

Prepared by (Production Div.)

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|      |      |      |         |

## 1,Application

This technical specification applies to 7.9" color TFT-LCD module1, L079J .The applications of the panel are car TV, portable DVD , Video Display, multimedia applications and others AV system.

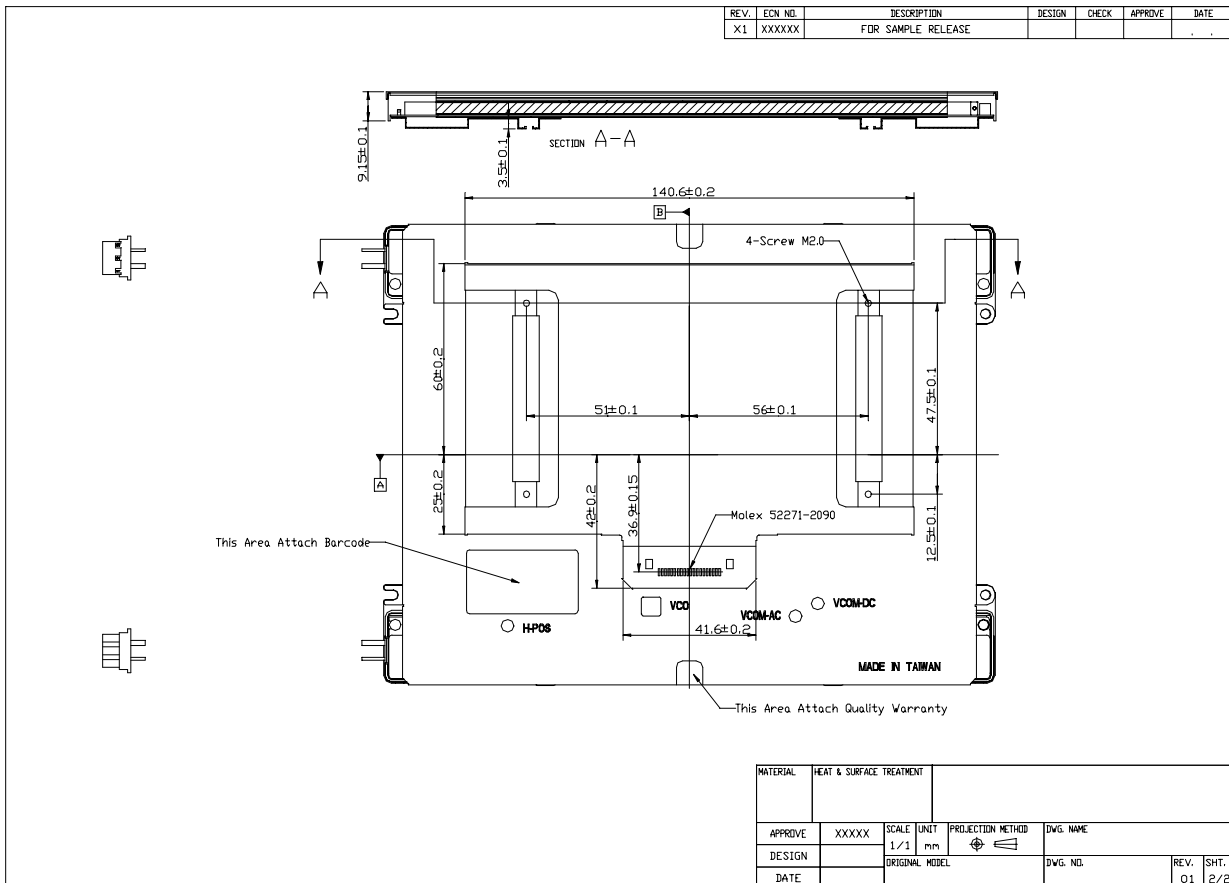
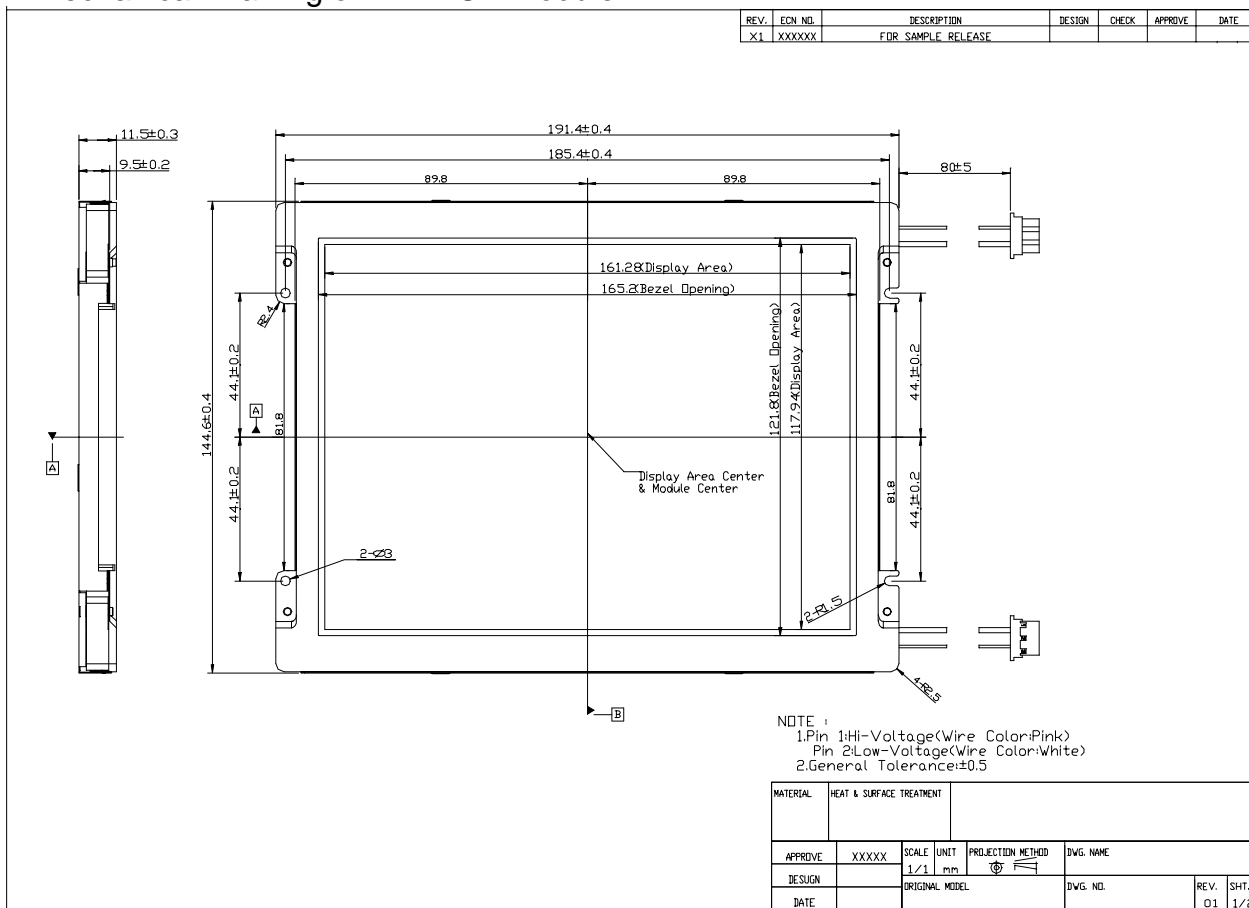
## 2. Features

- . Compatible with NTSC & PAL system
- . Pixel in stripe configuration
- . Slim and compact
- . Dual lamp design to make high picture brightness
- . Image Reversion : Up/Down and Left/Right

## 3. Mechanical Specifications

| Parameter           | Specifications                     | Unit |
|---------------------|------------------------------------|------|
| Screen Size         | 7.9 ( diagonal)                    | inch |
| Display Format      | 1440(H) × 234(V)                   | dot  |
| Active Area         | 161.28 (H) × 117.936 (V)           | mm   |
| Dot Pitch           | 0.112(H) × 0.504 (V)               | mm   |
| Pixel Configuration | Stripe                             |      |
| Outline Dimension   | 191.4 (W)×144.6 (H)×11.5 (D)(Typ.) | mm   |
| Surface treatment   | Anti-glare and hard coating        |      |
| Weight              | 365±10                             | g    |

#### 4. Mechanical Drawing of TFT-LCD Module



## 5. Input / Output Terminals

### 5-1) TFT-LCD Panel Driving

| Pin No | Symbol                         | I/O | Description                                | Remark   |
|--------|--------------------------------|-----|--|----------|
| 1      | $\overline{\text{HSY}}$        | I/O | Horizontal Sync. Input / Output            | Note 5-1 |
| 2      | FRP                            | O   | Video Polarity Alternating Signal          |          |
| 3      | CSY                            | I   | Composite Sync. Signal                     | Note 5-1 |
| 4      | V <sub>GH</sub>                | I   | Supply Voltage for Gate Driver (Hi level)  | Note 5-2 |
| 5      | V <sub>GL</sub>                | I   | Supply Voltage for Gate Driver (Low level) | Note 5-3 |
| 6      | V <sub>B</sub>                 | I   | Video Signal (Blue)                        |          |
| 7      | V <sub>R</sub>                 | I   | Video Signal (Red)                         |          |
| 8      | V <sub>G</sub>                 | I   | Video Signal (Green)                       |          |
| 9      | GND                            | I   | Ground                                     |          |
| 10     | V <sub>DD</sub>                | I   | Supply voltage for Controller              | Note 5-4 |
| 11     | V <sub>CC</sub>                | I   | Supply voltage for source driver           | Note 5-5 |
| 12     | GND                            | I   | Ground                                     |          |
| 13     | CKC                            | I   | Control pin for select I/O signal          | Note 5-1 |
| 14     | $\overline{\text{VS}}\text{Y}$ | I/O | Vertical Sync. Input/ Output               | Note 5-1 |
| 15     | PSI                            | O   | Synchronize Pulse for Decoder              |          |
| 16     | PSC                            | O   | Synchronize Pulse for DC-DC Converter      |          |
| 17     | NC                             | -   | No Connection                              |          |
| 18     | UD                             | I   | UP/DOWN Control                            | Note 5-7 |
| 19     | RL                             | I   | Right/Left Shift Control                   | Note 5-6 |
| 20     | NP                             | I   | NTSC/PAL Input                             | Note 5-8 |

Note 5-1 : Pin 13 (CKC) can select the function for Pin 1 (  $\overline{\text{HSY}}$  ), Pin 3 (CSY), and Pin 14 (  $\overline{\text{VS}}\text{Y}$  ).

| Pin 13 (CKC) | Pin 1 ( $\overline{\text{HSY}}$ ) | Pin 3 (CSY)          | Pin 14 ( $\overline{\text{VS}}\text{Y}$ ) |
|--------------|-----------------------------------|----------------------|---|
| Hi           | $\overline{\text{HSY}}$ Output    | CSY Input            | $\overline{\text{VS}}\text{Y}$ Output     |
| Low          | External Horizontal Sync Input    | External Clock Input | External Vertical Sync Input              |

Note 5-1-1: CKC= High:

- If CKC=1, the phase lock loop (PLL) is adopted in the LCD module.
- Inputs CSY, the controller of LCD module will separate the Vertical Sync and Horizontal Sync from CSY.
- Output Horizontal Sync (  $\overline{\text{HSY}}$  , Pin 1) and Vertical Sync (  $\overline{\text{VS}}\text{Y}$  , Pin 14)..
- The internal detect will detect Vertical Sync to reset the vertical counter.

Note 5-1-2: CKC= Low (VGA mode)

- a. If CKC=0, the phase lock loop (PLL) is not adopted in the LCD module.
- b. If CKC=0, the external clock input frequency of Pin 3 is 25.175 MHz.
- c. Input external Horizontal Sync (Pin 1) to synchronize the LCD module. External Horizontal Sync and External Vertical Sync input pulse can be high going or low going.

0. The cycle of external Horizontal Sync input is 31.8μs. The cycle of external Vertical Sync input is 525H.

Note 5-1-3: If there is any question about CKC=0, please contact PVI.

Note 5-2 :  $V_{GH}$  TYP. = +17V

Note 5-3 :  $V_{GL}$  TYP. = -15V

Note 5-4 :  $V_{DD}$  TYP. = +5V

Note 5-5 :  $V_{CC}$  TYP. = +5V

Note 5-6 : Low (0V) for shift Right; Input Hi (+5.0V) for inverse (shift Left).

Note 5-7 : Hi (+5.0V) for DOWN; Low (0V) for UP.

Note 5-8 : PAL= LOW(0V),NTSC= Hi(+5.0V)

|         | Low   | High |
|---------|-------|------|
| Note5-6 | Right | Left |
| Note5-7 | Down  | Up   |
| Note5-8 | PAL   | NTSC |

## 5-2) Backlight driving

| Pin No | Symbol | Description                       | Remark                        |
|--------|--------|-----------------------------------|-------------------------------|
| 1      | VL1    | Input terminal (Hi voltage side)  | Wire color: pink              |
| 2      | NC     | NO Connection                     |                               |
| 3      | VL2    | Input terminal (Low voltage side) | Wire color: white<br>Note 5-9 |

Note 5-9 : Low voltage side of backlight inverter connects with Ground of inverter circuits.

## 5-3) Input / Output Connector

### A) LCD Module Connector

6200-20P (Molex)  
FFC Down Connector  
20 Pins

Pitch : 1.0 mm

### B) Backlight Connector

JST BHR-03VS-1  
Pin No. : 3  
Pitch : 4 mm  
Pink: High Voltage  
White: Low Voltage

## 6. Absolute Maximum Ratings:

GND = 0 V , Ta = 25

| Parameter                        |         | Symbol   | MIN. | MAX. | Unit | Remark   |
|----------------------------------|---------|--|------|------|------|----------|
| Supply Voltage For Source Driver |         | V <sub>CC</sub>                                  | -0.5 | 7    | V    |          |
|                                  |         | V <sub>DD</sub>                                  | -0.5 | 7    | V    |          |
| Supply Voltage For Gate Driver   |         | V <sub>GH</sub> - V <sub>GL</sub>                | -0.3 | 40   | V    |          |
|                                  | H Level | V <sub>GH</sub>                                  | 0    | 40   | V    |          |
|                                  | L Level | V <sub>GL</sub>                                  | -20  | 0    | V    |          |
| Analog Signal Input Level        |         | V <sub>R</sub> , V <sub>G</sub> , V <sub>B</sub> | -0.3 | 7.0  | V    |          |
| Digital Input Signals            |         |  | -0.3 | 5.5  | V    | Note 6-1 |
| Digital Output Signals           |         |  | -0.3 | 5.5  | V    | Note 6-2 |
| Storage Temperature              |         |  | -30  | +80  |      |          |
| Operation Temperature            |         |  | -20  | +70  |      |          |

Note 6-1 :  $\overline{\text{HSY}}$  , CSY,  $\overline{\text{VS}}\overline{\text{Y}}$  , CKC,

Note 6-2 :  $\overline{\text{HSY}}$  ,  $\overline{\text{VS}}\overline{\text{Y}}$  , PSI, PSC

## 7. Electrical Characteristics

### 7-1) Recommended Operating Conditions:

#### 0. Driving for TFT-LCD Panel

GND = 0V , Ta = 25

| Parameter                        |         | Symbol          | MIN.                | Typ | MAX                  | Unit | Remark |
|----------------------------------|---------|-----------------|---------------------|-----|----------------------|------|--------|
| Supply Voltage For Source Driver | Analog  | V <sub>CC</sub> | 4.5                 | 5.0 | 5.5                  | V    |        |
|                                  | Logic   | V <sub>DD</sub> | 4.5                 | 5.0 | 5.5                  | V    |        |
| Supply Voltage For Gate Driver   | H level | V <sub>GH</sub> | +15                 | +17 | +19                  | V    |        |
|                                  | L level | V <sub>GL</sub> | -16                 | -15 | -14                  | V    |        |
| Supply Voltage For controller    |         | V <sub>DD</sub> | 4.5                 | 5.0 | 5.5                  | V    |        |
| Analog Signal input Level        |         | Amplitud        | 0.3                 |     | V <sub>CC</sub> -0.3 | V    |        |
| Digital input voltage            | H level | V <sub>IH</sub> | 0.7 V <sub>DD</sub> | -   | V <sub>DD</sub>      | V    |        |
|                                  | L level | V <sub>IL</sub> | -0.3                | -   | 0.3 V <sub>DD</sub>  | V    |        |
| Digital output voltage           | H level | V <sub>OH</sub> | 0.7 V <sub>DD</sub> | -   | V <sub>DD</sub>      | V    |        |
|                                  | L level | V <sub>OL</sub> | -0.3                | -   | 0.3 V <sub>DD</sub>  | V    |        |

## B) Driving for backlight

Ta= 25

| Parameter             | Symbol | Min. | Typ. | Max. | Unit | Remark               |
|-----------------------|--------|------|------|------|------|----------------------|
| Lamp voltage          | $V_L$  |      | 400  |      | Vrms | $I_L = 6 \text{ mA}$ |
| Lamp current          | $I_L$  | 3.5  | 6    | 8    | mA   |                      |
| Lamp frequency        | $P_L$  |      | 60   |      | KHz  | Note 7-1             |
| Kick-off voltage(25 ) | $V_s$  | TBD  | TBD  | 750  | Vrms | Note 7-2             |
| Kick-off voltage(0 )  | $V_s$  | TBD  | TBD  | 950  | Vrms | Note 7-2             |

Note 7-1 : The wave form of lamp driving voltage should be as closed to a perfect SIN wave as possible.

Note 7-2 : The Kick-off times 1sec

## 7-2) Power Consumption

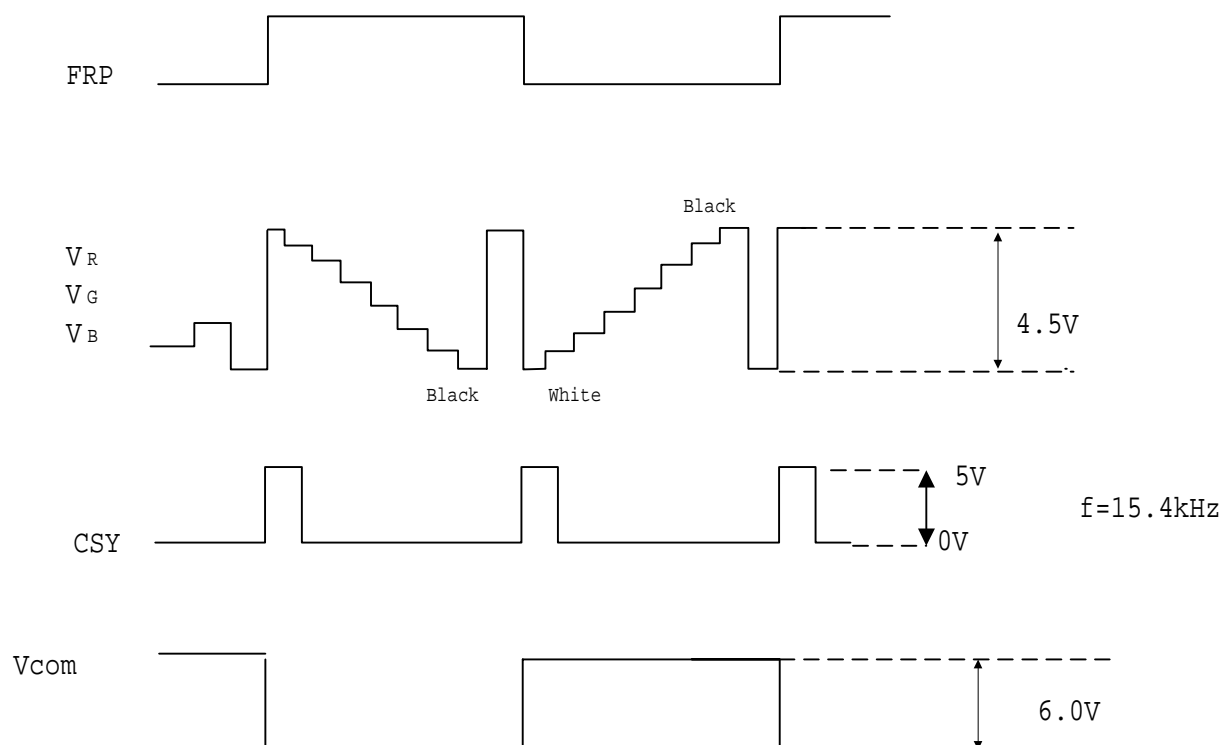
Ta= 25

| Parameter                                  | Symbol   | Conditions      | TYP. | MAX | Unit | Remark   |
|--|----------|-----------------|------|-----|------|----------|
| Supply current for Gate Driver (Hi level)  | $I_{GH}$ | $V_{GH} = +17V$ | 0.15 | 0.2 | mA   |          |
| Supply current for Gate Driver (Low level) | $I_{GL}$ | $V_{GL} = -15V$ | 20   | 30  | mA   |          |
| Supply current for Source Driver           | $I_{CC}$ | $V_{CC} = +5V$  | 20   | 30  | mA   |          |
| Supply current for controller              | $I_{DD}$ | $V_{DD} = +5V$  | 20   | 30  | mA   |          |
| LCD Panel Power Consumption                |          |                 | 0.51 |     | W    | Note 7-3 |
| Backlight Lamp Power Consumption           |          |                 | 4.8  |     | W    | Note 7-4 |

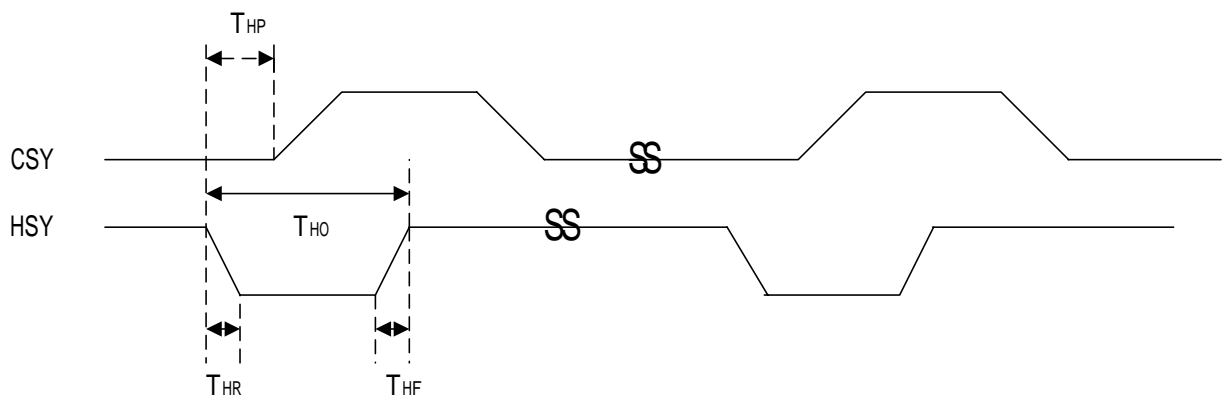
Note 7-3 : The power consumption for backlight is not included.

Note 7-4 : Backlight lamp power consumption is calculated by  $I_L \times V_L$ .

## 7-3) Input / Output signal timing chart



| Parameter                     |                  |      | Symbol       | MIN. | TYP.     | MAX. | Unit    | Remarks    |
|-------------------------------|------------------|------|--------------|------|----------|------|---------|------------|
| Horizontal Sync. Output Pulse | Frequency        | NTSC | $F_{HO(N)}$  | -    | 15.73    | -    | KHz     |            |
|                               |                  | PAL  | $F_{HO(P)}$  | -    | 15.63    | -    | KHz     |            |
|                               | Pulse Width      |      | $T_{HO}$     | 4.4  | 4.7      | 5.0  | $\mu s$ |            |
|                               | Phase Difference |      | $T_{HP}$     | 0    | 2        | -    | $\mu s$ |            |
|                               | Rising Time      |      | $T_{HR}$     | -    | -        | 0.05 | $\mu s$ |            |
|                               | Falling Time     |      | $T_{HF}$     | -    | -        | 0.05 | $\mu s$ |            |
| Vertical Sync. Output Pulse   | Frequency        | NTSC |              |      | fh/262.5 |      |         |            |
|                               |                  | PAL  |              |      | fh/312.5 |      |         |            |
|                               | Pulse Width      |      | $T_{VO}$     | -    | 4H       | -    | $\mu s$ |            |
|                               | Phase Difference | NTSC | $T_{VPO(N)}$ | -    | 2H       | -    | $\mu s$ | odd field  |
|                               |                  | PAL  | $T_{VPO(P)}$ | -    | 1H       | -    |         |            |
|                               | Phase Difference | NTSC | $T_{VPE(N)}$ | -    | 1.5H     | -    | $\mu s$ | even field |
|                               |                  | PAL  | $T_{VPE(P)}$ | -    | 0.5H     | -    |         |            |



#### 7-4) Display Time Range

A) When sync. Signal of NTSC system is applied.

a) Horizontally

11.35 ~ 61.36  $\mu s$ .

b) Vertical

22 ~ 255 H

B) When sync. Signal of PAL system is applied.

a) Horizontally

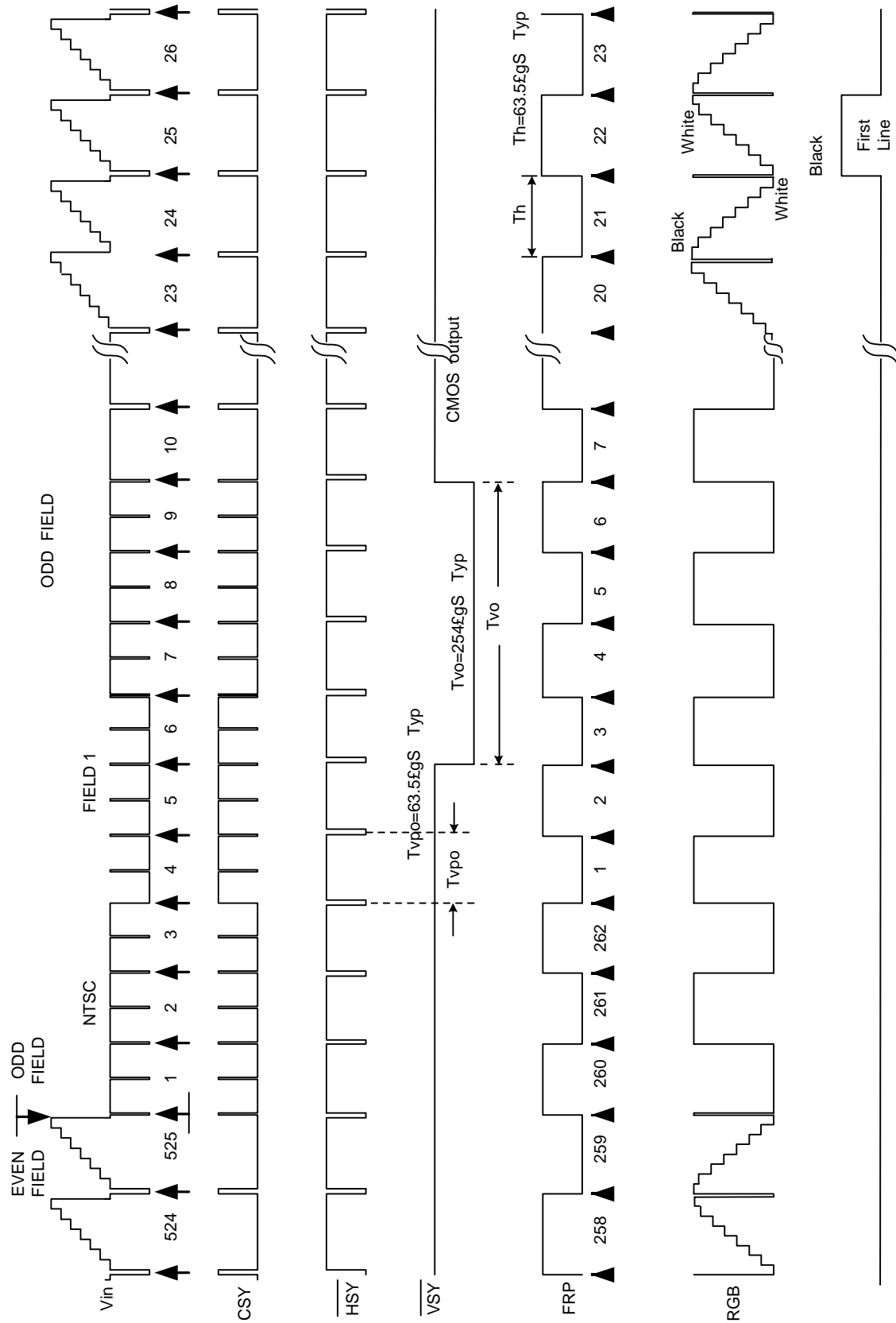
11.54 ~ 61.9  $\mu s$

b) Vertical

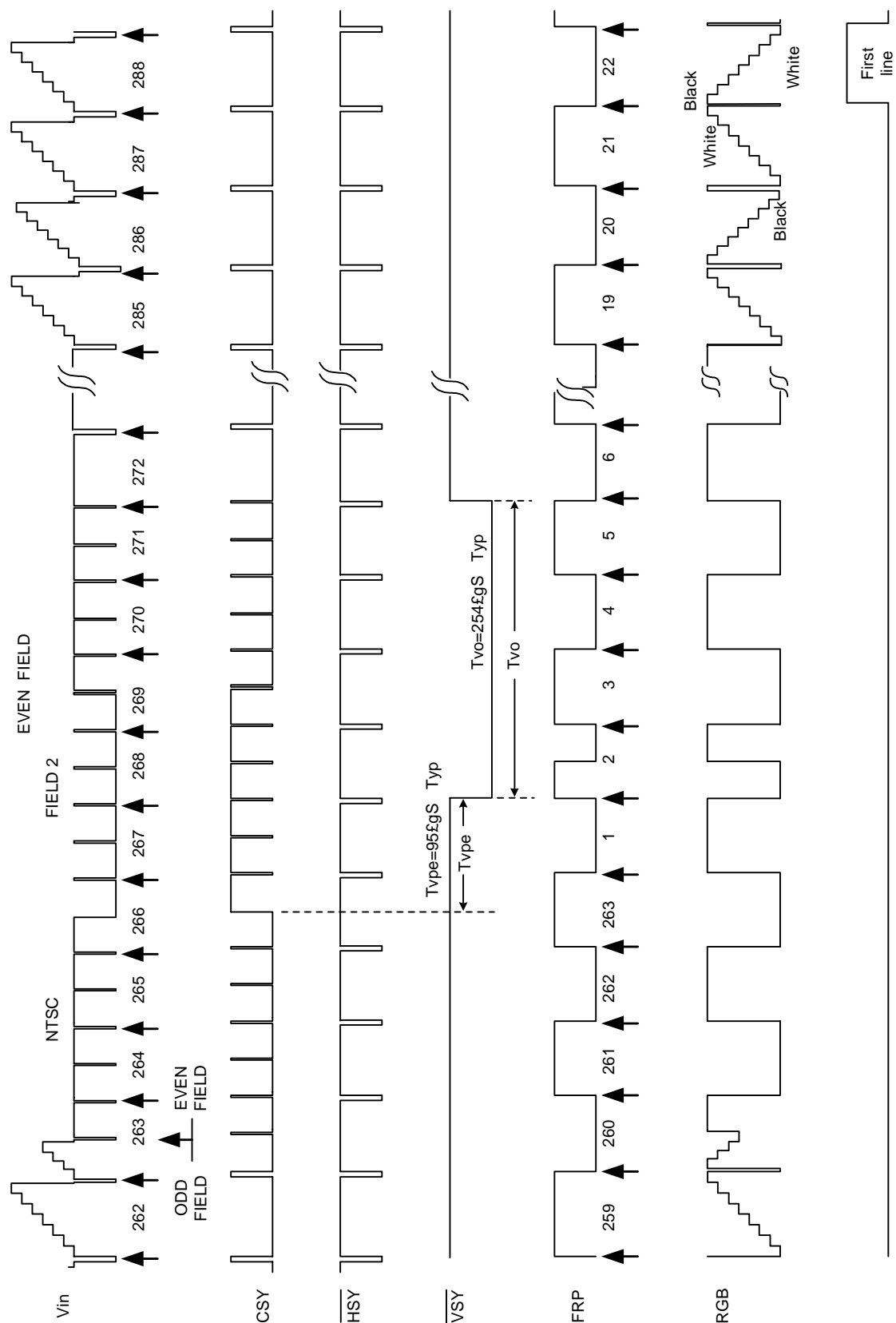
28 ~ 300 H



### C) NTSC System

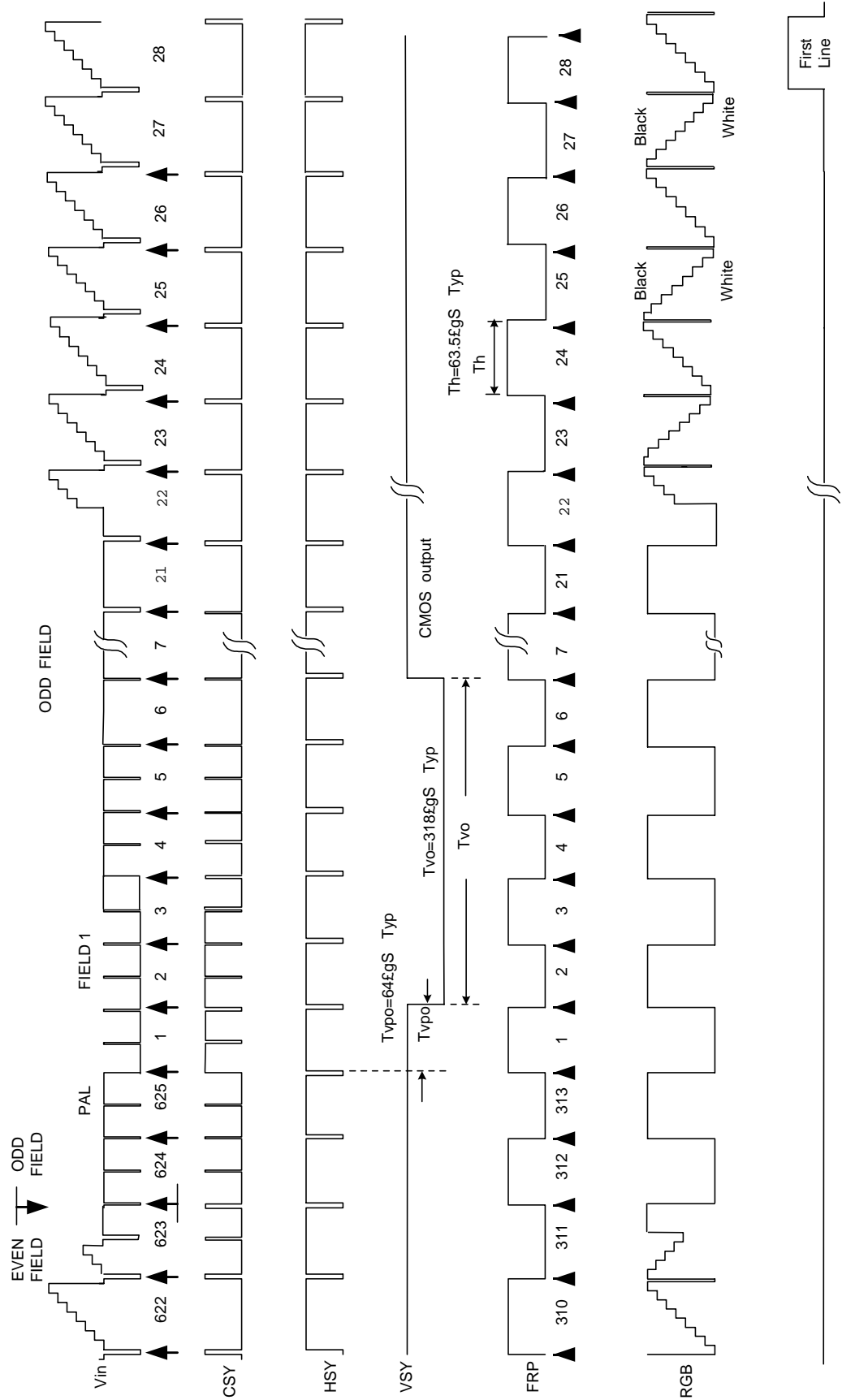


Timing chart of I/O and RGB signal

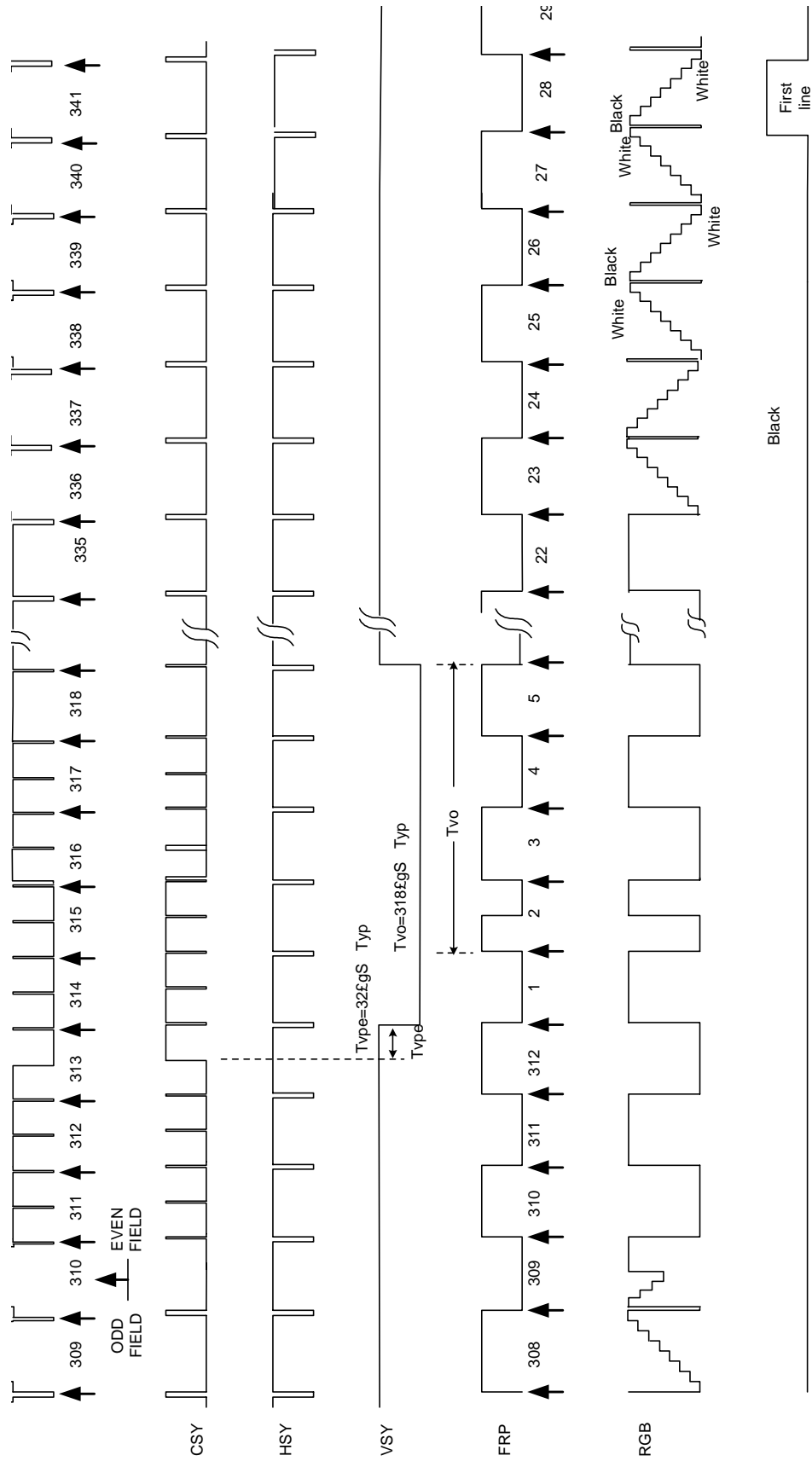


Timing chart of I/O and RGB signal

## D) PAL System

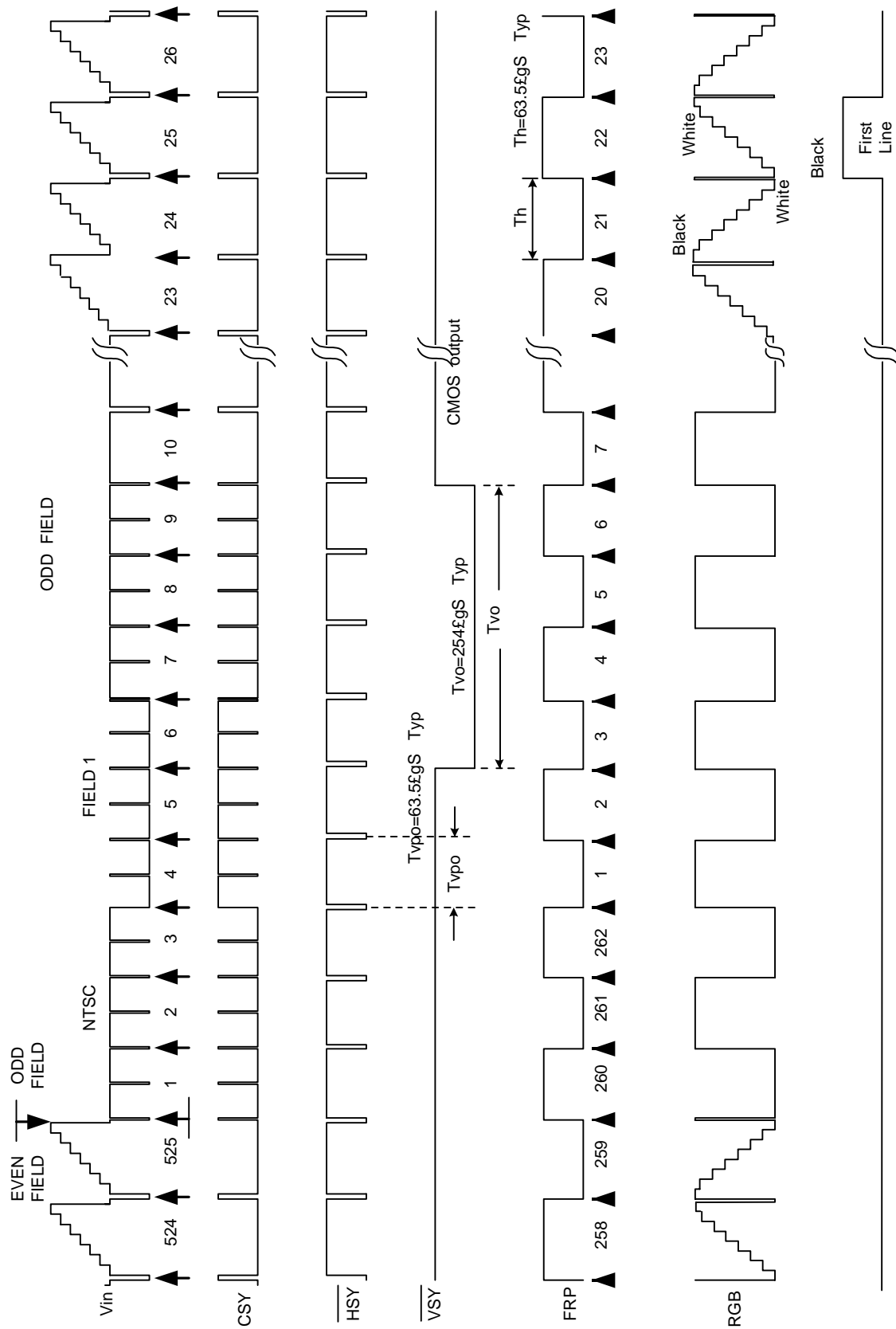


Timing chart of I/O and RGB signal



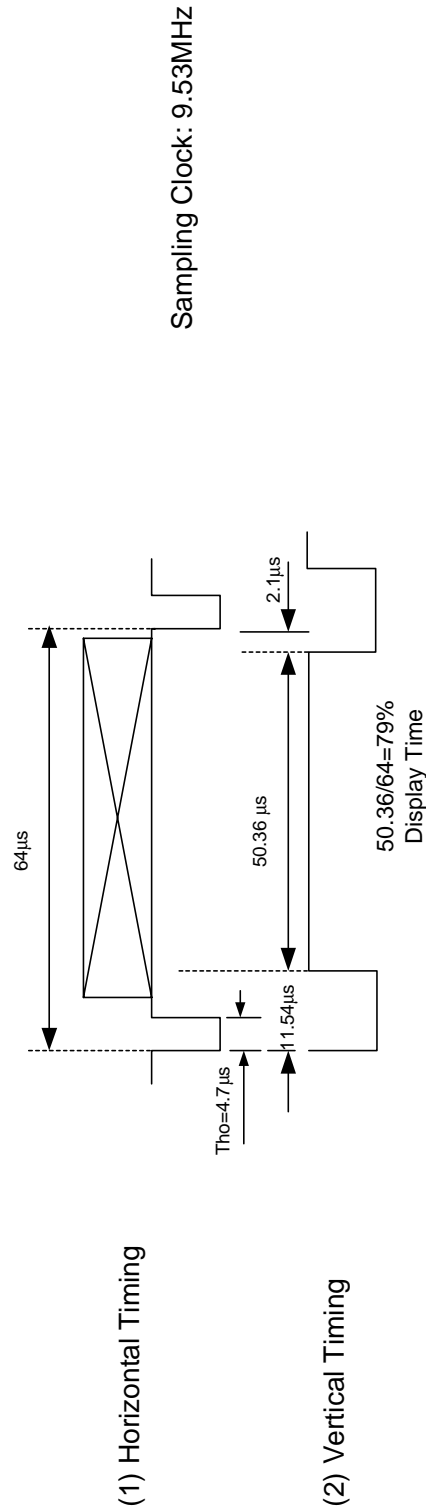
Timing chart of I/O and RGB signal

## E)NTSC Display Timing



Timing chart of I/O and RGB signal

## F)PAL Display Timing



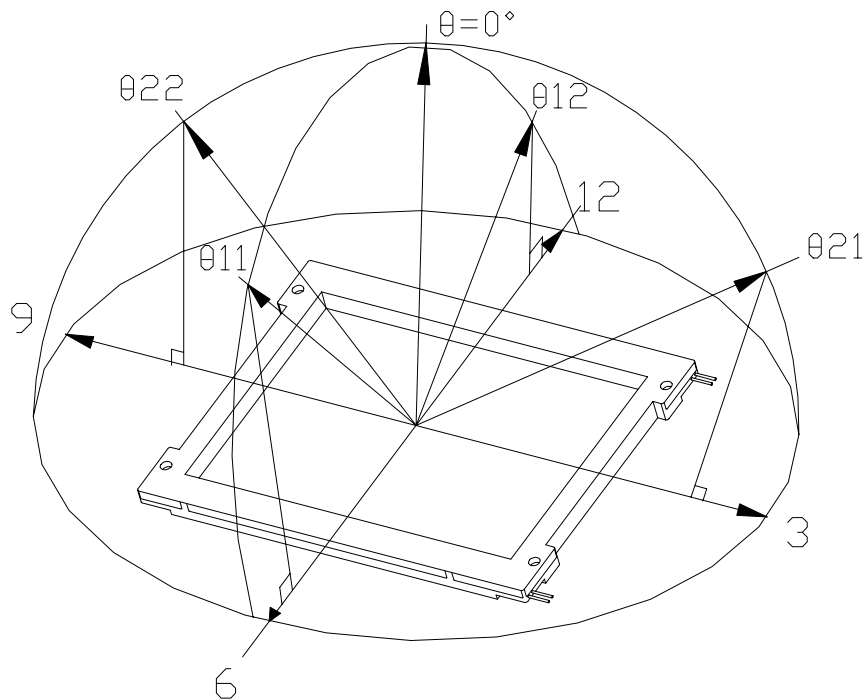
## 8.Optical Characteristics

### 8-1) Specification:

Ta = 25

| Parameter      |            | Symbol | Condition | MIN.  | TYP.  | MAX.  | Unit  | Remarks  |
|----------------|------------|--------|-----------|-------|-------|-------|-------|----------|
| Viewing Angle  | Horizontal | 21, 22 | CR 10     | 45    | 55    |       | deg   | Note 8-1 |
|                | Vertical   | 12     |           | 10    | 15    |       | deg   | Note 8-1 |
|                |            | 11     |           | 30    | 35    |       | deg   | Note 8-1 |
| Contrast Ratio |            | CR     |           | 80    | 150   |       |       | Note 8-2 |
| Response time  | Rise       | Tr     | =0 °      |       |       | 30    | ms    | Note 8-4 |
|                | Fall       | Tf     |           |       |       | 50    | ms    |          |
| Brightness     |            |        |           | 250   | 350   |       | cd/m² | Note 8-3 |
| White          |            | x      | =0 °      | 0.265 | 0.315 | 0.365 |       | Note 8-3 |
| Chromaticity   |            | y      | =0 °      | 0.280 | 0.330 | 0.380 |       |          |
| Lamp Life      | Time +25   |        |           | 20000 | 25000 |       | hr    |          |

Note 8-1: The definitions of viewing angles



Note 8-2 :  $CR = \frac{\text{Luminance when Testing point is White}}{\text{Luminance when Testing point is Black}}$

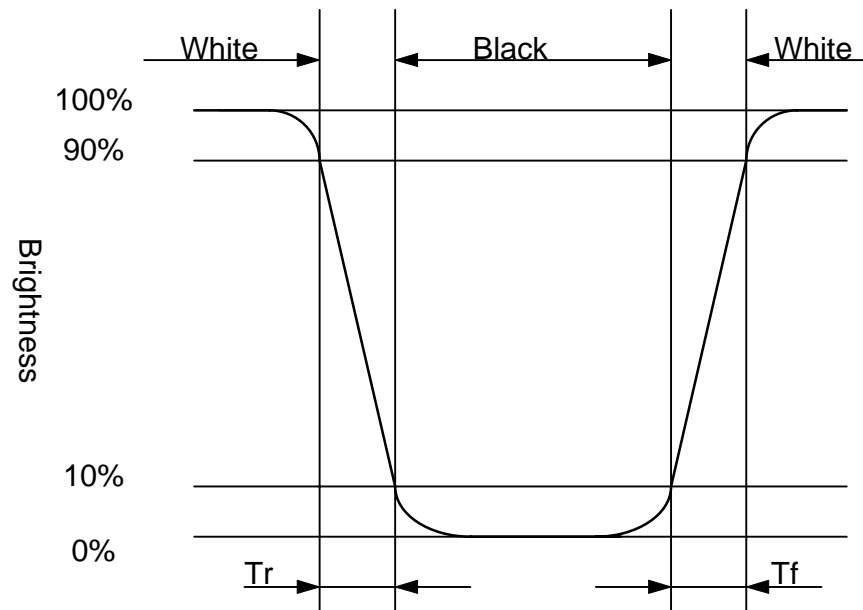
(Testing configuration see 8-2 )

Contrast Ratio is measured in optimum common electrode voltage.

Note 8-3 : Topcon BM-7(fast) luminance meter 2 ° field of view is used in the testing (after 20~30 minutes operation).

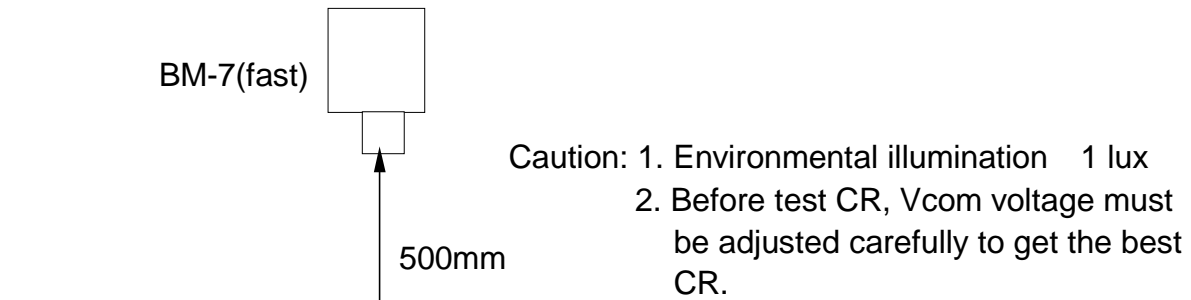
Lamp Current 6mA

Note 8-4: The definition of response time:

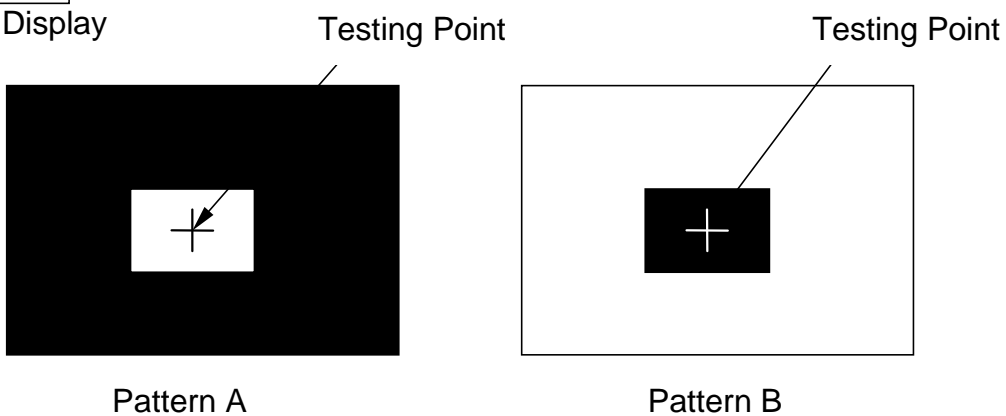




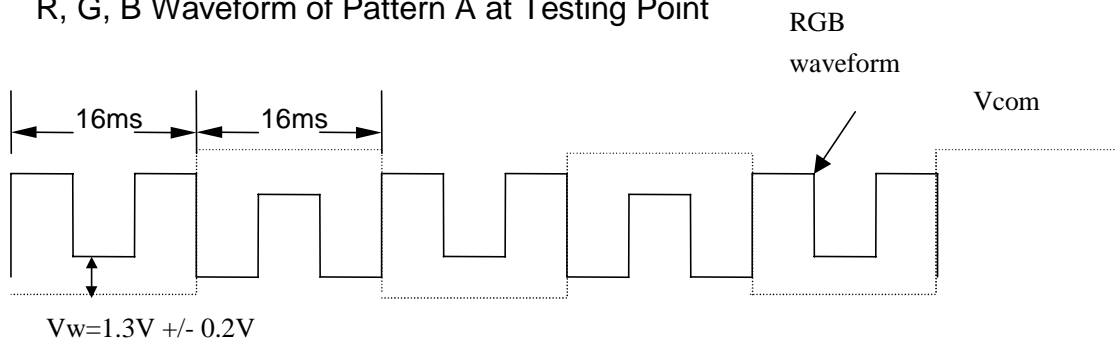
## 8-2) Testing configuration



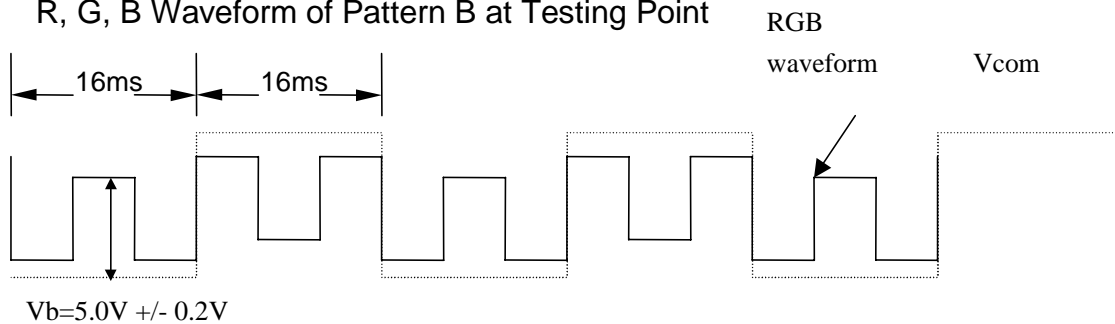
- LCD Display



- R, G, B Waveform of Pattern A at Testing Point



- R, G, B Waveform of Pattern B at Testing Point



## 9. Handling Cautions

### 9-1) Mounting of module

- a) Please power off the module when you connect the input/output connector.
- b) Please connect the ground pattern of the inverter circuit surely. If the connection is not perfect, some following problems may happen possibly.
  - 1.The noise from the backlight unit will increase.
  - 2.The output from inverter circuit will be unstable.
  - 3.In some cases a part of module will heat.
- c) Polarizer which is made of soft material and susceptible to flaw must be handled carefully.
- d) Protective film (Laminator) is applied on surface to protect it against scratches and dirt. It is recommended to peel off the laminator before use and taking care of static electricity.

### 9-2) Precautions in mounting

- a) When metal part of the TFT-LCD module (shielding lid and rear case) is soiled, wipe it with soft dry cloth.
- b) Wipe off water drops or finger grease immediately. Long contact with water may cause discoloration or spots.
- c) TFT-LCD module uses glass which breaks or cracks easily if dropped or bumped on hard surface. Please handle with care.
- d) Since CMOS LSI is used in the module. So take care of static electricity and earth yourself when handling.

### 9-3) Adjusting module

- a) Adjusting volumes on the rear face of the module have been set optimally before shipment.
- b) Therefore, do not change any adjusted values. If adjusted values are changed, the specifications described may not be satisfied.

### 9-4) Others

- a) Do not expose the module to direct sunlight or intensive ultraviolet rays for many hours.
- b) Store the module at a room temperature place.
- c) The voltage of beginning electric discharge may over the normal voltage because of leakage current from approach conductor by to draw lump read lead line around.
- d) If LCD panel breaks, it is possible that the liquid crystal escapes from the panel. Avoid putting it into eyes or mouth. When liquid crystal sticks on hands, clothes or feet. Wash it out immediately with soap.
- e) Observe all other precautionary requirements in handling general electronic components.
- f) Please adjust the voltage of common electrode as material of attachment by 1 module.

## 10. Reliability Test

| No | Test Item                                       | Test Condition   |
|----|---|--|
| 1  | High Temperature Storage Test                   | Ta = +80 , 240 hrs   |
| 2  | Low Temperature Storage Test                    | Ta = -30 , 240 hrs   |
| 3  | High Temperature Operation Test                 | Ta = +70 , 240 hrs   |
| 4  | Low Temperature Operation Test                  | Ta = -20 , 240 hrs   |
| 5  | High Temperature & High Humidity Operation Test | Ta = +60 , 95%RH, 240 hrs  |
| 6  | Thermal Cycling Test<br>(non-operating)         | -25 +25 +70 , 200 Cycles<br>30 min 5min 30 min   |
| 7  | Vibration Test<br>(non-operating)               | Frequency : 10 ~ 55 Hz<br>Amplitude : 1.5 mm<br>Sweep time: 11 mins<br>Test Period: 6 Cycles for each direction of X, Y, Z |
| 8  | Shock Test<br>(non-operating)                   | 100G, 6ms<br>Direction: $\pm X$ , $\pm Y$ , $\pm Z$<br>Cycle: 3 times  |
| 9  | Electrostatic Discharge Test<br>(non-operating) | 150pF, 330<br>Air: $\pm 15KV$ ; Contact: $\pm 8KV$<br>10 times/point, 9 points/panel face                                  |

Ta: ambient temperature

### [Criteria]

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

## 11. Block Diagram

