HITACHI

Displays, Hitachi, Ltd.

Date; Feb. 14, 2002

# TECHNICAL DATA

## TX38D95VC1CAH

CONTENTS

# RECORD OF REVISION

| Date | Old Sheet No.<br>New Sheet No. | Summary |
|---|---|---|
| | | |

# S C O P E

This specification is applied to the following TFT Liquid Crystal Display Module with Back-light unit.

Note : Inverter device for Back-light is not built in and so it needs to be prepared on yourside.

| | |
|---|---|
| ・Type name | : TX38D95VC1CAH |
| ・Display Area | : H304.5×V228.375 [mm] |
| ・Display Dots (Display Pixels) | : H(1400×3)×V1050 [dots] (H1400×V1050 pixels) |
| ・Voltage of $V_{DD}$ | : 3.3V |
| ・Pixel Pitch | : H0.2175×V0.2175 |
| ・Color Pixel Arrangement | : R･G･B Vertical Stripe |
| ・Display Mode | : Transmissive & Normally White Mode |
| ・Color Number | : 262k Colors |
| ・Direction with Wider Viewing Angle | : Lower side of 6 o'clock (Azomuth $\phi$=270° ) |
| ・Dimensions Outlines | : 315(W)×240(H)×6.8MAX(T) [mm] |
| ・Weight | : Approximately 660 [g] |
| ・Interface | : 2ch-LVDS |
| ・Surface Polarizing Film | : Polarizing Film with Antiglare Coating |
| ・Back-light | : One Cold Cathode Florescent Lamp (Lower side) Back-light inverter is not contained in Module. |

# 1. ABSOLUTE MAXIMUM RATINGS

## 1.1 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

| ITEM | OPERATING | | STORAGE | | UNIT | NOTE |
|---|---|---|---|---|---|---|
| | MIN. | MAX. | MIN. | MAX. | | |
| Ambient Temperature | 10 | 40 | −20 | 60 | ℃ | 1) |
| Humidity | 2) | | 2) | | %RH | 1) |
| Vibration | − | 4.9 (0.5G) | − | 19.6 (2G) | $m/s^2$ | 3) ,5) |
| Shock | − | 29.4(3G) | − | 490 (50G) | $m/s^2$ | 4) ,5) |
| Corrosive Gas | NOT ACCEPTABLE | | NOT ACCEPTABLE | | − | |
| Illuminance at LCD surface | − | 50,000 | − | 50,000 | lx | |

Note 1) Environmental temperature and humidity of this unit, not of system installed with this unit.
At low temperature the brightness of CFL drop and the life time of CFL become to be short.
2) Ambient temp. Ta≦40℃ : 85%RH MAX. without condensation
Ta＞40℃ : Absolute humidity must be lower than the saturated vapor of 85%RH at 40℃. without condensation
3) Vibration frequency : 20～50Hz. (Except resonance frequency)
4) 7ms of pulse width.
5) With mounting protective spacer(ref.page 4-2/2)

## 1.2 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

(1) TFT LIQUID CRYSTAL DISPLAY MODULE Vss=0V

| ITEM | SYMBOL | MIN. | MAX. | UNIT | NOTE |
|---|---|---|---|---|---|
| Power Supply Voltage | VDD | 0 | 4.0 | V | |
| Electrostatic Durability | VESD0 | ±100 | | V | 1), 2) |
| | VESD1 | ± 8 | | kV | 1), 3) |

Note 1) Discharge circuit : 200pF-250Ω, Surrounding : 25℃-70%RH.
2) The specification is applicable to I/F Connector pins.
3) The specification is applicable to metal bezel and LCD glass.

(2) BACK-LIGHT UNIT GND=0V

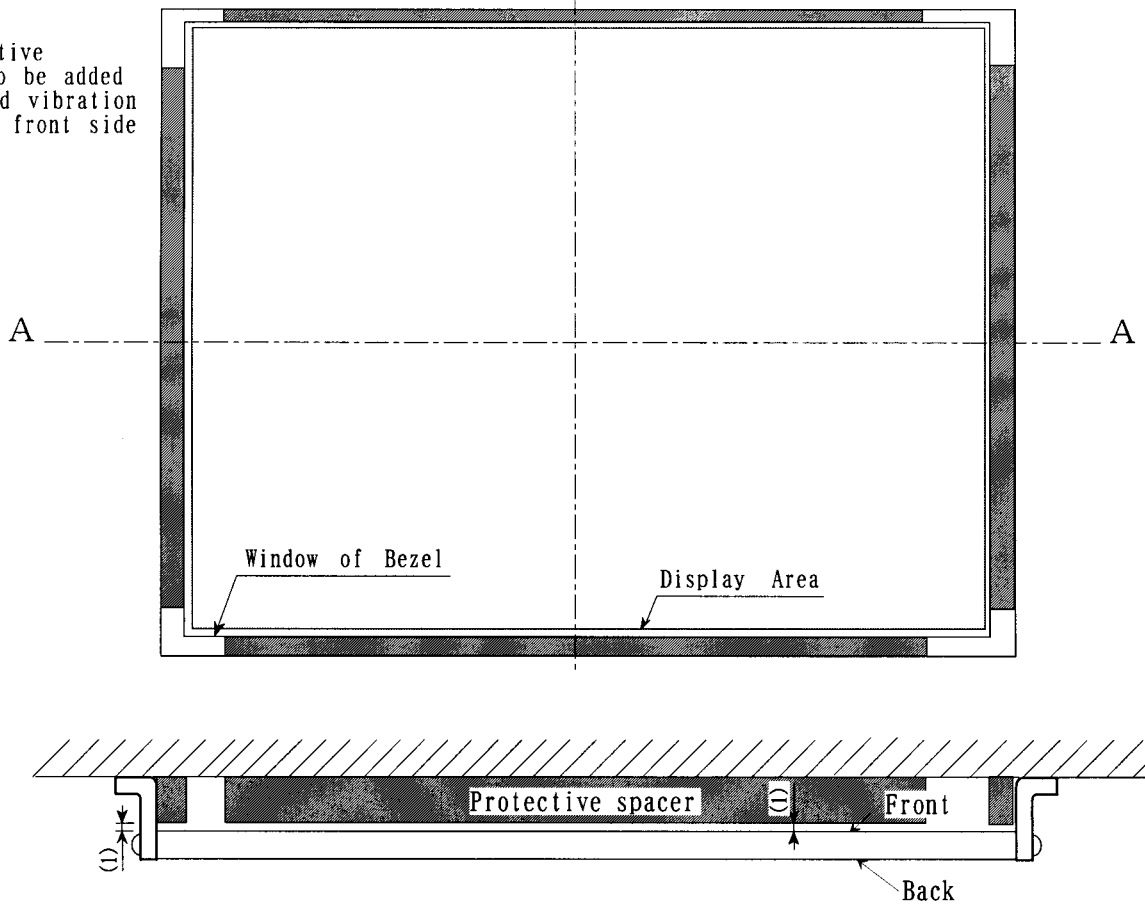
| ITEM | SYMBOL | MIN. | MAX. | UNIT | NOTE |
|---|---|---|---|---|---|
| Lamp Current | IL | 0 | 7.0 | mArms | 1) |
| Lamp Voltage | VL | 0 | 2000 | Vrms | |

Note 1) At Lamp start-up time.

Adding protective spacer at shock & vibration test

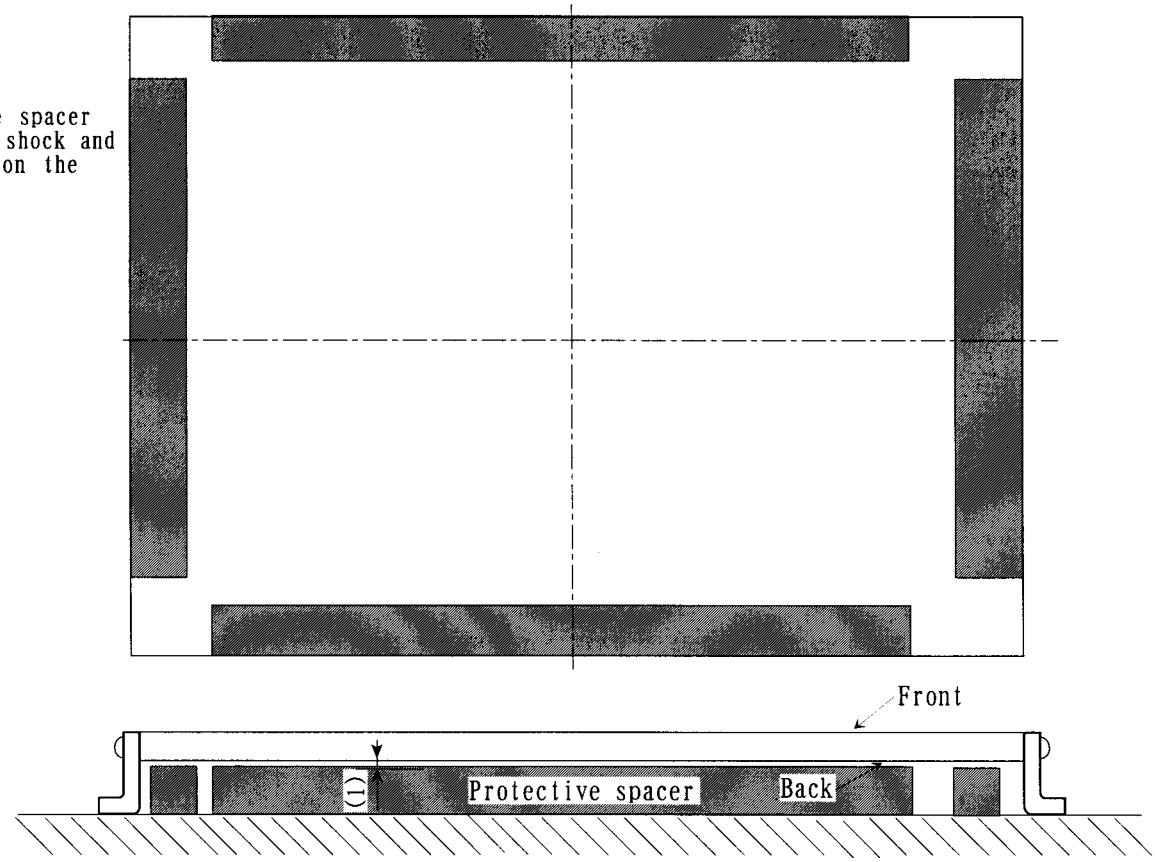
Shaded area is to be supported with additional spacer.

(1) This protective spacer is to be added at shock and vibration test on the front side




Shaded area is to be supported with additional spacer.

(2) This protective spacer is to be added shock and vibration test on the back side




| | | | | | | |
|---|---|---|---|---|---|---|
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## 2. OPTICAL CHARACTERISTICS

The following items are measured on the conditions that this unit operation (TFT panel and Back-light) and measuring systems are stable.

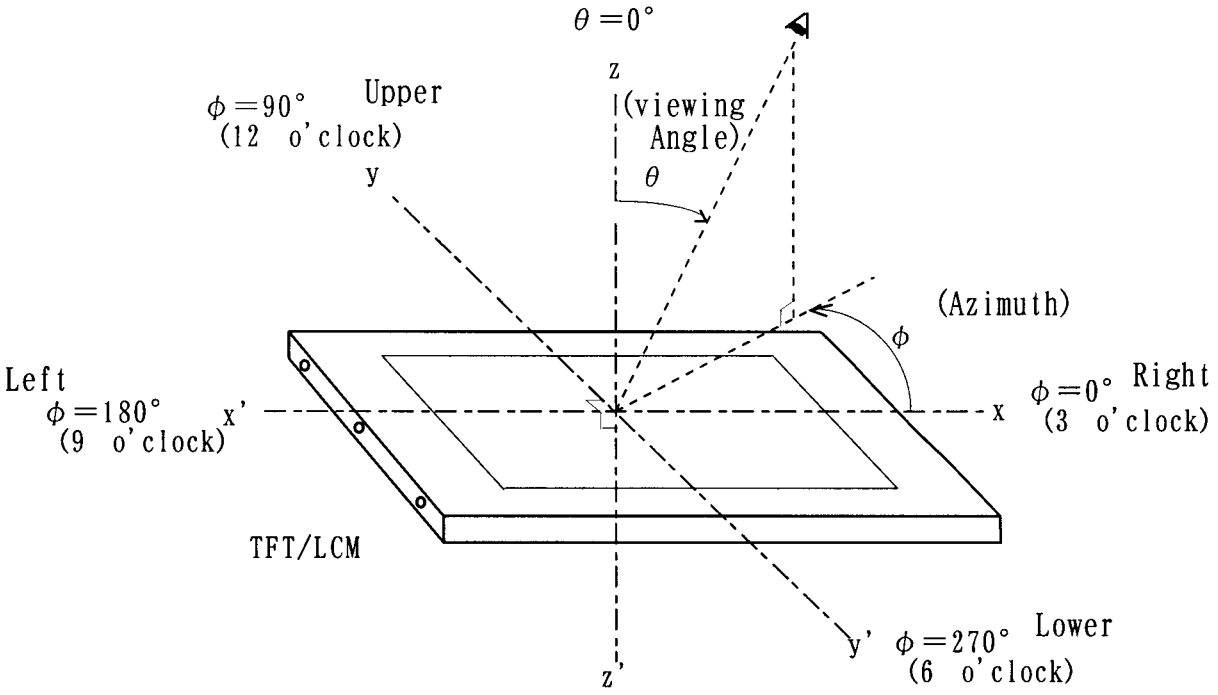
The ambient light excluding The Back-light unit is nothing.

- Measuring equipment : TOPCON BM-7, Prichard 1980B, or equivalent
- Measuring point : Active area center

Temperature of LCD=25℃, $V_{DD}$=3.3V, fv=60Hz, $I_L$=6mA,
Back-Light operation Frequency=50kHz

| ITEM | | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT | NOTE |
|---|---|---|---|---|---|---|---|---|
| Contrast Ratio | | CR | | 100 | — | — | — | 2) |
| Response Time | RISE | tr | | — | 37 | — | ms | 3) |
| | FALL | tf | | — | 20 | — | | |
| Brightness(White) | | Bwh | | 100 | 150 | — | cd/m² | |
| Color of CIE | Red | x | θ=0° Note 1) | 0.55 | 0.58 | 0.61 | — | |
| | | y | | 0.30 | 0.33 | 0.36 | | |
| | Green | x | | 0.27 | 0.30 | 0.33 | | |
| | | y | | 0.54 | 0.57 | 0.60 | | |
| | Blue | x | | 0.12 | 0.15 | 0.18 | | |
| | | y | | 0.11 | 0.14 | 0.17 | | |
| | White | x | | 0.29 | 0.32 | 0.35 | | |
| | | y | | 0.30 | 0.33 | 0.36 | | |

Note 1) Definition of Viewing Angle

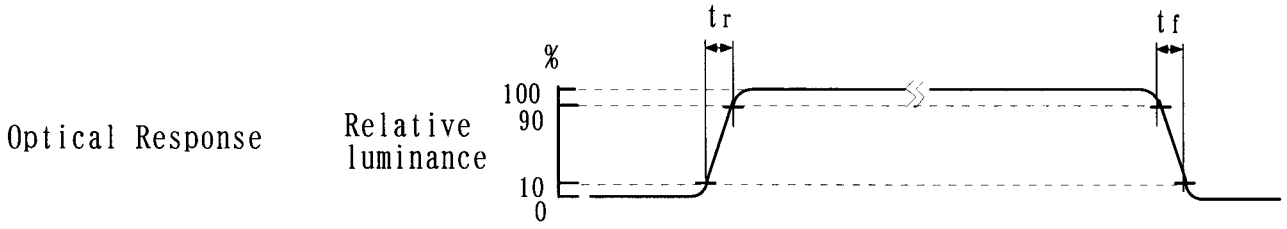



Note 2) Definition of Contrast Ratio (CR)

$$CR = \frac{\text{Brightness when displaying White raster}}{\text{Brightness when displaying Black raster}}$$

These Brightness is measured on the center of screen.
* Measurement in the darkroom.

Note 3) Definition of Response Time




| | | | | | | |
|---|---|---|---|---|---|---|
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# 1. ELECTRICAL CHARACTERISTICS

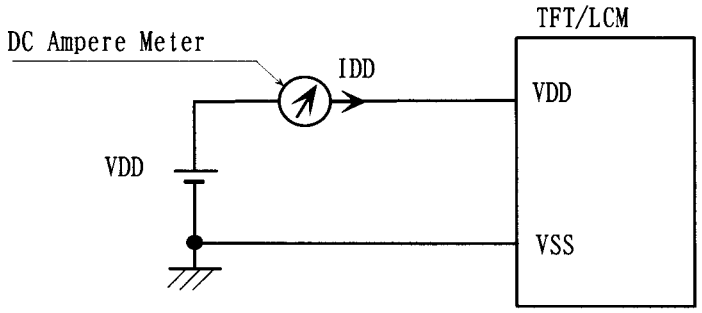
## (1) TFT LIQUID CRYSTAL DISPLAY MODULE

Ta=25℃, Vss=0V

| ITEM | | SYMBOL | MIN. | TYP. | MAX. | UNIT | NOTE |
|---|---|---|---|---|---|---|---|
| Power Supply Voltage | | $V_{DD}$ | 3.0 | 3.3 | 3.6 | V | |
| Differential Input Voltage for LVDS Receiver Threshold | Hi | $V_{IH}$ | — | — | +100 | mV | 1) |
| | Lo | $V_{IL}$ | -100 | — | — | | |
| Power Supply Current | | $I_{DD}$ | — | 530 | 900 | mA | 2), 3) |
| Vsync Frequency | | fv | — | 60 | 65 | Hz | 4) |
| Hsync Frequency | | $f_H$ | — | 61 | 76 | kHz | 4) |
| DCLK Frequency | | $f_{CLK}$ | 51 | 54 | 57 | MHz | 4) |

Note 1) Common Mode Voltage $V_{CM}$=+1.25V

2) fv=60Hz, $f_{CLK}$=54MHz, $V_{DD}$=3.3V, DC Current is measured with the method as below.




Typical value is measured when displaying vertical with 63th gray scale.
Maximum is measured when displaying Vertical-stripe(Black-7 Gray scale)

3) Current capacity for VDD power supply should be larger than 3A, so that the fuse built in the unit(Maximum) could appropriately work in the abnormal.

4) For LVDS Transmitter Input.

## (2) BACK-LIGHT UNIT

Ta=25℃

| ITEM | SYMBOL | | MIN. | TYP. | MAX. | UNIT | NOTE |
|---|---|---|---|---|---|---|---|
| Lamp Current | $I_L$ | | 4.0 | — | 6.0 | mArms | 1), 2), 5) |
| | | | — | — | 10 | mA0-peak | |
| Lamp Voltage | $V_L$ | | — | 690 | — | Vrms | |
| Frequency | $f_L$ | | 40 | 50 | 70 | kHz | 3) |
| Starting Lamp Voltage | Vs | Ta=25℃ | 1100 | — | — | Vrms | 4) |
| | | Ta=10℃ | 1500 | — | — | | 4) |

NOTE 1) Higher IL cause the short life time of CFL.

2) DC current cause irregular fluorescence and the short life of CFL.

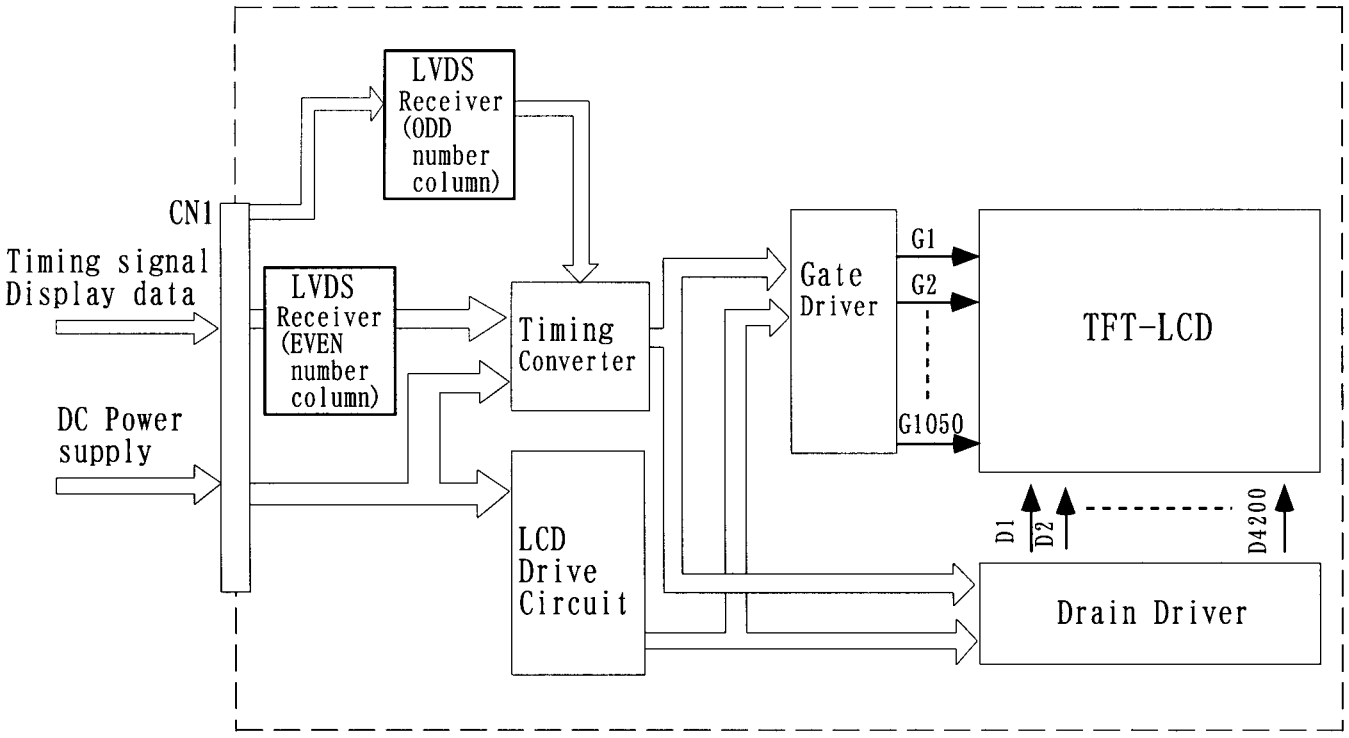
3) Lamp ooperation frequency may produce interference with Hsync frequency, which causes rolling or flickering screen. Therefore lamp operation frequency shall be as different as possible from Hsync frequency, to avoid interference.

4) Lamp start-up voltage should be more than Vs(min)

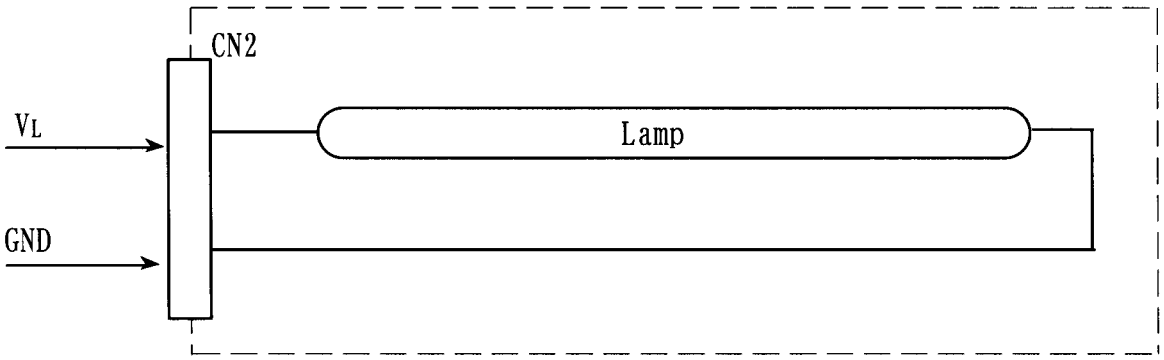
5) Reducing Lamp current increases Lamp voltage and generally increases Lamp operation frequency.
CFL inverter should be designed with taking account of minimizing the leakage current from the high-voltage output.

# 4. BLOCK DIAGRAM

## (1) TFT LIQUID CRYSTAL DISPLAY MODULE




## (2) BACK-LIGHT UNIT



# 5. INTERFACE PIN CONNECTION

## (1) TFT LIQUID CRYSTAL DISPLAY MODULE

CN1 《JAE FI-SEB20P-HF-A or Compatible》

| Pin No | SYMBOL | FUNCTION | NOTE |
|---|---|---|---|
| 1 | VDD | Power Supply 3.3V nominal | 2) |
| 2 | VDD | Power Supply 3.3V nominal | 2) |
| 3 | VSS | Ground | 1) |
| 4 | VSS | Ground | 1) |
| 5 | R1in0- | LVDS Differential Data INPUT (-) for Odd | |
| 6 | R1in0+ | LVDS Differential Data INPUT (+) for Odd | |
| 7 | R1in1- | LVDS Differential Data INPUT (-) for Odd | |
| 8 | R1in1+ | LVDS Differential Data INPUT (+) for Odd | |
| 9 | R1in2- | LVDS Differential Data INPUT (-) for Odd | |
| 10 | R1in2+ | LVDS Differential Data INPUT (+) for Odd | |
| 11 | R1CLK- | LVDS Differential Clock INPUT (-) for Odd | |
| 12 | R1CLK+ | LVDS Differential Clock INPUT (+) for Odd | |
| 13 | R2in0- | LVDS Differential Data INPUT (-) for Even | |
| 14 | R2in0+ | LVDS Differential Data INPUT (+) for Even | |
| 15 | R2in1- | LVDS Differential Data INPUT (-) for Even | |
| 16 | R2in1+ | LVDS Differential Data INPUT (+) for Even | |
| 17 | R2in2- | LVDS Differential Data INPUT (-) for Even | |
| 18 | R2in2+ | LVDS Differential Data INPUT (+) for Even | |
| 19 | R2CLK- | LVDS Differential Clock INPUT (-) for Even | |
| 20 | R2CLK+ | LVDS Differential Clock INPUT (+) for Even | |

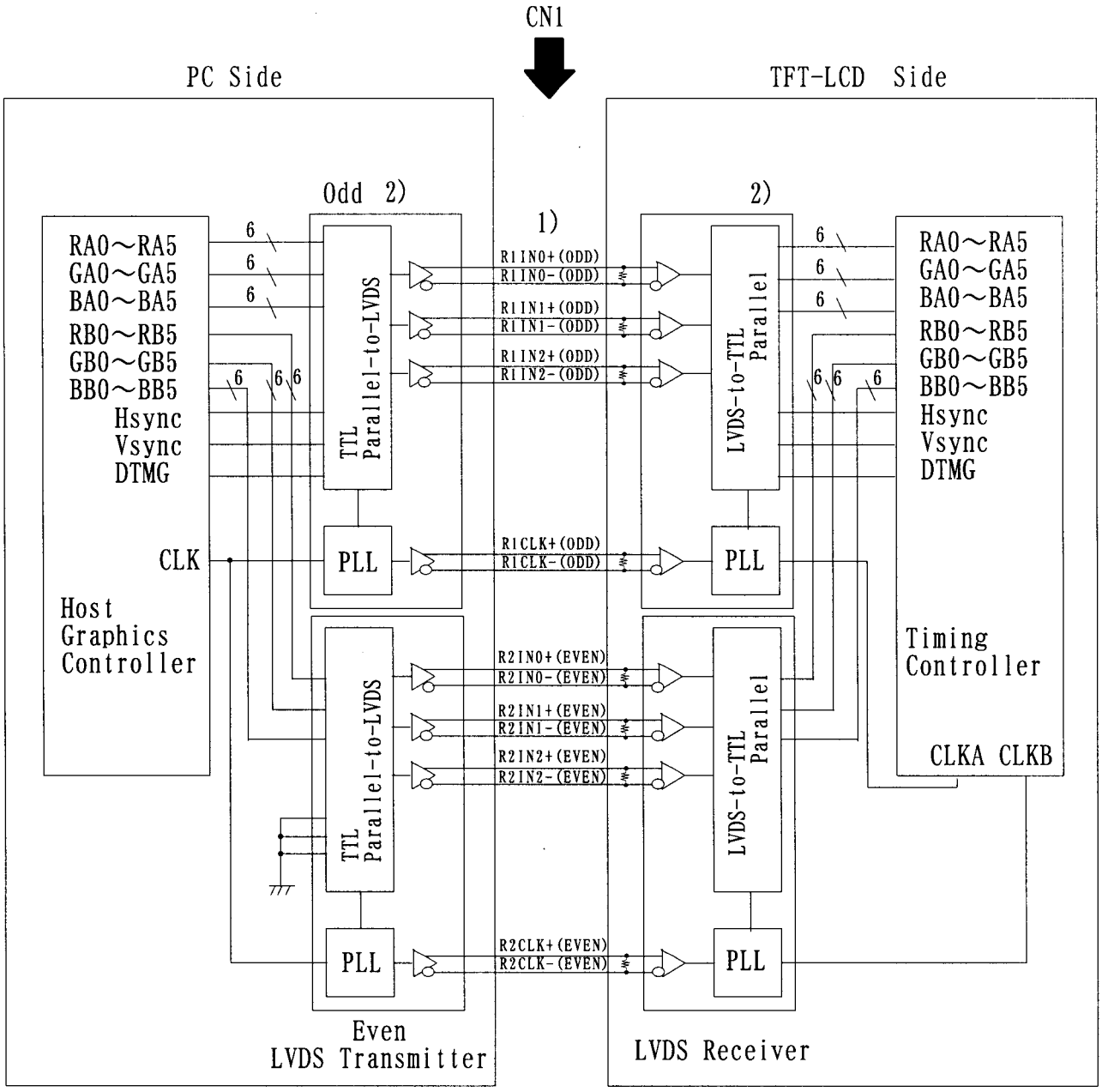
Note 1) All Vss pins should be connected to GND(0V).
Metal bezel is connected internaly to Vss.
2) All $V_{DD}$ pins should be connected to +3.3V.

## (2) BACK-LIGHT UNIT

CN2 《JST BHSR-02VS-1》

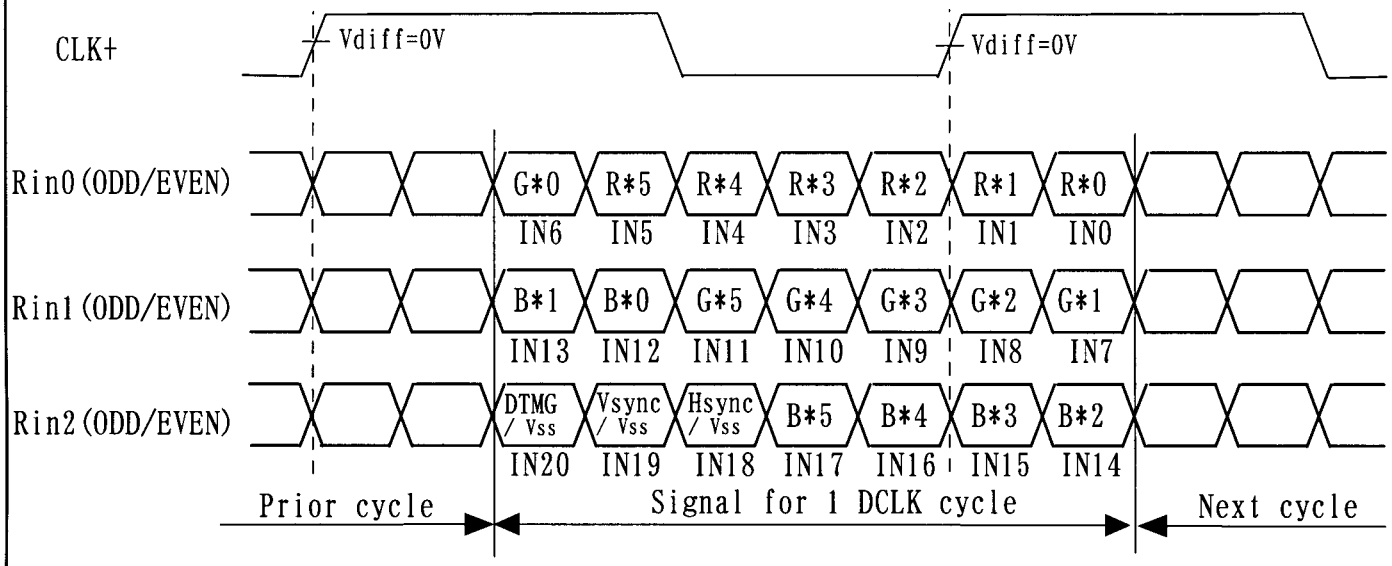
| Pin No | SYMBOL | DESCRIPTION |
|---|---|---|
| 1 | $V_L$ | Power Supply |
| 2 | GND | GND (0V) |

# LVDS INTERFACE




NOTE: 1) LVDS cable impedance should be 100 ohms per signal line when each 2-lines(+,-) is used in differential mode.
2) LVDS transmitter is not contained in the Module.
3) Odd data ; RA0～RA5, GA0～GA5, BA0～BA5, Hsync, Vsync, DTMG
Even data ; RB0～RB5, GA0～GA5, BB0～BB5, Vss, Vss, Vss

# LVDS INPUT SIGNAL




Pin connection in case of using
TI SN75LVDS84

Odd Data

| Graphic Controller output | Transmitter SN75LVDS84 |
|---|---|
| DCLK | CLK IN(26) |
| RA0 | IN0(44) |
| RA1 | IN1(45) |
| RA2 | IN2(47) |
| RA3 | IN3(48) |
| RA4 | IN4(1) |
| RA5 | IN5(3) |
| GA0 | IN6(4) |
| GA1 | IN7(6) |
| GA2 | IN8(7) |
| GA3 | IN9(9) |
| GA4 | IN(10) |
| GA5 | IN11(12) |
| BA0 | IN12(13) |
| BA1 | IN13(15) |
| BA2 | IN14(16) |
| BA3 | IN15(18) |
| BA4 | IN16(19) |
| BA5 | IN17(20) |
| Hsync | IN18(22) |
| Vsync | IN19(23) |
| DTMG | IN20(25) |

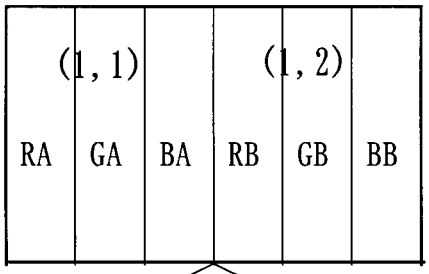
EVEN

| Graphic Controller output | Transmitter SN75LVDS84 |
|---|---|
| DCLK | CLK IN(26) |
| RB0 | IN0(44) |
| RB1 | IN1(45) |
| RB2 | IN2(47) |
| RB3 | IN3(48) |
| RB4 | IN4(1) |
| RB5 | IN5(3) |
| GB0 | IN6(4) |
| GB1 | IN7(6) |
| GB2 | IN8(7) |
| GB3 | IN9(9) |
| GB4 | IN(10) |
| GB5 | IN11(12) |
| BB0 | IN12(13) |
| BB1 | IN13(15) |
| BB2 | IN14(16) |
| BB3 | IN15(18) |
| BB4 | IN16(19) |
| BB5 | IN17(20) |
| Vss | IN18(22) |
| Vss | IN19(23) |
| Vss | IN20(25) |

1) ( ) indicate pin NO (IC).
2) Even IN18~20 are connected to Vss

# CORRESPONDENCE BETWEEN INPUT DATA AND SCREEN IMAGE FOR LVDS TRANSMITTER

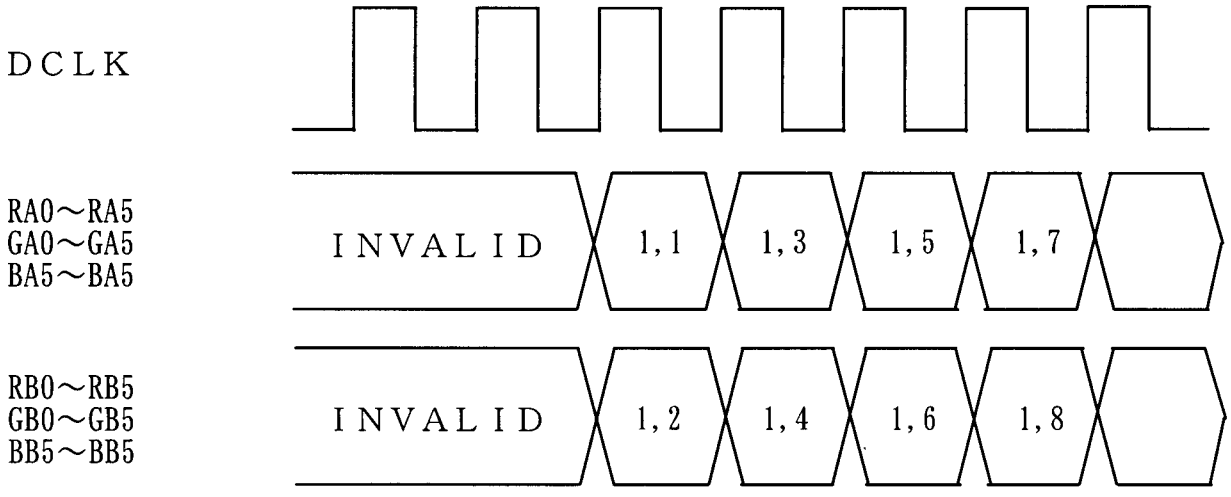
Display data of each adjacent two pixels are latched during one cycle of DCLK.




First Pixel Deta : RA0～RA5, GA0～GA5, BA0～BA5
Second Pixel Data : RB0～RB5, GB0～GB5, BB0～BB5

| | | | | |
|---|---|---|---|---|
| 1, 1 | 1, 2 | 1, 3 | ――――――――――――――― | 1, 1400 |
| 2, 1 | 2, 2 | 2, 3 | ――――――――――――――― | 2, 1400 |
| 3, 1 | 3, 2 | 3, 3 | ――――――――――――――― | 3, 1400 |
| : | : | : | | : |
| : | : | : | | : |
| : | : | : | | : |
| 1050, 1 | 1050, 2 | 1050, 3 | ――――――――――――――― | 1050, 1400 |

Location of screen corresponding to each input data



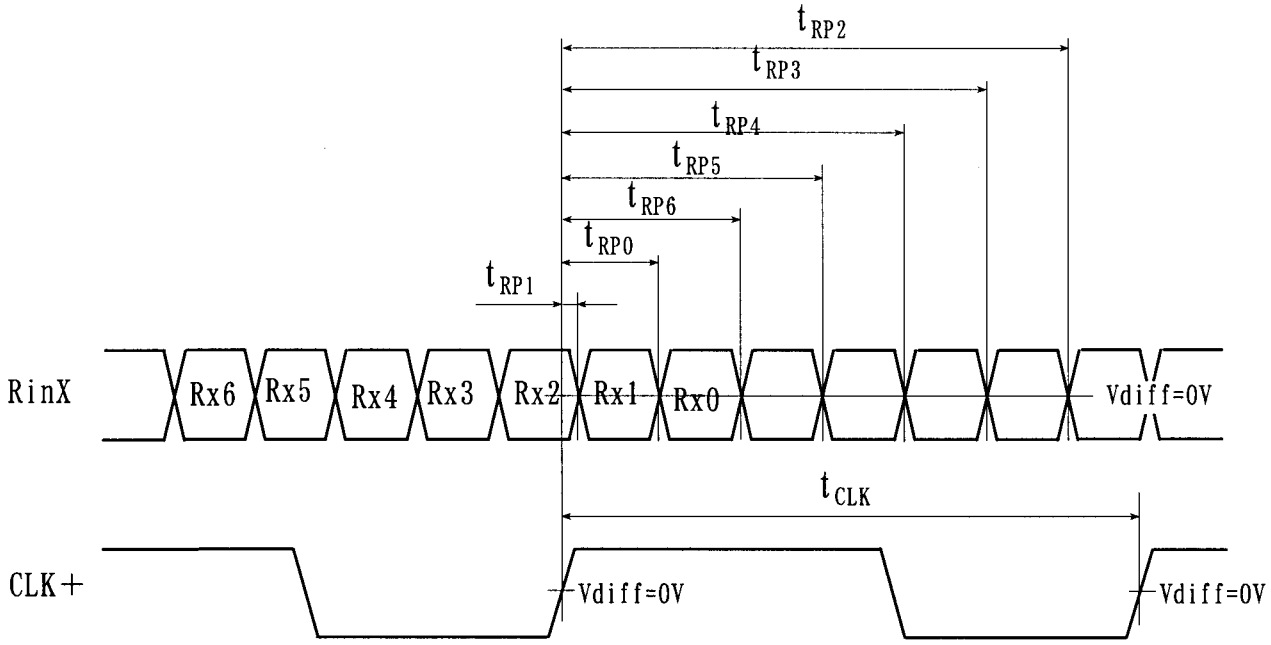
# RELATIONSHIP BETWEEN DISPLAYED COLOR AND INPUT DATA

| 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 |
| | YELLO | 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 | BLACK | 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(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 | BLACK | 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(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 | BLACK | 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(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 |

Note 1) Definition of gray scale :
Color(n) --- number in parenthesis indicates gray scale level.
Larger number corresponds to brighter level.
2) Data : 1:High, 0:Low

# 6. Interface timing

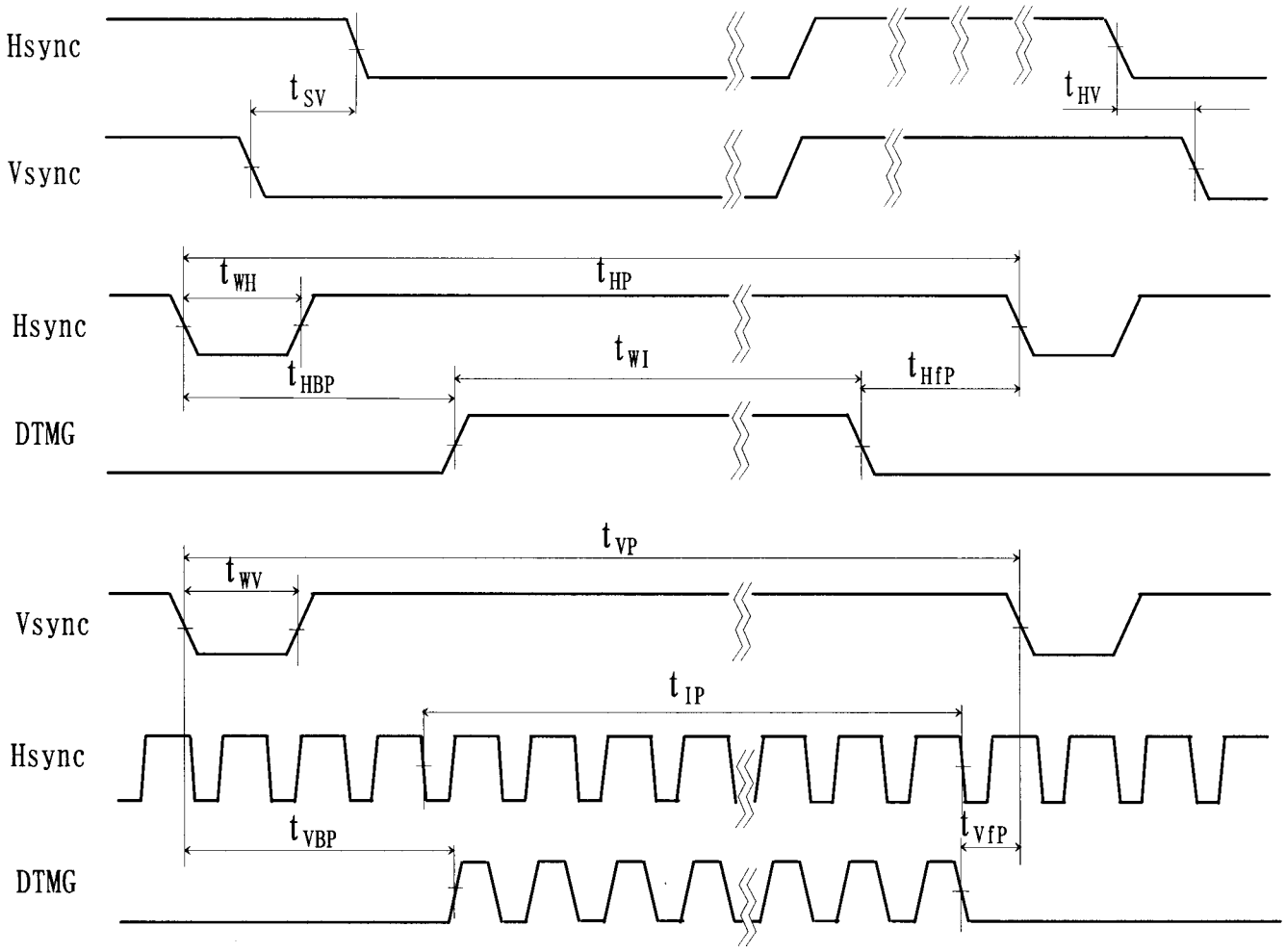
(1) LVDS receiver timing
(Interface of TFT module)




RinX=(RinX+)-(RinX-) (X=0, 1, 2)

| ITEM | | SYMBOL | MIN. | TYP. | MAX. | UNIT | NOTE |
|---|---|---|---|---|---|---|---|
| DCLK | Frequency | $1/t_{CLK}$ | 51 | 54 | 57 | MHz | |
| RinX (X=0, 1, 2) | 0 data position | $t_{RP0}$ | $\frac{1}{7}t_{CLK}-0.49$ | $\frac{1}{7}t_{CLK}$ | $\frac{1}{7}t_{CLK}+0.49$ | ns | |
| | 1st data position | $t_{RP1}$ | -0.49 | 0 | +0.49 | | |
| | 2nd data position | $t_{RP2}$ | $\frac{6}{7}t_{CLK}-0.49$ | $\frac{6}{7}t_{CLK}$ | $\frac{6}{7}t_{CLK}+0.49$ | | |
| | 3rd data position | $t_{RP3}$ | $\frac{5}{7}t_{CLK}-0.49$ | $\frac{5}{7}t_{CLK}$ | $\frac{5}{7}t_{CLK}+0.49$ | | |
| | 4th data position | $t_{RP4}$ | $\frac{4}{7}t_{CLK}-0.49$ | $\frac{4}{7}t_{CLK}$ | $\frac{4}{7}t_{CLK}+0.49$ | | |
| | 5th data position | $t_{RP5}$ | $\frac{3}{7}t_{CLK}-0.49$ | $\frac{3}{7}t_{CLK}$ | $\frac{3}{7}t_{CLK}+0.49$ | | |
| | 6th data position | $t_{RP6}$ | $\frac{2}{7}t_{CLK}-0.49$ | $\frac{2}{7}t_{CLK}$ | $\frac{2}{7}t_{CLK}+0.49$ | | |

(2) timing converter timing
(Input timing for transmitter)

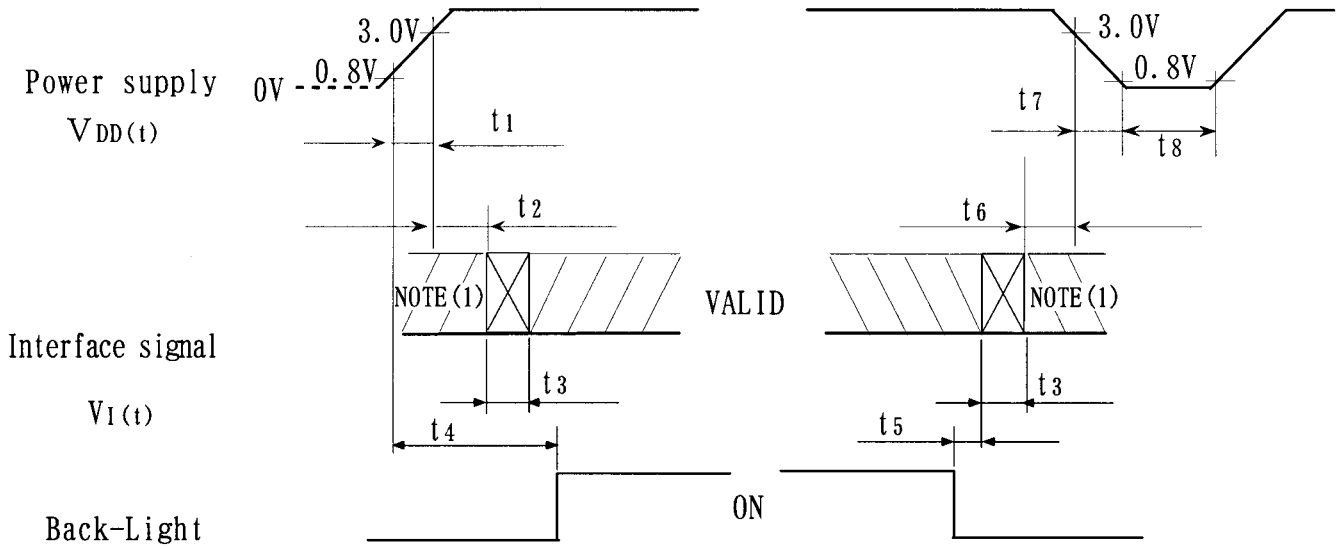



The timings except mentiond on the above should conform to the pecifications of LVDS transmitter in your system.

| Item | | SYMBOL | MIN. | TYP. | MAX. | UNIT | NOTE |
|---|---|---|---|---|---|---|---|
| Hsync | Period | $t_{HP}$ | 820 | 844 | 1023 | $t_{CLK}$ | |
| | Width-Active | $t_{WH}$ | (10) | — | (240) | | |
| Vsync | Set up Time | $t_{SV}$ | (-2) | — | — | $t_{CLK}$ | for Hsync signal |
| | Hold time | $t_{HV}$ | (0) | — | — | | |
| | period | $t_{VP}$ | 1059 | 1068 | 2047 | $t_{HP}$ | |
| | Width-Active | $t_{WV}$ | 1 | — | (120) | $t_{HP}$ | |
| DTMG | Width-Active | $t_{WI}$ | 700 | 700 | 700 | $t_{CLK}$ | |
| | Period | $t_{IP}$ | 1050 | 1050 | 1050 | $t_{HP}$ | |
| | Horizontal Back Portch | $t_{HBP}$ | (32) | — | (120) | $t_{CLK}$ | |
| | Horizontal Front Porch | $t_{HFP}$ | (0) | — | — | | |
| | Vertical Back Porch | $t_{VBP}$ | 3 | — | — | $t_{HP}$ | 1) |
| | Vertical Front Porch | $t_{VFP}$ | 0 | — | — | | |

NOTE In addition to the above, $t_{VBP}$ and $t_{VFP}$ should be
1) $t_{VBP}+t_{VFP} \geqq 3 \times t_{HP}$

## (3 )TIMING BETWEEN INTERFACE SIGNAL AND POWER SUPPLY

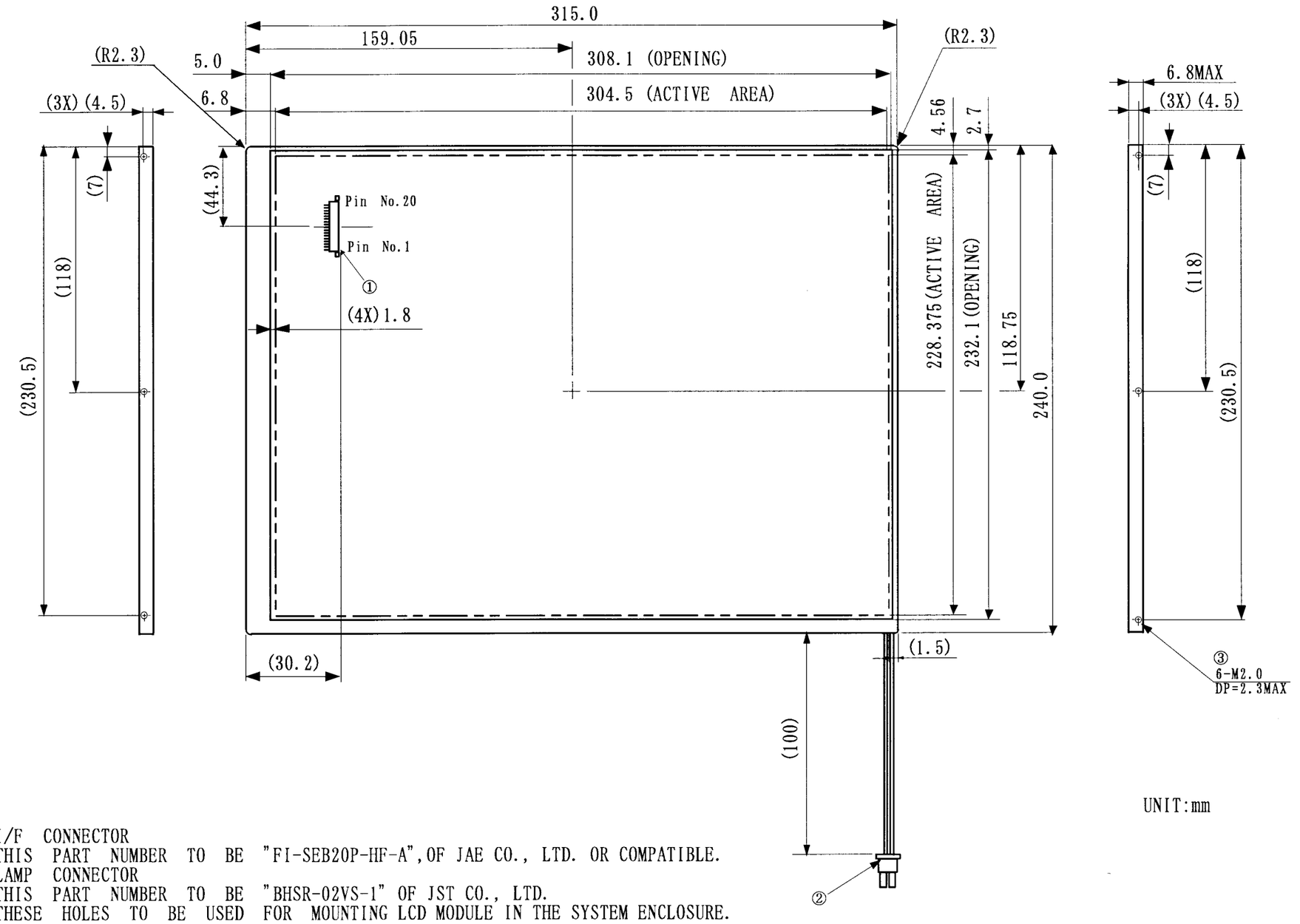



| POWER ON | POWER OFF |
|---|---|
| t1≦15ms | 5ms≦t5 |
| 0<t2≦45ms | 0≦t6≦45ms |
| 0≦t3≦5ms | 0≦t7≦20ms |
| 0.1s≦t4 | 0.4s≦t8 |

NOTE(1) All input are in the High impedance state during t2.

(2) t3 is needed for the signal transition between input High impedance state and valid state specified at 6(1) & (2).

# 7. DIMENSIONAL OUTLINE




UNIT:mm

NOTES

① I/F CONNECTOR
THIS PART NUMBER TO BE "FI-SEB20P-HF-A", OF JAE CO., LTD. OR COMPATIBLE.

② LAMP CONNECTOR
THIS PART NUMBER TO BE "BHSR-02VS-1" OF JST CO., LTD.

③ THESE HOLES TO BE USED FOR MOUNTING LCD MODULE IN THE SYSTEM ENCLOSURE.
MAXIMUM TORQUE FOR THE SCREW IN MOUNTING PANEL : 0.245N·m (2.5kgf·cm )
MAXIMUM PULL FOR THE SCREW IN MOUNTING PANEL : 29.4N (3kgf)

④ THE UNSPECIFIED TOLERANCE : ±0.5mm