

Specification

CLAA070NA01CT

7.0" / 1024x600 / LVDS / LED

Version September 2007

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1. OVERVIEW

CLAA070NA01CT is 7" color TFT-LCD(Thin Film Transistor Liquid Crystal Display)module which integrates Touch–Screen.Composed of LCD panel,driver ICs,control circuit,and LED backlight.

The 7.0"screen produces a high resolution image that is composed of 1024×600 pixel elements in a stripe arrangement.Display 262K colors by 6 Bit R.G.B signal input.

General specifications are summarized in the following table :

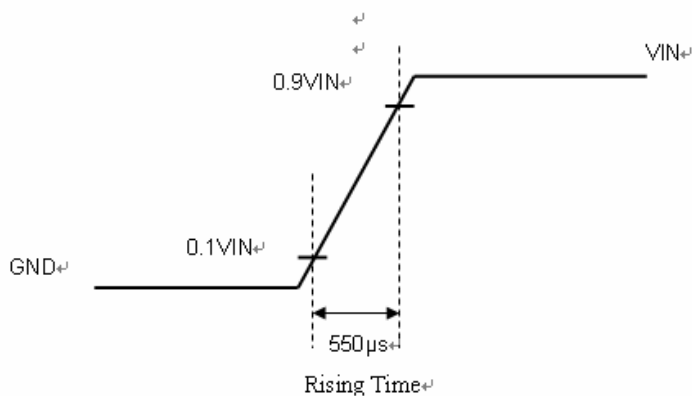
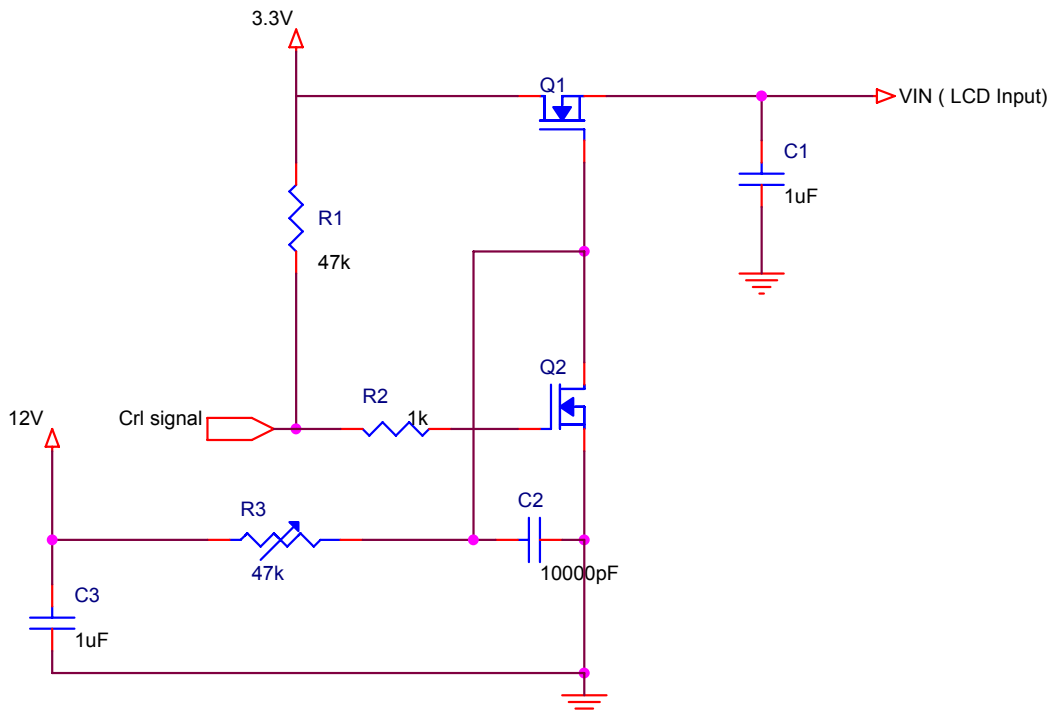
| ITEM | SPECIFICATION |
|--------------------------------|------------------------------|
| Display Area (mm) | 153.6(H)×90(V) |
| Number of Pixels | 1024(H)×3(RGB)×600(V) |
| Pixel Pitch (mm) | 0.15(H)×0.15(V) |
| Color Pixel Arrangement | RGB vertical stripe |
| Display Mode | Normally white |
| Number of colors | 262,144 |
| Viewing Direction | 6 o'clock |
| Response Time (Tr+Tf) | 20ms |
| Brightness(cd/m ²) | 200 nit(min)/250nit(typ) |
| Viewing Angle(BL on,CR≥10) | 140 degree(H) · 110degree(V) |
| Electrical Interface(data) | LVDS |
| Power consumption | 2.825W (TYP) |
| Outline Dimension(in mm) | 165(W)×102(H)×6(D) |
| Weight(g) | 138 |
| BL unit | LED |
| Surface Treatment | Anti-Glare · Hardness:3H |
| Touch Panel Type | 4 wire resistive |

2. ABSOLUTE MAXIMUM RATINGS

| Item | Symbol | Min. | Max. | Unit | Note |
|-----------------------|---|------|----------------------|------|------|
| LCD input Voltage | V _{cc} | -0.3 | 4.0 | V | |
| LED input Voltage | V _{LED} | -0.3 | 6 | V | |
| Signal Input Voltage | RxIN0+ ~ RxIN2+ RxIN0- ~ RxIN2- Rx CLK IN +/- | -0.3 | V _{cc} +0.3 | V | |
| Static Electricity | VESD _c | -200 | +200 | | *2) |
| | VESD _m | -15K | +15K | V | |
| ICC Rush Current | IRUSH | -- | 1 | A | *3) |
| Operation Temperature | T _{op} | -30 | 85 | °C | *1) |
| Storage Temperature | T _{stg} | -40 | 95 | °C | *1) |

Remarks :

- *1) If users use the product out off the environmment operation range (temperature and humidity) ,it will concern for visual quality.
- *2) Test Condition: IEC 61000-4-2 ,
VESD_c : Contact discharge to input connector
VESD_m : Contact discharge to module
- *3) Control signal:High(+3.3V)→Low(GND)
Supply Voltage of rising time should be from R3 and C2 tune to 550 us.



3. ELECTRICAL CHARACTERISTICS

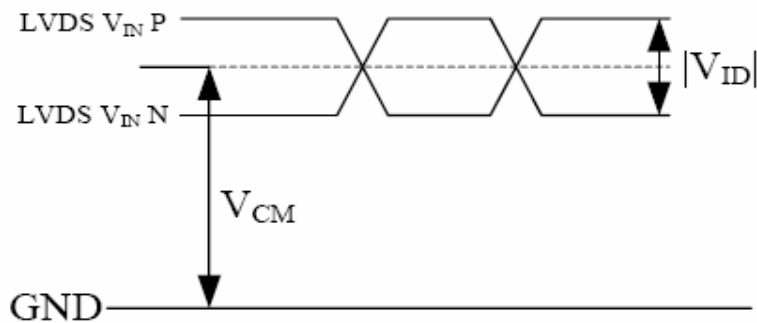
3.1 TFT LCD

Ta=25°C

| Item | Symbol | Min. | Typ | Max. | Unit | Note |
|------------------------------------|--------|------|-----|------|------|-----------------------|
| Power Supply Voltage For LCD | VCC | 3.0 | 3.3 | 3.6 | V | |
| Power Supply Voltage For LED | VLED | 4.5 | 5.0 | 5.5 | | |
| Logic Input Voltage (LVDS:IN+,IN-) | VCM | 1.08 | 1.2 | 1.32 | V | *1) |
| | VID | 250 | 350 | 450 | mV | *1) |
| | VTH | -- | -- | 100 | mV | *1) |
| | VTL | -100 | -- | -- | mV | *1) When VCM=+1.2V |
| ADJ Input Voltage | VIH | 3.0 | | 3.3 | V | |
| | VIL | GND | | 0.3 | V | |

Remarks :

*1) LVDS signal



$$|VID| = |VTH - VTL|,$$

$$VCM = (VTH + VTL)/2$$

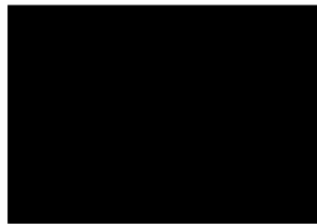
3.2 TFT-LCD Current Consumption

| ITEM | SYMBOL | MIN | TYP | MAX | UNIT | REMARK |
|-------------------|--------|-----|-----|-----|------|--------|
| LCD Power Current | ICC | -- | 250 | 300 | mA | *1) |
| LED Power Current | IDD | | 400 | 450 | mA | *2) |

*1) Typical: Under 64 gray pattern
 Maximum: Under black pattern



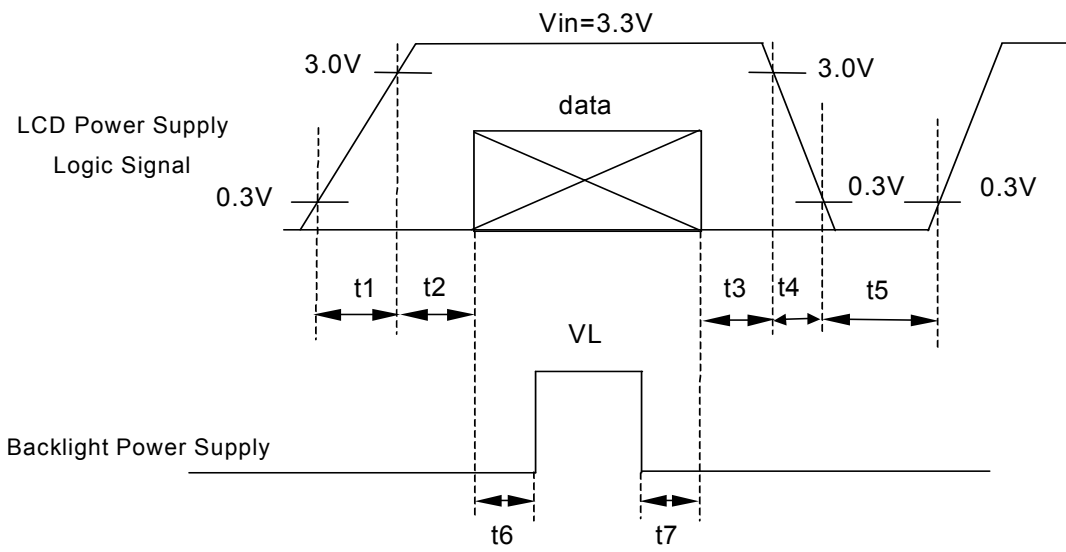
(a)64 Gray Pattern



(b)Black Pattern

*2) Typical: When VDD is 5V
 Maximum: When VDD is 4.5V

3.3 Power 、 signal sequence



Data: RGB DATA, DCLK, DENA

- $t1 \leq 10\text{ms}$
- $0 < t2 \leq 50\text{ms}$
- $0 < t3 \leq 50\text{ms}$
- $0 < t4 \leq 10\text{ms}$
- $1 \text{ sec} \leq t5$
- $200\text{ms} \leq t6$
- $200\text{ms} \leq t7$

4. INTERFACE CONNECTION

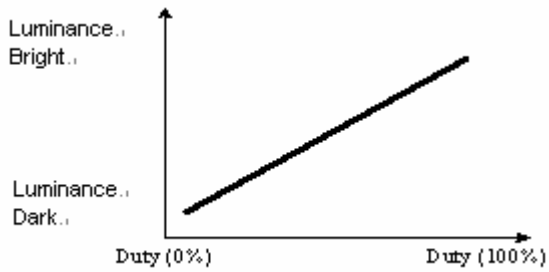
| Pin NO. | SYMBOL | DESCRIPTION |
|---------|--------|---|
| 1 | AVSS | Power Ground |
| 2 | VCC | Power Supply for Digital circuit |
| 3 | VCC | Power Supply for Digital circuit |
| 4 | NC | NC |
| 5 | ADJ | Adjust for LED brightness |
| 6 | NC | NC |
| 7 | AVSS | Power Ground |
| 8 | RXIN0- | Negative LVDS differential data inputs |
| 9 | RXIN0+ | Positive LVDS differential data inputs |
| 10 | AVSS | Power Ground |
| 11 | RXIN1- | Negative LVDS differential data inputs |
| 12 | RXIN1+ | Positive LVDS differential data inputs |
| 13 | AVSS | Power Ground |
| 14 | RXIN2- | Negative LVDS differential data inputs |
| 15 | RXIN2+ | Positive LVDS differential data inputs |
| 16 | AVSS | Power Ground |
| 17 | RXCLK- | Negative LVDS differential clock inputs |
| 18 | RXCLK+ | Positive LVDS differential clock inputs |
| 19 | AVSS | Power Ground |
| 20 | NC | NC |
| 21 | NC | NC |
| 22 | NC | NC |
| 23 | NC | NC |
| 24 | VLED | Power Supply for LED(Vled=5.0±0.5) |
| 25 | VLED | Power Supply for LED(Vled=5.0±0.5) |
| 26 | VLED | Power Supply for LED(Vled=5.0±0.5) |
| 27 | YD | Touch Panel control pin |
| 28 | XL | Touch Panel control pin |
| 29 | YU | Touch Panel control pin |
| 30 | XR | Touch Panel control pin |

Remarks :

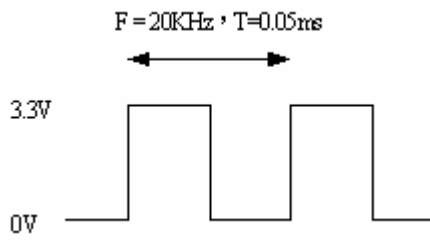
- 1) NC Pin must be retain, this pin can't contact GND or other signal.
- 2) GND Pin must ground contact , can not be floating.
- 3) Touch Panel Control

| Pin No. | Symbol | function |
|---------|--------|-------------------|
| 1 | YU | Y axis resistance |
| 2 | XR | X axis resistance |
| 3 | YD | Y axis resistance |
| 4 | XL | X axis resistance |

4) ADJ adjust brightness to control Pin · Pulse duty the more big the more bright



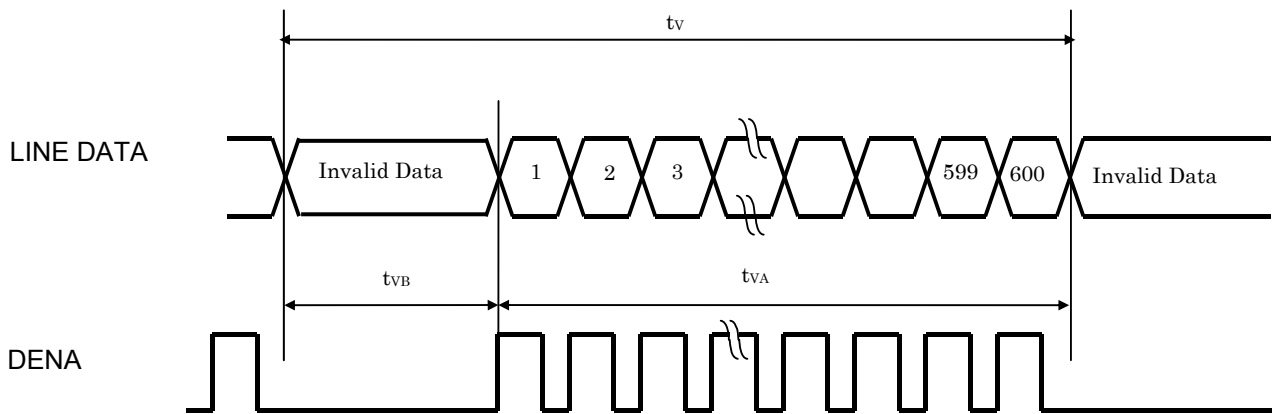
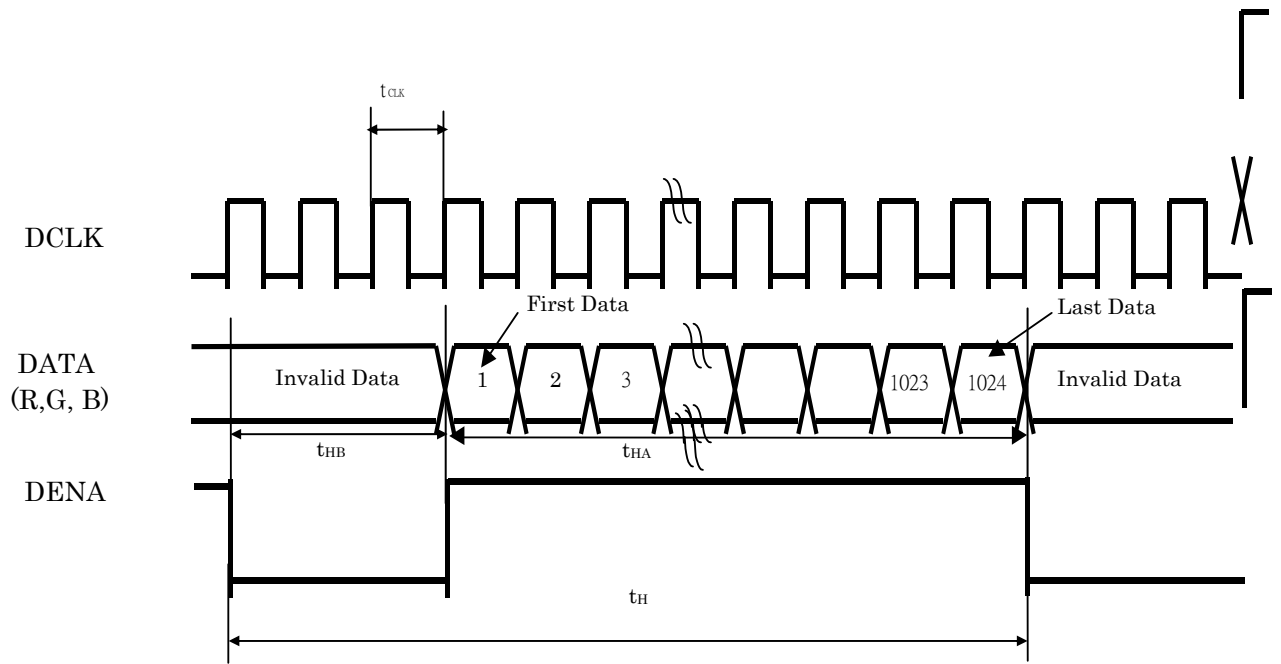
5) ADJ signal=0~3.3V · operation frequency : $20 \pm 5\text{KHz}$



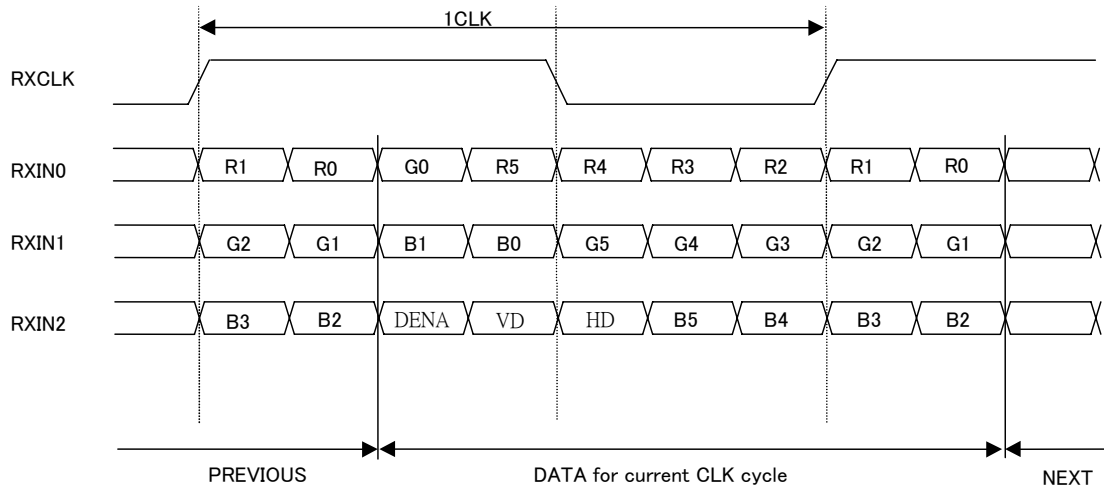
5. INPUT SIGNAL(DE ONLY MODE)

5.1 Timing Specification

| Item | | | Symbol | Min | Typ | Max | Unit | |
|---|---------------|------------|---------------------------|-----------------|------|------|------|----------------|
| LVDS input signal sequence | CLK Frequency | | fCLKin | 39 | 45 | 52 | MHz | |
| LCD input signal sequence (Input LVDS Transmitter) | DENA | Horizontal | Horizontal total Time | t _H | 1150 | 1200 | 1250 | tCLK |
| | | | Horizontal effective Time | t _{HA} | 1024 | | | tCLK |
| | | | Horizontal Blank Time | t _{HB} | 126 | 176 | 226 | tCLK |
| | Vertical | Vertical | Frame | fV | 55 | 60 | 65 | Hz |
| | | | Vertical total Time | t _V | 610 | 625 | 640 | t _H |
| | | | Vertical effectiveTime | t _{VA} | 600 | | | t _H |
| | | | Vertical Blank Time | t _{VB} | 10 | 25 | 50 | t _H |



5.3 LVDS Input Data mapping



5.4 Color Data Assignment

| COLOR | INPUT DATA | R DATA | | | | | | G DATA | | | | | | B DATA | | | | | |
|-------------|------------|--------|----|----|-----|----|----|--------|----|----|-----|----|----|--------|----|----|-----|----|----|
| | | R5 | R4 | R3 | R2 | R1 | R0 | G5 | G4 | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 | B0 |
| | | MSB | | | LSB | | | MSB | | | LSB | | | MSB | | | LSB | | |
| BASIC COLOR | BLACK | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | RED(63) | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | GREEN(63) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | BLUE(63) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| | CYAN | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | MAGENTA | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| | YELLOW | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 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 |
| RED | RED(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 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | RED(2) | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | RED(62) | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | RED(63) | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GREEN | GREEN(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 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | GREEN(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | GREEN(62) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | GREEN(63) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| BLUE | BLUE(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 | 1 |
| | BLUE(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | BLUE(62) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| | BLUE(63) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |

Remarks :

(1) Definition of Gray Scale

color(n) : n is series of Gray Scale

The more n value is, the bright Gray Scale.

(2)Data:1-High,0-Low

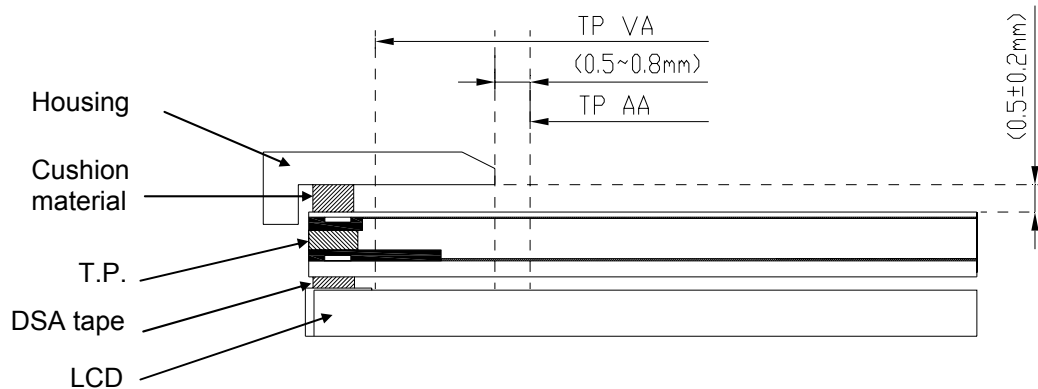
6. CHARACTERISTIC OF TOUCH PANEL

6.1 Basis characteristic

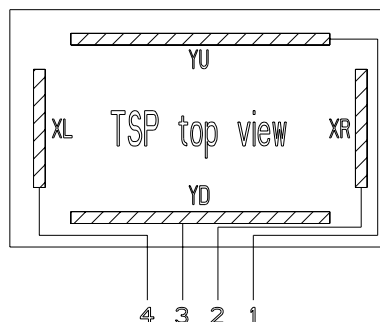
| Item | Standard | Note |
|------------------------------|---|---|
| Operating Voltage | 5V(Typ)/7V(Max) | DC |
| Surface Treatment | Anti-Glare · Hardness : 3H | |
| Activation Force | Max. 100gf | with stylus pen (R 0.8mm) or finger (R 8.0mm) |
| Interface Type | 4 Wire Resistive | |
| Resistance Between Terminals | X(Film side) : 200~900Ω Y(Glass side) : 200~900Ω | At the connector |
| Linearity | X(Film side) : ≤ 1.5% Y(Glass side) : ≤ 1.5% | Testing interval is 2mm with load 80g |
| Insulation Resistance | Min. 20MΩ | At DC 25V |

6.2 Design guideline for Touch-Panel

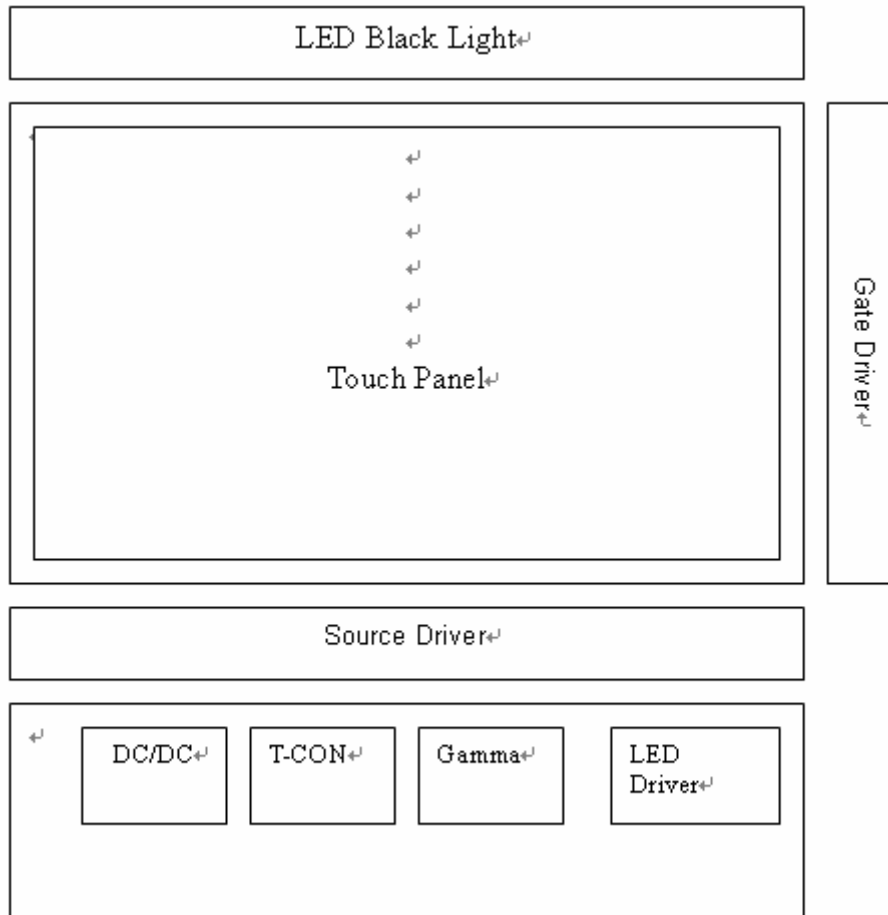
- (a) The Housing Cushion on touch-panel must be set at outside of T.P's view-area .
- (b) The Cushion material must be elastic material.
- (c) The housing must avoid to touch the T.P
- (d) To combine, the housing should not be stuck on T.P.
- (e) Example of housing design :



6.3 Circuit Diagram



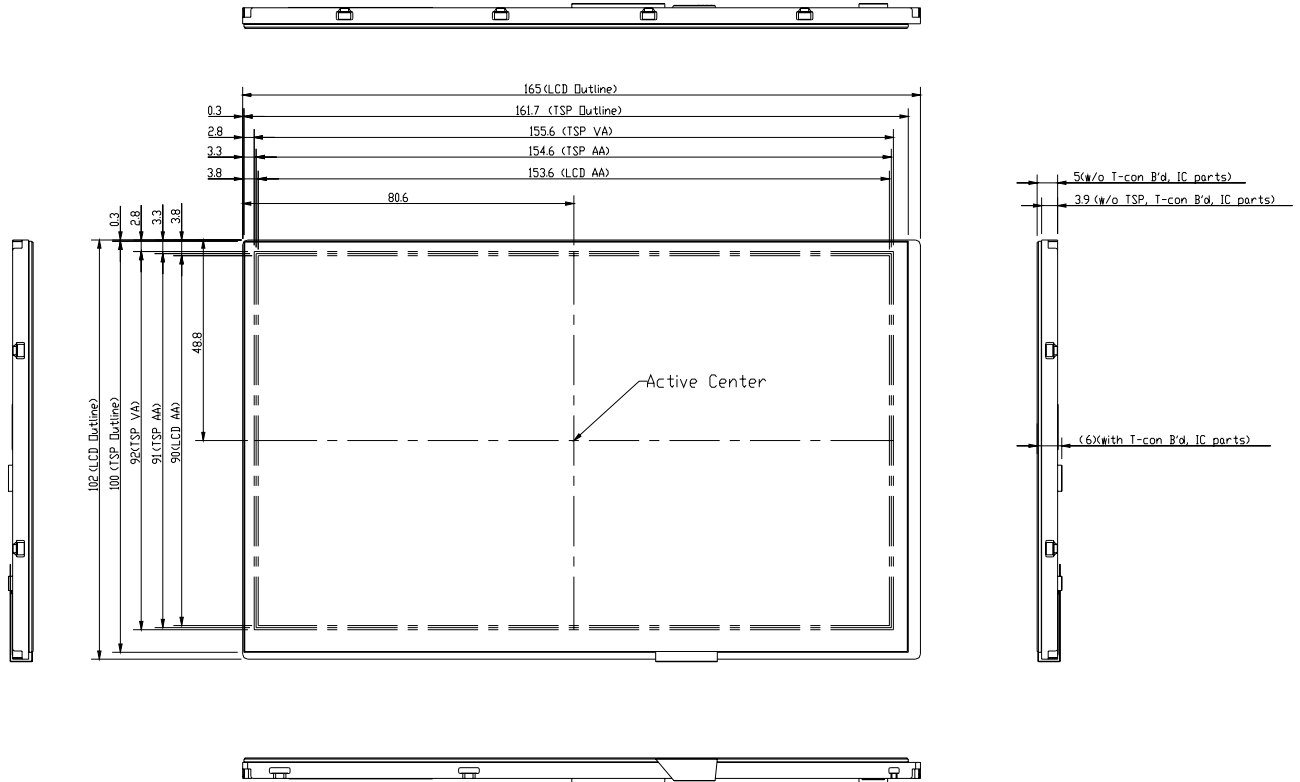
7. BLOCK DIAGRAM



8. MECHANICAL DIMENSION

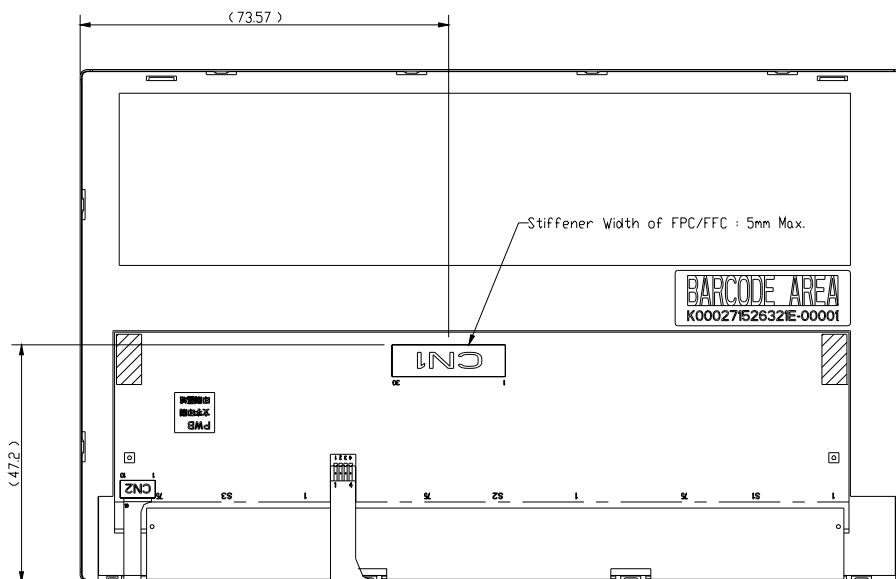
8.1 Front Side

[Unit : mm]



8.2 Rear Side

[Unit : mm]



Note :

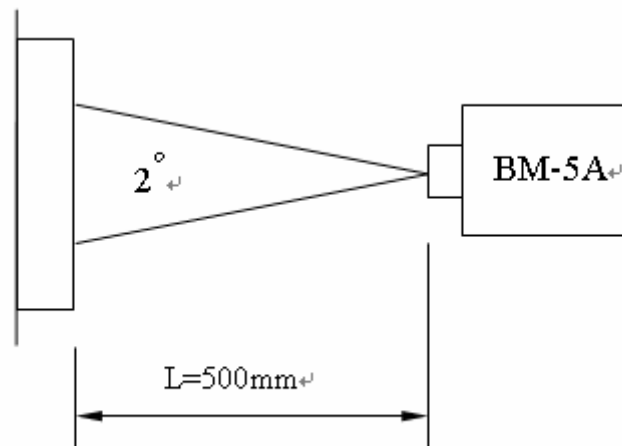
1. General tolerance : $\pm 0.3\text{mm}$
2. LCD connector CN1(30pin) : STARCONN , P/N : 089N30-000R00-G2

9. OPTICAL CHARACTERISTICS

| ITEM | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT | Remarks | |
|----------------------------------|------------|-----------|-------------------------|----------------|----------------|-------------------|-----------|-----------|
| Constrast Ratio | CR | Point-5 | 300 | 400 | -- | -- | *1)*2)*3) | |
| Luminance*) | Lw | Point-5 | 200 | 250 | -- | cd/m ² | *1)*3) | |
| Luminance Uniformity | ΔL | | 70 | 80 | -- | % | *1)*3) | |
| Response Time (White - Black) | Tr+ Tf | Point-5 | -- | -- | 20 | ms | *1)*3)*5) | |
| Viewing Angle | Horizontal | ϕ | CR \geq 10 Point-5 | 120 | 140 | -- | ° | *1)*2)*4) |
| | Vertical | θ | | 90 | 110 | -- | ° | *1)*2)*4) |
| Color Coordinate | White | Wx Wy | Point-5 | 0.273 0.289 | 0.313 0.329 | 0.353 0.369 | *1)*3) | *1)*3) |
| | Red | Rx Ry | | 0.544 0.299 | 0.584 0.339 | 0.624 0.379 | | |
| | Green | Gx Gy | | 0.275 0.528 | 0.315 0.568 | 0.355 0.608 | | |
| | Blue | Bx By | | 0.108 0.118 | 0.148 0.158 | 0.188 0.198 | | |

Remarks :

*1)Measure condition : 25°C \pm 2°C , 60 \pm 10%RH , under10 Lux in the dark room.BM-5A (TOPCON) , viewing angle2° , VCC=3.3V , VLED=5V.



*2) Definition of contrast ratio :

Contrast Ratio (CR)= (White) Luminance of ON ÷ (Black) Luminance of OFF

*3) Definition of luminance :

Measure white luminance on the point 5 as figure9-1

Definition of Luminance Uniformity:

Measure white luminance on the point1~9as figure9-1

$$\Delta L = [L(\text{MIN})/L(\text{MAX})] \times 100$$

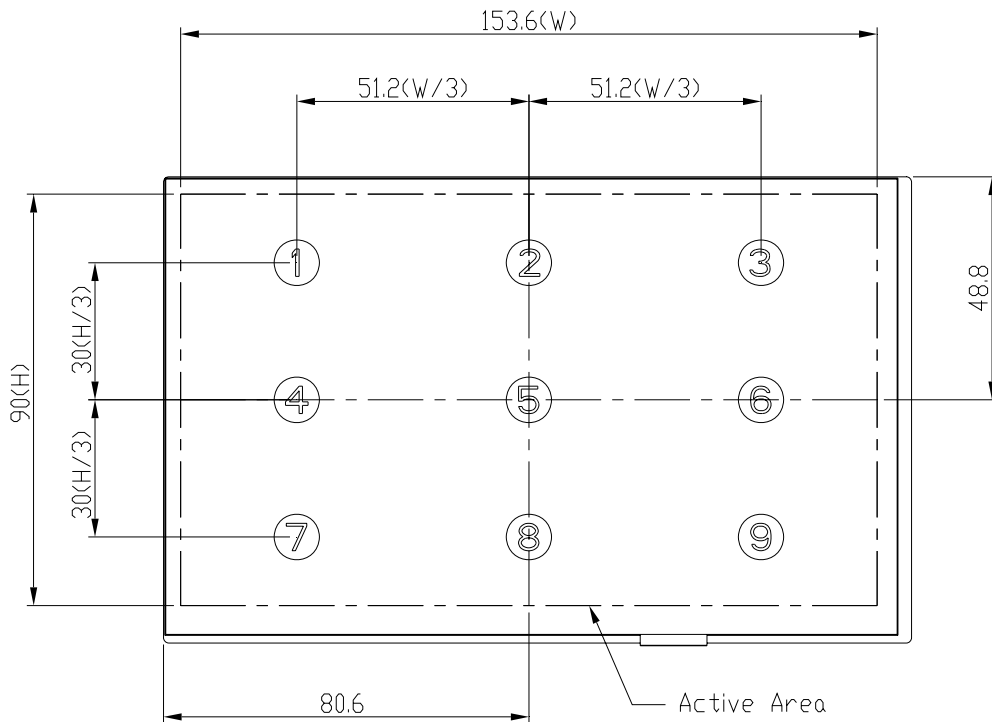


Fig9-1 Measuring point

*4) Definition of Viewing Angle(θ, ψ), refer to Fig9-2 as below :

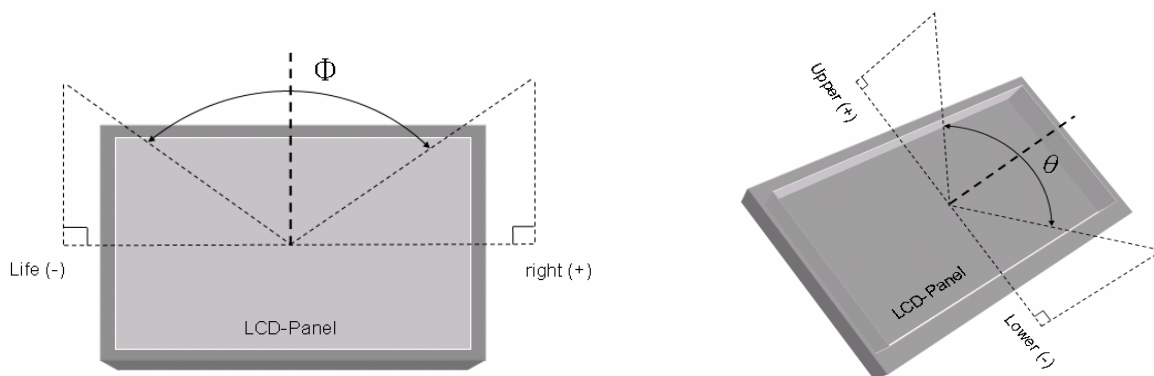


Fig9-2 Definition of Viewing Angle

*5) Definition of Response Time.(White-Black)

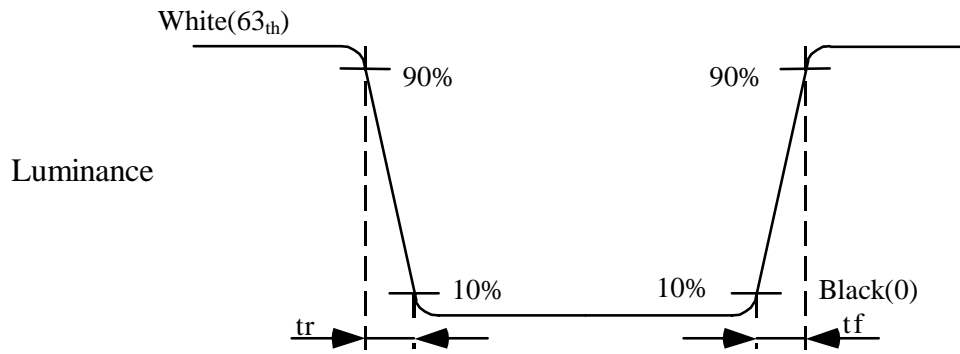


Fig9-3 Definition of Response Time(White-Black)

10. RELIABILITY TEST

10.1. Temperature and humidity

| TEST ITEMS | CONDITIONS | REMARK |
|--|---|-----------------|
| High Temperature Operation | 85°C , 240Hrs | |
| High Temperature Storage | 95°C , 240Hrs | |
| High Temperature High Humidity Operation | 60°C , 90%RH , 240Hrs | No condensation |
| Low Temperature Operation | -30°C , 240Hrs | |
| Low Temperature Storage | -40°C , 240Hrs | |
| Thermal Shock | -30°C (0.5Hr) ~ 85°C(0.5Hr) 200 cycles | |

10.2. Shock and Vibration

| TEST ITEMS | CONDITIONS |
|------------------------------|---|
| Shock (Non-operation) | <ul style="list-style-type: none"> ● Shock level:980m/s²(equal to 100G) ● Waveform:half sinusoidal wave,6ms. ● Number of shocks:one shock input in each direction of three mutually perpendicular axes for a total of three shock inputs. |
| Vibration (Non-operation) | <ul style="list-style-type: none"> ● Frequency range:8~33.3Hz ● Stoke:1.3mm ● Vibration: sinusoidal wave, perpendicular axis(both x, z axis:2Hrs,y axis:4Hrs). ● Sweep:2.9G,33.3Hz-400Hz ● Cycle:15min |

10.3 Judgment standard

The Judgment of the above test should be made as follow:

Pass:Normal display image with no obvious non-uniformity and no line defect.Partial trasformation of the module parts should be ignored.

Fail:No display image,obvious non-uniformity,or line defect.