Toshiba Matsushita Display Technology Co., Ltd

PRODUCT INFORMATION

21cm COLOR TFT-LCD MODULE
(8.4 TYPE)
LTM08C351S
(p-Si TFT)

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

TENTATIVE

RoHS compatible

FEATURES

(1) 8.4" SVGA color display with High Brightness (350cd/m^2).
(2) Wide viewing angle.
(3) Built in Long Life CCFLs (MTBF:50,000 h).
(Conditions / *Ta*:25°C I_{FL}:6.0mA(rms)(continuing lighting), f_{FL}:40kHz)
(4) Replaceable structure of lamp unit.
(5) RoHS compatible

MECHANICAL SPECIFICATIONS

Item	Specifications
Dimensional Outline (Typ.)	199.5 (*W*) x 149.5 (*H*) x 12.0max(*D*) mm
Number of Pixels	800 (*W*) x 600 (*H*) pixels
Active Area	170.4 (*W*) x 127.8 (*H*) mm
Pixel Pitch	0.213 (*W*) x 0.213 (*H*)
Weight (approximately)	385g
Backlight	Sidelight (2 CCFLs)

ABSOLUTE MAXIMUM RATINGS

Item		Min.	Max.	Unit
Supply Voltage	(V_{DD})	-0.3	4.0	V
	(V_{FL})	0	2.0	kV(rms)
FL Driving Frequency	(f_{FL})	---	100	kHz
Input Signal Voltage	(V_{IN})	-0.3	V_{DD}+0.3	V
Operating Temperature		-10	60	°C
Storage Temperature		-20	65	°C
Storage Humidity (Max. wet bulb temp. = 39°C)		10	90	%(RH)

ELECTRICAL SPECIFICATION (RECOMMENDED OPERATION CONDITION)

Item		Min.	Typ.	Max.	Unit	Remarks
Supply Voltage	(V_{DD})	3.0	3.3	3.6	V	
	(V_{FL})	---	480	---	V(rms)	I_{FL}=6.0 mA(rms)
FL Start Voltage	(V_{SFL})	1300	---	1600	V(rms)	*Ta*=0°C
High Level Input Voltage	(V_{IH})	0.8V_{DD}	---	V_{DD}	V	
Low Level Input Voltage	(V_{IL})	0	---	0.2V_{DD}	V	
Current Consumption	(I_{DD}) *1	---	190	---	mA	
	(I_{FL}) *2	3.0	---	6.5	mA(rms)	
Power Consumption *1*2		---	6.4	---	W	I_{FL}=6.0mA(rms)

*1 : 8 color bars pattern *2 : Excepting the efficiency FL inverter

OPTICAL SPECIFICATION (*Ta*=25°C)

Item		Min.	Typ.	Max.	Unit	Remarks
Contrast Ratio	(*CR*)	150	300	---	---	
Viewing Angle ($CR \geq 10$)	(Upper+Lower)	---	90	---	°	
	(Left+Right)	---	100	---	°	
Response Time	(t_{ON})	---	20	---	ms	
	(t_{OFF})	---	25	---	ms	
Luminance	(*L*)	280	350	---	cd/m^2	I_{FL}=6.0mA(rms)
Lamp Life Time (MTBF) *3 *4		50,000			h	

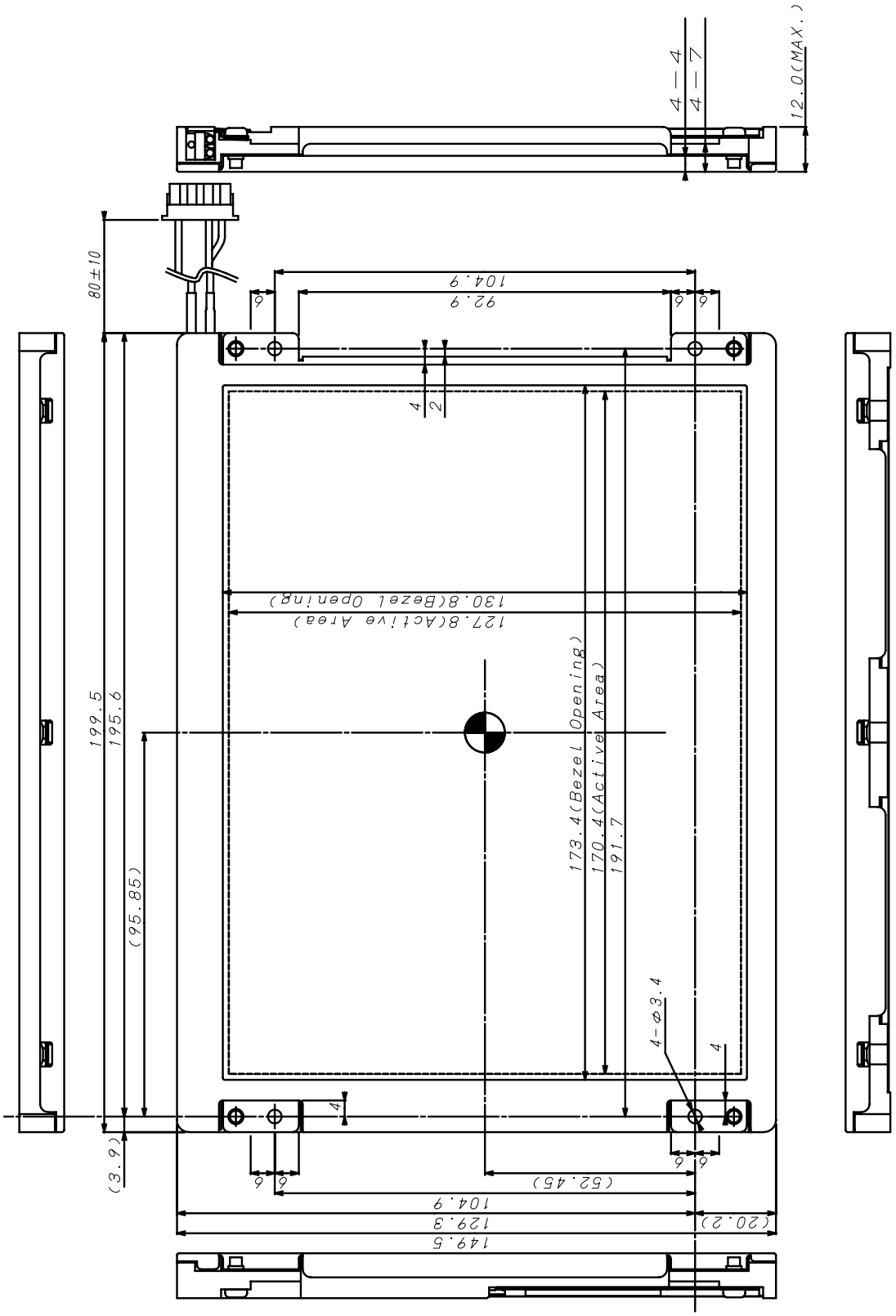
*3 : Conditions ; *Ta*=25°C, I_{FL}=6.0mA(rms), continuous lighting

*4 : Definitions of failure ; 1) Lcd luminance becomes half of the minimum value. 2) Lamp doesn't light normally.

DIMENSIONAL OUTLINE (front figure)

Unit : mm

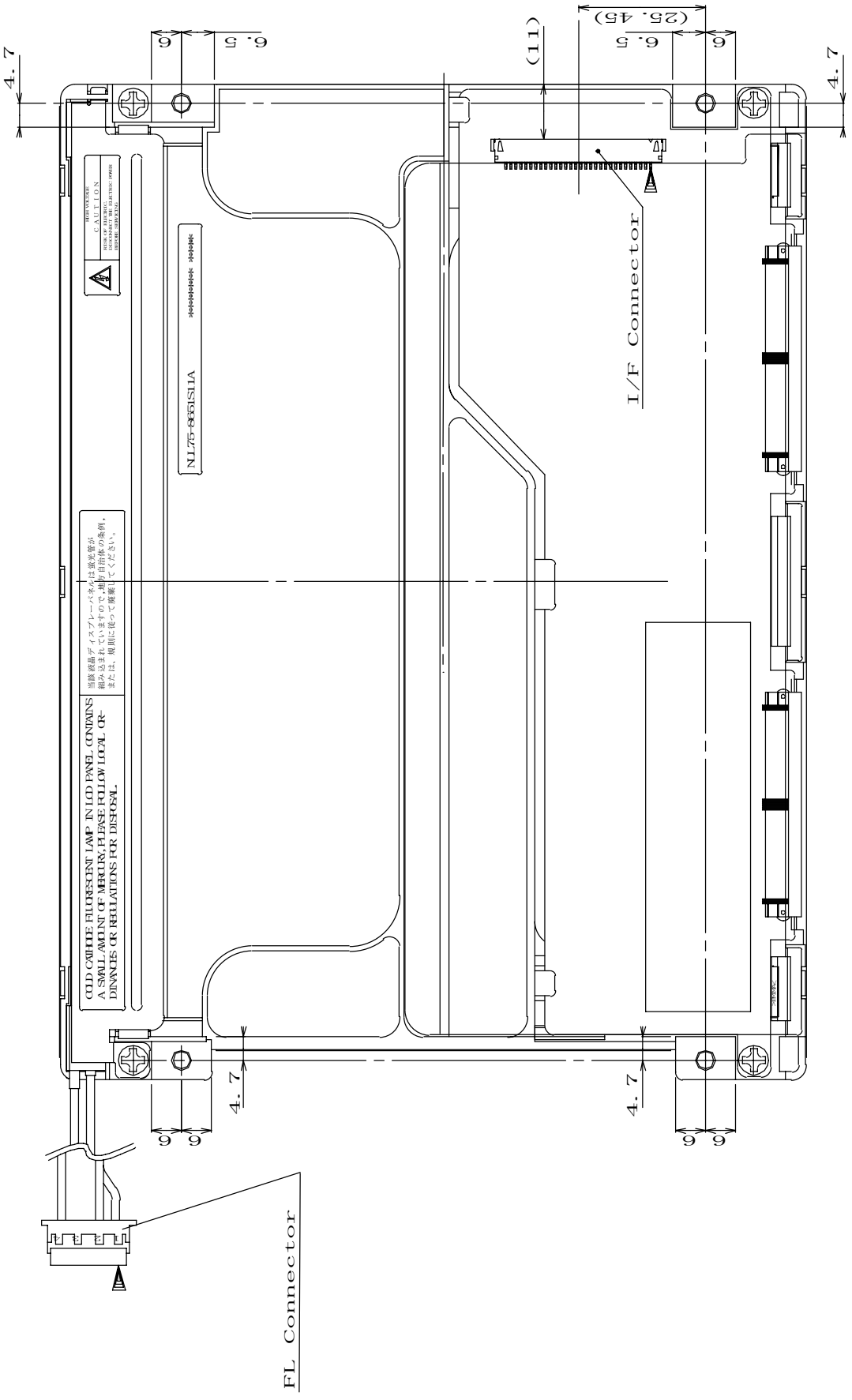
Standard tolerance : ±0.5



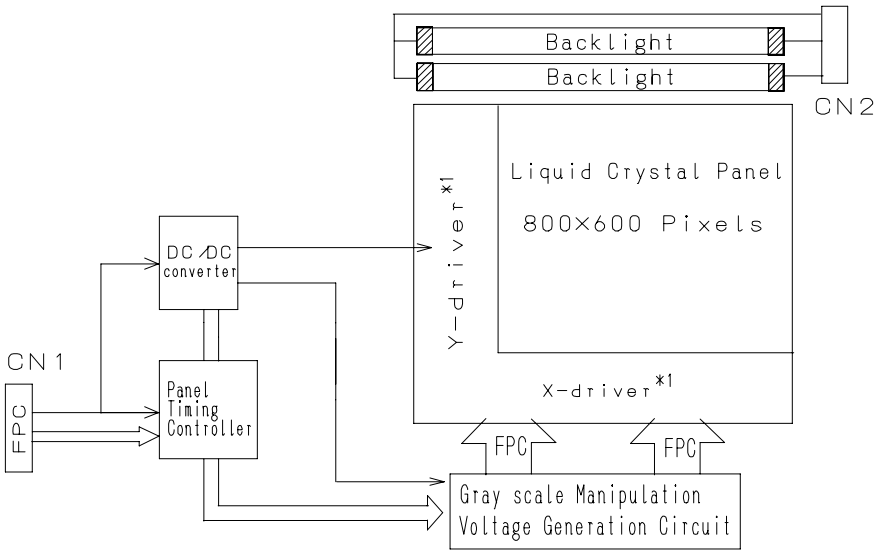
Unit : mm

Standard tolerance : ±0.5

(back figure)



BLOCK DIAGRAM



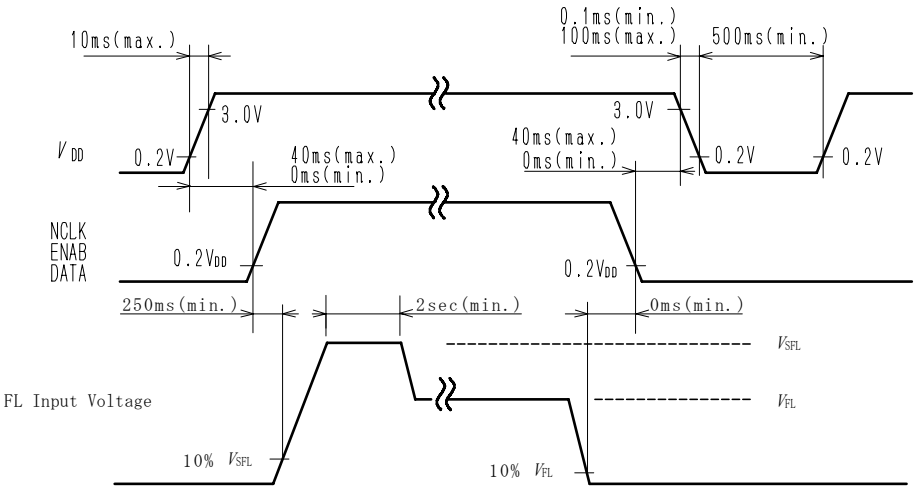
*1 Build up LCD drivers on the glass substrate

800 pixels

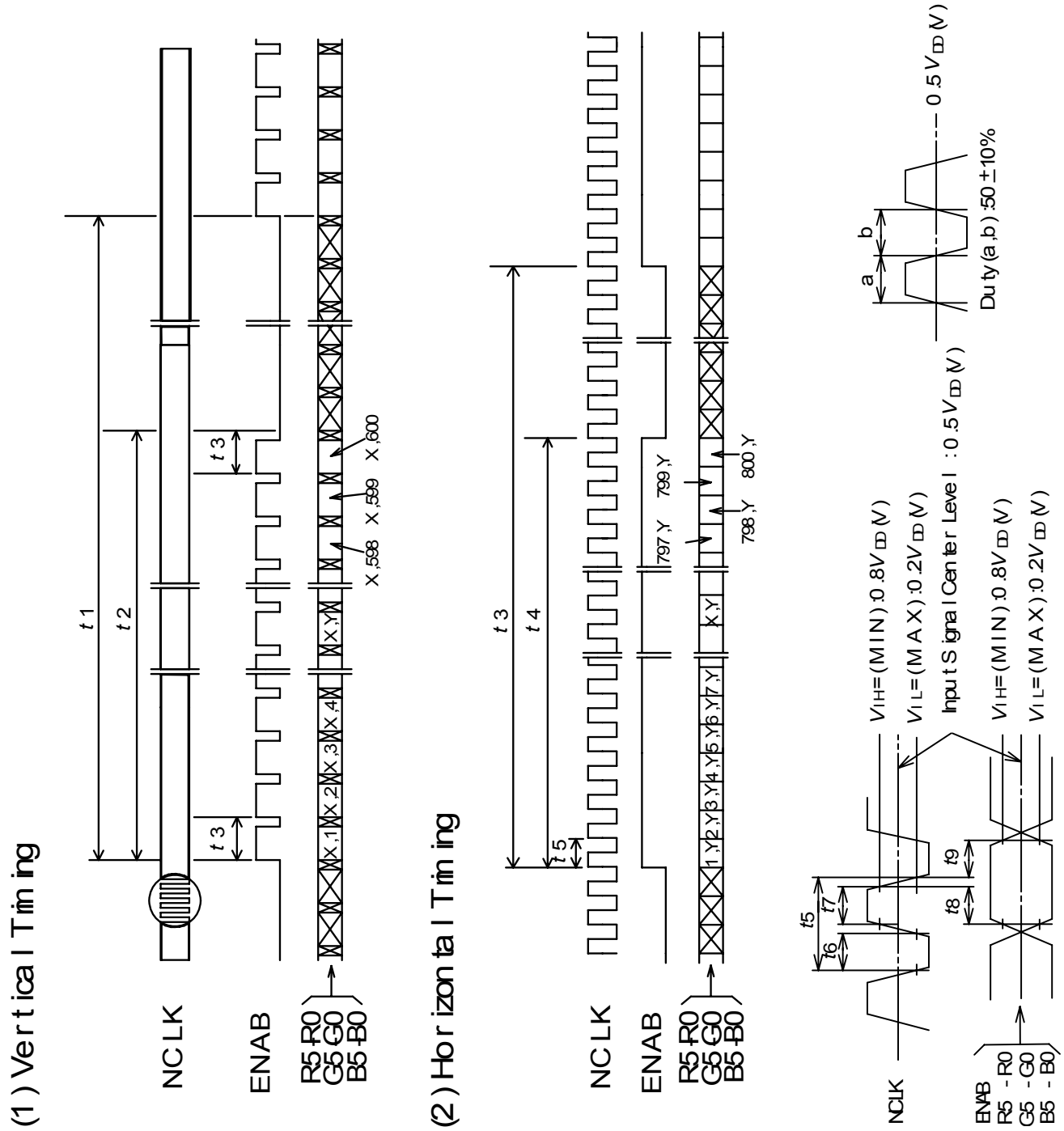
1, 1	2, 1	-----	$X2_{n-1}$, 1	$X2_n$, 1	------	800, 1
1, 2	2,2	------	$X2_{n-1}$, 2	$X2_n$, 2	------	800, 2
⋮	⋮		⋮	⋮		⋮
1, Y	2, Y	-----	X_{2n-1}, Y	X_{2n}, Y	------	800, Y
⋮	⋮		⋮	⋮		⋮
1, 600	2, 600	------	X_{2n-1}, 600	X_{2n}, 600	-----	800,600

600 pixels

SEQUENCE OF POWER SUPPLIES AND SIGNALS



TIMING CHART



TIMING SPECIFICATION *[1] *[2] *[3] *[4]

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Frame Period	*t*1	604 x *t*3 16.58	628 x *t*3 16.58	677 x *t*3 17.86	--- ms	*1
Vertical Display Term	*t*2	600 x *t*3	600 x *t*3	600 x *t*3	---	*1
One Line Scanning Time	*t*3	944 x *t*5 26.3	1056 x *t*5 26.4	1064 x *t*5 ---	--- μs	*1
Horizontal Display Term	*t*4	800 x *t*5	800 x *t*5	800 x *t*5	---	*1
Clock Period	*t*5	24.7	25.0	27.8	ns	
Clock “L” Time	*t*6	9.0	---	---	ns	
Clock “H” Time	*t*7	9.0	---	---	ns	
Set Up Time	*t*8	4.0	---	---	ns	
Hold Time	*t*9	5.0	---	---	ns	

*1 Refer to TIMING CHART on page 5.

*2 If ENAB is fixed to "H" or "L" level for certain period while NCLK is supplied, the panel displays black with some flicker.

*3 Don't fix NCLK to "H" or "L" level while the VDD(+3.3V) is supplied.
If NCLK is fixed to "H" or "L" level for certain period while ENAB is spplied, the panel may be damaged.
When It holds on, DC voltage supplies to liquid crystal materials and It may cause damage to liquid crystal materials.
Graphic controller 69000 (Chips & Technology), for example, causes above phenomenon.

*4 Please adjust LCD operating signal timing and FL driving frequency, to optimize the display quality.
There is a possibility that flicker is observed by the interference of LCD operating signal timing and FL driving condition (especially driving frequency), even if the condition satisfies above timing specifications and recommended operating conditions shown on page 1.

*5 Do not make *t*1, *t*2 and *t*3 fluctuate.
If *t*1, *t*2 and *t*3 are fluctuate, the panel displays black.

*6 Keep constant the number of clock within one line scanning time and the number of scanning line within one flame period.

CONNECTOR PIN ASSIGNMENT FOR INTERFACE

CN1 INPUT SIGNAL

Connector : DF19G-30P-1H(56) / HIROSE ELECTRIC CO., LTD.

Mating Connector : DF19G-30S-1C(Plug), DF19-2830SCFA(Crimp contact) / HIROSE ELECTRIC CO., LTD.

Terminal No.	Symbol	Function
1	GND	
2	V_{DD}	+3.3V POWER SUPPLY
3	V_{DD}	+3.3V POWER SUPPLY
4	GND	
5	ENAB	COMPOUND SYNCHRONIZATION SIGNAL
6	B5 *1	BLUE DISPLAY DATA (MSB)
7	B4 *1	BLUE DISPLAY DATA
8	B3 *1	BLUE DISPLAY DATA
9	B2 *1	BLUE DISPLAY DATA
10	B1 *1	BLUE DISPLAY DATA
11	B0 *1	BLUE DISPLAY DATA (LSB)
12	GND	
13	G5 *1	GREEN DISPLAY DATA (MSB)
14	G4 *1	GREEN DISPLAY DATA
15	G3 *1	GREEN DISPLAY DATA
16	G2 *1	GREEN DISPLAY DATA
17	G1 *1	GREEN DISPLAY DATA
18	G0 *1	GREEN DISPLAY DATA (LSB)
19	GND	
20	R5 *1	RED DISPLAY DATA (MSB)
21	R4 *1	RED DISPLAY DATA
22	R3 *1	RED DISPLAY DATA
23	R2 *1	RED DISPLAY DATA
24	R1 *1	RED DISPLAY DATA
25	R0 *1	RED DISPLAY DATA (LSB)
26	GND	
27	NC *2	
28	NC *2	
29	NCLK	SAMPLING CLOCK
30	GND	

CN2 CCFL POWER SOURCE

Connector : BHR-04VS-1/JAPAN SOLDERLESS TERMINAL MFG CO., LTD.

Mating Connector : SM04(4.0)B-BHS-1-TB/JAPAN SOLDERLESS TERMINAL MFG CO., LTD.

Terminal No.	Symbol	Function
1	*V*FLH	CCFL POWER SUPPLY (HIGH VOLTAGE)
2	*V*FLH	CCFL POWER SUPPLY (HIGH VOLTAGE)
3	NC *2	
4	*V*FLL	CCFL POWER SUPPLY (LOW VOLTAGE)

*1 See next page.

*2 NC Terminal is open. (Don't use)

256k (k=1024) COLORS 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 which exceed Toshiba Matsushita Display Technology's published specification limits.

C) In addition, since Toshiba Matsushita Display Technology 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 doses 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 and the fluorescent lamp's connector or cables in order to prevent electric shock, because high voltage is supplied to these parts from the inverter unit 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.