SHARP

No.	LD – 15252B
DATE	APR. 24. 2003

TECHNICAL LITERATURE

FOR

TFT - LCD module

MODEL No. LQ295T3LZ41

The technical literature is subject to change without notice. So, please contact SHARP or its representative before designing your product based on this literature.

DEVELOPMENT ENGINEERING DEPT. II
AVC LIQUID CRYSTAL DISPLAY DIVISION
AVC LIQUID CRYSTAL DISPLAY GROUP
SHARP CORPORATION

RECORDS OF REVISION

LQ295T3LZ41

SPEC No.	DATE	REVISED No.	PAGE	SUMMARY	NOTE
LD-15252	FEB. 28. 2003	-	-	-	1 st Issue
LD-15252A	APR. 10. 2003	▲1	4	Add Page No4	
		▲1	6	Add Mating connector SHR-07V-S(JST)	
		▲1	7	Add Mating connector PHR-3(JST)	
		▲1	7	Add Mating connector PHR-6(JST)	
		▲1	9	Add RINO	
		▲1	13	Change Response time (any level)	
		▲1	13	Change Contrast ratio 500→ 800	
		▲1	13	Change Luminance of White 450→500	
LD-15252B	APR. 24. 2003	▲1	6	Change explanation of O/S driving	
		▲2	14	Correct Response time value	
		▲3	14	Change explanation of Response time	
		▲4	1	Decided to apply → applies	

1. Application

This technical literature applies to the color 29.5" Wide XGA TFT-LCD module LQ295T3LZ41.

* The device listed in these technical literature sheets was designed and manufactured for use in AV equipment.

* In case of using the device for applications such as control and safety equipment for transportation (aircraft, trains, automobiles, etc.), rescue and security equipment and various safety related equipment which require higher reliability and safety, take into consideration that appropriate measures such as fail-safe functions and redundant system design should be taken.

* Do not use the device for equipment that requires an extreme level of reliability, such as aerospace applications, telecommunication equipment (trunk lines), nuclear power control equipment and medical or other equipment for life support.

* SHARP assumes no responsibility for any damage resulting from the use of the device which does not comply with the instructions and the precautions specified in these technical literature sheets.

* Contact and consult with a SHARP sales representative for any questions about this device.

2. Overview

This module is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, control circuit, power supply circuit, inverter circuit and back light system etc. Graphics and texts can be displayed on a 1280×RGB×768 dots panel with 16,777,216 colors by using LVDS (Low Voltage Differential Signaling) to interface, +5V of DC supply voltages and supply voltage for back light.

This module also includes the DC/AC inverter to drive the CCFT . ▲4

And in order to improve the response time of LCD, this module applies the O/S (over shoot) driving technology for the control circuit .In the O/S driving technology, signals are being applied to the Liquid Crystal according to a pre-fixed process as an image signal of the present frame when a difference is found between image signal of the previous frame and that of the current frame after comparing them.

By using the captioned process, the image signals of this LCD module are being set so that image response can be completed within one frame, as a result, image blur can be improved and clear image performance can be realized.

3. Mechanical Specifications

Parameter	Specifications	Unit
Display size	75 (Diagonal)	cm
	29.5 (Diagonal)	inch
Active area	643.20 (H) x 384.77 (V)	mm
Pixel Format	1280 (H) x 768 (V)	pixel
	(1pixel = R + G + B dot)	
Pixel pitch	0.5025(H) x 0.501 (V)	mm
Pixel configuration	B, G, R vertical stripe	
Display mode	Normally black	
Unit Outline Dimensions *1	718.1(W) x 445.6(H) x 51.3(D)	mm
Mass	8400±330	g
Surface treatment	Anti glare, low reflection coating Hard coating: 2H Haze: 23 +/- 5%	

(*1)Outline dimensions are shown in Fig.1

4. Input Terminals

4-1. TFT panel driving

CN1 (Interface signals and +5VDC power supply) (Shown in Fig.1)

Using connector ：FI-X30S-HF (Japan Aviation Electronics Ind., Ltd.)

Mating connector ：FI-X30H,FI-X30C or FI-X30M (Japan Aviation Electronics Ind., Ltd.)

Using LVDS receiver ：THC63LVDF84B (Thine)

Mating LVDS transmitter：THC63LVDM83A or equivalent device

Pin No.	Symbol	Function	Remark
1	VCC	+5V Power Supply	
2	VCC	+5V Power Supply	
3	VCC	+5V Power Supply	
4	VCC	+5V Power Supply	
5	GND	GND	
6	GND	GND	
7	GND	GND	
8	GND	GND	
9	SELLVDS	Select LVDS data order 【Note1】	Pull up Default H:3.3V
10	NC		
11	GND	Ground	
12	RIN0-	Negative (-) LVDS differential data input	LVDS
13	RIN0+	Positive (+) LVDS differential data input	LVDS
14	GND	Ground	
15	RIN1-	Negative (-) LVDS differential data input	LVDS
16	RIN1+	Positive (+) LVDS differential data input	LVDS
17	GND	Ground	
18	RIN2-	Negative (-) LVDS differential data input	LVDS
19	RIN2+	Positive (+) LVDS differential data input	LVDS
20	GND	Ground	
21	CLKIN-	Clock Signal(-)	LVDS
22	CLKIN+	Clock Signal(+)	LVDS
23	GND	Ground	
24	RIN3-	Negative (-) LVDS differential data input	LVDS
25	RIN3+	Positive (+) LVDS differential data input	LVDS
26	GND	Ground	
27	R/L	Horizontal shift direction【Note 3】	Pull down Default L:0V
28	U/D	Vertical shift direction【Note 3】	Pull down Default L:0V
29	Reserved		
30	Reserved		

* Shield case on the Back of module contacts to GND of internal circuit.

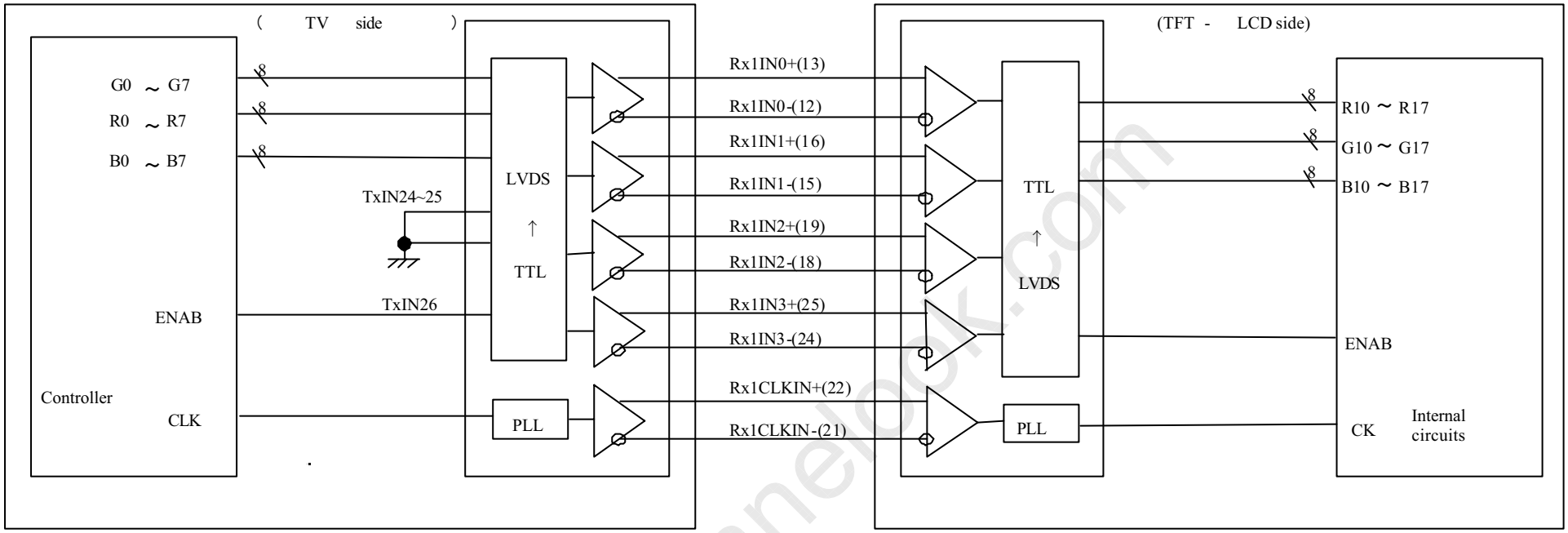
【Note1】SELLVDS

SELLVDS enable to select input Data order by tying this pin to GND or 3.3V.

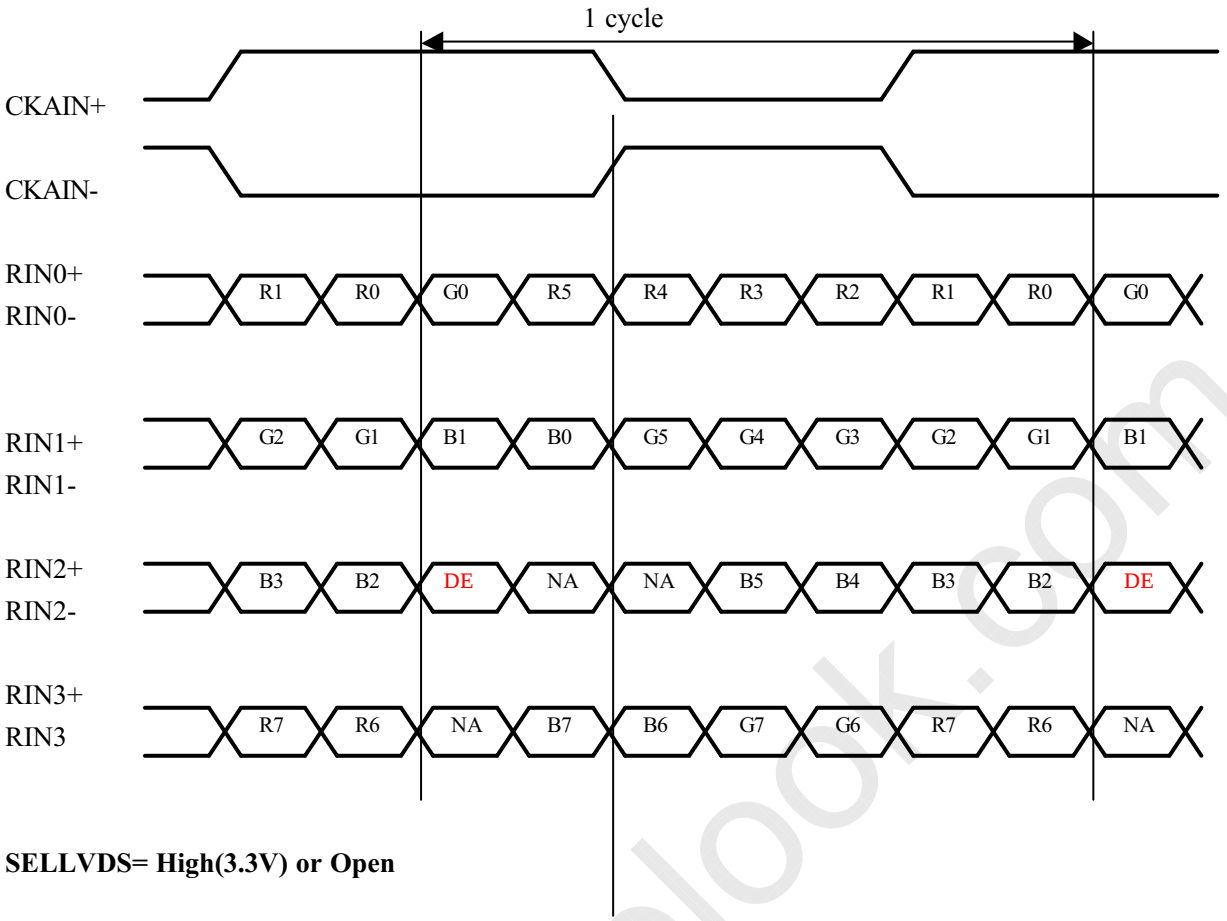
Transmitter		SELLVDS	
Pin No	Data	=L(GND)	=H(3.3V) or Open
51	TA0	R0(LSB)	R2
52	TA1	R1	R3
54	TA2	R2	R4
55	TA3	R3	R5
56	TA4	R4	R6
3	TA5	R5	R7(MSB)
4	TA6	G0(LSB)	G2
6	TB0	G1	G3
7	TB1	G2	G4
11	TB2	G3	G5
12	TB3	G4	G6
14	TB4	G5	G7(MSB)
15	TB5	B0(LSB)	B2
19	TB6	B1	B3
20	TC0	B2	B4
22	TC1	B3	B5
23	TC2	B4	B6
24	TC3	B5	B7(MSB)
27	TC4	NC	NC
28	TC5	(RSV1)	(RSV1)
30	TC6	DE	DE
50	TD0	R6	R0(LSB)
2	TD1	R7(MSB)	R1
8	TD2	G6	G0(LSB)
10	TD3	G7(MSB)	G1
16	TD4	B6	B0(LSB)
18	TD5	B7(MSB)	B1
25	TD6	(NA)	(NA)

Interface block diagram

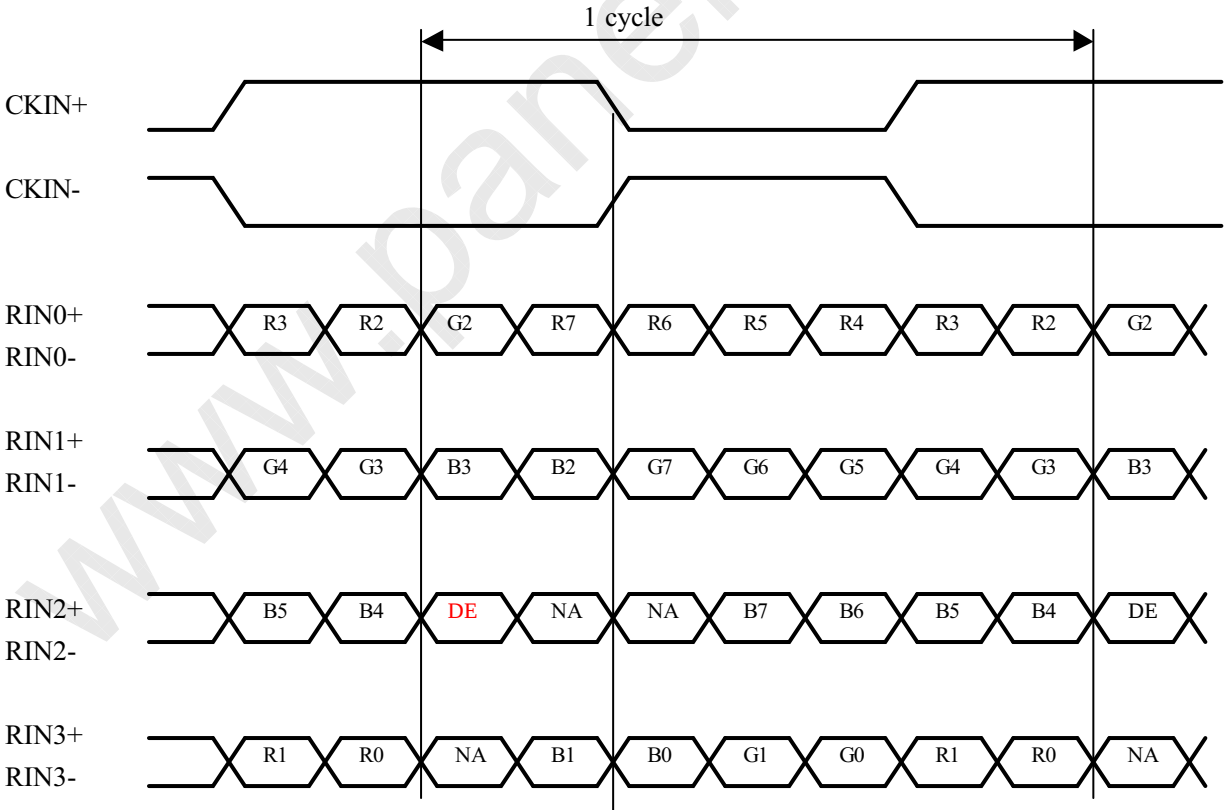
Using receiver: THC63LVDF84B(THine), Corresponding Transmitter:THC63LVDM83A(THine)



SELLVDS= Low(GND)



SELLVDS= High(3.3V) or Open



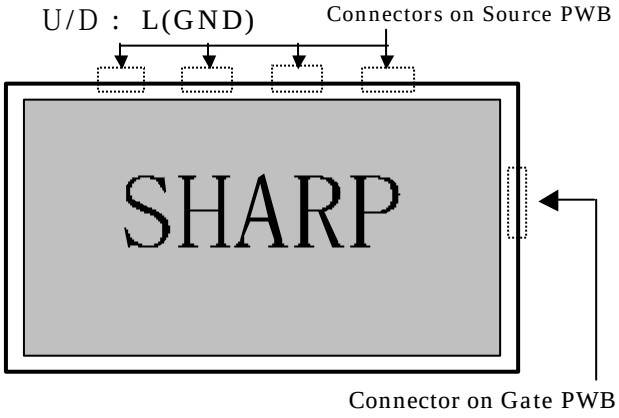
DE: Display Enable

NA: Not Available (Fixed Low)

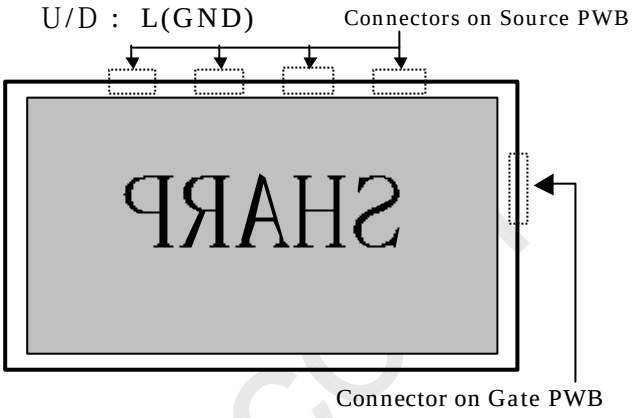
【Note 2】The horizontal display start timing is settled in accordance with a rising timing of DE signal.
Don't keep DE " High " during operation .

【Note 3】Image on panel will change like below by setting Pin27(Horizontal shift direction) ,Pin28(Vertical shift direction)

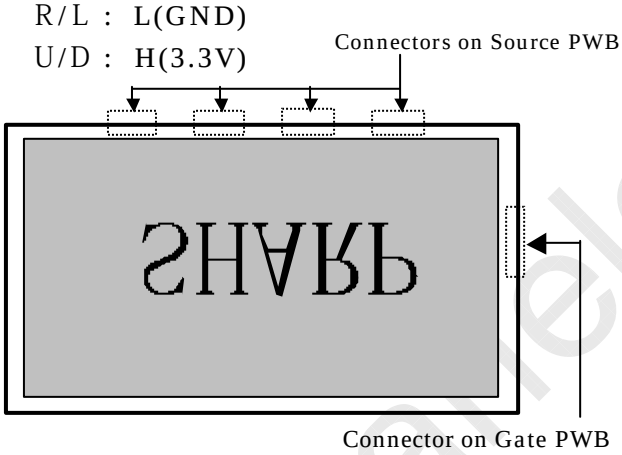
Normal (Default)
R/L : L(GND)
U/D : L(GND)



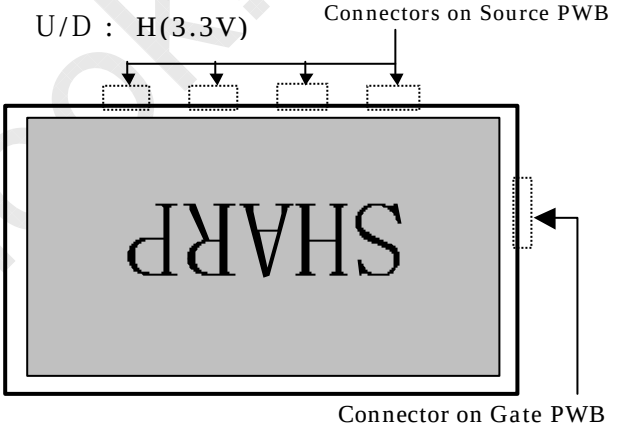
Reversed image with Horizontal
R/L : H(3.3V)
U/D : L(GND)



Reversed image with vertical
R/L : L(GND)
U/D : H(3.3V)



Reversed image with Horizontal and Vertical
R/L : H(3.3V)
U/D : H(3.3V)



CN2(O/S control) -(Shown Fig 1)

OS Driving Pin No and function Using connector: SM07B-SRSS-TB-A (JST)

Mating connector:SHR-07V-S or SHR-07V-S-B(JST) 0: (GND) ,1: (3.3V)

Pin No.	Function	Default
1	Frame frequency setting 0:50Hz, 1:60Hz	0: (GND through10k ohm register internally)
2	O/S operation setting 0:off, 1:on	0: (GND through10k ohm register internally)
3	Reserved	0: (GND through10k ohm register internally)
4	Reserved	0: (GND through10k ohm register internally)
5	Data2 of panel surface temperature	0: (GND through10k ohm register internally)
6	Data1 of panel surface temperature	0: (GND through10k ohm register internally)
7	Gnd	

According to the surface temperature of the panel, enter the optimum 2 bit signal into pin No.5,6. ▲1

Measuring the correlation between detected temperature by the senser on PWB in users side and actual surface Temperature of panel,convert the temperature detected by the sensor to the surface temperature of panel to Enter the 2 bit temperature data.

Pin no.	O/S driving	Panel surface temperature ℃			
		0-15	15-25	25-40	Over 40
5	1	0	0	1	1
6	1	0	1	0	1

For overlapping temperatures (such as 15℃,25℃,40℃) select the optimum parameter, judging from the actual picture image.

4-2. Backlight driving

CN3 (Inverter control) Using connector: S3B-PH-SM3-TB(JST) Mating connector:PHR-3(JST)

Pin No.	Symbol	Function	Remark
1	V_{ON}	Inverter ON/OFF	【Note 1】
2	V_{BRT}	Brightness Control	【Note 2】
3	GND	GND	

【Note 1】 Inverter ON/OFF

Input voltage	Function
5V	Inverter: ON
0V	Inverter: OFF

【Note 2】 Brightness Control

This analog control voltage (0V to 5V) control Brightness(note : Absolute maximum rating 0 ~ + 6V)

Input voltage	Function
5V	Brightness Control (15%) : (Dark)
0V	Brightness Control (100%) : (Bright)

CN1,CN2 (Inverter Power input Pin layout) Using connector: S6B-PH-SM3-TB (JST)

Mating connector:PHR-6(JST)

Pin No.	Function
1	12V
2	12V
3	12V
4	GND
5	GND
6	GND

*GND of Inverter doesn't contact GND of LCD module.

4-3. Lamp characteristics

The back light system is direct type with 12 CCFTs(Cold Cathode Fluorescent Tube).

The characteristics of the lamp are shown in the following table. The value mentioned below is at the case of one CCFT.

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Life time	T_L	50000	-	-	Hour	【Note 1】

【Note 1】Lamp life time is defined as the time when the situation 1 occurs in the continuous operation under the condition of Ta=25 ℃ and brightness control(100%).

1. Brightness becomes 50% of the original value under standard condition.

5. Absolute Maximum Ratings

Parameter	Symbol	Condition	Ratings	Unit	Remark
Input voltage (for Control)	V_I	Ta=25 ℃	-0.3 ~ 3.6	V	【Note 1】
5V supply voltage (for Control)	VCC	Ta=25 ℃	0 ~ + 6	V	
Input voltage (for Inverter)	V_{BRT} V_{ON}	Ta=25 ℃	0 ~ + 6	V	
12V supply voltage (for Inverter)	V_{INV}	Ta=25 ℃	0 ~ +14	V	
Storage temperature	Tstg	-	-25 ~ +60	℃	【Note 2】
Operation temperature (Ambient)	Topa	-	0 ~ +50	℃	

【Note 1】SELLVDS, R/L, U/D

【Note 2】Humidity 95%RH Max.(Ta≦40 ℃)

Maximum wet-bulb temperature at 39 ℃ or less.(Ta>40 ℃) No condensation.

6. Electrical Characteristics

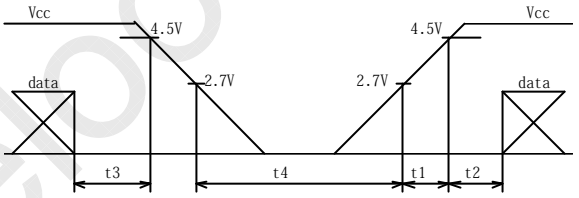
6-1. Control circuit driving Ta=25 ℃

Parameter		Symbol	Min.	Typ.	Max.	Uniit	Remark
+5V supply voltage	Supply voltage	Vcc	+4.5	+5.0	+5.5	V	【Note 1】
	Current dissipation	Icc	-	1.30	2.30	A	【Note 2】
Permissible input ripple voltage		V_{RP}	-	-	100	mV_{P-P}	Vcc = +5.0V
Differential input threshold voltage	High	V_{TH}	-	-	100	mV	V_{CM} = +1.2V 【Note 8】
	Low	V_{TL}	-100	-	-	mV	
Input Low voltage		V_{IL}	-	-	1.0	V	【Note 3】
Input High voltage		V_{IH}	2.3	3.3	3.6	V	
Input leak current (Low)		I_{IL1}	-	-	5	μA	V_I= 0V 【Note 4】
		I_{IL2}	-	-	360	μA	V_I= 0V 【Note 5】
Input leak current (High)		I_{IH1}	-	-	360	μA	V_I =3.3V 【Note 6】
		I_{IH2}	-	-	15	μA	V_I =3.3V 【Note 7】
Terminal resistor		R_T	-	100	-	Ω	Differential input

【Note】V_{CM}: Common mode voltage of LVDS driver.

【Note 1】

1) Input voltage sequences



0 < t1 ≦ 10ms, 0 < t2 ≦ 10ms

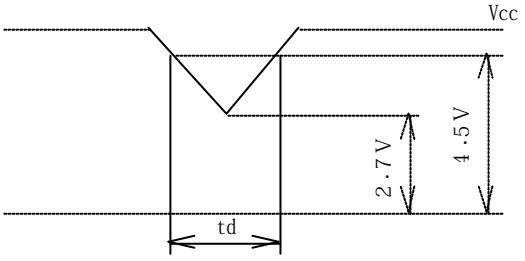
0 < t3 ≦ 1s, t4 ≧ 1s

2) Dip conditions for supply voltage

a) 2.7V ≦ Vcc < 4.5V

td ≦ 10ms

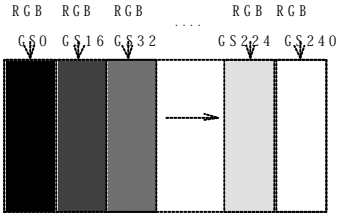
b) Vcc < 2.7V



Condition of Dip conditions for supply voltage is based on input voltage sequence.

【Note 2】Typical current situation: 16 gray-bar pattern (Vcc = +5.0V)

The explanation of RGB gray scale is seen in section 8.



【Note 3】R/L, U/D, SELLVDS

【Note 4】R/L, U/D

【Note 5】SELLVDS

【Note 6】R/L, U/D

【Note 7】SELLVDS

【Note 8】CKIN,RIN0, RIN1, RIN2, RIN3

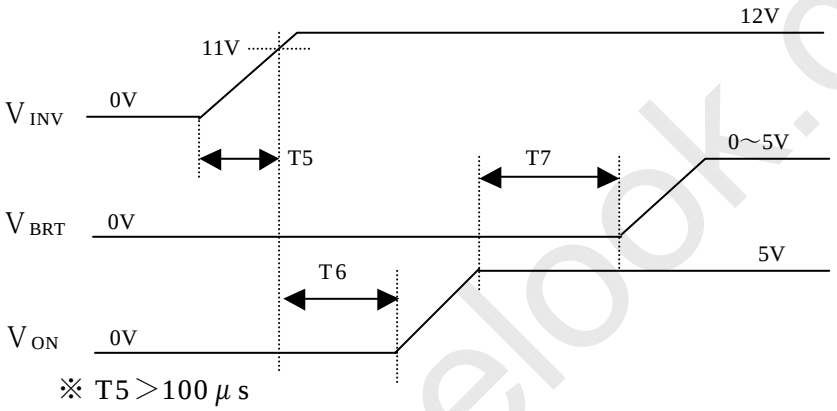
6-2. Inverter driving for back light

The back light system is under-lighting type with 12 CCFTs (Cold Cathode Fluorescent Tube).

Ta=25℃

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
+12V	Current dissipation	I_{INV}	5.1	6.8	8.5	A	V_{INV} = 12V V_{BRT} = 0V
	Supply voltage	V_{INV}	11	12	13	V	【Note 1】
Permissible input ripple voltage		V_{RP}	-	-	200	mV_{P-P}	V_{INV} = +12V
Input voltage (Low)		V_{ONL}	-	-	0.5	V	【Note 1,2】 impedance=24.7kΩ
Input voltage (High)		V_{ONH}	3	-	5.0	V	
Brightness control voltage(100%)		V_{BRT}	0	-	0.3	V	【Note 1,3, 4】 impedance=20.6kΩ
Brightness control voltage		V_{BRT}	0.7		5.0	V	

【Note 1】 1)V_{INV}-turn-on condition

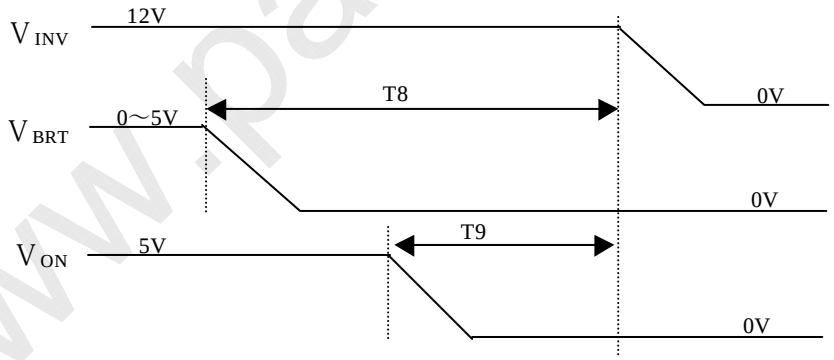


※ T5＞100μs

※ T6＞1ms

※ T7＞1ms

2) V_{INV}-turn-off condition



※ T8＞1ms

※ T9＞1ms

【Note 2】 V_{ON}

【Note 3】 V_{BRT}

【Note 4】 Refrain from using the device under the condition of V_{BRT}=0.5±0.2V because of the possibility of flicker on display. In case of V_{BRT}>5.0V, the protective circuit may stop driving the inverter.

7. Timing characteristics of input signals

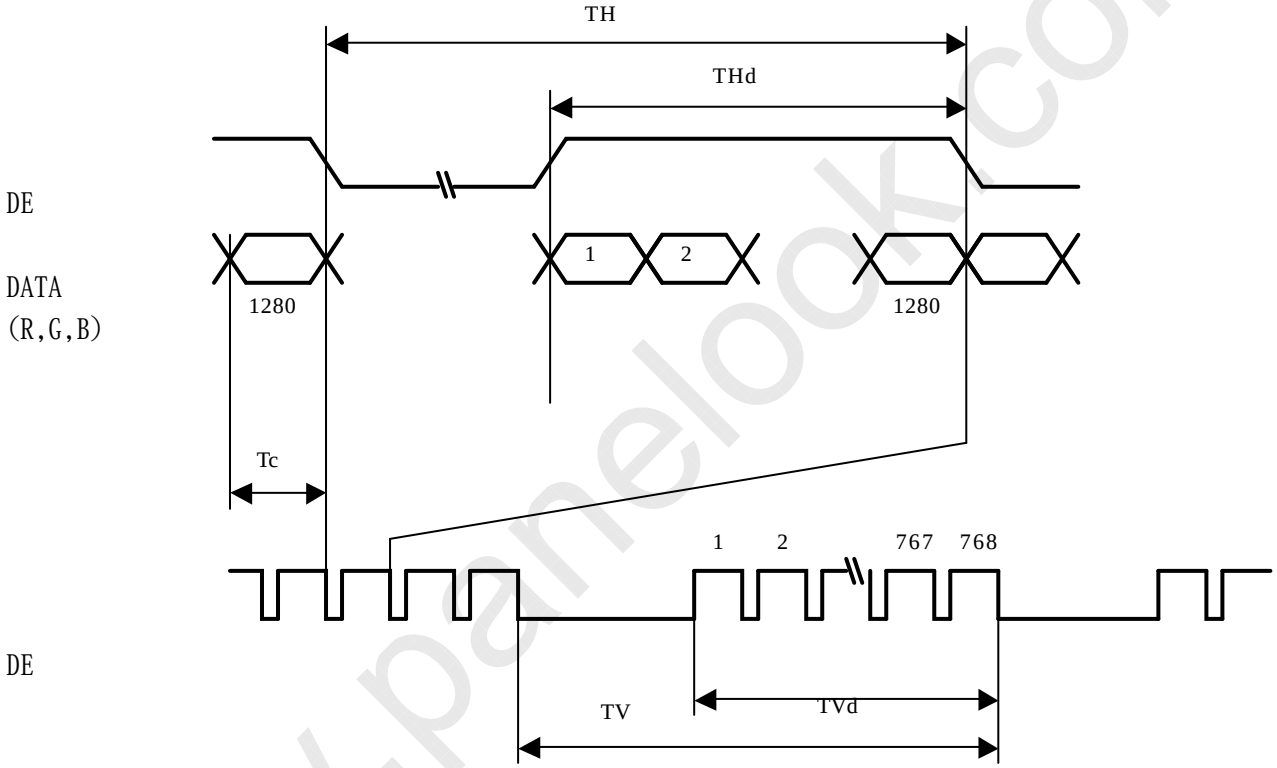
7-1. Timing characteristics

Timing diagrams of input signal are shown in Fig.3.

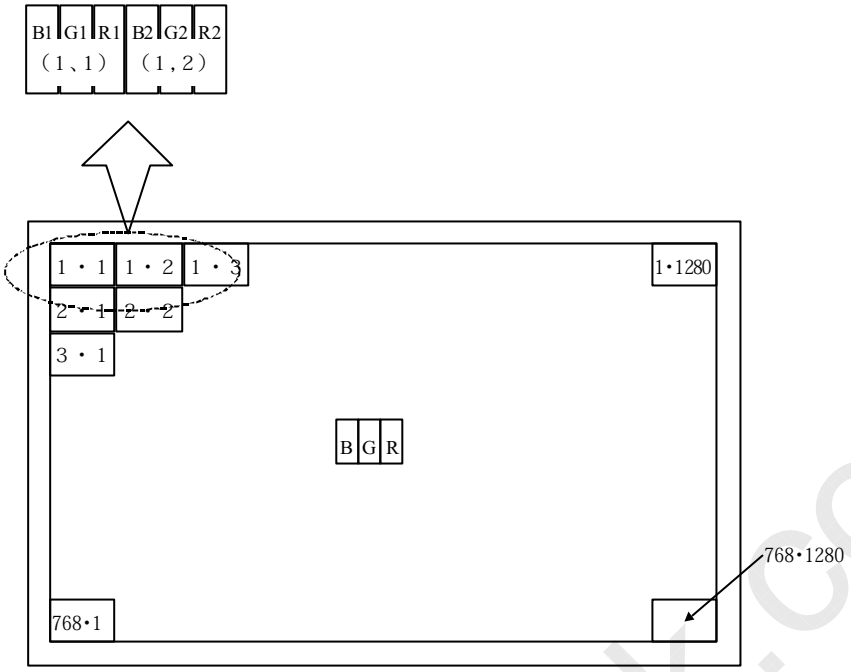
Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Clock	Frequency	1/Tc	-	82	85	MHz	
Data enable signal	Horizontal period	TH	1588	1696	1940	clock	
			19.37	20.67	-	μs	
	Horizontal period (High)	THd	1280	1280	1280	clock	
	Vertical period	TV	803	806	972	line	【Note1】
	Vertical period (High)	TVd	768	768	768	line	

【Note1】 In case of using the long vertical period, the deterioration of display quality, flicker etc. may occur.

【Note2】 In case of turn-off, turn-off may be after input signal for “black”.



7-2. Input data signal and display position on the screen



Display Position of Data (V,H)

8. Input Signal, Basic Display Colors and Gray Scale of Each Color

	Colors & Gray scale	Data signal																							
		Gray Scale	R0	R1	R2	R3	R4	R5	R6	R7	G0	G1	G2	G3	G4	G5	G6	G7	B0	B1	B2	B3	B4	B5	B6	B7
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
	Blue	—	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	—	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	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
	Red	—	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	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
Gray Scale of Red	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	↓					↓								↓								↓			
	⇩	↓					↓								↓								↓			
	Brighter	GS253	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇩	GS254	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS255	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	↓					↓								↓								↓			
	⇩	↓					↓								↓								↓			
	Brighter	GS253	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	⇩	GS254	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Green	GS255	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of Blue	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	⇧	↓					↓								↓								↓			
	⇩	↓					↓								↓								↓			
	Brighter	GS253	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1
	⇩	GS254	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
	Blue	GS255	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

0 : Low level voltage, 1 : High level voltage.

Each basic color can be displayed in 256 gray scales from 8 bit data signals. According to the combination of total 24 bit data signals, the 16-million-color display can be achieved on the screen.

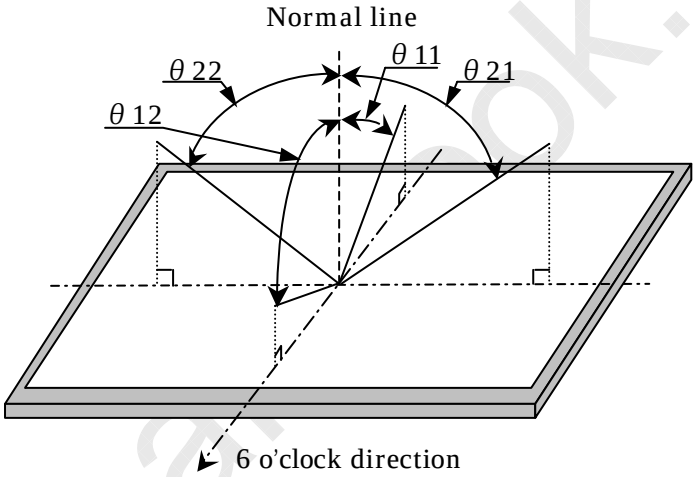
9. Optical characteristics

Ta=25℃, Vcc = +5V, V_{INV} = +12V

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle range	Horizontal	θ 21, θ 22	CR≧10	70	85	-	Deg.	【Note1,4】 V_{BRT}=0V
	Vertical	θ 11 θ 12		70	85	-	Deg.	
Contrast ratio		CRn	θ =0 deg.	-	(800)	-		【Note2,4】 V_{BRT}=0V
Response time		τ r τ d		-	(15)	TBD	ms	【Note3,4,5】 V_{BRT}=0V ▲2
Luminance of white		X		TBD	(0.308)	TBD		V_{BRT}=0V 【Note 4】
		Y		TBD	(0.329)	TBD		
Luminance of white		Y_{L1}		-	(500)	-	cd/m^2	V_{BRT}=0V 【Note 4】
Luminance uniformity		δ W		-	-	(1.25)		【Note 6】

*The measurement shall be executed 30 minutes after lighting at rating.

【Note 1】Definitions of viewing angle range :



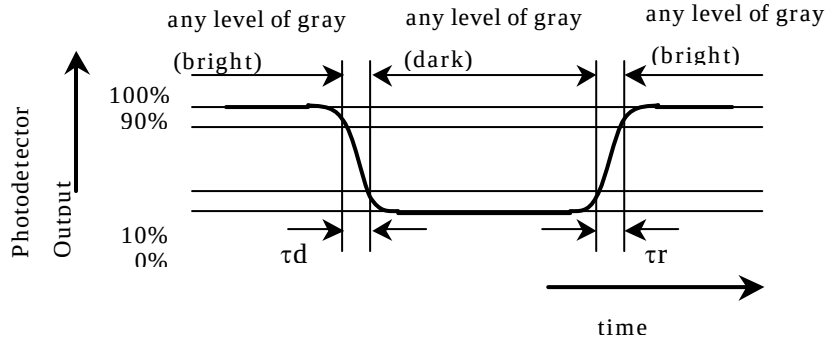
【Note 2】Definition of contrast ratio :

The contrast ratio is defined as the following.

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance(brightness) with all pixels white}}{\text{Luminance(brightness) with all pixels black}}$$

【Note 3】Definition of response time with O/S driving ▲3

The response time is defined as the following figure and shall be measured by switching the input signal for "any level of gray (bright)" and "any level of gray (dark)".



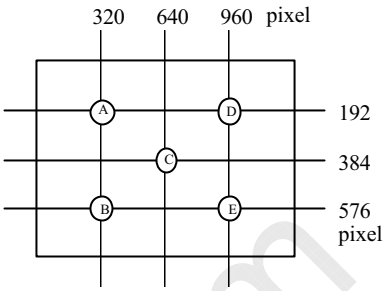
【Note 4】This shall be measured at center of the screen.

【Note 5】(15ms) is the value when over shoot driving is used .

【Note 6】Definition of white uniformity ;

White uniformity is defined as the following with five measurements.(A～E)

$$\delta_W = \frac{\text{maximum Luminance of five points(brightness)}}{\text{minimum Luminance of five points(brightness)}}$$



10. Display Quality

The display quality of the color TFT-LCD module shall be compliance with the incoming inspection standard.

11. Handling Precautions of the module

a) Be sure to turn off the power supply when inserting or disconnecting the cable.

b) Brightness control voltage is switched for "ON" and "OFF", as shown in Fig.4. Voltage difference generated by this switching, ΔV_{INV}, may affect a sound output, etc. when the power supply is shared between the inverter and its surrounding circuit. So, separate the power supply of the inverter circuit with the one of its surrounding circuit.

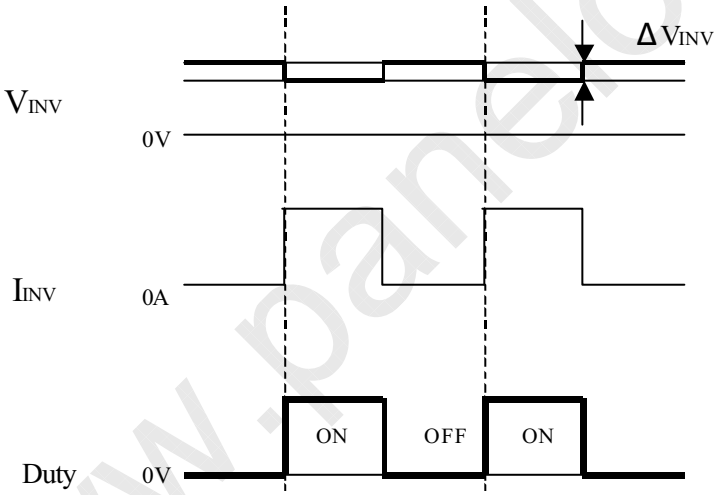


Fig.4 Brightness control voltage.

Since inverter board's GND is not connected to the frame of the LCD module, please connect it with the Customer's GND of inverter power supply.

c) Be sure to design the cabinet so that the module can be installed without any extra stress such as warp or twist.

d) Since the front polarizer is easily damaged, pay attention not to scratch it.

e) Since long contact with water may cause discoloration or spots, wipe off water drop immediately.

f) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

g) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.

h) Since CMOS LSI is used in this module, take care of static electricity and take the human earth into consideration when handling.

i) The module has some printed circuit boards (PCBs) on the back side, take care to keep them form any stress or pressure when handling or installing the module; otherwise some of electronic parts on the PCBs may be

damaged.

j) Observe all other precautionary requirements in handling components.

k) When some pressure is added onto the module from rear side constantly, it causes display non-uniformity issue, functional defect, etc.. So, please avoid such design.

l) When giving a touch to the panel at power on supply, it may cause some kinds of degradation. In that case, once turn off the power supply, and turn on after several seconds again, and that is disappear.

m) When handling LCD modules and assembling them into cabinets, please be noted that long-term storage in the environment of oxidization or deoxidization gas and the use of such materials as reagent, solvent, adhesive, resin, etc. which generate these gasses, may cause corrosion and discoloration of the LCD modules.

12. Packing form

a) Piling number of cartons: 4 maximum

b) Packing quantity in one carton: 2

c) Carton size: 827mm(W) x 427mm(H) x 589mm(D)

d) Total mass of one carton filled with full modules: 22.5kg

13. Reliability test item

No.	Test item	Condition
1	High temperature storage test	Ta=60℃ 240h
2	Low temperature storage test	Ta=-10℃ 240h
3	High temperature and high humidity operation test	Ta=40℃ ; 95%RH 240h (No condensation)
4	High temperature operation test	Ta=50℃ 240h
5	Low temperature operation test	Ta=0℃ 240h
6	Vibration test (non-operation)	Frequency : 10~57Hz/Vibration width(one side) : 0.075mm : 58~500Hz/Acceleration : 9.8 m/s2 Sweep time: 11 minutes Test period : 3 hours(1h for each direction of X,Y,Z)
7	Shock test (non-operation)	Maximum acceleration : 490m/s2 Pulse width : 11ms,sinusoidal half wave Direction : +/-X,+/-Y,+/-Z,once for each direction.

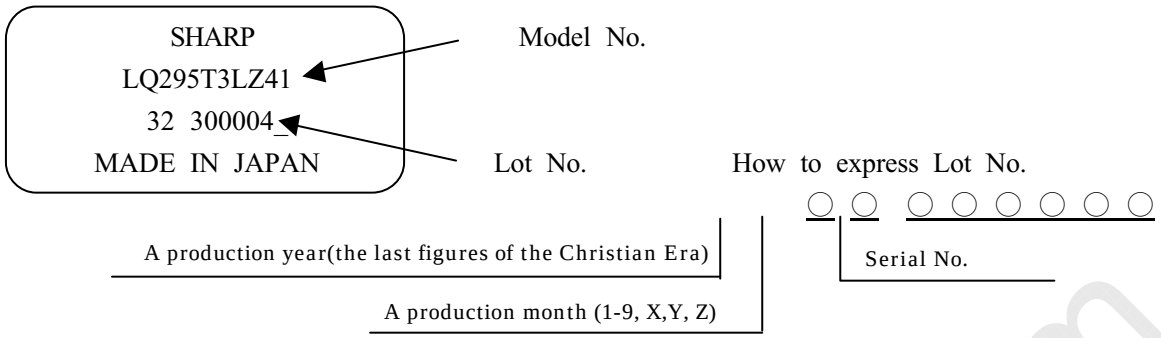
【Note】Ta= Ambient temperature

【Result evaluation criteria】

Under the display quality test condition with normal operation state, there shall be no change which may Affect practical display function.

14. Others

1)Lot No. Label ;



2) Adjusting volume have been set optimally before shipment, so do not change any adjusted value. If adjusted value is changed, the specification may not be satisfied.

3)Disassembling the module can cause permanent damage and should be strictly avoided.

4)Please be careful since image retention may occur when a fixed pattern is displayed for a long time.

5)Be sure to turn off the power supply of the inverter circuit before turning off the one of the control circuit.

6)Rust on the module is not taken up a problem.

7)When any question or issue occurs, it shall be solved by mutual discussion.

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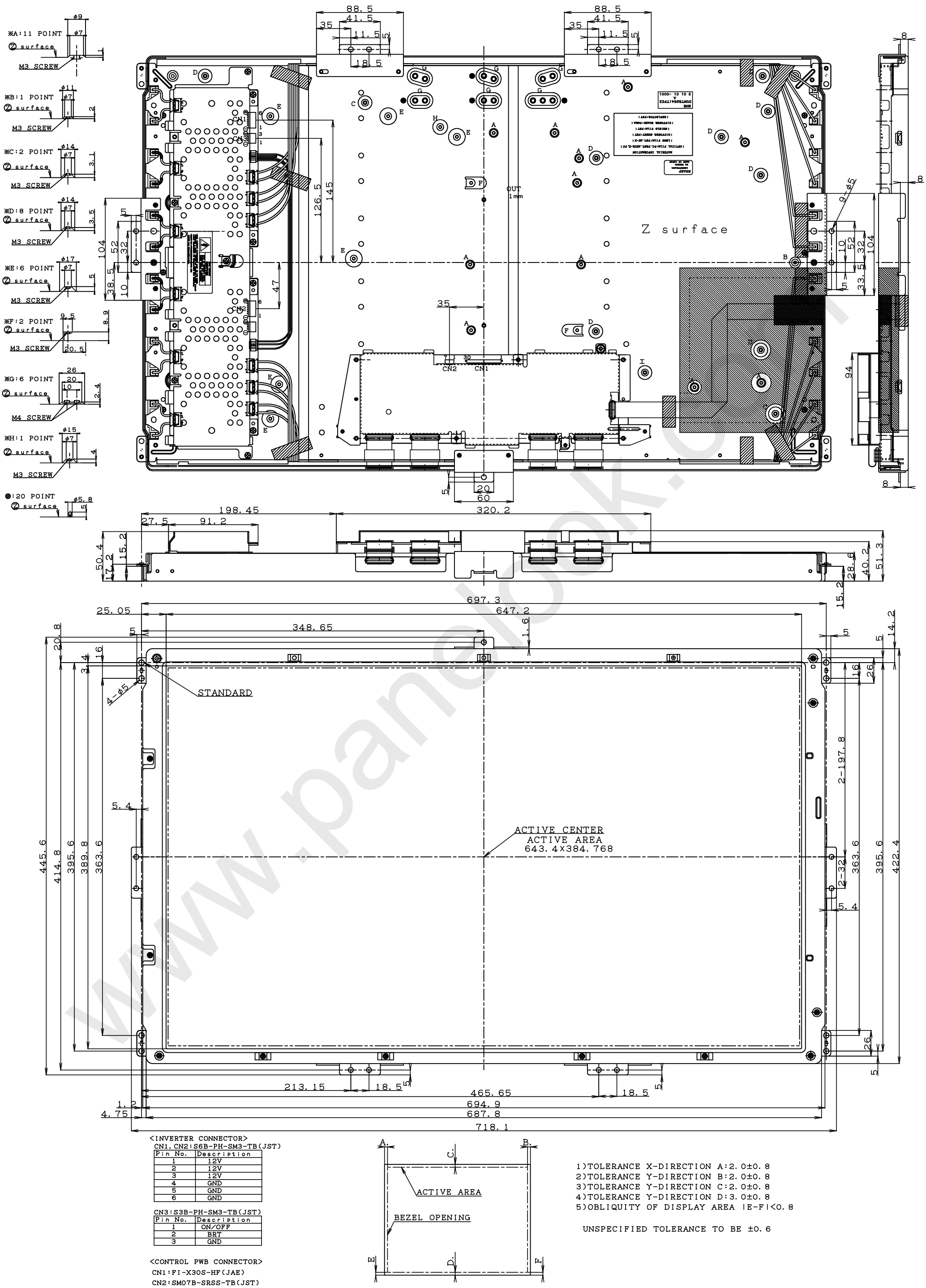

Pin No.	Description
1	12V
2	12V
3	12V
4	GND
5	GND
6	GND

Pin No.	Description
1	ON/OFF
2	BRT
3	GND

1)TOLERANCE X-DIRECTION A:2.0±0.8
2)TOLERANCE Y-DIRECTION B:2.0±0.8
3)TOLERANCE Y-DIRECTION C:2.0±0.8
4)TOLERANCE Y-DIRECTION D:3.0±0.8
5)OBLIQUITY OF DISPLAY AREA |E-F|<0.8

UNSPECIFIED TOLERANCE TO BE ±0.6

FIG. 1 OUTLINE DIMENSIONS (LQ295T3LZ41)