# PRODUCT SPECIFICATION

## 1.3” Rotating Button LCD MODULE
## MODEL: ETD46-T013240240 Ver:1.0

ROHS

< ◇ > Preliminary Specification

< ◆ > Finally Specification

| CUSTOMER’S APPROVAL | |
|---|---|
| CUSTOMER : | |
| SIGNATURE: | DATE: |
| | |

| APPROVED BY | PM REVIEWED | PD REVIEWED | PREPARED BY |
|---|---|---|---|
| | | | |

## Revision History

| Revision | Date | Originator | Detail | Remarks |
|---|---|---|---|---|
| Ver 1.0 | 2022.03.10 | ZFY | Initial Release | |
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# 1 General Description

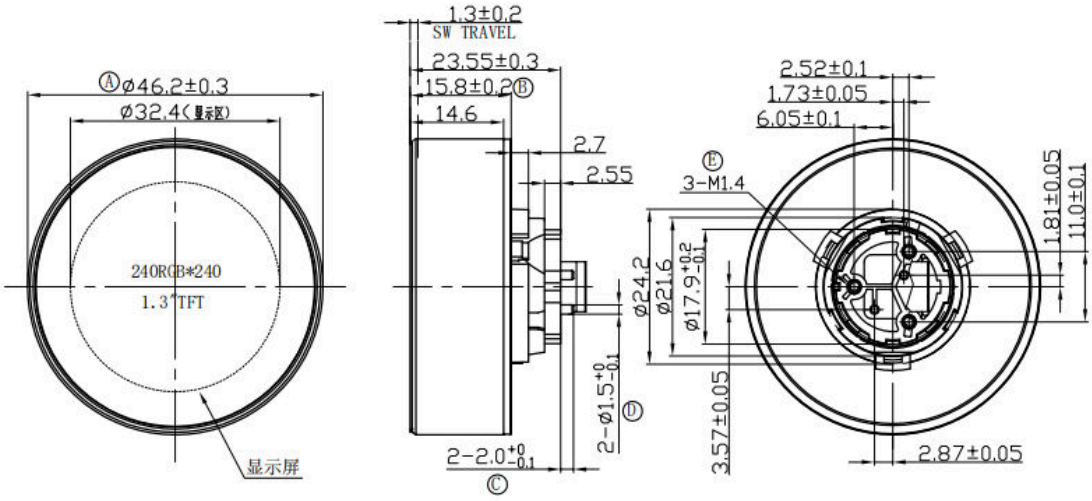
Basing on M0 IC development platform, ETD46 is a Rotating Button TFT display Module with serial communication. Through the optimization algorithm to speed up the communication between main chip, screen and encoder switch, increase the refresh rate and display effect. The module has superior reliability and excellent experience feeling of manipulation, because of its innovative structure and exquisite workmanship. It is used in household electric appliance, intelligent home, automobile console, beauty equipment, industrial control and other button type control application scenario.

| | |
|---|---|
| Interface | IIC or SPI or UART |
| Display Size | 1.3” |
| Display Mode | IPS |
| Resolution | 240RGB*240 |
| Memory system | 128M bit Flash (customizable) |
| Operation type | Rotate & press |
| LED | Bottom RGB LED (customizable) |
| UI design | customizable |
| Product Appearance | aluminium alloy with anodizing and sandblasting;<br>Black or White;<br>Cover lens 2.5D or 2.0D |

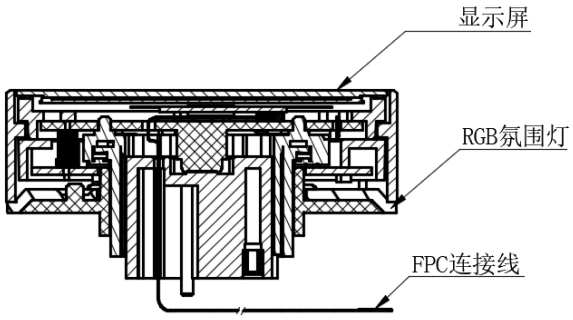
# 2 Technical Information

## 2.1 Appearance picture


## 2.2 Outline Drawing



## 2.3 Basic Structure




## 2.4 Interface Pins Definition

| No. | Symbol | Function | Remark |
|---|---|---|---|
| 1 | 5V | Power supply | 4.5~9V ， typ：5V/100mA |
| 2 | GND | Ground | |
| 3 | THS | Software Burning pin | 3.3V |
| 4 | TCK | Software Burning pin | 3.3V |
| 5 | TX | Data Out | 5V |
| 6 | RX | Data Input | 5V |

## 2.5 Technical Parameters

### 2.5.1 Basic Parameters

| Features | Details | Remark |
|---|---|---|
| Operating Voltage | 4.5V～9V, typ：5V | |
| Current Consumption | 50mA～150mA, typ：100mA | |
| Color | 65K | |
| Resolution | 240（W）*240（H） | |
| Luminance | 300±10%cd/m$^2$ | |
| View Direction | ALL | |
| Operating Temperature | -20℃～70℃/96H | |
| Storage Temperature | -30℃～80℃/96H | |

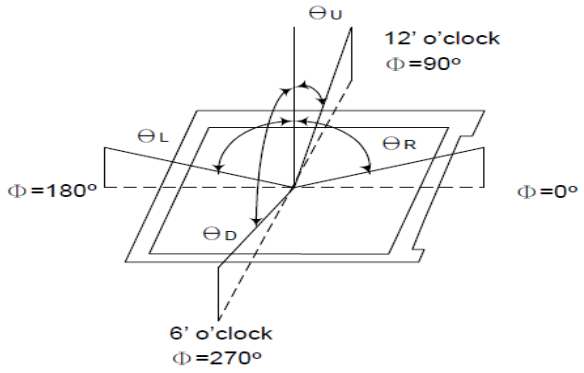
2.5.2 Optical Property

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|
| Contrast Ratio | C/R | θ = 0° | 900 | 1100 | - | - | Note(4) |
| NTSC Ratio | S | θ =0° | 55 | 60 | - | % | Note(7) |
| Luminance | L | θ =0° | 400 | 450 | - | cd/m2 | Note(5) |
| Luminance uniformity | UW | θ =0° | 70 | 80 | - | % | Note(3) |
| Response Time | TR+ TF | 25 °C | - | 30 | 40 | ms | Note(2) |
| Color Coordination | WX | θ = 0° (Center) Normal viewing angle B/L On | -0.04 | 0.29 | +0.02 | NTSC (x,y) | Note(6) |
| | WY | | | 0.32 | | | |
| | RX | | | 0.644 | | | |
| | RY | | | 0.332 | | | |
| | GX | | | 0.323 | | | |
| | Gy | | | 0.565 | | | |
| | BX | | | 0.134 | | | |
| | BY | | | 0.124 | | | |
| Viewing Angle | θ L | C/R>10 | 80 | 85 | - | Degree | Note(1) |
| | θ R | | 80 | 85 | - | | |
| | θ U | | 80 | 85 | - | | |
| | θ D | | 80 | 85 | - | | |

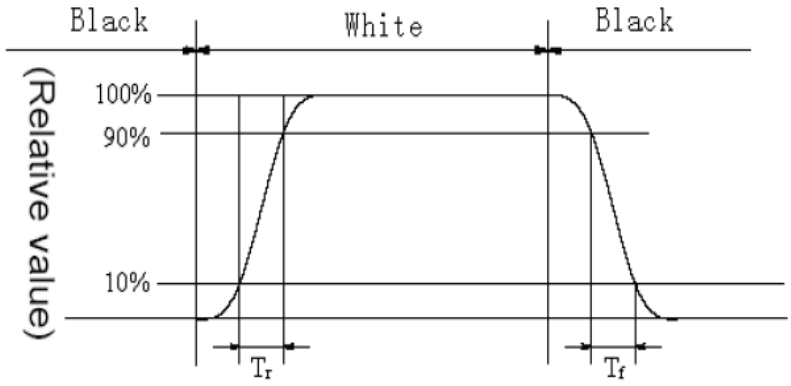
Test Conditions:

1. VDD=3.3V, IF=20mA (Backlight current), the ambient temperature is+25℃.
2. The test systems refer to Note 8.

**Note1:** Definition of Viewing Angle: The viewing angle range that the CR>10

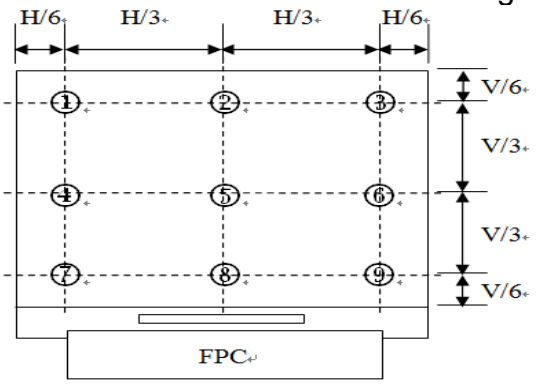



**Note2:** Definition of Response time: Sum of TR and TF




**Note 3:** Definition of Luminance Uniformity: Active area is divided into 9 measuring areas, every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity} = \frac{\text{Min Luminance of white among 9-points}}{\text{Max Luminance of white among}} \times 100\%$$




**Note4:** Definition of Contrast Ratio (CR): measured at the center point of panel

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

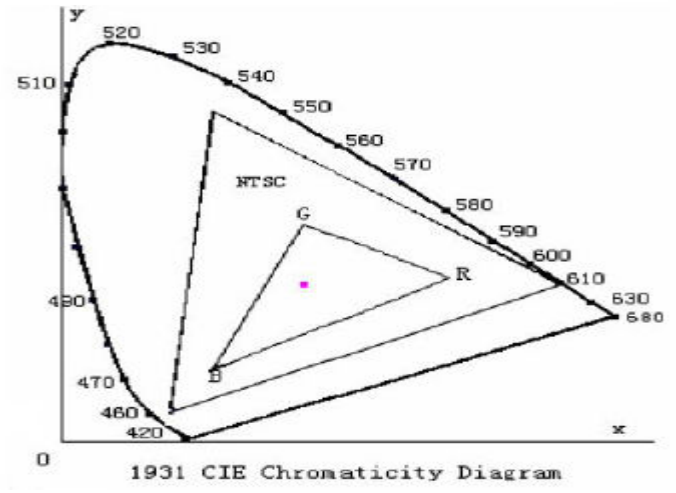
**Note 5:** Definition of Luminance: Center Luminance of white is defined as luminance values of 1point average across the LCD surface.

**Note 6:** Definition of Color Chromaticity (CIE 1931)

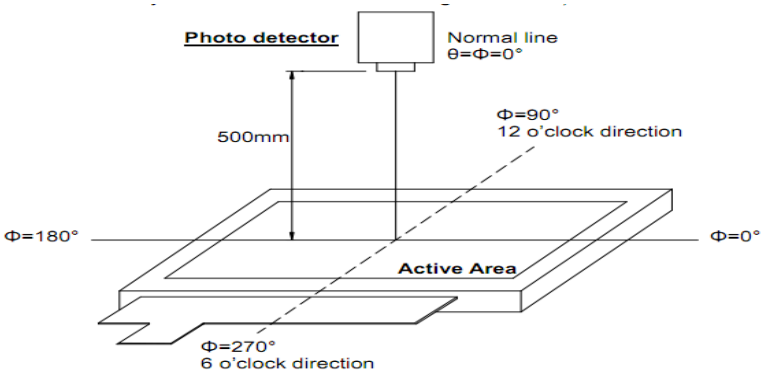
Color coordinates of white & red, green, blue measured at center point of LCD.

**Note 7:** Definition of NTSC ratio:

$$\text{NTSC ratio} = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}}$$




**Note 8:** Definition of optical measurement system.
The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen.(Response time is measured by Photo detector TOPCON BM-7, Field of view: 1°/Height: 500mm.)




### 2.6 Reliability

| Item | Test Condition | SPECIFICATIONS |
|---|---|---|
| Insulation Impedance | 250V DC, 1 minute, between the metal outer button and the base. | The impedance (between the metal outer button and the base) ≥100MΩ |
| Rated Voltage | 300V AC, 1 minute, between the metal outer button and the base. | No insulation damage |
| Rotation Angle | | 360° (without obstruction) |
| Rotation Torque | | 15±7mN.m (150±70gf.cm) |
| Number and position of the setpoints | | 30 setpoints (angular spacing =12°±2°) |

<table>
<tr><td>Axial Compression Strength</td><td>At the axial end, apply a static force of 5Kgf along the axial direction and press down for 10 seconds (the screw is fixed on the surface shell).</td><td>No shaft damage, no abnormal press, no abnormal electrical performance.</td></tr>
<tr><td>Axial Pulling Strength</td><td>At the axial end, apply a static force of 5Kgf along the axial direction and pull up for 10 seconds (the screw is fixed on the surface shell).</td><td>No shaft damage, no abnormal press, no abnormal electrical performance.</td></tr>
<tr><td>Working Life of Rotating</td><td>30,000 revolutions at 600~1000 cycles per hour under no pressure (1 cycle refers to 360° clockwise and 360° counterclockwise).</td><td>The torque is -50%~+10% of the initial value.<br>The Rotating Button display and adjustment are normal after power on.</td></tr>
<tr><td>High Humidity Storage</td><td>60±3℃, 90~95%%RH, 96±4Hrs<br>Before function test and visual inspection, the product must have enough recovery time, at least 1.5 hours in normal temperature and humidity.</td><td>No defection of cosmetic and operational function allowable.</td></tr>
<tr><td>High Temperature Storage</td><td>70±3℃, 96±4Hrs<br>Before function test and visual inspection, the product must have enough recovery time, at least 1.5 hours in normal temperature and humidity.</td><td>No defection of cosmetic and operational function allowable.</td></tr>
<tr><td>Thermal Cycling Test Storage</td><td><table><tr><th>Step</th><th>Temperature</th><th>Duration</th></tr><tr><td>1</td><td>-20℃</td><td>0.5 hour</td></tr><tr><td>2</td><td>Standard atmospheric temperature conditions</td><td>0.5 hour</td></tr><tr><td>3</td><td>70℃</td><td>0.5 hour</td></tr><tr><td>4</td><td>Standard atmospheric temperature conditions</td><td>0.5 hour</td></tr><tr><td colspan="3">Test cycle： 5 cycles</td></tr></table>Before function test and visual inspection, the product must have enough recovery time, at least 1.5 hours in normal temperature and humidity.</td><td>No defection of cosmetic and operational function allowable.</td></tr>
<tr><td>Pressure on the Rotating Button</td><td>The maximum value of the pressure that press on the cover lens along the axial until it doesn’t move.</td><td>250±80gf</td></tr>
<tr><td>Movement of pressing Rotating Button</td><td>The product is fixed on the cover plate, and then double pressure on it. Measure the distance of the rotating button moving until it stops moving.</td><td>1.3±0.2 mm</td></tr>
<tr><td>Working Life of Pressing</td><td>When the product is fixed, apply axial pressure of 300gf to it until pressing to the end, and then release it to return freely.<br>Press 1500-1800 times per hour.</td><td>The pressure is -50%~+10% of the initial value.<br>The Rotating Button display and adjustment are normal after power on.</td></tr>
</table>

### 2.7 Precautions for Operation

1) Never use the LCM under abnormal condition of high temperature and high humidity.

2) If possible, we suggest customer to use up all modules in six months.After unpacking, the unused modules should be stored in a moisture-proof and anti-gas environment.

3) The module will fail when working at high temperature for a long time.

4) On the main control board there are many electrostatic sensitive components especially main control chips. So the operator must wear the anti-ESD ring during operation.

5) The voltage of the DC power supply is less than 8V during the test, to prevent the IC is breakdown or damage by surge current when the power on.

## 3 Transport and Storage

### 3.1 Transport Requirement

1) During the transportation, carton can't be affected with damp, can’t wet or damaged.

2) Avoid heavy falls or heavy loads during transportation or handling, to avoid the pin damage or deformation

### 3.2 Storage Conditions

1) Natural ventilation, Temperature:15℃～+25℃, Humidity:40%-65%, No acid, alkali or other harmful gas in the environment.

2) Every stack height is not more than 5 cases in the process of storage and transportation.

| Item | Normal Parameter | Absolute Rating | Material Status | Note |
|---|---|---|---|---|
| Temperature | 25℃ | 85℃ | Normal | |
| Humidity | 65% | 95% | Normal | |