17cm COLOR TFT-LCD MODULE
(6.5 TYPE)

LTA065A043F
(a-Si TFT)

All information is subject to change without notice. Please read bottom notes.

TENTATIVE

RoHS compatible

FEATURES

(1) "Transmitting type", High brightness, High contrast, Wide view angle
(2) Digital 6 bit RGB input interface
(3) LCD drive circuit is built in, but inverter for backlight is not built in
(4) Mounting compatible with LTA065A041F
(5) RoHS compliant

MECHANICAL SPECIFICATIONS

Item	Specification
Dimensional Outline (Typ.) *1	151.0 (*W*) x 115.5 (*H*) x 10.0 (*D*) mm
Number of Pixels	640 (*W*) x 480 (*H*) pixels
Active Area	131.52 (*W*) x 98.64 (*H*) mm
Pixel Pitch	0.2055 (*W*) x 0.2055 (*H*)
Weight (approximately)	205 g
Backlight	Sidelight (L-type)

*1: The lug (FPC, lump harness and connector) is not included.

ABSOLUTE MAXIMUM RATINGS

Item		Min.	Max.	Unit
Supply voltage	(V_{DD})	-0.3	4.5	V
	(V_{FL})	---	3.0	kV(rms)
FL Driving Frequency	(f_{FL})	---	100	kHz
Input Signal Voltage	(V_{IN})	-0.3	V_{DD}+0.3	V
Operating Temperature *2		-20	65	°C
Storage Temperature		-30	80	°C
Storage humidity (Max. wet bulb temperature = 39°C)		---	95	%(RH)

*2:Wet bulb temperature should be 39°C Max.,and no condensation of water.

ELECTRICAL SPECIFICATION (*T*a=25°C) (RECOMMENDED OPERATION CONDITION)

Item		Min.	Typ.	Max.	Unit	Remarks
Supply Voltage	(V_{DD})	3.15	3.30	3.45	V	
	(V_{FL})	---	480	---	V(rms)	I_{FL}=7.0mA(rms)
FL Start Voltage	(V_{SFL})	1700	---	---	V(rms)	Ta=-10°C
High Level Input voltage	(V_{IH})	0.7V_{DD}	---	V_{DD}	V	
Low Level Input voltage	(V_{IL})	0.0	---	0.3V_{DD}	V	
Current Consumption	(I_{DD}) *4	---	240	---	mA(rms)	
	(I_{FL}) *5	4.0	7.0	7.5	mA(rms)	
Power Consumption *2*3		---	4.2	---	W	I_{FL}=7.0mA(rms)

*3: The surface temperature caused by self heat radiation of cell itself is specified on this item
*4: 8 color bars pattern *5: Except the efficiency of FL inverter

OPTICAL SPECIFICATION (*T*a=25°C)

Item		Min.	Typ.	Max.	Unit	Remarks
Contrast Ratio	(CR)	100	250	---	---	
Viewing Angle (CR≥10)	(Upper+Lower)	---	90	---	°	
	(Left+Right)	---	120	---	°	
Response Time	(T_{ON})	---	10	---	ms	
	(T_{OFF})	---	15	---	ms	
Luminance	(L)	300	400	---	cd/㎡	I_{FL}=7.0mA(rms)
		240	340	---	cd/㎡	I_{FL}=6.0mA(rms)
Lamp Life Time (MTBF) *6*7		30,000	40,000	---	h	I_{FL}=7.0mA(rms)
		50,000	---	---	h	I_{FL}=6.0mA(rms)

*6: Conditions ;Ta=25°C, I_{FL}=6.0 or 7.0mA(rms),contimuous lighting
*7: Definitions of failure; 1)Lcd luminance becomes half of the minimum value. 2)Lamp doesn't light normally.

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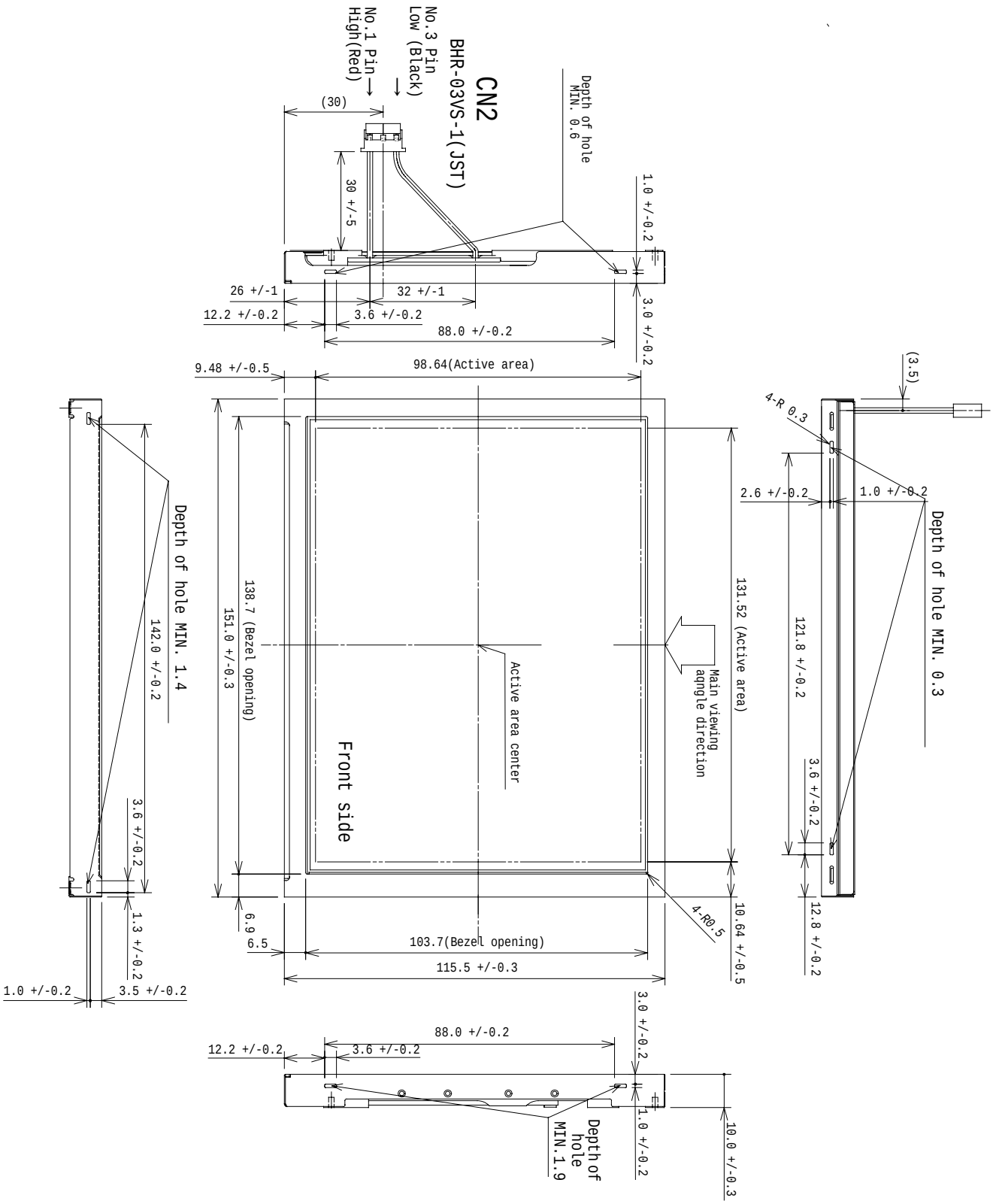
*The information contained herein may be changed without prior notice. It is therefore advisable to contact Toshiba Matsushita Display Technology Co., Ltd. before proceeding with the design of equipment incorporating this product.

DIMENSIONAL OUTLINE (Front figure)

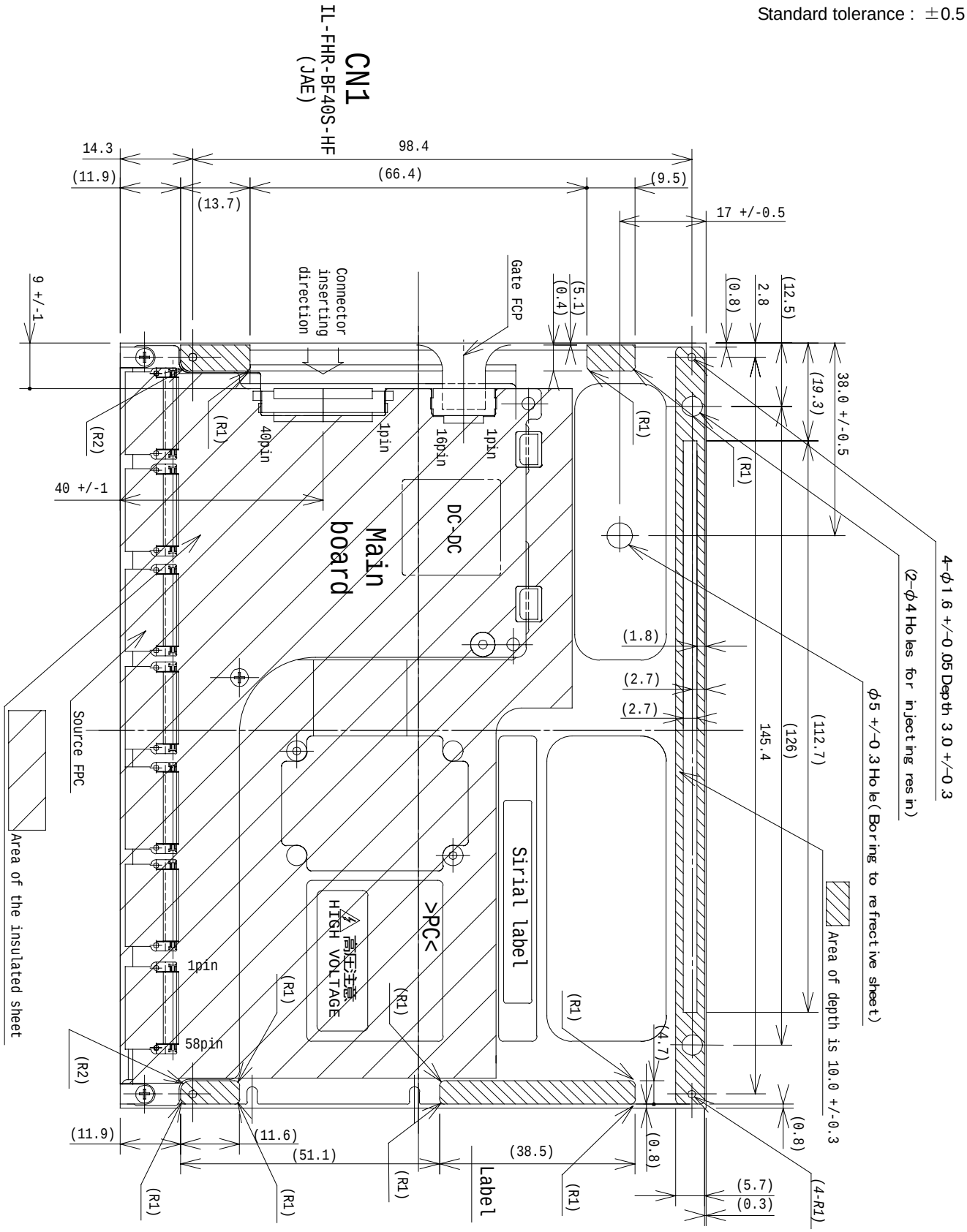
Unit : mm

Standard tolerance : ±0.5

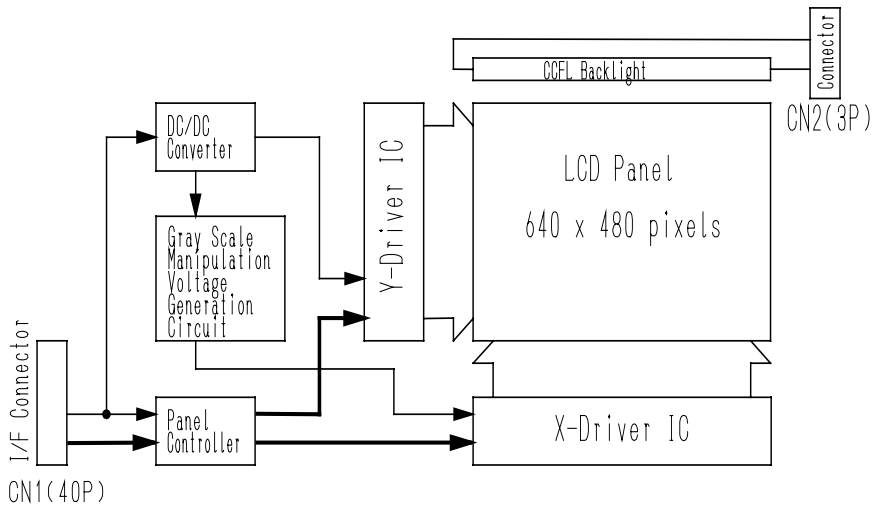


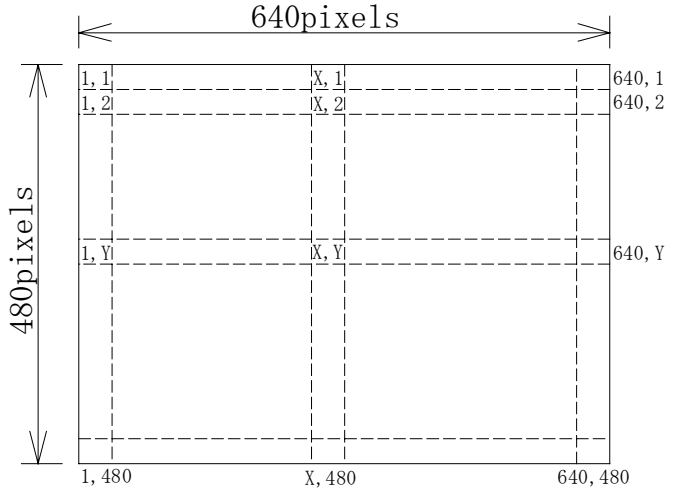
(Back figure)

Unit : mm
Standard tolerance : ±0.5

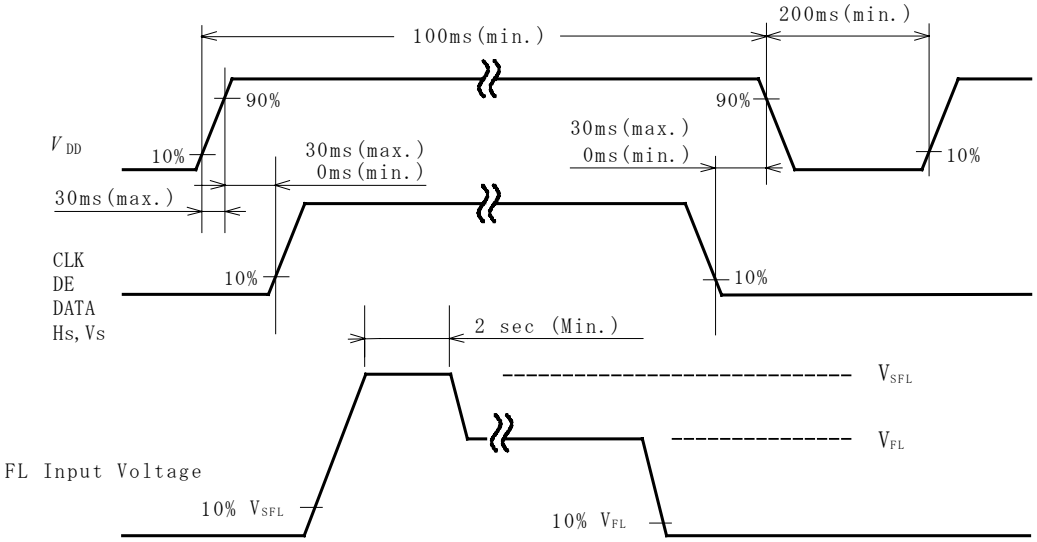


BLOCK DIAGRAM





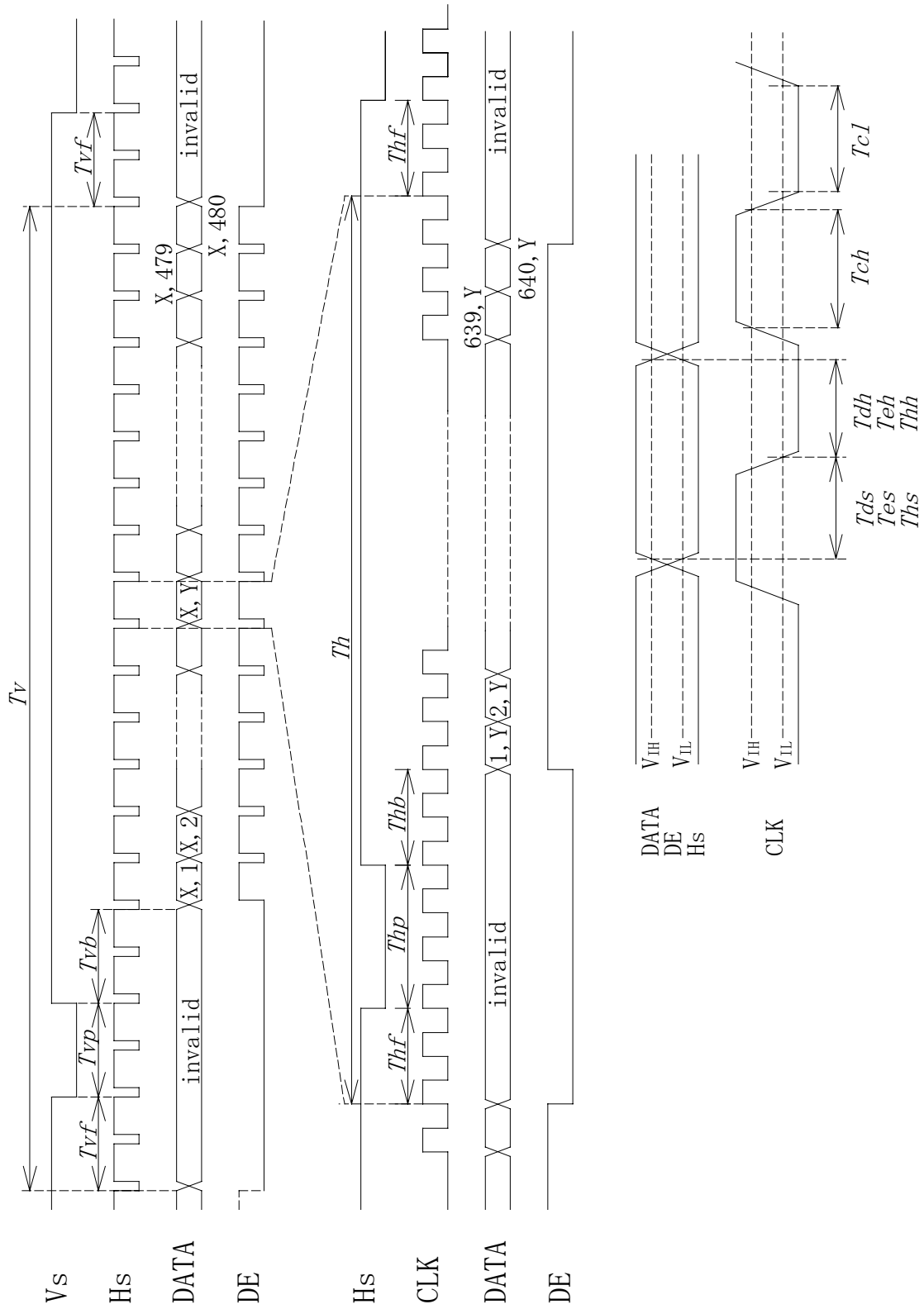
SEQUENCE OF POWER SUPPLIES AND SIGNALS



*1: In case handling

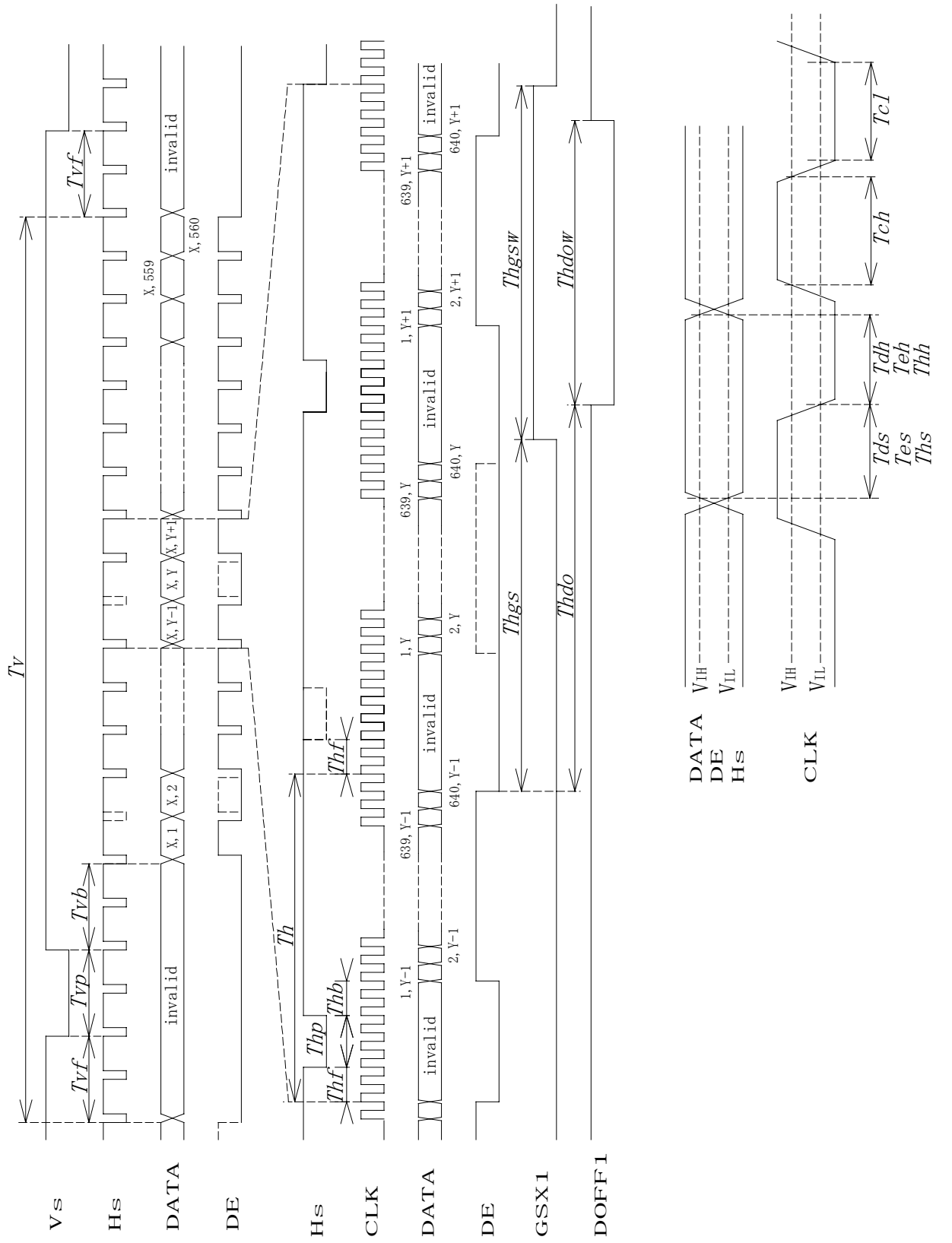
Make sure to turn off the power when you plug the cable to the input connector and pull the cable out from the connector.

TIMING CHART



*1: DE Signal is defined as above timing concerning to the sync. signal of Vs and Hs. This LCD module is designed to be synchronized only by DE signal even when Vs and Hs are inputted.
Therefore, make DE signal be low level by all means for the blanking period that effective data aren't inputted.

TIMING CHART (PAL Drive)



*1: DE Signal is defined as above timing concerning to the sync. signal of Vs and Hs. This LCD module is designed to be synchronized only by DE signal even when Vs and Hs are inputted.
Therefore, make DE signal be low level by all means for the blanking period that effective data aren't inputted.

TIMING SPECIFICATION

Item		Symbol	Min.	Typ.	Max.	PAL Drive *1	Unit
CLK (Clock)	frequency	Fck	---	25.175	---	25.175	MHz
	Period	Clk	---	39.72	---	39.72	us
	High Time	Tch	12	---	---	MIN : 12	ns
	Low Time	Tcl	12	---	---	MIN : 12	ns
DATA (Data)	Setup Time	Tds	5	---	---	MIN : 5	ns
	Hold Time	Tdh	10	---	---	MIN : 10	ns
DE (DataEnable)	Setup Time	Tes	5	---	---	MIN : 5	ns
	Hold Time	Teh	10	---	---	MIN : 10	ns
Hs (Horizontal Sync.)	Setup Time	Ths	5	---	---	MIN : 5	ns
	Hold Time	Thh	10	---	---	MIN : 10	ns
	Period	Th	790	800	832	800	clk
	Pulse Width	Thp	4	96	---	96	clk
	Front Porch	Thf	---	13	---	13	clk
	Back Porch	Thb	7	51	---	51	clk
Vs (Vertical Sync.)	Period	Tv	516	525	534	625	th
			16.2	16.7	17.6	19.875	ms
	Pulse Width	Tvp	1	2	---	2	th
	Front Porch	Tvf	---	11	---	25	th
	Back Porch	Thb	4	32	---	38	th
GSX1 *2 (Display period correction signal)	Start Position	Thgs	---	---	---	738	clk
	Pulse Width	Thgsw	---	---	---	990	clk
DOFF1 *2 (Non-display period correction signal)	Start Position	Thdo	---	---	---	800	clk
	Pulse Width	Thdow	---	---	---	800	clk

The timing of a clock signal is defined by the connector input terminal part.

*1: PAL drive does not guarantee about the timing which does not follow above.
A flicker and quality of image may deteriorate a little by PAL drive. Please include in your set and check enough.

*2: The start position of each correction signal is defined as the regulation from falling of DE signal before 1Hs of DE signal removed.

CONNECTOR PIN ASSIGNMENT FOR INTERFACE

CN1 INPUT SIGNAL

Connector : FA5B040HP1 (40 pin-0.5 ㎜ pitch/Gilded type) /Japan Aviation Industry, Limited

Terminal №.	Symbol	Function
1	VDD	Power Supply : +3.3V
2	VDD	Power Supply : +3.3V
3	VDD	Power Supply : +3.3V
4	VDD	Power Supply : +3.3V
5	VSS	GND
6	GSX1	Display period compensation signal. *1
7	VSS	GND
8	DOFF1	Non-display period compensation signal. *1
9	VSS	GND
10	DE	Data Enable Signal
11	VSS	GND
12	VS	Vertical Sync.
13	VSS	GND
14	HS	Horizontal Sync.
15	VSS	GND
16	B5	Blue display data (MSB)
17	B4	Blue display data
18	B3	Blue display data
19	B2	Blue display data
20	B1	Blue display data
21	B0	Blue display data (LSB)
22	VSS	GND
23	G5	Green display data (MSB)
24	G4	Green display data
25	G3	Green display data
26	G2	Green display data
27	G1	Green display data
28	G0	Green display data (LSB)
29	VSS	GND
30	R5	Red display data (MSB)
31	R4	Red display data
32	R3	Red display data
33	R2	Red display data
34	R1	Red display data
35	R0	Red display data (LSB)
36	VSS	GND
37	VSS	GND
38	CLK	Dot Clock
39	VSS	GND
40	VSS	GND

*1 : It opens, when performing the usual operation.

CN2 CCFL POWER SOURCE

Connector : BHR-03VS-1 / JAPAN SOLDERLESS TERMINAL MFG CO., LTD.

Mating Connector : SM02(8.0)B-BHS-1 / JAPAN SOLDERLESS TERMINAL MFG CO., LTD.

Terminal No.	Symbol	Function
1	V_{FLH}	CCFL Power Supply (high voltage)
2	NC *2	Non Connection (open)
3	V_{FLL}	CCFL Power Supply (low voltage)

*2 : NC terminal should be open.

256k (k=1024) COLOR COMBINATION TABLE

	Display	R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0	Gray Scale Level
Basic Color	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	---
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	---
	Green	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	---
	Light Blue	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	---
	Red	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	---
	Purple	H	H	H	H	H	H	L	L	L	L	L	L	H	H	H	H	H	H	---
	Yellow	H	H	H	H	H	H	H	H	H	H	H	H	L	L	L	L	L	L	---
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	---
Gray Scale of Red	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L 0
	Dark ↑ ↓ Light	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L 1
		L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L 2
					:						:						:			L3…
					:						:						:			L60
		H	H	H	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L61
		H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L62
	Red	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	Red L63
Gray Scale of Green	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L 0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L 1
		L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L 2
					:						:						:			L3…
					:						:						:			L60
		L	L	L	L	L	L	H	H	H	H	L	H	L	L	L	L	L	L	L61
		L	L	L	L	L	L	H	H	H	H	H	L	L	L	L	L	L	L	L62
	Green	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	Green L63
Gray Scale of Blue	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L 0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L 1
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L 2
					:						:						:			L3…
					:						:						:			L60
		L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	L	H	L61
		L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	L	L62
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	Blue L63
Gray Scale of White & Black	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L 0
	Dark ↑ ↓ Light	L	L	L	L	L	H	L	L	L	L	L	H	L	L	L	L	L	H	L 1
		L	L	L	L	H	L	L	L	L	L	H	L	L	L	L	L	H	L	L 2
					:						:						:			L3…
					:						:						:			L60
		H	H	H	H	L	H	H	H	H	H	L	H	H	H	H	H	L	H	L61
		H	H	H	H	H	L	H	H	H	H	H	L	H	H	H	H	H	L	L62
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	White L63

FOR SAFETY

LCD module is generally designed with precise parts to achieve light weighted thin mechanical dimensions.
In using our Modules, make certain that you fully understand and put into practice the warnings and safety precautions detailed in Engineering Information No.EE-N001,"CAUTIONS AND INSTRUCTIONS FOR TOSHIBA LCD MODULES".
Refer to individual specifications and TECHNICAL DATA sheets (hereinafter called "TD") for more detailed technical information.

1) SPECIAL PURPOSES

A) Toshiba Matsushita Display Technology's Standard LCD Modules have not been customized for operation in extreme environments or for use in applications where performance failures could be life threatening or otherwise catastrophic.

B) Since Toshiba Matsushita Display Technology's Standard LCD Modules have not been designed for operation in extreme environments, they must never be used in devices that will be exposed to abnormally high levels of vibration or shock that exceed Toshiba's published specification limits.

C) In addition, since Toshiba Matsushita Display Technology's Standard LCD Modules have not been designed for use in applications where performance failures could be life-threatening or catastrophic, they must never be installed in aircraft navigation control systems (such as, but not limited to Traffic Collision Avoidance System and Air Traffic Indicator), in military defense or weapons systems, in critical industrial process-control systems (e.g., those involved in the production of nuclear energy), or in critical medical device or patient life-support systems.

2) DISASSEMBLING OR MODIFICATION

DO NOT DISASSEMBLE OR MODIFY the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display.
Toshiba Matsushita Display Technology does not warrant the module, if customer disassembled or modified it.

3) BREAKAGE OF LCD PANEL

DO NOT INGEST liquid crystal material, DO NOT INHALE this material, and DO NOT CONTACT the material with skin, if LCD panel is broken and liquid crystal material spills out.
If liquid crystal material comes into mouth or eyes, rinse mouth or eyes out with water immediately.
If this material contact with skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

4) GLASS OF LCD PANEL

BE CAREFUL WITH CHIPS OF GLASS that may cause injuring fingers or skin, when the glass is broken.

5) ELECTRIC SHOCK

DISCONNECT POWER SUPPLY before handling LCD module. DO NOT TOUCH the parts inside LCD module in order to prevent electric shock, because high voltage is supplied to these parts while power supply is turned on.

6) ABSOLUTE MAXIMUM RATINGS AND POWER PROTECTION CIRCUIT

DO NOT EXCEED the absolute maximum rating values under the worst probable conditions caused by the supply voltage variation, input voltage variation, variation in parts' constants, environmental temperature, etc., otherwise LCD module may be damaged.
Employ protection circuit for power supply, whenever the specification or TD specifies it.
Suitable protection circuit should be applied for each system design.

7) RECOMMENDED OPERATION CONDITIONS

The performance and quality of the LCD panel are warranted only when the LCD panel is used within “the recommended operation conditions”. Toshiba Matsushita Display Technology Co., Ltd. never warrants the performance and quality of the LCD panel when you use the LCD panel over “the recommended operation conditions”, although within “the absolute maximum rating”.
To use the LCD panel over “the recommended operation conditions” may have bad influence on the characteristics and reliability of the LCD panel and may shorten the life of the LCD panel.
Therefore, when designing the whole set, not to be over “the recommended operation conditions”, you should fully take care of supply voltage change, characteristic of connection parts, serge of input-and-output line, and surrounding temperature.

8) DISPOSAL

When dispose LCD module, obey to the applicable environmental regulations.