

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

## FEATURES

- (1) 8.4" SVGA color display with High Brightness (350cd/m<sup>2</sup>).
- (2) Wide viewing angle.
- (3) Built in Long Life CCFLs (MTBF:50,000 h).  
( Conditions / Ta:25°C I<sub>FL</sub>:6mA(rms)(continuing lighting), f<sub>FL</sub>:40kHz )
- (4) Replaceable structure of lamp units.
- (5) RoHS compliant

**TENTATIVE**

**RoHS compliant product**

## 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	Twin CCFLs, Side-light type

## ABSOLUTE MAXIMUM RATINGS

Item	Min.	Max.	Unit	
Supply Voltage	(V <sub>DD</sub> )	-0.3	4.0	V
	(V <sub>FL</sub> )	0	2.0	kV(rms)
FL Driving Frequency (f <sub>FL</sub> )	---	100	kHz	
Input Signal Voltage (V <sub>IN</sub> )	-0.3	V <sub>DD</sub> +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 <sub>DD</sub> )	3.0	3.3	3.6	V	
	(V <sub>FL</sub> )	---	480	---	V(rms)	I <sub>FL</sub> =6.0 mA(rms)
FL Start Voltage (Ta=0°C)	1300	---	1600	V(rms)		
Common Mode Input Voltage (V <sub>CM</sub> )	1.0	1.25	2.0	V		
Differential Input Amplitude (V <sub>ID</sub> )	0.25	---	0.45	V		
Differential Input Voltage	V <sub>CM</sub> - V <sub>ID</sub> /2	---	V <sub>CM</sub> + V <sub>ID</sub> /2	V		
Current Consumption	*1 (I <sub>DD</sub> )	---	200	mA		
	*2 (I <sub>FL</sub> )	3.0	---	6.5	mA(rms)	
*1*2 Power Consumption	---	6.4	---	W	@350cd/m <sup>2</sup>	

\*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 ≥ 10)	(Upper+Lower)	90	---	°	
	(Left+Right)	100	---	°	
Response Time	(t <sub>ON</sub> )	20	---	ms	
	(t <sub>OFF</sub> )	25	---	ms	
Luminance (L)	280	350	---	cd/m <sup>2</sup>	I <sub>FL</sub> =6.0mA(rms)
Lamp Life Time (MTBF)*3 *4	50,000			h	

\*3 : Conditions ; Ta=25°C, I<sub>FL</sub>=6.0mA(rms), continuous lighting

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

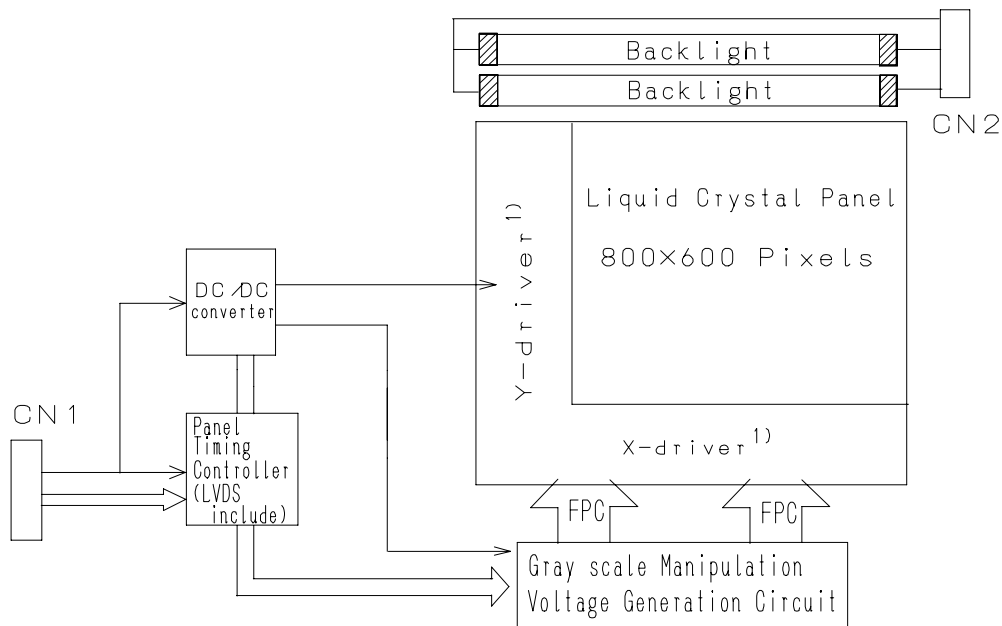
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\*The information contained herein may be changed without prior notice. It is therefore advisable to contact Toshiba Matsushita Display Technology before proceeding with the design of equipment incorporating this product.

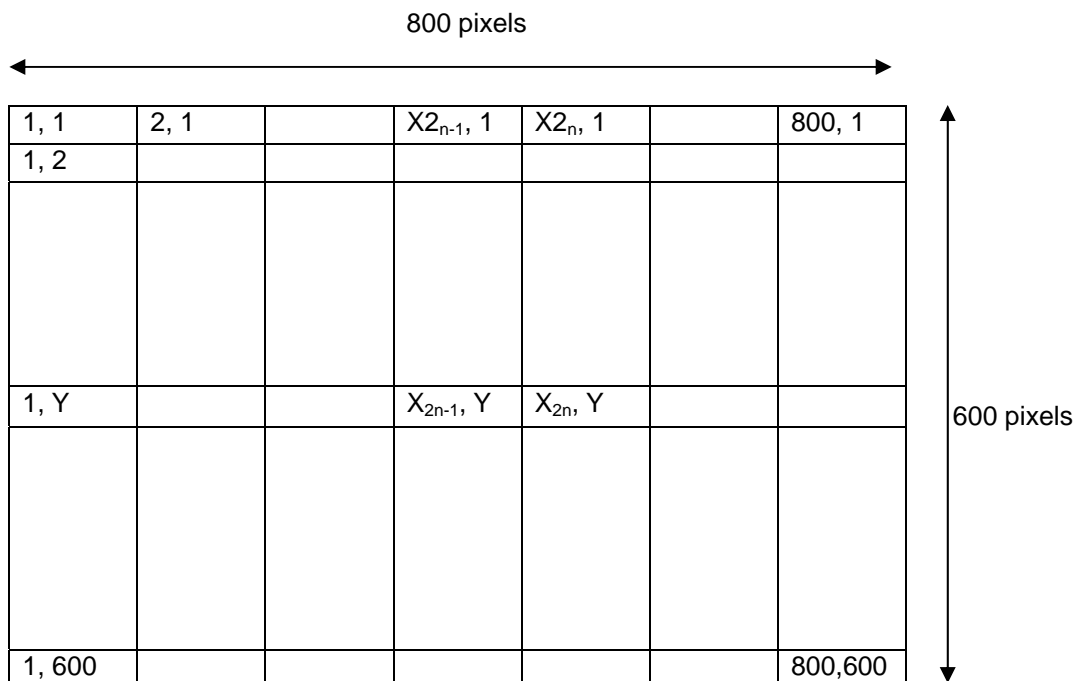




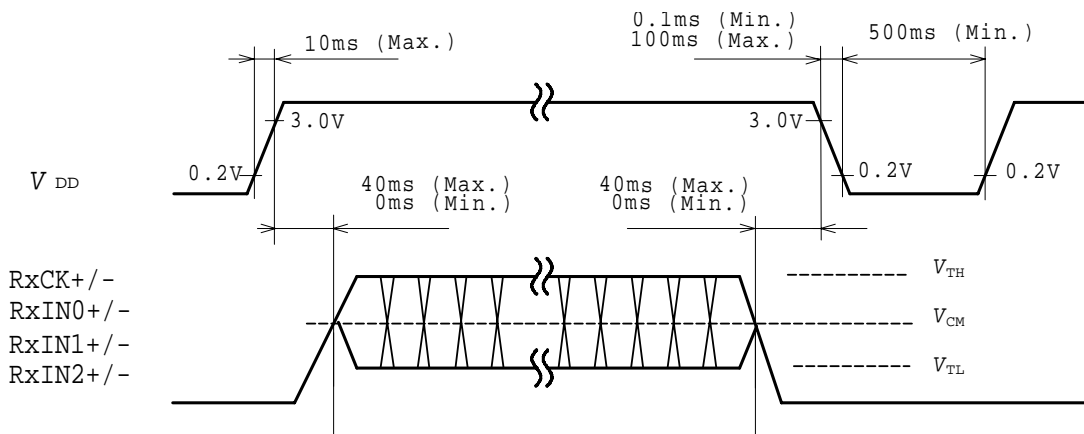
**BLOCK DIAGRAM**



Note1) Build up LCD drivers on the glass substrate

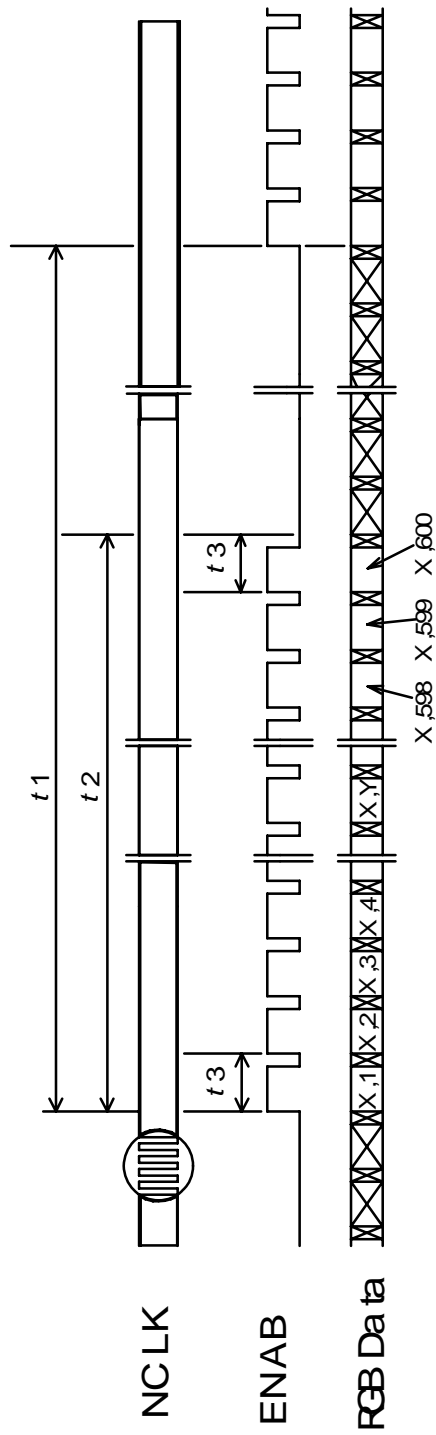


**SEQUENCE OF POWER SUPPLIES AND SIGNALS**

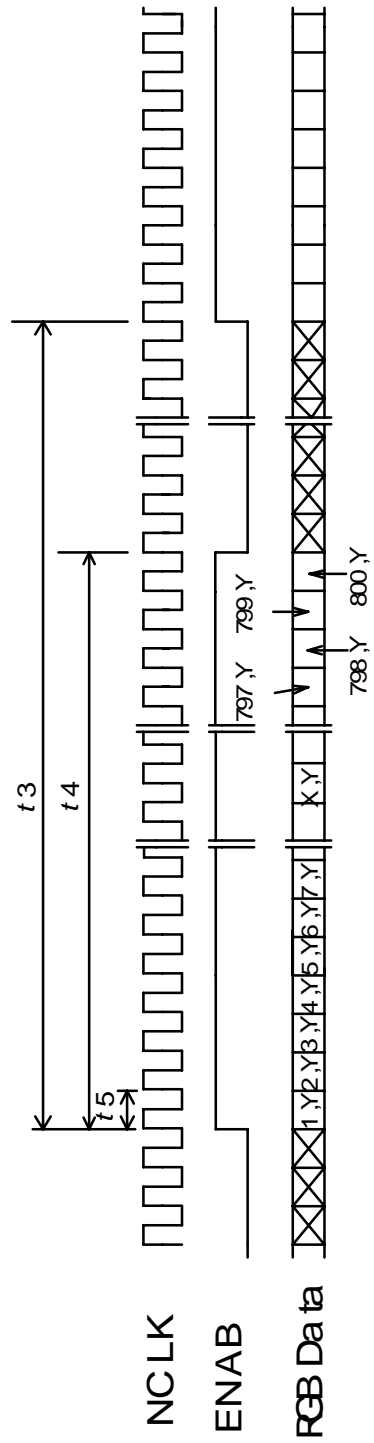


TIMING CHART

(1) Vertical Timing



(2) Horizontal Timing



**TIMING SPECIFICATION** <sup>1) 2) 3) 4) 5) 6)</sup>

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Frame Period	$t_1$	604 x $t_3$	628 x $t_3$ 16.58	677 x $t_3$ 17.86	---	
Vertical Display Term	$t_2$	600 x $t_3$	600 x $t_3$	600 x $t_3$	---	
One Line Scanning Time	$t_3$	944 x $t_5$ 26.3	1056 x $t_5$ 26.4	1064 x $t_5$ ---	---	$\mu\text{s}$
Horizontal Display Term	$t_4$	800 x $t_5$	800 x $t_5$	800 x $t_5$	---	
Clock Period	$t_5$	24.7	25.0	27.8	ns	

Note 1) Refer to "TIMING CHART" and LVDS (DC90C363A) specifications by National Semiconductor Corporation.

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

Note 3) Don't fix NCLK to "H" or "L" level while the VDD is supplied.

If NCLK is fixed to "H" or "L" level for certain period while ENAB is supplied, 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.

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), even if the condition satisfies above timing specifications and recommended operating conditions shown on page 1.

Note 5) Do not make  $t_1$ ,  $t_2$  and  $t_3$  fluctuate.

If  $t_1$ ,  $t_2$  and  $t_3$  fluctuate, the panel displays black.

Note 6) Keep constant the number of clock within one line scanning time and the number of scanning line within one frame period.

## CONNECTOR PIN ASSIGNMENT FOR INTERFACE

### CN1 INPUT SIGNAL

Connector : DF19L-20P-1H / HIROSE ELECTRIC CO., LTD.

Mating Connector : DF19G-20S-1C / HIROSE ELECTRIC CO., LTD.

Terminal No.	Symbol	Function
1	V <sub>DD</sub>	+3.3V POWER SUPPLY
2	V <sub>DD</sub>	+3.3V POWER SUPPLY
3	GND	
4	GND	
5	RxIN0-	Negative LVDS differential data input (R0-R5, G0)
6	RxIN0+	Positive LVDS differential data input (R0-R5, G0)
7	GND	
8	RxIN1-	Negative LVDS differential data input (G1-G5, B0-B1)
9	RxIN1+	Positive LVDS differential data input (G1-G5, B0-B1)
10	GND	
11	RxIN2-	Negative LVDS differential data input (B2-B5, HS, VS, DE)
12	RxIN2+	Positive LVDS differential data input (B2-B5, HS, VS, DE)
13	GND	
14	CLK-	Clock Signal (-)
15	CLK+	Clock Signal (+)
16	GND	
17	NC <sup>1)</sup>	Non Connection (open)
18	NC <sup>1)</sup>	Non Connection (open)
19	GND	
20	GND	

Note 1) Please connect NC pin to nothing. Don't connect it to ground nor to other signal input.

Note 2) Please connect GND pin to ground. Don't use it as no-connect nor connection with high impedance.

Note 3) Refer to next page.

### CN2 CCFL POWER SOURCE

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

Mating Connector <sup>4)</sup> : SM04(4.0)B-BHS-1-TB/JAPAN SOLDERLESS TERMINAL MFG CO., LTD.

Terminal No.	Symbol	Function
1	VFLH	CCFL POWER SUPPLY (HIGH VOLTAGE)
2	VFLH	CCFL POWER SUPPLY (HIGH VOLTAGE)
3	NC <sup>1)</sup>	
4	VFLL	CCFL POWER SUPPLY (LOW VOLTAGE)

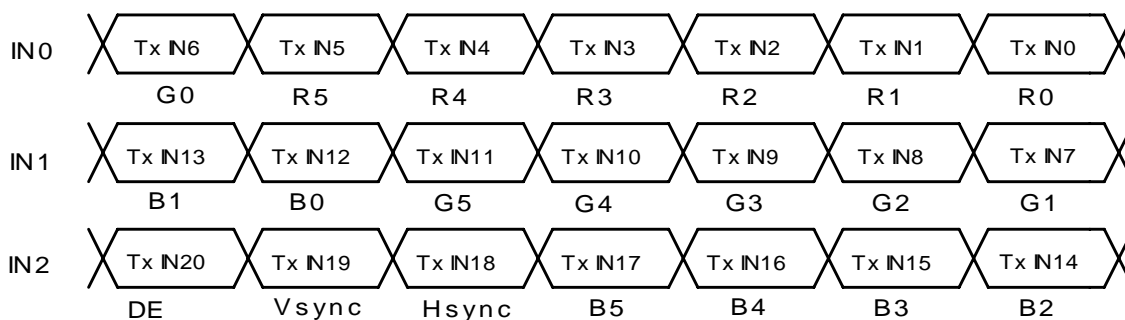
Note 4) Take away terminal No.3 of the mating connector. If does not take away, it may cause smoke burn of Electrical parts by high voltage.

## RECOMMENDED TRANSMITTER (DS90C363A) TO LTM08C351L INTERFACE ASSIGNMENT

## Case1: 6bit Transmitter

DS90C363A				LTM08C351L Interface (CN1)		
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol	Terminal	Symbol
Symbol	Terminal	Symbol	Function			
TxIN0	44	R0	Red Pixels Display Data (LSB)	TxOUT0- TxOUT0+	No.5 No.6	RxIN0- RxIN0+
TxIN1	45	R1	Red Pixels Display Data			
TxIN2	47	R2	Red Pixels Display Data			
TxIN3	48	R3	Red Pixels Display Data			
TxIN4	1	R4	Red Pixels Display Data			
TxIN5	3	R5	Red Pixels Display Data (MSB)			
TxIN6	4	G0	Green Pixels Display Data (LSB)	TxOUT1- TxOUT1+	No.8 No.9	RxIN1- RxIN1+
TxIN7	6	G1	Green Pixels Display Data			
TxIN8	7	G2	Green Pixels Display Data			
TxIN9	9	G3	Green Pixels Display Data			
TxIN10	10	G4	Green Pixels Display Data			
TxIN11	12	G5	Green Pixels Display Data (MSB)			
TxIN12	13	B0	Blue Pixels Display Data (LSB)	TxOUT2- TxOUT2+	No.11 No.12	RxIN2- RxIN2+
TxIN13	15	B1	Blue Pixels Display Data			
TxIN14	16	B2	Blue Pixels Display Data			
TxIN15	18	B3	Blue Pixels Display Data			
TxIN16	19	B4	Blue Pixels Display Data			
TxIN17	20	B5	Blue Pixels Display Data (MSB)			
TxIN18	22	Hsync	Horizontal Synchronization Signal	TxCLK OUT- TxCLK OUT+	No.14 No.15	CLK- CLK+
TxIN19	23	Vsync	Vertical Synchronization Signal			
TxIN20	25	DE	Compound Synchronization Signal			
TxCLK IN	26	NCLK	Data Sampling Clock			

Note 1) Please connect NC pin to nothing. Don't connect it to ground nor to other signal input.

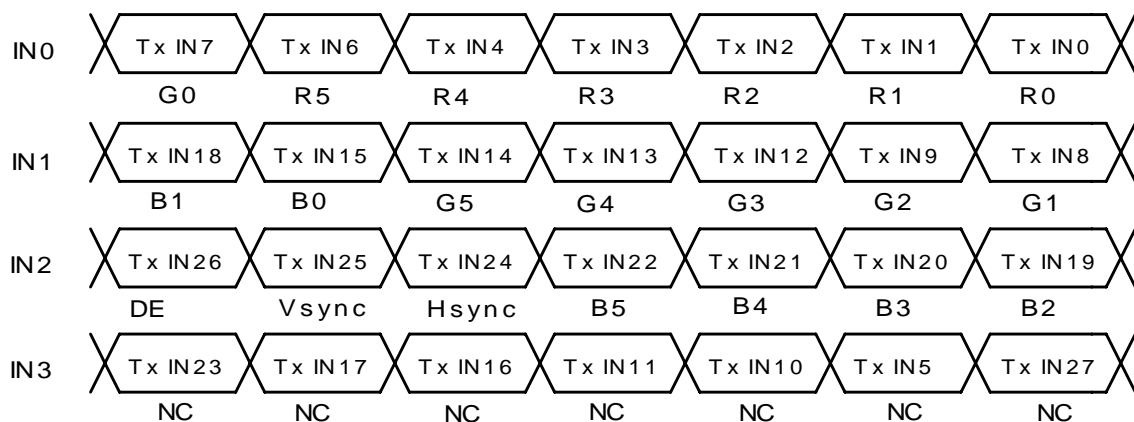


## RECOMMENDED TRANSMITTER (DS90C383A) TO LTM08C351L INTERFACE ASSIGNMENT

## Case2: 8bit Transmitter

DS90C383A				LTM08C351L Interface (CN1)		
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol	Terminal	Symbol
Symbol	Terminal	Symbol	Function			
TxIN0	51	R0	Red Pixels Display Data (LSB)	TxOUT0- TxOUT0+	No.5 No.6	RxIN0- RxIN0+
TxIN1	52	R1	Red Pixels Display Data			
TxIN2	54	R2	Red Pixels Display Data			
TxIN3	55	R3	Red Pixels Display Data			
TxIN4	56	R4	Red Pixels Display Data			
TxIN6	3	R5	Red Pixels Display Data (MSB)			
TxIN7	4	G0	Green Pixels Display Data(LSB)	TxOUT1- TxOUT1+	No.8 No.9	RxIN1- RxIN1+
TxIN8	6	G1	Green Pixels Display Data			
TxIN9	7	G2	Green Pixels Display Data			
TxIN12	11	G3	Green Pixels Display Data			
TxIN13	12	G4	Green Pixels Display Data			
TxIN14	14	G5	Green Pixels Display Data(MSB)			
TxIN15	15	B0	Blue Pixels Display Data (LSB)	TxOUT2- TxOUT2+	No.11 No.12	RxIN2- RxIN2+
TxIN18	19	B1	Blue Pixels Display Data			
TxIN19	20	B2	Blue Pixels Display Data			
TxIN20	22	B3	Blue Pixels Display Data			
TxIN21	23	B4	Blue Pixels Display Data			
TxIN22	24	B5	Blue Pixels Display Data (MSB)			
TxIN24	27	Hsync	Horizontal Synchronization Signal	TxOUT3- TxOUT3+		
TxIN25	28	Vsync	Vertical Synchronization Signal			
TxIN26	30	DE	Compound Synchronization Signal			
TxIN27	50	NC	Non Connection (open)			
TxIN5	2	NC	Non Connection (open)			
TxIN10	8	NC	Non Connection (open)			
TxIN11	10	NC	Non Connection (open)	TxCLK OUT- TxCLK OUT+	No.14 No.15	CLK- CLK+
TxIN16	16	NC	Non Connection (open)			
TxIN17	18	NC	Non Connection (open)			
TxIN23	25	NC	Non Connection (open)			
TxCLK IN	31	NCLK	Data Sampling Clock			

Note 1) Please connect NC pin to nothing. Don't connect it to ground nor to other signal input.



## 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 L L L	---
	Blue	L L L L L L L	L L L L L L L	H H H H H H H	---
	Green	L L L L L L L	H H H H H H H	L L L L L L L	---
	Light Blue	L L L L L L L	H H H H H H H	H H H H H H H	---
	Red	H H H H H H H	L L L L L L L	L L L L L L L	---
	Purple	H H H H H H H	L L L L L L L	H H H H H H H	---
	Yellow	H H H H H H H	H H H H H H H	L 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 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 L L	L 0
	Dark ↑ ↓ Light	L L L L L L H	L L L L L L L	L L L L L L L	L 1
		L L L L L H L	L 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 L L	L61
	H H H H H L	L L L L L L L	L L L L L L L	L62	
	Red	H H H H H H H	L L 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 L L	L 0
	Dark ↑ ↓ Light	L L L L L L L	L L L L L L H	L L L L L L L	L 1
		L L L L L L L	L L L L L H L	L L L L L L L	L 2
		: :	: :	: :	L3...
		: :	: :	: :	L60
		L L L L L L L	H H H H L H	L L L L L L L	L61
	L L L L L L L	H H H H H L	L L L L L L L	L62	
	Green	L L L L L L L	H H H H H H H	L 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 L L	L 0
	Dark ↑ ↓ Light	L L 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 L L H L	L 2
		: :	: :	: :	L3...
		: :	: :	: :	L60
		L L 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 L L	H H H H H L	L62	
	Blue	L L L L L L L	L L L L L L L	H 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 L L	L 0
	Dark ↑ ↓ Light	L L L L L L H	L L L L L L H	L 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 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 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 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, surge of input-and-output line, and surrounding temperature.

**8) DISPOSAL**

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