

## **SPECIFICATION APPROVAL SHEET**

8" TFT LOOSE KIT WITH FLANGES  
800\*600 200NITS VGA/ Video  
+4W RTP(USB) Operation Temperature -10 ~ +60

**MODEL: FCOP0800-TR**

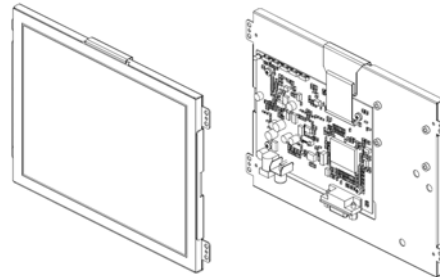


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# FLAT DISPLAY TECHNOLOGY

## *8" Digital TFT-LCD Module*



### **1. General Descriptions**

#### **1.1 Features**

- 8" Digital TFT LCD
- Ultra Compact
- NTSC/PAL/SECAM Video Auto Switch
- Single Operation Voltage +12V
- CVBS / Analog RGB (PC Mode) Signal Input
- All Functions can be controlled by UART
- Support Touch Screen Function (Option)
- Built-in EDID Function

#### **1.2 Applications**

- Portable product
- Industrial
- Hand-held
- Security
- Instrument Display
- Office Electronics

#### **1.3 Application Precautions**

Do not use the products herein for the following equipment which demands extremely high performance in terms of functionality, reliability, or accuracy.

- Aerospace equipment
- Communication equipment for trunk lines.
- Control equipment for the nuclear power industry.
- Medical equipment related to life support, etc.

The other application that demands high reliability and functionality should first contact a sales representative.



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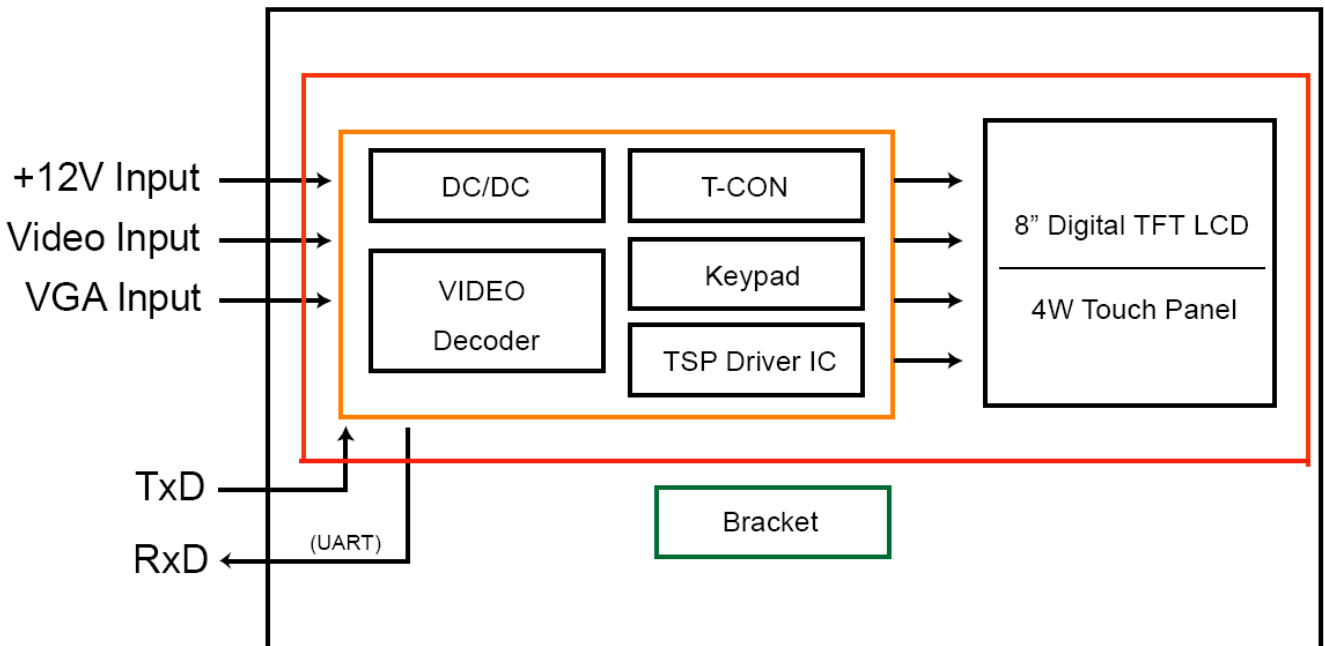


### 3. Specifications

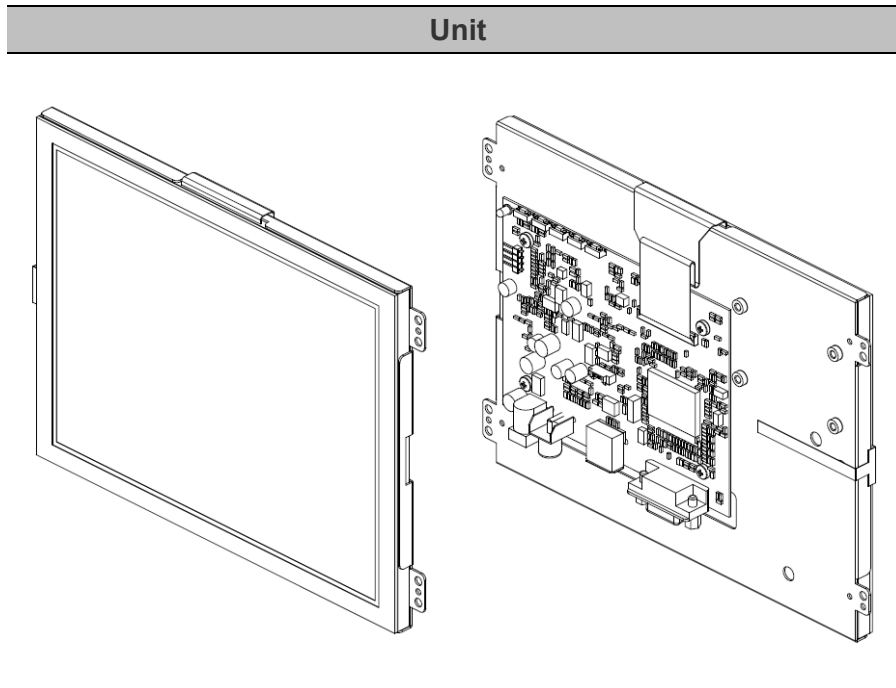
| Parameter  | Specifications                    |                   |               |
|--|-----------------------------------|-------------------|---------------|
| <b>Panel Size</b>  | 8"                                |                   |               |
| <b>Resolution (Pixels)</b>                                   | 800 x 600                         |                   |               |
| <b>Luminance without RTP</b>                                 | 250 cd/m <sup>2</sup>             |                   |               |
| <b>Luminance (RTP)</b>                                       | 200 cd/m <sup>2</sup>             |                   |               |
| <b>Contrast Ratio</b>  | 500                               |                   |               |
| <b>View Angle</b>  | 70 / 70 / 70 / 50                 |                   |               |
| <b>LED Life Time</b>   | 20K (Min)                         |                   |               |
| <b>Power Input (DC Jack 2.1 φ)</b>                           | +12V DC                           |                   |               |
| <b>Power Consumption@+12V</b>                                | 4.32 Watts                        |                   |               |
| <b>Resistive Type</b>  | USB / RS232 Interface             |                   |               |
| <b>Resistive Type Support OS</b>                             | Windows / Linux / DOS / Mac / QNX |                   |               |
| <b>Input Signal System</b>                                   | CVBS / Analog RGB (VGA)           |                   |               |
| <b>Input Video System</b>                                    | NTSC / PAL                        |                   |               |
| <b>Key</b>   | 5 Buttons                         |                   |               |
| <b>Serial Remote Control</b>                                 | UART / RS232 (Option)             |                   |               |
| <b>Temperature Range</b>                                     |                                   | <b>Without TP</b> | <b>4W RTP</b> |
|  | <b>Operating</b>                  | -20~ +60°C        | -10~ +60°C    |
|  | <b>Storage</b>                    | -20~ +70°C        | -20~ +70°C    |
| <b>High Temperature &amp; High Humidity (Non-condensing)</b> | <b>Operating</b>                  | +40°C / 90%       | +40°C / 90%   |

### 4. Block Diagram

#### 4.1 Block Diagram



**5.1 Unit (4W Touch)**



| Parameter   | FCOP0800-TR  | Unit |
|---|--------------|------|
| CVBS  | 1            |      |
| VGA (D-Sub15 / 2.0mm 14Pin)                           | D-Sub15      |      |
| Touch Panel Type                                      | 4W Resistive |      |
| Touch Screen Interface                                | USB          |      |
| AC to DC Adapter 12V/3.3A<br>(LASTD12033-FDR)         | ☉            |      |
| Power Cord<br>Plug Type B for USA<br>(LAAC818000-FDR) | ☉            |      |
| Video Cable<br>(LAVDO18000-FDR)                       | ☉            |      |
| VGA Cable<br>(LAVGA18000-FDR)                         | ☉            |      |
| USB Cable<br>(LAUSB18000-FDR)                         | -            |      |
| RS-232 Cable<br>(LARS218000-FDR)                      | ☉            |      |
| Touch Screen Driver CD Disk                           | ☉            |      |

**Note:** The assembling of panel and bracket is aimed for delivery, packaging and experiment. If the demand of shockproof and long-term fix, pls. have it into consideration of mechanism design.



## 6. Accessories

Before you begin installing the KIT, please make sure that the following materials have been shipped:



A. LASTD12033-FDR



B. LAACD18000-FDR



C. LACABLE068-FDR



D. LAVGA18000-FDR



E. LAUSB18000-FDR



F. LARS218000-FDR



G. LAVCD00002-FDR

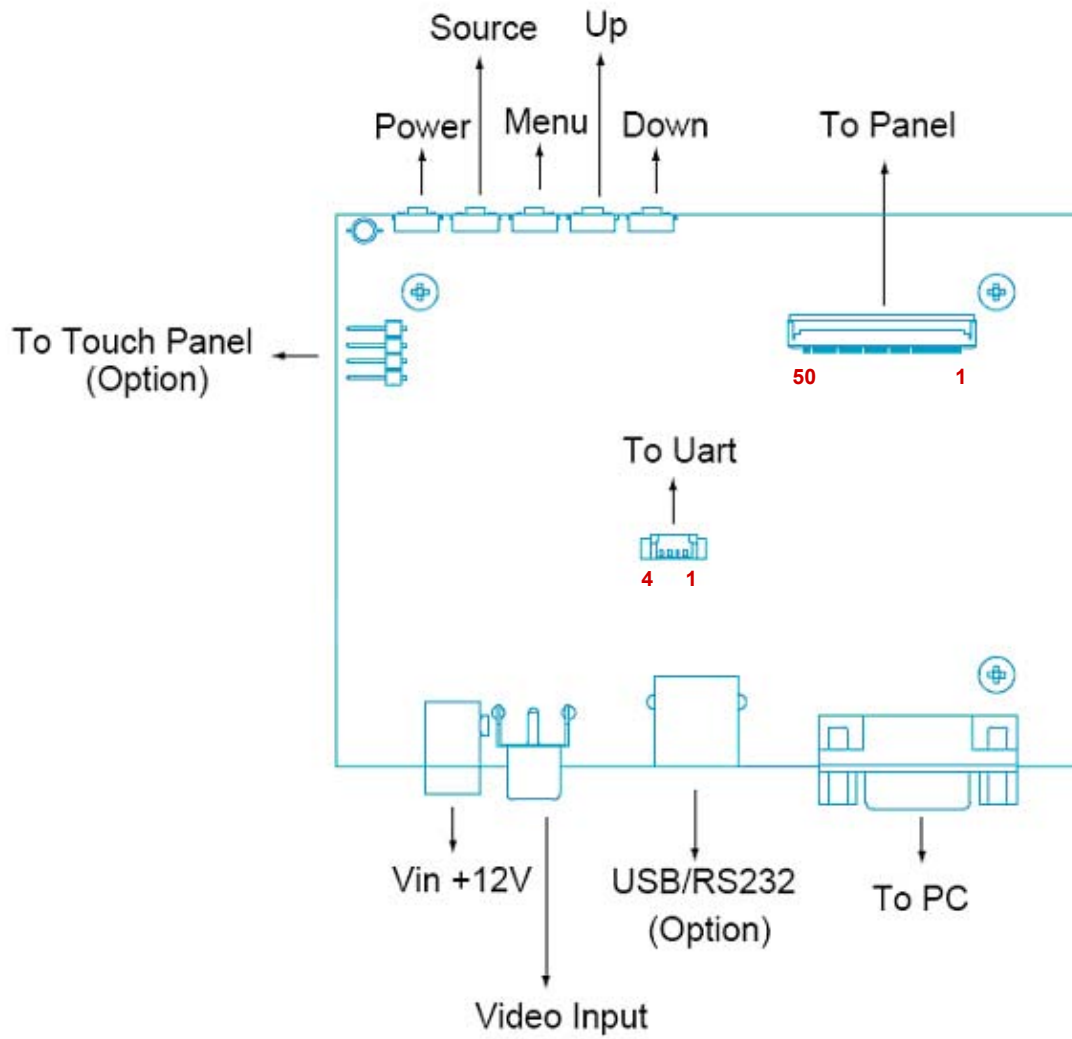
- A. AC to DC Adapter (L:1500mm, 100-240VAC 50-60Hz to +12VDC @ 3.3A)
- B. Power Cord ( L:1800mm, Plug Type B for USA)
- C. Video Cable (L:1800mm)
- D. VGA Cable (L:1800mm)
- E. USB Cable (L:1800mm)
- F. RS-232 Cable (L:1800mm)
- G. Touch Screen Driver CD Disk / User Manual

If any of these items are missing or damaged, contact your distributor or sales representative immediately.



# 7. Operation Manual

## 7.1 Driver Board Manual





## 8. Pin Description

### 8.1 J301 : LCD Panel I/O Terminals (FPC 50 Pin Pitch 0.5mm UP Contact Type)

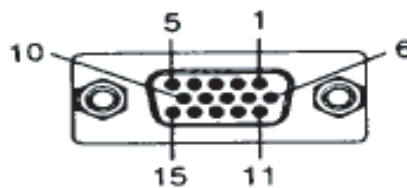
| Pin No | Symbol | I/O | Description               | Remark |
|--------|--------|-----|---------------------------|--------|
| 1      | NC     |     | No connection             |        |
| 2      | NC     |     | No connection             |        |
| 3      | NC     |     | No connection             |        |
| 4      | NC     |     | No connection             |        |
| 5      | GND    | P   | Power ground              |        |
| 6      | VCOM   | I   | Common voltage            |        |
| 7      | VCC    | P   | Power for Digital circuit |        |
| 8      | MODE   | I   | DE/SYNC mode select       |        |
| 9      | DE     | I   | Data Input Enable         |        |
| 10     | VS     | I   | Vertical Sync Input       |        |
| 11     | HS     | I   | Horizontal Sync Input     |        |
| 12     | B7     | I   | Blue data(MSB)            |        |
| 13     | B6     | I   | Blue data                 |        |
| 14     | B5     | I   | Blue data                 |        |
| 15     | B4     | I   | Blue data                 |        |
| 16     | B3     | I   | Blue data                 |        |
| 17     | B2     | I   | Blue data                 |        |
| 18     | B1     | I   | Blue data                 |        |
| 19     | B0     | I   | Blue data(LSB)            |        |
| 20     | G7     | I   | Green data (MSB)          |        |
| 21     | G6     | I   | Green data                |        |
| 22     | G5     | I   | Green data                |        |
| 23     | G4     | I   | Green data                |        |
| 24     | G3     | I   | Green data                |        |
| 25     | G2     | I   | Green data                |        |
| 26     | G1     | I   | Green data                |        |
| 27     | G0     | I   | Green data (LSB)          |        |
| 28     | R7     | I   | Red data (MSB)            |        |
| 29     | R6     | I   | Red data                  |        |
| 30     | R5     | I   | Red data                  |        |
| 31     | R4     | I   | Red data                  |        |
| 32     | R3     | I   | Red data                  |        |
| 33     | R2     | I   | Red data                  |        |
| 34     | R1     | I   | Red data                  |        |
| 35     | R0     | I   | Red data (LSB)            |        |
| 36     | GND    | P   | Power ground              |        |
| 37     | DCLK   | I   | Sample clock              |        |



|    |       |   |                          |
|----|-------|---|--------------------------|
| 38 | GND   | P | Power ground             |
| 39 | L/R   | I | Right/ left selection    |
| 40 | U/D   | I | Up/down selection        |
| 41 | VGH   | P | Gate ON voltage          |
| 42 | VGL   | P | Gate OFF voltage         |
| 43 | AVDD  | P | Power for Analog circuit |
| 44 | RESET | I | Global reset pin.        |
| 45 | NC    |   | No connection            |
| 46 | VCOM  | I | Common voltage           |
| 47 | DITHB | I | Dithering function       |
| 48 | GND   | P | Power ground             |
| 49 | NC    |   | No connection            |
| 50 | NC    |   | No connection            |

**8.2 J101B : Pin Assignment of Analog RGB Input ( D-Sub 15Pin)**

| Pin No | Symbol  | I/O | Description         | Remark |
|--------|---------|-----|---------------------|--------|
| 1      | RI+     | I   | Analog Red Signal   |        |
| 2      | GI+     | I   | Analog Green Signal |        |
| 3      | BI+     | I   | Analog Blue Signal  |        |
| 4      | NC      | -   | No Connection       |        |
| 5      | GND     | -   | Ground              |        |
| 6      | AGND    | -   | Analog Ground       |        |
| 7      | AGND    | -   | Analog Ground       |        |
| 8      | AGND    | -   | Analog Ground       |        |
| 9      | NC      | -   | No Connection       |        |
| 10     | NC      | -   | No Connection       |        |
| 11     | NC      | -   | No Connection       |        |
| 12     | DDC_SDA | -   | DDC2 Data           |        |
| 13     | HS_IN   | I   | TTL Horizontal sync |        |
| 14     | VS_IN   | I   | TTL Vertical sync   |        |
| 15     | DDC_SCL | -   | DDC2 Clock          |        |



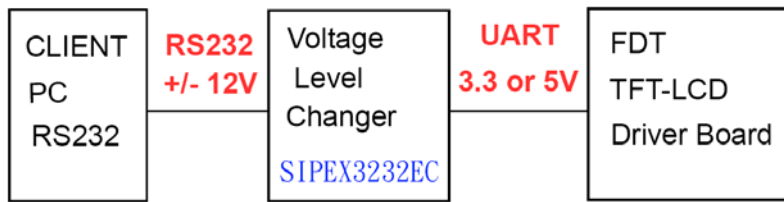
**8.3 J104: Pin Assignment of UART (Pitch 1.25mm 4Pin, Top Entry Type)**

※ Connector Part No.: MS24014 (STM) [Same as 53398-0471 (MOLEX)] ;

Matching Connector Part No.: P24014 (STM) [Same as 51021-0400 (MOLEX)]. Pin

| No | Symbol | I/O | Description            | Remark |
|----|--------|-----|------------------------|--------|
| 1  | TX     | O   | UART Transmission Data |        |
| 2  | RX     | I   | UART Receive Data      |        |
| 3  | GND    | -   | Ground                 |        |
| 4  | +5VA   | O   | +5V Output Voltage     |        |

Note: All Functions can be controlled by UART , About UART command list please contact FDT sales.



**8.4 DC JACK: Pin Assignment of Power Input (Inside Diameter:2.1 φ Outside Diameter:5.5 φ Side Entry Type)**

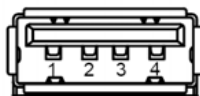
| Pin No | Symbol | I/O | Description        | Remark |
|--------|--------|-----|--------------------|--------|
| 1      | VIN    | I   | +12V Input Voltage |        |
| 2      | GND    | -   | Power Ground       |        |

**8.5 RCA: Pin Assignment of Video Input (RCA JACK Yellow, Side Entry Type)**

| Pin No | Symbol | I/O | Description   | Remark |
|--------|--------|-----|---------------|--------|
| 1      | Video  | I   | Video Input   |        |
| 2      | AGND   | -   | Analog Ground |        |

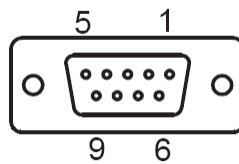
**8.6 J401B : Pin Assignment of Touch USB (USBA-Female 2.0mm, Side Entry Type )(Option)**

| Pin No | Symbol | I/O | Description    | Remark |
|--------|--------|-----|----------------|--------|
| 1      | VBUS   | -   | USB VCC        |        |
| 2      | D-     | -   | DATA (-)       |        |
| 3      | D+     | -   | DATA (+)       |        |
| 4      | DGND   | -   | Digital Ground |        |



**8.7 J401C : Pin Assignment of Touch RS232 (D-SUB 9 FEMALE)(Option)**

| Pin No | Symbol | I/O | Description   | Remark |
|--------|--------|-----|---------------|--------|
| 1      | -      | -   | Don't Connect |        |
| 2      | TXD    | -   | Transmit Data |        |
| 3      | RXD    | -   | Receive Data  |        |
| 4      | -      | -   | Don't Connect |        |
| 5      | GND    | -   | Ground        |        |
| 6      | NC     | -   | No Connection |        |
| 7      | -      | -   | Don't Connect |        |
| 8      | -      | -   | Don't Connect |        |
| 9      | NC     | -   | No Connection |        |



**9. Absolute Maximum Ratings**

**9.1 Absolute Maximum Ratings**

| Parameter   | Symbol        | Min  | Max      | Unit   | Remark |
|---|---------------|------|----------|--------|--------|
| Input Voltage   | Vin           | 9    | 15       | V      |        |
| Video Input Signal  | Video in      | 0.5  | 2.0      | Vp-p   | @75Ω   |
| Analog RGB Input Signal                                       | Analog RGB in | 0.5  | 2.0      | Vp-p   | @75Ω   |
| Digital Input Signal  | TTL           | -0.3 | +3.6     | V      |        |
| Operating Temperature   |               | -20  | +60      | °C     |        |
| Storage Temperature   |               | -20  | +70      | °C     |        |
| Operating Temperature With RTP                                |               | -10  | +60      | °C     |        |
| Storage Temperature With RTP                                  |               | -20  | +70      | °C     |        |
| High Temperature & High Humidity (Non-condensing) With RTP    |               | -    | +40 / 90 | °C / % |        |
| High Temperature & High Humidity (Non-condensing) Without RTP |               | -    | +40 / 90 | °C / % |        |



## 10. Recommended Operating Conditions

### 10.1 Electrical Characteristics

| Parameter               | Symbol        | I/O   | Min  | Typ  | Max  | Unit | Note   |
|-------------------------|---------------|-------|------|------|------|------|--------|
| Input Voltage           | Vin           | I     | +10  | +12  | +14  | V    |        |
| Total Current           | Iin (+12V)    | I     | -    | 360  | -    | mA   | ±15%   |
| Power Consumption       |               | I     | -    | 4.32 | -    | W    | @+12V  |
| Output Voltage          | VDD           | O     | +3.2 | +3.3 | +3.4 | V    | I=10mA |
| Video Input Signal      | Video in      | I     | -    | 1.0  | -    | Vp-p | @75Ω   |
| Analog RGB Input Signal | Analog RGB in | RGB I | 0.6  | 0.7  | 1.0  | Vp-p | @75Ω   |

### 10.2 VGA Mode Characteristics

| Dots per inch | H      | Unit | Polarity | V      | Unit | Polarity | Note |
|---------------|--------|------|----------|--------|------|----------|------|
| 640*480       | 31.469 | KHz  | Negative | 59.941 | Hz   | Negative |      |
| 800*600       | 37.879 | KHz  | Positive | 60.317 | Hz   | Positive |      |
| 1024*768      | 48.363 | KHz  | Negative | 60.004 | Hz   | Negative |      |

### 10.3 Panel Backlight Data

| Parameter             | Symbol | Min | Typ | Max  | Unit | Note |
|-----------------------|--------|-----|-----|------|------|------|
| LED Backlight Voltage | VLED   | 9.3 | 9.9 | 10.5 | Vrms |      |
| LED Backlight Current | ILED   | 162 | 180 | 198  | mA   |      |

## 11. 4W Resistance Touch Panel Characteristics

### 11.1 Pin assignment

| Pin No | Symbol | Description                    | Remark |
|--------|--------|--------------------------------|--------|
| 1      | Y1     | Upper Electrode Y (Down Side)  |        |
| 2      | X1     | Lower Electrode X (Left Side)  |        |
| 3      | Y2     | Upper Electrode Y (Upper Side) |        |
| 4      | X2     | Lower Electrode X (Right Side) |        |



### 11.2 Electrical Performance

| Parameter            | Symbol | Min | Typ | Max  | Unit       | Remark |
|----------------------|--------|-----|-----|------|------------|--------|
| Terminal Resistance  | X      | 300 |     | 1100 | $\Omega$   |        |
|                      | Y      | 150 |     | 650  | $\Omega$   |        |
| Linearity            |        | -   | -   | 1.5  | %          |        |
| Insulation Impedance |        | 20  | -   | -    | M $\Omega$ | DC 25V |
| Response Time        |        | -   | -   | 10   | ms         |        |

### 11.3 Optical Performance

| Parameter           | Specifications |
|---------------------|----------------|
| Light Transmittance | 82% Typ.       |
| Haze                | 5.0% Typ.      |

### 11.4 Mechanical Performance

| Parameter        | Specifications       |
|------------------|----------------------|
| Input Method     | Finger or stylus pen |
| Operating Force  | $\leq 50g$           |
| Surface Hardness | 3H or more           |

### 11.5 Durability Performance

| Parameter          | Specifications   |
|--------------------|--|
| Hitting Durability | $\geq 1000000$ times, with R8.0 mm silicon rubber, 200g, 5Hz           |
| Sliding Durability | $\geq 100000$ words, with R0.8 mm polyacetal stylus, 250g, 60 mm / sec |



**11.6 Touch Screen Operation System Support**

**Driver Vender : EETI (eGalax\_eMPIA Technology Inc.)**

| OS                                      | Version   | Interface |
|---|---|-----------|
| Windows                                 | Windows XP Embedded                               | RS232/USB |
|   | Windows Vista, XP, 2000                           |           |
|   | Windows Embedded POSReady 2009                    |           |
|   | Windows Embedded 7, 8                             |           |
|   | Windows 7, 8, 8.1, 10                             |           |
| Windows CE                              | Windows CE.Net (4.x / 5.0)                        | RS232/USB |
|   | Windows CE 6.0                                    |           |
|   | Windows Embedded Compact 7                        |           |
|   | Windows Embedded Compact 2013                     |           |
| Linux                                   | Kernel 2.4.x (x86)                                | USB       |
|   | Kernel 2.6.23 Downward (X86)                      |           |
|   | Kernel 2.6.24 Upward and 3.x.x (X86 / ARM / MIPS) |           |
| Android                                 | Android Version 2.3.x upwards (X86 / ARM / MIPS)  | USB       |
| Mac OS                                  | Mac OS X 10.5.3 Leopard ( Power PC )              | USB       |
|   | Mac OS X 10.7.4 Earlier ( 32Bit ) ( Intel CPU )   |           |
|   | Mac OS X 10.7.4 Earlier ( 64Bit ) ( Intel CPU )   |           |
|   | Mac OS X 10.7.5 ( 32Bit ) ( Intel CPU )           |           |
|   | Mac OS X 10.7.5 ( 64bit ) ( Intel CPU )           |           |
|   | Mac OS X 10.8.x Mountain Lion ( Intel CPU )       |           |
|   | Mac OS X 10.9.x Mavericks ( Intel CPU )           |           |
| Mac OS X 10.10.x Yosemite ( Intel CPU ) |   |           |
| QNX                                     | QNX RTOS V6.3                                     | USB       |
|   | QNX Neutrino RTOS V6.5/6.4                        |           |
| DOS                                     | DOS   | PS2       |

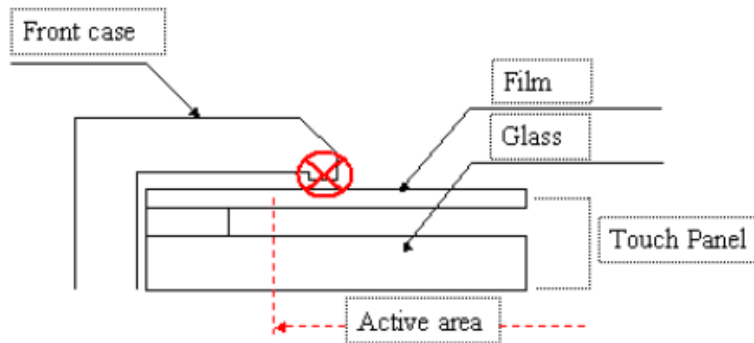
**Note: How to use Touch Driver, please refer to Readme of Touch Screen Driver CD Disk.**



**11.7 Touch Screen Integration Design Guide**

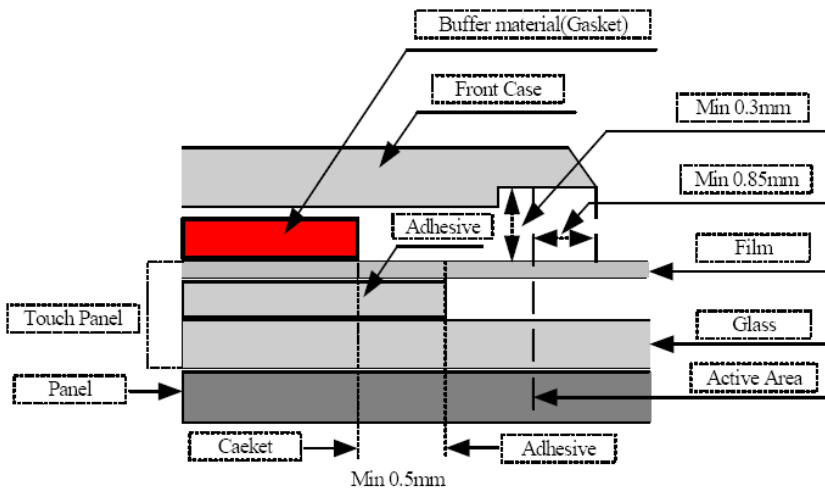
Avoid the design that Front-case overlap and press on the active area of the touch-panel.

Give enough gap (over 0.5mm at compressed) between the front case and touch-panel to protect wrong operating.



Use a buffer material (Gasket) between the touch-panel and front-case to protect damage and wrong operating.

Avoid the design that buffer material overlap and press on the inside of touch-panel viewing area.

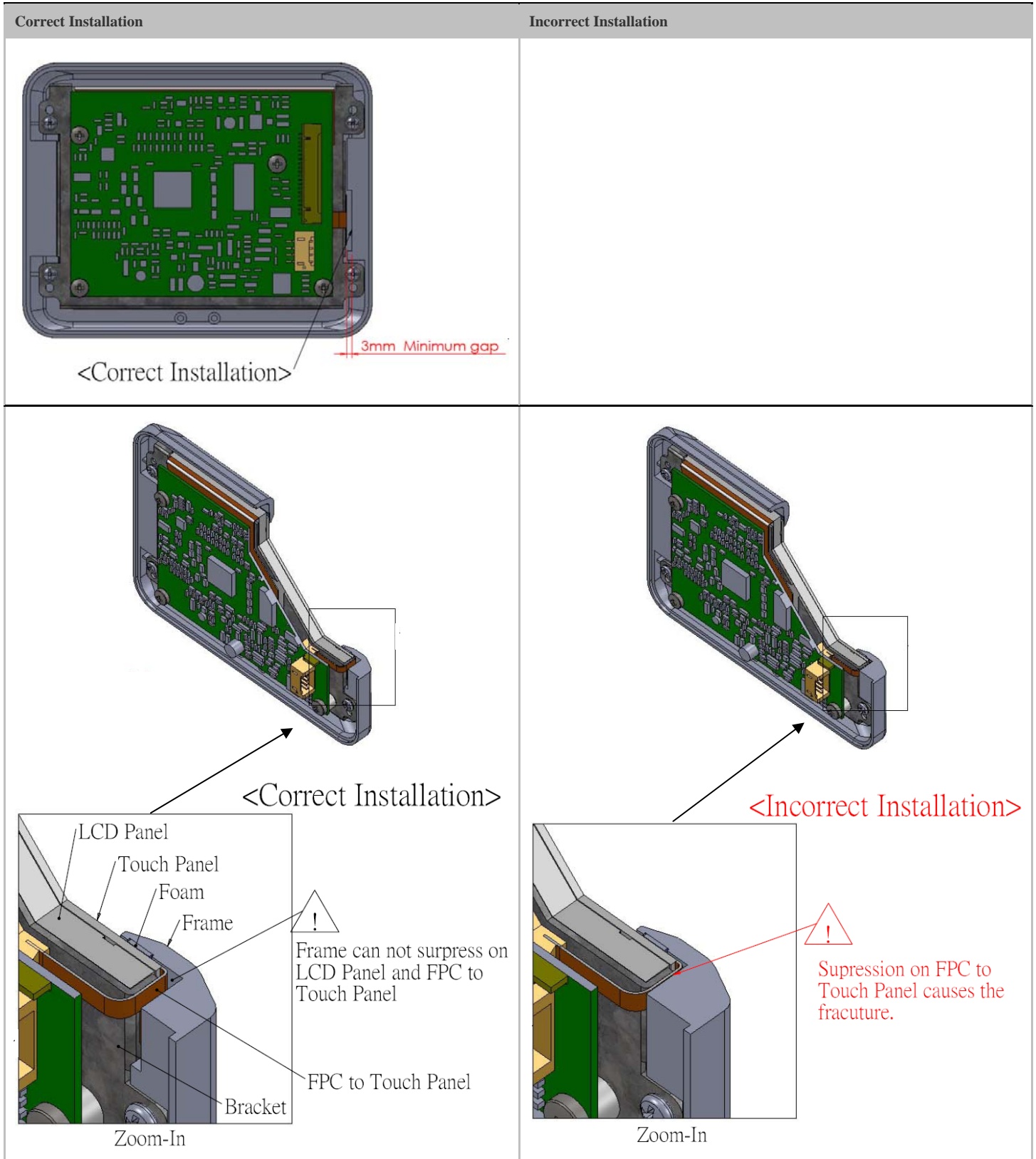


**Note: We strongly suggest to follow above design guide to avoid the linear defect happened on the touch panel.**



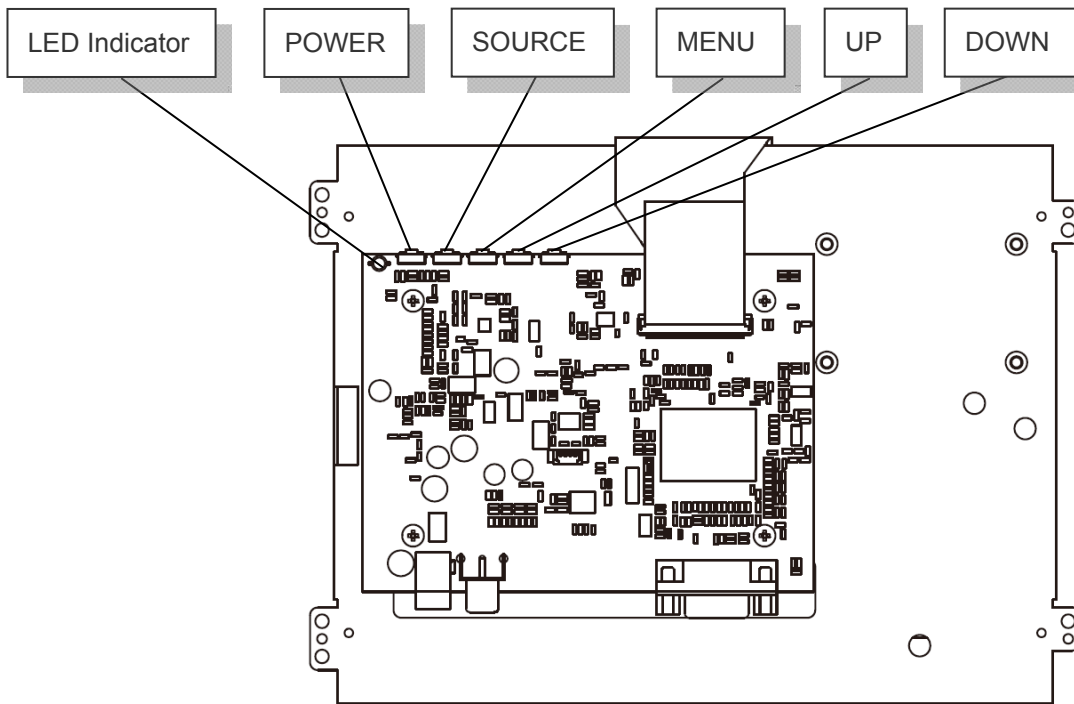
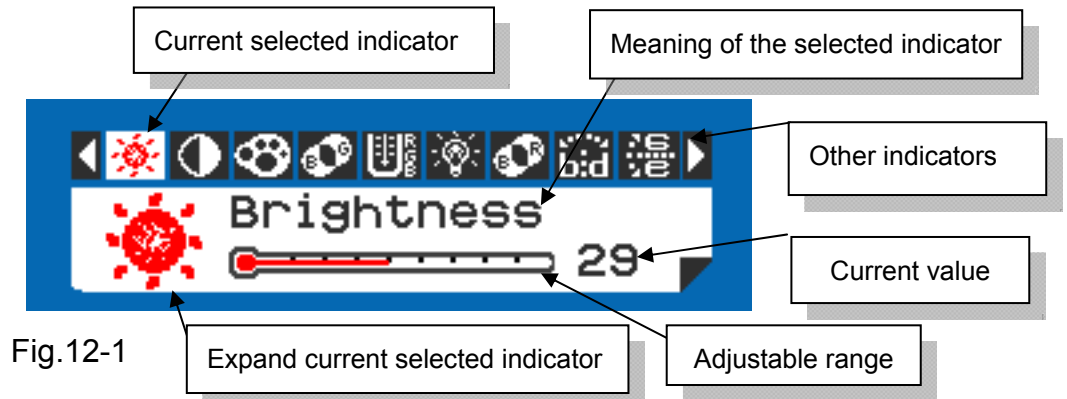


**11.8 Mechanical Design Notice For Touch Panel**



## 12. Key Function by OSD

### 12.1 Menu Operation



### Operations of key board :

1. To navigate the menu, press [MENU]. (Fig.12-1)
2. The indicator lighting up in white color is the selected adjustment item.
3. To Next Item of the menu, press [MENU] again.
4. The operations below are only available when "Menu" is started.
5. Press [UP] / [DOWN] to adjust the value of the selected item.
6. LED Indicator:
  - Waiting : Flickering Green
  - Power ON : Green
  - Power OFF : Red
















### Save OSD Setting:

1. EXIT MENU and settings will be saved automatically
2. Settings will be saved as well when MENU shuts down automatically



## Overview of the menu :

Firmware Version must be  $\geq$  VER 0.26

| Indicator   | Meaning     | Adjustable range       | For      | Remark      |
|---|-------------|------------------------|----------|-------------|
|    | Brightness  | 0 ~ 64                 | AV / VGA | Adjust-Bar  |
|    | Contrast    | 0 ~ 64                 | AV / VGA | Adjust-Bar  |
|    | Color       | 0 ~ 64                 | AV       | Adjust-Bar  |
|    | Tint        | 0 ~ 32                 | AV       | Adjust-Bar  |
|    | Sharpness   | 0 ~ 16                 | AV       | Adjust-Bar  |
|    | Dimmer      | 0 ~ 9                  | AV / VGA |             |
|    | Color Tone  | Normal / Warm / Cool   | AV / VGA |             |
|    | Mirror      | OFF / ON               | AV / VGA |             |
|   | Flip        | OFF / ON               | AV / VGA |             |
|  | H-Position  | -25 ~ +25              | AV / VGA | Balance-Bar |
|  | V-Position  | -10 ~ +10              | AV / VGA | Balance-Bar |
|  | Auto        |                        | VGA      |             |
|  | Scan        | Over Scan / Under Scan | AV       |             |
|  | Information |                        | AV / VGA | Fig.12-2    |
|  | Setup       |                        | AV / VGA | Fig.12-3    |
|  | Factory Set |                        | AV / VGA |             |
|  | Exit        |                        | AV / VGA |             |



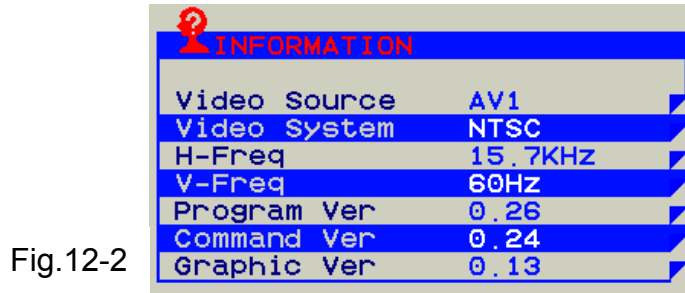


Fig.12-2

**Setup Menu :**



Fig.12-3

| Indicator | Meaning       | Adjustable range          | Function   | Remark                  |
|-----------|---------------|---------------------------|--|-------------------------|
|           | Show Status   | ON / OFF                  | Show signal status.                                  | ON: Show<br>OFF: Hidden |
|           | Blue Screen   | ON / OFF                  | If loss signal will put on the blue or black screen. | ON: Blue<br>OFF: Black  |
|           | Auto Power On | ON / OFF                  | Power input module will be auto turn on.             | ON: Auto<br>OFF: Manual |
|           | Auto Saving   | OFF / 3s / 5s / 15s / 30s | If signal lost over setting times will be power off. | ON: Auto<br>OFF: Normal |
|           | Detect Source | ON / OFF                  | Auto detection which source is existence and change. | ON: Auto<br>OFF: Normal |
|           | Return        |                           |  |                         |

**Note : VGA only type don't have Detect Source function.**



**12.2 Operations**

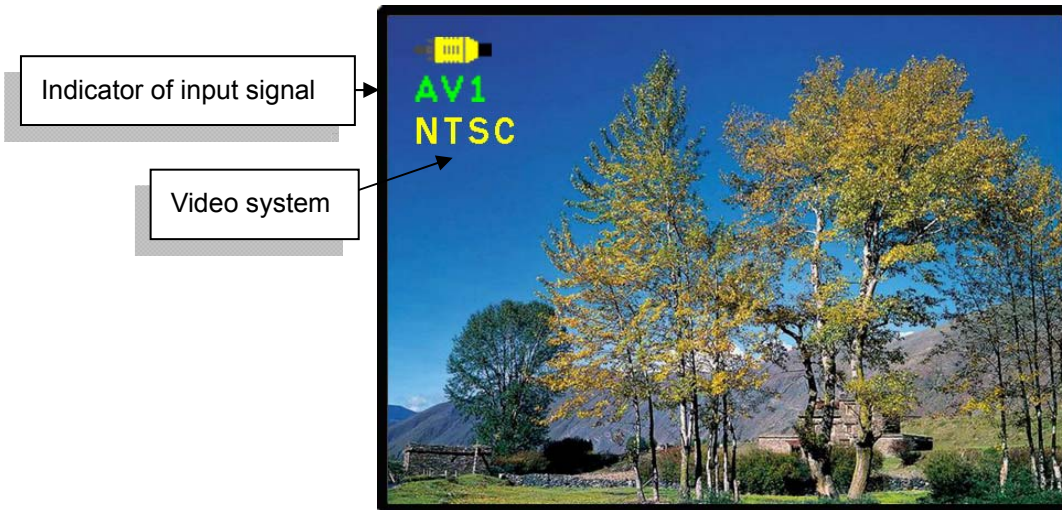




Fig.12-4

[Power] : Monitor power on / off

[Source] : Input signal switch

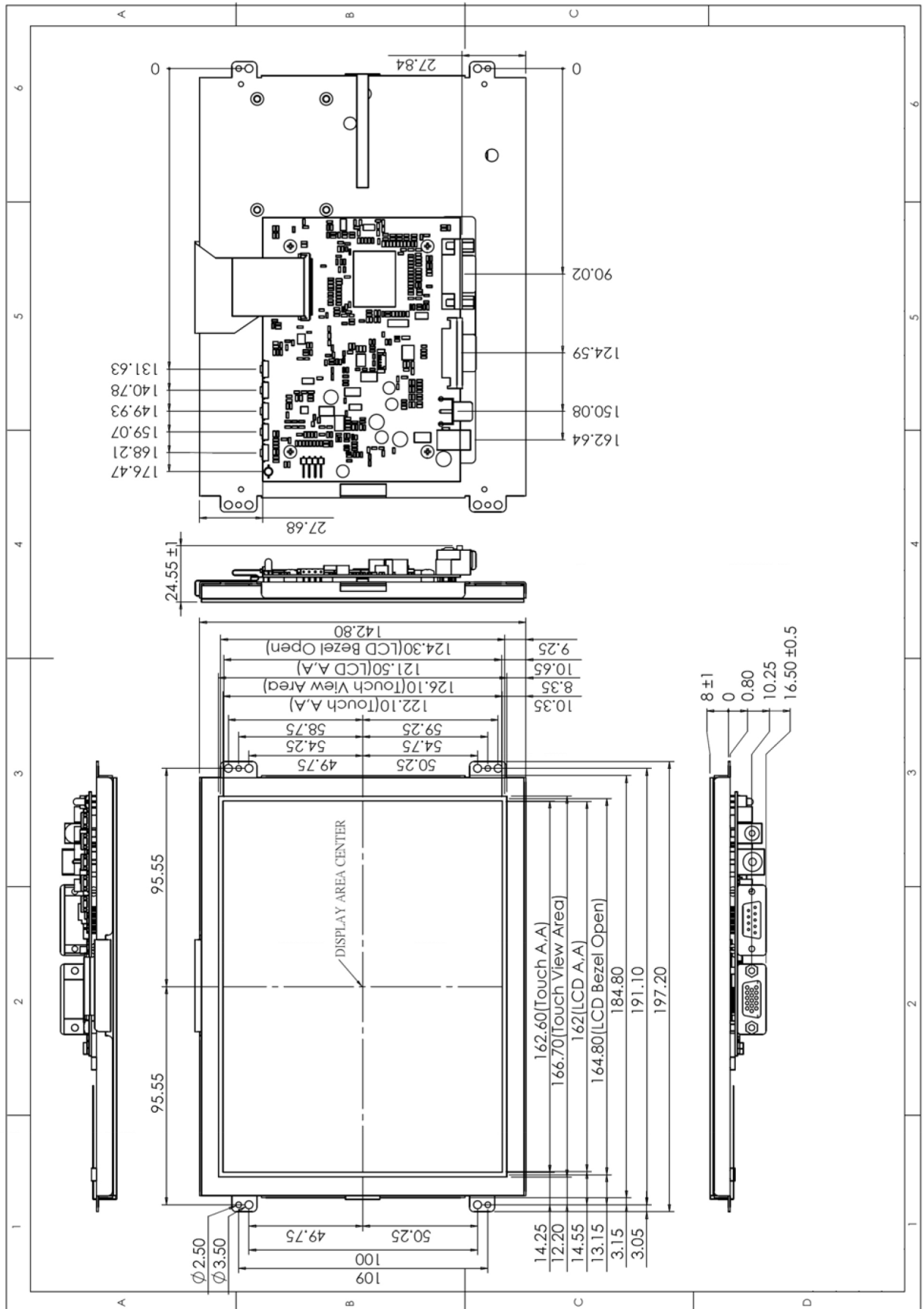
**Overview of input signals :**

| Indicator   | Input signal | Interface  | Video system                          |
|---|--------------|------------|---------------------------------------|
|  | AV1          | Composite  | NTSC / PAL / SECAM                    |
|  | VGA          | Analog RGB | 640x480_60 / 800x600_60 / 1024x768_60 |



# 13. Dimension Information

## 13.1 Unit (FCO0800-TR)



## 14. Appendix

### 14.1 TFT-LCD Mechanical Specifications

| Parameter           | Specifications           | Unit |
|---------------------|--------------------------|------|
| Screen Size         | 8.0 (diagonal)           | inch |
| Display Format      | 800 x (R.G.B) x 600      | dot  |
| Active Area         | 162(W) x 121.5(H)        | mm   |
| Pixel Pitch         | 0.2025(W) x 0.2025(H)    | mm   |
| Pixel Configuration | Stripe                   |      |
| Outline Dimension   | 183(W) x 141(H) x 6.3(D) | mm   |
| Surface Treatment   | Anti – Glare             |      |
| Weight              | 258(Typ)                 | g    |

### 14.2 TFT-LCD Optical Characteristics

| Parameter           | Symbol     | Condition          | Min    | Typ  | Max  | Unit              | Remark |  |
|---------------------|------------|--------------------|--------|------|------|-------------------|--------|--|
| Viewing Angle       | Horizontal | Left               | 60     | 70   | ---  | deg               |        |  |
|                     |            | Right              | 60     | 70   | ---  | deg               |        |  |
|                     | Vertical   | Top                | CR >10 | 60   | 70   | ---               | deg    |  |
|                     |            | Bottom             |        | 40   | 50   | ---               | deg    |  |
| Contrast Ratio      | CR         | $\theta = 0^\circ$ | 400    | 500  | ---  | ---               |        |  |
| Response time       | Rise Fall  | Tr                 | ---    | 10   | 20   | ms                |        |  |
|                     |            | Tf                 | ---    | 15   | 30   | ms                |        |  |
| Uniformity          | U          | $\theta = 0^\circ$ | 70     | 75   | ---  | %                 |        |  |
| Brightness          | L          | $\theta = 0^\circ$ | 200    | 250  | ---  | Cd/m <sup>2</sup> |        |  |
| Brightness With RTP |            |                    | 160    | 200  |      |                   |        |  |
| White Chromaticity  | x          | $\theta = 0^\circ$ | 0.26   | 0.31 | 0.36 |                   |        |  |
|                     | y          | $\theta = 0^\circ$ | 0.28   | 0.33 | 0.38 |                   |        |  |
| LED Life Time       |            | +25°               | 20000  | ---  | ---  | Hrs               | Note   |  |

Note: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL =180mA.

The LED lifetime could be decreased if operating IL is larger than 180 mA.

