

Version : 1.2

TECHNICAL SPECIFICATION

MODEL NO. : V16C6448AC

Customer's Confirmation

Date _____

By _____

PVI's Confirmation

Confirmed By _____

Prepared By _____

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Date : Oct. 24, 2000

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1. Application

This product applies computer peripheral, industrial meter, image communication and multi-media.

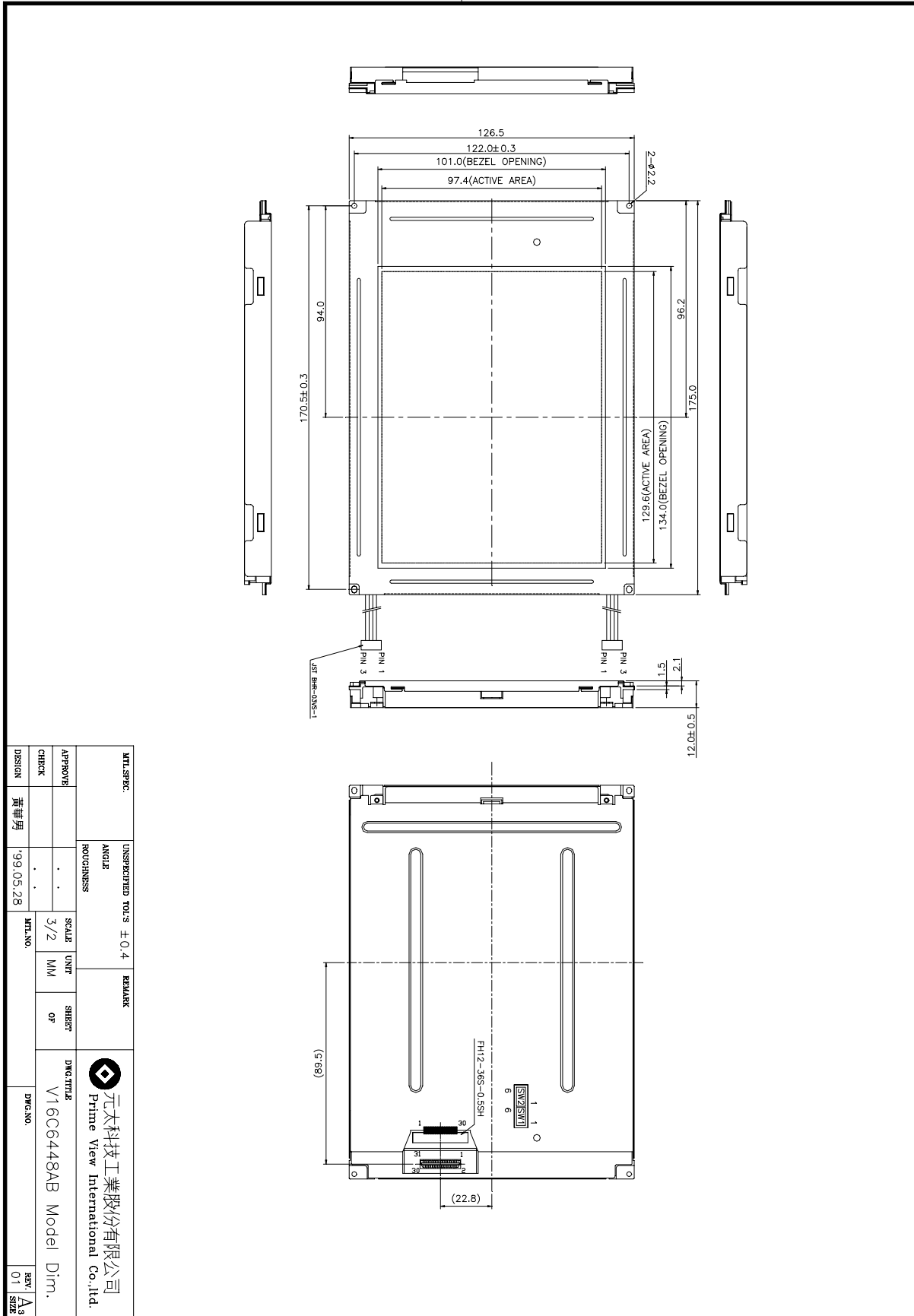
2. Features

- . Compatible with VGA-480, VGA-400, VGA-350 and free format.
- . Pixel in stripe configuration
- . Slim and compact
- . Display Colors : 262,144 colors
- . Image Reversion : Up/Down and Left/Right
- . Active area / Outline area = 62.3 %
- . Viewing Direction : 6 o'clock
- . Backlight lamps are Replaceable

3. Mechanical Specifications

| Parameter | Specifications | Unit |
|---------------------|------------------------|------|
| Screen Size | 6.4 (diagonal) | inch |
| Display Format | 640× R, G, B× 480 | dot |
| Active Area | 129.6(H)× 97.44 (V) | mm |
| Dot Pitch | 0.0675 (H)× 0.203 (V) | mm |
| Pixel Pitch | 0.203 (H)× 0.203 (V) | mm |
| Pixel Configuration | Stripe | |
| Outline Dimension | See Mechanical Drawing | mm |
| Weight | 335 | g |

4. Mechanical Drawing of TFT-LCD Module



5.Input / Output Terminals

5-1) TFT-LCD Panel Driving

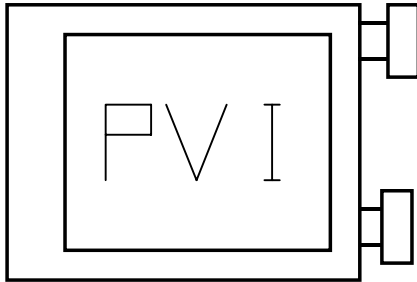
| Pin No. | Symbol | Function | Remark |
|---------|--------|--|----------|
| 1 | GND | Ground (0V) | |
| 2 | CLK | Clock Signal for Sampling Image Digital Data | |
| 3 | Hsync | Horizontal Synchronous Signal | Note 5-1 |
| 4 | Vsync | Vertical Synchronous Signal | Note 5-1 |
| 5 | GND | Ground (0V) | |
| 6 | R0 | Red Image Data Signal (LSB) | |
| 7 | R1 | Red Image Data Signal | |
| 8 | R2 | Red Image Data Signal | |
| 9 | R3 | Red Image Data Signal | |
| 10 | R4 | Red Image Data Signal | |
| 11 | R5 | Red Image Data Signal (MSB) | |
| 12 | GND | Ground (0V) | |
| 13 | G0 | Green Image Data Signal (LSB) | |
| 14 | G1 | Green Image Data Signal | |
| 15 | G2 | Green Image Data Signal | |
| 16 | G3 | Green Image Data Signal | |
| 17 | G4 | Green Image Data Signal | |
| 18 | G5 | Green Image Data Signal (MSB) | |
| 19 | GND | Ground (0V) | |
| 20 | B0 | Blue Image Data Signal (LSB) | |
| 21 | B1 | Blue Image Data Signal | |
| 22 | B2 | Blue Image Data Signal | |
| 23 | B3 | Blue Image Data Signal | |
| 24 | B4 | Blue Image Data Signal | |
| 25 | B5 | Blue Image Data Signal (MSB) | |
| 26 | GND | Ground (0V) | |
| 27 | DENB | Disable | |
| 28 | VCC | DC +5.0V Power Supply | |
| 29 | VCC | DC +5.0V Power Supply | |
| 30 | R/L | Horizontal Image Shift-direction Select Signal | Note 5-2 |
| 31 | U/D | Vertical Image Shift-direction Select Signal | Note 5-3 |

Note 5-1 : The TFT-LCD module is compatible with four kinds of VGA timing. They are VGA-480, VGA-400, VGA-350 and freedom mode. The polarization of Hsync and Vsync determine the timings.

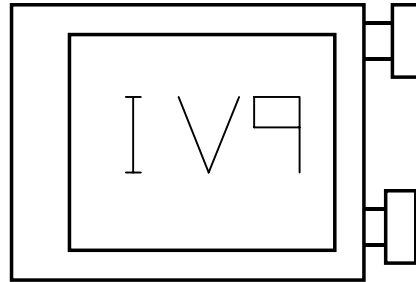
| | VGA-480 | VGA-400 | VGA-350 | Freedom Mode |
|---------------------------|----------|----------|----------|--------------|
| Hsync Polarization | Negative | Negative | Positive | Positive |
| Vsync Polarization | Negative | Positive | Negative | Positive |

Note 5-2 : R/L is the Right/Left shift signal.

(1). R/L= High, U/D= Low

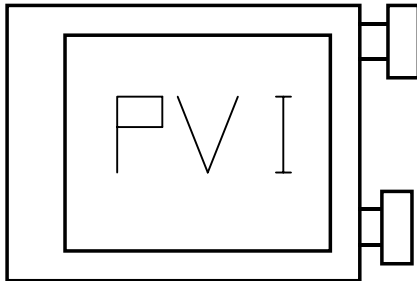


(2). R/L= Low, U/D= Low

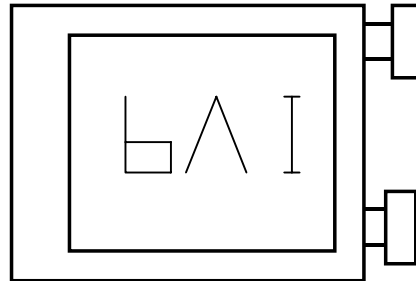


Note 5-3 : U/D is the Up/Down shift signal.

(1). R/L= High, U/D= Low



(2). R/L= High, U/D= High



5-2) Backlight driving

| Pin No | Symbol | Description | Remark |
|--------|--------|-----------------------------------|----------|
| 1 | VL1 | Input terminal (Hi voltage side) | |
| 2 | NC | No Connection | |
| 3 | VL2 | Input terminal (Low voltage side) | Note 5-4 |

Note 5-4 : Low voltage side of backlight inverter connects with ground of inverter circuits.

5-3) Input / Output Connector

A) LCD module connector (Reference)
DF9A-31P-1V

B) Backlight Connector

JST BHR-03VS-1

Pin No. : 3

Pitch : 4 mm

Red: High Voltage

White: Low Voltage

6. Absolute Maximum Ratings:

GND=0V, Ta=25°C

| Parameters | Symbol | MIN. | MAX. | Unit | Remark |
|-----------------------|------------------|------|----------------------|------|----------|
| +5V Supply Voltage | V _{CC} | 0.0 | +6.0 | V | |
| Input Signals Voltage | V _{sig} | -0.3 | V _{CC} +0.3 | V | Note 6-1 |
| Storage Temperature | T _{stg} | -25 | +70 | °C | Note 6-2 |
| Operating Temperature | T _{opa} | -0 | +55 | °C | |

Note 6-1: Input signals include CLK, Hsync, Vsync, DENB, R[0:5], G[0:5] and B[0:5].

Note 6-2: Humidity : 95% RH Max. at Ta ≤ 40°C.

Maximum wet-bulb temperature is at 39 °C or less at Ta > 40 °C.

No condensation.

7. Electrical Characteristics
7-1) Recommended Operating Conditions:

A) Driving for TFT-LCD panel

GND = 0V , Ta = 25 °C

| Parameters | Symbol | Min. | Typ. | Max. | Unit | Remark |
|------------------------------|-------------------|-------|------|-------|------|----------------------|
| +5V Supply Voltage | V _{CC} | +4.75 | +5.0 | +5.25 | V | |
| Supply Input Ripple Voltage | V _{CCRP} | | | 0.1 | Vp-p | V _{CC} =+5V |
| Input Signals Voltage (High) | V _{IH} | +2.6 | | | V | |
| Input Signals Voltage (Low) | V _{IL} | | | +0.5 | V | |

B) Driving for backlight

Ta = 25 °C

| Item | Symbol | Min. | Typ. | Max. | Unit | Remark |
|----------------|----------------|------|--------|------|------|--------|
| Tube Current | I _f | - | 6 | - | mA | |
| Tube Voltage | V _L | - | 380 | - | Vrms | |
| Oscillation | | - | 35 | - | KHz | |
| Lamp Life Time | | - | 20,000 | - | Hr | |

7-2) Power Consumption

| Parameters | Symbol | Typ. | Max. | Unit | Remark |
|------------------------------|-----------------|------|------|------|----------------------|
| +5V Current Dissipation | I _{CC} | 260 | 300 | mA | |
| Input Signals Current (High) | I _{IH} | | 100 | μA | V _{IH} =+5V |
| Input Signals Current (Low) | I _{IL} | | 100 | μA | V _{IL} =0V |
| LCD Panel Power Consumption | | 1.3 | | W | Note 7-1 |
| Backlight Power Consumption | | 4.56 | | W | Note 7-2 |

Note 7-1 : The power consumption of backlight is not included.

Note 7-2 : Backlight lamp power consumption is calculated by $I_L \times V_L$.

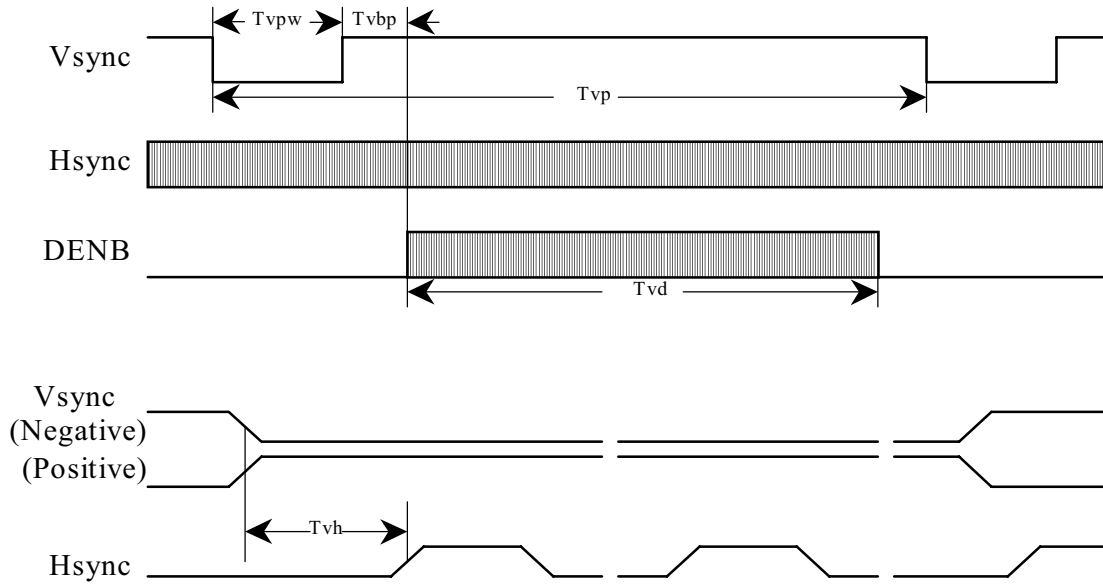
7-3) Input / Output signal timing chart

| | Parameters | Symbol | Format | Min. | Typ. | Max. | Unit | Note |
|-------|------------------------------|-------------|--------------|------|--------|-------|---------|----------|
| | Frequency | $F_c=1/T_c$ | All | | 25.175 | | MHz | Note 7-3 |
| Clock | High Time | Tckh | All | 10 | | | ns | |
| | Low Time | Tckl | All | 10 | | | ns | |
| | Periodic = Line | Thp | All | | 31.778 | | μs | Note 7-3 |
| Hsync | | | | | 800 | 1024 | clock | Note 7-3 |
| | Pulse Width | Thpw | All | 2 | 96 | 200 | clock | |
| | Back Porch | Thbp | All | 2 | 48 | 64 | clock | |
| | | | VGA-480 | 515 | 525 | 1024 | line | Note 7-3 |
| | Periodic = Frame | Tvp | VGA-400 | 447 | 449 | 1024 | line | Note 7-3 |
| | | | VGA-350 | 447 | 449 | 1024 | line | Note 7-3 |
| Vsync | | | Freedom Mode | | | 1024 | line | |
| | Pulse Width | Tvpw | All | 1 | 2 | | line | |
| | Back Porch | Tvbp | All | 1 | | 64 | line | |
| Data | Setup Time | Tds | All | 10 | | | ns | |
| | Hold Time | Tdh | All | 10 | | | ns | |
| | Periodic = Line | Tep | All | | 800 | 1024 | clock | |
| | Pulse Width (H) | Tepw | All | 2 | 640 | 800 | clock | |
| DENB | | | VGA-480 | 480 | 480 | | line | |
| | Display Line No(V) | Tvd | VGA-400 | 400 | 400 | | line | |
| | | | VGA-350 | 350 | 350 | | line | |
| | | | Freedom Mode | | 480 | | line | |
| | Horizontal Display Periodic | Thd | All | 640 | 640 | 640 | clock | |
| | Hsync-CLK Phase Difference | Thc | All | 10 | | Tc-10 | ns | |
| | Vsync-Hsync Phase Difference | Tvh | All | 1 | | Thp-1 | clock | |

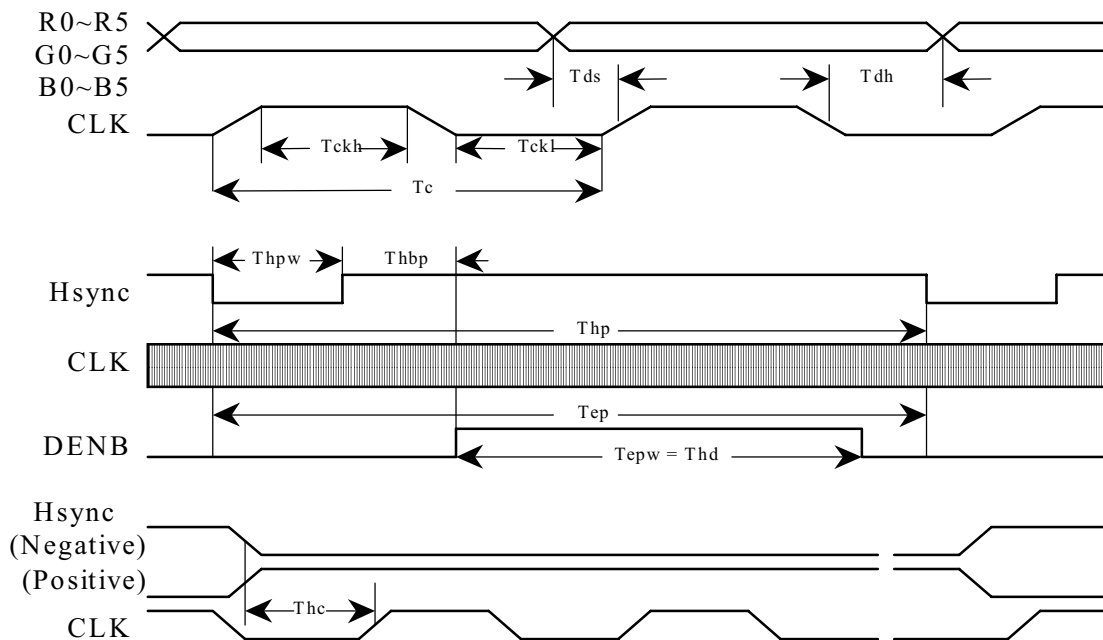
Note 7-3 : T_c is the period of sampling clock. In case of low-frequency, the image-flicker may occur.

7-4) Display Time Range

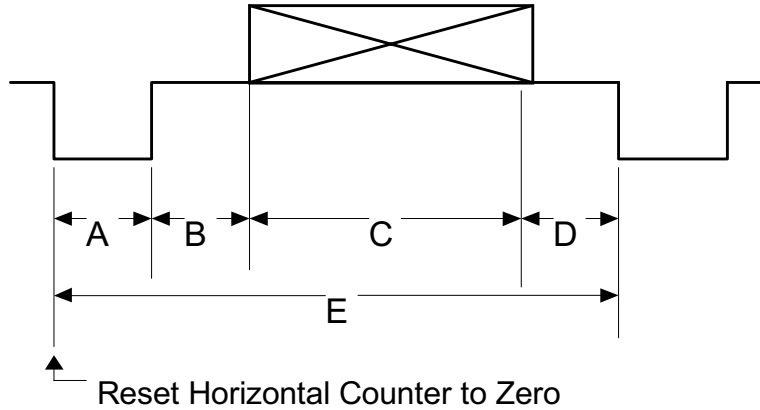
(1) Vertical Timing :



(2) Horizontal Timing :



(3). Detail of Horizontal Timing :



(a). VGA-480 Mode (Hsync = Negative Polarization)

| Item | Description | Clock Cycles | Time |
|------|--------------------|--------------|----------------|
| A | Horizontal Width | 96 | 3.813 μ s |
| B | Horizontal B-Porch | 48 | 1.907 μ s |
| C | Horizontal Display | 640 | 25.422 μ s |
| D | Horizontal F-Porch | 16 | 0.636 μ s |
| E | Horizontal Total | 800 | 31.778 μ s |

(b). VGA-400 Mode (Hsync = Negative Polarization)

| Item | Description | Clock Cycles | Time |
|------|--------------------|--------------|----------------|
| A | Horizontal Width | 96 | 3.813 μ s |
| B | Horizontal B-Porch | 48 | 1.907 μ s |
| C | Horizontal Display | 640 | 25.422 μ s |
| D | Horizontal F-Porch | 16 | 0.636 μ s |
| E | Horizontal Total | 800 | 31.778 μ s |

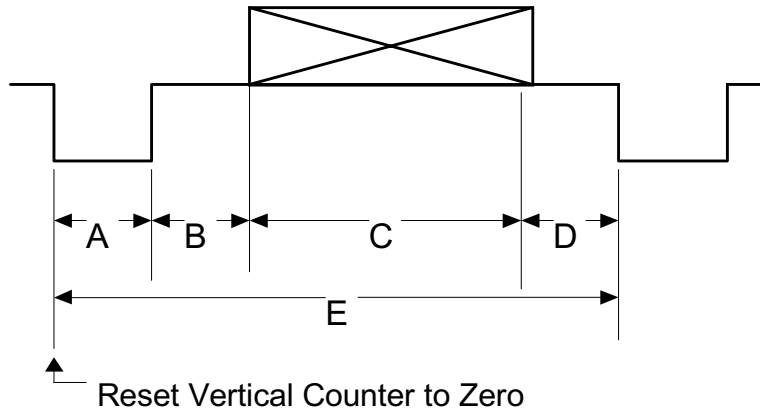
(c). VGA-350 Mode (Hsync = Positive Polarization)

| Item | Description | Clock Cycles | Time |
|------|--------------------|--------------|----------------|
| A | Horizontal Width | 96 | 3.813 μ s |
| B | Horizontal B-Porch | 48 | 1.907 μ s |
| C | Horizontal Display | 640 | 25.422 μ s |
| D | Horizontal F-Porch | 16 | 0.636 μ s |
| E | Horizontal Total | 800 | 31.778 μ s |

(d). Free Format (Hsync = Positive Polarization)

| Item | Description | Clock Cycles | Time |
|------|--------------------|--------------|------|
| A | Horizontal Width | Note 7-3 | --- |
| B | Horizontal B-Porch | Note 7-3 | --- |
| C | Horizontal Display | Note 7-3 | --- |
| D | Horizontal F-Porch | Note 7-3 | --- |
| E | Horizontal Total | < 1024 | --- |

(4). Detail of Vertical Timing :



(a). VGA-480 Mode (Vsync = Negative Polarization)

| Item | Description | Horizontal Lines | Time |
|------|------------------|------------------|---------------|
| A | Vertical Width | 2 | 63.5 μ s |
| B | Vertical B-Porch | 33 | 1.049 ms |
| C | Vertical Display | 480 | 15.253 ms |
| D | Vertical F-Porch | 10 | 317.8 μ s |
| E | Vertical Total | 525 | 16.683 ms |

(b). VGA-400 Mode (Vsync = Negative Polarization)

| Item | Description | Horizontal Lines | Time |
|------|------------------|------------------|---------------|
| A | Vertical Width | 2 | 63.5 μ s |
| B | Vertical B-Porch | 35 | 1.112 ms |
| C | Vertical Display | 400 | 12.711 ms |
| D | Vertical F-Porch | 12 | 381.0 μ s |
| E | Vertical Total | 449 | 14.268 ms |

(c). VGA-350 Mode (Vsync = Positive Polarization)

| Item | Description | Horizontal Lines | Time |
|------|------------------|------------------|---------------|
| A | Vertical Width | 2 | 63.5 μ s |
| B | Vertical B-Porch | 60 | 1.907 ms |
| C | Vertical Display | 350 | 11.122 ms |
| D | Vertical F-Porch | 37 | 1.176 μ s |
| E | Vertical Total | 449 | 14.268 ms |

(d). Free Format (Vsync = Positive Polarization)

| Item | Description | Horizontal Lines | Time |
|------|------------------|------------------|------|
| A | Vertical Width | Note 7-3 | --- |
| B | Vertical B-Porch | Note 7-3 | --- |
| C | Vertical Display | Note 7-3 | --- |
| D | Vertical F-Porch | Note 7-3 | --- |
| E | Vertical Total | < 1024 | --- |

7-5) Horizontal Display Position

Horizontal display position depends on the signal of DENB and the input digital image. As the rising edge of DENB signal comes, LCD module will create a horizontal sampling start pulse. At this time, the source driver ICs begin to sample image data and transfer the digital image data to analogue image data by D/A inverters. Then send the analogue image signal to the right position of active display area of the LCD panel. If DENB is low, LCD module will set horizontal display position in default value.

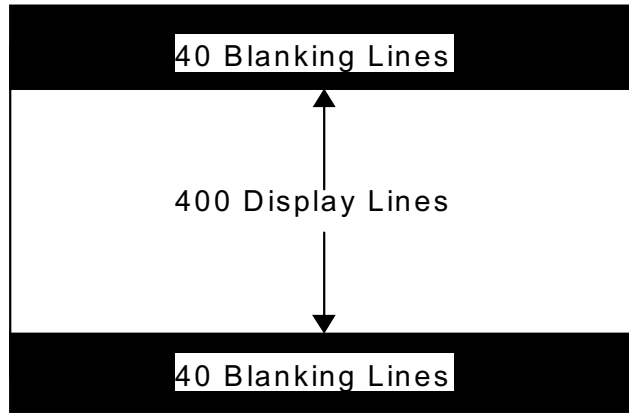
| Parameters | | Symbol | Format | Min. | Typ. | Max. | Unit | Remark |
|-----------------------------|----------------|--------|-------------|------|------|-------|-------|----------|
| DENB | Setup Time | Tes | All | 10 | | Tc-10 | ns | |
| | Hold Time | Teh | All | 10 | | Tc-10 | ns | |
| | Pulse Width | Tepw | All | 2 | 640 | 720 | clock | |
| DENB | Horizontal | | VGA-480 | | 144 | | clock | |
| Keep | Sampling | Thss | VGA-400 | | 144 | | clock | |
| At | Start | | VGA-350 | | 144 | | clock | |
| “Low” | Pulse Position | | Free Format | 128 | | 192 | clock | Note 7-4 |
| Hsync-DENB Phase Difference | | The | All | 96 | | 160 | clock | |

Note 7-4: In free format condition (Hsync = Positive, Vsync = Positive), if DENB is low, the position of horizontal sampling start pulse depends on the seven control lines of HP[6:0] Lattice iSPLSI1032E-LT70 FPGA. The starting position is the count of { 128 + Data(HP[6:0]) } clock.

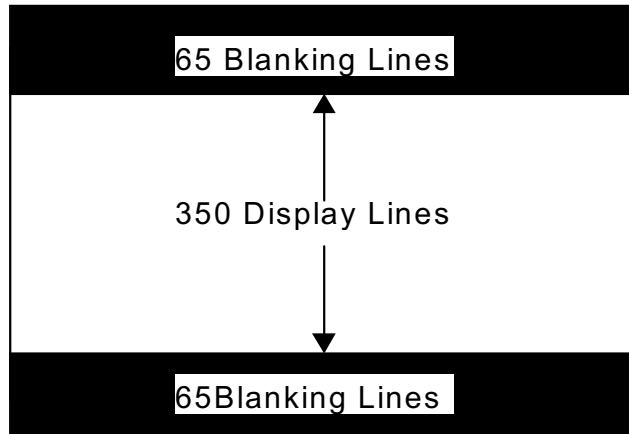
7-6) Vertical Display Position

| Mode | Hsync | Vsync | V-Start Position | V-Display | Remark |
|--------------|----------|----------|------------------|-----------|----------|
| VGA-480 | Negative | Negative | 34 | 480 lines | |
| VGA-400 | Negative | Positive | 17 | 400 lines | Note 7-5 |
| VGA-350 | Positive | Negative | 30 | 350 lines | Note 7-6 |
| Freedom Mode | Positive | Positive | 24 | 480 lines | |

Note 7-5: As the format is VGA-400(Hsync = Negative, Vsync = Positive), LCD module will adjust the display area to the center of display. At this time, both of the upper and lower display areas have 40 blanking lines (the display color is black). The actual display area is center 400 lines.

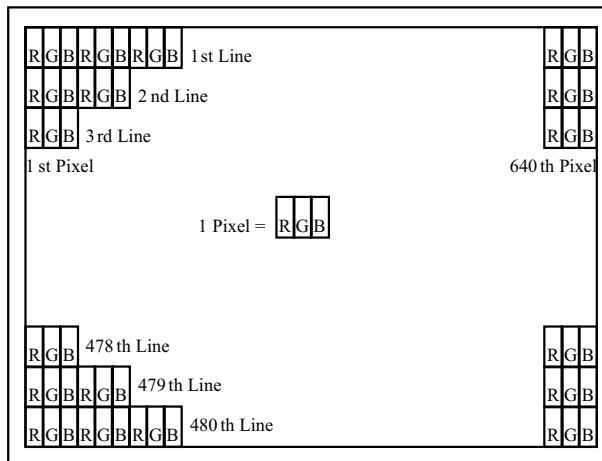


Note 7-6: As the format is VGA-350(Hsync = Negative, Vsync = Positive), LCD module will adjust the display area to the center of display. At this time, both of the upper and lower display areas have 65 blanking lines (the display color is black). The actual display area is center 350 lines.



7-6) Pixel Arrangement

The LCD module pixel arrangement is the stripe.



7-7) Display Color and Gray Scale Reference

| Color | | Input Color Data | | | | | | | | | | | | | | | | | |
|--------------|------------|------------------|----|----|----|----|-------|----|----|----|----|------|----|----|----|----|----|----|----|
| | | Red | | | | | Green | | | | | Blue | | | | | | | |
| | | R5 | R4 | R3 | R2 | R1 | R0 | G5 | G4 | G3 | G2 | G1 | G0 | 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 |
| | 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 (00) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red (01) | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red (02) | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | | | | | | | | | | | | | | | | | | |
| | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| | Brighter | | | | | | | | | | | | | | | | | | |
| | Red (61) | 1 | 1 | 1 | 1 | 0 | 1 | 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 (00) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green (01) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green (02) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | | | | | | | | | | | | | | | | | | |
| | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| | Brighter | | | | | | | | | | | | | | | | | | |
| | Green (61) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 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 (00) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue (01) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Blue (02) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | Darker | | | | | | | | | | | | | | | | | | |
| | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| | Brighter | | | | | | | | | | | | | | | | | | |
| | Blue (61) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 |
| | 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 | |

7-8)Control Board Dip Switch Format**SW1**

| Item | Condition | Remark |
|-------------|--------------------------|---------------|
| SW 1-1 | Vertical Shift (1 Line) | Default (ON) |
| SW 1-2 | Vertical Shift (2 Line) | Default (ON) |
| SW 1-3 | Vertical Shift (4 Line) | Default (OFF) |
| SW 1-4 | Vertical Shift (8 Line) | Default (OFF) |
| SW 1-5 | Vertical Shift (16 Line) | Default (OFF) |
| SW 1-6 | Vertical Shift (32Line) | Default (ON) |

SW2

| Item | Condition | Remark |
|-------------|----------------------------|---------------|
| SW 2-1 | Horizontal Shift (1 Line) | Default (ON) |
| SW 2-2 | Horizontal Shift (2 Line) | Default (ON) |
| SW 2-3 | Horizontal Shift (4 Line) | Default (ON) |
| SW 2-4 | Horizontal Shift (8 Line) | Default (ON) |
| SW 2-5 | Horizontal Shift (16 Line) | Default (OFF) |
| SW 2-6 | Horizontal Shift (32 Line) | Default (OFF) |

8. Optical Characteristics

8-1) Specification:

Ta=25°C

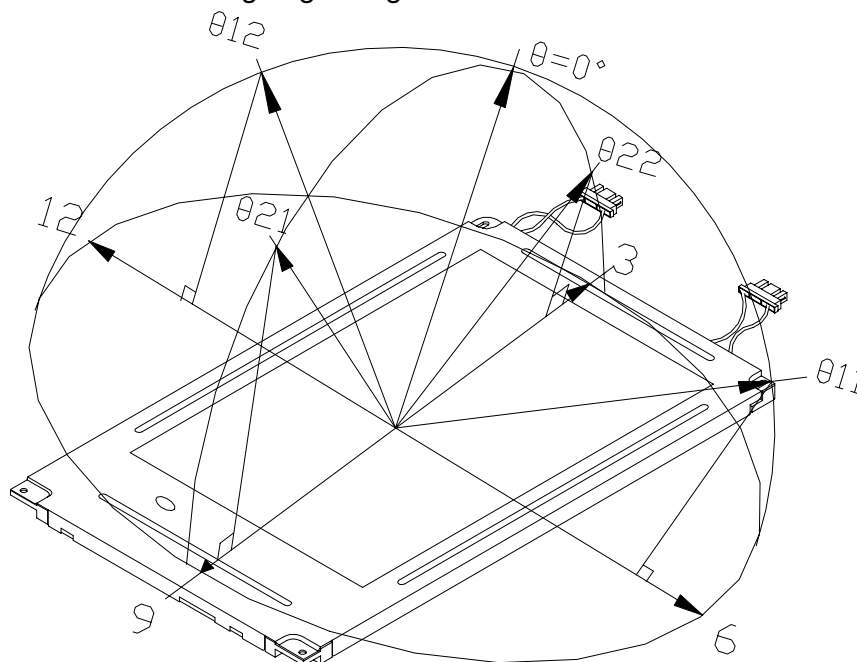
| Parameter | | Symbol | Condition | MIN. | TYP. | MAX. | Unit | Remarks |
|--------------------|------------|--------------------------|--------------------|-------|--------|-------|-------------------|----------|
| Viewing Angle | Horizontal | θ | CR > 10 | ± 45 | ± 55 | | deg | Note 8-3 |
| | Vertical | θ (to 12 o'clock) | | 10 | 15 | | deg | |
| | | θ (to 6 o'clock) | | 30 | 35 | | deg | |
| Contrast Ratio | | CR | | 100 | 120 | | | Note 8-1 |
| Response time | Rise | Tr | $\theta = 0^\circ$ | | | 30 | ms | |
| | Fall | Tf | | | | 50 | ms | |
| Brightness | | | | | 300 | | cd/m ² | Note 8-2 |
| Lamp Life Time | | | | | 20,000 | | hr | |
| White Chromaticity | | x | | 0.264 | 0.294 | 0.324 | - | |
| | | y | | 0.276 | 0.306 | 0.336 | - | |
| Cross Talk | | | $\theta = 0^\circ$ | | | 3 | % | Note 8-4 |

Note 8-1 : CR = $\frac{\text{Luminance when LCD is White}}{\text{Luminance when LCD is Black}}$

Contrast Ratio is measured in optimum common electrode voltage.

Note 8-2 : Topcon BM-7(fast) luminance meter 2° field of view is used in the testing (after 20~30 minutes' operation).

Note 8-3 : The definitions of viewing angle diagrams:



Note 8-4: Cross Talk (CTK) = $\frac{|YA-YB|}{YA} \times 100\%$

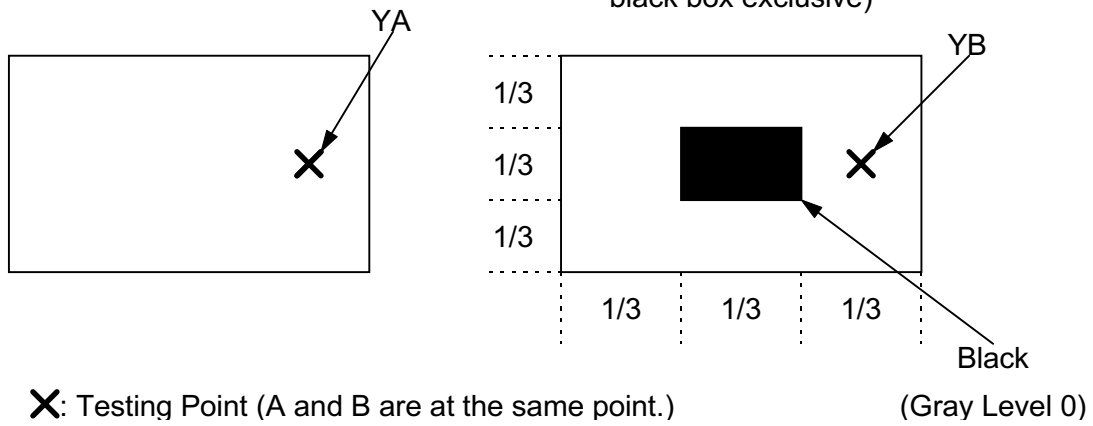
YA: Brightness of Pattern A

YB: Brightness of Pattern B
Pattern A

(Gray Level 46)

Pattern B

(Gray Level 46, central
black box exclusive)



9. Reliability Test

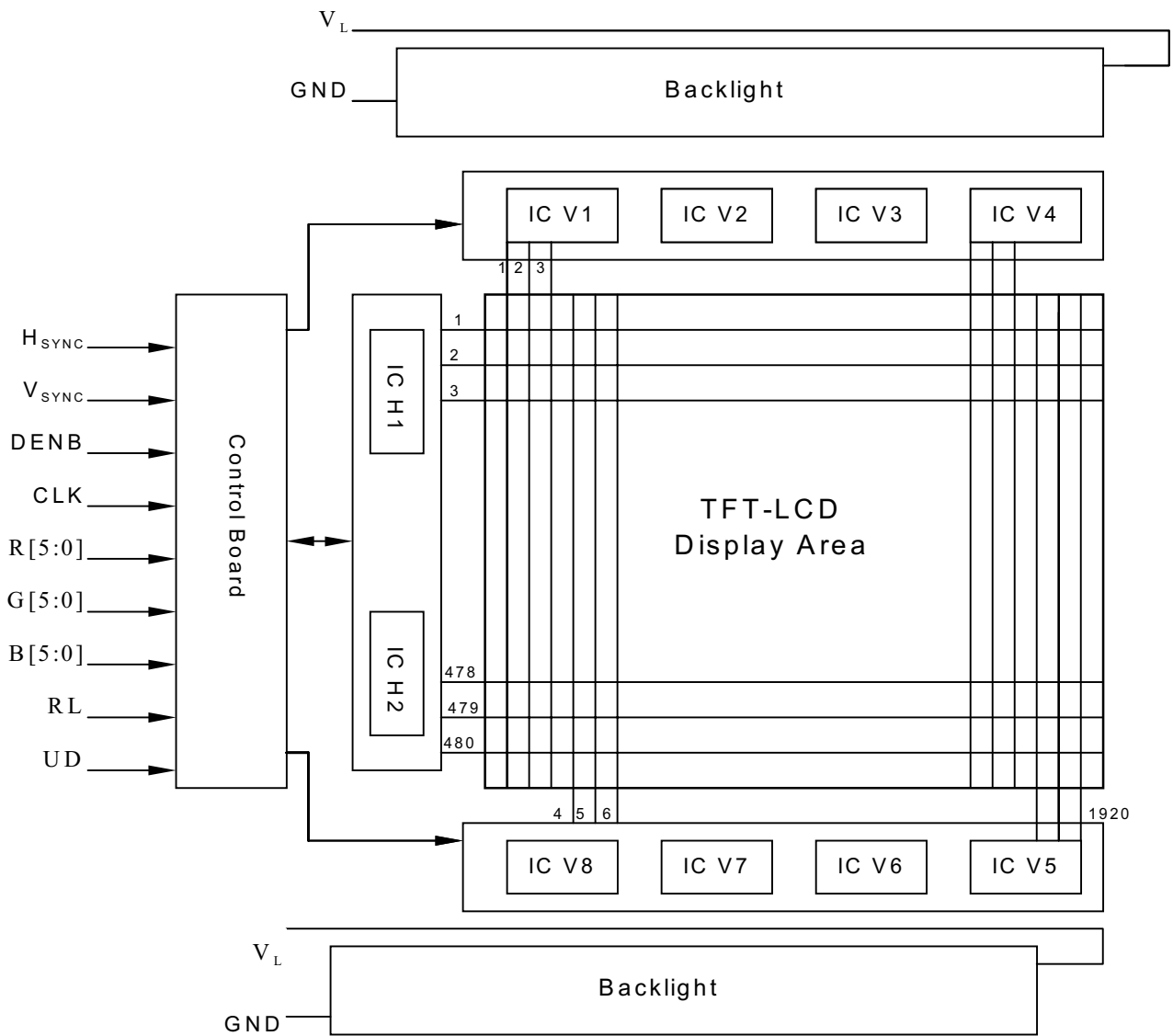
| No | Test Item | Test Condition |
|----|---|---|
| 1 | High Temperature Storage Test | Ta = +70 °C, 240 hrs |
| 2 | Low Temperature Storage Test | Ta = -25 °C, 240 hrs |
| 3 | High Temperature Operation Test | Ta = +55 °C, 240 hrs |
| 4 | Low Temperature Operation Test | Ta = 0 °C, 240 hrs |
| 5 | High Temperature & High Humidity Operation Test | Ta = +40 °C, 95%RH, 240 hrs |
| 6 | Vibration Test (non-operating) | Frequency : 10 ~ 57 Hz / Vibration Width : 0.075mm 58-500 H // Gravity : 9.8m/s ² Sweep time: 11 minutes Test period: 3 hrs for each direction of X, Y, Z |
| 7 | Shock Test (non-operating) | Gravity : 490m/s ² Direction: ± X, ± Y, ± Z Pulse Width : 11ms, half sine wave |

Ta: ambient temperature

[Judgement Criteria]

Under the display quality test conditions with normal operation state , there should be no change which may affect practical display function.

10. Block Diagram



11. Packing Diagram

| ZONE | REV. | DOCUMENT NO. | DESCRIPTION | DATE | REV. BY | | | | | | | | | | | | | | | | | | | | | | | | |
|--|------------|--|--------------------|--------|--|--------|---|---|------------|----------|---|---|------------|--------------------|--------|---|------------|--|----|---|------------|----------|---|------|----------|-------------|------------|--|--|
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>NOTE: 1.Q'TY: 30 pcs panel/carton. 2.Dimension: 680*440*250mm 3.Weight: 13 Kg</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:5%;">5</td> <td style="width:20%;">50-0100131</td> <td style="width:55%;">CARTON</td> <td style="width:20%; text-align: center;">1</td> </tr> <tr> <td>4</td> <td>50-0300201</td> <td>PP緩衝材 底座</td> <td style="text-align: center;">1</td> </tr> <tr> <td>3</td> <td>50-0500051</td> <td>Pink Bag 150*250mm</td> <td style="text-align: center;">30 抗靜電</td> </tr> <tr> <td>2</td> <td>V16C6448AC</td> <td></td> <td style="text-align: center;">30</td> </tr> <tr> <td>1</td> <td>50-0300191</td> <td>PP緩衝材 上蓋</td> <td style="text-align: center;">1</td> </tr> <tr> <td>ITEM</td> <td>PART NO.</td> <td>DESCRIPTION</td> <td>QTY REMARK</td> </tr> </table> | | 5 | 50-0100131 | CARTON | 1 | 4 | 50-0300201 | PP緩衝材 底座 | 1 | 3 | 50-0500051 | Pink Bag 150*250mm | 30 抗靜電 | 2 | V16C6448AC | | 30 | 1 | 50-0300191 | PP緩衝材 上蓋 | 1 | ITEM | PART NO. | DESCRIPTION | QTY REMARK | | |
| 5 | 50-0100131 | CARTON | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 50-0300201 | PP緩衝材 底座 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 50-0500051 | Pink Bag 150*250mm | 30 抗靜電 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | V16C6448AC | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 50-0300191 | PP緩衝材 上蓋 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ITEM | PART NO. | DESCRIPTION | QTY REMARK | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MTL.SPEC. | | UNSPECIFIED TOL'S | | REMARK | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ANGLE | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ROUGHNESS | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| APPROVE | | SCALE | UNIT | SHEET | DWG.TITLE | | | | | | | | | | | | | | | | | | | | | | | | |
| CHECK | | | | 1 OF 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| DRAWN | 陳萬典 | 99.09.08 | MTL.NO. V16C6448AC | | DWG FILE: D:\0asfs01\R&D\Jimmy\CAD\PACKING\6.4\64CV2AP01.DWG | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | REV. 01 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | A4 SIZE | | | | | | | | | | | | | | | | | | | | | | | | |

Revision History

| Rev. | Issued Date | Revised Contents |
|------|---------------|---|
| 1 | Jan. 19, 2000 | NEW |
| 1.1 | Aug.16 | 7. Electrical Characteristics Modify 7-8 Control Board Dip Switch Format(SW2-1 ON) |
| 1.2 | Oct. 24 ,2000 | 5. Input / Output Terminals Modify note 5-2(R/L) and note 5-3(U/D) define. |