Chunghwa Picture Tubes, Ltd.
Technical Specification

To : **YIH HSING ENTERPRISE CO.,LTD.**
Date : 2004.05.17

CLAA300WA 11

ACCEPTED BY

APPROVED BY	CHECKED BY	PREPARED BY
		TFT-LCD Product Planning Management General Division

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T- 3650002- 000- A NEW

1. OVERVIEW

CLAA300WA11 is 29.6" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD Panel, Driver ICs, Control Circuit Board, Backlight and Inverter. By applying 8 bit digital data, 1280× 768, 16.7M-color images are displayed on the 29.6" diagonal screen. Input power voltage is 12.0V for LCD driving and 24.0V for Inverter. Interface of data and control signals is LVDS. General specifications are summarized in the following table:

ITEM	SPECIFICATION
Display Area(mm)	643.2(H) × 385.92(V) (29.6 inch diagonal)
Number of Pixels	1280(H) × 768(V)
Pixel Pitch(mm)	0.5025(H) × 0.5025(V)
Color Pixel Arrangement	RGB vertical strip
Display Mode	Normally Black
Number of Colors	16.7M (8bits/color)
Brightness(cd/m^2)	500(cd/m^2) @5.5mA
Response Time	16ms
Viewing Angle	(-85~85)(H), (-85~85)(V)(Typ.)
Wide Viewing Angle Technology	Multi-domain Homeotropic Alignment
Surface Treatment	Hard coating:3H Anti-reflective coating <less than 2% reflection
Electrical Interface	LVDS
Total Module Power(W)	<110W
Module Size(mm)	683.6(W) × 431.8(H) × 45.9(with inverter), 44.6(no inverter)
Module Weight(g)	5600 (Typ.)
Backlight Unit	16 CCFLs direct-lighting

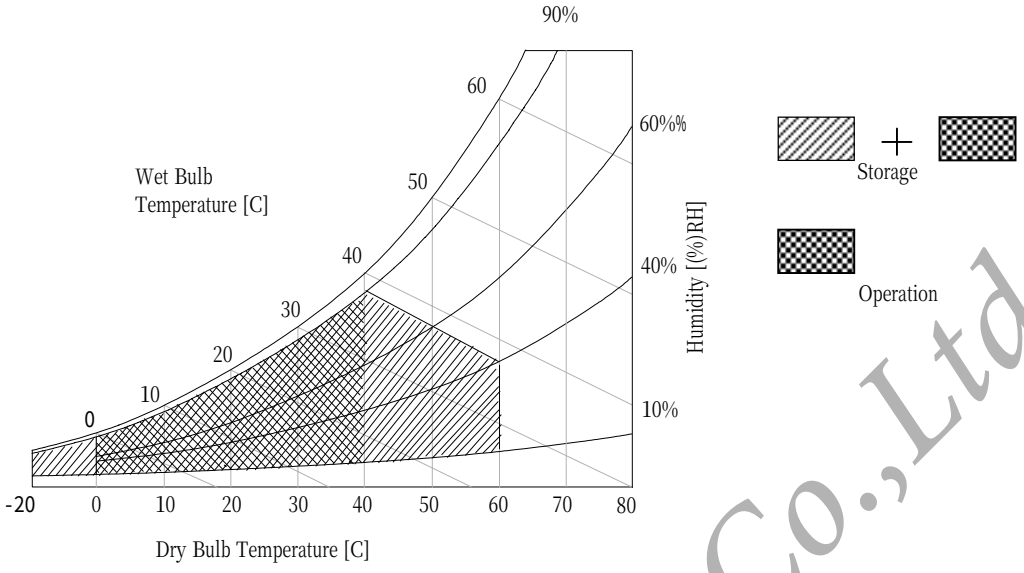
The LCD Products listed on this document are not suitable for use of aerospace equipment, submarine cables, nuclear reactor control system and life support systems. If customers intend to use these LCD products for above application or not listed in "Standard" as follows, please contact our sales people in advance.

Standard: Pure TV system, Computer, Office equipment, Communication equipment, Audio and Visual equipment, other consumer products.

2. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Power Supply Voltage for LCD	VCC	-0.3	16.0	V	
Input Voltage for Inverter	VIN	21.6	26.4	V	
Input Current for Inverter	IIN	-	6.2	A	
INVERTER dimming	-	3	0	Vdc	
INVERTER Frequence	FL	57	60	kHz	
ESD(Static electricity)	VESDt	-100	100	V	
	VESDc	-8000	8000	V	
ICC Rush Current	IRUSH	-	12	A	100 μsec
Operation Temperature	Top	0	50	°C	Note1,2
Storage Temperature	Tstg	-20	60	°C	Note1

[Note1]



[Note2] The temperature of panel display area should be min 0^0 and max 60^0

3. ELECTRICAL CHARACTERISTICS

(a)TFT-LCD

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	REMARK
Power Supply Voltage for LCD	VCC	11.4	12	12.6	V	Note1
Power Supply Current for LCD	ICC	--	540	770	mA	Note2
LVDS High Level Volatge	VIN+	--	--	100	mV	
LVDS Low Level Volatge	VIN-	100	--	--	mV	
LVDS COMMON voltage	VCM	1.125	1.25	1.375	V	
LVDS Impedance	R_T	--	100	--	ohm	

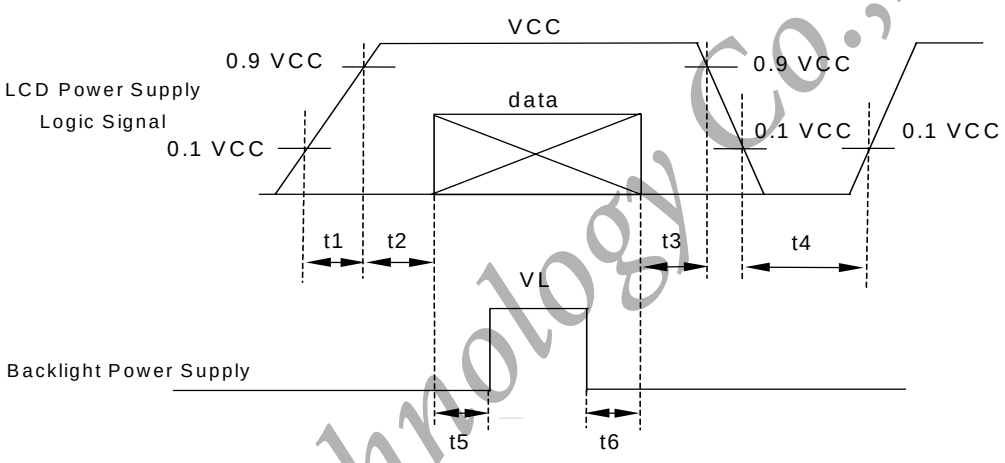
[Note 1]

1) VCC-turn-on conditions:

t1≧10ms 400ms≧t4

200ms≧t2 200ms≧t5

0≧t3≧50ms 0≧t6

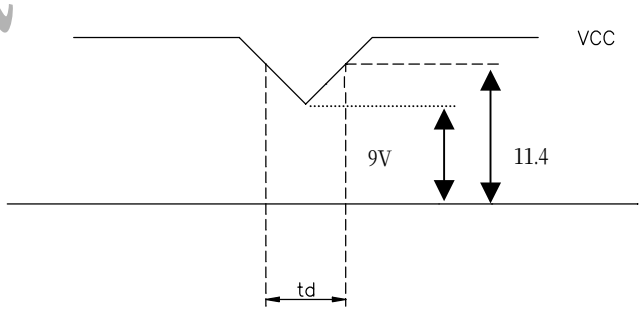


Data: RGB DATA, DCLK, HD, VD, DENA

2) VCC-dip conditions

- When 9V≦VCC<11.4V, then td≦10 ms
- VCC≧11.4V

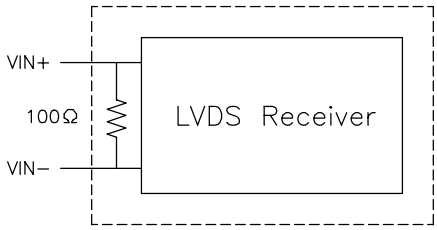
  VCC-dip conditions should also follow the VCC-turn-on conditions.

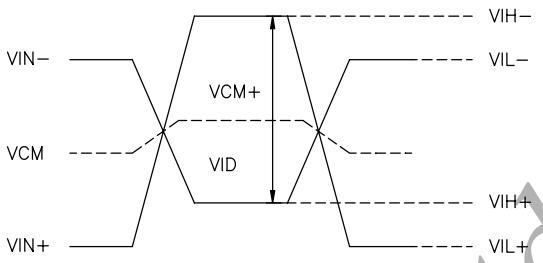


[Note 2] Typical current situation

256-gray-bar pattern, 768 line mode, VCC=12 V, f_H=48.8 kHz(20.5us)、f_V=60 Hz、f_{CLK}=70 MHz(14.3ns)

[Note 3] LVDS signal definition





$V_{ID} = V_{IN+} - V_{IN-}$

$\triangle V_{CM} = |V_{CM+} - V_{CM-}|$

$V_{ID+} = |V_{IH+} - V_{IH-}|$

$V_{CM} = (V_{IN+} + V_{IN-})/2$

$V_{CM+} = (V_{IH+} + V_{IH-})/2$

$\triangle V_{ID} = |V_{ID+} - V_{ID-}|$

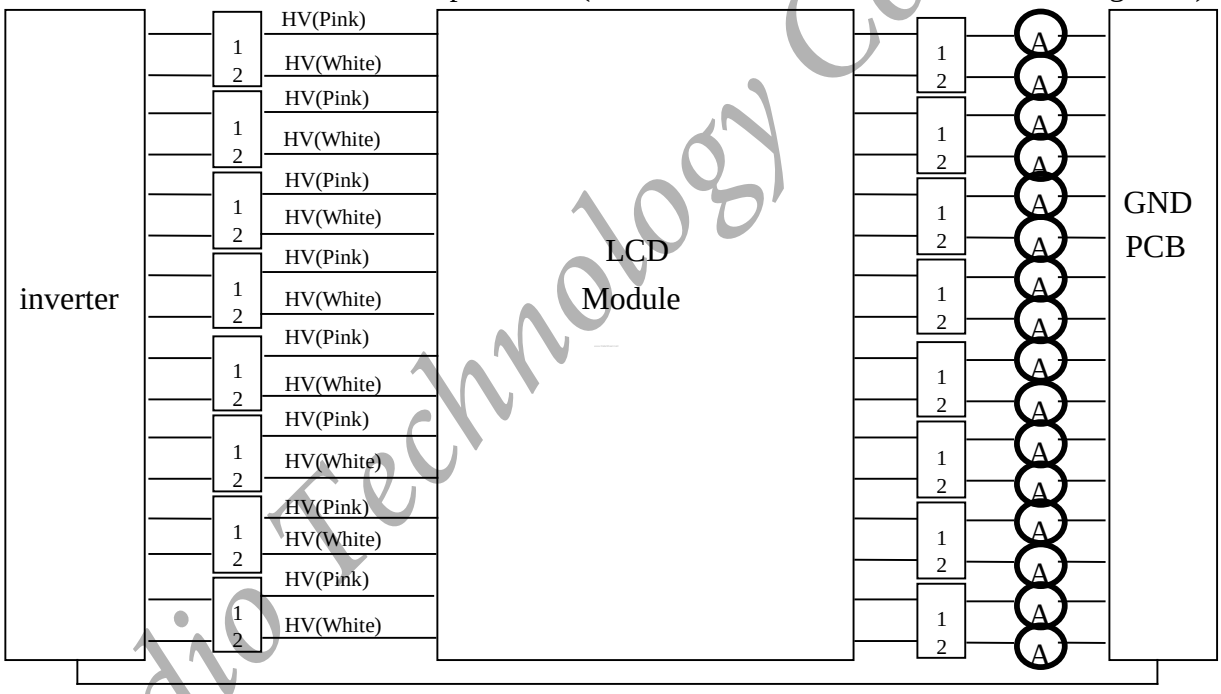
$V_{ID-} = |V_{IL+} - V_{IL-}|$

$V_{CM-} = (V_{IL+} + V_{IL-})/2$

(b)Backlight

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	REMARK
Lamp Voltage	VL	954	1060	1166	Vrms	IL=5.5mA
Lamp Current	IL	4.0	5.5	6.0	mArms	Note1~3
Interter Frequency	FI	57	-	60	kHz	Note1~3
INVERTER Voltage	VIN	21.6	24	26.4	V	Note4
INVERTER Current	IIN	-	5.2	6.2	A	
INVERTER dimming	VDIM(max)		0		Vdc	Note 5
	VDIM(min)		3		Vdc	
BL On/off	BLON(ON)	2	-	5	Vdc	Note 6
	BLON(OFF)	0	-	0.8	Vdc	
Starting Lamp Voltage	VS	-	1490	1870	Vrms	Ta=0 °C
		-	1150	1440	Vrms	Ta=25 °C
Lamp life Time	LT	60,000		-	hr	Note7

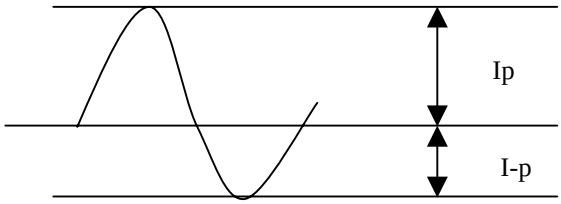
[Note1] Measurement Method of Lamp Current (the current meter is inserted in low voltage line)



[Note2] The influence of lamp frequency

This frequency range can keep the electrical and optical character within 10% variation. Lamp frequency may interfere with horizontal synchronous frequency (or vitical synchronous frequency), and then cause ripple noise on the display. Therefore, please adjust the frequency of lamp input, be removed inveter from module as possible, or use electronic shielding between inverter and module to avoid the interference.

[Note3] Wave request



Ip: high side peak

I-p: low side peak

The degrees of umbalance = (Ip-I-p)/Irms*100(%)

The ratio of wave height = Ip(or I-p)/Irms

[Note4]The rush voltage of Vin must less then 28V

[Note5] Bright control by **VDIM**: 0V: max brightness; 3V: min brightness

[Note6] Backlight on/off control by **BLON**

[Note7] Definination of the lamp life : The luminance reduced to 50% of initial value.

4. INTERFACE PIN CONNECTION

(a) CN1(TFT-LCD signal)

Used connector: FI-X30S-HF(JAE) or equivalent

Pin	Symbol	Function
1	VCC	Power supply,+12V
2	VCC	Power supply,+12V
3	GND	Ground
4	GND	Ground
5	TA-	Negative LVDS differential data input
6	TA+	Positive LVDS differential data input
7	GND	Ground
8	TB-	Negative LVDS differential data input
9	TB+	Positive LVDS differential data input
10	GND	Ground
11	TC-	Negative LVDS differential data input
12	TC+	Positive LVDS differential data input
13	GND	Ground
14	TCLK-	Negative LVDS differential clock input
15	TCLK+	Positive LVDS differential clock input
16	GND	Ground
17	TD-	Negative LVDS differential data input
18	TD+	Positive LVDS differential data input
19	GND	Ground
20	NC	
21	NC	
22	NC	
23	NC	
24	NC	
25	OVMD	FFD function (Low : FFD off ; High : FFD on)
26	NC	
27	NC	
28	NC	
29	NC	
30	NC	

(b) CN2(Inverter)

Inverter connector: S12B-PH-SM3-TB(JST)

Pin No	Signal name	Feature
1	VBL	+24V
2	VBL	+24V
3	VBL	+24V
4	VBL	+24V
5	VBL	+24V
6	GND	GND
7	GND	GND
8	GND	GND
9	GND	GND
10	GND	GND
11	VDIM	Dimming
12	BLON	BL ON/OFF

- VDIM ：MAX=0V ,MIN=3V
- BLON： ON=5V OFF=0V

(C) CN3 (Invertor)

Inverter connector: S10B-PH-SM3-TB(JST)

Pin No	Signal name	Feature
1	VBL	+24V
2	VBL	+24V
3	VBL	+24V
4	VBL	+24V
5	VBL	+24V
6	GND	GND
7	GND	GND
8	GND	GND
9	GND	GND
10	GND	GND

5. INTERFACE TIMING

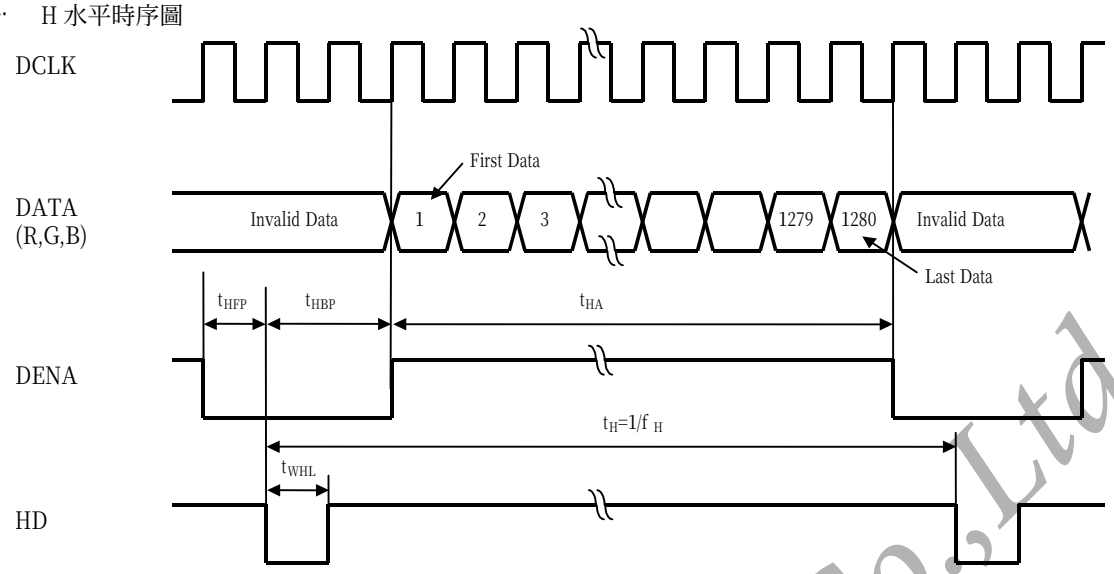
(a)Timing Specifications

項目		記號	最小	標準	最大	單位
DCLK*4)	Frequency	f_{CLK}	53.6	70	73	MHz
DATA Enable DENA *3)	Horizontal Active Time	t_{HA}	1280	1280	1280	t_{CLK}
	Horizontal Front Porch	t_{HFP}	32	58	-	t_{CLK}
	Horizontal Back Porch	t_{HBP}	56	84	-	t_{CLK}
	Vertical Active Time	t_{VA}	768	768	768	t_H
	Vertical Front Porch	t_{VFP}	2	14	-	t_H
	Vertical Back Porch	t_{VBP}	4	25	-	t_H
HD *2)*4)	Frequency	f_H	40.65	48.8	60.98	KHz
	Period	t_H	16.4	20.5	24.6	μs
	Pulse Width(low)	t_{WHL}	12	16	-	t_{CLK}
VD *2)*1)	Frequency	f_V	50	60	-	Hz
	Period	t_v	13.33	16.67	-	ms
	Pulse Width(low)	t_{WVL}	2	6	-	t_H

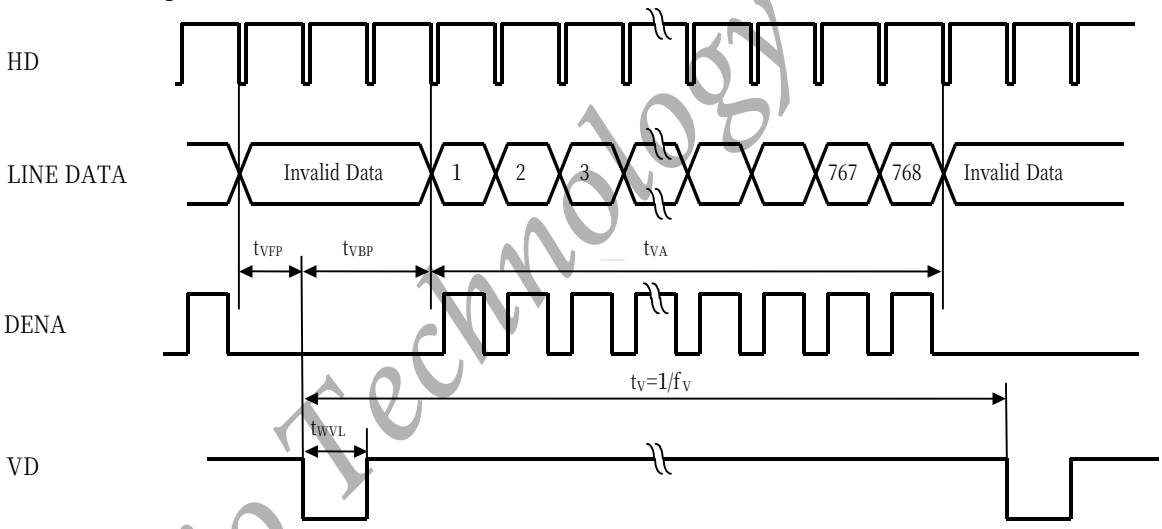
1) The best performance of over driving is at VD=60Hz
2) Data is latched at fall edge of DCLK in this specification.
3) Polaritites of HD and VD are negative in this specification.
4) DENA(Data Enable)should always be positive polarity as shown in the timing specification.
5) DCLK should appear during all blanking period, and HD should appear during blanking period of frame cycle.

(b)Timing chart

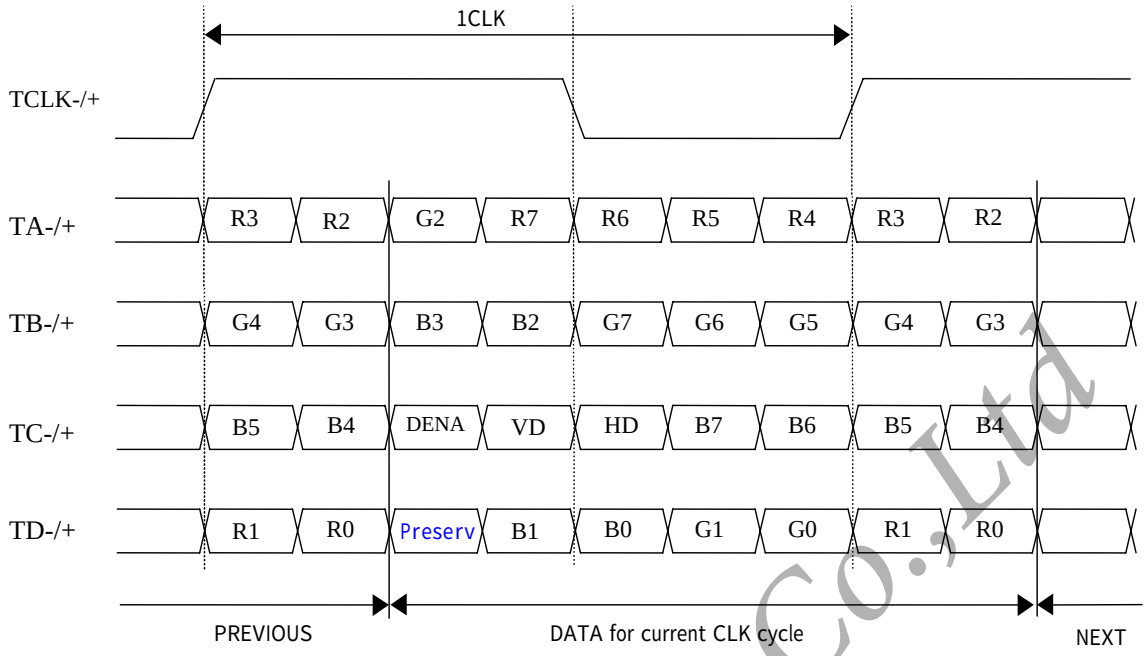
a. H 水平時序圖



b. Vertical Timing Chart



©LVDS Data mapping



8bit LSB: R0, G0, B0

Parallel TTL Data Inputs Mapped to LVDS output

(d) LVDS Interface

TRANSMITTER(THC63LVD823)		INTERFACE CONNECTOR		TIMING CONTROLLER INPUT
PIN NO	INPUT DATA	HOST	TFT_LCD	
51	TA0	TxOUT0+ TxOUT0-	TA+ TA-	R2
52	TA1			R3
54	TA2			R4
55	TA3			R5
56	TA4			R6
3	TA5			R7 (MSB)
4	TA6			G2
6	TB0	TxOUT1+ TxOUT1-	TB+ TB-	G3
7	TB1			G4
11	TB2			G5
12	TB3			G6
14	TB4			G7 (MSB)
15	TB5			B2
19	TB6			B3
20	TC0	TxOUT2+ TxOUT2-	TC+ TC-	B4
22	TC1			B5
23	TC2			B6
24	TC3			B7 (MSB)
27	TC4			Hsync
28	TC5			Vsync
30	TC6			DE
50	TD0	TxOUT3+ TxOUT3-	TD+ TD-	R0 (LSB)
2	TD1			R1
8	TD2			G0 (LSB)
10	TD3			G1
16	TD4			B0 (LSB)
18	TD5			B1
25	TD6			Preserve

(e)Color Data Assignment

COLOR	INPUT DATA	R DATA								G DATA								B DATA							
		R7 MSB	R6	R5	R4	R3	R2	R1	R0 LSB	G7 MSB	G6	G5	G4	G3	G2	G1	G0 LSB	B7 MSB	B6	B5	B4	B3	B2	B1	B0 LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	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	1	1	1	1	1	1
RED	RED(0)	0	0	0	0	0	0	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	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN(0)	0	0	0	0	0	0	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	0	0	0	0	1	0	0	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	0	00	0	0	1	0	0	0	0	0	0	0	0	0
	GREEN(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
BLUE	BLUE(0)	0	0	0	0	0	0	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	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	0	0	0	0	0	0	1	0
	BLUE(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

1) Definition of gray scale:
Color(n) : n indicates gray scale level.
Higher n means brighter level.

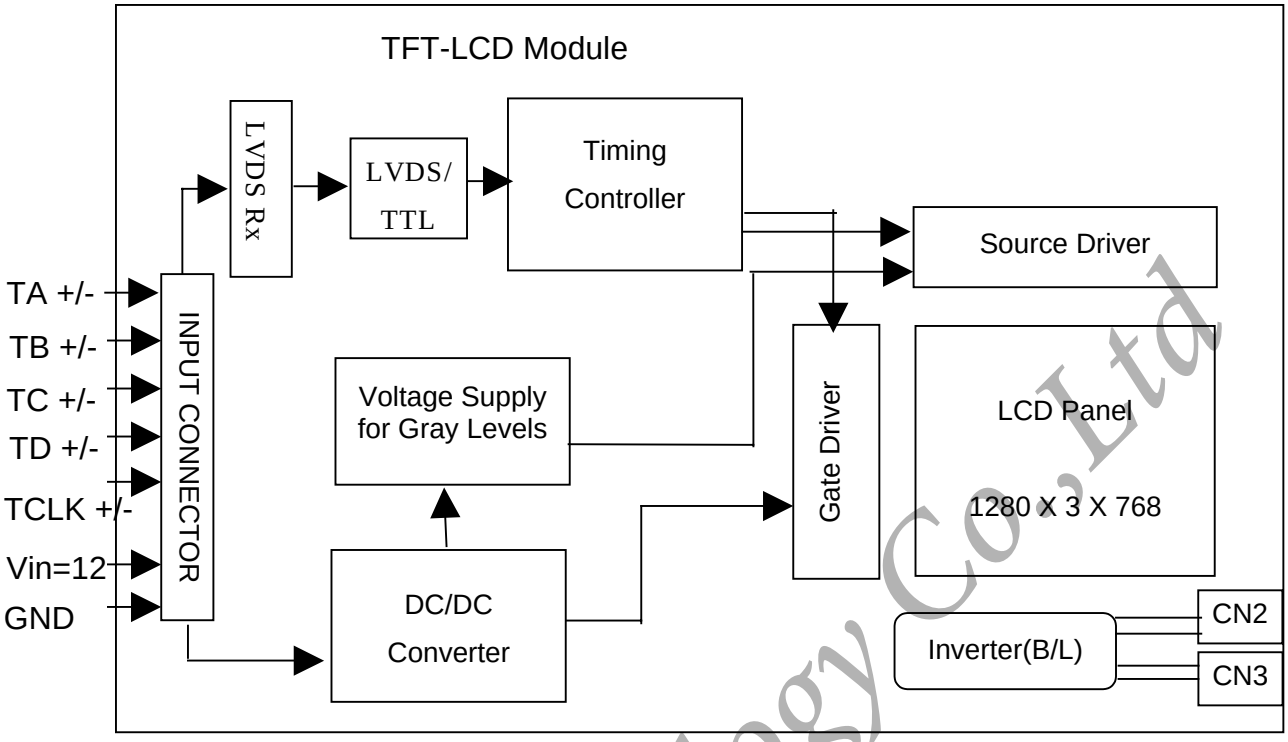
2) Data:1-High,0-Low.
3) This assignment is applied to both odd and even data.

(f) Pixel Mapping

D(1, 1)	D(2, 1)	---	D(X, 1)	---	D(1279, 1)	D(1280, 1)
D(1, 2)	D(2, 2)	---	D(X, 2)	---	D(1279, 2)	D(1280, 2)
⋮	⋮	+	⋮	+	⋮	⋮
D(1, Y)	D(2, Y)	---	D(X, Y)	---	D(1279, Y)	D(1280, Y)
⋮	⋮	+	⋮	+	⋮	⋮
D(1,767)	D(2,767)	---	D(X,767)	---	D(1279,767)	D(1280,767))
D(1,768)	D(2,768)	---	D(X,768)	---	D(1279,768)	D(1280,768)

6. BLOCK DIAGRAM

(a) TFT-LCD Module



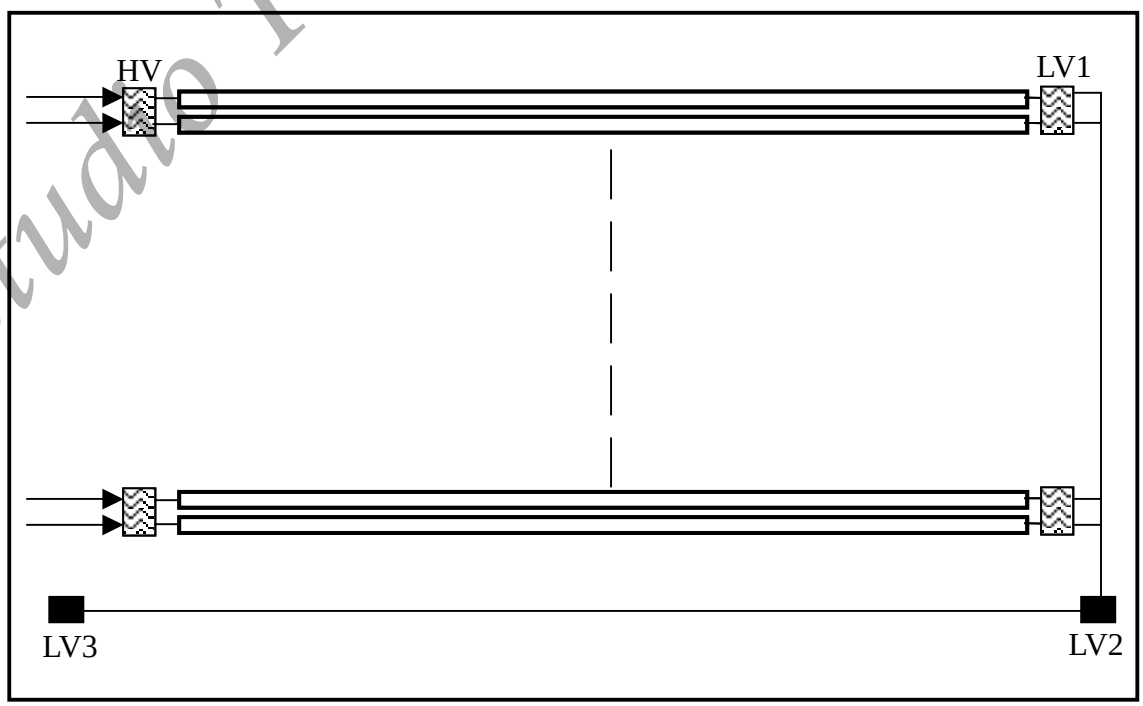
(b) BACKLIGHT UNIT

Lamp connector

HV： BHR-02(8.0)VS-1(JST)*8 Mating connector：SM02(8.0)B-BHS-1-TA(JST)

LV1：BHSR-02VS-1(JST)*8 Mating connector：SM02B-BHSS-1-TB(JST)

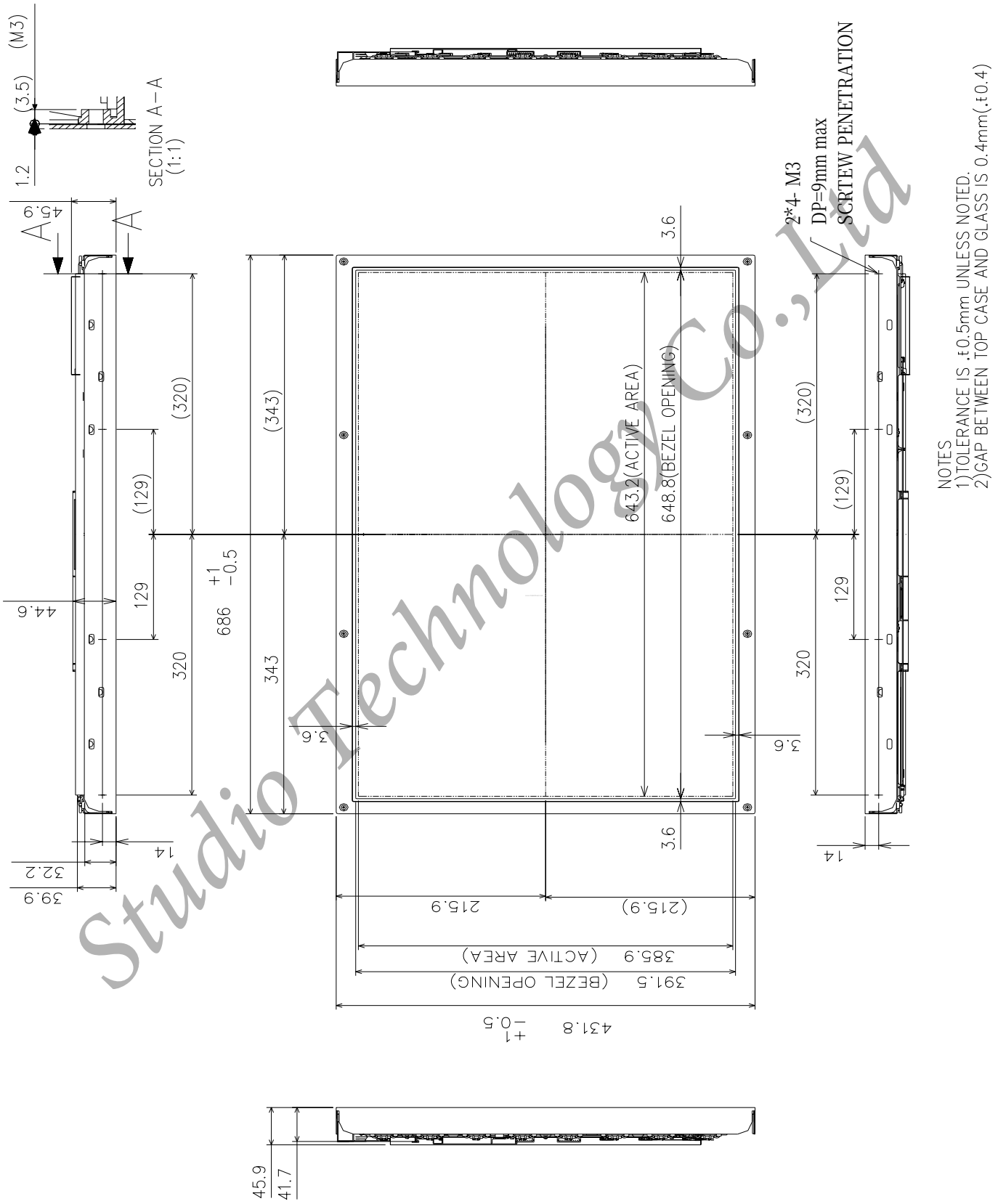
LV2：ZHR-2(JST) LV3：ZHR-2 (JST) Mating connector：S2B-ZR-SM3A-TF(JST)



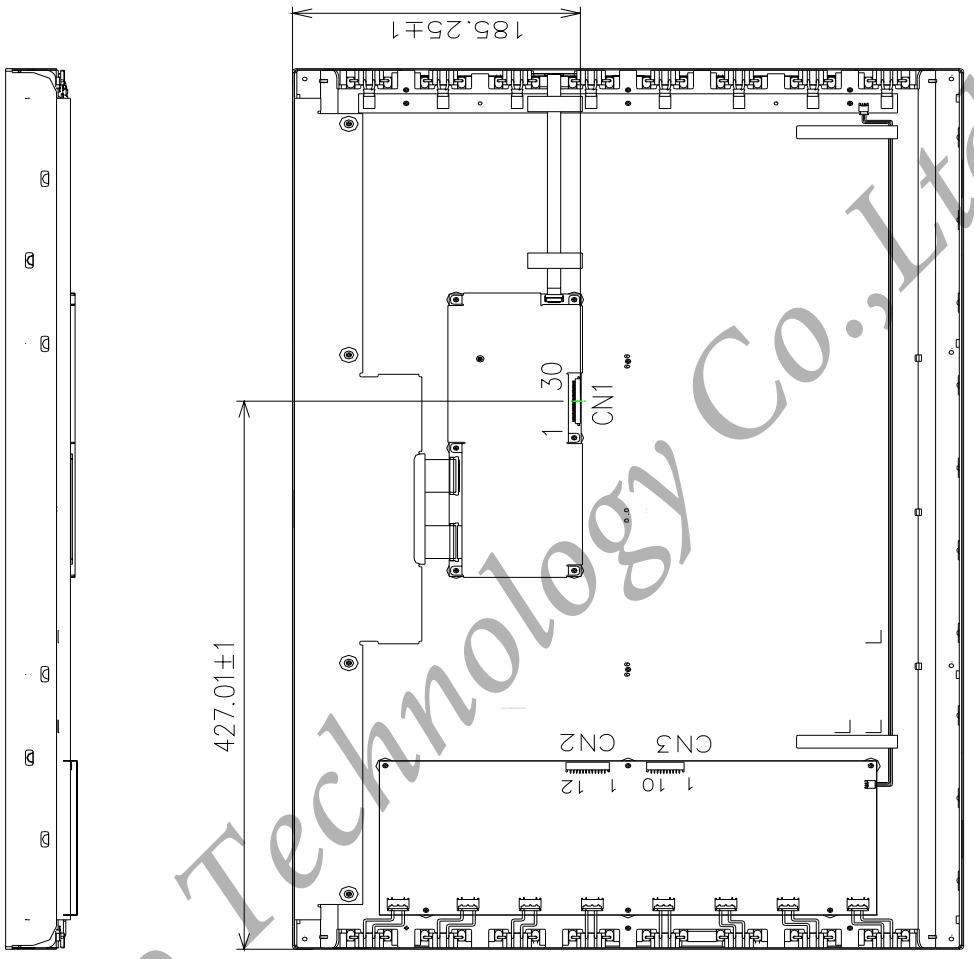
7. MECHANICAL SPECIFICATION

(a) Front side

Unit: mm



(b) Rear side (with inverter)



8.OPTICAL CHARACTERISTICS

Ta=25℃,VCC=5.0V

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	Notes
Contrast Ratio		CR	θ = ϕ = 0°	400	500	--	-	*1)*2)*3)
Luminance	Center	Lw	θ = ϕ = 0°	400	500	--	cd/m^2	*2)*3)
	Uniformity	ΔLw	θ = ϕ = 0°	70%-	--	--	%	*2)*3)
Response Time (White - Black)		tr	θ = ϕ = 0°	--	8	12	ms	*3)*4)
		tf	θ = ϕ = 0°	--	8	13	ms	*3)*4)
Response Time (Gray Scale Level)		Trg, Tfg	θ = ϕ = 0°	--	16	25		*3)*5)
Viewing Angle	Horizontal	ϕ	CR≧10	-75--75	-85~85	--	°	*2)*3)
	Vertical	θ		-75~75	-85~85	--	°	*2)*3)
Color Coordinates	Red	x y	θ = ϕ = 0°	0.609 0.294	0.639 0.324	0.669 0.354	-	*2)*3)
	Green	x y		0.231 0.575	0.261 0.605	0.291 0.635		
	Blue	x y		0.113 0.019	0.143 0.049	0.173 0.079		
	White	x y		0.253 0.267	0.283 0.297	0.313 0.327		

- These items are measured by BM-5A(TOPCON) or CS-1000 (MINOLUTA) in the dark room (no ambient light) after putting panel in normal temperature 10 minutes and lighting the lamps 20 minutes.
- Brightness condiction : BLON=High, VDIM=0V (IL=5.5mA)
- Definition of these measurement items are as follows:

*1) Definition of Contrast Ratio

CR=ON(White)Luminance/OFF(Black)Luminance

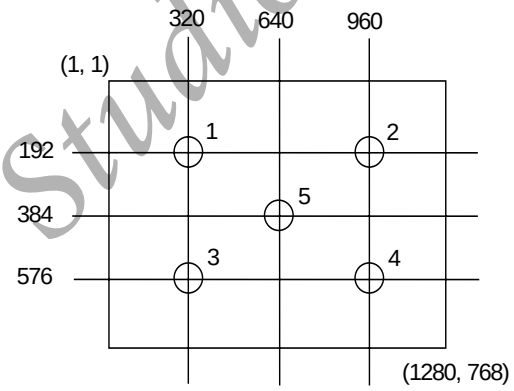
*2) Defintion of luminance and contrast ratio measured position

(a) Measured the 5th point on the below(c) for Lw and CR

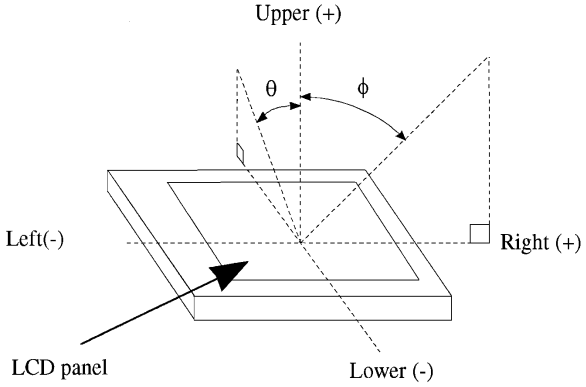
(b) ◁Lw=[L(Min)/L(Max)]×100%

(c)Measured points as below.

*3) Definition of Viewing Angle(ϴ,ϕ)

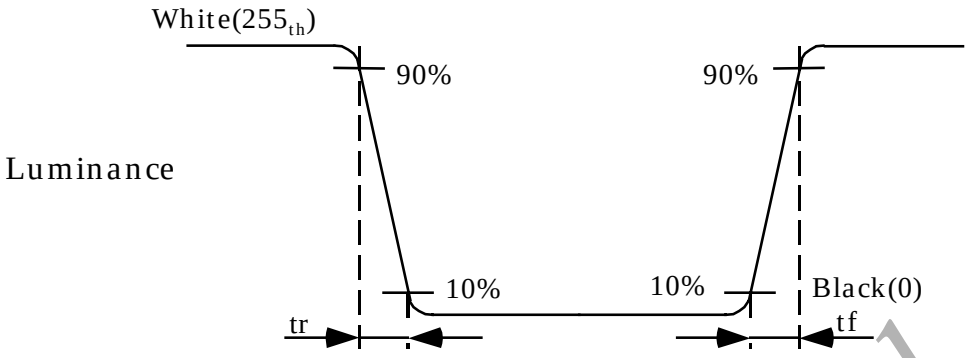


Measurement Points

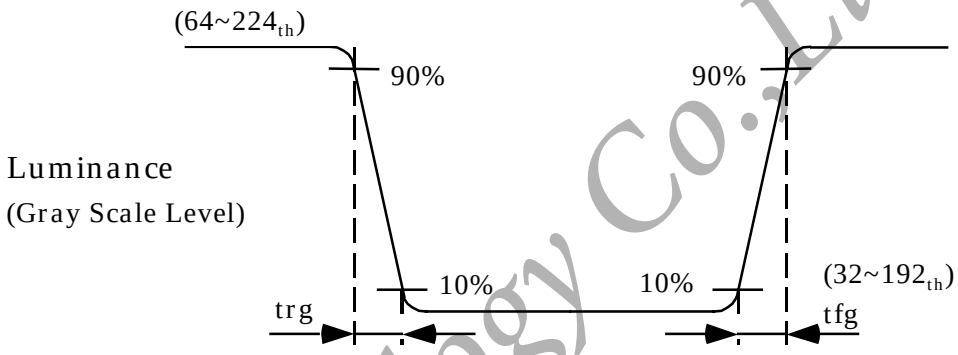


Viewing Angle(ϴ,ϕ)

*4) Definition of Response Time (White - Black)



*5) Definition of Response Time (Gray Scale Level)



9.RELIABILITY TEST CONDITIONS

(1)Temperature and Humidity

TEST ITEMS	CONDITIONS
HIGH TEMPERATURE HIGH HUMIDITY OPERATION	40℃,90%RH,240h (No condensation)
HIGH TEMPERATURE OPERATION	50℃,240h
HIGH TEMPERATURE STORAGE	60℃,240h
LOW TEMPERATURE OPERATION	0℃,240h
LOW TEMPERATURE STORAGE	-20℃,240h
THERMAL SHOCK	BETWEEN -20℃(1hr)AND 60℃(1hr),5 CYCLES

(2)Shock & Vibration

ITEMS	CONDITIONS
SHOCK (NON- OPERATION)	Shock level:1470m/s^2(150G) Waveform: half sinusoidal wave, 2ms Number of shocks: one shock input in each direction of three mutually perpendicular axes for a total of six shock inputs
	Shock level:392m/s^2(40G) Waveform: trapezoid wave, 11ms Number of shocks: one shock input in each direction of three mutually perpendicular axes for a total of six shock inputs
VIBRATION (NON- OPERATION)	Vibration level: 9.8m/s^2(1.0G) zero to peak Waveform: sinusoidal Frequency range: 5 to 500 Hz Frequency sweep rate: 0.5 octave/min Duration: one sweep from 5 to 500 to 5 Hz in each of three mutually perpendicular axis(each x,y,z axis: 1 hour, total 3 hours)

(3)Judgment standard

The judgment of the above test should be made as follow:

Pass: Normal display image with no obvious non-uniformity and no line defect. Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defects.

10. HANDLING PRECAUTIONS FOR TFT-LCD MODULE

Please pay attention to the followings in handling- TFT-LCD products;

1 ASSEMBLY PRECAUTION

(1) Please use the mounting hole on the module side in installing and do not beading or wrenching LCD in assembling. And please do not drop, bend or twist LCD module in handling.

(2) Please design display housing in accordance with the following guide lines.

(2.1) Housing case must be destined carefully so as not to put stresses on LCD all sides and not to wrench module. The stresses may cause non-uniformity even if there is no non-uniformity statically.

(2.2) Keep sufficient clearance between LCD module back surface and housing when the LCD module is mounted. Approximately 1.0 mm of the clearance in the design is recommended taking into account the tolerance of LCD module thickness and mounting structure height on the housing.

(2.3) When some parts, such as, FPC cable and ferrite plate, are installed underneath the LCD module, still sufficient clearance is required, such as 0.5mm. This clearance is, especially, to be reconsidered when the additional parts are implemented for EMI countermeasure.

(2.4) Design the inverter location and connector position carefully so as not to give stress to lamp cable, or not to interface the LCD module by the lamp cable.

(2.5) Keep sufficient clearance between LCD module and the others parts, such as inverter and speaker so as not to interface the LCD module. Approximately 1.0mm of the clearance in the design is recommended.

(3) Please do not push or scratch LCD panel surface with any-thing hard. And do not soil LCD panel surface by touching with bare hands. (Polarizer film, surface of LCD panel is easy to be flawed.)

(4) Please do not press any parts on the rear side such as source TCP, gate TCP, control circuit board and FPCs during handling LCD module. If pressing rear part is unavoidable, handle the LCD module with care not to damage them.

(5) Please wipe out LCD panel surface with absorbent cotton or soft cloth in case of it being soiled.

(6) Please wipe out drops of adhesives like saliva and water on LCD panel surface immediately. They might damage to cause panel surface variation and color change.

(7) Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.

(8) Please do not touch metal frames with bare hands and soiled gloves. A color change of the metal frames can happen during a long preservation of soiled LCD modules.

(9) Please pay attention to handling lead wire of backlight so that it is not tugged in connecting wit inverter.

2 OPERATING PRECAUTIONS

(1) Please be sure to turn off the power supply before connecting and disconnecting signal input cable.

(2) Please do not change variable resistance settings in LCD module. They are adjusted to the most suitable value. If they are changed, it might happen LCD does not satisfy the characteristics specification.

(3) Please consider that LCD backlight takes longer time to become stable of radiation characteristics in low temperature than in room temperature.

(4) A condensation might happen on the surface and inside of LCD module in case of sudden charge of ambient temperature.

(5) Please pay attention to displaying the same pattern for very long time. Image might stick on LCD. If then, time going on can make LCD work well.
(6) Please obey the same caution descriptions as ones that need to pay attention to ordinary electronic parts.

3 PRECAUTFONSWITHELECTROSTATICS

(1) This LCD module use CMOS-IC on circuit board and TFT-LCD panel, and so it is easy to be affected by electrostatics. Please be careful with electrostatics by the way of your body connecting to the ground and so on.
(2) Please remove protection film very slowly on the surface of LCD module to prevent from electrostatics occurrence.

4 STORAGE PRECAUTIONS

(1) When you store LCDs for a long time, it is recommended to keep the temperature between 0℃ ~40℃ without the exposure of sunlight and to keep the humidity less than 90%RH.
(2) Please do not leave the LCDs in the environment of high humidity and high temperature such as 60℃ 90%RH.
(3) Please do not leave the LCDs in the environment of low temperature; below -20℃.

5 SAFETY PRECAUTIONS

(1) When you waste LCDS, it is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.
(2) If any liquid leaks out of a damaged-glass cell and comes in contact with the hands, wash off throughly with soap and water.

6 OTHERS

(1) A strong incident light into LCD panel might cause display characteristics' changing inferior because of polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight Land strong UV rays.
(2) Please pay attention to a panel side of LCD module not to contact with other materials in preserving it alone.
(3) For the. packaging box, please pay attention to the followings:
  (3.1) Packaging box and inner case for LCD are designed to protect the LCDs from the damage or scratching during transportation. Please do not open except picking LCDs up from the box.
  (3.2) Please do not pile them up more than 5 boxes. (They are not designed so.) And please do not turn over.
  (3.3) Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
  (3.4) Packing box and inner case for LCDs are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)