



Chunghwa Picture Tubes, Ltd.

Product Specification

To : OD

Date : 100721

TFT LCD

CLAA057VC01CT

ACCEPTED BY : (V0.1)

Tentative

| APPROVED BY | CHECKED BY | PREPARED BY |
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|---------|-----------------------------------|-------------|------------|
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REVISION STATUS

| Revision Notice | Description | Page | Rev. Date |
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| 0.0 | First revision (Tentative) | | 2010/5/3 |
| 0.1 | Revised the Input Signal | P12 P13 P14 P15 | 2010/5/14 |
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1. OVERVIEW

CLAA057VC01CT is 5.7" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver IC, and LED backlight.

General specifications are summarized in the following table:

| Item | Specification |
|--------------------------------|---|
| Display Area (mm) | 116.16(H) × 87.12(V) |
| Resolution | 640(H) × 3(RGB) × 480(V) |
| Pixel Pitch (mm) | 0.1815(H) × 0.1815(V) |
| Pixel Arrangement | R,G,B vertical stripe |
| Display Mode | Normally White |
| Number of Color | 262K |
| Viewing Direction | 6 o'clock |
| Response Time (Tr+Tf) | 30ms(typ) |
| Contrast Ratio | 300 : 1 |
| Luminance (cd/m ²) | 180nit(typ) |
| NTSC | 50%(typ) |
| Viewing Angle CR > 10 | 140 degree (Horizontal) · 100 degree (Vertical) |
| Electrical Interface | TTL |
| Power Consumption (W) | 1.4W(typ) |
| Outline Dimension(mm) | 127(W) × 100(H) × 7.85(D) |
| Module Weight(g) | 135g(typ) |
| Backlight | LED |
| Surface Treatment | Anti-Glare · Surface hardness: 3H |

2. ABSOLUTE MAXIMUM RATINGS

| Item | Symbol | Min | Max | Unit | Remarks |
|------------------------------|--------|------|-----|------|---------|
| Power Supply Voltage for LCD | Vcc | -0.3 | 5 | V | |
| Power Supply Voltage for LED | VLED | GND | 30 | V | |
| ICC Rush Current | IRUSH | - | 1 | A | *2) |
| Gate Off Voltage | VEEG | -20 | 0.3 | V | |
| Operating temperature | Topa | -30 | 85 | °C | *1) |
| Storage temperature | Tstg | -40 | 90 | °C | *1) |

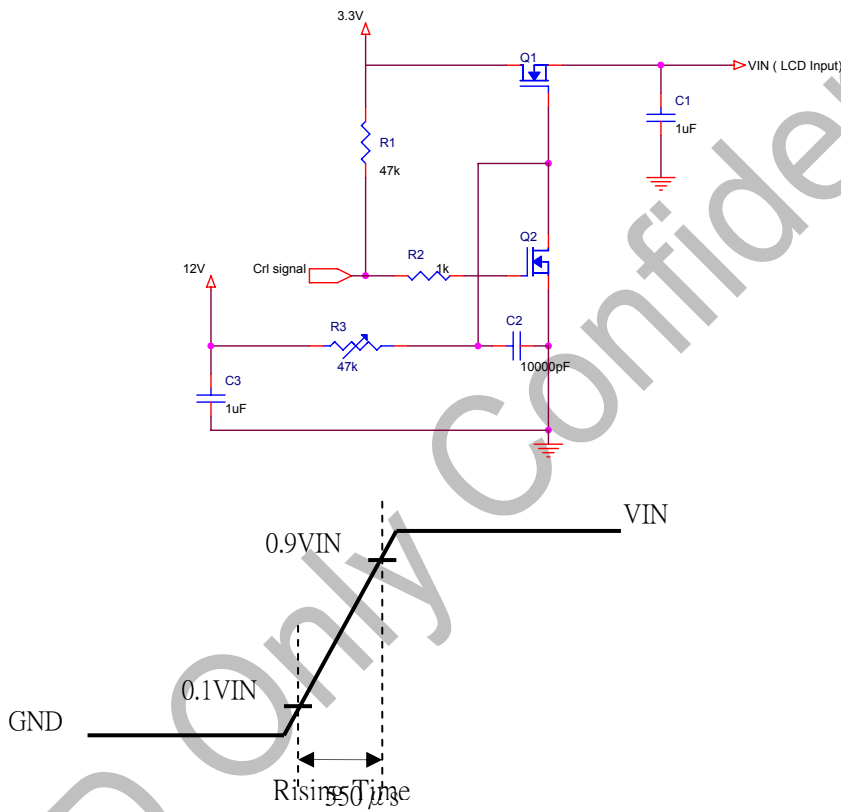
Remarks :

*1) If the product were used out of the operation and storage range, it will have quality issue.

*2) The input pulse-current measurement system is as below:

Control signal: High (+3.3V)→Low (GND)

Supply Voltage of rising time should be from R3 and C2 tune to 550 μs.



3. ELECTRICAL CHARACTERISTICS

3.1 TFT-LCD Power Supply Voltage

Ta=25°C

| Item | Symbol | Min | Typ | Max | Unit | Remarks |
|------------------------------|------------------|----------------------|-----|----------------------|------|---------|
| Power Supply Voltage For LCD | V _{CC} | 3.0 | 3.3 | 3.6 | V | |
| Power Supply Voltage For LED | V _{LED} | 4.5 | 5 | 5.5 | V | |
| Logic Input Voltage | V _{IH} | V _{CC} *0.7 | -- | V _{CC} | V | |
| | V _{IL} | GND | -- | V _{CC} *0.3 | V | |
| ADJ Input Voltage | V _{IH} | 3.0 | -- | 3.3 | V | |
| | V _{IL} | GND | -- | 0.3 | V | |

3.2 TFT-LCD Power Supply Current

Ta=25°C

| Item | Symbol | Conditions | Min | Typ | Max | Unit | Remarks |
|-------------------|------------------|------------|-----|-----|-----|------|---------|
| LCD Power Current | ICC | -- | 95 | 115 | mA | *1) | |
| LED Power Current | I _{LED} | -- | 210 | 240 | mA | *2) | |

Remarks :

*1) Typical : 64 gray pattern ◦ Maximum : Black pattern ◦



64 Gray Pattern

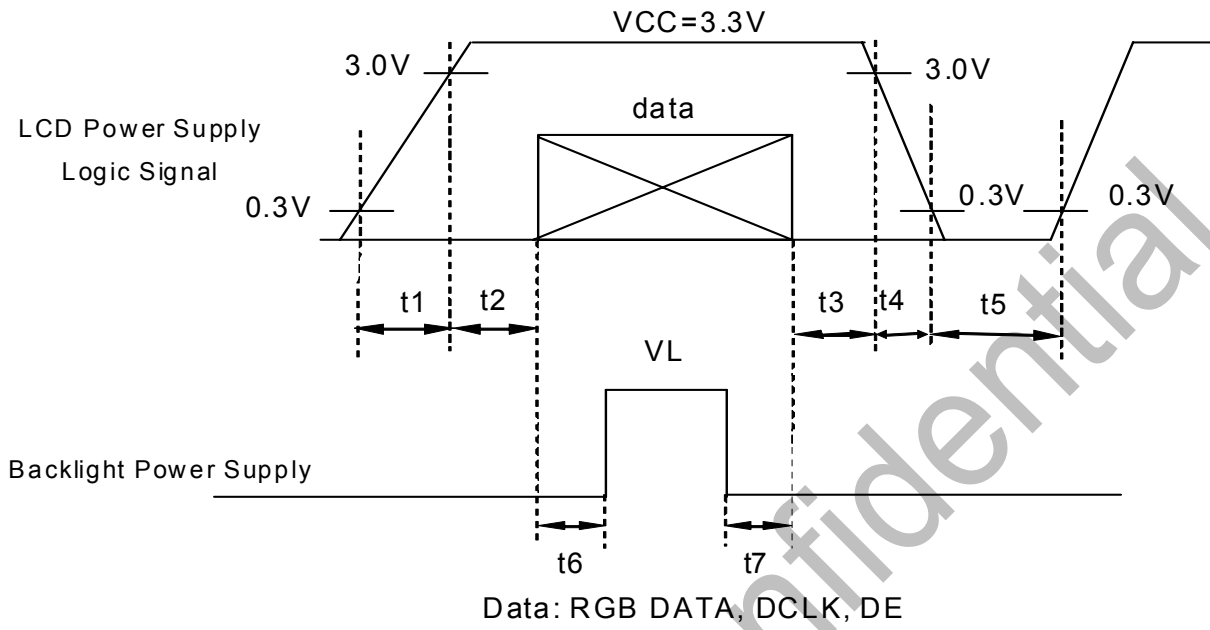


Black Pattern

*2) Typical: VDD = 5V
Maximum: VDD = 4.5V

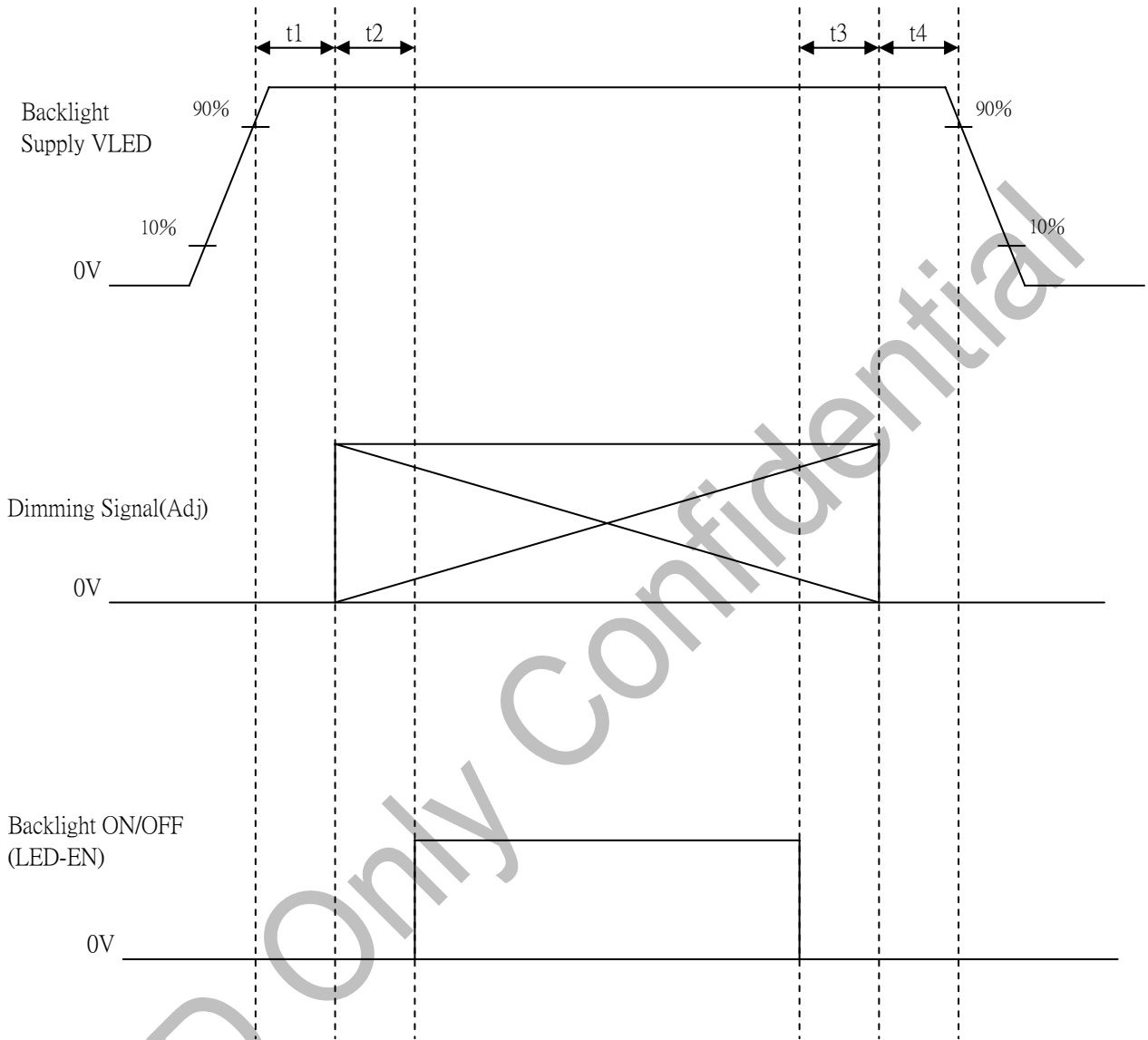
3.3 Power 、Signal sequence

- 0.5 $t_1 \le 10\text{ms}$ 200ms $\le t_5$
- 0 $t_2 \le 50\text{ms}$ 200ms $\le t_6$
- 0 $t_3 \le 50\text{ms}$ 200ms $\le t_7$
- 0 $t_4 \le 10\text{ms}$



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- 10ms \leq t1
- 10ms \leq t2
- 0ms \leq t3
- 10ms \leq t4



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3.4 Backlight

| Item | Symbol | Condition | Min | Typ | Max | Unit | Remarks |
|--------------|--------|-----------------------------|-------|-----|-----|------|---------|
| LED Lifetime | - | Ta=25°C Each serial=20mA | 30000 | | | Hr | |
| | | Ta=60°C Each serial=20mA | 15000 | | | Hr | |

Remarks :

*1) Definition LED lifetime : Luminance will decay less than 50%.

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4. INTERFACE CONNECTION

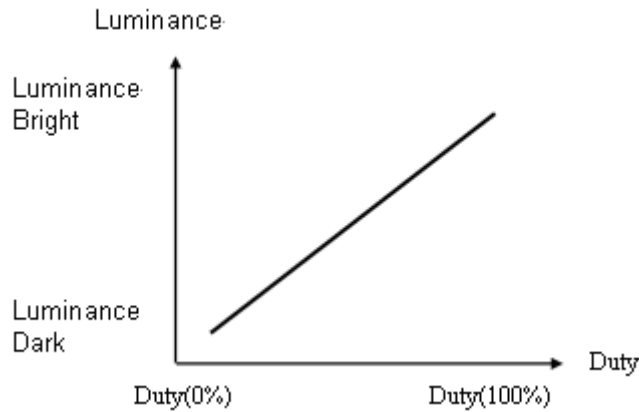
CN1 : Starconn. 089N40-000R00-G2

| Pin NO. | Symbol | Description |
|---------|------------------|------------------------------|
| 1 | U/D | Up / Down Display Control |
| 2 | DMS | DE / SYNC Mode Selection |
| 3 | Hsync | Horizontal SYNC. |
| 4 | V _{LED} | Power Supply for LED |
| 5 | V _{LED} | Power Supply for LED |
| 6 | V _{LED} | Power Supply for LED |
| 7 | V _{cc} | Power Supply for LCD |
| 8 | Vsync | Vertical SYNC. |
| 9 | DE | Data Enable |
| 10 | X2 | TSP control (Left) |
| 11 | Y1 | TSP control (Up) |
| 12 | ADJ | Adjust for LED brightness |
| 13 | B5 | Blue Data 5 (MSB) |
| 14 | B4 | Blue Data 4 |
| 15 | B3 | Blue Data 3 |
| 16 | V _{SS} | Power Ground |
| 17 | B2 | Blue Data 2 |
| 18 | B1 | Blue Data 1 |
| 19 | B0 | Blue Data 0 (LSB) |
| 20 | V _{SS} | Power Ground |
| 21 | G5 | Green Data 5 (MSB) |
| 22 | G4 | Green Data 4 |
| 23 | G3 | Green Data 3 |
| 24 | V _{SS} | Power Ground |
| 25 | G2 | Green Data 2 |
| 26 | G1 | Green Data 1 |
| 27 | G0 | Green Data 0 (LSB) |
| 28 | V _{SS} | Power Ground |
| 29 | R5 | Red Data 5 (MSB) |
| 30 | R4 | Red Data 4 |
| 31 | R3 | Red Data 3 |
| 32 | V _{SS} | Power Ground |
| 33 | R2 | Red Data 2 |
| 34 | R1 | Red Data 1 |
| 35 | R0 | Red Data 0 (LSB) |
| 36 | X1 | TSP control (Right) |
| 37 | Y2 | TSP control (Down) |
| 38 | DCLK | Clock Signals |
| 39 | V _{SS} | Power Ground |
| 40 | L/R | Left / Right Display Control |

Remarks :

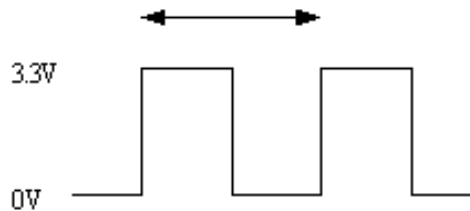
*1) VSS pin must be connected with GND. Don't let it be an empty pin.

*2) Adjust control pin (ADJ) controls brightness. The bigger pulse duty, the brighter luminance. ◦



*3) ADJ signal=0~3.3V, operation frequency: 25KHZ±5KHz

$$F=25\text{KHz} \pm 5\text{KHz} \cdot T=0.04\text{ms}$$



The ADJ should pull-high if not adjust brightness, this pin can't floating. ◦

*4) U/D & L/R Control Function

| L/R | U/D | Function |
|-----|-----|---|
| 1 | 0 | Normal Display |
| 0 | 0 | Left / Right Contrary |
| 1 | 1 | Up / Down Reverse |
| 0 | 1 | Left / Right Contrary , Up / Down Reverse |

*5) DMS (Selection DE / SYNC mode)

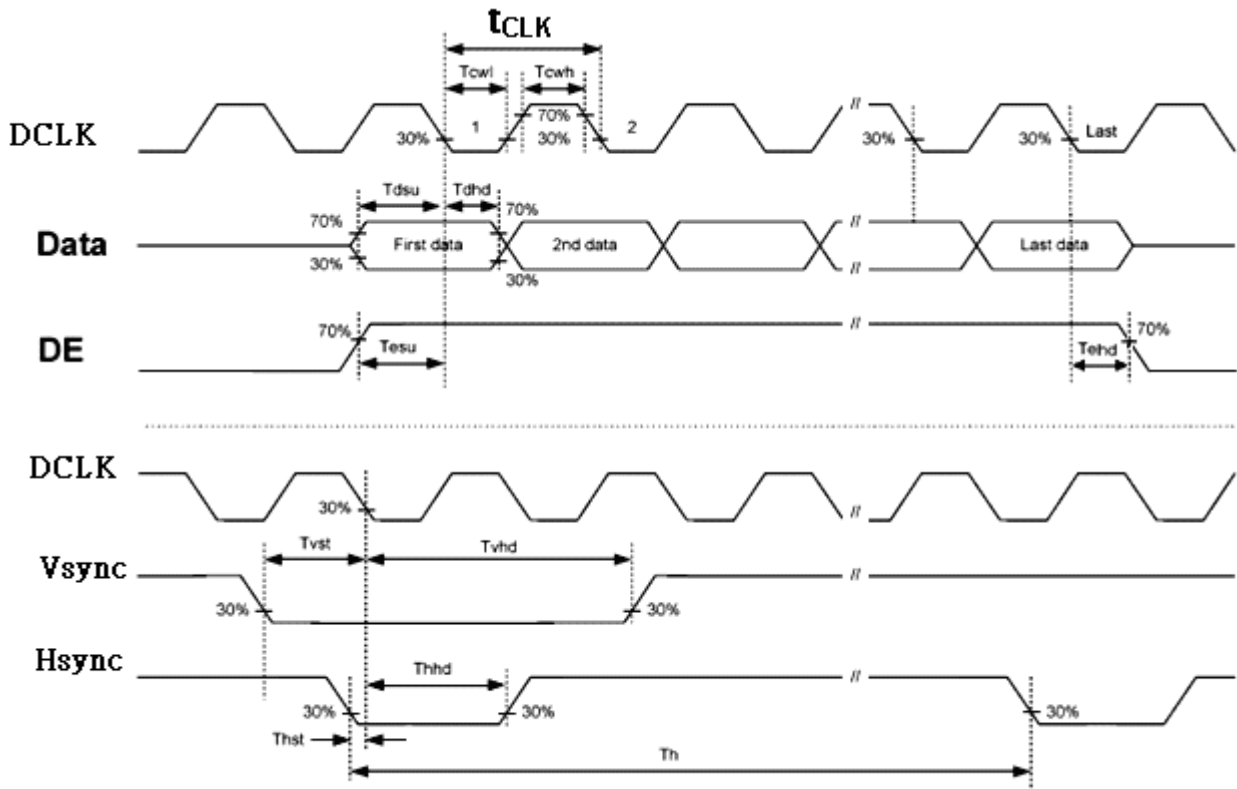
| DMS | Function |
|-----|-----------|
| 1 | DE Mode |
| 0 | SYNC Mode |

5. INPUT SIGNAL (DE ONLY MODE)

5.1 Timing specification

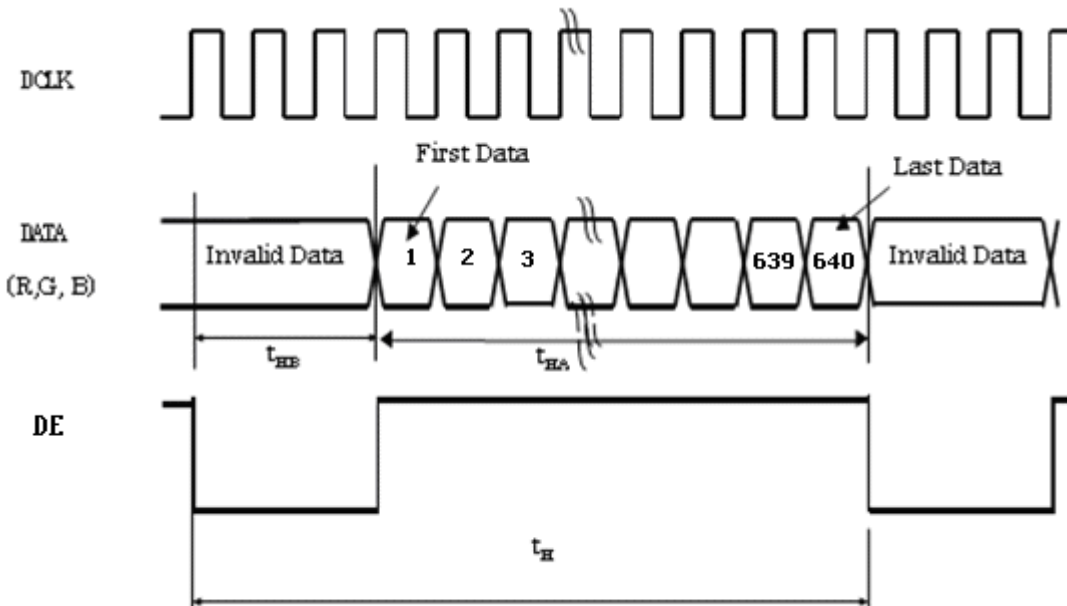
| | Item | Symbol | Min. | Typ. | Max. | Unit | Remarks |
|------|------------------------|-------------|------|------|------|-----------|----------------------------|
| DCLK | Dot Clock | $1/t_{CLK}$ | 23 | 25 | 30 | MHz | |
| | DCLK pulse duty | Tcwh | 40 | 50 | 60 | % | |
| DE | Setup Time | Tesu | 8 | - | - | ns | |
| | Hold time | Tehd | 8 | - | - | ns | |
| | Horizontal Period | t_H | 750 | 800 | 900 | t_{CLK} | |
| | Horizontal Valid | t_{HA} | 640 | | | t_{CLK} | |
| | Horizontal Blank | t_{HB} | 110 | 160 | 260 | t_{CLK} | |
| | Vertical Period | t_V | 515 | 525 | 560 | t_H | |
| | Vertical Valid | t_{VA} | 480 | | | t_H | |
| | Vertical Blank | t_{VB} | 35 | 45 | 80 | t_H | |
| SYNC | HSYNC Setup Time | Thst | 8 | - | - | ns | |
| | HSYNC Hold Time | Thhd | 8 | - | - | ns | |
| | VSYNC Setup Time | Tvst | 8 | - | - | ns | |
| | VSYNC Hold Time | Tvhd | 8 | - | - | ns | |
| | Horizontal Period | th | 750 | 800 | 900 | t_{CLK} | |
| | Horizontal Pulse Width | thpw | 1 | 48 | - | t_{CLK} | thb + thpw=88DCLK is fixed |
| | Horizontal Back Porch | thb | - | 40 | - | t_{CLK} | |
| | Horizontal Front Porch | thfp | 22 | 72 | 172 | t_{CLK} | |
| | Horizontal Valid | thd | 640 | | | t_{CLK} | |
| | Vertical Period | tv | 515 | 525 | 560 | th | |
| | Vertical Pulse Width | tvpw | 1 | 3 | - | th | tvpw + tvb = 32th is fixed |
| | Vertical Back Porch | tvb | - | 29 | - | th | |
| | Vertical Front Porch | tvfp | 3 | 13 | 48 | th | |
| | Vertical Valid | tvd | 480 | | | th | |
| DATA | Setup Time | Tdsu | 8 | - | - | ns | |
| | Hold Time | Tdhd | 8 | - | - | ns | |

5.2 Timing Chart

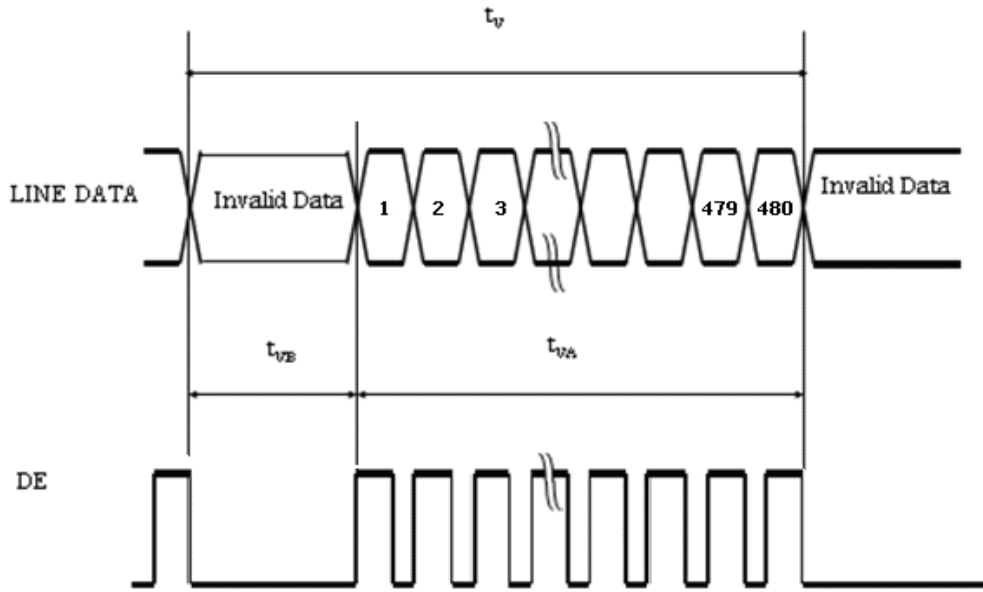


DE mode :

Horizontal Input Timing :



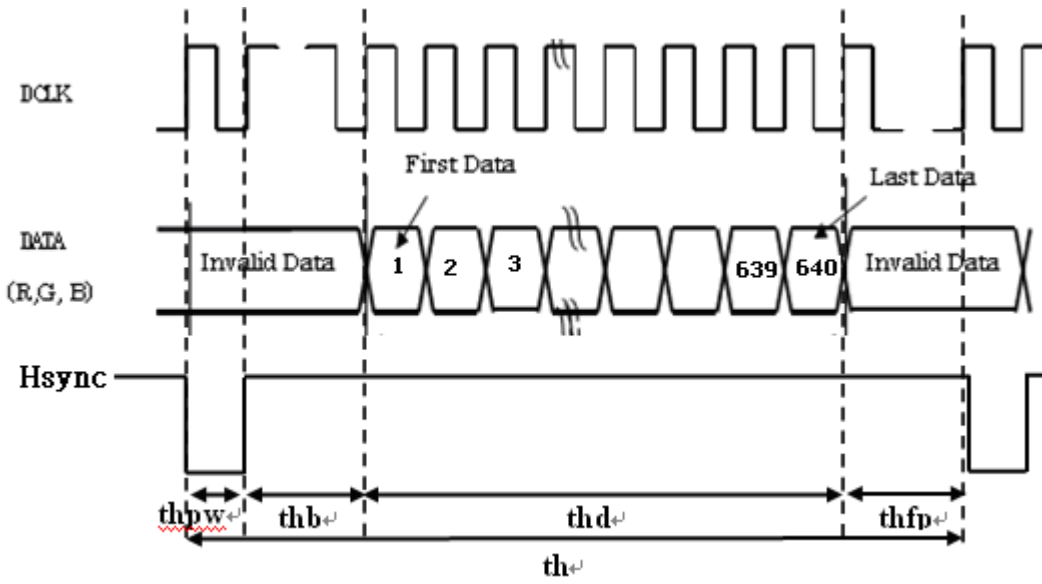
Vertical Input Timing :



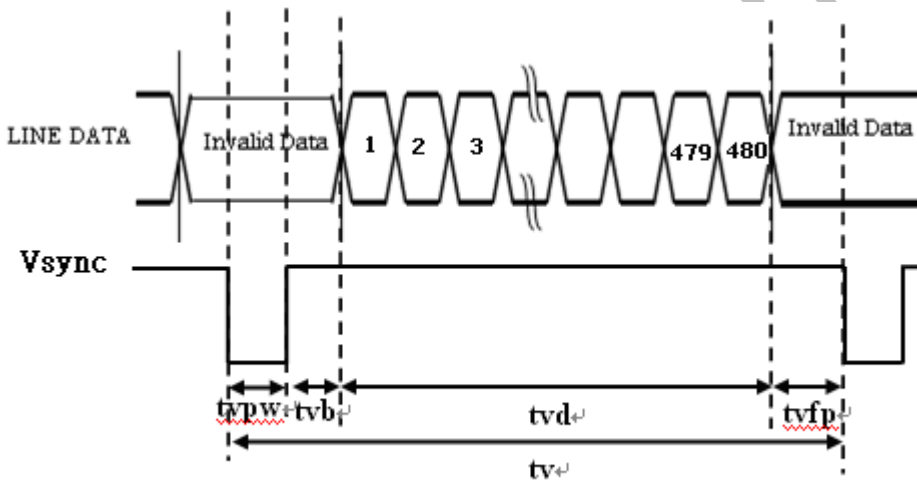
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SYNC mode

Horizontal Input Timing :



Vertical Input Timing :



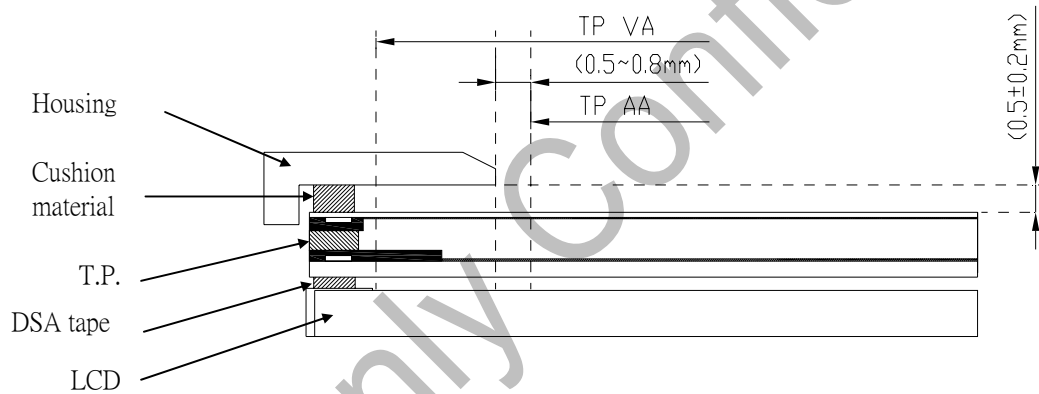
6. TOUCH PANEL

6.1 Specification

| Item | Min | Typ | Max | Unit | Remarks |
|-----------------------|-----------------|-----|-----|------------|--|
| Operating Voltage | -- | 5 | -- | V | DC |
| Activation Force | -- | -- | 80 | gf | Stylus pen (R 0.8mm) or finger (R 8.0mm) |
| Linearity Tolerance | -1.5 | -- | 1.5 | % | load 250g |
| Terminal Resistance | X | 150 | -- | 700 | At the connector |
| | Y | 450 | -- | 1200 | |
| Insulation Resistance | 20 | -- | | M Ω | DC 25V |
| Surface Treatment | Anti-Glare · 3H | | | -- | |

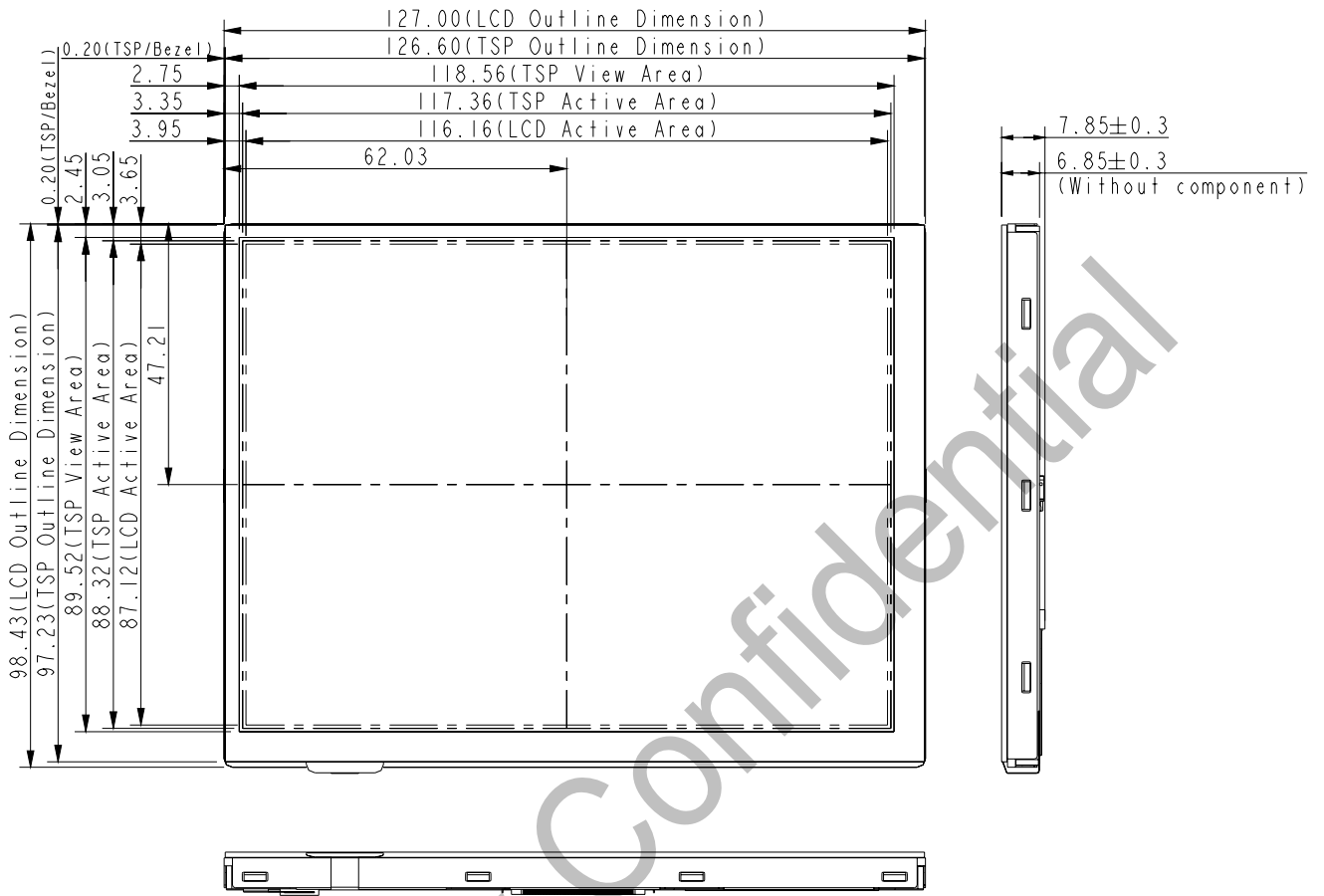
6.2 Design guideline for Housing and cushion material

- (1). The Cushion material must be elastic material.
- (2). The Cushion material on touch-panel must be outside of Touch Panel VA.
- (3). The housing must be outside of Touch Panel AA.
- (4). The housing is forbidden to contact the touch panel for abnormal function.
- (5). Example of housing design :

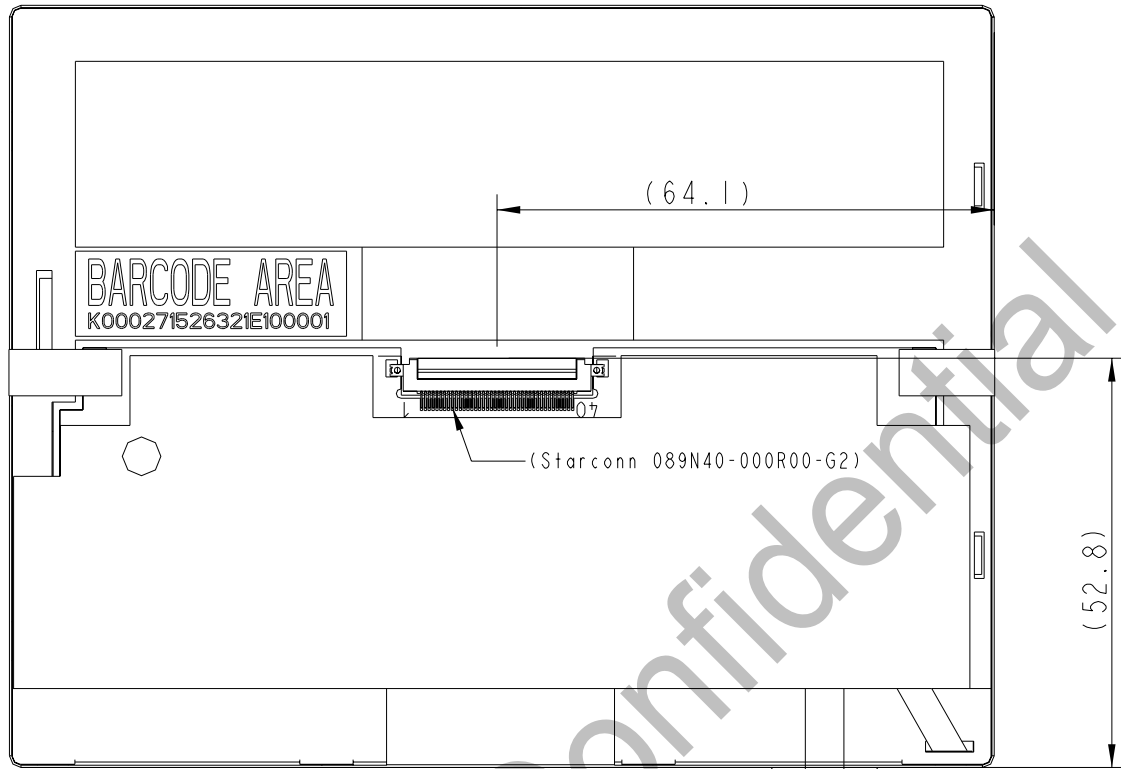


7. MECHANICAL DIMENSION

7.1 Front View



7.2 Rear View



General tolerance ± 0.3 mm

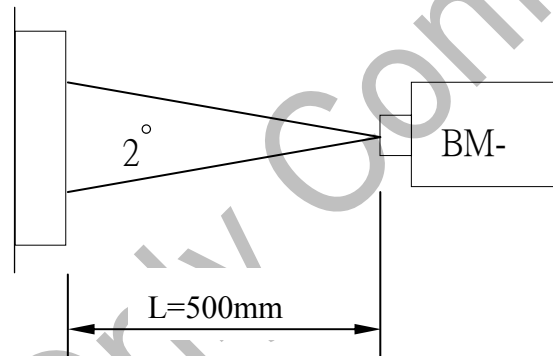
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8. OPTICAL CHARACTERISTICS

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | Remarks |
|----------------------------------|--------------|-----------|----------------|----------------|----------------|-------------------|-----------|
| Contrast | CR | Point-5 | 200 | 300 | -- | -- | *1)*2)*3) |
| Luminance | Center point | Lw | 145 | 180 | -- | cd/m ² | *2)*3) |
| | Uniformity | ΔL | 70 | 80 | -- | % | *2)*3) |
| Response Time (White - Black) | Tr+ Tf | | -- | 20 | -- | ms | *1)*3)*5) |
| NTSC | - | Point-5 | 40 | 50 | | % | *1)*3) |
| View angle | Horizontal | ∅ | 120 | 140 | -- | ° | *1)*2)*4) |
| | Vertical | θ | 80 | 100 | -- | ° | *1)*2)*4) |
| Color Coordination | White | Wx Wy | 0.273 0.289 | 0.313 0.329 | 0.353 0.369 | | *1)*3) |
| | Red | Rx Ry | TBD TBD | TBD TBD | TBD TBD | | |
| | Green | Gx Gy | TBD TBD | TBD TBD | TBD TBD | | |
| | Blue | Bx By | TBD TBD | TBD TBD | TBD TBD | | |

Remarks :

*1) Measuring conditions : 25°C±2°C , 60±10%RH , under 10 Lux in dark room ◦ BM-5A (TOPCON) , view cone=2° , VCC=3.3V , Vadj=3.3V Duty 100% , after 10 minutes operation ◦

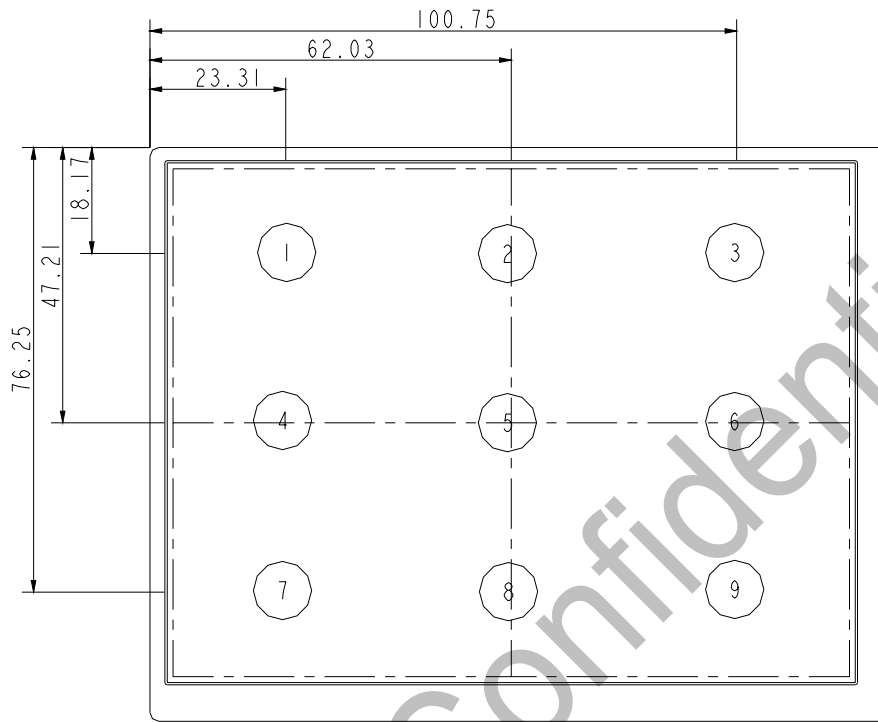


*2) Contrast : CR= On (White Luminance) / Off (Black Luminance)

*3) Luminance and Uniformity :

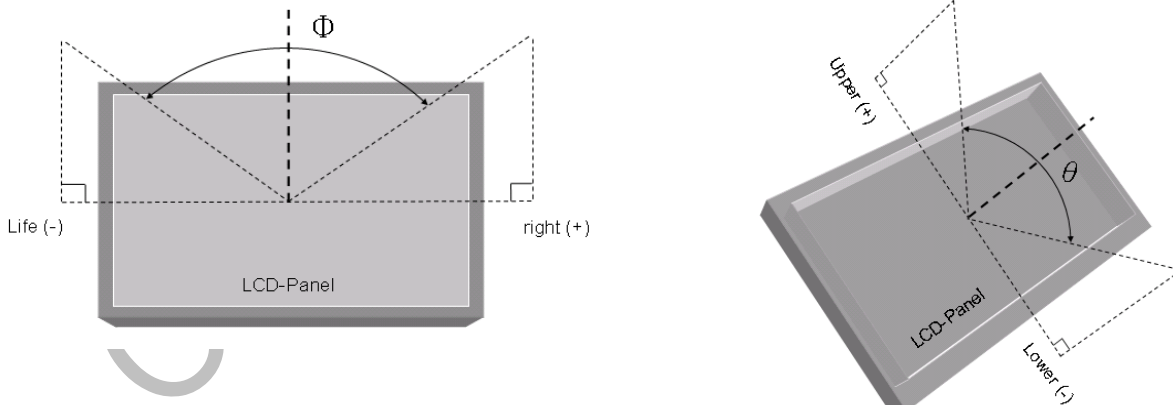
The center point of the Luminance : No 5 point.

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



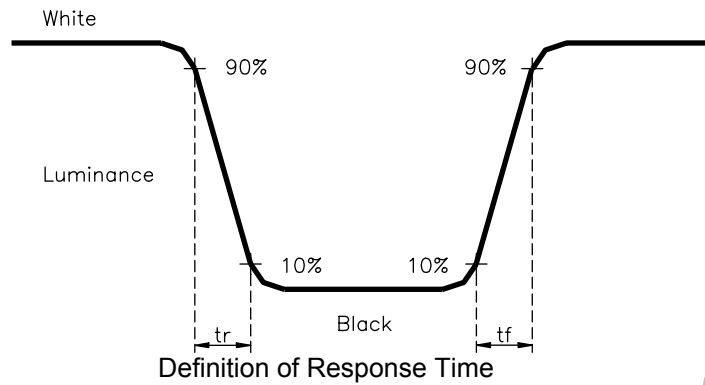
Measuring point

*4) Viewing Angle ($\theta \cdot \psi$) : (Measuring Device : EZ-CONTRAST)



Definition of View Angle

*4) Response Time (White - Black)

**9. RELIABILITY TEST**

9.1 Temperature and Humidity

| Item | Condition |
|--|---|
| High Temperature Operation | 85° C , 240hrs |
| High Temperature Storage | 95° C , 240hrs |
| High Temperature and 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 (0.5 hr)~85° C (0.5 hr), 200 CYCLE |

9.2 Shock and Vibration

| Item | Condition |
|------------------------------|--|
| Shock (Non-Operation) | 100G 6msec 1/2 Sine wave, ±X , ±Y , ±Z , each axis 3times. |
| Vibration (Non-Operation) | Frequency range : 8~33.3Hz Stroke : 1.3mm Sweep : 2.9G , 33.3~40Hz Vibration : X , Z 2hrs each axis ◦ Y 4hrs each axis ◦ Sin wave ◦ Cycle time : 15min |

9.3 ESD

| Item | Condition | Remarks |
|-------|--|---------|
| E S D | 150pF , 330Ω , ±8KV&±15KV air & contact test | *1) |
| | 200pF , 0Ω , ±200V contact test | *2) |

Remarks :

- *1) LCD glass and metal bezel ◦
- *2) IF connector pins ◦

9.4 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 transformation of the module parts should be ignored.

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

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