21cm COLOR TFT-LCD MODULE
(8.4 TYPE)

LTA084C191F
(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
(2) Built in Long Life CCFL (MTTF:50,000 h)
(Conditions / *T*a:25°C I_{FL}:6.0mA(rms)(continuing lighting), f_{FL}:50kHz)
(3) RoHS compatible

MECHANICAL SPECIFICATIONS

Item	Specifications
Dimensional Outline (Typ.)	203.0 (*W*) x 143.5 (*H*) x 6.5 (*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)	290 g
Backlight	Sidelight (1 CCFL)

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		-20	70	°C
Storage Temperature		-30	80	°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})	---	420	---	V(rms)	I_{FL}=6.0 mA(rms)
FL Start Voltage	(V_{SFL})	1200	---	1900	V(rms)	*T*a=0°C
Differential Input Voltage	(V_{ID})	0.1	---	0.6	V	
Common Mode Input Voltage	(V_{CM})	1.0	1.25	2.4-(V_{ID})/2	V	
"H" Level input	(V_{TH})	0.7V_{DD}	---	V_{DD}	V	
"L" Level Input	(V_{TL})	0	---	0.3V_{DD}	V	
Current Consumption	(I_{DD}) *1	---	240	---	mA	
	(I_{FL}) *2	3.0	6.0	6.5	mA(rms)	
Power Consumption *1*2		---	3.3	---	W	I_{FL}=6.0 mA(rms)

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

OPTICAL SPECIFICATION (*T*a=25°C)

Item		Min.	Typ.	Max.	Unit	Remarks
Contrast Ratio	(*CR*)	250	400	---	---	
Viewing Angle ($CR \geq 10$)	(Upper+Lower)	---	100	---	°	
	(Left+Right)	---	120	---	°	
Response Time	(t_{ON})	---	10	---	ms	
	(t_{OFF})	---	20	---	ms	
Luminance	(*L*)	200	250	---	cd/m^2	I_{FL}=6.0mA(rms)
Lamp Life Time (MTTF)*3 *4		50,000			h	

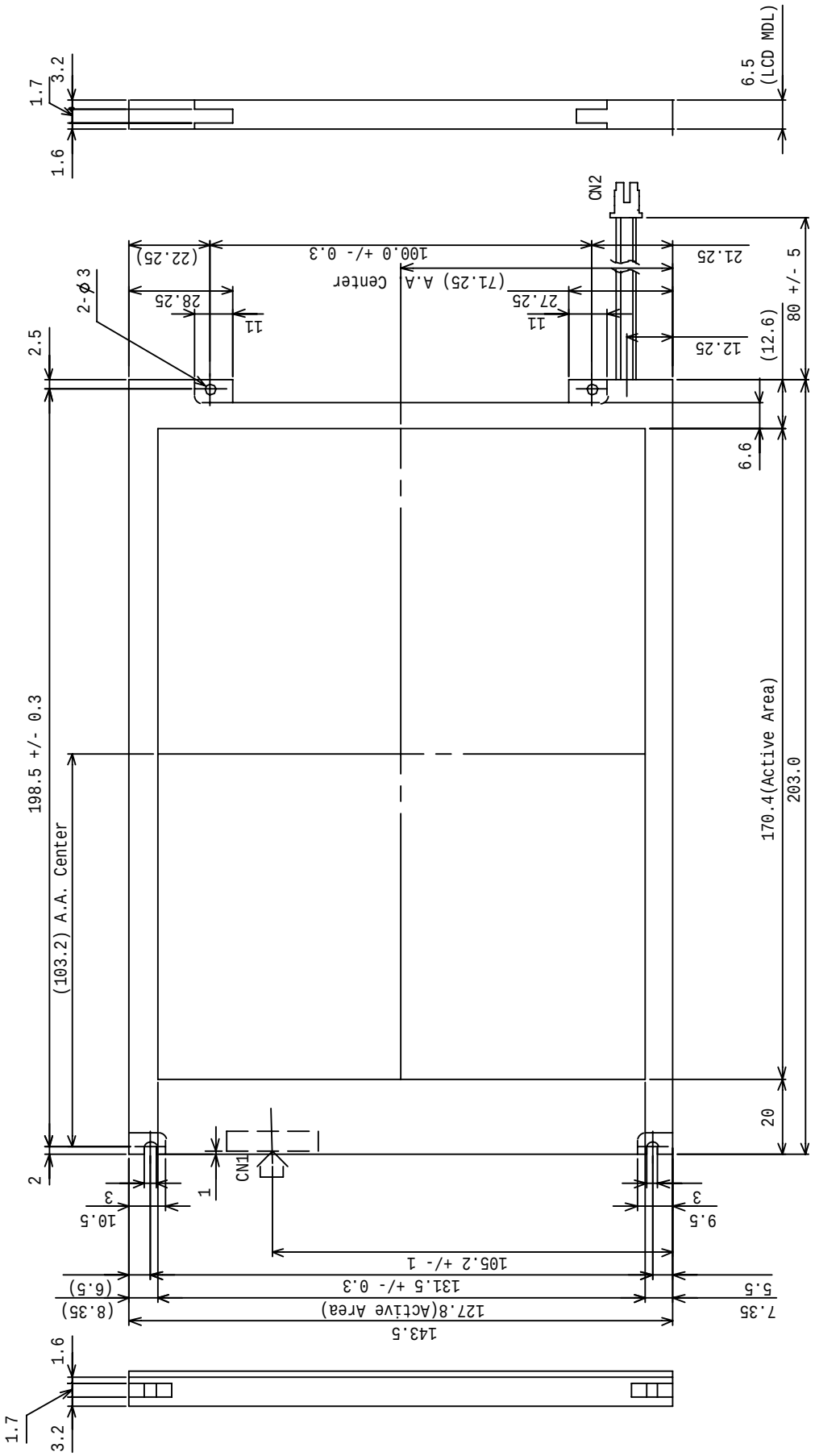
*3 : Conditions ;*T*a=25°C, I_{FL}=6.0mA(rms), continuous lighting

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

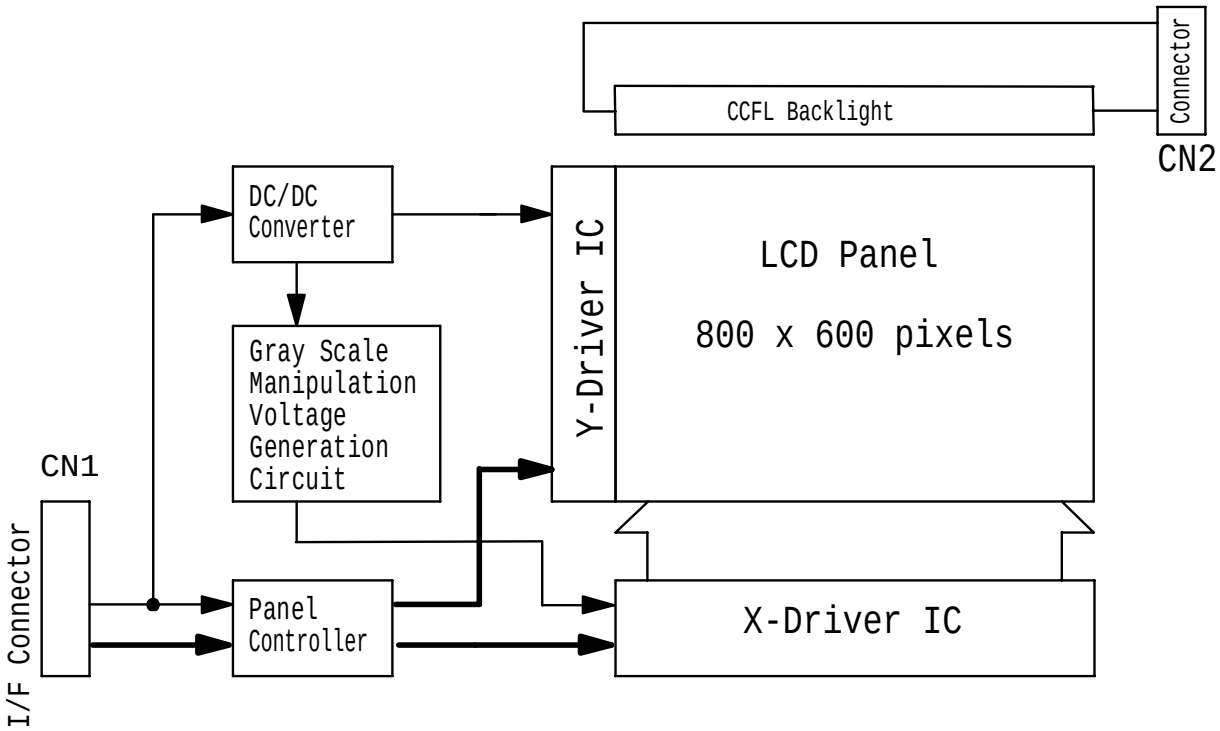
DIMENSIONAL OUTLINE (front figure)

Unit : mm

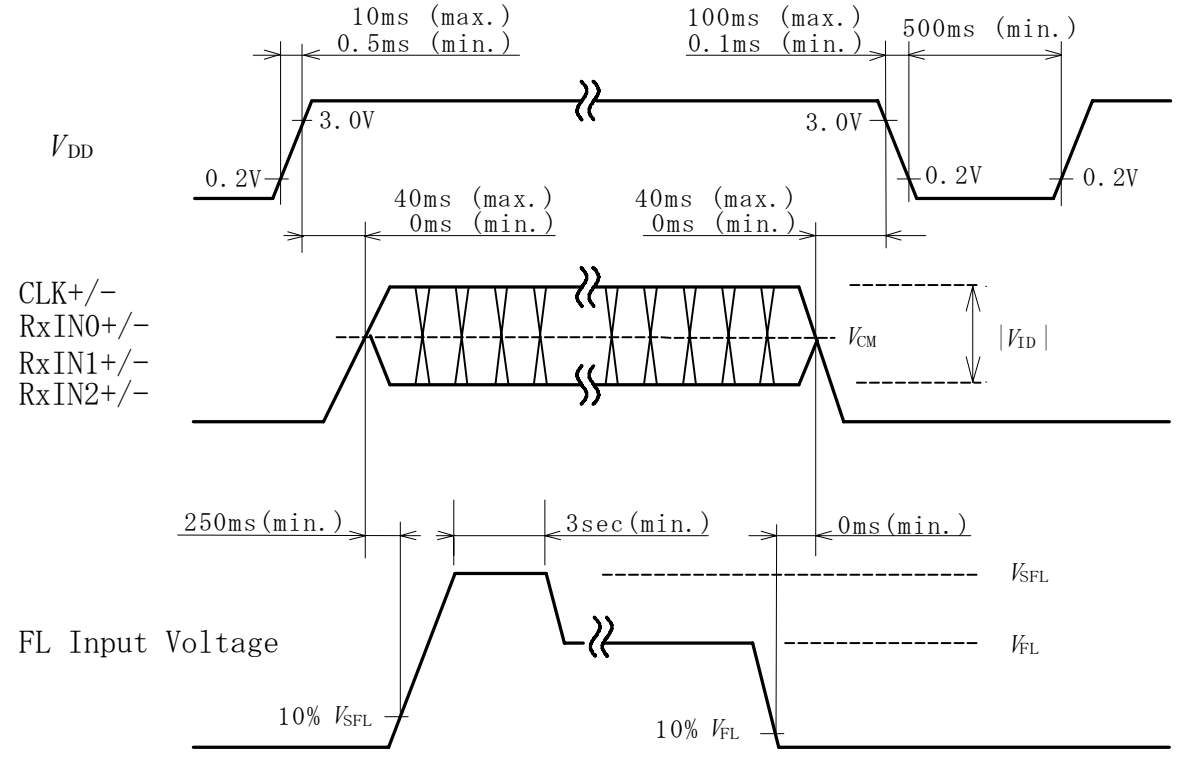
Standard tolerance : ±0.5



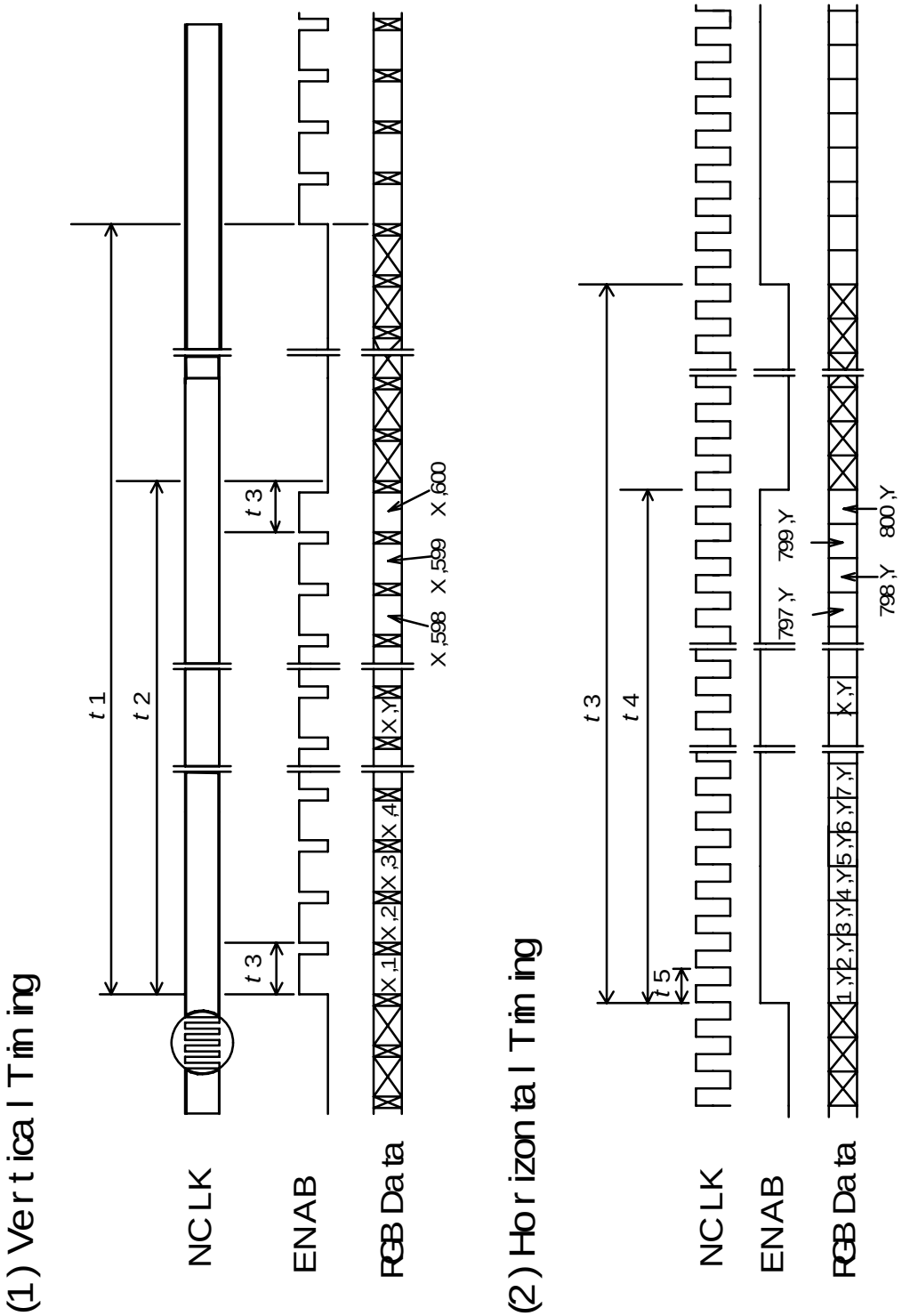
BLOCK DIAGRAM



SEQUENCE OF POWER SUPPLIES AND SIGNALS



TIMING CHART



TIMING SPECIFICATION [1) 2) 3) 4) 5) 6)]

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Frame Period	*t*1	604 x *t*3	628 x *t*3 16.66	677 x *t*3 17.78	--- ms	
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 26.2	1056 x *t*5 26.4	1064 x *t*5 26.6	--- μs	
Horizontal Display Term	*t*4	800 x *t*5	800 x *t*5	800 x *t*5	---	
Clock Period	*t*5	24.0	25.0	26.0	ns	

Note 1) Refer to “TIMING CHART” and LVDS (DC90C365) 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 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.

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 are 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 flame period.

CONNECTOR PIN ASSIGNMENT FOR INTERFACE

CN1 INPUT SIGNAL

Connector : 20268-020E-12F / I-PEX CO., LTD.

Mating Connector : 20230-020B-F or 20230-T20-F or 20230-W20B-F / I-PEX CO., LTD.

DF19G-20S-1F(FPC), DF19-2830SCFA(Crimp contact) / 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	RxIN0-	Negative LVDS differential data input (R0-R5, G0) [3)]
6	RxIN0+	Positive LVDS differential data input (R0-R5, G0) [3)]
7	GND [1)]	
8	RxIN1-	Negative LVDS differential data input (G1-G5, B0-B1) [3)]
9	RxIN1+	Positive LVDS differential data input (G1-G5, B0-B1) [3)]
10	GND [1)]	
11	RxIN2-	Negative LVDS differential data input (B2-B5, HS, VS, DE) [3)]
12	RxIN2+	Positive LVDS differential data input (B2-B5, HS, VS, DE) [3)]
13	GND [1)]	
14	CLK-	Clock Signal (-)
15	CLK+	Clock Signal (+)
16	GND [1)]	
17	U/D	Vertical Reverse("L" level or Open ; Normal, "H" level : Reverse)
18	L/R	Horizontal Reverse("L" level or Open ; Normal, "H" level : Reverse)
19	GND [1)]	GND(internal test pin) [2)]
20	GND [1)]	

Note 1) Please connect GND pin to ground. Don't use it as no-connect nor connection with high impedance.

Note 2) This pin is used our internal test. If input any noise, display noise may be occurred.

Note 3) Refer to next page.

CN2 CCFL POWER SOURCE

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

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

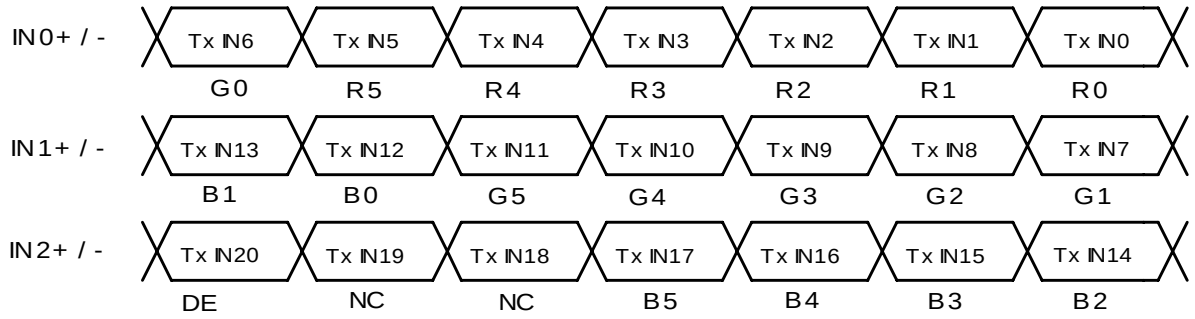
Terminal No.	Symbol	Function
1	*V*FLH	CCFL POWER SUPPLY (HIGH VOLTAGE)
2	*V*FLL	CCFL POWER SUPPLY (LOW VOLTAGE)

RECOMMENDED TRANSMITTER (DS90C365)TO LTA084C191F INTERFACE ASSIGNMENT

Case1: 6bit Transmitter

DS90C365					LTA084C191F Interface (CN1)	
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol		
Symbol	Terminal	Symbol	Function		Terminal	Symbol
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)			
TxIN7	6	G1	Green Pixels Display Data	TxOUT1- TxOUT1+	No.8 No.9	RxIN1- RxIN1+
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)			
TxIN13	15	B1	Blue Pixels Display Data			
TxIN14	16	B2	Blue Pixels Display Data	TxOUT2- TxOUT2+	No.11 No.12	RxIN2- RxIN2+
TxIN15	18	B3	Blue Pixels Display Data			
TxIN16	19	B4	Blue Pixels Display Data			
TxIN17	20	B5	Blue Pixels Display Data (MSB)			
TxIN18	22	NC [1)]	Non Connection (open)			
TxIN19	23	NC [1)]	Non Connection (open)			
TxIN20	25	DE	Compound Synchronization Signal			
TxCLK IN	26	NCLK	Data Sampling Clock	TxCLK OUT- TxCLK OUT+	No.14 No.15	CLK- CLK+

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

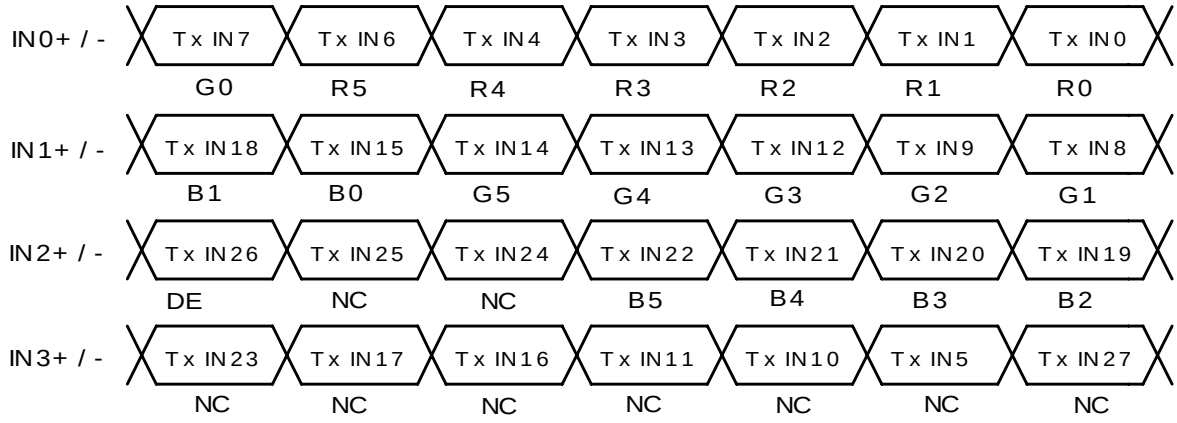


RECOMMENDED TRANSMITTER (DS90C385)TO LTA084C191F INTERFACE ASSIGNMENT

Case2: 8bit Transmitter

DS90C385					LTA084C191F Interface (CN1)	
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol		
Symbol	Terminal	Symbol	Function		Terminal	Symbol
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)			
TxIN8	6	G1	Green Pixels Display Data	TxOUT1- TxOUT1+	No.8 No.9	RxIN1- RxIN1+
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)			
TxIN18	19	B1	Blue Pixels Display Data			
TxIN19	20	B2	Blue Pixels Display Data	TxOUT2- TxOUT2+	No.11 No.12	RxIN2- RxIN2+
TxIN20	22	B3	Blue Pixels Display Data			
TxIN21	23	B4	Blue Pixels Display Data			
TxIN22	24	B5	Blue Pixels Display Data (MSB)			
TxIN24	27	NC [1)]	Non Connection (open)			
TxIN25	28	NC [1)]	Non Connection (open)			
TxIN26	30	DE	Compound Synchronization Signal			
TxIN27	50	NC [1)]	Non Connection (open)	TxOUT3- TxOUT3+		
TxIN5	2	NC [1)]	Non Connection (open)			
TxIN10	8	NC [1)]	Non Connection (open)			
TxIN11	10	NC [1)]	Non Connection (open)			
TxIN16	16	NC [1)]	Non Connection (open)			
TxIN17	18	NC [1)]	Non Connection (open)			
TXIN23	25	NC [1)]	Non Connection (open)			
TxCLK IN	31	NCLK	Data Sampling Clock	TxCLK OUT- TxCLK OUT+	No.14 No.15	CLK- CLK+

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	---
	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.