HITACHI

Hitachi, Ltd.,Displays

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TECHNICAL DATA

TX36D79VC1CAB

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RECORD OF REVISION

Date	Sheet No.	Summary

APPLICATIONS

This specification is applied to the following TFT Liquid Crystal Display Module with Back-light unit and LVDS (Low Voltage Differential Signaling) Interface.

Note : Inverter device for Back-light is not built in so it should be prepared by yourself.

・Type name	: TX36D79VC1CAB
・Display Area	: H285.7×V214.3 [mm]
・Display Pixels	: H1024×V768 [pixels]
(Display Dots)	(H(1024×3)×V768 dots)
・Pixel Pitch	: H 0.279×V 0.279 [mm]
・Color Pixel Arrangement	: R･G･B Vertical Stripe
・Display Mode	: Transmissive Mode Normally White Mode
・Color Number	: 262k Colors
・Interface	: LVDS
・Front side Polarizer	: Polarizer with Antiglare Coating
・Back-Light	: A Cold Cathode Fluorescent Lamp (Inverter is not included)
・Dimensions Outlines	: H299.0×V228.0×t6.0MAX [mm]
・Weight	: (485) [g]
・Power Supply	: 3.3V

1. ABSOLUTE MAXIMUM RATINGS

1.1 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		UNIT	NOTE
	MIN.	MAX.	MIN.	MAX.		
Ambient Temperature	10	45	−20	60	℃	1)
Humidity	2)		2)		%RH	1)
Vibration	−	4.9 (0.5G)	−	19.6 (2G)	m／s2	3)
Shock	−	29.4(3G)	−	490 (50G)		4)
Corrosive Gas	NOT ACCEPTABLE		NOT ACCEPTABLE		−	
Illuminance of LCD surface	−	50,000	−	50,000	1x	

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 humidity of 85%RH at 40℃.

3) 20～50Hz, (Except resonance frequency)

4) 7ms

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) 200pF-250Ω, 25℃-70%RH.
2) I/F Connector pins are subjected.
3) The Surface of Metal bezel and LCD are subjected.

(2) BACK-LIGHT UNIT GND=0V

ITEM	SYMBOL	MIN.	MAX.	UNIT
Lamp Current	IL	0	7	mArms
Lamp Voltage	VL	0	2000	Vrms

1.3 Connection between PC Ground and Metal frame.

Metal frame of the module shold be grounded with PC's ground in case that protection film is being peeled off white operating the module. Unless you connected between metal frame and PC's Ground. PC's system happen to shut down due to the influence of electrostatic discharge coused by peeling off the protection film.

2. OPTICAL CHARACTERISTICS

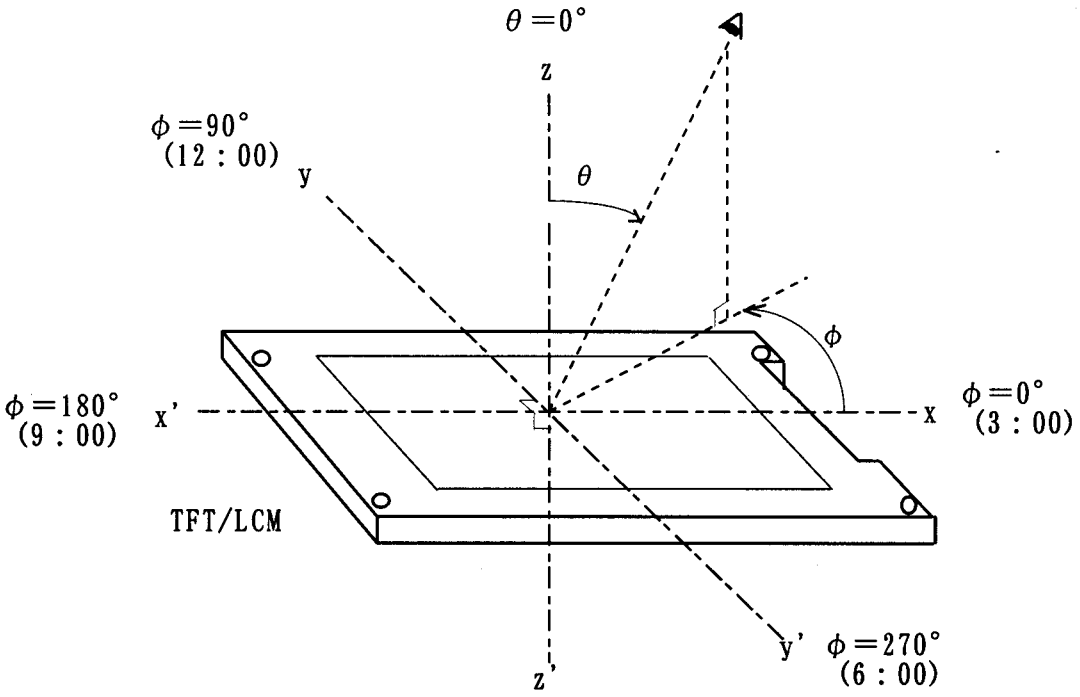
The following items are measured on the conditions that this unit operation (TFT panel and Back-light) and measuring systems are stable. The ambient light excluding the Back-light unit is nothing.

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

Temperature of LCD=25℃, VDD=3.3V, fv=60Hz, I_L=6mA
Back-Light operation Frequency = (55)kHz

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast Ratio		CR	$\theta=0°$ Note 1)	—	(150)	—	—	2)
Brightness(White)		Bwh		—	(150)	—	cd/m²	
Color of CIE	Red	x		—	(0.58)	—	—	
		y		—	(0.33)	—		
	Green	x		—	(0.30)	—		
		y		—	(0.56)	—		
	Blue	x		—	(0.14)	—		
		y		—	(0.13)	—		
	White	x		—	(0.33)	—		
		y		—	(0.34)	—		

Note 1) Definition of Viewing Angle



Note 2) Definition of Contrast Ratio (CR)

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

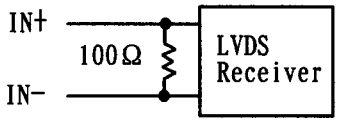
3. ELECTRICAL CHARACTERISTICS

(1) TFT LIQUID CRYSTAL DISPLAY MODULE

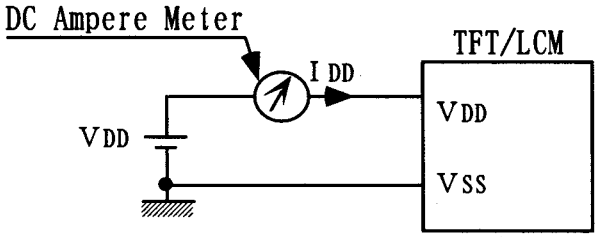
Ta=25℃, Vss=0V

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}	—	300	600	mA	2), 3)
Vsync Frequency		f_V	—	60	65	Hz	4)
Hsync Frequency		f_H	—	48.5	52.4	kHz	4)
DCLK Frequency		f_{CLK}	—	65	68	MHz	4)

Note 1) VCM=+1.25V
VCM is common mode voltage of LVDS transmitter/receiver.
The input terminal of LVDS transmitter is terminated with 100Ω.



2) f_V=60Hz, f_{CLK}=65MHz, V_{DD}=3.3V, DC Current.
Typ. value is measured when displaying Vertical-stripe (Black-Gray 7).



3) As this module contains 1.0A current fuse, prepare current source that is enough for cutting current fuse when a truble happens.
4) For LVDS Transmitter Input

(2) EXTENDED DISPLAY IDNTIFICATION DATA (EDID)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Power Supply Voltage	V_{EDID}	2.2	—	5.5	V

(3) BACK-LIGHT UNIT

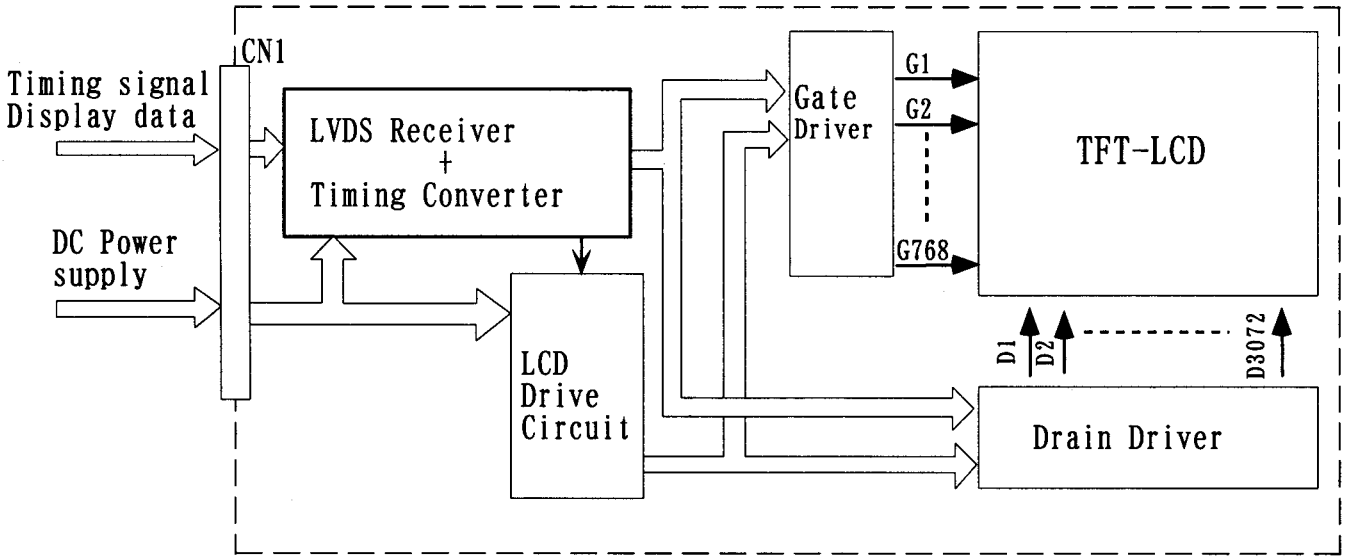
Ta=25℃, GND=0V

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Lamp Current	I_L	3.5	5.0	6.0	mArms	1), 2)
Lamp Voltage	V_L	—	650	—	Vrms	
Frequency	f_L	50	—	70	kHz	3)
Starting Lamp Voltage	V_S	1100	—		Vrms	4)
		1250	—			4), 5)

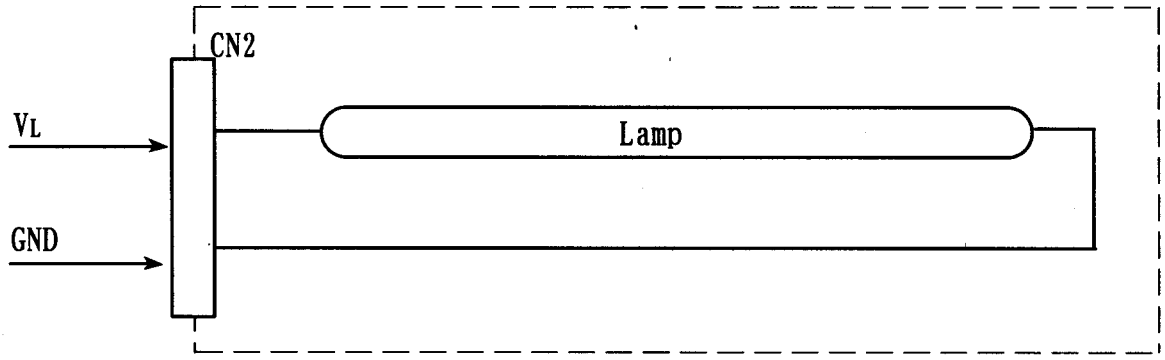
Note 1) I_L is Current of GND side.
2) Higher I_L cause the short life time of CFL.
3) Lamp frequency may produce interference with Hsync frequency, causing beat or flicker on the display.
4) Starting Lamp Voltage is applied more than Vs(min).
5) Ta=10℃

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-HF13 or equivalent》

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	RinO-	Receiver Signal(-)	
6	RinO+	Receiver Signal(+)	
7	VSS	Ground	1)
8	Rin1-	Receiver Signal(-)	
9	Rin1+	Receiver Signal(+)	
10	VSS	Ground	1)
11	Rin2-	Receiver Signal(-)	
12	Rin2+	Receiver Signal(+)	
13	VSS	Ground	1)
14	CLK-	Clock Signal(-)	
15	CLK+	Clock Signal(+)	
16	VSS	Ground	1)
17	V_{EDID}	DDC 3.3V power	
18	NC	Reserved for supplier test point	
19	CLK_{EDID}	DDC Clock	1)
20	$DATA_{EDID}$	DDC Data	1)

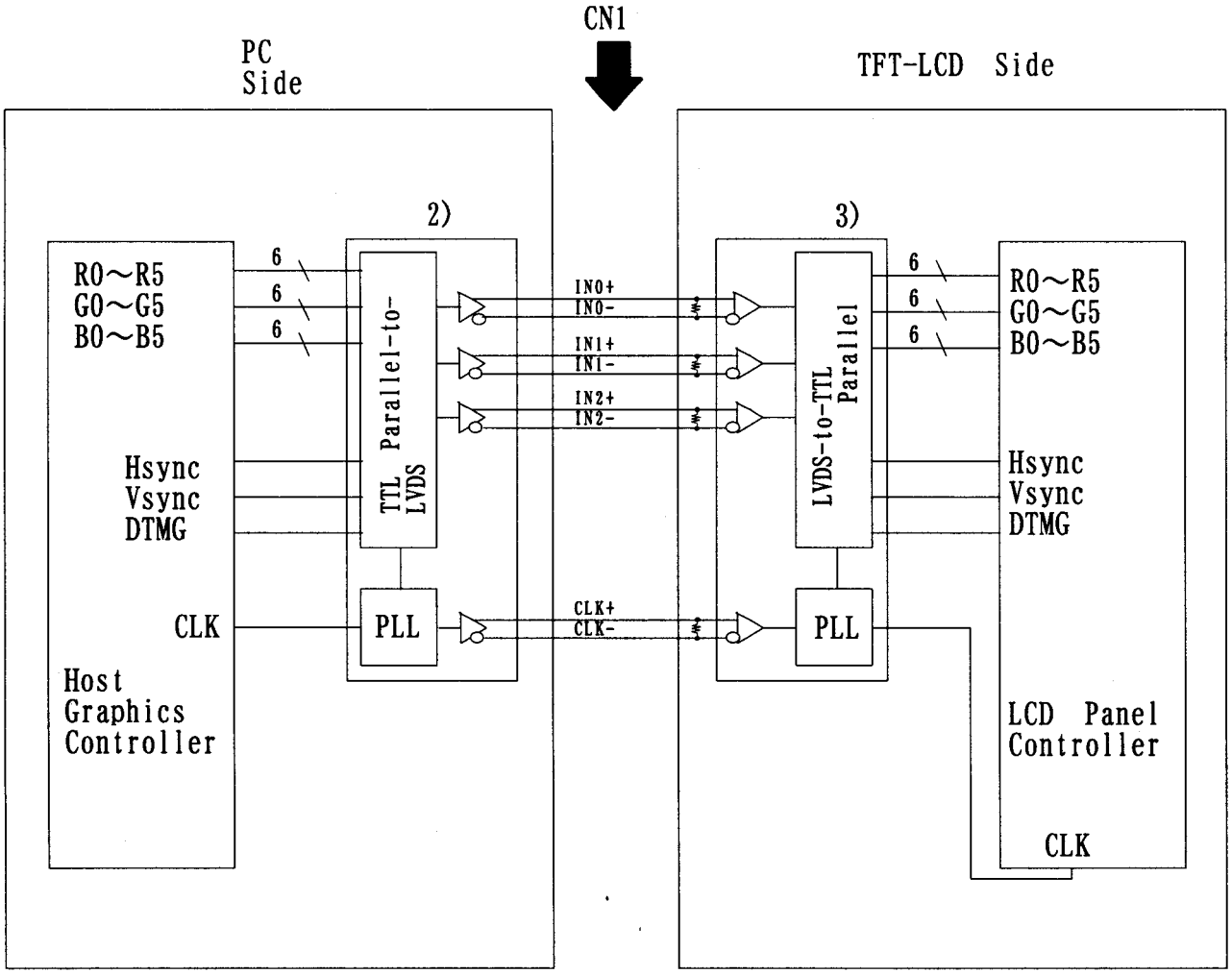
Note 1) All V_{SS} pins should be connected to GND(0V).
Metal bezel is connected internaly to V_{SS}.
2) All V_{DD} pins should be connected to +3.3V.

(2) BACK-LIGHT UNIT

CN2 《JST : BHSR-02VS-1》

Pin No	SYMBOL	DESCRIPTION
1	VL	Power Supply
2	GND	GND(0V)

LVDS INTERFACE

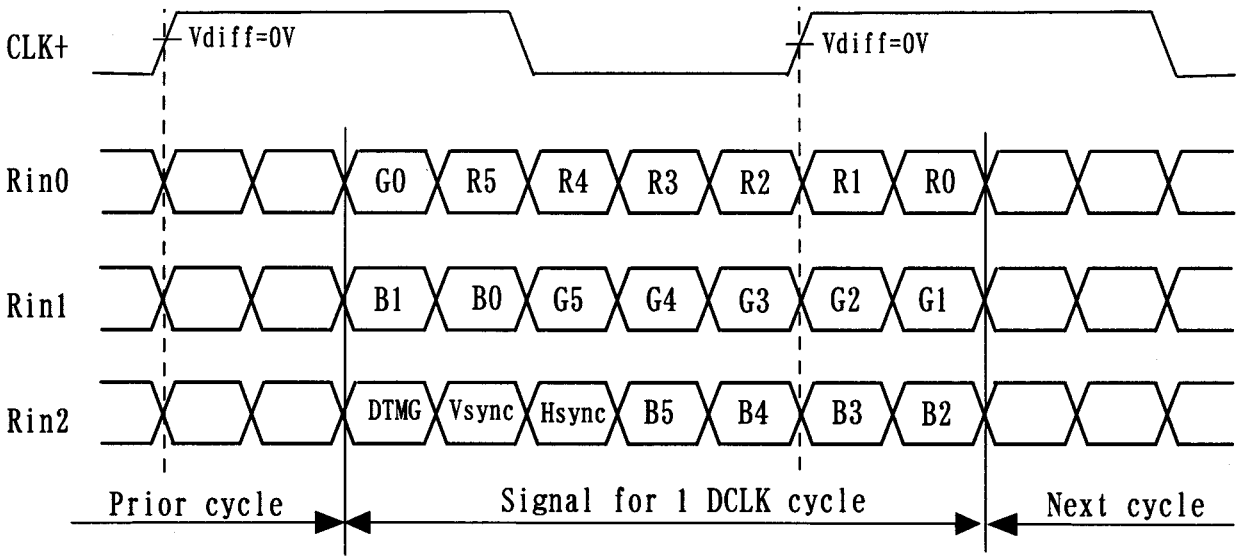


NOTE: 1) LVDS cable impedance is 100 ohms per signal line when two are used differentially...

2) Transmitter : NS DS90CF363A, or equivalent. Transmitter is not contained in Module.

3) Receiver : THine THC63LVDD64A, or equivalent

LVDS Input Signal



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

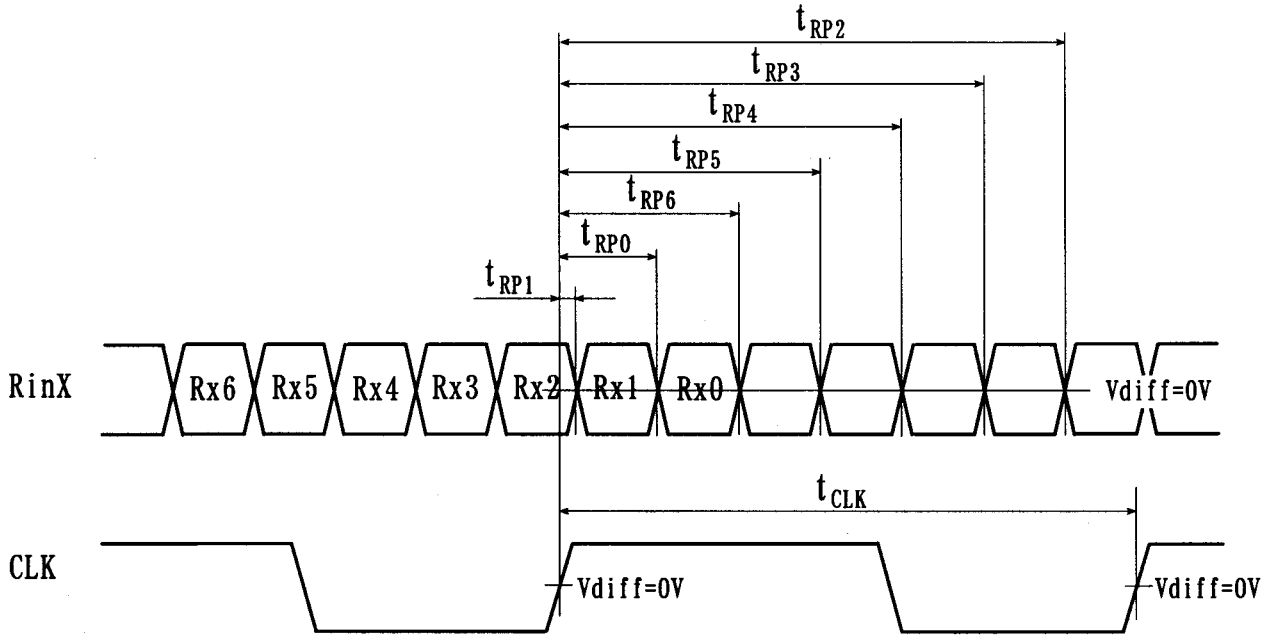
Pin connection in case of using
NS DS90CF363A

Input signal	Transmitter
CLK	Tx CLK IN(26)
R0	Tx IN0(44)
R1	Tx IN1(45)
R2	Tx IN2(47)
R3	Tx IN3(48)
R4	Tx IN4(1)
R5	Tx IN5(3)
G0	Tx IN6(4)
G1	Tx IN7(6)
G2	Tx IN8(7)
G3	TX IN9(9)
G4	Tx IN10(10)
G5	Tx IN11(12)
B0	Tx IN12(13)
B1	Tx IN13(15)
B2	Tx IN14(16)
B3	Tx IN15(18)
B4	Tx IN16(19)
B5	Tx IN17(20)
Hsync	Tx IN18(22)
Vsync	Tx IN19(23)
DTMG	Tx IN20(25)

1) ( ) indicate pin NO (IC).

6. Interface timing

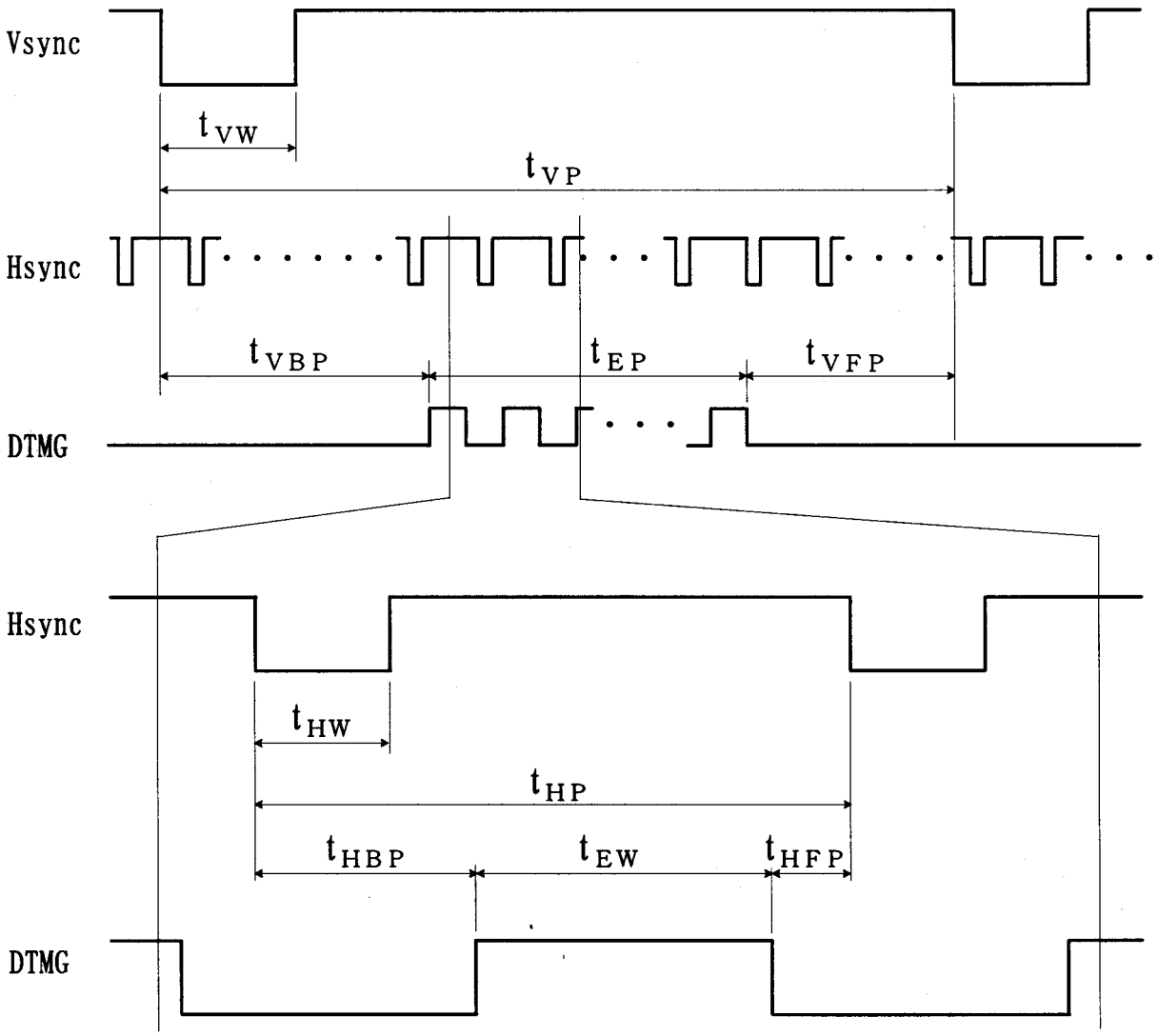
(1) LVDS receiver timing
(Interface of TFT module)



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

ITEM		SIMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
DCLK	FREQUENCY	$1/t_{CLK}$	60	65	68	MHz	
RinX (X=0, 1, 2)	0 data position	t_{RP1}	-0.50	0	+0.50	ns	
	1st data position	t_{RP0}	$\frac{1}{7}t_{CLK}$-0.50	$\frac{1}{7}t_{CLK}$	$\frac{1}{7}t_{CLK}$+0.50		
	2nd data position	t_{RP6}	$\frac{2}{7}t_{CLK}$-0.50	$\frac{2}{7}t_{CLK}$	$\frac{2}{7}t_{CLK}$+0.50		
	3rd data position	t_{RP5}	$\frac{3}{7}t_{CLK}$-0.50	$\frac{3}{7}t_{CLK}$	$\frac{3}{7}t_{CLK}$+0.50		
	4th data position	t_{RP4}	$\frac{4}{7}t_{CLK}$-0.50	$\frac{4}{7}t_{CLK}$	$\frac{4}{7}t_{CLK}$+0.50		
	5th data position	t_{RP3}	$\frac{5}{7}t_{CLK}$-0.50	$\frac{5}{7}t_{CLK}$	$\frac{5}{7}t_{CLK}$+0.50		
	6th data position	t_{RP2}	$\frac{6}{7}t_{CLK}$-0.50	$\frac{6}{7}t_{CLK}$	$\frac{6}{7}t_{CLK}$+0.50		

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



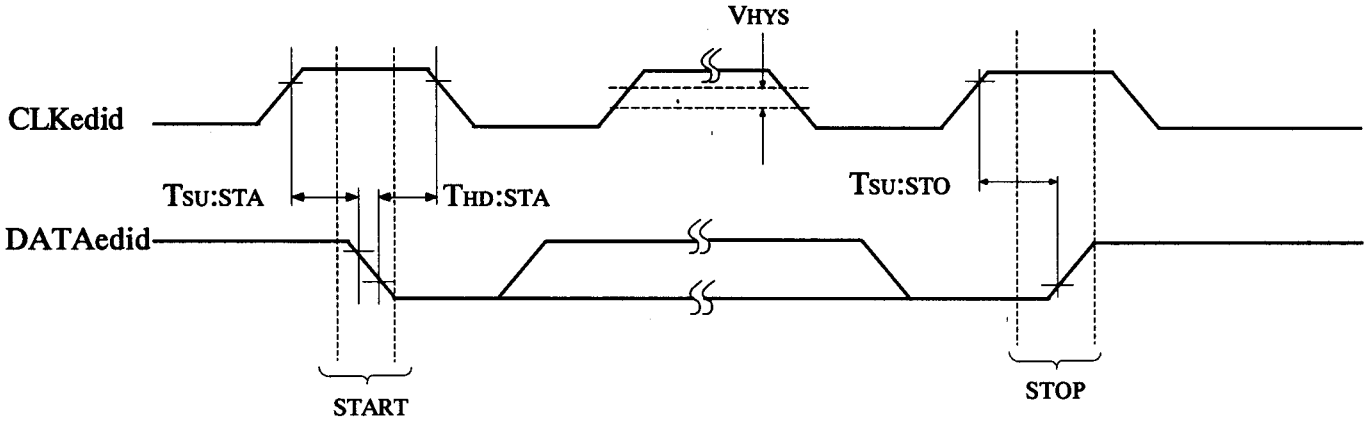
Item		Symbol	Min.	Typ.	Max.	Unit	Note
Vsync	Period	t_{VP}	770	—	1000	t_{HP}	
	Width-Active	t_{VW}	1	—	120		
Hsync	Period	t_{HP}	1180	—	2400	t_{CLK}	
	Width-Active	t_{HW}	8	—	240		
DTMG	Period	t_{EP}	768	768	768	t_{HP}	
	Width-Active	t_{EW}	1024	1024	1024	t_{CLK}	
	Vertical Back Porch	t_{VBP}	0	—	—	t_{HP}	1)
	Vertical Front Porch	t_{VFP}	1	—	—		
	Horizontal Back Porch	t_{HBP}	32	—	416	t_{CLK}	
	Horizontal Front Porch	t_{HFP}	4	—	—		

NOTE 1) $t_{VBP}+t_{VFP} \geqq 2$

(3) External Display Identification Data (EDID) timing

Vcc=+2.2V to +5.5V Commercial (C); Tamp=0℃ to +70℃ Industrial (I); Temp=-40℃ to +85℃					
Parameter	Symbol	Min.	Max.	Units	Conditions
CLKedid and DATAedid pins:					
High level input voltage	VIH	0.7Vcc		V	
Low level input voltage	VIL		0.3Vcc	V	
Hysteresis of Schmitt trigger inputs	VHYS	0.5Vcc	—	V	D
Low level output voltage	VOL		0.4Vcc	V	IOL=3.0mA,Vcc=2.5V
Input leakage current All I/O pins	ILI	-10	10	μA	VIN=0.1V to 5.5V
Output leakage current	ILO	-10	10	μA	VOUT=0.1V to 5.5V
Pin capacititance (all inputs/outputs)	CIN COUT	—	10	pF	Vcc=5.0V 1) FCLK=1MHz
Operating current	Icc Read	—	1	mA	Vcc=5.5V,CLKedid=400kHZ
Standby current	Iccs	—	30	μA	Vcc=3.0V, DATAedid=CLKedid=Vcc
			100	μA	Vcc=5.5V, DATAedid=CLKedid=Vcc

1) This parameter is periodically sampled and not 100% tested.

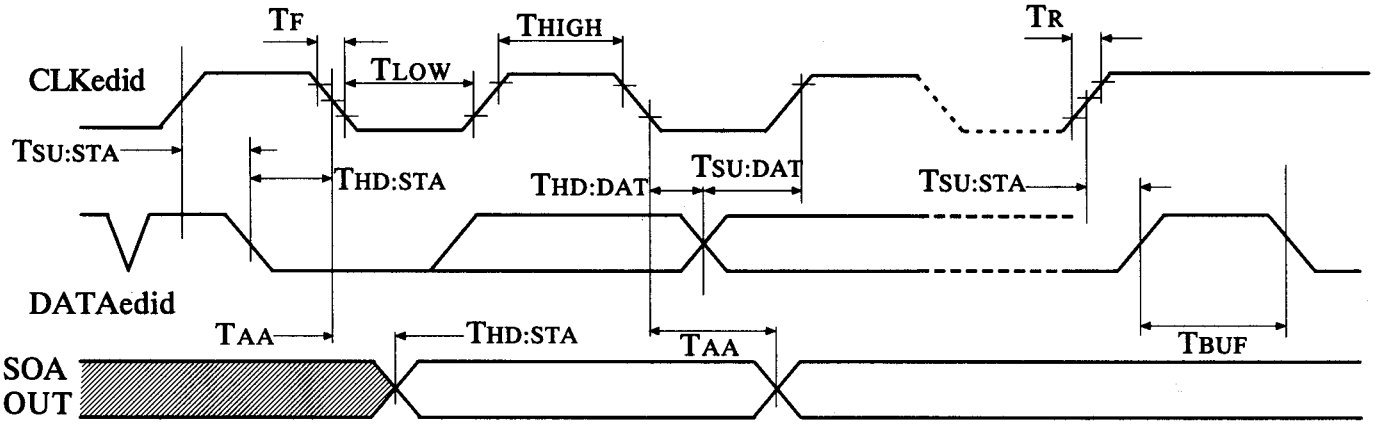


AC CHARECTERISTICS

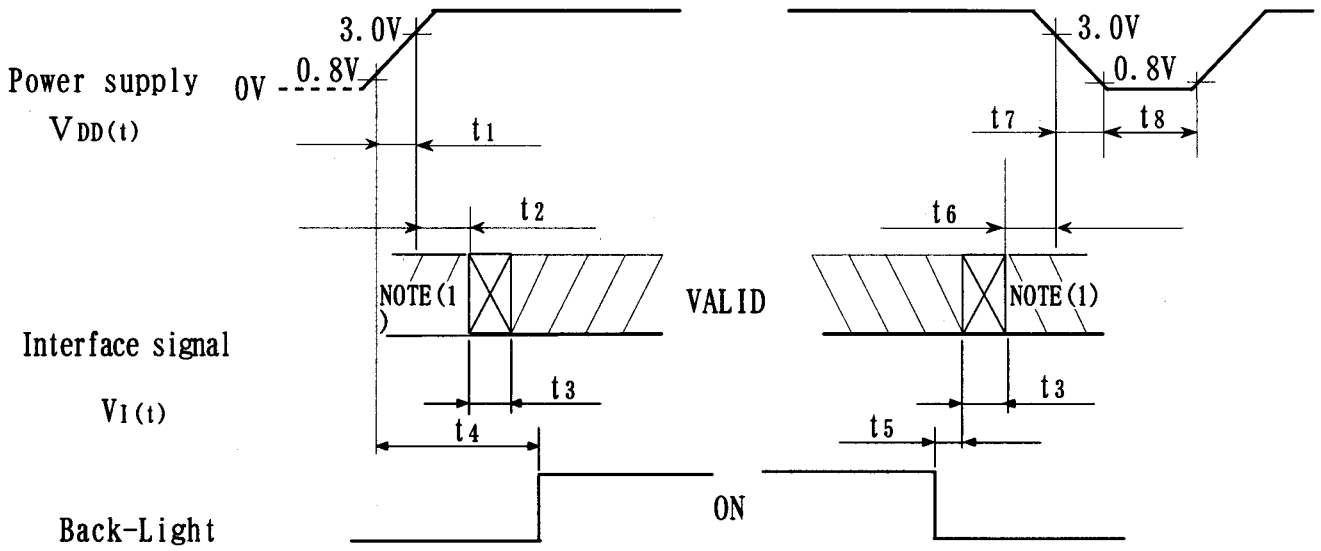
Parameter	Symbol	Vedid=2.2-5.5V STD MODE		Vedid=4.5-5.5V FAST MODE		Units	Remarks
		Min.	Max.	Min.	Max.		
Clock frequenvy	FCLK	—	100	—	400	kHz	
Clock high time	THIGH	4000	—	600	—	ns	
Clock low time	TLOW	4700	—	1300	—	ns	
DATAedid and CLKedid rise time	TR	—	1000	—	300	ns	1)
DATAedid and CLKedid fall time	TF	—	300	—	300	ns	1)
START condition hold time	THD:STA	4000	—	600	—	ns	After this period the first clock pulse is generated
START condition setup time	TSU:STA	4700	—	600	—	ns	Only relevant for repeated START condition
Data input hold time	THD:DAT	0	—	0	—	ns	2)
Data input setup time	TSU:DAT	250	—	100	—	ns	
STOP condition setup time	TSU:STO	4000	—	600	—	ns	
Output valid from clock	TAA	—	3500	—	900	ns	2)
Bus free time	TBUF	4700	—	1300	—	ns	Timing the bus must be free before a new transmission can start
Output fall time from VIH minimum to VIL maximum	TOF	—	250	20+0.1 CB	250	ns	1) ,CB σ 100 pF
Input filter spike suppression (DATAedid and CLKedid pins)	TOF	—	50	—	50	ns	3)
White cycle time	TWR	—	10	—	10	ns	Byte or Page mode
Endurance		1M	—	1M	—	cycles	Vcc=5.0V, Block Mode 4)

1) Not 100% tested. CB=total capacitance of one bus line in pF.
2) As a transmitter, the device must provide an internal minimum delay time to bridge the undefined region (minimum 300 ns) of the falling edge of CLKedid to avoid unintended to START or STOP conditions.
3) The combinied TSP and VHYS specifications are due to new Schmitt trigger inputs which provide improved notice spike suppression. This elminates the need for a TI specification for standerd operation.
4) This parameter is not tested but guaranteed by characteristization. For endurance estimatrs in a specific application, Please consult the Total Endurance Model which can be obtained on our website.

BUS TIMING



(3) TIMING BETWEEN INTERFACE SIGNAL AND POWER SUPPLY



POWER ON

$t_1 \leqq 15ms$

$0 < t_2 \leqq 45ms$

$0 \leqq t_3 \leqq 5ms$

$0.1s \leqq t_4$ NOTE(3)

POWER OFF

$5ms \leqq t_5$

$0 \leqq t_6 \leqq 45ms$

$0 \leqq t_7 \leqq 20ms$

$0.4s \leqq t_8$

NOTE(1) t2:Hi-Z(Hi-impedance)state

(2) t3:Signal transition time from Hi-Z state to Valid state specified by 3(1), 6(1)and(2).

(3) Recommended value

7. PRECAUTIONS

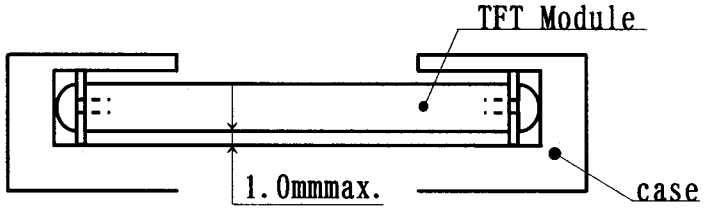
Please pay attention to the followings when you use this TFT/LCD module with Back-light unit.

7.1 MOUNTING PRECAUTION

(1) You must mount Module using mounting holes (8holes at side of Module) tightly.

(2) You should consider the mounting structure so that uneven force (ex. twisted stress) is not applied to Module.
And the case which Module is mounted should have sufficient strength so that external force is not transmitted directly to Module.

(3) To improve the strength of module against the mechanical shock the space between module and the case should be less than 1.0mm.



(4) You should adopt radiation structure to satisfy the temperature specification.

(5) Acetic acid type and chloline type materials for the cover case are not desiable because the former generate corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.

(6) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub by dustclothes with chemical treatment.
Do not touch the surface of polarizer with bare hand or greasy close. (Some cosmetics are detrimental to the polarizer.)

(7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials chamois soaked petrolium benzin.
Normal-Hexane is recommended for cleaning the adhesives used to attach front /rear polarizers. Do not use acetone, toluen and alcohol because they cause chemical damage to the polarizer.

(8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.

(9) Do not open the case because inside circuits have not sufficient strength.

(10) Use fingerstalls of soft gloves in order to keep clean display quality, when you handle the device for incoming inspection and assembly.

(11) Do not pull or do not fold the CFL cable.

7.2 OPERATING PRECAUTION

(1) Response time depends on the temperature. (In lower temperature, it becomes longer).
And also Transmittance and Color depend on the temperature.

(2) Brightness depends on the temperature. (In lower temperature, it becomes lower).
And in lower temperature, response time (required time that brightness is stable after turn on) becomes longer.

(3) Be careful for condensation at sudden temperature change.
Condensation make damage to polarizer or electrical contact part.
And after fading condensation, smear or spot will occur.

(4) When fixed patterns are displayed at long times, afterimage is likely to occur.

(5) The Module have high frequency circuit. If you need to shield the electromagnetic noise, please do in yours.

(6) When Back-light unit is operating, it sounds.
If you need to shield the noise, please do in yours.

(7) Please connect the Back-light connector to the inverter circuit directly.
The long cable between CFL and the inverter may cause the brightness drop of CFL and may cause the rise of starting lamp Voltage(Vs).

(8) Do not connect or remove the module from main system with power applied.

7.3 ELECTROSTATIC DISCHARGE CONTROL

Since Module is composed with electronic circuit, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through list band etc.. Anc don't touch I/F pin directly.

7.4 PRECAUTION FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

7.5 STORAGE

When storing Module as spares for long time, the following precautions are necessary.

(1) Store them in a dark place ; do not expose then to sunlight or fluorescent light.
Keep the temperature between 5℃ and 35℃ at normal humidity.

(2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

7.6 HANDLING PRECAUTIONS FOR PROTECTIVE FILM

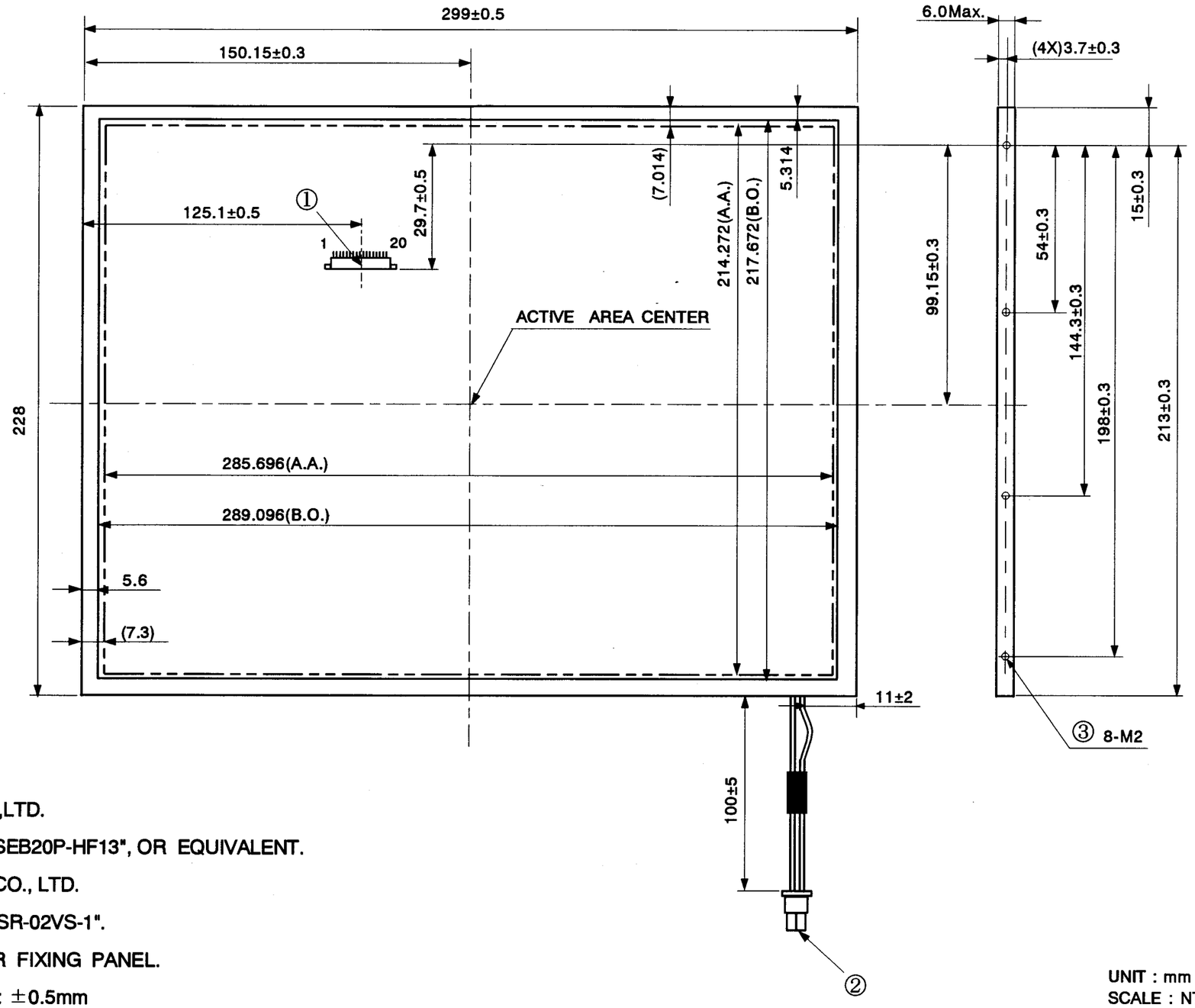
(1) When the protective film is peeled off, static electricity is generated between the film and the polarizer.
This film should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.

(2) The protective film is attached to the polarizer with a small amount of glue. If some stress is applied to rub the protective film against the polarizer during the time you peel off the film, the glue is apt to remain more on the polarizer. So please carefully peel off the protective film without rubbing it against the polarizer.

(3) When the Module with protective film attached is stored for long time, sometimes there remains a very small amount of glue, still on the polarizer after the protective film is peeled off.
Please refrain from storing the Module at the high temperature and high humidity for glue is apt to remain in these condition.

(4) The Glue may be taken for the Modules failure, but you can remove the Glue easily.
When the glue remains on the polarizer surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with Normal-hexane.

8. DIMENSIONAL OUTLINE



NOTES

① I/F CONNECTOR TO BE JAE CO.,LTD.
THIS PART NUMBER TO BE "FI-SEB20P-HF13", OR EQUIVALENT.

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

③ THESE HOLES TO BE USED FOR FIXING PANEL.

④ THE UNSPECIFIED TOLERANCE : ±0.5mm

⑤ MAXIMUM TORQUE FOR THE SCREW IN MOUNTING PANEL : 0.147N·m

⑥ MAXIMUM LENGTH OF SCREW FOR TFT MODULE MOUNTING : 2.5mm

UNIT : mm
SCALE : NTS