TOSHIBA MATSUSHITA DISPLAY TECHNOLOGY

PRODUCT INFORMATION

18cm COLOR TFT-LCD MODULE
(7.0 TYPE)

LTM07C382S
(p-Si TFT)

TENTATIVE

FEATURES

(1) 7.0 SVGA-wide display size for palm size PCs
(2) High resolution (169 pixel per inch)
(3) 256k-colors

MECHANICAL SPECIFICATIONS

Item	Specifications
Dimensional Outline (typ.)	182.0(*W*) x 108.5(*H*) x 6.4(*D*)max mm
Number of Pixels	1024(*W*) x 600(*H*) pixels
Active Area	153.6(*W*) x 90.0(*H*) mm
Pixel Pitch	0.150(*W*) x 0.150(*H*) mm
Weight (approximately)	150g
Backlight	Single CCFL, Sidelight type

ABSOLUTE MAXIMUM RATINGS

Item		Min.	Max.	Unit
Supply Voltage	(V_{DD})	-0.3	4.0	V
	(V_{FL})	---	2	kV(rms)
FL Driving Frequency (f_{FL})		---	100	kHz
Input Signal Voltage (V_{IN})		-0.3	V_{DD}+0.3	V
Operating Temperature		0	50	°C
Storage Temperature		-20	60	°C
Storage Humidity (Max. wet bulb temperature = 39°C)		10	90	%(RH)

ELECTRICAL SPECIFICATION (*T*a=25°C)

Item		Min.	Typ.	Max.	Unit	Remarks
Supply Voltage	(V_{DD})	3.0	3.3	3.6	V	
	(V_{FL})	(400)	450	(500)	V(rms)	(I_{FL}=3.5mA)
FL Start Voltage		(930)	---	---	V(rms)	*T*a=0°C
High Level Input Voltage (V_{IH})		0.8x V_{DD}	---	V_{DD}		
Low Level Input Voltage (V_{IL})		0	---	0.2x V_{DD}	V	
Current Consumption	*1 (I_{DD})	---	285	---	mA	
	*2 (I_{FL})	---	3.5	---	mA(rms)	
*1 *2 Power Consumption		---	2.7	---	W	@ 150cd/m^2

*1 : 8 color bars pattern
*2 : Except the efficiency of FL inverter
3: Do not use Hsync nor Vsync. Only ENAB control.

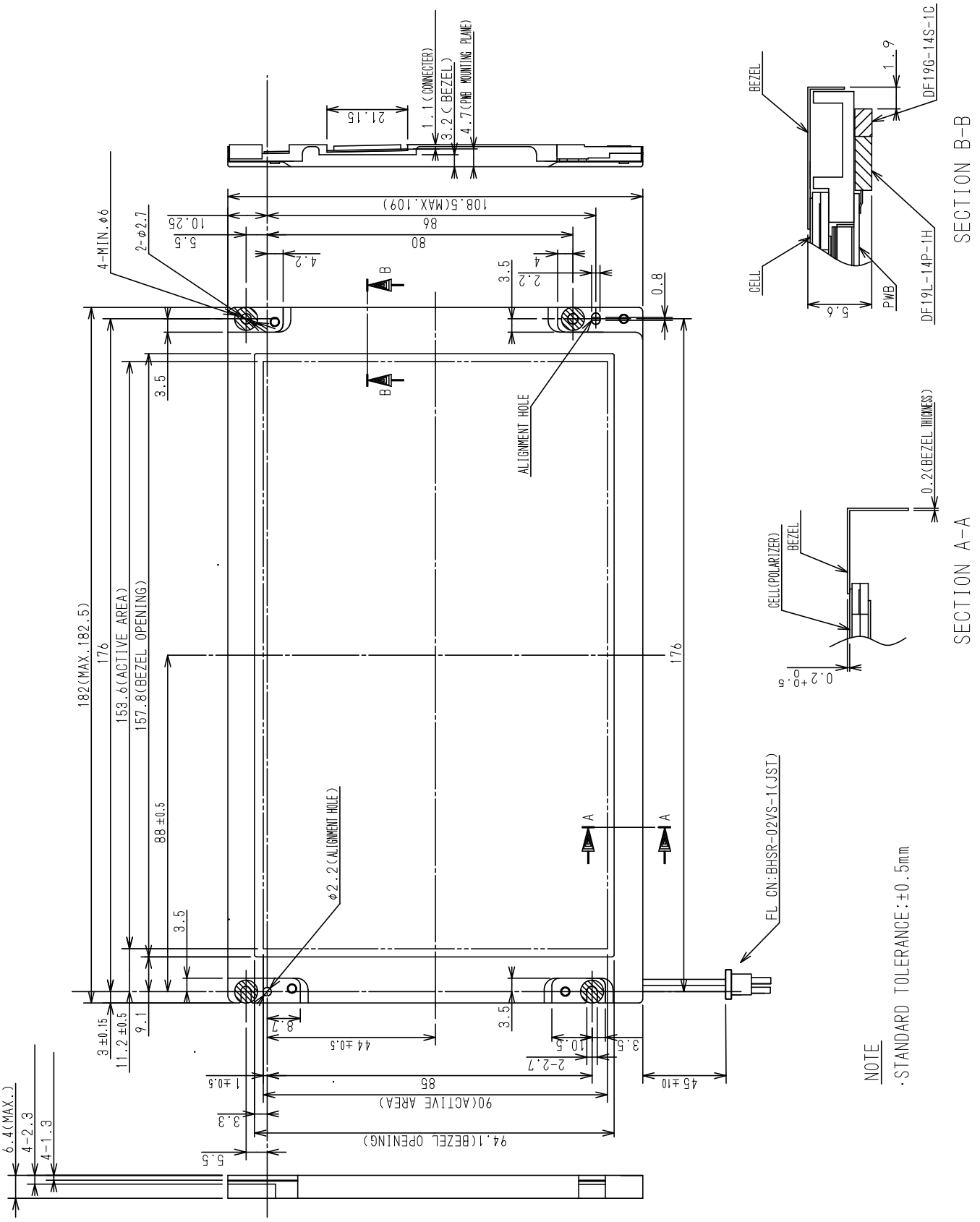
OPTICAL SPECIFICATION (*T*a=25°C)

Item		Min.	Typ.	Max.	Unit	Remarks
Contrast Ratio (*CR*)		100	250	---	---	
Response Time	(t_{ON})	---	---	50	ms	
	(t_{OFF})	---	---	50	ms	
Luminance *(L)*		(100)	150	---	cd/m^2	(I_{FL}=3.5mA(rms))

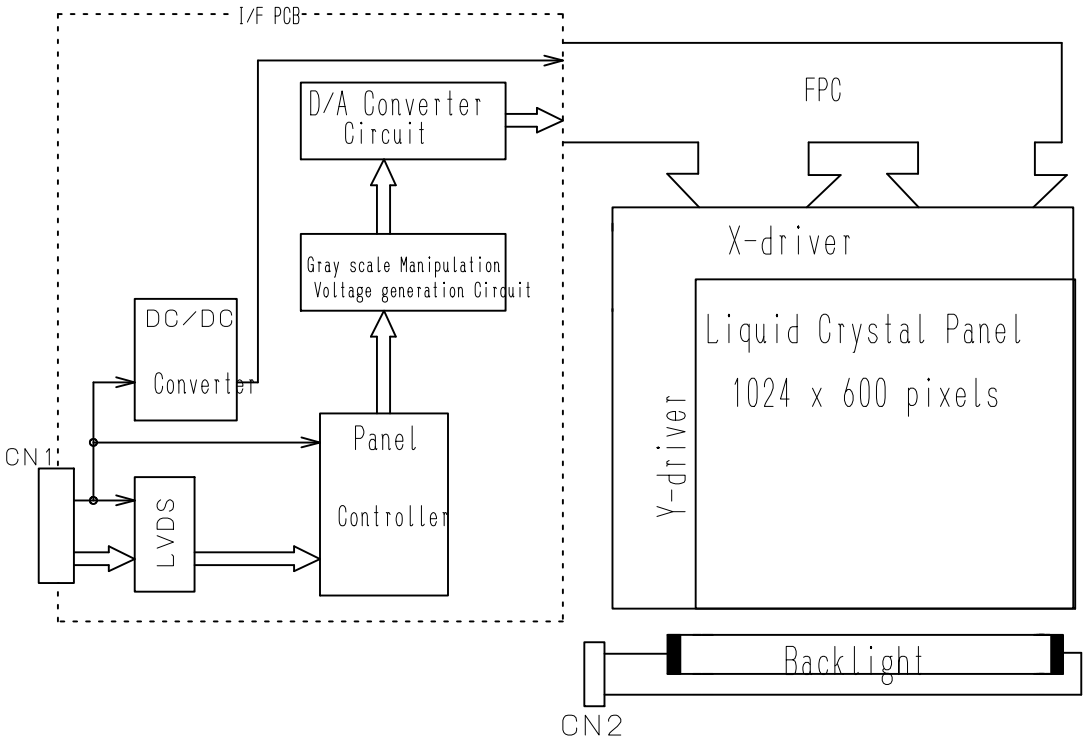
DIMENSIONAL OUTLINE

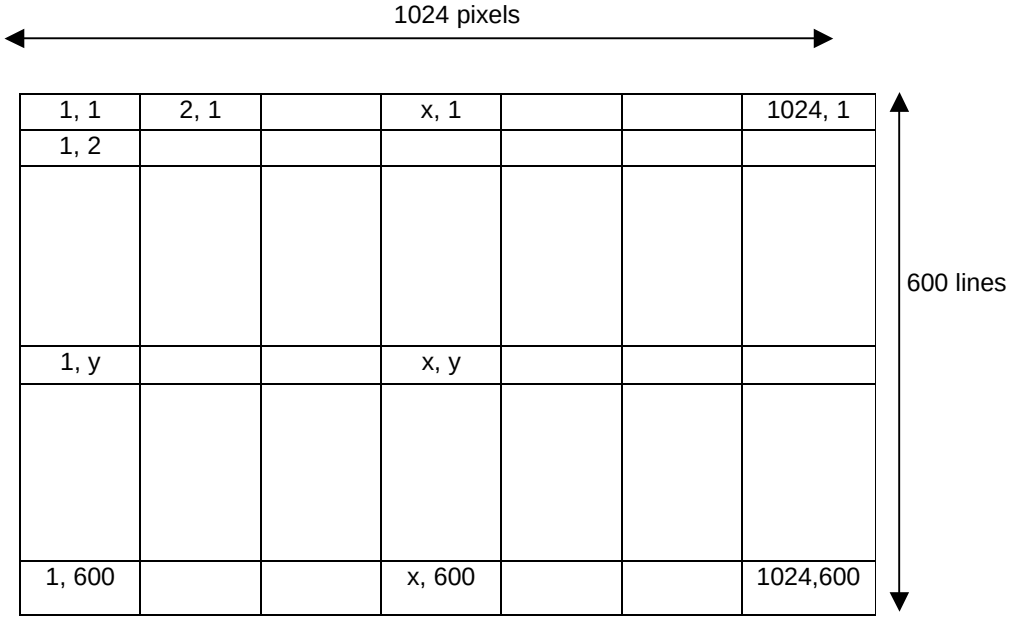
Unit : mm

Standard tolerance : ±0.5



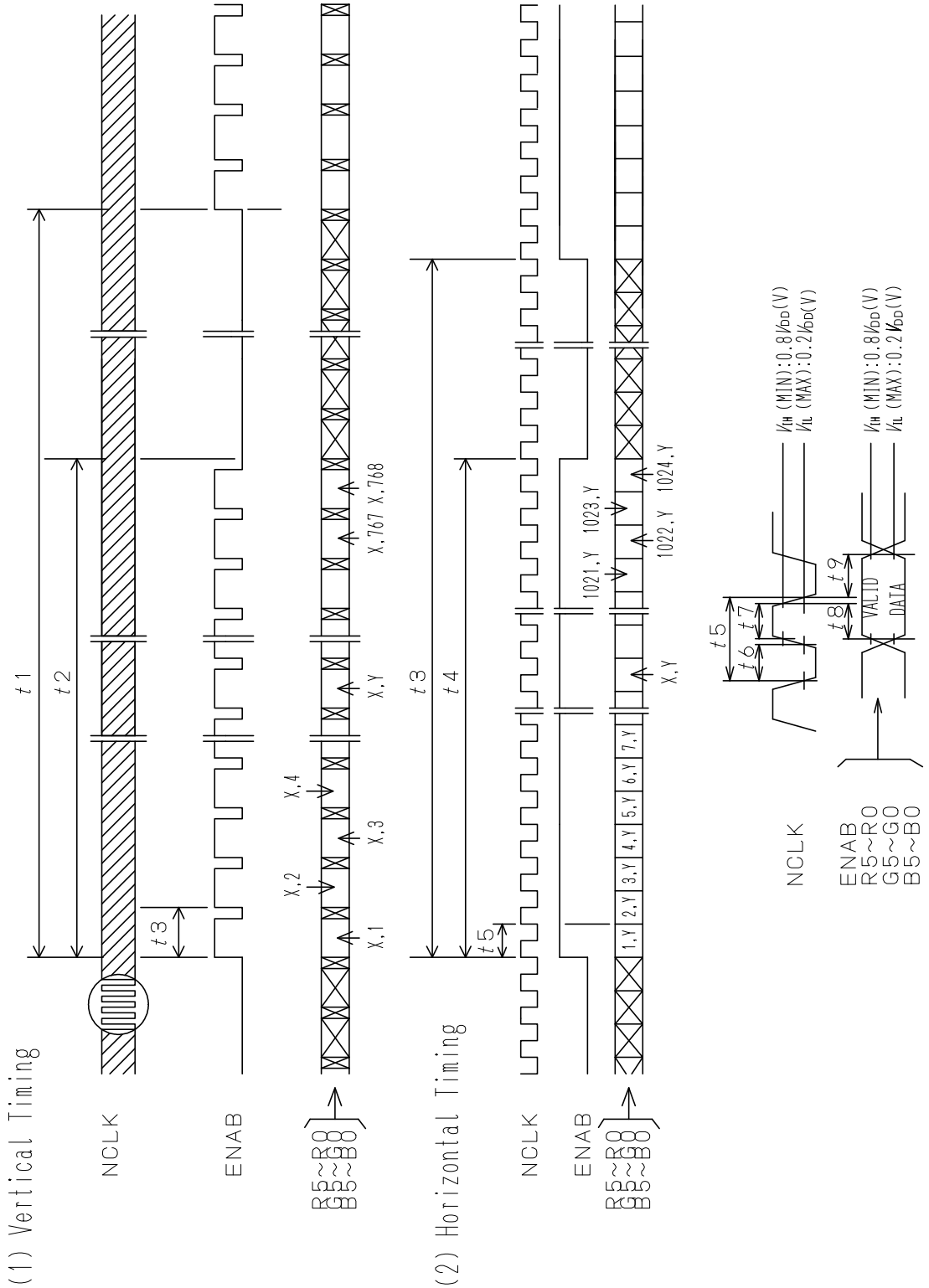
BLOCK DIAGRAM





1, 1	2, 1		x, 1			1024, 1
1, 2						
1, y			x, y			
1, 600			x, 600			1024,600

TIMING CHART



TIMING SPECIFICATION [1) 2) 3)]

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Frame Period	t1	778 x t3	800 x t3 16.67	860 x t3 17.86	--- ms	4)
Vertical Display Term	t2	768 x t3	768 x t3	768 x t3	---	
One Line Scanning Time	t3	1319 x t5 -	1344 x t5 -	1462 x t5 -	--- µs	4)
Horizontal Display Term	t4	1024 x t5	1024 x t5	1024 x t5	---	
Clock Period	t5	15.0	15.38	---	ns	
Clock “L” Time	t6	(2.5)	---	---	ns	
Clock “H” Time	t7	(5.0)	---	---	ns	
Set Up Time	t8	(1.5)	---	---	ns	
Hold Time	t9	(5.0)	---	---	ns	

Note 1) When ENAB is fixed to “H” level or “L” level after NCLK input, the panel is displayed as black. However, it may be occurred a flicker on the display.

Note 2) When NCLK is fixed to “H” level or “L” level, the panel becomes white stage after several seconds.

Note 3) Do not change t1 and t3 values in the operation. When t1 or t3 is changed, the panel is displayed as black.

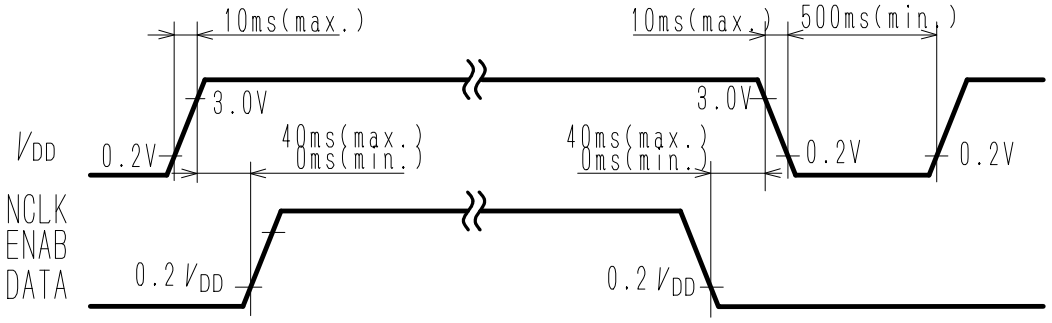
Note 4) Please adjust LCD operating signal timing and FL driving frequency, to optimize the display quality. There is a possibility that flicker is observed by the interference of LCD operating signal timing and FL driving condition (especially driving frequency).

Note 5) Keep constant the number of clock within one line scanning time and the number of scanning line within one frame

period.

Notes 6) Do not hold NCLK on “H” level nor “L” level during VDD(+3.3V) Is supplied. 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.

SEQUENCE OF POWER SUPPLIES AND SIGNALS



CONNECTOR PIN ASSIGNMENT FOR INTERFACE

CN1 INPUT SIGNAL

Connector : DF19L-14P-1H / HIROSE ELECTRIC CO.,LTD

Mating Connector : DF19G-14S-1C/ HIROSE ELECTRIC CO.,LTD

Terminal No.	Symbol	Function
1	V_{DD}	+3.3V POWER SUPPLY
2	V_{DD}	+3.3V POWER SUPPLY
3	GND[1)]	
4	GND[1)]	
5	IN0-	RECEIVER DATA 0 (NEGATIVE: -)
6	IN0+	RECEIVER DATA 0(POSITIVE: +)
7	IN1-	RECEIVER DATA 1 (NEGATIVE: -)
8	IN1+	RECEIVER DATA 1 (POSITIVE: +)
9	IN2-	RECEIVER DATA 2 (NEGATIVE: -)
10	IN2+	RECEIVER DATA 2 (POSITIVE: +)
11	CLK-	SAMPLING CLOCK (NEGATIVE: -)
12	CLK+	SAMPLING CLOCK (POSITIVE: +)
13	GND[1)]	
14	GND[1)]	

CN2 CCFL POWER SOURCE

Connector : BHSR-02VS-1 / JAPAN SOLDERLESS TERMINAL MFG CO.,LTD.

Mating Connector : SM02B-BHSS-1/ JAPAN SOLDERLESS TERMINAL MFG CO.,LTD.

Terminal No.	Symbol	Function
1	V_{FLH}	CCFL Power Supply (high voltage)
2	V_{FLL}	CCFL Power Supply (low voltage)

Note 1) Please connect GND pin to ground.

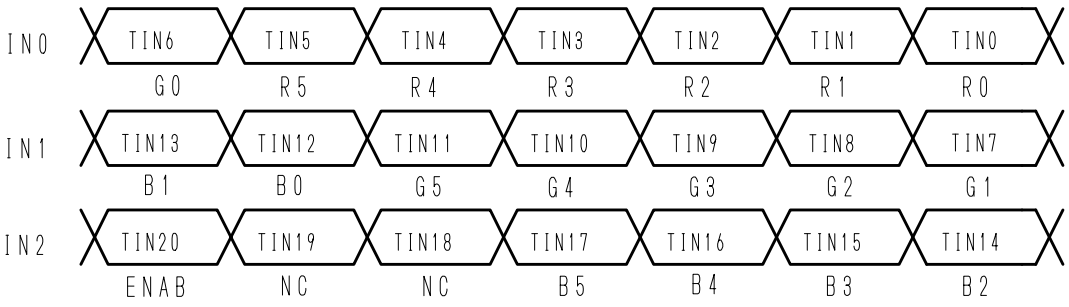
Don't use it as no-connect nor connection with high impedance.

Note 2) See next page.

RECOMMENDED TRANSMITTER (DS90CF363) TO LTM07C382S INTERFACE ASSIGNMENT

Case1: 6bit Transmitter

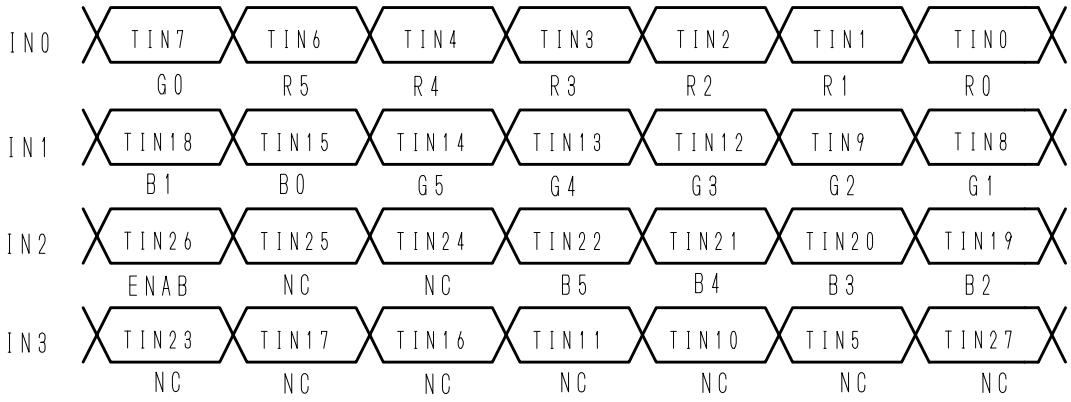
DS90CF363					LTM07C382S Interface (CN1)	
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol		
Symbol	DS90CF363	Symbol	Function		Terminal	Symbol
TIN0	44	R0	Red Pixels Display Data (LSB)	TOUT0- TOUT0+	No.5 No.6	IN0- IN0+
TIN1	45	R1	Red Pixels Display Data			
TIN2	47	R2	Red Pixels Display Data			
TIN3	48	R3	Red Pixels Display Data			
TIN4	1	R4	Red Pixels Display Data			
TIN5	3	R5	Red Pixels Display Data (MSB)			
TIN6	4	G0	Green Pixels Display Data (LSB)			
TIN7	6	G1	Green Pixels Display Data	TOUT1- TOUT1+	No.7 No.8	IN1- IN1+
TIN8	7	G2	Green Pixels Display Data			
TIN9	9	G3	Green Pixels Display Data			
TIN10	10	G4	Green Pixels Display Data			
TIN11	12	G5	Green Pixels Display Data (MSB)			
TIN12	13	B0	Blue Pixels Display Data (LSB)			
TIN13	15	B1	Blue Pixels Display Data			
TIN14	16	B2	Blue Pixels Display Data	TOUT2- TOUT2+	No.9 No.10	IN2- IN2+
TIN15	18	B3	Blue Pixels Display Data			
TIN16	19	B4	Blue Pixels Display Data			
TIN17	20	B5	Blue Pixels Display Data (MSB)			
TIN18	22	NC	Non Connection (open)			
TIN19	23	NC	Non Connection (open)			
TIN20	25	ENAB	Compound Synchronization Signal			
CLK IN	26	NCLK	Data Sampling Clock	TCLK OUT- TCLK OUT+	No.11 No.12	CLK- CLK+



RECOMMENDED TRANSMITTER (DS90CF383) TO LTM07C382S INTERFACE ASSIGNMENT

Case2: 8bit Transmitter

DS90CF383					LTM07C382S Interface (CN1)	
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol		
Symbol	DS90CF383	Symbol	Function		Terminal	Symbol
TIN0	51	R0	Red Pixels Display Data (LSB)			
TIN1	52	R1	Red Pixels Display Data			
TIN2	54	R2	Red Pixels Display Data	TOUT0- TOUT0+	No.5 No.6	IN0- IN0+
TIN3	55	R3	Red Pixels Display Data			
TIN4	56	R4	Red Pixels Display Data			
TIN6	3	R5	Red Pixels Display Data (MSB)			
TIN7	4	G0	Green Pixels Display Data(LSB)			
TIN8	6	G1	Green Pixels Display Data			
TIN9	7	G2	Green Pixels Display Data			
TIN12	11	G3	Green Pixels Display Data	TOUT1- TOUT1+	No.7 No.8	IN1- IN1+
TIN13	12	G4	Green Pixels Display Data			
TIN14	14	G5	Green Pixels Display Data(MSB)			
TIN15	15	B0	Blue Pixels Display Data (LSB)			
TIN18	19	B1	Blue Pixels Display Data			
TIN19	20	B2	Blue Pixels Display Data			
TIN20	22	B3	Blue Pixels Display Data			
TIN21	23	B4	Blue Pixels Display Data	TOUT2- TOUT2+	No.9 No.10	IN2- IN2+
TIN22	24	B5	Blue Pixels Display Data (MSB)			
TIN24	27	NC	Non Connection (open)			
TIN25	28	NC	Non Connection (open)			
TIN26	30	ENAB	Compound Synchronization Signal			
TIN27	50	NC	Non Connection (open)			
TIN5	2	NC	Non Connection (open)			
TIN10	8	NC	Non Connection (open)	TOUT3- TOUT3+	———	———
TIN11	10	NC	Non Connection (open)			
TIN16	16	NC	Non Connection (open)			
TIN17	18	NC	Non Connection (open)			
TIN23	25	NC	Non Connection (open)			
CLK IN	31	NCLK	Data Sampling Clock	TCLK OUT- TCLK OUT+	No.11 No.12	CLK- CLK+



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'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 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) DISPOSAL

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