Toshiba Matsushita Display Technology Co.,Ltd.

No. 1M1T-0419

DATE: 19 Aug 2002

REFERENCE SPECIFICATION

Description : 51cm(20" VGA) TFT Liquid Crystal Display

Customer's Parts Number :

Model Number : LTA200A030F

Notice: This Specification is "Preliminary".
The contents described in this specification may be changed without notice. Please ask us to send final version and reconfirm before you start to design.

AV-USE LCD DIV.		ISSUE
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Record of revision

R/V No	Date	Page	Contents of R/V
			First edition. Revision number is 01A.

CONTENT

1. Application
2. General Specification
3. Absolute Maximum Ratings
4. Environmental Conditions
5. Electro-optical Specification (Ta=25℃)
6. Electrical Specification
7. Block Diagram
8. Reliability specification

1. Application

This specification applied to the 51cm,6 bit driver 16.2 million Colors and 640xRGBx480 dots Color TFT Liquid Crystal Display Module(inverter to operate lamp is not included) manufactured by Toshiba Matsushita Display Technology Co.,Ltd.

Production Code (Parts No):LTA200A030F

2. General Specification

CHARACTERISTIC ITEM	SPECIFICATION
(1)Display technology	a-Si TFT active-matrix
(2)Display mode	NW(normally white)
(3)Module outer dimension (note2-1)	453.2(W) × 335.0(H) × 22.4 (T) ㎜ Typ
(4) Effective display area	408.00 × 306.00 ㎜
(5)Number of dots	640(W) × 3(RGB) × 480(H)
Number of pixels	640 × 480 (307,200 pixcels)
Pixel pitch	0.638 ㎜ × 0.638 ㎜
(6)Colors	1619 million colors
(7)Color-filter-array	RGB vertical stripes
(8)Backlight	CCFL × 4(L Type)
(9)Power Consumption	31. W (Typ) (note2-2)
(10)Weight	3140g
(11)Front Surface	Low Reflection & Anti-glare hard coat (haze ratio 11.5%)
(12)appearance	There is not a remarkable defects.

note 2-1: Excluding backlight cable.
Detailed dimension are shown as per attached drawing.

note 2-2: Including backight power.

3. Absolute Maximum Ratings

Ta=25℃

CHARACTERISTICS	SYMBOL		MIN. MAX.	UNIT	REMARKS
1.Input voltage	V_I	Ta=25℃	-0.3 ～ VDD+ 0.3	V	
2.Power supply voltage	VDD	Ta=25℃	-0.3 ～ + 6.0	V	
3.Panel surface temp.			-20 ～ + 70	℃	note 3-1

note 3-1… Maximum value in any place on LCD panel surface.

note： Absolute maximum ratings are the limited value which must not be applied to the product even a second, and the product will have a permanent damage when it isexceeded. Accordingly, please pay attention to the surge of input voltage, fluctuation and/or ripple of supply voltage, ambient temperature and so on. And absolute maximum rating is the condition which guarantee that panel doesn't extend to break, and which doesn't guarantee optical specifications and display in-uniformity in the outside inspections.

4.Environmental Conditions

Humidity min. 5%RH max.90%RH

CHARACTERISTICS	SYMBOL	MIN.	MAX.	UNIT	REMARKS
1.Operating Temperature	T OPE.	0	+ 50	℃	note4-1
2.Storage Temperature	T STG	-20	+ 60	℃	

note 4-1：

1)Temperature at 5mm from LCD module.

2)Ta ≦ 40℃： 90%RH Max.

Ta ＞ 40℃： Absolute humidity shall be less than Ta=40℃ 90%RH

3)These shall be no dew condensation.

4)Ta = 41℃～80℃：Storage time is less than 1 hour

5.Electro-optical Specification

(Ta=25℃)

CHARACTERISTICS		SYMBOL	CONDITION θ	CONDITION φ	CONDITION CR	STANDARD VALUE MIN.	STANDARD VALUE TYP.	STANDARD VALUE MAX.	UNIT	measurement method	
(1)Brightness (at 30min. after)		B	0°	0°		350	450	-	cd/m²	A-1	note 5-1
(2)Contrast Ratio		CR	0°	0°		300	400	-			
(3)Color Chroma-ticity note-5-2	White	X	0°	0°		0.260	0.280	0.300			note 5-2
		Y	0°	0°		0.268	0.288	0.308			
	Red	X	0°	0°		-	0.640	-			
		Y	0°	0°		-	0.330	-			
	Green	X	0°	0°		-	0.300	-			
		Y	0°	0°		-	0.600	-			
	Blue	X	0°	0°		-	0.138	-			
		Y	0°	0°		-	0.060	-			
(4)Brightness uniformity		-	0°	0°		-	-	1.60		A-2	
(5)Vertical viewing Angle		θu	-	0°	≧10	50	80	-	°	A-3	
		θu	-	0°	≧5	-	80	-	°		
		θD	-	0°	≧10	50	80	-	°		
		θD	-	0°	≧5	-	80	-	°		
(6)Horizontal Viewing Angle note 5-3		ΦL	0°	-	≧10	50	80	-	°		
		ΦL	0°	-	≧5	-	80	-	°		
		ΦR	0°	-	≧10	50	80	-	°		
		ΦR	0°	-	≧5	-	80	-	°		
(7)Response Time		τr	0°	0°		-	4	6	ms	A-4	
		τd	0°	0°		-	12	15	ms		
(8)Surface Glare Ratio		H				TBD	TBD	TBD	%	Depends on JIS K 7105	

note 5-1… Fluorescence current is TYP.

note 5-2… Color Chromaticity value of Red, Green and Blue is reference.

●Measuring condition:

◇ Measuring surroundings : Dark room or its coordinate
◇ Measuring temperature : 25±3℃
◇ Measuring humidity : 40～70%RH
◇ Wait 30 minutes after turning on backlight, then adjust operating voltage to get optimum contrast at the

A - 1.Measuring method

A-1-(1)Measuring method for brightness

(1)Measuring instrument

Topcon BM-5A (measuring field=2°)

(2)Measuring Point

center of the display area (θ =0°, ϕ=0°)

θ : viewing angle against normal in vertical axis

ϕ : viewing angle against normal in horizontal axis

(3)Measuring method

Measure the brightness B(cd/m^2)supplying signal voltage to get maximum brightness

The distance from screen to "BM-5A"is 500mm.

A-1-(2),(3)Measuring method for contrast, White Color Chromaticity

(1)Measuring instrument

Topcon BM-5A (measuring field=2°)

(2)Measuring Point

center of the display area

(3)Measuring method

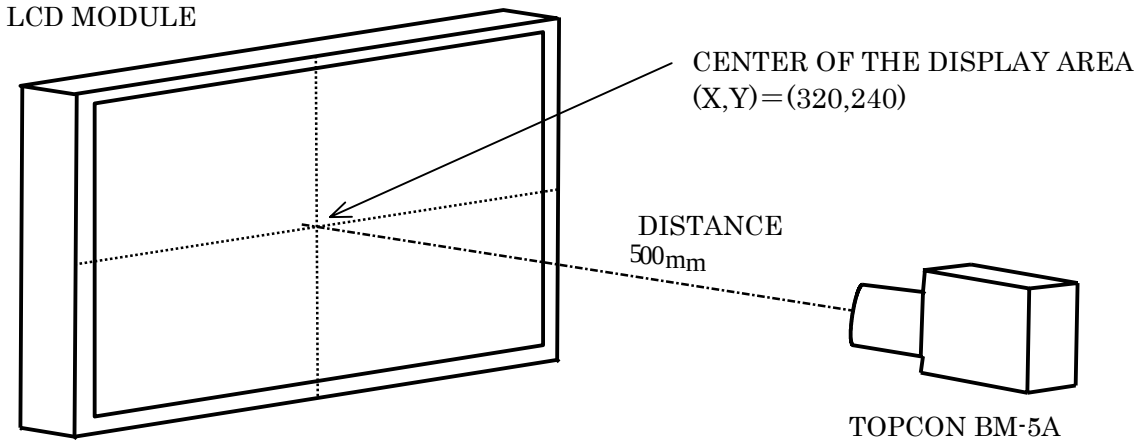
・Set the LCD module at θ =0°, ϕ=0°

θ : viewing angle against normal in vertical axis

ϕ : viewing angle against normal in horizontal axis

・Measure maximum brightness "Y1"and minimum brightness 'Y2'

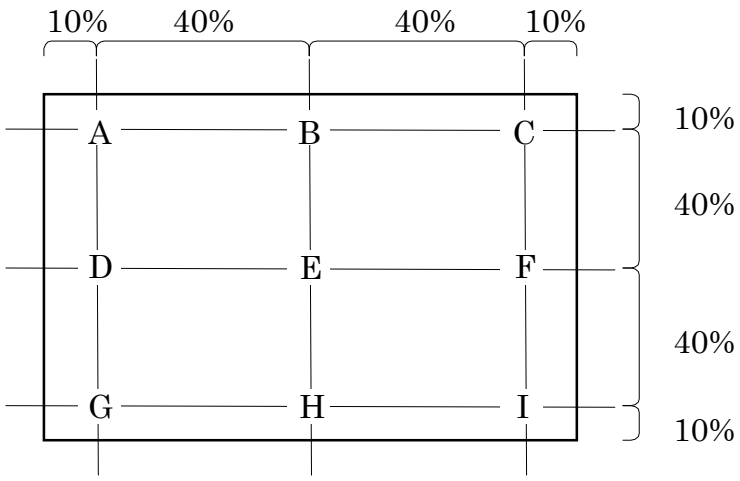
・ The contrast ratio CR is Y1/Y2.



A-2. Definition of the brightness uniformity.

Measure 9 point(A-I)and define the brightness uniformity using the following formula.

(The maximum brightness among A-I)／(The minimum brightness among A-I)



A-3.Measuring method for viewing angle

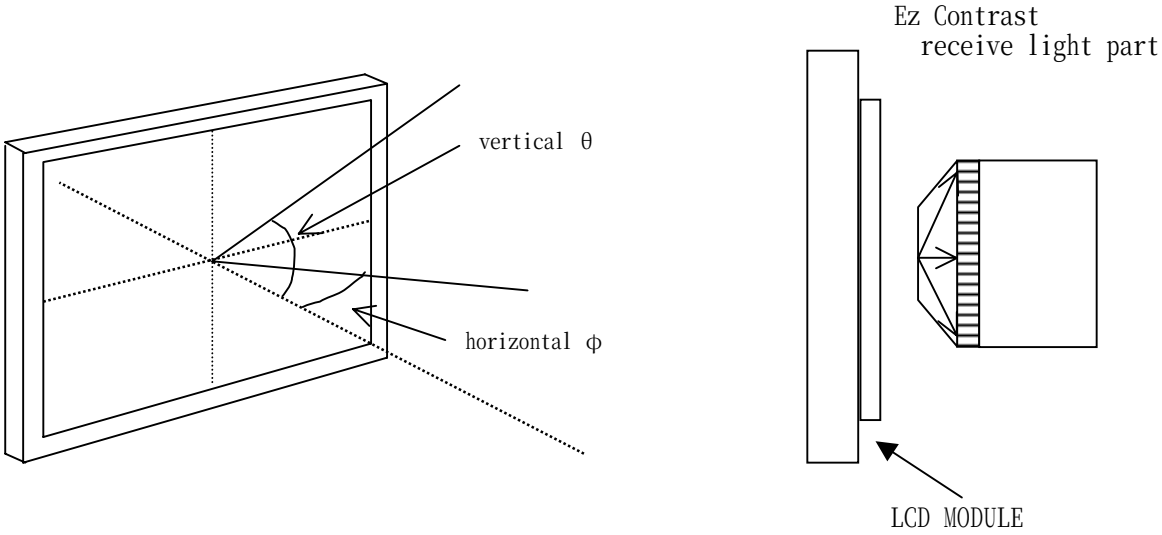
(1)Measuring instrument

ELDIM: EZ Contrast 160R

(2)Measuring point

center of the display area

(3)Measuring angle



θ: viewing angle against normal in vertical axis

φ: viewing angle against normal in horizontal axis

(4)Measuring distance

Measuring distance: 200 mm.

(5)Measuring method

- Set LCD module at φ=0°and measure the contrast ratio changing θ according to the "measuring method for contrast".
- Define the maximum |θ|(CR≧10) as θ_u, θ_D.
- Set LCD module at θ=0°and measure the contrast ratio changing φ according to the "measuring method for contrast".
- Define the maximum |φ|(CR≧10) as ϕ_L, ϕ_R.

θ_u: Upper side viewing angle θ_D: Lower side viewing angle

ϕ_L: Left side viewing angle ϕ_R: Right side viewing angle

A-4. Measuring method for response time

(1) Measuring instrument

Topcon BM-5A (measuring field=2°)

(2) Measuring point

center of the display area

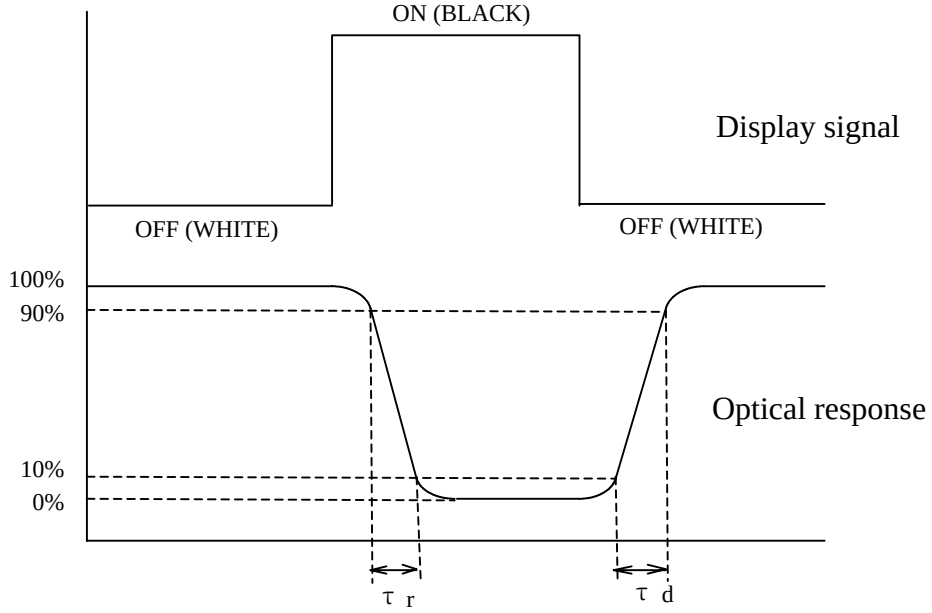
(3) Measuring method

・Set LCD module at ϕ=0° and θ=0°.

・Apply the signal voltage at maximum contrast ratio and switch LCD-cell off/on/off.

(screen status: white => black => white)

When normalizing each brightness level corresponding to the display signal "OFF" and "ON" as shown in the figure below, the rise time τr is defines as the time until the brightness level goes to 10% after 90% point of brightness, and also fall-time τd i



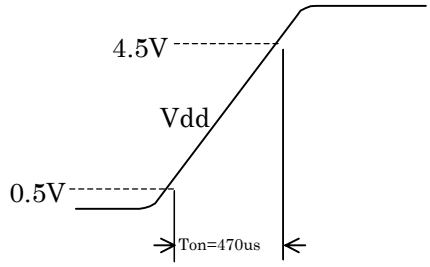
6.Electrical Specification

(1)TET LCD module operating condition Ta=25℃

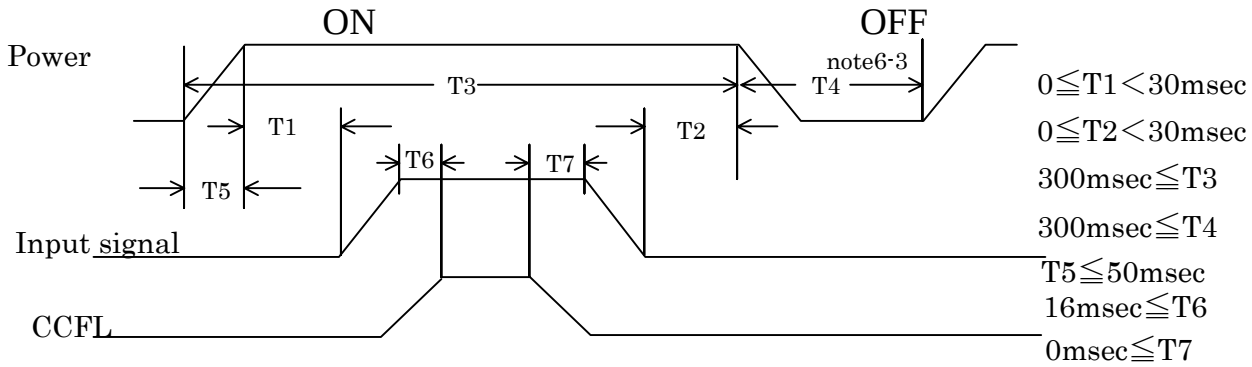
CHARACTERISTICS		SYMBOL	MIN	TYP	MAX	UNIT	REMARKS
Power supply voltage	input voltage	VDD	+ 4.75	+ 5.00	+ 5.25	V	
	Current consumption	IDD	-	190	310	mArms	note 6-1
	Inrush current	I RUSH	-	-	2400	mApeak	note 6-2
Allowable Ripple voltage		VRP	-	-	100	mVp-p	
Input Low Voltage		VIL	0	-	0.7	V	VDD=+5.0V
Input High Voltage		VIH	2.2	-	VDD	V	
Input leakage current		IIL	-100	-	-	μA	VI=0V
		IIH	-	-	100	μA	VI=VDD

note 6-1: Effective value (mArms) at VDD = 5.0V.
Typical value under 8-color-bar displaying condition.
Max value under vertical stripes pattern(at one-line intervals) displaying condition.

note 6-2: Reference



Sequence for Power-on/off and signal on/off



○ Keep the above sequence of timing.

note 6-3: OFF time of T4(≦0.5V) should be maintained more than 150msec.

Caution

○ In case of handling, Please turn off the power before connecting or removing the signal cable.

(2) Backlight

CHARACTERISTICS	SYMBOL	MIN	TYP	MAX	UNIT		REMARKS
Lamp current	IL	5.5	6	8	mArms		note 6-4
Lamp voltage	VL	1130	1260	1390	Vrms	IL=5.5mA	note 6-5
Lamp power consumption	PL	6.78	7.6	8.3	W	IL=5.5mA	note 6-8 note 6-10
Possible lighting frequency	FL	30	-	70	kHz		note 6-6
Starting Voltage	VS	-	-	2210	Vrms	Ta=0℃	note 6-8 note 6-10
Life time		-	60,000	-	Hour	IL=6.5mA	note 6-7
		30,000	50,000	-		IL=8mA	

note6-4: Panel surface temperature should be kept less than contents of "3. Absolute Maximum Ratings".
The lamp current "IL" shows the value per one CCFL

note6-5: Inverter should be designed to be subject to the conditions below:

(1) Both the area and the peak under the positive and negative cycles of the waveform of the lamp current and lamp voltage should be symmetric.
(The symmetric ratio should be larger than 90%)
(2) There should not be any spikes in the waveform.
(3) The waveform should be close to a sine wave whenever possible.
(4) Lamp current should not exceed the "MAX" value under the "Operating Temperature" (It is prohibited to exceed the "MAX" value even if it is operated in the non-guaranteed temperature). When lamp current exceed the maximum value for a long time, it may cause a smoking and ignition. Therefore, it is recommended that the inverter have the current limited circuit that is used as a protection circuit and/or the lamp current-controlled inverter.
(5) Please check the lamp current not to exceed the "MAX" value in the inverter open/short test.
(6) This backlight is designed premising on specification of inverter push/pull form
(7) Please set the all voltage applying to CN2, CN3, CN4, CN5 synchronization.

note6-6: The lamp frequency should be selected as different as possible from display horizontal synchronous signal (Including harmonic frequency of this scanning frequency) to avoid "Beat "interference which may be observed on the screen as horizontal stripes like moving wave.
This phenomenon is caused by interference between lamp (CCFL) lighting frequency and LCD horizontal synchronous signal.

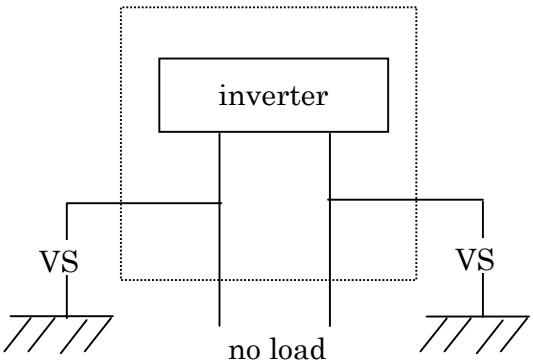
note6-7: "Life time" is defined as a lamp maker's warranty value which applied to CCFL only.
"Life time" is defined as the lamp brightness decrease to 50% original brightness at IL=MAX; continuous lighting, Ta=25℃.

note6-8: Values of "Lamp Voltage", "Lamp power consumption" and "Starting voltage" are defined on condition of the LCD module driven by Matsushita standard inverter (HARISON TOSHIBA LIGHTING Corp. HIU-473, corresponding to EDTCF21QAF).
The "MAX" of "Starting voltage "means the minimum voltage for inverter to turn on the CCFL normally in the LCD module.
However this isn't the values that we can assure stability of starting lamp on condition that the module is installed in your set.
It is careful that "Starting voltage" is changed by an increase of stray capacitance in your set, inverter method, value of ballast capacitor in your inverter and so on.
Especially, the value of "Starting voltage" is higher in low temperature condition than in normal temperature condition, because impedance of CCFL is increased.
So, please check your set in low temperature condition.

note6-9: Please do not bring the high voltage wire into contact with metallic frame and the GND lead wire, so as to ensure the safety and decrease the difference of brightness.

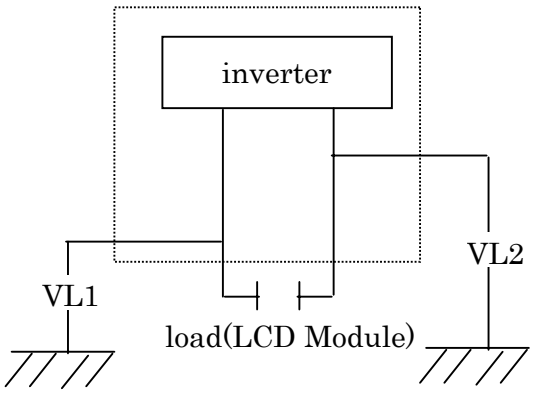
note6-10: "Starting Voltage" and "Lamp voltage" are defined as follows.

(1)Starting voltage
Use inverter : HIU - 542-1
(corresponding to LTA200A030F)



VS = VS1 + VS2

(2)Lamp voltage
Use inverter : HIU - 542-1
(corresponding to LTA200A030F)



VL = VL1 + VL2

○ CN2, CN5(Upper Side Lamp Connector) CONNECTOR:BHSR-02VS-1(JST)

Pin No.	SYMBOL	FUNCTION	REMARKS
1	H	CCFL power supply(High voltage)	Cable color : Pink Heat Shrinking tube : White
2	H	CCFL power supply(High voltage)	Cable color : Pink Heat Shrinking tube : White

○ CN3, CN4(Under Side Lamp Connector) CONNECTOR:BHSR-02VS-1(JST)

Pin No.	SYMBOL	FUNCTION	REMARKS
1	H	CCFL power supply(High voltage)	Cable color : Pink Heat Shrinking tube : Black
2	H	CCFL power supply(High voltage)	Cable color : Pink Heat Shrinking tube : Black

(3)Input signal interface

CONNECTOR : IL-FHR-BF50S HF (JAPAN AVLATION ELECTRICS INDUSTRY.,LTD.)

CN1 (50P)

	symbol	Function	Remarks
1	GND	Signal Ground	
2	CLK	Clock	Pick up each signal at negative edge
3	GND	Signal Ground	
4	Vs	Vertical sync.	Negative logic
5	Hs	Horizontal sync.	Negative logic
6	DE	Data Enable	Specifies the display position of the picture
7	GND	Signal Ground	
8	R0	Red Display Data(LSB)	
9	R1	Red Display Data	
10	R2	Red Display Data	
11	R3	Red Display Data	
12	GND	Signal Ground	
13	R4	Red Display Data	
14	R5	Red Display Data	
15	R6	Red Display Data	
16	R7	Red Display Data(MSB)	
17	GND	Signal Ground	
18	G0	Green Display Data(LSB)	
19	G1	Green Display Data	
20	G2	Green Display Data	
21	G3	Green Display Data	
22	GND	Signal Ground	
23	G4	Green Display Data	
24	G5	Green Display Data	
25	G6	Green Display Data	
26	G7	Green Display Data(MSB)	
27	GND	Signal Ground	
28	B0	Blue Display Data(LSB)	
29	B1	Blue Display Data	
30	B2	Blue Display Data	
31	B3	Blue Display Data	
32	GND	Signal Ground	
33	B4	Blue Display Data	
34	B5	Blue Display Data	
35	B6	Blue Display Data	
36	B7	Blue Display Data(MSB)	
37	GND	Signal Ground	
38	GND	Signal Ground	
39	GND	Signal Ground	
*40	INV	Input Data Inversion Control	GND : Normal, Vdd : Inversion note-1
*41	VECET	Vepp Control	note-2
42	NC		
*43	FRC ON	FRC Control	Vdd:ON , GND:OFF note-3

to be continued

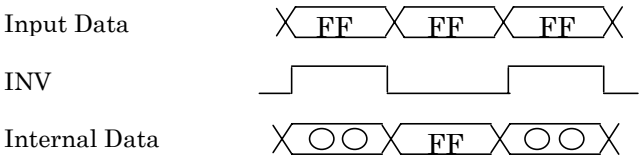
※ In case of the range of input data is 6bit, please use higher 6bit, (bit7～bit2).
In that case, it is recommended to set input signal of bit0 and bit1 into GND.

	Symbol	Function	Remarks
44	Vdd	Power Supply	
45	Vdd	Power Supply	
46	Vdd	Power Supply	
47	Vdd	Power Supply	
*48	LR		"H"Level : Inversion (vertical direction) "L"Level : Normal
*49	UD		"L"Level : Inversion (horizontal direction) "H"Level : Normal
50	GND	Signal Ground	

※In the case of 6bit data input, please use to class 6bit 7～2.

*INV

By selecting INV mode, input signal data can be changed into inversion data.
According to control INV suitably, change of the data signal can be suppressed good for EMI noise.



*VECNT

Vepp Control is controllable by the Input Voltage level(0～5[V]).
The possible change range is as follows.

Unit[V]

Input Voltage	Vepp Control (TYP)
0	14.6
1	14.0
2	13.3
3	12.7
4	12.1
5	11.4

*FRC

*FRC

FRC_ON=VDD
Conversion 8bit input signal to 6bit signal for LCD driver, but displaying image can be reproduced almost same as 8bit image. (Reproducing 16,190k colors.)

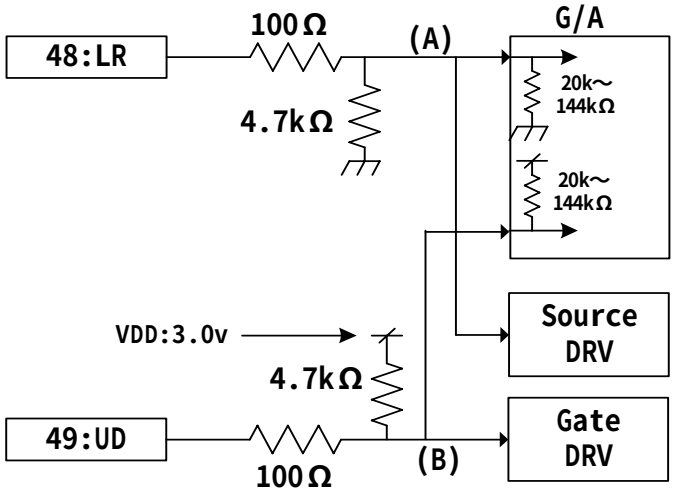
FRC_ON=GND
Corresponding to 6bit input signal.

*H Level / L Level

Voltage Level

	MIN	MAX
H Level (V)	2.0	3.3
L Level (V)	0.0	0.8

The circuit and pullup/pulldown resistance of G/A are as follows.
Please apply the voltage of (A) and (B) to voltage level in above table.



The circuit and pullup/pulldown resistance of G/A

(4)Timing characteristics of input signals

CHARACTERISTICS		SYMBOL	MIN	TYP	MAX	UNIT	REMARKS
1.Clock (dCLK)	Frequency	Fck	17	25.2	31.5	MHz	
	High time	Tch	10	-	-	ns	
	Low time	Tcl	10	-	-	ns	
2.Data (DATA)	Setup time	Tds	6	-	-	ns	
	Hold time	Tdh	7	-	-	ns	
3.Enable signal(ENAB)	Polarity			Positive		-	
	Setup time	Tes	6	-	-	ns	
	Hold time	Teh	7	-	-	ns	
4.Horizontal (Hs)	Polarity			Negative		-	
	Setup time	Ths	6	-	-	ns	
	Hold time	Thh	7	-	-	ns	
	Period including blanking	TH	650	800	1620	Fck	note*
			30.0	32.0	-	μs	
	Data width	Thd	640	640	640	Fck	
5.Vertical (Vs)	Polarity			Negative		-	
	Phase shift	TVpd	-1	0	1	Fck	
	Period including blanking	TV	※1	525	※2	TH	note*
			-	16.6	20.0	ms	
	Data width	Tvd	320	480	-	TH	

○ Vertical Centering function

Vertical Centering function is valid in the case of less than 480 vertical enable line by ENAB signal setting.(The number of Vertical enable line must be set multiple of 4.)

Example Case : Vertical enable lines 440
Top and Bottom 20 lines are set "BLACK" display state.

And do not change the number of Vertical line for each flame. There is a possibility of causing an incorrect operation, because of that recognition of the number of Vertical enable line cannot be performed.

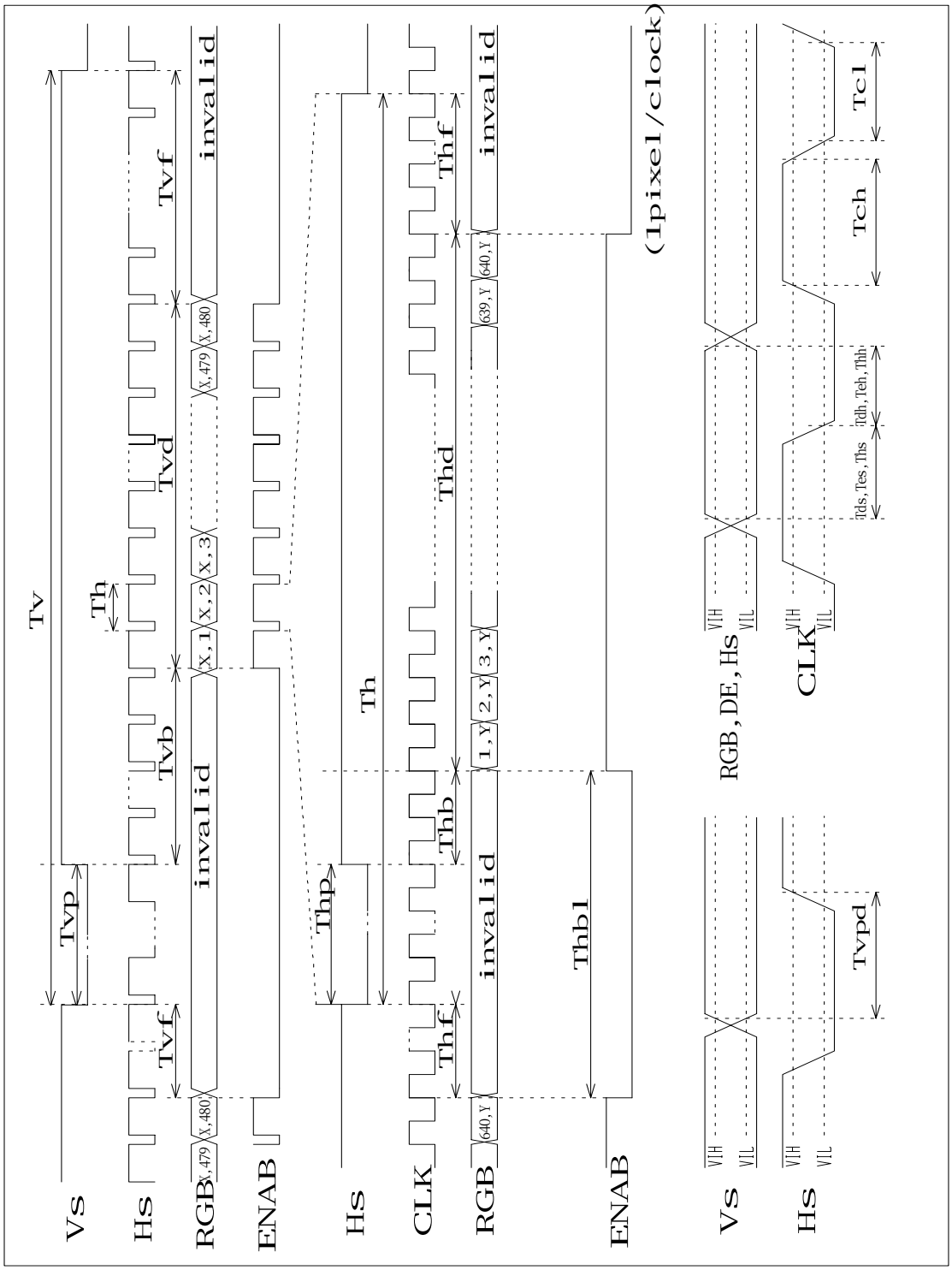
note* : 25MHz, TH=31.8us
38MHz, TH=29.6us

About TH and TV, It is shown the limit of clock or line number and actual time. Please don't exceed these range of value, in order to satisfy Electro-optical Specification.

※1 : More than (480 - TVD + 3) / 2 × 800 (CLK)

※2 : More than 524287 × 2 (CLK)

(5)Timing diagram

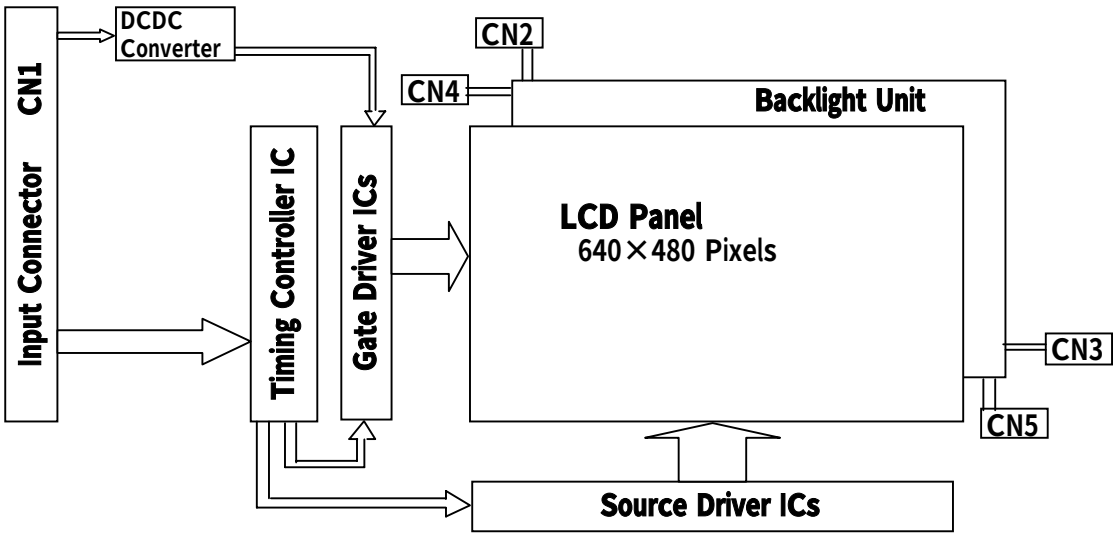


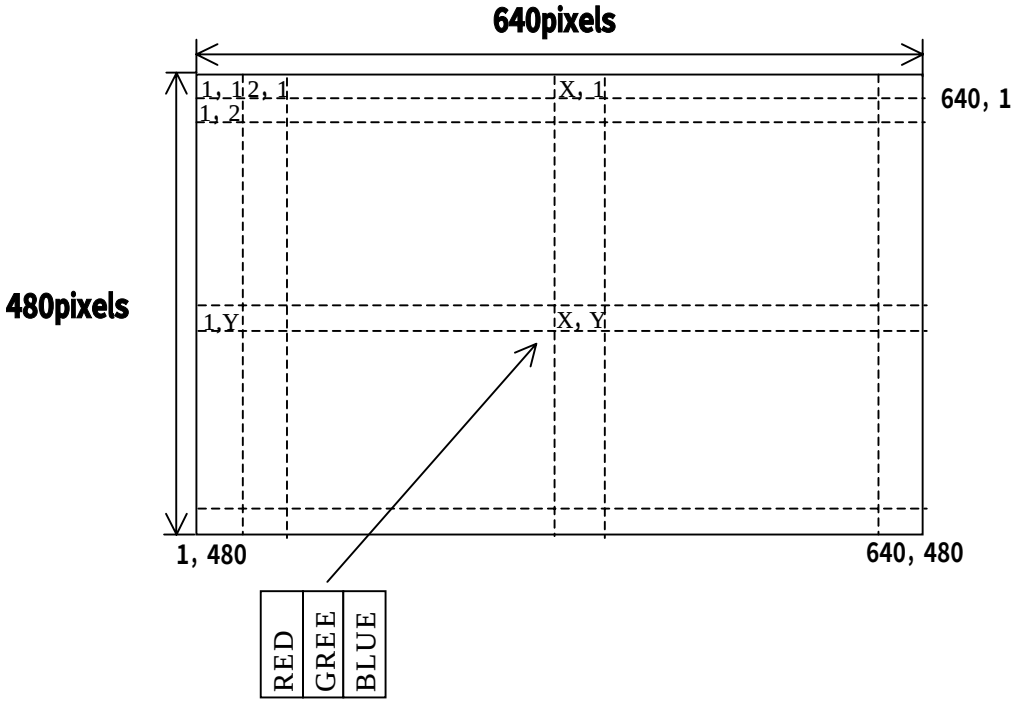
(6)Data Signal VS. Display Color Gray Scale

	Display	Data Signal (0:Low Level, 1:High Level)																							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
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
	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
	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
	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dark	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:								:								:							
	↓	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bright	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	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	↑	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	:	:								:								:							
	↓	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Bright	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	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	↑	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:								:								:							
	↓	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Bright	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

16.2 million colors are available by combining red,green and blue signal of 8 bits（256th gray scale）for each.

7. Block diagram



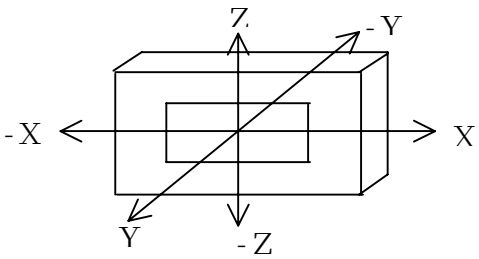


8.Reliability specification

TEST ITEM	TEST CONDITION		JUDGMENT
(1)Operation at high temperature	Ta = 50 ℃ 240 h *LCD panel surface temperature must be less than 60℃		After test, display should maintain the value of Visual Inspections. (Refer to page 21)
(2)Operation in high humidity	Ta=40 ℃ 90%RH 240 h (No dew condensation)		
(3)Operation at low temperature	Ta = 0 ℃ 240 h		
(4)High temperature exposure	Ta = 60 ℃ 240 h		
(5)Low temperature exposure	Ta = -20 ℃ 240 h		
(6)High humidity exposure	Ta=40 ℃ 90%RH 240 h (No dew condensation)		
(7)Heat shock	-20 ℃ 1 h ／ 60 ℃ 1 h 5cycles		
(8)Electrostatic withstanding voltage	Panel surface	±15 kV (150pF,150Ω)	Display should operate normally, after testing.
	Input signal connector	±200 V (100pF,0Ω)	
(9) Drop test *no operating	490m/S^2 11ms half-sine pulse Once for each direction (±) X, Y, Z		
(10) Vibration test *no operating	10～57HZ half-sine pulse0.075mm 57～500HZ 9.8m/s2 11min/cycles Once for each direction. X, Y, Z 1h each total 3h		

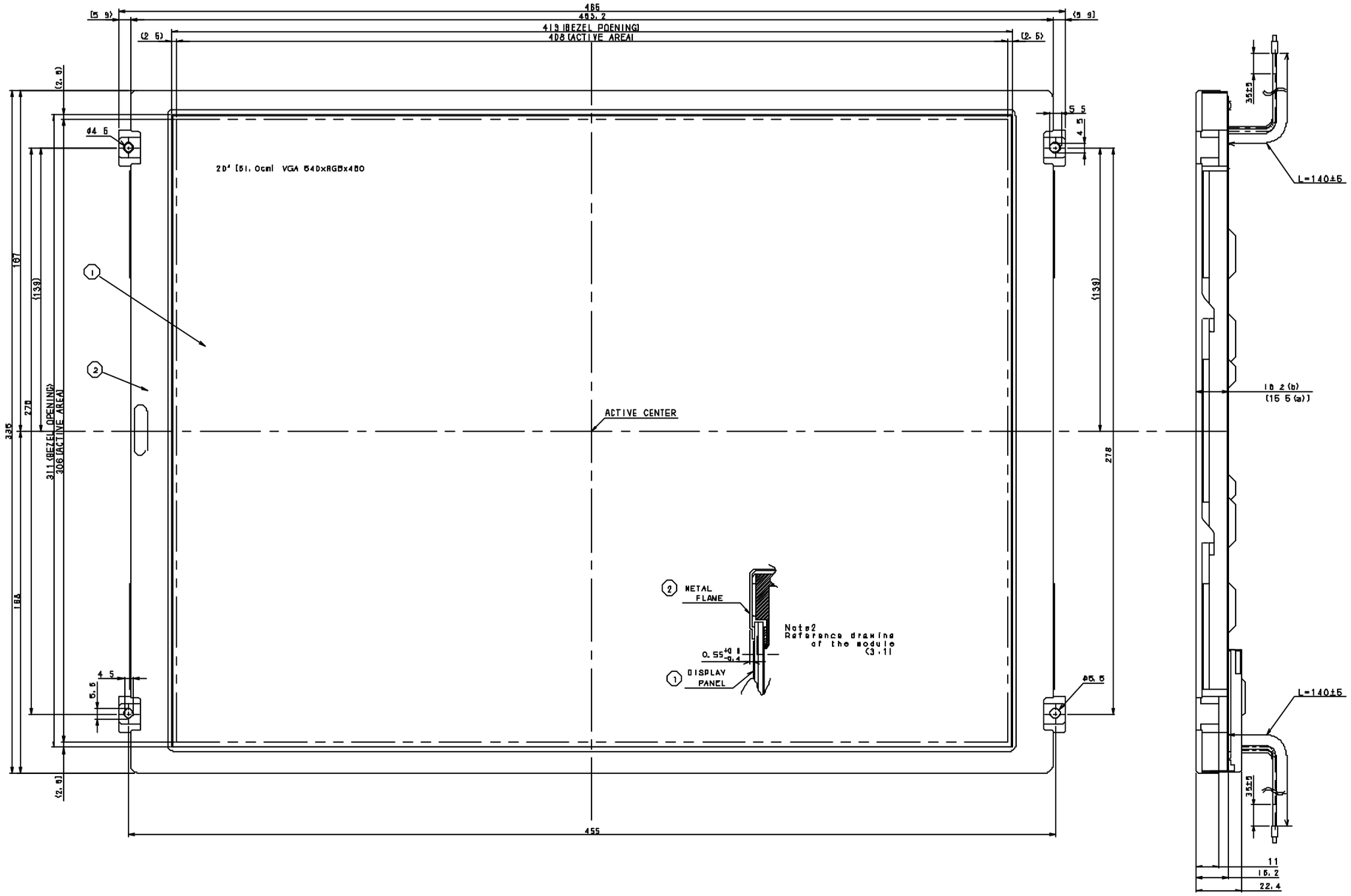
note8-1 : Panel surface temperature should be kept less than 60℃

note8-2 : The direction of X, Y, Z are shown on the right figure.



○(1)～(7). : "Ta" means setting temperature of the chamber.
○(1), (3) : CCFL keeps lighting.
○(2),(4).～(10) : CCFL keeps off state.
○(2),(6) : No dew condensation
○Judgment to be done after 1 hours exposure at room temperature after test.

Sym.	Date	Revision	Dsigned	Checked



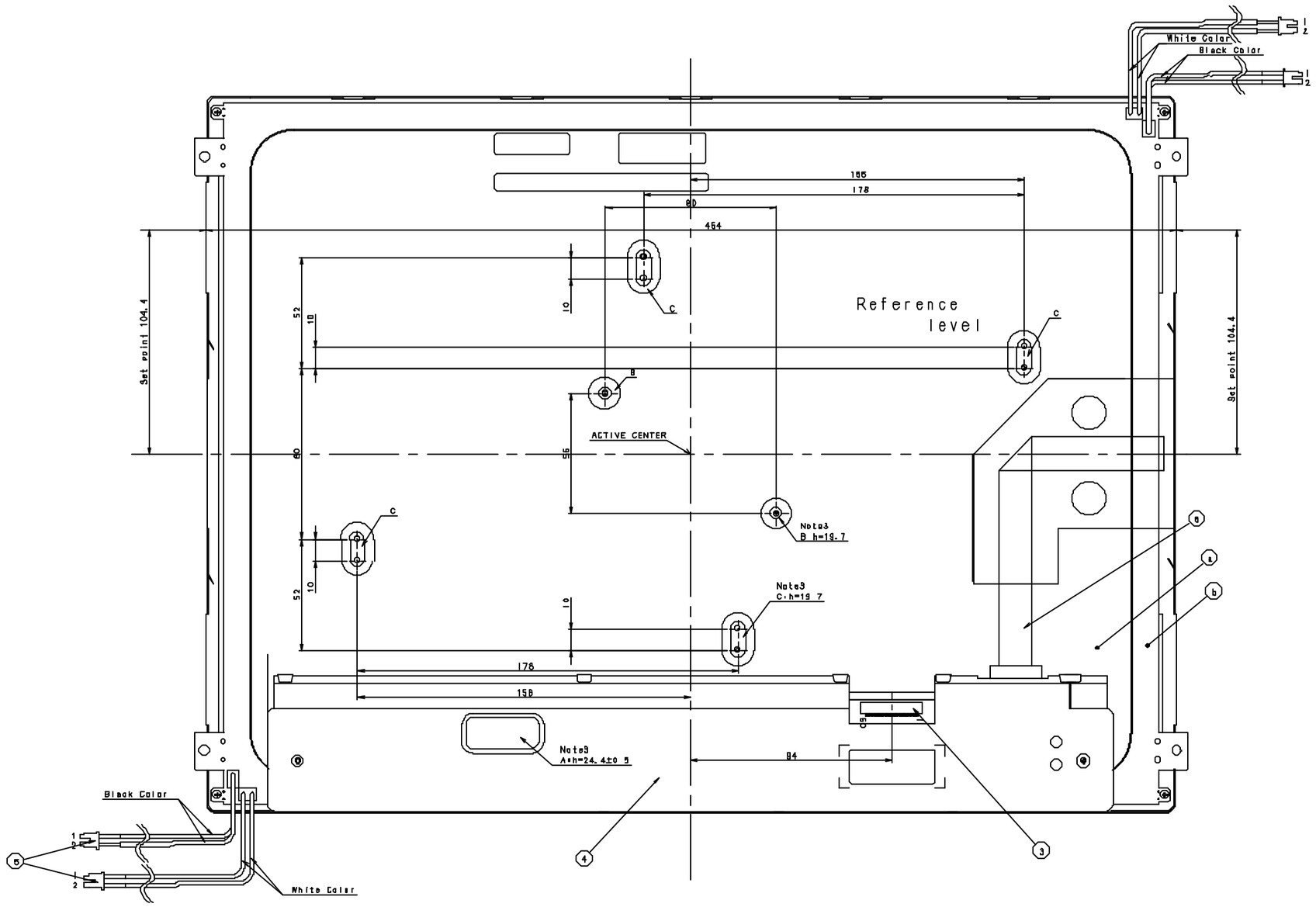
Note1 General tolerance are ±0.5mm
2. To show depth to the panel surface
3. The thickness of the LCD module is a maximum of 22.8mm except for A and B,C

Sym	Item or Code No.	Qt	Material & Size

						Model	FZ70B
Scale	Designed	Drawn	Checked	Approved		Name	Module Outside View(1/2)
1/1	ura 2002.7.2	shimizu 2002.7.2	ura	made		Drawing No.	LTA200A030F

Toshiba Matsushita Display Technology Co.,Ltd Unit'mm 3rd Angle

Sym	Date	Revision	Signed	Checked



Sym	Item or Code No.	Qt	Material & Size	
6	Signal cable	1		
5	Lamp Assy	2		
4	Shield cover	1		
3	Signal connector	1		
2	Metal Plate	1		
1	Displaypanel	1		

Scale	Designed	Drawn	Checked	Approved	Model	F270B
1/1	ura	shimizu	ara	maeda	Name	Module Outside View(2/2)
	2002.7.2	2002.7.2			Drawing No.	LTA200A030F

Toshiba Matsushita Display Technology Co., Ltd Unit:mm 3rd Angle