



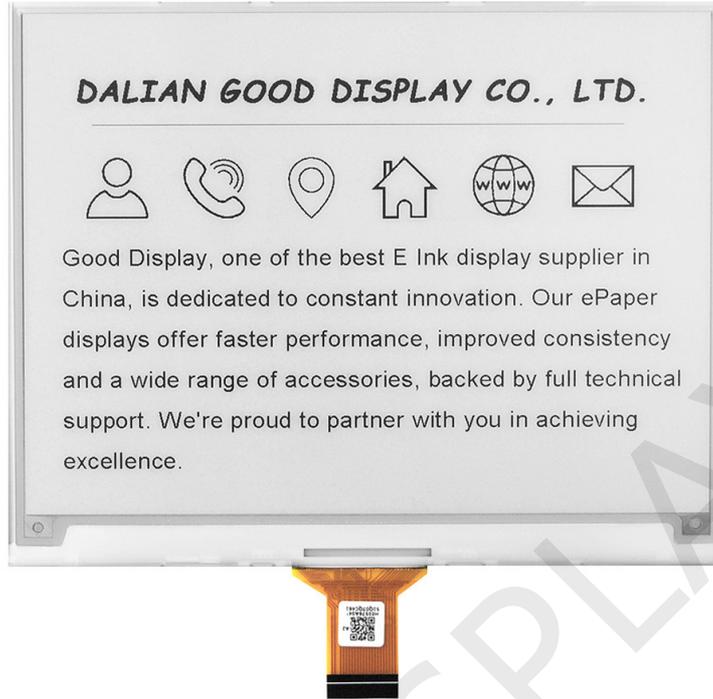
## 5.76 inch E-paper Display Series



**GDEH0576T81**

Dalian Good Display Co., Ltd.

# Product Specifications



|                    |                              |
|--------------------|------------------------------|
| <b>Customer</b>    | <b>Standard</b>              |
| <b>Description</b> | <b>5.76" E-PAPER DISPLAY</b> |
| <b>Model Name</b>  | <b>GDEH0576T81</b>           |
| <b>Date</b>        | <b>2025/04/11</b>            |
| <b>Revision</b>    | <b>1.0</b>                   |

|  | Design Engineering  |   |   |
|--|---|---|---|
|  | Approval  | Check   | Design  |
|  |  |  |  |

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## 1. General Description

### 1.1 Over View

GDEH0576T81 is an Active Matrix Electrophoretic Display (AMEPD), with interface and a reference system design. The 5.76" active area contains 920\*680 pixels, and has B/W full display capabilities. An integrated circuit contains gate buffer, source buffer, interface, timing control logic, oscillator, DC-DC,SRAM, LUT, VCOM and border are supplied with each panel.

### 1.2 Features

- 920\*680 pixels display
- High contrast & High reflectance
- Ultra wide viewing angle
- Ultra low power consumption
- Pure reflective mode
- Bi-stable display
- Commercial temperature range
- Landscape, portrait modes
- Hard-coat antiglare display surface
- Ultra Low current deep sleep mode
- On chip display RAM
- Low voltage detect for supply voltage
- High voltage ready detect for driving voltage
- Internal temperature sensor
- Waveform stored in On-chip OTP
- 10-byte OTP space for module identification
- Serial peripheral interface available
- On-chip oscillator
- On-chip booster and regulator control for generating VCOM, Gate and Source driving voltage
- I2C signal master interface to read external temperature sensor/ built-in temperature sensor

### 1.3 Mechanical Specifications

| Parameter           | Specifications           | Unit  | Remark   |
|---------------------|--------------------------|-------|----------|
| Screen Size         | 5.76                     | Inch  |          |
| Display Resolution  | 920(H)×680(V)            | Pixel | Dpi: 198 |
| Active Area         | 117.668(H)×86.972 (V)    | mm    |          |
| Pixel Pitch         | 0.1279×0.1279            | mm    |          |
| Pixel Configuration | Rectangle                |       |          |
| Outline Dimension   | 125.4(H)×99.5(V) ×0.9(D) | mm    |          |
| Weight              | 28.08±0.5                | g     |          |



## 1.5 Input/Output Terminals

| Pin # | Single | Description                                    | Remark                     |
|-------|--------|--|----------------------------|
| 1     | NC     | No connection and do not connect with other NC | Keep Open                  |
| 2     | GDR    | This pin is N-MOS gate control.                |                            |
| 3     | RESE   | Current sense input for control loop.          |                            |
| 4     | NC     | No connection and do not connect with other NC | Keep Open                  |
| 5     | VSH2   | Positive source voltage for Red                |                            |
| 6     | TSCL   | I2C clock for external temperature sensor      | Connect to GND if not used |
| 7     | TSDA   | I2C data for external temperature sensor       | Connect to GND if not used |
| 8     | BS     | Input interface setting.                       | Note 5-5                   |
| 9     | BUSY_N | This pin indicates the driver status.          | Note 5-4                   |
| 10    | RST_N  | Global reset pin                               | Note 5-3                   |
| 11    | DC     | Serial communication Command/Data input        | Note 5-2                   |
| 12    | CSB    | Serial communication chip select.              | Note 5-1                   |
| 13    | SCL    | Serial communication clock input.              |                            |
| 14    | SDA    | Serial communication data input.               |                            |
| 15    | VDDIO  | IO voltage supply                              |                            |
| 16    | VCC    | Digital/Analog power.                          |                            |
| 17    | VSS    | Digital ground                                 |                            |
| 18    | VDD    | 1.5V voltage input & output                    |                            |
| 19    | VPP    | OTP program power (10V)                        |                            |
| 20    | VSH1   | Positive source voltage                        |                            |
| 21    | VGH    | Positive gate voltage                          |                            |
| 22    | VSL    | Negative source voltage.                       |                            |
| 23    | VGL    | Negative gate voltage.                         |                            |
| 24    | VCOM   | VCOM driving voltage                           |                            |

Note 1.5-1: This pin (CSB) is the chip select input connecting to the MCU. The chip is enabled for MCU communication: only when CSB is pulled LOW.

Note 1.5-2: This pin (DC) is Data/Command control pin connecting to the MCU. When the pin is pulled HIGH, the data will be interpreted as data. When the pin is pulled LOW, the data will be interpreted as command.

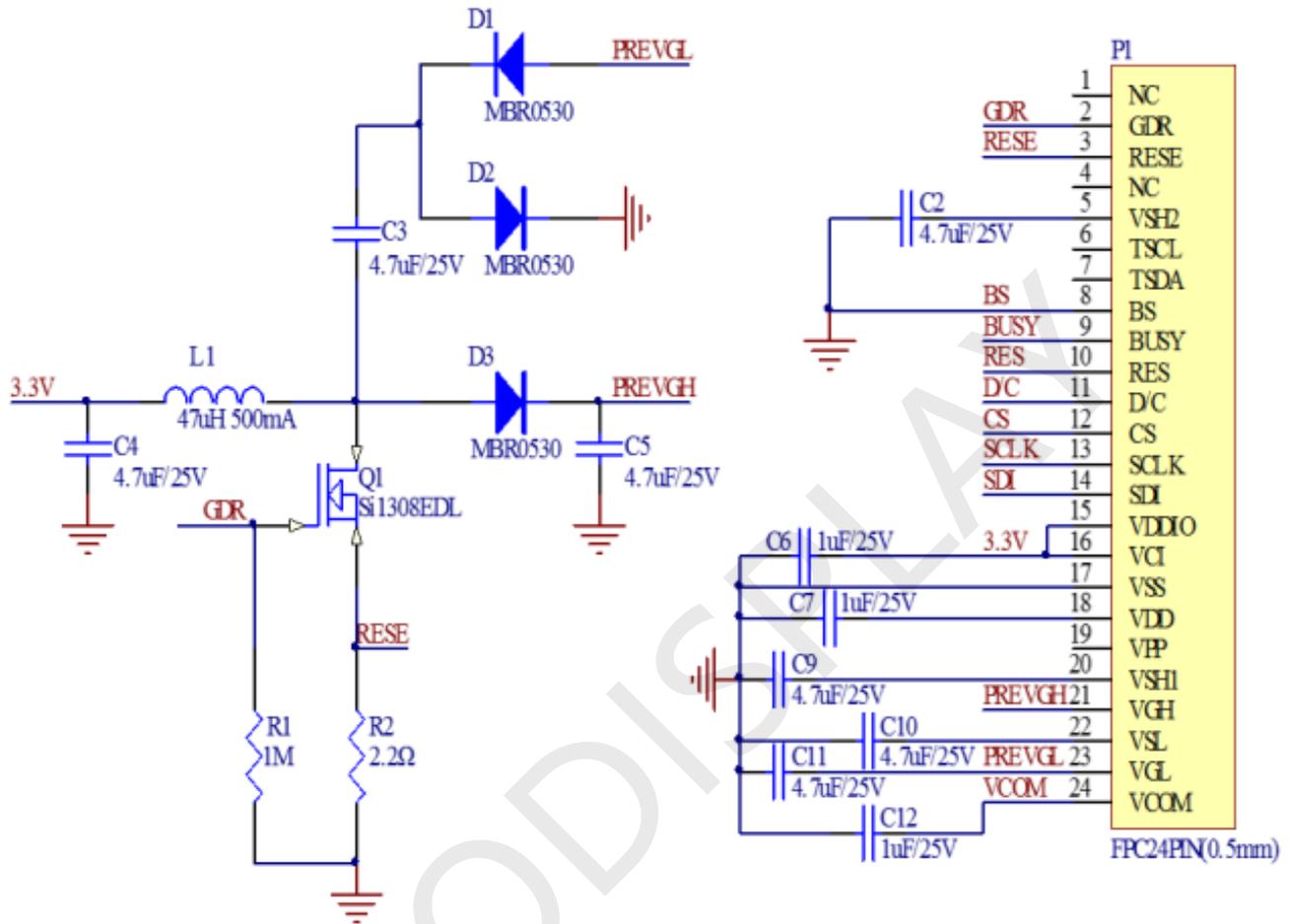
Note 1.5-3: This pin (RST\_N) is reset signal input. The Reset is active low.

Note 1.5-4: This pin (BUSY\_N) is busy state output pin. When Busy is High, the operation of chip should not be interrupted and any commands should not be issued to the module. The driver IC will put Busy pin High when the driver IC is working such as: Outputting display waveform; Communicating with digital temperature sensor

Note 1.5-5: This pin (BS) is for 3-line SPI or 4-line SPI selection. When it is "Low", 4-line SPI is selected. When it is "High", 3-line SPI (9 bits SPI) is selected.

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### 1.6 Reference Circuit



| Part Name | Requirements for spare part   |
|-----------|---|
| C1—C12    | 0603/0805; X5R/X7R; Voltage Rating: $\geq 25V$  |
| R1、R2     | 0603/0805; 1% variation, $\geq 0.05W$   |
| D1—D3     | MBR0530: 1) Reverse DC Voltage $\geq 30V$ 2) $I_o \geq 500mA$ 3) Forward voltage $\leq 430mV$                     |
| Q1        | Si1308EDL: 1) Drain-Source breakdown voltage $\geq 30V$ 2) $V_{gs(th)} \leq 1.5V$ 3) $R_{ds(on)} \leq 400m\Omega$ |
| L1        | refer to NR3015: $I_o = 500mA(max)$   |
| P1        | 24pins, 0.5mm pitch   |

## 1.7 Matched Development Kit

Our Development Kit designed for SPI E-paper Display aims to help users to learn how to use E-paper Display more easily. It can refresh black-white E-paper Display and three-color (black, white and red/Yellow) Good Display 's E-paper Display. And it is also added the functions of USB serial port, Raspberry Pi and LED indicator light ect. DESPI Development Kit consists of the development board and the pinboard.

More details about the Development Kit, please click to the following link:

<https://www.good-display.com/product/53/>

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## 2. Electrical Characteristics

### 2.1 Absolute Maximum Rating

| Parameter                        | Symbol    | Rating   | Unit | Humidity | Unit | Note              |
|----------------------------------|-----------|----------|------|----------|------|-------------------|
| Logic Supply voltage             | VCC,VDDIO | -0.5~6.0 | V    | 45~70    | %RH  | Note 3-1          |
| Operation temperature range      | TOPR      | 0~50     | ℃    | 45~70    | %RH  |                   |
| Storage temperature range        | TSTG      | -25~60   | ℃    | 45~70    | %RH  | Note 3-2          |
| Transportation temperature range | TTTG      | -25~60   | ℃    | 45~70    | %RH  | Note 3-3          |
| GND                              | Ground    | -        | -    |          | -    | Connect to Ground |

**Table 3.1-1: Maximum Ratings**

Note 2 -1: Maximum ratings are those values beyond which damages to the device may occur. VCC: Digital power, VDDIO: IO power. Functional operation should be restricted to the limits in the Electrical Characteristics chapter.

Note 2 -2: The display effect may be affected if the product is stored for more than 10days under the environment of 40-60 degree.

Note 2 -3: TTTG is the transportation condition, the transport time is within 10 days for -25℃~0℃ or 40℃~60℃

Note 2 -4: The single pixel effect under the condition of above 35 degree cannot be guaranteed.

### 2.2 DC CHARACTERISTICS

The following specifications apply for: VSS=0V, VCC=3.0V, TOPR=25±2℃.

**Table 2 .2-1: DC Characteristics**

| Symbol  | Parameter                 | Test Condition | Applicable pin  | Min.     | Typ. | Max.     | Unit |
|---------|---------------------------|----------------|-----------------|----------|------|----------|------|
| VCC     | VCC operation voltage     | -              | VCC             | 2.4      | 3.0  | 3.6      | V    |
| VIH     | High level input voltage  | -              | SDA, SCL, CS#,  | 0.8VDDIO | -    | -        | V    |
| VIL     | Low level input voltage   | -              | D/C#, RES#, BS1 | -        | -    | 0.2VDDIO | V    |
| VOH     | High level output voltage | IOH = -100uA   | BUSY,           | 0.9VDDIO | -    | -        | V    |
| VOL     | Low level output voltage  | IOL = 100uA    |                 | -        | -    | 0.1VDDIO | V    |
| Iupdate | Module peak current       | TEMP = 25℃     | -               | -        | 25   | -        | mA   |
| Isleep  | Deep sleep mode           | VCC=3.0V       | -               | -        | 1    | 3        | uA   |

### 2.3 Power Consumption

| Parameter                             | Symbol | Conditions | TYP | Max | Unit | Remark |
|---------------------------------------|--------|------------|-----|-----|------|--------|
| Panel power consumption during update | -      | 25℃        | -   | 600 | mAs  | -      |

mAs=update average current×update time

### 3. Optical characteristics

#### 3.1 Specifications

Measurements are made with that the illumination is under an angle of 45 degrees, the detection is perpendicular unless otherwise specified.

T=25°C

| SYMBOL     | PARAMETER            | CONDITIONS | MIN | TYP. | MAX | UNIT | Note     |
|------------|----------------------|------------|-----|------|-----|------|----------|
| $\Delta E$ | ghosting             | -          | -   | -    | 2   |      | -        |
| <b>BS</b>  | Black State L* value |            | -   | -    | 20  |      | Note 4-1 |
| WS         | White State L* value |            | 66  | -    | -   |      | Note 4-2 |

Note 4-1: Luminance meter: Eye - One Pro Spectrophotometer

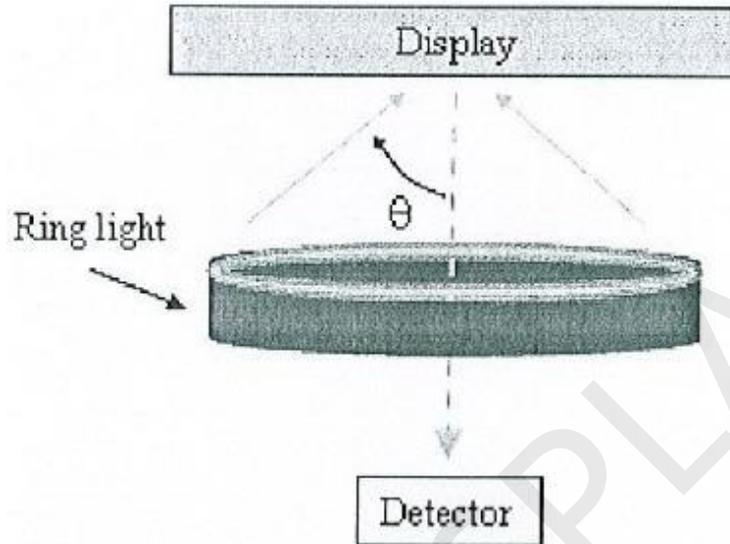
Note 4-2: We don't guarantee 5 years pixels display quality for humidity below 45%RH or above 70%RH; Suggest Updated once a day;

Note 4-3: To increase the black and white screen clear screen when red has refreshed for a long time, the effect is better.

### 3.2 Definition of contrast ratio

The contrast ratio (CR) is the ratio between the reflectance in a full white area (Rl) and the reflectance in a dark area (Rd):

Rl: white reflectance    Rd: dark reflectance     $CR = Rl/Rd$

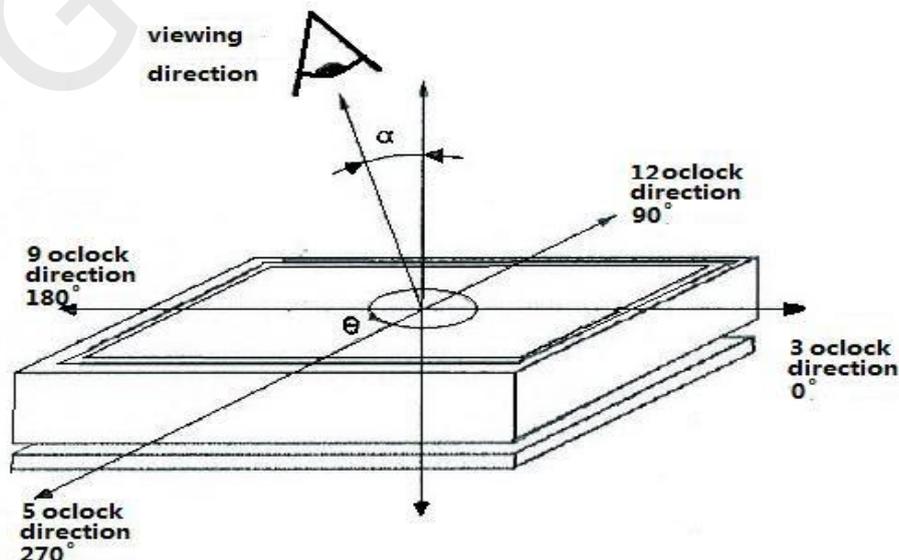


### 3.3 Reflection Ratio

The reflection ratio is expressed as:

$R = \text{Reflectance Factor white board} \times (L_{\text{center}} / L_{\text{white board}})$

$L_{\text{center}}$  is the luminance measured at center in a white area ( $R=G=B=1$ ).  $L_{\text{white board}}$  is the luminance of a standard white board. Both are measured with equivalent illumination source. The viewing angle shall be no more than 2 degrees.



#### 4. Point and line standard

| Shipment Inspection Standard                    |   |  |               |             |        |             |
|---|---|--|---------------|-------------|--------|-------------|
| Equipment: Electrical test fixture, Point gauge |   |  |               |             |        |             |
| Outline dimension                               | 125.4(H)×99.5(V)<br>×0.9 (D)                              | Unit: mm   | Part-A        | Active area | Part-B | Border area |
| Environment                                     | Temperature   | Humidity   | illuminance 8 | Distance    | Time   | Angle       |
|   | 19°C~25°C   | 50±5%RH  | 00~1300Lux    | 300 mm      | 35Sec  | 45 °        |
| Defect type                                     | Inspection method   | Standard   |               | Part-A      | Part-B |             |
| Spot  | Electric Display  | D≤0.2 mm   |               | Ignore      | Ignore |             |
|   |   | 0.2 mm < D ≤ 0.4 mm  |               | N≤4         | Ignore |             |
|   |   | 0.4 mm < D ≤ 0.6 mm  |               | N≤1         | Ignore |             |
|   |   | D > 0.6 mm   |               | Not Allow   | Ignore |             |
| Display malfunction                             | Electric Display  | Not Allow  |               | Not Allow   | Ignore |             |
| Display error                                   | Electric Display  | Not Allow  |               | Not Allow   | Ignore |             |
| Scratch or line defect(include dirt)            | Visual/Film card  | L≤2 mm, W≤0.1 mm   |               | Ignore      | Ignore |             |
|   |   | 2.0mm < L ≤ 9.0mm, 0.1 < W ≤ 0.2mm,                                  |               | N≤2         | Ignore |             |
|   |   | L > 9 mm, W > 0.2 mm   |               | Not Allow   | Ignore |             |
| PS Bubble                                       | Visual/Film card  | D≤0.4mm  |               | Ignore      | Ignore |             |
|   |   | 0.4mm < D ≤ 0.6mm  |               | N≤4         | Ignore |             |
|   |   | D > 0.6 mm   |               | Not Allow   | Ignore |             |
| Corner /Edge chipping                           | Visual/Film card  | X≤6mm, Y≤0.4mm, Do not affect the electrode circuit (Edge chipping)  |               |             |        |             |
|   |   | X≤1mm, Y≤1mm, Do not affect the electrode circuit( (Corner chipping) |               |             |        |             |
| TFT warping                                     | For 1.54~7.5inch, T≤2mm; For above 7.5inch, T≤3mm         |  |               |             |        |             |
| Remark  | 1. Cannot be defect & failure cause by appearance defect; |  |               |             |        |             |
|   | 2. Cannot be larger size cause by appearance defect;      |  |               |             |        |             |
|   | L=long    W=wide    D=point size    N=Defects NO          |  |               |             |        |             |



## 5. Environmental

### 5.1 Handling, Safety and Environmental Requirements

|                |
|----------------|
| <b>WARNING</b> |
|----------------|

|  |
|--|
| 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. |
|--|

|                |
|----------------|
| <b>CAUTION</b> |
|----------------|

|  |
|--|
| 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 invalidate the warranty agreements. |
|---|

|   |
|---|
| IPA solvent can only be applied on active area and the back of a glass. For the rest part, it is not allowed. |
|---|

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 electricity and other rough environmental conditions.

|                             |
|-----------------------------|
| <b>Mounting Precautions</b> |
|-----------------------------|

|   |
|---|
| (1) It's recommended that you consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module. |
|---|

|   |
|---|
| (2) It's recommended that you attach a transparent protective plate to the surface in order to protect the EPD. Transparent protective plate should have sufficient strength in order to resist external force. |
|---|

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|--|
| (3) You should adopt radiation structure to satisfy the temperature specification. |
|--|

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|--|
| (4) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the PS at high temperature and the latter causes circuit break by electro-chemical reaction. |
|--|

|  |
|--|
| (5) Do not touch, push or rub the exposed PS with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of PS for bare hand or greasy cloth. (Some cosmetics deteriorate the PS) |
|--|

|  |
|--|
| (6) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach the PS. Do not use acetone, toluene and alcohol because they cause chemical damage to the PS. |
|--|

|   |
|---|
| (7) Wipe off saliva or water drops as soon as possible. Their long time contact with PS causes deformations and color fading. |
|---|

|                       |   |
|-----------------------|---|
| Product specification | The data sheet contains final product specifications. |
|-----------------------|---|

| <b>Limiting values</b>   |
|--|
| Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability. |
| <b>Application information</b>   |
| Where application information is given, it is advisory and does not form part of the specification.  |

| <b>Product Environmental certification</b>  |
|---|
| ROHS  |
| <b>REMARK</b>   |
| All The specifications listed in this document are guaranteed for module only. Post-assembled operation or component(s) may impact module performance or cause unexpected effect or damage and therefore listed specifications is not warranted after any Post-assembled operation. |

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## 5.2 Reliability test

|    | TEST   | CONDITION  | METHOD                      | REMARK |
|----|--|--|-----------------------------|--------|
| 1  | High-Temperature Operation                   | T=40°C, RH=35%RH, For 240Hr  |                             |        |
| 2  | Low-Temperature Operation                    | T = 0°C for 240 hrs  |                             |        |
| 3  | High-Temperature Storage                     | T=60°C RH=35%RH For 240Hr<br>Test in white pattern   |                             |        |
| 4  | Low-Temperature Storage                      | T = -25°C for 240 hrs<br>Test in white pattern   |                             |        |
| 5  | High Temperature,<br>High-Humidity Operation | T=40°C, RH=90%RH, For 168Hr  |                             |        |
| 6  | High Temperature,<br>High-Humidity Storage   | T=60°C, RH=80%RH, For 240Hr<br>Test in white pattern   |                             |        |
| 7  | Temperature Cycle                            | -25°C(30min)~70°C(30min), 50<br>Cycle<br>Test in white pattern   |                             |        |
| 8  | Package Vibration                            | 1.04G,Frequency : 10~500Hz<br>Direction : X,Y,Z<br>Duration: 1 hours in each direction                               | Full packed for<br>shipment |        |
| 9  | Package Drop Impact                          | Drop from height of 100 cm on<br>Concrete surface<br>Drop sequence: 1 corner, 3edges,<br>6face<br>One drop for each. | Full packed for<br>shipment |        |
| 10 | UV exposure<br>Resistance                    | 765 W/m <sup>2</sup> for 168hrs,40°C   |                             |        |

Actual EMC level to be measured on customer application.

Note1: Stay white pattern for storage and non-operation test.

Note2: Power off duration time is 30s.

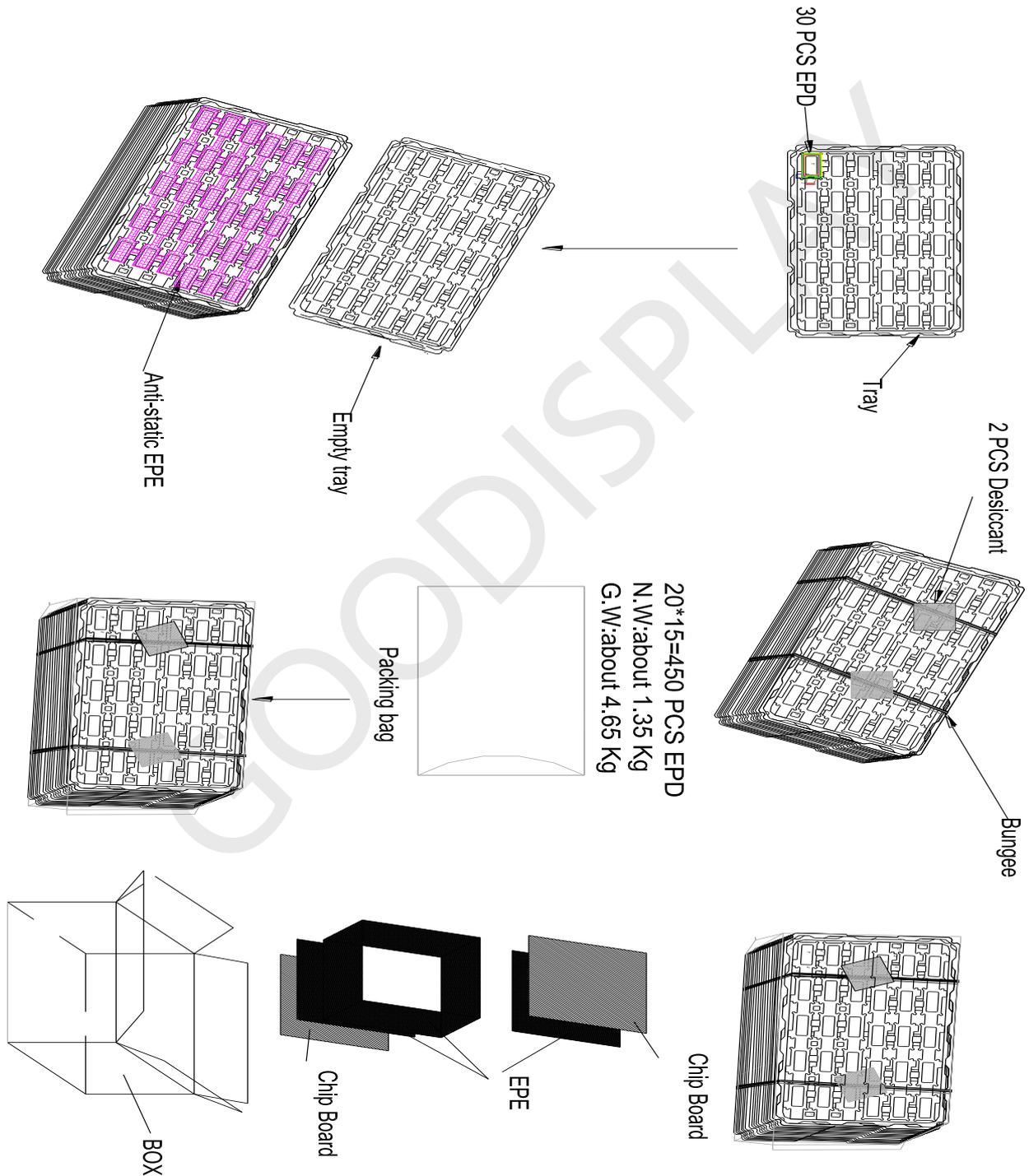
Note3: The function, appearance, optical should meet the requirements of the test before and after the test.

Note4: Continue testing after 2 hours at 20C~25C°C.

## 6. Packing

Full carton: 12 pcs tray with products and 1 pcs empty tray.

Last carton: less 12pcs tray with products and 1 pcs empty tray. The packager will add the right amount of EPE to box so that the added EPE' s height approximately close to the EPE height around the inside of the box.



## 7. Precautions

- (1) Do not apply pressure to the EPD panel in order to prevent damaging it.
- (2) Do not connect or disconnect the interface connector while the EPD panel is in operation.
- (3) Do not touch IC bonding area. It may scratch TFT lead or damage IC function.
- (4) Please be mindful of moisture to avoid its penetration into the EPD panel, which may cause damage during operation.
- (5) If the EPD Panel / Module is not refreshed every 24 hours, a phenomena known as "Ghosting" or "Image Sticking" may occur. It is recommended to refreshed the ESL / EPD Tag every 24 hours in use case. It is recommended that customer ships or stores the ESL / EPD Tag with a completely white image to avoid this issue
- (6) High temperature, high humidity, sunlight or fluorescent light may degrade the EPD panel's performance. Please do not expose the unprotected EPD panel to high temperature, high humidity, sunlight, or fluorescent for long periods of time.
- (7) For more precautions, please click on the link:  
<https://www.good-display.com/news/80.html>

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