

Version : *Preliminary*

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Http://www.lcdfriends.com

TECHNICAL SPECIFICATION

MODEL NO. : PW070DS1T1

Customer's Confirmation

Date _____

By _____

PVI's Confirmation

Confirmed By _____

Prepared By _____

PRIME VIEW INTERNATIONAL CO., LTD.
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<http://www.pvi.com.tw>

Date : FEB. 02,2000

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TECHNICAL SPECIFICATION

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1. Application

This technical specification applies to 7.0" color TFT-LCD module, P70AN1. The applications of the panel are car TV, portable DVD, GPS, multimedia applications and others AV system.

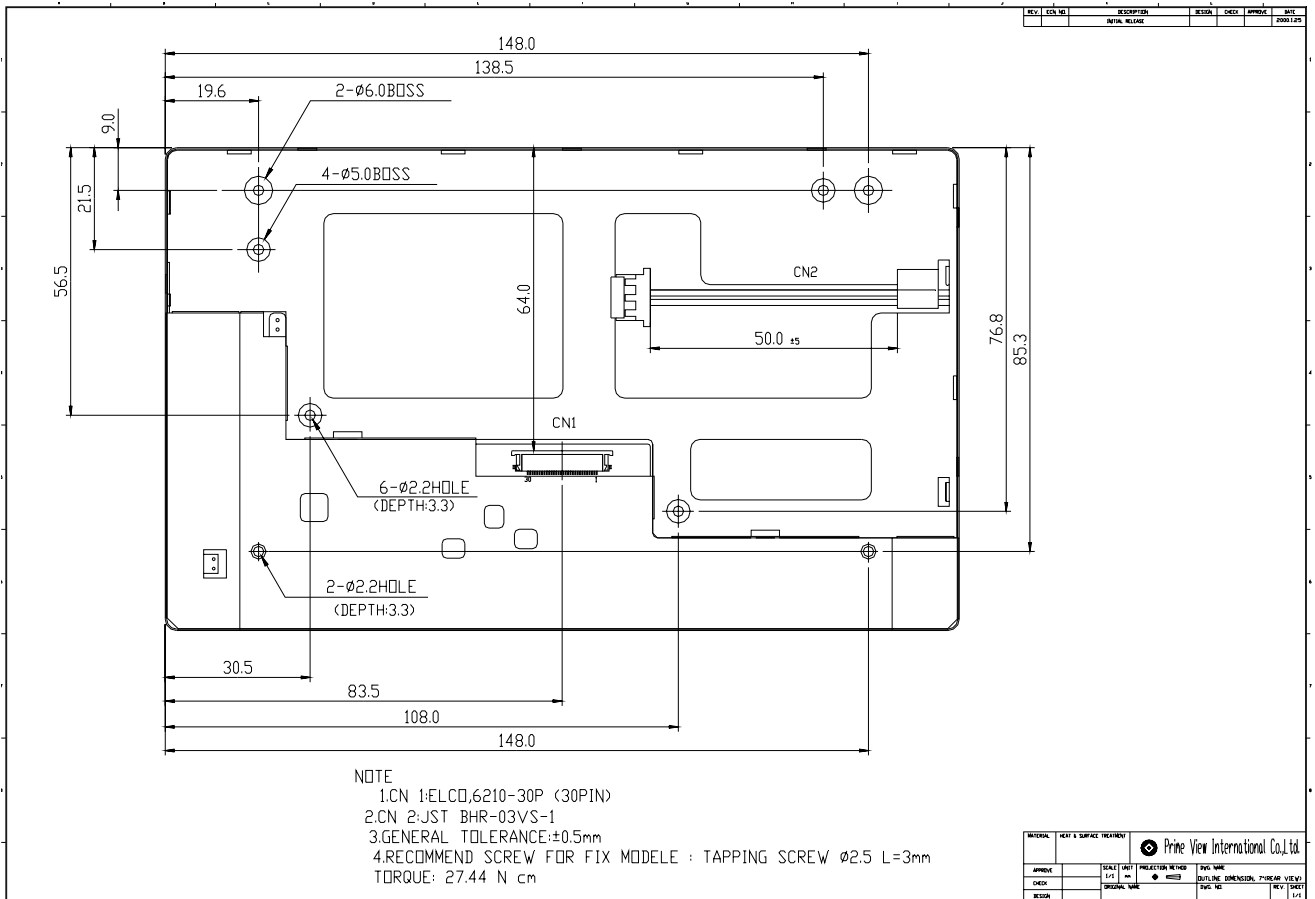
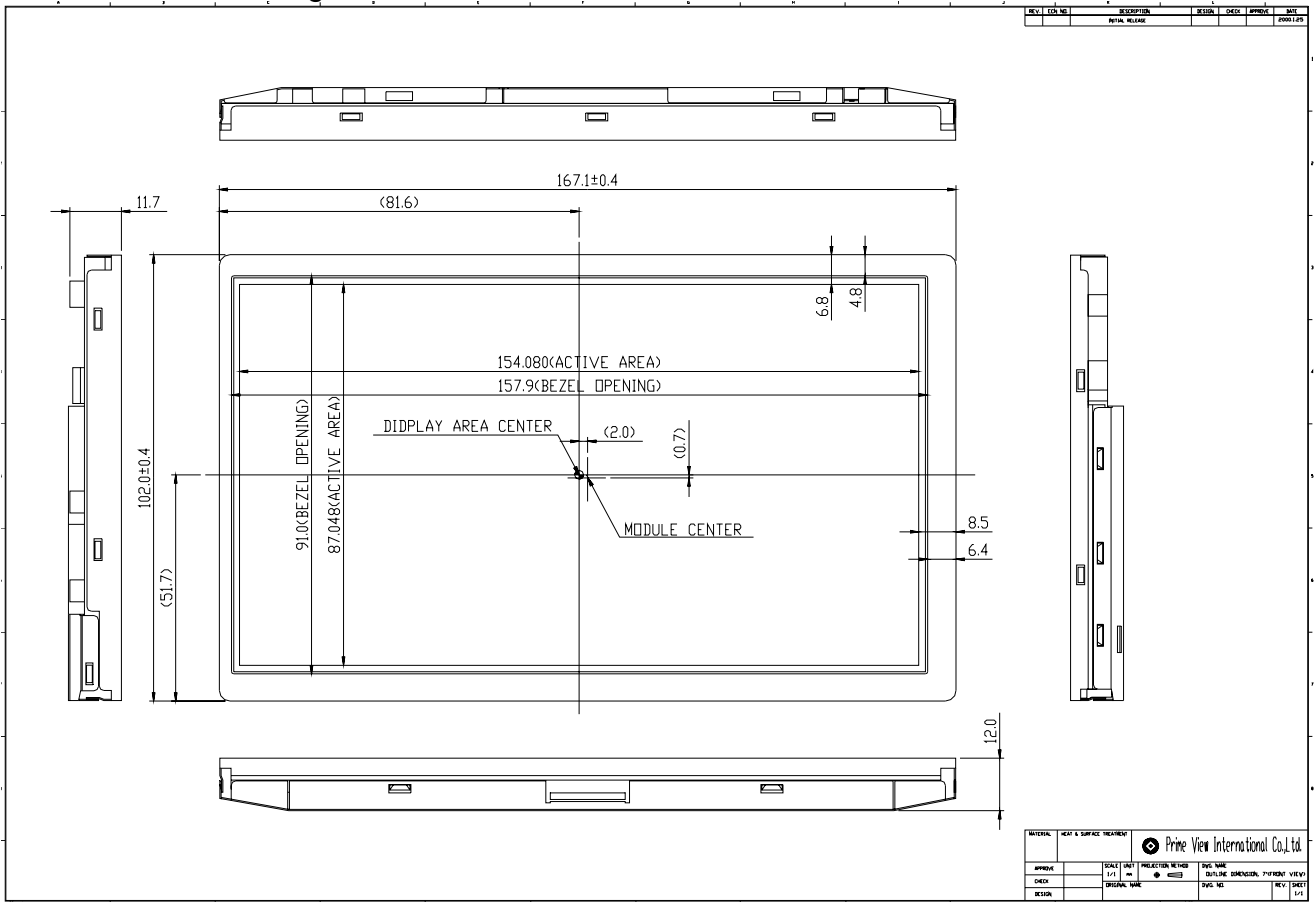
2. Features

- . Pixel in stripe configuration
- . Slim and compact
- . High Brightness
- . Image Reversion : Up/Down and Left/Right
- . 8 Video Display Mode

3. Mechanical Specifications

| Parameter | Specifications | Unit |
|---------------------|-------------------------------|-------------|
| Screen Size | 7.0 (16:9 diagonal) | inch |
| Display Mode | Normally White | |
| Display Format | 1440(H)×234(V) | dot |
| Active Area | 154.08 (H)×87.048 (V) | mm |
| Dot Pitch | 0.107(H)×0.372 (V) | mm |
| Pixel Configuration | Stripe | |
| Outline Dimension | 166.9 (W)×101.8 (H)×12.05 (D) | mm |
| Surface Treatment | Anti-Glare and Hard Coating | |
| Weight | 200 | g |

4. Mechanical Drawing of TFT-LCD Module



5. Input / Output Terminals
5-1) TFT-LCD Panel Driving

The interface connector is 6210-30P Series manufactured by ELCO or equivalent. (0.5mm pitch 30 pin)

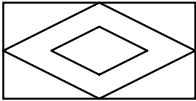
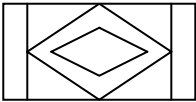
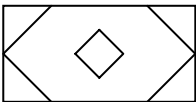
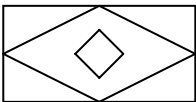
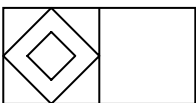
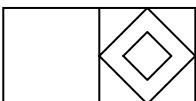
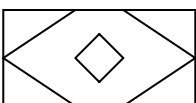
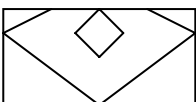
The connector interface pin assignments are listed in the Table below.

| Pin No | Symbol | Description | Remark |
|--------|--------|--|----------|
| 1 | NC | No Connection | |
| 2 | RED | Red Video Input | |
| 3 | GREEN | Green Video Input | |
| 4 | BLUE | Blue Video Input | |
| 5 | GND | Ground | |
| 6 | CSY | Composite Sync Input | |
| 7 | NC | No Connection | |
| 8 | NC | No Connection | |
| 9 | NC | No Connection | |
| 10 | NC | No Connection | |
| 11 | MODE 1 | Display Mode Selection Switch (Refer to 5.2) | |
| 12 | MODE 2 | | |
| 13 | MODE 3 | | |
| 14 | GND | Ground | |
| 15 | BLK | Video Signal Mask Timing Output | |
| 16 | HSY | Horizontal Sync Output | |
| 17 | VSY | Vertical Sync Output | |
| 18 | VCC | Input Voltage For Logic/Logic Voltage For Source Driver | Note:5-1 |
| 19 | POLS | Video Polarity Control Signal | |
| 20 | POLC | VCOM Polarity Control Signal | |
| 21 | GND | Ground | |
| 22 | U/D | Scanning Direction : (Low : Normal , High : Reverse) | |
| 23 | L/R | Scanning Direction : (Low : Normal , High : Reverse) | |
| 24 | N/P | NTSC/PAL Selection Signal(Low : PAL , High : NTSC) | |
| 25 | VD | Vertical Sync Input | Note:5-2 |
| 26 | HD | Horizontal Sync Input | Note:5-2 |
| 27 | GND | Ground | |
| 28 | VDD | Analog Voltage For Source Driver/Logic Voltage For Gate Driver | |
| 29 | VGON | Positive Voltage For Gate Driver | |
| 30 | VGOFF | Negative Voltage For Gate Driver | |

Note 5-1:FPGA V_{CC}=+3.3V, ASIC V_{CC}=+5V

Note 5-2:Default is composite sync mode , if you uses separate mode , please contact PVI.

5.2)Display Mode

| Display Mode | Display (Input Signal of 4:3 Aspect Ratio) | NO:11 | NO:12 | NO:13 | Note |
|---------------|---|--------|--------|--------|---|
| | | Mode 1 | Mode 2 | Mode 3 | |
| Full |  | Low | Low | Low | Input Video Signals Are Displayed In Full Screen. |
| Normal Center |  | High | Low | Low | Input Video Signals Are Displayed In The Center Screen.(4:3 Aspect Ratio) |
| Zoom 1 |  | High | High | Low | Input Video Signal Of Central 176 Lines Are Display In Full Screen.(Vertically Extension) |
| Wide |  | Low | High | Low | Input Video Signals Are Displayed In Full Screen. (Horizontal Modification) |
| Normal Left |  | High | Low | High | Input Video Signals Are Display In the Left Screen. (4:3 Aspect Ratio) m |
| Normal Right |  | Low | High | High | Input Video Signals Are Display In the Right Screen. (4:3 Aspect Ratio) |
| Zoom 2 |  | Low | Low | High | Input Video Signal Of Central 204 Lines Are Display In Full Screen.(Vertically Extension) |
| Zoom 3 |  | High | High | High | Same As Zoom 2 Mode Vertically Offset Centered |

6 Absolute Maximum Ratings:

The followings are maximum values , which if exceeded, may cause faulty operation or damage to the unit.

| Parameter | Symbol | MIN. | MAX. | Unit | Remark | |
|----------------------------------|--|-------------------|------|------|--------|--|
| Supply Voltage For Source Driver | V _{DD} | -0.5 | 7 | V | | |
| Supply Voltage For Gate Driver | H Level | V _{GON} | 0 | 40 | V | |
| | L Level | V _{GOFF} | -20 | 0 | V | |
| Analog Input Voltage | V _R ,V _G ,V _B | -0.3 | 7.0 | V | | |
| Digital Input Signals | | -0.5 | 5.5 | V | | |
| Digital Output Signals | | -0.5 | 5.5 | V | | |
| Storage Temperature | | -30 | +80 | °C | | |
| Operation Temperature | | -20 | +70 | °C | | |

7 Electrical Characteristics
7-1)Driving for TFT-LCD panel

| | | Symbol | MIN. | Typ | MAX | Unit | Remark |
|----------------------------------|-----------|-------------------|------|-----|-----|------|--------|
| Supply Voltage For Source Driver | Analog | V _{DD} | 4.5 | 5.0 | 5.5 | V | |
| | Logic | V _{CC} | 3.0 | 3.3 | 3.6 | V | |
| Supply Voltage For Gate Driver | H level | V _{GON} | +15 | +17 | +19 | V | |
| | L level | V _{GOFF} | -14 | -12 | -10 | V | |
| Supply Voltage For controller | | V _{DD} | 4.5 | 5.0 | 5.5 | V | |
| Analog input voltage | Amplitude | | | | | | |
| | AC com | | | | | | |
| Digital input voltage | H level | V _{IN} | +2.4 | - | 5 | V | |
| | L level | V _{IL} | -0.3 | - | 0.5 | V | |
| Digital output voltage | H level | V _{OH} | +2.4 | | 5 | V | |
| | L level | V _{OL} | 0 | | 0.5 | V | |

7-2) Backlight driving & Power Consumption

| Pin No | Symbol | Description | Remark |
|--------|--------|-----------------------------------|----------|
| 1 | VL1 | Input terminal (Hi voltage side) | |
| 2 | VL2 | Input terminal (Low voltage side) | Note 7-1 |

Note 7-1 : Low voltage side of backlight inverter connects with Ground of inverter circuits.

Driving for backlight

 $T_a = 25$

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|------------------------|--------|------|------|------|------|-----------|
| Lamp voltage | V_L | 480 | 520 | 560 | Vrms | $I_L=6mA$ |
| Lamp current | I_L | 4 | 6 | 8 | mA | |
| Lamp frequency | P_L | 20 | | 60 | KHz | Note 7-2 |
| Kick-off voltage | V_s | | | 1500 | Vrms | |
| Kick-off voltage(-20) | V_s | | | TBD | Vrms | |

Note 7-2 : The wave form of lamp driving voltage should be as closed to a perfect SIN wave as possible.

Power Consumption

 $T_a = 25$

| Parameter | Symbol | Conditions | TYP. | MAX | Unit | Remark |
|----------------------------------|--------|------------|------|-----|------|----------|
| LCD Panel Power Consumption | | | TBD | | W | Note 7-3 |
| Backlight Lamp Power Consumption | | | 4.2 | | 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 $I_L \times V_L$.

7-4) Input / Output Connector

A) LCD Module Connector

The interface connector is 6210-30p Series manufactured by Elco or equivalent (0.5mm pitch 30pin)

B) Backlight Connector, JST BHR-03VS-1. Pin No. : 3, Pitch : 4 mm

7-5) Pixel Arrangement and Output Interface Pin

| | 1 | 2 | 3 | 4 | 5 | 6 | | 1438 | 1439 | 1440 |
|-----|---|---|---|---|---|---|--|------|------|------|
| 1 | R | G | B | R | G | B | | R | G | B |
| 2 | R | G | B | R | G | B | | R | G | B |
| 3 | R | G | B | R | G | B | | R | G | B |
| | | | | | | | | | | |
| 233 | R | G | B | R | G | B | | R | G | B |
| 234 | R | G | B | R | G | B | | R | G | B |

7-6)Signal Timing Waveforms
Timing Specification
[Horizontal]

| Parameter | Symbol | Condition | NTSC | PAL | Unit | Notes |
|---------------------------|--------|-----------|-------|-------|------|---------|
| Horizontal Start Position | HPOS | - | 11.35 | 11.54 | usec | Note7-5 |
| Horizontal Display Area | HDIS | - | 50.01 | 50.36 | usec | |

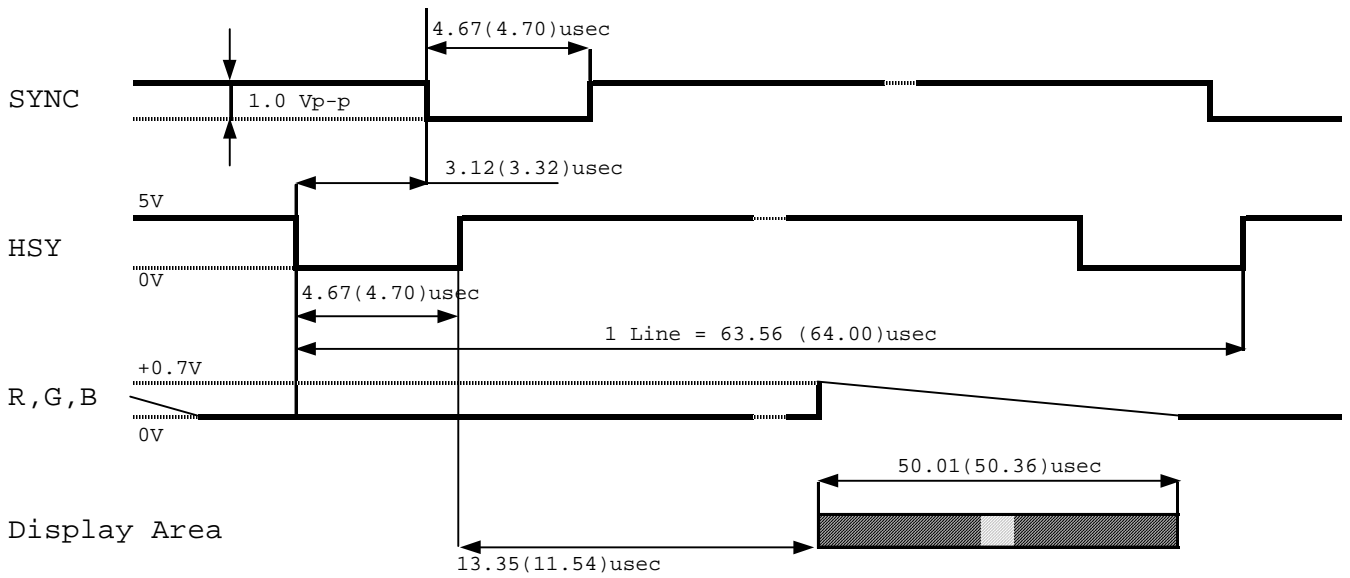
Notes :7-5

1. Sampling start based on the composite sync falling edge.
2. This value is default , if you want to charge ,please contact PVI.

[Vertical]

| Parameter | Symbol | Condition | | Display Mode | | | | | Unit | Notes |
|---------------------------|--------|-----------|----------|--------------|-----------|-----------|-----------|-----------|------|----------|
| | | | | Full Normal | Wide | Zoom 1 | Zoom 2 | Zoom 3 | | |
| Vertical Start Position | VPOS | NTSC | ODD EVEN | 20 286 | 20 286 | 52 315 | 38 301 | 53 315 | Line | Note 7-6 |
| | | PAL | ODD EVEN | 26 339 | 26 363 | 62 375 | 50 363 | 62 375 | Line | Note 7-6 |
| Vertical Display Position | VDIS | NTSC | | 234 | 234 | 176 | 204 | 204 | Line | |
| | | PAL | | 281 | 281 | 210 | 234 | 234 | Line | |

Notes :7-6 Sampling start line number base on the vertical sync pulse (SYNC).



Note: 7-7 Values in brackets correspond to PAL mode ($f_H=15.734(15.625)$ KHz).

7-7) Display Time Range

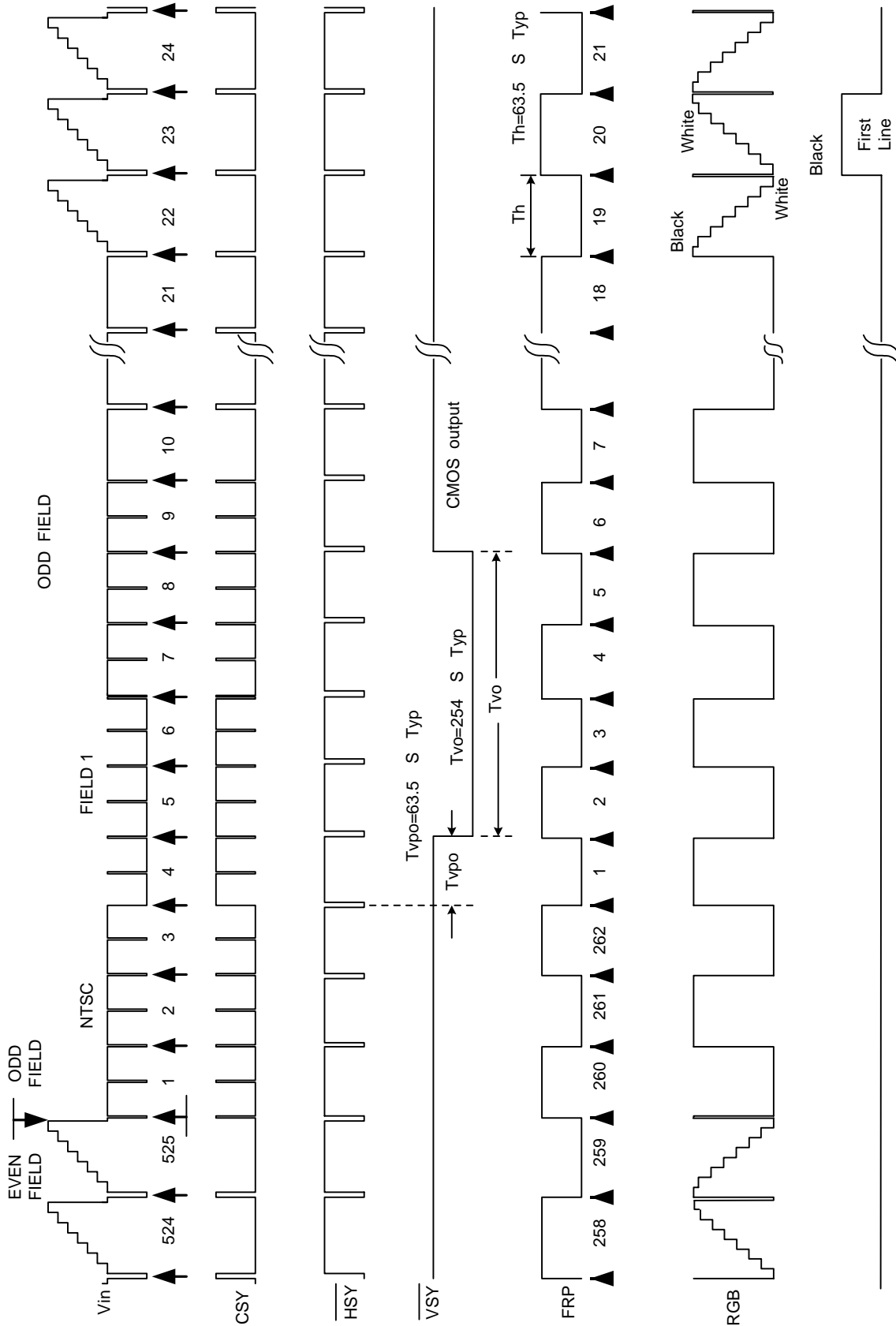
A) When sync. signal of NTSC system is applied.

- a) Horizontally
11.35 ~ 63.4 μ s.
- b) Vertical
20 ~ 253 H

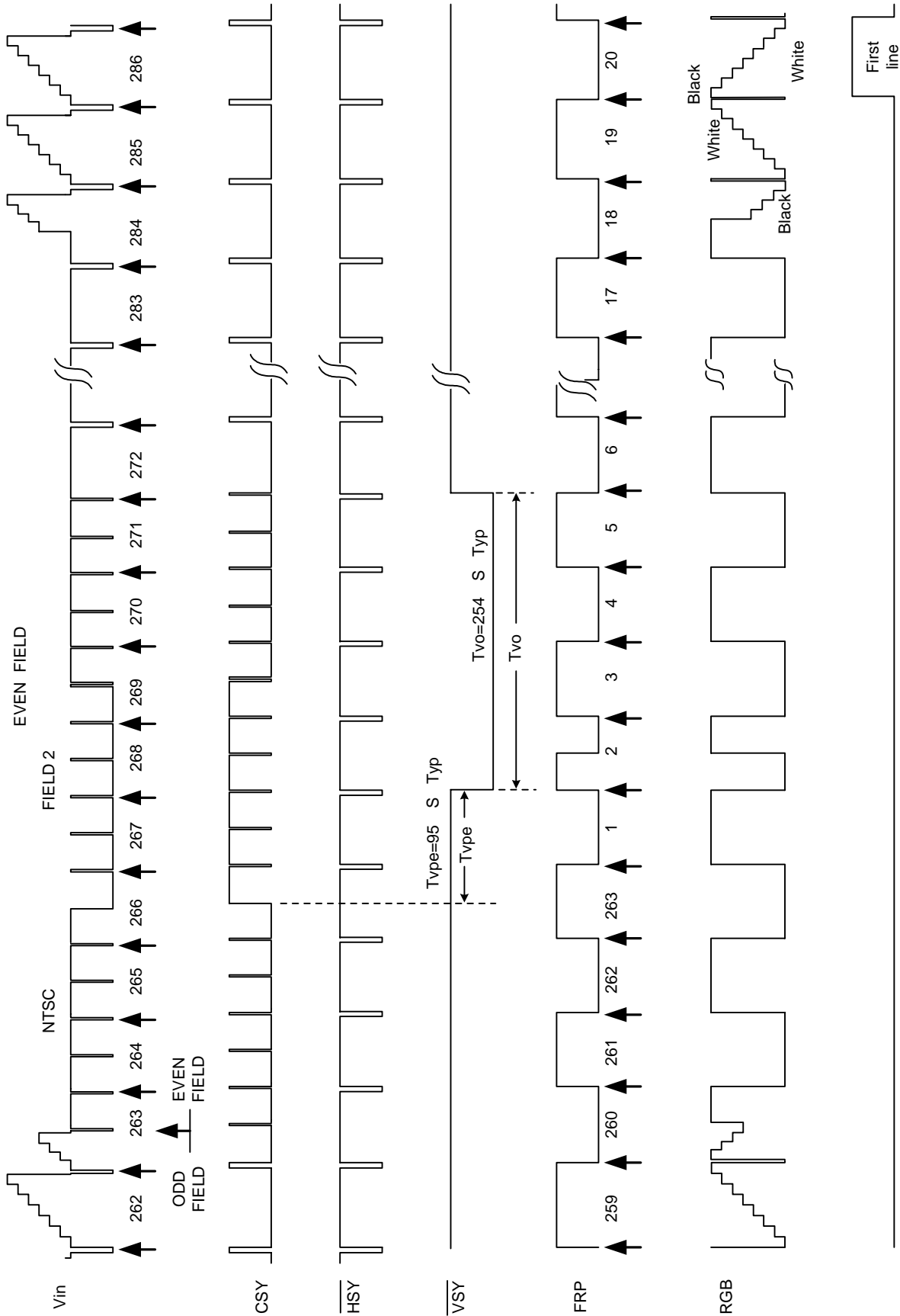
B) When sync. signal of PAL system is applied.

- a) Horizontally
11.54.0 ~ 64 μ s .
- b) Vertical
26 ~ 298 H

C) NTSC System Timing Reference

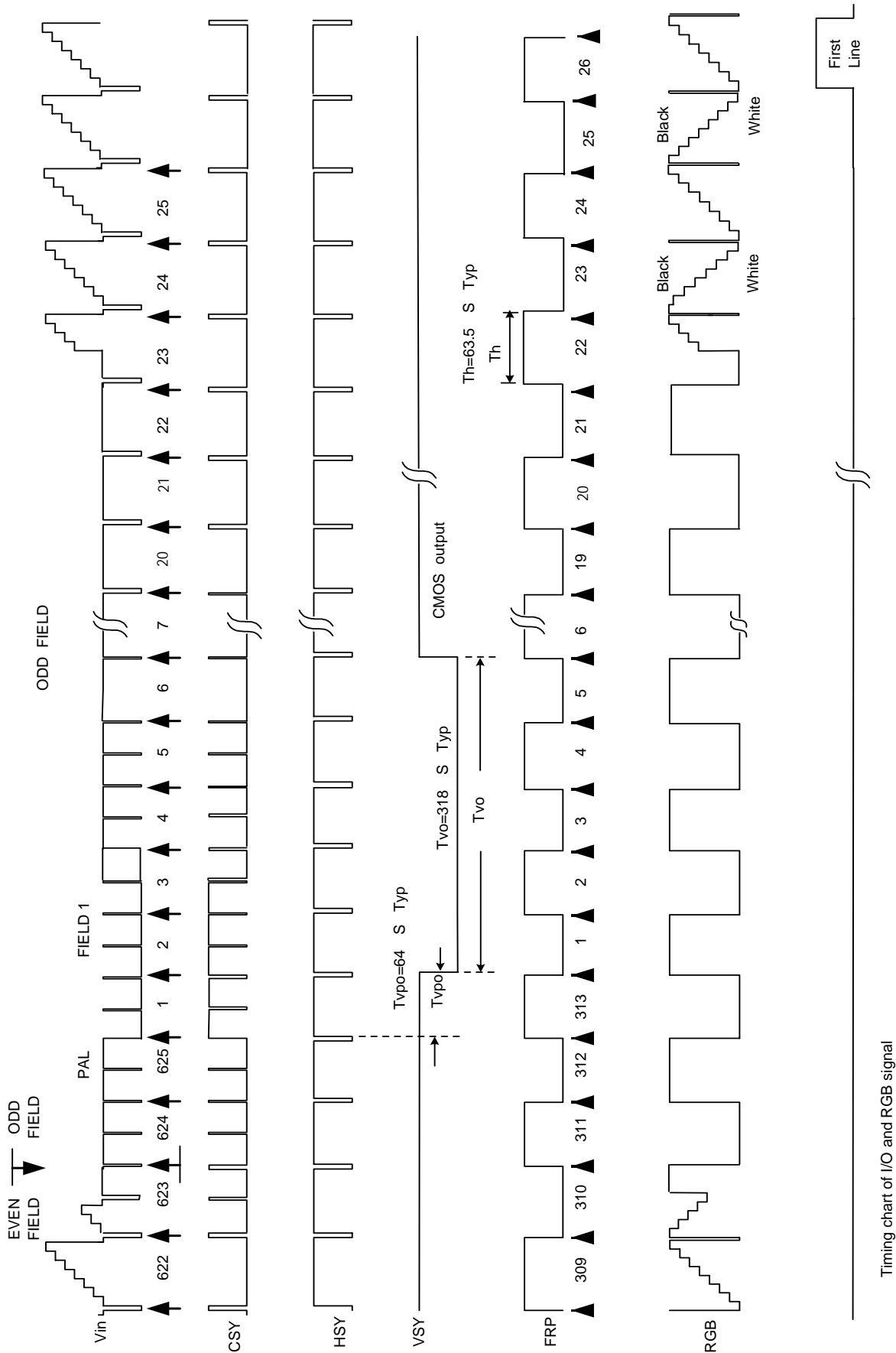


Timing chart of I/O and RGB signal

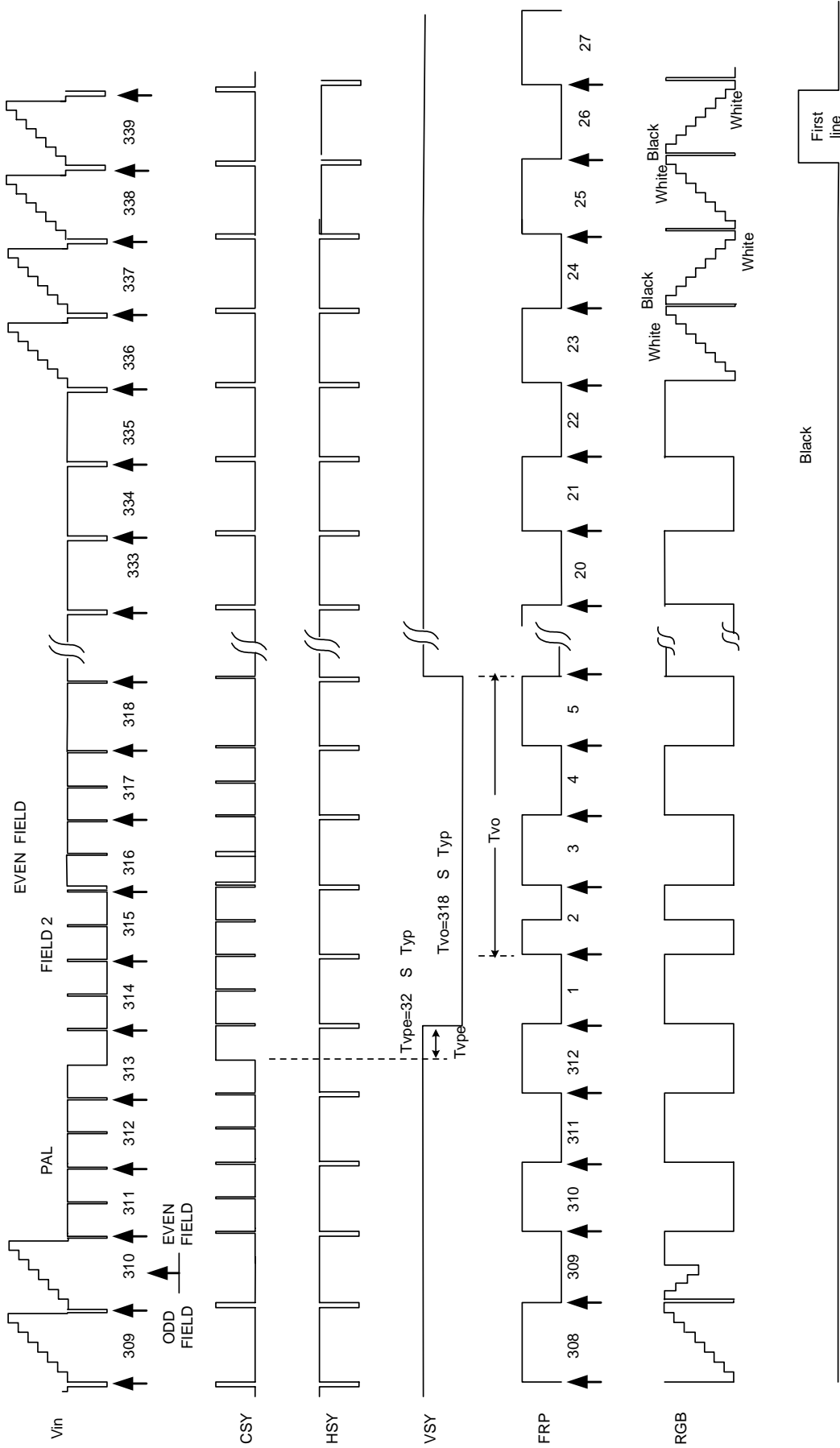


Timing chart of I/O and RGB signal

D) PAL System Timing Reference

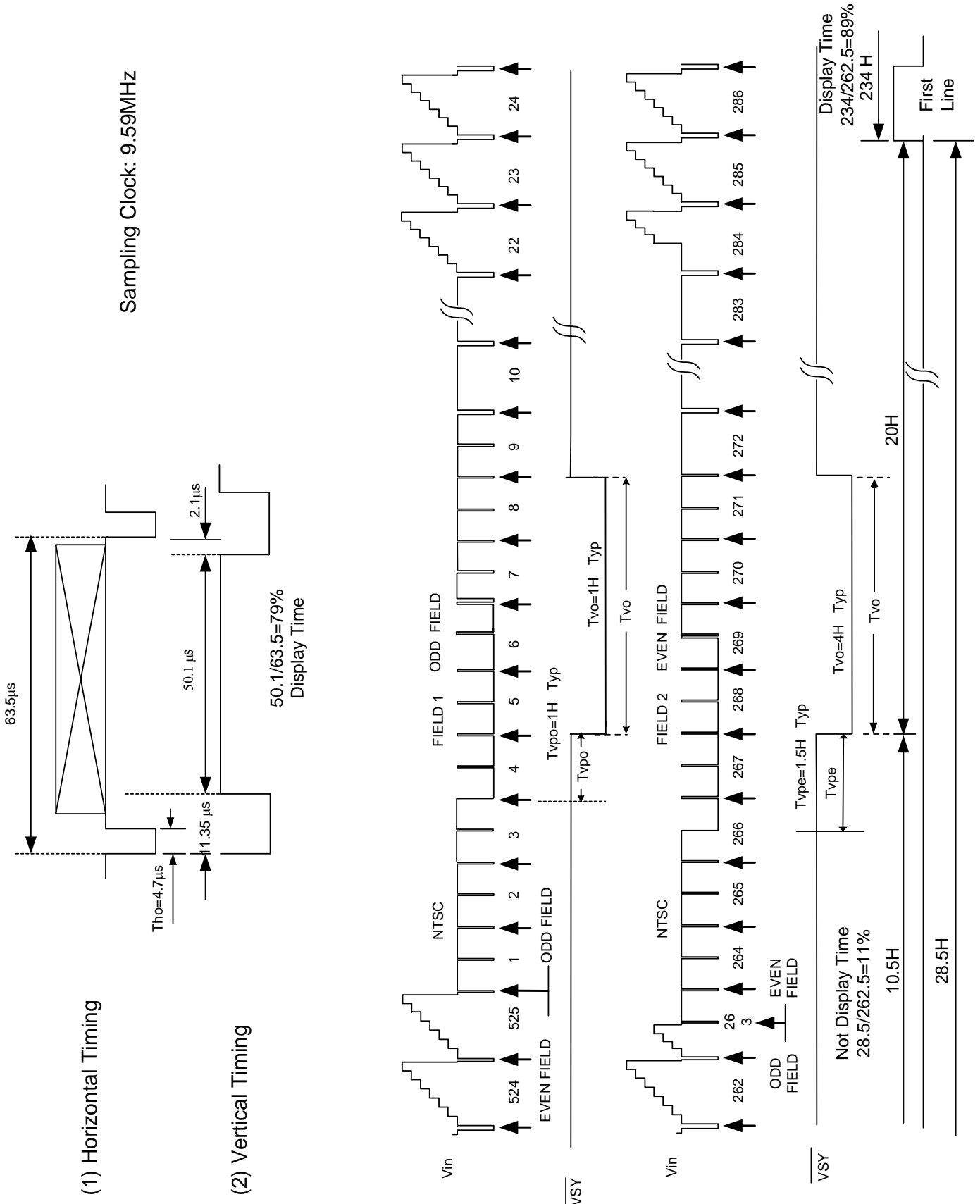


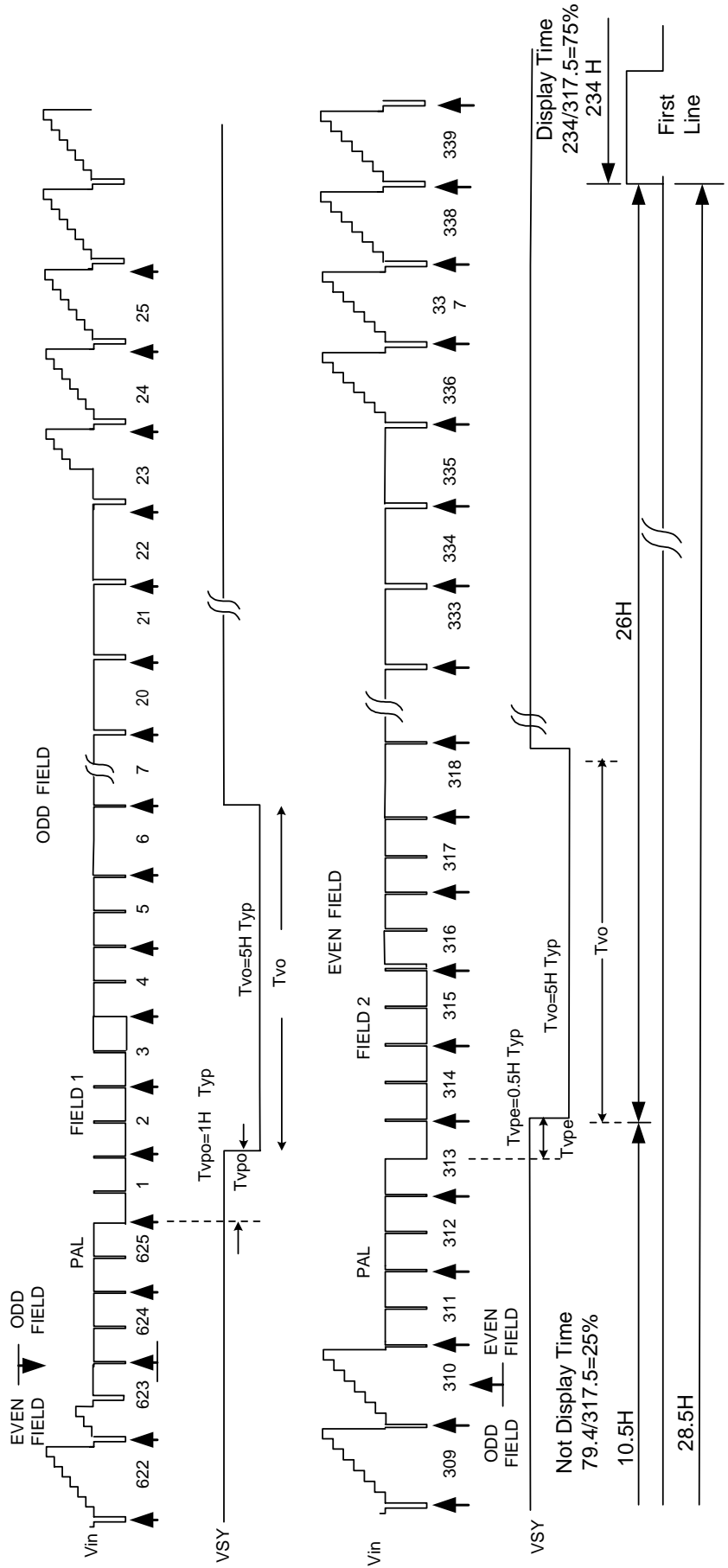
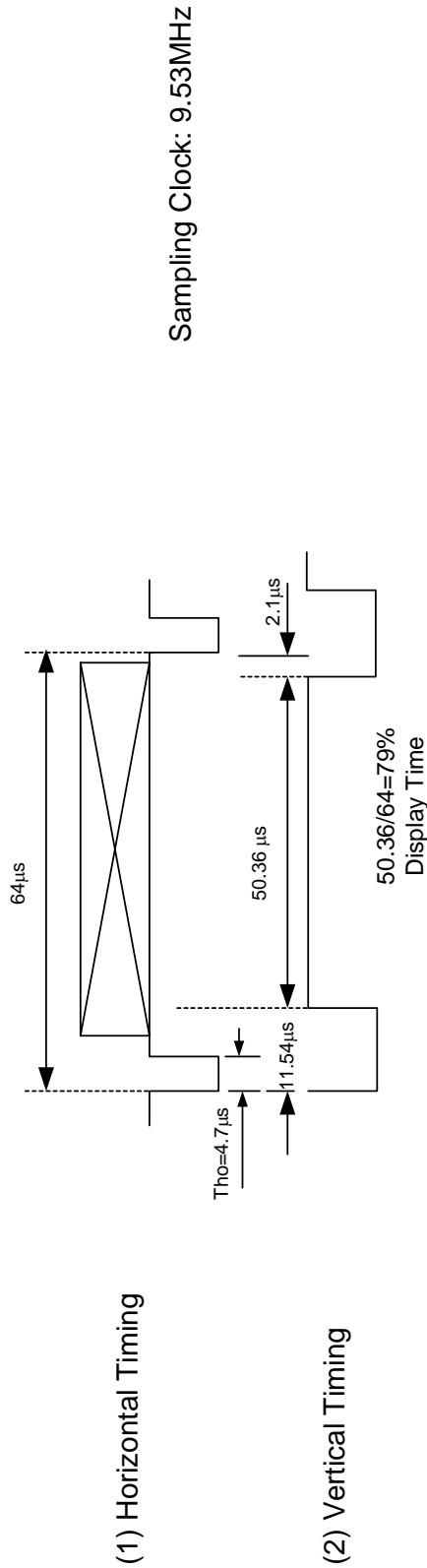
Timing chart of I/O and RGB signal



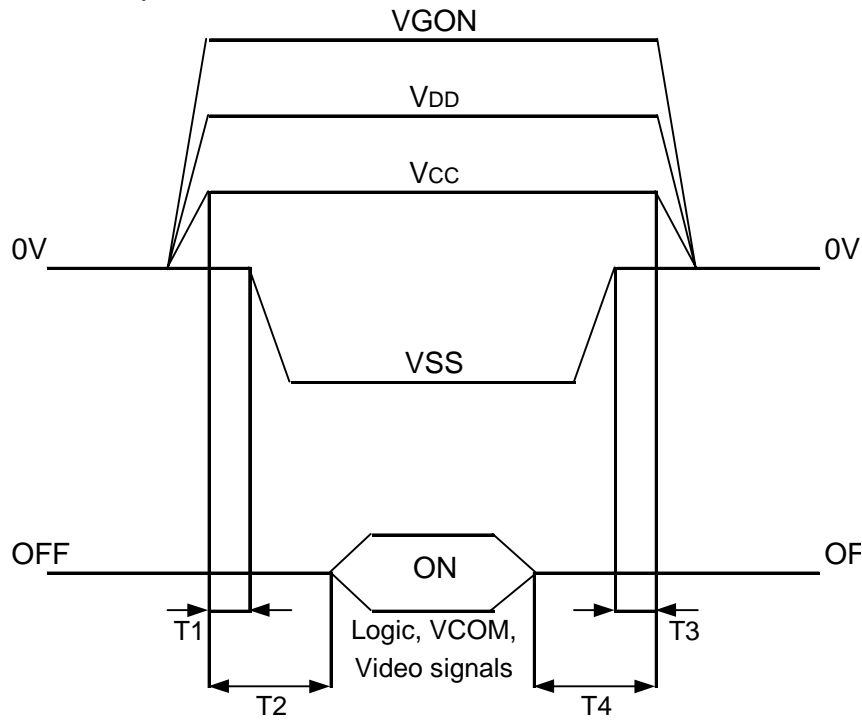
Timing chart of I/O and RGB signal

E) Display Timing (NTSC&PAL)





8.Power Sequence



- 1) $10 \text{ msec} \leq T1 < T2, 0 < T3 < T4 \leq 10 \text{ msec}$
- 2) Vcc, VDD, VGON

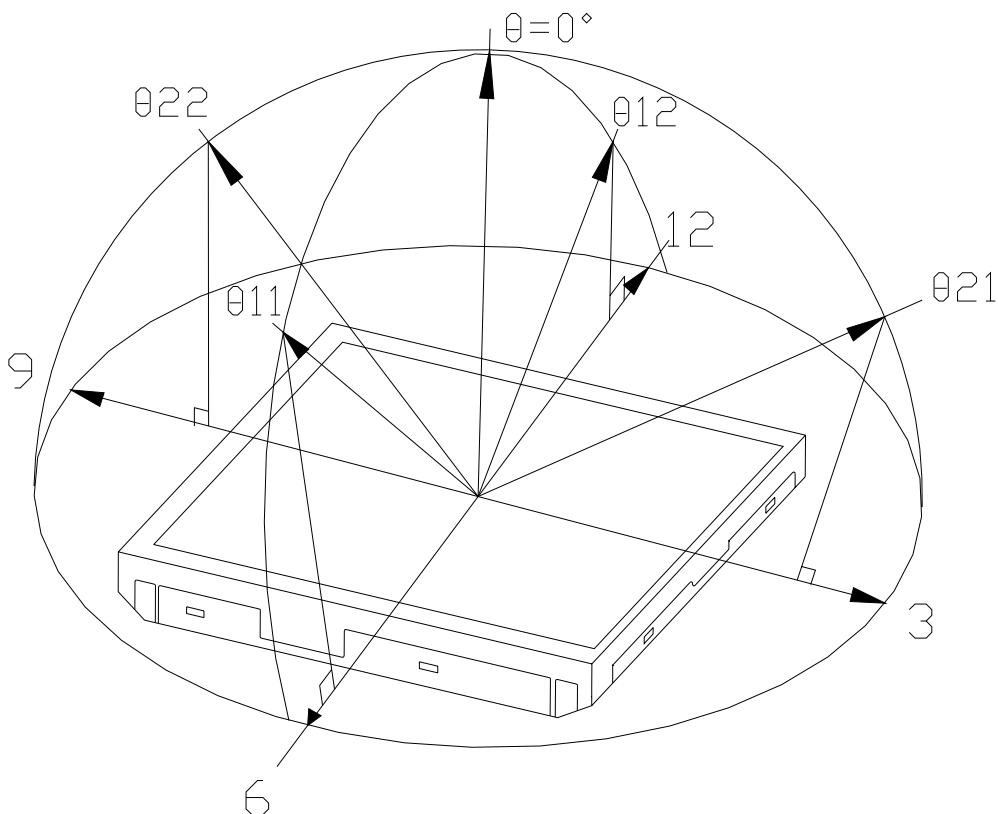
9. Optical Characteristics

9-1) Specification:

Ta = 25

| Parameter | | Symbol | Condition | MIN. | TYP. | MAX. | Unit | Remarks |
|--------------------|------------|----------------------------|--------------------|--------|------|------|-------------------|----------|
| Viewing Angle | Horizontal | θ_{21}, θ_{22} | $CR \geq 10$ | 45 | 55 | | deg | Note 9-1 |
| | Vertical | θ_{12} | | 10 | 15 | | deg | Note 9-1 |
| | | θ_{11} | | 30 | 35 | | deg | Note 9-1 |
| Contrast Ratio | | CR | | 80 | 150 | | | Note 9-2 |
| Response time | Rise | Tr | $\theta = 0^\circ$ | | | 30 | ms | Note 9-4 |
| | Fall | Tf | | | | 50 | ms | |
| Brightness | | | | 300 | 350 | | cd/m ² | Note 9-3 |
| White Chromaticity | | x | | | | | | Note 9-3 |
| | | y | | | | | | |
| Lamp Life Time | | | | 10,000 | | | hr | |

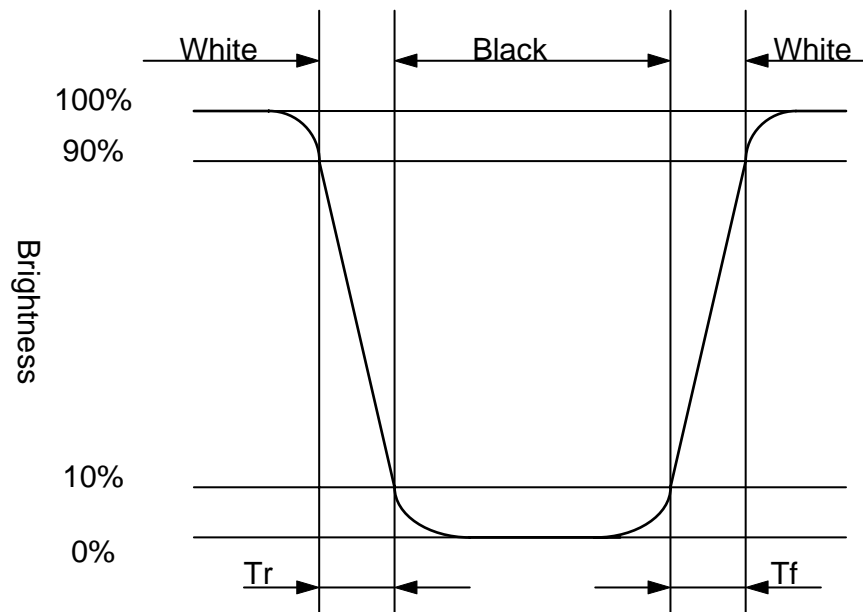
Note 9-1: The definitions of viewing angles



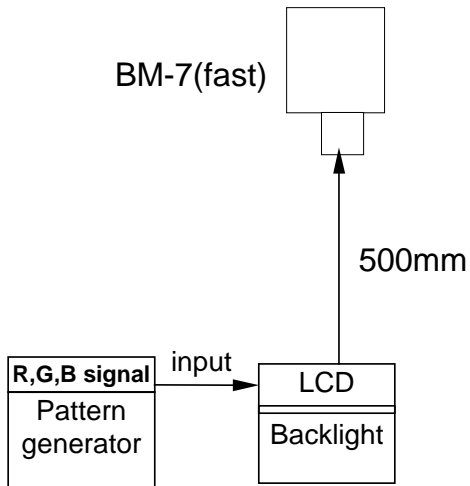
Note 9-2 : $CR = \frac{\text{Luminance when Testing point is White}}{\text{Luminance when Testing point is Black}}$
 (Testing configuration see 8-2)
 Contrast Ratio is measured in optimum common electrode voltage.

Note 9-3 : Topcon BM-7(fast) luminance meter 2°field of view is used in the testing (after 20~30 minutes operation).
 Lamp Current 6mA

Note 9-4: The definition of response time:

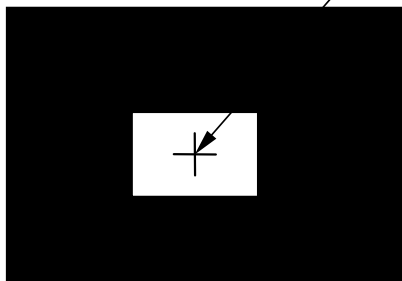


9-2) Testing configuration

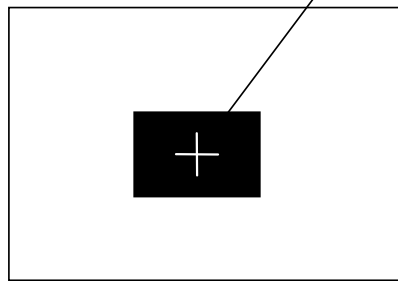


Caution: 1. Environmental illumination 1 lux
 2. Before test CR, Vcom voltage must be adjusted carefully to get the best CR.

- LCD Display Testing Point Testing Point

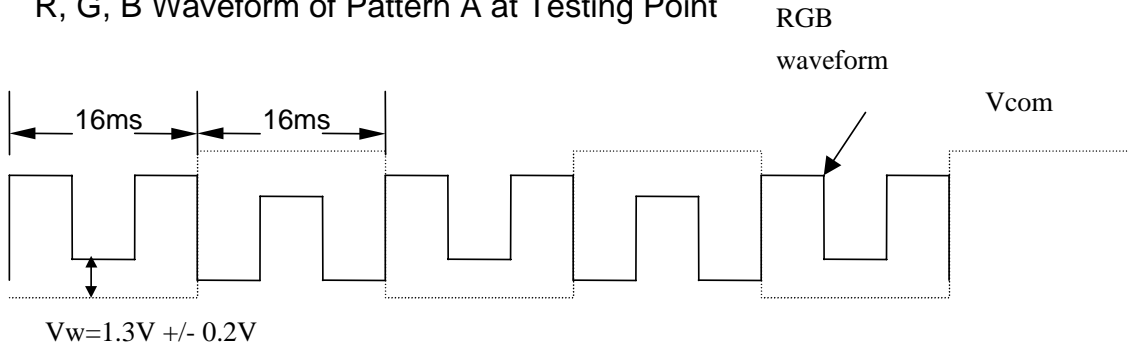


Pattern A

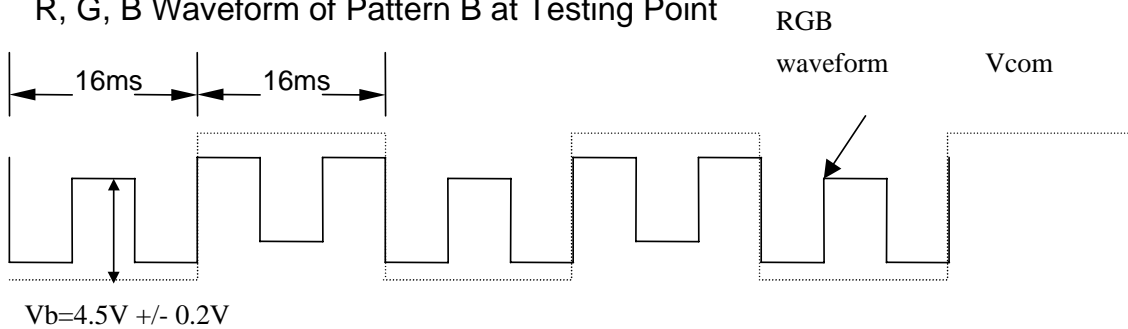


Pattern B

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



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



10. Reliability Test

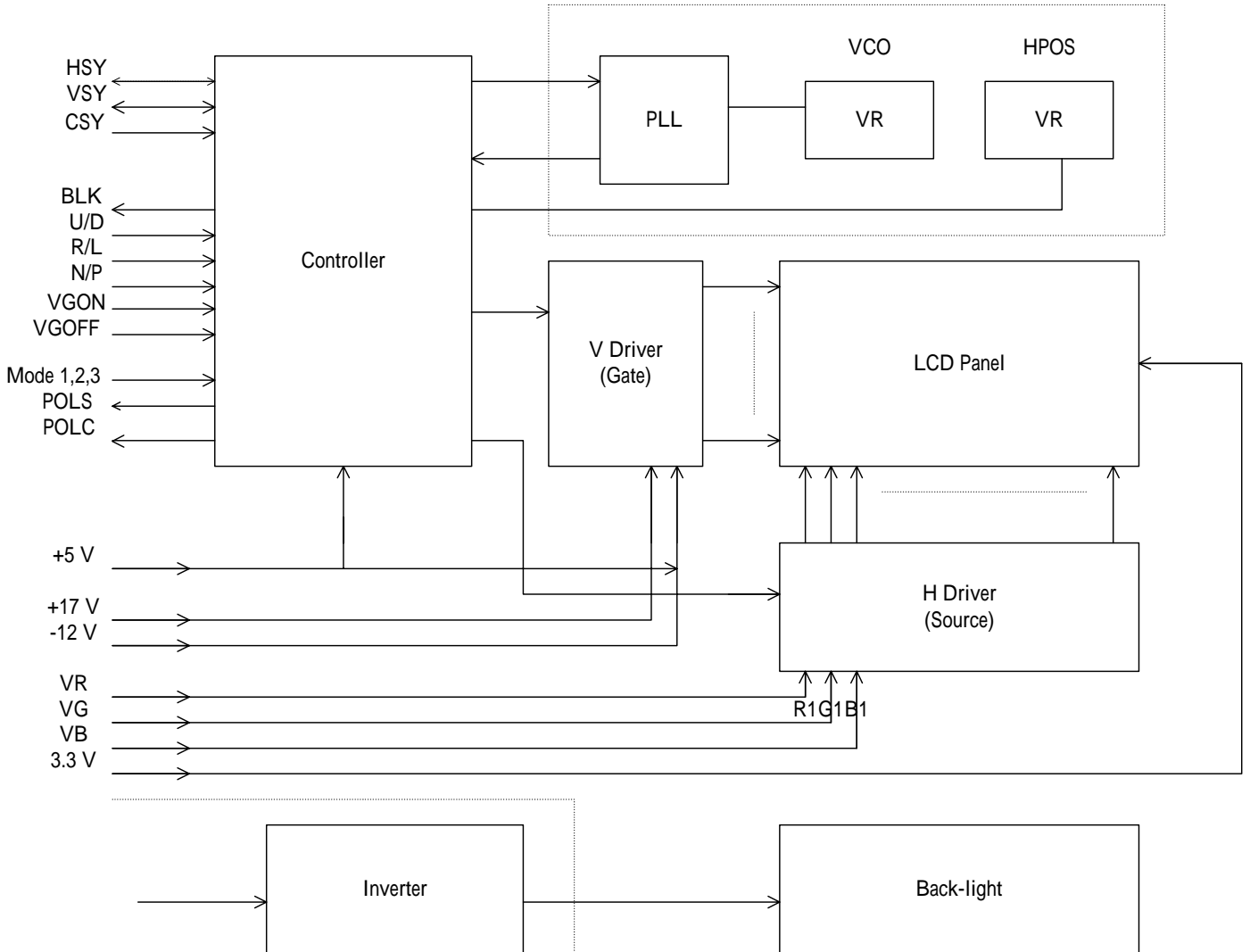
| No | Test Item | Test Condition |
|----|---|--|
| 1 | High Temperature Storage Test | Ta = +80 , 240 hrs |
| 2 | Low Temperature Storage Test | Ta = -30 , 240 hrs |
| 3 | High Temperature Operation Test | Ta = +70 , 240 hrs |
| 4 | Low Temperature Operation Test | Ta = -20 , 240 hrs |
| 5 | High Temperature & High Humidity Operation Test | Ta = +60 , 95%RH, 240 hrs |
| 6 | Thermal Cycling Test (non-operating) | -25 +25 +70 , 200 Cycles 30 min 5min 30 min |
| 7 | Vibration Test (non-operating) | Frequency : 10 ~ 55 Hz Amplitude : 1.0 mm Sweep time: 11 mins Test Period: 6 Cycles for each direction of X, Y, Z |
| 8 | Shock Test (non-operating) | 100G, 6ms Direction: ±X, ±Y, ±Z Cycle: 3 times |
| 9 | Electrostatic Discharge Test | 150pF, 330 Air: ±15KV; Contact: ±8KV 10 times/point, 9 points/panel face |

Ta: ambient temperature

[Criteria]

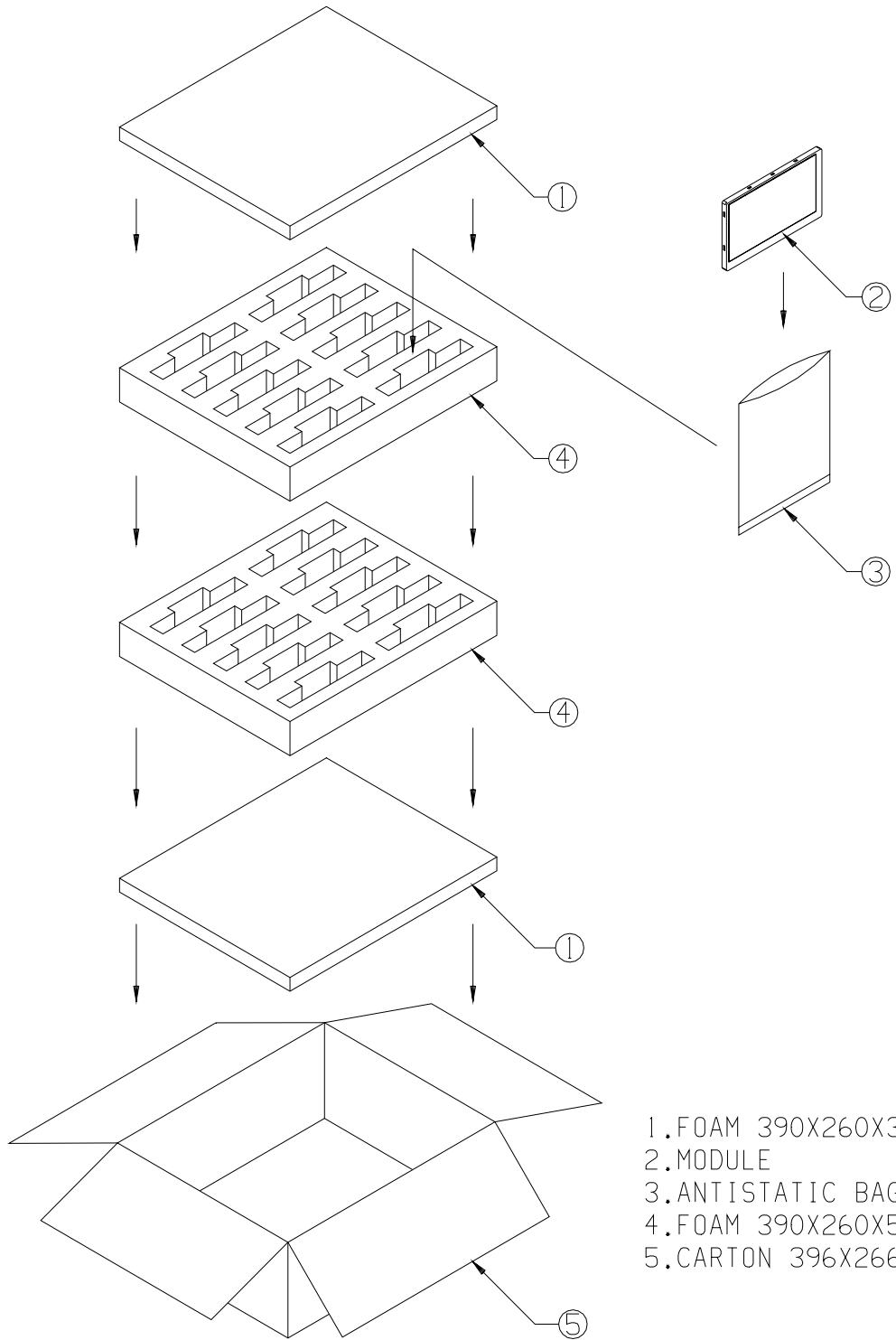
Under the display quality test conditions with normal operation state, there should be no change which may affect practical display function.

11. Block Diagram



12. Packing

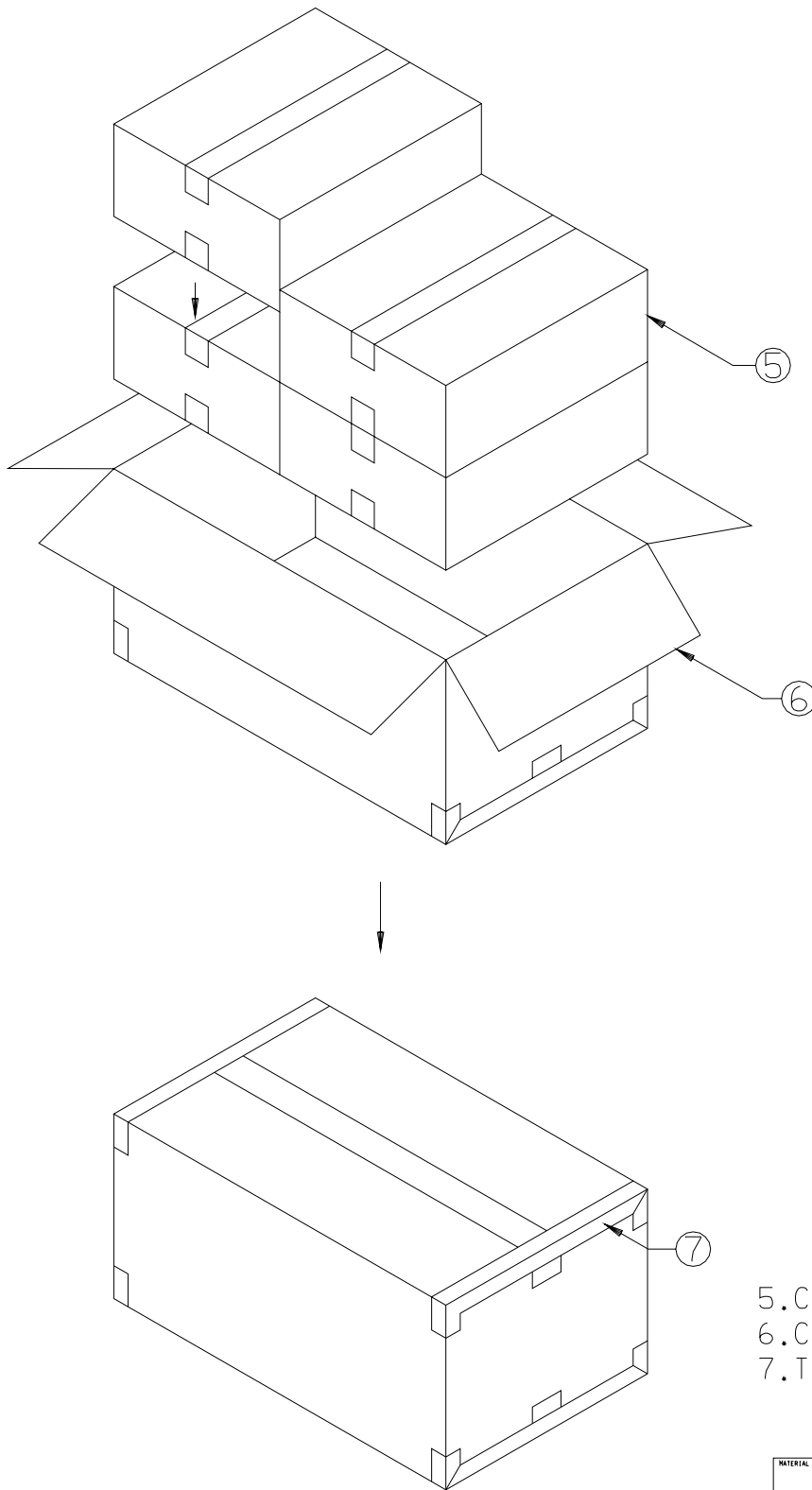
| REV. | ECN NO. | DESCRIPTION | DESIGN | CHECK | APPROVE | DATE |
|------|---------|-----------------|--------|-------|---------|-----------|
| | | INITIAL RELEASE | | | | 2006/1/24 |



- 1.FOAM 390X260X30
- 2.MODULE
- 3.ANTISTATIC BAG 180X200
- 4.FOAM 390X260X55
- 5.CARTON 396X266X188

| MATERIAL | HEAT & SURFACE TREATMENT | Prime View International Co.,Ltd. | | | |
|----------|--------------------------|-----------------------------------|-------------------|-----------|------------|
| APPROVE | SCALE 1/1 | UNIT mm | PROJECTION METHOD | DWG. NAME | PACKING_71 |
| CHECK | ORIGINAL NAME | | | DWG. NO. | REV. SHEET |
| DESIGN | | | | | 1/1 |

| REV. | ECN NO. | DESCRIPTION | DESIGN | CHECK | APPROVE | DATE |
|------|---------|-----------------|--------|-------|---------|-----------|
| | | INITIAL RELEASE | | | | 2000.4.24 |



- 5. CARTON 396X266X188
- 6. CARTON 558X418X415
- 7. TAPE

| | | | | | | | |
|----------|--|--------------------------|------|------------------------------------|-----------|-------------|------------|
| MATERIAL | | HEAT & SURFACE TREATMENT | | Prime View International Co., Ltd. | | | |
| APPROVE | | SCALE | UNIT | PROJECTION METHOD | ENG. NAME | PACKING. 7" | |
| CHECK | | 1/1 | ** | | | ENG. NO. | REV. SHEET |
| DESIGN | | ORIGINAL NAME | | | | | 2/2 |

Revision History

| Rev. | Issued Date | Revised Contents |
|------|--------------|------------------|
| 0 | FEB. 02,2000 | NEW |