 29 | STV | Start pulse gate driver |
| 30 | NC | NO Connection |
| 31 | VBORDER | Border connection |
| 32 | VSS | Ground |
| 33 | VPOS | Positive power supply source driver |
| 34 | VGH | Positive power supply gate driver |



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|------------------|--|----------------------|-------------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 6 of 17 |

5 Electrical Characteristics

5.1 Module interface description

This module can be driven by ASIC AVT6201A Timing Controller(T-Con).

5.2 Module DC characteristics

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|-----------------------------------|--------|------------|-------|----------|-------|------|
| Signal ground | VSS | | - | 0 | - | V |
| Logic Voltage supply | VDD | | 3.0 | 3.3 | 3.6 | V |
| | IVDD | VDD=3.3V | | 3.0 | | mA |
| Gate Positive supply | VGH | | 21 | 22 | 23 | V |
| | IVGH | | | 0.35 | | mA |
| Gate Negative supply | VGL | | -21 | - | -19 | V |
| | IVGL | | | 3.0 | | mA |
| Source Positive supply | VPOS | | 14.6 | 15 | 15.4 | V |
| | IPOS | VPOS=15V | - | 20 | - | mA |
| Source Negative supply | VNEG | | -15.4 | -15 | -14.6 | V |
| | INEG | VNEG=-15V | | -20 | | mA |
| Asymmetry source | VASYM | VPOS+VNEG | -80 | 0 | 80 | mV |
| Common voltage | VCOM | | -2.5 | Adjusted | 0 | V |
| | ICOM | | - | -1.5 | - | mA |
| Standby power module | PSTBY | | | - | 0.4 | mW |
| Typical power module | PTYP | | - | 600 | 1100 | mW |
| Operating temperature | Top | | 0 | | 50 | °C |
| Operating relative humidity | RHop | | 0 | | 70 | % |
| Storage temperature | Tst | | -20 | - | 70 | °C |
| Storage relative humidity | RHst | | 30 | | 60 | % |
| Maximum image update time at 25°C | | | | 960 | 1200 | ms |



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|------------------|--|----------------------|-------------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 7 of 17 |

Notes:

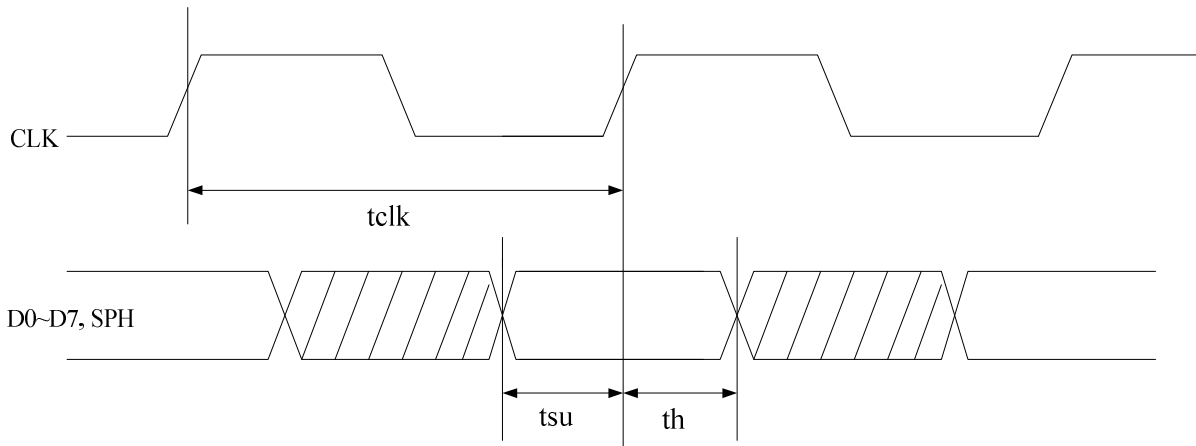
- 1.The maximum power and maximum current are specified for the worst case power consumption.
- 2.The typical power is measured when “typical images” are displayed.
3. The standby power is the consumed power when the module controller is in standby mode.
4. The listed electrical/optical characteristics are only guaranteed under the controller & waveform provided by EETECH.

5.3 Module AC characteristics

Note:VDD=3.0V to 3.6V, unless otherwise specified

| Parameter | Symbol | Min. | Typ. | Max. | Unit | App Pin |
|---------------------------|--------|------|------|------|------|----------------|
| Clock frequency | fcpv | | | 200 | kHz | CPV |
| Clock CPV high time | tCPVh | 0.5 | - | - | us | |
| Clock CPV low time | tCPVl | 0.5 | - | - | us | |
| Data setup time | tSU | 100 | - | - | ns | CPV STV |
| Data hold time | tH | 300 | - | - | ns | |
| Clock CLK cycle time | tclk | 40 | - | - | ns | Below table |
| D0 .. D7, SPH setup time | tsu | 8 | - | - | ns | |
| D0 .. D7, SPH hold time | th | 8 | - | - | ns | |
| LE on delay time | tLEdly | 40 | - | - | ns | |
| LE high-level pulse width | tLEw | 40 | - | - | ns | |
| LE off delay time | tLEoff | 40 | - | - | ns | |
| SHR setup time | tMsu | 100 | - | - | ns | |
| SHR hold time | tMh | 10 | - | - | ns | |

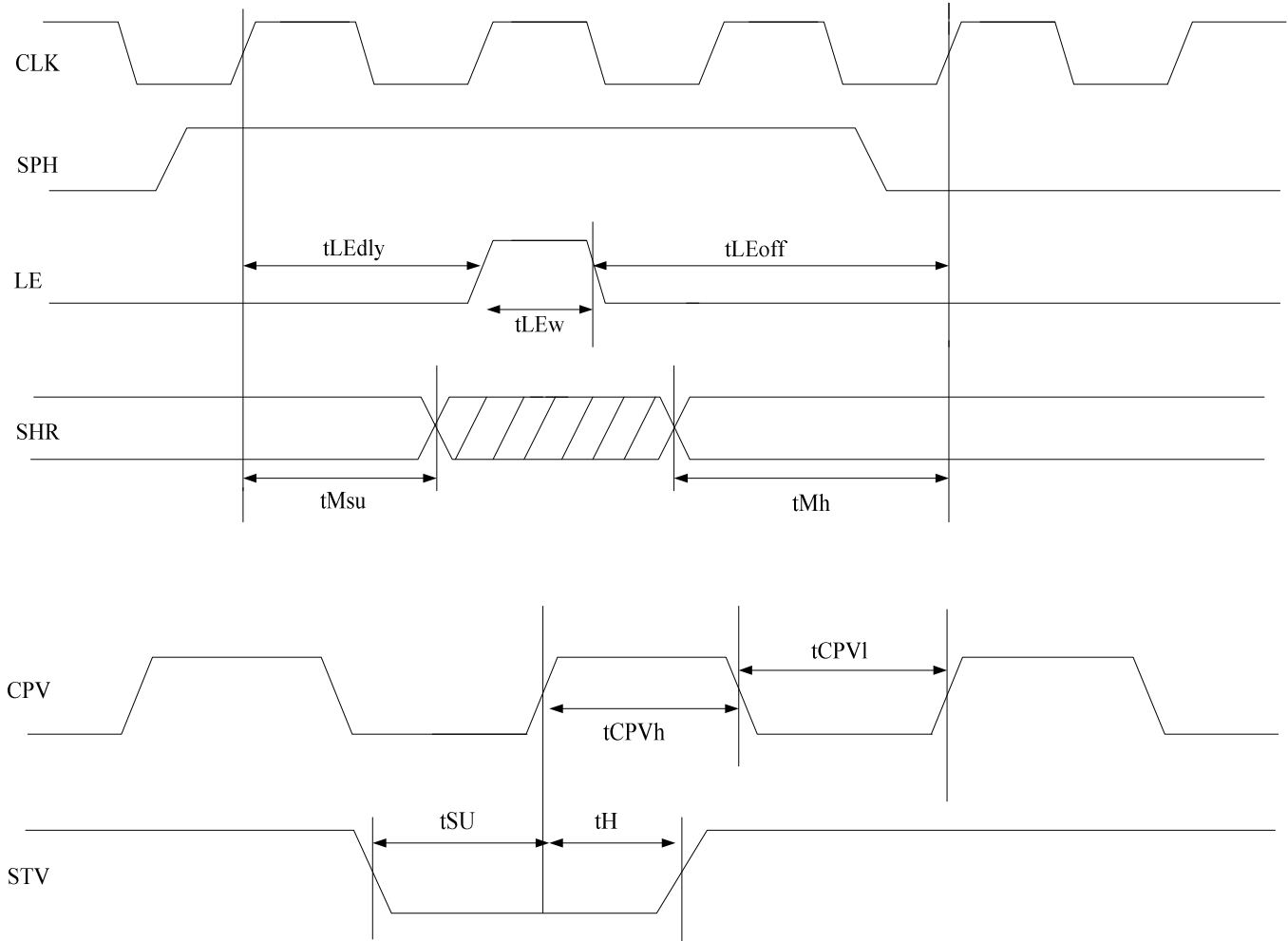
Clock & Data Timing





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|-----------|---------------------------------------|---------------|------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 8 of 17 |

Output Latch/Control Signals





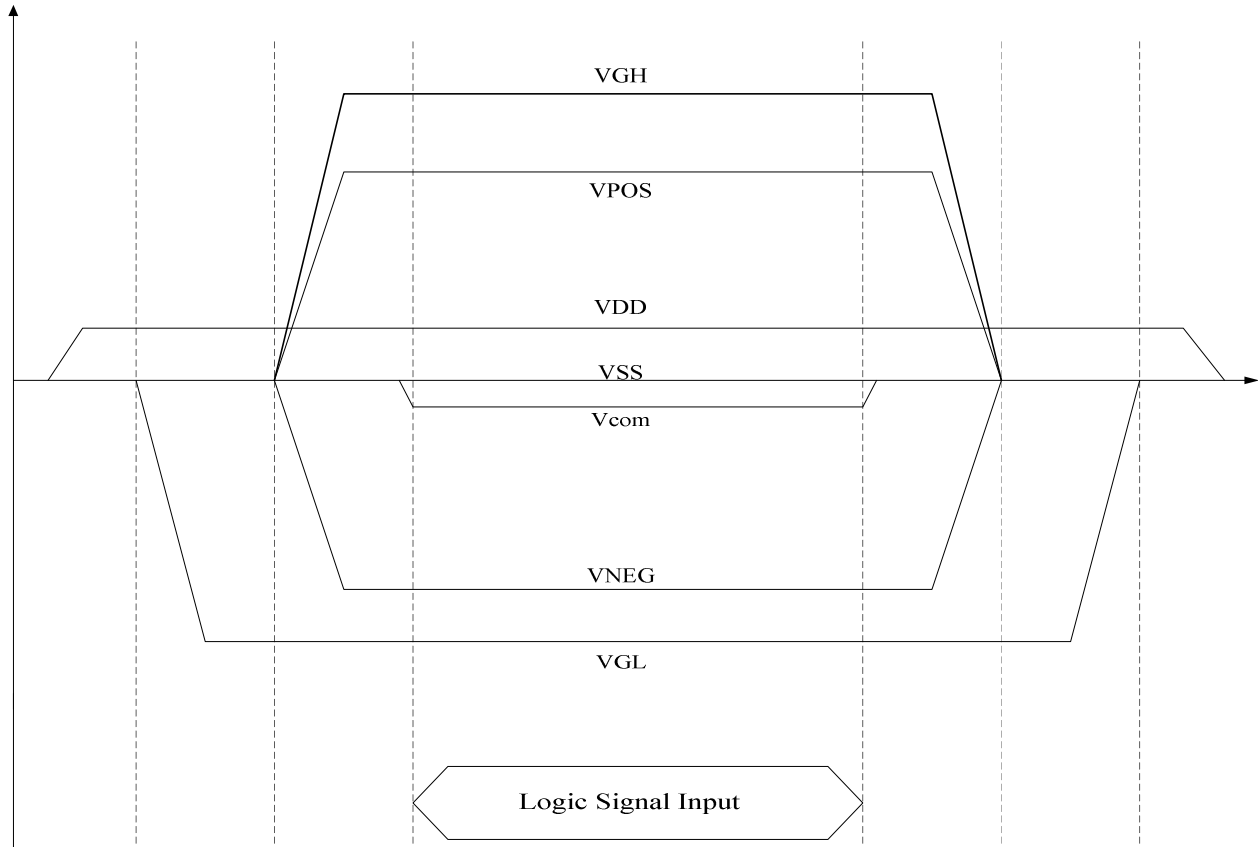
| | | | |
|-----------|---------------------------------------|---------------|------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 9 of 17 |

6 Power On/Off Sequence

To prevent the device from damage due to latch up, the power on/off sequence shown below must be followed.

When power on: VDD -> VGL -> VNEG/VGH/VPOS -> Vcom

When power off: Vcom -> VNEG/VGH/VPOS -> VGL -> VDD





| | | | |
|------------------|--|----------------------|-------------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 10 of 17 |

7 Mechanical Specifications

7.1 Dimension

| PARAMETER | VALUE | UNIT | Remark |
|------------------------|---------------------|------|--------|
| Display Resolution | 800×600 | dots | |
| Active area dimensions | | | |
| Width | 88 | mm | |
| Height | 66 | mm | |
| Screen size | 4.3 (4: 3 diagonal) | Inch | |
| Resolution | 230 | dpi | |
| Pixel pitch | | | |
| Horizontal | 0.11 | mm | |
| Vertical | 0.11 | mm | |
| Pixel configuration | Rectangle | | |
| Overall dimensions | | | |
| Width | 104.0 | mm | |
| Height | 74.6 | mm | |
| Thickness | 1.17 | mm | |
| Mass of the module | 18.5 | g | |

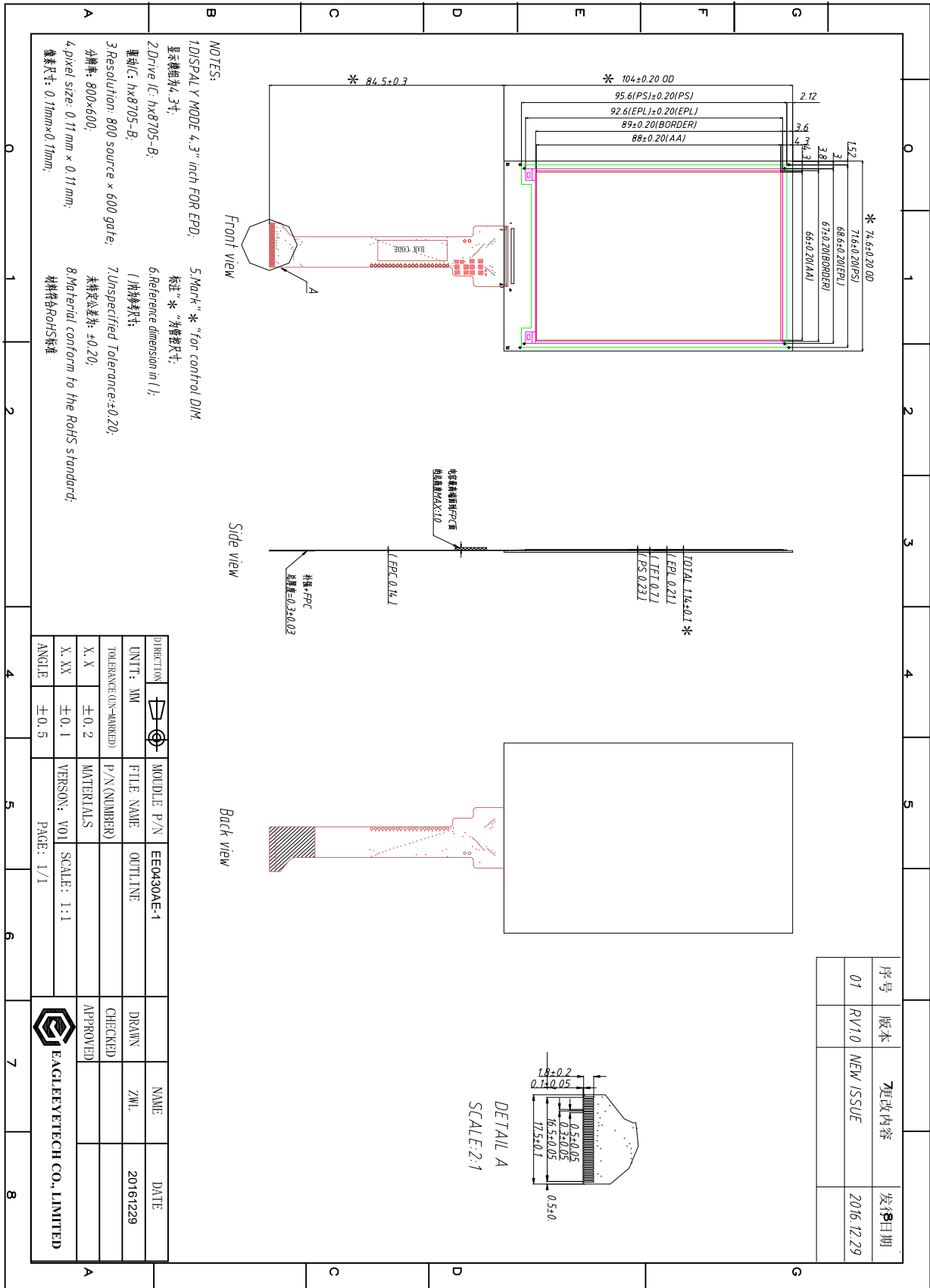
7.2 Electrical Connector

| SERVICE | CONNECTOR | NUMBER OF PINS |
|-----------|-----------------|----------------|
| Interface | FPC pitch=0.5mm | 34 |



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|-----------|---------------------------------------|---------------|------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 11 of 17 |

7.3 Mechanical Drawing of EPD Module



| | | |
|------------------------|--------------|------------|
| DIRECTION | MODULE P/N | EE0430AE-1 |
| UNIT: MM | FILE NAME | OUTLINE |
| TOLERANCE: (UN-MARKED) | P/N (NUMBER) | |
| X.X ±0.2 | MATERIALS | |
| X.XX ±0.1 | VERSION: V01 | SCALE: 1:1 |
| ANGLE ±0.5 | PAGE: 1/1 | |



| NAME | DATE |
|------|----------|
| ZWL | 20161229 |

| 序号 | 版本 | 更改内容 | 发布日期 |
|----|-------|-----------|------------|
| 01 | RV1.0 | NEW ISSUE | 2016.12.29 |



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|------------------|--|----------------------|-------------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 12 of 17 |

8 Optical Characteristics

| Parameter | Conditions | Values | | | Units | Notes |
|---------------------|--------------|--------|------|------|-------|-------|
| | | Min. | Typ. | Max | | |
| White Reflectivity | 0 min | 34 | | | % | |
| Contrast Ratio (CR) | 0 min | 8:1 | | | | 1 |
| Image Update Time: | GC16(T=0°C) | | 1500 | 1600 | ms | |
| | GC16(T=25°C) | | 960 | 1200 | | |
| | GC16(T≥35°C) | | 760 | 960 | | |
| | DU (T=0°C) | | 500 | 540 | | |
| | DU(T≥20°C) | | 300 | 360 | | |

($T_{amb}=25^{\circ}\text{C}$, $f_v=50\text{Hz}$. Measurements are made with Eye-One Pro Spectrophotometer.)

Notes:

1. CR=Surface Reflectance with all white pixel/Surface Reflectance with all black pixels;



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|------------------|--|----------------------|-------------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 13 of 17 |

9 Handling, Safety, and Environment Requirements

Warning

The display glass may break when it is dropped or bumped on a hard surface. Handle with care. Should the display break, do not touch the electrophoretic material. In case of contact with electrophoretic material, wash with water and soap.

Caution

The display module should not be exposed to harmful gases, such as acid and alkali gases, which corrode electronic components.

Disassembling the display module can cause permanent damage and invalidates the warranty agreements.

Observe general precautions that are common to handling delicate electronic components. The glass can break and front surfaces can easily be damaged. Moreover the display is sensitive to static electricality and other rough environmental conditions.



| | | | |
|------------------|--|----------------------|-------------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 14 of 17 |

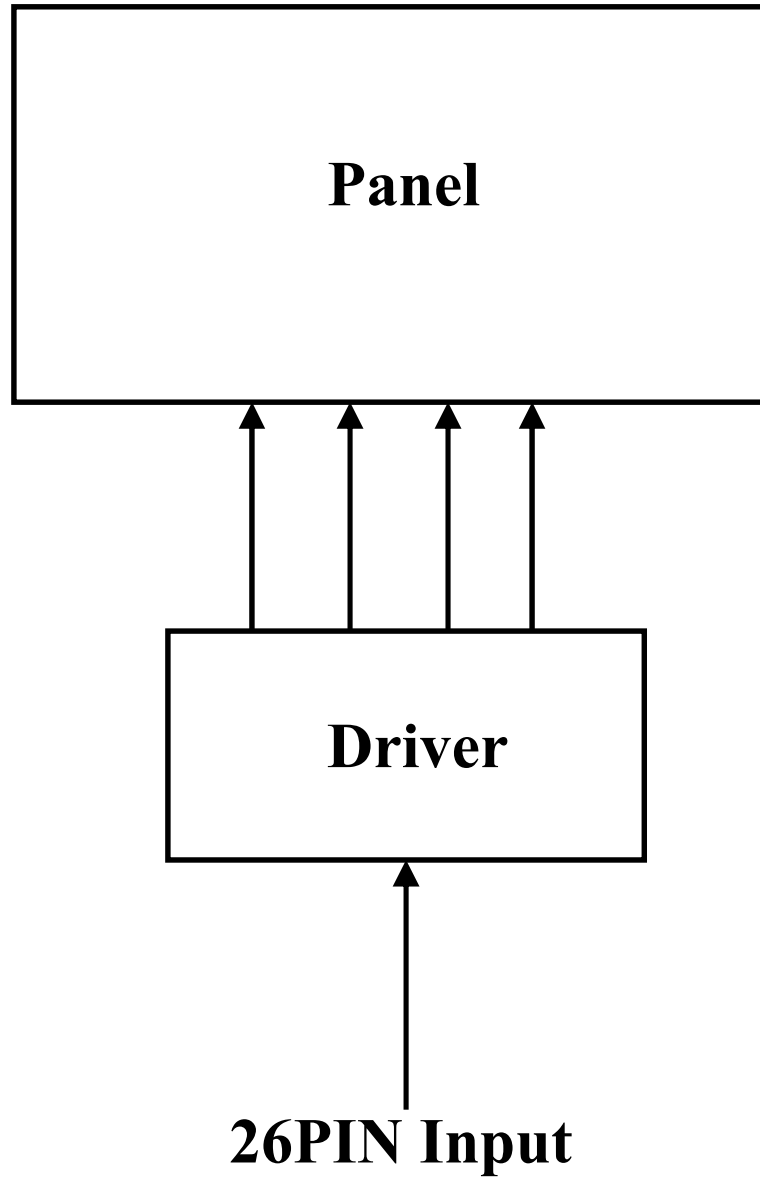
10. Reliability test

| No. | TEST | CONDITION | METHOD | REMARK |
|-----|---|---|--------------------------|--|
| 1 | High-Temperature Operation | T = +50°C, RH = 30% for 168hrs | IEC 60 068-2-2Bp | At the end of the test, electrical, mechanical, and optical specifications shall be satisfied. |
| 2 | Low-Temperature Operation | T = 0°C for 168hrs | IEC 60 068-2-2Ab | At the end of the test, electrical, mechanical, and optical specifications shall be satisfied. |
| 3 | High-Temperature Storage | T = +70°C, RH=23% for 168 hrs | IEC 60 068-2-2Bp | At the end of the test, electrical, mechanical, and optical specifications shall be satisfied. |
| 4 | Low-Temperature Storage | T = -25°C for 168 hrs | IEC 60 068-2-1Ab | At the end of the test, electrical, mechanical, and optical specifications shall be satisfied. |
| 5 | High-Temperature, High-Humidity Operation | T = +40°C, RH = 90% for 168 hrs | IEC 60 068-2-3CA | At the end of the test, electrical, mechanical, and optical specifications shall be satisfied. |
| 6 | High Temperature, High-Humidity Storage | T = +60°C, RH=80% for 168hrs | IEC 60 068-2-3CA | At the end of the test, electrical, mechanical, and optical specifications shall be satisfied. |
| 7 | Thermal Shock | 1 cycle:[-25°C 30min]→[+70°C 30 min] : 50 cycles | IEC 60 068-2-14 | At the end of the test, electrical, mechanical, and optical specifications shall be satisfied. |
| 8 | Package Vibration | 1.04G, Frequency: 10~500Hz Direction: X,Y,Z Duration: 1 hours in each direction | Full packed for shipment | At the end of the test, electrical, mechanical, and optical specifications shall be satisfied. |
| 9 | Package Drop Impact | Drop from height of 122 cm on concrete surface. Drop sequence: 1 corner, 3edges, 6 faces One drop for each | Full packed for shipment | At the end of the test, electrical, mechanical, and optical specifications shall be satisfied. |
| 10 | Electrostatic Effect (non-operating) | Machine model +/- 250V, 0Ω, 200pF | IEC 62179, IEC 62180 | At the end of the test, electrical, mechanical, and optical specifications shall be satisfied. |
| 11 | Stylus Tapping | POLYACETAL Pen: Top R0.8mm Load: 200gf; Speed: 30times/min; Speed: 30times/min Total 13,500times, | | At the end of the test, electrical, mechanical, and optical specifications shall be satisfied. |



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|------------------|--|----------------------|-------------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 15 of 17 |

11 Block Diagram



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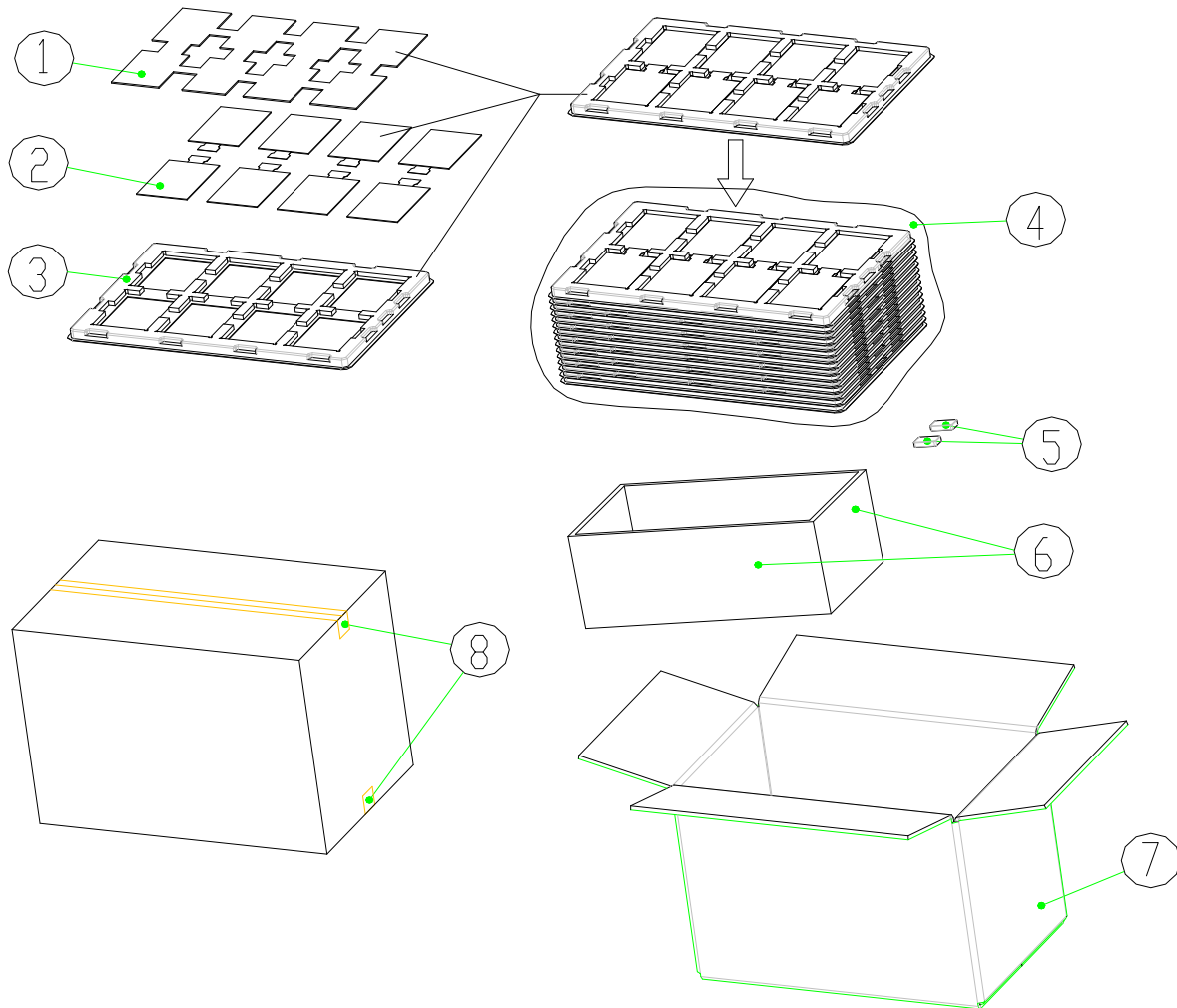


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|-----------|---------------------------------------|---------------|------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 16 of 17 |

12 Packaging

Packing Form

- a) Package quantity in one outer box: 96 pcs
- b) box size: 458 mm X 303 mm X 310 mm
- c) 1 outer box = 12 (full tray) + 1 (dummy / top tray)



| No. | Description | Material |
|-----|------------------------------------|----------------|
| ① | PE Foam | EPE |
| ② | Board Ass'y (96 pcs/1 Box) | EPD Panel |
| ③ | Packing, tray (13 pcs/1 outer box) | PS |
| ④ | Aluminium foil bag | Aluminium foil |
| ⑤ | Desiccant | Desiccant |
| ⑥ | side plate | EPE |
| ⑦ | Outer carton | K=A |
| ⑧ | Tape (43mm*300m) | OPP |



| | | | |
|-----------|---------------------------------------|---------------|------------|
| File Name | Specification For EE0430AE-1 SVGA EPD | Module Number | EE0430AE-1 |
| Version | V1.1 | Page Number | 17 of 17 |

13 Mark and Bar Code Definition

EE0430AE-1 MMMMMMMM XX



R5F086AN1001001

- (A) EE0430AE-1: Module No.
- (B) MMMMMMMM: Product date year month day
- (C) XX: Internal Code
- (D) Bar Code definition

R5F086 A N1 001 001
(1) (2) (3) (4) (5)

- (1) O-Paper Film LOT
- (2) Factory
- (3) Internal Code
- (4) Product LOT
- (5) Product Serial Number