



# SPECIFICATION

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*easy* **TOUCH  
DISPLAY**

**easyTOUCH DISPLAY Advanced (12015572)**

10.1" - WXGA – eTD101W3201-INA-A

Version: 1.0  
Date: 08.06.2020

Note: This specification is subject to change without prior notice

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## ADVANCED LEVEL

**10.1 inch (25.7cm)**

**Part-No. 12015572**

**G101ICE-L01 incl.easyTOUCH eTD101W3201-INA-A**

### Display

|                             |                       |
|-----------------------------|-----------------------|
| Panel Type                  | InnoluxG101ICE-L01    |
| Resolution (pixel) / format | 1280 x 800/ wide      |
| Brightness (typical)        | 500 cd/m <sup>2</sup> |
| Display Mode                | AAS, Normally black   |
| Customer Interface Display  | LVDS                  |
| Contrast ratio (typical)    | 800:1                 |
| Backlight                   | LED                   |

### Glass and Touch

|                                  |  |
|----------------------------------|--|
| Cover glass                      | 2mm Glare Glass, chemically strengthened, no treatment<br>Printing RAL9005 organic, light-tight<br>Dimensions according to outline drawing |
| Touch sensor type                | 10.1" easyTOUCH 12014890   |
| Active area touch sensor (W x H) | 226.0 (H) x 139.0 (V)  |
| Optical Specification            | according to DATA MODUL Outgoing Specification 12005965  |
| Touch Interface                  | USB mXT640T  |

### Assembling

|                                 |   |
|---------------------------------|---|
| Glass to touch                  | Optically bonded  |
| Glass/Touch assembly to display | AirGap-Bonding with 4 stripes industrial double-sided adhesive tape |
| Touch Controllerboard           | mounted on rear side of TFT with metal bracket                      |

### Accessories

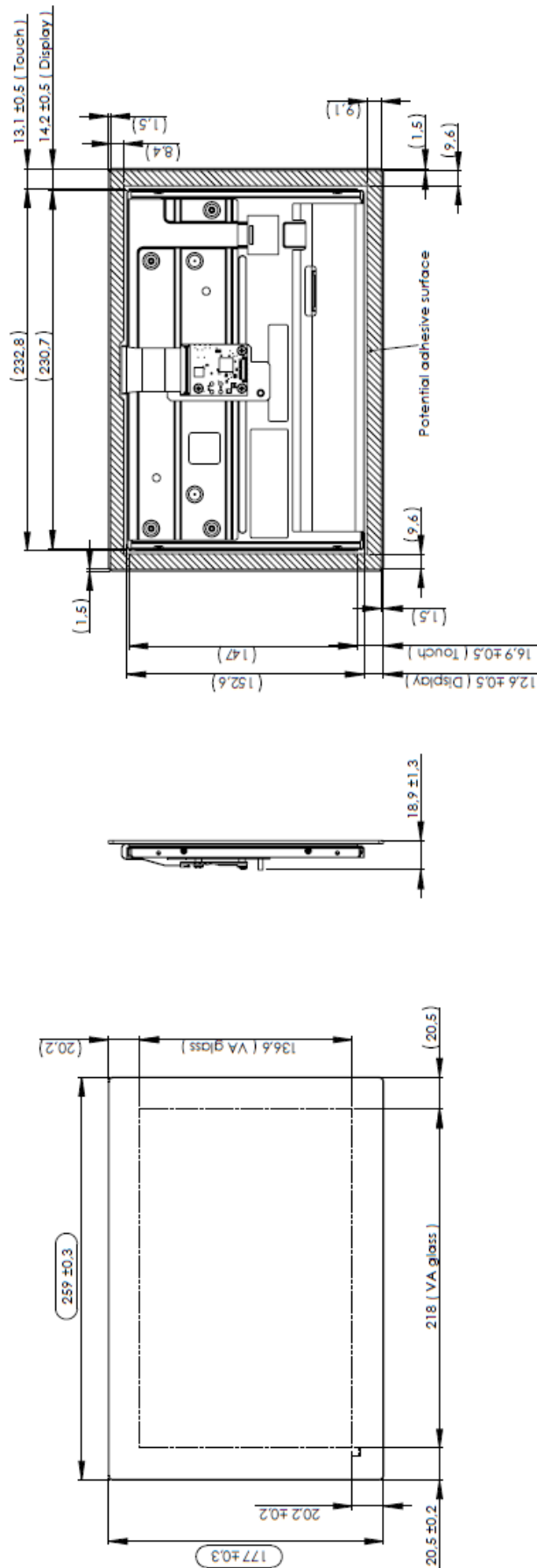
|                  |                                  |
|------------------|----------------------------------|
| Touch Controller | easyTOUCH mXT640T Driverless USB |
|------------------|----------------------------------|

### Environmental conditions

|                         |             |
|-------------------------|-------------|
| Temperature (operating) | -20 - 65 °C |
|-------------------------|-------------|

### Mechanical dimensions

|                                |  |
|--------------------------------|--|
| Outline dimensions (W x H x T) | 259.0 (H) x 177.0 (V) x 18.9 (T)<br>Detailed dimensions according to outline drawing |
| Weight                         | approx. 0.780 kg   |



Doc. Number :

- Tentative Specification
- Preliminary Specification
- Approval Specification

**MODEL NO.: G101ICE**  
**SUFFIX: L01**

|  |                  |
|--|------------------|
| <b>Customer:</b>   |                  |
| <b>APPROVED BY</b>   | <b>SIGNATURE</b> |
| <u>Name / Title</u>  | _____            |
| Note   |                  |
| <hr/> Please return 1 copy for your confirmation with your signature and comments. |                  |

| Approved By    | Checked By | Prepared By |
|----------------|------------|-------------|
| Matt. 1c. chen | Sen. Lin   | Crika. liu  |

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**REVISION HISTORY**

| Version  | Date          | Page | Description                              |
|----------|---------------|------|--|
| Ver. 1.0 | 18 Jun., 2015 | All  | Approval Specification was first issued. |
| Ver. 1.1 | 16 Sep., 2015 | 1.5  | Bezel area dimension modified            |
| Ver. 3.0 | 16 Jun., 2019 | All  | Change Revision from C1 to C2            |
|          |               |      |  |
|          |               |      |  |
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|          |               |      |  |
|          |               |      |  |
|          |               |      |  |



## 1. GENERAL DESCRIPTION

### 1.1 OVERVIEW

G101ICE-L01 is a 10.1" TFT Liquid Crystal Display module with LED Backlight units and 40 pins LVDS interface. This module supports 1280 x 800 WXGA mode and can display 16.2M/ 262k colors. The LED driving device for Backlight is built in PCBA.

### 1.2 FEATURES

- WXGA (1280 x 800 pixels) resolution
- DE (Data Enable) only mode
- LVDS Interface with 1pixel/clock
- Wide operating temperature.
- RoHS compliance

### 1.3 APPLICATION

- TFT LCD Monitor
- Factory Application
- Amusement

### 1.4 GENERAL SPECIFICATIONS

| Item                     | Specification                            | Unit  | Note    |
|--------------------------|--|-------|---------|
| Active Area              | 216.96 (H) x 135.60 (V) (10.1" diagonal) | mm    | (1)     |
| Bezel Opening Area       | 218.96 (H) x 137.6 (V)                   | mm    |         |
| Driver Element           | a-Si TFT active matrix                   | -     | -       |
| Pixel Number             | 1280 x R.G.B x 800                       | pixel | -       |
| Pixel Pitch              | 0.1695 (H) x 0.1695 (V)                  | mm    | -       |
| Pixel Arrangement        | RGB vertical Stripe                      | -     | -       |
| Display Colors           | 16,194,277 / 262,144                     | color | -       |
| Display Mode             | Normally Black                           | -     | -       |
| Surface Treatment        | Hard Coating (3H), Anti-Glare            | -     | -       |
| Module Power Consumption | 6.18                                     | W     | Typical |

**1.5 MECHANICAL SPECIFICATIONS**

| Item        |               | Min.   | Typ.   | Max.   | Unit | Note   |
|-------------|---------------|--------|--------|--------|------|--------|
| Module Size | Horizontal(H) | 230.2  | 230.7  | 231.2  | mm   | (1)    |
|             | Vertical(V)   | 152.05 | 152.55 | 153.05 | mm   |        |
|             | Depth(D)      | 6.0    | 6.5    | 7.0    | mm   | (1)(2) |
| Bezel Area  | Horizontal    | 217.66 | 218.96 | 218.26 | mm   |        |
|             | Vertical      | 137.3  | 137.6  | 137.9  | mm   |        |
| Active Area | Horizontal    | -      | 216.96 | -      | mm   |        |
|             | Vertical      | -      | 135.6  | -      | mm   |        |
| Weight      |               | -      | 360    | 375    | g    |        |

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

Note (2) The depth is without connector.



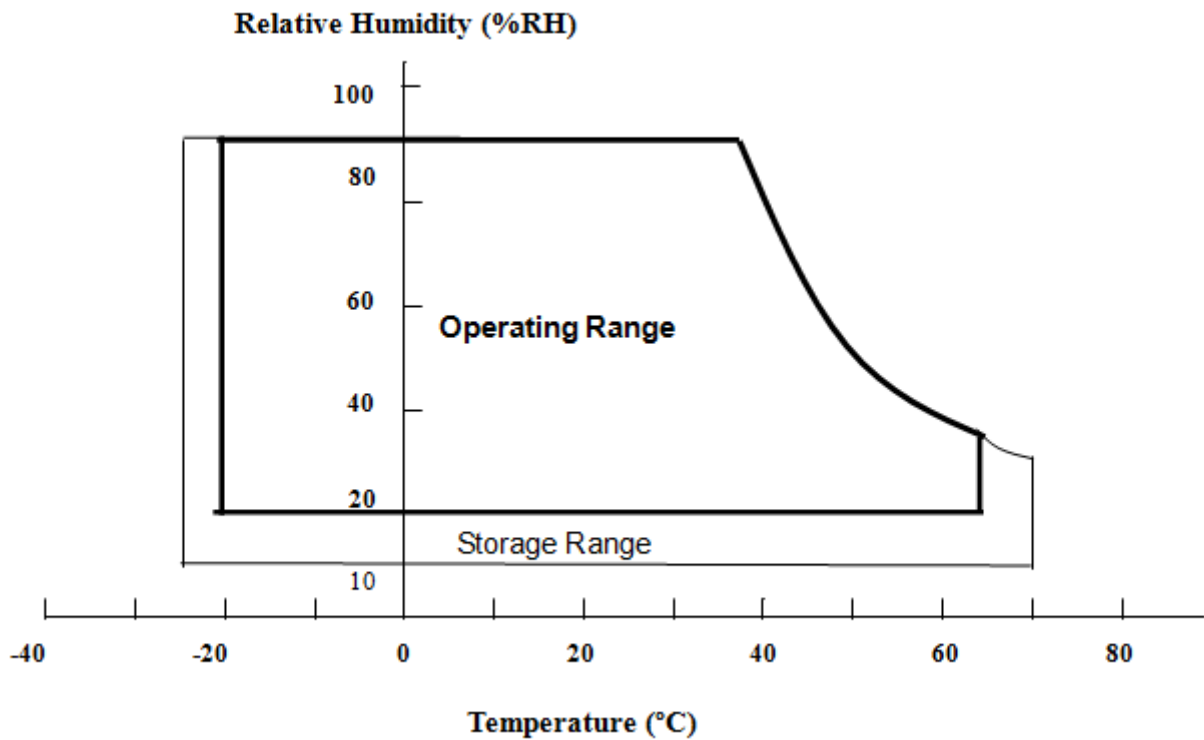
**2. ABSOLUTE MAXIMUM RATINGS**

**2.1 ABSOLUTE RATINGS OF ENVIRONMENT**

| Item                          | Symbol          | Value |      | Unit | Note |
|-------------------------------|-----------------|-------|------|------|------|
|                               |                 | Min.  | Max. |      |      |
| Operating Ambient Temperature | T <sub>OP</sub> | -20   | +65  | °C   |      |
| Storage Temperature           | T <sub>ST</sub> | -25   | +70  | °C   |      |

Note (1) Temperature and relative humidity range is shown in the figure below.

- (2) 90 %RH Max. (Ta < 40°C).
- (3) Wet-bulb temperature should be 39°C Max.
- (4) No condensation.



## 2.2 ELECTRICAL ABSOLUTE RATINGS

### 2.2.1 TFT LCD MODULE

| Item                 | Symbol | Value |      | Unit | Note |
|----------------------|--------|-------|------|------|------|
|                      |        | Min.  | Max. |      |      |
| Power Supply Voltage | VCC    | -0.3  | 4    | V    | (1)  |

### 2.2.2 BACKLIGHT UNIT

| Item              | Symbol | Value |      | Unit | Note     |
|-------------------|--------|-------|------|------|----------|
|                   |        | Min.  | Max. |      |          |
| Converter Voltage | $V_i$  | -0.3  | 18   | V    | (1), (2) |
| Enable Voltage    | EN     | ---   | 5.5  | V    |          |
| Backlight Adjust  | ADJ    | ---   | 5.5  | V    |          |

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for lamp (Refer to 3.2 for further information).

3. ELECTRICAL SPECIFICATIONS

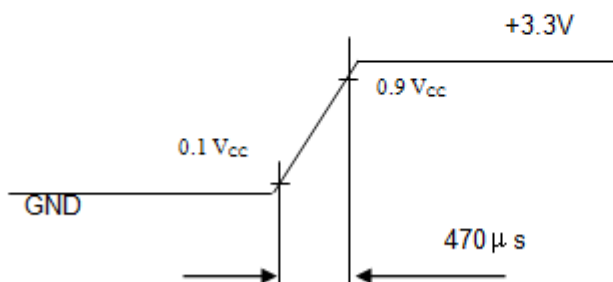
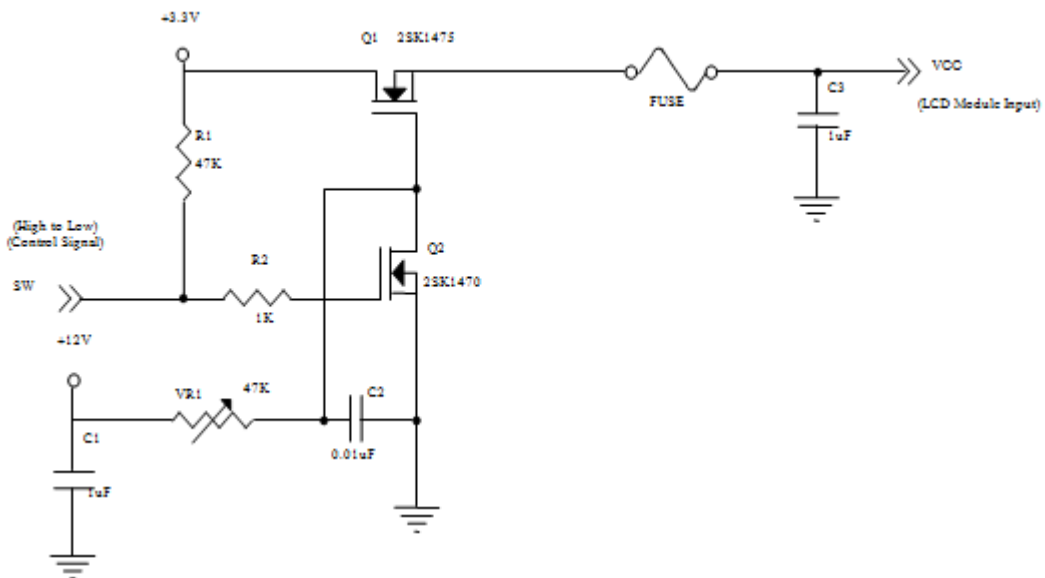
3.1 TFT LCD MODULE

Ta = 25 ± 2 °C

| Parameter  | Symbol            | Value |      |      | Unit  | Note |
|--|-------------------|-------|------|------|-------|------|
|  |                   | Min.  | Typ. | Max. |       |      |
| Power Supply Voltage                                   | V <sub>CC</sub>   | 3.0   | 3.3  | 3.6  | V     | -    |
| Ripple Voltage   | V <sub>RP</sub>   | -     | -    | 100  | mVp-p |      |
| Rush Current   | I <sub>RUSH</sub> | -     | -    | 1.5  | A     | (2)  |
| Power Supply Current                                   | White             | -     | 265  | 320  | mA    | (3)a |
|  | Black             | -     | 210  | 260  | mA    | (3)b |
| LVDS differential input voltage                        | V <sub>id</sub>   | 200   | -    | 600  | mV    |      |
| LVDS common input voltage                              | V <sub>ic</sub>   | 1.0   | 1.2  | 1.4  | V     |      |
| Differential Input Voltage for LVDS Receiver Threshold | "H" Level         |       |      | 100  | mV    | -    |
|  | "L" Level         | -100  |      |      | mV    | -    |
| Terminating Resistor                                   | R <sub>T</sub>    | -     | 100  |      | Ohm   | -    |

Note (1) The module should be always operated within above ranges.

Note (2) Measurement Conditions:



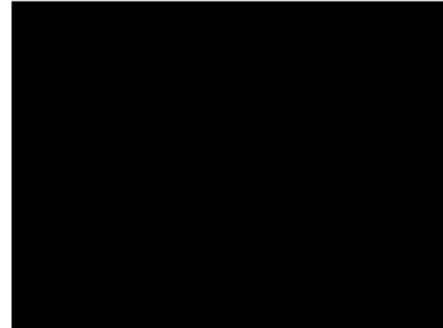
Note (3) The specified power supply current is under the conditions at  $V_{DD} = 3.3V$ ,  $T_a = 25 \pm 2 \text{ }^\circ\text{C}$ , DC Current and  $f_v = 60 \text{ Hz}$ , whereas a power dissipation check pattern below is displayed.

a. White Pattern



Active Area

b. Black Pattern



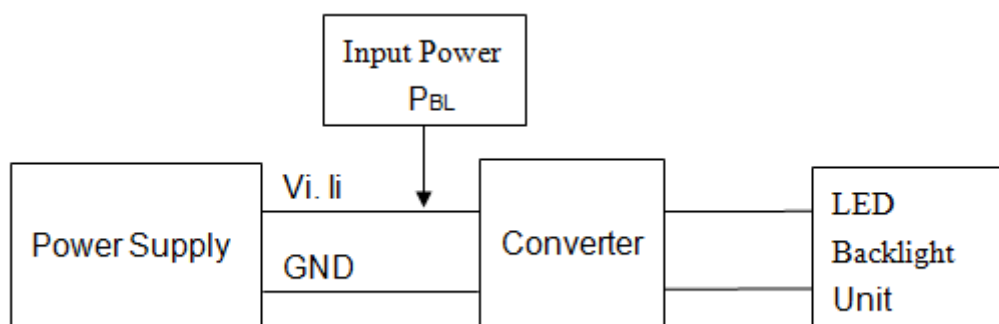
Active Area

### 3.2 BACKLIGHT UNIT

$T_a = 25 \pm 2 \text{ }^\circ\text{C}$

| Parameter                      | Symbol         | Value  |      |      | Unit | Note                         |
|--------------------------------|----------------|--------|------|------|------|------------------------------|
|                                |                | Min.   | Typ. | Max. |      |                              |
| Converter Power Supply Voltage | $V_i$          | 10.8   | 12.0 | 13.2 | V    |                              |
| Converter Power Supply Current | $I_i$          | -      | 0.45 | 0.50 | A    | @ $V_i = 12V$<br>(Duty 100%) |
| Backlight Power Consumption    | $P_{BL}$       | -      | 5.3  | 5.8  | W    | @ $V_i = 12V$<br>(Duty 100%) |
| EN Control Level               | Backlight on   | 2.5    | 3.3  | 5.0  | V    |                              |
|                                | Backlight off  | 0      | ---  | 0.8  | V    |                              |
| PWM Control Level              | PWM High Level | 2.5    | 3.3  | 5.0  | V    |                              |
|                                | PWM Low Level  | 0      | -    | 0.15 | V    |                              |
| PWM Control Duty Ratio         | -              | 1      | -    | 100  | %    | @200Hz                       |
| PWM Control Frequency          | $f_{PWM}$      | 190    | 200  | 20k  | Hz   | (2)                          |
| LED Life Time                  | $L_L$          | 50,000 | -    | -    | Hrs  | (3)                          |

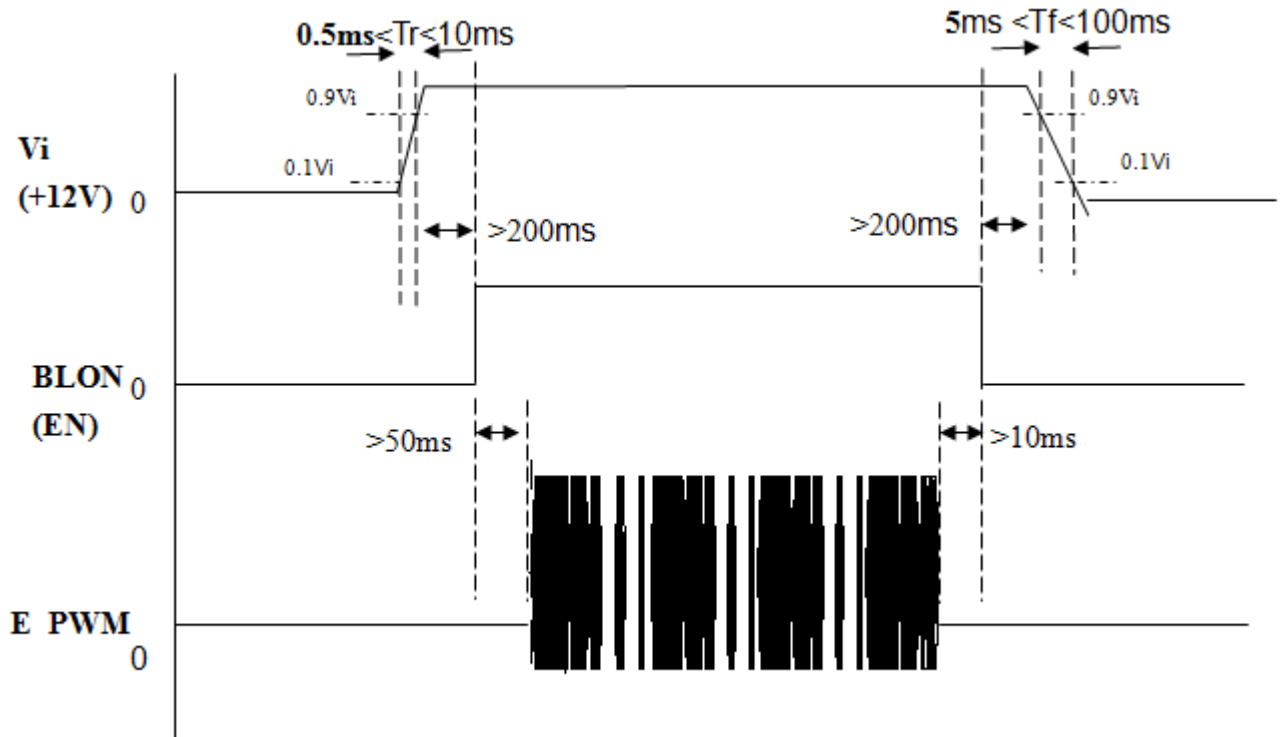
Note (1) LED current is measured by utilizing a high frequency current meter as shown below:



Note (2) At 200 Hz PWM control frequency, duty ratio range is restricted from 1% to 100%

Note (3) The lifetime of LED is defined as the time when it continues to operate under the conditions at  $T_a = 25 \pm 2 \text{ }^\circ\text{C}$  and Duty 100% until the brightness becomes  $\leq 50\%$  of its original value. Operating LED under high temperature environment will reduce life time and lead to color shift.

Power sequence and control signal timing are shown in the following figure



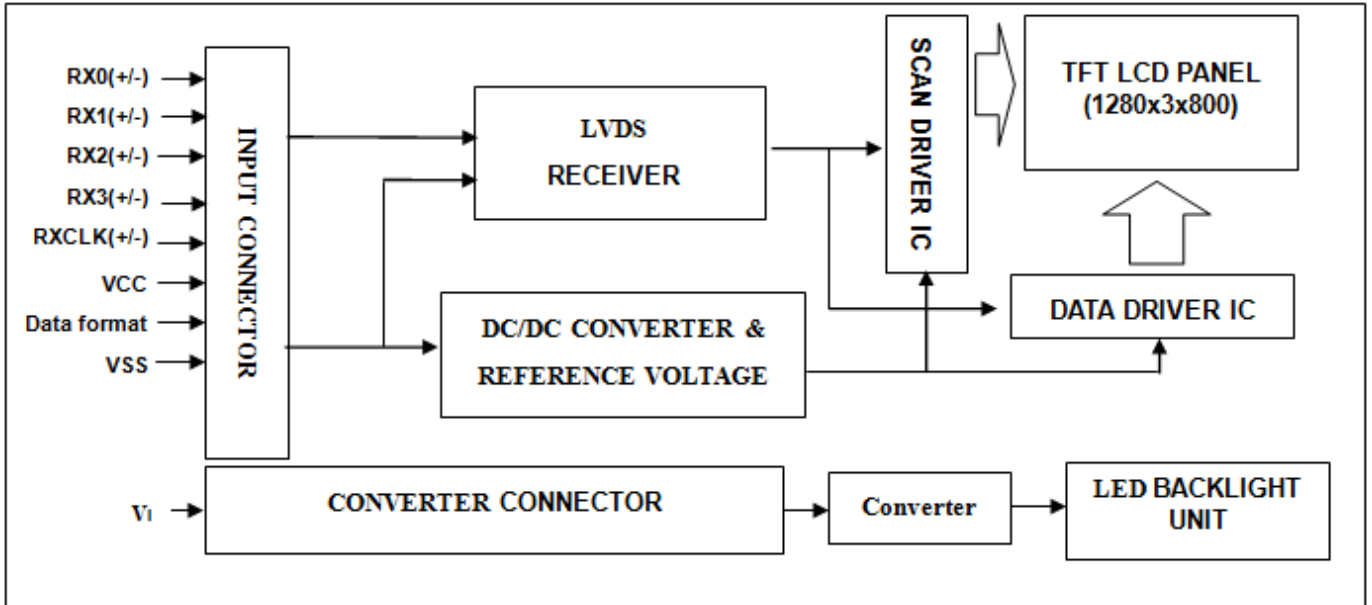
Note : While system is turned ON or OFF, the power sequences must follow as below descriptions

Turn ON sequence:  $V_i(+12V) \rightarrow \text{BLON} \rightarrow \text{E\_PWM}$  signal

Turn OFF sequence:  $\text{E\_PWM}$  signal  $\rightarrow \text{BLON} \rightarrow V_i(+12V)$

4. BLOCK DIAGRAM

4.1 TFT LCD MODULE





## 5. INPUT TERMINAL PIN ASSIGNMENT

### 5.1 TFT LCD MODULE

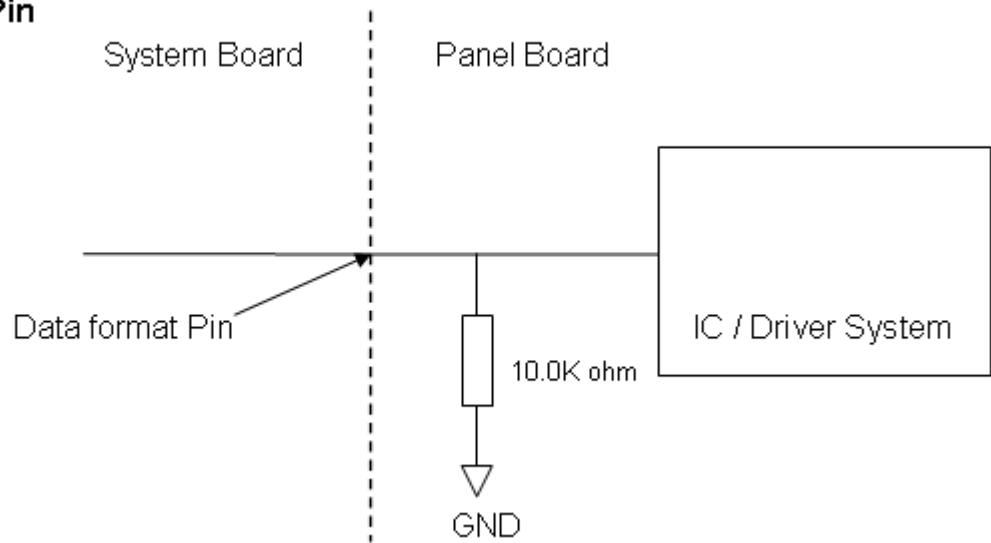
| Pin No. | Symbol      | Function   | Polarity | Note             |
|---------|-------------|--|----------|------------------|
| 1       | VCCS        | Power Supply +3.3V(typical)                      |          |                  |
| 2       | VCCS        | Power Supply +3.3V(typical)                      |          |                  |
| 3       | VCCS        | Power Supply +3.3V(typical)                      |          |                  |
| 4       | Data format | L or NC : 8bit Input Mode<br>H : 6bit Input Mode |          | Note (2),Note(3) |
| 5       | NC          | No Connction (Reserve for INX test)              |          |                  |
| 6       | NC          | No Connction (Reserve for INX test)              |          |                  |
| 7       | NC          | No Connction (Reserve for INX test)              |          |                  |
| 8       | Rxin0-      | LVDS Differential Data Input                     | Negative |                  |
| 9       | Rxin0+      | LVDS Differential Data Input                     | Positive |                  |
| 10      | VSS         | Ground   |          |                  |
| 11      | Rxin1-      | LVDS Differential Data Input                     | Negative |                  |
| 12      | Rxin1+      | LVDS Differential Data Input                     | Positive |                  |
| 13      | VSS         | Ground   |          |                  |
| 14      | Rxin2-      | LVDS Differential Data Input                     | Negative |                  |
| 15      | Rxin2+      | LVDS Differential Data Input                     | Positive |                  |
| 16      | VSS         | Ground   |          |                  |
| 17      | RxCLK-      | LVDS Differential Clock Input                    | Negative |                  |
| 18      | RxCLK+      | LVDS Differential Clock Input                    | Positive |                  |
| 19      | VSS         | Ground   |          |                  |
| 20      | Rxin3-      | LVDS Differential Data Input                     | Negative |                  |
| 21      | Rxin3+      | LVDS Differential Data Input                     | Positive |                  |
| 22      | VSS         | Ground   |          |                  |
| 23      | NC          | No Connction (Reserve)                           |          |                  |
| 24      | NC          | No Connction (Reserve)                           |          |                  |
| 25      | VSS         | Ground   |          |                  |
| 26      | VSS         | Ground   |          |                  |
| 27      | LED_PWM     | PWM Control Signal od LED Converter              |          |                  |
| 28      | LED_EN      | Enable Control Signal od LED Converter           |          |                  |
| 29      | LED_GND     | LED Ground                                       |          |                  |
| 30      | LED_GND     | LED Ground                                       |          |                  |
| 31      | LED_GND     | LED Ground                                       |          |                  |
| 32      | LED_GND     | LED Ground                                       |          |                  |
| 33      | LED_GND     | LED Ground                                       |          |                  |
| 34      | NC          | No Connction (Reserve)                           |          |                  |
| 35      | NC          | No Connction (Reserve)                           |          |                  |
| 36      | LED_VCCS    | LED Power Supply                                 |          |                  |
| 37      | LED_VCCS    | LED Power Supply                                 |          |                  |
| 38      | LED_VCCS    | LED Power Supply                                 |          |                  |
| 39      | LED_VCCS    | LED Power Supply                                 |          |                  |
| 40      | LED_VCCS    | LED Power Supply                                 |          |                  |

Note (1) Connector Part No.: I-PEX 20455-040E-12 or Tyco\_5-2069716-3.

Note (2) "Low" stands for 0V. "High" stands for 3.3V. "NC" stands for "No Connection".

Note (3) Interface optional pin has internal scheme as following diagram, Customer should keep the interface voltage level requirement which including panel board loading as below.

Data format Pin



## 5.2 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input the brighter the color. The table below provides the assignment of color versus data input.

| Color               |                | Data Signal |    |    |    |    |    |    |    |       |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
|---------------------|----------------|-------------|----|----|----|----|----|----|----|-------|----|----|----|----|----|----|----|------|----|----|----|----|----|----|----|
|                     |                | Red         |    |    |    |    |    |    |    | Green |    |    |    |    |    |    |    | Blue |    |    |    |    |    |    |    |
|                     |                | R7          | R6 | R5 | R4 | R3 | R2 | R1 | R0 | R7    | R6 | G5 | G4 | G3 | G2 | G1 | G0 | R7   | R6 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Colors        | Black          | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  |    |
|                     | Red            | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  |    |
|                     | Green          | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0  | 0  | 0  |    |
|                     | Blue           | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1    | 1  | 1  | 1  | 1  | 1  | 1  |    |
|                     | Cyan           | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1  | 1  | 1  |    |
|                     | Magenta        | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1  | 1  |    |
|                     | Yellow         | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0  | 0  | 0  |    |
|                     | White          | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1  | 1  | 1  |    |
| Gray Scale Of Red   | Red(0) / Dark  | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |    |    |
|                     | Red(1)         | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |    |    |
|                     | Red(2)         | 0           | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |    |    |
|                     | ⋮              | ⋮           | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮     | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮    | ⋮  | ⋮  | ⋮  | ⋮  |    |    |    |
|                     | ⋮              | ⋮           | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮     | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮    | ⋮  | ⋮  | ⋮  | ⋮  |    |    |    |
|                     | ⋮              | ⋮           | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮     | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮    | ⋮  | ⋮  | ⋮  | ⋮  |    |    |    |
|                     | Red(252)       | 1           | 1  | 1  | 1  | 1  | 1  | 0  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |    |    |
|                     | Red(252)       | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |    |    |
| Red(252)            | 1              | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  |    |    |    |
| Gray Scale Of Green | Green(0)/Dark  | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |    |    |
|                     | Green(1)       | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |    |    |
|                     | Green(2)       | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |    |    |
|                     | ⋮              | ⋮           | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮     | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮    | ⋮  | ⋮  | ⋮  | ⋮  |    |    |    |
|                     | ⋮              | ⋮           | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮     | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮    | ⋮  | ⋮  | ⋮  | ⋮  |    |    |    |
|                     | ⋮              | ⋮           | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮     | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮    | ⋮  | ⋮  | ⋮  | ⋮  |    |    |    |
|                     | Green(252)     | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 0  | 1  | 0    | 0  | 0  | 0  | 0  | 0  |    |    |
|                     | Green(252)     | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |    |    |
| Green(252)          | 0              | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1     | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0    | 0  | 0  | 0  | 0  |    |    |    |
| Gray Scale Of Blue  | Blue(0) / Dark | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |    |    |
|                     | Blue(1)        | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 1  |    |    |
|                     | Blue(2)        | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 1  |    |    |
|                     | ⋮              | ⋮           | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮     | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮    | ⋮  | ⋮  | ⋮  | ⋮  |    |    |    |
|                     | ⋮              | ⋮           | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮     | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮    | ⋮  | ⋮  | ⋮  | ⋮  |    |    |    |
|                     | ⋮              | ⋮           | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮     | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮  | ⋮    | ⋮  | ⋮  | ⋮  | ⋮  |    |    |    |
|                     | Blue(252)      | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1    | 1  | 1  | 1  | 1  | 0  |    |    |
|                     | Blue(252)      | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1    | 1  | 1  | 1  | 1  | 0  |    |    |
| Blue(252)           | 0              | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1  |    |    |    |

Note (1)0: Low Level Voltage, 1: High Level Voltage

**6. INTERFACE TIMING**

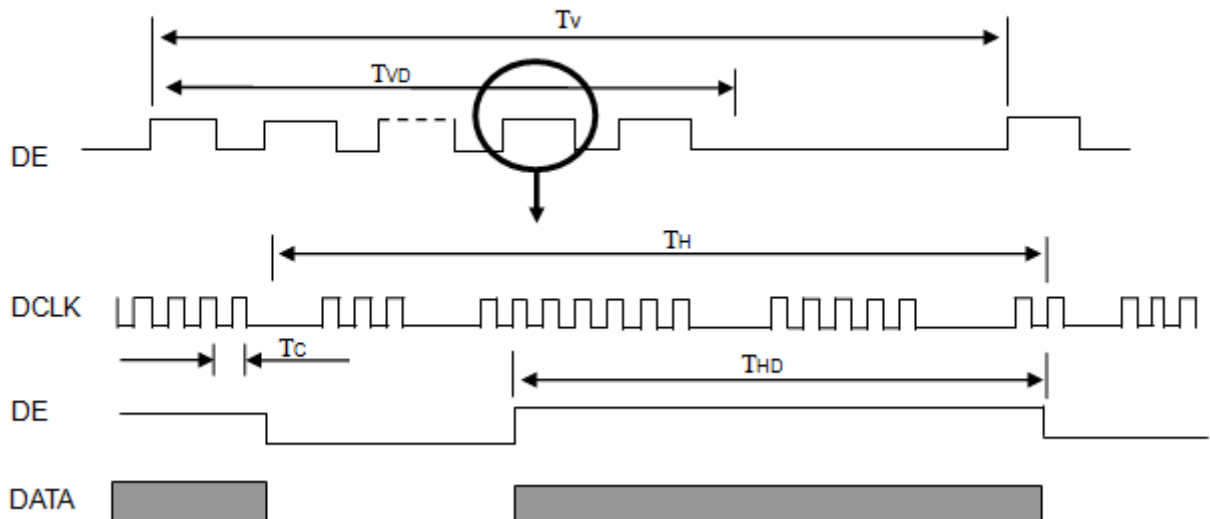
**6.1 INPUT SIGNAL TIMING SPECIFICATIONS**

The input signal timing specifications are shown as the following table and timing diagram.

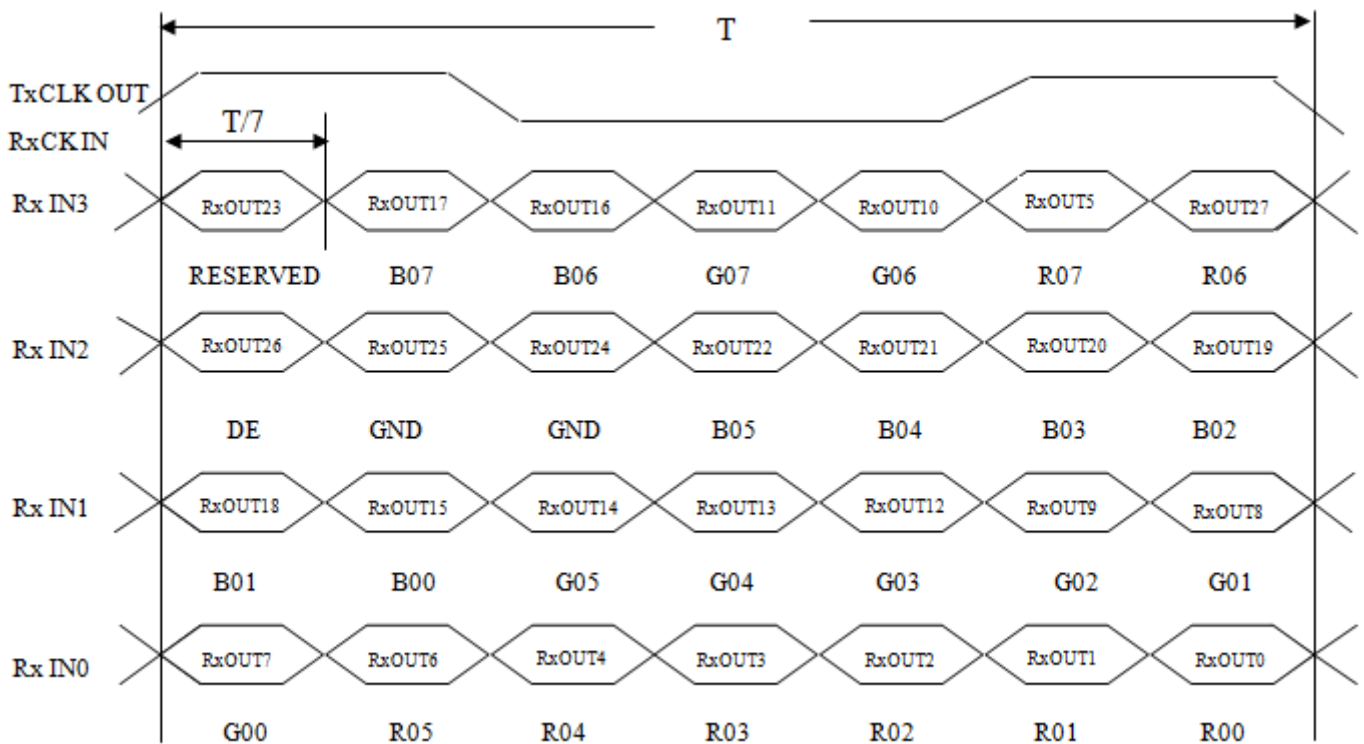
| Signal | Item                    | Symbol   | Min.  | Typ. | Max. | Unit  | Note |
|--------|-------------------------|----------|-------|------|------|-------|------|
| DCLK   | Pixel Clock             | $1/T_C$  | 60.40 | 71.1 | 74.7 | MHz   | -    |
| DE     | Vertical Total Time     | $T_V$    | 810   | 823  | 829  | $T_H$ | -    |
|        | Vertical Address Time   | $T_{VD}$ | 800   | 800  | 800  | $T_H$ | -    |
|        | Horizontal Total Time   | $T_H$    | 1362  | 1440 | 1480 | $T_C$ | -    |
|        | Horizontal Address Time | $T_{HD}$ | 1280  | 1280 | 1280 | $T_C$ | -    |

Note (1) Because this module is operated by DE only mode, Hsync and Vsync input signals should be set to low logic level or ground. Otherwise, this module would operate abnormally.

**INPUT SIGNAL TIMING DIAGRAM**

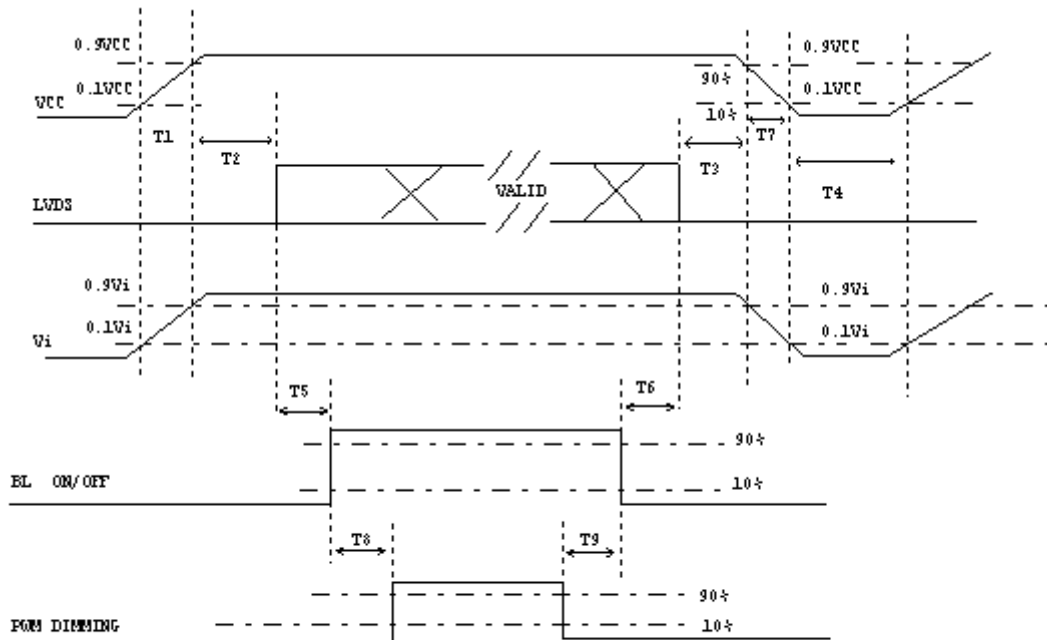


TIMING DIAGRAM of LVDS



**6.2 POWER ON/OFF SEQUENCE**

To prevent a latch-up or DC operation of LCD assembly, the power on/off sequence should be as the diagram below.



**Power ON/OFF sequence**

Note (1) Please avoid floating state of interface signal at invalid period.

Note (2) When the interface signal is invalid, be sure to pull down the power supply of LCD VCC to 0 V.

Note (3) The Backlight converter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight converter power must be turned off before the power supply for the logic and the interface signal is invalid.

| Parameter | Value |     |     | Units |
|-----------|-------|-----|-----|-------|
|           | Min   | Typ | Max |       |
| T1        | 0.5   | -   | 10  | ms    |
| T2        | 0     | -   | 50  | ms    |
| T3        | 0     | -   | 50  | ms    |
| T4        | 500   | -   | -   | ms    |
| T5        | 200   | -   | -   | ms    |
| T6        | 200   | -   | -   | ms    |
| T7        | 5     | -   | 300 | ms    |
| T8        | 10    | -   | -   | ms    |
| T9        | 10    | -   | -   | ms    |

## 7. OPTICAL CHARACTERISTICS

### 7.1 TEST CONDITION

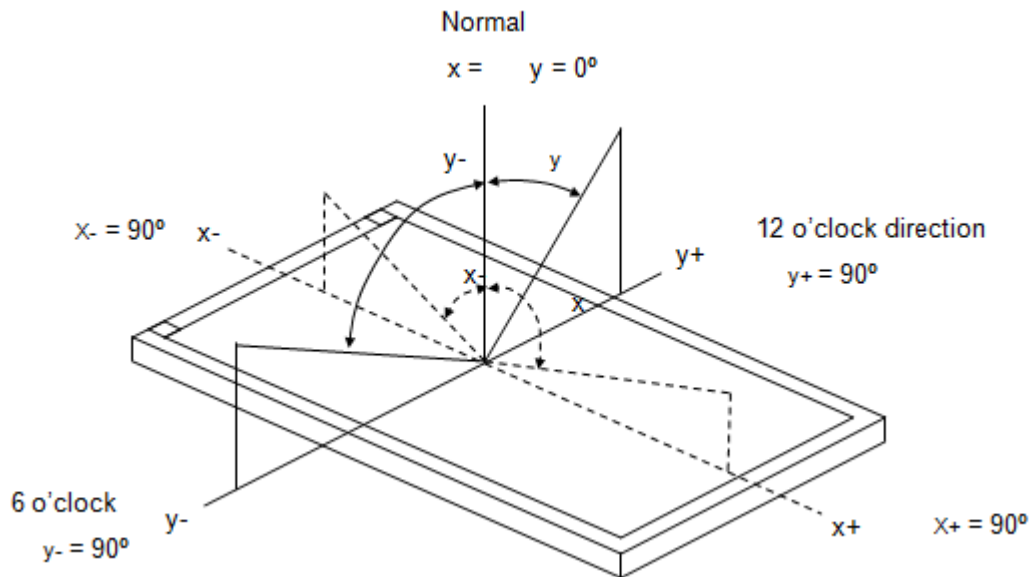
| Item                | Symbol  | Value | Unit |
|---------------------|---|-------|------|
| Ambient Temperature | Ta  | 25±2  | °C   |
| Ambient Humidity    | Ha  | 50±10 | %RH  |
| Supply Voltage      | V <sub>CC</sub>   | 3.3   | V    |
| Input Signal        | According to typical value in "3. ELECTRICAL CHARACTERISTICS" |       |      |
| Converter Voltage   | V <sub>i</sub>  | 12    | V    |
| Converter Duty      |   | 100%  |      |

### 7.2 OPTICAL SPECIFICATION

The relative measurement methods of optical characteristics are shown in 7.2 and all items are measured at the center point of screen except white variation. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (5).

| Item                      | Symbol         | Condition   | Min.       | Typ.  | Max.      | Unit              | Note     |
|---------------------------|----------------|---|------------|-------|-----------|-------------------|----------|
| Color Chromaticity        | Red            | R <sub>x</sub>                                    | Typ - 0.05 | 0.592 | Typ+ 0.05 | -                 | (1), (5) |
|                           |                | R <sub>y</sub>                                    |            | 0.340 |           |                   |          |
|                           | Green          | G <sub>x</sub>                                    |            | 0.316 |           |                   |          |
|                           |                | G <sub>y</sub>                                    |            | 0.591 |           |                   |          |
|                           | Blue           | B <sub>x</sub>                                    |            | 0.154 |           |                   |          |
|                           |                | B <sub>y</sub>                                    |            | 0.123 |           |                   |          |
|                           | White          | W <sub>x</sub>                                    |            | 0.313 |           |                   |          |
|                           |                | W <sub>y</sub>                                    |            | 0.329 |           |                   |          |
| Center Luminance of White | L <sub>C</sub> |   | 400        | 500   |           | cd/m <sup>2</sup> | (4), (5) |
| Contrast Ratio            | CR             |   | 600        | 800   |           | -                 | (2), (5) |
| Response Time             | T <sub>R</sub> | θ <sub>x</sub> =0°, θ <sub>y</sub> =0°            | -          | 14    | 17        | ms                | (3)      |
|                           | T <sub>F</sub> |   | -          | 11    | 14        |                   |          |
| White Variation           | δW             | θ <sub>x</sub> =0°, θ <sub>y</sub> =0°<br>USB2000 | 70         | -     | -         | %                 | (5), (6) |
| Viewing Angle             | Horizontal     | θ <sub>x+</sub>                                   | 80         | 85    | -         | Deg.              | (1), (5) |
|                           |                | θ <sub>x-</sub>                                   | 80         | 85    | -         |                   |          |
|                           | Vertical       | θ <sub>y+</sub>                                   | 80         | 85    | -         |                   |          |
|                           |                | θ <sub>y-</sub>                                   | 80         | 85    | -         |                   |          |

Note (1) Definition of Viewing Angle ( $\theta_x, \theta_y$ ):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{252} / L_0$$

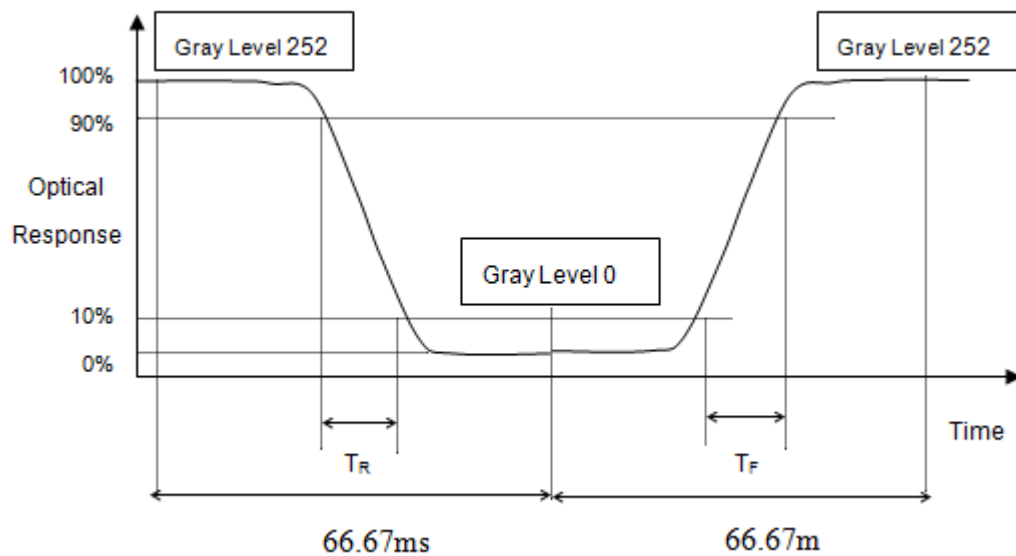
L<sub>252</sub>: Luminance of gray level 252

L<sub>0</sub>: Luminance of gray level 0

$$\text{CR} = \text{CR} (5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) Definition of Response Time ( $T_R, T_F$ ):





Note (4) Definition of Luminance of White ( $L_c$ ):

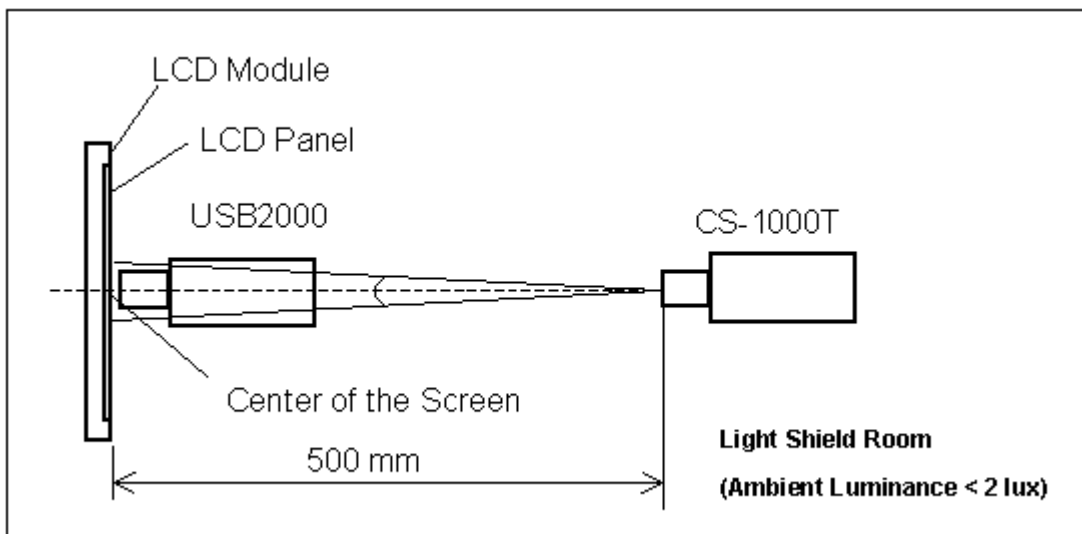
Measure the luminance of gray level 252 at center point

$$L_c = L(5)$$

$L(x)$  is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) Measurement Setup:

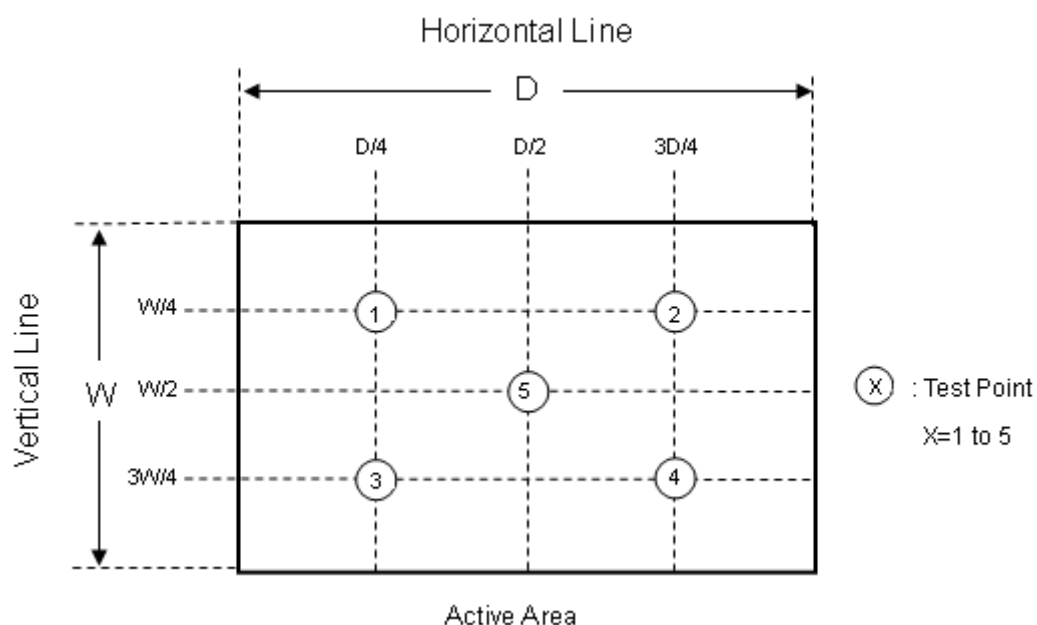
The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



Note (6) Definition of White Variation ( $\delta W$ ):

Measure the luminance of gray level 252 at 5 points

$$W_{5p} = \{ \text{Minimum} [L(1) \sim L(5)] / \text{Maximum} [L(1) \sim L(5)] \} * 100\%$$



8. RELIABILITY TEST CRITERIA

| Test Item                                       | Test Condition   | Note            |
|---|--|-----------------|
| High Temperature Storage Test                   | 70°C, 240 hours  | (1), (2)<br>(4) |
| Low Temperature Storage Test                    | -25°C, 240 hours   |                 |
| Thermal Shock Storage Test                      | -25°C, 0.5 hour ↔ 70°C, 0.5 hour; 100cycles, 1 hour/cycle)   |                 |
| High Temperature Operation Test                 | 65°C, 240 hours  |                 |
| Low Temperature Operation Test                  | -20°C, 240 hours   |                 |
| High Temperature & High Humidity Operation Test | 60°C, RH 90%, 240 hours  |                 |
| ESD Test (Operation)                            | 150pF, 330Ω, 1 sec/cycle<br>Condition 1 : panel contact, ±8 KV<br>Condition 2 : panel non-contact ±15 KV | (1)             |
| Shock (Non-Operating)                           | 50G, 11ms, half sine wave, 1 time for ± X, ± Y, ± Z direction  | (1), (3)        |
| Vibration (Non-Operating)                       | 1.5G, 10 ~ 300 Hz sine wave, 10 min/cycle, 3 cycles each X, Y, Z direction                               | (1), (3)        |

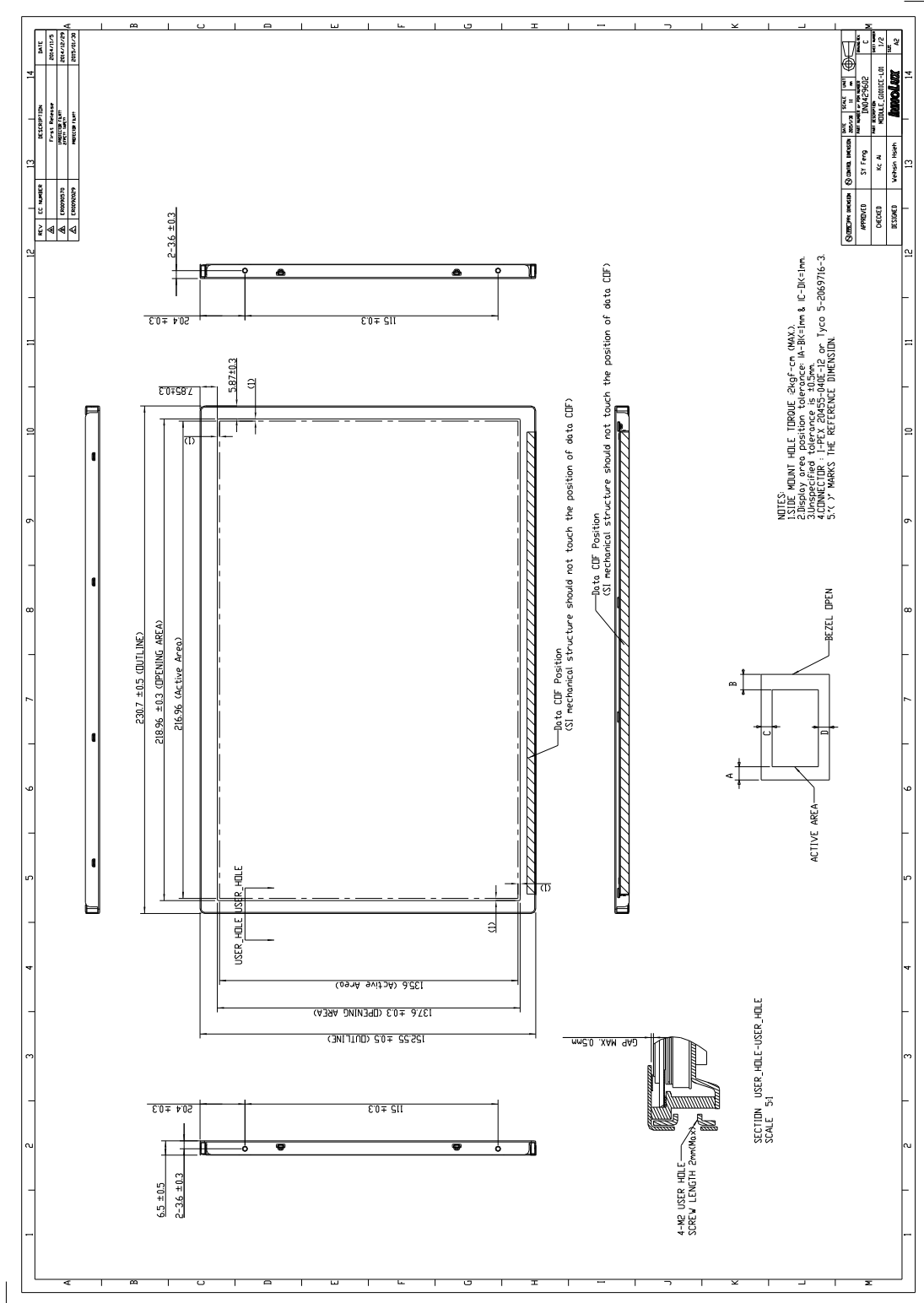
Note (1) No display malfunction.

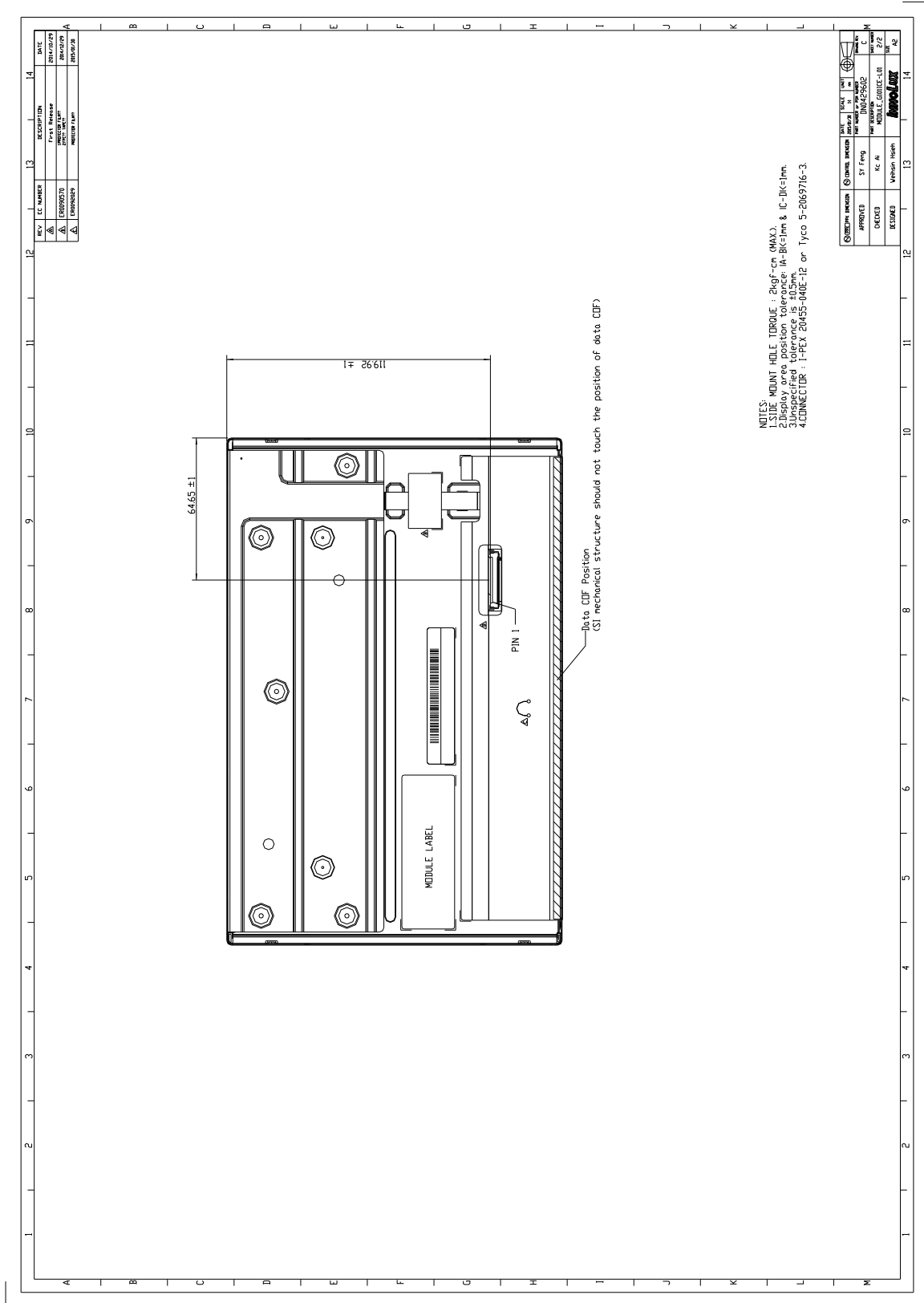
Note (2) Judgment should be tested after storage at room temperature for more than two hour. All the cosmetic specification is judged before reliability test.

Note (3) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

Note (4) Temperature of panel display surface area should be 75°C Max.

12. MECHANICAL CHARACTERISTICS





|     |            |            |
|-----|------------|------------|
| REV | REV NUMBER | REV DATE   |
| 1   | 1.00000001 | 2018/07/19 |
| 2   | 1.00000002 | 2018/07/19 |
| 3   | 1.00000003 | 2018/07/19 |

|   |          |      |    |
|---|----------|------|----|
| ① | APPROVED | DATE | BY |
| ② | DESIGNED | DATE | BY |
| ③ | REVIEWED | DATE | BY |

- NOTES:
1. SIDE MOUNT HOLE TORQUE : 2kgf-cm (MAX).
  2. Display area position tolerance: A-B<=1mm & I-C<=1mm.
  3. Unspecified tolerance is ±0.2mm.
  4. CONNECTOR : I-PEX ED45-040E-1E or Tyco 5-2069716-3.



**10.1" PCAP Solution  
12014890**

Date: 2/11/2019

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## 1 Scope

DATA MODUL's PCAP solution 12014890 consists of a 10.1" capacitive touch screen. Please note that this is only a sub-assembly of the final product. The specification of the final end product might differ from this specification.

## 2 Touch Sensor and Cover Glass

### 2.1 Technical Parameters

|                                    |                                 |
|------------------------------------|---------------------------------|
| Screen size                        | 10.1 inch /25.7 cm              |
| Format                             | Wide                            |
| Composite                          | SITO with Tail                  |
| Outline dimensions                 | 232.84 x 147.0 x 1.1 mm (WxHxT) |
| Active area                        | 226 x 139 mm (WxH)              |
| Bending radius of tail             | R = 2 mm recommended            |
| Transmissivity                     | 90% (min.)                      |
| Haze                               | % (max.)                        |
| Operating temperature and humidity | -30 to +85°C, < 90% RH          |
| Storage temperature and humidity   | -40 to +95°C, < 80 % RH         |
| Tail connector                     | OMRON XF2M-5515-1A              |

## 2.2 Reliability Tests

|                                       |                                      |
|---------------------------------------|--------------------------------------|
| Low Temperature Storage Test          | -40°C for 480h                       |
| High Temperature Storage Test         | 95°C for 480h                        |
| High Temperature / High Humidity Test | 85°C, 85% RH for 480h                |
| Cycle test                            | -40°C(30min), 85°C(30min), 500cycles |

## 3 Recommended Touch Controller

The recommendation for this PCAP solution is a controller based on mXT640T. Please ask your local DATA MODUL sales representative for further details.

## 4 Optical Inspection Criteria and Handling Recommendations

### 4.1 Optical Inspection Criteria

For details on the optical inspection criteria, please refer to DATA MODULs Outgoing Spec or ask your local DATA MODUL sales representative.

### 4.2 Handling Recommendations

Precautions for operation

- Do not put a heavy, hard or sharp object on the product
- Do not bend the product in order to assure the reliability
- Do not put one product on the other. Otherwise, it may cause the product to be scratched
- Don't use any organic solvent acid or alkali solution.

Precautions for mounting

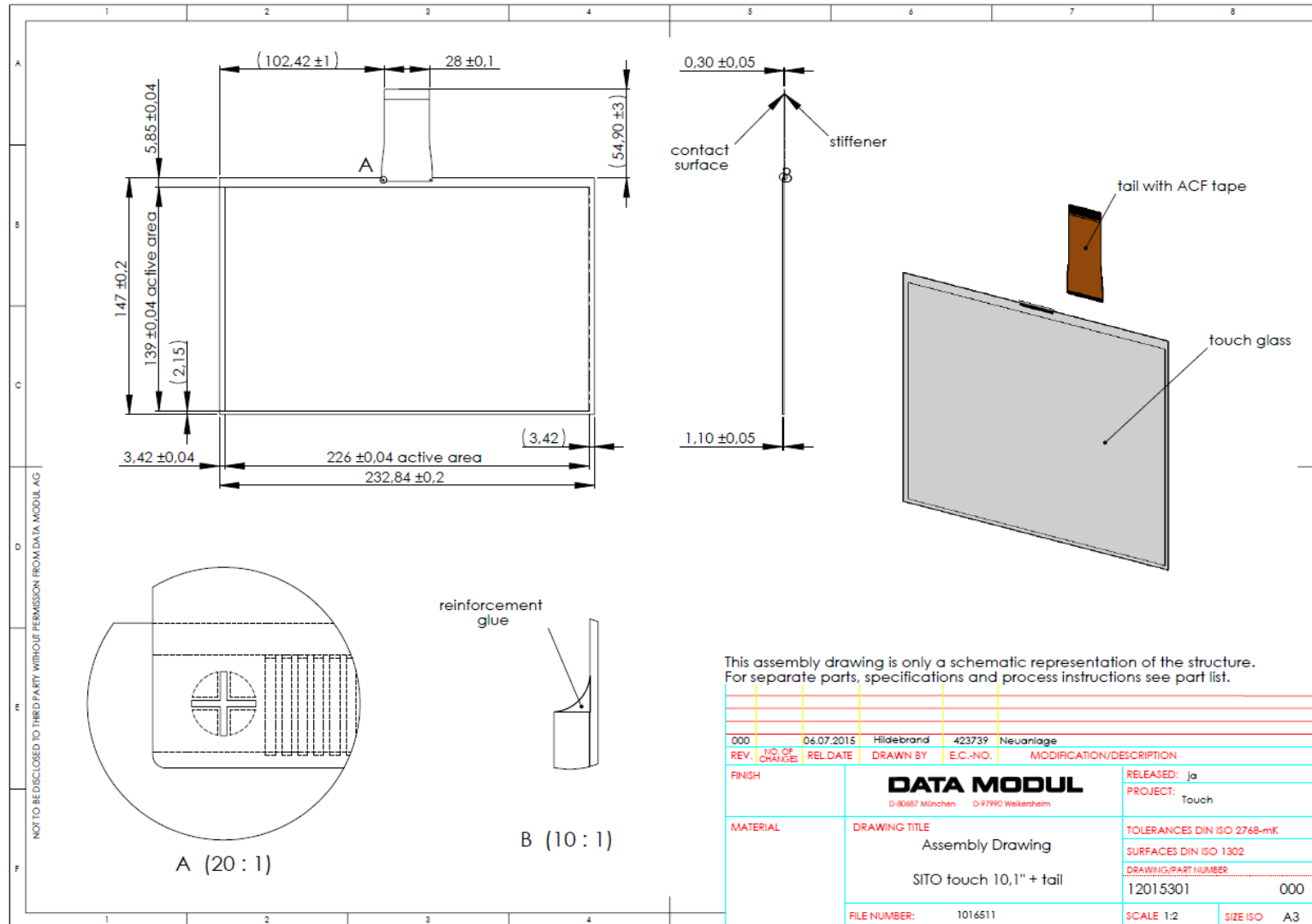
- The panel should be mounted using a configuration that either holds the panel by all four corners or by all four sides
- The bezel edge must be positioned outside the active area. The bezel may cause false activation if the edge overlaps the active area
- Any mounting configuration should ensure that there is no twisting force applied to the panel
- 1mm distance between TFT screen and touch panel is recommended

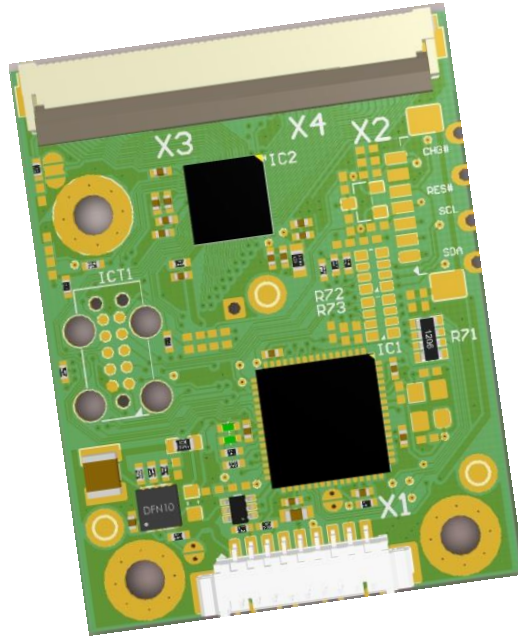
Precautions for tail

- The flex tail in general can be bent with a min. radius of about 1mm
- In order to avoid damaging and malfunction of the sensor, please don't bend the FPC area next to the panel
- Excess or repeated bending of the FPC connector should also be avoided



## 5 Appendix A: Technical Drawing





## easyTOUCH mXT640T PCAP USB controller

Revision: 002

Date: 2016-03-04

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# 1 Introduction

The easyTouch mXT640T Controller is designed as a part of the capacitive touch systems developed by Data Modul. It offers the possibility to connect a projective capacitive touch sensor to standard computers or embedded systems using USB. For the connection the customer can use the cable or connect the controller board via soldering pads on top of another PCB.

The controller is based on the Atmel maXTouch 640T which offers a very good touch performance and high noise resistance. To get the best touch performance with water and glove usage the mXT640T has integrated self-capacitance technology. In combination with the mutual-capacitance entity the controller is applicable for single- and multi-touch. Together with outstanding filter technology the maXTouch ICs are suitable for industrial, medical and other applications.

For the communication with the OS the controller uses Data Modul's Driverless firmware. The firmware connects as a Human Interface Device (HID) without an additional driver to the most popular operating systems like Windows XP, Windows 7 / 8, Windows CE5/6/7, OSX and Linux. For more information about the Data Modul Driverless firmware please refer to the *Driverless Controller User Guide*.

## 2 Controller specification

### 2.1 Mechanical features

|                       |                               |
|-----------------------|-------------------------------|
| Size                  | 33x43x4.5 mm                  |
| Operating temperature | -30 to +85 °C                 |
| Storage temperature   | -30 to +85 °C                 |
| Temperature slew rate | 10 °C /minute (max.)          |
| Relative humidity     | 95 % at 60 °C no condensation |
| RoHS compliant        | Yes                           |

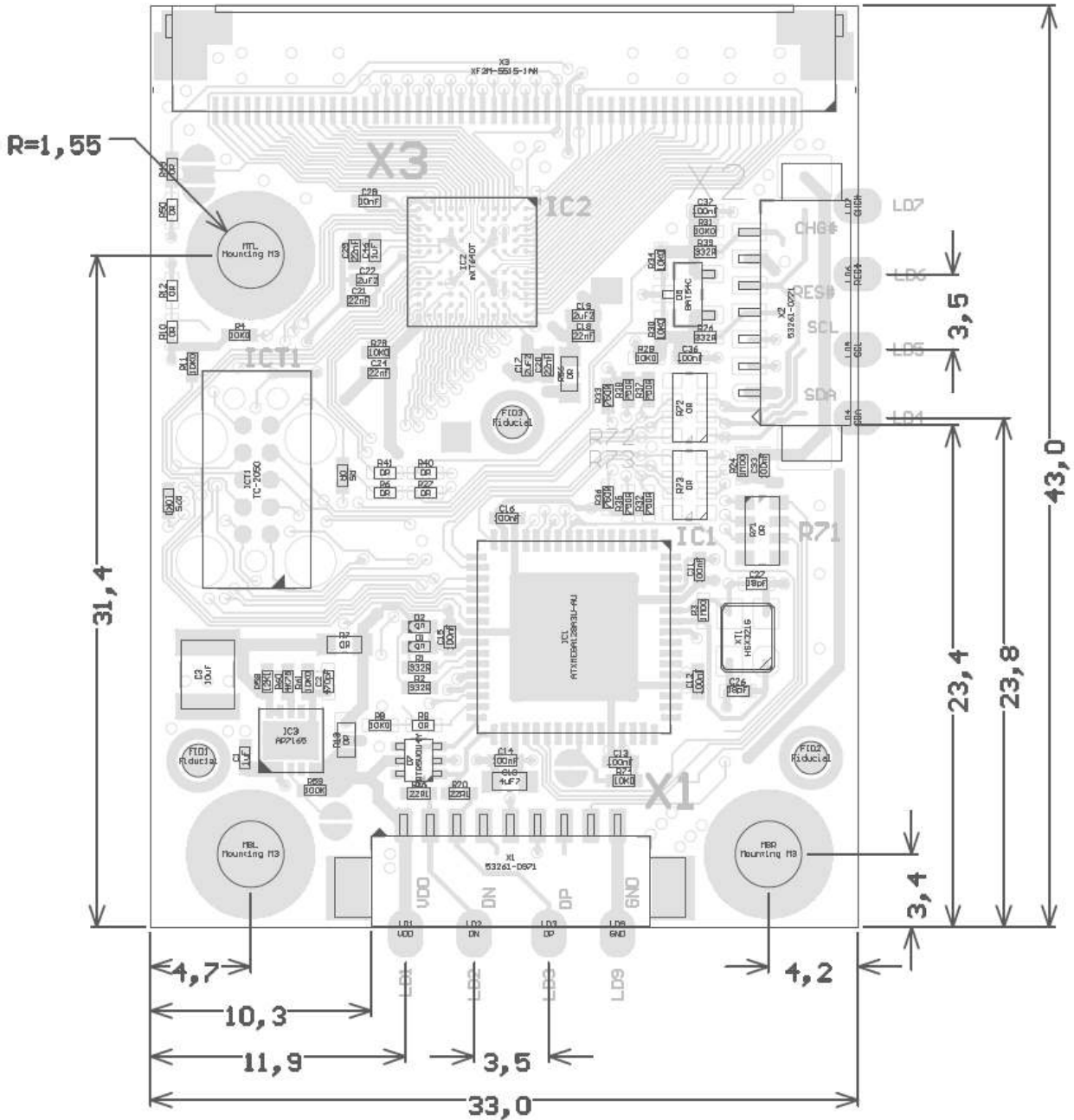
### 2.2 Connection features

|               |   |
|---------------|---|
| Protocol      | HID mouse, HID digitizer                    |
| Multi touch   | 10 fingers (max.)                           |
| Single touch  | HID mouse with right mouse button emulation |
| Resolution    | 4096 x 4096 (x/y)                           |
| Report rate   | 350 Hz (max. subject to configuration)      |
| USB connector | MOLEX 53261-0971 or equivalent              |

### 2.3 Electrical features

|                   |  |
|-------------------|--|
| Power supply      | 5 V± 5%                                |
| Vin ripple        | ±50 mV peak-peak (max.)                |
| On board voltage  | 3.3 V and 6.6 V                        |
| Power consumption | 200 mW (max. subject to configuration) |

### 3 Mechanical drawing



Height: 4.5 mm (including components)

## 4 Connectors and signals

### 4.1 Connectors

| Connector            | Type   | Connection                  |
|----------------------|--|-----------------------------|
| X1                   | 1.25 mm pitch 9 pin header<br>MOLEX 53261-0971 | USB                         |
| X3                   | 0.5 mm pitch 55 pin header                     | Flextail to touch sensor    |
| Soldering pads LD1-9 |  | Alternative connector of X1 |

### 4.2 X1 and soldering pads pin assignment

| X1 | Pad | Signal | Description      |
|----|-----|--------|------------------|
| 1  | 1   | VDD_5V | USB power supply |
| 2  | 2   | USB DM | USB signal -     |
| 3  | 3   | USB DP | USB signal +     |
| 4  | 4   |        | Do not use       |
| 5  | 5   |        | Do not use       |
| 6  | 6   |        | Do not use       |
| 7  | 7   |        | Do not use       |
| 8  | -   |        | Do not use       |
| 9  | 9   | GND    | Ground           |

Matching USB cable (length 2m): Article number **TP72241**

## 5 UL information

| Part | Type   | UL number  |
|------|--|--|
| X1   | 1.25 mm pitch 9 pin header<br>MOLEX 53261-0971 | Molex 53261-xx71: E29179 or<br>YeonHo 12505WR- xx: E108706                       |
| X3   | 0.5 mm pitch 55 pin header                     | Omron XF2M-xx15-1AH:<br>LCP resin (UL94V-0)/natural<br>LCP resin (UL94V-0)/black |
| PCB  |  | Fuying: E315019  |

## 7 Appendix: Frequently asked questions

### Touch coordinates are not stable and the cursor is “jumping around”?

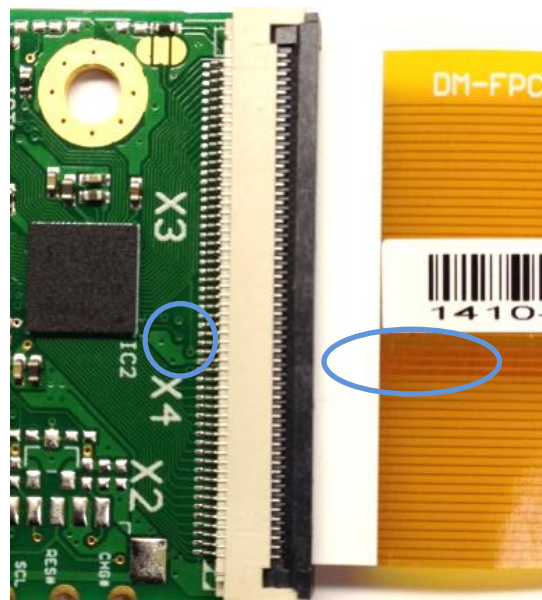
In mains-operated systems this can happen if the touch controller is missing the systems ground reference. Another reason can be an extreme amount of noise present that exceeds the touch threshold set in the controller.

Please connect the system ground reference to one of the mounting holes. For best touch performance the touch controller needs a low impedance AC connection to the person that operates the system to achieve a good current loop back to the controller.

If the instability is caused by a noise source like a display, a switching regulator or a RF antenna your system may have an integration issue. With proper settings the controller can most likely suppress the noise. However, eliminating the noise source should be the first thing to check. If you have any difficulties to find the correct settings, please contact Data Modul.

### Connecting is done, but no touch function at all?

If the tail is inserted “upside-down” you will not get any touch event. Please check if the tail is connected correctly. When connecting the touch panel to the controller, do not let the golden finger side misleading you. Always check the alignment of the three ground connections on the tail (marked blue in the following picture) to make sure the connection is correct. Please always connect the tail first before you connect to USB. You also should check if you touch the correct side of the panel.







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